

**2005 Annual Report  
on the  
Air Resources Board's  
Fine Particulate Matter Monitoring Program**



January 2006



California Environmental Protection Agency

**Air Resources Board**

State of California  
California Environmental Protection Agency  
Air Resources Board

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Fine Particulate Matter Monitoring Program**

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

- Federally-approved monitors that measure PM2.5 mass over a 24-hour period at 81 sites;



Health and Safety Code 39619.5 requires the Air Resources Board (ARB) to provide an update by January 1 of 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 2005 and how the data are being used to support ARB programs.

California's PM2.5 air quality monitoring program provides information used for determining which areas violate standards, characterizing the sources that contribute to pollution, determining background concentrations, assessing pollution transport, and supporting health studies and other research. Monitoring data also provide information on how effective our programs are in 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. Figure 1 displays the locations of PM2.5 monitors throughout the State. Additional information on the PM2.5 monitoring network can be found at:

<http://www.arb.ca.gov/aqd/pm25/pmfdsign.htm>

### Federal Reference Monitors

The installation of federally-approved PM2.5 mass monitors at 81 sites throughout California began in 1998 and was completed in 2000. 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, we added continuous PM2.5 mass monitors to our network.

### Continuous Mass Monitors

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

- Samplers that quantify PM2.5 mass continuously at 50 sites;



and

- Monitors that collect PM2.5 samples for analysis of chemical components at 17 sites.



California and have installed monitors at approximately 50 sites.

### **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 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. To develop the best speciation network, California will need to take full advantage of emerging technologies. We are evaluating newly emerging methods not currently used in routine monitoring and working with manufacturers to improve these technologies.

### **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, required 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. Siting of the seven PM2.5 speciation monitors in Bakersfield, El Cajon, Fresno, Sacramento, San Jose, Riverside, and Simi Valley was completed in January 2002.

### **Additional Speciation Monitors**

The second component of California's PM2.5 speciation network is the selection and deployment of samplers at selected State and Local Air Monitoring Stations (SLAMS). Data from these sites will 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 in areas with a diversity of PM problems.

ARB and the air districts have deployed filter-based speciation monitors at ten sites - Anaheim, Calexico, Chico, Fontana, Escondido, Los Angeles, Modesto, Portola, Sacramento, and Visalia. To complete the SLAMS

### Ultrafine particle monitoring network

In support of the Children's Health Study, we deployed ultrafine particle counters in 12 Southern California communities.



Ultrafine Particle Sampler

### Fresno Supersite



Conducted Intensive monitoring to compare and evaluate different emerging sampling methods that ultimately may advance our ability to investigate exposure to PM<sub>2.5</sub> and associated health effects.

speciation network, we are also evaluating various continuous sampling technologies.

### Ultrafine Particle Counter Network

In support of the Children's Health Study, we deployed and operated from 2002 through mid-2004 a network of ultrafine particle counters in Southern California including: Los Angeles County (Lancaster, Glendora, and Long Beach), Riverside County (Lake Elsinore, Mira Loma, and Riverside), San Bernardino County (Lake Arrowhead and Upland), Santa Barbara County (Santa Maria and Lompoc), San Luis Obispo County (Atascadero), and San Diego (Alpine) County. We are now evaluating the data collected. Ultrafine particles - particles that are less than 100 nanometers in diameter - are usually present in high numbers and due to their small size can be especially harmful to human health. They are emitted by common combustion sources such as cars, trucks, buses and power plants. Data from this monitoring effort will provide new insights into the impact of particulate matter (PM) on children's health and into approaches to effectively reduce the levels of all sizes of particles in community air.

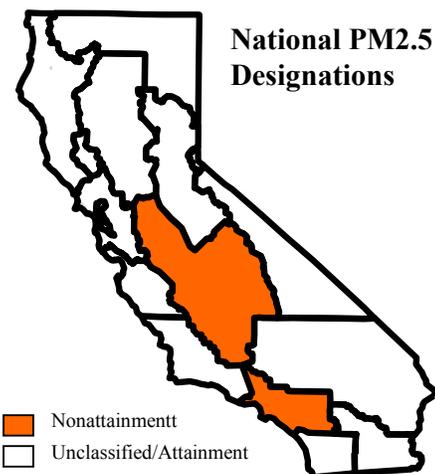
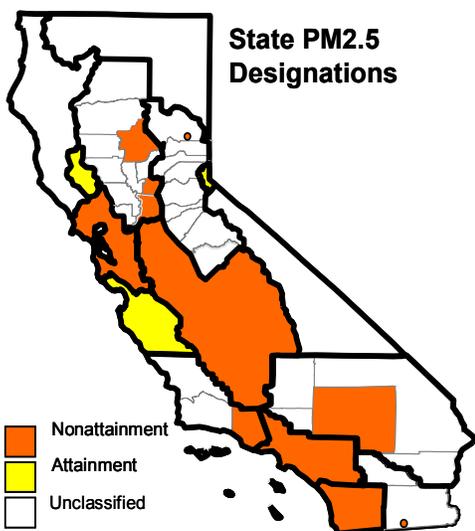
### Fresno PM Supersite

