

**1-HOUR OZONE  
ATTAINMENT DETERMINATION REQUEST  
FOR THE  
SACRAMENTO FEDERAL OZONE  
NONATTAINMENT AREA**

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**Prepared by:**

**Sacramento Metropolitan Air Quality Management District  
777 12<sup>th</sup> Street, Third Floor  
Sacramento, CA 95814-1908  
(916) 874-4800  
<http://www.airquality.org>**

**Principal Authors: Bruce Katayama, Associate Air Quality Planner  
Janice Lam, Statistician  
Steven Lau, Associate Air Quality Planner  
Hao Quinn, Associate Air Quality Engineer**

**Reviewed by: Charles Anderson, Program Coordinator**

**Approved by: Brigette Tollstrup, Division Manager  
Larry Greene, Executive Director/APCO**

Prepared on behalf of the following:

El Dorado County Air Quality Management District  
Marcella McTaggart, Air Pollution Control Officer  
2850 Fairlane Court, Bldg. C  
Placerville, CA 95667-4100  
(530) 621-6662  
<http://www.co.el-dorado.ca.us/emd/apcd>

Feather River Air Quality Management District  
David Valler, Jr., Air Pollution Control Officer  
1007 Live Oak Boulevard, Suite B-3  
Yuba City, CA 95991  
(530) 634-7659  
<http://www.fraqmd.org>

Placer County Air Pollution Control District  
Tom Christofk, Air Pollution Control Officer  
3091 County Center Drive, Suite 240  
Auburn, CA 95603  
(530) 745-2330  
<http://www.placer.ca.gov/Departments/Air.aspx>

Yolo-Solano Air Quality Management District  
Mat Ehrhardt, Air Pollution Control Officer  
1947 Galileo Court, Suite 103  
Davis, CA 95618  
(530) 757-3650  
<http://www.ysaqmd.org>

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## **1. INTRODUCTION**

### **1.1 Ozone Formation**

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.

Ozone is formed as a result of photochemical reactions involving two types of precursor pollutants: volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>). VOC and NO<sub>x</sub> 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 Health Effects and Public Welfare Impacts**

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 U.S. Environmental Protection Agency (EPA) in their 2006 Criteria Document for ozone (U.S. EPA, 2006), 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 (CARB, 2005).

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 interfering with normal plant metabolic processes. Vegetation effects (75 FR 2938) include:

- reduction in photosynthesis;
- increased vulnerability to harsh environmental conditions, pests, and diseases;
- growth impairment during seedlings, saplings, and mature tree growth stages;
- visible foliar injury; and
- yield loss in annual crops.

In addition to adverse impacts on sensitive natural vegetation and sensitive ecosystems, ozone can also indirectly affect other ecosystem components, such as soils, water, and wildlife, through its effects on vegetation.

### **1.3 Purpose of Attainment Determination Request**

The Sacramento Federal Nonattainment Area (SFNA, see Figure 1.1) includes Sacramento and Yolo counties, Placer and El Dorado counties (except Lake Tahoe Basin portions), Solano County (eastern portion), and Sutter County (southern portion). The SFNA was designated as “severe” nonattainment for the 1-hour ozone national ambient air quality standards (NAAQS)<sup>1</sup>, with the attainment deadline of November, 2005 (SMAQMD, 1994).

The SFNA met the 1-hour ozone NAAQS in 2008. The air quality data for 2006-2008 show attainment of the 1-hour ozone NAAQS if EPA approves the “Exceptional Events Demonstration for High Ozone in the Sacramento Regional Nonattainment Area Due to Wildfires” (SMAQMD, 2009b). In addition, no exceedances of the 1-hour ozone NAAQS were recorded in 2009.

The purpose of this report is to provide supporting documentation to request a formal attainment determination for the 1-hour ozone NAAQS for the SFNA. According to EPA guidance (Page, 2010), an attainment determination by EPA is needed to terminate the Clean Air Act Section 185 penalty fee program obligations which apply to ozone nonattainment areas classified as severe or extreme for failing to attain the ozone standards by the required deadline. If an area fails to attain by the required deadline, section 185 requires major stationary sources of volatile organic compounds and nitrogen oxides located in the area to pay an annual penalty fee of \$5,000 per ton (adjusted for inflation) for their actual annual emissions that exceed 80% of specified baseline emissions.

This report includes the following elements and tasks:

- Document the extent of the 1-hour ozone improvement in Sacramento Federal Nonattainment Area
- Determine the 1-hour ozone air quality data trend
- Document the emission inventory sources contributing to the ozone improvement and the emission reduction trends
- Request formal attainment determination for the 1-hour ozone NAAQS.

### **1.4 Preparation and Review Process**

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<sup>1</sup> 1-hour ozone standard violation criterion defined as no more than 3 daily exceedances (greater than 124 ppb) over three years at a monitor station.

The Sacramento Metropolitan Air Quality Management District (SMAQMD) is a local government air quality regulatory agency for the jurisdiction of Sacramento County. This 1-Hour Ozone Attainment Determination Request for the Sacramento Federal Ozone Nonattainment Area is developed by the SMAQMD staff on behalf of the air districts in the SFNA including the El Dorado County Air Quality Management District, Feather River Air Quality Management District, Placer County Air Pollution Control District, and Yolo-Solano Air Quality Management District. The California Air Resources Board (CARB) staff provided information regarding mobile and area-wide emissions inventory category estimates, state and federal control measures, and 1-hour ozone air quality data analysis.

The Board of Directors for the Sacramento Metropolitan Air Quality Management District will hold a public hearing on May 27, 2010 to receive public comments on the 1-Hour Ozone Attainment Determination Request for the Sacramento Federal Ozone Nonattainment Area. The final report and documentation of public comments and responses to comments will be sent to CARB for their submittal to EPA.

## 1.5 Overview of Chapter Contents

This document includes the information and analyses to fulfill the federal 1-hour ozone air quality attainment determination requirements for the Sacramento Federal Ozone Nonattainment Area. The following chart contains a brief description of each chapter in this report.

Chapter 1	Provides an introduction that contains background information on 1-hour ozone air pollution, health impacts, purpose of the plan, and an overview of the plan's preparation and review process.
Chapter 2	Explains the current 1-hour ozone nonattainment status and defines federal Clean Air Act 1-hour ozone requirements for an attainment determination.
Chapter 3	Analyzes 1-hour ozone air quality data and trends in Sacramento Federal Nonattainment Area.
Chapter 4	Presents the ozone precursor pollutants baseline emissions inventory and the emission forecasts that are based on existing control strategies and growth assumptions.
Chapter 5	Documents the 1-hour ozone attainment determination for Sacramento Federal Nonattainment Area and its implications.
Chapter 6	Summarizes the key points and major conclusions of this report.

## 1.6 References

CARB. *Review of the California Ambient Air Quality Standard for Ozone*. Sacramento, CA: California Air Resources Board, [2005.]

Page, Stephen D. *Guidance on Developing Fee Programs Required by Clean Air Act Section 185 for the 1-hour Ozone NAAQS, OAQPS*, U.S. EPA Memorandum, January 5, 2010.

SMAQMD, et al. *Sacramento Area Regional Ozone Attainment Plan*. Sacramento, CA: Sacramento Metropolitan Air Quality Management District, [1994.]

