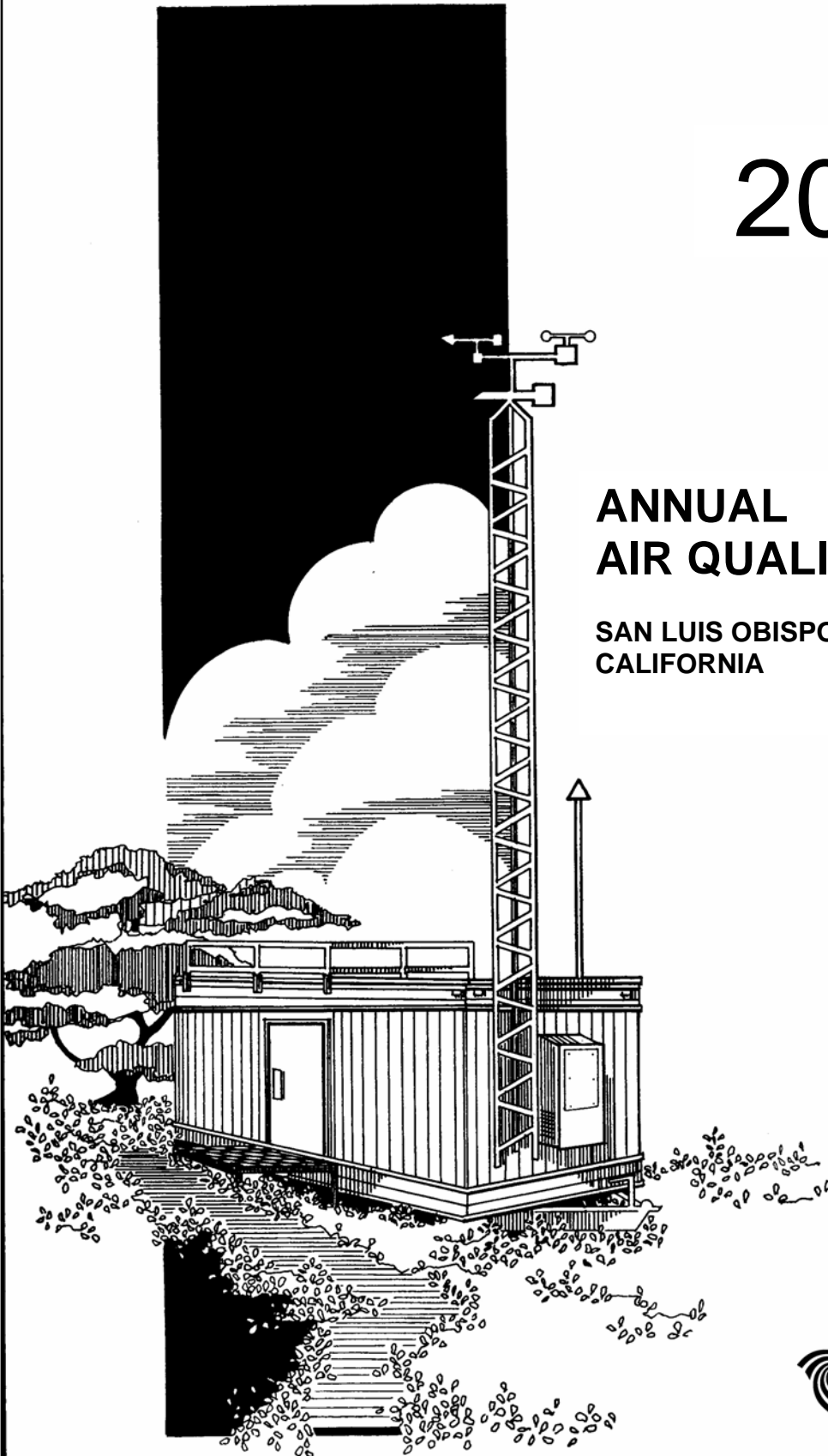


2004

ANNUAL AIR QUALITY REPORT

SAN LUIS OBISPO COUNTY
CALIFORNIA



AIR POLLUTION CONTROL DISTRICT COUNTY OF SAN LUIS OBISPO

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Fiscal/Administrative Services: Paul Allen

Administrative Support: Kim Johnson

2004 Annual Air Quality Report

Published September 2005

By Technical Services Division

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 weekly on the APCD's website and in this Annual Air Quality Report. Ozone summary data appear weekly in the Saturday edition of the San Luis Obispo County Tribune, a local newspaper. Each month's data from ambient monitoring is added to separate archives maintained by the federal Environmental Protection Agency (EPA) and by the Air Resources Board (ARB). Summary data from San Luis Obispo County can be found in EPA and ARB publications and on the world wide web at the following websites:

www.slocleanair.org
SLO APCD website
www.arb.ca.gov
ARB website
www.epa.gov
US EPA website

2004 Air Quality Summary

Most populated areas of San Luis Obispo County enjoyed very good air quality this year. None of the District's ambient air monitoring stations recorded an exceedance of either the state or federal standards for ozone in 2004. While not unprecedented, extended periods of low ozone concentrations, like this year's, occur infrequently and are largely the result of exceptional atmospheric conditions over the region. Countywide, exceedances of the state 24 hour PM₁₀ standard of 50 ug/m³ occurred on 9 out of 61 different sample days. Statistically, this is equivalent to 54 exceedance days for 2004 since sampling is only conducted once every six days. An exceedance of the state PM₁₀ standard was recorded twice at the District's Nipomo Regional Park station and nine times at the contractor-operated MESA2 station. There was no exceedance of the national air quality standard for PM₁₀ in 2004.

