Air Resources Board

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June 20, 2011

Mr. Jared Blumenfeld
Regional Administrator
U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Blumenfeld:

We are transmitting recommendations for area designations and boundaries for the new federal sulfur dioxide (SO_2) 1-hour standard of 75 parts per billion, as required under the Federal Clean Air Act.

We base our area designation recommendations on ambient SO_2 concentrations measured during 2007 through 2009. Data for these years show there are no monitored violations of the 1-hour SO_2 standard. The Air Resources Board (ARB) staff is therefore recommending that all of California be designated attainment. The proposed boundaries for the attainment areas, summarized in the enclosed Staff Report, rely on California air basin boundaries. Additional dispersion modeling for large SO_2 sources will be provided prior to final designations to further support the attainment recommendation.

We are including the following materials in this package:

- Staff Report (Enclosure 1).
- Area boundary descriptions (Enclosure 2).

Please contact me at (916) 445-4383 if you have any questions regarding these recommendations, or have your staff contact Ms. Karen Magliano, Chief, Air Quality Data Branch, at (916) 322-7137.

Sincerely,

James N. Goldstene
Executive Officer

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AIR RESOURCES BOARD

RECOMMENDED
AREA DESIGNATIONS
FOR THE
2010 FEDERAL
SULFUR DIOXIDE (SO_2) STANDARD

STAFF REPORT

June 2011

California Environmental Protection Agency

Air Resources Board

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BACKGROUND

This report provides the Air Resources Board's (ARB) recommendations on designations for the revised federal sulfur dioxide (SO_2) standard, based on air quality monitoring data for California.

On June 2, 2010, the United States Environmental Protection Agency (U.S. EPA) established a new primary 1-hour SO_2 standard of 75 parts per billion (ppb). At the same time, U.S. EPA revoked the 24-hour and annual average standards. In addition to changing the averaging time and level of the standard, U.S. EPA revised the ambient air monitoring and data reporting requirements for SO_2. The final rule for the SO_2 standard was published in the Federal Register on June 22, 2010 and can be accessed via the link below:

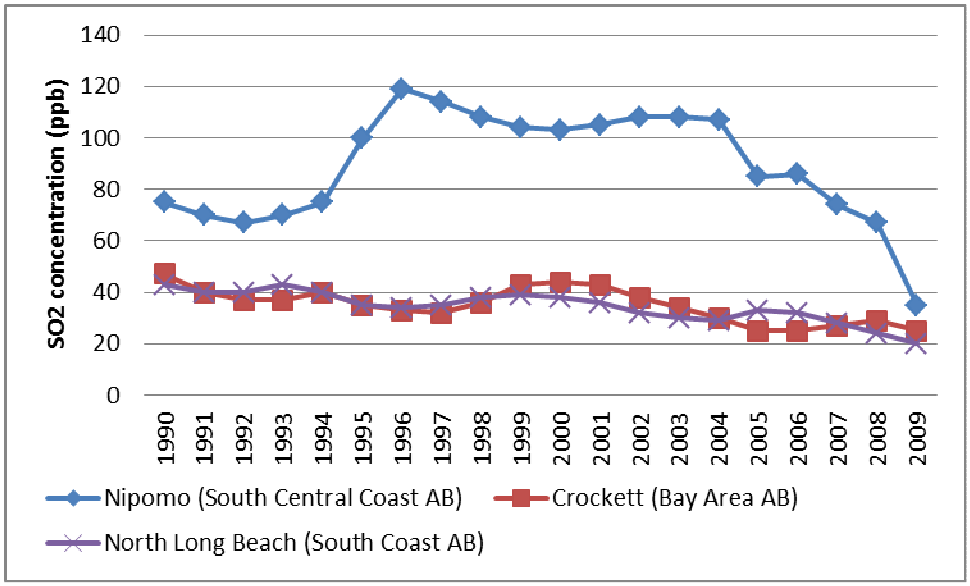
http://www.epa.gov/ttn/naaqs/standards/so2/fr/20100622.pdf

SULFUR DIOXIDE AIR QUALITY

Routine Monitoring

California has attained the 24-hour and annual average standards since the late 1980s. In the early 1970s, peak 1-hour SO_2 concentrations in California were as high as 230 ppb, but by the early 1990s, had decreased to less than 50 ppb. Based on California's routine monitoring network, in 2009, 1-hour SO_2 concentrations are one tenth of 1970 levels, ranging from 3 ppb to 35 ppb. Figure 1 below shows the trends in 1-hour SO_2 concentrations for the South Central Coast, San Francisco Bay Area and South Coast Air Basins. These urban areas have the highest level of SO_2 concentrations in California. Although the Nipomo site in the South Central Coast once had concentrations above the level of the 1-hour standard, concentrations have decreased as a result of new emission control requirements and revised permit requirements for a nearby refinery. The 20 year trend shows that sites with the highest SO_2 concentrations in 2009 are well below the standard.

FIGURE 1
1-hour SO_2 Design Values at Highest Monitoring Sites in California



Special Purpose Monitoring

In addition to the routine monitoring network, several special purpose monitoring networks are operated in the South Coast and San Francisco Bay Area. In the South Coast, the Port of Long Beach/Los Angeles Air Quality Monitoring Program collects data on criteria air pollutants, including SO_2, to estimate ambient levels of pollution that are due to Port operational activities. Together, the two Ports operate six monitoring sites. At the Port of Los Angeles these sites are the Wilmington Community Monitoring Station, the San Pedro Community Monitoring Station, the Outer Harbor site, and the Terminal Island Treatment Plant Station. The two sites at the Port of Long Beach are the Inner and Outer Port sites. Terminal Island Treatment Plant Station (at the Port of Los Angeles) and the Inner Port site (at the Port of Long Beach) are expected to have the highest exposure to emissions from port operations, as they are in direct proximity to terminal operations which use a large number of diesel engine sources. The 2010 1-hour SO_2 design value at the Terminal Island Treatment Station was 59 ppm. The 1-hour SO_2 2010 design value at the Inner Port site was 62 ppb.

In the San Francisco Bay Area, 15 ground level monitors are deployed at the region's five petroleum refineries. These ground level monitors, required under the Bay Area Air Quality Management District's Regulation 9, are located near or outside the facility property boundaries and monitor downwind near-source concentrations as part of the facility operating permit requirements. Measurements were collected at all 15 sites during the 2008 through 2010 timeframe, and all but one have valid 2010 1-hour SO_2

design values. The highest design values were 56 ppb, measured near the Chevron facility and 53 ppb measured near the Conoco facility.

EMISSIONS

ARB maintains a comprehensive Oxides of Sulfur (SO_x) inventory. Staff estimates that SO_2 comprises 97% of the SO_x inventory. Additionally, in most combustion categories almost all SO_x will be SO_2. Therefore, in this report, SO_x emissions are used to represent SO_2 emissions.

Emissions of SO_x declined tremendously in California between 1990 and today. Statewide, emissions have decreased by 45% since 1990. SO_x emissions from stationary sources have decreased due to improved industrial source controls and switching from fuel oil to natural gas for electric generation and industrial boilers. The SO_x emissions from land-based on- and off-road gasoline and diesel-fueled engines and vehicles have also decreased due to lower sulfur content in the fuel, and regulations to reduce the sulfur content in fuel used by commercial harbor craft.

As SO_x is emitted primarily from combustion of fuels, emission control efforts have focused largely on reducing the content of sulfur in fuels. California has required the use of ultra-low-sulfur diesel fuel for on-road vehicles since 2006. In 2007, the U.S. EPA followed suit, requiring the ultra-low sulfur content (15ppm) in on-road diesel fuel sold in the United States. Off-road diesel fuel was required to transition to ultra-low sulfur by 2010. Railroad locomotive and marine diesel fuel was reduced to 500 ppm sulfur in 2007, and will change to ultra-low sulfur in 2012. By the end of 2014, all highway, off-road, locomotive and marine diesel fuel produced will be ultra-low-sulfur diesel.

Implementation of the revised SO_2 standard is focused on large stationary sources. U.S. EPA guidance suggests initial focus on those emitting 100 tons per year or greater of SO_2. States are required to identify and eventually conduct air quality modeling of any sources that may be anticipated to contribute to a violation of the revised SO_2 standard. SO_x emissions from stationary sources in California are a fraction of the levels in other parts of the country. The largest sources in the U.S. have emissions exceeding 100,000 tons per year. These are large fossil fuel electrical generation facilities located in the eastern and southern states. In contrast, the largest source of SO_x emissions in California, a refinery in the Bay Area, has emissions of approximately 5,000 tons per year, and ranks 350 on the list of top SO_2 emitters in the nation. In total, there are 34 facilities in California with emissions greater than 100 tons per year. ARB staff is working with air districts to conduct additional dispersion modeling as required by U.S. EPA.

RECOMMENDED AREA DESIGNATIONS

ARB staff evaluated the available ambient SO_2 data and SO_x emissions data to determine appropriate area designations throughout the State. The recommendations in this report are based on SO_2 air quality data collected between 2007 and 2009. The analysis was conducted for each monitoring site in the State for which data are available. Generally, the 99th percentile is the fourth highest 1-hour SO_2 concentration measured during a year. However, if data are incomplete, a higher value may be used, in accordance with established U.S. EPA criteria.

ARB staff has conducted a five factor analysis to determine the appropriate designations and boundaries. The five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries include: jurisdictional boundaries, geography/topography, meteorology, emissions, and air quality data. No areas with monitors in California violate the federal 1-hour SO_2 standard.

Areas of the State where no monitors exist are generally more rural in nature. There are no facilities located in these air basins with significant SO_x emissions (greater than 100 tons per year), and only two facilities with SO_x emissions greater than 50 tons per year. In comparison to the rest of the state, total SO_x emissions are low. Since the existing monitoring network indicates that all areas with monitors are well below the level of the standard, ARB staff conclude that areas without monitors should also be below the standard.

Therefore, ARB staff is recommending that all areas in California be designated attainment for the 1-hour SO_2 standard. The recommended area designations are summarized in Table 1 below. Staff is recommending the air basin as the appropriate boundary for all of the attainment areas. Air basin boundaries were developed based on regions with similar meteorology and topography. The five factor analysis for each air basin is provided in Appendix 1. Design values for individual monitoring sites are provided in Appendix 2.

Table 1
Area Designation Recommendations

Air Basin Name	Recommended Designation	2009 DV SO2 (ppb)
Mojave Desert	Attainment	10
North Central Coast	Attainment	11*
North Coast	Attainment	5
Sacramento Valley	Attainment	4*
Salton Sea	Attainment	10
San Diego	Attainment	17
San Francisco Bay Area	Attainment	25
San Joaquin Valley	Attainment	9*
South Central Coast	Attainment	35
South Coast	Attainment	20
Great Basin Valleys	Attainment	n/a
Lake County	Attainment	n/a
Mountain Counties	Attainment	n/a
Northeast Plateau	Attainment	n/a
Lake Tahoe	Attainment	n/a

*Design value is not considered complete under U.S. EPA criteria. While no other site exists in the basin with a valid design value, the indicated design value is representative of concentrations in the region.

SULFUR DIOXIDE MONITORING NETWORK REQUIREMENTS

The final rule for the primary SO_2 standard also specifies the minimum number of SO_2 monitoring sites that State and local air agencies must operate. The monitoring regulations require SO_2 monitors be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index (PWEI) for the area. The PWEI is calculated by multiplying the latest available SO_2 emission data within each CBSA by the population of the CBSA, and then dividing the result by one million. The final rule requires:

- Three SO_2 monitors in CBSAs with PWEI values of one million or more;
- Two SO_2 monitors in CBSAs with PWEI values less than one million but greater than 100,000; and
- One SO_2 monitor in CBSAs with PWEI values greater than 5,000 but less than 100,000.

California has thirty-five CBSAs with population ranging from 17,000 to more than 12 million people. Table 2 lists the three CBSAs in California that require SO_2 monitoring. In addition, Table 2 shows that these CBSAs either meet or exceed federal monitoring requirements for SO_2. California's monitoring network currently consists of 39 monitors, in excess of the 4 required monitors.

Table 2
Minimum Monitoring Requirements for Sulfur Dioxide

CBSA	Counties in CBSA	SO2 emissions per CBSA (tpy)	Population (2009)	PWEI (Million persons-tpy)	Required SO2 Monitors	Existing SO2 monitors
Los Angeles-Long Beach-Santa Ana	Los Angeles, Orange	13,498	12,874,797	173,785	2	5
Riverside-San Bernardino-Ontario	Riverside, San Bernardino	2,478	4,143,113	10,266	1	4
San Francisco-Oakland-Fremont	Alameda, Contra Costa, San Francisco, San Mateo, Marin	12,669	4,317,853	54,702	1	9

SUMMARY

ARB has used California's air quality monitoring and emissions data to develop recommended area designations for U.S. EPA's revised 1-hour SO_2 standard. The statewide monitoring network shows no violations and the highest concentrations are far below the new federal standard. A review of the statewide monitoring data and SOx emissions shows that California attains the SO_2 standard. Therefore, ARB recommends all air basins in California be designated as attainment. Additional dispersion modeling, for sources with SOx emissions greater than 100 tons per year, will be provided to the U.S. EPA. ARB is working with air districts to complete the required modeling and plans to submit the modeling results to the U.S. EPA later this year.

APPENDIX 1

FIVE FACTOR ANALYSES FOR

CALIFORNIA AIR BASINS

APPENDIX 1 Five Factor Analyses

Air Basins Having Facilities Greater Than 100 Tons Per Year of SOx Emissions

I. San Francisco Bay Area Air Basin

II. South Coast Air Basin

III. San Joaquin Valley Air Basin

IV. Mojave Desert Air Basin

V. South Central Coast Air Basin

VI: Remaining Air Basins

Sacramento Valley Air Basin

San Diego Air Basin

Salton Sea Air Basin

North Central Coast Air Basin

Mountain Counties Air Basin

Great Basin Valleys Air Basin

Lake County Air Basin

Lake Tahoe Air Basin

Northeast Plateau Air Basin

I. SAN FRANCISCO BAY AREA BASIN

Recommendation

Ambient air quality monitors in the San Francisco Bay Area Air Basin (Bay Area) show a 2009 1-hour sulfur dioxide (SO_2) design value of 25 parts per billion (ppb). Because this value is well below the level of the federal standard, staff recommends the Bay Area be designated as attainment, based on the assessment provided below. The assessment includes an evaluation of the five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries: jurisdictional boundaries, geography/topography, and meteorology (collectively referred to as nature of the region), emission data, and air quality data. Additional dispersion modeling results will be provided to the U.S. EPA later this year to further support the attainment designation recommendation.

Nature of the Region

The Bay Area is California's second largest metropolitan region. The nine county area comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern half of Sonoma County, and the southwestern portion of Solano County. It includes a number of large cities, for example, San Francisco, Oakland, and San Jose. Overall, approximately 20% of California's population resides in the Bay Area. The entire nine county area falls under the jurisdiction of the Bay Area Air Quality Management District (Bay Area District or District), which has responsibility for developing and implementing rules and regulations to control SO_2 emissions from stationary sources located in the region.

Although the Bay Area comprises a diverse landscape, the unifying feature of this region is the Bay itself, which is one of the largest natural harbors in the world. The Bay is oriented north-south and covers about 400 square miles of the region's total 5,340 square miles. Surrounding the Bay are the Coast Range Mountains, oriented northwest/southeast with elevations up to about 2,500 feet. Along the western and northern shores of the Bay are numerous headlands and peninsulas separated by small bays which lead into valleys and canyons in the surrounding foothills. In contrast, much of the eastern side is bordered by a low plain that slopes up into the Berkeley Hills. The highest population densities occur in the heavily urbanized areas surrounding the Bay. These urban centers give way to more suburban areas, to the north, south, and east. Although these areas are less densely populated, they are home to a significant number of people.

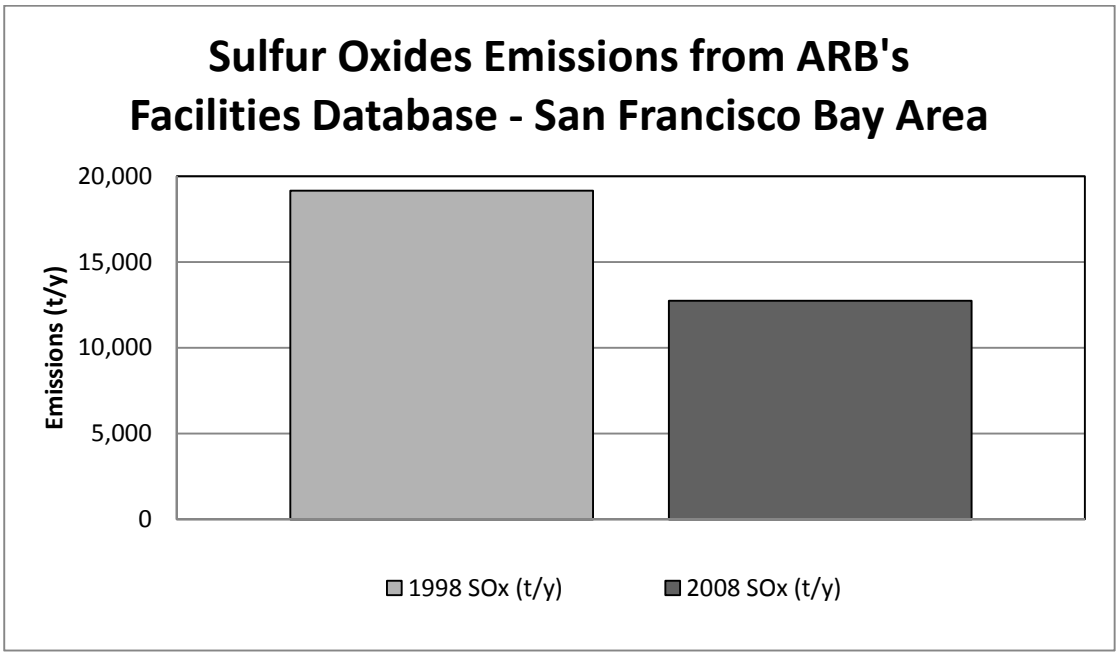
As with most of California, the Bay Area exhibits the typical wet winter/dry summer meteorological regime. Rainfall varies from more than 20 inches along the coast to less than 15 inches at inland locations. Because of the variety of terrain, air flow in the region can be complex, especially at the lowest levels. This is particularly true when the airmass is stable and wind speeds are weak. Although flow patterns vary, the Bay Area shows a general sea breeze circulation pattern with onshore flow during the day and offshore flow during the evening and overnight hours. During the summer, surface temperatures over the Bay Area are determined in large part by the effect of differential heating between land and water surfaces. This process produces a large-scale gradient across the region. The temperature difference between coastal locations and inland locations can be 35 degrees Fahrenheit (F) or more on many summer afternoons. At night, the difference is usually less than 10 degrees F. The coastal versus inland temperature extremes reverse during the winter months, with smaller differences during the daytime and larger differences at night.

Emissions

Based on the Air Resources Board's (ARB) 2008 emission inventory, there were 22,448 tons per year of total SO_x emissions in the Bay Area. Petroleum refining and combustion-related processes accounted for approximately 55% of the total emissions, while ocean going vessels accounted for an additional 20% of the total. Another 15% of the total SO_x emissions was attributable to the mineral processes, chemical processes, and manufacturing and industrial fuel combustion categories. The remaining fraction of emissions was distributed over a number of small stationary, area-wide, off-road, and on-road source categories.

Stationary sources are of particular interest because implementation of the federal 1-hour SO_2 standard is focused on determining whether large stationary sources have the potential to result in violations of the standard. U.S. EPA guidance suggest initial focus on sources emitting more than 100 tons of SO_x per year. Stationary sources account for the majority of SO_x emissions in the Bay Area, and emissions from these sources have decreased. Figure 1, based on data from ARB's facility emissions database, shows total SO_x emissions from all stationary source facilities in the Bay Area during 1998 and 2008. Overall, stationary source facility SO_x emissions have been reduced by a third, down from 19,161 tons per year in 1998 to 12,744 tons per year in 2008.

FIGURE 1

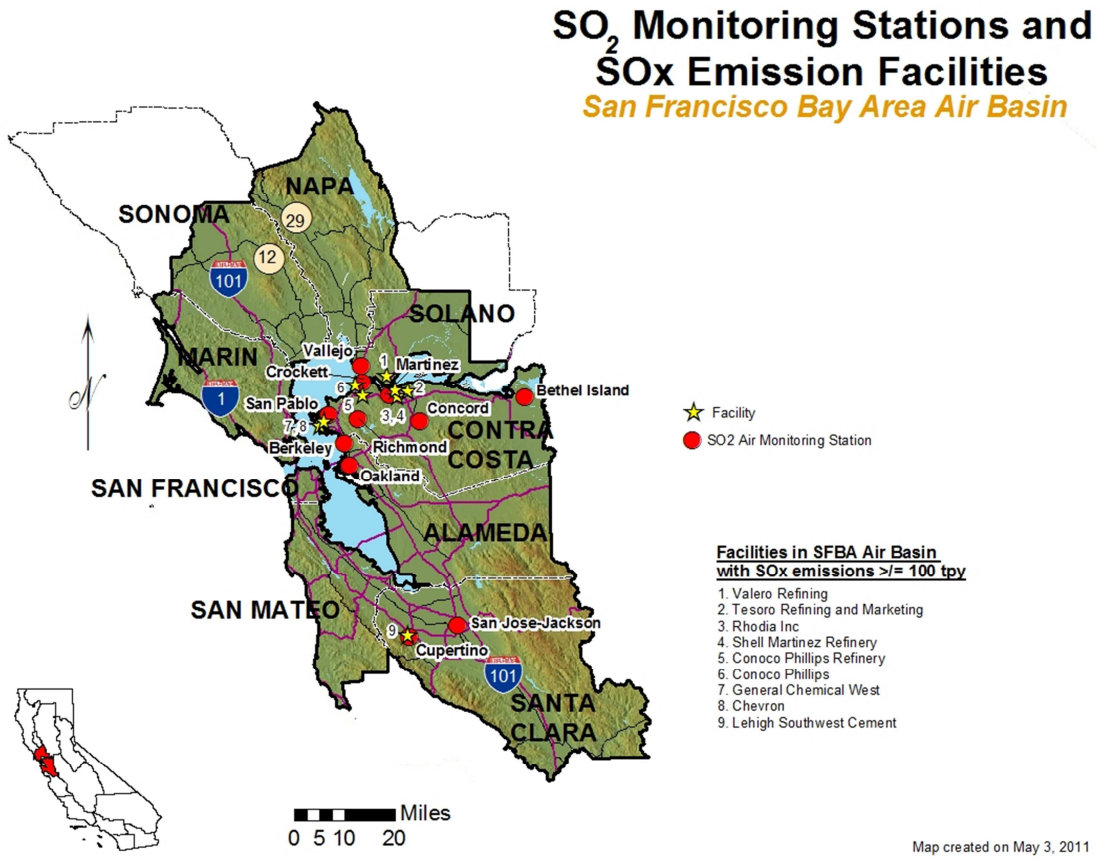


While the above information is based on ARB's 2008 emission inventory, more recent data for specific large facilities are available from the Bay Area District. The remainder of this discussion centers on these large facilities because of EPA's focus on their potential to violate the 1-hour standard. Based on the District's 2009 emission data, there are nine stationary source facilities in the Bay Area with SO_x emissions in excess of 100 tons per year. These sources are summarized in Table 1 and Figure 2.

TABLE 1
Bay Area Facilities with SO_x Emissions Greater than 100 Tons per Year

Facility Name	*City*	*County*	*SOx Emissions*
Valero Refining Company	Benicia	Solano	5,066.10 t/y
Shell Martinez Refinery	Martinez	Contra Costa	1,222.50 t/y
Conoco Phillips Refining	Rodeo	Contra Costa	1,172.10 t/y
Tesoro Refining	Martinez	Contra Costa	588.6 t/y
ConocoPhillips	Rodeo	Contra Costa	500.4 t/y
Chevron Products Company	Richmond	Contra Costa	470.4 t/y
Rhodia, Inc.	Martinez	Contra Costa	307.5 t/y
Lehigh Southwest Cement	Cupertino	Santa Clara	240.2 t/y
General Chemical West LLC	Richmond	Contra Costa	163.5 t/y

FIGURE 2



Six of the large Bay Area sources are petroleum refining and processing facilities. Five of these petroleum-related facilities are located in Contra Costa County, and one is located in Solano County. The remaining three facilities are a cement plant located in Santa Clara County and two chemical manufacturing facilities located in Contra Costa County. Together, these nine facilities emitted 9,731 tons of SO_x in 2009, representing about 38% of the total 2009 Bay Area SO_x emissions.

The Bay Area District has reduced emissions from stationary facilities through a combination of District rules controlling SO_x emissions, permitting requirements, and compliance with recent U.S. EPA consent agreements. The Bay Area District has two existing rules that control SO_2 emissions:

* **Regulation 9: Inorganic Gaseous Pollutants, Rule 1: Sulfur Dioxide** establishes emissions limits from stacks, as well as ground-level concentration limits (beyond the facility property) for sulfur dioxide-emitting operations. There are specific limits for sulfur content in fuels, sulfur recovery plants, sulfuric acid plants, fluid catalytic cracking units, fluid cokers and coke calcining kilns, catalyst manufacturing plants, fresh fruit sulfuring operations, sulfur removal operations at petroleum refineries, and ships.