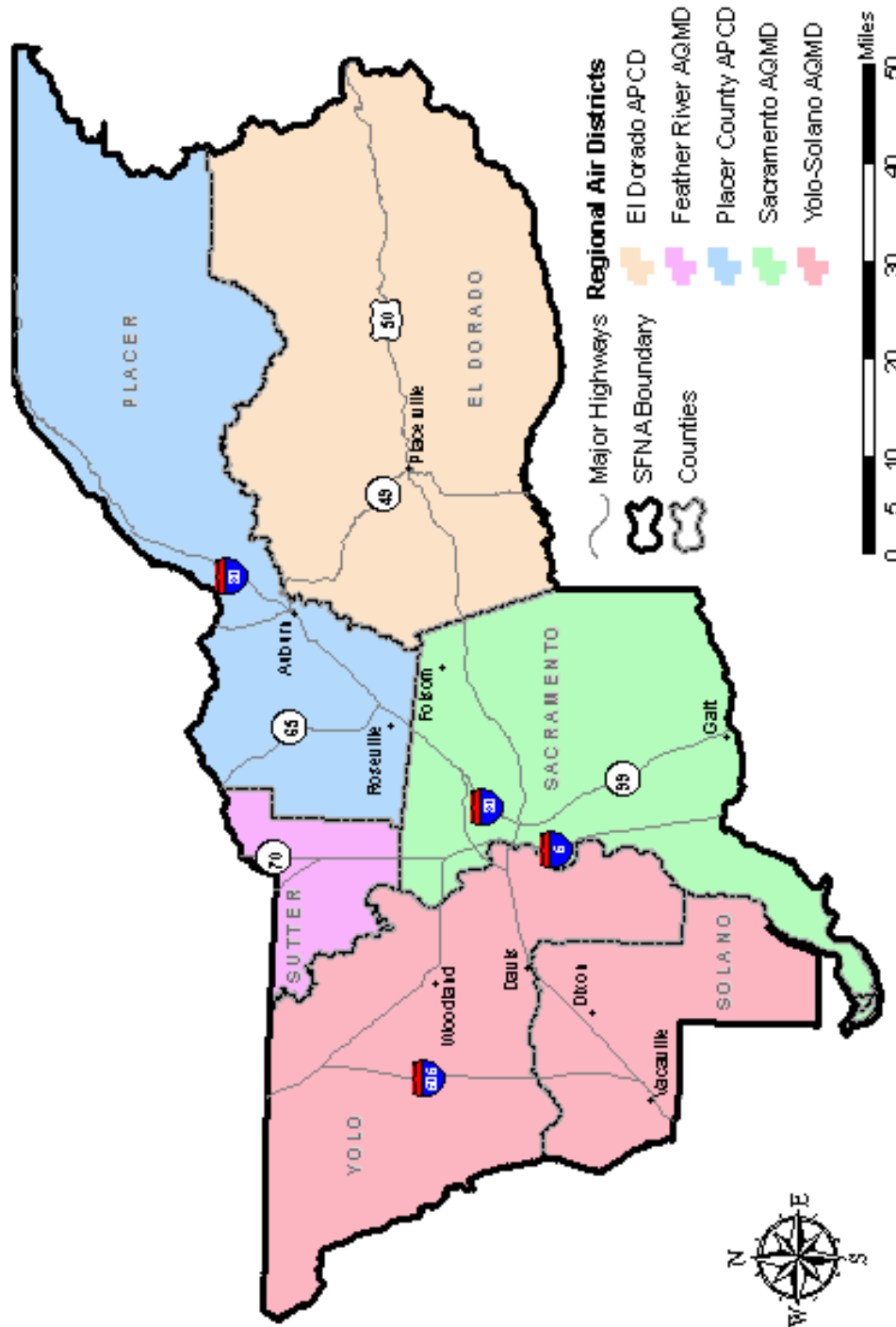
SMAQMD, et al. *Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan (with errata sheets incorporated)*. Sacramento, CA: Sacramento Metropolitan Air Quality Management District, [2009a.]

SMAQMD, et al. *Exceptional Events Demonstration for High Ozone in the Sacramento Regional Nonattainment Area Due to Wildfires*. Sacramento, CA: Sacramento Metropolitan Air Quality Management District, [2009b.]

U.S. EPA. *Air Quality Criteria for Ozone and Related Photochemical Oxidants*. United States Environmental Protection Agency, [2006.] Web January 14, 2009 <<http://www.epa.gov/ncea>>

U.S. EPA. *National Ambient Air Quality Standards for Ozone*, Federal Register, Volume 75, January 19, 2010, p. 2938.

**Figure 1.1**  
**Sacramento 1-Hour Ozone Nonattainment Area**





## **2. FEDERAL CLEAN AIR ACT REQUIREMENTS**

### **2.1 1-Hour Ozone Standard**

In 1979, the U.S. Environmental Protection Agency (EPA) revised the national ambient air quality standard (NAAQS) for ozone to a concentration of 0.12 parts per million averaged over one hour (44 FR 8202). The 1-hour ozone standard violation criterion is defined as no more than 3 exceedance days (>124 ppb) over a consecutive 3-year period at a monitoring site (40 CFR 50, Appendix H).

### **2.2 Sacramento Nonattainment Designation**

The federal Clean Air Act Amendments of 1990 included new designation classifications, attainment deadlines, and planning requirements. On November 6, 1991, the Sacramento region was designated nonattainment for the 1-hour ozone NAAQS (56 FR 56694). Under Section 181 of the Clean Air Act (CAA), the area was initially classified as “serious” with an attainment date of no later than November 15, 1999, based on an ozone design value of 0.16 parts per million.

### **2.3 1994 SIP and Reclassification to Severe**

In preparing the 1-hour ozone attainment demonstration plan, sophisticated air quality computer modeling was used to simulate future ozone formation and evaluate the effectiveness of emission control scenarios. However, the computer modeling did not project attainment by the 1999 deadline. As a result, the 1994 Sacramento Area Regional Ozone Attainment Plan demonstrated 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 (SMAQMD, et al, 1994).

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.

In response to the 1994 SIP submittal relying on a 2005 attainment date, EPA granted the voluntary request for Sacramento’s nonattainment reclassification from a “serious” area to a “severe” area, effective June 1, 1995 (60 FR 20237). The higher classification extended the attainment deadline to November 15, 2005. EPA approved the 1994 Sacramento attainment demonstration SIP and its associated elements, effective February 7, 1997 (62 FR 1150).

## **2.4 1-Hour Ozone Standard Revoked**

On April 30, 2004, EPA published the Phase 1 Rule to implement the 8-hour ozone NAAQS which revoked the 1-hour ozone NAAQS effective June 15, 2005 (69 FR 23951). However, a court decision and EPA rule reconsideration provided that certain previous 1-hour ozone nonattainment and maintenance control obligations remain in effect (70 FR 44470) (Meyers, 2007). The anti-backsliding regulations retained provisions which include: 1) the 1-hour ozone NAAQS new source review requirements, 2) CAA Section 185 penalty fees for failure of severe and extreme areas to attain the 1-hour ozone NAAQS, and 3) contingency measures for failure to attain or make reasonable further progress toward attainment of the 1-hour ozone NAAQS. In addition, the 1-hour ozone nonattainment designation and severe classification status for the Sacramento area remain in place (tables in 40 CFR 81.305) due to the continued control obligations.

## **2.5 Reasonably Available Control Measures Analysis**

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... and shall provide for attainment of the national primary ambient air quality standards.”

EPA’s RACM policy indicates that areas should consider all candidate measures that are potentially reasonably available (Seitz, 1999) (Seitz and Oge, 2000). Sources of potentially reasonable measures include measures adopted in other nonattainment areas, measures that the EPA has identified in guidelines or other documents, and any measures that have been suggested for the particular nonattainment area during a public comment period.

Areas should consider all reasonably available measures for implementation in light of local circumstances. However, areas need only to adopt measures if they are both economically and technologically feasible and cumulatively will advance the attainment date (by one year or more) or are necessary for RFP. Furthermore, “EPA does not believe that Congress intended the RACM requirement to compel the adoption of measures that are absurd, unenforceable, or impracticable” (57 FR 13498).

The 1994 Sacramento Area Regional Ozone Attainment Plan for 1-hour ozone NAAQS included commitments to adopt VOC and NO<sub>x</sub> control measures to meet RFP and attainment demonstration requirements. All source categories of mobile, stationary and area sources were evaluated to determine the potential for additional reductions. EPA’s approval of the 1994 Sacramento SIP elements for control measures, RFP, and attainment indicates that the RACM requirement was met for the 1-hour ozone control measure commitments.

In addition, the promulgation of the more stringent 1997 8-hour ozone NAAQS requires SIP update efforts for the Sacramento nonattainment area. Therefore, the development, adoption and implementation of additional reasonably available VOC and NO<sub>x</sub> control measures is a continuous process. The 2009 Sacramento 8-hour ozone SIP contains a RACM analysis which documents the evaluation and commitment to adopt potentially reasonably available control measures (SMAQMD, et al, 2008).

## 2.6 EPA Guidance for Attainment Determination

EPA no longer promulgates redesignations for the 1-hour standard because that standard has been revoked. However, CAA Section 185 penalty fee requirements provide that fees are to continue until the area has been redesignated to attainment for ozone. Therefore, EPA recently issued guidance which states that it is reasonable for the fee program obligation to cease upon a determination, based on notice-and-comment rulemaking, that an area has attained the 1-hour ozone standard due to permanent and enforceable emission reduction measures (Page, 2010). This determination centers on core criteria for redesignations under Clean Air Act Section 107(d)(3).

