ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1996 Air Quality Data for Arizona

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1996

AIR QUALITY DATA

FOR ARIZONA

Annual Report

Honorable Fife Symington
Governor
State of Arizona

Arizona Department of Environmental Quality
Russell F. Rhoades, Director

The Arizona Department of Environmental Quality shall preserve, protect and enhance the environment and public health and shall be a leader in the development of public policy to maintain and improve the quality of Arizona's air, land and water resources.

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Nelson	Perry Curly
Nogales	Ricardo Maldonado & Ben Stapleton
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I. AIR QUALITY STANDARDS

EPA has set National Ambient Air Quality Standards (NAAQS) for seven pollutants, which are summarized in Table 1. For each pollutant EPA has adopted primary standards to protect public health. For each pollutant except carbon monoxide, EPA also adopted secondary standards to protect public welfare. The states are required to adopt standards which are at least as stringent as the NAAQS. In Arizona, ambient air quality standards are identical to the federal NAAQS. These seven pollutants are referred to as criteria pollutants because criteria documents are prepared which summarize effects on public health and welfare.

A brief summary of the health and welfare effects which have been considered prior to setting ambient air quality standards is given below. It should be noted that $PM_{2.5}$ and PM_{10} are defined as particles 2.5 and 10 microns or smaller in diameter, respectively.

Pollutant	
Carbon Monoxide	Impairs the ability of blood to carry oxygen in the body. Cardiovascular system is primarily affected, causing angina pain in persons suffering from cardiac disease and leg pain in persons suffering form cardiac arterial disease. Affects other mammals in a similar manner.
Lead	Damages the cardiovascular, renal, and nervous systems resulting in anemia, brain damage, and kidney disease. Preschool age children are particularly susceptible to brain damage effects. Similar effects observed in other mammals. Others adverse effects on animals, microorganisms, and plants.
Nitrogen Dioxide	Impairs the respiratory system, causing a high incidence of acute respiratory diseases. Preschool children are especially at risk. Damages certain plants and materials. Degrades visibility due to its brownish color and its conversion to nitrate particles. Nitrate particles are also a major component of acid deposition.

Ozone	Damages the respiratory system, reducing breathing capacity and causing chest pain, headache, nasal congestion and sore throat. Individuals with chronic respiratory diseases are especially susceptible to ozone. Injures certain plants, trees, and materials.
$PM_{2.5}$ /PM_{10}	Causes irritation and damage to the respiratory systems, resulting in difficult breathing, inducement of bronchitis, and aggravation of existing respiratory diseases. Also, certain polycyclic aromatic hydrocarbons in $PM_{2.5}$ /PM_{10} are carcinogenic. Individuals with respiratory and cardiovascular diseases, children, and elderly persons are at greatest risk. Secondary effects include soiling, damaging materials and impairment of visibility. Sulfates and nitrates in $PM_{2.5}$ /PM_{10} are responsible for acid deposition which damages materials, plants, and trees and acidifies surface waters, thereby harming aquatic life.
Sulfur Dioxide	Aggravates asthma, resulting in wheezing, shortness of breath, and coughing. Healthy persons exhibit the same responses at higher exposures. Asthmatics and atopic individuals are the most sensitive groups, followed by those suffering from bronchitis, persons with emphysema, bronchiectasis, cardiovascular disease, the elderly, and children. Damages certain plants and materials. Causes visibility impairment and acid deposition due to its conversion to sulfate particles.

The Clean Air Act requires EPA to periodically review the NAAQS (National Ambient Air Quality Standards), and adopt revisions when new information indicates that changes are required. As a result, EPA revised the ozone standards in July, 1997 from a 1-hour standard of 0.12 ppm to an 8-hour standard of 0.08 ppm. Recent information indicates that the chronic effects of ozone correlate better with 8-hour exposures than with 1-hour exposures. EPA also changed the procedure for determining compliance with the standards. The new procedure requires determining the fourth highest 8-hour concentration for each year for three consecutive years. These three values are then averaged to determine the average fourth highest value for the 3-

year period. This value must be 0.084 ppm or less to indicate compliance (values are rounded to the nearest 0.01 ppm).

In regard to particulates, EPA made one minor change to the PM_{10} standard by modifying the procedure for determining compliance with the 24-hour standard. The new procedure requires determining the 99th percentile value for each year for three consecutive years. These three values are then averaged to determine the average 99th percentile for the 3-year period. This value must be 154 ug/m^3 or less to indicate compliance (values are rounded to the nearest 10 ug/m^3). For $PM_{2.5}$ EPA set standards of 65 ug/m^3 for a 24-hour averaging time and 15 ug/m^3 for an annual period. Compliance is determined in a similar manner as for the PM_{10} standards. The only exception is the use of the 98th percentile to determine compliance with the 24-hour $PM_{2.5}$ standard.

It should be noted that data in this report is appropriately compared to the 1996 standards. In future reports ozone data will be reported as 8-hour averages for comparison with the new standards. Also, $PM_{2.5}$ data will be included to provide a comparison with the $PM_{2.5}$ standards.

Table 1
Summary of Ambient Air Quality Standards
State and Federal Standards

Pollutant	Averaging Time	Primary	Secondary
Carbon Monoxide	1-hr 8-hr	35 ppm 9 ppm	None
Nitrogen Dioxide	Annual	100 ug/m3	100 ug/m^3
Ozone*	1-hr 8-hr	0.12 ppm 0.08 ppm	0.12 ppm 0.08 ppm
$PM_{2.5}$**	24-hr Annual	65 ug/m^3 15 ug/m^3	65 ug/m^3 15 ug/m^3
PM_{10}	24-hr Annual	150 ug/m^3 50 ug/m^3	150 ug/m^3 50 ug/m^3
Sulfur Dioxide	3-hr 24-hr Annual	--- 365 ug/m^3 80 ug/m^3	1300 ug/m^3 --- ---
Lead	Calendar Qtr.	1.5 ug/m^3	1.5 ug/m^3

Summary of Emergency Episode Levels
State and Federal

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon Monoxide	1-hr 4-hr 8-hr	--- --- 15 ppm	--- --- 30 ppm	--- --- 40 ppm	125 ppm 75 ppm 50 ppm
Nitrogen Dioxide	1-hr 24-hr	0.60 ppm 0.15 ppm	1.20 ppm 0.30 ppm	1.60 ppm 0.40 ppm	2.00 ppm 0.50 ppm
Ozone	1-hr	0.20 ppm	0.40 ppm	0.50 ppm	0.60 ppm
PM_{10}	24-hr	350 ug/m^3	420 ug/m^3	500 ug/m^3	600 ug/m^3
Sulfur Dioxide	24-hr	0.30 ppm	0.60 ppm	0.80 ppm	1.00 ppm

* Throughout 1996 the ozone standard was 0.12 ppm for a 1-hr averaging time. In July, 1997, the standard was revised to 0.08 ppm for an 8-hr averaging time.