* **Regulation 12: Miscellaneous Standards of Performance, Rule 12: Flares at Petroleum Refineries** requires reporting and analysis of any flaring emission of over 500 lbs per day of sulfur dioxide. To reduce future emisisons, the analysis is incorporated into flaring minimization plans.

In addition to these two rules, the Bay Area District implements two operating permit programs. Approximately 9,200 facilities have District operating permits which are renewed on an annual basis, in most cases. Permit renewal includes a review to determine if permit conditions are adequate to ensure compliance with, and the enforceability of, applicable rules and regulations. Requirements for projects that would increase SO_2 emissions include Best Available Control Technology (for sources that emit 10 pounds per day or more), offsets (for major sources that increase emissions by more than 1 ton per year), and air quality impact analysis which includes review for the 1-hour federal SO_2 standard (for major sources that would increase emissions by more than 40 tons per year). The permit review also includes a compliance determination for other applicable rules and regulations.

Finally, SO_2 emissions from the largest SO_x emission source in the Bay Area (as well as in California) have been significantly reduced as the result of a U.S. EPA consent decree. The 2005 U.S. EPA consent decree required the Valero refinery to reduce sulfur dioxide emissions at their fluid catalytic cracking unit (FCCU). Valero installed a pre-scrubber for PM and sulfate removal and a regenerative amine scrubber for sulfur dioxide. These controls abate emissions from the FCCU and from Valero's coker, which are vented to a common stack. The new emissions control equipment reduced SO_2 emissions more than 90% -- from a potential to emit of 6,222 tons per year to 416 tons per year.

In addition to existing controls, the Bay Area District included two upcoming rules in their 2010 Clean Air Act Plan. When formally adopted, these rules will further reduce SO_x emissions:

SSM 8 - Coke Calcining: This measure will reduce SO_2 emissions from coke calcining by requiring a minimum 80% sulfur capture. In combination, the two coke calcining kilns at District Plant 22 (ConocoPhillips Carbon Plant) emit 1,232 tons of sulfur dioxide per year. The facility has committed to reducing SO_2 emissions by 42 tons per year to provide offsets for their Clean Fuels Expansion Project. The plant currently operates an abatement device to periodically trim SO_2 emissions to maintain compliance with the current SO_2 emission limit in Regulation 9, Rule 1 of 400 ppm by volume or 113 kg (250 pounds) per hour, whichever is more restrictive.

Similar to the proposed rule described above, the South Coast Air Quality Management District also requires a minimum 80% sulfur capture. The Bay Area's proposed SSM 8 - Coke Calcining measure is intended to replicate the South Coast measure. Bay Area District staff expect to take a proposed rule to their Board in mid-2012.

SSM 9 - Cement Kilns: This control measure would reduce emissions of NOx, SOx, mercury, and other toxic air contaminants from cement kilns. There is one cement manufacturing facility in the Bay Area: Lehigh Southwest Cement (plant #17). The proposed rule would require Lehigh to use abatement technology to reduce NOx emissions and to consider a wet scrubber to reduce SO_2 emissions if any synergies in installing SO_2 controls along with NOx controls (or other controls) can be identified. Bay Area District staff expects to take a proposed rule for cement kilns to their Board in 2011.

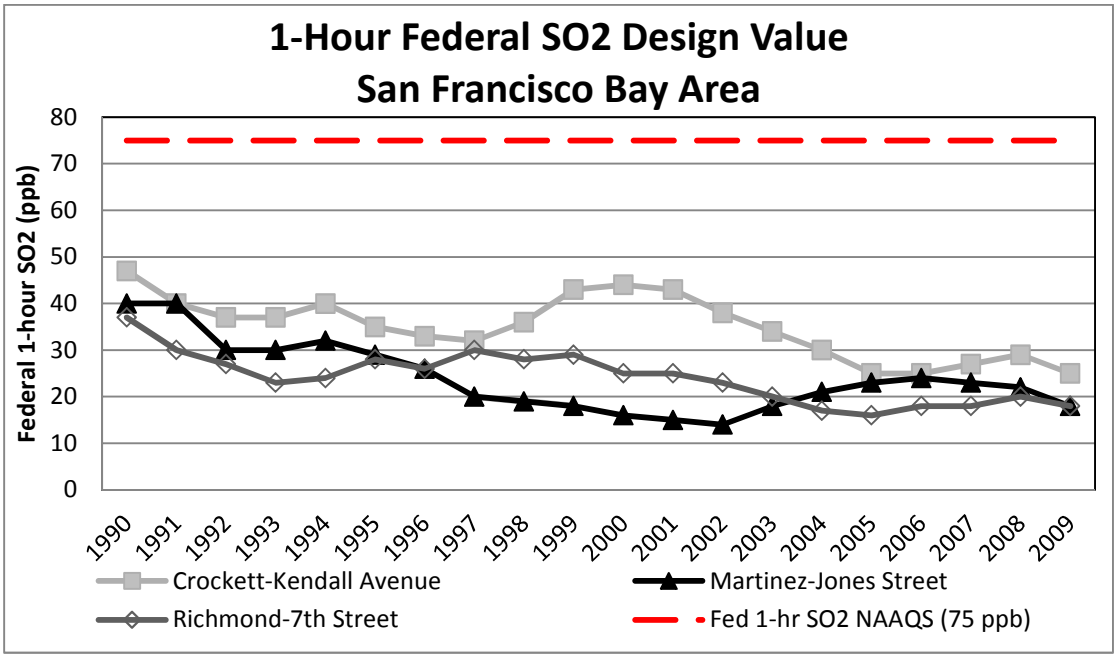
Air Quality Trends

Ten SO_2 monitors were operated in the Bay Area during the 2007 through 2009 time period. An additional monitor recently began operating near the Lehigh Southwest Cement facility in Cupertino. These air quality monitors, shown in Figure 2, collect quality-assured data for record. Most of the Bay Area monitors are located in and around the more heavily industrialized eastern portion of the region. Several others are located downwind of the major source areas (refer to Figure 2). Based on data collected during 2007 through 2009, six monitoring sites have valid design values. These design values range from 8 to 25 parts per billion (ppb), which is well below the level of the federal 1-hour standard. Although the remaining sites do not have valid design values for the three-year period, individual fourth high 1-hour measurements are well below the level of the standard, indicating that design values for these sites would also be below the standard.

The monitoring site with the highest 1-hour SO_2 design value in the Bay Area is the Crockett-Kendall Avenue site in Contra Costa County. This site is located in the portion of the Bay Area that has the greatest density of stationary SO_2 sources. The 2009 design value for the Crockett site is 25 ppb, which is well below the 75 ppb standard. The next highest design value is 18 ppb, measured at both the Martinez-Jones Street and Richmond-7th Street sites. These sites are also located in Contra Costa County, also in the vicinity of the largest SO_2 sources.

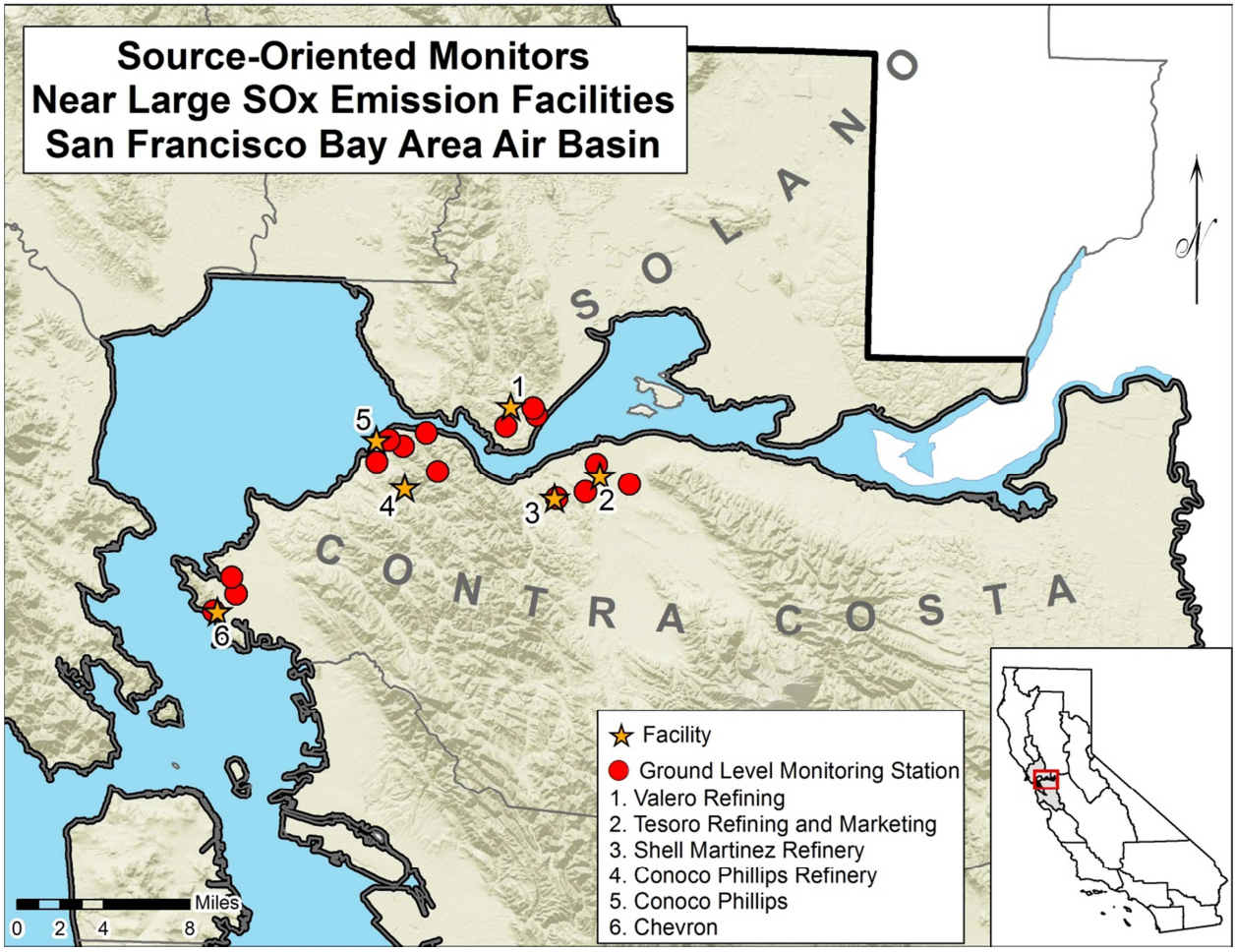
One-hour ambient SO_2 concentrations at Bay Area sites have decreased during the last 20 years. Figure 3 shows the trend for the three highest sites from 1990 through 2009. Although concentrations are variable from year-to-year, they show a 50% overall decrease. Design values for these sites have never been more than two-thirds the level of the federal standard, and in 2009, were no more than one-third the level of the standard. Design values for other sites in the Bay Area are even lower, ranging from 8 to 14 ppb in 2009. Monitoring sites in the Bay Area are located both upwind and downwind of the main source area, indicating that people living in this region of California are not exposed to SO_2 concentrations above the level of the federal standard.

FIGURE 3



In addition to the long-term ambient monitoring network, 15 ground level monitors are deployed at the five Bay Area petroleum refineries (refer to Figure 4). These ground level monitors, required under the District's Regulation 9, are located near or outside the facility property boundaries and monitor downwind near-source concentrations as part

FIGURE 4



of the facility operating permit requirements. Measurements were collected at all 15 sites during the 2008 through 2010 timeframe, and all but one have valid 2010 1-hour SO_2 design values. As summarized in Table 2, none of these sites had a design value above the level of the federal standard. The highest design values were 56 ppb, measured near the Chevron facility and 53 ppb measured near the Conoco facility (note that the monitor near the Conoco facility is missing data for one quarter, but based on the other data collected at this site, it is highly unlikely the design value exceeded the standard).

TABLE 2
2010 1-Hour SO_2 Design Values for Monitors
Located Near Bay Area Petroleum Refineries

Refinery	*Site*	*Design Value*
Chevron	2201	56.3 ppb
	2202	17.7 ppb
	2203	31.7 ppb
Conoco	2263	53.3 ppb*
	2265	3.3 ppb
	2271	10.0 ppb
	2273	36.7 ppb
	2274	18.3 ppb
Shell	2242	0.3 ppb
Tesoro	2251	36.7 ppb
	2252	20.0 ppb
	2253	10.0 ppb
Valero	8201	1.7 ppb
	8202	3.0 ppb
	8203	1.3 ppb

* *Missing data for 1 quarter*

Summary

Staff evaluated the five factors recommended by U.S. EPA for the purposes of determining attainment status and appropriate boundaries for federal SO_2 designations: jurisdictional boundaries, geography/topography, meteorology, emission data, and air quality data. Based on this analysis, violations of the 1-hour SO_2 standard have not been measured over the last two decades, and violations are not expected to occur in the future. Therefore, staff recommends the San Francisco Bay Area be designated as attainment, with the San Francisco Bay Area Air Basin serving as the appropriate boundary for the attainment area. This recommendation is based on the following weight of evidence:

- The San Francisco Bay Area has a comprehensive SO_2 monitoring network, with monitoring sites located in the areas with the highest SO_x emissions. Design values for all the Bay Area sites are well below the level of the standard,

including air quality monitoring data for the east Bay region, which has the greatest density of SO_x sources and emissions;

- Emissions from SO_x facilities have declined more than 30% since 1998 and are expected to continue declining as a result of continuing and anticipated District emission control programs;

- The San Francisco Bay Area Air Basin falls under the control of one jurisdiction: the Bay Area Air Quality Management District, and the most effective air quality management will be achieved by including the entire air basin in the attainment area;

- There are no specific meteorological, geographical, or topographic factors that warrant a different boundary for the attainment area; and

- Bay Area District staff are in the process of conducting dispersion modeling for large local SO_2 sources, as described in the March 2011 U.S. EPA guidance, and results of this modeling are expected to provide further support for the attainment designation.

II. SOUTH COAST AIR BASIN

Recommendation

Ambient air quality monitors in the South Coast Air Basin (South Coast) show a 2009 1-hour sulfur dioxide (SO_2) design value of 20 parts per billion (ppb), which is less than one-third the level of the federal standard. Because this value is well below the standard, staff recommends the South Coast be designated as attainment, based on the assessment provided below. The assessment includes an evaluation of the five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries: jurisdictional boundaries, geography/topography, and meteorology (collectively referred to as nature of the region), emission data, and air quality data. Dispersion modeling results will be provided to the U.S. EPA later this year to further support the attainment designation recommendation.

Nature of the Region

The South Coast is California's largest metropolitan region. The area includes the southern two-thirds of Los Angeles County, all of Orange County, and the western urbanized portions of Riverside and San Bernardino counties. It covers a total of 6,480 square miles and is home to nearly 17 million people -- more than 40% of the State's population. The South Coast falls under the jurisdiction of the South Coast Air Quality Management District (District), which has responsibility for developing and implementing rules and regulations to control SO_x emissions from stationary sources located in the region.

The South Coast region generally forms a lowland coastal plain, bounded by the Pacific Ocean on the west and by mountains on the other three sides. Although the coastal plain comprises only about a third of the region's land area, more than 80% of the South Coast population lives in the coastal area. The region boasts a diverse economic base. Historically, the four South Coast counties collectively comprised one of the fastest growing local economies in the United States. However, the industrial base has realized significant changes over the last several decades. Similar to many other parts of the nation, a large segment of the heavy manufacturing sector, including steel and tire manufacturing and automobile assembly, has been phased out. These operations have been replaced by smaller service industries and businesses that have developed as a result of growth in the regional shipping and trade sectors.

Overall, the South Coast region experiences more days of sunlight than any other major urban area in the nation except Phoenix. However, the climate does vary, from mild near the coast to more extreme at inland locations. The coastal area benefits from the

marine influence. This influence moderates temperatures, and the daily onshore/offshore circulation pattern tends to disperse pollutants, which keeps pollutant concentrations low. Average temperatures in the coastal area vary from lows in the mid-50s to highs in the mid-70s, with annual precipitation ranging from 12 to 15 inches. Further inland, temperatures increase and precipitation decreases. Average highs during the summertime can reach the mid- to high-90s, with maximum daily temperatures over 100 degrees Fahrenheit common in many inland areas. Rainfall in some areas averages less than 10 inches per year. In contrast to the low elevation inland areas, the surrounding inland mountains reach elevations of more than 10,000 feet. These areas see temperatures below freezing in the winter and precipitation in the form of snow.

Emissions

There are 13,870 tons per year of total SO_x emissions in the South Coast, based on the Air Resources Board's (ARB) 2008 emission inventory. The major sources are ocean-going vessels and related port industrial and freight activities. The South Coast is home to two major port facilities. The Port of Long Beach is the second busiest container port in the country and is considered one of the largest shipping ports in the world. It is located approximately two miles from downtown Long Beach and twenty miles south of downtown Los Angeles. Occupying 3,200 acres of land, the Port of Long Beach adjoins the neighboring Port of Los Angeles.

The remainder of this section addresses large SO_2 stationary sources in the South Coast because implementation of the federal 1-hour SO_2 standard is focused on determining whether large stationary sources have the potential to result in violations of the standard. U.S. EPA guidance suggests initial focus on sources emitting more than 100 tons of SO_x per year. Figure 5, based on data provided by the South Coast District, shows total SO_x emissions from all stationary source facilities in the South Coast during 1998 and 2008. Overall, stationary source SO_x emissions have decreased 40%, down from 7,748 tons per year in 1998 to 4,570 tons per year in 2008.

There are eleven stationary source facilities with SO_x emissions greater than 100 tons per year in the South Coast. All eleven facilities are located in Los Angeles County and most are related to petroleum processing and transportation. Together, these facilities represent 84% of the total stationary source component of the South Coast SO_x inventory. The map in Figure 6 shows the locations of the large SO_x facilities. Seven of the facilities are located relatively close to one another, near the Port of Long Beach, south of the city of Los Angeles. The remaining four are scattered around the southern and central portions of the County. Table 3 provides a summary of the sources, their location, and their SO_x emissions levels.

FIGURE 5

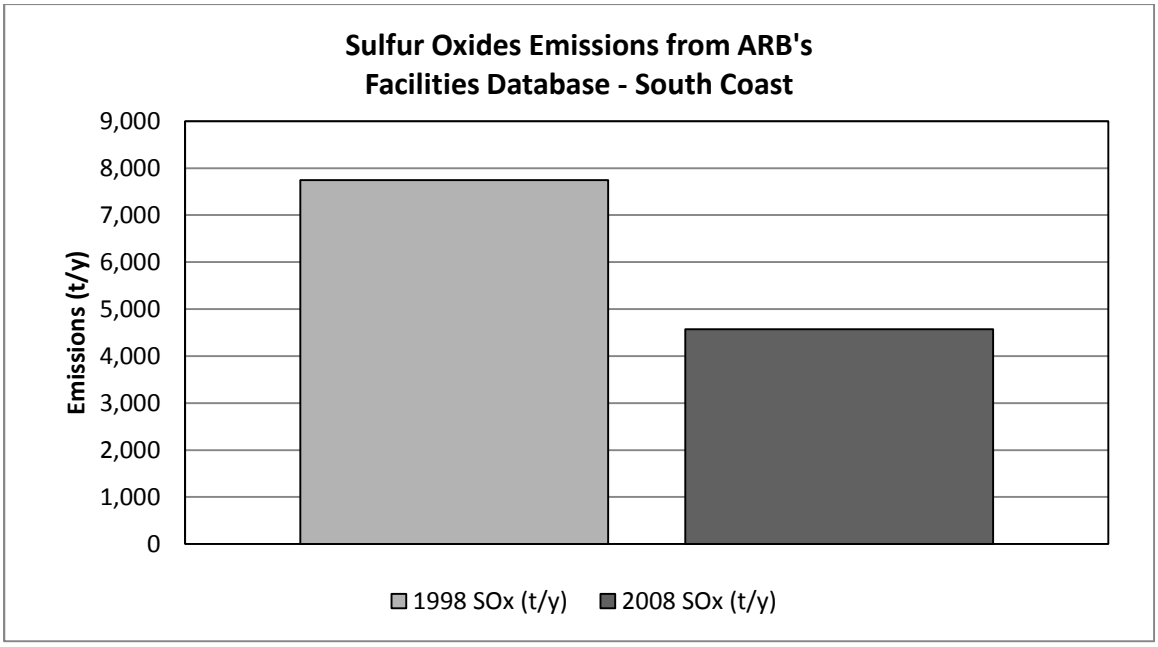


FIGURE 6

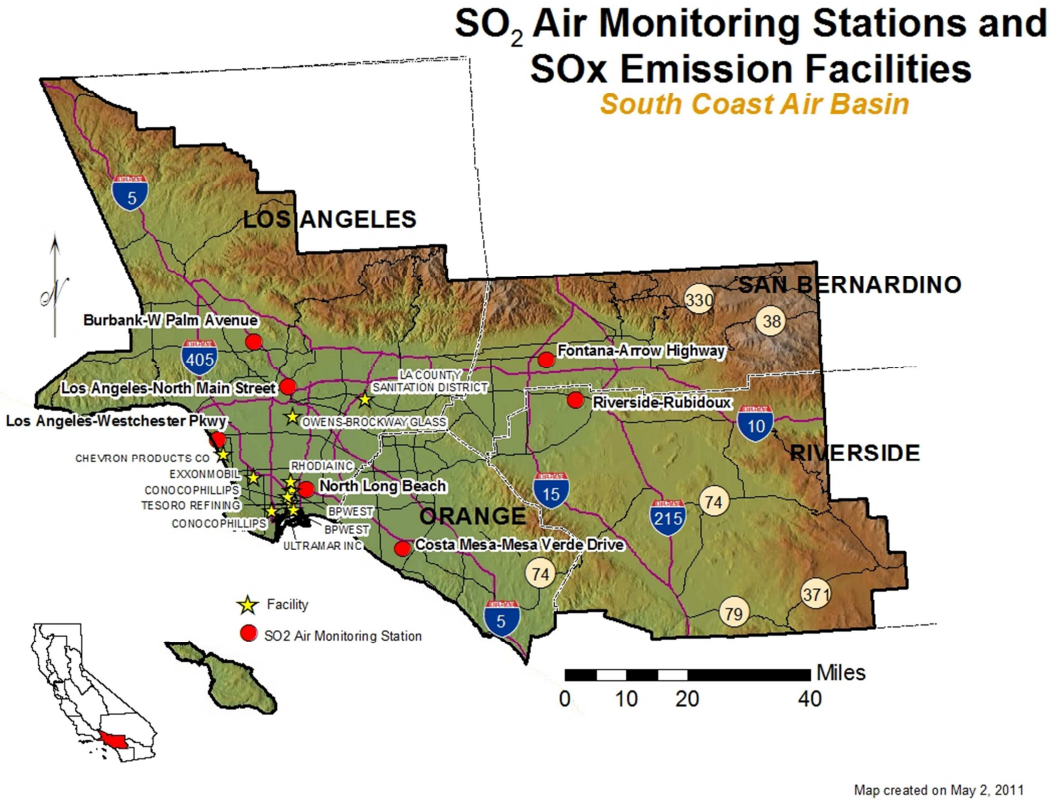


TABLE 3

South Coast Facilities with SO2 Emissions Greater than 100 tons per year

Facility Name	*City*	*County*	*SOx Emissions*
BP West Carson Refinery	Carson	Los Angeles	915 t/y
Chevron Products Company	El Segundo	Los Angeles	429 t/y
Rhodia	Carson	Los Angeles	426 t/y
Tesoro Refining & Marketing	Wilmington	Los Angeles	368 t/y
Ultramar Inc. (NSR use only)	Wilmington	Los Angeles	357 t/y
Exxon Mobil Oil Corporation	Torrance	Los Angeles	328 t/y
Conoco Phillips Company	Carson	Los Angeles	305 t/y
Conoco Phillips Company	Wilmington	Los Angeles	270 t/y
BP West Wilmington	Wilmington	Los Angeles	208 t/y
LA County Sanitation District	City of Industry	Los Angeles	142 t/y
Owens-Brockway Glass	Vernon	Los Angeles	100 t/y

The South Coast has the most stringent SO_2 control measures in the nation. These measures go far beyond what U.S. EPA has required in recent settlement agreements of similar facilities in California and the rest of the country. The South Coast District is in the process of submitting updates to their regulations. Under their Regional Clean Air Incentives Market (RECLAIM) program, these updates will ensure an additional 2,080 tons per year reduction in SO_x emissions. Of the total 2,080 ton reduction, more than half (1,095 tons) will be reduced by 2013. All of the large SO_x facilities, with the exception of the Los Angeles County Sanitation District, are covered by these updated regulations, which are both verifiable and enforceable.

In addition to the stationary source SO_x emission control measures adopted by the South Coast District, the ARB has a number of emission control measures that will reduce emissions from port-related sources including cargo handling, commercial harbor craft, port trucks, and ship auxiliary and main engines. There are additional substantial emission reduction efforts at the local level. The Ports of Long Beach and Los Angeles approved the San Pedro Bay Ports Clean Air Action Plan (Ports Plan) in 2006, which provides an overall strategy for reducing air pollution emissions from port-related cargo movement. Among the main elements of the Ports Plan are requirements and incentives to reduce diesel truck-related emissions in the ports area and surrounding communities.

