CHAPTER 7
AIR QUALITY AND PUBLIC HEALTH IMPACTS

Summary

The emissions reported by RECLAIM facilities from Compliance Years 1989 through 2002 are found to be in an overall downward trend. Quarterly NOx emissions remained relatively constant throughout Calendar Year 2002 except for a slight increase in the third quarter. This emissions trend is more apparent if emissions from power producing facilities were isolated. The trend of quarterly SOx emissions was the reverse of the quarterly NOx emissions trend. When quarterly NOx emissions increased, quarterly SOx emissions decreased, and vise versa. Furthermore, analysis of the geographical distribution of emissions during the first nine years of the program on a quarterly basis does not show any distinct shift in the geographical distribution of emissions.

The California Clean Air Act requires a 50 percent reduction in population exposure to ozone by December 31, 2000. Analysis of per capita exposure (the length of time each person is exposed) to ozone in 1998 and 2000 shows that the Basin achieved the December 2000 target for ozone well before the deadline. In fact, Los Angeles County, Orange County, and the South Coast Air Basin overall achieved attainment with the December 2000 target prior to 1994 and Riverside and San Bernardino Counties achieved attainment in 1996.

Air toxic health risk is primarily caused by emissions of VOCs and metals, rather than NOx or SOx emissions. Additionally, RECLAIM facilities are subject to the same air toxic regulations as other sources in the Basin. Therefore, it can be concluded that there is no toxic impact due to the implementation of the RECLAIM program beyond what would have occurred pursuant to the rules and control measures RECLAIM subsumed.

Background

RECLAIM is designed to achieve the same, or a higher level of, benefits in terms of air quality and public health as would have been achieved from implementation of the control measures and command-and-control rules that RECLAIM subsumed. Therefore, as a part of each annual program audit, AQMD evaluates per capita exposure to air pollution, toxic risk reductions, emission trends, and seasonal fluctuations in emissions. AQMD also maintains quarterly emissions maps depicting the geographic distribution of RECLAIM emissions. This chapter addresses:

- Emission trends for RECLAIM facilities;
- Seasonal fluctuations in emissions;
- Geographic patterns of emissions;
- Per capita exposure to air pollution; and
- Toxics impacts.

Emission Trends for RECLAIM Sources

Concerns were expressed during program development that RECLAIM might cause sources to increase their aggregate emissions during the early years of the program due to perceived over-allocation of emissions. The analysis of emissions from RECLAIM sources indicates that this did not occur. Figures 7-1 and 7-2 show NOx and SOx emissions for RECLAIM sources for Compliance Years 1989 through 2002.

