
Chapter 4

Air Basin Trends and Forecasts -- Criteria Pollutants

Introduction

This chapter provides a look at emissions and air quality in California's five major air basins (data for individual counties are provided in Appendix A). Emissions data include past trends and projections of future emissions levels. These emissions data remain the same as presented in the previous edition of the Almanac and will be updated in the 2009 edition. The air quality statistics include values reflecting both the State and national ambient air quality standards. Below we will briefly discuss some of the statistics used to characterize ozone and PM air quality in this chapter.

In addition to maximum concentrations and number of days above the standards, the ozone statistics include the peak indicator and the three-year average of the 4th highest 8-hour concentration. The peak indicator represents the maximum concentration expected to be exceeded no more than once per year, on average, based on the distribution of data at a particular monitoring site. Because it is based on a robust statistical calculation using three years of data, the peak indicator is relatively stable and provides a trend indicator that is not highly influenced by year-to-year changes in weather. The 1-hour and 8-hour peak indicators are calculated from measured data and relate to State standards. In contrast, the three-year average of the 4th highest concentration is related to the national 8-hour ozone standard. (Please note that a different indicator was used for determining compliance with the national 1-hour ozone standard.) These statistics are reported for the end year of the three year period. For example, the 2006 peak indicator reflects data for the years 2004 through 2006.

The peak indicator and the three-year average of the 4th high are generally called "design values" and are the concentrations that are compared to the standard for the purpose of determining attainment status. However, values for these statistics that are included in this almanac may not satisfy data completeness requirements or the boundaries of a nonattainment area, which may differ from county or

air basin boundaries. Data conforming to the established design value requirements are available for the national 8-hour ozone standard on the web at www.arb.ca.gov/airqualitytoday under "recent year's ozone air quality." Furthermore, when evaluating these statistics, keep in mind that they represent data for a three-year period.

Some of the PM statistics included in this chapter also relate to the State and national standards and differ from one another because the requirements of the standards are different. For example, there is a maximum 24-hour PM_{2.5} concentration listed for State purposes and another for national purposes. During some years or in some areas the two numbers may differ. These differences occur because the monitors acceptable for the two standards are different. The situation is similar for the State and national annual average. Both reflect a summary statistic based on one year of data. However in this case, both the acceptable monitors and the calculation methods differ. Finally, it is important to note that air quality statistics based on a single year of data (for example, the yearly count of days above the standard) can fluctuate from year-to-year because of variations in weather. As a result, this almanac compares three-year averages when characterizing the percentage increase or decrease in days above the standard. In this case, the number of exceedance days for 1987 (which represents an average of 1985, 1986, and 1987) is then compared to the 2006 value (which represents an average of 2004, 2005, and 2006), giving a much more stable indicator of long-term progress.

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South Coast Air Basin

Introduction - Area Description

The South Coast Air Basin 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, is home to more than 43 percent of California's population, and generates about 29 percent of the State's total criteria pollutant emissions.

The South Coast Air Basin generally forms a lowland plain, bounded by the Pacific Ocean on the west and by mountains on the other three sides. In terms of air pollution potential, there are probably few areas less suited for urban development. The warm sunny weather associated with a persistent high pressure system is conducive to the formation of ozone, commonly referred to as "smog." The problem is further aggravated by the surrounding mountains, frequent low inversion heights, and stagnant air conditions. All of these factors act together to trap pollutants in the air basin.

Pollutant concentrations in parts of the South Coast Air Basin are among the highest in the nation. As a result, controlling the contributing emission sources poses a great challenge to State and local air pollution control agencies.

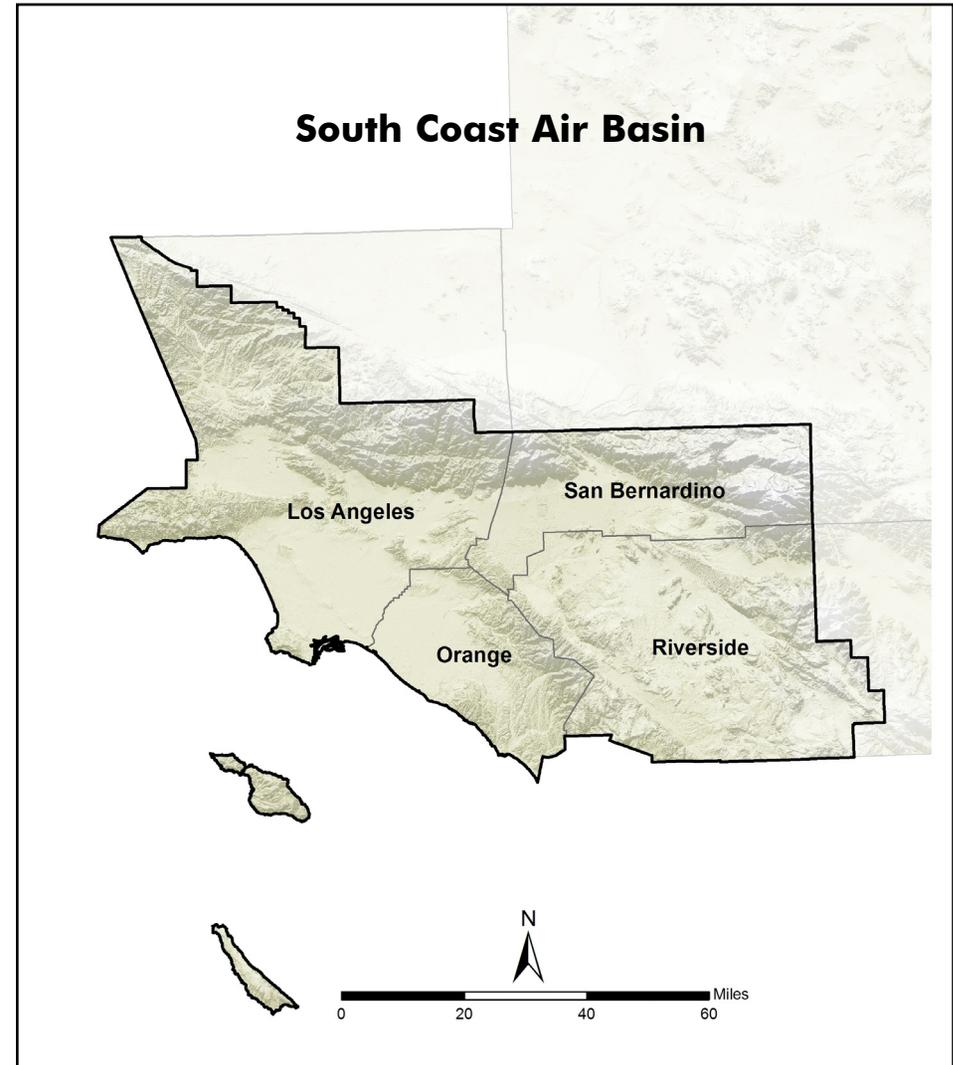


Figure 4-1

South Coast Air Basin

Emission Trends and Forecasts

Overall, since 1975 the emission levels for CO and the ozone precursors NO_x and ROG have been decreasing in the South Coast Air Basin and are projected to continue decreasing through 2020. The decreases are predominantly due to motor vehicle controls and reductions in evaporative emissions. In the South Coast Air Basin, on-road motor vehicles are the largest contributors to CO, NO_x, and ROG emissions. Other mobile sources are also significant contributors to CO and NO_x emissions. The emission levels for SO_x have decreased since 1975. This is mainly due to the switch from fuel oil to natural gas for electric generation and to reduced fuel sulfur content. The increase in SO_x emissions from 2005 onward is due to predicted growth in shipping activities.

SIP and conformity inventory forecasts may differ from the forecasts presented in this almanac. For more information on these forecasts, please see the ARB SIP web page at www.arb.ca.gov/planning/sip/sip.htm.

South Coast Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	1693	1532	1564	1561	1335	1180	999	755	600	493
ROG	2748	2312	2246	1801	1361	1080	729	569	518	496
PM ₁₀	224	233	254	357	346	348	313	286	296	306
PM _{2.5}	126	115	114	131	114	115	112	103	103	105
SO _x	409	194	101	77	52	43	46	48	52	57
CO	16544	13605	13148	10750	7778	5648	4129	2950	2472	2198

Table 4-1

South Coast Air Basin

Population and VMT

Both population and the daily VMT grew from 1980 to 2005 and are projected to continue to grow at high rates in the South Coast Air Basin from 2005 to 2020. While high growth rates are often associated with corresponding increases in emissions and pollutant concentrations, aggressive emission control programs in the South Coast Air Basin have resulted in emission decreases and a continuing improvement in air quality.

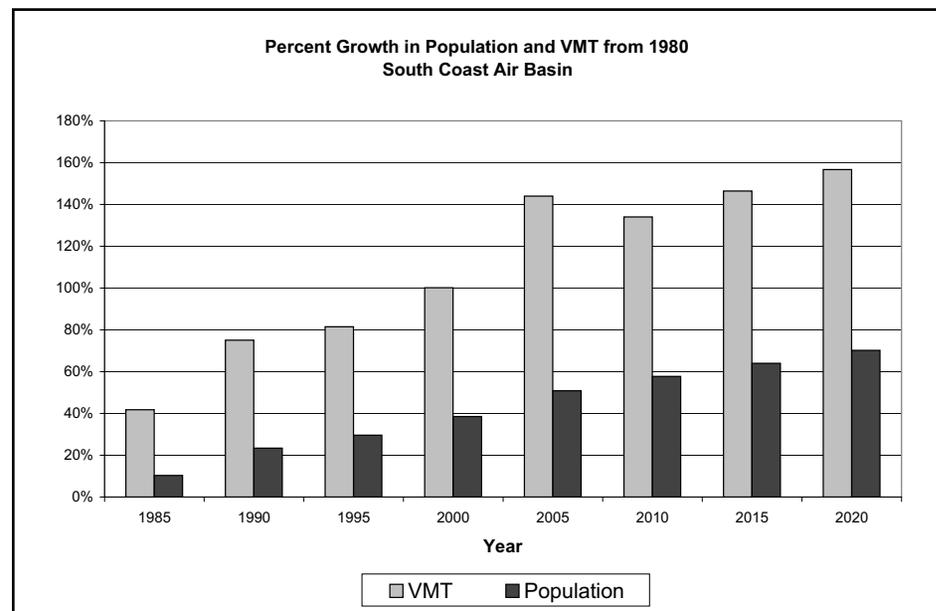


Figure 4-2

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	10604663	11698030	13083594	13745292	14687872	15996422	16727861	17389313	18050763
Avg. Daily VMT/1000	161397	228818	282561	292884	323009	393767	377734	397696	414267

Table 4-2

South Coast Air Basin

Ozone Precursor Emission - Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG in the South Coast Air Basin are generally following the statewide downward trend. Motor vehicle miles traveled in the basin are increasing, but NO_x and ROG emissions from on-road vehicles are dropping as more stringent vehicle emission standards have been adopted. These decreases in NO_x and ROG emissions are projected to continue between 2000 and 2020, as even more stringent motor vehicle standards are implemented and as newer, lower-emitting vehicles become a larger percentage of the fleet. NO_x emissions from electric utilities in the air basin have declined substantially since 1975, despite a nationwide increase in emissions from electric utilities in the same time period. These large reductions are primarily due to increased use of natural gas as the principal fuel for power plants, and control rules that limit NO_x emissions.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1693	1532	1564	1561	1335	1180	999	755	600	493
Stationary Sources	306	265	229	181	130	112	60	55	51	51
Area-wide Sources	60	54	49	42	35	30	27	23	22	23
On-Road Mobile	998	880	955	953	831	692	586	400	285	204
Gasoline Vehicles	927	777	796	725	616	455	295	178	127	92
Diesel Vehicles	71	103	159	228	215	237	291	222	158	111
Other Mobile	329	333	331	385	338	345	327	276	241	216
Gasoline Fuel	27	27	29	32	28	29	28	24	22	21
Diesel Fuel	268	271	267	314	265	266	241	194	155	123
Other Fuel	34	35	35	39	45	51	58	58	64	72

Table 4-3

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	2748	2312	2246	1801	1361	1080	729	569	518	496
Stationary Sources	599	494	509	455	298	259	101	100	105	110
Area-wide Sources	177	188	204	223	192	185	157	147	152	158
On-Road Mobile	1734	1382	1269	875	650	438	297	183	139	113
Gasoline Vehicles	1725	1368	1250	852	635	425	280	169	129	105
Diesel Vehicles	9	13	19	23	15	13	17	14	11	8
Other Mobile	238	248	264	248	221	198	173	139	121	115
Gasoline Fuel	183	192	208	186	164	151	130	104	92	88
Diesel Fuel	40	40	40	46	41	39	34	27	20	17
Other Fuel	15	15	15	16	16	9	9	8	10	11

Table 4-4

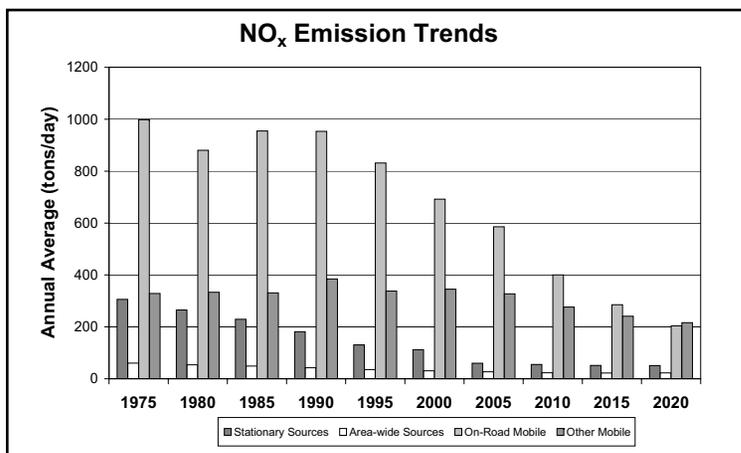


Figure 4-3

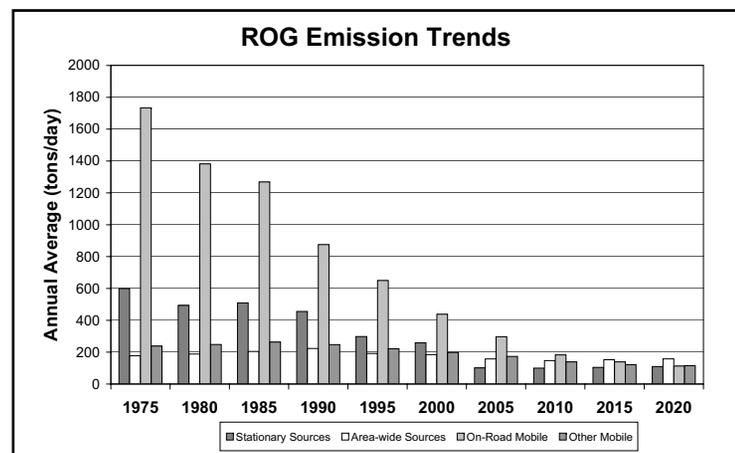


Figure 4-4

South Coast Air Basin

Ozone Air Quality Trend

Ozone air quality in the South Coast Air Basin has improved substantially over the last 30 years. During the 1960s, maximum 1-hour concentrations were above 0.60 ppm. Today, the maximum measured concentrations are less than one-third of that. The 2006 ozone season in the South Coast was on a par with 2005, with some statistics showing considerable decreases. The 2006 peak 8-hour indicator value was 45 percent lower than the 1987 value. The 2007 three-year average of the maximum 8-hour concentration was over 40 percent lower than 1989. The number of days above the standards has also declined dramatically, and the trend for 1-hour ozone is similar to that for 8-hour.

Although ozone has improved substantially over time, progress has leveled off during the last several years. This may be attributable to changes in the mix and reactivity of precursor emissions in the South Coast. While the basinwide trends show a slower rate of improvement during recent years, progress in some subregions of the Basin (for example, the coastal area and some of the inland valley areas) is still occurring. Continuing implementation of the aggressive emissions control measures will ensure continued progress throughout the Basin.

The ARB has identified the South Coast Air Basin as a transport contributor to several downwind areas — Mojave Desert Air Basin,

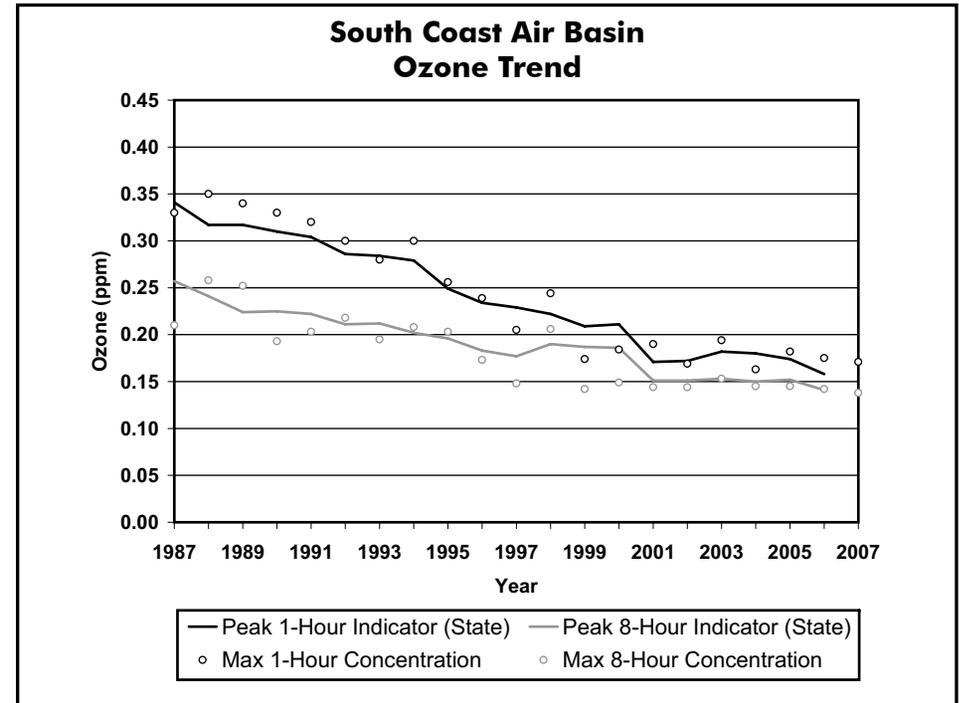


Figure 4-5
Salton Sea Air Basin, San Diego Air Basin, and South Central Coast Air Basin. As ozone concentrations in the South Coast Air Basin decline further, the transport impact on the downwind areas should also decrease.

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.257	0.241	0.224	0.225	0.222	0.211	0.212	0.202	0.196	0.183	0.177	0.190	0.187	0.186	0.151	0.151	0.153	0.150	0.152	0.141	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.217	0.205	0.192	0.186	0.182	0.180	0.177	0.171	0.165	0.161	0.148	0.154	0.147	0.146	0.129	0.128	0.131	0.127	0.127	0.121	
Peak 1-Hour Indicator (State)	0.341	0.317	0.317	0.310	0.304	0.286	0.284	0.279	0.249	0.234	0.229	0.222	0.209	0.211	0.171	0.172	0.182	0.180	0.174	0.158	
4th High 1-Hr. in 3 Yrs ²	0.350	0.340	0.330	0.330	0.310	0.300	0.300	0.280	0.250	0.231	0.215	0.217	0.211	0.211	0.184	0.169	0.184	0.171	0.173	0.164	
Max. 8-Hr. Concentration	0.210	0.258	0.252	0.193	0.203	0.218	0.195	0.208	0.203	0.173	0.148	0.206	0.142	0.149	0.144	0.144	0.153	0.145	0.145	0.142	0.138
Maximum 1-Hr. Concentration	0.330	0.350	0.340	0.330	0.320	0.300	0.280	0.300	0.256	0.239	0.205	0.244	0.174	0.184	0.190	0.169	0.194	0.163	0.182	0.175	0.171
Days Above State 8-Hr. Std.	198	215	221	192	188	199	205	176	173	165	175	139	146	147	154	147	153	152	138	130	127
Days Above Nat. 8-Hr. Std.	179	194	181	161	160	173	161	148	120	115	118	93	93	94	92	96	109	88	83	85	79
Days Above State 1-Hr. Std.	196	216	211	185	184	190	185	165	153	141	144	107	111	115	121	116	125	105	99	102	97

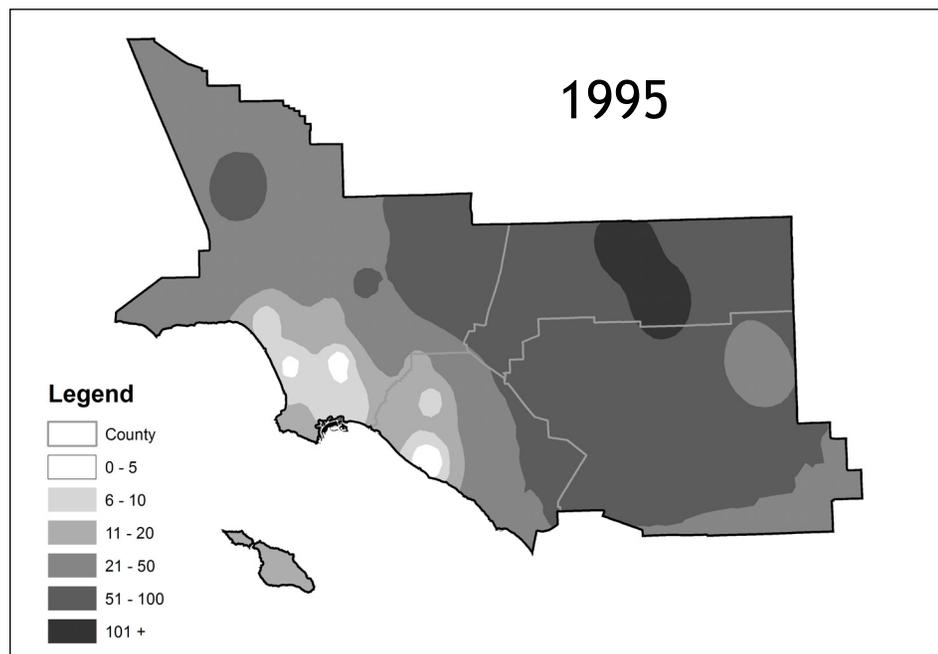
¹ Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

² The national 1-Hour standard has been revoked. Historical 1-Hour data are provided for reference.

Table 4-5

South Coast Air Basin

Ozone Contour Maps - 3-year Average of National 8-Hour Exceedance Days



NOTE: Values used in these maps are for long-term sites only. Long-term sites are used to more accurately represent a trend over a period, by comparing the same or similar sites over a long period.

Figure 4-6

Another way to look at ozone air quality is to evaluate how widespread the problem is within a region. The maps on this page illustrate how the number of days exceeding the national 8-hour standard have changed across the South Coast Air Basin over the last decade. Three-year averages are used to help mitigate the impact of changes in meteorology.

Overall, the two maps show a substantial reduction in the number of exceedance days over the last 10 years. During the 1995 time period, about half of the South Coast had more than 50 exceedance days, with more than 100 days in the worst area. This is equivalent to more than three months during a year with ozone concentrations above the level of the standard. The coastal areas were cleaner than the inland areas. However, only small, isolated portions of the Basin had ten or fewer exceedance days.

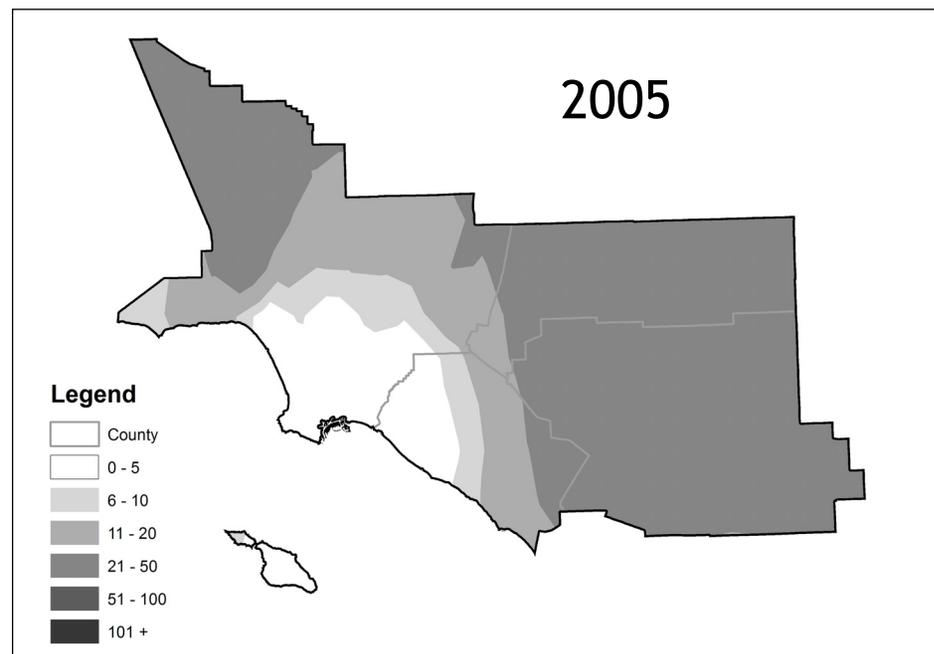


Figure 4-7

The 2005 map shows a dramatic expansion of clean areas, especially those in the range of zero to five exceedance days. These are the areas that currently meet the national standard, and they include about a third of Orange County and a fourth of Los Angeles County, where the majority of the Basin population lives and works. The areas with 6 to 10 and 11 to 20 exceedance days has also grown substantially. Ozone air quality in the inland areas is still worse than in areas nearer the coast. Even so, the areas with the highest number of exceedance days are limited to the northwestern portion of Los Angeles County and portions of Riverside and San Bernardino counties. However, despite the dramatic improvements in these areas, a large percentage of the basinwide population still experiences more than 50 exceedance days per year.

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South Coast Air Basin Directly Emitted PM₁₀ Emission Trends and Forecasts

Direct emissions of PM₁₀ have been increasing in the South Coast Air Basin since 1975. A decrease in emissions would have been observed, if not for growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads, dust from construction and demolition operations, and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia (secondary PM). The PM₁₀ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM₁₀ emissions contribute approximately 65 percent of the ambient PM₁₀ in the South Coast Air Basin.

Directly Emitted PM ₁₀ Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	224	233	254	357	346	348	313	286	296	306
Stationary Sources	61	45	33	50	45	50	51	22	23	25
Area-wide Sources	122	145	172	249	255	253	213	219	231	240
On-Road Mobile	18	20	25	32	25	24	27	25	24	24
Gasoline Vehicles	10	8	9	11	11	13	16	16	18	20
Diesel Vehicles	8	12	16	21	13	11	11	8	6	4
Other Mobile	24	24	23	27	21	21	21	20	18	17
Gasoline Fuel	2	3	3	4	4	4	4	5	6	7
Diesel Fuel	19	19	18	21	15	15	14	11	8	5
Other Fuel	2	2	2	3	3	2	3	4	5	5

Table 4-6

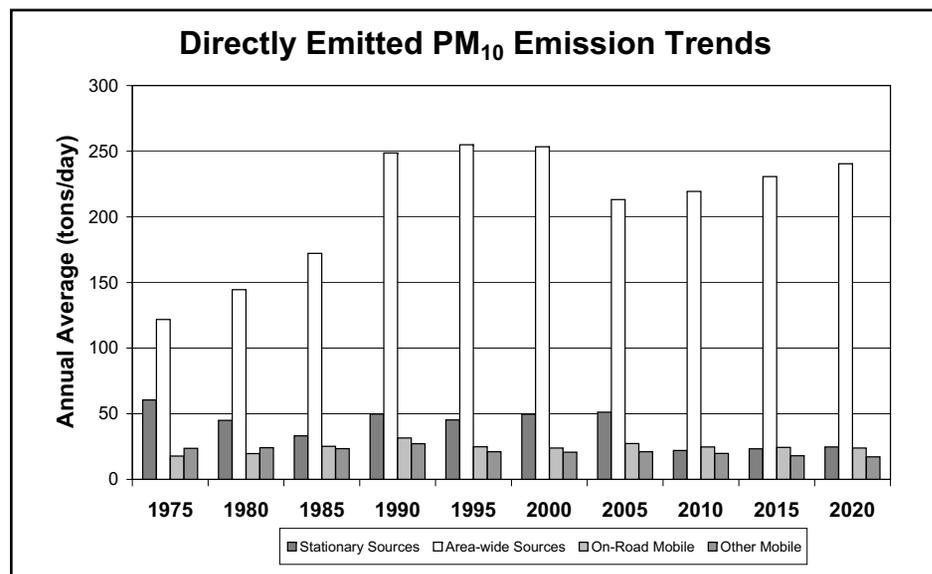


Figure 4-8

South Coast Air Basin Directly Emitted PM_{2.5} Emission Trends and Forecasts

Direct emissions of PM_{2.5} have decreased slightly in the South Coast Air Basin since 1975. Stationary source emissions have been decreasing, while area-wide emissions have been increasing. A more significant decrease in emissions would have been observed, if not for growth in emissions from area-wide sources, primarily fugitive dust from paved and unpaved roads, dust from construction and demolition operations, and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM_{2.5} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 40 percent of the ambient PM_{2.5} in the South Coast Air Basin.