Air Quality Trends

As mentioned earlier, there are seven SO_2 monitors in the South Coast that collect quality-assured data for record (refer to Figure 7). Several of these monitors are located near (from 2 to 12 miles) the largest SO_x facilities in Los Angeles County and are therefore well-sited for capturing the highest regional SO_2 concentrations. In addition to these monitors, several others are located in Orange, Riverside, and San Bernardino counties. These sites monitor public SO_2 exposure from smaller facilities and from area wide transportation sources. Based on data for record collected during 2007 through 2009, the South Coast attains the federal 1-hour SO_2 standard with design values for individual sites ranging from 6 ppb to 20 ppb, with design values for most sites below 10 ppb.

The monitoring site with the highest design value in the South Coast is the North Long Beach site, located near the area with the highest density of major SO_x emission sources. This site has a design value of 20 ppb, which is well below the level of the standard. The long-term trend in 1-hour SO_2 design values at North Long Beach is graphed in Figure 7. The trend line shows the value is now less than half what it was in 1998, and the design value has never violated the federal standard. Figure 7 also shows trend lines for two other long-term sites: Burbank and Riverside. These sites are located in the inland portions of Los Angeles and Riverside counties, respectively. In 2009, design values at these sites were less than half the value for North Long Beach, indicating that concentrations are much lower in areas further away from the main source area near the coast.

In addition to the long-term SO_2 monitoring network, the ports of Long Beach and Los Angeles conduct special monitoring to measure air quality at the ports and in nearby communities. The ports monitoring network collects air quality (including SO_2) and weather data on a real-time basis to provide timely and accurate information on air quality in the ports region. The Port of Long Beach operates two monitoring stations: one in the Inner Port area, near West Long Beach (also called Superblock), and the second in the Outer Port area, near the breakwater (also called Gull Park). The Port of Los Angeles operates four monitoring stations, located in the Outer Harbor area at Berth 47, at the Terminal Island Treatment Plant, in the community of San Pedro, and in the community of Wilmington. The six-monitor network was developed under the Green Port Policy and is used to better manage air quality improvement efforts. As shown in the Table 4, the three-year average of the 99th percentile 1-hour concentration for the six ports sites ranged from 34 ppb to 62 ppb, all of which are below the level of the federal standard.

FIGURE 7

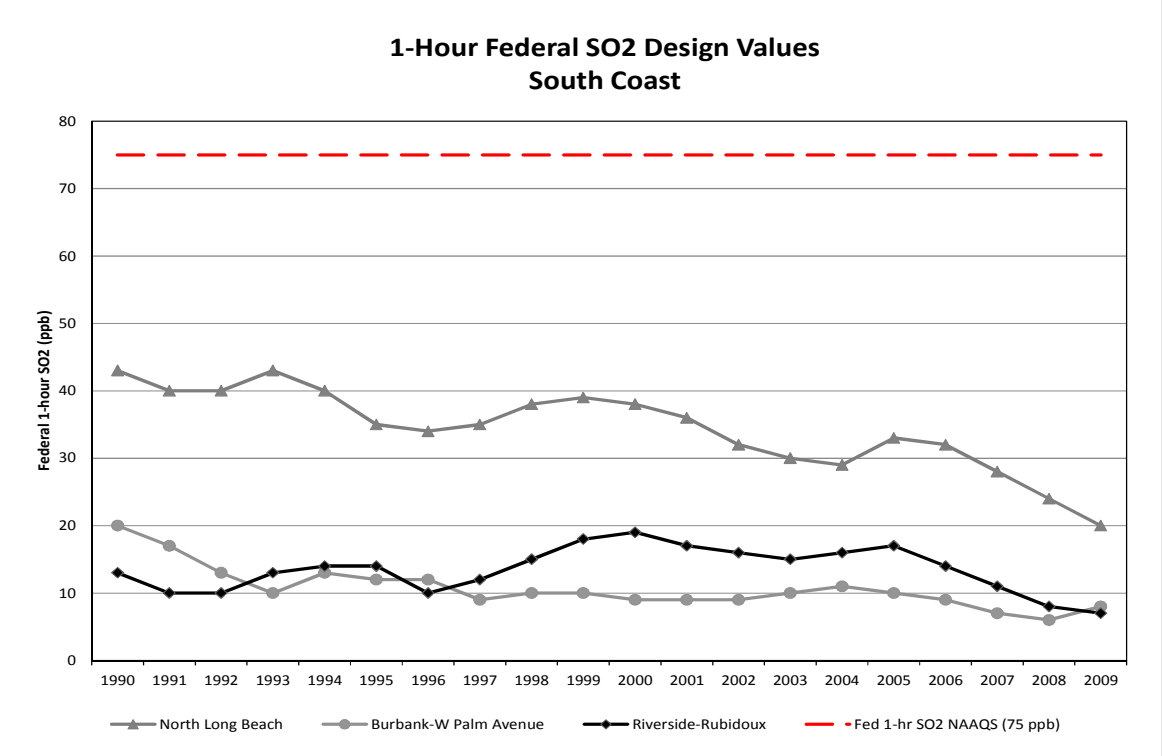


TABLE 4
1-Hour SO_2 Design Values for Monitoring Sites Located at the Ports of Long Beach and Los Angeles

Site	*Port*	*2008-2010 Design Value*
Inner Port (Superblock)	Port of Long Beach	62 ppb
Terminal Island	Port of Los Angeles	53 ppb
Outer Port (Gull Park)	Port of Long Beach	47 ppb
Outer Harbor	Port of Los Angeles	47 ppb
San Pedro	Port of Los Angeles	44 ppb
Wilmington	Port of Los Angeles	34 ppb

Summary

Staff evaluated the five factors recommended by U.S. EPA for the purposes of determining attainment status and appropriate boundaries for federal SO_2 designations: jurisdictional boundaries, geography/topography, meteorology, emission data, and air quality data. Based on this analysis, violations of the 1-hour SO_2 standard have not been measured over the last two decades, and violations are not expected to occur in the future. Therefore, staff recommends the South Coast be designated as attainment, with the South Coast Air Basin serving as the appropriate boundary for the attainment area. This recommendation is based on the following weight of evidence:

- South Coast Air Basin has a comprehensive SO_2 monitoring network, with monitoring sites in the areas with the highest SO_x emissions and expected highest concentrations. Design values for all the South Coast monitoring sites are well below the level of the standard, including monitoring data collected in the Long Beach/San Pedro area, which has the greatest density of SO_x sources and emissions;

- The South Coast has the most stringent SO_x control measures in the nation;

- Stationary source SO_x emissions decreased 40% between 1998 and 2008. The South Coast District is currently updating rules that will ensure an additional 2,080 ton per year reduction in SO_x emissions from large facilities participating in its RECLAIM program, and more than half the reduction will occur by 2013;

- The South Coast Air Basin falls under the jurisdiction of a single agency, the South Coast Air Quality Management District, and effective air quality management is best achieved by including the entire air basin in the attainment area;

- There are no specific meteorological, geographical or topographic factors that warrant a different boundary for the attainment area;

- South Coast District staff are in the process of conducting dispersion modeling for large local SO_x sources, as described in the March 2011 U.S. EPA guidance, and results of their modeling are expected to provide further support for the attainment designation.

III. SAN JOAQUIN VALLEY AIR BASIN

Recommendation

Ambient air quality monitoring in the San Joaquin Valley Air Basin (SJV or Valley) shows a 2009 1-hour sulfur dioxide (SO_2) design value of 9 parts per billion (ppb). Although this value is not considered valid under U.S. EPA's criteria because data for one quarter are incomplete, it provides a good indication of SO_2 concentrations in relation to the standard. The preliminary design value for 2010, which is generally complete, is even lower, at 7 ppb. Because the two design values are so far below the level of the federal standard, staff recommends the San Joaquin Valley be designated as attainment, based on the assessment provided below. The assessment includes an evaluation of the five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries: jurisdictional boundaries, geography/topography, and meteorology (collectively referred to as nature of the region), emission data, and air quality data. Additional dispersion modeling results will be provided to the U.S. EPA later this year to further support the attainment designation recommendation.

Nature of the Region

The San Joaquin Valley Air Basin is one of California's largest air quality control regions. The eight-county area includes all of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties, as well as the western portion of Kern County. Although the San Joaquin Valley (SJV or Valley) was once primarily agricultural, urban and industrial development has increased substantially over the last several decades. About 10% of the State's population, or about three million people, now live in the Valley. The entire region falls under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJV District or District), which has responsibility for developing and implementing rules and regulations to control SO_2 emissions from stationary sources.

The SJV occupies the southern two-thirds of California's Central Valley and comprises nearly 23,500 square miles. With very few exceptions, the SJV is flat, with most of the area lying below 400 feet elevation. The long flat valley area is bordered by the Coast Range to the west, the Sierra Nevada to the east, the Transverse Range to the south, and the Sacramento Valley to the north. In contrast to other California areas, the San Joaquin Valley is not dominated by one large urban area. Instead, there are a number of moderately sized urban areas spread along the main axis of the Valley. Most residents are distributed along the two major thoroughfares: Highway 99 and Interstate 5. The Valley's major population centers include the Fresno, Bakersfield, and Stockton/Modesto urban areas.

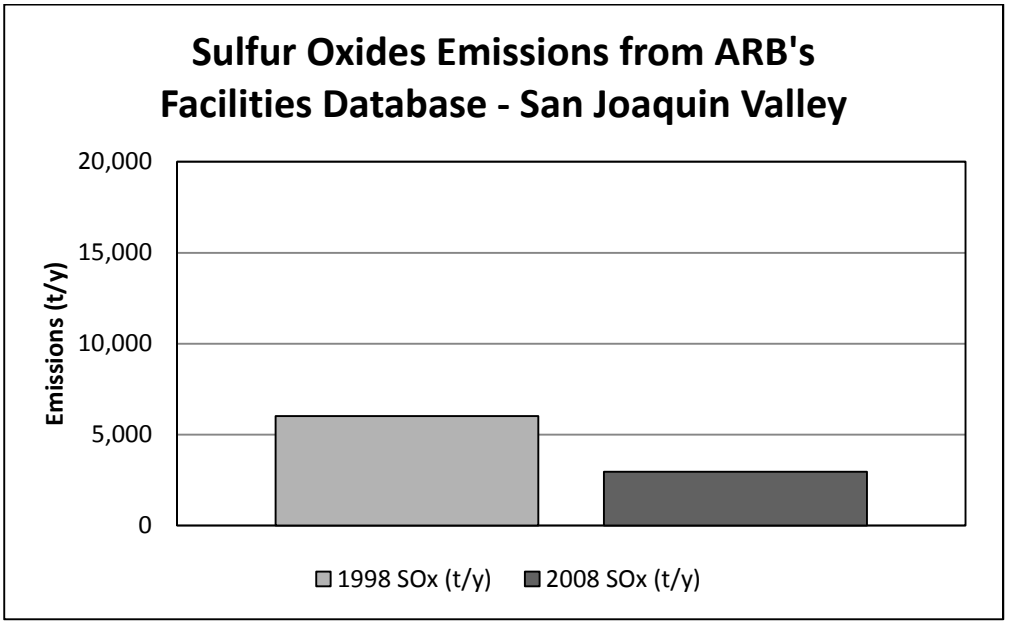
In general, the San Joaquin Valley experiences a climate with cool wet winters and hot dry summers. The northern Valley experiences a more temperate climate than the rest of the SJV because it is located closer to the Pacific Ocean, and the marine influence extends into the area through gaps in the Coast Range Mountains. This keeps temperatures cooler and favors better air flow. Moving further down the Valley, maximum daily temperatures increase, and rainfall totals decrease. From north to south, average maximum July temperatures increase from about 94 degrees Fahrenheit (F) at Stockton to nearly 99 degrees F at Fresno and Bakersfield. In contrast, annual average rainfall decreases from north to south, averaging 14 inches at Stockton, 11 inches at Fresno, and 6 inches at Bakersfield. The amount of stagnation and the complexity of local circulation patterns also increase from north to south. As a result, prevailing conditions in the central and southern portions of the SJV are more likely to trap pollutants and prevent their dispersal.

Emissions

Based on the Air Resources Board's (ARB) 2008 emission inventory, there were a total of 8,413 tons per year of SO_x emissions in the San Joaquin Valley. The SO_x inventory is dominated by stationary source emissions. Among the various stationary source categories, fuel combustion from manufacturing and industrial operations, oil and gas production, electric utilities, and service and commercial operations account for more than half the SJV total. Industrial processes, including glass and related products, mineral processes, chemical processes, and food and agricultural processes account for another third of the total. The remaining SO_x emissions are distributed over a wide range of fuel combustion and miscellaneous processes, including cogeneration, food and agricultural processes, petroleum refining, and managed burning and disposal operations.

U.S. EPA guidance suggests initial focus on sources emitting more than 100 tons of SO_x per year. In total, emissions from stationary sources in the SJV have decreased over the last decade. Figure 8, based on data from the ARB's facility emission database, shows total SO_x emissions from all stationary source facilities in the San Joaquin Valley during 1998 and 2008. Overall, stationary source SO_x emissions decreased a little more than 50 percent between 1998 and 2008 – from 6,021 tons per year to 2,947 tons per year.

FIGURE 8

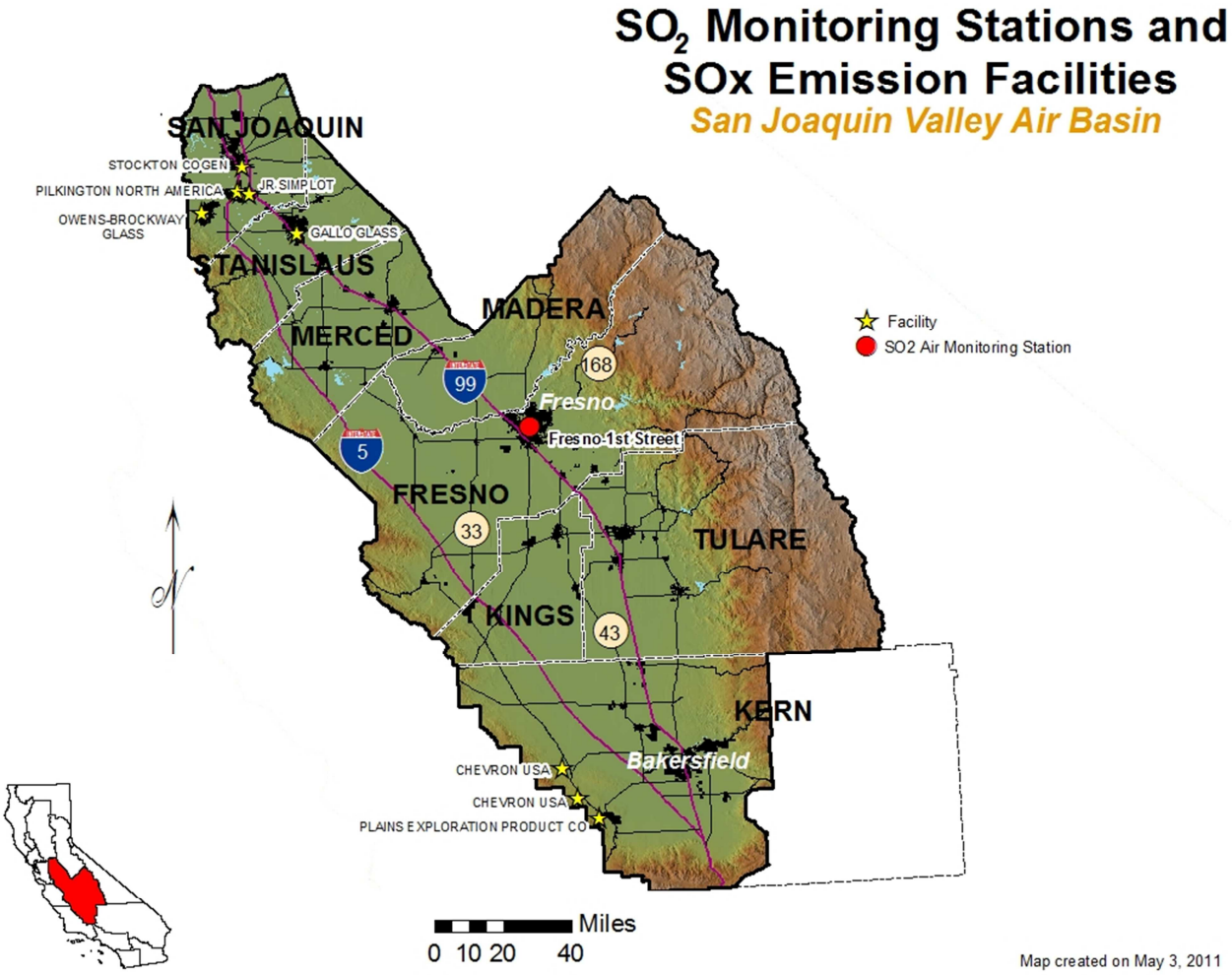


While the information in Figure 8 is based on ARB's 2008 emission inventory, more recent data for the specific large local facilities are available from the SJV District. The remainder of this discussion centers on these large facilities because of EPA's focus on their potential to violate the 1-hour standard. Based on the District's 2009 emission data, there are eight stationary source facilities in the San Joaquin Valley with emissions in excess of 100 tons per year. These sources are summarized in Table 5 and Figure 9. Together, these eight facilities emitted 1,899 tons of SO_x in 2009, representing about 23% of the total SJV SO_x inventory.

TABLE 5
San Joaquin Valley Facilities with SO_x Emissions Greater than 100 Tons per Year

Facility Name	*City*	*County*	*SO_x Emissions*
Chevron USA Inc.	Kern County	Kern	430.69 t/y
J. R. Simplot Company	Lathrop	San Joaquin	359.13 t/y
Gallo Glass Company	Modesto	Stanislaus	300.05 t/y
Plains Exploration & Production Co	Kern County	Kern	231.25 t/y
Owens-Brockway Glass Container, Inc.	Tracy	San Joaquin	226.46 t/y
Chevron USA Inc.	Kern County	Kern	130.97 t/y
Pilkington North America, Inc	Lathrop	San Joaquin	114.67 t/y
Stockton Cogen Company	Stockton	San Joaquin	106.02 t/y

FIGURE 9



The large stationary source facilities reflect four general source types. The two Chevron facilities and the Plains Exploration and Production Company are crude oil and gas extraction facilities. All three use multiple boilers, steam generators, and flares in their extraction processes. Another three facilities, Owens-Brockway Glass Container, Inc., Pilkington North America, Inc., and Gallo Glass Company manufacture glass, including container glass and flat glass. The J. R. Simplot Company in San Joaquin County produces sulfuric acid, which is used in the manufacture of fertilizer. Finally, the Stockton Cogeneration Company is a solid fuels-fired combined heat and power facility that supplies power for sale to PG&E, as well as steam for local manufacturing. This facility has modified both its operations and its permit to include agriculturally-derived biomass in its fuel mix. The facility anticipates that an increased use of biomass will likely lower their SO_2 emissions in the coming years.

The SJV District has reduced SO_x emissions from large stationary sources through a combination of rules and the use of low-sulfur Public Utilities Commission-grade (PUC-grade) natural gas (natural gas that is low in sulfur and meets California PUC specifications). For many industries, the prevailing use of PUC-grade natural gas as the primary process fuel source minimizes SO_2 emissions. But most importantly, the SJV District has adopted stringent rules regulating SO_2 emissions. Table 6 summarizes the major District rules that apply to the Valley's eight large stationary sources.

TABLE 6
San Joaquin Valley District Rules Applicable to Stationary Sources with SO_x Emissions of 100 Tons per Year or More

Rule	***Name***
4306	Boilers, Steam Generators & Process Heaters >5 MMBtu/nr
4320	Advanced Emission Reduction Options for Boilers, Steam Generators & Process Heaters >5.0MMBtu/hr (AERO)
4354	Glass Melting Furnaces
4802	Sulfuric Acid Mist
4311	Flares

Rules 4306 and 4320 work together to require the most effective pollution controls for large boilers, steam generators, and process heaters. Although Rule 4306 is not directly aimed at reducing SO_x emissions, SO_x emissions may be reduced, depending on the control method utilized. In contrast, Rule 4320 does directly target SO_2 emissions, with reductions estimated at 73% of baseline levels.

Rule 4354 places stringent limits on NO_x, VOC, CO, and SO_x emissions from glass-melting furnaces. The Rule limits SO_x emissions to between 0.9 and 1.7 pounds per ton of glass produced, depending on the type of glass furnace and firing technology. These limits are the most stringent in the nation.

Rule 4802 limits sulfuric acid mist emissions from existing sulfuric acid production units by limiting the discharge of effluent process gas to no more than 0.30 pounds of gas per short ton of sulfuric acid produced.

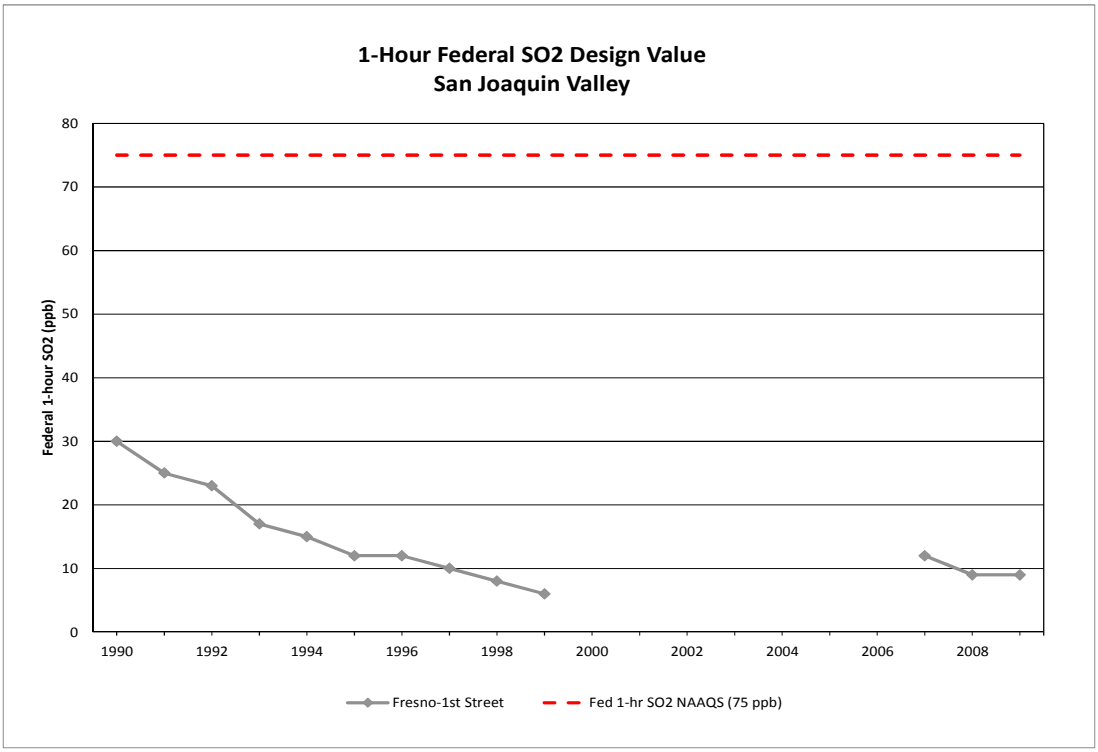
Rule 4311 regulates emissions from combustion in flares associated with oil and gas production. Amendments adopted in 2009 added SO_x emission limits, which will reduce SO_x emissions by 66% from baseline levels.

Air Quality Trends

There is one monitor in the San Joaquin Valley that collects quality assured data for record. This monitor, Fresno-1st Street, is located in the downtown portion of Fresno. The map in Figure 9 shows the location of the Fresno-1st Street monitor. Based on available 2007 through 2009 data, the design value for the Fresno monitor is 9 parts per billion (ppb), which is well below the 75 ppb federal 1-hour standard. However, the design value is not considered complete under U.S. EPA criteria, because data for January and February 2007 are missing. Based on data for 2008 through 2010, which are generally complete, the site has a preliminary design value of 7 ppb. The long-term trend in SO_2 design values for the Fresno-1st Street is shown in Figure 10 and shows that concentrations have decreased 70% since 1990, dropping from 30 ppb to 9 ppb. Throughout the entire time period, the design value has been less than half the level of the federal standard.

Although Fresno-1st Street is the only SO_2 monitor currently operating in the San Joaquin Valley, data are available from a number of other monitors that were in operation during the mid-1970s through late-1990s. Several sites located in and around the Bakersfield urban area showed 4th high 1-hour SO_2 concentrations up to 130 ppb during the late-1970s to mid-1980s, but these concentrations dropped to the 10 to 20 ppb range by the early 1990s. Other sites located throughout the Valley showed 4th high 1-hour measurements in the range of 10 to 20 ppb during the 1980s. Monitoring at most of these sites, including sites in Stockton, Modesto, Oildale, and Visalia, was discontinued by 1990. None of these historic sites violated the federal 1-hour SO_2 standard at the time monitoring was stopped. Because SO_x emissions are now lower, it is unlikely the federal standard is currently violated anywhere in the San Joaquin Valley. As discussed earlier, in addition to these air quality data, dispersion modeling for large stationary sources in the SJV will be provided when available, to further support the recommended attainment designation.