Figure 7-1
NOx Emission Trend for RECLAIM Sources

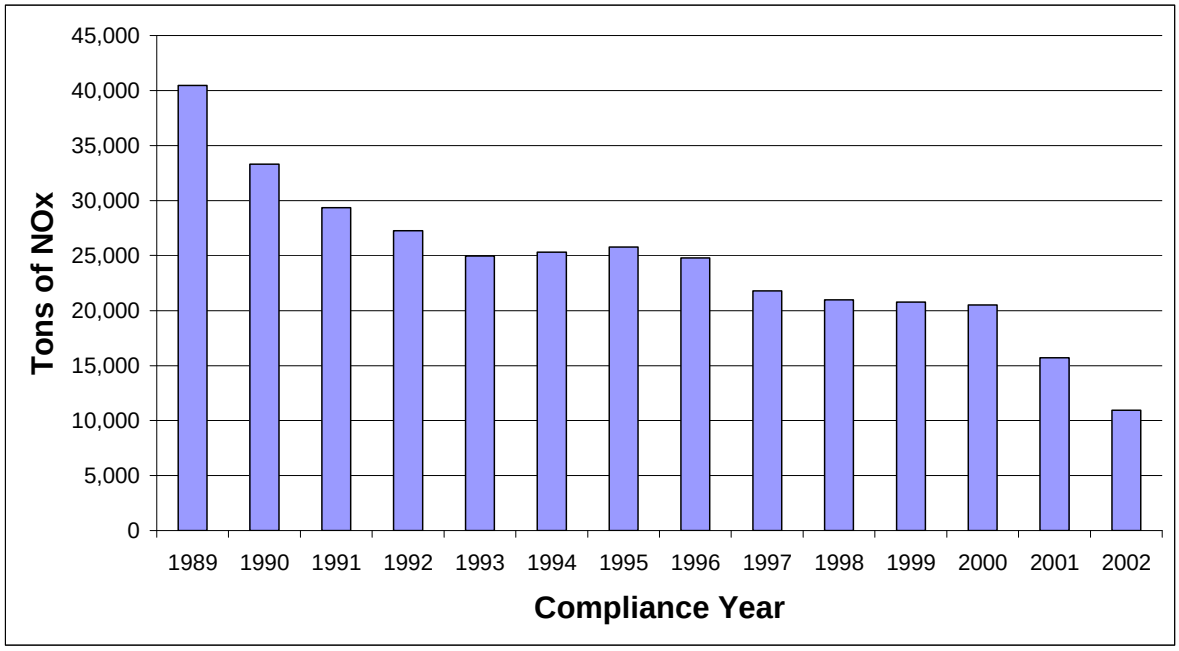
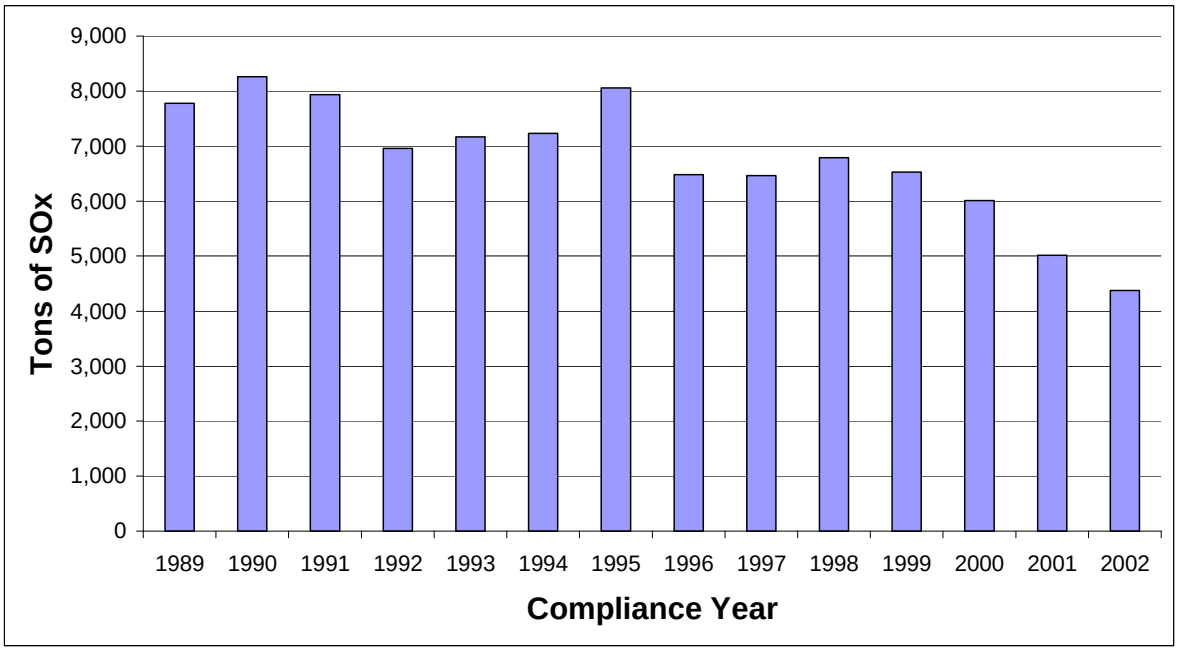


Figure 7-2
SOx Emission Trend for RECLAIM Sources



As indicated in Figures 7-1 and 7-2, there is an overall downward trend in both NOx and SOx emissions. When comparing SOx emissions for Compliance Years 1997 through 2002, there was a slight increase in SOx emissions in Compliance Year 1998, with Compliance Year 1999 SOx emissions comparable to Compliance Year 1997. Compliance Year 2002 SOx emissions are the lowest of the six years. The decrease of SOx emissions continued from Compliance Years 1999 to 2002. Overall, the figures clearly show that RECLAIM facilities did not increase their aggregate emissions during the earlier years of the program, dispelling the concerns about higher emissions in the early years.

