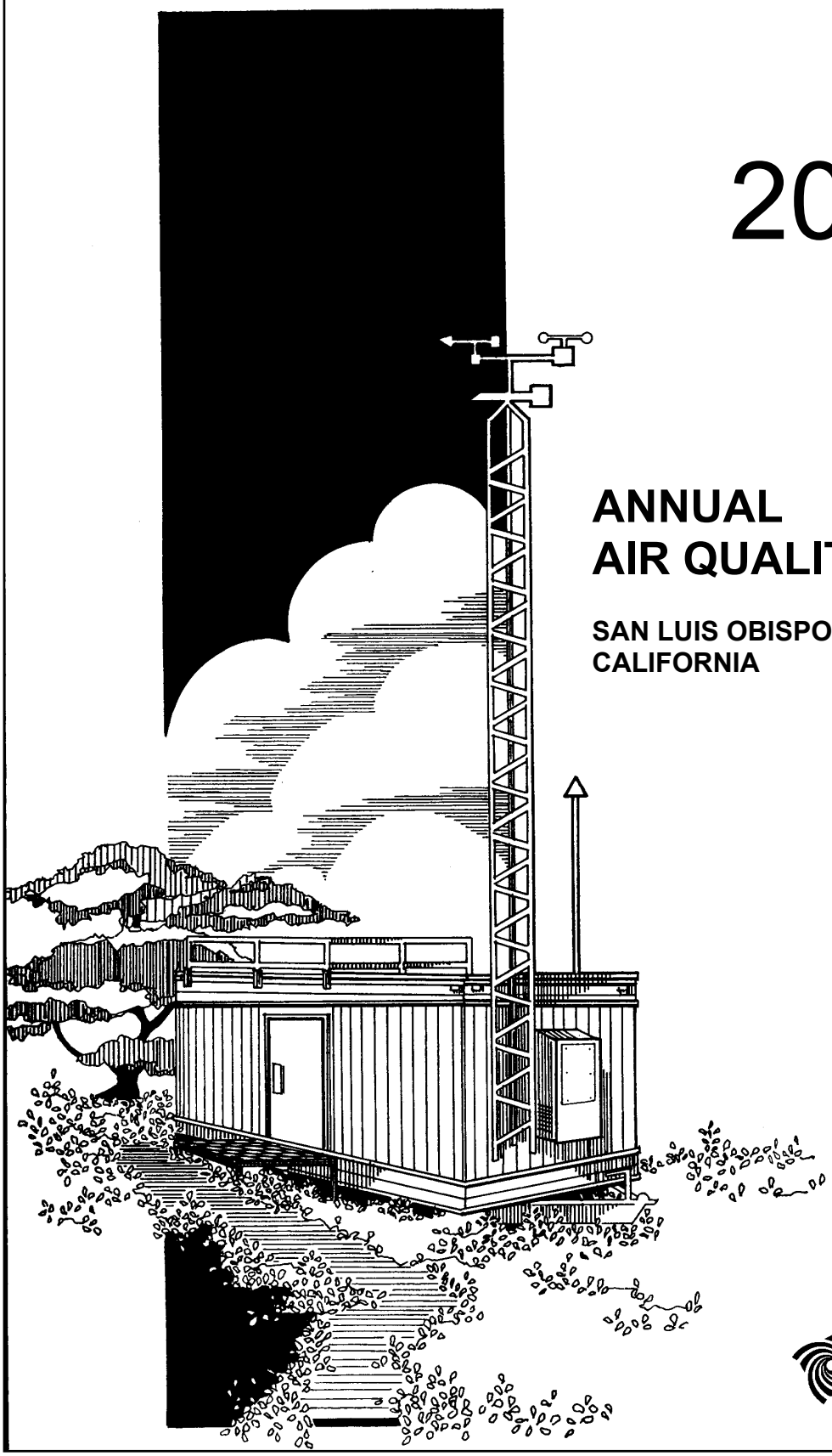
2001

ANNUAL AIR QUALITY REPORT

SAN LUIS OBISPO COUNTY CALIFORNIA



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2001 Annual Air Quality Report

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The air quality database for San Luis Obispo County is a public record and is available from the APCD office in various forms, including comprehensive records of all hourly or other sample values acquired anywhere in the county. Data summaries are published in the APCD quarterly newsletter Clear Vision, and in this Annual Air Quality Report. Ozone summary data appear weekly in the Saturday edition of the San Luis Obispo County Telegram Tribune, a local newspaper. Each month data from all countywide monitoring is added to separate archives maintained by the federal Environmental Protection Agency (EPA) and by the ARB. Summary data from San Luis Obispo County can be found in EPA and ARB publications and on the District's website at:

www.slocleanair.org

2001 Air Quality Summary

Most populated areas of San Luis Obispo County enjoyed good air quality this year. In 2001 the state and federal ozone standards were not exceeded at any of the permanent ambient air monitoring stations. State and federal ozone standards were exceeded at special study sites described on page 7. Countywide, exceedances of the state PM_{10} standard of 50 ug/m^3 occurred on 10 out of 61 different sample days in 2001. Both the Paso Robles and Atascadero monitoring stations recorded two state PM_{10} exceedances this year while the Mesa 2 monitoring station on the Nipomo Mesa recorded ten exceedance days with a maximum value of 115.4 ug/m^3. There were no exceedances of the national air quality standard for PM_{10} in the county in 2001.

In San Luis Obispo County, ozone and PM_{10} are the pollutants of main concern, since exceedances of state health-based standards for those are experienced here in most years. For this reason our county is designated as a non-attainment area for both the state ozone and PM_{10} standards.

Air Quality Monitoring

San Luis Obispo County air quality was measured in 2001 by a network of eight ambient air monitoring stations and four special stations run only during the summer ozone season. Station locations are depicted on the map on page 2. The APCD operated four permanent stations at Nipomo Regional Park, Grover Beach, Morro Bay, and Atascadero and seasonal research stations at Red Hills, Shandon, Camp Roberts and on the summit of Black Mountain. The State Air Resources Board (ARB) operated stations at San Luis Obispo and Paso Robles. Two stations on the Nipomo Mesa were operated by a private contractor for a petroleum refining and production company.

Air quality monitoring is rigorously controlled by federal and state quality assurance and control procedures to ensure data validity. Gaseous pollutant levels are measured continuously and averaged each hour, 24 hours a day. Particulate pollutants are generally sampled by filter techniques for averaging periods of three to 24 hours. PM_{10} (inhalable particulate matter 10 microns or less in size) and $PM_{2.5}$ (inhalable particulate matter 2.5 microns or less in size) are sampled for 24 hours every sixth day on the same schedule nationwide. In addition, PM_{10} is sampled continuously at the Atascadero monitoring station using a TEOM (*tapered element oscillating microbalance*) sampler.