In San Luis Obispo County, ozone and PM₁₀ are the pollutants of main concern, since exceedances of state health-based standards for those are experienced here in most years. In January 2004 our county was designated by the state Air Resources Board as being in attainment of the state ozone standard but our county is still designated as a non-attainment area for the state PM₁₀ standard

Air Quality Monitoring

San Luis Obispo County air quality was measured in 2004 by a network of seven ambient air monitoring stations and two 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 and on the summit of Black Mountain. The State Air Resources Board (ARB) operated stations at San Luis Obispo and Paso Robles. One station on the Nipomo Mesa at 1300 Guadalupe Road, was operated by a private contractor for the ConocoPhillips refinery.

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 24 hours. PM₁₀ (respirable particulate matter 10 microns or less in size) and PM_{2.5} (fine particulate matter 2.5 microns or less in size) are sampled for 24 hours every sixth day on the same schedule nationwide. In addition, PM₁₀ is sampled continuously at the Atascadero monitoring station using a TEOM (*tapered element oscillating microbalance*) sampler.

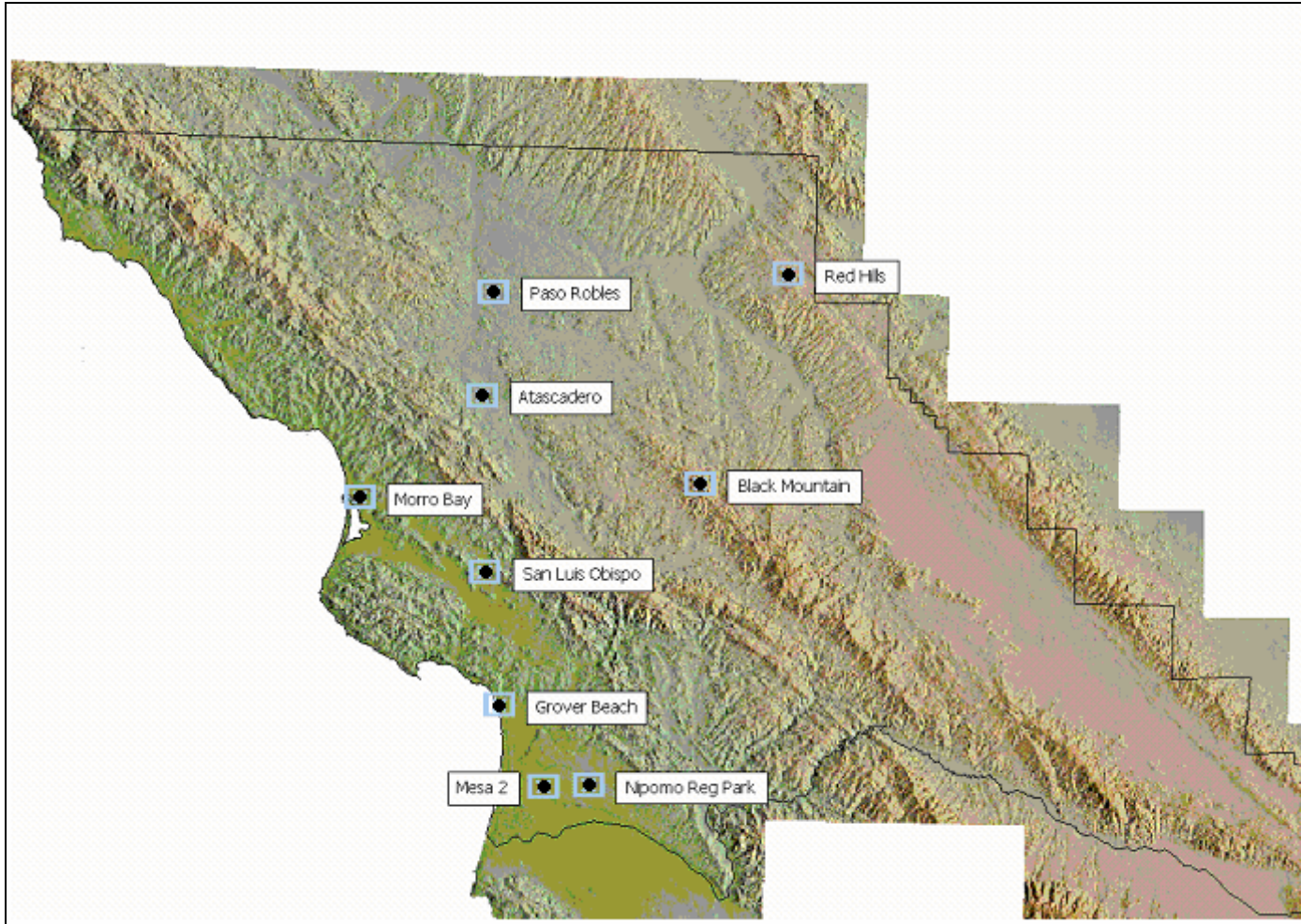


Figure 1: Ambient Air Pollution Monitoring Stations in San Luis Obispo County in 2004

Table 1: Ambient Air Quality Parameters Monitored in San Luis Obispo County in 2004

O ₃	NO	NO ₂	NO _x	SO ₂	CO	PM ₁₀	PM _{2.5}	TEOM	WS	WD	ATM
----------------	----	-----------------	-----------------	-----------------	----	------------------	-------------------	------	----	----	-----

APCD Permanent 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	X
Grover Beach	X	X	X	X	X					X	X	

APCD Research Stations

Black Mountain	X									X	X	X
Red Hills	X									X	X	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, Mesa2					X		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	PM _{2.5}	Particulates < 2.5 microns (samples every sixth day)	WD	Wind Direction
NO ₂	Nitrogen Dioxide	TEOM	Particulates <10 microns (monitored continuously)			ATM	Ambient Temp
NO _x	Oxides of Nitrogen						

Table 2: Ambient Air Quality Standards

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 (O₃)	1 Hour	0.09 ppm	0.12 ppm
	8 Hour		0.08 ppm
Carbon Monoxide (CO)	8 Hour	9.0 ppm	9 ppm
	1 Hour	20 ppm	35 ppm
Nitrogen Dioxide (NO₂)	Annual Arithmetic Mean		0.053 ppm
	1 hour	0.25 ppm	
Sulfur Dioxide (SO₂)	Annual Arithmetic Mean		30 ug/m ³ (primary)
	24 Hour	0.04 ppm	0.14 ppm (primary)
	3 Hour		0.5 ppm (secondary)
	1 Hour	0.25 ppm	
Respirable Particulate Matter (PM₁₀)	24 Hour	50 ug/m ³	150 ug/m ³
	Annual Arithmetic Mean	20 ug/m ³	50 ug/m ³
Fine Particulate Matter (PM_{2.5})	Annual Arithmetic Mean	12 ug/m ³	15 ug/m ³
	24 Hour	No Separate State Standard	65 ug/m ³
Hydrogen Sulfide (H₂S)	1 Hour	0.03 ppm	
Visibility	8 hour	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

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.

