

**Annual Report  
on the  
California Air Resources Board's  
Fine Particulate Matter Monitoring Program**



January 2018



State of California  
California Environmental Protection Agency  
California Air Resources Board

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This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the California Air Resources Board, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

### California's PM2.5 monitoring network includes:

- Federally-approved monitors that measure PM2.5 mass over a 24-hour period currently located at 59 sites throughout the state;



**Federal Reference Method  
monitor**

Health and Safety Code, Section 39619.5(g) requires the California Air Resources Board (CARB) to provide an update each year on the status and results of the fine particulate matter (PM2.5) monitoring program. This report provides a summary of PM2.5 monitoring activities in 2017 and how the data are being used to support CARB programs.

California's PM2.5 air quality monitoring program provides information used for determining which areas violate PM2.5 standards, characterizing the sources that contribute to PM2.5 pollution, determining background concentrations, assessing pollution transport, and supporting health studies and other research. Monitoring data also provide information to develop and evaluate programs for improving air quality.

California's PM2.5 monitoring network began collecting data in 1998. A number of different types of PM2.5 monitors are operated to provide information on PM2.5 mass and chemical composition which are summarized below. Types and numbers of the PM2.5 monitors vary each year. Figure 1 displays the locations of PM2.5 monitors throughout the State as of the end of 2017. Additional information on PM2.5 monitoring can be found at:

<https://www.arb.ca.gov/aaqm/partic.htm>

### **Federal Reference Method Monitors**

The installation of federally-approved PM2.5 mass monitors throughout California began in 1998. As of the end of 2017, Federal Reference Method (FRM) monitors are operated at 59 sites. These monitors collect particulate samples on filters, which are later weighed and analyzed in a laboratory. Because of this two-step process, PM2.5 air quality data collected with these monitors are not immediately available. To provide "real-time" PM2.5 air quality information, continuous PM2.5 mass monitors were added to our network.

### **Continuous Mass Monitors**

Continuous PM2.5 mass monitors provide valuable information for public reporting, temporal representation,

- Samplers that quantify PM2.5 mass continuously at 108 sites;



Beta Attenuation Monitor

and

- Monitors that collect PM2.5 samples for analysis of chemical components at 18 sites.



Speciation monitor

health studies, transport studies, and background monitoring. PM2.5 mass can be measured continuously with several different commercially available technologies. We chose the Beta Attenuation Monitor (BAM) for use in California and several other types of continuous monitors (e.g., laser light scattering monitor) in limited use. There are 108 sites continuously measuring PM2.5 mass. The U.S. Environmental Protection Agency (U.S. EPA) designated certain models of the continuous monitors as Federal Equivalent Method (FEM) monitors. They are considered equivalent to the FRM monitors and therefore may be used to determine compliance with federal standards. Sixty-two of California’s continuous monitoring sites have FEM monitors.

### Speciation Monitors

Another major stage of network implementation is the deployment of PM2.5 speciation monitors. Speciation monitoring provides valuable information about the composition, and ultimately, the sources of PM2.5 pollution. However, monitoring of the individual species that make up PM is still an emerging field, with continuous speciation measurements the greatest challenge. We continue to evaluate newly emerging methods not currently used in routine monitoring for potential incorporation in California’s PM2.5 monitoring network.

In 2014, along with states, U.S. EPA conducted a nationwide assessment of the PM2.5 speciation network to determine whether the sites were meeting the objectives and still needed. The review determined that all of the sites in California were needed and should continue to operate.

### Federally-Required Speciation Monitors

There are two components to the PM2.5 speciation network in California. The first component, mandated by the U.S. EPA, requires filter-based PM2.5 speciation monitoring at seven California sites that are now part of a national trends network for PM2.5 speciation. These monitors are the National Air Monitoring Stations (NAMS) monitors for the speciation network. The seven PM2.5 speciation monitors are located in Bakersfield, El Cajon,

Fresno, Sacramento, San Jose, Los Angeles, and Riverside.

**Additional Speciation Monitors**

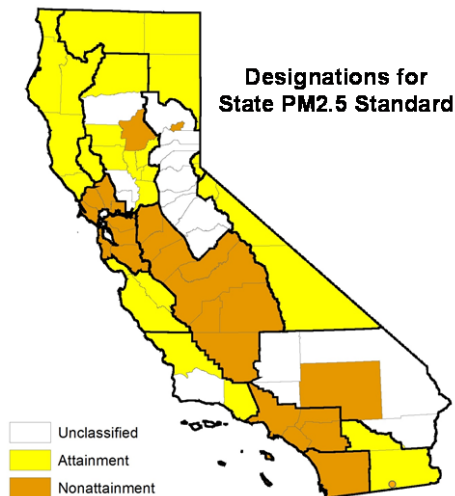
The second component of California’s PM2.5 speciation network is the deployment of samplers at selected State and Local Air Monitoring Stations (SLAMS). Data from these sites provide additional information needed for developing effective air quality attainment plans. The focus of the SLAMS PM2.5 speciation network is to enhance the spatial coverage of the NAMS sites, particularly in areas with elevated PM levels.

CARB and local air districts operate filter-based speciation monitors at eleven sites - Anaheim, Calexico, Chico, Fontana, Modesto, Portola, Visalia, Sacramento, Vallejo, Livermore, and Oakland.

In 2007, CARB began monitoring for specific wood smoke tracers to determine the contribution of wood burning sources to PM2.5 ambient levels. Wood smoke tracers are being monitored at six of the speciation SLAMS sites - Calexico, Chico, Modesto, Portola, Sacramento, and Visalia during the winter season.

