
**SACRAMENTO REGIONAL
8-HOUR OZONE ATTAINMENT AND
REASONABLE FURTHER PROGRESS PLAN**

December 19, 2008

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SACRAMENTO REGIONAL 8-HOUR OZONE ATTAINMENT AND REASONABLE FURTHER PROGRESS PLAN

This Plan demonstrates how existing and new control strategies will provide the necessary future emission reductions to meet the federal Clean Air Act requirements for reasonable further progress and attainment of the 1997 8-hour ozone NAAQS for the Sacramento region. In addition, this Plan includes an updated emission inventory, sets new motor vehicle emission budgets for transportation and general conformity purposes, provides photochemical modeling results, and documents the implementation of reasonably available control measures.

December 19, 2008

ACKNOWLEDGEMENTS

This report was prepared by Sacramento Metropolitan Air Quality Management District staff from the Program Coordination Division and the Mobile Source and Land Use Division as a joint project with the El Dorado County Air Quality Management District, Feather River Air Quality Management District, Placer County Air Pollution Control District, Yolo-Solano Air Quality Management District, and Sacramento Area Council of Governments.

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We would like to thank staff from the California Air Resources Board for their major contributions in the development of the updated motor vehicle emissions budgets, photochemical modeling, weight-of-evidence analyses, and reasonable further progress evaluation. Various consultants and California Air Resources Board staff also provided information on local, state, and federal control measures in conjunction with the attainment demonstration modeling assessment. In addition, we would like to acknowledge all of the governmental agencies, organizations, and consultants involved in the Central California Ozone Study (CCOS) which provided the basis for the photochemical modeling.

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LIST OF ABBREVIATIONS AND ACRONYMS

94SIP	-	1994 Sacramento Area Regional Ozone Attainment Plan
ABAG	-	Association of Bay Area Governments
APCD	-	Air Pollution Control District
AQMD	-	Air Quality Management District
ARB	-	California Air Resources Board
BAR	-	Bureau of Automotive Repair
BTU	-	British thermal unit
BVOC	-	biogenic volatile organic compounds
CAA	-	Clean Air Act
CAMx	-	<u>C</u> omprehensive <u>A</u> ir Quality <u>M</u> odel with <u>e</u> xtension
CARB	-	California Air Resources Board
CCOS	-	Central California Ozone Study
CEFS	-	California Emissions Forecasting System
CEQA	-	California Environmental Quality Act
CFR	-	Code of Federal Regulations
CI	-	compression ignition
CMAQ	-	Congestion Mitigation and Air Quality Improvement Program
CMR	-	Construction Mitigation Rule
CTG	-	Control Techniques Guidelines
DOF	-	Department of Finance
DOT	-	U.S. Department of Transportation
DRI	-	Desert Research Institute
DTIM	-	Direct Travel Impact Model
EDCAQMD	-	El Dorado County Air Quality Management District
EIC	-	emission inventory category code
EMFAC	-	California's on-road motor vehicle emission factor model
EMS	-	Emissions Modeling System
EPA	-	U. S. Environmental Protection Agency

ERCs	-	emission reduction credits
FDDA	-	four dimensional data analysis
FHWA	-	Federal Highway Administration of DOT
FMVCP	-	federal motor vehicle control program
FR	-	Federal Register
FRAQMD	-	Feather River Air Quality Management District
FTA	-	Federal Transit Administration of DOT
GVWR	-	gross vehicle weight rating
HDGT	-	heavy-duty gas trucks
HDV	-	heavy-duty vehicles
HHDDT	-	heavy heavy-duty diesel trucks
IC	-	internal combustion
ICC	-	Interagency Coordination Committee
I/M	-	motor vehicle inspection and maintenance
ISR	-	Indirect Source Rule
ITS	-	Intelligent Transportation Systems
LDV	-	light-duty vehicles
LHDT	-	light heavy-duty trucks
MC	-	Mountain Counties
MCR	-	mid-course review
MHR	-	Mather Airport
MM5	-	Mesoscale Model version 5
MNB	-	mean normalized bias
MNGE	-	mean normalized gross error
MPO	-	Metropolitan Planning Organization
MTC	-	Metropolitan Transportation Commission (Bay Area)
MTIP	-	Metropolitan Transportation Improvement Program
MTP	-	Metropolitan Transportation Plan
MTP2035	-	Metropolitan Transportation Plan for 2035
MVEB	-	motor vehicle emissions budget

MVSTAFF - Motor Vehicle Stock, Travel and Fuel Forecast (Caltrans Report)

NAA - nonattainment area

NAAQS - national ambient air quality standard

NG - natural gas

NSR - new source review

NOx - nitrogen oxides

OAQPS - EPA Office of Air Quality Planning and Standards

OBD - onboard diagnostics

PCAPCD - Placer County Air Pollution Control District

ppb - parts per billion

ppm - parts per million

RACM - reasonably available control measure

RACT - reasonably available control technology

RFP - reasonable further progress

ROG - reactive organic gases

ROP - rate-of-progress

RRF - relative reduction factor

RVP - Reid vapor pressure

SACMET - SACOG's previous regional transportation model

SACOG - Sacramento Area Council of Governments

SACSIM - SACOG's new regional transportation model

SAPRC - Statewide Air Pollution Research Center

SECAT - Sacramento Emergency Clean Air and Transportation

SFNA - Sacramento Federal Nonattainment Area

SI - spark ignited

SIP - State Implementation Plan

SJVAPCD - San Joaquin Valley Air Pollution Control District

SMAQMD - Sacramento Metropolitan Air Quality Management District

SMF - Sacramento International Airport

SNA - Sacramento Nonattainment Area

SOCMI -	Synthetic Organic Chemical Manufacturing Industry
SRTS -	Safe Route to Schools
STARNET -	Sacramento Transportation Area Network
SV -	Sacramento Valley
TCM -	transportation control measure
TDM -	Transportation Demand Management
TMA -	Transportation Management Association
tpd -	tons per day
UAM -	Urban Airshed Model
ULEV -	ultra-low emission vehicle
VMT -	vehicle miles traveled
VOC -	volatile organic compounds
YSAQMD -	Yolo-Solano Air Quality Management District

1. EXECUTIVE SUMMARY

1.1 Background Information on Ozone

Air pollution or “smog” is composed of many different gaseous and particulate pollutants, which can create a regional haze reducing atmospheric visibility. Ground-level ozone, a colorless gas, is a major component of photochemical smog. Since ozone is formed especially in the presence of strong sunlight, ambient ozone concentrations are more problematic during May through October in the Sacramento region.

Ground-level ozone can have harmful health effects. Breathing air containing ozone can reduce lung function and increase respiratory symptoms, thereby aggravating asthma, bronchitis, or other respiratory conditions including chest pains and wheezing. Ozone exposure has been associated with increased susceptibility to respiratory infections, cardiac-related effects, medical visits, school absenteeism, and contributing to premature death, especially in people with heart and lung disease. Ozone can also cause damage to crops and natural vegetation by acting as a chemical oxidizing agent.

Ozone is formed as a result of photochemical reactions involving two types of precursor pollutants: volatile organic compounds (VOC) and nitrogen oxides (NO_x). VOC and NO_x air pollutants are emitted by many types of sources, including on-road and off-road combustion engine vehicles, power plants, industrial facilities, gasoline stations, organic solvents, and consumer products. VOC pollutants are also known as reactive organic gases (ROG).

1.2 Overview of Federal 8-Hour Ozone Standard

The 1997 federal 8-hour ozone standard lowered the health-based limit for ambient ozone concentration from 0.12 parts per million of ozone averaged over one hour¹ to 0.08 parts per million of ozone averaged over eight hours². An area’s nonattainment designation is based on whether the 8-hour ozone design value for any of the monitoring sites in the area exceeds the national ambient air quality standard (NAAQS). The Sacramento region is designated a nonattainment area, and includes all of Sacramento and Yolo counties and portions of Placer, El Dorado, Solano, and Sutter counties.

Nonattainment areas are classified as marginal, moderate, serious, severe, or extreme areas depending on the magnitude of the highest 8-hour ozone design value for the monitoring sites in the nonattainment area. In 2004, the Sacramento region was

¹ The one-hour ozone standard violation criterion is defined as no more than 3 daily exceedances (>124 ppb) over 3 years at a monitoring site.

² Under the eight-hour ozone standard violation criterion, the annual 4th-highest daily maximum 8-hour ozone concentration averaged over 3 years (i.e., ozone design value) may not exceed 84 ppb at a monitoring site.

classified as a “serious” nonattainment area with an attainment deadline of June 15, 2013. This classification was based on the 8-hour ozone design value of 107 ppb at Cool, calculated from ozone concentrations monitored from 2001 to 2003.

However, since the Sacramento region needs to rely on the longer term emission reduction strategies from state and federal mobile source control programs, the 2013 attainment date cannot be met. Consequently, on February 14, 2008, CARB, on behalf of the air districts in the Sacramento region, submitted a letter to EPA requesting a voluntary reclassification (bump-up) of the Sacramento Federal Nonattainment Area from a “serious” to a “severe” 8-hour ozone nonattainment area with an extended attainment deadline of June 15, 2019³.

This plan includes the information and analyses to fulfill the federal Clean Air Act requirements for demonstrating reasonable further progress and attainment of the 1997 8-hour ozone NAAQS for the Sacramento region. In addition, this plan establishes an updated emissions inventory, provides photochemical modeling results, proposes the implementation of reasonably available control measures, and sets new motor vehicle emission budgets for transportation conformity purposes.

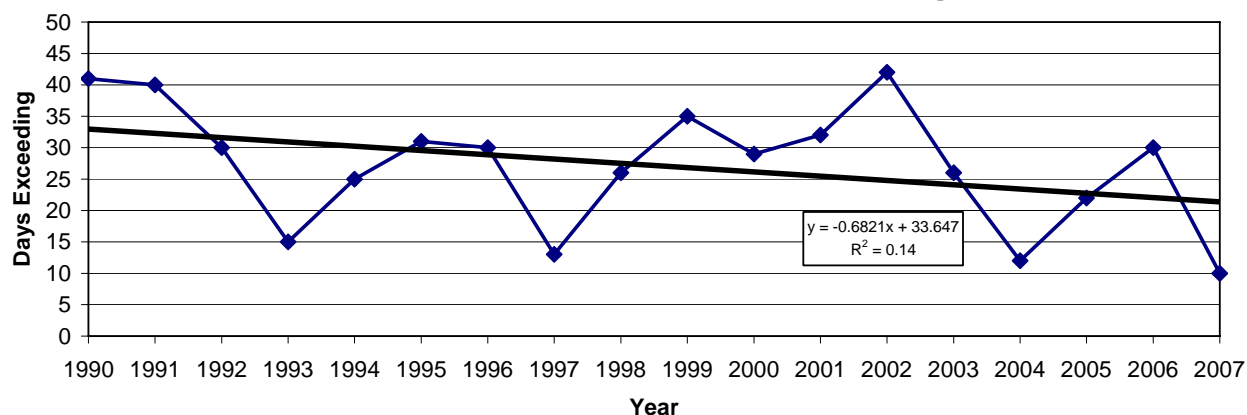
1.3 8-Hour Ozone Trends in the Sacramento Region

The progress toward attainment is measured by analyzing ambient air quality data collected at various monitoring sites over a period of many years (1990-2007). There are currently 16 ozone monitoring stations located throughout the Sacramento region that are operated by either local air districts or the California Air Resources Board.

The annual number of 8-hour ozone exceedance days recorded at the peak monitoring sites fluctuates from year to year due to meteorological variability and changes in precursor emission patterns. The most frequent exceedances of the federal 8-hour ozone standard occur at the region’s eastern monitoring sites (Cool, Folsom, Placerville, and Auburn). The 18-year trend line indicates a decline in the overall average peak number of annual exceedance days, from about 33 down to 22 (see Figure 1-1).

³ In order to attain by June 15th, the prior year’s ozone season would need to be in attainment, making 2018 to be the attainment demonstration analysis year.

Figure 1-1
8-Hour Ozone Exceedance Days
Sacramento Nonattainment Area – Peak Monitoring Site

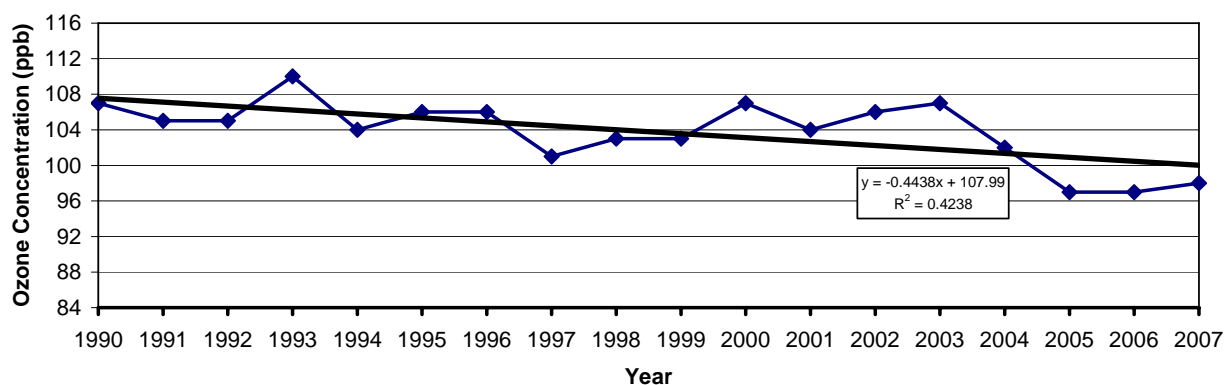


Federal 8-hr ozone standard = 84 ppb

This trend analysis uses the highest number of 8-hour ozone exceedance days recorded each year at the various monitoring sites, including the addition of the Cool station in 1996.

The peak 8-hour ozone design value concentration also varies from year to year and occurs at the eastern monitoring sites in the Sacramento region. The overall 18-year trend line shows a slight decline, from 108 ppb down to about 100 ppb (see Figure 1-2). The design value has improved from being 24 ppb (or 28%) over the standard⁴ down to about 16 ppb (or 19%).

Figure 1-2
8-Hour Ozone Design Values
Sacramento Nonattainment Area – Peak Monitoring Site



Federal 8-hr ozone standard = 84 ppb

This trend analysis uses the highest 8-hour ozone design values based on ozone concentrations recorded each year at the various monitoring sites, including the addition of the Cool station in 1996

⁴ Federal 8-hour ozone standard = 84 ppb.

1.4 VOC and NOx Emissions Inventory

Ozone is not directly emitted into the atmosphere, but is a pollutant produced by photochemical reactions in the air involving volatile organic compounds (VOC) and nitrogen oxides (NOx). Therefore, planning efforts to evaluate and reduce ozone air pollution include identifying and quantifying the various processes and sources of VOC emissions (such as solvents, surface coatings, and motor vehicles) and NOx emissions (such as motor vehicles and other fuel combustion equipment).

EPA emission inventory guidance requires the planning emissions inventory to be based on estimates of actual emissions for an average summer weekday, typical of the ozone season (May – October). The anthropogenic emissions inventory is first divided into four broad source categories: stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources. Each of these major categories is further defined into more descriptive equipment types and specific emission processes. The biogenic VOC emissions from vegetation for natural areas, crops, and urban landscapes are estimated separately from the anthropogenic inventory.

The 2002 base year anthropogenic planning inventory is estimated to be 160 tons per day of VOC emissions and 196 tons per day of NOx emissions for the Sacramento nonattainment area. The base year emissions are used to forecast future year inventories by using socio-economic growth indicators and the post-2002 emission reduction effects of existing control strategies. Also, potentially available pre-2002 emission reduction credits (ERCs) are included as additional growth in future years to ensure that their use will not be inconsistent with the reasonable further progress and attainment targets.

Tables 1-1 and 1-2 summarize the VOC and NOx emissions inventory for the Sacramento nonattainment area by the four major emission categories. The VOC and NOx emission forecasts out to 2018 show significant declines in mobile source emissions, despite increasing population, vehicle activity, and economic development in the Sacramento region.

Table 1-1
Emissions Inventory of Volatile Organic Compounds (VOC)
Sacramento Nonattainment Area

Emission Category	2002	2011	2014	2017	2018
Stationary Sources	23	23	24	25	25
Area-Wide Sources	31	29	30	31	31
On-Road Motor Vehicles	64	38	32	28	27
Other Mobile Sources	43	38	36	34	34
ERCs	---	4	4	4	4
Total	160	131	125	122	121

**Table 1-2
Emissions Inventory of Nitrogen Oxides (NO_x)
Sacramento Nonattainment Area**

Emission Category	2002	2011	2014	2017	2018
Stationary Sources	16	15	15	14	14
Area-Wide Sources	3	3	3	4	4
On-Road Motor Vehicles	115	78	61	49	45
Other Mobile Sources	61	48	44	40	38
ERCs	---	3	3	3	3
Total	196	147	126	109	104

1.5 Air Quality Modeling Analysis

Updated photochemical air quality grid modeling was developed to simulate base case episodes of high ozone formation as part of the extensive air monitoring and data analysis conducted for the 2000 Central California Ozone Study. The air quality model was then run with 2002 baseline year emissions and future year emissions forecasts (including VOC and NO_x ERCs) to see if the ozone standard would be attained with existing control strategies. The relative decline in future ozone concentrations shown in the photochemical modeling results predicted attainment at all ozone monitors in 2018 except for two sites (Cool and Folsom) located in the eastern part of the Sacramento region.

Additional air quality modeling runs of across-the-board emission reduction scenarios were conducted. The air quality modeling analysis shows that attainment can be reached by 2018 with different combinations of VOC and NO_x control. The modeling results indicate that both VOC and NO_x reductions provide ozone benefits in the Sacramento region, but on a ton for ton basis NO_x reductions provide greater ozone benefits than VOC reductions. More specific conclusions regarding attainment targets for the Sacramento region's peak ozone monitoring site at Cool are provided in the attainment demonstration evaluation.

1.6 Proposed Regional and Local Control Measures

The Sacramento SIP control strategy relies on the following components:

1. Reductions from existing control measures and adopted rules,
2. Reductions from new state and federal regulations, and
3. Reductions from defined new SIP local and regional measures.

The proposed SIP emissions control strategy includes reductions of both VOC and NO_x air pollutants. A single pollutant strategy is not practical since many existing statewide

and local control programs will inherently achieve reductions from both ozone precursors.

EPA's final 8-hour ozone implementation rule (pursuant to section 172(c)(1) of the Clean Air Act) requires the attainment SIP submittal to include adopting all reasonably available control measures (RACM) necessary to demonstrate attainment as expeditiously as practicable and to meet any RFP requirements. EPA's RACM policy indicates that areas should consider all candidate measures that are potentially reasonably available. Sources of potentially reasonable measures include measures adopted in other nonattainment areas, measures that the EPA has identified in guidelines or other documents, and any measures that have been suggested for the particular nonattainment area during a public comment period.

Areas should consider all reasonably available measures for implementation in light of local circumstances. However, areas need only adopt measures if they are both economically and technologically feasible and cumulatively will either advance the attainment date by one year or more or are necessary for RFP. This plan contains required reasonably available control measures.

The total emission reductions from the new measures necessary to attain the federal standards are an enforceable commitment in the SIP. While the proposed regional and local control measures include estimates of the emission reductions from each of the individual measures, it is important to note that the commitment is to achieve the total emission reductions necessary to attain the federal standards. Therefore, if a particular measure or a portion thereof is found infeasible or does not get its expected emission reductions, each air district still commits to achieving the total aggregate emission reductions necessary for attainment, whether this is realized through additional or surplus reductions from the other adopted measures, from alternative control measures, or incentive programs.

Although the regional and local commitment is to the "total emission reductions," for purposes of transportation conformity, an explicit commitment is made to the reductions associated with the on-road mobile source incentive program. Also, the urban forest control measure, SMAQMD-1, is an emerging measure. Because of the uncertainties associated with implementation and validation of this urban forest measure, the emission benefits from this strategy are not included in the attainment or reasonable further progress demonstrations.

Should future air quality modeling or air quality improvements indicate that all of the emission reductions from the new measures are not necessary for attainment and an infeasibility finding is made for a control measure or a portion thereof, the region's SIP commitment can be adjusted downward. For purposes of SIP commitment, infeasibility means that the proposed control technology is not reasonably likely to be available by the implementation date needed, or achievement of the emission reductions by that date is not cost-effective or technologically feasible because of local circumstances.

The following Table 1-3 contains a summary of the proposed new regional and local control measures and expected VOC and NO_x emission reductions for the Sacramento nonattainment area for the 2018 attainment demonstration year. Emission benefits from these new committal measures are estimated to provide reductions of 3 tons per day of VOC and 3 tons per day of NO_x in 2018. Some of these new local measures will be adopted by the end of 2008, and emission benefits from just these adopted new measures are estimated to provide reductions of 1 ton per day of VOC in 2018.

Table 1-3
Summary of New Regional and Local Proposed Control Measures
Sacramento Nonattainment Area

Control Measure Name	2018 Emission Reductions (TPD)	
	VOC	NO _x
Regional Non-regulatory Measures		
Regional Mobile Incentive Program – On-road	<0.1	0.9
Regional Mobile Incentive Program – Off-road	<0.1	<0.1
Spare The Air Program	<0.1	<0.1
SACOG Transportation Control Measures	-	-
Urban Forest Development Program	0 - 0.2	-
Total Regional Non-regulatory Measures	0.1	0.9
Local Regulatory Measures		
Indirect Source Rule - Construction	-	0.1
Indirect Source Rule - Operational	0-<0.1	0-0.1
Architectural Coating	1.5	-
Automotive Refinishing	0.2	-
Degreasing/Solvent Cleaning	1.4	-
Graphic Arts	na	-
Miscellaneous Metal Parts and Products	<0.1	-
Natural Gas Production and Processing	0.1	-
Asphalt Concrete	-	0.1
Boilers, Steam Generator, and Process Heaters	-	0.2
IC Engines	-	0.1
Large Water Heaters and Small Boilers	-	1.3
Total Local Regulatory Measures	3.2	1.8
Total Reductions*	3.4	3.1

Notes: Numbers are truncated to one decimal place. na = not available

*Total reductions are summed from untruncated values. See summary table in Appendix C – Proposed Control Measures.

The following Table 1-4 contains a summary of SACOG transportation control measures (TCMs) that are included in the Sacramento region's federal 8-hour ozone plan. The TCMs include new and continuing projects and funding programs.

Table 1-4
Summary of SACOG Transportation Control Measures
New and Continuing Projects and Funding Programs

TCM Name and (ID)	Implementing Agency	Implement or Completion Date	VOC Reduction (Tons/Day)	NOx Reduction (Tons/Day)
Intelligent Transportation Systems (ITS) Projects				
Arden Way Smart Corridor (ITS-1)	City of Sac - Dept of Transportation	2008	---	---
Sacramento Traffic Operations Center (ITS-2)	City of Sac - Dept of Transportation	2009	---	---
Watt Ave Phase 3 Smart Corridor (ITS-3)	Sac County - Dept of Transportation	2009	---	---
STARNET Implementation (ITS-4)	SACOG	2009	---	---
Park and Ride Lots / Transit Centers				
El Dorado Central Park and Ride Facility (TF-1)	El Dorado County Transit	2009	---	---
Improvements to Loomis Multimodal Center (TF-2)	Town of Loomis – Dept of Public Works	2010	---	---
13 th and 16 th St :Light Rail Station Improvements (TF-3)	Sac Regional Transit District	2009	---	---
Transit Service Funding Programs				
Transit Vehicle Acquisitions (TR-1)	Various Agencies	Various Dates	---	---
Transit Operations (TR-2)	Various Agencies	Various Dates	---	---
Other Specific Funding Programs				
Freeway Service Patrol (AQ-1)	Sac Transportation Authority	Through 2018	---	---
SECAT Program (AQ-2)	SMAQMD	Through 2018	--- ^a	--- ^a
Spare The Air Program (AQ-3)	SMAQMD	Through 2018	--- ^b	--- ^b
MTP Regional Funding Programs				
Air Quality Funding Program (FP-1)	Various Agencies	Through 2018	---	---
Bicycle and Pedestrian Funding Program (FP-2)	Various Agencies	Through 2018	---	---
Transportation Demand Management Funding Program (FP-3)	Various Agencies	Through 2018	---	---
Community Design Funding Program (FP-4)	Various Agencies	Through 2018	---	---
Miscellaneous Projects				
Light Rail Grade Separation at Watt Ave and Folsom Blvd (M-2)	Sac County – Dept of Transportation	2009	---	---
Total Emission Reductions			---	---

^aSECAT emission reductions are assumed to be included in SMAQMD mobile source control measure ONMS-HD-1.

^bSpare The Air emission reductions are assumed to be included in SMAQMD control measure TCM-ONMS-ED-1.

1.7 Attainment Demonstration

The attainment demonstration in this plan is premised on EPA approval of the Sacramento nonattainment area's requested voluntary reclassification (bump-up) and extended attainment deadline. Therefore, attainment of the 1997 8-hour ozone NAAQS is evaluated for a 2018 "severe" classification scenario, based on modeling results for the peak ozone site (Cool) in the region. The modeled VOC and NO_x emission forecasts for 2018 incorporate growth assumptions and the estimated reductions associated with the existing control strategy. The photochemical modeling results were used to estimate the percent reductions needed from the 2018 emission forecasts in order to achieve the 1997 federal 8-hour ozone standard (84 ppb).

The combined reductions from new state and federal control measures and from new regional and local proposed control measures contained in this plan provide the additional VOC and NO_x emission reductions needed to demonstrate attainment by the 2018 "severe" classification deadline. The total emission reductions from new measures that will be adopted by the end of 2008 and expected future new measures are included in the 2018 attainment demonstration for the Sacramento area. These new control measures are included as a SIP commitment to meet the Clean Air Act and EPA requirements⁵ for nonattainment areas to adopt all reasonably available control measures (RACM) and to attain the 1997 federal 8-hour ozone standard as expeditiously as practicable. These measures will also provide a buffer in the event that CARB's estimate of emission reductions from the Cleaner In-Use Heavy Duty Trucks, are reduced due to changes in the final rule adopted December 11, 2008⁶. However, these additional emission reductions from new measures expected to be adopted after 2008 are less certain and may change during the rule development process. Even though these future new committal measures are required for expeditious attainment, it is anticipated that the attainment would be achieved by the 2018 deadline even if there is a reduction in their emission benefits. The attainment demonstration assessment for the Sacramento nonattainment area is summarized in Table 1-5.

⁵ CAA Section 172(c)(1) and Section 181(a)(1), and 40 CFR 51.912(d)

⁶ This is considered to be unlikely since on December 17, 2008 CARB staff informed district staff that it does not anticipate a decrease in emission reduction estimates (personal communication Ravi Ramalingan to SIP working group.)

Table 1-5
Summary of 2018 Attainment Demonstration for 1997 8-Hour Ozone NAAQS

Sacramento Nonattainment Area	VOC (tpd)	NOx (tpd)
A) 2002 Planning Emissions Inventory	160	196
B) 2018 Planning Emissions Inventory with Existing Controls	121	104
Attainment Demonstration with All New Committal Measures		
C) Emission Reductions in 2018 from All New State/Federal Control Measures	11	15
D) Emission Reductions in 2018 from All New Regional/Local Control Measures	3	3
E) Total Percent Emission Reductions in 2018 from All New Controls [(Line C + Line D) ÷ Line B]	11.6%	17.3%
F) Percent Emission Reduction Targets for Attainment* (see Figure 8-1, Point B)	3.3%	12.5%
G) Percent Emission Reductions for Accelerated Progress [Line E – Line F]	8.3%	4.8%
H) Is Attainment Demonstrated? (see Figure 8-1, Point A)	Yes	
Attainment Demonstration with Only New Measures Adopted by End of 2008		
I) Emission Reductions in 2018 from Adopted New State/Federal Control Measures	3	13
J) Emission Reductions in 2018 from Adopted New Regional/Local Control Measures	1	0
K) Total Percent Emission Reductions in 2018 from Adopted New Controls [(Line I + Line J) ÷ Line B]	3.3%	12.5%
L) Percent Emission Reduction Targets for Attainment (see Figure 8-1, Point B)	3.3%	12.5%
M) Percent Emission Reductions for Accelerated Progress [Line K – Line L]	0%	0%
N) Is Attainment Demonstrated? (see Figure 8-1, Point B)	Yes	

*The percent emission reduction targets for attainment (3.3% VOC and 12.5% NOx) are based on modeling results for the combination of emission reductions from only adopted new control measures that reduce the peak ozone design value to the federal standard (84 ppb).

1.8 Transport Analysis

The air quality in the Sacramento region is impacted by pollutant transport from the San Francisco Bay Area. Delta breezes carry air pollutants from upwind Bay Area emission sources into the Sacramento region, and these pollutants may contribute to ozone formation during the same day or the following days. The California Air Resources Board has determined that the relative impact from this Bay Area transport can be considered overwhelming, significant, or inconsequential on various days,⁷ depending on meteorological conditions. CARB has also made findings that pollutant transport

⁷ California Air Resources Board, "Ozone Transport: 2001 Review", April 2001.

from the San Joaquin Valley can have significant or inconsequential impact⁸ on air quality in the Sacramento region.

States are responsible for submitting SIPs for all areas of their State and need to demonstrate attainment in all areas addressing intrastate transport where appropriate. The photochemical grid modeling study includes the northern and central regions of California in the modeling domain, and was used to address and account for air pollutant transport impacts among the San Francisco Bay Area, San Joaquin Valley, Sacramento Valley, and Mountain Counties air basins.

CARB modeling for the attainment demonstration for the Sacramento nonattainment area used domain-wide emission reductions to characterize future ozone reductions at peak ozone monitoring stations. Therefore, for our area to attain, reductions in forecasted emissions necessary and committed to in Sacramento must also be achieved in the areas that significantly impact the region. In other words, the attainment demonstration for the Sacramento nonattainment area is predicated on the San Francisco Bay Area and the San Joaquin Valley also achieving an equivalent additional percent reduction of VOC and NO_x emissions in their forecasted 2018 inventory. The reductions could come from either state or upwind regions' local measures, but we understand that CARB has committed to address the reduction requirement by implementing the new state measures statewide, which are expected to achieve similar reductions in the Bay Area and San Joaquin Valley.

In addition, pollutant transport from the Sacramento region can potentially impact the air quality in other regions under certain meteorological conditions. For example, CARB analyses have determined that ozone violations at the Grass Valley monitoring station in Nevada County are considered to be overwhelmingly due to transport from the Sacramento region.⁹ Emission reduction strategies in the Sacramento region will benefit their efforts to attain the federal ozone standards.

1.9 Weight-of-Evidence Determination

Attainment demonstrations based on photochemical modeling can be strengthened by supplemental evidence from additional modeling analyses and from considering modeling outputs other than the attainment test results. More diverse non-modeling and observational methods analyzing air quality, meteorological, and emissions data can also be used to corroborate the modeling predictions. EPA guidance¹⁰ specifies that a comprehensive weight-of-evidence approach should be undertaken to support the modeled attainment demonstration.

⁸ Ibid.

⁹ Ibid.

¹⁰ "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze" (EPA, April 2007, p. 98-109).

Since 1999, the number of area-wide exceedance days has decreased by over 10%. The ozone design value has decreased by 5%. A smaller portion of the nonattainment region violates the 1997 federal ozone standard, and the western most and eastern most portions of the region attain. Analyses show that these improvements are due to emissions reductions, not favorable weather conditions.

The overall conclusions of the weight-of-evidence analyses support the attainment demonstration when taking into account: 1) the ozone modeling results and that NOx reductions will be critical to attainment, and 2) the general decline in emissions, ambient air pollutants, and ozone trend indicators. These evaluations are consistent with the overall NOx and VOC emission control strategy in reducing peak ozone in the region.

1.10 Transportation Conformity and Emission Budgets

Under the federal Clean Air Act, federal agencies may not approve or fund transportation plans and projects unless they are consistent with state air quality implementation plans (SIPs). Conformity with the SIP requires that transportation activities not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS). Conformity regulations state that emissions from transportation plans and projects must be less than or equal to the motor vehicle emissions budgets established by reasonable further progress, attainment or maintenance plans (SIPs). (40 CFR 93.118)

Table 1-6 lists the proposed new transportation conformity budgets for the 2011, 2014, and 2017 RFP milestone years, and the 2018 attainment analysis year for the Sacramento nonattainment area. The proposed budgets incorporate the recent on-road motor vehicle emission inventory factors of EMFAC2007, updated travel activity data, and latest regional and state control strategies.

Table 1-6 Proposed New Motor Vehicle Emissions Budgets* Sacramento Nonattainment Area		
	ROG	NOx
2011 Emissions Budgets (EMFAC2007) – Tons per Day	38	78
2014 Emissions Budgets (EMFAC2007) – Tons per Day	32	61
2017 Emissions Budgets (EMFAC2007) – Tons per Day	29	48
2018 Emissions Budgets (EMFAC2007) – Tons per Day	24	34

*All motor vehicle emission budget years include regional incentive benefits. State control measure reductions are only included in 2018.

This ozone plan includes the updated on-road motor vehicle emissions and the proposed transportation budgets that assume vehicle activity levels based on the road and transit projects contained in the region's Metropolitan Transportation Plan for 2035 (MTP2035). The transportation analysis for the MTP2035 relied on SACOG's new SACSIM regional travel forecasting model to estimate future traffic volumes in the 6-county Sacramento region. This model also incorporated the latest SACOG land use assumptions from the MTP2035, including the "smart growth" principles expected to be implemented from the Blueprint Program.

The vehicle activity levels for the eastern part of Solano County in the Sacramento nonattainment area are based on MTP data from the Bay Area Metropolitan Transportation Commission (MTC).

If these proposed new motor vehicle emission budgets are determined to be adequate for transportation conformity purposes by EPA, future transportation plans will need to conform to them. The Metropolitan Planning Organizations, SACOG and MTC, must ensure that the aggregate transportation emissions in the region stay below these levels when approving new metropolitan transportation plans and transportation improvement programs, even if the mix of projects changes or growth increases. These new, adequate 8-hour MVEBs will remain in effect until other budgets are found adequate or approved by EPA.

1.11 SACOG's Blueprint MTP

Over the past several years, the Sacramento region has embarked on a visionary process of defining and implementing a new, higher density, land use pattern which reduces congestion, encroachment on open space, average vehicle miles traveled per household and air pollutants. The program, called Blueprint, was initiated by SACOG with the goal of reducing traffic congestion in the future metropolitan transportation plans (MTPs).

In December 2004, Blueprint smart growth principles and a 2050 growth scenario were approved by SACOG¹¹ to achieve the following objectives:

1. Provide a variety of transportation choices
2. Offer housing choices
3. Take advantage of compact development
4. Use existing assets
5. Increase mixed land use
6. Encourage natural resource conservation
7. Ensure distinctive, attractive communities with quality design

¹¹ <http://www.sacog.org/regionalfunding/betterways.pdf>

The region then began the more detailed planning efforts for the long range Metropolitan Transportation Plan for 2035. SACOG works with local jurisdictions, CalTrans, and transportation and planning agencies to define interim land use allocations and specific transportation project needs. Federal MTP guidelines require that the land use allocations represent what is most likely to be built. Therefore, the specific Blueprint smart growth policies affect land use allocations only to the extent that the local jurisdictions and SACOG are able to demonstrate that the policies will actually be implemented.

These updated activity data were used in setting the baseline projections for the motor vehicle inventory. While the Blueprint principles affect these baseline projections, Blueprint is not included in this plan as a transportation control measure.

1.12 General Conformity

General conformity is the federal regulatory process for preventing major federal actions or projects from interfering with air quality planning goals. Conformity provisions ensure that federal funding and approval are given only to those activities and projects that are consistent with state air quality implementation plans (SIPs). Conformity with the SIP means that major federal actions will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS). Examples of general federal actions that may require a conformity determination include, but are not limited to, the following: leasing of federal land; private construction on federal land; reuse of military bases; airport construction and expansions, and construction of federal office buildings.

A federal agency may demonstrate conformity by showing that the total of direct and indirect emissions from the action is accounted for in the applicable SIP's attainment or maintenance demonstration. Therefore, the updated emissions inventory in this 8-hour ozone attainment demonstration plan would be applicable for general conformity purposes. Specific emission budgets for airport operations are identified for future years.

1.13 Reasonable Further Progress Demonstration

The federal 8-hour ozone regulations¹² require that areas classified as "serious or above" submit a reasonable further progress (RFP) demonstration plan that provides for at least 3% average annual reductions of VOC (and/or NOx) emissions every 3-year period after 2008 out to the attainment year. The RFP demonstration must fully account for emissions growth when calculating the net emission reductions.

In February 2006, the Sacramento region submitted an early 8-hour ozone RFP plan to EPA demonstrating an 18% reduction from 2002-2008 for the Sacramento

¹² Federal Register, November 29, 2005, p. 71634.

nonattainment area with existing control strategies. In addition, the early RFP plan included an updated emission inventory and set new motor vehicle emission budgets for 2008, which EPA found to be adequate for transportation conformity purposes.¹³ Consequently, this Sacramento Regional 8-Hour Ozone Attainment and RFP Plan does not include a 2002-2008 RFP demonstration.

In May 2008, an 8-hour ozone 2011 RFP plan¹⁴ approved by the air districts in the Sacramento nonattainment area was submitted to CARB. This RFP plan demonstrated a 27% reduction from 2002-2011 for the Sacramento nonattainment area with existing control strategies. In addition, the 2011 RFP plan included an updated emissions inventory and carried forward 2008 motor vehicle emission budgets to 2011 for transportation conformity purposes.

The 2011 RFP was due to EPA on June 15, 2007. EPA made a finding of failure to submit certain RFP SIPs and began federal sanctions clocks for the Sacramento region, effective March 24, 2008.¹⁵ The preparation and local approval of the 2011 RFP plan was expedited to satisfy the RFP demonstration requirement and stop the sanctions clock. Because of the expeditious schedule, the 2011 RFP was prepared before final approval of SACOG's recent Metropolitan Transportation Plan for 2035, which contained updated motor vehicle activity. Therefore, this Sacramento Regional 8-Hour Ozone Attainment and RFP Plan replaces the emissions inventory, 2011 RFP demonstration, and motor vehicle emission budgets in the previous 2011 RFP submittal.

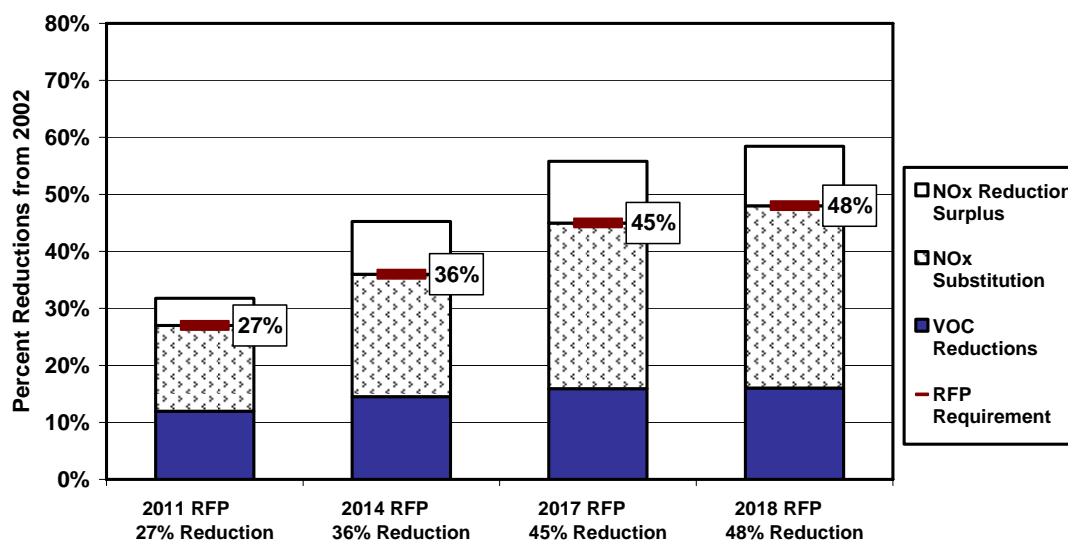
The RFP evaluation in this ozone plan is based on the emission inventory forecasts, which assume expected growth rates and current control measures. The 3-year RFP demonstrations are achieved through VOC and NOx emission reductions for the milestone years of 2011, 2014, 2017, and the 2018 attainment analysis year. Figure 1-3 shows the percentages of VOC reductions and NOx substitution that are used to meet the RFP reduction targets.

