5 Chapter 5

Best Available Control Measures and Most Stringent Measures

2015 Plan for the 1997 PM2.5 Standard
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Chapter 5: Best Available Control Measures and Most Stringent Measures

5.1 BACM DEFINED

As discussed in Chapter 1 of this *2015 Plan for the 1997 PM2.5 Standard* (*2015 PM2.5 Plan)*, one of the requirements for a Serious area attainment plan under Title 1, Part D Subpart 4 (Subpart 4) of the federal Clean Air Act (CAA) is to demonstrate, "*Provisions to assure that the best available control measures (BACM), including best available control technology (BACT) for stationary sources, for the control of direct PM2.5 and PM2.5 precursors shall be implemented no later than four years after the area is reclassified*."[1] As such, this *2015 PM2.5 Plan* will demonstrate that the District's regulatory control measures satisfy the U.S. Environmental Protection Agency (EPA) BACM requirements.

EPA defines a BACM-level of control as:

- The maximum degree of emissions reductions achievable from a source or source category, which is determined on a case-by-case basis considering energy, economic and environmental impacts.[2]
- More stringent than reasonably available control measure (RACM) standards, but less stringent than the lowest achievable emission rate (LAER), which doesn't take into consideration the cost effectiveness of implementing a particular control measure.[3]
- Additive to RACM, as BACM will generally consist of a more extensive implementation of RACM measures (i.e. paving more unpaved roads, strengthening components of a smoke management system (SMS) program, etc.)[4]
- Inclusive of BACT. EPA defines BACT similarly to BACM as an emission limitation based on the, "maximum degree of reduction of each pollutant emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques." BACT is also at least as stringent as NSPS and NESHAPs.[5]

BACM must be implemented within 4 years after area is reclassified as Serious nonattainment, with the exception of source categories that EPA has determined do not contribute significantly to exceedances of the federal PM2.5 standards. [6]

[1] Clean Air Act Subpart 4 Section 189(b)(1)(B).
[2] Environmental Protection Agency (EPA). 1994 Addendum to the General Preamble, p. 42010.
[3] EPA. 1994 Addendum to the General Preamble, p. 42010.
[4] EPA. 1994 Addendum to the General Preamble, p. 42013.
[5] EPA. 1994 Addendum to the General Preamble, p. 42009.
[6] EPA. Proposed Approval and Promulgation of Implementation Plans; Arizona—Maricopa County PM-10 Nonattainment Area; Serious Area Plan for Attainment of the 24-Hour PM-10 Standard and Contingency Measures. 66 FR 50255.

5.2 MSM DEFINED

As demonstrated in Chapter 4 (Classification and Attainment) and Appendix A (Data Analysis), the San Joaquin Valley (Valley) will not attain the 1997 PM2.5 NAAQS by the December 2015 Serious area deadline; as such, the District is requesting an extension of the attainment date with this *2015 PM2.5 Plan*. Pursuant to CAA Subpart 4, EPA may grant one extension of the attainment date of up to five years for a Serious nonattainment area, provided certain criteria are met. One of those criteria requires the District to, *"Demonstrate to the satisfaction of the Administrator that the plan for the area includes the most stringent measures (MSM) that are included in the implementation plan of any State, or are achieved in practice in any State, and can feasibly be implemented in the area."* [7] EPA further clarifies that, similarly to BACM, the definition of a MSM is the maximum degree of emission reduction that has been required or achieved from a source or source category in other SIPs or in practice in other states and can be feasibly implemented in the area.[8] Unlike BACM, the CAA does not specify an implementation deadline for MSM; EPA states that all MSM should be implemented as expeditiously as practicable.[9]

5.3 BACM/MSM EVALUATION PROCESS

The Maricopa County PM10 nonattainment area is the only other area in the nation that has conducted a BACM and MSM analysis to comply with Subpart 4 requirements. Within EPA's Technical Support Document (TSD) for the Maricopa County Serious Area Nonattainment Plan,[10] EPA defined the processes for evaluating whether an attainment plan satisfies BACM and/or MSM requirements. Recognizing the similarity between the BACM and MSM requirements, EPA defines the MSM evaluation process as the same as the BACM evaluation process, but with one additional step, to compare the potential MSM against the measures already adopted in the area to determine if the existing measures are most stringent. The process is as follows:[11]