Directly Emitted PM _{2.5} Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	126	115	114	131	114	115	112	103	103	105
Stationary Sources	53	35	24	29	22	23	22	14	15	15
Area-wide Sources	38	43	49	52	54	56	51	53	56	58
On-Road Mobile	13	15	20	25	19	18	20	18	17	16
Gasoline Vehicles	6	5	5	6	7	8	10	10	12	13
Diesel Vehicles	7	11	15	19	12	10	10	8	5	4
Other Mobile	22	22	21	25	19	19	19	18	16	15
Gasoline Fuel	2	2	2	3	3	3	3	4	4	5
Diesel Fuel	18	18	17	19	14	14	13	10	7	5
Other Fuel	2	2	2	2	3	2	3	4	5	5

Table 4-7

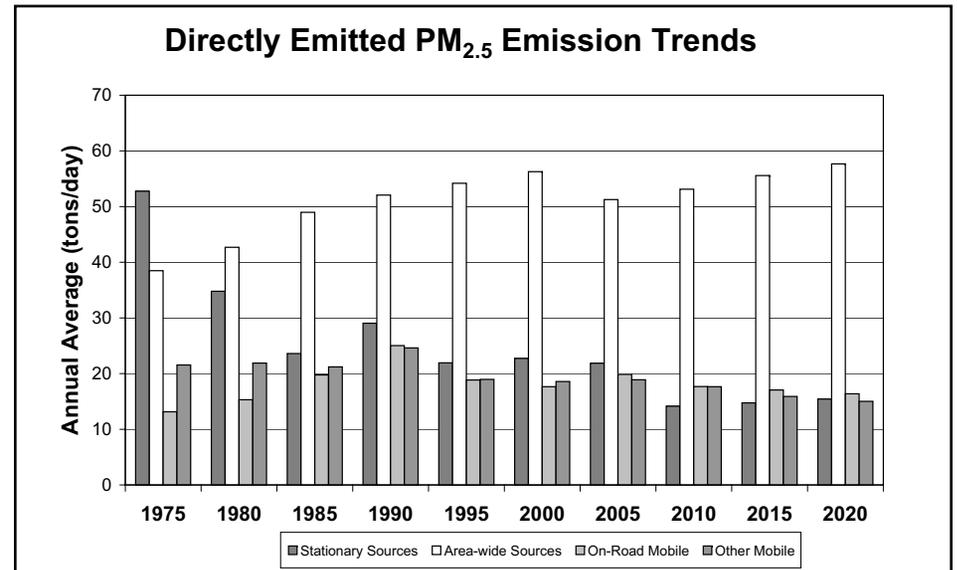


Figure 4-9

South Coast Air Basin

PM₁₀ Air Quality Trend

As with other pollutants, the PM₁₀ statistics also show overall improvement. During the period for which data are available, the three-year average of the annual average (State) decreased about 33 percent. Although the values in the late 1990's show some variability, this is probably due to meteorology rather than a change in emissions. Despite the overall decrease, ambient concentrations still exceed the State annual and 24-hour PM₁₀ standards. Similar to the ambient concentrations, the calculated number of days above the 24-hour PM₁₀ standards has also shown an overall drop. During 1989, there were 305 calculated days above the State standard and 34 calculated days above the national standard. By 2006, there were 241 calculated State standard exceedance days and no national standard exceedance days.

Despite these decreases, PM₁₀ continues to pose a significant problem in the South Coast Air Basin. While emission controls implemented for ozone will also benefit PM₁₀, more controls aimed specifically at reducing PM₁₀ will be needed to reach attainment.

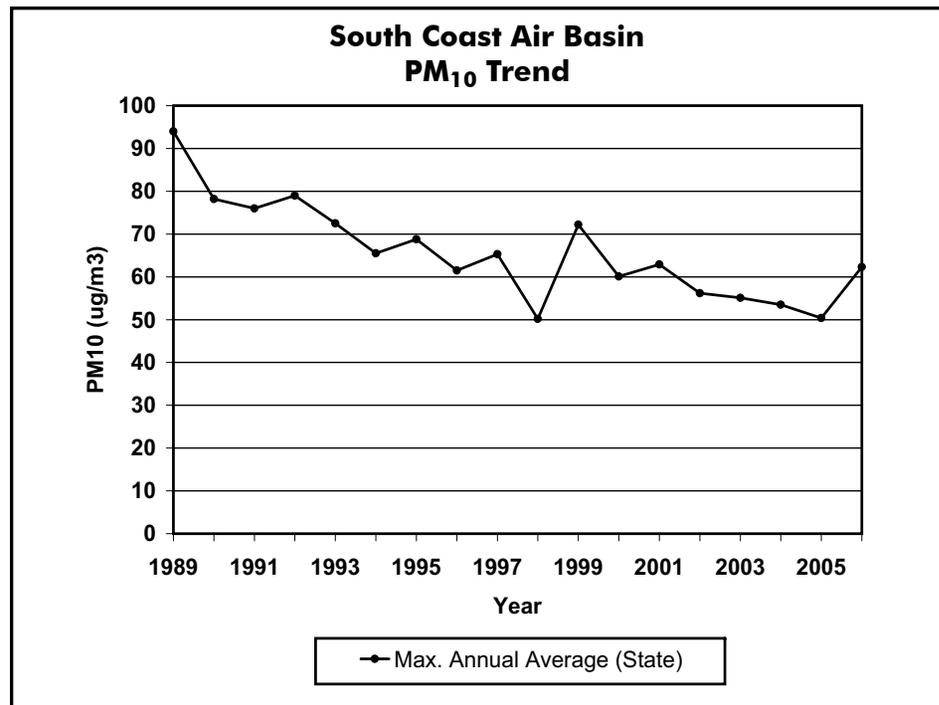


Figure 4-10

PM ₁₀ (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)		287	271	475	179	649	231	161	219	162	208	116	183	139	219	126	159	133	131	135
Max. 24-Hr. Concentration (Nat)		287	271	475	179	649	231	210	219	185	208	116	183	139	219	130	164	137	131	142
Max. Annual Average (State)			94.0	78.2	76.0	79.0	72.5	65.5	68.8	61.5	65.3	50.2	72.2	60.1	62.9	56.2	55.1	53.5	50.4	62.3
Max. Annual Average (Nat)		103.7	93.0	78.2	76.1	79.0	72.5	65.5	68.8	62.8	65.6	58.7	72.2	59.1	63.3	58.1	55.6	54.8	51.8	64.0
Calc Days Above State 24-Hr Std		305	275	250	243	251	244	226	251	257	171	261	248	240	228	201	210	198	241	
Calc Days Above Nat 24-Hr Std		34	19	12	12	18	6	25	6	6	0	6	0	6	0	6	0	0	0	

Table 4-8

South Coast Air Basin

PM_{2.5} Air Quality Trend

Figure 4-11 shows the annual average PM_{2.5} concentrations (national) in the South Coast Air Basin from 1999 through 2006. Overall, concentrations were relatively stable during the first three years. However, over the last five years the annual average concentrations have decreased. The State annual average concentrations also show a declining trend, although the trend looks less pronounced, due to differences in State and national monitoring methods. The 98th percentile of 24 hour PM_{2.5} concentrations has also declined within the last eight years. The South Coast Air Basin is currently designated as nonattainment for the State and national PM_{2.5} standards. Measures adopted as part of the upcoming PM_{2.5} SIP, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

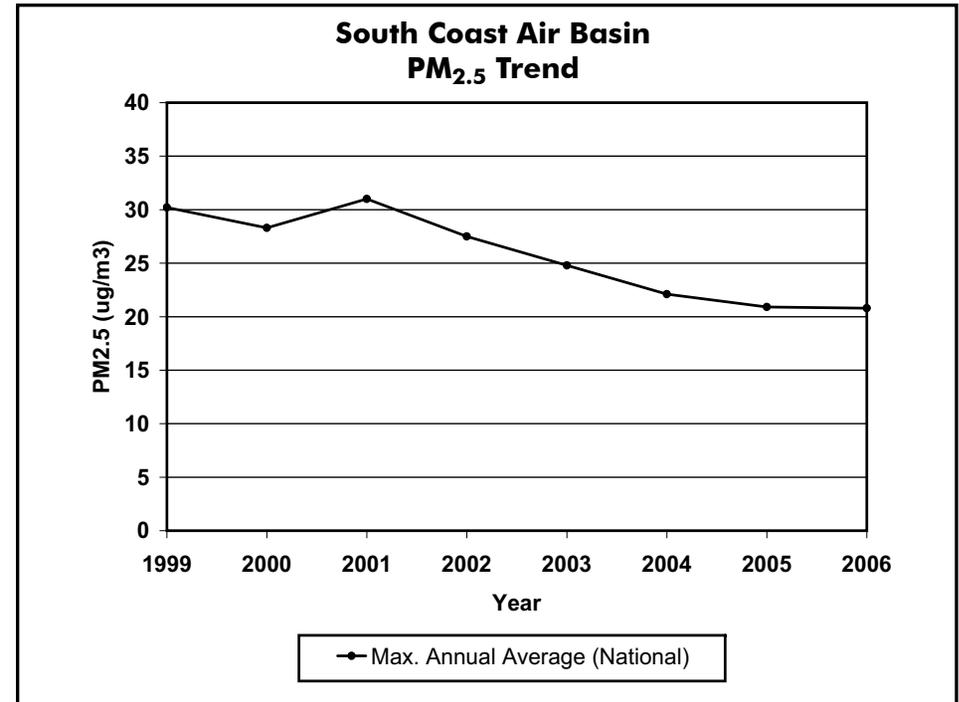


Figure 4-11

PM _{2.5} (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)													121.4	119.6	104.0	82.1	121.2	93.8	132.6	72.2
Max. 24-Hr. Concentration (Nat)													121.4	119.6	98.0	82.1	121.2	93.8	132.6	72.2
98th Percentile of 24-Hr Conc.													85.6	83.0	74.3	66.3	76.6	72.4	58.3	54.4
Annual Average (State)														24.0	25.0	25.8	24.8	16.6	21.0	16.6
Avg. of Qtrly. Means (Nat)													30.2	28.3	31.0	27.5	24.8	22.1	20.9	20.8

Table 4-9

South Coast Air Basin Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been trending downward since 1975 in the South Coast Air Basin even though motor vehicle miles traveled have increased and industrial activity has grown. On-road motor vehicle controls are primarily responsible for this decline in emissions of CO. Stationary source emissions decreased during the 1970s and 1980s as a result of a decline in the manufacture of carbon black (a material used in the manufacture of tires) and steel in the South Coast Air Basin. CO emissions from other mobile sources have declined since 1990 and are projected to decline through 2010 as more stringent emission standards are adopted.

CO Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	16544	13605	13148	10750	7778	5648	4129	2950	2472	2198
Stationary Sources	288	278	66	92	60	45	55	55	55	57
Area-wide Sources	85	70	106	70	79	104	109	112	115	119
On-Road Mobile	14958	11988	11627	9103	6385	4414	2979	1818	1306	973
Gasoline Vehicles	14926	11940	11558	9013	6307	4350	2905	1756	1254	929
Diesel Vehicles	33	48	69	90	78	64	73	62	52	43
Other Mobile	1213	1269	1348	1485	1254	1085	985	964	995	1049
Gasoline Fuel	957	1011	1090	1198	987	858	769	740	744	771
Diesel Fuel	132	135	135	161	137	123	110	118	137	154
Other Fuel	123	123	124	126	130	103	107	106	115	124

Table 4-10

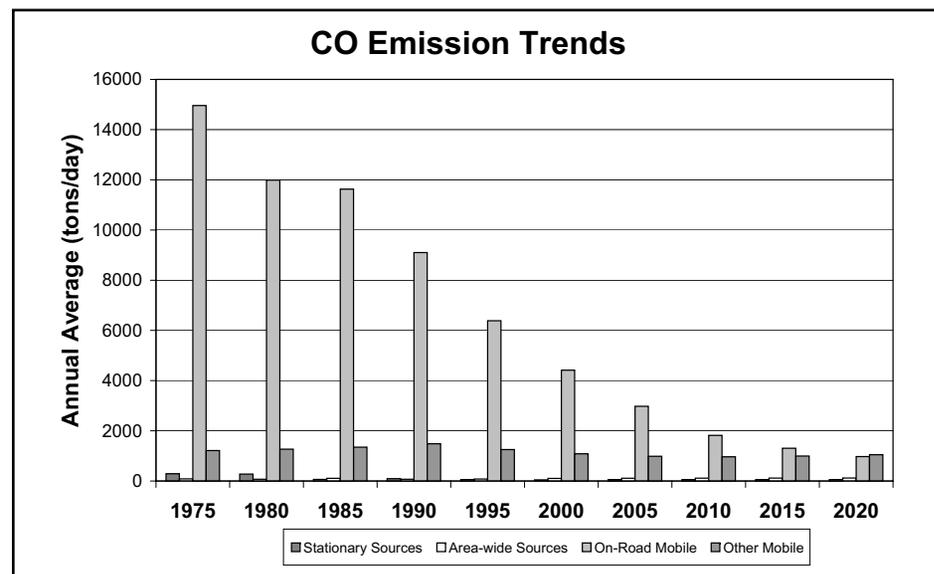


Figure 4-12

South Coast Air Basin

Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations in the South Coast Air Basin have decreased markedly — a total decrease of more than 70 percent in the peak 8-hour indicator since 1987. The number of exceedance days has also declined. During 1987 there were 50 days above the State standard and 40 days above the national standard. However, since 2003, there were no exceedance days for either standard.

The entire South Coast Air Basin is now designated as attainment for the national CO standards effective June 11, 2007. Ongoing reductions from motor vehicle control programs should continue the downward trend in ambient CO concentrations.

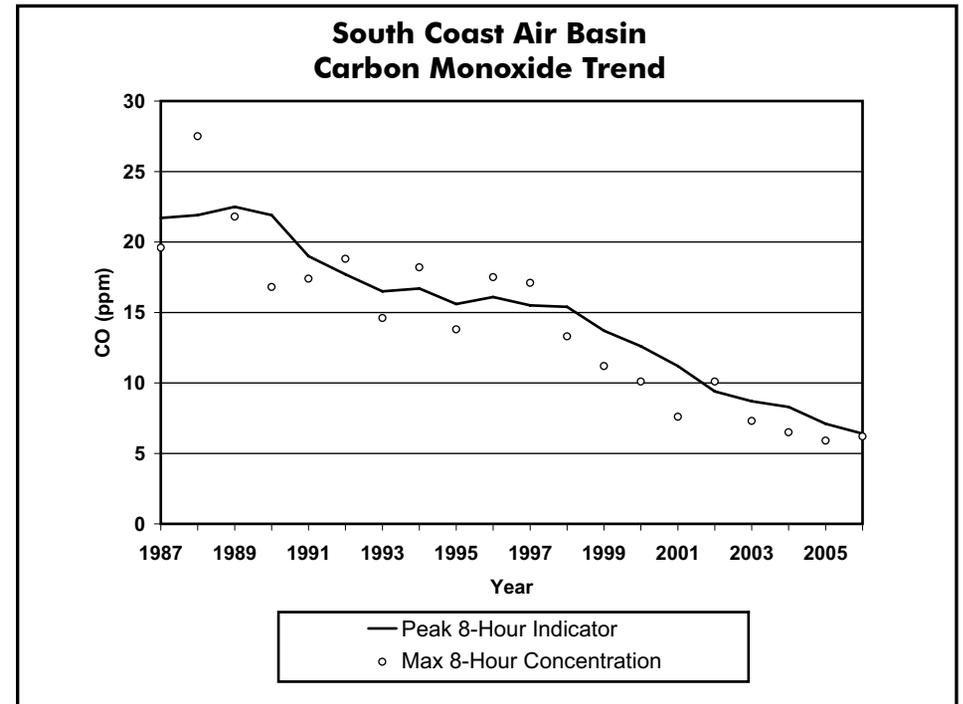


Figure 4-13

CARBON MONOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 8-Hr. Indicator (State)	21.7	21.9	22.5	21.9	19.0	17.7	16.5	16.7	15.6	16.1	15.5	15.4	13.7	12.6	11.2	9.4	8.7	8.3	7.1	6.4
Max. 1-Hr. Concentration	26.0	32.0	31.0	24.0	30.0	28.0	21.0	24.9	16.8	22.5	19.2	17.0	19.0	13.8	11.7	15.8	12.2	10.4	7.4	8.4
Max. 8-Hr. Concentration (State)	19.6	27.5	21.8	16.8	17.4	18.8	14.6	18.2	13.8	17.5	17.1	13.3	11.2	10.1	7.6	10.1	7.3	6.5	5.9	6.2
Days Above State 8-Hr. Std.	50	73	71	50	51	39	29	27	17	26	18	13	11	6	0	1	0	0	0	0
Days Above Nat. 8-Hr. Std.	40	65	67	42	41	34	19	19	14	19	13	10	7	3	0	1	0	0	0	0

Table 4-11

South Coast Air Basin

Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Oxides of nitrogen (NO_x) and nitrogen dioxide (NO₂) emissions in the South Coast Air Basin have been trending downward since 1985. This decline should continue as more stringent motor vehicle and stationary source emission standards are adopted and implemented.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1693	1532	1564	1561	1335	1180	999	755	600	493
Stationary Sources	306	265	229	181	130	112	60	55	51	51
Area-wide Sources	60	54	49	42	35	30	27	23	22	23
On-Road Mobile	998	880	955	953	831	692	586	400	285	204
Gasoline Vehicles	927	777	796	725	616	455	295	178	127	92
Diesel Vehicles	71	103	159	228	215	237	291	222	158	111
Other Mobile	329	333	331	385	338	345	327	276	241	216
Gasoline Fuel	27	27	29	32	28	29	28	24	22	21
Diesel Fuel	268	271	267	314	265	266	241	194	155	123
Other Fuel	34	35	35	39	45	51	58	58	64	72

Table 4-12

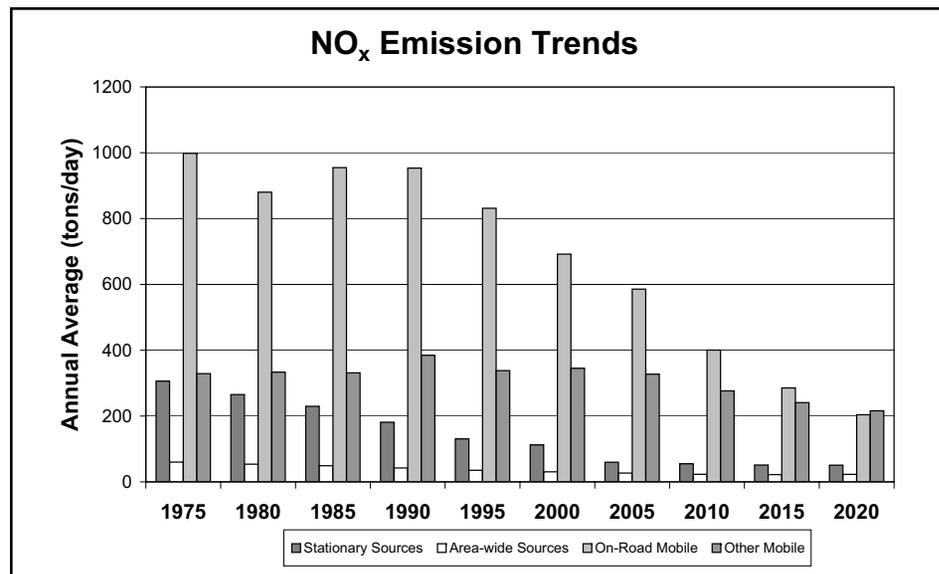


Figure 4-14

South Coast Air Basin

Nitrogen Dioxide Air Quality Trend

The South Coast Air Basin is one of only a few areas in California where NO₂ has been a problem. The South Coast Air Basin attained the State 1-hour NO₂ standard in 1994, bringing the entire State into attainment. The national standard has not been exceeded since 1991.

Over the last 20 years, NO₂ values have decreased significantly in the South Coast Air Basin. The peak 1-hour indicator for 2006 was less than half of what it was during 1987.

NO₂ is formed from NO_x emissions, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's NO_x emissions.

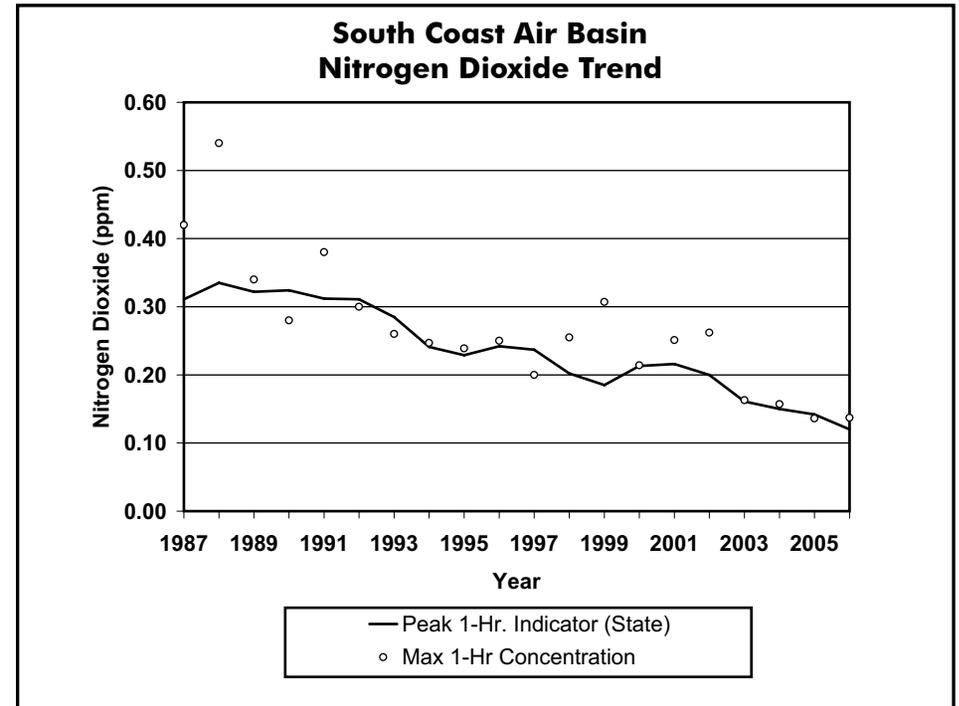


Figure 4-15

NITROGEN DIOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 1-Hr. Indicator (State)	0.311	0.335	0.322	0.324	0.312	0.311	0.285	0.241	0.229	0.242	0.237	0.202	0.185	0.213	0.216	0.200	0.161	0.150	0.142	0.120
Max. 1-Hr. Concentration	0.420	0.540	0.340	0.280	0.380	0.300	0.260	0.247	0.239	0.250	0.200	0.255	0.307	0.214	0.251	0.262	0.163	0.157	0.136	0.137
Max. Annual Average (Nat)	0.055	0.061	0.057	0.055	0.055	0.051	0.050	0.050	0.046	0.042	0.043	0.043	0.051	0.044	0.041	0.040	0.035	0.034	0.031	0.031
Max. Annual Average (State)	0.055	0.061	0.057	0.056	0.055	0.051	0.050	0.050	0.046	0.042	0.043	0.043	0.050	0.044	0.041	0.040	0.036	0.033	0.031	0.031

Table 4-13

San Francisco Bay Area Air Basin

Introduction - Area Description

The San Francisco Bay Area is California's second largest metropolitan area and is the focal point of northern California. 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. The unifying feature of the area is the Bay itself, which is oriented north-south and covers about 400 square miles of the area's total 5,340 square miles.

About 19 percent of California's population resides in the San Francisco Bay Area, and pollution sources in the region account for about 15 percent of the total statewide criteria pollutant emissions. The climate in the San Francisco Bay Area varies from one location to the next. Along the coast, temperatures are mild year-round. However, as one moves inland, temperatures show larger diurnal and seasonal variations. Overall air quality in the San Francisco Bay Area Air Basin is better than inland areas such as the South Coast, San Joaquin Valley, and Sacramento regions. This is due to a more favorable climate, with cooler temperatures and better ventilation. However, exceedances of the State ozone and PM standards continue to occur in the San Francisco Bay Area Air Basin, and still pose challenges to State and local air pollution control agencies.

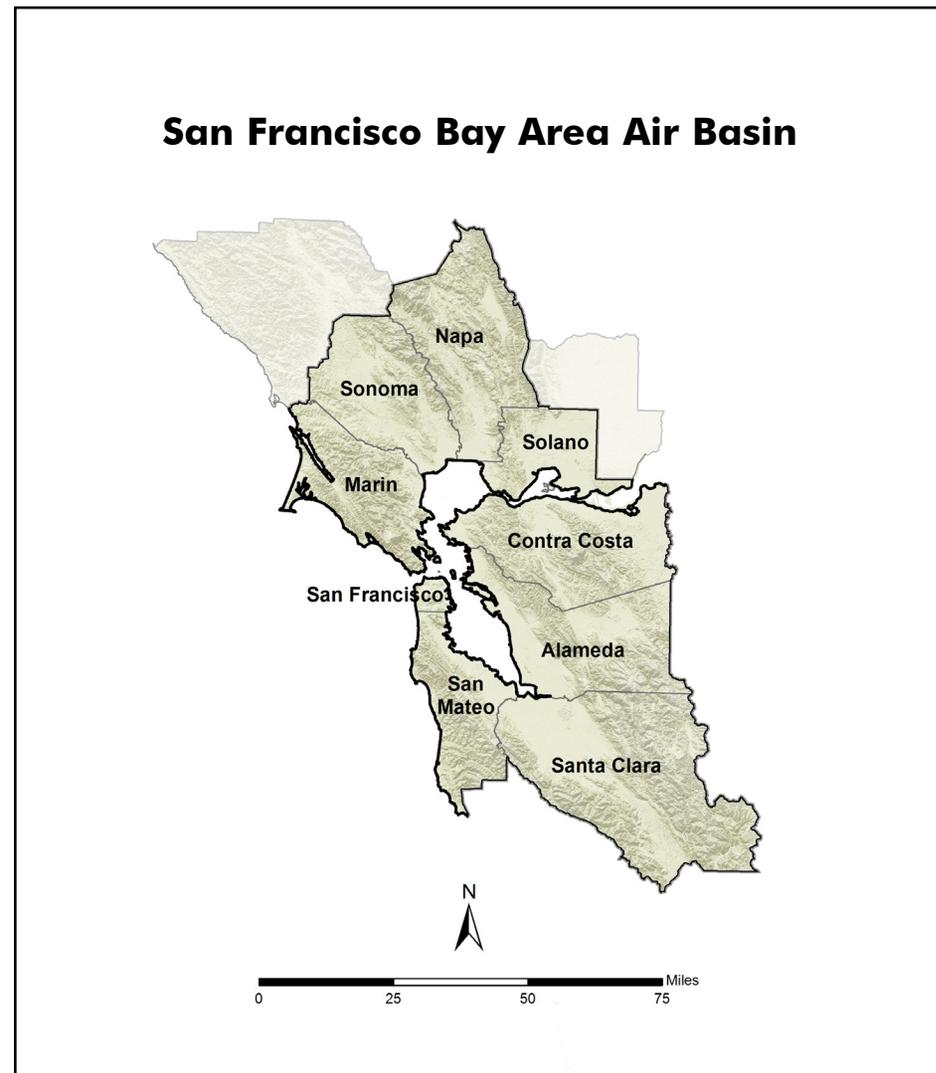


Figure 4-16

San Francisco Bay Area Air Basin

Emission Trends and Forecasts

The emission levels for the ozone precursors NO_x and ROG have been trending downward in the San Francisco Bay Area Air Basin since 1975. CO emissions have also been trending downward since 1975. On-road motor vehicles are the largest contributors to CO, ROG, and NO_x emissions in the air basin. The implementation of stricter mobile source (both on-road and other) emission standards will continue to decrease vehicle emissions in this air basin. Controls on stationary source solvent evaporation and fugitive emissions will also continue to reduce ROG emissions. The emission levels for SO_x have decreased since 1975. This is mainly due to the switch from fuel oil to natural gas for electric generation and to reduced fuel sulfur content. The increase in SO_x emissions from 2005 onward is due to predicted growth in shipping activities. An increase in petroleum refining emissions is also seen.

San Francisco Bay Area Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	943	918	821	797	720	622	496	423	348	301
ROG	1430	1320	1047	764	646	525	382	330	302	290
PM ₁₀	181	182	195	194	189	218	210	220	230	241
PM _{2.5}	81	79	79	83	81	84	81	83	84	87
SO _x	210	196	106	109	67	64	58	57	62	68
CO	9075	8334	7011	5325	3917	2961	2041	1617	1363	1230

Table 4-14

San Francisco Bay Area Air Basin

Population and VMT

Compared with the statewide totals, population and the number of vehicle miles traveled each day grew steeply until 1990, having slowed in recent years and are projected to continue at a slower rate in the San Francisco Bay Area Air Basin through 2020. During that 40-year period, the population is projected to increase about 60 percent, from about 5.1 million in 1980 to more than eight million in 2020. During the same period, the daily VMT is projected to increase 109 percent, from 93 million miles per day in 1980 to over 194 million miles per day in 2020. While these growth rates are lower than the growth rates seen in other areas, they still represent substantial increases.

