Chapter 4

Classification and Attainment

2015 Plan for the 1997 PM2.5 Standard
SJVUAPCD

This page intentionally blank.

Chapter 4: Classification and Attainment

Until the exceptional weather conditions experienced due to the recent drought, the San Joaquin Valley (Valley) was on track to attain the 1997 annual PM2.5 standard before the federally mandated deadline of December 2014. As discussed earlier in Chapter 1 and Appendix F, the Valley was on the verge of attaining the 1997 federal PM2.5 national ambient air quality standard (15 µg/m^3 for annual, 65 µg/m^3 for 24-hour) with an average annual concentration of 14.7 µg/m^3 and average 24-hour concentration of 56.4 µg/m^3 in 2012 at the Valley's historic peak PM2.5 sites in Bakersfield. The San Joaquin Valley Air Pollution Control District's (District's) *2008 PM2.5 Plan* satisfied all federal implementation requirements for the 1997 PM2.5 standard at the time of adoption and demonstrated attainment based on projected 2012-2014 PM2.5 levels. All emission reduction commitments under that plan have been fulfilled. Due to the extreme drought, stagnation, strong inversions, and historically dry conditions experienced over the winter of 2013-2014, analysis showed that the Valley could not reach attainment even if the Valley experienced zero PM2.5 pollution for the last three quarters of 2014. Since the U.S. Environmental Protection Agency's (EPA) policy does not allow for drought and stagnation to qualify as "exceptional events" under the Clean Air Act, the District was left with no choice but to request a bump-up in classification from Moderate nonattainment to Serious nonattainment, which was finalized for approval by EPA on April 7, 2015.

4.1 REQUEST FOR ATTAINMENT EXTENSION

As a Serious nonattainment area, the Valley would have until December 31, 2015 to attain the 1997 PM2.5 national ambient air quality standards (NAAQS) as determined using air monitoring data collected in calendar years 2013 through 2015.[1] Under federal Clean Air Act (CAA) Title 1, Part D, Subpart 4 (Subpart 4) Section (§) 188(e), upon application by any State, the EPA may grant one extension of the attainment date of up to five years for a Serious nonattainment area beyond the date specified under CAA §188(c)(2). To be granted an extension, an area must show that it cannot attain by December 2015, but will attain as expeditiously as possible and no later than 2020.

In this plan, the District requests a one-time extension of the attainment deadline for the 24-hour standard to 2018 and the annual standard to 2020, based on the following findings:

4.1.1 Attainment by the December 31, 2015 Deadline is Impracticable

Design values (DV) represent the official metric for assessing air quality improvements and attainment of the NAAQS per the federal CAA and EPA regulations. Design value calculations are three-year averages that follow EPA protocols for rounding, averaging conventions, data completeness, sampling frequency, data substitutions, and data validity. The results provide consistency and transparency to determine basin-wide

[1] U.S. Environmental Protection Agency (2012, March 2). Memorandum from the Office of Air Quality Planning and Standards: Implementation Guidance for the 2006 24-Hour Fine Particle (PM2.5) National Ambient Air Quality Standards (NAAQS). Pages 14-15. Retrieved from http://www.epa.gov/ttn/naaqs/pm/pdfs/20120302_implement_guidance_24-hr_pm2.5_naaqs.pdf

attainment for both components of the 1997 PM2.5 NAAQS, including the 24-hour PM2.5 standard of 65 µg/m³ and the annual PM2.5 standard of 15.0 µg/m³. If any monitoring site within the air basin has either a 24-hour or annual PM2.5 design value higher than the respective standard, then the entire air basin is designated nonattainment. EPA provides detailed guidelines and standards for the calculation[2] and data handling[3] methodologies.

For the Valley to attain the 1997 NAAQS for the years 2013-2015, the monitoring data for this period would need to satisfy both the 24-hour average and annual average attainment tests, which are based on 98th percentile values and calendar year averages, respectively. Since the PM2.5 monitoring data during this period was heavily influenced by the extreme drought conditions, long periods of stagnation, and strong inversions experienced during the winter of 2013-2014, as described in more detail below, the Valley cannot demonstrate attainment of either component of the 1997 NAAQS by December 2015.