¹³ Federal Register, March 14, 2006, p. 13124 (effective date March 29, 2006).

¹⁴ Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (May 2008).

¹⁵ "Finding of Failure to Submit State Implementation Plans Required for the 1997 8-Hour Ozone NAAQS" (Federal Register, March 24, 2008, p.15416-15421).

Figure 1-3
Summary of Reasonable Further Progress Demonstrations
Sacramento Nonattainment Area



1.14 Conclusions

1. Since 1990, there has been a declining trend in 8-hour ozone exceedances and ozone design value concentration, with the most frequent and highest violations occurring at eastern monitoring sites (e.g., Cool, Folsom, Placerville, Auburn).
2. The VOC and NOx emissions inventory forecasts through 2018 show significant declines in mobile source emissions, despite increasing population, vehicle activity, and economic development in the Sacramento region.
3. The air quality modeling analysis indicates additional emission reductions are needed to achieve attainment by 2018, and NOx reductions on a ton for ton basis would be more effective at reducing high ozone in downwind areas than VOC reductions.
4. New regulatory and non-regulatory VOC and NOx control measures at the regional and local level are proposed for adoption in this plan, which includes commitments to adopt required reasonably available control measures (RACM).
5. The combined reductions from new state and federal control measures and from new regional and local proposed control measures contained in this plan provide the additional VOC and NOx emission reductions needed to demonstrate attainment by the 2018 "severe" classification deadline.

6. New transportation conformity emission budgets are being proposed for the Sacramento region, which incorporate the recent EMFAC2007 motor vehicle emission factors, updated travel activity data, and latest control strategies.
7. Reasonable further progress demonstrations for the milestone years of 2011, 2014, 2017, and the 2018 attainment analysis year are achieved by a combination of VOC and NO_x reductions.
8. Future ozone planning efforts will include the preparation of progress (milestone) reports to assess reasonable further progress.

2. BACKGROUND INFORMATION and PLAN DEVELOPMENT OVERVIEW

2.1 Ozone Health Effects

Air pollution or “smog” is composed of many different gaseous and particulate pollutants, which can create a regional haze reducing atmospheric visibility. Ground-level ozone, a colorless gas, is a major component of photochemical smog. Since ozone is formed especially in the presence of strong sunlight, ambient ozone concentrations are more problematic during May through October.

Ozone is a strong irritant that adversely affects human health. Breathing air containing ozone can reduce lung function and increase respiratory symptoms, thereby aggravating asthma, bronchitis, or other respiratory conditions including chest pains and wheezing. As documented by the EPA in their 2006 Criteria Document¹⁶ for ozone, both short-term and long-term exposure to ozone can irritate and damage the human respiratory system, resulting in:

- increased susceptibility to respiratory infections;
- increased risk of cardiovascular problems such as heart attacks and strokes;
- increased doctors visits, hospitalizations, and emergency room visits;
- increased school absenteeism; and
- an increase in mortality/premature deaths, especially in people with heart and lung disease.¹⁷

The adverse effects of ozone are not just limited to humans. Ozone can also cause damage to crops and natural vegetation by acting as a chemical oxidizing agent.

Ground-level ozone is one of the air pollutants regulated by the federal and state government. Reducing ozone to levels below state and federal standards is one of the primary goals of the air districts.

2.2 Ozone Formation and Precursor Pollutants

Ozone is not directly emitted into the atmosphere. It is a pollutant formed in the atmosphere through complex chemical reactions involving volatile organic compounds (VOC) and nitrogen oxides (NOx) in the presence of sunlight. Because of this, VOC and NOx are known as ozone “precursors.”

VOC and NOx air pollutants are emitted by many types of sources, including on-road and off-road combustion engine vehicles, power plants, industrial facilities, gasoline

¹⁶ “Air Quality Criteria for Ozone and Related Photochemical Oxidants” (EPA, February 2006) – <http://www.epa.gov/ncea>.

¹⁷ Staff Report Revisions to the “Review of the California Ambient Air Quality Standard for Ozone” (California Air Resources Board, October 27, 2005, p. 1-1 and 1-2).

stations, organic solvents, and consumer products. VOC pollutants are also known as reactive organic gases (ROG).

2.3 Clean Air Act and Prior Federal 1-Hour Ozone Standard

The first comprehensive national air pollution legislation was the federal Clean Air Act (CAA) of 1970. The CAA was amended in 1977 to require local plans for meeting national ambient air quality standards. To protect the public from unhealthy ozone levels, the U.S. Environmental Protection Agency (EPA) revised the national ambient ozone standard in 1979 to a concentration of 0.12 parts per million averaged over one hour¹⁸.

The federal Clean Air Act Amendments of 1990 included new attainment deadlines and planning requirements. In 1991, the Sacramento region was initially designated by EPA as a “serious” nonattainment area for the 1-hour ozone standard with an attainment deadline of 1999. Attainment demonstration plans for the 1-hour ozone standard were due to EPA by November 15, 1994.

2.4 1994 Sacramento Area Regional Ozone Attainment Plan

Sophisticated air quality computer modeling was used to simulate future ozone formation and evaluate the effectiveness of emission control scenarios. Computer modeling did not project attainment by the 1999 deadline. As a result, the 1994 Sacramento Area Regional Ozone Attainment Plan was prepared to demonstrate that a combined strategy controlling emissions of volatile organic compounds and nitrogen oxides could achieve attainment of the federal 1-hour ozone standard by 2005. Commitments were made to develop and implement new regional, state, and federal control measures to reduce emission levels below the amounts shown by the modeled attainment demonstration.

In response to the 1994 SIP relying on a 2005 attainment date, EPA approved the attainment plan and voluntary request for nonattainment reclassification from a “serious” area to a “severe” area, effective June 1, 1995.¹⁹ The control measures implemented from the 1994 SIP are incorporated into the existing control strategies and reflected in future emission forecasts.

2.5 Federal 8-Hour Ozone Standard

In July 1997, EPA promulgated an 8-hour standard for ozone²⁰. This change lowered the health-based standard for ambient ozone from 0.12 parts per million of ozone

¹⁸ One-hour ozone standard violation criterion defined as no more than 3 daily exceedances (>124 ppb) over 3 years at a monitoring site.

¹⁹ “California, Sacramento Ozone Nonattainment Area, Reclassification to Severe” (Federal Register, April 25, 1995).

²⁰ “National Ambient Air Quality Standards for Ozone” (Federal Register, July 18, 1997, p. 38855-38896).

averaged over one hour to 0.08 parts per million of ozone averaged over eight hours. In general, the 8-hour standard is more protective of public health and more stringent than the federal 1-hour standard.

Court Challenges and Findings

The American Trucking Association challenged this standard in the Washington D.C. Court of Appeals. In May 1999, the Court ruled that EPA's delegation of authority and implementation approach were improper, and remanded the standard. EPA appealed this decision, and in February 2001, the U.S. Supreme Court upheld the 8-hour ozone standard, but maintained that EPA's implementation approach was unreasonable. In June 2003, EPA proposed a revised implementation strategy for the 8-hour ozone standard to address the Supreme Court findings, and finalized phases 1 and 2 of the rulemaking in the April 30, 2004 Federal Register and November 29, 2005 Federal Register, respectively.

The Phase 1 rule addressed such topics as: 1) classification and attainment deadlines, 2) revocation of the 1-hour ozone standard, 3) transitioning to the 8-hour ozone rule, and 4) control measure anti-backsliding provisions²¹. The Phase 2 rule addressed remaining elements of implementing the 8-hour ozone standard, such as: 1) reasonably available control technology and measures, 2) reasonable further progress, 3) modeling and attainment demonstrations, and 4) new source review.

Several parties representing various interest groups challenged different aspects of the Phase 1 rule in the D.C. Court. On December 22, 2006, the Court decided in favor of some of the petitioners but upheld parts of EPA's action. The Court determined that EPA could revoke the 1-hour ozone standard and did not dispute EPA's classification scheme for the new 8-hour ozone standard using the approach promulgated under the 1990 CAA Amendments.²² Nevertheless, the Court appeared to vacate the Phase 1 rule in its entirety, because EPA did not comply with the Clean Air Act anti-backsliding provisions in section 172(e), which requires 8-hour ozone nonattainment areas remain subject to control measure commitments that applied under the 1-hour ozone standard. The anti-backsliding issues included:

1. The Phase 1 rule provided that NSR levels be based on new 8-hour ozone classifications, rather than maintaining the more restrictive 1-hour ozone NSR levels that were applicable to some areas.
2. The Phase 1 rule deferred Clean Air Act, section 185 fees that would have been enforced for areas that did not attain the federal 1-hour ozone standards beginning in 2005.

²¹ Section 172(e) of the Clean Air Act provides that in the event EPA relaxes a primary standard, controls cannot be less stringent than the controls applicable to nonattainment areas before the relaxation.

²² Court allowed 8-hour ozone classifications using Clean Air Act, Title 1, part D, subpart 2, but not using subpart 1.

3. The Phase 1 rule allowed states to remove 1-hour ozone plan contingency measures that have not been triggered, or to modify the trigger for measures to reflect the 8-hour standard.
4. The Phase 1 rule no longer required conformity determinations for the 1-hour ozone standard.

EPA requested a rehearing by the D.C. Circuit Court of Appeals. On June 8, 2007, the Court rejected the rehearing of classification and anti-backsliding issues. However, the Court clarified its reference to 1-hour ozone conformity determinations and limited the scope of its previous decision vacating the Phase 1 rule by stating that only those portions of the rule specifically challenged by the petitioners were affected by the ruling. Additionally, the Court urged EPA to promptly promulgate a revised rule.

Finally, on January 14, 2008, the Supreme Court denied two industry petitions to review the D.C. Circuit Court of Appeals' decision on EPA's Phase 1 rule. These two petitions challenged the Circuit Court's interpretation of the Clean Air Act's anti-backsliding provisions, arguing in part that these provisions should not apply when EPA strengthens a NAAQS.

This 8-hour ozone attainment plan assumes that upon new action by EPA in response to the Court's remand, EPA will not modify the 8-hour ozone classification scheme and attainment deadlines.

New 8-Hour Ozone NAAQS

On March 12, 2008, EPA promulgated a revised 8-hour ozone NAAQS²³ of 0.075 parts per million, based on a review of new health studies. However, the 1997 standards remain in effect, and the SIP requirements and implementation rules for these 8-hour ozone standards are still in place. Planning requirements for the new 8-hour ozone NAAQS will be identified and addressed in the future.

2.6 Development of the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan

This ozone attainment plan was developed for the Sacramento region by the five air districts in the nonattainment area with participation from the California Air Resources Board (CARB), the Sacramento Area Council of Governments (SACOG), and the Bay Area Metropolitan Transportation Commission (MTC). The five local air districts include the Sacramento Metropolitan Air Quality Management District (SMAQMD), the Yolo-Solano Air Quality Management District (YSAQMD), the Placer County Air Pollution Control District (PCAPCD), the El Dorado County Air Quality Management District (EDCAQMD), and the Feather River Air Quality Management District (FRAQMD).

²³ "National Ambient Air Quality Standards for Ozone" (Federal Register, March 27, 2008, p. 16436-16514).

SACOG and MTC²⁴ are the metropolitan planning organizations (MPO) for transportation planning in the Sacramento region.

Because of recent changes in the long range transportation plans, SACOG was a key contributor in the development of the updated motor vehicle emissions inventory and transportation control measures. CARB staff also conducted the photochemical modeling and provided information regarding state and federal control measures, weight-of-evidence analyses, motor vehicle emissions budgets, and the reasonable further progress demonstration.

Several committees provided input on technical and policy issues during the development of the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. The Interagency Coordination Committee (ICC) consisted of participants from the various agencies mentioned above and from the California Department of Transportation, EPA, and Federal Highways Administration. The ICC was assembled to coordinate the efforts of the local, state, and federal governmental agencies directly involved in the preparation and/or review of the ozone plan.

A SIP coordination working group was formed from participants of the Central California Ozone Study Technical Committee to focus on evaluating and improving the modeling and emissions inventory. Also, a subcommittee of the air districts in the Sacramento nonattainment area met periodically to coordinate the development of the various potential local VOC and NOx emission control measures needed in the SIP attainment strategy. In addition, the Regional Air Pollution Control Officers Committee for the Sacramento region was used to discuss and coordinate SIP topics and concerns.

2.7 Public Input and Review Process

Existing public working groups were used to disseminate information and seek input from a wide variety of key community stakeholders during the development process of the draft plan. These committees included the Sacramento Cleaner Air Partnership, SACOG's Climate and Air Quality Committee and Regional Planning Partnership, and the Chamber of Commerce's Air Quality and Transportation Committee, who represent major business interests, environmental groups, transportation agencies, local governments, and other community organizations. In addition, representatives for the various Native American tribes in the Sacramento region were contacted and invited to participate in the public process to develop the draft plan.

In the fall of 2006, public workshops were held to solicit comments on potential control measures for the attainment demonstration. Additional public workshops were held early fall of 2008 to present information and receive comments on the draft Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. Finally, the

²⁴ MTC is the MPO for the east Solano County portion of the Sacramento nonattainment area.

Board of Directors for each of the air districts in the Sacramento nonattainment area are required to hold a public hearing prior to approving the plan.

2.8 Contents of 8-Hour Ozone Plan

This document includes the information and analyses to fulfill the federal 8-hour ozone attainment and reasonable further progress planning requirements for the Sacramento regional nonattainment area. This plan does not address state ozone planning obligations prescribed by the California Clean Air Act. This document relies on information about proposed state and federal control strategies that are included here by reference. This document does not describe in detail or evaluate those strategies. For more information about emission control strategies implemented by the California Air Resources Board or other state agencies, contact the California Air Resources Board, P.O. Box 2815, Sacramento, CA 95812-2815 or see <http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm>.

Chapter 1 is an executive summary of the 8-hour ozone plan. Chapter 2 provides an introduction that contains background information on ozone health effects, ozone formation, the federal ozone standards, and an overview of the plan's development process. Chapter 3 explains the purpose of the attainment plan and defines federal Clean Air Act 8-hour ozone requirements for the region. Chapter 4 analyzes and illustrates 8-hour ozone air quality trends in the Sacramento region. Chapter 5 presents the 2002 base year emissions inventory and the emission forecasts that are based on existing control strategies and growth assumptions.

Chapter 6 characterizes the air quality modeling simulations and predictions, and analysis of results for determining attainment emission targets. Chapter 7 identifies and evaluates the proposed new regional and local control measures that are needed to reduce future emissions. Some control measures may provide benefits for other air contaminants such as fine particles or greenhouse gases. This plan does not quantify those benefits. Chapter 8 shows the 8-hour ozone attainment demonstration for the Sacramento region using the emission forecasts, photochemical modeling results, and the proposed control strategy scenario. Chapter 9 discusses interbasin pollutant transport issues and addresses transport assumptions included in the photochemical modeling. Chapter 10 discusses additional evidence supporting the attainment demonstration based on supplemental non-modeling data analyses of air quality and emission trends in conjunction with modeling results.

Chapter 11 documents the motor vehicle emissions budgets for transportation conformity purposes. Chapter 12 explains general conformity requirements and provides estimates for forecasted airport emissions. Chapter 13 demonstrates how the reasonable further progress emission reduction requirements will be achieved. Finally, Chapter 14 summarizes the key points and major conclusions of this report, and mentions expected future air quality planning efforts by the air districts.

Additional documentation for the more technical sections of the 8-hour ozone attainment plan is contained in the following Appendices:

- A – Emissions Inventory
- B – Photochemical Modeling
- C – Proposed Control Measures
- D – Transportation Control Measures
- E – Weight-of-Evidence Analyses
- F – Motor Vehicle Emissions Budgets
- G – Reasonable Further Progress Demonstrations
- H – Reasonably Available Control Measures (RACM) Analysis
- I – Federal Clean Air Act Requirements

3. FEDERAL CLEAN AIR ACT REQUIREMENTS

3.1 Purpose of a Federal Ozone Attainment Plan

In 2004, the Sacramento region was rated one of the four worst ozone air quality areas in the nation, based on the U.S. Environmental Protection Agency (EPA) designations and classifications²⁵ for the 1997 8-hour ozone national ambient air quality standards (NAAQS)²⁶. The Sacramento region was classified as a “serious” nonattainment area. While air quality has improved in recent years, exceedances of the health-based ozone air quality standard continue to occur in many parts of the region. Emissions of air pollutants that contribute to the formation of ozone must be reduced significantly in order to attain the NAAQS.

The federal 8-hour ozone implementation rules²⁷ set new deadlines for attaining the ozone standard. The rules also set specific planning requirements to ensure that the attainment goal is met. Foremost among these requirements is adoption and implementation of an ozone attainment plan. This plan must identify a comprehensive strategy to reduce emissions needed for attainment by the mandated deadline. The rules and programs in a plan are then implemented over time to reduce the emissions that go into the air, reducing unhealthful concentrations of air pollutants and helping areas reach federal air quality standards.

This Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan was prepared to meet these requirements as part of California’s State Implementation Plan (SIP) update. The California SIP includes plans for each of the state’s nonattainment areas, along with rules, regulations, and other control measures adopted by air districts and the California Air Resources Board (CARB). After SIP updates are reviewed and approved by CARB, they are submitted to EPA for federal review and approval.

3.2 Federal Clean Air Act Requirements

The federal Clean Air Act (CAA) contains many SIP requirements for areas classified as a nonattainment area for 8-hour ozone. A list of CAA requirements applicable to nonattainment plan elements are outlined in Appendix I. SIP requirements for several basic plan elements are summarized in the following sections.

²⁵ “Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards” (Federal Register, April 30, 2004, p. 23858-23951) and EPA Website for “Classifications of 8-Hour Ozone Nonattainment Areas” (<http://www.epa.gov/oar/oaqps/greenbk/gnc.html>), accessed March 2, 2006.

²⁶ “National Ambient Air Quality Standards for Ozone” (Federal Register, July 18, 1997, p. 38855-38896).

²⁷ “Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1” (Federal Register, April 30, 2004, p. 23951-24000) and “Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2” (Federal Register, November 29, 2005, p. 71612-71705).

3.3 New Source Review (NSR) and Other Permitting Requirements

Section 181(b)(3) of the Clean Air Act (CAA) permits a state to request that EPA reclassify or “bump-up” a nonattainment area to a higher classification and extend the time allowed for attainment. This bump-up process is appropriate for areas that must rely on longer term strategies to achieve the emission reductions needed for attainment. On February 14, 2008, CARB on behalf of the air districts²⁸ in the Sacramento nonattainment area requested a voluntary reclassification (bump-up) of the Sacramento Federal Nonattainment Area from a “serious” to a “severe” 8-hour ozone nonattainment area with an associated attainment deadline of June 15, 2019. EPA is expected to finalize the reclassification before final plan approval. The attainment demonstration in this plan is premised on this reclassification and extended deadline.

The region must meet requirements associated with the “severe” classification. Pursuant to section 182(d) of the CAA, the New Source Review offset ratio of total VOC and NOx emission reductions to total increased emissions of such air pollutants must be at least 1.3 to 1 (instead of at least 1.2 to 1 for a serious classification).

Also, the emissions threshold for the definitions of a “major source” and a “major stationary source” are 25 tons per year of either VOC or NOx emissions (instead of 50 tons per year for a serious classification). The lowering of the major source emissions threshold to 25 tons per year will increase the number of sources affected by the following regulations:

- Federal permitting requirements for major stationary sources under Title 5 of the CAA.
- Permitting requirements for agricultural stationary sources with actual emissions equal to or exceeding one-half of any applicable emissions threshold for a major stationary source pursuant to California Health and Safety Code section 42301.16 (SB 700). The agricultural stationary source permitting threshold will be 12.5 tons per year for ozone precursors VOC and NOx.

Because the region was classified “severe” under the previous 1-hour ozone standard, rules in all air districts in the Sacramento nonattainment area already include “severe” area permitting requirements. The only change will be the number and types of sources subject to the requirements.

3.4 Reasonably Available Control Technology (RACT) Requirements

The U.S. Environmental Protection Agency (EPA) published the final Phase 2 Rule to implement the 8-hour ozone air quality standard on November 29, 2005 (70 FR 71611). Among the requirements of the Phase 2 Rule, a new section was added to the Code of

²⁸ District action dates approving the reclassification request: SMAQMD 1-24-08; FRAQMD 2-04-08; EDCAQMD 2-05-08; YSAQMD 2-13-08; PCAPCD 2-14-08.

Federal Regulations (40 CFR 51.912) that requires the District to submit a revision to the State Implementation Plan (SIP) that meets the Reasonably Available Control Technology (RACT) requirements for VOC and NO_x in accordance with Sections 182(b)(2) and 182(f) of the federal Clean Air Act. This requirement is known as the RACT SIP.

EPA defines RACT (44 FR 53762) as “the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.” Sections 182(b)(2) and 182(f) of the Clean Air Act require the District to implement RACT for:

- Each category of VOC sources that is covered by a Control Techniques Guidelines (CTG) document issued by EPA; and
- All major stationary sources of VOC and/or NO_x.

The submittal deadline for RACT SIPs was September 15, 2006 (27 months after designation for the 8-hr ozone NAAQS). RACT SIPs for major sources under “serious” requirements were prepared and submitted by each district.

For areas designated as “severe” nonattainment for the 8-hr ozone NAAQS, RACT control measures would apply to sources with emissions equal to or greater than 25 tons per year. Each air district will independently prepare and submit updated RACT SIPs as needed.

3.5 Reasonably Available Control Measures (RACM) Requirements

Section 172(c)(1) of the Clean Air Act states that SIP “plan provisions shall provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards.” In addition, EPA’s final 8-hour ozone implementation rule in 40 CFR 51.912(d), adopted under section 172(c)(1) of the CAA, requires the attainment SIP submittal to include “a SIP revision demonstrating that it has adopted all RACM necessary to demonstrate attainment as expeditiously as practicable and to meet any RFP requirements.”

EPA’s RACM policy^{29,30} indicates that areas should consider all candidate measures that are potentially reasonably available. Sources of potentially reasonable measures include measures adopted in other nonattainment areas, measures that the EPA has

²⁹ “Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2” (Federal Register, November 29, 2005, p. 71659-71661).

³⁰ “Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas” (EPA, December 1999).

identified in guidelines or other documents, and any measures that have been suggested for the particular nonattainment area during a public comment period.

Areas should consider all reasonably available measures for implementation in light of local circumstances. However, areas need only to adopt measures if they are both economically and technologically feasible and cumulatively will advance the attainment date (by one year or more) or are necessary for RFP. Furthermore, “EPA does not believe that Congress intended the RACM requirement to compel the adoption of measures that are absurd, unenforceable, or impracticable.”³¹

3.6 Sacramento Nonattainment Area Designation

EPA made determinations of which areas violate the standard under the federal 8-hour ozone regulations³², effective June 15, 2004. The nonattainment designation is based on whether the ozone design value concentration for any of the monitoring sites in the area exceeds the national ambient air quality standard³³. A monitoring site’s 8-hour ozone design value is the standard-related indicator calculated by averaging the annual fourth-highest daily maximum 8-hour average ozone concentrations over the most recent three years.

The Sacramento region is designated a nonattainment area, and includes all of Sacramento and Yolo counties and portions of Placer, El Dorado, Solano, and Sutter counties. See Figure 3-1 for a map of the 8-hour ozone Sacramento nonattainment area (same boundaries as federal 1-hour ozone nonattainment area).

3.7 Nonattainment Classification and Attainment Deadline

Nonattainment areas are classified³⁴ as marginal, moderate, serious, severe, or extreme areas depending on the magnitude of the highest 8-hour ozone design value for the monitoring sites in the nonattainment area. The Sacramento region was classified as a “serious” nonattainment area³⁵ for the 8-hour ozone standard, with an attainment deadline of June 15, 2013 (i.e., 9 years after designation). This classification was based on the 8-hour ozone design value of 107 ppb at Cool, calculated from ozone concentrations monitored during 2001-2003.

Section 181(b)(3) of the Clean Air Act permits a state to request that EPA reclassify or “bump-up” a nonattainment area to a higher classification and extend the time allowed

³¹ “General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990” (57 FR 13498, April 16, 1992).

³² “Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards” (Federal Register, April 30, 2004, p. 23857-23951).

³³ 1997 federal 8-hour ozone standard = 84 ppb.

³⁴ Sacramento’s classification was given by the more specific requirements of the subpart 2 provisions in the Clean Air Act.

³⁵ “Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards” (Federal Register, April 30, 2004, p. 23887).

for attainment. Reclassification is appropriate for areas that must rely on longer term strategies to achieve the emission reductions needed for attainment. More stringent requirements are imposed with each higher classification level.

Since the Sacramento region needs to rely on the longer term emission reduction strategies from state and federal mobile source control programs, the 2013 attainment date cannot be met. Consequently, on February 14, 2008, CARB, on behalf of the air districts in the Sacramento region, submitted a letter to EPA requesting a voluntary reclassification of the Sacramento Federal Nonattainment Area from a “serious” to a “severe” 8-hour ozone nonattainment area with an extended attainment deadline of June 15, 2019.

3.8 Reasonable Further Progress Plan

Sections 172(c)(2), 182(b)(1), and 182(c)(2)(B) of the Clean Air Act include reasonable further progress (RFP) requirements for reducing emissions in ozone nonattainment areas. EPA’s 8-hour ozone planning implementation Phase 2 rule requires RFP reductions averaging at least 3% per year demonstrated in specific milestone years; 6 years after the 2002 baseline year and every 3 years thereafter through attainment.

In February 2006, the Sacramento region submitted an early 8-hour ozone RFP plan³⁶ to EPA demonstrating an 18% reduction from 2002-2008 for the Sacramento nonattainment area with existing control strategies. In addition, the 2006 RFP plan included an updated emissions inventory and set new motor vehicle emission budgets for 2008, which EPA found to be adequate for transportation conformity purposes.³⁷

In May 2008, an 8-hour ozone 2011 RFP plan³⁸ approved by the air districts in the Sacramento nonattainment area was submitted to CARB. This RFP plan demonstrated a 27% reduction from 2002-2011 for the Sacramento nonattainment area with existing control strategies. In addition, the 2011 RFP plan included an updated emissions inventory and carried forward 2008 motor vehicle emission budgets to 2011 for transportation conformity purposes.

The 2011 RFP was due to EPA on June 15, 2007. EPA made a finding of failure to submit the 2011 RFP SIP and began federal sanctions clocks for the Sacramento region, effective March 24, 2008.³⁹ The preparation and approval of the 2011 RFP plan was expedited to stop the sanctions clocks. Because of the expeditious schedule, the 2011 RFP was prepared before final approval of SACOG’s recent Metropolitan Transportation Plan for 2035, which contained updated motor vehicle activity. Therefore, this Sacramento Regional 8-Hour Ozone Attainment and RFP Plan

³⁶ Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan (February 2006).

³⁷ Federal Register, March 14, 2006, p. 13124 (effective date March 29, 2006).

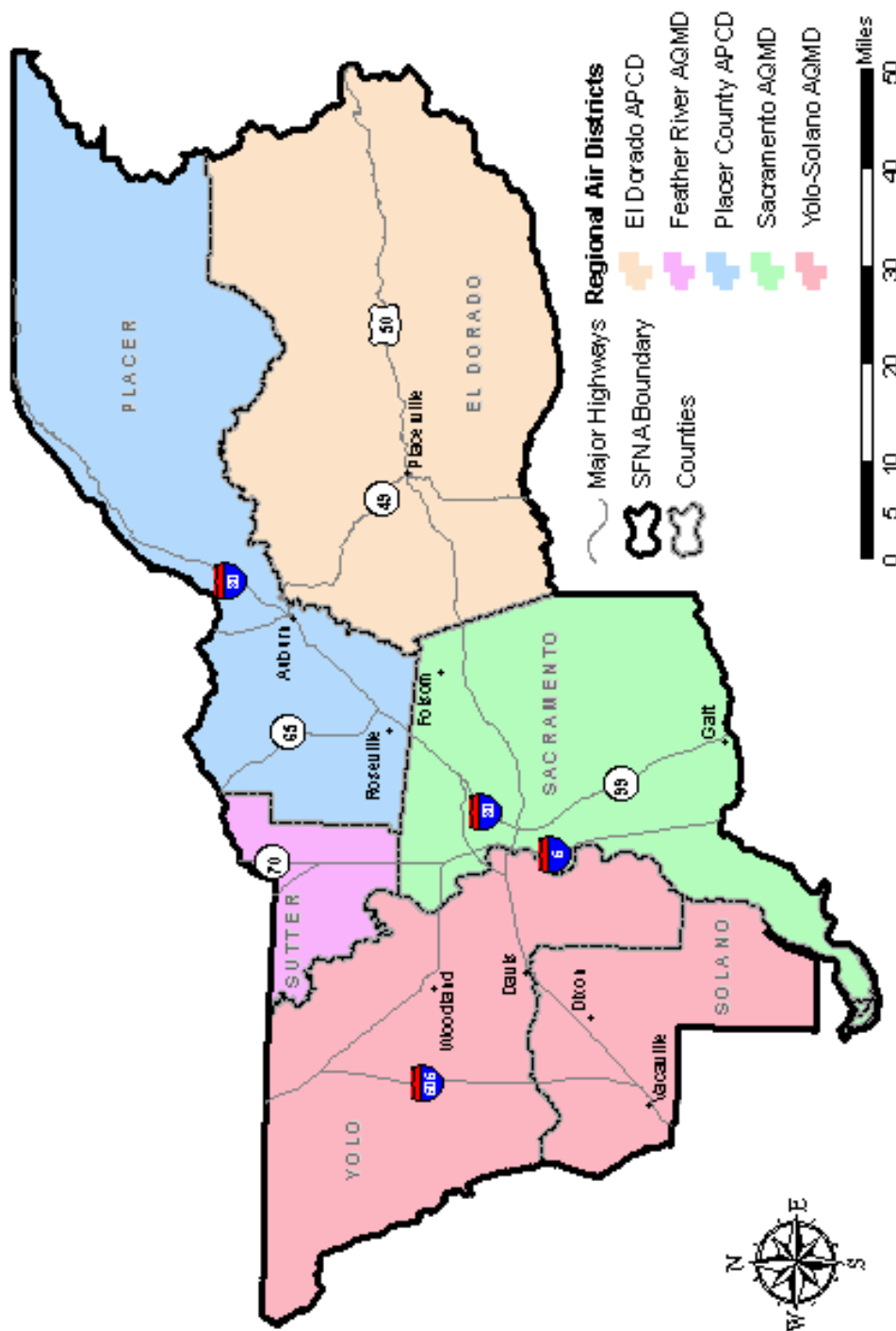
³⁸ Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (May 2008).

³⁹ “Finding of Failure to Submit State Implementation Plans Required for the 1997 8-Hour Ozone NAAQS” (Federal Register, March 24, 2008, p.15416-15421).

incorporates the transportation activity data from the final MTP2035 and replaces the emissions inventory and motor vehicle emission budgets in the previous 2011 RFP submittal.

As a result of the Sacramento nonattainment area's reclassification to severe, RFP milestone years also include 2014, 2017, and 2018. Therefore, this ozone plan includes RFP demonstrations for each of these years to satisfy the RFP submittal requirements.

**Figure 3-1
Federal 8-Hour Ozone
Sacramento Nonattainment Area**



4. 8-HOUR OZONE AIR QUALITY TRENDS

4.1 Introduction to Air Quality Trends

The progress toward attainment is measured by analyzing ambient air quality data collected at various monitoring sites over a period of many years. In this chapter, the focus of air quality trends is on two different 8-hour ozone parameters. These indicators are the number of days exceeding the 8-hour ozone standard and the magnitude of the 8-hour ozone design value concentrations. Additional information regarding trend analyses can be found in Chapter 10 and Appendix E – Weight-of-Evidence Analyses.

4.2 Ozone Monitoring Sites

There are currently 16 ozone monitoring stations located throughout the Sacramento nonattainment area that are operated by either local air districts or the California Air Resources Board. Most ozone sites also have meteorological instruments, and some sites sample for ambient concentrations of ozone precursor pollutants.

See Figure 4-1 for a map showing the location of each of the ozone monitoring stations operating in the Sacramento region during 2008.

4.3 Annual Number of Exceedance Days

Table 4-1 contains the annual number of days that exceeded the 8-hour ozone standard for each of the ozone monitoring sites in the Sacramento nonattainment area since 1990. The most frequent exceedances of the federal 8-hour ozone standard occur at the region's eastern monitoring sites (Cool, Folsom, Placerville, and Auburn). Also, the number of exceedance days at the peak monitoring site varies year to year, between 10 and 42. The bar chart in Figure 4-2 illustrates the monitoring site locations that exceeded the federal 8-hour ozone standard the most days in each year. Year to year ozone differences are caused by meteorological variability and changes in precursor emission patterns. The 8-hour ozone standard allows for up to 3 exceedance days per year since the fourth-highest daily maximum 8-hour ozone concentration is used to calculate the ozone design value.

4.4 Trend in Exceedance Days

The line graph in Figure 4-3 shows the number of exceedance days for the peak monitoring site in each year and a trend line from 1990 to 2007. The 18-year trend line indicates a decline in the overall average peak number of annual exceedance days, from about 33 down to 22, which equals a decline rate of about 0.6 exceedance day per year.

The trend line R^2 statistic (coefficient of determination = 0.14) is very low, which indicates a weak correlation to the annual peak exceedance days due to the wide

variability. Also, the addition of the Cool monitoring station in 1996 may have skewed the 18-year trend analysis toward a slower decline rate. Since Cool has been the peak exceedance site 8 times in the more recent years, the introduction of these higher values in the later years of the trend analysis may overshadow the decline rate of the earlier peak exceedance sites at Auburn and Folsom.

4.5 Ozone Design Values

Table 4-2 lists the 8-hour ozone design value concentrations for each of the ozone monitoring sites in the Sacramento nonattainment area since 1990. To show attainment, the ozone design value must meet the 8-hour ozone standard (84 ppb). A monitoring site's 8-hour ozone design value is calculated by averaging the annual fourth-highest daily maximum 8-hour average ozone concentrations over the most recent three years⁴⁰. The location of the highest 8-hour ozone design value concentrations occurs most frequently at the region's eastern monitoring sites (Cool, Folsom, Placerville, Auburn, and Colfax). The region's peak ozone design value concentration varies from year to year, between 97 ppb and 110 ppb.

4.6 Trend in Ozone Design Value

The line graph in Figure 4-4 shows the ozone design value for the peak monitoring site in each year and a trend line from 1990 to 2007. The overall 18-year trend line indicates a decline, from 108 ppb down to about 100 ppb. The ozone design value has improved from being 24 ppb (or 28%) over the standard⁴¹ down to about 16 ppb (or 19%), which equals a decline rate of about 0.4 ppb per year.

The trend line R^2 statistic (coefficient of determination = 0.42) is low, which indicates a weak correlation to the annual peak ozone design values. Also, the addition of the Cool monitoring station in 1996 may have skewed the 18-year trend analysis toward a slower decline rate. Since Cool was the peak design value site from 1998 to 2005, the introduction of these high values in the later years of the trend analysis may overshadow the decline rate of the earlier peak design value sites at Auburn and Folsom.

⁴⁰ For example, the 2007 ozone design value concentration for a specific monitoring site would be calculated by taking the average of:

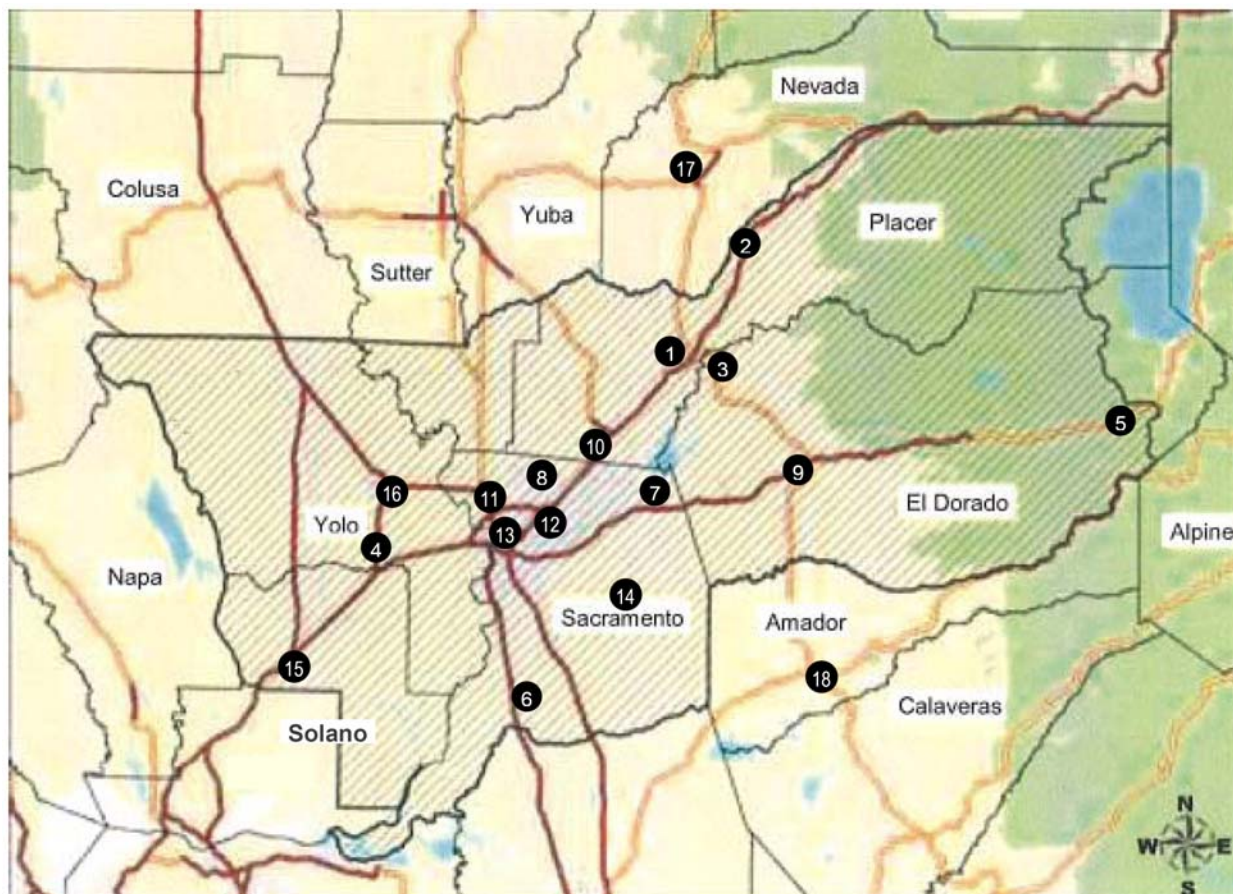
2005 4th highest daily maximum 8-hour average ozone concentration

2006 4th highest daily maximum 8-hour average ozone concentration

2007 4th highest daily maximum 8-hour average ozone concentration

⁴¹ Federal 8-hour ozone standard = 84 ppb.

