
Chapter 4

Air Basin Trends and Forecasts -- Criteria Pollutants

Introduction

In addition to the peak indicator, there are several other air quality statistics provided in this chapter and in the appendices. These include the fourth highest 1-hour ozone concentration in three years, which is summarized from the monitoring data, and the average of the 4th highest 8-hour ozone concentrations in three years, which is a calculated value. These values are provided for the five major air basins in this chapter and for individual counties in Appendix A.

In many cases, these two statistics represent the national 1-hour and national 8-hour ozone design values, which are used to determine an area's attainment status. These calculations do not reflect data completeness requirements or the boundaries of a nonattainment area, which may differ from county or air basin boundaries in some parts of California. Design values are available on the web at www.arb.ca.gov/airqualitytoday under "recent year's ozone air quality." When evaluating these statistics, keep in mind that they represent data for a three-year period. For example, the 2004 fourth highest 1-hour ozone concentration in three years represents data for the period 2002-2004.

Days above the State or national standards (exceedance days) often fluctuate when comparing one year to another. When characterizing a percentage increase or decrease in exceedance days, this almanac compares three-year averages. For example, exceedance days for 1983, 1984, and 1985 are averaged and then compared to the average of exceedance days for the years 2003, 2004, and 2005. This gives 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.

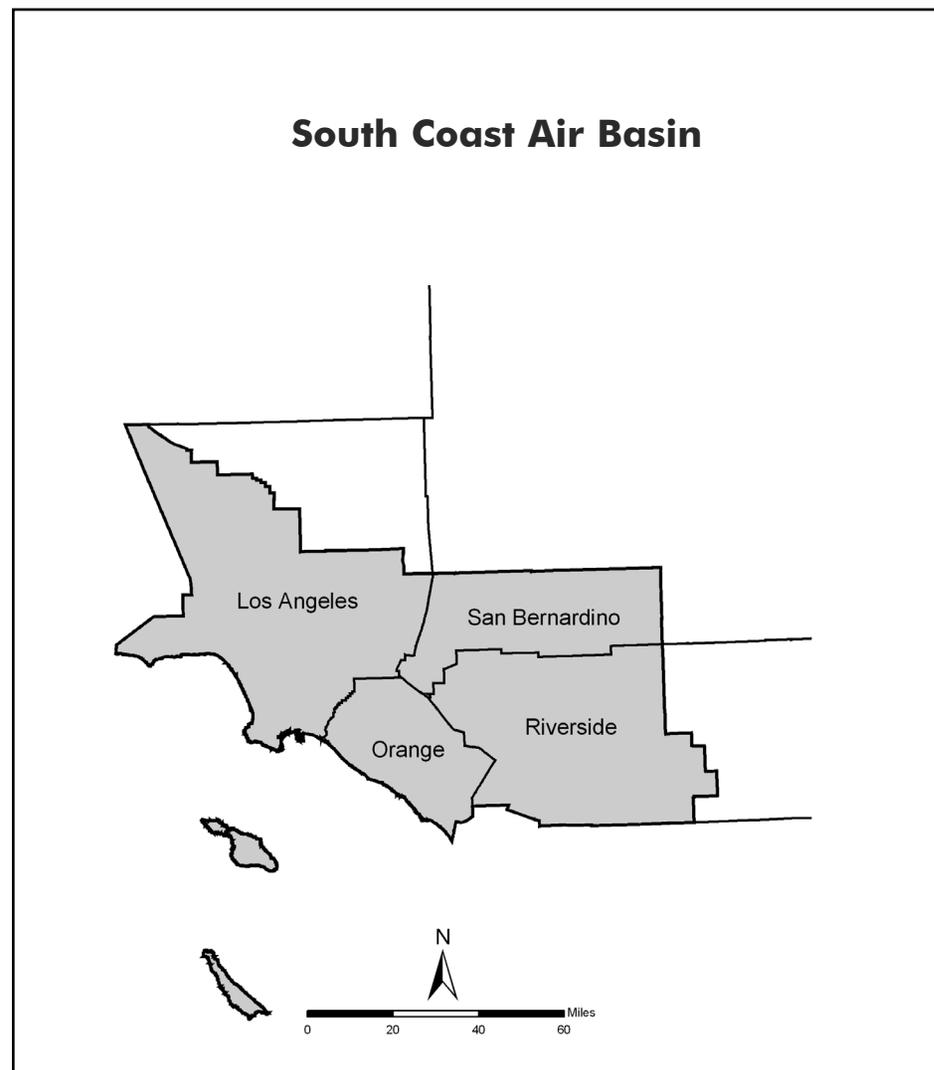


Figure 4-1

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. State Implementation Plan (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/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	1712	1600	1694	1553	1315	1183	957	756	586	496
ROG	2642	2270	2245	1760	1319	1056	684	567	517	492
PM ₁₀	228	239	261	347	330	325	276	278	284	292
PM _{2.5}	119	110	108	125	108	107	97	97	98	100
CO	16137	13368	13099	10309	7547	5451	3838	2943	2395	2056

Table 4-1

South Coast Air Basin

Population and VMT

Both population and the daily VMT will grow at high rates in the South Coast Air Basin from 1980 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.

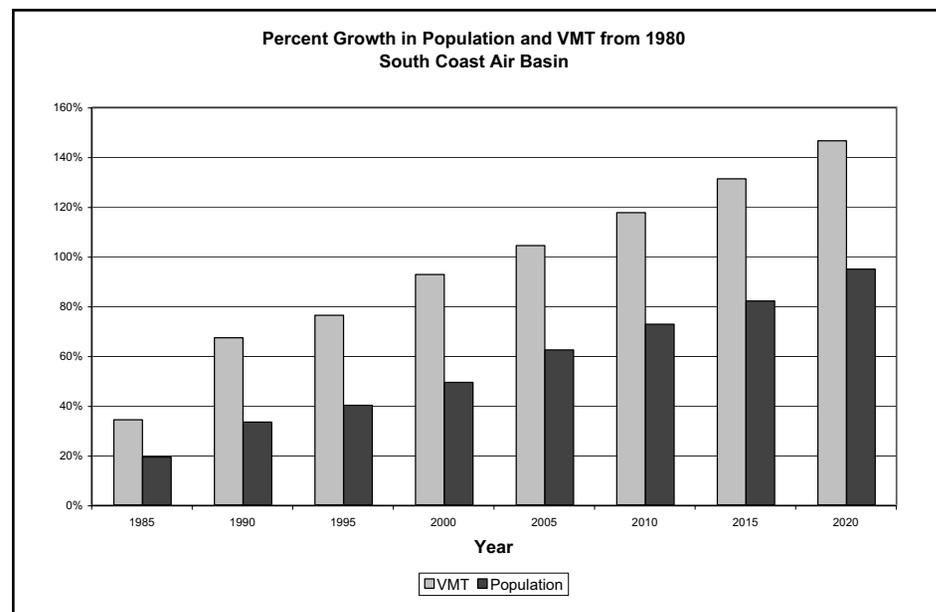


Figure 4-2

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population (1000s)	10605	11698	13084	13745	14688	15984	16728	17389	18051
Avg. Daily VMT/1000	158732	221550	275902	290888	317873	337083	358938	381397	406622

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	1712	1600	1694	1553	1315	1183	957	756	586	496
Stationary Sources	304	263	227	169	120	104	58	57	56	56
Area-wide Sources	31	34	34	28	26	26	28	22	21	22
On-Road Mobile	1026	954	1094	1000	869	751	581	426	282	196
Gasoline Vehicles	921	768	788	700	594	432	270	186	129	92
Diesel Vehicles	105	186	306	299	275	319	311	239	153	103
Other Mobile	351	349	339	356	300	301	290	250	227	223
Gasoline Fuel	20	21	22	24	22	25	26	22	19	19
Diesel Fuel	303	301	287	291	233	229	202	160	132	118
Other Fuel	28	28	29	40	45	48	62	68	76	86

Table 4-3

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	2642	2270	2245	1760	1319	1056	684	567	517	492
Stationary Sources	583	482	497	456	295	258	110	114	119	126
Area-wide Sources	207	222	237	231	203	191	169	155	162	168
On-Road Mobile	1669	1375	1306	852	612	412	275	196	146	113
Gasoline Vehicles	1663	1364	1288	838	600	402	265	187	138	107
Diesel Vehicles	6	11	17	14	12	10	10	9	7	6
Other Mobile	184	192	205	221	209	195	130	102	91	86
Gasoline Fuel	148	157	171	185	178	163	100	77	69	65
Diesel Fuel	29	28	27	27	23	22	20	16	12	10
Other Fuel	7	7	7	8	9	9	10	10	10	11

Table 4-4

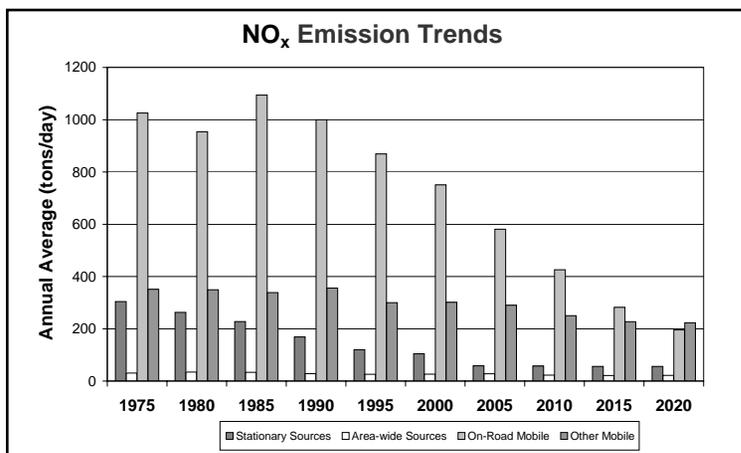


Figure 4-3

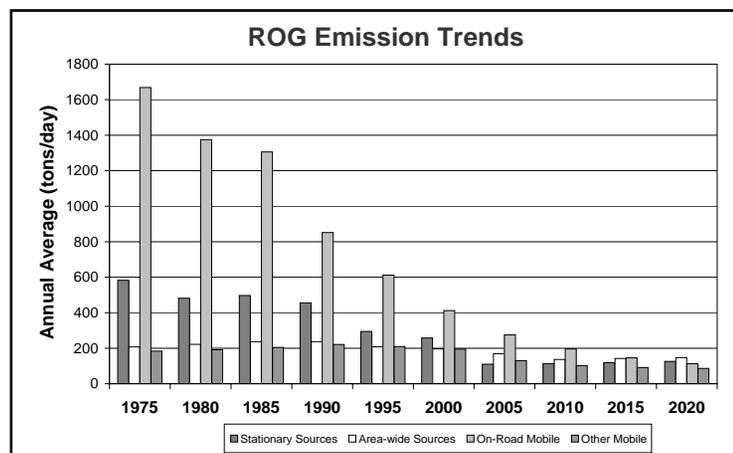


Figure 4-4

South Coast Air Basin

Ozone Air Quality Trend

Air quality as it relates to ozone 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 parts per million. Today, the maximum measured concentrations are less than one-third of that. All of the ozone statistics show an overall, steady decline. The 2004 ozone season in the South Coast was considerably better than the 2003 ozone season. The 2004 peak 8-hour indicator value is almost 43 percent lower than the 1985 value. The 2005 three-year average of the maximum 8-hour concentration is almost 41 percent lower than 1985. The number of days above the standards has declined dramatically. The downward trend for 8-hour ozone is similar to that for 1-hour.

The ARB has identified the South Coast Air Basin as a transport contributor to several downwind areas -- the Mojave Desert Air Basin, the Salton Sea Air Basin, the San Diego Air Basin, and the 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.

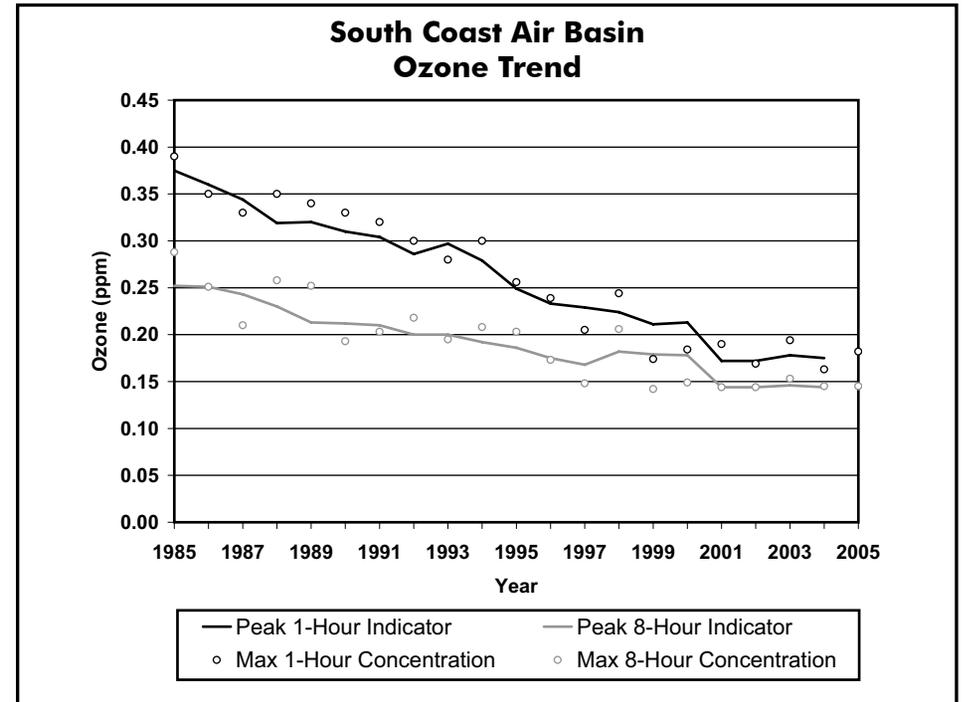


Figure 4-5

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹
Peak 1-Hour Indicator	0.375	0.360	0.344	0.319	0.320	0.310	0.304	0.286	0.297	0.279	0.249	0.233	0.229	0.224	0.211	0.213	0.172	0.172	0.178	0.175	
Peak 8-Hour Indicator	0.252	0.251	0.243	0.230	0.213	0.212	0.210	0.200	0.200	0.192	0.186	0.175	0.168	0.182	0.179	0.178	0.144	0.144	0.146	0.144	
4th High 1-Hr. in 3 Yrs	0.360	0.350	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	0.170	0.169	0.180	0.171	
Avg. of 4th High 8-Hr. in 3 Yrs	0.226	0.222	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	
Maximum 1-Hr. Concentration	0.390	0.350	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
Max. 8-Hr. Concentration	0.288	0.251	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
Days Above State Standard	207	217	196	216	211	185	184	190	185	165	153	141	144	107	111	115	121	116	125	105	97
Days Above Nat. 1-Hr. Std.	158	167	161	178	157	131	130	142	124	118	98	85	64	60	39	33	36	45	64	28	30
Days Above Nat. 8-Hr. Std.	181	191	179	194	181	161	160	173	161	148	120	115	118	93	93	94	92	96	109	88	84

¹ Preliminary data for January through October 2005 are shown here, however they are subject to change. 2004 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-5

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 and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

Particulate matter 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	228	239	261	347	330	325	276	278	284	292
Stationary Sources	56	40	28	27	19	18	16	16	17	17
Area-wide Sources	133	157	186	273	273	269	221	223	229	236
On-Road Mobile	15	17	24	22	19	19	19	19	20	20
Gasoline Vehicles	10	8	9	10	11	12	13	15	16	17
Diesel Vehicles	5	9	15	12	8	6	6	4	3	3
Other Mobile	25	24	23	24	19	20	21	20	19	19
Gasoline Fuel	3	3	3	4	4	4	5	5	6	6
Diesel Fuel	21	20	19	19	14	13	12	11	9	7
Other Fuel	1	1	1	1	2	2	3	4	5	5

Table 4-6

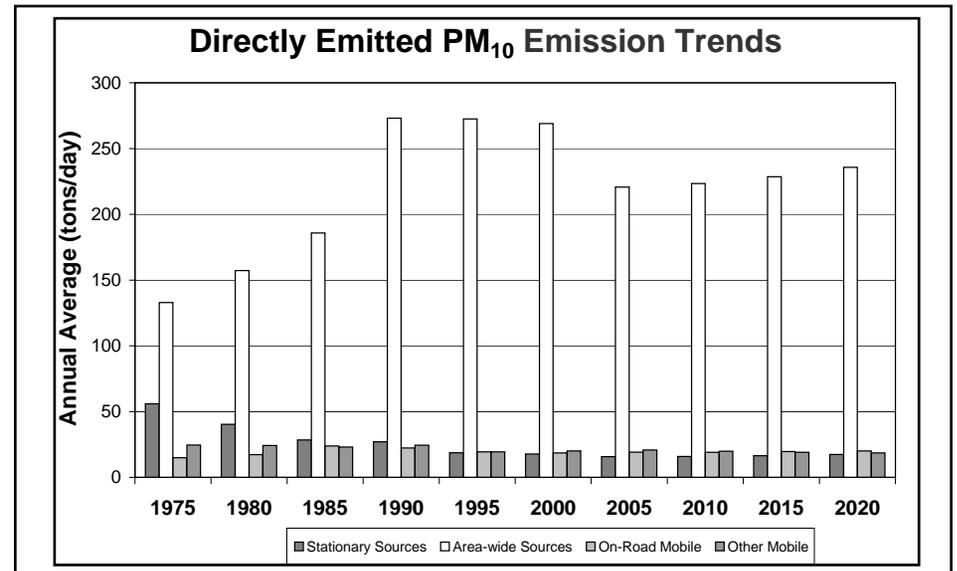


Figure 4-6

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 and other sources. The increase in activity of these area-wide sources reflects the increased growth and VMT in the air basin.

Particulate matter 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	119	110	108	125	108	107	97	97	98	100
Stationary Sources	52	34	22	23	15	15	13	13	13	14
Area-wide Sources	35	41	46	63	62	61	53	54	55	57
On-Road Mobile	11	13	19	17	14	13	13	13	13	13
Gasoline Vehicles	6	5	5	6	6	7	8	9	10	10
Diesel Vehicles	5	9	14	11	8	6	5	4	3	3
Other Mobile	22	22	21	22	17	18	18	18	17	16
Gasoline Fuel	2	2	2	3	3	3	4	4	4	5
Diesel Fuel	19	19	17	18	13	12	11	10	8	7
Other Fuel	1	1	1	1	2	2	3	4	4	5

Table 4-7

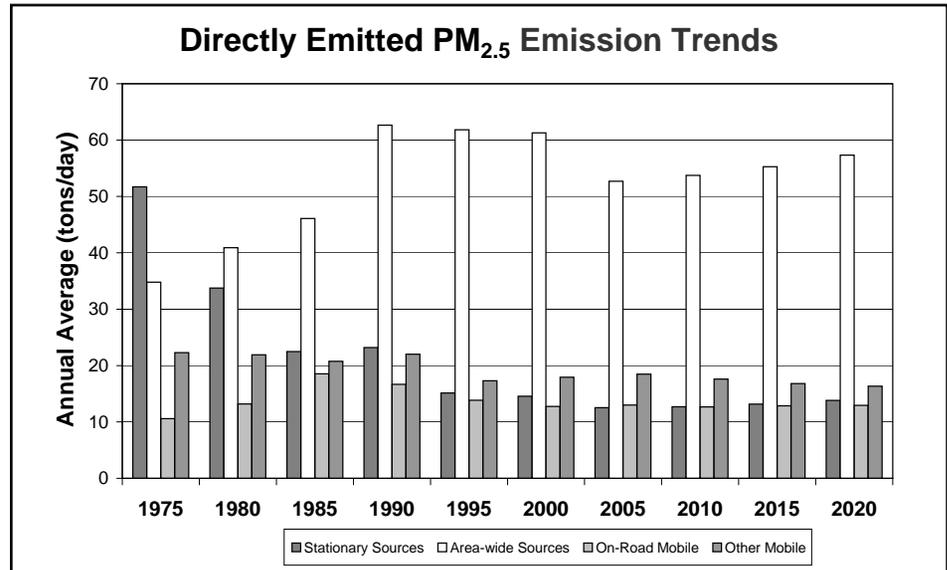


Figure 4-7

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 34 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 1988, there were 345 calculated days above the State standard and 44 calculated days above the national standard. By 2004, there were still 279 calculated State standard exceedance days. In contrast, there were 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.

