

**EPA's Technical Support Document
for the San Joaquin Valley, California,
2003 PM-10 Plan and 2003 PM-10 Plan Amendments**

January 27, 2004

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San Joaquin Valley Unified Air Pollution Control District, Final Staff Report, Rule 4692
(Commercial Charbroiling), March 21, 2002.

San Joaquin Valley Unified Air Pollution Control District, Final Draft Staff Report, Rule 4701
(Internal Combustion Engines - Phase 1) and Rule 4702 (Internal Combustion Engines - Phase
2), August 21, 2003.

San Joaquin Valley Unified Air Pollution Control District, Final Staff Report, Amendments to
Rule 4354 (Glass Melting Furnaces), April 16, 1998.

San Joaquin Valley Unified Air Pollution Control District, Final Staff Report, Amendments to
Rule 4354 (Glass Melting Furnaces, February 22, 2002.

San Joaquin Valley Unified Air Pollution Control District, Final Draft Staff Report, Proposed
Amendments to: Rule 4305 (Boilers, Steam Generators, and Process Heaters - Phase 2) and Rule
4351 (Boilers, Steam Generators, and Process Heaters - Phase 1), New Rule 4306 (Boilers,
Steam Generators, and Process Heaters - Phase 3), September 18, 2003.

San Joaquin Valley Unified Air Pollution Control District, Staff Report, Rule 4902 - Residential
Water Heaters, May 25, 1993.

San Joaquin Valley Unified Air Pollution Control District, Final Staff Report, Amendments to Rule 4703 (Stationary Gas Turbines), April 25, 2002.

Email from Patrick Gaffney, CARB, to Karen Irwin, EPA, SJV Data by EIC (PM10 Data), 4/17/2003.

Email from Hector Guerra, SJVUAPCD, to Karen Irwin, EPA, Additional info re: windblown and open space issues, 8/7/2003.

San Joaquin Valley UAPCD Control Profile Unpaved Road Travel Dust - City & County Roads 638-5400-0000 (47399) - 1999 Inventory Year, Reg 8 Emissions Reductions Master, City County 99, 2/5/2003.

PM10 Control Factors for Previous, Current, ... Proposed Regulation VIII.

Email from Patrick Gaffney, CARB, to Karen Irwin, EPA, Initial Ag Unpaved Road VMT Documentation, 4/28/2003.

Email from Jennifer Barba, SJVUAPCD, to Karen Irwin, EPA, Parcel Data Requested, 8/7/2003.

I. Introduction/Purpose of Technical Support Document

On August 19, 2003, California submitted the "2003 PM10 Plan, San Joaquin Valley Plan to Attain Federal Standards for Particulate Matter 10 Microns and Smaller" (2003 PM-10 Plan). On December 30, 2003, California submitted the Amendment to the 2003 PM-10 Plan. The Amendments to the 2003 PM-10 Plan supercede some portions of the 2003 PM-10 Plan and also add to it. References hereafter to the "SJV 2003 PM-10 Plan" or "the Plan" mean the 2003 Plan submitted on August 19, 2003, as amended by the December 30, 2003 submittal. California and the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD or District) developed and adopted these SIP revisions in order to address the CAA requirements in section 189(b) - (d).

EPA's notice of proposed rulemaking (NPR) for the 2003 PM-10 Plan provides detailed discussions of the PM-10 air quality planning in the San Joaquin Valley (SJV), the Clean Air Act (CAA or the Act) requirements applicable to serious PM-10 nonattainment areas that have failed to meet their attainment date, such as the SJV, and how the 2003 PM-10 Plan meets the CAA requirements. This Technical Support Document (TSD) provides additional information supporting our proposed rulemaking on the 2003 PM-10 Plan.

II. Additional Information on the Adequacy of Motor Vehicle Emissions Budgets for Transportation Conformity

The NPR provides a detailed discussion of our evaluation of the motor vehicle emissions budgets for transportation conformity, including a discussion of the CARB methodology for estimating PM-10, the adequacy of the plan's budgets and the trading mechanism. This TSD provides additional information on the adequacy determination. 40 CFR 93.118(e)(4) sets forth the criteria for determining whether motor vehicle budgets are adequate and approvable. EPA's analysis for the SJV 2003 PM-10 Plan's PM-10 and NOx motor vehicle budgets is provided in Table 1 below.

Table 1: Transportation Conformity Adequacy Review

Control Strategy SIP under Review: San Joaquin Valley 2003 PM-10 Plan Date received by EPA: August 19, 2003 Reviewers: Doris Lo, Karina O'Connor		
Review Criteria	Is Criterion Satisfied? Y/N	Reference in SIP Document / Comments
93.118(e)(4)(i): The plan was endorsed by the Governor (or designee) and was subject to a public hearing.	Y	The August 19, 2003 SIP transmittal letter from Catherine Witherspoon, Executive Officer, CARB (Governor's designee) to Wayne Natri endorses the 2003 PM-10 Plan. Evidence of public hearing is provided by Enclosure II of the letter (Public notice evidence and transcript for the ARB Public Meeting to Consider Approval of the Proposed 2003 State Implementation Plan for Particulate Matter in the San Joaquin Valley, including New State Strategies).
93.118(e)(4)(ii): The plan was developed through consultation with federal, state and local agencies; full implementation plan documentation was provided and EPA's stated concerns, if any, were addressed.	Y	Consultation with federal, state and local agencies and the public was undertaken; this consultation is described in enclosures to the submittal letters (Board resolution documents). EPA questions were responded to in SIP additions submitted with the original SIP and in a second submittal in December 2003.

Control Strategy SIP under Review: San Joaquin Valley 2003 PM-10 Plan Date received by EPA: August 19, 2003 Reviewers: Doris Lo, Karina O'Connor		
Review Criteria	Is Criterion Satisfied? Y/N	Reference in SIP Document / Comments
93.118(e)(4)(iii): The motor vehicle emission budget(s) is clearly identified and precisely quantified.	Y	The motor vehicle budget is clearly identified and precisely quantified on pages 3-14 to 3-17 of the 2003 PM-10 Plan, in Table 3-8, and in a table with a detailed county by county summary of the motor vehicle budgets for PM-10 and NOx ("2005 Motor Vehicle Emissions Budgets (tons per average annual day), Date printed: 7/24/2003; SJV PM Plan Budget Derivations.xls; SJV PM Budget Derivation, July 8, 2003) submitted as part of the 2003 PM-10 Plan. The budgets were developed using EMFAC2002, a modified version of AP-42 with local data and California-specific unpaved road emission factors.
93.118(e)(4)(iv): The motor vehicle emissions budget(s), when considered together with all other emission sources, is consistent with applicable requirements for reasonable further progress, attainment, or maintenance (whichever is relevant to the given plan).	Y	Based on EPA's preliminary assessment, the plan adequately provides for all the control measures and emission reductions needed for attainment. With the required mobile source control reductions, the area should be able to reach attainment of both the annual and 24-hour standard in 2010. The area will also meet reasonable further progress milestones in 2005, 2008 and 2010. Chapters 4 (Attainment projections) and 7 (Reasonable Further Progress) contain the details of these analyses.
93.118(e)(4)(v): The plan shows a clear relationship between the emissions budget(s), control measures and the total emissions inventory.	Y	The emission inventory for all point, area and motor vehicle, and their relation to control measures, is described in Chapter 3, PM10 Emissions Inventory; Chapter 4, Control Strategy, Chapter 6, Attainment Projections and Chapter 7, Reasonable Further Progress.
93.118(e)(4)(vi): Revisions to previously submitted control strategy or maintenance plans explain and document any changes to any previous submitted budgets and control measures; impacts on point and area source emissions; any changes to established safety margins (see 93.101 for definition), and reasons for the changes (including the basis for any changes to emission factors or estimates of vehicle miles traveled).	Y	There is no previous PM-10 SIP with conformity emission budgets for the San Joaquin Valley nonattainment area. Previously submitted plans (which were withdrawn) did not contain identified budgets.

Control Strategy SIP under Review: San Joaquin Valley 2003 PM-10 Plan Date received by EPA: August 19, 2003 Reviewers: Doris Lo, Karina O'Connor		
Review Criteria	Is Criterion Satisfied? Y/N	Reference in SIP Document / Comments
93.118(e)(5): The state's compilation of public comments and the response to those comments are complete.	Y	The plan contains all of the actual public comments received on the plan and the responses to those comments (enclosures to submittal letters) are complete.

III. Additional Information on the Emissions Inventories

Section 172(c)(3) of the CAA requires all plan submittals to include a comprehensive, accurate, and current inventory of actual emissions from all sources in the nonattainment area. Since the San Joaquin Valley exceeds both the 24-hour and annual PM-10 standards, representative emission inventories are needed for both standards. The District chose the year 1999 as the base year for the 2003 PM-10 Plan since it was the most complete emission inventory available. This base year inventory meets the CAA requirement for a comprehensive, accurate and current inventory and is used as the basis for forecasting future year inventories and for developing average annual, seasonal and modeling inventories. (See Chapter 3, 2003 PM-10 Plan, Appendix B: Basin-Wide Summary of District's On-road Motor Vehicle Emissions Inventory, Appendix C: Updated Emissions Inventory Category Changes, Appendix D: Seasonal Emissions Inventories, Appendix J: Attainment Inventories, R1: Detailed Annual Emissions Inventories (CD-ROM), R2: Detailed Seasonal Emissions Inventories (CD-ROM).) EPA's primary guidance in evaluating these inventories is the PM-10 Emissions Inventory Requirements, EPA, OAQPS, EPA-454/R-94-033 (September, 1994) available at <http://www.epa.gov/ttn/chief>.

The base year and subsequent year emission inventories describe fall and winter seasons, and average annual emissions for directly emitted PM-10 and PM-10 precursors. Seasonal inventories are provided to account for the differences in emissions occurring during the times of year when the San Joaquin Valley Air Basin exceeds the 24-hour PM-10 standard. Pollutants that form PM-10 in reactions in the atmosphere are referred to as PM-10 precursors. PM-10 precursors inventoried in the PM-10 Plan include oxides of nitrogen (NO_x), volatile organic compounds (VOC), oxides of sulfur (SO_x), and ammonia (NH₃).

The emission inventory is divided into source categories and subcategories. The main source categories are stationary sources (both point and aggregated), area sources, on-road mobile sources, and off-road mobile sources. Source categories provide a convenient way to organize the emission inventory and to determine the significance of particular sources.

It is important to realize that emissions inventories are only estimates, since it is highly impractical to directly measure and compile emissions on a continuous basis from a multitude of sources. Methods such as surveys and sampling are used to overcome this limitation. Actual emission measurements can be taken on a sample of devices to determine an average emission rate.

Base Year Inventory

A base year inventory is defined as an inventory of actual annual and typical weekday peak season emissions used in calculating projected inventories and in developing control

strategies. The base year inventory is defined to include manmade sources of PM-10, NO_x, SO_x, NH₃, and VOC emissions. It must include emissions from all point, area, and highway and non-highway mobile sources located within the nonattainment area. Since the EPA has not issued any guidance on the types of emissions inventories to be included in this PM-10 Plan, the District followed the basic guidance that was issued for the ozone attainment SIPs and made modifications as appropriate. 1999 is used as the baseline inventory because it has the most complete data. 2002 is used as the base year from which to calculate all future year milestones (i.e., 5% per year reductions and reasonable further progress requirements). EPA finds this approach to be satisfactory.

Annual Standard and 24-Hour Standard

EPA finds the emissions inventory for the San Joaquin Valley to be very detailed. The emission categories are well documented, comprehensive, accurate, and current. The emissions inventory was prepared following the procedures in EPA guidance documents (PM-10 Emissions Inventory Requirements, EPA, OAQPS, EPA-454/R-94-033 (September, 1994) available at <http://www.epa.gov/ttn/chief>), using either EPA emission factors found in AP-42 (Compilation of Air Pollutant Emission Factors) or other appropriate emission factors combined with San Joaquin Valley-specific activity data to estimate emissions from each type of emissions source. This approach is the customary method used for preparing emissions inventories and the one required by EPA guidance. EPA finds the emissions inventory found in R1 - Detailed Annual Emissions Inventories to be sufficiently detailed. It would have been helpful if a detailed discussion of the 24-hour inventory was provided in the Plan. An example would be how the determination was made to use a seasonal inventory. Though all the information is available in R2 - Detailed Seasonal Emissions Inventories, it is a massive collection of data and requires a great deal of time to review. Having a brief discussion on the contents of R2 would have been useful. Also, it would have been helpful if the District had a discussion on the causes of PM-10 violations for the annual and the 24-hour standards. The information is contained within the plan but not easily found. These comments are minor and EPA proposes full approval of the emissions inventory for the federal 24 hour standard of 150 µg/m³ and the annual standard of 50 µg/m³.

Future Years Inventories

Detailed annual, fourth, and first quarter inventories for the 1999, 2002, 2005, 2008, and 2010 inventories are available in reference documents R1 and R2. Reference documents R1 and R2 also include a series of summary tables that show the annual emissions of a year followed by that year's seasonal emissions. The summary tables include 1999, 2002, 2005, and 2010 emissions.

IV. BACM Demonstration: BACM for NO_x and PM-10 Significant Source Categories

Table 4-8 of the 2003 PM-10 Plan lists the significant source categories that are primarily within the District's regulatory authority. A summary of how BACM has been provided for these categories¹ is provided below.

1. Agricultural Irrigation Internal Combustion Engines.

This category is estimated to emit 17.4 tpd NO_x and 1.2 tpd PM-10 in 1999 and is currently uncontrolled. SJVUAPCD Rule 4101 establishes a 20% opacity limit for internal combustion (IC) engines and Rule 4702 establishes NO_x emission limits and other requirements which implement BACM for many IC engines, as discussed below (internal combustion engines, stationary), but both of these regulations currently exempt IC engines used in agriculture. Through adoption of the PM-10 Plan Amendments dated December 18, 2003, SJVUAPCD has committed to implement BACM for agricultural IC engines by removing the general agricultural exemptions from Rules 4101 and 4702 and to establish NO_x emission limits in Rule 4702 for diesel IC engines used in agriculture. In a separate action (see 68 FR 55917, September 29, 2003 and 69 FR 1271, January 8, 2004), EPA determined that the opacity limits in Rule 4101 are generally sufficient for BACM.

These rules will be revised by 4Q/04² and July 1, 2005, implemented by 3Q/05 and January 1, 2006, and will achieve unspecified PM-10 and 7.5 tons/day NO_x emission reductions respectively. See pages 4-22, 4-23 and 4-46 to 4-48.

2. Charbroiling.

This category is estimated to emit 1.3 tpd of PM-10 in 1999. SJVUAPCD Rule 4692, *Commercial Charbroiling*, limits emissions of, among other things, particulate matter from chain-driven charbroilers at restaurants and fast food facilities by requiring charbroilers to be

¹ Pages 4.16 and 8-2 explain that emission estimates from agricultural crop processing losses (3.1 tpd NO_x and 4.4 tpd PM-10) and unspecified agricultural products processing losses (6.2 tpd NO_x) could not be adequately described to allow development of emission controls. This problem occasionally occurs because of the way inventories have been historically generated and is reasonably addressed by SJVUAPCD's efforts to improve the inventory. Page 4.18 reasonably explains that plastic and plastic product manufacturing should now be treated as part of the baseline rather than as a significant source category because of regulations adopted in 2000.