Figure 4-1
Sacramento Nonattainment Area
Ozone Monitoring Stations



2008 Ozone Monitoring Sites (County)

Sacramento Nonattainment Area Sites

- | | |
|--------------------------------|--|
| 1. Auburn (Placer Co.) | 11. Sacramento – Airport Rd. (Sac. Co.) |
| 2. Colfax (Placer Co.) | 12. Sacramento – Del Paso Manor (Sac. Co.) |
| 3. Cool (El Dorado Co.) | 13. Sacramento – T Street (Sac. Co.) |
| 4. Davis (Yolo Co.) | 14. Sloughhouse (Sac. Co.) |
| 5. Echo Summit (El Dorado Co.) | 15. Vacaville (Solano Co.) |
| 6. Elk Grove (Sac. Co.) | 16. Woodland (Yolo Co.) |
| 7. Folsom (Sac. Co.) | |
| 8. North Highlands (Sac. Co.) | Other Sites |
| 9. Placerville (El Dorado Co.) | 17. Grass Valley* (Nevada Co.) |
| 10. Roseville (Placer Co.) | 18. Jackson** (Amador Co.) |

*Grass Valley site: 2007 ozone design value = 95 ppb, and modeling analysis is applied for 2018.

**Jackson site informational only: 2007 ozone design value = 81 ppb, and modeling analysis is not applied.

Table 4-1
8-Hour Ozone Exceedance Days
Sacramento Nonattainment Area – Ozone Monitoring Sites

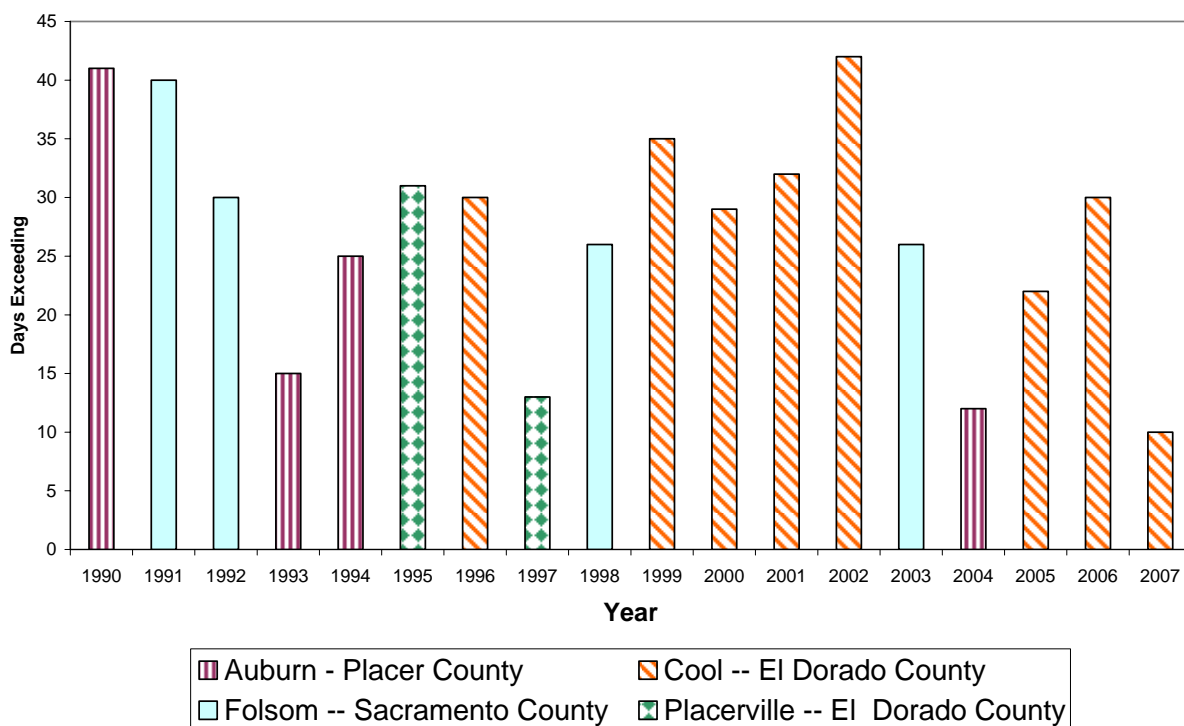
Monitoring Site	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Auburn	41	25	26	15	25	18	17	1	16	25	17	21	15	11	12	10	29	0
Colfax			12	4	12	11	5	2	8	9	na	na	18	12	9	13	14	1
Cool							30	10	25	35	29	32	42	22	8	22	30	10
Davis	3	0	4	1	0	2	4	1	4	5	2	2	2	0	0	0	1	1
Echo Summit											0	0	0	0	0	0	0	0
Elk Grove				0	3	4	9	3	4	7	1	3	0	5	1	2	7	1
Folsom	1	40	30	13	22	27	23	8	26	18	15	19	23	26	7	19	25	7
North Highlands	4	5	5	3	6	11	15	0	9	5	7	7	11	4	1	2	10	1
Placerville			29	12	22	31	27	13	17	23	15	15	20	19	7	16	20	4
Pleasant Grove*	0	0	4	2	0	7	5	0	4	3	3	3	2					
Rocklin*		12	24	9	19	17	20	4	12	11	12	8	15					
Roseville				7	8	8	12	2	12	9	8	9	11	5	1	9	9	3
Sac-Airport Rd.									6	1	1	2	0	1	0	1	1	1
Sac-Del Paso M.	17	14	14	6	5	23	13	1	10	6	9	6	23	13	3	10	10	2
Sac-T Street	2	2	2	1	0	3	3	1	4	4	0	3	3	1	0	1	3	1
Sloughhouse								3	24	19	18	15	16	19	8	10	17	2
Vacaville						3	2	0	7	8	0	0	0	0	1	0	2	0
Woodland									4	4	0	1	4	0	0	2	4	0
Peak Site	41	40	30	15	25	31	30	13	26	35	29	32	42	26	12	22	30	10

Data source: CARB air quality data base (www.arb.ca.gov/adam/welcome.html).

*Site closed

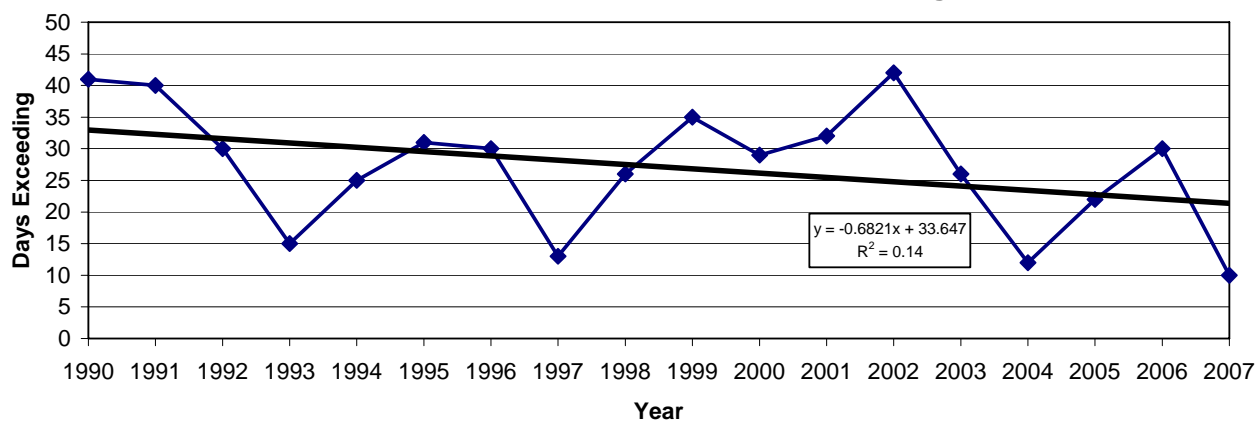
na = insufficient data available

Figure 4-2
8-Hour Ozone Exceedance Days
Sacramento Nonattainment Area – Peak Monitoring Site



Federal 8-hr ozone standard = 84 ppb

Figure 4-3
8-Hour Ozone Exceedance Days Trend
Sacramento Nonattainment Area – Peak Monitoring Site



Federal 8-hr ozone standard = 84 ppb

This trend analysis uses the highest number of 8-hour ozone exceedance days recorded each year at the various monitoring stations, including the addition of the Cool station in 1996.

Table 4-2
8-Hour Ozone Design Values (ppb)
Sacramento Nonattainment Area – Ozone Monitoring Sites

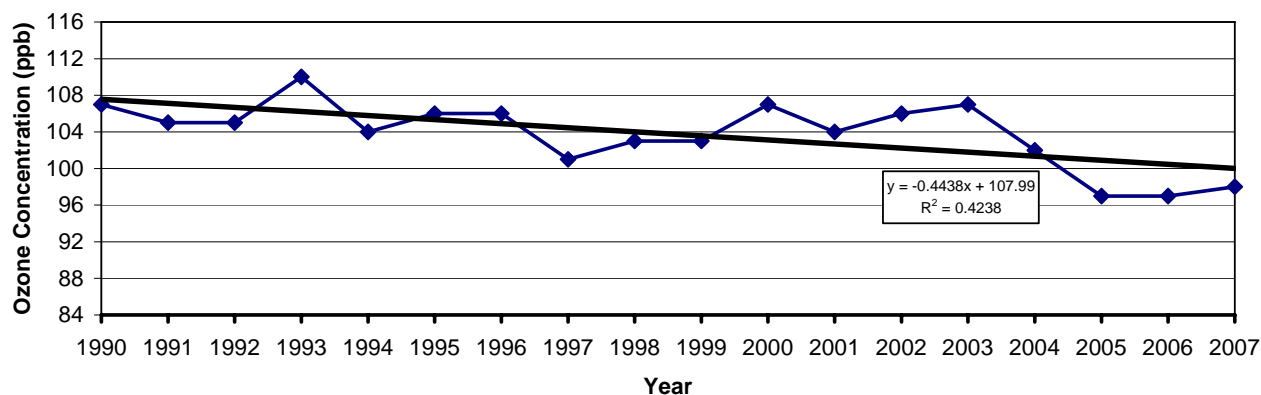
Monitoring Site	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Auburn	107	105	105	101	102	105	103	95	95	97	102	101	101	99	95	92	93	89
Colfax			92	92	92	92	91	86	86	86	na	na	na	88	92	91	97	94
Cool							103	97	103	103	107	104	106	107	102	97	95	96
Davis	78	73	80	78	79	78	82	79	80	81	85	81	77	76	74	73	74	75
Echo Summit													76	76	75	72	72	73
Elk Grove						81	87	87	87	88	85	84	75	80	77	82	82	83
Folsom	101	100	101	110	104	106	106	101	102	101	104	99	100	100	97	97	97	98
North Highlands	87	82	88	87	87	88	91	88	89	87	89	89	92	91	85	80	82	80
Placerville			98	95	97	99	103	99	98	98	99	96	94	95	94	94	94	93
Pleasant Grove*					81	82	83	82	81	81	84	83	82					
Rocklin*		93	102	101	103	100	100	95	94	92	93	91	92					
Roseville				103	96	97	96	93	93	89	93	90	92	90	87	86	89	89
Sac-Airport Rd.									88	85	82	79	78	77	74	73	73	76
Sac-Del Paso M.	96	95	100	99	92	96	100	97	95	91	95	92	95	97	95	92	90	90
Sac-T Street			79	79	78	78	80	77	79	80	82	80	79	79	75	73	76	78
Sloughhouse									97	100	105	98	95	95	94	94	96	93
Vacaville								76	82	85	85	77	72	72	71	71	73	74
Woodland									87	86	84	82	83	83	79	77	79	80
Peak Site	107	105	105	110	104	106	106	101	103	103	107	104	106	107	102	97	97	98

Data source: CARB air quality data base (www.arb.ca.gov/adam/welcome.html).

*Site closed after 2002.

na = insufficient data available

Figure 4-4
8-Hour Ozone Design Values Trend
Sacramento Nonattainment Area – Peak Monitoring Site



Federal 8-hr ozone standard = 84 ppb

This trend analysis uses the highest 8-hour ozone design values based on ozone concentrations recorded each year at the air monitoring stations, including the addition of the Cool station in 1996.

5. EMISSIONS INVENTORY

5.1 Introduction to Emissions Inventory

Planning efforts to evaluate and reduce ozone air pollution include identifying and quantifying the various processes and sources of VOC emissions (such as solvents, surface coatings, and motor vehicles) and NO_x emissions (such as motor vehicles and other fuel combustion equipment). VOC pollutants are also known as reactive organic gases (ROG), and the two are considered to be synonymous for this report.

In this chapter, the emissions inventory system is characterized by different air pollutant source categories for the Sacramento nonattainment area. The summary of VOC and NO_x emissions estimates are provided for a 2002 base year in tabular and graphical formats. In addition, the base year emissions are used to forecast future year inventories by using socio-economic growth indicators and the post-2002 emission reduction effects of existing control strategies. Emission reduction credits are also included in the emissions inventory forecasts. More detailed information and emissions inventory tables are provided in Appendix A – Emissions Inventory.

5.2 Emission Inventory Requirements

Emissions are updated as part of the overall requirement for “plan revisions to include a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutants” under sections 172(c)(3) and 182(a)(1) of the Clean Air Act. The baseline year for the SIP planning emissions inventory is identified as 2002 by EPA guidance memorandum⁴².

Additional EPA emission inventory guidance⁴³ and federal 8-hour ozone implementation rules⁴⁴ set specific planning requirements pertaining to future milestone years for reporting reasonable further progress (RFP) and to attainment demonstration years. Key RFP analysis years in this report include 2011 and every subsequent 3 years out to the attainment date.

The attainment date for a “severe” nonattainment area classification is June 15, 2019. However, in order to attain by June 15th, the prior year’s ozone season would need to be in attainment.⁴⁵ Therefore, the emission inventory year for attainment analysis purposes is 2018, the year preceding the mandated attainment date.

⁴² “2002 Base Year Emission Inventory SIP Planning: 8-Hour Ozone, PM_{2.5} and Regional Haze Programs” (EPA Memorandum from L. Wegman and P. Tsirigotis, November 18, 2002).

⁴³ “Emission Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations” (EPA-454/R-05-001, August 2005, updated November 2005).

⁴⁴ “Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2” (Federal Register, November 29, 2005, p. 71612-71705).

⁴⁵ “Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze” (EPA, April 2007, p. 35).

The emissions inventory years included in this plan are 2002 (baseline), 2011, 2014, 2017, and 2018. EPA emission inventory guidance⁴⁶ also requires the SIP planning emissions inventory to be based on estimates of actual emissions for an average summer weekday, typical of the ozone season (May – October).

5.3 Emission Inventory Source Categories

Due to the large number and wide variety of emission processes and sources, a hierarchical system of emission inventory categories was developed for more efficient use of the data. The anthropogenic emissions inventory is divided into four broad categories: stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources. Each of these major categories is subdivided into more descriptive subcategory sources. Each of these subcategories is further defined into more specific emission processes.

5.3.1 Stationary Sources

The stationary source category of the emissions inventory includes non-mobile, fixed sources of air pollution. They are mainly comprised of individual industrial, manufacturing, and commercial facilities called “point sources.” The more descriptive subcategories include fuel combustion (e.g., electric utilities), waste disposal (e.g., landfills), cleaning and surface coatings (e.g., printing), petroleum production and marketing, and industrial processes (e.g., chemical). Industrial facility operators reported the process and emissions data used to calculate emissions from point sources.

5.3.2 Area-Wide Sources

The area-wide sources inventory category includes aggregated emissions data from processes that are individually small and widespread or not well-defined point sources. The area-wide subcategories include solvent evaporation (e.g., consumer products and architectural coatings) and miscellaneous processes (e.g., residential fuel combustion and farming operations). Emissions from these sources are calculated from product sales, population, employment data, and other parameters for a wide range of activities that generate air pollution across the Sacramento nonattainment region. More detailed information on the area-wide source category emissions can be found on the CARB website: <http://www.arb.ca.gov/ei/areasrc/areameth.htm>

⁴⁶ “Emission Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations” (EPA-454/R-05-001, August 2005, updated November 2005, p. 17).

5.3.3 On-Road Motor Vehicles

The on-road motor vehicles inventory category consists of trucks, automobiles, buses, and motorcycles. EMFAC, the California model for on-road motor vehicle emissions, has undergone significant revision since the EMFAC2002 model (version 2.2), which was used in the early 8-hour ozone 2002-2008 RFP plan⁴⁷ submitted to EPA in February 2006. As discussed below, this SIP analysis relied on updated model parameters.

Improved Motor Vehicle Emissions Model, EMFAC2007

The California Air Resources Board has continued to update and improve its EMFAC on-road motor vehicle emissions model with extensive new data. ARB's EMFAC2007 model (version 2.3) was released November 2006. The most significant improvements in EMFAC2007 include:

- Revised vehicle fleet information based on California Department of Motor Vehicles registration records specific to each county, which reflect the growth in vehicle populations and the increasing average age of the fleet;
- Current base year and forecast year VMTs and speed distributions from regional transportation and metropolitan planning organizations;
- Redistribution of heavy-duty diesel truck populations based on VMT;
- Enhanced emission rate data for heavy-duty diesel trucks that include the results of testing larger sample sizes and recent model years; and
- New summer temperature and relative humidity profiles better representing the meteorological conditions corresponding to the federal 8-hour ozone standard.

In general, the revised EMFAC2007 motor vehicle emission forecasts are higher than the previous EMFAC2002 model. For example, in the Sacramento region, updated EMFAC2007 VOC emission forecasts are estimated about 10-15% higher than EMFAC2002 mostly due to using improved summer temperature profiles. In addition, updated EMFAC2007 NOx emission forecasts are estimated about 25-30% more than EMFAC2002 mainly due to vehicle population updates, improved data on heavy-duty diesel emission rates, and spatial redistribution of heavy-duty diesel trucks. EMFAC software and detailed information on the vehicle emissions model can be found on the CARB website: <http://www.arb.ca.gov/msei/onroad/on-road.htm>

Vehicle Activity Data

On-road motor vehicle emission estimates for this plan were developed using the latest available transportation data and California's new EMFAC2007 model⁴⁸. The current

⁴⁷ Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan (February 2006).

⁴⁸ ARB conducted off model runs to incorporate SACOG's MTP2035 travel forecasts that were not included in the released EMFAC2007 model (version 2.3). (Laura Lawrence e-mail providing on-road emissions with February 2008 SACOG activity, formally transmitted to SMAQMD on April 1, 2008).

and forecasted vehicle miles traveled (VMT) are from SACOG-supplied activity data (submitted to ARB February 2008)⁴⁹ based on transportation modeling for the Sacramento region's recent Metropolitan Transportation Plan (MTP2035) with Blueprint (described in Chapter 11). The vehicle activity levels for the eastern part of Solano County in the Sacramento nonattainment area are based on MTP data (submitted to ARB August 2006) from the Bay Area Metropolitan Transportation Commission (MTC).

5.3.4 Other Mobile Sources

The emission inventory category for other mobile sources includes aircraft, trains, ships, and off-road vehicles and equipment used for construction, farming, commercial, industrial, and recreational activities. The OFFROAD2007 model was released November 2006 by CARB and used to calculate the air pollutant emissions from vehicles and engines used in agriculture, construction, lawn and garden care, and off-road recreation. In general, emissions are calculated based on estimated equipment population, engine size and load, usage activity, and emission factors.

Aircraft, ship, and train emissions are estimated outside the OFFROAD model. More detailed information on the OFFROAD2007 mobile emissions model can be found on the CARB website: <http://www.arb.ca.gov/msei/offroad/offroad.htm>

5.3.5 Biogenic Sources

Biogenic emissions are emissions from natural sources, such as plants and trees. Using the BEIGIS model and region-specific input databases on vegetation land cover, species composition, leaf mass distribution, temperature and light conditions, CARB estimates emission of biogenic volatile organic compounds (BVOC) from vegetation for natural areas, agricultural crops, and urban landscapes. BVOC emissions vary with temperature.

Table 5-1 shows the sum of biogenic emissions for the Sacramento nonattainment area for six episodic days used in ozone modeling and for an average episodic day. More detailed information on the emissions from natural sources can be found on the CARB website: <http://www.arb.ca.gov/ei/naturalsources.htm>

⁴⁹ SACOG travel data transmittal letter to ARB, and April 1, 2008 e-mail to SMAQMD.

Table 5-1
Biogenic Emissions

Biogenic Category	VOC ^a (tons per day) By Episodic Day Used in Ozone Modeling						
	Sacramento Nonattainment Area						
	7/28/2000	7/29/2000	7/30/2000	7/31/2000	8/1/2000	8/2/2000	Avg Day
Urban	55	60	64	75	72	72	66
Agricultural	33	36	38	45	44	43	40
Natural	383	409	418	494	465	481	442
Total	472	505	520	614	580	596	548

^a Source: Cheryl Taylor, CARB, sum of Sacramento Nonattainment Area biogenic gridded emissions for episodic days, July 28-August 2, 2000, used in ozone modeling.

5.4 Base Year Emissions Inventory

2002 Anthropogenic Emissions Table by Source Category

The following tables (Tables 5-2 and 5-3) show the 2002 anthropogenic emissions inventory of VOC and NOx by source categories for the Sacramento nonattainment area. The Sacramento nonattainment area for the federal 8-hour ozone standard includes all of Sacramento and Yolo Counties, eastern portion of Solano County, Placer and El Dorado Counties excluding the Lake Tahoe Basin, and the southern portion of Sutter County⁵⁰. The emissions inventory for ozone planning purposes represents emissions for a summer seasonal average day in units of tons per day⁵¹. The VOC emissions total is 160 tons per day in 2002. The NOx emissions total is 196 tons per day in 2002.

⁵⁰ Southern Sutter County emissions include:

- 1) all point sources located in the area,
- 2) 6% of the county total of area and aggregated point sources that are projected by population or construction/demolition activity, where, 6% is the percent of Sutter County population in the Sutter portion of the Sacramento nonattainment area,
- 3) 34% of the county total for emissions from agriculture and off-road equipment, where, 34% is the percent of Sutter County land area in the Sutter portion of the Sacramento nonattainment area,
- 4) 0% of the county total for emissions from oil and gas operations, landfills, and cogeneration categories.

⁵¹ Annual emissions are multiplied by a summer seasonal factor, $TF = [\text{sum of fractional monthly throughputs for the emission process during May through October}] / 184$ days in the summer ozone season.

Table 5-2 Emissions of VOC^a (tons per day) Sacramento Nonattainment Area					
	2002	2011	2014	2017	2018
TOTAL EMISSIONS	160	127	121	118	117
STATIONARY	23	23	24	25	25
AREA-WIDE	31	29	30	31	31
ON-ROAD MOTOR VEHICLES	64	38	32	28	27
OTHER MOBILE SOURCES	43	38	36	34	34
STATIONARY					
Solvent/Coatings	8.1	7.5	7.8	8.1	8.3
Petroleum Production/Marketing	4.9	5.3	5.5	5.8	5.9
Industrial Process	3.6	3.9	4.1	4.4	4.5
Waste Composting	4.1	4.1	4.1	4.1	4.1
Other	2.0	2.1	2.2	2.2	2.2
AREA-WIDE					
Consumer Products	14.8	13.8	14.3	14.9	15.1
Architectural Coatings	8.0	7.3	7.6	8.0	8.1
Pesticides	1.8	1.3	1.3	1.3	1.3
Livestock Waste	2.8	2.9	2.9	2.9	2.9
Ag Burn/Other Managed Burn	1.3	1.3	1.2	1.2	1.2
Other	2.1	2.3	2.3	2.4	2.4
ON-ROAD					
Automobiles	26.9	12.2	9.4	7.7	7.3
Lt/Med Duty Trucks	24.4	15.1	13.3	11.9	11.6
Heavy Duty Gas Trucks	6.2	3.5	2.9	2.6	2.4
Heavy Duty Diesel Trucks	3.3	3.2	2.6	2.1	2.0
Motorcycles	2.7	3.4	3.4	3.5	3.5
Buses/Motor Homes	0.5	0.3	0.2	0.2	0.2
OTHER MOBILE					
Recreational Boats	19.1	17.2	16.6	16.3	16.2
Equipment (Const/Ind/Farm)	9.4	6.1	4.9	3.9	3.7
Lawn & Garden Equipment	6.4	5.9	5.4	5.0	4.9
Gas Can	3.1	1.8	1.6	1.4	1.4
Trains	0.6	0.6	0.6	0.6	0.6
Aircraft	0.5	0.6	0.6	0.6	0.6
Other	3.8	5.4	5.9	6.5	6.7

^a Source: CARB CEFS Version 1.06 Sacramento NAA (Rf#980), February 28, 2007, for average summer day, updated to reflect recently adopted control measures, new emission and February 2008 SACOG transportation data.

Table 5-3 Emissions of NOx^a (tons per day) Sacramento Nonattainment Area					
	2002	2011	2014	2017	2018
TOTAL EMISSIONS	196	144	123	106	101
STATIONARY	16	15	15	14	14
AREA-WIDE	3	3	3	4	4
ON-ROAD MOTOR VEHICLES	115	78	61	49	45
OTHER MOBILE SOURCES	61	48	44	40	38
STATIONARY					
Fuel Combustion	7.5	8.1	8.4	8.6	8.6
Ag Irrigation Pumps	7.9	5.9	5.2	4.5	4.3
Industrial Process	0.8	0.9	1.0	1.0	1.0
AREA-WIDE					
Residential Fuel Combustion	2.8	3.0	3.1	3.1	3.2
Ag Burn/Other Managed Burn	0.4	0.4	0.4	0.4	0.4
ON-ROAD					
Heavy Duty Diesel Trucks	54.1	46.4	35.3	26.9	24.7
Lt/Med Duty Trucks	30.4	15.0	12.1	9.7	9.1
Automobiles	19.8	7.9	5.9	4.5	4.2
Heavy Duty Gas Trucks	7.4	5.1	4.6	4.3	4.1
Buses/Motor Homes	3.1	2.7	2.4	2.2	2.1
Motorcycles	0.5	0.9	0.9	0.9	0.9
OTHER MOBILE					
Construction & Mining Equip	18.2	13.0	10.9	8.7	8.0
Trains	12.2	8.8	9.1	9.3	9.4
Farm Equipment	13.0	9.0	7.3	5.8	5.3
Boats	6.2	7.3	7.1	7.1	7.1
Comm/Ind Equipment	4.9	3.2	2.7	2.1	1.9
Trans Refrig Units	1.6	2.0	2.0	2.0	2.0
Oil Drilling/Workover	2.7	1.7	1.4	1.2	1.1
Aircraft	1.6	2.2	2.4	2.7	2.8
Other	0.9	0.8	0.8	0.9	0.9

^a Source: CARB CEFS Version 1.06 Sacramento NAA (Rf#980), February 28, 2007, for average summer day, updated to reflect recently adopted control measures, new emission and February 2008 SACOG transportation data.

2002 Emissions Pie Charts

The following pie charts (Figures 5-1 to 5-2) show the 2002 VOC and NO_x emission inventory categories as a percentage of the total inventory for the Sacramento nonattainment region. In 2002, the VOC inventory includes 40% on-road mobile sources, 27% other mobile sources, 19% area-wide sources, and 14% stationary sources.

The NO_x inventory is mainly due to mobile source combustion emissions. In 2002, the NO_x inventory includes 59% on-road mobile sources, 31% other mobile sources, 2% area-wide sources, and 8% stationary sources.

Figure 5-1

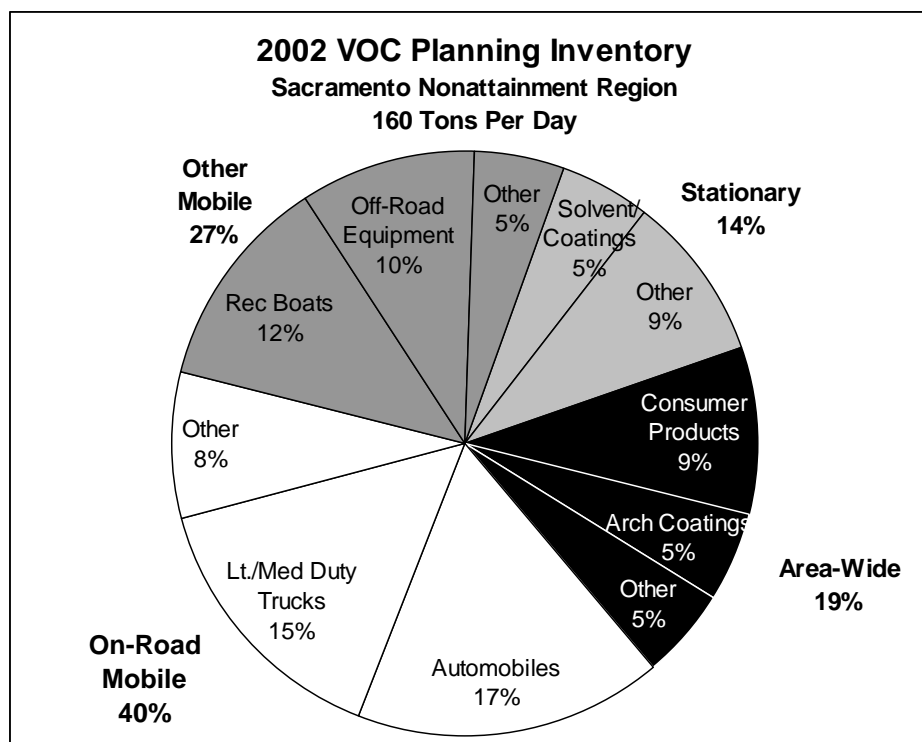
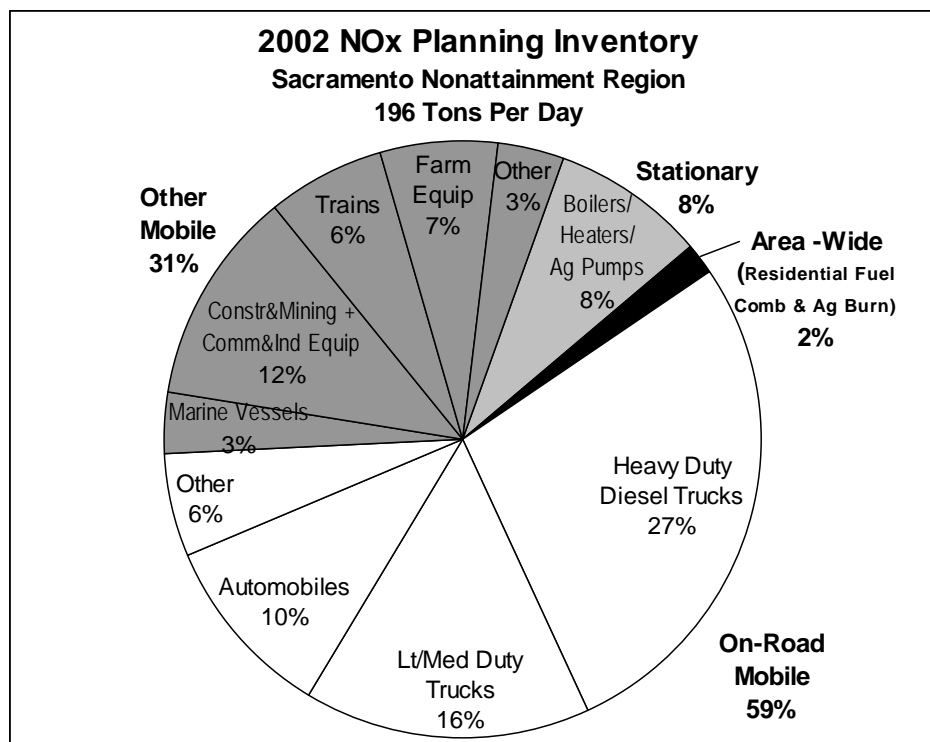


Figure 5-2



2002 Top 10 Emission Categories

Figures 5-3 and 5-4 contain bar charts that display the 2002 top 10 emission inventory categories for VOC and NO_x, respectively. The largest source categories for VOC are automobiles, light-duty trucks, recreational boats, consumer products, and off-road equipment. The largest source categories for NO_x are heavy-duty diesel trucks, off-road equipment, light-duty trucks, automobiles, farm equipment, and trains.

State and federal laws limit local air district authority to regulate certain emissions sources, notably motor vehicles, off-road engines, and consumer products. EPA retains almost exclusive regulatory authority for emissions from trains, aircraft, and ships. Local air districts do not have direct authority to regulate seven of the top ten VOC source categories, and nine of the top ten NO_x source categories. The significant categories that air districts have regulatory authority include solvents and coatings, architectural coatings, petroleum marketing, and stationary fuel combustion.

Figure 5-3

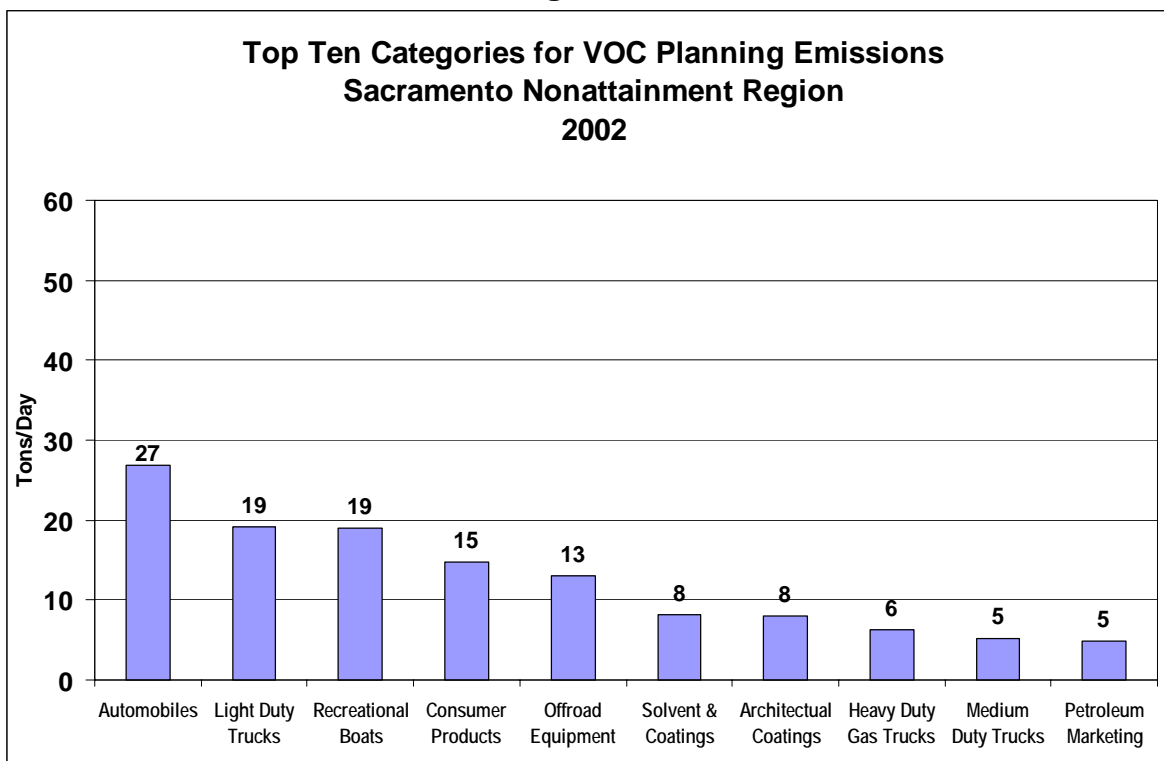
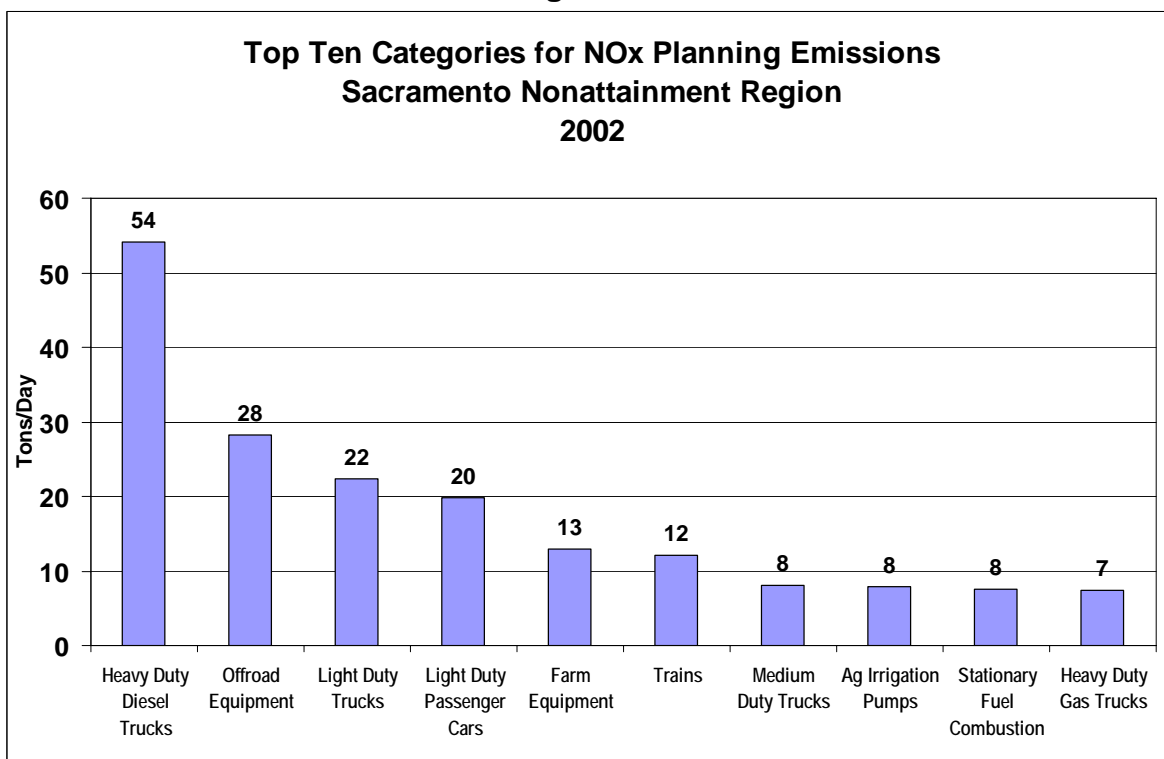


Figure 5-4



Emissions Contribution by Agency Responsibility

Figures 5-5 and 5-6 show pie charts that identify the VOC and NO_x emissions contribution by primary agency responsibility (District, CARB, or EPA). In terms of emissions, local air districts have direct regulatory authority for only 23% of VOC emissions and 10% of NO_x emissions in the Sacramento region. CARB has the most regulatory responsibility over emissions, 76% of VOC and 82% of NO_x, due to their authority over mobile source emissions.