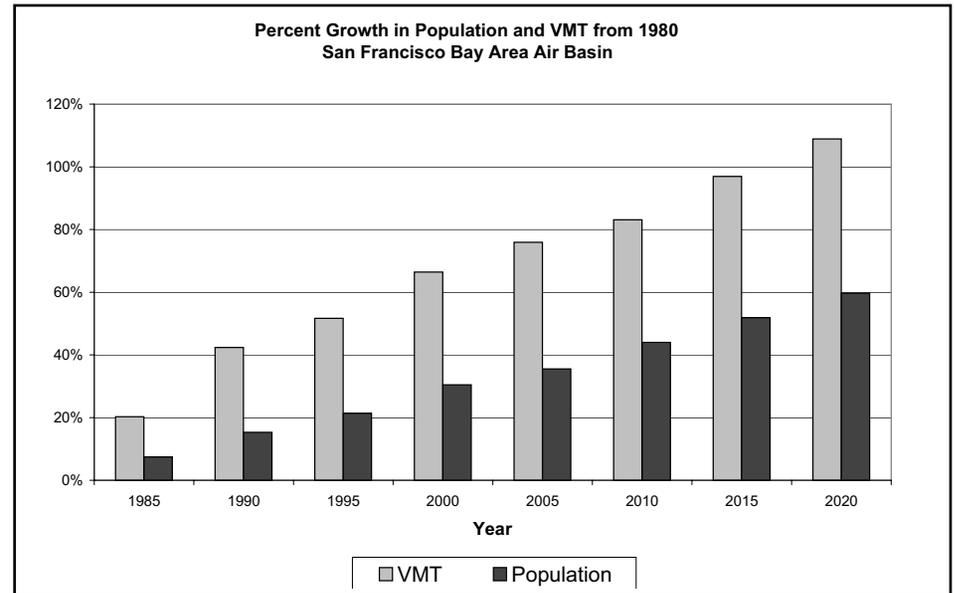


Figure 4-17

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	5095406	5473956	5874273	6182722	6646802	6904411	7337485	7736635	8135781
Avg. Daily VMT/1000	93109	111964	132558	141224	154959	163790	170505	183332	194476

Table 4-15

San Francisco Bay Area Air Basin

Ozone Precursor Emission - Trends and Forecasts

Emissions of ozone precursors have decreased in the San Francisco Bay Area Air Basin since 1975 and are projected to continue declining through 2020. The Bay Area has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_x and ROG. Stationary source emissions of ROG have declined over the last 20 years due to new controls for oil refinery fugitive emissions and new rules for control of ROG from various industrial coatings and solvent operations.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	943	918	821	797	720	622	496	423	348	301
Stationary Sources	229	205	134	124	107	83	49	49	51	53
Area-wide Sources	13	14	15	19	20	19	20	20	21	21
On-Road Mobile	542	540	500	453	385	312	234	181	124	88
Gasoline Vehicles	516	493	427	356	296	215	128	86	59	42
Diesel Vehicles	26	47	73	97	89	98	106	94	64	46
Other Mobile	159	159	172	201	208	207	194	174	153	138
Gasoline Fuel	10	10	11	13	14	14	13	11	10	10
Diesel Fuel	123	121	130	154	158	154	142	120	97	77
Other Fuel	27	28	31	34	37	39	39	43	46	51

Table 4-16

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1430	1320	1047	764	646	525	382	330	302	290
Stationary Sources	294	255	164	113	121	111	73	75	79	82
Area-wide Sources	111	110	107	111	97	93	88	90	93	96
On-Road Mobile	915	841	654	425	319	223	139	97	72	57
Gasoline Vehicles	912	836	647	417	314	218	133	92	68	54
Diesel Vehicles	3	5	7	8	5	5	5	5	4	3
Other Mobile	111	114	122	114	108	98	83	67	59	56
Gasoline Fuel	83	85	90	79	74	67	56	44	38	36
Diesel Fuel	18	17	19	22	24	22	20	16	12	10
Other Fuel	11	12	13	13	11	9	7	8	9	10

Table 4-17

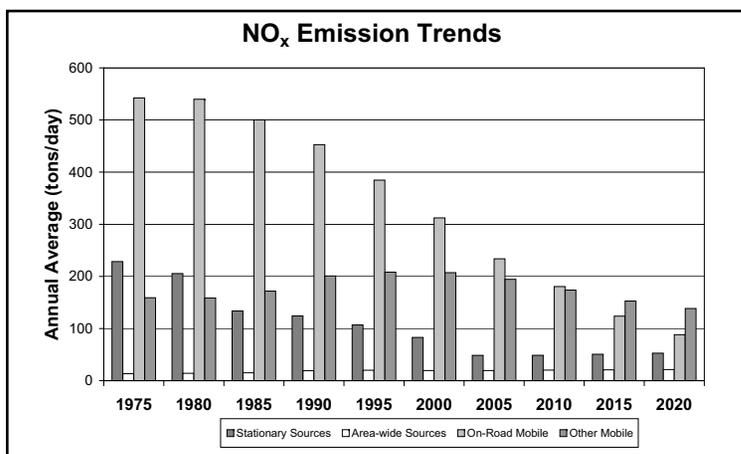


Figure 4-18

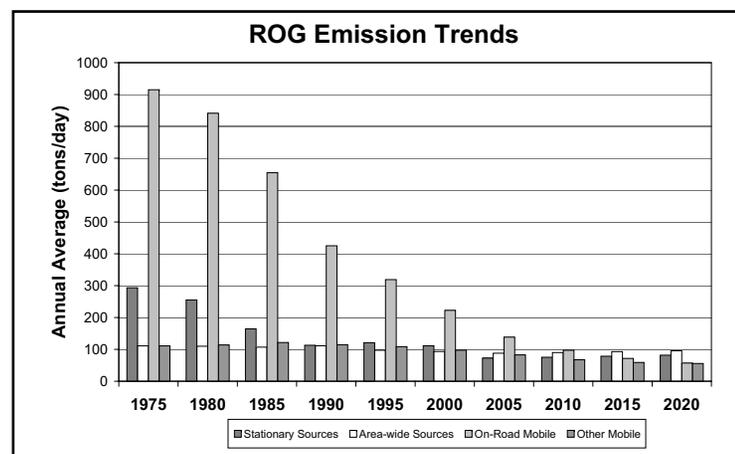


Figure 4-19

San Francisco Bay Area Air Basin

Ozone Air Quality Trend

Ozone concentrations in the San Francisco Bay Area are much lower than in the South Coast and San Joaquin Valley Air Basins. The peak 1-hour and 8-hour indicators have declined by nearly 19 percent during the last 20 years. The number of days when State and national standards are exceeded show a similar trend. Another indication of progress is that the Bay Area now qualifies for attainment of the currently effective national 8-hour ozone standard, although they still exceed the more stringent State 1-hour and 8-hour standards. Although the long-term trends indicate improving air quality, since 1994 the peak indicators have been relatively flat. However, it is not yet clear whether these data represent a significant change in the overall trend.

Meteorology can cause ozone and ozone precursor emissions to be transported from one air basin to another. The ARB has identified the San Francisco Bay Area Air Basin as a transport contributor to the following six areas: the Sacramento region, the Mountain Counties Air Basin, the North Central Coast Air Basin, the North Coast Air Basin, the San Joaquin Valley Air Basin, and the South Central Coast Air Basin. The amount of transport impact varies from day to day, depending in large part on meteorology. To the extent that the Bay Area continues to reduce ozone precursor emissions, the transport impact on downwind areas should also decrease.

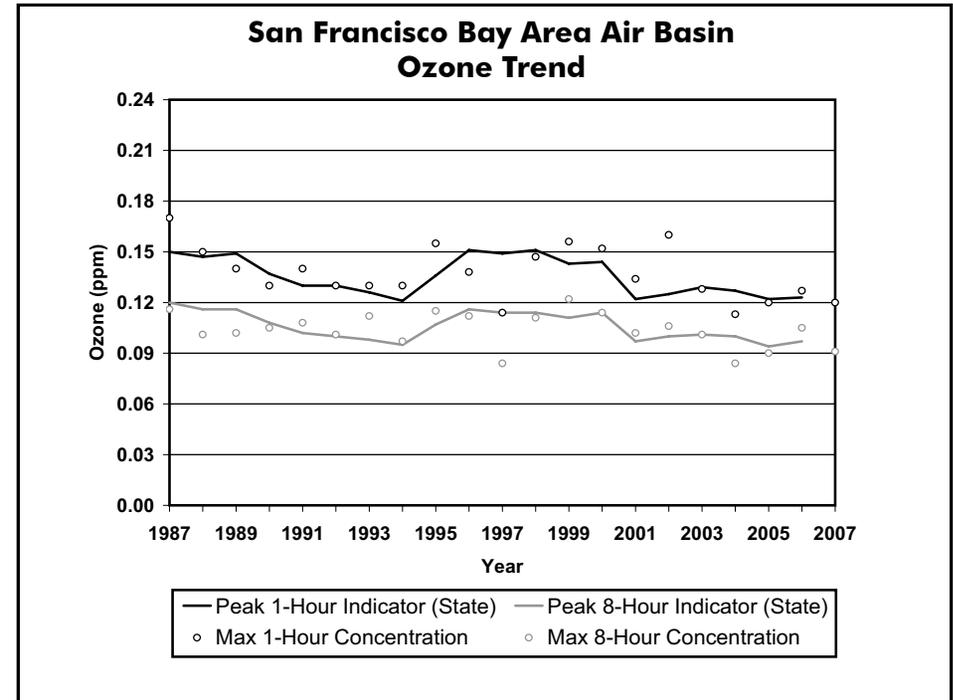


Figure 4-20

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.120	0.116	0.116	0.108	0.102	0.100	0.098	0.095	0.107	0.116	0.114	0.114	0.111	0.114	0.097	0.100	0.101	0.100	0.094	0.097	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.092	0.092	0.097	0.088	0.084	0.082	0.081	0.082	0.087	0.093	0.090	0.089	0.086	0.087	0.082	0.082	0.086	0.084	0.078	0.080	
Peak 1-Hour Indicator (State)	0.150	0.147	0.149	0.137	0.130	0.130	0.126	0.121	0.136	0.151	0.149	0.151	0.143	0.144	0.122	0.125	0.129	0.127	0.122	0.123	
4th High 1-Hr. in 3 Yrs ²	0.150	0.140	0.140	0.130	0.130	0.130	0.120	0.121	0.138	0.138	0.138	0.138	0.139	0.139	0.126	0.124	0.123	0.123	0.113	0.118	
Max. 8-Hr. Concentration	0.116	0.101	0.102	0.105	0.108	0.101	0.112	0.097	0.115	0.112	0.084	0.111	0.122	0.114	0.102	0.106	0.101	0.084	0.090	0.105	0.091
Maximum 1-Hr. Concentration	0.170	0.150	0.140	0.130	0.140	0.130	0.130	0.130	0.155	0.138	0.114	0.147	0.156	0.152	0.134	0.160	0.128	0.113	0.120	0.127	0.120
Days Above State 8-Hr. Std.	57	44	34	17	26	30	23	20	30	37	10	29	28	17	21	19	20	13	9	22	9
Days Above Nat. 8-Hr. Std.	29	20	13	7	6	6	5	4	18	14	0	16	9	4	7	7	7	0	1	12	1
Days Above State 1-Hr. Std.	46	41	22	14	23	23	19	13	28	34	8	29	20	12	15	16	19	7	9	18	4

¹ Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

² The national 1-Hour standard has been revoked. Historical 1-Hour data are provided for reference.

Table 4-18

San Francisco Bay Area Air Basin Directly Emitted PM₁₀ Emission Trends and Forecasts

Direct emissions of PM₁₀ increased in the San Francisco Bay Area Air Basin between 1975 and 2005 and are projected to continue increasing through 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust sources. Emissions of directly emitted PM₁₀ from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing, due to adoption of more stringent emission standards.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM₁₀ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM₁₀ emissions contribute approximately 75 percent of the ambient PM₁₀ in the San Francisco Bay Area Air Basin.

Directly Emitted PM ₁₀ Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	181	182	195	194	189	218	210	220	230	241
Stationary Sources	38	26	23	20	21	19	15	16	17	17
Area-wide Sources	123	134	148	146	145	177	174	184	195	205
On-Road Mobile	7	9	11	12	10	10	10	10	10	10
Gasoline Vehicles	5	5	5	5	5	6	6	7	8	8
Diesel Vehicles	2	4	6	8	5	4	3	3	2	1
Other Mobile	13	13	14	16	13	12	11	10	9	8
Gasoline Fuel	1	1	1	2	2	2	2	2	2	3
Diesel Fuel	8	8	9	11	9	9	8	7	5	3
Other Fuel	3	3	4	4	3	2	1	2	2	2

Table 4-19

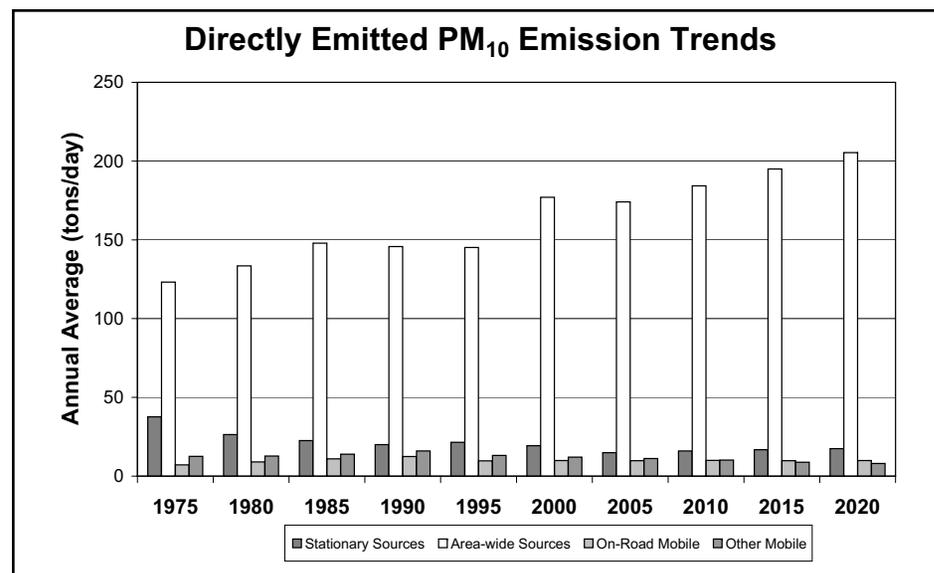


Figure 4-21

San Francisco Bay Area Air Basin

Directly Emitted PM_{2.5} Emission Trends and Forecasts

Direct emissions of PM_{2.5} remained relatively constant in the San Francisco Bay Area Air Basin between 1975 and 2005 and are projected to increase slightly through 2020. Emissions from stationary sources declined slightly, while area-wide sources increased. This increase in area-wide sources is primarily due to growth in fugitive dust sources. Emissions of directly emitted PM_{2.5} from diesel motor vehicles have been decreasing since 1990 even though population and VMT are growing, due to adoption of more stringent emission standards.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM_{2.5} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 60 percent of the ambient PM_{2.5} in the San Francisco Bay Area Air Basin.

Directly Emitted PM _{2.5} Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	81	79	79	83	81	84	81	83	84	87
Stationary Sources	26	20	14	12	15	14	11	12	13	13
Area-wide Sources	38	41	44	47	47	51	53	55	57	60
On-Road Mobile	5	7	8	10	7	7	7	7	7	7
Gasoline Vehicles	3	3	2	3	3	3	4	4	5	5
Diesel Vehicles	2	4	6	7	4	4	3	3	2	1
Other Mobile	12	12	13	15	12	11	10	9	8	7
Gasoline Fuel	1	1	1	1	1	1	1	2	2	2
Diesel Fuel	8	8	8	10	8	8	7	6	4	3
Other Fuel	3	3	3	4	3	2	1	2	2	2

Table 4-20

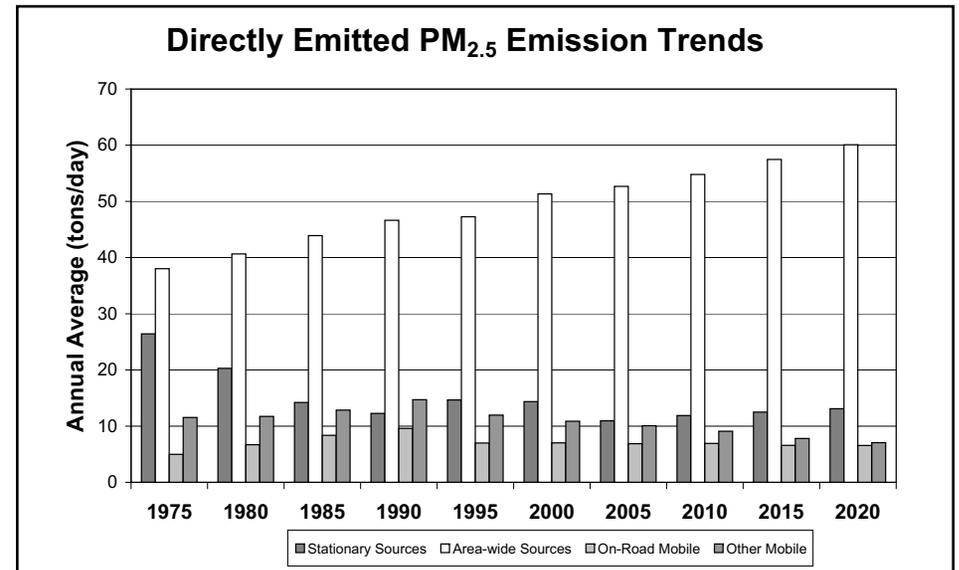


Figure 4-22

San Francisco Bay Area Air Basin

PM₁₀ Air Quality Trend

As with other pollutants, the PM₁₀ statistics also show overall improvement. During the period for which data are available, the three-year average of the annual average (State) decreased by 23 percent.

Calculated exceedance days for the State 24-hour standard dropped from a high of 76 days during 1989 to 23 days during 2005 and then rose to 77 in 2006. The national 24-hour standard was last exceeded in 1991. Because many of the same sources contribute to both ozone and PM₁₀, future ozone precursor emission controls should help ensure continued PM₁₀ improvements.

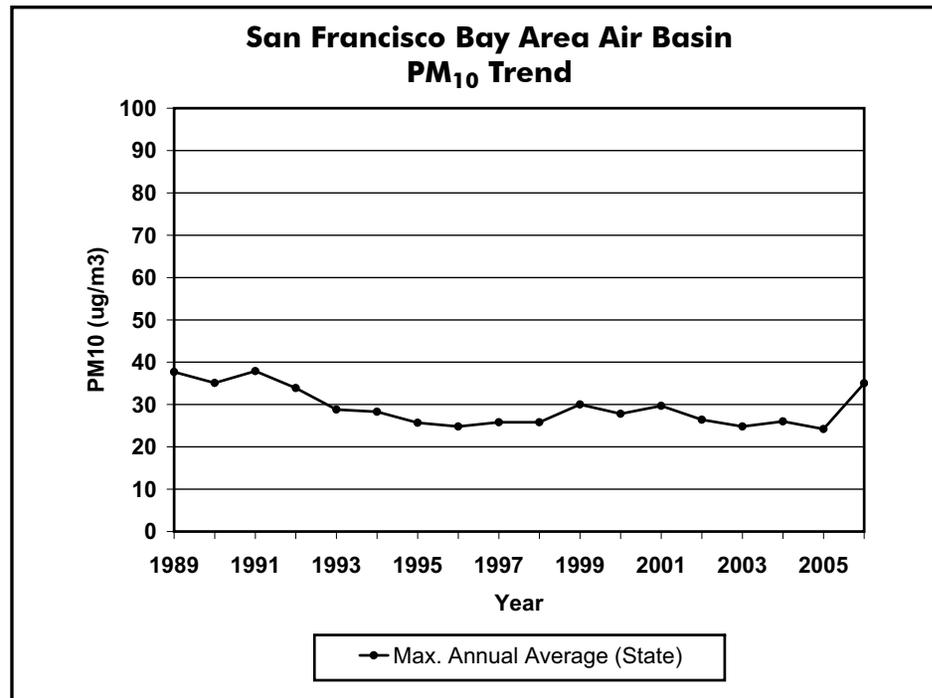


Figure 4-23

PM ₁₀ (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)		146	147	165	155	112	93	97	74	76	85	100	117	80	114	84	60	65	81	106
Max. 24-Hr. Concentration (Nat)		146	150	165	155	112	101	97	75	77	95	92	119	76	109	80	58	63	78	104
Max. Annual Average (State)			37.7	35.1	37.9	33.9	28.8	28.3	25.7	24.8	25.8	25.8	30.0	27.8	29.7	26.4	24.8	26.0	24.2	35.0
Max. Annual Average (Nat)		33.8	40.8	35.2	38.3	33.7	28.8	28.6	28.4	24.9	25.8	25.1	28.7	26.8	28.9	30.6	24.2	25.3	23.5	34.1
Calc Days Above State 24-Hr Std			76	70	91	53	37	36	24	12	18	18	37	42	48	24	18	25	23	77
Calc Days Above Nat 24-Hr Std			0	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-21

San Francisco Bay Area Air Basin

PM_{2.5} Air Quality Trend

Annual average PM_{2.5} concentrations (national) in the San Francisco Bay Area decreased in the last eight years. The State annual average concentration trend however, remained relatively constant during the last seven years, due to differences in State and national monitoring methods. The 98th percentile of 24-hour PM_{2.5} concentrations also declined during the last eight-year period. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. Measures adopted as part of SB 656, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

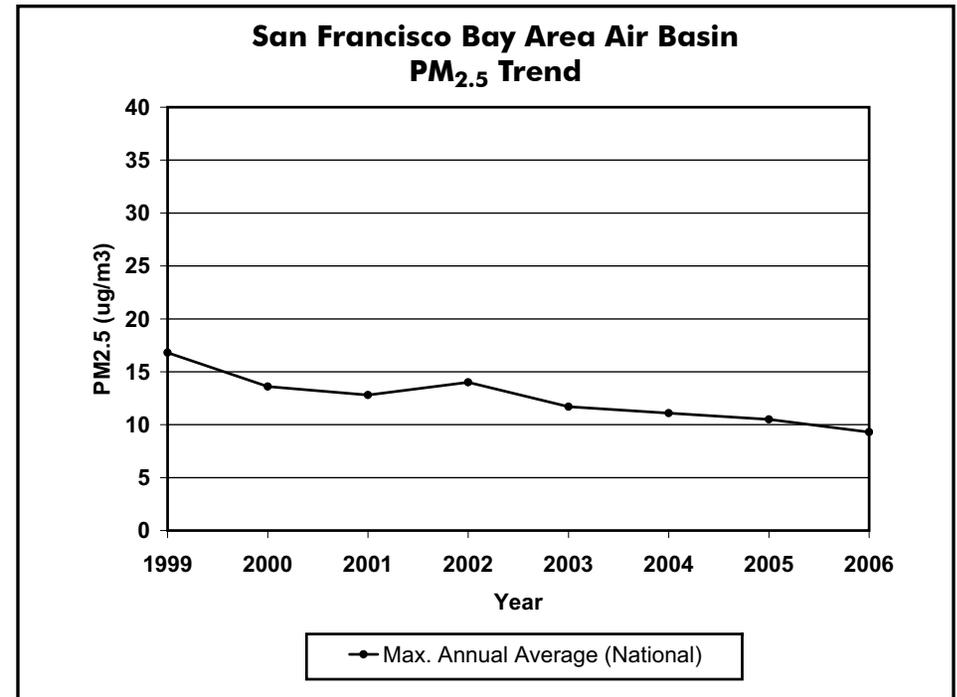


Figure 4-24

PM _{2.5} (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)													90.5	67.2	107.5	84.5	56.1	73.7	55.6	75.3
Max. 24-Hr. Concentration (Nat)													90.5	67.2	107.5	76.7	56.1	73.7	54.6	75.3
98th Percentile of 24-Hr Conc.													63.2	55.3	57.1	57.5	37.4	42.7	41.2	42.8
Annual Average (State)														11.6	12.9	14.0	11.7	12.7	11.8	12.4
Avg. of Qtrly. Means (Nat)													16.8	13.6	12.8	14.0	11.7	11.1	10.5	9.3

Table 4-22

San Francisco Bay Area Air Basin Carbon Monoxide Emission Trends and Forecasts

Emissions of CO have been declining in the San Francisco Bay Area Air Basin since 1975. Motor vehicles and other mobile sources are the largest sources of CO emissions in the air basin. Emissions from motor vehicles have been declining, with the introduction of new automotive emission controls, despite increases in VMT. Commercial and industrial fuel combustion and electric generation contribute a significant portion of the stationary source CO emissions. Area-wide CO emissions are primarily from residential fuel combustion (including wood), waste burning, and fires.

CO Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	9075	8334	7011	5325	3917	2961	2041	1617	1363	1230
Stationary Sources	46	55	73	65	62	50	38	38	40	42
Area-wide Sources	126	135	143	160	163	169	178	182	188	194
On-Road Mobile	8391	7615	6209	4446	3077	2203	1338	914	631	460
Gasoline Vehicles	8381	7597	6182	4414	3050	2177	1312	889	611	444
Diesel Vehicles	9	18	27	32	27	26	25	25	20	16
Other Mobile	511	529	586	654	615	539	488	484	504	533
Gasoline Fuel	401	416	463	512	472	410	364	351	359	376
Diesel Fuel	57	57	64	79	82	71	62	62	67	73
Other Fuel	53	56	59	62	62	59	61	70	77	85

Table 4-23

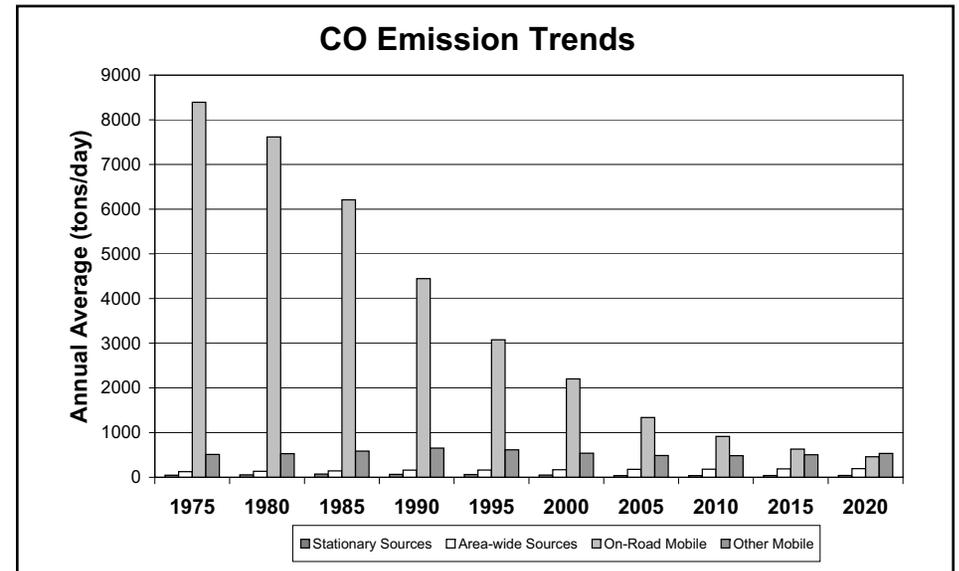


Figure 4-25

San Francisco Bay Area Air Basin

Carbon Monoxide Air Quality Trend

Similar to other areas of the State, CO concentrations in the San Francisco Bay Area Air Basin have declined substantially over the last 20 years. The peak 8-hour indicator value during 2006 is 26 percent of what it was during 1987 and is now well below the level of the standards. In fact, neither the State nor the national standards have been exceeded in this area since 1991.

Much of the decline in ambient CO concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles. The San Francisco Bay Area Air Basin is currently designated as attainment for both the State and national CO standards. Based on emission projections, the area is expected to maintain its attainment status in the coming years.