** In July, 1997 the EPA also adopted standards for $PM_{2.5}$.

II. AIR QUALITY MONITORING NETWORKS

A. MONITORING NETWORKS

In Arizona, ambient air monitoring for criteria pollutants is conducted by a number of governmental agencies and regulated industries. Criteria pollutants are those pollutants for which federal and State air quality standards have been adopted. They include carbon monoxide, lead, nitrogen dioxide, ozone, particulates of PM_{10} , and sulfur dioxide. Federal and state air quality standards are listed in Table 1. A list of the monitoring network operators and the areas monitored is given below.

Agency or Industry	Area Monitored
Arizona Portland Cement Co.	Rillito
Arizona Public Service Co.	Joseph City
ASARCO, Inc.	Hayden
BHP Copper, Inc..	San Manuel
Cyprus Miami Mining Corp.	Miami
Maricopa County Environmental Services Dept.	Phoenix Urban Area
National Park Service	National Monuments and Parks
Pima County Dept. of Environmental Quality	Tucson Urban Area
Pinal County Air Quality Control District	Pinal County
Praxair, Inc.	Kingman
Salt River Project	Page and St. Johns
Southern California Edison Co.	Bullhead City, AZ and Laughlin, NV
Tucson Electric Power Co.	Tucson and Springerville

Maps indicating the locations of the Phoenix, Tucson and

statewide monitoring stations are provided in Figures 1, 2, and 3. The Maricopa, Pima, and Pinal Counties networks are operated primarily to monitor urban-related air pollution. In contrast, the industrial networks are operated to monitor emissions from certain industrial facilities. State monitors are employed for a variety of purposes, including urban, industrial, rural and background surveillance.

B. DATA REPORTING/QUALITY ASSURANCE

Ambient air quality data collected in 1996 by the various networks above are summarized in Section II. of this report. In addition, Maricopa and Pima Counties and some of the companies publish annual reports which include summaries of their data.

Raw data files are maintained by each of the network operators. In addition, the U.S. Environmental Protection Agency (EPA) stores raw data submitted quarterly by Maricopa and Pima Counties and the State. EPA analyzes these data for the purposes of evaluating progress in attaining and maintaining the NAAQS and reporting trends in air quality to the President and Congress.

Maricopa and Pima Counties report pollutant concentrations in the Phoenix and Tucson urban areas each day to the public via television, radio, newspapers and telephone. The data are reported in pollutant standard index (PSI) units, that is, units of concentrations relative to the standards. These reports include the descriptor words "good", "moderate", "unhealthy", "very unhealthy", or "hazardous", depending on pollutant levels.

The industrial operators submit either monthly or quarterly data reports to the state, depending on the type of facility. In addition, they are required to report any exceedance of an air quality standard by the next working day. The report includes an explanation of the causes of the exceedance and corrective actions to be taken, if possible, to prevent future occurrences.

To ensure that valid data are obtained, each network operator conducts a quality assurance program in accordance with state and federal requirements.

C. SPECIAL MONITORING STUDIES

In addition to monitoring criteria pollutants at fixed sites, the State conducts special monitoring studies. These studies address several issues including:

- Visibility in urban areas.
- Visibility in Class I (pristine) areas.
- HAPS (Hazardous Air Pollutants).
- Border area air quality.
- Volatile organic compounds (ozone nonattainment plans)

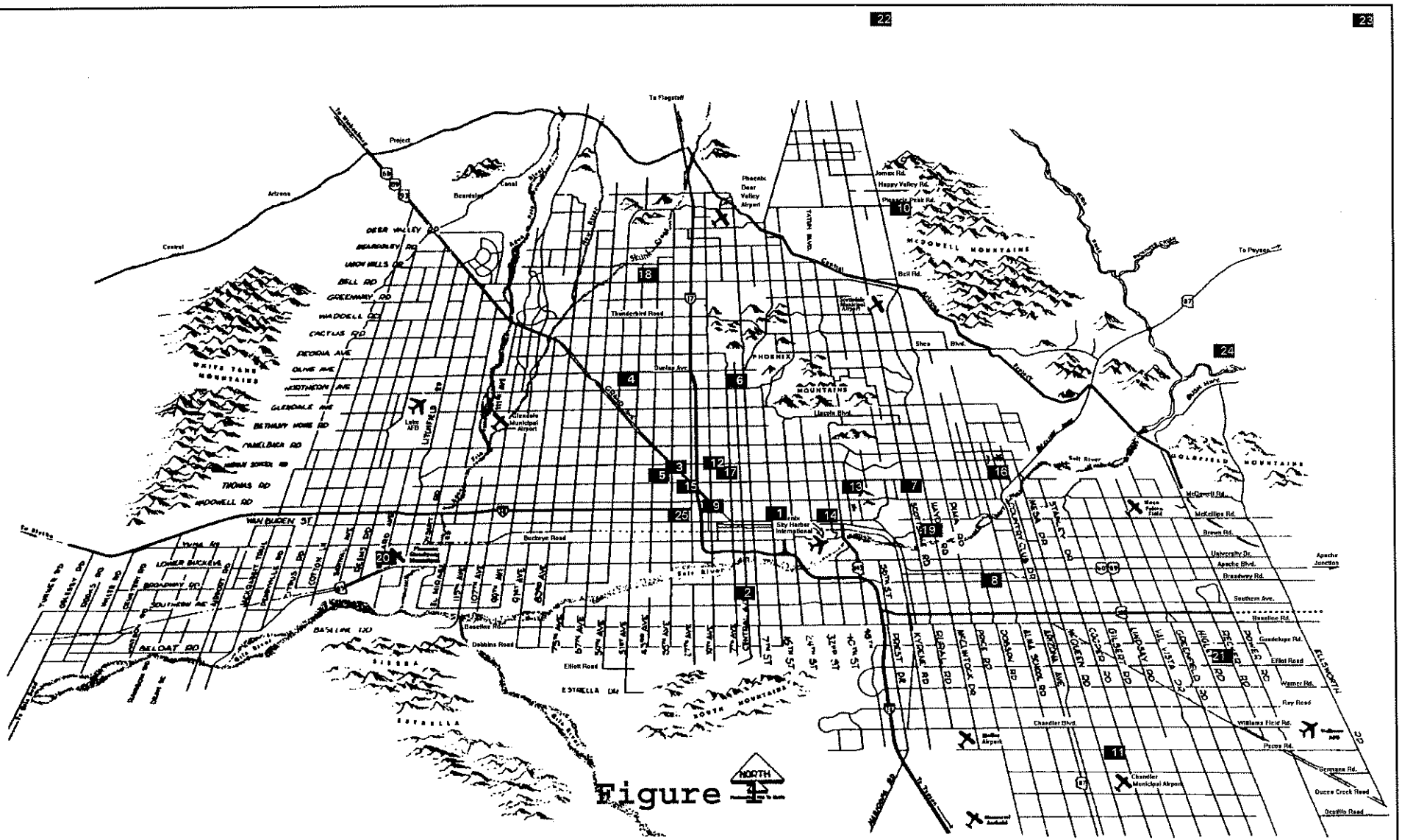
Visibility is monitored in the urban areas of Phoenix and Tucson to assess spatial and temporal variations and to evaluate sources of visibility reduction. This study is a follow-up to the research performed by DRI (Desert Research Institute) in Phoenix in 1989-1990 and by ENSR Consulting and Engineering in Tucson in 1992-1993, the so-called brown cloud studies. In these studies DRI and ENSR performed special monitoring to determine which pollutants have the greatest impact on visibility. They also determined the major sources of these pollutants. However, since this research was performed in the fall and winter seasons, it is necessary to conduct year round monitoring to assess seasonal changes in visibility.