EPA guidance for redesignating areas to attainment further states, "Attainment resulting from temporary reductions in emission rates (e.g., reduced production or shutdown due to temporary adverse economic conditions) or unusually favorable meteorology would not qualify as an air quality improvement due to permanent and enforceable emission reductions" (Calcagni, 1992). The percent emission reductions achieved from control measures that have been adopted and implemented since the nonattainment designation should be estimated.

## 2.7 References

Calcagni, John. *Procedures for Processing Requests to Redesignate Areas to Attainment*. OAQPS, U.S. EPA Memorandum, September 4, 1992.

Code of Federal Regulations, Title 40, Appendix H to Part 50 – *Interpretation of the 1-Hour Primary and Secondary National Ambient Air Quality Standards for Ozone*.

Meyers, Robert J. *Decision of the U.S. Court of Appeals for the District of Columbia Circuit on our Petition for Rehearing of the Phase 1 Rule to Implement the 8-Hour Ozone NAAQS*. U.S. EPA Memorandum, June 15, 2007.

Page, Stephen D. *Guidance on Developing Fee Programs Required by Clean Air Act Section 185 for the 1-hour Ozone NAAQS*, OAQPS, U.S. EPA Memorandum, January 5, 2010.

- Seitz, John S. *Reasonable Further Progress, Attainment Demonstration, and Related Requirements for Ozone Nonattainment Areas Meeting the Ozone National Ambient Air Quality Standard*. OAQPS, U.S. EPA Memorandum, May 10, 1995.
- Seitz, John S. *Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas*, OAQPS, U.S. EPA Memorandum, November 30, 1999.
- Seitz, John S and Oge, Margo. *Additional Submission on RACM from States with Severe 1-hour Ozone Nonattainment Area SIPs*. OAQPS and OTAQ, U.S. EPA Memorandum, December 14, 2000.
- SMAQMD, et al. *Sacramento Area Regional Ozone Attainment Plan*. Sacramento Metropolitan Air Quality Management District, November 15, 1994.
- SMAQMD, et al. *Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan, Appendix H: Reasonably Available Control Measures Analysis*. Sacramento Metropolitan Air Quality Management District, December 19, 2008.
- U.S. EPA. *Revisions to the National Ambient Air Quality Standards for Photochemical Oxidants*, Federal Register, Volume 44, February 8, 1979, p. 8202.
- U.S. EPA. *Designation of Areas for Air Quality Planning Purposes*, Federal Register, Volume 56, November 6, 1991, p. 56694.
- U.S. EPA. *General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990*, Federal Register, Volume 57, April 16, 1992, p. 13498.
- U.S. EPA. *California, Sacramento Ozone Nonattainment Area, Reclassification to Severe*, Federal Register, Volume 60, April 25, 1995, p. 20237.
- U.S. EPA. *Approval and Promulgation of Implementation Plans: California - Ozone*, Federal Register, Volume 62, January 8, 1997, p. 1150.
- U.S. EPA. *Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1*, Federal Register, Volume 69, April 30, 2004, p. 23951.
- U.S. EPA. *Identification of Ozone Areas for Which the 1-Hour Standard Has Been Revoked and Technical Corrections to Phase 1 Rule*, Federal Register, Volume 70, August 3, 2005, p. 44470.
- U.S. EPA. *Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard*, Federal Register, Volume 70, November 29, 2005, p. 71611.

U.S. EPA. *Designations of Areas for Air Quality Planning Purposes; California; San Joaquin Valley, South Coast Air Basin, Coachella Valley, and Sacramento Metro Ozone Nonattainment Areas; Reclassification*, Federal Register, Volume 74, August 27, 2009, p. 43654.

### **3. 1-HOUR OZONE MONITORING NETWORK AND AIR QUALITY DATA**

#### **3.1 Introduction to 1-Hour Ozone Data**

The progress towards attainment is measured by analyzing ambient air quality data collected at various monitoring sites over a period of many years. In this chapter, the focus of air quality trends is on the number of days exceeding the 1-hour ozone standard at each monitor in each year. This indicator is used to calculate the average annual number of exceedance days during three consecutive calendar years for determining attainment of the NAAQS at a monitoring site.

Year to year ozone differences are caused by meteorological variability and changes in precursor emission patterns. The 1-hour ozone standard allows for an average of up to one exceedance per year per site.

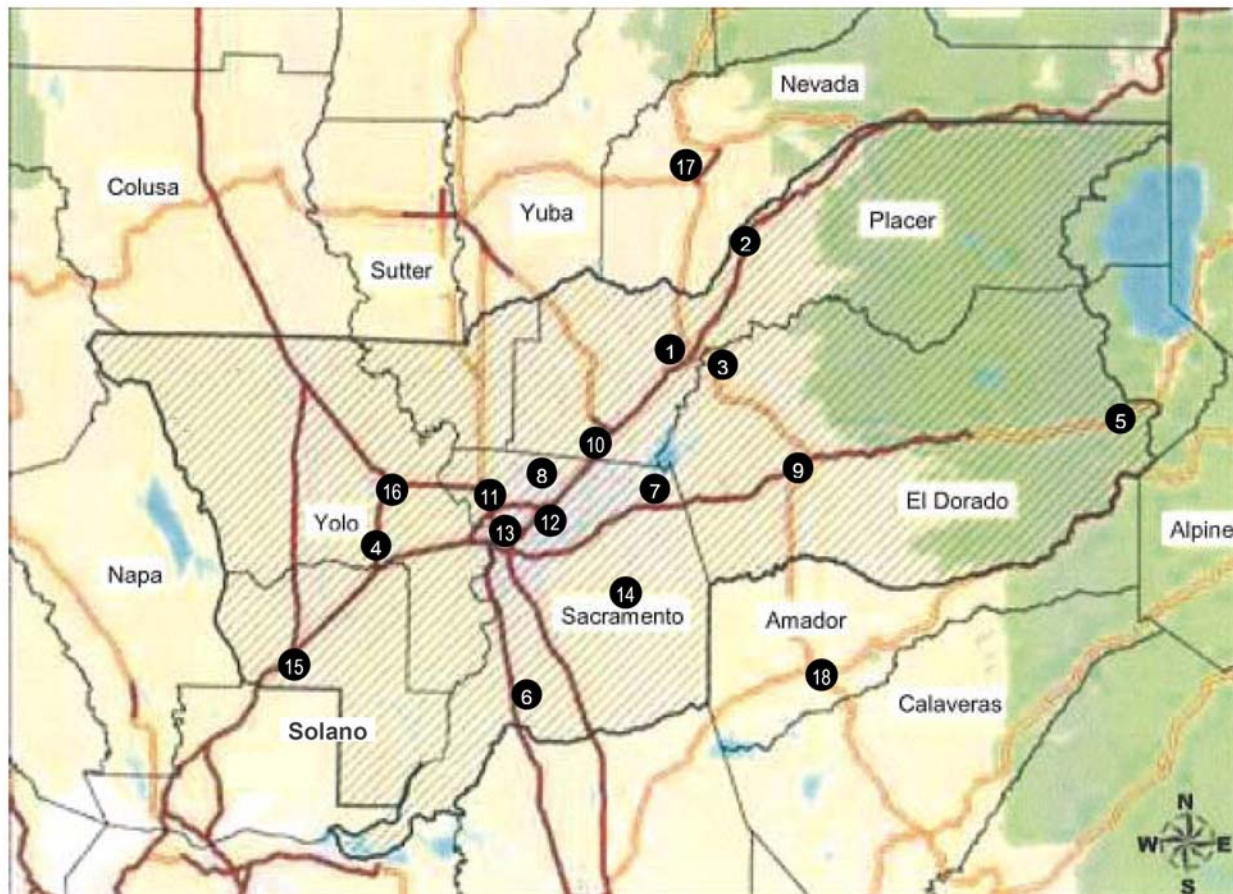
#### **3.2 Ozone Monitoring Network and the Adequacy of the Network**

“Network Design Criteria for Ambient Air Quality Monitoring,” Title 40 Code of Federal Regulations, Appendix D to Part 58 defines minimum monitoring requirements based on the Population of the Metropolitan Statistical Area (MSA) and the design value for each NAAQS. Sacramento County is within the Sacramento-Arden Arcade-Roseville MSA. The minimum number of monitors for each pollutant is based on the MSA Population as described in 40 CFR 58 Appendix D. Currently, the Sacramento-Arden Arcade-Roseville MSA has a population of 2.1 million. The monitoring network within the MSA exceeds the minimum monitoring requirements for all criteria pollutants. Section 3.0 of the 2008/2009 Annual Air Monitoring Network Plan for Sacramento County submitted to EPA (July 13, 2009) discusses the minimum required monitors for ozone which is two monitors.

