BAY AREA AIR QUALITY MANAGEMENT DISTRICT

## METEOROLOGY, MEASUREMENT AND RULES DIVISION

# 2016 AIR MONITORING NETWORK PLAN

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# Definition of Terms

1:1 ..... Particulate or toxic sample schedule that is taken every day
1:3 ..... Particulate or toxic sample schedule that is taken every 3rd day
1:6 ..... Particulate or toxic sample schedule that is taken every 6th day
1:12 ..... Particulate or toxic sample schedule that is taken every 12th day
AADT ..... Annual Average Daily Traffic
AGL ..... Above Ground Level
APCD ..... Air Pollution Control District
AQMD ..... Air Quality Management District
AQS ..... Air Quality System; the EPA national air quality database
ARM ..... Approved Regional Method
Air District ..... Bay Area Air Quality Management District
BAM ..... Beta Attenuation Monitor, a type of continuous $PM_{2.5}$ monitor
BAAQMD ..... Bay Area Air Quality Management District
BC ..... Black Carbon
CARB ..... California Air Resources Board
CBSA ..... Core Based Statistical Area
CDP ..... Census Designated Place
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
$CH_4$ ..... Methane
CSN ..... Chemical Speciation Network
DOT ..... Department of Transportation
DRI ..... Desert Research Institute
EPA ..... U.S. Environmental Protection Agency
FE-AADT ..... Fleet Equivalent Annual Average Daily Traffic
FEM ..... Federal Equivalent Method
FRM ..... Federal Reference Method
GC ..... Gas Chromatograph
GCMS ..... Gas Chromatograph Mass Spectrometer
GPS ..... Geographic Positioning System
HiVol ..... High Volume
HPLC ..... High Performance Liquid Chromatograph
$H_2S$ ..... Hydrogen Sulfide
ICPMS ..... Inductively Coupled Plasma Mass Spectrometry
IMPROVE ..... Interagency Monitoring of Protected Visual Environments
Maintenance Plan .... A Plan submitted by states to EPA that outlines how the NAAQS will be maintained for a particular region.

# Definition of Terms (continued)

MBUAPCD..... Monterey Bay Unified Air Pollution Control District
NAAQS ..... National Ambient Air Quality Standard
NATTS ..... National Air Toxics Trends Station
NCore ..... National Core (Monitoring Program)
NEI ..... National Emissions Inventory
NMHC ..... Non-methane Hydrocarbons
NO ..... Nitric Oxide
$NO_2$ ..... Nitrogen Dioxide
$NO_x$ ..... Oxides of Nitrogen
$NO_y$ ..... Total Reactive Nitrogen
NSR ..... New Source Review
$O_3$ ..... Ozone
PAMS ..... Photochemical Assessment Monitoring Stations
Pb ..... Lead
PPB ..... Parts per billion
PM ..... Particulate Matter
$PM_{2.5}$ ..... Particulates less than or equal to 2.5 microns in size
$PM_{2.5F}$ ..... $PM_{2.5}$ measured using a filter-based sampler
$PM_{2.5C}$ ..... $PM_{2.5}$ measured using a continuous monitor
$PM_{10}$ ..... Particulates less than or equal to 10 microns in size
$PM_{10C}$ ..... $PM_{10}$ measured using a continuous monitor
$PM_{10-2.5}$ ..... PM Coarse – PM less than or equal to 10 microns and greater than 2.5 microns in size
POC ..... Parameter Occurrence Code
PWEI ..... Population Weighted Emissions Index
SIP ..... State Implementation Plan – A Plan submitted by states to EPA that outlines how the NAAQS will be met for a particular region
SLAMS ..... State or Local Air Monitoring Station
$SO_2$ ..... Sulfur Dioxide
SPM ..... Special Purpose Monitor
STN ..... Speciation Trends Network
TAMS ..... Total Atmospheric Mercury
TSP ..... Total Suspended Particulate
UFP ..... Ultrafine Particulate less than or equal to 0.1 microns
VOC ..... Volatile Organic Compound

# 1. INTRODUCTION

This annual network plan for the Bay Area Air Quality Management District summarizes the air monitoring activities between January 1, 2016, and December 31, 2016. The detailed information about the instruments used at each air monitoring site pertains to the status as of December 31, 2016. There are also siting and local area descriptions for monitoring sites that operated in 2016 and for those that opened, or were planned to open, between January 1 and June 30, 2017.

# 2. OVERVIEW OF NETWORK OPERATION

## 2.1 Network Design

The Bay Area Air Quality Management District (Air District) is the public agency responsible for air quality management in the nine Bay Area counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma. The Air District operates air monitoring stations in each of these nine counties. The Air District began measuring air quality in the San Francisco Bay Area in 1957. In 2016 there were 32 air monitoring stations in operation within the Air District.

The Air District also performs air monitoring as part of other programs. These include programs that the Air District has initiated, such as meteorological monitoring and the ambient toxics program, and programs required by the EPA. EPA programs currently include the National Air Toxics Trends Stations (NATTS) program, the National Core (NCore) program, the Photochemical Assessment Monitoring Stations (PAMS) program, and the $PM_{2.5}$ Chemical Speciation Network (CSN). Summaries of these programs can be found later in this report.

The San Francisco Bay Area contains more than 100 cities. Although resources do not allow for placement of air pollution monitors in every city, it can be demonstrated that air pollution levels, in the absence of significant local sources, are similar within each geographical region of the Bay Area. That is, cities within each of the major valleys of the Bay Area can have similar air quality levels. Consequently, a few sites can characterize an area. Generally, locations for permanent air monitoring sites are initially based on knowledge of population density, local wind patterns, topography, and sources of air emissions, while the final site selection is determined after analyzing preliminary air quality measurements collected from field studies, temporary monitoring studies, mobile monitoring data, and air quality modeling.

The monitoring objectives of the Air District's air monitoring network are:

- To provide air pollution data to the public in a timely manner.

- To support compliance with California and national ambient air quality standards. When sites do not meet the standards, attainment plans are developed to attain the standards.
- To support air pollution research studies.

To meet its monitoring objectives, the Air District collects ambient air data at locations with a variety of monitoring site types. These site types, as defined in 40 CFR Part 58, Appendix D, are listed below.

Highest concentration: Sites expected to have the highest concentration, even if populations are sparse in that area. High concentrations may be found close to major sources, or further downwind if pollutants are emitted from tall stacks. High concentrations also may be found at distant downwind locations when the pollutants such as ozone or secondary particulate matter are a result of chemical reactions in the atmosphere.

Population oriented: Sites established in areas with high population density to evaluate exposure to air pollution. In most cases, stations are located within the largest cities in each county. Because people spend more time at home than at work, air monitoring sites are generally located in residential areas rather than at downtown locations.

Source impact: Sites in areas downwind of potential major sources of pollutants. In the Bay Area, there are five refineries that are potential pollutant sources: Chevron, Shell, Tesoro, Phillips 66, and Valero. The Port of Oakland also can be a significant source of particulates, CO, and toxics. General aviation airports can be sources of lead because piston engine aircraft continue to use leaded fuel.

Upwind background: Sites in areas that have no significant emissions from mobile, area, or industrial sources. At these sites, the measured concentrations reflect the transported air quality levels from upwind areas.

General background: Where there are no significant emission sources upwind of a site, then the site is considered to be a general background site.

Regional transport: The Air District shares a common boundary with six other air districts: Monterey Bay Unified APCD, San Joaquin Valley APCD, Sacramento Metropolitan AQMD, Yolo-Solano AQMD, Lake County AQMD, and Northern Sonoma County APCD. When upwind areas have significant air pollution sources, pollutants may be transported into the Bay Area Air District and result in overall higher air pollution levels in the Bay Area. The Air District operates monitoring stations near the borders of

the Air District to measure the air pollution concentrations transported into and out of the Bay Area Air District.

Welfare-related impacts: Sites located to measure impacts on visibility, vegetative damage, or other welfare-based impacts.

Each site type is associated with a spatial scale. For example, a regional transport site is meant to represent air quality levels over a large area, while a highest concentration site may represent a spatial scale of no more than a few blocks in size. Spatial scales are defined in 40 CFR Part 58, Appendix D. They are: micro scale, having dimensions of several meters up to 100 m; middle scale, having dimensions of 100 m to 0.5 km; neighborhood scale, having dimensions of 0.5 km to 4.0 km; urban scale, having dimensions of 4 to 50 km; and regional scale, having dimensions of up to hundreds of km. Table 2-1 lists the appropriate scales for each site type.

Table 2-1. SLAMS Site Types and Appropriate Spatial Scales

| Site Type | Appropriate Spatial Scale |
|---|---|
| Highest Concentration | Micro, middle, neighborhood |
| Population Oriented | Neighborhood, urban |
| Source Oriented | Micro, middle, neighborhood |
| General Background | Urban, regional |
| Regional Transport | Urban, regional |

The spatial scale of a monitor must conform to established criteria for the distance from roadways, based on traffic volumes. There are different distance requirements for each pollutant, which can be found in 40 CFR Part 58, Appendix E. Table 2-2 lists the stations and the pollutants measured at each site and Figure 2-1 is a map of the monitoring sites in 2016.

Table 2-2. List of Monitoring Stations within the Air District in 2016

| Site No. | Station Name | Pollutants Monitored[1] |
|---|---|---|
| 1 | Bethel Island | $O_3$, $NO_x$, $SO_2$, CO, $PM_{10}$, Toxics |
| 2 | Berkeley Aquatic Park (near-road) | $O_3$, $NO_x$, CO, $PM_{2.5C,}$ Toxics, BC, UFP |
| 3 | Concord | $O_3$, $NO_x$, $SO_2$, CO, $PM_{10}$, $PM_{2.5C}$, Toxics |
| 4 | Crockett | $SO_2$, Toxics |
| 5 | Fairfield | $O_3$ |
| 6 | Forest Knolls | BC |
| 7 | Fort Cronkhite | Toxics |
| 8 | Gilroy | $O_3$, $PM_{2.5C}$ |
| 9 | Hayward | $O_3$ |
| 10 | Laney College (near-road) | $NO_x$, CO, $PM_{2.5C,}$ Toxics, BC, UFP |
| 11 | Livermore | $O_3$, $NO_x$, $PM_{2.5C}$, Speciated $PM_{2.5}$, Toxics, BC, UFP |
| 12 | Los Gatos | $O_3$ |
| 13 | Martinez | $SO_2$, Toxics |
| 14 | Napa | $O_3$, $NO_x$, CO, $PM_{10}$, $PM_{2.5C}$, Toxics |
| 15 | Napa Valley College | $O_3$, $NO_x$, CO, $PM_{10}$, $PM_{2.5C}$, Toxics [not operational in 2016] |
| 16 | Oakland | $O_3$, $NO_x$, $CO_,$ $PM_{2.5C}$, Toxics |
| 17 | Oakland West | $O_3$, $NO_x$, $SO_2$, CO, $PM_{2.5C,}$ Speciated $PM_{2.5}$, Toxics, BC |
| 18 | Palo Alto Airport | Lead (TSP) [not operational in 2016] |

| Site No. | Station Name | Pollutants Monitored[1] |
|---|---|---|
| 19 | Patterson Pass | $NO_x$, $O_3$ |
| 20 | Pittsburg – Loveridge | Toxics, BC |
| 21 | Pleasanton – Owens Court | $NO_x$, CO, $PM_{2.5}$ |
| 22 | Point Richmond | $H_2S$ |
| 23 | Redwood City | $O_3$, $NO_x$, CO, $PM_{2.5C}$, Toxics, UFP |
| 24 | Reid-Hillview Airport | Lead (TSP) |
| 25 | Richmond 7th | $SO_2$, $H_2S$, Toxics |
| 26 | Rodeo | $H_2S$ |
| 27 | San Carlos Airport II | Lead (TSP) |
| 28 | San Francisco | $O_3$, $NO_x$, CO, $PM_{10}$, $PM_{2.5C}$, Toxics |
| 29 | San Jose – Jackson | $O_3$, $NO_x$, $NO_y$, $SO_2$, CO, $PM_{10}$, $PM_{2.5F}$, $PM_{2.5C}$, Speciated $PM_{2.5}$, Toxics, Lead ($PM_{10}$) |
| 30 | San Jose – Knox (near-road) | $NO_x$, CO, $PM_{2.5C}$, Toxics, BC, UFP |
| 31 | San Martin | $O_3$ |
| 32 | San Pablo | $O_3$, $NO_x$, $SO_2$, CO, $PM_{10}$, $PM_{2.5\ C}$, Toxics, UFP |
| 33 | San Rafael | $O_3$, $NO_x$, CO, $PM_{10}$, $PM_{2.5C}$, Toxics |
| 34 | San Ramon | $O_3$, $NO_x$ |
| 35 | Sebastopol | $O_3$, $NO_x$, CO, $PM_{2.5C}$, Toxics, UFP |
| 36 | Vallejo | $O_3$, $NO_x$, $SO_2$, CO, $PM_{2.5C}$, Speciated $PM_{2.5}$, Toxics |

[1] See pages 9 and 10 for acronym definitions.

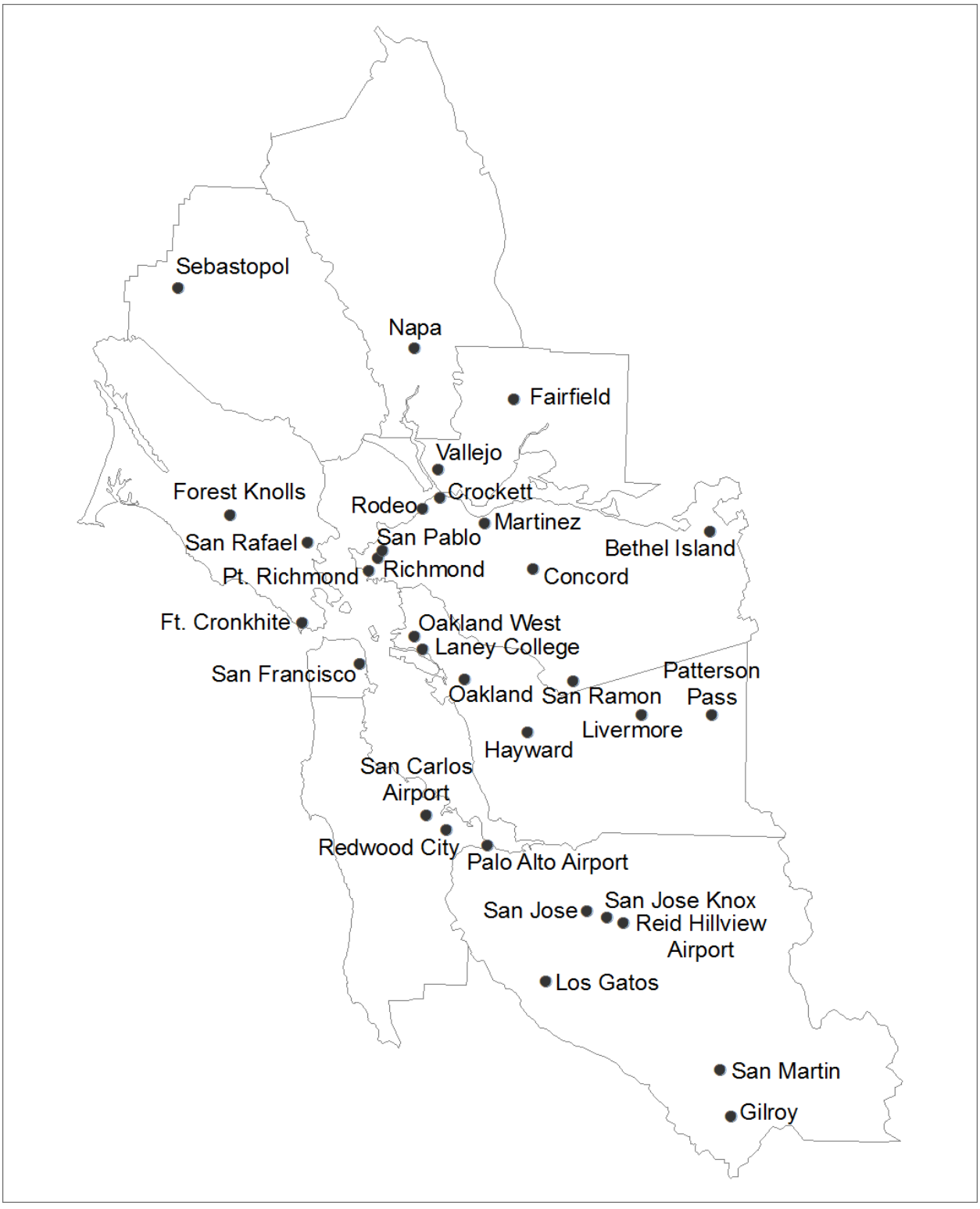



Figure 2-1. Map of Bay Area SLAMS and SPM Sites in 2016

## 2.2 Minimum Monitoring Requirements

The Air District met or exceeded all minimum monitoring requirements for most criteria pollutants in 2016. The two instances for which the Air District did not meet minimum monitoring requirements were due to circumstances beyond the Agency's control. These cases (near-road $NO_2$ and airport Pb), and the Air District's ongoing efforts to resolve them, are discussed in the $NO_2$ and Pb portions of this section.

The Air District does not expect to request that EPA exclude from regulatory determinations any 2014-2016 data affected by exceptional events. Therefore, design values listed in the tables of this section have not been adjusted to remove data affected by exceptional events. In the Bay Area the most common type of exceptional events that could contribute to NAAQS exceedances are wildfires.

EPA minimum monitoring requirements are not based on the Air District boundary. Instead, they are based on Core Based Statistical Areas (CBSAs) or Metropolitan Statistical Areas (MSAs) which are CBSAs with populations greater than 50,000. All the CBSAs in the Air District jurisdiction have populations above 50,000, so the names and boundaries of the CBSAs and MSAs are identical. Because some CBSAs include multiple Air Districts, some monitors listed in the tables below are counted toward the minimum monitoring requirements even though the monitor is located in another Air District. CBSA boundaries for the Bay Area are shown in Figure 2-2.

These minimum monitoring requirements are determined by evaluating certain data for the CBSA. For population data, these are required to be based on the latest available census for $O_3$, $PM_{2.5}$, and $NO_2$. $SO_2$ allows for population data to be based on either a census or population estimates, and CO and $PM_{10}$ requirements do not specify the data source. To use consistent populations for the CBSAs/MSAs within the Air District, the minimum monitoring requirements discussed below are based on the 2010 U.S. Census. The Air District does consider population estimates in our longer-term monitoring network planning, which is summarized in our Five-Year Network Assessments. Table 2-3 below lists the 2010 census populations as well as 2015 estimated populations for each CBSA. While 2010 Census populations are used to determine official requirements, the population estimates are used to evaluate potential future changes to these requirements, which are noted, as applicable.

Many minimum monitoring requirements are based on air quality data. The information for the highest site in a CBSA/MSA is given in the tables below and is based on 2014-2016 data. For a more complete overview of the air quality measured at the Air District sites including 2016 design values at all sites, please see the Annual Bay Area Air

Quality Summary reports, posted online at http://www.baaqmd.gov/about-air-quality/air-quality-summaries.

Table 2-3. 2010 Census Population and 2015 Population Estimates for Bay Area CBSAs

| CBSA | Census Population April 1, 2010 | Population Estimate (July 1, 2015) |
|---|---|---|
| San Francisco-Oakland-Hayward | 4,335,391 | 4,656,132 |
| San Jose-Sunnyvale-Santa Clara | 1,836,911 | 1,976,836 |
| Santa Rosa | 483,878 | 502,146 |
| Vallejo-Fairfield | 413,344 | 436,092 |
| Napa | 136,484 | 142,456 |

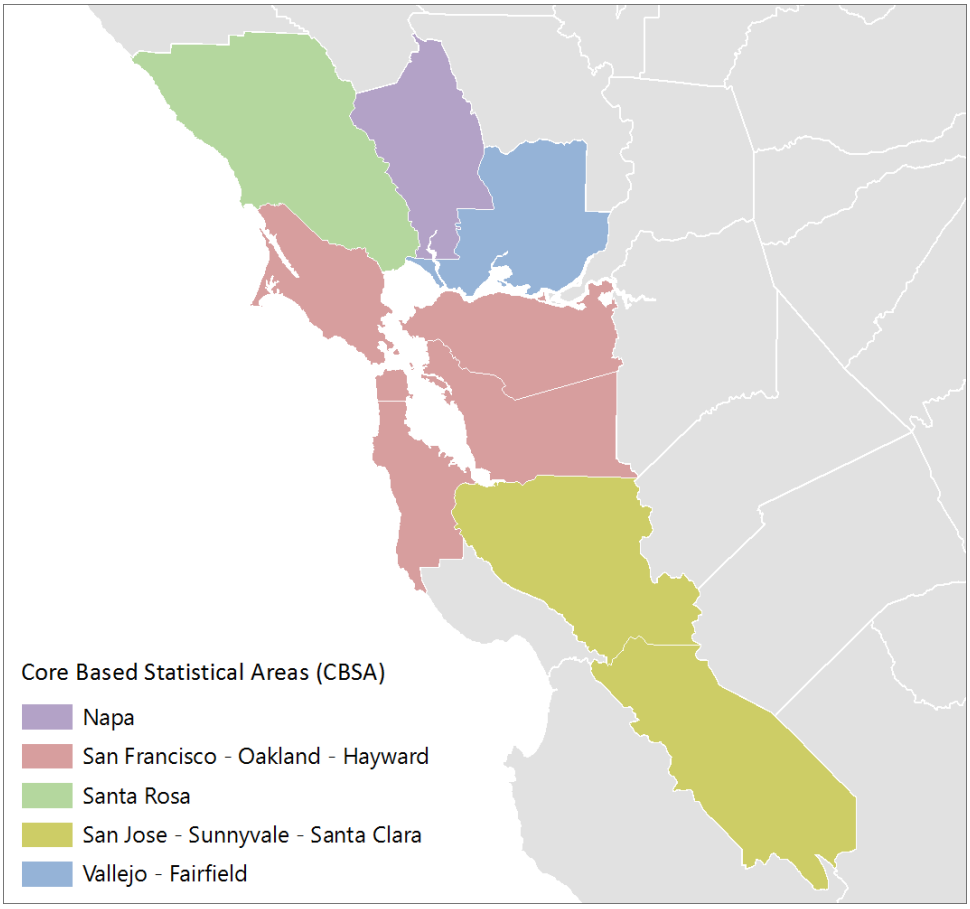



Figure 2-2. Core Based Statistical Areas (CBSA) for the San Francisco Bay Area

**Monitoring Agreements with Yolo/Solano AQMD and Northern Sonoma APCD**

The Bay Area network meets all minimum monitoring requirements for all criteria pollutants in the Santa Rosa CBSA and the Vallejo–Fairfield CBSA. Therefore, no interagency agreements are needed with these monitoring agencies.

**Monitoring Agreements with Monterey Bay Unified APCD**

The Bay Area and Monterey Air Districts share minimum monitoring requirements for the San Jose–Sunnyvale–Santa Clara CBSA. This CBSA includes Santa Clara County (Bay Area) and San Benito County (Monterey). Shared pollutant monitoring agreements include $O_3$, $PM_{2.5}$, $PM_{10}$, and near-road $NO_2$, CO, and $PM_{2.5}$. Within its own network, the Bay Area Air District meets minimum monitoring requirements for $O_3$, $PM_{2.5}$, and near-road $NO_2$, CO, and $PM_{2.5}$. $PM_{10}$ is the only pollutant that the Bay Area does not meet the minimum requirements on its own, and therefore has a monitoring agreement with Monterey Bay for $PM_{10}$. Monterey Bay needs agreements for $O_3$, $PM_{2.5}$, and near-road $NO_2$, CO, and $PM_{2.5}$ monitoring. Existing agreements are in Appendix A ($O_3$), Appendix B ($PM_{10}$), Appendix C ($NO_2$), and Appendix D (near-road CO, $NO_2$, and $PM_{2.5}$).

### 2.2.1 Minimum Monitoring Requirements for Ozone

The number of required ozone ($O_3$) monitors in each MSA is determined by the MSA population and design value, as specified in Table D-2 of 40 CFR Part 58, Appendix D. $O_3$ design values are calculated for each site according to 40 CFR Part 50, Appendix I and are compared to the National Ambient Air Quality Standard (NAAQS) to determine the attainment status of an area.

Table 2-4 shows that the Air District monitoring network meets or exceeds the $O_3$ minimum monitoring requirements. Therefore, no monitoring agreement is needed between the Bay Area Air Quality Management District and any other Air District to comply with the minimum monitoring requirement for ozone.

The Bay Area was designated nonattainment for both the 1997 and the 2008 8-hour $O_3$ NAAQS, with area classifications of "marginal". Updated design values based on the last three years of data (2014-2016) show that ozone concentrations are now in attainment of both these NAAQS; however, the Bay Area will continue to be designated as nonattainment until the Air District submits a redesignation request and a maintenance plan to the EPA and the EPA approves the redesignation and maintenance plan. No additional monitors are required in the State Implementation Plan (SIP) or Maintenance Plan for ozone.

On December 28, 2015, EPA's final 2015 8-hour $O_3$ NAAQS, at a level of 0.070 ppm, became effective. Although this action revoked prior $O_3$ standards, the 2008 NAAQS remains in effect in the Bay Area since we are currently designated nonattainment for that standard. EPA expects to address the revocation of the previous (2008) $O_3$ standards and transitioning to the current (2015) standards in the implementation rule for the 2015 $O_3$ NAAQS. The state of California is required to submit initial area designation recommendations for areas throughout the state by October 1, 2016. EPA is then expected to conclude mandatory designations based on the 2015 $O_3$ by October 2017[1].

A map of ozone monitoring locations in the San Francisco Bay Area for 2016 is shown in Figure 2-3.

Table 2-4. Minimum Monitoring Requirements for Ozone

| MSA | County or Counties | Pop. 2010 Census | 8-hour Design Value[a] (ppb) 2016 | Design Value Site & AQS ID | Required SLAMS Sites | Active SLAMS Sites | Additional SLAMS Sites Needed |
|---|---|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, Marin, Alameda, San Mateo, Contra Costa | 4,335,391 | 74 | Livermore 060010007 | 3 | 7 | 0 |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 70 | San Martin 060852006 | 2 | 6[b] | 0 |
| Santa Rosa | Sonoma | 483,878 | 58 | Healdsburg 060971003 | 1 | 2[c] | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 67 | Vacaville 060953003 | 2 | 3[d] | 0 |
| Napa | Napa | 136,484 | 62[e] | Napa 060550003 | 1[e] | 1 | 0 |

a Design values are calculated at each monitoring site by taking the 3-year mean (2014-2016) of the 4th highest 8-hour concentration. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below the 0.070 ppm meet the 8-Hour $O_3$ NAAQS.

b Two of the six monitors are not in the BAAQMD. They are in Hollister and Pinnacles National Park which are in the Monterey Bay Unified APCD. The Pinnacles monitor is part of the CASTNET program and was designated SLAMS in 2010 by the EPA.

[1] See the EPA webpage https://www.epa.gov/ozone-pollution/applying-or-implementing-ozone-standards for additional information.

c One of the two monitors is not in the BAAQMD. It is in Healdsburg which is in the Northern Sonoma County APCD

d One of the three monitors is not in the BAAQMD. It is in Vacaville which is in the Yolo-Solano AQMD.

e EPA Region 9 analysis of this site showed that the design value would increase by 2 ppb if this site was located at a neighborhood scale instead of middle scale site. However, the required number of SLAMS monitors would be unchanged (one) for the Napa MSA.

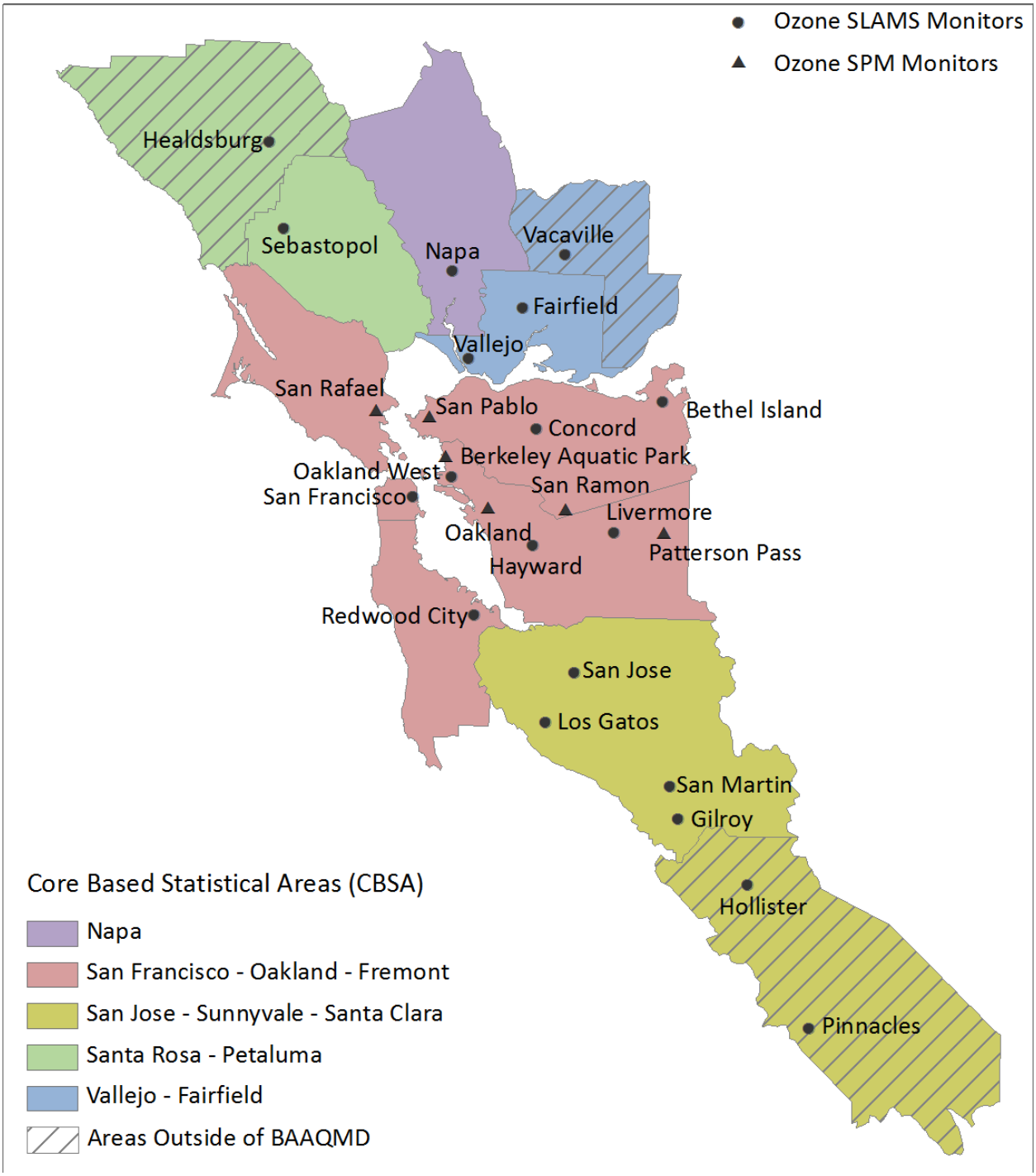



Figure 2-3. Ozone Monitoring in the San Francisco Bay Area in 2016

## Ozone Monitoring Season Waivers and Waiver Request

From January through March 2016, and in December 2016, the following six sites did not measure ozone: Fairfield, Gilroy, Hayward, Los Gatos, San Martin, and San Ramon. Monitoring waiver requests and EPA's approvals, in accordance with 40 CFR 58, Appendix D §4.1, are in Appendix E. A waiver was not required to discontinue ozone monitoring at San Ramon because it is a Special Purpose Monitor (SPM). However, the Air District included San Ramon in its waiver request for transparency and completeness.

## Napa Ozone Spatial Scale, Waiver Request

The Napa ozone monitor is classified as middle scale based on the nearby traffic count and distance between the monitor and the roadway (per 40 CFR Part 58). An Air District analysis concluded that recorded $O_3$ concentrations at Napa are not appreciably affected by $NO_2$ emissions from the nearest roadway. Subsequently, the Air District applied for a waiver from EPA Region 9 for this monitor to count toward the requirement for a maximum concentration $O_3$ site in the Napa MSA despite not meeting the roadway distance requirement for a neighborhood scale site.

In response to this request, EPA used a conservative approach to estimate how much ozone measured at the Napa site is decreased due to $NO_2$ emitted from nearby roadways. Based on this analysis, EPA concluded that the Napa ozone design value would increase by 2 ppb if the monitor were far enough away from the roadway to meet EPA siting criteria. Therefore, EPA Region 9 granted the waiver and stated that the waiver was automatically extended each year with the demonstration that the design value is not within 5 ppb of any applicable NAAQS. The BAAQMD hereby requests a renewal of the originally granted April 2013 40 CFR Part 58 Appendix E spacing from roadway siting waiver for the Napa ozone monitor, based on a 2014-2016 design value of 62 ppb.

### 2.2.2 Minimum Monitoring Requirements for $PM_{2.5}$

The number of required $PM_{2.5}$ monitors in each MSA is determined by the MSA population and design value, as specified in Table D-5 of Appendix D to 40 CFR Part 58. All SLAMS $PM_{2.5}$ and continuous SLAMS $PM_{2.5}$ monitoring locations are shown in Figure 2-4. Table 2-5 shows that the $PM_{2.5}$ minimum requirements for SLAMS monitoring were met in 2016. In 2016, every $PM_{2.5}$ monitor in the network was a Federal Reference Method (FRM) or Federal Equivalent Method (FEM), and the primary monitor at every site was a continuous FEM. While the near-road sites at Oakland-Laney College, Berkeley Aquatic Park, and San Jose-Knox are considered micro-scale because of their distance to roadways, they are considered area-wide sites since they represent many similar locations throughout their MSAs (see 40 CFR Part 58, Appendix D §4.7.1(b)).

The BAAQMD does not need any monitoring agreements with the Monterey Bay Unified ACPD for $PM_{2.5}$ because the Bay Area meets the requirements with its own network. Additionally, there are no monitoring agreements with the Northern Sonoma County APCD because the Santa Rosa MSA is not required to have any $PM_{2.5}$ monitors. There are no monitoring agreements with the Yolo-Solano AQMD because the Vallejo – Fairfield MSA is not required to have any $PM_{2.5}$ monitors. No additional monitors are required for the State Implementation Plan or Maintenance Plans.

In addition to the requirement for a minimum number of $PM_{2.5}$ SLAMS, EPA requires that a certain number of sites operate continuous $PM_{2.5}$ monitors (40 CFR Part 58, Appendix D §4.7.2). Currently, all the primary $PM_{2.5}$ monitors in the Air District network are continuous FEMs. Therefore, the requirement to operate continuous $PM_{2.5}$ monitors equal to at least one-half (rounding up) the number of $PM_{2.5}$ SLAMS monitors is met if the requirement described below for the minimum number of SLAMS is met.

The $PM_{2.5}$ network design requirement for the minimum number of near-road $PM_{2.5}$ monitors in the PQAO (40 CFR Part 58, Appendix D §4.7.1(b)(2)) and the QA requirements for the collocation of $PM_{2.5}$ monitors (40 CFR Part 58, Appendix A §3.2.5) are discussed below.

**State Implementation Plan (SIP) Requirements**

EPA designated the Bay Area as nonattainment of the 2006 24-hour $PM_{2.5}$ NAAQS on October 8, 2009. The effective date of the designation was December 14, 2009, and the Air District had three years to develop a State Implementation Plan (SIP) to demonstrate that the Bay Area will achieve the revised standard by the attainment date of December 14, 2014. However, in October 2012, EPA proposed to suspend some of the SIP requirements after making a Clean Data Determination, as described below.

**Clean Data Determination by U.S. EPA**

On January 9, 2013, EPA issued a final rule determining that the Bay Area is attaining the 2006 24-hour $PM_{2.5}$ NAAQS, suspending key SIP requirements as long as monitoring data continues to show that the Bay Area attains the $PM_{2.5}$ standard.

Although most SIP requirements are suspended, the Bay Area was still required to prepare and submit an abbreviated SIP to address the required elements, including:

- An emission inventory for primary $PM_{2.5}$, as well as precursor pollutants that contribute to formation of secondary PM; and
- Amendments to the Air District's New Source Review (NSR) to address $PM_{2.5}$ (as well as other revisions). Amendments to the NSR were adopted by the Air District's Board of Directors on December 19, 2012.

The Bay Area will continue to be designated as nonattainment for the 2006 24-hour $PM_{2.5}$ NAAQS until the Air District elects to submit and EPA approves a redesignation request and a maintenance plan.

On December 18, 2014, EPA designated the Bay Area as unclassifiable/attainment for the 2012 Annual $PM_{2.5}$ NAAQS. Areas designated as unclassifiable/attainment are not required to submit a SIP.

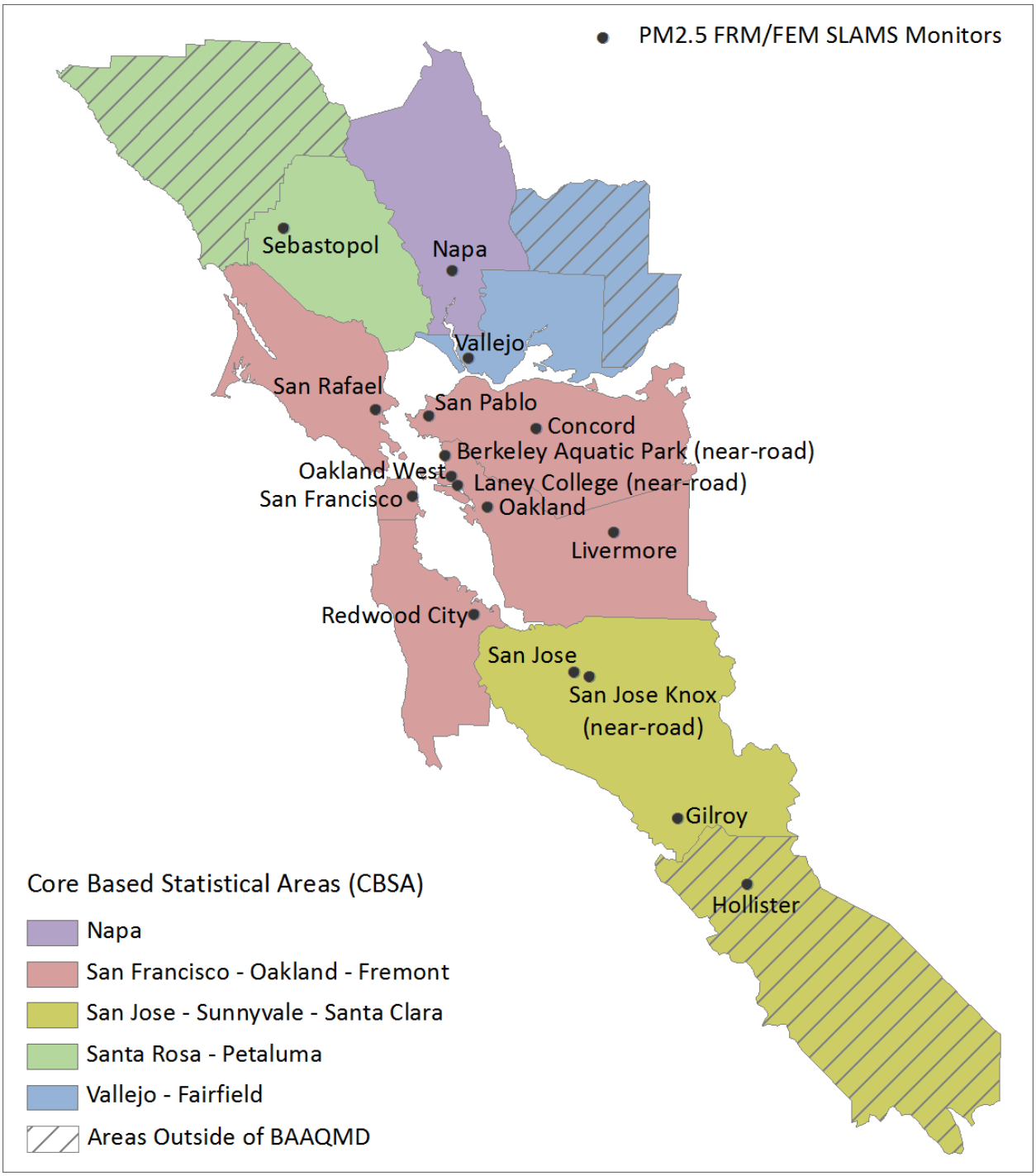



Figure 2-4. SLAMS $PM_{2.5}$ Monitoring in the San Francisco Bay Area in 2016

Table 2-5. Minimum Monitoring Requirements for FRM/FEM $PM_{2.5}$ SLAMS in 2016

| MSA | County or Counties | Pop. 2010 Census | Annual Design Value[a] ($\mu g/m^3$) 2014-16 | Annual Design Value Site & AQS ID | Daily Design Value[b] ($\mu g/m^3$) 2014-16 | Daily Design Value site & AQS ID | Required SLAMS Sites | Active SLAMS Sites | Additional SLAMS Sites Needed |
|---|---|---|---|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, San Mateo, Alameda, Marin, Contra Costa | 4,335,391 | 9.5 | Oakland West 060010011 | 25 | Oakland West 060010011 | 2 | 10[c] | 0 |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 8.9 | San Jose 060850005 | 24 | San Jose 060850005 | 2 | 4[d] | 0 |
| Santa Rosa | Sonoma | 483,878 | 6.4 | Sebastopol 060970004 | 18 | Sebastopol 060970004 | 0 | 1 | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 8.9 | Vallejo 060950004 | 25 | Vallejo 060950004 | 0 | 1 | 0 |
| Napa | Napa | 136,484 | 10.4 | Napa 060550003 | 25 | Napa 060550003 | 1 | 1 | 0 |

a Annual design values are calculated at each monitoring site by taking the 3-year mean (2014-2016) of the annual averages for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below 12.0 $\mu g/m^3$ indicate the area meets the 2012 Annual $PM_{2.5}$ NAAQS.

b Daily design values are calculated by taking the 3-year mean (2014-2016) of the 98$^{th}$ percentiles for each site. The design values shown for each MSA in this table are the highest design value of monitors in the MSA. Design values at or below 35 $\mu g/m^3$ indicate the area meets the 2006 24-hour $PM_{2.5}$ NAAQS.

c Two of the ten monitors, Oakland – Laney College and Berkeley Aquatic Park, are near-road and classified as micro-scale sites. Because there are many similar micro-scale locations affected by roadways throughout the MSA, Oakland – Laney College and Berkeley Aquatic Park are considered area-wide sites and can be counted toward meeting the area-wide requirement.

d One of the four monitors, San Jose – Knox, is near-road and classified as a micro-scale site. Because there are many similar micro-scale locations affected by roadways throughout the MSA, San Jose – Knox is considered an area-wide site and can be counted toward meeting the area-wide requirement. Additionally, one of the four monitors is not in the BAAQMD. It is in Hollister which is in the Monterey Bay Unified APCD.

## Near-road $PM_{2.5}$ Sites

Along with the 2012 $PM_{2.5}$ NAAQS revision, EPA also revised the $PM_{2.5}$ network design criteria to require at least one $PM_{2.5}$ monitor at near-road sites in CBSAs with populations of 1 million or more (40 CFR 58, Appendix D §3.7.1 (b)(2)). The monitor is required to be operational by January 1, 2015 in CBSAs populations above 2.5 million and by January 1, 2017, in CBSAs with populations between 1 and 2.5 million. The minimum monitoring requirements are met and shown in Table 2-7 below.

Table 2-6. Near-Road Monitoring for $PM_{2.5}$

| CBSA | County or Counties | Pop. 2010 Census | # Near-road $PM_{2.5}$ Monitors Required | Active Near-road $PM_{2.5}$ Monitors in 2016 |
|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, Marin, Alameda, San Mateo, Contra Costa | 4,335,391 | 1[a] | 2[b] |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 1[c] | 1[d] |
| Santa Rosa | Sonoma | 483,878 | 0 | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 0 | 0 |
| Napa | Napa | 136,484 | 0 | 0 |

a The near-road site in the San Francisco-Oakland-Hayward CBSA is required to be operational by January 1, 2015.
b The near-road Laney College site began operation on February 1, 2014, and the near-road site at Berkeley Aquatic Park began operation on July 1, 2016. Another near-road site is planned to open in Pleasanton in 2017.
c The near-road site in the San Jose-Sunnyvale-Santa Clara CBSA is required to be operational by January 1, 2017.
d The near-road San Jose – Knox site began operation on September 1, 2014.

