

State of California
AIR RESOURCES BOARD

Final Draft

STAFF REPORT

**ANALYSIS OF THE
SAN JOAQUIN VALLEY 2007 OZONE PLAN**

Date of Release: 5/30/2007
Scheduled for Consideration: 6/14/2007

This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

(This page intentionally left blank.)

PRINCIPAL AUTHOR

Jeff Lindberg, Planning Liaison to the San Joaquin Valley Unified Air Pollution Control District
Phone: (916) 322-2832
Email: jlindber@arb.ca.gov

PROJECT MANAGER

Ravi Ramalingam, P.E., Manager, Transportation Strategies Section

CONTRIBUTORS

Air Quality and Transportation Planning

Kurt Karperos, P.E., Chief, Air Quality and Transportation Planning Branch
Jon Taylor, P.E., Manager, Motor Vehicle Assessment Section
Kyriacos Kyriacou, Ph.D., Air Resources Engineer
John Nguyen, Air Pollution Specialist
Jamesine Rogers, Air Pollution Specialist
Tom Scheffelin, P.E., Air Resources Engineer
Earl Withycombe, P.E., Air Resources Engineer

Air Quality Data

Karen Magliano, Chief, Air Quality Data Branch
Mena Shah, Manager, Air Quality and Statistical Analysis Section
Gayle Sweigert, Manager, Air Quality Analysis Section
Steve Gouze, Air Pollution Specialist
Larry Larsen, Ph.D., Staff Air Pollution Specialist

Air Quality Health Impacts

Barbara Weller, Ph.D., Manager, Population Studies Section
Hien Tran, Staff Air Pollution Specialist

Air Quality Modeling

John DaMassa, Chief, Modeling and Meteorology Branch
Vernon Hughes, Manager, Atmospheric Modeling and Support Section
Paul Allen, Staff Air Pollution Specialist
Daniel Chau, Ph.D. Air Resources Engineer
Cheryl Taylor, Air Resources Engineer
Qi Ying, Ph.D, Air Resources Engineer

Emissions Inventory

Martin Johnson, P.E., Staff Air Pollution Specialist
Larry Hunsaker, Air Pollution Specialist

ACKNOWLEDGMENT

ARB staff thanks the staff of the San Joaquin Valley Unified Air Pollution Control District for the high level of coordination between the agencies in the development of the technical elements of this plan.

Table of Contents

EXECUTIVE SUMMARY.....iii

I. BACKGROUND.....1

 A. Profile of the San Joaquin Valley

 B. Ozone Health Effects

 C. Historical Air Quality

 D. Central California Air Quality Studies

II. AIR QUALITY PLANNING.....7

 A. Air Quality Planning Background

 B. Recent Air Quality Planning Activities

 C. General Planning Requirements

 D. California Clean Air Act Plans

III. PLAN EVALUATION.....11

 A. Overview of the San Joaquin Valley 2007 Ozone Plan

 B. Emissions Inventory

 C. Air Quality Modeling

 D. Reclassification to Extreme Nonattainment

 E. Control Strategy

 F. Attainment Demonstration

 G. Reasonable Further Progress and Contingency Measures

 H. Transportation Conformity Budgets

 I. Additional Requirements for Extreme Nonattainment Areas

IV. ENVIRONMENTAL IMPACTS.....44

V. LEGAL AUTHORITY.....44

VI. STAFF RECOMMENDATIONS.....45

APPENDICES

- Appendix A Emissions Inventory Output Tables
- Appendix B Weight-of-Evidence Analysis – San Joaquin Valley Air Basin: Ozone
- Appendix C Photochemical Modeling Protocol for Developing Strategies to Attain the Federal 8-hour Ozone Air Quality Standard in Central California
- Appendix D Proposed Updates to the Transportation Conformity Budgets Identified in the San Joaquin Valley 2007 Ozone Plan

(This page intentionally left blank.)

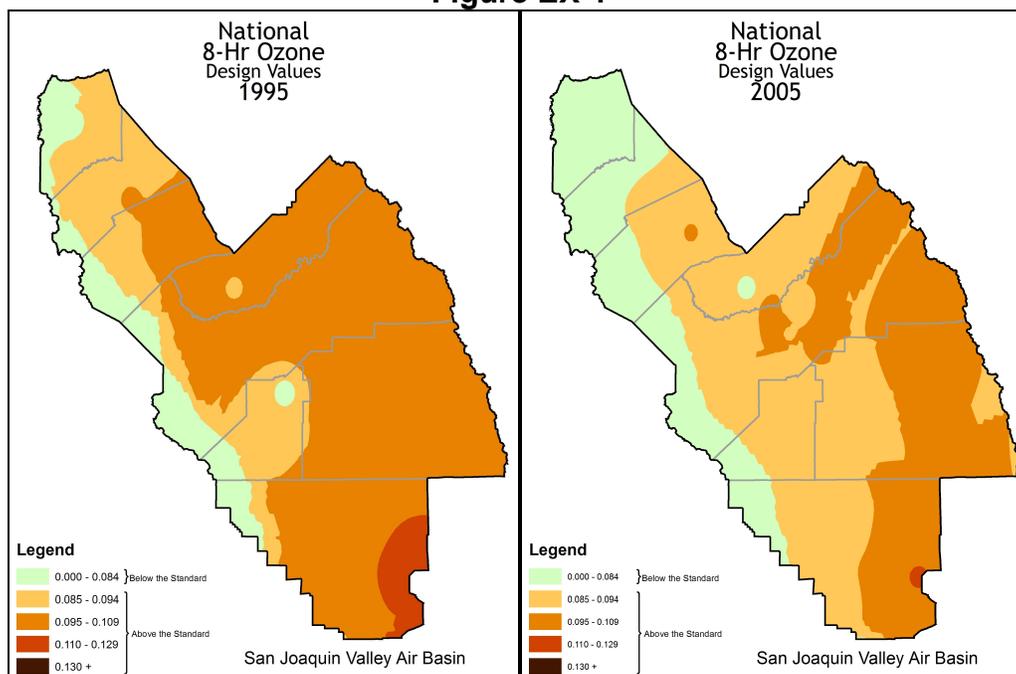
EXECUTIVE SUMMARY

On April 30, 2007, the San Joaquin Valley Unified Air Pollution Control District (District) adopted the 2007 Ozone Plan. The 2007 Ozone Plan charts the course to attainment of the federal 8-hour ozone air quality standard in the Valley. The staff of the Air Resources Board (ARB or Board) has reviewed the 2007 Ozone Plan and is recommending that the Board approve the 2007 Ozone Plan and submit it to the U.S. Environmental Protection Agency (U.S. EPA) as a State Implementation Plan (SIP) revision.

The topography of the San Joaquin Valley, combined with hot, dry summers, creates an environment very conducive to ozone formation, especially in the southern end of the Valley which most frequently experiences the highest ozone levels. This, combined with the physical environment and the emissions from cars, trucks, tractors, and industrial sources, results in some of the highest ozone levels in the nation. In 2006, Valley air quality monitors recorded 86 days over the federal 8-hour ozone standard, one day more than the South Coast Air Basin. The federal ozone standard is exceeded by 30 percent, based on the 2006 design value.

California has led the nation in reducing public exposure to harmful air pollution through the development of emission control regulations on both mobile and stationary sources. The rules and regulations in place today are already providing air quality improvement, measured by the 8-hour standard. However, progress indicators present a mixed picture. The average number of days exceeding the federal 8-hour ozone standard has declined nearly 20 percent between 1996 and 2006, yet maximum levels have been strikingly flat over the last 10 years, with the average federal 8-hour design value declining by only 3 percent. Still, although the 8-hour design value has come down slowly, the areas – and populations – experiencing the highest ozone levels have decreased in size dramatically (Figure EX-1), and Valley residents experience those elevated levels on fewer days.

Figure EX-1



Air quality modeling indicates that attainment of the ozone standard in the Valley is heavily dependent on control of nitrogen oxides (NO_x) emissions, and that NO_x emissions must be reduced by 75 percent from today's levels in order for the region to reach attainment of the standard. Reducing reactive organic gas (ROG) emissions will also help to reduce ozone, especially in the near-term, and will help bring many areas of the Valley into attainment of the 8-hour ozone standard more quickly. However, air quality modeling indicates that while important, ROG emission reductions do not have the same relative benefit as NO_x emission reductions, especially in the areas with the worst air quality.

The U.S. EPA classifies the San Joaquin Valley as serious nonattainment for ozone, with an attainment date of June 15, 2013. To attain the standard by the 2013 deadline, the Valley would need to have all of the necessary NO_x reductions in place by 2012. The majority of the emission reductions needed to bring the Valley into attainment will come from the implementation of the State's existing mobile source control program, as newer and cleaner equipment and vehicles are put in place. This will provide a 28 percent reduction in NO_x and a 10 percent reduction in ROG emissions between now and 2012 in the Valley. Even with this marked improvement, the Valley will still be short of the NO_x goal by 66 percent and will be 15 percent short of the ROG goal in 2012.

A "serious" classification does not reflect the true magnitude of the ozone problem in the Valley or the increased stringency of the 8-hour standard. Demonstrating attainment of the federal ozone standard by June 2013 as a

serious nonattainment area is not practical, given the scope of the problem and the need to rely on new technologies that will phase in between 2011 and 2017. The federal Clean Air Act (Act) allows, and U.S. EPA recommends, that in these cases the area be reclassified to an appropriate higher classification such as severe-15, severe-17, or extreme, with attainment dates in 2019, 2021, and 2024, respectively.

ARB and District staffs have identified additional opportunities to garner further reductions. ARB staff developed the proposed 2007 State Strategy¹ to provide significant new mobile source emission reductions in the Valley, beyond the existing control program, on a very aggressive timeline. On April 30, 2007, the District Governing Board adopted a plan which requires additional controls on stationary and area-wide sources.

Both the proposed State Strategy and adopted District plan include commitments to develop new emission control regulations and expand incentive programs as a mechanism to accelerate the conversion to newer, cleaner technologies. The local strategy includes a suite of near-term regulatory measure commitments for significant early ROG reductions which will result in near-term air quality improvement throughout the Valley.

The Valley faces a fundamental technology constraint in its effort to attain the federal ozone standard. As discussed later in this document, even if every car, truck, and piece of construction and farm equipment met the cleanest adopted emission standards, the Valley would still need more reductions. Therefore, the ARB and District staffs will need to continue to develop longer-term concepts and new technologies to provide the final increment of reductions needed for the Valley to attain the standard. Under the Act, the Valley's real-world need to rely on future technology is only allowable in SIPs for areas classified as extreme.

On April 30, 2007, the District adopted the San Joaquin Valley's 2007 Ozone Plan and voted to request that U.S. EPA reclassify the Valley to an extreme nonattainment classification. While the ultimate attainment date would be extended to 2024, full implementation of the 2007 Ozone Plan would result in most regions in the Valley attaining the standard before then. Table EX-1 demonstrates that the emission reduction commitments included in the San Joaquin Valley's 2007 Ozone Plan will result in attainment of the federal ozone standard throughout the Valley by the final attainment date. The near-term emission reduction measures approved by the District, combined with those proposed by ARB staff, will result in dramatic air quality improvement in the San Joaquin Valley. By 2023, only four sites in the Valley will need emission reductions, beyond the proposed state measures, in order to attain the federal ozone standard – and all sites will have seen marked improvement to that point.

¹ Available online at: <http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm>

Table EX-1
Setting and Meeting the Emission Reduction
Target for Ozone Attainment
(Summer Planning tons per day)

San Joaquin Valley (2023)		
	NOx	ROG
2006 Emissions Inventory	650	454
Carrying Capacity	160	342
Emission Reduction Target	490	112
Emission Reductions from Existing Program	355	43
Emission Reductions from New Local Measures	9	47
Emission Reductions from New State Measures	46	25
Long-Term Concepts	80	--
Total Reductions Identified	490	115

The 2007 Ozone Plan includes long-term commitments to achieve this last increment of emission reductions necessary to meet attainment goals in the San Joaquin Valley. As the State agency charged with ensuring California's SIP compliance, ARB is ultimately responsible for ensuring the necessary measures are identified no later than 2020 (three years prior to the attainment year), and the emission reductions are achieved by 2023.

As part of the State Strategy under development, ARB staff is proposing to initiate a coordinated government, private, and public effort to establish emission goals for critical mobile and stationary emission source categories. Following the setting of emission goals, ARB would start an ongoing public process to assess technology advancement opportunities for the critical categories. ARB staff will periodically brief the Board at public meetings on emerging emission reduction opportunities, promising technologies, and the progress made in developing long-term emission reduction measures. As ARB staff identifies feasible technology-forcing emission reduction measures, staff will propose those measures to the Board for inclusion into the SIP.