² Where commitments are made for a given month, quarter or year, EPA considers the deadline to be the last day of the month, quarter or year.

operated with a tested or certified catalytic oxidizer control device. On June 3, 2003, EPA published a direct final approval of Rule 4692, locally adopted on March 21, 2002.

In developing Rule 4692, SJVUAPCD used South Coast Air Quality Management District (SCAQMD) Rule 1138, *Control of Emissions from Restaurants*, as guidance. SCAQMD Rule 1138 is considered the most effective district regulatory standard in effect for this source category. The flameless catalytic oxidizer was determined to be the most cost-effective control method for reducing PM-10 emissions from chain-driven charbroilers. SJVUAPCD's staff report supporting adoption of Rule 4692 provides a detailed analysis of the technological and economic feasibility of possible control technologies.

SJVUAPCD estimates that implementation of Rule 4692 will reduce PM-10 emissions by 0.11 ton/day. SJVUAPCD estimates the overall rule cost effectiveness to be \$3,017/ton reduced of PM-10 and VOC per year. See final staff report to SJVUAPCD Rule 4692 (March 21, 2002).

3. Cotton Gins.

This category is estimated to emit 2.7 tpd of PM-10 in 1999. SJVUAPCD commits to adopt a new rule to require 95% efficient 1D-3D cyclones for high-pressure exhaust units, 90% efficient 2D-2D cyclones for low-pressure exhaust units, and appropriate trash hoppers to minimize fugitive emissions. These limits are considered as BACT when issuing permits for new and modified sources in the SJV.

This rule will be adopted by 4Q/04, implemented by 2005, and will reduce PM-10 emissions by 1.5 tpd. See pages 4-22, 4-23, 4-29 and 4-30.

4. Internal Combustion Engines, Stationary.

This category is estimated to emit 47 tpd of NO_x in 1999. SJVUAPCD Rule 4701, *Internal Combustion Engines - Phase 1*, and SJVUAPCD Rule 4702, *Internal Combustion Engines - Phase 2*, limit emissions of NO_x and other pollutants from internal combustion (IC) engines rated greater than 50 horsepower. These rules establish different emission limits and compliance schedules depending on engine type, size and location. On February 28, 2002, EPA published a final limited approval and limited disapproval of the version of Rule 4701 locally adopted on December 19, 1996. In this action, EPA noted that Rule 4701 would strengthen the SIP, but also noted several deficiencies in the rule regarding rule applicability and enforceability that prevented EPA from fully approving the rule. See 67 FR 9209 (February 28, 2002).

SJVUAPCD amended Rule 4701 and adopted new Rule 4702 on August 21, 2003. Rule 4701 applies to both spark-ignited and compression-ignited (i.e., diesel) IC engines, whereas Rule 4702 applies only to spark-ignited IC engines. Rule 4702 and the amendments to Rule

4701 address the issues identified in EPA's limited disapproval and tighten the NO_x emission limits for spark-ignited IC engines to fulfill Best Available Retrofit Control Technology (BARCT). BARCT is a California requirement that is defined similarly to federal BACT. The NO_x emission limits for diesel IC engines in Rule 4701 did not need to be tightened since they already reflect BARCT level of control. Both Rules 4701 and 4702 currently exempt IC engines used in agriculture. However, as noted above (Agricultural irrigation internal combustion engines), SJVUAPCD has committed to remove the general agricultural exemption from Rule 4702 and to amend Rule 4702 to establish BACM-level NO_x emission limits for diesel IC engines used in agriculture.

SJVUAPCD's staff report supporting the 2003 amendments to Rule 4701 and the adoption of Rule 4702 provides a detailed analysis of the inventory of affected engines and the technological and economic feasibility of possible control technologies. This includes socioeconomic and cost effectiveness analyses of upgrading or installing a non-selective catalytic reduction control system, and upgrading or installing a selective catalytic reduction control system. With the exception of agricultural IC engines, Rule 4701 establishes BACM level of control for diesel IC engines, and new Rule 4702 establishes BACM level of control for spark-ignited IC engines. SJVUAPCD estimates 85 - 96% control for the various requirements, resulting in reduced NO_x emissions of 1.8 tons/day. SJVUAPCD estimates that Rule 4702 cost effectiveness ranges from \$267 to \$50,494/ton of NO_x, depending on the specific engine type, size and choice of control. See final draft staff report to SJVUAPCD Rules 4701 and 4702 (August 21, 2003). In a separate action (see 68 FR 55917, September 29, 2003 and 69 FR 1271, January 8, 2004), EPA also determined that the opacity limits in Rule 4101, which also apply to these sources, are generally sufficient for BACM. Also in a separate rulemaking, we are proposing approval of Rule 4702.

5. Fugitive Dust.

(i) Agricultural Conservation Management Practice Program.

The Agricultural Conservation Management Practices (Ag CMP) Program covers the following significant PM-10 source categories: agricultural unpaved roads, agricultural windblown dust, cattle feedlot dust, harvest operations, livestock wastes, tilling dust, and windblown dust from pasture lands. SJVUAPCD estimates that, without this program, these source categories will emit 144.3 tons per day of PM-10 in 2010. Like other PM-10 nonattainment areas (e.g., Phoenix and Los Angeles), SJVUAPCD has chosen to reduce emissions from agricultural sources with a program that provides more flexibility than a typical command and control regulation.

The Ag CMP Program will require growers to submit CMP plans to SJVUAPCD. The plans will identify the CMPs that the growers are implementing in each of five (three for

concentrated animal feeding operations) categories: unpaved roads, unpaved vehicle/equipment traffic areas, land preparation, harvest, and other (including windblown PM-10 from open areas and agricultural burning). A list of CMPs for these categories is currently being developed, and the CMP plans will include information on the CMPs selected by each grower. The District will ensure that growers comply with the CMP plans and that overall reductions for the Ag CMP Program are met.

Based on the program description and its similarity to programs we have approved elsewhere as BACM, we believe that SJVUAPCD's Ag CMP program will achieve a BACM level of control for these source categories. SJVUAPCD has committed to adopt the Ag CMP Program in April 2004, implement it in July 2004, and reduce PM-10 emissions by 33.8 tons per day in 2010. See pages 4-22 to 4-29.

(ii) Regulation VIII Sources.

From Table 4-8 of the San Joaquin PM-10 Plan, the following source categories reference Regulation VIII for their BACM Demonstration: Agricultural Unpaved Roads, Earthmoving, Open Areas, and Paved & Unpaved Roads (non-agricultural). A discussion of the history and requirements of Regulation VIII is provided below.

a. Description of source categories

Regulation VIII applies to the following PM-10 fugitive dust sources:

- Rule 8021 - construction, demolition, excavation, extraction, other earthmoving
- Rule 8031 - bulk materials
- Rule 8041 - carryout and trackout
- Rule 8051 - open areas
- Rule 8061 - paved and unpaved roads
- Rule 8071 - unpaved vehicle/equipment traffic areas
- Rule 8081 - off-field agricultural sources³

Sources of fugitive dust emissions at construction sites include land clearing, earthmoving, excavating, construction, demolition, material handling, bulk material storage and/or transporting operations, material trackout or spillage onto paved roads, and vehicle use and movement on site (e.g., the operation of any equipment on unpaved surfaces, unpaved roads and unpaved parking areas). Windblown emissions from disturbed areas and inactive storage

³ Rule 8011, section 3.33, defines an off-field agricultural source as any agricultural source that meets the definition of outdoor handling, storage and transport of bulk material, paved road, unpaved road or unpaved vehicle/equipment traffic area.

piles on construction sites are also a source of PM-10.

On vacant land, windblown fugitive dust emissions are caused by virtually any activity which disturbs otherwise naturally stable land, including earthmoving activities, material dumping, weed abatement, and vehicle traffic. The San Joaquin Valley inventory estimates emissions from three types of vacant land: agricultural non-pasture lands, pasture lands, and unpaved roads and associated areas.

Re-entrained road dust occurs from vehicle traffic on unpaved roads and unpaved parking lots. Also, windblown dust is entrained from the disturbed surfaces of unpaved roads and parking lots. The San Joaquin Valley inventory disaggregates unpaved roads into publicly-owned/maintained roads, privately-owned roads (e.g., agricultural roads), and unpaved haul/access roads associated with construction sites or industrial facilities. Unpaved haul/access roads are addressed under Rule 8021 while other types of roads are addressed under Rule 8061 or 8081.

Paved road dust is fugitive dust that is deposited on a paved roadway and then re-entrained into the air by passing vehicles. Dust is deposited on the roadway by being blown from disturbed areas; tracked from unpaved shoulders or vehicles traveling on connecting unpaved roads or other access points (e.g., construction sites); stirred up from unpaved shoulders by wind currents created from traffic movement; spilled by haul trucks; and deposited by water runoff or erosion. Emissions of paved road dust are generally proportional to vehicle miles traveled. Re-entrained road dust emission rates are not significantly affected by vehicle speed but are affected by the silt loading on the road and amount of vehicle travel. Emission rates are lower per mile traveled on more trafficked roads.

b. Emissions

Fugitive dust sources make up the largest emissions category contributing to violations of the annual PM-10 standard.⁴ They also contribute significantly to violations of the PM-10 24-hour standard. The PM-10 Plan attributes the following percentages of total directly-emitted PM-10 from each of the Regulation VIII source categories for the years 1999 and 2010 (the 2010 estimates reflect growth but not reductions from proposed control measures).⁵

Source Category	1999	2010
paved road dust	14%	18%

⁴ 2003 PM-10 Plan, Appendix N, Tables N-3 through N-11.

⁵ 2003 PM-10 Plan, Chapter 3, Table 3-11.

unpaved road dust	10.7%	10%
construction/demolition	3.6%	6%
unpaved traffic areas	2.2%	2%
fugitive windblown dust	1% ⁶	<1%
Total	32%	37%

c. History of EPA rulemakings on Regulation VIII

On March 8, 2000, EPA took final action on the 1996 version of Regulation VIII, issuing a limited approval and limited disapproval with an effective date of April 7, 2000. 65 FR 12,118. EPA noted that it was “finalizing the limited approval of these rules in order to strengthen the SIP and finalizing the limited disapproval because of the remaining deficiencies.” Ibid. at 12,119/1.⁷ Among the deficiencies identified by EPA were “lack of appropriate standards and/or test methods that would ensure a level of control consistent with RACM or BACM” Ibid.

As a result of the disapproval, EPA explained that the emissions offset sanction would apply 18 months after April 7, 2000, and the highway funding sanction six months later, unless SJVUAPCD cured the deficiencies. Id. at 12,118/2-3. In addition, EPA explained that it would be required to promulgate a FIP if those deficiencies were not corrected within 24 months.

SJVUAPCD adopted the current version of Regulation VIII on November 15, 2001, and CARB submitted it to EPA on December 6, 2001. SJVUAPCD intended that the new rules would both remedy the RACM deficiencies identified by EPA in its March 8, 2000 action, and fulfill BACM requirements under the CAA. EPA found that new provisions in Regulation VIII “significantly strengthened” the rules by tightening standards, covering more activities, and adding more requirements to control dust-producing activities. 67 FR 15,346-47 (4/1/02).

On February 26, 2003, EPA issued a final rulemaking (Final Rule) (68 FR 8830) that conditionally approved Regulation VIII with respect to RACM and issued a limited approval and limited disapproval of Regulation VIII with respect to BACM.

⁶ Emissions inventory by EIC code, Patrick Gaffney, CARB, April 17, 2003, “Dust from Unpaved Roads and Associated Areas”. See attachment to this TSD.

⁷ The number following the slash (“/”) in this citation refers to the column on the Federal Register page.

With regard to RACM, EPA concluded that the 2001 version of Regulation VIII “includes the types of measures commonly relied upon for achieving the bulk of PM-10 emission reductions from fugitive dust sources . . . and because rule coverage for the significant source categories subject to Regulation VIII was significantly expanded, it is more likely than not that the regulation fulfills” the RACM requirements of the Act. 67 FR at 15,347. However, EPA concluded that SJVUAPCD had not completely demonstrated that it applied RACM to sources covered by Regulation VIII. 67 FR at 15,347. EPA noted that this demonstration was important and required by the Act. 68 FR at 8831/2 & 8832/2. Accordingly, EPA determined that full approval of Regulation VIII was inappropriate. EPA therefore granted Regulation VIII a conditional approval with respect to RACM. The approval was explicitly conditioned on SJVUAPCD submitting a more detailed RACM analysis within one year from the date of the Final Rule. 68 FR at 8830/3. By letter dated March 5, 2002, SJVUAPCD agreed to the condition and committed to meet it. Id.

EPA also finalized a limited approval and limited disapproval of Regulation VIII for failure to meet BACM requirements. 68 FR at 8830/2. The sanctions clock for the BACM deficiency began with the effective date of the Final Rule, March 28, 2003. 68 FR at 8833/3. We found that the submittal did not adequately fulfill the Clean Air Act section 189(b) requirement for a BACM demonstration, specifically identifying thresholds of source coverage within the rules (e.g., minimum size of sources subject to rule requirements) for which an adequate BACM demonstration was outstanding.

d. Summary of Evaluation of Regulation VIII for RACM and BACM

With this proposed rulemaking, we have evaluated the PM-10 Plan with respect to providing RACM and BACM for Regulation VIII sources. Our proposal addresses both the RACM conditional approval and the BACM sanctions clock established by our February 2003 Final Rule; therefore, no separate EPA rulemaking on Regulation VIII is required.

In our Final Rule, we reviewed three BACM-related criteria: 1) stringency of control measure options and performance standards that apply to individual sources; 2) enforceability concerns that may have negative implications on whether BACM can be effectively implemented on individual sources; and 3) thresholds of source coverage.

We concluded that the BACM-related deficiencies associated with stringency of control measure options and performance standards that apply to individual sources and enforceability concerns had been corrected in the November 15, 2001 version of Regulation VIII.⁸ We identified only certain thresholds of coverage as the basis for our limited disapproval per CAA

⁸ U.S. EPA Technical Support Document for EPA's Notice of Proposed Rulemaking for SJVUAPCD Regulation VIII rules, Karen Irwin, March 14, 2002, pg. 8.

section 189(b) and otherwise approved Regulation VIII as BACM. Therefore, in our proposed rulemaking on the PM-10 Plan, we do not re-iterate aspects of Regulation VIII we have found already satisfy the BACM requirement that are not being revised as part of the PM-10 Plan.