Figure 5-5
VOC Emissions Contribution by Primary Agency Responsibility
Sacramento Nonattainment Region

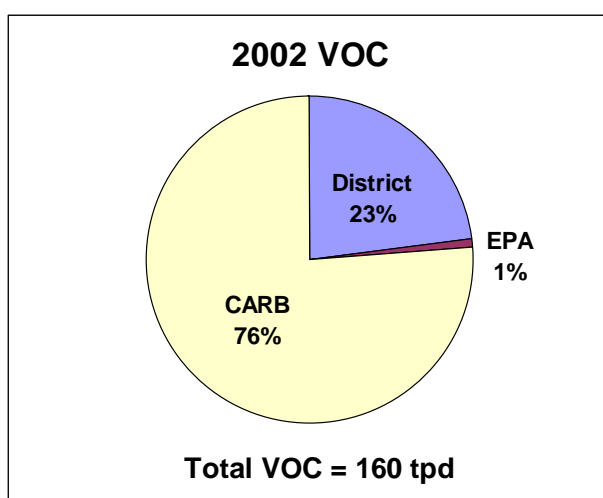
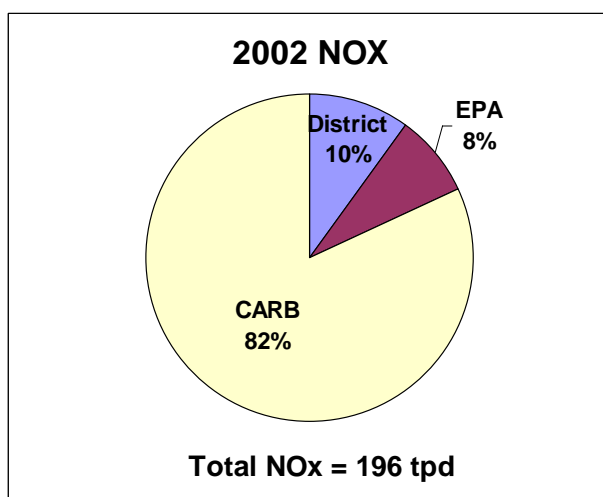


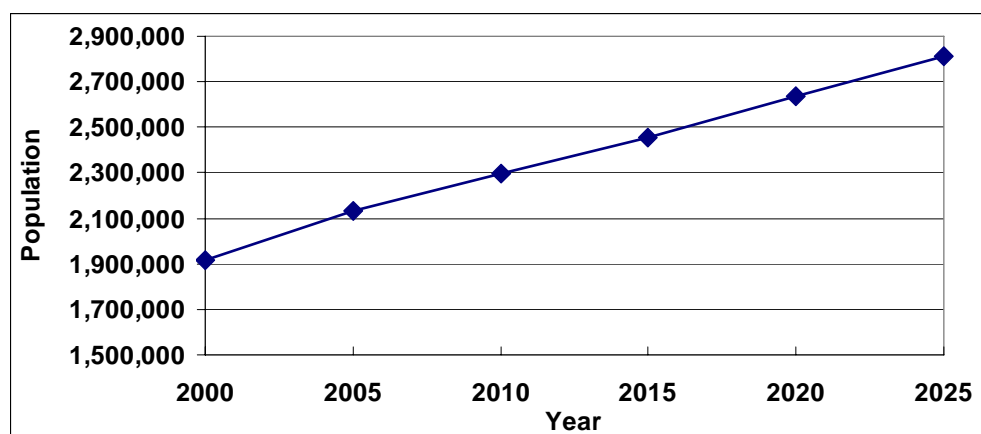
Figure 5-6
NO_x Emissions Contribution by Primary Agency Responsibility
Sacramento Nonattainment Region



5.5 Emission Inventory Forecasts

In order to forecast emissions for various future milestone and attainment analysis years, growth parameters and the post-2002 emission reduction effects of already adopted control measures⁵² are applied to the 2002 base year emissions inventory at the emission process level. Tables 5-2 and 5-3 show the forecast anthropogenic inventories for 2011, 2014, 2017, and 2018. The various growth parameters include forecasts for population, housing, employment, energy demand, motor vehicle travel, and other industrial and commercial outputs. Figure 5-7 contains a graph showing population growth⁵³ for the Sacramento region used in the CARB emission forecasting system. Existing control strategies continue to reduce future VOC and NOx emissions from stationary and area sources, on-road motor vehicles, and some other mobile source categories (such as off-road equipment).

Figure 5-7
Population Growth Forecast
Sacramento Nonattainment Area



Tables 5-2 and 5-3 include the anthropogenic emissions inventory forecasts of VOC and NOx by source categories for the Sacramento nonattainment area. Emissions are

⁵² Some recently adopted CARB and district control measures through December 31, 2006 were manually adjusted into emission projections for the Sacramento nonattainment area from the California Emission Forecast System (CEFS), Version 1.06 dated November 16, 2006. These recently adopted emission controls are listed separately in Appendix A1.

⁵³ Notes:

1. Data source: CARB CEFS V1.06 growth table.
2. Except Solano, population is based on SACOG forecasts adopted by SACOG Board of Directors 12/16/04.
3. Solano County population is from DOF projection released May 19, 2004.
4. El Dorado County and Placer County population data exclude the Tahoe Basin.
5. Sacramento Nonattainment Area fraction for South Sutter is estimated at 6% of Sutter County.
6. Sacramento Valley fraction for North East Solano is estimated at 30.69% of Solano County.

given for milestone RFP years of 2011, 2014, and 2017, and for the attainment demonstration analysis year of 2018.

The following bar charts (Figures 5-8 and 5-9) show the VOC and NO_x emission inventory forecasts for stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources for the Sacramento nonattainment region. Bar charts are given for the 2002 base year and compared to the milestone RFP years of 2011, 2014, and 2017, and to the attainment demonstration analysis year of 2018. The VOC and NO_x emission forecasts show significant declines in mobile source emissions, despite increasing population, vehicle activity, and economic development.

Figure 5-8

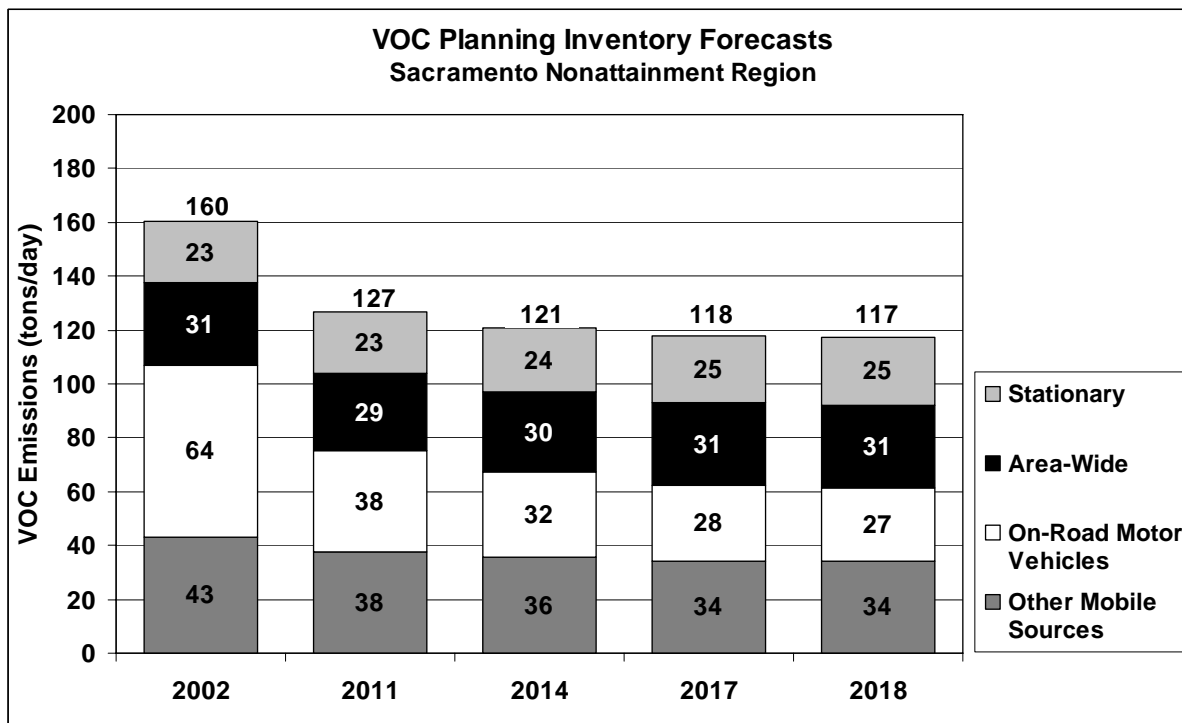
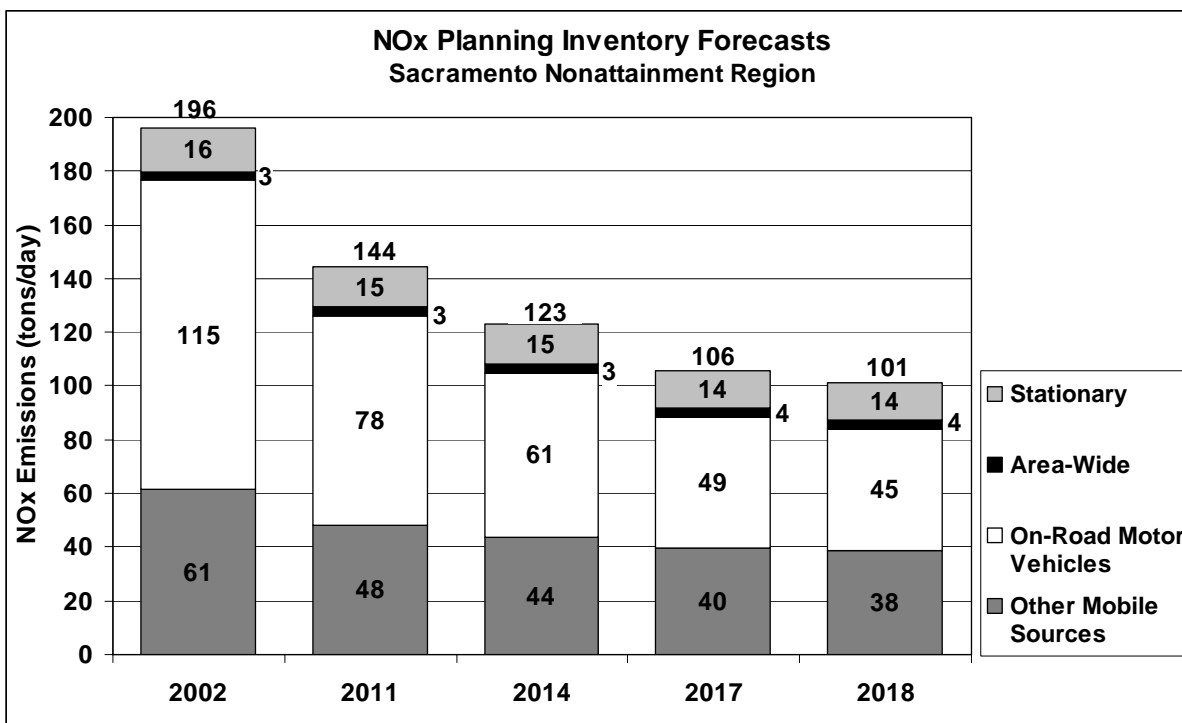


Figure 5-9



5.6 Emission Reduction Credits Added to Emission Inventory Forecasts

Certain pollutant emission reductions due to equipment shutdown or voluntary control may be converted to emission reduction credits (ERCs) and registered with the air districts. These ERCs may then be used as “offsets” to compensate for an increase in emissions from a new or modified major emission source regulated by the air districts. In the SMAQMD, ERCs may also be used as an alternative to strict compliance with specified rules. Thus, if a permitted source cannot meet the applicable emission standard requirements, usually because it is technically infeasible or not cost effective, the source may lease or purchase ERCs to achieve the required reductions.

Since ERCs represent potential emissions, they need to be taken into account in the emission inventories. One method is to assume that the use of ERCs will already be included within the projected rate of stationary source growth in the emissions inventory. However, if the use of available ERCs exceeds anticipated emissions growth, future emissions could be underestimated. Therefore, to ensure that the use of ERCs will not be inconsistent with the future reasonable further progress and attainment goals, the amount of ERCs issued for reductions that occurred prior to the 2002 base year are added to the emission inventory forecasts.

Emission Reduction Credits

For this attainment plan, the amounts of unused banked ERCs of emissions reductions that occurred prior to the 2002 baseline year for the Sacramento nonattainment area are 2.6 tons per day of VOC and 1.4 tons per day of NOx. The quantity of these ERCs is listed for each air district in Appendix A. The ERCs consist of emissions reduced from stationary sources and military aircraft. Including these ERCs here simply maintains the validity of previously banked ERCs and other reductions.

Future Bankable Rice Burning Emission Reduction Credits

California legislation⁵⁴ in 1991 (known as the Connelly bill) required rice farmers to phase down rice field burning on an annual basis, beginning in 1992. A burn cap of 125,000 acres in the Sacramento Valley Air Basin was established, and growers with 400 acres or less were granted the option to burn their entire acreage once every four years. Since the rice burning reductions were mandated by state law, they would ordinarily not be “surplus” and eligible for banking. However, the Connelly bill included a special provision declaring that the reductions qualified for banking if they met the State and local banking rules.

⁵⁴ Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991, section 41865 of California Health and Safety Code.

Some rice burning reductions have been banked as ERCs. Other pre-2002 reductions in rice burning may be banked in the future under an ERC rule⁵⁵ currently in development. The total amounts of potential bankable rice burning ERCs for the Sacramento nonattainment area are estimated at 0.9 ton per day of VOC and 1.0 ton per day of NOx. The potential future bankable rice burning ERCs are listed for each air district in Appendix A.

Summary of Emission Reduction Credits

ERCs issued for reductions that occurred prior to the 2002 base year and potential future bankable rice burning ERCs are summarized for the Sacramento nonattainment area and added to the VOC and NOx emission inventory forecasts in Tables 5-4 and 5-5. The ERCs are not included in the 2002 base year inventory.

5.7 Emissions Inventory Documentation

More detailed documentation of the VOC and NOx emissions inventory is provided in Appendix A. This appendix contains the estimated 2002, 2011, 2014, 2017, and 2018 emission inventories for each county and air basin combination in the Sacramento nonattainment area. A listing of the VOC and NOx emission reduction credits by individual air district is also included.

Emission inventories are constantly being updated to incorporate new and better information and methodologies. Many improvements, especially in the mobile source categories, and the addition of previously un-inventoried emission sources, have been made to the inventory. Detailed information on emission methodologies, changes and forecasts can be found on CARB websites: <http://www.arb.ca.gov/ei/ei.htm> and <http://www.arb.ca.gov/msei/msei.htm>

⁵⁵ This rice burning ERC rule must be approved by EPA into the SIP for the rice ERCs to be used for compliance with federal air quality requirements.

Table 5-4
VOC Emission Reduction Credits Added to the Emission Inventory Forecasts
Sacramento Nonattainment Area

Emissions in tons/day	2002	2011	2014	2017	2018
Emission Reduction Credits	---	2.6	2.6	2.6	2.6
Future Bankable Rice Burning Emission Reduction Credits	---	0.9	0.9	0.9	0.9
Total ERCs (rounded up)	---	4	4	4	4
Emission Inventory Forecasts	160	127	121	118	117
Total	160	131	125	122	121

Table 5-5
NOx Emission Reduction Credits Added to the Emission Inventory Forecasts
Sacramento Nonattainment Area

Emissions in tons/day	2002	2011	2014	2017	2018
Emission Reduction Credits	---	1.4	1.4	1.4	1.4
Future Bankable Rice Burning Emission Reduction Credits	---	1.0	1.0	1.0	1.0
Total ERCs (rounded up)	---	3	3	3	3
Emission Inventory Forecasts	196	144	123	106	101
Total	196	147	126	109	104

6. AIR QUALITY MODELING ANALYSIS

6.1 Introduction to Air Quality Modeling

Ozone is a secondary pollutant produced by complex chemical reactions in the air involving ozone precursor pollutants of volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the presence of sunlight. Ozone formation is also affected by meteorological characteristics (e.g., temperature, wind, vertical mixing, and humidity) and land surface features (e.g., land use, surface roughness, albedo, and terrain).

Due to the large number of atmospheric interactions, varying physical factors, and vast spatial boundaries pertaining to ozone formation, the evaluation of air quality problems to develop adequate emission reduction strategies is inherently difficult and resource intensive. Therefore, state-of-the-science computer modeling is used to simulate the formation of ozone through mathematical descriptions of atmospheric processes and photochemical reactions of pollutants over large regional air basins.

This chapter describes the updated air quality modeling and analysis performed by the California Air Resources Board (CARB) with the help and cooperation of the various air districts, contracted agencies and consultants. The methodology and application of the modeling results for determining the emission reduction targets needed for attainment of the 1997 8-hour ozone standard in the Sacramento region are provided. More detailed documentation of the air quality modeling and analysis of results are included in Appendix B – Photochemical Modeling.

6.2 Air Quality Modeling Methodology and Applications

To evaluate attainment of the 8-hour ozone standard, it is necessary to understand existing high ozone episodes and then predict future ozone concentrations under changing emission scenarios. Extensive air monitoring and emissions data are first collected or estimated for actual high ozone episodes to provide information for developing base case model simulations. An air quality modeling episode can then be run for different future year emissions scenarios to study how reducing VOC and NO_x emissions will decrease ozone concentrations. Emission reduction levels for meeting the ambient ozone standard can be quantified for a specified attainment year.

Ozone air quality modeling has other uses besides estimating attainment of the ambient standard. It can also be used to assess the magnitude and impact of pollutants being transported between air basins. Another useful application could be to determine potential unmonitored high ozone areas where future monitoring sites may be installed.

6.3 Air Quality Modeling Analysis Requirements

Under section 182(c)(2)(A) of the Clean Air Act, the attainment demonstration for “serious and higher” nonattainment areas must be based on photochemical grid

modeling or any other EPA-approved analytical method determined to be at least as effective. In addition, EPA provides recommended guidance⁵⁶ on how to apply air quality models to generate results for preparing 8-hour ozone attainment demonstrations. The guidance document lists the following nine steps for applying an air quality model:

1. Develop a conceptual description of the problem to be addressed.
2. Develop a modeling/analysis protocol.
3. Select an appropriate model to support the demonstration.
4. Select appropriate meteorological episode time periods to model.
5. Choose an appropriate area to model with appropriate horizontal/vertical resolution and establish suitable initial and boundary conditions.
6. Generate meteorological inputs to the air quality model.
7. Generate emissions inputs to the air quality model.
8. Evaluate the performance of the air quality model and perform diagnostic tests to improve the model, as necessary.
9. Perform future year modeling (including additional control strategies, if necessary) and apply the attainment test.

EPA's modeling guidance document⁵⁷ describes a modeled attainment test as an exercise in which an air quality model is used to simulate current and future air quality for selected high ozone episodes. The estimated reduction in modeled future ozone is used in a relative rather than absolute sense to predict attainment. The simulated percent reduction in future ozone at each nonattainment monitor is applied to the monitor's actual observed average baseline ozone design value. If the calculated future ozone design value concentrations are ≤ 84 ppb, then the attainment test is satisfied for the monitors.

The modeled attainment test should be applied at monitors within the nonattainment area; plus the State is responsible for other nearby counties or areas outside the nonattainment area to address downwind influence. Therefore, the recommended modeled attainment test predicts whether or not all estimated future design values will achieve the ozone NAAQS under meteorological conditions similar to those that have been simulated.

6.4 Central California Ozone Study

The Central California Ozone Study (CCOS) consisted of a field program, data analysis, emission inventory development, and modeling. Sponsors and participants in CCOS include federal, state, and local governmental agencies, university researchers, private consulting firms, industry associations, and environmental groups. The main goals of the CCOS activities and analyses were to enable CARB and central California air

⁵⁶ "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze" (EPA, April 2007, p. 121-125).

⁵⁷ Ibid., p. 15 and 40-42.

districts to further evaluate VOC and NO_x control strategies, to determine the impacts of pollutant transport between air basins, and to provide the technical basis for preparing the attainment demonstration plans for the federal 8-hour ozone State Implementation Plan.

The CCOS field program was conducted during the summer of 2000 and included massive air quality and meteorological data collection over all of central California and most of northern California. Supplemental continuous surface and upper air monitoring equipment and more comprehensively instrumented research stations were specifically installed and operated to complement the existing routine air monitoring networks. Also, during forecasted high ozone episode days, additional sophisticated air measurements were taken using specially-equipped aircraft, speciated VOC surface samplers, and radiosonde upper air meteorological and ozone telemetry monitors.

6.5 Description of Air Quality Model and Modeling Inputs

The photochemical grid modeling used for the 8-hour ozone attainment analysis is developed with the CAMx⁵⁸ air quality model. The CAMx model simulates a three-dimensional atmosphere over multiple days, and is used to investigate air pollution at the spatial resolution of 4 km grid squares for the entire CCOS area (see modeling domain in Figure 6-1). It is computationally efficient, publicly available, and acceptable to EPA for SIP modeling. The CAMx model is run using the SAPRC-99 chemical mechanism⁵⁹. The model calculates air quality concentrations averaged for each hour at each 4 km grid square location at the surface and for each vertical layer above.

Air quality models require time varying meteorological fields including winds, temperature, and water vapor content to calculate the transport and transformations of air pollutants. Meteorological inputs to the SIP air quality modeling project were developed by NOAA and CARB using the widely employed Mesoscale Model version 5 (MM5). The MM5 model is a prognostic meteorological model which is driven mainly by the principles of physics (e.g., laws of thermodynamics and conservation of mass) instead of being strongly influenced by observed meteorological data. However, the MM5 model run is improved by using four dimensional data analysis (FDDA), which does allow some wind calculations to be adjusted by actual monitoring data.

The MM5 model is able to simulate mesoscale and regional-scale atmospheric circulation using its multiple-nest capability that allows sub-domains to be examined at finer spatial resolutions. The MM5 model was run using multiple sub-domains with resolutions of 36 km, 12km, and 4 km grid squares. Also, the vertical structure of the meteorological modeling incorporated a 30-50 layer configuration.

⁵⁸ CAMx is Comprehensive Air Quality Model with extension, version 4.03a (as modified by CARB).

⁵⁹ Chemical mechanism originally developed by the Statewide Air Pollution Research Center (SAPRC) of the University of California at Riverside.

Air quality models also require inputs for time varying and spatially gridded emissions estimates. The modeling emissions files consist of hourly speciated emissions for elevated point, area, motor vehicle, and biogenic sources for each grid cell, which are provided by various methods. Point and area source emissions are processed into modeling inputs using the CARB-developed Emissions Modeling System (EMS-95). On-road motor vehicle emissions are gridded using Caltrans' Direct Travel Impact Model (DTIM). Emissions from biogenic sources are generated for modeling by CARB's BEIGIS program.

Other air quality model inputs include estimates of speciated concentrations for initial and boundary conditions. Initial pollutant concentrations represent ambient air quality inside the modeling domain at the time the modeling episode begins. Boundary conditions represent pollutant concentrations entering the modeling domain from the vertical top and horizontal side borders.

Figure 6-1
Photochemical Modeling Domain
Central California Ozone Study



6.6 Selection and Characterization of Modeling Episodes

Two high ozone episodes were selected for air quality modeling and analysis in this plan. One of the episodes occurred during the summer 2000 field data collection of the Central California Ozone Study. The summer 2000 ozone modeling episode includes 5 days from July 29 to August 2. The start of this episode was characterized by a typical high pressure system centered over the Four Corners area (Utah, Arizona, Colorado, and New Mexico). The relatively large high pressure ridge slowly migrated west and became centered near Reno, Nevada by July 31, creating meteorological conditions conducive to high ozone formation in Central California.

The other episode took place in July 1999 under more routine air monitoring data collection. The July 1999 ozone modeling episode includes 5 days from July 9 to 13. This episode is characterized by a much broader high pressure system than the summer 2000 episode. The high pressure system encompassed the Four Corners area, the Pacific Northwest region, and the Eastern Pacific Ocean, causing

meteorological conditions conducive to high ozone formation in Central and Northern California.

Additional details of the meteorological and air quality characterization of the two modeling episodes are provided in Appendix B – Photochemical Modeling.

6.7 Base Case Model Performance Evaluation

After preparing the air quality modeling input files (e.g., meteorological fields, gridded emissions, initial and boundary conditions), the CAMx air quality model was run for the two different high ozone episodes. The July 29-August 2, 2000 and July 9-13, 1999 episodes also included two spin-up days prior to the beginning of each episode. Due to varying uncertainties and conditions in running air quality models, the model performance was evaluated for each base case scenario.

EPA modeling guidance⁶⁰ recommends the operational evaluation should compare hourly ozone observations and predictions as well as 8-hour daily maximum observations and predictions over the episode days (excluding spin-up days). The ozone data should be evaluated for all data pairs in which the observed concentrations are above 60 ppb, and for all data pairs without any minimum threshold. At a minimum, statistical calculations should be performed for: 1) mean normalized bias (MNB), 2) mean normalized gross error (MNGE), and 3) average peak prediction bias and error. The summary statistics should be calculated for individual days averaged over all sites and for individual sites averaged over all days, and then aggregated into meaningful subregions or subperiods.

EPA modeling guidance does not assign an acceptance criteria level that distinguishes between adequate and inadequate model performance. Instead, EPA recommends that a qualitative weight-of-evidence approach consisting of a variety of performance tests be used to determine whether a particular modeling application is valid for assessing the future attainment status of an area.

Based on the statistical comparisons between observed and predicted ozone data, the base case modeling scenarios were determined to be performing adequately overall in the Sacramento region. Various summary base case model performance statistics tables, additional base case model performance evaluations, and modeling documentation are provided in Appendix B – Photochemical Modeling.

6.8 Baseline and Future Year Model Runs for Each Episode

After the photochemical modeling base case episodes were shown to perform adequately, the modeling was run with the summer planning inventory for a 2002

⁶⁰ “Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze” (EPA, April 2007, p. 190-198).

baseline year and a 2018 future year with existing control strategies for assessing attainment of the ozone NAAQS. The EPA 8-hour ozone implementation rule (40 CFR 51.908) states that emission reductions needed for attainment must be implemented by the beginning of the ozone season immediately preceding the area's attainment deadline date. Since the ozone season typically occurs May through October, the forecast model year for attainment demonstration analysis needs to represent the year preceding the June 15, 2019 attainment deadline date for a "severe" nonattainment classification.

6.9 Emission Reduction Credits Added to Future Year Model Runs

Emission reduction credits (ERCs) for the Sacramento region were discussed and quantified in Section 5.6. Since ERCs are potential future emissions, it is not currently known as to what emission sources they will be applied to and where the emission sources will be specifically located. Existing inventories for stationary emissions are gridded for modeling by using the point source facility locations. Estimated area-wide emissions are gridded for modeling using related spatial surrogate parameters, such as population and land use types.

Due to the uncertainty of the type and location of future sources using ERCs, the baseline VOC and NO_x ERCs (including rice burning) for the Sacramento nonattainment area were spatially distributed to the future year gridded modeling inventory by increasing the existing stationary and area-wide emissions in Sacramento and Yolo Counties. This across-the-board percentage increase was only applied to Sacramento and Yolo Counties, because other counties in the Sacramento nonattainment area partially extend outside the nonattainment area.

6.10 Forecasted Ozone Design Values

The results from baseline and future year modeling runs are applied to each ozone nonattainment monitor to determine the predicted future ozone design value with the estimated future emissions scenario. The method for calculating the predicted future ozone design values is described by the following equation⁶¹:

$$DV_{\text{future}} = \text{RRF} \times (DV_{\text{base}} - \text{BG}) + \text{BG} \quad \text{where,}$$

DV_{future} = the estimated future design value concentration at the monitor used to predict attainment of the 8-hour ozone NAAQS (≤ 84 ppb). [Truncated to whole ppb]

⁶¹ "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze" (EPA, April 2007, p. 20), and modified by ARB with consideration of background ozone.

RRF = the relative reduction factor which is the ratio of the future year (FY) modeled average 8-hour daily maximum ozone (rounded to tenths of a ppb) to the base year (BY) modeled average 8-hour daily maximum ozone (rounded to tenths of a ppb) for the monitor. [Rounded to three significant figures to right of decimal]

$$RRF = \frac{(FY - BG)_{AVG}}{(BY - BG)_{AVG}}$$

BG = background ozone which is assumed at 40 ppb.

DV_{base} = the actual observed average base year design value concentration (2002-2004) at the monitor for 8-hour ozone. [Rounded to tenths of a ppb]

A background ozone concentration is considered in the equations for calculating future ozone design value and relative reduction factor, because it is assumed that this represents the portion of a site's ozone problem that cannot be mitigated by anthropogenic emission controls.

The results for the forecasted ozone design values for the future year 2018 are shown in Table 6-1. This future year corresponds to the attainment demonstration analysis year for a severe nonattainment classification. Any monitors with predicted future ozone design values greater than 84 ppb (in **bold**) are not expected to attain the 8-hour ozone NAAQS and indicate the need for additional VOC and/or NOx emission reductions in the Sacramento region.

Based on the photochemical modeling results, attainment was predicted at all ozone monitors in 2018, except for two sites (Cool and Folsom) located in the eastern part of the Sacramento nonattainment area. Therefore, additional modeling runs were conducted to estimate the emission reductions needed to demonstrate attainment of the 8-hour ozone NAAQS for the 2018 forecast year.

Table 6-1
Forecasted 8-Hour Ozone Design Values
2018 Attainment Analysis Year for Severe Classification

Sacramento Nonattainment Area	[A] Baseline Design Value^a (ppb)	[B] Modeled Baseline Ozone (ppb)	[C] Modeled Future Ozone (ppb)	[D] Relative Reduction Factor^b	[E] Future Design Value^c (ppb)
Auburn (Placer Co.)	98.3	104.8	88.3	0.745	83
Colfax (Placer Co.)	90.0	91.5	75.5	0.689	74
Cool (El Dorado Co.)	105.0	98.5	83.5	0.744	88
Folsom (Sac. Co.)	99.0	107.9	92.0	0.766	85
North Highlands (Sac. Co.)	89.3	101.4	89.8	0.811	79
Placerville (El Dorado Co.)	94.3	99.4	84.0	0.741	80
Roseville (Placer Co.)	89.7	103.4	89.1	0.775	78
Sac-Del Paso Manor (Sac. Co.)	95.7	106.6	93.6	0.805	84
Sloughhouse (Sac. Co.)	94.7	103.0	91.0	0.810	84
Adjacent Downwind Areas					
Grass Valley (Nevada Co.)	97.7	95.0	81.0	0.745	83

^aBased on average of ozone design values for 2002, 2003 and 2004, except Colfax had insufficient data for 2002.

^bRRF calculation = $(C - 40) / (B - 40)$

^cFuture design value calculation = $RRF \times (A - 40) + 40$ [truncated to whole ppb]

The forecasted 8-hour ozone design values indicate that all of the high ozone monitoring sites in the Sacramento nonattainment area, except for Cool and Folsom, are predicted to attain the federal 8-hour ozone standard (84ppb) by 2018 without new control strategies. The Cool and Folsom monitoring sites are forecasted to remain above the standard and will need additional emission reductions to attain.

6.11 Analysis of VOC and NOx Emission Reduction Strategies

The attainment plan must show that emissions in the Sacramento nonattainment area will be reduced sufficiently to meet the federal 8-hour ozone air quality standard. The plan must identify emission reduction levels that provide for attainment of the standard, and show how the targets will be reached. Emission reduction targets are defined for both ozone precursor pollutants, VOC and NOx.

Ozone/Emission Reduction Graphs

Systematic reductions in anthropogenic VOC and/or NOx emissions were simulated to characterize the change in the resulting ozone concentrations. For each individual modeling run, domain-wide emissions for NOx-only, VOC-only, or both VOC and NOx are scaled by factors ranging from 100% to 80% in increments of 5%. As a result, forecasted ozone concentrations were determined for 25 different combinations of varying VOC and/or NOx emission reductions. For example, one modeling run scaled VOC emissions by 95% and NOx emissions by 85%, and then another run scaled VOC emissions by 85% and NOx emissions by 95%.

The forecasted ozone concentration data (in ppb) associated with each of the 25 emission reduction modeling scenarios were used to ratio the future ozone design values, which were plotted on a graph for an individual monitoring site. These diagrams show the pattern of ozone responses to varying combinations in VOC and NOx emission reductions. This exercise was performed for the 2018 attainment demonstration year, and evaluated at each of the nonattainment air monitoring sites.

The graph for the peak ozone design value site in the Sacramento region will generally determine the extent of additional emission reductions needed for attainment. Also, the particular VOC and NOx emission reductions associated with the region's new control measures can be applied to the peak site's diagram to estimate a future ozone design value concentration. The individual ozone/emission reduction graphs for the nonattainment ozone sites in the Sacramento region are shown in Appendix B – Photochemical Modeling.

Air Quality Modeling Analysis Conclusions

Some general conclusions can be drawn based on the 2018 modeling results of forecasted emissions and the additional across-the-board percent emission reduction scenarios. The air quality modeling analysis shows that attainment can be reached by 2018 with different combinations of VOC and NOx control. The modeling results indicate that both VOC and NOx reductions provide ozone benefits in the Sacramento region, but on a ton for ton basis NOx reductions provide greater ozone benefits than VOC reductions. More specific conclusions regarding attainment targets for the Sacramento region's peak ozone monitoring site at Cool are provided in Chapter 8 – Attainment Demonstration.

6.12 Air Quality Modeling Uncertainties

EPA's modeling guidance document⁶² explains that, "Uncertainty is the notion that model estimates will not perfectly predict observed air quality at any given location, neither at the present time nor in the future." Uncertainty arises for a variety of reasons. For example, limitations in the model's formulation may be due to an incomplete representation in the model of atmospheric physical and chemical processes. Modeling inaccuracies can also result from meteorological, emissions, and other input data base limitations, and uncertainty in forecasting future levels of emissions and changing land use.

Other factors adding to air quality modeling uncertainties include: 1) how well the meteorological episodes simulated in the modeling represent the severity of future meteorological conditions conducive to high ozone formation, 2) how well the methodology for forecasting ozone design values (by applying the relative reduction modeling results to baseline ozone design value concentrations) corresponds to actual future monitored ozone design values, and 3) how well domain-wide (especially Bay Area) emission reductions in the Sacramento attainment analysis are achieved, especially during those Sacramento ozone episodes when Bay Area transport is significant.

The impact of future climate change is not included in the photochemical modeling assumptions. In the view of CARB modeling experts, the temperature changes during the timeframe of this SIP will likely be small enough to have very little impact on the model results. Effects of climate change would be speculative in the short term, and impacts on the region's ability to attain will be tracked through the RFP process. However, long term effects of climate change on future ozone concentrations are being evaluated. CARB staff reported⁶³ that projected ozone response to climate change in 2050 is estimated to cause a four percent penalty increase in ozone relative to current meteorological conditions in the Sacramento region.

In order to mitigate potential air quality modeling uncertainties, the modeling guidance suggests using corroborative methods and analyses to support the air quality modeling results and attainment control strategy. This supplemental weight-of-evidence approach is discussed in Chapter 10.

⁶² "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze" (EPA, April 2007, p. 3) .

⁶³ Report to the Board on Impacts of Climate Change on California: Scenarios Assessment Findings of the Climate Action Team, November 20, 2008. Staff presentation slide 15, which references Steiner et al., "Influence of future climate and emissions on regional air quality in California", JGR (2006).

7. PROPOSED CONTROL MEASURES

7.1 Introduction to Control Measures

The air quality modeling analysis performed by the California Air Resources Board (described in Chapter 6) shows that the Sacramento region will not attain the 1997 federal 8-hour ozone standards by the mandated attainment deadline⁶⁴ unless additional emission reductions are achieved. In addition, all reasonably available control measures are required. The proposed control strategy in this chapter will describe measures and emission reductions to meet these requirements. This section uses the current projected inventory data and projected control measure reductions based on that current inventory. In addition, a contingency control measure strategy is defined.

More detailed information on the regional and local proposed new control measures is provided in Appendix C – Proposed Control Measures (separate document) and Appendix D – Transportation Control Measures.

The Sacramento SIP control strategy relies on the following components:

1. Reductions from existing control measures and adopted rules,
2. Reductions from new state and federal regulations, and
3. Reductions from defined new SIP local and regional measures.

The proposed SIP emissions control strategy includes reductions of both VOC and NO_x air pollutants. A single pollutant strategy is not practical since many existing statewide and local control programs will inherently achieve reductions from both ozone precursors.

7.2 Reductions from Existing Controls

Air districts have been regulating stationary air pollution sources since the 1970's. Existing rules and their emission benefits are helping to make progress toward achieving air attainment goals. The benefits from existing rules are reflected in the 2018 forecast inventory.

A coarse analysis was conducted to illustrate benefits from existing air district rules. Figures 7-1 and 7-2 illustrate the amount of 2008 emission reduction benefits that are attributable to district stationary and area-wide source VOC and NO_x rules since 1975. Existing district rules resulted in reductions of roughly 60 tons per day of VOC and 20 tons per day of NO_x emissions. The most beneficial VOC rules are those affecting: 1) gasoline dispensing facilities and bulk terminals, and 2) solvent cleaning, degreasing, and painting operations. NO_x rules regulating gas turbines and internal combustion

⁶⁴ "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1" (Federal Register, April 30, 2004, p. 23951-24000).

engines have achieved the most NOx emission reductions for stationary and area-wide sources.

Figure 7-1

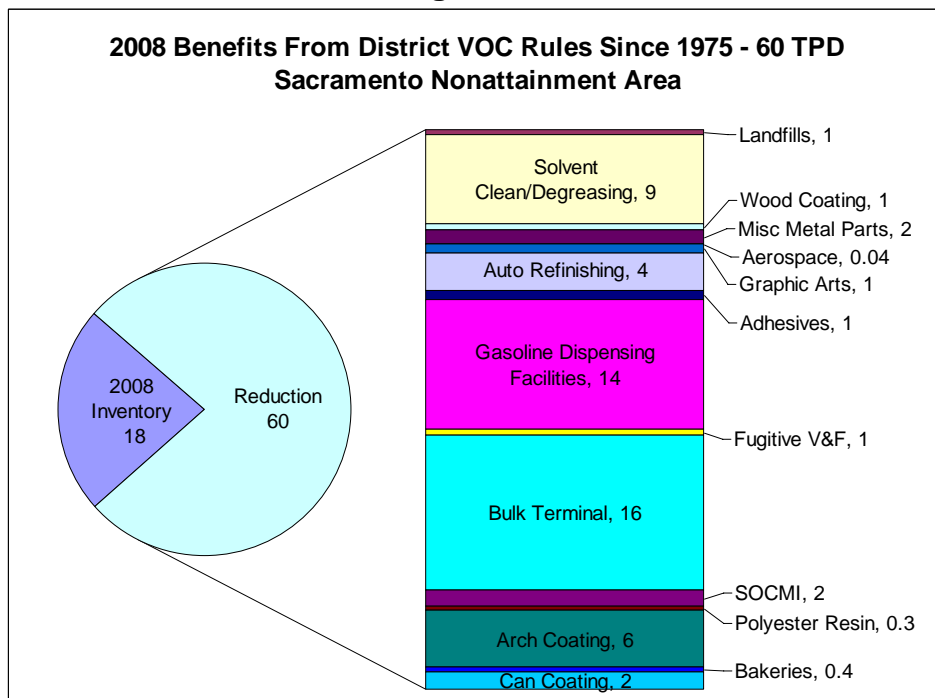
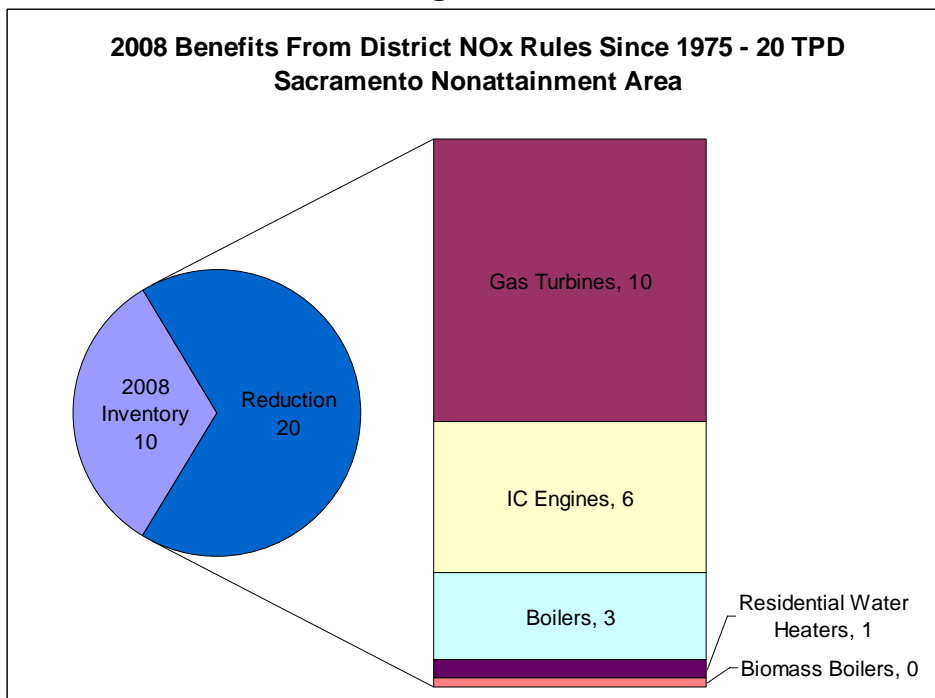


Figure 7-2



7.3 Reductions from New State and Federal Control Measures

New state and federal measures and their estimated 2018 emission reductions in the Sacramento nonattainment area are listed in Table 7-1⁶⁵. Emission benefits from these new committal measures are estimated to provide reductions of 11 tons per day of VOC and 15 tons per day of NO_x in 2018. Many of these new state and federal measures will be adopted by the end of 2008 and are listed separately in Table 7-1A. Emission benefits from just these adopted new measures are estimated to provide reductions of 3 tons per day of VOC and 13 tons per day of NO_x in 2018.