There are currently 16 ozone monitoring stations located throughout the Sacramento nonattainment area that are operated by either the local air districts or the California Air Resources Board (CARB). Most ozone sites measure meteorological parameters (i.e. wind direction, speed, relative humidity, etc), and several also sample for ambient concentrations of ozone precursor pollutants.

See Figure 3.1 for a map showing the location of each of the ozone monitoring stations operating in the Sacramento region during 2009.

**Figure 3.1**  
**Sacramento Nonattainment Area**  
**Ozone Monitoring Stations**



**2009 Ozone Monitoring Sites (County)**

**Sacramento Nonattainment Area Sites**

- |                                |  |
|--------------------------------|--|
| 1. Auburn (Placer Co.)         | 11. Sacramento – Airport Rd./Goldenland Ct. (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.)  | <b>Other Sites</b>                                     |
| 9. Placerville (El Dorado Co.) | 17. Grass Valley (Nevada Co.)                          |
| 10. Roseville (Placer Co.)     | 18. Jackson (Amador Co.)                               |

### 3.3 1-Hour Ozone Data Trends

Table 3.1 shows the number of days that are greater than the federal 1-hour ozone standard (0.12 ppm) for the individual monitoring stations during 1997-2009 (CARB, 2009 and 2010). The sites that regularly used to show exceedances of the 1-hour ozone NAAQS in the Sacramento nonattainment area for 1-hour ozone are the Cool, Sloughhouse, Folsom and the Del Paso Manor sites. The highest total number of exceedance days within the consecutive years of 2006-2008 is at the Sloughhouse and Folsom sites with 3 exceedance days each. Note that the 2008 year does not include days requested as exceptional events (described in Section 3.4). In 2009, there were no additional 1-hour ozone exceedance days at any site.

Figures 3.2 and 3.3 show the historical trend of the number of days that are greater than the federal 1-hour ozone standard at the Sloughhouse Site and Folsom Site respectively. There was a general trend of decline on the number of days that exceeded the standard from years 1997-2009<sup>2</sup> at both sites. Ongoing ozone precursor control programs to meet EPA's 8-hour ozone NAAQS are expected to continue these trends.

**Table 3.1: Days > Federal 1-Hour Ozone Standard (0.12 ppm)**

Monitoring Sites	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 <sup>a</sup>	2009
Cool-Highway 193	1	5	2	2	1	6	3	0	0	2	0	0	0
Echo Summit				0	0	0	0	0	0	0	0	0	0
Placerville-Gold Nugget Way	0	2	2	0	0	0	1	0	0	0	0	0	0
Auburn-Dewitt-C Avenue	0	5	2	0	0	3	0	0	0	1	0	0	0
Colfax-City Hall	0	1	1	0	0	2	0	0	1	1	0	0	0
Roseville-N Sunrise Blvd	0	5	2	1	0	2	1	0	0	0	0	1	0
Elk Grove-Bruceville Road	0	1	1	0	0	0	0	0	0	1	0	0	0
Folsom-Natoma Street	1	10	4	1	2	3	3	0	0	1	1	1	0
North Highlands-Blackfoot Way	0	3	0	0	1	0	1	0	0	1	0	0	0
Sacramento-3801 Airport Rd		1	0	0	0	0	0	0	0	0	0	0	<sup>b</sup>
Sacramento-Del Paso Manor	0	5	1	0	1	2	2	0	1	1	1	0	0
Sacramento-Goldenland Court <sup>b</sup>													0
Sacramento-T Street	0	1	0	0	0	0	0	0	0	0	0	0	0
Sloughhouse	2	8	4	3	0	2	1	0	3	3	0	0	0
Vacaville-Elmira Rd/ Ulatis Dr	0	2	1	0	0	0	0	0	0	0	0	0	0
Davis-UCD Campus	0	0	0	0	0	0	0	0	0	0	0	0	0
Woodland-Sutter St/ Gibson Rd	0	0	0	0	0	0	0	0	0	0	0	0	0

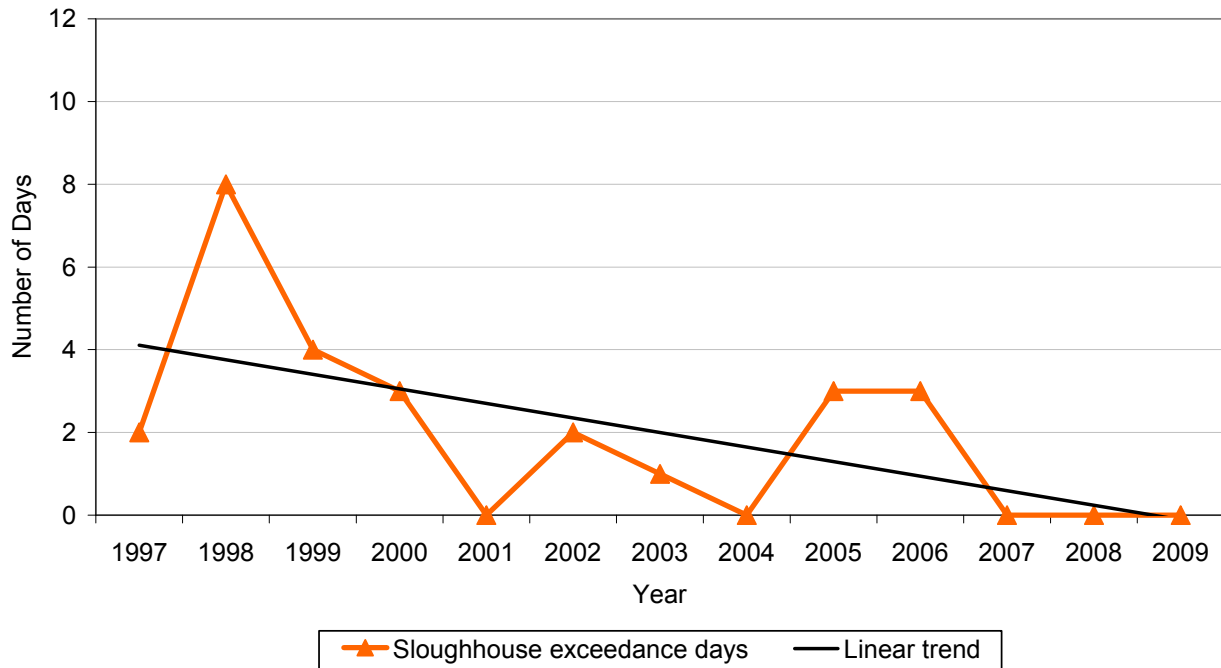
<sup>a</sup>Year 2008 does not include days requested as exceptional events.

<sup>b</sup>Sacramento-Airport Road site moved to Goldenland Court.

