
**SACRAMENTO REGIONAL
8-HOUR OZONE ATTAINMENT AND
REASONABLE FURTHER PROGRESS PLAN
(2013 SIP REVISIONS)**

September 26, 2013

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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.

September 26, 2013

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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
NO_x	- 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 classified as a “serious” nonattainment area with an attainment deadline of June 15,

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.

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. EPA approved the reclassification request on May 5, 2010 (75 FR 24409).

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.

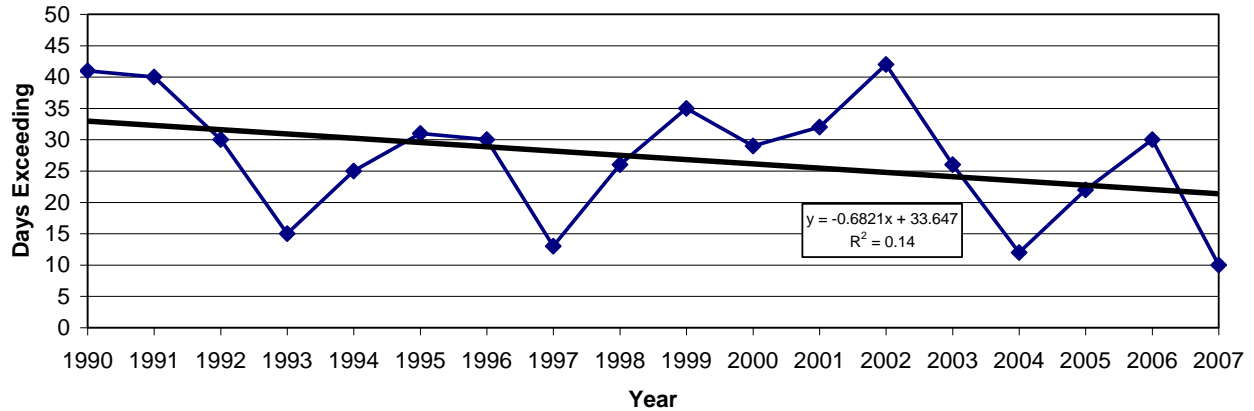
1.3 8-Hour Ozone Trends in the Sacramento Region

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.

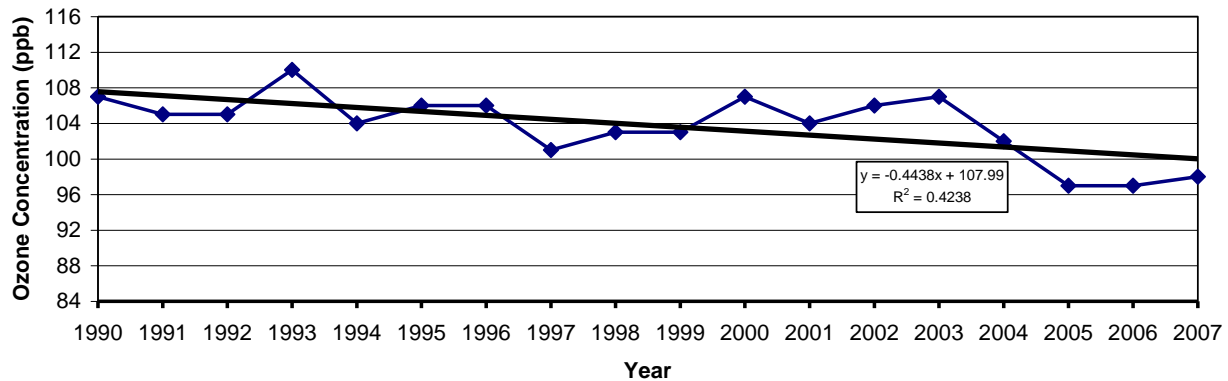
Figure 1-1
8-Hour Ozone Exceedance Days
Sacramento Nonattainment Area – Peak Monitoring Site



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

1.4 VOC and NO_x 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

⁴ Federal 8-hour ozone standard = 84 ppb.

nitrogen oxides (NO_x). 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 NO_x 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 147 tons per day of VOC emissions and 165 tons per day of NO_x 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 NO_x emissions inventory for the Sacramento nonattainment area by the four major emission categories. The VOC and NO_x 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 (tpd)**

Emission Category	2002	2014	2017	2018
Stationary Sources	22	26	27	27
Area-Wide Sources	32	30	30	31
On-Road Motor Vehicles	52	21	17	15
Other Mobile Sources	41	28	25	24
Total	147	104	99	98

Notes: – ERCs are included in the 2014, 2017, and 2018 inventories.
– Totals may not add exactly due to rounding.

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

Emission Category	2002	2014	2017	2018
Stationary Sources	12	13	12	12
Area-Wide Sources	3	3	3	3
On-Road Motor Vehicles	99	46	37	34
Other Mobile Sources	50	28	27	25
Total	165	90	78	74

Notes: – ERCs are included in the 2014, 2017, and 2018 inventories.
– Totals may not add exactly due to rounding.

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 NO_x pollutant strategy is not appropriate because, even though VOC measures are not as effective as NO_x, they still provide needed reductions. Moreover, 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 are an enforceable commitment in the SIP and provide a buffer for attainment. 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, 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.

If an infeasibility finding is made for a control measure or a portion thereof in the future, 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	0.5
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	0.5
Local Regulatory Measures		
Architectural Coating	1.5	-
Automotive Refinishing	0.2	-
Degreasing/Solvent Cleaning	0.7	-
Graphic Arts	na	-
Miscellaneous Metal Parts and Products	<0.1	-
Natural Gas Production and Processing	0.1	-
Boilers, Steam Generator, and Process Heaters	-	0.2
IC Engines	-	0.0
Large Water Heaters and Small Boilers	-	0.2
Total Local Regulatory Measures*	2.6	0.5
Total Reductions*	2.7	1.1

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)	NO _x 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	---	---
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	---	---
Dry Creek Parkway Trail Phase 1	Sac County – Dept of Transportation	2011	---	---
Total Emission Reductions			---	---

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

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

1.7 Attainment Demonstration

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 emissions reduction from new measures is shown in Table 1-5. These future new committal measures provide a buffer in the attainment demonstration. 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.

Table 1-5 Summary of Attainment Demonstration for 8-Hour Ozone NAAQS 2018 “Severe” Classification Scenario

Sacramento Nonattainment Area	VOC (tpd)	NO _x (tpd)
Summary of 2009 Plan Attainment Demonstration		
A) 2002 Planning Emissions Inventory ¹	160.3	196.1
B) 2018 Planning Emissions Inventory with Existing Controls ¹	121.1	104.1
C) Attainment Emission Reduction in percentage ²	3.3%	12.5%
D) SIP Emissions Target: Line B × (1 – Line C)	117.1	91.1
E Percentage Emission Reduction Required for Attainment: (1 – (Line D ÷ Line A)) × 100%	27.0%	53.6%
Revised Emissions Targets		
F) Updated 2002 Inventory ³	146.7	164.8
G) Updated SIP Emissions Target: Line F × (1 – Line E)	107.1	76.5
Revised Attainment Demonstration		
H) Updated 2018 Inventory ³	97.7	73.9
I Motor Vehicle Emissions Budgets Safety Margin ⁴	1	3
J) Emission Reductions in 2018 from Remaining Regional/Local Control Measures ^{5,7}	2.7	1.1
K Emissions Reductions in 2018 from Remaining State/Federal Control Measures ^{6,7}	5.7	0.3
L) Total Emissions in 2018 with All Remaining Controls: (Line H + Line I - Line J – Line K)	90.3	75.5
M) Is Attainment Demonstrated? (Is Line L ≤ Line G?)	Yes	

1. The 2009 inventory is shown in Appendix A8.
2. The percent emission reduction targets for attainment are based on modeling results. Figure 8-1 Point A.
3. Chapter 5. Tables 5-2 and 5-3 include ERCs (ERC details are in Tables 5-4 and 5-5).
4. Chapter 11 Table 11-1
5. Appendix C, Table of Emission Reductions by Air District, Page C-5.
6. Chapter 7. Table 7-2, sum of expected emission reductions from New Emission Standards for Recreational Boats and Expanded Off-Road Rec. Vehicle Emission Standards.
7. These reductions provide a buffer for meeting attainment targets.

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 days⁵, depending

⁵ California Air Resources Board, “Ozone Transport: 2001 Review”, April 2001.

on meteorological conditions. CARB has also made findings that pollutant transport from the San Joaquin Valley can have significant or inconsequential impact⁶ 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 inventories. 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.⁷ 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 guidance⁸ specifies that a comprehensive weight-of-evidence approach should be undertaken to support the modeled attainment demonstration.

⁶ Ibid.

⁷ Ibid.

⁸ "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. The ozone modeling concluded that NO_x reductions will be critical to reaching attainment. The additional weight-of-evidence analyses looked at three areas: (i) the general decline in emissions, (ii) ambient air pollutants, and (iii) ozone concentration trend indicators. The ozone concentration analyses included adjustments for meteorology. These weight-of-evidence analyses found that each of these areas are improving over time, consistent with the overall NO_x and VOC emission control strategy reducing peak ozone in the region, and support the conclusion that the region will attain by 2018.

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 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 EMFAC2011, updated travel activity data, and latest regional and state control strategies.

Table 1-6 Proposed New Motor Vehicle Emission Budgets Sacramento Nonattainment Area						
	NO _x			VOC		
	2014	2017	2018	2014	2017	2018
ARB Inventories for Conformity (Tons per Day)	46	37	34	21	17	16
Safety Margin	3	2	3	2	1	1
Budgets	49	39	37	23	18	17

*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 2013/16 Metropolitan Transportation Improvement Program on SACOG's new SACSIM regional travel forecasting model to estimate future traffic volumes in the 6-county Sacramento region.

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.

Vehicle Miles Traveled Offset (VMT Offset)

In early 2011, EPA's interpretation of the Clean Air Act VMT offset requirements (Section 182(d)(1)(A)) was challenged in the U.S. Court of Appeals for the 9th Circuit.⁹ The ruling effectively requires severe and extreme nonattainment areas, including Sacramento, to submit VMT offset demonstrations.

A detailed VMT offset demonstration was prepared by California Air Resources Board and is included in Appendix F – Motor Vehicle Emission Budgets and VMT Offset Demonstration.

1.11 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.

⁹ Association of Irrigated Residents v EPA, (9th Cir. 2011, reprinted as amended on January 27, 2012, 632 F. 3d 584, at 596-597).

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.

1.12 Reasonable Further Progress Demonstration

The federal 8-hour ozone regulations¹⁰ 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 NO_x) 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.

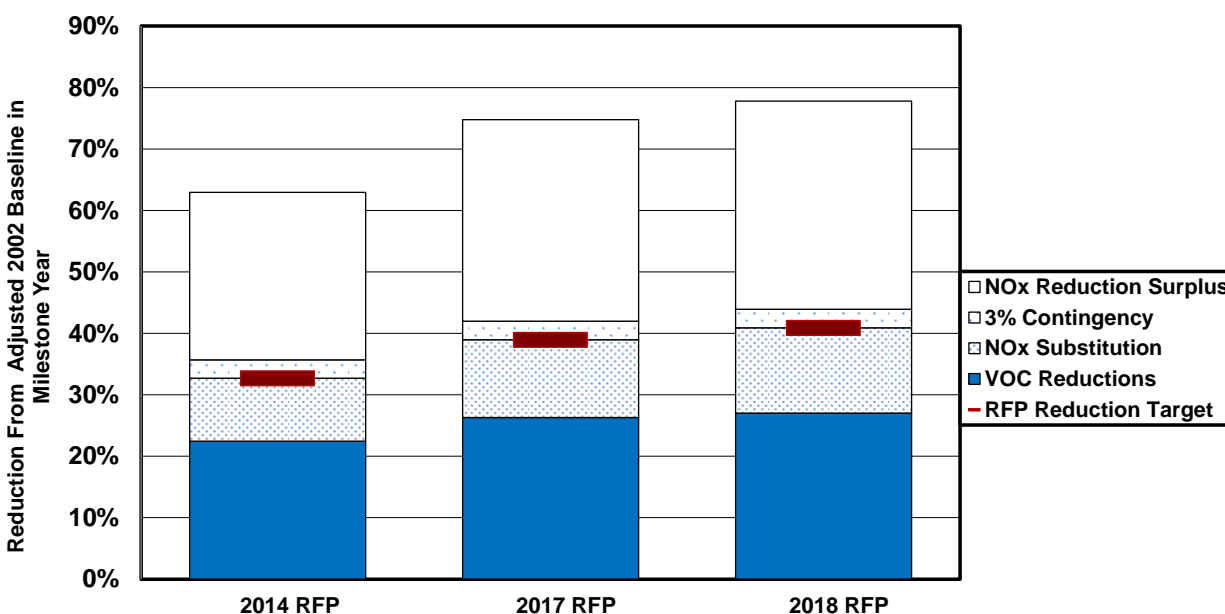
In February 2006, the Sacramento region submitted an early 8-hour ozone RFP plan to EPA demonstrating an 18% reduction from 2002-2008 for the Sacramento nonattainment area with existing control strategies. In addition, the early RFP plan included an updated emission inventory and set new motor vehicle emission budgets for 2008, which EPA found to be adequate for transportation conformity purposes.¹¹ Consequently, this Sacramento Regional 8-Hour Ozone Attainment and RFP Plan does not include a 2002-2008 RFP demonstration.

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 NO_x emission reductions for the milestone years of 2014, 2017, and the 2018 attainment analysis year. Figure 1-3 shows the percentages of VOC reductions and NO_x substitution that are used to meet the RFP reduction targets.

¹⁰ Federal Register, November 29, 2005, p. 71634.

¹¹ Federal Register, March 14, 2006, p. 13124 (effective date March 29, 2006).

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



1.13 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 NO_x 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 NO_x reductions on a ton for ton basis would be more effective at reducing high ozone in the region than VOC reductions.
4. New regulatory and non-regulatory VOC and NO_x 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 NO_x 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 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 Document¹² 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.¹³

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 (NO_x) in the presence of sunlight. Because of this, VOC and NO_x are known as ozone “precursors.”

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

¹² “Air Quality Criteria for Ozone and Related Photochemical Oxidants” (EPA, February 2006) – <http://www.epa.gov/ncea>.

¹³ 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 hour¹⁴.

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, 1995¹⁵. The control measures implemented from the 1994 SIP are incorporated into the existing control strategies and reflected in future emission forecasts. EPA has recognized the Sacramento Region attained the 1-hour ozone standard¹⁶.

¹⁴ One-hour ozone standard violation criterion defined as no more than 3 daily exceedances (>124 ppb) over 3 years at a monitoring site.

¹⁵ “California, Sacramento Ozone Nonattainment Area, Reclassification to Severe” (Federal Register, April 25, 1995).

¹⁶ Federal Register, October 12, 2012, p. 64036-64039.

2.5 Federal 8-Hour Ozone Standard

In July 1997, EPA promulgated an 8-hour standard for ozone¹⁷. This change lowered the health-based standard for ambient ozone from 0.12 parts per million of ozone 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 provisions¹⁸. 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.¹⁹ The Court then found that EPA did not comply with the Clean Air Act anti-backsliding provisions in section 172(e), under which 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.

¹⁷ "National Ambient Air Quality Standards for Ozone" (Federal Register, July 18, 1997, p. 38855-38896).

¹⁸ 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.

¹⁹ Court allowed 8-hour ozone classifications using Clean Air Act, Title 1, part D, subpart 2, but not using subpart 1.

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.
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.

Since 1992, EPA applied its longstanding interpretation of CAA section 182(d)(1)(A) requirement that allowed a state to conclude that no further transportation control measures (TCMs) are necessary if aggregate motor vehicle emissions are projected to decline each year from the base year of the plan to the attainment year.

In early 2011, EPA's interpretation was challenged in the U.S. Court of Appeals for the 9th Circuit.²⁰ The ruling effectively requires severe and extreme nonattainment areas, including Sacramento, to submit the VMT offset demonstrations.

In August 2012, EPA released guidance²¹ in response to the Court's opinion. This guidance indicates that technology improvements such as vehicle technology improvements, motor vehicle fuels, and other control strategies that are transportation related could be used to offset increases in emissions due to VMT. This guidance also sets out a methodology for demonstrating achievement of the VMT offset requirement.

²⁰ Association of Irrigated Residents v EPA, (9th Cir. 2011, reprinted as amended on January 27, 2012, 632 F. 3d 584, at 596-597)

²¹ Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Travelled (EPA, August 2012).

This Plan contains a vehicle miles travelled offset demonstration that satisfies Clean Air Act requirements under section 182(d)(1)(A), using the methodology outlined in EPA's August 2012 guidance entitled "Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Travelled."

New 8-Hour Ozone NAAQS

On March 12, 2008, EPA promulgated a revised 8-hour ozone NAAQS²² of 0.075 parts per million, based on a review of new health studies. However, the 1997 8-hour standard remains in effect, as do the SIP requirements and implementation rules for that standard, including this Plan update requirement. 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). SACOG and MTC²³ 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.

²² "National Ambient Air Quality Standards for Ozone" (Federal Register, March 27, 2008, p. 16436-16514).

²³ MTC is the MPO for the east Solano County portion of the Sacramento nonattainment area.

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 NO_x 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 Board of Directors for each of the air districts in the Sacramento nonattainment area held a public hearing prior to approving the plan. The 2013 technical amendments were noticed in each air district and the public hearing conducted by the SMAQMD Board of Directors.

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 inter-basin 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. This chapter also provides an analysis demonstrating that the SFNA meets the vehicle miles traveled (VMT) Offset requirements under CAA section 182(d)(1)(A). 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 and VMT Offset Analysis
- 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 classifications²⁴ for the 1997 8-hour ozone national ambient air quality standards (NAAQS)²⁵. The Sacramento region was classified as a “serious” nonattainment area. While air quality has improved, and the area met the 1-hour standard in 2009, exceedances of the 8-hour 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 8-hour NAAQS.

The federal 8-hour ozone implementation rules²⁶ 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 going 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. The 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.