## Area of Expected Maximum Concentration

Network design requirements for $PM_{2.5}$ require sites in each MSA located in areas of expected maximum concentrations. The Air District siting for $PM_{2.5}$ takes into account characterizing the effect on air quality from many $PM_{2.5}$ source types, including industrial stationary and area sources, roadways, residential wood burning and agriculture. The primary objective of these maximum concentration SLAMS is to determine compliance with the $PM_{2.5}$ NAAQS. Because the NAAQS are based on annual averages or the $98^{th}$ percentile daily average $PM_{2.5}$ concentrations, these sites should be located where the annual average or $98^{th}$ percentile concentration are expected to be highest most years, even though another location may experience higher concentrations on a specific day. Also, the maximum concentration site should characterize sources that could be important on a variety of days.

In 2013, in response to public concerns about residential wood burning in the San Geronimo Valley, the Air District began a special purpose monitoring study to measure black carbon (BC) in Forest Knolls in addition to the $PM_{2.5}$ SLAMS in San Rafael. The objectives of the measurements in Forest Knolls are to evaluate representative conditions in areas prone to experiencing a buildup of wood smoke emissions, compared to other monitored areas with a different source mix, and to track improvements in air quality due to the Air District and County's efforts to reduce wood burning emissions. While elevated levels of BC can occur on cold, stagnant winter days in the San Geronimo Valley and other similar valleys throughout the Bay Area, this effect varies drastically with year-to-year changes in meteorology. Also, the San Geronimo Valley is not expected to experience significant contributions to $PM_{2.5}$ concentrations from other sources, and as such may not experience the maximum $98^{th}$ percentile concentration in the MSA.

In their review of the 2015 Air Monitoring Network Plan, EPA also requested that the Air District provide additional information supporting the $PM_{2.5}$ network design assessment for the San Francisco-Oakland-Hayward MSA. Therefore, the Air District has analyzed the BC data from Forest Knolls to estimate whether compliance with the NAAQS would be expected to be different for various locations. Relationships between $PM_{2.5}$ mass and BC (measured by aethalometers) at other Air District sites were used to estimate $PM_{2.5}$ concentrations at Forest Knolls. However, the measured BC concentrations are a combination of BC from residential wood smoke emissions and other combustion sources, including gasoline and diesel vehicles. Therefore, since the sites with both $PM_{2.5}$ and BC measurements are more urban than Forest Knolls, using BC as a sole predictor of $PM_{2.5}$ mass at a rural site with a higher percentage contribution of residential wood smoke will overestimate the $PM_{2.5}$ mass since there will not be the corresponding amount of $PM_{2.5}$ mass from urban sources.

To approximate the $PM_{2.5}$ concentrations at Forest Knolls, all the measured values of BC at Forest Knolls were converted to $PM_{2.5}$ concentration using regression relationships between BC and $PM_{2.5}$ measurements in 2015 at four Bay Area sites: Livermore, Laney College, Oakland-West and San Jose-Knox. The initial estimates from these sites are then scaled to better estimate a rural wood smoke $PM_{2.5}$ estimate from these urban BC-$PM_{2.5}$ relationships using two approaches: 1) the urban to rural ratio of the percent carbonaceous PM, and 2) the urban to rural ratio of the percent biomass measurements (a value calculated by the aethalometer readings of different wavelengths). While the methodology is a rough estimate, using four site BC-$PM_{2.5}$ relationships and two different scaling approaches to produce eight estimates of $PM_{2.5}$ mass at Forest Knolls helps determine a reasonable range for the result.

The composition of $PM_{2.5}$ in San Geronimo Valley is expected to be like that measured in Portola, California, given the predominance of residential wood smoke emissions and lack of other significant pollution sources. $PM_{2.5}$ speciation measurements in Portola show that carbonaceous compounds constitute over 80% of the total annual average $PM_{2.5}$ mass, and up to 94% of the $PM_{2.5}$ mass on high concentration days[2]. However, the carbonaceous content of PM measured at the more urban sites in the Bay Area is approximately 30%[3]. Therefore, we roughly estimate that BC is expected to contribute about two to three times as much to the total mass in rural wood smoke-dominated areas than it does in more urban areas. Therefore, for the first scaling approach, a conservative estimate of the urban to rural ratio of percent carbonaceous PM of $\frac{30\%}{70\%}$ was used for all four sites.

The second scaling factor uses percent biomass, an additional measurement made by the aethalometer that measures the concentration of black carbon. The calculated urban to rural ratio of percent biomass measurements from the aethalometer ranged from 0.2 to 0.4 for the four sites used for the relationships.

The Air District compared the resulting annual metric for the 24-hour $PM_{2.5}$ NAAQS (the 98$^{th}$ percentile) to determine if the Forest Knolls measurements indicate a deficiency in the $PM_{2.5}$ network design, particularly the maximum concentration site in each MSA. Since our $PM_{2.5}$ sites are operated continuously, the 98$^{th}$ percentile concentration is taken as the 8$^{th}$ highest daily average concentration measured throughout the year (40 CFR 50 Appendix N §4.5). The resulting estimated 2015 $PM_{2.5}$ 98$^{th}$ percentile concentration at Forest Knolls is shown in Table 2-7. In comparison, the measured $PM_{2.5}$ 98$^{th}$ percentile concentrations at all the $PM_{2.5}$ sites in the San Francisco-

[2] Portola Fine Particulate Matter ($PM_{2.5}$) Attainment Plan; Sierra Nevada Air Quality Management District, January 2017.

[3] Trends in Bay Area Ambient Particulates; David Fairley, BAAQMD, November 2011.

Oakland-Hayward MSA are shown in Table 2-8. Since the 98th percentile is highly variable from year to year, due primarily to changes in meteorology, five years of $PM_{2.5}$ 98th percentile concentrations measured at sites in the San Francisco-Oakland-Hayward MSA were compared to the estimates in Forest Knolls (see Table 2-8). The results show that the $PM_{2.5}$ mass in Forest Knolls is expected to be similar to that already measured at other sites in the same MSA. Additionally, none of the sites in this MSA have measured a 98th percentile above the NAAQS since 2007. Therefore, the network design requirement for a maximum concentration site is met with the current $PM_{2.5}$ network.

Table 2-7. Estimated 2015 $PM_{2.5}$ 98th percentile concentration (µg/m$^3$) at Forest Knolls based on a scaled BC:$PM_{2.5}$ relationship observed at other Air District sites

| | **Forest Knolls $PM_{2.5}$ 98th Percentile Estimated Using Measurements at Air District Sites** | | | |
|---|---|---|---|---|
| **Calculation Method** | **Livermore** | **Laney College** | **Oakland-West** | **San Jose-Knox** |
| Scale using percent carbonaceous content | 32.0 | 30.8 | 29.9 | 28.0 |
| Scale using percent biomass | 30.9 | 13.4 | 24.5 | 18.7 |

Table 2-8. Measured $PM_{2.5}$ 98th percentile concentrations in the San Francisco-Oakland-Hayward MSA from 2011-2015 (µg/m$^3$)

| **Sites** | **$PM_{2.5}$ 98th percentile concentration (µg/m$^3$)[a]** | | | | |
|---|---|---|---|---|---|
| | **2011** | **2012** | **2013** | **2014** | **2015** |
| Livermore | 27.0 | 22.2 | 32.3 | 25.3 | 26.5 |
| Oakland-East | 28.0 | 21.5 | 27.6 | 23.6 | 24.8 |
| Oakland-West | * | * | 30.0 | 25.7 | 29.9 |
| Laney College | * | * | * | 19.1 | 27.9 |
| Concord | 24.4 | 22.5 | 21.7 | 20.5 | 28.0 |
| San Pablo | * | * | 27.4 | 23.4 | 29.6 |
| San Rafael | 25.0 | 19.2 | 26.5 | 20.4 | 30.5 |
| San Francisco | 26.4 | 21.5 | 27.8 | 20.3 | 27.9 |
| Redwood City | 24.2 | 20.9 | 28.5 | 20.7 | 22.0 |

[a] Sites not yet operating or without a complete year of data are listed in the table as *.

The Air District believes the best approach to reduce emissions from residential wood burning is to work with local stakeholders and partners (city governments, county governments, utility companies, and the Air District Board) to try to provide heat sources, other than wood, and to discourage the public from using wood as a heat source through education about the health impacts from wood smoke and financial assistance to replace non-EPA certified wood-burning devices with those that are EPA-certified. Currently Marin County is implementing wood stove rebate programs for certain qualifying county residents, including one program specifically targeting the San Geronimo Valley (http://www.marincounty.org/depts/cd/divisions/sustainability/green-building-program?panelnum=3). The Air District also is currently offering rebates for replacing or decommissioning older wood burning fireplaces or stoves to low income residents, as well as residents who live in areas with specific wood smoke impacted areas or whose sole source of heat is word burning (http://www.baaqmd.gov/grant-funding/residents/wood-smoke-rebate).

The Air District also imposes wood-burning restrictions during the high $PM_{2.5}$ season (November through February) as required by Regulation 6, Rule 3. During the winter season, residential wood-burning is banned on days conducive to approaching or exceeding the $PM_{2.5}$ NAAQS. These days are declared as Winter Spare the Air (WSTA) days. In the winter of 2015-2016 there was one WSTA day and in the winter of 2016-2017 there were seven WSTA days.

**Regional Background and Transport Sites**

Every state is required to operate at least one regional transport site and one regional background site (40 CFR 58, Appendix D §4.7.3). In the Bay Area, the Vallejo and Livermore $PM_{2.5}$ air monitoring sites are located in areas that are frequently subject to regional transport. Due to geography and seasonal weather patterns, both of these sites are frequently downwind of the Sacramento and San Joaquin valleys which are often heavily laden with particulates during winter (November through February). The Bay Area does not have a regional background site. More information about transport and background sites in California can be found in the California Air Resource Board's Annual Monitoring Network Report, found at http://www.arb.ca.gov/aqd/aqmoninca.htm.

**$PM_{2.5}$ Filter Analysis for Other Air Districts and PQAO Responsibility**

Because the Air District has a fully staffed professional Laboratory Services Section, $PM_{2.5}$ filter samples collected by the North Coast AQMD and Monterey Bay Unified APCD are weighed in the Air District's laboratory by Air District staff. The Bay Area Air District is not the Primary Quality Assurance Organization (PQAO) for these

samples. Therefore, the $PM_{2.5}$ concentrations are sent back to the collecting agencies for their review, data validation, and certification. The Bay Area Air Quality Management District is the certifying agency for samples collected within the Bay Area only. In 2016, some filters were analyzed by CARB because the Air District laboratory was not in operation during relocation of the Air District's central office in San Francisco.

### 2.2.3 Minimum Monitoring Requirements for Collocated $PM_{2.5}$

In 2016, the Bay Area operated 16 primary $PM_{2.5}$ monitors, all MetOne BAM continuous FEMs (method 170). EPA requires collocation at 15% of the sites (round up) which equates to two collocated monitors, the first of which must be an FRM and the second must be the same FEM method as the primary monitor (see 40 CFR 58, Appendix A §3.2.3). In 2016, the Bay Area operated two collocated $PM_{2.5}$ monitors, one at the San Jose-Jackson site (a FEM primary and FRM collocated), and another at the Vallejo site (a FEM/FEM primary/collocated pair), as shown in Table 2-9 below.

Table 2-9. Collocated $PM_{2.5}$ monitors for FEM networks in 2016

| Method Code | # Primary Monitors | # Required Collocated Monitors | # Active Collocated FRM Monitors | # Active Collocated FEM Monitors (same method designation as primary) |
|---|---|---|---|---|
| 170 | 16 | 2 | 1<br>San Jose – Jackson | 1<br>Vallejo |

Historically, the San Jose – Jackson and Vallejo sites have had the first and second highest 24-hour design values for $PM_{2.5}$ in the Bay Area, which is why these sites were selected for collocated monitoring.

The Air District expects to add one additional continuous FEM SLAMS by the end of 2017 (at the near-road site in Pleasanton). This will bring the total number of primary FEMs in the PQAO to 17, which will increase the number of required collocated $PM_{2.5}$ sites from two to three. The Air District intends to add another FEM-FRM collocated pair when the 17$^{th}$ primary FEM becomes operational. The Air District is currently evaluating existing sites for the feasibility of adding a collocated FEM-FRM.

### 2.2.4 Minimum Monitoring Requirements for $PM_{10}$

The number of required $PM_{10}$ monitors in each MSA is specified in Table D-4 of Appendix D to 40 CFR Part 58. To meet the requirements, a monitoring agreement is needed between the Air District and the Monterey Bay Unified APCD for the San Jose – Sunnyvale – Santa Clara MSA. The Bay Area operates one monitor in Santa Clara County

and Monterey Bay operates one monitor in San Benito County. The monitoring agreement is presented in Appendix B.

There are no monitoring agreements with either the Northern Sonoma APCD or the Yolo-Solano AQMD because the Santa Rosa MSA and the Vallejo – Fairfield MSA are not required to have any $PM_{10}$ monitors. No additional monitors are required for the State Implementation Plan or Maintenance Plan because the Bay Area has never been designated as nonattainment for $PM_{10}$.

Table 2-10 and Figure 2-5 show the required $PM_{10}$ monitors, the active SLAMS counted toward those requirements, and the locations of all the $PM_{10}$ SLAMS and SPMs in the PQAO. Special purpose $PM_{10}$ monitoring at Bethel Island, Concord, and San Francisco is conducted at a sampling frequency of 1:12. SPM monitors are not counted toward meeting the minimum monitoring requirements in Table 2-10.

Table 2-10. Minimum Monitoring Requirements for SLAMS $PM_{10}$ in 2016

| MSA | County or Counties | Pop. 2010 Census | Highest 24-hr Conc. (µg/m$^3$) | Highest 24-hr Conc. Site & AQS ID | Required SLAMS Sites[a] | Active SLAMS Sites | Additional SLAMS Sites Needed |
|---|---|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, San Mateo, Alameda, Marin, Contra Costa | 4,335,391 | 35 | San Francisco 060750005 | 2-4 | 2 | 0 |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 40 | San Jose 060850005 | 2-4 | 2[b] | 0 |
| Santa Rosa | Sonoma | 483,878 | 42 | Healdsburg 060970002 | 0-1[c] | 3[d] | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 24 | Vacaville 060953001 | 0-1 | 1[e] | 0 |
| Napa | Napa | 136,484 | 32 | Napa 060550003 | 0-1 | 1 | 0 |

a The number of $PM_{10}$ monitors required depends on the population of the MSA and the ambient concentration of $PM_{10}$. Because all stations in the Bay Area measure concentrations below the threshold of 80% of the NAAQS (150 µg/m$^3$), the minimum monitoring requirement is determined by the "low concentration" category in Table D-4 of Appendix D, Part 58 of 40 CFR.

b One of the two monitors is not in the BAAQMD. It is in Hollister, which is in the Monterey Bay Unified APCD.

c While the official 2010 census population for the Santa Rosa MSA is below 500,000, the 2015 population estimate is 502,146. At a population over 500,000, the required number of $PM_{10}$ monitors for the Santa Rosa MSA will be 1-2. At this time, there are three $PM_{10}$ monitors in the MSA operated by Northern Sonoma APCD. As the 2020 census

results approach, the Air District will consider, as part of our next Network Assessment, developing a $PM_{10}$ agreement with Northern Sonoma APCD.

d These monitors are not in the BAAQMD. They are in Healdsburg, Guerneville, and Cloverdale, which are in the Northern Sonoma APCD.

e This monitor is not in the BAAQMD. It is in Vacaville, which is in the Yolo-Solano AQMD.

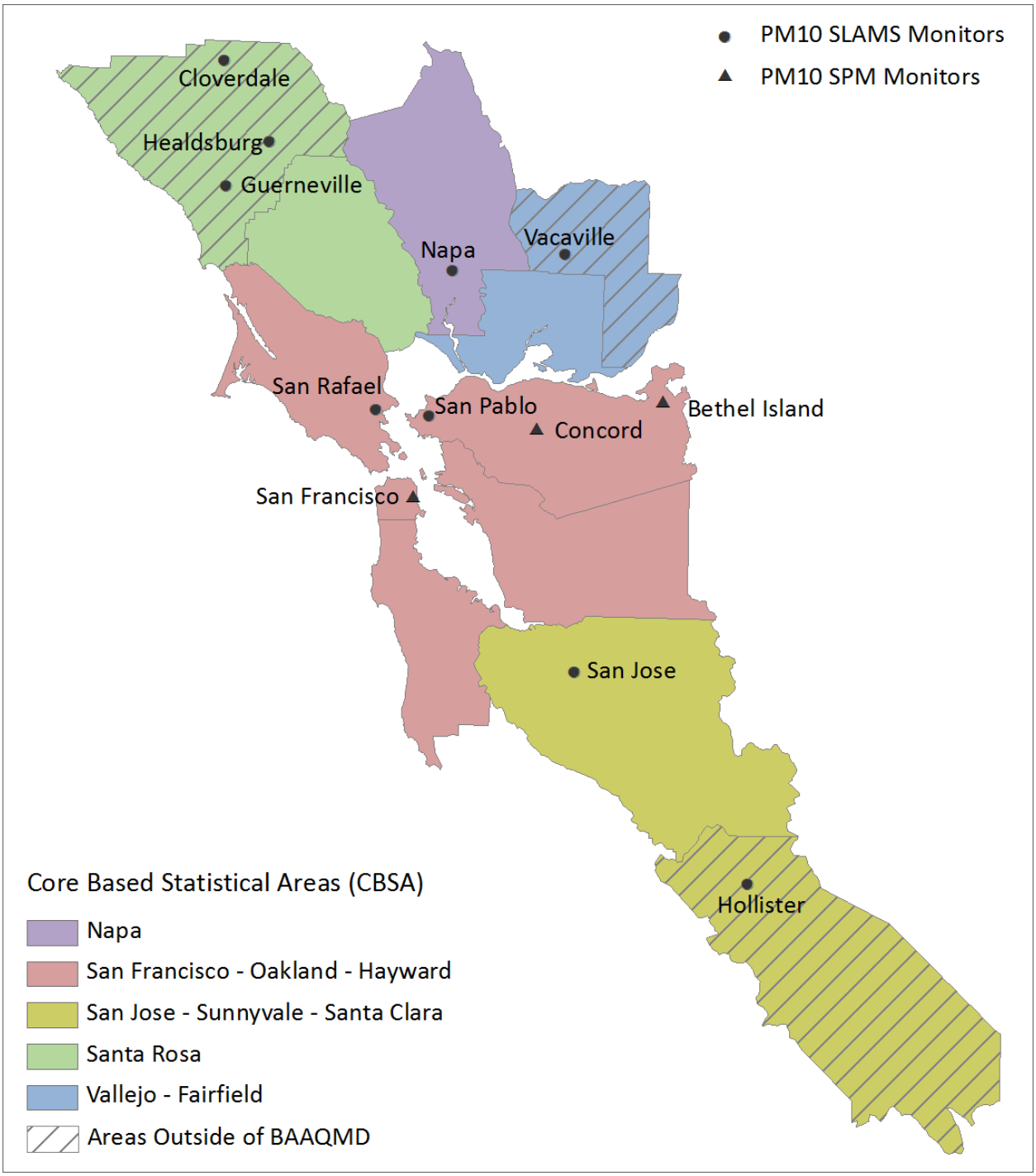



Figure 2-5. $PM_{10}$ Monitoring in the San Francisco Bay Area in 2016

### 2.2.5 Minimum Monitoring Requirements for Collocated $PM_{10}$

EPA requires a PQAO's network of manual $PM_{10}$ samplers to have collocated monitoring at 15% (or at least one) of the monitoring sites within a PQAO (40 CFR 58, Appendix D §3.3.4). All primary $PM_{10}$ SLAMS in the Bay Area network are manual methods (method codes 063, 141, and 127). Table 2-11 summarizes the collocation of $PM_{10}$ in the Bay Area during 2015.

Table 2-11. Collocated $PM_{10}$ Monitoring in the Bay Area in 2016

| Method Codes | # Primary SLAMS Manual Monitors | # Required SLAMS Collocated Manual Monitors | # Active SLAMS Collocated Manual Monitors |
|---|---|---|---|
| 063, 141, and 127 | 4 | 1 | 1<br>Napa/San Pablo |

Napa has been the collocation site for $PM_{10}$ since 2004 because it measures some of the highest $PM_{10}$ concentrations in the PQAO. San Jose usually measures the highest maximum $PM_{10}$ concentration in the PQAO, but $PM_{10}$ collocation is not feasible at this site due to space and power limitations, unless other monitoring programs (NCore, CSN, or NATTS) are discontinued.

The monitoring trailer that will be used at the Napa Valley College site is too small to allow for the required distanced between the primary and collocated samplers. Therefore, in preparation for the relocation of the Napa site from Jefferson Street to the Napa Valley College site, collocated $PM_{10}$ monitoring was moved to San Pablo on October 17, 2016. Because the maximum concentrations at these sites are amongst the highest in the PQAO and the concentrations are relatively consistent throughout the network, the Air District and Region 9 concluded that operating collocated $PM_{10}$ at San Pablo would be appropriate.

Although the collocated sampler is only required to operate on a 1:12 schedule, the Bay Area operates the sampler 1:6 throughout the year; the collocated sampling frequency may be reevaluated in the future.

### 2.2.6 Minimum Monitoring Requirements for $SO_2$

In 2016 the Air District operated eight $SO_2$ SLAMS and one SPM $SO_2$ monitor at Crockett as shown in Table 2-12. The $SO_2$ monitoring locations are shown in Figure 2-6.

The number of required $SO_2$ monitors in each CBSA is determined by the product of the total amount of $SO_2$ emissions in the CBSA and its population as specified in 40 CFR 58, Appendix D §4.4.2. The resulting value is defined as the Population Weighted Emissions Index (PWEI). One $SO_2$ monitor is required in CBSAs with PWEI values greater than 5,000 but less than 100,000, and none when the value is less than 5,000. $SO_2$ emissions shown in Table 2-12 are from the 2011 National Emissions Inventory (NEI). Table 2-12 also shows that the Air District monitoring network meets or exceeds the $SO_2$ minimum requirements for monitoring by the PWEI.

In addition to minimum monitoring requirements by the PWEI, EPA requires trace-level $SO_2$ monitoring at NCore sites (40 CFR 58, Appendix D §4.4.5), which is fulfilled by a trace-level $SO_2$ monitor at the San Jose – Jackson NCore site.

On August 21, 2015, EPA issued the final Data Requirements Rule (DRR) for the 2010 1-hour $SO_2$ NAAQS, which requires characterization of ambient $SO_2$ concentrations near $SO_2$ sources that emit more than 2,000 tons per year (tpy). This air quality characterization may be accomplished by monitoring or modeling or can be avoided by imposing federally enforceable limits on the source to ensure they emit less than 2,000 tpy. There are no sources in the CBSAs within the Bay Area that emit greater than 2,000 tpy of $SO_2$. However, in a letter dated March 18, 2016, EPA notified the state of California that due to their close proximity and combined emissions, EPA is requiring further air quality characterization of the following sources in Martinez (in the San Francisco-Oakland-Hayward CBSA): the Shell Refinery, the Tesoro Refinery, and the Eco Services Sulfuric Acid Plant. Based on emissions reported in 2013 (from the 2012 year) these three sources considered together emit 2,018 tpy of $SO_2$. The Air District has operated an $SO_2$ SLAMS in Martinez since 1973, within two miles of these sources to characterize the effect of emissions from these and other upwind $SO_2$ sources on the air quality in Martinez.

On September 29, 2016, the Air District made available for public comment an analysis determining that the Martinez monitor is appropriate for showing compliance with the NAAQS in the vicinity of these three sources, as required by the $SO_2$ DRR. We received no public comments, submitted the analysis to Region 9 EPA on September 29, 2016, who approved the site as meeting the $SO_2$ DRR on December 6, 2016. Our submittal and Region 9 EPAs approval are included in Appendix I.

In addition to the six monitoring sites currently characterizing the air quality in the area that may be affected by refinery or other sources of $SO_2$, the Air District also intends to site and operate five $SO_2$ SLAMS to further characterize the air quality in the nearby communities, including Martinez, per our Regulation 3, Fees.

Finally, no additional $SO_2$ monitors are required for SIP or Maintenance Plans because the Air District has never been designated as nonattainment for $SO_2$ and, therefore, no SIP or maintenance plans have been prepared for $SO_2$. EPA is in the process of completing designations for the 2010 $SO_2$ NAAQS. This process is expected to be finalized for the Bay Area by December 2017 or earlier.

Table 2-12. Minimum Monitoring Requirements for $SO_2$ in 2016

| CBSA | County or Counties | Pop. 2010 Census | Total $SO_2$ (tons/yr) 2014 NEI | PWEI (million-person-tons/yr) | Required SLAMS Monitors | Active SLAMS Monitors | Additional SLAMS Monitors Needed |
|---|---|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, San Mateo, Alameda, Marin, Contra Costa | 4,335,391 | 7372 | 31,961 | 1[a] (PWEI and DRR) | 6 | 0 |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 1324 | 2,431 | 1 (NCore) | 1 | 0 |
| Santa Rosa | Sonoma | 483,878 | 119 | 58 | 0 | 0 | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 225 | 93 | 0 | 1 | 0 |
| Napa | Napa | 136,484 | 128 | 17 | 0 | 0 | 0 |

a There is a requirement for one $SO_2$ monitor both from the PWEI and from the final $SO_2$ DRR. These requirements could be met by the same monitor, so the requirement is listed as one monitor. However, the Air District intends to continue operating more $SO_2$ monitors than are required to characterize the effects of sources in this CBSA.

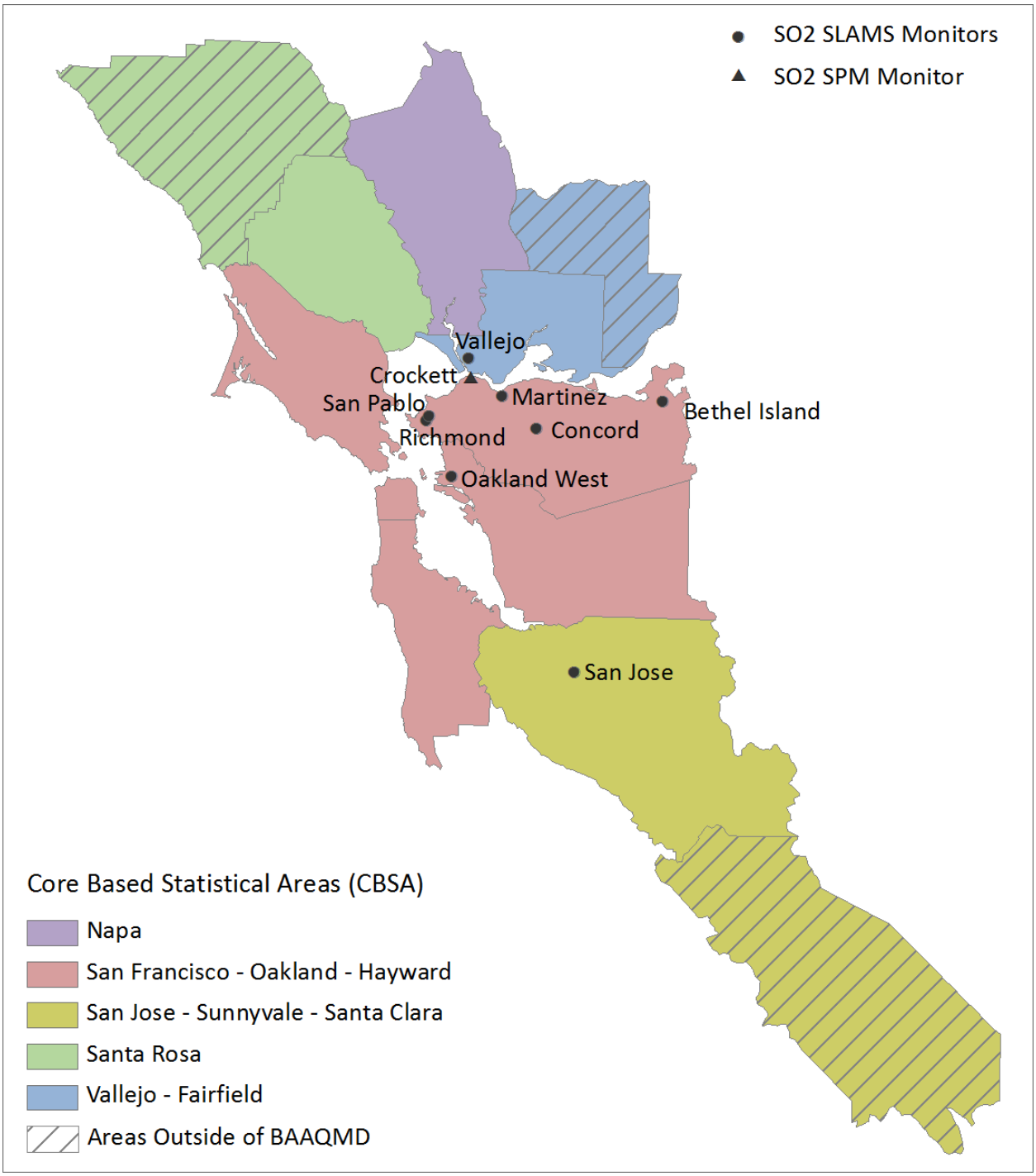



Figure 2-6. $SO_2$ Monitoring in the San Francisco Bay Area in 2016

### 2.2.7 Minimum Monitoring Requirements for $NO_2$

On April 12, 2010, EPA revised the minimum monitoring requirements for $NO_2$ in 40 CFR Part 58, Appendix D §4.3. The revision required the Air District to operate $NO_2$ monitors at neighborhood-scale or larger sites to monitor the expected highest area-wide concentrations, and at sites within 50 meters of major freeways (near-road sites). In addition, the rule required the EPA Regional Administrators to identify an additional 40 sites nationwide to monitor $NO_2$ in areas with susceptible and vulnerable populations by January 1, 2013.

On March 7, 2013 and December 30, 2016, EPA issued final rules revising the requirements and implementation dates for near-road $NO_2$ sites. The current requirements are for one near-road $NO_2$ monitor in CBSA's with a population greater than 1 million, and a second near-road $NO_2$ monitor in CBSA's with a population greater than 2.5 million or CBSA's with populations over 1 million and roadway with annual average daily traffic (AADT) over 250,000. The first near-road $NO_2$ site within a CBSA with a population greater than 1 million had to be operational by January 1, 2014, and the second monitor within a CBSA, if required, had to be operational by January 1, 2015. Based on CBSA population and traffic counts, the Air District is required to operate three near-road monitoring sites (two required by January 1, 2014, and one additional monitor by January 1, 2015). In addition to the near-road monitoring requirement, in, the Air District is required to monitor for area-wide $NO_2$ concentrations with at least one site in both the San Francisco – Oakland – Hayward and San Jose – Sunnyvale – Santa Clara CBSAs (see

Table 2-14).

No additional monitors are required for the SIP or Maintenance Plans because the Air District is not designated as non-attainment for $NO_2$ and no SIP or maintenance plans have been prepared for $NO_2$.

In 2016, the Air District operated nine neighborhood scale $NO_2$ monitors in the Bay Area, including six in the San Francisco – Oakland – Hayward CBSA and one in the San Jose – Sunnyvale – Santa Clara CBSA. One of the nine, at the Oakland West site, was selected as one of the 40 nationwide sites for monitoring $NO_2$ in areas with susceptible and vulnerable populations.

As part of the $NO_2$ network design criteria, EPA sets the most important scale for different $NO_2$ monitoring requirements. The most important spatial scale for near-road $NO_2$ monitoring stations to effectively characterize the maximum expected hourly $NO_2$ concentration due to mobile source emissions on major roadways is microscale. The most important spatial scales for other monitoring stations characterizing maximum expected hourly $NO_2$ concentrations are microscale and middle scale. The most important spatial scale for area-wide monitoring of high $NO_2$ concentrations is neighborhood scale.

Table 2-13 shows $NO_2$ monitors at various spatial scales by CBSA. $NO_2$ monitoring at Napa, Oakland, San Rafael, and San Pablo is middle scale based on traffic counts and the distance between the monitors and the nearest traffic lane to the monitors. Therefore, these sites are not counted toward meeting the area-wide requirements of 40 CFR Part 58, Appendix D §4.3.3. San Ramon and Patterson Pass are $NO_2$ SPMs, so while they are neighborhood or larger scale, they are not counted toward meeting the minimum area-wide monitoring requirements.

Table 2-14 shows $NO_2$ minimum monitoring requirements by CBSA for near-road and area-wide monitoring; Figure 2-7 shows the area-wide, middle-scale, near-road and SPM monitors in the Bay Area.

In 2016 the Air District continued to meet the $NO_2$ minimum monitoring requirements for area-wide and Regional Administrator Required Monitoring in areas with susceptible and vulnerable populations. The Air District also meets the near-road $NO_2$ minimum monitoring requirements in the San Francisco-Oakland-Hayward CBSA with the addition of the Berkeley Aquatic Park (near-road) air monitoring station in 2016.Increases in traffic have caused the San Jose-Sunnyvale-Santa Clara CBSA to exceed the 250,000 AADT threshold for a second near-road $NO_2$ site in a CBSA (see

Table 2-14). After consulting with EPA, the appropriate timeframe for addressing this requirement is in the network assessment to be submitted to EPA in 2020. This ensures time to determine that the traffic amounts remain consistently above the threshold, and to start the process of evaluating the best location for an additional near-road site.

Table 2-13. $NO_2$ Monitors at Various Spatial Scales

| CBSA | Pop. 2010 Census | Sites at Micro Scale[a] | Sites at Middle Scale[a] | Sites at Neighborhood or Larger |
|---|---|---|---|---|
| San Francisco-Oakland-Hayward | 4,335,391 | Laney College and Berkeley Aquatic Park | Oakland, San Pablo and San Rafael | Bethel Island, Concord, Livermore, Oakland West, Patterson Pass[b], Redwood City, San Francisco and San Ramon[b] |
| San Jose-Sunnyvale-Santa Clara | 1,836,911 | San Jose – Knox | None | San Jose – Jackson |
| Santa Rosa | 483,878 | None | None | Sebastopol |
| Vallejo-Fairfield | 413,344 | None | None | Vallejo |
| Napa | 136,484 | None | Napa | None |

a Micro- and middle-scale sites are not counted towards meeting the requirement for monitoring area-wide concentrations.
b San Ramon and Patterson Pass are SPMs and is not counted toward meeting the requirement for monitoring area-wide concentrations.

Table 2-14. Minimum Monitoring Requirements for $NO_2$ in 2016

| CBSA | Pop. 2010 Census | Max. AADT (2014) | Required Near-road Monitors | Active Near-road Monitors | Additional Near-road Monitors Needed | Required Area-wide Monitors | Active Area-wide Monitors | Additional Area-wide Monitors Needed |
|---|---|---|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | 4,335,391 | 277,000 | 2 | 2 | 0 | 1[a] | 6 | 0 |
| San Jose-Sunnyvale-Santa Clara | 1,836,911 | 253,000 | 2[b] | 1[c] | 1[d] | 1 | 1 | 0 |
| Santa Rosa | 483,878 | 153,000 | 0 | 0 | 0 | 0 | 1 | 0 |
| Vallejo-Fairfield | 413,344 | 209,000 | 0 | 0 | 0 | 0 | 1 | 0 |
| Napa | 136,484 | 123,000 | 0 | 0 | 0 | 0 | 0[d] | 0 |

a One area-wide monitor is required, however, the Oakland West monitoring site was selected as one of the 40 nationwide sites for monitoring near susceptible and vulnerable populations. Therefore, there are two requirements for this CSBA, which are met by a single site.

b Recent increases in traffic triggered a second required monitor in the San Jose-Sunnyvale-Santa Clara CBSA. The plan for implementing this site will be included in the next Five-Year Network Assessment due to EPA by July 1, 2020.

c This monitor is shared with Monterey Bay Unified APCD. The monitoring agreement is in 0.

d $NO_2$ is monitored at Napa, but based on the distance to the roadway, the scale of monitoring is middle scale. Therefore, this monitor cannot be counted as an area-wide monitor.

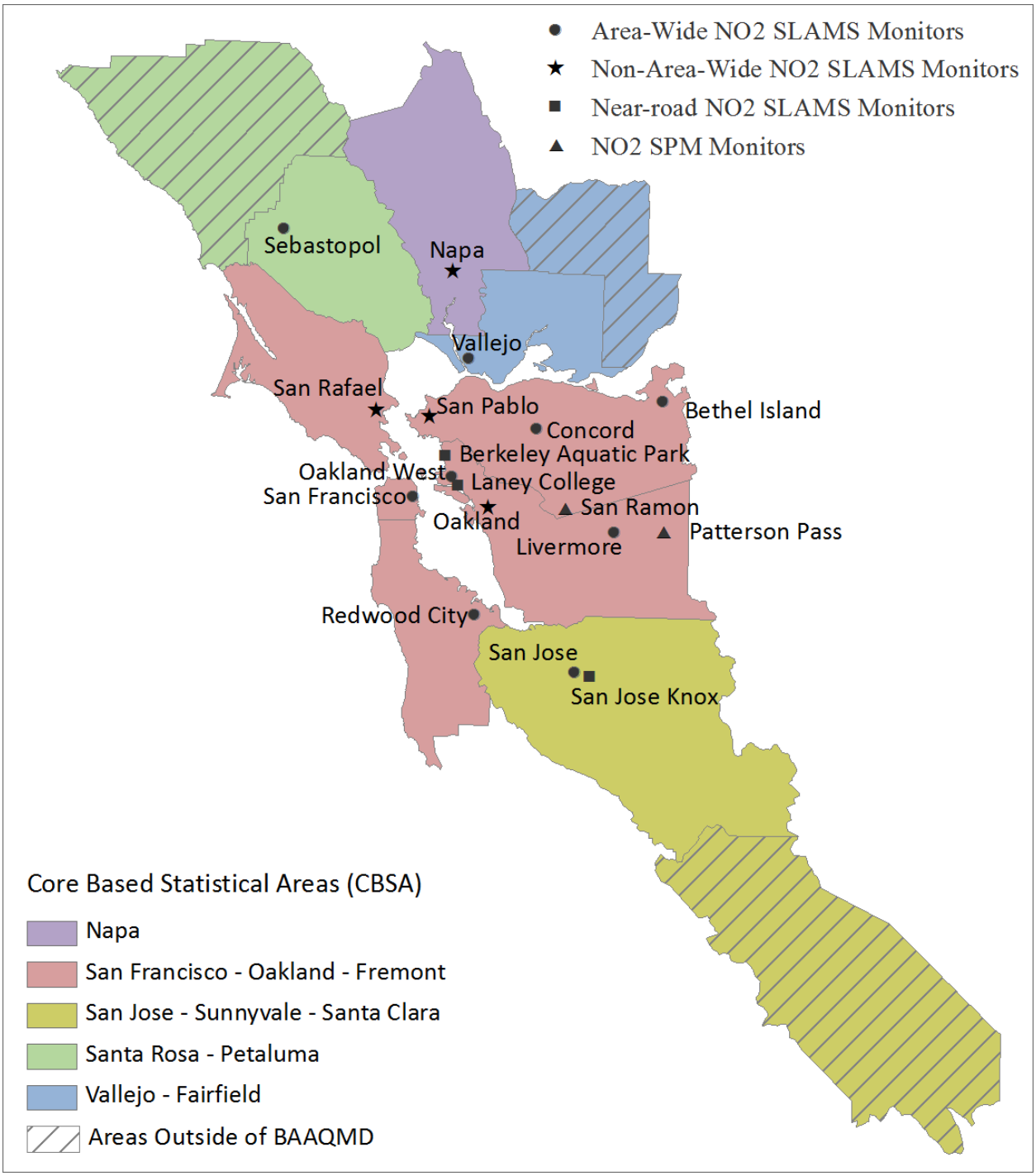



Figure 2-7. $NO_2$ Monitoring in the San Francisco Bay Area in 2016

### 2.2.8 Minimum Monitoring Requirements for CO

Effective October 31, 2011, EPA revised 40 CFR Part 58, Appendix D for carbon monoxide (CO) monitoring. The revision requires one CO monitor to operate collocated with a near-road $NO_2$ monitor in CBSAs having a population of 1 million or more. If a CBSA is required to have more than one near-road $NO_2$ monitor, only one CO monitor is required to be collocated with a near-road $NO_2$ monitor within that CBSA. This near-road CO monitor was required to be operating by January 1, 2015 in CBSAs with a population greater than 2.5 million, and by January 1, 2017 in CBSAs with a population between 1 and 2.5 million. Table 2-15 shows these requirements applied to the Bay Area CBSAs. The Air District operates CO monitors at all near-road sites. The first near-road CO monitor started operating on February 1, 2014, at the Oakland – Laney College site in the San Francisco-Oakland-Hayward CBSA. The second near-road CO monitor in the Bay Area started operating on September 1, 2014, at the San Jose – Knox site in the San Jose-Sunnyvale-Santa Clara CBSA. A third near-road CO monitor started operating on July 1, 2016, at the Berkeley Aquatic Park site in the San Francisco-Oakland-Hayward CBSA. Therefore, the Bay Area meets the minimum monitoring requirements for CO.

Table 2-15. Minimum Monitoring Requirements for CO in 2016

| CBSA | County or Counties | Pop. 2010 Census | Near-road Monitors Required | Near-road Monitors Active | Near-road Monitors Needed |
|---|---|---|---|---|---|
| San Francisco-Oakland-Hayward | SF, San Mateo, Alameda, Marin, Contra Costa | 4,335,391 | 1 | 2 | 0 |
| San Jose-Sunnyvale-Santa Clara | Santa Clara, San Benito | 1,836,911 | 1 | 1[a] | 0 |
| Santa Rosa | Sonoma | 483,878 | 0 | 0 | 0 |
| Vallejo-Fairfield | Solano | 413,344 | 0 | 0 | 0 |
| Napa | Napa | 136,484 | 0 | 0 | 0 |

a This monitor will be shared with Monterey Bay Unified APCD. The monitoring agreement is in 0.

In addition to minimum monitoring requirements for near-road CO, EPA requires trace-level CO monitoring at NCore sites (40 CFR 58, Appendix D §4.4.5), which is fulfilled by a trace-level CO monitor at the San Jose – Jackson NCore site.

The Air District was redesignated attainment for the CO 8-hour NAAQS in 1998. The Air District CO maintenance plan is contained within the California Air Resource Board document "2004 Revision to the California State Implementation Plan for Carbon Monoxide." The plan does not specify the number of CO monitors needed. In 2016, the Air District operated 15 CO monitors: one within each of the nine Bay Area counties plus additional CO monitors in large cities and three near-road CO monitors, as shown in Figure 2-8.