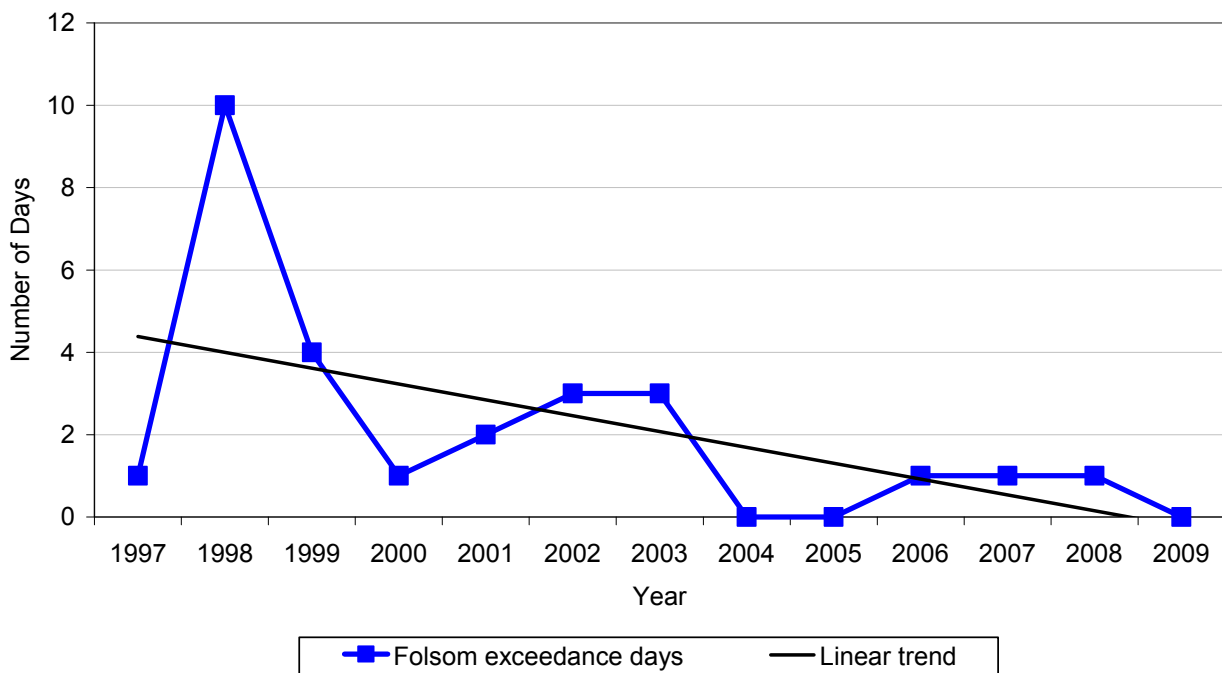
<sup>2</sup> These years are shown because the Folsom (Natoma Street) monitoring site began operation in 1996 and the Sloughhouse site began operation in 1997.



**Figure 3.2: Number of Days > 0.12 ppm 1-Hour Ozone at Sloughouse Site**



**Figure 3.3: Number of Days > 0.12 ppm 1-Hour Ozone at Folsom Site**



### **3.4 2008 Exceptional Events**

During the summer of 2008, violations of the federal 1-hour ozone standard (0.12 ppm) occurred in the Sacramento region when over 50 catastrophic wildfires burned nearly 1.2 million acres throughout the State. The Exceptional Event Demonstration Request submitted to EPA by the SMAQMD and CARB, dated September 10, 2009, evaluated 1-hour ozone exceedances on June 23, June 27, July 7, July 9, July 10, and July 25, 2008 (SMAQMD, 2009). The analysis established a clear and causal relationship between the ozone exceedances and the emissions from numerous statewide wildfires. The document demonstrated that ozone concentrations on specific days during the period meet the requirements for having been influenced by an exceptional event as stipulated in the EPA Exceptional Events Rule published on March 22, 2007.

Air quality in northern and central California, especially in the Sacramento Valley deteriorated as a result of smoke from the wildfires. From June 21 to July 27, 2008, much of Northern California was covered in a thick blanket of smoke, which reduced visibility and turned the sky yellow. Many of the air monitors recorded high levels of ozone, along with hazardous concentrations of particulate matter. The smoky and hazy conditions prompted the District and local health officials to issue air quality advisories and warnings, as particulate matter reached unhealthy levels. The wildfires and smoke spread throughout the entire Sacramento region and were widely recognized by the residents in the Sacramento region and public media.

### **3.5 Meteorological Trend Analysis**

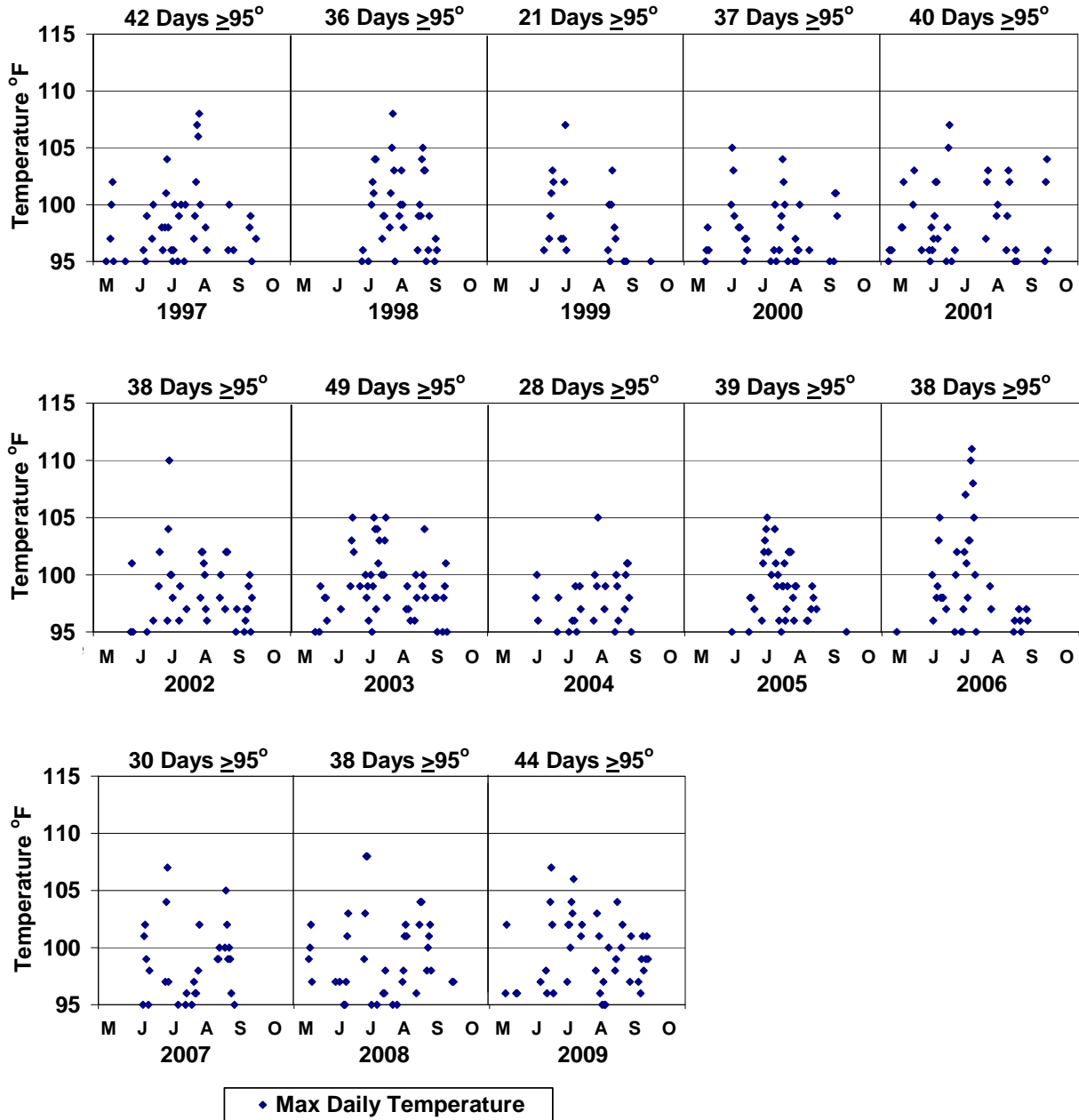
One of the EPA criteria for an attainment determination is that the air quality improvement is not due to unusually favorable meteorology. Since hot ambient conditions are a key factor in the formation of ozone, a trend analysis of high temperature days was conducted. The high temperature days were used as a meteorological indicator for the potential to exceed the 1-hour ozone standard.

Figure 3.4 shows the annual number of days with maximum temperatures greater than or equal to 95°F during May through October from 1997 to 2009. During this 13-year period, there is an annual average occurrence of 37 high temperature days. The fewest days over or equal to 95°F are in 1999 and 2004 with 21 days and 28 days, respectively. For the most recent years of 2006-2009, the annual average number of high temperature days is 37, which is the same for the 13-year period.

Figure 3.5 compares the annual number of high temperature days greater than or equal to 95°F with the annual number of days exceeding the 1-hour ozone standard in the Sacramento nonattainment area for 1997 to 2009. The 13-year trend line for high temperature days is slightly increasing, while the trend line for ozone exceedance days is declining.