²⁴ “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.

²⁵ “National Ambient Air Quality Standards for Ozone” (Federal Register, July 18, 1997, p. 38855-38896).

²⁶ “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 districts²⁷ 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 approved the reclassification, effective June 4, 2010 (75 FR 24409, May 5, 2010).

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 NO_x 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 NO_x emissions.

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 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.

²⁷ 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.

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^{28,29} 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: (i) they are both economically and technologically feasible and cumulatively will advance the attainment date by one year or more, or (ii) 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 impracticable³⁰.”

3.6 Vehicle Miles Travelled (VMT) Offset Requirement

Section 182(d)(1)(A) of the federal Clean Air Act applies to areas classified as severe or extreme nonattainment of the National Ambient Air Quality Standard (NAAQS) for ozone. The Sacramento Federal Ozone Nonattainment Area is currently designated as Severe-15, (75FR24409) and is subject to this requirement. A VMT offset demonstration

²⁸ “Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2” (Federal Register, November 29, 2005, p. 71659-71661).

²⁹ “Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas” (EPA, December 1999).

³⁰ “General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990” (57 FR 13498, April 16, 1992).

was prepared in accordance with U.S. EPA's guidance³¹ and is included as part of this plan.

3.7 Sacramento Nonattainment Area Designation

EPA made determinations regarding 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 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).

3.8 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 initially 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 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

³¹ "Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Travelled." (EPA August 2012)

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.

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.

3.9 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 purposes³⁷.

The Sacramento region was required to submit a plan demonstrating RFP through 2011. 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, 2008³⁸.

In May 2008, an 8-hour ozone 2011 RFP plan³⁹ 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 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 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.

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

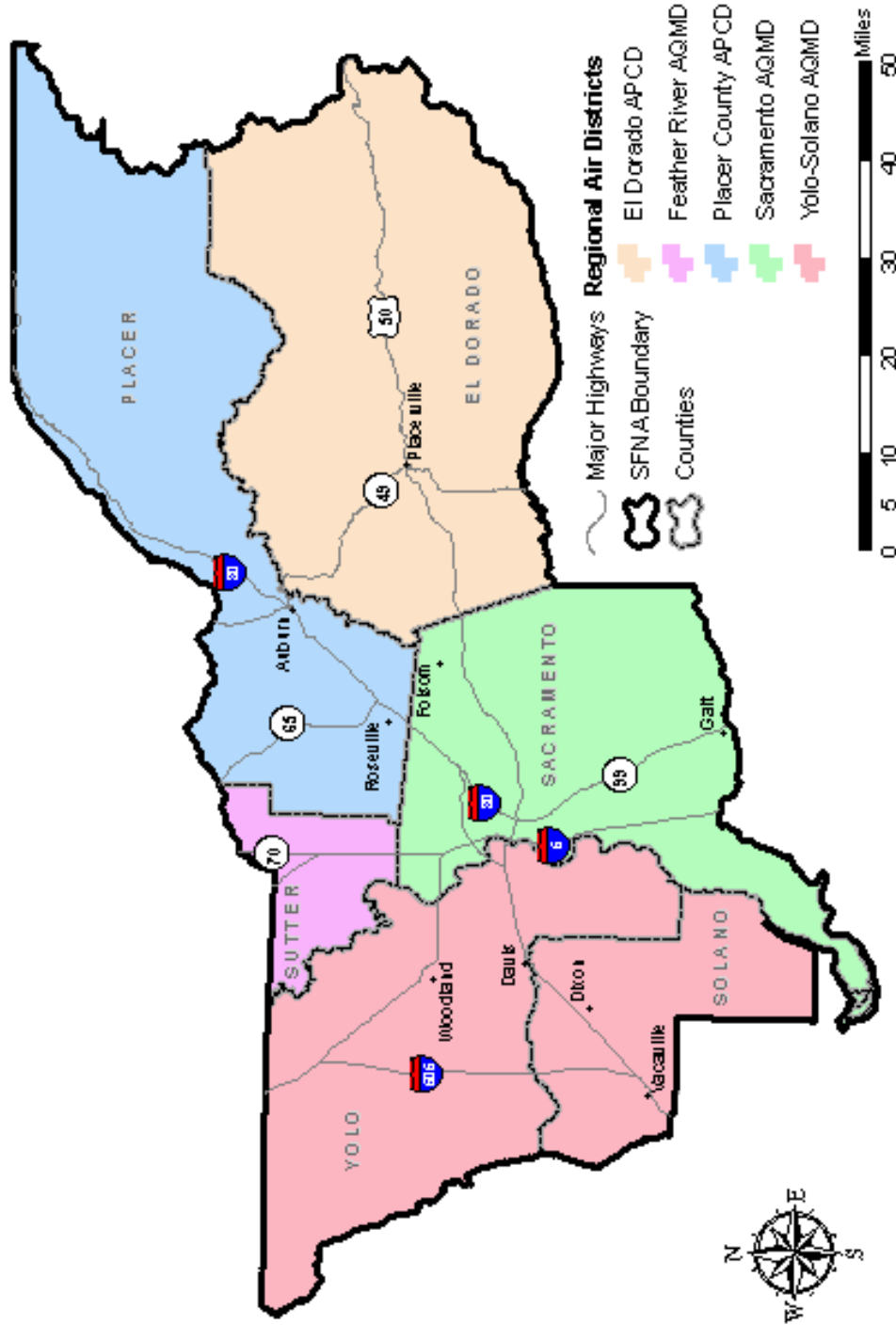
³⁷ Federal Register, March 14, 2006, p. 13124 (effective date March 29, 2006).

³⁸ “Finding of Failure to Submit State Implementation Plans Required for the 1997 8-Hour Ozone NAAQS” (Federal Register, March 24, 2008, p.15416-15421).

³⁹ Sacramento Regional 8-Hour Ozone 2011 Reasonable Further Progress Plan (May 2008).

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. This chapter focuses on two different 8-hour ozone parameters: 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. In 2010, one monitoring site was relocated from the Sacramento Airport Road site to Goldenland Court. 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 2012.

4.3 Annual Number of Exceedance Days

Table 4-1 shows the annual number of days over 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). The number of exceedance days at the peak monitoring site varies year to year, between 8 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 site 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 2012. The 23-year trend line indicates a decline in the overall average peak number of annual exceedance days, from about 34 down to 15, which equals a decline rate of about 0.8 exceedance days per year.

The historical ambient air quality data (Tables 4-1) show that Cool and Folsom were the sites recording the highest number of exceedance days in the past 23 years. In the previous Plan revisions, Cool was the peak exceedance site from 1996 -2007. During this 12 year period, Cool has recorded the highest number of exceedance days for 8 years. In the recent five year period (2008 – 2012), the Folsom monitor has recorded the highest number of exceedance days and peak design values.

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 95 ppb and 110 ppb. Folsom was the peak design value site for the past 7 years.

4.6 Trend in Ozone Design Value

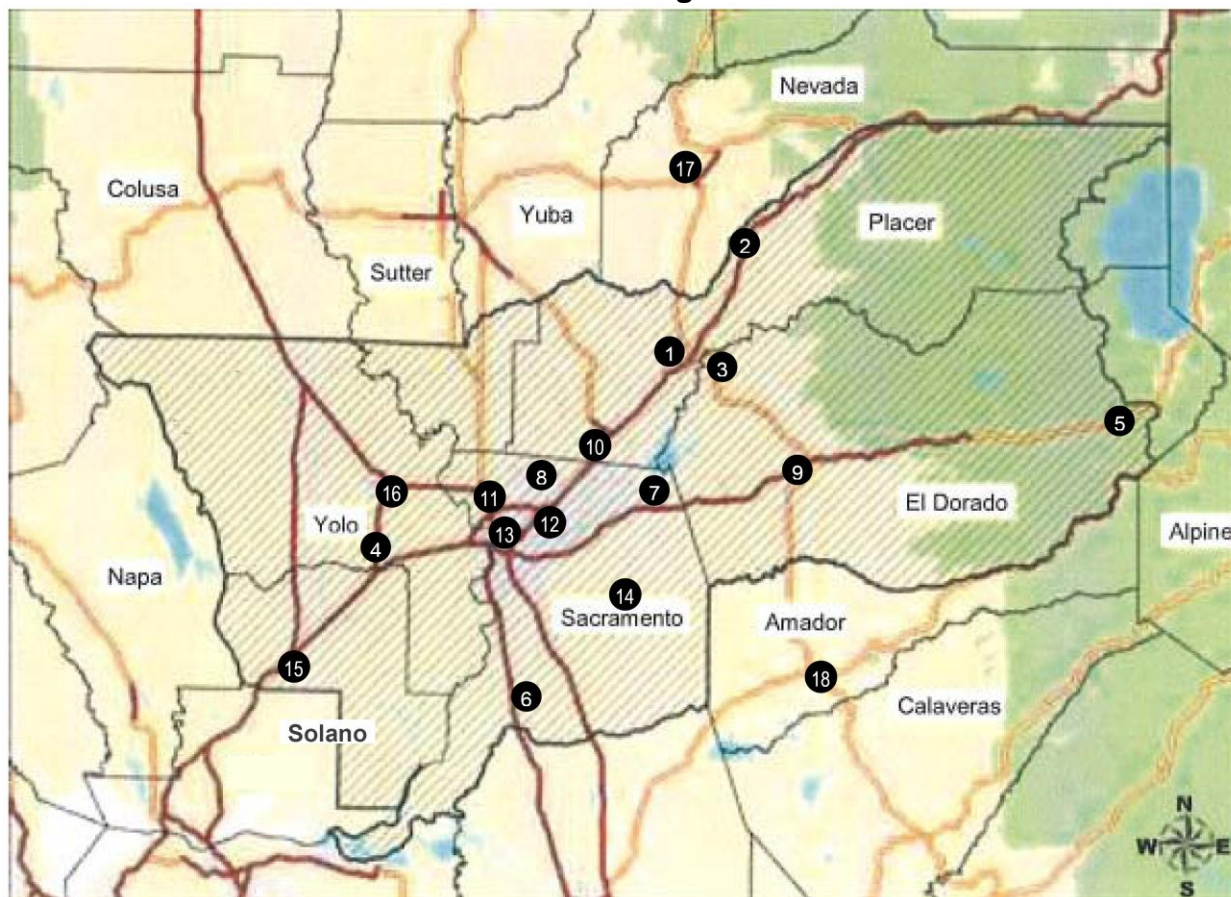
The line graph in Figure 4-4 shows the ozone design value for the peak monitoring site in each year and a trend line from 1990 to 2012. The overall 23-year trend line indicates a decline, from 107 ppb down to about 98 ppb. The ozone design value has improved from being 24 ppb (or 28%) over the standard⁴¹ down to about 14 ppb (or 16%), which equals a decline rate of about 0.4 ppb per year.

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**



2012 Ozone Monitoring Sites (County)

Sacramento Nonattainment Area Sites

- | | |
|--------------------------------|---|
| 1. Auburn (Placer Co.) | 11. Sacramento – Goldenland Court. (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. Sloughouse (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	2008	2009	2010	2011	2012
Auburn	41	25	26	15	25	18	17	1	16	25	17	21	15	11	12	10	29	0	13	3	3	3	na
Colfax			12	4	12	11	5	2	8	9	0	2	18	12	9	13	14	1	3	0	0	1	1
Cool							30	10	25	35	29	32	42	22	8	22	30	10	15	6	1	8	1
Davis	3	0	4	1	0	2	4	1	4	5	2	2	2	0	0	0	1	1	1	0	0	0	0
Echo Summit											0	0	0	0	0	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	2	1	1	0	1
Folsom	1	40	30	13	22	27	23	8	26	18	15	19	23	26	7	19	25	7	25	22	8	14	12
North Highlands	4	5	5	3	6	11	15	0	9	5	7	7	11	4	1	2	10	1	0	1	2	1	1
Placerville			29	12	22	31	27	13	17	23	15	15	20	19	7	16	20	4	16	5	2	1	6
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	13	11	5	3	5
Sac-Airport Rd.**									6	1	1	2	0	1	0	1	1	1	2				
Sac-Del Paso M.	17	14	14	6	5	23	13	1	10	6	9	6	23	13	3	10	10	2	7	8	1	1	3
Sac-Goldenland Court																			0	0	0	0	0
Sac-T Street	2	2	2	1	0	3	3	1	4	4	0	3	3	1	0	1	3	1	2	1	0	1	1
Sloughhouse								3	24	19	18	15	16	19	8	10	17	2	10	7	4	4	7
Vacaville	1	na	na	na	na	3	2	0	7	8	0	0	0	0	1	0	2	0	1	1	0	0	0
Woodland	2	1	6	1	0	3	2	0	4	4	0	1	4	0	0	2	4	0	1	0	0	0	0
Peak Site	41	40	30	15	25	31	30	13	26	35	29	32	42	26	12	22	30	10	25	22	8	14	12

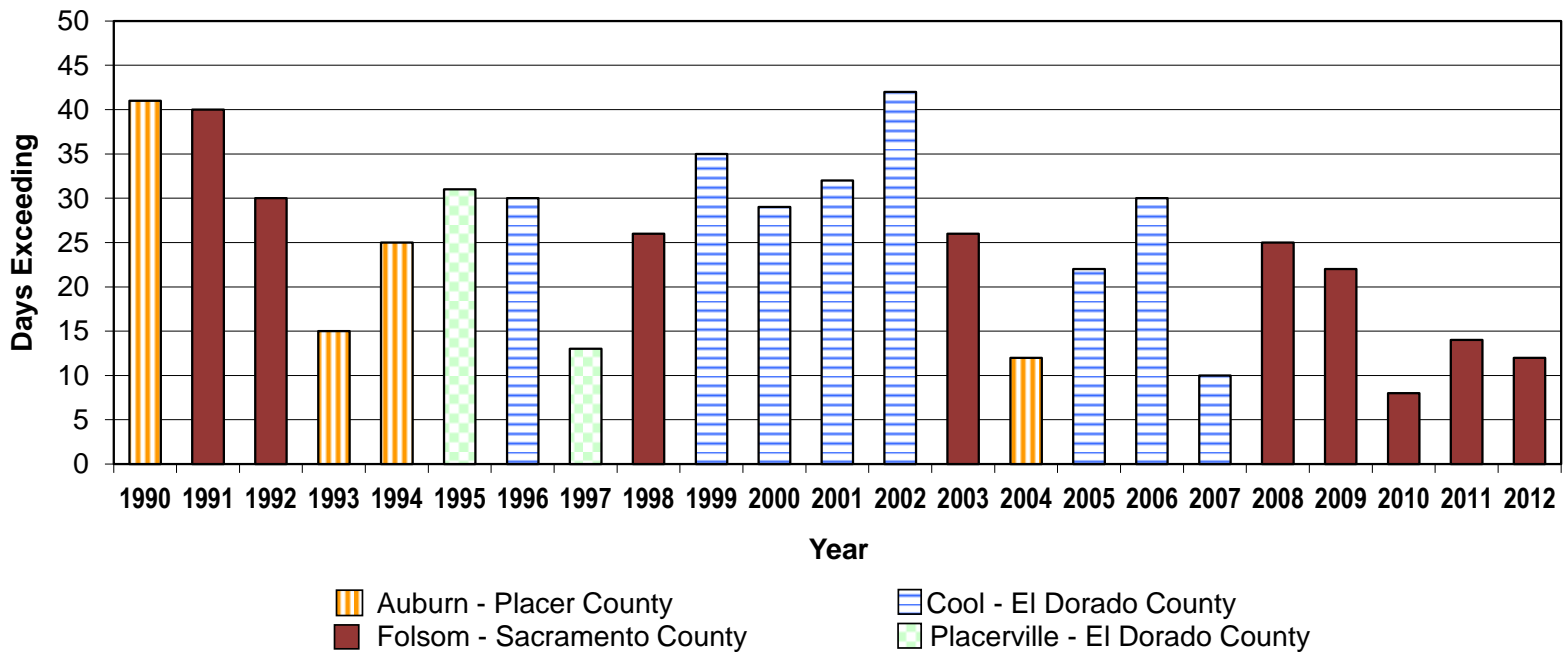
Data source: CARB air quality data base (www.arb.ca.gov/adam/welcome.html). Downloaded on 06/06/2013.