The 2007 Ozone Plan, and the request for reclassification, is controversial. Many members of the environmental community believe that a reclassification to extreme represents an unacceptable delay in attainment of the federal 8-hour ozone standard. Based on the air quality modeling conducted for the San Joaquin Valley, combined with known emission control technologies which will be available, the District believes, and ARB staff concurs, that an extreme area attainment plan is the only one that realistically charts the course to clean air – which makes it the only federally approvable course of action.

While a reclassification to extreme is, in the District's and ARB staff's view, a practical and legal necessity, the District Board approved a dual path strategy for attainment. One path includes the commitments and timelines needed in a federally approvable SIP, and recognizes the constraints placed on the District by

State and federal law, policy, and guidance. The second path, which will parallel SIP implementation, includes important policy initiatives such as the use of increased, but as yet unsecured, incentive funding. Via the second path, the District is attempting to meet the standard before the 2024 extreme deadline.

ARB staff recognizes the significance of having the dual path approach in the 2007 Ozone Plan. However, only some of the included actions reflect federally enforceable commitments and quantifiable emission reductions. In this document, where the district has made an enforceable and quantifiable commitment, ARB staff has indicated such. Where the District has committed to broader-reaching, yet equally important dual-path strategies, ARB staff has indicated this as well. However, only the federally approvable elements will be transmitted to U.S. EPA for inclusion in the Valley's SIP.

While the focus of the current planning effort for the San Joaquin Valley is ozone, it is important to remember that the Valley is also classified as nonattainment for the federal PM_{2.5} standard. The Valley now has a nominal attainment date for the PM_{2.5} standard of April 2010. This attainment date may be extended from one to five years. The PM_{2.5} attainment plan must be submitted to U.S. EPA by April 5, 2008. Many of the control strategies needed to bring the Valley into attainment of the federal ozone standard will also provide progress towards attainment of the PM_{2.5} standard. Like the 8-hour ozone standard, U.S. EPA guidance requires all of the emission reductions needed to attain the PM_{2.5} standard to be in place by the beginning of the year prior to the attainment year, in this case 2014 if the extension is granted. The District will adopt a PM_{2.5} attainment plan in the first half of 2008. As part of this effort, ARB staff is working with the District to both identify emission reduction targets for attainment and to ensure the Valley comes into attainment with the fine particulate standard as expeditiously as practicable.

(This page intentionally left blank.)

I. BACKGROUND

A. Profile of the San Joaquin Valley

Covering nearly 25,000 square miles, the San Joaquin Valley (Valley) is one of the dominant features in California's landscape. The Valley is one of the fastest growing regions in California and is home to more than 3.6 million people. The Valley has four large cities, Stockton, Modesto, Fresno, and Bakersfield, with populations of greater than 200,000 people. Outside of these cities, the Valley has numerous smaller cities and towns, separated by large expanses of agricultural lands. While the Valley has large tracts of agricultural land, the Valley is very urbanized, and as more and more land is converted from agricultural to non-agricultural land uses, this urbanization will continue.

Open to the Sacramento-San Joaquin River Delta in the north, the San Joaquin Valley is surrounded by the Sierra Nevada Mountains to the east, the Pacific Coast Range to the west, and the Tehachapi Mountains to the south. Airflow patterns in the San Joaquin Valley tend to move from north to south and are dammed by the surrounding mountain ranges.

The climate and geography of the San Joaquin Valley create the optimal conditions for creating and trapping air pollution. The Valley is characterized by hot, dry summers, with normal temperatures in the nineties, and heat waves periodically exceeding 100 degrees Fahrenheit. Winters in the San Joaquin Valley are cool and damp, with frequent periods of dense fog. In both summer and winter, the major airflow patterns tend to result in long mixing times for emitted pollutants, especially in the central and southern portions of the Valley.

These stagnant weather patterns make the Valley vulnerable to forming ozone and fine particulate matter air pollution and impede the region's ability to disperse it. The ozone season in the San Joaquin Valley spans a six-month period—May through October. The Valley has ozone levels more than 30 percent above the federal standard, which make it among the most heavily impacted regions in the nation. Approximately two out of every three days in this period has an exceedance of the national ozone standard at one or more sites within the Basin—reflecting the challenge of attaining the standard throughout the Valley.

B. Ozone Health Effects

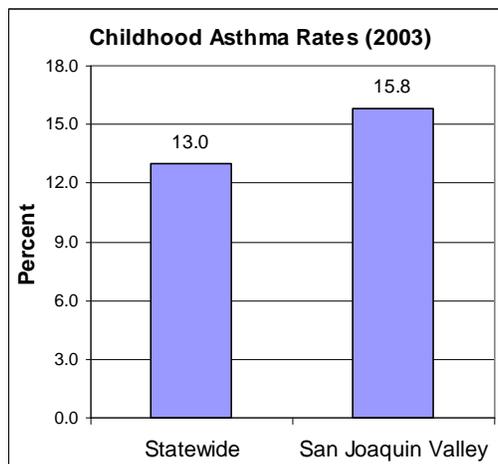
Ozone is a highly reactive gas that forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, consumer products and many other sources. It forms in greater quantities on hot, sunny, calm days, making the summer season the key exposure period.

Considerable research over the past 35 years has investigated how people respond to inhaling ozone. These studies have consistently shown that ozone can lead to inflammation and irritation of the tissues lining the human airways. This causes the muscle cells in the airways to spasm and contract, thus reducing the amount of air that can be inhaled. Symptoms and responses to ozone exposure vary widely, even when the amount inhaled and length of exposure is the same. Typical symptoms include cough, chest tightness, and increased asthma symptoms. Ozone in sufficient doses can also increase the permeability (“leakiness”) of lung cells, making them more susceptible to damage from environmental toxins and infection.

Medical studies of large populations have found that ozone exposure is associated with an increase in hospital admissions and emergency room visits, particularly for persons with lung problems such as asthma and chronic obstructive pulmonary disease. Several studies have also associated ozone exposure with increased premature mortality. ARB analysis indicates that hospitalizations for respiratory related illnesses, not including premature mortality, resulting from ozone levels over the federal standard costs Valley residents on average 18 million dollars per year.

The following charts are examples of our reason for concern over the health effects of air pollution in the San Joaquin Valley (Figure 1). The rates for asthma in children and the rates for deaths from cardiovascular causes are listed for the San Joaquin Valley and compared to the State as a whole. Childhood asthma rates are from the California Health Interview Survey, 2003 data.

Figure 1



C. Historical Air Quality

The Valley is currently classified as serious nonattainment for the federal 8-hour ozone standard, and is designated as nonattainment for the federal PM2.5 standard. Unlike many other ozone nonattainment areas of the State, the ozone problem in the San Joaquin Valley is not dominated by one large urban area. Instead, it is the result of a number of moderately sized population centers, located along the main, northwest-southeast axis of the Valley.

The rules and regulations in place today were largely developed to reduce exposures to 1-hour ozone levels. The average number of days exceeding the now-revoked federal 1-hour standard dropped more than 75 percent over the past decade. Even with this progress, the 1-hour ozone design value in the San Joaquin Valley has declined by only 11 percent over that same time period (Figures 2 and 3).

Trends for 8-hour ozone levels for the San Joaquin Valley as a whole have also been strikingly flat over the last 10 years. While the average number of days exceeding the federal 8-hour ozone standard has declined nearly 20 percent between 1996 and 2006, the average federal 8-hour design value has dropped by only 3 percent.

Figure 2

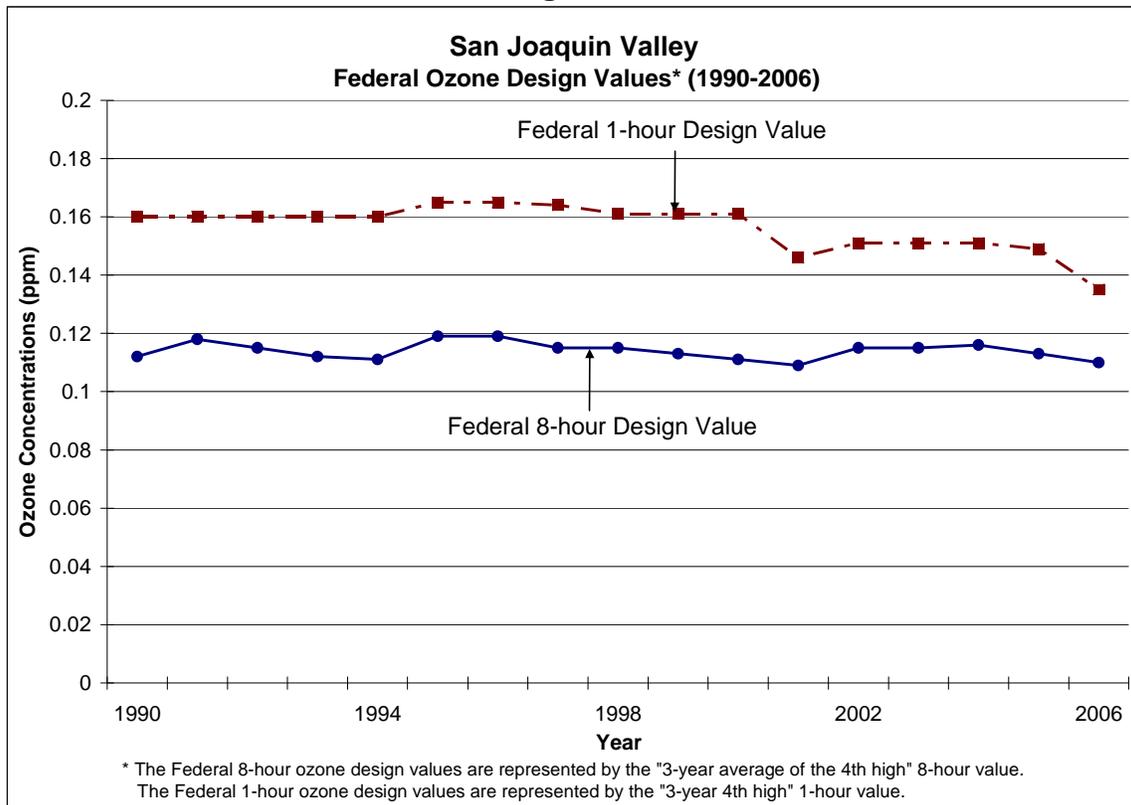
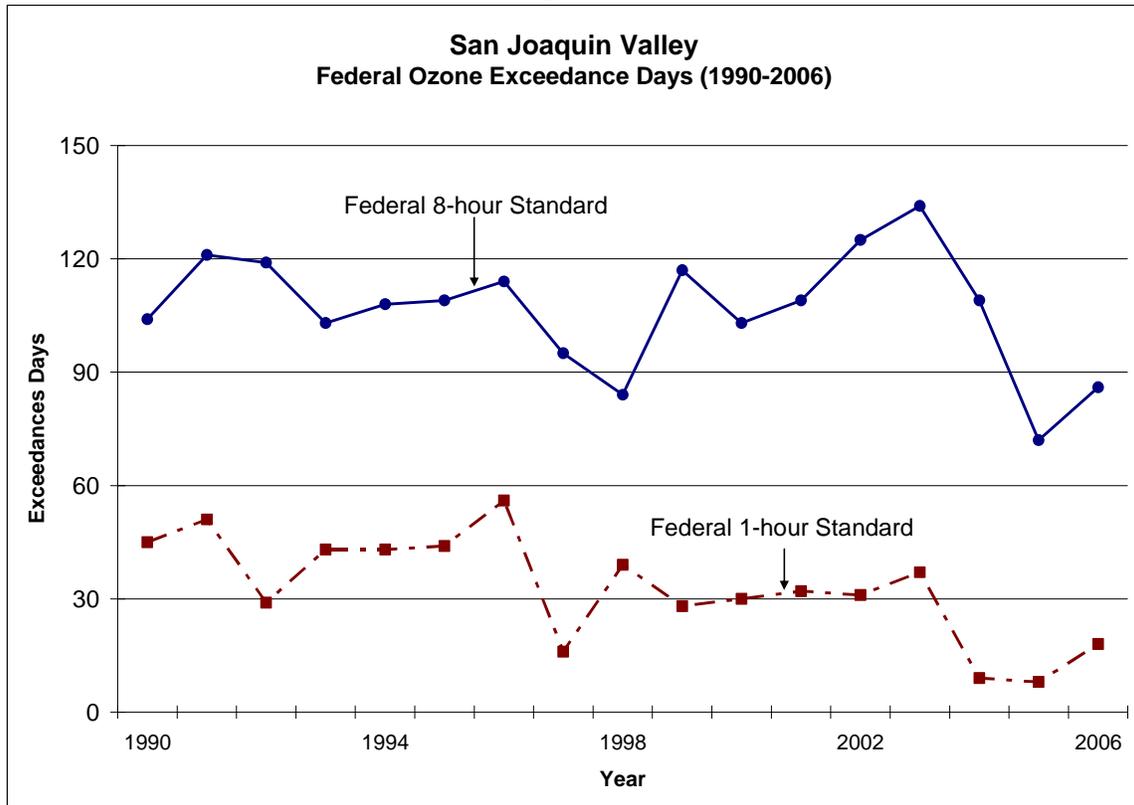


