State of California
AIR RESOURCES BOARD

STAFF REPORT

PROPOSED 2003 STATE IMPLEMENTATION PLAN FOR PARTICULATE MATTER IN THE SAN JOAQUIN VALLEY

Release Date: May 28, 2003
Meeting Date: June 26-27, 2003

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PUBLIC HEARING TO CONSIDER APPROVAL OF THE PROPOSED 2003 STATE IMPLEMENTATION PLAN FOR PARTICULATE MATTER IN THE SAN JOAQUIN VALLEY

Air Resources Board Hearing
Begins June 26, 2003
9:00 a.m.
San Joaquin Valley Unified Air Pollution Control District
1990 E. Gettysburg Avenue
Fresno, California
Hearing notice available at http://www.arb.ca.gov/regact/sjvsipnotice.htm

For questions, contact: Ms. Sylvia Morrow, Project Manager
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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The San Joaquin Valley Unified Air Pollution Control District (District) released the Proposed Final *San Joaquin Valley Plan to Attain Federal Standards for Particulate Matter 10 Microns and Smaller* (2003 PM10 Plan or Plan) on May 12, 2003. The District will consider adoption of the 2003 PM10 Plan at a hearing scheduled for June 19, 2003. Contingent on adoption by the District, the Air Resources Board (ARB or Board) will consider approval of the 2003 PM10 Plan as a revision to the California State Implementation Plan (SIP) following a public hearing on June 26-27, 2003. This Staff Report is premised on District adoption of the Proposed Plan with the clarifications identified below.

1. What is the San Joaquin Valley's overall air quality status?

The San Joaquin Valley exceeds federal and State air quality standards for particulate matter and ozone. The Valley experiences some of the worst air pollution in the U.S., with both high levels and frequent episodes. According to air quality standards set by ARB, Valley residents breathe unhealthy levels of airborne particles nearly half of each year, (fall and winter) and unhealthy levels of smog or ozone one-third of the year (summer). Like other urban areas of California, the health risk from air toxics in the Valley is too high and particles from diesel-fueled engines are the dominant source of this risk. To meet air quality standards, air agencies must continue to adopt new measures to further reduce emissions from motor vehicles and equipment, fuels, industrial and commercial operations, and other sources.

By law, the 2003 PM10 Plan focuses on meeting federal particulate matter standards– the federal 24-hour and annual standards for particulate matter 10 microns and smaller (PM10). A number of strategies in the 2003 PM10 Plan will also reduce particulate matter 2.5 microns and smaller (PM2.5), one component of PM10. Future air quality plans will need to identify further strategies to attain the PM2.5 standards, as well as the federal and State standards for ozone. Although these other standards are outside the scope of the 2003 San Joaquin Valley PM10 SIP, the control strategies in this Plan will reduce emissions of multiple pollutants that are common precursors to PM10, PM2.5, and ozone.

2. What is particulate matter and how does it impact human health?

In the San Joaquin Valley, inhalable particulate matter or PM10 is a complex mixture of primary or directly emitted particles (from dust and soot), and secondary particles or aerosol droplets formed in the atmosphere by precursor chemicals. In the Valley, nitrogen oxides (NOx) and ammonia react in the winter to form particulate ammonium nitrate. NOx also contributes to ozone formation.

Because these particles are so small, they bypass our body's defenses, deposit in the respiratory tract, and can lodge deep in the lungs. The tiniest particles can also enter the bloodstream. Health studies link particulate pollution to sudden death in infants as well as adults with heart and lung ailments, shortening lives by years. Exposure to airborne particles also aggravates respiratory illnesses like asthma, bronchitis, emphysema, and pneumonia.

A ten-year ARB funded study of 5,000 children in Southern California shows that current levels of particles (and the gases that also contribute to ozone) reduce lung function growth in kids, diminish lung capacity, and increase school absences. In the San Joaquin Valley, ARB is currently sponsoring the Fresno Asthmatic Children's Environment Study to determine the effects of particulate matter (in combination with other ambient air pollutants) on asthma in young children.

3. What is the nature of the PM10 problem in the Valley?

The San Joaquin Valley exceeds both the federal 24-hour PM10 standard of 150 micrograms per cubic meter ($\mu g/m^3$) and the annual average PM10 standard of 50 $\mu g/m^3$ at multiple locations throughout the air basin. Table ES-1 shows the monitoring sites that violated the 24-hour standard or annual average standard between 1999 and 2001, the most recent three year period with complete monitoring results. The sites with the highest 24-hour levels and greatest number of exceedances are in the Bakersfield and Fresno metropolitan areas. Limited monitoring data from 2002 show that the days over the standard and highest values were less severe than in the 1999-2001 period.

Table ES-1
Monitoring Sites Exceeding
the Federal 24-Hour or Annual Average PM10 Standard
San Joaquin Valley, 1999-2001

Monitoring Site Name	High 24-Hour Value Above Standard ($\mu g/m^3$)	Annual Average Above Standard ($\mu g/m^3$)
Bakersfield-California Ave.	190	--
Bakersfield-Golden	205	57
Clovis	155	--
Corcoran-Patterson Ave.	174	--
Fresno-Drummond	186	--
Fresno-First Street	193	--
Hanford-Irwin Street	185	53
Modesto-14th Street	158	--
Oildale-3311 Manor Street	158	--
Turlock-900 Minaret Street	157	--
Visalia-Church Street	--	54

High PM10 episodes in the San Joaquin Valley typically differ by season. Fall episodes occur between October and December during relatively stable atmospheric conditions prior to rainfall. These episodes are dominated by directly emitted PM10, with the highest recent 24-hour violation of 174 $\mu g/m^3$ recorded at Corcoran in 1999.

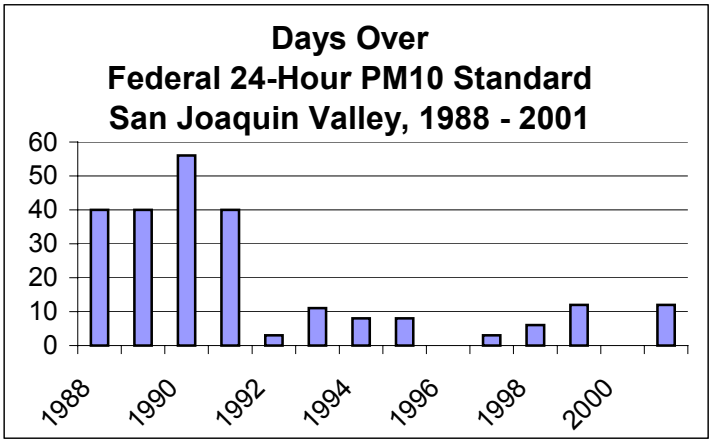
Winter episodes occur between late November and January during extended periods of stagnant weather with cold, damp, foggy conditions conducive to the formation of secondary particulate. Stagnant conditions occur when there are low winds with little movement to the upper atmosphere. These episodes are dominated by ammonium nitrate, which builds up and accumulates over the stagnant weather period. Winter episodes also contain wood smoke and directly emitted particulate. The highest recent winter episode was 205 $\mu g/m^3$ recorded at Bakersfield-Golden in 2001.

4. How have PM10 levels in the Valley changed over time?

The severity and frequency of PM10 episodes have decreased since we began routinely monitoring for this pollutant in 1988. Unlike ozone levels that are measured directly by the monitor each hour, PM10 levels are determined in a multi-step process. The sample is collected at a monitor by drawing air through a filter for 24 hours and then the filter is taken back to a laboratory for analysis.

Because this process is labor intensive and expensive, PM10 samples are routinely collected every sixth day. In Corcoran, sampling is done every three days. The results indicate the level of PM10 detected in the air over the 24-hour period. To estimate the number of days over the applicable standard, we multiply each day with a measured PM10 level exceeding the standard by the monitoring frequency. Figure ES-1 shows the calculated number of days over the PM10 standard from 1988 to 2001. In 1996 and 2000, the San Joaquin Valley did not exceed the federal 24-hour PM10 standard.

Figure ES-1



5. Why has the District developed this Plan?

The 2003 PM10 Plan is designed to fulfill an outstanding requirement of the Clean Air Act (Act) to define how and when the Valley will attain the federal PM10 standards, as well as resolve a number of related legal actions. The San Joaquin Valley is classified as a serious PM10 nonattainment area with a statutory attainment deadline of December 31, 2001. In 1997, the Valley developed and ARB submitted a PM10 SIP to the U.S. Environmental Protection Agency (U.S. EPA) that sought to show attainment by that deadline. The Valley did not attain by that date. At the District's request, the State withdrew the prior PM10 SIP in 2002. The agencies have since focused on developing a new, stronger PM10 plan that relies on improved science and identifies the full scope of control measures needed for attainment.

In 2002, U.S. EPA made formal findings that the Valley failed to submit a PM10 SIP and failed to attain the PM10 standards by the 2001 deadline. U.S. EPA concurrently noted deficiencies in the withdrawn 1997 PM10 Plan. Each of the separate findings starts sanctions clocks that will ultimately result in (1) higher emissions offsets for new and expanding businesses, followed by (2) a cutoff of most federal highway funds, unless the State submits a new PM10 SIP that U.S. EPA finds complete. The first sanction will begin August 28, 2003, the second on February 28, 2004. In response to litigation on PM10-related issues, U.S. EPA must promulgate a Federal Implementation Plan (FIP) for the Valley by February 28, 2004 unless the new California-developed SIP is approved before then.

6. What federal requirements does the Plan address?

Fundamentally, the State must submit a PM10 SIP revision that provides for interim progress in reducing emissions and attainment of both federal standards by the most expeditious date practicable. The Plan must satisfy the requirements of the Clean Air Act for a serious area PM10 plan, and for an area that failed to attain by the deadline. It does. The 2003 PM10 SIP:

- Demonstrates attainment by the earliest practicable date (2010);
- Implements Best Available Control Measures (BACM) for all significant sources of PM10 and NOx;
- Identifies interim emissions targets to show progress based on combined annual reductions in direct PM10 and NOx emissions of at least five percent until attainment;
- Sets emissions budgets for the transportation sector to support progress and attainment; and
- Provides contingency measures.