*Site closed

** Sac-Airport Road site was relocated to Sac-Goldenland Court in 2010.

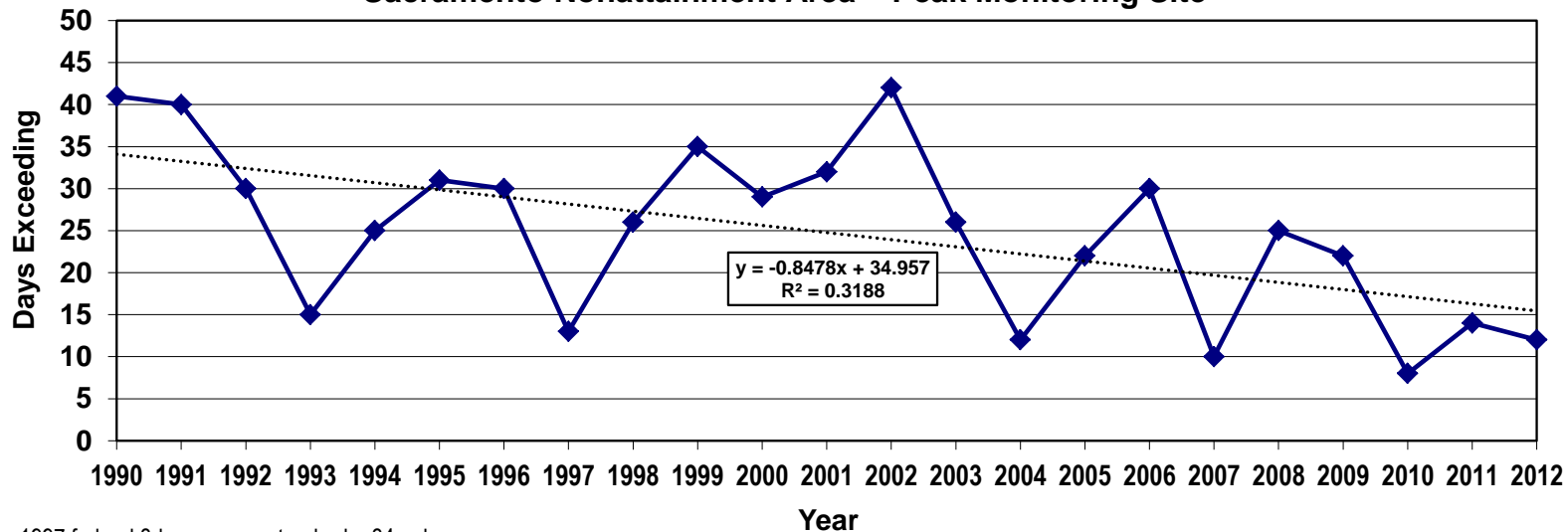
na = insufficient data available

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



1997 federal 8-hour ozone standard = 84 ppb

This trend analysis uses the highest number of 8-hour ozone exceedance days above the 1997 federal 8-hour ozone standard recorded each year at the various monitoring sites, 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	2008	2009	2010	2011	2012
Auburn	107	105	105	101	102	105	103	95	95	97	102	101	101	99	95	92	93	89	90	86	87	80	na
Colfax			na	na	92	92	91	86	86	86	79	73	77	88	92	91	97	94	89	79	78	74	75
Cool							na	na	103	103	107	104	106	107	102	97	95	96	98	93	89	84	83
Davis	78	73	80	78	79	78	82	79	80	81	85	81	77	76	74	73	74	75	76	74	72	70	70
Echo Summit													75	76	75	72	72	73	76	74	71	67	69
Elk Grove						81	87	87	87	88	85	84	75	80	77	82	82	83	82	79	77	74	74
Folsom	101	100	101	110	104	106	106	na	92	101	104	99	100	100	97	97	97	98	102	100	102	95	95
North Highlands	87	82	88	87	87	88	91	88	89	87	89	89	92	91	85	80	82	80	78	74	75	77	77
Placerville			na	na	97	99	103	99	98	98	99	96	94	95	94	94	94	93	96	92	90	80	81
Pleasant Grove*	82	76	79	82	81	82	83	82	81	81	84	83	82										
Rocklin*		na	na	101	103	100	100	95	94	92	93	91	92										
Roseville				na	na	97	96	93	93	89	93	90	92	90	87	86	89	89	90	89	90	86	85
Sac-Airport Rd.**									na	na	82	79	78	77	74	73	73	76	78				
Sac-Del Paso M.	96	95	100	99	92	96	100	97	95	91	95	92	95	97	95	92	90	90	87	86	85	81	78
Sac-Goldenland Court																					57	69	69
Sac-T Street		76	79	79	78	78	80	77	79	80	82	80	79	79	75	73	76	78	79	77	75	71	71
Sloughhouse									na	100	105	98	95	95	94	94	96	93	95	91	92	87	88
Vacaville	75	na	na	na	na	na	na	76	82	85	85	77	72	68	na	71	73	74	75	72	71	68	69
Woodland	80	77	na	na	79	78	81	79	na	na	84	82	83	83	79	77	79	80	79	74	72	69	69
Peak Site	107	105	105	110	104	106	106	101	103	103	107	104	106	107	102	97	97	98	102	100	102	95	95

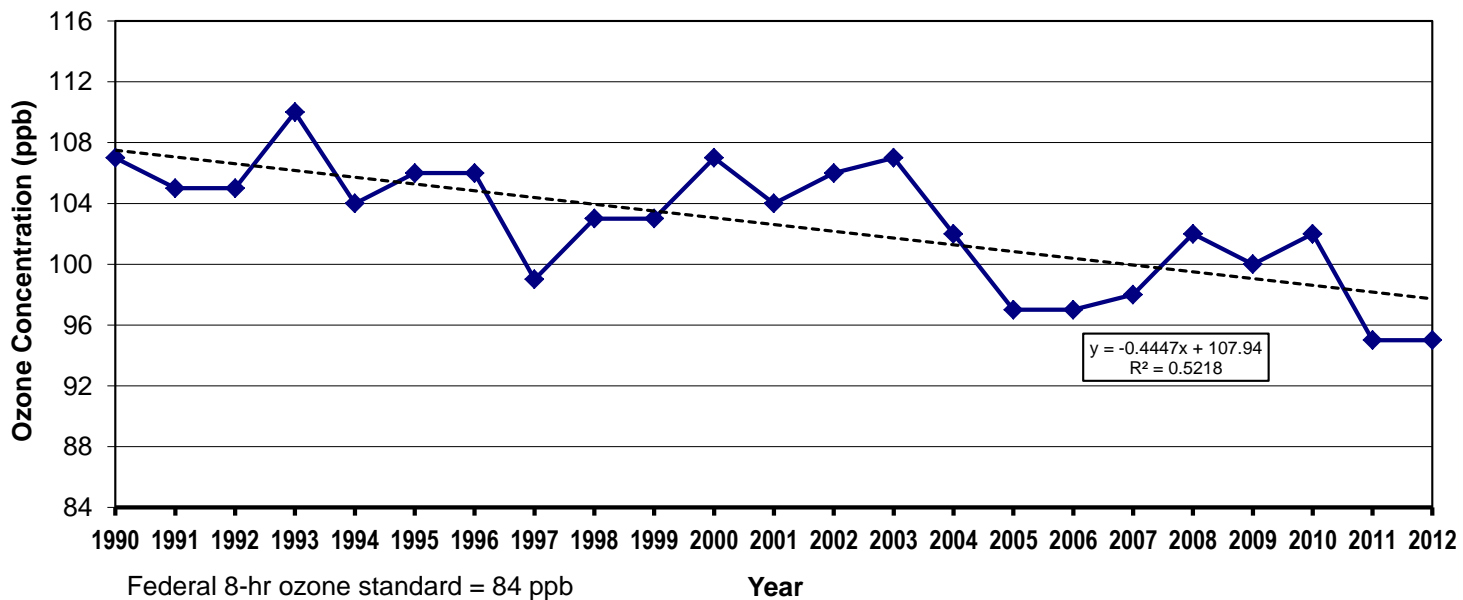
Data source: CARB air quality data base (www.arb.ca.gov/adam/welcome.html) Downloaded on 06/06/2013.

*Site closed after 2002.

** Sac-Airport Road site was relocated to Sac-Goldenland Court in 2010.

na = insufficient data available

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



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.

The summary of VOC and NO_x emissions estimates by different air pollutant source categories are provided for the SIP planning years in tabular and graphical formats. This Plan reflects the impact from the recent economic recession and the improvements to the on-road motor vehicles and the off-road equipment emission estimates. The 2002 base year, 2014, 2017 and 2018 emission inventories use the latest planning assumptions and emissions data in California Air Resources Board's (CARB's) California Emission Projection Analysis Model (CEPAM). These inventories, presented in tons per day for an average summer day, are forecasted using the latest socio-economic growth indicators and applying the emission reduction benefits from adopted 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 2014 and every subsequent 3 years out to and including 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

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).

be in attainment.⁴⁵ Therefore, the emission inventory year for attainment analysis purposes is 2018, the year preceding the mandated attainment date.

The emissions inventory years included in this plan are 2002 (baseline), 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>

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).

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 (EMission FACtor) is California's model for estimating emissions from on-road motor vehicles operating in California. It is built on decades of vehicle testing and analysis. It uses travel activity data from metropolitan planning organizations, vehicle registration data from the Department of Motor Vehicles (DMV), and data from the Smog Check program. EMFAC has undergone many revisions over the years and the current on-road motor vehicles emission model, EMFAC2011⁴⁷, is used in this Plan.

Motor Vehicle Emissions Model, EMFAC2011

The California Air Resources Board (CARB) has continued to update and improve its EMFAC on-road motor vehicle emissions model. CARB's EMFAC2011 model was released in September 2011, and it replaces EMFAC2007. EMFAC2011 model improvements include:

- The latest information on vehicle populations and miles traveled in California.
- The impacts of recently adopted diesel regulations including the Truck and Bus Rule and other diesel truck fleet rules; the Pavley Clean Car Standard, and the Low Carbon Fuel Standard.
- The latest emissions inventory methods for heavy duty trucks and buses.

EMFAC2011 software and detailed information on the vehicle emission model can be found on the CARB website: <http://www.arb.ca.gov/msei/modeling.htm>.

Vehicle Activity Data

On-road motor vehicle emission estimates were developed using the latest available transportation data and California's EMFAC2011 model. The forecasted vehicle miles traveled (VMT)⁴⁸ and speed distributions used in this plan are based on transportation modeling for the Sacramento region's Final 2013/2016 Metropolitan Transportation Improvement Program (2013/2016 MTIP)⁴⁹, which was adopted by Sacramento Area Council of Governments (SACOG) on August 16, 2012, and approved by FHWA on December 14, 2012. All projects included in the MTIP must be consistent with the Metropolitan Transportation Plan/Sustainable Communities Strategy 2035 (MTP/SCS

⁴⁷ CARB conducted off model runs to incorporate 2013/2016 MTIP travel forecasts that were not included in the released EMFAC2011 model. (Jon Taylor e-mail providing 2014, 2017, 2018 on-road emissions based on October & November 2012 SACOG activity, formally transmitted to SMAQMD on December 5, 2012).

⁴⁸ SACOG travel data transmittal letter to CARB, and October 10, 2012 and November 30, 2012 e-mails to SMAQMD.

⁴⁹ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012), FHWA approval December 14, 2012.

2035) for the Sacramento Region. Final 2013/2016 MTIP is Amendment #1 to the MTP/SCS2035. Vehicle activity data for Solano County portion of the nonattainment area is based on Plan Bay Area Preferred Land Use Scenario/Transportation Investment Strategy (May 11, 2012) and was provided by San Francisco Bay Area Metropolitan Transportation Commission (MTC) to SACOG⁵⁰.

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. Like EMFAC, the off-road emissions model underwent a significant update. The OFFROAD2007 model has been updated with category-specific methods and inventory models. The diesel equipment categories using category specific method include: In-Use Off-Road Equipment (Construction, Industrial, Ground Support and Oil Drilling); Cargo Handling Equipment; In-Use Mobile Agricultural Equipment; Locomotives; Transport Refrigeration Units; Commercial Harbor Craft; Ocean Going Vessels; and Stationary Commercial Engines. The base OFFROAD2007 emission model also includes emission estimates of equipment categories which have not yet been replaced with a category specific method (e.g., lawn and garden equipment, farm equipment). In general, emissions are calculated by using estimated equipment population, engine size and load, usage activity, and emissions factors.

Off-road inventory improvements that have the greatest impact in the Sacramento region are described in a CARB report entitled “2010 Documentation (Appendix D)”. The most significant off-road inventory improvements include:

- Updated estimates of equipment population
- New data from 2009 academic studies and from engine manufacturers suggesting load factors be reduced by 33%
- Decreases in construction activity and revised projections of growth due to the recent economic recession.

More detailed information on the latest off-road motor vehicle emissions inventory, including “2010 Documentation (Appendix D)”, can be found on the CARB website:

http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles.

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

⁵⁰ MTC (Harold Brazil) Eastern Solano travel data transmittal letter to SACOG, May, 2012, and October 16, 2012 e-mail forwarded to SMAQMD.

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>

**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: 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

Anthropogenic Emissions Table by Source Category

The following tables (Tables 5-2 and 5-3) show the anthropogenic emissions inventory of VOC and NO_x 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 County⁵¹. The emissions inventory for ozone planning purposes represents emissions for a summer seasonal average day in units of tons per day⁵². Inventories, except for 2014, 2017 and 2018 on-road vehicles, were generated using CEPAM: NORCAL 2012

⁵¹ 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.

⁵² Annual emissions are multiplied by a summer seasonal factor, TF = [sum of fractional monthly throughputs for the emission process during May through October] / 184 days in the summer ozone season.

SIP Baseline Emission Projections⁵³. On-road vehicle emissions for 2014, 2017 and 2018 in this plan were generated separately to reflect updated VMT activity forecasts in the SACOG 2013/2016 MTIP⁵⁴. The VOC emissions total is 147 tons per day in 2002. The NO_x emissions total is 165 tons per day in 2002.

⁵³ CARB CEPAM website, <http://www.arb.ca.gov/app/emsinv/2012pm25sip/norcal2012pm25sip/>; CEPAM: NORCAL 2012 PM_{2.5} SIP Baseline Emission Projections, Section a1 – Emission Projections With External Adjustments.

⁵⁴ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012). FHWA approved on December 14, 2012.

Table 5-2 Emissions of VOC^a (tons per day) Sacramento Nonattainment Area				
	2002	2014	2017	2018
TOTAL EMISSIONS	147	104	99	98
STATIONARY	22	26	27	27
AREA-WIDE	32	30	30	31
ON-ROAD MOTOR VEHICLES	52	21	17	15
OTHER MOBILE SOURCES	41	28	25	24
STATIONARY				
Solvent/Coatings	7.6	8.7	9.0	9.2
Petroleum Production/Marketing	4.7	6.2	6.4	6.5
Industrial Process	3.5	4.0	4.4	4.5
Waste Composting	4.3	4.4	4.4	4.4
Other	1.5	2.6	2.5	2.5
AREA-WIDE				
Consumer Products	14.8	12.6	13.0	13.2
Architectural Coatings	8.4	8.8	9.2	9.3
Pesticides	1.8	1.2	1.2	1.2
Livestock Waste	2.6	2.9	2.9	2.9
Ag Burn/Other Managed Burn	1.0	1.0	1.0	1.0
Other	3.9	3.2	3.2	3.2
ON-ROAD				
Automobiles	22.9	6.4	4.4	3.8
Lt/Med Duty Trucks	19.9	8.8	7.3	6.8
Heavy Duty Gas Trucks	3.5	1.9	1.6	1.5
Heavy Duty Diesel Trucks	2.5	1.4	1.2	1.2
Motorcycles	2.4	2.0	2.0	2.0
Buses/Motor Homes	0.7	0.3	0.2	0.2
OTHER MOBILE				
Recreational Boats	20.3	13.7	12.3	11.9
Equipment (Const/Ind/Farm)	7.0	3.2	2.7	2.5
Lawn & Garden Equipment	6.5	5.5	5.1	5.1
Fuel Storage and Handling	3.1	1.6	1.4	1.4
Off-Road Recreational Vehicles	2.4	2.5	2.5	2.5
Trains	0.6	0.4	0.4	0.3
Aircraft	0.5	0.7	0.6	0.6
Ocean Vessels & Harbor Craft	0.1	0.1	0.1	0.1

^a Source: (CARB, 2012), includes 4 tpd of VOC ERCs and inventory adjustments identified in Appendix A5, Tables A5-1 and A5-2.

Table 5-3 Emissions of NO_x^a (tons per day) Sacramento Nonattainment Area				
	2002	2014	2017	2018
TOTAL EMISSIONS	165	90	78	74
STATIONARY	12	13	12	12
AREA-WIDE	3	3	3	3
ON-ROAD MOTOR VEHICLES	99	46	37	34
OTHER MOBILE SOURCES	50	28	27	25
STATIONARY				
Fuel Combustion	7.6	9.8	9.8	9.8
Ag Irrigation Pumps	3.8	2.1	1.1	1.0
Industrial Process	0.8	0.8	0.9	0.9
AREA-WIDE				
Residential Fuel Combustion	2.5	2.7	2.6	2.5
Ag Burn/Other Managed Burn	0.5	0.6	0.6	0.6
ON-ROAD				
Heavy Duty Diesel Trucks	48.4	25.7	20.1	18.5
Lt/Med Duty Trucks	24.9	9.1	7.3	6.6
Automobiles	18.3	4.7	3.5	3.2
Heavy Duty Gas Trucks	3.1	3.0	2.8	2.7
Buses/Motor Homes	4.1	2.5	2.3	2.1
Motorcycles	0.3	0.5	0.5	0.6
OTHER MOBILE				
Construction & Mining Equip	11.6	3.5	4.1	3.6
Trains	12.1	7.1	7.1	7.0
Farm Equipment	13.0	7.3	5.8	5.3
Marine Vessels	4.6	3.7	3.2	3.2
Commercial/Industrial Equipment	3.5	1.5	1.5	1.4
Aircraft	1.7	2.5	2.8	2.8
Oil Drilling/Workover	1.7	0.6	0.5	0.5
Other	1.7	1.1	1.0	1.0
Transportation Refrigeration Units	0.7	0.6	0.5	0.5

^a Source: (CARB, 2012), includes 3 tpd of NO_x ERCs and inventory adjustments identified in Appendix A5, Tables A5-1 and A5-2.

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 35% on-road mobile sources, 28% other mobile sources, 22% area-wide sources, and 15% stationary sources.

The NO_x inventory is mainly due to mobile source combustion emissions. In 2002, the NO_x inventory includes 60% on-road mobile sources, 31% other mobile sources, 2% area-wide sources, and 7% stationary sources.