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.

NO₂ and SO₂ 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 blood's ability to carry oxygen.

Ozone

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 compromised respiratory systems. 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

Two classes of particulate matter with air quality standards are PM₁₀ (respirable 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: diesel exhaust, mineral extraction and production; combustion products from industry and motor vehicles; demolition and construction; agricultural operations; smoke from open burning; paved and unpaved roads; condensation of gaseous pollutants into liquid or solid particles; and natural sources such as wind-blown dust.

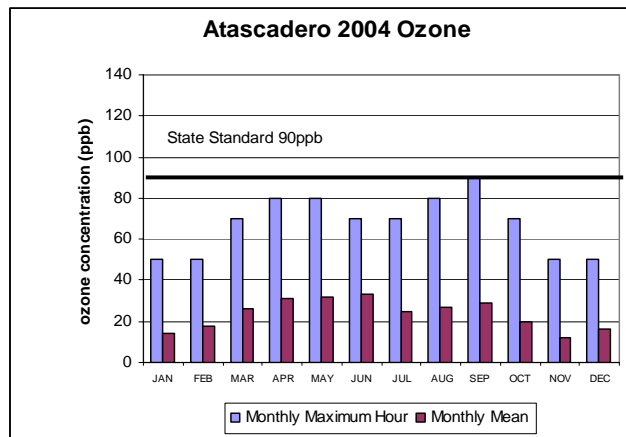
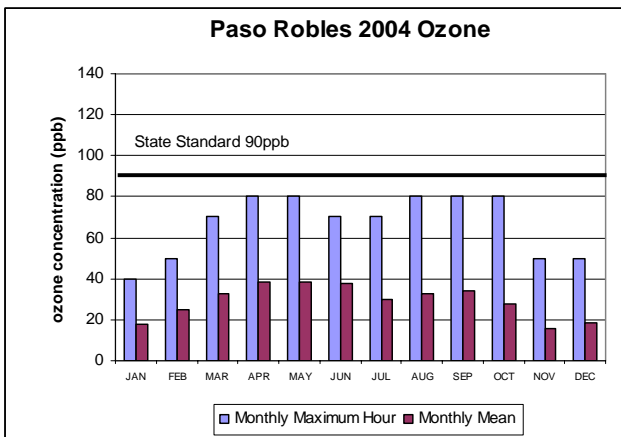
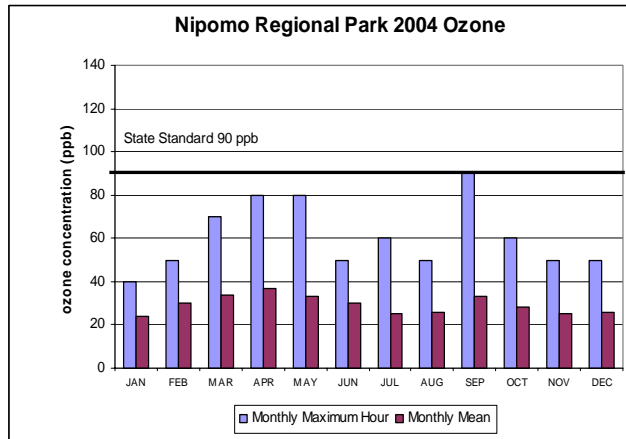
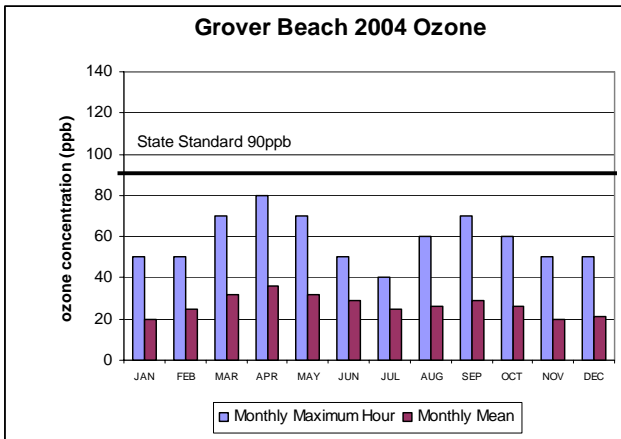
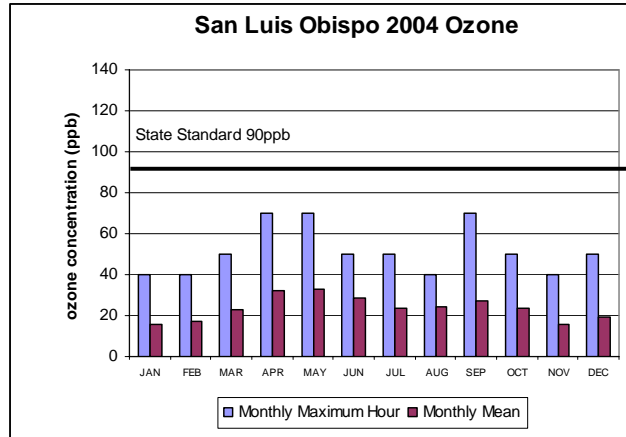
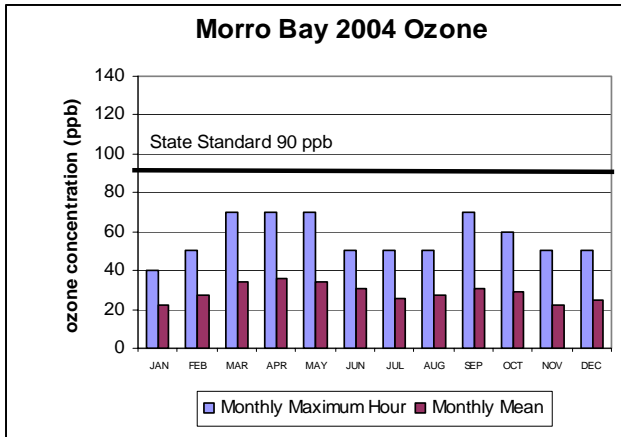
NO₂, SO₂, CO