Meteorology during the Winter Season of 2013-2014

In 2013, California experienced record-low precipitation and snow pack levels at only 20 percent of the normal amount of snow to provide water for the year. Specifically, in the Valley, 2013 represented the driest year since the start of record keeping in 1895.

Extreme weather conditions over the winter of 2013-2014 overwhelmed emissions controls and led to abnormally high PM2.5 levels. Because of this, attainment of the 1997 annual and 24-hour PM2.5 standards based on 2012-2014 data is impossible. Furthermore, reclassification to Serious will not initially provide an attainment deadline that the Valley can meet, since the Serious deadline is based on 2013-2015 data, which is also heavily affected by the high PM2.5 values recorded during the winter period of 2013-2014.

Stable meteorology during the winter season can increase PM2.5 concentrations to high levels by providing strong temperature inversions and low wind speeds (see Chapter 2). When this occurs, the PM2.5 concentrations during the winter months of November to February can climb to very high levels. The winter of 2013-2014 experienced the strongest average atmospheric stability over the last 15 years creating conducive conditions for the formation and retention of high PM2.5 concentrations. This was the result of a persistent strong high pressure over the eastern Pacific that effectively blocked weather disturbances from entering California, which inhibited dispersion during November, December, and January.

In addition to the historically strong atmospheric stability, the winter of 2013-2014 also experienced record low precipitation totals, with some locations breaking records over 100 years old. These unprecedented dry conditions exacerbated the air quality

[2] Interpretation of the National Ambient Air Quality Standards for PM2.5, 40 C.F.R. Pt. 50 Appendix N (2012). Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=9bdb7a34dcb75892aef9ee60b74da642&rgn=div9&view=text&node=40:2.0.1.1.1.0.1.18.15&idno=40

[3] Environmental Protection Agency [EPA]: Office of Air Quality Planning and Standards. (1999, April). *Guideline on Data Handling Conventions for the PM NAAQS* (EPA-454/R-99-008). Retrieved from http://www.epa.gov/ttn/oarpg/t1/memoranda/pmfinal.pdf

challenge during the winter of 2013-2014. As a result of the extreme meteorology, the PM2.5 concentrations experienced in the Valley were the highest recorded in over a decade.

1997 Annual PM2.5 NAAQS

As background, the 1997 annual average PM2.5 standard was set at 15.0 µg/m^3. The design value (DV) for the annual PM2.5 standard, which is the official EPA metric used to determine whether an area is in attainment of a standard, is defined as the 3-year average of annual averages over three consecutive years. Each individual annual average is calculated as the average among the four quarterly averages throughout the year. For example, the 2015 design value would be calculated as the average among the annual averages for the years 2013, 2014, and 2015, where the average of each of these individual years is calculated as the average among their respective quarterly averages. If the final annual average DV for all of the regulatory PM2.5 monitoring sites for the 3-year period is less than or equal to 15.0 µg/m^3, then the area would be in attainment of the standard.

Because both 2013 and 2014 PM2.5 concentrations were influenced by the extreme weather of the 2013-14 winter season, the 2015 annual averages would have to be improbably low in the southern portion of the Valley in order for the 2013-2015 period to satisfy the annual average attainment test. To show this improbability, the District determined the maximum annual PM2.5 average needed in 2015 to bring each air quality monitoring site into attainment during the 2013-2015 period. This determination was made by first estimating the 2014 values with the best available information. On January 16, 2015 the District pulled data from the EPA Air Quality System (AQS) to estimate the 2014 values. Most values in the "2014 Estimated" column of Table 4-1 were determined using 2014 AQS data when available, and preliminary data was used for the remainder of the year. Sites marked with an asterisk were calculated using 4th Quarter 2013 PM2.5 Data because 4th Quarter 2014 filter data was unavailable at the time of this *2015 PM2.5 Plan*. The maximum annual PM2.5 average in 2015 needed to bring each site into attainment during the 2013-2015 period was then subsequently calculated. These results are displayed in Table 4-1.