Figure 5-1

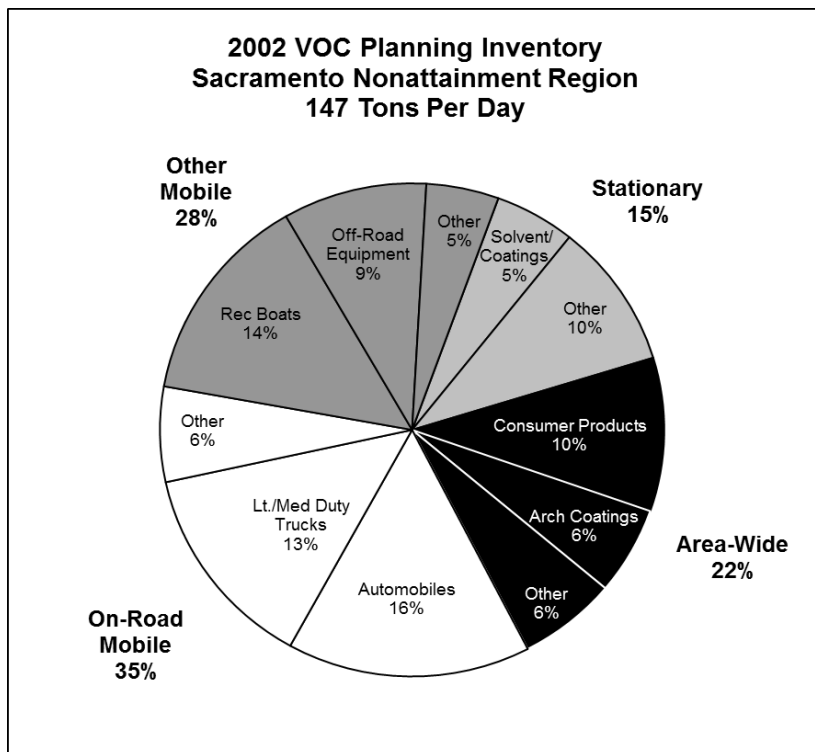
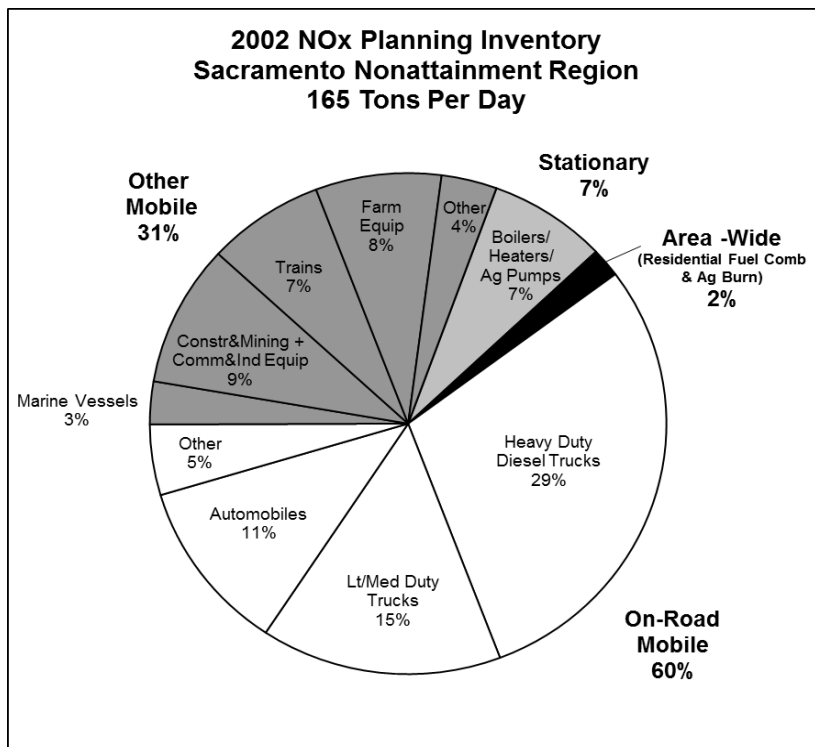


Figure 5-2



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 architectural coatings. 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

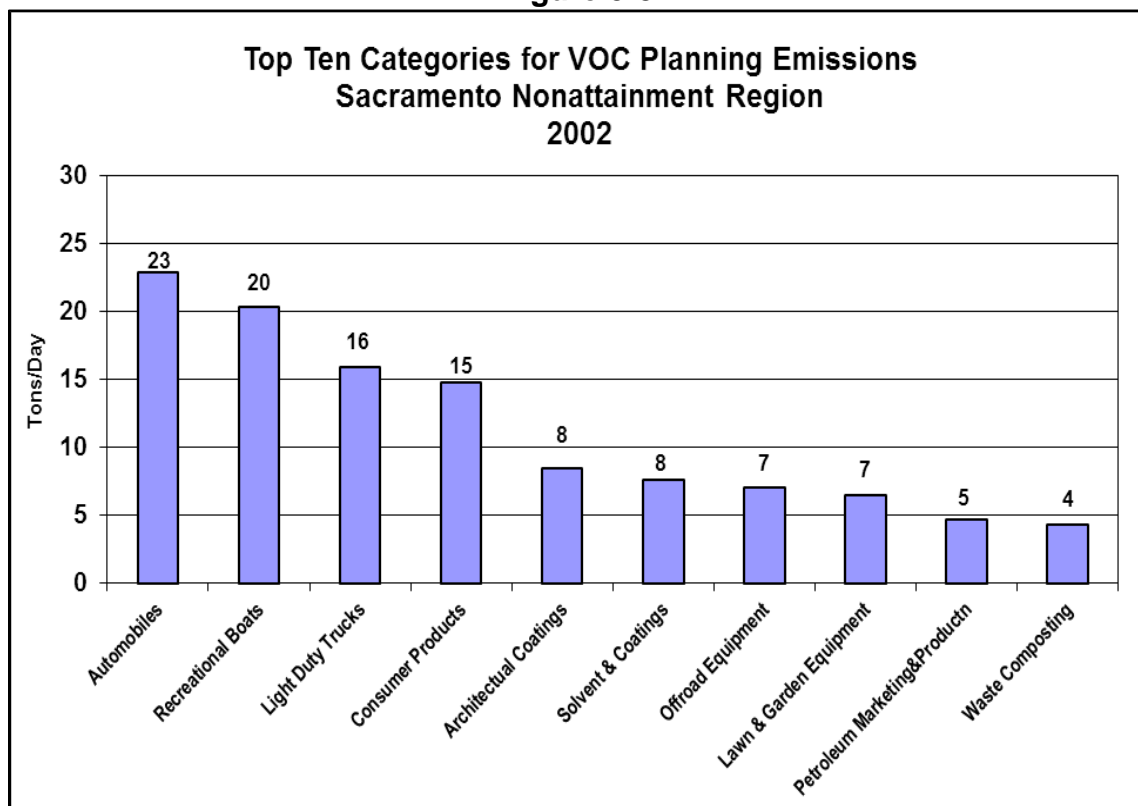
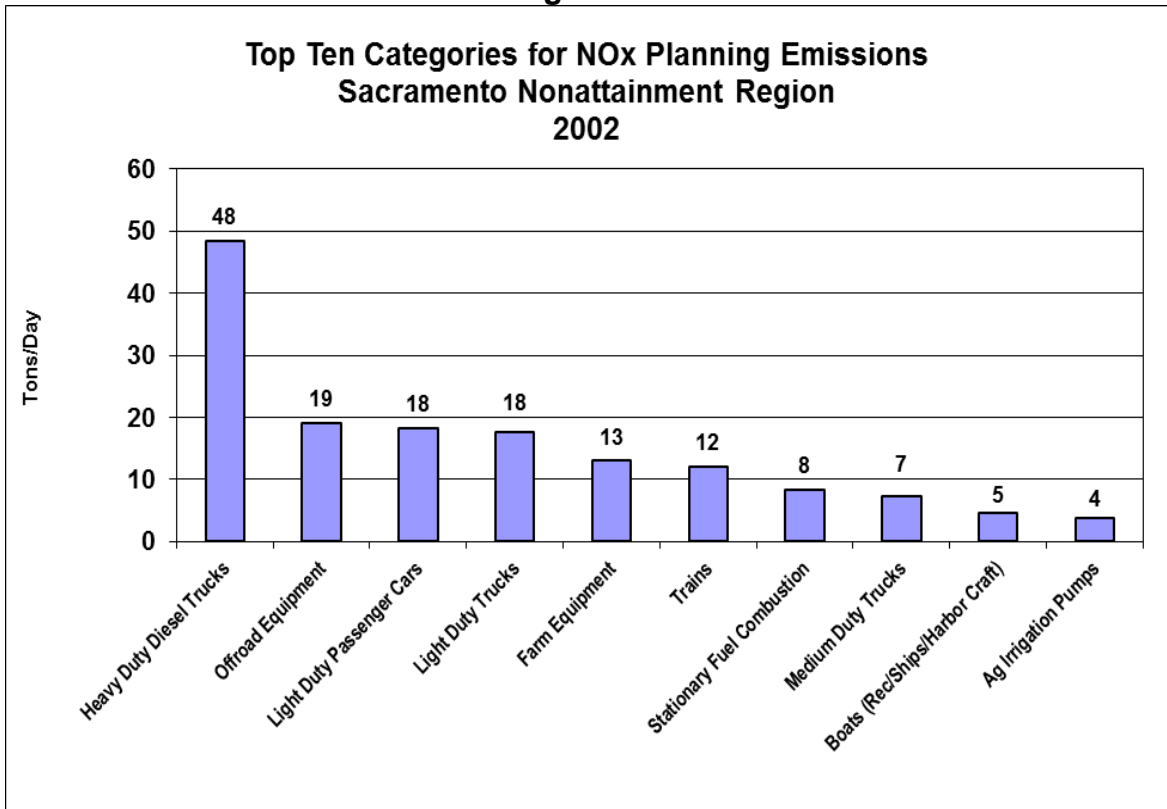


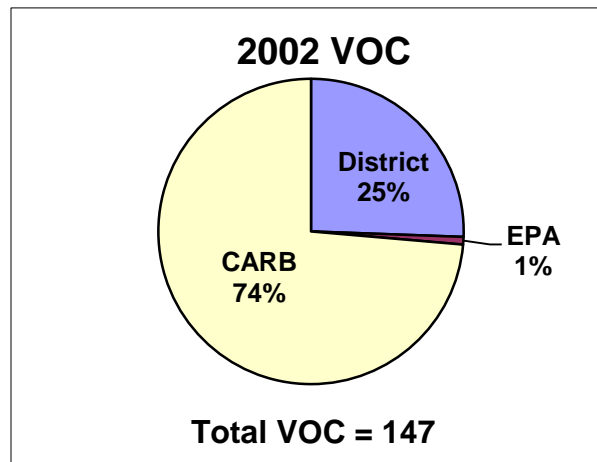
Figure 5-4



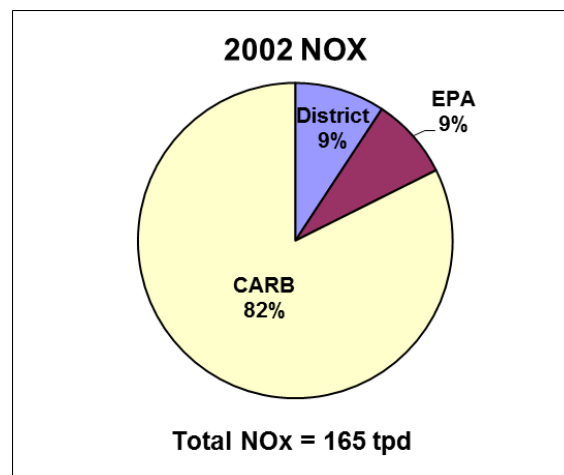
Emissions Contribution by Agency Responsibility

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 25% of VOC emissions and 9% of NO_x emissions in the Sacramento region. CARB has the most regulatory responsibility over emissions, 74% 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

The emission inventory forecasts take into account anticipated population and economic growth and emission benefits from the federal, state and local control measures. In order to forecast emissions for various future milestone and attainment analysis years, growth parameters and the post-2002 emission reduction effects of control measures⁵⁵ received by CARB as of mid-2011 are applied to the 2005 emissions inventory at the emission process level for stationary and area-wide sources. The various growth parameters include forecasts for population, housing, employment, energy demand, motor vehicle travel, and other industrial and commercial outputs. Off-road motor vehicle emissions are forecasted separately by off-road category specific models using growth rates that were based on category-specific economic indicators such as employment, expenditures and fuel use. Future on-road emissions are determined by EMFAC2011 model using VMT forecasts in SACOG's 2013/2016 MTIP⁵⁶ and MTC's Plan Bay Area Preferred Land Use Scenario/Transportation Investment Strategy (May 11, 2012) for Solano County portion of SFNA⁵⁷. Figure 5-7 contains a graph showing population and VMT growth⁵⁸ for the Sacramento region. Existing control strategies continue to reduce future VOC and NO_x emissions from stationary and area sources, on-road motor vehicles, and some other mobile source categories (such as off-road equipment).

⁵⁵ Recently adopted CARB measures that went into effect by January 2012 and some adopted district control measures that went into effect by mid-2011 were manually adjusted into emission projections. These inventory adjustments are identified in Appendix A5, Tables A5-1 and A5-2.

⁵⁶ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012), FHWA approval December 14, 2012.

⁵⁷ Joint MTC Planning/ABAG Administrative Committees, *Plan Bay Area Preferred Land Use and Transportation Investment Strategy*. Oakland, CA: Bay Area Metropolitan Transportation Commission. [May 2012.]

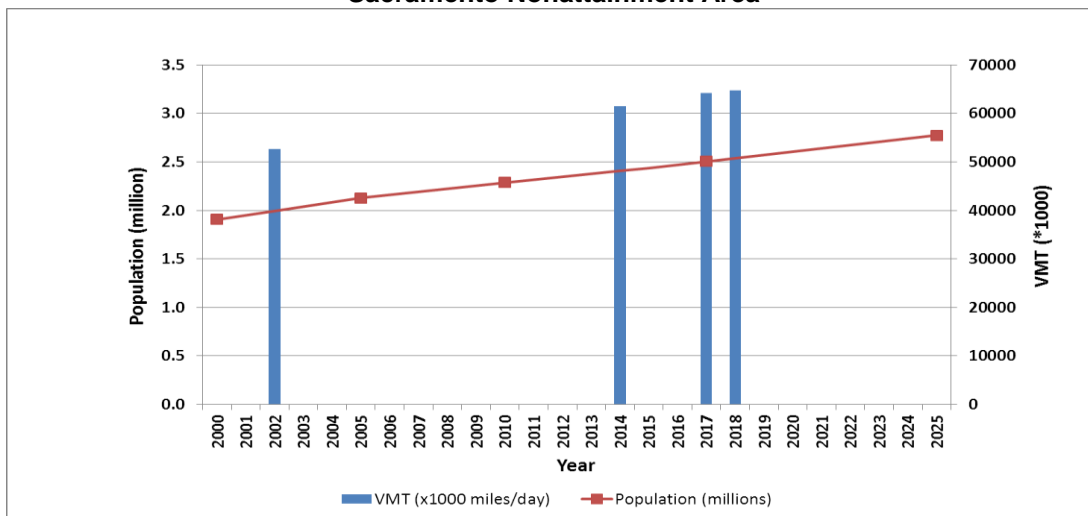
⁵⁸ Population:

1. Data source: CARB CEPAM growth table.
2. Except Solano, CEPAM population growth rate is based on SACOG forecasts in the 2008 MTP adopted by SACOG Board of Directors 12/16/04. CEPAM population growth rate, which is used for stationary and area-wide source forecasts is higher than the population growth rate in the MTP/SCS 2035.
3. Solano County population is from DOF projection released May 2012.
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.

VMT:

1. 2014, 2017, 2018 VMT activities are from SACOG travel data transmittal letter to CARB, and October 10, 2012 and November 30, 2012 e-mails to SMAQMD.
2. 2002 VMT is EMFAC2011 2002 default VMT.

**Figure 5-7
Population Growth and VMT Forecast
Sacramento Nonattainment Area**



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

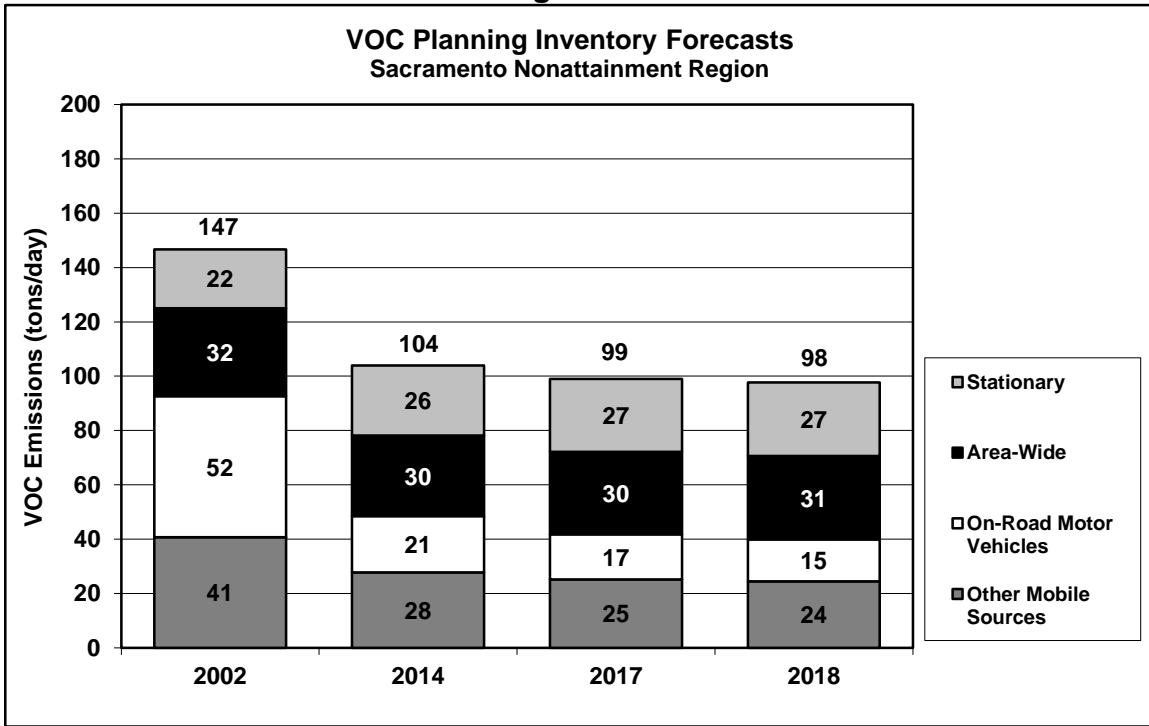
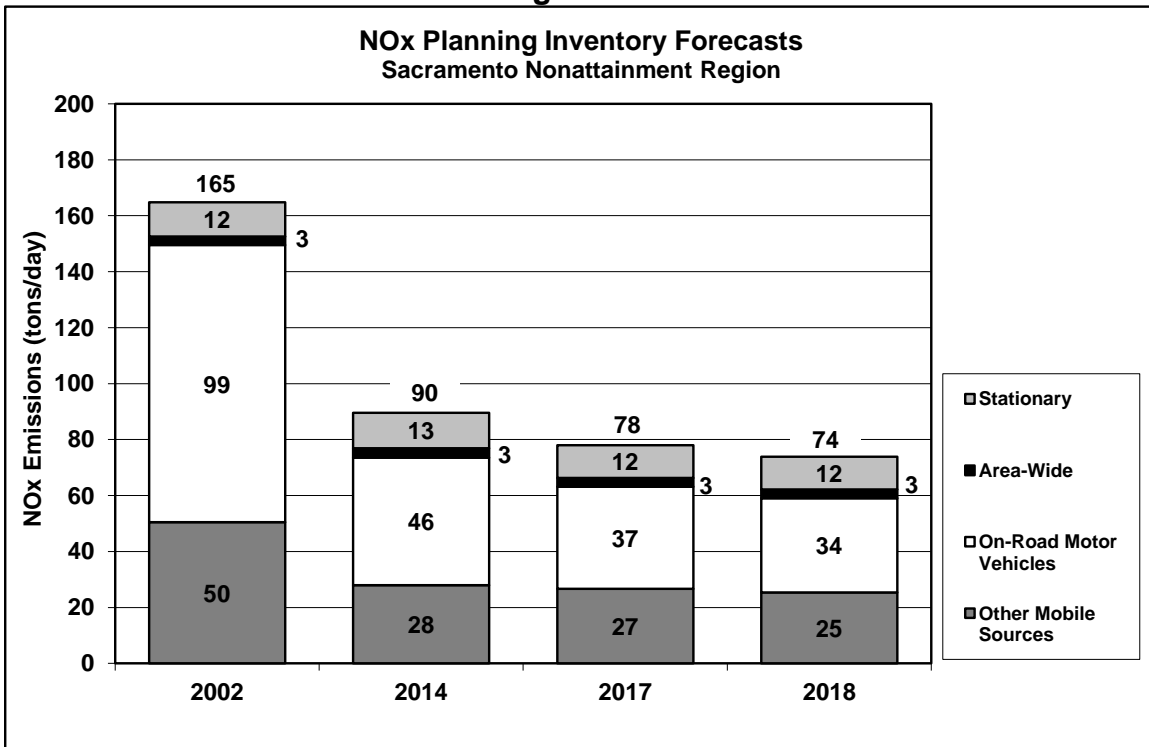


Figure 5-9



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 NO_x. 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 legislation⁵⁹ 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.