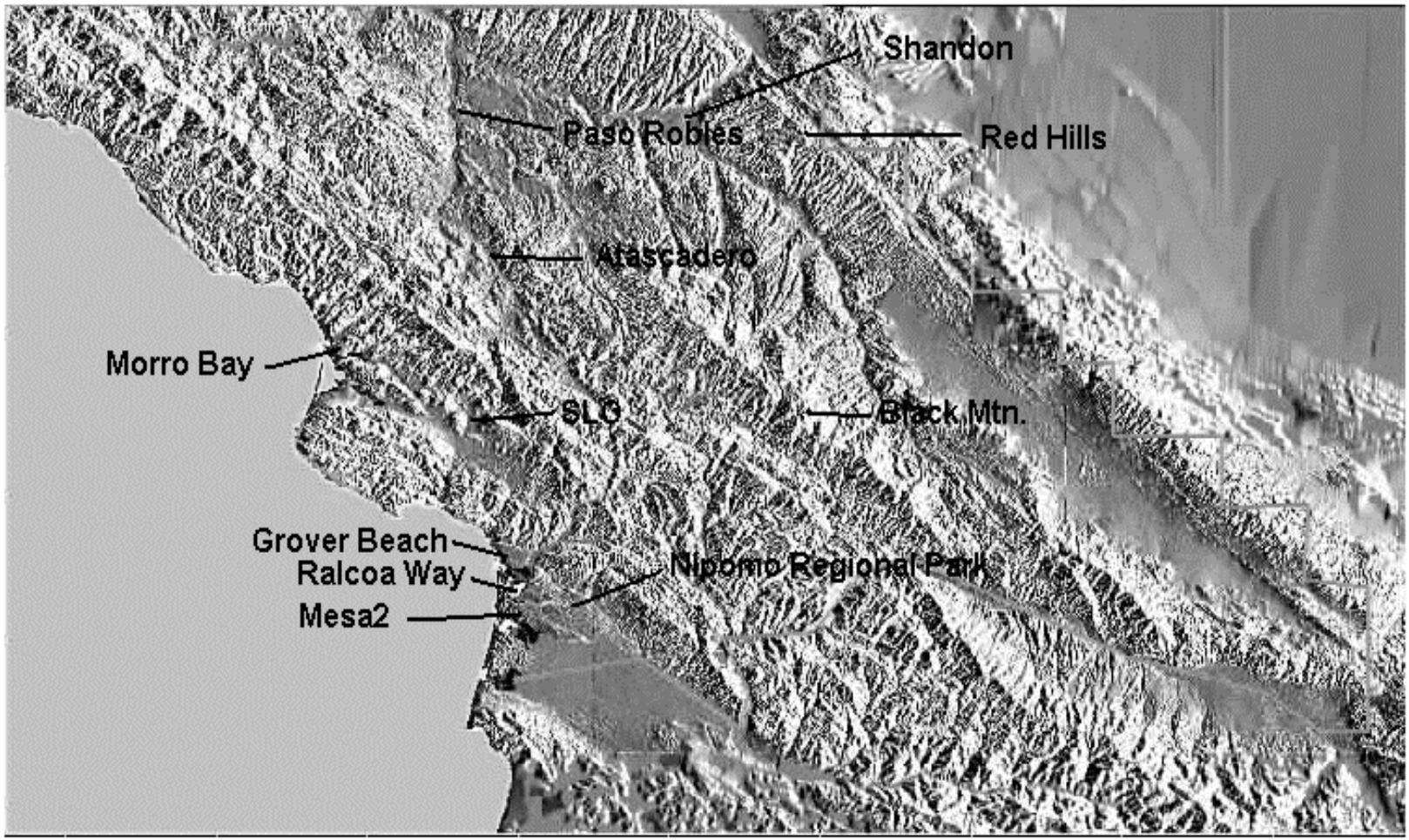


Figure 1: Ambient Air Monitoring Stations in San Luis Obispo County in 2001

Table 1: Ambient Air Quality Parameters Monitored in San Luis Obispo County (2001)

	O_3	NO	NO_2	NOx	SO_2	CO	PM_{10}	$PM_{2.5}$	TEOM	WS	WD	ATM
APCD Stations												
Atascadero	X	X	X	X		X	X	X	X	X	X	X
Morro Bay	X	X	X	X			X			X	X	
Nipomo Regional Park	X	X	X	X	X		X			X	X	
Grover Beach	X	X	X	X	X					X	X	
*Black Mountain	X									X	X	X
*Red Hills	X									X	X	X
*Camp Roberts	X									X	X	X
*Shandon	X											
ARB Stations												
San Luis Obispo	X	X	X	X		X	X	X		X	X	X
Paso Robles	X						X			X	X	X
Contractor Operated Stations												
Nipomo, Guadalupe Rd.					X		X			X	X	X
Nipomo, Ralcoa Way					X		X			X	X	

Acronyms:

O_3	Ozone	SO_2	Sulfur Dioxide	PM_{10}	Particulates < 10 microns (samples every sixth day)	WS	Wind Speed
NO	Nitric Oxide	CO	Carbon Monoxide			WD	Wind Direction
NO_2	Nitrogen Dioxide	TEOM	Particulates <10 microns (monitored continuously)	$PM_{2.5}$	Particulates < 2.5 microns (samples every sixth day)	ATM	Ambient Temp
Nox	Oxides of Nitrogen						

* Research station

Table 2: Ambient Air Quality Standards

In recent years we have experienced both our worst and our cleanest ozone seasons. The factors that lead to ozone formation are very complex and include: climate, topography, emissions of precursor pollutants, and pollutant transport. Air quality monitoring has shown that ozone levels can be very different from year to year. The reasons for this are not fully understood and are the subject of ongoing research.