Visibility is also monitored in federally designated Class I areas, which are pristine places where visibility protection is required by the Clean Air Act. There are 12 Class I areas in Arizona, which are either managed by the National Park Service or the U.S. Forest Service. Through the IMPROVE (Interagency Monitoring of PROtected Visual Environments) program visibility information has been collected at a few of the Class I areas over the course of the last 12 or so years. In order to more fully understand visual air quality in all Class I areas in Arizona, the State has taken the lead in a cooperative program with the Park Service and the Forest Service in expanding the number of monitoring locations. The program is presently being implemented, and four sites were operational by July, 1997. These are at Saguaro National Park, at Mt. Ord for the Mazatzal Wilderness, at Humboldt Peak for the Pine Mtn. Wilderness, and at Muleshoe Ranch for Galiuro Wilderness. Later in 1997 monitoring equipment will be in place at McFadden Peak for Sierra Ancha Wilderness, at Rucker Canyon for Chiricahua Wilderness, and at Green's

Peak for Mt. Baldy Wilderness; the goal is to augment existing IMPROVE monitoring at three locations such that visibility data are collected in or near all 12 Class I areas in Arizona.

HAPS monitoring was initiated in 1993 by the State in conjunction with a study of the impacts of HAPS in Arizona. In addition to monitoring, the study involved an inventory of sources and emissions and an assessment of health risks due to HAPS. A report on the study was submitted to the legislature in 1995, and is currently being peer reviewed.

On the Arizona-Mexico border special monitoring studies are conducted to evaluate the air quality impacts of urban and industrial activities. Preliminary studies conducted in 1990 found that a majority of PM_{10} pollution measured on the U.S. side of the border originated in Mexico and was transported by winds which on nearly a daily basis causes air pollution exchange between the two countries. Starting in 1994, a second study in the Nogales area was done. In this study monitoring for PM_{10} and HAPS was performed in both Nogales, Mexico and Nogales, Arizona. An inventory of PM_{10} and HAPS emissions on both sides of the border was completed in July, 1997, and the results will be used to apportion source impacts, and for human health risk assessment and evaluation of potential controls. In late 1997, a similar PM_{10} /HAPS monitoring and inventory investigation will be initiated in Douglas and Aqua Prieta.


22
23
24
To Flagstaff
Project
Arizona
Central
Beardsley
Canal
Skunk Creek
Deer Valley
Phoenix Deer Valley Airport
Jomax Rd.
Happy Valley Rd.
Pinnacle Peak Rd.
McDOWELL MOUNTAINS
Bell Rd.
To Payson
DEER VALLEY RD
BEARDSLEY RD
UNION HILLS DR
BELL RD
GREENWAY RD
WADDELL DR
CACTUS RD
PEORIA AVE
OLIVE AVE
NORTHERN AVE
GLENDALE AVE
BETHANY HOME RD
MALDEN RD
THOMAS RD
MIDDLEFIELD RD
WHITE TANK MOUNTAINS
Luke AFB
LITCHFIELD RD
Glendale Municipal Airport
Thunderbird Road
Dunlap Ave.
Glendale
PHOENIX
MOUNTAINS
Union Hills Dr.
Shea Blvd.
Salt River
McDOWELL MOUNTAINS
VAN BUREN ST
Buckeye Road
Sky Harbor International
Salt River
LOWER BUCKEYE
BROADWAY RD
SOUTHERN AVE
BELDAT RD
BASELINE RD
Baseline Rd.
Dobbins Road
Elliot Road
ESTRELLA DR
SIERRA
ESTRELLA
SOUTH MOUNTAINS
NORTH
McKellips Rd.
Brown Rd.
University Dr.
Apache Blvd.
Broadway Rd.
Southern Avs.
Baseline Rd.
Guadalupe Rd.
Elliot Road
Warner Rd.
Ray Road
Williams Field Rd.
Pecos Rd.
Germans Rd.
Queen Creek Road
Ocotillo Road
Chandler Blvd.
Chandler Municipal Airport
Williams AFB
Falcon Field
Deer Valley Airport
Phoenix Mountains Preserve Airport
Sky Harbor Airport
Phoenix Mountains Preserve Airport
Apache Junction
ELLSWORTH RD
GILBERT RD
LINDSAY RD
VAL VISTA DR
GREENFIELD RD
HIGLEY RD
RECKER RD
POWER RD
ALMA SCHOOL RD
ARIZONA AVE
McQUEEN RD
COOPER RD
DOBSON RD
POCE RD
McKUTTRICK DR
SIGNAL BUTTE RD
KYRENE RD
FOREST DR
ALMA SCHOOL RD
COUNTRY CLUB DR
STAPLEY DR
SCOTTSDALE RD
MILL AVE
DUPONT
McDOWELL MOUNTAINS
SALT RIVER
Figure 1
MARICOPA COUNTY MONITORING NETWORK