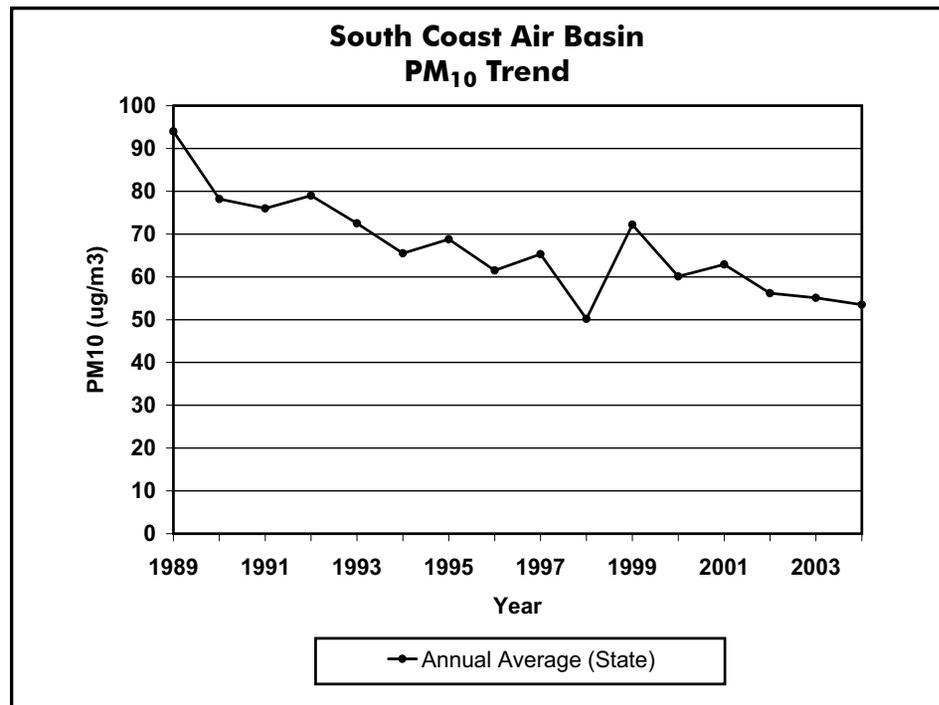


Figure 4-8

PM ₁₀ (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				287	271	475	179	649	231	161	219	162	208	116	183	139	219	126	159	133
Max. 24-Hr. Concentration (Nat)				289	271	475	179	649	231	161	219	162	208	116	183	139	219	130	164	137
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
Annual Average (Nat)				94.5	93.0	78.2	76.1	79.0	72.5	65.5	68.8	62.8	65.6	50.2	72.2	59.1	63.3	58.1	55.6	54.8
Calc Days Above State 24-Hr Std				345	338	301	294	282	293	276	252	276	290	238	288	300	278	297	252	279
Calc Days Above Nat 24-Hr Std				44	32	33	15	24	12	3	31	6	17	0	6	0	5	0	6	0

Table 4-8

South Coast Air Basin

PM_{2.5} Air Quality Trend

Figure 4-8 shows the annual average PM_{2.5} concentrations (national) in the South Coast Air Basin from 1999 through 2004. Overall, concentrations were relatively stable during the first three years. However, over the last three 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 six years. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. Several more years are needed before determining longer-term trends. The South Coast Air Basin is currently designated as nonattainment for the national PM_{2.5} standards. Measures adopted as part of the upcoming PM_{2.5} State Implementation Plan, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

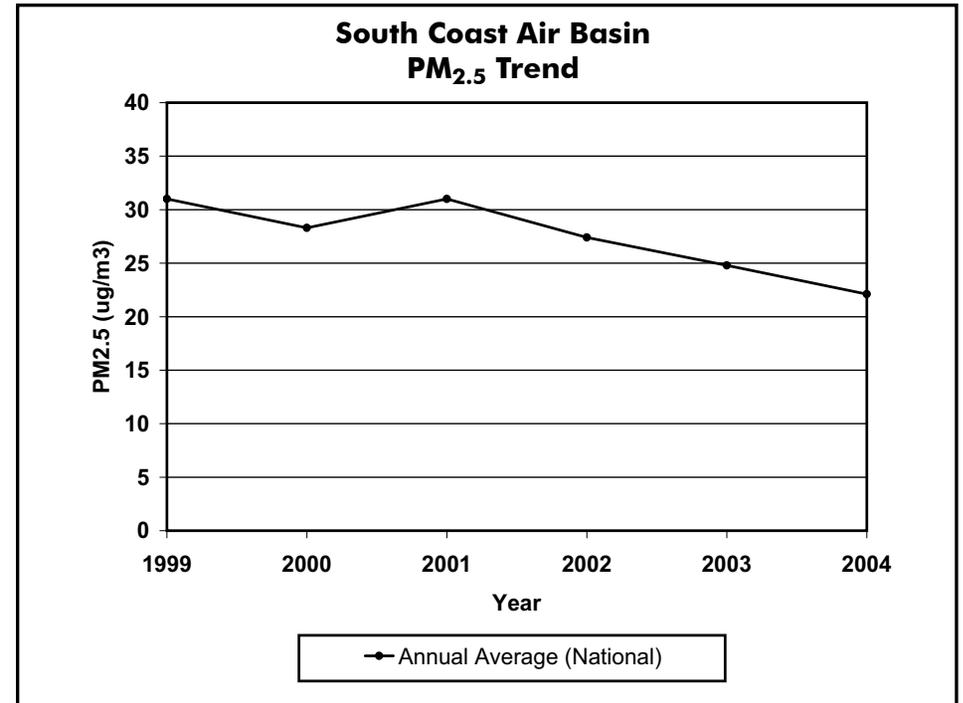


Figure 4-9

PM _{2.5} (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)															121.4	119.6	104	82.1	121.2	93.8
Max. 24-Hr. Concentration (Nat)															121.4	119.6	98.0	82.1	121.2	93.8
98th Percentile of 24-Hr Conc.															85.6	83.0	74.3	66.3	76.6	72.4
Annual Average (State)																24.0	25.0	25.8	24.8	16.6
Avg. of Qtrly. Means (Nat)															31.0	28.3	31.0	27.4	24.8	22.1

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 are projected to decrease 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	16137	13368	13099	10309	7547	5451	3838	2943	2395	2056
Stationary Sources	291	280	69	95	62	48	65	66	68	69
Area-wide Sources	39	44	48	56	57	60	64	68	73	78
On-Road Mobile	14571	11754	11622	8690	6153	4207	2705	1883	1334	956
Gasoline Vehicles	14546	11708	11545	8623	6093	4154	2654	1839	1295	920
Diesel Vehicles	25	47	78	67	60	52	51	44	39	36
Other Mobile	1236	1290	1360	1468	1274	1136	1004	926	921	953
Gasoline Fuel	1027	1076	1156	1251	1080	952	823	743	735	761
Diesel Fuel	119	121	119	122	96	85	76	72	69	68
Other Fuel	91	92	86	96	98	98	105	111	117	124

Table 4-10

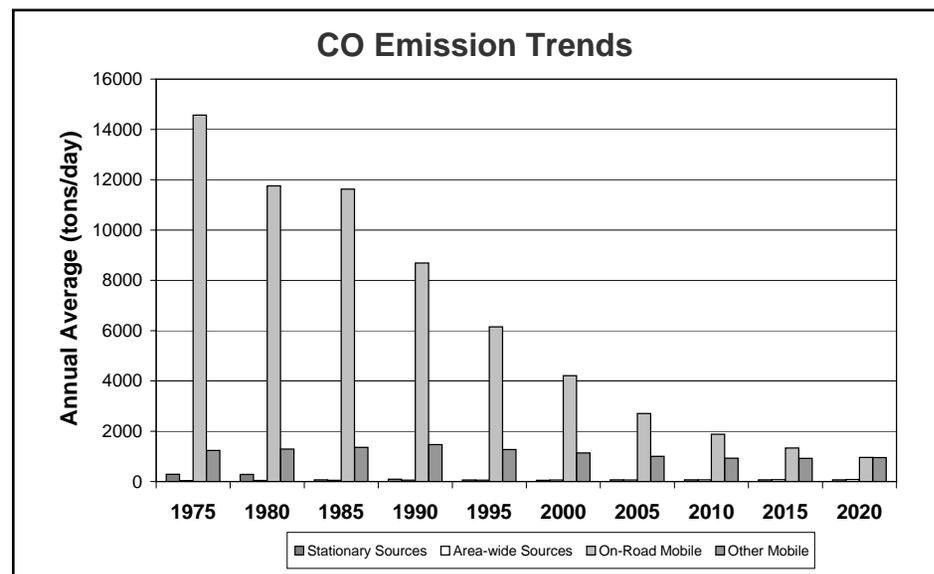


Figure 4-10

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 60 percent in the maximum peak 8-hour indicator since 1985. The number of exceedance days has also declined. There were 64 days above the State standard and 54 days above the national standard during 1985. However, during 2004, there were no exceedance days for either standard.

The entire South Coast Air Basin is designated as nonattainment for the national CO standards, however, CO violations that have occurred have been limited to a small portion of Los Angeles County. The South Coast Air Basin now qualifies as attainment for the national standard. No violations have occurred in the other three counties since 1992. Continuing reductions from motor vehicle control programs should continue the downward trend in ambient CO concentrations.

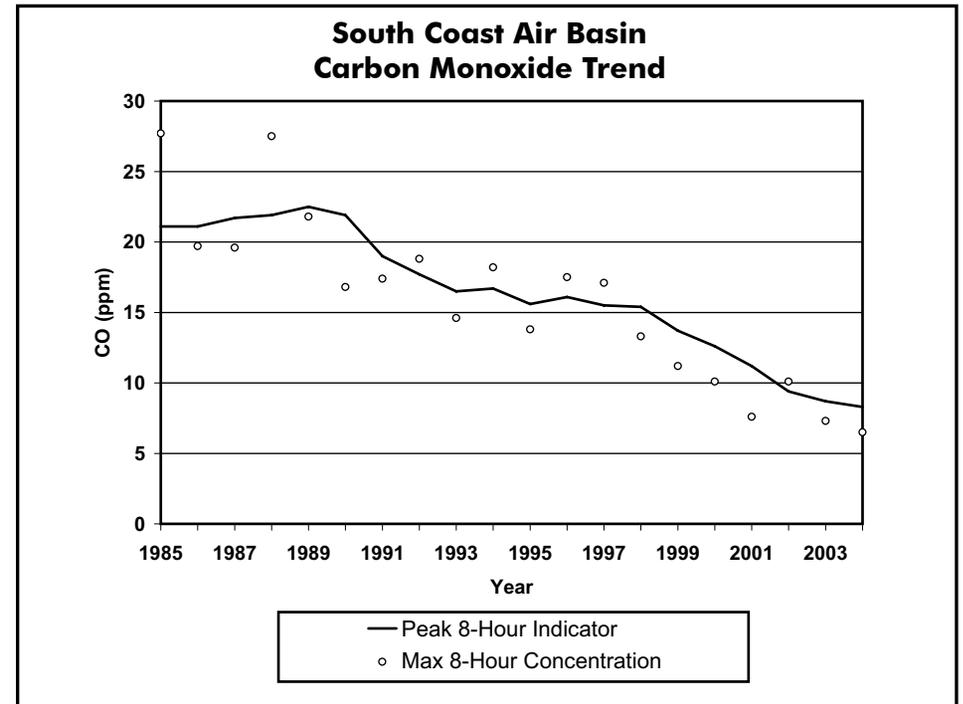


Figure 4-11

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	21.1	21.1	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
Max. 1-Hr. Concentration	33.0	27.0	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
Max. 8-Hr. Concentration	27.7	19.7	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
Days Above State 8-Hr. Std.	64	58	50	73	71	50	51	39	29	27	17	26	18	13	11	6	0	1	0	0
Days Above Nat. 8-Hr. Std.	54	49	40	65	67	42	41	34	19	19	14	19	13	10	7	3	0	1	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	1712	1600	1694	1553	1315	1183	957	756	586	496
Stationary Sources	304	263	227	169	120	104	58	57	56	56
Area-wide Sources	31	34	34	28	26	26	28	22	21	22
On-Road Mobile	1026	954	1094	1000	869	751	581	426	282	196
Gasoline Vehicles	921	768	788	700	594	432	270	186	129	92
Diesel Vehicles	105	186	306	299	275	319	311	239	153	103
Other Mobile	351	349	339	356	300	301	290	250	227	223
Gasoline Fuel	20	21	22	24	22	25	26	22	19	19
Diesel Fuel	303	301	287	291	233	229	202	160	132	118
Other Fuel	28	28	29	40	45	48	62	68	76	86

Table 4-12

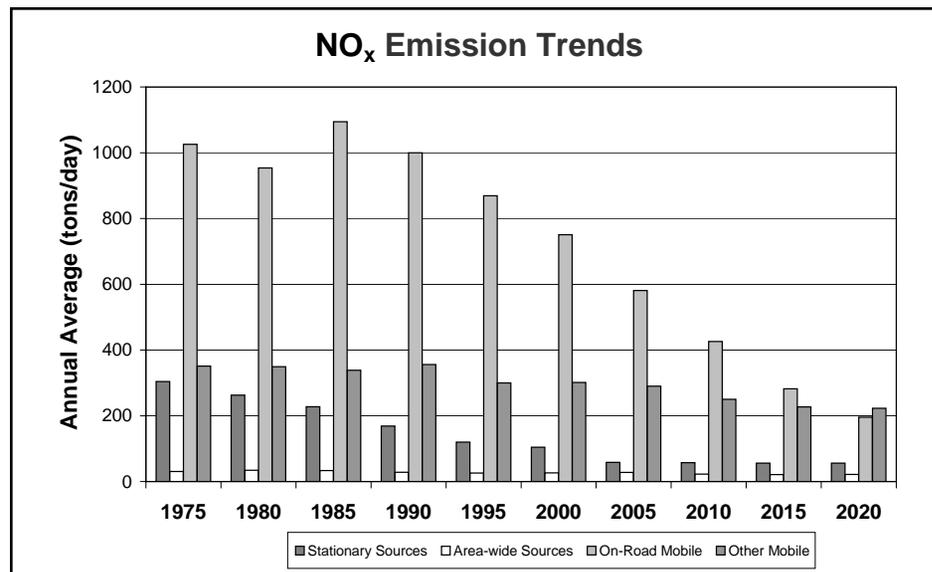


Figure 4-12

South Coast Air Basin

Nitrogen Dioxide Air Quality Trend

The South Coast Air Basin is one of only a few areas in California where nitrogen dioxide (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 federal 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 2004 was half of what it was during 1985. However, since the early 1990's, maximum 1-hour NO₂ concentrations that exceed the level of the State standard have occasionally occurred but have not affected the area's attainment status. These exceedances have been very infrequent and limited to either the Banning Airport or the Burbank-West Palm Avenue monitoring sites. Additional years of data will be needed to determine if there is any long-term change in NO₂ trends in the South Coast Air Basin.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, 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 oxides of nitrogen emissions.

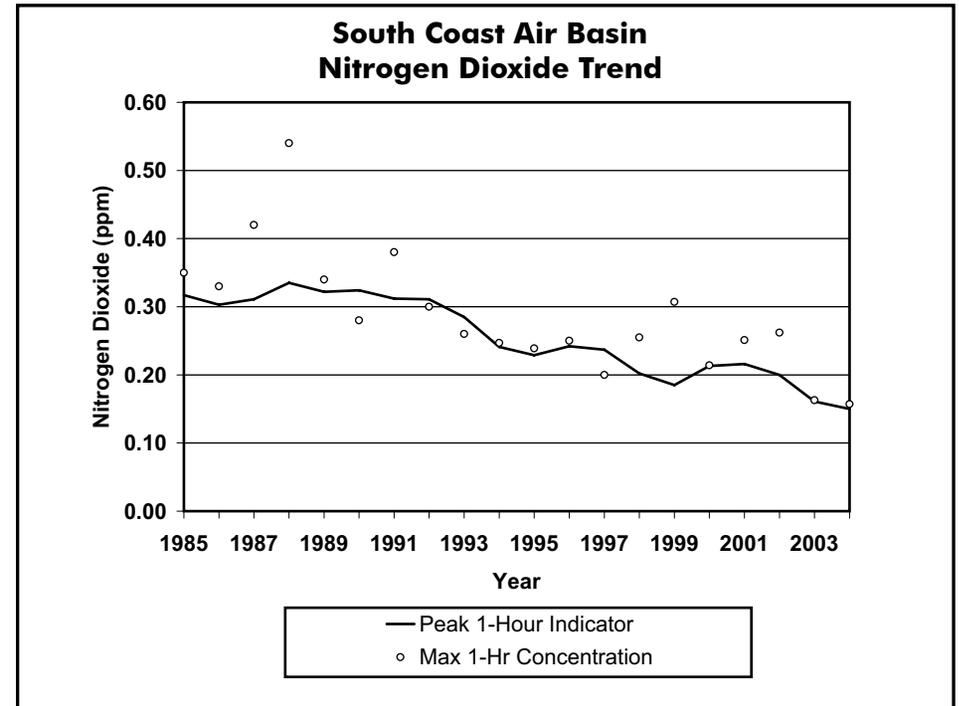


Figure 4-13

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator	0.317	0.303	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
Max. 1-Hr. Concentration	0.350	0.330	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
Max. Annual Average	0.060	0.061	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	0.033

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.

Over 19 percent of California's population resides in the San Francisco Bay Area, and pollution sources in the region account for about 16 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 in the South Coast Air Basin. This is due to a more favorable climate, with cooler temperatures and better ventilation. However, exceedances of the ozone 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 4-14

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.

San Francisco Bay Area Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	979	972	909	878	765	658	547	465	389	352
ROG	1366	1278	1029	756	631	513	387	337	307	292
PM ₁₀	178	179	193	192	189	219	213	226	238	251
PM _{2.5}	87	85	87	88	86	93	91	94	99	103
CO	8846	8200	6997	5190	3814	2799	2213	1792	1456	1257

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 are projected to grow at a slower rate in the San Francisco Bay Area Air Basin from 1980 to 2020. During that 40-year period, the population is projected to increase about 57 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 136 percent, from 90 million miles per day in 1980 to over 213 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.

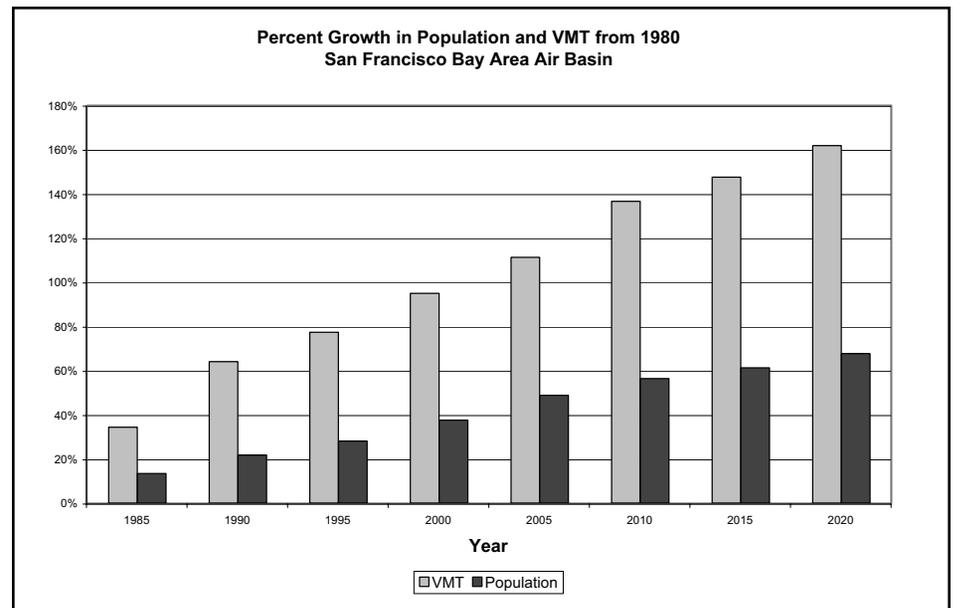


Figure 4-15

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	5095406	5473956	5874353	6182467	6646727	6953438	7337485	7736635	8135781
Avg. Daily VMT/1000	90066	109789	133990	144854	159271	172581	193300	202212	213900

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	979	972	909	878	765	658	547	465	389	352
Stationary Sources	235	212	141	131	114	90	55	57	59	61
Area-wide Sources	13	14	15	19	20	20	20	20	21	21
On-Road Mobile	552	570	566	524	437	352	286	217	146	101
Gasoline Vehicles	497	478	417	348	294	208	155	114	78	54
Diesel Vehicles	55	92	149	176	142	144	131	103	68	47
Other Mobile	178	175	187	203	195	196	186	171	163	169
Gasoline Fuel	8	8	9	11	12	13	13	10	10	10
Diesel Fuel	146	142	151	161	148	144	131	110	96	91
Other Fuel	24	26	28	32	35	40	43	50	58	68

Table 4-16

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1366	1278	1029	756	631	513	387	337	307	292
Stationary Sources	301	261	169	117	121	115	78	79	82	85
Area-wide Sources	115	115	112	117	103	97	92	95	98	101
On-Road Mobile	865	815	652	417	307	207	152	113	80	60
Gasoline Vehicles	862	809	643	409	300	201	146	108	76	57
Diesel Vehicles	3	5	8	8	6	6	6	5	4	3
Other Mobile	85	88	96	105	101	94	64	51	48	46
Gasoline Fuel	61	63	70	77	76	71	43	32	29	27
Diesel Fuel	14	13	14	15	15	14	13	10	9	8
Other Fuel	10	11	12	13	11	9	8	9	10	11

Table 4-17

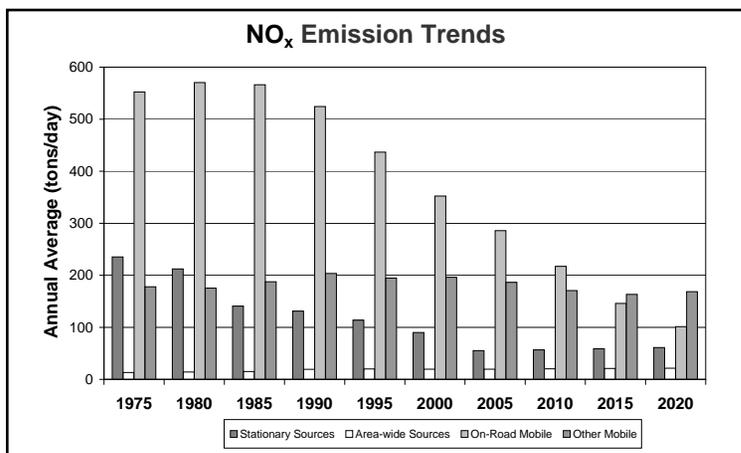


Figure 4-16

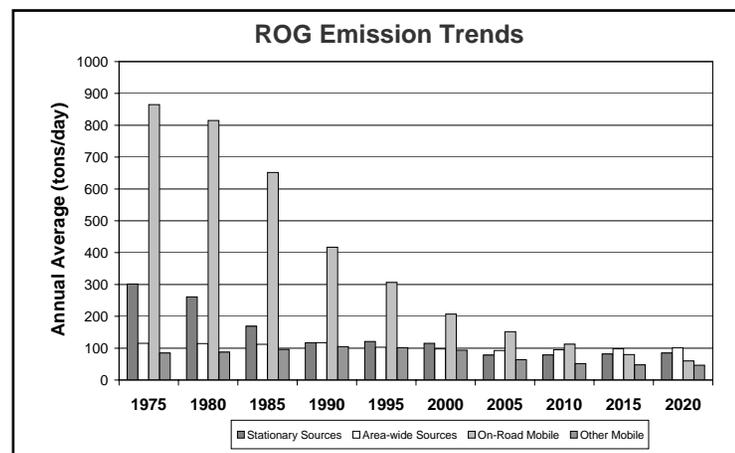


Figure 4-17

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 26 percent during the last 20 years. The number of days when State and federal standards are exceeded show a similar trend. Another indication of progress is that the Bay Area may soon qualify for attainment of the federal 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 show some elevated values. 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.