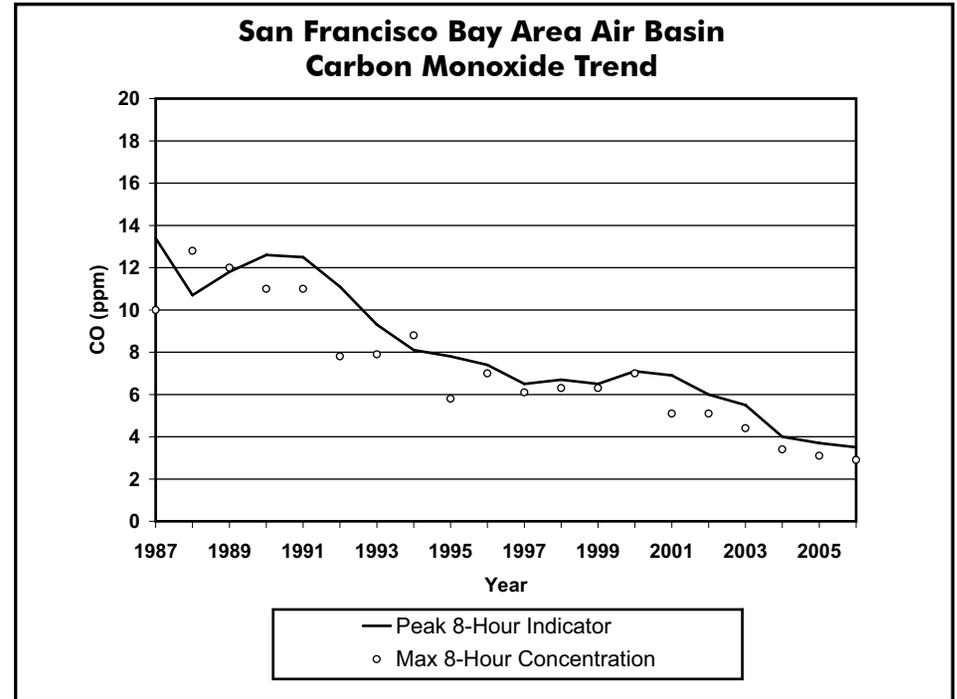


Figure 4-26

CARBON MONOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 8-Hr. Indicator (State)	13.4	10.7	11.8	12.6	12.5	11.1	9.3	8.1	7.8	7.4	6.5	6.7	6.5	7.1	6.9	6.0	5.5	4.0	3.7	3.5
Max. 1-Hr. Concentration	17.0	15.0	19.0	18.0	15.0	12.0	14.0	12.0	10.1	8.8	10.7	8.7	9.0	9.8	7.6	7.7	8.6	4.8	4.5	5.5
Max. 8-Hr. Concentration (State)	10.0	12.8	12.0	11.0	11.0	7.8	7.9	8.8	5.8	7.0	6.1	6.3	6.3	7.0	5.1	5.1	4.4	3.4	3.1	2.9
Days Above State 8-Hr. Std.	2	4	10	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	1	4	9	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-24

San Francisco Bay Area Air Basin Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x and NO₂ have decreased in the San Francisco Bay Area Air Basin since 1975 and are projected to continue declining through 2020. The Bay Area has a significant motor vehicle population, and the implementation of stricter motor vehicle controls has resulted in significant emissions reductions for NO_x.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	943	918	821	797	720	622	496	423	348	301
Stationary Sources	229	205	134	124	107	83	49	49	51	53
Area-wide Sources	13	14	15	19	20	19	20	20	21	21
On-Road Mobile	542	540	500	453	385	312	234	181	124	88
Gasoline Vehicles	516	493	427	356	296	215	128	86	59	42
Diesel Vehicles	26	47	73	97	89	98	106	94	64	46
Other Mobile	159	159	172	201	208	207	194	174	153	138
Gasoline Fuel	10	10	11	13	14	14	13	11	10	10
Diesel Fuel	123	121	130	154	158	154	142	120	97	77
Other Fuel	27	28	31	34	37	39	39	43	46	51

Table 4-25

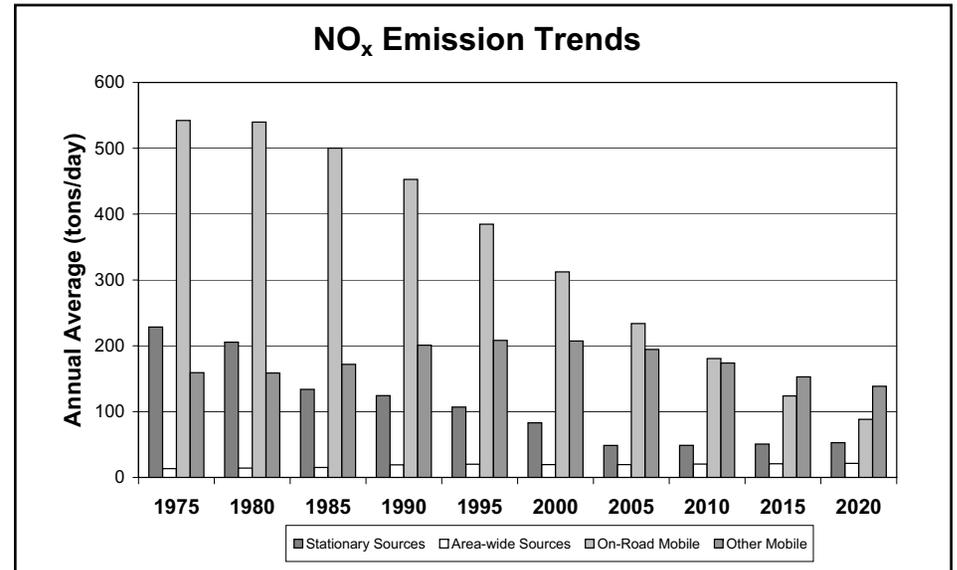


Figure 4-27

San Francisco Bay Area Air Basin

Nitrogen Dioxide Air Quality Trend

The San Francisco Bay Area has attained both the State and national NO₂ standards for more than 20 years. During this time-period, there have been no concentrations that exceeded the level of the State 1-hour or the national annual standard. Ambient concentrations continue to be well below the level of both standards. The peak 1-hour indicator has declined by 58 percent in the San Francisco Bay Area since 1987. This downward trend is expected to continue.

NO₂ is formed from NO_x emissions, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's NO_x emissions.

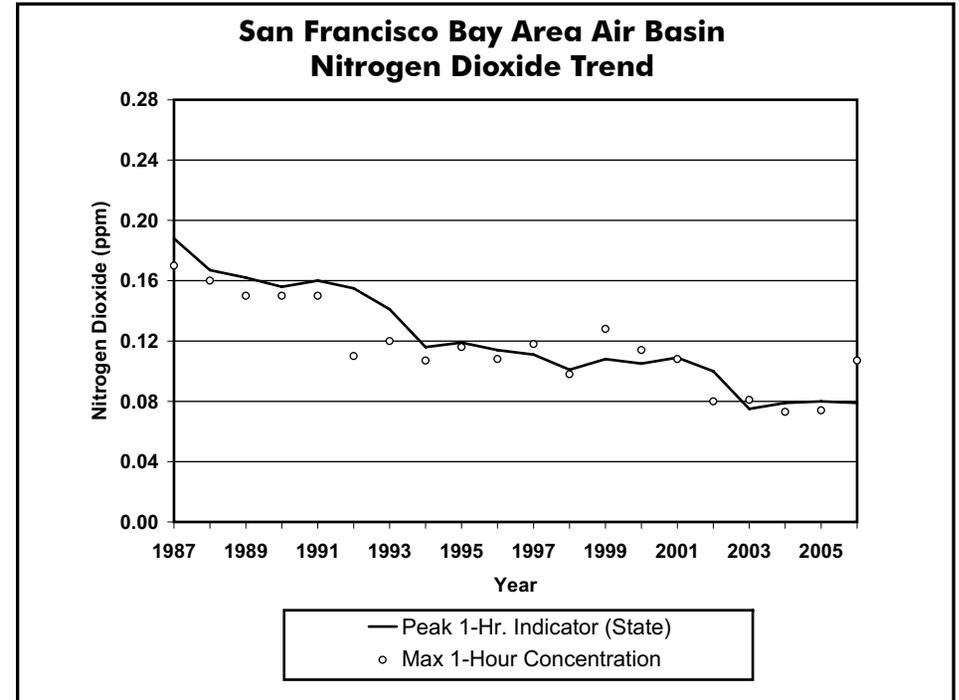


Figure 4-28

NITROGEN DIOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 1-Hr. Indicator (State)	0.188	0.167	0.162	0.156	0.160	0.155	0.141	0.116	0.119	0.114	0.111	0.101	0.108	0.105	0.109	0.100	0.075	0.079	0.080	0.079
Max. 1-Hr. Concentration	0.170	0.160	0.150	0.150	0.150	0.110	0.120	0.107	0.116	0.108	0.118	0.098	0.128	0.114	0.108	0.080	0.081	0.073	0.074	0.107
Max. Annual Average (Nat)	0.031	0.032	0.032	0.030	0.031	0.027	0.027	0.028	0.027	0.025	0.025	0.025	0.026	0.025	0.024	0.019	0.018	0.017	0.019	0.018
Max. Annual Average (State)	0.031	0.032	0.032	0.030	0.031	0.027	0.027	0.028	0.027	0.025	0.025	0.025	0.026	0.025	0.024	0.019	0.018	0.017	0.019	0.016

Table 4-26

San Joaquin Valley Air Basin

Introduction - Area Description

The San Joaquin Valley Air Basin occupies the southern two-thirds of California's Central Valley. The eight-county area comprises Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties and the western portion of Kern County. The Valley covers nearly 23,490 square miles. With very few exceptions, the San Joaquin Valley is flat, with most of the area lying below 1,000 feet in elevation and most of the population living below 500 feet. The Valley floor slopes downward from east to west, and the San Joaquin River winds its way along the western side from south to north.

Similar to other inland areas, the San Joaquin Valley has cool wet winters and hot dry summers. Generally, the temperature increases and rainfall decreases from north to south.

In contrast to other California areas, air quality in the San Joaquin Valley is not dominated by emissions from one large urban area. Instead, there are a number of moderately sized urban areas spread along the main axis of the Valley. This wide distribution of emissions complicates the challenge faced by air quality control agencies. Overall, about 10 percent of California's population lives in the San Joaquin Valley, and pollution sources in the region account for about 13 percent of the total statewide criteria pollutant emissions.

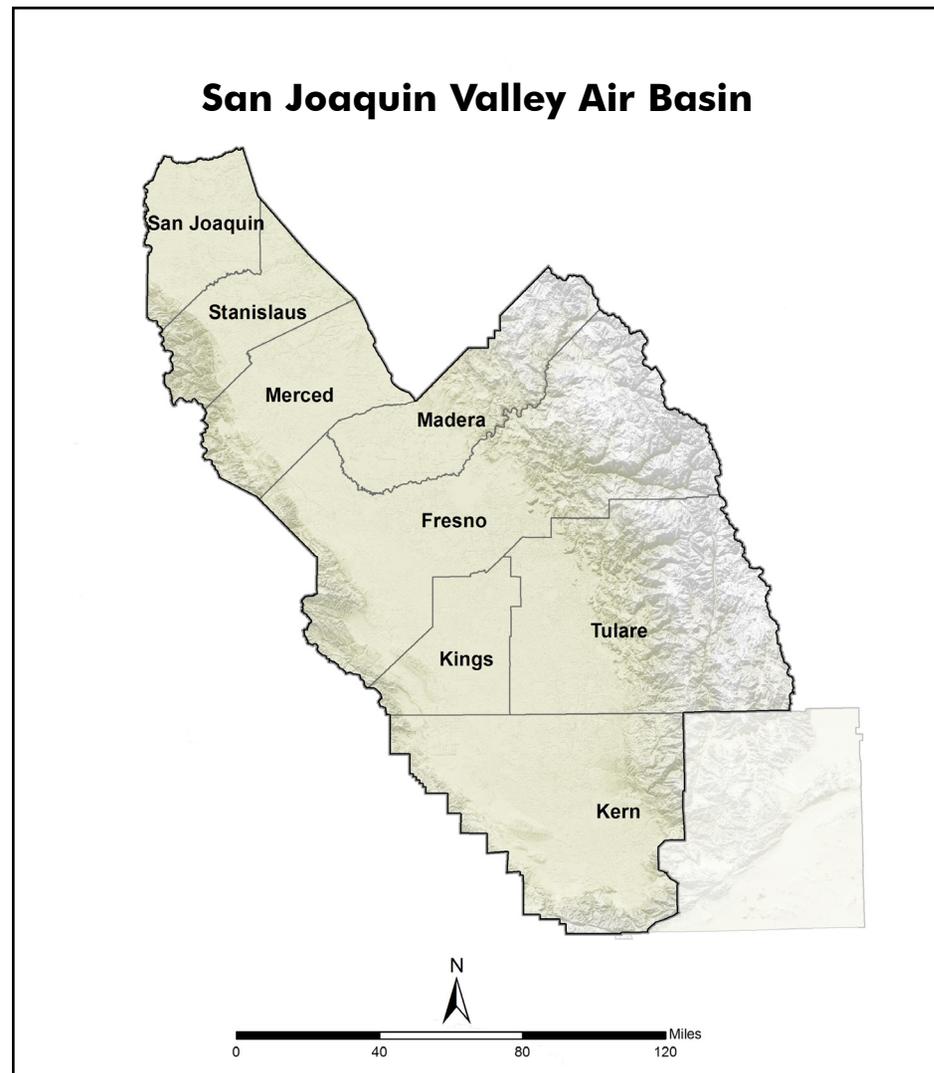


Figure 4-29

San Joaquin Valley Air Basin

Emission Trends and Forecasts

The emission levels in the San Joaquin Valley Air Basin have been decreasing since 1990 with the exception of PM₁₀, which has remained relatively unchanged. The decreases are predominantly due to motor vehicle controls and reductions in evaporative and fugitive emissions. On-road motor vehicles are the largest contributors to CO emissions in the San Joaquin Valley. On-road motor vehicles, other mobile sources, and stationary sources are all significant contributors to NO_x emissions. A significant portion of the stationary source ROG emissions is fugitive emissions from the extensive oil and gas production operations in the lower San Joaquin Valley. PM₁₀ emissions are mostly fugitive dust from paved and unpaved roads, agricultural operations, and waste burning. The emission levels for SO_x have decreased since 1975. This is mainly due to the switch from fuel oil to natural gas for electric generation and to reduced fuel sulfur content. The SO_x emissions increase slightly after 2010. This increase is seen mainly in the industrial fuel combustion categories.

San Joaquin Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	700	839	831	844	750	672	616	549	431	349
ROG	1102	1176	1026	617	486	432	381	357	344	343
PM ₁₀	287	284	287	346	336	339	297	293	294	300
PM _{2.5}	126	118	114	123	114	114	106	102	99	99
SO _x	299	272	129	100	33	37	26	25	27	29
CO	3564	3514	3241	3020	2404	1966	1538	1285	1101	1001

Table 4-27

San Joaquin Valley Air Basin

Population and VMT

Compared to California's other urban areas, the population and number of vehicle miles traveled each day in the San Joaquin Valley Air Basin has grown and is projected to grow at a much faster rate than most other areas of the State. The population is projected to increase about 144 percent, from nearly two million in 1980 to nearly five million in 2020. During the same period, the daily VMT is projected to increase by 312 percent, from nearly 33 million miles per day in 1980 to over 129 million miles per day in 2020. These growth rates are much higher than the growth rates in other areas.

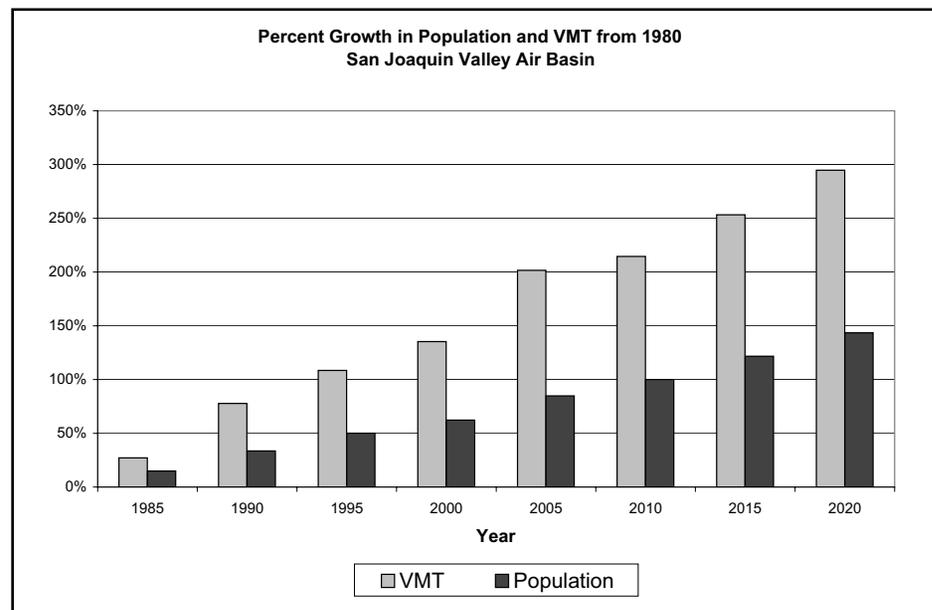


Figure 4-30

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1979840	2275776	2645311	2972667	3212615	3658320	3959518	4389922	4820322
Avg. Daily VMT/1000	32804	41697	58326	68389	77176	98950	103176	115884	129484

Table 4-28

San Joaquin Valley Air Basin

Ozone Precursor Emission - Trends and Forecasts

Emissions of the ozone precursors NO_x and ROG are decreasing in the San Joaquin Valley Air Basin. Both stationary source and motor vehicle NO_x emissions have been reduced by the adoption of more stringent emission standards. Stricter standards have reduced ROG emissions from motor vehicles since 1980, even though VMT have been increasing. Stationary and area-wide sources of ROG include petroleum production operations and the use of solvents. Stricter emission standards and new controls have reduced the ROG emissions from these sources.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	700	839	831	844	750	672	616	549	431	349
Stationary Sources	246	328	321	267	197	135	104	104	107	108
Area-wide Sources	21	21	21	20	19	19	18	18	17	17
On-Road Mobile	245	261	293	344	344	339	339	298	204	140
Gasoline Vehicles	158	158	152	160	150	117	77	55	39	29
Diesel Vehicles	87	103	141	184	194	221	262	243	165	111
Other Mobile	189	230	196	214	190	179	155	129	104	84
Gasoline Fuel	4	5	5	6	6	6	6	6	6	6
Diesel Fuel	180	220	188	204	181	169	143	117	92	72
Other Fuel	4	5	4	4	4	5	5	6	6	7

Table 4-29

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1102	1176	1026	617	486	432	381	357	344	343
Stationary Sources	632	701	568	185	92	88	77	80	83	86
Area-wide Sources	120	127	134	141	149	146	147	152	161	171
On-Road Mobile	285	271	250	216	174	131	95	72	53	41
Gasoline Vehicles	274	257	231	193	158	114	78	55	40	32
Diesel Vehicles	11	14	18	23	16	17	17	17	13	9
Other Mobile	64	78	74	75	71	67	63	54	48	46
Gasoline Fuel	31	39	43	42	40	38	36	32	30	30
Diesel Fuel	24	30	25	28	26	23	19	15	11	8
Other Fuel	9	9	6	6	5	6	7	7	7	7

Table 4-30

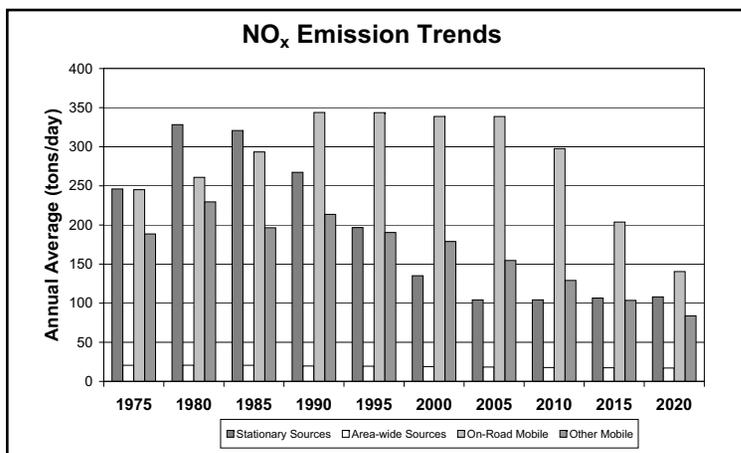


Figure 4-31

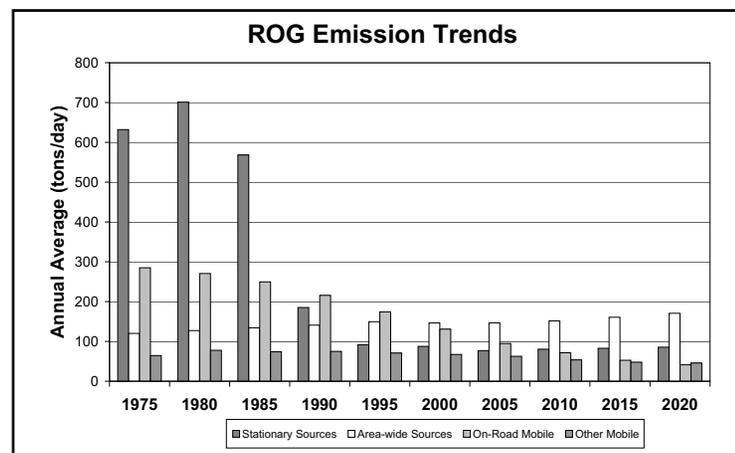


Figure 4-32

San Joaquin Valley Air Basin

Ozone Air Quality Trend

The ozone problem in the San Joaquin Valley ranks among the most severe in the State. Looking at ozone air quality from a historical perspective is challenging because of the lack of long-term monitors prior to 1990. Furthermore, monitoring did not include the sites in the worst portions of the basin until 1990. For this reason we are using 1990 as the beginning year to characterize trends.

Similar to other areas of the State, exceedance days have declined at a faster rate than peak levels. Peak levels declined by ten percent while the number of State and national 8-hour exceedance days declined by 38 percent and 35 percent respectively. Most of this progress has occurred since 2003. However, the number of exceedance days in 2006 and 2007 were among the lowest in this 18 year period.

The ARB has identified the San Joaquin Valley Air Basin as both a contributor and a receptor for ozone transport. The Valley is a transport contributor to the Sacramento region, the Great Basin Valleys Air Basin, the Mountain Counties Air Basin, the Mojave Desert Air Basin, the North Central Coast Air Basin, and the South Central Coast Air Basin. In contrast, the San Joaquin Valley Air Basin is a receptor area for ozone transported from the Sacramento region and the San Francisco Bay Area Air Basin.

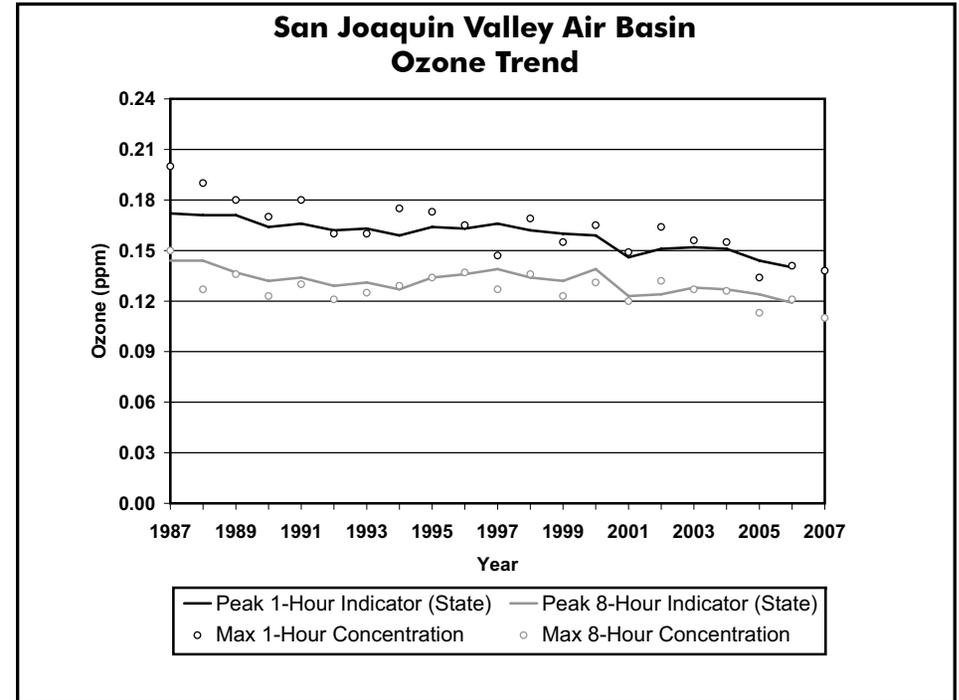


Figure 4-33

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.144	0.144	0.137	0.132	0.134	0.129	0.131	0.127	0.134	0.136	0.139	0.134	0.132	0.139	0.123	0.124	0.128	0.127	0.124	0.119	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.118	0.121	0.116	0.112	0.118	0.115	0.112	0.111	0.119	0.119	0.115	0.115	0.113	0.111	0.109	0.115	0.115	0.116	0.113	0.110	
Peak 1-Hour Indicator (State)	0.172	0.171	0.171	0.164	0.166	0.162	0.163	0.159	0.164	0.163	0.166	0.162	0.160	0.159	0.146	0.151	0.152	0.151	0.144	0.140	
4th High 1-Hr. in 3 Yrs ²	0.170	0.170	0.180	0.170	0.160	0.160	0.160	0.160	0.164	0.165	0.164	0.161	0.161	0.161	0.146	0.151	0.151	0.151	0.149	0.135	
Max. 8-Hr. Concentration	0.150	0.127	0.136	0.123	0.130	0.121	0.125	0.129	0.134	0.137	0.127	0.136	0.123	0.131	0.120	0.132	0.127	0.126	0.113	0.121	0.110
Maximum 1-Hr. Concentration	0.200	0.190	0.180	0.170	0.180	0.160	0.160	0.175	0.173	0.165	0.147	0.169	0.155	0.165	0.149	0.164	0.156	0.155	0.134	0.141	0.138
Days Above State 8-Hr. Std.	189	200	182	179	167	169	174	166	163	164	169	127	175	158	192	181	172	167	124	141	138
Days Above Nat. 8-Hr. Std.	148	140	133	104	121	119	103	108	109	114	95	84	117	103	109	125	134	109	72	86	65
Days Above State 1-Hr. Std.	156	156	148	131	133	127	125	118	124	120	110	90	123	114	123	127	137	106	83	90	69

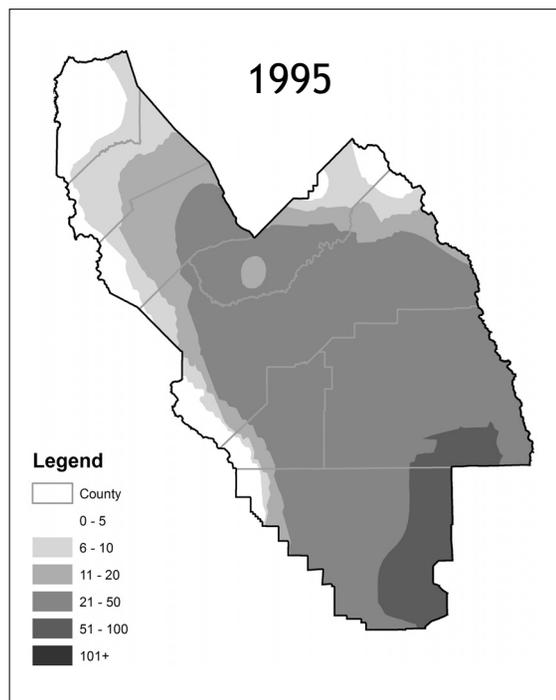
¹ Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

² The national 1-Hour standard has been revoked. Historical 1-Hour data are provided for reference.

Table 4-31

San Joaquin Valley Air Basin

Ozone Contour Maps - 3-year Average of National 8-Hour Exceedance Days



NOTE: Values used in these maps are for long-term sites only. Long-term sites are used to more accurately represent a trend over a period, by comparing the same or similar sites over a long period.

Figure 4-34

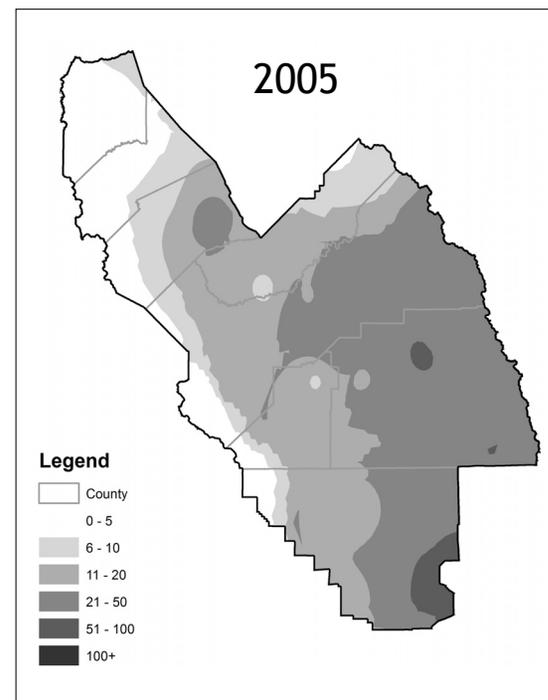


Figure 4-35

Another way to look at ozone air quality is to evaluate how widespread the problem is within the air basin, using data for all sites. The maps on this page illustrate the reduction in days exceeding the national 8-hour standard over the last decade throughout the basin. The use of three-year averages helps to mitigate the changes in meteorology.