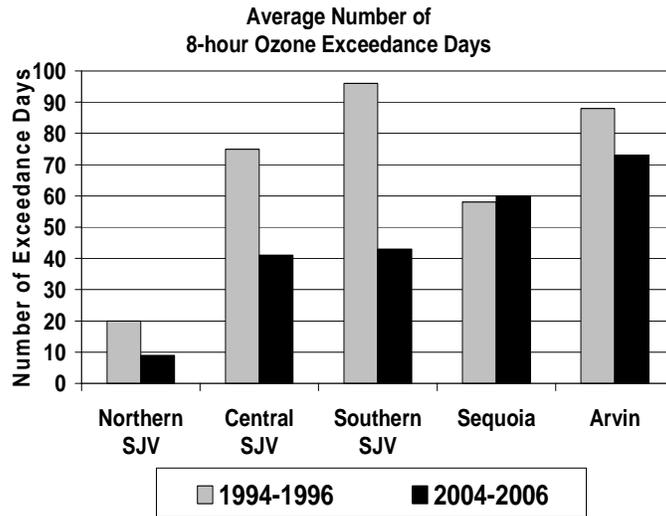
Figure 3



Because the Valley encompasses a very large geographic area, looking at sub-regions with similar geography and weather conditions helps provide a better understanding of air quality improvements and challenges. Generally, the number of days exceeding the level of the 8-hour standard is low in the northern region, but dramatically increases from the central to the southern region of the Valley. High ozone concentrations are widespread and commonly occur in the urbanized Merced, Fresno, and Bakersfield regions, and as well as in the downwind areas of Parlier, Sequoia National Park, and Arvin.

Over the past 10 years, air quality has improved throughout the Valley. On average, there were fewer days over the standard between 2004 and 2006 than between 1994 and 1996 (Figure 4), with the exception of the monitor at Sequoia and Kings Canyon National Park which shows slightly more days over the standard, on average. So, while the fourth highest ozone levels have remained relatively consistent, the number of days on which elevated levels occur has decreased.

Figure 4



Ozone exceedances in downwind areas such as Arvin and Sequoia National Park are a special concern. Arvin is a community of 15,000 people located southeast of Bakersfield at the foot of the Tehachapi Mountains. The air quality monitor located near Arvin is the site recording the San Joaquin Valley's highest 8-hour ozone levels. The 2006 design value², as monitored at the Arvin site, is 0.110 parts per million (ppm), over 30 percent above the level of the standard of 0.084 ppm. This compares to 17 percent above the standard in Fresno and 18 percent in Bakersfield. Generally, the number of exceedance days at Arvin surpasses any other site in the Valley with the possible exception of sites located in Sequoia National Park, downwind of the Fresno area. The air quality monitor in Arvin records an exceedance 85 percent of the time when there is an exceedance anywhere in the San Joaquin Valley.

Air quality planning in the San Joaquin Valley is further complicated because the Valley is also designated nonattainment for the federal PM_{2.5} standard. PM_{2.5} tends to be high during the wintertime. While the Valley does meet the current 24-hour PM_{2.5} standard of 65 ug/m³, the design value for the annual PM_{2.5} standard is approximately 25 percent above the standard of 15 ug/m³. Attainment of the annual standard is the most significant near-term challenge in the San Joaquin Valley. The San Joaquin Valley Unified Air Pollution Control District (District) is currently developing a PM_{2.5} attainment plan, which will be brought to the District Governing Board in early 2008. In addition, the Valley has a significant number of days above the new 24-hour standard of 35 ug/m³, which became effective at the end of 2006 and will be the subject of a future planning cycle.

² The Federal ozone design values are represented by the "3 year average of the 4th high" monitored 8-hour ozone level.

D. Central California Air Quality Studies

The Central California Air Quality Studies are comprised of two programs, the California Regional Particulate Air Quality Study (CRPAQS) and the Central California Ozone Study (CCOS). These studies are a collaborative effort between the public and private sector designed to: 1) develop an improved understanding of ozone and particulate matter in central California; and, 2) provide decision-makers with the tools needed to identify equitable and efficient control methods.

The studies are a comprehensive multi-year effort of meteorological and air quality monitoring, emission inventory development, data analysis, and air quality simulation modeling. Combined, the two studies reflect an investment of nearly 50 million dollars, coupled with extensive in-kind support from study sponsors, extending over a 15-year period. The resulting data and analytical tools are providing the most advanced scientific understanding available for State Implementation Plan development.

CCOS consists of a field program, data analysis, emission inventory development, and modeling. The CCOS field program was conducted during the summer of 2000. Emission inventory development, data analysis, and modeling are on-going projects. The entire effort is expected to be completed by 2011. ARB and the central California air pollution control districts are using the results of CCOS to prepare the ozone SIPs for nonattainment areas in central California. CCOS provides the most important scientific building blocks for the Valley's current ozone planning effort.

CRPAQS is intended to evaluate the Valley's particulate matter challenges with respect both to the national and State air quality standards for particulate matter smaller than 10 micrometers in diameter (PM10) and for particulate matter smaller than 2.5 micrometers (PM2.5). The San Joaquin Valley routinely experiences high levels of particulate matter, and currently exceeds the federal annual PM2.5 standard. CRPAQS was designed to address annual particulate levels as well as fall and winter episodic conditions. Data was collected for 14 months (December 1999 through February 2001) throughout the Valley and surrounding regions. CRPAQS will provide the scientific foundation upon which PM2.5 SIP planning efforts will be built.

II. AIR QUALITY PLANNING

A. Air Quality Planning Background

The federal Clean Air Act Amendments of 1990 (CAA or Act) establish the planning requirements for those areas that routinely exceed the health-based National Ambient Air Quality Standards (NAAQS). These nonattainment areas must adopt and implement a SIP that demonstrates how they will attain the standards by specified dates. Federal law holds each state responsible for implementing the provisions of the Act.

In the air quality management process, many regulatory authorities in California work together to reduce air pollution levels. Each of these agencies is responsible for achieving emission reductions from a part of the inventory. The State has primary regulatory authority over on-road vehicles sold and operated in California, consumer products, pesticide emissions, and certain off-road vehicles and equipment sold or operated in the State. The U.S. EPA has regulatory authority over on-road vehicles sold outside of California, large new farm and construction equipment, locomotives, ocean-going vessels, and aircraft. The regional air pollution control districts have primary authority over stationary emission sources, including industrial and commercial equipment. The regional air districts also develop locally approved air quality plans which, upon approval by the ARB and submission to U.S. EPA, become the region's SIP.

Ultimately, State law³ designates the ARB as the State's air pollution control agency for all purposes set forth in federal law, including the preparation of the SIP. State law further specifies that the ARB must adopt the nonattainment area plan approved by a local district, unless the ARB finds, after a public hearing, that the locally adopted plan will not meet the requirements of the CAA.⁴ The provisions and commitments in a U.S. EPA-approved SIP are federally enforceable. The CAA also allows interested parties to sue U.S. EPA, the State, or local agencies to compel implementation of an approved SIP and other provisions of the Act.

B. Recent Air Quality Planning Activities

Over the past decade, the San Joaquin Valley Unified Air Pollution Control District, ARB, and other State and local agencies have adopted a series of regulations and measures to improve air quality in the Valley. New mobile source standards, reformulated gasoline, and multiple consumer products regulations have been adopted and are being implemented today. And, while California continues to face serious air quality challenges, it is important to recognize the progress made as a result of California's landmark air pollution control programs.

³ California Health and Safety Code (HSC) section 39602.

⁴ HSC Section 41650(a).

1. 2004 Extreme Ozone Plan

In October 2004, the San Joaquin Valley Unified Air Pollution Control District adopted the 2004 Extreme Ozone Attainment Plan (2004 Plan). The 2004 Plan addressed the now-revoked federal 1-hour standard. U.S. EPA never took action on the 2004 Plan. Still, the emission reduction measures identified in the 2004 Plan are being implemented and will provide significant progress towards reducing emissions of NOx and ROG, the two primary precursors to ozone formation.

2. 2006 PM10 Plan

The District has implemented a successful PM10 attainment plan which has resulted in the Valley coming into attainment of the federal PM10 standard. The San Joaquin Valley recently attained the federal PM10 standard, based upon three years of complete, quality-assured monitored air quality data for 2003-2005. The U.S. EPA concurred, and on October 30, 2006, published a finding of attainment⁵ of the PM10 standard for the Valley. The 2006 data continues to support this finding.

C. General Planning Requirements

1. 8-hour Ozone Planning

In July 1997, U.S. EPA promulgated a new air quality standard for ozone that provides additional protection from the harmful health effects of this pollutant. The ozone standard was revised to protect against longer pollutant exposure periods by requiring that ozone concentrations not exceed specified levels over an

Ozone Standard

0.08 parts per million for 8 hours, not to be exceeded, based on the annual fourth highest concentration averaged over three years.

8-hour period instead of a 1-hour period. In April 2004, U.S. EPA finalized Phase 1 of the ozone implementation rule.⁶ This rule set forth the classification scheme for nonattainment areas and continued obligations with respect to the existing 1-hour ozone requirements. As described by the Phase 1 rule, the San Joaquin Valley Air Basin is classified as a serious nonattainment area with an attainment date of June 15, 2013.

On December 22, 2006, after hearing arguments for and against limited aspects of the Phase 1 rule, the U.S. Court of Appeals for the District of Columbia Circuit vacated the rule, and sent it back to U.S. EPA for further proceedings. On

⁵ Federal Register: October 30, 2006 (Volume 71, Number 209, pages 63641-63664)

⁶ Federal Register: April 30, 2004 (Volume 69, Number 84, pages 23951-2400)

March 22, 2007, the U.S. Department of Justice petitioned the Court for a rehearing by the entire Court. While the ultimate outcome of this rule may have impacts on areas with lesser air quality problems, ARB staff expects the impacts on the San Joaquin valley will be minimal.

On November 9, 2005, U.S. EPA supplemented its Phase 1 implementation rule with a Phase 2 rule.⁷ The Phase 2 rule outlines the emission controls and planning elements that nonattainment areas must address in their implementation plans, including:

- air quality modeling that demonstrates attainment of the 8-hour ozone standard;
- adopted control strategies capable of meeting attainment, and contingency measures in the event the controls fall short of achieving needed reductions;
- reasonable further progress plans;
- demonstration that all reasonably available control technology (RACT) has been applied to existing sources;
- transportation conformity emission budgets to ensure transportation plans and projects are consistent with, and will not hinder attainment;
- a weight-of-evidence analysis;

In order to demonstrate attainment of the 8-hour ozone standard by the Valley's formal attainment date, all of the emission reductions needed for attainment must be in place by the beginning of the full ozone season prior to 2024. For example, with a June 15, 2024 attainment date, the necessary emission reduction strategies must be in place by the beginning of the 2023 ozone season.

2. PM2.5 Planning

The San Joaquin Valley is also designated nonattainment for the federal fine particulate matter (PM2.5) standard. PM2.5 plans are due to U.S. EPA in April 2008. Recent air quality monitoring data shows that the San Joaquin Valley Air Basin attains the 1997 24-hour PM2.5 standard of 65 micrograms per cubic meter (ug/m³) of air. The Valley exceeds the annual standard of 15 ug/m³. However, U.S. EPA recently strengthened the 24-hour standard, lowering the acceptable levels to 35 ug/m³ over a 24-hour period.

NO_x is one of the primary contributors to PM2.5 formation in the Valley. As such, the NO_x reductions identified in the 2007 Ozone Plan will provide substantial progress towards attainment of the PM2.5 standard. The District and ARB staffs have begun to identify the magnitude of emission reductions needed to bring the Valley into attainment of the PM2.5 standard by 2015. To the extent that the NO_x emission reductions identified in the 2007 Ozone Plan need to be supplemented, the District and ARB will explore opportunities to achieve direct PM2.5 emission reductions, particulate precursor reductions from sources such

⁷ Federal Register: November 29, 2005 (Volume 70, Number 288, pages 71612-71705)

as mobile agricultural equipment, as well as additional precursor reductions through increased use of financial incentives.

D. California Clean Air Act Plans

The California Clean Air Act requires all areas that violate the State 8-hour ozone standard to achieve a 5 percent annual reduction in ozone precursors, but allows the option of adopting all feasible measures where this is not possible. Areas must demonstrate every three years that they are making steady progress towards attainment. Thus far, all districts, including the San Joaquin Valley APCD, have relied on the all feasible measures options to show progress.