***A standard exceedance** occurs when a measured value meets exceedance criteria prescribed by state or federal agencies and does not necessarily constitute a violation.*

***A standard violation** may occur following a single or cumulative series of standard exceedances. Criteria constituting a violation are unique for each pollutant and may result in changes to an area's attainment status.*

Pollutant		Averaging Time	California Standard	National Standard
Ozone		1 Hour	0.09 ppm	0.12 ppm
		8 Hour		
Carbon Monoxide		8 Hour	9.0 ppm	9 ppm
		1 Hour	20 ppm	35 ppm
Nitrogen Dioxide		Annual Average		0.052 ppm
		1 hour	0.25 ppm	
Sulfur Dioxide		Annual Average		80 ug/m^3 (primary)
		24 Hour	0.04 ppm	0.14 ppm (primary)
		3 Hour		0.5 ppm (secondary)
		1 Hour	0.25 ppm	
Suspended Particulate Matter	**PM_{10}**	Annual Geometric Mean	30 ug/m^3	
		24 Hour	50 ug/m^3	150 ug/m^3
		Annual Arithmetic Mean		50 ug/m^3
	$PM_{2.5}$	Annual Arithmetic Mean		15 ug/m^3
		24 Hour		65 ug/m^3
Hydrogen Sulfide		1 Hour	0.03 ppm	
Visibility		1 Observation	In sufficient amount to reduce the prevailing visibility to less than ten miles when the relative humidity is less than 70 %.	

Ambient Air Pollutants Of Local Concern

Ozone

While ground level ozone is harmful to plants and animals and is considered a pollutant, upper level (stratospheric) ozone occurs naturally and protects the earth from harmful ultra-violet energy from the sun.

Although ozone occurs naturally at low concentrations near the earth's surface, much higher and unhealthful levels are created when airborne mixtures of hydrocarbons and oxides of nitrogen are driven by sunlight to react, forming ozone pollution. The emissions of these ozone precursor pollutants come from many human activities, but primarily from industry and the wide use of motor vehicles. As a pollutant, ozone is a strong oxidant gas, which attacks plant and animal tissues. It causes impaired breathing and reduced lung capacity, especially among children, athletes, and persons with respiratory disorders. It also causes significant crop and forest damage. Ozone is a pollutant of particular concern in California where geography, climate and high population densities contribute to frequent violations of health-based air quality standards.

Particulate Matter

Fine particulate matter, in addition to being a health hazard, can greatly reduce visibility. Recent research suggests that fine particulate may be much more detrimental to human health than previously thought.

The two classes of particulate matter are PM_{10} (coarse particulate matter less than 10 microns in aerodynamic diameter), and $PM_{2.5}$ (fine particulate matter 2.5 microns or less in aerodynamic diameter). Both consist of many different types of particles that vary in their chemical activity and toxicity. $PM_{2.5}$ tends to be a greater health risk since it cannot be removed from the lungs once it is deeply inhaled. Sources of particulate pollution include: mineral extraction and production; combustion products from industry and motor vehicles; demolition and construction; agricultural operations; fire; paved and unpaved roads; condensation of gaseous pollutants into liquid or solid particles; and natural sources such as wind-blown dust.

NO_2, SO_2, CO

NO_2 and SO_2 create aerosols, which may fall as acid rain causing damage to crops, forests, and lakes.

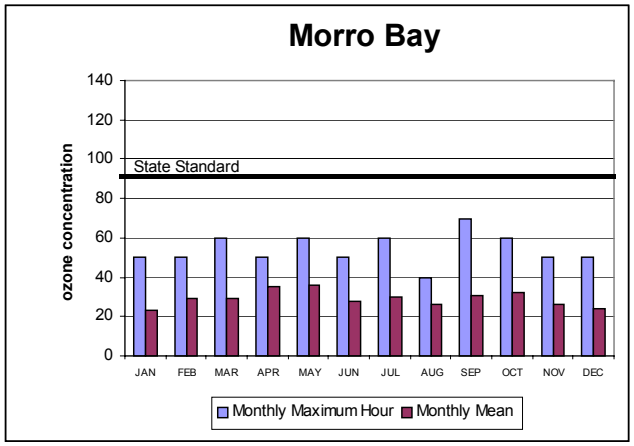
CO is a colorless, odorless gas that can lower the bloods ability to carry oxygen.

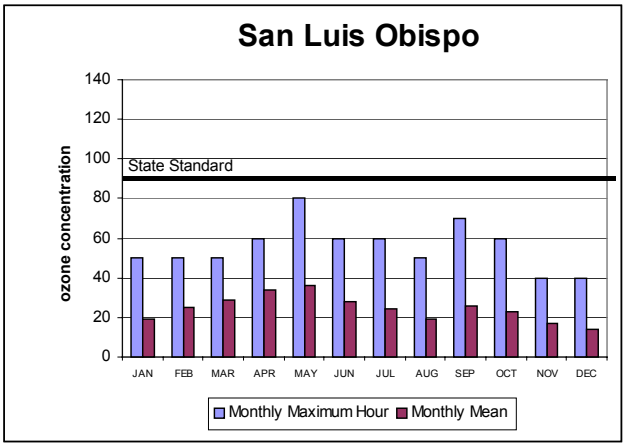
Nitrogen dioxide (NO_2) is the brownish-colored component of smog. NO_2 irritates the eyes, nose and throat, and can damage lung tissues. Sulfur dioxide (SO_2) is a colorless gas with health effects similar to NO_2. SO_2 and NO_2 are generated by fossil fuel combustion in mobile sources (such as vehicles, ships and aircraft), and at stationary sources (such as industry, homes and businesses). SO_2 may also be emitted by petroleum production and refining operations. The state and national standards for NO_2 have never been exceeded in this county. The state standard for SO_2 was exceeded periodically on the Nipomo Mesa up until 1993. Equipment and processes at the facilities responsible for the emissions were upgraded as a result, and the state SO_2 standard has not been exceeded since that time. Exceedances of the federal SO_2 standard have never been measured here.

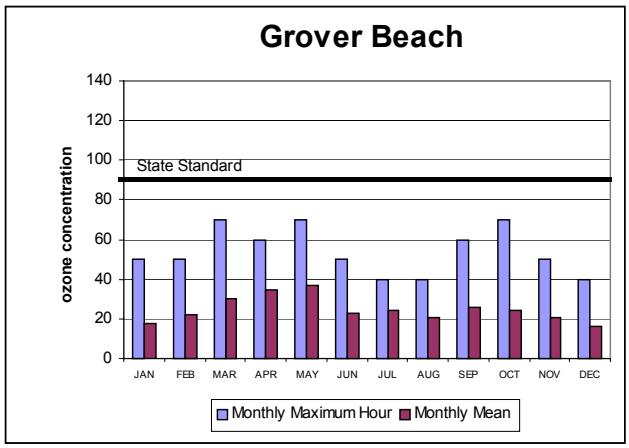
Carbon monoxide (CO) can cause headaches and fatigue and results from fuel combustion of all types. Motor vehicles are by far the chief contributor of CO in outdoor air. State CO standards have not been exceeded in San Luis Obispo since 1975. CO is measured at two locations in the county and the measured concentrations have been low in recent years.