1. Develop a detailed emissions inventory of PM2.5 sources and source categories (Appendix B).

2. Model to evaluate the impact of various source categories on PM2.5 concentrations over the NAAQS to determine which sources are significant and which sources are de minimis (less than significant) for the purposes of adopting BACM and MSM.

    a. More source categories should be subject to the MSM analysis than those subject to a BACM analysis by lowering the threshold for what is

[7] Clean Air Act Subpart 4 Section 189(b)(1)(B).
[8] EPA TSD for Maricopa County PM10 Nonattainment Area. 2001, p. 31.
[9] EPA TSD for Maricopa County PM10 Nonattainment Area. 2001, p. 237.
[10] EPA. Technical Support Document (Notice of Proposed Rulemaking on the Serious Area PM-10 State Implementation Plan for the Maricopa County PM-10 Nonattainment Area Provisions for Attaining the 24-Hour Standard and Contingency Measures). (2001, September 14).
[11] EPA Technical Support Document for Maricopa County PM10 Nonattainment Area. 2001, pp. 237-238

considered a de minimis source category.[12] What constitutes a de minimis source category for BACM is dependent upon the specific facts of the nonattainment problem under consideration. According to EPA, one means of determining an appropriate de minimis level is to determine if applying MSM to the proposed de minimis source categories would meaningfully expedite attainment. If it does, then the established de minimis level is too high, and if it does not, then the de minimis level is appropriate.

b. Section 5.4 presents the calculations for determining the de minimis thresholds for sources of PM2.5, NOx, and SOx emissions.

3. Identify potential BACM and MSM in other implementation plans or used in practice in other states for each significant source category, and for each measure evaluate the technological and economic feasibility for the area, as necessary (Appendix C).

   a. **Technological feasibility**[13] – This analysis determines if the new control can be integrated with the existing controls without reducing or delaying the emission reductions from the existing control. If it cannot, then it would not be considered to be technologically feasible for the area unless the emission benefit of the new measure is substantially greater than the existing measure.

   b. **Economic feasibility**[14] – If the potential control is determined to be technologically feasible, it is then evaluated for economic feasibility. The District has evaluated the economic feasibility of various control measures by conducting cost effectiveness analyses within Appendix C of this *2015 PM2.5 Plan*. A cost effectiveness analysis examines the added cost, in dollars per year, of the control technology or technique, divided by the emissions reductions achieved, in tons per year. Within the Maricopa County TSD, EPA cautions that they have not established a general guide for evaluating when a measure is economically infeasible, but will instead address the issue on a case-by-case basis as needed.

4. Compare potential BACM/MSM for each significant source category against the control measures, if any, already adopted for that source category (Appendix C).

5. Provide for the adoption of any BACM/MSM that is more stringent than existing similar local measures and provide for implementation as expeditiously as practicable or, in lieu of adoption, provide a reasoned justification for rejecting the

[12] EPA. Technical Support Document (Notice of Proposed Rulemaking on the Serious Area PM-10 State Implementation Plan for the Maricopa County PM-10 Nonattainment Area Provisions for Attaining the 24-Hour Standard and Contingency Measures). (2001, September 14).
[13] EPA. Technical Support Document for Maricopa County PM10 Nonattainment Area. 2001, p. 34.
[14] EPA. Technical Support Document for Maricopa County PM10 Nonattainment Area. 2001, p. 34.

potential MSM, i.e., why such measures cannot be feasibly implemented in the area (Appendix C).

Using the EPA defined BACM/MSM process above, emission control requirements for stationary and area source categories were evaluated in Appendix C to determine if they satisfy both BACM and MSM requirements or if there are any technologically and economically feasible technologies that could further reduce emissions for sources in the Valley.

5.4 DE MINIMIS THRESHOLD

As described in the previous section, BACM and MSM are required for all categories of sources in Serious areas unless the State adequately demonstrates that a particular source category does not contribute significantly to nonattainment of the PM2.5 NAAQS. Using modeling data from this *2015 PM2.5 Plan*, the calculations below were used to quantify the impact of various source categories on PM2.5 concentrations over the federal air quality standards to determine which sources are significant and which sources are de minimis for the purposes of adopting BACM and MSM. The sections below outline the significance determination approach used and summarize which source categories are considered significant based on the de minimis thresholds.