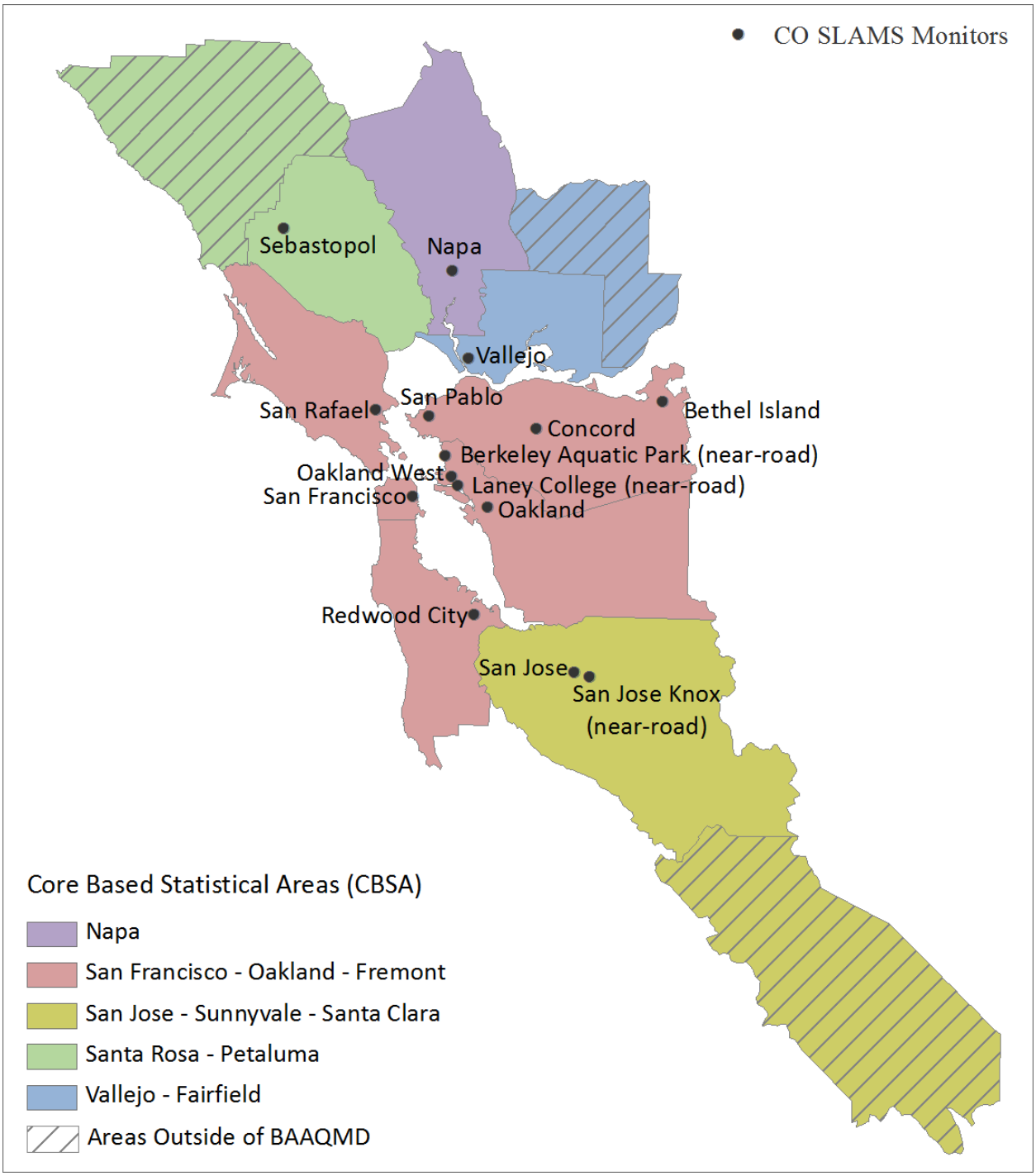



Figure 2-8. CO Monitoring in the San Francisco Bay Area in 2016

### 2.2.9 Minimum Monitoring Requirements for Lead

40 CFR Part 58, Appendix D §4.5(a) requires lead monitoring near sources expected to contribute to a maximum lead (Pb) concentration in ambient air in excess of the NAAQS. These monitors are to be sited, taking into account logistics and the potential for population oriented, where the ambient Pb concentration is expected to be at its maximum. The applicable sources are identified by having emissions greater than 0.5 tpy for non-airport sources and greater than 1.0 tpy for airports. In the Bay Area there are no sources meeting this criteria according to the 2014 National Emissions Inventory (NEI). However, 40 CFR Part 58, Appendix D §4.5(a)(iii) requires source-oriented monitoring near an additional 15 airports to evaluate air quality near airports with emissions from piston engine aircraft using leaded fuel that may approach 0.50 tons per year, including three airports in the Bay Area (Palo Alto, San Carlos, and Reid-Hillview). One of the airport lead monitoring sites is also required to operate a collocated sampler.

The Palo Alto Airport lead site was shut down at the end of December 2014 because Santa Clara County sold the property to the city of Palo Alto. The sale triggered FAA review of various operational plans and permits, revealing that the lead sampler location violated FAA regulations. The Air District continues to work with EPA to find a suitable alternative.

The San Carlos Airport lead monitoring site was moved about 120 yards to the southeast because the property owner at the original site did not renew the lease. Data collected at the original site ended on September 13, 2013, and resumed at the new location (San Carlos II) on March 25, 2015. As of Tuesday, April 11, 2017, the TSP-Pb monitoring at the San Carlos Airport II monitoring site has been discontinued due to circumstances beyond our control. The San Carlos Airport management informed the Air District site operator on April 11 that the Air District is no longer allowed access to the site, citing the expired lease. The Air District has tried unsuccessfully to renegotiate the lease since November 2016. The airport management is requiring that a shutdown provision be included in the renewed lease. However, the Air District cannot commit to the provision, since EPA, not the Air District, has the authority to approve the closure of the site. The Air District notified EPA of the discontinuation of data collection on April 13, 2017.

Figure 2-9 shows the lead monitors in the San Francisco Bay Area in 2016. Minimum monitoring requirements for source oriented lead at airports and NATTS site at San Jose are provided in Tables 2-16 and 2-17.

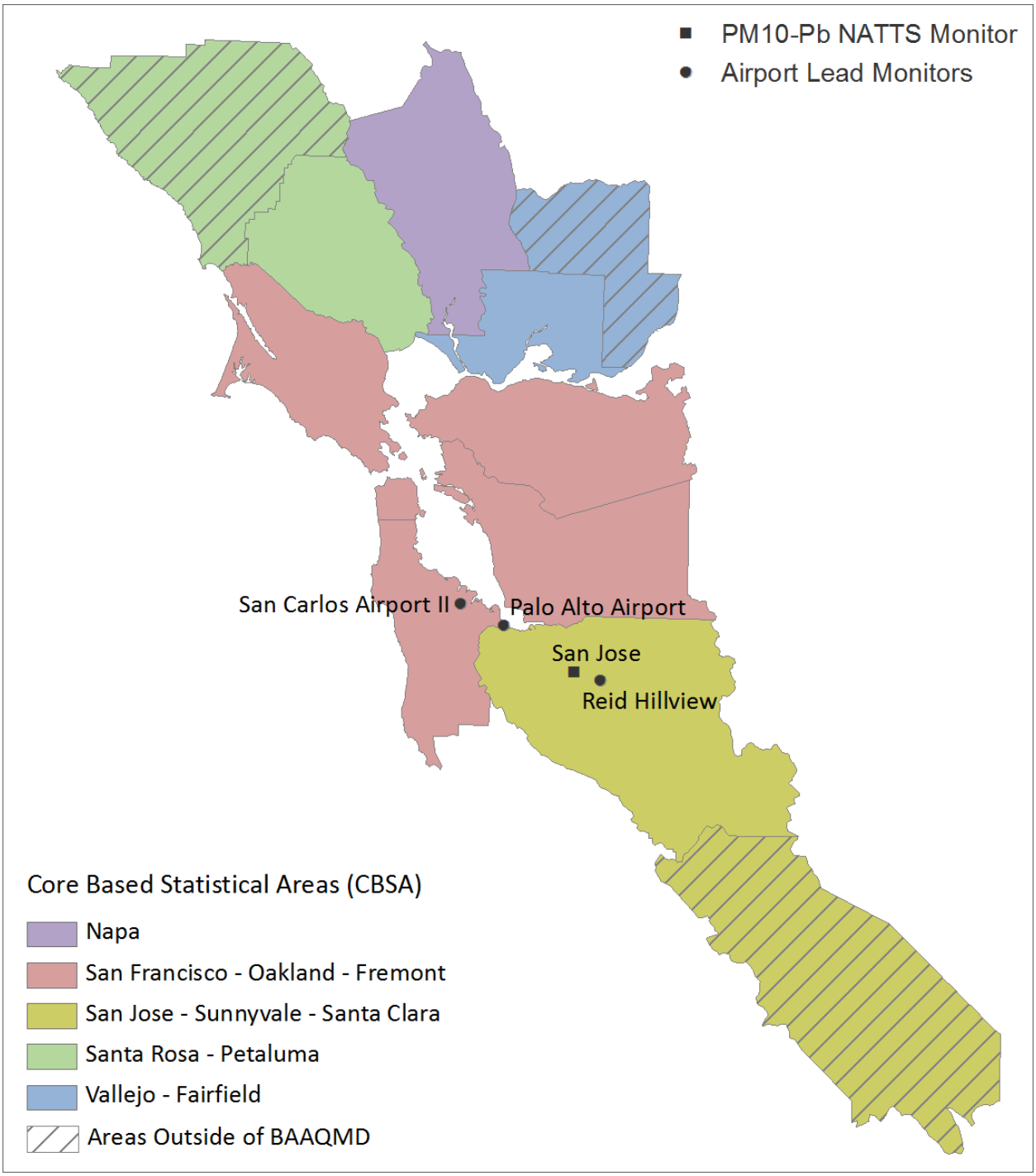



Figure 2-9. Lead Monitoring in the San Francisco Bay Area in 2016

Table 2-16. Source Oriented Lead Monitoring at Airports in 2016

| Source Name | Address | Pb Emissions (tons/yr) | Emission Inventory Source Data & Year | Monitors Required | Monitors Active | Monitors Needed |
|---|---|---|---|---|---|---|
| San Carlos Airport | 620 Airport Dr. San Carlos 94070 | 0.30 | NEI/2014 | 1 | 1[a] | 0[a] |
| Palo Alto Airport | 1925 Embarcadero Rd. Palo Alto 94303 | 0.48 | NEI/2014 | 1 | 0[b] | 1[b] |
| Reid-Hillview Airport | 2500 Cunningham Ave. San Jose 95148 | 0.37 | NEI/2014 | 1 | 1 | 0 |

a. The San Carlos Airport II monitor began operation on March 25, 2015.
b. The Palo Alto monitor was shut down in December 2014, after it was found to violate FAA regulations and would therefore need to be relocated. When a suitable location is found, lead monitoring will resume at this airport.

Table 2-17. Collocated Source Oriented Lead Monitoring at Airports in 2016

| Source Name | Address | Pb Emissions (tons/yr) | Emission Inventory Source Data & Year | Collocated Monitors Required | Monitors Active | Monitors Needed |
|---|---|---|---|---|---|---|
| San Carlos Airport | 620 Airport Dr. San Carlos 94070 | 0.30 | NEI/2011 | 1 | 1[a] | 0[a] |

a. The San Carlos Airport II sampler began operation on March 25, 2015.

## 2.3 Modifications Made to Network in 2016

Napa $PM_{10}$ Monitoring

As part of our ongoing relocation effort, the $PM_{10}$ monitors at Napa – Jefferson needed to be moved in October 2016. While primary $PM_{10}$ monitoring in Napa will resume when the new Napa Valley College site opens, the collocated $PM_{10}$ monitor was moved to the San Pablo site to ensure a continuous precision dataset.

Near-road Monitoring Update ($NO_2$, CO, $PM_{2.5}$, Black Carbon, and Ultrafine Particles)

The Berkeley Aquatic Park (near-road) site was originally expected to be operating by mid-2015. The process of installing this near-road site has been delayed by the

permitting process and other site development logistics, consistent with the development of other near-road sites. The Berkeley Aquatic Park site was opened on July 1, 2016.

## 2.4 Proposed Modifications to Network in 2017–2018

Community Monitoring Near Refineries

The Air District has committed to conducting additional monitoring in communities near refineries, funded by fees paid by the facilities, per Regulation 3.

In 2017, the Air District expects to conduct workshops to ask for public input on the cumulative impacts experienced in these areas. The Air District will use the information submitted by the public, along with the most up-to-date source location, emissions, modeling, and ambient monitoring data to determine the best plan for combining fixed site and short-term monitoring studies to further evaluate the exposure the nearby communities are experiencing.

Lead – Palo Alto Airport

In 2017, the Air District will continue to work with EPA to find a suitable alternative to the Palo Alto Airport lead site.

Lead – San Carlos Airport II

As of Tuesday, April 11, 2017, the TSP-Pb monitoring at the San Carlos Airport II monitoring site has been discontinued due to circumstances beyond our control. The San Carlos Airport management informed the Air District site operator on April 11 that the Air District is no longer allowed access to the site, citing the expired lease. The Air District has tried unsuccessfully to renegotiate the lease since November 2016. The airport management is requiring that a shutdown provision be included in the renewed lease. However, the Air District cannot commit to the provision, since EPA, not the Air District, has the authority to approve the closure of the site. The Air District notified EPA of the discontinuation of data collection on April 13, 2017.

Napa

While the expected relocation of the Napa site at Jefferson Street to the Napa Valley College site has been delayed, the Air District continues to make progress on this network modification which will likely occur in 2017. The relocation has already been approved by EPA (see correspondences in Appendix G).

Near-road Monitoring Update

In 2016, the Air District continued to identify an appropriate location and begin site installation for a near-road air monitoring site in Pleasanton near the intersections of Highways 580 and 680. This site is being implemented at the request of an Air District Board member, and is expected to be operational in 2017.

Recent increases in traffic have caused the San Jose-Sunnyvale-Santa Clara CBSA to exceed the 250,000 AADT threshold for a second near-road $NO_2$ site in a CBSA. The Air District and EPA will continue to track the AADT in this CBSA to determine that the traffic amounts remain consistently above the threshold, and to start the process of evaluating the best location for an additional near-road site. The appropriate deadline for a plan to implement this requirement, per EPA, is the next Five-Year Network Assessment, due in 2020.

Patterson Pass

The $O_3$, $NO_2$, and AutoGC SPMs at Patterson Pass was operated with the objective of supporting ozone transport research. While the data collected from 2010 through 2016 will be used in ongoing research analyses, it has not proven to be representative of Bay Area ozone production or population oriented, nor has it improved air quality forecasting capabilities. Therefore, we are closing these monitors to redeploy resources in other ways with a greater likelihood of achieving local air quality management goals or a public health benefit. The Air District closed the Patterson Pass SPMs in March of 2017.

Pittsburg

The Air District is currently developing a monitoring site in Pittsburg to measure toxics and BC at the request of the city of Pittsburg. In addition to measuring the effect of nearby sources on the community, this site will be located in an area of expected population growth and increased commuter traffic.

$PM_{2.5}$ Collocation

As described in Section 2.2.3, the Air District will likely trigger the requirement for a third collocated $PM_{2.5}$ site during 2017. When the 17$^{th}$ primary $PM_{2.5}$ monitor begins operating, the Air District will also collocate an additional $PM_{2.5}$ FRM sampler with an existing FEM monitor within the PQAO. The Air District is currently evaluating which $PM_{2.5}$ sites would be most appropriate for this collocation, based on site logistics and $PM_{2.5}$ concentrations, including Concord and San Pablo.

San Jose $NO_y$ monitoring for NCore

In March 2014, the Air District requested a waiver to discontinue $NO_y$ monitoring because the past three years of data showed an insignificant statistical difference

between $NO_x$ and $NO_y$. The waiver request is in Appendix F. EPA has not yet officially responded to this request.

Santa Rosa MSA $PM_{10}$ Monitoring Requirement

After tracking population estimates for several years, it seems likely that the Santa Rosa MSA population will exceed 500,000 in the next census triggering a change in the required number of $PM_{10}$ monitors in the area from 0-1 to 1-2. There are currently three $PM_{10}$ monitors in the MSA, all operated by Northern Sonoma County Air Pollution Control District. The Air District agrees that these sites already appropriately characterize $PM_{10}$ in the MSA, and will begin to work to develop a monitoring agreement with NSCAPCD.

## 2.5 Removing a NAAQS Compliance Monitor

When the Air District proposes changes to the air monitoring network, the proposed changes are included in the Annual Monitoring Network Plan. The Annual Monitoring Network Plan is posted on the Air District website for 30 days for public comment on the proposed changes. After the public comment period, the Air District reviews and considers the comments before making a final decision on a change to air monitoring network. The Air District submits the Annual Monitoring Network Plan with public comments to the EPA Region 9 Regional Administrator by July 1 each year.

Before shutting down a SLAMS (State or Local Air Monitoring Station) monitor, 40 CFR Part 58.14(c) requires that the Air District obtain the Regional Administrator's written approval. The Regional Administrator will normally approve the shutdown of a SLAMS monitor when any of the following situations apply:

1. Criteria pollutant monitors which have shown attainment of the national standards during the previous five years may be removed if the probability is less than 10% that the monitor will exceed 80% of NAAQS during the next three years, and if the monitor is not required by an attainment or maintenance plan.
2. CO, $PM_{10}$, $SO_2$, or $NO_2$ monitors not required by an attainment or maintenance plan may be removed if the monitor has shown consistently lower concentrations than another monitor for the same pollutant in the same county during the previous five years and is expected to remain higher during the following five years given expected implementation of control measures in the area.
3. Criteria pollutant monitors that have not violated the national standards in the most recent five years may be removed if the State Implementation Plan (SIP) provides a method of representing the air quality in the applicable county in the absence of monitoring.
4. $PM_{2.5}$ monitors may be removed when EPA determines that measurements are not comparable to the relevant NAAQS because of siting issues in accordance with 40 CFR 58.30.
5. Criteria pollutant monitors that are located upwind of an urban area to characterize transport into the area may be removed if the monitor has not recorded violations of the relevant NAAQS in the previous five years and the monitor is being replaced by another monitor characterizing transport.
6. Criteria pollutant monitors not eligible for removal under any of the above criteria may be relocated to a nearby location with the same scale of representation if logistical problems beyond the agency's control make it impossible to continue operation at its current site.

EPA may also approve other requests for discontinuation on a case-by-case basis if discontinuance does not compromise data collection needed for implementation of a NAAQS and if the requirements of 40 CFR Part 58, Appendix D continue to be met.

The closure of an SPM (Special Purpose Monitor) monitor does not require approval from EPA (see 40 CFR 58.20(f)), but changing in the monitor type from SLAMS to SPM requires approval of the Regional Administrator.

## 2.6 Data Submission Requirement

After all data review procedures are complete, the Air District submits monthly air quality and associated precision and accuracy reports to the EPA AQS database within 90 days of the end of every month. By May 1 each year, the Air District submits a data certification letter to Region 9 stating that the previous calendar year of data is complete and correct. The certification letter for 2016 data was submitted to EPA Region 9 on April 27, 2017.

## 3. SITE INFORMATION DEFINITIONS

Section 4 describes each of the 32 air quality sites operating within the Bay Area Air Quality Management District in 2016. It also includes some sites expected to begin operation in 2017, including the Napa Valley College, Dublin 580, and new Pittsburg sites. The site descriptions include siting information about the site and a general description of the individual monitors at the site and their purpose. Monitors that are operated to determine compliance with the NAAQS must be operated following EPA requirements found in 40 CFR Part 58. These regulations also specify monitor siting criteria for each pollutant.

Included in each site description is also the number of days when a criteria pollutant measurement exceeded the National Ambient Air Quality Standard (NAAQS). The national standards for hourly and daily averaging times are shown in Table 3-1 below. The table below is abbreviated for clarity. A full list of national and California ambient air quality standards and the Air District's attainment status for each pollutant can be viewed at: http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status.

Table 3-1. National Ambient Air Quality Standards (as of December 31, 2015)

| Pollutant | Averaging Time | Standard |
|---|---|---|
| Ozone | 8 hour | 0.070 ppm |
| $PM_{2.5}$ | 24 hour | 35 µg/$m^3$ |
| $PM_{2.5}$ | 1 year | 12.0 µg/$m^3$ |
| $PM_{10}$ | 24 hour | 150 µg/$m^3$ |
| Carbon Monoxide | 1 hour | 35 ppm |
| | 8 hour | 9 ppm |
| Sulfur Dioxide | 1 hour | 75 ppb |
| Nitrogen Dioxide | 1 hour | 100 ppb |
| Lead | Rolling 3-month average | 0.15 µg/$m^3$ |

More detailed information about NAAQS standards, including past standards, may be found at: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Table 3-2 explains the monitoring terms and definitions used in the detailed site summaries found in the site information sections later in this document.

Table 3-2. Monitor Information Definitions and EPA Air Monitoring Siting Criteria

| Site or Monitor Information | Definition of Terms |
|---|---|
| AQS ID | The 9-digit code that identifies each site in the EPA's AQS database |
| GPS coordinates (decimal degrees) | The latitude and longitude of the site from the World Geodetic System (WGS-84) used as the reference coordinate system for Global Positioning System (GPS). |
| Distance to roadways from the gaseous probe (meters) | 40 CFR Part 58 Appendix E, 6.0: specifies the distance monitors must be from roadways to be considered neighborhood- or urban-scale. Recommended distances are found in Table E-1 for $NO_x$ and $O_3$, Table E-2 for CO, and Figure E-1 for PM. |
| Traffic count | The annual average daily traffic (AADT) count. |
| Groundcover | 40 CFR Part 58 Appendix E, 3.0: states that particulate samplers should not be located in an unpaved area unless there is vegetative ground cover year round, so that the impact of wind-blown dusts will be kept to a minimum. |
| Statistical Area | The core based statistical area (CBSA) or Metropolitan Statistical Area (MSA) the site is located within. |
| Pollutant, POC | The pollutant being measured and its Parameter Occurrence Code (POC). There may be multiple instruments measuring a pollutant at a site. Each instrument of the same pollutant is assigned a unique POC to differentiate it from the others in EPA's AQS database. |
| Primary/QA Collocated/Other | This row applies to parameters that have collocation requirements as well as parameters that are combined at a site level for design value calculations. This currently includes $PM_{2.5}$, $PM_{10}$, $PM_{10-2.5}$, Pb and $NO_2$. Non-PM, Pb, and $NO_2$ monitors are listed as "N/A". |
| Parameter code | The 5-digit code assigned to each pollutant in the EPA's AQS database. |
| Basic monitoring objective(s) | The purpose for monitoring at that location. Choices include public information, NAAQS comparison, and research. |
| Site type(s) | Choices include highest concentration, population oriented, source impact, general/background, regional transport, and welfare-related impacts. |
| Monitor type(s) | Choices include SLAMS, Special Purpose (SPM), Industrial, Non-EPA Federal, Tribal, EPA and Other. |
| Network affiliation(s) | Some monitors are used for specific types of monitoring networks. Examples that apply to the Bay Area include: CSN STN, CSN Supplemental, NATTS, NCore, Near Road, and Unofficial PAMS. The full list may be found at: https://aqs.epa.gov/aqsweb/documents/codetables/networks.html |
| Instrument manufacturer and model | Details about the instrumentation used to measure the pollutant. |

| Site or Monitor Information | Definition of Terms |
|---|---|
| Method code | Based on the Instrument manufacture and model, a method code is assigned and is reported to the EPA AQS database system. 40 CFR Part 58 Appendix C, 2.0: requires that the monitor used must be from EPA's current List of Designated Reference and Equivalent Methods. |
| FRM/FEM/ARM/other | FRMs (Federal Reference Methods) and FEMs (Federal Equivalent Methods) are approved by EPA for criteria pollutant monitoring to determine compliance with the. An ARM (Approved Regional Method) may be approved by EPA as an alternative to and FRM or FEM, however, no ARMs are used in the Bay Area. |
| Collecting Agency | The agency that operates the instrument at a site, which currently is the Air District for all BAAQMD sites in this report. |
| Analytical Lab | The agency that weighs particulate filters or does chemical analysis of particulate filters or air samples. |
| Reporting Agency | The agency that uploads air monitoring data to the EPA's AQS database. |
| Spatial scale | The relative distance over which the air pollution measurements are representative. Choices are micro, middle, neighborhood, urban, regional, national, or global scales. |
| Monitor start date | The date valid data collection began for that pollutant at an air monitoring station. |
| Current Sampling frequency | This reflects the sampling frequency used for district monitors in 2016. This frequency describes if the monitor is operated continuously or intermittently. Intermittent sampling for particulate matter ($PM_{2.5}$, $PM_{10}$, $PM_{10}$-Pb, and TSP-Pb) and toxics is performed by collecting a sample (filter, air canister or other) either every day, every 3$^{rd}$ day, every 6$^{th}$ day or every 12$^{th}$ day (1:1, 1:3, 1:6, 1:12). Samples are subsequently analyzed for the pollutant of interest, for example, $PM_{2.5}$ mass or lead concentrations. The Air District at times elects to operate a monitor more frequently than is required. For more information about how the current sampling frequency compares to the required sampling frequency, see the sections on minimum monitoring requirements for that pollutant. |
| Sampling season | The date range (season) monitors were operated during 2016. While California has a required yearlong $O_3$ season, EPA has granted a waiver to the Air District so that some ozone sites in the Bay Area are not required to run during the winter. |
| Probe height (meters) | 40 CFR Part 58 Appendix E, 2.0: requires that probe height be 2-15 meters above ground level (AGL). |
| Distance from supporting structure (meters) | 40 CFR Part 58 Appendix E, 2.0: requires the probe be at least 1 meter vertically or horizontally away from any supporting structure unless it is a roof, in which case 1 meter separation is required. |

| Site or Monitor Information | Definition of Terms |
|---|---|
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | 40 CFR Part 58 Appendix E, 4.0: requires that the distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe or inlet. PM samplers must have a 2 meter separation from walls, parapets and structures. |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | 40 CFR Part 58 Appendix E, 4.0: requires that the distance from the obstacle to the probe or inlet must be at least twice the height that the obstacle protrudes above the probe or inlet. |
| Distance from trees (meters) | 40 CFR Part 58 Appendix E, 5.0: requires that probe be at least 10 meters from the nearest tree drip line. |
| Distance to furnace or incinerator flue (meters) | 40 CFR Part 58 Appendix E, 3.0: requires that scavenging be minimized by keeping the probe away from furnace or incineration flues or other minor sources of $SO_2$ or $NO_x$. The separation distance should take into account the heights of the flues, type of waste or fuel burned, and the sulfur content of the fuel. |
| Distance between monitors fulfilling a QA collocation requirement (meters) | Collocated $PM_{2.5}$, $PM_{10}$, and Pb monitors must be 2-4 meters apart for flow rates >200L/m and 1-4 meters apart for flow rates <200 L/m (40 CFR 58, Appendix A 3.2.3.4(c), 3.3.4.1(c), and 3.4.4.2(b)). |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | 40 CFR Part 58, Appendix A 3.2.3.4(c), 3.3.4.1(c), and 3.4.4.2(b) require that PM monitors with flow rates <200L/m have at least a 1 meter separation. |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | 40 CFR Part 58, Appendix A 3.2.3.4(c), 3.3.4.1(c), and 3.4.4.2(b) require that PM monitors with flow rates > 200L/m have at least a 2 meter separation. |
| Unrestricted airflow (degrees) | 40 CFR Part 58 Appendix E, 4.0: requires the probe or inlet to have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. |
| Probe material for reactive gases | 40 CFR Part 58, Appendix E, 9.0: requires that either Pyrex glass or FEP Teflon be used for intake sampling lines. |
| Residence time for reactive gases (seconds) | 40 CFR Part 58, Appendix E, 9.0: requires a residence time of 20 seconds or less for reactive gas monitors. |
| Will there be changes within the next 18 months? | Describes if any changes are expected to occur to that monitor at that station within the next 18 months. |

| Site or Monitor Information | Definition of Terms |
|---|---|
| Is it suitable for comparison against the annual $PM_{2.5}$? | 40 CFR 58.30: $PM_{2.5}$ data from monitors that are located are at relatively unique micro-scale, localized hot spot, or unique middle-scale impact sites, and do not represent area-wide concentrations, are not eligible for comparison to the Annual $PM_{2.5}$ NAAQS (they are eligible for comparison to the 24-hour $PM_{2.5}$ NAAQS). Currently, all of the $PM_{2.5}$ sites in the Bay Area are considered to be representative of area-wide concentrations. |
| Frequency of flow rate verification for PM samplers | 40 CFR Part 58, Appendix A, Sections 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2: require that a one-point flow rate verification check must be performed at least once every month for low-volume PM samplers and quarterly for hi-volume PM samplers. |
| Frequency of one-point QC check for gaseous instruments | 40 CFR Part 58 Appendix A, 3.1.1: requires that QC checks be performed at least once every two weeks. |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 40 CFR Part 58 Appendix A, 3.1.2: requires that $SO_2$, CO, $O_3$, and $NO_2$ monitors have annual performance evaluations. |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 40 CFR Part 58 Appendix A, Sections 3.2.2, 3.3.3, 3.4.3: require that PM samplers have flow rate checks every six months. |

# 4. DETAILED STATION INFORMATION FOR SLAMS AND SPM SITES

## 4.1 Berkeley Aquatic Park (near-road)

| Station Information for Berkeley Aquatic Park | |
|---|---|
| AQS ID | 06-001-0013 |
| GPS coordinates | 37.864731, -122.302703 |
| Location | Trailer within 50m east of Interstate 80 |
| Address | 1 Bolivar, Berkeley CA 94710 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | 25 approximately based on latest siting plans |
| Traffic count (AADT, year) | 262,000 (2015)<br>Traffic counts data were updated on January 24, 2017 and reflect the latest available data. |
| Groundcover | Gravel, grass, small plants. |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

The Air District is monitoring pollutants at this site because it has the fifth highest Fleet Equivalent AADT (FE-AADT) in the Bay Area and is ranked first for highest traffic congestion by the Metropolitan Transportation Commission of the Bay Area. The four segments with higher FE-AADT than this segment are located along Highway 880 in Oakland where the Air District began monitoring on February 1, 2014 (Laney College). This site is monitoring $NO/NO_2$, CO, $O_3$, $PM_{2.5}$, Ultrafine Particulate Matter (UFP), black carbon (BC) and toxics. Monitoring began on July 1, 2016. The site is located near the city of Berkeley, with a population of 112,580 per the 2010 census.

$PM_{2.5}$ monitoring at this site is considered representative of area-wide concentrations within this region even though it is a microscale site. The site type for $NO/NO_2$, CO, $O_3$, and $PM_{2.5}$ in AQS and in the accompanying tables is source oriented and population oriented.

## Berkeley Aquatic Park Monitor Information

| Pollutant, POC | O3, 1 | NO2, 1 | CO, 1 | PM2.5, 3 | BC, 1 |
|---|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary | N/A | Primary | N/A |
| Parameter code | 44201 | 42602 | 42101 | 88101 | 84313 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison | Research |
| Site type(s) | Population Oriented & Source Oriented | Population Oriented & Source Oriented | Population Oriented & Source Oriented | Population Oriented & Source Oriented | Population Oriented & Source Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS | Special Purpose |
| Network affiliation(s) | N/A | Near Road | Near Road | Near Road | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 42i | TECO 48i | Met One FEM BAM 1020 | Teledyne API model 633 |
| Method code | 047 | 074 | 054 | 170 | 894 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM | N/A |
| Collecting Agency | Air District | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District | Air District |
| Spatial scale | Urban | Micro | Micro | Micro | Micro |
| Monitor start date | 07/01/2016 | 07/01/2016 | 07/01/2016 | 07/01/2016 | 07/01/2016 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01-12/31 |
| Probe height (meters) | 6 | 6 | 6 | 2 | 4 |
| Distance from supporting structure (meters) | >1 | >1 per EPA requirement | >1 per EPA requirement | >2 per EPA requirement | >1 desired |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | 4, 0 | 4, 0 | 4, 0 | 5,0.75 | 6, 1 |
| Distance from trees (meters) | 25 | 25 | 25 | 25 | 25 |
| Distance to furnace or incinerator flue (meters) | None | None | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | N/A | N/A |
| Residence time for reactive gases (seconds) | 16 | 18 | 17 | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | Y | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | Bi-weekly | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 09/13/2016 | 09/13/2016 | 09/13/2016 | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | 12/12/2016, 09/14/2016 | N/A |

## 4.2 Bethel Island

| Station Information for Bethel Island | |
|---|---|
| AQS ID | 06-013-1002 |
| GPS coordinates | 38.006311, -121.641918 |
| Location | Trailer in parking lot |
| Address | 5551 Bethel Island Rd, Bethel Island, CA 94511 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Bethel Island Rd: 63<br>Sandmound Blvd: 110 |
| Traffic count (AADT, year) | Bethel Island Rd: 5,550 (2009)<br>Sandmound Blvd: 1,537 (2009)<br>Traffic counts data were updated on March 31, 2017 and reflect the latest available data. |
| Groundcover | Gravel surrounded by grassy fields |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Bethel Island was chosen for air monitoring to measure pollutant transport between the Central Valley and the Bay Area. The site is 26 miles east of the only sea-level gap (the Carquinez Strait) between the two regions. Local pollution emissions are low due to the lack of any industrial sources within six miles of the site. The town of Bethel Island, 0.6 miles to the north, has a population of 2,137 according to the 2010 census. This site was operated by the California Air Resources Board (CARB) from 1981 until late 1986 and by the Air District from then on.

Ozone and $NO/NO_2$ are measured because the area is in the transport corridor between the San Francisco Bay Area and the Central Valley, both of which are major sources of ozone, ozone precursors, and particulates. Traffic volume near the site is low, so CO measurements tend to be representative of natural background levels, or regional transport. $SO_2$ is measured because the area is downwind from numerous refineries, which can be large sources of $SO_2$. $PM_{10}$ is measured because easterly winds occasionally transport particulates from the Central Valley, and because the filters can be analyzed to determine sulfate and nitrate levels transported from the Central Valley.

Toxic compounds are determined from canister samples taken at Bethel Island on a 1:12 schedule and later analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

$PM_{10}$ monitoring was changed from 1:6 to 1:12 sampling effective January 1, 2013 to accommodate limited resources. Because the Bay Area is well above the minimum monitoring requirements for $PM_{10}$, EPA approved this decrease in sampling frequency as well as converting these $PM_{10}$ monitors from SLAMS to SPMs. Therefore, this monitor is no longer counted in $PM_{10}$ minimum monitoring requirements.

During the most recent three years, this site recorded four exceedances of the national 70 ppb 8-hour ozone standard and no exceedances of the national standards for $PM_{10}$, $NO_2$, $SO_2$, or CO.

## Bethel Island Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Regional Transport & Highest Conc. | General Background | Regional Transport |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i |
| Method code | 047 | 054 | 074 |
| FRM/FEM/ARM/other | FEM | FRM | FRM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Urban | Urban | Urban |
| Monitor start date | 03/01/1981 | 03/01/1981 | 03/01/1981 |
| Current Sampling frequency | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 7 | 7 | 7 |
| Distance from supporting structure (meters) | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 13 | 13 | 13 |
| Distance to furnace or incinerator flue (meters) | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 11 | 12 | 12 |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/03/2016<br>11/08/2016 | 05/03/2016<br>11/08/2016 | 05/03/2016<br>11/08/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A |

## Bethel Island Monitor Information

| Pollutant, POC | SO2, 1 | PM10, 1 |
|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary |
| Parameter code | 42401 | 81102 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison |
| Site type(s) | Regional Transport | Regional Transport |
| Monitor type(s) | SLAMS | SPM |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | TECO 43i | Andersen GUV-16HBLA |
| Method code | 060 | 063 |
| FRM/FEM/ARM/other | FEM | FRM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | N/A | Air District |
| Reporting Agency | Air District | Air District |
| Spatial scale | Urban | Neighborhood |
| Monitor start date | 03/01/1981 | 11/05/1986 |
| Current Sampling frequency | Continuous | 1:12 |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 7 | 5 |
| Distance from supporting structure (meters) | >1 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 13 | 14 |
| Distance to furnace or incinerator flue (meters) | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | No |
| Unrestricted airflow (degrees) | 270 | 270 |
| Probe material for reactive gases | Teflon | N/A |
| Residence time for reactive gases (seconds) | 12 | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | Quarterly |
| Frequency of one-point QC check for gaseous instruments | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/03/2016<br>11/08/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | 02/10/2016, 07/20/2016<br>05/02/2016, 11/06/2016 |

## 4.3 Concord

| Station Information for Concord | |
|---|---|
| AQS ID | 06-013-0002 |
| GPS coordinates | 37.936013, -122.026154 |
| Location | One-story commercial building |
| Address | 2956-A Treat Blvd, Concord CA 94518 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Treat Blvd: 181<br>Oak Grove Rd: 244 |
| Traffic count (AADT, year) | Treat Blvd: 42,964 (2016)<br>Oak Grove Rd: 29,100 (2016)<br>Traffic counts data were updated on March 31, 2017 and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Concord was chosen for air monitoring because it is the largest city in Contra Costa County, with a population of 122,067 according to the 2010 census; and because of the high pollution potential due to locally emitted and transported pollutants into the area. Because Concord is in the Diablo Valley, locally emitted pollutants can become trapped when winds are light. Large emission sources in the valley include the two major freeways, Interstate 680 and California Highway 4, and two refineries at the north end of the valley.

The air monitoring site is in the back of a shopping center, near the intersection of two major streets, and surrounded by residential neighborhoods. There is no industry in the immediate vicinity. $NO/NO_2$ is measured because of local mobile emissions. Ozone is measured at the site because hot, inland summertime temperatures combined with precursor pollutants stagnating in the surrounding valley often produces high ozone levels. Carbon monoxide is measured because the site is near two major roads, Treat Blvd. and Oak Grove Road. $SO_2$ is measured because the site is six miles south of the Tesoro and the Shell Refineries, both potential major sources of $SO_2$. $PM_{10}$ and $PM_{2.5}$ are measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels in the valley.

$PM_{10}$ monitoring was changed from 1:6 to 1:12 sampling effective January 1, 2013 to accommodate limited resources. Because the Bay Area is well above the minimum monitoring requirements for $PM_{10}$, EPA approved this decrease in sampling frequency as

well as converting these $PM_{10}$ monitors from SLAMS to SPMs. Therefore, this monitor is no longer counted in $PM_{10}$ minimum monitoring requirements.

VOC toxic compounds are sampled at Concord on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded six exceedances of the national 70 ppb 8-hour ozone standard, and no exceedances of the national standards for $PM_{2.5}$, $PM_{10}$, $NO_2$, $SO_2$, or CO.

## Concord Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | SO2, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | N/A |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 42401 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented & Source Impact |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | TECO 43i |
| Method code | 047 | 054 | 074 | 060 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 04/09/1980 | 02/21/1980 | 2/21/1980 | 02/21/1980 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 9 | 9 | 9 | 9 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 24 | 24 | 24 | 24 |
| Distance to furnace or incinerator flue (meters) | None | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 11 | 11 | 12 | 11 |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 01/12/2016<br>11/08/2016 | 01/12/2016<br>11/08/2016 | 01/12/2016<br>11/08/2016 | 01/12/2016<br>11/08/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | N/A |

## Concord Monitor Information

| Pollutant, POC | PM10, 1 | PM2.5, 3 |
|---|---|---|
| Primary/QA Collocated/Other | Primary | Primary |
| Parameter code | 81102 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented & Highest Conc. |
| Monitor type(s) | SPM | SLAMS |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | Andersen HiVol 1200 | Met One BAM 1020 |
| Method code | 063 | 170 |
| FRM/FEM/ARM/other | FRM | FEM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | Air District | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Urban | Urban |
| Monitor start date | 11/04/1986 | 1/1/2013 |
| Current Sampling frequency | 1:12 | Continuous |
| Sampling season | 01/01-12/31 | 01/01-12/31 |
| Probe height (meters) | 6 | 6 |
| Distance from supporting structure (meters) | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 15 | 22 |
| Distance to furnace or incinerator flue (meters) | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | Y |
| Frequency of flow rate verification for PM samplers | Quarterly | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 01/12/2016, 05/02/2016 07/20/2016, 12/05/2016 | 01/12/2016, 04/28/2016 07/20/2016, 12/05/2016 |

## 4.4 Crockett

| Station Information for Crockett | |
|---|---|
| AQS ID | 06-013-1001 |
| GPS coordinates | 38.054920, -122.233229 |
| Location | Pump house |
| Address | End of Kendall Avenue, Crockett CA 94525 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | San Pablo Ave: 68 |
| Traffic count (AADT, year) | San Pablo Ave: 2,797 (2013)<br>Traffic counts data were updated on March 31, 2017 and reflect the latest available data. |
| Groundcover | Vegetative |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Crockett was chosen for $SO_2$ source oriented monitoring because it is downwind of the Phillips 66 Refinery. Prevailing winds in the area are from the west, which transport $SO_2$ emissions from the refinery over the town of Crockett, a predominately residential community with a population of 3,094 according to the 2010 census. The monitoring site is located on the west side of Crockett 0.9 mile northeast of the refinery boundary. The only other major industry near Crockett is C&H Sugar, which is not a significant source of $SO_2$ emissions.

VOC toxic compounds are sampled at Crockett on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

Crockett is classified as an SPM site. EPA siting criteria require the probe be located at least 10 meters from the drip line of all trees within the 180-degree arc of unrestricted airflow for source oriented monitoring as determined by the predominant wind direction and the direction of the refinery. The closest tree drip line within the 180-degree arc is less than 10 meters from the probe, which does not meet siting criteria. The Air District has been unable to negotiate with the local homeowner's association for the removal of this tree. Even though the siting criteria for a SLAMS site cannot be met, the site is still suitable for source oriented monitoring as an SPM site.

$SO_2$ concentrations measured at Crockett did not exceed the national 1-hour 75 ppb standard during the last three years.

## Crockett Monitor Information

| Pollutant, POC | SO2, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 42401 |
| Basic monitoring objective(s) | NAAQS comparison |
| Site type(s) | Population Oriented & Source Oriented |
| Monitor type(s) | SPM |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 43C |
| Method code | 060 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 01/01/1979 |
| Current Sampling frequency | Continuous |
| Sampling season | 01/01 – 12/31 |
| Probe height (meters) | 6 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | 1 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 270 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 9 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 0411/2016<br>10/11/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.5 Fairfield

| Station Information for Fairfield | |
|---|---|
| AQS ID | 06-095-0005 |
| GPS coordinates | 38.227066, -122.075624 |
| Location | Small trailer in open field |
| Address | 1010 Chadbourne Rd, Fairfield, CA 94534 |
| County | Solano |
| Distance to road from gaseous probe (meters) | Cordelia Rd: 194<br>Chadbourne Rd: 705 |
| Traffic count (AADT, year) | Cordelia Rd: 2,145 (2011)<br>Chadbourne Rd: 2,547 (2011)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Vegetative |
| Statistic Area | Vallejo-Fairfield CBSA |

Fairfield was chosen for monitoring ozone transport between the San Francisco Bay Area and the Sacramento Valley. Fairfield lies in the northeast part of the Air District in the Carquinez Strait Region, the only sea level gap between the Bay Area and the Central Valley. Prevailing westerly winds carry ozone and its precursors from the Bay Area to the Sacramento Valley.

The monitoring site is in a rural area between Fairfield/Suisun City and the greater Bay Area. Prevailing winds are westerly during the summer season. Therefore, the monitor normally measures ozone concentrations coming from the Bay Area. Occasionally easterly winds transport ozone from the Central Valley to Fairfield and the Bay Area.

Over the past decade the Fairfield/Suisun City area has grown considerably. According to the 2010 census the area has a combined population of 138,815, the largest urban area in Solano County. Thus, Fairfield is also a population oriented ozone monitoring site.

Ozone concentrations measured at Fairfield exceeded the national 70 ppb 8-hour ozone standard on one day during the last three years.

## Fairfield Monitor Information

| Pollutant, POC | O3, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 44201 |
| Basic monitoring objective(s) | NAAQS comparison |
| Site type(s) | Population Oriented & Regional Transport |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 49i |
| Method code | 047 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Urban |
| Monitor start date | 05/29/2002 |
| Current Sampling frequency | Continuous |
| Sampling season | 04/01-11/30 |
| Probe height (meters) | 4 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | >50 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 5 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/22/2016<br>07/06/2016<br>10/31/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.6 Forest Knolls

| Station Information for Forest Knolls | |
|---|---|
| AQS ID | 06-041-2001 |
| GPS coordinates | 38.015136, -122.689531 |
| Location | Roof |
| Address | 6 Castro Street, Forest Knolls, CA 94933 |
| County | Marin |
| Distance to road from probe (meters) | Sir Francis Drake Blvd: 14<br>Montezuma Road: 48<br>Castro St: 6<br>Arroyo Rd: 316 |
| Traffic count (AADT, year) | Sir Francis Drake Blvd: 2950 (2014)<br>Montezuma Road: < 300 (est. 2014)<br>Castro St: <300 (est. 2014)<br>Arroyo Rd: <300 (est. 2014)<br>Traffic counts data were updated on March 31, 2016 and reflect the latest available data. |
| Groundcover | Paved |
| Statistic Area | San Francisco-Oakland-Hayward CBSA |

Forest Knolls was chosen for monitoring black carbon (BC) due to community interest about wood smoke in the San Geronimo Valley and to better understand and characterize the wood smoke source category in sheltered valley locations where winter wood burning often is the primary source of home heating. Lagunitas-Forest Knolls is considered a Census Designated Place (CDP) with a population of 1,819 based on the 2010 census.

Forest Knolls is located in San Geronimo Valley about 10 miles west to northwest of San Rafael. Wintertime meteorological conditions are frequently conducive to trapping wood smoke in the valley, particularly during cold, still evenings. Many of the homes do not have residential gas for heating and, therefore, burn wood.