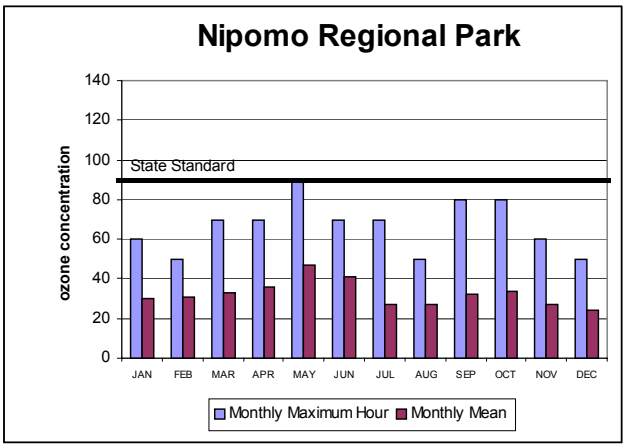
2001 Ozone

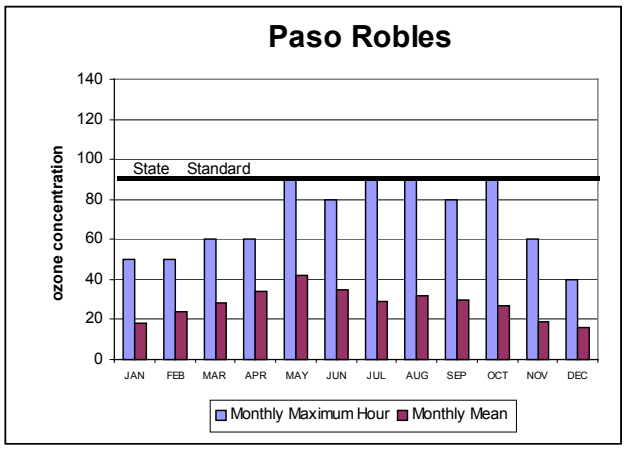
The following graphs depict 2001 monthly ozone concentrations at six locations. There are two data bars presented for each month. The monthly maximum hour bar shows the highest hourly average concentration during the month in parts per billion (ppb). The monthly mean bar is a monthly average concentration and depicts an overall average ozone intensity (in ppb) for the month.

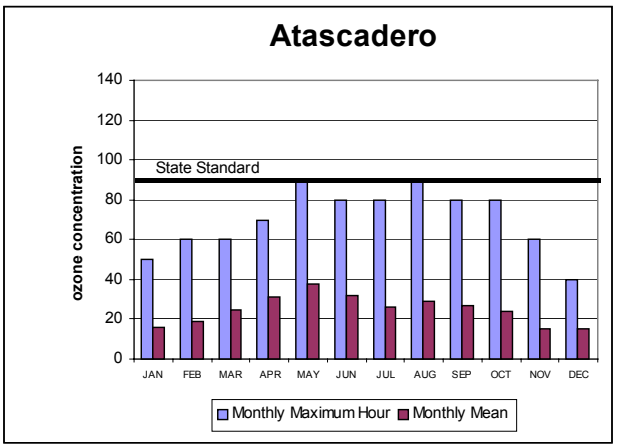








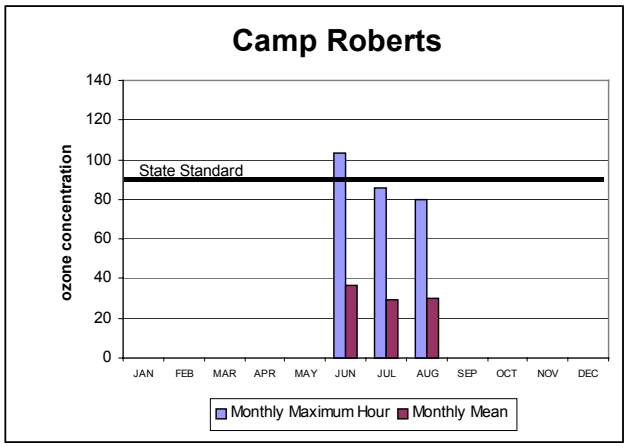


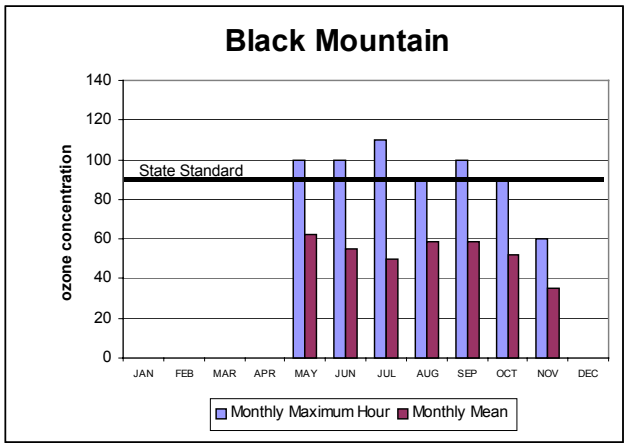


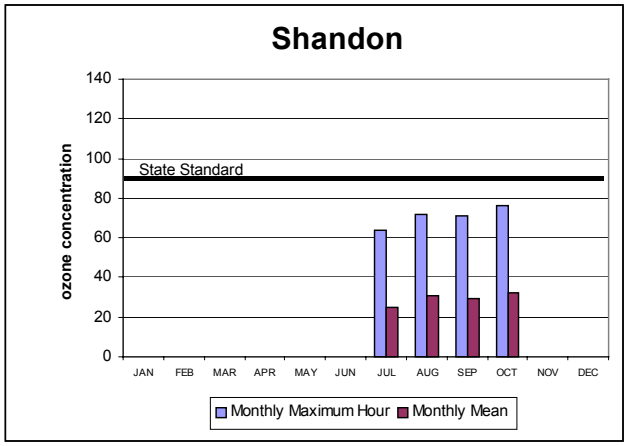
2001 Ozone at Special Study Sites

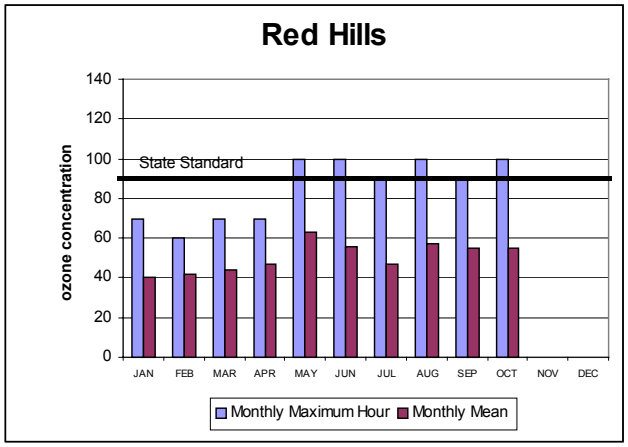
The following graphs depict 2001 monthly ozone concentrations at four research monitoring stations operated by the District. There are two data bars presented for each month. The monthly maximum hour bar shows the highest hourly average concentration during the month in parts-per-billion (ppb). The monthly mean bar is a monthly average concentration and depicts overall average ozone intensity for the month (in ppb).

