

# Annual Network Plan

Covering Monitoring Operations in

25 California Air Districts

July 2022



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## Abbreviations used in this document

AB	Assembly Bill
ANP	Annual Network Plan
APCD	Air Pollution Control District
AQMD	Air Quality Management District
AQMIS	Air Quality and Meteorological Information System
AQS	Air Quality System
ARD	Air Resources District
ARM	Approved Regional Method
AQDA	Air Quality Data Action
CAN	Corrective Action Notification
CARB	California Air Resources Board
CASTNET	Clean Air Status and Trends Network
CBSA	Core-Based Statistical Area
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CSN	Chemical Speciation Network
DV	Design Value
EMP	Enhanced Monitoring Plan
FEM	Federal Equivalent Method
FR	Federal Register
FRM	Federal Reference Method
GHG	Greenhouse Gases
IMPROVE	Interagency Monitoring of Protected Visual Environments
MATES	Multiple Air Toxics Exposure
MLD	Monitoring and Laboratory Division
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard

NCore	National Core multipollutant network monitoring Station
NIST	National Institute of Standards and Technology
NO <sub>2</sub>	Nitrogen Dioxide
NPS	National Park Service
OMB	Office of Management and Budget
OTR	Ozone Transport Region
PAMS	Photochemical Assessment Monitoring Site
PM <sub>10</sub>	Particulate Matter with an aerodynamic diameter ≤10 micrometers
PM <sub>2.5</sub>	Particulate Matter with an aerodynamic diameter ≤2.5 micrometers
PQAO	Primary Quality Assurance Organization
PWEI	Population Weighted Emissions Index
QAS	Quality Assurance Section
QAW	Quality Management Section
QMB	Quality Management Branch
QMS	Quality Management Section
SLAMS	State and Local Air Monitoring Site
SLS	Standards Laboratory Section
SO <sub>2</sub>	Sulfur Dioxide
SPM	Special Purpose Monitor
STN	Speciated Trends Network
TACs	Toxic Air Contaminants
TPY	Tons per Year
TSA	Technical System Audit
TTP	Through the Probe
U.S. EPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

## Executive Summary

Title 40 Code of Federal Regulations (CFR) Part 58.10 requires state and local agencies that conduct ambient air monitoring for regulatory purposes to submit an Annual Network Plan (ANP) to the United States (U.S.) Environmental Protection Agency (EPA) annually. The ANP provides detailed information about criteria pollutant monitoring sites and instruments operating in California. Accurately measuring air quality is the foundation of California's efforts to reduce air pollution and meet air quality standards. For more than 50 years, California has maintained one of the most extensive air monitoring networks in the world, collecting data on a wide range of pollutants. The information gathered from these networks makes it possible to track progress in cleaning the air and identify the most effective actions needed to meet air quality standards.

The California Air Resources Board (CARB) and California's thirty-five local air districts, 25 of which are covered in this plan, have been measuring ambient air quality using a variety of stationary monitoring networks supplemented by mobile platforms including cars, aircraft, and ships. From the very beginning, California's air monitoring program has been a partnership between government agencies at the federal, State, and local level, along with universities and more recently with engaged community members and industry representatives.

California's different air monitoring networks are designed to meet a range of regulatory requirements, such as compliance with the federal Clean Air Act, as well as to help address research and public health priorities. Over time, the types of air pollutants being monitored and the extent of the air monitoring networks have varied as a function of new legislative mandates, community concerns, as well as our success in improving air quality in many parts of California. Air monitoring data outreach such as the Air Quality and Meteorological Information System (AQMIS), Air Quality Index, and AirNow program allow people and companies to take precautions by avoiding the outdoors or minimizing activities that contribute to air pollution when levels are unhealthy.

This executive summary briefly describes the main types of monitoring that are conducted in California. The focus of this report is on criteria pollutant monitoring being conducted by governmental agencies using regulatory grade monitoring instruments. This report does not discuss the extensive networks of low-cost sensors installed by agencies, community groups, academics, and others.

### Criteria Pollutant Monitoring

The majority of California's governmental air monitoring resources, reflected in the current statewide network of approximately 250 regulatory monitoring stations, have been dedicated to measuring ambient concentrations of criteria pollutants, which are ground-level ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and lead (Pb).

For each of these criteria pollutants, the CFR specifies a list of acceptable instruments and methods, the frequency at which samples are to be collected, and how many instruments must be duplicated at the same location for each region. The CFR also details standards to be used for locating air monitoring sites (such as population, local traffic counts, local emission sources, etc.), number of sites located in each region, and the appropriate scale (e.g., neighborhood, urban, and regional) for the spatial objective of the particular pollutant. The CFR has established minimum monitoring requirements for criteria pollutants, generally, based on the population from the most recent census data, the severity of the air quality problem, as specified by the design values or emissions.

Data from these monitoring networks are used for determining the attainment status for national and State ambient air quality standards, supporting public information services, forecasting expected high pollution events, and supporting the development of emissions reduction programs. Monitoring data must undergo review and validation process by the agency collecting the data before the data is deemed final for regulatory purposes. Because this type of monitoring often requires significant infrastructure and resources, these methods have limitations for widespread deployment as part of community air monitoring efforts.

## **Additional Types of Air Monitoring Not Covered in the Annual Network Plan**

**Toxic Air Contaminants Monitoring:** Beginning in the 1980s, with the recognition of the health risks posed by a wide range of chemicals, California and the local air districts deployed a network of approximately 35 air toxics monitoring stations. Each of these stations take samples of toxic compounds which are then analyzed using specialized equipment. A few examples are volatile organic compounds, carbonyl compounds, toxic metals, and hexavalent chromium.

Most air toxics monitoring methods involve collecting air samples in the field and returning them to the laboratory for subsequent analysis. One significant limitation is that data from these methods may take weeks, or in some cases months, after sampling to become available as these sophisticated methods often require labor intensive analytical procedures. Air toxic monitoring data are used to identify sources contributing to air toxic pollution and trends in the concentration of air toxics over time. Data can be used to support regulatory and enforcement actions when collected in a scientifically defensible manner.

**Greenhouse Gas Emission Monitoring:** With the passage of the California Global Warming Solutions Act of 2006 (AB 32), CARB collaborated with federal agencies and universities to deploy a network of 15 tall towers and other stations across California to measure greenhouse gases (GHG), study regional GHG emissions trends throughout the State, and evaluate regional and statewide emissions inventories.

Evaluating regional and statewide GHG emissions requires highly accurate and precise measurements of ambient GHGs. The GHG network currently uses state-of-the-art, air

monitoring instrumentation (cavity ringdown spectrometry) to measure carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). In conjunction with the ground based network, airborne and spaceborne remote sensing measurements are conducted to screen large spatial regions for methane “hot spots”.

**Remote Sensing:** Remote sensing instrumentation measures reflected or emitted radiation to collect information about air pollutant concentrations and meteorological conditions. Remote sensing instruments can be deployed on ground-based (mobile and stationary), airborne (i.e., aircraft), and spaceborne (i.e., satellites) platforms. Fence-line and community remote sensing applications can monitor emissions from facilities such as refineries. When deployed on aircraft or satellites, remote sensing systems can survey large spatial areas and identify the general location of concentrated air pollution.

**Community-Scale Air Monitoring:** Recognizing the need to understand air quality at the neighborhood level, CARB and the local air districts have periodically undertaken community -focused air monitoring studies. With the advent of low -cost air sensors in the last decade, many community groups and individuals are now also measuring air quality and deploying their own grassroots monitoring networks. As a result, community -level air monitoring network is continually expanding throughout California neighborhoods by community members, universities, private entities, and government agencies.

Continued usage of fence-line monitoring, advancements in air sensors, and additional mobile monitoring studies are important pieces to local air monitoring programs. Community -level air monitoring programs are expected to continue expanding in California with the adoption of Assembly Bill 617 (AB 617) in 2017. Monitoring methods commonly used for community air monitoring include:

- **Fence -line Monitoring:** Fence -line monitoring is a monitoring strategy in which air quality is measured at the perimeter of a known or potential emission source. Air districts may require fence -line monitoring at facilities that emit or potentially emit air pollutants and GHGs. Depending on the air pollutant that is expected to be emitted, fence -line monitoring can utilize a wide variety of measurement tools such as air sensors, passive samplers, remote sensing systems, and real-time instrumentation. This type of monitoring may be used to help determine where and when leaks are occurring, the rate emissions are leaving the source, and what chemicals are present. AB 1647 and AB 617 include new requirements for enhanced fence -line and community monitoring in the vicinity of major stationary sources such as refineries; new requirements recommend districts should, within existing air monitoring programs, locate additional stations that monitor in real-time for H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and VOCs in a predominantly downwind orientation from refineries and other high-hazard facilities. When upgrading or replacing equipment, districts should seek to employ continuous measuring instruments with real-time telemetry to gather

data on all TACs of concern and make the preliminary information available in real-time to response agencies and the public.

- *Air Sensors:* Air quality sensors measure air pollutants on a real-time or near real-time basis and are generally low in cost, highly portable, and can require less power, siting infrastructure, and expertise than other air monitoring methods. Currently, no low-cost (i.e., \$2,000 or less) sensors meet federal reference or federal equivalent method requirements and many have not been robustly evaluated to determine the accuracy of their measurements. However, sensor technology is rapidly developing, and performance is expected to improve over time. Sensors have the potential to provide hyper-local air quality data as part of coordinated, well -designed, community -led air monitoring efforts. The resulting data may be of sufficient quality to help understand spatial variability, identify areas with relatively higher pollutant concentrations for further investigation, complement existing air monitoring networks, and evaluate personal exposure to air pollution.
- *Mobile Monitoring:* Mobile monitoring platforms collect environmental data while in motion, for example in a car or van. Instrumentation is utilized that can quickly measure air pollutant concentrations and provide instantaneous snapshots of air pollutant concentrations at a specific location and time. Mobile platforms can deploy a variety of instrumentation ranging from sensors, research grade instrumentation, and remote sensing devices. Mobile platforms have the ability to measure real-time air pollutant concentrations at fine spatial gradients which can be used to identify persistent elevated pollutant concentrations and indicate potential contributing sources. These mobile monitoring platforms provide a valuable means of identifying areas that may need additional measurements and/or inspections or inquiries.

## Conclusion

Monitoring networks and studies provide critical information for identifying and mitigating California's most significant air quality challenges. This Annual Network Plan documents California's network of regulatory ambient air quality monitors and describes how they meet Federal air monitoring and quality assurance requirements. In 2021, the Metropolitan Statistical Areas (MSAs) covered by this ANP met or exceeded the minimum monitoring requirements for all the criteria pollutants including O<sub>3</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, NO<sub>2</sub>, SO<sub>2</sub>, and Pb.

## Section 1: Introduction

Federal regulations require state and local agencies that conduct ambient air monitoring for regulatory purposes to submit an Annual Network Plan (ANP) to the U.S. Environmental Protection Agency (U.S. EPA) annually. ANPs are required to include detailed information about sites and instruments operating in the ambient air monitoring network. This ANP meets the federal regulatory requirements set forth in 40 CFR 58.10 and Appendices A through E.

The CARB Primary Quality Assurance Organization (PQAO) is comprised of 32 of the 35 local air districts in California. The districts in the CARB PQAO may elect to prepare their own ANP or have their information included in the CARB ANP. The CARB 2022 ANP covers the monitoring networks of 25 districts within the CARB PQAO. Seven districts in the CARB PQAO will prepare their own ANPs and submit them directly to the U.S. EPA. Three other districts in California, the Bay Area Air Quality Management District (AQMD), San Diego County Air Pollution Control District (APCD), and South Coast AQMD represent their own PQAOs and are responsible for preparing their own ANPs and submitting them directly to U.S. EPA.

The 2022 ANP details the operations of the monitoring networks in 2021 and describes the changes that are planned to occur within the next 18 months. Consistent with direction from U.S. EPA, this ANP describes monitors operated by districts, CARB, and other agencies such as the National Park Service (NPS), within the jurisdictions of the districts covered by this report. As required by federal regulations, this ANP includes detailed information about monitors using Federal Reference Methods (FRM), Federal Equivalent Methods (FEM), or Approved Regional Methods (ARM) that are included in the State and Local Air Monitoring (SLAMS) network, National Core (NCore) multipollutant monitoring station, Chemical Speciation Network (CSN), Special Purpose Monitor (SPM) stations, and Photochemical Assessment Monitoring Stations (PAMS).

### Areas Covered in this Network Plan

The geographic boundaries of the 25 air districts covered in this ANP as well as the districts preparing their own ANPs are identified in Table 1 and Figure 1. Monitoring sites operated by districts that are not covered by this ANP are included, when necessary to demonstrate fulfillment of federal monitoring requirements.

### Public Inspection and Comment Period

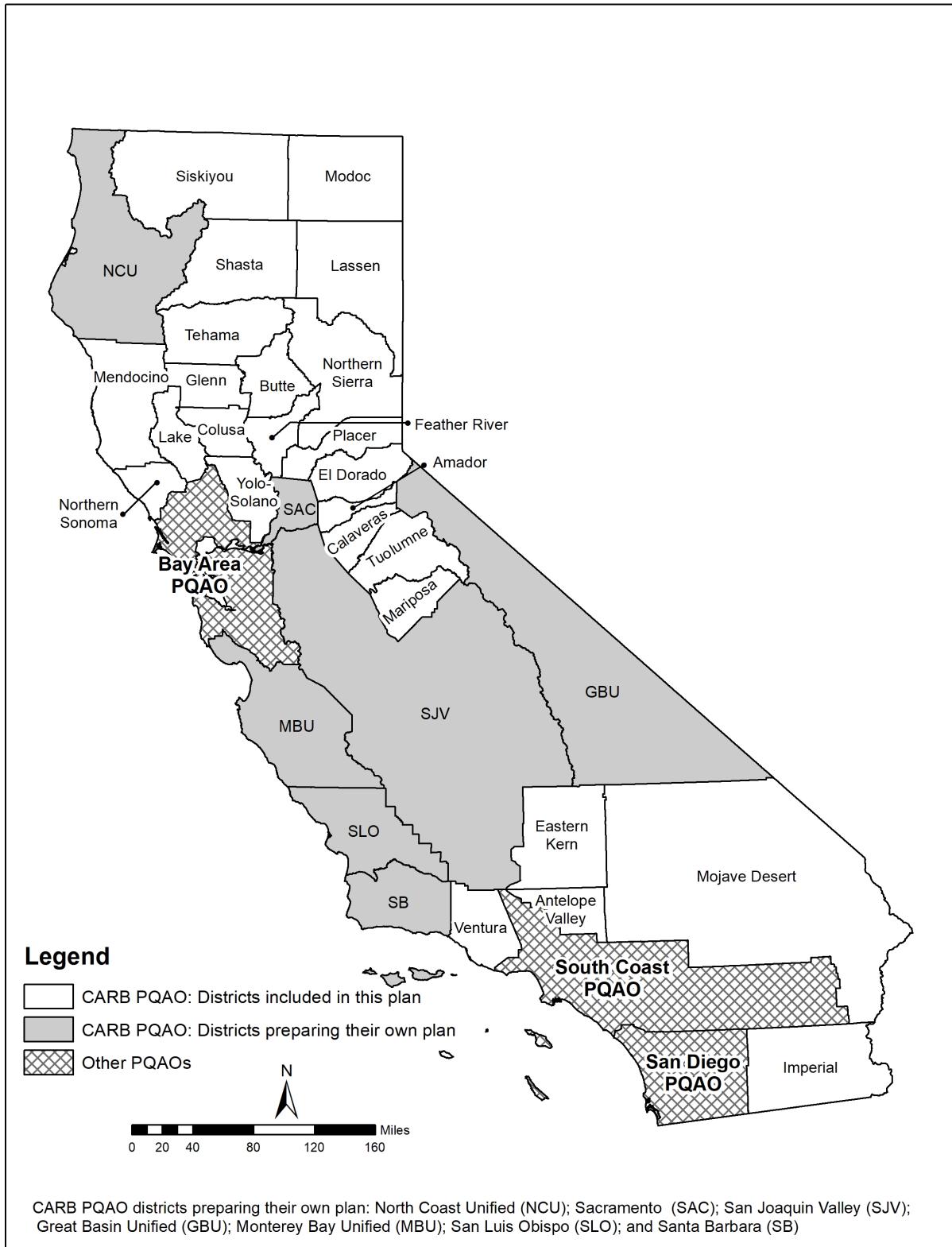
The CARB 2022 ANP will be available for a 30-day public inspection and comment period prior to its submittal to the U.S. EPA. If public comments are received, CARB will provide a response to the comments when the plan is submitted to the U.S. EPA. The final version of the CARB ANP is available for download from <https://www.arb.ca.gov/aqd/amnr/amnr.htm>.