Map Key for Figure 1

Maricopa County Monitoring Network

Map Number	Site
1	1845 East Roosevelt - Phoenix
2	4732 South Central - Phoenix
3	3315 West Indian School - Phoenix
4	6000 West Olive - Glendale
5	3847 West Earll - Phoenix
6	601 East Butler - Phoenix
7	2857 North Miller - Scottsdale
8	Broadway & Brooks - Mesa
9	1826 West McDowell - Phoenix
10	25000 North Windy Walk - Scottsdale
11	1475 East Pecos - Chandler
12*	4530 N. 17th Avenue - Phoenix
13*	2035 North 52nd Street - Phoenix
14*	600 North 40th Street - Phoenix
15*	27th Avenue/Grand/Thomas - Phoenix
16*	10005 East Osborn - Scottsdale
17*	3905 North 7th Avenue - Phoenix
18*	4701 West Thunderbird - Phoenix
19*	3340 South Rural - Tempe
20*	15099 West Casey Abbott - Goodyear
21*	15500 South Higley - Gilbert
22	National Forest Service - Humboldt Mtn.
23	National Forest Service - Mount Ord
24	Sheriff's Station - Blue Point
25	I-10/27th Avenue - Phoenix

* State operated

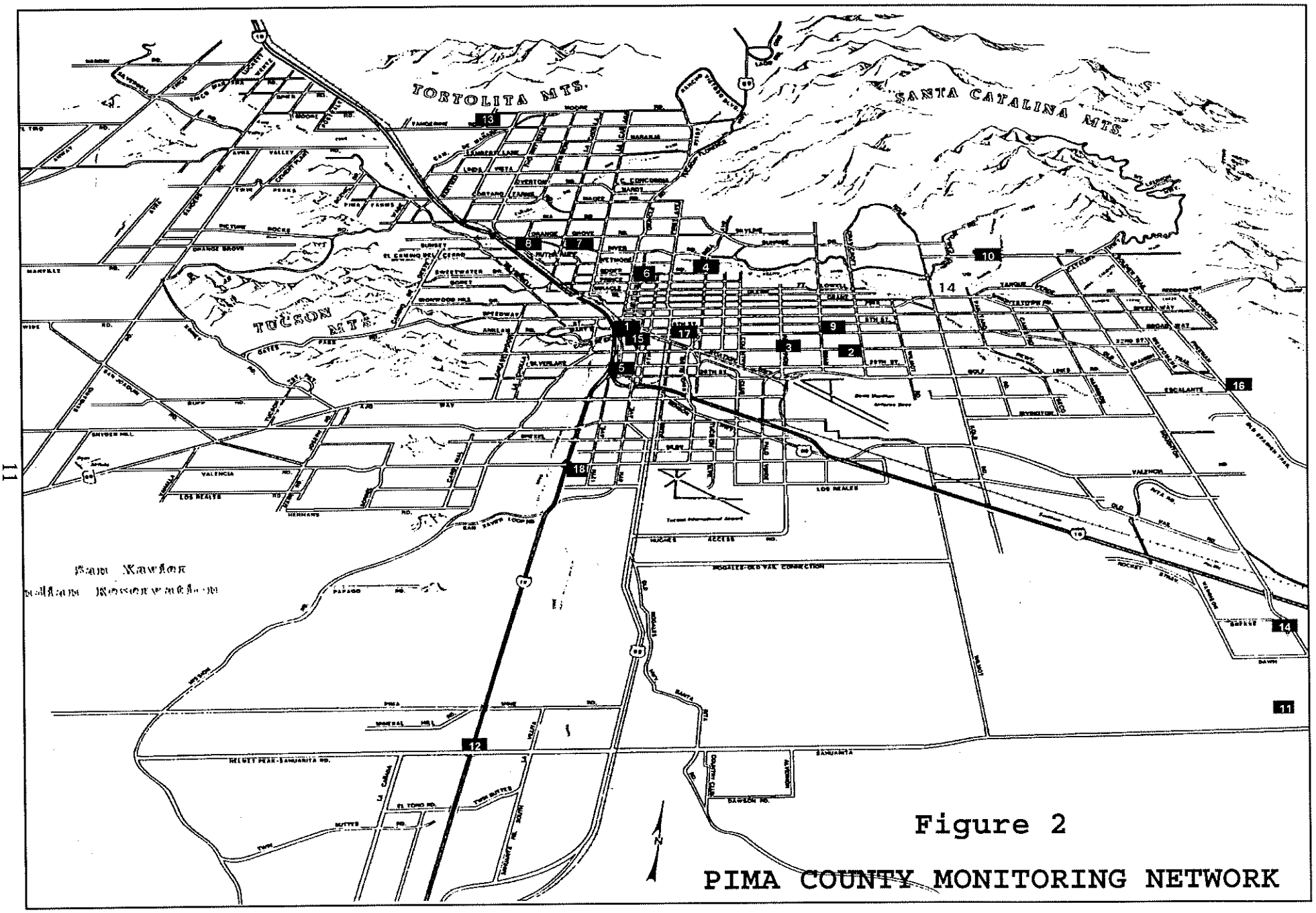


Figure 2

PIMA COUNTY MONITORING NETWORK

Map Key for Figure 2

Pima County Monitoring Network

Map Number	Site
1	190 West Pennington
2	22nd & Craycroft
3	22nd & Alvernon
4	2745 North Cherry
5	1810 South 6th Avenue - South Tucson
6	1016 West Prince
7	4591 North Pomona
8	3401 West Orange Grove
9	2645 East Broadway
10	4829 North Sabino Canyon
11	22000 South Houghton - Corona de Tucson
12	350 West Helmet Peak - Sahuarita Jr. High School
13	12101 North Camino de Oeste - Tangerine
14	11330 South Houghton Rd.- Pima County Fair Grounds
15	260 South Church - Community Center
16	3905 S. Old Spanish Trail - Saguaro Nat. Park
17	1435 N. Fremont Ave.
18	6910 S. Santa Clara