Nitrogen dioxide (NO₂) is the brownish-colored component of smog. NO₂ irritates the eyes, nose and throat, and can damage lung tissues. Sulfur dioxide (SO₂) is a colorless gas with health effects similar to NO₂. SO₂ and NO₂ are generated by fossil fuel combustion by mobile sources (such as vehicles, ships and aircraft), and at stationary sources (such as industry, homes and businesses). SO₂ may also be emitted by petroleum production and refining operations. The state and national standards for NO₂ have never been exceeded in this county. The state standard for SO₂ 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 SO₂ standard has not been exceeded since that time. Exceedances of the federal SO₂ 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.

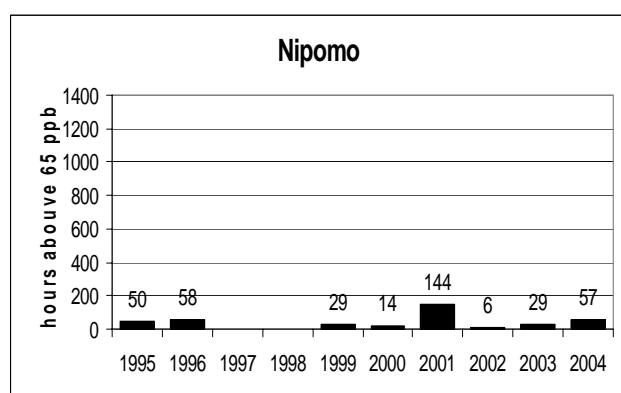
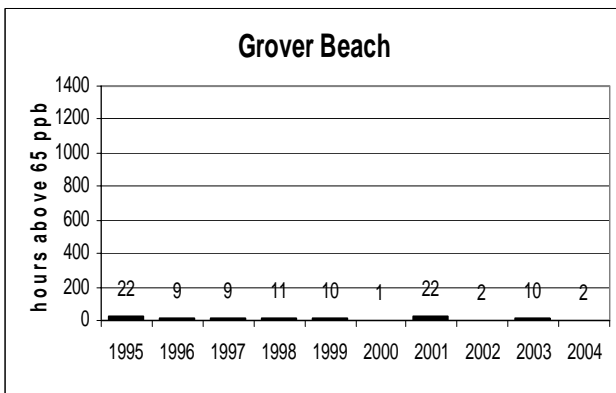
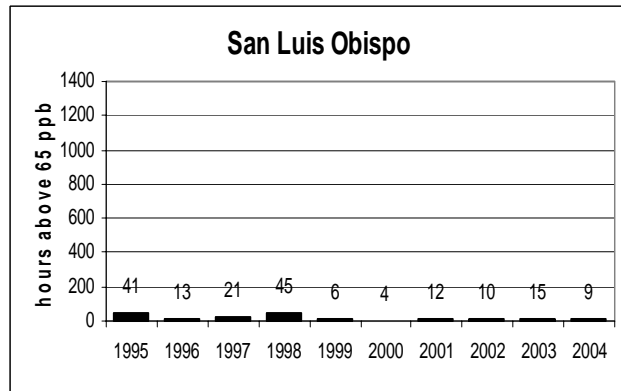
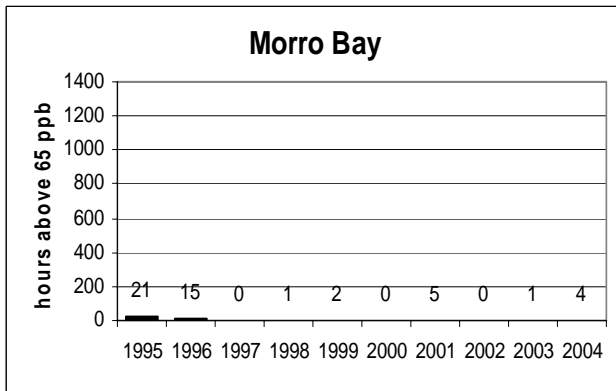
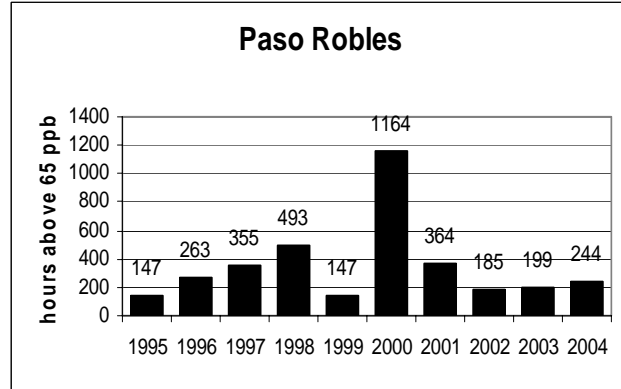
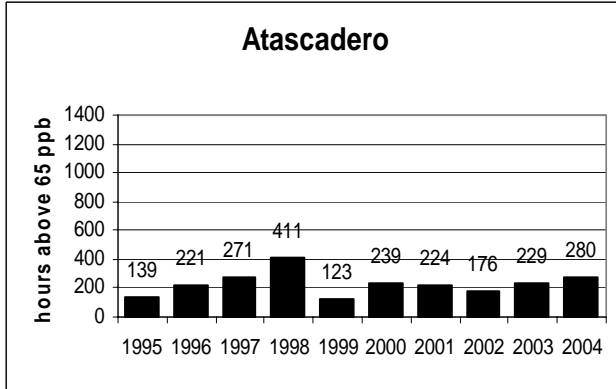
2004 Ozone

The following graphs depict 2004 monthly ozone concentrations at six permanent monitoring stations in the county. 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 average ozone intensity (in ppb) for the month. There were no exceedances of the federal or state standards for ozone in 2004 at any monitoring stations in the county.