**Table 1: Districts in the CARB Primary Quality Assurance Organization**

<b>Districts Included in the CARB ANP</b>	
Amador County APCD	Antelope Valley AQMD
Butte County AQMD	Calaveras County APCD
Colusa County APCD	Eastern Kern APCD
El Dorado County AQMD	Feather River AQMD
Glenn County APCD	Imperial County APCD
Lake County AQMD	Lassen County APCD*
Mariposa County APCD	Mendocino County AQMD
Modoc County APCD*	Mojave Desert AQMD
Northern Sierra AQMD	Northern Sonoma County APCD
Placer County APCD	Shasta County AQMD
Siskiyou County APCD	Tehama County APCD
Tuolumne County APCD	Ventura County APCD
Yolo-Solano AQMD	
<b>Districts Drafting Their Own ANP</b>	
Great Basin Unified APCD	Monterey Bay ARD
North Coast Unified AQMD	Sacramento Metropolitan AQMD
San Joaquin Valley APCD	San Luis Obispo County APCD
Santa Barbara County APCD	

\* Lassen County APCD, Modoc County APCD and Siskiyou County APCD are part of Northeast Plateau air basin and covered by this ANP, however, no ambient air quality monitors are currently sited in the Lassen County APCD, Modoc County APCD.

Figure 1: California Primary Quality Assurance Organizations



## Section 2: Monitoring Network Overview

California's ambient air monitoring network includes over 250 sites and more than 700 monitors, making it one of the most extensive in the world. Many regions in California are characterized by complex terrain, variable meteorological conditions, and diverse emission sources. A large monitoring network is critical for assessing the State's progress in meeting clean air standards, understanding spatial and temporal variation in air pollutants, and evaluating pollutant exposure. Monitors are operated by CARB, local air districts, and other entities including the NPS, private contractors, and tribal authorities. Tribal monitors are not included in this report.

Ambient concentration data are collected for a wide variety of pollutants including ozone, particulate matter with a diameter of 2.5 microns or less (PM<sub>2.5</sub>), particulate matter with a diameter of 10 microns or less (PM<sub>10</sub>), CO, NO<sub>2</sub>, SO<sub>2</sub>, and Pb, which are the federal criteria pollutants. Meteorological parameters, volatile organic compounds (VOCs), and a host of toxic air contaminants are also monitored at a number of sites. While toxics, VOCs, and meteorological monitoring play an integral role in California's air quality programs, the focus of this ANP, as specified by federal requirements, is on sites that conduct monitoring of the federal criteria pollutants, as well as PAMS data, within the jurisdiction of districts covered by this ANP.

Although most sites monitor for multiple pollutants, not all pollutants are monitored at every site because the data needs vary by locale. One fundamental purpose of air monitoring is to distinguish between areas where pollutant levels violate the ambient air quality standards and areas that meet ambient air quality standards. Areas in violation of a standard usually have increasingly stringent mandates to reduce the sources of pollution that result in the exceedances. Based in part on monitoring data, local air districts develop strategies, programs, and regulations to achieve needed emission reductions. Data from the ambient air monitoring network are then used to assess the efficacy of those strategies, programs, and regulations.

The pollutants and the number of monitors at each monitoring site in the area covered by this ANP are shown in Table 2; additional site and monitor-level details are provided in Appendix A.

**Table 2: Pollutants Monitored in the Districts Covered by this ANP**

District	Site (AQS ID)	CO	NO <sub>2</sub>	Ozone	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CARB Operated
Amador	Jackson-Clinton (06-005-0002)			1				Yes
Antelope Valley	Lancaster-Division (06-037-9033)	1	1	1		2	1	
Butte	Chico-East (06-007-0008)	1	1	1		1	2	Yes
	Gridley (06-007-4001)						1	Yes
	Paradise-Airport (06-007-0007)			1				Yes
	Paradise-Theater (06-007-2002)						1	Yes
Calaveras	San Andreas (06-009-0001)			1		1	1	Yes
Colusa	Colusa-Sunrise Blvd (06-011-1002)			1		1	1	Yes
Eastern Kern	Canebrake (06-029-0017)					1		
	Mojave-CA58 (06-029-0019)			1		1	1	Yes
	Ridgecrest-Ward (06-029-0018)					1	1	
El Dorado	Cool (06-017-0020)			1				Yes
	Echo Summit (06-017-0012)			1				Yes
	Placerville (06-017-0010)			1				Yes
	South Lake Tahoe (06-017-0011)					1		Yes
Feather River	Sutter Buttes (06-101-0004)			1				Yes
	Yuba City (06-101-0003)		1	1		1	2	Yes
Glenn	Willows-Colusa (06-021-0003)			1		1	1	Yes
Imperial	Brawley-Main (06-025-0007)					1	1	
	Calexico-Ethel (06-025-0005)	1	1	1	1	1	3	Yes
	El Centro-9th (06-025-1003)		1	1		1	1	
	Niland-English (06-025-4004)			1		1		
	Westmorland (06-025-4003)			1		1		
Lake	Anderson Spring (06-033-3010)					1		
	Glenbrook (06-033-3011)					1		
	Lakeport-S.Main (06-033-3002)			1		1	1	
Mariposa	Jerseydale (06-043-0006)			1				Yes
	Yosemite Village (06-043-1001)					1	1	Yes
	Yosemite NP-Turtleback (06-043-0003)*			1				
Mendocino <sup>1</sup>	Fort Bragg-300 Dana (06-045-0010)					1		
	Ukiah-Gobbi (06-045-0008)			1				
	Ukiah-Library (06-045-0006)						1	
	Willits-Blosser (06-045-2003)						1	
	Willits-Justice Center (06-045-2002)						1	
Mojave Desert	Barstow (06-071-0001)	1	1	1		1		
	Blythe-Murphy (06-065-9003)			1				Yes
	Hesperia-Olive (06-071-4001)			1		1		
	Joshua Tree-Black Rock (06-071-9002)*			1				
	Joshua Tree-Pinto Wells (06-065-1004)*			1				
	Lucerne Valley (06-071-0013)					1		
	Mojave NP (06-071-1001)*			1				
	Phelan (06-071-0012)			1				
	Trona-Athol/Telescope (06-071-1234)		1	1	1	1		
Victorville-Park (06-071-0306)	1	1	1	1	1	2		
Northern Sierra	Chester (06-063-1007)						1	
	Grass Valley (06-057-0005)			1			3	
	Portola (06-063-1010)						3	
	Quincy-N Church (06-063-1006)						2	
	Truckee-Fire Station (06-057-1001)						2	
	White Cloud Mountain (06-057-0007)**			1				Yes
Northern Sonoma	Cloverdale (06-097-0001)					1		
	Guerneville-Church (06-097-3002)					1		
	Healdsburg-Matheson (06-097-0002)					1		

District	Site (AQS ID)	CO	NO <sub>2</sub>	Ozone	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CARB Operated
Placer	Auburn-Atwood (06-061-0003)			1			1	
	Colfax-City Hall (06-061-0004)			1			1	
	Lincoln-Moore (06-061-2003)			1			1	
	Roseville-N Sunrise (06-061-0006)		1	1		1	1	Yes
	Tahoe City-Fairway (06-061-1004)			1			1	
Shasta	Anderson-North (06-089-0007)			1		1		
	Lassen Volcanic NP (06-089-3003)*			1				
	Redding-Health Dept (06-089-0004)			1		1	2	
	Shasta Lake-Lake (06-089-0009)			1				
Siskiyou	Shasta Lake-La Mesa (06-089-0008)					1		
	Yreka (06-093-2001)			1			1	
Tehama	Red Bluff-Walnut (06-103-0007)			1		1	1	
	Tuscan Butte (06-103-0004)			1				Yes
Tuolumne	Sonora-Barretta (06-109-0005)			1				Yes
Ventura	El Rio-Rio Mesa School (06-111-3001)		1	1		1	1	
	Ojai-East Ojai (06-111-1004)			1			1	
	Piru-Pacific (06-111-0009)			1			1	
	Simi Valley-Cochran (06-111-2002)		1	1		1	2	
	Thousand Oaks (06-111-0007)			1			1	
Yolo-Solano	Davis-UCD Campus (06-113-0004)		1	1			1	Yes
	Vacaville-Merchant (06-095-3001)					1		
	Vacaville-Ulatis (06-095-3003)			1				
	West Sacramento-15 <sup>th</sup> (06-113-2001)					1		
	Woodland-Gibson (06-113-1003)			1		1	2	

<sup>1</sup> Mendocino County AQMD relocated its PM<sub>2.5</sub> site from Willits -Justice Center to Willits - Blosser Lane. The monitoring start date at the new site was February 5, 2021.

\* These sites are operated by National Park Service (NPS).

\*\* White Cloud Mountain did not operate in 2021

Note: CARB operating sites are delineated with grey shading.

## Section 3: Site and Monitoring Information

Appendix D of 40 CFR Part 58 requires the federal site type, federal monitoring objective, and federal monitor type to be included in the ANPs. These elements are described in the following sections and identified at the monitor-level in the detailed site reports in Appendix A. CARB periodically evaluates these elements and update them to correctly match with monitoring objectives of each site and to reflect any change in population, traffic counts, physical characteristics, emission source, frequency of occurrence of meteorological pattern, etc.

### Federal Site Type

Monitoring sites must be capable of informing air quality program managers about peak air pollution levels, typical levels in populated areas, air pollution transported into and out of a city or region, and air pollution levels near specific sources. For these reasons, U.S. EPA requires that each monitor at a site be designated, at a minimum, with one of the following site types established in the Air Quality System (AQS) database:

- Extreme Downwind
- Highest Concentration
- Maximum Ozone Concentration
- Maximum Precursor Emissions Impact
- Population Exposure
- Source Oriented
- Upwind Background
- General/Background
- Regional Transport
- Welfare Related Impacts
- Quality Assurance
- Other

U.S. EPA requires that a monitor be designated with an appropriate site type so that the data collected can be used to support a specific federal monitoring objective. The site type designations are at the monitor level rather than the site level because U.S. EPA has determined that a single site type may not be adequate to describe all of the monitors at a particular site.

Federal regulations note that the spatial scale of representativeness of a monitor should be consistent with the stated site type. The spatial scale of representativeness is a measure of the physical dimensions of the air mass through which pollutant concentrations are expected to be relatively homogeneous. The scales of representativeness that are most relevant to ambient air monitoring are defined as follows:

- *Microscale*: Measured concentrations are expected to be similar for an area ranging from several meters up to about 100 meters.
- *Middle scale*: Measured concentrations are expected to be similar for areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- *Neighborhood scale*: Measured concentrations are expected to be similar within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.
- *Urban scale*: Measured concentrations are expected to be similar within an area of city-like dimensions, on the order of 4 to 50 kilometers.
- *Regional scale*: Measured concentrations are expected to be similar within a rural area of reasonably homogeneous geography without large sources, and extend from tens to hundreds of kilometers.
- *National and global scales*: These measurement scales represent concentrations characterizing the nation and the globe as a whole

The spatial scale of representativeness that is generally most appropriate for each of the most common federal site types are shown in Table 3, which is based on Table D-1 in Appendix D of 40 CFR Part 58.

**Table 3: Site Type and Recommended Spatial Scale**

Appropriate Site Type	Appropriate Spatial Scales
Highest concentration	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants)
Population exposure	Neighborhood, urban
Source oriented	Micro, middle, neighborhood
General background	Urban, regional
Regional transport	Urban, regional
Welfare-related impacts	Urban, regional

The types of monitoring sites and the spatial scales designated in the area covered by this ANP are listed in Table 4 and included in the detailed site reports in Appendix A. The site type is listed first following the spatial scale. Note that a monitor may have more than one site type.

**Table 4: Site Type and Spatial Scale in the Districts Covered by this ANP**

District	Site	CO	NO <sub>2</sub>	Ozone	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Amador	Jackson-Clinton			pop/n			
Antelope Valley	Lancaster-Division	pop/m	pop/m	pop/m		pop/n	pop/n
Butte	Chico-East	pop/n	pop/n	pop/n		pop/n	pop/n
	Gridley						pop/n
	Paradise-Airport			high/r			
	Paradise-Theater						gen/n
Calaveras	San Andreas			high/n		gen/n	gen/n
Colusa	Colusa-Sunrise Blvd			gen/r		high,pop/n	pop/ n
Eastern Kern	Canebrake					gen,pop/u	
	Mojave			high/r		pop/n	high/n
	Ridgecrest-Ward					high/n	pop/n
El Dorado	Cool			high/r			
	Echo Summit			trans/r			
	Placerville			high/r			
	South Lake Tahoe					pop/m	
Feather River	Sutter Buttes			high,trans/r			
	Yuba City		pop/n	high/n		pop/n	pop/n
Glenn	Willows-Colusa			pop/n		pop/n	pop/n
Imperial	Brawley-Main					pop/n	pop/n
	Calxico-Ethel	pop/n	pop/n	gen/n	pop/n	pop/n	pop/n
	El Centro-9th		pop/n	high/n		pop/n	pop/n
	Niland-English			pop/n		pop/n	
	Westmorland			pop/r		pop/m	
Lake	Anderson Spring					pop/u	
	Glenbrook					pop/u	
	Lakeport-S.Main			pop/u		gen/n	pop/n
Mariposa	Jerseydale			high/r			
	Yosemite Village					pop/m	pop/ m
	Yosemite NP-Turtleback*			gen/r			
Mendocino	Fort Bragg-300 Dana					gen/n	
	Ukiah-Gobbi			pop/n			
	Ukiah-Library						pop/n
	Willits-Blosser						pop/n
Mojave Desert	Willits-Justice Center						pop/n
	Barstow	pop/m	pop/m	pop/m		pop/n	
	Blythe-Murphy			gen/n			
	Hesperia-Olive			pop/n		gen,pop/n	
	Joshua Tree-Black Rock*			high/r			
	Joshua Tree-Pinto Wells*			gen/r			
	Lucerne Valley					pop/n	
	Mojave NP*			gen/r		pop/n	pop/n
	Mojave-CA58						
	Phelan			pop/n			
Northern Sierra	Trona-Athol/Telescope		source/n	pop/n	source/n	high,source/n	
	Victorville-Park	pop/n	pop/n	pop/n	pop/n	pop/n	trans,pop/n
	Chester						pop/n
	Grass Valley			pop/n			pop/n
	Portola						pop/n
	Quincy-N Church						pop/n
	Truckee-Fire Station						pop/n
	White Cloud Mountain			gen/r			
	Northern Sonoma	Cloverdale					pop/n
Guerneville-Church						pop/n	
Healdsburg-Matheson						pop/n	
Placer	Auburn-Atwood			pop/n			pop/n
	Colfax-City Hall			pop/n			pop/n
	Lincoln-Moore			pop/n			pop/n
	Roseville-N Sunrise		pop/n	high/n		high/n	pop/n
	Tahoe City-Fairway			gen/u			gen/u

District	Site	CO	NO <sub>2</sub>	Ozone	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Shasta	Anderson-North			pop/n		high/n	
	Lassen Volcanic NP*			gen/r			
	Redding-Health Dept			pop,high/n		high/n	pop/n
	Shasta Lake-Lake			pop/n			
	Shasta Lake-La Mesa					pop/n	
Siskiyou	Yreka			high,trans,pop/n			pop/n
Tehama	Red Bluff-Walnut			pop/n		high/n	gen/n
	Tuscan Butte			high/r			
Tuolumne	Sonora-Barretta			high/n			
Ventura	El Rio-Rio Mesa School		pop/u	pop/u		pop/n	pop/n
	Ojai-East Ojai			pop/u			pop/n
	Piru-Pacific			pop/n			high/n
	Simi Valley-Cochran		high/u	high/u		pop/n	high/n
	Thousand Oaks			pop/u			pop/n
Yolo-Solano	Davis-UCD Campus		pop/n	pop/n			pop/n
	Vacaville-Merchant					pop/n	
	Vacaville-Ulatis			high,pop/n			
	West Sacramento-15 <sup>th</sup>					pop/n	
	Woodland-Gibson			pop/n		pop/n	pop/n

\* These sites are operated by National Park Service (NPS).