The total emission reductions from new measures that will be adopted by the end of 2008 and expected future new measures are included in the 2018 attainment demonstration for the Sacramento area. These new state and federal measures are included as a SIP commitment to meet the Clean Air Act and EPA requirements⁶⁶ for nonattainment areas to adopt all reasonably available control measures (RACM) and to attain the 1997 federal 8-hour ozone standard as expeditiously as practicable. However, these additional emission reductions from new measures expected to be adopted after 2008 are less certain and may change during the rule development process. Even though these future new committal measures are required for expeditious attainment, it is anticipated that attainment would be achieved by the 2018 deadline even if there is a reduction in their emission benefits.

This document relies on information about proposed state and federal control strategies that are included here by reference. This document does not describe in detail or evaluate those strategies. For more information about emission control strategies implemented by the California Air Resources Board or other state agencies, contact the California Air Resources Board, P.O. Box 2815, Sacramento, CA 95812-2815 or see <http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm>.

⁶⁵ Data provided by Planning and Technical Support Division, CARB, Ravi Ramalingam e-mail 12-02-08.

⁶⁶ CAA Section 172(c)(1) and Section 181(a)(1), and 40 CFR 51.912(d)

**Table 7-1
New State and Federal SIP Measures
Expected 2018 Emission Reductions
Sacramento Nonattainment Area**

Proposed New SIP Measures	NOx (tpd)	VOC (tpd)
Passenger Vehicles	1.7	2.6
Smog Check Improvements (BAR)	1.4	1.3
Expanded Vehicle Retirement	0.3	0.2
Modifications to Reformulated Gasoline Program	--	1.1
Heavy-Duty Trucks	9.5	0.8
Cleaner In-Use Heavy-Duty Trucks	9.5	0.8
Goods Movement Sources	2.1	0.1
Accelerated Intro. of Cleaner Line-Haul Locomotives	1.9	0.1
Clean Up Existing Harbor Craft	0.2	0.0
Off-Road Equipment	1.9	0.4
Cleaner In-Use Off-Road Equipment (over 25hp)	1.9	0.4
Other Off-Road Sources	0.3	6.1
New Emission Standards for Recreational Boats	0.3	3.0
Expanded Off-Road Rec. Vehicle Emission Standards	0.0	2.7
Additional Evaporative Emission Standards	--	0.4
Areawide Sources	--	1.9
Consumer Products Program	--	1.9
Emission Reductions from Proposed New Measures	15	11

BAR = Bureau of Automotive Repair.

Locomotives measure relies on U.S. EPA rulemaking.

Includes motor vehicle inventory from SACOG FEB 2008 submittal.

Updated 12/02/08 by CARB (Ravi Ramalingam e-mail 12/02/08). Note that CARB's estimates were provided before adoption of the Cleaner In-Use Heavy Duty Truck rule on December 11, 2008. Staff was informed by CARB on December 17, 2008 that the changes to the rule made on December 11, 2008 will not reduce the emission benefits expected from this rule (personal communication Ravi Ramalingam to Charles Anderson)

Table 7-1A
Adopted New State and Federal SIP Measures
Expected 2018 Emission Reductions
Sacramento Nonattainment Area

New SIP Measures Adopted by End of 2008	NOx (tpd)	VOC (tpd)
Passenger Vehicles	--	1.1
Modifications to Reformulated Gasoline	--	1.1
Heavy-Duty Trucks	9.5	0.8
Cleaner In-Use Heavy-Duty Trucks	9.5	0.8
Goods Movement Sources	2.1	0.1
Accelerated Intro. of Cleaner Line-Haul Locomotives	1.9	0.1
Clean Up Existing Harbor Craft	0.2	0.0
Off-Road Equipment	1.9	0.4
Cleaner In-Use Off-Road Equipment (over 25hp)	1.9	0.4
Other Off-Road Sources	--	0.4
Emission Standards for Recreational Boats and Vehicles	--	0.4
Areawide Sources	--	0.3
Consumer Products	--	0.3
Emission Reductions from Adopted New Measures	13	3

Locomotives measure relies on U.S. EPA rulemaking.

Includes motor vehicle inventory from SACOG FEB 2008 submittal.

Updated emission reductions from adopted measures provided by CARB (Lynn Terry e-mail 10-21-08).

7.4 Consideration and Selection of New Regional and Local Control Measures

EPA's final 8-hour ozone implementation rule⁶⁷ (pursuant to section 172(c)(1) of the Clean Air Act) requires "a SIP revision demonstrating that it has adopted all reasonably available control measures (RACM) necessary to demonstrate attainment as expeditiously as practicable and to meet any RFP requirements." EPA's RACM policy⁶⁸ indicates that areas should consider all candidate measures that are potentially reasonably available. Sources of potentially reasonable measures include measures adopted in other nonattainment areas, measures that the EPA has identified in guidelines or other documents, and any measures that have been suggested for the particular nonattainment area during a public comment period.

⁶⁷ "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2" (Federal Register, November 29, 2005, p. 71659-71661).

⁶⁸ "Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas" (EPA, December 1999).

Areas should consider all reasonably available measures for implementation in light of local circumstances. However, areas need only adopt measures if they are both economically and technologically feasible and cumulatively will either advance the attainment date by one year or more or are necessary for RFP. The emission reductions needed to attain 1 year earlier would be the difference in the emission forecasts (including new proposed control measures) between 2017 and 2018.

This plan contains required reasonably available control measures. Documentation, analysis, and conclusions regarding each control measure are provided in Appendix H – Reasonably Available Control Measures Analysis.

7.5 SIP Control Measure Commitments

To achieve the additional emission reductions needed for attaining the 1997 federal 8-hour ozone standard, the implementation of new control measures are proposed as a SIP commitment. The total emission reductions and the obligation to propose specific new measures would become federally enforceable upon approval by U.S. EPA of the control measures in the attainment plan. The commitments for emission reductions are calculated using the planning emissions inventory, and progress will be tracked in the same inventory currency to assess compliance.

The total emission reductions from the new measures necessary to attain the federal standards are an enforceable commitment in the SIP. While the proposed regional and local control measures include estimates of the emission reductions from each of the individual measures, it is important to note that the commitment is to achieve the total emission reductions necessary to attain the federal standards. Therefore, if a particular measure or a portion thereof is found infeasible or does not get its expected emission reductions, each air district still commits to achieving the total aggregate emission reductions necessary for attainment, whether this is realized through additional or surplus reductions from the other adopted measures, from alternative control measures, or incentive programs.

Although the regional and local commitment is to the "total emission reductions," for purposes of transportation conformity, an explicit commitment is made to the reductions associated with the on-road mobile source incentive program. Also, the urban forest control measure, SMAQMD-1, is an emerging measure. Because of the uncertainties associated with implementation and validation of this urban forest measure, the emission benefits from this strategy are not included in the attainment or reasonable further progress demonstrations.

Should future air quality modeling or air quality improvements indicate that all of the emission reductions from the new measures are not necessary for attainment and an infeasibility finding is made for a control measure or a portion thereof, the region's SIP commitment can be adjusted downward. For purposes of SIP commitment, infeasibility means that the proposed control technology is not reasonably likely to be available by

the implementation date needed, or achievement of the emission reductions by that date is not cost-effective or technologically feasible because of local circumstances.

7.6 SIP Emission Reduction Tracking

For purposes of tracking progress in emission reductions, the baseline emissions for the year 2002 and for milestone years in this plan will be used, regardless of any subsequent new inventory information that reflects more recent knowledge. This is to ensure that the same “currency” is used in measuring progress as was used in designing the ozone attainment and RFP plan. This will provide a fair and equitable measurement of progress.

7.7 Non-regulatory Control Measures

The non-regulatory control measures proposed in this 8-hour ozone plan are regional programs that will achieve emission reductions throughout the Sacramento nonattainment area. The following non-regulatory measures are proposed:

- Mobile Source Incentive Measures – On-road and Off-road
- Spare The Air Program
- SACOG Transportation Control Measures
- Urban Forest Development Program

7.8 Mobile Source Incentive Measures

Mobile sources such as trucks, automobiles, trains, boats, construction and farm equipment are by far the largest sources of ozone precursors in the Sacramento nonattainment area. Included under this major source category are all non-stationary sources from lawn mowers to jumbo jets. The air districts do not have authority to directly regulate mobile source emissions through emission standards; however, the air district incentive programs (and indirect source rules) may complement state and federal regulatory efforts in reducing mobile source emissions. These regional mobile source incentive measures are implemented in all or parts of the Sacramento nonattainment area by the air districts.

The estimated emission reductions from the proposed regional mobile incentive measures are summarized, followed by descriptions of the individual on-road mobile and off-road mobile control measures. Because many of the incentive measures in the mobile source categories target the same vehicles or engines, it is difficult to predict in advance what portion of the benefits should be assigned to each of the individual strategies. Therefore, the benefits from the collection of measures have been estimated, and all or any portion of the measures may be implemented to achieve those benefits. Some measures noted may likewise not be implemented if cost effective reductions are not available. However, for purposes of transportation conformity, an

explicit commitment is made to the reductions associated with the on-road mobile source incentive program.

Control Measure	Adoption Year	Implement Year	Emission Reduction (TPD)	
			2018	
			VOC	NO _x
Mobile Source Incentive Programs	2010	2008-2018	<0.1	0.9

The incentive program measures rely on funding provided according to existing laws and policies. The funding sources for 2008-2018 include SECAT program (\$38.4M), local district Department of Motor Vehicle fees (\$13.0M), and local district revenues for Mowdown (\$0.35M).

On-road Measures

The on-road motor vehicle category includes trucks, automobiles, buses and motorcycles. The on-road emissions inventory includes estimates of exhaust and evaporative emissions. Regional measures for reducing on-road vehicle emissions include the use of financial incentives to promote the accelerated introduction of low emission vehicle, engine, and fuel technologies to the Sacramento region.

ONMS-HD-1: SECAT-Like Program

This measure implements an incentive program for NO_x reduction in heavy-duty vehicles similar to that created by the Sacramento Emergency Clean Air Transportation (SECAT) program. Incentives would be distributed on a dollar per ton basis. The level of reductions is based on both the amount of money available and the options available to specific trucks. This measure is implemented annually through the attainment year (2008-2018).

ONMS-LD-1: Light Duty Early Retirement

This measure would implement an incentive based light-duty vehicle early retirement program for non-OBD-II vehicles⁶⁹. Light duty scrappage programs have been successfully implemented in the SCAQMD and the Bay Area. This program would be based upon the Bay Area program, providing cash incentives to retire registered, working vehicles early. The program would require more monitoring than is currently performed in other programs to ensure emission reductions are achieved and would require replacement with at least ULEVs. No incentives for purchase of new vehicles are provided in the measure. This measure is implemented from 2009-2014. The specific program details, quantification methods, auditing, and reporting will be adopted and submitted separate from this SIP document.

⁶⁹ OBD is abbreviation for onboard diagnostics

Control Measure	Adoption Year	Implement Year	Emission Reduction (TPD)	
			2018	
			VOC	NO _x
Mobile Source Incentive Programs - On-road	2010	2008-2018	<0.1	0.9

Off-road Measures

The off-road mobile source category encompasses a wide variety of sources including small off-road engines and equipment, off-road recreational vehicles, farm and construction equipment, forklifts, locomotives, commercial marine vessels, and marine pleasure craft. Regional measures for reducing off-road emissions include the use of financial incentives to accelerate voluntary retirement or retrofit of older, high emitting equipment, resulting in reduced off-road emissions.

OFMS-HD-1: Off-road CI Incentive Program

This measure implements an incentive program for NO_x reductions through after-treatment retrofits, engine repowers, and fleet modernization in off-road heavy-duty compression ignition (CI) equipment. Incentives would be distributed on a dollar per ton basis. This measure is implemented from 2008-2014.

OFMS-SI-1: Zero Emission Lawn and Garden Incentive (Residential)

This measure would implement a year-round continuous incentive program for the replacement of residential spark ignited (SI) gasoline-powered mowers with electric or zero emission alternatives. Cash incentives per mower replaced will be offered in exchange for SI equipment through local retailers. Eligible equipment is primarily limited to lawn mowers with engines less than five horsepower. The measure is implemented from 2008-2014.

Control Measure	Adoption Year	Implement Year	Emission Reduction (TPD)	
			2018	
			VOC	NO _x
Mobile Source Incentive Programs - Off-road	2010	2008-2014	<0.1	<0.1

7.9 “Spare The Air Program”

The “Spare The Air” control measure is a year-round public education program with an episodic ozone reduction element during the summer ozone season, plus general

awareness throughout the rest of the year. It is designed to protect public health by informing people when air quality is unhealthy and achieving voluntary emission reductions by encouraging them to reduce vehicle trips. This program is implemented by the SMAQMD staff on behalf of the region. Funding for this program has historically been federal Congestion Management and Air Quality (CMAQ) funds, with local matching funding provided by each air district's DMV and/or Sacramento County's Measure A funding. CMAQ funding (\$600,000 per year) has been included in the SACOG MTP2035 through 2018.

Since transportation control measures (TCMs) are strategies for reducing vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions, the Spare The Air program is proposed as a TCM in this SIP. The estimated emission reductions from this program are provided in the following table.

Control Measure	Adoption Year	Implement Year	Emission Reduction (TPD)	
			2018	
			VOC	NO _x
Spare The Air Program (TCM-ONMS-ED-1)	2009	2008-2018	<0.1	<0.1

7.10 SACOG Transportation Control Measures

Transportation control measures (TCMs) are strategies for reducing vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions. The Sacramento Area Council of Governments (SACOG) is the Metropolitan Planning Organization (MPO) for the greater Sacramento region (includes Sacramento, Yolo, Placer, El Dorado, Sutter, and Yuba counties). SACOG provides transportation planning and funding for the region. SACOG, local governments, and the air districts have worked together over the years to develop and implement TCMs. They have included public transit, carpooling and vanpooling, bicycling and pedestrian enhancement, and land use programs. Many of the existing TCM efforts may be used in part to comply with the proposed operational indirect source rule. The Spare The Air program is also a TCM.

TCMs are included in the "smart growth" assumptions for the Blueprint program used in the SACOG transportation model to forecast future vehicle activity. Federal MTP guidelines require that the land use allocations represent what is most likely to be built. Therefore, the specific Blueprint smart growth policies affect land use allocations only to the extent that the local jurisdictions and SACOG are able to demonstrate that the policies will actually be implemented. These updated activity data were used in setting the baseline projections for the motor vehicle inventory. While the Blueprint principles affect these baseline projections, Blueprint is not included in this plan as a transportation control measure.

There are transportation planning implications associated with including TCMs in a SIP. Every time the MPO makes a conformity determination to accompany a new Metropolitan Transportation Plan (MTP), a new Metropolitan Transportation Improvement Program (MTIP), or an amendment to either document, it must demonstrate that all TCMs are still on track to be implemented in a timely fashion. If a TCM does not stay on schedule, the MPO must show that all State and local agencies with influence over approvals or funding for TCMs are giving maximum priority to approval or funding of TCMs over other projects within their control. The MPO and any other responsible agencies would have to either ensure that the TCM is able to get back on schedule, or be able to substitute another TCM. In other words, the MPO may not be able to demonstrate conformity on a new or amended MTP or MTIP if a TCM is failing.

In addition, the Transportation Conformity Rule (40 CFR 93.103) states, “When assisting or approving any action with air quality-related consequences, FHWA and FTA shall give priority to the implementation of those transportation portions of an applicable implementation plan prepared to attain and maintain the NAAQS.”

7.11 New and Continuing TCM Projects

All of the following new and continuing TCM projects⁷⁰ chosen to be included in the federal 8-hour ozone plan were selected because they had early completion dates, costs were not large, funding was already committed, and delivery appeared to be likely. Additional information and documentation of the TCM projects are included in Appendix D – Transportation Control Measures.

Intelligent Transportation Systems (ITS) Projects

SACOG is working with local partners to plan and implement Intelligent Transportation Systems (ITS) projects to improve traffic flow and reduce vehicle emissions. ITS projects use advanced technology and tools such as freeway ramp meters, dynamic message signs, and traffic signal timing to provide real-time information on traffic conditions and coordinate operations at local traffic centers.

- **Arden Way “Smart Corridor” from Del Paso to Watt** – Smart Corridor on Arden Way from Del Paso to Watt Avenue.
- **Sacramento Traffic Operations Center** – evaluate and implement on downtown and other major corridors, ITS elements and infrastructure necessary to provide traffic responsive/coordinated signal timing and communications to the Traffic Operation Center.

⁷⁰ These TCMs were approved for inclusion by SACOG Board (August 21, 2008, Consent Item #08-8-10).

- **Watt Avenue Phase 3 Smart Corridor** – implement phase 3 priority and mobility enhancement demonstration project for the Watt Avenue Corridor in Sacramento County.
- **STARNET Implementation** – develop and install an information exchange system called the Sacramento Transportation Area Network (STARNET), and connect 18 traffic and emergency centers.

Park and Ride Lots / Transit Centers

- **El Dorado Central Park and Ride Facility** – construct Central Transfer Facility and Park & Ride with capacity for 95 spaces in Diamond Springs, on Commerce Way at State Route 49.
- **Improvements to Loomis Multimodal Center** – design and construct pedestrian and landscaping improvements at the multimodal center including a Class I bike facility adjacent to Taylor Road from downtown Loomis to Sierra College Blvd.
- **13th and 16th Street Light Rail Station Improvements** – construct improved pedestrian access, lighting, and signage at 13th and 16th Street Light Rail Stations in Sacramento.

Transit Service Funding Programs

Travel by transit is of great interest in the Sacramento region for several reasons. First, transit provides an opportunity for reducing VMT and emissions, through shifts from low-occupancy modes like driving alone to a very high occupancy mode of travel. Second, for commute trips, which tend to occur at peak periods of travel demand when congestion is highest, transit can provide substantial congestion relief. Finally, high quality transit service can provide necessary mobility to residents and employees in higher density, mixed use areas, where auto travel can be impractical. For these reasons, SACOG proposes making a commitment to maintain existing levels of transit service through the following TCMs:

- **Transit Vehicle Acquisitions** - fund the following bus purchases:

SACOG Measure Title	Cost
Auburn Transit Bus Replacement	\$225,000
Roseville Transit Bus Purchase	\$2,300,000
Roseville Transit Bus Replacement	\$375,000
Replacement Neighborhood Ride Buses	\$255,000
E-Tran Replacement Buses	\$1,400,000
SRTD Neighborhood Ride Vehicle Replacement	\$3,600,000
Yuba Sutter Transit Bus Expansion	\$1,500,000
YCTD Bus Replacement	\$1,700,000

- **Transit Operations** – fund the following transit operations:

SACOG Measure Title	Cost
El Dorado Transit Operating Assistance	\$580,000
Roseville Operating Assistance	\$145,000
Elk Grove Operating Assistance	\$1,800,000
Folsom Operating Assistance	\$745,000
Paratransit Operating Assistance	\$350,000
Sacramento County Operating Assistance	\$59,000
Regional Transit Operating Assistance	\$364,000,000
YCTD Operating Assistance	\$1,100,000

Other Specific Funding Programs

- **Freeway Service Patrol** - Sacramento County: provide motorist assistance and towing of disabled vehicles during a.m. and p.m. commute periods on various highways in Sacramento County and a portion of I-80 in Yolo County.
- **Sacramento Emergency Clean Air Transportation (SECAT) Program** - Heavy-Duty NOx control strategies; SECAT program; GIS Transit program (includes bus stop and centralized regional transit information system, and trip planning). Bus Replacement projects include: REG17782, YCT18087, UNI10441, SAC24145, PCT10481.
- **“Spare The Air” Program** - conduct the Spare The Air Education Program, jointly funded by the Sacramento Metropolitan AQMD, Yolo-Solano AQMD, and the Placer County APCD.

MTP Regional Funding Programs

The Metropolitan Transportation Plan (MTP) includes four federally-funded programs to be used for regional transportation and related priorities that implement the goals of the MTP. This TCM is a SACOG commitment to continue to implement the MTP Funding Program for the following:

- **Air Quality Funding Program** – includes projects under Other Specific Funding Programs (Freeway Service Patrol, SECAT Program, and “Spare The Air” Program).
- **Bicycle and Pedestrian Funding Program** – to provide facilities for walking and biking in the cities and towns of the region, or to provide connections between them, and includes the following list of projects:

Adopted Projects from SACOG's Regional Bike/Pedestrian Funding Program	Cost
City of Sacramento: I-80 Bike/Ped Bridge at the West Canal	\$6,600,000
City of Folsom Bikestation and "Bikelink" On-Demand Long-Term Class I Bike Parking at Transit Stations	\$178,000
City of Elk Grove: Elk Grove Creek Bike/Ped Bridge Crossing at SR 99	\$5,600,000
Retrofit Yolo bus fleet with higher capacity bike racks	\$67,500

- **Transportation Demand Management (TDM) Funding Program** – composed of strategies that can lower the demands made on the road and highway system and improve air quality by encouraging the use of carpooling, vanpooling, public transit, bicycling, and walking. The goal is to reduce single-occupant vehicle trips in the Sacramento region using TDM strategies and measure the effects of these strategies.

SACOG currently operates the regional ridesharing database and performs a number of marketing activities that publicize TDM strategies to the public. SACOG also sponsors the TDM Task Force, a group of Transportation Management Associations (TMAs) and other organizations that perform or promote TDM services for employers and residents of the region.

This measure includes funding the following program:

SACOG Measure Title	Cost
SACOG Regional Rideshare Program	\$1,200,000 through 2018

- **Community Design Funding Program** – to provide support and financial incentives to local governments for planning and capital development projects that promote and implement the Blueprint Project principles. Grants are awarded to projects sponsored by qualified public agencies in the SACOG region that conform to the seven Blueprint principles: 1) transportation choices, 2) housing diversity, 3) compact development, 4) mixed land uses, 5) use of existing assets, 6) natural resource protection, and 7) quality design.

The Community Design program results from the recognition that land use influences travel behavior and can be a powerful tool to improve the efficiency and effectiveness of the regional transportation system. Land use and projects that lead to fewer vehicle miles traveled and more walking, biking, and transit usage can provide air quality and congestion-relief benefits at the local and regional scale.

This measure includes funding the following projects:

Adopted Projects from SACOG's Regional Community Design Funding Program	Cost
City of Marysville: East 10th Street and Ramirez Street Intersection Improvement	\$510,000
City of Rancho Cordova: Folsom Boulevard Complete Streets	\$12,200,000
Sacramento County: Complete Streets for Freedom Park Drive and North Watt Avenue	\$6,400,000
City of Woodland: Lemen, North, East Streets Intersection Realignment	\$2,600,000

Miscellaneous Projects

- **Light Rail Grade Separation at Watt Avenue and Folsom Boulevard** – in Sacramento County, Regional Transit Light Rail tracks south of Folsom Blvd. on Watt Ave., grade separate the rail tracks over Watt Ave.

Summary of SACOG New and Continuing TCM Projects and Funding Programs

Table 7-2 contains a summary of SACOG new and continuing transportation control measure (TCM) projects and funding programs that are being included in the federal 8-hour ozone plan. Also listed are the implementing agencies, the predicted implementation or completion dates, and the estimated VOC and NO_x emission reductions, if quantified.

Table 7-2
Summary of SACOG Transportation Control Measures
New and Continuing Projects and Funding Programs

TCM Name and (ID)	Implementing Agency	Implement or Completion Date	VOC Reduction (Tons/Day)	NOx Reduction (Tons/Day)
Intelligent Transportation Systems (ITS) Projects				
Arden Way Smart Corridor (ITS-1)	City of Sac - Dept of Transportation	2008	---	---
Sacramento Traffic Operations Center (ITS-2)	City of Sac - Dept of Transportation	2009	---	---
Watt Ave Phase 3 Smart Corridor (ITS-3)	Sac County - Dept of Transportation	2009	---	---
STARNET Implementation (ITS-4)	SACOG	2009	---	---
Park and Ride Lots / Transit Centers				
El Dorado Central Park and Ride Facility (TF-1)	El Dorado County Transit	2009	---	---
Improvements to Loomis Multimodal Center (TF-2)	Town of Loomis – Dept of Public Works	2010	---	---
13 th and 16 th St :Light Rail Station Improvements (TF-3)	Sac Regional Transit District	2009	---	---
Transit Service Funding Programs				
Transit Vehicle Acquisitions (TR-1)	Various Agencies	Various Dates	---	---
Transit Operations (TR-2)	Various Agencies	Various Dates	---	---
Other Specific Funding Programs				
Freeway Service Patrol (AQ-1)	Sac Transportation Authority	Through 2018	---	---
SECAT Program (AQ-2)	SMAQMD	Through 2018	--- ^a	--- ^a
Spare The Air Program (AQ-3)	SMAQMD	Through 2018	--- ^b	--- ^b
MTP Regional Funding Programs				
Air Quality Funding Program (FP-1)	Various Agencies	Through 2018	---	---
Bicycle and Pedestrian Funding Program (FP-2)	Various Agencies	Through 2018	---	---
Transportation Demand Management Funding Program (FP-3)	Various Agencies	Through 2018	---	---
Community Design Funding Program (FP-4)	Various Agencies	Through 2018	---	---
Miscellaneous Projects				
Light Rail Grade Separation at Watt Ave and Folsom Blvd (M-2)	Sac County – Dept of Transportation	2009	---	---
Total Emission Reductions			---	---

^aSECAT emission reductions are assumed to be included in SMAQMD mobile source control measure ONMS-HD-1.

^bSpare The Air emission reductions are assumed to be included in SMAQMD control measure TCM-ONMS-ED-1.

7.12 Research and Policy Development TCMs

The research efforts listed below are included as TCMs because they are expected to result in policies that will help improve the region's air quality. Since these measures are only in the preliminary "study" stage, it is not possible to quantify the potential emission reductions from policies developed as a result of the studies. Consequently, no associated emissions reduction benefits are included as part of this SIP. Instead, emissions reductions for future adopted policies will be accounted for in future SIPs. The SIP does include a present commitment to adopt the Complete Streets Policy and Safe Route to School Policy TCMs. The following Table 7-3 lists the recommended research and policy development TCMs:

Table 7-3
Summary of SACOG Transportation Control Measures
Research and Policy Development Studies

1. Blueprint Implementation & Planning Technical Assistance
2. Develop Rural-Urban Connections Strategy & Best Practices Toolkit
3. Research a Transportation Pricing Policy
4. Research a Regional Parking Regulation Policy
5. Adopt a Complete Streets Policy
6. Initiate a Complete Streets Technical Assistance Program
7. Adopt a Safe Routes to School Policy and Implement a Pilot Program

Blueprint Implementation & Planning Technical Assistance

To implement the Blueprint Project's vision and "smart growth" principles through existing and new programs, SACOG will: 1) continue to fund the regional Community Design Grant Program, 2) develop a form-based zoning code handbook, 3) provide evaluations of proposed development projects for Blueprint consistency, and 4) provide technical planning assistance in the development or update of local government plans.

Develop Rural-Urban Connections Strategy & Best Practices Toolkit

SACOG will develop a Rural-Urban Connections Strategy to expand on and support implementation of the Blueprint growth strategy and the MTP. The Rural-Urban Connections Strategy will utilize state-of-the-art data collection, modeling, research and participation methods to develop a toolkit of best practices to enhance land use planning practices in rural areas that are both economically viable for land owners and local governments and environmentally sustainable.

Research a Transportation Pricing Policy

SACOG will prepare an analysis on the impacts and viability of using pricing policies with the transit system and selected portions of the road network to encourage people to drive less and use transit, walking, and bicycling modes more.

Research a Regional Parking Regulation Policy

SACOG will perform travel modeling and air emissions analysis to identify a range of alternatives for local governments to use to modify current parking regulations to create incentives for people to use available transit, walking and biking options, and neighborhood electric vehicles. This study will be conducted cooperatively with key partners such as the air districts and local governments within the region.

Adopt a Complete Streets Policy

SACOG will adopt a “Complete Streets” policy to require that applicants for SACOG regional funding programs demonstrate that the planning, design, construction and maintenance of roadway and transit facilities include the needs of all transportation users – pedestrians, bicyclists, the disabled, transit users, and motorists.

Initiate a Complete Streets Technical Assistance Program

To implement the Complete Streets policy, SACOG will review and analyze the practices of local governments within the SACOG region and around the nation to identify appropriate “Best Practices” for complete street design within the SACOG region. SACOG will also provide technical assistance to local governments on a case by case basis, as requested, to help them successfully implement this concept.

Adopt a Safe Routes to School Policy and Implement Pilot Program

SACOG will adopt a Safe Routes to Schools (SRTS) policy to promote the practice of safe bicycling and walking to and from schools throughout the MTP Plan Area to reduce traffic congestion, improve air quality, and enhance neighborhood safety. SACOG will also obtain federal funds from the Federal Highway Administration through Caltrans to implement at least one SRTS pilot program within the MTP Plan Area.

7.13 Urban Forest Air Quality Development Program

Emerging and Voluntary Measures

It is imperative today that we look for new and innovative strategies to include in the SIP to offset the impacts of anthropogenic emissions. Emerging control measures are control strategies based on science and technology that are new, difficult to quantify, and do not possess the high level of certainty normally found in traditional control measures. Voluntary measures are strategies that will result in the reduction of a

criteria pollutant or precursor that the State could claim as an emission reduction in a SIP for the purposes of demonstrating attainment of the National Ambient Air Quality Standard (NAAQS) or reasonable further progress (RFP), but that is not directly enforceable against a source. The Urban Forest and Spare The Air programs are the only two voluntary measures in this plan.

Numerous scientific studies and research projects have documented the benefits of heat island strategies using urban forest expansion programs, and several states are exploring the benefits of adopting urban forest strategies into their SIPs. This emerging and voluntary control measure proposes one such strategy that is based on the selection of trees provided for the expansion of the urban forest to minimize biogenic volatile organic compound (BVOC) emissions.

Sacramento Region Urban Forest

The Sacramento region has succeeded in creating a renowned urban forest. Our forest evolved over many years, with each generation of our community adding trees that met the needs of their day. In earlier years, urban trees were planted for comfort cooling and public health benefits. More recently, the Sacramento Municipal Utility District (SMUD) has invested millions of dollars in the strategic planting of an energy-saving urban forest. Today we have a pressing need to improve the purity of the region's air. While our urban trees make a major contribution to air quality, they were not planted with this in mind and so do not do as much as they could.

The regional urban forest is populated by about 7 million trees, composed of over 100 different species. Each of these tree species can be categorized as low, medium and high biogenic volatile organic compound (BVOC) emitting trees. Currently, about 61% of the trees are considered low emitting trees, 28% medium and 11% high emitting trees.

Control Strategy to Minimize BVOC Emissions

This control measure proposes a targeted urban forest management program to reduce total urban forest BVOC emissions by favoring the planting of low emitting trees rather than medium and high emitting trees during the next 10 years. Through a combination of community education and governmental policy change over the next 10 years, the control measure calls for a minimum of 390,000 low emitting trees to be planted that otherwise would have been medium or high emitting trees. Although the duration of the project is 10 years, the actual benefit will last many years longer.

Estimated Emission Reductions

The estimated emission reductions from this urban forest development program for the Sacramento region are summarized in the following table. The estimated 2018 VOC reduction is about 0.8 tpd, but the credited reduction is limited to 0.2 tpd. This is

consistent with the EPA policy⁷¹ for incorporating emerging and voluntary measures in a SIP that limits the amount of emission reductions allowed due to the uncertainty and untested nature of the control mechanisms. For total emerging and voluntary measures, EPA has adopted a presumptive⁷² limit of 6 percent of the total amount of emission reductions necessary to demonstrate attainment.

Emerging/Voluntary Measures	Adoption Year	Implement Year	Emission Reduction* (TPD)	
			2018	
			VOC	NO _x
Urban Forest Development Program (SMAQMD-1)	2009	2008-2018	0 - 0.2	---

*Reductions within 6% limitation of VOC emission reduction needed to achieve attainment and result from lower BVOC emitting trees. More detailed documentation of the credited emission reductions is included in Appendix C – Proposed Control Measures.

7.14 Regulatory Control Measures

The regulatory control measures proposed in this 8-hour ozone plan are local programs that will achieve emission reductions from:

- Indirect Source Rules
- Stationary/Area Source Control Measures.

7.15 Indirect Source Rules (ISR)

Indirect source rules mitigate emissions from construction projects and the operational emission effects of new land development projects. With off-road equipment (typically used for construction) contributing about 10% and on-road vehicles contributing about 50% of the Sacramento region's VOC and NO_x emissions, mitigation efforts to reduce emissions from construction projects and the effects of new land development projects may provide reductions that may be essential for the Sacramento region to reach the ozone standard.

IS-1: Construction Mitigation Rule

New land use and development projects are indirect sources of air pollutant emissions from construction equipment, worker and vendor vehicle trips, and construction materials (e.g., adhesives, sealants, and architectural coatings). Based on California storm water permit data (2004-2006), there are, on average, 245 new land use projects occurring in the Sacramento Federal Non-Attainment Area (SFNA) each year.

⁷¹ "Incorporating Emerging and Voluntary Measures in a State Implementation Plan (SIP)" (OAQPS, EPA, September 2004, p. 9).

⁷² The limit is presumptive in that EPA believes it may approve measures into a SIP in excess of the presumptive 6 percent where a clear and convincing justification is made by the State for a higher limit.

Depending upon the size and type, the timeline for a construction project can vary from a few months to years.

This control measure will reduce NO_x emissions from equipment associated with the construction phase of new land use projects. The requirements that are being considered for the control measure are based on the construction requirements of San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) Rule 9510, Indirect Source Review, which specifies that all applicable projects mitigate their NO_x emissions by 20% less than the statewide average emission rates either by using cleaner construction equipment or modifying the construction equipment (through retrofits, replacements, or post-combustion controls), or by paying a fee that will be used by the districts to obtain emission reductions.

The proposed control measure commits to a framework that includes quantification of emissions before and after mitigation measures are applied, establishes appropriate levels to define who is subject to the rule and emission reduction requirements for affected sources. The proposed emission reduction requirements will include a fee option to achieve offsite reductions when onsite reductions are insufficient. The proposed control measure will be evaluated for adoption by districts noted in the table below.

The estimated emission reductions from the construction mitigation rule are provided in the following table.

Construction Mitigation Rule			Emission Reduction (TPD)	
District	Adoption Year	Implement Year	2018	
			VOC	NO _x
SMAQMD	2010	2011	---	<0.1
PCAPCD	2013	2014	---	<0.1
FRAQMD	2013	2014	---	unknown
Total			---	0.1

During the rule development process, staff will explore integration of this rule with CARB's offroad engine rule to ensure that the 20% requirement is feasible and cost effective through 2018 and beyond.

IS-2: Operational Indirect Source Rule

This control measure will reduce emissions generated during the operational phase of indirect sources. An indirect source is defined as any facility, building, structure or installation, or combination thereof, which generates or attracts mobile source activity that results in emissions of any pollutant for which there is a state ambient air quality

standard. The rule will require indirect sources to mitigate a portion of their emissions through a combination of on-site mitigation measures and/or, if onsite measures are insufficient, a contribution to an off-site mitigation fund that will invest in emission reduction projects.

On-site mitigation could include strategies that reduce vehicle trips or vehicle miles traveled (VMT). Other on-site mitigation measures could be considered, such as improved energy efficiency resulting in fewer power plant emissions or reductions in on-site combustion emissions. Off-site mitigation fees will be calculated based on the amount of required emission reductions that can not be achieved through on-site measures. This control measure will integrate with SACOG's Blueprint Metropolitan Transportation Plan⁷³ and look for synergistic opportunities from AB 32 (Nunez) – California Global Warming Solutions Act of 2006⁷⁴ and SB 375 (Steinberg) – legislation to reduce greenhouse gases through land-use planning⁷⁵.

The proposed control measure commits to a framework that includes quantification of emissions before and after mitigation measures are applied, establishes appropriate levels to define who is subject to the rule and emission reduction requirements for affected sources. The proposed emission reduction requirements will include a fee option to achieve offsite reductions when onsite reductions are unavailable. The proposed control measure will be evaluated for adoption by districts noted in the table below.

The estimated emission reductions from the operational indirect source rule are provided in the following table.

Operational Indirect Source Rule			Emission Reduction (TPD)	
District	Adoption Year	Implement Year	2018	
			VOC	NO _x
SMAQMD	2012	2014	0-<0.1	0-<0.1
PCAPCD	2014	2016	0-<0.1	0-<0.1
Total			0-<0.1	0-0.1

7.16 Stationary and Area-wide Source Control Measures

Historically, local air district regulatory control measures have been implemented to control emissions from stationary and area-wide type sources. In general, stationary

⁷³ Metropolitan Transportation Plan for 2035 (MTP2035), approved by SACOG Board of Directors March 20, 2008

⁷⁴ California Health and Safety Code, Section 38500-38599.

⁷⁵ Signed by Governor 9-30-08, and amends California Government Code and Division 13 of the Public Resources Code.

sources include non-mobile sources such as power plants, cement plants, and manufacturing facilities. Area-wide sources of pollution are those where the emissions are spread over a wide area, such as gas stations, house paints, and residential fuel combustion. New air district regulatory control measures are being proposed to obtain additional emission reductions from specific stationary and area-wide sources. The proposed VOC and NO_x emission control measures are briefly summarized in the following descriptions, along with estimated emission reductions for the future 2018 attainment demonstration year.

There are differences in the commitments for each district. These differences are due to one or more of the following reasons. See Appendix H – Reasonably Available Control Measures Analysis, for additional details.

1. The costs are too high and/or the emissions benefits of the measure are too low.
2. The requirements are already in place.
3. The measure is technically infeasible due to local circumstances.

7.17 VOC Emission Control Measures

Architectural Coatings

This control measure regulates the volatile organic compound (VOC) content in coatings applied to residential, commercial, and industrial structures and their appurtenances (e.g., general use flats, general use non-flats, and specialty coatings such as industrial maintenance coatings, lacquers, floor coatings, roof coatings, stains, etc.). The strategy also regulates the sale of coatings within the district by prohibiting manufacturers and suppliers of coatings from selling coatings that do not comply with the strategy.

Architectural Coatings Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-442	2010	2011-2012	0.9
EDCAQMD-215	2013	2015	0.1
FRAQMD-3.15	<2012	<2012-2012	<0.1
PCAPCD-218	2012	2013	0.2
YSAQMD-2.14	2010	2012	0.2
Total			1.5

Automotive Refinishing

Automotive refinishing coatings are used on motor vehicles and other mobile equipment, primarily by auto body repair and paint shops and automotive dealerships.