This Plan also resolves a number of technical deficiencies that U.S. EPA identified in the 1997 PM10 Plan. The 2003 PM10 Plan is based on a substantial improvement in the science and a more extensive control strategy. This Plan relies on a comprehensive emission inventory that includes new data on directly-emitted PM10 and ammonia, as

well as multiple pollutants from motor vehicles and equipment. The current inventory uses county-specific information on activity and growth; it also reflects seasonal changes. This Plan builds on available data from extensive field studies and includes a rigorous analysis of the best relevant controls in place or planned elsewhere in the U.S.

7. How does the Plan use the available science to assess attainment?

The 2003 PM10 Plan uses extensive monitoring data from the California Particulate Matter Air Quality Study (Particulate Study) and the latest technical tools to assess the impact of the proposed control strategy on the region's ability to attain the federal PM10 standards. The Particulate Study is a public-private $27 million effort to develop an improved scientific basis for particulate matter control, including information on emissions, particle composition, and atmospheric processes. The Plan benefits from the Particulate Study data available so far on emission inventory improvements, source profiles specific to the San Joaquin Valley, extensive monitoring data, and a preliminary air quality model (IMS95).

By looking at the chemical compounds that make up the total PM10 captured on filters and at the emissions from pollution sources in the region, the District estimated how much of the measured PM10 came from various sources. Next, by projecting how the emissions from those sources will change in the future with growth and controls, the District determined how the concentration of each chemical compound is expected to change. The Plan shows that the proposed control strategy is sufficient to reduce the combined PM10 mass to attainment levels by 2010.

For directly emitted particles, the Plan uses a 1 to 1 relationship between direct PM10 emission reductions and the resulting change in particulate concentrations. For secondary particles formed in the atmosphere, the Plan relies on photochemical modeling to establish the relationship between precursor emission reductions and the resulting change in ammonium nitrate concentrations. The modeling indicates that to reduce ammonium nitrate, the attainment strategy must include NOx controls. The modeling also supports a relationship between NOx reductions and ammonium nitrate decreases of 1.5 to 1. The potential benefits of ammonia control compared to NOx control remains an open question which will be addressed in the 2006 update to this Plan.

Two different analysis methods were used to try to determine the relative benefits of ammonia and NOx control to reduce ammonium nitrate formation. The goal of these types of analyses is to determine the "limiting" chemical species. Reducing the limiting pollutant from a chemical standpoint is the most efficient way to reduce the end product – which in this case is ammonium nitrate. In the first method, actual measured concentrations (in Bakersfield) of ammonium nitrate and its precursors, nitric acid (formed from NOx) and ammonia, were compared to determine which would be limiting in terms of forming ammonium nitrate. The results indicated that a significant amount of ammonia would remain after all the NOx was consumed. This suggests that NOx is the limiting precursor—ammonia is not and ammonia controls will not be effective at

reducing particulate concentrations at these ambient levels. The second analysis method, atmospheric modeling, suggests that there could be some positive impact from ammonia controls in the Bakersfield area. We expect the final Particulate Study results to reconcile these apparently differing results. Since the data available today do not clearly demonstrate that ammonia reductions would accelerate attainment, there is insufficient evidence to include ammonia controls in the Plan at this time.

The Plan includes a 2010 projection for the highest value at each site that recorded an exceedance between 1999 and 2001, as shown in Table ES-2.

Table ES-2
Projected 24-hour PM10 Values in 2010
With Plan Implementation

Site Name	Highest Measured Value ($\mu g/m^3$)	Projected 2010 Value ($\mu g/m^3$)
Bakersfield-California Ave.	190	139
Bakersfield-Golden	205	153*
Clovis	155	122
Corcoran-Patterson	174	136/134**
Fresno-Drummond	186	145
Fresno-First Street	193	148
Hanford-Irwin Street	185	143
Modesto-14th Street	158	117
Oildale-3111 Manor Street	158	120
Turlock-900 Minaret Street	157	117

* U.S. EPA regulations interpreting the form of the 24-hour PM10 standard prescribe rounding of measured values to the nearest 10 $\mu g/m^3$ and explicitly define attainment as 154 $\mu g/m^3$ or less. Thus, the projected 153 $\mu g/m^3$ rounds to 150 $\mu g/m^3$ and complies with the standard.

** Corcoran had two exceedances at 174 $\mu g/m^3$; the specific conditions of each exceedance day result in different 2010 projections.

The District used the same scientific approach to evaluate the impact of the proposed control strategy on annual average PM10 levels for the three sites that exceeded the standard. The plan strategies would result in attainment of the federal PM10 standard at all three sites.

We believe the modeling conducted for the 2003 PM10 Plan meets U.S. EPA requirements for areas designated as serious nonattainment for PM10. The District and ARB used the best modeling tools available to address the complex PM10 problem in the San Joaquin Valley, and to provide reasonable assurance that the control strategy will attain the standard.

8. How much will the Plan reduce emissions that contribute to PM10 in the Valley?

Table ES-3 below quantifies the net emission reductions in tons per day (tpd) between 1999 and 2010 from the existing State, local, and federal control programs plus new reductions from the commitments quantified in the Plan. The majority of the NOx reductions will come from the State's existing requirements for cleaner new cars, trucks, and equipment.

Table ES-3
Proposed Plan Net Reductions in Direct Particulate and Precursor NOx Emissions
San Joaquin Valley, 1999-2010

	Direct PM10 Emissions		NOx Emissions	
	Reductions (tpd)	% Reduction	Reductions (tpd)	% Reduction
Stationary and Area Sources	39	13	37	21
Mobile Sources	2	13	164	43
Total	41	13	201	36

9. What is the local control strategy?

In the San Joaquin Valley, the District is the primary local agency responsible for regulating air pollution from stationary and areawide sources throughout the region. The District coordinates with the eight county Councils of Government that forecast growth and decide how the transportation system will develop in each county. The miles traveled, the efficiency of the transportation system, and the vehicles used all affect the resulting air emissions. To improve air quality, air agencies must secure enough emission reductions from sources under their control to fully offset the growth in all sectors and achieve a net decrease in emissions.

The new element of the local control strategy will reduce direct PM10 and NOx from District measures, including dust control requirements to be implemented by local governments. The District proposes to adopt a total of 14 new measures between 2003-2005 that achieve 66 tpd direct PM10, 16 tpd NOx, and 6 tpd sulfur oxides (SOx) reductions, compared to 2010 levels with the existing control program. Full implementation would occur between 2004-2006 (except for residential water heaters).

The new proposed District measures address the following types of sources:

- Agricultural irrigation engines (opacity);
- Cotton gins;
- Dryers;
- Wineries;
- Glass-melting furnaces;
- Gas-fired oilfield steam generators;
- Steam enhanced crude oil production well vents;

- Small boilers, steam generators, and process heaters;
- Water heaters (industrial, commercial, and institutional);
- Residential wood combustion;
- Residential space heating; and
- Paved and unpaved roads, parking lots and staging areas, construction activities, and disturbed open areas; plus
- A proposed Conservation Management Practice program to cut dust from on-field agriculture operations, developed in consultation with the agriculture industry; and
- A mitigation fee on new indirect "destination" sources (like shopping malls and distribution centers) that attract vehicle travel; the funds would provide incentives for other sources to reduce emissions, beyond applicable requirements.

10. How does the District propose to address ammonia emissions?

The primary sources of ammonia in the Valley are livestock operations, fertilizer use, and composting. Other sources include fertilizer application, composting, motor vehicles, domestic waste emissions, landfill gases, burning, and combustion devices equipped with selective catalyst reduction technology. Preliminary analyses of the effectiveness of ammonia reduction in decreasing total PM10 levels are inconclusive. As discussed in Question 7, development of ammonia controls will depend on further analysis of the San Joaquin Valley's ammonia chemistry as part of the Particulate Study.

If the final Particulate Study results show that ammonia controls are effective, the District will include ammonia reduction measures in the next PM10 SIP revision. The District will also evaluate the need to reduce livestock waste emissions to achieve the federal ozone standard. Livestock waste is a significant source of ROG emissions as well as ammonia. Ongoing research will provide new information on ammonia, ROG, and direct PM10 emissions from livestock operations. Preliminary data will be used in the Valley ozone SIP in late 2003; final results will be available for the 2006 reassessment of this PM10 attainment demonstration and future ozone SIPs.

11. What is the State control strategy?

The bulk of the State controls with benefits between 1999 and 2010 have already been adopted by ARB; they will provide over 140 tpd of NOx reductions in this period. ARB staff is proposing that the Board commit to achieve an additional 10 tpd of NOx and 0.5 tpd of direct PM10 reductions in the San Joaquin Valley by 2010. Staff is also proposing a commitment to develop statewide control measures for Board consideration (affecting passenger vehicles, heavy trucks and buses, and off-road equipment) and improvements to the Smog Check program for implementation by the Bureau of Automotive Repair. The State measures are a subset of the *Proposed 2003 State and Federal Strategy for the California SIP* that ARB will consider later this year. The State's proposed commitments for the San Joaquin Valley PM10 SIP are described in Section I, Chapter D of the comprehensive strategy document available at http://arb.ca.gov/planning/sip/sip.htm.

The new proposed State measures address the following types of sources:

- Existing passenger vehicles;
- New and existing heavy-duty trucks and buses;
- New and existing off-road industrial equipment, including forklifts; and
- Existing off-road heavy-duty diesel equipment.

12. Why is 2010 the earliest San Joaquin Valley can attain the standards?

The 2003 PM10 Plan provides for attainment as expeditiously as practicable by aggressively reducing directly emitted particles and secondarily formed ammonium nitrate particles through NOx control.

The District has proposed an ambitious rulemaking calendar to implement its 2003 PM10 Plan commitments as soon as possible. New local rules are scheduled for implementation between 2004-2006, including over 70 percent of the reductions in direct PM10.

The NOx reductions phase-in steadily through 2010. Motor vehicles and equipment are the dominant source of NOx emissions. New controls on these sources typically require significant lead time, especially standards for new engines that depend on engine design changes, production line modifications, and natural fleet turnover to the cleaner vehicles and equipment. Regulations already adopted by ARB are scheduled for implementation through 2010. For example, the latest low emission vehicle fleet requirements are increasingly more stringent through 2010, stricter truck standards will be implemented 2007-2010, and the last phase of cleaner pleasure craft engines will be introduced in 2008.