Site Types: gen-general background; high-highest concentration; pop-population exposure; trans-regional transport; source-source oriented

Spatial Scales: m-middle scale; n-neighborhood scale; u-urban scale; r-regional scale

## Federal Monitoring Objective

The federal monitoring objectives are defined in Appendix D of 40 CFR Part 58. Federal monitoring regulations require that each monitor measuring a criteria pollutant is sited to meet at least one monitoring objective. The three federal monitoring objectives are:

- To provide air quality data to the public in a timely manner;
- To support compliance with national ambient air quality standards; and
- To support air quality research studies.

Many air quality agencies operate monitors with multiple objectives in mind. For example, monitoring is conducted to provide both air quality data to the public as well as to support compliance with national ambient air quality standards.

There are a number of monitoring purposes besides the federal monitoring objectives that are directly related to the needs of state and local agencies. Some of the most common state and local monitoring purposes include determination of agricultural and residential burn periods and state designations. These are outside of the scope of the ANP.

## Federal Monitor Type

The federal monitor type refers to the agency operating the monitor or the specific purpose for which the monitor is operated. There are seven federal monitor types:

- SLAMS
- SPM
- Industrial
- Non-EPA federal
- Tribal
- EPA
- Other \*

\* U.S. EPA states that "Other" is intended for a monitor for a parameter not addressed by 40 CFR Part 58. (i.e., it will not be allowed for criteria pollutants or monitoring network such as NCore, PAMs or NATTS).

Most monitors established and operated by state and local air agencies are identified as SLAMS. SLAMS monitors meet specific siting and quality assurance criteria defined in federal regulations. Some monitors are identified as SPMs and are operated by state and local monitoring agencies to fulfill very specific or short-term monitoring goals. SPMs are required to meet 40 CFR Part 58 Appendix A requirements, and 40 CFR Part 58 Appendix E requirements are optional. Many SPMs operated in California by State and local agencies do fulfill these requirements. SPMs that operate for more than two years can be used by U.S. EPA to determine compliance with federal air quality standards.

In this ANP, all the monitors identified as non-EPA federal monitors are operated by the NPS. Industrial monitors and EPA monitors are not operated in the area covered by this ANP. Tribal monitors are operated on tribal lands by tribal entities and are outside of the scope of this ANP. Table 5 shows the types of monitors, their monitoring objectives and the network affiliations. Some monitors are operated under specific types of monitoring network programs. Examples of the network affiliations are PAMS, NCore, Near-road and CSN. The full list can be found at <https://aqs.epa.gov/aqsweb/documents/codetables/networks.html>.

**Table 5: Monitoring Objective, Monitor Type and Network Affiliation**

District	Site	Monitoring Objective	Monitor Type*	Network Affiliation**
Amador	Jackson-Clinton	NAAQS Comparison	SLAMS	
Antelope Valley	Lancaster-Division	NAAQS Comparison, Public Info.	SLAMS	
Butte	Chico-East	NAAQS Comparison, Public Info.	SLAMS	CSN Supplemental
	Gridley	Public Info.	SLAMS	
	Paradise-Airport	NAAQS Comparison	SLAMS	
	Paradise-Theater	Public Info.	SLAMS	
Calaveras	San Andreas	NAAQS Comparison, Public Info.	SLAMS	
Colusa	Colusa-Sunrise Blvd	NAAQS Comparison	SLAMS	
Eastern Kern	Canebrake	NAAQS Comparison	SLAMS	
	Mojave	NAAQS Comparison	SLAMS	
	Ridgecrest-Ward	NAAQS Comparison	SLAMS	
El Dorado	Cool	NAAQS Comparison	SLAMS	
	Echo Summit	NAAQS Comparison	SLAMS	
	Placerville	NAAQS Comparison	SLAMS	
	South Lake Tahoe	NAAQS Comparison	SLAMS	
Feather River	Sutter Buttes	NAAQS Comparison	SLAMS	
	Yuba City	NAAQS Comparison, Public Info.	SLAMS	
Glenn	Willows-Colusa	NAAQS Comparison, Public Info.	SLAMS	
Imperial	Brawley-Main	NAAQS Comparison	SLAMS	
	Calexico-Ethel	NAAQS Comparison, Public Info.	SLAMS	CSN Supplemental
	El Centro-9th	NAAQS Comparison	SLAMS	
	Niland-English	NAAQS Comparison	SLAMS	
	Westmorland	NAAQS Comparison	SLAMS	
Lake	Anderson Spring	Public Info.	SLAMS	
	Glenbrook	Public Info.	SLAMS	
	Lakeport-S.Main	NAAQS Comparison	SLAMS	
Mariposa	Jerseydale	NAAQS Comparison	SLAMS	
	Yosemite Village	NAAQS Comparison, Public Info.	SLAMS	
	Yosemite NP-Turtleback	NAAQS Comparison	non-EPA Federal	CASTNET
Mendocino	Fort Bragg-300 Dana	NAAQS Comparison	SLAMS	
	Ukiah-Gobbi	NAAQS Comparison	SLAMS	
	Ukiah-Library	NAAQS Comparison	SLAMS	
	Willits-Blosser	NAAQS Comparison	SLAMS	
	Willits-Justice Center	NAAQS Comparison	SLAMS	
Mojave Desert	Barstow	NAAQS Comparison	SLAMS	
	Blythe-Murphy	NAAQS Comparison, Public Info.	SLAMS	
	Hesperia-Olive	NAAQS Comparison	SLAMS	
	Joshua Tree-Black Rock	NAAQS Comparison	non-EPA Federal	CASTNET
	Joshua Tree-Pinto Wells	Public Info.	non-EPA Federal	
	Lucerne Valley	NAAQS Comparison	SLAMS	
	Mojave NP	Public Info.	non-EPA Federal	
	Phelan	NAAQS Comparison	SLAMS	
	Trona-Athol/Telescope	NAAQS Comparison	SLAMS	
Victorville-Park	NAAQS Comparison	SLAMS		
Northern Sierra	Chester	NAAQS Comparison	SLAMS	
	Grass Valley	NAAQS Comparison	SLAMS	
	Portola	NAAQS Comparison	SLAMS	CSN Supplemental
	Quincy-N Church	NAAQS Comparison	SLAMS	
	Truckee-Fire Station	NAAQS Comparison	SLAMS	
	White Cloud Mountain	NAAQS Comparison	SLAMS	
Northern Sonoma	Cloverdale	NAAQS Comparison	SLAMS	
	Guerneville-Church	NAAQS Comparison	SLAMS	
	Healdsburg-Matheson	NAAQS Comparison	SLAMS	
Placer	Auburn-Atwood	NAAQS Comparison	SLAMS	
	Cofax-City Hall	NAAQS Comparison, Public Info.	SLAMS	
	Lincoln-Moore	NAAQS Comparison, Public Info.	SLAMS	
	Roseville-N Sunrise	NAAQS Comparison, Public Info.	SLAMS	
	Tahoe City-Fairway	NAAQS Comparison, Public Info.	SLAMS	

District	Site	Monitoring Objective	Monitor Type*	Network Affiliation**
Shasta	Anderson-North	NAAQS Comparison	SLAMS	
	Lassen Volcanic NP	NAAQS Comparison, Research	non-EPA Federal	CASTNET
	Redding-Health Dept	NAAQS Comparison	SLAMS	
	Shasta Lake-Lake	NAAQS Comparison	SLAMS	
	Shasta Lake-La Mesa	NAAQS Comparison	SLAMS	
Siskiyou	Yreka	NAAQS Comparison	SLAMS	
Tehama	Red Bluff-Walnut	NAAQS Comparison	SLAMS	
	Tuscan Butte	NAAQS Comparison	SLAMS	
Tuolumne	Sonora-Barretta	NAAQS Comparison	SLAMS	
Ventura	El Rio-Rio Mesa School	NAAQS Comparison	SLAMS	PAMS
	Ojai-East Ojai	NAAQS Comparison	SLAMS	
	Piru-Pacific	NAAQS Comparison	SLAMS	
	Simi Valley-Cochran	NAAQS Comparison, Public Info.	SLAMS	PAMS
	Thousand Oaks	NAAQS Comparison	SLAMS	
Yolo-Solano	Davis-UCD Campus	NAAQS Comparison, Public Info.	SLAMS	
	Vacaville-Merchant	NAAQS Comparison	SLAMS	
	Vacaville-Ulatis	NAAQS Comparison	SLAMS	
	West Sacramento-15th	NAAQS Comparison	SLAMS	
	Woodland-Gibson	NAAQS Comparison	SLAMS	

\* There are no other network types such as CSN, STN, IMPROVE, NATTS, NCore, or Near-road in the area covered by this ANP.

## Section 4: Additional Information about the Monitors

### Required Monitor Information

Title 40 CFR Part 58.10 requires that the annual monitoring network plan lists specific additional information that characterizes the nature and location of the monitors. U.S. EPA Region 9 identified all of the information that is required on each site/monitor basis. The full list of required information is included in Table 6. This detailed information for each site can be found in the detailed site tables in Appendix A of this ANP.

**Table 6: Required Detailed Monitoring Site Information**

Local site name
AQS ID
GPS coordinates (decimal degrees)
Street Address
County
Distance to roadways (meters)
Traffic count (AADT, year)
Groundcover (e.g., paved, vegetative, dirt, sand, gravel)
Representative statistical area name (i.e., MSA, CBSA, other)
Pollutant, POC
Primary / QA Collocated / Other
Parameter code
Basic monitoring objective(s)
Site type(s)
Monitor type
Network affiliation(s), if applicable
Instrument manufacturer and model
Method code
FRM/FEM/ARM/other
Collecting Agency
Analytical Lab (i.e., weigh lab, toxics lab, other)
Reporting Agency
Spatial scale (e.g., micro, neighborhood)
Monitoring start date
Current sampling frequency
Required sampling frequency
Sampling season
Probe height (meters)
Distance from supporting structure (meters)
Distance from obstructions on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters).
Distance from obstructions not on roof. Include horizontal distance + vertical height above probe for obstructions nearby (meters).
Distance from tree drip-lines (meters)
Distance to furnace or incinerator flue (meters)
Distance between monitors fulfilling a QA collocation requirement (meters).

**Table 6 continued**

Unrestricted airflow (degrees around probe/inlet or percentage of monitoring path)
Probe material for reactive gases NO/NO <sub>2</sub> /NO <sub>y</sub> , SO <sub>2</sub> , O <sub>3</sub> ; PAMS: VOCs, Carbonyls
Residence time for reactive gases NO/NO <sub>2</sub> /NO <sub>y</sub> , SO <sub>2</sub> , O <sub>3</sub> ; PAMS: VOCs, Carbonyls (seconds)
Will there be changes within the next 18 months? (Y/N)
Is it suitable for comparison against the annual PM <sub>2.5</sub> ? (Y/N)
Frequency of flow rate verification for manual PM samplers, including Pb samplers
Frequency of flow rate verification for automated PM analyzers
Frequency of one-point QC check for gaseous instruments
Date of Annual Performance Evaluation conducted in the past calendar year for gaseous parameters
Date of two semi-annual flow rate audits conducted in the past calendar year for PM monitors

### Information on the continuous PM<sub>2.5</sub> non-FEM monitors

The federal regulations (Appendix D of 40 CFR Part 58) require that monitors are FRMs, FEMs, or ARMs and meet certain siting criteria in order for the data to be used for national ambient air quality standards (NAAQS) comparison. While all continuous PM<sub>10</sub> monitors discussed in this report are FEM monitors, there are some continuous PM<sub>2.5</sub> monitors that are non-FEMs. Table 7 lists the continuous PM<sub>2.5</sub> non-FEM monitoring sites covered in this ANP. The continuous PM<sub>2.5</sub> data reported from these non-FEM monitors are excluded from NAAQS comparison. However, many of these non-FEM monitors are California Approved Samplers (CAS) and the data are used for State designation purposes and/or in AirNow for Air Quality Index reporting.

**Table 7: Monitoring Sites Operating Continuous PM<sub>2.5</sub> Non-FEM monitors**

District	Site
Butte	Gridley (06-007-4001)
	Paradise-Theater (06-007-2002)
Glenn	Willows-Colusa (06-021-0003)
Mariposa	Yosemite Village (06-043-1001)
Northern Sierra	Chester (06-063-1007)
	Portola (06-063-1010)
	Quincy-N Church Street (06-063-1006)
	Truckee-Fire Station (06-057-1001)
Placer	Colfax-City Hall (06-061-0004)
	Lincoln-Moore Street (06-061-2003)
	Tahoe City-Fairway Drive (06-061-1004)
Yolo-Solano*	Davis-UCD Campus (06-113-0004)

\*This district also operates non-FEM BAM monitors at sites in Rio Vista, Vacaville, and Woodland. Data from these monitors are used for local air quality purposes, are not reported to AQS, and are therefore not included here.

## Core-Based Statistical Areas

Appendix A of this ANP also lists the location of each monitor, including the Core-Based Statistical Area (CBSA) in which each monitor is located. CBSAs are defined by the United States Office of Management and Budget (OMB) and provide a consistent set of geographical areas for federal agencies to use in collecting, tabulating, and publishing statistical data. Two types of areas are included as CBSAs: Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas, which differ by population threshold. A MSA has an urban core with a population of 50,000 or more, whereas a Micropolitan Statistical Area has an urban core with a population of at least 10,000, but less than 50,000. Several counties in California are sparsely populated and do not meet the classification requirements for incorporation into a CBSA (Figure 2).