The main coating categories include primers, color coatings, and clear coatings. VOC emissions from the surface coating operations result from the evaporation of the organic solvents used in the coatings. These emissions occur in a number of places during the operation, including surface preparation and cleanup, application of the coating, drying of the parts, and cleanup of the application equipment.

The control measure will lower the VOC emissions by further regulating the VOC content in automotive refinishing coatings.

Automotive Refinishing Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-459	2010	2011	0.1
FRAQMD-3.19	2016	2017	<0.1
PCAPCD-234	2015	2017	<0.1
YSAQMD-2.26	2008	2009-2010	<0.1
Total			0.2

Degreasing/Solvent Cleaning

Degreasing and solvent cleaning operations are performed by many commercial and industrial facilities. Solvents are used for surface preparation for further processing and cleaning after manufacturing. Degreasing is widely used by automotive repair and maintenance facilities and by electric apparatus and electronic component manufacturing or repair, construction trades, printing shops, metal parts and products, can coating, and other types of commercial and manufacturing facilities. Solvents are also used by coating operations for cleaning of coating application equipment such as spray guns and brushes. VOC emissions from general surface preparation and degreasing operations result from the evaporation of organic solvents.

This measure primarily proposes to lower the VOC limits in the materials used in general cleaning and degreasing operations (which include cold cleaning, vapor degreasers, hand wiping, thinning and cleanup solvents).

Degreasing/Solvent Cleaning Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-454/466	2008	2010-2011	0.5
EDCAQMD-225/235	2013	2015	<0.1
FRAQMD-3.14	<2012	<2012	<0.1
YSAQMD-2.24/2.31	2008	2009	0.7
Total			1.4

Graphic Arts

VOC emissions from graphic art operations result from the evaporation of organic solvents in the inks, fountain solutions, and solvents used in the various types of printing processes. These operations produce a wide variety of printed products that include books, magazines, newspapers, fliers, posters, and packaging materials. These various types of products require that facilities use very specific materials and printing methods. The different types of printing methods include lithography, flexography, gravure, and letterpress.

This proposed control measure for graphic arts operations lowers the current rule exemption limit from 400 lbs/month to 60 lbs/month. Additionally, this control measure is to revise the various cleaning solvent VOC limits to match the current SMAQMD standards.

Graphic Arts Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
YSAQMD-2.14	2010	2012	Not available
Total			---

Miscellaneous Metal Parts and Products

This category is comprised of VOC emissions from the coating of miscellaneous metal parts and products including signs, storage and trash containers, door frames, window frames, panels, metal cabinets, caskets and various other metal coating operations. VOC emissions from the surface coating operations result from the evaporation of the organic solvents used in the coatings. These emissions occur in a number of places during the operation, including surface preparation and cleanup, application of the coating, drying of the parts, and cleanup of the application equipment. This control measure will only address the VOC emissions from the coating process. The surface preparation and cleanup VOC emissions are addressed under other measures.

Miscellaneous Metal Parts and Products Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
EDCAQMD-246	2009	2009	<0.1
PCAPCD-CM3	2008	2009	<0.1
Total			<0.1

Natural Gas Production and Processing

There are several natural gas production fields within Sacramento County. Fugitive emissions of VOC from natural gas production occur from equipment leaks in valves, pumps, compressors, pressure relief devices, flanges, and threaded connections at gas wells and associated transmission systems. The proposed control measure would establish inspection and repair requirements for leaking components. Emission reductions would result from a reduction in the number of leaking components. The proposed measure would establish leak inspection frequencies and allowable repair periods.

Natural Gas Production and Processing Category			VOC Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-461	2011	2012	0.1
Total			0.1

7.18 NOx Emission Control Measures**Asphalt Concrete**

Asphaltic concrete, or hot-mix pavement material, is produced in both continuous and batch plants; some of the latter are portable. The process involves heating aggregate in a rotary dryer to 300°F and mixing with melted asphalt cement refined from petroleum. This measure addresses NOx emissions from burners used to heat the dryer. Other ancillary NOx emissions come from heaters used to melt asphalt cement and from stationary internal combustion engines.

The control of dryer NOx emissions is accomplished by controlling the burners used to heat the dryer. The control measure will propose a NOx limit that may be complied with by retrofitting with low NOx burners and flue gas re-circulation.

Asphalt Concrete Category			NOx Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-471	2012	2014	0.1
PCAPCD-CM1	2013	2014	<0.1
Total			0.1

Boilers, Steam Generator, and Process Heaters

Boilers and steam generators are used to provide hot water and steam for numerous industrial and commercial applications. These applications include space heating, food processing, garment laundering, and equipment sterilization. Manufacturing operations use process heaters to heat materials or equipment. The equipment burners can be fired on solid, liquid or gaseous fuels. The proposed control measure lowers the NOx emission to a more stringent level. Current technology is widely available to adopt this control measure.

Boilers, Steam Generators, and Process Heaters Category			NOx Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
YSAQMD-2.27	2010	2012	0.2
Total			0.2

IC Engines

Internal combustion (IC) engines are used widely in many different facilities. They can be used to drive electric generators, pumps, gas compressors, or blowers. A high percentage of the engines are used to provide backup power or electricity in emergencies. IC engines use propane, gasoline, natural gas, liquefied petroleum gas, diesel or other fuels as their source of energy. The ignition of the fuels converts the energy in the fuel to mechanical energy. NOx is produced during the combustion process.

The proposed control measure would establish emission standards for stationary engines.

IC Engines Category			NOx Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-412	2011	2013	<0.1
FRAQMD-3.22	2010	2011	<0.1
YSAQMD-2.32	2010	2011	0.1
Total			0.1

Large Water Heaters and Small Boilers

Large water heaters and small boilers are used to provide hot water and steam to a variety of different applications, including space heating and food processing. Those units are usually fired on gaseous fuels and have burner ratings of less than 1 million BTU/hr. In general, units with burner rating under 0.3 million BTU/hr use the draft

created during the combustion process to transfer heat into the water. Large units (0.3 million BTU/hr or above) use fans or the natural draft to transfer heat into the heating system.

Currently, 75,000 to 1 million BTU/hr units are exempted from the districts' rule for water heaters and boilers. This revised control measure will eliminate the exemption for new 75,000 to 1 million BTU/hr units.

Large Water Heaters and Small Boilers Category			NOx Emission Reduction (TPD)
District Measure	Adoption Year	Implement Year	2018
SMAQMD-414	2009	2010-2012	1.1
EDCAQMD-239	2015	2016	<0.1
FRAQMD-3.23	2016	2017	0
PCAPCD-CM2	2015	2017	<0.1
YSAQMD-2.37	2009	2010	0.2
Total			1.3

7.19 Summary of Regional and Local Proposed Emission Reductions

The following Table 7-4 summarizes the list of new regional and local proposed control measures and their expected 2018 emission reductions for the Sacramento nonattainment area. Emission benefits from these new committal measures are estimated to provide reductions of 3 tons per day of VOC and 3 tons per day of NOx in 2018. Some of these new local measures will be adopted by the end of 2008 and are listed separately in Table 7-4A. Emission benefits from just these adopted new local measures are estimated to provide reductions of 1 ton per day of VOC in 2018.

Table 7-4
Summary of New Regional and Local Proposed Control Measures
Sacramento Nonattainment Area

Control Measure Name	2018 Emission Reductions (TPD)	
	VOC	NO _x
Regional Non-regulatory Measures		
Regional Mobile Incentive Program – On-road	<0.1	0.9
Regional Mobile Incentive Program – Off-road	<0.1	<0.1
Spare The Air Program	<0.1	<0.1
SACOG Transportation Control Measures	--	--
Urban Forest Development Program	0 - 0.2	--
Total Regional Non-regulatory Measures	0.1	0.9
Local Regulatory Measures		
Indirect Source Rule - Construction	--	0.1
Indirect Source Rule - Operational	0-<0.1	0-0.1
Architectural Coating	1.5	--
Automotive Refinishing	0.2	--
Degreasing/Solvent Cleaning	1.4	--
Graphic Arts	na	--
Miscellaneous Metal Parts and Products	<0.1	--
Natural Gas Production and Processing	0.1	--
Asphalt Concrete	--	0.1
Boilers, Steam Generator, and Process Heaters	--	0.2
IC Engines	--	0.1
Large Water Heaters and Small Boilers	--	1.3
Total Local Regulatory Measures	3.2	1.8
Total Reductions*	3.4	3.1

Notes: Numbers are truncated to one decimal place. na = not available

*Total reductions are summed from untruncated values. See summary table in Appendix C – Proposed Control Measures.

Table 7-4A
Summary of Adopted New Local Control Measures
Sacramento Nonattainment Area

New Local Control Measures Adopted by End of 2008	2018 Emission Reductions (TPD)	
	VOC	NO_x
Control Measures – Local Air District		
Automotive Refinishing - YSAQMD	<0.1	--
Degreasing/Solvent Cleaning - SMAQMD	0.5	--
Degreasing/Solvent Cleaning - YSAQMD	0.7	--
Miscellaneous Metal Parts and Products - PCAPCD	<0.1	--
Total Adopted New Local Measures	1.4	--

7.20 Further Study Measures

Further study measures are measures for which insufficient information was available during the development of the control strategy to allow the region to commit to them as control measures. The adoption of further study measures requires full evaluations of emission data, cost effectiveness, technological feasibility, and authority for implementation. If the evaluations show that the measures are viable control measures, they will be considered for adoption and implementation.

These measures are evaluated qualitatively for environmental impacts in this State Implementation Plan and will be evaluated quantitatively for the actual emission benefits and feasibility in the future. These further study measures are: 1) Heat Island Mitigation, 2) Alternative Energy, 3) Energy Efficiency, 4) Gasoline Transfer Phase I/II, 5) Lubricants, and 6) Episodic Controls. More detailed information on these measures can be found in Appendix C – Proposed Control Measures.

Urban Heat Island

The Urban Heat Island Measure encourages activities that would lower the ambient temperature in urban areas, such as lighter, more reflective surface materials, building surface and pavements, solar roofing membranes, and increased tree planting. Programs to promote use of reflective materials and tree planting could be a required element for new sources or recommendations through California Environmental Quality Act (CEQA) Air Quality Handbook. Sources that promote higher reflective materials or tree planting could be eligible for emission credits. The emission credits could be based on the type of reflective materials and trees per unit area that meet or exceed the benchmark.

Alternative Energy

The use of alternative energy in transportation or stationary applications can reduce ozone precursors. This measure will look at reductions possible in the stationary sector of the region. This source category includes facilities or operations that have VOC-containing byproducts that can be converted to electric energy by utilizing currently available technology or other byproducts such as biomass waste, from which energy could also be derived. This measure will also evaluate opportunities to convert green waste or other forms of biomass into electricity generation. The electricity produced may be used for the source facility or metered and sold to utility companies.

Energy Efficiency

This measure will look at possible sources of emissions in the region that could reduce ozone precursors by reducing energy consumption. The region districts will evaluate energy efficiency projects and practices that have a demonstrable benefit to air quality

and examine green certification of energy efficient buildings that utilized green building practices.

Gasoline Transfer Phase I/II

This measure seeks to reduce VOC and toxic emissions from gasoline dispensing facilities by improving implementation of the Enhanced Vapor Recovery (EVR) Regulation. The EVR regulation includes testing and certification procedures to improve the performance and specification of Phases I and II vapor recovery systems. This measure will evaluate methods to improve the functions of the in-station diagnostic. Improvements may include providing earlier warning signal, changing both the warning and gross failure alerting ranges, disallowing the use of the reset button, or installing a “shut down” sensor or mechanism on the dispenser to stop fueling if the fuel filters are blocked and the fueling flow rate drops below the system certification standards. In addition, this measure will explore the option to require controls for mobile refuelers if a district rule has not established such requirements.

Lubricants

This measure seeks to reduce VOC emissions from the use of lubricants that are utilized by different industrial processes. Lubricants with their additives are at least 50 percent VOC solvents and are believed to emit a significant amount of VOCs. In addition, lubricant thinners usually contain toxic chemicals which are classified as Hazardous Air Pollutants (HAPs) by the EPA and Toxic Air Contaminants (TACs) by the state of California. This measure will look at further reducing source emissions by either placing an overall emission limit by source or by limiting VOC content in lubricant formulations at the point of sale or use.

Episodic Controls

There are various emission reduction strategies that could potentially be implemented on an episodic basis when meteorological conditions would normally result in ozone exceedances. This further study measure will evaluate the feasibility of banning or reducing the use of a variety of types of equipment on high ozone days such as construction equipment, pleasure craft or other recreational vehicles; and lawn and landscaping equipment.

7.21 Contingency Measures

In general, contingency measures are control measures that go into effect if planned emission controls fail to reach desired goals and targets. Contingency provisions are required under sections 172(c)(9) and 182(c)(9) of the Clean Air Act in the event the nonattainment area fails to meet a reasonable further progress milestone or attainment deadline. Contingency measures are specific additional controls to be implemented

automatically without further significant rulemaking activities, such as public hearings or legislative review, and without further action by the State or the Administrator (EPA).

Federal guidance⁷⁶ requires that contingency measures must be adopted to provide 3% more emission reductions than needed to meet the reasonable further progress and attainment demonstration requirements. The control measure strategy in this plan is expected to surpass the amount of emission reductions needed for reasonable further progress targets and for attainment by a margin that meets the contingency measures requirements. The calculations that demonstrate the anticipated contingency reductions are documented in conjunction with the attainment demonstration in Chapter 8 and the reasonable further progress demonstration in Chapter 13.

⁷⁶ "General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990" (57 FR 13498, April 16, 1992).

8. ATTAINMENT DEMONSTRATION

8.1 Introduction to Attainment Demonstration

EPA guidance⁷⁷ states, “A modeled attainment demonstration consists of (a) analyses which estimate whether selected emissions reductions will result in ambient concentrations that meet the NAAQS, and (b) an identified set of control measures which will result in the required emissions reductions.” To meet these requirements, this chapter incorporates all the major plan elements from Chapters 5 to 7 (emission inventories, modeling, and control measures) to demonstrate attainment by the required deadline.

8.2 Attainment Demonstration Requirements

Section 182(c)(2)(A) of the Clean Air Act requires that attainment demonstrations for “serious and higher” classified nonattainment areas be based on photochemical grid modeling or any other analytical method determined by EPA to be at least as effective. In addition, EPA provides recommended guidance⁷⁸ on how to apply air quality models to generate results for preparing 8-hour ozone attainment demonstrations.

EPA regulations also require serious and higher nonattainment areas to meet various criteria contained in 40 CFR 51.112 for attainment demonstrations. The demonstration criteria include the following:

- A summary of the computations, assumptions, and judgments used to determine the level of emission reductions (or reductions in the growth of emissions) that will result from the implementation of the control strategy.
- A presentation of emission levels expected to result from implementation of each measure of the control strategy.
- A presentation of the air quality levels expected to result from implementation of the overall control strategy presented either in tabular form or as an isopleth map showing expected maximum pollutant concentrations.
- A description of the air quality models used to project air quality and to evaluate control strategies.

8.3 Attainment Demonstration Evaluation

Attainment of the 8-hour ozone NAAQS is evaluated for a 2018 “severe” classification scenario, based on modeling results for the peak ozone site (Cool) in the Sacramento region. The modeled VOC and NO_x emission forecasts for 2018 incorporate growth assumptions and the estimated reductions associated with the existing control strategy.

⁷⁷ “Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze” (EPA, April 2007, p. 15).

⁷⁸ Ibid, p. 15-40.

The photochemical modeling results in Chapter 6 were used to predict the 2018 regional peak ozone design value (88 ppb) and estimate the percent reductions needed from the 2018 emission forecasts in order to achieve the federal 8-hour ozone standard.

The combined reductions from new state and federal control measures and from new regional and local proposed control measures contained in this plan are used to assess future 2018 attainment. Attainment is evaluated for:

- 1) the 2018 emission reductions from all new local, regional, state and federal control measure committals. The total benefits from all new measures are estimated to be 14 tpd of VOC and 18 tpd of NOx in 2018.
- 2) the 2018 emission reductions from only the new local, regional, state and federal control measures adopted by the end of 2008. The benefits from adopted new measures are estimated to be 4 tpd of VOC and 13 tpd of NOx in 2018.

The total emission reductions from new measures that will be adopted by the end of 2008 and expected future new measures are included in the 2018 attainment demonstration for the Sacramento area. These new control measures are included as a SIP commitment to meet the Clean Air Act and EPA requirements⁷⁹ for nonattainment areas to adopt all reasonably available control measures (RACM) and to attain the 1997 federal 8-hour ozone standard as expeditiously as practicable (also referred to as "accelerated progress"). These measures will also provide a buffer in the event that CARB's estimate of emission reductions from the Cleaner In-Use Heavy Duty Trucks, are reduced due to changes in the final rule adopted December 11, 2008⁸⁰. However, these additional emission reductions from new measures expected to be adopted after 2008 are less certain and may change during the rule development process. Even though these future new committal measures are required for expeditious attainment, it is anticipated that attainment would be achieved by the 2018 deadline even if there is a reduction in their emission benefits.

VOC and NOx Reduction Goals for 2018

Figure 8-1 contains the ozone and pollutant emission reduction graph, based on modeling results, for the peak ozone design value site at Cool in the Sacramento region. This diagram shows the pattern of ozone responses to varying combinations in domain-wide VOC and NOx emission reductions. There are any number of potential VOC and NOx reduction combinations that could provide for attainment. Since the ozone design values are truncated to the whole ppb, values below 85 ppb represent attainment of the federal 8-hour ozone standard.

⁷⁹ CAA Section 172(c)(1) and Section 181(a)(1), and 40 CFR 51.912(d)

⁸⁰ This is considered to be unlikely since on December 17, 2008 CARB staff informed district staff that it does not anticipate a decrease in emission reduction estimates (personal communication Ravi Ramalingam to SIP working group.)

The modeling results for the combination of emission reductions from new control measures indicate attainment of the federal 8-hour ozone standard (84 ppb) for:

- 1) the 2018 emission reductions from all new local, regional, state and federal control measure committals (11.6% of VOC and 17.3% of NO_x, designated at Point A).
- 2) the 2018 emission reductions from only the new local, regional, state and federal control measures adopted by the end of 2008 (3.3% of VOC and 12.5% of NO_x, designated at Point B).

Additional modeling details and assumptions for assessing the VOC and NO_x reduction attainment goals are provided in Appendix B – Photochemical Modeling.

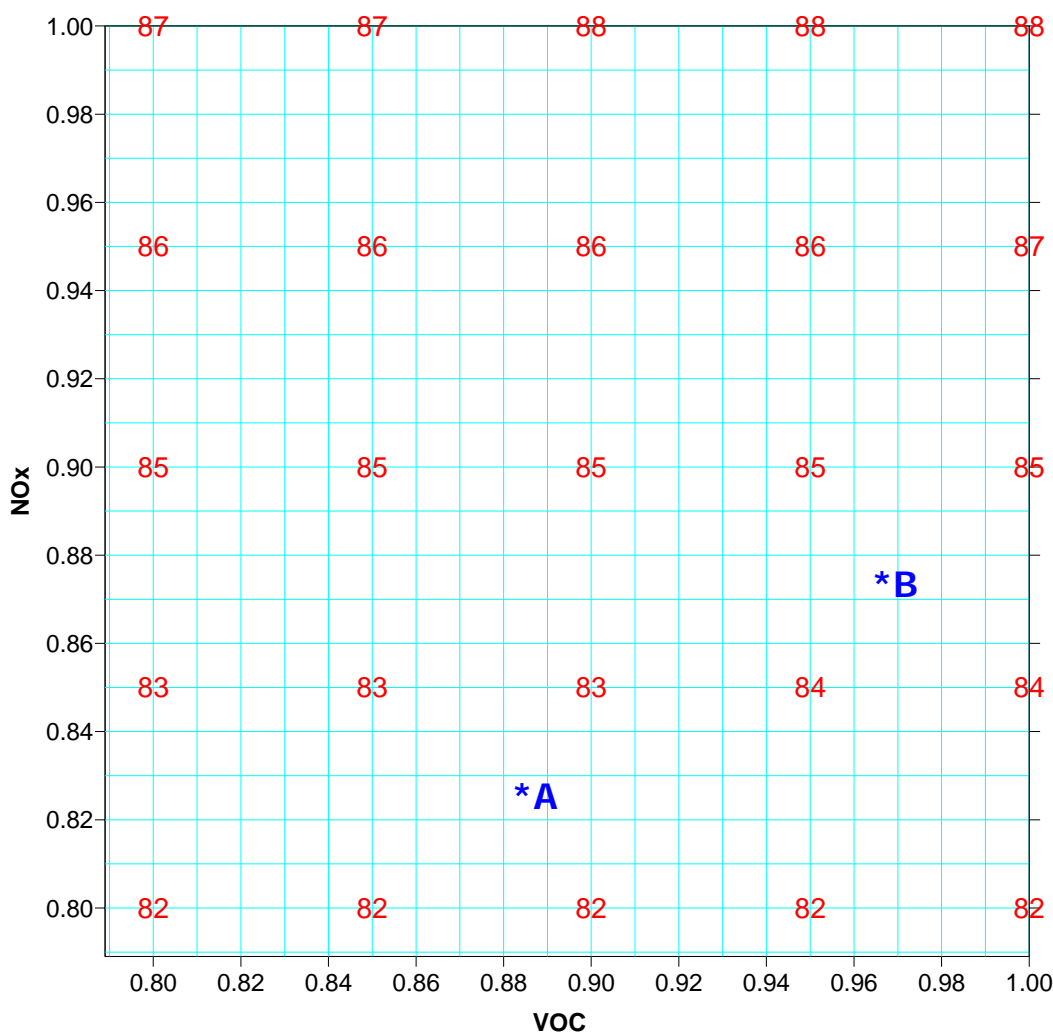
8.4 Attainment Demonstration Conclusions

Attainment of the 1997 federal 8-hour ozone standard is demonstrated for the 2018 “severe” classification deadline in the Sacramento region as shown on the graph in Figure 8-1. The total emission reductions from new measures that will be adopted by the end of 2008 and expected future new measures are included in the 2018 attainment demonstration for the Sacramento area. These new control measures are included as a SIP commitment to meet the Clean Air Act and EPA requirements⁸¹ for nonattainment areas to adopt all reasonably available control measures (RACM) and to attain the 1997 federal 8-hour ozone standard as expeditiously as practicable. These measures will also provide a buffer in the event that CARB's estimate of emission reductions from the Cleaner In-Use Heavy Duty Trucks, are reduced due to changes in the final rule adopted December 11, 2008⁸². However, these additional emission reductions from new measures expected to be adopted after 2008 are less certain and may change during the rule development process. Even though these future new committal measures are required for expeditious attainment, it is anticipated that attainment would be achieved by the 2018 deadline even if there is a reduction in their emission benefits.

⁸¹ CAA Section 172(c)(1) and Section 181(a)(1), and 40 CFR 51.912(d)

⁸² This is considered to be unlikely since on December 17, 2008 CARB staff informed district staff that it does not anticipate a decrease in emission reduction estimates (personal communication Ravi Ramalingam to SIP working group.)

Figure 8-1
Attainment Demonstration Analysis
Predicted 2018 Regional Peak Ozone Design Value at Cool
Sacramento Nonattainment Area



1. The upper right corner point designates the predicted 2018 peak ozone design value (88 ppb) based on the forecasted 2018 planning emissions inventory (without new control measures): 121 tpd of VOC and 104 tpd of NOx.
2. The x and y axes represent fractional emissions reductions from the forecasted 2018 planning emissions inventory.
3. The whole numbers on the graph represent predicted ozone design value concentrations (truncated to whole ppb), based on modeling results for fractional VOC and NOx reductions at 5% increments. Values below 85 ppb represent attainment of the federal 8-hour ozone standard.
4. Point A designates the 2018 emission reductions (11.6% VOC and 17.3% NOx) from all new local, regional, state and federal control measure commitments, and provides for attainment.
5. Point B designates the 2018 emission reductions (3.3% VOC and 12.5% NOx) from only the new local, regional, state and federal control measures that will be adopted by the end of 2008. These levels also provide for attainment.

8.5 Summary of Attainment Demonstration

The attainment demonstration for the Sacramento nonattainment area is summarized in Table 8-1. The attainment demonstration is based on the combination of emission reductions from new VOC and NOx control measures that reduce the peak ozone design value to the 1997 federal 8-hour ozone standard (84 ppb), based on modeling results.

Table 8-1
Summary of Attainment Demonstration for 8-Hour Ozone NAAQS
2018 “Severe” Classification Scenario

Sacramento Nonattainment Area	VOC (tpd)	NOx (tpd)
A) 2002 Planning Emissions Inventory	160	196
B) 2018 Planning Emissions Inventory with Existing Controls	121	104
Attainment Demonstration with All New Committal Measures		
C) Emission Reductions in 2018 from All New State/Federal Control Measures	11	15
D) Emission Reductions in 2018 from All New Regional/Local Control Measures	3	3
E) Total Percent Emission Reductions in 2018 from All New Controls [(Line C + Line D) ÷ Line B]	11.6%	17.3%
F) Percent Emission Reduction Targets for Attainment* (see Figure 8-1, Point B)	3.3%	12.5%
G) Percent Emission Reductions for Accelerated Progress [Line E – Line F]	8.3%	4.8%
H) Is Attainment Demonstrated? (see Figure 8-1, Point A)	Yes	
Attainment Demonstration with Only New Measures Adopted by End of 2008		
I) Emission Reductions in 2018 from Adopted New State/Federal Control Measures	3	13
J) Emission Reductions in 2018 from Adopted New Regional/Local Control Measures	1	0
K) Total Percent Emission Reductions in 2018 from Adopted New Controls [(Line I + Line J) ÷ Line B]	3.3%	12.5%
L) Percent Emission Reduction Targets for Attainment (see Figure 8-1, Point B)	3.3%	12.5%
M) Percent Emission Reductions for Accelerated Progress [Line K – Line L]	0%	0%
N) Is Attainment Demonstrated? (see Figure 8-1, Point B)	Yes	

*The percent emission reduction targets for attainment (3.3% VOC and 12.5% NOx) are based on modeling results for the combination of emission reductions from only adopted new control measures that reduce the peak ozone design value to the federal standard (84 ppb).

8.6 Predicted Attainment Dates for High Ozone Sites

Figure 8-2 illustrates the potential attainment dates for the various high ozone sites in the Sacramento region based on photochemical modeling results. This chart shows the ozone site attainment lines (84 ppb) in relation to VOC and NO_x emission levels for the Sacramento nonattainment area, based on photochemical modeling results. The attainment analyses are predicted for emission forecast scenarios with existing controls and with new controls.

All high ozone sites in the Sacramento region, except Cool and Folsom, are projected to attain the federal 8-hour ozone standard by 2018 under the emission forecasts with existing control measures. Under the emission forecasts with new control measures, both Cool and Folsom are predicted to attain the 8-hour ozone standard by 2018.

Figure 8-2
Summary of Attainment Demonstration for High Ozone Sites
in the Sacramento Region

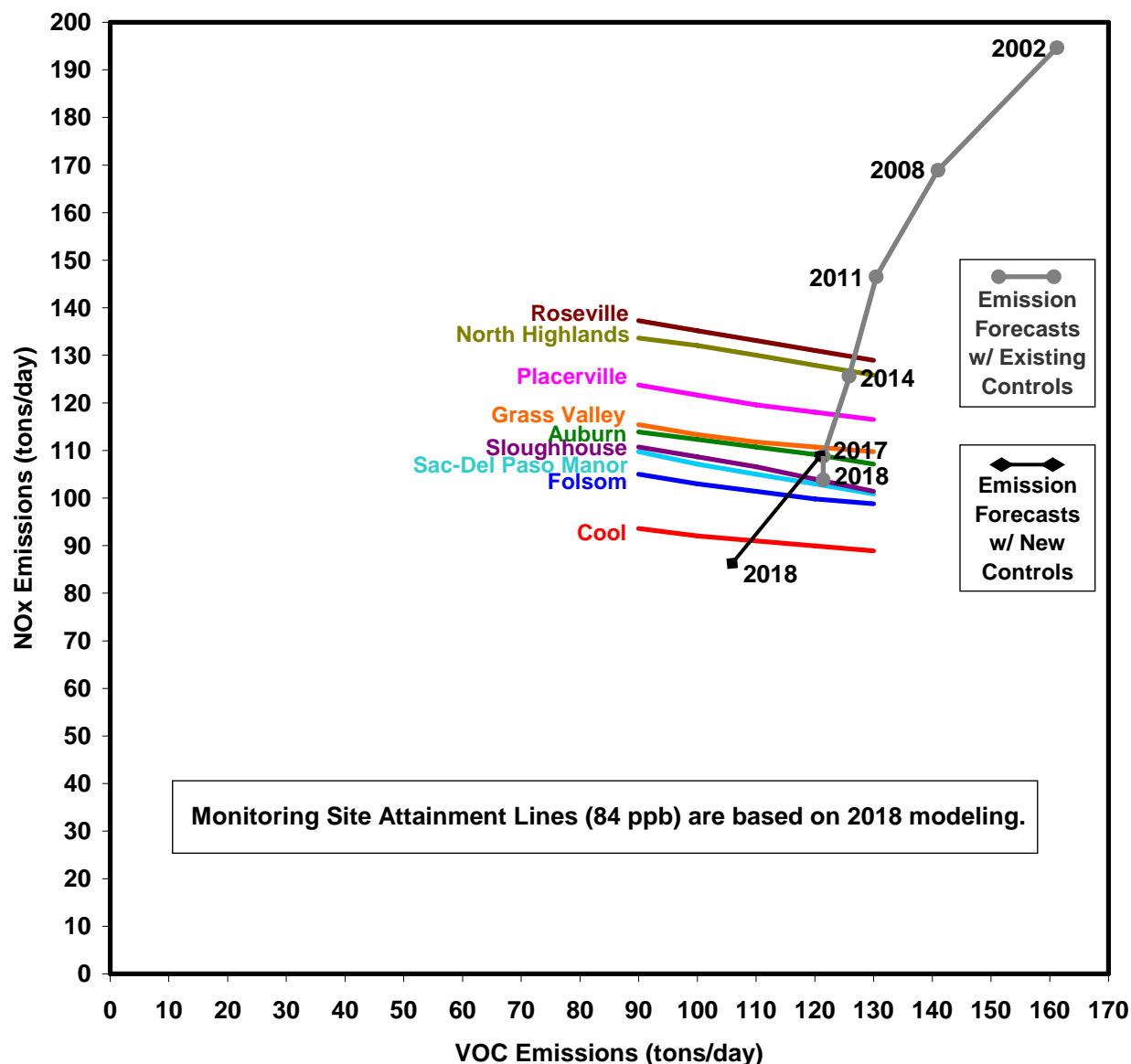


Figure 8-2 shows predicted attainment lines (84 ppb) for various high ozone sites in relation to VOC and NOx emission levels for the Sacramento nonattainment area, based on photochemical modeling results provided by CARB on June 9, 2009. All high ozone sites in the Sacramento region, except Cool and Folsom, are projected to attain the federal 8-hour ozone standard by 2018 under the emission forecasts with existing control measures. Under the emission forecasts with new control measures, both Cool and Folsom are predicted to attain the 8-hour ozone standard by 2018.

8.7 Attainment Demonstration Contingency Measures Requirement

Federal guidance requires that sufficient contingency measures in the plan should be adopted to provide a 3% emission reduction beyond what is needed for the attainment demonstration. The expected additional emission reduction benefits achieved from existing control programs meet the attainment contingency requirement in 2019. More detailed information and documentation on the 2019 emissions inventory are provided in Appendix A – Emissions Inventory.

The calculations of the attainment contingency measures reductions for 2019 are provided in Table 8-2. The combined VOC and NOx reductions in 2019 total 3% to meet the attainment contingency requirement.

Table 8-2
Attainment Contingency Measures Reductions
Sacramento Nonattainment Area

Emission Source Category	2018 VOC (tpd)	2019 VOC (tpd)	Reductions (tpd)	2018 NOx (tpd)	2019 NOx (tpd)	Reductions (tpd)
Stationary	25.0	25.3		13.9	13.7	
Area-Wide	31.0	31.3		3.5	3.6	
On-Road Motor Vehicles	27.0	26.0		45.2	42.1	
Other Mobile Sources	34.2	34.1		38.5	37.3	
Total	117.1	116.7	0.4	101.1	96.7	4.4
2019 Regional Mobile Incentive Program			0.1			0.9
Percent Reduction from 2002 Baseline	0.5 ÷ 160 = 0.3%			5.3 ÷ 196 = 2.7%		
Conclusion:	The combined VOC and NOx reductions in 2019 total 3% to meet the attainment contingency requirements.					

9. TRANSPORT ANALYSIS

9.1 Introduction to Pollutant Transport

The air quality in the Sacramento region can be impacted by pollutant transport from the San Francisco Bay Area. Delta breezes carry air pollutants from coastal Bay Area emission sources downwind to the inland areas of the Sacramento region, and these pollutants may contribute to ozone formation during the same day or the following days. The California Air Resources Board has determined that the relative impact from this Bay Area transport can be considered overwhelming, significant, or inconsequential on various days,⁸³ depending on meteorological conditions. CARB has also made findings that pollutant transport from the San Joaquin Valley can have significant or inconsequential impact⁸⁴ on air quality in the Sacramento region.

In addition, pollutant transport from the Sacramento region can potentially impact the air quality in other regions under certain meteorological conditions. For example, CARB analyses have determined that ozone violations at the Grass Valley monitoring station in Nevada County are considered to be overwhelmingly due to transport from the Sacramento region.⁸⁵

This chapter discusses various interbasin transport issues and modeling assumptions regarding transported air pollutants.

9.2 Interbasin Transport Issues

There are many different issues involving interbasin transport of air pollutants. First, air pollutant transport is evaluated in order to get a more complete picture of how ozone is formed in the Sacramento region. Depending on meteorological conditions, the amount of transport from outside the nonattainment area can vary from day to day. Understanding the impacts of transport can be an important factor in predicting future attainment of the ozone standard in the Sacramento region. For example, if a region's ozone problem is significantly caused by outside pollutant transport, then a local emission control strategy may not achieve its goal.

Another issue is that air pollutant transport is difficult to assess and can involve many different complex methodologies with varying degrees of limitations and uncertainty. For example, surface wind flow studies using ambient meteorological and air quality monitoring data can reveal general directional and temporal potential for transport and qualitative air pollution impacts. However, specific quantitative impacts on downwind ozone formation may still be undetermined and carryover effects may be unaccounted for. Photochemical grid modeling studies can quantify a more precise transport contribution to downwind ozone and take carryover into account, but they may only be

⁸³ California Air Resources Board, "Ozone Transport: 2001 Review" (April 2001).

⁸⁴ Ibid.

⁸⁵ Ibid.

representative of a specific ozone episode of several days and subject to various modeling performance uncertainties.

In addition, other issues pertaining to transport assessment include: 1) uncertainties in transport occurring from aloft layers⁸⁶, 2) potentially different assumptions in future emission reduction strategies in upwind air basins, 3) transport from the Sacramento region to other downwind areas, and 4) emissions transport due to motor vehicles traveling between air basins.

9.3 EPA Rules and Regulations on Intrastate Transport

The Federal 8-hour ozone implementation rules⁸⁷ state that intrastate transport could be considered by EPA and States in determining the attainment date that is as expeditious as practicable for nonattainment areas. However, if the date were later than allowed for the area's classification, the State would need to request a bump-up of the area to a higher classification for that date to be approved. In identifying the appropriate attainment date for an area, the State should consider measures to address intrastate transport of pollution from sources within its jurisdiction.

9.4 Attainment Assumptions of Domain-wide Reductions

Transported pollutants from upwind areas can contribute to the ozone problem further downwind across geographic air basins. The photochemical grid modeling study includes the northern and central regions of California in the modeling domain (see Chapter 6 – Air Quality Modeling Analysis). This extensive air quality model was used to address and account for air pollutant transport impacts among the San Francisco Bay Area, San Joaquin Valley, Sacramento Valley, and Mountain Counties air basins.

States are responsible for submitting SIPs for all areas of their State and need to demonstrate attainment in all areas addressing intrastate transport where appropriate. CARB modeling for the attainment demonstration for the Sacramento nonattainment area used domain-wide emission reductions to characterize future ozone reductions at peak ozone monitoring stations. Therefore, for our area to attain, reductions in forecasted emissions necessary and committed to in Sacramento must also be achieved in the areas that significantly impact the region. In other words, the attainment demonstration for the Sacramento nonattainment area is predicated on the San Francisco Bay Area and the San Joaquin Valley also achieving an equivalent additional percent reduction of VOC and NOx emissions in their forecasted 2018 inventory.

The reductions could come from either state or upwind regions' local measures, but we understand that CARB has committed to address the reduction requirement by implementing the new state measures statewide. The CARB attainment demonstration

⁸⁶ Aloft layers are the layers above the surface inversion layer.

⁸⁷ "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2" (Federal Register, November 29, 2005, p. 71623-71624).

for Sacramento has not quantified state measure benefits in the Bay Area or the impact of Bay Area transport. Because the new state measures achieve 9% VOC and 14% NO_x reductions from the 2018 emission inventory forecasts for the Sacramento region, it is likely that the state measures will achieve similar reductions in the Bay Area and San Joaquin Valley.

Regarding the ozone violations in Nevada County, emission reduction strategies in the Sacramento region will benefit their efforts to attain the federal ozone standards. CARB modeling results predict that future ozone reductions at the Grass Valley monitoring station could achieve the 1997 federal 8-hour ozone standard by 2018. Ultimately, CARB is responsible for ensuring that Nevada County meets its federal attainment requirements.

10. WEIGHT-OF-EVIDENCE DETERMINATION

10.1 Introduction to Weight-of-Evidence

Air quality computer models attempt to represent or simulate complex physical and chemical phenomena occurring in the atmosphere, based on the best available information. Photochemical models are used to predict future ozone concentrations and quantify VOC and NO_x emission reduction targets for meeting the ambient ozone standard. As mentioned at the end of Chapter 6, air quality modeling uncertainties can arise due to: 1) the model's simplification of atmospheric processes, 2) inaccuracies from meteorological, emissions, and other input data bases, and 3) limitations in the assumptions and methodologies for forecasting future emissions, meteorological conditions, and ozone design value concentrations.

Attainment demonstrations based on photochemical modeling can be strengthened by supplemental evidence from additional modeling analyses and from considering modeling outputs other than the attainment test results. More diverse non-modeling and observational methods analyzing air quality, meteorological, and emissions data can also be used to corroborate the modeling predictions.

This chapter summarizes the recommended requirements and methodology for preparing a weight-of-evidence (WOE) determination and the WOE analysis performed by the California Air Resource Board staff for the region. The CARB weight-of-evidence assessment indicates that the ozone attainment demonstration is likely to be achieved by the mandated deadline. More detailed information on the weight-of-evidence techniques and evaluations are provided in Appendix E – Weight-of-Evidence Analyses.

10.2 Weight-of-Evidence Requirements

EPA guidance⁸⁸ requires districts (or the state) to conduct a comprehensive weight-of-evidence analysis to support the modeled attainment demonstration. The amount of supporting material needed depends on how close the attainment modeling demonstration is to meeting the 8-hour ozone standard (≤ 84 ppb) at all monitors. For example, a limited amount of basic supplemental analyses is required if the predicted future ozone design value concentration is less than 82 ppb at all monitors. However, if future design values are closer to the NAAQS, more rigorous analyses must be conducted.

Corroborative analyses can include the following.⁸⁹

- Modeling performance evaluation and assessment of uncertainty, such as:
 - accuracy in simulating ozone formation

⁸⁸ "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5}, and Regional Haze" (EPA, April 2007, p. 98-109).

⁸⁹ Ibid.