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 rule⁶⁰ currently in

⁵⁹ Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991, section 41865 of California Health and Safety Code.

⁶⁰ 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.

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 NO_x. 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, rounded up to 4 tpd VOC and 3 tpd NO_x ERCs, and added to the VOC and NO_x 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 NO_x emissions inventory is provided in Appendix A. This appendix contains the estimated 2002, 2014, 2017, and 2018 emission inventories for each county and air basin combination in the Sacramento nonattainment area. A listing of the VOC and NO_x 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>.

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

Emissions in tons/day	2002		2014	2017	2018
Emission Reduction Credits	---		2.6	2.6	2.6
Future Bankable Rice Burning Emission Reduction Credits	---		0.9	0.9	0.9
Total ERCs (rounded up)	---		4	4	4
Emission Inventory Forecasts⁶¹	147		100	95	94
Total	147		104	99	98

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

Emissions in tons/day	2002		2014	2017	2018
Emission Reduction Credits	---		1.4	1.4	1.4
Future Bankable Rice Burning Emission Reduction Credits	---		1.0	1.0	1.0
Total ERCs (rounded up)	---		3	3	3
Emission Inventory Forecasts⁶²	165		87	75	71
Total	165		90	78	74

⁶¹ VOC Emissions summaries in Table 5-2 include ERCs. The emission inventory forecasts in Table 5-4 are calculated by subtracting 4 tpd of VOC ERCs from total emission in Table 5-2.

⁶² NO_x Emissions summaries in Table 5-3 include ERCs. The emission inventory forecasts in Table 5-5 are calculated by subtracting 3 tpd of NO_x ERCs from total emission in Table 5-3.

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 guidance⁶³ 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 document⁶⁴ 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. Because the State is responsible for analyzing downwind and upwind influences from or on other areas outside the nonattainment area, the recommended modeled attainment test predicts whether or not all estimated future design values will achieve the ozone NAAQS under modeled meteorological conditions.

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 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

⁶³ "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).

⁶⁴ Ibid., p.15 and 40-42.

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 CAMx⁶⁵ 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 mechanism⁶⁶. 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.

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

⁶⁵ CAMx is Comprehensive Air Quality Model with extension, version 4.03a (as modified by CARB).

⁶⁶ Chemical mechanism originally developed by the Statewide Air Pollution Research Center (SAPRC) of the University of California at Riverside.

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 guidance⁶⁷ 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 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

⁶⁷ “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).

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 equation⁶⁸:

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

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]

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]

⁶⁸ "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.

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

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 NO_x 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
Sloughouse (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

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

^b RRF calculation = $(C - 40) / (B - 40)$

^c Future 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 NO_x 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 NO_x.

Ozone/Emission Reduction Graphs

Systematic reductions in anthropogenic VOC and/or NO_x emissions were simulated to characterize the change in the resulting ozone concentrations. For each individual modeling run, domain-wide emissions for NO_x-only, VOC-only, or both VOC and NO_x 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 NO_x emission reductions. For example, one modeling run scaled VOC emissions by 95% and NO_x emissions by 85%, and then another run scaled VOC emissions by 85% and NO_x 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 NO_x 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 NO_x 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 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 Chapter 8 – Attainment Demonstration.

6.12 Air Quality Modeling Uncertainties

EPA's modeling guidance document⁶⁹ 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 reported⁷⁰ that projected ozone response to climate change in 2050 is estimated to cause a four percent 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.

⁶⁹ "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) .

⁷⁰ 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 deadline⁷¹ 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 NO_x pollutant strategy is not appropriate because, even though VOC measures are not as effective as NO_x, they still provide needed reductions. Moreover, 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 engines have achieved the most NO_x emission reductions for stationary and area-wide sources.

⁷¹ "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1" (Federal Register, April 30, 2004, p. 23951-24000).

Figure 7-1

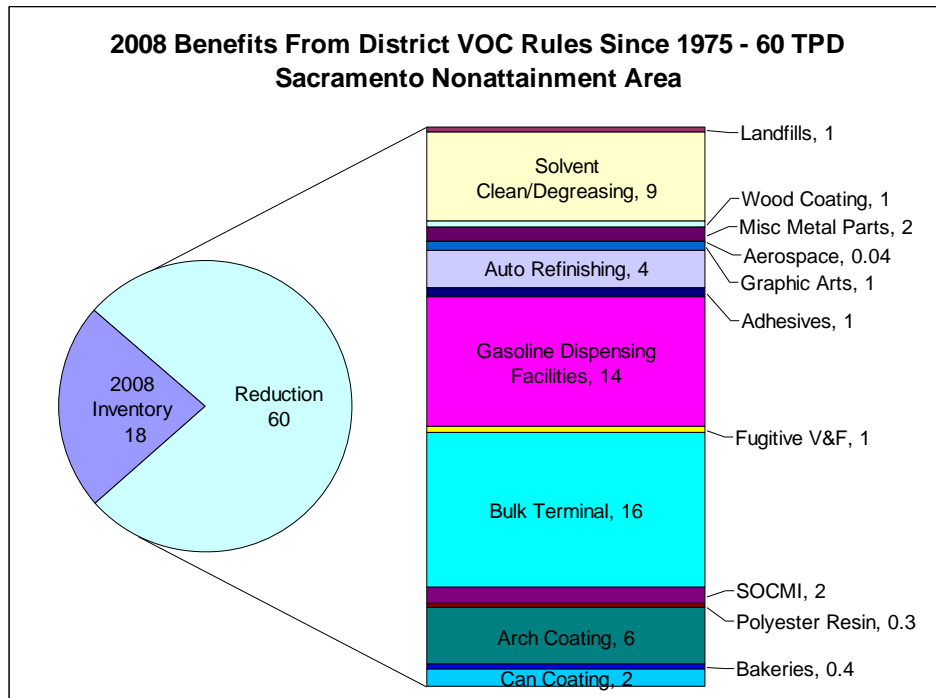
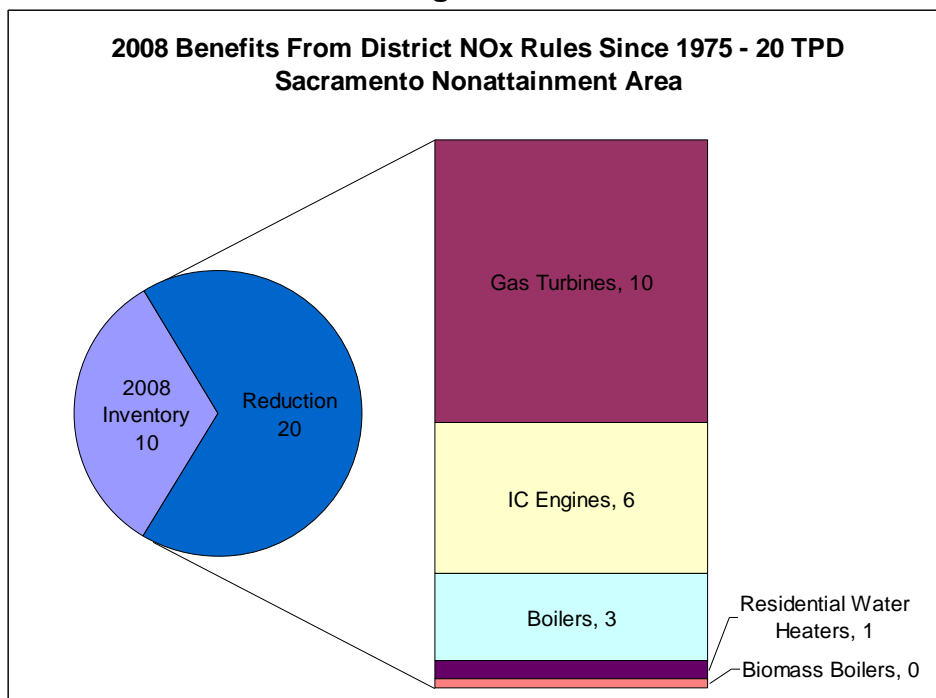


Figure 7-2



7.3 Reductions from New State and Federal Control Measures

Since 2007, ARB has adopted a number of statewide measures that will further reduce ozone precursor emissions in the Sacramento Metropolitan 8-Hour Ozone Nonattainment Area. Listed below are ARB measures adopted since 2007 and sent to U.S. EPA as revisions to the SIP or as requests for waivers (Clean Air Act section 209(b)) or for authorizations (Clean Air Act section 209(e)(2)).

Table 7-1 State Measures Adopted Since 2007

Measure	Date of Adoption	Date Sent to U.S. EPA
Modifications to Reformulated Gasoline	June 14, 2007	Feb. 3, 2009
Vapor Recovery for Above-Ground Storage Tanks	June 21, 2007	June 12, 2008
Clean Up Existing Harbor Craft	Nov. 15, 2007	Apr.12, 2010
Ship Auxiliary Engine Cold Ironing and Clean Technology	Dec. 6, 2007	Aug. 2, 2010
Consumer Products Program --2008 amendment --2009 amendment	June 26, 2008 Sept. 24, 2009	Feb. 16, 2010 Jan. 28, 2011
Additional Evaporative Emission Standards	Sept. 25, 2008	May 2, 2011
Portable Outboard Marine Tanks	Sept. 25, 2008	May 2, 2011
Smog Check Improvements	Aug. 31, 2009	Oct. 28, 2009
Pesticides Element	Oct. 12, 2009	Aug. 2, 2011
Cleaner In-Use Heavy-Duty Trucks	Dec. 16, 2010	Sept. 21, 2011
Cleaner In-Use Off-Road Equipment	Dec. 17, 2010	Sept. 21, 2011

The control strategy in the Sacramento Regional 8-Hour Ozone attainment and Reasonable Further Progress Plan (Plan) relies on reductions of NO_x and VOC to meet the 8-hour ozone standards. Because mobile sources are the largest contributors to ozone-forming emissions, reducing emissions from passenger vehicles, trucks, and a variety of off-road engines is key to attaining the ozone standards. In developing the Sacramento Area SIP for meeting the 8-hour standard by 2018, the biggest challenge was cleaning up the existing fleets of diesel engines.

Over the past five years, ARB adopted a number of regulations aimed at reducing emissions of oxides of nitrogen from existing, “in-use” diesel sources like heavy-duty diesel trucks, and off-road sources like large construction equipment. Phased implementation of these regulations will produce increasing emission reduction benefits over time, as the regulated fleets are retrofitted, and as older and dirtier portions of the fleets are replaced with newer and cleaner models at an accelerated pace. ARB’s longstanding programs to reduce emissions from passenger vehicles, including the smog check program, also provide continuing benefits needed for attainment of the ozone standard.

Table 7-2 shows the impact of adopted state measures on projected 2018 emissions in the Sacramento Metropolitan 8-Hour Ozone Nonattainment Area. The region also compared this Plan to the 2009 Plan to ensure that the revisions do not weaken the control measures and strategies. That analysis is summarized in Table 7-2. As the table illustrates, the 2009 SIP committed to control measures that have since been adopted and incorporated into the emissions inventory, and the 2018 SIP baseline inventory minus the expected emissions reductions equals the “Remaining Emissions” after 2009 SIP implementation. The sum of the 2009 SIP “Remaining Emissions” is higher than the “Current Estimate” demonstrating that this 2013 SIP will achieve greater emissions reductions than the 2009 SIP. This section describes the adopted measures and programs that are providing these reductions.

Table 7-2: Analysis of ARB's Implemented Regulations using Calendar Year 2018 NO_x
Summer Season Emissions (tpd)

Statewide SIP Measures	2009 SIP Summary			Current Estimate
	2018 Baseline	Expected Reductions	Remaining Emissions	Remaining Emissions
Passenger Vehicles	22.2	1.7	20.5	16.7
Smog Check Improvements (BAR)		1.4		
Expanded Vehicle Retirement	22.20	0.3	20.5	16.7
Modifications to Reformulated Gasoline Program		0.0		
Heavy-Duty Trucks	22.4	9.5	12.9	12.6
Cleaner In-Use Heavy-Duty Trucks	22.4	9.5	12.9	12.6
Goods Movement Sources	10.3	2.1	8.2	7.0
Accelerated Intro. Of Cleaner Line-Haul Locomotives	9.4	1.9	7.5	6.2
Clean Up Existing Harbor Craft	0.9	0.2	0.7	0.9
Off-Road Equipment	13.4	1.9	11.5	7.0
Cleaner In-Use Off-Road Equipment (over 25hp)	13.4	1.9	11.5	7.0
Other Off-road Sources	6.1	0.3	5.8	2.4
New Emission Standards for Recreational Boats	5.9	0.3	5.6	2.3
Expanded Off-Road Rec. Vehicle Emission Standards	0.1	0.0	0.1	0.1
Additional Evaporative Emission Standards	--	--	--	--
Areawide Sources	0.0	0.0	0.0	0.0
Consumer Products Program	0.0	0.0	0.0	0.0
2018 NO_x Totals				
State SIP Measure Sources ¹	74	16	59	46
All Other State/Federal Source Categories	9	--	9	13
District Source Categories ²	17	2	15	12
Total Inventory	101	18	83	71
Emission Reduction Credits	3 ³	--	3 ³	3 ³
Motor Vehicle Emission Budget Safety Margin	--	--	--	3
Total Inventory for Modeling/RFP⁴	104	18	86	77

Table 7-2 (continued): Analysis of ARB's Implemented Regulations using Calendar Year 2018 VOC Summer Season Emissions (tpd)

Statewide SIP Measures	2009 SIP Summary			Current Estimate
	2018 Baseline	Expected Reductions	Remaining Emissions	Remaining Emissions
Passenger Vehicles	24.9	2.6	22.3	16.3
Smog Check Improvements (BAR)		1.3		
Expanded Vehicle Retirement	24.9	0.2	22.3	16.3
Modifications to Reformulated Gasoline Program		1.1		
Heavy-Duty Trucks	1.9	0.8	1.1	0.8
Cleaner In-Use Heavy-Duty Trucks	1.9	0.8	1.1	0.8
Goods Movement Sources	0.7	0.1	0.6	0.4
Accelerated Intro. Of Cleaner Line-Haul Locomotives	0.6	0.1	0.5	0.3
Clean Up Existing Harbor Craft	0.1	0.0	0.1	0.1
Off-Road Equipment	7.5	0.4	7.1	6.5
Cleaner In-Use Off-Road Equipment (over 25hp)	7.5	0.4	7.1	6.5
Other Off-road Sources	22.8	6.1	16.7	14.4
New Emission Standards for Recreational Boats		3.0		
Expanded Off-Road Rec. Vehicle Emission Standards	22.8	2.7	16.7	14.4
Additional Evaporative Emission Standards		0.4		--
Areawide Sources	15.1	1.9	13.2	13.2
Consumer Products Program	15.1	1.9	13.2	13.2
2018 VOC Totals				
State SIP Measure Sources ¹	73	12	61	52
All Other State/Federal Source Categories	5	--	5	3
District Source Categories ²	40	3	36	39
Total Inventory	117	15	102	94
Emission Reduction Credits	4 ³	--	4 ³	4 ³
Motor Vehicle Emission Budget Safety Margin	--	--	--	1
Total Inventory for Modeling/RFP⁴	121	15	106	99

¹ State SIP Measure Sources un-truncated. 2013 Plan uses truncated numbers.

² For the purposes of this table, ERCs are shown separately.

³ ERCs for the 2009 SIP Commitment listed in the 2013 Update, Tables 5-4 and 5-5.