Similar to the South Coast, the two maps show a substantial reduction in the number of exceedance days over the last ten years. During the 1995 time period, more than half of the San Joaquin Valley had between 21 and 50 exceedance days. The worst site had about 90 days, which is equivalent to about three months during a year with ozone concentrations above the level of the standard. Areas in the northern San Joaquin Valley were cleaner than areas in the central and southern

Valley. However, only a relatively small portion of the Basin averaged ten or fewer exceedance days.

The 2005 map shows a dramatic expansion of cleaner areas. Most of San Joaquin and Stanislaus counties now meet the national 8-hour ozone standard. Much of the rest of the Valley experiences an average of only 6 to 20 exceedance days per year. Areas with more than 20 exceedance days are now generally limited to the eastern portion of the central and southern San Joaquin Valley. While the extent of these areas is much smaller than the 1995 timeframe, the areas of poor ozone air quality are also the most heavily populated. Even though these areas still pose a challenge, the worst sites show an average reduction in exceedance days of more than 35 percent over the last decade.

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San Joaquin Valley Air Basin Directly Emitted PM₁₀ Emission Trends and Forecasts

Direct emissions of PM₁₀ have remained relatively unchanged between 1975 and 2005 and are projected to remain unchanged through 2020. PM₁₀ emissions in the San Joaquin Valley are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from farming operations, waste burning, and residential fuel combustion (including wood).

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM₁₀ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM₁₀ emissions contribute approximately 75 percent of the ambient PM₁₀ in the San Joaquin Valley Air Basin.

Directly Emitted PM ₁₀ Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	287	284	287	346	336	339	297	293	294	300
Stationary Sources	58	42	34	27	26	27	25	24	25	26
Area-wide Sources	204	213	222	281	282	285	246	246	250	258
On-Road Mobile	12	14	18	23	17	15	15	14	11	10
Gasoline Vehicles	2	2	2	2	3	3	4	5	5	6
Diesel Vehicles	10	12	16	21	14	12	11	9	6	4
Other Mobile	13	16	14	15	11	11	10	9	7	6
Gasoline Fuel	0	1	1	1	1	1	1	1	2	2
Diesel Fuel	12	15	12	13	10	9	8	6	4	3
Other Fuel	1	1	1	1	1	1	1	2	2	2

Table 4-32

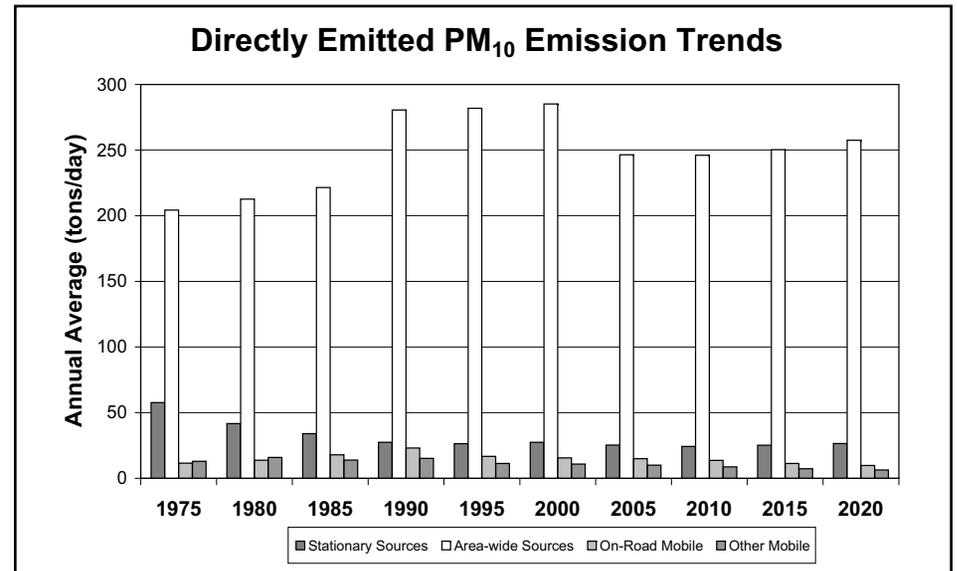


Figure 4-36

San Joaquin Valley Air Basin

Directly Emitted PM_{2.5} Emission Trends and Forecasts

Direct emissions of PM_{2.5} decreased from 1975 to 2005 and are projected to continue decreasing through 2020. PM_{2.5} emissions in the San Joaquin Valley are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from farming operations, waste burning, and residential fuel combustion (including wood).

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM_{2.5} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 60 percent of the ambient PM_{2.5} in the San Joaquin Valley Air Basin.

Directly Emitted PM _{2.5} Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	126	118	114	123	114	114	106	102	99	99
Stationary Sources	46	32	24	18	18	18	17	17	18	19
Area-wide Sources	57	59	61	72	72	73	67	66	66	68
On-Road Mobile	10	12	16	20	14	13	12	11	9	7
Gasoline Vehicles	1	1	1	1	2	2	2	3	3	3
Diesel Vehicles	9	11	15	19	13	11	10	8	5	4
Other Mobile	12	15	13	14	10	10	9	8	7	6
Gasoline Fuel	0	0	1	1	1	1	1	1	1	1
Diesel Fuel	11	13	11	12	9	8	7	5	4	2
Other Fuel	1	1	1	1	1	1	1	2	2	2

Table 4-33

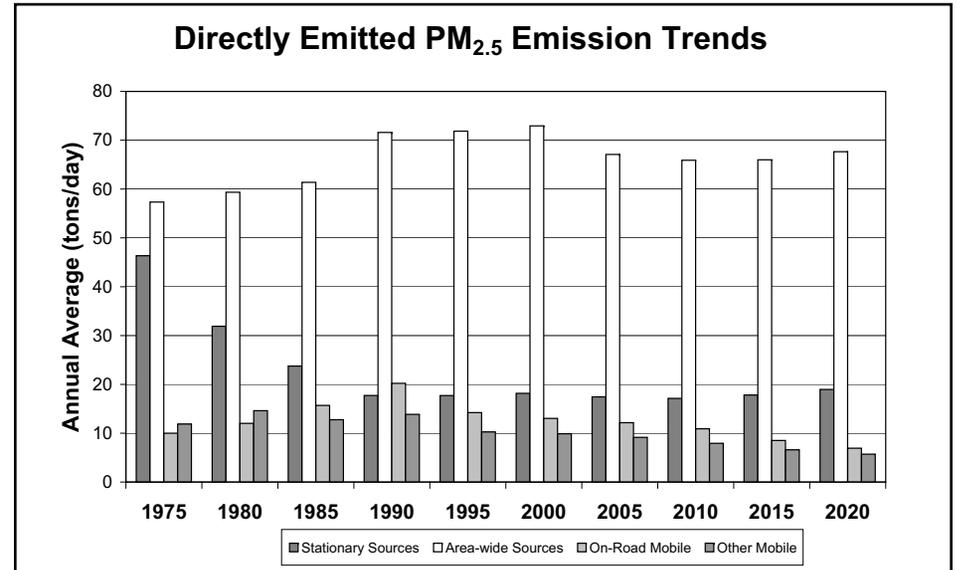


Figure 4-37

San Joaquin Valley Air Basin

PM₁₀ Air Quality Trend

The available PM₁₀ data show some variation during the trend period, but overall, there has been a downward trend. The low values for the annual average in 1988 and 1989 are due to the limited number of monitors with complete data for these years during the startup of the PM monitoring network. The period between 1990 and 2006 provides a better indication of trends. Over this period, the three-year average of the annual average (State) shows a decrease of 32 percent. The calculated number of days exceeding the State and national 24-hour standards also shows a decrease. There were 292 calculated State standard exceedance days and 31 calculated national standard exceedance days during 1990. During 2006, there were 167 calculated State standard exceedance days and 13 national standard exceedance days.

Although PM₁₀ air quality has improved overall in the San Joaquin Valley Air Basin, values overall are highly variable. The variability appears to be a result of meteorology, while the overall downward trend is consistent with a change in emissions. While, based on the ambient data, the San Joaquin Valley now attains the national PM₁₀ standards, it will still be a number of years before this area reaches attainment of the more stringent State standards.

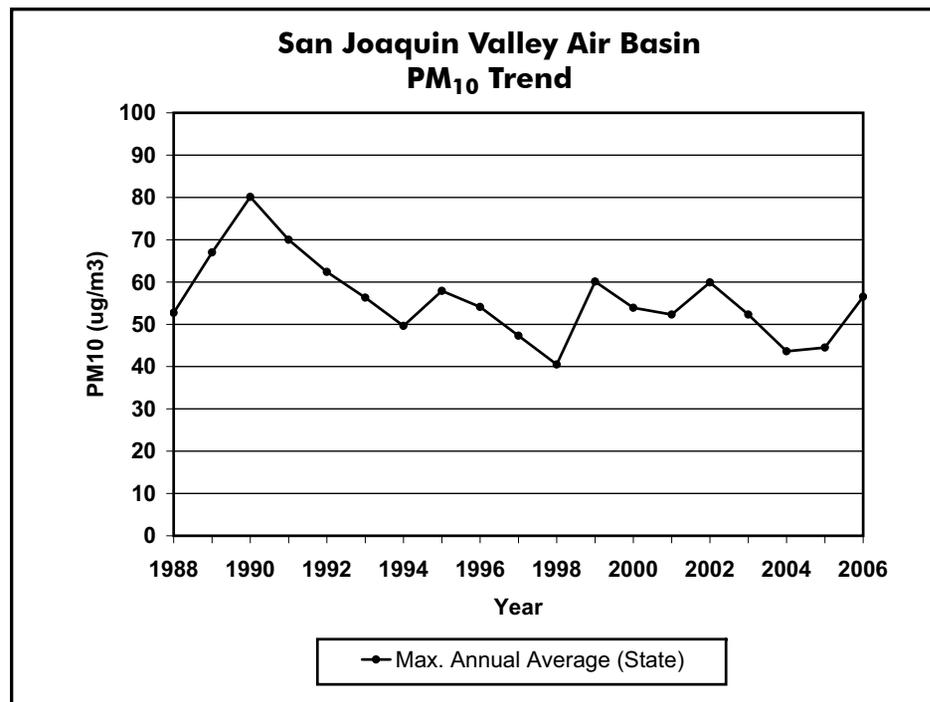


Figure 4-38

PM ₁₀ (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)		206	237	439	279	186	239	192	279	153	199	167	186	153	221	194	150	219	137	255
Max. 24-Hr. Concentration (Nat)		206	237	439	279	186	239	192	279	153	228	160	183	145	212	189	150	217	131	304
Max. Annual Average (State)		52.7	67.0	80.1	70.0	62.4	56.3	49.6	57.9	54.1	47.3	40.5	60.1	53.9	52.3	59.9	52.3	43.6	44.5	56.5
Max. Annual Average (Nat)		74.3	79.3	79.3	76.3	62.9	56.9	50.1	58.2	52.0	48.2	52.5	59.5	53.1	57.4	59.2	52.4	47.9	44.3	55.4
Calc Days Above State 24-Hr Std		159	208	292	225	246	183	166	184	204	107	102	182	196	168	256	167	113	146	167
Calc Days Above Nat 24-Hr Std		0	29	31	18	18	20	6	12	0	6	6	8	0	14	6	0	7	0	13

NOTE: 13 National standard exceedance days due to exceptional events such as high wind days.

Table 4-34

San Joaquin Valley Air Basin

PM_{2.5} Air Quality Trend

Annual average (national) PM_{2.5} concentrations in the San Joaquin Valley Air Basin show a definite downward trend from 1999 through 2006. The State annual average concentrations remained relatively constant from 1999 through 2006, with a slight drop in 2003. The differences in trends are due to differences in State and national monitoring methods. The 98th percentile of 24-hour PM_{2.5} concentrations also declined during this period. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. The San Joaquin Valley Air Basin is currently designated as nonattainment for the State and national PM_{2.5} standards. Measures adopted as part of the upcoming PM_{2.5} SIP, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

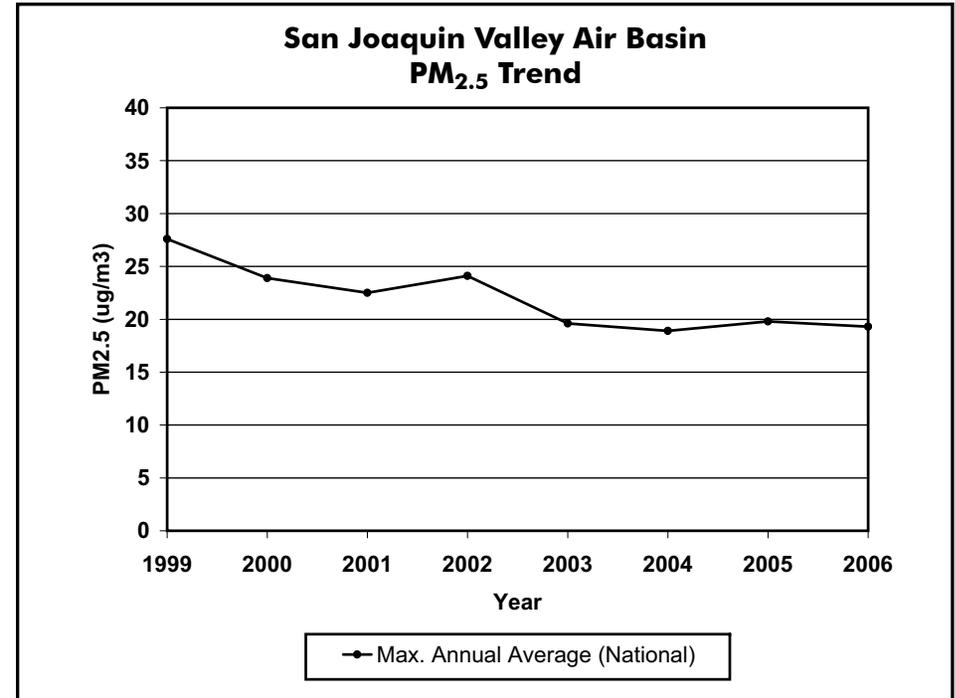


Figure 4-39

PM _{2.5} (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)													136.0	160.0	154.7	104.3	84.5	77.0	102.1	88.1
Max. 24-Hr. Concentration (Nat)													136.0	160.0	154.7	90.7	67.8	71.0	92.5	87.0
98th Percentile of 24-Hr Conc.													120.0	103.0	96.0	80.4	56.0	61.5	74.9	64.7
Annual Average (State)													23.4	23.9	20.8	24.1	24.8	18.2	22.4	21.6
Avg. of Qtrly. Means (Nat)													27.6	23.9	22.5	24.1	19.6	18.9	19.8	19.3

Table 4-35

San Joaquin Valley Air Basin Carbon Monoxide Emission Trends and Forecasts

Emissions of CO decreased between 1975 and 2005 and are projected to continue decreasing through 2020. Motor vehicles are by far the largest source of CO emissions. Emissions from motor vehicles have been declining since 1975, despite increases in VMT, with the introduction of new automotive emission controls and fleet turnover.

CO Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	3564	3514	3241	3020	2404	1966	1538	1285	1101	1001
Stationary Sources	188	160	62	76	63	55	53	55	56	57
Area-wide Sources	261	266	272	275	270	269	269	268	268	269
On-Road Mobile	2767	2664	2516	2241	1676	1285	877	629	443	331
Gasoline Vehicles	2726	2613	2449	2156	1597	1209	801	556	387	286
Diesel Vehicles	41	51	67	85	79	76	75	72	56	45
Other Mobile	348	424	391	428	395	357	339	334	334	345
Gasoline Fuel	160	213	221	256	236	211	197	194	193	200
Diesel Fuel	80	101	91	104	93	77	63	56	53	53
Other Fuel	109	111	78	69	67	70	79	84	88	92

Table 4-36

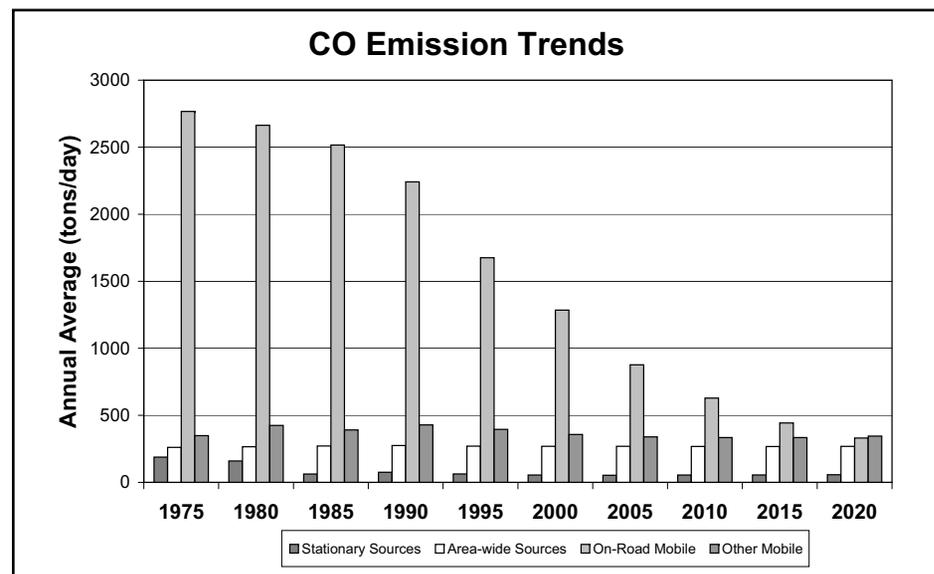


Figure 4-40

San Joaquin Valley Air Basin

Carbon Monoxide Air Quality Trend

CO concentrations show a fairly consistent downward trend from 1987 through 2006. The peak 8-hour indicator for 2006 is over 75 percent lower than that for 1987. Measured concentrations in the San Joaquin Valley Air Basin have not exceeded the national CO standards since 1991, and concentrations have not exceeded the State standards for the last 10 years. Much of the decline in ambient CO concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles.

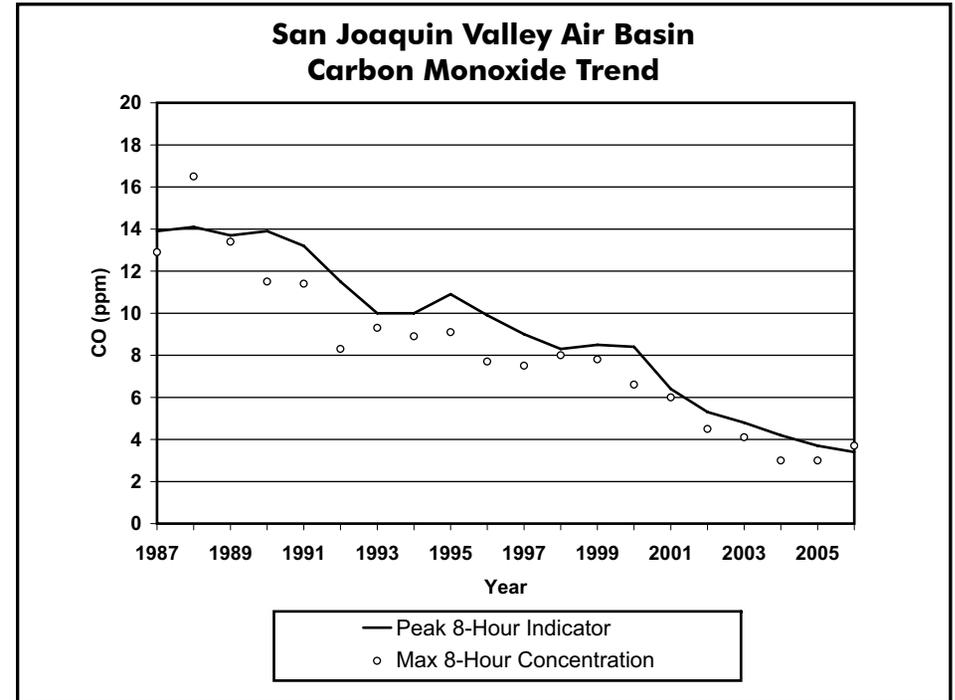


Figure 4-41

CARBON MONOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 8-Hr. Indicator (State)	13.9	14.1	13.7	13.9	13.2	11.5	10.0	10.0	10.9	9.9	9.0	8.3	8.5	8.4	6.4	5.3	4.8	4.2	3.7	3.4
Max. 1-Hr. Concentration	16.0	19.0	23.0	17.0	19.0	13.0	13.0	15.0	12.0	11.0	9.9	10.3	11.9	10.1	8.4	6.1	5.8	4.6	4.3	6.9
Max. 8-Hr. Concentration (State)	12.9	16.5	13.4	11.5	11.4	8.3	9.3	8.9	9.1	7.7	7.5	8.0	7.8	6.6	6.0	4.5	4.1	3.0	3.0	3.7
Days Above State 8-Hr. Std.	4	5	24	10	3	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	4	6	18	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-37

San Joaquin Valley Air Basin Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x and NO₂ increased between 1975 and 1990. Since 1990, however, emissions decreased and are projected to continue declining in the San Joaquin Valley Air Basin. Both stationary source and motor vehicle NO_x emissions have been reduced by the adoption of more stringent emission standards.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	700	839	831	844	750	672	616	549	431	349
Stationary Sources	246	328	321	267	197	135	104	104	107	108
Area-wide Sources	21	21	21	20	19	19	18	18	17	17
On-Road Mobile	245	261	293	344	344	339	339	298	204	140
Gasoline Vehicles	158	158	152	160	150	117	77	55	39	29
Diesel Vehicles	87	103	141	184	194	221	262	243	165	111
Other Mobile	189	230	196	214	190	179	155	129	104	84
Gasoline Fuel	4	5	5	6	6	6	6	6	6	6
Diesel Fuel	180	220	188	204	181	169	143	117	92	72
Other Fuel	4	5	4	4	4	5	5	6	6	7

Table 4-38

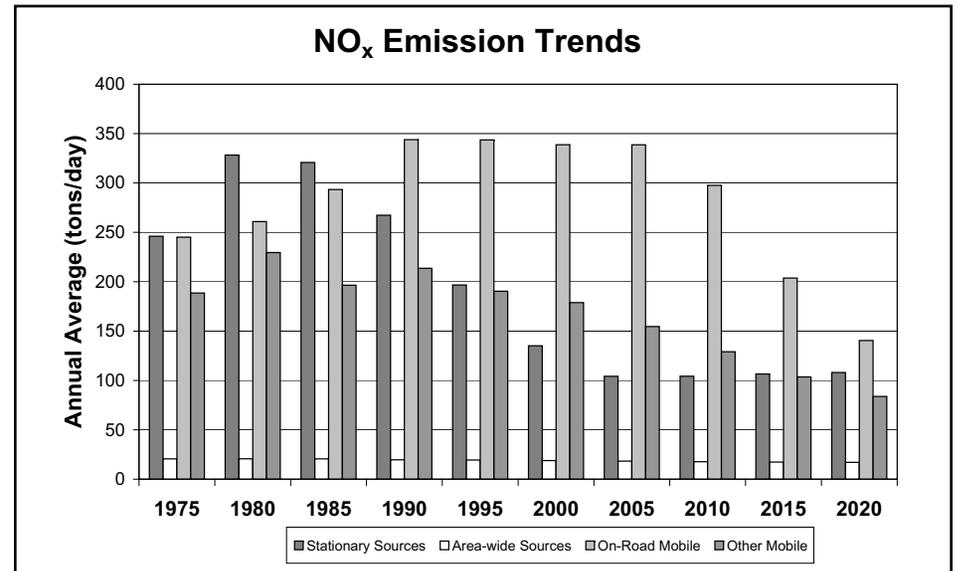


Figure 4-42

San Joaquin Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The San Joaquin Valley has attained both the State and national NO₂ standards for more than 20 years. During this time-period, there have been no concentrations that exceeded the level of the State 1-hour or the national annual standard. Ambient concentrations continue to be well below the level of both standards. From 1987 through 1989, ambient levels increased somewhat, but have decreased substantially since 1990. The peak 1-hour indicator has declined by more than 46 percent since 1990. This downward trend is expected to continue.

NO₂ is formed from NO_x emissions, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's NO_x emissions.

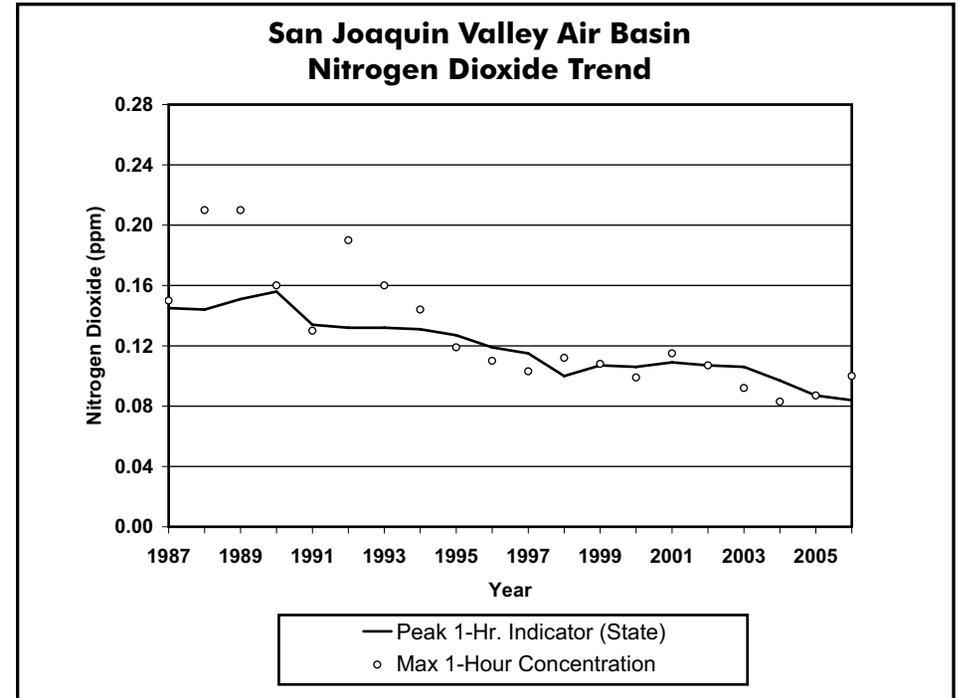


Figure 4-43

NITROGEN DIOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 1-Hr. Indicator (State)	0.145	0.144	0.151	0.156	0.134	0.132	0.132	0.131	0.127	0.119	0.115	0.100	0.107	0.106	0.109	0.107	0.106	0.097	0.087	0.084
Max. 1-Hr. Concentration	0.150	0.210	0.210	0.160	0.130	0.190	0.160	0.144	0.119	0.110	0.103	0.112	0.108	0.099	0.115	0.107	0.092	0.083	0.087	0.100
Max. Annual Average (Nat)	0.030	0.032	0.033	0.031	0.030	0.027	0.027	0.024	0.029	0.029	0.024	0.024	0.027	0.024	0.022	0.024	0.023	0.019	0.021	0.021
Max. Annual Average (State)	0.030	0.033	0.033	0.032	0.030	0.027	0.024	0.024	0.029	0.029	0.024	0.023	0.027	0.024	0.022	0.024	0.020	0.018	0.021	0.021

Table 4-39

San Diego Air Basin

Introduction - Area Description

The San Diego Air Basin lies in the southwest corner of California and comprises all of San Diego County. However, the population and emissions are concentrated mainly in the western portion of the County. The air basin covers 4,200 square miles, includes about eight percent of the State's population, and produces about seven percent of the State's criteria pollutant emissions. Because of its southerly location and proximity to the ocean, much of the San Diego Air Basin has a relatively mild climate. Higher temperatures and seasonal variations are experienced further inland.

Air quality in the San Diego Air Basin is impacted not only by local emissions, but also by pollutants transported from other areas -- in particular, ozone and ozone precursor emissions transported from the South Coast Air Basin and Mexico. Although the impact of transport is particularly important on days with high ozone concentrations, transported pollutants and emissions cannot be attributed entirely for the ozone problem in the San Diego area. Studies show that emissions from the San Diego Air Basin are sufficient, on their own, to cause ozone violations.