FIGURE 10



Summary

Staff evaluated the five factors recommended by U.S. EPA for the purposes of determining attainment status and appropriate boundaries for federal SO_2 designations: jurisdictional boundaries, geography/topography, meteorology, emission data, and air quality data. Based on this five factor analysis, violations of the 1-hour SO_2 standard have not been measured over the last two decades, and violations are not expected to occur in the future. Therefore, staff recommends the San Joaquin Valley be designated as attainment, with the San Joaquin Valley Air Basin serving as the appropriate boundary for the attainment area. This recommendation is based on the following weight of evidence:

- The design value for Fresno-1st Street decreased over the last two decades and is now well below the level of the federal 1-hour SO_2 standard. Evaluation of historic data for other sites located throughout the San Joaquin Valley also indicate long-term levels below the standard;

- SO_x emissions from stationary source facilities in the SJV declined 50% in the last ten years as a result of District emission control measures, and they will continue to decline in the future;

- The entire San Joaquin Valley falls under the jurisdiction of the San Joaquin Valley Air Pollution Control District, and effective air quality management is best achieved by including the entire Air Basin in the attainment area;

- There are no specific meteorological or geographic/topographic factors that support an attainment area boundary different from the Air Basin boundary; and

- SJV District staff are in the process of conducting dispersion modeling for large local stationary SO_2 sources, as described in the March 2011 U.S. EPA guidance, and results of this modeling are expected to provide further support for the attainment designation. The District is also considering modeling additional facilities with SO_x emissions under 100 tons per year.

IV. MOJAVE DESERT AIR BASIN

Recommendation

Ambient air quality monitoring in the Mojave Desert Air Basin (Mojave Desert) shows a 2009 1-hour sulfur dioxide (SO_2) design value of 10 parts per billion (ppb). Because this value is well below the level of the federal standard, staff recommends the Mojave Desert be designated as attainment, based on the assessment provided below. The assessment includes an evaluation of the five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries: jurisdictional boundaries, geography/topography, meteorology (collectively referred to as nature of the region), emission data, and air quality data. Additional dispersion modeling results will be provided to the U.S. EPA later this year to further support the attainment designation recommendation.

Nature of the Region

The Mojave Desert comprises portions of four counties: eastern Kern County, northeast Los Angeles County, eastern Riverside County, and all but a small southwestern portion of San Bernardino County. Although the region is adjacent to the South Coast, California's largest metropolitan area, the Mojave Desert is sparsely populated, with only 2.4% of the State population. Four local agencies have jurisdiction over air quality in the Mojave Desert. Eastern Kern Air Pollution Control District (APCD) governs the Kern County portion of the region. South Coast Air Quality Management District (AQMD) governs the Coachella Valley portion of Riverside County, which adjoins the South Coast. The far eastern portion of Riverside County and the San Bernardino County portion of the Mojave Desert are governed by the Mojave Desert AQMD. Finally, the Antelope Valley AQMD has jurisdiction over the Los Angeles County portion of the region; however, they contract with the Mojave Desert AQMD for the day-to-day operations in this area.

The Mojave Desert covers a total of 27,287 square miles and is California's largest air basin. The region is bounded by the Colorado River Valley to the south and east and by mountains on its remaining sides. The landscape is quite diverse, including low elevation desert, high elevation desert, and mountain areas. Elevations range from below sea level on the desert floor to peaks of more than 7,000 feet. There are several scattered population centers, although the most heavily populated is the Palmdale/Lancaster area. These two communities are located closest to the South Coast and have grown over the last several decades as bedroom communities of the South Coast. Major thoroughfares, including Interstate 15, Interstate 40, U.S. Highway 395, and California State Highway 58, carry significant amounts of commuter and truck traffic in and out of the Mojave Desert region.

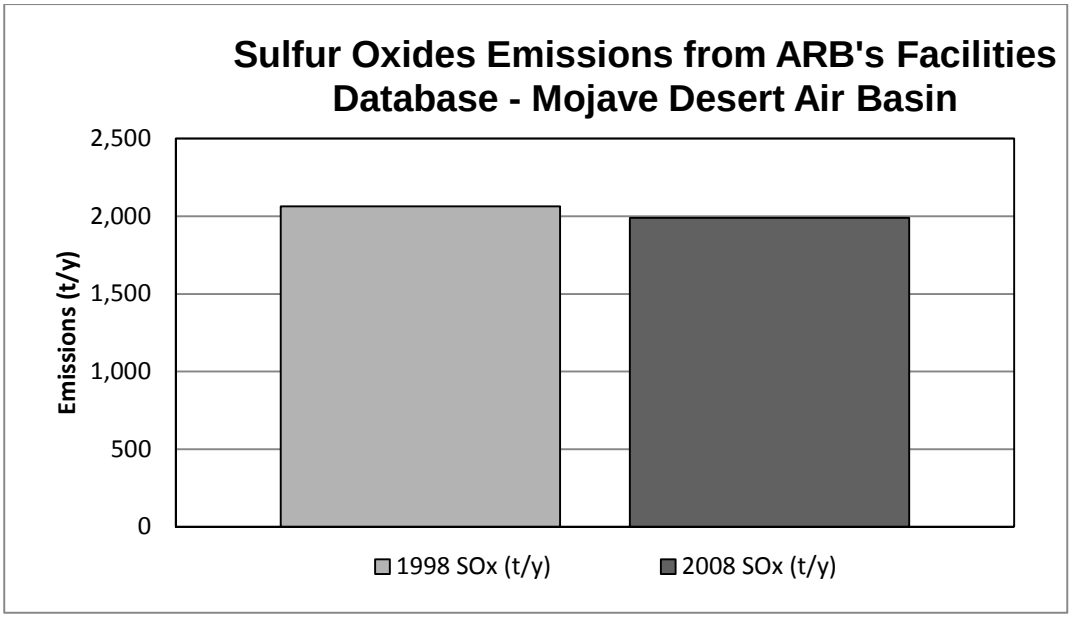
Overall, the Mojave Desert has an arid climate with cool winters, hot summers, and little rainfall. Temperatures generally increase, while precipitation generally decreases from south to north and west to east in this region. For example, the average minimum temperature in Palmdale is 48 degrees Fahrenheit (F), while it is 61 degrees F in Needles. Similarly, the average maximum temperature in Palmdale is 81 degrees F, compared with 87 degrees F in Needles. Daily maximum temperatures in both cities can top 100 degrees F during Summer, and annual average rainfall is less than 8 inches. In contrast to the desert portions of the region, both temperature and precipitation can be significantly different in the mountain areas, where snowcapped peaks are commonplace during Winter. Overall, the Mojave Desert tends to be windy, with winds blowing predominantly from the south and west. During the late spring months, high winds from the coastal areas of southern California blow into the Mojave Desert. In contrast, during Fall Santa Ana conditions, hot air from the desert blows into southern California.

Emissions

The Air Resources Board's (ARB) 2008 emission inventory shows the Mojave Desert Air Basin with a total of 3,259 tons per year of SO_x emissions. The largest source category is mineral processes, which comprises about 60% of the SO_x emissions total. Cogeneration, electric utilities, aircraft, and trains are the next largest contributing categories, together accounting for another 20% of the inventory. The remaining SO_x emissions are attributable to a number of smaller area-wide, on-road, and off-road sources.

Although the numbers above reflect the total SO_x inventory for the Mojave Desert, stationary sources are of particular interest with respect to the federal 1-hour SO_2 standard. Figure 11 shows the change in stationary source SO_x emissions for the Mojave Desert between 1998 and 2008. The data reflect sources in ARB's facility emissions database. As shown in Figure 11, stationary source SO_x emissions decreased about 5%, from 2,063 tons per year in 1998 to 1,990 tons per year in 2008. The remainder of this discussion is focused on large stationary sources because implementation of the federal 1-hour SO_2 standard is focused on determining whether large sources cause violations. U.S. EPA guidance suggests initial focus on sources emitting more than 100 tons of SO_x per year.

FIGURE 11



Within the Mojave Desert, four facilities have emissions exceeding 100 tons per year. A number of smaller sources are widely distributed throughout the region. Figure 12 shows the relative locations of the four large facilities, while Table 7 provides a summary of their city/county location and 2008 level of SO_x emissions.

Two of the facilities, Mitsubishi Cement Company and California Portland Cement Company, manufacture, process, and distribute Portland cement. Cement manufacturing utilizes a mixture of raw materials such as limestone, clay, sand, and iron ore. These raw materials are ground and heated in a rotary kiln to produce “clinker.” After being cooled, the clinker is ground and then mixed with a small amount of gypsum to produce concrete. Most of the SO_x emissions from this process result from the heating of the raw materials, with burning of fuels being a small contributing factor.

The third facility in the Mojave Desert, Searles Valley Minerals, is a mining operation that uses a solvent extraction method to recover boric acid from weak Searle’s Lake brines, thus providing a variety of Boron minerals. The last of the four facilities is the Ace Cogeneration Company. Cogeneration is the practice of operating a boiler to produce steam that provides heat for industrial processes, as well as generates electricity. This facility uses a circulating fluidized bed combustion boiler, which reduces the amount of sulfur emitted.

FIGURE 12

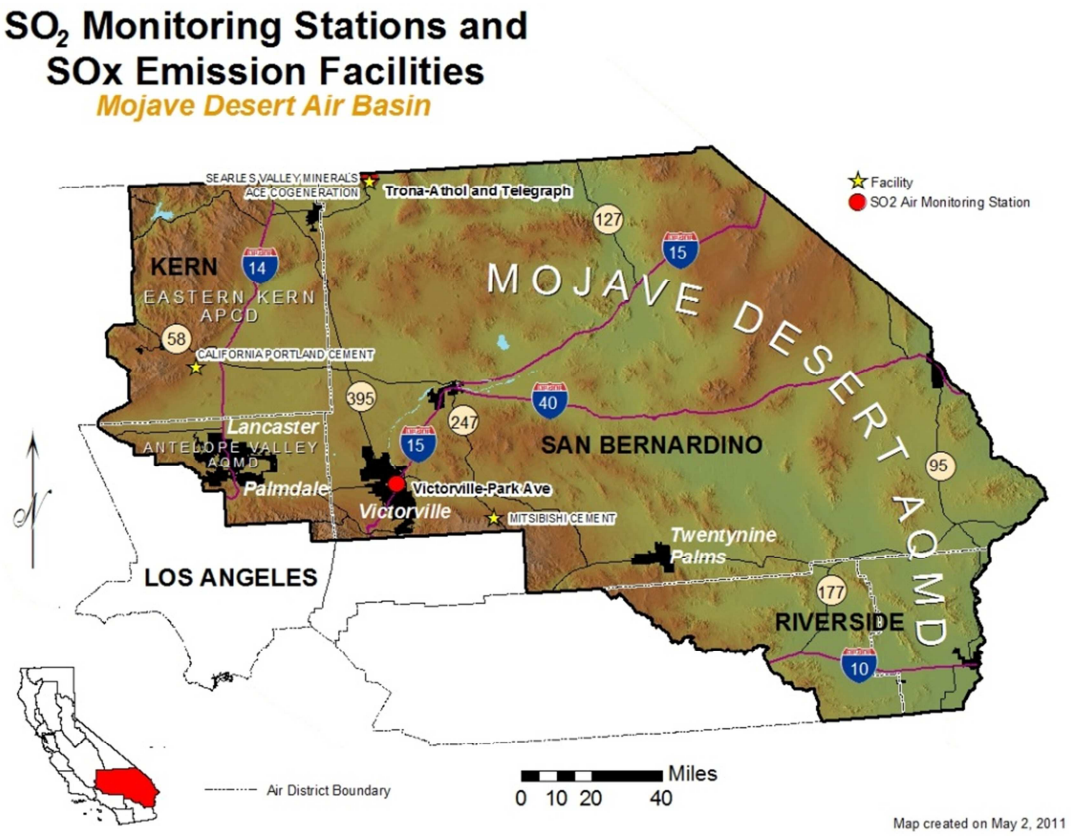


TABLE 7

Mojave Desert Facilities with SO_x Emissions Greater than 100 Tons per Year

Facility Name	*City*	*County*	*SOx Emissions*
California Portland Cement Company	Mojave	Kern	966 t/y
Mitsubishi Cement	Lucerne Valley	San Bernardino	256 t/y
Ace Cogeneration Company	Trona	San Bernardino	256 t/y
Searles Valley Minerals	Trona	San Bernardino	134 t/y

Sulfur oxide emissions from the four large facilities located in San Bernardino and Kern counties are controlled through a combination of local district rules and permit conditions. Facilities in San Bernardino County comply with the Mojave Desert AQMD's Rule 406, which limits SO_2 emissions to 500 parts per million. The facility in Kern County complies with Eastern Kern APCD's Rule 407. Under Rule 407, SO_x emissions must not exceed a specified concentration limit at the point of discharge. This concentration limit is 0.2 percent by volume, calculated as SO_2.

In addition to these local rules, U.S. EPA recently amended two rules that apply specifically to Portland cement manufacturing and will significantly reduce SO_2 emissions from these sources. The rules apply to both large and small, new and existing, cement kilns. Existing kilns, including those in the Mojave Desert, are required to comply in 2013. When fully implemented, U.S. EPA estimates a 78% percent reduction in SO_2 emissions from affected cement kilns.

Air Quality Trends

Figures 13 and 14 show 1-hour SO_2 design value trends for two locations with long-term data: Trona and Victorville. The trend for Trona (refer to Figure 13) shows a decrease in design value from 1990 to 1995 at the Trona-Market Street site. There is a gap in the data record between 1995 and 2000, as the site was moved, and data collected at the interim site are not complete enough to calculate a representative design value. The interim site was moved to the Trona-Athol & Telegraph location during 1997, and a representative three-year design value is available for 2000 and subsequent years. As shown on the graph, the design value for the Trona-Athol & Telegraph site continued the trend seen at the Trona-Market Street site, and the design value for the Trona area continues to hover around 10 ppb. The location of the monitoring site in the town of Victorville has also changed over time. Similar to the trend for Trona, the transition from the Victorville-Armagosa site to the Victorville-Park Avenue is also smooth, with both sites showing design values well below the standard over the entire 20-year trend period (refer to Figure 14).

The current monitors in both Trona and Victorville are located near two of the Mojave Desert facilities that have SO_x emissions in excess of 100 tons per year and are sited to capture high SO_2 concentrations. Based on data collected during 2007 through 2009, the 1-hour SO_2 design values for these sites are 10 ppb and 6 ppb, both of which are well below the level of the 75 ppb standard. These data demonstrate that SO_2 concentrations in the Mojave Desert attain the federal 1-hour SO_2 standard.

FIGURE 13

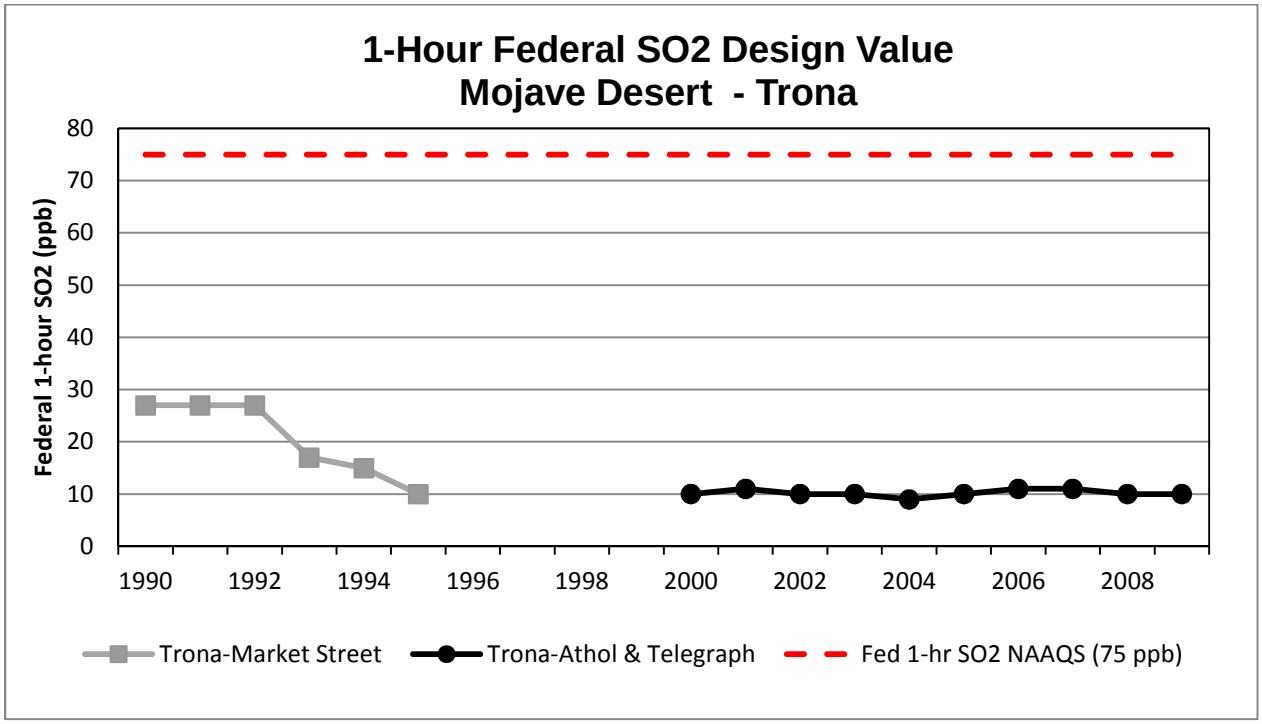
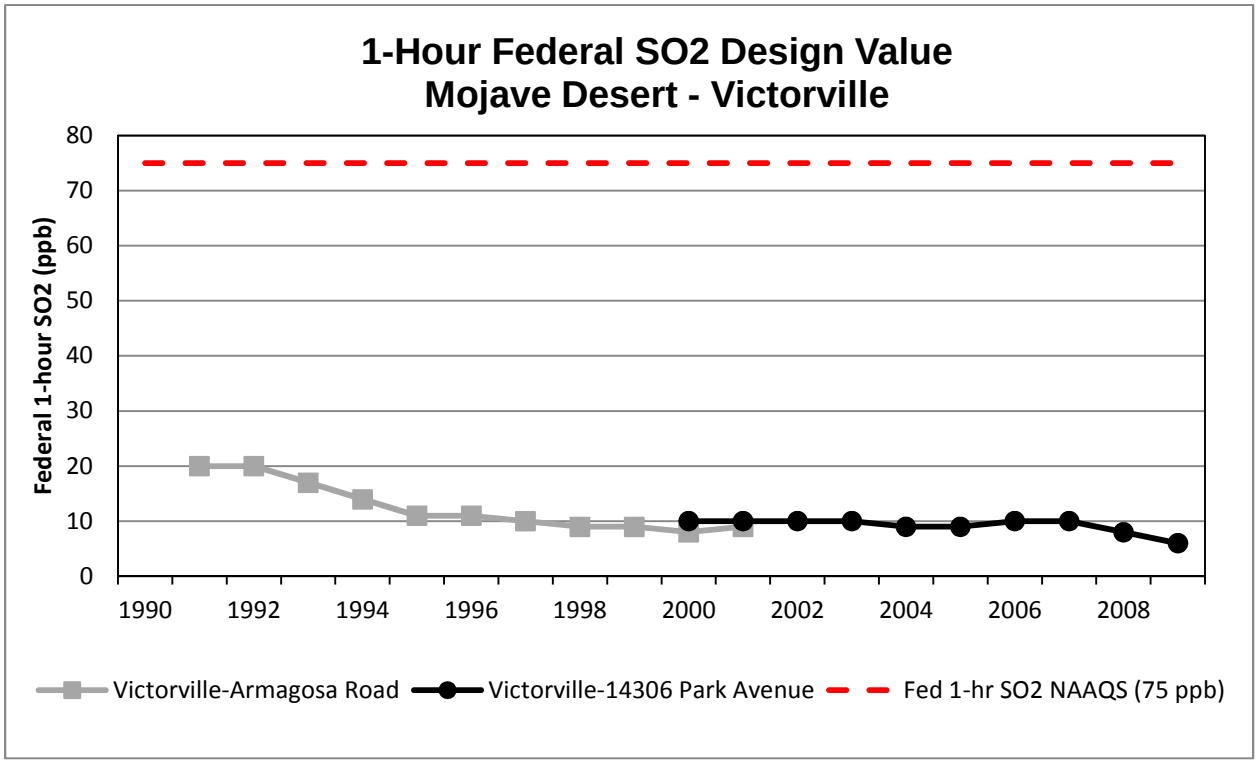


FIGURE 14



Summary

Staff evaluated the five factors recommended by U.S. EPA for the purposes of determining attainment status and appropriate boundaries for federal SO_2 designations: jurisdictional boundaries, geography/topography, meteorology, emission data, and air quality data. Based on this analysis, violations of the federal 1-hour SO_2 standard have not been measured over the last two decades, and violations are not expected to occur in the future. Therefore, staff recommends the Mojave Desert be designated as attainment with the Mojave Desert Air Basin serving as the appropriate boundary for the attainment area. This recommendation is based on the following weight of evidence:

- There are two air quality monitors in the Mojave Desert, located in areas with high expected SO_2 concentrations. One-hour SO_2 design values for both monitors are well below the level of the federal standard;

- There are no geographical, topographic, or meteorological factors that warrant a different boundary for the attainment area.

- Large stationary sources in the Mojave Desert comply with local rules that limit SOx emissions, based on SO_2 concentrations;

- Recent revisions to U.S. EPA rules for Portland cement manufacturers will significantly reduce emissions from cement kilns. Existing kilns, such as those in the Mojave Desert, must comply by 2013;

- Dispersion modeling results for large SO_2 emission facilities in the Mojave Desert will be provided to the U.S. EPA later this year to further support the attainment designation.

V. SOUTH CENTRAL COAST AIR BASIN

Recommendation

Ambient air quality monitors in the South Central Coast Air Basin (South Central Coast or SCC) show a 2009 1-hour sulfur dioxide (SO_2) design value of 35 parts per billion (ppb), which is well below the level of the federal standard. Based on the following assessment, staff recommends the South Central Coast be designated as attainment. The assessment includes an evaluation of the five factors recommended by U.S. EPA for the purposes of determining the appropriate attainment area boundaries: jurisdictional boundaries, geography/topography, and meteorology (collectively referred to as nature of the region), emission data, and air quality data. Dispersion modeling results will be provided to the U.S. EPA later this year as additional support for the attainment designation recommendation.

Nature of the Region

The South Central Coast comprises all of San Luis Obispo, Santa Barbara, and Ventura counties. Overall, the region covers 7,887 square miles and is home to approximately 4% of California's population. More than half the region's population lives in Ventura County, and the largest cities include Oxnard, Thousand Oaks, and Ventura. Each of the three counties in the South Central Coast is governed by its own air pollution control district (APCD): the Ventura County APCD, the Santa Barbara County APCD, and the San Luis Obispo County APCD. These agencies have responsibility for developing and implementing rules and regulations to control SO_x emissions from stationary sources located in their local county area.

The region is bounded by the Pacific Ocean on the west and south, and it includes six of the eight Channel Islands. All three counties comprise a relatively narrow coastal strip that gives way to inland mountains, with the highest elevations ranging from 6,000 to over 8,000 feet. San Luis Obispo County, the northernmost county, covers 3,304 square miles. The County is more rural and agricultural than many of California's other coastal regions, with a number of small communities scattered along the beaches, coastal hills, and mountains. Santa Barbara County is the middle county, comprising 2,737 square miles. In addition to the mainland area, the County includes Santa Cruz, San Miguel, Santa Rosa, and Santa Barbara islands. Similar to San Luis Obispo County, most Santa Barbara County residents live in or near the coastal area. Ventura County, which includes Anacapa and San Nicolas islands, is the most populated county in the South Central Coast. It is also the smallest, with an area of 1,845 square miles. Significant population centers are found along Ventura County's coastline (Oxnard and Ventura), as well as inland (Simi Valley and Thousand Oaks).

In terms of climate, the South Central Coast generally has relatively wet winters and warm dry summers. Coastal areas benefit from the marine influence, where onshore breezes keep beach communities cooler in summer and warmer in winter than communities located further inland. Year-round temperatures near the coast are mild, with average minimums in the 40s and 50s and average maximums in the 60s and low 70s. Average precipitation in this part of the region is between about 15 and 25 inches per year. In contrast, the inland areas are warmer and dryer. In these areas, average minimum temperatures are still in the 40s and 50s. However, average maximums can be in the high 70s, and daily summer maximums can exceed 100 degrees Fahrenheit. Rainfall totals in the inland portions of the South Central Coast are generally less than 15 inches per year.

Emissions

Based on the Air Resources Board's (ARB) 2008 emission inventory, there were 4,646 tons of SO_x emissions in the South Central Coast Air Basin. Two major source categories account for the majority of these emissions: petroleum refining operations (close to 60%) and mineral processes (about 30%). More than 90% of the SO_x emissions within the mineral processes source category are attributable to diatomaceous earth processing.

The remainder of this discussion is focused on large stationary sources because implementation of the federal 1-hour SO_2 standard is focused on determining whether large stationary sources are likely to cause violations of the standard. U.S. EPA guidance suggests initial focus on sources emitting more than 100 tons of SO_x per year. Similar to other areas of California, most of the SO_x emissions in the South Central Coast come from stationary sources. As shown in Figure 15, which is based on ARB's facility emissions database, emissions from stationary sources decreased more than 70% between 1998 and 2008.

Facility SO_x emissions were reduced even further in 2010, from a combination of more stringent rules and permit requirements, along with the implementation of federal consent decrees. There are two large SO_x stationary sources in the South Central Coast (refer to Figure 16). These sources are the Conoco Phillips Santa Maria Refinery in San Luis Obispo County and the Celite Corporation, a facility in Santa Barbara County that processes diatomaceous earth. Both are discussed in more detail, below. SO_x emissions from the remaining stationary sources in the South Central Coast are below 100 tons per year, with each emitting between 0 and 30 tons of SO_x per year.