- reliability of modeling data bases
 - confidence in forecasting methodologies
- Other modeling results and characteristics, such as:
 - how close predicted future ozone results are to attainment
 - number of years projected to attainment year
 - representativeness of modeling episodes
- Trends in ambient air quality and ozone precursor emissions, such as:
 - assessment of monitored ozone trends
 - assessment of monitored ambient ozone precursor pollutant trends
 - assessment of VOC and NOx emission trends
- Observational methods to assess control strategies, such as:
 - using receptor models to verify emission source categories causing ambient precursor pollutants
 - using ambient indicator species/ratios to evaluate sensitivity of ozone formation to precursor pollutants
 - review success of implementing SIP committal controls

10.3 Methodology for Applying Weight-of-Evidence Analyses

EPA guidance⁹⁰ states, “A weight-of-evidence determination examines results from a diverse set of additional analyses, including the outcome of the primary attainment test, and attempts to summarize the results into an aggregate conclusion” with respect to the attainment demonstration. “Each analysis is weighed qualitatively, depending on: 1) the capacity of the analysis to address the adequacy of a strategy and 2) the technical credibility of the analysis.”

The weight-of-evidence end product is a document which describes the following:

- Analyses performed,
- Data bases used,
- Key assumptions and outcomes of each analysis, and
- Rationale for concluding that the aggregate evidence supports a conclusion regarding whether the area will or will not attain the ozone standard, which may differ from the modeled attainment test.

10.4 Summary of CARB Weight-of-Evidence Analyses

Photochemical modeling results indicate that reducing NOx emissions will be the most effective strategy for bringing the Sacramento Metro Area⁹¹ into attainment. These reductions will not be in place by the 2013 deadline. However, they will be implemented by 2018. Therefore, districts in the Sacramento Metro Area have approved

⁹⁰ Ibid.

⁹¹ Sacramento Metro Area is considered the same as the Sacramento Federal Nonattainment Area.

reclassification, and ARB has requested that U.S. EPA reclassify the Sacramento Metro Area as Severe-15, with a required attainment date of June 15, 2019.

The ARB staff's modeling results indicate that NO_x emissions reductions will be critical for bringing sites in the Sacramento Metro Area into attainment. Given the timeframe over which these reductions are expected to occur, the Sacramento Metro Area should be attainment by June 15, 2019, with a 10 percent or more reduction in forecasted NO_x emissions. Based on modeling, as well as supporting analyses included in this WOE evaluation, attainment by 2019 is anticipated because of the following factors:

- Since 1999, the number of areawide exceedance days has decreased a little more than 10 percent. The maximum concentration and design value show more modest reductions, with decreases of about 10 and 5 percent, respectively, from 1999 to 2006. Because these are areawide numbers, they reflect the “worst case” sites. Although 2007 data show a slightly higher maximum concentration and a design value comparable with 2006, they show the number of areawide exceedance days at an all-time low of 16 days for the entire year.
- While the amount of progress varies on a subregional basis, there has been a substantial reduction in the number of exceedance days in the western subregion. Since 1999, exceedance days decreased 25 percent, and all sites in this subregion now attain the federal 8-hour ozone standard.
- Between 1999 and 2006, the central subregion shows a 10 percent decrease in the three-year average of exceedance days at all sites but Folsom, which shows only a slight reduction in days. Although progress at Folsom appears to have slowed over the last several years, the central subregion has demonstrated long-term progress. Sites with long-term data, including Folsom, show a 35 to 50 percent decrease in exceedance days since 1990, based on three-year averages. The decrease in design values has been more modest, averaging about 5 percent since 1990.
- Although sites in the eastern subregion still have some of the highest ozone concentrations, the three-year average of exceedance days at Cool, the worst site in this area, decreased about 15 percent between 1999 and 2006. Other sites in the subregion showed little change in the average number of exceedance days between 1999 and 2006.
- During the late-1990s, the ozone problem was more widespread throughout the Sacramento Metro Area. Since then, all areas have improved, although at differing rates. All of the western subregion

and the easternmost portion of the eastern region now meet the federal standard. The ozone problem is now confined to the central subregion and the more urbanized portions of the eastern subregion. However, even at the worst sites in these subregions (Cool and Folsom), 60 to 65 percent of the days during the 2006 ozone season were below the more stringent State 8-hour ozone standard.

- Ozone indicator values for many sites in the Sacramento Metro Area were higher for 2005, 2006, and 2007 than for 2004. However, the 2004 values were uncharacteristically low. When compared with values for 2002 and 2003, the values for 2005 through 2007 are generally lower, indicating progress. The Sacramento Metro Area is much closer to attainment than other areas of the State, such as the South Coast and San Joaquin Valley air basins. Because the Sacramento Metro Area values are closer to the standard, small variations in meteorology can result in relatively large year-to-year changes in the trends. These variations can make it difficult to interpret the trends. However, in the Sacramento Metro Area, it appears there has been overall improvement, despite this variability.
- Analyses suggest that recent ozone improvements are linked to emissions reductions. The decline in the number of exceedance days relative to the number of days with a high potential for ozone formation indicates that the modest improvements in ozone over the last few years were related to emissions reductions rather than favorable meteorological conditions. A more detailed adjustment of ozone trends for the annual mean of the Top 30 produced similar results. Results of these analyses also indicate that increasingly adverse meteorological conditions are now needed to create ozone levels exceeding the federal 8-hour standard.
- Estimated ROG and NO_x emissions trends, as well as ambient measurements, indicate reductions in both precursors since the mid-1990s. These reductions have resulted in modest ozone improvements. Emissions estimates indicate a continuing decline in ROG and NO_x emissions. However, photochemical modeling results show that NO_x reductions will be critical to attainment. As a result, a control strategy relying on a 10 percent or more reduction in NO_x emissions is proposed as the most efficient path to attainment by June 15, 2019.
- Photochemical modeling results show a design value of less than 0.085 ppm with proposed new controls for the Sacramento Metro Area by the end of 2018. Many sites will reach attainment before this date. Coupled with the analyses completed for the WOE, it is

reasonable to conclude that the entire Sacramento Metro Area will reach attainment within this timeframe, consistent with the June 15, 2019, attainment deadline.

Taken together, all of these factors indicate that the Sacramento Metro Area can expect to attain the federal 8-hour ozone standard by June 15, 2019, the required attainment date for a Severe-15 ozone nonattainment area.

11. TRANSPORTATION CONFORMITY AND EMISSION BUDGETS

11.1 Introduction to Transportation Conformity

Transportation conformity is the federal regulatory procedure for linking and coordinating the transportation and air quality planning processes. Under the federal Clean Air Act, federal agencies may not approve or fund transportation plans and projects unless they are consistent with state air quality implementation plans (SIPs). Conformity with the SIP requires that transportation activities not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS). The quantification and comparison of on-road motor vehicle emissions is the method for determining transportation conformity between air quality and transportation planning.

This chapter provides a historical perspective of transportation conformity budgets in the Sacramento region, summarizes principal transportation conformity requirements, and proposes new motor vehicle emissions budgets (MVEB).

11.2 Historical Perspective

The 8-hour ozone reasonable further progress (RFP) plan⁹² for 2002-2008 included transportation conformity budgets for 2008 for the Sacramento region. In the March 14, 2006 Federal Register, EPA found that the new motor vehicle emissions budgets for 2008 were adequate for conformity purposes. This allowed SACOG to make the conformity determination for the 2006 Metropolitan Transportation Plan and the 2006/08 Metropolitan Transportation Improvement Program for the Sacramento region, lifting the conformity lapse on April 20, 2006 when approved by the Federal Highway Administration.

In May 2008, an 8-hour ozone 2011 RFP plan⁹³ approved by the air districts in the Sacramento nonattainment area was submitted to CARB. This RFP plan proposed carrying forward 2008 motor vehicle emission budgets to 2011 for transportation conformity purposes. These proposed 2011 transportation budgets have not yet been found adequate or approved by EPA.

The 2011 RFP was due to EPA by June 15, 2007. EPA made a finding of failure to submit certain RFP SIPs and began federal sanctions clocks for the Sacramento region, effective March 24, 2008.⁹⁴ The preparation and local approval of the 2011 RFP plan was expedited to stop the federal sanctions clocks. Because of the expeditious schedule, the 2011 RFP was prepared before final approval of SACOG's recent

⁹² Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan (Final Report, February 2006).

⁹³ Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (May 2008).

⁹⁴ "Finding of Failure to Submit State Implementation Plans Required for the 1997 8-Hour Ozone NAAQS" (Federal Register, March 24, 2008, p.15416-15421).

Metropolitan Transportation Plan for 2035, which contained updated motor vehicle activity. This Sacramento Regional 8-Hour Ozone Attainment and RFP Plan, which includes the updated data, replaces the emissions inventory and motor vehicle emission budgets proposed in the previous 2011 RFP submittal.

The motor vehicle emission budgets previously proposed for the Sacramento nonattainment area for 2011 are shown in Table 11-1.

Table 11-1 Previously Proposed 2011 Motor Vehicle Emissions Budgets* Sacramento Nonattainment Area		
	VOC	NOx
2011 Emissions Budgets (EMFAC2002) – Tons per Day	41	75

* Have not yet been found adequate or approved by EPA.

11.3 Transportation Conformity Requirements

The CAA states that no federal department engage in, support in any way or provide financial assistance for or license or approve any activity that does not conform to the State Implementation Plan (SIP). (42 USC 7506.) To implement this requirement, EPA established the Transportation Conformity Rule (40 CFR 93). This Rule:

- Establishes criteria and procedures for determining whether long range metropolitan transportation plans (MTPs), short range metropolitan transportation improvement programs (MTIPs), and projects conform to the SIP.
- Ensures that transportation plans and projects are consistent with the applicable SIP, such that associated transportation emissions are less than or equal to motor vehicle emissions budgets established for demonstrating reasonable further progress, attainment or maintenance of health-based air quality standards.
- Ensures that transportation plans, programs, and other individual projects do not cause new air quality violations, exacerbate existing ones, or delay attainment of air quality standards.

11.4 Purpose of the Motor Vehicle Emissions Budget

The motor vehicle emissions budget is the total allowable emissions allocated to on-road motor vehicles in the submitted or approved SIP revision or maintenance plan for reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS. (40 CFR 93.101)

Transportation conformity determinations are accomplished by comparing the motor vehicle emissions associated with MTPs and MTIPs with the motor vehicle emissions

budgets established in the SIP for each attainment, milestone, or transportation planning year. If the emissions associated with implementation of the MTP and/or MTIP are less than or equal to the budgets established in the SIP, a conformity determination can be made.

In this SIP, an emission budget is established for both VOC and NO_x for two reasons:

1. Both VOC and NO_x are ozone precursors, and reductions of both pollutants are needed to demonstrate attainment of the ozone standards, and
2. The reasonable further progress demonstration relies on NO_x substitution to meet the required goals.

This ozone plan proposes to update the allowable motor vehicle emissions budgets that SACOG must use to demonstrate that projected regional motor vehicle emissions with all of the new transportation projects will conform to the levels established in the SIP.

11.5 Latest Planning Assumptions

The current and forecasted vehicle miles traveled (VMT) are from SACOG-supplied activity data (submitted to ARB February 2008)⁹⁵ based on transportation modeling for the Sacramento region's recent Metropolitan Transportation Plan (MTP2035) with Blueprint. In addition, the vehicle activity levels for the eastern part of Solano County in the Sacramento nonattainment area are based on MTP data from the Bay Area Metropolitan Transportation Commission (submitted to ARB August 2006).

11.6 SACOG's Blueprint MTP

Over the past several years, the Sacramento region has embarked on a process of defining and implementing a new, higher density, land use pattern which reduces congestion, encroachment on open space, average vehicle miles traveled per household and air pollutants. The program, called Blueprint, was initiated by SACOG with the goal of reducing traffic congestion in the future metropolitan transportation plans.

In December 2004, Blueprint smart growth principles and a 2050 growth scenario were approved by SACOG⁹⁶ to achieve the following objectives:

1. Provide a variety of transportation choices
2. Offer housing choices
3. Take advantage of compact development
4. Use existing assets
5. Increase mixed land use
6. Encourage natural resource conservation

⁹⁵ SACOG travel data transmittal letter to ARB, and April 1, 2008 e-mail to SMAQMD.

⁹⁶ <http://www.sacog.org/regionalfunding/betterways.pdf>

7. Ensure distinctive, attractive communities with quality design

The region then began the more detailed planning efforts for the long range Metropolitan Transportation Plan for 2035 (MTP2035). SACOG works with local jurisdictions, CalTrans, and transportation and planning agencies to define interim land use allocations and specific transportation project needs. Federal MTP guidelines require that the land use allocations represent what is most likely to be built. Therefore, the specific Blueprint smart growth policies affect land use allocations only to the extent that the local jurisdictions and SACOG are able to demonstrate that the policies will actually be implemented.

These updated activity data were used in setting the baseline projections for the motor vehicle inventory. While the Blueprint principles affect these baseline projections, Blueprint is not included in this plan as a transportation control measure.

SACOG's Transportation Model⁹⁷

The transportation analysis for the MTP2035 relied on the latest planning assumptions and SACOG's new regional travel demand forecasting model, SACSIM.⁹⁸ The SACSIM model was used to estimate future traffic volumes and public transit ridership in the 6-county Sacramento region. SACSIM incorporates an "activity-based" travel model which simulates the population of households allocated to parcels and creates a one-day activity and trip travel schedule for each person in the population.

The activity and travel schedule are sensitive to transportation network accessibility and a variety of demographic and land use variables. SACSIM also incorporates a mode choice model which determines how each travel destination is reached.

The network traffic assignment models load the trips onto the network, resulting in vehicle miles traveled at four time intervals (AM peak, midday, PM peak, and evening/early morning) and speed within each time period. To develop the travel forecasting model, information on the characteristics and constraints of the transportation system and residents' travel survey data were collected. The SACSIM travel outputs were compared to actual base year data to be able to demonstrate adequate model performance results.

SACOG used the SACSIM travel demand model to forecast average weekday travel patterns for several future years, based on given assumptions about expected future

⁹⁷ SACOG's transportation model description and results provided by SACOG's Gordon Garry e-mail to SMAQMD (5-28-08).

⁹⁸ Bradley, M.A., J.L. Bowman and B. Griesenbeck. "Development and application of the SACSIM activity-based model system," submitted for presentation at the 11th World Conference on Transport Research, Berkeley, California. June 2007.

population and employment projections,⁹⁹ land use allocations, and transportation system improvements and changes contained in the MTP2035. The results of the travel model predicted that growth in vehicle trips and growth in vehicle miles traveled will be slightly lower than the population growth rate for the Sacramento region through 2035.

11.7 Comparison of Previous and New SIP On-Road Motor Vehicle Emissions

The on-road motor vehicle emission inventories have undergone many major improvements, both in CARB's motor vehicle emissions model (from EMFAC2002 to EMFAC2007) and SACOG's transportation activity model (from SACMET to SACSIM). Figures 11-1 and 11-2 compare the new motor vehicle emission estimates (EMFAC2007 with MTP2035) to those from the previous version (EMFAC2002¹⁰⁰). The net result of these changes is that on-road motor vehicle VOC emissions for EMFAC2007 are 10-15% higher than the previous EMFAC2002 estimates. For on-road motor vehicle NOx emissions, the EMFAC2007 updates are 25-30% higher than the prior EMFAC2002 estimates for current and future years.

As described in Section 5.3.3, CARB's EMFAC2007 motor vehicle emissions model includes significant revisions. The main reason the VOC emissions are estimated to be higher is EMFAC2007's updated summer temperature profiles corresponding to federal 8-hour ozone standard exceedance days. The major changes contributing to the overall increase in NOx emission forecasts are from EMFAC2007's updated vehicle populations, revised emission factors for heavy-duty diesel trucks, and redistribution of heavy-duty diesel trucks.

Figure 11-3 compares the new on-road vehicle miles traveled (VMT) estimates from SACOG's MTP2035 transportation model runs¹⁰¹ (used with EMFAC2007) to those from the previous VMT assumptions¹⁰² (used with EMFAC2002) for the Sacramento region. The overall difference is that the new VMT estimates are about 5% higher for past years than previous assumptions. New VMT estimates for current and future years are about the same as previous assumptions. However, the new SACSIM VMT estimates (which include Blueprint) result in 3-4% less VMT growth in future years when compared to previous SACMET transportation modeling. The updated increase in on-road motor vehicle emission estimates reflects CARB's EMFAC model revisions, increased VMT activity from the updated transportation activity model and the reduced growth in VMT in future years as a result of the 2035 MTP in the SACOG region.

⁹⁹ SACOG Board of Directors (September 2007) approved 2013 and 2018 housing and employment allocations based on July 2007 DOF projections.

¹⁰⁰ SACOG/CARB vehicle activity adjustments were applied to EMFAC2002 as off model runs along with some ARB/District control analysis external adjustments, and are documented in Appendix D and D1 of the Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan.

¹⁰¹ VMT based on SACOG's SACSIM Feb 2008 transportation model simulations.

¹⁰² VMT based on SACOG/CARB assumptions using 2003 VMT estimates from MVSTAFF report (CARB) with VMT growth rates from SACOG's Feb/Mar 2005 SACMET transportation model.

Figure 11-1
Comparison of Previous and New SIP On-Road Motor Vehicle VOC Emissions

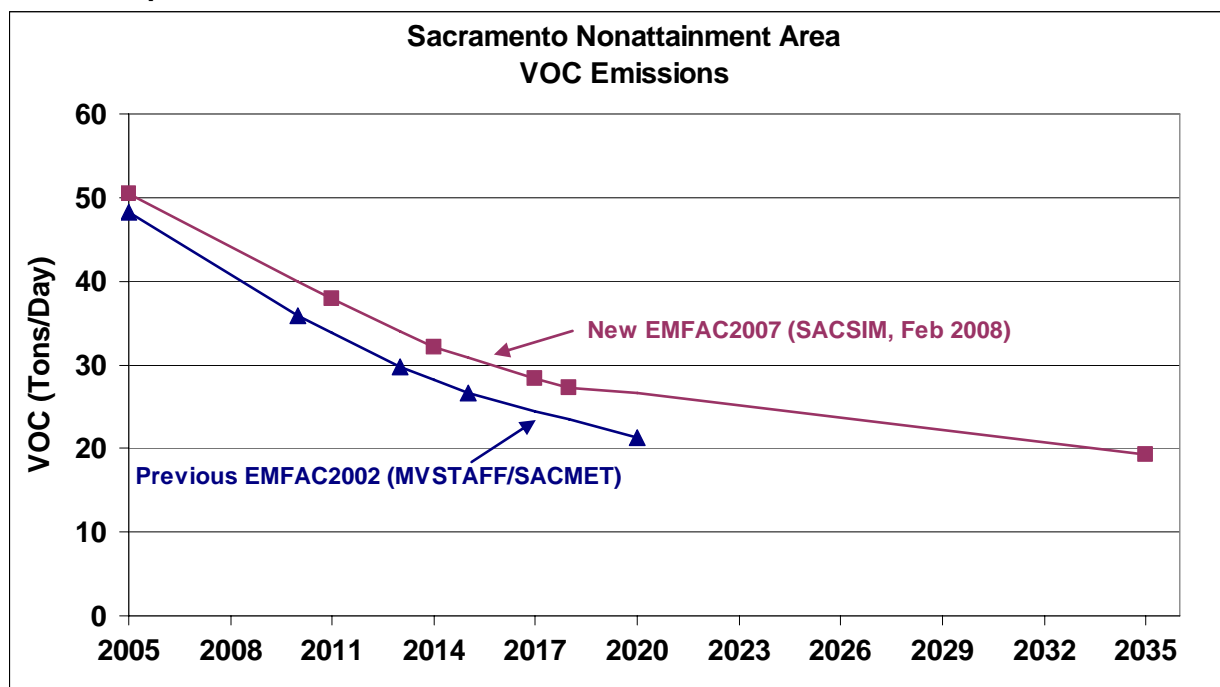


Figure 11-2
Comparison of Previous and New SIP On-Road Motor Vehicle NO_x Emissions

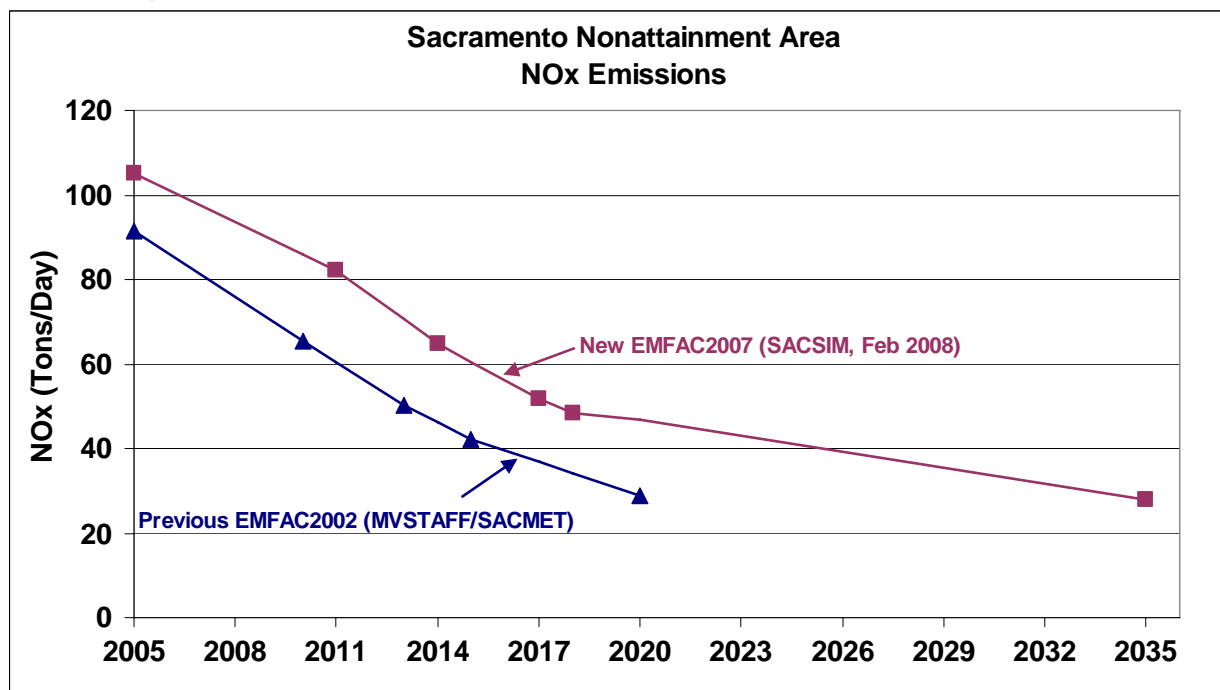
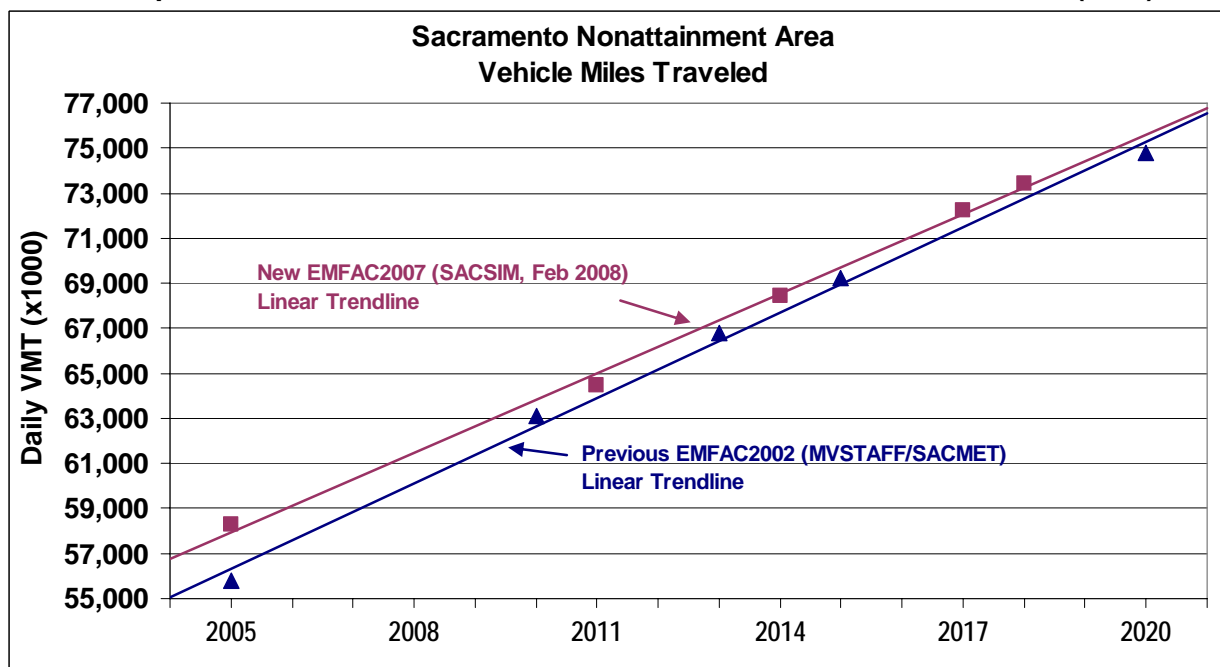


Figure 11-3
Comparison of Previous and New SIP On-Road Vehicle Miles Traveled (VMT)



11.8 Proposed New Motor Vehicle Emissions Budgets

To reflect the updated motor vehicle emission forecasts, the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan includes new transportation conformity budgets for the 2011, 2014, and 2017 RFP milestone years, and the 2018 attainment analysis year, listed in Table 11-2. The proposed budgets incorporate: 1) the recent on-road motor vehicle emission inventory factors of EMFAC2007 (described in Section 5.3.3), 2) updated travel activity data from SACOG's Blueprint MTP2035, based on the new SACSIM transportation modeling system, and 3) latest regional and state control strategies.

Table 11-2 Proposed New Motor Vehicle Emissions Budgets* Sacramento Nonattainment Area		
	VOC	NOx
2011 Emissions Budgets (EMFAC2007) – Tons per Day	38	78
2014 Emissions Budgets (EMFAC2007) – Tons per Day	32	61
2017 Emissions Budgets (EMFAC2007) – Tons per Day	29	48
2018 Emissions Budgets (EMFAC2007) – Tons per Day	24	34

*All motor vehicle emission budget years include regional incentive benefits. State control measure reductions are only included in 2018.

These new transportation budgets will lock in a greater degree of vehicle emission control based on recently adopted measures by ARB that were not credited in the previous early RFP plan¹⁰³ for Sacramento and adjusted with some new additional ARB and local control analysis reductions. Although the regional and local commitment is to the "total emission reductions," for purposes of establishing motor vehicle emissions budgets for transportation conformity, an explicit commitment is made to the reductions associated with the on-road mobile source incentive program in each of the milestone years. These external adjustments for certain proposed State measures (in 2018) and local control measures are documented in Appendix F – Motor Vehicle Emissions Budgets. These transportation budgets decline significantly from 2011 through 2018, which will ensure continued progress towards attainment of the 8-hour ozone standards.

11.9 Motor Vehicle Emissions Budget Approval Process

EPA can make an adequacy finding on new 8-hour motor vehicle emissions budgets prior to their approval of a SIP revision plan. This adequacy review process is subject

¹⁰³ Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan (Final Report, February 2006).

to public participation and review requirements pursuant to 40 CFR 93.118(f). This adequacy process is intended to expedite the use of conformity budgets to protect air quality.

If determined to be adequate for transportation conformity purposes by EPA, future transportation plans will need to conform to these new motor vehicle emissions budgets. The Metropolitan Planning Organizations, SACOG and MTC, must ensure that the aggregate transportation emissions in the region stay below these levels when approving new metropolitan transportation plans and transportation improvement programs, even if the mix of projects changes or growth increases. Following EPA action, these new 8-hour MVEBs will remain in effect until other budgets are found adequate or approved by EPA.

12. GENERAL CONFORMITY

12.1 Introduction to General Conformity

General conformity is the federal regulatory process for preventing major federal actions¹⁰⁴ or projects from interfering with air quality planning goals. Conformity provisions ensure that federal funding and approval are given only to those activities and projects that are consistent with state air quality implementation plans (SIPs). Conformity with the SIP means that major federal actions will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS).

Current federal rules require that federal agencies use the emissions inventory from an approved SIP's attainment or maintenance demonstration to support a conformity determination. The 1994 SIP is the most recent attainment plan for the Sacramento region that may be used to assess general conformity. The emissions inventory in this 8-hour ozone attainment plan will replace the old 1994 SIP emissions inventory for general conformity purposes.

This chapter summarizes basic general conformity requirements and emissions criteria for demonstrating general conformity. In addition, a specific inventory for airport emissions is provided in this chapter for the potential general conformity analysis of future airport expansions.

12.2 General Conformity Requirements

The Clean Air Act (CAA) states that no federal department may engage in, support in any way or provide financial assistance for or license or approve any activity that does not conform to an approved SIP. (42 USC 7506.)

The EPA promulgated the conformity regulations for general federal actions (40 CFR 51 subpart W and 40 CFR 93 subpart B) pursuant to section 176(c) of the Clean Air Act. The "General Conformity" Rule sets forth the requirements a federal agency must comply with to make a conformity determination. General conformity requires that federal agencies and departments not support or approve an action that does any of the following:

- Causes or contributes to new violations of any NAAQS in an area;
- Increases the frequency or severity of an existing violation of any NAAQS; or

¹⁰⁴ Federal actions are defined as any activity engaged in by a department, agency, or instrumentality of the Federal government, or any activity that they support, fund, license, permit, or approve, other than activities related to transportation plans, programs, and projects that are applicable to transportation conformity requirements. (40 CFR 93.152)

- Delays timely attainment of any NAAQS, required interim emission reduction, or other milestones.

12.3 Types of Federal Actions Subject to General Conformity Requirements

Examples of general federal actions that may require a conformity determination include, but are not limited to, the following: leasing of federal land, private construction on federal land, reuse of military bases, airport construction and expansions, and construction of federal office buildings.

General conformity requirements apply only if federal actions satisfy one of the following two conditions: (40 CFR 93.153)

- The action's direct and indirect emissions have the potential to exceed the de minimus threshold levels established for criteria pollutants in the rule. For a severe nonattainment area, the threshold level is 25 tons per year of VOC or NOx.
- The action's direct and indirect emissions of any criteria pollutant represent 10% or more of a nonattainment or maintenance area's total emissions inventory for that pollutant. For the nonattainment area, 10% of the total 2002 VOC emission inventory is 16 tons per day (or about 5,700 tons per year), and 10% of the total 2002 NOx emission inventory is 19 tons per day (or about 6,900 tons per year).

Direct emissions of a criteria pollutant or its precursors¹⁰⁵ are emissions that are caused or created by the federal action, and occur at the same time and place as the action. Indirect emissions are reasonably foreseeable emissions that are further removed from the federal action in time and/or distance, and can be practicably controlled by the federal agency due to a continuing program responsibility. (40 CFR 93.152) A federal agency can indirectly control emissions by placing conditions on federal approval or federal funding. An example would be controlling emissions by limiting the size of a parking facility or by making employee trip reduction requirements.¹⁰⁶

12.4 Emissions Criteria for Demonstrating General Conformity

To meet the conformity determination emissions criteria, the total of direct and indirect emissions from a federal action must meet all relevant requirements and milestones contained in the applicable SIP (40 CFR 93.158(c)), and must meet other specified requirements, such as:

- For any criteria pollutant, the total of direct and indirect emissions from the action must be specifically identified and accounted for in the applicable SIP's attainment or maintenance demonstration (40 CFR 93.158(a)(1)); or

¹⁰⁵ Precursors for ozone include NOx and VOC pollutants (40 CFR 93.152).

¹⁰⁶ "General Conformity Guidance: Questions and Answers" (OAQPS, EPA, dated July 13, 1994), p. 13.

- For ozone, the total of direct and indirect emissions from the action must be fully offset within the same nonattainment (or maintenance) area through a revision to the applicable SIP or a similarly enforceable emissions control measure in the SIP (40 CFR 93.158(a)(2)); or
- For ozone, CARB must make a finding that the total of direct and indirect emissions from the action will result in a level of emissions that, together with all other emissions in the nonattainment (or maintenance) area, will not exceed the emissions inventory specified in the applicable SIP (40 CFR 93.158(a)(5)(i)(A)); or
- For ozone, CARB must make a finding that the total of direct and indirect emissions from the action will result in a level of emissions that, together with all other emissions in the nonattainment (or maintenance) area, will exceed the emissions inventory specified in the applicable SIP but the State Governor or designee for SIP actions makes a written commitment to EPA to take specific future actions (40 CFR 93.158(a)(5)(i)(B)).

12.5 Airports Emissions Inventory

Airports in the nonattainment area are planning for future growth. Sacramento County has prepared a master plan for this growth that shows an increase in emissions. The Sacramento County Airport System is comprised of four airports: Sacramento International (SMF), Mather (MHR), Executive (SAC), and Franklin (F32). In addition, the County Airport System manages the aviation activities at McClellan Airport on behalf of another County agency. Three private airports also operate in Sacramento County: Rancho Murieta, Rio Linda, and Sunset.¹⁰⁷ The aircraft emissions inventory forecast includes airports from all counties in the Sacramento nonattainment area.

To facilitate future conformity determinations, the projected direct and indirect emissions from airport growth are identified for the 2011, 2014, and 2017 RFP milestone years, and for the 2018 attainment analysis year in Table 12-1. The 1994 SIP aircraft emissions inventory is shown for comparison purposes. Note that the current aircraft VOC emissions projection for 2011 is lower than the 1994 SIP projection for 2005, because the closures of the Mather and McClellan air force base operations were not included in the 1994 SIP.

¹⁰⁷ Information from Sacramento County Airport System; comment letter dated October 24, 2008.

Table 12-1 Airport (Aircraft Operations + Ground Support Equipment) Emissions for the Sacramento Nonattainment Area		
Year of Operations	VOC (tons/day)	NOx (tons/day)
94SIP* 2005 Emissions Inventory Aircraft Operations Only	1.4	2.0
2011 Projected Emissions Inventory Aircraft Operations	0.6	2.2
Ground Support Equipment	0.06	0.29
2014 Projected Emissions Inventory Aircraft Operations	0.6	2.4
Ground Support Equipment	0.05	0.25
2017 Projected Emissions Inventory Aircraft Operations	0.6	2.7
Ground Support Equipment	0.05	0.22
2018 Projected Emissions Inventory Aircraft Operations	0.6	2.8
Ground Support Equipment	0.05	0.22

*Ground support equipment was not explicitly identified in the 94SIP.

13. REASONABLE FURTHER PROGRESS DEMONSTRATIONS

13.1 Introduction to Reasonable Further Progress

The Clean Air Act specifies reasonable further progress (RFP) requirements for ozone nonattainment areas. RFP refers to the general need to obtain a certain level of annual incremental reductions in emissions of the relevant air pollutant for the purpose of ensuring attainment of the standard by the applicable attainment deadline.

In May 2008, an 8-hour ozone 2011 RFP plan¹⁰⁸ approved by the air districts in the Sacramento nonattainment area was submitted to CARB. This RFP plan demonstrated a 27% reduction from 2002-2011 for the Sacramento nonattainment area with existing control strategies. In addition, the 2011 RFP plan included an updated emissions inventory and carried forward 2008 motor vehicle emission budgets to 2011 for transportation conformity purposes.

The 2011 RFP was due to EPA by June 15, 2007. EPA made a finding of failure to submit certain RFP SIPs and began federal sanctions clocks for the Sacramento region, effective March 24, 2008.¹⁰⁹ The preparation and local approval of the 2011 RFP plan was expedited to stop the federal sanctions clocks for missing the submittal deadline. Because of the expeditious schedule, the 2011 RFP was prepared before final approval of SACOG's recent Metropolitan Transportation Plan for 2035, which contained updated motor vehicle activity. This Sacramento Regional 8-Hour Ozone Attainment and RFP Plan replaces the emissions inventory and motor vehicle emission budgets proposed in the previous 2011 RFP submittal.

This chapter begins with a discussion of RFP requirements for the 8-hour ozone NAAQS. It also describes the methodology for deriving the base year emissions inventory, calculating RFP emission targets, assessing creditable reductions, and using NOx substitution for VOC reduction shortfalls. Finally, this chapter includes the emission reduction summary that demonstrates the RFP targets are met for each of the future milestone years. Additional RFP information and documentation are provided in Appendix G – Reasonable Further Progress Demonstrations.

13.2 Reasonable Further Progress Requirements

Sections 172(c)(2), 182(b)(1) and 182(c)(2)(B) of the Clean Air Act include RFP provisions for reducing emissions in ozone nonattainment areas. The federal 8-hour ozone regulations¹¹⁰ (40 CFR 51.910) require that areas classified under subpart 2 as "serious and above" need to submit a reasonable further progress plan that shows a

¹⁰⁸ Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (May 2008).

¹⁰⁹ "Finding of Failure to Submit State Implementation Plans Required for the 1997 8-Hour Ozone NAAQS" (Federal Register, March 24, 2008, p.15416-15421).

¹¹⁰ The final 8-hour ozone implementation rule (Phase 2) which includes the reasonable further progress requirements was signed and published in the November 29, 2005 Federal Register.

VOC (and/or NOx) emission reduction of at least 3% per year averaged over the first 6 years from the 2002 baseline year (i.e., 2002-2008)¹¹¹ and over each consecutive 3-year period (i.e., 2009-2011, 2012-2014, etc.) out to their attainment year. These demonstrations are made for milestone years 2011, 2014, 2017, and 2018.

13.3 Contingency Measures Requirement

In general, contingency measures are control measures that go into effect if planned emission controls fail to reach desired goals and targets. Contingency provisions are required under sections 172(c)(9) and 182(c)(9) of the Clean Air Act in the event the nonattainment area fails to meet a reasonable further progress milestone or attainment deadline. Contingency measures are specific additional controls to be implemented automatically without further significant rulemaking activities, such as public hearings or legislative review, or without further action by the State or the Administrator (EPA).

Federal guidance¹¹² requires that sufficient contingency measures in the plan be adopted to provide a 3% emission reduction beyond what is needed for the reasonable further progress requirement. The existing control measure strategy in this plan is expected to surpass the amount of emission reductions needed for reasonable further progress targets by a margin that meets the contingency measures requirement.

13.4 Methodology for Reasonable Further Progress Demonstrations

The methodology for demonstrating reasonable further progress includes deriving the base year and milestone year emissions inventories, calculating RFP emission reduction targets, assessing creditable reductions, and using NOx substitution for VOC reduction shortfalls.

13.4.1 Base Year and Forecast Milestone Year Emissions Inventories

The first step is compiling the 2002 base year VOC and NOx inventories of anthropogenic emissions that are used as the basis for calculating the required percent reduction targets. Section 182(b)(1)(B) of the Clean Air Act defines these baseline emissions as the total amount of actual VOC or NOx emissions from all anthropogenic sources in the nonattainment area, excluding emissions eliminated by federal motor vehicle control program (FMVCP) regulations promulgated prior to 1990 and federal Reid Vapor Pressure (RVP) fuel regulations promulgated prior to the enactment of the Clean Air Act Amendments of 1990.

¹¹¹ The Sacramento Regional Nonattainment Area 8-Hour Ozone Rate-of-Progress Plan (February 2006) included over 18% RFP reductions of VOC and NOx emissions for the first 6 years from the 2002 baseline year.

¹¹² "General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990" (57 FR 13498, April 16, 1992).

The VOC and NO_x emission inventory forecasts are needed for each future milestone year to quantify the emission reductions that are expected to be achieved since the 2002 base year. The emission forecasts are derived by projecting base year emissions using expected growth assumptions and the effects of adopted control measures.