State and National PM2.5 Ambient Air Quality Standards (micrograms per cubic meter)

	California	National
Annual	12	12.0
24-hour	---	35



**Accessing PM2.5 Data**

Data collected as part of California’s PM2.5 monitoring program can be obtained in several ways. Daily PM2.5 values as well as summary statistics can be accessed through the interactive query program on CARB’s web page at:

<https://www.arb.ca.gov/adam>

Real-time hourly PM2.5 data from California’s continuous monitors can also be found at:

<https://www.arb.ca.gov/aqmis2/aqdselect.php>

### PM2.5 Designations

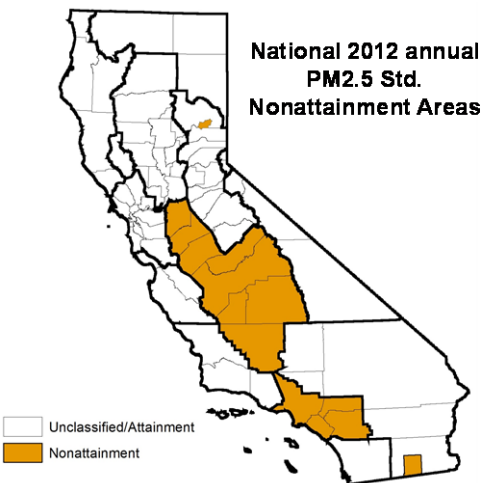
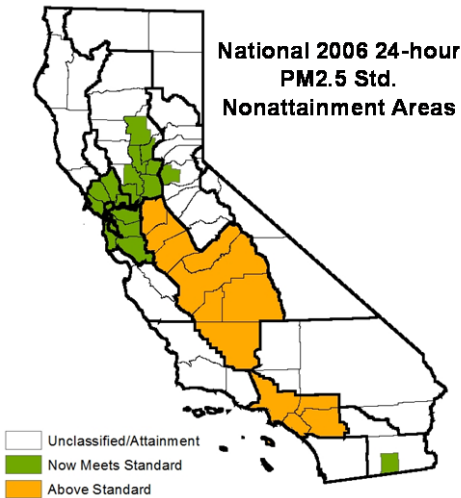
The Clean Air Act requires the U.S. EPA to set national 24-hour and annual PM2.5 ambient air quality standards, and to designate nonattainment area for the national standards. CARB established a more health protective State PM2.5 ambient air quality standard as required by California State law. California State law also requires CARB to designate each area as attainment, nonattainment, or unclassified for the State standard.

Based on data collected as part of California’s PM2.5 monitoring network, CARB designates the attainment status of areas with respect to the State annual average PM2.5 ambient air quality standard of 12 µg/m<sup>3</sup>. Based on 2013-2015 air quality data, there were no changes to any area’s PM2.5 attainment status. Most urban areas of California exceed the State PM2.5 standard, as well as several more isolated sub-areas. However, overall, as air quality has improved more areas now meet the State PM2.5 ambient air quality standard.

In 2006, U.S. EPA strengthened the national 24-hour PM2.5 standard from 65 µg/m<sup>3</sup> to 35 µg/m<sup>3</sup>. The U.S. EPA issued final designations for this standard which became effective in December 2009. Seven areas in California were designated as not meeting the strengthened federal 24-hour PM2.5 standard – the South Coast Air Basin, San Joaquin Valley Air Basin, Bay Area Air Basin, Sacramento Metropolitan area, a portion of the Feather River Air Pollution Control District, a portion of Butte County, and a portion of Imperial County. Since 2009, U.S. EPA has determined that the Bay Area Air Basin, the Feather River Air Pollution Control District, Sacramento Metropolitan area, Imperial County, and Butte County have attained the standard. Information on the final designation may be found at:

<https://www3.epa.gov/region9/air/actions/ca.html>

In 2012, U.S. EPA lowered the annual PM2.5 standard from 15.0 µg/m<sup>3</sup> to 12.0 µg/m<sup>3</sup>. The U.S. EPA issued final designations for this standard in December 2014 based on 2011-2013 air quality data. Four areas in California were designated as not meeting the lowered annual PM2.5 standard – South Coast Air Basin, San Joaquin Valley Air





Basin, and portions of Imperial and Plumas Counties. Information on the State and federal designations may be found at:

<https://www.arb.ca.gov/desig/pm25desig/pm25desig.htm>

### **PM2.5 Attainment Plans**

Progress in reducing PM2.5 levels has occurred throughout the State. As shown in the maps on the previous page, four areas now remain above the standards and are developing State Implementation Plans (SIPs). The South Coast SIP for the 24-hour standard was submitted to U.S. EPA in final form in 2015. The South Coast 2016 Air Quality Management Plan (2016 AQMP) includes a comprehensive approach for attaining multiple PM2.5 air quality standards, including the 12 µg/m<sup>3</sup> annual standard. The San Joaquin Valley prepared a SIP in 2012 to meet the 24-hour standard. The San Joaquin Valley is preparing an integrated plan starting in late 2017 detailing an attainment approach for multiple PM2.5 standards. The Imperial County Air Pollution Control District will be submitting the annual PM2.5 SIP for the Imperial County nonattainment area in 2018. The Plumas County SIP for the annual PM2.5 standard was submitted to U.S. EPA in 2017.

Information on SIPs for the South Coast, the San Joaquin Valley, Imperial County, and Plumas County are available, respectively, at:

<https://www.arb.ca.gov/planning/sip/planarea/scabsip/scabsip.htm>

<https://www.arb.ca.gov/planning/sip/planarea/sanjqnvllysip.htm>

<https://www.arb.ca.gov/planning/sip/planarea/imperial/imperialsip.htm>

<https://www.arb.ca.gov/planning/sip/planarea/nsierra/nsierr.htm>

Figure 1: PM2.5 Monitoring Stations in California