To accelerate the pace of mobile source reductions, the existing fleet can be cleaned up through accelerated replacement, retrofit technology, or repair of excess emissions. ARB staff has proposed commitments for new regulatory strategies to further reduce emissions from existing passenger vehicles, trucks, construction and farm equipment, and industrial equipment. Given the technical work and regulatory development process required to make these strategies successful, we believe the proposed timelines are as expeditious as practicable. The District has also committed to speed the introduction of lower emission engines through incentive programs.

13. When will the District reassess the attainment demonstration?

The final Particulate Study modeling results are currently projected to be completed in 2005. Remaining work includes: improving the emission inventory, creating the meteorological inputs for each day, setting up the initial air quality conditions for each day, evaluating the model performance, and conducting sensitivity testing. If the Particulate Study modeling shows that the assumptions used for the attainment demonstration are no longer valid, the District proposes to revise the 2003 SIP in 2006.

14. What have been the opportunities for public involvement in the Plan?

The District staff held three series of public workshops to solicit input on the 2003 PM10 Plan with a combination of afternoon and evening sessions. Each workshop was held in Fresno, Bakersfield, or Modesto and linked via videoconference to the other locations. ARB staff participated in these local workshops, providing technical support on the joint science and the State's control strategy.

Beginning in June 2002, the first set of workshops focused on the state of the science on PM10, emission inventory development, and the air quality modeling approach. The second workshops in November 2002 provided more background on the PM10 problem and updates on the air quality modeling, emission inventory improvements, and potential control measures. In March 2003, the District released the Draft Plan for initial public review and held the third set of workshops in April to discuss the final inventory, modeling, control measures, and attainment demonstration.

The District released the final PM10 Plan on May 12, 2003 for the formal 30-day review and comment period. On June 19, 2003, the District's Governing Board is scheduled to hear public testimony on the 2003 PM10 Plan, and take action.

Beginning in 2001, ARB also conducted its own outreach across California on the statewide measures from the earliest stages of development. In early 2003, we released draft strategy documents for the South Coast and San Joaquin Valley. Through March and April, we participated in eleven public workshops with the local air districts in the South Coast and San Joaquin Valley, as well as an ARB technical workshop in both those regions plus Sacramento, to discuss the draft State and federal SIP strategy.

15. Is the Plan consistent with State and federal requirements?

Yes. The proposed 2003 PM10 Plan meets the requirements of State and federal law.

The federal Clean Air Act (section 189(b)(1)(A)) requires this PM10 Plan to demonstrate attainment of the PM10 standards by the most expeditious alternative date practicable. Due to timing of controls and vehicle turnover, ARB staff and the District collectively determined that 2010 is the most expeditious date practicable for San Joaquin Valley to attain the 24-hour and annual PM10 standards.

The Act (section 189(b)(1)(B)) requires this PM10 Plan to provide for implementing BACM to reduce PM10. The District hired an outside contractor to conduct a BACM analysis, and determine which controls needed to be upgraded. The District incorporated the contractor suggestions, and we believe the 2003 PM10 Plan provides for BACM on all significant sources of PM10 and PM10 precursors.

The Act (section 189(c)(1)) requires this PM10 Plan to establish PM10 reasonable further progress milestone targets, which are to be achieved every three years until the area attains. The 2003 PM10 Plan establishes progress targets for 2005, 2008, and 2010.

The Act (section 189(d)) requires this PM10 Plan to provide an annual reduction in PM10 or PM10 precursors not less than five percent of such emissions as reported in the most recent inventory prepared for the area. The 2003 PM10 Plan meets this requirement with a combination of direct PM10 and NOx emission reductions. The combined five percent reduction for PM10 plus NOx is calculated using the substitution convention allowed by the Clean Air Act and directed in U.S. EPA guidance for ozone rate-of-progress demonstrations.

16. What clarification to the District's proposal does ARB staff recommend?

We recommend that the District clarify its proposal to revisit the PM10 emission reduction strategy when the final Particulate Study data are available. The District needs to specify a timeline for any needed plan revision.

17. What action does ARB staff recommend to the Board?

With the clarification discussed above, we recommend that the Air Resources Board take the actions necessary to approve both the State and local elements of the 2003 San Joaquin Valley PM10 Plan and to forward it to U.S. EPA as a revision to the California SIP.

(1) After considering public testimony, we recommend that the Board adopt the proposed State commitments to support the 2003 San Joaquin Valley PM10 SIP as identified in Section I, Chapter D of the *Proposed State and Federal Strategy for the California SIP*. These commitments for emission reductions and new measures are integral to the Plan's ability to show both attainment and progress.

(2) After considering public testimony, we recommend that the Board approve the 2003 San Joaquin Valley PM10 Plan as a revision to the California SIP. Board action should also encompass any District revisions that strengthen the Proposed Plan in response to public comments.

ARB staff finds that the 2003 PM10 Plan meets applicable requirements. We believe that Plan implementation would clearly reduce PM10 levels throughout the San Joaquin Valley and benefit public health.

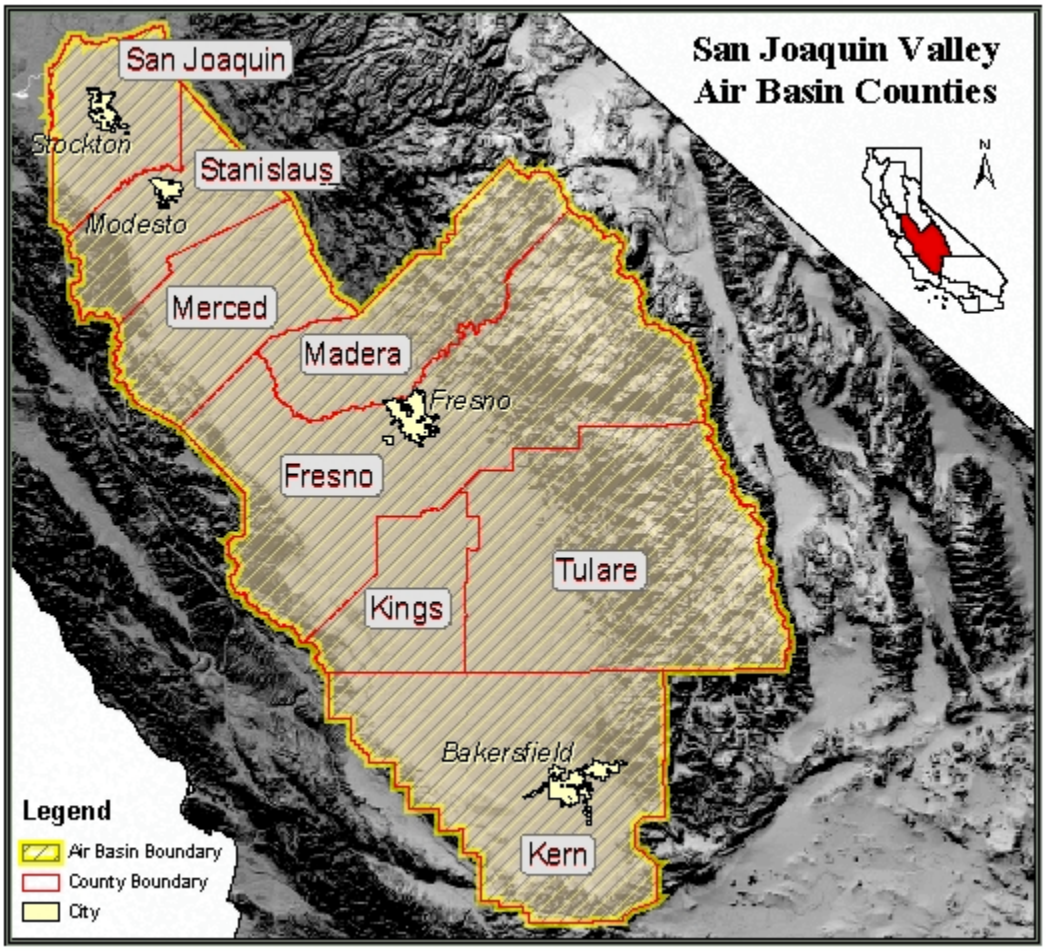
I. BACKGROUND

This chapter provides an overview of the topography, meteorology, and air quality of the San Joaquin Valley and describes some of the air quality research that supports the 2003 PM10 Plan.

A. Profile of the San Joaquin Valley

The San Joaquin Valley Air Basin covers San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Western Kern Counties. The San Joaquin Valley comprises nearly 25,000 square miles and covers approximately 16 percent of the geographic area of California. It is a continuous valley approximately 250 miles long and averaging 80 miles wide. Mountains bound the area on the west (Coastal Mountain range), the east (Sierra Nevada range), and the south (Tehachapi Mountains). The San Joaquin Valley has over 3.3 million residents with major urban centers at Bakersfield, Fresno, Modesto, and Stockton. Figure I-1 shows the San Joaquin Valley Air Basin.

Figure I-1



The San Joaquin Valley Unified Air Pollution Control District is the local air quality agency responsible for the air basin.

B. Historical Air Quality

High PM10 episodes in the San Joaquin Valley typically follow one of two patterns. Fall-type episodes occur between October and December during relatively stable atmospheric conditions before rainfall. Directly emitted PM10 dominates these episodes with the highest recent 24-hour violation of 174 $\mu g/m^3$ recorded at Corcoran in 1999. The federal 24-hour average standard is 150 $\mu g/m^3$, although U.S. EPA regulations interpreting the form of the 24-hour PM10 standard prescribe rounding of measured values to the nearest 10 $\mu g/m^3$ and explicitly define attainment as 154 $\mu g/m^3$ or less.

Winter-type episodes typically occur between late November through January during extended periods of stagnant weather with cold, damp, foggy conditions especially conducive to ammonium nitrate particle formation. These so-called secondary particles are formed in the air by the chemical reaction of gaseous pollutants. While ammonium nitrate particles are the most abundant, these episodes also contain wood smoke and directly emitted particles. The highest recent winter concentration recorded was 205 $\mu g/m^3$ at Bakersfield-Golden in 2001. This multi-day, winter 2001 episode was valley-wide with twelve violations of the federal 24-hour standard recorded at nine separate locations.