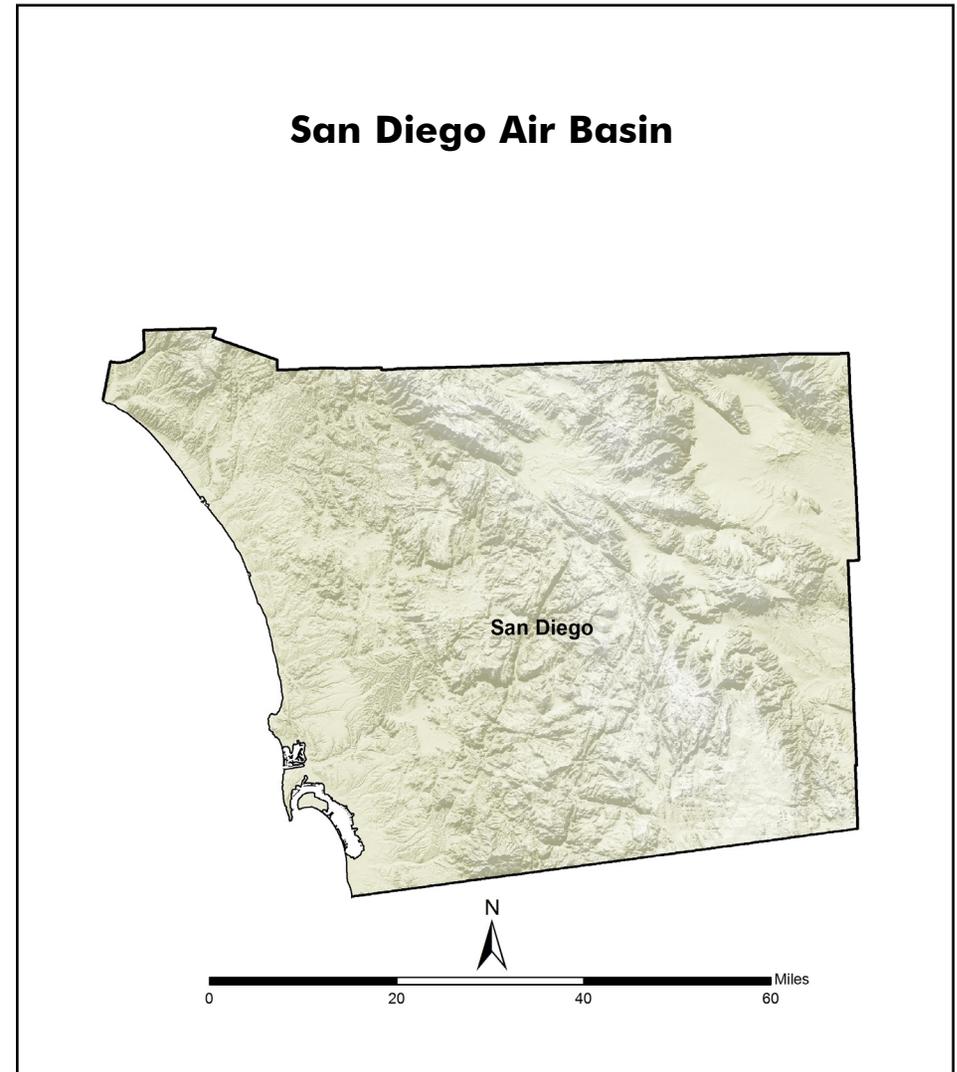


Figure 4-44

San Diego Air Basin

Emission Trends and Forecasts

Emissions of NO_x, ROG, PM₁₀, and CO in the San Diego Air Basin have been following the declining statewide trends since 1975. These trends are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources (both on-road and other) are by far the largest contributors to NO_x, ROG, and CO emissions in the San Diego Air Basin. The majority of the PM₁₀ emissions are from area-wide sources. The emission levels for SO_x have also followed the statewide trends since 1975. The SO_x emissions are forecasted to increase in future years due to predicted growth in shipping activities.

San Diego Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	284	268	271	305	268	232	193	160	129	111
ROG	448	436	401	333	261	213	172	151	141	138
PM ₁₀	69	77	86	104	99	107	116	121	127	134
PM _{2.5}	27	28	25	30	29	31	31	32	33	35
SO _x	45	47	20	24	8	4	4	5	7	11
CO	3389	3066	2897	2517	1787	1333	955	753	630	564

Table 4-40

San Diego Air Basin

Population and VMT

Population in the San Diego Air Basin during the 1980-2020 period is projected to nearly double, from almost 1.9 million in 1980 to over 3.6 million in 2020. During this same time period, the number of vehicle miles traveled each day is projected to triple, from over 32 million miles per day in 1980 to nearly 97 million miles per day in 2020. As in other parts of California, overall air quality in the San Diego Air Basin has improved, despite high growth rates, indicating the benefits of cleaner technologies.

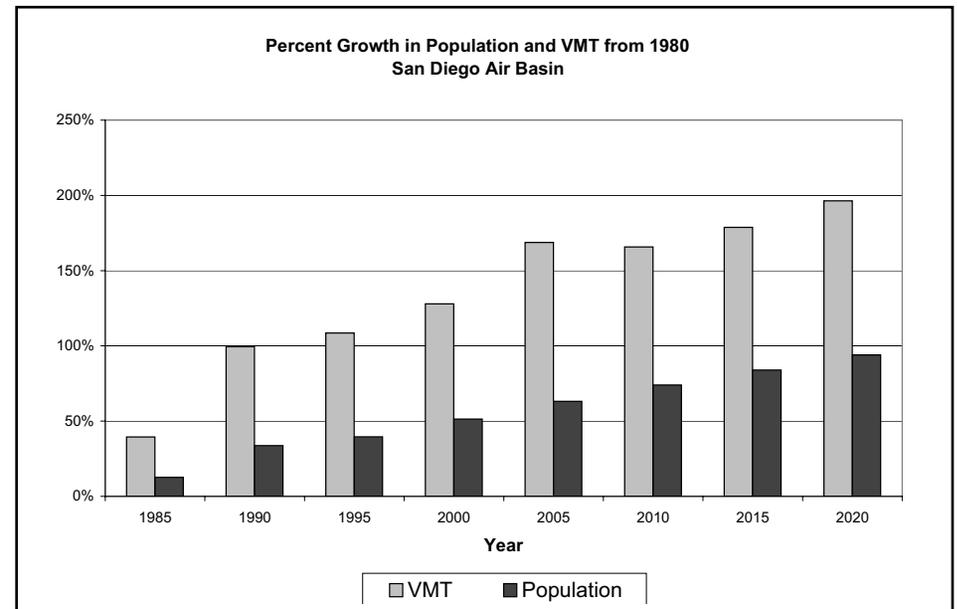


Figure 4-45

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1873300	2109300	2504897	2615201	2836158	3057000	3258951	3446262	3633572
Avg. Daily VMT/1000	32722	45636	65250	68235	74567	87944	86948	91223	96987

Table 4-41

San Diego Air Basin

Ozone Precursor Emission - Trends and Forecasts

Emissions of the ozone precursor NO_x increase between 1975 and 1990 and decrease thereafter. ROG emissions have been decreasing overall since 1975. These decreases are mostly due to decreased emissions from motor vehicles, brought about by stricter motor vehicle emission standards. Stationary and area-wide source emissions of ROG have remained mostly unchanged over the last 20 years, with stricter emission standards offsetting industrial and population growth.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	284	268	271	305	268	232	193	160	129	111
Stationary Sources	48	32	17	19	16	14	9	10	10	10
Area-wide Sources	2	3	3	3	3	3	3	3	3	3
On-Road Mobile	186	176	187	203	178	146	113	88	64	48
Gasoline Vehicles	172	159	160	165	141	104	64	45	32	24
Diesel Vehicles	13	17	26	38	37	42	50	43	31	24
Other Mobile	48	58	65	80	70	70	68	60	53	50
Gasoline Fuel	3	4	5	6	6	6	7	6	6	6
Diesel Fuel	38	47	52	65	55	54	49	41	32	25
Other Fuel	7	8	8	9	9	11	12	13	15	20

Table 4-42

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	448	436	401	333	261	213	172	151	141	138
Stationary Sources	28	44	42	38	32	31	32	34	36	39
Area-wide Sources	32	37	41	44	39	39	36	37	38	40
On-Road Mobile	351	310	268	200	142	96	63	45	34	29
Gasoline Vehicles	350	308	265	196	139	93	60	42	32	27
Diesel Vehicles	2	2	3	4	3	3	3	3	2	2
Other Mobile	37	43	50	52	49	46	42	35	32	30
Gasoline Fuel	28	33	39	39	36	35	31	26	24	23
Diesel Fuel	5	7	8	10	9	8	7	6	4	3
Other Fuel	3	3	3	3	3	4	4	4	4	4

Table 4-43

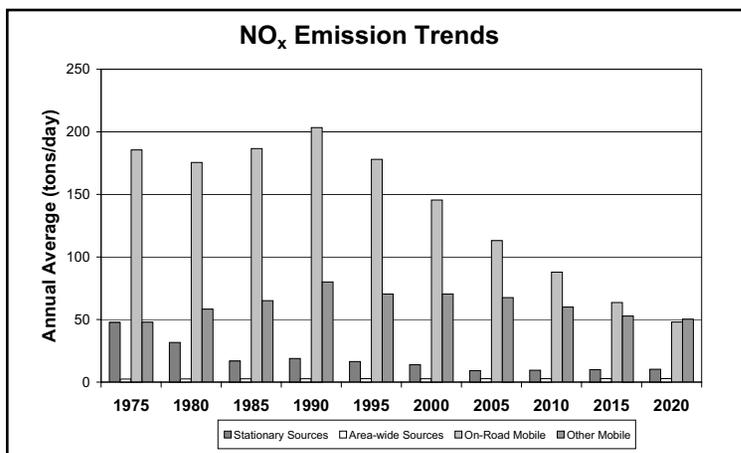


Figure 4-46

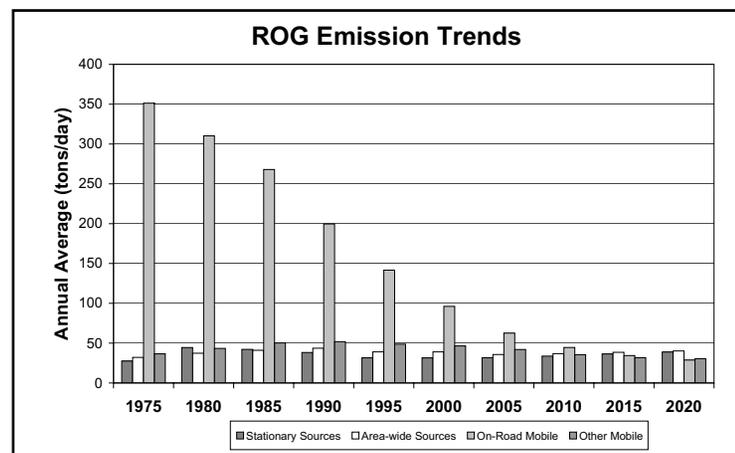


Figure 4-47

San Diego Air Basin

Ozone Air Quality Trend

Both the peak indicator and the number of days above the State and national ozone standards have decreased substantially over the last 20 years. The peak 8-hour ozone indicator shows an overall decline of 31 percent from 1987 to 2006. The number of State and national 8-hour standard exceedance days has dropped even more. There were 160 State 8-hour standard exceedance days during 1987 compared with 50 during 2007. This represents a decrease of about 69 percent in the three-year average of the State standard exceedance days. During 1987, there were 99 national 8-hour standard exceedance days compared with 7 during 2007. San Diego is expected to attain the current national 8-hour standard by the year 2009.

The San Diego Air Basin is the only one of the five major air basins the ARB has not identified as a transport contributor to a downwind area. The San Diego area is, however, a transport receptor. While it is clear that additional local emission controls will be needed to reach attainment of the ozone standards in the San Diego area, because of transport, future air quality in this area will also be affected by emission controls and growth in the South Coast Air Basin and, to some extent, Mexico.

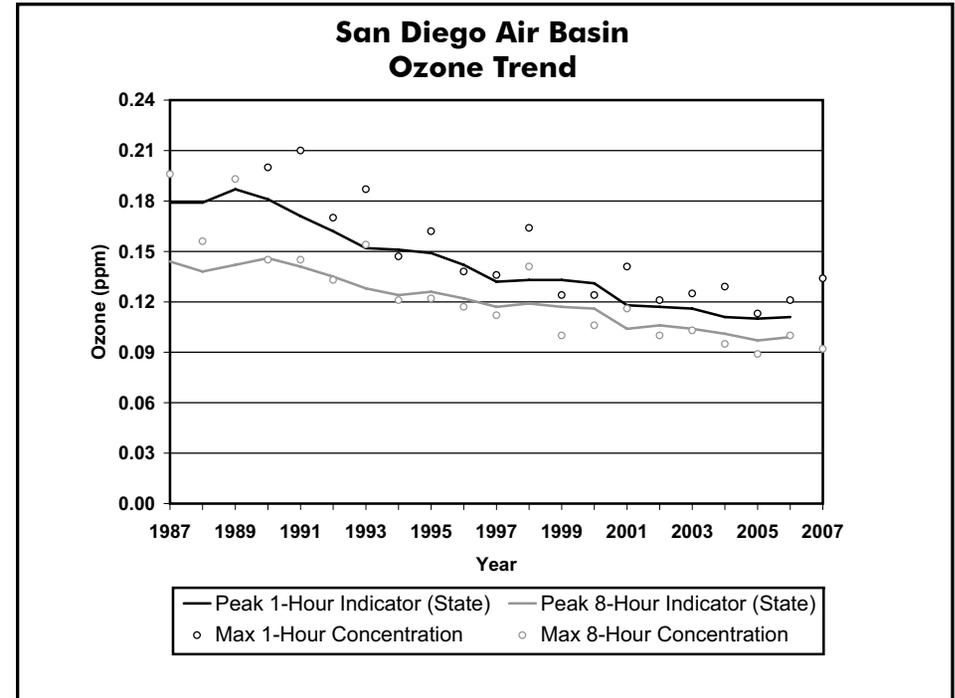


Figure 4-48

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.144	0.138	0.142	0.146	0.141	0.135	0.128	0.124	0.126	0.122	0.117	0.119	0.117	0.116	0.104	0.106	0.104	0.101	0.097	0.099	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.124	0.121	0.125	0.129	0.125	0.118	0.112	0.109	0.108	0.104	0.099	0.102	0.099	0.100	0.094	0.095	0.093	0.089	0.086	0.088	
Peak 1-Hour Indicator (State)	0.179	0.179	0.187	0.181	0.171	0.162	0.152	0.151	0.149	0.142	0.132	0.133	0.133	0.131	0.118	0.117	0.116	0.111	0.110	0.111	
4th High 1-Hr. in 3 Yrs ²	0.180	0.180	0.190	0.190	0.170	0.170	0.154	0.150	0.146	0.141	0.137	0.133	0.131	0.130	0.118	0.118	0.118	0.115	0.112	0.113	
Max. 8-Hr. Concentration	0.196	0.156	0.193	0.145	0.145	0.133	0.154	0.121	0.122	0.117	0.112	0.141	0.100	0.106	0.116	0.100	0.103	0.095	0.089	0.100	0.092
Maximum 1-Hr. Concentration	0.290	0.250	0.250	0.200	0.210	0.170	0.187	0.147	0.162	0.138	0.136	0.164	0.124	0.124	0.141	0.121	0.125	0.129	0.113	0.121	0.134
Days Above State 8-Hr. Std.	160	189	189	167	144	133	127	122	127	89	73	88	74	75	64	56	59	43	51	68	50
Days Above Nat. 8-Hr. Std.	99	119	122	96	67	66	58	46	48	31	16	35	17	16	17	13	6	8	5	14	7
Days Above State 1-Hr. Std.	127	160	159	139	106	97	90	79	96	51	43	54	27	24	29	15	24	12	16	23	21

¹ Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

² The national 1-Hour standard has been revoked. Historical 1-Hour data are provided for reference.

Table 4-44

San Diego Air Basin Directly Emitted PM₁₀ Emission Trends and Forecasts

Direct emissions of PM₁₀ are projected to almost double in the San Diego Air Basin between 1975 and 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from construction and demolition operations, and particulates from residential fuel combustion (including wood). The growth in these area-wide sources is primarily due to population growth and increases in VMT.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM₁₀ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM₁₀ emissions contribute approximately 70 percent of the ambient PM₁₀ in the San Diego Air Basin.

Directly Emitted PM ₁₀ Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	69	77	86	104	99	107	116	121	127	134
Stationary Sources	18	13	7	8	9	8	10	11	12	13
Area-wide Sources	43	55	68	82	79	87	94	99	104	110
On-Road Mobile	3	4	5	6	5	5	6	5	5	5
Gasoline Vehicles	2	2	2	3	3	3	4	4	4	5
Diesel Vehicles	1	2	3	4	2	2	2	2	1	1
Other Mobile	5	6	7	8	6	6	6	6	6	6
Gasoline Fuel	0	0	1	1	1	1	1	1	1	2
Diesel Fuel	3	3	4	5	3	3	3	2	2	1
Other Fuel	2	2	2	2	2	2	2	3	3	3

Table 4-45

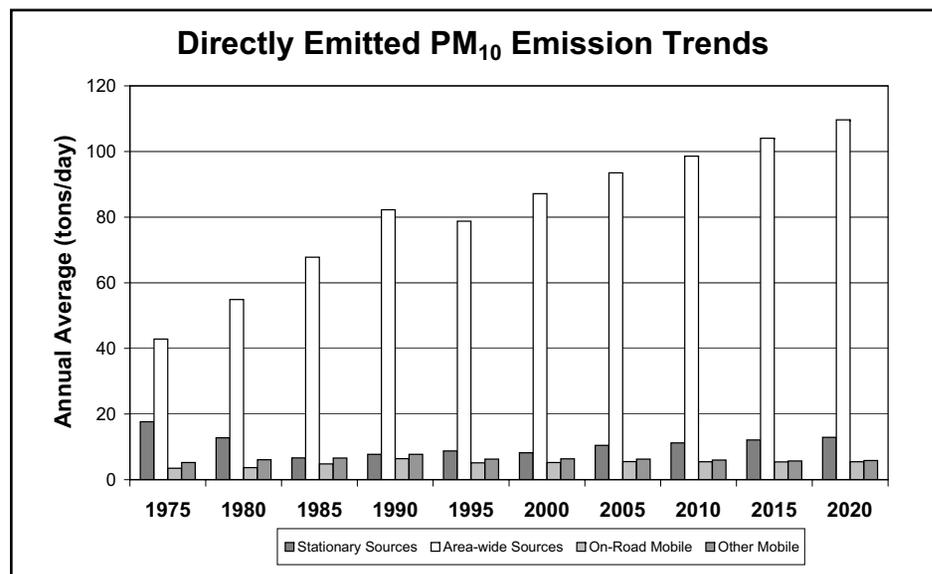


Figure 4-49

San Diego Air Basin Directly Emitted PM_{2.5} Emission Trends and Forecasts

Direct emissions of PM_{2.5} increased steadily in the San Diego Air Basin between 1975 and 2005 and are projected to continue increasing through 2020. This increase is due to growth in emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, dust from construction and demolition operations, and particulates from residential fuel combustion (including wood). The growth in these area-wide sources is primarily due to population growth and increases in VMT.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM_{2.5} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 50 percent of the ambient PM_{2.5} in the San Diego Air Basin.

Directly Emitted PM _{2.5} Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	27	28	25	30	29	31	31	32	33	35
Stationary Sources	12	10	4	4	6	6	6	6	7	7
Area-wide Sources	8	10	12	14	14	15	16	17	18	19
On-Road Mobile	3	3	4	5	4	4	4	4	4	4
Gasoline Vehicles	1	1	1	2	2	2	2	2	3	3
Diesel Vehicles	1	2	3	3	2	2	2	1	1	1
Other Mobile	5	6	6	7	6	6	6	5	5	5
Gasoline Fuel	0	0	0	1	1	1	1	1	1	1
Diesel Fuel	3	3	4	4	3	3	3	2	1	1
Other Fuel	2	2	2	2	2	2	2	2	3	3

Table 4-46

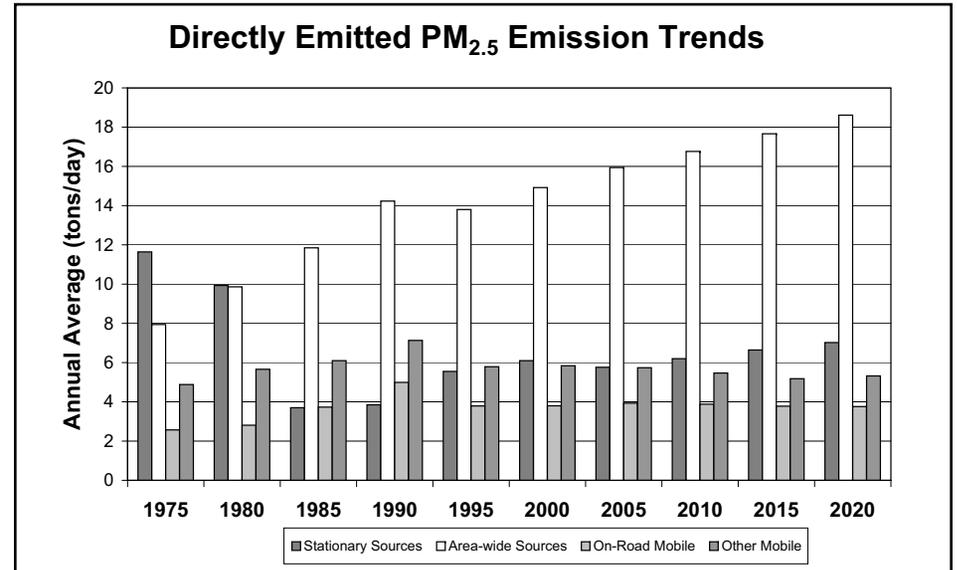


Figure 4-50

San Diego Air Basin

PM₁₀ Air Quality Trend

PM₁₀ concentrations in the San Diego Air Basin have changed little during the years for which reliable data are available. The annual average for 2006 exceeds the State annual standard and in previous years has been higher than the 1989 value. In 2005 it briefly dropped below what it had been in any previous year, before returning to a normal level in 2006. The previous apparent lack of progress was, in part, a result of monitoring that began at a new site in 1993, which measured higher concentrations. The maximum 24-hour concentrations exceed the State standards. The highest maximum 24-hour concentration of 289 ug/m³ occurred in 2003, and was due to severe wildfires that occurred in Southern California during October.

During 1989, there were 114 calculated State standard exceedance days, compared with 159 during 2006. During 2006, there were no calculated days over the 24-hour national standard. There is a substantial amount of variability from year-to-year in the 24-hour statistics. This variability is a reflection of meteorology, the 1-in-6-day sampling schedule, and changes in monitoring location. Although ambient PM₁₀ concentrations in the San Diego Air Basin are not as high as in some other areas of the State, additional emission controls will be needed to bring this area into attainment with the State standards.

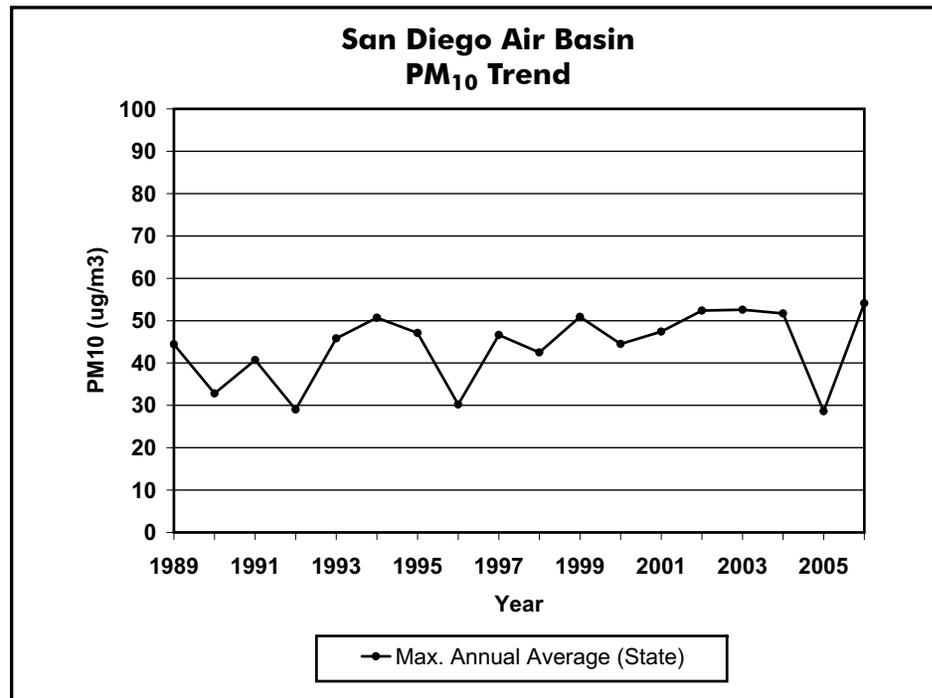


Figure 4-51

PM ₁₀ (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)		80	90	115	81	67	159	129	121	93	125	89	119	136	106	131	289	138	154	134
Max. 24-Hr. Concentration (Nat)		80	90	115	81	67	159	129	121	93	125	89	121	139	107	130	280	137	155	133
Max. Annual Average (State)			44.4	32.8	40.7	29.0	45.8	50.7	47.1	30.2	46.6	42.5	50.9	44.5	47.4	52.4	52.6	51.7	28.6	54.1
Max. Annual Average (Nat)		40.0	43.8	37.6	36.4	35.9	45.9	50.7	46.8	38.5	46.6	42.5	52.2	45.2	49.1	54.9	52.1	51.2	49.8	53.7
Calc Days Above State 24-Hr Std			114	38	84	12	134	134	122	12	125	107	124	109	129	173	151	175	13	159
Calc Days Above Nat 24-Hr Std		0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	6	0	0	0

Table 4-47

San Diego Air Basin

PM_{2.5} Air Quality Trend

Annual average PM_{2.5} concentrations (national) in the San Diego Air Basin have declined during the period of 1999 through 2006. The State annual average concentrations also decreased within this period. The highest maximum 24-hour concentration of 239 ug/m³ occurred in 2003, and was due to severe wildfires that occurred in Southern California during October. The 98th percentile of 24-hour PM_{2.5} concentrations showed substantial variability within this period, a reflection of changes in meteorology and the influence of the 2003 wildfires. Measures adopted as part of SB 656, as well as programs to reduce ozone and diesel PM should help in reducing public exposure to PM_{2.5} in this region.

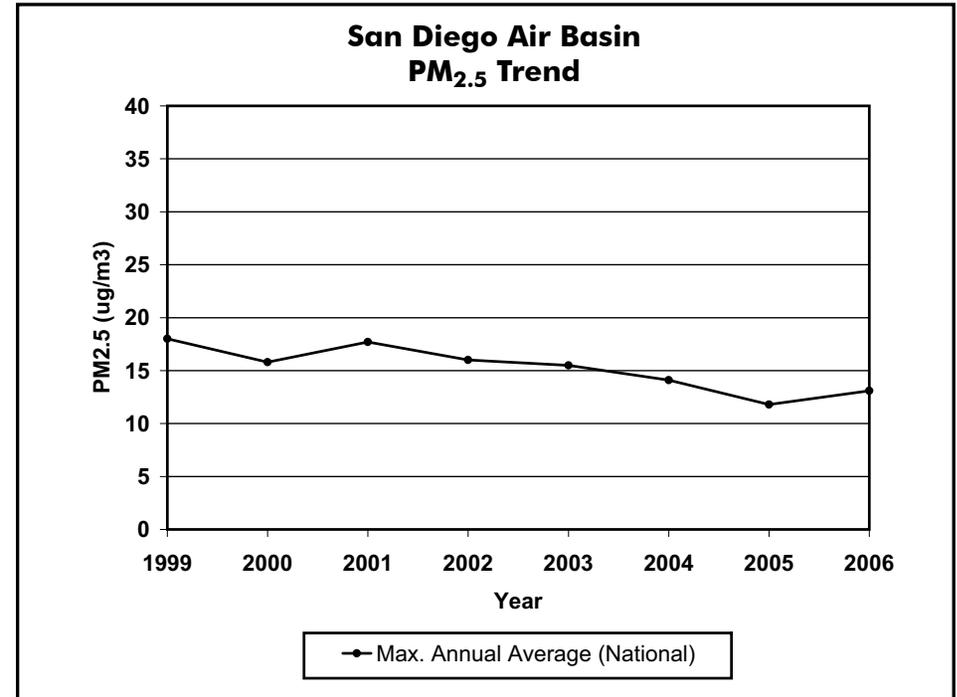


Figure 4-52

PM _{2.5} (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)													64.3	66.3	60.0	53.6	239.2	67.3	44.1	63.3
Max. 24-Hr. Concentration (Nat)													64.3	66.3	60.0	53.6	239.2	67.3	44.1	63.3
98th Percentile of 24-Hr Conc.													45.1	48.7	40.8	39.3	46.9	37.4	30.2	28.4
Annual Average (State)																15.5	14.4	14.1		13.1
Avg. of Qtrly. Means (Nat)													18.0	15.8	17.7	16.0	15.5	14.1	11.8	13.1

Table 4-48

San Diego Air Basin Carbon Monoxide Emission Trends and Forecasts

CO emissions in the San Diego Air Basin mirror the decreasing state-wide trend from 1975 to 2020, even though the VMT are increasing. This is yet another example of how California’s motor vehicle control program is having a positive impact on CO emissions.