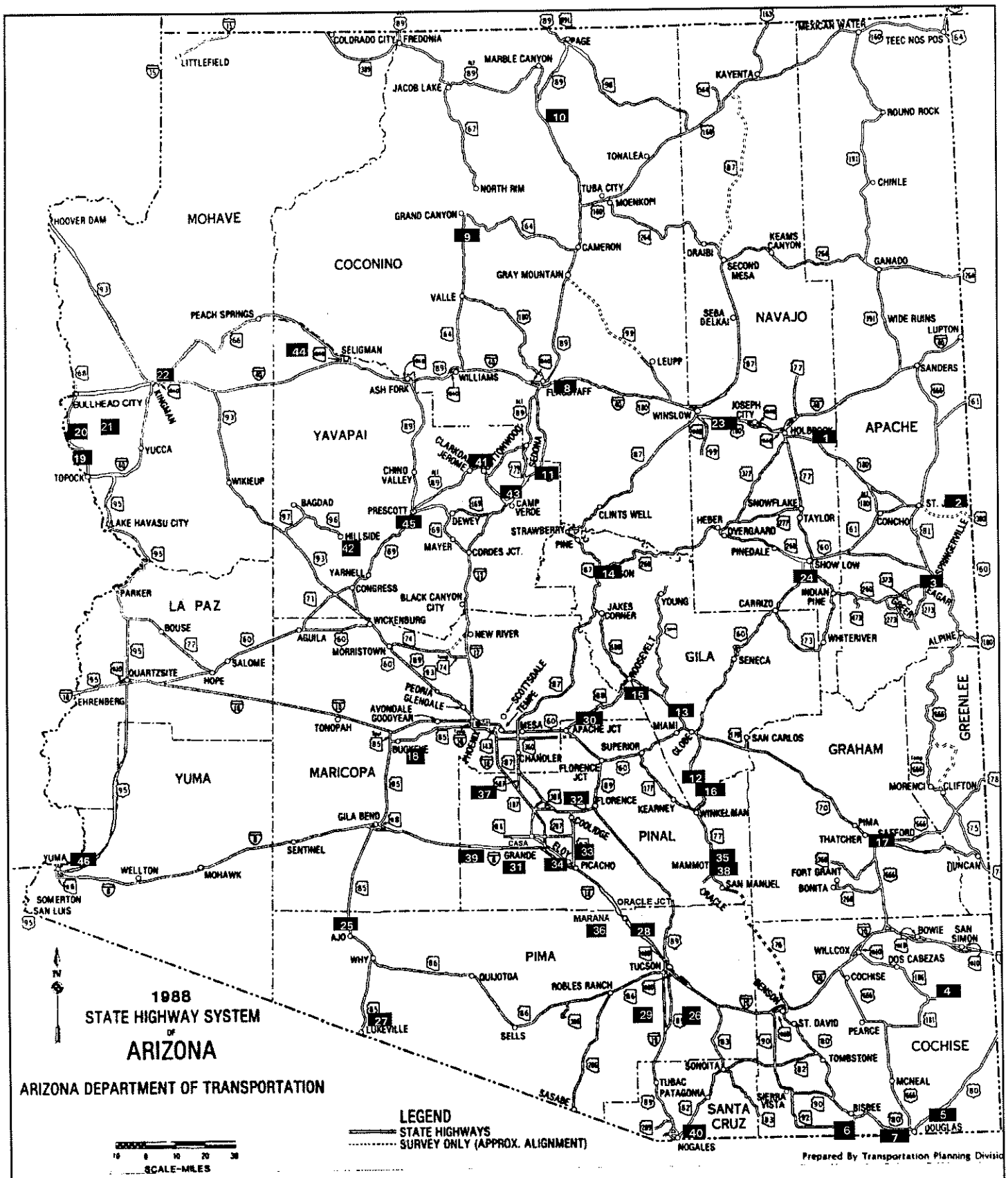


Figure 3
STATE, COUNTY & INDUSTRIAL
MONITORING NETWORK

Map Key for Figure 3

State, County and Industrial Monitoring Networks

Map Number	County	Town
1	Apache	Petrified Forest
2		St. Johns
3		Springerville
4	Cochise	Chiricahua
5		Douglas
6		Naco
7		Paul Spur
8	Coconino	Flagstaff
9		Grand Canyon
10		Page
11		Sedona
12	Gila	Hayden
13		Miami
14		Payson
15		Tonto
16		Winkelman
17	Graham	Safford
18	Maricopa	Palo Verde
19	Mohave	Alonas Way
20		Bullhead City
21		Fort Mohave
22		Kingman
23	Navajo	Joseph City
24		Show Low
25	Pima	Ajo
26		Green Valley
27		Organ Pipe
28		Rillito
29		Sierrita
30	Pinal	Apache Junction
31		Casa Grande
32		Coolidge
33		Eleven Mile Corner
34		Eloy
35		Mammoth
36		Marana
37		Maricopa
38		San Manuel
39		Stanfield
40	Santa Cruz	Nogales
41	Yavapai	Clarkdale
42		Hillside
43		Montezuma Castle
44		Nelson
45		Prescott
46	Yuma	Yuma

III. AIR QUALITY DATA FOR 1996

Table 2 lists the counties and towns monitored in the state and the pollutants for which data are listed.

1996 data summaries, which are tabulated in Tables 3 through 8, consist of the following:

- Mean concentrations for the calendar year;
- Highest concentrations for shorter time intervals;
- Number of exceedances of air quality standards; and
- Number of samples collected or hours monitored.

In the data summaries, the following abbreviations and footnotes were used:

General

NA	Not Applicable
NR	Not Reported

Operators

APC	Arizona Portland Cement Company
APS	Arizona Public Service Company
ASARCO	ASARCO
BHP	BHP Copper, Inc.
CMM	Cyprus Miami Mining Corporation
Maricopa	Maricopa County Environmental Svcs Department
NPS	National Park Service
Pima	Pima County Department of Environmental Quality
Pinal	Pinal County Air Quality Control District
PRAX	Praxair, Inc.
SRP	Salt River Project
SCE	Southern California Edison Company
State	Arizona Department of Environmental Quality
TEP	Tucson Electric Power Company

Equipment

Carbon Monoxide

GFC	Gas filter correlation

Nitrogen Dioxide

Chem	Chemiluminescent

Ozone

UV	Ultraviolet absorption

PM_{10}

SA321B	Sierra Andersen 321B hi-vol
SA1200	Sierra Andersen 1200 hi-vol
Wed	Wedding hi-vol
Dichot	Dichotomous
Imp.	Improve