Appendix E of the Valley's 2007 Ozone Plan addresses California Clean Air Act planning requirements. Appendix E will not be submitted to U.S. EPA as part of the 8-hour ozone SIP.

III. PLAN EVALUATION

A. Overview of the San Joaquin Valley 2007 Ozone Plan

The San Joaquin Valley Unified Air Pollution Control District adopted its 2007 Ozone Plan on April 30, 2007. This plan charts the course towards attainment of the federal 8-hour ozone standard in the San Joaquin Valley no later than the deadline for an extreme nonattainment area. The 2007 Ozone Plan contains a dual path strategy, one path constrained by the requirements contained in federal law and regulation on an extreme timeline, the other charting actions to beat that timeline. ARB staff supports this “beat-the-SIP” approach; however, as did the District, we recognize that California must submit a federally approvable plan, meeting all of the requirements of the Clean Air Act. The discussion below focuses on the federally approvable SIP elements, which ARB staff are proposing the Air Resources Board approve and forward to U.S. EPA.

Attaining the ozone standard in the San Joaquin Valley will require continued efforts at all levels of government. ARB staff will continue to track promising new emission reduction technologies. This will include technologies to ensure that new sources are as clean as possible and will leverage technology development to keep existing equipment operating at its intended levels. U.S. EPA will need to continue to reduce emissions from sources under its authority. In the San Joaquin Valley, this will require additional reductions from the on-road trucks registered outside of California and locomotives moving goods up and down the Valley, plus continued progress to clean up the off-road equipment under its control.

Substantial emission reductions will be achieved in the near-term through the use of programs which speed up the transition to cleaner mobile sources. However, as the adopted mobile source controls reach full implementation by 2020, new technologies will be needed to further reduce both mobile and stationary source emissions. Further, as mobile sources continue to get cleaner, stationary and area-wide sources will own a greater share of ozone forming emissions. The District has experience implementing first-of-their-kind emission control regulations. This will need to continue as cleaner industrial and commercial technology becomes available.

B. Emissions Inventory

An emissions inventory is a critical tool used to evaluate, control, and mitigate air pollution. At its core, an emission inventory is a systematic listing of the sources of air pollutants along with the amount of pollutants emitted from each source or category over a given time period. Emission inventories are *estimates* of the air pollutant emissions that are released into the environment – they are not direct ambient concentration measurements. The following are examples of key sources of air emissions:

- Stationary Sources – power plants and oil refineries;
- Area-wide Sources – consumer products and residential fuel combustion for heating homes;
- On-Road Sources – passenger vehicles and heavy-duty trucks;
- Off-Road Mobile Sources – aircraft, trains, ships, recreational boats, construction equipment and farm equipment;
- Non-anthropogenic (Natural) Sources – biogenic (or vegetation), geogenic (petroleum seeps) and wildfires

This section summarizes emissions in the San Joaquin Valley during 2006 and projects emissions for 2014, 2020, and 2023. More detailed emissions data are presented in Appendix B of the San Joaquin Valley 2007 Ozone Plan. The 2006 inventory reflects adopted District and ARB regulations through December 2006. Forecast (future year) emissions are based on adopted air regulations with both current and future compliance dates.

The San Joaquin Valley 2007 Ozone Plan uses two types of inventories: a modeling inventory used as an input to the air quality model and a summer-season planning inventory used to guide policy-makers in their efforts to identify solutions to the ozone challenge. These inventories use the same baseline assumptions and data sources. The primary difference is in how the inventories are aggregated for use. A modeling inventory reflects where and when the emissions are occurring in the region being examined. The planning inventory is aggregated by source type and industry sector, and reflects the emissions on a typical summertime day. The following discussion focuses on the planning inventory used in the San Joaquin Valley 2007 Ozone Plan.

The planning emissions inventory is divided into four major categories: stationary, area-wide, off-road mobile, and on-road mobile sources. These are the sources over which air quality regulators have influence. The summer season inventory is used for ozone because it reflects the activity levels and conditions that occur when higher ozone levels occur in the Valley.

In addition to the four major source categories, the modeling inventory includes non-anthropogenic emissions. In the San Joaquin Valley, these generally include wildfire emissions (if a fire occurred on an episode day) and emissions from vegetation. It is critical to include these emissions in the air quality modeling exercise, as they play an important role in understanding ozone formation in the Valley.

1. Summary of Emission Sources

Emission sources in the San Joaquin Valley are diverse. The San Joaquin Valley is an important transportation corridor for moving goods and people inside the State and beyond. In addition, it is one of the most productive agricultural regions in the world, as well as home to industrial and commercial activities. All

of these sources contribute to the concentrations of pollutants in the Valley. Table 1 shows the San Joaquin Valley's ozone precursor emissions split by source category.

Table 1
San Joaquin Valley Air Basin
Baseline Emission Trends
 (Summer Planning tons per day)

Source Category	ROG			NOx		
	2006	2023	Change (%)	2006	2023	Change (%)
Stationary & Area-wide^a	277	308	11%	128	113	-12%
On-Road Mobile Vehicles^b	99	42	-58%	361	102	-72%
Off-Road Vehicles and Equipment^b	74	59	-21%	161	80	-50%
Total^c	450	409	-9%	650	295	-55%

a – Baseline emissions with SJV Controls Measures adopted through 2006.

b – State Measures adopted through 2006.

c – Numbers may not add up exactly due to rounding.

Mobile sources, including commercial trucks, passenger vehicles, tractors and construction equipment currently account for nearly 80 percent of the NOx emissions in the San Joaquin Valley. By 2023, the existing control program drops this to 62 percent. Of this, heavy-duty commercial trucks are the leading source, accounting for 44 percent of the total NOx emissions Valley-wide. Mobile agricultural equipment and passenger vehicles, the number two and three sources, account for about 9 percent of the total NOx emissions in the Valley. The future year emission inventory projections show reductions are expected to occur due to the on-going mobile source emission control program. Table 2 shows the top 10 sources of NOx emissions in the San Joaquin Valley.

Table 2
San Joaquin Valley Air Basin
Top 10 NOx Emission Sources*
 (Summer Planning tons per day)

Source Category	2006	2015	2023
HEAVY DUTY DIESEL TRUCKS	285	141	75
FARM EQUIPMENT (COMBINES AND TRACTORS)	60	34	17
PASSENGER VEHICLES	58	28	16
<i>Light Trucks, Minivans and SUVs</i>	27	13	8
<i>Passenger Cars</i>	20	9	5
<i>Medium Duty Trucks</i>	12	7	4
MANUFACTURING AND INDUSTRIAL (BOILERS, IC ENGINES)	39	44	48
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	35	20	12
OFF-ROAD EQUIPMENT (OTHER)	34	21	15
<i>Oil Drilling and Workover Rigs</i>	21	13	8
<i>Industrial Equipment</i>	4	2	1
<i>Transport Refrigeration Units</i>	3	4	4
<i>Commercial</i>	3	2	1
<i>Cargo Handling Equipment</i>	1	1	1
<i>Airport Ground Support Equipment</i>	1	1	1
<i>Other</i>	3	2	1
LOCOMOTIVES	22	21	22
AGRICULTURAL IRRIGATION PUMPS	16	5	5
OIL AND GAS PRODUCTION (COMBUSTION)	11	10	10
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	9	8	8
TOTAL OF TOP 10	569	333	227
TOTAL OF SJV	650	398	295
TOP 10 PERCENT OF TOTAL	88%	84%	77%

* Numbers may not add up exactly due to rounding.

Emission sources of ROG are more diverse. Of the top 10 ROG sources in the San Joaquin Valley (Table 3), only two individual categories are larger than 10 percent of the total inventory – passenger vehicles and composting currently account for 14 percent and 13 percent, respectively. All other ROG sources, including dairy cattle waste, prescribed burning, oil and gas production, and recreational boats make up less than 10 percent each when viewed individually.

When viewed at the larger level, stationary and area-wide emission sources account for more than 60 percent of the total ROG emissions. On-road mobile sources make up one-quarter of the ROG emissions. The balance is made up of off-road mobile sources such as construction and farming equipment. In the future, mobile source ROG emissions are expected to decline, as more of the vehicles and equipment in operation meet the most stringent emission standards required. ROG emissions from stationary and area-wide sources are expected to grow in the future, as economic growth outpaces the benefits of the current generation of emission control equipment. ROG emissions from waste disposal

and composting alone are expected to increase by more than 20 tons per day between now and 2023. The 2007 Ozone Plan sets out commitments to reduce composting emissions.⁸

Table 3
San Joaquin Valley Air Basin
Top 10 ROG Emission Sources*
 (Summer Planning tons per day)

Source Category	2006	2015	2023
PASSENGER VEHICLES	62	35	24
<i>Passenger Cars</i>	29	13	8
<i>Light Trucks, Minivans and SUVs</i>	26	16	11
<i>Medium Duty Trucks</i>	8	6	5
OTHER (WASTE DISPOSAL/COMPOSTING)	57	71	80
LIVESTOCK WASTE (DAIRY CATTLE)	40	33	41
OIL AND GAS PRODUCTION (EVAPORATIVE LOSSES/FLARING)	28	25	23
CONSUMER PRODUCTS	24	26	30
HEAVY DUTY DIESEL TRUCKS	20	12	8
RECREATIONAL BOATS	20	17	17
<i>Pleasure Boats</i>	16	14	14
<i>Personal Water Craft</i>	4	3	3
PESTICIDES	18	18	18
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	13	12	13
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	11	12	13
TOTAL OF TOP 10	294	262	268
TOTAL OF SJV	450	402	409
TOP 10 PERCENT OF TOTAL	65%	65%	66%

* Numbers may not add up exactly due to rounding.

2. Estimating Emissions

As mentioned previously, emission inventories are estimates of the pollutant emissions that are actually released into the environment. California uses computer models to estimate the emissions from on- and off-road mobile sources. Stationary source emissions data is derived directly from District permitting activities. Area-wide emissions are estimated based on emission factors and information on expected activity from these diverse sources and undergo routine reevaluation to ensure that they remain up to date and accurate.

All emission estimates take into account expected growth in activity, state-of-the-science emission data, and currently adopted emission control rules and regulations. The growth assumptions used to estimate future emissions are

⁸ On March 15, 2007, the San Joaquin Valley Unified Air Pollution Control District adopted Rule 4565 - Biosolids, Animal Manure, And Poultry Litter Operations, satisfying the commitment to address emissions from this source (see New Local Measures Discussion, below).

critical elements in any attainment demonstration plan -- they directly impact the amount of emission reductions needed to reach the emissions target.

Stationary source emissions are derived from District permit data. Area-wide and off-road source emissions are estimated jointly by ARB, the District, and in the case of pesticide usage, by the California Department of Pesticide Regulation (DPR). Emission reductions from both ARB and District regulations adopted by December 2006 are included in the emission forecasts.

The mobile source emission inventories used in the 2007 Ozone Plan represent many improvements in the models that are used to estimate emissions from both on-road and off-road sources. Using the new models, our estimates of the emissions generated by mobile sources have increased relative to those used in earlier SIPs. These higher estimates do not indicate that actual in-the-air emissions are increasing – on the contrary, actual emissions from cars and trucks have declined and will continue to decline rapidly over time. This progress comes because of State and federal requirements for cleaner engines and fuels, and despite significant growth in population and vehicle usage.

Ozone-related emissions in the Valley are generally consistent with the overall downward trend statewide. Although motor vehicle miles traveled in the basin continue to increase, on-road vehicle emissions are dropping because of more stringent vehicle emission standards and fleet turnover. This trend will be strengthened between 2000 and 2020 as newer, lower-emitting vehicles become a larger percentage of the fleet. Likewise, as new engines and equipment replace older, more polluting models, emissions will decline more steeply. The issue before us is not whether, but how quickly emissions from the mobile source fleet can be reduced.

(a) EMFAC2007

EMFAC2007, California's updated on-road motor vehicle emission factor model, was used to generate the on-road mobile source emission inventory for the 2007 Ozone Plan. EMFAC2007 represents a comprehensive review and revision of the on-road inventory when compared to EMFAC2002, which was used in previous San Joaquin Valley plans. The major changes reflected in EMFAC2007 include updated information on emissions from heavy-duty diesel in-use engines, smog check testing, corrections to estimated fuel emissions, and more accurate vehicle population numbers. Transportation activity data was provided by the eight Valley Councils of Government (COGs) from their Regional Transportation Plans.

(b) OFFROAD2007

The 2007 Ozone Plan reflects improved estimates of engines and equipment population, usage, emission rates, and equipment deterioration for most

categories of off-road mobile sources. The inventory also includes revised estimates of evaporative emissions. The extensively revised ship and train emission inventories that were developed for ARB's Goods Movement Emission Reduction Plan have also been incorporated into the OFFROAD2007 model.