## Forest Knolls Monitor Information

| Pollutant, POC | BC, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 84313 |
| Basic monitoring objective(s) | Research |
| Site type(s) | Population Oriented |
| Monitor type(s) | SPM |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | Teledyne API AE-633 |
| Method code | 894 |
| FRM/FEM/ARM/other | N/A |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 01/16/2013 |
| Current Sampling frequency | Continuous |
| Sampling season | 01/01-12/31 |
| Probe height (meters) | 5 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | 4 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | N/A |
| Residence time for reactive gases (seconds) | N/A |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.7 Fort Cronkhite

| Station Information for Fort Cronkhite | |
|---|---|
| AQS ID | 06-041-0004 |
| GPS coordinates | 37.832725, -122.527658 |
| Location | At ground level behind a ranger residence |
| Address | Building 1111, Fort Cronkhite, Sausalito CA 94965 |
| County | Marin |
| Distance to road from probe (meters) | Bunker Road: 16 |
| Traffic count (AADT, year) | Bunker Road: 948 (2007)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Vegetative |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Fort Cronkhite was chosen as an air VOC toxics monitoring site because it is representative of background levels of VOC toxics compounds transported into the Bay Area from the Pacific Ocean due to prevailing westerly winds. The site is 0.5 miles east of the Pacific Ocean, on the north side of the Golden Gate gap which opens into San Francisco Bay. The monitor is located within the Golden Gate National Recreation Area (GGNRA) near the visitor center at Fort Cronkhite. Low concentrations of toxics from this site provide a baseline to compare other toxics measurements in the Bay Area.

Toxics concentrations measured at this site may reflect some anothropogenic sources in addition to natural background sources such as VOC toxics contributions from ships headed to and from the Bay Area and Central Valley ports, and from ships sailing along the coast. Additionally, there can be a small contribution from vehicle traffic in areas upwind of the site within the GGNRA. Despite these contributions, when winds are from the west, the VOC toxics levels at this site reflect the lowest levels in the Bay Area.

The closest industrial sources are in San Francisco about eight miles southeast of the site. The closest towns are Sausalito, three miles to the east-northeast with a population of 7,061, and Marin City, three miles to the northeast with a population of 2,666 based on the 2010 census. Sausalito and Marin City have little impact on the monitoring site because winds are typically from the west so the site is upwind of these towns, and the towns have no significant industrial sources.

This site is operated as part of the Air District's Toxics Program with samples taken on a 1:12 schedule. Samples are collected using a Xontech canister and are

analyzed in the Air District laboratory. More information about the VOC toxics monitoring program can be found in the Toxics Program section of this report.

## Fort Cronkhite Monitor Information

| Pollutant, POC | Toxics, 3 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | See toxics section |
| Basic monitoring objective(s) | Research |
| Site type(s) | General / Background |
| Monitor type(s) | SPM |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | Xontech 910A |
| Method code | 210 |
| FRM/FEM/ARM/other | N/A |
| Collecting Agency | Air District |
| Analytical Lab | Air District |
| Reporting Agency | Air District |
| Spatial scale | Regional |
| Monitor start date | 03/26/1987 |
| Current Sampling frequency | 1:12 |
| Sampling season | 01/01 - 12/31 |
| Probe height (meters) | 7 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | 20 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Glass |
| Residence time for reactive gases (seconds) | N/A |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.8 Gilroy

| Station Information for Gilroy | |
|---|---|
| AQS ID | 06-085-0002 |
| GPS coordinates | 36.999571, -121.574684 |
| Location | Air monitoring shelter next to water pump station |
| Address | 9th and Princevalle St, Gilroy, CA 95020 |
| County | Santa Clara |
| Distance to road from gaseous probe (meters) | Princevalle St: 18<br>9th St: 16<br>10th St: 185 |
| Traffic count (AADT, year) | Princevalle St: 5,000 (2008)<br>9th St: 1,400 (est. 2013)<br>10th St: 12,700 (2008)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

Gilroy was chosen for air monitoring to measure ozone and particulate transport between the San Francisco and Monterey Bay Areas. Prevailing northwesterly afternoon winds carry ozone and ozone precursors from the San Jose area southward through the Santa Clara Valley. When temperatures are hot, and solar insolation is strong, these precursors react and can form high concentrations of ozone in the Gilroy area. As Gilroy grew in population (48,821 according to the 2010 census) the site was considered not only a regional ozone transport site but also a population oriented ozone site. $PM_{2.5}$ is measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels in the valley.

The monitoring site is in a residential area of Gilroy on the west side of the Santa Clara Valley.

During the most recent three years, this site recorded seven exceedances of the national 70 ppb 8-hour ozone standard and two exceedances of the national 24-hour $PM_{2.5}$ standard. The two exceedances of the national 24-hour $PM_{2.5}$ standard were likely due to fire emissions from a brush fire near Gilroy on June 20, 2015 and the Jerusalem fire in Lake County on August 16, 2015.

## Gilroy Monitor Information

| Pollutant, POC | O3, 1 | PM2.5, 3 |
|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary |
| Parameter code | 44201 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented & Regional Transport | Population Oriented& Regional Transport |
| Monitor type(s) | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | Met One FEM BAM 1020 |
| Method code | 047 | 170 |
| FRM/FEM/ARM/other | FEM | FEM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | N/A | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood |
| Monitor start date | 07/01/1980 | 10/31/2009 |
| Current Sampling frequency | Continuous | Continuous |
| Sampling season | 04/01-11/30 | 01/01 - 12/31 |
| Probe height (meters) | 5 | 3 |
| Distance from supporting structure (meters) | >1 | No supporting structure / ground level |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | N/A |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A | 1.8[a] |
| Distance from trees (meters) | 26 | 26 |
| Distance to furnace or incinerator flue (meters) | 14 | 14 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | Teflon | N/A |
| Residence time for reactive gases (seconds) | 16 | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | Y |
| Frequency of flow rate verification for PM samplers | N/A | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/27/2016<br>07/11/2016<br>11/13/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | 03/08/2016, 04/27/2016<br>07/09/2016, 11/03/2016 |

a The $PM_{2.5}$ monitor is outdoors, ground based. The probe is 3m above ground. A nearby shelter is 1.8m away and is the eve of the shelter is 0.12m above the probe height. This is not an obstruction because the probe is more than twice the distance that the eve extends above the probe. The shelter has a slanted roof that peaks at a height of 3.99m. The probe is 3.9m away from the roof peak, which is 0.99m above the probe. This is not an obstruction because the probe is more than twice the distance that the roof peak extends above the probe.

## 4.9 Hayward

| Station Information for Hayward | |
|---|---|
| AQS ID | 06-001-2001 |
| GPS coordinates | 37.654456, -122.031547 |
| Location | Pump house near water tank |
| Address | 3466 La Mesa Drive, Hayward, CA 94542 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | Hayward Blvd: 26<br>La Mesa Dr: 38<br>Farmhill Drive: 205 |
| Traffic count (AADT, year) | Hayward Blvd: 4,293 (2010)<br>La Mesa Drive: 500 (est. 2012)<br>Farmhill Drive: 2,500 (<2006)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

The Hayward air monitoring site was chosen to measure ozone at a higher elevation. The city of Hayward has a population of 144,186 according to the 2010 census. Located on the east side of Hayward at an elevation of 951 feet, it is the highest elevation ozone SLAMS in the Air District. Studies had shown that on high ozone days, a cloud of ozone and ozone precursors moves southward from Oakland on the west side of the East Bay Hills.

Because ozone monitoring sites were typically located in the low-lying areas of the East and South Bay, i.e., in Oakland and San Jose, this site was chosen to be between them, but at a higher elevation. Thus, the site gives an indication of ozone levels aloft and sub-regional transport. The Hayward site is also important because it provides air quality forecasting information concerning residual ozone from the previous day. Although there is a large water tank onsite in the upwind direction, the instrument probe is high enough so that the tank is not an obstacle.

During the most recent three years, this site recorded six exceedances of the national 70 ppb 8-hour ozone standard.

## Hayward Monitor Information

| Pollutant, POC | O3, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 44201 |
| Basic monitoring objective(s) | NAAQS comparison & Research |
| Site type(s) | Other (Sub-Regional Transport) |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 49i |
| Method code | 047 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Urban |
| Monitor start date | 05/31/1977 |
| Current Sampling frequency | Continuous |
| Sampling season | 04/01-11/30 |
| Probe height (meters) | 7 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | 11 |
| Distance to furnace or incinerator flue (meters) | N/A |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 16 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/25/2016<br>07/07/2016<br>11/04/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.10 Laney College (near-road)

| Station Information for Laney College | |
|---|---|
| AQS ID | 06-001-0012 |
| GPS coordinates | 37.793624, -122.263376 |
| Location | Trailer east of Interstate 880 |
| Address | Laney College 8th St. parking lot, Aisle J, Oakland, CA 94607 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | I-80: 20 |
| Traffic count (AADT, year) | Interstate 880: 230,000 (2015)<br>Traffic counts data were updated on March 28, 2016, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

The Air District began monitoring pollutants at this site on February 1, 2014. The site is along a segment of roadway with the second highest Fleet Equivalent AADT (FE-AADT) in the Bay Area. The roadway segment with the highest FE-AADT in the Bay Area was not suitable for monitoring because it was near train tracks and no access was permitted across the easement by the land owner (Union Pacific) due to safety concerns. The site is in Oakland which is the largest city in Alameda County, with a population of 390,724 according to the 2010 census.

This site monitors $NO/NO_2$, CO, and $PM_{2.5,}$ Ultrafine Particulate Matter (UFP), black carbon (BC) and toxics. $PM_{2.5}$ monitoring at this site is considered representative of area-wide concentrations within this major metropolitan region.

The site type for $NO/NO_2$, CO, and $PM_{2.5}$ in AQS and in the accompanying tables is source oriented and population oriented. The site is within 0.25 miles of residential and commercial areas in Oakland.

During the most recent three years, this site recorded one exceedances of the national 24-hour $PM_{2.5}$ standard.

## Laney College Monitor Information

| Pollutant, POC | NO2, 1 | CO, 1 | PM2.5, 3 | BC, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | Primary | N/A | Primary | N/A |
| Parameter code | 42601 / 42602 | 42101 | 88101 | 84313 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | Public Information |
| Site type(s) | Source Impact & Population Oriented | Source Impact & Population Oriented | Source Impact & Population Oriented | Source Impact |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SPM |
| Network affiliation(s) | Near Road | Near Road | Near Road | N/A |
| Instrument manufacturer and model | TECO 42i | TECO 48i | Met One FEM BAM 1020 | Teledyne API AE-633 |
| Method code | 074 | 054 | 170 | 894 |
| FRM/FEM/ARM/other | FRM | FRM | FEM | N/A |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Micro | Micro | Micro | Micro |
| Monitor start date | 02/01/2014 | 02/01/2014 | 02/01/2014 | 02/01/2014 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01-12/31 |
| Probe height (meters) | 6 | 6 | 5 | 5 |
| Distance from supporting structure (meters) | >1 | >1 | >2 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | None | None | None | None |
| Distance to furnace or incinerator flue (meters) | None | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | No | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | N/A | N/A |
| Residence time for reactive gases (seconds) | 16 | 16 | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | Y | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | Bi-weekly | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | N/A | N/A |
| Dates of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 08/18/2016, 02/04/2016 | 08/18/2016, 02/04/2016 | N/A | N/A |
| Date of semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | 11/30/2016, 08/18/2016, 05/19/2016, 02/03/2016 | N/A |

## 4.11 Livermore

| Station Information for Livermore | |
|---|---|
| AQS ID | 06-001-0007 |
| GPS coordinates | 37.687526, -121.784217 |
| Location | One-story commercial building |
| Address | 793 Rincon Avenue, Livermore, CA 94551 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | Rincon Ave: 67<br>Pine St: 94<br>Interstate 580: 1,320<br>Portola Ave: 722 |
| Traffic count (AADT, year) | Rincon Ave: 3,091 (2013) Portola Ave: 21,747 (2016)<br>Pine St: 4,263 (2013) Interstate 580: 192,000 (2015)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Livermore was chosen for air monitoring because it is the largest city in eastern Alameda County, with a population of 80,968 according to the 2010 census. Past measurements have shown this area to have the highest ozone levels in the Bay Area. Livermore is located within the Livermore Valley, an east-west oriented inland valley between the San Francisco Bay and the Central Valley. Wind analyses of high ozone days show ozone precursors moving to this valley from the Hayward and Niles Canyon Gaps to the west, and from the San Ramon Valley to the north. The air monitoring site is west of the city center, in a residential neighborhood. The station is in a small one-story shopping center, with a little-used parking lot in front of the station and a city park behind it.

There are no industrial sources in the immediate vicinity of the site. Ozone and its precursors and $NO/NO_2$, are measured because the area is downwind of large sources of ozone precursors. $PM_{2.5}$ is measured because light winds combined with surface-based inversions during the winter months can cause elevated particulate levels. Black carbon (BC) is measured to better determine the composition and relationship between BC and $PM_{2.5}$.

VOC toxic compounds are sampled at Livermore on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

The Livermore site is part of an unofficial Photochemical Assessment Monitoring Stations (PAMS) program. This is a program to measure hourly speciated hydrocarbons using a gas chromatograph analyzer at three Bay Area locations. The other two locations are San Ramon and Patterson Pass. A full description of the PAMS program can be found in the PAMS section of this document. As part of the 2015 $O_3$ NAAQS revision, EPA updated the PAMS requirements. Starting in 2019, PAMS measurements are required at NCore sites that are located in Core-Based Statistical Areas (CBSAs) with populations of 1,000,000 or more. The Air District is requesting a waiver from EPA for approval to conduct required PAMS monitoring at Livermore rather than the NCore site (see Appendix H for more details).

During the most recent three years, this site recorded 17 exceedances of the national 70 ppb 8-hour ozone standard, one exceedance of the national 24-hour $PM_{2.5}$ standard, and no exceedances of the national $NO_2$ standard.

## Livermore Monitor Information

| Pollutant, POC | O3, 1 | NO2, 1 | PM2.5, 3 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary | Primary |
| Parameter code | 44201 | 42601 / 42602 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison & Research | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented& Highest Conc. |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | Unofficial PAMS | Unofficial PAMS | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 42i | Met One FEM BAM 1020 |
| Method code | 047 | 074 | 170 |
| FRM/FEM/ARM/other | FEM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | Air District | Air District | Air District |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 01/01/2000 | 12/31/1999 | 03/01/2011 |
| Current Sampling frequency | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 6 | 6 | 5 |
| Distance from supporting structure (meters) | >1 | >1 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 51 | 51 | 52 |
| Distance to furnace or incinerator flue (meters) | 17 | 17 | 21 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | N/A |
| Residence time for reactive gases (seconds) | 13 | 14 | N/A |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | N/A | N/A | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 01/27/2016<br>08/02/2016 | 01/27/2016<br>08/02/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | 01/26/2016, 04/28/2016<br>08/02/2016, 12/05/2016 |

## Livermore Monitor Information

| Pollutant, POC | Speciated PM2.5, 5 | BC, 1 |
|---|---|---|
| Primary/QA Collocated/Other | Other | N/A |
| Parameter code | 88502 (pm mass) – many others see Section 5.5.1 | 84313 |
| Basic monitoring objective(s) | Research | Research |
| Site type(s) | Population Oriented | Population Oriented |
| Monitor type(s) | SPM | SPM |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | Met One SASS | Teledyne API AE-633 |
| Method code | 810 | 894 |
| FRM/FEM/ARM/other | N/A | N/A |
| Collecting Agency | Air District | Air District |
| Analytical Lab | Air District | N/A |
| Reporting Agency | N/A | Air District |
| Spatial scale | Neighborhood | Neighborhood |
| Monitor start date | 06/11/2008 | 01/01/2012 |
| Current Sampling frequency | 1:6 | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01-12/31 |
| Probe height (meters) | 5 | 6 |
| Distance from supporting structure (meters) | >2 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 55 | 52 |
| Distance to furnace or incinerator flue (meters) | 17 | 17 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N | N/A |
| Frequency of flow rate verification for PM samplers | Monthly | N/A |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 01/26/2016, 04/28/2016 08/02/2016, 12/05/2016 | N/A |

## 4.12 Los Gatos

| Station Information for Los Gatos | |
|---|---|
| AQS ID | 06-085-1001 |
| GPS coordinates | 37.226862, -121.979675 |
| Location | Top of fire station's hose drying tower |
| Address | 306 University Ave, Los Gatos, CA 95030 |
| County | Santa Clara |
| Distance to road From gaseous probe (meters) | University Ave: 37<br>Bentley Ave: 27<br>State Route 17: 291<br>State Route 9: 121 |
| Traffic count (AADT, year) | University Ave: 13,000 (2016)<br>Bentley Ave: 700 (2017)<br>State Route 17: 97,000 (2015)<br>State Route 9: 36,500 (2015)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

Los Gatos was chosen for ozone monitoring because prevailing northerly winds transport ozone and ozone precursors from the densely populated area around the south Bay Area to the west side of the Santa Clara Valley.

High ozone levels are in part due to Los Gatos being situated at the base of the Santa Cruz Mountains, which act as a barrier to the movement of polluted air. The monitoring site is located near the downtown area at a fire station surrounded by residential neighborhoods. The city of Los Gatos has a population of 29,413 according to the 2010 census.

During the most recent three years, this site recorded six exceedances of the national 70 ppb 8-hour ozone standard.

## Los Gatos Monitor Information

| Pollutant, POC | O3, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 44201 |
| Basic monitoring objective(s) | NAAQS comparison |
| Site type(s) | Population Oriented |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 49i |
| Method code | 047 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 04/01/1972 |
| Current Sampling frequency | Continuous |
| Sampling season | 04/01 – 11/30 |
| Probe height (meters) | 11.0 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from trees (meters) | 16 |
| Distance to furnace or incinerator flue (meters) | 4 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 11 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Daily |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/26/2016<br>07/12/2016<br>11/02/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.13 Martinez

| Station Information for Martinez | |
|---|---|
| AQS ID | 06-013-2001 |
| GPS coordinates | 38.012816, -122.134467 |
| Location | Small sampling shelter next to fire station |
| Address | 521 Jones St, Martinez, CA 94553 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Jones St: 22<br>Alhambra Ave: 19 |
| Traffic count (AADT, year) | Jones St: 2,000 (2008)<br>Alhambra Ave: 25,001 (2012)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Martinez was chosen for $SO_2$ source oriented monitoring because the Shell and Tesoro oil refineries are located in north and east sections of the city. The Carquinez Strait boarders the city to the north and the prevailing winds are from the west. However, north and east winds can transport $SO_2$ emissions from the refineries over populated areas of the city.

The monitoring site is located near downtown Martinez and is 0.5 miles south of the Shell Refinery and 2.5 miles west of the Tesoro Refinery. According to the 2010 census, Martinez has a 2010 population of 35,824. There are no industrial activities or $SO_2$ sources nearby other than the refineries.

VOC toxic compounds are sampled at Martinez on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

$SO_2$ concentrations measured at Martinez did not exceed the national 1-hour 75-ppb standard during the last three years.

## Martinez Monitor Information

| Pollutant, POC | SO2, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 42401 |
| Basic monitoring objective(s) | NAAQS comparison |
| Site type(s) | Population Oriented& Source Impact |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 43C |
| Method code | 060 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 07/02/1973 |
| Current Sampling frequency | Continuous |
| Sampling season | 01/01 - 12/31 |
| Probe height (meters) | 7 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | 11 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 12 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 01/15/2016<br>07/14/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.14 Napa

| Station Information for Napa | |
|---|---|
| AQS ID | 06-055-0003 |
| GPS coordinates | 38.310942, -122.296189 |
| Location | One story commercial building |
| Address | 2552 Jefferson Street, Napa, CA 94558 |
| County | Napa |
| Distance to road from gaseous probe (meters) | Jefferson St: 16 Brown St: 79<br>Lincoln Ave: 283 Central Ave: 122 |
| Traffic count (AADT, year) | Jefferson St: 19,317 (2016) Brown St: 3,392 (2008)<br>Lincoln St: 17,652 (2016) Central Ave: 2,927 (2007)<br>Traffic counts data were updated on March 9, 2017 and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | Napa CBSA |

Napa was chosen for air monitoring because it is the largest city in Napa County with a population of 76,915 according to the 2010 census. The city is located in the center of Napa Valley where agricultural burning and fireplace usage during the fall and winter can result in high particulate levels. In summer months, Napa can have elevated ozone levels when central Bay Area ozone precursors are transported north to the city. The site will be closed in 2017 pending the opening of the Napa Valley College site. The Napa site relocation request and approval correspondence with EPA is in 0.

The air monitoring site is situated about a mile north of downtown Napa in a mixed residential and commercial neighborhood. There are no industrial sources in the immediate vicinity. Ozone and $NO/NO_2$ are measured because southerly winds carry ozone and its precursors into Napa. The Napa ozone monitor is classified as middle scale based on the nearby traffic count and distance between the monitor and the roadway (per 40 CFR Part 58). However, data is representative at neighborhood spatial scale per waiver from EPA Region 9 (see page 22 for details). Therefore, the Air District considers this monitor to be comparable to the NAAQS.

Carbon monoxide is measured because the Napa Valley is a major tourist attraction with resulting high traffic volumes through the city. $PM_{10}$ and continuous $PM_{2.5}$ are measured because of agricultural and household wood burning. Until October 21, 2016, Napa was also the location of a collocated $PM_{10}$ monitor. The collocated $PM_{10}$ monitor was subsequently moved to the San Pablo site. On October 21, the primary $PM_{10}$ monitoring was discontinued until the Napa Valley College site can be opened.

VOC toxic compounds are sampled at Napa on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

$PM_{2.5}$ is measured using a continuous FEM, which began operating on December 13, 2012. The monitor is classified as middle scale based on its distance from the roadway and nearby traffic volume. The Air District considers this monitor to be comparable to the NAAQS because the monitor is representative of area-wide $PM_{2.5}$ concentrations in the Napa CBSA.

During the most recent three years, this site recorded one exceedance of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for ozone, $PM_{10}$, $NO_2$, or CO were recorded.

## Napa Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i |
| Method code | 047 | 054 | 074 |
| FRM/FEM/ARM/other | FEM | FRM | FRM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Neighborhood per EPA waiver (see p 22) | Middle | Middle |
| Monitor start date | 07/01/1976 | 07/01/1973 | 07/01/1973 |
| Current Sampling frequency | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 9 | 9 | 9 |
| Distance from supporting structure (meters) | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 25 | 25 | 25 |
| Distance to furnace or incinerator flue (meters) | 6 | 6 | 6 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 10 | 7 | 9 |
| Will there be changes within the next 18 months? | Yes[a] | Yes[a] | Yes[a] |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 3/16/2016<br>9/7/2016 | 3/16/2016<br>9/7/2016 | 3/16/2016<br>9/7/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A |

a The site will be closing and a new site will open at Napa College during 2017.

## Napa Monitor Information

| Pollutant, POC | PM10, 1 | PM10[b], 2 | PM2.5, 3 |
|---|---|---|---|
| Primary/QA Collocated/Other | Primary | QA Collocated | Primary |
| Parameter code | 81102 | 81102 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented& Highest Conc. |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | Tisch Env. HiVol TE-6000 | Tisch Env. HiVol TE-6000 | Met One FEM BAM 1020 |
| Method code | 141 | 141 | 170 |
| FRM/FEM/ARM/other | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | Air District | Air District | N/A |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Middle | Middle | Middle |
| Monitor start date | 11/04/1986 | 06/08/2004 | 12/13/2012 |
| Current Sampling frequency | 1:6 | 1:6 | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01-12/31 |
| Probe height (meters) | 6 | 6 | 6 |
| Distance from supporting structure (meters) | >2 | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 21 | 18 | 26 |
| Distance to furnace or incinerator flue (meters) | 5 | 4 | 9 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | 3.4 | 3.4 | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | No | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | N/A | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A | N/A |
| Will there be changes within the next 18 months? | Yes[a] | Yes[a] | Yes[a] |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | Quarterly | Quarterly | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 3/15/2016<br>6/27/2016<br>9/6/2016 | 3/15/2016<br>6/27/2016<br>9/9/2016 | 3/15/2016<br>9/9/2016 |

a The site will be closing and a new site will open at Napa College during 2017.

B The collocated $PM_{10}$ monitor was moved to the San Pablo site on October 21, 2016.

## 4.15 Oakland

| Station Information for Oakland | |
|---|---|
| AQS ID | 06-001-0009 |
| GPS coordinates | 37.743065, -122.169935 |
| Location | Two-story commercial building |
| Address | 9925 International Blvd, Oakland, CA 94603 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | International Blvd: 19<br>98th St: 43 99th St: 23 |
| Traffic count (AADT, year) | International Blvd: 21,988 (2011)<br>98th St: 31,340 (<2006) 99th St: 100 (2008)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Oakland is an important area for air pollution monitoring because it is the largest city in Alameda County, with a population of 390,724 according to the 2010 census. It has large emission sources within its boundaries, such as a major maritime port, an international airport, extensive areas of industry, and several major freeways. These sources have the potential to emit significant amounts of CO and ozone precursors, as well as particulates and toxic compounds.

The monitoring site is located seven miles southeast of downtown Oakland, on a commercial strip in a residential area. Ozone and $NO/NO_2$ are measured to monitor population oriented to these pollutants. Carbon monoxide is measured because of the high volume of traffic in the city, which includes several major freeways. $PM_{2.5}$ is measured due to the large emission sources in the area, and because light winds combined with wood burning, vehicular traffic, and surface-based inversions during winter can cause elevated particulate concentrations.

The monitoring scale for ozone is middle scale. Following an EPA Region 9 review of the distance between the gaseous probe and the roadway, and the corresponding traffic count, EPA Region 9 suggested this monitor be changed from SLAMS to SPM and the Air District agreed to the change. Consequently, this monitor cannot be used toward meeting the minimum monitoring requirements for ozone.

The $PM_{2.5}$ monitor is middle scale based on the distance from the roadway and nearby traffic count. The Air District considers this monitor to represent area-wide air

quality and, therefore, comparable to the NAAQS because the site represents many similar locations throughout the metropolitan area .

VOC toxic compounds are sampled at Oakland on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, the national 24-hour $PM_{2.5}$ standard was exceeded on two days, and the national 70 ppb 8-hour ozone standard was exceeded on two days. No exceedances of the national standards for $NO_2$ or CO were measured during the last three years.

## Oakland Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | PM2.5, 3 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SPM | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | Met One FEM BAM 1020 |
| Method code | 047 | 054 | 074 | 170 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Middle | Middle | Middle | Middle |
| Monitor start date | 11/01/2007 | 11/01/2007 | 11/01/2007 | 10/01/2009 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 10 | 10 | 10 | 7 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 21 | 21 | 21 | 21 |
| Distance to furnace or incinerator flue (meters) | 8 | 8 | 8 | 5 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | N/A |
| Residence time for reactive gases (seconds) | 14 | 15 | 14 | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/20/2016 10/26/2016 | 04/20/2016 10/26/2016 | 04/20/2016 10/26/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | 01/28/2016, 04/19/2016 08/15/2016, 11/01/2016 |

## 4.16 Oakland West

| Station Information for Oakland West | |
|---|---|
| AQS ID | 06-001-0011 |
| GPS coordinates | 37.814781, -122.282347 |
| Location | Shelter in parking lot |
| Address | 1100 21st St, Oakland, CA 94607 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | Grand Ave: 34<br>Linden St: 33<br>Adeline St: 168<br>21st St: 80 |
| Traffic count (AADT, year) | Grand Ave: 19,796 (2012)<br>Linden St: 500 (2012)<br>Adeline St: 8,596 (2013)<br>21st St: 600 (2015)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

The Air District opened a monitoring station one mile downwind of the Port of Oakland in February 2009 because the Port of Oakland is considered a major area source of diesel particulate matter emissions. Studies have shown that the West Oakland community is exposed to higher concentrations of diesel particulate matter than elsewhere in the Bay Area, resulting in higher potential cancer risks. This site is one of the 40 nationwide sites for community monitoring of $NO_2$ in areas with susceptible and vulnerable populations.

Carbon monoxide, NO/$NO_2$, and $PM_{2.5}$ are measured to determine the impact of emissions from the Port of Oakland and its associated diesel-truck traffic, and vehicle traffic from nearby highways. $SO_2$ is measured to determine the impact of emissions from ship traffic. Black carbon (BC) is measured to better determine the composition and relationship between BC and $PM_{2.5}$.

VOC toxic compounds are sampled at Oakland West on a 1:12 schedule, and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded four exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for $O_3$, $NO_2$, $SO_2$, or CO were measured during the past three years.

## Oakland West Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | SO2, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | N/A |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 42401 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | TECO 43i |
| Method code | 047 | 054 | 074 | 060 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Middle | Neighborhood | Neighborhood |
| Monitor start date | 12/13/2010 | 02/25/2009 | 02/25/2009 | 02/25/2009 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 6 | 6 | 6 | 6 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 40 | 40 | 40 | 40 |
| Distance to furnace or incinerator flue (meters) | None | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 10 | 10 | 10 | 10 |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/06/2016 11/29/2016 | 05/06/2016 11/29/2016 | 05/06/2016 11/29/2016 | 05/06/2016 11/29/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | N/A |

## Oakland West Monitor Information

| Pollutant, POC | PM2.5, 3 | Speciated PM2.5, 5 | BC, 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | Primary | Other | N/A |
| Parameter code | 88101 | 88502 (pm mass) – many others see SASS section | 84313 |
| Basic monitoring objective(s) | NAAQS comparison | Research | Research |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SPM | SPM |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | Met One FEM BAM 1020 | Met One SASS | Teledyne API AE-633 |
| Method code | 170 | 810 | 894 |
| FRM/FEM/ARM/other | FEM | N/A | N/A |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | Air District | N/A |
| Reporting Agency | Air District | N/A | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 12/18/2012 | 02/12/2009 | 03/17/2009 |
| Current Sampling frequency | Continuous | 1:6 | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 5 | 5 | 5 |
| Distance from supporting structure (meters) | >2 | >2 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 40 | 39 | 40 |
| Distance to furnace or incinerator flue (meters) | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | No | No | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | N/A | N/A | Glass |
| Residence time for reactive gases (seconds) | N/A | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | Y | N | N/A |
| Frequency of flow rate verification for PM samplers | Bi-weekly | Monthly | N/A |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 03/17/2016, 05/25/2016 08/25/2016, 11/20/2016 | 03/17/2016, 05/25/2016 08/25/2016, 11/28/2016 | N/A |

## 4.17 Palo Alto Airport

| Station Information for Palo Alto Airport | |
|---|---|
| AQS ID | 06-085-2010 |
| GPS coordinates | 37.457621, -122.112286 |
| Location | The end of the runway in the aircraft run-up zone |
| Address | 1925 Embarcadero Road, Palo Alto, CA 94303 |
| County | Santa Clara |
| Groundcover | Paved |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

To better assess lead emissions and possible public exposure to lead in the ambient air near general aviation airports, the EPA selected 15 airports from across the nation (see 40 CFR 58 Appendix D 4.5(a)(iii)). Palo Alto Airport was one of the 15 airports chosen by EPA for required TSP-lead monitoring due to expected lead emissions from piston engine aircraft utilizing this airport.

For these required airport lead monitoring sites, if the rolling three-month average exceeds 50% of the 0.15 $\mu g/m^3$ NAAQS, then the site will continue to operate. If concentrations are consistently below 50% of the NAAQS, monitoring agencies may request a waiver for EPA approval to discontinue airport lead monitoring.

Lead monitoring at this site began on February 3, 2012, but was extended indefinitely because monitoring results showed that lead concentrations exceed 50% of the NAAQS in all but one of the rolling three-month quarters since monitoring began. Lead monitoring ended on December 19, 2014, because Santa Clara County sold the property to the City of Palo Alto. The sale triggered an FAA review of various operational plans and permits, revealing that the lead sampler location violated FAA regulations. The closure date in AQS is December 23, 2014 (the date of the last audit). The Air District continues to work EPA to identify a suitable alternative.

## Palo Alto Airport Monitor Information

| Pollutant, POC | Lead (TSP), 3 |
|---|---|
| Primary/QA Collocated/Other | Primary |
| Parameter code | 14129 |
| Basic monitoring objective(s) | NAAQS Comparison & Research |
| Site type(s) | Source Oriented |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | Tisch TE-HVPLUS-BL |
| Method code | 191 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | RTI |
| Reporting Agency | Air District |
| Spatial scale | Micro |
| Monitor start date | 02/03/2012 |
| Current Sampling frequency | 1:6 |
| Sampling season | 01/01 - 12/31 |
| Probe height (meters) | 2.0 |
| Distance from supporting structure (meters) | N/A |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | >20 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | N/A |
| Residence time for reactive gases (seconds) | N/A |
| Will there be changes within the next 18 months? | Yes – closed Dec 2014, working with EPA on alternative |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | Quarterly |
| Frequency of one-point QC check for gaseous instruments | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | Site closed Dec 2014 due to FAA violations in siting |

## 4.18 Patterson Pass

| Station Information for Patterson Pass | |
|---|---|
| AQS ID | 06-001-2005 |
| GPS coordinates | 37.689615, -121.631916 |
| Location | Trailer |
| Address | 13224 Patterson Pass Road, Livermore, CA 94550 |
| County | Alameda |
| Distance to road from gaseous probe (meters) | Patterson Pass Road: 400 |
| Traffic count (AADT, year) | Patterson Pass Road: 3,595 (2012)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Vegetative |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

The Patterson Pass site is part of a Bay Area Photochemical Assessment Monitoring Stations (PAMS) program. Prior to the 2013 $O_3$ NAAQS, the Bay Area was not required to participate in the required EPA PAMS program, however, this unofficial PAMS program was designed to facilitate $O_3$ formation and transport research and to help improve local $O_3$ forecasting. The PAMS sites measure hourly speciated hydrocarbons using a gas chromatograph analyzer, $O_3$ and $NO/NO_2$ at three Bay Area locations (the other two locations are San Ramon and Livermore). A full description of the PAMS program can be found in the PAMS section of this document.

The site is located in a sparsely populated unincorporated area in the hills east of Livermore. It was established in August 2010 to provide additional information about potential transport of ozone precursor compounds between the Bay Area and the Central Valley. In March 2011, the Air District added a $NO/NO_2$ monitor at this site. The Air District does not operate the $NO_x$ monitor during winter (December 1-March 31). In April 2015, the non-FEM $O_3$ monitor was replaced with an FEM monitor, which will be operated year-round.

The Air District chooses to operate all monitors at this site as PAMS-like sites that meet both Appendix E and Appendix A as allowed under Part 58.11(d). When the $NO_2$ and $O_3$ FEM monitors operate for more than 24 months, the data are eligible for NAAQS comparison, but the monitors are still considered SPMs and do not contribute to minimum monitoring design requirements.

Since $NO_2$ monitoring began in March 2011, no exceedances of the national $NO_2$ standard have been measured. Since $O_3$ monitoring began in April 2015, this site recorded twenty exceedances of the national 70 ppb 8-hour ozone standard.

This site was closed in March 2017. The objective of this special purpose monitor was to support ozone transport research, but the data have not proven to be representative of Bay Area ozone production or population oriented, nor have they improved air quality forecasting capabilities. Therefore, this site is being closed to redeploy resources in order to better achieve local air quality management goals. In accordance with 40 CFR 58.20, EPA considers data from this monitor not eligible for comparison to the NAAQS.

## Patterson Pass Monitor Information

| Pollutant, POC | O3, 1 | NO2, 1 |
|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary |
| Parameter code | 44201 | 42601 / 42602 |
| Basic monitoring objective(s) | Research | Research |
| Site type(s) | Regional Transport | Regional Transport |
| Monitor type(s) | SPM | SPM |
| Network affiliation(s) | Unofficial PAMS | Unofficial PAMS |
| Instrument manufacturer and model | TECO 49i | TECO 42i |
| Method code | 047 | 074 |
| FRM/FEM/ARM/other | FEM | FRM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | N/A | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Regional | Regional |
| Monitor start date | 04/01/2015 | 03/01/2011 |
| Current Sampling frequency | Continuous | Continuous |
| Sampling season | 01/01-12/31 | 04/01-11/30 |
| Probe height (meters) | 5.8 | 6 |
| Distance from supporting structure (meters) | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 9 | 8 |
| Will there be changes within the next 18 months? | Yes[a] | Yes[a] |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 6/14/2016<br>12/7/2016 | 6/14/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A |

a The site was closed on March 29, 2017.

## 4.19 Point Richmond

| Station Information for Point Richmond | |
|---|---|
| AQS ID | 06-013-0005 |
| GPS coordinates | 37.926162, -122.385561 |
| Location | Air monitoring shelter next to fire station |
| Address | 140 W. Richmond Ave, Richmond, CA 94801 |
| County | Contra Costa |
| Distance to road From gaseous probe (meters) | Washington Ave: 25<br>W. Richmond Ave: 10<br>Park Place: 27<br>Interstate 580: 266 |
| Traffic count (AADT, year) | Washington Ave: 1,000 (2012)<br>W. Richmond Ave: 1,340 (2003)<br>Park Place: 250 (2012)<br>Interstate 580: 80,000 (2014)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Point Richmond was chosen for $H_2S$ source oriented monitoring because the community is near the southern fenceline of the Chevron refinery. The monitoring site is located in downtown Point Richmond, 0.2 miles south of the Chevron refinery boundary. Point Richmond, a neighborhood within the city of Richmond, has a population of 3,780 according to the 2010 census.

Although prevailing winds in the area are from the south-southwest, occasional northerly winds will transport $H_2S$ emissions from the refinery over the community. $H_2S$ gases at Chevron can be emitted from the processing units, one mile to the north, or the Chevron Richmond Long Wharf Complex, one mile to the west, where crude oil and other feedstock chemicals from tankers are unloaded.

## Point Richmond Monitor Information

| Pollutant, POC | H2S, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 42402 |
| Basic monitoring objective(s) | Public Information |
| Site type(s) | Population Oriented& Source Impact |
| Monitor type(s) | SPM |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 45i |
| Method code | 020 |
| FRM/FEM/ARM/other | N/A |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 01/01/1999 |
| Current Sampling frequency | Continuous |
| Sampling season | 01/01 - 12/31 |
| Probe height (meters) | 3 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from trees (meters) | 17 |
| Distance to furnace or incinerator flue (meters) | 7 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 5 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other week |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/14/2016<br>10/13/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.20 Redwood City

| Station Information for Redwood City | |
|---|---|
| AQS ID | 06-081-1001 |
| GPS coordinates | 37.482934, -122.203500 |
| Location | One-story commercial building |
| Address | 897 Barron Ave, Redwood City, CA 94063 |
| County | San Mateo |
| Distance to road from gaseous probe (meters) | Barron Ave: 13<br>Bay Road: 24<br>Warrington Ave: 131<br>US Highway 101: 455 |
| Traffic count (AADT, year) | Barron Ave: 1,200 (2016) Warrington Ave: 1,100 (2017)<br>Bay Road: 10,000 (2010) U.S. Highway 101: 221,000 (2015)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Redwood City was chosen for air monitoring because it is one of the largest cities in San Mateo County, with a population of 76,815 according to the 2010 census. Being midway between San Francisco and San Jose, the site is well positioned to monitor ozone precursors and ozone moving southward across the peninsula as they are channeled by the coastal mountains to the west. Generally, Redwood City characterizes an area between South San Francisco and Palo Alto, which has a low air pollution potential due to the frequent presence of the sea breeze. Although the sea breeze typically keeps pollution levels low, when winds are light, high levels of ozone precursors, ozone, or particulates can occur due to the large number of sources in the area.

The air monitoring site is located in a commercial/industrial zone bordered by U.S. Highway 101 on one side and residential areas on the other three sides. $NO/NO_2$ and ozone are monitored because the area is a large source of ozone precursor emissions and ozone. Carbon monoxide is monitored because of the high traffic volume in the area with U.S. Highway 101, 0.3 miles north of the site. $PM_{2.5}$ is monitored because light winds combined with surface-based inversions during the winter months can cause particulate levels to become elevated.

VOC toxic compounds are sampled at Redwood City on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded one exceedance of the national 70 ppb 8-hour ozone standard. No exceedances of the national standards for $PM_{2.5}$, $NO_2$ or CO were measured during the last three years.

## Redwood City Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | PM2.5, 3 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | Met One FEM BAM 1020 |
| Method code | 047 | 054 | 074 | 170 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 07/01/1976 | 03/01/1967 | 03/01/1967 | 10/01/2009 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 7 | 7 | 7 | 6 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 46 | 46 | 46 | 47 |
| Distance to furnace or incinerator flue (meters) | 13 | 13 | 13 | 14 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | N/A |
| Residence time for reactive gases (seconds) | 15 | 15 | 15 | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 02/23/2016 08/09/2016 | 02/23/2016 08/09/2016 | 02/23/2016 08/09/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | 02/22/2016, 05/19/2016 08/11/2016, 11/30/2016 |

## 4.21 Reid-Hillview Airport

| Station Information for Reid-Hillview Airport | |
|---|---|
| AQS ID | 06-085-2011 |
| GPS coordinates | 37.329841, -121.815438 |
| Location | The end of the runway in the aircraft run-up zone |
| Address | 2500 Cunningham Ave., San Jose, CA 95148 |
| County | Santa Clara |
| Groundcover | Paved |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

To better assess lead emissions and possible public exposure to lead in the ambient air near general aviation airports, the EPA selected 15 airports from across the nation (see 40 CFR 58 Appendix D 4.5(a)(iii)).

Reid-Hillview Airport was one of the 15 airports chosen by EPA for required TSP-lead monitoring due to expected lead emissions from piston engine aircraft utilizing this airport.

For these required airport lead monitoring sites, if the rolling three-month average exceeds 50% of the 0.15 µg/$m^3$ NAAQS, then the site will continue to operate. If concentrations are consistently below 50% of the NAAQS, monitoring agencies may request a waiver for EPA approval to discontinue airport lead monitoring. For Reid-Hillview airport, results through December 2016 indicate that lead concentrations exceeded 50% of the NAAQS in a few of the rolling three-month quarters. Consequently, this site will continue monitoring in 2017. Three-month rolling averages from 2014 through 2016 at this site ranged from 0.049 µg/$m^3$to 0.103 µg/$m^3$.

## Reid-Hillview Airport Monitor Information

| Pollutant, POC | Lead (TSP), 3 |
|---|---|
| Primary/QA Collocated/Other | Primary |
| Parameter code | 14129 |
| Basic monitoring objective(s) | NAAQS Comparison & Research |
| Site type(s) | Source Oriented |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | Tisch TE-HVPLUS-BL |
| Method code | 191 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | ERG |
| Reporting Agency | Air District |
| Spatial scale | Micro |
| Monitor start date | 02/03/2012 |
| Current Sampling frequency | 1:6 |
| Sampling season | 01/01 - 12/31 |
| Probe height (meters) | 1.6[a] |
| Distance from supporting structure (meters) | N/A |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | > 20 |
| Distance to furnace or incinerator flue (meters) | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | N/A |
| Residence time for reactive gases (seconds) | N/A |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | Quarterly |
| Frequency of one-point QC check for gaseous instruments | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 12/28/2016, 09/22/2016, 06/16/2016, 03/22/2016 |

a The probe height of the lead sampler at Reid-Hillview is set to the height of the fence standing between the samplers and Tully Road in order to place the sampler within the area designated by EPA for sampling. This was a requirement of the Reid-Hillview Airport and was designed to ensure that the samplers were in unquestionable compliance with the FAA requirements in 14 CFR Part 77. Operation of the samplers at the airport was contingent on meeting this requirement. Movement of the sampler to achieve a probe height greater than or equal to 2 meters would result in the sampler being located off airport property.

## 4.22 Richmond 7th

| Station Information for Richmond 7th | |
|---|---|
| AQS ID | 06-013-0006 |
| GPS coordinates | 37.948172, -122.364852 |
| Location | Fire station |
| Address | 1065 7th Street, Richmond, CA 94801 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | 7th St: 22<br>Hensley St: 30<br>Richmond Parkway: 200 |
| Traffic count (AADT, year) | 7th St: 3,125 (2007)<br>Hensley St: 3,700 (2012)<br>Richmond Parkway: 32,000 (2012)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Richmond 7th Street was chosen for $H_2S$ and $SO_2$ source oriented monitoring because it is near the eastern fence line of the Chevron refinery. Richmond has a population of 103,701 per the 2010 census and the site is located 0.5 miles east of the refinery boundary where public exposure to the highest $H_2S$ and $SO_2$ concentrations are expected. Normally, monitoring is done downwind of the prevailing wind direction. However, the prevailing winds are from the south, and carry emissions over San Pablo Bay. Because it is impractical to monitor over San Pablo Bay, a monitoring site was chosen downwind of the secondary wind direction, on the east side of the refinery.

VOC toxic compounds are sampled at Richmond 7th on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

$SO_2$ concentrations measured at Richmond 7th did not exceed the national 1-hour 75 ppb standard during the last three years.