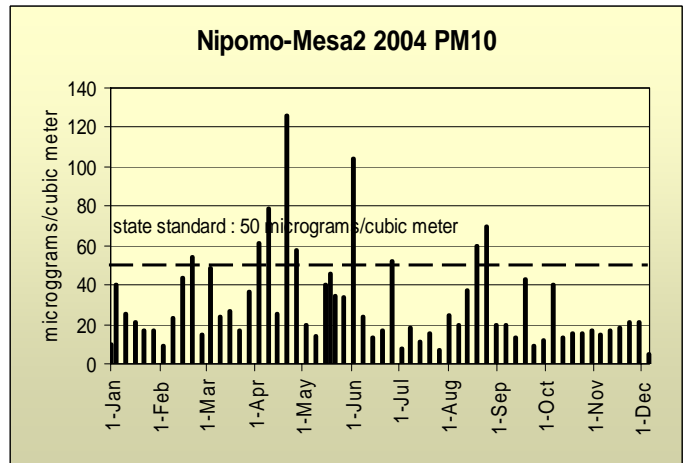
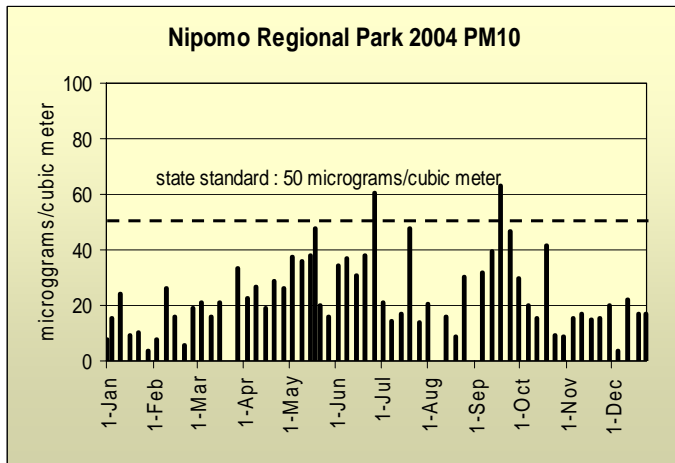
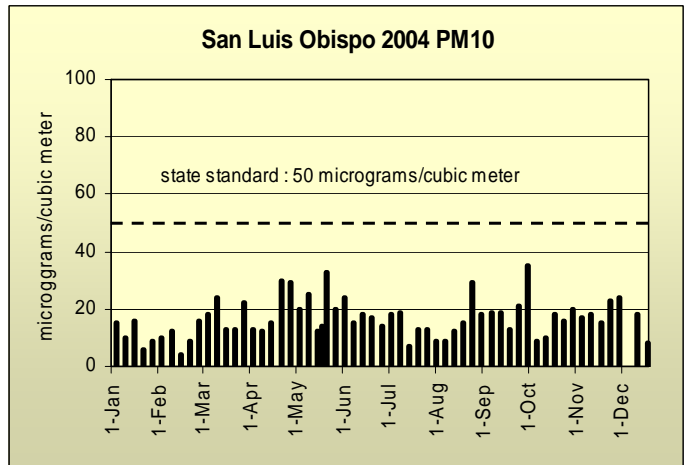
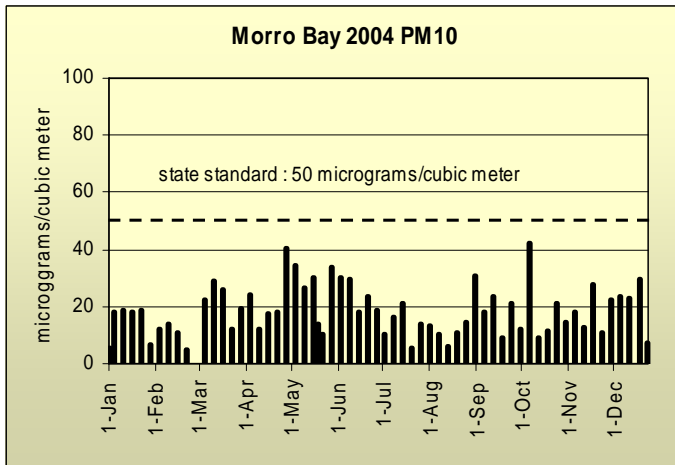
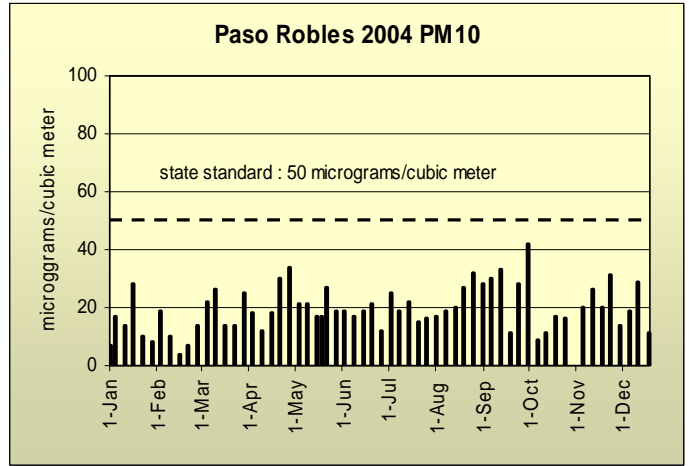
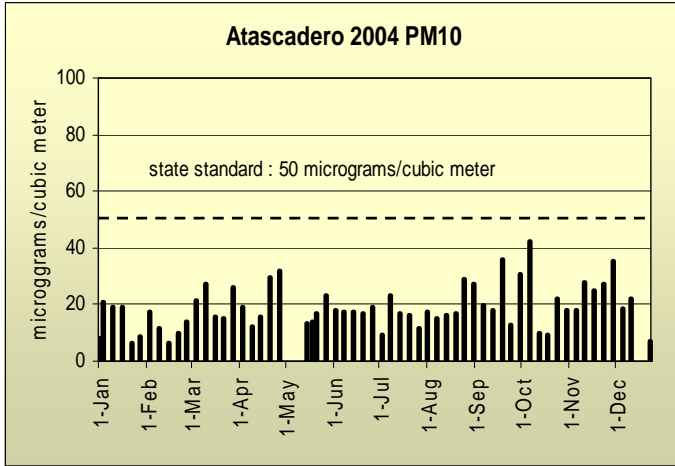
Countywide Ozone Trends - 1995-2004

