

DRAFT

Procedure for Designating an Area with Respect to the State Particulate Matter Standards (PM10 and PM2.5)

Introduction

In June 2002, the Air Resources Board (ARB, Board) established a new State annual standard for particulate matter with a diameter of 2.5 microns or less (PM2.5) and lowered the level of the existing State annual standard for particulate matter with a diameter of 10 microns and smaller (PM10). In addition, the ARB revised the averaging method for the State annual PM10 standard from an annual geometric mean to an annual arithmetic mean. The annual arithmetic mean also applies to the State PM2.5 standard. These standards became effective July 5, 2003. The Board also approved a list of PM10 and PM2.5 samplers that, for the first time, includes continuous monitors for use in determining compliance with particulate matter (PM) standards. This document describes the procedure we will follow for designating areas with respect to the State new PM2.5 and revised PM10 standards.

Background

State ambient air quality standards for particulate matter consist of three elements – the pollutant, the averaging time, and the level or concentration not to be exceeded. When a measured PM concentration averaged over the specified averaging time period is above the level of the standard, the area experiences an “exceedance” of the standard. Whether or not an exceedance is identified as a “violation” is determined through the attainment test. The attainment test is not established as part of the standard setting process, but as part of the State area designation process.

Table 1 shows each of the current State PM standards, with the levels expressed as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Table 1: Comparison of State PM Standards

Standard	PM10		PM2.5
Averaging Time	24 hour	Annual	Annual
Level	50 µg/m ³	20 µg/m ³	12 µg/m ³
Attainment Test	<ul style="list-style-type: none"> Identify the highest 24-hour concentration in an area in the previous three years that is not excluded as an extreme, exceptional, or unusual concentration event. Extreme concentration events are identified through a statistical calculation. Compare to the level of the standard. 	<ul style="list-style-type: none"> Calculate the arithmetic annual average concentrations for the previous three years. The annual average is calculated as an average of quarters¹. Compare to the level of the standard. 	<ul style="list-style-type: none"> Calculate the arithmetic annual average concentrations for the previous three years. The annual average is calculated as an average of quarters¹. Compare to the level of the standard.

1. Extreme concentration, exceptional, or unusual events do not generally significantly influence the annual average. However, their exclusion can be considered on a case-by-case basis.

State Area Designations

Section 39608 of the Health and Safety Code requires ARB to establish and annually review area designations for the State standards. These designations are intended to notify the public about air quality in the areas where they live, work, play, or travel. This is accomplished by designating areas as nonattainment, attainment, and unclassified. The nonattainment designation identifies a region with unhealthy air. There is a subcategory of the nonattainment designation called nonattainment–transitional that only applies to the 24-hour PM10 standard. Areas that are making progress towards attainment of this standard are designated as nonattainment-transitional. Areas with adequate PM monitoring data that do not violate the standards are considered to have healthful air and are designated as attainment. Areas without adequate PM monitoring data are designated as unclassified.

Process to Identify Nonattainment and Attainment Areas

Area designations are based on air quality data measured at each monitoring site within the area under consideration. California approved samplers used at PM monitoring sites include the PM10 and PM2.5 Federal Reference Methods (FRMs) and a series of continuous PM samplers. FRMs provide filter-based 24-hour measurements of ambient PM concentrations, while continuous monitors provide hourly measurements of PM concentrations. The list of approved PM

monitors, methods, and samplers is provided in section 70100, title 17, California Code of Regulations (CCR). Because the Board approved multiple monitors during the standard setting process, the data used for designations will represent the highest value from any approved monitor operating at a site. Therefore, designation values may be based on data from different types of monitors at different sites. Moreover, in some cases, the 24-hour PM10 and the annual average PM10 designation values may be derived from two different monitors at the same site.

In determining the 2003 area designations, we used district- and ARB-collected data on ambient PM concentrations from 2000 to 2002 from each of the PM monitoring sites across California. This included data from over 180 PM10 FRMs, over 110 PM2.5 FRMs, and approximately 15 PM2.5 continuous samplers. Since the installation of PM10 continuous California approved samplers started only recently, no continuous PM10 data were used.

The monitoring methods adopted simultaneously with the new State PM standards require that PM concentrations be reported at local temperature and pressure conditions. In contrast, previous monitoring methods required PM10 concentrations to be reported under standard temperature and pressure conditions (25°C and 760 torr). Because of the transition period between monitoring methods, data under local conditions are not available for all sites at this time. Therefore, we combined standard and local condition data for area designations, with a case-by-case review for those sites with designation values near the level of the standard.

To determine which air quality monitors either attain or do not attain the PM standards, we conducted the analysis described below. We analyzed the data from each monitor separately; data are not combined from different monitors located at the same site.

A. Annual PM Standards

1. We evaluated the data for representativeness as described in Appendix 1 to CCR, title 17, sections 70300 through 70306. The specific representativeness criteria differ for continuous samplers and 24-hour samplers. The State representativeness and completeness criteria are different from the federal criteria and are more stringent. In general, the State criteria consider an air quality statistic to be representative if at least 75 percent of each of the short-term values required to represent the averaging time of the standard are available.

- A representative annual statistic must have four representative quarters. All measurements collected at a site are included in the annual average.

- A quarter is considered representative if it includes three representative months.
- A month is representative when it includes data for 75 percent of the scheduled sampling days: For example, if FRM sampling is scheduled every sixth day, in a 31 day month 5 or 6 samples are expected, depending on which day of the month sampling starts. Therefore, a minimum of 4 or 5 samples, respectively, would make a representative month. Continuous samplers provide data to estimate 24-hour daily average PM concentrations. In this case at least 23 daily averages constitute a representative month (75% of 31 days).
- A day is representative if there is 75% completeness within each of the three 8-hour periods of the day. Each representative day includes a minimum of 18 hourly samples, with at least 6 samples in each of the three periods (12 a.m. until 8 a.m., 8 a.m. until 4 p.m., and 4 p.m. until 12 a.m.) and no more than two consecutive hourly measurements missing.