5.4.1 Significance Determination Approach

5.4.1.1 U.S. EPA Guidance

For PM2.5 implementation, EPA has directed states to follow guidance that was used to implement the PM10 standard. For the PM10 standard, guidance specifies that sources are considered significant and required to have BACM and MSM controls if they contribute 1 $\mu g/m^3$ PM10 out of an annual PM10 standard of 50 $\mu g/m^3$. Applying this guidance to PM2.5, the PM10 significance ratio is applied to the annual PM2.5 standard to estimate the level considered significant requiring BACM and MSM controls.

$$1\ \mu g/m^3 / 50\ \mu g/m^3 = X\ \mu g/m^3 / 15\ \mu g/m^3$$

$$X = 0.3\ \mu g/m^3$$

PM2.5 is very complex with many species and associated emissions contributing to the formation of PM2.5. A first step is to determine whether an individual species is significant. If a species is determined to be significant, then a de minimis threshold needs to be established for the pollutant.

5.4.1.2 Significant Species

Available speciation data collected from 2011 through 2013 was used to determine which PM2.5 species are significant. In the Valley, four speciation sites are operated in Bakersfield, Visalia, Fresno and Modesto. The composition for each site was applied to the highest design value in the area related to that speciation site. The highest concentration from all the sites was used to establish the significance level. As shown in Table 5-1, all species are considered significant in relationship to the 0.3 µg/m3 threshold established above.

Table 5-1 PM2.5 Significance Thresholds (µg/m^3)

	Bakersfield	Visalia	Clovis	Modesto	Significant level
2013 DV	17.3	16.6	16.4	13.3	n/a
Ammonium Nitrate	7.1	7.6	6.4	5.0	7.6
Ammonium Sulfate	2.4	2.1	1.9	1.6	2.4
Organic Carbon	4.1	4.7	5.5	4.5	5.5
Elemental Carbon	1.0	0.7	1.1	0.8	1.1
Dust	2.4	1.1	1.1	0.8	2.4
Elements	0.4	0.4	0.4	0.6	0.6

The next step is to establish a significant emission level for each pollutant associated with the species using the 2012 baseline emission inventory. Any source that exceeds the significance emission level is assumed to contribute 0.3 µg/m^3 of PM2.5 and would need to be evaluated for BACM and MSM controls. The equation to establish the significant emission level is as follows:

Significant emissions level = (0.3 µg/m^3 / significant level in µg/m^3) x Basinwide 2012 emissions

The above PM2.5 species will be correlated to the following emission inventory categories:

- 5% of OC will be considered secondary organic aerosols-VOC emissions
- Am Sulfate-SOx and ammonia emissions
- Am Nitrate-NOx and ammonia emissions
- Dust-directly emitted PM2.5 from dust sources
- EC + OC & elements-directly emitted PM2.5 combustion emissions

Sulfur Oxide (SOx) Emissions

SOx emissions contribute to the formation of ammonium sulfate. Per the equation below, the amount of emissions that cause at least a 0.3 µg/m^3 impact on air quality for SOx is 1.0 tpd.

Significant SOx emissions level = (0.3 µg/m^3 / 2.4 µg/m^3) x 8.1 tpd SOx
= 1.0 tpd SOx

Nitrogen Oxide (NOx) Emissions
NOx emissions contribute to the formation of ammonium nitrate. Per the equation below, the amount of emissions that cause at least a 0.3 µg/m^3 impact on air quality for NOx is 13.1 tpd.

Significant NOx emissions level = (0.3 µg/m^3 / 7.6 µg/m^3) x 332 tpd NOx
= <u>13.1 tpd NOx</u>

PM2.5 Emissions
PM2.5 emissions contribute to the remaining species, dust, OC, EC, and element species. It is appropriate to separate the dust and combustion emissions. Per the equation below, the amount of emissions that cause at least a 0.3 µg/m^3 impact on air quality for PM2.5 dust is 4.0 tpd PM2.5 dust emissions. Also, per the equation below, the amount of emissions that cause at least a 0.3 µg/m^3 impact on air quality for PM2.5 combustion is 1.4 tpd PM2.5 combustion emissions.

Significant PM2.5 dust level = (0.3 µg/m^3 / 2.4 µg/m^3) x 32.3 tpd PM2.5 dust
= <u>4.0 tpd PM2.5 dust emissions</u>

Significant PM2.5 combustion level = (0.3 µg/m^3 / 7.2 µg/m^3) x
33.7 tpd PM2.5 combustion emissions
= <u>1.4 tpd PM2.5 combustion emissions</u>