In our limited approval/limited disapproval rulemaking for Regulation VIII that established the BACM sanctions clock, we identified several areas of concern with respect to BACM coverage.⁹ We discussed the absence of sufficiently detailed information to determine the magnitude of coverage at the thresholds in question which would allow an informed assessment of the environmental and economic feasibility at various thresholds of control.¹⁰

An alternative means to demonstrate the feasibility of different thresholds of coverage is by conducting a detailed cost-effectiveness analysis of control at various thresholds. A cost-effectiveness analysis assesses the costs and the emissions reductions associated with specific control measures. If the dollar per ton value of a measure is reasonable, we can conclude that the measure meets the BACM criteria for economic feasibility, or if it is excessive, that the measure is not economically feasible.

The District relied on a sequential cost-effectiveness analysis methodology to determine whether proposed measures meet BACM.¹¹ If the "worst case" cost-effectiveness results are less than \$5,000 per ton PM-10 reduced, the District assumes the measure is feasible under all scenarios. If the worst case cost-effectiveness results exceed \$500,000 per ton, the District assumes the best case scenarios are also infeasible and does not further consider the measures. If the worst case cost-effectiveness results are between \$5,000 and \$500,000 per ton, the District evaluates a cost-effectiveness ratio for a typical scenario and determines whether it meets BACM.

In the PM-10 Plan or amendments to the PM-10 plan, the District has committed to increase coverage for many of the thresholds listed in EPA's 2003 Final Rule and has also provided supporting BACM analyses. These are discussed in Section VII below. The PM-10 Plan contains a comprehensive BACM analysis for the Regulation VIII sources. We describe the full list of candidate BACM that the District considered and measures the District has adopted or commits to adopt in Section VI.

e. Reference documents for PM-10 Plan Regulation VIII RACM and BACM and

⁹ Ibid., pg. 9.

¹⁰ Ibid.

¹¹ Appendix G, 2003 PM-10 Plan, Exhibit A, "Final BACM Technological and Economic Feasibility Analysis", Sierra Research, March 21, 2003, pg. 10.

commitments

- (1) Appendix G - "Best Available Control Measures/Technology and Reasonably Available Control Measures/Technology Demonstration for Sources of PM-10 and PM-10 Precursors in the San Joaquin Valley Air Basin", April 28, 2003, [cited hereafter as April '03 BACM/RACM Analysis].
- (2) Appendix G, Exhibit A - "Final BACM Technological and Economic Feasibility Analysis", March 21, 2003 [cited hereafter as March '03 BACM Analysis].
- (3) Appendix G, Exhibit B - "Regulation VIII RACM Analysis for San Joaquin Valley Unified Pollution Control District PM-10 Nonattainment Plan", March 3, 2003 [cited hereafter as March '03 RACM Analysis].
- (4) The District's commitments to upgrade Regulation VIII can be found in Chapter 4, pgs. 4-31 through 4-38.¹²
- (5) The District's amendments to the PM-10 plan commitments in Chapter 4 can be found in the document titled "2003 PM-10 Plan Appendix G, Exhibit C Supplemental BACM Analysis", December 18, 2003 [cited hereafter as Supplemental BACM Analysis].

f. List of candidate RACM/BACM considered along with adopted or committed measures

The table titled "Regulation VIII Measures" summarizes information contained in the PM-10 Plan and plan commitment amendments for Regulation VIII measures.

¹² The District notes that ultimate feasibility of the committed measures will be confirmed during rule development. PM-10 Plan, pg. 4-33.

Regulation VIII Measures

Regulation VIII source category	Candidate RACM/BACM	Adopted or Committed Measure
Paved roads	1. Pave new/modified shoulders	<u>Adopted measure</u> requires shoulders to be paved on new or modified paved roads that receive 500-3,000 average daily vehicle trips
	2. Pave/stabilize existing unpaved shoulders	<u>Committed measure</u> to pave shoulders of 50% highest-ADT urban roads and 25% highest-ADT rural roads, subject to funding availability
	3. Require use of PM-10 efficient street sweepers	<u>Committed measure</u> for new purchases to be PM-10 efficient, including purchase of at least one PM-10 efficient sweeper within 3 years
	4. Rapidly clean up material spills and erosion-caused deposits	<u>Committed measure</u> for required removal of dirt/debris from roadways within 24 hours of identification after wind/rain event
	5. Conduct routine and frequent sweeping/cleaning of paved roads	<u>Committed measure</u> to require minimum once-per-month sweeping on roads where PM-10 efficient street sweepers are used

Paved roads (cont.)	6. Prevent trackout deposits from unpaved roads onto paved roads	<u>Committed measures</u> ¹³ to require trackout control devices on unpaved haul/access roads that experience ≥ 10 trips per day by 3-axle vehicles and removal of trackout extending ≥ 50 ft. onto public paved roads within one hour of occurrence ¹⁴ <u>Adopted measure</u> requires trackout control devices on unpaved haul/access roads that experience ≥ 150 total vehicle trips per day
	7. Prevent bulk material spillage from haul trucks onto roads	<u>Adopted measures</u> require 6 inches of freeboard and material wetting to meet 20% opacity or covering/tarping
	8. Require priority street sweeping on dirt-laden roads	Voluntary ¹⁵

¹³ Additional committed measures define minimum specifications for trackout control devices, paved interior roads and gravel pads (see pg. 4-35 of the PM-10 Plan).

¹⁴ The District's commitment excludes rural area construction sites < 10 acres in size. The District's justification is discussed in Section VII below.

¹⁵ The District could not identify a means by which to make this measure a meaningful requirement. (Justification provided on pg. G-70 of Appendix G, 2003 PM-10 Plan.) Likewise, this candidate BACM is not a specific requirement in other serious PM-10 nonattainment areas.

Paved roads (cont.)	9. Stabilize unpaved access points	NA. While not specifically implemented by Rule 8061, other implemented measures affect unpaved access points, including surface treatment of unpaved roads per Rule 8061 and preventing trackout from construction sites and industrial sites per Rule 8041
	10. Require measures for storm water drainage, material specifications for skid control	NA. Storm water is not a significant source of paved road deposits in the nonattainment area and roads are not sanded or salted for skid control ¹⁶
Unpaved roads (public and private, non-agricultural)	11. Require paving of new roads (i.e., prohibit new unpaved roads)	<u>Committed measure</u> to require all new non-temporary roads in urban areas to be paved. For rural areas, county ordinances and commitments prohibiting creation of new unpaved roads are summarized in Note 1 at the end of this Table.
	12. Require existing unpaved roads to be paved/stabilized	<u>Committed measures</u> to require paving of 20% or up to 5 miles of urban owned road per city jurisdiction and stabilization of any unpaved roads with ≥ 26 annual average daily vehicle trips
	13. Limit speeds on existing unpaved roads	<u>Committed measure</u> to limit vehicle speeds to 25 mph

¹⁶ 2003 PM-10 Plan, Appendix G, Table G-14, pgs. G-85 and G-86.

Unpaved roads (agricultural)	14. Require existing unpaved agricultural roads to be stabilized	<u>Committed measure</u> to require control of roads on days when they receive ≥ 75 vehicle trips and/or ≥ 25 heavy truck trips ¹⁷
	15. Limit speeds on existing unpaved agricultural roads	<u>Committed measure</u> to limit speeds on unpaved agricultural roads subject to the Agricultural CMP rule (other options include surface treatment or restricted access)
Unpaved parking/traffic areas (public and private, nonagricultural)	16. Require existing unpaved parking areas to be paved/stabilized	<u>Committed measure</u> to require unpaved parking areas to be stabilized that receive ≥ 50 annual average daily vehicle trips and/or on days when they receive ≥ 25 heavy truck trips. <u>Committed measure</u> to revise the existing single-day 75 vehicle trip threshold and replace it with a 150 single-day or 30-day threshold
	17. Limit speeds on existing unpaved parking/traffic areas	NA. The District rejected this measure in the form of an enforceable requirement based on a high cost-effectiveness value ¹⁸

¹⁷ Additional coverage is provided for unpaved roads that fall below these thresholds in the Agricultural CMP rule. 2003 PM-10 Plan, Table 4-10, pg. 4-29.

¹⁸ 2003 PM-10 Plan, Table G-13, pg. G-74.

Unpaved parking/traffic areas (agricultural)	18. Require existing unpaved agricultural parking/traffic areas to be stabilized	<u>Committed measure</u> to require control of parking/traffic areas that receive ≥ 50 annual average daily vehicle trips and/or on days when they receive ≥ 25 heavy truck trips. <u>Committed measure</u> to revise the existing single-day 75 vehicle trip threshold and replace it with a 150 single-day or 30-day threshold
	19. Limit speeds on existing unpaved agricultural traffic areas	The District indicates this measure will be implemented as part of the Agricultural CMP Program. ¹⁹
Construction, demolition, industrial (incl. earthmoving, bulk materials handling/storage and windblown sources) ²⁰	20. Require Dust Control Plans (DCPs) for construction, earthmoving, demolition sites	<u>Committed measure</u> to require DCPs for residential projects > 10 acres and commercial projects > 5 acres ²¹
	21. Require pre-wetting before earthmoving	<u>Adopted measure</u> requires pre-watering site to meet 20% opacity
	22. Require watering/dust suppression during active earthmoving operations	<u>Adopted measure</u> requires application of water or dust suppressant to meet 20% opacity

¹⁹ Supplemental BACM Analysis, pg. 18.

²⁰ Control measures addressing trackout and bulk material spills from construction site haul trucks are discussed under the paved roads category.

²¹ The District also commits to require notification to the District for earthmoving projects that are ≥ 1 acre for which DCPs are not required.

Construction, etc. (cont.)	23. Stabilize unpaved haul/access roads	<u>Adopted measure</u> requires application of water or dust suppressant to meet 20% opacity and the conditions of a stabilized surface ²²
	24. Establish high-wind condition operating restrictions	<u>Committed measure</u> to cease construction activities when a wind event ²³ occurs or when 20% opacity is exceeded due to wind. Water trucks are required to continue operating unless it is unsafe to do so.
	25. Stabilize disturbed inactive surfaces	<u>Adopted measure</u> requires application of water or dust suppressant to meet the conditions of a stabilized surface ²⁴
	26. Stabilize unpaved vehicle equipment traffic/parking areas	<u>Adopted measure</u> requires application of water or dust suppressant to meet 20% opacity and the conditions of a stabilized surface

²² This is defined in Rule 8011 as a surface that complies with a silt content test demonstrating silt content of 6% or less and/or silt loading of 0.33 oz/sq. foot or less.

²³ The District defines this as any day in which 1-minute wind gust exceeds 25 miles per hour as determined by the District.

²⁴ This is defined in Rule 8011 as a surface that complies with at least one of five surface stabilization standards.

Construction, etc. (cont.)	27. Water bulk materials during handling	<u>Adopted measure</u> requires application of water or dust suppressant to meet 20% opacity <u>Committed measure</u> to remove existing 100 cubic yard exemption
	28. Stabilize bulk materials storage piles	<u>Adopted measure</u> requires covering or a stabilized surface for piles \geq 100 cubic yards
	29. Prevent trackout	See measure 6 of this table
	30. Clean up/remove trackout	See measure 6 of this table
	31. Prevent bulk material spills from haul trucks	See measure 7 of this table
	32. Apply water or dust suppressant on surfaces where demolition equipment operates	<u>Committed measure</u> to require water or dust suppressants on areas where equipment will operate
	33. Pre-wet erodible surfaces undergoing demolition	<u>Committed measure</u> to require water on erodible surfaces within 100 feet of a structure within 1-hour of demolition
	34. Apply water or dust suppressant to disturbed soils and debris following demolition	<u>Committed measure</u> to require water or dust suppressant on disturbed soils and debris within one hour following demolition or at the end of the workday
Construction, etc. (cont.)	35. Require a dust control training class	<u>Committed measure</u> to require a person employed by each developer/builder to attend a dust control training class within 90 days of dust control plan submittal

	36. Prohibit a visible dust plume from traveling a distance of > 100 feet	NA. The District determined this measure is not technically feasible ²⁵
	37. Require on-site speed limit signs	<u>Committed measure</u> to require sites > 10 acres to include speed limit signage
	38. Require a person to monitor dust on-site for projects with \geq 50 acres of disturbed surface	NA. The District determined this measure to have a high cost-effectiveness value (\$231,000 to \$339,000)
Agricultural bulk materials storage piles and trackout	39. Water bulk materials during handling	<u>Adopted measure</u> requires application of water or dust suppressant to meet 20% opacity <u>Committed measure</u> to remove existing 100 cubic yard exemption
	40. Stabilize bulk materials storage piles	<u>Adopted measure</u> requires covering or a stabilized surface for piles \geq 100 cubic yards
Agricultural bulk materials storage piles and trackout (cont.)	41. Prevent and clean up trackout	<u>Committed measure</u> to adopt California Vehicle Code trackout removal requirements. Preventative trackout control measures are included in the Agricultural CMP rule. ²⁶

²⁵ Supplemental BACM Analysis, pg. 2.

²⁶ Supplemental BACM Analysis, pg. 29.

Vacant disturbed land (non-agricultural)	42. Stabilize vacant land	<u>Committed measure</u> to require stabilization of urban vacant lots ≥ 0.5 acres with $\geq 1,000$ sq. ft. of disturbed surface. Applicable rural vacant lot size is ≥ 3 acres
	43. Limit off-road vehicle use on vacant land	<u>Adopted measure</u> requires installing physical barriers or other means to effectively prevent trespass
	44. Establish weed abatement controls	<u>Adopted measure</u> requires watering to meet 20% opacity and surface stabilization following weed abatement on lots $\frac{1}{2}$ acre or larger

Note 1: Kern County ordinances require or will be amended to require new residential, commercial and industrial roads to be paved.²⁷ (Kern County Resolution No. 2003-010, Exhibit A, Measures 7 and 8.) A Kings County ordinance requires new additional street construction to be paved. (See Kings County Resolution No.02-119, Exhibit A, Measure 7.) Madera County commits to require developers to pave all new public access roads for parcels less than 40 acres or that serve more than 12 parcels. (Madera County Resolution No.2002-248, Exhibit A, Measure 1.) Merced County Improvement Standards require all roads associated with new land development projects to be paved. (Merced County Resolution No. 2002-220, Exhibit A, Measure 1.) San Joaquin County commits to require developers to pave or otherwise improve any non-temporary roadways as a condition of development approval. (San Joaquin County Resolution No. 02-779, Exhibit A, Measure 1.)

Note 2: Not all of the measures adopted by SJVUAPCD as BACM are as stringent as those adopted in other areas because BACM is determined based on area-specific feasibility. For example, the Clark County PM-10 plan provides for stabilization of all existing unpaved shoulders of paved roads by 2006 and does not establish a minimum vehicle trip threshold for unpaved parking lots. SJVUAPCD has submitted a BACM cost-effectiveness analysis that indicates that Clark's extent of coverage is not feasible in the San Joaquin Valley.

²⁷ Roads associated with small agricultural lots less than 5 acres under Williamson Act Land Use Contract are excluded.

Note 3: There are a few additional miscellaneous candidate BACM not included in the District's analysis, which we discuss below. We believe exclusion of these candidate measures is acceptable for reasons provided.