These monitoring stations were sited to give us more information about possible transport of polluted air into our county from other areas, as well as providing us with a profile of ozone concentrations in the air column from ground level to about 4000 foot elevation. In general, ozone levels were higher at these sites than in populated areas where we regularly monitor for ozone. This information is invaluable to APCD staff and ARB researchers in understanding pollutant transport within California.



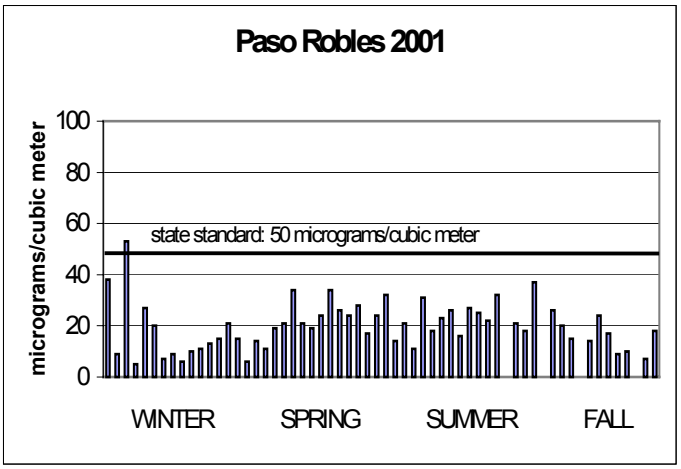


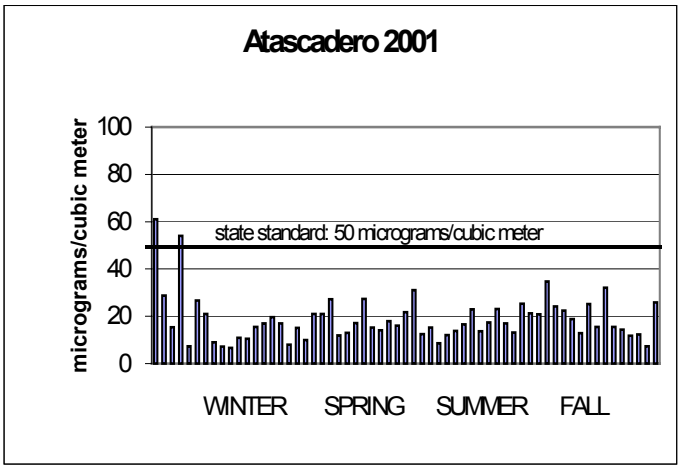


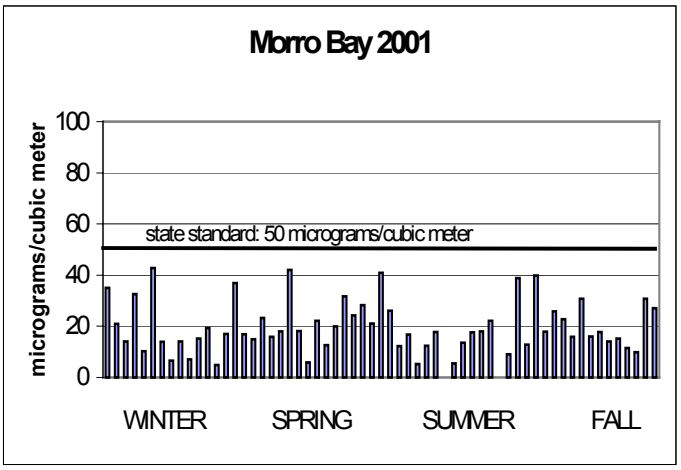


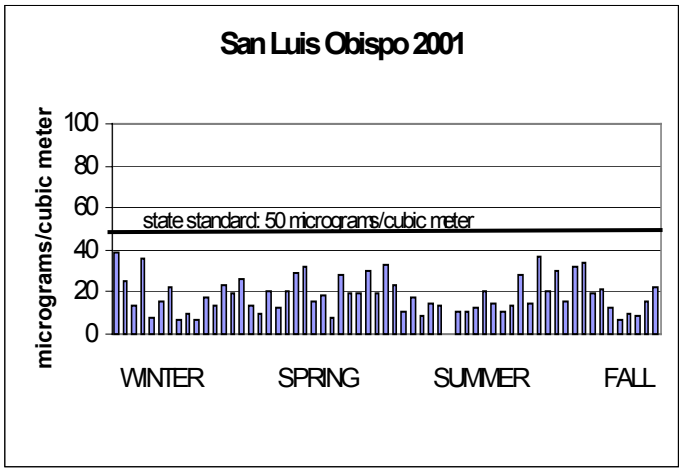
Particulate Matter, 10 microns or less (PM_{10})

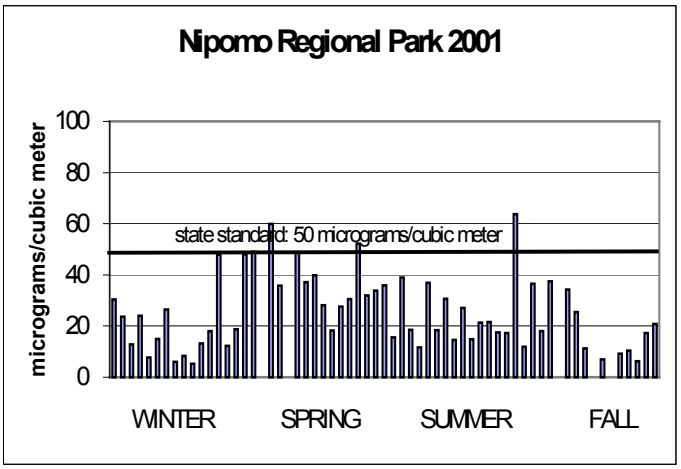
The graphs on this and the next page present PM_{10} data from seven locations and a graph of PM_{10} trends over the past nine years. In 2001, exceedances of the state standard of 50 micrograms per cubic meter were recorded at five air monitoring stations in the county. No exceedance of the national standard of 150 micrograms per cubic meter was measured.