The sites in Hanford, Visalia-Church, and Bakersfield-California would all have to have a 2015 annual average under 10 µg/m^3 (historical data demonstrates that the Valley is not likely to achieve these annual averages). With the 2013 and 2014 PM2.5 data from Bakersfield-Planz, the site is already out of attainment of the annual standard, without including the 2015 data. Based on this impossibility, the Valley cannot reach attainment of the annual average portion of the 1997 PM2.5 standard during the 2013-2015 period. This demonstrates the long reaching ramifications that one season of unusually high values due to the extreme weather can have on a region's ability to reach attainment.

Table 4-1 Maximum Allowable PM2.5 Annual Averages Needed in 2015 to Reach Attainment of Annual Standard in 2013-2015

Site	2013 Measured Actuals	2014 Estimated	2015 Max Allowable for Attainment
Stockton-Hazelton	17.7	12.3	15.0
Manteca	11.6	9.9	23.5
Modesto	14.3	11.6	19.1
Turlock	15.0	12.6	17.4
Merced-M*	13.5	13.6	17.9
Merced-Coffee	13.3	10.9	20.8
Madera-City	17.8	14.2	13.0
Clovis	15.9	15.3	13.8
Fresno-Garland	16.8	15.3	12.9
Fresno-Winery*	15.9	16.8	12.3
Tranquility	8.3	7.9	28.8
Corcoran*	15.6	16.6	12.8
Hanford	18.2	17.2	9.6
Visalia-Church	18.9	16.7	9.4
Bakersfield-California	20.0	17.9	7.1
Bakersfield-Planz*	22.8	24.6	**-2.4**

*Calculated using 4th Quarter 2013 PM2.5 Data, 2014 4th Quarter filter data unavailable at this time.
All other sites, used 2014 AQS data when available, preliminary data was used for the remainder of the year.

1997 24-Hour PM2.5 NAAQS

The 1997 24-hour average PM2.5 standard was set at 65 µg/m^3. The DV for the 24-hour average PM2.5 standard, is defined as the 3-year average of annual 98th percentile values over three consecutive years. Each individual annual 98th percentile value is calculated by ranking the 24-hour average values within a year and selecting the value corresponding with the 98th percentile. The 98th percentile values for each individual year over the 3-year period are averaged to produce the final DV. For example, the 2015 design value would be calculated as the average among the 98th percentile values for the years 2013, 2014, and 2015. If the final annual average DV for all of the regulatory PM2.5 monitoring sites for the 3-year period is less than or equal to 65 µg/m^3, then the area would be in attainment of the standard.

The maximum 98th percentile 24-hour average PM2.5 concentrations in 2015 needed to bring each air quality monitoring site into attainment during the 2013-2015 period were calculated using a methodology similar to that discussed above. First, the 2014 values were estimated using data pulled from the EPA AQS on January 16, 2015. Most values in the "2014 Estimated" column of Table 4-2 were determined using 2014 AQS data when available, and preliminary data was used for the remainder of the year. Sites marked with an asterisk were calculated using 4th Quarter 2013 PM2.5 Data because 4th Quarter 2014 filter data was unavailable at the time of this *2015 PM2.5 Plan*. The maximum 98th percentile 24-hour average PM2.5 concentrations in 2015 need to bring each site into attainment during the 2013-2015 period was then subsequently calculated. Refer to Table 4-2 for the results of this analysis.

As with the annual average data, because both 2013 and 2014 were influenced by the extreme weather of 2013-2014, the 2015 averages would have to be improbably low in the southern portion of the Valley. The Bakersfield-Planz air monitoring site would need to have a 98th percentile 24-hour PM2.5 concentration of 15.9 µg/m^3 for 2015 to show attainment for the three year average. Historical data demonstrates that the Valley is extremely unlikely to achieve these averages for 2015. Based on this impossibility, the Valley cannot reach attainment of the 24-hour average portion of the 1997 PM2.5 standard during the 2013-2015 period.