2. For each California approved sampler, we calculated the annual average PM concentrations for 2000, 2001, and 2002. The annual average is a simple average of the quarterly averages. This approach is consistent with the federal method described in Appendix N to Code of Federal Regulations (CFR), Title 49, Chapter I, Part 50 for filter-based FRM data. For continuous data, we first calculated 24-hour average values. Then, we estimated quarterly averages from the 24-hour values. Finally, we averaged the quarterly estimates. The procedure is described below:

- We entered monitoring data into a computer database maintaining one decimal place more than the concentration specified in the standard. For example, the annual PM_{2.5} standard is 12 $\mu\text{g}/\text{m}^3$, so hourly values in the database are truncated at xx.x $\mu\text{g}/\text{m}^3$.
- We calculated 24-hour averages using midnight to midnight hourly data sampled with continuous monitors. This is consistent with filter-based FRM samplers which collect 24-hour samples from midnight to midnight.
- When calculating quarterly and annual averages, we maintained all available digits and decimal places.
- We then rounded the annual averages to the nearest integer. For example, 12.49 $\mu\text{g}/\text{m}^3$ rounds down to 12 $\mu\text{g}/\text{m}^3$ and 12.50 $\mu\text{g}/\text{m}^3$ rounds up to 13 $\mu\text{g}/\text{m}^3$.

3. Finally, we compared each annual average to the level of the corresponding annual PM standard:

Nonattainment

- An area is nonattainment for the State annual **PM2.5** standard if the calculated representative PM2.5 annual concentration at any site during any of the three years is $13 \mu\text{g}/\text{m}^3$ or higher.
- An area is nonattainment for the State annual **PM10** standard if the calculated representative annual PM10 concentration at any site during any of the three years is $21 \mu\text{g}/\text{m}^3$ or higher.

Attainment

An area is attainment for the State annual **PM2.5** standard if:

- The calculated maximum representative annual PM2.5 concentration for any site in the area during each of the three years is equal to or less than $12 \mu\text{g}/\text{m}^3$, or
- The calculated annual PM2.5 concentrations are representative for only two years and the maximum concentration for any site in the area is equal to or less than $9 \mu\text{g}/\text{m}^3$ (less than three-fourths of the level of the standard), or
- The calculated annual PM2.5 concentrations are representative for only one year and the maximum concentration at any site is equal to or less than $6 \mu\text{g}/\text{m}^3$ (less than one-half of the level of the standard).

An area is attainment for the annual average **PM10** standard if:

- The calculated maximum representative annual PM10 concentration for any site in the area during each of the three years is equal to or less than $20 \mu\text{g}/\text{m}^3$, or
- The calculated annual PM10 concentrations are representative for only two years and the maximum concentration for any site in the area is equal to or less than $15 \mu\text{g}/\text{m}^3$ (less than three-fourths of the level of the standard), or
- The calculated annual PM10 concentrations are representative for only one year and the maximum concentration at any site is equal to or less than $10 \mu\text{g}/\text{m}^3$ (less than one-half of the level of the standard).

B. 24-Hour PM10 Standard

The 24-hour State PM10 standard remains the same. The procedures for designating areas as attainment and nonattainment basically remain unchanged. However, as we do for the annual average PM10 standard, we now equally analyze PM10 data collected at the primary PM10 FRM and at all collocated PM10 FRMs operating at each monitoring site. The Board approved list of PM10 monitors now also includes continuous samplers for use in determining compliance with State PM10 standards. When these continuous data become available, we will consider data from multiple monitors for determining area designations, as we do for the State annual PM2.5 standard. In contrast to the

annual average, data identified as affected by highly irregular or infrequent events (extreme concentration, exceptional, and unusual concentration events) are excluded from the dataset before comparing concentrations to the State 24-hour standard (refer to Appendix 2 to CCR, title 17, sections 70300 through 70306). In identifying data affected by highly irregular or infrequent events, we consider data from each monitor separately. In other words, data from different monitors at the same site are not “mixed and matched.”

Criteria for Establishing Area Designation Boundaries

The area designation criteria (CCR title 17, section 70302) specify that the geographic extent of designated areas for PM10 and PM2.5 will be an air basin. However, these criteria allow the State to consider factors such as air quality data, meteorology, topography, or the distribution of population or emissions in determining areas smaller than an air basin.

In determining appropriate boundaries for designated areas, we considered geography and meteorology, the extent of urban areas, transportation corridors, the location of emission sources, and existing political jurisdictions. The resulting areas consider the following broad principles.

PM10 Designation Areas

- Retain the same boundaries as the existing PM10 attainment and nonattainment areas. These are primarily air basins, with exceptions in the Mountain Counties Air Basin (MCAB), where counties and the Yosemite National Park constitute smaller nonattainment areas. The split of the MCAB is based on the distinct effects that possible pollutant transport from the Sacramento and San Joaquin valleys may have on the western portions of many of these counties due to the MCAB’s topography and meteorology. The Yosemite National Park is a distinct nonattainment area based on supplemental air quality data and unique topography and meteorology.

PM2.5 Designation Areas

- Designate air basin where appropriate.
- Designate smaller areas within the air basin when significant differences among the areas exist. Differences might include topography, the extent of urban areas, transportation corridors, and location of emission sources. Boundaries would be based on county or air district boundaries or pre-existing State and federal nonattainment area boundaries for related pollutants (e.g., ozone).