⁴ The inventory used for this update also serves as a model inventory. For modeling purposes, ERCs were distributed across Stationary and Area Source Categories.

Clean New and In-Use Heavy-Duty Trucks

Increasingly stringent standards for new trucks, as shown in the Table 7-2A, are a central element of ARB’s emission reduction strategy. New heavy-duty trucks sold since 2010 emit 98 percent less NO_x and PM_{2.5} than new trucks sold in 1986.

Table 7-2A: Phase-in of truck engine standards

Model Year	Applicable Standard g/bhp-hr	
	NO _x	PM
1986 and older	10.7	0.60
1987-2006	From 6.0 to 2.0	From 0.6 to 0.10
2007-2009	1.1	0.01
2010	0.2	0.01

However, older, higher-emitting trucks with long service lives can stay on the road for many years, because of the typically slow replacement of older trucks on the road with the latest models. Consequently, emissions from existing “on-road” trucks must also be reduced to meet near-term air quality standards.

To address this, ARB developed the Cleaner In-use Heavy-duty Truck SIP measure. This measure leverages the benefits provided by new truck emission standards by accelerating introduction of the cleanest trucks. This “Truck and Bus Regulation” was adopted in December 2008, and amended in December 2010 to account for the reduced emissions resulting from the economic effects of the recession. This rule represents a multi-year effort to turn over the legacy fleet of engines and replace them with the cleanest technology available. More information is available at: <http://www.arb.ca.gov/regact/2010/truckbus10/truckbus10.htm>.

Starting in 2012, the Truck and Bus Regulation phases in requirements so that by 2023 nearly all vehicles will meet 2010 model year engine emissions levels. The regulation applies to nearly all diesel fueled trucks and buses with a gross vehicle weight rating greater than 14,000 pounds that are privately or federally owned, including on-road and off-road yard goats, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases or rents affected vehicles. The regulation also establishes requirements for any in-state or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation’s potential applicability to buyers of the vehicles.

In addition to the Truck and Bus Regulation, separate regulations reduce emissions from on-road vehicles in public fleets, including solid waste collection trucks and transit

buses. Trucks that transport marine containers must comply with the drayage truck regulation.

Cleaner In-Use Off-Road Equipment

ARB has also adopted increasingly stringent standards for engines used in new off-road diesel equipment. As a result of these standards, new construction, mining, industrial and oil drilling equipment will become progressively cleaner. The requirements vary according to the power rating of engines. Table 7-2B shows the schedule for phasing in tiered requirements for new off-road engines with a power rating between 175 and 300 horsepower (hp). Beginning in 2014, new Tier 4 construction equipment with the power rating shown below will emit about 96 percent less NO_x and PM than new Tier 1 equipment sold in the year 2000.

Table 7-2B: Phase-in of off-road engine standards

Model year	Level of Control	Applicable Emission Standard for New Off-road Engines 175<hp<300 g/bhp-hr	
		NO _x	PM
1996-2002	Tier 1	6.9	0.4
2003-2005	Tier 2	4.9*	0.15
2006-2010	Tier 3	3.0*	0.15
2011-2013	Tier 4 interim	1.5	0.015
2014+	Tier 4 final	0.3	0.015

*Reflects combined limit for non-methane hydrocarbons and NO_x

However, large diesel off-road equipment typically remains in use for many years, if not decades. As with heavy-duty trucks, this long life means that newer, lower-emitting engines would be introduced into fleets relatively slowly, which will also delay the emission reductions and associated health benefits from these cleaner engines. To address this, the [State Strategy for California's 2007 SIP](#) included the Cleaner In-use Off-road Equipment measure, the "Off-Road Regulation."

First approved in 2007, the Off-Road Regulation was amended in 2010 in light of the impacts of the economic recession. Affected off-road equipment is used in construction, manufacturing, the rental industry, road maintenance, airport ground support, and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines. More information is available at: <http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadlsi10.htm>.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NO_x from the over 150,000 in-use off-road diesel vehicles that operate in California by requiring their owners to modernize their fleets and install exhaust retrofits. The regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize

their fleets by replacing older engines or vehicles with newer, cleaner models, by retiring older vehicles or using them less often, or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The regulation also requires that all vehicles be reported to ARB, restricts the addition of older vehicles into fleets, and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Advanced Clean Cars

The Board established California's Low Emission Vehicle (LEV) program in 1990 and the LEV2 program in 1998. ARB's Zero Emission Vehicle (ZEV) regulation, which affects passenger cars and light-duty trucks, has also spurred movement towards commercialization of advanced clean cars and light-duty trucks. As a result, many new gasoline engines now emit extremely low levels of smog forming emissions. Conventional hybrid electric vehicles have been commercialized, and the number of models offered for sale is quickly expanding. Recently battery electric vehicles and plug-in hybrid electric vehicles have been introduced for sale, and fuel cell electric vehicles are expected to follow.

ARB's Advanced Clean Cars (ACC) Program, approved in January 2012, is a pioneering approach of a 'package' of regulations, that although separate in construction, are related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect.

The ACC program includes amendments affecting the current ZEV regulation through the 2017 model year to enable manufacturers to successfully meet 2018 and subsequent model year requirements. The ZEV amendments are intended to achieve commercialization by simplifying the regulation and pushing technology to higher volume production to achieve cost reductions.

The ACC Program will produce increasing benefits over time as new cleaner cars enter the fleet, displacing older and dirtier vehicles. This program will continue to provide benefits well after 2019 as vehicles meeting the new standards replace older, higher-emitting vehicles.

Many additional programs are currently in place to reduce emissions from the passenger car legacy fleets and accelerate fleet turn over. The Smog Check Program ensures that passenger vehicles stay clean as they age and on-board diagnostic

systems identify smog control problems. The Smog Check Program is continuously being improved to provide additional emission reductions such as requiring stricter inspection standards and annual inspection of older vehicles. ARB is also active in encouraging consumers with older dirtier vehicles to retire them early. Replacing older dirtier vehicles with cleaner new vehicles provides permanent emission reductions.

Expanded Passenger Vehicle Retirement

Voluntary accelerated vehicle retirement or “car scrap” programs provide monetary incentives to vehicle owners to retire older, more polluting vehicles. The purpose of these programs is to reduce fleet emissions by accelerating the turnover of the existing fleet and subsequent replacement with newer, cleaner vehicles. Reducing emissions from the existing fleet is a component of California’s SIP, which outlines the State’s strategy for meeting health-based ambient air quality standards. Both State and local vehicle retirement programs are available.

California’s updated voluntary vehicle retirement program is administered by the Bureau of Automotive Repair (BAR) and provides \$1,000 per vehicle and \$1,500 for low-income consumers for unwanted vehicles that meet certain eligibility guidelines. This program is referred to as the Consumer Assistance Program.

The Enhanced Fleet Modernization Program (EFMP) was approved by the AB 118 legislation to augment the State’s existing vehicle retirement program. Approximately \$30 million is available annually through 2015 to fund the EFMP via a \$1 increase in vehicle registration fees. ARB developed the program in consultation with BAR. The program is jointly administered by both BAR for vehicle retirement, and local air districts for vehicle replacement.

Other programs, in addition to vehicle retirement programs, help to clean up the light duty fleet. The Air Quality Improvement Program (AQIP), established by AB 118, is an ARB voluntary incentive program to fund clean vehicle and equipment projects. The Clean Vehicle Rebate Project (CVRP) is one of the current projects under AQIP. CVRP, started in 2009, is designed to accelerate widespread commercialization of zero-emission vehicles and plug-in hybrid electric vehicles by providing consumer rebates up to \$2,500 to partially offset the higher cost of these advanced technologies. These vehicles are a key element of California’s strategy for meeting health based air quality standards and climate change goals.

The CVRP is administered statewide by the California Center for Sustainable Energy. In Fiscal Years 2009-2012, \$26.1 million, including \$2 million provided by the California Energy Commission, funded approximately 2,000 rebates. In June 2012, the ARB allocated up to \$21 million to the CVRP as outlined in the AQIP FY2012-2013 Funding Plan.

Improvements and Enhancements to California's Smog Check Program

The following requirements were added to improve and enhance the Smog Check Program:

- Low pressure evaporative test;
- More stringent pass/fail cutpoints;
- Visible smoke test; and
- Inspection of light- and medium-duty diesel vehicles.

AB 2289, adopted in October 2010, restructured California's Smog Check Program by streamlining and strengthening inspections, increasing penalties for misconduct, and reducing costs to motorists. This new law, sponsored by ARB and BAR, promises faster and less expensive Smog Checks by taking advantage of diagnostic software installed on all vehicles since 2000. The new law also directs vehicles without this equipment to high-performing stations, helping to ensure that these cars comply with current emission standards.

This program will reduce consumer costs by having stations take advantage of diagnostic software that monitors pollution-reduction components and tailpipe emissions. This technology, known as On-Board Diagnostics (OBD), has been required on all new vehicles since 1996. Under the new law, testing of passenger vehicles using OBD will begin mid-2013 on all vehicles model years 2000 or newer. Statewide, this is expected to reduce consumer costs by up to \$180 million annually.

Accelerated Introduction of Cleaner Line-Haul Locomotives

California leads the nation with the most extensive efforts to reduce locomotive and rail yard emissions. In 2007 ARB staff proposed to replace existing switch and medium horsepower locomotives with cleaner locomotives; retrofitting these locomotives with particulate matter and NO_x after-treatment devices, and accelerating the introduction of cleaner new Tier 4 interstate line-haul locomotives to operate in California and other western states. ARB completed 18 major rail yard health risk assessments that showed increased risk for those who live and work near these facilities.

The Union Pacific (UP) rail yards located in Roseville has benefitted from numerous programs targeting NO_x and PM emissions. ARB utilized Proposition 1B funding for 15 Tier 2 "regional" line haul locomotives. The UP also operates 6 ultra-low emitting genset switch locomotives within the Roseville rail yards. The UP 9900, an experimental Tier 3+ locomotive (Tier 4 PM, and Tier 3+ NO_x), has been assigned to UP Roseville and operates primarily in Northern California. Finally, the California interstate line haul locomotive fleet has become significantly cleaner than the rest of the country due to the spillover benefits from the 1998 Locomotive NO_x Fleet Average Agreement in the South Coast Air Basin. Emissions within Sacramento's Nonattainment area have been reduced by about 42 percent from the 2002 baseline.

Consumer Products

Under State law, ARB has regulatory responsibility for reducing VOC emissions from consumer products. Since 2005, consumer products regulations adopted by ARB reduce VOC levels in significant, but previously unregulated, sectors of commerce and ban the use of toxic and high global warming potential chemicals in these and previously regulated sectors.

On November 17, 2006, ARB approved amendments to the Consumer Products regulations including automotive care products, cleaners, degreasers, disinfectants, adhesives, fabric care products, personal care products, and waxes and polishes. On June 26, 2008, the ARB approved amendments that include household cleaning and degreasing products, home and garden pesticides, aerosol paints, personal care products, and automotive maintenance products. These amendments have been approved by the EPA, and the effects are reflected in the inventory used in this update.

7.4 Consideration and Selection of New Regional and Local Control Measures

EPA's final 8-hour ozone implementation rule⁷² (see 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 policy⁷³ 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. 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

⁷² "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2" (Federal Register, November 29, 2005, p. 71659-71661).

⁷³ "Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas" (EPA, December 1999).

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 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	2012	2008-2018	<0.1	0.5

The incentive program measures rely on funding provided according to existing laws and policies. The funding sources for 2008-2018 include SECAT program (\$33.0M) and local district Department of Motor Vehicle fees (\$13.0M).

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 vehicles⁷⁴. 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.

Control Measure	Adoption Year	Implement Year	Emission Reduction (tpd)	
			2018	
			VOC	NO _x
Mobile Source Incentive Programs - On-road	2012	2008-2018	<0.1	0.5

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.

⁷⁴ OBD is abbreviation for onboard diagnostics

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	2012	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. 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 projects⁷⁵ 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.
- **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

⁷⁵ These TCMs were approved for inclusion by SACOG Board (August 21, 2008, Consent Item #08-8-10).

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 NO_x 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 Yolobus 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.
- **Dry Creek Parkway Trail, Phase 1** – In Sacramento County, Rio Linda-Dry Creek Parkway, from Dry Creek Road at Dry Creek Ranch to the Cheery Island Soccer Complex: Construct a 3-mile Class I shared-use bicycle/pedestrian trail.

Summary of SACOG New and Continuing TCM Projects and Funding Programs

Table 7-3 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 7-3
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)	NO _x 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	---	---
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	---	---
Dry Creek Parkway Trail Phase 1	Sac County – Dept of Transportation	2011	---	---
Total Emission Reductions			---	---

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

^b Spare 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 7-4 lists the recommended research and policy development TCMs:

**Table 7-4
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 policy⁷⁶ 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 presumptive⁷⁷ 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)	2014	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:

- Stationary/Area Source Control Measures.

7.15 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 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.

⁷⁶ “Incorporating Emerging and Voluntary Measures in a State Implementation Plan (SIP)” (OAQPS, EPA, September 2004, p. 9).

⁷⁷ 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.

2. The requirements are already in place.
3. The measure is technically infeasible due to local circumstances.

7.16 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	2014	2016	0.9
EDCAQMD-215	2013	2015	0.1
FRAQMD-3.15	2014	2014	<0.1
PCAPCD-218	2012	2013	0.2
YSAQMD-2.14	2014	2016	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	2011	2012	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
FRAQMD-3.14	2011	2011	<0.1
YSAQMD-2.24/2.31	2008	2009	0.7
Total			0.8

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-2.29	2016	2018	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
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	2014	2015	0.1
Total			0.1

7.17 NO_x Emission Control Measures

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 NO_x emission to a more stringent level. Current technology is widely available to adopt this control measure.

Boilers, Steam Generators, and Process Heaters Category			NO _x Emission Reduction (tpd)
District Measure	Adoption Year	Implement Year	2018
YSAQMD-2.27	2016	2018	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. NO_x is produced during the combustion process.

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

IC Engines Category			NO _x Emission Reduction (tpd)
District Measure	Adoption Year	Implement Year	2018
FRAQMD-3.22	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			NO _x Emission Reduction (tpd)
District Measure	Adoption Year	Implement Year	2018
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			0.2

7.18 Summary of Regional and Local Proposed Emission Reductions

The following Table 7-5 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 measures are estimated to provide reductions of 2 tons per day of VOC and 1 tons per day of NO_x in 2018. Some

of these new local measures were adopted by mid -2011, but have not been reflected in the inventory.

**Table 7-5
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	0.5
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	0.5
Local Regulatory Measures		
Architectural Coating	1.5	--
Automotive Refinishing	0.2	--
Degreasing/Solvent Cleaning	0.7	--
Graphic Arts	na	--
Miscellaneous Metal Parts and Products	<0.1	--
Natural Gas Production and Processing	0.1	--
Boilers, Steam Generator, and Process Heaters	--	0.2
IC Engines	--	<0.1
Large Water Heaters and Small Boilers	--	0.2
Total Local Regulatory Measures*	2.6	0.5
Total Reductions*	2.7	1.1

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

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

7.19 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.

7.20 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 guidance⁷⁸ 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.

⁷⁸ "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 guidance⁷⁹ 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 guidance⁸⁰ 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. The photochemical modeling results in Chapter 6 were used to predict the 2018

⁷⁹ “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).

⁸⁰ Ibid, p. 15-40.

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 adopted local, state, and federal control measures are used to assess future 2018 attainment. These include (i) measures adopted since the initial regional adoption of this Plan in 2009, and (ii) from proposed control measures identified in this Plan that have yet to be adopted or reflected in the current inventory. The total benefits from all remaining control measure are estimated to be 8 tpd of VOC and 1 tpd of NO_x in 2018⁸¹.

The emission reductions from new measures are shown in Table 8-1, lines J and K. Although it appears that some NO_x reductions from 'remaining measures' are needed to reach the 2018 attainment emissions target (Table 8-1, Line G), one of the measures, YSAQMD Rule 2.37 for water heaters, has been adopted and approved by EPA (75 FR 25778) and achieved more than the anticipated emissions benefits expected in 2018. That measure is still included as a "remaining measure" because the emissions benefits have not yet been reflected in the emissions inventory. Rule 2.37 was expected to achieve 0.2 tpd NO_x emissions reductions in this plan. The EPA approved Rule 2.37 is expected to achieve 0.5 tpd NO_x reductions. Therefore, we conclude that the region does not rely on new measures to attain by 2018. These remaining measures provide a buffer for meeting attainment by 2018.

VOC and NO_x 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 NO_x emission reductions. There are any number of potential VOC and NO_x 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.

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 16.3% 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).