Table 4-2 Maximum Allowable 98th Percentile 24-Hour Average PM2.5 Concentrations Needed in 2015 to Reach Attainment of 24-Hour Standard

Site	2013 Measured Actuals	2014 Estimated	2015 Max Allowable for Attainment
Stockton-Hazelton	56.3	44.5	95.4
Manteca	40.2	40.0	116.0
Modesto	56.4	49.5	90.3
Turlock	55.4	51.0	89.8
Merced-M*	67.3	57.2	71.7
Merced-Coffee	42.3	43.9	110.0
Madera-City	54.6	56.1	85.5
Clovis	56.2	59.0	81.0
Fresno-Garland	63.8	65.5	66.9
Fresno-Winery*	71.6	71.6	53.0
Tranquility	35.7	31.2	129.3
Corcoran*	66.0	71.0	59.2
Hanford	67.6	82.0	46.6
Visalia-Church	62.5	74.0	59.7
Bakersfield-California	71.8	80.0	44.4
Bakersfield-Planz*	96.7	83.6	**15.9**

*Calculated using 4th Quarter 2013 PM2.5 Data, 2014 4th Quarter filter data unavailable at this time.
All other sites used 2014 AQS data when available, preliminary data was used for the remainder of the year.

4.1.2 All Requirements and Commitments in the Implementation Plan Have Been Met

As detailed in Chapter 6, the District has met or exceeded all requirements contained in the *2008 PM2.5 Plan* and the emissions reductions achieved exceed the emission reduction commitments in the plan.

ARB has also met or exceeded all requirements and emission reduction commitments contained in the *2008 PM2.5 Plan,* and a detailed description will be included in ARB's supporting documentation for the plan's adoption by ARB, scheduled in May.

4.1.3 The *2015 PM2.5 Plan* Contains Best Available Control Measures (BACM)

Chapter 5 and Appendix C contain detailed analyses of all potential measures for all source categories consistent with federal guidance and past precedents. Going beyond applicable federal requirements, this analysis even examined the application of BACM to source categories that were found to be below federal de minimis thresholds. This analysis indicates that the District meets or exceeds BACM requirements for all source categories.

4.1.4 The *2015 PM2.5 Plan* Contains Most Stringent Measures (MSM)

Chapter 5 and Appendix C contain detailed analyses of all potential measures for all source categories consistent with federal guidance and past precedents. Going beyond applicable federal requirements, this analysis even examined the application of MSM to source categories that were found to be below federal de minimis thresholds. This analysis indicates that the District meet or exceeds MSM requirements for all source categories.

4.1.5 The *2015 PM2.5 Plan* Includes a Demonstration of Attainment by the Most Expeditious Alternative Date Practicable

Attaining federal health-based air quality standards is an important milestone for improving public health. As detailed in Appendix F, this *2015 PM2.5 Plan* demonstrates that the Valley will attain the federal 1997 PM2.5 standard as expeditiously as possible, with all feasible measures and strategies being implemented to accomplish this goal. Through ongoing implementation of the control strategy contained in the *2015 PM2.5 Plan*, the Valley will come into attainment of the 24-hour standard by 2018, and the annual standard by 2020.

The Role of NOx Reductions in Assisting Valley Reach Attainment
Given the significant contribution of ammonium nitrate to the Valley's PM2.5 concentrations, reductions in NOx emissions are particularly important. To achieve the NOx reductions critical for reaching attainment in the Valley, ARB has adopted regulations that will significantly reduce NOx emissions from various mobile sources. Achieving this level of emissions reductions requires adequate time and carries a tremendous cost.

The District's "no stone unturned" evaluation of emissions sources and emissions controls demonstrate that the most stringent measures, which includes all reasonably available emission reduction opportunities and best available control measures, are in place in the Valley.

The attainment demonstration for this *2015 PM2.5 Plan* includes the benefits of ARB and District control programs that provide ongoing emission reductions. Continued implementation of these control programs provides new emission reductions each year, resulting in a forecasted 38 percent decrease in NOx emissions and a five percent decrease in PM2.5 emissions between 2012 and 2020.