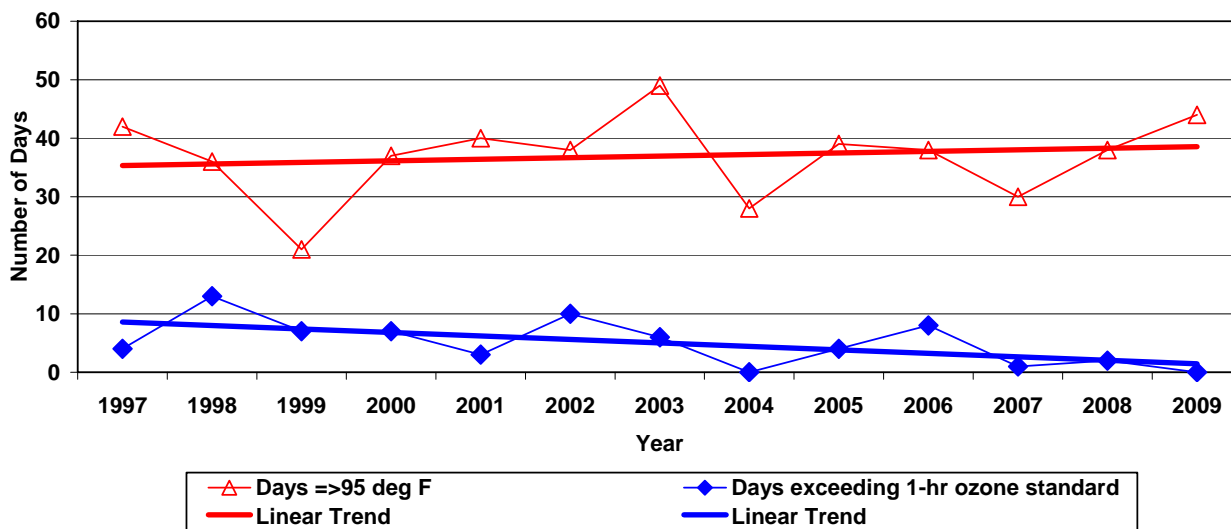
Figure 3.6 contains a time-series graph of maximum daily temperatures averaged over all days during the May-October ozone season for each year from 1960 to 2009. The average maximum daily temperatures ranged from a low of 82°F to a high of 90°F with a 50-year average of 86.4°F. The average maximum daily temperatures for the 1-hour ozone attainment years 2006-2009 are very close to the 50-year average, ranging from 85°F to 87°F. Therefore, the overall trend analysis indicates that the air quality improvement is not due to unusually favorable meteorology.

**Figure 3.4**  
**Sacramento Maximum Daily Temperatures**  
**May-October, 1997-2009**



Data source: Sacramento Executive Airport temperature data.

**Figure 3.5**  
**High Temperature Days vs. Ozone Exceedance Days**  
**Sacramento Nonattainment Area**

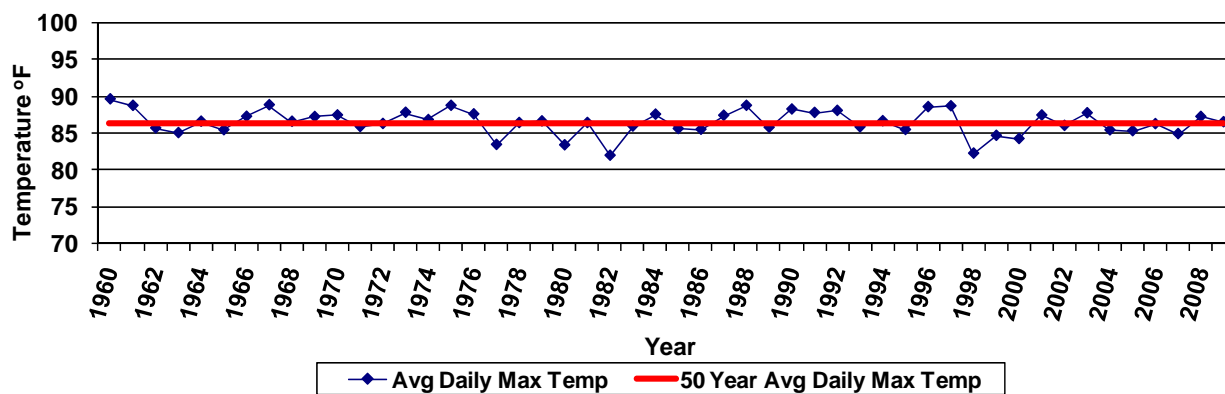


Data source:

Sacramento Executive Airport temperature data.

Ozone data from CARB ADAM database, except 2008 data does not include 6 days requested as exceptional events due to wildfires.

**Figure 3.6**  
**Sacramento Average Maximum Daily Temperature**  
**May-October, 1960-2009**



The 50-year average daily maximum temperature equals 86.4 °F.

Data source: Sacramento Executive Airport temperature data.

### 3.6 References

CARB. *iADAM Air Quality Data Statistics*. CA: California Air Resources Board, Web 31 December 2009 and March 2010. <<http://www.arb.ca.gov/adam/welcome.html>>

SMAQMD, et al. *Exceptional Events Demonstration for High Ozone in the Sacramento Regional Nonattainment Area Due to Wildfires*. Sacramento, CA: Sacramento Metropolitan Air Quality Management District, July 2009.

## **4. EMISSIONS INVENTORY**

### **4.1 Introduction to Emissions Inventory**

Ozone is not directly emitted into the atmosphere, but is a secondary pollutant produced by photochemical reactions in the air involving volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>). Thus, comprehensive past, current and future VOC and NO<sub>x</sub> emissions inventories are prepared pursuant to U.S. Environmental Protection Agency guidance for Sacramento Federal Nonattainment Area to track emissions. These inventories demonstrate that improvement in air quality is due to permanent and enforceable emission reductions achieved from 1990 to the attainment year 2008 and that continued attainment of the federal 1-hour ozone standard out to 2030 is expected. In addition, post-2008 controls from the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan (SMAQMD, 2009) will provide more reductions. Since 2008 is the third of three years that the air monitors show ozone attainment, the 2008 emission inventory is designated as the attainment inventory.

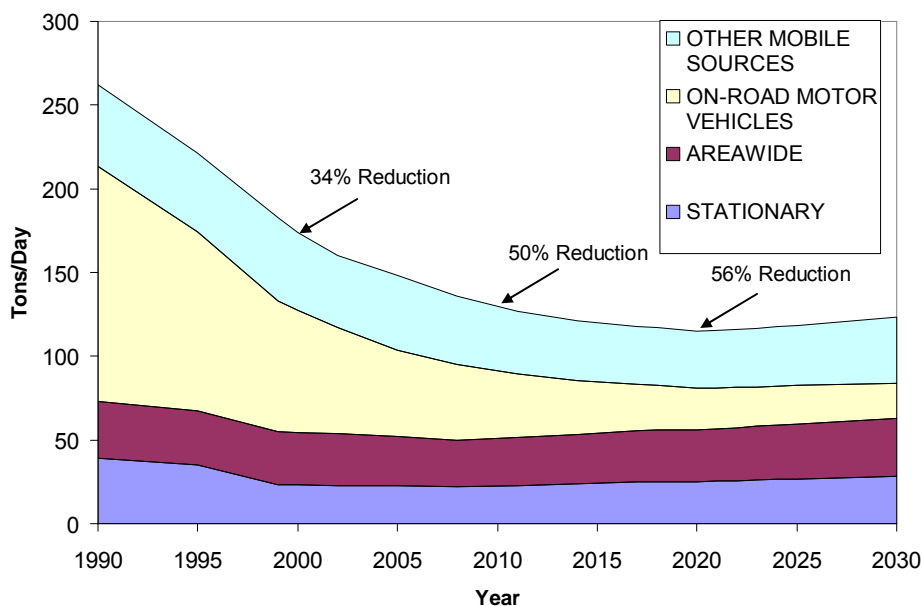
The emissions inventories used in this trend analysis are based on the SIP planning emissions (SMAQMD, 2009). The source of emissions data is from California Air Resources Board (CARB) California Emission Forecasting System (CEFS) Version 1.06 Rf#980 with options of: average summer day, updated to reflect recently adopted control measures, new emission sources, and February 2008 SACOG transportation data (CARB, 2007). More detailed information and emissions inventory tables are provided in the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan (SMAQMD, 2009).