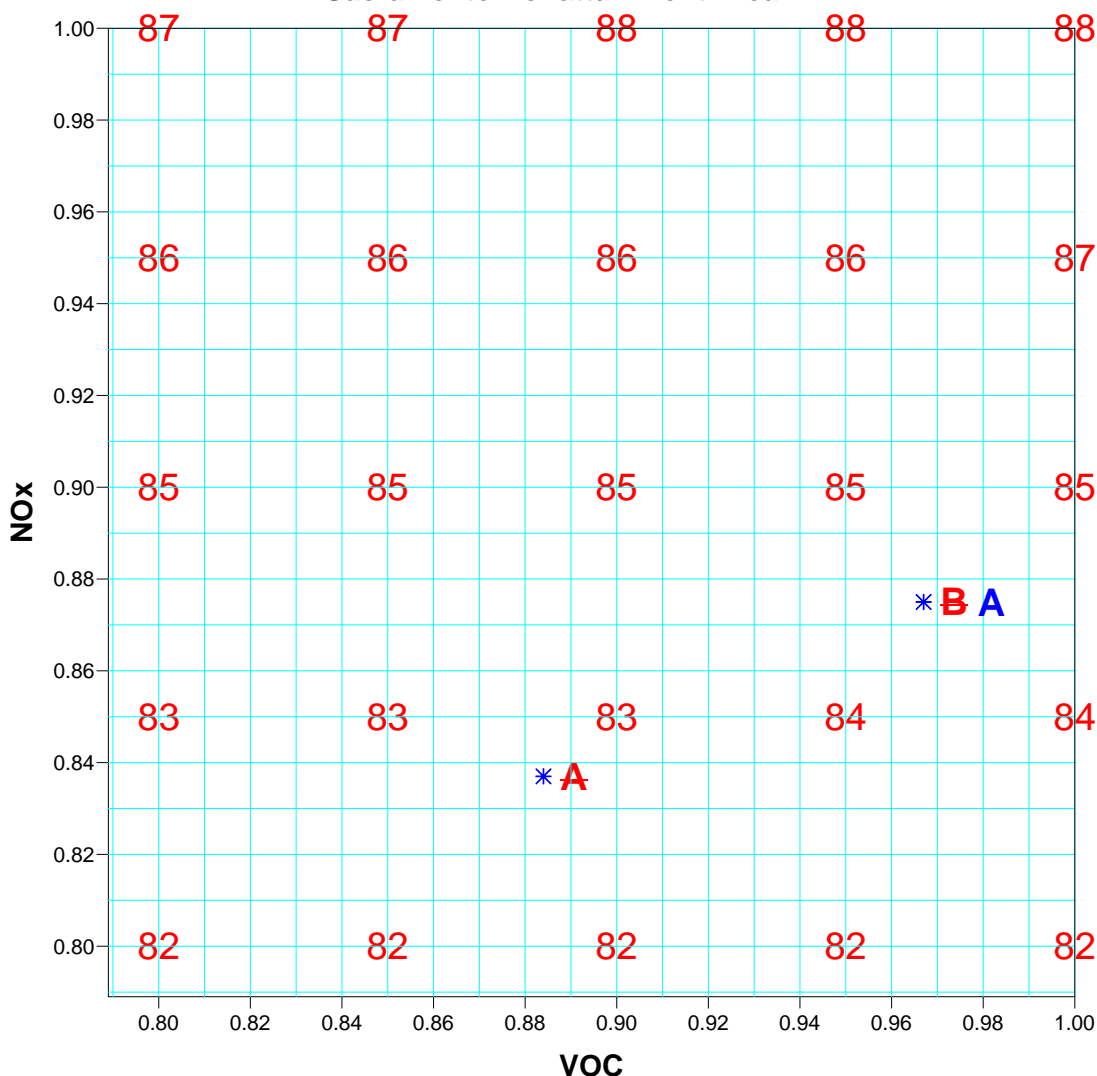
Additional modeling details and assumptions for assessing the VOC and NO_x reduction attainment goals are provided in Appendix B – Photochemical Modeling.

⁸¹ Sum of Expected emission reductions from New Emission Standards for Recreational Boats and Expanded Off-Road Recreation Vehicle Emissions Standards (Table 7-1) and Emissions Reductions from Local/Regional Control Measures (Page C-5)

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 in Table 8-1 and the graph in Figure 8-1. The total emission reductions from remaining, non-EPA approved, measures are not needed for attainment and provide a buffer to ensure the region meets the 2018 attainment deadline.

**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 used in the Plan as adopted in 2009 (without new control measures): 121 tpd of VOC and 104 tpd of NO_x.
2. The x and y axes represent fractional emissions reductions from the forecasted 2018 planning emissions inventory used in the Plan as adopted in 2009.
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 NO_x reductions at 5% increments. Values below 85 ppb represent attainment of the federal 8-hour ozone standard.
4. Point A identifies the percentage of emission reductions (3.3% VOC and 12.5% NO_x from 2018 emissions projected without new controls) that would have been achieved with the control strategy identified in the plan as adopted by local districts in 2009. Point A is below 85 ppb, demonstrating that this percentage of reductions would result in attainment of the standard at the Cool monitoring site.

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 NO_x 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)	NO _x (tpd)
Summary of 2009 Plan Attainment Demonstration		
A) 2002 Planning Emissions Inventory ¹	160.3	196.1
B) 2018 Planning Emissions Inventory with Existing Controls ¹	121.1	104.1
C) Attainment Emission Reduction in percentage ²	3.3%	12.5%
D) SIP Emissions Target: Line B × (1 – Line C)	117.1	91.1
E Percentage Emission Reduction Required for Attainment: (1 – (Line D ÷ Line A)) × 100%	27.0%	53.6%
Revised Emissions Targets		
F) Updated 2002 Inventory ³	146.7	164.8
G) Updated SIP Emissions Target: Line F × (1 – Line E)	107.1	76.5
Revised Attainment Demonstration		
H) Updated 2018 Inventory ³	97.7	73.9
I Motor Vehicle Emissions Budgets Safety Margin ⁴	1	3
J) Emission Reductions in 2018 from Remaining Regional/Local Control Measures ^{5,7}	2.7	1.1
K Emissions Reductions in 2018 from Remaining State/Federal Control Measures ^{6,7}	5.7	0.3
L) Total Emissions in 2018 with All Remaining Controls: (Line H + Line I - Line J – Line K)	90.3	75.5
M) Is Attainment Demonstrated? (Is Line L ≤ Line G?)	Yes	

1. The 2009 inventory is shown in Appendix A8.
2. The percent emission reduction targets for attainment are based on modeling results. Figure 8-1 Point A.
3. Chapter 5. Tables 5-2 and 5-3 include ERCs (ERC details are in Tables 5-4 and 5-5).
4. Chapter 11 Table 11-1
5. Appendix C, Table of Emission Reductions by Air District, Page C-5.
6. Chapter 7. Table 7-2, sum of expected emission reductions from New Emission Standards for Recreational Boats and Expanded Off-Road Rec. Vehicle Emission Standards.
7. These reductions provide a buffer for meeting attainment targets.

8.6 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 NO_x reductions in 2019 exceed the 3% needed to meet the attainment contingency requirement.

**Table 8-2
Attainment Contingency Measures Reductions
Sacramento Nonattainment Area**

Revised Inventory (adjusted CEPAM 2012) (tpd)	VOC	NO_x
A. Updated SIP Emission Target ¹	107.1	76.5
B. Updated 2019 Emissions ²	99.8	74.4
2019 Total Reductions (tpd)	VOC	NO_x
C. 2019 Reductions From Emission Target [Line A – Line B]	7.4	2.2
D. Percent Reduction from SIP Emission Target [Line C ÷ Line A] × 100%	6.9%	2.8%
Conclusion:	The combined VOC and NO_x reductions total 9.7%, which exceeds the 3% attainment contingency requirement.	

^{1.} Table 8-1 Line G.

^{2.} Appendix A, Table A7-1. Plus the MVEB safety margin from Table 8-1 Line I. Total ERCs (rounded up) listed in Tables 5-4 and 5-5 are included in the 2019 inventory.

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 days⁸², depending on meteorological conditions. CARB has also made findings that pollutant transport from the San Joaquin Valley can have significant or inconsequential impact⁸³ 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 region⁸⁴.

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

⁸² California Air Resources Board, "Ozone Transport: 2001 Review" (April 2001).

⁸³ Ibid.

⁸⁴ 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 layers⁸⁵, 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 rules⁸⁶ 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 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. The CARB attainment demonstration for Sacramento has not quantified state measure benefits in the Bay Area or the impact

⁸⁵ Aloft layers are the layers above the surface inversion layer.

⁸⁶ "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 2" (Federal Register, November 29, 2005, p. 71623-71624).

of Bay Area transport. Because the measures identified in CARB's 2007 Statewide SIP Strategy⁸⁷ 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.

⁸⁷ CARB. *Air Resources Board's Proposed State Strategy for California's 2007 State Implementation Plan*. CA: California Air Resources Board, Sacramento, CA [2007.] Web 18 April 2013, < <http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm#April26>>

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
 - reliability of modeling data bases
 - confidence in forecasting methodologies

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.

- 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 NO_x 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 Analyses⁹¹

Photochemical modeling results indicate that reducing NO_x emissions will be the most effective strategy for bringing the Sacramento Metro Area⁹² 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 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.

⁹⁰ Ibid.

⁹¹ This section was not updated. See Chapter 4, 8-Hour Ozone Air Quality Trends, for updated trend information.

⁹² Sacramento Metro Area is considered the same as the Sacramento Federal Nonattainment Area.

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 summarizes principal transportation conformity requirements, and proposes new motor vehicle emissions budgets (MVEB).

11.2 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.

11.3 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.

11.4 Latest Planning Assumptions

The current and forecasted vehicle miles traveled (VMT) are from SACOG-supplied activity data (submitted to ARB October 2012)⁹³ based on transportation modeling for the Sacramento region and recent amendments to the Metropolitan Transportation Improvement Plan (2013/16 MTIP)⁹⁴, which received federal approval on December 14, 2012. 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 November 2012).

11.5 SACOG's Blueprint and MTP/SCS 2035

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 SACOG⁹⁵ 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

⁹³ SACOG travel data transmittal e-mails to ARB and SMAQMD dated October 10, 2012 and November 30, 2012 respectively.

⁹⁴ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012), FHWA approval December 14, 2012.

⁹⁵ <http://www.sacog.org/regionalfunding/betterways.pdf>

6. Encourage natural resource conservation
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.

Since the last MTP, California adopted Senate Bill 375, which requires a Sustainable Communities Strategy, to be added to transportation plans across the state. As a result, the region adopted on April 19, 2012, the Metropolitan Transportation Plan/Sustainable Communities Strategy (2012 MTP/SCS). This is a long-range plan for transportation built on the Blueprint concept and replaced MTP2035

Updated activity data based on the 2013/16 MTIP⁹⁶ 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 2013/16 MTIP 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

⁹⁶ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012), FHWA approval December 14, 2012.

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.

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 population and employment projections,⁹⁹ land use allocations, and transportation system improvements and changes contained in the 2013/16 MTIP¹⁰⁰. The results of the travel model predicted that growth in vehicle trips and growth in vehicle miles traveled would be slightly lower than the population growth rate for the Sacramento region through 2035.

11.6 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, 2014, and 2017 RFP milestone years, and the 2018 attainment analysis year, listed in Table 11-1. The proposed budgets incorporate: 1) the recent on-road motor vehicle emission inventory factors of EMFAC2011 (described in Section 5.3.3), 2) updated travel activity data from SACOG's 2013/16 MTIP¹⁰¹ and MTC's Plan Bay Area Preferred Land Use Scenario/Transportation Investment Strategy (May 11, 2012)¹⁰², based on the new SACSIM transportation modeling system, and 3) latest regional and state control strategies.

Table 11-1 Proposed New Motor Vehicle Emission Budgets Sacramento Nonattainment Area						
	NO _x			VOC		
	2014	2017	2018	2014	2017	2018
ARB Inventories for Conformity (Tons per Day)	46	37	34	21	17	16
Safety Margin	3	2	3	2	1	1
Budgets	49	39	37	23	18	17

*All motor vehicle emission budget years include regional incentive benefits.

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

¹⁰⁰ Final 2013/16 Metropolitan Transportation Improvement Program (MTIP), Amendment #1 to the MTP/SCS 2035, and Air Quality Conformity Analysis. (August 16, 2012) FHWA approved on December 14, 2012.

¹⁰¹ Ibid.

¹⁰² Joint MTC Planning/ABAG Administrative Committees, *Plan Bay Area Preferred Land Use and Transportation Investment Strategy*. Oakland, CA: Bay Area Metropolitan Transportation Commission. [May 2012.]

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 and local control measures are documented in Appendix F – Motor Vehicle Emissions Budgets and VMT Offset demonstration. Additionally, the transportation budgets incorporate a "safety margin."¹⁰³ These transportation budgets decline significantly from 2014 through 2018, which will ensure continued progress towards attainment of the 8-hour ozone standards. As required by 40CFR93.105, the regional air districts consulted with the metropolitan planning organizations, state agencies, Department of Transportation and the U.S. Environmental Protection Agency during development of the MVEBs proposed in this Plan Revision. On December 11, 2012, a meeting of SACOG's Regional Planning Partnership (RPP)¹⁰⁴ was held to review and recommend for adoption of the MVEBs. By a consensus vote, members of RPP approved that the proposed MVEBs to be included in the Plan revision. The proposed MVEBs were also presented to the Land Use and Natural Resources Committee of the SACOG Board on February 7, 2013.

11.7 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 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.

US EPA determined the motor vehicle emissions budgets for 2014, 2017, to be adequate and found the budget for 2018 inadequate on July 28, 2009. The budgets in this plan replace the prior budgets¹⁰⁵.

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.

¹⁰³ 40 CFR 93.101 and 40 CFR 93.124.

¹⁰⁴ SACOG. *Regional Planning Partnership December 11, 2012 Meeting Agenda Item 6: Proposed Update to Sacramento Ozone Pre-Cursor Emissions Budgets*. Sacramento Area Council of Governments, Sacramento, CA. [December 11, 2012.]

¹⁰⁵ Federal Register Volume 74 No. 143 p.37210, 07/28/2009.

11.8 Vehicle Miles Traveled Offset (VMT Offset)

Section 182(d)(1)(A) of the federal Clean Air Act applies to areas classified as severe or extreme nonattainment of the National Ambient Air Quality Standard (NAAQS) for ozone. The Sacramento Federal Ozone Nonattainment Area is currently designated as Severe-15, (75FR24409) and is subject to the requirement to offset any growth in emissions resulting from an increase in vehicle miles travelled. A detailed VMT offset demonstration was prepared by California Air Resources Board and is included in Appendix F – Motor Vehicle Emission Budgets and VMT Offset Demonstration as part of the 2013 revision to the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. The analysis shows there are sufficient transportation control strategies and TCMs to offset the emissions increase due to growth in VMT and demonstrates compliance with the requirements of Section 182(d)(1)(A) of the federal Clean Air Act.

12 GENERAL CONFORMITY

12.1 Introduction to General Conformity

General conformity is the federal regulatory process for preventing major federal actions¹⁰⁶ 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
- Delays timely attainment of any NAAQS, required interim emission reduction, or other milestones.

¹⁰⁶ 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)

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 NO_x.
- 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 NO_x emission inventory is 19 tons per day (or about 6,900 tons per year).

Direct emissions of a criteria pollutant or its precursors¹⁰⁷ 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.¹⁰⁸

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
- 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

¹⁰⁷ Precursors for ozone include NO_x and VOC pollutants (40 CFR 93.152).

¹⁰⁸ "General Conformity Guidance: Questions and Answers" (OAQPS, EPA, dated July 13, 1994), p. 13.

- 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 Sunset¹⁰⁹. 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 2014, and 2017 RFP milestone years, and for the 2018 attainment analysis year in Table 12-1. A portion of the airport emissions inventory is represented by ground support equipment (GSE) and subject to CARB's 2007 In-Use, Off-Road Equipment Regulation. In 2010 CARB approved a suite of amendments to the in-use rules that were designed to account for reduced activity resulting from the recession and provide regulatory relief to truck and equipment owners. The off-road rule revisions delayed implementation requirements for small fleets. CARB's inventory uses the same average GSE emission rates for all counties in California and does not reflect fleet size and characteristics specific to each airport. The state's total GSE emissions are dominated by "large fleet" emissions and controls, and CARB's rule requires accelerated and greater control of "large fleets" as compared to those of "medium and small fleets."

This Plan revision combines the GSE emissions with aircraft emissions for each planning year and the total is rounded up to the next tenth decimal number. This rounding convention is used in estimating emissions inventories included in the Plan.

¹⁰⁹ Information from Sacramento County Airport System; comment letter dated October 24, 2008.

Table 12-1 (Revised)		
Airport (Aircraft Operations + Ground Support Equipment) Emissions		
for the Sacramento Nonattainment Area		
Year of Operations	VOC	NO_x
	(tons/day)	(tons/day)
2014 Projected Emissions Inventory Aircraft Operations and GSE	0.7	2.7
2017 Projected Emissions Inventory Aircraft Operations and GSE	0.7	3.0
2018 Projected Emissions Inventory Aircraft Operations and GSE	0.7	3.0

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.

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 NO_x 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 VOC (and/or NO_x) emission reduction of at least 18% over the first 6 years from the 2002 baseline year (i.e., 2002-2008)¹¹¹ and 9% between each subsequent milestone year (i.e., 2009-2011, 2012-2014, 2014-2017) and 3% in the attainment year. These demonstrations are made for future milestone years 2014, 2017, and 2018. A plan to demonstrate how progress toward milestone targets in 2008 and 2011 is considered moot, since those milestone years are in the past.

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).

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.

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

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 NO_x 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 NO_x 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 NO_x 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.

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. In addition, the emission inventory includes emission reduction credits (ERCs)¹¹³ to ensure they will not interfere with reasonable further progress if they are used in the future. ERCs may be used as “offsets” to compensate for an increase in emissions from a new source or modified major source regulated by the air districts. The “safety margin”¹¹⁴ is added to the baseline emission inventory for each milestone year to calculate reasonable further progress.

13.4.2 RFP Emission Reduction Targets

40 CFR 51.910(a)(1)(ii)(B) requires a 18% reduction between 2002 base year and the first milestone year of 2008 and 9% between each subsequent milestone year. For the 2008 RFP target VOC level, the required 18% RFP emission reduction is applied to the adjusted 2002 baseline for 2008 milestone year. For the subsequent milestone RFP target VOC level, the required 9% is applied to the previous milestone RFP target VOC

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

¹¹³ Chapter 5, Section 5.6.

¹¹⁴ Chapter 11, Table 11-2.

level minus current milestone's FMVCP/RVP adjustments. For the 2018 attainment RFP target VOC level, the required 3% is applied to the 2017 milestone RFP target VOC level minus 2018 FMVCP/RVP adjustments.

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 included in the RFP demonstration assessment to fulfill the shortfall.

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 Guidance¹¹⁵, 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, the 10.7% apparent shortfall in VOC in 2014 milestone year can be substituted with 10.7% NO_x reductions.

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

¹¹⁵ Environmental Protection Agency (OAQPS), "NO_x Substitution Guidance", December 1993.