The San Joaquin Valley also violates the federal 50 $\mu g/m^3$ annual average standard. While the 24-hour violations occur during stagnant weather conditions with low wind speeds, wind blown dust does contribute to the annual average problem.

Table I-1 shows the highest 24-hour values measured at various monitors between 1999 and 2001, as well as the resulting annual average for that time period. Bold type indicates violations of the standard.

In the late 1980s and early 1990s, fall-type episodes were the most prevalent. Since the implementation of some primary PM10 controls in the early 1990s, the fall episodes are fewer and less severe. Winter-type episodes now predominate. Figure I-2 shows the slight downward trend of the peak 24-hour PM10 concentrations since the late 1980s.

Table I-1
PM10 Design Values ($\mu g/m^3$)
San Joaquin Valley, 1999-2001

Monitoring Site Name	PM10 Plan 24-hour Design Value	PM10 Plan Annual Average Design Value
Bakersfield-California Ave.	**190**	48
Bakersfield-Golden #2	**205**	**57**
Clovis	**155**	43
Corcoran-Patterson Ave.	**174**	49
Fresno-Drummond	**186**	50
Fresno-First	**193**	42
Hanford-Irwin St.	**185**	**53**
Merced-M Street	134	40
Modesto-14th Street	**158**	37
Oildale-3311 Manor Street	**158**	46
Stockton-Hazelton-HD	150	35
Stockton-Wagner-Holt	119	30
Taft-College	128	36
Turlock-900 Minaret Street	**157**	39
Visalia-Church Street	152	**54**

Figure I-2

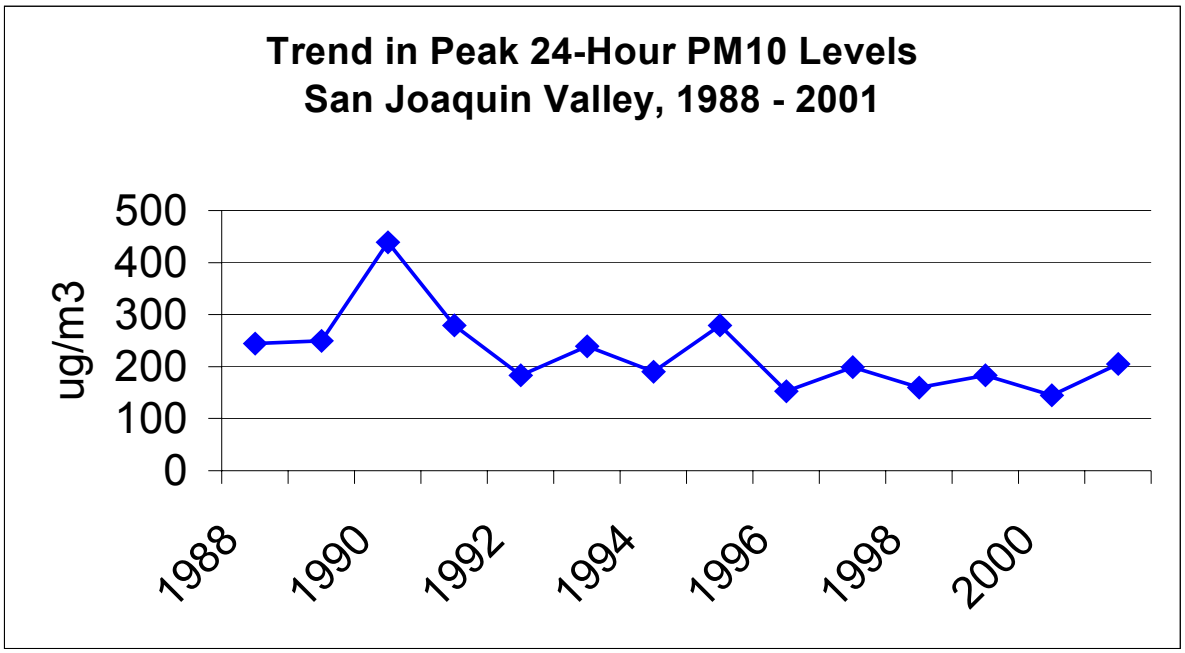
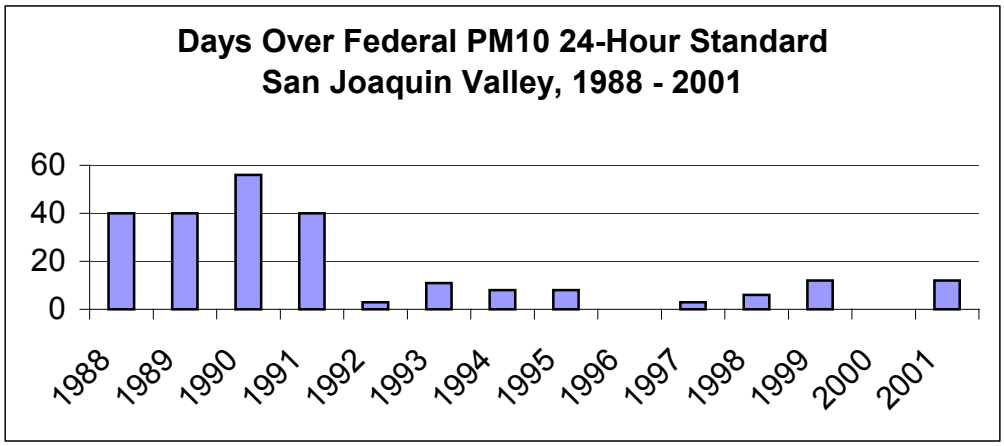


Figure I-3 shows the number of days the San Joaquin Valley has exceeded the 24-hour standard. There were no days over the standard in 1996 and 2000. (Since most of the San Joaquin Valley monitoring occurs once every six days, each recorded exceedance counts as six expected exceedances.) The drop in the number of unhealthy days since the late 1980s reflects the same improvement shown by the decrease in maximum 24-hour values.

Figure I-3



C. Fine Particulate Air Quality

PM10 in the San Joaquin Valley includes a large subset of fine particles, or PM2.5. In 1997, U.S. EPA established a 65 $\mu g/m^3$ 24-hour PM2.5 standard and a 15 $\mu g/m^3$ annual average PM2.5 standard. U.S. EPA is planning to officially designate PM2.5 nonattainment areas in 2004, with SIPs due in 2007 and attainment required by 2014. The San Joaquin Valley exceeds both the 24-hour and annual average PM2.5 standards throughout the basin. The highest recent PM2.5 reading was 160 $\mu g/m^3$ recorded at the Fresno-First Street monitor in 2000.

D. California Regional Particulate Matter Air Quality Study

The California Regional Particulate Matter Air Quality Study (Particulate Study) is a public-private, $27 million effort to develop an improved scientific basis—including emissions, particle composition, and atmospheric processes—for current and future particulate matter control.

The study has four phases:

- Phase 1 involved planning and preparatory research. Projects conducted within this phase included demonstration projects evaluating alternative control strategies, a preliminary field monitoring program known as the 1995 Integrated Monitoring Study (IMS95), analysis and modeling of historical and IMS95 data, and emission inventory development.

- Phase 2 aimed at developing improved techniques for the identification of primary particulate matter sources.

- Phase 3 involved major field studies under both fall and winter-type episode conditions. The field work included four components:

  1. A long-term annual program from December 1, 1999, through January 31, 2001.
  2. A summer program from June 15, 2000, through September 15, 2000.
  3. A fall episodic program between October 8, 2000, and November 14, 2000.
  4. A winter episodic program between December 1, 2000, and February 3, 2001.

  The field measurements were collected over a region extending from the Pacific Ocean on the west to the Mojave Desert on the east, and from the Tehachapi Mountains on the south to the northern end of the Sacramento Valley.

- Phase 4 is underway; it involves analysis and modeling of the data collected during the field program.

II. AIR QUALITY PLANNING

This chapter briefly reviews the relevant planning provisions in the federal Clean Air Act (Act), and describes recent San Joaquin Valley plans.

A. Planning Requirements

In 1987, U.S. EPA replaced its standard for total suspended particulates with standards that focused on PM10. The 1990 Clean Air Act Amendments subsequently established moderate and serious classifications for PM10 nonattainment areas, with planning requirements applicable to each classification.

1. Moderate Area PM10 Attainment Plan

The San Joaquin Valley was originally classified as a moderate PM10 nonattainment area. The Act requires moderate areas to adopt reasonably available control measures (RACM), and sets a December 31, 1994 attainment deadline.

In November 1991, the newly formed San Joaquin Valley Unified Air Pollution Control District adopted the 1991 PM10 Attainment Plan. In the plan, the District committed to adopt rules to limit fugitive dust emissions from paved and unpaved roads, construction sites, and other commercial and industrial activities (collectively Regulation VIII). The District also committed to controls on various burning practices, including fireplace use. The District adopted Regulation VIII and a residential wood combustion rule in 1993.

Because the moderate area plan showed that the San Joaquin Valley would not attain the PM10 standards by December 31, 1994, the San Joaquin Valley was reclassified to serious. Along with the new classification, effective February 8, 1993, came new planning requirements.

2. Serious Area PM10 Attainment Plan

The Act requires serious areas to adopt a plan that contains Best Available Control Measures (BACM) within four years of reclassification. The attainment deadline is December 31, 2001. The Act also allows serious areas an attainment deadline extension to 2006 if the region can demonstrate that it has implemented all the serious area requirements and adopted measures as stringent as done elsewhere in the nation; yet, attainment is still not possible by 2001.

ARB submitted the District's 1994 Serious Area PM10 Plan containing BACM commitments on October 12, 1994. ARB submitted the District's 1997 PM10 Attainment Demonstration Plan on July 17, 1997. In the 1997 PM10 Plan, the District requested an extension until 2006. U.S. EPA had not acted on the 1997 PM10 Plan and the Valley had not attained by the December 31, 2001 deadline. In early 2002, U.S. EPA indicated their intent to disapprove substantial portions of the 1997 PM10 Plan. The basis of its intended disapproval was U.S. EPA's finding that:

- The emissions inventory was incomplete;
- The plan did not provide for attainment by December 31, 2001, nor provide sufficient documentation for a deadline extension;
- The plan did not provide for BACM on all significant sources; and
- The plan did not provide for quantitative milestones nor demonstrate reasonable further progress.