Additional paved road candidate measures include the use of vacuum seal crack equipment; the use of PM-10 efficient street sweepers on paved parking lots (a Clark County requirement), and; paving/stabilizing medians (Clark County requirement). While SJVUAPCD Regulation VIII does not require vacuum seal crack equipment, Rule 8041 requires that a rotary brush or broom be accompanied or preceded by sufficient wetting to meet 20% opacity. Use of PM-10 efficient street sweepers on paved parking lots and stabilization of highway medians are measures addressing miscellaneous sources not identified in EPA's BACM guidance. We view them as specific to identified needs in Clark County, as opposed to measures that all areas must consider.

Additional construction site candidate measures include soil-specific requirements for dust control (e.g., application of surfactant with water on soils resistant to water penetration) and other miscellaneous requirements that apply in Clark County. Unlike Clark County, SJVUAPCD has not identified construction sites as among the highest-emitting PM-10 sources, but rather only 6% of directly-emitted PM-10 by 2010 (without accounting for controls). The Clark County PM-10 Plan relies on achieving a high control efficiency at construction sites in order to demonstrate attainment of the 24-hour standard, while this is not shown to be necessary in San Joaquin Valley.

An additional candidate measure for non-agricultural unpaved parking/traffic areas is to require that new unpaved parking/traffic areas be paved. Some cities identified ordinances that require paving of new parking lots (e.g., City of San Joaquin). Most cities/counties did not identify an ordinance that requires paving of new parking lots, however, this does not necessarily mean that they do not have such ordinances.

An additional candidate measure for preventing windblown dust from disturbed vacant land is constructing windbreaks, but this measure is not as effective as stabilizing disturbed surfaces, therefore, we do not believe it is necessary nor practical since Rule 8051 requires surface stabilization. On this basis, the measure was not adopted in the Clark County PM-10 Plan.

g. Evaluation of Regulation VIII Final Rule BACM deficiencies

Below we evaluate each deficiency identified in EPA's Regulation VIII limited approval/limited disapproval for BACM²⁸ in light of the PM-10 Plan's Regulation VIII

²⁸ Op. Cit., EPA Notice of Proposed Rulemaking for SJVUAPCD Regulation VIII rules, pg. 9.

commitments and BACM analyses, including additional analyses the District has provided to address specific issues.

(1) Rule 8061 unpaved road vehicle trip count threshold

Rule 8061 applies to both private and public unpaved roads but does not apply to private agricultural unpaved roads subject to Rule 8081.

The 2002 PM-10 emissions inventory estimates 6.6 tons per day (tpd) for city and county owned roads, 3 tpd for non-agricultural private roads (e.g., canal and oil field roads), 8 tpd for U.S. Forest and Park Service roads, and 6.4 tpd for BLM roads.²⁹ In addition, the District attributes 3 tpd of windblown dust to "unpaved road travel dust (unspecified)", a part of which corresponds to sources subject to Rule 8061.

Rule 8061, as adopted on November 15, 2001, applies to unpaved roads with 75 vehicle trips. The District has committed to lower this threshold to 26 vehicle trips, add new requirements for city owned roads, and modify the format and reporting requirements of Rule 8061.

Specifically, the existing format of the Rule 8061 vehicle trip threshold applies on a per day basis, as opposed to average vehicle traffic. The District has committed to apply the rule on an average daily trip (ADT) basis because this is more in line with how public transportation departments assess vehicle traffic on roads and because these roads have a fairly consistent traffic density level throughout the year. We also note that this is consistent with the format of requirements for public unpaved roads in other PM-10 nonattainment areas, e.g., Maricopa County and Clark County. Also, the District has committed to require city and county jurisdictions to report the number of miles that exceed the vehicle trip threshold, which will facilitate implementation of the rule.³⁰

For urban roads, the District has committed to require paving of a targeted 20% or up to 5 miles of existing city owned unpaved roads located within each incorporated municipality over a

²⁹ Email from Hector Guerra, SJVUAPCD, to Karen Irwin, EPA Region 9, August 7, 2003, with attached analysis prepared by Mel Zeldin, Environmental Consultant, "Spreadsheet to show cost-effectiveness of unpaved road thresholds lower than 75 ADT". See attachment to this TSD.

³⁰ Supplemental BACM Analysis, pg. 7.

5-year period,³¹ and that all new non-temporary roads in urban areas be paved.³² Of the approximately 750 miles of city and county owned roads in the San Joaquin Valley, 4.2% (or 31.5 miles) are city owned roads while the remaining percentage are county owned roads predominantly located in rural areas.³³

A commitment in the District's plan amendments that increases coverage of both city and county owned roads is to require controls for unpaved roads that receive 26 ADT or more. Applicability of this requirement to public unpaved roads depends on how many have traffic levels that meet or exceed the 26 ADT threshold. While a specific assessment of traffic levels on unpaved roads is not yet available, in order to demonstrate BACM, the District has provided a cost-effectiveness analysis using a weighted average approach to estimate the number of unpaved road miles subject to Rule 8061 with \geq 26 ADT relative to unpaved road miles that exceed lower vehicle trip thresholds.³⁴ The District estimates that about 90 miles of unpaved roads have 26 ADT or more and 123 miles exceed a 20 ADT threshold. The District's cost-effectiveness estimate for coverage at the 26 ADT threshold is \$3,000/ton with total capital costs to public agencies of approximately \$1.7 million. The District estimates that total capital costs to public agencies at the lower 20 ADT threshold would be approximately \$2.4 million.

In reviewing Transportation Planning Agency (TPA) commitments, we also note that Tulare County has committed to pave 14.5 miles of unpaved roads by 2005 using \$1.1 million in Congestion Mitigation Air Quality funds.³⁵ Other counties have not made explicit road paving/stabilization commitments, commonly citing lack of funding that precludes them from making such commitments.

In considering whether an area's strategy for public unpaved roads meets BACM, we

³¹ April '03 RACM/BACM Analysis, Table G-13 "Identification and Justification of BACM Selection", pg. G-73.

³² 2003 PM-10 Plan, pg. 4-36.

³³ "San Joaquin Valley Unified APCD Control Profile Unpaved Road Travel Dust - City & County Roads 640-638-5400-0000 (47399) - 1999 Inventory Year", SJVUAPCD, February 5, 2003. See attachment to this TSD.

³⁴ Ibid., "Spreadsheet to show cost-effectiveness of unpaved road thresholds lower than 75 ADT".

³⁵ "Regional Transportation Planning Agency Commitments for Implementation: Volume Three", San Joaquin Valley Transportation Planning Agencies Director's Association, April 2003, Tulare County Board of Supervisors, Resolution No. 2002-0812, Exhibit A.

determine whether the plan's strategy demonstrates a good faith effort to pave or stabilize roads given availability of funding.³⁶ Specifically, EPA's BACM guidance states that "where the economic feasibility of a measure (e.g., road paving) depends on public funding, EPA will consider past funding of similar activities as well as availability of funding sources to determine whether a good faith effort is being made to expeditiously implement available control measures."³⁷

The District estimates that the coverage provided by its commitment will result in the paving or treating of approximately 90 miles of road.³⁸ The District's analysis shows that coverage at lower ADT thresholds would result in considerably higher capital costs to public agencies. Given the budgetary constraints discussed in the TPA SIP commitments, we propose to accept as "good faith effort" the Plan's coverage of city and county unpaved roads for purposes of meeting the BACM requirement. The District credits a conservative emissions reduction of approximately 1 tpd by 2010 from city and county unpaved roads.³⁹

The plan does not attribute any emissions reductions to other types of roads subject to Rule 8061. Unpaved public roads that are not county-owned (U.S. Forest and Park Service roads and BLM roads) are located outside of urban areas and generally have low estimated vehicle trip counts (e.g., 10 trips per day) that would preclude them from coverage under the 26 ADT threshold. Such roads are generally not subject to control in other serious PM-10 nonattainment

³⁶ The District's BACM analysis compares the Rule 8061 vehicle trip threshold for public unpaved roads to the 150 vehicle trip threshold EPA approved as BACM in other serious PM-10 nonattainment areas (along with city road paving commitments). However, our approval of an area's strategy to target unpaved roads of a specific traffic threshold (e.g., 150 vehicles per day or more) should not be interpreted as a policy statement that controls on unpaved roads in either those areas or in other areas with less than 150 vehicles per day do not need to be considered in a BACM analysis. Rather, we approved this strategy as BACM for the Phoenix metropolitan and Las Vegas areas given the large volume of unpaved roads that exceeded 150 vehicles per day in those areas and cost considerations involved in paving or otherwise stabilizing them. Costs associated with road paving above a given vehicle trip level vary from area to area depending on the nature of traffic on unpaved roads in the respective areas.

³⁷ 59 FR 41998, 42013, August 16, 1994.

³⁸ The District's commitment also acknowledges that uncertainty exists as to availability of funding to accomplish this task. Supplemental BACM Analysis, pg 8.

³⁹ This is based on the District's assumption that about 17% of emissions from these sources will be controlled according to "PM-10 Control Factors for Previous, Current and Proposed Regulation VIII", SJVUAPCD. See attachment to this TSD.

areas. Also, the District does not anticipate that private canal or oil field roads have traffic levels that would trigger the rule's requirements.

(2) Rule 8081 unpaved road vehicle trip count thresholds

Rule 8081 applies to off-field agricultural sources, including unpaved roads. The 2002 PM-10 inventory includes an estimate of 10.9 tpd for agricultural unpaved roads.⁴⁰

Rule 8081, as adopted on November 15, 2001, exempts unpaved roads on any days when they receive < 75 vehicle trips. On days when unpaved roads receive 100 trips or more, the surface must be treated (e.g., water, chemical dust suppressant, etc.) so that it is stabilized. On days when unpaved roads receive between 75 and 100 trips, 20% opacity must be met either by surface treatment or other technique (e.g., speed control).

The District has committed to adopt the following amendments to the existing coverage:⁴¹

- (A) Require compliance with both the 20% opacity standard and the surface stabilization standard at the 75+ vehicle trip threshold.
- (B) Establish an additional threshold of 26+ vehicle trips/day for trucks with three or more axles.

The District has provided a cost-effectiveness analysis that indicates it is economically feasible to apply water or dust suppressant on unpaved agricultural roads at the 75+ vehicle trip threshold.⁴² We note that this cost-effectiveness estimate is influenced by the amount of vehicle traffic assumed to be occurring on unpaved agricultural roads throughout the year and the resulting emissions, so it only has bearing as an estimate associated with agricultural roads in the San Joaquin Valley.⁴³ It is also feasible to apply controls on unpaved agricultural roads that do

⁴⁰ Emissions estimates for unpaved agricultural roads are based on road usage values provided by the agricultural sector. See attachment to this TSD.

⁴¹ 2003 PM-10 Plan, pg. 4-37.

⁴² Supplemental BACM Analysis, pgs. 19-25.

⁴³ While the San Joaquin Valley PM-10 Plan assumes 10.9 tpd of actively-generated emissions from unpaved agricultural roads, estimates of vehicle traffic levels and resulting emissions may be different in other areas. For example, in Maricopa County, actively-generated emissions from unpaved agricultural roads are estimated to be 20.8 tpd, so cost-effectiveness values there would be different. "Maricopa County PM-10 Serious Area State Implementation

not exceed the thresholds in Rule 8081, however, the District has opted to apply controls for these roads as part of the Agricultural CMP. Therefore, our evaluation of the District's unpaved roads strategy for BACM takes into account the combined effect of measures in Rule 8081 and the District's commitment to achieve 2.3 tons per day emissions reductions from measures applied to unpaved roads subject to the Agricultural CMP.

We accept the adequacy of the coverage provided for in the District's strategy as BACM. The District credits a conservative emissions reduction of 0.56 tpd from agricultural unpaved roads subject to Rule 8081 and a 2.3 ton-per-day reduction from Agricultural CMP unpaved road controls.⁴⁴

(3) Rule 8071 and Rule 8081 unpaved vehicle/equipment traffic area trip count thresholds

The 2002 PM-10 inventory includes an estimate of 6 tpd for agricultural unpaved vehicle/equipment traffic areas and 1 ton per day for all other types of unpaved parking lots.⁴⁵

Rules 8071 and 8081, as adopted on November 15, 2001, exempt unpaved vehicle/equipment traffic areas on any days when they receive < 75 vehicle trips. On days when unpaved traffic areas receive 100 trips or more, the surface must be treated (e.g., water, chemical dust suppressant, etc.) so that it is stabilized. On days when unpaved traffic areas receive between 75 and 100 trips, 20% opacity must be met either by surface treatment or other means (e.g., speed control).

For Rules 8071 and 8081, the District has committed to adopt a vehicle threshold of ≥ 50 annual average daily trips and ≥ 25 for vehicles with three or more axles.⁴⁶ The District also has committed to propose requiring 48-hour notification to the District of special events with parking of more than 1,000 vehicles on unpaved surfaces in Rule 8071. Finally, the District has committed to revise the existing 75 single-day vehicle trip threshold to a 150 single-day or 30-

Plan Revision Agricultural Best Management Practices", June 13, 2001, Enclosure 3, Attachment 5 "Technical Support Document for Quantification of Agricultural Best Management Practices", URS Corporation, November 1, 2000, pg. 3-11.

⁴⁴ This is based on the District's assumption that about 5.2% of emissions from these sources will be controlled according to "PM-10 Control Factors for Previous, Current and Proposed Regulation VIII", SJVUAPCD. See attachment to this TSD.

⁴⁵ 2003 PM-10 Plan, Table 4-11, pg. 4-38.

⁴⁶ Ibid., pg. 4-37.

day vehicle trip threshold based on a new cost-effectiveness analysis.⁴⁷

With respect to the 50 annual average daily trip threshold and the 25 vehicle trip threshold for vehicles with three or more axles, the District assessed the cost-effectiveness of applying polymer emulsion to a 1-acre unpaved parking area that receives 25 and 50 vehicle trips per day, respectively. The cost-effectiveness at the lower 25 vehicle trip threshold was estimated to be \$91,400 per ton versus \$9,420 at the 50 vehicle trip threshold.⁴⁸ On this basis, the District adopted the higher 50 vehicle trip threshold. The District conducted a separate cost-effectiveness analysis that supports the 25 vehicle trip threshold for vehicles with three or more axles.⁴⁹

With respect to replacing the 75 single-day vehicle trip threshold with a 150 threshold, the District's cost-effectiveness analysis concludes that the 75 vehicle trip threshold is not cost-effective (the lowest value calculated is \$34,256/ton). The District's analysis calculates the cost-effectiveness value of a 150 single-day threshold as ranging between \$9,894 to \$18,751/ton, which the District concludes is marginally cost-effective. These cost-effectiveness analysis values are heavily influenced by assumptions concerning the types, speeds and frequency of vehicles that travel on unpaved parking lots and corresponding emissions factors. As little data is available on the actual nature of travel on unpaved parking lots, we therefore rely on the District's assumptions.