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 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. No emission reductions from new measures identified in Chapter 7 are used in the reasonable further progress demonstrations or in the RFP contingency demonstration. 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 (14%) used to cover any VOC shortfalls is less than the total NO_x reductions (54%) required for attainment¹¹⁶, the use of NO_x substitution for RFP purposes is consistent with the attainment demonstration strategy.

¹¹⁶ 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**

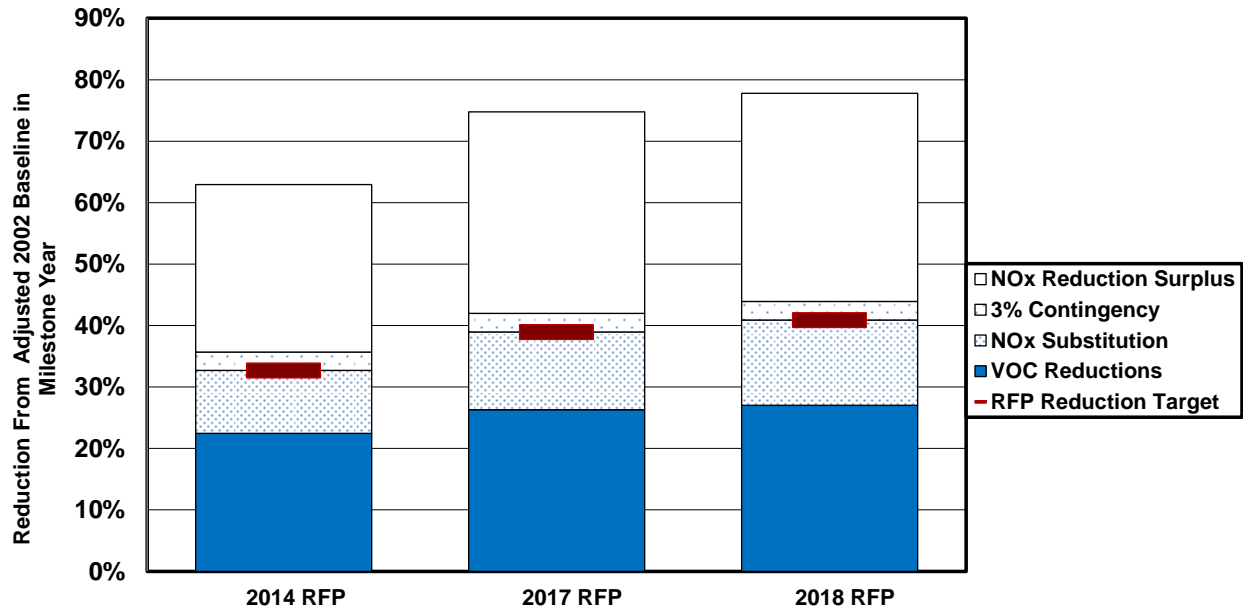
VOC Emission Calculations – Tons/Day	2002	2014	2017	2018
Baseline VOC ^B	146.7	106.0	99.9	98.7
Non-Creditable FMVCP/RVP Adjustment ^C	0.0	10.9	11.9	12.2
RACT Corrections	0	0	0	0
Adjusted 2002 Baseline VOC in milestone year	146.7	135.8	134.8	134.5
RFP commitment for VOC reductions from new measures	0	0	0	0
Future Year VOC with existing and proposed measures		106.0	99.9	98.7
Required % change since previous milestone year (VOC or NO _x) compared to 2002		9%	9%	3%
Target VOC levels		91.5	82.3	79.5
Apparent shortfall in VOC		14.5	17.6	19.2
Apparent shortfall in VOC, %		10.7%	13.0%	14.3%
VOC shortfall previously provided by NO _x substitution, %		0.0%	10.7%	13.0%
Actual VOC shortfall, %		10.7%	2.3%	1.2%
NO_x Emission Calculations – Tons/Day				
2002	2014	2017	2018	
Baseline NO _x ^B	164.8	92.6	80.0	76.9
Non-Creditable FMVCP Adjustment ^C	0.0	10.4	11.0	11.2
Adjusted 2002 Baseline NO _x in milestone year	164.8	154.4	153.8	153.6
RFP commitment for NO _x reductions from new measures	0	0	0	0
Change in NO _x since 2002		61.8	73.8	76.7
Change in NO _x since 2002, %		40.0%	48.0%	49.9%
NO _x reductions since 2002 already used for RFP substitution and contingency through last milestone year, %		0.0%	13.7%	16.0%
NO _x reductions since 2002 available for RFP substitution and contingency in this milestone year, %		40.0%	34.3%	33.9%
Change in NO _x since 2002 used for VOC substitution in this milestone year, %		10.7%	2.3%	1.2%
Change in NO _x since 2002 available for contingency in this milestone year, %		3.0%	3.0%	3.0%
Change in NO _x since 2002 surplus after meeting substitution and contingency needs in this milestone year, %		26.3%	31.9%	32.6%
RFP Met?		YES	YES	YES
Contingency Met?		YES	YES	YES

^A CARB RFP and Pre-90 RFP write-up March 26, 2013, email transmittal to SMAQMD.

^B Sum of emissions from Chapter 5, Tables 5-2 and 5-3 and motor vehicle “safety margin” from Chapter 11, Table 11-1. The emission reduction credits (are included in emission inventory) see Tables 5-4 and 5-5.

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

**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 NO_x 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 concentration¹¹⁷ 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. EPA approved the reclassification request on May 5, 2010 (75 FR 24409).

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,

¹¹⁷ 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.

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.

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 standard¹¹⁸ down to about 16 ppb (or 19%).

14.4 VOC and NO_x 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 (NO_x). 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 NO_x emissions (such as motor vehicles and other fuel combustion equipment).

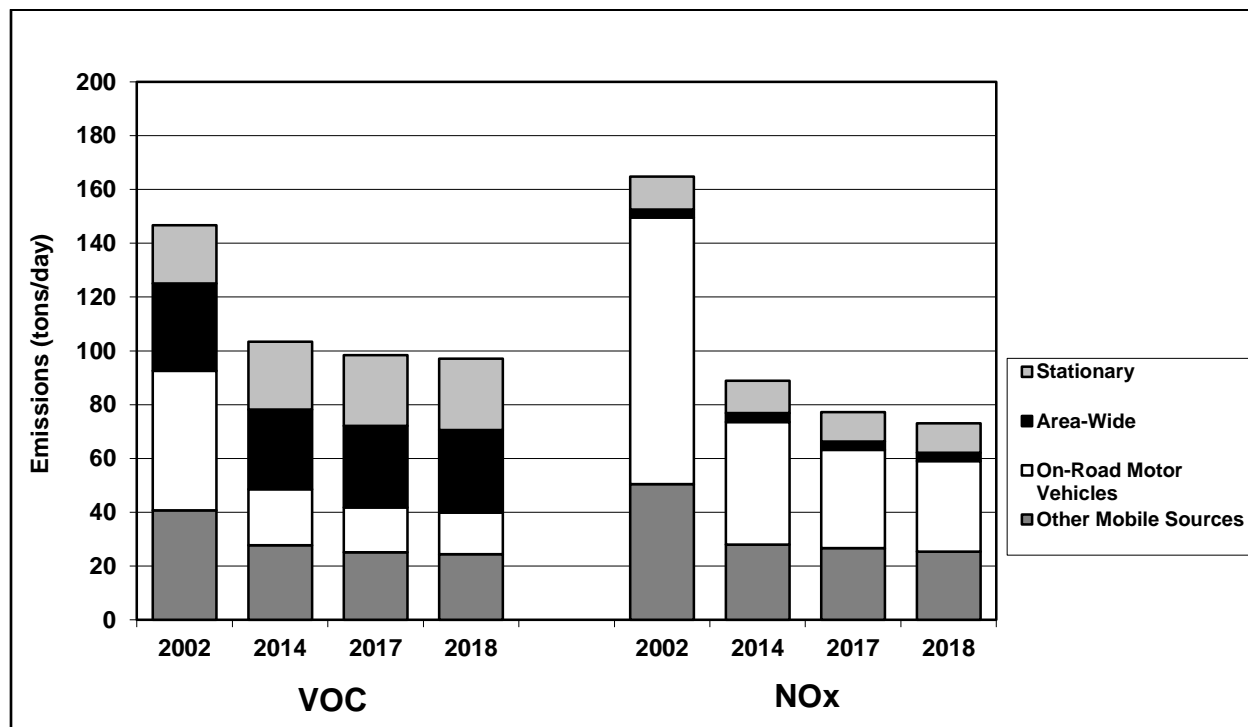
EPA emission inventory guidance requires the planning emissions inventory to be based on estimates of actual emissions for an average summer weekday, typical of the ozone season (May – October). The anthropogenic emissions inventory is first divided into four broad source categories: stationary sources, 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 147 tons per day of VOC emissions and 165 tons per day of NO_x 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 NO_x emission forecasts show significant declines in mobile source emissions, despite increasing population, vehicle activity, and economic development in the Sacramento region.

¹¹⁸ Federal 8-hour ozone standard = 84 ppb.

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



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

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 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 control 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.

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 NO_x air pollutants. A single NO_x pollutant strategy is not appropriate because, even though VOC measures are not as effective as NO_x, they still provide needed reductions. Moreover, 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 are an enforceable commitment in the SIP. The proposed regional and local control measures include estimates of the emission reductions from each of the individual measures, but the commitment is for emissions reductions from the aggregate of all proposed new measures combined. Because new measures provide a buffer to attain standards by 2018, and are not included in the Reasonable Further Progress demonstration, if a particular measure does not get its expected emission reductions, it does not compromise the attainment demonstration or Reasonable Further Progress demonstration. An explicit commitment is made to the reductions associated with the on-road mobile source incentive program for purposes of transportation conformity.

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. Emission benefits from these new committal measures are estimated to provide reductions of 2.7 tons per day of VOC and 1.1 tons per day of NO_x 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	0.5
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	0.5
Local Regulatory Measures*		
Architectural Coating	1.5	-
Automotive Refinishing	0.2	-
Degreasing/Solvent Cleaning	0.7	-
Graphic Arts	na	-
Miscellaneous Metal Parts and Products	<0.1	-
Natural Gas Production and Processing	0.1	-
Boilers, Steam Generator, and Process Heaters	-	0.2
IC Engines	-	<0.1
Large Water Heaters and Small Boilers	-	0.2
Total Local Regulatory Measures*	2.6	0.5
Total Reductions*	2.7	1.1

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)	NO _x 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	---	---
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	---	---
Dry Creek Parkway Trail Phase 1	Sac County – Dept of Transportation	2011		
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

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 projected 2018 emission inventory with adopted control measures, including emission reduction credits and a safety margin in the motor vehicle emissions budgets demonstrates attainment by the 2018 “severe” classification deadline. New local control measures provide a buffer in the attainment demonstration. The attainment demonstration assessment for the Sacramento nonattainment area is summarized in Table 14-3.

Table 14-3 Summary of Attainment Demonstration for 8-Hour Ozone NAAQS 2018 “Severe” Classification Scenario

Sacramento Nonattainment Area	VOC (tpd)	NO _x (tpd)
Summary of 2009 Plan Attainment Demonstration		
A) 2002 Planning Emissions Inventory ¹	160.3	196.1
B) 2018 Planning Emissions Inventory with Existing Controls ¹	121.1	104.1
C) Attainment Emission Reduction in percentage ²	3.3%	12.5%
D) SIP Emissions Target: Line B × (1 – Line C)	117.1	91.1
E Percentage Emission Reduction Required for Attainment: (1 – (Line D ÷ Line A)) × 100%	27.0%	53.6%
Revised Emissions Targets		
F) Updated 2002 Inventory ³	146.7	164.8
G) Updated SIP Emissions Target: Line F × (1 – Line E)	107.1	76.5
Revised Attainment Demonstration		
H) Updated 2018 Inventory ³	97.7	73.9
I Motor Vehicle Emissions Budgets Safety Margin ⁴	1	3
J) Emission Reductions in 2018 from Remaining Regional/Local Control Measures ^{5,7}	2.7	1.1
K Emission Reductions in 2018 from Remaining State/Federal Control Measures ^{6,7}	5.7	0.3
L) Total Emissions in 2018 with All Remaining Controls: (Line H + Line I - Line J – Line K)	90.3	75.5
M) Is Attainment Demonstrated? (Is Line L ≤ Line G?)	Yes	

1. The 2009 inventory is shown in Appendix A8.
2. The percent emission reduction targets for attainment are based on modeling results. Figure 8-1 Point A.
3. Chapter 5. Tables 5-2 and 5-3 include ERCs (ERC details are in Tables 5-4 and 5-5).
4. Chapter 11 Table 11-1
5. Appendix C, Table of Emission Reductions by Air District, Page C-5.
6. Chapter 7. Table 7-2, sum of expected emission reductions from New Emission Standards for Recreational Boats and Expanded Off-Road Rec. Vehicle Emission Standards.
7. These reductions provide a buffer for meeting attainment targets.

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 days¹¹⁹, 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 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.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.

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

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).

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 reduction 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 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 EMFAC2011, updated travel activity data, latest control strategies, and a safety margin.

Table 14-4 Proposed New Motor Vehicle Emission Budgets* Sacramento Nonattainment Area						
	NO _x			VOC		
	2014	2017	2018	2014	2017	2018
ARB Inventories for Conformity (Tons per Day)	46	37	34	21	17	16
Safety Margin	3	2	3	2	1	1
Budgets	49	39	37	23	18	17

*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 SACOG's Metropolitan Transportation Improvement Plan (2013/16 MTIP) and MTC's Plan Bay Area Preferred Land Use Scenario/Transportation Investment Strategy (May 11, 2012). The transportation analysis for the 2013/16 MTIP 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 Metropolitan Transportation Plan/Sustainable Communities Strategies (2012 MTP/SCS).

If these proposed new motor vehicle emission budgets are determined to be adequate for transportation conformity purposes by EPA, they will replace the prior 2014 and 2017 budgets found adequate in 2009. 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.

Vehicle Miles Traveled Offset (VMT Offset)

Section 182(d)(1)(A) of the federal Clean Air Act applies to areas classified as severe or extreme nonattainment of the National Ambient Air Quality Standard (NAAQS) for ozone. The Sacramento Federal Ozone Nonattainment Area is currently designated as Severe-15, (75FR24409) and is subject to the requirement to offset any growth in emissions resulting from an increase in vehicle miles travelled. A detailed VMT offset demonstration was prepared by California Air Resources Board and is included in Appendix F – Motor Vehicle Emission Budgets and VMT Offset Demonstration as part of the 2013 revision to the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. The analysis shows there are sufficient transportation control strategies and TCMs to offset the emissions increase due to growth in VMT and demonstrates compliance with the requirements of Section 182(d)(1)(A) of the federal Clean Air Act.

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

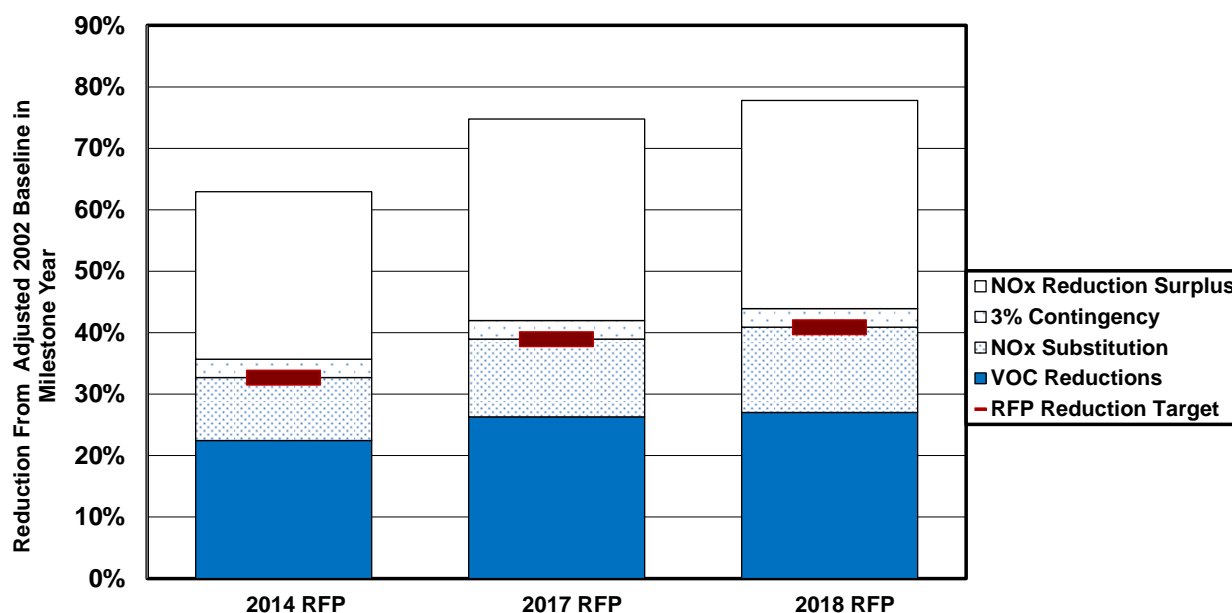
purposes. Specific emission budgets for airport operations are identified for future years.

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 NO_x) 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.

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 NO_x emission reductions for the milestone years 2014, 2017, and the 2018 attainment analysis year. Figure 14-2 shows the percentages of VOC and NO_x emission reductions used to meet the RFP reduction goals. A NO_x 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

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

re-evaluated. Revisions to this plan can be made at any time if new information indicates a change is needed. Each air district has prepared and submitted RACT SIPs for major sources (emissions equal to or greater than 25 tons per year) under severe area requirements.

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 2011 8-hour ozone milestone report was the Sacramento Regional 8-Hour Ozone Milestone Report: 2011 Milestone Year (SMAQMD, 2012)¹²⁴. The air districts will prepare subsequent reports every three years out to the attainment year.

¹²⁴ SMAQMD et al. Sacramento Regional 8-Hour Ozone Milestone Report: 2011 Milestone Year. Sacramento Metropolitan Air Quality Management District et al: Sacramento, CA. [2012.]