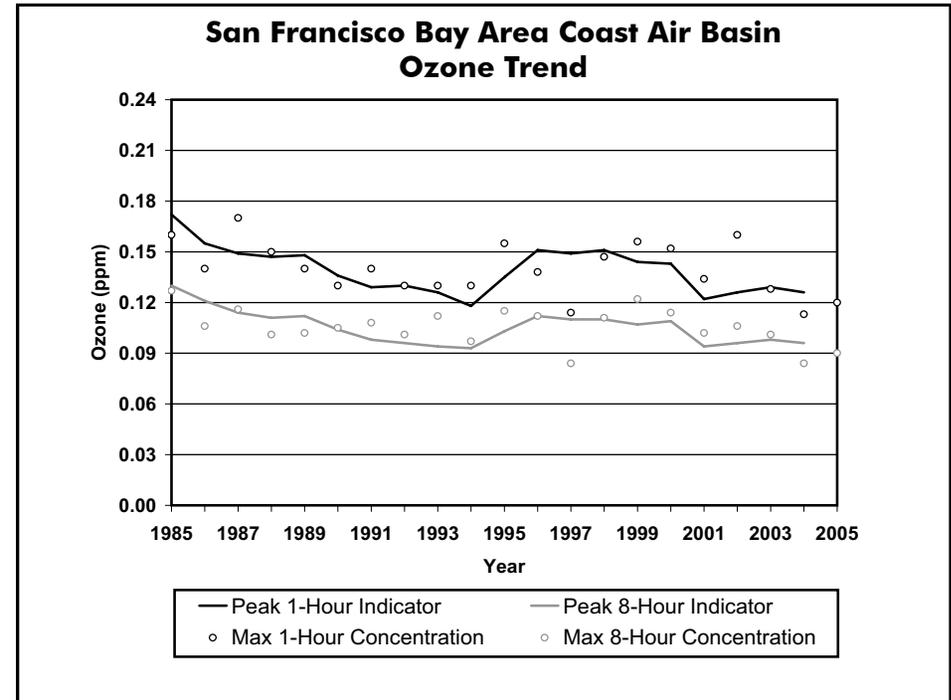


Figure 4-18

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹
Peak 1-Hour Indicator	0.172	0.155	0.149	0.147	0.148	0.136	0.129	0.130	0.126	0.118	0.135	0.151	0.149	0.151	0.144	0.143	0.122	0.126	0.129	0.126	
Peak 8-Hour Indicator	0.130	0.121	0.114	0.111	0.112	0.104	0.098	0.096	0.094	0.093	0.103	0.112	0.110	0.110	0.107	0.109	0.094	0.096	0.098	0.096	
4th High 1-Hr. in 3 Yrs	0.160	0.150	0.140	0.140	0.140	0.130	0.130	0.120	0.120	0.121	0.138	0.138	0.138	0.138	0.139	0.139	0.126	0.124	0.123	0.123	
Avg. of 4th High 8-Hr. in 3 Yrs	0.103	0.097	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	
Maximum 1-Hr. Concentration	0.160	0.140	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
Max. 8-Hr. Concentration	0.127	0.106	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
Days Above State Standard	45	39	46	41	22	14	23	23	19	13	28	34	8	29	20	12	15	16	19	7	9
Days Above Nat. 1-Hr. Std.	9	5	14	5	4	2	2	2	3	2	11	8	0	8	3	3	1	2	1	0	0
Days Above Nat. 8-Hr. Std.	17	13	29	20	13	7	6	6	5	4	18	14	0	16	9	4	7	7	7	0	1

¹ Preliminary data for January through October 2005 are shown here, however they are subject to change. 2004 is the last year for which complete and approved data is available, thus annual statistics are not included.

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.

Particulate matter 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	178	179	193	192	189	219	213	226	238	251
Stationary Sources	39	28	24	21	23	21	17	18	18	19
Area-wide Sources	118	129	144	143	144	177	175	187	199	210
On-Road Mobile	7	9	12	12	9	9	10	10	10	11
Gasoline Vehicles	5	4	4	5	5	6	7	8	9	9
Diesel Vehicles	2	5	7	7	4	3	3	2	2	1
Other Mobile	14	14	14	16	13	12	12	11	11	11
Gasoline Fuel	1	1	1	1	2	2	2	2	3	3
Diesel Fuel	10	9	10	11	9	9	8	7	6	5
Other Fuel	3	3	3	4	3	2	2	2	2	3

Table 4-19

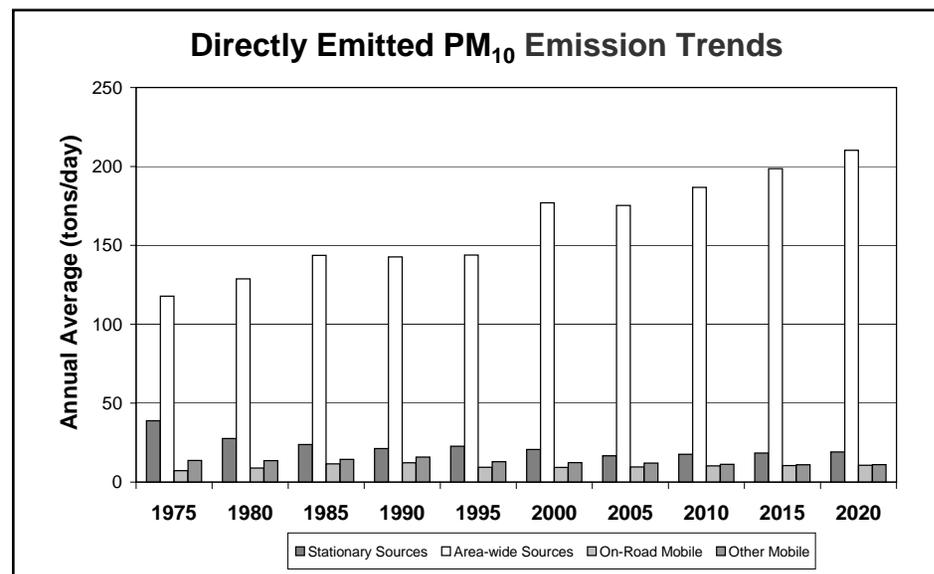


Figure 4-19

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 is due to growth in emissions from area-wide sources, primarily 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.

Particulate matter 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	87	85	87	88	86	93	91	94	99	103
Stationary Sources	28	22	16	14	16	16	13	14	14	15
Area-wide Sources	41	44	48	50	52	59	60	64	67	71
On-Road Mobile	5	7	9	9	7	6	7	7	7	7
Gasoline Vehicles	3	3	2	3	3	3	4	5	5	6
Diesel Vehicles	2	4	7	7	4	3	3	2	2	1
Other Mobile	13	13	13	15	12	11	11	10	10	10
Gasoline Fuel	1	1	1	1	1	1	2	2	2	2
Diesel Fuel	9	9	9	10	8	8	8	6	6	5
Other Fuel	3	3	3	4	3	2	2	2	2	3

Table 4-20

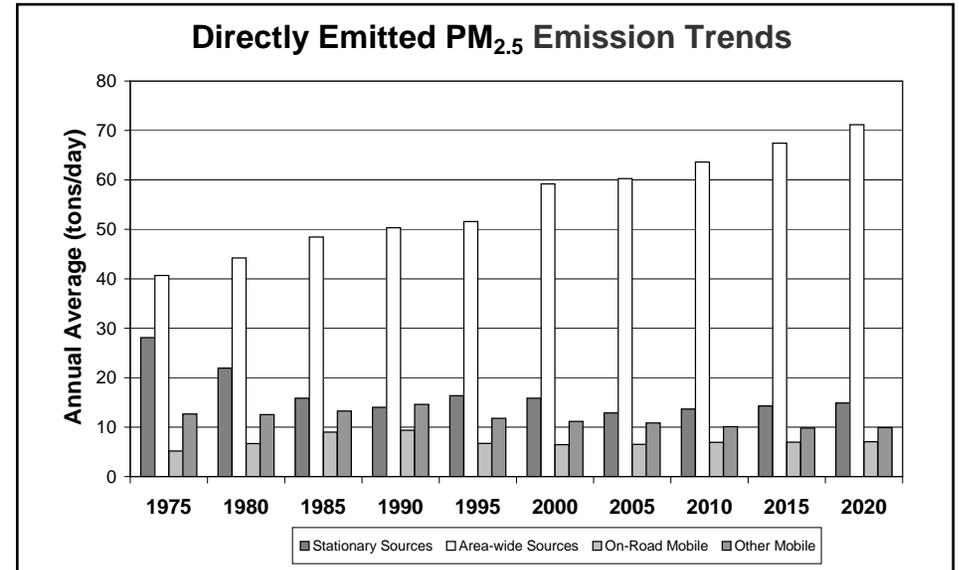


Figure 4-20

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 more than 30 percent.

Calculated exceedance days for the State 24-hour standard dropped from a high of 123 days during 1988 to 36 days during 2004. 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.

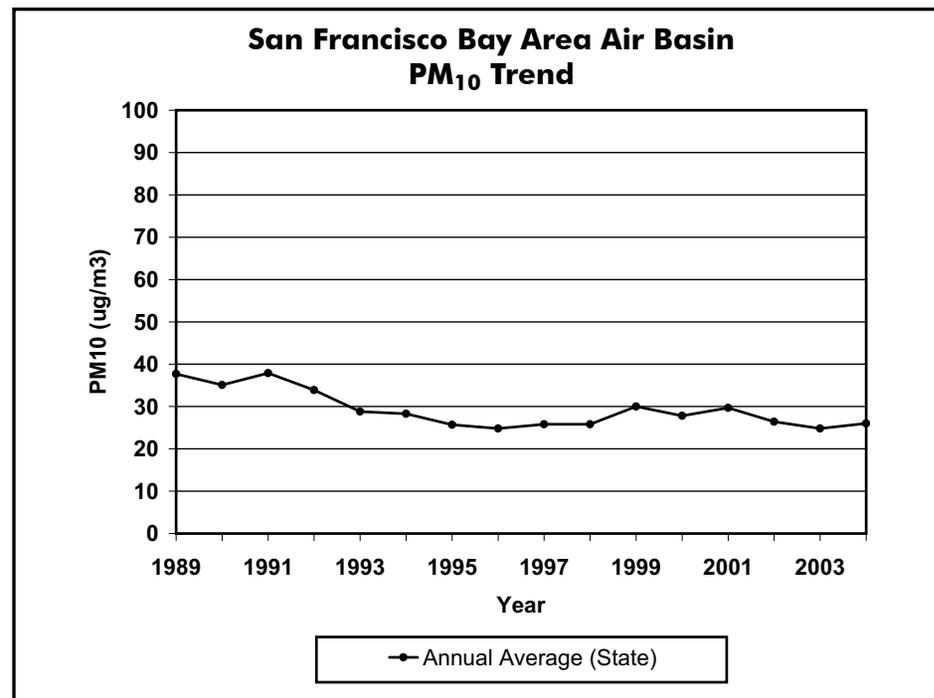


Figure 4-21

PM ₁₀ (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				146	147	165	155	112	93	97	74	76	85	100	117	80	114	84	60	65
Max. 24-Hr. Concentration (Nat)				146	150	173	155	112	101	97	74	76	95	92	114	76	109	80	58	63
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
Annual Average (Nat)				38.3	40.8	40.4	38.3	33.7	28.8	28.3	25.7	24.9	25.8	25.1	28.7	26.8	28.9	25.4	24.2	25.3
Calc Days Above State 24-Hr Std				123	137	93	125	108	59	54	42	18	20	25	63	42	51	30	30	36
Calc Days Above Nat 24-Hr Std				0	0	4	1	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 slightly in the last five years. The State annual average concentration trend however, remained relatively constant, due to differences in State and national monitoring methods. However, the national annual statistics show a slight downward trend. The 98th percentile of 24-hour PM_{2.5} concentrations also declined during this five-year period. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. Several more years are needed before determining longer-term trends. 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.

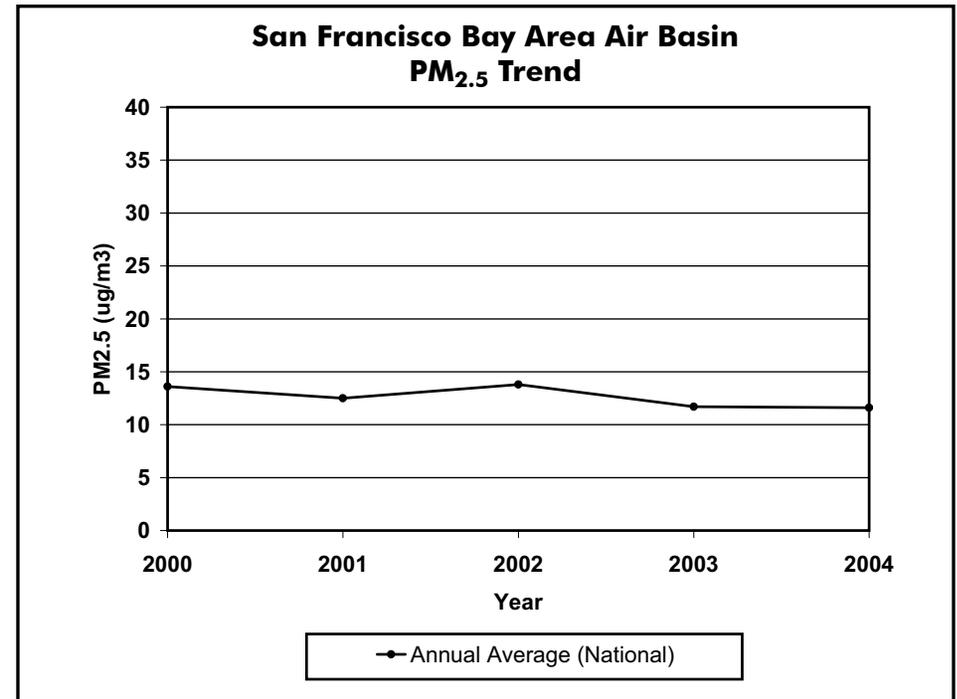


Figure 4-22

PM _{2.5} (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)															90.5	67.2	107.5	84.5	56.1	73.7
Max. 24-Hr. Concentration (Nat)															90.5	67.2	107.5	76.7	56.1	73.7
98th Percentile of 24-Hr Conc.																55.3	56.0	57.5	37.4	39.8
Annual Average (State)																11.6	12.5	13.8	11.7	11.6
Avg. of Qtrly. Means (Nat)																13.6	12.5	13.8	11.7	11.6

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. Oil refineries, manufacturing, 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	8846	8200	6997	5190	3814	2799	2213	1792	1456	1257
Stationary Sources	53	62	80	72	69	57	53	54	57	59
Area-wide Sources	127	136	144	160	163	169	178	182	188	194
On-Road Mobile	8155	7477	6190	4310	2965	2029	1496	1105	752	522
Gasoline Vehicles	8142	7454	6152	4270	2934	2001	1470	1082	733	505
Diesel Vehicles	13	23	38	39	31	27	26	23	19	17
Other Mobile	511	525	582	648	618	544	486	450	459	481
Gasoline Fuel	402	413	461	518	495	431	376	333	333	345
Diesel Fuel	56	56	63	69	62	55	49	46	47	48
Other Fuel	52	55	58	61	61	59	61	71	79	88

Table 4-23

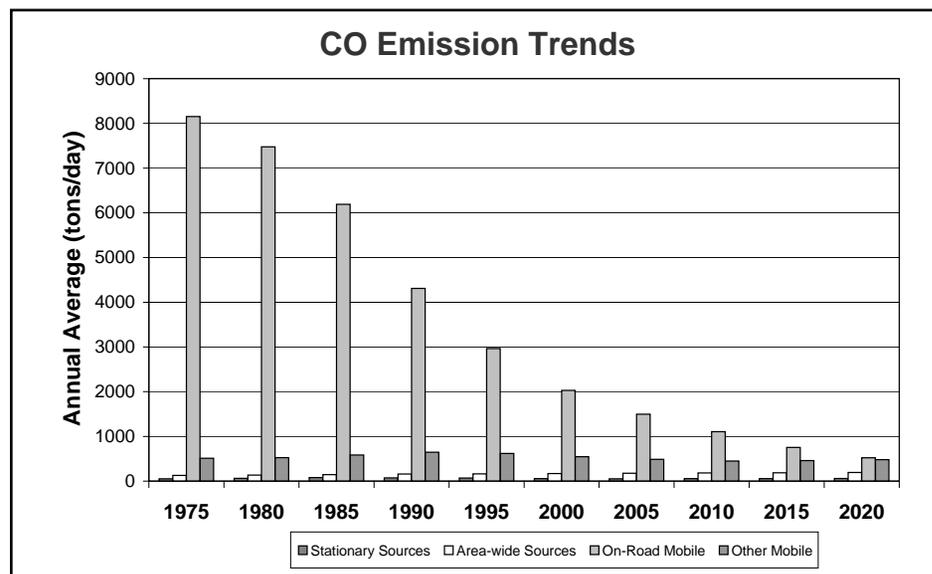


Figure 4-23

San Francisco Bay Area Air Basin Carbon Monoxide Air Quality Trend

As in other areas of the State, carbon monoxide concentrations in the San Francisco Bay Area Air Basin have declined substantially over the last 20 years. The peak 8-hour indicator value during 2004 is 30 percent of what it was during 1985 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 carbon monoxide 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.

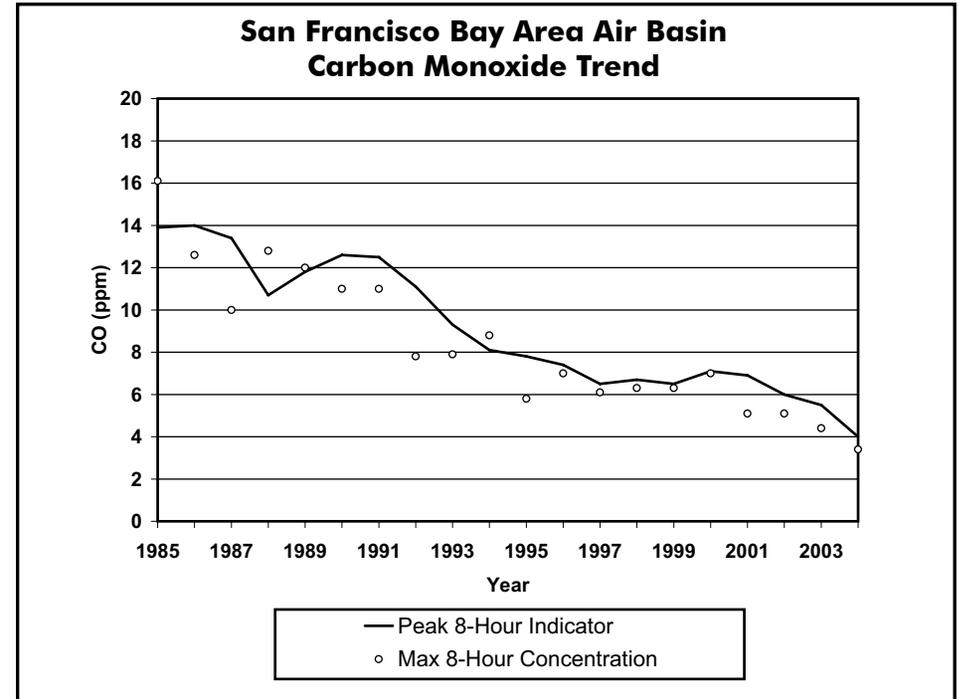


Figure 4-24

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	13.9	14.0	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
Max. 1-Hr. Concentration	21.0	20.0	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
Max. 8-Hr. Concentration	16.1	12.6	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
Days Above State 8-Hr. Std.	24	8	2	4	10	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	21	8	1	4	9	2	4	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	979	972	909	878	765	658	547	465	389	352
Stationary Sources	235	212	141	131	114	90	55	57	59	61
Area-wide Sources	13	14	15	19	20	20	20	20	21	21
On-Road Mobile	552	570	566	524	437	352	286	217	146	101
Gasoline Vehicles	497	478	417	348	294	208	155	114	78	54
Diesel Vehicles	55	92	149	176	142	144	131	103	68	47
Other Mobile	178	175	187	203	195	196	186	171	163	169
Gasoline Fuel	8	8	9	11	12	13	13	10	10	10
Diesel Fuel	146	142	151	161	148	144	131	110	96	91
Other Fuel	24	26	28	32	35	40	43	50	58	68

Table 4-25

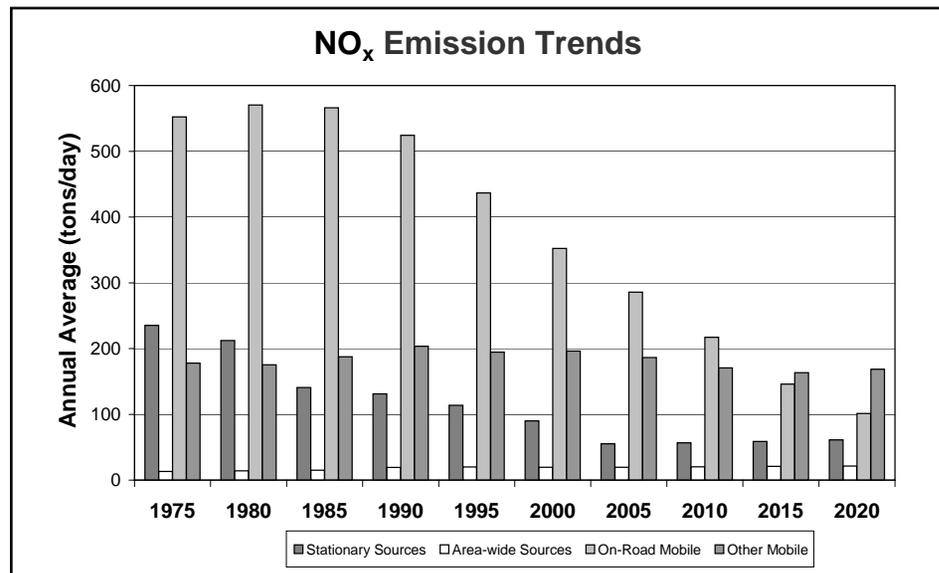


Figure 4-25

San Francisco Bay Area Air Basin

Nitrogen Dioxide Air Quality Trend

The San Francisco Bay Area has attained both the State and national nitrogen dioxide 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 almost 60 percent in the San Francisco Bay Area since 1985. This downward trend is expected to continue.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, 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 oxides of nitrogen emissions.