## Richmond 7th Monitor Information

| Pollutant, POC | SO2, 1 | H2S, 1 |
|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A |
| Parameter code | 42401 | 42402 |
| Basic monitoring objective(s) | NAAQS comparison | Public information |
| Site type(s) | Population Oriented & Source Impact | Population Oriented & Source Impact |
| Monitor type(s) | SLAMS | SPM |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | TECO 43i | TECO 43i |
| Method code | 060 | 020 |
| FRM/FEM/ARM/other | FEM | N/A |
| Collecting Agency | Air District | Air District |
| Analytical Lab | N/A | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood |
| Monitor start date | 07/01/1980 | 01/01/1999 |
| Current Sampling frequency | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 8 | 8 |
| Distance from supporting structure (meters) | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 10 | 10 |
| Distance to furnace or incinerator flue (meters) | 12 | 12 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 5 | 5 |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other week |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 04/13/2016<br>10/12/2016 | 04/13/2016<br>10/12/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A |

## 4.23 Rodeo

| Station Information for Rodeo | |
|---|---|
| AQS ID | 06-013-0007 |
| GPS coordinates | 38.034331, -122.270336 |
| Location | Single story storage area at fire station |
| Address | 326 Third Street, Rodeo, CA 94572 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Third St: 13<br>Parker St: 249 |
| Traffic count (AADT, year) | Third St: 500 (2007)<br>Parker St: 9,484 (2013)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

Rodeo was chosen for $H_2S$ source oriented monitoring because the Phillips 66 refinery is on the northeastern boundary of the city with a population of 8,679 according to the 2010 census. The monitoring site is in a residential area 0.6 miles southwest of the refinery. Although the prevailing winds in the area are from the southwest, northeast winds can transport $H_2S$ emissions from the refinery over the populated area of the town.

## Rodeo Monitor Information

| Pollutant, POC | H2S, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 42402 |
| Basic monitoring objective(s) | Public information |
| Site type(s) | Population Oriented & Source Impact |
| Monitor type(s) | SPM |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 45C |
| Method code | 020 |
| FRM/FEM/ARM/other | N/A |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Neighborhood |
| Monitor start date | 04/01/2002 |
| Current Sampling frequency | Continuous |
| Sampling season | 01/01 – 12/31 |
| Probe height (meters) | 7 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None |
| Distance from trees (meters) | >50 |
| Distance to furnace or incinerator flue (meters) | 11 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 12 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other week |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 01/14/2016<br>07/13/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.24 San Carlos Airport (II)

| Station Information for San Carlos Airport (II) | |
|---|---|
| AQS ID | 06-081-2004 |
| GPS coordinates | 37.508162, -122.246305 |
| Location | The end of the runway in the aircraft run-up zone |
| Address | 620 Airport Drive, San Carlos, CA 94070 |
| County | San Mateo |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

To better assess lead emissions and possible public exposure to lead in the ambient air near general aviation airports, the EPA selected 15 airports from across the nation (see 40 CFR 58 Appendix D 4.5(a)(iii)). San Carlos Airport was one of the 15 airports chosen by EPA for required TSP-lead monitoring due to expected lead emissions from piston engine aircraft utilizing this airport.

For these required airport lead monitoring sites, if the rolling three-month average exceeds 50% of the 0.15 µg/$m^3$ NAAQS, then the site will continue to operate. If concentrations are consistently below 50% of the NAAQS, monitoring agencies may request a waiver for EPA approval to discontinue airport lead monitoring.

Lead monitoring at the San Carlos II site (both primary and collocated) started on March 25, 2015. The original San Carlos Airport I site was inappropriately sited and had to be moved because it violated FAA air space restrictions. This new site has a different AQS site ID (06-081-2004) than the original San Carlos Airport I site because the new site is about 120 meters to the southeast and farther away from the aircraft run-up area. Three-month rolling averages during 2015 and 2016 at this site ranged from 0.016 µg/$m^3$to 0.025 µg/$m^3$.

As of Tuesday, April 11, 2017, the TSP-Pb monitoring at the San Carlos Airport II monitoring site has been discontinued due to circumstances beyond the Air District's control. The Air District notified EPA of the discontinuation of data collection on April 13, 2017. See Sections 2.2.9 and 2.4 for more details.

## San Carlos Airport (II) Monitor Information

| Pollutant, POC | Lead (TSP), 3 | Lead (TSP), 5 |
|---|---|---|
| Primary/QA Collocated/Other | Primary | QA Collocated |
| Parameter code | 14129 | 14129 |
| Basic monitoring objective(s) | NAAQS Comparison & Research | NAAQS Comparison & Research |
| Site type(s) | Source Oriented | Source Oriented |
| Monitor type(s) | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | Tisch TE-HVPLUS-BL | Tisch TE-HVPLUS-BL |
| Method code | 191 | 191 |
| FRM/FEM/ARM/other | FEM | FEM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | ERG | ERG |
| Reporting Agency | Air District | Air District |
| Spatial scale | Micro | Micro |
| Monitor start date | 03/25/2015 | 03/25/2015 |
| Current Sampling frequency | 1:6 | 1:12 |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 2.1 | 2.1 |
| Distance from supporting structure (meters) | N/A | N/A |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | >30 | >30 |
| Distance to furnace or incinerator flue (meters) | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | 2.8 | 2.8 |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | No |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A |
| Will there be changes within the next 18 months? | No | No |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A |
| Frequency of flow rate verification for PM samplers | Quarterly | Quarterly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A |
| Dates of semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 12/28/2016,09/24/2016, 06/30/2016, 03/22/2016 | 12/28/2016,09/24/2016, 06/30/2016, 03/22/2016 |

## 4.25 San Francisco

| Station Information for San Francisco | |
|---|---|
| AQS ID | 06-075-0005 |
| GPS coordinates | 37.765946, -122.399044 |
| Location | One-story commercial building |
| Address | 10 Arkansas St, Suite N, San Francisco, CA 94107 |
| County | San Francisco |
| Distance to road from gaseous probe (meters) | $16^{th}$ St: 32 Interstate 280: 300<br>Arkansas St: 17 U.S. Highway 101: 504 |
| Traffic count (AADT, year) | $16^{th}$ St: 11,764 (2012)<br>Arkansas St: 1,750 (2015)<br>Interstate 280: 106,000 (2015)<br>U.S. Highway 101: 226,000 (2015)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

San Francisco was chosen for air monitoring because it is the second largest city in the Bay Area with a population of 805,235 according to the 2010 census. Although the sea breeze usually keeps pollution levels low, light wind conditions can result in high levels of ozone precursors or particulates due to the large number of sources in the city. The east side of the city was selected for air monitoring because it is densely populated (including many daytime visitors and commuters), has some industry, and, as a transportation hub, has generally higher traffic volume. The site is located near the fringe of the central business district, in an area of light industry that is close to a residential area and two major freeways.

Ozone and $NO/NO_2$ are measured to monitor population exposure to these pollutants, and because this is a source area for ozone precursors. Carbon monoxide is measured due to high traffic volume. $PM_{10}$ and $PM_{2.5}$ are measured due to stagnant days, surface-based inversions, and heavy vehicular traffic can cause elevated PM levels.

$PM_{10}$ monitoring was changed from 1:6 to 1:12 sampling effective January 1, 2013 to accommodate limited resources. Because the Bay Area is well above the minimum monitoring requirements for $PM_{10}$, EPA approved this decrease in sampling frequency as well as converting these $PM_{10}$ monitors from SLAMS to SPMs. Therefore, this monitor is no longer counted in $PM_{10}$ minimum monitoring requirements.

VOC toxic compounds are sampled at San Francisco by both the Air District and CARB on a 1:12 schedule and analyzed by their respective laboratories. Carbonyls and

metals are also sampled by CARB on the same 1:12 schedule. Details about the CARB toxics monitoring program can be found at http://www.arb.ca.gov/toxics/toxics.htm. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

During the most recent three years, there were no exceedances of the national standards for ozone, $PM_{2.5}$, $PM_{10}$, $NO_2$ or CO recorded.

## San Francisco Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i |
| Method code | 047 | 054 | 074 |
| FRM/FEM/ARM/other | FEM | FRM | FRM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 01/01/1986 | 01/01/1986 | NO: 12/01/1985<br>NO2: 01/01/1986 |
| Current Sampling frequency | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 11 | 11 | 11 |
| Distance from supporting structure (meters) | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | 15 | 15 | 15 |
| Distance to furnace or incinerator flue (meters) | 5 | 5 | 5 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 11 | 11 | 12 |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/10/2016<br>11/06/2016 | 05/10/2016<br>11/06/2016 | 05/10/2016<br>11/06/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A |

## San Francisco Monitor Information

| Pollutant, POC | PM10, 1 | PM2.5, 3 |
|---|---|---|
| Primary/QA Collocated/Other | Primary | Primary |
| Parameter code | 81102 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented |
| Monitor type(s) | SPM | SLAMS |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | Andersen HiVol 1200 | Met One FEM BAM 1020 |
| Method code | 063 | 170 |
| FRM/FEM/ARM/other | FRM | FEM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | Air District | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood |
| Monitor start date | 11/16/1986 | 10/01/2009 |
| Current Sampling frequency | 1:12 | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 8 | 8 |
| Distance from supporting structure (meters) | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 18 | 16 |
| Distance to furnace or incinerator flue (meters) | 7 | 7 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | Y |
| Frequency of flow rate verification for PM samplers | Quarterly | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 02/01/2016, 05/09/2016 08/03/2016, 11/15/2016 | 02/01/2016, 05/09/2016 08/03/2016, 11/15/2016 |

## 4.26 San Jose – Jackson

| Station Information for San Jose – Jackson | |
|---|---|
| AQS ID | 06-085-0005 |
| GPS coordinates | 37.348497, -121.894898 |
| Location | Top floor of two-story commercial building |
| Address | 158 E. Jackson St, San Jose, CA 95112 |
| County | Santa Clara |
| Distance to road from gaseous probe (meters) | Jackson St: 15<br>4th St: 35 |
| Traffic count (AADT, year) | Jackson St: 5,992 (2007)<br>4th St: 7,300 (2014)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

San Jose was chosen for air monitoring because it is the largest city in the Bay Area, with a population of 945,942 according to the 2010 census. The air monitoring site is in the center of northern Santa Clara Valley, in a commercial and residential part of downtown San Jose. This area is encircled by major freeways with an international airport 1.5 miles to the northwest.

Ozone precursors emitted within the central San Francisco Bay Area are often carried into the San Jose area by the prevailing northwesterly winds. The northern half of the Santa Clara Valley is densely populated and the associated activities of the residents also add significant pollutant emissions into the air. The air quality in this location is representative of a large part of the valley due to the diurnal up-valley and down-valley air flow, which mixes the pollutants throughout the valley.

$NO/NO_2$ and ozone are monitored because of the large amount of ozone precursor emissions near the area as well as from upwind areas. Carbon monoxide is measured because of the significant traffic volume in the area. $PM_{10}$ and $PM_{2.5}$ are monitored because light winds combined with surface-based inversions within the valley during winter months can cause elevated particulate levels.

The San Jose – Jackson station was approved by EPA as an NCore multi-pollutant monitoring station on October 30, 2009 and NCore air monitoring began on January 1, 2011. NCore sites must measure, at a minimum, $PM_{2.5}$ using both continuous and filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$, $O_3$, $SO_2$, CO, $NO/NO_Y$, wind speed, wind direction, relative humidity, and ambient temperature. More information about the

NCore program is included in Section 5.3. In March 2014, the Air District requested a waiver (see APPENDIX F) to discontinue $NO_y$ monitoring for the NCore program because 2011-2013 data showed an insignificant statistical difference between $NO_x$ and $NO_y$. Similar findings are shown using the 2014-2015 data. EPA has not yet officially responded to this request. However, since $NO_y$ is a required parameter for the upcoming PAMS requirement, the Air District is renewing the request to discontinue $NO_y$ monitoring at the NCore site so that the monitor can be relocated to the proposed required PAMS site at Livermore.

Gaseous VOC toxic compounds, carbonyls, PAHs, and metals are sampled on a 1:6 schedule as part of the NATTS program. The Air District laboratory analyzes samples for VOCs and carbonyls, the EPA national contract laboratory, currently ERG, analyzes samples for PAH's and $PM_{10}$ metals. CARB also does sampling for VOC toxic compounds, carbonyls, and metals at San Jose but on a 1:12 schedule with the analysis done by the CARB laboratory. More information about CARB toxics monitoring can be found at: https://www.arb.ca.gov/aaqm/toxics.htm. Information about toxics monitoring by the Air District can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded two exceedances of the national 70 ppb 8-hour ozone standard and four exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for $PM_{10}$, $NO_2$, $SO_2$, or CO were measured during the last three years.

## San Jose – Jackson Monitor Information

| Pollutant, POC | O3, 1 | CO[a], 1 | NO2, 1 | SO2[a], 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | N/A |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 42401 |
| Basic monitoring objective(s) | NAAQS comparison & Research | NAAQS comparison & Research | NAAQS comparison & Research | NAAQS comparison & Research |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | NCore | NCore | N/A | NCore |
| Instrument manufacturer and model | TECO 49i | TECO 48iTLE | TECO 42i | TECO 43iTLE |
| Method code | 047 | 554 | 074 | 560 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 11/01/2002 | 11/01/2002 | 11/01/2002 | 02/10/2009 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 12 | 12 | 12 | 12 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 5 | 5 | 5 | 5 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 12 | 14 | 13 | 15 |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/17/2016<br>11/12/2016 | 03/08/2016<br>08/24/2016 | 05/17/2016<br>11/12/2016 | 03/08/2016<br>08/24/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | N/A |

a Trace level instruments required for CO and $SO_2$ at NCore sites.

## San Jose – Jackson Monitor Information

| Pollutant, POC | $NO_y$, 2 | PM10, 1 | Lead (from PM10), 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary | Primary |
| Parameter code | 42600 | 81102 | 85129 |
| Basic monitoring objective(s) | Research | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | NCore | N/A | NCore |
| Instrument manufacturer and model | API 200 EU/NOy | Partisol 2025 without VSCC | Partisol 2025 without VSCC |
| Method code | 699 | 127 | 907 |
| FRM/FEM/ARM/other | N/A | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | Air District | ERG |
| Reporting Agency | Air District | Air District | ERG |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 01/13/2011 | 10/15/2002 | 06/01/2012 |
| Current Sampling frequency | Continuous | 1:3 (1:6 required) | 1:6 |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 11 | 9 | 9 |
| Distance from supporting structure (meters) | >1 | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 5 | 3 | 3 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | N/A | N/A |
| Residence time for reactive gases (seconds) | None | N/A | N/A |
| Will there be changes within the next 18 months? | Y – wavier to shut down pending[a] | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | Monthly | Monthly |
| Frequency of one-point QC check for gaseous instruments | Every other day | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | NA |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | 03/03/2016, 05/16/2016 08/23/2016, 08/24/2016 11/21/2016 | 03/03/2016, 05/16/2016 08/23/2016, 08/24/2016 11/21/2016 |

a While the waiver to shut down the $NO_y$ monitor required for NCore is pending, the Air District is also now requesting that EPA approve the relocation of this monitor to the proposed required PAMS site at Livermore.

## San Jose – Jackson Monitor Information

| Pollutant, POC | PM10-2.5 (PM coarse) | PM2.5, 1[a] | PM2.5, 3 | Speciated PM2.5, 5 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | Primary | QA Collocated | Primary | Other |
| Parameter code | 86101 | 88101 | 88101 | 88502 (pm mass) – many others see SASS section |
| Basic monitoring objective(s) | Research | NAAQS comparison | NAAQS comparison | Research |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented & Highest Conc. | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | NCore | NCore | NCore | NCore, CSN STN |
| Instrument manufacturer and model | Partisol 2025 without VSCC | Partisol-Plus 2025 w/VSCC | Met One FEM BAM 1020 | Met One SASS |
| Method code | 176 | 145 | 170 | 810 |
| FRM/FEM/ARM/other | FRM | FRM | FEM | N/A |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | Air District | Air District | N/A | RTI |
| Reporting Agency | Air District | Air District | Air District | RTI |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 1/1/2011 | 10/05/2002 | 10/01/2012 | 10/05/2002 |
| Current Sampling frequency | 1:3 (NCore) | 1:3 (NCore) | Continuous | 1:3 |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 9 | 9 | 10 | 9 |
| Distance from supporting structure (meters) | >2 | >2 | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 2 | 2 | 4 | 4 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | 4.0 | 4.0 | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No | No | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | N/A | N/A | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | Y | Y | N |
| Frequency of flow rate verification for PM samplers | Monthly | Monthly | Bi-weekly | Monthly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 03/03/2016, 05/16/2016 08/23/2016, 11/21/2016 | 03/03/2016, 05/16/2016 08/23/2016, 11/21/2016 | 03/03/2016, 05/16/2016 08/23/2016, 11/21/2016 | 03/03/2016, 05/16/2016 08/23/2016, 11/21/2016 |

a $PM_{2.5}$ POC 1 was the primary sampler from October 2002 through September 2012 and was changed to be the collocated sampler after October 1, 2012 when $PM_{2.5}$ POC 3 became operational as the primary monitor.

## 4.27 San Jose – Knox (near-road)

| Station Information for San Jose – Knox | |
|---|---|
| AQS ID | 06-085-0006 |
| GPS coordinates | 37.338202, -121.849892 |
| Location | Trailer within 50m of freeway |
| Address | 1007 Knox Ave. San Jose, CA 95122 |
| County | Santa Clara |
| Distance to road from gaseous probe (meters) | Hwy 101: 16.2 |
| Traffic count (AADT, year) | Hwy 101: 258,000 (2015)<br>Traffic counts data were updated on March 28, 2016, and reflect the latest available data. |
| Groundcover | Gravel |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

The Air District is monitoring pollutants at this site because it has the fourth highest Fleet Equivalent AADT (FE-AADT) in Santa Clara County. Road segments with higher FE-AADT values in Santa Clara County did not meet EPA siting requirements for monitoring (either the roadway was elevated or was otherwise in an unsafe location).

This site is monitoring $NO/NO_2$, CO, $PM_{2.5,}$ Ultrafine Particulate Matter (UFP), black carbon (BC) and toxics. Toxics sampling began on August 15, 2014. Monitoring for all other parameters began on September 1, 2014. The site is located with the city of San Jose, which is the largest city in the Bay Area with a population of 945,942 according to the 2010 census.

$PM_{2.5}$ monitoring at this site is considered representative of area-wide concentrations within this major metropolitan region.

The site type for $NO/NO_2$, CO, and $PM_{2.5}$ in AQS and in the accompanying tables is source oriented and population oriented based on the similarity in pollutant concentration with other nearby measurements. The site is within 0.25 miles of residential and commercial areas in San Jose.

## San Jose – Knox Monitor Information

| Pollutant, POC | NO2, 1 | CO, 1 | PM2.5, 3 | BC, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | Primary | N/A | Primary | N/A |
| Parameter code | 42601 / 42602 | 42101 | 88101 | 84313 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | Public Information |
| Site type(s) | Source Impact & Population Oriented | Source Impact & Population Oriented | Source Impact & Population Oriented | Source Impact |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SPM |
| Network affiliation(s) | Near Road | Near Road | Near Road | N/A |
| Instrument manufacturer and model | TECO 42i | TECO 48i | Met One FEM BAM 1020 | Teledyne API AE-633 |
| Method code | 074 | 054 | 170 | 894 |
| FRM/FEM/ARM/other | FRM | FRM | FEM | N/A |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Micro | Micro | Micro | Micro |
| Monitor start date | 09/01/2014 | 09/01/2014 | 09/01/2014 | 09/01/2014 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01-12/31 |
| Probe height (meters) | 6 | 6 | 5 | 6 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 8 | 8 | 8 | 8 |
| Distance to furnace or incinerator flue (meters) | None | None | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | No | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | N/A | N/A |
| Residence time for reactive gases (seconds) | 16 | 16 | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | Y | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | Bi-weekly | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | N/A | N/A |
| Dates of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 12/06/2016, 06/01/2016 | 12/06/2016, 06/01/2016 | N/A | N/A |
| Dates semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | 12/06/2016, 08/23/2016, 06/01/2016, 03/02/2016 | N/A |

## 4.28 San Martin

| Station Information for San Martin | |
|---|---|
| AQS ID | 06-085-2006 |
| GPS coordinates | 37.079379, -121.600031 |
| Location | Air monitoring shelter next to maintenance shed |
| Address | 13030 Murphy Ave, San Martin, CA 95046 |
| County | Santa Clara |
| Distance to road from gaseous probe (meters) | Murphy Ave: 57<br>US Highway 101: 455<br>Monterey Rd: 562<br>San Martin Ave: 920 |
| Traffic count (AADT, year) | Murphy Ave: 400 (2011)<br>US Highway 101: 113,000 (2014)<br>Monterey Rd: 9350 (2011)<br>San Martin Ave: 8360 (2011)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Vegetative |
| Statistical Area | San Jose-Sunnyvale-Santa Clara CBSA |

San Martin was chosen for monitoring ozone because earlier field measurements showed this area to have the highest ozone concentrations in the Santa Clara Valley. Prevailing winds transport ozone and ozone precursors down the valley from the densely populated San Jose area as well as the surrounding San Francisco Bay. Because ozone is formed by a chemical reaction between organic and nitrogen oxide gases in the presence of sunlight, the highest ozone concentrations are usually observed tens of miles downwind from the highest concentration of emission sources (freeways, power generating facilities, etc.) because the reactions involving the organic gases are relatively slow.

San Martin is in an agricultural area at the south end of the Santa Clara Valley approximately 24 miles southeast of downtown San Jose and is a Census Designated Place (CDP) with a population of 7,027 based on the 2010 census. The monitoring site is located at the South County Airport, in the center of the valley and about 0.3 miles west of U.S. Highway 101.

During the most recent three years, this site recorded nine exceedances of the national 70 ppb 8-hour ozone standard.

## San Martin Monitor Information

| Pollutant, POC | O3, 1 |
|---|---|
| Primary/QA Collocated/Other | N/A |
| Parameter code | 44201 |
| Basic monitoring objective(s) | NAAQS comparison |
| Site type(s) | Highest Conc. & Population Oriented & Regional Transport |
| Monitor type(s) | SLAMS |
| Network affiliation(s) | N/A |
| Instrument manufacturer and model | TECO 49i |
| Method code | 047 |
| FRM/FEM/ARM/other | FEM |
| Collecting Agency | Air District |
| Analytical Lab | N/A |
| Reporting Agency | Air District |
| Spatial scale | Urban |
| Monitor start date | 04/30/1994 |
| Current Sampling frequency | Continuous |
| Sampling season | 04/01-11/30 |
| Probe height (meters) | 5 |
| Distance from supporting structure (meters) | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | N/A |
| Distance from trees (meters) | 23 |
| Distance to furnace or incinerator flue (meters) | N/A |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A |
| Unrestricted airflow (degrees) | 360 |
| Probe material for reactive gases | Teflon |
| Residence time for reactive gases (seconds) | 17 |
| Will there be changes within the next 18 months? | N |
| Is it suitable for comparison against the annual PM2.5? | N/A |
| Frequency of flow rate verification for PM samplers | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/11/2016<br>07/11/2016<br>11/18/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A |

## 4.29 San Pablo

| Station Information for San Pablo | |
|---|---|
| AQS ID | 06-013-1004 |
| GPS coordinates | 37.960400, -122.356811 |
| Location | One story commercial building |
| Address | 1865-D Rumrill Blvd, San Pablo, CA 94806 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Rumrill Blvd: 16 |
| Traffic count (AADT, year) | Rumrill Blvd: 15,921 (2013)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

San Pablo, with a population of 29,139 according to the 2010 census, was chosen for air monitoring because the city is in the most populated portion of western Contra Costa County. San Pablo is almost surrounded by the city of Richmond with a population of 103,701. This area of the county has heavy industry, high traffic volume including two major freeways, and is close to the Chevron refinery. Ozone and $NO/NO_2$ are measured because the area is downwind of the central San Francisco Bay Area, which is a large source of ozone precursor emissions. Carbon monoxide is measured due to the high traffic volume in the area. $SO_2$ is measured because the site is 1.2 miles downwind of the Chevron refinery, which can be a significant source of $SO_2$ emissions. $PM_{2.5}$ and $PM_{10}$ are measured because stagnant days in the fall and winter can result in elevated particulate levels. On October 19, 2016, a collocated $PM_{10}$ monitor was added to the site for quality assurance purpose.

A $PM_{2.5}$ continuous FEM began operation on December 12, 2012. The monitor is classified as middle scale based on its distance from the roadway and nearby traffic volume. The Air District considers this monitor to be comparable to the NAAQS because the monitor is representative of area-wide $PM_{2.5}$ concentrations.

The monitoring scale for ozone is middle scale. Following an EPA Region 9 review of the distance between the gaseous probe and the roadway, and the corresponding traffic count, EPA Region 9 suggested this monitor be changed from SLAMS to SPM and the Air District agreed to the change. Consequently, this monitor cannot be used toward meeting the minimum monitoring requirements for ozone.

VOC toxic compounds are sampled at San Pablo on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years this site recorded one exceedance of the national 24-hour $PM_{2.5}$ standard. No national exceedances of the national standards for $O_3$, $NO_2$, $SO_2$, CO or $PM_{10}$ were measured during the past three years.

## San Pablo Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | SO2, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | N/A |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 42401 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented& Source Impact |
| Monitor type(s) | SPM | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | TECO 43i |
| Method code | 047 | 054 | 074 | 060 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Middle | Middle | Middle | Neighborhood |
| Monitor start date | 09/13/2002 | 09/13/2002 | 09/13/2002 | 09/13/2002 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 9 | 9 | 9 | 9 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 3 | 3 | 3 | 3 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 10 | 10 | 11 | 9 |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/05/2016 10/21/2016 | 05/05/2016 10/21/2016 | 05/05/2016 10/21/2016 | 05/05/2016 10/21/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | N/A |

## San Pablo Monitor Information

| Pollutant, POC | PM10, 1 | PM10, 2 | PM2.5, 3 |
|---|---|---|---|
| Primary/QA Collocated/Other | Primary | QA Collocated | Primary |
| Parameter code | 81102 | 81102 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | Tisch Env. HiVol TE-60 | Tisch Env. HiVol TE-6000 | Met One FEM BAM 1020 |
| Method code | 141 | 141 | 170 |
| FRM/FEM/ARM/other | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | Air District | Air District | Air District |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Middle | Middle | Middle |
| Monitor start date | 09/23/2002 | 10/19/2016 | 12/12/2012 |
| Current Sampling frequency | 1:6 | 1:12 | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 - 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 5 | | 6 |
| Distance from supporting structure (meters) | >2 | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 7 | 4 | 7 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | | | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | No | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | N/A | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | Quarterly | Quarterly | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 01/26/2016, 05/04/2016 08/01/2016, 10/19/2016 | 10/19/2016 | 01/26/2016, 05/04/2016 08/01/2016, 10/19/2016 |

## 4.30 San Rafael

| Station Information for San Rafael | |
|---|---|
| AQS ID | 06-041-0001 |
| GPS coordinates | 37.972310, -122.520004 |
| Location | Second floor of two-story commercial building |
| Address | 534 4th Street, San Rafael, CA 94901 |
| County | Marin |
| Distance to road from gaseous probe (meters) | 4th St: 18 Irwin St: 48<br>US Highway 101: 112 3rd St: 124 |
| Traffic count (AADT, year) | 4th St:13,276 (2016) Irwin St: 17,606 (2011)<br>US Highway 101:141,000 (2015) 3rd St:23,480 (2016)<br>Traffic counts data were updated on March 31, 2017, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

San Rafael was chosen for air monitoring because it is the largest city in Marin County with a population of 57,713 according to the 2010 census. The city's climate and air quality is representative of that found throughout the populous eastern side of the county. Afternoon sea breezes typically keep pollution levels low. However, when the sea breeze is absent, local sources can cause elevated pollution levels.

The monitoring site is located at a commercial building about a block east of U.S. Highway 101 and near major highway access ramps. It is 0.5 miles east of the downtown San Rafael business district. There is no industrial activity in the immediate area. $O_3$ and $NO/NO_2$ are measured to monitor general population exposure to these pollutants. Carbon monoxide and $PM_{10}$ are measured because the site is close to a major transportation corridor. $PM_{2.5}$ is measured because light winds combined with wood burning, vehicular traffic, and surfaced-based inversions during winter can cause elevated particulate concentrations.

VOC toxic compounds are sampled at San Rafael on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

The monitoring scale for ozone is middle scale. Following an EPA Region 9 review of the distance between the gaseous probe and the roadway, and the corresponding traffic count, EPA Region 9 suggested this monitor be changed from SLAMS to SPM and the Air District agreed to the change. Consequently, this monitor cannot be used toward meeting the minimum monitoring requirements for ozone.

The $PM_{2.5}$ continuous FEM that has operated since 2009 was classified as middle scale based on its distance from the roadway and nearby traffic volume. The Air District considers this monitor to be comparable to the NAAQS because the monitor is representative of area-wide $PM_{2.5}$ concentrations.

During the most recent three years this site recorded three exceedances of the national 24-hour $PM_{2.5}$ standard and no exceedances of the national standards for $O_3$, $PM_{10}$, $NO_2$, or CO.

## San Rafael Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 |
|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented |
| Monitor type(s) | SPM | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i |
| Method code | 047 | 054 | 074 |
| FRM/FEM/ARM/other | FEM | FRM | FRM |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Middle | Middle | Middle |
| Monitor start date | 07/01/1976 | 10/01/1967 | NO: 01/01/1968 NO2:10/01/1967 |
| Current Sampling frequency | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 12 | 12 | 12 |
| Distance from supporting structure (meters) | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | H Dist = 23[a] V Dist above probe = 17 | H Dist = 23[a] V Dist above probe = 17 | H Dist = 23[a] V Dist above probe = 17 |
| Distance from trees (meters) | 14 | 14 | 14 |
| Distance to furnace or incinerator flue (meters) | 4 | 4 | 4 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 320 | 320 | 320 |
| Probe material for reactive gases | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 10 | 10 | 13 |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 02/09/2016 08/31/2016 | 02/09/2016 08/31/2016 | 02/09/2016 08/31/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A |

a The "obstruction not on the roof" is between zero degrees (north) and 40 degrees (northeast) leaving greater than 270 degrees of unobstructed airflow. The prevailing winds are from the south and lay within the unobstructed arc.

## San Rafael Monitor Information

| Pollutant, POC | PM10, 1 | PM2.5, 3 |
|---|---|---|
| Primary/QA Collocated/Other | Primary | Primary |
| Parameter code | 81102 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A |
| Instrument manufacturer and model | Andersen HiVol 1200 | Met One FEM BAM 1020 |
| Method code | 063 | 170 |
| FRM/FEM/ARM/other | FRM | FEM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | Air District | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Middle | Middle |
| Monitor start date | 11/04/1986 | 10/27/2009 |
| Current Sampling frequency | 1:6 | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 8 | 9 |
| Distance from supporting structure (meters) | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | H Dist = 22[a]<br>V Dist above probe = 21 | H Dist = 25 [a]<br>V Dist above probe = 20 |
| Distance from trees (meters) | 13 | 10 |
| Distance to furnace or incinerator flue (meters) | 2 | 3 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | No | N/A |
| Unrestricted airflow (degrees) | 320 | 320 |
| Probe material for reactive gases | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | Y |
| Frequency of flow rate verification for PM samplers | Quarterly | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 02/08/2016, 05/20/2016<br>08/30/2016, 12/13/2016 | 02/08/2016, 05/20/2016<br>08/30/2016, 12/13/2016 |

a The "obstruction not on the roof" is between zero degrees (north) and 40 degrees (northeast) leaving greater than 270 degrees of unobstructed airflow. The prevailing winds are from the south and lay within the unobstructed arc.

## 4.31 San Ramon

| Station Information for San Ramon | |
|---|---|
| AQS ID | 06-013-2007 |
| GPS coordinates | 37.743649, -121.934188 |
| Location | Top of trailer |
| Address | 9885 Alcosta Blvd, San Ramon, CA 94582 |
| County | Contra Costa |
| Distance to road from gaseous probe (meters) | Alcosta Blvd: 300<br>Pine Valley Rd: 100<br>Estero Dr: 250<br>Del Mar Dr: 350 |
| Traffic count (AADT, year) | Alcosta Blvd: 8,277 (2010)<br>Pine Valley Rd: <500 (est. 2012)<br>Estero Dr: <500 (est. 2012)<br>Del Mar Dr: <500 (est. 2012)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Gravel |
| Statistical Area | San Francisco-Oakland-Hayward CBSA |

San Ramon was chosen to be an upwind ozone and ozone precursor background site to better characterize ozone levels in the Livermore Valley where the highest ozone design values in the Bay Area occur. San Ramon is also a population oriented monitoring site and has a population of 72,148 according to the 2010 census. The site is located along the I-680 corridor, which connects the Livermore Valley with the San Ramon Valley and other major cities of Contra Costa County.

During summer, localized north winds can be channeled southward from Concord and Walnut Creek along the I-680 corridor and pass through San Ramon before turning eastward into the Livermore Valley. Consequently, ozone and $NO/NO_2$ are measured at San Ramon in support of the Bay Area Photochemical Assessment Monitoring Stations (PAMS) program. Additionally, hourly speciated hydrocarbons are measured using a gas chromatograph analyzer for the PAMS program. A full description of the PAMS program can be found in the PAMS section of this document. In late 2013, the Air District decided to not operate the $NO_x$ monitor during winter.

The Air District chooses to operate all monitors at this site as PAMS-like sites that meet both Appendix E and Appendix A as allowed under Part 58.11(d). In operation for more than 24 months, these monitors are eligible for NAAQS comparison, but will continue as SPMs and not contribute to minimum monitoring design requirements.

During the most recent three years, this site recorded eleven exceedances of the national 70 ppb 8-hour ozone standard. During the same period, no exceedances of the national $NO_2$ standard have been measured.

## San Ramon Monitor Information

| Pollutant, POC | O3, 1 | NO2, 1 |
|---|---|---|
| Primary/QA Collocated/Other | N/A | Primary |
| Parameter code | 44201 | 42601 / 42602 |
| Basic monitoring objective(s) | Research, NAAQS comparison | Research |
| Site type(s) | Population Oriented | Population Oriented |
| Monitor type(s) | SPM | SPM |
| Network affiliation(s) | Unofficial PAMS | Unofficial PAMS |
| Instrument manufacturer and model | TECO 49i | TECO 42i |
| Method code | 047 | 074 |
| FRM/FEM/ARM/other | FEM | FRM |
| Collecting Agency | Air District | Air District |
| Analytical Lab | N/A | N/A |
| Reporting Agency | Air District | Air District |
| Spatial scale | Urban | Urban |
| Monitor start date | 01/01/2012 | 01/01/2012 |
| Current Sampling frequency | Continuous | Continuous |
| Sampling season | 04/01 – 11/30 | 01/01-11/30 in 2013<br>04/01-11/30 since 2014 |
| Probe height (meters) | 6 | 6 |
| Distance from supporting structure (meters) | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None |
| Distance from trees (meters) | 62 | 62 |
| Distance to furnace or incinerator flue (meters) | None | None |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 16 | 17 |
| Will there be changes within the next 18 months? | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 6/22/2016<br>12/21/2016 | 6/22/2016<br>12/21/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A |

## 4.32 Sebastopol

| Station Information for Sebastopol | |
|---|---|
| AQS ID | 06-097-0004 |
| GPS coordinates | 38.403765, -122.818294 |
| Location | Top of two-story commercial building |
| Address | 103 Morris Street, Sebastopol, CA 95472 |
| County | Sonoma |
| Distance to road from gaseous probe (meters) | Morris St.: 80<br>Highway 12: 70 |
| Traffic count (AADT, year) | Morris St.: 3,300 (2011)<br>Highway 23,000 (2015)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | Santa Rosa CBSA |

The Sebastopol site began operating on January 9, 2014 after the Air District was forced to move out of the Santa Rosa location when the landlord refused to extend the lease. After difficulty finding a replacement site in Santa Rosa, the Air District evaluated the historical data record and decided to open a new site in Sebastopol rather than Santa Rosa. This approach, approved by EPA, allows the Air District to continue broadening the efforts to characterize air quality throughout the Bay Area, and evaluate the air quality impact of a different combination of sources, including residential wood burning.

Sebastopol's population was 7,379 according to the 2010 census. The city's climate is strongly influenced by the Pacific Ocean and the marine air flow is expected to keep pollution levels low.

There are no industrial sources in the immediate area. Ozone and $NO/NO_2$ are measured to monitor general population exposure to these pollutants. Carbon monoxide is measured because of the local urban traffic volume and proximity to the State Routes 12 and 116 corridor, which connects Sebastopol to surrounding rural portions of Sonoma County, a region known as West County, which has a population of up to 50,000 residents. $PM_{2.5}$ is measured because light winds combined with wood burning, vehicular traffic, and surface-based inversions in winter can cause elevated particulate concentrations.

VOC toxic compounds are sampled on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

Pollutant concentrations measured at Sebastopol have not recorded any exceedances of the national standards for ozone, $PM_{2.5}$, $NO_2$, or CO since opening in January 2014.

## Sebastopol Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | PM2.5, 3 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | Primary |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 88101 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented& Highest Conc. |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | Met One FEM BAM 1020 |
| Method code | 047 | 054 | 074 | 170 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 01/09/2014 | 01/09/2014 | 01/09/2014 | 01/09/2014 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 | 01/01 – 12/31 |
| Probe height (meters) | 12 | 12 | 12 | 9 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | 12 | 12 | 12 | 12 |
| Distance to furnace or incinerator flue (meters) | 4 | 4 | 4 | 4 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | N/A |
| Residence time for reactive gases (seconds) | 13 | 14 | 13 | N/A |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | Y |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | Bi-weekly |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 01/20/2016 08/11/2016 | 01/20/2016 08/11/2016 | 01/20/2016 08/11/2016 | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | 01/20/2016, 04/21/2016 08/11/2016, 11/17/2016 |

## 4.33 Vallejo

| Station Information for Vallejo | |
|---|---|
| AQS ID | 06-095-0004 |
| GPS coordinates | 38.102507, -122.237976 |
| Location | One-story commercial building |
| Address | 304 Tuolumne St, Vallejo, CA 94590 |
| County | Solano |
| Distance to road from probe (meters) | Tuolumne St: 18 Solano Ave: 33<br>Capitol St: 30 Interstate 80: 700 |
| Traffic count (AADT, year) | Tuolumne St: 8,332 (2008)<br>Capitol St: 500 (2008)<br>Solano Ave: 8,588 (2008)<br>Interstate 80: 149,000 (2015)<br>Traffic counts data were updated on March 31, 2016, and reflect the latest available data. |
| Groundcover | Paved |
| Statistical Area | Vallejo-Fairfield CBSA |

Vallejo was chosen for air monitoring because it is the largest city in Solano County with a population of 115,942 according to the 2010 census. The monitoring site is located in a mixed commercial and residential neighborhood one mile east of downtown and 0.5 miles west of Interstate 80.

Ozone and $NO/NO_2$ are measured because southerly winds can transport ozone and its precursors into Vallejo from the heavily populated central Bay Area. Easterly winds can transport particulates from the Central Valley through the Carquinez Strait into Vallejo during winter. Additionally, $PM_{2.5}$ can be elevated in Vallejo in winter due to local fireplace burning during nighttime temperature inversions when winds are light. Additionally, over the last several years, data has shown this site to be impacted by transport of particulates from the Central Valley. Carbon monoxide is measured because Interstate 80 passes through the middle of the urban area east of the monitoring site. $SO_2$ is measured to monitor general population exposure and because refineries located to the south and east can be significant sources of $SO_2$.

A collocated $PM_{2.5}$ FEM BAM is operated at Vallejo because this site has one of the highest $PM_{2.5}$ design values in the Bay Area.

VOC toxic compounds are sampled at Vallejo on a 1:12 schedule and analyzed in the Air District laboratory. More information about the toxics monitoring program can be found in the Toxics Program section of this report.

During the most recent three years, this site recorded one exceedance of the national 70 ppb 8-hour ozone standard, and four exceedances of the national 24-hour $PM_{2.5}$ standard. No exceedances of the national standards for $NO_2$, $SO_2$, or CO were measured during the last three years.

## Vallejo Monitor Information

| Pollutant, POC | O3, 1 | CO, 1 | NO2, 1 | SO2, 1 |
|---|---|---|---|---|
| Primary/QA Collocated/Other | N/A | N/A | Primary | N/A |
| Parameter code | 44201 | 42101 | 42601 / 42602 | 42401 |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | NAAQS comparison | NAAQS comparison |
| Site type(s) | Population Oriented | Population Oriented | Population Oriented | Population Oriented& Source Impact |
| Monitor type(s) | SLAMS | SLAMS | SLAMS | SLAMS |
| Network affiliation(s) | N/A | N/A | N/A | N/A |
| Instrument manufacturer and model | TECO 49i | TECO 48i | TECO 42i | TECO 43i |
| Method code | 047 | 054 | 074 | 060 |
| FRM/FEM/ARM/other | FEM | FRM | FRM | FEM |
| Collecting Agency | Air District | Air District | Air District | Air District |
| Analytical Lab | N/A | N/A | N/A | N/A |
| Reporting Agency | Air District | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood | Urban |
| Monitor start date | 07/01/1976 | 07/01/1976 | 07/01/1976 | 07/01/1976 |
| Current Sampling frequency | Continuous | Continuous | Continuous | Continuous |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 10 | 10 | 10 | 10 |
| Distance from supporting structure (meters) | >1 | >1 | >1 | >1 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 4 | 4 | 4 | 4 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | N/A | N/A | N/A | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | N/A | N/A | N/A | N/A |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 | 360 |
| Probe material for reactive gases | Teflon | Teflon | Teflon | Teflon |
| Residence time for reactive gases (seconds) | 8 | 10 | 11 | 10 |
| Will there be changes within the next 18 months? | N | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | N/A | N/A | N/A | N/A |
| Frequency of flow rate verification for PM samplers | N/A | N/A | N/A | N/A |
| Frequency of one-point QC check for gaseous instruments | Every other day | Every other day | Every other day | Every other day |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | 05/12/2016 11/10/2016 | 05/12/2016 11/10/2016 | 05/12/2016 11/10/2016 | 05/12/2016 11/10/2016 |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | N/A | N/A | N/A | N/A |

## Vallejo Monitor Information

| Pollutant, POC | PM2.5, 3 | PM2.5, 4 | PM2.5, 5 Speciated |
|---|---|---|---|
| Primary/QA Collocated/Other | Primary | QA Collocated | Other |
| Parameter code | 88101 | 88101 | 88502 (pm mass) – many others see SASS section |
| Basic monitoring objective(s) | NAAQS comparison | NAAQS comparison | Research |
| Site type(s) | Population Oriented & Highest Conc. & Regional Transport | Population Oriented | Population Oriented |
| Monitor type(s) | SLAMS | SLAMS | SPM |
| Network affiliation(s) | N/A | N/A | N/A |
| Instrument manufacturer and model | Met One FEM BAM 1020 | Met One FEM BAM 1020 | Met One SASS |
| Method code | 170 | 170 | 810 |
| FRM/FEM/ARM/other | FEM | FEM | N/A |
| Collecting Agency | Air District | Air District | Air District |
| Analytical Lab | Air District | Air District | Air District |
| Reporting Agency | Air District | Air District | Air District |
| Spatial scale | Neighborhood | Neighborhood | Neighborhood |
| Monitor start date | 01/01/2011 | 01/01/2013 | 06/11/2008 |
| Current Sampling frequency | Continuous | Continuous | 1:6 |
| Sampling season | 01/01 - 12/31 | 01/01 - 12/31 | 01/01 - 12/31 |
| Probe height (meters) | 6 | 6 | 7 |
| Distance from supporting structure (meters) | >2 | >2 | >2 |
| Distance from obstructions on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from obstructions not on roof (meters). Include horizontal distance + vertical height above probe for obstructions nearby (meters). | None | None | None |
| Distance from trees (meters) | >50 | >50 | >50 |
| Distance to furnace or incinerator flue (meters) | 3 | 3 | 5 |
| Distance between monitors fulfilling a QA collocation requirement (meters) | 4 | 4 | N/A |
| For low volume PM instruments (flow rate < 200 liters/minute) is any PM instrument within 1m of the LoVol? If yes, please list distance (meters) and instruments(s). | No | No | No |
| For high volume PM instrument (flow rate > 200 liters/minute), is any PM instrument within 2m of the HiVol? If yes, please list distance (meters) and instrument(s). | N/A | N/A | N/A |
| Unrestricted airflow (degrees) | 360 | 360 | 360 |
| Probe material for reactive gases | N/A | N/A | N/A |
| Residence time for reactive gases (seconds) | N/A | N/A | N/A |
| Will there be changes within the next 18 months? | N | N | N |
| Is it suitable for comparison against the annual PM2.5? | Y | Y | N |
| Frequency of flow rate verification for PM samplers | Bi-weekly | Bi-weekly | Monthly |
| Frequency of one-point QC check for gaseous instruments | N/A | N/A | N/A |
| Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters (MM/DD/YYYY) | N/A | N/A | N/A |
| Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors (MM/DD/YYYY, MM/DD/YYYY) | 02/29/2016, 05/11/2016 08/26/2016, 11/19/2016 | 05/11/2016, 08/26/2016 11/19/2016 | 02/29/2016, 08/26/2016 11/19/2016 |

# 5. SPECIAL MONITORING PROGRAMS CONDUCTED IN 2015

## 5.1 Meteorology Program

The Air District operates a meteorological monitoring program to provide measurements of ambient meteorological parameters to meet the requirements of many programs within the Air District. Air District programs using meteorological data are: air quality forecasting, photochemical modeling, source modeling, and data analysis. To obtain high quality data to be used for regulatory applications, the Air District considers EPA recommendations for siting, instrumentation, data accuracy, and quality assurance.