Sulfur Dioxide

Fluor	Fluorescent

Table 2
1996 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
APACHE:						
Petrified Forest		X	X		X	X
St. Johns		X	X	X	X	X
Springerville			X		X	X
COCHISE:						
Chiricahua		X	X		X	
Douglas					X	
Naco					X	
Paul Spur					X	
COCONINO:						
Flagstaff					X	
Grand Canyon		X	X	X	X	X
Page			X	X		X
Sedona					X	
GILA:						
Hayden					X	X
Miami					X	X
Payson					X	
Tonto (NM)		X	X		X	
Winkelman						X

Table 2 (Cont'd)
1996 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
MARICOPA:						
Chandler				X	X	
Gilbert	X					
Glendale	X			X	X	
Goodyear					X	
Mesa	X			X	X	
Palo Verde				X	X	
Phoenix	X	X	X	X	X	X
Scottsdale	X		X	X	X	X
Tempe					X	
MOHAVE:						
Alonas Way			X		X	X
Bullhead City					X	
Fort Mohave						X
Kingman					X	
NAVAJO:						
Joseph City					X	
Show Low					X	
PIMA:						
Ajo					X	
Green Valley					X	X
Organ Pipe					X	
Rillito					X	
Saguaro National Park				X		

Table 2 (Cont'd)
1996 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
PIMA (Cont'd)						
Tucson	X	X	X	X	X	X
PINAL:						
Apache Junction	X			X	X	
Casa Grande	X			X	X	
Coolidge					X	
Eleven Mile Corner					X	
Eloy					X	
Mammoth					X	
Marana					X	
Maricopa					X	
San Manuel						X
Stanfield					X	
SANTA CRUZ:						
Nogales					X	
YAVAPAI:						
Clarkdale					X	
Hillside					X	
Montezuma Castle NM					X	
Nelson					X	
Prescott					X	
YUMA:						
Yuma				X	X	

Table 3
1996 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MAX	1-HR AVERAGE 2ND	8-HR AVERAGE MAX	8-HR AVERAGE 2ND	NUMBER OF EXCEEDANCES DAY	NUMBER OF EXCEEDANCES TIMES	NUMBER OF SAMPLES
MARICOPA:										
Chandler	163 S. Price	Maricopa	GFC	4.4	3.7	2.8	2.7	0	0	8323
Gilbert	525 N. Lindsay	Maricopa	GFC	3.8	3.6	2.7	2.5	0	0	8642
Glendale	6000 W. Olive	Maricopa	GFC	6.9	6.1	4.2	4.1	0	0	7980
Mesa	Broadway & Brooks	Maricopa	GFC	6.7	5.9	4.5	4.4	0	0	7516
Phoenix	4732 S. Central	Maricopa	GFC	10.3	9.5	5.2	5.1	0	0	8244
Phoenix	1845 E. Roosevelt	Maricopa	GFC	11.1	10.3	8.0	7.5	0	0	8239
Phoenix	601 E. Butler	Maricopa	GFC	10.0	7.5	4.4	4.3	0	0	8232
Phoenix	3315 W.Indian School	Maricopa	GFC	11.7	11.0	8.5	8.4	0	0	8096
Phoenix	3847 W. Earll	Maricopa	GFC	11.4	11.2	8.0	7.7	0	0	7949
Phoenix	4530 N. 17th Ave	State	GFC	10.9	9.8	7.8	7.2	0	0	5567
Phoenix	27th Ave/Grand/Thomas	State	GFC	15.1	12.7	10.2	10.0	2	2	3648
Phoenix	3905 N. 7th Ave	State	GFC	10.0	10.0	7.6	7.5	0	0	4131
Phoenix	I-10 & 27th Ave	Maricopa	GFC	10.7	9.4	8.1	7.7	0	0	7969
Phoenix	6180 W. Encanto	Maricopa	GFC	10.4	9.9	7.0	6.9	0	0	8730
Phoenix	3225 W. Ocotillo	Maricopa	GFC	9.9	9.4	4.8	4.7	0	0	2160
Scottsdale	2857 N. Miller	Maricopa	GFC	9.0	8.0	4.9	4.8	0	0	8383
PIMA:										
Tucson	190 W. Pennington	Pima	GFC	9.9	7.6	4.6	4.4	0	0	8626
Tucson	22nd & Craycroft	Pima	GFC	6.7	6.6	3.1	2.8	0	0	8662
Tucson	22nd & Alvernon	Pima	GFC	10.0	9.9	5.2	5.1	0	0	8708
Tucson	2745 N. Cherry	Pima	GFC	8.2	7.8	4.1	4.0	0	0	5711
Tucson	4591 N. Pomona[B]	Pima	GFC	5.6	5.5	2.7	2.7	0	0	5754

Table 3 (Cont'd)
1996 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MAX	1-HR AVERAGE 2ND	8-HR AVERAGE MAX	8-HR AVERAGE 2ND	NUMBER OF EXCEEDANCES DAY	NUMBER OF EXCEEDANCES TIMES	NUMBER OF SAMPLES
PINAL:										
Apache Junction	County Courthouse	Pinal	GFC	2.6	2.6	1.1	1.0	0	0	4873
Casa Grande	Airport N. Pinal	Pinal	GFC	1.6	1.5	1.2	1.2	0	0	8734

STATE AND FEDERAL STANDARDS (ppm): 1-Hour Average 35 8-Hour Average 9

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m^3

Table 4
1996 Lead Data (in ug/m^3)
In TSP, PM_{10} ,$PM_{2.5}$

COUNTY AND CITY	SITE LOCATION	OPERATOR	IN	QUARTERLY AVERAGE 1	2	3	4	NUMBER OF SAMPLES 1	2	3	4
APACHE:											
Petrified Forest	1 mi.N-Park Hdqrtrs	NPS	PM_{10}	2.1[F]	0.94[F]	0.82[f]	1.4[F]	26	23	21	23
COCHISE:											
Douglas	City Park	State	PM_{10}	0.030	0.002	0.007	0.009	15	11	15	15
Chiricahua NM	Faraway Ranch	NPS	PM_{10}	2.7[F]	1.5[F]	1.4[F]	2.7[F]	17	26	27	26
COCONINO:											
Grand Canyon NP	Hopi Point	NPS	PM_{10}	0.78[F]	0.86[F]	0.75[F]	0.99[F]	26	26	27	26
Grand Canyon NP	Indian Gardens	NPS	PM_{10}	0.73[F]	1.0[F]	1.1[F]	1.1[F]	23	23	10	4
GILA:											
Hayden	Old Town Jail	State	PM_{10}	0.420	0.318	1.27	0.209	15	15	14	13
Tonto	Maintenance Station	NPS	PM_{10}	6.6[F]	2.6[F]	2.5[F]	7.5[F]	18	26	27	22
MARICOPA:											
Palo Verde	36248 W. Elliot[a]	State	PM10	-	-	-	0.004	-	-	-	9
Phoenix	1845 E. Roosevelt	Maricopa	TSP	0.040	0.032	0.037	0.032	14	13	16	12
Phoenix	1826 W. McDowell	Maricopa	TSP	0.040	0.035	0.047	0.032	14	14	15	15
PIMA:											
Organ Pipe	Visitor's Center	State	PM_{10}	0.041	0.021	0.004	0.073	15	15	14	14
Tucson	1016 W. Prince Rd.	Pima	TSP	0.044	0.018	0.013	0.025	15	15	15	15
Tucson	22nd & Craycfoft	Pima	TSP	0.026	0.011	0.009	0.010	15	15	16	15