FIGURE 15

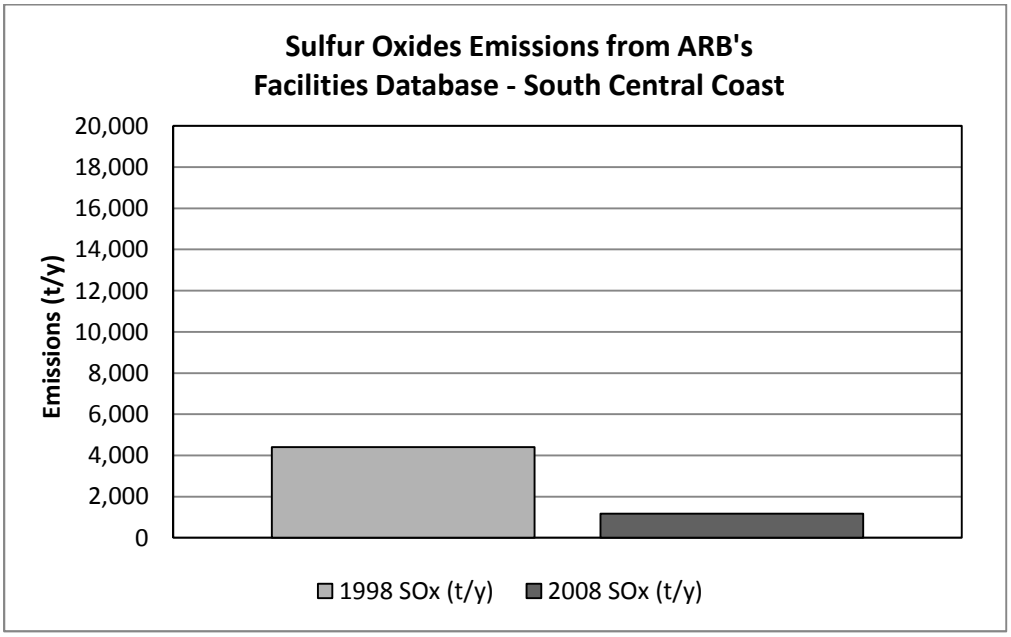
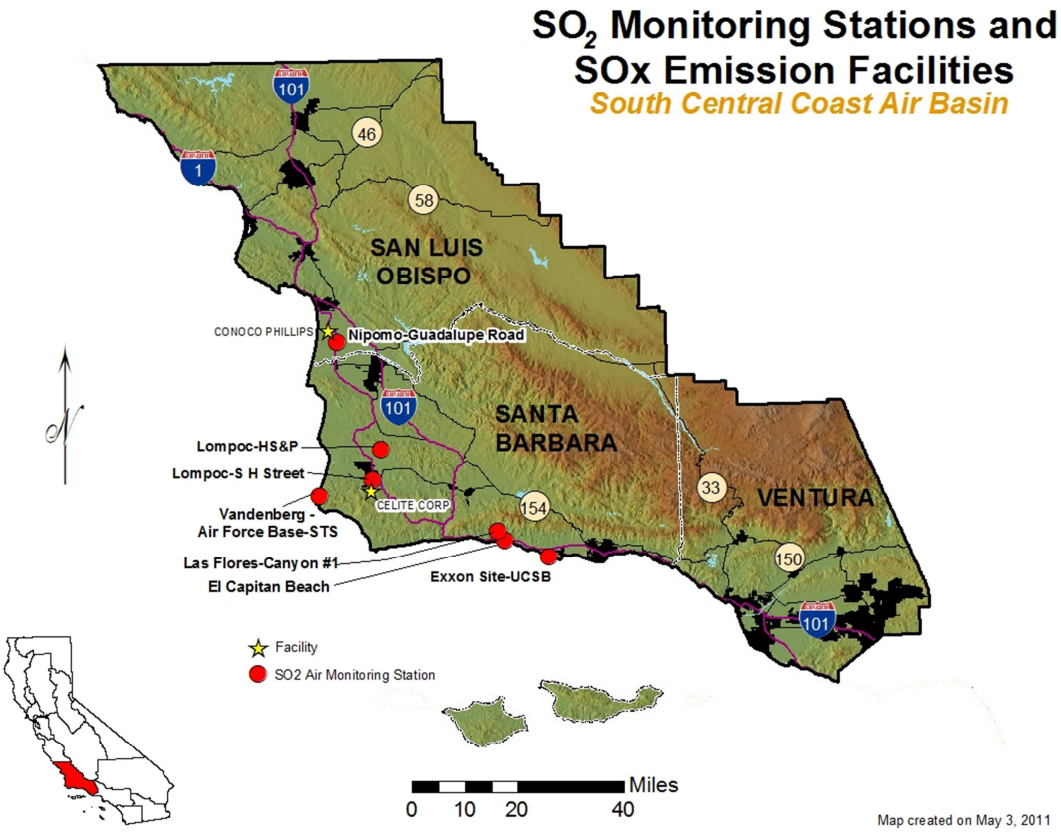


FIGURE 16



Conoco Phillips Facility: The Conoco Phillips Santa Maria Refinery (Conoco Phillips SMR or SMR) facility is located near the town of Nipomo in San Luis Obispo County. The SMR facility was originally built by Union Oil Company of California in 1955 and has had several owners since then, including Tosco, Phillips Petroleum, and now Conoco Phillips. The refinery operates 24 hours per day, year-round, unless operations are shut down for maintenance. Over time, the San Luis Obispo County APCD has been successful in securing substantial emission reductions from this facility not just for SO_x, but also for reactive organic gases and particulate matter.

The estimated SO_x emissions from this facility have decreased nearly 95% since 2006 – emissions were 2,668 tons per year in 2006 compared with only 154 tons per year in 2010. These are verifiable reductions, attributable to emission control measures adopted by the San Luis Obispo County APCD and to compliance with a recent U.S. EPA consent decree. Of particular importance is the recent shutdown of the calciner kiln stack.

When it was operating, the calciner unit accounted for over 90% of SO_x emissions in San Luis Obispo County and almost 95% of the annual SO_2 emissions from the entire SMR facility (refer to Table 8, below). On May 31, 2006, the San Luis Obispo County APCD Board took action and approved amendments to District Rule 440, Petroleum Coke Calcining and Storage Operations. This Rule required an 80% reduction in SO_2 emissions from SMR coke calcining operations and limits the storage of green coke to the levels that were stored at the facility as of January 1, 2006. On March 13, 2007, Conoco Phillips SMR shut down the calciner unit. Only green petroleum coke is generated by the coker units, stored in greatly reduced storage piles, and shipped out. As shown in Table 8, total emissions from the SMR facility have been greatly reduced since 2006, but there is some year-to-year variation. This variation is attributable to year-to-year differences in feedstock and throughput.

TABLE 8

SO_2 Emission History at Conoco Phillips Santa Maria Refinery

Calendar Year	Total SMR Facility SO_2	Calciner Unit SO_2
2006	2668 tons/year	2500 tons/year
2007	789 tons/year	668 tons/year
2008	176 tons/year	0
2009	129 tons/year	0
2010	154 tons/year	0

Other relevant measures contributing to the SO_x emission reductions at the SMR facility are summarized below:

- *U.S. EPA Consent Decree:* As part of U.S. EPA's on-going multi-company Refinery Initiative, SMR was issued a Consent Decree in 2004/2005 covering both emission reductions and procedural changes under various regulatory compliance requirements, including New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP). The San Luis Obispo County APCD and U.S. EPA partnered in writing and implementing the Consent Decree. SMR is still operating under this Consent Decree, working towards full compliance with its provisions. December 2011 and 2013 mark upcoming milestone deadlines.

- *Abatement Order:* In 1989, the San Luis Obispo County APCD issued an Abatement Order for the SMR facility, addressing numerous neighborhood odor complaints and excessive emissions from operations at the refinery and carbon plant. The Abatement Order included conditions for new and modified emission controls, odor abatement projects, new monitoring equipment, and procedural changes. Odor complaints, which numbered over 350 during the year prior to the Abatement Order, are now sporadic and usually in conjunction with facility upset conditions. The San Luis Obispo County APCD considers the Abatement Order a success in curbing emissions and odors from processes at the SMR facility.

Celite Corporation: Celite Corporation is a diatomaceous earth processing plant located in the city of Lompoc in Santa Barbara County. In the recent past, SO_x emissions from the Celite facility exceeded 700 tons per year. Since then, Celite Corporation has permanently ceased operating two older processing lines. They recently installed a new processing line that includes SO_x emission control equipment with a potential to emit restriction of 13 tons per year. The new processing line includes Best Available Control Technology (BACT), comprising a high energy venturi scrubber and packed bed scrubber combination SO_x control unit. The Authority to Construct (ATC) permit contains specific SO_x emission limitations, reflecting BACT control.

The plant is currently going through a shake-out period under the ATC permit, and the new processing line limits reflecting BACT control will ultimately be federally enforceable under a Part 70 permit. One older line is being retained by Celite Corporation as a back-up, anticipated to operate for only brief periods if the new line breaks down. As a result, hourly SO_x emissions will routinely be under 3 pounds/hour, consistent with the permit limitations. The Santa Barbara County APCD has provided a recent source test that demonstrates the SO_x control equipment is meeting the required efficiency and SO_x emissions are in compliance with the permit limits. Because

SO_x emissions are now under 100 tons per year, the Celite Corporation facility will not require modeling.

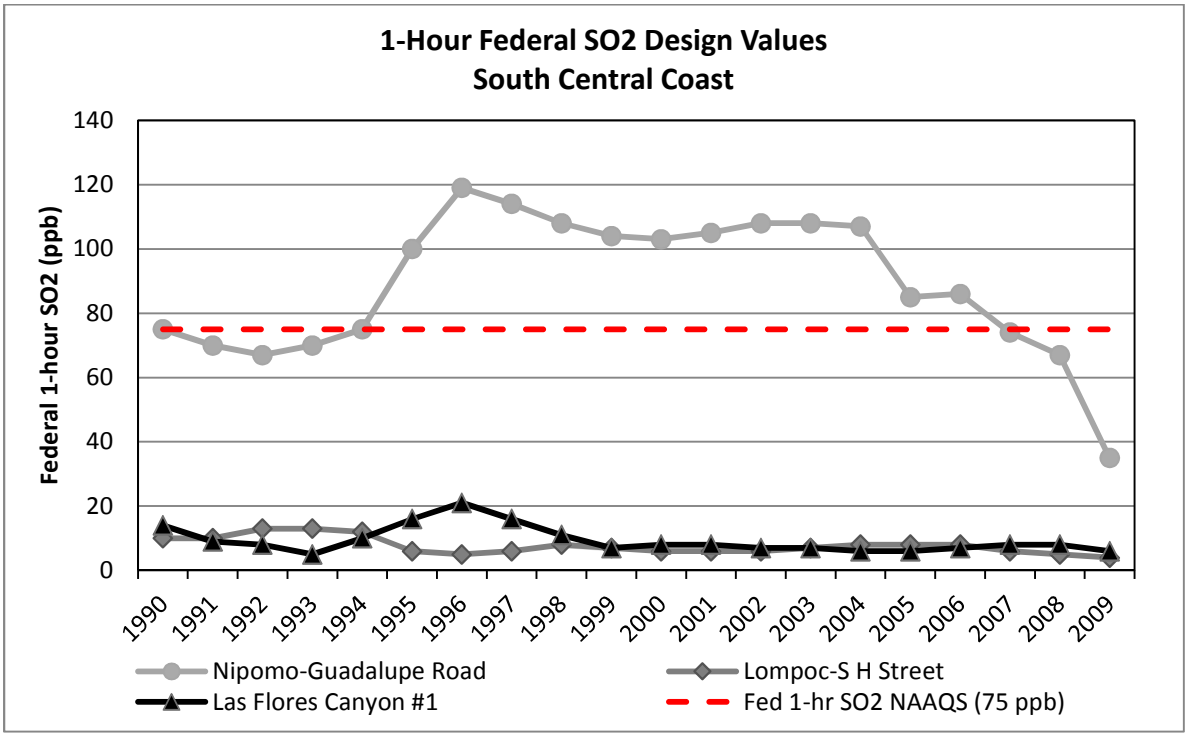
Air Quality Trends

The South Central Coast has an extensive air quality monitoring network, including a number of monitors that collect quality-assured SO_2 data for record. Several of these monitors are located near the two SO_x facilities described above and therefore reflect high SO_2 concentrations within the South Central Coast region. In addition, several other monitors are located along the coast, downwind of these facilities. These downwind sites monitor public exposure from smaller facilities and area-wide SO_x emissions from transportation sources (refer to Figure 16 for relevant monitor locations). Based on data for record, the South Central Coast attains the federal 1-hour SO_2 standard, with 2009 design values ranging from 2 ppb to 35 ppb, which is well below the level of the federal standard.

The highest design value is for the Nipomo-Guadalupe Road monitoring site, located near the Conoco Phillips SMR. The long-term design value for the Nipomo site is plotted in Figure 17. It shows a significant reduction between 2006 and 2009. As shown in Table 8, the SMR facility sharply reduced emissions from its calciner unit between 2006 and 2007. The facility then shut the calciner unit down, in March 2007. The design value at Nipomo reflects these emission reductions, dropping more than 50% between 2006 and 2009 (from 86 ppb to 35 ppb). Design values for future years should be even lower, because the 2009 design value still includes data for 2007 and 2008, before the calciner unit ceased operating. Maximum 1-hour SO_2 concentrations provide a good illustration of the significant decrease in SO_2 concentrations over the three-year period, with maximums of 151 ppb in 2007, 47 ppb in 2008, and 17 ppb in 2009.

In addition to Nipomo, Figure 17 also shows the long-term trend for the monitoring site nearest the Celite facility (Lompoc-South H Street). The 2009 design value for this site is 6 ppb, less than one-tenth the level of the federal standard. It should be noted that the three-year period reflected in this design value (2006-2009) includes a period of uncontrolled high emissions at the Celite facility. Even so, the design value does not violate the standard. The remaining trend plotted in Figure 17 reflects the downwind coastal site with the highest 2009 design value – Las Flores Canyon-#1, in Santa Barbara County. The design value for this site is also well below the level of the federal standard, at 6 ppb. Based on these data and data for other sites in the region, violations of the federal 1-hour SO_2 standard are unlikely in the South Central Coast.

FIGURE 17



Summary

Staff evaluated the five factors recommended by U.S. EPA for the purposes of determining appropriate attainment status and boundaries for federal SO_2 designations: jurisdictional boundaries, geography/topography, meteorology, emission data, and air quality data. This five factor analysis shows that violations of the federal 1-hour SO_2 standard have not been measured over the last several years, and because of substantial verifiable and enforceable emission reduction measures, are not expected to occur in the future. Therefore, staff recommends the South Central Coast be designated as attainment, with the South Central Coast Air Basin serving as the appropriate boundary for the attainment area. This recommendation is based on the following weight of evidence:

- The South Central Coast has a comprehensive SO_2 monitoring network, with monitoring sites located in areas with the highest SO_x emissions and highest expected SO_2 concentrations;

- 2009 design values for all sites in the South Central Coast region are well below the standard, including values for sites nearest the Conoco Phillips SMR and

Celite Corporation facilities. The highest 2009 design value in the region was 35 ppb, less than half the level of the federal 1-hour SO_2 standard;

- Emissions from SO_x facilities in the South Central Coast decreased 30% between 1998 and 2008.

- Since 2006, SO_x emissions from the Conoco Phillips SMR facility have decreased close to 95%, from 2,668 tons per year to 154 tons per year;

- SO_x emissions are expected to decrease from 743 tons per year to 13 tons per year at the Celite Corporation in Santa Barbara County, once their permit to operate is finalized. Therefore, this facility will not require modeling;

- There are no significant differences in geography, topography, or meteorology in the South Central Coast that warrant an attainment area boundary different from the Air Basin boundary;

- Dispersion modeling results for the Conoco Phillips SMR facility will be provided to the U.S. EPA later this year, to further support the attainment designation;

- Staff will work with the Santa Barbara APCD to update their emissions inventory, after the Celite Corporation's final permit to operate has been issued and is fully implemented.

VI. REMAINING AIR BASINS

Recommendation

The staff recommends that the following areas be designated as attainment, based on the assessment provided below. The assessment includes an evaluation of the five factors recommended by U.S. EPA for purposes of determining the appropriate attainment area boundaries: air quality data, emissions data, meteorology, geography/topography, and jurisdictional boundaries.

Staff recommends that air basins be used as the jurisdictional boundaries for the attainment areas. In some cases air basins consist of a single air district, but the majority of air basins are composed of one or more air districts, each containing one or more counties or portions of counties. Air basins were determined based on similar meteorology and geography of the area which they contain.

The following air basins, and the counties included within, contain no large stationary sources of SO_x emissions.

Air Basin	**Counties**
Sacramento Valley	Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, Yuba, western Placer, northeastern Solano
San Diego	San Diego
Salton Sea	Imperial, central Riverside
North Central Coast	Santa Cruz, San Benito, Monterey
North Coast	Del Norte, Humboldt, Trinity, Mendocino, northern Sonoma
Mountain Counties	Plumas, Sierra, Nevada, central Placer, western El Dorado, Amador, Calaveras, Tuolumne, Mariposa
Great Basin Valleys	Inyo, Mono, Alpine
Lake County	Lake
Lake Tahoe	Portions of El Dorado and Placer
Northeast Plateau	Lassen, Modoc, Siskiyou

In general, these air basins encompass regions of the state that are more rural in nature. Population tends to be concentrated in a small number of urban areas, most notably Sacramento and San Diego Counties. There are no facilities located in these air basins with significant SO_x emissions (greater than 100 tons per year), and in comparison to the rest of the state, total SO_x emissions are low. SO_2 monitoring data is available only in select areas where the highest SO_2 concentrations are expected to

occur, and concentrations at these monitors are far below the standard. These monitors are located in the areas with the largest emissions. Since the existing monitoring network indicates that all areas are well below the level of the standard, we conclude that areas without monitors would also be considerably below the standard.

Sacramento Valley Air Basin

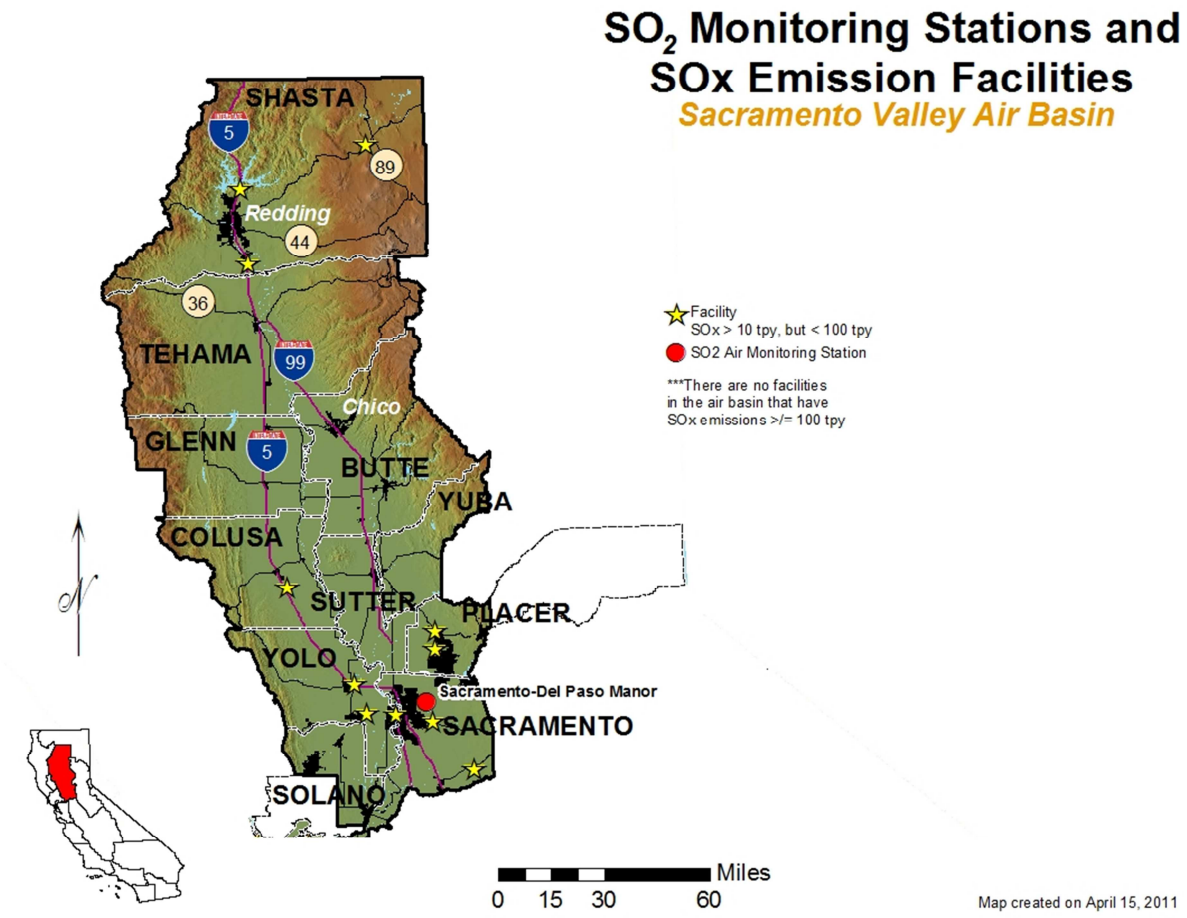
Nature of the Region

The Sacramento Valley Air Basin (SVAB) is located in the northern portion of the Central Valley. It includes Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba Counties, the western urbanized portion of Placer County, and the northeastern portion of Solano County. The SVAB occupies nearly 15,000 square miles and has a population of more than 2.5 million people. More than half of the total population in the eleven-county air basin resides in Sacramento County.

The SVAB is approximately 216 miles from north to south and 95 miles east to west at the widest part. It is bounded on the north and west by the Coast Range Mountains and on the east by the southern portion of the Cascade Mountain Range and the northern portion of the Sierra Nevada Mountains. Within the SVAB the elevations reach heights of approximately 3,500 feet in the southwest, 8,500 feet in the northwest, 1,700 feet in the southeast and 10,500 feet in the northeast. In contrast, the elevation in Sacramento County near the San Francisco Bay delta is barely above sea level. The mountain ranges provide a significant physical barrier to trap locally created pollution as well as pollution transported into the SVAB from elsewhere.

The Sacramento Valley's usual summer daytime wind flow pattern is characterized by onshore flow from the Bay Area to Sacramento (known as the sea breeze). A portion of the wind flow turns south, blowing into the San Joaquin Valley, a portion continues eastward, across the southern Sacramento Valley, and a portion turns north, blowing into the upper Sacramento Valley. At night, the sea breeze weakens, and the wind direction in the Sacramento Valley changes. Typical downslope flow, known as nocturnal drainage, brings air from the Coast Range and Sierra Nevada Mountains into the Sacramento Valley.

FIGURE 18



Emissions

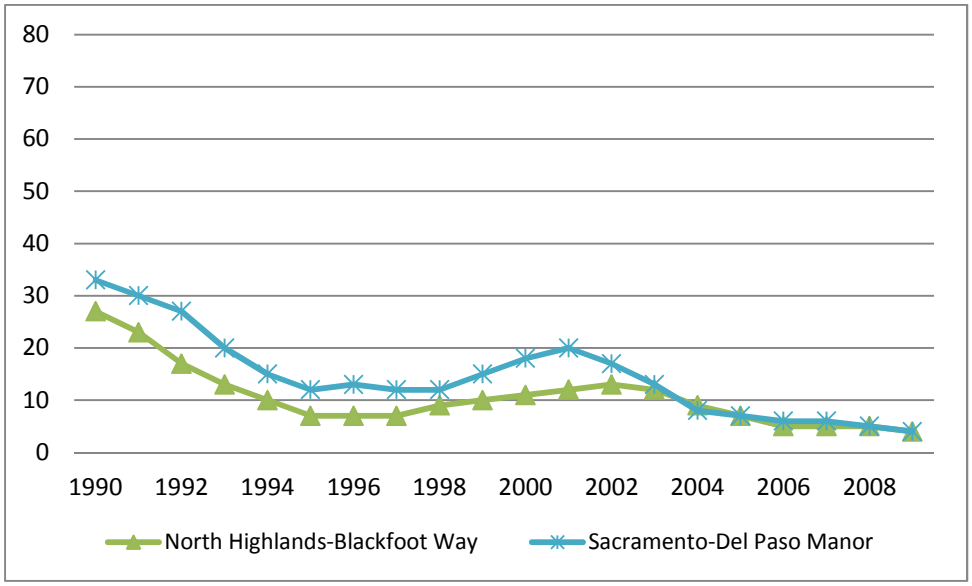
There are no facilities in the SVAB with SO_x emissions greater than 100 tons per year. In 1998, the total facility SO_x emissions were 595 tpy. By 2008, the facility SO_x emissions dropped to 410 tpy, a decrease of over 30%. Other sources of SO_x emissions in SVAB are of a more diffuse nature, such as residential burning, managed burning, trains, airplanes, and vehicles. Emissions from all sources totaled 1,240 tpy in 2008, down from over 2,300 tpy in 1998, a 45% reduction.