We accept the adequacy of the District's cost-effectiveness analysis that the coverage provided in the PM-10 Plan Amendment meets BACM. The District's PM-10 Plan credits conservative emissions reductions in 2010 of 0.3 tpd from private unpaved traffic areas subject to Rule 8071 and 0.9 tpd from agricultural unpaved traffic areas subject to Rule 8081.⁵⁰

(4) Rule 8071 and Rule 8081 unpaved vehicle/equipment traffic area size threshold

Rules 8071 and 8081, as adopted November 15, 2001, contain an exemption for unpaved parking areas less than 1 acre in size. The District has committed to eliminate the

⁴⁷ Supplemental BACM Analysis, pgs. 10-14.

⁴⁸ March '03 BACM Analysis, pgs. 30-31.

⁴⁹ Supplemental BACM Analysis, pgs. 14-15.

⁵⁰ This is based on the District's assumption that 31.1% of emissions from private unpaved traffic areas and 15.8% of emissions from agricultural unpaved traffic areas will be controlled according to "PM-10 Control Factors for Previous, Current and Proposed Regulation VIII", SJVUAPCD. See attachment to this TSD.

1-acre threshold in the Regulation VIII rule development for farms within one mile of any incorporated city or unincorporated rural community.⁵¹ The District states that the impact of excluding farms that do not meet this criteria is negligible because agricultural unpaved traffic areas tend to be large for purposes of maneuvering farm equipment and the vehicle trip thresholds found to be cost-effective (i.e., 50 average annual vehicle trips and 150 single-day vehicle trips) would largely preclude smaller lots from coverage regardless.

(5) Rule 8081 unpaved road and unpaved vehicle/equipment traffic area exclusion of implements of husbandry in the trip count

The District has committed to eliminate the exemption for implements of husbandry from the vehicle trip count.⁵²

(6) Rule 8051 disturbed open areas threshold

Rule 8051, as adopted on November 15, 2001, applies only to non-agricultural open areas with 3 or more acres of disturbed surface. (Construction and demolition site disturbed open areas are subject to the requirements of Rule 8021.) Rule 8051 requires owners/operators of sites that meet the applicability criteria to apply one or more measures (e.g., dust suppressant or vegetation) so that the lot meets both the conditions for a stabilized surface (defined in Rule 8011) and a 20% opacity standard. In addition, upon evidence of vehicle trespass, owners/operators must apply a measure(s) that effectively prevents access to the lot.

The District committed to require a more stringent applicability threshold of 1,000 square feet of disturbed surface on ≥ 0.5 -acre lots in urban areas and ≥ 3 -acre lots in rural areas.⁵³ The District has provided information on parcel sizes in two counties that indicates at least 98% of total parcels are 3 acres or greater.⁵⁴ This suggests that only a very small percentage of rural non-agricultural disturbed open areas throughout the Valley would be exempt from coverage

⁵¹ Supplemental BACM Analysis, pgs. 28-29.

⁵² 2003 PM-10 Plan, pg. 4-37.

⁵³ 2003 PM-10 Plan, pg. 4-35.

⁵⁴ Based on assessor parcel data in Fresno and Tulare Counties, a weighted average of 98.4% of parcels are 3 acres or larger. Provided by email from Jennifer Barba, SJVUAPCD, August 7, 2003 with attached file "8051Parcel Info.xls" and email from Hector Guerra, SJVUAPCD, to Karen Irwin, EPA Region 9, August 7, 2003, with attached analysis prepared by Mel Zeldin, Environmental Consultant, "Open Area Acreage 072103.xls". See attachment to this TSD.

under the 3-acre threshold. Also, the assessor data indicates that less than 1% of parcels in the two counties are under 1 acre in size, therefore, even fewer open areas would be exempt under the urban area 0.5-acre threshold.

In light of the county assessor data provided by the District demonstrating broad rule coverage, we propose to approve the District's commitments to apply the thresholds discussed above as BACM. A reduction of 0.5 tpd is credited from this category for the area's 2010 attainment demonstration.⁵⁵

(7) Rule 8041 threshold for when trackout control devices must be employed

Rule 8041, as adopted November 15, 2001, requires measures to prevent trackout onto public paved roads for sites that receive 150 or more vehicle trips per day. In the Technical Support Document for our most recent proposed action on Regulation VIII, we noted that "...a BACM demonstration should consider expanding the specific requirement for preventative trackout control devices or paved interior roads to additional sites, in light of the demonstrated feasibility of this measure in other PM-10 nonattainment areas."⁵⁶

The District has committed to add a requirement that extends the coverage for when trackout control devices or other preventative measures need to be employed to sites that receive 20 or more 3-axle vehicle trips (i.e., ten 3-axle vehicles entering and leaving a site).⁵⁷

SJVUAPCD's BACM analysis found that the cost-effectiveness of this measure ranges from \$44,100 to \$387,000 per ton of PM-10 reduced.⁵⁸ Given the relatively high cost-effectiveness and that sites with little hauling activity have less propensity for trackout, we believe the exemption threshold is acceptable as BACM in light of the requirements to mitigate trackout should it occur. We approved a similar exemption in Maricopa County Rule 310, which requires trackout control devices at all sites with a disturbed surface area of five acres or larger and where 100 cubic yards of bulk materials are hauled on-site and/or off-site per day.⁵⁹ We consider the 100 cubic yard exemption in Maricopa County equivalent to a < 10 three-axle vehicle per day exemption in Rule 8041 since SJVUAPCD's BACM analysis indicates that a

⁵⁵ 2003 PM-10 Plan, Table 4-11, pg. 4-38.

⁵⁶ Op. Cit., EPA TSD, March 14, 2002, pg. 17.

⁵⁷ Supplemental BACM Analysis, pg. 4.

⁵⁸ March '03 BACM Analysis, pg. 22.

⁵⁹ Maricopa County Rule 310, section 308.3, a(1) and a(2).

typical three-axle dump truck has a 10-cubic-yard capacity.⁶⁰ The load capacity of 10 three-axle truck trips hauling material off-site, e.g., equals 100 cubic yards of bulk materials.

(8) Rule 8041 trackout cleanup requirements as they apply to rural areas

Rule 8041, as adopted on November 16, 2001, contains a requirement for immediate removal of trackout extending 50 feet or more from construction or industrial sources located in urban areas. This requirement does not apply to sources located in rural areas. (We note that Rule 8041 requires all sources to remove trackout at the end of the work day.⁶¹)

Other serious PM-10 nonattainment area rules require cleanup of trackout immediately that extends 50 feet or more.⁶² The District has committed to require construction sites 10 acres or larger in rural areas to immediately remove trackout onto public paved roads.⁶³ The District's justification for allowing rural sites < 10 acres to clean up all trackout at the end of the work day rather than immediately is that lower traffic volumes typical of rural areas produce fewer PM-10 emissions from entrainment of trackout and carryout.⁶⁴

We propose to accept as BACM the District's commitment to strengthen the trackout removal provisions as specified.

(9) Rule 8031 and Rule 8081 bulk materials thresholds

Rules 8031 and 8081, as adopted on November 16, 2001, contain an exemption for the storage and handling of bulk materials at a single site that is 100 cubic yards or less.

The District has committed to eliminate the 100-cubic yard exemption for materials

⁶⁰ March '03 BACM Analysis, pg. 21.

⁶¹ Rule 8041, sections 5.1 and 5.2.

⁶² Maricopa County Rule 310, section 308.3(b)(1); South Coast Rule 403 (d)(5)(B)(i) and (ii); Clark County Section 94 CST 19. We note that the South Coast AQMD PM-10 Plan for Coachella Valley contains a commitment to adopt a threshold of 25 feet for immediate cleanup of trackout, but this is not yet adopted in a rule.

⁶³ Supplemental BACM Analysis, pg. 5.

⁶⁴ Ibid., pg. 6.

handling.⁶⁵

The District has provided a BACM justification for retaining the 100-cubic yard exemption threshold for stored material (i.e., open storage piles).⁶⁶ The District analyzed the cost-effectiveness of controlling the smallest quantity of bulk materials that would be stored at a single site, i.e., 5 cubic yards. The District developed cost estimates associated with constructing a 3-sided enclosure. The resulting cost-effectiveness estimate was very high, \$659,000 per ton reduced. The District estimates the square footage of a 5 cubic yard pile to equal 124 square feet.

Requirements for bulk materials storage piles in other serious nonattainment areas contain an exemption for piles that are < 150 square feet in size.⁶⁷ The District's analysis confirms that at least an exemption of this size is appropriate given the exceedingly high cost-effectiveness value. The District's analysis does not consider the cost-effectiveness of the various means to control bulk materials storage piles that are between 5 cubic yards and 100 cubic yards in size. However, we note that the District's cost-effectiveness methodology states that if the worst case cost-effectiveness results exceed \$500,000 per ton, the District assumes that the best case scenarios are also infeasible and does not consider further measures. Since the District's worst case cost-effectiveness scenario for controlling bulk materials piles < 100 cubic yards equals \$659,000 per ton reduced, the District followed its methodology and has not considered adopting a lower threshold of control.

The District provided a cost-effectiveness value associated with watering storage piles as part of its December 6, 2001 Regulation VIII submittal. The District estimated the cost-effectiveness of watering a bulk material storage pile of 3,398 square feet as \$28,293 per ton reduced.⁶⁸ Using the District's assumption that a 5 cubic yard pile is approximately 124 square feet, a 3,398 square-foot pile would equal 716 cubic yards, or a storage pile considerably larger than those the District's rule exempts. Given that the District's cost-effectiveness estimate of watering such a pile is over 5 times higher than the District's \$5,700 per ton reduced cost-effectiveness criteria, we accept the reasonableness of the District's retention of the 100-cubic yard exemption since the cost-effectiveness of watering piles smaller than 100 cubic yards would be higher than \$28,293 per ton reduced.

⁶⁵ 2003 PM-10 Plan, pg. 4-34.

⁶⁶ March '03 BACM Analysis, pgs. 50-52.

⁶⁷ E.g., South Coast Rule 403, Maricopa County Rule 310.

⁶⁸ "Appendix C, Cost Effectiveness Analysis of Regulation VIII" September 27, 2001, pg. 12. See attachment to this TSD.

(10) Rule 8021 Dust Control Plan (DCP) requirement thresholds

Rule 8021, as adopted on November 15, 2001, requires that earthmoving projects disturbing 40 or more acres or moving > 2,500 cubic yards per day of bulk materials on at least three days prepare and submit a DCP to SJVUAPCD. Because sources subject to Rule 8021 are temporary in nature, DCPs are a means for the District to identify sources for rule enforcement purposes. DCPs also serve to increase industry awareness of applicable requirements, which improves rule effectiveness.

The District has committed to increase applicability of the DCP requirement as follows: "Require DCPs for residential projects larger than 10 acres and for commercial projects larger than 5 acres."⁶⁹ In addition, the District has committed to "require notification to the District of any earthmoving operations between 1 and 10 acres for residential construction projects, and 1 and 5 acres for commercial construction projects." The latter requirements would enable the District to identify and routinely enforce the Regulation VIII requirements at most earthmoving sites that are not required to submit a DCP.

As discussed in our March 14, 2002 TSD,⁷⁰ the requirement for submitting a DCP is related to rule effectiveness more than coverage (Rule 8021 control requirements apply to all earthmoving sites). The adequacy of the applicability threshold for a DCP depends on several factors that impact rule effectiveness, including the number of sites that fall below the thresholds, whether the District can effectively use an alternative mechanism to identify sites below the thresholds for enforcement purposes, the overall contribution of construction sites to the inventory relative to attainment needs accounting for growth factors, and whether the rule effectiveness value assumed for Rule 8021 in the PM-10 Plan for purposes of an attainment demonstration can be supported by the District's overall enforcement strategy.

The District has not provided an assessment of the number of earthmoving sites that fall below the proposed 10-acre DCP threshold for residential construction and 5-acre DCP threshold for commercial construction. However, the District has committed to use an alternative notification mechanism to identify sites below these thresholds that are 1 acre or greater. We assume that the majority of sites are greater than 1 acre in size, and therefore would either need to notify the District or submit a DCP. Therefore, we do not believe additional coverage of DCP requirements beyond what the District has committed to in the PM-10 Plan is necessary for BACM to be successfully implemented at construction sites.

(11) Control measures for existing sources of paved road emissions

⁶⁹ 2003 PM-10 Plan, pg. 4-34.

⁷⁰ Pg. 12.

Regulation VIII rules, as adopted on November 15, 2001, do not contain requirements that address existing sources of paved road emissions, with the exception of trackout control requirements in Rule 8041. The District has committed to add several requirements to control paved road emissions to Rule 8061. Commitments described in subsections b, c, and d below are estimated to achieve a 9.4 tpd day reduction by 2010.

(a) Preventing/mitigating agricultural source trackout

There are two means to control trackout onto paved roads: prevent trackout from occurring and mitigate trackout that has occurred. The types of measures to prevent and mitigate trackout from construction/earthmoving sites and industrial sources in Rule 8041 are similar to those that might be applied to agricultural sources.

With respect to mitigating agricultural trackout, the District has committed to include reference in Rule 8081 to the California Vehicle Code (CVC) requirements, sections 23112 and 23113, for dirt removal from public roads.⁷¹ This general State law requirement applies to any dirt accumulations tracked out from any source onto adjacent public paved roads, including agricultural sources. Incorporating the CVC provision into Rule 8081 enables District enforcement of the requirements. EPA approval of Rule 8081 would place the CVC requirements into the SIP.

Preventative measures for agricultural trackout are included in the Agricultural CMP Program.⁷²

We propose that the combination of committed Rule 8081 mitigative measures and inclusion of preventative trackout measures in the Ag CMP Program meets BACM for this source of paved road dust.

(b) Stabilizing existing unpaved shoulders

Rule 8061, as adopted on November 15, 2001, applies to new or modified paved road surfaces, but not to existing paved road surfaces. BACM is required not only for new but existing sources of fugitive dust.⁷³ The District has committed to require the following measure to address existing unpaved road shoulders: "Obtain commitments from municipalities to construct 4-foot paved shoulders on 50% of existing paved roads with the highest ADT in urban

⁷¹ Supplemental BACM Analysis, pg. 16.

⁷² Ibid., pg. 29.

⁷³ 59 FR 41998, 42010 (August 16, 1994).

areas and on 25% of existing paved roads with the highest ADT in rural areas (measure subject to state and local funding constraints).⁷⁴ Paving offers approximately 99% dust control efficiency on the surfaces paved.

The District's BACM analysis indicates that, as part of this measure, cities and counties would be required to survey all paved roads in order to assess traffic counts.⁷⁵ Because this survey has not yet been performed, the Plan does not contain a specific estimate for the miles of unpaved road shoulder that would be paved under the committed requirement. The BACM analysis provides a cost-effectiveness estimate for stabilizing unpaved road shoulders with polymer emulsion, which ranges from \$7,290 to \$11,300 per ton reduced.⁷⁶ The cost of paving shoulders would be higher. The Plan's BACM analysis shows that stabilizing shoulders is relatively more expensive than other control strategies for paved roads (aside from paving new or modified shoulders).⁷⁷ Thus, the District's strategy to selectively target unpaved shoulders of paved roads that experience heavy traffic volumes is appropriate.