Disapproval would have required the District to correct the identified deficiencies in order to forestall an immediate transportation conformity freeze, and subsequent loss of federal highway funds. Rather than correct a plan that had already failed to provide for attainment by the 2001 deadline, the District requested and ARB withdrew the 1997 PM10 Plan from U.S. EPA consideration.

Effective February 28, 2002, U.S. EPA issued a finding that the San Joaquin Valley failed to submit a serious area PM10 SIP. The finding triggered a number of federal sanctions clocks:

- An 18-month deadline for sanctions on new and modified sources requiring emission offsets at a 2:1 ratio;
- A 24-month deadline to withhold federal highway funds; and
- A 24-month deadline to require that U.S. EPA prepare a Federal Implementation Plan (FIP).

On July 23, 2002, U. S. EPA also issued a finding that the San Joaquin Valley failed to attain the PM10 standards by the December 31, 2001 attainment deadline. This starts additional clocks on the sanctions listed above for this deficiency.

3. 2003 PM10 Plan

The 2003 PM10 Plan addresses both of U.S. EPA's findings: the failure to submit a serious SIP and the failure to attain the standard. The District remains classified as a serious nonattainment area and is still subject to serious area planning requirements. But, having missed the 2001 attainment deadline, additional requirements will apply to the District.

The serious nonattainment requirements are:

- Implement BACM for all significant sources of PM10 or PM10 precursors;
- Provide quantitative milestones for reasonable further progress; and
- Adopt contingency measures to provide further emission reductions in case a milestone is not achieved on schedule.

The additional requirements due to failure to attain by 2001 are:

- Demonstrate attainment at the earliest practicable date; and
- Provide an annual reduction in PM10 or PM10 precursor emissions within the area of not less than five percent of the amount of such emissions as reported in the most recent inventory.

B. Planning Schedule and Impact on Sanctions

1. Sanction Deadlines

For the San Joaquin Valley to avoid federal sanctions, all of the following must happen by August 28, 2003:

- The District must adopt a complying PM10 SIP;
- ARB must adopt and submit the SIP to U.S. EPA; and
- U.S. EPA must issue a finding that the SIP is complete.

The completeness finding is an evaluation by U.S. EPA that the plan includes all the necessary elements. If U.S. EPA does not issue a completeness finding within six months, the SIP is deemed complete by operation of law. However, if sanction deadlines are pending as they are in the San Joaquin Valley, federal regulations require U.S. EPA to make a formal completeness finding.

Unless the Valley PM10 SIP is adopted, submitted, and approved by U.S. EPA by February 28, 2004, U.S. EPA is obligated to issue a Federal Implementation Plan.

2. Moderate Plan Complaint

On October 22, 2002, Earthjustice filed a citizen enforcement action, on behalf of the Sierra Club, Medical Advocates for Healthy Air, and the Latino Issues Forum, to compel U.S. EPA to enforce federal requirements in the San Joaquin Valley. The basis of the Earthjustice complaint was that since U.S. EPA never acted on the District's 1991 Moderate Area PM10 Attainment Plan, U.S. EPA was obligated to impose sanctions and a FIP. U.S. EPA did neither.

On May 14, 2003, the U.S. District Court approved a consent decree requiring U.S. EPA to adopt a FIP for the San Joaquin Valley by July 31, 2004. Under the decree, U.S. EPA is relieved of the FIP obligation if the Administrator signs a final notice approving a San Joaquin Valley PM10 SIP revision on or before that date.

III. PLAN EVALUATION

This chapter reviews the contents of the Proposed 2003 PM10 Plan and provides ARB staff's evaluation of each significant element.

A. Emission Inventory

Emission inventories are fundamental elements of any air quality plan, incorporating the effects of growth and existing regulations to determine the expected emissions in future years. Table III-1 shows the total emissions of each pollutant, and the breakdown by broad source category. In 1999, almost all of the direct PM10, ammonia, and SOx emissions, and one-third of the NOx came from stationary and area sources under the jurisdiction of the District. About two-thirds of the NOx is emitted by sources under State or federal authority.

Table III-1
Plan Base Year Emission Inventory
San Joaquin Valley, Annual Average, 1999

	Direct PM10 (tpd)	SOx (tpd)	NOx (tpd)	VOC (tpd)	Ammonia (tpd)
Stationary and Area Sources	310	27	180	255	351
Mobile Sources - On-Road Motor Vehicles - Off-Road Vehicles/Equipment	 6 9	 2 1	 241 144	 130 159	5
Total	325	30	565	444	356

U.S. EPA cited deficiencies in the emissions inventory in the 1997 PM10 Plan. To ensure that U.S. EPA can approve the 2003 PM10 Plan, District and ARB staffs have worked closely to improve the emission inventory. The major improvements are described below.

1. <u>Ammonia Emissions</u>

The 1997 PM10 Plan did not include an ammonia inventory. ARB and District staff has developed a comprehensive ammonia inventory for San Joaquin Valley. The largest source of ammonia emissions is livestock waste. Work is underway to refine the new estimates. Emission rate estimates per animal remain the greatest uncertainty.

Additional ammonia sources with quantified emissions include fertilizer application, composting, motor vehicles, domestic waste emissions, landfill gases, and burning. In the future, ARB staff will also assess the potential for ammonia contributions from other smaller sources like combustion devices equipped with selective catalyst reduction technology and swimming pools.

2. Unpaved Agricultural Road Emissions

Previously, the vehicle miles traveled (VMT) activity rate on dirt farm roads was based on a single assumption for all crops about the miles traveled per acre per year (4.38 VMT/acre/year). This was replaced with a crop-specific, season-specific estimate developed with input from the agricultural industry. The new crop-specific values range from 0.38 VMT/acres/year for grapes to 2.40 VMT/acre/year for small field cotton. The seasonal-specific emissions are based on land preparation and harvest activities from crop calendars. The crop calendar determines the operations needed to prepare an acre of land for each crop. The inventory now more accurately reflects the fact that there is more unpaved road travel during the times of year when land preparation and harvest activities are at the highest. The change reduced annual agriculture unpaved road dust emission estimates by 80 percent.

3. On-Field Agricultural Emissions

The inventory also includes new UC Davis emission factors for on-field agricultural particulate matter emissions by field operations, including all crop harvesting operations. These agriculture emission factors were developed through the Particulate Study.

Previously, a single emission factor was used for all land preparation activities. Working with agriculture experts, five emission factors were developed for five land preparation activities: root cutting; discing, tilling and chiseling; ripping and subsoiling; land planing and floating; and weeding. The crop calendar and county crop acreage were then used to estimate the monthly fugitive dust emissions from agriculture land preparation.

Due to the limited availability of harvest emission factors, ARB previously estimated harvest emissions for only three crops (cotton, almonds, and wheat). For the 2003 PM10 Plan, ARB used those existing emission factors, and developed a methodology to apply them to all of the harvest activities performed in California. The methodology is to select an existing emission factor, and then scale the factor to reflect the relative dustiness of different harvest activities. The crop calendar along with county-specific crop acreage was then used to determine the monthly fugitive dust emissions from agriculture harvest.

4. Other Improvements

Other inventory improvements include:

- Rainfall factors for paved and unpaved road dust;
- Direct PM10 emissions from dairies (previously zero);
- Direct PM10 emission from private unpaved roads (previously zero);
- Updated agriculture irrigation pump emissions;
- Updated pesticide emissions;
- Revised agriculture burning estimates;

- Revised oil and gas production growth; and
- Updated mobile source emission inventory using ARB's EMFAC 2002 and OFFROAD models.

5. Emission Reduction Credits

According to U.S. EPA and ARB policy, emission reductions credits (ERC) banked before a plan's emission inventory baseyear must be explicitly treated as emissions in the air. In other words, the plan must account for ERC use. The District does this by including projected ERC use in the emission inventory growth factor. This plan's projections for ERC use and total growth between 2002 and 2010 are shown in Table III-2.

Table III-2
Projected ERC Use and Emissions Growth
San Joaquin Valley, Annual Average, 2002-2010

Pollutant	ERC Use (tpd)	Total Growth (tpd)
NOx	9.6	11
ROG	6.4	7.8
PM10	1.6	2.3
SOx	2.4	2.6

Projected ERC use is less than total growth for each pollutant. That is the minimum criteria for the District's approach to work. However, projected ERC use is large and accounts for nearly all growth. Consequently, there is very little margin for nonpermitted stationary sources to grow. The District should provide additional information on both the ERC use projections and growth in nonpermitted sources to demonstrate why the sum of the two will not exceed total growth.

B. Control Strategy

The Proposed 2003 PM10 Plan includes a control strategy to attain the federal 24-hour and annual average PM10 standards based on reductions from existing regulations as well as additional reductions from enforceable commitments to adopt new control measures. The complex nature of PM10 pollution in the San Joaquin Valley requires a multi-pollutant control strategy for a wide variety of sources. The District has lead responsibility for adopting and implementing most stationary and area source controls; the transportation planning agencies for transportation control measures; ARB for most mobile sources, fuels, and consumer products; the Bureau of Automotive Repair for vehicle inspection and maintenance (Smog Check); and U.S. EPA for national transportation sources and certain off-road farm and construction equipment.

1. Existing Stationary and Area Source Commitments

In the 2003 San Joaquin Valley Ozone Rate of Progress Plan, the District committed to adopt two rules by Fall 2003 for implementation in 2007, but did not specify the emission reductions to be achieved. These two rules are listed in Table III-3. In the 2003 PM10 Plan, the District commits to emission reductions for these rules, and uses them in the attainment demonstration.