Seasonal Fluctuation in Emissions for RECLAIM Sources

During program development, another concern was that RECLAIM might cause facilities to shift emissions from the winter season into the summer ozone season, thus exacerbating air quality. To address this concern, AQMD staff analyzed quarterly emissions during calendar year 2002 to assess if there had been such a shift in emissions. Where available, audited quarterly emissions data was used for this analysis. Where audited emissions were unavailable, emissions as reported by facilities (either under the Annual Permitted Emissions Program or the Quarterly Certification of Emissions Report) were used.

Figure 7-3
Calendar Year 2002 NOx Quarterly Emissions

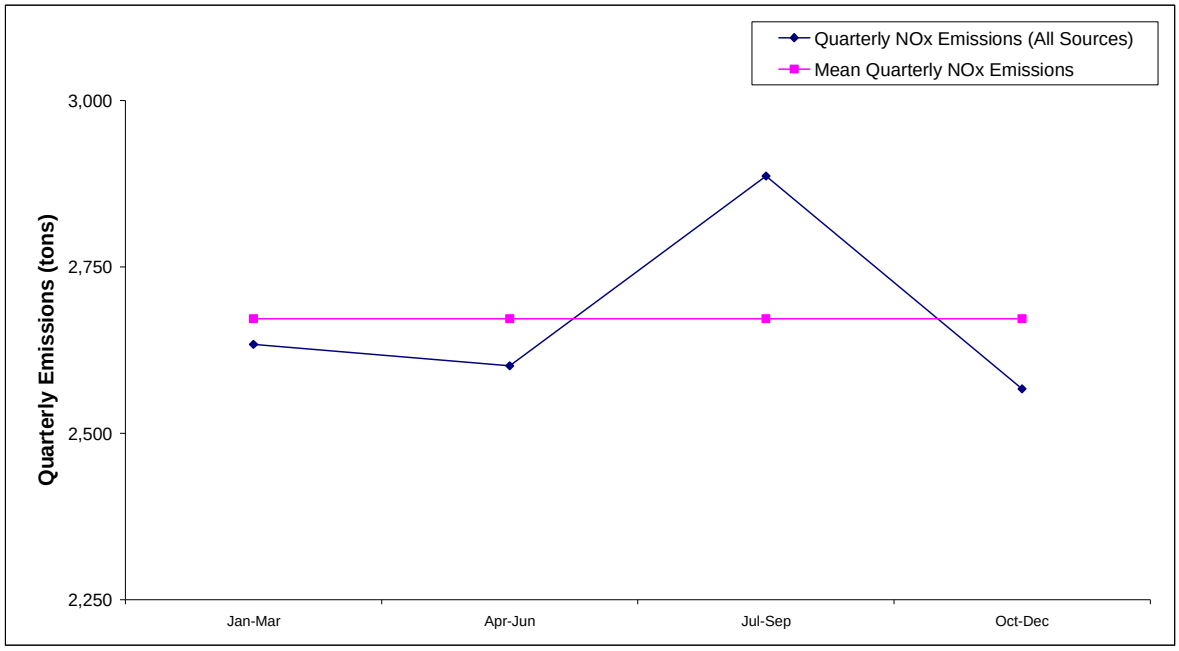


Figure 7-3 shows the mean quarterly NOx emission, which is the average of the four quarterly emissions, versus the actual quarterly emissions. Quarterly NOx emissions vary about the mean quarterly emission with maximum percent differences in the third quarter (July through September) of 8 percent above the mean and 4 percent below the mean in the fourth quarter (October through December). Aggregate quarterly NOx emissions were relatively constant throughout the year except for the slight increase in the third quarter, as previously mentioned. To show the cause of this upward trend, Figure 7-4 was plotted to separate power producing facility emissions and from the rest of RECLAIM facilities. This figure shows that the upward trend is mostly attributed to the increased emissions from power producing facilities because the slope of increasing emissions from power producing facilities matches similarly to the slope of increasing emissions from all facilities during the calendar year. In addition, emissions from non-power producing facilities were essentially flat throughout the Calendar Year 2002.