(c) Updated Pesticide Emission Estimates

The DPR has provided updated emission estimates for pesticide use in the San Joaquin Valley. On April 4, 2007, DPR staff published a memorandum⁹ outlining revisions to the emission estimation calculations for ROG emissions from agricultural pesticide usage. These revised inventories reflect changes to the emission estimating methodology to include updated emission factors and the inclusion of an application use factor.

The proposed pesticide emission reduction measures under development by DPR staff are calculated using the updated emission estimates. Table 4 summarizes the estimated pesticide emissions calculated with the revised estimation methodology.

**Table 4
Revised Pesticide Emissions**

Source Category	2005	2006	2008	2011	2014	2017	2020	2023
Agricultural and Commercial Structural Pesticides Emissions ^a	22.9	--	22.2	21.7	21.4	21.2	21.0	20.9
Agricultural and Commercial Structural Pesticides Emissions ^b	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9

a. – As identified in Appendix B to the San Joaquin Valley 2007 Ozone Plan.

b. – As updated by the California Department of Pesticide Regulation and included in Appendix A to this report.

(d) Emission Reduction Credits

New Source Review (NSR) rules require new and modified major stationary sources that increase emissions in amounts exceeding specified thresholds to provide emission reduction offsets to mitigate the emissions growths. Emission reduction offsets represent either on-site emission reductions or the use of banked emission reduction credits (ERCs). ERCs are voluntary, surplus emission reductions, which are registered, or banked, with the District for future use as offsets.

⁹ California Department of Pesticide Regulation Memorandum. Date: April 6, 2007. Subject: Pesticide Volatile Organic Compound Emission Adjustments for Field Conditions and Estimated Volatile Organic Compound Reductions–Initial Estimates. Available online at: http://www.cdpr.ca.gov/docs/dprdocs/methbrom/comp_modeling.htm

According to U.S. EPA policy, ERCs banked before a plan's emission inventory baseyear (2002 for this plan) must be explicitly treated as emissions in the air. This plan does this by including projected ERC use in the emission inventory growth factors for stationary sources. This plan's projection for ERC use and total growth in stationary source emissions, between 2002 and 2023, is shown in Table 5.

Table 5
San Joaquin Valley
Projected ERC Use and Total Stationary Source Growth 2002-2023
(Summer Planning tons per day)

Pollutant	Expected ERC Use	Expected Growth
NOx	20.5	20.8
ROG	36.1	37.6

Projected ERC use is roughly equal to total growth expected for each pollutant. The District does take a conservative approach in estimating ERC usage, by assuming that all ERCs used will be from pre-baseyear ERCs. The District will need to very closely monitor pre-baseyear ERC usage and stationary source growth, especially in non-permitted source growth and permitted sources for which growth offsets are not required, to ensure that the sum of the two does not exceed total permitted and non-permitted growth. If all of the ERCs used are pre-baseyear ERCs, there will be extremely little margin (0.3 tpd NOx between 2002 and 2023) for non-permitted stationary source growth or growth at permitted sources which do not require offsets.

ARB staff recommends that the District consider setting the pre-baseyear ERC usage caps, as discussed in Appendix D of the 2007 Ozone Plan, at not more than 75 percent of expected stationary source growth, in order to ensure that there is adequate room for growth in non-permitted sources. This is consistent with the caps on pre-baseyear ERC usage in the 2004 1-hour Ozone SIP for the San Joaquin Valley.

3. Future Improvements to the Emissions Inventory

(a) Off-road Mobile Agricultural Equipment

As illustrated later in this document, ARB staff has not quantified the benefits of an off-road mobile agricultural equipment emission reduction measure. ARB staff plans to develop this emission reduction measure as part of the proposed State Strategy. Off-road mobile agricultural equipment currently accounts for 60 tons per day of NOx emissions in the Valley. As older equipment turns over, these emissions are expected to decline to 34 tpd by 2015. Part of the measure development effort will involve ARB staff acquiring a better understanding of the activity and population profile of off-road mobile agricultural equipment use in the

Valley, including where, when, and how this equipment operates. This understanding will improve the emissions inventory estimates and serve as the basis for a new emission reductions measure to be developed.

(b) Non-point Source Industrial Natural Gas Combustion

ARB staff recommends that the District explore opportunities to refine the emissions inventory for non-point source industrial natural gas combustion. In November 2006, District staff revised the emission estimation methodology¹⁰ for this category. District staff estimates that combustion of natural gas in non-point source industrial heaters, boilers, and burners resulted in NOx emissions of more than 32 tpd in 2006, based on the California Energy Commission estimation of industrial natural gas usage in the Valley. Emissions from this category are expected to increase to more than 40 tpd NOx by 2023. Some of this equipment may be subject to existing district rules. If so, the benefits of these rules might not be reflected in the current emissions inventory estimation.

4. Model Emission Inventory

Modeling emission inputs are commonly known as “gridded inventories” or “modeling inventories.” Even though the basic source of emissions data for planning and modeling purposes are the same, there are a variety of things that cause differences between emission estimates used for planning and modeling.

Where air quality planning strategies are generally developed using seasonal emission estimates for air quality planning or political boundary regions, air quality models require hourly estimates of emissions for each grid cell in a modeling domain. In addition, because base year model simulations are required to meet specific performance criteria in the base year, the base year modeling inventory estimates must also be most representative of the actual emissions that occurred during the days and hours that are being simulated. The need for greater spatial and temporal resolution involves taking into consideration, for example, temperature effects on evaporative or biogenic emissions and emission upsets that might have occurred at large sources.

During the July 30-August 2, 2000 base case, a large wildfire produced ozone precursors that affected air quality in the San Joaquin Valley. Wildfire emissions were only included in the modeling of the base case. Because there is no method to predict where, when and how large future wildfires will occur, wildfire emissions were not included in the base year (2002) and future year model projections.

¹⁰ See Emissions Inventory Methodology – 050 – Industrial Natural Gas Combustion, available online at: http://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/MethodForms/Mthd_IndustrialNGC_ombustion_SJV_2005.pdf

C. Air Quality Modeling

The Act requires the use of air quality modeling to relate ozone levels to emissions and meteorology in a region, and to simulate future air quality based on changes in emissions. Air quality modeling uses day-specific emission inventories, combined with meteorological and air quality measurements, to establish this relationship. The air quality modeling conducted for the Valley, as approved in the 2007 Ozone Plan, provides ROG to NOx carrying capacity diagrams which can be used to determine the relative efficacy of both ROG and NOx reductions. Rather than using air quality model predicted ozone concentrations results directly, U.S. EPA Guidance calls for using models to develop relative reduction factors (RRF). The RRF is calculated as the ratio of future-year to reference-year model-simulated concentrations at a specific location (i.e. based on estimates of forecasted, future year emissions and base-year emissions). The reference year for RRF calculations is 2002. The impact that future-year emission changes might have on reference-year pollutant design values is assumed to be proportional to the effect that the associated emission inputs used for modeling have on model-simulated concentrations. This is one of the reasons why multiple days are used in the calculation of RRFs, since the reference year design value is not day-specific. Thus, to estimate a future-year design value at a site, the 2002 reference-year, site-specific design value is multiplied by the RRF that is derived from modeling.

ARB staff conducted the modeling used in support of the San Joaquin Valley 2007 Ozone Plan with input from the Valley Air District, other northern California air districts, and the academic community. In particular, ARB staff drew heavily on the input and involvement of the CCOS Technical Committee, the Bay Area Modeling Advisory Committee, and the SIP Gridded Inventory Coordination Group. More information on the air quality modeling conducted by ARB staff can be found in Appendix C to this report, in Appendix F of the San Joaquin Valley 2007 Ozone Plan, and on-line at:

http://www.arb.ca.gov/eos/SIP_Modeling/

1. Ozone Episode

A key air quality modeling decision is the selection of a modeling episode. The modeling episode is an actual time period(s), or base-case, where extensive information on emissions, meteorological conditions, and air quality data have been studied and which are representative of exceedance conditions.

Two modeling episodes were selected for use in the San Joaquin Valley 2007 Ozone Plan: July 29-August 2, 2000 and July 9-13, 1999. Another episode in September 2000 was considered, but to date, model performance has been poor and consequently this episode has not been used. Episodes in 2000 were partially chosen because they fall within the intensive CCOS monitoring period

where a comprehensive data set to use in modeling is available. The 1999 episode was chosen because the Bay Area and Sacramento Metropolitan Air Quality Management Districts believed ozone levels during that episode were representative of their concentrations. In addition to selecting the model, the CCOS Technical Committee and Northern California SIP/Transport working group considered and approved these episodes.

For both the 1999 and 2000 episodes, the model-simulated ozone levels were near design values at key air monitoring sites. In general, modeling of these episodes met performance standards, but some concentrations were under-predicted at sites in the Valley. During the July – August 2000 episode, meteorology was generally representative of ozone exceedance days. A comparison of this episode to historical cases indicates that some days of the episode were extreme meteorological and pollutant events. For July 1999, statistical analyses also showed that meteorology was especially conducive to forming ozone. According to U.S. EPA guidance, these pollutant and meteorological characteristics make them good candidates for modeling. For these episodes, typical meteorological features that have been seen in the past, such as, slope, eddy, and marine flows were evident. The episodes did represent the transport and dispersion that have been observed historically in Central California. Additional detail on the episode selection can be found in Chapter three of the Valley's 2007 Ozone Plan.

2. Air Quality Model

The U.S. EPA-accepted "Comprehensive Air Quality Model with Extensions" (CAMx) modeling system was chosen to estimate the amount of emissions reductions needed to achieve the 8-hour ozone standard. A meteorological model, the Mesoscale Model version 5 (MM5), was used to generate the meteorological fields for the CAMx model. Modelers chose the [California] Statewide Air Pollution Research Center (SAPRC) chemical mechanism for the final run, which is slower computationally than other mechanisms but treats the chemical production of ozone in more detail. The choice of the modeling system was a consensus among the modelers and stakeholders in Central California. Discussion of these choices in models occurred through the Central California Ozone Study.

3. Model Performance

Appendix F of the 2007 Ozone Plan describes the modeling conducted by ARB staff and includes a detailed model performance analysis. The model performance analysis documentation provided to the District by ARB staff summarizes model performance procedures and results for meteorological modeling, as well as air quality modeling for the July 1999 and July-August, 2000, episodes. The model performance evaluations are based on U.S. EPA guidance, as well as recommendations from published academic

literature. The model performance documentation also provides a summary of the performance analysis and provides a tabular listing of complete graphical and statistical results, which can be downloaded via file transfer protocol at:

ftp://eos.arb.ca.gov/pub/outgoing/model_protocol2

4. Weight-of-Evidence

ARB staff conducted the weight-of-evidence (WOE) analysis the District staff relied upon. Appendix F of the San Joaquin Valley 2007 Ozone Plan includes ARB staff's initial draft of the WOE analysis. Appendix B of this staff report updates this analysis and summarizes the analyses that comprise the WOE assessment for the San Joaquin Valley nonattainment area.

5. Attainment Emissions Target

Air quality modeling helps to establish the attainment emission target, a key piece of information that policy-makers need in order to assess the magnitude of the challenge and to develop appropriate solutions. The Valley's 2007 Ozone Plan uses modeling for future year 2020 to establish the carrying capacity. The 2020 modeling indicates that ozone levels in the San Joaquin Valley are much more constrained by the availability of NO_x, especially in the southern region. The air quality modeling indicates that NO_x emissions must be reduced by 75 percent from current levels. Similarly, ROG emissions must be reduced nearly 25 percent. Greater ROG reductions would not substantially change the NO_x reductions needed. For example, increasing the ROG reductions by an additional 50 percent would only decrease the NO_x reductions needed by 5 percent. While not the critical ozone precursor in the most heavily impacted downwind sites, early ROG reductions will result in significant improvement in air quality throughout the Valley. ARB modelers took background ozone levels into consideration when establishing the attainment target. Table 6 shows the current emission levels, the attainment emission target used in the 2007 Ozone Plan, and the emission reductions which need to be achieved in order to attain the federal ozone standard.

Carrying capacities for ozone reflect absolute ROG and NO_x emissions in a given area and are largely independent of the year in which they occur, with two notable exceptions: ROG reactivity and spatial changes in emissions. The reactivity profiles for ROG species (i.e. the relative contribution of high vs. low reactivity ROG species) varies as new controls are implemented and older emission sources, primarily motor vehicles, are removed from service. However, reactivity and spatial changes tend to occur over a long time periods, so when the modeled years are close together chronologically, the impact of these changes is minimal. With that exception, carrying capacities can generally be viewed as independent of the year in which the absolute emission levels are achieved.