The emission inventories include emissions from Sacramento Federal Nonattainment Area (SFNA), which includes Sacramento and Yolo counties, Placer and El Dorado counties (except Lake Tahoe Basin portions), Solano County (eastern portion), and Sutter County (southern portion.)

### **4.2 Emissions Inventory Trends**

The following graphs (Figures 4.1 and 4.2) show the VOC and NO<sub>x</sub> trends from 1990 to 2030 for stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources for the Sacramento nonattainment region. The emission trends show significant declines in emissions, despite increasing population, vehicle activity, and economic development. Based on SACOG forecast and the U.S. Census, the population in the Sacramento Ozone Nonattainment Area grows at an average annual rate 2.3% from 1990 to 2030. By 2010, the trend shows 50% reduction in VOC emissions from the 1990 level. After 2010, the trend bottoms out at 56% reduction in 2020 and starts growing slightly, at less than 1% annually, as activity growth in the area overcomes emission reduction.

**Figure 4.1**  
**Sacramento Nonattainment Area**  
**Average Summer Day - VOC**



Whereas for the NOx emissions, the trend shows 37% reduction from the 1990 level by 2010 and sharply declines to 61% reduction by 2020 and 67% by 2030. Mobile fleet turnover and existing control strategies continue to reduce future VOC and NOx emissions from stationary and area sources, on-road motor vehicles, and some other mobile source categories (such as off-road equipment).

**Figure 4.2**  
**Sacramento Nonattainment Area**  
**Average Summer Day - NOx**

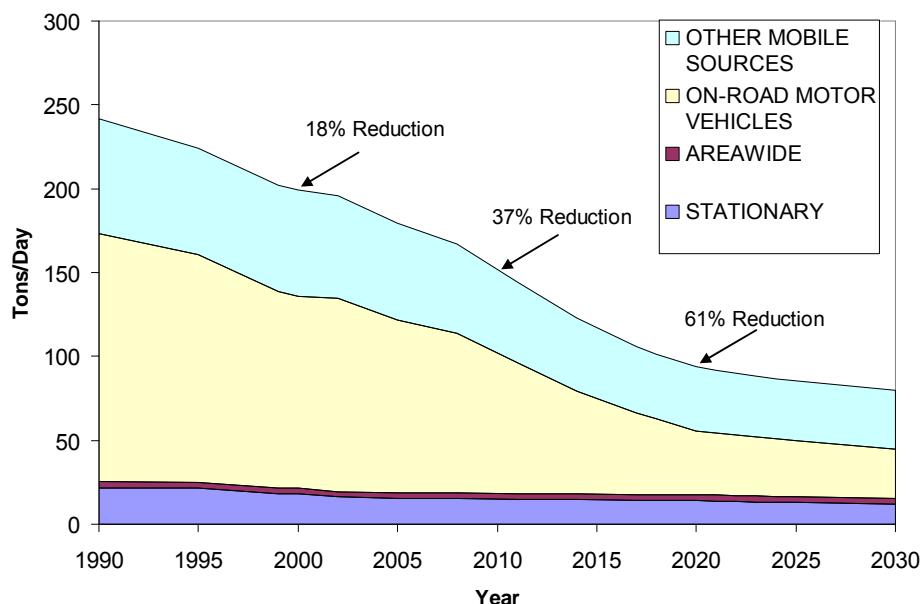




Table 4.1 contains a tabulation of summer seasonal average emissions inventory in units of tons per day. The largest emission reductions have been from the largest emissions inventory category, on-road motor vehicles. Statewide mobile source regulations, such as low emission vehicle programs, smog check, and reformulated gasoline, have achieved almost 150 tons per day of ozone precursor reductions from 1990 to 2008 in the Sacramento nonattainment area. Control measures adopted by the districts locally and the state have also achieved significant emission reductions, especially from regulations affecting gasoline stations, house paints and other paint and solvent uses, auto refinishing, and stationary combustion equipment. Reductions from mobile and stationary sources will continue in the future as mobile fleets turn over to cleaner vehicles and equipment, and additional state and local controls from the 8-Hour Ozone Plan are fully implemented.

<b>Table 4.1</b>								
<b>Emissions (tons per day)</b>								
<b>Sacramento Federal Nonattainment Area</b>								
	<b>VOC</b>				<b>NOx</b>			
	<b>1990</b>	<b>2008</b>	<b>2020</b>	<b>2030</b>	<b>1990</b>	<b>2008</b>	<b>2020</b>	<b>2030</b>
<b>TOTAL EMISSIONS</b>	262	136	115	124	242	167	94	80
STATIONARY	39	22	25	28	22	15	14	12
AREA-WIDE	34	28	31	35	4	3	4	4
ON-ROAD MOTOR VEHICLES	140	45	25	21	148	95	38	29
OTHER MOBILE SOURCES	49	41	34	40	69	53	38	35

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

### 4.3 Gasoline and Diesel Fuel Sales Trends

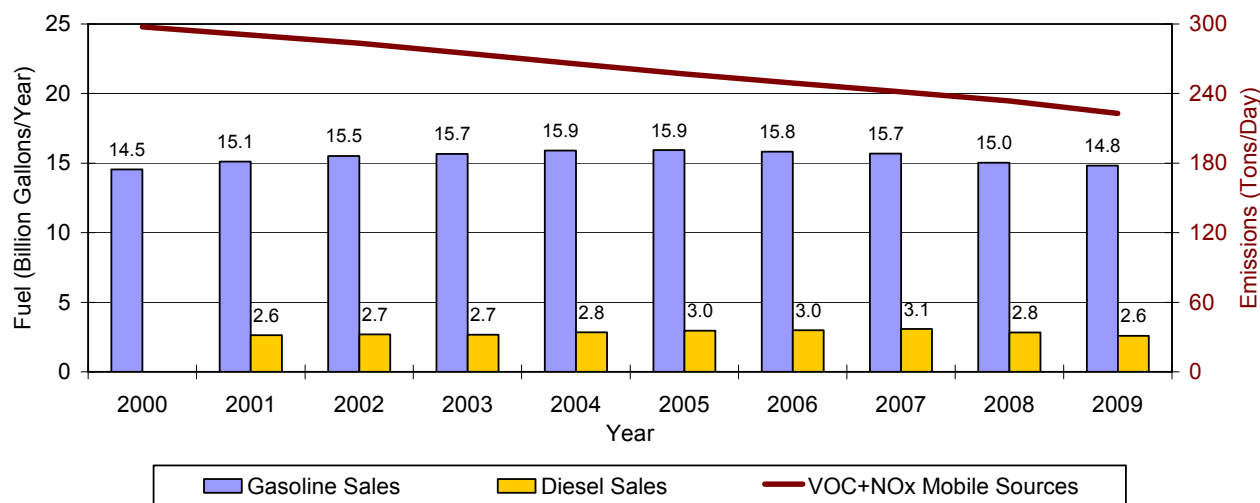
Since mobile sources are the predominant inventory category of VOC and NOx emissions in the Sacramento region, gasoline and diesel fuel sales are evaluated as an economic trend indicator for emissions. Figure 4.3 shows California annual fuel sales for gasoline and diesel for 2000-2009 in comparison to SFNA mobile source VOC and NOx emissions.

Gasoline sales range from 14.5 billion gallons in 2000 to a peak of 15.9 billion gallons in 2004 and 2005. During the ozone attainment years 2006-2009, gasoline sales decline gradually to 14.8 billion gallons. Diesel fuel sales range from 2.6 billion gallons in 2001 to a high of 3.1 billion gallons in 2007, and decline to 2.6 billion gallons in 2009.

The overall trend indicates that statewide fuel sales peaked during the middle of the last 10 years and then declined the last few years back to the levels of the early 2000's. Even though California has experienced temporary adverse economic conditions the last few years, mobile source activity is still equivalent or more than earlier nonattainment years. In addition, this analysis does not account for the increase in miles per gallon fuel economy of newer vehicles, which would underestimate more recent mobile source activity.

SFNA mobile source VOC and NOx emissions were 298 tons per day in 2000 and steadily decline to 223 tons per day in 2009 for an overall 25% reduction. Therefore, the emissions and fuel sales trends provide further evidence that the improvement in air quality leading to attainment in 2006-2009 can be credited to lower-emitting vehicles as a result of previously adopted emission reduction control measures.