Figure 7-4
Comparison of Calendar Year 2002 NOx Quarterly Emissions from Power Producing Facilities and Non-power Producing Facilities

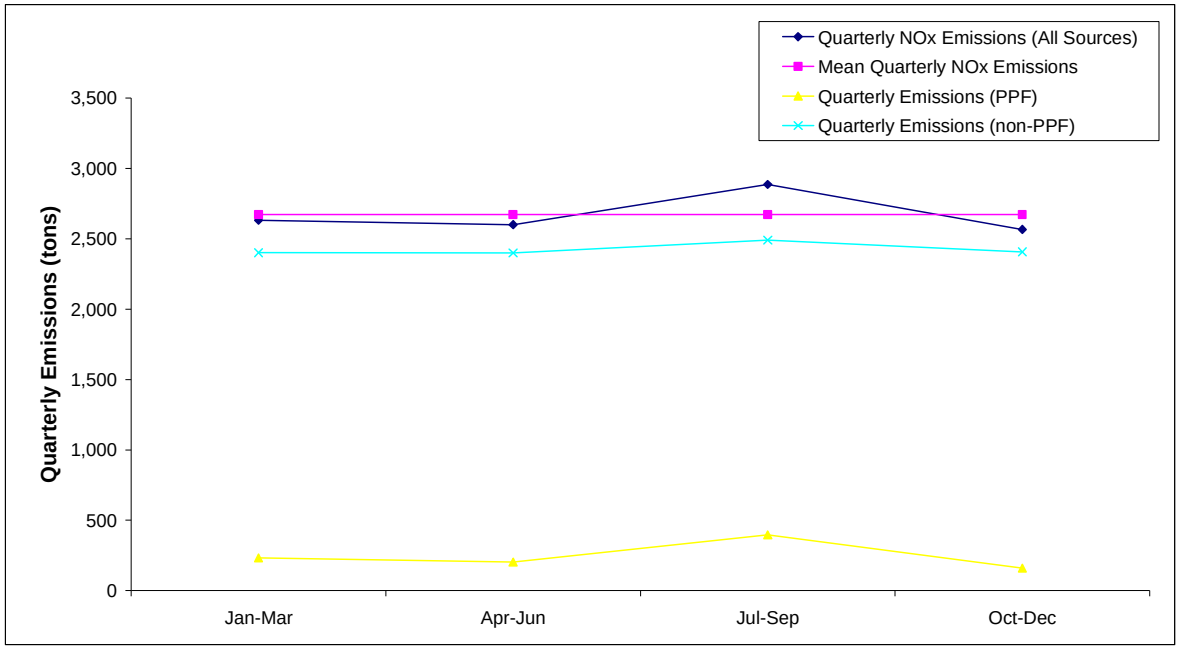
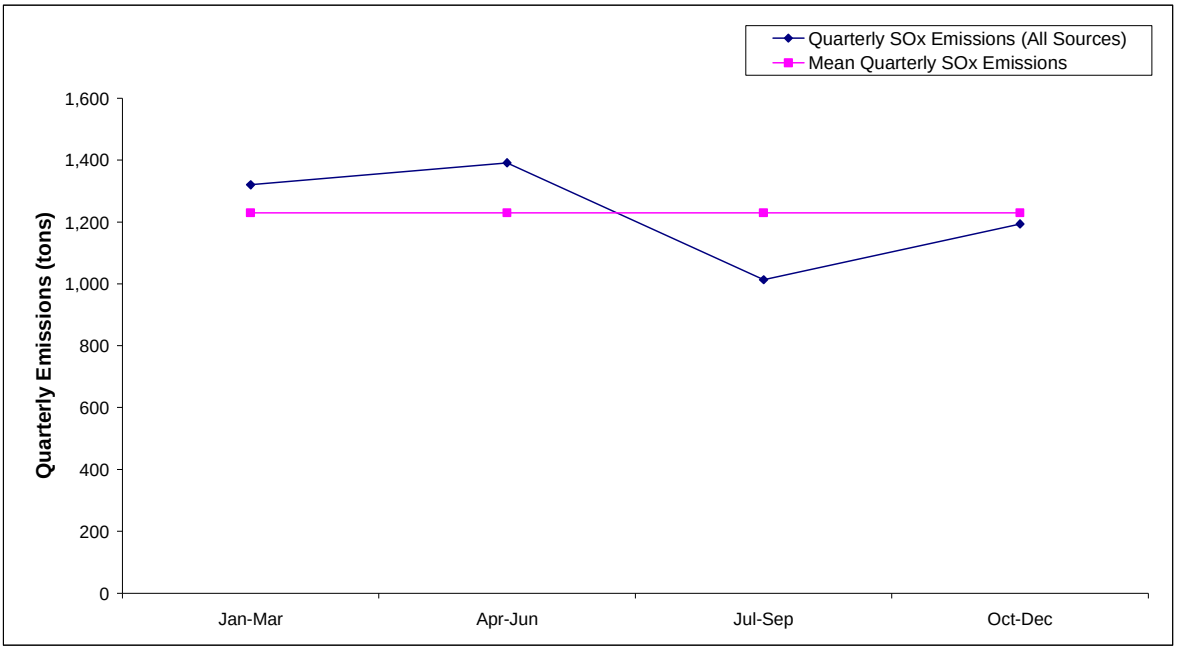