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.



Particulate Matter, 10 microns or less (PM₁₀)

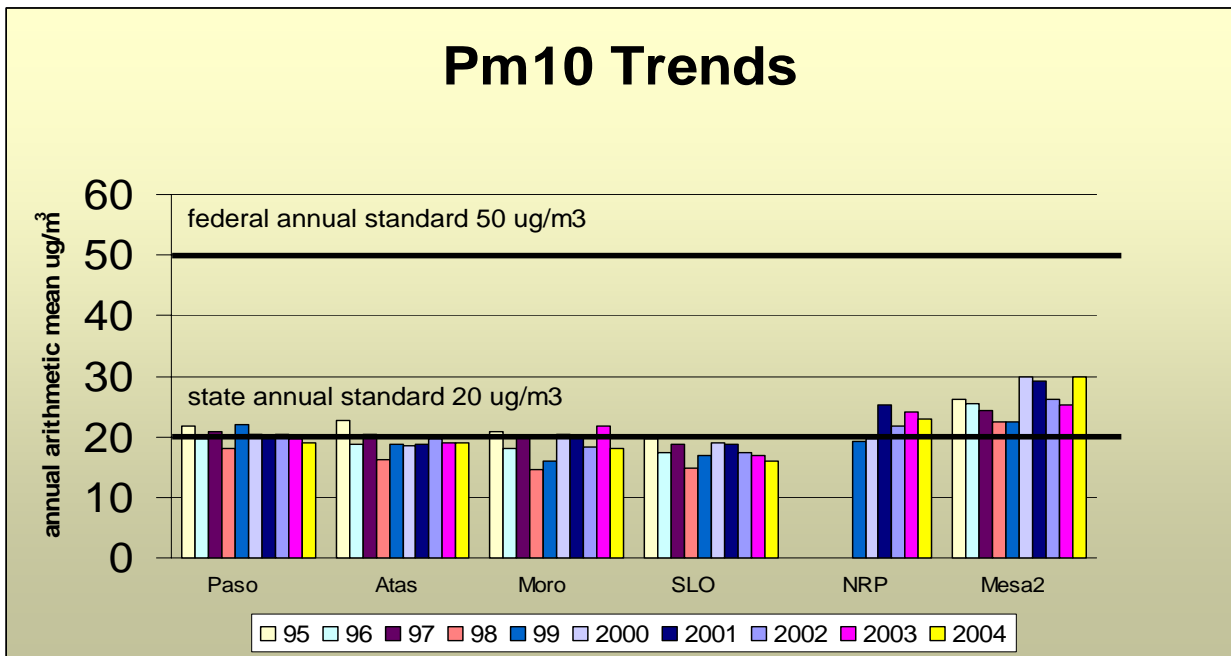
The graphs on this page present PM₁₀ particulate data from six locations. In 2004, there were exceedances of the state standard of 50 micrograms per cubic meter in our county on nine of the sixty-one days sampling occurred. All of the exceedances occurred at two monitoring stations on the Nipomo Mesa.



Particulate Matter, 10 microns or less (PM₁₀) continued.

The graph below depicts the annual arithmetic average PM₁₀ concentration at six locations in San Luis Obispo County over the past ten years (six years at NRP). While occasional exceedances of the state PM₁₀ standard occur at all sites, the monitors on the Nipomo Mesa at NRP and Guadalupe Road consistently exceed the state standard and have exhibited an apparent increase in PM₁₀ pollutant concentrations over time.

The reasons for this are under investigation and are the subject of the Nipomo Mesa particulate study discussed on page 11 of this report.



Particulate Matter, 2.5 microns or less (PM_{2.5})

Monitoring for fine particulate matter (PM_{2.5}) began in 1999 and is performed at two locations in San Luis Obispo County: the San Luis Obispo and Atascadero monitoring stations. The federal standard for PM_{2.5} of 65 micrograms per cubic meter was not exceeded during 2004. California has not set a 24 hour PM_{2.5} standard.