The NOx reductions result from ongoing implementation of both new vehicle standards for passenger and heavy-duty diesel vehicles and equipment, as well as rules accelerating the turnover of legacy diesel fleets. Implementation of stringent requirements for new off-road engines and in-use off road equipment lead to further NOx reductions, along with District rules addressing stationary source NOx emissions. PM2.5 emission reductions result from ongoing implementation of diesel on- and off-road equipment measures as well as the District's recently strengthened rule for wood-burning fireplaces and heaters.

Attainment Demonstration Modeling

The attainment demonstration approach for this *2015 PM2.5 Plan* is based on modeling conducted for the 2008 PM2.5 Plan, which also addressed the 1997 annual and 24-hour PM2.5 standards. The atmospheric dynamics and associated response to emission reductions represented in this modeling, coupled with 2013 design values (DV) and chemical composition, was used to project future (2020 for the annual standard and 2018 for the 24-hour standard) design values.

To assess the representativeness of the 2008 SIP modeling for capturing the dynamics and response to emission reductions for the updated attainment demonstration, ARB evaluated both the meteorological characteristics, as well as the chemical composition used in the two modeling efforts and found that they are very similar. Therefore, the 2008 $PM_{2.5}$ SIP modeling response to emission reduction, applied to 2013 DVs, provides a suitable basis for the updated attainment demonstration.

To ensure consistency with the approved 2008 PM2.5 SIP modeling, the current effort uses a single DV representing 2013 based on ambient measurements during 2011-2013. The base emission year is the middle year of 2012, with future emission years of 2020 for the annual standard attainment demonstration, and 2018 for the 24-hour standard demonstration.

Due to the differences in base years (2005 for the *2008 PM2.5 Plan* vs. 2012 for the *2015 PM2.5 Plan*) and future years (2014 vs. 2018 or 2020), the RRFs calculated for the 2008 modeling cannot be used directly in the current Plan. Thus, the updated modeling uses scaled RRFs presented in the following equation.

$$RRF_{12-20} = \left[1 - (1 - RRF_{05-14}) \times \frac{\%\Delta E_{12-20}}{\%\Delta E_{05-14}}\right]$$

Here,

$$\%\Delta E_{12-20} = \frac{E_{12} - E_{20}}{E_{12}} \times 100\% \; and \; \%\Delta E_{05-14} = \frac{E_{05} - E_{14}}{E_{05}} \times 100\%,$$

where, E_j is the total emissions for a given emissions component for year j (= 2005, 2012, 2014, and 2020). That is, quantities in the above equation represent percent emissions changes for the current and 2008 Plans. Similarly, RRF_{i-k} represents RRF values for the current (2012-2020) and 2008 Plans (2005-2014).

Modeling Results

Eight of the fifteen sites in the Valley recorded 2013 DVs over the annual $PM_{2.5}$ standard of 15 µg/m^3. The higher DVs occurred in the Valley's southern region (including the Bakersfield and Visalia as well as Hanford) and the central region (around the Fresno urban area and Madera). Only one site in the northern region (Turlock) measured a 2013 DV over the standard. All sites in the SJV recorded 2013 DVs at or below the 24-hour standard of 65 µg/m^3. In 2020, all sites in the Valley are projected to attain the annual standard. For those sites that exceeded the standard, the projected 2020 DVs range from 12.5 µg/m^3 to 15.0 µg/m^3.

This section intentionally blank.