CO Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	3389	3066	2897	2517	1787	1333	955	753	630	564
Stationary Sources	30	29	28	27	26	40	27	26	25	25
Area-wide Sources	23	25	27	29	27	28	28	28	29	30
On-Road Mobile	3169	2799	2586	2145	1448	1007	657	456	327	251
Gasoline Vehicles	3164	2792	2574	2130	1434	994	643	444	317	242
Diesel Vehicles	6	8	11	16	14	14	14	13	10	9
Other Mobile	167	213	256	316	286	259	243	243	248	258
Gasoline Fuel	126	165	207	255	231	207	194	193	197	206
Diesel Fuel	17	23	25	34	29	26	22	22	22	23
Other Fuel	24	26	24	27	26	26	27	28	28	29

Table 4-49

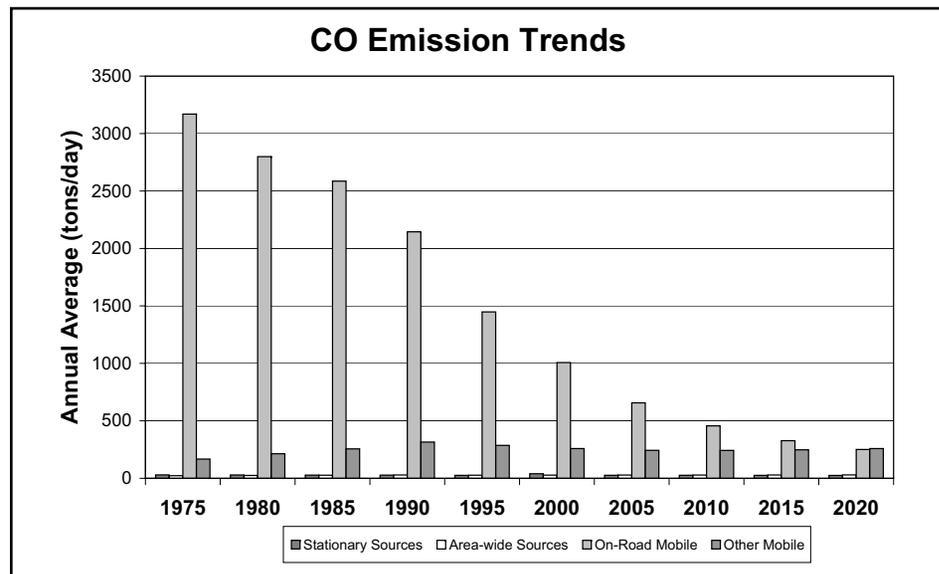


Figure 4-53

San Diego Air Basin

Carbon Monoxide Air Quality Trend

The peak 8-hour indicator for CO in the San Diego Air Basin decreased substantially over the trend period: an almost 64 percent decrease from 1987 to 2006. As a result of these decreases, the national CO standards had not been exceeded in the San Diego Air Basin since 1989. However, in 2003 the CO standards were exceeded due to extensive wildfires that impacted air quality throughout Southern California. This exceedance does not impact San Diego's attainment status, because it qualifies as an exceptional event.

With existing and anticipated motor vehicle and clean fuels regulations, ambient CO concentrations should continue to decline. This should be sufficient to maintain a healthful level of CO in this area.

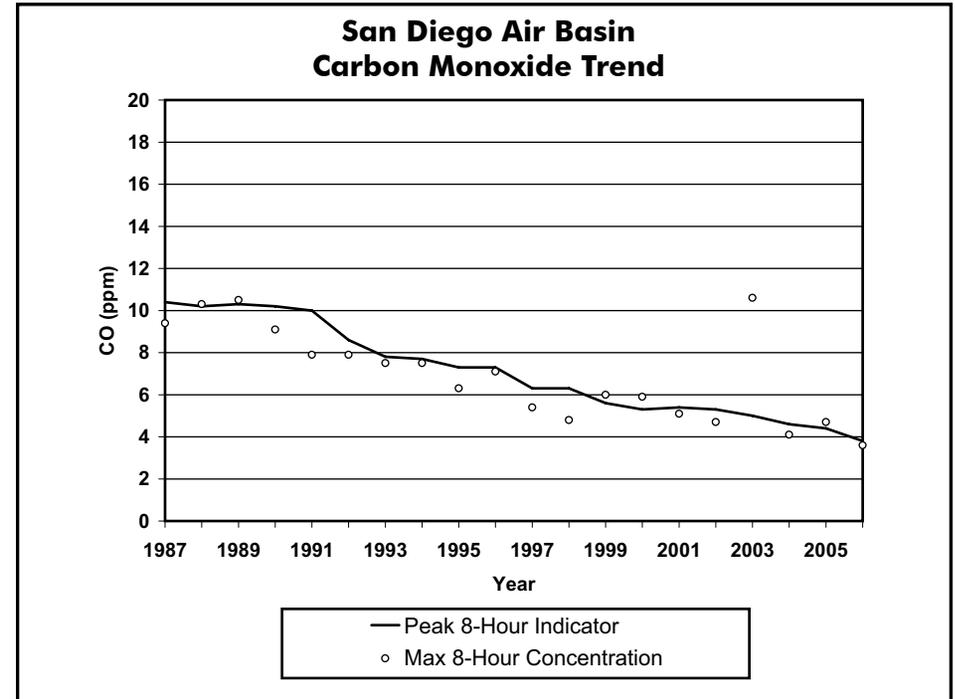


Figure 4-54

CARBON MONOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 8-Hr. Indicator (State)	10.4	10.2	10.3	10.2	10.0	8.6	7.8	7.7	7.3	7.3	6.3	6.3	5.6	5.3	5.4	5.3	5.0	4.6	4.4	3.8
Max. 1-Hr. Concentration	14.0	17.0	17.0	18.0	14.0	14.0	11.4	11.0	9.9	12.4	9.3	10.2	9.9	9.3	8.5	8.5	12.7	6.9	7.9	10.8
Max. 8-Hr. Concentration (State)	9.4	10.3	10.5	9.1	7.9	7.9	7.5	7.5	6.3	7.1	5.4	4.8	6.0	5.9	5.1	4.7	10.6	4.1	4.7	3.6
Days Above State 8-Hr. Std.	1	5	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Days Above Nat. 8-Hr. Std.	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Table 4-50

San Diego Air Basin Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

NO_x and NO₂ emissions in the San Diego Air Basin follow the declining statewide trend from 1990 to 2020. The continued adoption of more stringent motor vehicle and stationary source emission standards should continue to reduce NO₂ emissions.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	284	268	271	305	268	232	193	160	129	111
Stationary Sources	48	32	17	19	16	14	9	10	10	10
Area-wide Sources	2	3	3	3	3	3	3	3	3	3
On-Road Mobile	186	176	187	203	178	146	113	88	64	48
Gasoline Vehicles	172	159	160	165	141	104	64	45	32	24
Diesel Vehicles	13	17	26	38	37	42	50	43	31	24
Other Mobile	48	58	65	80	70	70	68	60	53	50
Gasoline Fuel	3	4	5	6	6	6	7	6	6	6
Diesel Fuel	38	47	52	65	55	54	49	41	32	25
Other Fuel	7	8	8	9	9	11	12	13	15	20

Table 4-51

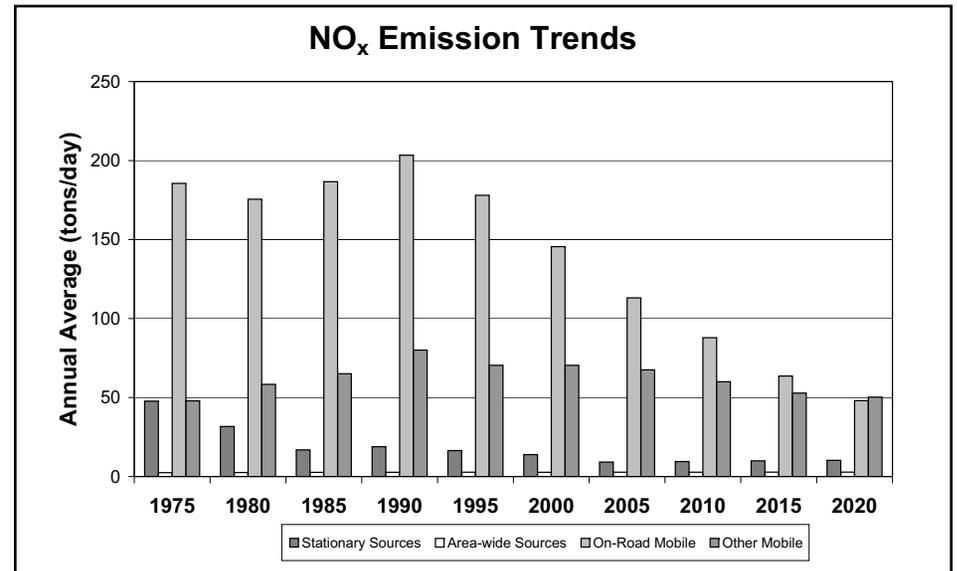


Figure 4-55

San Diego Air Basin

Nitrogen Dioxide Air Quality Trend

The San Diego Air Basin attains both the State and national NO₂ standards. Since 1990 ambient concentrations have been well below the levels of both the State and national standards. Data show that the peak 1-hour indicator decreased nearly 47 percent from 1987 to 2006.

Because NO_x emissions contribute to ozone, as well as to NO₂, many of the ozone control measures help reduce ambient NO₂ concentrations. Furthermore, NO_x emission controls are a critical part of the ozone control strategy. As a result, these controls should ensure continued attainment of the State and national NO₂ standards.

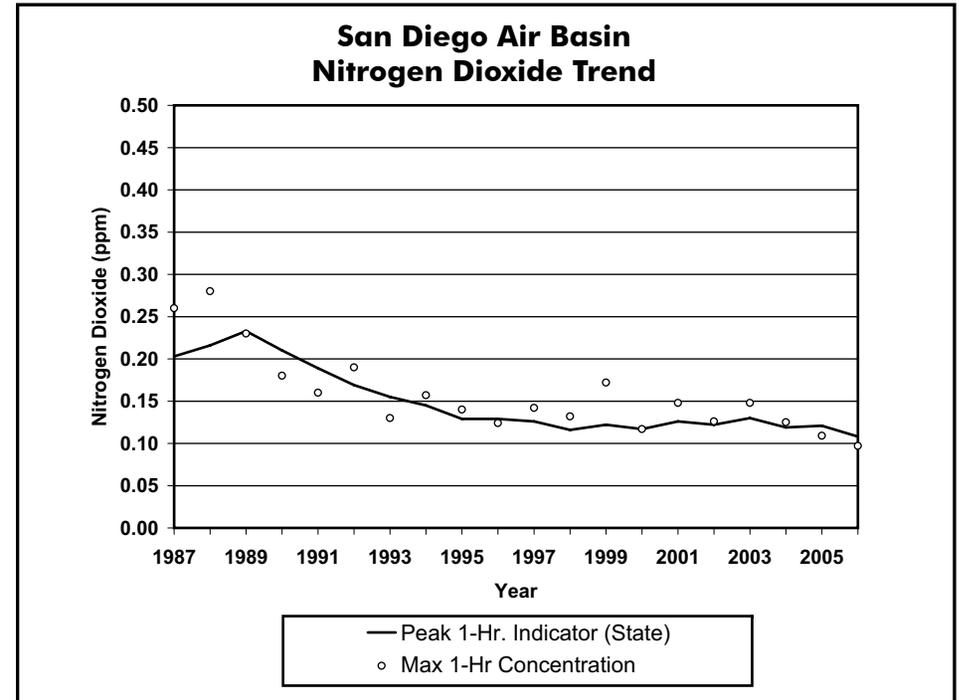


Figure 4-56

NITROGEN DIOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 1-Hr. Indicator (State)	0.203	0.216	0.233	0.210	0.189	0.169	0.155	0.145	0.129	0.129	0.126	0.116	0.122	0.117	0.126	0.122	0.130	0.119	0.121	0.108
Max. 1-Hr. Concentration	0.260	0.280	0.230	0.180	0.160	0.190	0.130	0.157	0.140	0.124	0.142	0.132	0.172	0.117	0.148	0.126	0.148	0.125	0.109	0.097
Max. Annual Average (Nat)	0.032	0.035	0.031	0.029	0.029	0.027	0.023	0.024	0.026	0.022	0.024	0.023	0.026	0.024	0.022	0.022	0.021	0.023	0.024	0.024
Max. Annual Average (State)	0.032	0.035	0.031	0.029	0.029	0.027	0.023	0.024	0.026	0.022	0.024	0.023	0.026	0.024	0.022	0.022	0.021	0.023	0.018	0.024

Table 4-52

Sacramento Valley Air Basin

Introduction - Area Description

The Sacramento Valley Air Basin is home to California's capital. Located in the northern portion of the Central Valley, the Sacramento Valley Air Basin 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 Sacramento Valley Air Basin occupies 14,994 square miles and has a population of more than two million people.

Because of its inland location, the climate of the Sacramento Valley Air Basin is more extreme than that of the San Francisco Bay Area or South Coast air basins. The winters are generally cool and wet, while the summers are hot and dry.

Emissions from the urbanized portion of the basin (Sacramento, Yolo, Solano, and Placer Counties) dominate the emission inventory for the Sacramento Valley Air Basin, and on-road motor vehicles are the primary source of emissions in the metropolitan area. While pollutant concentrations have generally declined over the years, additional emission reductions will be needed to attain the State and national ambient air quality standards in this air basin.

Note: The Sacramento Metropolitan Nonattainment Area includes the southern part of the Air Basin, as well as the western portion of El Dorado County and the western portion of Placer County.

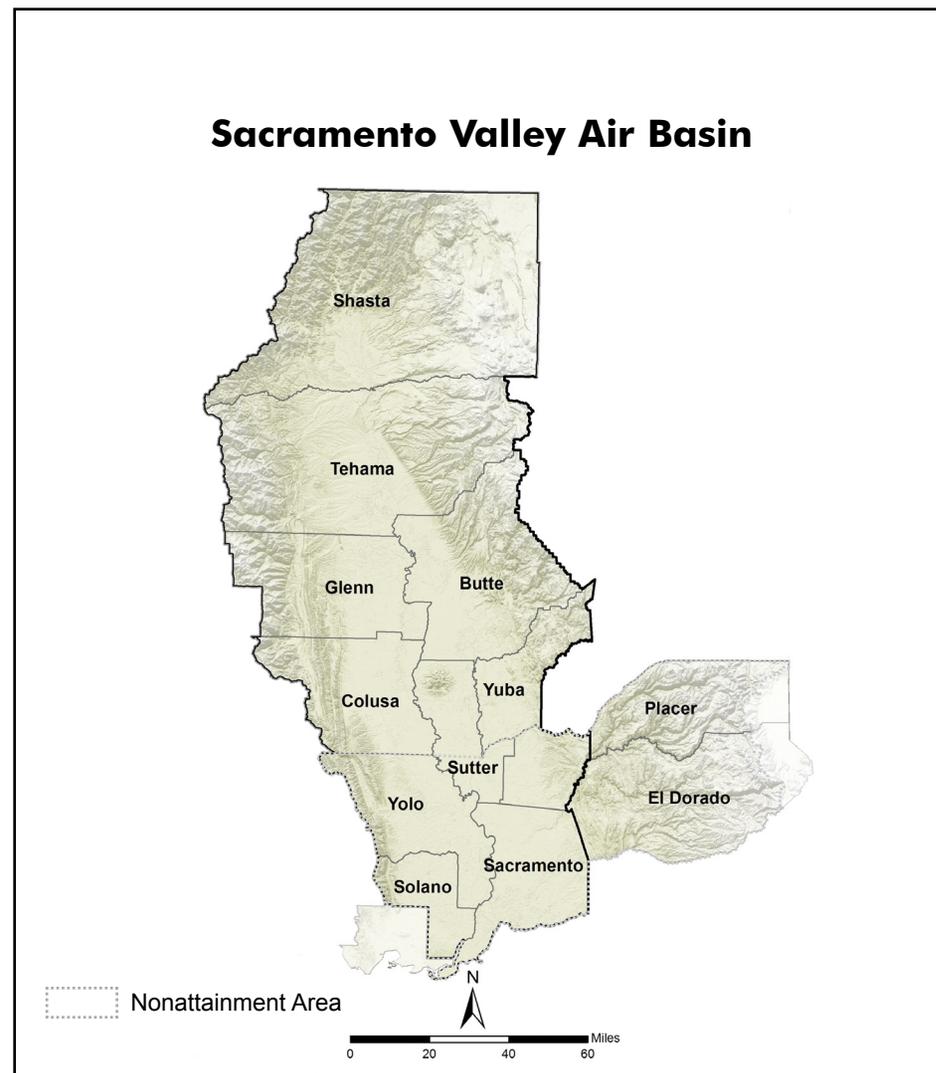


Figure 4-57

Sacramento Valley Air Basin Emission Trends and Forecasts

The emission levels in the Sacramento Valley Air Basin are trending downward from 1990 to 2020 for NO_x, and downward from 1975 to 2020 for ROG and CO. The decreases in NO_x, ROG, and CO are largely due to motor vehicle controls and reductions in evaporative emissions. Mobile sources are by far the largest contributors to NO_x, ROG, and CO emissions in the Sacramento Valley Air Basin. PM₁₀ and PM_{2.5} emissions are increasing from 1975 to 2020. The emission levels for SO_x have declined after 1990. Most of the reduction in SO_x emissions is seen for on-road motor vehicles and other mobile sources.

Sacramento Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	335	351	342	382	354	318	290	250	200	164
ROG	461	447	415	362	301	243	207	183	170	165
PM ₁₀	199	206	213	226	215	222	227	232	237	242
PM _{2.5}	73	71	73	81	73	74	73	74	75	76
SO _x	25	23	26	30	9	6	5	4	4	4
CO	3116	3113	2899	2573	1935	1520	1223	1032	908	835

Table 4-53

Sacramento Valley Air Basin Population and VMT

Between 1980 and 2020, population in the Sacramento Valley Air Basin is projected to grow at a higher rate than the statewide average—a 140 percent increase compared with an 84 percent increase statewide. Population is projected to grow from 15 million in 1980 to 36 million in 2020. During this same period, the increase in the number of vehicle miles traveled each day is projected to be higher than the overall statewide value: a 200 percent increase in the Sacramento Valley Air Basin. VMT are projected to increase from about 30 million miles in 1980 to nearly 90 million miles in 2020.

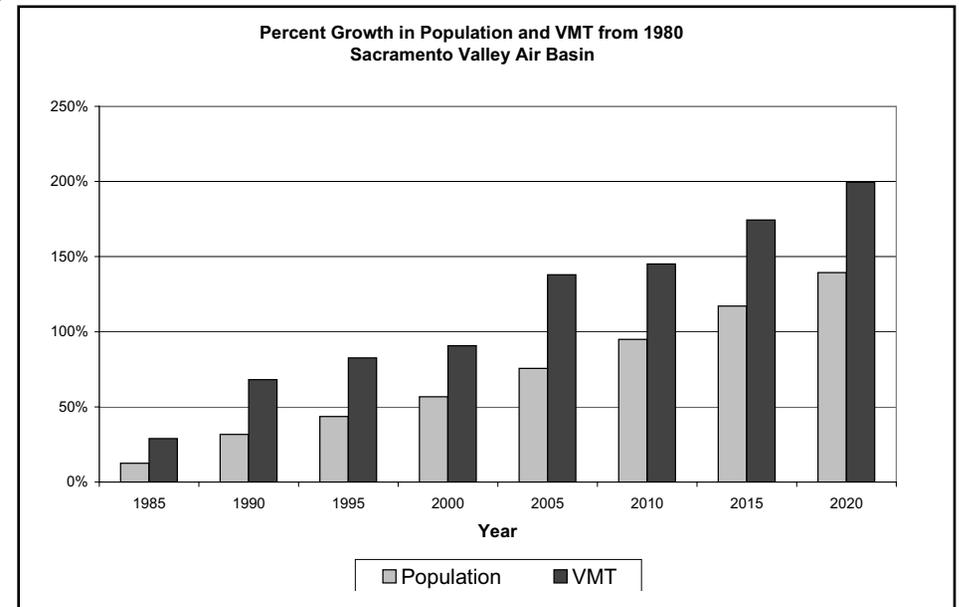


Figure 4-58

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1500924	1688217	1977544	2155490	2353225	2636019	2925202	3259235	3593262
Avg. Daily VMT/1000	30025	38728	50471	54826	57268	71433	73601	82374	89914

Table 4-54

Sacramento Valley Air Basin

Ozone Precursor Emission - Trends and Forecasts

Emissions of NO_x decreased from 1990 to 2005 and are projected to continue decreasing from 2005 to 2020. On-road motor vehicles and other mobile sources are by far the largest contributors to NO_x emissions. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_x emissions. ROG emissions have been decreasing for the last 30 years due to more stringent motor vehicle standards and new rules for control of ROG from various industrial coating and solvent operations.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	335	351	342	382	354	318	290	250	200	164
Stationary Sources	38	32	31	45	46	42	38	39	39	38
Area-wide Sources	9	9	9	10	9	9	9	9	9	9
On-Road Mobile	186	194	202	215	196	167	154	127	88	62
Gasoline Vehicles	156	158	151	144	123	88	59	42	30	22
Diesel Vehicles	30	35	51	72	74	79	96	85	58	40
Other Mobile	102	116	100	112	102	100	88	75	64	54
Gasoline Fuel	3	4	5	6	5	5	7	7	7	6
Diesel Fuel	96	108	92	103	93	90	77	64	53	43
Other Fuel	3	4	4	3	4	5	4	4	4	5

Table 4-55

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	461	447	415	362	301	243	207	183	170	165
Stationary Sources	72	50	52	49	41	30	31	32	35	37
Area-wide Sources	58	65	63	70	67	65	61	62	64	66
On-Road Mobile	289	279	244	185	137	94	67	49	36	29
Gasoline Vehicles	285	274	238	177	132	89	61	43	32	26
Diesel Vehicles	4	5	6	8	6	5	6	6	4	3
Other Mobile	42	53	55	58	55	53	47	40	35	33
Gasoline Fuel	29	36	41	43	40	39	35	30	27	26
Diesel Fuel	12	14	12	14	13	12	11	8	6	5
Other Fuel	1	3	2	2	2	2	2	2	2	2

Table 4-56

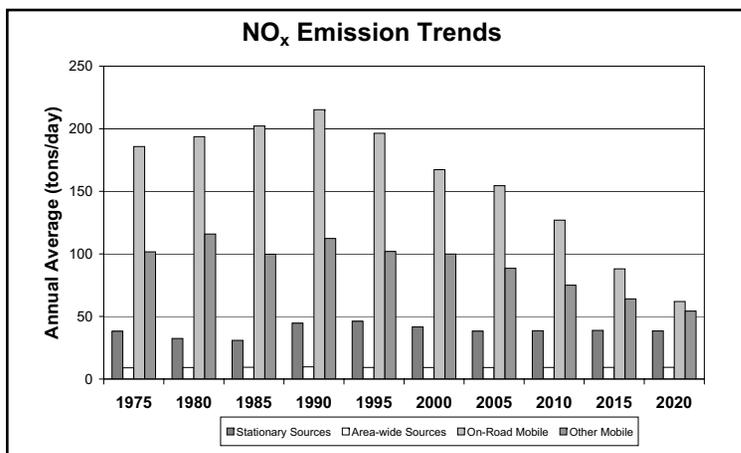


Figure 4-59

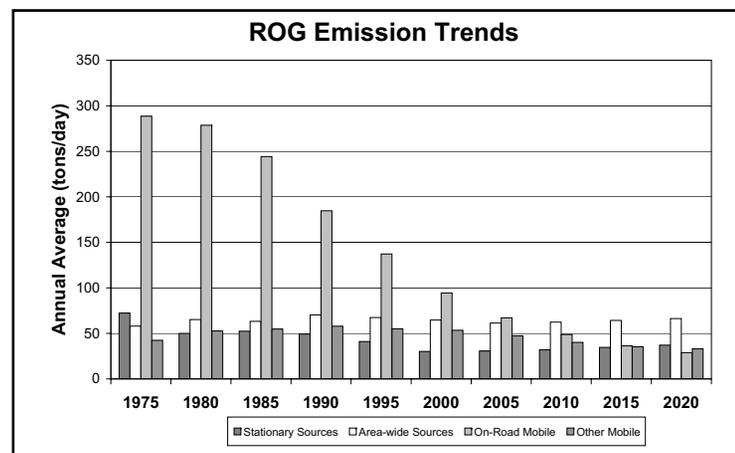


Figure 4-60

Sacramento Valley Air Basin

Ozone Air Quality Trend

Peak ozone values in the Sacramento Valley Air Basin have not declined as quickly over the last several years as they have in other urban areas. The peak 8-hour indicator remained fairly constant from 1987 to 1990. Since 1990, the peak 8-hour indicator has decreased slightly, and the overall decline for the 20-year period is almost 13 percent. Looking at the number of days above the State and national standards, the trend is much more variable. However, the number of 8-hour exceedance days has declined by more than 50 percent since 1988.

Similar to the San Joaquin Valley, the Sacramento Metropolitan area, which includes the urbanized portion of the Southern Sacramento Valley Air Basin, along with the urbanized portions of El Dorado and Placer Counties in the Mountain Counties Air Basin, is identified as both a transport contributor and receptor. The region is a transport contributor to the Mountain Counties, Upper Sacramento Valley, San Joaquin Valley, and San Francisco Bay Area air basins and is a receptor area for the San Francisco Bay Area and San Joaquin Valley air basins.

The data for the Sacramento Metropolitan Area, on the following page, reflects the portion of the region that is nonattainment for the national ozone standards.

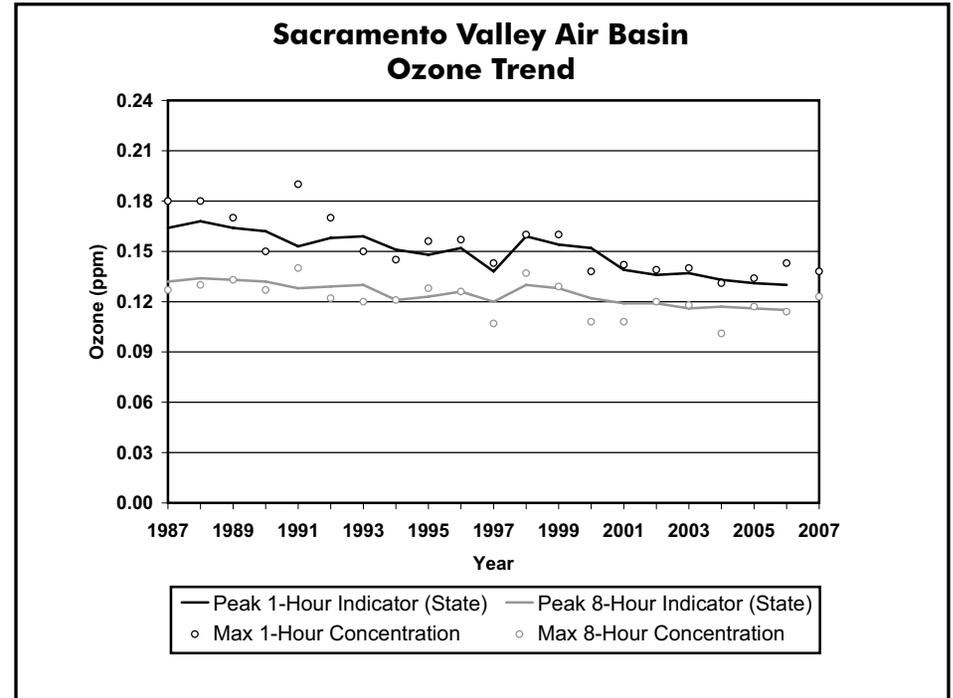


Figure 4-61

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.132	0.134	0.133	0.132	0.128	0.129	0.130	0.121	0.123	0.126	0.120	0.130	0.128	0.122	0.119	0.119	0.116	0.117	0.116	0.115	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.097	0.095	0.101	0.105	0.101	0.101	0.100	0.097	0.097	0.097	
Peak 1-Hour Indicator (State)	0.164	0.168	0.164	0.162	0.153	0.158	0.159	0.151	0.148	0.152	0.138	0.159	0.154	0.152	0.139	0.136	0.137	0.133	0.131	0.130	
4th High 1-Hr. in 3 Yrs ²	0.160	0.160	0.160	0.160	0.150	0.160	0.150	0.142	0.145	0.145	0.143	0.149	0.149	0.149	0.138	0.134	0.138	0.138	0.131	0.134	
Max. 8-Hr. Concentration	0.127	0.130	0.133	0.127	0.140	0.122	0.120	0.121	0.128	0.126	0.107	0.137	0.129	0.108	0.108	0.120	0.118	0.101	0.117	0.114	0.123
Maximum 1-Hr. Concentration	0.180	0.180	0.170	0.150	0.190	0.170	0.150	0.145	0.156	0.157	0.143	0.160	0.160	0.138	0.142	0.139	0.140	0.131	0.134	0.143	0.138
Days Above State 8-Hr. Std.	136	125	99	104	111	107	61	113	86	103	60	97	111	81	84	95	92	87	62	88	61
Days Above Nat. 8-Hr. Std.	73	68	37	44	60	56	22	48	40	44	15	60	43	35	37	34	40	20	25	39	10
Days Above State 1-Hr. Std.	94	98	68	50	68	74	34	60	50	58	25	62	59	41	44	46	51	29	33	44	15

¹ Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

² The national 1-Hour standard has been revoked. Historical 1-Hour data are provided for reference.