Table 6
Setting the Ozone Emission Reduction Target
 (Summer Planning tons per day)

	San Joaquin Valley (2023)	
	NOx	ROG
2006 Emissions Inventory	650	450
Carrying Capacity	160	342
Emission Reduction Target	490	108

(2006 Emissions Inventory) – (Carrying Capacity) = (Emission Reduction Target)

2006 Emissions Inventory = Amount of ozone-forming emissions.

Carrying Capacity = Pollutant emissions limit that ensures air quality standards are met.

Emission Reduction Target = Amount of emissions that must be reduced to meet the standard.

D. Reclassification to Extreme Nonattainment

The control strategy discussed below reflects an extreme non-attainment area SIP. Because the magnitude of the air quality challenge in the San Joaquin Valley, and the limits on existing emission control technologies, the San Joaquin Valley Unified Air Pollution Control District is left with only one federally approvable option: to request reclassification to extreme nonattainment. The ARB is the primary regulatory authority for the majority of the NOx emissions in the Valley. As such, a reclassification to extreme is largely driven by the timing and magnitude of mobile source emission reductions which can be achieved.

While ARB staff's proposed State Strategy is very aggressive, it does not provide all the NOx emission reductions needed for attainment in the Valley. ARB staff therefore performed a broad brush analysis to see whether the shortfall could be covered by assuming complete replacement of mobile source fleets with the cleanest new technology standards phasing in from 2007-2017. Cost was not a constraining factor in this analysis. ARB staff considered the constraints of legal authority, since SIP measures addressing sources not under our authority to control cannot be approved.

In our analysis, shown in Table 7, we made the following assumptions: in 2020 the Valley would have no passenger vehicles older than 10 years; all diesel trucks would meet the extremely stringent 2010 standards; and all diesel construction and farm equipment would meet the most stringent Tier 4 standards.

Table 7
All New Fleets Analysis Unconstrained by Cost
(Summer Planning tons per day)

Source	Remaining NOx 2020 Emissions (tpd) ^a
<i>Passenger vehicles</i>	5
<i>Diesel trucks</i>	43
<i>Construction and other equipment</i>	5
<i>Farm equipment</i>	7
<i>Locomotive</i>	5
Ships and harbor craft	1
Aircraft	5
Stationary/area-wide sources	103
Subtotal of remaining emissions from above categories	173
All other NOx sources	22
Total of all remaining emissions	195
Carrying capacity	160

a. – Includes the emission reduction benefits of the 2007 Ozone Plan, as approved by the San Joaquin Valley Unified Air Pollution Control District on April 30, 2007.

In the above table, the top four rows are italicized to indicate the categories for which we assume that all vehicles and equipment meets the cleanest adopted emission standards. Because the ARB does not have emission standard setting authority for aircraft, stationary sources or area-wide NOx sources, the emissions reported above for those categories come directly from the standard emission inventory for 2020. Included in the category “all other NOx sources” are commercial gas trucks, motorcycles, buses, motor homes, ships and commercial boats, off-road recreational vehicles and gas powered off-road equipment.

The result of the all-new-fleet scenario was a NOx emission level of 195 tons per day compared, to a carrying capacity of 160 tons per day. Close to half of the remaining emissions, 103 tons per day, are from stationary and area-wide sources. Based on these types of analyses, long-term concepts that include new technologies for both mobile and stationary sources will be needed. This makes reclassification to extreme necessary in ARB staff's view.

Lacking all of the emission reductions needed by 2020 to close the gap for attainment in 2021, the San Joaquin Valley is left with only one realistic option: to request that U.S. EPA reclassify the San Joaquin Valley nonattainment area to an extreme classification. While an extreme classification has impacts on industrial growth, it also allows the San Joaquin Valley to take advantage of the full suite of tools allowed by the Act, including the use of new emission control techniques which are expected to develop in the future. The impacts of reclassification are borne locally, so the decision to be reclassified is one which

should properly be made by the local air quality agency. The District Governing Board resolution adopting the 2007 Ozone Plan includes a request for U.S. EPA to reclassify the Valley to extreme nonattainment.

E. Control Strategy

Many actions already taken by the District, ARB, and U.S. EPA have reduced emissions in the San Joaquin Valley. These actions include the adoption of controls on stationary sources as well as reductions in tailpipe emissions from motor vehicles and off-road equipment.

California’s on-going mobile source control program will provide the majority of the NOx emission reductions needed to bring the Valley into attainment of the federal ozone standard. By 2023, ozone precursor emissions from on-road motor vehicles are expected to decline by nearly 70 percent, while off-road vehicles and equipment emissions will decline by more than 40 percent. Emissions from stationary and area sources are projected to increase slightly, 5 and 3 percent, respectively.

The existing mobile source emission control program does not provide all of the necessary emission reductions needed to meet the deadlines established by U.S. EPA. ARB and District staffs have identified aggressive new emission control strategies which will result in marked improvement of air quality. These strategies focus on cleaning up the existing mobile source fleet, through regulatory actions and financial mechanisms. While the majority of the NOx emission reductions will come from mobile sources, the 2007 Ozone Plan also includes an aggressive suite of near-term ROG reduction measures. Combined, the near-term strategies would provide significant additional emission reductions benefits. Table 8 illustrates the emission reductions which would be achieved through implementation of the 2007 Ozone Plan.

Table 8
NOx Emission Inventory with the Benefits of the
San Joaquin Valley 2007 Ozone Plan
 (Summer Planning tons per day)

	2006	2023 (with Proposed Near-term Measures)	Percent Reduction
On-road Mobile	361	79	78%
Off-road Mobile	161	58	64%
Stationary and Area-wide	128	104	19%
TOTAL	650	240	63%

ARB staff believes that the combined control strategy provides enforceable measures and commitments that meet the applicable requirements for approval.

1. New Local Measures

(a) Rule Development Commitment

The San Joaquin Valley Unified Air Pollution Control District's approved 2007 Ozone Plan contains a suite of commitments to develop rules to control ROG and NOx emissions for implementation by 2012. The six NOx control rules will reduce emissions by six tons per day in the 2012 ozone season and 8.2 tons per day by 2023. The 14 ROG emissions control rules will achieve reductions of 26.5 tons per day and 46 tons per day by 2023.

Table 9 lists the District's emission reduction measure commitments, the emission benefits of these measures at each milestone year, and the rule adoption timelines as identified in Chapter Six of the District's Plan.

Table 9
Summary of the Near-term Rule Development Commitments* in the 2007 Ozone Plan
 (Summer Planning tons per day)

CM#	Measure Name	Product	Completion Date	Compliance Date	Reduction Start	Projected NOx Reductions by 20__ Year							Projected VOC Reductions by 20__ Year						
						08	11	12	14	17	20	23	08	11	12	14	17	20	23
S-GOV-1	Composting Biosolids	Rule	2007 1Q	2008	2008								2	3.4	3.4	3.9	4.0	4.1	4.1
S-AGR-1	Open Burn	Rule	2007 2Q 2010 2Q	2007 2010	2007 2010	1.1	2.4	2.4	2.4	3.5	3.5	3.4	1.3	2.8	2.8	2.8	2.8	2.8	2.7
S-SOL-11	Solvents	Rule	2007 3Q	2010	2010								0.0	1.3	1.32	1.39	1.46	1.53	1.62
S-COM-5	Gas Turbines	Rule	2007 3Q	2010	2010	0.0	0.6	0.6	0.61	0.64	0.66	0.68							
S-IND-24	Soil Decontamination	Rule	2007 3Q	2008	NA								0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-IND-6	Polystyrene Foam	Rule	2007 3Q	2010	2011								0.0	0.0	0.10	0.10	0.11	0.12	0.35
S-PET-1&2	Gasoline Storage & Transfer	Rule	2007 4Q	2009	2009								0.0	0.9	0.92	0.99	1.03	1.07	1.08
S-PET-3	Aviation Fuel Storage	Rule	2007 4Q	2010	2010								0.0	0.05	0.05	0.05	0.05	0.05	0.05
S-COM-1	Large Boilers	Rule	2008 3Q	2011	2011	0.0	0.0	0.69	0.72	0.75	0.77	0.8							
S-COM-2	Medium Boilers	Incentives Rule Backstop	2008 3Q	2020	2012 from incentives	0.0	0.0	0.51	0.51	0.51	0.51	0.51							
S-COM-7	Glass Melting	Rule	2008 3Q	Varies	2008	1.2	1.2	1.6	1.7	1.8	1.9	2.0							
S-SOL-20	Graphic Arts	Rule	2008 4Q	2011	2011								0.0	0.0	0.07	0.07	0.08	0.08	0.08
S-COM-9	Residential Water Heaters	Rule	2009 1Q	Attrition	2011	0.0	0.2	0.25	0.40	0.55	0.70	0.85							
S-GOV-5	Composting Green Waste	Rule	2009 1Q	2012	2012								0.0	0.0	9	10	10	11	11
S-IND-21	Flares	Rule	2009 2Q	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-IND-14	Brandy & Wine Aging	Rule	2009 3Q	NA	NA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S-SOL-1	Architectural Coatings	Rule	2009 4Q	2012	2012								0.0	0.0	2	2.1	2.1	2.2	2.3
S-AGR-2	CAFO	Rule	2010 2Q	2011	2011								0.0	6.8	6.7	18.9	20.4	21.5	22.9
S-SOL-6	Adhesives	Rule	2010 3Q	2012	2012								0.0	0.0	0.11	0.17	0.12	0.13	0.15

NA (Not Available)

* For the purposes of implementing the 2007 Ozone Plan, the District is committed to adopt and implement control measures that will achieve, in aggregate, the emission reductions specified in Table 9.

Total Projected NOx Reductions by 20__ Year							Total Projected VOC Reductions by 20__ Year						
08	11	12	14	17	20	23	08	11	12	14	17	20	23
2.3	4.4	6.0	6.3	7.8	8.0	8.2	3.3	15.3	26.5	40.5	42.2	44.5	46.3

(b) Innovative Strategies

In addition to traditional rules, the Valley Plan includes several strategies which could result in additional NO_x and ROG reductions. These strategies include development of programs which will promote air quality friendly behavioral changes, including commitments to develop a green contracting “model ordinance,” to expand the Spare-the-Air efforts, to develop a heat-island mitigation model ordinance, and to promote alternative energy and energy efficiency within the Valley. The District will also explore ways to achieve even greater emission reductions from land development activities.

The Valley Plan includes a commitment to explore the expanded use of episodic emission control programs as a mechanism to reduce ozone levels on days when air quality is expected to be poor. Episodic controls utilize real-time meteorological and air quality data to forecast air quality on the following day. An example of an episodic control program is the District’s Rule 4901 “Wood Burning Fireplaces and Wood Burning Heaters.” This “check before you burn” program moves a step beyond informational “don’t light tonight” programs by prohibiting the use of wood-burning residential fireplaces when particulate matter levels are expected to be elevated. Episodic and regionally-focused controls will be considered as a part of each rule rulemaking exercise. The Valley Plan does not include quantified emission reduction commitment for these types of controls at this time.

The Valley Plan also includes a commitment to consider amending other prohibitory rules to require facilities which are already subject to controls to achieve even greater emission reductions through the Advanced Emission Reduction Options (AERO) program. The AERO program would set emission reduction goals for stationary sources which are based on advanced technologies.

The AERO program will be implemented through individual rulemaking efforts, at which time the appropriate level of advanced control goal would be determined. The AERO program is primarily a compliance flexibility tool, which will provide stationary source operators with flexibility to achieve additional emission reductions in a manner that fits into their individual business plan. The 2007 Ozone Plan does not take credit for the benefits of AERO provisions as part of the attainment demonstration.

The emission reduction goals would be met through several possible options: application of the advanced controls upon which the regulation is based, achieving on- or off-site emission reductions by controlling other emission sources (such as replacing on-site forklifts), or through the payment of a fee to the District’s Community Clean Air Fund (CCAF). Funds placed into the CCAF

would support emission reductions achieved through the District's incentive programs.

Finally, the 2007 Ozone Plan includes a commitment to achieve emission reductions through the adoption of a mandatory employer-based trip reduction program. This program will require employers with 100 or more employees to establish a ride sharing program which will reduce NOx and ROG emissions. The rule would discourage single occupant vehicle commutes, by making ridesharing or other mass transit options more appealing. Table 10 lists the emission benefits the District is committing to achieve from the employer based trip reduction program.

Table 10
Mandatory Employer-based Trip Reduction Program
Estimated Emission Reductions (tpd)

	2008	2011	2012	2014	2017	2020	2023
NOx	0.0	0.23	0.24	0.25	0.26	0.27	0.28
ROG	0.0	0.61	0.62	0.64	0.65	0.66	0.68

(c) Incentive Programs – Secured Funding

The District proposal differentiates incentive-based emission reductions into two types: those for which the funding has been secured, and those which could be achieved if new sources of funding are identified. In the attainment demonstration, the 2007 Ozone Plan only includes the benefits of incentive programs for which funding has been secured. Table 11 lists the incentive based emission reductions the District commits to achieve as part of the 2007 Ozone Plan. These emission reductions are funded through a combination of Indirect Source Review fees, Developer Mitigation Contract fees, and Department of Motor Vehicle Surcharge fees. Carl Moyer Program reductions are not credited here, as they are included in the ARB baseline adjustments identified in Appendix B, Table B-2, of the 2007 Ozone Plan.