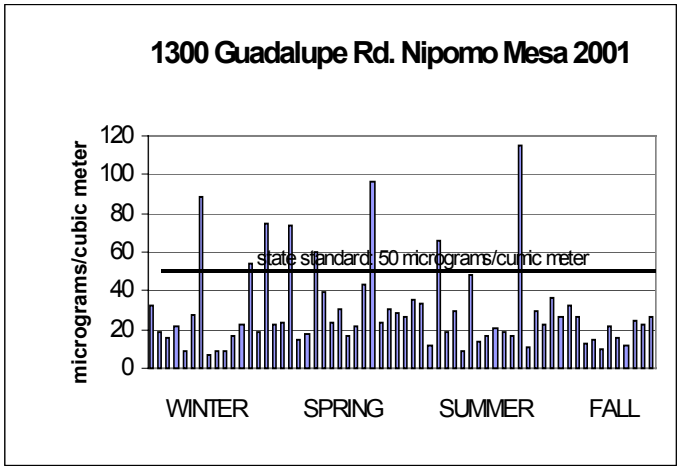




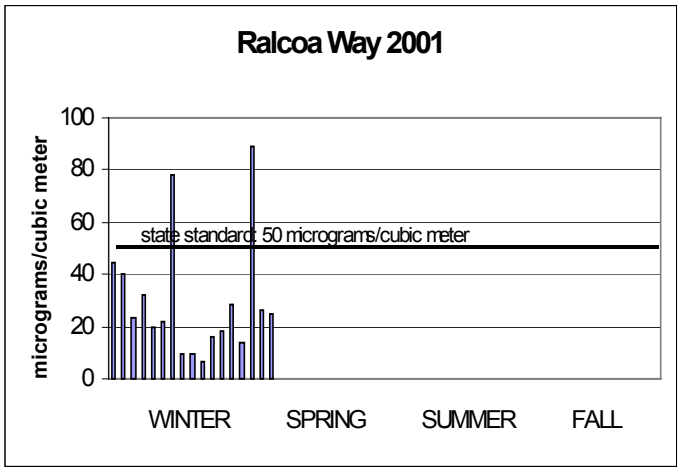








Particulate Matter, 10 microns or less (PM_{10}) continued.



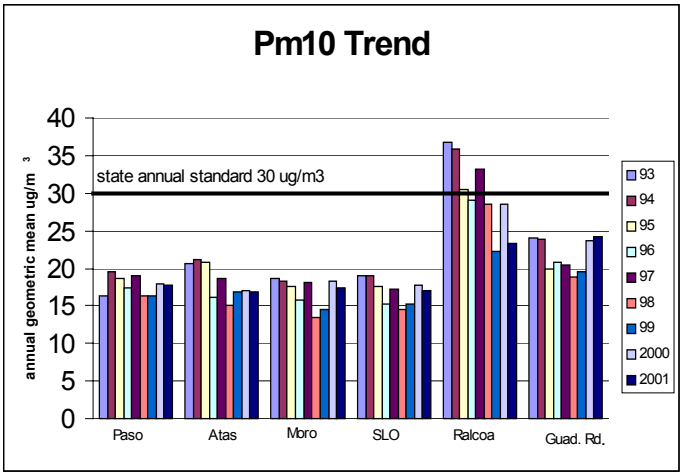


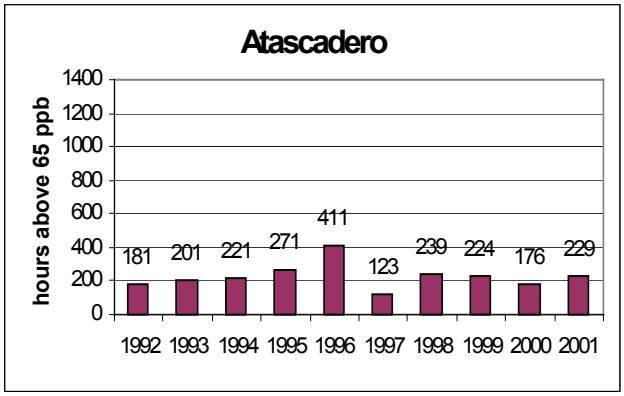
Table 4: First, Second and Third Highest Hourly Averages for 2001

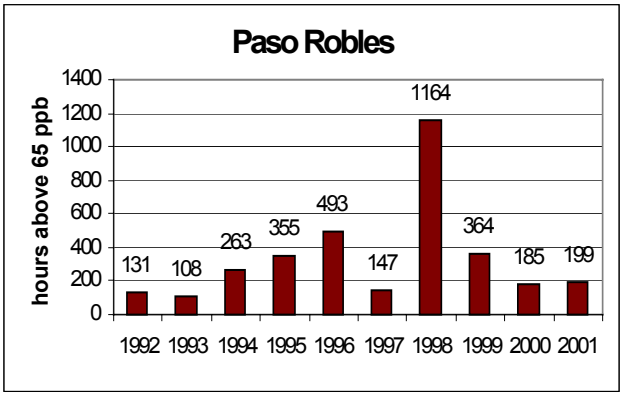
sampling date and hour appears with each data value in the format of month/day : hour.