**Figure 4.3**  
**California Gasoline and Diesel Fuel Annual Sales 2000-2009**  
**vs. SFNA Mobile Source VOC and NOx Emissions**



Data source: California State Board of Equalization – Fuel Taxes Division Statistics and Reports.  
2000 diesel fuel sales not available.

#### 4.4 References

CARB. *CEPAM: 8-Hour Ozone SIP Baseline Emission Projections – Version 1.06 MAIN Planning Inventory Tool*. CA: California Air Resources Board, 28 February 2007. Web. 16 December 2009.  
<[http://www.arb.ca.gov/app/emsinv/o3sip/fcemssumcat\\_o3v106.php](http://www.arb.ca.gov/app/emsinv/o3sip/fcemssumcat_o3v106.php)>.

SMAQMD, et al. *Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan (with errata sheets incorporated)*. Sacramento, CA: Sacramento Metropolitan Air Quality Management District, [2009.]

## **5. ATTAINMENT DETERMINATION**

### **5.1 Introduction to Attainment**

This chapter describes how attainment of the 1-hour ozone NAAQS is determined for the Sacramento nonattainment area. The annual number of days exceeding the 1-hour ozone standard for each monitoring station reported in Chapter 3 is evaluated for 2006 to 2009. Three years of data are needed for calculating the expected average annual number of exceedance days, and these data statistics are provided for each monitoring site.

### **5.2 Attainment Determination Requirements**

The 1-hour ozone NAAQS is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million ( $\geq 125$  ppb) is equal to or less than 1, as determined by 40 CFR 50, Appendix H (40 CFR 50.9). Therefore, the number of exceedance days at each of the monitoring sites in the area are recorded for each calendar year and then averaged over the past 3 calendar years to determine if this average is less than or equal to 1. In addition, incomplete sampling or missing daily maximum ozone data for days with potentially high ozone values would need to be taken into account in the calculation of expected exceedances.

As discussed in Chapter 3, the SMAQMD has requested that EPA disallow several ozone exceedance days in 2008 pursuant to the exceptional events policy for wildfires. The attainment determination for the 1-hour ozone NAAQS for the Sacramento nonattainment area is contingent upon EPA approval of these exceptional event days.

### **5.3 Summary of Average Annual Exceedance Days**

Table 5.1 contains the 2006-2009 ambient air monitoring data summary for 1-hour ozone exceedance days for each of the Sacramento nonattainment area monitors. The data show that the Sacramento nonattainment area has attained the 1-hour ozone NAAQS for the 2006-2008 monitoring period in accordance with Appendix H of 40 CFR 50. For 2006-2008 ozone data, the highest average annual exceedance days equal 1.0 at the Folsom and Sloughhouse monitoring sites. Attainment is continued for 2007-2009 ozone data, as the highest average annual exceedance days equal 0.67 at the Folsom monitoring site.

**Table 5.1**  
**1-Hour Ozone Data 2006-2009**  
**Sacramento Nonattainment Area**

Monitoring Site	Number of Exceedance Days				3-Year Exceedance Average	3-Year Exceedance Average
	2006	2007	2008*	2009	2006-2008	2007-2009
Folsom	1	1	1	0	1.00	0.67
Sloughhouse	3	0	0	0	1.00	0
Cool	2	0	0	0	0.67	0
Sacramento-Del Paso Manor	1	1	0	0	0.67	0.33
Auburn	1	0	0	0	0.33	0
Colfax	1	0	0	0	0.33	0
Elk Grove	1	0	0	0	0.33	0
North Highlands	1	0	0	0	0.33	0
Roseville	0	0	1	0	0.33	0.33
Davis	0	0	0	0	0	0
Echo Summit	0	0	0	0	0	0
Placerville	0	0	0	0	0	0
Sacramento-Airport Rd.	0	0	0	0	0	0
Sacramento-T Street	0	0	0	0	0	0
Vacaville	0	0	0	0	0	0
Woodland	0	0	0	0	0	0

\*Year 2008 does not include days requested as exceptional events.

#### 5.4 Attainment Determination Request

The documentation of air quality and meteorological trends in Chapter 3 and emissions reduction trends due to adopted control measures in Chapter 4 support the 1-hour ozone attainment is not from unusually favorable meteorology or temporary reductions in emission rates. Therefore, it is requested that EPA make an attainment determination for the 1-hour ozone standard based on the air quality improvement due to permanent and enforceable emission reductions in accordance with EPA guidance.

#### 5.5 Planning and Control Implications from Attainment

There are certain air quality planning and control implications from attaining the 1-hour ozone NAAQS. As mentioned in Chapter 2, specific anti-backsliding regulations retained control provisions which would take effect upon failure to attain the 1-hour ozone standard by the mandated deadline even after the 1-hour ozone standard was revoked. These control obligations include the CAA Section 185 major stationary source penalty fees. With an attainment determination for the 1-hour ozone standard, the requirements for the implementation of penalty fees would no longer apply.

There are ongoing ozone precursor control programs in the Sacramento region. The five air districts in the Sacramento ozone nonattainment area adopted the 8-Hour Ozone Attainment and Reasonable Further Progress Plan in early 2009. This plan includes new commitments to adopt and implement additional control measures to meet the more stringent 8-hour ozone NAAQS. Emission reductions from mobile and stationary sources will continue in the future as mobile fleets turn over to cleaner vehicles and equipment, and additional state and local controls from the 8-Hour Ozone Plan are fully implemented.

## **6. SUMMARY AND CONCLUSIONS**

### **6.1 1-Hour Ozone Nonattainment Designation**

On November 6, 1991, the Sacramento region was designated a “serious” nonattainment area for the 1-hour ozone NAAQS under the provisions of the 1990 Clean Air Act Amendments. In response to the 1994 SIP submittal relying on a 2005 attainment date, EPA granted the voluntary request to reclassify Sacramento’s nonattainment to a “severe” area with an extended attainment deadline of November 15, 2005.

### **6.2 1-Hour Ozone Air Quality Trends**

There is a general declining trend for the number of days that exceeded the NAAQS for 1-hour ozone (0.12 ppm). A meteorological trend analysis of high temperature days and average maximum daily temperatures indicates the improvement in air quality was not due to unusually favorable meteorology. During the summer of 2008, multiple exceedances of the federal 1-hour ozone standard occurred in the Sacramento region due to emissions from catastrophic wildfires, and a request has been submitted to EPA to exclude these exceedances as due to exceptional events. The highest total number of exceedance days within the consecutive years of 2006-2008 was at the Sloughouse and Folsom sites with 3 exceedance days each. In 2009, there were no additional 1-hour ozone exceedance days at any site.

### **6.3 Emissions Inventory Trend**

Ozone is produced by photochemical reactions in the air involving volatile organic compounds (VOC) and nitrogen oxides (NOx). VOC and NOx emissions inventories from 1990 to 2030 were estimated for stationary sources, area-wide sources, on-road motor vehicles, and other mobile sources for the Sacramento nonattainment region. Overall emissions trends show significant declines, despite increasing population, vehicle activity, and economic development. These inventories and an economic trend analysis of gasoline and diesel fuel sales demonstrate that improvement in air quality from 1990 to the attainment year 2008 is due to adopted control measures and not temporary reductions in emission rates.

### **6.4 Attainment Determination**

Ambient air monitoring data show that the Sacramento nonattainment area has attained the 1-hour ozone NAAQS for the 2006-2008 monitoring period in accordance with Clean Air Act requirements. The highest average annual exceedance days equal 1.0 at the Folsom and Sloughouse peak monitoring sites. This attainment determination for the 1-hour ozone NAAQS is contingent upon EPA approval of the 2008 exceptional event days due to wildfires. Attainment is continued for 2007-2009 ozone data, as the highest average annual exceedance days equal 0.67 at the Folsom monitoring site.

The documentation of air quality and meteorological trends along with emissions reduction trends support the 1-hour ozone attainment is achieved due to permanent and enforceable emission reductions in accordance with EPA guidance. Therefore, it is requested that EPA make an attainment determination for the 1-hour ozone standard.

## **6.5 Conclusions**

With an attainment determination for the 1-hour ozone standard, the anti-backsliding control requirements for the implementation of CAA Section 185 major stationary source penalty fees would no longer apply. Continued attainment of the federal 1-hour ozone standard is expected due to additional emission reductions from the mobile fleet turnover with newer cleaner motor vehicles and the implementation of new control measure commitments adopted in the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan to achieve the more stringent 8-hour ozone standard.