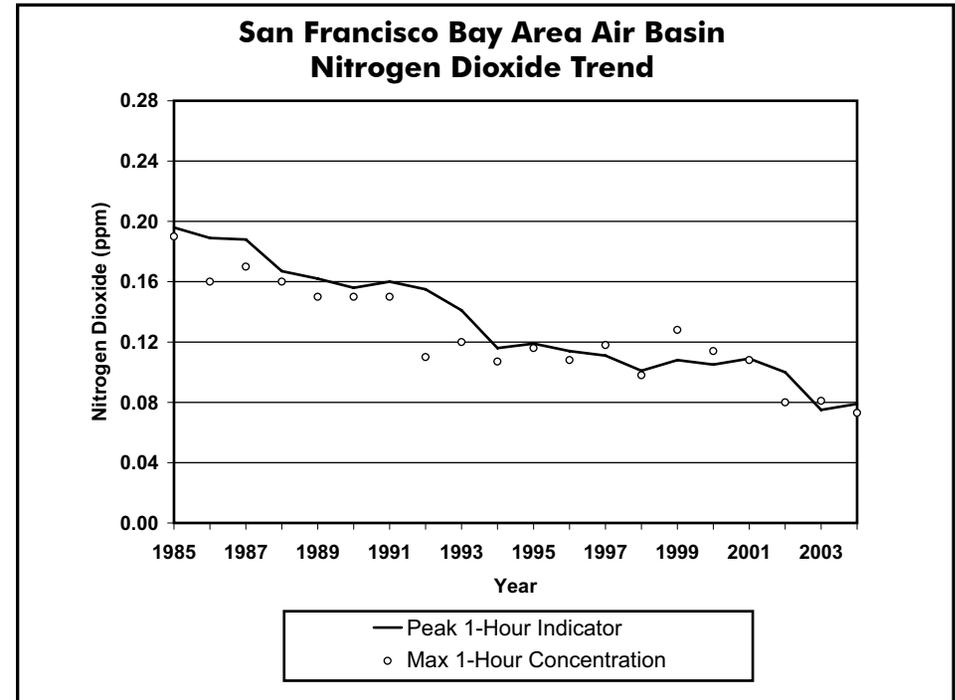


Figure 4-26

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator	0.196	0.189	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
Max. 1-Hr. Concentration	0.190	0.160	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
Max. Annual Average	0.035	0.033	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

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 and unbroken, 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 14 percent of the total statewide criteria pollutant emissions.

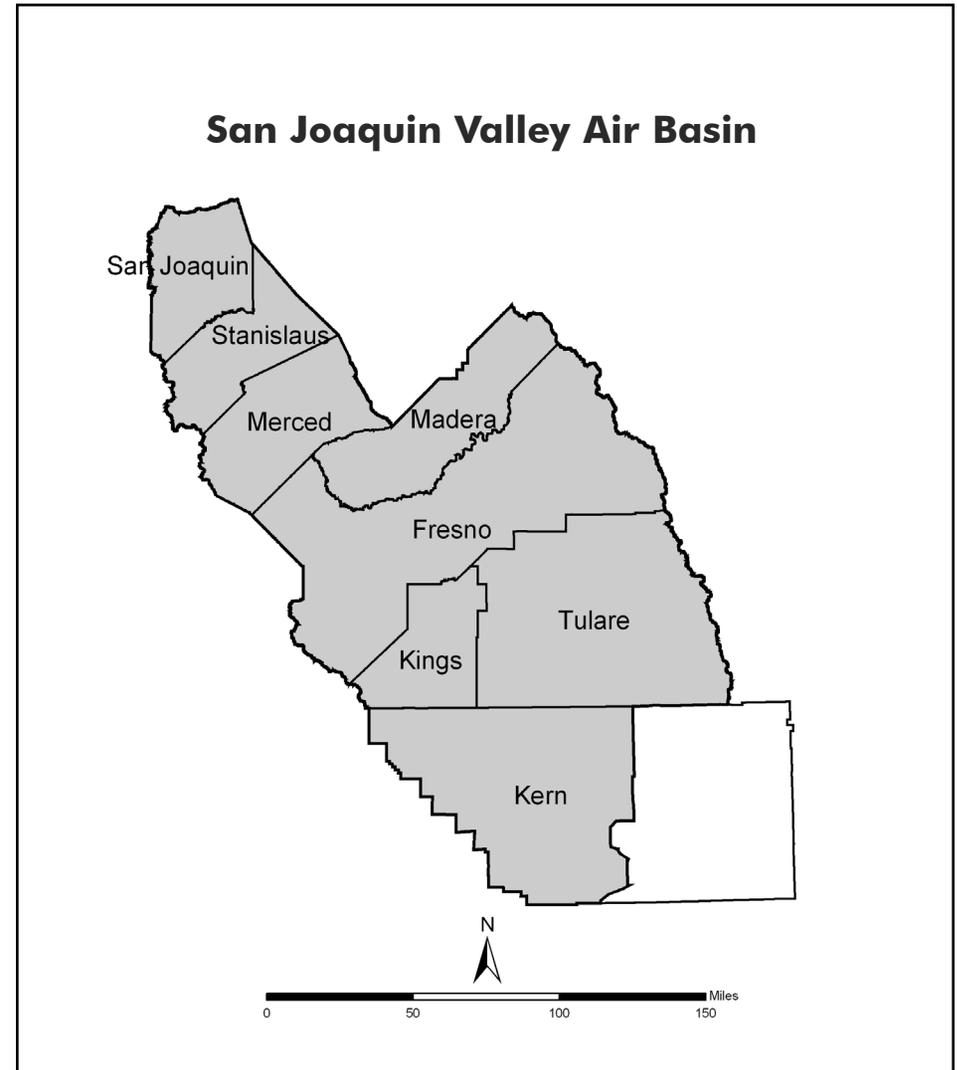


Figure 4-27

San Joaquin Valley Air Basin Emission Trends and Forecasts

With the exception of PM₁₀, the emission levels in the San Joaquin Valley Air Basin have been decreasing since 1990. 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.

San Joaquin Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	658	810	800	820	695	579	481	402	337	297
ROG	1199	1261	1086	671	536	473	413	389	380	382
PM ₁₀	355	352	352	385	380	385	361	345	350	359
PM ₂₅	192	183	176	180	175	175	167	161	161	162
CO	4287	4310	4089	3774	3053	2510	2105	1817	1620	1505

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 is projected to grow at a much faster rate during the 1980 to 2020 time period. The population is projected to increase about 150 percent, from nearly 2 million in 1980 to nearly 5 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 135 million miles per day in 2020. These growth rates are much higher than the growth rates in other areas.

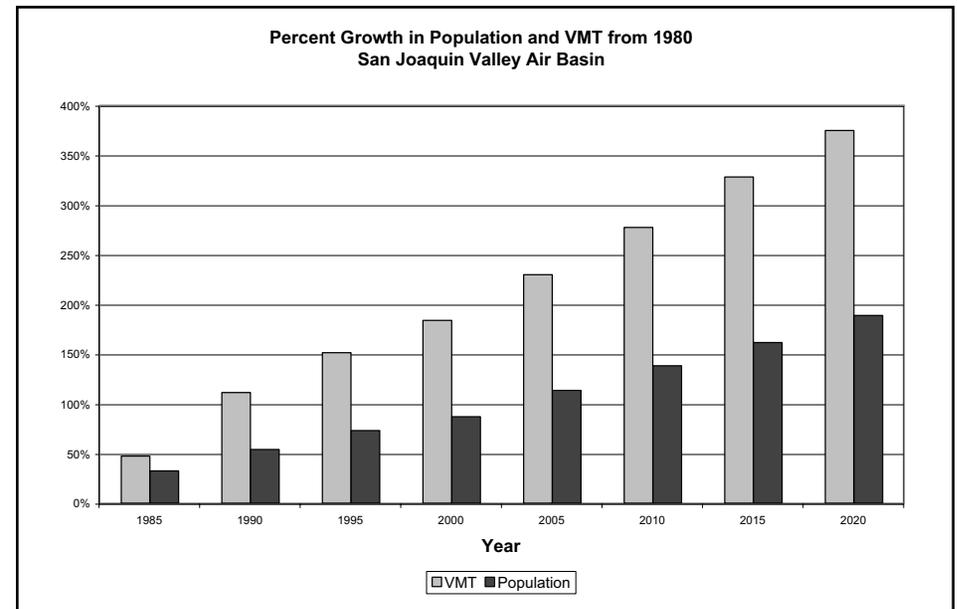


Figure 4-28

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1979840	2275776	2645192	2972618	3212583	3632469	3959518	4389922	4820322
Avg. Daily VMT/1000	32884	42075	60357	71772	81055	94209	107741	122270	135618

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	658	810	800	820	695	579	481	402	337	297
Stationary Sources	232	308	296	283	215	158	128	124	126	127
Area-wide Sources	26	26	26	25	25	24	24	24	23	23
On-Road Mobile	219	252	292	320	288	239	196	145	98	68
Gasoline Vehicles	169	171	168	174	161	121	83	58	40	29
Diesel Vehicles	50	81	124	145	127	118	113	87	57	39
Other Mobile	181	223	185	192	168	157	134	109	90	78
Gasoline Fuel	4	5	5	6	6	6	7	7	6	6
Diesel Fuel	169	211	174	182	157	146	121	97	78	66
Other Fuel	8	8	5	5	5	6	6	6	6	6

Table 4-29

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	1199	1261	1086	671	536	473	413	389	380	382
Stationary Sources	692	743	584	201	107	103	91	95	97	100
Area-wide Sources	166	173	179	185	193	190	190	196	204	215
On-Road Mobile	289	283	265	221	172	119	84	59	43	33
Gasoline Vehicles	287	278	258	214	166	113	79	55	39	30
Diesel Vehicles	3	5	8	8	6	5	5	4	4	3
Other Mobile	52	62	58	63	63	61	47	40	36	34
Gasoline Fuel	23	30	34	38	40	40	28	23	21	20
Diesel Fuel	16	20	16	17	15	14	12	9	7	5
Other Fuel	13	13	8	8	8	8	8	8	9	9

Table 4-30

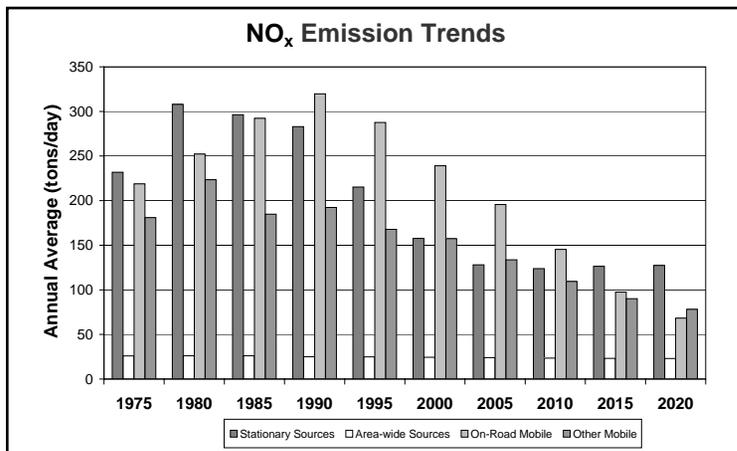


Figure 4-29

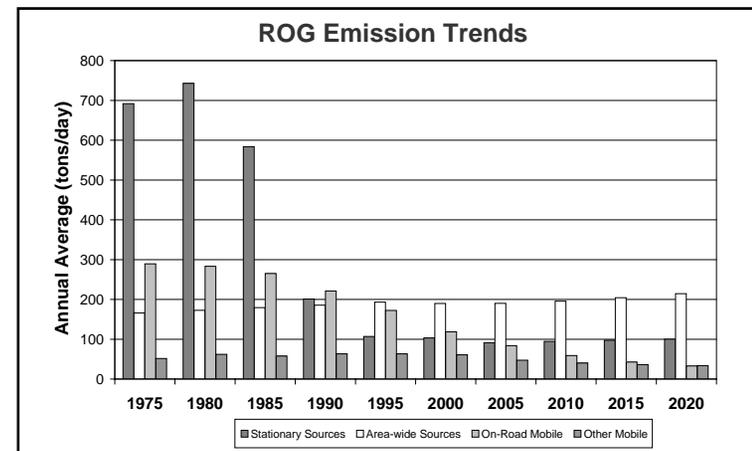


Figure 4-30

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. Peak levels have not declined as much as the number of days that standards are exceeded. From 1985 to 2004, the maximum peak 8-hour indicator decreased only two percent. The number of national 8-hour standard exceedance days has been quite variable over the years. This variability is due, in part, to the influence of meteorology as well as changes to the monitoring network. The monitoring network was not as extensive during the 1980's as it has been during the last 14 years. For this reason, the period between 1990 to 2005 provides a better indication of trends. During this period, there has been an eight percent decrease in the three-year average of the number of exceedance days of the national 8-hour standard.

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 Broader Sacramento Area and the San Francisco Bay Area Air Basin.

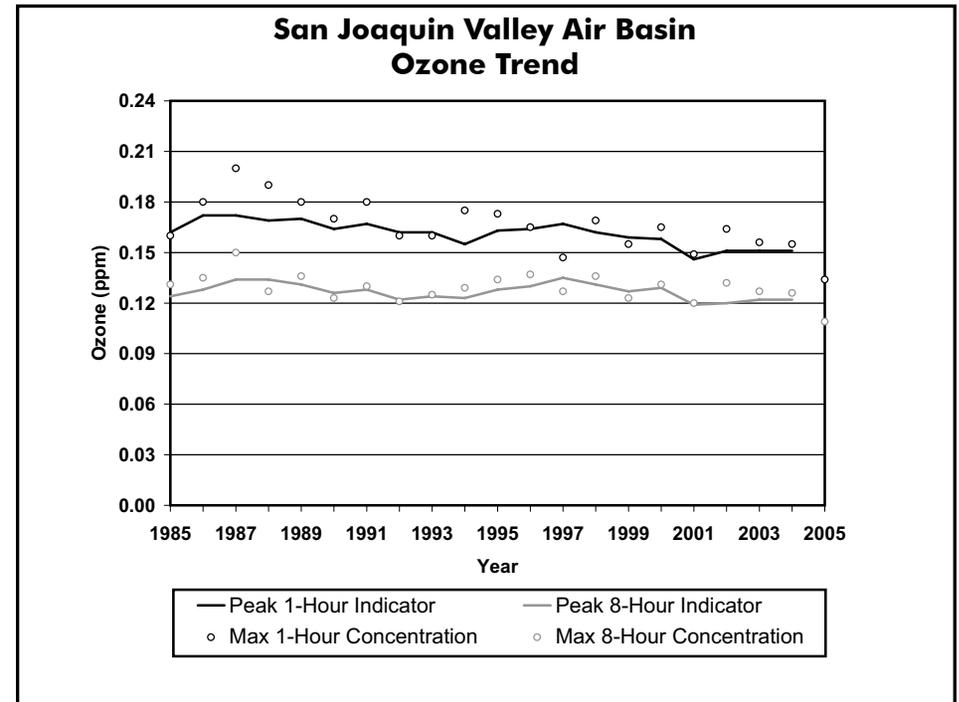


Figure 4-31

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹
Peak 1-Hour Indicator	0.162	0.172	0.172	0.169	0.170	0.164	0.167	0.162	0.162	0.155	0.163	0.164	0.167	0.162	0.159	0.158	0.146	0.151	0.151	0.151	
Peak 8-Hour Indicator	0.124	0.128	0.134	0.134	0.131	0.126	0.128	0.122	0.124	0.123	0.128	0.130	0.135	0.131	0.127	0.129	0.119	0.120	0.122	0.122	
4th High 1-Hr. in 3 Yrs	0.160	0.170	0.170	0.170	0.170	0.160	0.160	0.160	0.160	0.160	0.165	0.165	0.164	0.161	0.161	0.161	0.146	0.151	0.151	0.151	
Avg. of 4th High 8-Hr. in 3 Yrs	0.111	0.117	0.118	0.121	0.120	0.119	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	
Maximum 1-Hr. Concentration	0.160	0.180	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
Max. 8-Hr. Concentration	0.131	0.135	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	0.109
Days Above State Standard	149	147	156	156	148	131	133	127	125	118	124	120	110	90	123	114	123	127	137	106	83
Days Above Nat. 1-Hr. Std.	53	59	65	74	54	45	51	29	43	43	44	56	16	39	28	30	32	31	37	9	8
Days Above Nat. 8-Hr. Std.	127	134	148	140	133	104	121	119	103	108	109	114	95	84	117	103	109	125	134	109	72

¹ Preliminary data for January through October 2005 are shown here, however they are subject to change. 2004 is the last year for which complete and approved data is available, thus annual statistics are not included.

Table 4-31

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, waste burning, and residential fuel combustion (including wood).

Particulate matter 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	355	352	352	385	380	385	361	345	350	359
Stationary Sources	58	42	35	28	27	28	23	24	25	26
Area-wide Sources	281	289	297	335	336	341	323	307	312	320
On-Road Mobile	4	6	8	9	7	6	6	6	6	7
Gasoline Vehicles	2	2	2	2	3	3	4	4	5	6
Diesel Vehicles	2	4	6	6	4	3	3	2	2	1
Other Mobile	12	15	12	13	10	10	9	8	7	6
Gasoline Fuel	0	1	1	1	1	1	1	1	2	2
Diesel Fuel	11	14	11	12	9	8	7	6	5	4
Other Fuel	1	1	1	1	0	0	1	1	1	1

Table 4-32

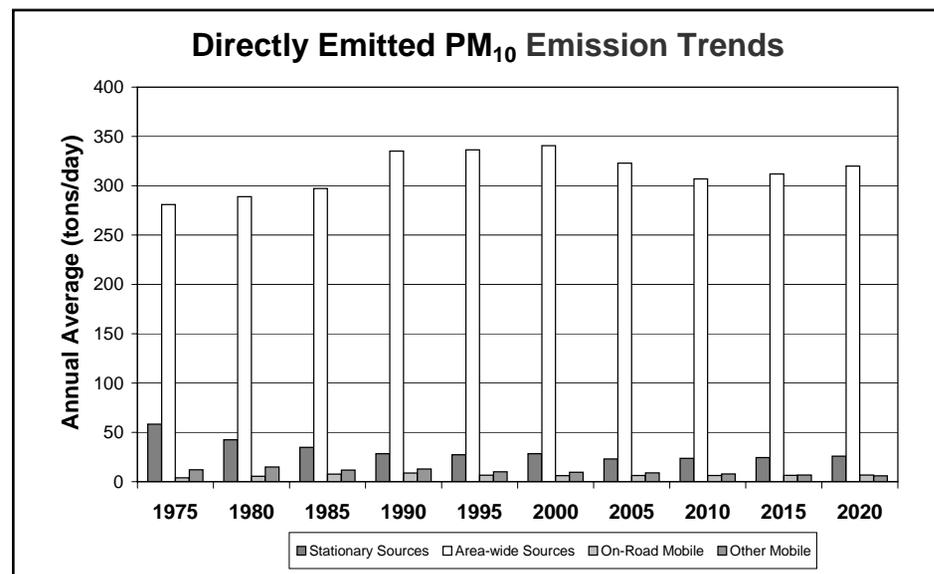


Figure 4-32

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, waste burning, and residential fuel combustion (including wood).

Particulate matter 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	192	183	176	180	175	175	167	161	161	162
Stationary Sources	47	33	24	19	19	19	16	17	17	18
Area-wide Sources	131	133	134	143	142	143	138	133	133	134
On-Road Mobile	3	5	6	7	5	4	4	4	4	4
Gasoline Vehicles	1	1	1	1	2	2	2	2	3	3
Diesel Vehicles	2	4	6	6	4	3	2	2	1	1
Other Mobile	11	14	11	12	9	9	8	7	6	5
Gasoline Fuel	0	0	0	1	1	1	1	1	1	1
Diesel Fuel	10	13	10	11	8	7	7	5	4	3
Other Fuel	1	1	0	1	0	0	1	1	1	1

Table 4-33

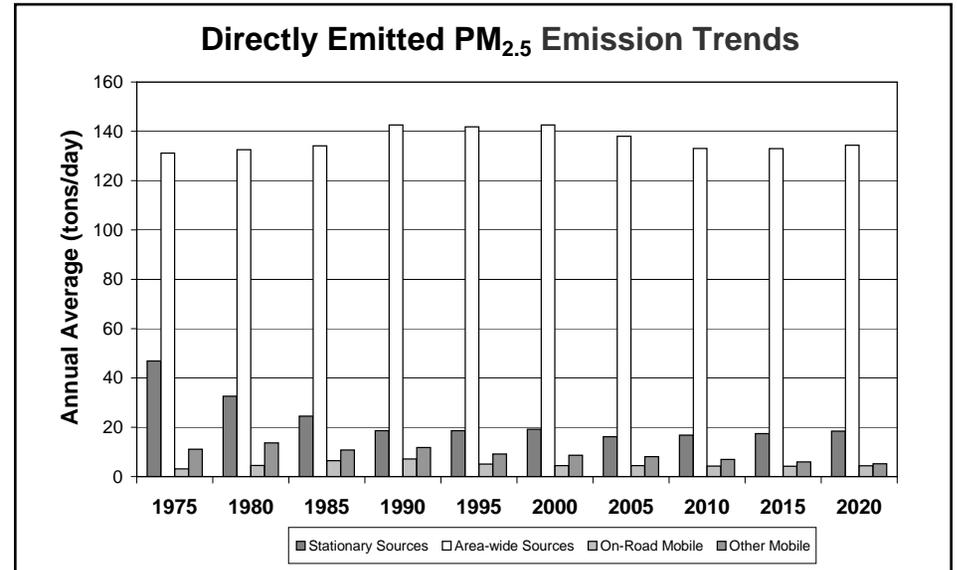


Figure 4-33

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. Part of the variation can be attributed to meteorology. Long periods of stagnation during the winter months allow PM to accumulate over many days with resulting high concentrations. 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 2004 provides a better indication of trends. Over this period, the three-year average of the annual average (State) shows a decrease of more than 26 percent. The calculated number of days exceeding the State and national 24-hour standards also shows a decrease. There were 300 calculated State standard exceedance days and 40 calculated national standard exceedance days during 1988. During 2004, there were 196 calculated State standard exceedance days and three national standard exceedance days, with the national exceedances due to a natural windblown dust event.

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 the San Joaquin Valley is nearing attainment for the national PM₁₀ standards, based on the ambient data, it will still be a number of years before this area reaches attainment of the more stringent State standards.