Table III-3
List of Existing District Commitments and Emission Reductions
San Joaquin Valley, Annual Average, 2010

	Source Category	Adoption Date	Implement Date	PM10 (tpd)	NOx (tpd)	SOx (tpd)
ROP	Boilers, Steam Generators, and Process Heaters	3Q/03	2Q/07	0	0.4	0.15
ROP	Stationary I/C Engines	3Q/03	2Q/07	0	1.7	0
Totals				0	2.1	0.15

2. New Stationary and Area Source Measures

The District is proposing fourteen new or updated control measures for stationary and area sources. These measures are listed in Table III-4.

Table III-4
List of Proposed New District Commitments and Emission Reductions
San Joaquin Valley, Annual Average, 2010

SIP #	Source Category	Adoption Date	Full Implementation Date	Direct PM10 (tpd)	NOx (tpd)	SOx (tpd)
A	Ag CMP	1Q/04	1Q/05	33.8	0	0
B	Cotton Gins	4Q/04	2Q/05	1.7	0	0
C	Dryers	2Q/05	4Q/06	0	0.4	0.15
D	Fugitive PM10	3Q/04	4Q/05	18.8	0	0
E	Glass Melting Furnaces	2Q/05	4Q/06	0	0	1.2
F	Gas-Fired Oilfield Steam Generators	4Q/04	2Q/06	0	0	4.8
G	Indirect Source Mitigation Fee	4Q/04	1Q/05	6.3	4.1	0
H	Residential Wood Combustion	3Q/03	1Q/04	5.4	0.2	0
I	Small Boilers	4Q/04	4Q/06	0	7.7	0
J	Water Heaters	4Q/04	4Q/04	0	1.8	0
K	Wineries	4Q/04	4Q/06	Not Quantified		
L	Steam-Enhanced Crude Oil Production Well Vents	1Q/05	1Q/06	Not Quantified		
M	Residential Space Heating	3Q/04	1Q/05	Not Quantified		
N	Agriculture Irrigation Engines	4Q/04	3Q/05	Not Quantified		
Totals				66.0	14.2	6.15

In Chapter 4 of the 2003 PM10 Plan, the District commits to developing its control measures as follows:

> "For the purpose of implementing the PM10 Plan, the District is committed to adopt and implement control measures that will achieve, in aggregate, emission reductions specified in the following section. Emission reductions achieved in excess of the amount committed to in a given year can be applied to the emission reduction commitments of subsequent years. The District is committed to adopt the control measures listed below unless these measures or a portion thereof are found infeasible and other substitute measures that can achieve equivalent reductions in the same adoption/implementation timeframes are adopted. Findings of infeasibility will be made at a regularly scheduled meeting of the District Governing Board with proper public notification. For purposes of State Implementation Plan (SIP) commitment, infeasibility means that the proposed control technology is [not*] reasonably likely to be available by the implementation date in question, or achievement of the emission reductions by that date is not cost-effective. The District acknowledges that this commitment is enforceable under Section 304(f) of the CAA."

ARB staff's recommendation to approve this approach is with the understanding that the District is committing to adopt control measures between 2003-2005 that achieve in aggregate 66 tpd direct PM10, 16.3 tpd NOx, and 6.3 tpd SOx reductions, for implementation between 2004-2006. The District is also committing to adopt the specific measures in Tables III-3 and III-4, unless the District Board finds a measure

* Note: The District intends to correct this typographical error prior to plan adoption.

infeasible at a noticed public hearing. A summary of each proposed measure is presented below.

A, Agriculture Conservation Management Practice (CMP) Program This is a proposed new measure that would affect on-field agriculture operations, off-field activities, equipment parking and storage areas, inactive open area windblown emissions, and concentrated animal feeding operations. Participation in the CMP program would be mandatory. Small farms would be exempt from the program reporting requirements.

B, Cotton Gins. This is an update to an existing rule to make it BACM. The rule is similar to a Maricopa County, Arizona rule. Under this control measure, cotton gins would be retrofitted with cyclones or equivalent devices with at least 95 percent efficiency, which is considered BACM for seed loading, first seed-cotton cleaning, master trash system, and other high-pressure exhaust emission units. Cyclones or equivalent devices with at least 90 percent efficiency could be installed for low-pressure exhaust units. Other rule requirements would ensure maximum particulate matter collection efficiency for cyclones.

C, Dryers This is a new measure that will affect dryers used to remove water from process material by heating. The District determined that these dryers exceed the de minimus threshold and are subject to BACM. These units are currently subject to District permitting requirements, but there is no specific rule. Emission controls appropriate for dryers include Public Utilities Commission-quality natural gas, low excess air, low NOx burners, and flue gas recirculation.

D, Fugitive PM10 (Regulation VIII) This is an update to make the rule BACM, increasing both the types of operations covered and the effectiveness of the dust reduction requirements. For example, local and State agencies responsible for roads will need to reduce the dust from vehicle travel and construction activities.

E, Glass Melting Furnaces This is an update to an existing rule for NOx, carbon monoxide, and ROG control. The District determined that SOx emissions from glass melting furnaces exceed the de minimus threshold and are subject to BACM. This measure would establish specific SOx limits, and would affect new and existing glass furnaces fired on petroleum-based fuel.

F, Gas-Fired Oilfield Steam Generators This is an update to an existing rule. The District determined that SOx emissions from gas-fired oilfield steam generators exceed the de minimus threshold and are subject to BACM. This measure is intended to assure appropriate control of SOx emissions from steam generators used in petroleum production. Compliance could be achieved through fuel conditioning or caustic scrubbing.

G, Indirect Source Mitigation Fee This proposal would create a program to mitigate emissions from new development projects (like shopping and goods distribution

centers) that generate motor vehicle trips. These types of projects are referred to as indirect sources. New development projects would be required to pay a mitigation fee, and those funds would be used to purchase cost-effective emission reductions. The District is also proposing a focused mitigation program for the Bakersfield Metropolitan Area. The District is committing to additional reductions in the Bakersfield area beyond the Valley-wide source mitigation fee program. The District believes this commitment can be funded through fees or federal grants.

H, Residential Wood Combustion This is an update to an existing rule. Emissions from residential wood combustion exceed the de minimis threshold and are subject to the BACM requirement. The District intends to include mandatory curtailment of burning on high pollution days, limit the number of fireplaces in new homes, and require U.S. EPA-certified fireplaces and woodstoves upon property sale or transfer. The District will provide exemptions where the rule is not practical (for example, homes where wood is the primary source of heat).

I, Small Boilers, Steam Generators and Process Heaters, from 2 MMBtu/hr to 5 MMBtu/hr This is a new measure applicable to small boilers, steam generators, and process heaters, from 2 MMBtu/hr to 5 MMBtu/hr. The District determined that the emissions exceed the de minimus threshold and are subject to BACM requirements.

J, Water Heaters 75,000 Btu/hr to 2 MMBtu/hr This is a new measure applicable to industrial, commercial, and institutional water heaters. The District determined that the emissions exceed the de minimus threshold and are subject to BACM requirements. These sources are currently not regulated by the District. NOx and SOx prohibitory rules may be coupled with a financial incentive program to accelerate the replacement or retrofit of higher-polluting units.

K, Wineries This is a new measure applicable to winery processes that produce significant ROG emissions via wine fermentation and aging. The District determined that the emissions exceed the de minimus threshold and are subject to BACM requirements. The District does not currently regulate wine fermentation and aging. ROG reduction could be achieved with vapor collection and control systems, carbon adsorption, water scrubbers, catalytic incineration, condensation, and additional temperature control.

L, Steam-Enhanced Crude Oil Production Well Vents This is an upgrade to an existing rule. The District determined that ROG emissions from this source exceed the de minimus levels and are subject to BACM requirements. This measure would reduce ROG emissions from steam-enhanced crude oil production wells, and any associated vapor collection and control systems. Emission reductions can be achieved by lowering the rule exemption thresholds.

M, Residential Space Heating This is a new measure applicable to residential fan-type central furnaces fueled with natural gas. The District determined that NOx emissions from this source exceed the de minimus levels and are subject to BACM

requirements. The measure would likely affect new furnaces installed in new residences, and units replaced in existing homes once the useful life of the units have expired. The District is modeling this rule after similar measures in place in other California districts.

N, Agricultural Irrigation Engines This measure is an upgrade to an existing rule establishing opacity standards. Agriculture irrigation engines are currently exempt from the opacity standards; the District plans to remove the exemption.

Resources Needed to Ensure Effectiveness of Dust Strategies The Agriculture CMP and the updates to the fugitive dust rule, Regulation VIII, contribute over three-quarters of the new direct PM10 emission reductions in the Plan. The success of both of these measures, and ultimately the PM10 strategy itself, is critically dependent on the staff resources the District provides for public outreach, education, and enforcement.

3. Mobile Source Measures

State and federal agencies have jurisdiction to regulate mobile source emissions. Adopted State and federal regulations for cleaner engines and fuels are driving Valley NOx emissions down by over 140 tpd, or nearly 40 percent, between 1999 and 2010. To supplement the existing program, ARB staff has identified six new State measures that would be developed over the next several years to provide an additional 10 tpd NOx and 0.5 tpd PM10 reductions by 2010, consistent with the attainment demonstration needs established in this 2003 PM10 Plan. These measures are a subset of a larger strategy ARB staff has proposed to cut emissions of ROG, NOx, and particulate matter statewide.

The proposed ARB SIP commitments and a detailed description of the measures are included in the *Proposed 2003 State and Federal Strategy for the California State Implementation Plan,* released May 12, 2003. Only the six measures that are needed for PM10 attainment in this region are included as part of the San Joaquin Valley's 2003 PM10 Plan.