Air Quality Trends

Based on quality-assured data for record, the SVAB attains the revised federal SO_2 standard, with a 2009 design value of 4 ppb. The SVAB has monitoring data available from five sites, one in Butte County and four in Sacramento County. The monitor in Butte County was located at Chico-Manzanita Avenue and operated from 1981 to 1984. SO_2 concentrations were very low, and never came close to the level of the revised standard (75 ppb). Monitors in Sacramento County include Citrus Heights-Sunrise Boulevard (1980-1983), Sacramento-P Street (1980-1982), Sacramento-Del Paso

Manor (1980-present), and North Highlands-Blackfoot Way (1980-2010). Monitors are located in areas of the air basin where we would expect the highest SO_2 concentrations to occur. These are also the areas with the greatest population density, capturing emissions from area-wide sources, such as residential burning and vehicles, as well as stationary facility sources. As shown in Figure 19 below, design values have been steadily decreasing since 2000. The 2009 design value is just 4 ppb, down from 20 ppb in 2001. Since monitoring began in 1980, SO_2 concentrations have been well below the level of the revised standard.

FIGURE 19
Sacramento Valley Air Basin SO_2 1-Hour Design Values



San Diego Air Basin

Nature of the Region

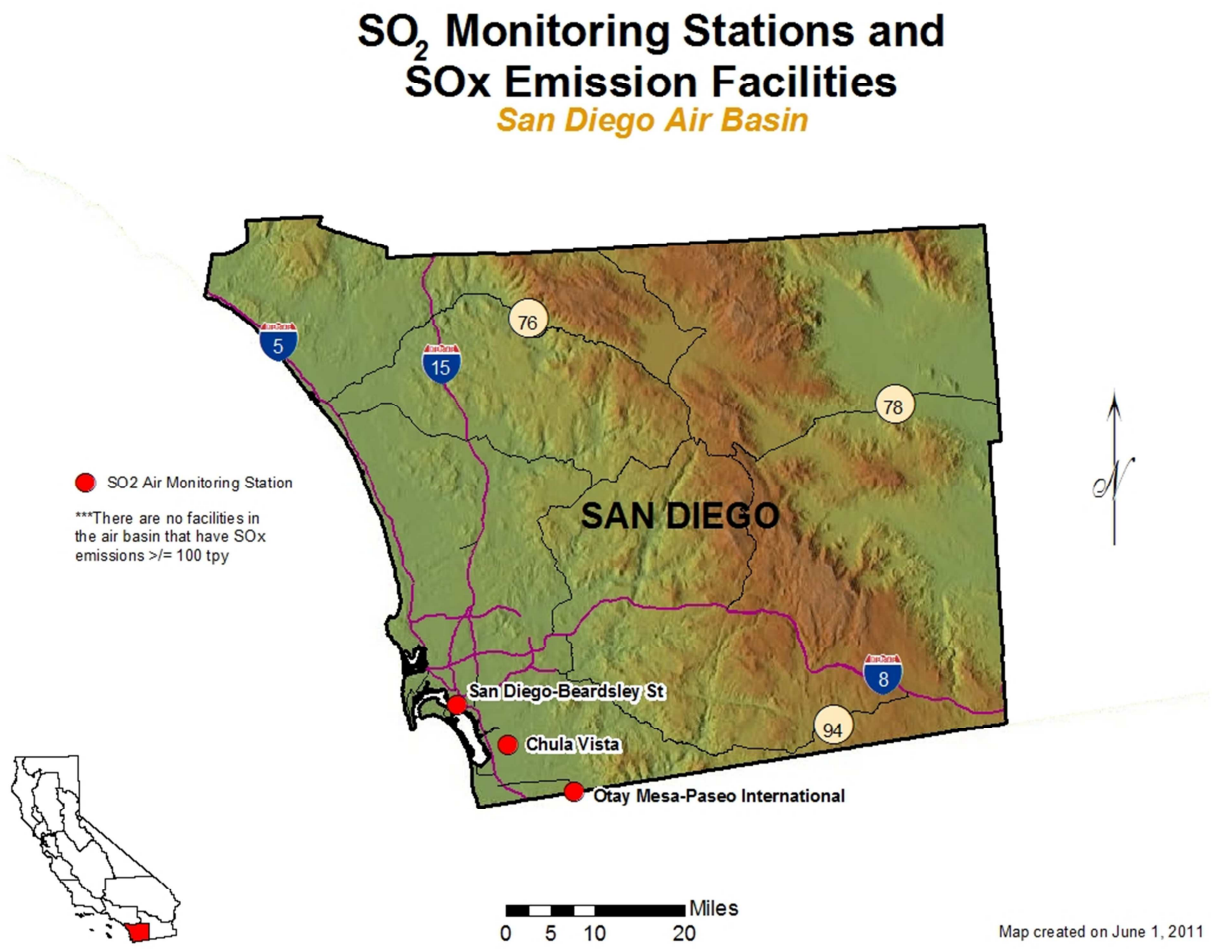
The San Diego Air Basin (SDAB) lies in the southwest corner of California and comprises the entire San Diego region. Population is concentrated mainly in the western portion of the county. The air basin covers 4,260 square miles, and is home to over three million residents. The City of San Diego covers approximately 330 square miles, and has a population of over 1.3 million, 42 percent of the total population of San Diego County.

The topography in SDAB varies greatly, from beaches on the west to mountains and desert on the east. Much of the topography in between consists of mesa tops intersected by canyon areas. Topography, along with local meteorology, influences the

dispersal and movement of pollutants in the basin. The mountains to the east prohibit dispersal of pollutants and help trap them under inversion layers.

The San Diego region typically has dry, warm summers and mild, occasionally wet winters. The average temperature ranges from the mid 40s to the high 90s. Most of the county's precipitation falls from November to April, with infrequent precipitation during the summer. The average seasonal precipitation along the coast is approximately ten inches.

FIGURE 20



Emissions

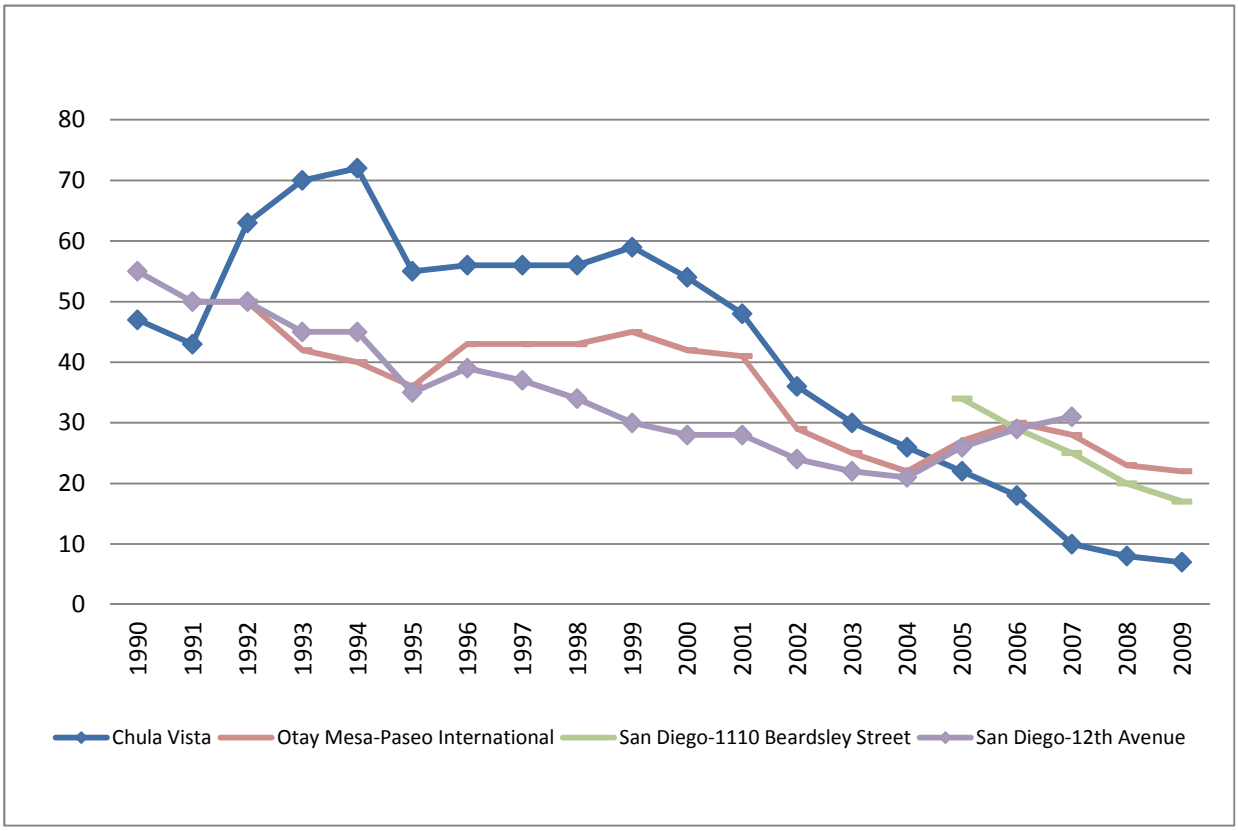
There are no facilities located in the SDAB that have emissions greater than 100 tons per year. Emissions from all facilities in SDAB totaled just 85 tpy in 2008. The largest sources of SO_x emissions in SDAB are more regional, including trains, shipping ports, fuel combustion and residential burning. Total SO_x emissions from all sources totaled 730 tpy in 2008, down from 1030 tpy in 1998, a reduction of nearly 30%.

Air Quality Trends

Based on data for record, the SDAB attains the revised federal SO_2 standard, with a valid 2009 design value of 17 ppb. The design value at Otay Mesa (22 ppb) is not considered valid under U.S. EPA criteria. SDAB has had several monitors operating at various times from 1980 to the present. Currently, there are three sites with SO_2 monitors – San Diego-Beardsley Street, Otay Mesa-Paseo International, and Chula Vista. Otay Mesa and Chula Vista have long term data dating back to the early 1990s. Only Chula Vista has come close to the level of the revised standard in 1994 when the design value reached 72 ppb. However, emissions have dropped dramatically since then. The 2009 design value at Otay Mesa is just 22 ppb, 7 ppb at Chula Vista, 17 ppb at San Diego – Beardsley Street.

The monitor at Otay Mesa is located near the California/Mexico border and captures emissions from international commerce. The monitors in Chula Vista and downtown San Diego are designed to measure community exposure. The three monitors are located in areas where the highest SO_2 concentrations are expected to occur.

FIGURE 21
San Diego Air Basin SO_2 1-hour Design Values



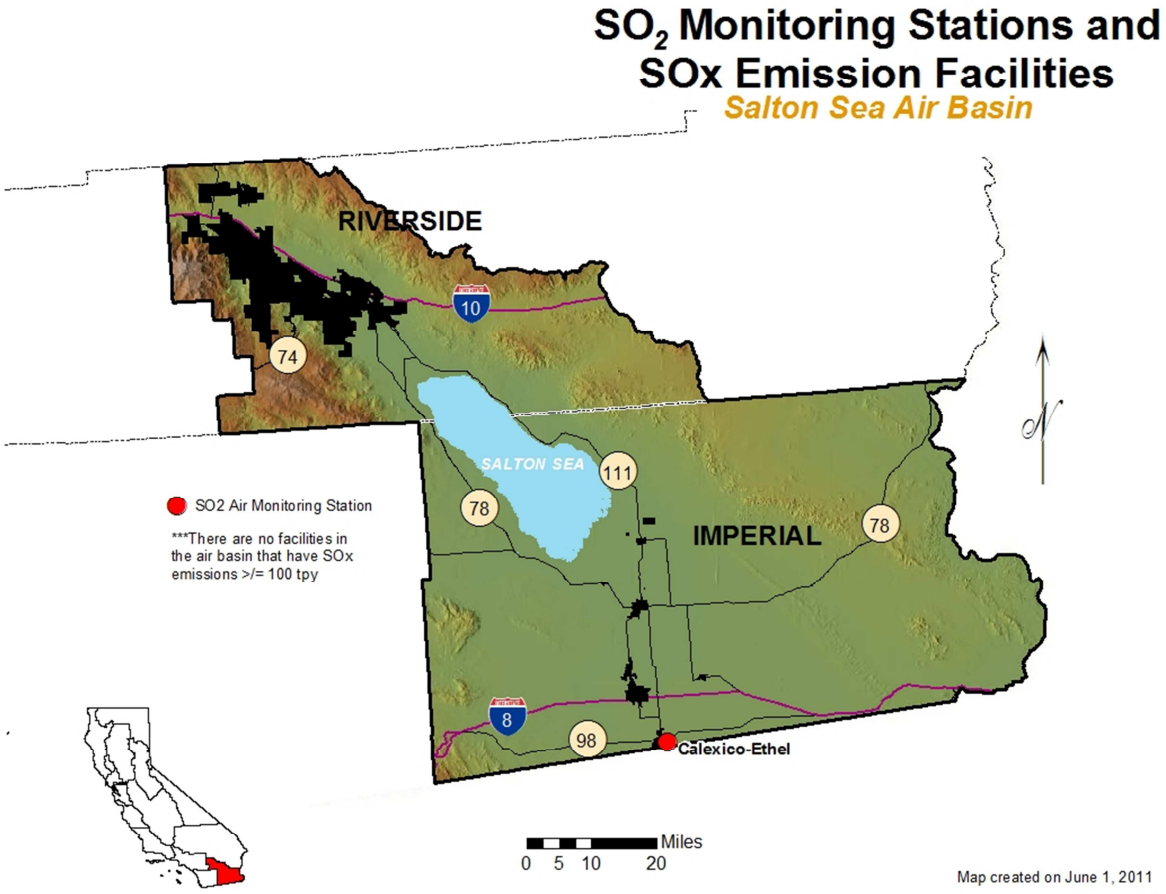
Salton Sea Air Basin

Nature of the Region

The Salton Sea Air Basin (SSAB) is composed of the central portion of Riverside County (Coachella Valley) and Imperial County. The Coachella Valley extends southeast from the San Bernardino Mountains to the Salton Sea, the largest saltwater lake in California. The Riverside County portion of the SSAB is separated from the South Coast Air Basin on the west by the San Jacinto Mountains and the Santa Rosa Mountains and from the Mojave Desert Air Basin to the east by the Little San Bernardino Mountains. Imperial County borders Mexico to the south. The SSAB has a population of approximately 650,000.

The mountain peaks range from 3,000 to 11,000 feet in elevation, and prevent off-shore winds from flowing into the Coachella Valley and Imperial County. During the summer, high temperatures in the SSAB frequently exceed 100 degrees Fahrenheit. In the winter, daytime temperatures are generally over 70 degrees. The SSAB averages between three and seven inches of precipitation per year.

FIGURE 22



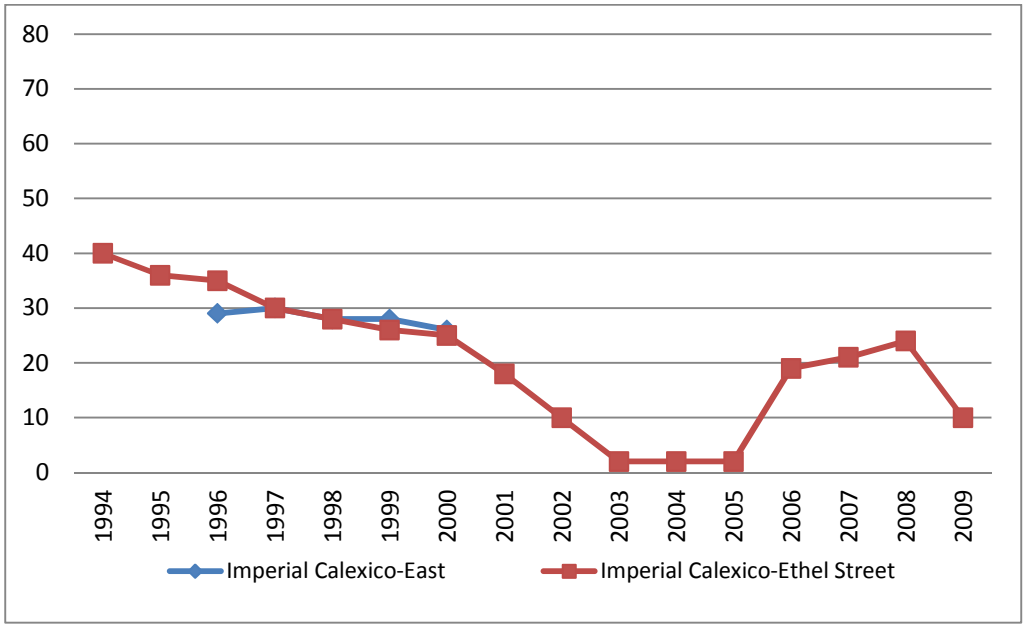
Emissions

There are no facilities located in the Salton Sea Air Basin with SO_x emissions greater than 100 tons per year. The largest facility in the basin is the Palm Springs International Airport. Emissions from all facilities combined totaled 124 tpy in 2008. All other sources of emissions in the SSAB totaled 270 tpy in 2008, down from 590 tpy in 1998, a reduction of over 50 percent. The largest SO_x sources are trains, fuel combustion and residential burning.

Air Quality Trends

Based on data for record, the Salton Sea Air Basin attains the revised federal SO_2 standard, with a 2009 design value of 10 ppb. Current monitoring is conducted at the Imperial Calexico site. Historic data is also available from the Riverside-Palm Springs Fire Station. No monitor in the SSAB has ever come close to the level of the standard since monitoring began in 1980.

FIGURE 23
Salton Sea Air Basin SO_2 1-hour Design Values



North Central Coast Air Basin

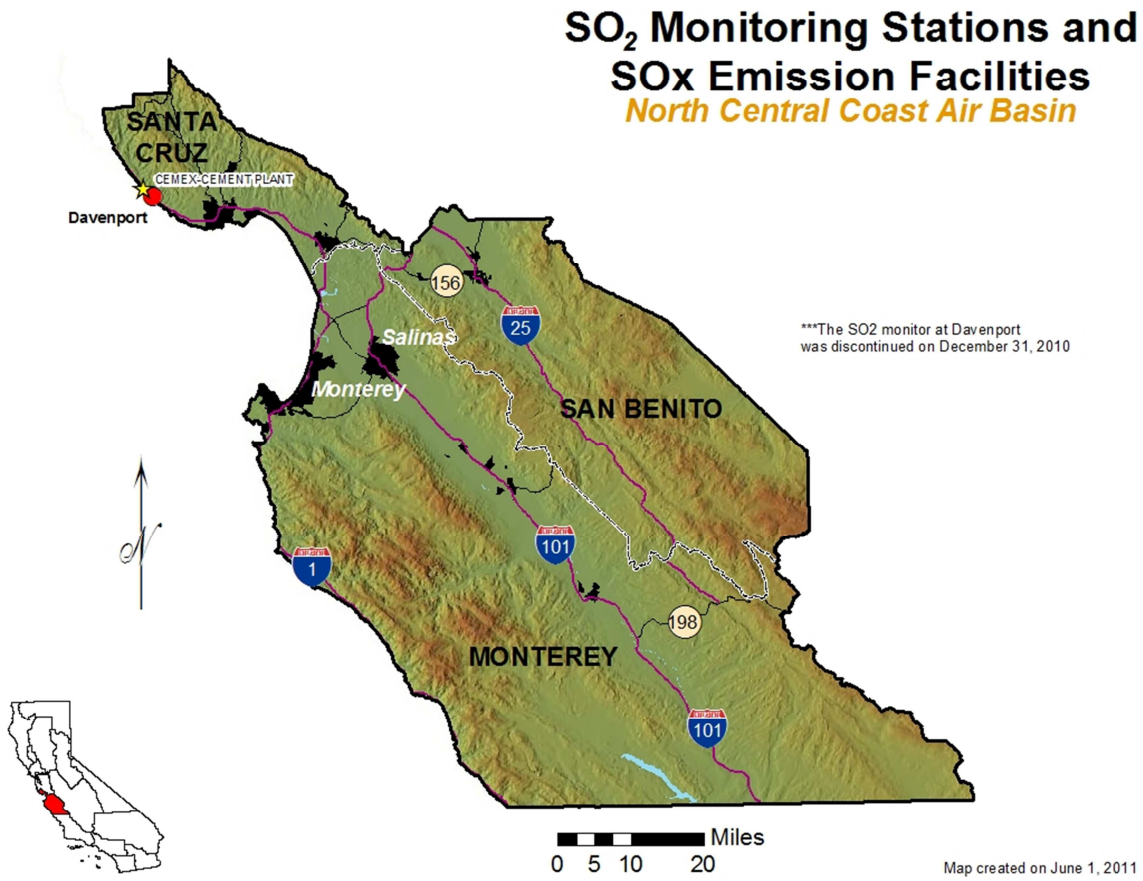
Nature of the Region

The North Central Coast Air Basin (NCCAB) consists of Santa Cruz, San Benito, and Monterey Counties. It covers an area of 5,159 square miles along the coast, and has a

population of over 750,000. The Santa Cruz Mountains dominate the northwest portion of NCCAB, and the Diablo Range marks the northeastern boundary. The Santa Clara Valley extends into the northeastern tip of the basin. Further south, the Santa Clara Valley becomes the San Benito Valley, which runs northwest-southeast, with the Gabilan Range as its western boundary. To the west of the Gabilan Range is the Salinas Valley, which extends from Salinas at the northwest end to south of King City.

In the summer, a high-pressure system over the Pacific Ocean is dominant and causes persistent west and northwest winds over the entire California coast. The onshore wind brings fog and relatively cool air into the coastal valleys. The northwest-southeast orientation of the mountain ridges tends to restrict and channel the summer onshore air. In the fall, the surface winds become weak. The airflow is occasionally reversed in a weak offshore movement and the relatively stationary air mass is held in place. During the winter, the Pacific high-pressure system moves south and has less influence on the NCCAB. Air frequently flows in a southeasterly direction out of the Salinas and San Benito Valleys, especially during night and morning hours.

FIGURE 24



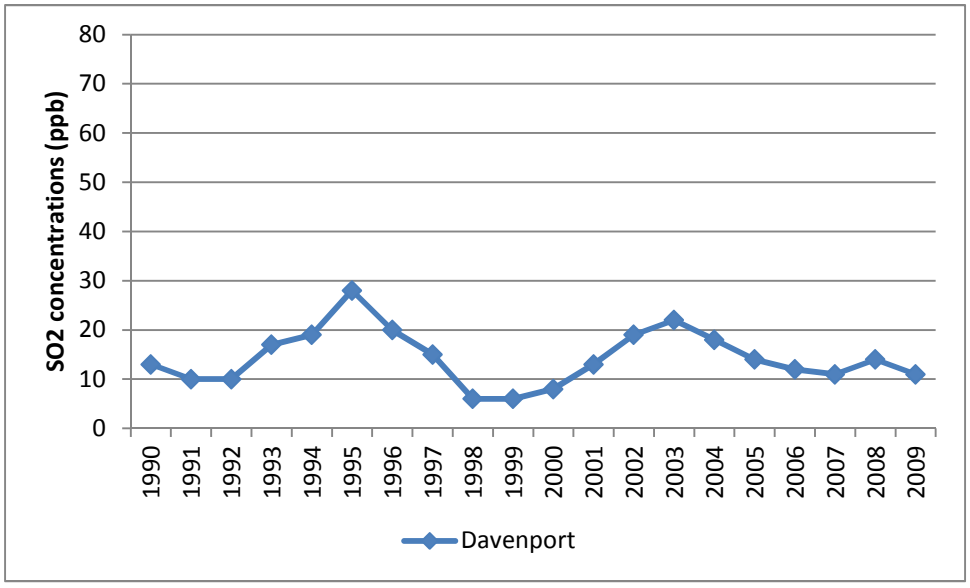
Emissions

As of 2009, there are no facilities in the NCCAB with SO_x emissions greater than 100 tons per year. Prior to 2009, the Cemex Cement Plant, operated in Davenport, had SO_x emissions of 179 tpy. The Cemex Cement Plant closed at the end of 2008, and the permit to operate was forfeited. In 2008, SO_x emissions from all facilities totaled 261 tpy. In 2009, the total emissions dropped to just 69 tpy, due to the closure of the Cemex facility. SO_x emissions from all sources in NCCAB totaled 908 tpy in 2008, down from 967 tpy in 1998, a 6% reduction.

Air Quality Trends

Based on available data for record from 2007 to September 2009, the NCCAB attains the revised federal SO_2 standard with a design value of 11 ppb. The air basin had only one SO_2 monitor in operation, located in the town of Davenport. After the closure of the Cemex Cement Plant, the Davenport monitor was shut down at the end of September 2009. The design value is not considered complete under U.S. EPA criteria because data from October through December 2009 are missing. However, even with the Cemex Plant in operation, design values were generally in the 10 – 20 ppb range over a period of 20 years, never exceeding 30 ppb. With the closure of the Cemex Plant, we expect the design value will remain well below the level of the revised standard.