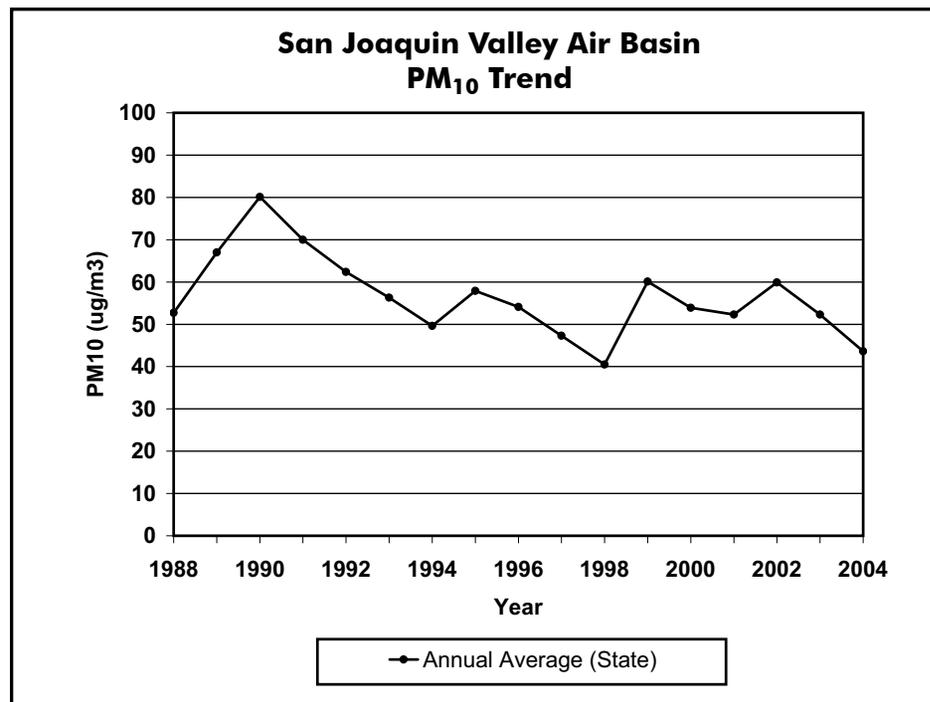


Figure 4-34

PM ₁₀ (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				206	237	439	279	186	239	192	279	153	199	167	186	153	221	194	150	219
Max. 24-Hr. Concentration (Nat)				244	250	439	279	183	239	190	279	153	199	160	183	145	205	189	150	217
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
Annual Average (Nat)				67.4	79.3	79.3	69.9	62.9	56.3	50.1	58.2	54.1	48.2	39.9	59.5	53.1	57.4	59.2	52.4	44.6
Calc Days Above State 24-Hr Std				300	302	313	285	273	233	253	246	225	188	185	216	237	236	267	242	196.5
Calc Days Above Nat 24-Hr Std				40	40	56	40	3	11	8	8	0	3	6	12	0	12	8	0	3

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 2004. The State annual average concentrations remained relatively constant from 1999 through 2003, but decreased significantly in 2004. 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. Several more years are needed before determining longer-term trends. The San Joaquin Valley Air Basin is currently designated as nonattainment for the national PM_{2.5} standards. Measures adopted as part of the upcoming PM_{2.5} State Implementation Plan, as well as programs to reduce ozone and diesel PM will help in reducing public exposure to PM_{2.5} in this region.

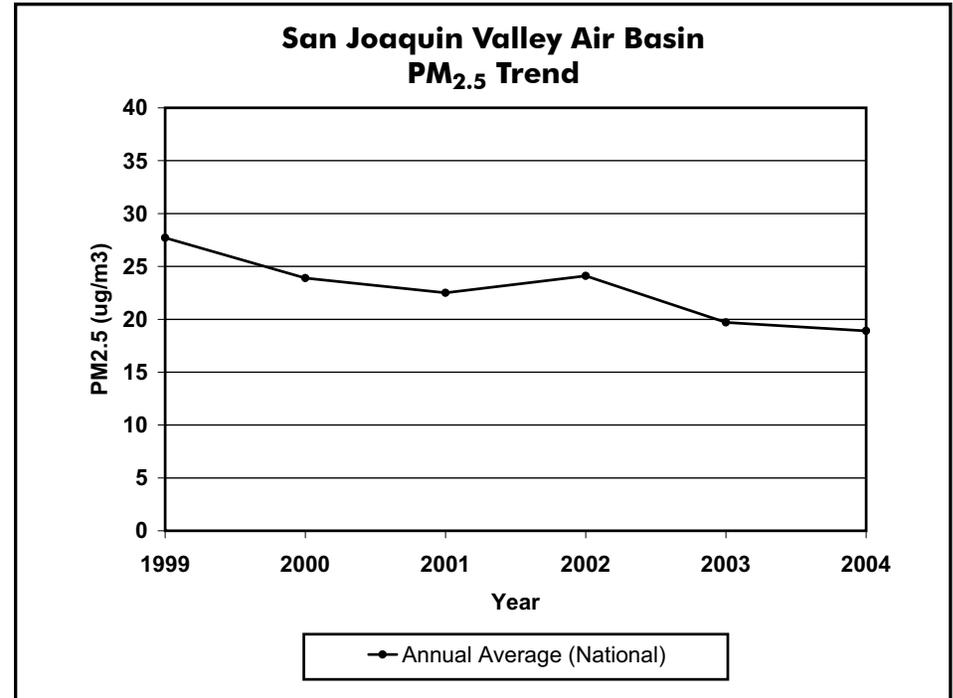


Figure 4-35

PM _{2.5} (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)															136.0	160.0	154.7	104.3	84.5	77.0
Max. 24-Hr. Concentration (Nat)															136.0	160.0	154.7	90.7	67.8	71.0
98th Percentile of 24-Hr Conc.															120.0	108.0	96.0	80.4	56.0	54.0
Annual Average (State)															23.4	23.9	20.8	24.1	24.8	18.2
Avg. of Qtrly. Means (Nat)															27.7	23.9	22.5	24.1	19.7	18.9

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	4287	4310	4089	3774	3053	2510	2105	1817	1620	1505
Stationary Sources	189	160	63	77	64	56	54	55	56	58
Area-wide Sources	849	848	848	844	834	830	827	825	822	819
On-Road Mobile	2895	2869	2784	2428	1751	1252	874	606	416	297
Gasoline Vehicles	2883	2848	2750	2391	1721	1227	851	585	397	280
Diesel Vehicles	12	21	34	37	30	25	24	21	18	18
Other Mobile	353	433	393	426	404	372	349	332	326	331
Gasoline Fuel	175	233	241	275	267	247	228	213	209	214
Diesel Fuel	68	88	76	80	70	58	48	42	39	37
Other Fuel	110	111	76	70	67	67	73	76	79	81

Table 4-36

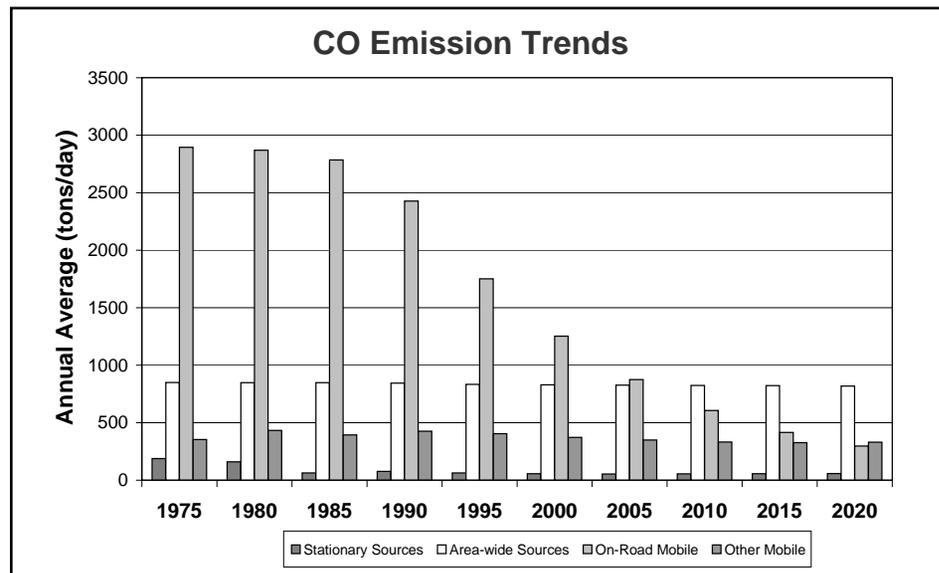


Figure 4-36

San Joaquin Valley Air Basin

Carbon Monoxide Air Quality Trend

Carbon monoxide concentrations show a fairly consistent downward trend from 1985 through 2004. Similar to other areas of the State, the trend line for the San Joaquin Valley Air Basin shows a slight increase during the late 1980s, probably related to meteorology. The maximum peak 8-hour indicator for 2004 is almost 69 percent lower than that for 1985. 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 nine years. Much of the decline in ambient CO concentrations can be attributed to the introduction of clean fuels and newer, cleaner motor vehicles.

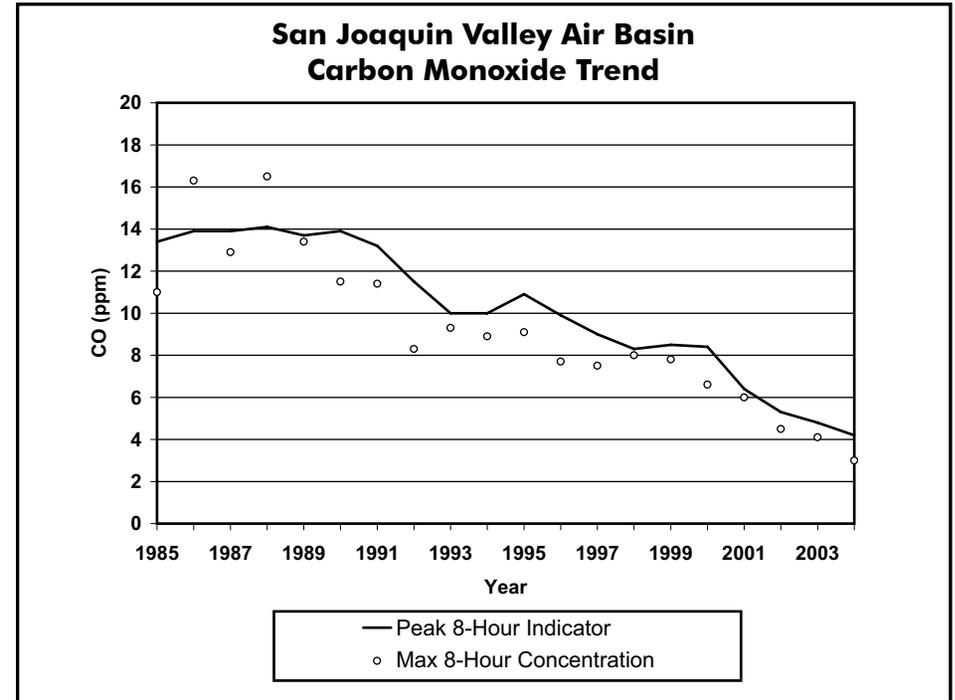


Figure 4-37

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	13.4	13.9	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
Max. 1-Hr. Concentration	18.0	21.0	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	16.0	6.1	5.8	4.6
Max. 8-Hr. Concentration	11.0	16.3	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
Days Above State 8-Hr. Std.	7	13	4	5	24	10	3	0	2	0	1	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	7	11	4	6	18	9	3	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	658	810	800	820	695	579	481	402	337	297
Stationary Sources	232	308	296	283	215	158	128	124	126	127
Area-wide Sources	26	26	26	25	25	24	24	24	23	23
On-Road Mobile	219	252	292	320	288	239	196	145	98	68
Gasoline Vehicles	169	171	168	174	161	121	83	58	40	29
Diesel Vehicles	50	81	124	145	127	118	113	87	57	39
Other Mobile	181	223	185	192	168	157	134	109	90	78
Gasoline Fuel	4	5	5	6	6	6	7	7	6	6
Diesel Fuel	169	211	174	182	157	146	121	97	78	66
Other Fuel	8	8	5	5	5	6	6	6	6	6

Table 4-38

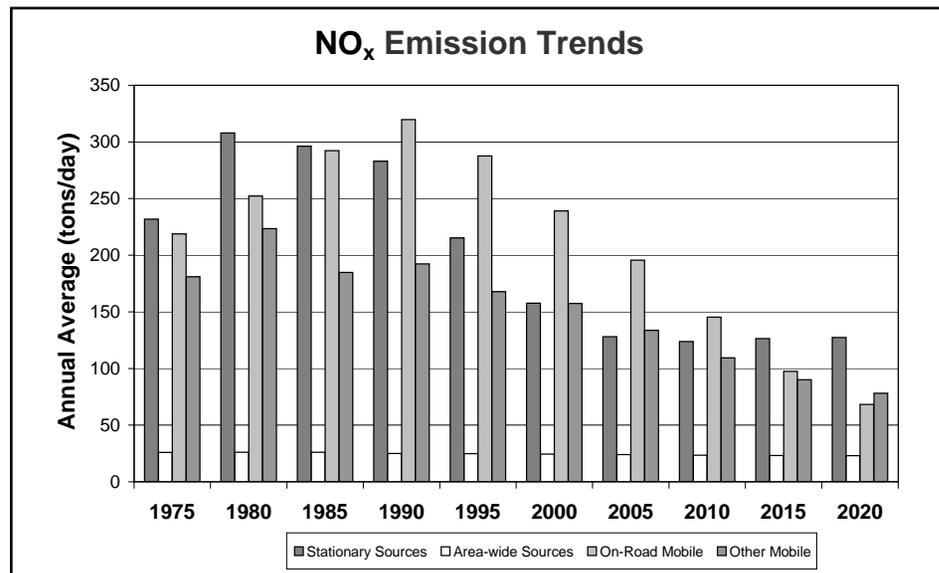


Figure 4-38

San Joaquin Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The San Joaquin Valley has attained both the State and national nitrogen dioxide 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 1985 through 1989, ambient levels increased somewhat, but remained below the level of the standard and have shown substantial decreases since 1990. The peak 1-hour indicator has declined by more than 37 percent since 1990. This downward trend is expected to continue.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, 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 oxides of nitrogen emissions.

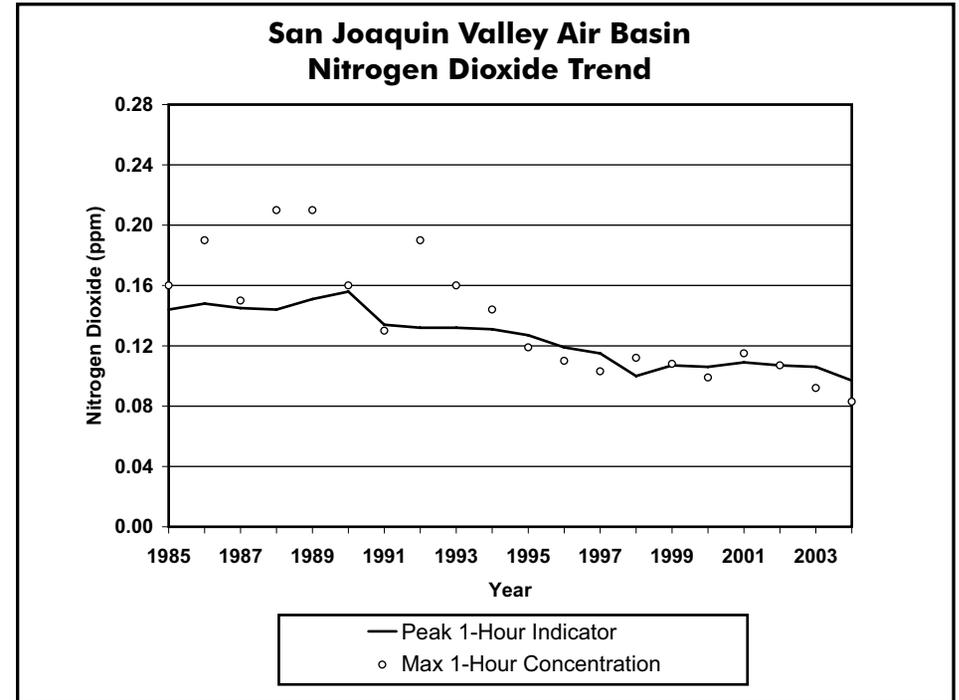


Figure 4-39

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator	0.144	0.148	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
Max. 1-Hr. Concentration	0.160	0.190	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
Max. Annual Average	0.031	0.030	0.030	0.032	0.033	0.031	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

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.

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 blamed 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.

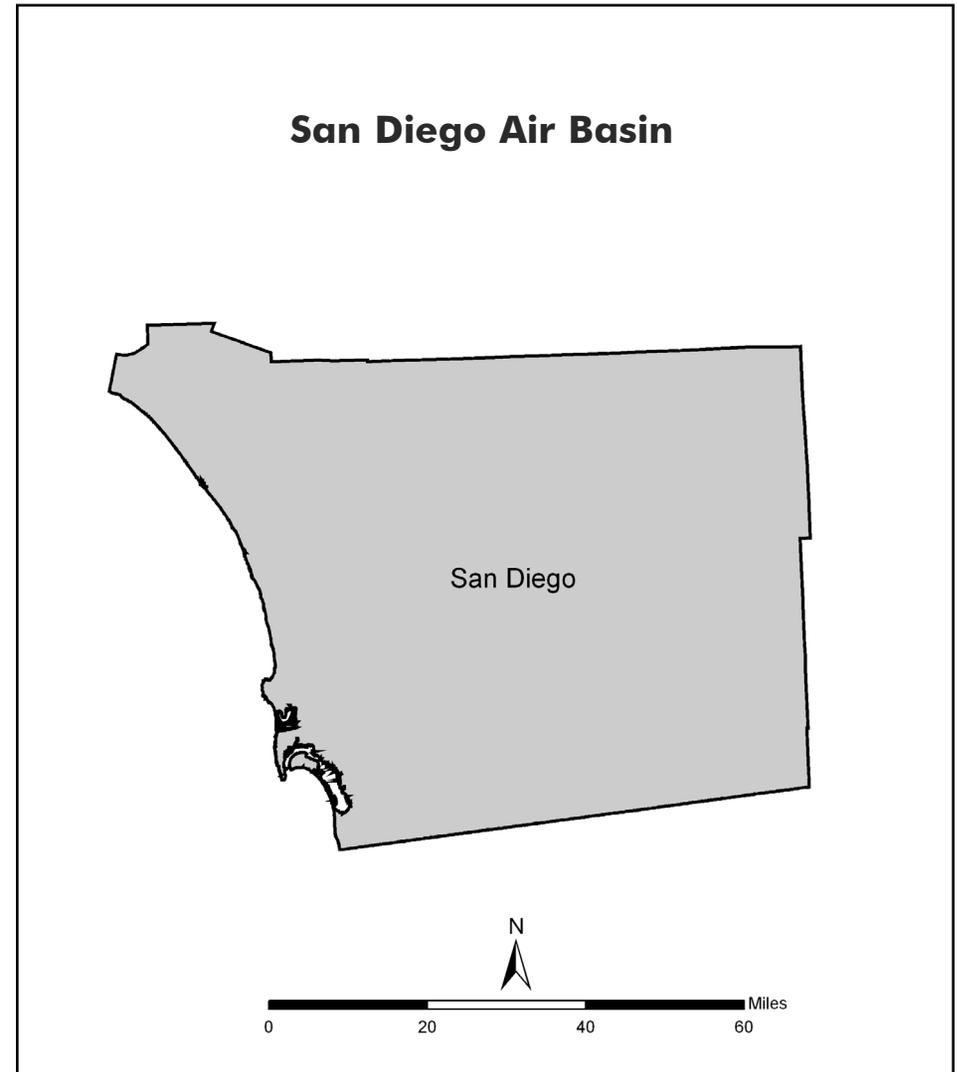


Figure 4-40

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 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.

San Diego Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	280	273	287	319	270	231	189	157	131	125
ROG	439	437	413	343	267	226	186	173	168	170
PM ₁₀	68	76	84	102	97	105	112	119	125	133
PM _{2.5}	29	31	30	35	33	36	38	40	42	45
CO	3299	3030	2924	2458	1719	1279	938	742	610	539

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 more than double: from almost 1.9 million in 1980 to almost 3.9 million in 2020. During this same time period, the number of vehicle miles traveled each day is projected to triple, from almost 32 million miles per day in 1980 to over 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.