The placement of meteorological stations depends on the use of the data. Sites chosen for air quality forecasting are located in areas that show the general wind and temperature patterns within the Air District. Photochemical modeling sites are chosen to show boundary conditions, general conditions, and upper air meteorological conditions. Source modeling sites are chosen to be representative of the source and receptor domain to be modeled. Sites used for data analysis are usually located near high pollution areas to determine the trajectories between source areas and downwind high concentration areas, as well as the general atmospheric conditions occurring during pollution episodes.

Because most Air District air monitoring stations are in urban or suburban neighborhoods where multistory buildings and trees are nearby, it is not possible to place meteorological systems at all Air District air monitoring stations that meet EPA meteorological siting recommendations. EPA recommends that wind systems be located at a height of 10 meters or at plume height if the use is source oriented modeling. In addition, the distance between the wind instrument and any obstruction should be at least 10 times the height of the obstruction.

In 2016, the meteorological network consisted of 20 sites. Figure 5-1 shows their locations. Nine are adjacent to air monitoring stations (Bethel Island, Suisun, Concord, Patterson Pass, San Ramon, Vallejo, Livermore, Gilroy, and San Martin). The other air monitoring stations have obstructions to air flow nearby, necessitating placement of the meteorological sites further away. Additionally, to meet forecasting or photochemical modeling needs, some meteorological sites have been placed on ridges or mountain-tops, such as at Chabot and Patterson Pass. Sensors used in the Air District's meteorological network include wind speed and direction, temperature, relative humidity, precipitation, and pressure.

Hourly-averaged data are made available to Air District staff and the public on the Air District's web page, and are archived in the Meteorology, Measurement, and Rules Division's database. Each site is visited monthly by Air District staff for a visual

inspection of the instrumentation. A technician visits the site to correct problems. Data are also reviewed on an ongoing basis by Air District meteorologists producing daily air quality forecasts for the Bay Area.

Data recorded at airports, oil refineries, sewage treatment plants, universities, and private companies are included in the Meteorology, Measurement, and Rules Division meteorological database as long as they meet EPA recommended siting and maintenance specifications. If requested by facilities, Air District staff will advise where to place meteorological stations and how to maintain the sensors so the data can be used for regulatory purposes.

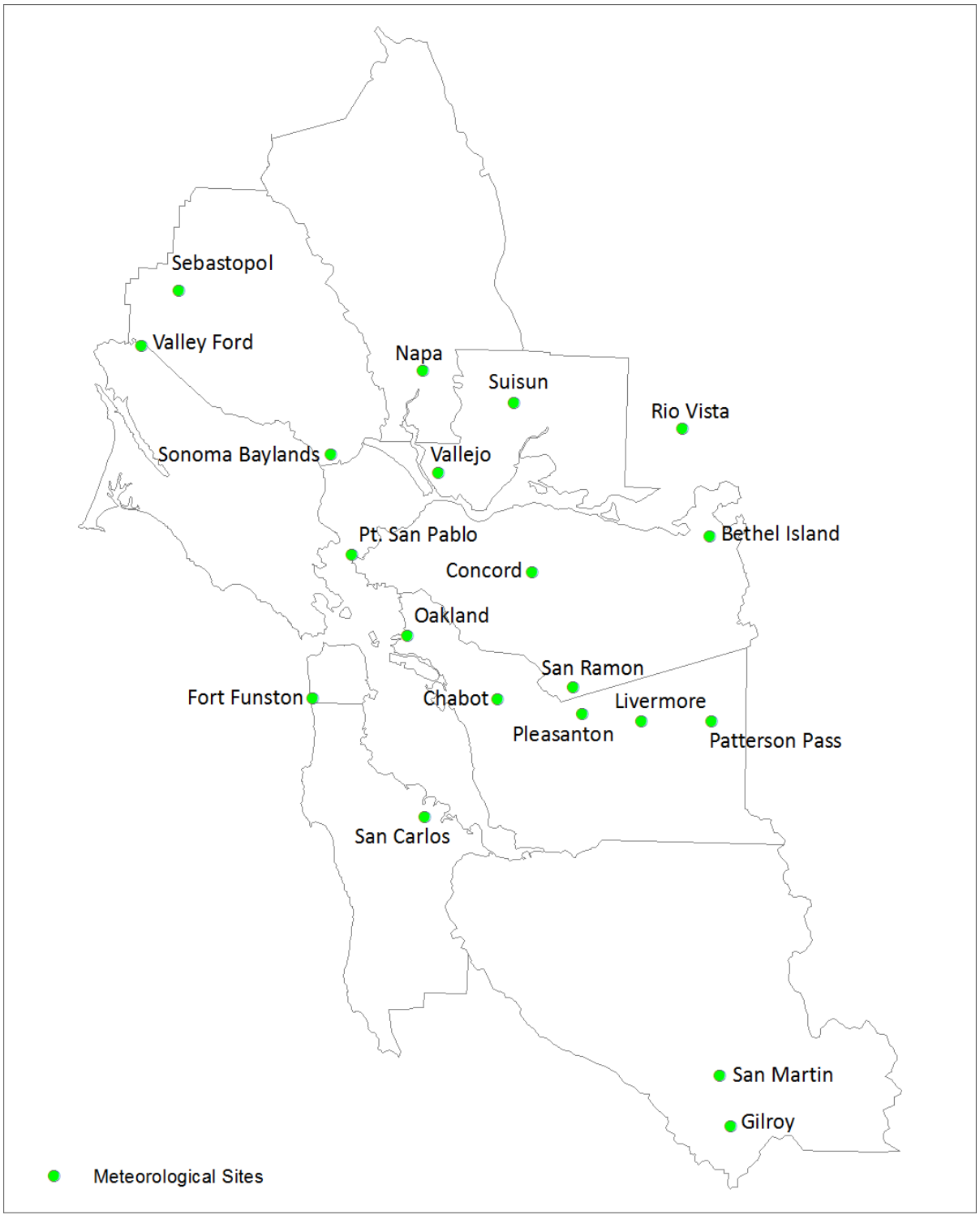



Figure 5-1. Map of Air District Meteorological Monitoring Sites in 2016

## 5.2 National Air Toxics Trends Station (NATTS) at San Jose

EPA established the National Air Toxics Trends Stations (NATTS) network in 2003. The program was created to improve national toxics monitoring with the goal of identifying toxics trends in urban and rural settings in the United States. EPA and the Air District agreed to include San Jose in the NATTS network because San Jose is the largest city in Northern California with a 2010 population of 945,942 and the San Jose air monitoring station has long data record (since 1991). The Air District began operating a NATTS site at the San Jose air monitoring station on January 1, 2003, with samples taken on a 1:6 schedule.

### 5.2.1 Hazardous Air Pollutants (HAPs) Measurements

NATTS pollutants can be grouped into four categories: hazardous air pollutants (HAPs), continuous measurements, polycyclic aromatic hydrocarbons, and metals. In 2016, the NATTS program required 18 compounds to be measured, as listed in Table 5-1. These compounds were selected for analysis based on toxicity, available measurement methods, measurement cost, correlation with other important HAPs, and expected concentration levels. Hexavalent chromium is the only required NATTS airborne toxic compound that the Air District does not directly measure, because the current sampling methodology allows significant deterioration of the compound before the analysis can be performed. Chromium is measured instead as an estimate of hexavalent chromium concentrations. In the future, the Air District may sample for hexavalent chromium when better sampling techniques are developed.

Table 5-1. List of the 18 NATTS HAPs Monitored by the Air District in 2016

| Hazardous Air Pollutant or Species | Parameter Code | Method Code | Year NATTS Measurements Began | Parameter Type | Sample Source (24-hr Period) | Analyzing Lab | Analysis Equipment |
|---|---|---|---|---|---|---|---|
| 1, 3 Butadiene | 43218 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Benzene | 45201 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Carbon tetrachloride | 43804 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Chloroform | 43803 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Tetrachloroethylene | 43817 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Trichloroethylene | 43824 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Vinyl Chloride | 43860 | 210 | 2003 | VOC | SUMMA canister | BAAQMD | GCMS |
| Formaldehyde | 43502 | 202 | 2006 | Carbonyl | Cartridge | BAAQMD | HPLC |
| Acetaldehyde | 43503 | 202 | 2006 | Carbonyl | Cartridge | BAAQMD | HPLC |
| Benzo(a)pyrene | 17242 | 118 | 2008 | PAH | Hi-Vol Polyurethane filter | ERG | GCMS |

| Hazardous Air Pollutant or Species | Parameter Code | Method Code | Year NATTS Measurements Began | Parameter Type | Sample Source (24-hr Period) | Analyzing Lab | Analysis Equipment |
|---|---|---|---|---|---|---|---|
| Naphthalene | 17141 | 118 | 2008 | PAH | Hi-Vol Polyurethane filter | ERG | GCMS |
| Arsenic | 85103 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Beryllium | 85105 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Cadmium | 85110 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Chromium[1] | 85112 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Lead | 85129 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Manganese | 85132 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |
| Nickel | 85136 | 907 | 2008 | Metal | $PM_{10}$ Lo-Vol Teflon filter | ERG | ICPMS |

[1]Chromium is measured as an estimate of hexavalent chromium.

Emission sources of the NATTS HAPs:

- Benzene and 1, 3 butadiene are emitted by mobile sources (cars and trucks).
- Carbon tetrachloride, tetrachloroethylene, and trichloroethylene are used for cleaning, but Air District regulations have significantly reduced their use.
- Chloroform is produced in the chlorination of water.
- Vinyl chloride is emitted by discharge of exhaust gases from factories that manufacture or process vinyl chloride, plastics, and vinyl products as well as waste of mentioned products.
- Formaldehyde and acetaldehyde are formed during combustion processes. Formaldehyde is also created during the manufacture of some building materials and household products, and continues to off gas after manufacturing.
- Arsenic compounds originate from soil and the smelting of metals.
- Nickel and cadmium compounds are naturally found in some soils and can be emitted from fossil fuel combustion, cement manufacturing, and electroplating. Also, cadmium comes from tire wear.
- Manganese compounds naturally occur in some soils and can be emitted from steel plants, power plants, and coke ovens.
- Hexavalent chromium is emitted during chrome plating operations, and is believed to be a byproduct of the cement-making process.

Benzene, 1, 3 butadiene, trichloroethylene, carbon tetrachloride, chloroform, trichloroethylene, and vinyl chloride are collected in canisters using a Xontech 910a sampler. The canister contents are then analyzed in the Air District laboratory using a Gas Chromatograph Mass Spectrometer (GCMS) method TO-15.

Formaldehyde and acetaldehyde (carbonyls) are collected using a cartridge on one sampling channel of a Xontech 924 toxics sampler. In the Air District laboratory, exposed cartridges are analyzed for carbonyls using High Performance Liquid Chromatograph (HPLC) method TO-11.

Benzo(a)pyrene and Naphthalene (two PAH compounds) are collected using a HiVol Polyurethane Foam (PUF) filter and sent to ERG (EPA's designated contract laboratory) for analysis using GCMS method TO-13.

Metals are collected on a $PM_{10}$ Low Volume Teflon filter and sent to ERG for analysis using Inductively Coupled Plasma Mass Spectrometry (ICPMS).

### 5.2.2 Additional Polycyclic Aromatic Hydrocarbons (PAHs) Measurements

The PAHs are products of incomplete combustion, and are found primarily in soil, sediment and oily substances, as opposed to in water or air. However, they are also a component of concern in particulate matter in air and have probable human carcinogenic (cancer), mutagenic (genetic mutation), and teratogenic (birth defects) properties.

In May 2008, the Air District began sampling for two PAHs for the NATTS program at San Jose (Benzo(a)pyrene and Naphthalene) as listed in Table 5-1. The PAH compounds are collected on a HiVol Polyurethane Foam (PUF) sampler on the NATTS 1:6 sampling schedule. ERG provides the filter media and does the analysis. Also, ERG provides the Air District with analysis results for 20 additional PAH compounds as listed in Table 5-2.

Table 5-2. Additional 20 PAH Compounds Measured by the Air District in 2016

| Hazardous Air Pollutant or Species | Parameter | Method Code | Year Measurements Began | Sample Source (24-hr Period) | Analyzing Lab | Analysis Equipment |
|---|---|---|---|---|---|---|
| 9-Fluorenone | 17159 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |

| Hazardous Air Pollutant or Species | Parameter | Method Code | Year Measurements Began | Sample Source (24-hr Period) | Analyzing Lab | Analysis Equipment |
|---|---|---|---|---|---|---|
| Acenaphthene | 17147 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Acenaphthylene | 17148 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Anthracene | 17151 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Benzo(a)anthracene | 17215 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Benzo(b)fluoranthene | 17220 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Benzo(e)pyrene | 17224 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Benzo(g,h,i)perylene | 17237 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Benzo(k)fluoranthene | 17223 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Chrysene | 17208 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Coronene | 17211 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Cyclopenta(cd)pyrene | 17160 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Dibenzo(a,h)anthracene | 17231 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Fluoranthene | 17201 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Fluorene | 17149 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Indeno(1,2,3-cd)pyrene | 17243 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Perylene | 17212 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Phenanthrene | 17150 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Pyrene | 17204 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |
| Retene | 17158 | 118 | 2008 | Hi-Vol Polyurethane filter | ERG | GCMS |

Summary NATTS data are available from the EPA's AirData website at: http://www.epa.gov/airdata/ad_maps.html. In addition to the NATTS analyses discussed in this section, the Air District also samples for other toxics compounds at San Jose. These are discussed in the National Air Toxics Trends Station (NATTS) at San Jose section of this report.

## 5.3 NCore Program

In October 2006 the EPA revised 40 CFR Parts 53 and 58 to enhance ambient air quality monitoring to improve air quality measurements. One significant revision was the requirement to establish National Core (NCore) multi-pollutant monitoring stations. These stations provide data on several pollutants at lower detection limits and replace the National Air Monitoring Station (NAMS) networks that previously existed. NCore stations are also used to monitor trends of pollutants already in attainment. EPA recognized that pollutants already in attainment, and likely to remain so, did not need to be measured at all sites in a monitoring network. NCore stations are located in areas that represent the highest pollution levels for both attainment and non-attainment pollutants within an agency's boundaries. By reducing the number of monitors needed in a network, agencies can allocate scarce resources to other monitoring programs.

NCore stations are intended to:

- Report data to the public in a timely manner through AirNow, air quality forecasting, and other public reporting mechanisms.
- Support development of emissions control strategies through air quality model evaluation and other observational methods.
- Track long-term trends for accountability of emissions control programs and health assessments that contribute to ongoing reviews and attainment of the National Ambient Air Quality Standards (NAAQS).
- Support scientific studies ranging across technological, health, and atmospheric disciplines including ecosystem assessments.

EPA designed the NCore network to have a mixture of urban and rural sites. In Northern California, EPA desired a monitoring station that would represent a large urban area. Recommendations for locating NCore urban sites are found in 40 CFR Part 58, Appendix D, and other EPA publications:

- Urban NCore stations are to be located at neighborhood or urban scale to provide representative exposure levels throughout the metropolitan area population.
- Urban NCore stations should be located where significant pollution levels exist.
- Population oriented monitoring is highly recommended.
- No biasing local pollutant emission sources should be within 500 meters at urban stations.

- Collocation with other network programs (such as NATTS, CSN, CASTNET, IMPROVE, NADP, PAMS) is encouraged.
- Siting of monitors at NCore sites must meet SLAMS requirements as specified in 40 CFR Part 58.

EPA and the Air District cooperatively agreed to establish the Northern California NCore station in San Jose effective January 1, 2011. San Jose was chosen as the NCore site because it is the city with largest population in the Bay Area with nearly one million residents based on 2010 census data. Exceedances of both the ozone and 24-hour $PM_{2.5}$ national standards have been measured in San Jose. Consequently, operating an NCore station in the San Jose area meets the requirement of being in an urban area with significant air pollution problems.

San Jose is located in the southern part of the Bay Area, and lies within the Santa Clara Valley. Wind patterns in the Santa Clara Valley are influenced greatly by the terrain, resulting in a prevailing flow roughly parallel to the valley's northwest-southeast orientation. During the daytime a sea breeze commonly carries pollutants from San Francisco, San Mateo, and Alameda counties southward into the Santa Clara Valley, while a drainage flow carrying pollutants toward the bay, in the opposite direction, occurs during the nighttime hours. This diurnal up valley and down valley air flow mixes pollutants throughout the valley, making San Jose representative of a large part of the Bay Area.

The monitoring objective for the current San Jose air quality monitoring station is population exposure. Monitoring at a population-oriented station is intended to represent air quality levels over a large area having a high population density. Consequently, the site cannot be too close to large emission sources such as industrial sources or highways, and the surrounding land use should be relatively uniform. EPA has defined neighborhood or urban scale as the appropriate area of representativeness for population oriented monitoring. Neighborhood scale has dimensions of a 4 km radius around the monitoring station, and urban scale has a 50 km radius. Figure 5-2 shows the location of the current San Jose monitoring station (as a blue balloon), and a 4 km circle around the site representing a neighborhood scale area.


Figure 5-2. Map showing area of Neighborhood Scale at the San Jose NCore station

The map shows that the current station is in a residential/commercial area of San Jose. The station is located on Jackson Street, 1.6 km northwest of the downtown core. The Air District has operated air monitoring stations at various locations near downtown San Jose since 1968, and the current station has been in operation since 2002. The downtown area is encircled by freeways, but the closest freeway to the air monitoring station is 800 meters to the west-southwest, which is sufficiently distant to prevent vehicular emissions from dominating the general air quality at the San Jose station. San Jose International Airport is 2 to 4 km from the air monitoring station, distant enough that impacts from airport emissions would be relatively low at the monitoring station.

There are no large point sources within 500 meters of the station. The only significant emission sources within a 4 km radius of the San Jose air monitoring station are:

- The Norman Y. Mineta San Jose International Airport, located from 2-4 km NW of the site, is a significant source. The airport averaged 250 commercial and 81 general aviation departures and landings per day in 2015.
- Reed & Graham, Inc. (an asphalt batch plant), located 3.7 km SSW of the site.
- Central Concrete Supply Company, Inc., located 1.9 km SSW of the site.
- San Jose State University Cogeneration Plant, located 2.6 km SSE of the site.

The San Jose air monitoring station was located to provide air quality data representative of neighborhood scale monitoring. The station currently monitors all criteria pollutants, criteria pollutant precursors, and toxics. In addition to the NCore network, the site is part of the EPA NATTS and STN networks.

### 5.3.1 NCore Monitors

Table 5-3 lists the NCore monitors operating at the San Jose station including the sampling methodology, sampling frequency, and spatial scale. Because ambient concentrations of the criteria pollutants CO and $SO_2$ are well below the NAAQS at population oriented sites across the U.S., EPA requires NCore sites to use higher sensitivity instruments than conventional instruments for these pollutants (note the use of Trace Level-Enhanced (TLE) type instruments for CO and $SO_2$). $PM_{10-2.5}$ is measured using the difference between measurements of a pair of Partisol-Plus Model 2025 Sequential samplers, with one configured as a $PM_{2.5}$ sampler and the other configured as a $PM_{10}$ sampler.

On March 10, 2016, EPA issued a final rule revising monitoring requirements in 40 CFR Part 58. As a result, lead monitoring at NCore sites is not required after April 27, 2016. Since the lead monitoring at San Jose – Jackson is also part of the NATTS network, the Air District intends to continue $PM_{10}$-Pb monitoring as part of that program.

In March 2014, the Air District requested a waiver to discontinue $NO_y$ monitoring at San Jose because the past three years of data showed an insignificant statistical difference between $NO_x$ and $NO_y$. EPA has not yet officially responded to this request. The waiver request is in 0. The new $O_3$ NAAQS modified the PAMS requirements to apply to the Bay Area, requiring an official Bay Area PAMS site. While the default location of this site is at the NCore site, the Air District intends to request that EPA approve Livermore as the required PAMS site, since its location is more appropriate for collecting data to improve understanding of $O_3$ formation during times of high concentrations. As part of PAMS implementation, the Air District is renewing the request

to discontinue $NO_y$ monitoring at the NCore site, in order to move the monitor to the Livermore PAMS site. See Appendix H for more details about the upcoming PAMS implementation.

Table 5-3. NCore Monitors

| Monitor Type | Sampling Method | Sampling Frequency | Spatial Scale |
|---|---|---|---|
| Carbon Monoxide (CO) trace level | TECO 48i TLE | Continuously | Neighborhood |
| Ozone ($O_3$) | TECO 49i | Continuously | Neighborhood |
| Sulfur Dioxide ($SO_2$) trace level | TECO 43i TLE | Continuously | Neighborhood |
| $PM_{2.5}$ – filter-based FRM | Partisol-Plus 2025 w/VSCC | 1:3 | Neighborhood |
| $PM_{2.5}$ – continuous FEM | Met One FEM BAM 1020 | Continuously | Neighborhood |
| $PM_{2.5}$ Speciation | Met One SASS | 1:3 | Neighborhood |
| Total Reactive Nitrogen ($NO_y$) | API 200EU/NOy | Continuously | Neighborhood |
| Nitric Oxide (NO) from $NO_y$ monitor | API 200EU/NOy | Continuously | Neighborhood |
| $PM_{10-2.5}$ | Partisol-Plus 2025 Sequential $PM_{10-2.5}$ Air Sampler Pair | 1:3 | Neighborhood |
| Meteorological | EPA approved a waiver to use meteorological data from the San Jose Airport as official data for the NCore site. | Continuously | N.A. |

## 5.4 Photochemical Assessment Monitoring Stations (PAMS)[1]

The 1990 Clean Air Act Amendments required EPA to promulgate rules for the enhanced monitoring of ozone and its precursors ($NO/NO_2$ and VOCs) to collect information to address the continued nonattainment of the National Ambient Air Quality Standard (NAAQS) for ozone nationwide. Subsequent revisions to EPA's Air Monitoring regulations, 40 CFR Part 58, required air pollution agencies to establish Photochemical Assessment Monitoring Stations (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme. The Bay Area is not in any of these categories, but is in marginal nonattainment of the ozone NAAQS. However, the Air District chose to voluntarily conduct unofficial-PAMS monitoring to collect data that would improve our understanding of ozone formation in the area, which could be used to improve air quality forecasting and management activities. Monitoring began in 2010 (at Livermore and Patterson Pass) and in 2012 (at San Ramon).

The objectives of the Bay Area unofficial PAMS program are to:

- Measure air quality improvement progress by tracking ambient concentrations of ozone and ozone precursors.
- Improve photochemical model performance.
- Adjust ozone control strategies.

Traditionally, summertime Bay Area ozone concentrations are highest in the Livermore and Santa Clara Valleys. Meteorological conditions are ideal for ozone formation in these areas when precursor $NO/NO_2$ and VOCs are present in upwind areas. To better understand the atmospheric chemistry, pollutant concentrations, emission reductions strategies, and transport, three locations in the Livermore area monitor for ozone and ozone precursors. Each PAMS site has meteorological wind and temperature sensors, as listed in

[1] This section describes the Air Districts un-official PAMS monitoring during 2016. For a discussion of upcoming changes to the Air Districts PAMS monitoring approach to implement new EPA requirements, please see Appendix H.

Table 5-4.

Table 5-4. Monitoring start date for PAMS sites

| Site | Parameter | Start Date for PAMS Data Collection |
|---|---|---|
| Livermore | Air Monitoring | August 1, 2010 |
| | Meteorology | August 1, 2010 |
| San Ramon | Air Monitoring | January 1, 2012 ($NO/NO_2$) |
| | | May 1, 2012 (VOC) |
| | Meteorology | December 14, 2011 |
| Patterson Pass | Air Monitoring | March 1, 2011 ($NO/NO_2$) |
| | | August 1, 2010 (VOC) |
| | Meteorology | October 27, 2011 |

The Air District's long existing Livermore air monitoring station was selected as a PAMS site because Livermore usually has the highest annual number of days exceeding the ozone NAAQS in the Bay Area. The site already had meteorological sensors measuring wind, temperature, and solar radiation; and air monitoring instruments measuring $NO/NO_2$ and ozone. Speciated VOCs were added to the Patterson Pass site in 2010, and the San Ramon site in 2012. All ozone, $NO/NO_2$, and VOC data are submitted to EPA's AQS database.

The San Ramon and Patterson Pass sites are temporary sites operated solely for the unofficial-PAMS program research. The San Ramon PAMS provides information on ozone precursors and ozone formation in the San Ramon Valley that may contribute to ozone concentrations in the Livermore Valley. The Patterson Pass site is located in the hills east of Livermore and provides additional information on the potential transport of ozone precursor compounds eastward from the Bay Area to the Central Valley. The three PAMS locations are shown in Figure 5-3.

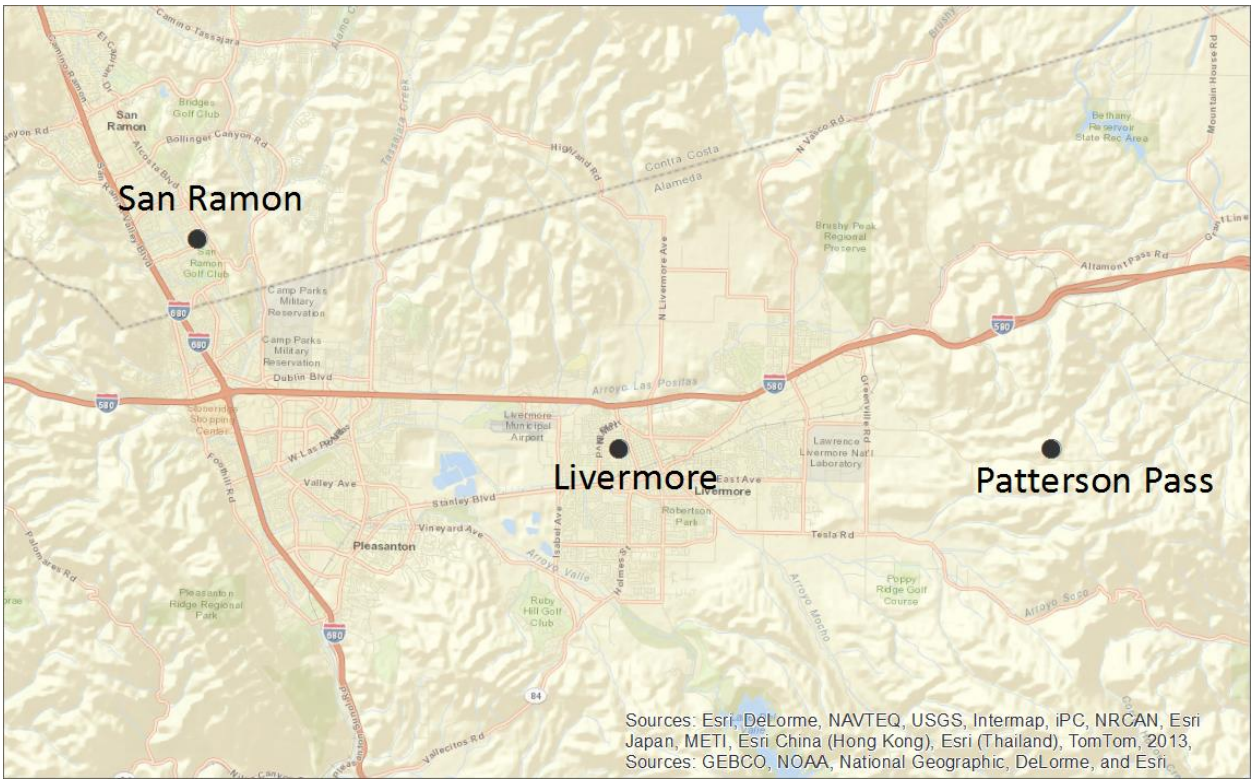



Figure 5-3. Map of the three PAMS sites in the Livermore Valley

Prior to November 2013, EPA identified 57 organic ozone precursor compounds usually measured at PAMS locations because of their significance in photochemical ozone pollution. On November 20, 2013, EPA released a memo (http://www.epa.gov/ttn/amtic/files/ambient/pams/targetlist.pdf) revising the photochemical assessment monitoring station compound target list. The revisions divide the previous list into two categories: priority compounds and optional compounds. In addition, seven new compounds were added to the priority list, for a total of 34 priority compounds and 29 optional compounds.

The Air District measures 56 compounds every hour using a gas chromatograph (GC) instrument. The GC does not analyze for two compounds EPA considers important ozone precursors: formaldehyde and acetone. The Air District determined that it is too costly to measure these compounds hourly. In addition, the GC does not measure the new priority compounds identified in the November 2013 EPA memo, α/β-Pinene, 1,3 Butadiene, benzaldehyde, carbon tetrachloride, ethanol, and tetrachloroethylene. However, the GC does measure two additional compounds not on the EPA target list, 1-hexene and n-dodecane. Table 5-5 below lists the 56 compounds measured by the GC.

Table 5-5. List of speciated hydrocarbons measured by Gas Chromatograph in 2016

| Compound | Parameter Code | Method Code |
|---|---|---|
| n-dodecane | 43141 | 142 |
| Ethane | 43202 | 142 |
| Ethylene | 43203 | 142 |
| Propane | 43204 | 142 |
| Propylene | 43205 | 142 |
| Acetylene | 43206 | 142 |
| n-butane | 43212 | 142 |
| Isobutane | 43214 | 142 |
| t-2-butene / trans-2-butene | 43216 | 142 |
| c-2-butene / cis-2-butene | 43217 | 142 |
| n-pentane | 43220 | 142 |
| Isopentane | 43221 | 142 |
| 1-pentene | 43224 | 142 |
| t-2-pentene / trans-2-pentene | 43226 | 142 |
| c-2-pentene / cis-2-pentene | 43227 | 142 |
| 3-methylpentane | 43230 | 142 |
| n-hexane | 43231 | 142 |
| n-heptane | 43232 | 142 |
| n-octane | 43233 | 142 |
| n-nonane | 43235 | 142 |
| n-decane | 43238 | 142 |
| Cyclopentane | 43242 | 142 |
| Isoprene | 43243 | 142 |
| 2-2-dimethylbutane | 43244 | 142 |
| 2-4-dimethylpentane | 43247 | 142 |
| 1-hexene | 43245 | 142 |
| Cyclohexane | 43248 | 142 |
| 3-methylhexane | 43249 | 142 |
| 2-2-4-trimethylpentane | 43250 | 142 |
| 2-3-4-trimethylpentane | 43252 | 142 |
| 3-methylheptane | 43253 | 142 |
| Methylcyclohexane | 43261 | 142 |

| Compound | Parameter Code | Method Code |
|---|---|---|
| Methylcyclopentane | 43262 | 142 |
| 2-methylhexane | 43263 | 142 |
| 1-butene | 43280 | 142 |
| 2-3-dimethylbutane | 43284 | 142 |
| 2-methylpentane | 43285 | 142 |
| 2-3-dimethylpentane | 43291 | 142 |
| n-undecane | 43954 | 142 |
| 2-methylheptane | 43960 | 142 |
| m/p xylene | 45109 | 142 |
| Benzene | 45201 | 142 |
| Toluene | 45202 | 142 |
| Ethylbenzene | 45203 | 142 |
| o-xylene | 45204 | 142 |
| 1-3-5-trimethylbenzene | 45207 | 142 |
| 1-2-4-trimethylbenzene | 45208 | 142 |
| n-propylbenzene | 45209 | 142 |
| Isopropylbenzene | 45210 | 142 |
| o-ethyltoluene | 45211 | 142 |
| m-ethyltoluene | 45212 | 142 |
| p-ethyltoluene | 45213 | 142 |
| m-diethylbenzene | 45218 | 142 |
| p-diethylbenzene | 45219 | 142 |
| Styrene | 45220 | 142 |
| 1-2-3-trimethylbenzene | 45225 | 142 |

The Air district operated the GC, $O_3$, and $NO/NO_2$ monitors at San Ramon, the GC, and $NO/NO_2$ monitor at Patterson Pass, and the GC at Livermore from April to November in 2016. In 2017, the Air District intends to operate the GCs at Livermore and San Ramon, and the $NO/NO_2$ monitor at San Ramon from April through October in 2017. The ozone and $NO/NO_2$ monitors at Livermore will operate year-round in 2017.

While the data collected from 2010 through 2016 from Patterson Pass will be used in ongoing research analyses, it has not proven to be representative of Bay Area ozone production or population exposure, nor has it improved air quality forecasting

capabilities. Therefore, the Air District are closed this SPM site in March of 2017 (see Section 2.4).

## 5.5 $PM_{2.5}$ Chemical Speciation Network (CSN)

In 1997, the EPA established national 24-hour and annual standards for fine particles less than or equal to 2.5 microns in diameter, known as $PM_{2.5}$, and required each state and local agency to begin ambient monitoring using Federal Reference Method (FRM) samplers. EPA also established a network of chemical speciation monitors to provide information for the development of control strategies in implementation plans and then to track the success of the plans. This monitoring program is known as the Chemical Speciation Network (CSN).

Speciation monitors provide chemical composition of $PM_{2.5}$, which aides in identification of emissions sources. Some CSN sites were designated as long-term trend sites predominately located in large urban areas. Such sites are part of the Speciation Trends Network (STN) to study longer term trends in the chemical composition of $PM_{2.5.}$ Other sites in the CSN program are known as CSN supplemental sites.

STN monitoring has the primary objective of defining concentration trends of the elements, ions, and organic and elemental carbon components of $PM_{2.5}$. In January 1999, a $PM_{2.5}$ FRM sampler was installed in San Jose and the first year of data showed exceedances of the national standard. Consequently, EPA requested that a Met One Spiral Ambient Speciation Sampler (SASS) be installed at the San Jose monitoring site (which was located on Fourth Street at the time) as part of the STN program because the site is located in a major urban area. The site was relocated to Jackson Street in 2002. The sampler operates 24 hours, from midnight to midnight, and samples are collected on a 1:3 schedule.

In April 2005, the Clean Air Scientific Advisory Committee supported changes to the EPA $PM_{2.5}$ speciation network to improve comparability with the rural Interagency Monitoring of Protected Visual Environments (IMPROVE) $PM_{2.5}$ carbon concentration data. The EPA process, designed to achieve this comparability, included replacing the carbon sampling method with the IMPROVE carbon Thermal Optical Reflectance (TOR) analysis method instead of the Thermal Optical Transmittance (TOT) method. Additionally, the EPA also requested the manufacturer of the IMPROVE sampler, URG Corporation, to modify the sampler to incorporate mass flow control versus fixed-orifice flow control. This effort resulted in a new instrument called the URG-3000N Sequential Particulate Speciation System. In the Bay Area, the Air District began operating the URG 3000 to collect $PM_{2.5}$ carbon concentrations at San Jose starting on April 1, 2009, while continuing to operate the SASS sampler to collect all the other compounds.

Filters collected by the SASS and URG-3000 samplers are later analyzed using energy-dispersive X-ray fluorescence, ion chromatography, and thermal/optical analysis

techniques to measure metals, anions and cations, and carbon (elemental and organic) components, respectively. The STN filters are analyzed by an EPA national contract laboratory. The sixty-five chemical species measured are listed in Table 5-6, and can be viewed on the EPA's AirData website at http://www.epa.gov/airdata/ad_maps.html.

### 5.5.1 BAAQMD Supplemental $PM_{2.5}$ Speciation Network Program

The Air District added SASS samplers to existing air monitoring sites at Vallejo and Livermore in 2008 and at the Oakland West station in 2009. These samplers are not part of the national CSN program but contribute to local monitoring objectives. Vallejo and Livermore were selected for sampling because there was an interest in determining the sources of $PM_{2.5}$ on days that exceed the standard at those sites, since exceedances often occur on days when the air flow is from the Central Valley. These sites may have a different $PM_{2.5}$ composition than at San Jose – Jackson. Oakland West was selected because it is downwind of the Port of Oakland, a major source of diesel particulate matter. The Air District operates these samplers on a 1:6 schedule. Prior to 2015, DRI provided the filters, did the analysis, and submitted the data to AQS; and the filters were also analyzed for palladium, thallium and uranium. Starting with data collected in January 2015, the Air District's laboratory staff have prepared the filters and performed the analysis.

Table 5-6. $PM_{2.5}$ Speciation Measurements at Air District Sites in 2016

| Compound | Parameter Code at San Jose | Parameter Code at Other Sites | Method Code at San Jose | Method Code at Other Sites |
|---|---|---|---|---|
| **Metals** | | | | |
| Antimony | 88102 | 88102 | 811 | 811 |
| Arsenic | 88103 | 88103 | 811 | 811 |
| Aluminum | 88104 | 88104 | 811 | 811 |
| Barium | 88107 | 88107 | 811 | 811 |
| Bromine | 88109 | 88109 | 811 | 811 |
| Cadmium | 88110 | 88110 | 811 | 811 |
| Calcium | 88111 | 88111 | 811 | 811 |
| Chromium | 88112 | 88112 | 811 | 811 |
| Cobalt | 88113 | 88113 | 811 | 811 |
| Copper | 88114 | 88114 | 811 | 811 |
| Chlorine | 88115 | 88115 | 811 | 811 |
| Cerium | 88117 | 88117 | 811 | 811 |
| Cesium | 88118 | 88118 | 811 | 811 |
| Europium | 88121 | 88121 | 811 | 811 |

| Compound | Parameter Code at San Jose | Parameter Code at Other Sites | Method Code at San Jose | Method Code at Other Sites |
|---|---|---|---|---|
| Gallium | 88124 | 88124 | 811 | 811 |
| Gold | 88143 | 88143 | 811 | 811 |
| Hafnium | 88127 | 88127 | 811 | 811 |
| Iron | 88126 | 88126 | 811 | 811 |
| Indium | 88131 | 88131 | 811 | 811 |
| Iridium | 88133 | 88133 | 811 | 811 |
| Lanthanum | 88146 | 88146 | 811 | 811 |
| Lead | 88128 | 88128 | 811 | 811 |
| Manganese | 88132 | 88132 | 811 | 811 |
| Molybdenum | 88134 | 88134 | 811 | 811 |
| Magnesium | 88140 | 88140 | 811 | 811 |
| Mercury | 88142 | 88142 | 811 | 811 |
| Nickel | 88136 | 88136 | 811 | 811 |
| Niobium | 88147 | 88147 | 811 | 811 |
| Palladium[1] | - | 88151 | - | 811 |
| Phosphorous | 88152 | 88152 | 811 | 811 |
| Potassium | 88180 | 88180 | 811 | 811 |
| Rubidium | 88176 | 88176 | 811 | 811 |
| Samarium | 88162 | 88162 | 811 | 811 |
| Scandium | 88163 | 88163 | 811 | 811 |
| Selenium | 88154 | 88154 | 811 | 811 |
| Silicon | 88165 | 88165 | 811 | 811 |
| Silver | 88166 | 88166 | 811 | 811 |
| Sodium | 88184 | 88184 | 811 | 811 |
| Strontium | 88168 | 88168 | 811 | 811 |
| Sulfur | 88169 | 88169 | 811 | 811 |
| Tantalum | 88170 | 88170 | 811 | 811 |
| Terbium | 88172 | 88172 | 811 | 811 |
| Thallium[1] | - | 88173 | - | 811 |
| Tin | 88160 | 88160 | 811 | 811 |
| Titanium | 88161 | 88161 | 811 | 811 |
| Tungsten | 88186 | 88186 | 811 | 811 |
| Uranium[1] | - | 88179 | - | 811 |
| Vanadium | 88164 | 88164 | 811 | 811 |
| Yttrium | 88183 | 88183 | 811 | 811 |
| Zinc | 88167 | 88167 | 811 | 811 |
| Zirconium | 88185 | 88185 | 811 | 811 |
| **Anions and Cations** | | | | |
| Ammonium Cation | 88301 | 88301 | 812 | 812 |

| Compound | Parameter Code at San Jose | Parameter Code at Other Sites | Method Code at San Jose | Method Code at Other Sites |
|---|---|---|---|---|
| Sodium Cation | 88302 | 88302 | 812 | 812 |
| Chloride Anion | 88203 | 88203 | 812 | 812 |
| Sulfate Anion | 88403 | 88403 | 812 | 812 |
| Potassium Cation | 88303 | 88303 | 812 | 812 |
| Nitrate Anion | 88306 | 88306 | 812 | 812 |
| **Organic and Elemental Carbon** | | | | |
| Total Organic Carbon (sum of the OC Fractions below) | 88370 | 88320 | 838 | 815 |
| Elemental Carbon Fraction 1 (carbon released at 550ºC in 10% oxygen/90% helium gas) | 88383 | 88329 | 841 | 814 |
| Elemental Carbon Fraction 2 (carbon released at 700ºC in 10% oxygen/90% helium gas) | 88384 | 88330 | 841 | 814 |
| Elemental Carbon Fraction 3 (carbon released at 800ºC in 10% oxygen/90% helium gas) | 88384 | 88331 | 841 | 814 |
| Organic Carbon Fraction 1 (carbon released at 120ºC in helium gas) | 88374 | 88324 | 841 | 814 |
| Organic Carbon Fraction 2 (carbon released at 250ºC in helium gas) | 88375 | 88325 | 841 | 814 |
| Organic Carbon Fraction 3 (carbon released at 450ºC in helium gas) | 88376 | 88326 | 841 | 814 |
| Organic Carbon Fraction 4 (carbon released at 550ºC in helium gas) | 88377 | 88327 | 841 | 814 |

[1] Elements measured only at Vallejo, Livermore, and Oakland West.

## 5.6 Toxics Program

The Clean Air Act Amendments of 1990 required EPA to set emission standards for major sources of Hazardous Air Pollutants (HAPs). The Act also required EPA to assess the risks to human health from HAPs. As of 2012 EPA had listed 187 compounds as HAPs and are known to cause or are suspected of causing cancer, birth defects, reproduction problems, and other serious illnesses. Exposure time to certain levels of some HAPs can cause difficulty in breathing, nausea, or other illnesses and can even cause death.

Toxic pollutants (HAPs) are emitted daily by industrial and chemical manufacturing processes, commercial activities, refinery operations, gasoline marketing, and motor vehicles within the Bay Area. Ambient concentrations vary by proximity to sources and current meteorological conditions.

The Air District established an ambient air toxics monitoring program with the objectives of:

- Establishing trends and evaluating the effectiveness of HAP reduction strategies.
- Characterizing ambient concentrations in local areas.
- Providing data to support and evaluate dispersion and deposition models.
- Providing data to the scientific community to support studies to reduce uncertainty about the relationships between ambient levels of HAPs, actual human exposure to air toxics, and health effects from such exposures.

Figure 5-4 is a map of the 19 toxics monitoring sites operating in 2016. They are located at existing Air District monitoring stations to measure a wide range of contaminant levels throughout the Bay Area. The sites are generally located in major population centers or downwind of major industrial sources such as refineries. There is also an ambient background site at Fort Cronkhite. The toxics data collected at San Jose are reported to EPA as part of the NATTS program.

Air samples are collected at Air District toxics monitoring sites for a 24-hour period on a 1:12 schedule except at San Jose where sampling is on a 1:6 schedule as part of the NATTS program. A 1:12 schedule allows samples to be taken on a different day of the week over the course of months. This is the same schedule EPA and CARB use for their toxics monitoring programs, thereby allowing Bay Area toxics concentrations to be compared to concentrations measured elsewhere across the country.

Gaseous (VOC) toxics are collected in 6-liter SUMMA stainless steel canisters using Xontech 910 samplers. The sampler continuously collects an ambient air sample for 24-hours to ensure capturing transient and intermittent toxic releases. Since 2012, samples have been analyzed using gas chromatography mass spectrometry.