Appendix D of 40 CFR Part 58 specifies the number of monitors required for each pollutant based on the CBSA. Table 8 contains a comprehensive list of CBSAs and associated air districts for California. Several of the 25 air districts covered by this ANP are located in CBSAs that also include air districts that are preparing their own ANPs. Information regarding monitors operated by districts outside of those covered by this ANP will be included in this plan when necessary to demonstrate fulfillment of federal monitoring requirements.

For CBSAs that include multiple districts, fulfillment of minimum monitoring requirements is dependent upon coordination between air monitoring staff, particularly when changes to the monitoring network are considered. The Roles and Responsibilities documents developed by CARB specify that districts and CARB must communicate with each other when changes to the network are being considered. When proposed changes are communicated between districts and CARB, staff from both agencies will work closely to evaluate impacts on minimum monitoring requirements and develop pathways that ensure federal requirements are met. The Roles and Responsibilities documents are available on the CARB website at <https://ww2.arb.ca.gov/our-work/programs/quality-assurance/qm-document-repository/roles-responsibility-agreements>.

## Assessing the PM<sub>2.5</sub> monitoring network

The Roles and Responsibilities outlined in the documents described above direct CARB to coordinate all changes to the PM<sub>2.5</sub> monitoring network with local air districts, the general public and affected CARB divisions. Any PM<sub>2.5</sub> network changes are thoroughly reviewed by CARB and district working groups, both separately and in coordinated discussions, and impacts on all CFR requirements are assessed. CARB and the local air districts then work together, and with U.S. EPA Region 9, to mitigate impacts of any changes to the monitoring network, particularly with regard to any changes that impact any monitors that have violated the NAAQS. Public comment is solicited through the ANP process as required by 40 CFR 58.10(c) and any comments received are addressed in either this document or in the documents of the individual district Annual Network Plans.



**Table 8: List of Core-Based Statistical Areas included in CARB ANP and Other ANP in California**

CBSA Name*	County	Included in the CARB ANP?	Included in other ANP?
Bakersfield	Kern	Yes; Eastern Kern	San Joaquin Valley
Chico	Butte	Yes	--
Clearlake	Lake	Yes	--
Crescent City	Del Norte	No	North Coast Unified
El Centro	Imperial	Yes	--
Eureka-Arcata-Fortuna	Humboldt	No	North Coast Unified
Fresno	Fresno	No	San Joaquin Valley
Hanford-Corcoran	Kings	No	San Joaquin Valley
Los Angeles-Long Beach-Anaheim	Los Angeles; Orange	Yes; Antelope Valley	South Coast
Madera	Madera	No	San Joaquin Valley
Merced	Merced	No	San Joaquin Valley
Modesto	Stanislaus	No	San Joaquin Valley
Napa	Napa	No	Bay Area
Oxnard-Thousand Oaks-Ventura	Ventura	Yes	--
Red Bluff	Tehama	Yes	--
Redding	Shasta	Yes	--
Riverside-San Bernardino-Ontario	Riverside; San Bernardino	Yes, Mojave Desert	South Coast
Sacramento-Roseville-Folsom	El Dorado; Placer; Sacramento; Yolo	Yes; Placer, Yolo-Solano, and El Dorado	Sacramento Metropolitan
Salinas	Monterey	No	Monterey Bay
San Diego-Carlsbad	San Diego	No	San Diego County
San Francisco-Oakland-Hayward	Alameda; Contra Costa; Marin; San Francisco; San Mateo	No	Bay Area
San Jose-Sunnyvale-Santa Clara	San Benito; Santa Clara	No	Bay Area
San Luis Obispo-Paso Robles-Arroyo Grande	San Luis Obispo	No	San Luis Obispo County
Santa Cruz-Watsonville	Santa Cruz	No	Monterey Bay
Santa Maria-Santa Barbara	Santa Barbara	No	Santa Barbara County
Santa Rosa-Petaluma	Sonoma	Yes; Northern Sonoma	Bay Area
Sonora	Tuolumne	Yes	--
Stockton-Lodi	San Joaquin	No	San Joaquin Valley
Susanville	Lassen	Yes	--
Truckee-Grass Valley	Nevada	Yes	--
Ukiah	Mendocino	Yes	--
Vallejo-Fairfield	Solano	Yes; Yolo-Solano	Bay Area
Visalia-Porterville	Tulare	No	San Joaquin Valley
Yuba City	Sutter; Yuba	Yes	--

\* Micropolitan Statistical Areas are delineated with grey shading.

## Section 5: Federal Minimum Monitoring Requirements

For criteria pollutants, U.S. EPA has established minimum monitoring requirements that are specified in Appendix D of 40 CFR Part 58. Generally, requirements are based on the population from the most recent census data, the severity of the air quality problem, as specified by the design value, or emissions.

This ANP uses 2020 census populations to determine official minimum monitoring requirements. Upon direction from U.S. EPA, this ANP also includes the most recent available population census estimates (July 1, 2021) to estimate any changes to these requirements.

### Section 5A: Ozone

#### Minimum Number of Ozone Monitoring Sites

The criteria for minimum monitoring requirements for ozone are shown in Table 9. The requirements are based on the population of the MSA and the magnitude of the design value (i.e., if the design value is greater or equal to 85 percent or less than 85 percent of the ozone standard). NCore and SLAMS monitors can be used to meet minimum monitoring requirements for ozone. In the absence of a valid design value, requirements for “less than 85 percent of any ozone NAAQS” apply.

**Table 9: Minimum Ozone Monitoring Requirements for SLAMS**

MSA population <sup>1</sup>	Monitors required for MSAs with most recent 3-year design value concentrations $\geq 85\%$ of any Ozone NAAQS	Monitors required for MSAs with most recent 3-year design value concentrations $< 85\%$ of any Ozone NAAQS
>10 million	4	2
4 - 10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000	1	0

<sup>1</sup>There are no minimum monitoring requirements for areas that are not belong to any MSAs.

Within each MSA, at least one site should be sited to capture maximum ozone concentrations and the site type should be identified as “Highest Concentration”. As shown in Table 10, the 11 MSAs covered by this ANP met the minimum ozone monitoring requirements for ozone in 2021. Sites from districts not covered by this ANP are also listed to provide a complete picture of all the sites contributing towards the minimum monitoring requirements in each MSA. Note that percentages are relative to the 0.070 ppm 8-hour ozone standard and high concentration sites are denoted with bold text.

SPMs and non-EPA federal ozone monitors are operated in some areas covered by this ANP but cannot be counted towards the minimum monitoring requirements. Information about these monitors is provided in Appendix A of this ANP.

**Table 10: CBSAs with Minimum Ozone Monitoring Requirements**

CBSA	2020 Census Population (2021 Population Estimate*)	2019-2021 Design Value (% of NAAQS) <sup>1</sup> DV Site	Required # of Sites	SLAMS Sites Operating in 2021 (District where site is located) <i>Highest Concentration Sites Denoted by Bold Text</i>
Bakersfield	909,235 (917,673)	0.093 ppm (133%) <i>Edison</i>	2	<b>Arvin-Di Giorgio (San Joaquin Valley)</b> Bakersfield-5558 California Avenue (San Joaquin Valley) <b>Bakersfield-Municipal Airport (San Joaquin Valley)</b> <b>Edison (San Joaquin Valley)</b> Maricopa-Stanislaus Street (San Joaquin Valley) <b>Mojave-923 Poole Street (Eastern Kern)</b> Oildale-3311 Manor Street (San Joaquin Valley) Shafter-Walker Street (San Joaquin Valley)
Chico	211,632 (208,309)	0.070 ppm (100%) <i>Paradise</i>	1	Chico-East Avenue (Butte County) <b>Paradise-4405 Airport Road (Butte County)</b>
El Centro	179,702 (179,851)	0.08 ppm (114%) <i>Calexico</i>	1	<b>Calexico-Ethel Street (Imperial)</b> <b>El Centro-9th Street (Imperial)</b> Niland-English Road (Imperial) Westmorland (Imperial)
Los Angeles-Long Beach-Anaheim	13,200,998 (12,997,353)	0.103 ppm (147%) <i>Glendora</i>	4	Anaheim-Pampas Lane (South Coast) Azusa (South Coast) Compton-700 North Bullis Road (South Coast) <b>Glendora-Laurel (South Coast)</b> La Habra (South Coast) Lancaster-43301 Division Street (Antelope Valley) Long Beach-Signal Hill (South Coast) Los Angeles-LAX (South Coast) Los Angeles-North Main Street (South Coast) Mission Viejo-26081 Via Pera (South Coast) North Hollywood (South Coast) Pasadena-S Wilson Avenue (South Coast) Pico Rivera-4144 San Gabriel (South Coast) Pomona (South Coast) Reseda (South Coast) <b>Santa Clarita (South Coast)</b> West Los Angeles-VA Hospital (South Coast)
Oxnard-Thousand Oaks-Ventura	843,843 (839,784)	0.076 ppm (109%) <i>Simi Valley</i>	2	El Rio-Rio Mesa School #2 (Ventura) Ojai-Ojai Avenue (Ventura) Piru-3301 Pacific Avenue (Ventura) <b>Simi Valley-Cochran Street (Ventura)</b> Thousand Oaks-Moorpark Road (Ventura)
Redding	182,155 (182,139)	0.064 ppm (91%) <i>Shasta</i>	1	Anderson-North Street (Shasta County) <b>Redding-Health Dept Roof (Shasta County)</b> Shasta Lake-13791 Lake Blvd (Shasta County)

Metropolitan Statistical Area	2020 Census Population (2021 Population Estimate*)	2019-2021 Design Value (% of NAAQS) <sup>1</sup> DV Site	Required # of Sites	SLAMS Sites Operating in 2021 (District where site is located) <i>Highest Concentration Sites Denoted by Bold Text</i>
Riverside-San Bernardino-Ontario	4,599,839 (4,653,105)	0.114 ppm (163%) <i>Redlands</i>	3	Banning Airport (South Coast) Barstow (Mojave Desert) Blythe-445 West Murphy Street (Mojave Desert) <b>Crestline (South Coast)</b> Fontana-Arrow Highway (South Coast) Hesperia-Olive Street (Mojave Desert) Indio-Jackson Street (South Coast) Lake Elsinore-W Flint Street (South Coast) Mira Loma-Van Buren (South Coast) Palm Springs-Fire Station (South Coast) Perris (South Coast) Phelan (Mojave Desert) Redlands-Dearborn (South Coast) Riverside-Rubidoux (South Coast) <b>San Bernardino-4th Street (South Coast)</b> Trona-Athol and Telegraph (Mojave Desert) Upland (South Coast) Victorville-14306 Park Avenue (Mojave Desert) Winchester-33700 Borel Road (South Coast)
Sacramento-Roseville-Folsom	2,397,382 (2,411,428)	0.082 ppm (117%) <i>Auburn</i>	2	Auburn-11645 Atwood Road (Placer County) Colfax-City Hall (Placer County) <b>Cool-Highway 193 (El Dorado County)</b> Davis-UCD Campus (Yolo-Solano) Echo Summit (El Dorado County) Elk Grove (Sacramento) <b>Folsom (Sacramento)</b> Lincoln-2885 Moore Rd (Placer County) North Highlands (Sacramento) <b>Placerville-Gold Nugget Way (El Dorado County)</b> <b>Roseville-N Sunrise Blvd (Placer County)</b> Sacramento-Del Paso Manor (Sacramento) Sacramento-T St (Sacramento) Sloughhouse (Sacramento) Tahoe City-221 Fairway Drive (Placer County) Woodland-Gibson Road (Yolo-Solano)
Santa Rosa-Petaluma	488,863 (485,887)	0.053 ppm (76%) <i>Sebastopol</i>	1	<b>Sebastopol (Bay Area)</b>
Vallejo-Fairfield	453,491 (451,716)	0.053ppm (93%) <i>Vacaville</i>	2	Fairfield-Chadbourne Road (Bay Area) Vallejo-304 Tuolumne Street (Bay Area) <b>Vacaville-Ulatis Drive (Yolo-Solano)</b>
Yuba City	181,208 (181,484)	0.075 ppm (107%) <i>Sutter Buttes</i>	1	<b>Sutter Buttes-S Butte (Feather River)</b> <b>Yuba City-Almond Street (Feather River)</b>

<sup>1</sup> Wildfires in 2019, 2020 and 2021 impacted many monitoring sites covered in this ANP. Some of these impacts will be addressed under the Exceptional Event Rule (81 FR 68216)

\* Source: U.S. Census Bureau. Retrieved from <https://www.census.gov/programs-surveys/popest.html>

## Seasonal Ozone Monitoring

The ozone monitoring season is year-round in California; however, monitoring at the six sites shown in Table 11 have operated on a seasonal basis since they were established. The ozone monitoring season for these sites is April through October, the period in which peak ozone is expected or when sites are physically accessible. A seasonal waiver for ozone monitoring in 2021 at these sites was granted by U.S. EPA. The waiver must be updated each year, and a copy of the waiver request for 2022 is provided in Appendix B.

**Table 11: Seasonal Ozone Monitoring Sites**

AQS ID	Site Name	District	Start Year
060170012	Echo Summit	El Dorado County	2000
060170020	Cool	El Dorado County	1996
060430006	Jerseydale	Mariposa County	1995
060570007	White Cloud Mountain*	Northern Sierra	1995
061010004	Sutter Buttes	Feather River	1993
061030004	Tuscan Butte	Tehama County	1995

\*The White Cloud Mountain site has not operated since 2016 due to shelter and power issues. A date for the relocation and startup of a new site is unknown at this time.

## Section 5B: Nitrogen Dioxide (NO<sub>2</sub>)

### Minimum Number of NO<sub>2</sub> Monitoring Sites

Appendix D of 40 CFR Part 58 - specify three types of NO<sub>2</sub> minimum monitoring requirements:

- Area-wide;
- Near-road NO<sub>2</sub> monitoring, and;
- Monitoring in communities with susceptible populations

Area-wide monitoring must be conducted in CBSAs with populations of one million or more. For these areas, a minimum of one monitor is required and should be sited to capture the highest concentrations at a neighborhood or larger spatial scale. PAMS sites can be used to meet area-wide minimum monitoring requirements if they meet siting criteria.

The CBSAs in California that meet the population thresholds for required area-wide NO<sub>2</sub> monitoring are the Los Angeles--Long Beach--Anaheim, Riverside--San Bernardino--Ontario, Sacramento--Roseville--Folsom, San Diego--Carlsbad, San Francisco--Oakland--Hayward and San Jose--Sunnyvale--Santa Clara. The areas of expected highest concentration in these CBSAs are not within the jurisdictions of the districts covered by this ANP. As such, area-wide NO<sub>2</sub> monitoring for these CBSAs is addressed in the ANPs prepared by the South Coast AQMD, Sacramento Metropolitan AQMD, San Diego County APCD, and Bay Area AQMD. Although not required, NO<sub>2</sub> monitors are operated in several districts covered by this ANP. Information about these monitors can be found in Appendix A of this ANP.