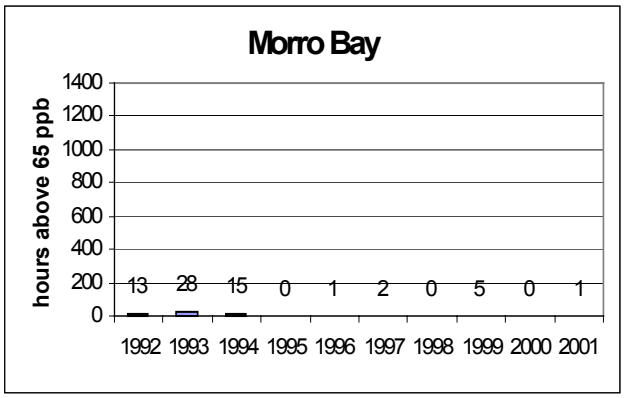
Station	O_3 (ppm)			SO_2 (ppm)			NO_2 (ppm)			CO (ppm)		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Paso Robles	**.092** 7/3:11	**.082** 8/16:11	**.082** 8/17:11									
Atascadero	**.094** 5/31:12	**.092** 5/31:11	**.091** 8/18:12				**.061** 10/25:18	**.057** 10/25:19	**.054** 10/19:18	**3.2** 01/04:17	**3.0** 01/02:17	**3.0** 01/03:08
Morro Bay	**.074** 9/30:13	**.072** 9/30:14	**.071** 9/30:16				**.041** 11/08:18	**.037** 11/08:17	**.037** 11/09:18			
San Luis Obispo	**.078** 05/07:17	**.073** 09/30:15	**.066** 05/04:15				**.054** 01/05:10	**.052** 01/04:10	**.051** 01/05:09	**8.3** 10/15:12	**3.2** 02/01:08	**2.8** 01/05:08
Grover Beach	**.067** 10/15:13	**.066** 03/31:17	**.066** 05/24:18	**.038** 07/26:05	**.017** 01/21:06	**.017** 09/04:20	**.046** 01/03:08	**.045** 01/05:18	**.043** 01/05:19			
Nipomo Regional Park	**.085** 05/07:17	**.085** 05/07:18	**.084** 09/30:14	**.059** 06/15:10	**.056** 05/08:18	**.055** 05/14:18	**.042** 01/05:19	**.039** 01/05:18	**.038** 01/05:20			
Nipomo, 1300 Guadalupe Road				**.129** 04/28:15	**.125** 03/27:11	**.115** 03/16:17						
Nipomo, Ralcoa Way				**.224** 07/01:08	**.126** 06/08:07	**.111** 07/01:18						

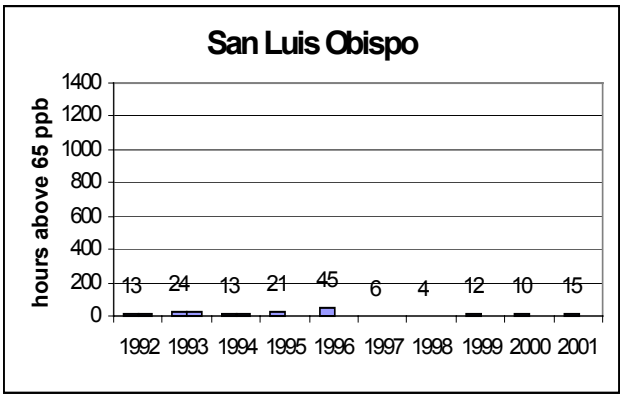
COUNTYWIDE OZONE TRENDS - 1992-2001

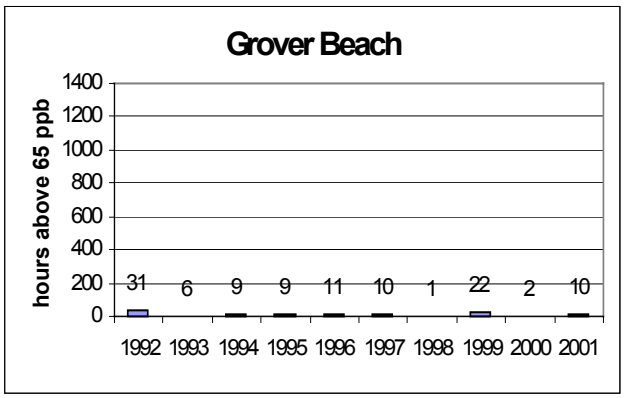
The following graphs depict ozone trends at six locations within the county for the past ten years (eight at Nipomo). Each data bar represents the total number of hours in a given year in which the ozone concentrations exceeded 65 parts per billion. This concentration level is a useful indicator for trend purposes even though there are no health standards for single-hour exposures to 65 parts per billion of ozone. No data was collected for Nipomo in 1997 and 1998 during which time the station was relocated. Monitoring resumed at Nipomo in November 1998.