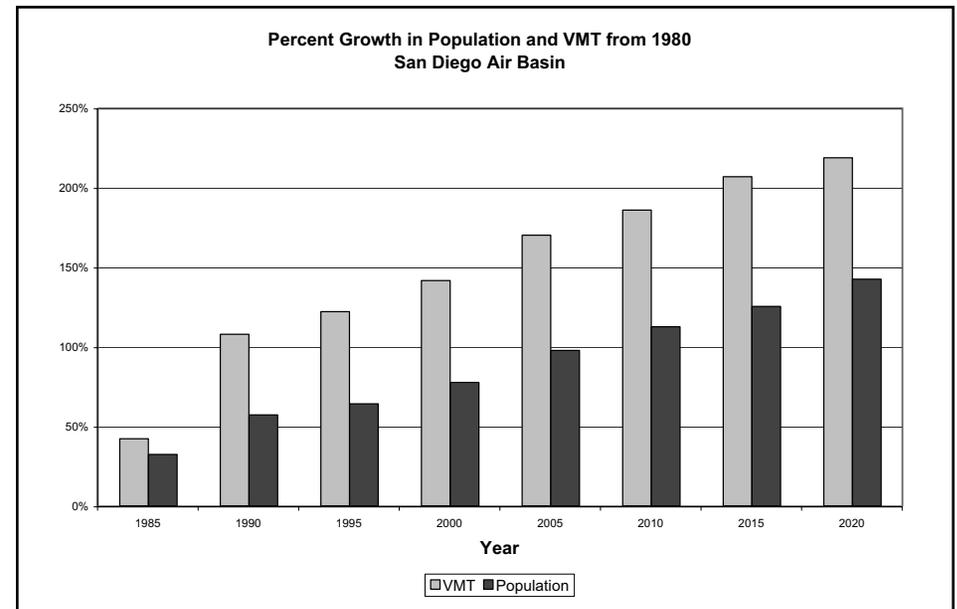


Figure 4-41

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1873300	2109300	2504900	2615200	2836179	3073469	3258951	3446262	3633572
Avg. Daily VMT/1000	31707	43517	63591	67943	73909	82660	87481	93886	97542

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	280	273	287	319	270	231	189	157	131	125
Stationary Sources	48	32	17	19	16	14	9	11	11	12
Area-wide Sources	2	3	3	3	3	3	3	3	3	3
On-Road Mobile	178	174	195	216	185	149	113	83	57	41
Gasoline Vehicles	168	155	156	157	133	96	62	43	30	22
Diesel Vehicles	10	19	39	59	52	52	51	40	27	20
Other Mobile	52	65	72	81	66	66	65	61	60	69
Gasoline Fuel	3	3	4	5	5	6	6	6	6	5
Diesel Fuel	44	56	62	68	53	50	46	38	31	27
Other Fuel	5	6	6	7	8	11	13	17	23	36

Table 4-42

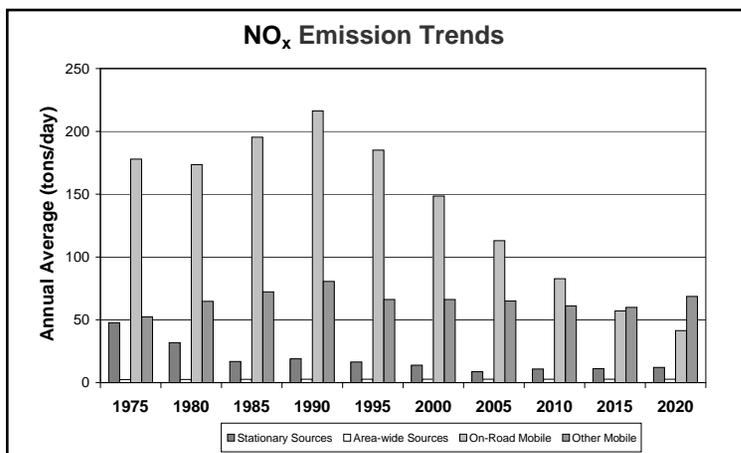


Figure 4-42

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	439	437	413	343	267	226	186	173	168	170
Stationary Sources	40	57	54	52	45	50	55	63	70	76
Area-wide Sources	34	40	44	47	41	41	38	40	42	44
On-Road Mobile	334	303	272	194	132	89	60	43	32	25
Gasoline Vehicles	334	302	269	191	129	86	58	41	30	24
Diesel Vehicles	1	1	3	3	3	2	2	2	2	1
Other Mobile	31	37	44	50	49	46	33	27	25	24
Gasoline Fuel	23	28	35	40	40	38	24	19	17	16
Diesel Fuel	4	5	6	7	6	5	5	4	3	2
Other Fuel	3	3	3	3	3	4	4	4	5	6

Table 4-43

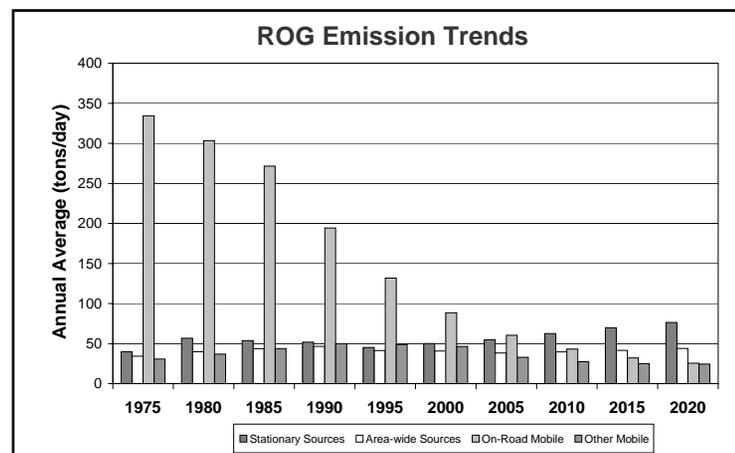


Figure 4-43

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 32 percent from 1985 to 2004. The number of State and national 1-hour standard exceedance days has dropped even more. There were 148 State 1-hour standard exceedance days during 1985 compared with 11 during 2005. This represents a decrease of about 88 percent in the three-year average of the State standard exceedance days. During 1985, there were 109 national 8-hour standard exceedance days compared with one during 2005.

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.

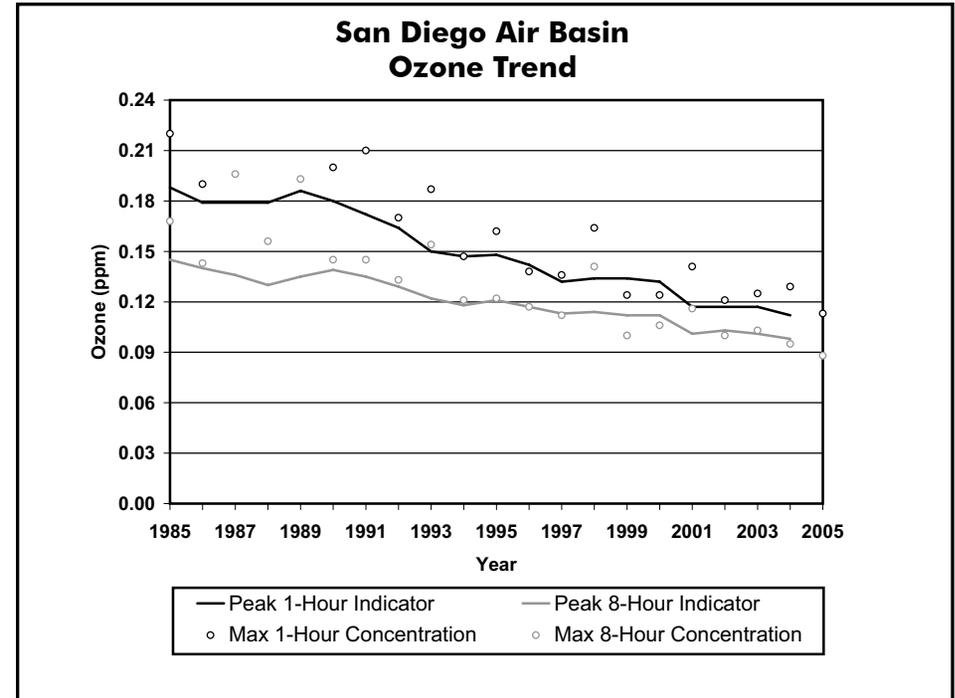


Figure 4-44

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹
Peak 1-Hour Indicator	0.188	0.179	0.179	0.179	0.186	0.180	0.172	0.164	0.150	0.147	0.148	0.142	0.132	0.134	0.134	0.132	0.117	0.117	0.117	0.112	0.112
Peak 8-Hour Indicator	0.145	0.140	0.136	0.130	0.135	0.139	0.135	0.129	0.122	0.118	0.121	0.117	0.113	0.114	0.112	0.112	0.101	0.103	0.101	0.098	0.098
4th High 1-Hr. in 3 Yrs	0.210	0.190	0.180	0.180	0.190	0.190	0.170	0.170	0.154	0.150	0.146	0.141	0.138	0.135	0.135	0.131	0.118	0.118	0.118	0.115	0.115
Avg. of 4th High 8-Hr. in 3 Yrs	0.132	0.125	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	0.089
Maximum 1-Hr. Concentration	0.220	0.190	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
Max. 8-Hr. Concentration	0.168	0.143	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	0.088
Days Above State Standard	148	131	127	160	159	139	106	97	90	79	96	51	43	54	27	24	29	15	24	12	11
Days Above Nat. 1-Hr. Std.	50	42	40	45	56	39	27	19	14	9	12	2	1	9	0	0	2	0	1	1	0
Days Above Nat. 8-Hr. Std.	109	81	99	119	122	96	67	66	58	46	48	31	16	35	17	16	17	13	6	8	1

¹ Preliminary data for January through October 2005 are shown here, however they are subject to change. 2003 is the last year for which complete and approved data is available, thus annual statistics are not included.

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.

Particulate matter 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	68	76	84	102	97	105	112	119	125	133
Stationary Sources	17	12	5	7	8	7	8	10	10	11
Area-wide Sources	43	55	68	82	79	87	94	99	104	110
On-Road Mobile	3	3	4	5	4	4	5	5	5	5
Gasoline Vehicles	2	2	2	2	3	3	3	4	4	4
Diesel Vehicles	1	1	2	3	2	1	1	1	1	1
Other Mobile	6	6	7	8	6	6	7	6	7	7
Gasoline Fuel	0	1	1	1	1	1	1	1	1	2
Diesel Fuel	3	4	4	5	3	3	3	3	2	2
Other Fuel	2	2	2	2	2	2	2	3	3	4

Table 4-45

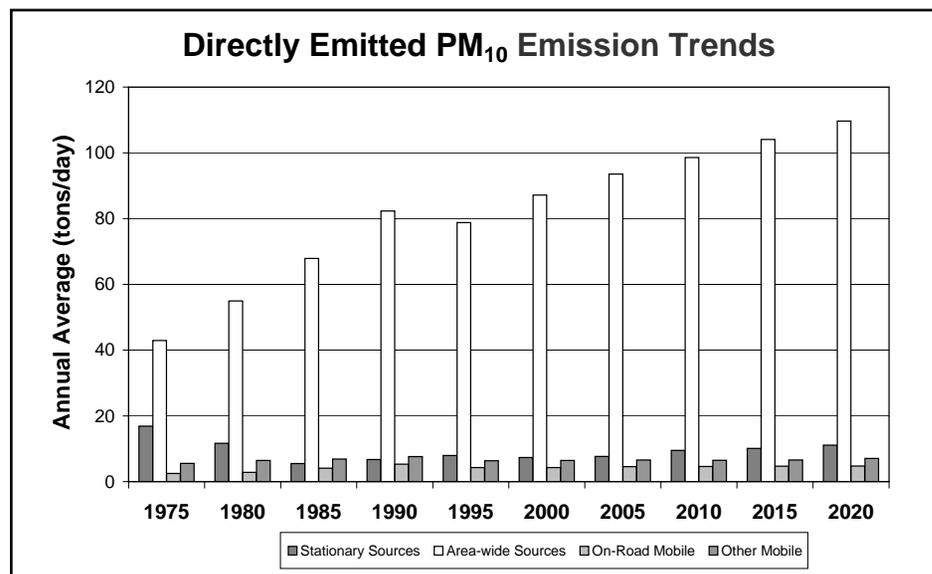


Figure 4-45

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.

Particulate matter 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	29	31	30	35	33	36	38	40	42	45
Stationary Sources	11	9	3	4	6	6	7	8	9	10
Area-wide Sources	11	14	17	20	19	21	22	23	24	26
On-Road Mobile	2	2	3	4	3	3	3	3	3	3
Gasoline Vehicles	1	1	1	1	1	2	2	2	2	3
Diesel Vehicles	0	1	2	3	2	1	1	1	1	1
Other Mobile	5	6	6	7	6	6	6	6	6	6
Gasoline Fuel	0	0	1	1	1	1	1	1	1	1
Diesel Fuel	3	4	4	4	3	3	3	2	2	2
Other Fuel	2	2	2	2	2	2	2	3	3	4

Table 4-46

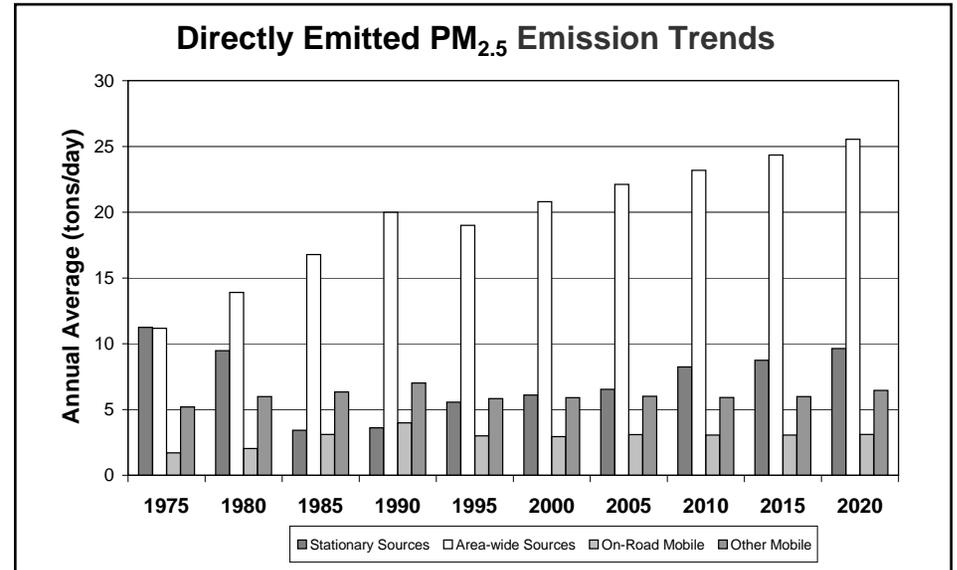


Figure 4-46

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 2004 exceeds the State annual standard and is actually higher than it was during 1989. This apparent lack of progress is, in part, a result of monitoring that began at a new site in 1993, which measured higher concentrations. The maximum 24-hour concentration also exceeds the State standard. During 2003, the maximum 24-hour concentration (State) was 289 $\mu\text{g}/\text{m}^3$. This value was due to the severe wildfires that occurred in Southern California in October of 2003. However, in 2004, the values have returned to their normal levels.

During 1988, there were 105 calculated State standard exceedance days, compared with 186 during 2004. Again, some of this apparent increase is attributable to the new site that began operating in 1993. 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.

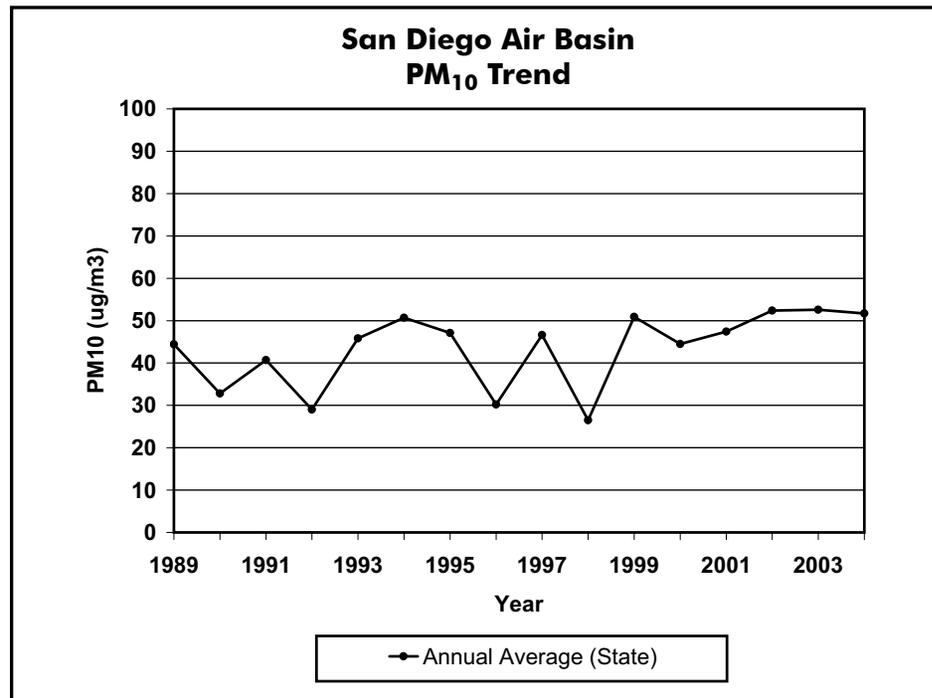


Figure 4-47

PM ₁₀ (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				80	90	115	81	67	159	129	121	93	125	57	119	136	106	131	289	138
Max. 24-Hr. Concentration (Nat)				81	90	115	81	67	159	129	121	93	125	89	121	139	107	130	280	137
Annual Average (State)					44.4	32.8	40.7	29.0	45.8	50.7	47.1	30.2	46.6	26.5	50.9	44.5	47.4	52.4	52.6	51.7
Annual Average (Nat)				40.0	43.8	37.6	40.6	35.9	45.9	50.7	46.8	30.0	46.6	42.5	52.2	45.2	49.1	54.9	52.1	51.2
Calc Days Above State 24-Hr Std				105	146	60	90	42	143.5	131	117	96	125	108	140	144	146	186	147	186
Calc Days Above Nat 24-Hr Std				0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	9	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 2004. The State annual average concentrations also decreased over the last three years. 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. Several more years are needed before determining longer-term trends. 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.

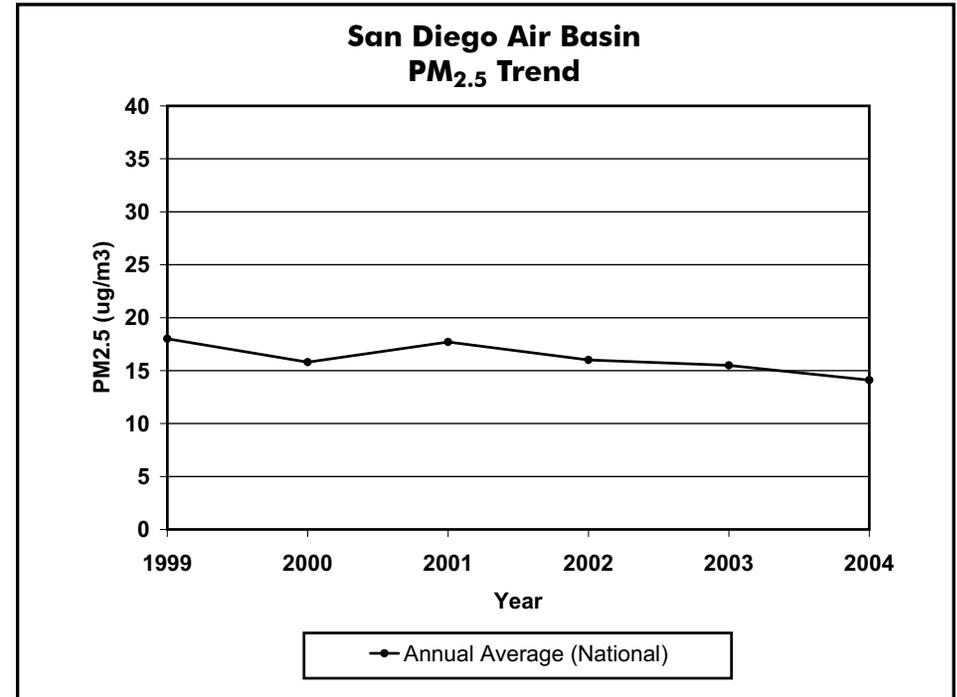


Figure 4-48

PM _{2.5} (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)															64.3	66.3	60.0	53.6	239.2	67.3
Max. 24-Hr. Concentration (Nat)															64.3	66.3	60.0	53.6	239.2	67.3
98th Percentile of 24-Hr Conc.															35.7	32.5	40.8	36.0	46.9	37.4
Annual Average (State)																		15.5	14.4	14.1
Avg. of Qtrly. Means (Nat)															18.0	15.8	17.7	16.0	15.5	14.1

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	3299	3030	2924	2458	1719	1279	938	742	610	539
Stationary Sources	30	29	28	28	26	40	25	31	31	33
Area-wide Sources	23	25	27	29	27	28	28	28	29	30
On-Road Mobile	3059	2740	2586	2067	1360	930	626	438	306	225
Gasoline Vehicles	3056	2735	2575	2052	1347	918	616	429	298	217
Diesel Vehicles	3	6	11	15	13	11	11	9	8	8
Other Mobile	187	236	282	334	306	282	258	244	244	252
Gasoline Fuel	147	188	234	279	258	237	214	200	199	205
Diesel Fuel	17	22	25	29	23	20	17	16	15	15
Other Fuel	23	25	23	26	25	25	26	28	29	32

Table 4-49

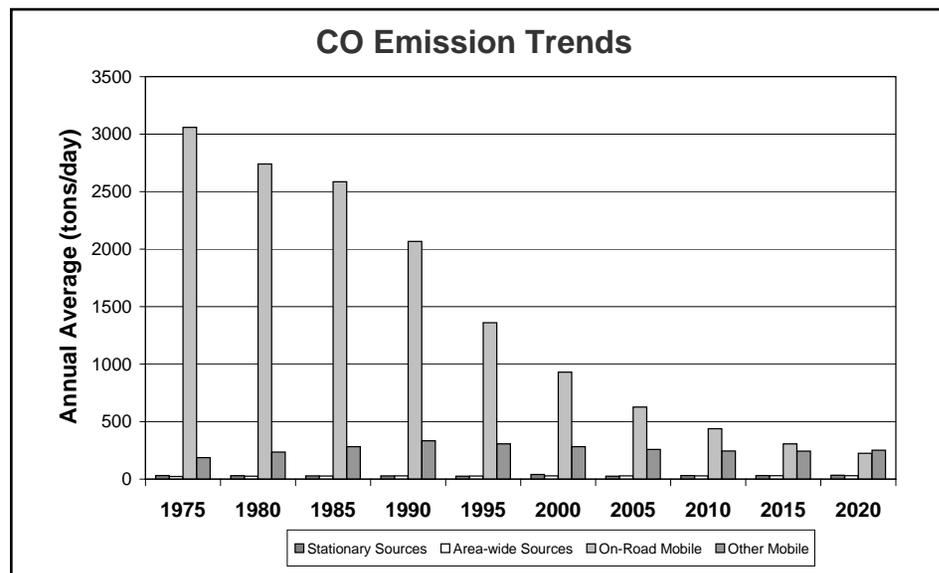


Figure 4-49

San Diego Air Basin

Carbon Monoxide Air Quality Trend

The peak 8-hour indicator for carbon monoxide in the San Diego Air Basin decreased substantially over the trend period: a 56 percent decrease from 1985 to 2004. 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 carbon monoxide in this area.