Table 4 (Cont'd)
1996 Lead Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	IN	QUARTERLY AVERAGE 1	2	3	4	NUMBER OF SAMPLES 1	2	3	4
SANTA CRUZ:											
Nogales	U.S. Post Office	State	PM_{10}	0.006	0.002	0.007	0.007	9	7	13	13
YAVAPAI:											
Clarkdale	NW Cement Plant	PC	PM_{10}	0.014	0.003	0.004	0.005	15	15	16	15
Clarkdale	SE Cement plant	PC	PM_{10}	0.005	0.001	0.000	0.009	15	15	16	15
Clarkdale	School	State	PM_{10}	0.005	0.003	0.002	0.003	14	14	13	14
Hillside	Sheriff Repeater Sta	State	PM_{10}	0.001	0.001	0.003	0.004	10	15	6	7
Montezuma Castle	Maintenance Bldg	State	PM_{10}	0.010	0.004	0.007	0.007	12	10	8	15

STATE AND FEDERAL STANDARDS (ug/m³): Calendar Quarter Average
1.5

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m³

Table 5
1996 Nitrogen Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 1-HR AVG	MAXIMUM 24-HR AVG	NUMBER OF SAMPLES
APACHE:							
St. Johns	Mesa Parada	SRP	Chem	8	51	15	8061
Springerville	Airport	TEP	Chem	2	41	13	7663
Springerville	4 mi.NE of town	TEP	Chem	2	60	13	7649
Springerville	1 mi.NNE of stack 1	TEP	Chem	4	57	9	7650
COCONINO:							
Page	Glen Canyon Dam	SRP	Chem	3	55	23	7849
MARICOPA:							
Phoenix	4530 N. 17th Ave.	State	Chem	42	376	233	8683
Phoenix	1845 E. Roosevelt	Maricopa	Chem	59	211	207	8385
Phoenix	Greenwood	Maricopa	Chem	57	213	210	7098
Phoenix	3847 W. Earll	Maricopa	Chem	28	216	211	7825
Scottsdale	2857 N. Miller Rd.	Maricopa	Chem	38	181	151	7390
MOHAVE:							
Alonas Way	1285 Alonas Way	SCE	Chem	8	58	27	8509

Table 5 (Cont'd)
1996 Nitrogen Dioxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 1-HR AVG	MAXIMUM 24-HR AVG	NUMBER OF SAMPLES
PIMA:							
Tucson	22nd & Craycroft	Pima	Chem	34	128	68	8264
Tucson	4591 N. Pomona Ave[b]	Pima	Chem	36[c]	141	36	5083

STATE AND FEDERAL STANDARDS (ug/m^3): Annual Average
100

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m^3

Table 6
1996 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MAX	1-HR AVERAGE 2ND HI	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
APACHE:							
St. Johns	Mesa Parada	SRP	UV	0.075	0.074	0	8218
COCONINO:							
Grand Canyon	2 mi. W. Hopi Point	NPS	UV	0.084	0.082	0	7993
Page	Glen Canyon Damn	SRP	UV	0.074	0.073	0	8322
MARICOPA:							
Chandler	163 S. Price	Maricopa	UV	0.118	0.105	0	8389
Glendale	6000 W. Olive	Maricopa	UV	0.097	0.095	0	7883
Mesa	Broadway & Brooks	Maricopa	UV	0.127	0.118	1	7661
Mesa	4530 E McKellips Rd	Maricopa	UV	0.098	0.095	0	8146
Palo Verde	36248 W. Elliott[ad]	State	UV	0.092	0.085	0	1551
Phoenix	2035 52nd St.	Maricopa	UV	0.118	0.104	0	8483
Phoenix	1845 E. Roosevelt	Maricopa	UV	0.100	0.092	0	8133
Phoenix	601 E. Butler	Maricopa	UV	0.124	0.122	0	6840
Phoenix	600 N. 40th St.	State	UV	0.115	0.109	0	4283
Phoenix	3847 W. Earll	Maricopa	UV	0.110	0.100	0	7926
Phoenix	4732 S. Central	Maricopa	UV	0.124	0.119	0	8134
Phoenix	4530 N. 17th Ave.	State	UV	0.113	0.110	0	4283
Phoenix	6180 W. Encanto	Maricopa	UV	0.103	0.098	0	8291

Table 6 (Cont'd)
1996 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MAX	1-HR AVERAGE 2ND HI	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
MARICOPA (Cont'd):							
Scottsdale	2857 N.Miller Rd	Maricopa	UV	0.114	0.111	0	8320
Scottsdale	10005 E.Osborn[d]	State	UV	0.130	0.122	1	4179
PIMA:							
Saguaro Nat. Park	3905 S.Old Spanish Tr	Pima	UV	0.092	0.092	0	8277
Tucson	190 W.Pennington	Pima	UV	0.085	0.085	0	8514
Tucson	22nd & Craycroft	Pima	UV	0.091	0.090	0	8649
Tucson	4591 N.Pomona[b]	Pima	UV	0.093	0.091	0	5730
Tucson	11330 S.Houghton	Pima	UV	0.084	0.084	0	8635
Tucson	12101 N.Camino deOeste	Pima	UV	0.082	0.081	0	8485
Tucson	4829 W.Sabino Canyon Rd.[b]	Pima	UV	0.077	0.076	0	3839
PINAL:							
Apache Junction	County Courthouse	Pinal	UV	0.121	0.115	0	7832
Casa Grande	Airport - N. Pinal	Pinal	UV	0.104	0.091	0	8708