Table 4-57

*Sacramento Metropolitan Area¹***Ozone Air Quality Table**

OZONE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ¹
Peak 8-Hour Indicator (State)	0.132	0.134	0.133	0.132	0.128	0.129	0.130	0.121	0.123	0.126	0.120	0.130	0.128	0.126	0.119	0.124	0.127	0.126	0.116	0.115	
Avg. of 4th High 8-Hr. in 3 Yrs (Nat)	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.099	0.103	0.103	0.107	0.104	0.106	0.107	0.102	0.097	0.097	
Peak 1-Hour Indicator (State)	0.164	0.168	0.163	0.162	0.153	0.158	0.159	0.151	0.148	0.152	0.140	0.159	0.154	0.152	0.139	0.142	0.146	0.143	0.131	0.130	
4th High 1-Hr. in 3 Yrs ²	0.160	0.160	0.160	0.160	0.150	0.160	0.150	0.142	0.145	0.145	0.145	0.149	0.149	0.149	0.144	0.148	0.148	0.145	0.139	0.134	
Max. 8-Hr. Concentration	0.127	0.138	0.133	0.127	0.140	0.122	0.120	0.121	0.128	0.126	0.107	0.137	0.129	0.113	0.109	0.137	0.122	0.102	0.117	0.116	0.123
Maximum 1-Hr. Concentration	0.180	0.180	0.170	0.150	0.190	0.170	0.150	0.145	0.156	0.157	0.145	0.163	0.160	0.138	0.148	0.156	0.145	0.118	0.134	0.143	0.138
Days Above State 8-Hr. Std.	121	125	114	99	102	113	61	103	80	96	62	72	108	78	88	106	94	81	69	92	64
Days Above Nat. 8-Hr. Std.	65	72	53	43	57	55	24	42	42	48	19	34	48	37	41	47	43	25	35	42	16
Days Above State 1-Hr. Std.	86	99	74	47	65	76	36	54	52	57	25	49	56	45	51	59	53	35	43	50	16

¹ The Sacramento Metropolitan Area includes urbanized portions of the Sacramento Valley Air Basin (Sacramento, Yolo, Placer, and Solano Counties, and part of Sutter County) and all of El Dorado and Placer Counties in the Mountain Counties Air Basin.

² Preliminary data for 2007 are shown here, however they are subject to change. 2006 is the last year for which complete and approved data is available, thus calculated annual statistics are not included for 2007.

Table 4-58

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Sacramento Valley Air Basin Directly Emitted PM₁₀ Emission Trends and Forecasts

Direct emissions of PM₁₀ increased in the Sacramento Valley Air Basin between 1975 and 2005 and are projected to continue increasing through 2020. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from paved and unpaved roads, dust from farming operations, fugitive dust from construction and demolition, and particulates from residential fuel combustion. Emissions of directly emitted PM₁₀ from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM₁₀ emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM₁₀ emissions contribute approximately 75 percent of the ambient PM₁₀ in the Sacramento Valley Air Basin.

Directly Emitted PM ₁₀ Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	199	206	213	226	215	222	227	232	237	242
Stationary Sources	25	20	18	22	17	18	17	18	20	21
Area-wide Sources	163	173	181	187	185	192	197	202	208	212
On-Road Mobile	5	6	7	9	7	6	6	6	6	5
Gasoline Vehicles	2	1	2	2	2	2	3	3	4	4
Diesel Vehicles	3	4	6	7	5	4	4	3	2	1
Other Mobile	7	8	7	8	6	6	6	5	5	4
Gasoline Fuel	1	1	1	1	1	1	1	2	2	2
Diesel Fuel	6	7	6	7	5	4	4	3	2	2
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-59

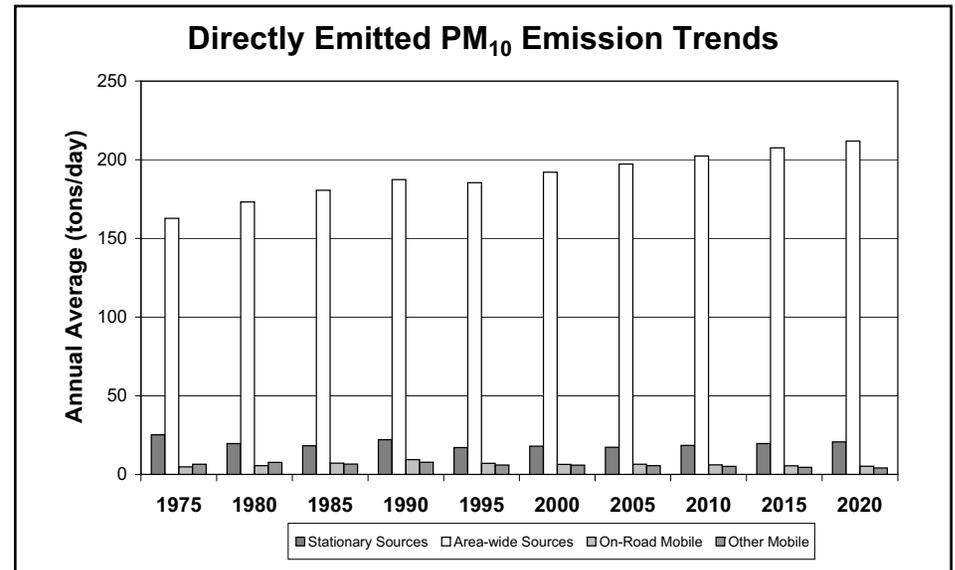


Figure 4-62

Sacramento Valley Air Basin Directly Emitted PM_{2.5} Emission Trends and Forecasts

Direct emissions of PM_{2.5} have remained relatively steady in the Sacramento Valley Air Basin between 1975 and 2005 and are projected to increase slightly through 2020. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from paved and unpaved roads, fugitive dust from construction and demolition, particulates from residential fuel combustion, and waste burning. Emissions of directly emitted PM_{2.5} from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

PM can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, SO_x, ROG, and ammonia. The PM_{2.5} emission inventory includes only directly emitted particulate emissions. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 70 percent of the ambient PM_{2.5} in the Sacramento Valley Air Basin.

Directly Emitted PM _{2.5} Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	73	71	73	81	73	74	73	74	75	76
Stationary Sources	18	12	11	13	10	10	10	11	11	12
Area-wide Sources	45	48	50	52	52	53	54	55	56	57
On-Road Mobile	4	5	6	8	6	5	5	5	4	4
Gasoline Vehicles	1	1	1	1	1	1	2	2	2	2
Diesel Vehicles	3	4	5	7	5	4	3	3	2	1
Other Mobile	6	7	6	7	5	5	5	4	4	3
Gasoline Fuel	0	1	1	1	1	1	1	1	2	2
Diesel Fuel	5	6	5	6	4	4	4	3	2	1
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-60

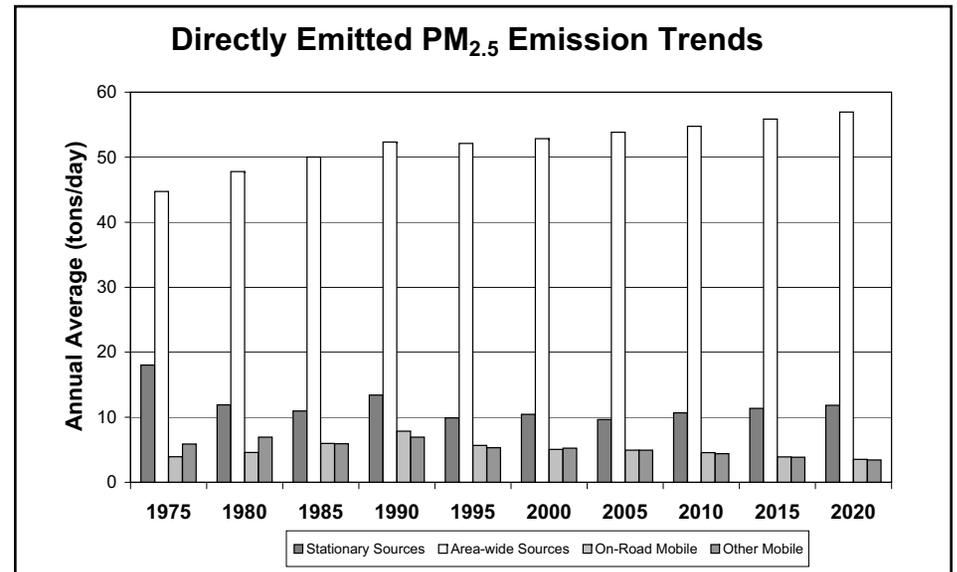


Figure 4-63

Sacramento Valley Air Basin

PM₁₀ Air Quality Trend

The annual average (State) PM₁₀ concentration in the Sacramento Valley Air Basin shows a fairly steady decline over the trend period, with some variability over the last several years. The three-year average of the annual average (State) shows a decrease of 23 percent from 1991 to 2006. The three-year average of calculated days over the State 24-hour standard decreased by 33 percent from 1991 to 2006. Because many of the sources that contribute to ozone also contribute to PM₁₀, future ozone emission controls should improve PM₁₀ air quality.

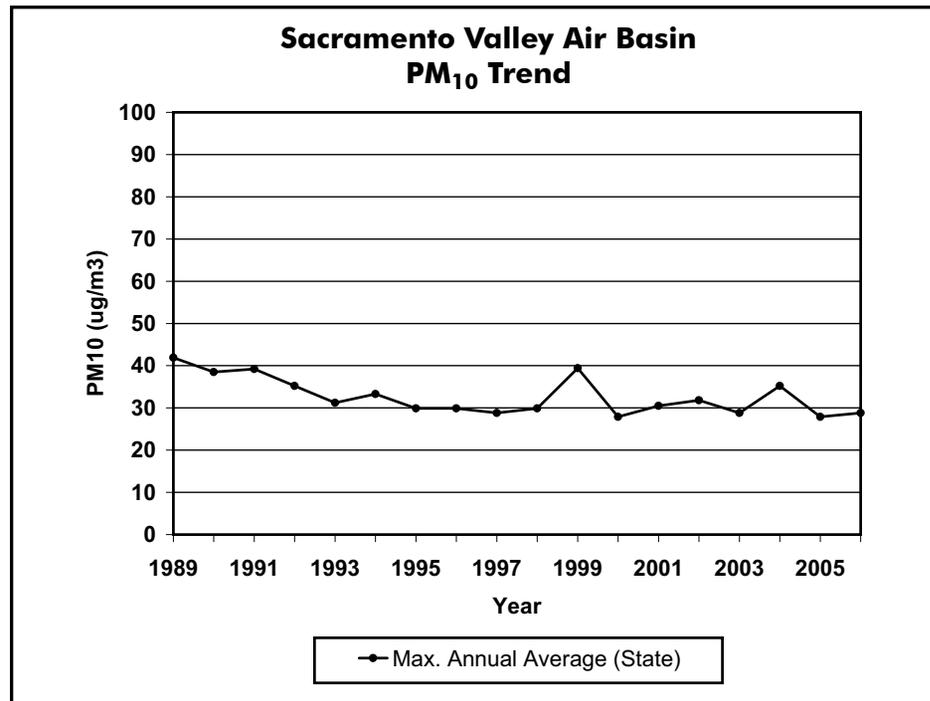


Figure 4-64

PM ₁₀ (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)		100	147	153	136	111	113	154	145	98	126	130	179	90	112	96	123	171	109	111
Max. 24-Hr. Concentration (Nat)		100	147	153	136	111	113	204	287	98	126	130	275	109	123	145	89	169	110	160
Max. Annual Average (State)			41.9	38.5	39.2	35.2	31.2	33.3	29.9	29.9	28.8	29.9	39.4	27.9	30.5	31.8	28.8	35.2	27.9	28.8
Max. Annual Average (Nat)		51.2	46.0	51.9	46.4	42.3	36.9	34.5	40.7	32.6	28.6	29.0	38.4	27.9	30.2	30.9	28.4	34.5	27.2	37.8
Calc Days Above State 24-Hr Std			82	74	104	70	63	36	57	44	22	60	64	43	50	41	31	80	42	53
Calc Days Above Nat 24-Hr Std			0	0	0	0	0	1	0	0	0	0	7	0	0	0	0	6	0	0

Table 4-61

Sacramento Valley Air Basin

PM_{2.5} Air Quality Trend

Overall, annual average (national) PM_{2.5} concentrations in the Sacramento Valley Air Basin decreased slightly during 1999 through 2006. The State annual average concentrations also show a declining trend, although the trends looks less pronounced, due to differences in State and national monitoring methods. The 98th percentile of 24-hour PM_{2.5} concentrations also declined during this nine-year period. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. Measures adopted as part of SB 656, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

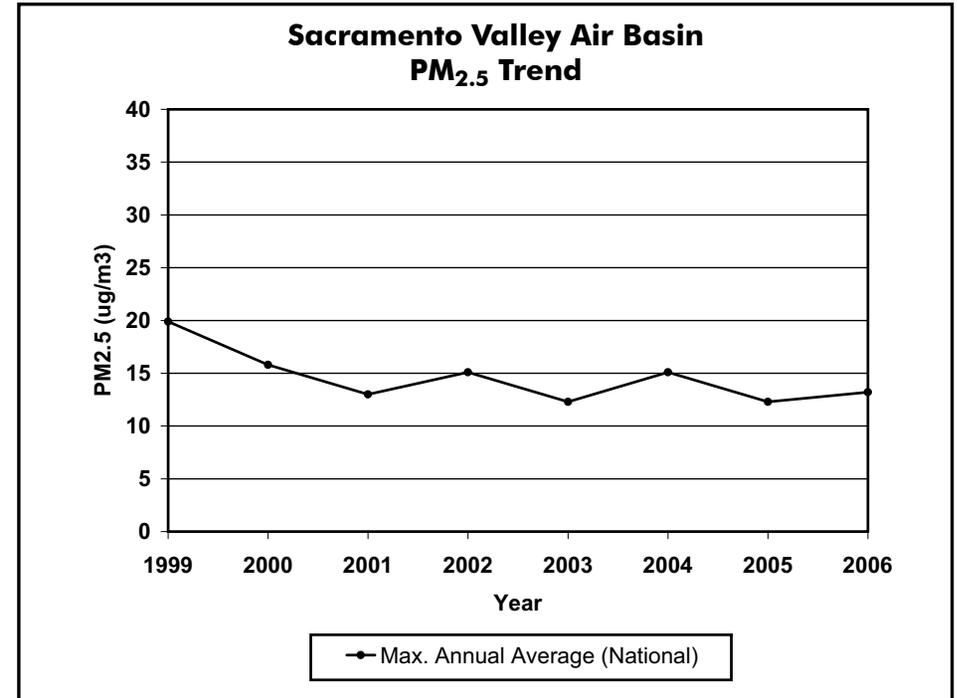


Figure 4-65

PM _{2.5} (ug/m ³)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Max. 24-Hr. Concentration (State)												96.0	108.0	123.1	128.2	96.1	73.2	76.3	82.7	78.6
Max. 24-Hr. Concentration (Nat)												96.0	108.0	98.0	78.0	91.0	65.0	65.0	80.0	78.0
98th Percentile of 24-Hr Conc.												96.0	84.0	81.0	56.0	63.0	43.0	54.0	54.0	59.0
Annual Average (State)												17.5	15.8	11.9	15.1	15.9	16.5	13.8	15.2	
Avg. of Qtrly. Means (Nat)												19.9	15.8	13.0	15.1	12.3	15.1	12.3	13.2	

Table 4-62

Sacramento Valley Air Basin Carbon Monoxide Emission Trends and Forecasts

Emissions of CO declined in the Sacramento Valley Air Basin between 1975 and 2005 and are projected to decrease through 2020. Motor vehicles are the largest source of CO emissions. With the introduction of new automotive emission controls to meet more stringent emission standards, motor vehicle CO emissions have been declining since 1975, despite increases in VMT. Stationary and area-wide source CO emissions have remained relatively steady since 1990, with additional emission controls offsetting growth.

CO Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	3116	3113	2899	2573	1935	1520	1223	1032	908	835
Stationary Sources	27	28	15	50	38	40	49	51	53	55
Area-wide Sources	252	265	275	286	283	282	284	286	289	293
On-Road Mobile	2638	2568	2342	1915	1318	927	635	445	312	229
Gasoline Vehicles	2624	2551	2319	1885	1290	902	608	420	292	213
Diesel Vehicles	13	17	23	31	28	26	26	25	20	16
Other Mobile	200	253	267	323	296	270	255	251	254	258
Gasoline Fuel	145	186	209	257	235	212	200	197	199	202
Diesel Fuel	37	44	39	47	43	38	33	31	30	30
Other Fuel	18	23	19	19	19	20	22	23	25	25

Table 4-63

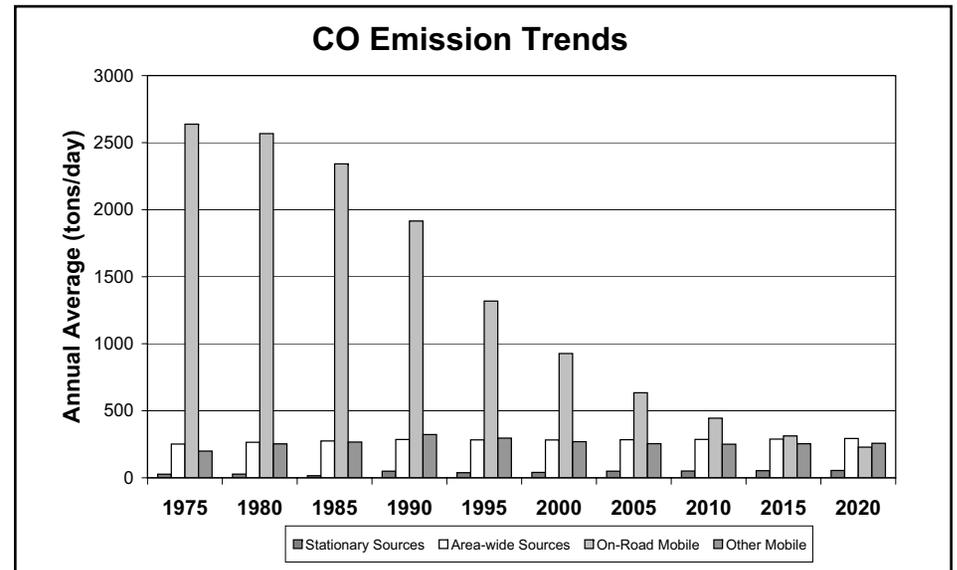


Figure 4-66

Sacramento Valley Air Basin

Carbon Monoxide Air Quality Trend

The trend of the peak 8-hour indicator for CO for the Sacramento Valley Air Basin was relatively flat from 1987 to 1991, with some year-to-year variability that was probably caused by meteorology. Since 1991, indicator values have decreased substantially. The 2006 value was 71 percent lower than the 1991 value. The national CO standards have not been exceeded since 1991, and the State standards were last exceeded in 1993. Much of the decline in ambient CO concentrations is attributable to the introduction of cleaner fuels and newer, cleaner motor vehicles. These controls will help keep the area in attainment for both the State and national CO standards.

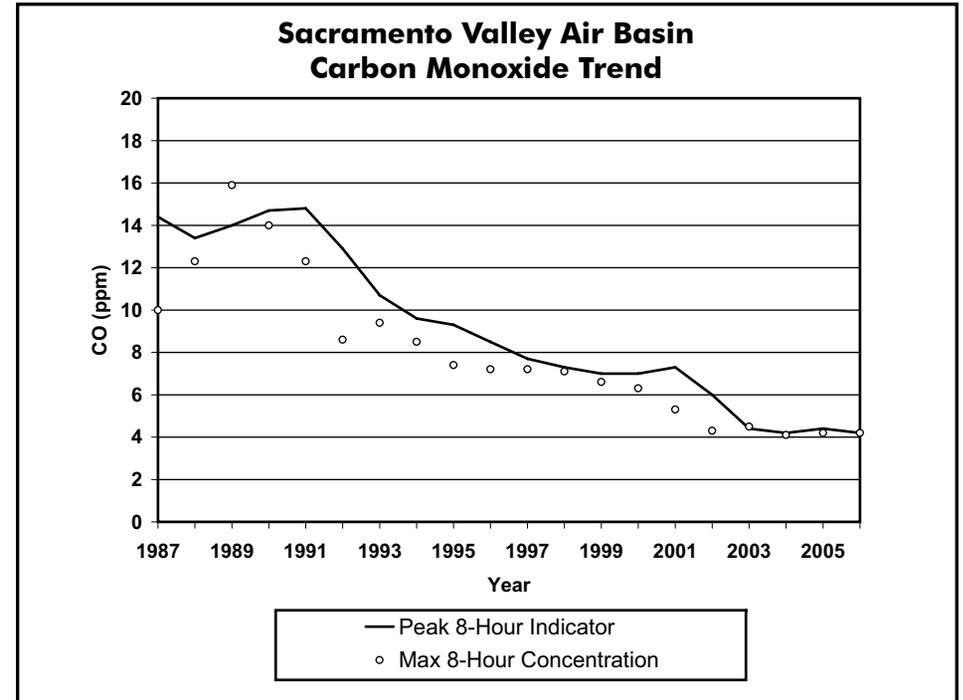


Figure 4-67

CARBON MONOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 8-Hr. Indicator (State)	14.4	13.4	14.0	14.7	14.8	12.9	10.7	9.6	9.3	8.5	7.7	7.3	7.0	7.0	7.3	6.0	4.4	4.2	4.4	4.2
Max. 1-Hr. Concentration	15.0	17.0	18.0	17.0	15.0	14.0	12.0	10.8	9.8	8.7	9.5	7.9	7.7	10.0	17.2	7.8	8.5	7.3	8.0	7.5
Max. 8-Hr. Concentration (State)	10.0	12.3	15.9	14.0	12.3	8.6	9.4	8.5	7.4	7.2	7.2	7.1	6.6	6.3	5.3	4.3	4.5	4.1	4.2	4.2
Days Above State 8-Hr. Std.	5	12	22	14	9	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	3	9	22	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-64

Sacramento Valley Air Basin Nitrogen Dioxide

Oxides of Nitrogen Emission Trends and Forecasts

Emissions of NO_x show a steady decrease from 1990 to 2020. On-road motor vehicles and other mobile sources are by far the largest contributors to NO_x emissions. More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_x emissions.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	335	351	342	382	354	318	290	250	200	164
Stationary Sources	38	32	31	45	46	42	38	39	39	38
Area-wide Sources	9	9	9	10	9	9	9	9	9	9
On-Road Mobile	186	194	202	215	196	167	154	127	88	62
Gasoline Vehicles	156	158	151	144	123	88	59	42	30	22
Diesel Vehicles	30	35	51	72	74	79	96	85	58	40
Other Mobile	102	116	100	112	102	100	88	75	64	54
Gasoline Fuel	3	4	5	6	5	5	7	7	7	6
Diesel Fuel	96	108	92	103	93	90	77	64	53	43
Other Fuel	3	4	4	3	4	5	4	4	4	5

Table 4-65

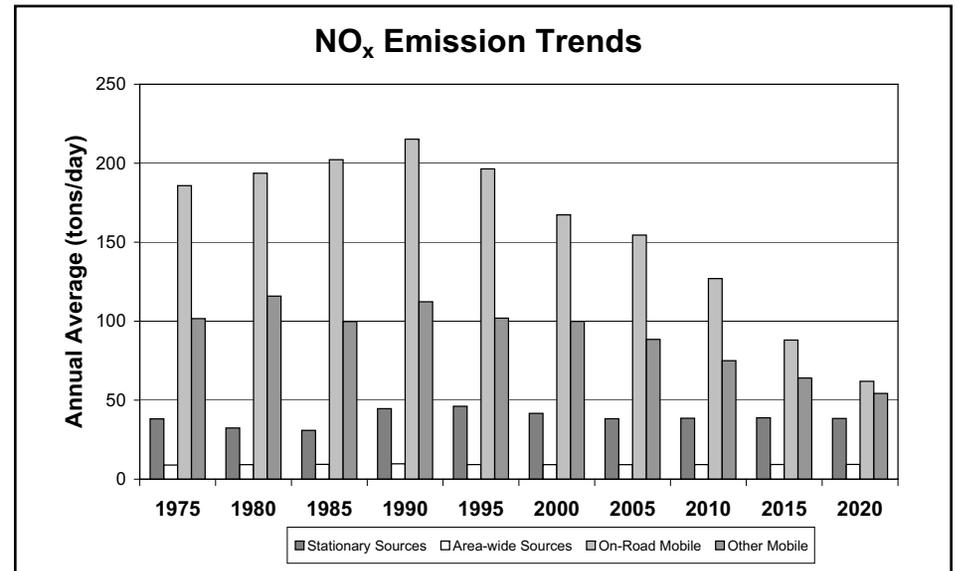


Figure 4-68

Sacramento Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The Sacramento Valley Air Basin has attained both the State and national NO₂ standards for more than 20 years. The peak 1-hour indicator increased from 1987 through 1993, but has declined by 39 percent since 1993. There is more variability in maximum 1-hour concentrations as compared to other areas. This variability may be due to changes in emission sources and may also reflect year-to-year changes in meteorology. However, ambient concentrations are well below the level of the two standards, and a decline in NO₂ concentrations is expected in the coming years.

NO₂ is formed from NO_x emissions, which also contribute to ozone. As a result, the majority of the future emission control measures will be implemented as part of the overall ozone control strategy. Many of these control measures will target mobile sources, which account for more than three-quarters of California's NO_x emissions.

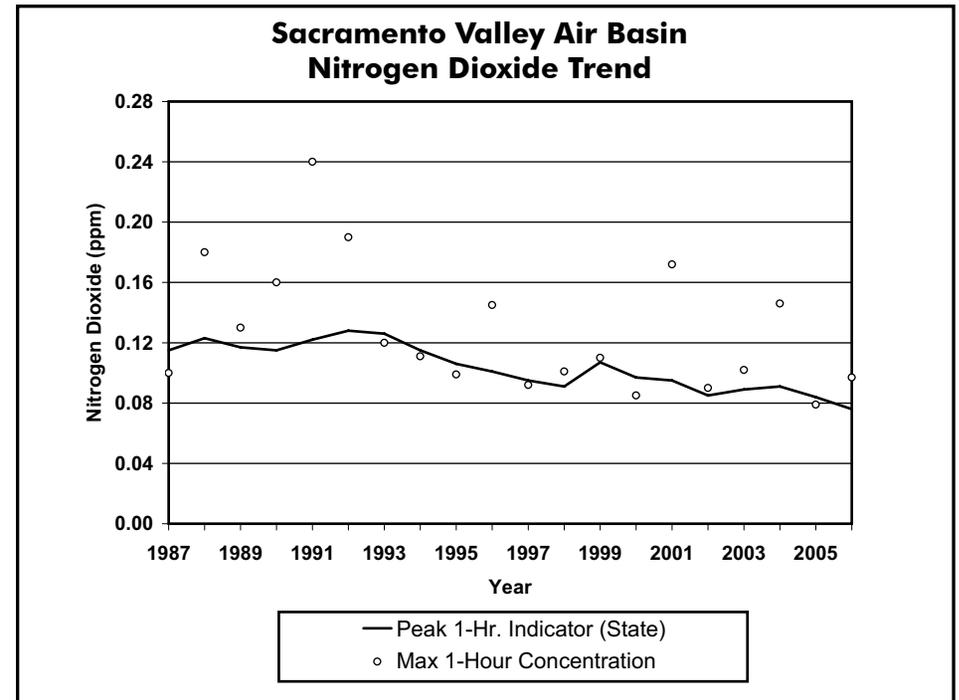


Figure 4-69

NITROGEN DIOXIDE (ppm)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Peak 1-Hr. Indicator (State)	0.115	0.123	0.117	0.115	0.122	0.128	0.126	0.115	0.106	0.101	0.095	0.091	0.107	0.097	0.095	0.085	0.089	0.091	0.084	0.076
Max. 1-Hr. Concentration	0.100	0.180	0.130	0.160	0.240	0.190	0.120	0.111	0.099	0.145	0.092	0.101	0.110	0.085	0.172	0.090	0.102	0.146	0.079	0.097
Max. Annual Average (Nat)	0.022	0.025	0.021	0.023	0.024	0.021	0.022	0.022	0.022	0.022	0.019	0.021	0.021	0.019	0.019	0.020	0.018	0.017	0.016	0.016
Max. Annual Average (State)	0.022	0.024	0.020	0.023	0.024	0.021	0.017	0.022	0.022	0.022	0.019	0.020	0.021	0.019	0.019	0.020	0.015	0.017	0.016	0.016

Table 4-66

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