Near-road NO<sub>2</sub> monitoring requirements are based on population of the CBSA and Annual Average Daily Traffic (AADT) counts on road segments within the CBSA. One monitor is required in CBSAs with a population of one million or more. A second monitor is required in CBSAs with a population greater than or equal to 2.5 million; or CBSA's with populations greater than or equal to 1 million and roadway AADT greater than or equal to 250,000 on one or more road segments. Near-road monitors should be sited to capture maximum one-hour concentrations at a micro spatial scale. The near-road requirements are being implemented in phases, over the course of several years. For informational purposes, all of the CBSAs in California that are required by current federal regulations to conduct near-road NO<sub>2</sub> monitoring are shown in Table 12.

The near-road areas with road segments with the highest AADT for the Bakersfield, Los Angeles--Long Beach--Anaheim, Riverside--San Bernardino--Ontario, and Sacramento--Roseville--Folsom CBSAs are not within the jurisdiction of the districts covered by this ANP. Near--road NO<sub>2</sub> monitoring for these CBSAs in the CARB PQAO is addressed in the ANPs prepared by the San Joaquin Valley APCD and the Sacramento Metropolitan AQMD. Information about near--road NO<sub>2</sub> monitoring for

the other PQAOs in California can also be found in the ANPs prepared by the San Diego County APCD, South Coast AQMD and the Bay Area AQMD.

**Table 12: CBSAs with Near-Road NO<sub>2</sub> Monitoring Requirements**

CBSA	Population 2020 Census (2021 Population Estimate)	Area-wide Monitoring	Maximum AADT (2020)*	Required Near-road Sites	Near-road Sites; AQS ID (District where sites are located)
Bakersfield	909,235 (917,673)	No	140,000	1**	Bakersfield–Westwind; 060292019 (San Joaquin Valley)
Fresno	1,008,654 (1,013,581)	Yes	143,000	1	Fresno-2482 Foundry Park; 060192016 (San Joaquin Valley)
Los Angeles-Long Beach-Anaheim	13,200,998 (12,997,353)	Yes	386,000	2	Anaheim-Route 5; 060590008 (South Coast) Long Beach-Route 710; 060374008 (South Coast)
Riverside-San Bernardino-Ontario	4,599,839 (4,653,105)	Yes	274,000	2	Ontario-Etiwanda; 060710026 (South Coast) Ontario-Route 60; 060710027 (South Coast)
Sacramento-Roseville-Folsom	2,397,382 (2,411,428)	Yes	249,000	2	Sacramento-Bercut Drive; 060670015 (Sacramento) - - ***
San Diego-Chula Vista-Carlsbad	3,298,634 (3,286,069)	Yes	272,000	2	Rancho Carmel Drive; 060731017 (San Diego) San Ysidro; 060731025 (San Diego) ***
San Francisco-Oakland-Berkeley	4,749,008 (4,623,264)	Yes	260,000	2	Laney College; 060010012 (Bay Area) Berkeley-Aquatic Park; 060010013 (Bay Area)
San Jose-Sunnyvale-Santa Clara	2,000,468 (1,952,185)	Yes	232,000	2	San Jose-Knox Ave; 060850006 (Bay Area) - - ***

\* Source: Traffic Census Program, California Department of Transportation

<http://www.dot.ca.gov/trafficops/census/>

\*\* Regional Administrator Required Near-Road NO<sub>2</sub> Monitoring Site

\*\*\* Near-road sites were in the planning/construction stages and not yet operating in 2021.

As part of the final rule revising the NO<sub>2</sub> NAAQS in 2010 (75 FR 6474), U.S. EPA required the Regional Administrators to identify an additional 40 monitoring sites nationwide that would be located in areas representing susceptible and vulnerable populations. Seven of these sites are located in California, and the locations of them are shown in Table 13 along with the responsible monitoring agency. More information on this monitoring can be found in the ANPs prepared by Bay Area AQMD, San Diego County APCD, San Joaquin Valley APCD and South Coast AQMD.

**Table 13: Regional Administrator Required NO<sub>2</sub> Monitoring Site**

District	Site (AQS ID)
San Diego	Sherman Elementary School (060731026)
Bay Area	Oakland West (060010011)
San Joaquin Valley	Parlier (060194001)
	Bakersfield-Muni (060292012)*
South Coast	Long Beach North (060374002)
	Los Angeles-Main St. (060371103)
	San Bernardino (060719004)

\* The San Joaquin Valley APCD’s 2019 Air Monitoring Network Plan discussed Bakersfield Muni as the required NO<sub>2</sub> monitoring site for susceptible and vulnerable populations.

## Section 5C: Carbon Monoxide (CO)

### Minimum Number of CO Monitoring Sites

The only federal requirement for CO monitoring is for near-road CO monitoring. In CBSAs with a population of one million or more, one CO monitor is required to operate collocated with one near-road NO<sub>2</sub> monitor. If a CBSA has more than one near-road NO<sub>2</sub> monitoring site, a CO monitor is only required at one near-road site in the CBSA. The CO monitor was required to be operational by January 1, 2015 in CBSAs with a population more than 2.5 million, and by January 1, 2017 for all other CBSAs. Additionally, the Regional Administrators, jointly with states, may require additional CO monitoring in other areas where data or other indicators suggest that concentrations may approach or exceed the NAAQS. 40 CFR Part 58 Appendix D 4.2.2 (3) Carbon Monoxide (CO) Design Criteria states *“The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and maintain the most appropriate CO network to address the data needs for an area and include all monitors under this provision in the annual monitoring network plan.*

**Table 14: CBSAs with CO Minimum Monitoring Requirements**

CBSA	Population 2020 Census (2021 Population Estimate)	Required # of Near-road Sites	Near-road Sites (AQS ID; District where sites are located)
Los Angeles-Long Beach-Anaheim	13,200,998 (12,997,353)	1	Anaheim-Route 5; 060590008 (South Coast)
Riverside-San Bernardino-Ontario	4,599,839 (4,653,105)	1	Ontario-Etiwanda; 060710026 (South Coast)
Sacramento-Roseville-Folsom	2,397,382 (2,411,428)	1	Sacramento-Bercut Drive; 060670015 (Sacramento)
San Diego-Chula Vista-Carlsbad	3,298,634 (3,286,069)	1	Rancho Carmel Dr. ; 060731017 (San Diego)
San Francisco-Oakland-Berkeley	4,749,008 (4,623,264)	1	Laney College; (060010012 (Bay Area) Berkeley-Aquatic Park; 060010013 (Bay Area)
San Jose-Sunnyvale-Santa Clara	2,000,468 (1,952,185)	1	San Jose-Knox Ave; 060850006 (Bay Area)

As shown in Table 14, three CBSAs that include a district covered by this ANP meet the population threshold and have minimum monitoring requirements for CO; however, the near-road areas with road segments that have the highest AADT for the Los Angeles-Long Beach-Anaheim, Riverside-San Bernardino-Ontario, and Sacramento-Roseville-Folsom CBSAs are not within the areas covered by this ANP. Subsequently, near-road monitoring for these CBSAs is addressed in the ANPs

prepared by South Coast AQMD, Bay Area AQMD, and Sacramento Metropolitan AQMD.

Several districts covered by this ANP (Antelope Valley, Butte County, Imperial County and Mojave Desert) operate five area-wide CO monitors as listed in Table 2. The data from these monitors are used for various purposes such as estimating the general population exposure and also determining the impact of emissions from wildfires. CO concentrations at area-wide monitors are well below the standard, and California has long attained federal and State CO standards. CARB is working with EPA to close CO monitors at Calexico (060250005), Chico (060070008), Modesto (060990005), and Stockton (060771003). Information about these monitors is provided in Appendix A.

## Section 5D: Sulfur Dioxide (SO<sub>2</sub>)

### Minimum Number of SO<sub>2</sub> Monitoring Sites

Monitoring regulations for SO<sub>2</sub> are based on the population weighted emissions index (PWEI) in a CBSA. The PWEI considers population and aggregated county-level emissions data and is calculated using the equation:

$$CBSA\ PWEI = \frac{CBSA\ Population \times \sum_{County} Emission}{1,000,000}$$

One monitor is required in CBSAs with PWEIs equal to or greater than 5,000 but less than 100,000; two monitors are required in CBSAs with PWEIs equal to or greater than 100,000 but less than one million; and three monitors are required in CBSAs with PWEI values of one million or more. As shown in Table 15, two CBSAs that contain a district covered by this plan meet the PWEI threshold and have minimum monitoring requirements for SO<sub>2</sub>. Site types identified as population exposure, high concentration, source oriented, general background, or regional transport can satisfy minimum monitoring requirements. SO<sub>2</sub> monitors at NCore sites shall be counted toward minimum monitoring requirements.

The most recent emission data available to calculate PWEI was from the 2020 CARB Emission Inventory.

**Table 15: CBSAs with Minimum Monitoring Requirements for SO<sub>2</sub>**

CBSA	District covered by this ANP	Other District ANPs covering this CBSA	County SO <sub>2</sub> (TPY) (2020 Data)*	Population 2020 Census (2021 Population Estimate)	PWEI	Required Sites	SLAMS Sites Operating in 2020
Los Angeles-Long Beach-Anaheim	Antelope Valley AQMD	South Coast AQMD	Los Angeles: 4,818	13,200,998 (12,997,353)	69,873 (68,795)	1	Los Angeles-Main Street (South Coast) Los Angeles-Hastings (South Coast)
			Orange: 475				
Riverside-San Bernardino-Ontario	Mojave Desert AQMD	South Coast AQMD	Riverside: 329	4,599,839 (4,653,105)	9,572 (9,683)	1	Fontana (South Coast) Rubidoux (South Coast) Trona (Mojave Desert) Victorville (Mojave Desert)
			San Bernardino: 1,752				

\* Source: Criteria Pollutant Emission Inventory Data, California Air Resources Board  
<https://ww2.arb.ca.gov/criteria-pollutant-emission-inventory-data>

All districts covered by this ANP met the minimum monitoring requirements for SO<sub>2</sub> in 2020. In December 2017, U.S. EPA designated all areas of California as unclassifiable/attainment for the federal SO<sub>2</sub> standard.

## Section 5E: Lead (Pb)

### Minimum Number of Pb Monitoring Sites

Monitoring is required near Pb sources which are expected or have been shown to contribute to a maximum Pb concentration in excess of the federal standard. Specifically, monitoring is required at airports which emit more than 1.0 tons per year or non-airport sources which emit 0.50 tons per year or more of Pb. None of the areas covered by this ANP exceed the threshold for source monitoring.

Pb monitoring at NCore site is no longer required. However, agencies that operate NCore sites are required to obtain approval to terminate an existing Pb monitor.

## Section 5F: PM<sub>10</sub>

### Minimum Number of PM<sub>10</sub> Monitoring Sites

Monitoring requirements for PM<sub>10</sub> are based on population and air quality conditions in each MSA. The criteria for determining the minimum number of monitoring sites are listed in Table 16. The number of sites is given as a range rather than an absolute number because the goal of establishing a network of monitoring sites is to characterize national and regional air quality trends and geographic patterns, which can vary in complexity from place to place.

**Table 16: Minimum Monitoring Requirements for PM<sub>10</sub> Monitoring Sites**

Population	High Concentration (Exceeds NAAQS by ≥20%)	Medium Concentration (≥80% of NAAQS)	Low Concentration (<80% of NAAQS)
> 1 million	6 – 10 sites	4 – 8 sites	2 – 4 sites
500,000 - 1 million	4 – 8 sites	2 – 4 sites	1 – 2 sites
250,000 - 500,000	3 – 4 sites	1 – 2 sites	0 – 1 sites
100,000 - 250,000	1 – 2 sites	0 – 1 sites	0 sites

The number of required monitoring sites in CBSAs with populations that are greater than or equal to 100,000 are shown in Table 17. Only sites designated as SLAMS may be counted to meet PM<sub>10</sub> minimum monitoring requirements. In contrast to the information presented on the gaseous monitoring network, sites outside of the scope of this ANP are only included in Table 17 if needed to meet minimum monitoring requirements because of the complex nature of PM monitoring.

Eleven MSAs include at least a portion of the areas covered by this ANP. The Los Angeles-Long Beach-Anaheim MSA includes the Antelope Valley AQMD; however, most of the area is under the jurisdiction of the South Coast AQMD. Monitoring sites operated by South Coast AQMD are necessary to meet minimum monitoring requirements for PM<sub>10</sub> and include sites located in areas where high concentrations are expected. The sole monitoring site run by Antelope Valley AQMD is not needed to meet minimum monitoring requirements for this area but serves to complement the network of monitors operated by South Coast AQMD.

The monitors operated in districts covered by this ANP are adequate to meet minimum monitoring requirements in the remaining ten MSAs; however, there are additional monitors operated in these areas that are in jurisdictions outside of the scope of this ANP. Information about these monitors can be found in the ANPs prepared by the South Coast AQMD, San Joaquin Valley APCD, and Sacramento Metropolitan AQMD.

**Table 17: CBSAs with Minimum Monitoring Requirements for PM<sub>10</sub>**

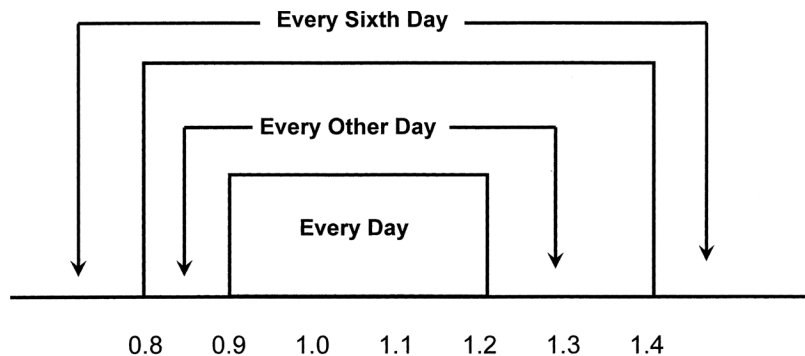
CBSA	2020 Census Population (2021 Population Estimate)	2021 Max Concentration (% of NAAQS) Max Concentration Site	Required <sup>1</sup> Sites	SLAMS Sites Operating in 2021 (District where site is located)
Bakersfield	909,235 (917,673)	437 µg/m <sup>3</sup> (291%) <i>Bakersfield-California</i>	4-8	Canebrake (Eastern Kern); Mojave (Eastern Kern); Ridgecrest (Eastern Kern); Bakersfield-California (San Joaquin); Bakersfield-Golden (San Joaquin); Oildale (San Joaquin)
Chico	211,632 (208,309)	130 µg/m <sup>3</sup> (87%) <i>Chico</i>	0-1	Chico (Butte County)
El Centro	179,702 (179,851)	547 µg/m <sup>3</sup> (365%) <i>Westmorland</i>	1-2	Brawley (Imperial County); Calexico (Imperial County); El Centro (Imperial County); Niland (Imperial County); Westmorland (Imperial County)
Los Angeles-Long Beach-Anaheim	13,200,998 (12,997,353)	121 µg/m <sup>3</sup> (81%) <i>Glendora</i>	4-8	Lancaster (Antelope Valley); Anaheim (South Coast); Azusa (South Coast); Glendora (South Coast); Los Angeles-N Main St (South Coast); Los Angeles-LAX (South Coast); Mission Viejo (South Coast); Santa Clarita (South Coast); South Long Beach (South Coast)
Oxnard-Thousand Oaks-Ventura	843,843 (839,784)	377 µg/m <sup>3</sup> (251%) <i>El Rio</i>	4-8	Simi Valley (Ventura County); El Rio (Ventura County)
Redding	182,155 (182,139)	126 µg/m <sup>3</sup> (84%) <i>Redding</i>	0-1	Redding (Shasta County); Anderson (Shasta County); Shasta Lake (Shasta County)
Riverside-San Bernardino-Ontario	4,599,839 (4,653,105)	334 µg/m <sup>3</sup> (223%) <i>Mecca</i>	6-10	Barstow (Mojave Desert); Lucerne Valley (Mojave Desert); Victorville (Mojave Desert); Trona (Mojave Desert); Hesperia (Mojave Desert); Banning (South Coast); Crestline (South Coast); Indio (South Coast); Mecca (South Coast); Palm Springs (South Coast)
Sacramento-Roseville-Folsom	2,397,382 (2,411,428)	492 µg/m <sup>3</sup> (328%) <i>So. Lake Tahoe</i>	6-10	So. Lake Tahoe (El Dorado County); Roseville (Placer County); North Highlands (Sacramento); Del Paso (Sacramento); Sacramento-T St (Sacramento); Sacramento-Branch (Sacramento); Woodland (Yolo-Solano); West Sacramento (Yolo-Solano)
Santa Rosa-Petaluma	488,863 (485,887)	58 µg/m <sup>3</sup> (39%) <i>Cloverdale</i>	0-1	Cloverdale (Northern Sonoma); Healdsburg (Northern Sonoma); Guerneville (Northern Sonoma)
Vallejo-Fairfield	453,491 (451,716)	50 µg/m <sup>3</sup> (33%) <i>Vacaville</i>	0-1	Vacaville (Yolo-Solano)
Yuba City	181,208 (182,484)	110 µg/m <sup>3</sup> (73%) <i>Yuba City</i>	0	Yuba City (Feather River)

<sup>1</sup> The minimum monitoring requirements were impacted by exceptional events in 2021 in some areas. Some of these impacts will be addressed under the Exceptional Event Rule (81 FR 68216) while others did not lead to exceedances of the standard or will not affect any upcoming regulatory determinations. Existing monitoring meets the needs of the local air districts and the communities; CARB is committed to working with U.S. EPA and the local air districts to ensure that monitoring levels continue to protect public health and safety.