Table 11
NOx Reductions Achieved by District Incentive Measures with Assured Funding ^a

Year	NOx Reductions (tpd)
2012	1.4
2020	0.7
2023	0.6

a. – The Reductions achieved with through the Carl Moyer Program are not included in the reductions listed here since ARB includes these reductions in the baseline emission projections.

ARB staff believes that the emission reductions achieved through the Carl Moyer Program represent the “Gold Standard” for an incentive-based emission reduction program. When the District follows the Carl Moyer Program Guidelines, no additional effort should be needed to ensure that the emission reductions achieved are SIP creditable. The District staff is required to use the Carl Moyer Program Guidelines when expending funds from the Carl Moyer program. However, as the District addresses non-Carl Moyer Program funding, additional documentation may be necessary. The 2007 Ozone Plan includes a commitment to strengthen the District’s incentives program in order to ensure that the incentive program is SIP creditable.

The District will strengthen their program through the development of additional emission reduction calculation protocols where needed, the enhancement of auditing and enforcement of contracted emission reductions, and the tracking and periodic reporting of the benefits of the projects funded through the District’s incentive program.

The District has the discretion to use the Carl Moyer Program Guidelines when expending funds from other sources. ARB staff encourages the District staff to use the protocols developed under the Carl Moyer Program Guidelines where applicable. However, recognizing that special circumstances may arise where the Carl Moyer Program may not provide guidance or the District needs additional flexibility to address specific sources, the District can develop and implement specific protocols which allow non-Carl Moyer Program funds to address specific District needs. ARB staff will provide technical assistance in the development of these additional protocols, as needed.

2. Proposed New State Measures

Cleaning up the mobile NO_x sources in the San Joaquin Valley is the most critical component of the emission control effort to reduce both ozone and PM_{2.5} concentrations in the Valley. Vehicles and equipment operating in California are subject to the most stringent tailpipe emission standards in the world. ARB has a long history of adopting successful programs to reduce emission from mobile sources. These regulations will result in fewer emissions as vehicles and equipment units meeting the cleanest emission standards enter into service. However, the benefits of these cleanest engines are only realized as new engines enter service and older engines are retired, and diesel engines have very long useful lives. In order to expedite the use of engines meeting the cleanest emission control standards, ARB staff is proposing a comprehensive list of emission control measures to reduce both NO_x and ROG emissions throughout the State.

Table 12 summarizes the estimated benefits of ARB staff’s proposed measures in the San Joaquin Valley. ARB staff is proposing to commit to the total emission reductions benefits of the proposal in 2020 and 2023 in the San Joaquin Valley.

The potential emission reduction benefits of individual measures are provided for informational purposes only. The emission reduction benefits of the proposed State Strategy in 2014 will be considered, and recommended as a State commitment, in the context of the Valley's PM2.5 attainment plan. Additional details on the individual measures being proposed by ARB staff, and on the estimated benefits of those measures, are available in the proposed 2007 State Strategy, which is available on-line at:

<http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm>

Table 12
Expected Emission Reductions from Proposed New SIP Measures
San Joaquin Valley
(Summer Season, tons per day)

Proposed New SIP Measures	2020		2023	
	NOx	ROG	NOx	ROG
Passenger Vehicles	2.7	4.1	2.1	3.3
Smog Check Improvements (BAR)	2.4	2.2	2.1	1.9
Expanded Vehicle Retirement	0.3	0.3	0.04	0.1
Modifications to Reformulated Gasoline Program	--	1.6	--	1.3
Heavy-Duty Trucks	30.2	3.3	21.2	2.3
Cleaner In-Use Heavy-Duty Trucks	30.2	3.3	21.2	2.3
Goods Movement Sources	15.6	1.2	16.4	1.3
Auxiliary Ship Engine Cold Ironing & Clean Technology	--	--	--	--
Cleaner Main Ship Engines and Fuel	--	--	--	--
Port Truck Modernization	--	--	--	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	15.6	1.2	16.4	1.3
Clean Up Existing Harbor Craft	--	NYQ	--	NYQ
Off-Road Equipment	7.0	1.0	5.4	0.6
Cleaner In-Use Off-Road Equipment (over 25hp)	7.0	1.0	5.4	0.6
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	NYQ
Other Off-Road Sources	0.4	8.7	0.6	11.4
New Emission Standards for Recreational Boats	0.4	3.8	0.6	5.3
Expanded Off-Road Rec. Vehicle Emission Standards	--	4.9	--	6.1
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Area-wide Sources	--	6.1	--	6.3
Consumer Products Program	--	3.6	--	3.8
Pesticides: DPR 2008 Pesticide Plan	--	2.5	--	2.5
Emission Reductions from Proposed New Measures	56	24	46	25

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation
Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.
Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs.
Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

3. Proposed New Federal Measures

The San Joaquin Valley 2007 Ozone Plan does not include federal commitments for new emission reductions. However, the proposed State Strategy takes advantage of new emission standards for on- and off-road engines and equipment which will be in place in the near future. The proposed State Strategy also takes advantage of Tier 4 locomotive emission standards that U.S. EPA has

proposed to implement by 2017.¹¹ The ARB staff has proposed developing a suite of measures and agreements with the railroads to ensure that the cleanest locomotives in the industry's fleets are operated in California on an expedited timeline. U.S. EPA must work to develop these standards in a timeframe which will allow the benefits to be achieved in the Valley as expeditiously as possible.

4. Long-term Measures

In order to attain the federal 8-hour ozone standard, the Valley needs to achieve a 75 percent reduction in NOx emissions and a 25 percent reduction in ROG emissions, valleywide. The near-term measure commitments in the 2007 Ozone Plan, as a whole, will reduce NOx emissions by 63 percent and ROG emissions by 25 percent.

Combined, the near-term NOx emission reduction commitments adopted by the District and under consideration by ARB staff will not provide all of the NOx emission reductions necessary for the Valley to attain the federal ozone standard. Federal law¹² allows areas classified as extreme nonattainment of the federal ozone standard to take advantage of improvements in emission control technologies and techniques which are expected to develop in the future. This provision allows areas with the most extreme air quality challenges to develop approvable SIPs, even where 100 percent of the necessary reductions cannot be achieved cost effectively with today's technologies. In order to demonstrate attainment, the 2007 Ozone Plan relies on the use of advanced technologies to achieve the last increment of emission reductions.

More than 80 tons per day of the necessary NOx emission reductions remain to be achieved, beyond what known technologies will reliably achieve. It is impractical to presumptively apportion those reductions by primary regulatory authority. Both the ARB and District staffs must work diligently to identify and take advantage of all effective emission control technologies as those technologies as quickly as they become available.

The District's 2007 Ozone Plan has two components, future study measures and long-term concepts, which will help identify and promote the technologies and programs needed to achieve additional emission reductions on both mobile and stationary sources. ARB staff has also identified long-term measures which may result in additional emission reductions.

(a) Future Study Measures

The District has identified a suite of future study measures which, upon completion, could result in opportunities for additional emission reductions. These study measures seek to explore where and how additional emission

¹¹ Federal Register: April 3, 2007 (Volume 72, Number 63, pages 15937-16151)

¹² Clean Air Act Amendments Section 182(e)(5)

reductions may be achieved through another round of prohibitory rules. The District is committing to release a study report by the dates listed in Table 13, which may recommend a future amendment to the regulatory implementation schedule to include those additional measures identified as fruitful.

Such study measures include the internal combustion engine study and the two boiler studies. In all cases, the District should strive to adopt new rules within one year of completion of study measures, where the studies indicate that emission reductions could be achieved. For study measures where additional emission reductions are not available, the District should periodically revise those studies, to take advantage of technology as quickly as it becomes available.

Table 13
District Stationary Source Feasibility/Future Study Implementation
Schedule

CM#	Measure Name	Product	Completion Date
S-COM-6	ICE Electrification\Pump Efficiency Incentives	FS	2008
S-GOV-6	Prescribed Burning	FS	2008
Program Review	Open Burning Biomass Incentive	FS	2008
S-PET-13	Oil Production Sumps	FS	2009
S-PET-16	Heavy Crude Oil Components	FS	2009
S-COM-4	Solid Fuel Fired Boilers	FS	2009
S-COM-3	Small Boilers	FS	2010
S-IND-12	Wine Fermentation & Storage	FS	2010
S-IND-5	Asphalt Roofing	FS	2010
S-PET-18	HOTS & Gauge Tanks	FS	2010
S-AGR-4	Pesticide Fumigation Chambers	FS	2011
S-COM-11	Dryers	FS	2011
S-GOV-4	Asphalt Paving	FS	2011
S-IND-13	Bakeries	FS	2011
S-COM-6	IC Engines – Standards Review	FS	2012
S-GOV-2	POTW Water Treatment	FS	2012
S-IND-23	Reduction of Animal Matter	FS	2012
S-PET-22	Refinery Turnaround Units	FS	2012
S-PET-23	Refinery Vacuum Devices	FS	2012
S-PET-24	Refinery Wastewater Separators	FS	2012

FS – Feasibility/Future Study: Not currently quantifiable. FS reports will be released by the completion date, which may recommend an amendment to the Plan Regulatory Implementation Schedule to include additional regulatory measures identified as fruitful and have the potential of achieving reductions committed to in the Black Box.

(b) Incentive Programs – Unsecured Funding

The primary driver of emission reductions in the “beat-the-SIP” strategy is through the use of additional incentive monies. ARB staff supports use of incentives to accelerate the air quality progress. However, the federal regulation and policy constrains what can be included in a federally approvable SIP. Despite these constraints, ARB staff believes that securing funding and getting cleaner vehicles and equipment into service quickly will improve air quality throughout the Valley.

Chapter 7 of the 2007 Ozone Plan outlines the District staff’s incentive-based emission reduction “action plan” which would be employed as funding becomes available. Using economic incentives to facilitate fleet clean-up has the potential to achieve greater emission reductions, well before they would occur with natural turnover. The District staff has experience implementing several emission reduction incentive programs, including the State funded Carl Moyer Program.

ARB staff believes that, where possible, District incentive funding should not be limited to mobile equipment. Where possible and cost effective, the District should explore funding ultra-clean stationary source technology. Funding the use of cutting-edge stationary source emission control technologies would help demonstrate that these technologies are effective in real-world applications. Development of these newer and more advanced technologies could support another round of regulatory development, needed to achieve the final increment of emission reductions in the Valley.

U.S. EPA does not allow regions to use emission reduction estimates from unsecured incentive money as part of an approvable attainment demonstration. In addition to having secure funding, EPA requires that emission reductions achieved through an incentive program must be quantifiable, surplus to regulatory requirements and inventory estimation assumptions, permanent over the life of the project, and enforceable by the District. Emission reductions meeting these requirements are considered to be "SIP creditable." Identifying new funding streams, and implementing the requirement that emission reductions must be surplus to regulatory requirements, will help drive the development and implementation of new advanced technologies.

Since prospective funding does not meet U.S. EPA SIP accountability criteria, the District plan does not take credit, in the attainment demonstration, for emission reductions achieved through prospective funding. However, once funding has been secured, the incentive measures identified will provide additional near-term emission reductions. Long-term, these will help achieve the last increment of emission reductions needed for attainment. As this money is secured, the District staff will work with the public, U.S. EPA, and ARB to ensure that the emission reductions are SIP creditable.

Sections 7.6 and 7.7 of the 2007 Ozone Plan outline the District's strategy to strengthen their current and future incentive programs. These sections were approved by the District and recognize the need to ensure that implementation of the publicly funded incentive programs is transparent. These sections will serve as the guiding principles and strategies the District staff will follow in developing new funding sources to support their beat-the-SIP approach. The District is not submitting sections 7.6 and 7.7 for inclusion in the San Joaquin Valley SIP.

(c) Long-term Concepts

Chapter 11 of the 2007 Ozone Plan outlines three long-term strategy components: alternative energy sources, advanced retrofit/replacement technologies, and smart growth/land use. Developments in these three arenas could lead to increased emission reductions, reduced vehicle travel, and a further clean-up of the remaining vehicles and equipment.

(d) Proposed Long-term State Measures

A discussion of the ARB staff's proposed long-term measures can be found in Chapter 3 of the proposed 2007 State Strategy.

(e) Contingencies for New Technologies

Additional provisions apply to extreme areas that include new technologies in their attainment plans. These attainment demonstration plans can rely on future advances in emission reduction technologies (referred to as new technologies) if the State, among other things:

- submits enforceable commitments to develop and adopt contingency measures if the anticipated technologies do not achieve the planned reductions;
- demonstrates that the contingency measures shall be adequate to produce emission reductions sufficient to achieve attainment and reasonable further progress.