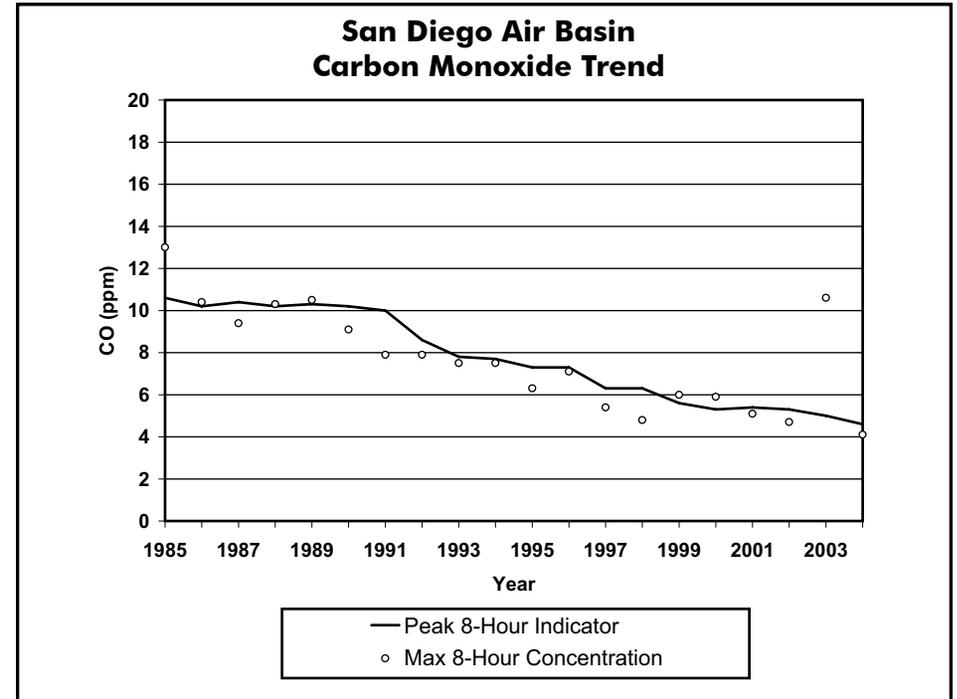


Figure 4-50

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	10.6	10.2	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
Max. 1-Hr. Concentration	17.0	16.0	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
Max. 8-Hr. Concentration	13.0	10.4	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
Days Above State 8-Hr. Std.	5	2	1	5	6	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Days Above Nat. 8-Hr. Std.	3	1	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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 nitrogen dioxide emissions.

NO _x Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	280	273	287	319	270	231	189	157	131	125
Stationary Sources	48	32	17	19	16	14	9	11	11	12
Area-wide Sources	2	3	3	3	3	3	3	3	3	3
On-Road Mobile	178	174	195	216	185	149	113	83	57	41
Gasoline Vehicles	168	155	156	157	133	96	62	43	30	22
Diesel Vehicles	10	19	39	59	52	52	51	40	27	20
Other Mobile	52	65	72	81	66	66	65	61	60	69
Gasoline Fuel	3	3	4	5	5	6	6	6	6	5
Diesel Fuel	44	56	62	68	53	50	46	38	31	27
Other Fuel	5	6	6	7	8	11	13	17	23	36

Table 4-51

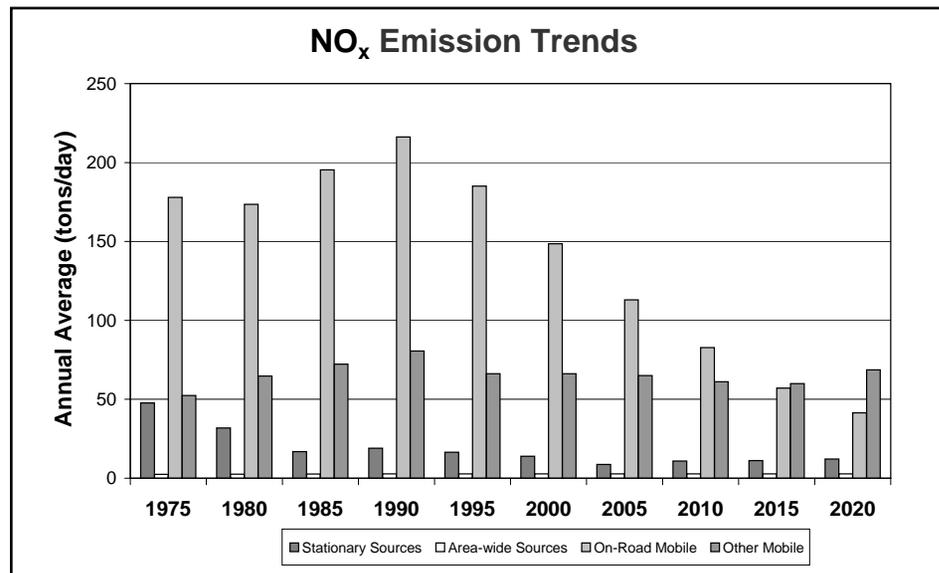


Figure 4-51

San Diego Air Basin

Nitrogen Dioxide Air Quality Trend

The San Diego Air Basin attains both the State and national nitrogen dioxide standards. Maximum 1-hour concentrations during the 1980s occasionally exceeded the level of the State 1-hour standard. However, these exceedances did not affect the area's attainment status. Ambient concentrations are now well below the levels of both the State and national standards. Data show that the maximum peak 1-hour indicator decreased over 38 percent from 1985 to 2004.

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 and are not expected to be relaxed in the future. As a result, these controls should ensure continued attainment of the State and national nitrogen dioxide standards.

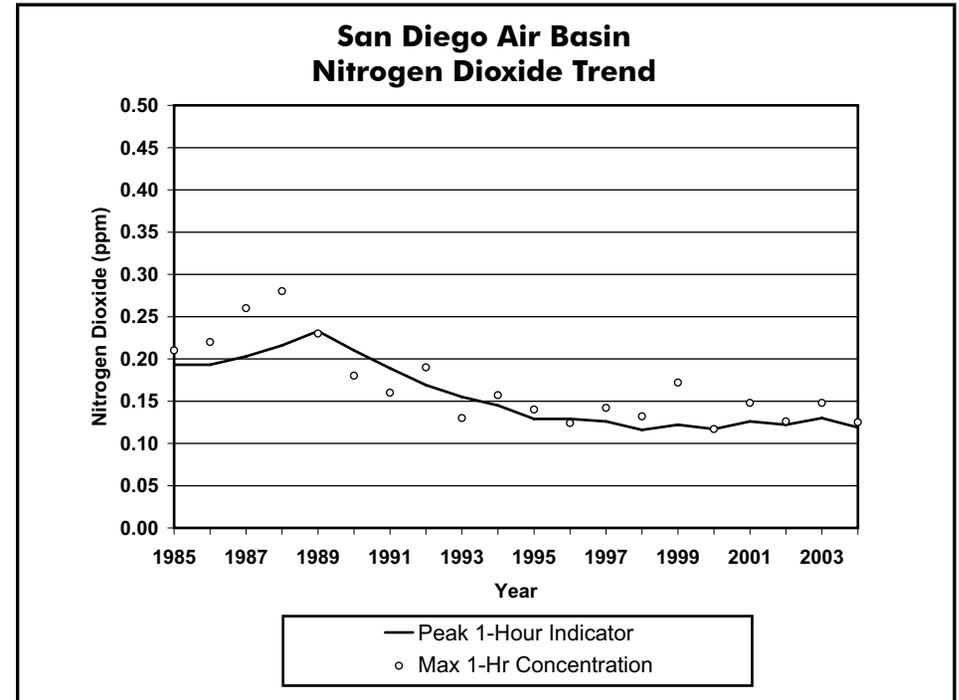


Figure 4-52

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator	0.193	0.193	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
Max. 1-Hr. Concentration	0.210	0.220	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
Max. Annual Average	0.032	0.030	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

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 the climate in the San Francisco Bay Area Air Basin or South Coast Air Basin. 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 regulations will be needed to attain the State and national ambient air quality standards in this air basin.

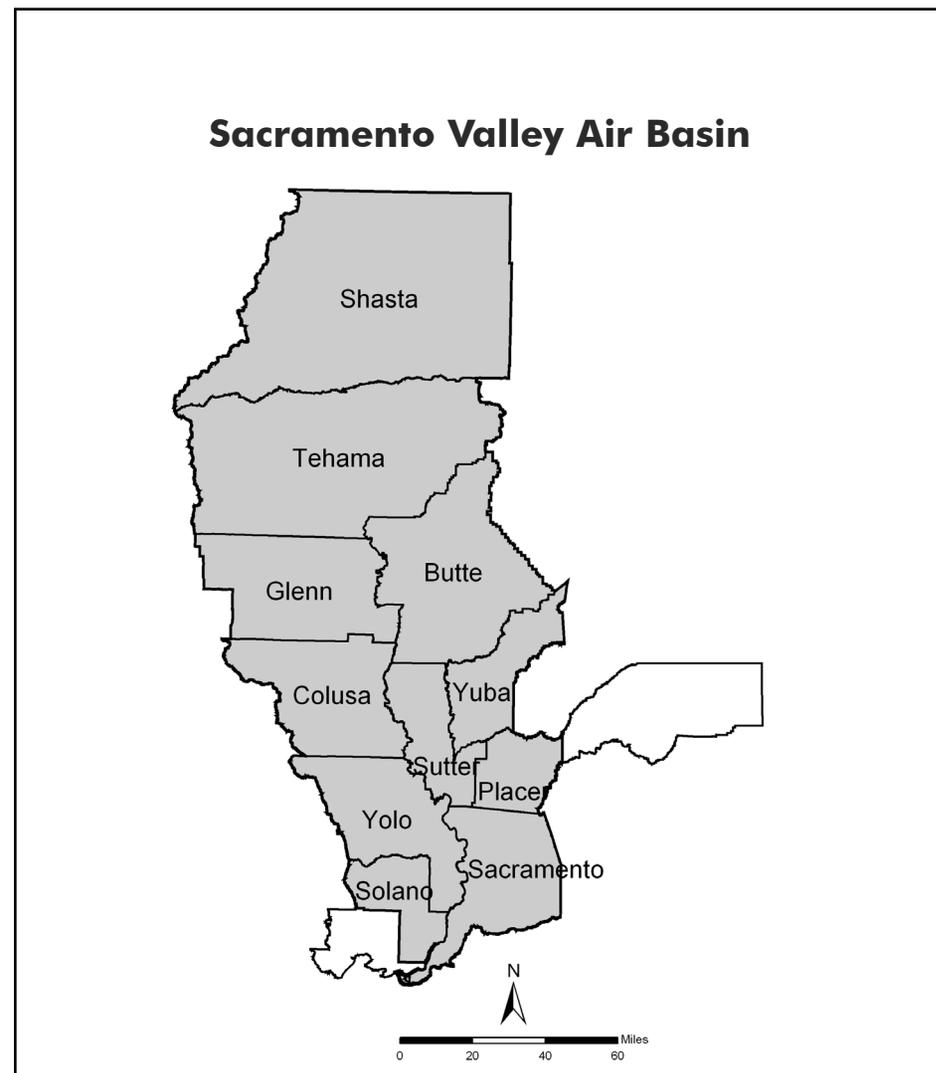


Figure 4-53

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.

Sacramento Valley Air Basin Emissions (tons/day, annual average)										
Pollutant	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
NO _x	334	360	356	388	341	300	249	203	165	140
ROG	448	438	408	362	299	243	205	185	175	171
PM ₁₀	197	203	209	221	212	219	226	232	238	243
PM _{2.5}	82	81	83	89	82	84	86	87	89	90
CO	2933	2942	2811	2475	1860	1439	1182	991	864	787

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 a 93 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 201 percent increase in the Sacramento Valley Air Basin. VMT are projected to increase from nearly 28 million miles in 1980 to 84 million miles in 2020.

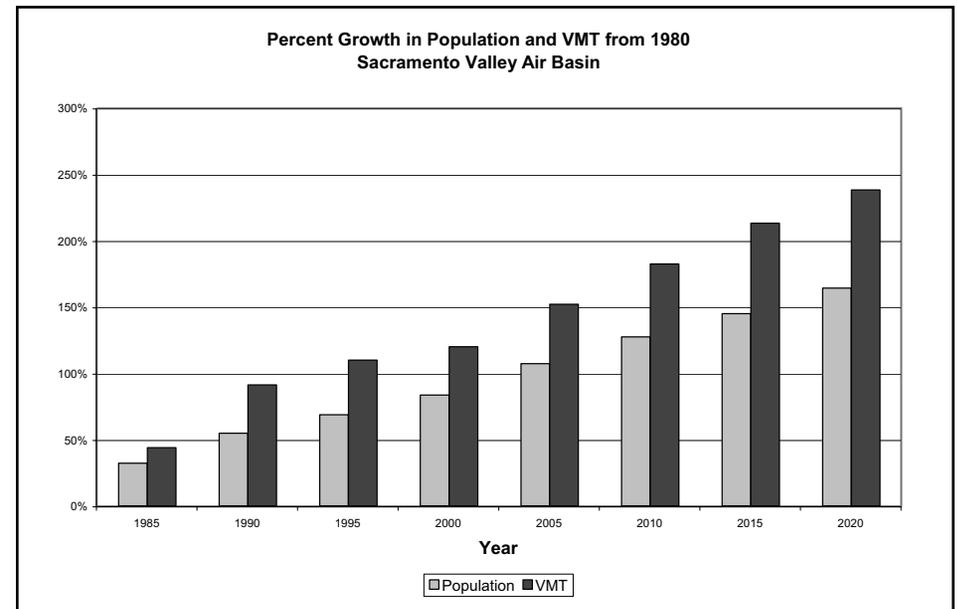


Figure 4-54

Parameter	1980	1985	1990	1995	2000	2005	2010	2015	2020
Population	1500924	1688217	1977625	2155511	2353221	2645098	2925202	3259235	3593262
Avg. Daily VMT/1000	27881	35762	47540	52178	54681	62630	70184	77831	84078

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	334	360	356	388	341	300	249	203	165	140
Stationary Sources	37	32	30	44	46	41	38	38	39	38
Area-wide Sources	9	9	9	10	9	9	9	9	9	9
On-Road Mobile	179	194	208	216	182	147	113	80	53	36
Gasoline Vehicles	147	148	143	132	112	78	54	38	25	18
Diesel Vehicles	32	46	65	84	70	68	59	43	27	18
Other Mobile	109	126	109	118	105	103	89	75	65	57
Gasoline Fuel	3	3	4	5	5	6	7	7	6	6
Diesel Fuel	103	119	101	109	95	92	77	63	53	44
Other Fuel	3	4	4	4	4	5	5	5	6	6

Table 4-55

ROG Emission Trends (tons/day, annual average)										
Emission Source	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
All Sources	448	438	408	362	299	243	205	185	175	171
Stationary Sources	87	64	57	58	48	38	40	44	48	52
Area-wide Sources	59	66	65	73	69	66	63	65	67	69
On-Road Mobile	269	265	241	179	128	85	62	44	31	24
Gasoline Vehicles	267	262	237	175	125	83	59	42	30	23
Diesel Vehicles	2	3	4	4	3	3	2	2	1	1
Other Mobile	33	43	45	52	54	53	40	33	29	27
Gasoline Fuel	22	28	33	40	42	42	30	24	21	20
Diesel Fuel	9	10	9	9	8	8	7	5	4	3
Other Fuel	3	4	4	3	3	4	4	4	4	4

Table 4-56

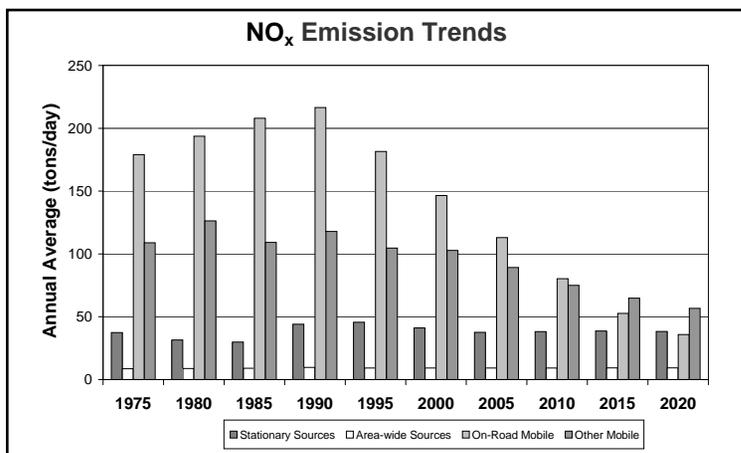


Figure 4-55

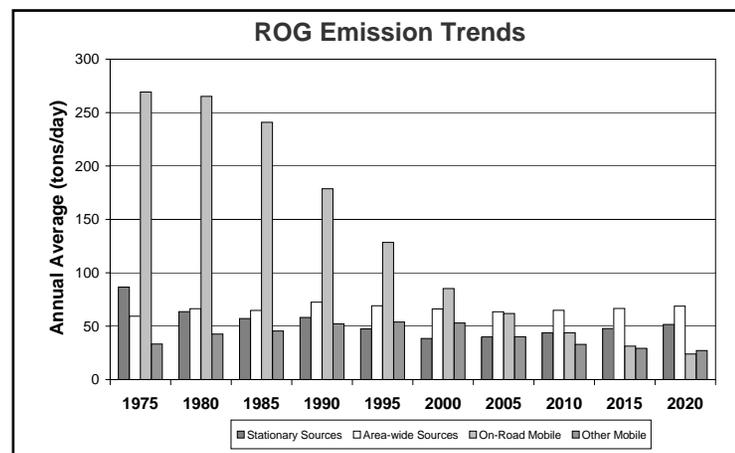


Figure 4-56

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 maximum peak 8-hour indicator remained fairly constant from 1985 to 1989. Since 1989, the peak 8-hour indicator has decreased slightly, and the overall decline for the 20-year period is almost 14 percent. Looking at the number of days above the State and national standards, the trend is much more variable. However, the number of exceedance days has declined since 1988. The maximum measured 8-hour concentrations have also decreased, but with more year-to-year variation.

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, 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.

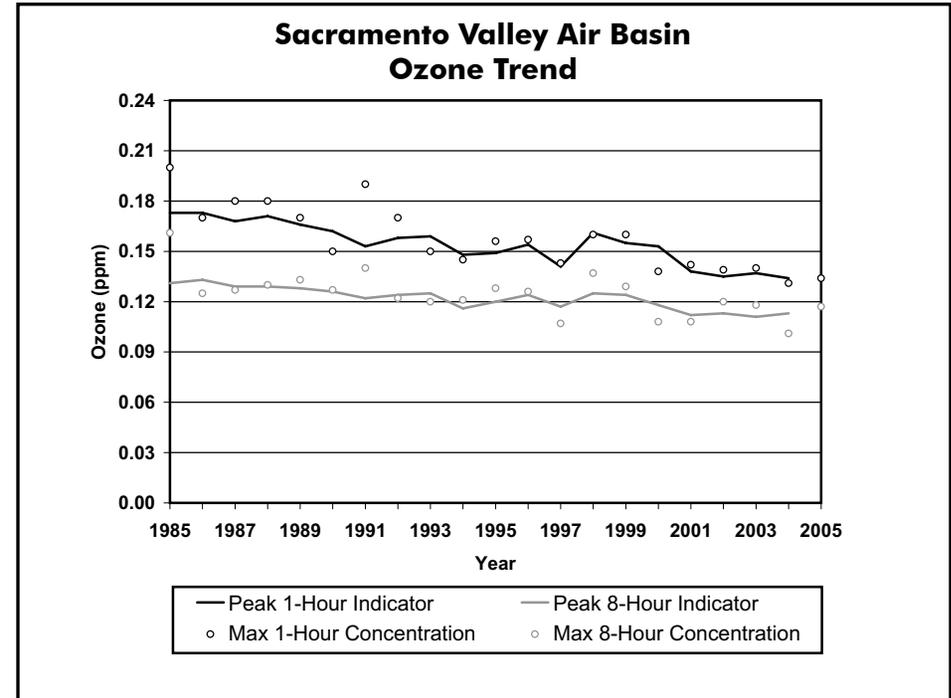


Figure 4-57

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹
Peak 1-Hour Indicator	0.173	0.173	0.168	0.171	0.166	0.162	0.153	0.158	0.159	0.148	0.149	0.154	0.141	0.161	0.155	0.153	0.138	0.135	0.137	0.134	
Peak 8-Hour Indicator	0.131	0.133	0.129	0.129	0.128	0.126	0.122	0.124	0.125	0.116	0.120	0.124	0.117	0.125	0.124	0.118	0.112	0.113	0.111	0.113	
4th High 1-Hr. in 3 Yrs	0.180	0.180	0.160	0.160	0.160	0.160	0.150	0.150	0.150	0.143	0.145	0.145	0.133	0.148	0.148	0.148	0.133	0.132	0.138	0.138	
Avg. of 4th High 8-Hr. in 3 Yrs	0.118	0.118	0.114	0.114	0.114	0.107	0.105	0.105	0.110	0.104	0.106	0.106	0.097	0.097	0.101	0.105	0.101	0.101	0.100	0.097	
Maximum 1-Hr. Concentration	0.200	0.170	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
Max. 8-Hr. Concentration	0.161	0.125	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
Days Above State Standard	59	66	94	98	68	50	68	74	34	60	50	58	25	62	59	41	44	46	51	29	35
Days Above Nat. 1-Hr. Std.	19	24	24	35	8	16	14	14	7	9	11	9	3	14	7	5	2	7	5	1	3
Days Above Nat. 8-Hr. Std.	42	50	73	68	37	44	60	56	22	48	40	44	15	60	43	35	37	34	40	20	25

¹ Preliminary data for January through October 2005 are shown here, however they are subject to change. 2004 is the last year for which complete and approved data is available, thus annual statistics are not included.
Table 4-57

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

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Peak 1-Hour Indicator	0.173	0.173	0.168	0.171	0.166	0.162	0.153	0.158	0.159	0.148	0.149	0.154	0.141	0.161	0.155	0.153	0.139	0.143	0.146	0.143	
Peak 8-Hour Indicator	0.131	0.133	0.129	0.129	0.128	0.126	0.122	0.124	0.125	0.116	0.120	0.124	0.117	0.125	0.124	0.118	0.112	0.113	0.111	0.121	
4th High 1-Hr in 3 Yrs	0.180	0.180	0.160	0.160	0.160	0.160	0.150	0.150	0.150	0.143	0.145	0.145	0.133	0.148	0.148	0.148	0.133	0.143	0.143	0.142	
Avg of 4th Hi 8-Hr in 3 Yrs	0.118	0.118	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	0.107	
Maximum 1-Hr. Concentration	0.200	0.170	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
Max. 8-Hr. Concentration	0.161	0.125	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
Days Above State Standard	54	57	86	97	74	47	65	76	36	54	52	58	25	49	56	46	52	59	53	35	43
Days Above Nat. 1-Hr. Std.	19	23	22	35	9	14	14	14	7	9	11	11	4	13	7	7	3	10	6	0	4
Days Above Nat. 8-Hr. Std.	37	49	64	72	53	43	57	55	24	42	42	48	19	34	48	37	41	47	43	25	35

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 January through October 2005 are shown here, however they are subject to change. 2004 is the last year for which complete and approved data is available, thus annual statistics are not included.