The cities and counties have submitted individual commitments concerning a variety of paved road measures, including stabilization of unpaved road shoulders.⁷⁸ We summarize the commitments for unpaved road shoulder stabilization as follows:

Tulare County commits to spend approximately \$120 million of State Transportation Improvement Project funds to pave/stabilize 90 miles of paved road shoulders. Fresno County commits to spend \$1.5 million CMAQ funds to pave existing shoulders on 17.5 miles of roads. Kern County commits to spend \$2.4 million to stabilize 22.85 miles of existing unpaved road shoulders using road oil (conditional on funding availability). San Joaquin County commits to stabilize unpaved shoulders at a minimum rate of 2% annually through 2005 (conditional on funding availability). Other counties have not made specific commitments. Some small cities commit to stabilize 10% of unpaved shoulders annually on paved roads in their jurisdiction. Other cities commit to inventory

⁷⁴ 2003 PM-10 Plan, pg. 4-36.

⁷⁵ March '03 BACM Analysis, pg. 15.

⁷⁶ Other options for control include the use of recycled asphalt, double chip seal, or ½ inch gravel screened or washed to contain < 6 percent silt content.

⁷⁷ March '03 BACM Analysis, pg. 12.

⁷⁸ "Regional Transportation Planning Agency Commitments for Implementation", ["TPA commitments"], San Joaquin Valley Transportation Planning Agencies Director's Association, Volume Three, April 2003.

their existing unpaved road shoulders. We also note that shoulder improvements (e.g., adding curbs, gutter, and sidewalks) are a normal part of most roadway improvements (reconstructions) and widening, a routine activity of local jurisdictions.

Most county transportation departments that did not submit a specific commitment state that it is not economically feasible to stabilize unpaved shoulders of paved roads within their jurisdiction. This contradicts the District's committed measure that would require stabilization of road shoulders to some degree in all county jurisdictions. The District indicates the individual committed measures will ultimately be judged on technical and economic feasibility based on input from the public and stakeholders and from detailed socioeconomic study.⁷⁹ We propose to accept the District's commitment as BACM with the available cost effectiveness analysis provided in the Plan, in addition to the individual commitments from cities and counties to pave or stabilize existing road shoulders in their respective jurisdictions. We recommend to the District and transportation planning agencies that prioritizing unpaved road shoulders for paving or treatment also include as a factor an assessment of silt loading per road type (e.g., collector vs. arterial).

(c) Use of PM-10 efficient street sweepers and frequent street sweeping

Rule 8061, as adopted on November 15, 2001, does not require purchase, lease or use of PM-10 efficient street sweepers. The District has made the following commitments:⁸⁰

1. Require municipalities, or their contractors, to purchase PM-10 efficient street sweepers when new street sweepers are purchased;
2. Require municipalities (which conduct street sweeping programs) to purchase at least one PM-10 efficient street sweeper within three years;
3. Require that PM-10 efficient street sweepers are operated according to manufacturer's specifications;
4. Require priority sweeping on dirt-laden roads;
5. Require street sweeping frequency of at least once per month on roads where PM-10 efficient street sweepers are used.

The District's BACM analysis indicates that these measures are all very cost-effective.⁸¹

In reviewing transportation planning agency commitments, most but not all public

⁷⁹ 2003 PM-10 Plan, pg. 4-33.

⁸⁰ Ibid., pg. 4-36.

⁸¹ March '03 BACM Analysis, pg. 12.

transportation departments operate a street sweeping program with regular sweeping cycles. Similar requirements for the purchase or contracting for and use of PM-10 efficient street sweepers are in place in fugitive dust rules in the South Coast, Clark County and Washoe County.⁸²

We propose to accept the District's determination that the committed measures meet BACM.

(d) Rapid cleanup of material spills and erosion-caused deposits

Rule 8061, as adopted on November 15, 2001, does not require cleanup of spills or erosion-caused deposits. The District has made the following commitments.⁸³

1. Require removal of dirt/debris from roadways within 24 hours of identification of such conditions after a wind or rain runoff event.
2. Require that proper procedures be followed to minimize entrainment of material during removal of wind/rain related dirt deposits from roads.

The District's BACM analysis indicates the cost-effectiveness of these measures is \$2,840/ton. The measures are of equivalent stringency to requirements for erosion cleanup in Maricopa County, which also specify removal of material deposited within 24 hours, and in other areas.⁸⁴ We propose to accept the District's determination that the committed measures meet BACM.

6. Glass Manufacturing.

This category is estimated to emit 12.3 tpd of NO_x in 1999. SJVUAPCD Rule 4354, *Glass Melting Furnaces*, limits emissions of NO_x and other pollutants from glass melting furnaces in the San Joaquin Valley. On September 1, 2000 (65 FR 53181), EPA finalized a limited approval and limited disapproval of the version of Rule 4354 locally adopted on April 16, 1998. In that action, EPA noted that the rule as a whole strengthens the SIP, but identified several deficiencies regarding monitoring and compliance requirements.

SJVUAPCD amended Rule 4354 on February 21, 2002. In addition to addressing the issues identified in EPA's limited disapproval, this amendment changed the definition of "major

⁸² April '03 BACM/RACM Analysis, pg. 53.

⁸³ 2003 PM-10 Plan, pg. 4-36.

⁸⁴ April '03 BACM/RACM Analysis, pg. 52.

NOx source" from 50 to 25 tons or more per year of NOx, to reflect the San Joaquin Valley's reclassification from serious to severe ozone nonattainment status. EPA fully approved this Rule on December 6, 2002 (65 FR 72573).

SJVUAPCD's staff report supporting the 2002 amendments provides a rule consistency analysis that compares the elements of Rule 4354 with the corresponding elements of other District rules, federal regulations and guidelines that apply to the same type of equipment or source category. The staff report for the April 16, 1998, version of the rule described the rule as implementing BARCT.

The NOx emission limits in Rule 4354 for container glass furnaces are consistent with limits imposed in SCAQMD and the Bay Area Air Quality Management District. The SJVUAPCD conducted cost effectiveness and socioeconomic analyses for the emission limits in Rule 4354, and the results of these analyses are contained in the staff report for the April 16, 1998, version of the rule. The cost effectiveness estimates range from \$400 to \$9,500/ton of NOx reduced, depending on the specific type of facility and choice of control technology. See final draft staff reports for amendments to SJVUAPCD Rule 4354 (April 16, 1998 and February 22, 2002).

7. Manufacturing and Industrial Fuel Combustion.

This category is estimated to emit 24.3 tpd of NOx in 1999. SJVUAPCD commits to adopt new rules that would establish NOx emission standards for dryers based on PUC-quality natural gas, low excess air, low-NOx burners and flue gas recirculation; require low excess air, low-NOx burners and flue gas recirculation for small boilers, steam generators and process heaters; and require BACM-level prohibitions for industrial, commercial and institutional water heaters. We understand this will generally establish 30 ppm NOx limits similar to South Coast AQMD Rules 1146.1 and 1146.2.

These rules will be adopted by 2Q/04, 4Q/04 and 4Q/04; implemented by 2006, 2006 and 2004; and will reduce emissions by 1.0, 1.0 and 0.2 tpd of NOx respectively, although not all these reductions fall within this source category. See pages 4-22, 4-23, 4-30, 4-31 and 4-42 to 4-44.

8. Natural Gas Boilers.

This category is estimated to emit 3.7 tpd NOx in 1999. SJVUAPCD Rule 4351, *Boilers, Steam Generators, and Process Heaters - Phase 1*, Rule 4305, *Boilers, Steam Generators, and Process Heaters - Phase 2*, and Rule 4306, *Boilers, Steam Generators, and Process Heaters - Phase 3*, limit emissions of NOx and other pollutants from gaseous fuel or liquid fuel fired boilers, steam generators, and process heaters with a total rated heat input greater than 5 million

Btu per hour. These rules establish different emission limits and compliance schedules depending on unit type, fuel and size. On February 28, 2002, EPA published a final limited approval and limited disapproval of Rule 4305, locally adopted on December 19, 1996, and Rule 4351, locally adopted on October 19, 1995. In this action, EPA noted that the general requirements of these rules would strengthen the SIP, but identified several deficiencies regarding rule applicability and enforceability that prevented EPA from fully approving the rule. See 67 FR 9209 (February 28, 2002).

SJVUAPCD amended Rules 4351 and 4305 on August 21, 2003, and adopted Rule 4306 on September 18, 2003. The District took these actions partly to address the issues identified in EPA's limited disapproval but also to establish BACM level of control for this source category.

SJVUAPCD's staff report supporting the 2003 amendments for Rule 4305 and 4351, and the adoption of Rule 4306, provides a detailed analysis of the technological and economic feasibility of possible control technologies. This includes socioeconomic and cost effectiveness analyses of combustion modification and exhaust gas treatment. The analysis also includes comparison to analogous requirements in other nonattainment areas. While Rules 4305 and 4351 remain enforceable, they will become obsolete as the more stringent limits of Rule 4306 become effective. These limits are generally at least as stringent as State BARCT. SJVUAPCD estimates that Rule 4306 will reduce NO_x emissions by about 7.7 tons/day in 2005. The cost effectiveness analysis shows that values improve for larger units, higher operating capacity factor, and more restrictive NO_x limits. Cost effectiveness estimates range from \$4,177-\$276,909/ton of NO_x, depending on type and size of unit, capacity factor, and other parameters. The NO_x emission limits of Rule 4306 for existing units are generally more stringent than the limits contained in the federal New Source Performance Standards for new units (40 CFR Part 60, Subpart D and Db). See final draft staff report to SJVUAPCD Rules 4305, 4351 and 4306 (September 18, 2003). In a separate rulemaking, we are proposing approval of these rules.

9. Natural Gas Fired Oilfield Steam Generators.

This category is estimated to emit 6.4 tpd of NO_x and 1.4 tpd of PM-10 in 1999. The discussion above of NO_x controls for natural gas boilers in Rule 4306 applies to natural gas fired oilfield steam generators as well. Page 4-18 states that a BACT investigation revealed that there are no available controls for PM-10.

10. Oil Drilling and Workover.

This category is estimated to emit 10.8 tpd of NO_x in 1999. The PM-10 plan (pages 4-18, G-133 and G-134) explains that SJVUAPCD Rule 2280 and CARB's portable equipment registration program (PERC, see 13 California Code of Regulations 2450-2466) provide BACM for this category. These rules establish numerous operational requirements and emission

limitations for applicable engines. Sources may choose to register engines, including those used for oil drilling and workover, under either PERC or SJVUAPCD's analogous Rule 2280 program. Most sources register under PERC because it is less expensive and allows use of portable engines throughout the state. To register under PERC, engines manufactured after January 1, 1996 must meet the most stringent emission standard (see 13 CCR 2456(e)(b)), which is effectively California's Off-Road Compression Ignition Engine Standards.

11. Open Burning.

This category is estimated to emit 4.6 tpd of NO_x and 11.3 tpd of PM-10 in 1999. EPA has separately determined that SJVUAPCD Rule 4103 implements BACM for open burning. See 67 FR 8894 (Feb. 27, 2002).

12. Prescribed Burning.

This category is estimated to emit 16.5 tpd of NO_x and 28.9 tpd of PM-10 in 1999. EPA has separately determined that SJVUAPCD Rule 4106 implements BACM for prescribed burning. See 67 FR 8894, (Feb. 27, 2002).

13. Residential Space Heating.

This category is estimated to emit 2.7 tpd of NO_x in 1999. SJVUAPCD commits to adopt a new rule requiring that newly installed residential furnaces emit no more than 40 nanograms NO_x per joule of heat output. This standard is equivalent to controls adopted in the South Coast, Bay Area and other parts of California, and is believed to be the most stringent in effect in the country.

This rule will be adopted by 3Q/04, implemented fully by 2020, and will reduce NO_x emissions by 0.01 tons/day. See pages 4-22, 4-23, 4-45 and 4-46.

14. Residential Water Heaters.

This category is estimated to emit 1.6 tpd of NO_x in 1999. SJVUAPCD Rule 4902, *Residential Water Heaters*, limits NO_x emissions from residential gas-fired water heaters in the San Joaquin Valley. This rule establishes a maximum NO_x emission limit for newly manufactured water heaters with a rated heat input less than or equal to 75,000 Btu/hr. Rule 4902 was originally adopted by the SJVUAPCD on June 17, 1993 and submitted to EPA on November 4, 2003 as a revision to the SIP. EPA is publishing a separate direct final approval of this submittal.

SJVUAPCD estimates that the 40 nanograms per joule of heat output limit in Rule 4902

will reduce NOx emissions by 2.24 tons per day by 2003. SJVUAPCD estimates the cost effectiveness of the rule to be \$1100 per ton NOx per year.

The requirements in Rule 4902 are among the most stringent in the country and the NOx emission limit is equivalent to limits in effect elsewhere in California (e.g., Sacramento, Santa Barbara and Ventura). SCAQMD Rule 1121, however, establishes more stringent emission limits for these sources of 20 and 10 nanograms of NOx per joule, effective July 1, 2002 and January 1, 2005, respectively. When these more stringent limits are demonstrated to be commercially available without alternative compliance mechanisms, they may become a basis for future BACM determinations. See staff report to SJVUAPCD Rule 4902 (May 25, 1993).

15. Residential Wood Combustion.

This category is estimated to emit 11.3 tpd of PM-10 in 1999. EPA has separately determined that SJVUAPCD Rule 4901 implements BACM for residential wood combustion. See 68 FR 56181(Sept. 9, 2003).

16. Service and Commercial-Other Fuel Combustion.

This category is estimated to emit 25.7 tpd of NOx and 1.0 tpd of PM-10 in 1999. SJVUAPCD has committed to adopt new rules that would establish NOx emission standards for dryers based on PUC-quality natural gas, low excess air, low-NOx burners and flue gas recirculation; require low excess air, low-NOx burners and flue gas recirculation for small boilers, steam generators and process heaters; and require BACM-level prohibitions for industrial, commercial and institutional water heaters. We understand this will generally establish 30 ppm NOx limits similar to South Coast AQMD Rules 1146.1 and 1146.2.

These rules will be adopted by 2Q/04, 4Q/04 and 4Q/04; implemented by 2006, 2006 and 2004; and will reduce emissions by 1.0, 1.0 and 0.2 tpd of NOx respectively, although not all these reductions fall within this source category. See pages 4-22, 4-23, 4-30, 4-31 and 4-42 to 4-44.

17. Solid-Fuel Boiler, Steam Generators and Process Heaters.

This category is estimated to emit 3.5 tpd of NOx in 1999. SJVUAPCD Rule 4352, *Solid Fuel Fired Boilers, Steam Generators, and Process Heaters*, limits emissions of NOx and other pollutants from boilers and similar units burning coal, biomass and other solid fuels in the San Joaquin Valley. On February 11, 1999 (64 FR 6803), EPA published a direct final approval of the version of Rule 4352 locally adopted on October 19, 1995. In this action, EPA noted that the emission limits in Rule 4352 (e.g., 0.20 lb/MMBtu of heat input for coal) generally fulfilled RACT requirements.