FIGURE 25
North Central Coast SO_2 1-hour Design Values



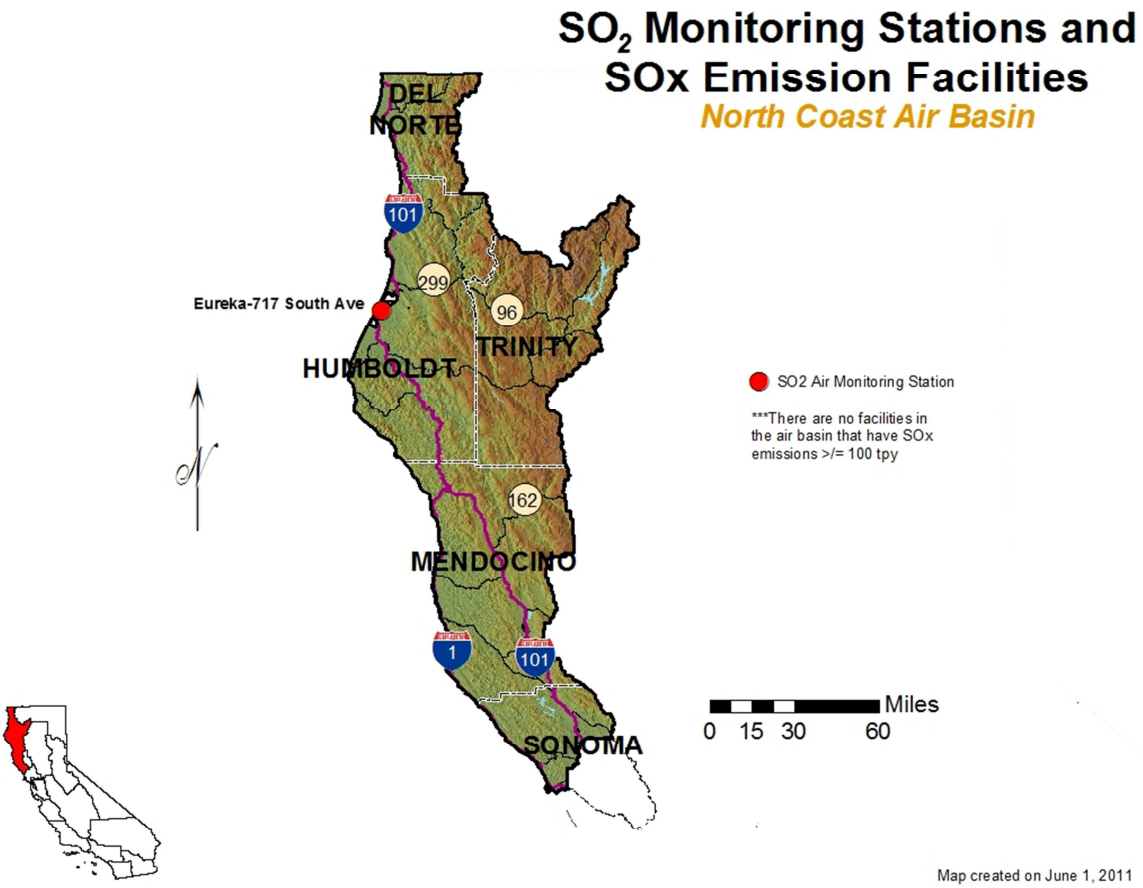
North Coast Air Basin

Nature of the Region

The North Coast Air Basin (NCAB) includes the counties of Del Norte, Humboldt, Trinity, Mendocino, and the northern portion of Sonoma County. It has a land area of more than 12,000 square miles, and a population of approximately 330,000.

In general, the climate of the North Coast is characterized by cool summers with frequent fog and mild winters with lots of rain. In coastal areas, the ocean helps to moderate temperatures year-round. Further inland, the summers are hotter and drier and the winters colder and more snowy. At higher elevations in inland areas, it is cooler in the summers and snowier in the winter. In the summer months strong northwesterly winds are common. During the winter, storms from the south Pacific lead to winds from the south.

FIGURE 26



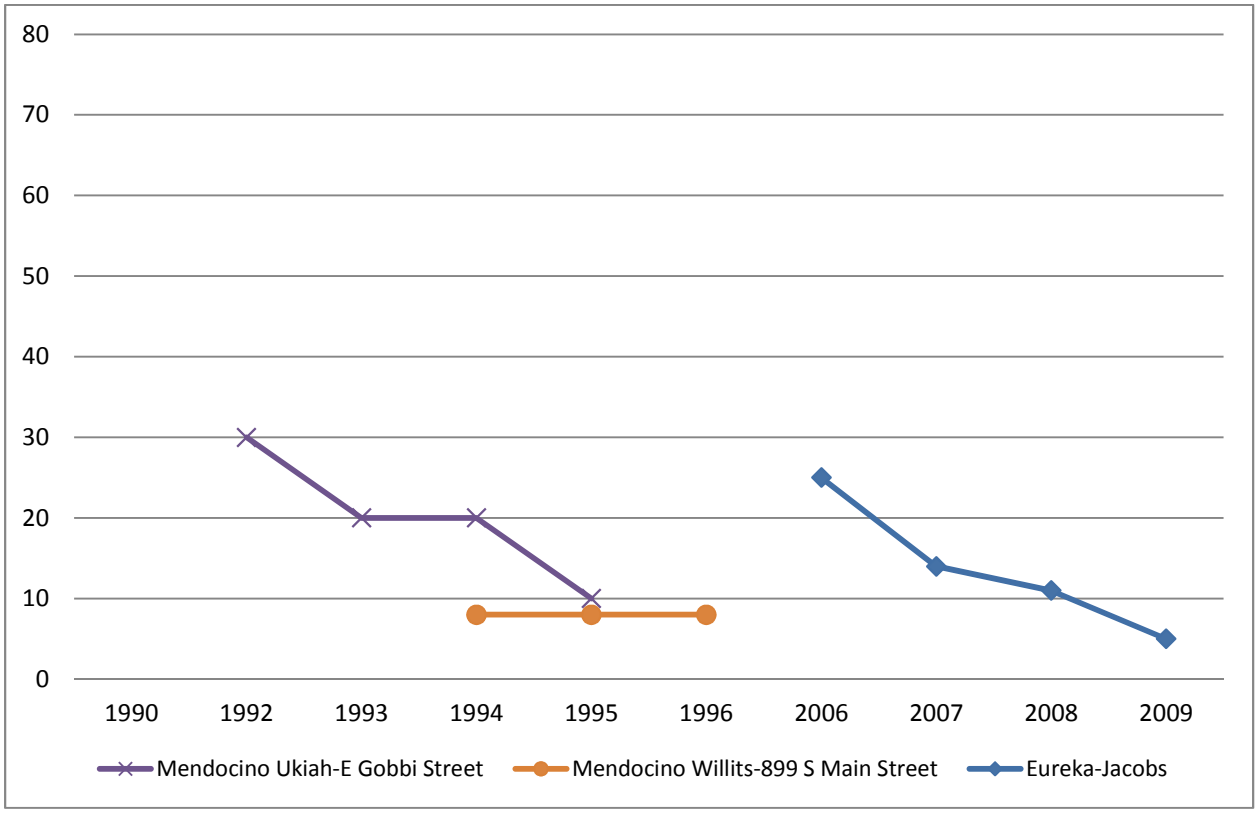
Emissions

There are no facilities in the NCAB with SO_x emissions greater than 100 tons per year. Emissions from all facilities in NCAB totaled 140 tpy in 2008. SO_x emissions from all sources in NCAB totaled 558 tpy in 2008, down from 615 tpy in 1998, a reduction of almost 10%. The largest sources of SO_x emissions are residential burning and fuel combustion.

Air Quality Trends

Based on data for record, the NCAB attains the revised federal SO_2 standard, with a 2009 design value of 5 ppb, down from 25 ppb in 2006. Monitoring for SO_2 in the NCAB is currently conducted at the Eureka-Jacobs site. Historic data is available from Eureka-Fort Avenue from 1981-1983, Ukiah-Gobbi Street from 1992-1995, Ukiah-Highway 101 from 1988-1990, and Willits-S Main Street from 1994-1996. Design values at these sites have never been near the level of the revised standard. The highest design value in the NCAB was 30 ppb at the Ukiah-Highway 101 site in Mendocino in 1992.

FIGURE 27
North Coast 1-hour SO_2 Design Values



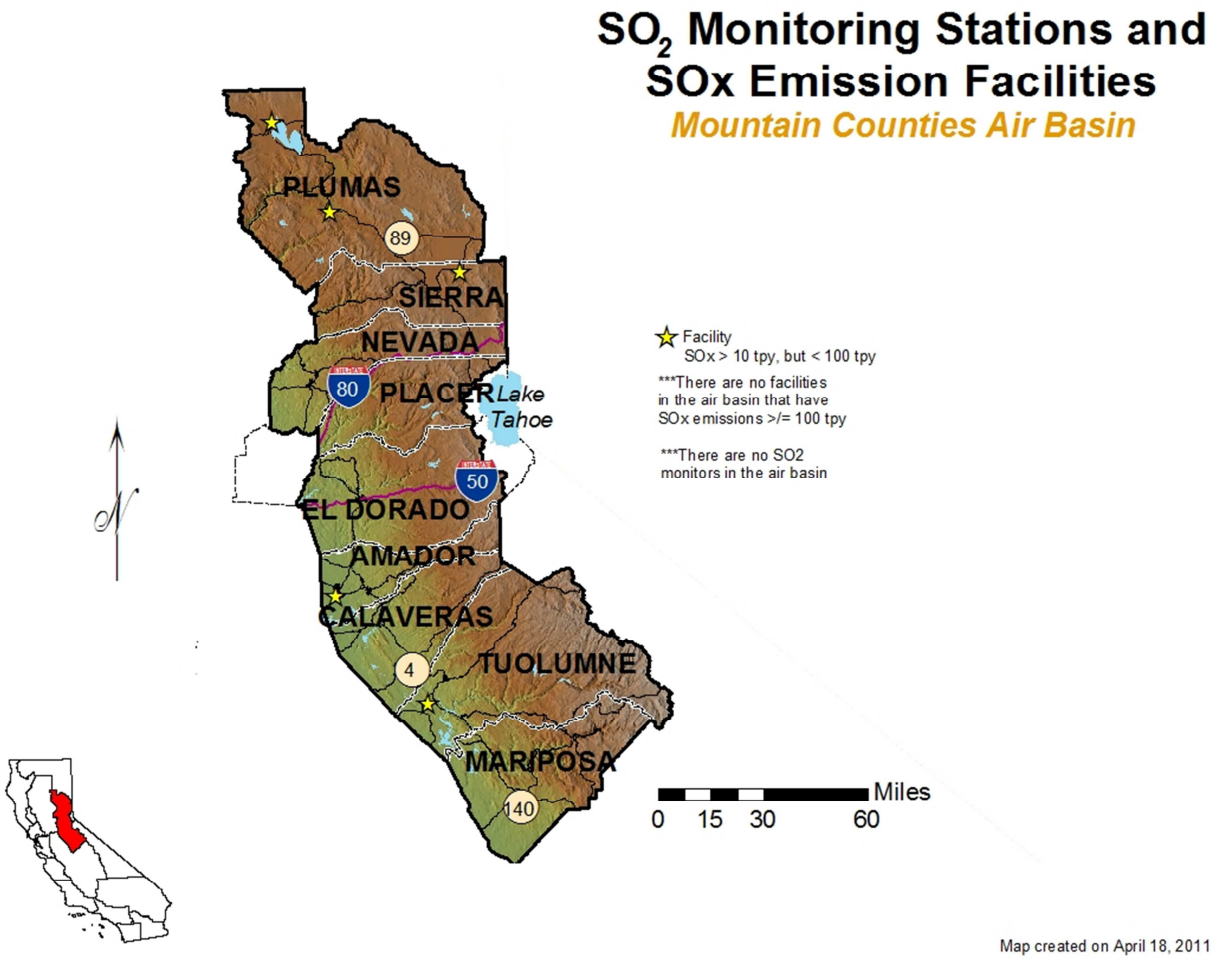
Mountain Counties Air Basin

Nature of the Region

The Mountain Counties Air Basin (MCAB) includes Plumas, Sierra, Nevada, Placer (middle portion), El Dorado (western portion), Amador, Calaveras, Tuolumne, and Mariposa Counties. The basin lies along the northern Sierra Nevada Mountain Range, close to or contiguous with the Nevada border, and covers an area of roughly 11,000 square miles. The population of the entire air basin is less than 500,000. The western slope of El Dorado County, from Lake Tahoe on the east to the Sacramento County boundary on the west, lies within the MCAB. Elevations range from over 10,000 feet at the Sierra crest down to several hundred feet above sea level at the Sacramento County boundary. Throughout the basin, the topography is highly variable, and includes rugged mountain peaks and valleys with extreme slopes and differences in elevation in the Sierras, as well as rolling foothills to the west.

The general climate of the MCAB varies considerably with elevation and proximity to the Sierra ridge. The terrain features of the basin make it possible for various climates to exist in relatively close proximity. The Sierra Nevada receives large amounts of precipitation in the winter, with lighter amounts in the summer. Precipitation levels are high in the highest mountain elevations but decline rapidly toward the western portion of the basin. Winter temperatures in the mountains can be below freezing for weeks at a time, and substantial depths of snow can accumulate, but in the western foothills, winter temperatures usually dip below freezing only at night and precipitation is mixed as rain or light snow. In the summer, temperatures in the mountains are mild, with daytime peaks in the 70s to low 80s, but the western end of the basin can routinely exceed 100 degrees.

FIGURE 28



Emissions

There are no facilities in the MCAB with SO_x emissions greater than 100 tons per year. Total SO_x emissions from all facilities totaled 162 tpy in 2008. The largest contribution to SO_x emissions are from residential and managed burning, trains, and cogeneration plants. Total emissions in MCAB in 2008 were 858 tpy, down from 1555 tpy in 1998, a 45% reduction.

Air Quality Trends

Currently, no SO_2 monitors exist in MCAB. One monitor, San Andreas-Gold Strike Road, operated from 1980-1982. The design value at that time was 10 ppb. Due to the low SO_x emissions throughout the MCAB, we conclude that the area would not exceed the level of the standard.

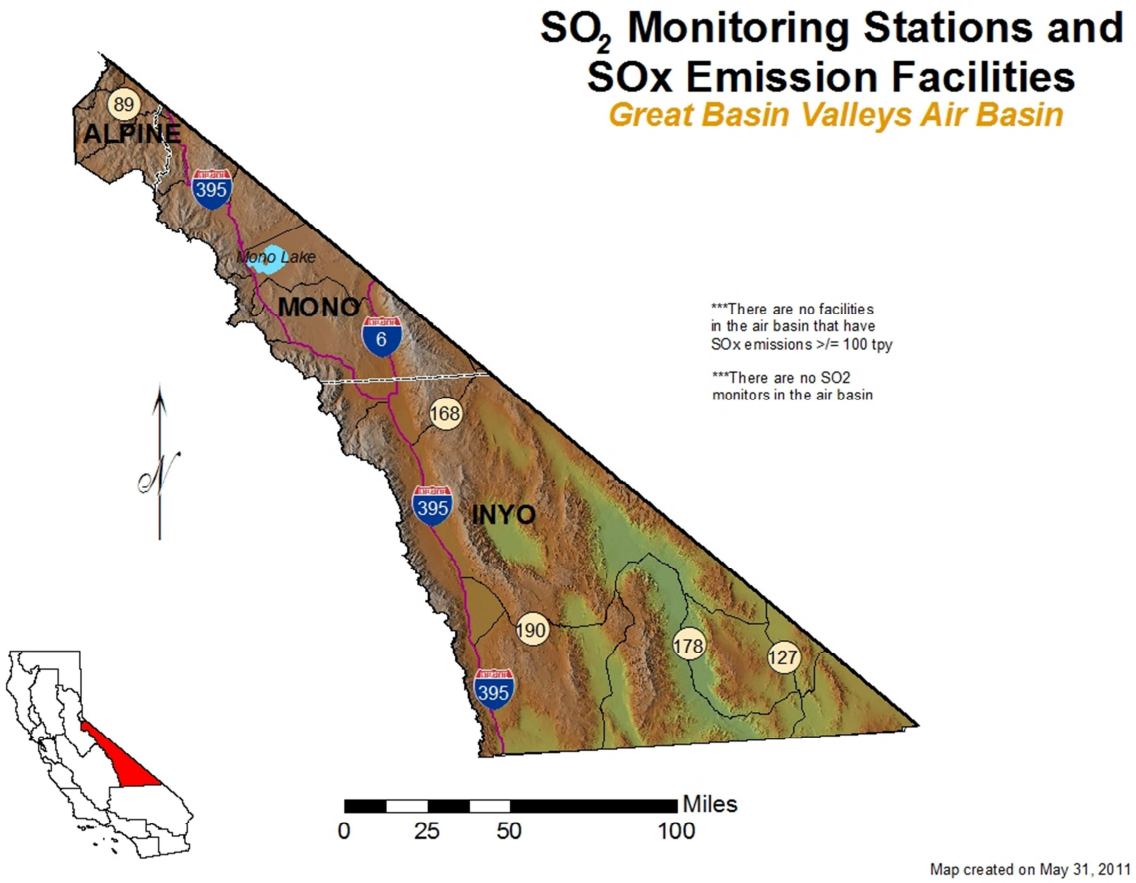
Great Basin Valleys Air Basin

Nature of the Region

The Great Basin Valleys Air Basin (GBVAB) includes Inyo, Mono and Alpine Counties. This basin is bounded on the west by the Sierra Nevada Mountains, on the east by the Nevada border, and on the south by the desert. As the transition from the Great Basin Valleys to the desert is somewhat indistinct, the Inyo-San Bernardino County line has been chosen as the basin boundary.

The population in the GBVAB is approximately 35,000, approximately 2 people per square mile. Much of the land area is open desert. The land use varies from riparian areas along the Owens River to light industry, small commercial and residential in the City of Bishop (population 4,000). The topography varies from high desert to mountain peaks.

FIGURE 29



Emissions

There are no facilities in the Great Basin Valleys Air Basin with SO_x emissions greater than 100 tons per year. SO_x emissions from all facilities in 2008 were just 32 tpy. The largest contributors of SO_x emissions in GBVAB are managed burning and fuel combustion. Emissions from all sources totaled 263 tpy in 2008, down from 375 tpy in 1998, a 30% reduction.

Air Quality Trends

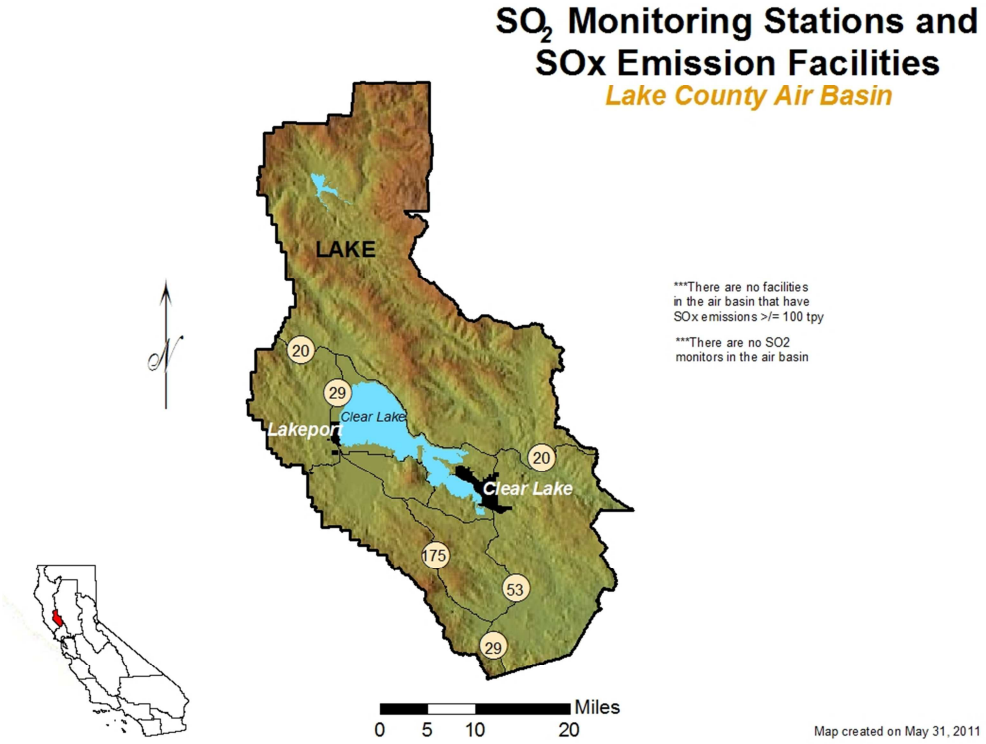
There is no monitoring data available for GBVAB. However, due to the very low SO_x emissions throughout the GBVAB, we conclude that the area would not exceed the level of the standard.

Lake County Air Basin

Nature of the Region

Lake County Air Basin (LCAB) consists of only Lake County. It is located inland from the Pacific Ocean, north of the San Francisco Bay Area, covers an area of 1,327 square miles and has a population of nearly 65,000. The highest peak in LCAB is Snow Mountain at 7,056 feet in the wilderness area of the Mendocino National Forest. LCAB has just two incorporated cities, Clearlake and Lakeport, surrounded by several smaller communities.

FIGURE 30



Emissions

There are no facilities in LCAB with SO_x emissions greater than 100 tons per year. All facilities in LCAB combined emit just 34 tpy SO_x in 2008. The largest contributors of SO_x emissions are agriculture production and processing and residential burning. The total emissions from all sources in LCAB were 153 tpy in 2008, down from 168 tpy in 1998, a 9% reduction.

Air Quality Trends

There is no monitoring data available for LCAB. However, due to the very low SO_x emissions throughout the LCAB, we conclude that the area would not exceed the level of the standard.

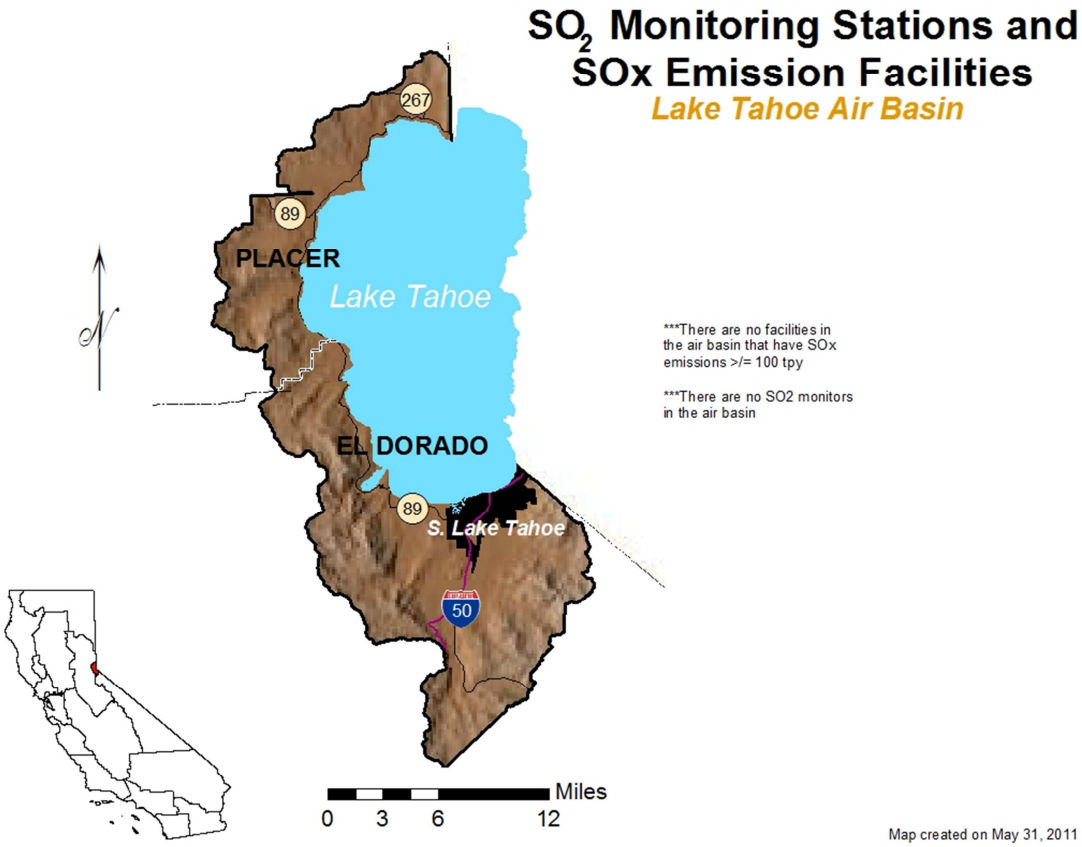
Lake Tahoe Air Basin

Nature of the Region

The Lake Tahoe Air Basin (LTAB) is comprised of the surface of Lake Tahoe (roughly 20 miles long by 10 miles wide) and land up to the surrounding rim of mountain ridges. The southern portion of the air basin is in El Dorado County and the northern portion is in Placer County. The basin has a population of less than 60,000. The lake is at 6,200 feet elevation, and the ridges climb to over 10,000 feet. The mountain slopes surrounding the lake are quite precipitous, and are broken by deep valleys carved by streams that drain into the lake.

The meteorology of the LTAB in winter is typified by large amounts of precipitation from Pacific storms that fall mainly as snow, and temperatures below freezing accompanied by winds, cloudiness, and lake and valley fog. Winter days can also bring cool, brilliantly clear days between storms. In the summer, the LTAB experiences sunny, mild days, with daytime peaks in the upper 70s and low 80s, with an occasional thunderstorm from southern flows of moisture.

FIGURE 31



Emissions

There are no facilities in the Lake Tahoe Air Basin with SO_x emissions greater than 100 tons per year. There are virtually no SO_x facility emissions, just over 1 tpy in the entire basin. The largest contribution of SO_x emissions is from residential burning and airplanes. In 2008, SO_x emissions totaled 40 tpy, down from 44 tpy in 1998, a 9% reduction.

Air Quality Trends

There is no monitoring data available for LTAB. However, due to the very low SO_x emissions throughout the LTAB, we conclude that the area would not exceed the level of the standard.