The U.S. EPA sponsored the Supersite program from 1999 to 2005 to better understand PM measurement technologies, source contributions, and health effects. The program included the operation of research-grade air monitoring stations in seven U.S. cities, including two in California, Fresno and Los Angeles. The ARB participated in the operation of the Fresno site, where intensive monitoring was conducted from 1999 through 2003. Data obtained are now being evaluated and analyzed. The results will help us determine which of the tested methods to include in future PM monitoring field studies or to even integrate into the routine monitoring network.

**State and National PM2.5 Ambient Air Quality Standards**

	California	National
Annual	12	15
24-hour	---	65

The levels of the standards are expressed in micrograms per cubic meter.



**Accessing PM2.5 Data**

Data collected as part of California’s PM2.5 monitoring program can be obtained through a number of means. Daily PM2.5 values as well as summary statistics can be accessed through the interactive query program on ARB’s web page at:

<http://www.arb.ca.gov/adam/welcome.html>

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

<http://www.arb.ca.gov/agmis2/pagdselect.php>

In addition, the annual California Almanac of Emissions and Air Quality now includes a five-year summary of PM2.5 air quality data which is available at:

<http://www.arb.ca.gov/agd/almanac/almanac.htm>

**PM2.5 Designations**

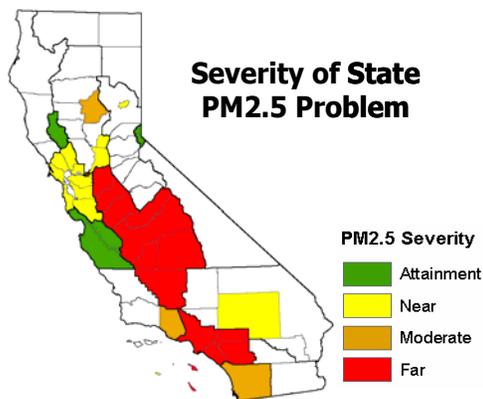
Based on data collected as part of California’s PM2.5 monitoring network, in 2005 the ARB designated areas as attaining or not attaining the State PM2.5 ambient air quality standard. All major urban areas of California exceed the State PM2.5 standard, as well as several more isolated sub-areas. Information on the 2005 designations can be found at:

<http://www.arb.ca.gov/regact/area05/area05.htm>

ARB will be updating the designations in early 2006.

The ARB also identified areas that do not meet the national PM2.5 standards and proposed designations to the U.S. Environmental Protection Agency (U.S. EPA) in 2004. The U.S. EPA issued final designations which became effective in April 2005. Two areas in California do not meet the federal standards – the San Joaquin Valley Air Basin, and the South Coast Air Basin. These areas must submit State Implementation Plans in early 2008, with attainment of the federal standards by 2015. Information on the federal designations can be found at:

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



The nature and severity of the PM2.5 problem varies substantially by region.

### **Characterization of Ambient PM10 and PM2.5 in California**

To characterize the nature, severity, and possible sources leading to the PM problem in each of the thirty-five air districts in the State, we analyzed the extensive information currently available from the monitoring networks for PM2.5 and PM10 (particles with a diameter of 10 microns and smaller, that includes the subset of PM2.5), as well as information from special studies conducted in California. The resulting technical report assisted air districts in their implementation of Senate Bill SB656 (SB 656), Sher, 2003.

SB 656 establishes a process for achieving near-term reductions in PM10 and PM2.5 throughout California, especially in those areas that do not have national planning requirements, to make progress towards attaining the State PM standards. SB 656 required the ARB to adopt a list of readily available, feasible, and cost-effective measures that air districts can use to address their PM problem. ARB adopted the list in November, 2004. Air districts were then to adopt implementation schedules for a subset of these measures based on the nature and severity of their PM problem.

ARB's technical report describing the characteristics of PM10 and PM2.5 in each of California's thirty-five air districts by air basin is available at:

<http://www.arb.ca.gov/pm/pm.htm>

Figure 1: PM2.5 Monitoring Stations in California