Table III-5
Proposed New State Measures
San Joaquin Valley, Annual Average, 2010

Strategy (Agency)	Name	Expected Reductions* (tpd)			Action Dates
		ROG	PM10	NOx	
LT/MED-DUTY-1 (ARB)	Replace or Upgrade Emission Control Systems on Existing Passenger Vehicles – Pilot Program	0-2.4	--	0-2.7	2005
LT/MED-DUTY-2 (BAR)	Smog Check Improvements	1.5	--	3	2002-2005
ON-RD HVY-DUTY-3 (ARB)	Pursue Approaches to Clean Up the Existing and New Truck/Bus Fleet – PM In-Use Emission Control, Engine Software Upgrade, On-Board Diagnostics, Manufacturers' In-Use Compliance, Reduced Idling	1.5	0.1	4	2003-2006
OFF-RD CI-1 (ARB)	Pursue Approaches to Clean Up the Existing Heavy-Duty Off-Road Equipment Fleet (Compression Ignition Engines) – Retrofit Controls	1.0	0.4	0	2004-2008
OFF-RD LSI-2 (ARB)	Clean Up Existing Off-Road Gas Equipment Through Retrofit Controls (Spark-Ignition Engines 25 hp and Greater)	0.1	--	0.1	2004
OFF-RD LSI-3 (ARB)	Require Zero Emission Forklifts Where Feasible – Lift Capacity ≤8,000 Pounds	0.1	--	0.2	2004
Total Emission Reduction Commitment from New State Measures		--	0.5	10	2002-2008

* Expected reductions from individual defined measures are shown for information only. The State is proposing commitments for total new reductions in NOx and PM10 emissions only, consistent with the PM10 attainment demonstration. Commitments for further reductions will be considered in the context of the upcoming Valley Ozone SIP.

The District has also taken action to reduce mobile source emissions in the San Joaquin Valley as shown in Table III-6. In 2001, the District requested the Bureau of Automotive Repair to expand the Enhanced Smog Check program to additional areas. In addition, the District's incentive programs provide funds to reduce emissions from sources not subject to local control.

Table III-6
Benefits of Existing District Mobile Source Strategies
San Joaquin Valley, Annual Average, 2010

Strategy	NOx (tpd)
Request to Add Areas to Enhanced Smog Check	4.9
Clean Engine Incentive Programs	6.5

C. Modeling

The Act requires Serious PM10 nonattainment plans to include a demonstration (including air quality modeling) that the plan provides for attainment of the PM10 standards. The 2003 PM Plan includes chemical mass balance (CMB) receptor modeling, urban airshed modeling, zone of influence analysis, and linear rollback analysis to demonstrate attainment of the 24-hour and annual average PM10 standards.

1. Chemical Mass Balance

CMB is a statistical analysis using information about the chemical composition of air monitoring samples and information about the composition of emission sources to apportion each source's contribution to the measure sample. CMB receptor modeling (CMB version 8) was conducted for all PM10 design value sites in the San Joaquin Valley.

The Particulate Study fieldwork provided extensive data on the types and proportion of the chemical species in San Joaquin Valley PM10. This information goes far beyond the routine data collected by federally required monitors. The receptor modeling used source profiles provided by the Particulate Study specific to dust and tire/brake wear in the San Joaquin Valley, a California-based motor vehicle profile, and a wood smoke profile specific to vegetation in the San Joaquin Valley.

In general, the analysis for all sites met established performance criteria. Two sites, Turlock and Modesto, did not meet all performance criteria. However, monitored concentrations at these sites were close to the standard, and therefore, not limiting in terms of control strategy design.

2. Precursor Analysis

The plan uses an urban airshed model modified to address aerosol chemistry (UAM-Aero) to analyze the response of ammonium nitrate to precursor reductions. Using data from the 1995 Integrated Monitoring Study (IMS95), an early phase of the Particulate Study, the impact on ammonium nitrate concentrations of reductions in NOx, ROG, and ammonia emissions was evaluated. The conclusion was:

- NOx reductions had the greatest impact on ammonium nitrate levels and over the largest geographical area,
- ROG reductions had no impact on ammonium nitrate levels, and
- Ammonia controls appeared to provide some benefits in the Bakersfield area.

From the modeling, a ratio relating NOx emission changes to changes in ambient ammonium nitrate concentrations of 1.5 to 1 was identified. That ratio was then used in the rollback analysis. Without modeling, the nominal assumption is a NOx to ammonium nitrate ratio of 1 to 1. A 1 to 1 ratio was used in the San Joaquin Valley's

previous PM10 plan. The 1.5 to 1 ratio is more health–protective, and therefore, provides increased confidence that the projected NOx reductions will yield the ammonium nitrate reductions relied on in the attainment demonstration.

3. Background Concentrations

Background concentrations are used in the linear rollback analysis to determine the portion of the ambient PM10 that will not respond to controls. The primary sources of natural emissions include organic carbon from vegetation, NOx from soil microbial activities and lightening strikes, fugitive dust from undisturbed surfaces, biogenic sulfur, and sea salt.

The linear rollback analysis for this plan used values ranging from 10 to 14 $\mu g/m^3$. In contrast, the draft South Coast SIP assumed background PM10 concentrations of 5 to 6 $\mu g/m^3$. The rationale for using higher values in the Valley was based on an assumption of elevated concentrations from accumulation of natural emissions during stagnation events, as well as an assumption of significant contributions from biogenic emissions of organic carbon.

Given the level of uncertainty in specifying background concentrations, and the range of values used elsewhere, the background concentrations used appear somewhat high. In addition, a portion of the background carbon was ascribed to the vegetative burning category. This may be appropriate for the annual average when wildfire emissions may cause impacts. However, it is not appropriate to specify a background concentration for this source category for the winter episodic analysis because there are generally no wildfire emissions during this season.

The ultimate effect of higher background concentrations is to require more emission reductions. Assuming background concentrations that are perhaps somewhat high is conservative and does not undermine the attainment demonstration.

4. Attainment Demonstration

To demonstrate attainment, the District used the CMB analysis with linear rollback. Linear rollback assumes that future PM10 levels above background will decrease in proportion to projected emission reductions. In the linear rollback for each design value site, CMB source categories are matched to the appropriate emission inventory categories. Controls are applied to the emission inventory categories and then substituted back into the linear rollback equation to determine what the monitor value would be if the controls had been implemented. For the 2003 PM10 Plan, the District used a 2010 controlled emission inventory. Tables III-7 and III-8 show the projected 2010 values with Plan implementation for both the 24-hour and annual average design values.

Table III-7
Projected 24-Hour PM10 Values at Exceedance Sites with Plan Implementation
San Joaquin Valley

Site Name	1999-2001 Design Value ($\mu g/m^3$)	2010 Projected Value ($\mu g/m^3$)
Bakersfield-California Ave.	190	139
Bakersfield-Golden	205	153
Clovis	155	122
Corcoran-Patterson	174	136/134*
Fresno-Drummond	186	145
Fresno-First Street	193	148
Hanford-Irwin Street	185	143
Modesto-14th Street	158	117
Oildale-3311 Manor Street	158	120
Turlock-900 Minaret Street	157	117

*Corcoran had two exceedances at 174 $\mu g/m^3$

Table III-8
Projected Annual PM10 Values at Exceedance Sites with Plan Implementation
San Joaquin Valley

Site Name	1999-2001 Design Value ($\mu g/m^3$)	2010 Projected Value ($\mu g/m^3$)
Bakersfield-Golden	57	49
Hanford-Irwin Street	53	47
Visalia-Church Street	54	46

The projected 153 $\mu g/m^3$ at Bakersfield-Golden represents attainment of the standard according to U.S. EPA regulation. In the Code of Federal Regulations, Part 50, National Primary and Secondary Ambient Air Quality Standards, Appendix K *Interpretation of the National Ambient Air Quality Standards for Particulate Matter*, U.S. EPA defines a 24-hour exceedance as a "value that is above the level of the 24-hour standard after rounding to the nearest 10 $\mu g/m^3$ (i.e., values ending in 5 or greater are to be rounded up)." The regulation also states that "although the discussion in this appendix focuses on monitoring data, the same principles apply to modeling data." Therefore, according to U.S. EPA regulation, the 153 $\mu g/m^3$ is rounded to 150 $\mu g/m^3$.

As shown above, the Bakersfield-Golden site has the highest design value in the San Joaquin Valley for both standards. The Bakersfield-Golden site was also the site most resistant to controls, especially NOx controls. Attainment at Bakersfield-Golden is critically dependent on the effectiveness of fugitive dust controls.

In general, the attainment demonstration is health-protective with a conservative NOx to ammonium nitrate ratio and conservative background assumptions.

D. Best Available Control Measures

The Act requires all serious nonattainment areas to implement BACM on all significant sources of PM10 or PM10 precursors. U.S. EPA generally presumes the contribution to nonattainment of any source category to be de minimis if the source category causes a PM10 impact in the area of less than 1 $\mu g/m^3$ for the annual mean concentration and 5 $\mu g/m^3$ for a 24-hour average.

The District hired two consultants to do a preliminary BACM analysis for most fugitive dust sources. The consultant calculated the de minimis levels by matching annual average daily emissions with the maximum annual average PM10 measurement for each county, and matching the worst-case 24-hour ambient measurement with seasonal quarter emissions for each corresponding pollutant. The worst-case condition for each component of PM10 was examined separately. This approach determines a de minimis level for each contributing component of PM10 based on a worst-case PM10 day, which is greater than the highest measured 24-hour PM10 concentration. For sources above de minimis, the District's consultants evaluated the relevant District rules and recommended potential upgrades. District staff conducted the BACM analysis for stationary sources and residential wood burning.

Considering the consultants' recommendations and staff analyses, the District is committing to upgrade seven existing rules to BACM levels and to adopt seven new rules. We believe implementation of these commitments would meet BACM requirements. We urge the District to work with ARB and U.S. EPA to ensure that the final rules include control requirements that satisfy BACM.

E. Transportation Conformity Budgets

This Plan establishes on-road motor vehicle emissions budgets for transportation conformity for the years 2005, 2008, and 2010. These emissions budgets reflect the latest planning assumptions and were developed using ARB's latest on-road mobile source emission factor model EMFAC2002 (approved by U.S. EPA on April 1, 2003). Currently, transportation agencies use a build/no-build analysis for PM10 conformity budgets.

The new emissions budgets for NOx and PM10 are shown in Table III-9. The budgets are derived with EMFAC2002 projections and matched to activity data reported by the eight county Councils of Government using ARB's VMT matching methodology. These results are adjusted to account for any baseline emission reductions not included in the model, and any emissions that the model does not project (e.g. PM10 emissions from road construction activities, reentrained paved road dust, and reentrained unpaved road dust.) Finally, the new State and local commitments to reduce on-road vehicle and road construction emissions are subtracted from the adjusted baseline to arrive at the conformity budgets. The new budgets will become applicable when U.S. EPA finds the budgets adequate. The conformity budgets are based on the average annual daily emissions. The District determined that they are applicable for both the annual and

24-hour PM10 standards. Conformity assessments for these budgets will use the emission factors in this SIP with updated activity.