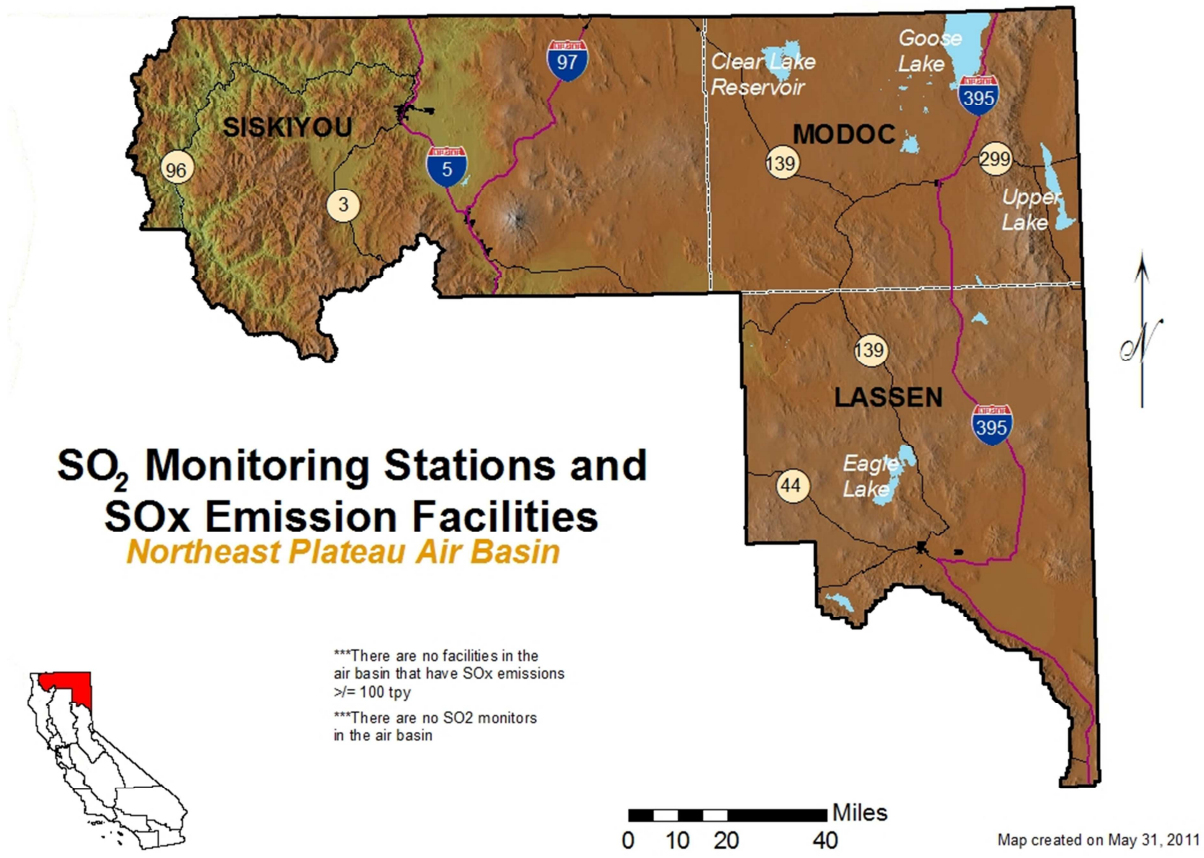
Northeast Plateau Air Basin

Nature of the Region

The Northeast Plateau Air Basin (NEPAB) is located in the northeast corner of California and includes Lassen, Modoc, and Siskiyou Counties. The northern part of NEPAB has lofty volcanic peaks, such as Mount Shasta and Mount Lassen. Forested mountains dominate the southern and western regions. The NEPAB covers approximately 14,788 square miles and is bordered by the states of Oregon to the north and Nevada to the east. NEPAB's population of nearly 95,000 predominately resides in rural towns, including Yreka, Mount Shasta, Alturas, and Susanville.

The climate is dry, cool, and windy. The area is separated from the rest of the State by the Cascade Mountains to a degree that permits very little air movement to or from other regions in the State.

FIGURE 32



Emissions

There are no facilities in the NEPAB with SO_x emissions greater than 100 tons per year. All facilities combined emitted just 45 tpy in 2008. Emissions from all sources in NEPAB totaled 215 tpy in 2008, down from 533 tpy in 1998, a nearly 60% reduction. The largest sources of emissions are from trains and residential burning.

Air Quality Trends

There is no monitoring data available for NEPAB. However, due to the very low SO_x emissions throughout the NEPAB, we conclude that the area would not exceed the level of the standard.

Summary

ARB staff has evaluated the five factors recommended by U.S. EPA for purposes of determining the appropriate attainment status and boundaries: air quality data, emissions data, meteorology, geography/topography, and jurisdictional boundaries. Based on this five factor analysis, the above mentioned air basins should be designated as attainment areas for the federal 1- hour SO_2 standard. This recommendation is based on the following weight of evidence:

- There are no stationary source facilities in these areas with SO_2 emissions greater than 100 tons per year.

- ARB maintains a statewide monitoring network, with monitoring sites in the areas with the highest expected SO_x emissions. All design values in areas with monitors are well below the standard; areas without monitors have significantly lower SO_x emissions. Therefore, we conclude that areas without monitors would also attain the standard.

- Stringent statewide SO_2 control measures will reduce emissions from sources including diesel fuel, locomotives, and shipping.

- There are no specific meteorological or topographical factors which would warrant different boundaries for the attainment areas.

APPENDIX 2

2009 SO2 1-HOUR DESIGN VALUES FOR ALL SITES IN CALIFORNIA

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APPENDIX 2: 2009 SO2 1-Hour Federal Design Values[1]

Basin	County	Site Name	SO2 1-hr Fed DV (ppb)
Mojave Desert	San Bernardino	Trona-Athol and Telegraph	10
		Victorville-14306 Park Avenue	6
North Coast	Humboldt	Eureka-Jacobs	5
North Central Coast	Santa Cruz	Davenport	11*
South Coast	Los Angeles	Burbank-W Palm Avenue	8*
		Los Angeles-North Main Street	7
		Los Angeles-Westchester Parkway	15*
		North Long Beach	20
	Orange	Costa Mesa-Mesa Verde Drive	7
	Riverside	Riverside-Rubidoux	7
	San Bernardino	Fontana-Arrow Highway	6
South Central Coast	San Luis Obispo	Nipomo-Guadalupe Road	35
	Santa Barbara	El Capitan Beach	4
		Exxon Site 10-UCSB West Campus	4
		Goleta-Fairview	3*
		Las Flores Canyon #1	6
		Lompoc-HSandP	2
		Lompoc-S H Street	4
		Vandenberg Air Force Base-STS Power	3
San Diego	San Diego	Chula Vista	7
		Otay Mesa-Paseo International	22*
		San Diego-1110 Beardsley Street	17
San Francisco Bay Area	Alameda	Berkeley-6th Street	12*
		Oakland-West	13*
	Contra Costa	Bethel Island Road	8
		Concord-2975 Treat Blvd	14
		Crockett-Kendall Avenue	25
		Martinez-Jones Street	18
		Pittsburg-10th Street	20*
		Richmond-7th Street	18
		San Pablo-Rumrill Blvd	14*
	San Francisco	San Francisco-Arkansas Street	15*
	Santa Clara	San Jose-Jackson Street	5*
	Solano	Benicia-East 2nd Street	26*
		Vallejo-304 Tuolumne Street	8
San Joaquin Valley	Fresno	Fresno-1st Street	9*
Salton Sea	Imperial	Calexico-Ethel Street	10
Sacramento Valley	Sacramento	North Highlands-Blackfoot Way	4*
		Sacramento-Del Paso Manor	4*

[1] Data were extracted on 11/23/2010 from AQMIS Merged. The 2009 SO2 1-hour Federal Design Values were calculated based on the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations (2007, 2008, 2009). The Federal 1-hour SO2 standard is 75 ppb and was effective August 23, 2010. All SO2 1-hour Federal Design Values in California are below the standard of 75 ppb.

** Sites do not meet the EPA's data completeness criteria. No monitoring data are available for the following air basins: Great Basin Valleys, Lake County, Lake Tahoe, Mountain Counties, Northeast Plateau.*

Enclosure 2

California SO_2 Attainment Area Boundary Descriptions

North Coast Basin

a) All of Del Norte County
b) All of Humboldt County
c) All of Mendocino County
d) All of Trinity County
e) That portion of Sonoma County which lies north and west of a line described as follows:

Beginning at the southeasterly corner of the Rancho Estero Americano, being on the boundary line between Marin and Sonoma Counties, California; thence running northerly along the easterly boundary line of said Rancho Estero Americano to the northeasterly corner thereof, being an angle corner in the westerly boundary line of Rancho Canada de Jonive; thence running along said boundary of Rancho Canada de Jonive westerly, northerly and easterly to its intersection with the easterly line of Graton Road; thence running along the easterly and southerly line of Graton Road, northerly and easterly to its intersection with the easterly line of Sullivan Road; thence running northerly along said easterly line of Sullivan Road to the southerly line of Green Valley Road; thence running easterly along the said southerly line of Green Valley Road and easterly along the southerly line of State Highway 116, to the westerly line of Vine Hill Road; thence running along the westerly and northerly line of Vine Hill Road, northerly and easterly to its intersection with the westerly line of Laguna Road; thence running northerly along the westerly line of Laguna Road and the northerly projection thereof to the northerly line of Trenton Road; thence running westerly along the northerly line of said Trenton Road to the easterly line of Trenton-Healdsburg Road; thence running northerly along said easterly line of Trenton-Healdsburg Road to the easterly line of Eastside Road; thence running northerly along said easterly line of Eastside Road to its intersection with the southerly line of Rancho Sotoyome; thence running easterly along said southerly line of Rancho Sotoyome to its intersection with the Township line common to Townships 8 and 9 North, M.D.M.; thence running easterly along said township line to its intersection with the boundary line between Sonoma and Napa Counties, State of California.

Enclosure 2

California SO_2 Attainment Area Boundary Descriptions

San Francisco Bay Area Basin

a) That portion of Sonoma County which lies south and east of a line described as follows:

   Beginning at the southeasterly corner of the Rancho Estero Americano, being on the boundary line between Marin and Sonoma Counties, California; thence running northerly along the easterly boundary line of said Rancho Estero Americano to the northeasterly corner thereof, being an angle corner in the westerly boundary line of Rancho Canada de Jonive; thence running along said boundary of Rancho Canada de Jonive westerly, northerly and easterly to its intersection with the easterly line of Graton Road; thence running along the easterly and southerly line of Graton Road, northerly and easterly to its intersection with the easterly line of Sullivan Road; thence running northerly along said easterly line of Sullivan Road to the southerly line of Green Valley Road; thence running easterly along the said southerly line of Green Valley Road and easterly along the southerly line of State Highway 116, to the westerly line of Vine Hill Road; thence running along the westerly and northerly line of Vine Hill Road, northerly and easterly to its intersection with the westerly line of Laguna Road; thence running northerly along the westerly line of Laguna Road and the northerly projection thereof to the northerly line of Trenton Road; thence running westerly along the northerly line of said Trenton Road to the easterly line of Trenton-Healdsburg Road; thence running northerly along said easterly line of Trenton-Healdsburg Road to the easterly line of Eastside Road; thence running northerly along said easterly line of Eastside Road to its intersection with the southerly line of Rancho Sotoyome; thence running easterly along said southerly line of Rancho Sotoyome to its intersection with the Township line common to Townships 8 and 9 North, M.D.M.; thence running easterly along said township line to its intersection with the boundary line between Sonoma and Napa Counties, State of California.

b) All of Napa County

c) That portion of Solano County which lies south and west of a line described as follows:

   Beginning at the intersection of the westerly boundary of Solano County and the 1/4 section line running east and west through the center of Section 34, T6N, R2W, M.D.B. & M., thence east along said 1/4 section line to the east boundary

of Section 36, T6N, R2W, thence south 1/2 mile and east 2.0 miles, more or less, along the west and south boundary of Los Putos Rancho to the northwest corner of Section 4, T5N, R1W, thence east along a line common to T5N and T6N to the northeast corner of Section 3, T5N, R1E, thence south along section lines to the southeast corner of Section 10, T3N, R1E, thence east along section lines to the south 1/4 corner of Section 8, T3N, R2E, thence east to the boundary between Solano and Sacramento Counties.

d) All of Contra Costa County
e) All of Alameda County
f) All of Santa Clara County
g) All of San Mateo County
h) All of San Francisco County
i) All of Marin County

North Central Coast Basin

a) All of Santa Cruz County
b) All of San Benito County
c) All of Monterey County

South Central Coast Basin

a) All of San Luis Obispo County
b) All of Santa Barbara County
c) All of Ventura County

South Coast Air Basin

a) All of Orange County
b) That portion of Riverside County which lies west of a line described as follows:

Beginning at the Riverside-San Diego County boundary and running north along the range line common to R. 4 E and R. 3 E; then east along the township line

common to T. 8 S and T. 7 S; then north along the range line common to R. 5 E and R. 4 E; then west along the township line common to T. 6 S and T. 7 S to the southwest corner of Section 34, T. 6 S, R. 4 E; then north along the west boundaries of Sections 34, 27, 22, 15, 10, 3, T. 6 S, R. 4 E; then west along the township line common to T. 5 S and T. 6 S; then north along the range line common to R. 4 E and R. 3 E; then west along the south boundaries of Sections 13, 14, 15, 16, 17 and 18, T. 5 S. R. 3 E; then north along the range line common to R. 2 E and R. 3 E to the Riverside-San Bernardino County line.

c) That portion of San Bernardino County west and south of a line described as follows:

Beginning at the San Bernardino-Riverside County boundary and running north along the range line common to R. 3 E and R. 2 E; then west along the township line common to T. 3 N and T. 2 N to the San Bernardino-Los Angeles County boundary.

d) That portion of Los Angeles County which lies south and west of a line described as follows:

Beginning at the Los Angeles-San Bernardino County boundary and running west along the township line common to T.3 N and T.2 N, San Bernardino Base and Meridian; then north along the range line common to R.8 W and R.9 W; then west along the township line common to T.4 N and T.3 N; then north along the range line common to R.12 W and R.13 W to the southeast corner of Section 12, T.5 N, R. 13 W; then west along the south boundaries of Sections 12, 11, 10, 9, 8, 7, T.5 N, R. 13 W to the boundary of the Angeles National Forest which is collinear with the range line common to R. 13 W and R. 14 W; then north and west along the Angeles National Forest boundary to the point of intersection with the township line common to T.7 N and T. 6 N (point is at the northwest corner of Section 4 in T.6 N, R. 14 W); then west along the township line common to T.7 N and T.6 N; then north along the range line common to R. 15 W and R. 16 W to the southeast corner of Section 13, T.7 N, R. 16 W; then along the south boundaries of Sections 13, 14, 15, 16, 17, 18, T.7 N, R. 16 W; then north along the range line common to R.16 W and R. 17 W to the north boundary of the Angeles National Forest (collinear with township line common to T.8 N and T.7 N); then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then

west and north along this land grant boundary to the Los Angeles-Kern County boundary.

Northeast Plateau Basin

a) All of Modoc County
b) All of Lassen County
c) All of Siskiyou County

Sacramento Valley Basin

a) All of Tehama County
b) All of Glenn County
c) All of Butte County
d) All of Colusa County
e) All of Yolo County
f) All of Sutter County
g) All of Yuba County
h) All of Sacramento County
i) All of Shasta County.
j) That portion of Solano County which lies north and east of a line described as follows:

   Beginning at the intersection of the westerly boundary of Solano County and the 1/4 section line running east and west through the center of Section 34, T6N, R2W, M.D.B. & M., thence east along said 1/4 section line to the east boundary of Section 36, T6N, R2W, thence south 1/2 mile and east 2.0 miles, more or less, along the west and south boundary of Los Putos Rancho to the northwest corner of Section 4, T5N, R1W, thence east along a line common to T5N and T6N to the northeast corner of Section 3, T5N, R1E, thence south along section lines to the southeast corner of Section 10, T3N, R1E, thence east along section lines to the south 1/4 corner of Section 8, T3N, R2E, thence east to the boundary between Solano and Sacramento Counties.

k) That portion of Placer County which lies west of Range 9 east, M.D.B. & M.

Enclosure 2

California SO_2 Attainment Area Boundary Descriptions

San Joaquin Valley Basin

a) All of San Joaquin County
b) All of Stanislaus County
c) All of Merced County
d) All of Madera County
e) All of Fresno County
f) All of Kings County
g) All of Tulare County
h) That portion of Kern County which lies west and north of a line described as follows:

Beginning at the Kern-Los Angeles County boundary and running north and east along the northwest boundary of the Rancho La Libre Land Grant to the point of intersection with the range line common to R. 16 W. and R. 17 W., San Bernardino Base and Meridian; north along the range line to the point of intersection with the Rancho El Tejon Land Grant boundary; then southeast, northeast, and northwest along the boundary of the Rancho El Tejon Land Grant to the northwest corner of S. 3, T. 11 N., R. 17 W.; then west 1.2 miles; then north to the Rancho El Tejon Land Grant boundary; then northwest along the Rancho El Tejon line to the southeast corner of S. 34, T. 32 S., R. 30 E., Mount Diablo Base and Meridian; then north to the northwest corner of S. 35, T. 31 S., R. 30 E.; then northeast along the boundary of the Rancho El Tejon Land Grant to the southwest corner of S. 18, T. 31 S., R. 31 E.; then east to the southeast corner of S. 13, T. 31 S., R. 31 E.; then north along the range line common to R. 31 E. and R. 32 E., Mount Diablo Base and Meridian, to the northwest corner of S. 6, T. 29 S., R. 32 E.; then east to the southwest corner of S. 31, T. 28 S., R. 32 E.; then north along the range line common to R. 31 E. and R. 32 E. to the northwest corner of S. 6, T. 28 S., R. 32 E., then west to the southeast corner of S. 36, T. 27 S., R. 31 E., then north along the range line common to R. 31 E. and R. 32 E. to the Kern-Tulare County boundary.

Great Basin Valleys Basin

a) All of Alpine County
b) All of Mono County
c) All of Inyo County

Enclosure 2

California SO_2 Attainment Area Boundary Descriptions

Mojave Desert Air Basin

a) That portion of Riverside County which lies east of a line described as follows:

That segment of the southwestern boundary line of Hydrologic Unit Number 18100100 within Riverside County*, further described as follows:

Beginning at the Riverside-Imperial County boundary and running north along the range line common to R. 17 E. and R. 16 E., San Bernardino Base and Meridian; then northwest along the ridge line of the Chuckwalla Mountains, through T. 8 S., R. 16 E. and T. 7 S., R. 16 E., until the Black Butte Mountain, elev. 4504 '; then west and northwest along the ridge line to the southwest corner of T. 5 S., R. 14 E.; then north along the range line common to R. 14 E. and R. 13 E.; then west and northwest along the ridge line to Monument Mountain, elev. 4834 '; then southwest and then northwest along the ridge line of the Little San Bernardino Mountains to Quail Mountain, elev. 5814 '; then northwest along the ridge line to the Riverside-San Bernardino County line.

b) That portion of San Bernardino County east and north of a line described as follows:

Beginning at the San Bernardino-Riverside County boundary and running north along the range line common to R. 3 E and R. 2 E, San Bernardino Base and Meridian; then west along the township line common to T. 3 N and T. 2 N to the San Bernardino-Los Angeles County boundary.

c) That portion of Los Angeles County which lies north and east of a line described as follows:

Beginning at the Los Angeles-San Bernardino County boundary and running west along the township line common to T. 3 N and T. 2 N, San Bernardino Base and Meridian; then north along the range line common to R. 8 W and R. 9 W; then west along the township line common to T. 4 N and T. 3 N; then north along the range line common to R. 12 W and R. 13 W to the southeast corner of Section 12, T. 5 N, R. 13 W; then west along the south boundaries of Sections 12, 11, 10, 9, 8, 7, T. 5 N, R. 13 W to the boundary of the Angeles National Forest which is collinear with the range line common to R. 13 W and R. 14 W; then north and west along the Angeles National Forest boundary to the point of

intersection with the township line common to T. 7 N and T. 6 N (point is at the northwest corner of Section 4 in T. 6 N, R. 14 W); then west along the township line common to T. 7 N and T. 6 N; hen north along the range line common to R. 15 W and R. 16 W to the southeast corner of Section 13, T. 7 N, R. 16 W; then along the south boundaries of Sections 13, 14, 15, 16, 17, 18, T. 7 N, R. 16 W; then north along the range line common to R. 16 W and R. 17 W to the north boundary of the Angeles National Forest (collinear with township line common to T. 8 N and T. 7 N) then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then west and north along this land grant boundary to the Los Angeles-Kern County boundary.

d) That portion of Kern County east and south of a line described as follows:

Beginning at the Kern-Los Angeles County boundary and running north and east along the northwest boundary of the Rancho La Libre Land Grant to the point of intersection with the range line common to R. 16 W. and R. 17 W., San Bernardino Base and Meridian; north along the range line to the point of intersection with the Rancho El Tejon Land Grant boundary; then southeast, northeast, and northwest along the boundary of the Rancho El Tejon Land Grant to the northwest corner of S. 3, T. 11 N., R. 17 W.; then west 1.2 miles; then north to the Rancho El Tejon Land Grant boundary; then northwest along the Rancho El Tejon line to the southeast corner of S. 34, T. 32 S., R. 30 E., Mount Diablo Base and Meridian; then north to the northwest corner of S. 35, T. 31 S., R. 30 E.; then northeast along the boundary of the Rancho El Tejon Land Grant to the southwest corner of S. 18, T. 31 S., R. 31 E.; then east to the southeast corner of S. 13, T. 31 S., R. 31 E.; then north along the range line common to R. 31 E. and R. 32 E., Mount Diablo Base and Meridian, to the northwest corner of S. 6, T. 29 S., R. 32 E.; then est to the southwest corner of S. 31 T. 28 S., R. 32 E.; then north along the range line common to R. 31 E. and R. 32 E. to the northwest corner of S. 6, T. 28 S., R. 32 E., then west to the southeast corner of S. 36, T. 27 S., R. 31 E., then north along the range line common to R. 31 E. and R. 32 E. to the Kern-Tulare County boundary.

San Diego Air Basin

All of San Diego County.

Enclosure 2

California SO_2 Attainment Area Boundary Descriptions

Mountain Counties Air Basin

a) All of Plumas County
b) All of Sierra County
c) All of Nevada County
d) All of Amador County
e) All of Calaveras County
f) All of Tuolumne County
g) All of Mariposa County
h) All of El Dorado County except that portion included in the Lake Tahoe Air Basin, as defined in Section 60113(a).
i) All of Placer County except that portion included in the Lake Tahoe Air Basin, as defined in Section 60113(b), and that portion included in the Sacramento Valley Air Basin, as defined in Section 60106(k).

Lake County Air Basin

All of Lake County.

Lake Tahoe Air Basin

a) That portion of El Dorado County within the drainage area naturally tributary to Lake Tahoe including said Lake.

b) That portion of Placer County within the drainage area naturally tributary to Lake Tahoe including said Lake, plus that area in the vicinity of the head of the Truckee River described as follows: commencing at the point common to the aforementioned drainage area crestline and the line common to Townships 15 North and 16 North, M.D.B. & M., and following that line in a westerly direction to the northwest corner of Section 3, Township 15 North, Range 16 East, M.D.B. & M., thence south along the west line of Sections 3 and 10, Township 15 North, Range 16 East, M.D.B. & M., to the intersection with the said drainage area crestline, thence following the said drainage area boundary in a southeasterly, then northeasterly direction to and along the Lake Tahoe Dam, thence following the said drainage area crestline in a northeasterly, then northwesterly direction to

the point of beginning.

Salton Sea Air Basin

a) All of Imperial County
b) That portion of Riverside County which lies east of a line described as follows:

Beginning at the Riverside-San Diego County boundary and running north along the range line common to R. 4 E and R. 3 E; then east along the township line common to T. 8 S and T. 7 S; then north along the range line common to R. 5 E and R. 4 E; then west along the township line common to T. 6 S and T. 7 S to the southwest corner of Section 34, T. 6 S, R. 4 E; then north along the west boundaries of Sections 34, 27, 22, 15, 10, 3, T. 6 S, R. 4 E; then west along the township line common to T. 5 S and T. 6 S; then north along the range line common to R. 4 E and R. 3 E; then west along the south boundaries of Sections 13, 14, 15, 16, 17 and 18, T. 5 S. R. 3 E; then north along the range line common to R. 2 E and R. 3 E to the Riverside-San Bernardino County line;

and west of a line described as follows:

That segment of the southwestern boundary line of Hydrologic Unit Number 18100100 within Riverside County*, further described as follows:

Beginning at the Riverside-Imperial County boundary and running north along the range line common to R. 17 E. and R. 16 E., San Bernardino Base and Meridian; then northwest along the ridge line of the Chuckwalla Mountains, through T. 8 S., R. 16 E. and T. 7 S., R. 16 E., until the Black Butte Mountain, elev. 4504 '; then west and northwest along the ridge line to the southwest corner of T. 5 S., R. 14 E.; then north along the range line common to R. 14 E. and R. 13 E.; then west and northwest along the ridge line to Monument Mountain, elev. 4834 '; then southwest and then northwest along the ridge line of the Little San Bernardino Mountains to Quail Mountain, elev. 5814 '; then northwest along the ridge line to the Riverside-San Bernardino County line.

*Hydrologic Unit Map, 1978, State of California (Southern Half), Department of the Interior, Geological Survey, Reston, Virginia (Reprinted 1987), incorporated by reference herein.