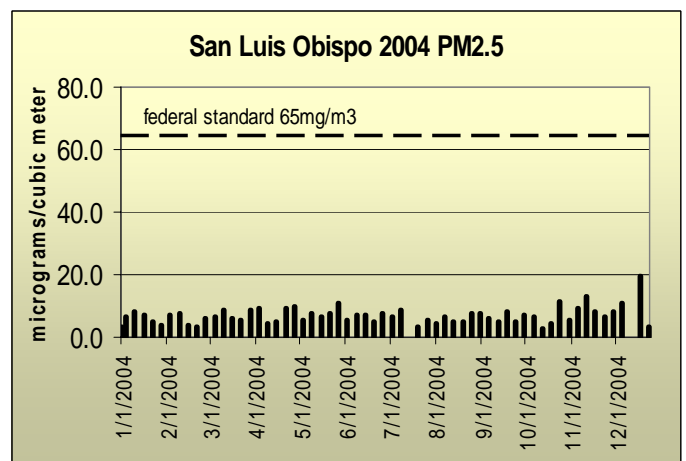
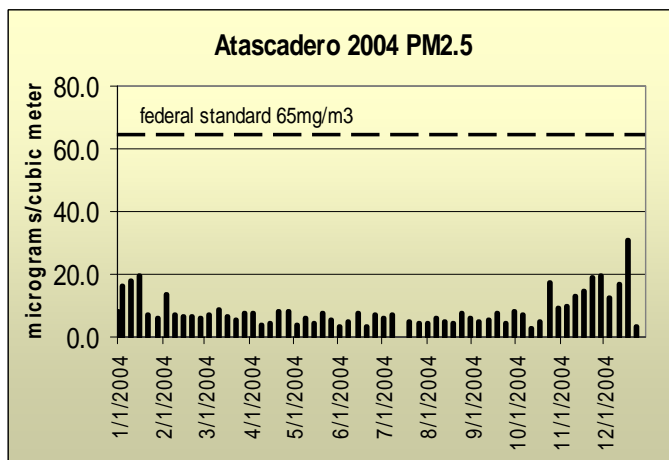


Table 3: First, Second and Third Highest Hourly Averages for 2004

The following table lists the highest concentrations recorded in 2004 for ozone, sulfur dioxide, nitrogen dioxide and carbon monoxide at the stations where they are monitored. 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	.080 9/1:12	.080 9/26:12	.079 9/25:12									
Atascadero	.085 9/25:12	.084 9/1:12	.082 9/26:12				.063 10/17:18	.058 10/28:17	.057 10/29:18	2.1 1/12:08	1.8 1/9:08	1.5 1/9:07
Morro Bay	.074 4/27:12	.071 5/2:10	.069 4/26:17				.044 9/22:06	.042 2/12:18	.040 10/13:06			
San Luis Obispo	.070 10/26:15	.065 10/27:14	.064 10/24:13				.042 10/12:21	.041 10/12:20	.041 10/12:22	2.6 2/13:10	2.3 1/14:08	2.3 2/11:08
Grover Beach	.075 4/27:13	.072 3/20:15	.072 5/2:14	.029 7/16:08	.027 2/14:10	.024 7/20:07	.075 4/27:13	.072 3/20:15	.072 5/2:14			
Nipomo Regional Park	.086 9/8:14	.078 5/2:08	.075 4/27:13	.118 5/3:05	.067 12/23:17	.046 5/3:14	.043 11/2:19	.039 2/12:20	.036 3/17:20			
Nipomo, Mesa2				.150 3/4:15	.118 3/8:14	.115 4/14:16						

Table 4: Summary of Particulate Matter Concentrations for 2004

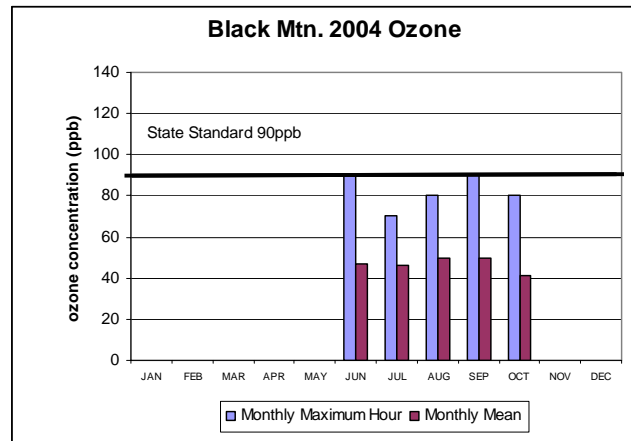
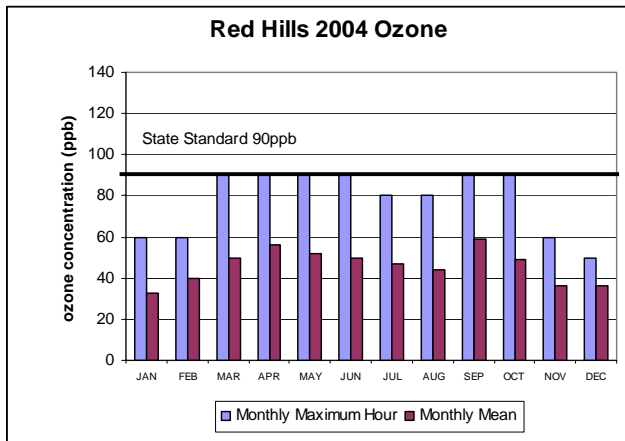
The following table lists the highest concentrations and the annual means recorded in 2004 for PM₁₀ and PM_{2.5} particulate matter at the stations where they are monitored. Values are in micrograms/cubic meter. Values exceeding state or federal standards are in bold.

2003	PM ₁₀		PM _{2.5}	
	Highest Concentration	Annual Arithmetic Mean	Highest Concentration	Annual Arithmetic Mean
Paso Robles	42 ug/M³ 10/12/04	19 ug/M ³		
Atascadero	42 ug/M³ 10/12/04	19 ug/M ³	30.8 ug/M³ 12/23/04	8.31 ug/M ³
Morro Bay	42 ug/M³ 10/12/04	18 ug/M ³		
San Luis Obispo	35 ug/M³ 10/12/04	16 ug/M ³	19.5 ug/M³ 12/23/04	6 ug/M ³ .8
Nipomo Regional Park	63 ug/M³ 9/12/04	23 ug/M³		
Nipomo, Mesa2	126 ug/M³ 5/9/04	30 ug/M³		

Ozone at Special Study Sites in 2004

The following graphs depict monthly ozone concentrations at two research monitoring stations operated by the District in 2004. 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). The Black Mountain station was operated only during the summer ozone season.