Figure 7-5 shows quarterly SOx emissions during Calendar Year 2002. Quarterly SOx emissions trend was the reverse of the NOx emissions trend. When quarterly NOx emissions increased, quarterly SOx emissions decreased.. And vise versa, when NOx emissions decreased, SOx emissions increased. Quarterly SOx emissions vary about the mean quarterly emission with maximum percent differences in the second quarter (April through June) of 13 percent above the mean and 18 percent below the mean in the third quarter (July through September).

Figure 7-5
Calendar Year 2002 SOx Quarterly Emissions



Geographic Distribution of Emissions

As part of this program audit, AQMD staff examined the quarterly emissions maps, which were developed pursuant to Rule 2015(b)(2), for any notable changes in the geographic distribution of emissions. RECLAIM facilities have the flexibility to increase emissions as much as they need to, as long as they can provide RTCs to offset the emissions exceeding their allocations; however, there are NSR implications if they increase above their Compliance Year 1994 Allocation including non-tradable credits. Because of this flexibility and the ability of RECLAIM facilities to purchase RTCs from other facilities, some people were concerned that RECLAIM could alter the geographic distribution of emissions in the Basin and adversely affect air quality in certain areas.

Quarterly emissions for both NOx and SOx were mapped for Compliance Year 2002 (all four quarters of 2002 and the first two quarters of 2003). These maps are included in Appendices F and G. The quarterly emission maps do not show any distinct shift in the geographic pattern of emissions. AQMD will continue to review additional quarterly maps and assess the geographic patterns of emissions as the information becomes available.

Per Capita Exposure to Pollution

The predicted effects of RECLAIM on air quality and public health were thoroughly analyzed through modeling during program development. The results were compared to projected impacts from the continuation of the traditional command-and-control regulations and implementation of control measures in the 1991 AQMP. One of the criteria examined in the analysis was per capita population exposure.

Per capita population exposure reflects the length of time each person is exposed to unhealthful air quality. The modeling performed in the analysis projected that the reductions in per capita exposure under RECLAIM in Calendar Year 1994 would be nearly identical to the reductions projected for implementation of the control measures in the 1991 AQMP, and the reductions resulting from RECLAIM would be greater in Calendar Years 1997 and 2000.

Table 7-1 compares the projected Calendar Years 1994 and 1997 per capita exposures to ozone based upon continuation of the command-and-control regulatory approach and the implementation of the control measures in the 1991 AQMP with the actual per capita exposure in the Basin for Calendar Years 1994 and 1997. Table 7-2 summarizes Calendar Years 1998 through 2003 ozone data in terms of the number of days that exceeded the state and federal ambient ozone standards and the Basin's maximum concentration during each of the six calendar years.