Appendix G, Exhibit D, of the PM-10 Plan provides an analysis of the 15 units subject to Rule 4352. This analysis compares the emission limits in District permits with analogous limits provided in EPA's RACT/BACT/LAER clearinghouse. The analysis shows that each District permit is more stringent than the average limit found in the clearinghouse for similar sources (e.g., large coal units, medium biomass units).

Because cost, feasibility and effectiveness of control vary widely in this source category depending on fuel, size and design of each unit, a BACM demonstration for the category is necessarily complex. The methodology provided by SJVUAPCD is conservative in that the RACT/BACT/LAER clearinghouse describes controls for new sources, which are generally more stringent than those required as BACM for existing sources. However, some of the clearinghouse requirements may be dated and BACM is generally implemented by rule rather than permit. Given the relatively small size of this source category and the complexity of the analysis, we believe SJVUAPCD has made reasonable assumptions on balance.

18. Stationary Gas Turbines.

This category is estimated to emit 10.2 tpd of NO_x in 1999. SJVUAPCD Rule 4703 limits emissions of NO_x and other pollutants from stationary gas turbine systems with ratings equal to or greater than 0.3 megawatt (MW) and/or maximum heat input ratings of more than 3 million Btu per hour. This rule that establishes different emission limits and compliance schedules depending on turbine size, fuel and design. On February 28, 2002, EPA published a final limited approval and limited disapproval of the version of Rule 4703 locally adopted on October 16, 1997. In this action, EPA noted that the emission limits in Rule 4703 (e.g., 9-42 ppmv NO_x, depending on size, for natural gas fired units) generally established RACT-level of control for this source category, but EPA noted several other deficiencies in the rule, however, regarding rule applicability and enforceability that prevented EPA from fully approving the rule. See 67 FR 9209.

SJVUAPCD amended Rule 4703 on April 25, 2002. In addition to addressing the issues identified in EPA's limited disapproval, this amendment significantly tightened the emission limits (e.g., 3-35 ppmv NO_x, depending on size, for all but one natural gas fired design). SJVUAPCD tightened the emission limits partly to fulfill State BARCT.

SJVUAPCD's staff report supporting the 2002 amendments provides a detailed analysis of the inventory of affected turbines and the technological and economic feasibility of possible control technologies. This includes socioeconomic and cost effectiveness analysis of dilutant injection, dry low-NO_x (DLN), selective catalytic reduction (SCR) and other control systems. The analysis also includes comparison to analogous requirements in other nonattainment areas. SJVUAPCD's 2002 amendments to Rule 4703 establish BACM level of control for this source category. SJVUAPCD estimates that the 2002 amendments will reduce NO_x emissions by about

5.4 tons/day in 2010. SJVUAPCD estimates that the cost effectiveness of the amendments range from \$4,300 to \$18,000/ton NO_x/year, depending on the specific requirement. See final staff report to SJVUAPCD Rule 4703 (April 25, 2002). In a separate rulemaking, we are proposing action on this rule.

V. Additional Information on Modeling for the Attainment Demonstration

Summary of EPA Guidance

- Guideline of Air Quality Models, 40 CFR Pt. 51, App W. 7.2.2 Particulate Matter.
- PM10 SIP Development Guideline (EPA-450/2-86-001), June 1987.
- Protocol for Applying and Validating the CMB Model (EPA-450/4-87-020), May 1987
- Receptor Model Technical Series, Volume V: Source Apportionment Techniques and Considerations in Combining Their Use. (EPA - 450/4-87-010), May 1987

Summary of Plan Cites

Chapter 5, Appendices K and L, and References 6-10 of the SJV PM-10 Plan summarize the modeling methodology and modeling results for the plan. Chapter 6 and Appendix N summarize the attainment methodology and procedures. These references are summarized below:

- Chapter 5, Modeling Demonstration, 2003 PM10 Plan
- Chapter 6, Attainment Projections
- Appendix K, SJVAPCD Modeling Protocol
- Appendix L, CART Analysis Summary Report
- Appendix M, UAM Documentation for NO_x and Ammonia
- Appendix N, Rollback Documents
- Reference 6: Chemical and Meteorological Analysis
- Reference 7: Meteorological Analysis
- Reference 8: CMB Profile Selection Documents
- Reference 9: CMB Modeling Documentation
- Reference 10: Rollback Modeling of Additional Episodes

Summary of the statutory and policy requirements for demonstrating attainment of the PM-10 standard

The CAA section 189(b)(1)(A) requires a demonstration (including air quality modeling) - (i) that the plan provides for attainment of the PM-10 national ambient air quality standard by the applicable attainment date. The Guideline on Air Quality Models (GAQM), 40 CFR Pt. 51, App W, has a detailed discussion of modeling requirements for particulate matter.

For the purposes of this evaluation, we are using a two-step approach which will incorporate the procedures discussed in the GAQM and EPA guidance. The first step involves identifying the source contribution to measured concentrations above the PM-10 standard in the San Joaquin Valley through receptor modeling and will be discussed in sections 4 and 5, below.

The second step involves identifying the relationship between source categories and PM-10 concentrations for specific sites and specific days and the effect of emission reductions from the proposed control strategy on PM-10 concentrations, and will be discussed in sections 7 and 8 below. The attainment demonstration for both the annual and 24-hour standard will be discussed.

Summary of how the 2003 PM-10 Plan meets the CAA requirements for demonstrating attainment of the PM-10 standard

1. Introduction

For the reasons discussed below, we propose to find that the SJV 2003 PM-10 Plan demonstrates attainment of the 24-hour and annual PM-10 standard. We propose to find that the attainment demonstration is based on acceptable modeling techniques.

2. EPA Modeling Requirements and Guidance

The GAQM (40 CFR Pt. 51 7.2.2. (c.) Particulate Matter) states that "No model recommended for general use at this time accounts for secondary particulate formation or other transformations in a manner suitable for SIP control strategy demonstrations." A significant portion of both the annual and 24-hour particulate matter in the San Joaquin Valley is secondary particulate matter, as discussed in section 4 below, as well as in Reference 9: CMB Modeling Documentation, pp 5-10, and Attachment 2. For this reason, although the SJV Plan included dispersion modeling (Appendix M, UAM Documentation for NO_x and Ammonia), it was not relied upon for this action.

The GAQM (40 CFR 7.2.2. (c.) Particulate Matter) states that "Where possible, the use of receptor models in conjunction with dispersion models is encouraged to more precisely characterize the emission inventory and to validate the source specific impacts calculated by the dispersion model. A SIP development guideline, model reconciliation guidance, and an example model application are available to assist in PM-10 analysis and control strategy development. Under certain conditions, recommended dispersion models are not available or applicable. In such circumstances, the modeling should be approved by the appropriate Regional Office on a case-by case basis." As stated above, recommended dispersion models are not applicable for areas with secondary particulate formation. Therefore, the modeling methodology was based on the modeling protocol specific to San Joaquin Valley (Appendix K, SJVAPCD Modeling Protocol), based on guidance provided in the PM10 SIP Development Guideline (PMSDG).

The PM10 SIP Development Guideline (PMSDG) presents three options for estimating

air quality impact of emission of PM10 using dispersion and receptor models.⁸⁵

- (1). use of receptor and dispersion models in combination(preferred);
- (2). use of dispersion model alone; and
- (3). use of two receptor models, with control stratagem developed using a proportional model.

This latter approach is only encouraged if no applicable dispersion model is available. As discussed above, because of the high proportion of secondary particulate matter in the San Joaquin Valley, no applicable dispersion model is available. Therefore, modeling demonstration was based on the use of two receptor models, with control stratagem developed using a proportional model.

The recommended approach for PM10 Source Apportionment is receptor methods (at least two), Chemical Mass Balance (CMB) with a corroborating method.⁸⁶ If CMB is used for source apportionment, it is required that at least one other modeling approach be used as a corroborating analysis. This may be factor analysis, microscopy, automated scanning electron microscopy, microinventory, trajectory analysis, or other corroborating approach.⁸⁷ In the PMSDG, the terms "model" and "method" are used interchangeably, even though analysis methods such as scanning electron or optical microcopy are methods, not models.⁸⁸

SJV has based the attainment demonstration on receptor modeling (CMB) with several corroborating approaches as discussed in section 6, below. The control stratagem was developed using a proportional model and is discussed in Section 7 and 8 below.

3. SJV PM-10 Plan Overall Modeling Approach

The 2003 PM-10 Plan relies on receptor modeling (References 8 and 9), supported by corroborating analysis (Appendix L and References 6, 7, and 10), together with a proportional model (Appendix N), for the attainment demonstration. For the 24-hour PM-10 NAAQS, a receptor modeling analysis was performed for each monitoring site on each day in the 1999-2001 time period when the PM-10 concentration exceeded the PM-10 standard. A proportional model was subsequently applied for each value. An example of this approach for an exceedance of the 24-hour standard is given in Section 9 below. For the annual standard, the monthly average

⁸⁵ PMSDG 4.1 Introduction

⁸⁶ PMSDG Table 4-2 Recommended Approaches for PM10 Source Apportionment

⁸⁷ PMSDG 4.4 Receptor Models for Estimation PM10 Concentrations.

⁸⁸ PMSDG p. 4-11

source contributions, as determined by the CMB model, were averaged to calculate the annual average PM-10 source contributions. An example of the approach for the determining the source contributions to the annual standard is given in Section 10.

4. Receptor Modeling for the 24-hour PM-10 Concentrations Above the Standard

Procedures collectively known as receptor models are available that examine an ambient monitor sample of particulate matter and the conditions of its collection to infer the types or reactive mix of sources impacting on it during collection. The most widely used and accepted quantitative receptor model is the chemical mass balance (CMB) model.⁸⁹ The most current version of the chemical mass balance model, CMB8, was used to reconcile emission sources with ambient air quality measurements in the SJV.

The Protocol for Applying and Validating the CMB Model (EPA -450/4-87-020, May 1987) is the primary guideline for the Chemical Mass Balance Model. The receptor modeling procedures, results and performance statistics for the San Joaquin Valley Plans are described in Reference 9: CMB Modeling Documentation.

The exceedance days and sites that were modeled using CMB are shown in Table 3, p.4 of Reference 9. Eight days were modeled (1/12/99, 10/21/99, 11/14/99, 12/17/99, 12/23/99, 1/1/01, 1/4/01, 1/7/01). A total of 23 exceedances were modeled, as several days measured exceedances at more than one monitoring site. The measured mass of PM-10 for the exceedance days ranges from 157 ug/m³ to 208 ug/m³. The routine monitoring network did not have sufficient speciation data for CMB modeling for each of the modeled days. Therefore, for days that lacked speciation data, each episode that resulted in a violation of the 24-hour standard was identified and matched with an appropriate site and date that could be modeled based on representative meteorology and expected source contribution. Chemical composition of each modeled exceedance day was estimated using episode specific assumptions, which are listed in Tables 4-12.⁹⁰ The source profiles are given in Tables 13-20. The fitting species used for the analysis are listed in Table 22.

The performance statistics criteria for receptor modeling are outlined in the Protocol for Applying and Validating the CMB Model in Section 3.3, Outputs, Statistics and Diagnostics - Definitions. Performance statistics for SJV Plan 24-hour standard the receptor models are listed in Table 24: CMB Performance Measures - by Site /Exceedance Day. Most (21 of 23) of the exceedance dates met all EPA performance criteria.

⁸⁹ PMSDG. 4.1 Introduction.

⁹⁰ Reference 9: CMB Modeling Documentation Tables 4 -12.

Table 26 lists the CMB Source Apportionment for the 24-hour standard. For most winter days, at most sites, ammonium nitrate is the largest contributor to the PM-10 concentration (53 - 109 ug/m³). Geological material (10 -59 ug/m³) and woodsmoke (14-40 ug/m³) also contribute. Motor vehicle exhaust(2-25 ug/m³), tires and brakes (0.9-4.7 ug/m³), and ammonium sulfate (3.8 -7.7 ug/m³) have a smaller contribution. The autumn exceedances have a relatively greater contribution from geological material (62 ug/m³-92 ug/m³), and less contribution for ammonium nitrate (16 ug/m³ -24 ug/m³), than the winter episode.

5. Receptor Modeling for the Annual PM-10 Standard

The receptor modeling for the annual standard was based on a composite of monthly CMB results for the months of February through December 2000 and January 2001. Statistics for the annual standard are listed in Table 25, p. 37 of Reference 9: CMB Modeling Documentation. All annual average values met all EPA performance criteria.

Table 27 lists the source apportionment for the annual averages. The largest contributor is from geological material (18-23 ug/m³), with smaller contributions from ammonium nitrate (7.4-8.5 ug/m³), woodsmoke (4.5-4.8 ug/m³), motor vehicle exhaust(3-3.3 ug/m³), tires and brakes (0.3-1.0 ug/m³), and ammonium sulfate (2.3-2.7 ug/m³).

6. Corroborating Analyses

The PMSDG requires, if CMB is used for source apportionment, that at least one other modeling approach be used as a corroborating analysis, such as factor analysis, microscopy, automated scanning electron microscopy, microinventory, trajectory analysis, or other corroborating approach. The corroborating approaches for the analysis are described in the following document: Receptor Model Technical Series, Volume V: Source Apportionment Techniques and Considerations in Combining Their Use (RMTS). The SJV 2003 PM-10 Plan incorporated several corroborating approaches, outlined below:

a. Correlation Coefficients. The SJV Plan uses correlation coefficients as a corroborating analysis. Section 2.3.7.10, Correlation Coefficients, of the RTMS discusses the use of statistical analysis of particulate data. In Appendix L, results of the CART Analysis Summary Report; The Classification and Regression Trees (CART) model are presented. The CART model establishes the relationships between dependent air quality (i.e. PM-10 and PM_{2.5}) variables and independent meteorological variables such as relative humidity, temperature, stability, precipitation, visibility, etc.

b. Episode Day Analysis and Time Series Analysis. The SJV plan also uses the episode day analysis as a corroborating approach. Section 2.3.7.8. Episode Day Analysis, states that "Days are selected on which higher than typical particulate matter concentrations are recorded

throughout an area. The meteorological data are examined to determine the possible influence of inversions, stagnation conditions, days since last significant precipitation event, etc.” Section 2.3.7.11 Time Series Analysis. “The 24 - hour concentration measurements for all sites will usually vary in a similar manner. Sites and periods which do not vary similarly are indicative of events that occur on a neighborhood scale. Time series plots can also be prepared to compare changes in particulate matter concentrations to changes in meteorology and other parameters.”

The following references provide supporting documentation for corroborative time series and episode day analysis provided in the San Joaquin Valley Plan: Reference 6: Chemical and Meteorological Analysis; and Reference 7: Meteorological Analysis.

c. Wind Trajectories. The final corroborating approach used is wind trajectories. This approach is outlined in Section 2.3.7.12, Wind Trajectories and Pollution Roses, of the RTMS . Reference 8: CMB Profile Selection Documents, pages R8-53-61.