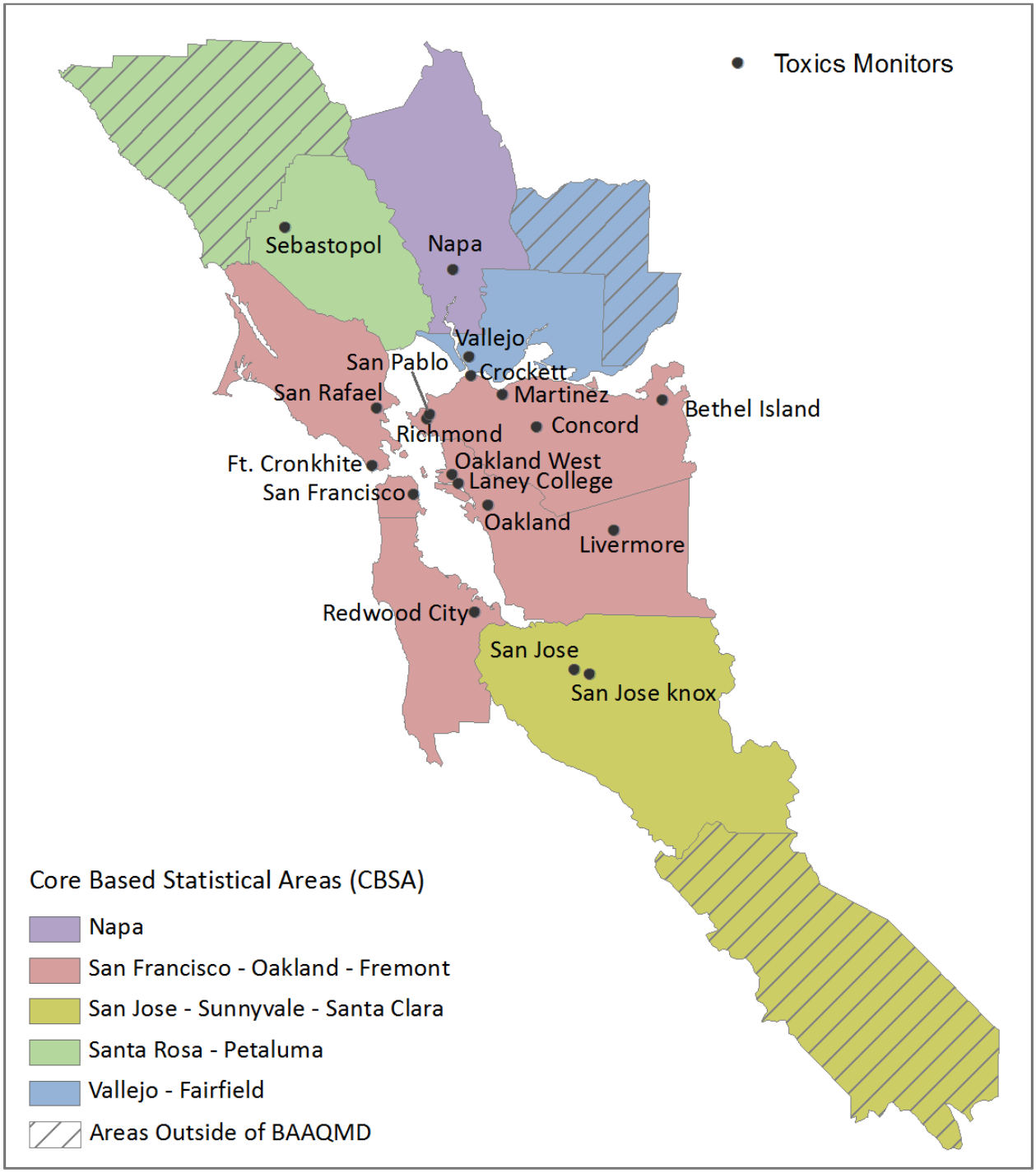



Figure 5-4. Map of Air District Toxics Monitoring Sites in 2016

Both the Air District and CARB have toxics monitoring programs in the Bay Area. CARB conducts toxics monitoring on a 1:12 schedule at two sites: San Francisco and San Jose. CARB supplies the canisters and performs the laboratory analyses, while Air District staff operates the CARB sampler and ships the canisters to CARB. Because the Air District also does toxics monitoring at San Francisco and San Jose, the two sets of data allow calculation of the measurement precision at these sites, and by extrapolation, an estimate of the precision of the toxics measurement program.

For Quality Assurance purposes, once a quarter at San Francisco, an additional canister sample is taken on a scheduled sample day using a collocated sampler. Both samples are analyzed by the Air District laboratory, and the results allow an additional measure of precision. Additionally, at least one canister per month is chosen at random for a second analysis. The results are submitted to AQS for both the San Francisco collocated sample and the randomly selected replicate analysis.

From each canister sample, the Air District laboratory analyzes for the 22 gaseous toxic compounds shown in Table 5-7 from canister samples collected using a gas chromatography mass spectrometry instrument. The compounds selected for analysis were those that had high toxicity or were known to have high emissions in the Bay Area, or a combination of the two. Another consideration was whether the current methodology could accurately detect a compound at reasonable expense, based on previous CARB studies. Some compounds, such as carbon tetrachloride, are measured because their concentration in the ambient air does not change much over time. This is useful because carbon tetrachloride or other similar, stable compounds can be used for quality control purposes. If the measurement of such a control is unusually high or low, there may be a problem in the sampling, transport, storage, or analysis procedures.

Table 5-7. List of Toxic Compounds Measured by the Air District in 2016

| Compound | Parameter Code | Method Code |
|---|---|---|
| 1,3-Butadiene | 43218 | 210 |
| Acetone | 43551 | 210 |
| Acetonitrile | 43702 | 210 |
| Acrylonitrile | 43704 | 210 |
| Benzene | 45201 | 210 |
| Carbon tetrachloride | 43804 | 210 |
| Chloroform | 43803 | 210 |
| Dichloromethane | 43802 | 210 |
| Ethyl alcohol | 43302 | 210 |

| Compound | Parameter Code | Method Code |
|---|---|---|
| Ethylbenzene | 45203 | 210 |
| Ethylene dibromide | 43843 | 210 |
| Ethylene dichloride | 43815 | 210 |
| Freon 113 | 43207 | 210 |
| m/p Xylene | 45109 | 210 |
| Methyl chloroform | 43814 | 210 |
| Methyl ethyl ketone | 43552 | 210 |
| o-Xylene | 45204 | 210 |
| Tetrachloroethylene | 43817 | 210 |
| Toluene | 45202 | 210 |
| Trichloroethylene | 43824 | 210 |
| Trichlorofluoromethane | 43811 | 210 |
| Vinyl chloride | 43860 | 210 |

### 5.6.1 Additional Toxics Monitoring at San Jose

In addition to the compounds listed in Table 5-7, formaldehyde and acetaldehyde are measured at San Jose on a 1:6 schedule as part of the NATTS program. These compounds are highly reactive and cannot be accurately measured using a canister sample. Instead, they are collected on a chemically treated cartridge using a Xontech 924 sampler, operated on the same 1:6 schedule. Samples are analyzed at the Air District laboratory using High Performance Liquid Chromatography.

Metals are also measured at San Jose as part of the NATTS program. A full description of the NATTS program can be found in the NATTS section of this document. In addition, summary toxics data are available from the EPA's AirData website at: http://www.epa.gov/airdata/.

## 5.7 Greenhouse Gas Fixed-site Network

For the past decade, the governing Board of the Air District has recognized that climate change threatens to degrade air quality and to jeopardize the health and well-being of residents in the San Francisco Bay Area. Aligning itself with California's greenhouse gas (GHG) reduction targets (Assembly Bill 32, Senate Bill 32, Executive Order S-3-05), the Air District has set a goal to reduce the region's GHG emissions 80 percent below 1990 levels by 2050. Carbon dioxide ($CO_2$) is the dominant source of GHGs in the region accounting for ~91% of the 88 million metric tonnes $CO_2$-equivalent emitted as per the Air District's regional emissions inventory while methane ($CH_4$) accounts for ~5%[5]. To make progress toward the 2050 goal, BAAQMD has developed a 2017 Clean Air Plan[6] that establishes the agency's vision and actions to protect the climate by reducing climate-forcing pollutants and protect public health by reducing air pollution. Key elements of the 2017 Clean Air Plan include developing effective GHG reduction measures, monitoring regional carbon fluxes to ensure reduction measures are effective, and providing information to local, regional, and state partners.

The Air District began a GHG measurement program in 2015 that includes the fixed-site GHG monitoring network described below, and short-term studies using mobile monitoring platform. The objective of this network is to observe ambient concentrations and track trends of $CO_2$, $CH_4$, CO, and water vapor $(H_2O)_v$. Other monitoring objectives for this network include:

- quantifying future GHG emission reductions that will be achieved under the 2017 Clean Air Plan,
- educating and informing the public on how the region is contributing to climate change to stress the importance of local action,
- providing measurements and resources to support to climate change research in the region, which may improve our collective understanding of GHG sources and opportunities for reductions,
- evaluating and improving the Air District's regional GHG emissions inventory, especially for methane, and
- demonstrating measurement programs that other local agencies could deploy or emulate.

[5] BAAQMD, 2017. http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/baaqmd_2017_cap_draft_122816-pdf.pdf?la=en, GHG Inventory, 2017. http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/ghg_emissions_and_forecasts_draft_121216-pdf.pdf?la=en

[6] BAAQMD, 2017. http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/baaqmd_2017_cap_draft_122816-pdf.pdf?la=en

The GHG instruments operated at the four fixed-sites of this network are listed in Table 5-8. The GHG monitors at Bethel Island, Livermore and San Martin are located at the criteria pollutant monitoring sites described earlier in this report. The Bodega Bay site is located at Bodega Marine Lab of University of California Davis, and lies just outside of the Air District's jurisdictional boundaries.

Table 5-8. Fixed-site GHG Monitoring Network Operated in 2016

| Station Name | Elevation (m above sea level) | GHG Measurements | Start Date |
|---|---|---|---|
| Bethel Island | -2 | $CO_2$, $CH_4$, CO, water vapor ($H_2O$) | October 2015 |
| Livermore | 137 | $CO_2$, $CH_4$, CO, water vapor ($H_2O$) | December 2016 |
| San Martin | 86 | $CO_2$, $CH_4$, CO, water vapor ($H_2O$) | May 2016 |
| Bodega Bay | 21 | $CO_2$, $CH_4$, CO, water vapor ($H_2O$) | October 2015 |

The location of the four stations has been determined to provide the most likely encapsulation of inflow-outflow wind regimes in the greater San Francisco Bay Area (*see* Figure 5-5). The Bodega Bay station, located on the coast north of the Golden Gate gap, often receives clean marine inflow from the west-northwest and hence serves as a regional background site. The remaining three stations are located at presumed exit points for Bay Area plumes that may contain well-mixed emissions from upwind local sources. San Martin is located south and generally downwind of San Jose metropolitan area, Livermore is close to the cross section of the eastern edge of the Bay Area with California's Central Valley, and Bethel Island is located at the mouth of the Sacramento-San Joaquin Delta.

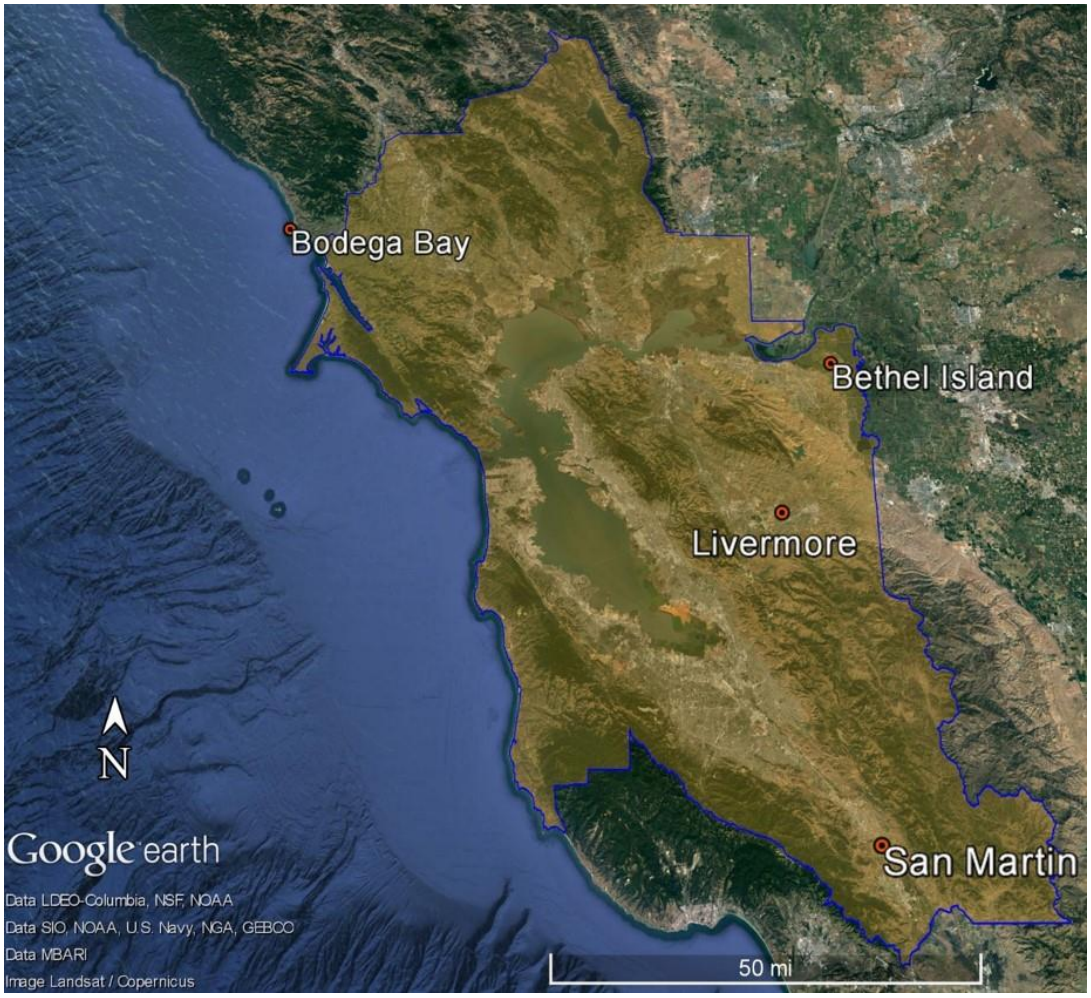



Figure 5-5. Locations of BAAQMD GHG monitoring sites the San Francisco Bay Area (courtesy: Google Earth)

The fixed-site GHG network has been designed to be consistent with protocols of international atmospheric GHG monitoring networks and conforms with accuracy and precision data quality standards set by World Meteorological Organization Global Atmosphere Watch (WMO-GAW) for GHGs[7]. At each of the four sites, measurements are conducted using an *in-situ* infrared laser-based monitor (Model # G2401; Picarro Inc. Mountain View, USA) operating on principles of Cavity Ringdown Spectroscopy. Concentration time series and diurnal variance plots of validated $CH_4$, $CO_2$, and CO data is made available through Air District's' GHG data webpage (http://www.baaqmd.gov/ghgdata).

[7] WMO-GAW 2013. http://www.wmo.int/pages/prog/arep/gaw/documents/Final_GAW_213_web.pdf

# Appendices A through G

# APPENDIX A. OZONE MONITORING AGREEMENT BETWEEN BAAQMD AND MBUAPCD

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

June 4, 2014

Mr. Michael J. Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Dear Mr. Gilroy:

The Bay Area Air Quality Management District has signed the Ozone monitoring agreement as described in your letter of May 23, 2014 (attached). We will continue to operate the Ozone monitors at San Jose, Los Gatos, Gilroy, and San Martin as stated in your letter. We will advise you well in advance if any of these monitors are shutdown or moved to another location.

Sincerely,

Eric D. Stevenson
Director, Technical Services Division

Enclosure

939 ELLIS STREET • SAN FRANCISCO CALIFORNIA 94109 • 415.771.6000 • *www.baaqmd.gov*

**MBUAPCD**
Monterey Bay Unified Air Pollution Control District
Serving Monterey, San Benito, and Santa Cruz Counties

24580 Silver Cloud Court
Monterey, CA 93940
PHONE: (831) 647-9411 - FAX: (831) 647-8501

May 23, 2014

Mr. Eric D. Stevenson
Director, Technical Services Division
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Subject: Shared Ozone Monitoring Responsibilities

Dear Mr. Stevenson:

For Ozone monitoring in the San Jose-Sunnyvale-Santa Clara Metropolitan Statistical Area (MSA), both of our agencies are required to meet the full minimum monitoring requirements of 40 CFR Part 58 Appendix D, section (2)(e) in the absence of an Ozone monitoring agreement. The Monterey Bay Unified Air Pollution Control District (MBUAPCD) currently operates one SLAMS Ozone monitor in this MSA (at Hollister) but two monitors are required. Therefore, MBUAPCD would like this letter to serve as a monitoring agreement between our two agencies.

The MBUAPCD requests BAAQMD reply to this letter confirming agreement to continue operation of the SLAMS Ozone monitors at San Jose, Los Gatos, Gilroy, and San Martin. Both agencies will advise each other if changes to the instruments listed below are planned.

| | AQS# | Parameter | Method | POC |
|---|---|---|---|---|
| San Jose | 060850005 | 44201 | 047 | 1 |
| Los Gatos | 060851001 | 44201 | 047 | 1 |
| Gilroy | 060850002 | 44201 | 047 | 1 |
| San Martin | 060852006 | 44201 | 047 | 1 |
| Hollister | 060690002 | 44201 | 047 | 1 |

Sincerely,

Michael J Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940
(831) 647-9411

# APPENDIX B. $PM_{10}$ MONITORING AGREEMENT BETWEEN BAAQMD AND MBUAPCD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

January 14, 2013

Mr. William Chevalier
Supervising Air Monitoring Specialist
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Dear Mr. Chevalier:

During a recent review of the Annual Network Report for the Bay Area Air Quality Management District (BAAQMD), EPA Region 9 pointed out that we do not have a written agreement to share minimum monitoring requirements with neighboring Air Districts. For $PM_{10}$ monitoring in the San Jose-Sunnyvale-Santa Clara Metropolitan Statistical Area (MSA), both of our agencies are required to meet the full minimum monitoring requirements of 40 CFR Part 58 Appendix D, section (2)(e) in the absence of a $PM_{10}$ monitoring agreement.

The San Jose-Sunnyvale-Santa Clara MSA must have two SLAMS $PM_{10}$ monitors to meet EPA minimum monitoring requirements. The BAAQMD operates one SLAMS $PM_{10}$ monitor at San Jose and will continue to operate this instrument indefinitely.

The BAAQMD requests Monterey Bay Unified Air Pollution Control District reply to this letter confirming agreement to continue operating the SLAMS $PM_{10}$ monitor at Hollister. As part of the agreement, both agencies will advise each other if changes to the instruments (as shown below) are planned.

| | AQS# | Parameter | Method | POC |
|---|---|---|---|---|
| San Jose | 060850005 | 81102 | 127 | 1 |
| Hollister | 060690002 | 81102 | 122 | 3 |

Sincerely,

Eric D. Stevenson
Director, Technical Services Division

939 ELLIS STREET • SAN FRANCISCO CALIFORNIA 94109 • 415.771.6000 • www.baaqmd.gov

# APPENDIX C. $NO_2$ MONITORING AGREEMENT BETWEEN BAAQMD AND MBUAPCD

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

June 4, 2014

Mr. Michael J. Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Dear Mr. Gilroy:

The Bay Area Air Quality Management District has signed the $NO_2$ monitoring agreement as described in your letter of May 23, 2014 (attached). We will continue to operate the $NO_2$ monitor at San Jose as stated in your letter. We will advise you well in advance if this monitor is shutdown or moved to another location.

Sincerely,

Eric D. Stevenson
Director, Technical Services Division

Enclosure

939 ELLIS STREET • SAN FRANCISCO CALIFORNIA 94109 • 415.771.6000 • *www.baaqmd.gov*

**MBUAPCD**
Monterey Bay Unified Air Pollution Control District
Serving Monterey, San Benito, and Santa Cruz Counties

24580 Silver Cloud Court
Monterey, CA 93940
PHONE: (831) 647-9411 • FAX: (831) 647-8501

May 23, 2014

Mr. Eric D. Stevenson
Director, Technical Services Division
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Subject: Shared NO/NO2/NOX Monitoring Responsibilities

Dear Mr. Stevenson:

40 CFR Part 58 Appendix D, section (2)(e), requires air monitoring of oxides of nitrogen to be performed to meet minimum federal requirement for the San Jose-Sunnyvale-Santa Clara Metropolitan Statistical Area (MSA). The Monterey Bay Unified Air Pollution Control District (MBUAPCD) currently does not operate any SLAMS $NO_2$ monitors in this MSA and would like this letter to serve as a monitoring agreement between our two agencies.

The MBUAPCD requests the Bay Area Air Quality Management District reply to this letter confirming agreement to continue operation of the SLAMS $NO_2$ monitor at San Jose and advise MBUAPCD if changes to this instrument are planned.

| | AQS# | Parameter | Method | POC |
|---|---|---|---|---|
| San Jose | 060850005 | 42602 | 074 | 1 |

Sincerely,

Michael J Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940
(831) 647-9411

# APPENDIX D. CO, $NO_2$, AND $PM_{2.5}$ NEAR-ROAD MONITORING AGREEMENT BETWEEN BAAQMD AND MBUAPCD

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

May 14, 2015

Mr. Michael J. Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Dear Mr. Gilroy:

The Bay Area Air Quality Management District has signed the shared near-road CO, $NO_2$ and $PM_{2.5}$ monitoring agreement as described in your letter of May 13, 2015 (attached). We will continue to operate these monitors at the San Jose Knox monitoring site (060850006) as stated in your letter. We will advise you in advance if any of these monitors are shutdown or moved to another location.

Sincerely,

Eric D. Stevenson
Director, Meteorology, Measurement and Rules Division

Enclosure

939 ELLIS STREET • SAN FRANCISCO CALIFORNIA 94109 • 415.771.6000 • *www.baaqmd.gov*

**MBUAPCD**
Monterey Bay Unified Air Pollution Control District
Serving Monterey, San Benito, and Santa Cruz Counties

24580 Silver Cloud Court
Monterey, CA 93940
PHONE: (831) 647-9411 • FAX: (831) 647-8501

May 13, 2015

Mr. Eric D. Stevenson
Director, Technical Services Division
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109

Subject: Shared Near-Road CO, NO2, and $PM_{2.5}$ Monitoring Responsibilities

Dear Mr. Stevenson:

40 CFR Part 58 Subparts 58.10(a)(7), 58.13(e)(1), and Appendix D section 4.3.1, requires near-road monitoring of CO, NOx, and $PM_{2.5}$ to be performed to meet minimum federal requirements for the San Jose-Sunnyvale-Santa Clara Core Based Statistical Area (CBSA), 41940. The Bay Area Air Quality Management District (BAAQMD) established a near-road monitor in San Jose on September 1, 2014 and will take responsibility for meeting these near-road requirements as they currently exist. The Monterey Bay Unified Air Pollution Control District (MBUAPCD) currently does not operate any Near-Road CO, NO2, and $PM_{2.5}$ monitors in this MSA and would like this letter to serve as a monitoring agreement between our two agencies.

The MBUAPCD requests the Bay Area Air Quality Management District reply to this letter confirming agreement to continue operation of the Near-Road CO, NO2, and $PM_{2.5}$ monitors at San Jose-Knox Avenue and advise MBUAPCD if changes to this instrument are planned.

| | AQS# | Parameter | Method | POC |
|---|---|---|---|---|
| San Jose | 060850006 | 42101 | 054 | 1 |
| San Jose | 060850006 | 42602 | 074 | 1 |
| San Jose | 060850006 | 88101 | 170 | 1 |

Sincerely,

Michael J Gilroy
Deputy Air Pollution Control Officer
Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940
(831) 647-9411

# APPENDIX E. OZONE MONITORING WAIVER CORRESPONDENCE

As part of the 2015 $O_3$ NAAQS revision, EPA revoked all standing $O_3$ monitoring season waivers, so on December 18, 2015, the Air District requested an $O_3$ monitoring waiver for January 1 through March 31, and November 1 through December 31 in both 2016 and 2017. EPA approved this waiver request for shorter $O_3$ monitoring at certain sites in a letter dated January 20, 2016. Both the BAAQMD request letter and the EPA approval letter are included below.

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT



December 18, 2015

Meredith Kurpius, Ph. D.
Manager, Air Quality Analysis Office
United States Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Kurpius:

The Bay Area Air Quality Management District (BAAQMD) is requesting that waivers from ambient ozone air monitoring be renewed in accordance with 40 CFR 58.12(a)(3) and 58 Appendix D 4.1(i) from January 1 through March 31, and November 1 through December 31, 2016, as well as from January 1 through March 31, and November 1 through December 31, 2017. Operating at a shortened season for some ozone-only sites allows resources to be used more efficiently during the high $PM_{2.5}$ season. We request that the following five SLAMS ozone stations be considered under this waiver:

1. Hayward AQS# 060012001
2. Gilroy AQS# 060850002
3. San Martin AQS# 060852006
4. Fairfield AQS# 060950005
5. Los Gatos AQS# 060851001

The San Ramon ozone SPM began operation on January 1, 2012. It is part of the District's unofficial PAMS network and is not a required monitor for the San Francisco-Oakland-Fremont MSA. The Air District is also providing curtesy notification of our intent to stop winter operation of the San Ramon ozone SPM:

6. San Ramon (SPM) AQS# 060132007

The ambient ozone analyzers at the remaining sixteen BAAQMD air monitoring stations (see Enclosure A) will continue operating on the January through December ozone season per 40 CFR 58 Appendix D. In accordance with 40 CFR 58 Appendix D 4.1(i), we have included supporting information using data from 2011 through 2015 (see enclosures). Historical data indicates the probability of these sites reaching any national or state standard during the winter months of December through March is extremely low.

We note that a waiver for the same sites listed above was approved for November 1 through December 31, 2015 in EPA's approval of our Annual Monitoring Network Plan submitted in July 2015. We anticipate requesting a renewal of ozone sampling season waivers as appropriate in future Air Monitoring Network Plans, beginning

with the plan we expect to submit in July 2017. While we could have requested the waiver for months in 2017 in the Plan submitted in July 2016, it would be based on the same data as presented here, since 2015 will be the most recent complete ozone season.

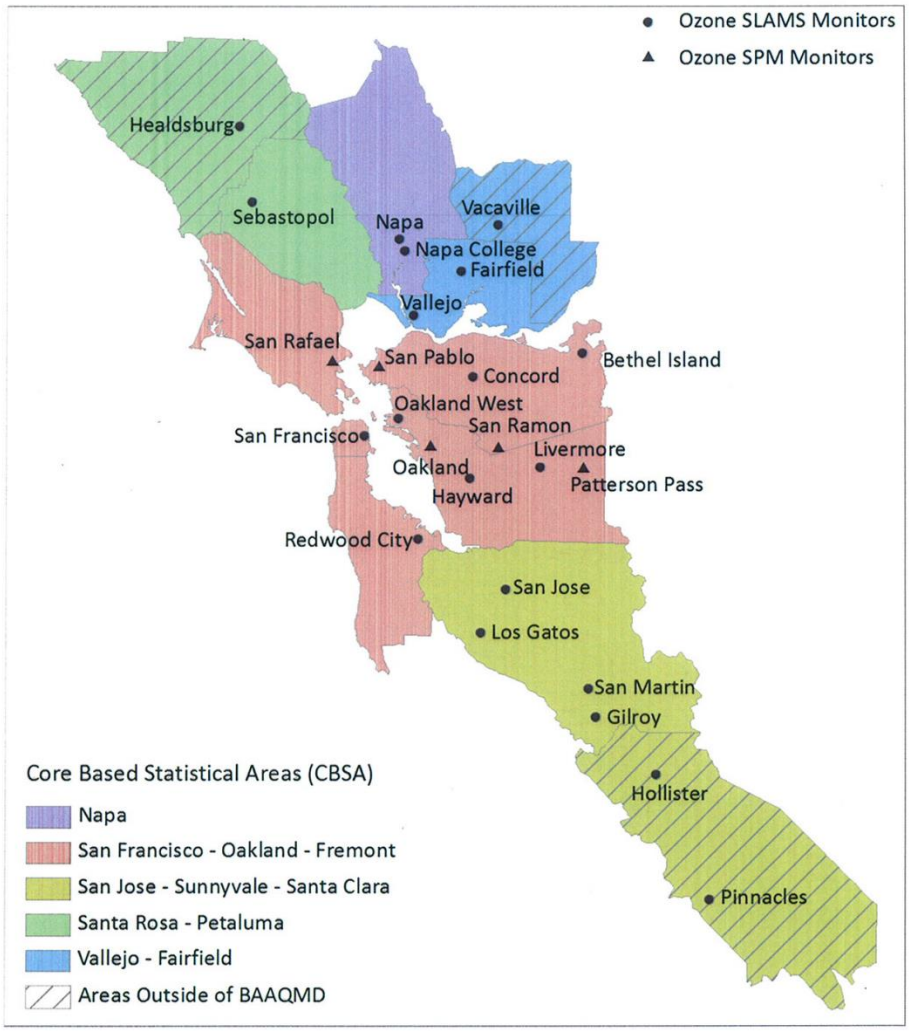
Thank you for your consideration of the ozone season waiver requests for winter months of 2016 and 2017. Please contact Steve Randall at (415) 749-8456 if you have any questions or concerns.

Sincerely,

Eric D. Stevenson
Director of Meterology, Measurement and Rules

cc: Dena Vallano
Michael Flagg

Enclosure A: Ozone monitoring in the San Francisco Bay Area in 2015

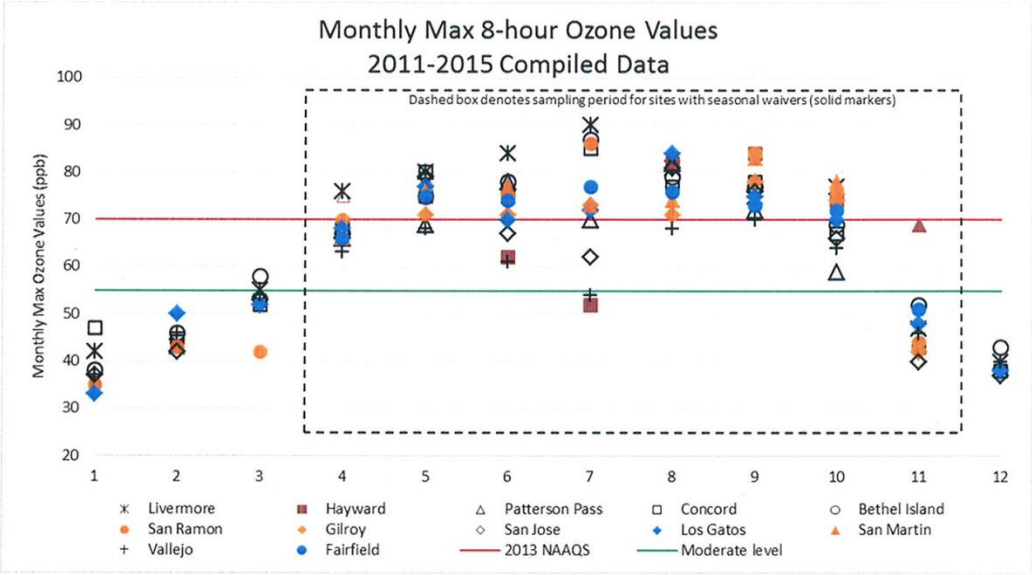


Enclosure B: Ozone data in the BAAQMD network from 2011 to 2015

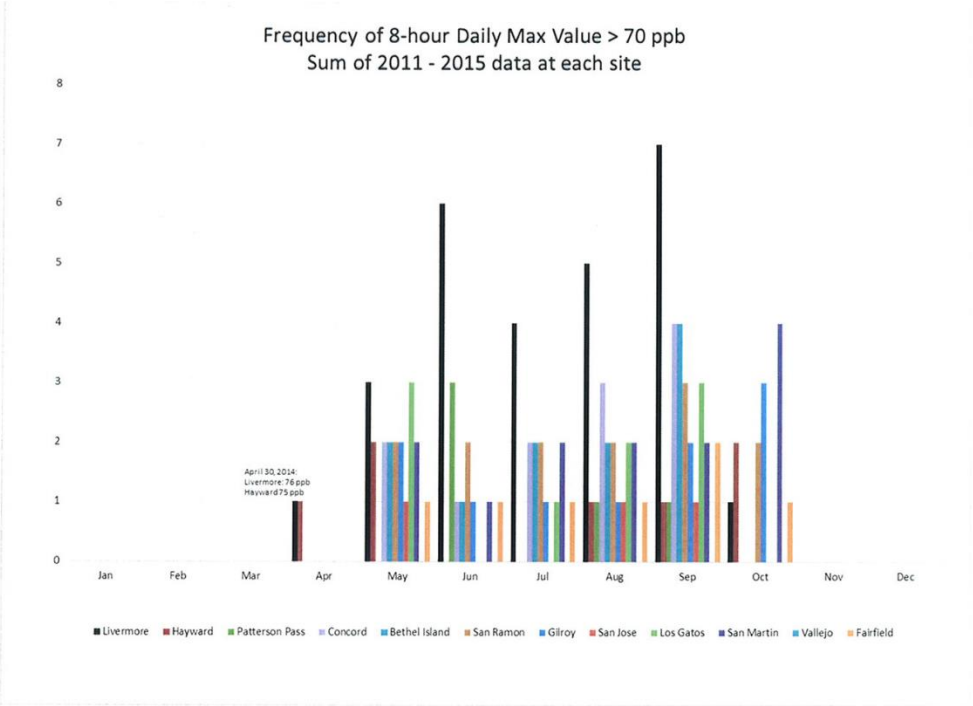
| Site Name | AQS ID | Monitoring season | Monitor Type | DV 2013 | DV 2014 | DV 2015 | 4th max 2011 | 4th max 2012 | 4th max 2013 | 4th max 2014 | 4th max 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Livermore | 06-001-0007 | Jan-Dec | SLAMS | 71 | 72 | 73 | 74 | 71 | 69 | 76 | 74 |
| Oakland | 06-001-0009 | Jan-Dec | SLAMS | 44 | 47 | 52 | 47 | 40 | 46 | 57 | 55 |
| Oakland West | 06-001-0011 | Jan-Dec | SLAMS | 45 | 47 | 49 | 45 | 46 | 45 | 51 | 52 |
| Hayward | 06-001-2001 | April-Oct | SLAMS | 56 | 61 | 65 | 57 | 52 | 59 | 72 | 65 |
| Patterson Pass | 06-001-2005 | Jan-Dec | SPM | - | nv | nv | | | | | 75 |
| Concord | 06-013-0002 | Jan-Dec | SLAMS | 67 | 64 | 64 | 75 | 70 | 57 | 67 | 70 |
| Bethel Island | 06-013-1002 | Jan-Dec | SLAMS | 68 | 67 | 66 | 71 | 72 | 62 | 69 | 68 |
| San Pablo | 06-013-1004 | Jan-Dec | SLAMS | 51 | 52 | 55 | 53 | 49 | 52 | 55 | 59 |
| San Ramon | 06-013-2007 | April-Oct | SPM | nv | 67 | 70 | | 65 | 65 | 72 | 74 |
| San Rafael | 06-041-0001 | Jan-Dec | SLAMS | 53 | 56 | 61 | 53 | 49 | 57 | 64 | 63 |
| Napa | 06-055-0003 | Jan-Dec | SLAMS | 59 | 58 | 61 | 64 | 58 | 55 | 62 | 66 |
| San Francisco | 06-075-0005 | Jan-Dec | SLAMS | 46 | 47 | 48 | 48 | 47 | 43 | 52 | 50 |
| Redwood City | 06-081-1001 | Jan-Dec | SLAMS | 53 | 56 | 59 | 53 | 50 | 56 | 64 | 59 |
| Gilroy | 06-085-0002 | April-Oct | SLAMS | 64 | 66 | 67 | 65 | 66 | 63 | 71 | 68 |
| San Jose | 06-085-0005 | Jan-Dec | SLAMS/ Ncore | 58 | 60 | 63 | 59 | 57 | 60 | 65 | 65 |
| Los Gatos | 06-085-1001 | April-Oct | SLAMS | 63 | 64 | 67 | 65 | 63 | 62 | 69 | 72 |
| San Martin | 06-085-2006 | April-Oct | SLAMS | 68 | 70 | 70 | 68 | 70 | 67 | 73 | 71 |
| Cupertino | 06-085-2009 | Jan-Dec | SLAMS | 62 | nv | nv | 63 | 61 | 63 | | |
| Vallejo | 06-095-0004 | Jan-Dec | SLAMS | 57 | 58 | 61 | 61 | 56 | 55 | 64 | 64 |
| Fairfield | 06-095-0005 | April-Oct | SLAMS | 65 | 63 | 63 | 68 | 67 | 61 | 63 | 67 |
| Santa Rosa | 06-097-0003 | Jan-Dec | SLAMS | 47 | nv | nv | 45 | 42 | 55 | | |
| Sebastopol | 06-097-0004 | Jan-Dec | SLAMS | na | nv | nv | | | | 54 | 56 |

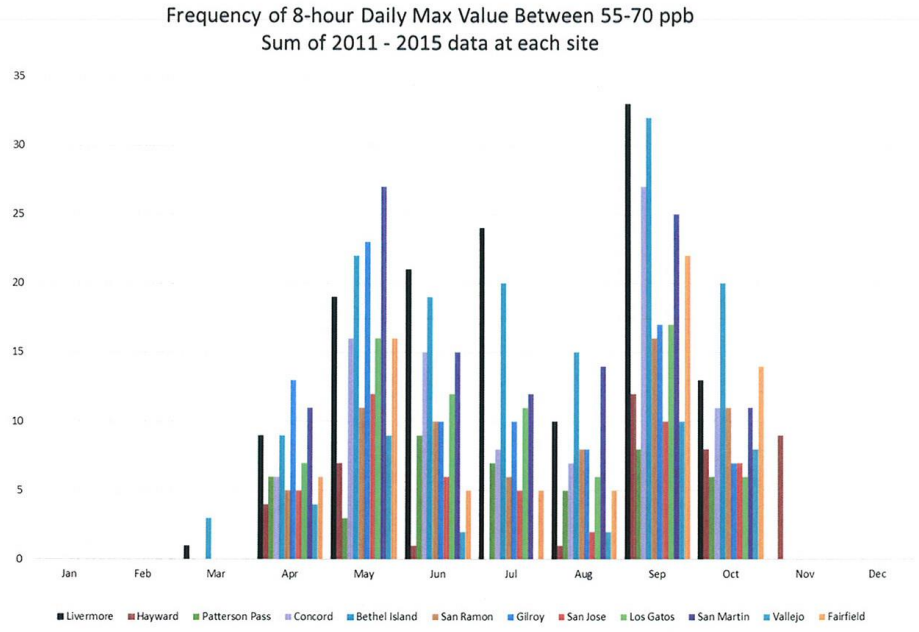
Sites with seasonal sampling waivers
Years with no data

Enclosure C:


Monthly Max 8-hour Ozone Values
2011-2015 Compiled Data
Dashed box denotes sampling period for sites with seasonal waivers (solid markers)
Monthly Max Ozone Values (ppb)
100
90
80
70
60
50
40
30
20
1
2
3
4
5
6
7
8
9
10
11
12
Livermore
San Ramon
Vallejo
Hayward
Gilroy
Fairfield
Patterson Pass
San Jose
2013 NAAQS
Concord
Los Gatos
Moderate level
Bethel Island
San Martin

Enclosure D: Frequency of ozone violations and concentrations between 55 ppb and 70 ppb during 2011 through 2015




Frequency of 8-hour Daily Max Value Between 55-70 ppb
Sum of 2011 - 2015 data at each site
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Livermore
Hayward
Patterson Pass
Concord
Bethel Island
San Ramon
Gilroy
San Jose
Los Gatos
San Martin
Vallejo
Fairfield

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JAN 20 2016

Mr. Eric Stevenson
Director of Meteorology, Measurement and Rules
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Dear Mr. Stevenson:

This letter is in response to your request dated December 18, 2015 for a waiver to suspend operation of five Bay Area Air Quality Management District (BAAQMD) State or local air monitoring stations (SLAMS) ozone sites (Hayward – Air Quality System (AQS) ID 06-001-2001, Gilroy – AQS ID 06-085-0002, San Martin – AQS ID 06-085-2006, Fairfield – AQS ID 06-095-0005, and Los Gatos – AQS ID 06-085-1001) from January 1, 2016 through March 31, 2016, November 1, 2016 through March 31, 2017, and November 1, 2017 through December 31, 2017. Per 40 CFR 58, Appendix D Section 4.1(i), monitoring agencies must have ozone season deviations approved by the U.S. Environmental Protection Agency (EPA), documented in the Annual Ambient Air Quality Monitoring Network Plan, and updated in EPA's AQS database.

The continuing record of data from BAAQMD sites shows a low probability that these sites would measure an exceedance of the 2015 8-hour Ozone National Ambient Air Quality Standard (NAAQS) or state ozone standards during these winter months. As shown in BAAQMD's analysis, the past five years of data show no exceedances of the 2015 8-hour Ozone NAAQS for ozone at any BAAQMD monitors during the months of November through March. In addition, BAAQMD will continue to operate ozone monitors at sixteen sites throughout the waiver period. Please attach this approval letter and update the relevant monitor and site information in your next Annual Ambient Air Quality Monitoring Network Plan.

If you have any questions, please contact me at (415) 947-4534 or Dena Vallano of my staff at (415) 972-3134. Thank you for your continued attention to detail and thorough data analyses.

Sincerely,

Meredith Kurpius
Manager, Air Quality Analysis Office

cc (via email): Steven Randall, BAAQMD
Katherine Hoag, BAAQMD

# APPENDIX F. REQUEST TO END MONITORING OF $NO_Y$ AT THE SAN JOSE NCORE SITE



March 3, 2014

Ms. Meredith Kurpius, Ph.D.
Manager, Air Quality Analysis Office
United States Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Kurpius:

Since January 2011, the Bay Area Air Quality Management District (Air District) has been operating a federally mandated NOy instrument as part of EPA NCore requirements at our San Jose NCore site; AQS ID 06-085-0005. Hourly average data from this monitor have been submitted to the EPA AQS data base using the required method code 599 and parameter code 42600.

Analysis of 24 hourly NOx vs. NOy averages indicate statistically insignificant differences between NOx and NOy measurements as demonstrated in the three figures (24 hr NOx vs NOy correlation, by year) included below. To enable more efficient utilization of both fiscal and personnel resources within the Air District Air Monitoring Section, we are requesting that the EPA Administrator grant a waiver permitting NOx monitoring to be substituted for the required NOy monitoring at the Air District NCore site, as allowed in ***40CFR Part 58 Appendix D.3: Design Criteria for NCore Sites.***

The EPA NCore requirements from 40CFR Part 58 Appendix D.3: Design Criteria for NCore Sites as last amended on Dec. 27th 2010 includes the following in paragraph 3 (b) (1);

***Although the measurement of NOy is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NOy compared to the conventional measurement of NOX, particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NOy and NOX measured concentrations, the Administrator may allow for waivers that permit NOX monitoring to be substituted for the required NOy monitoring at applicable NCore sites.***

All data represented in the figures below is available for further analysis in the EPA AQS data base, or can be provided upon request if independent verification by EPA is desired. We propose to close this monitor immediately upon receipt of the Administrator's letter providing the requested waiver.

939 ELLIS STREET • SAN FRANCISCO CALIFORNIA 94109 • 415.771.6000 • www.baaqmd.gov

Please contact Glen Colwell at (415) 749-4672 if you have any questions or concerns.