These research monitoring stations were sited to provide the district with 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 the study sites located in elevated terrain than in populated areas at lower elevations where we regularly monitor for ozone. Information gathered at these sites is used by APCD staff and ARB researchers in understanding regional pollutant transport within California. Special study site data is not reported to the official state or federal air quality databases and is not used in determination of our attainment status for ozone air quality standards.

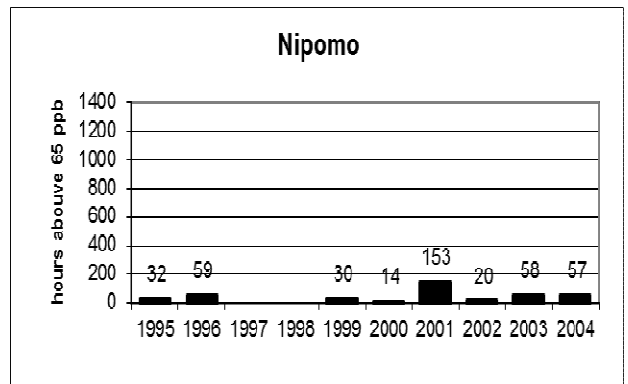
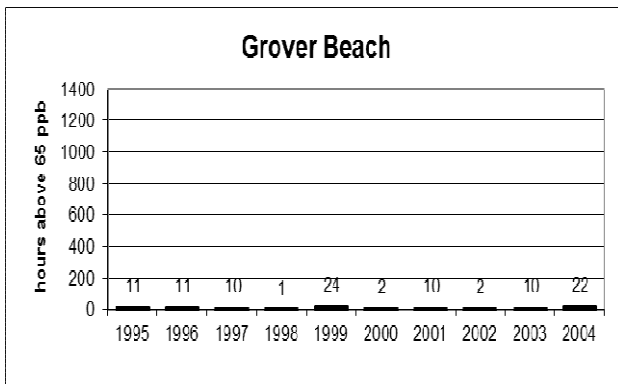
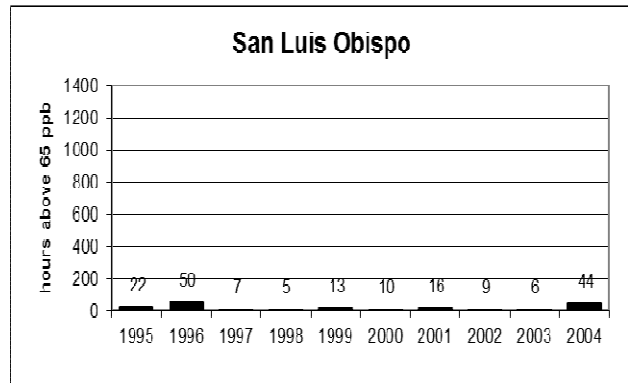
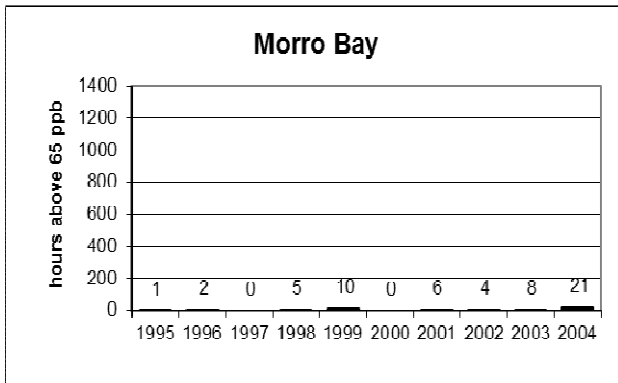
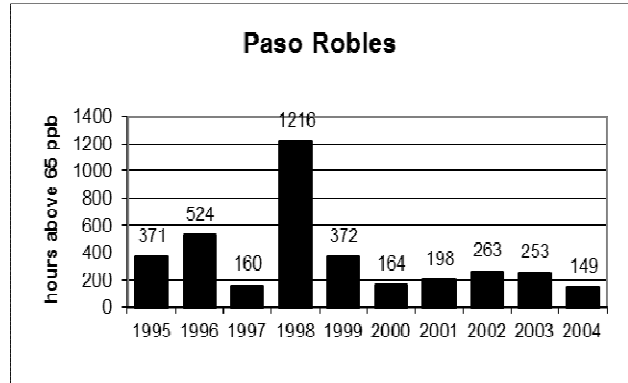
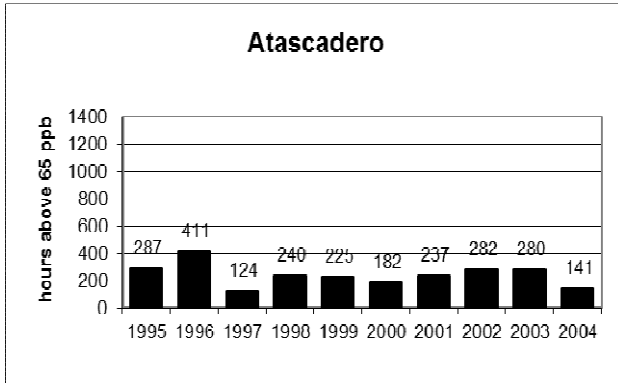


Nipomo Mesa Particulate Study

In April 2004, after several months of preparation, the District began a year-long program of intensive monitoring of particulate matter concentrations in the coastal region of the Nipomo Mesa. This study was initiated to try and determine the extent and severity of previously measured high concentrations of particulates in the area adjacent to state highway one on the Mesa. The study is scheduled to run for one year ending in April 2005 and will use several different sampling and analysis techniques to attempt to identify the source of the particulate pollution. The results of this study will not be available for District and public use until early 2006 due to the large amount of information being collected and the time-consuming process of data qualifying, reduction and interpretation.

Errata

Subsequent to the original publication of this report, some minor errors were discovered in the ozone and PM₁₀ trends charts on pages 7 and 9. Corrected charts appear below; see the [2008-2009 Annual Air Quality Report](#) for detailed discussion of the errors in the original figures.



PM10 Trends