## PM<sub>10</sub> Sampling Frequency Requirements for Primary FRM Monitors

Federal regulations establish procedures for determining an appropriate sampling frequency for PM<sub>10</sub> monitors. All 24-hour samples must be taken from midnight to midnight, local standard time, to ensure consistency among measurements nationwide. Figure 3, reproduced from Figure 1 in 40 CFR 58.12e, shows the required sampling frequency based upon the ratio of the design value to the standard.

**Figure 3: Required Sampling Frequency for manual PM<sub>10</sub> monitors**



The calculated required sampling frequencies for all FRM PM<sub>10</sub> monitors in the districts covered by this ANP are shown in Table 18. Note that exceptional events are included in the concentrations shown.

**Table 18: Required Sampling Frequency for PM<sub>10</sub> FRM Monitors**

Site Name	District	AQS ID	2021 Max Concentration	Ratio of Max Concentration to Standard	Required Sampling Frequency <sup>1</sup>	Current Sampling Frequency
Anderson Springs <sup>2</sup>	Lake	060333010-1	70	0.47	1:6	1:6
Glenbrook <sup>2</sup>	Lake	060333011-1	72	0.48	1:6	1:6
Lakeport <sup>3</sup>	Lake	060333002-1	88	0.59	1:6	1:6
Anderson <sup>4</sup>	Shasta	060890007-1	22	0.15	1:6	1:6
Redding	Shasta	060890004-2	126	0.84	1:2	1:6
Shasta Lake <sup>5</sup>	Shasta	060890008-1	116	0.77	1:6	1:6
Red Bluff	Tehama	061030007-1	96	0.64	1:6	1:6
Vacaville	Yolo-Solano	060953001-2	50	0.33	1:6	1:6
West Sacramento	Yolo-Solano	061132001-1	50	0.33	1:6	1:6
Woodland	Yolo-Solano	061131003-1	68	0.45	1:6	1:6

<sup>1</sup> Wildfires in 2021 impacted many monitoring sites covered in this ANP, including the monitor at Redding in Shasta County. Based solely on these exceptional events, this monitoring site moved into a higher sampling frequency category. This monitor is not located in an area impacted by upcoming regulatory determinations, so will not qualify for an exceptional event demonstration. CARB is working with local air districts to evaluate sampling frequencies at all monitoring sites impacted by the massive wildfires.

<sup>2</sup> The Lake County AQMD has discontinued PM10 monitoring at this location starting 1/1/2022".

<sup>3</sup> The Lake County AQMD is working with EPA to resolve district staffing and funding issues, as well as identifying equipment options for PM10 to resolve the sampling frequency issue for Lakeport".

<sup>4</sup> FRM monitor at Anderson was closed on 1/11/21.

<sup>5</sup> FRM monitor at Shasta Lake was closed on 10/31/21.

## Section 5G: PM<sub>2.5</sub>

### Minimum Number of PM<sub>2.5</sub> Monitoring Sites

The minimum number of monitoring sites that are required for the PM<sub>2.5</sub> network is based on population and air quality within each MSA, as shown in Table 19. Each MSA is required to have at least one monitoring site situated to measure maximum concentrations at a neighborhood or larger scale.

**Table 19: Minimum Monitoring Requirements for PM<sub>2.5</sub>**

Population	DV ≥ 85% of any PM <sub>2.5</sub> NAAQS	DV < 85% of any PM <sub>2.5</sub> NAAQS
> 1 million	3 sites	2 sites
500,000 - 1 million	2 sites	1 site
50,000 - <500,000	1 site	0 sites

Only SLAMS sites situated to measure concentrations that are representative of area-wide PM<sub>2.5</sub> concentrations should be used to meet minimum monitoring requirements. NCore and PAMS sites can count towards meeting minimum monitoring requirements if the site(s) are representative of area-wide PM<sub>2.5</sub> concentrations. In contrast to the information presented on the gaseous monitoring network, sites outside of the scope of this ANP were only included in Table 20 if needed to meet minimum monitoring requirements because of the complex nature of PM monitoring.

### PM<sub>2.5</sub> Near-Road Monitoring

Federal regulations require that at least one PM<sub>2.5</sub> monitor is collocated at a near-road NO<sub>2</sub> monitoring site in CBSAs with a million or more people. No near-road sites are located in the areas covered by this ANP. Information about near-road sites can be found in the ANPs prepared by the Bay Area AQMD, Sacramento Metropolitan AQMD, San Joaquin Valley APCD, and South Coast AQMD.

### PM<sub>2.5</sub> Continuous Monitoring

Federal regulations require that at least half of the minimum number of required monitors operated in each MSA should be continuous monitors. In each MSA, at least one continuous monitor should be collocated with a required FRM/FEM/ARM monitor unless one of the required monitors is a continuous monitor. Sites outside of the scope of this ANP were only included in Table 21 if needed to meet minimum monitoring requirements.

**Table 20: CBSAs with Minimum Monitoring Requirements for PM<sub>2.5</sub>**

CBSA	2020 Census Population (2021 Population Estimate)	2021 Design Value (% of NAAQS) <sup>1</sup> Design Value Site		Required Sites	SLAMS Sites Operating in 2021 (District where site is located) Highest Concentration Site Types Denoted by Bold Text
		24-hour	Annual		
Bakersfield	909,235 (917,673)	61 µg/m <sup>3</sup> (174%) <i>Bakersfield-Planz</i>	17.8 µg/m <sup>3</sup> (148%) <i>Bakersfield-Planz</i>	2	<b>Mojave (Eastern Kern)</b> Ridgecrest (Eastern Kern) Bakersfield-California (San Joaquin) Bakersfield-Planz (San Joaquin)
Chico	211,632 (208,309)	55 µg/m <sup>3</sup> (157%) <i>Chico</i>	11.4 µg/m <sup>3</sup> (95%) <i>Chico</i>	1	Chico (Butte)
El Centro	179,702 (179,851)	30 µg/m <sup>3</sup> (86%) <i>Calexico</i>	11 µg/m <sup>3</sup> (92%) <i>Calexico</i>	1	Brawley (Imperial)* Calexico (Imperial) El Centro (Imperial)
Los Angeles-Long Beach-Anaheim	13,200,998 (12,997,353)	41 µg/m <sup>3</sup> (117%) <i>Pico Rivera</i>	12.8 µg/m <sup>3</sup> (107%) <i>Pico Rivera</i>	3	Lancaster (Antelope Valley) Compton (South Coast) Long Beach-Rte 710 (South Coast) Los Angeles-N Main (South Coast) Pico Rivera (South Coast)
Oxnard-Thousand Oaks-Ventura	843,843 (839,784)	21 µg/m <sup>3</sup> (60%) <i>El Rio, Piru, Simi Valley, Thousand Oaks</i>	7.9 µg/m <sup>3</sup> (66%) <i>Simi Valley</i>	1	El Rio (Ventura) Ojai (Ventura) <b>Piru (Ventura)</b> <b>Simi Valley (Ventura)</b> Thousand Oaks (Ventura)
Redding	182,155 (182,139)	69 µg/m <sup>3</sup> (197%) <i>Redding</i>	9.7 µg/m <sup>3</sup> (81%) <i>Redding</i>	1	Redding (Shasta)
Riverside-San Bernardino-Ontario*	4,599,839 (4,653,105)	41 µg/m <sup>3</sup> (117%) <i>Ontario</i>	14.2 µg/m <sup>3</sup> (118%) <i>Ontario</i>	3	Victorville (Mojave Desert) <b>Mira Loma (South Coast)</b> Ontario (South Coast)
Sacramento-Roseville-Folsom	2,397,382 (2,411,428)	60 µg/m <sup>3</sup> (171%) <i>Woodland**</i>	11.5 µg/m <sup>3</sup> (96%) <i>Sacramento-Bercut</i>	3	Auburn (Placer) <b>Del Paso-Avalon Dr (Sacramento)</b> Roseville- (Placer) Sacramento-Bercut (Sacramento) Woodland (Yolo-Solano)
Santa Rosa-Petaluma	488,863 (485,887)	21 µg/m <sup>3</sup> (60%) <i>Sebastopol**</i>	7.0 µg/m <sup>3</sup> (58%) <i>Sebastopol**</i>	0	Sebastopol (Bay Area)
Vallejo-Fairfield	453,491 (451,716)	31 µg/m <sup>3</sup> (89%) <i>Vallejo</i>	9.7 µg/m <sup>3</sup> (81%) <i>Vallejo</i>	1	<b>Vallejo- (Bay Area)</b>
Yuba City	181,208 (182,484)	54 µg/m <sup>3</sup> (154%) <i>Yuba City</i>	13.1 µg/m <sup>3</sup> (109%) <i>Yuba City</i>	1	Yuba City (Feather River)

\* Closed in 2021

\*\* Incomplete data

<sup>1</sup> Many monitoring sites were impacted by exceptional events in 2019, 2020 and 2021. Some of these impacts will be addressed under the Exceptional Event Rule (81 FR 68216) while others did not lead to exceedances of the standard but impacted the minimum monitoring requirements. CARB is working with local air districts to evaluate minimum monitoring requirements for all impacted areas.

**Table 21: CBSAs with Minimum Monitoring Requirements for Continuous PM<sub>2.5</sub>**

Metropolitan Statistical Area	Minimum # of Required Sites	Required Continuous Monitors	Sites with Continuous Monitors Operating in 2021 <sup>1</sup> (District where site is located)
Bakersfield	2	1	Mojave (Eastern Kern); Ridgecrest (Eastern Kern)
Chico	1	1	Chico (Butte); Gridley (Butte)**; Paradise (Butte)**
El Centro	1	1	Brawley (Imperial) <sup>1</sup> ; Calexico (Imperial)
Los Angeles-Long Beach-Anaheim	3	2	Lancaster (Antelope Valley); Anaheim (South Coast)
Oxnard-Thousand Oaks-Ventura	1	1	El Rio (Ventura); Ojai (Ventura);Piru (Ventura); Simi Valley (Ventura); Thousand Oaks (Ventura)
Redding	1	1	Redding (Shasta)
Riverside-San Bernardino-Ontario	3	2	Victorville (Mojave Desert); Rubidoux (South Coast)
Sacramento-Roseville-Folsom	3	2	Auburn (Placer); Colfax (Placer)**; Lincoln (Placer)*; Roseville (Placer); Tahoe City (Placer)**; Del Paso (Sacramento); Elk Grove (Sacramento)**; Folsom (Sacramento); Sacramento-T St (Sacramento); Sacramento-Bercut (Sacramento); Sloughhouse (Sacramento); Woodland (Yolo-Solano); Davis (Yolo-Solano)**
Santa Rosa-Petaluma	0	0	Sebastopol (Bay Area)
Vallejo-Fairfield	1	1	Vallejo (Bay Area)
Yuba City	1	1	Yuba City (Feather River)

\*These sites operate continuous SLAMS monitors reporting only under non-regulatory parameter codes 88501 or 88502.

\*\*These sites operate continuous monitors reporting under non-regulatory parameter codes 88501 or 88502 but not as SLAMS monitors (e.g., SPM or Other).

<sup>1</sup>The monitors listed here are primarily those in the districts covered by this ANP. Sites outside of the scope of this ANP are only included if needed to meet minimum monitoring requirements.

<sup>1</sup>The Brawley site FRM monitor was replaced with an FEM on 6/23/21.

## PM<sub>2.5</sub> Sampling Frequency Requirements for Primary FRM Monitors

Sampling frequency for FRM PM<sub>2.5</sub> monitoring can vary by site. Determination of the required sampling frequency for PM<sub>2.5</sub> monitors is based upon the site level design value and a number of different factors identified in federal regulations and summarized in Table 22. Sites located in areas with more severe air quality conditions generally are required to collect measurements more frequently than other sites.

The current and required sampling frequency for PM<sub>2.5</sub> FRM monitors located in districts covered by this ANP are shown in Table 23 and also in Appendix A. Exceptional events are included in the determination of the design values shown here.

**Table 22: Criteria for Minimum Sampling Frequency for FRM PM<sub>2.5</sub> Monitoring**

1:6 may be approved by Regional Administrator	1:3	1:1
Collocated with continuous FEM/ARM monitor	Not collocated with continuous FRM/FEM/ARM monitor	Not collocated with continuous FRM/FEM/ARM monitor
<b>AND</b>	<b>OR</b>	<b>AND</b>
Annual DV is <90% of NAAQS and not the highest in the area	Annual DV is ± 10% of NAAQS and highest in the area	24-hour DV is ± 5% of NAAQS and the highest in the area
<b>AND</b>	<b>OR</b>	<b>AND</b>
24-hour DV is <90% of NAAQS and not the highest in the area	24-hour DV is ± 10% of NAAQS and highest in the area	Annual DV is below annual NAAQS
<b>AND</b>	<b>OR</b>	
24-hour NAAQS has not been exceeded one or more times in each of the past three years	24-hour NAAQS has been exceeded one or more times in each of the past three years	
	<b>OR</b>	
	NCore Site	
	<b>OR</b>	
	Required regional background site	
	<b>OR</b>	
	Required regional transport site	

**Table 23: Required PM<sub>2.5</sub> Sampling Frequency for FRM monitors**

Site Name	AQS ID	District	2021 24-hr DV	2021 Annual DV	Required Sampling Frequency	Current Sampling Frequency
Calexico	060250005	Imperial	30	11.0	1:3	1:3
Brawley <sup>1</sup>	060250007	Imperial	20*	8.5*	1:3	1:1
El Centro	060251003	Imperial	20	8.7	1:3	1:3
Lakeport <sup>2</sup>	060333002	Lake	42	6.3	1:3	1:6
Truckee	060571001	Northern Sierra	54*	8.4*	1:3	1:3
Quincy	060631006	Northern Sierra	72*	11.6*	1:3	1:1
Portola	060631010	Northern Sierra	63	16.5	1:3	1:3
Woodland <sup>3</sup>	061131003	Yolo-Solano	60*	10.5*	1:3	1:6

\*DV based on incomplete data.