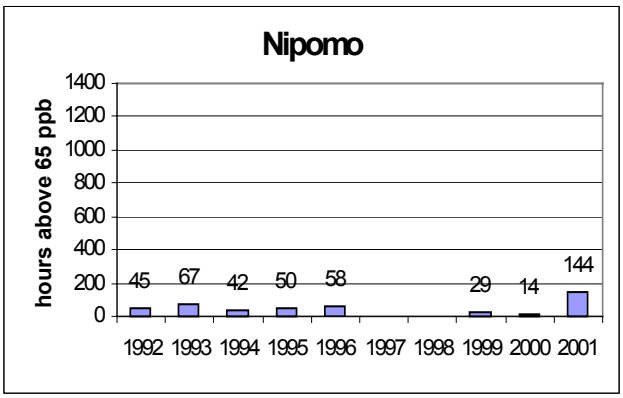






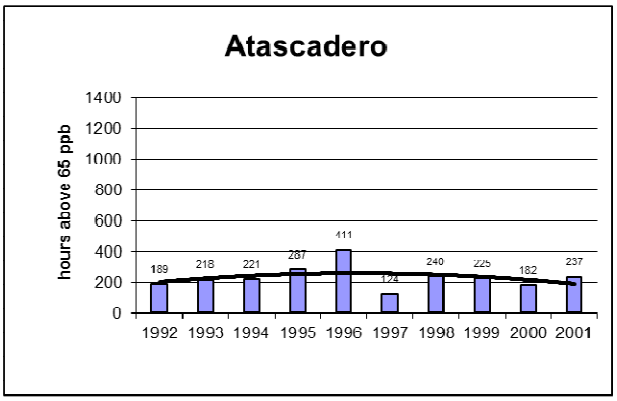


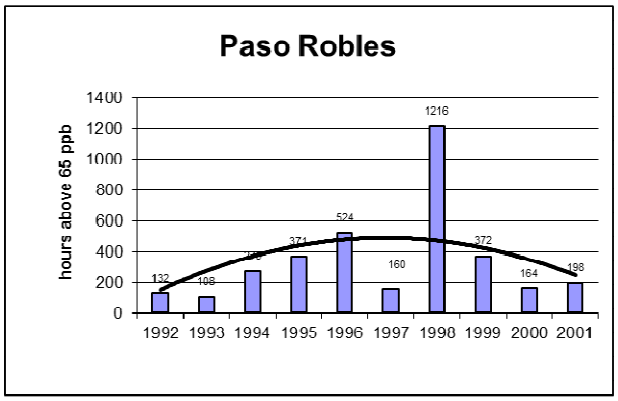


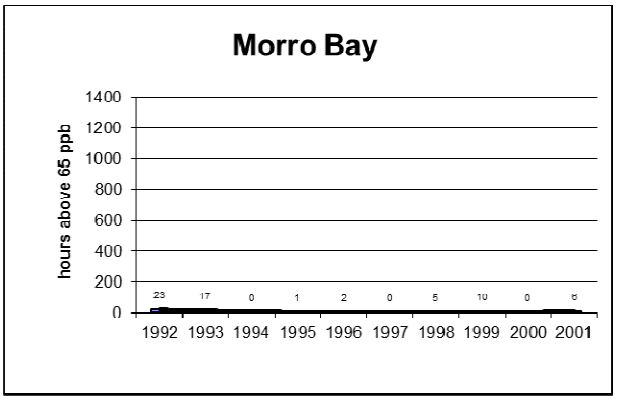


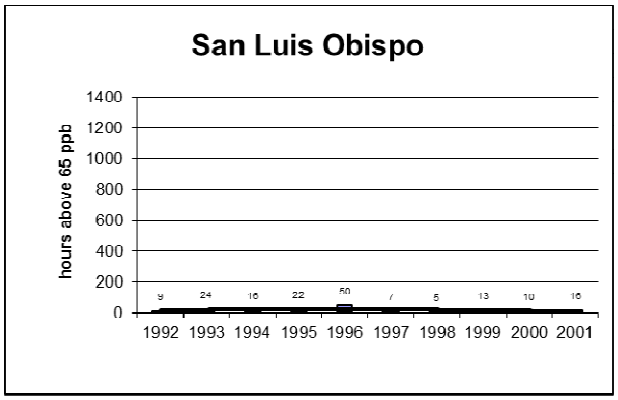
Errata

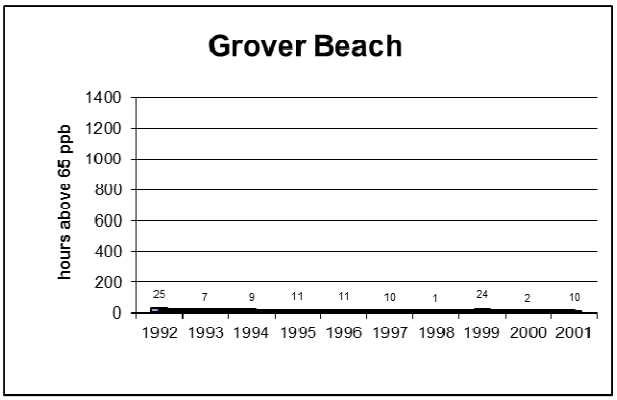
Subsequent to the original publication of this report, some minor errors were discovered in the ozone and PM_{10} trends charts on pages 9 and 10. Corrected charts appear below; see the 2008-2009 Annual Air Quality Report for detailed discussion of the errors in the original figures.

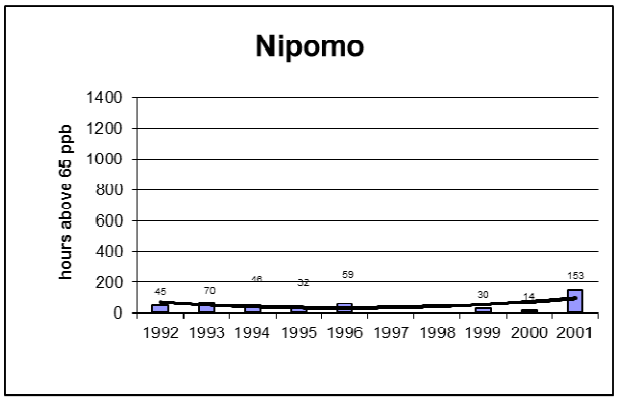


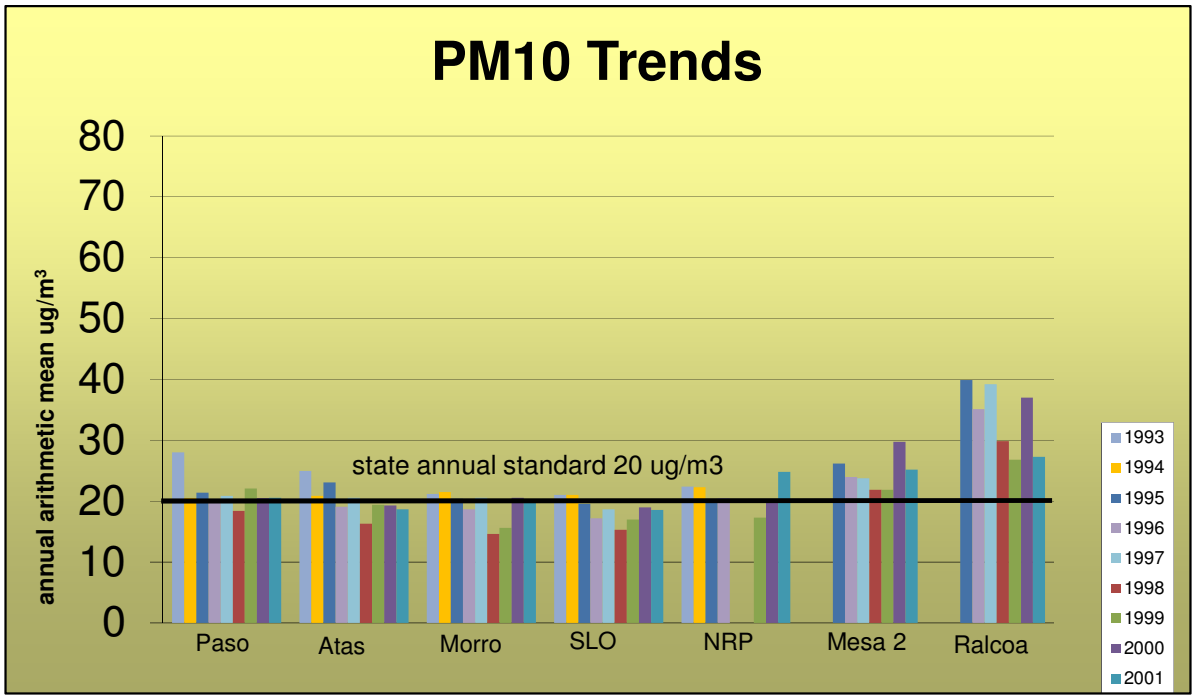











PM10 Trends
annual arithmetic mean ug/m3
80
70
60
50
40
30
20
10
0
state annual standard 20 ug/m3
Paso
Atas
Morro
SLO
NRP
Mesa 2
Ralcoa
1993
1994
1995
1996
1997
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