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, 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.

Particulate matter 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	197	203	209	221	212	219	226	232	238	243
Stationary Sources	24	18	17	21	16	17	19	20	22	23
Area-wide Sources	163	173	181	187	185	192	197	202	208	212
On-Road Mobile	3	4	5	5	4	4	4	4	4	4
Gasoline Vehicles	1	1	1	2	2	2	2	3	3	3
Diesel Vehicles	2	2	3	4	2	2	1	1	1	1
Other Mobile	7	8	7	8	6	6	6	6	5	5
Gasoline Fuel	0	1	1	1	1	1	2	2	2	2
Diesel Fuel	6	7	6	7	5	5	4	4	3	2
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-59

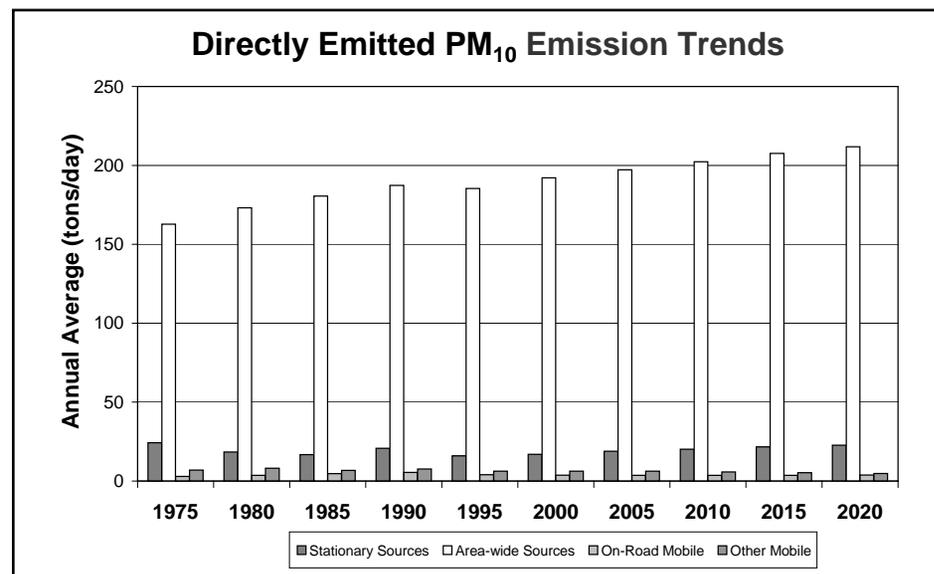


Figure 4-58

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

Direct emissions of PM_{2.5} increased slightly in the Sacramento Valley Air Basin between 1975 and 2005 and are projected to increase 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, and particulates from residential fuel combustion. Emissions of directly emitted PM_{2.5} from mobile sources and stationary sources in the Sacramento Valley Air Basin have remained relatively steady.

Particulate matter 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	82	81	83	89	82	84	86	87	89	90
Stationary Sources	18	12	11	13	10	10	12	12	13	14
Area-wide Sources	56	60	62	65	64	65	66	68	69	70
On-Road Mobile	2	3	4	4	3	3	3	2	2	2
Gasoline Vehicles	1	1	1	1	1	1	1	2	2	2
Diesel Vehicles	1	2	3	3	2	2	1	1	1	0
Other Mobile	6	7	6	7	6	6	6	5	5	4
Gasoline Fuel	0	0	1	1	1	1	1	1	2	2
Diesel Fuel	6	7	5	6	5	4	4	3	3	2
Other Fuel	0	0	0	0	0	0	0	0	0	0

Table 4-60

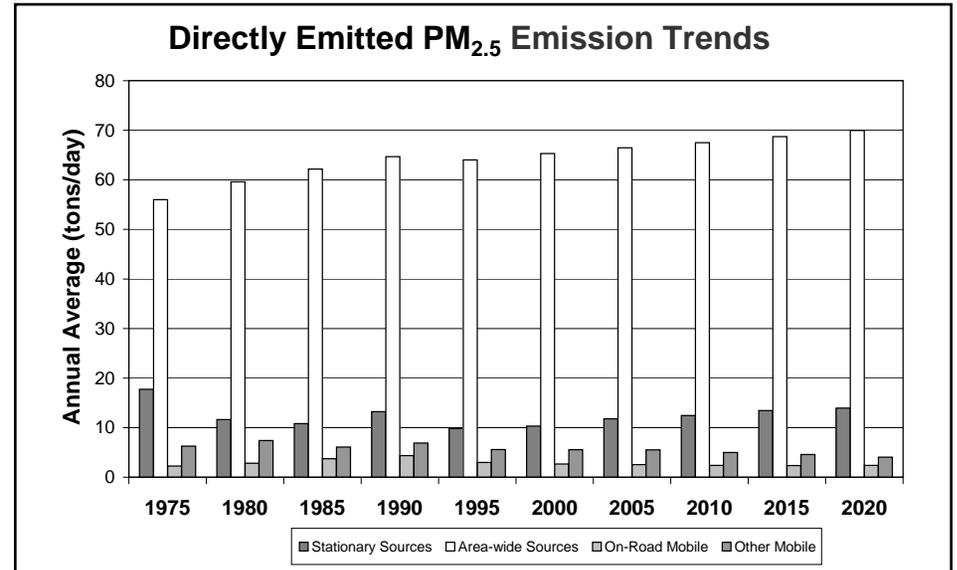


Figure 4-59

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 about 13 percent from 1989 to 2004. The three-year average of calculated days over the State 24-hour standard decreased by 21 percent from 1988 to 2004. Because many of the sources that contribute to ozone also contribute to PM₁₀, future ozone emission controls should improve PM₁₀ air quality.

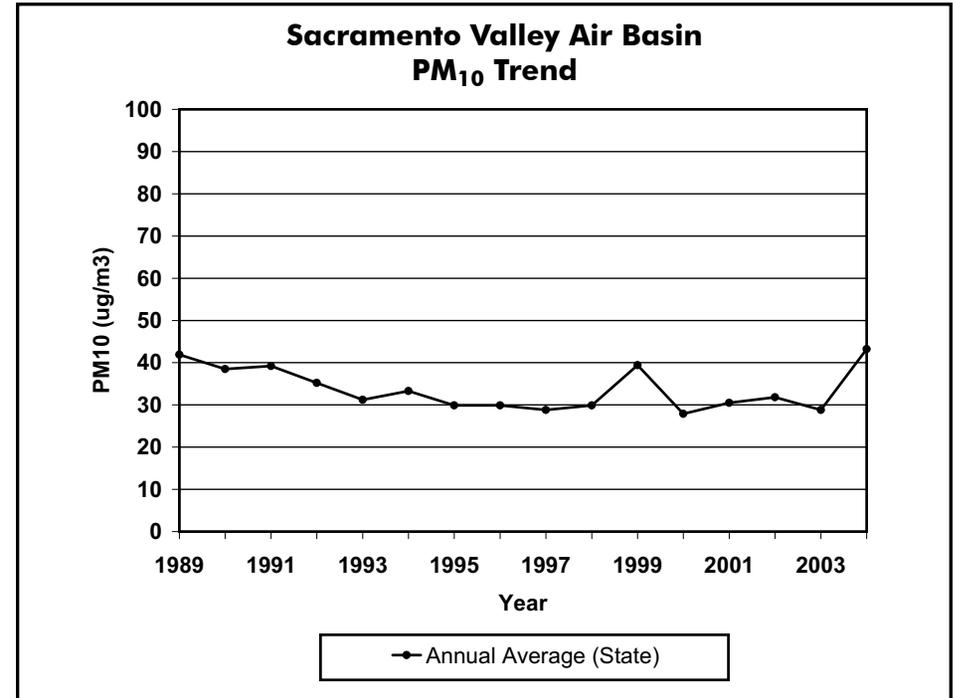


Figure 4-60

PM ₁₀ (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				100	147	153	136	111	113	154	145	98	126	130	179	90	112	96	123	171
Max. 24-Hr. Concentration (Nat)				115	139	153	136	111	110	154	145	98	126	130	179	86	105	92	81	169
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	43.2
Annual Average (Nat)				42.8	41.9	41.7	42.3	34.7	31.8	34.5	30.1	29.8	28.6	29.0	38.4	27.9	30.2	30.9	28.4	42.6
Calc Days Above State 24-Hr Std				183	134	175	189	177	92	108	108	129	65	97	144	81	102	126	66	195
Calc Days Above Nat 24-Hr Std				0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6

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 2004. 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 six-year period. Similar to PM₁₀, year-to-year changes in meteorology can mask the impacts of emission control programs. Several more years are needed before determining longer-term trends. 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.

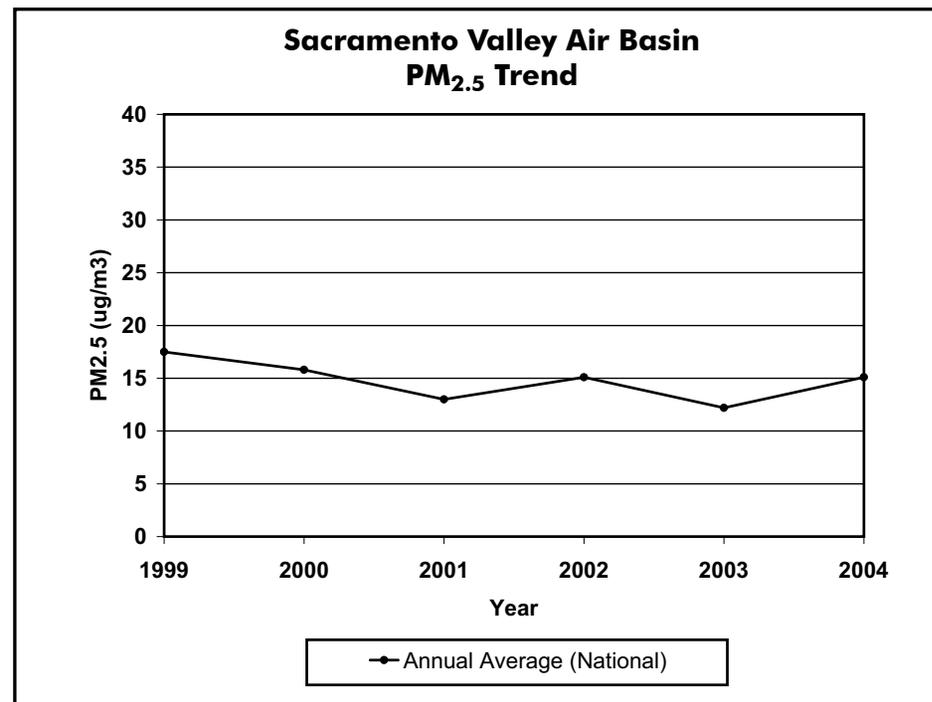


Figure 4-61

PM _{2.5} (ug/m ³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)														96.0	108.0	123.1	128.2	96.1	73.2	76.3
Max. 24-Hr. Concentration (Nat)														96.0	108.0	98.0	78.0	91.0	65.0	65.0
98th Percentile of 24-Hr Conc.														96.0	84.0	81.0	78.0	77.0	43.0	54.0
Annual Average (State)															17.5	15.8	11.9	15.1	15.9	16.5
Avg. of Qtrly. Means (Nat)															17.5	15.8	13.0	15.1	12.2	15.1

Table 4-62

Sacramento Valley Air Basin Carbon Monoxide Emission Trends and Forecasts

Emissions of CO declined in the Sacramento Valley Air Basin between 1980 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	2933	2942	2811	2475	1860	1439	1182	991	864	787
Stationary Sources	28	28	16	51	39	41	48	50	54	56
Area-wide Sources	252	265	275	286	283	282	284	286	288	292
On-Road Mobile	2450	2389	2246	1813	1225	822	576	398	268	187
Gasoline Vehicles	2442	2377	2228	1793	1210	808	565	389	260	180
Diesel Vehicles	8	12	17	20	16	13	12	9	8	7
Other Mobile	204	261	274	326	313	294	273	257	254	251
Gasoline Fuel	147	192	215	262	255	240	221	205	202	201
Diesel Fuel	36	44	37	42	36	31	28	26	25	23
Other Fuel	21	25	22	22	22	23	25	26	27	27

Table 4-63

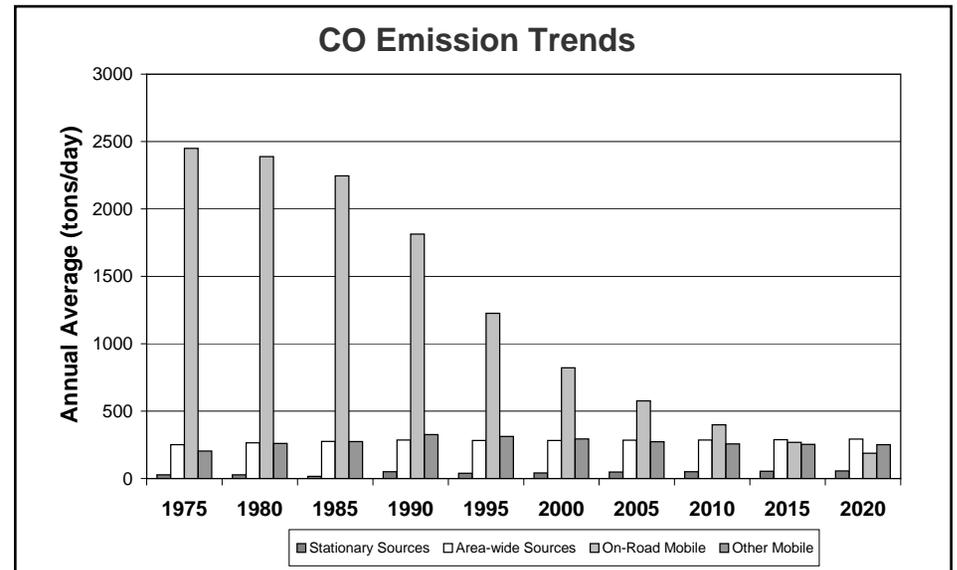


Figure 4-62

Sacramento Valley Air Basin

Carbon Monoxide Air Quality Trend

The trend of the maximum peak 8-hour indicator for carbon monoxide for the Sacramento Valley Air Basin was relatively flat from 1985 to 1991, with some year-to-year variability that was probably caused by meteorology. Since 1991, indicator values have decreased substantially. The 2004 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 carbon monoxide 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.

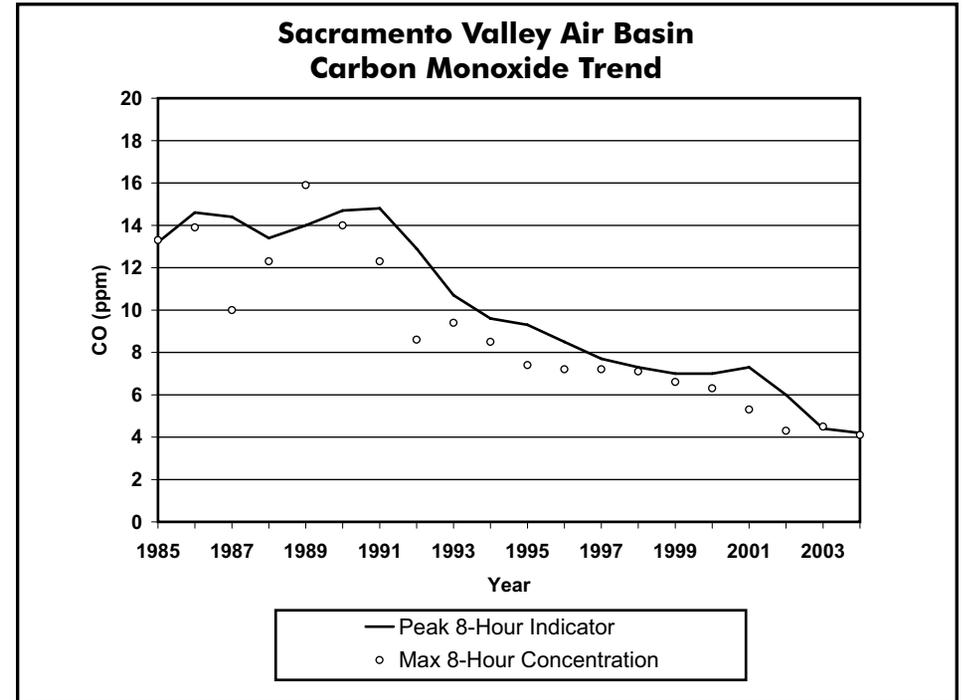


Figure 4-63

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	13.2	14.6	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
Max. 1-Hr. Concentration	17.0	20.0	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
Max. 8-Hr. Concentration	13.3	13.9	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
Days Above State 8-Hr. Std.	12	13	5	12	22	14	9	0	2	0	0	0	0	0	0	0	0	0	0	0
Days Above Nat. 8-Hr. Std.	12	12	3	9	22	12	6	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	334	360	356	388	341	300	249	203	165	140
Stationary Sources	37	32	30	44	46	41	38	38	39	38
Area-wide Sources	9	9	9	10	9	9	9	9	9	9
On-Road Mobile	179	194	208	216	182	147	113	80	53	36
Gasoline Vehicles	147	148	143	132	112	78	54	38	25	18
Diesel Vehicles	32	46	65	84	70	68	59	43	27	18
Other Mobile	109	126	109	118	105	103	89	75	65	57
Gasoline Fuel	3	3	4	5	5	6	7	7	6	6
Diesel Fuel	103	119	101	109	95	92	77	63	53	44
Other Fuel	3	4	4	4	4	5	5	5	6	6

Table 4-65

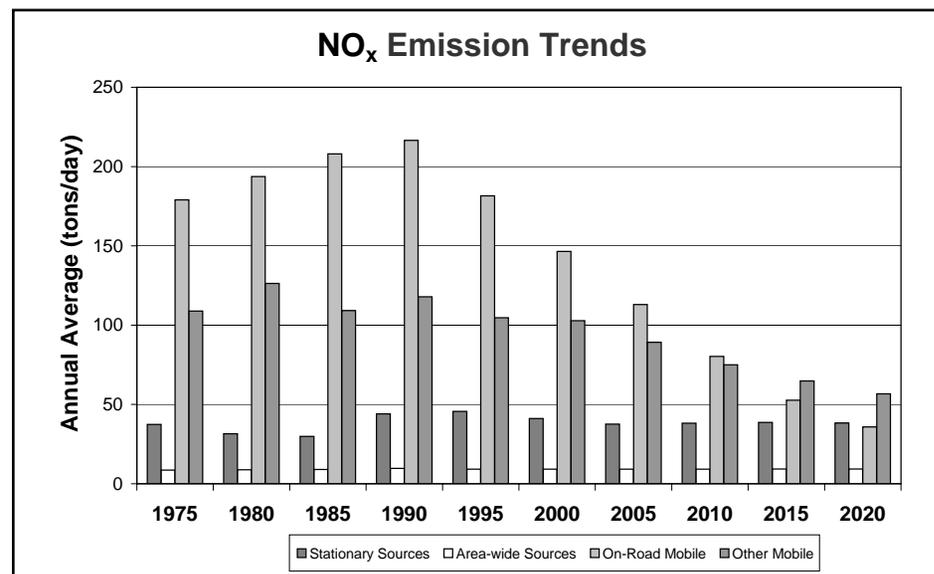


Figure 4-64

Sacramento Valley Air Basin

Nitrogen Dioxide Air Quality Trend

The Sacramento Valley Air Basin has attained both the State and national nitrogen dioxide standards for more than twenty years. The peak 1-hour indicator increased from 1984 through 1993, but has declined by almost 28 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.

Nitrogen dioxide is formed from emissions of oxides of nitrogen, 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 oxides of nitrogen emissions.

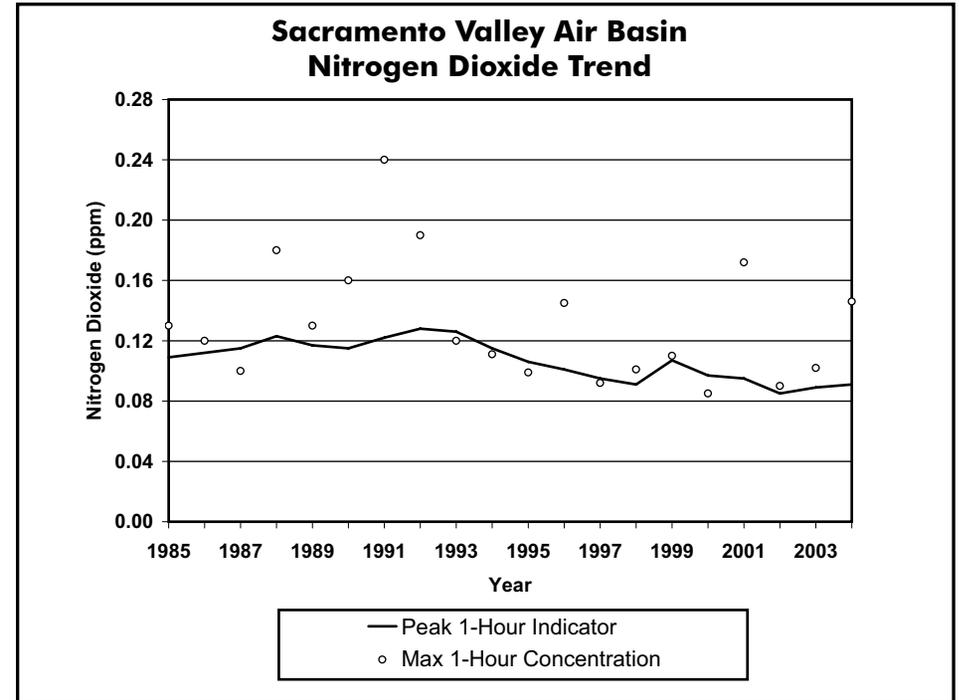


Figure 4-65

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator	0.109	0.112	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
Max. 1-Hr. Concentration	0.130	0.120	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
Max. Annual Average	0.021	0.022	0.022	0.025	0.019	0.023	0.024	0.021	0.017	0.022	0.022	0.022	0.019	0.021	0.021	0.019	0.019	0.020	0.015	0.017

Table 4-66

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