<sup>1</sup>The Brawley FRM monitor was replaced with an FEM on 6/23/21.

<sup>2</sup>The Lake County AQMD is working with EPA to resolve district staffing and funding issues, as well as identifying equipment options for PM<sub>2.5</sub> to resolve the sampling frequency issue for Lakeport.

<sup>3</sup>The Woodland primary monitor was replaced with an FEM on 12/10/20 which operated until July 2021. The FEM was since replaced with a non-FEM. CARB is working with the district to resolve the sampling frequency issue at the Woodland site.

### Suitability for comparison to the annual PM<sub>2.5</sub> standard

The CFR states that for PM<sub>2.5</sub> FRM or FEM monitors used in area-wide monitoring and that meet siting criteria, the reported data are comparable to the annual PM<sub>2.5</sub> NAAQS. For a PM<sub>2.5</sub> monitor to be considered area-wide, the concentration values measured by the monitor should be representative of concentrations expected over an area with dimensions of a few kilometers. The PM<sub>2.5</sub> FRM and FEM monitors included in this report are sited per the definition of area-wide monitoring in the CFR and meet applicable requirements; therefore, the FRM and FEM data are suitable for comparison to the annual PM<sub>2.5</sub> NAAQS.

### Requirements for PM<sub>2.5</sub> Background and Transport Sites

Within each state, federal regulations require at least one site measuring concentrations representative of regional background and at least one site representative of regional transport. The regulatory language referenced in 40 CFR Part 58 Appendix C 2.9 indicates that IMPROVE samplers used for regional background/regional transport requirements can be considered SLAMS.<sup>1</sup> Federal regulations require that monitors required to characterize regional background and

<sup>1</sup> January 13, 2017 email communication from A.Meburst, EPA, to R.Fine/G.Sweigert/T.Najita/W.Tasat citing 40 CFR Part 58 Appendix C 2.9.

transport have a minimum sampling frequency of one in every three days (1:3). The monitors sited to meet these requirements are listed below.

**Table 24: Regional Background and Transport Sites for PM<sub>2.5</sub>**

Regional Background Sites (Monitor Type/AQS ID)	Regional Transport Sites (Monitor Type/AQS ID)
Northern: Point Reyes National Seashore (EPA/060410002) Southern: San Rafael Wilderness (EPA/060839000)	Vallejo (SLAMS/060950004)

All districts covered by this ANP meet the requirements for PM<sub>2.5</sub> minimum monitoring, near-road monitoring, and continuous monitoring. CARB is working with local air districts to reassess the current sampling schedules and assist in applying for additional funding to comply with sampling frequency requirements and associated continuous collocation requirements.

## Section 6: Other Federal Monitoring Requirements

### Chemical Speciation Network (CSN)

Federal regulations also require that states continue to conduct speciated particulate measurements at CSN sites. These measurements are intended to support development of SIPs and research activities. Some districts in California conduct additional speciated particulate measurements to fulfill specific local objectives. Table 25 lists the California sites in the National Speciation Trends Network (STN) and State speciation network.

**Table 25: PM<sub>2.5</sub> CSN Sites in California**

Site Name	AQS ID	District	National STN Site	State Speciation Site
Anaheim-Pampas*	060590007	South Coast		x
Bakersfield-California Ave	060290014	San Joaquin Valley	x	
Calexico-Ethel St	060250005	Imperial County		x
Chico-East Ave	060070008	Butte County		x
El Cajon-Lexington	060731022	San Diego	x	
Fontana-Arrow*	060712002	South Coast		x
Fresno-Garland	060190011	San Joaquin Valley	x	
Livermore-Rincon*	060010007	Bay Area		x
Los Angeles-North Main St*	060371103	South Coast	x	x
Modesto-14th	060990005	San Joaquin Valley		x
Oakland-West*	060010011	Bay Area		x
Portola-Gulling	060631010	Northern Sierra		x
Riverside-Rubidoux*	060658001	South Coast	x	x
Sacramento-Del Paso Manor	060670006	Sacramento	x	
Sacramento-T Street	060670010	Sacramento		x
San Jose-Jackson	060850005	Bay Area	x	
Vallejo-Tuolumne *	060950004	Bay Area		x
Visalia-Church St	061072002	San Joaquin Valley		x

\* District supplemental speciation monitor

## PM Monitor Spacing

Federal regulations require that high volume monitors, defined as monitors that have a sample flow rate > 200 liters per minute, are more than 2 meters away from all other PM samplers. Further, low volume monitors, those with a sample flow rate < 200 liters per minute, are required to be more than 1 meter away from all other PM monitors.

The PM monitors in the districts covered by this ANP meet spacing requirements.

## National Core Multipollutant Network (NCore) Monitoring

Sites in the NCore Monitoring measure multiple pollutants to support a wide range of air quality management objectives. NCore sites are intended to be long-term sites that will generate datasets useful for trend analyses and model evaluation. The NCore Monitoring includes rural and metropolitan sites. As shown in Table 26, seven NCore sites are located in California; none of the sites are located in the districts covered by this ANP, although the Fresno-Garland site is operated by CARB. More information about specific sites can be found in the ANPs submitted by districts in which the sites are located.

**Table 26: NCore Sites in California**

Site	AQS ID	District	Site Type
El Cajon-Lexington Elementary	060731022	San Diego	Urban
Fresno-Garland	060190011	San Joaquin Valley	Urban
Los Angeles-N Main St.	060371103	South Coast	Urban
Riverside-Rubidoux	060658001	South Coast	Urban
Sacramento-Del Paso Manor	060670006	Sacramento	Urban
San Jose-Jackson	060850005	Bay Area	Urban
White Mountain Research Station	060270002	Great Basin	Rural

## Photochemical Assessment Monitoring Station (PAMS)

Ozone nonattainment areas classified as serious, severe, or extreme were required to establish PAMS site(s) which provide enhanced monitoring of ozone, NO<sub>x</sub>, VOCs, and meteorological parameters. The enhanced monitoring is intended to provide comprehensive data to evaluate the nature of ozone pollution and craft effective planning strategies to improve air quality in effected areas.

On October 1, 2015, U.S. EPA substantially revised the PAMS requirements in 40 CFR part 58 Appendix D. As part of the revision, U.S. EPA required state and local monitoring agencies to make PAMS measurements (including hourly averaged mixing height) at NCore sites in CBSAs with a population of 1,000,000 or more. The Fresno

CBSA has triggered the PAMS 1 million population requirement according to the 2020 census results. CARB is working with San Joaquin Valley APCD and U.S. EPA to implement the PAMS monitoring at the Freson-Garland NCore site. The revisions also required state monitoring agencies with moderate and above 8-hour ozone nonattainment areas and states in the Ozone Transport Region (OTR) to develop and implement an Enhanced Monitoring Plan (EMP) detailing enhanced ozone and ozone precursor monitoring activities to be performed to better understand area specific ozone issues.

In California, the Bay Area AQMD, Sacramento Metropolitan AQMD, San Diego County APCD, San Joaquin Valley APCD, South Coast AQMD, and Ventura County APCD have established PAMS sites. Ventura County is the only district covered by this ANP that conducts monitoring as part of the PAMS program. Due to the significant resources required to operate and maintain VOC measurements at the PAMS, the age of equipment, and changes to the monitoring regulations, the Ventura County APCD terminated VOC sampling at the Simi Valley and El Rio sites with U.S. EPA's approval in 2019. The Ventura County APCD continues to monitor NO<sub>2</sub>/NO<sub>x</sub> at Simi Valley and El Rio sites; upper air meteorological parameters at the Simi Valley upper air site; and surface meteorological parameters at its six monitoring sites.

Ventura County does not have any NCore sites and its CBSA (Oxnard-Thousand Oaks-Ventura) is under 1,000,000. However, Ventura County is nonattainment - serious for ozone and is required to develop and implement an EMP. CARB worked with Ventura County APCD and U.S. EPA Region 9 to develop an EMP in 2019, and also the EMP was updated as part of the CARB 5-year Network Assessment in 2020.

Ozone air quality continues to improve in the Ventura County due to the implementation of Ventura County APCD and State programs designed to reduce local and statewide ozone precursor emissions and ozone formation; therefore, no additional ozone or ozone precursor monitoring is planned or needed for the Ventura County nonattainment area at this time.

### **Special Purpose Monitors (SPM)**

In the areas covered by this ANP, non-primary SPM monitors operated in 2021 in conjunction with SLAMS monitors at Brawley in Imperial County and at all sites in Ventura County.

## Section 7: Federal Quality Assurance Requirements

### CARB PQAO Collocation Requirements

Appendix A of 40 CFR Part 58 includes requirements for collocation of samplers to ensure that measurements of PM<sub>2.5</sub>, PM<sub>10</sub>, and Pb are of comparable quality throughout monitoring networks located in each PQAO.

#### PM<sub>2.5</sub> Collocation Status

Federal regulations require that 15 percent of the FEM and FRM monitors in the network of primary PM<sub>2.5</sub> monitors must have a collocated monitor. Collocated FRM monitors must have the same method of measurement. For each site with collocated PM<sub>2.5</sub> FEM monitors, half of the collocated monitors must have the same method of measurement and half must be FRM monitors. If there are an odd number of required collocated monitors, then the additional monitor must be an FRM monitor.

Federal regulations require that 80 percent of collocated PM<sub>2.5</sub> monitors are located at sites where the design values are within 20 percent of the PM<sub>2.5</sub> NAAQS. However, California is a large state in which environmental conditions can cause significant variation in ambient PM<sub>2.5</sub> concentrations across spatial and temporal scales. Thus, CARB determined that limiting the focus of collocation efforts on meeting the 80 percent metric would result in collocated monitors being tightly clustered in a limited geographic range, which would not adequately represent the range of environmental conditions in the PQAO that could potentially affect PM<sub>2.5</sub> measurements.

The current locations of collocated PM<sub>2.5</sub> samplers were collaboratively identified by CARB and local districts as representative of areas of expected high concentrations as well as areas with environmental conditions that could potentially affect measurements, which effectively addresses the quality control function of the collocated monitoring requirement.

**Table 27: Collocation Requirements for PM<sub>2.5</sub> Monitoring Methods**

Method Type	Method Description	# of Primary Monitors	# of Required Collocated Monitors	Sites with Collocated Monitors - Method Type (District)
143 (FRM) <sup>1</sup>	R&P Model 2000 with VSCC	2	1	
145 (FRM) <sup>2</sup>	R&P Model 2025 with VSCC	9	1	Bakersfield-California – 145/145 (San Joaquin Valley) Portola – 145/145 (Northern Sierra) Sacramento-Del Paso – 145/145 (Sacramento)
170 (FEM) <sup>3</sup>	Met One BAM 1020 with VSCC	53	8	Calexico – 170/143 (Imperial) Folsom – 170/170 (Sacramento) Fresno-Garland – 170/145 (San Joaquin Valley) Grass Valley – 170/143 (Northern Sierra) <sup>4</sup> Sacramento-T St – 170/143 (Sacramento) Salinas – 170/143 (Monterey Bay) Simi Valley – 170/170 (Ventura) Victorville – 170/170 (Mojave Desert) Yuba City – 170/170 (Feather River)
181 (FEM)	Thermo TEOM 1400	1	1	Keeler – 181/145 (Great Basin)
209 (FEM)	Met One BAM-1022 with VSCC or TE-PM2.5C	6	1	Redding – 209/143 (Shasta)
238 (FEM) <sup>5</sup>	Teledyne TEOM T640X	2	1	Bishop/White Mountain – 238/145 (Great Basin)

<sup>1</sup> Previous collocation with FRM (143/143) replaced with FEM (170). CARB is working with the local air district to replace the two FRM (143) monitors with FEM (170). Once completed, this replacement will remove the collocation requirement for Method 143 (FRM)

<sup>2</sup>Two FRM (145) monitors (Brawley and Corcoran) were closed in 2021 and are not included in this total.

<sup>3</sup>Four FEM (170) monitors (Stockton-Hazeltan secondary monitor, San Luis Obispo, Santa Maria, and Visalia) were closed in 2021 and are not included in this total.

<sup>4</sup>The collocated monitor at Grass Valley was closed in August 2021. CARB is working with local air districts to identify a replacement location in anticipation of more BAM1020 units being added to the network; current 8 collocations satisfy the requirement.

<sup>5</sup>Mammoth monitor, listed as SPM, is included in this total since it has been in operation over two years.

## PM<sub>10</sub> Collocation Status

Federal regulations require that 15 percent of PM<sub>10</sub> sites using manual FRMs in a PQAQO have collocated monitors. Collocated monitors must use the same method of measurement as the primary FRM monitor.

Per U.S. EPA’s guidance, the required number of collocation sites was determined by counting all of the PM<sub>10</sub> FRM primary monitors, regardless of method code.

**Table 28: Collocation Requirements for PM<sub>10</sub>**

Number of Primary FRM Monitors*	# of Required Collocated Monitors	Sites with Collocated Monitors - Method Types (District)
22	3	Fresno-Drummond – 162/162 (San Joaquin Valley) Keeler-Cerro – 127/127 (Great Basin) Sacramento-Del Paso – 063/063 (Sacramento)

**Pb Collocation Status**

There is one Pb monitor in the CARB PQAO located at the Sacramento-Del Paso Manor sites. However, Pb collocation for NCore sites is addressed by U.S. EPA at the national level. Thus, CARB is not required to collocate for lead at the NCore sites.

## CARB Quality Management Branch (QMB)

The information in this section, along with the information available on CARB's Quality Assurance website, <https://ww2.arb.ca.gov/our-work/programs/quality-assurance>, provides an overview of CARB's QMB compliance status with the requirements of 40 CFR Part 58, Appendices A, C, and E. The compliance status overview is part of the annual network plan requirement.

### QMB Background

The Quality Assurance Section (QAS), Standards Laboratory Section (SLS) and Quality Management Section (QMS) fulfill the QMB mission to ensure ambient air quality data meet or exceed the quality and program objectives of the end users. QAS, SLS and QMS perform various quality assurance activities to verify that the data collected comply with procedures and regulations set forth by U.S. EPA and can be considered good quality data and data-for-record.

The quality assurance activities are achieved through various audits which are independent from the ambient air monitoring program responsibilities. California's large network and unique ambient air monitoring challenges require a comprehensive state-of-the-art audit program. CARB's audit program meets the federal requirements for conducting annual performance evaluations. Audits are conducted by using independent National Institute of Standards and Technology (NIST) traceable standards.