13.4.2 RFP Emission Reduction Targets

The required RFP percent emission reductions (e.g., average of 3% per year for first 6 years and every subsequent 3-year period until attainment) are applied to the adjusted base year VOC emissions inventory to derive the RFP target levels for each of the future milestone years, in this case, 2011, 2014, 2017, and 2018. For example, the RFP reduction requirement for 2011 is for an additional 9% (2009-2011 period) on top of the previous 18% (2002-2008 period) for a total of 27% reduction from the 2002 base year. The overall RFP requirement for 2014 is a 36% reduction, for 2017 is a 45% reduction, and for 2018 is a 48% reduction from the 2002 base year.

13.4.3 Creditable Control Measure Reductions

When assessing RFP emission reductions creditable toward the percent reductions required, there are specific restrictions as listed in section 182(b)(1)(D) of the Clean Air Act. For example, post-1990 control benefits are not creditable as reductions if they were already required prior to the enactment of the 1990 Clean Air Act Amendments. These measures include the federal motor vehicle control program, federal RVP fuel regulations, corrections to reasonably available control technology (RACT) rules, and corrections to motor vehicle inspection and maintenance (I/M) programs.

The creditable VOC reductions from existing control regulations are applied to the required RFP target levels. If there are any RFP reduction shortfalls for VOC, the NO_x reductions are considered in the RFP demonstration assessment.

13.4.4 NO_x Substitution for VOC Reduction Shortfalls

Any remaining VOC reduction shortfalls are met by using NO_x emission reductions. Section 182(c)(2)(C) of the Clean Air Act allows for the substitution of NO_x emission reductions in place of VOC reductions to meet the reasonable further progress requirements. According to EPA's NO_x Substitution Guidance¹¹³, the substitution of NO_x reductions for VOC reductions must be done on a percentage basis, rather than a straight ton-for-ton exchange.

Thus, if there is a certain percent VOC reduction shortfall, an equal percentage reduction in NO_x emissions can be substituted to provide the equivalent reductions necessary for meeting the reasonable further progress goals toward attainment. For example, if there is a 15% reduction in VOC emissions forecasted from 2002 to 2011

¹¹³ Environmental Protection Agency (OAQPS), "NO_x Substitution Guidance", December 1993.

and 27% is needed, then an additional 12% reduction in NO_x emissions could be used to make up the shortfall to achieve the minimum required reduction.

13.4.5 NO_x Substitution Attainment Consistency Requirement

The overall VOC and NO_x reduction totals applied to the RFP demonstration must be consistent with the SIP attainment control strategy. Therefore, the cumulative amount of NO_x substitution reductions used toward the RFP requirement cannot be greater than the total NO_x reductions dictated by the modeled attainment demonstration. This attainment consistency requirement is meant to prevent the substitution of NO_x reductions that would not lead to progress toward attaining the ozone standard.

The current air quality modeling analysis from the Central California Ozone Study (CCOS) shows that attainment can be reached with different combinations of VOC and NO_x control. Photochemical modeling results indicate that both VOC and NO_x reductions provide ozone benefits in the Sacramento region, but on a ton for ton basis NO_x reductions provide greater ozone benefits than VOC reductions. Therefore, a substantial use of NO_x substitution would be consistent with current analyses of ozone attainment strategies in the Sacramento nonattainment area.

13.5 Calculations of Reasonable Further Progress Demonstrations

Table 13-1 contains a summary of the calculations for determining whether reasonable further progress is achieved for the required milestone targets for 2011, 2014, 2017, and the 2018 attainment demonstration year. Projected future VOC and NO_x emission reductions will provide the required RFP reductions, as well as a 3% contingency margin.

The reasonable further progress demonstrations are achieved by forecasted emission reductions from existing control regulations and already adopted control measures. Also, both VOC and NO_x emission reductions are needed to meet the RFP reduction targets as shown in Figure 13-1. The NO_x substitution is used on a percentage basis to cover any VOC percentage shortfalls. Since the total sum of NO_x emission reductions (32%) used to cover any VOC shortfalls is less than the total NO_x reductions (54%) required for attainment,¹¹⁴ the use of NO_x substitution for RFP purposes is consistent with the attainment demonstration strategy.

¹¹⁴ 2018 attainment demonstration analysis in Table 8-1 indicates NO_x reduction needed from 2002 base year = $1 - (91/196) = 54\%$

Table 13-1
Calculation of Reasonable Further Progress Demonstrations
Sacramento Nonattainment Area

VOC Emission Calculations – Tons/Day	2011	2014	2017	2018
1. 2002 Baseline VOC Inventory ^A	160.3	160.3	160.3	160.3
2. Non-Creditable FMVCP/RVP Adjustments ^B	11.9	14.5	15.8	16.3
3. Adjusted 2002 Baseline VOC Inventory (Line 1 – Line 2)	148.4	145.9	144.5	144.0
4. VOC Emissions Forecast with existing controls + ERCs (3.5) ^C	130.5	124.5	121.3	120.7
5. RFP Commitment for VOC Reductions from New Measures	0	0	0	0
6. Forecasted VOC Creditable Reductions Since 2002 (Line 3 – Line 4 + Line 5)	17.9	21.4	23.2	23.3
7. Forecasted % VOC Reductions Since 2002 (Line 6 ÷ Line 3)	12.1%	14.7%	16.1%	16.2%
8. RFP % Reduction Required from 2002 Adjusted Baseline VOC Inventory ^D	27%	36%	45%	48%
9. Forecasted % VOC Shortfall (Line 8 – Line 7)	14.9%	21.3%	28.9%	31.8%
NOx Emission Calculations – Tons/Day				
10. 2002 Baseline NOx Inventory ^A	196.1	196.1	196.1	196.1
11. Non-Creditable FMVCP Adjustments ^B	13.0	15.0	16.1	16.5
12. Adjusted 2002 Baseline NOx Inventory (Line 10 – Line 11)	183.1	181.1	180.0	179.6
13. NOx Emissions Forecast with existing controls + ERCs (2.4) ^C	146.8	125.4	108.3	103.5
14. RFP Commitment for NOx Reductions from New Measures	0	0	0	0
15. Forecasted NOx Creditable Reductions Since 2002 (Line 12 – Line 13 + Line 14)	36.3	55.6	71.7	76.2
16. Forecasted % NOx Reductions Since 2002 (Line 15 ÷ Line 12)	19.8%	30.7%	39.9%	42.4%
17. % NOx Substitution Needed for VOC Shortfall (Same as Line 9)	14.9%	21.3%	28.9%	31.8%
18. Forecasted % NOx Reduction Surplus (Line 16 – Line 17)	4.9%	9.4%	10.9%	10.6%
Is Reasonable Further Progress Met?	Yes	Yes	Yes	Yes
Is 3% Contingency Met for RFP?	Yes	Yes	Yes	Yes

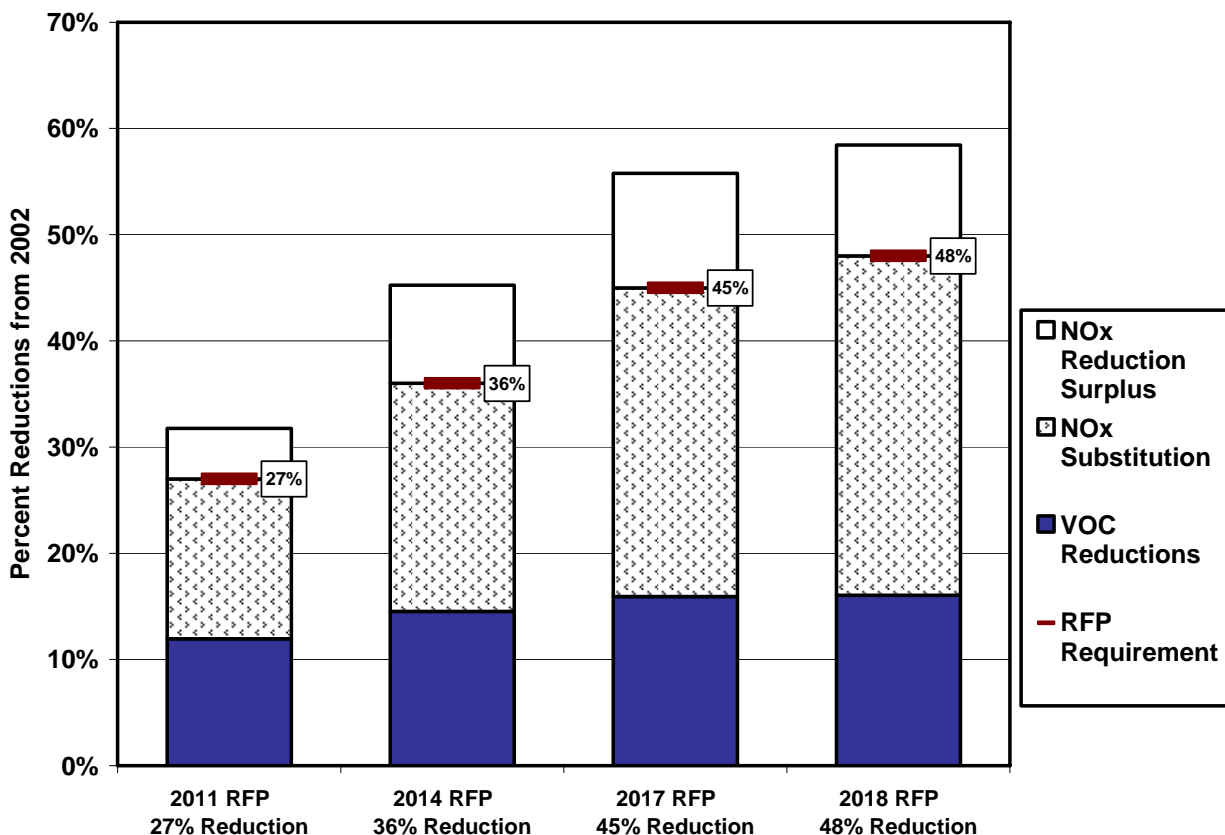
^A From Chapter 5, Tables 5-2 and 5-3.

^B CARB provided the non-creditable FMVCP/RVP adjustments, using CA MVCP method in Appendix G.

^C From Chapter 5, Tables 5-4 and 5-5.

^D RFP reduction requirements contained in EPA's Final Rule to Implement the 8-Hour Ozone NAAQS (Phase 2) published in the November 29, 2005 Federal Register.

Figure 13-1
Summary of Reasonable Further Progress Demonstrations
Sacramento Nonattainment Area



Reasonable further progress (RFP) demonstrations are achieved by forecasted emission reductions from existing control strategies and accounting for emissions growth. Both VOC and NOx emission reductions are needed to meet the RFP reduction targets.

14. SUMMARY AND CONCLUSIONS

14.1 8-Hour Ozone Nonattainment Designation for Sacramento Region

The 1997 federal 8-hour ozone standard lowered the health-based limit for ambient ozone concentration from 0.12 parts per million of ozone averaged over one hour to 0.08 parts per million of ozone averaged over eight hours. An area's nonattainment designation is based on whether the ozone design value concentration¹¹⁵ for any of the monitoring sites in the area exceeds the national ambient air quality standard (NAAQS). The Sacramento region is designated a nonattainment area, and includes all of Sacramento and Yolo counties and portions of Placer, El Dorado, Solano, and Sutter counties.

14.2 “Severe” 8-Hour Ozone Classification with 2019 Attainment Deadline

Nonattainment areas are classified as marginal, moderate, serious, severe, or extreme areas depending on the magnitude of the highest 8-hour ozone design value for the monitoring sites in the nonattainment area. In 2004, the Sacramento region was classified as a “serious” nonattainment area with an attainment deadline of June 15, 2013. This classification was based on the 8-hour ozone design value of 107 ppb at Cool, calculated from ozone concentrations monitored from 2001 to 2003.

However, since the Sacramento region needs to rely on the longer term emission reduction strategies from state and federal mobile emission standard programs, the Sacramento region cannot meet the 2013 attainment date for serious nonattainment areas. Consequently, on February 14, 2008, CARB on behalf of the air districts in the Sacramento region submitted a letter to EPA requesting a voluntary reclassification (bump-up) of the Sacramento Federal Nonattainment Area from a “serious” to a “severe” 8-hour ozone nonattainment area with an extended attainment deadline of June 15, 2019.

14.3 Trend in Ozone Air Quality Shows Improvement

The progress toward attainment is measured by analyzing ambient air quality data collected at various monitoring sites over a period of many years (1990-2007). There are currently 16 ozone monitoring stations located throughout the Sacramento region that are operated by either local air districts or the California Air Resources Board.

The annual number of 8-hour ozone exceedance days recorded at the peak monitoring sites fluctuates from year to year due to meteorological variability and changes in precursor emission patterns. The most frequent exceedances of the federal 8-hour ozone standard occur at the region's eastern monitoring sites (Cool, Folsom, Placerville, and Auburn). The 18-year trend line indicates a decline in the overall average peak number of annual exceedance days, from about 33 down to 22.

¹¹⁵ The 8-hour ozone design value is the standard-related indicator calculated as the annual 4th-highest daily maximum 8-hour ozone concentration averaged over 3 years.

The peak 8-hour ozone design value concentration also varies from year to year and occurs at the eastern monitoring sites in the Sacramento region. The overall 18-year trend line shows a decline, from 108 ppb down to about 100 ppb. The design value has improved from being 24 ppb (or 28%) over the standard¹¹⁶ down to about 16 ppb (or 19%).

14.4 VOC and NOx Emissions Inventory Forecasted to Decline

Ozone is not directly emitted into the atmosphere, but is a pollutant produced by photochemical reactions in the air involving volatile organic compounds (VOC) and nitrogen oxides (NOx). Therefore, planning efforts to evaluate and reduce ozone air pollution include identifying and quantifying the various processes and sources of VOC emissions (such as solvents, surface coatings, and motor vehicles) and NOx emissions (such as motor vehicles and other fuel combustion equipment).

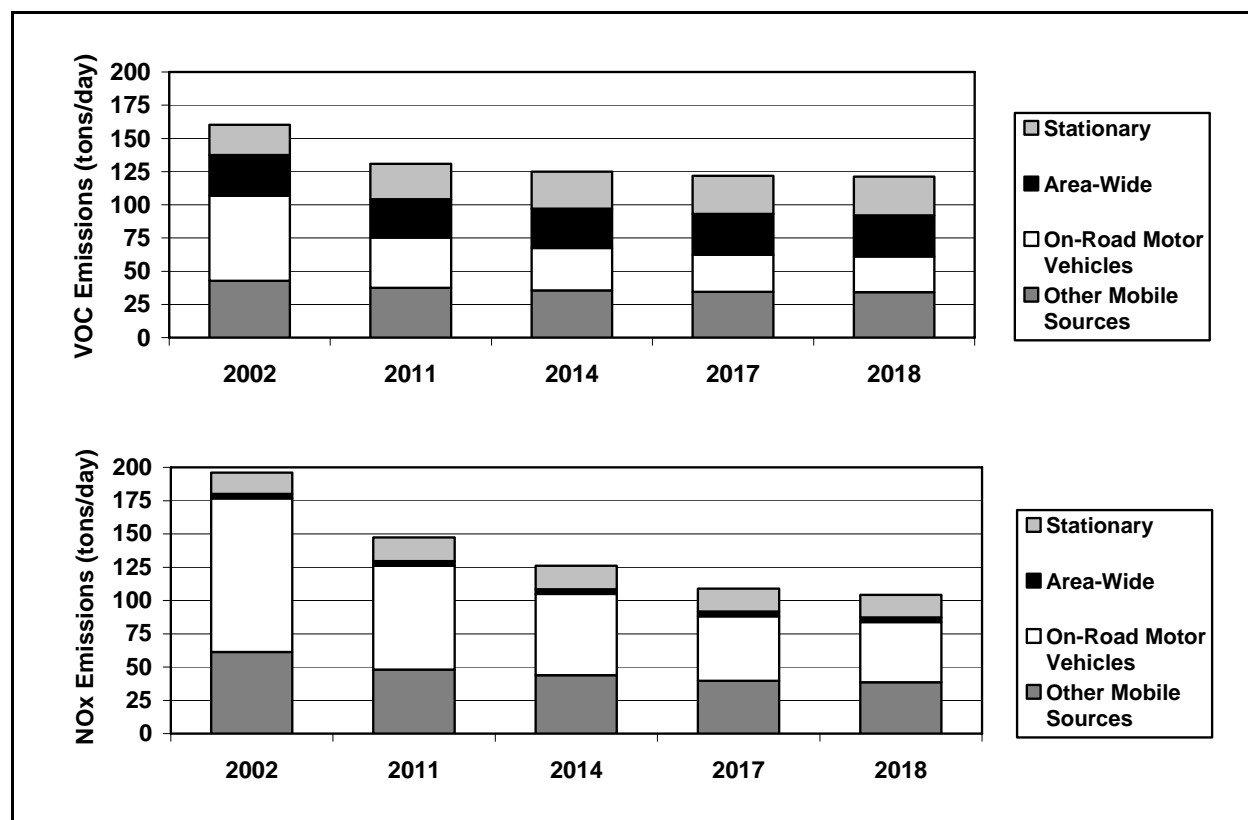
EPA emission inventory guidance requires the planning emissions inventory to be based on estimates of actual emissions for an average summer weekday, typical of the ozone season (May – October). The anthropogenic emissions inventory is first divided into four broad source categories: stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources. Each of these major categories is further defined into more descriptive equipment types and specific emission processes. The biogenic VOC emissions from vegetation for natural areas, crops, and urban landscapes are estimated separately from the anthropogenic inventory.

The 2002 base year anthropogenic planning inventory is estimated to be 160 tons per day of VOC emissions and 196 tons per day of NOx emissions for the Sacramento nonattainment area. The base year emissions are used to forecast future year inventories by using socio-economic growth indicators and the post-2002 emission reduction effects of existing control strategies. Also, potentially available pre-2002 emission reduction credits (ERCs) are included as additional growth in future years to ensure that their use will not be inconsistent with the reasonable further progress and attainment targets.

The 2002 base year emissions and emission forecasts out to 2018 for the Sacramento nonattainment area are summarized by the four major emission categories in Figure 14-1. The VOC and NOx emission forecasts show significant declines in mobile source emissions, despite increasing population, vehicle activity, and economic development in the Sacramento region.

¹¹⁶ Federal 8-hour ozone standard = 84 ppb.

Figure 14-1
VOC and NOx Emission Forecasts*
Sacramento Nonattainment Area



*Post-2002 stationary source emission forecasts include ERCs (4 tpd VOC and 3 tpd NOx).

14.5 Air Quality Modeling Analysis Indicates Additional Emission Reductions Are Needed for Attainment

Updated photochemical air quality grid modeling was developed to simulate base case episodes of high ozone formation as part of the extensive air monitoring and data analysis conducted for the 2000 Central California Ozone Study. The air quality model was then run with 2002 baseline year emissions and future year emissions forecasts (including VOC and NOx ERCs) to see if the ozone standard would be attained with existing control strategies. The relative decline in future ozone concentrations shown in the photochemical modeling results predicted attainment at all ozone monitors in 2018 except for two sites (Cool and Folsom) located in the eastern part of the Sacramento region.

Additional air quality modeling runs of across-the-board control scenarios were conducted. The air quality modeling analysis shows that attainment can be reached by 2018 with different combinations of VOC and NOx control. The modeling results indicate that both VOC and NOx reductions provide ozone benefits in the Sacramento region, but on a ton for ton basis NOx reductions provide greater ozone benefits than

VOC reductions. More specific conclusions regarding attainment targets for the Sacramento region's peak ozone monitoring site at Cool are provided in the attainment demonstration evaluation.

14.6 Proposed Regional and Local Control Measures

The Sacramento SIP control strategy relies on the following components:

1. Reductions from existing control measures and adopted rules,
2. Reductions from new state and federal regulations, and
3. Reductions from defined new SIP local and regional measures.

The proposed SIP emissions control strategy includes reductions of both VOC and NOx air pollutants. A single pollutant strategy is not practical since many existing statewide and local control programs will inherently achieve reductions from both ozone precursors.

EPA's final 8-hour ozone implementation rule (pursuant to section 172(c)(1) of the Clean Air Act) requires the attainment SIP submittal to include adopting all reasonably available control measures (RACM) necessary to demonstrate attainment as expeditiously as practicable and to meet any RFP requirements. EPA's RACM policy indicates that areas should consider all candidate measures that are potentially reasonably available. Sources of potentially reasonable measures include measures adopted in other nonattainment areas, measures that the EPA has identified in guidelines or other documents, and any measures that have been suggested for the particular nonattainment area during a public comment period.

Areas should consider all reasonably available measures for implementation in light of local circumstances. However, areas need only to adopt measures if they are both economically and technologically feasible and cumulatively will either advance the attainment date (by one year or more) or are necessary for RFP. This plan contains required reasonably available control measures.

The total emission reductions from the new measures necessary to attain the federal standards are an enforceable commitment in the SIP. While the proposed regional and local control measures include estimates of the emission reductions from each of the individual measures, the commitment is for emissions reductions from the aggregate of all proposed new measures combined. Therefore, if a particular measure does not get its expected emission reductions, each air district still commits to achieving the total aggregate emission reductions, whether this is realized through additional reductions from the other adopted measures, from alternative control measures, or incentive programs. Although the regional and local commitment is to the "total emission reductions," for purposes of transportation conformity, an explicit commitment is made to the reductions associated with the on-road mobile source incentive program.

The following Table 14-1 contains a summary of the proposed new regional and local control measures and expected VOC and NO_x emission reductions for the Sacramento nonattainment area for the 2018 attainment demonstration year. Emission benefits from these new committal measures are estimated to provide reductions of 3 tons per day of VOC and 3 tons per day of NO_x in 2018. Some of these new local measures will be adopted by the end of 2008, and emission benefits from just these adopted new measures are estimated to provide reductions of 1 ton per day of VOC in 2018.

Table 14-1
Summary of New Regional and Local Proposed Control Measures
Sacramento Nonattainment Area

Control Measure Name	2018 Emission Reductions (TPD)	
	VOC	NO _x
Regional Non-regulatory Measures		
Regional Mobile Incentive Program – On-road	<0.1	0.9
Regional Mobile Incentive Program – Off-road	<0.1	<0.1
Spare The Air Program	<0.1	<0.1
SACOG Transportation Control Measures	-	-
Urban Forest Development Program	0 - 0.2	-
Total Regional Non-regulatory Measures	0.1	0.9
Local Regulatory Measures		
Indirect Source Rule - Construction	-	0.1
Indirect Source Rule - Operational	0-<0.1	0-0.1
Architectural Coating	1.5	-
Automotive Refinishing	0.2	-
Degreasing/Solvent Cleaning	1.4	-
Graphic Arts	na	-
Miscellaneous Metal Parts and Products	<0.1	-
Natural Gas Production and Processing	0.1	-
Asphalt Concrete	-	0.1
Boilers, Steam Generator, and Process Heaters	-	0.2
IC Engines	-	0.1
Large Water Heaters and Small Boilers	-	1.3
Total Local Regulatory Measures	3.2	1.8
Total Reductions*	3.4	3.1

Note: Numbers are truncated to one decimal place. na = not available

*Total reductions are summed from untruncated values. See summary table in Appendix C – Proposed Control Measures.

The following Table 14-2 contains a summary of SACOG transportation control measures (TCMs) that are included in the Sacramento region's federal 8-hour ozone plan. The TCMs include new and continuing projects and funding programs.

Table 14-2
Summary of SACOG Transportation Control Measures
New and Continuing Projects and Funding Programs

TCM Name and (ID)	Implementing Agency	Implement or Completion Date	VOC Reduction (Tons/Day)	NOx Reduction (Tons/Day)
Intelligent Transportation Systems (ITS) Projects				
Arden Way Smart Corridor (ITS-1)	City of Sac - Dept of Transportation	2008	---	---
Sacramento Traffic Operations Center (ITS-2)	City of Sac - Dept of Transportation	2009	---	---
Watt Ave Phase 3 Smart Corridor (ITS-3)	Sac County - Dept of Transportation	2009	---	---
STARNET Implementation (ITS-4)	SACOG	2009	---	---
Park and Ride Lots / Transit Centers				
El Dorado Central Park and Ride Facility (TF-1)	El Dorado County Transit	2009	---	---
Improvements to Loomis Multimodal Center (TF-2)	Town of Loomis – Dept of Public Works	2010	---	---
13 th and 16 th St :Light Rail Station Improvements (TF-3)	Sac Regional Transit District	2009	---	---
Transit Service Funding Programs				
Transit Vehicle Acquisitions (TR-1)	Various Agencies	Various Dates	---	---
Transit Operations (TR-2)	Various Agencies	Various Dates	---	---
Other Specific Funding Programs				
Freeway Service Patrol (AQ-1)	Sac Transportation Authority	Through 2018	---	---
SECAT Program (AQ-2)	SMAQMD	Through 2018	--- ^a	--- ^a
Spare The Air Program (AQ-3)	SMAQMD	Through 2018	--- ^b	--- ^b
MTP Regional Funding Programs				
Air Quality Funding Program (FP-1)	Various Agencies	Through 2018	---	---
Bicycle and Pedestrian Funding Program (FP-2)	Various Agencies	Through 2018	---	---
Transportation Demand Management Funding Program (FP-3)	Various Agencies	Through 2018	---	---
Community Design Funding Program (FP-4)	Various Agencies	Through 2018	---	---
Miscellaneous Projects				
Light Rail Grade Separation at Watt Ave and Folsom Blvd (M-2)	Sac County – Dept of Transportation	2009	---	---
Total Emission Reductions				
			---	---

^aSECAT emission reductions are assumed to be included in SMAQMD mobile source control measure ONMS-HD-1.

^bSpare The Air emission reductions are assumed to be included in SMAQMD control measure TCM-ONMS-ED-1.

14.7 2018 Attainment Demonstration

The attainment demonstration in this plan is premised on EPA approval of the Sacramento nonattainment area's requested voluntary reclassification (bump-up) and extended attainment deadline. Therefore, attainment of the 1997 8-hour ozone NAAQS is evaluated for a 2018 "severe" classification scenario, based on modeling results for the peak ozone site (Cool) in the region. The modeled VOC and NO_x emission forecasts for 2018 incorporate growth assumptions and the estimated reductions associated with the existing control strategy. The photochemical modeling results were used to estimate the percent reductions needed from the 2018 emission forecasts in order to achieve the 1997 federal 8-hour ozone standard (84 ppb).

The combined reductions from new state and federal control measures and from new regional and local proposed control measures contained in this plan provide the additional VOC and NO_x emission reductions needed to demonstrate attainment by the 2018 "severe" classification deadline. The total emission reductions from new measures that will be adopted by the end of 2008 and expected future new measures are included in the 2018 attainment demonstration for the Sacramento area. These new control measures are included as a SIP commitment to meet the Clean Air Act and EPA requirements¹¹⁷ for nonattainment areas to adopt all reasonably available control measures (RACM) and to attain the 1997 federal 8-hour ozone standard as expeditiously as practicable (also referred to as "accelerated progress".) These measures will also provide a buffer in the event that CARB's estimate of emission reductions from the Cleaner In-Use Heavy Duty Trucks, are reduced due to changes in the final rule adopted December 11, 2008¹¹⁸. However, these additional emission reductions from new measures expected to be adopted after 2008 are less certain and may change during the rule development process. Even though these future new committal measures are required for expeditious attainment, it is anticipated that the attainment would be achieved by the 2018 deadline even if there is a reduction in their emission benefits. The attainment demonstration assessment for the Sacramento nonattainment area is summarized in Table 14-3.

¹¹⁷ CAA Section 172(c)(1) and Section 181(a)(1), and 40 CFR 51.912(d)

¹¹⁸ This is considered to be unlikely since on December 17, 2008 CARB staff informed district staff that it does not anticipate a decrease in emission reduction estimates (personal communication Ravi Ramalingam to SIP working group.)

Table 14-3
Summary of 2018 Attainment Demonstration for 1997 8-Hour Ozone NAAQS

Sacramento Nonattainment Area	VOC (tpd)	NOx (tpd)
A) 2002 Planning Emissions Inventory	160	196
B) 2018 Planning Emissions Inventory with Existing Controls	121	104
Attainment Demonstration with All New Committal Measures		
C) Emission Reductions in 2018 from All New State/Federal Control Measures	11	15
D) Emission Reductions in 2018 from All New Regional/Local Control Measures	3	3
E) Total Percent Emission Reductions in 2018 from All New Controls [(Line C + Line D) ÷ Line B]	11.6%	17.3%
F) Percent Emission Reduction Targets for Attainment* (see Figure 8-1, Point B)	3.3%	12.5%
G) Percent Emission Reductions for Accelerated Progress [Line E – Line F]	8.3%	4.8%
H) Is Attainment Demonstrated? (see Figure 8-1, Point A)	Yes	
Attainment Demonstration with Only New Measures Adopted by End of 2008		
I) Emission Reductions in 2018 from Adopted New State/Federal Control Measures	3	13
J) Emission Reductions in 2018 from Adopted New Regional/Local Control Measures	1	0
K) Total Percent Emission Reductions in 2018 from Adopted New Controls [(Line I + Line J) ÷ Line B]	3.3%	12.5%
L) Percent Emission Reduction Targets for Attainment (see Figure 8-1, Point B)	3.3%	12.5%
M) Percent Emission Reductions for Accelerated Progress [Line K – Line L]	0%	0%
N) Is Attainment Demonstrated? (see Figure 8-1, Point B)	Yes	

*The percent emission reduction targets for attainment (3.3% VOC and 12.5% NOx) are based on modeling results for the combination of emission reductions from only adopted new control measures that reduce the peak ozone design value to the federal standard (84 ppb).

14.8 Pollutant Transport from Upwind Bay Area Region

The air quality in the Sacramento region is impacted by pollutant transport from the San Francisco Bay Area. Delta breezes carry air pollutants from upwind Bay Area emission sources into the Sacramento region, and these pollutants may contribute to ozone formation during the same day or the following days. The California Air Resources Board has determined that the relative impact from this Bay Area transport can be considered overwhelming, significant, or inconsequential on various days,¹¹⁹ depending on meteorological conditions. CARB has also made findings that pollutant transport

¹¹⁹ California Air Resources Board, "Ozone Transport: 2001 Review", April 2001.

from the San Joaquin Valley can have significant or inconsequential impact¹²⁰ on air quality in the Sacramento region.

States are responsible for submitting SIPs for all areas of their State and need to demonstrate attainment in all areas addressing intrastate transport where appropriate. The photochemical grid modeling study includes the northern and central regions of California in the modeling domain, and was used to address and account for air pollutant transport impacts among the San Francisco Bay Area, San Joaquin Valley, Sacramento Valley, and Mountain Counties air basins.

CARB modeling for the attainment demonstration for the Sacramento nonattainment area used domain-wide emission reductions to characterize future ozone reductions at peak ozone monitoring stations. Therefore, for our area to attain, reductions in forecasted emissions necessary and committed to in Sacramento must also be achieved in the areas that significantly impact the region. In other words, the attainment demonstration for the Sacramento nonattainment area is predicated on the San Francisco Bay Area and the San Joaquin Valley also achieving an equivalent additional percent reduction of VOC and NOx emissions in their forecasted 2018 inventory. The reductions could come from either state or upwind regions' local measures, but we understand that CARB has committed to address the reduction requirement by implementing the new state measures statewide, which are expected to achieve similar reductions in the Bay Area and San Joaquin Valley.

In addition, pollutant transport from the Sacramento region can potentially impact the air quality in other regions under certain meteorological conditions. For example, CARB analyses have determined that ozone violations at the Grass Valley monitoring station in Nevada County are considered to be overwhelmingly due to transport from the Sacramento region.¹²¹ Emission reduction strategies in the Sacramento region will benefit their efforts to attain the federal ozone standards.

14.9 Weight-of-Evidence Determination

Attainment demonstrations based on photochemical modeling can be strengthened by supplemental evidence from additional modeling analyses and from considering modeling outputs other than the attainment test results. More diverse non-modeling and observational methods analyzing air quality, meteorological, and emissions data can also be used to corroborate the modeling predictions. EPA guidance¹²² specifies that a comprehensive weight-of-evidence approach should be undertaken to support the modeled attainment demonstration.

¹²⁰ Ibid.

¹²¹ Ibid.

¹²² "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" (EPA, October 2005, p. 28-33).

Since 1999, the number of area-wide exceedance days has decreased by over 10%. The ozone design value has decreased by 5%. A smaller portion of the nonattainment region violates the 1997 federal ozone standard, and the western most and eastern most portions of the region attain. Analyses show that these improvements are due to emissions reductions, not favorable weather conditions.

The overall conclusions of the weight-of-evidence analyses support the attainment demonstration when taking into account: 1) the ozone modeling results and that NO_x reductions will be critical to attainment, and 2) the general decline in emissions, ambient air pollutants, and ozone trend indicators. These evaluations are consistent with the overall NO_x and VOC emission control strategy in reducing peak ozone in the region.

14.10 Transportation Conformity and Motor Vehicle Emissions Budgets

Under the federal Clean Air Act, federal agencies may not approve or fund transportation plans and projects unless they are consistent with state air quality implementation plans (SIPs). Conformity with the SIP requires that transportation activities not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS). Conformity regulations state that emissions from transportation plans and projects must be less than or equal to the motor vehicle emissions budgets established by reasonable further progress, attainment or maintenance plans (SIPs). (40 CFR 93.118)

Table 14-4 lists the proposed new transportation conformity budgets for the 2011, 2014, and 2017 RFP milestone years, and the 2018 attainment analysis year for the Sacramento nonattainment area. The proposed budgets incorporate the recent on-road motor vehicle emission inventory factors of EMFAC2007, updated travel activity data, and latest control strategies.

Table 14-4 Proposed New Motor Vehicle Emissions Budgets* Sacramento Nonattainment Area		
	VOC	NO_x
2011 Emissions Budgets (EMFAC2007) – Tons per Day	38	78
2014 Emissions Budgets (EMFAC2007) – Tons per Day	32	61
2017 Emissions Budgets (EMFAC2007) – Tons per Day	29	48
2018 Emissions Budgets (EMFAC2007) – Tons per Day	24	34

*All motor vehicle emission budget years include regional incentive benefits. State control measure reductions are only included in 2018.

This ozone plan includes the updated on-road motor vehicle emissions and the proposed transportation budgets that assume vehicle activity levels based on the road

and transit projects contained in the region's Metropolitan Transportation Plan for 2035 (MTP2035). The transportation analysis for the MTP2035 relied on SACOG's new SACSIM regional travel forecasting model to estimate future traffic volumes in the 6-county Sacramento region. This model also incorporated the latest SACOG land use assumptions from the MTP2035, including the "smart growth" principles expected to be implemented from the Blueprint Program.

If these proposed new motor vehicle emission budgets are determined to be adequate for transportation conformity purposes by EPA, future transportation plans will need to conform to them. The Metropolitan Planning Organizations, SACOG and MTC, must ensure that the aggregate transportation emissions in the region stay below these levels when approving new metropolitan transportation plans and transportation improvement programs, even if the mix of projects changes or growth increases. These new, adequate 8-hour MVEBs will remain in effect until other budgets are found adequate or approved by EPA.

14.11 Updated Emissions Inventory for General Conformity

General conformity is the federal regulatory process for preventing major federal actions or projects from interfering with air quality planning goals. Conformity provisions ensure that federal funding and approval are given only to those activities and projects that are consistent with state air quality implementation plans (SIPs). Conformity with the SIP means that major federal actions will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS). Examples of general federal actions that may require a conformity determination include, but are not limited to, the following: leasing of federal land; private construction on federal land; reuse of military bases; airport construction and expansions, and construction of federal office buildings.

A federal agency may demonstrate conformity by showing that the total of direct and indirect emissions from the action is accounted for in the applicable SIP's attainment or maintenance demonstration. Therefore, the updated emissions inventory in this 8-hour ozone attainment demonstration plan would be applicable for general conformity purposes. Specific emission budgets for airport operations are identified for future years.

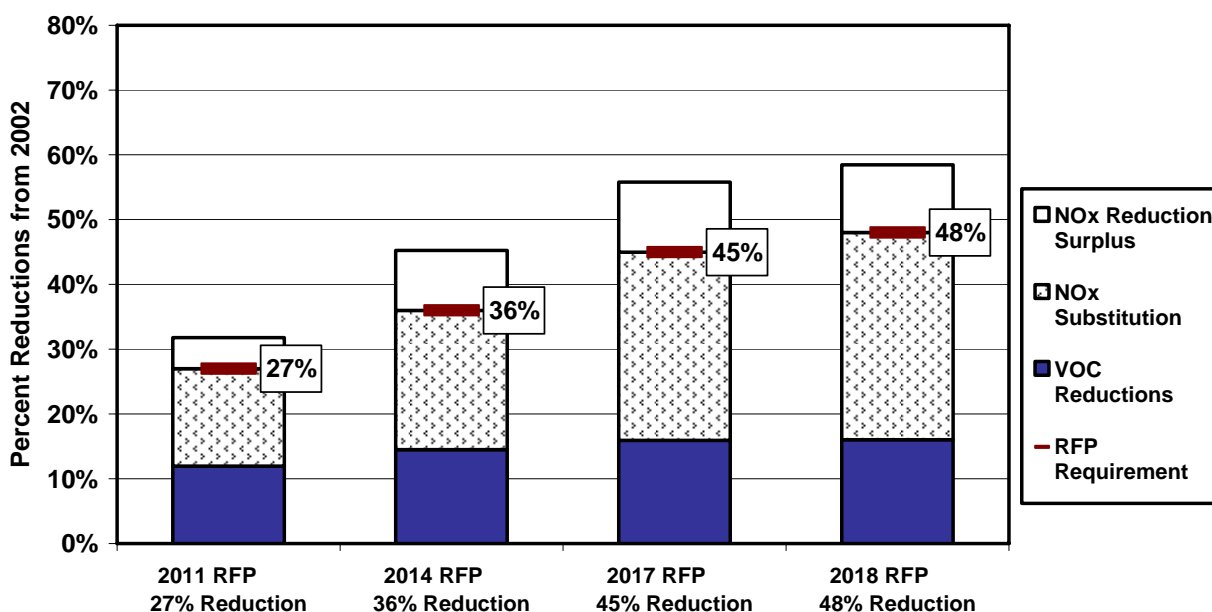
14.12 Reasonable Further Progress Demonstration Achieved

The federal 8-hour ozone regulations¹²³ require that areas classified as "serious or above" submit a reasonable further progress (RFP) demonstration plan that provides for at least 3% average annual reductions of VOC (and/or NOx) emissions every 3-year period after 2008 out to the attainment year. The RFP demonstration must fully account for emissions growth when calculating the net emission reductions.

¹²³ Federal Register, November 29, 2005, p. 71634.

The RFP evaluation is based on the emission inventory forecasts, which assume expected growth rates and current control measures. The 3-year RFP demonstrations are achieved through VOC and NOx emission reductions for the milestone years 2011, 2014, 2017, and the 2018 attainment analysis year. Figure 14-2 shows the percentages of VOC and NOx emission reductions used to meet the RFP reduction goals. A NOx reduction surplus is used to meet a 3% contingency margin requirement.

Figure 14-2
Summary of Reasonable Further Progress Demonstrations
Sacramento Nonattainment Area



14.13 Future Ozone Planning Efforts

The proposed Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan reflects the best available information at this time. However, emission inventories, modeling analyses, and control strategies will continue to be updated and re-evaluated. Revisions to this plan can be made at any time if new information indicates a change is needed. Each air district will independently prepare and submit updated RACT SIPs for major sources (emissions equal to or greater than 25 tons per year) under severe area requirements as needed.

Milestone Reports

Section 182(g) of the Clean Air Act Amendments requires that progress (milestone) reports be prepared to evaluate whether actual emission reductions meet the minimum reasonable further progress targets. In addition, the milestone analysis assesses the control measures that have actually been adopted and implemented in comparison to

the overall comprehensive attainment strategy contained in the ozone plan. The first 8-hour ozone milestone report will be prepared following the 2008 RFP milestone year, and then every three years out to the attainment year.