Table 4-3 Projected 2020 Annual and 2018 24-hour Design Values

Monitoring Site	AQS Site ID	Type	Speciation	2013 Ann. DV[1]	2020 Ann. DV with Rules[1]	2013 24-hr DV[2]	2018 24-hr DV with Rules[2]
Bakersfield - California Street	060290014	FRM	Bakersfield-California	16.4	13.7	64.6	51.6
Bakersfield - 410 E Planz	060290016	FRM	Bakersfield-California	17.0[3]	14.3	55.8[3]	44.9
Clovis - N Villa Avenue	060195001	FRM	Fresno-1st	16.4[4]	13.3	57.6[4]	45.3
Fresno - 1st Street/Garland[5]		FRM	Fresno-1st	15.4[5]	12.5	62.0[5]	49.3
Fresno - Hamilton and Winery	060195025	FRM	Fresno-1st	14.7	12.0	63.5	50.3
Hanford-S Irwin Street	060311004	FEM-BAM	Visalia - N Church	17.0	13.9	60.2	45.8
Madera	060392010	FEM-BAM	Fresno-1st	18.1	15.0	52.3	41.4
Manteca-530 Fishback Rd	060772010	FEM-BAM	Modesto 14th	10.2	8.7	36.7	32.1
Merced - 2334 M Street	060472510	FRM	Modesto 14th	11.1	9.2	49.2	40.3
Merced – S Coffee Ave	060470003	FEM	Modesto 14th	13.3	11.0	41.8	34.8
Modesto - 14th Street	060990005	FRM	Modesto 14th	13.6	11.5	50.6	42.2
Stockton - Hazelton Street	060771002	FRM	Modesto 14th	13.8	12.0	45.0	39.0
Tranquility	060192009	FEM-BAM	Fresno-1st	7.9	6.6	30.0	23.9
Turlock-S Minaret Street	060990006	FEM-BAM	Modesto 14th	15.7	13.2	52.7	43.8
Visalia - N Church Street	061072002	FRM	Visalia - N Church	16.6	13.5	55.7	42.5

1. Design values equal to or less than 15.0 $\mu g/m^3$ attain the annual $PM_{2.5}$ standard
2. Design values equal to or less than 65.4 $\mu g/m^3$ attain the 24-hour $PM_{2.5}$ standard
3. Does not include 167.3 $\mu g/m^3$ measured on May 05, 2013 (supporting documentation provided in Attachment B)
4. Clovis 2013 DV is based on combined FRM/FEM BAM data
5. 2013 DV is based on 2011 data for Fresno-1st (060190011) and 2012/2013 data for Fresno-Garland (060190008)

4.2 COMMITMENT TO ACHIEVE EXTRA REDUCTIONS IN EMISSIONS

As discussed earlier, the 2015 PM2.5 Plan contains Most Stringent Measures, Best Available Control Measures, and ensures expeditious attainment. However, the District and the California Air Resources Board are committed to leaving no stone unturned to ensure attainment of this important health-based standard as rapidly as possible. Towards that end, this plan contains commitments for the following additional reductions in emissions:

1. **Replace Heavy Duty Trucks** – Using motor vehicle surcharge funds generated by the District under AB 2522, the District commits to allocating $10,000,000, for the period of 2016 through 2020. These funds will be used towards the replacement of heavy duty trucks in the San Joaquin Valley through the District's truck replacement incentive program, achieving emissions reductions surplus to the State Truck and Bus Regulation.

    a. **Amount of Funding:** $10,000,000; for period of 2016 through 2020
    b. **Number of Trucks Replaced:** 152 - 200
    c. **Surplus Emissions Reductions Achieved:** 0.25 – 0.33 tons NOx/day

2. **Replace Residential Wood burning Devices** – Through the use of locally-generated funding, the District commits to allocating $7,500,000, for the period of 2016 through 2020. These funds will be used towards the replacement of old high polluting residential wood burning devices in the San Joaquin Valley through the District's Burn Cleaner Incentive Program, achieving emissions reductions surplus to District Rule 4901.

    a. **Amount of Funding:** $7,500,000; for period of 2016 through 2020
    b. **Number of Devices Replaced:** 4,000 – 7,500
    c. **Surplus Emissions Reductions Achieved:** 0.1 – 0.4 tons of PM2.5 per day

3. **ARB Commitments for Additional Reductions** – In addition to the above commitments by the District for additional reductions in emissions, ARB has also committed to do their part by committing to provide additional reductions in emissions for sources under their control. ARB staff will propose a commitment on actions for key truck sectors in the Valley to:

    a. Better ensure benefits from the Truck and Bus regulation, and
    b. Pursue opportunities for the replacement of trucks certified to the State's optional low NOx standard.