7. Proportional modeling for the 24-hour standard.

The development of control strategies is discussed in Chapter 6 of the PMSDG, Section 6.4.1., which describes the proportioning method that can be used at each site to estimate control requirements for SIP development. The modeling is based on the assumption that, for primary sources (vegetative burning, motor vehicle, tire/brake, and geological material) each given percentage reduction in emissions yields the same percentage reduction in concentration at the receptor. This assumption is applied to each source individually, and the individual source changes are added in proportion to the sources contribution to the observed concentration. The procedure is slightly modified for secondary particulate (sulfate and nitrate). Ideally, the relationship between emissions and concentration would be based on dispersion modeling for secondary particulate matter. As stated above, no acceptable dispersion modeling for secondary particulates exists for the San Joaquin Valley at the time of the proposal. Therefore a ratio of 1.5:1 reduction in precursor to nitrate was used, which is more conservative than a 1:1 ratio. This ratio will be revised when acceptable modeling based on the CRPAQS study is available.

The PMSDG states that the SIP must demonstrate that the control requirements will be adequate to meet the NAAQS under the design day conditions. In addition, the SIP must demonstrate that the control requirements will be adequate to meet the NAAQS under situations where the relative source contributions may be different from that on the design day. The SJV Plan fulfills this requirement by determining the effect of the proposed control strategy for each day at each site when the measured concentration is above the 24-hour PM-10 standard.

The proportional modeling for the plan is discussed in Appendix N, Rollback Documentation. The proportional modeling analysis for each day when the 24-hour PM-10 standard is exceeded is presented on pages N1-43.

In EPA guidance (GAQM 9.2), background is to be determined from a regional background monitor. The background calculation should be based on actual observations in non-urban areas near the boundary of the area or on model estimates of the actual impact of the sources not under investigation.⁹¹ The determination of the background concentration is discussed in Appendix K, SJVAPCD Modeling Protocol, page 62. The background concentrations are presented for the day and site specific proportional analysis in Appendix N, pages N 1- 37.

8. Proportional Modeling for the Annual Standard

The procedures for determining the emission limits for the annual average standard are outlined in Section 6.4.2, Example for annual averages, of the PMSDG. The procedures for proportional modeling for the annual standard for the SJV Plan are presented in Appendix N, Rollback Documents, pages N 2-18 and N 43. For each of the four sites (Bakersfield - Golden # 2, Fresno - Drummond St., Hanford - Irwin St., and Visalia - Church St.), source contributions were determined for each month using receptor modeling. The results from the CMB modeling indicate the contribution on a monthly basis from vegetative burning, motor vehicle, tire/brake, sulfate, nitrate, and geological material, and are shown on shown on pages N 11. The monthly average source contributions were then combined to create an annual average source contribution. The proportional modeling for the annual standard, based in on the annual average source contribution is presented for each site on pages N 3-10.

9. Example Receptor Modeling, Corroborative Analysis and Proportional Modeling for a Representative Exceedance of the 24-Hour Standard

January 4, 2001, Bakersfield Golden Street was selected as a representative day for the 24-hour modeling because it represents a typical high winter day. The measured concentration, 208 ug/m³ was the highest measured concentration modeled.

The receptor modeling for each exceedance day is documented in Reference 9: CMB Modeling Documentation. The modeling assumptions for 1/4/2001 are listed in Table 12. Winter 2000/2001 - Assumptions. Table 13. Winter 2000/2001 - Measured and Estimated Concentrations indicates that the measured nitrate/sulfate concentration is 106 ug/m³, total carbon, 38 ug/m³ geological material 47 ug/m³. Table 24: CMB Performance Measures, indicates that on 1/4/01 at the Bakersfield Golden site, all performance measures met EPA Criteria.⁹² The percent of mass accounted for was 93.6% (EPA target - 80% to 120%), the R -

⁹¹ PMSDG p. 6-11

⁹² Protocol for Applying and Validating the CMB Model (EPA-450/4-87-020), May 1987.

squared value was 0.8 (EPA target - 0.8 to 1.0), and the Chi-Squared value was 3.1 (EPA target - 0.0 to 4.0). Table 26: CMB Apportionment - Exceedance Days indicates the source contribution ug/m³ for 1/4/01 at Bakersfield is wood burning - 23.6 ug/m³, motor vehicle exhaust - 6.8 ug/m³, tires and brakes- 1.3 ug/m³, ammonium nitrate - 96.6 ug/m³, ammonium sulfate - 7.1 ug/m³, geological - 58.9 ug/m³.

The proportional modeling for the Bakersfield Golden site on 1/4/01 is shown on pages N33-34 of Appendix N. The proportional modeling documentation shows that the control strategy for the SJV plan results in substantial reductions of ammonium nitrate, vegetative burning, and geological material. Line 1 on page N-33 represents the base case source apportionment, from Table 26. Line 2 represents the background value for this date. Lines 3-7 represent the regional/subregional/local contributions to the PM-10. The projected concentration for the year 2010, after controls (shown on line 224) is a 151.48 ug/m³. The most substantial reductions are from ammonium nitrate (reduced from 96.6 ug/m³ to 75.9ug/m³), vegetative burning (reduced from 23.6 ug/m³ to 5.2 ug/m³) and geological (reduced from 58.9 ug/m³ to 42.3 ug/m³). Smaller reductions are achieved from motor vehicle exhaust (reduced from 6.8 ug/m³ to 4.9 ug/m³), and ammonium sulfate (reduced from 7.1 ug/m³ to 5.1 ug/m³). There were slight increases in the concentrations of organic carbon (increased from 7.0 ug/m³ to 7.3 ug/m³), and tires and brakes (increased from 1.3 ug/m³ to 1.9 ug/m³).

10. Example Receptor Modeling, Corroborative Analysis and Proportional Modeling for a Representative Exceedance of the Annual Standard

The Bakersfield Golden was selected for the example annual modeling because the design value for this site, 57 ug/m³, is the highest annual design value for the San Joaquin Valley. The receptor modeling for the annual standard was based on a composite of monthly CMB results for the months of February through December 2000 and January 2001. Table 27 lists the source apportionment for the annual averages. For the Bakersfield Golden site, the largest contributor is from geological material (23.9 ug/m³), with contributions from ammonium nitrate (7.6 ug/m³), woodsmoke (4.8 ug/m³), motor vehicle exhaust (3.3 ug/m³), tires and brakes (1.0 ug/m³), and ammonium sulfate (2.6 ug/m³).

The proportional modeling, documented in Appendix N, shows that the most substantial reductions of PM-10 for the annual standard result from reductions in ammonium nitrate and geological material. Line 1 on page N-5 represents the base case source apportionment, from Table 27. Line 2 represents the background value for this date. Lines 3-7 represent the regional/subregional/local contributions to the PM-10. The projected concentration for the year 2010, after controls (shown on line 224) is 48.6 ug/m³. The most substantial reductions from the base case to the year 2010 controlled values are from ammonium nitrate (reduced from 14.9 ug/m³ to 11.8 ug/m³) and geological (reduced from 26.7 g/m³ to 23.3 ug/m³). Smaller reductions are achieved from motor vehicle exhaust (reduced from 3.6 ug/m³ to 2.7 ug/m³),

vegetative burning (reduced from 4.41 ug/m³ to 3.8 ug/m³), and ammonium sulfate (reduced from 3.0 ug/m³ to 2.4 ug/m³). There were slight increases in the concentrations of organic carbon (increased from 1.89ug/m³ to 2.0 ug/m³), and tires and brakes (increased from 1.1 ug/m³ to 1.6 ug/m³).

11. Attainment Demonstration

The results of the proportional modeling for the 24-hour standard and annual standard are presented in Tables 2 and 3 below, which show for the current and future design concentrations for each site which exceeds the standard.

Table 2: Simulated Future Year 24- hour PM-10 values

Site Name	Design Value	2010 without additional reductions	2010 with additional reductions
Bakersfield -California Ave.	190	186	137
Bakersfield - Golden # 2	205	203	151
Clovis	155	145	120
Corcoran, Patterson Ave.	174 174	185 197	143 138
Fresno - Drummond	186	181	140
Fresno - First St.	193	182	144
Hanford, Irwin St.	185	189	143
Modesto, 14 th Street	158	144	121
Oildale, 3311 Manor St..	158	151	120
Turlock, 900 Minaret Street	157	162	116

Table 3: Simulated Future Year Annual PM-10 Values

Site Name	Design Value	2010 without additional reductions	2010 with additional reductions
Bakersfield - Golden # 2	57	58	49
Fresno -Drummond	50	50	45

Hanford -Irwin St.	53	52	47
Visalia - Church St.	54	52	46

Attainment is demonstrated for both the 24-hour and annual PM-10 standards. Each site is projected to have design concentrations at or below the federal standard in 2010. We believe that the approach described above and in the 2003 PM-10 Plan satisfies EPA's requirements for demonstrating attainment for the 24-hour and annual PM-10 Standards.

VI. Additional Information on the Section 189(d) 5% Requirement

As discussed in the NPR, for areas such as the San Joaquin Valley, which fail to meet their attainment deadlines, CAA section 189(d) requires a new attainment plan with "...an annual reduction in PM-10 or PM-10 precursor emissions ... of not less than 5 percent of the amount of such emissions as reported in the most recent inventory prepared for such area."

Tables 7-1 and 7-2 of the 2003 PM-10 Plan provides two methods of demonstrating a 5% annual reduction. The District provided 2 methods in order to help ensure that the 5% requirement was being met by the plan. The methods are different, but the emissions of NOx and PM-10 reduced each year are the same in both.⁹³ EPA does not believe that the method summarized in Table 7-1 satisfies CAA section 189(d) 5% requirement because adding percentages does not achieve the necessary 5% reductions.

However, EPA does believe that the Table 7-2 "Alternative Method" is an approvable method for meeting the section 189(d) 5% requirement. This method:

- achieves the 5% annual reduction of either PM-10 *or* PM-10 precursors from 2002 to 2010,
- is consistent with the District's NOx/PM attainment strategy for PM-10 precursors; and
- carries forward any reductions beyond 5% towards calculating the 5% requirement for a future year.

Reliance on reductions in either PM-10 or PM-10 precursor emissions is specifically provided for in section 189(d). Since the attainment demonstration is based on a NOx/PM strategy, EPA believes it is reasonable to calculate the percentage of reductions required based upon NOx reductions, and not to require reductions in the other PM-10 precursors VOC, SOx, or ammonia for which there is either less benefit or high uncertainty toward attaining the NAAQS. Finally, EPA believes it is reasonable and beneficial to allow for any emissions reductions beyond the required 5% in one year to be carried forward in order to encourage emissions reductions as quickly as possible. Thus, the Table 7-2 Alternative Method is an acceptable method for meeting the 5% requirement of CAA section 189(d).

TABLE 4 below summarizes the tons per day (TPD) of NOx and PM-10 emissions provided in the 2003 PM-10 Plan and provides an emissions analysis which further supports the "Alternative Method" found in Table 7-2 of the plan.

⁹³ As a result of the NOx/PM strategy, NOx is the only PM-10 precursor used in the 5% calculation.

TABLE F-1 - Summary of NOx and PM-10 Emissions Inventories for 2002-2010						
Year	NOx emissions (tpd)	percent (& tpd) of NOx reduction used for 5% req.	percent* & tpd NOx carried forward	PM-10 emissions (tpd)	percent (& tpd) of PM-10 reduction used for 5% req.	percent* & tpd PM-10 carried forward
2002	519.8	n/a		329.4	n/a	
2003	493.5	5% (26.0)	0.1% (0.3)	329.4	0	0
2004	479.5	0% (0)	2.8% (14.3)	312.1	5% (16.5)	0.2%* (0.8)
2005	461.8	0% (0)	6.2% (32.0)	285.5	5% (16.5)	3.3% (10.9)
2006	441.0	5% (26.0)	5.2% (26.9)	285.8	0% (0)	3.2% (10.6)
2007	420.1	5% (26.0)	4.2% (21.8)	285.4	0% (0)	3.3% (11.0)
2008	403.6	5% (26.0)	2.4% (12.3)	280.1	0% (0)	4.9% (16.3)
2009	389.1	5% (26.0)	0.2% (0.8)	284.5	0% (0)	3.6% (11.9)
2010	363.7	5% (26.0)	0%* (0.2)	283.7	0% (0)	3.9%* (12.7)

* Percentages in TABLE 4 may be slightly different than percentages in the 2003 PM-10 Plan's Table 7-2. This is probably due to minor rounding differences.

TABLE 4 provides the NOx and PM-10 emissions (in tpd) and percentages found in the 2003 PM-10 Plan's Table 7-2 and also provides the tpd of emissions associated with the percentages. The following summarizes how the annual 5% requirement is met for each year:

- 2002 is the baseyear⁹⁴ used for the 5% calculation, with 519.8 tpd of NOx and 329.4 tpd

⁹⁴ The 2003 PM-10 Plan bases the 5% calculations on the annual average inventory. This inventory represents the emissions on an average day during a year by taking the total annual

of PM-10. In order to satisfy the 5% requirement, annual reductions of either 26.0 tpd of NOx or 16.5 tpd of PM-10 are needed.

- For 2003, 26.3 tpd of NOx and 0 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions and 0.3 tpd of NOx and 0 tpd of PM-10 reductions are carried forward.
- For 2004, 14.0 tpd of NOx and 17.3 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the PM-10 reductions and 14.3 tpd of NOx and 0.8 tpd of PM-10 reductions are carried forward.
- For 2005, 17.7 tpd of NOx and 26.6 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the PM-10 reductions and 32.0 tpd of NOx and 10.9 tpd of PM-10 reductions are carried forward.
- For 2006, 20.8 tpd of NOx and -0.3 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions and 26.9 tpd of NOx and 10.6 tpd of PM-10 reductions are carried forward.
- For 2007, 20.9 tpd of NOx and 0.4 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions and 21.8 tpd of NOx and 11.0 tpd of PM-10 reductions are carried forward.
- For 2008, 16.5 tpd of NOx and 5.3 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions and 12.3 tpd of NOx and 16.3 tpd of PM-10 reductions are carried forward.
- For 2009, 14.5 tpd of NOx and -4.4 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions and 0.8 tpd of NOx and 11.9 tpd of PM-10 reductions are carried forward.
- Finally for 2010, 25.4 tpd of NOx and 0.8 tpd of PM-10 reductions are achieved. The 5% reduction requirement is met with the NOx reductions with 0.2 tpd of NOx and 12.7 tpd of PM-10 reductions to spare.

In order to ensure that the 5% requirement is met, EPA is proposing to approve as enforceable emissions levels each of the yearly NOx and PM-10 emissions levels found in Table

emissions in tons and dividing by 365 days/year (2003 PM-10 Plan, 3-13). EPA believes that a this is an appropriate inventory to use for determining the section 189(d) 5% reduction requirement for the San Joaquin Valley.

7-2 of the 2003 PM-10 Plan and summarized below.

Summary of NO_x and PM-10 Emission Levels Necessary for Satisfying the 5% Requirement		
Year	NO_x (tons/day)	PM-10 (tons/day)
2002	519.8	329.4
2003	493.5	329.4
2004	479.5	312.1
2005	461.8	285.5
2006	441.0	285.8
2007	420.1	285.4
2008	403.6	280.1
2009	389.1	284.5
2010	363.7	283.7