Table III-9
Motor Vehicle Emission Budgets for PM10*
San Joaquin Valley, Annual Average, Tons per Day

County	2005		2008		2010	
	PM10	**NOx**	**PM10**	**NOx**	**PM10**	**NOx**
Fresno	14.1	42.6	13.3	36.4	16.2	29.7
Kern	10.6	38.8	10.7	34.2	10.8	28.4
King	5.6	7.5	5.6	6.5	6.7	5.4
Madera	4.3	9.9	4.3	9.1	4.5	7.8
Merced	5.5	15.3	5.2	12.5	5.3	9.9
San Joaquin	9.0	28.9	3.9	23.4	9.2	18.3
Stanislaus	6.5	22.5	6.1	18.7	6.1	14.9
Tulare	8.7	23.6	7.9	20.1	8.9	16.4

* The District released these revised budget numbers on May 19, 2003.

Fugitive dust emissions from roads will continue to grow due to growth in VMT. Section 93.124 of the federal conformity rule, in particular 93.124(c), allows the SIP to establish trading mechanisms between budgets for pollutants or precursors. The basic idea is to allow conformity demonstrations for analysis years after 2010 to use NOx reductions beyond the attainment level to offset PM10 increases from this VMT growth.

We note that since growth in VMT plays a significant role in PM10 emissions in the San Joaquin Valley, the San Joaquin Valley transportation agencies have committed to conduct feasibility analyses as part of each new Regional Transportation Plan, excluding revisions. The analyses will identify and evaluate potential post-2010 control measures to mitigate emissions growth. We believe these are critical for retaining the health benefits of the State's mobile source program. We will work closely with the transportation planning agencies and the District to ensure that post-2010 conformity analyses adequately protect public health.

The emissions budgets established in this Plan fulfill the requirements of the Act and U.S. EPA regulations to ensure that transportation activities support progress and attainment of the PM10 standards. With the upcoming implementation of the more health protective federal eight-hour ozone and PM2.5 standards, we recognize that the motor vehicle budgets associated with those SIPs must reflect additional reductions.

Directly emitted PM10 poses a unique challenge that is not experienced with ozone or PM10 precursors. As currently calculated, directly emitted PM10 from paved roads has a linear relationship with VMT. Thus, as VMT grows, paved road dust also grows. Since the opportunities for controlling paved road dust emissions are limited, ARB will continue to work closely with the District, the Councils of Government, and other transportation agencies to address the emissions growth.

F. Five Percent/Reasonable Further Progress

In addition to the overarching requirement that the Plan demonstrate attainment as soon as practicable, it must also provide for an annual reduction in PM10 or PM10 precursors of not less than five percent of such emissions as reported in the most recent inventory prepared for the area. We believe this is not a separate requirement, but an integral part of the attainment demonstration. It ensures annual progress toward clean air and steady implementation of the attainment strategy. In other words, adoption and implementation of control measures are not put off until late in the attainment period. This is directly analogous to the Act's ozone rate of progress requirements.

For the San Joaquin Valley, CMB and urban airshed modeling results show that to attain the standard, the region must reduce both direct PM10 and NOx emissions. The attainment strategy is designed to do so. Reducing directly emitted PM10 and NOx simultaneously provides for the most expeditious attainment strategy. Therefore, the 2003 PM10 Plan shows a five-percent annual reduction of emissions by reducing a combination of directly emitted PM10 and NOx each year. The percent reductions are added to achieve five percent using the same adding convention used in ozone rate of progress plans.

The Act requires the plan to contain quantitative progress milestones to be achieved every three years. The District has identified emission milestones that satisfy the five-percent annual and reasonable further progress requirements.

G. Contingency Measures

Contingency measures are intended to provide additional reductions in case the control measures identified for attainment and progress do not deliver the expected reductions. The District and ARB have included all measures currently known to be feasible in the 2003 PM10 Plan to obtain the reductions needed to attain the PM10 standards at the earliest practicable date. The District has two contingency measures -- additional amendments to the fugitive dust rule and an amendment to the agriculture CMP. For the fugitive dust rule, measures that were not selected for BACM, for reasons such as cost-effectiveness or other reasons, would be implemented. For the agriculture CMP, the District would increase the number of mandatory measures. The District will also be submitting an ozone attainment plan in 2004, which will have additional reductions in both the 2008-2010 and the post-2010 timeframe. The District must continue to implement control measures post-2010 due to nonattainment of the federal eight-hour ozone and the PM2.5 standards.

The State contingency measures in the Plan are the post-2010 benefits of mobile measures ARB and U.S. EPA have adopted, and that will be implemented without the need for further action.

IV. FUTURE ACTIONS AND AIR QUALITY PLANS

A. Further Study Measures

The District includes four further study measures in its plan. These measures appear to have potential for emission reductions, but have uncertain emission inventories or control measure effectiveness at this time.

1. Concentrated Animal Feeding Operations

The District is proposing a further study measure for ammonia emissions from concentrated animal feeding operations (CAFOs). In light of the uncertainty of the impact of ammonia reductions on ammonium nitrate levels and uncertainty in the ammonia inventory itself, ARB staff concurs that a further study measure is appropriate. A decision to move forward with controls should be made as soon as the complete Particulate Study modeling is available. The District is actively engaged in efforts to provide information needed to develop better emission estimates and potential CAFO controls.

The District's Agricultural Technical Advisory Committee includes stakeholders from industry, academia, and environmental regulatory agencies. This group has developed a Dairy Action Plan that defines research to assess ammonia, ROG, and direct PM10 emissions from dairy farms. The goal of the research is to better understand the contribution of livestock related emissions to air pollution.

2. Solid-Fueled Boilers, Steam Generators, and Process Heaters

In the Plan development process, the District received a question about controls on solid-fueled boilers, steam generators, and process heaters. Upon further investigation, the District determined that NOx and SOx emissions from these sources exceed the de minimus threshold levels and are subject to BACM. The District's permitting process establishes NOx and SOx emission limits for these units. The District will evaluate whether the current emission limits are consistent with BACM. In the event they are not BACM, the District commits to adopt a rule in 2005.

3. Soil Decontamination

The District commits to improving the ROG emission inventory for soil decontamination that occurs by open aeration. The District plans to assess the amount of contaminated soils received at these facilities from out-of-district locations. The District's permitting process currently establishes limits for in-situ soil decontamination.

4. Leaf Blowers

The current emissions inventory for leaf blowers includes direct PM10 emissions in the engine exhaust, but does not include the dust that is disturbed during the blowing process. If the dust emissions are determined to be significant, the District will conduct analysis to determine appropriate control measures.

B. Commitment for Air Quality Modeling and Plan Reassessment

Final Particulate Study modeling is scheduled to be completed in 2005. Beyond the data already available from the Particulate Study that was used in the 2003 PM10 Plan, this work will provide greater atmospheric modeling capability. Table IV-1 details some of the critical Particulate Study milestones.

Table IV-1
California Regional Particulate Air Quality Study Modeling Schedule

Spring 2003	Initiate in-house modeling efforts for Study episodes
Spring 2003	Release Request for Proposals for external modeling support
Summer 2003	Initiate UC Davis modeling for Study episodes
Fall 2003	Begin contracts for external modeling support
Winter 2004	Preliminary findings from in house modeling
Summer 2004	Preliminary findings from UC Davis modeling
Fall 2005	Modeling contracts complete

If the Particulate Study modeling shows that the assumptions used for the attainment demonstration are no longer valid, the District proposes to revise the PM10 SIP in 2006.

V. LEGAL AUTHORITY

The Clean Air Act Amendments of 1990 (42 U.S.C. section 7401 et seq.) require states such as California to submit to the U.S. EPA revisions to the SIP for ozone and PM10 for certain areas. The primary tool to be used in the effort to attain national ambient air quality standards is a plan to be developed by any state with one or more nonattainment areas which provides for implementation, maintenance and enforcement of the standards—the SIP (section 110(a)(1)). Section 110(a)(2)(A) broadly authorizes and directs states to include in their SIPs:

> "...enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of the Act."

Pursuant to these statutory provisions, ARB is charged with coordinating State, regional, and local efforts to attain and maintain both State and national ambient air quality standards. The direct statutory link between ARB and the mandates of the Clean Air Act is found in section 39602 of the Health and Safety Code. This provision states:

> "The state board is designated the air pollution control agency for all purposes set forth in federal law.
>
> The state board is designated as the state agency responsible for the preparation of the state implementation plan required by the Clean Air Act (42 U.S.C., Sec. 7401, et seq.) and, to this end, shall coordinate the activities of all districts necessary to comply with that act.
>
> Notwithstanding any other provision of this division, the state implementation plan shall only include those provisions necessary to meet the requirements of the Clean Air Act."

VI. STAFF RECOMMENDATIONS

A. For District Action Prior to Plan Adoption

We recommend that the District clarify its proposal to revisit the PM10 emission reduction strategy when the final Particulate Study data are available. The District needs to specify a timeline for any needed plan revision.

B. For Air Resources Board Action

With the clarification discussed above, we recommend that the Board take the actions necessary to approve both the State and local elements of the 2003 San Joaquin Valley PM10 Plan and to forward it to U.S. EPA as a revision to the California SIP.

(1) After considering public testimony, we recommend that the Board adopt the proposed State commitments to support the 2003 San Joaquin Valley PM10 SIP as identified in Section I, Chapter D of the *Proposed State and Federal Strategy for the California SIP*. These commitments for emission reductions and new measures are integral to the Plan's ability to show both attainment and progress.

(2) After considering public testimony, we recommend that the Board approve the 2003 San Joaquin Valley PM10 Plan as a revision to the California SIP. Board action should also encompass any District revisions that strengthen the Proposed Plan in response to public comments.

ARB staff finds that the 2003 PM10 Plan meets applicable requirements. We believe that Plan implementation would clearly reduce PM10 levels throughout the San Joaquin Valley and benefit public health.