Sincerely,

Eric D. Stevenson
Director of Technical Services

cc: K. Hoag, EPA Region 9
G. Yoshimura, EPA Region 9
E. Felix, EPA Region 9

cc: K. Malone,
M. Flagg, EPA Region 9

Figure 1 – NCore BAAQMD San Jose: NOx vs. NOy 2013 24 Hr Correlation: R2 = 0.995

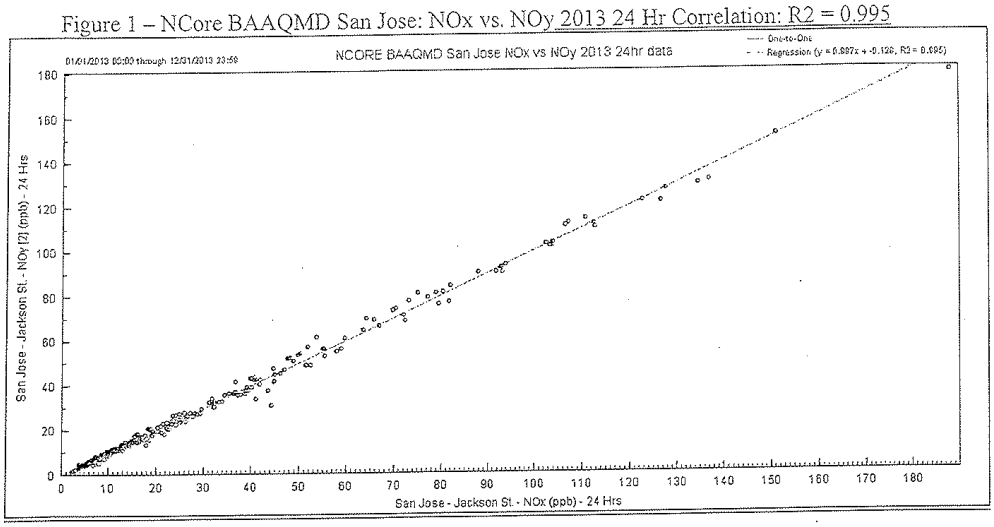



Figure 2 – NCore BAAQMD San Jose: NOx vs. NOy 2012 24 Hr Correlation: R2 = 0.994

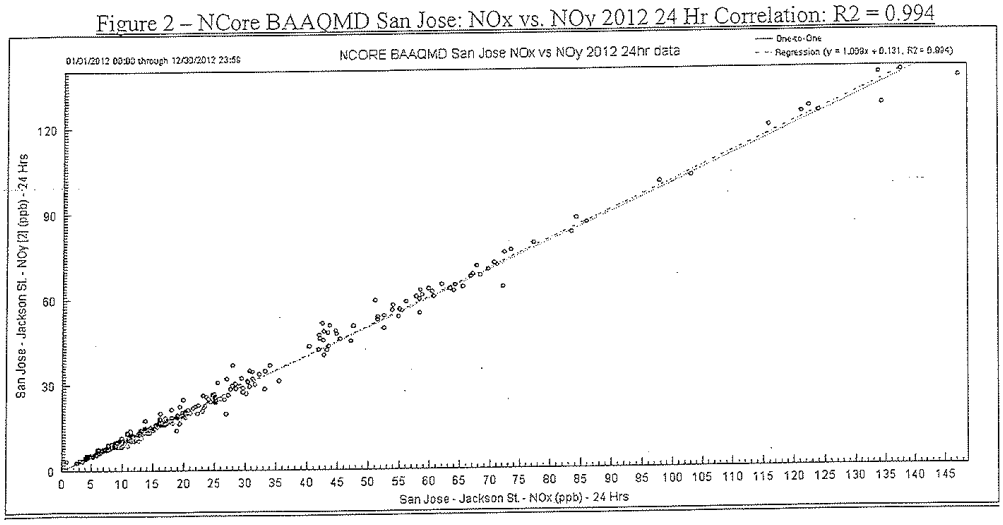
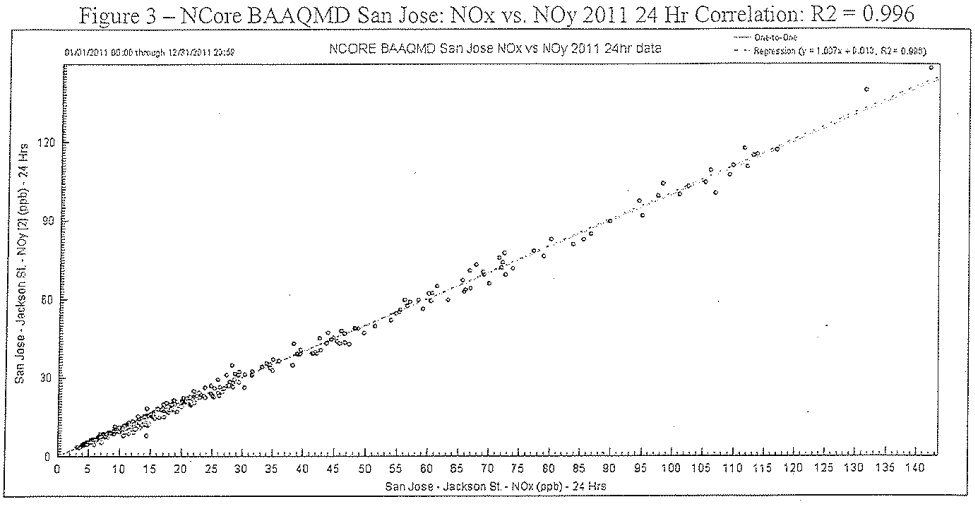


Figure 3 – NCore BAAQMD San Jose: NOx vs. NOy 2011 24 Hr Correlation: R2 = 0.996



# APPENDIX G. NAPA SITE RELOCATION CORRESPONDENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JUN 12 2015

Mr. Eric Stevenson
Director of Meteorology, Measurements and Rules Division
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Dear Mr. Stevenson:

This letter is in response to Bay Area Air Quality Management District's (BAAQMD's) request for approval for the relocation of State/Local Air Monitoring Station (SLAMS) $PM_{2.5}$, $PM_{10}$, CO, $NO_x$, and $O_3$ monitoring at the Napa site (AQS ID 06-055-0003) to a new site at the Napa Valley College Campus (38.278881°, -122.274948°). Additionally, BAAQMD is requesting approval for the relocation of the current Napa collocated $PM_{10}$ monitor to the San Pablo site (AQS ID 06-013-1004).

Per 40 CFR 58.14, monitoring agencies are required to obtain the U.S. Environmental Protection Agency's (EPA) approval for the relocation of SLAMS monitors. On April 28, 2015, we received your official request to 1) relocate the Napa station due to lack of an acceptable lease agreement and associated habitability issues, and 2) relocate the collocated $PM_{10}$ monitor due to insufficient space at the new Napa site and inability to meet 40 CFR 58 Appendix E criteria.

Napa Site Relocation

After a visit to the proposed relocation site and upon our review of the documentation BAAQMD has provided, pursuant to 40 CFR 58.14, we approve your selection for the relocation of the current Napa station. Specifically, we have determined that your request meets the provisions under 40 CFR 58.14(c)(6), namely that logistical problems beyond BAAQMD's control make it impossible to continue operation at the current site. In addition to the logistical lease and habitability issues, the $O_3$ monitor at this site is located closer to Jefferson Street than is specified for neighborhood scale $O_3$ sites. EPA believes that our April 24, 2013 waiver from the Appendix E "spacing from roadways" siting requirement (per 40 CFR 58 Appendix E, section 10) is still justified based on the data and do not expect a substantive amount of $O_3$ scrubbing at the Jefferson street location which would compromise the comparison of the collected $O_3$ data to the NAAQS. However, we also support BAAQMD's desire to have the Napa MSA site meet all the siting requirements of 40 CFR 58 Appendix E for $O_3$ as a long-term solution to this siting issue.

BAAQMD worked with the Napa Valley College Campus to find a new location that meets requirements described in 40 CFR 58 and its associated appendices for all the pollutants measured at the site. The replacement site (Napa Valley College Campus) is 2.5 miles southeast of the current Napa site and is expected to be at the same scale of representation (i.e., measuring similar $PM_{2.5}$, $PM_{10}$, CO, $NO_x$, and $O_3$ concentrations from similar sources), free from trees and other obstructions in all directions, and the predominant wind pattern and direction are assumed to be similar to the current site based on the

proposed site's close proximity to the previous site. Based on the weight of evidence and pursuant to 40 CFR 58.14(c)(6), EPA concludes that the relocation does not compromise data collection needed for implementation of the NAAQS, provided that the trailer will be placed in the expected location and meets the appropriate requirements in 40 CFR 58.

Collocated $PM_{10}$ Monitor Relocation

Upon our review of the documentation you have provided, pursuant to 40 CFR 58.14, we approve your selection for the relocation of the collocated $PM_{10}$ monitor currently located at the Napa site to the San Pablo site. Specifically, we have determined that your request meets the provisions under 40 CFR 58.14(c)(6), namely that logistical problems beyond BAAQMD's control make it impossible to continue operation at the current and proposed Napa sites.

Accordingly, BAAQMD provided adequate supporting documentation and data analysis justifying the selection of the relocation to the San Pablo site instead of the San Jose-Jackson NCore site (06-085-0005), due to the latter not meeting 40 CFR 58 Appendix E siting requirements with the addition of the collocated $PM_{10}$ monitor, and already having a $PM_{10}$ monitor as a part of the $PM_{2.5-10}$ network that has a different method designation, precluding it's eligibility as a collocated $PM_{10}$ monitor based on 40 CFR 58 Appendix A.3.3.1. The new San Pablo $PM_{10}$ monitor is expected to be at the same scale of representation (i.e., measuring similar $PM_{10}$, concentrations from similar sources), free from trees and other obstructions in all directions. Based on the weight of evidence and pursuant to 40 CFR 58.14(c)(6), EPA concludes that the $PM_{10}$ monitor relocation does not compromise data collection needed for implementation of the NAAQS and meets the appropriate requirements in 40 CFR 58.

Please attach this approval letter and update the relevant monitor and site information in your next Annual Ambient Air Quality Monitoring Network Plan and Network Assessment. As this is a relocation, the data from the old and new Napa sites will be combined to form one continuous data record for design value calculations with an anticipated end date of July 31, 2015 at the old site and start date of August 1, 2015 at the new site. Please note these changes, along with the collocated $PM_{10}$ monitor relocation in the AQS comment field for both the old and new AQS sites. Should you have any questions, please feel free to contact me at (415) 947-4534 or Dena Vallano at (415) 972-3134.

Sincerely,

Meredith Kurpius, Manager
Air Quality Analysis Office

cc (via email):
K. Malone, BAAQMD
J. Hesson, BAAQMD
M. Beacon, BAAQMD

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT



April 16, 2015

Ms. Meredith Kurpius, Ph.D.
Manager, Air Quality Analysis Office
United States Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Kurpius:

The Bay Area Air Quality Management District (Air District) has recently identified serious habitability issues with its Napa monitoring site (AQS ID 06-055-0003). Attempts at negotiating a new lease agreement, including mediation of those issues, have been unsuccessful. The Air District feels that the lack of acceptable lease terms and the continuing habitability issues have made maintaining the current site impossible. Consequently, the Air District has identified a new site approximately 2.5 miles from the current site at the Napa Valley College Campus (Lat 38.278881°, Long -122.274948°). After reviewing the siting and performing a site visit with Katherine Hoag of EPA Region 9, we believe the new location is an appropriate site to characterize air quality in the Napa CBSA. Since the FEM BAM at the current Napa monitoring site began monitoring in December 2012 there is currently not enough $PM_{2.5}$ data to determine its eligibility for shut down under 40 CFR Part 58(c)(1-5). Therefore, the Air District is officially requesting EPA to provide approval for the necessary move of the current Napa $PM_{2.5}$, $PM_{10}$, CO, NOx, and $O_3$ monitors to the new location pursuant to 40 CFR Part 58.14(c)(6) which states that "A SLAMS monitor not eligible for removal under any of the criteria in paragraphs (c)(1) through (c)(5) of this section may be moved to a nearby location with the same scale of representation if logistical problems beyond the State's control make it impossible to continue operation at its current site".

Currently the Napa monitoring site also houses the District's single required collocated Hi-Vol $PM_{10}$ sampler. The new site will require deployment of a trailer with insufficient room to house two Hi-Vol samplers while maintaining 40 CFR Part 58 Appendix E siting criteria. In looking for another appropriate site to collocate $PM_{10}$ the Air District evaluated the annual average $PM_{10}$ concentrations from the manual $PM_{10}$ network. While the maximum $PM_{10}$ concentrations are typically found at the San Jose site, that site is the District's NCore site and houses a large number of rooftop samplers that make siting a collocated $PM_{10}$ sampler according to 40 CFR Part 58 Appendix E requirements impossible. In addition, the sampler deployed at that site is part of the $PM_{10-2.5}$ network and has a different method designation from the rest of the $PM_{10}$ network which precludes its eligibility as a collocated $PM_{10}$ monitor per 40 CFR Part 58 Appendix A.3.3.1. Excluding San Jose from the analysis, the location of maximum concentration among the remaining sites changes from year to year.

In addition, maximum concentrations at these sites are close enough to the methodological minimum allowable concentration for a valid collocated sample that the Air District believes the precision results from any of the sites would be statistically indistinguishable from one another. As a result, the Air District is also requesting EPA to provide approval for the relocation of the collocated $PM_{10}$ monitor to the San Pablo site.

**$PM_{10}$ Annual Averages**

| Site | Monitor Type | Sampling | Annual Average PM10 conc. (µg/m3) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Napa | SLAMS | 1:6 | 17.5 | 16.6 | 19.2 | 15.2 | 17.7 | 14.8 |
| San Jose | SLAMS | 1:3 | 19.1 | 18.5 | 18.1 | 17.8 | 21.3 | 18.9 |
| San Pablo | SLAMS | 1:6 | 15.0* | 17.8* | 18.5 | 14.8 | 17.4 | 15.4 |
| San Rafael | SLAMS | 1:6 | 15.3 | 15.7 | 15.5 | 12.4 | 14.6 | 13.3 |
| San Francisco | SPM | 1:12 | 17.6 | 18.8 | 18.3 | 16.5 | 16.3 | 15.9 |
| Concord | SPM | 1:12 | 13.8 | 13.1 | 14.8 | 11.8 | 14.7 | 13.3 |
| Bethel Island | SPM | 1:12 | 16.4 | 17.8 | 16.8 | 13.3 | 19.6** | 15.6 |

* San Pablo invalid 2009/2010 – major damage due to fire at site
** Bethel island invalid in 2013 as low summer months were missed for shelter replacement

Sincerely,

Eric D. Stevenson
Director of Meteorology, Measurement and Rules Division

cc: K. Hoag, EPA Reg. 9
G. Yoshimura, EPA Reg. 9

cc: K. Malone, BAAQMD
J. Hesson, BAAQMD
M. Beacon, BAAQMD

# APPENDIX H. INITIAL PLAN FOR PAMS REQUIRED SITES

The Bay Area Air Quality Management District (Air District) voluntarily operated three unofficial Photochemical Assessment Monitoring Stations (PAMS) sites (Livermore, San Ramon and Patterson Pass) as a PAMS-like network to better understand ozone formation episodes and enhance forecasting capabilities (see Section 5.4 for more details). While a PAMS network was previously required for only serious, severe, or extreme ozone nonattainment areas, the recently revised monitoring rule (80 FR 65292; October 26, 2015) requires PAMS measurements June 1 through August 31 at NCore sites that are located in Core-Based Statistical Areas (CBSAs) with populations of 1,000,000 or more, starting in 2019. The PAMS measurements at this site must include hourly measurements of speciated VOCs, $O_3$, NO, true $NO_2$, $NO_y$, ambient temperature, wind speed, wind direction, atmospheric pressure, relative humidity, precipitation, mixing-height, solar radiation, and UV radiation. In addition, three 8-hour average carbonyl samples in a day are required on a 1 in 3 day schedule. The initial plan for implementing this requirement is to be submitted to EPA for their approval by July 1, 2018 (40 CFR 50.10(a)(10). However, EPA has requested that monitoring agencies submit the following information by July 1, 2017.

**Network Decision**

☐ The NCore site located at San Jose – Jackson will serve as the location of the required PAMS site and will measure the following parameters described below. An inventory of equipment used at the site(s) is provided in Attachment 2.

☑ We request a waiver from implementing PAMS at an otherwise required NCore site entirely, or to make PAMS measurements at alternative locations such as existing PAMS sites or existing NATTS sites. The Air District is requesting approval for an alternate location, the current unofficial-PAMS site in Livermore, per 40 CFR 58 Appendix D 5(c). Rationale for this waiver is provided in Attachment 1. An inventory of equipment the Air District expects to use at the site is provided in Attachment 2.

**Auto GC Decision**

Volatile organic compounds (VOCs) – Table 1 includes a draft list of the targeted VOCs not yet finalized by EPA.

☑ We will measure hourly speciated VOC measurements with an auto-gas chromatograph (GC). An inventory of equipment the Air District expects to use at the site is provided in Attachment 2.

☐ We request a waiver to allow three 8-hour samples every third day as an alternative to daily hourly speciated VOC measurements at locations (insert locations).

**Meteorology Measurements Decision**

EPA is suggesting the use of ceilometers for determining mixing height, however other types of meteorological equipment that provide for an indication of mixing height can be proposed.

☑ Will measure wind direction, wind speed, temperature, humidity, atmospheric pressure, precipitation, solar radiation, ultraviolet radiation, and mixing height. An inventory of equipment the Air District expects to use at the site is provided in Attachment 2.

☐ We request a waiver to allow meteorological measurements to be obtained from other nearby sites.

**Other Required Measurements**

Carbonyls – The Air District will conduct carbonyl sampling at a frequency of three 8-hour samples on a one-in-three day basis (~90 samples for a June through August PAMS sampling season). An inventory of equipment the Air District expects to use at the site is provided in Attachment 2. Table H-1 includes a draft list of the target carbonyl compounds not yet finalized by EPA. The TO-11A test method will be used.

Nitrogen Oxides – The Air District will monitor for NO and $NO_y$ (total oxides of nitrogen) in addition to true $NO_2$. The true $NO_2$ is required to be measured with a direct reading $NO_2$ analyzer, cavity attenuated phase shift (CAPS) spectroscopy or photolytic-converter $NO_x$ analyzer. An inventory of equipment the Air District expects to use at the site is provided in Attachment 2.

**Table H-1. PAMS Target Compound List**

| Priority Compounds | | | | Optional Compounds | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1,2,3-trimethylbenzene [a] | 19 | n-hexane [b] | 1 | 1,3,5-trimethylbenzene | 19 | m-diethlybenzene |
| 2 | 1,2,4-trimethylbenzene [a] | 20 | n-pentane | 2 | 1-pentene | 20 | methylcyclohexane |
| 3 | 1-butene | 21 | o-ethyltoluene [a] | 3 | 2,2-dimethylbutane | 21 | methylcyclopentane |
| 4 | 2,2,4-trimethylpentane [b] | 22 | o-xylene [a,b] | 4 | 2,3,4-trimethylpentane | 22 | n-decane |
| 5 | acetaldehyde [b,c] | 23 | p-ethyltoluene [a] | 5 | 2,3-dimethylbutane | 23 | n-heptane |
| 6 | acetone [c,d] | 24 | Propane | 6 | 2,3-dimethylpentane | 24 | n-nonane |
| 7 | benzene [a,b] | 25 | propylene | 7 | 2,4-dimethylpentane | 25 | n-octane |
| 8 | c-2-butene | 26 | styrene [a,b] | 8 | 2-methylheptane | 26 | n-propylbenzene [a] |
| 9 | ethane [d] | 27 | toluene [a,b] | 9 | 2-methylhexane | 27 | n-undecane |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | ethylbenzene [a,b] | 28 | t-2-butene | 10 | 2-methylpentane | 28 | p-diethylbenzene |
| 11 | Ethylene | | | 11 | 3-methylheptane | 29 | t-2-pentene |
| 12 | formaldehyde [b,c] | | | 12 | 3-methylhexane | 30 | α/β-pinene |
| 13 | Isobutane | | | 13 | 3-methylpentane | 31 | 1,3 butadiene [b] |
| 14 | Isopentane | | | 14 | Acetylene | 32 | benzaldehyde [c] |
| 15 | Isoprene | | | 15 | c-2-pentene | 33 | carbon tetrachloride [b] |
| 16 | m&p-xylenes [a,b] | | | 16 | cyclohexane | 34 | Ethanol |
| 17 | m-ethyltoluene [a] | | | 17 | cyclopentane | 35 | Tetrachloroethylene [b] |
| 18 | n-butane | | | 18 | isopropylbenzene [b] | | |

Source: Revisions to the Photochemical Assessment Monitoring Stations Compound Target List.
U.S. EPA, November 20, 2013

[a] Important SOAP (Secondary Organic Aerosols Precursor) Compounds
[b] HAP (Hazardous Air Pollutant) Compounds
[c] Carbonyl compounds
[d] Non-reactive compounds, not considered to be VOC for regulatory purposes

**Attachment 1: PAMS Required Site Location Waiver Request and Rationale**

The Bay Area Air Quality Management District (Air District) is requesting that EPA approve a waiver to operate the required PAMS site at our current unofficial PAMS location at Livermore (AQS ID 06-001-0007), rather than our NCore site at San Jose – Jackson (AQS ID 06-085-0005). The Livermore site has been the design value site for the Bay Area ozone nonattainment area since 2003-2005. As such, it is the critical site for any required attainment modeling, and therefore it will be more useful to have precursor and meteorological measurements at Livermore than at San Jose – Jackson. Due to the flight path for the San Jose International Airport, meteorological measurements are impossible to conduct at the San Jose – Jackson site, so implementing PAMS at Livermore allows for these measurements at the same location as the $O_3$ and $O_3$ precursor measurements, which is also preferable for model validation. Finally, the Air District has conducted $O_3$ precursor measurements at the Livermore site since 2010, making it a better site to continue to assess trends in the concentrations of these precursors.

**Attachment 2: Current Equipment Plans for the PAMS Required Site**

| Parameter | Equipment |
|---|---|
| VOC | Perkin Elmer TD300 with Clarus GC |
| True $NO_2$ | API T500U (CAPS) |
| $NO/NO_y$ | API T200 EU/$NO_y$ |
| Carbonyls | tbd |
| Mixing Height | Vaisala CL-51 (ceilometer) |
| Wind Direction, Wind Speed | Climatronics F460 cup and vane |
| Ambient Temperature | Campbell Scientific CS107 |
| Relative Humidity | Vaisala HMP-45 |
| Barometric Pressure | Vaisala PTB110 |
| Solar Radiation | Eppley 8-48 |
| UV Radiation | Eppley TUVR |
| Precipitation | Texas Electronics TR-525USW (tipping bucket) |

# APPENDIX I. SULFUR DIOXIDE DATA REQUIREMENTS RULE COMPLIANCE INFORMATION

On March 18, 2016, the U.S. Environmental Protection Agency sent a letter to the California Air Resources Board, informing the state that they considered three sources in Martinez, California, to be aggregated with respect to triggering compliance with the sulfur dioxide Data Requirements Rule ambient air characterization requirements. These sources are the Shell and Tesoro refineries and the Eco Services sulfur recovery plant. The Air District prepared an analysis (see below) outlining the proposed compliance with the sulfur dioxide Data Requirements Rule through ambient air monitoring. The Air District solicited comments from the public on this analysis from September 29 through October 31, 2016, and submitted it to the EPA. The EPA approved this approach on December 6, 2016 (see below).

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT



September 29, 2016

Anita Lee, Ph.D.
Manager, Air Quality Analysis Office
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

RE: 2015 Annual Network Plan

Dear Dr. Lee

On March 18, 2016, EPA sent a letter to the California Air Resources Board, informing the state that they considered three sources in Martinez, California, to be aggregated with respect to triggering compliance with the sulfur dioxide Data Requirements Reporting Rule ($SO_2$ DRR) ambient air characterization requirements. These sources (the Shell and Tesoro refineries, and the Eco Services sulfur recovery plant) are within the jurisdiction of the Bay Area Air Quality Management District ("Air District").

In our 2015 Annual Monitoring Network Plan, the Air District indicated that we intend to comply with the $SO_2$ DRR using the existing Martinez $SO_2$ monitoring station to fulfill the monitoring option. The attached document includes additional information supporting the Air District's approach to rely on the ongoing $SO_2$ monitoring at the Martinez site to satisfy this requirement for ambient air quality characterization.

This document is currently available for pubic comment on our website until October 31, 2016. Please contact me at (415) 749-4695 with any questions or concerns.

Sincerely,

Eric D. Stevenson
Director of Meteorology, Measurement, and Rules

Attachment

cc: Gayle Sweigert, Califiornia Air Resources Board

# Analysis of the suitability of the Martinez $SO_2$ SLAMS to fulfill the monitoring requirement of the $SO_2$ Data Requirements Rule

The $SO_2$ Data Requirements Rule ($SO_2$ DRR), finalized by EPA on August 21, 2015, requires states to characterize ambient sulfur dioxide ($SO_2$) concentrations in areas around sources emitting greater than 2000 tons per year (tpy) of $SO_2$. The rule includes the flexibility for areas to meet this requirement through ambient air monitoring, modeling, or by the source adopting enforceable limits to bring emissions below 2000 tpy. On March 18, 2016, EPA sent a letter to the California Air Resources Board, informing the state that they considered three sources in Martinez, California, to be aggregated with respect to triggering compliance with the $SO_2$ DRR ambient air characterization requirements. These facilities and their 2014 calendar year emissions are listed in Table 1, below.

**Table 1: Martinez Facility $SO_2$ Emissions for Calendar Year 2014**

| Facility Name | Source Type | $SO_2$ (tons/yr) |
|---|---|---|
| Shell | Petroleum Refinery | 1,093 |
| Eco Services (formerly Solvay) | Sulfuric Acid Plant | 186 |
| Tesoro | Petroleum Refinery | 962 |
| Aggregated Total | - | 2,241 |

Martinez is situated in a small basin bordered on the north by the Carquinez Strait, connecting the San Pablo and Suisun Bays, and in the other directions by hills that range in height from 200-400 meters. Due to the complicated topography and meteorology of the area surrounding these sources, heavily influenced by sea-breezes and orographic forcing, typical dispersion modeling does not accurately characterize ambient concentrations of pollutants. However, such modeling can be used to help identify areas of relative maximum concentration.

The Bay Area Air Quality Management District ("Air District") completed 1-hour $SO_2$ modeling for the Martinez area using the AERMOD dispersion model to evaluate the normalized ambient $SO_2$ concentrations resulting from the combined $SO_2$ source emissions from Shell, Tesoro, and Eco Services. The modeling was performed according to the following specifications:

- A 16 km x 16 km special receptor grid containing 16,600 discrete receptor locations centered on UTM: 580,124 E, 4,208,805 N.
- A combined total of 30 sources of $SO_2$ at Shell, Tesoro and Eco Services were included in the model. Source locations and stack parameters were previously provided by the facilities.
- $SO_2$ emission rates used in the model were considered to be maximum values.
- Elevations for sources and receptors were taken from the National Elevation Dataset (NED) using 10 meter horizontal resolution data.

- Five consecutive years of meteorological data (2009 – 2013) from a centrally located meteorological station (called Shell East) was used.

Figure 1 below shows an outline of the domain used for the modeling, the fence lines of the included facilities, and nearby $SO_2$ monitors. The Air District's $SO_2$ monitors, also known as state or local air monitoring stations (SLAMS) are labeled with the site name and the monitor type. More detailed information about the modeling protocol, including model inputs, are available upon request to the Air District.

As shown in Figure 2 below, based on the five-year modeling period results, the higher normalized 1-hour $SO_2$ concentrations are expected to occur generally at elevated areas. The resulting maximum normalized 1-hour $SO_2$ concentration is about 0.5 km southwest of the existing Air District $SO_2$ SLAMS. Access to power is very limited in this sparsely populated hilly area, similar to many of the elevated areas surrounding Martinez. Therefore, the Martinez SLAMS current location is likely the closest feasible location to the modeled concentration maximum, given power and siting constraints, as well as being representative of the actual population exposure of the likely maximum 1-hour $SO_2$ concentrations.

Given the complexity of the area and the resulting challenges in modeling, the Air District performed two additional 5-year modeling runs using the same parameters, but meteorological data from two other nearby meteorological stations (Shell-West, and Tesoro). These runs show other areas of potential high $SO_2$ concentrations in addition to the consistent high concentration location uphill from the current monitoring SLAMS (see Figures 3 and 4 below). The Air District believes that the varied modeling results support the current monitoring location as adequate to satisfy the monitoring requirement for the $SO_2$ DRR for the sources EPA identified, however, the Air District will continue to evaluate the appropriateness of this location to meet this objective in each 5-year network assessment. Any such assessment will utilize new information that may become available, such as data from upcoming community monitoring sites. In the next few years, the Air District expects to install monitors in the communities surrounding the five Bay Area refineries to further characterize the air quality near those sources as required by our Regulation 3.

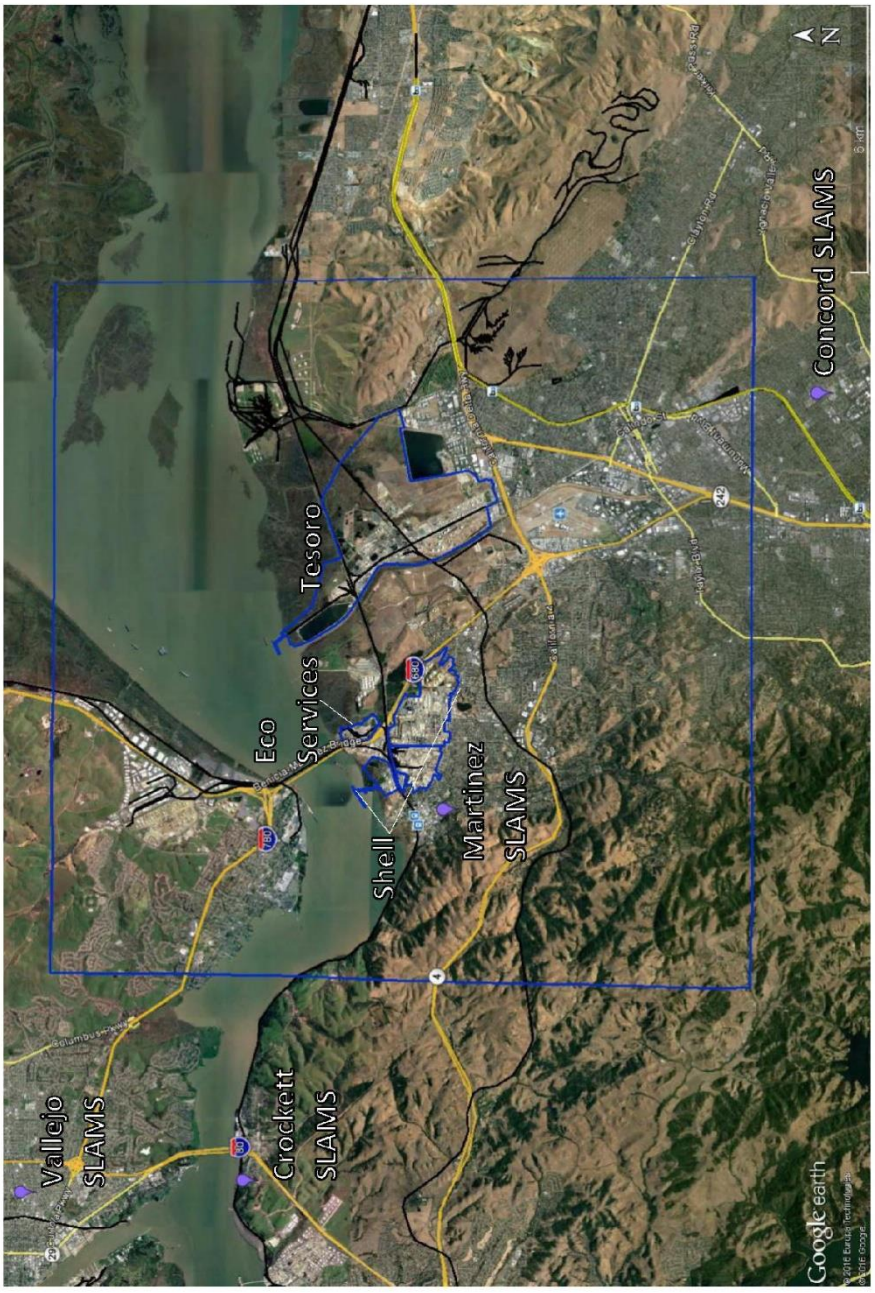



*Figure 1: Area overview including the AERMOD modeling domain (blue rectangle), facilities subject to the $SO_2$ DRR, and nearby $SO_2$ monitoring sites*

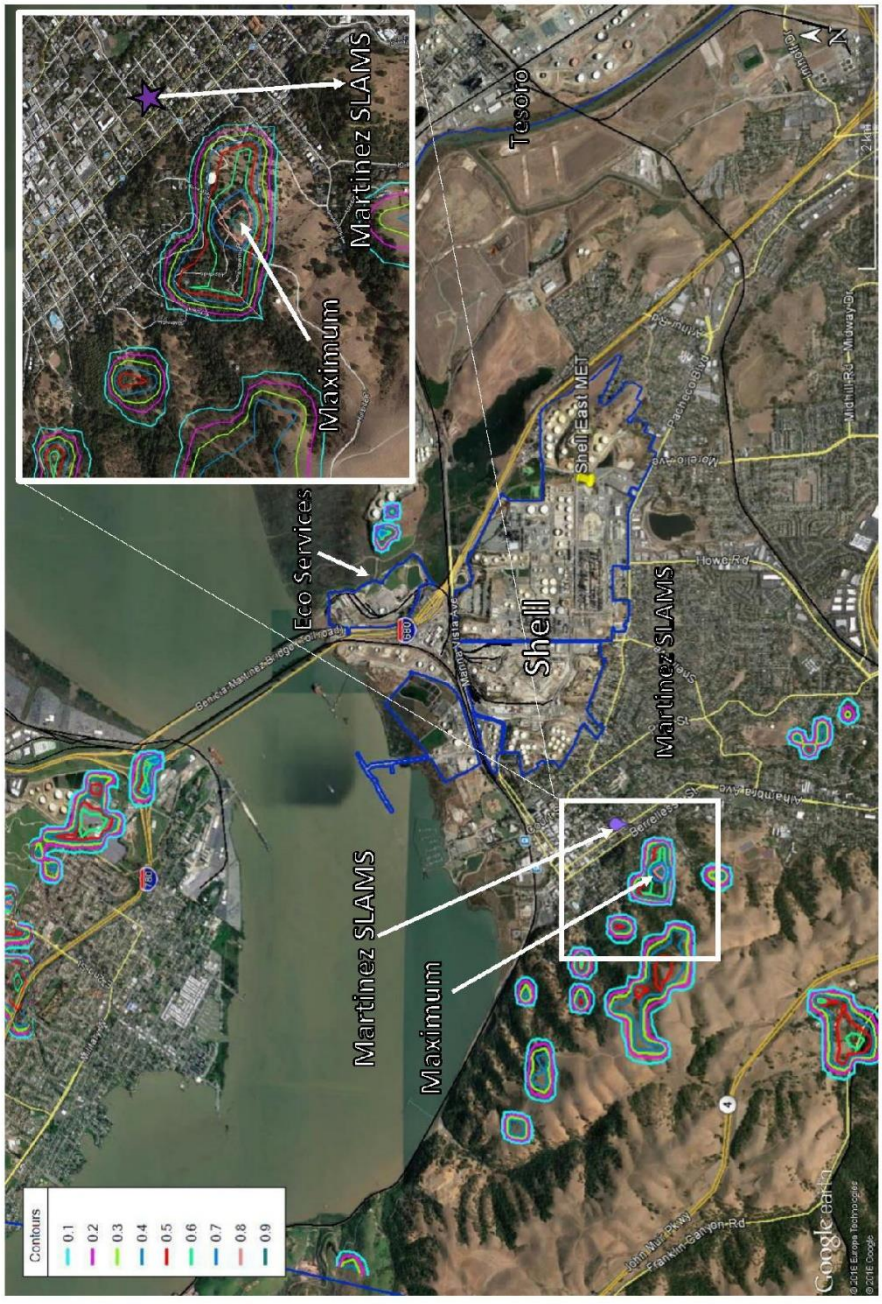



*Figure 2: Maximum normalized 1-hour SO2 concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Shell-East meteorological data*

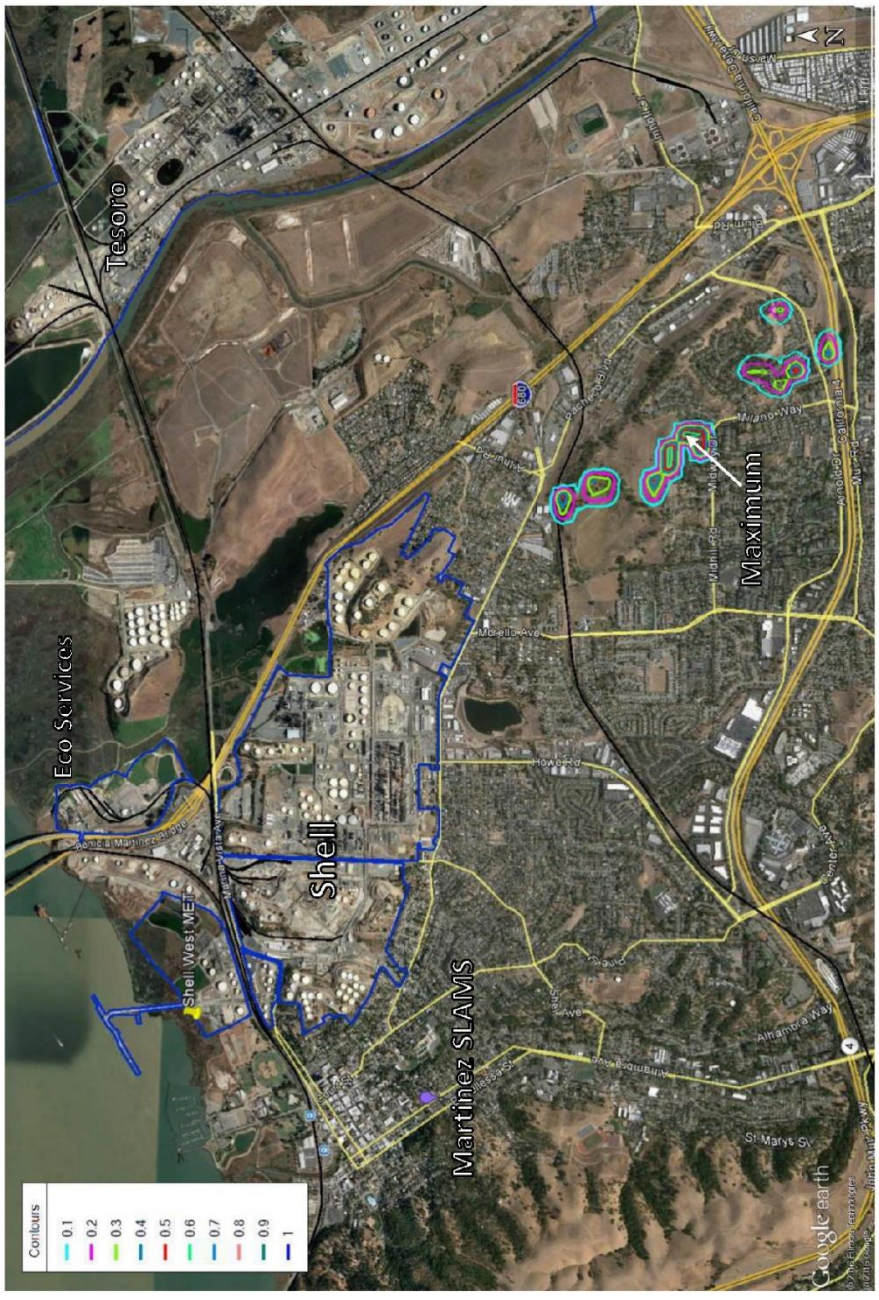



*Figure 3: Maximum normalized 1-hour SO2 concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Shell-West meteorological data*

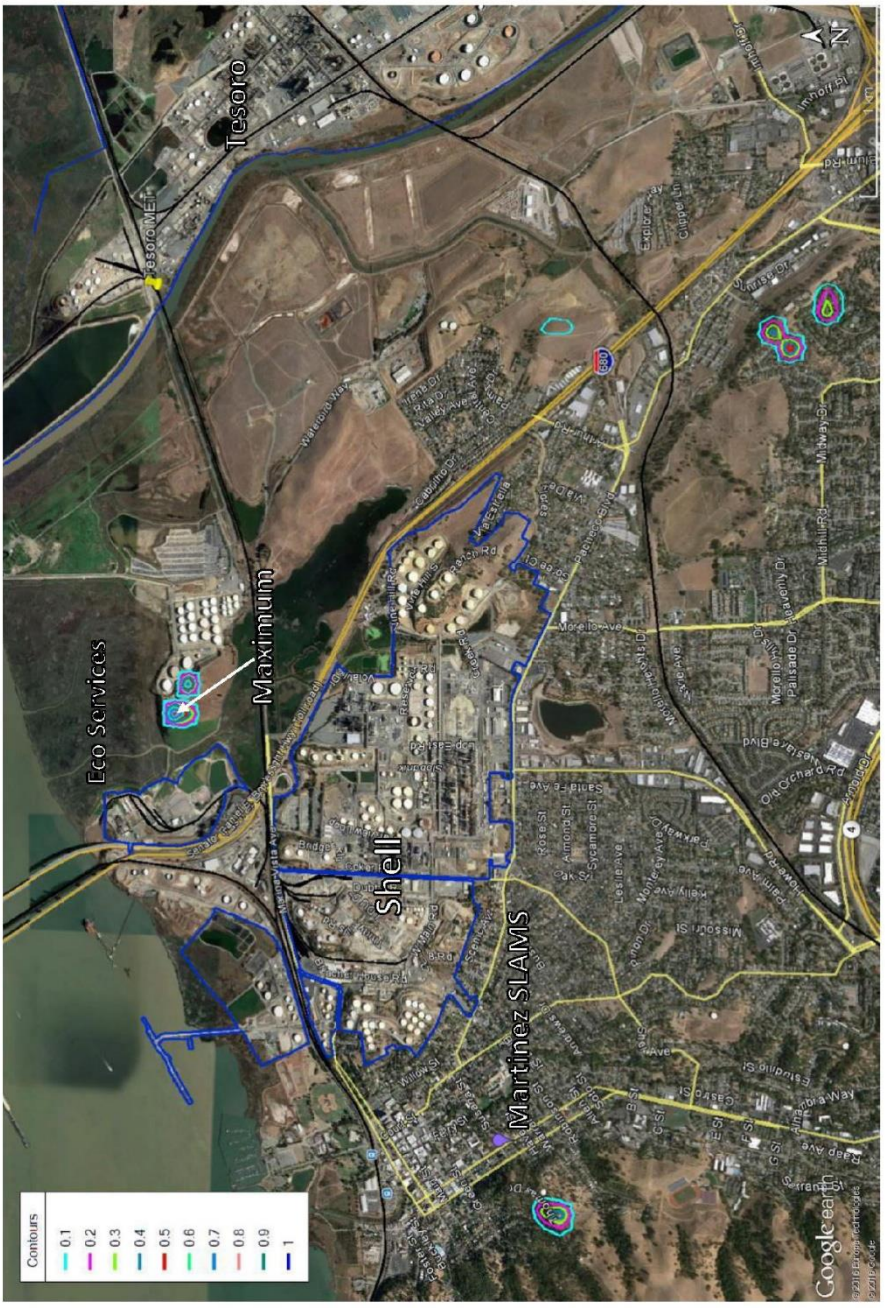



*Figure 4: Maximum normalized 1-hour SO2 concentrations from AERMOD modeling using emissions from Shell, Tesoro, and Eco Services, and 2009-2013 Tesoro meteorological data*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

December 6, 2016

Mr. Eric Stevenson
Director of Technical Services
Bay Area Air Quality Management District
375 Beale Street
San Francisco, California 94105

Dear Mr. Stevenson:

Thank you for your September 29, 2016 submission of your analysis of the suitability of the Martinez $SO_2$ State or Local Air Monitoring Station (SLAMS) to fulfill the monitoring requirement of the $SO_2$ Data Requirements Rule, as well as the October 5, 2016 submission of the Interoffice Memorandum describing the modeling protocol and source parameter data used in the analysis. The analysis was made available for public comment between September 29, 2016 and October 31, 2016. In your 2015 Air Monitoring Network Plan, submitted June 27, 2016, you described your intent to perform this analysis and submit it to EPA. We approved your network plan on October 31, 2016, and included a comment in Enclosure C, checklist item 63, stating that "…BAAQMD and EPA are currently evaluating whether existing $SO_2$ monitoring is adequate to meet the requirements of DRR."

On December 5, 2016 your staff communicated to us via email that no comments on the analysis were received. Based on the information we received from your agency, we approve the current location of the Martinez $SO_2$ SLAMS to satisfy monitoring requirements under the $SO_2$ Data Requirements Rule.

If you have any questions regarding this letter, please feel free to contact me at (415) 947-4134 or Anna Mebust at (415) 972-3265.

Sincerely,

Gwen Yoshimura, Acting Manager
Air Quality Analysis Office

cc (via email): Katherine Hoag, Bay Area Air Quality Management District
Gayle Sweigert, California Air Resources Board