SLS is responsible for ensuring air monitoring equipment and QAS standards are in compliance with federally establish acceptance criteria and traceable to national and international standards. QAS is responsible for conducting performance audits of criteria and non-criteria gaseous analyzers, particulate matter samplers, meteorological equipment, and laboratory analyses utilized for generating ambient pollutant level measurements. QAS also performs site reviews as well as reports quality assessment and quality control results. In addition, QAS performs technical system audits (TSA). QMS is responsible for ensuring that CARB meets its federally mandated PQAO responsibilities and provides quality assurance oversight of the PQAO districts.

### CARB Quality Assurance Activities

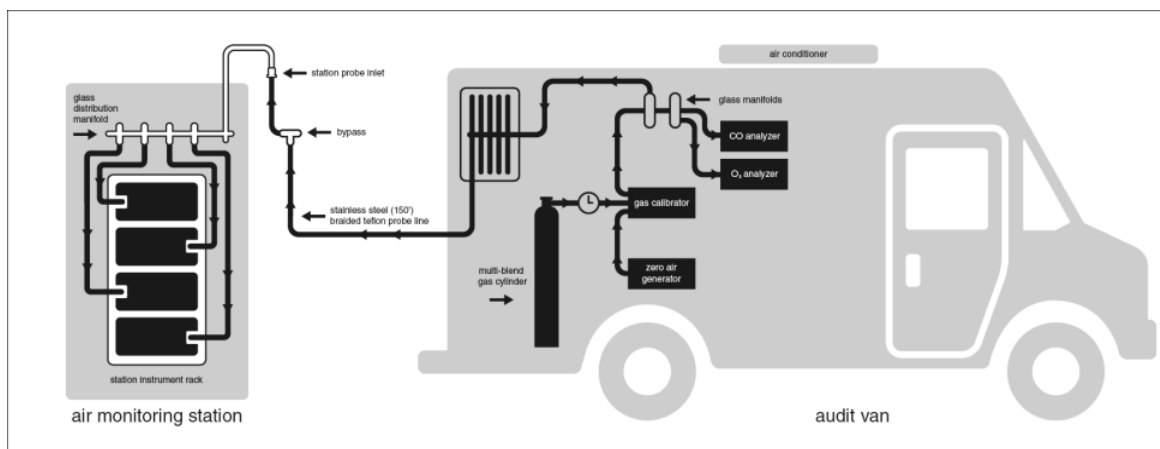
#### Monitoring Station Audits

Annually, QAS conducts through-the-probe (TTP) audits for all continuous gaseous analyzers in the network. TTP audits of the gaseous analyzers, which monitor for CO, NO<sub>2</sub>, H<sub>2</sub>S, SO<sub>2</sub>, and ozone, are conducted in accordance with U.S. EPA requirements (Title 40 CFR Part 58, Appendix A). These audits verify the accuracy of the gaseous analyzers and ensure the integrity of the entire sampling system. For most TTP audits, an audit van is transported by QAS to the ambient air monitoring station. Audit vans house the necessary instrumentation and equipment to allow the audit to be

conducted at the same condition as the station instruments. TTP audits, depicted in Figure 4, are conducted by introducing NIST traceable gases from the van into the station sampling probe inlet at various concentrations. QAS compares the results obtained from the station analyzer to the known values generated in the van.

TTP audit methodology can identify deficiencies caused by poor analyzer response, pollutant scavenging contaminants, and sampling system leaks. Deficiencies like these can cause the gaseous analyzers to fail an audit and possibly affect the quality of the ambient air data.

**Figure 4: Through-the-Probe Audit**



Biannually, QAS determines the accuracy of each particulate matter sampler in the network by comparison of the instrument's flow rate to either a certified orifice or a mass flow meter. These devices are certified against a NIST traceable flow device or calibrator. The audit device is connected in-line with the sampler's flow path and the flow rate is measured while the sampler is operating under normal sampling conditions. The true flow is calculated from the audit device's calibration curve. The sampler's flow is then compared to the true flow and a percent difference is determined for verifying compliance.

QAS also conducts annual audits of meteorological sensors using NIST traceable equipment. Accurate meteorological data are important for characterizing meteorological processes such as transport and diffusion, and to make air quality forecasts and burn-day decisions.

An integral part of a performance audit is conducting a siting evaluation. Stations that meet siting criteria at the time of initial setup may no longer conform due to updated regulations or changes in surrounding conditions and land use. Physical measurements and observations are noted on the site survey or accompanying documentation to determine compliance with 40 CFR Part 58, Appendix E requirements. Many of the siting issues result from the growth of vegetation such as trees infringing on the minimum distance required from probe inlets.

## Laboratory Performance and System Audits

Laboratory mass analysis performance audits are conducted annually by QAS. These audits utilize NIST certified weights, hygrometers, and temperature sensors to verify the accuracy of the laboratory balance, relative humidity, and temperature sensors.

### Technical System Audit

A Technical System Audit (TSA) is an on-site inspection and review of a monitoring organization's entire ambient air monitoring program. CARB conducts TSAs of monitoring organizations within its PQAQO in accordance with U.S. EPA Quality Assurance Guidance Document: Conducting Technical Systems Audits of Ambient Air Monitoring Programs, EPA-454/B-17-004, November 2017. Each local air district within a PQAQO must be audited on a six-year schedule. The entire measurement system is reviewed which includes sample collection, sample analysis, and data processing. TSAs include a review of staff records, procedures, instrumentation, facilities, and documentation to assure compliance with all applicable requirements. Following evaluation of available information, a report is issued which includes a summary of the audit process, and a summary of findings and recommendations to correct any issues identified.

### Quality Assessment and Quality Control

QAS ensures the quality of the data collected by the air monitoring stations operating in California through the analysis of precision data submitted to U.S. EPA's AQS database. Precision checks for gaseous-continuous samplers are required once every two weeks. These precision checks are conducted nightly at CARB and some district operated sites, and weekly or bi-weekly at other district sites. Precision checks for non-continuous, collocated particulate matter samplers are to be performed at least every 12 days. QAS staff analyzes the precision data in accordance with 40 CFR 58, Appendix A.

Air monitoring staff perform a one-point flow rate verification at least once every month on the filter-based and automated PM analyzers. Air monitoring staffs review these data and take corrective action when the results exceed U.S. EPA's requirements. These flow rate verifications are used to assess bias of the automated instruments in accordance with 40 CFR Part 58, Appendix A, 3.2.3. These bias estimates are further verified by the semi-annual flow rate audits that are conducted five to seven months apart in each calendar year. In the course of auditing the PM<sub>2.5</sub> FRM and continuous samplers, the date of the last six months of flow rate and leak checks performed by the air monitoring staff are recorded.

### Identifying and Correcting Deficiencies

During a performance audit, if a parameter fails to meet critical criteria (QA Handbook Volume II, Appendix D) or CARB control limits, an Air Quality Data Action (AQDA)

request is issued to the facility operator. All AQDAs must be investigated by the operator and resolved to bring the parameter in question into compliance. The station operator completes the AQDA by documenting the resolution, specifying the time period during which data were potentially affected, and recommending whether the data are to be released, corrected, or invalidated. QMB reviews the completed AQDA and discusses any concerns with the operator. A finalized copy of the AQDA is forwarded to the operator and CARB's Air Quality Analysis Section. Other issues identified as systematic or operational criteria that may impact or potentially impact data quality are documented through the issuance of a Corrective Action Notification (CAN).

## Audit Report Summary

Information about each air monitoring station audited by QMB is available at <https://ww2.arb.ca.gov/applications/quality-assurance-air-monitoring-site-list-generator-1>. This web page provides the map location, latitude and longitude coordinates, site photos, the pollutants monitored, along with a detailed site survey of the instrumentation and physical parameters for each site.

The 2021 calendar year audit dates for both the gaseous analyzers and PM monitors and residence time for each gas analyzer operating at the monitoring sites covered in this report are provided in the detailed site tables in Appendix A. Audit results are directly submitted to AQS quarterly per Appendix A of 40 CFR Part 58. Notably for 2021, the audit program was fully functional while operating under travel restrictions and safety protocol imposed during the pandemic. Following the guidance on priorities from the March 26, 2020 U.S. EPA memo, the program was able to audit all required monitors, including semi-annual assessments of PM monitors. Nearly all PM assessments met the criteria of being five to seven months apart.

In addition, as required by 40 CFR Part 58.15, CARB submits a data certification letter along with the required AQS reports (AMP450NC and AMP600) to U.S.EPA annually. The most recent certification letter was sent to the U.S. EPA on June 21, 2021.

## **Section 8: Proposed and Recently Implemented Monitoring Site Changes**

CARB utilizes the annual network plan process to document and provide the public opportunities to comment on any proposed changes to the monitoring network. Any received comments are formally addressed via letters and are documented in the network plan. The network plan is submitted to the U.S. EPA annually for formal approval of all network modifications.

Table 29 lists the proposed and recently implemented monitoring site changes that CARB is currently aware of in the areas covered by this ANP.

### **Ambient Air Monitoring Priorities During Covid-19 Response**

Due to the statewide stay-at-home order in March 2020, CARB was forced to reduce or discontinue its filter-based monitoring operations during the COVID-19 response. All operations were implemented with personnel health and safety requirements following recommendations from the California Department of Public Health and Center for Disease Control guidelines.

In early December 2020, a new statewide stay-at-home order required CARB to further reduce its operations. CARB's air monitoring laboratory support was limited to only 3 sites (Bakersfield–California, Bakersfield–Southeast Planz, and Portola), which were deemed critical for area designations. CARB worked closely with the U.S. EPA and local agencies to inform them of the situation and the potential impacts. In February 2021, CARB received approval to resume its air monitoring operations for all programs at all sites.

**Table 29: Proposed and Recently Implemented Changes to the Sites in the CARB ANP**

District	Site (AQS ID)	Comment
Antelope Valley AQMD	Divisions St (060339033)	Antelope Valley AQMD stopped collecting CO data effective 1/1/2022 relying on South Coast AQMD shared CBSA site. Additionally, the Antelope Valley AQMD is planning to move the location of the site to the recently relocated District office location sometime in 2022-23 timeframe.
Butte County APCD	Paradise-Theater (060072002); Paradise-Airport (060070007)	CARB is planning to consolidate the two Paradise monitoring stations to a single new location due to the potential demolition of the Theater building. The new site will be located at 5913 Clark Road. Lease negotiations are underway and site improvements have begun.
Colusa County APCD	Colusa-Sunrise (060111002)	The PM <sub>2.5</sub> FRM was converted to FEM BAM-1022 in December 2020 shortly after the lab shutdown*. The BAM-1022 was then replaced by a BAM-1020 on 6/28/2021.
Eastern Kern APCD	Mojave (060290011)	The Mojave site is still at its temporary location behind the Kern County Sheriff's Department in Mojave. Currently, the plan is to move the site to a permanent spot located at 3200 Pat Avenue in Mojave.
El Dorado APCD	Placerville (060170010)	CARB is currently working to move the CARB operated Placerville-Gold Nugget station to El Dorado High School property. Lease negotiations were finalized in April 2022. CARB staff will begin building the station.
Feather River AQMD	Yuba City (061010003)	CARB installed a collocated PM <sub>2.5</sub> FEM BAM-1020 in March 2021 to meet PQAO continuous collocation requirements.
Imperial County APCD	El Centro-9 <sup>th</sup> Street (060251003)	BAM-1022 PM <sub>2.5</sub> installed at location in November 2021. R&P 2025 PM <sub>2.5</sub> shut down on January 18, 2022.
	Brawley-Main Street (060250007)	R&P 2025 PM <sub>2.5</sub> shut down on May 27, 2021. BAM-1022 PM <sub>2.5</sub> installed at location in June 2021.
Lake County AQMD	Anderson Springs (060333010); Glenbrook (060333011)	The Lake County AQMD has discontinued PM <sub>10</sub> monitoring at these locations starting 1/1/2022.
	Lakeport (060333002)	District is working with U.S. EPA to resolve District staffing and funding issues, as well as identifying equipment options for PM <sub>10</sub> and PM <sub>2.5</sub> to resolve the sampling frequency concerns.
Mendocino County AQMD	Willits-Justice Center (060452002)	District relocated its PM <sub>2.5</sub> site from Willits -Justice Center to Willits - Blosser Lane. The monitoring start date at the new site was February 5, 2021.

District	Site (AQS ID)	Comment
Northern Sierra AQMD	Grass Valley (060570005)	District shut down the collocated PM <sub>2.5</sub> FRM monitor in August 2021; this change does not require U.S. EPA approval.
	White Cloud Mountain (060570007)	Monitoring site is no longer available due to shelter and power issues. CARB is currently in the process of requesting U.S. EPA 's approval to close the site and establish a new site in the area.
Shasta County APCD	Anderson-North Street (060890007); Shasta Lake-La Mesa (060890008)	District got approval from U.S. EPA to discontinue the PM <sub>10</sub> monitors at the Anderson and Shasta Lake sites.
	Redding-Health Department (060890004)	The BAM-1022 is now the primary monitor, the PM <sub>2.5</sub> FRM has been changed to a 1:12 day sampling schedule.
CARB	Calexico (060250005); Chico (060070008); Modesto (060990005); Stockton (060771003).	CARB is working with EPA to close CO monitors at Calexico, Chico, Modesto, and Stockton.

\* The lab shutdown filter processing 12/7/2020. With the exception of Bakersfield CA St., Bakersfield Planz and Portola, the lab resumed operations on 4/1/2021.

CARB operates multiple sites in districts that are not covered by this ANP. Table 30 lists proposed and recently implemented changes to the CARB operated sites in Sacramento Metro AQMD and San Joaquin Valley APCD. For more detailed information of changes in these districts, please see the individual district plans.

**Table 30: Proposed and Recently Implemented Changes to the CARB Operated Sites in the Other District ANPs**

District	Site (AQS ID)	Comment
San Joaquin Valley APCD	Stockton-Hazelton (060771002)	Due to site demolition, the Stockton-Hazelton site was permanently closed down Nov 2021
	Stockton-University Park (060771003)	Due to the Stockton-Hazelton site closure, the Stockton-University Park site was installed and online Nov 2021.

## Section 9: Network Information Resources

While this ANP includes a great deal of information about the ambient air quality monitoring network, much more information, including summaries of the pollutant data from the monitors around the State is readily available on the web. This section lists a number of additional sources of such information. Also listed is contact information for the agencies responsible for the monitoring covered in this report.

CARB's Monitoring and Laboratory Division (MLD) maintains web pages with information about all the existing monitoring sites that routinely monitor and submit air quality data in California. The pages also include detailed local maps showing the location of the sites. This information can be found at

<https://ww2.arb.ca.gov/applications/quality-assurance-air-monitoring-site-search-1>. A more general MLD web page that provides links to other aspects of ambient monitoring is located at

<https://ww2.arb.ca.gov/our-work/programs/ambient-air-monitoring-regulatory>

Summaries of the official air quality data from sites around the State can be found at <http://www.arb.ca.gov/adam/welcome.html>. Summaries of the most recent preliminary data can be viewed at: <http://www.arb.ca.gov/aqmis2/aqmis2.php>. These last two sources of information are maintained by CARB staff of the Air Quality Planning and Science Division, as is the following more general web page that lists links to other aspects of the ambient air quality data program: <http://www.arb.ca.gov/html/ds.htm>.

## Agency contacts for CARB

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