Table 7-1
Comparison of Per Capita Exposures Over State Standard for Ozone
1991 AQMP Projection Vs Actual Exposures

Calendar Year	Projected Per Capita Exposure based on 1991 AQMP (hrs)	Actual Per Capita Exposure (hrs)
1994	38.6	37.6
1997	32.0	5.9

Table 7-2
Summary of Ozone Data

	Calendar Year					
	1998	1999	2000	2001	2002	2003
Days exceeding state standard	113	120	125	121	118	133
Days exceeding federal standard	62	42	40	36	49	68
Basin Maximum (pphm)	24	17	18.5	19.1	16.9	21.6

Table 7-3 compares the actual per capita exposures to the exposure milestones as specified in the California Clean Air Act (CCAA) for Calendar Years 1997 and 2000. The CCAA establishes specific milestones for achieving reductions in overall population exposure to severe non-attainment pollutants in the Basin. These milestones include a 25 percent reduction by December 31, 1994, a 40 percent reduction by December 31, 1997, and a 50 percent reduction by December 31, 2000, relative to a Calendar Years' 1986-88 baseline. The data presented in Table 7-3 for actual per capita exposure in both Calendar Years 1997 and 2000 for the four counties, and the Basin overall, have shown substantial progress toward continuous attainment of the state standard. As

indicated in Table 7-3, actual reductions in per capita exposure in Calendar Year 1997 have gone well beyond the 50 percent reduction target scheduled for Calendar Year 2000.

Table 7-3
Per Capita Exposure to Ozone above the State Standard of 0.09 ppm (hours)

Calendar Year	Basin	Los Angeles	Orange	Riverside	San Bernardino
1986-88 baseline[1]	80.5	75.8	27.2	94.1	192.6
1994 actual	37.6	26.5	9	71.1	124.9
1995 actual	27.7	20	5.7	48.8	91.9
1996 actual	20.3	13.2	4	42.8	70
1997 actual	5.9	3	0.6	13.9	24.5
1998 actual	12.1	7.9	3.1	25.2	40.2
2000 actual	3.8	2.6	0.7	8.5	11.4
2001 actual	1.73	0.88	0.15	6	5.68
2002 actual	3.87	2.16	0.13	11.12	12.59
2003 actual	10.92	6.3	0.88	20.98	40.21
1997 target[2]	48.3	45.5	16.3	56.5	115.6
2000 target[3]	40.2	37.9	13.6	47	96.3

1. Average over three years, 1986 through 1988
2. 60% of the 1986-88 baseline exposures
3. 50% of the 1986-88 baseline exposures

The three tables (Tables 7-1, 7-2, and 7-3) in combination show that actual per capita exposure during all the years mentioned continues to be well under the projected exposure in the 1991 AQMP. It should also be noted that air quality in the Basin is a complex function of meteorological conditions and an array of different emission sources, including mobile, area, RECLAIM stationary sources, and non-RECLAIM stationary sources. Therefore, the reduction of per capita exposure beyond the projected level is not necessarily attributable to implementation of the RECLAIM program. It is possible that actual per capita exposure might have been as low, if not lower, with continuation of command-and-control regulations.

Toxic Impacts

Based on a comprehensive toxic impact analysis performed during program development, it was concluded that RECLAIM would not result in any significant impacts on air toxic emissions. Nevertheless, to ensure that the implementation of RECLAIM does not result in adverse toxic impacts, each annual program audit is required to assess any increase in the public health exposure to toxics as a result of RECLAIM.

RECLAIM sources are subject to the same air toxic regulations (i.e., AQMD Regulation XIV, State AB 2588, Federal NESHAP, etc.) as other sources in the Basin. These regulations further ensure that RECLAIM does not result in adverse air toxic health impacts. In addition, air toxic health risk is primarily caused by emissions of VOC and certain metals, rather than NOx or SOx emissions. The majority of VOC sources at RECLAIM facilities are subject to

source-specific command-and-control rules, in addition to the applicable toxics requirements described above. Similarly, sources of toxic metals emissions are also subject to the above-identified regulations pertaining to toxic emissions. As a result, implementation of NOx and SOx RECLAIM is not expected to significantly impact air toxic emissions. That is, the substitution of NOx and SOx RECLAIM for the command-and-control rules and the measures RECLAIM subsumes are not relevant to toxic emissions; the same toxics requirements and VOC rules and control measures apply in either case. However, AQMD will continue to monitor and assess toxic risk reduction as part of future annual audits.