These contingency measures to back-up the new technology provisions are not due until three years before implementation of these new technology provisions.

After adoption of the State Strategy, ARB staff proposes to initiate a coordinated government, private, and public effort to establish emission goals for critical mobile and stationary emission source categories. Following the setting of emission goals, ARB will start an ongoing public process to assess technology advancement opportunities for the critical categories. ARB staff will periodically brief the Board at public meetings on emerging emission reduction opportunities, promising technologies, and the progress made in developing long-term emission reduction measures. As ARB staff identifies feasible technology-forcing emission reduction measures, staff will propose those measures to the Board for inclusion into the SIP.

No later than 2020, ARB and the District will prepare a revision to the 8-hour Ozone SIP that (1) reflects any modifications to the 2023 emission reduction target based on updated science, and (2) identifies any additional strategies,

including the implementing agencies, needed to achieve the necessary emissions reductions by 2023. If the specific measures developed to satisfy the long-term obligation affect on-road motor vehicle emissions, we will work with the air districts and transportation planning agencies to revise the transportation conformity budgets accordingly.

F. Attainment Demonstration

The emission reduction measures identified previously, including long-term measures, will provide the necessary emission reductions to demonstrate attainment of the federal standard by 2023. Table 14 demonstrates that the required emission reductions will be achieved by implementing the commitments for new and long-term measures proposed in the State Strategy and approved in the San Joaquin Valley's 2007 Ozone Plan.

From today's emission levels, reaching the emission targets for attainment will necessitate NOx emission reductions of 490 tons per day (see table 5, above). The existing emission control program will yield 355 tons per day of NOx reductions between today and 2023. The San Joaquin Valley 2007 Ozone Plan, including ARB staff's proposed new measures, would generate another 55 tons per day of NOx reductions by 2023. This leaves an additional 80 tons per day of NOx emissions to be addressed by long-term, new technology measures. The existing and proposed new measures will achieve all of the ROG reductions needed, without the reliance on new technologies.

Table 14
Meeting the Ozone Emission Reduction Target
 (Summer Planning tons per day)

	San Joaquin Valley (2023)	
	NOx	ROG
Emission Reduction Target	490	108
Emission Reductions from Adopted SIP Measures	355	41
Emission Reductions from New Local Measures	9	47
Emission Reductions from New State Measures	46	25
Long-Term Measures	80	--
Total Reductions	490	113

Emission Reductions from Adopted SIP Measures = Emissions reduced from measures adopted through 2006.

Emission Reductions from New Measures = Emissions reduced from measures in the State Strategy or new local measures adopted after 2006.

Long-Term Measures = Emissions reduced from measures adopted after 2020 that rely on new or evolving technology, as allowed in section 182(e)(5) of the Clean Air Act.

1. Requirements for Failure to Attain by the Applicable Deadline

The Act requires that, should the Valley not attain the federal 8-hour zone standard by 2024, the SIP include contingency measures which take effect without further action by the State.¹³ The State's mobile source emission reduction program will achieve additional emission reduction benefits as older dirtier mobile sources are removed from service after the Valley's attainment deadline. Those additional benefits achieved are available to meet the attainment-year contingency requirements. ARB staff is proposing to commit the benefit of the State's mobile source emission reduction program in 2024 for attainment-year contingency measures.

The Act also requires that areas classified as severe or extreme nonattainment of the federal ozone standard include in the SIP procedures to levy a fee for failure to attain.¹⁴ The District has an adopted a rule¹⁵ implementing these

¹³ Section 172(c)(9) of the 1990 Clean Air Act Amendments.

¹⁴ Section 185 of the 1990 Clean Air Act Amendments.

¹⁵ San Joaquin Valley Unified Air Pollution Control District Rule 3170 – "Federally Mandated Ozone Nonattainment Fee."

requirements, which goes into effect automatically if the Valley does not attain the ozone standard by the 2024 deadline.

G. Reasonable Further Progress and Contingency Measures

The Clean Air Act requires that areas classified moderate or greater, demonstrate that progress towards attaining the federal standard will not be delayed. This Reasonable Further Progress (RFP) requirement ensures that areas do not delay implementation of emission control programs until immediately before the attainment date. RFP requirements vary by nonattainment classification. Nonattainment areas classified serious and above, including the San Joaquin Valley, must demonstrate an 18 percent reduction in ROG and/or NOx emissions from the 2002 baseline ROG inventory by 2008. In the years that follow, they must demonstrate, on average, an additional 3 percent per year reduction in ROG and/or NOx emissions until their attainment year.

The Act also requires that nonattainment areas provide for contingency measures which take effect without further action if an area fails to achieve the reductions required to demonstrate RFP. U.S. EPA has interpreted this to mean that the contingency measures must be from measures that have already been adopted.

The District staff analysis of RFP and contingency measures, set out in Chapter 10 of the Valley's 2007 Ozone Plan, demonstrates that all of the emission reductions needed to meet the RFP and progress related contingency measure requirements will come from the existing emission control program.

ARB staff concurs that RFP and contingency measures requirements are met through currently adopted rules and regulations. Table 15 sets out the RFP and contingency measure demonstration conducted by ARB staff. This demonstration includes the impacts of the revised pesticide emissions, which were not available in time for inclusion in the publication and adoption of the 2007 Ozone Plan by the District. As such, ARB staff is proposing to submit this RFP demonstration to U.S. EPA for inclusion in California's SIP for the San Joaquin Valley. Details on the calculation procedures can be found in Appendix D to the proposed State Strategy, and is available on-line at:

<http://www.arb.ca.gov/planning/sip/2007sip/apr07draft/revdrftappd.pdf>

**Table 15
San Joaquin Valley
RFP and Contingency Measure Summary**

	Milestone year					
	2008	2011	2014	2017	2020	2023 (for 2024 attainment)
ROG or NOx percent reduction required from 2002 levels	18%	27%	36%	45%	54%	63%
ROG percent reduction projected from existing program 2002 levels used to meet RFP	8.9%	13.3%	13.7%	14.5%	14.0%	12.7%
NOx percent reduction projected from existing program from 2002 levels used to meet RFP	9.1%	13.7%	22.3%	30.5%	40.0%	50.3%
Total ROG and/or NOx percent reductions from existing program used to meet RFP	18%	27%	36%	45%	54%	63%
RFP percent reduction requirements met?	Yes	Yes	Yes	Yes	Yes	Yes
Total NOx or ROG percent reductions used to meet contingency requirements	2.5%	3%	3%	3%	3%	3%
Contingency measure requirements met?	Yes	Yes	Yes	Yes	Yes	Yes

H. Transportation Conformity Budgets

The District's 2007 Ozone Plan establishes county-level on-road motor vehicle emission transportation conformity budgets for each milestone year, as well as for the attainment year. The emissions budgets reflect the latest planning assumptions and were developed using EMFAC2007. These new conformity budgets are listed in Table 16. Detailed calculations used to derive the transportation conformity budgets can be found in Chapter 9 and Appendix C of the San Joaquin Valley 2007 Ozone Plan.

Two updates to the San Joaquin Valley on-road transportation conformity budgets are being proposed by ARB staff: new on-road mobile source activity estimates for Madera County which was not available in time for inclusion in the 2007 Ozone SIP; and a technical correction to the San Joaquin County transportation conformity budgets for 2008 to fix a data input error discovered subsequent to District Governing Board action. Table 16 includes the impact of these updates. Appendix D to this report discusses these updates in greater detail.

With the proposed updates identified above, the emission budgets established in the Valley's 2007 Ozone Plan fulfill the requirements of the Act and U.S. EPA regulations to ensure that transportation projects will not interfere with progress, and attainment of, the federal 8-hour ozone standard.

Table 16
Transportation Conformity Budgets ^a
 (Summer planning tons per day)

County sub-area	2008		2011		2014		2017		2020		2023	
	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx	ROG	NOx
Fresno	18.6	58.5	15.5	47.9	12.9	37.2	11.1	29.1	8.0	16.9	7.8	15.7
Kern (SJV)	18.1	93.9	15.7	79.4	13.5	64.1	11.6	49.5	8.5	18.4	8.1	24.8
Kings	3.9	18.3	3.4	15.9	2.8	12.3	2.3	9.4	1.7	5.3	1.6	4.7
Madera ^b	4.4	14.6	3.7	12.2	3.1	9.7	2.6	7.7	1.9	4.8	1.9	4.5
Merced	7.4	35.5	6.2	28.8	5.1	22.3	4.2	17.1	2.9	9.9	2.8	9.0
San Joaquin	13.9 ^b	40.0 ^b	12.1	34.7	10.1	27.8	8.6	21.3	6.3	12.7	6.3	11.9
Stanislaus	10.5	26.7	9.0	22.3	7.5	17.2	6.5	13.4	4.9	8.0	4.6	7.1
Tulare	10.5	23.4	9.2	20.9	7.7	16.6	6.7	13.1	5.2	8.4	4.8	7.4

a. – The budgets were derived using EMFAC2007 with updated vehicle population and vehicle miles traveled data where available. The budget was established by taking the EMFAC results, subtracting by County, emission reductions from District and ARB control measures and rounding up to the nearest tenth if the hundredths place was “1” or higher.

b. – Revised per discussion above. Please see Appendix D for additional details.

I. Additional Requirements for Extreme Nonattainment Areas

1. Major Source Permitting Requirements

The Act requires that areas classified as extreme nonattainment revise their permitting requirements to be applicable to sources with the potential to emit 10 tons per year of ozone forming emissions. The 2007 Ozone Plan includes a commitment to submit to U.S. EPA a revised New Source Review rule which meets the requirements for an extreme area, within one year of District Board approval of the plan. See Chapter 2 of the 2007 Ozone Plan for more detail.

2. Clean Fuels Requirements

The Act also has requirements for the use of clean fuels or advanced technology in all electric utilities and industrial or commercial boilers which emit more than 25 tons per year of NOx. Existing District rules¹⁶ meet implement this requirement. More information is available in Chapter 2 of the Valley's 2007 Ozone Plan.

¹⁶ San Joaquin Valley Unified Air Pollution Control District Rules 4305, 4306, and 4352.

IV. ENVIRONMENTAL IMPACTS

The California Environmental Quality Act (CEQA) requires that State and local agency projects be assessed for potential significant environmental impacts. Air quality plans are “projects” that are potentially subject to CEQA requirements. The District staff found that the plan would not have a significant effect on the environment and prepared an Initial Study/Negative Declaration. The District Governing Board approved this Initial Study/Negative Declaration on April 30, 2007.¹⁷

V. LEGAL AUTHORITY

The federal Clean Air Act Amendments (the Act) require states to provide for the attainment of national ambient air quality standards. The primary tool to be used in the effort to attain national ambient air quality standards is a plan that any state with one or more nonattainment areas must develop, which provides for implementation, maintenance and enforcement of the standards—the State Implementation Plan (section 110(a)(1)). Section 110(a)(2)(A) of the Act 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.”

State law charges the ARB 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 (HSC). 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.”

State law also limits what the ARB may submit as a SIP revision. HSC section 39602 goes on to state,

“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.”

¹⁷ San Joaquin Valley Unified Air Pollution Control District resolution number 07-04-11a.

ARB will exclude from the SIP submittal any provisions of the San Joaquin Valley 2007 Ozone Plan that relate solely to the California Clean Air Act requirements.

VI. STAFF RECOMMENDATIONS

As described in this report, ARB staff has reviewed San Joaquin Valley's 8-Hour Ozone Attainment Plan 2007 and consulted extensively with District staff during this review.

ARB staff finds that the San Joaquin Valley's 2007 Ozone Plan meets all applicable requirements. We believe that implementation of this plan would clearly reduce ozone levels throughout San Joaquin Valley and benefit public health and result in attainment of the 8-hour ozone standard by June 2024. Therefore, we recommend that the Board take the following actions:

- (1) Adopt the local elements of the 2007 San Joaquin Valley 2007 Ozone Plan as a revision to the California SIP, including the local control strategy, the updated emission inventories, the updated attainment demonstration, and the updated motor vehicle emission budgets.
- (2) Direct the Executive Officer to submit the local plan elements to U.S. EPA as a revision to the California SIP.

The San Joaquin Valley 2007 Ozone Plan relies on emission reductions to be achieved from the proposed State Strategy for California's 2007 SIP. The State Strategy is scheduled to be considered by ARB on June 21, 2007, and thus at the June 14, 2007 hearing ARB will be considering the 2007 Ozone Plan before the State Strategy has been approved. Therefore, final ARB action on the San Joaquin Valley's 2007 Ozone Plan would be contingent upon ARB's subsequent adoption of commitments, as part of the State Strategy, to achieve the emission reductions from State measures.