Table 6 (Cont'd)
1996 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MAX	1-HR AVERAGE 2ND HI	NUMBER OF EXCEEDANCES	NUMBER OF SAMPLES
YAVAPAI:							
Hillside	Sheriffs Repeater St[ad]	State	UV	0.101	0.088	0	3589
YUMA:							
Yuma	1485 Second Ave.[d]	State	UV	0.099	0.098	0	2595

STATE AND FEDERAL STANDARDS (ppm): Maximum Daily 1-HR Average
0.12

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m^3

Table 7
1996 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND HIGH	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
APACHE:								
Petrified Forest	1 mi from Vis.Ctr	NPS	Improve	8	22	21	0	93
St Johns	Mesa Parada	SRP	Dichot	6	16	16	0	55
St. Johns	Carrizo Draw	SRP	Dichot	9	28	24	0	61
Springerville	Coyote Hills	TEP	Dichot	8	34	27	0	111
Springerville	Plant Site	TEP	Dichot	10	36	29	0	118
COCHISE:								
Chiricahua NM	Faraway Ranch	NPS	Improve	10	50	27	0	96
Douglas	City Park[b]	State	Dichot	32	74	69	0	56
Douglas	City Park[b]	State	TEOM	43	184	161	2	5734
Naco	Port of Entry	State	SA1200	32[c]	101	90	0	42
Paul Spur	Housing area	State	Dichot	36	69	66	0	56
COCONINO:								
Flagstaff	5701 E.Railroad	State	Wedd'g	14	42	28	0	49
Flagstaff[b]	Thorpe Park	State	Dichot	16	31	30	0	27
Flagstaff[a]	Middle School	State	Dichot	10[c]	32	16	0	11
Grand Canyon	Hopi Point	NPS	Imprrve	9	27	19	0	104
Grand Canyon	Indian Gardens	NPS	Improve	11	24	21	0	60
Sedona	Post Office	State	SA322	9[c]	22	19	0	27

Table 7 (Cont'd)
1996 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND HIGH	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
GILA:								
Hayden	Old Town Jail	State	Dichot	41	67	66	0	57
Miami	Golf Course	CMMC	Dichot	30	76	64	0	106
Miami	Ridgeline	CMMC	Dichot	14	40	25	0	104
Miami	Barcon Bldg US60[a]	State	TEOM	48	141	138	0	7206
Payson	US West Bldg	State	Dichot	30	70	66	0	59
Tonto	Maintenance Stat.	NPS	Improve	14	37	34	0	93
GRAHAM:								
Safford	523 Tenth Ave.	State	SA1200	40	90	84	0	51
MARICOPA:								
Chandler	1475 E Pecos Rd.	Maricopa	SA1200	62	140	130	0	59
Gilbert	15500 S. Higley	State	Dichot	54	179	114	1	55
Glendale	6000 W. Olive	Maricopa	SA321B	34	67	60	0	57
Goodyear/Estrella	15099 W.Casey Abbott	State	Dichot	31	82	72	0	55
Mesa	6001 S.Power Rd[ab]	State	Dichot	28[c]	53	50	0	30
Mesa	Broadway & Brooks	Maricopa	SA1200	33	67	62	0	54
Phoenix	4732 S. Central	Maricopa	SA321B	47	96	96	0	75
Phoenix	3847 W. Earll	Maricopa	SA321B	45	102	100	0	55
Phoenix	1845 E. Roosevelt	Maricopa	BA321B	41	105	89	0	59
Phoenix	601 E Butler	Maricopa	SA321B	37	71	66	0	74
Phoenix	4530 N.17th Ave.	State	Dichot	34	83	68	0	54
Phoenix	4530 N.17th Ave.	State	TEOM	41	137	104	0	8177
Phoenix	4701 W. Thunderbird	Stste	Dichot	31	58	57	0	55

Table 7 (Cont'd)
1996 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND HIGH	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
MARICOPA (Cont'd):								
Scottsdale	2857 N.Miller Rd.	Maricopa	SA321B	35	80	64	0	59
Tempe	3340 S. Rural	State	Dichot	57	193	185	3	54
MOHAVE:								
Alona's Way	1285 Alona's Way	SCE	SA321B	24	79	50	0	61
Bullhead City	224 N. Main	State	TEOM	35	249	203	2	8386
Fort Mohave	Fort Mohave	State	Dichot	17	60	36	0	59
Kingman	I-40/Griffith Rd	Praxair	SA1200	12	65	49	0	105
NAVAJO:								
Joseph City	Third & Tanner	APS	Wedd'g	14	24	24	0	56
Show Low	Deuce of Clubs Ave.	State	Wedd'g	12	29	28	0	57
PIMA:								
Ajo	Well Road	State	Dichot	21	61	53	0	55
Corona de Tucson	2200 S. Houghton	Pima	SA1200	13	25	24	0	57
Green Valley	245 W. Esperanza	Pima	SA1200	15	28	27	0	93
Organ Pipe NM	Visitors Center	State	Dichot	11	57	17	0	58
Rillito	8820 W. Water	State	Dichot	39	84	80	0	57
Rillito	8820 W. Water	APCC	Wedd'g	31	104	81	0	110
Tucson	Broadway & Swan	Pima	SA1200	25	40	39	0	61
Tucson	6910 S.Santa Clara	Pima	SA1200	28	62	54	0	60
Tucson	360 S. Church	Pima	SA1200	33	123	81	0	247
Tucson	3401 W.Orange Grove[b]	Pima	SA321B	32	62	51	0	46
Tucson	3401 W. Orange Grove	Sta/Pima	Dichot	30	67	58	0	61

Table 7 (Cont'd)
1996 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND HIGH	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
PIMA (Cont'd):								
Tucson	1016 W. Prince Rd	Sta/Pima	Dichot	36	79	60	0	61
Tucson	1810 S. 6th Ave	Pima	SA1200	31	72	53	0	61
Tucson	22nd/Craycroft	Sta/Pima	Dichot	23	38	36	0	61
Tucson	12101N.CaminodeOeste	Sta/Pima	Dichot	14	24	24	0	61
Tucson	11330 S.Houghton Rd.	Sta/Pima	Dichot	15	74	29	0	61
Tucson	1435 N Fremont	Sta/Pima	Dichot	28	53	45	0	61
Tucson	4829 N.Sabino Canyon	Pima	Wedd'g	18	43	38	0	60
PINAL:								
Apache Junction	South Cty Courthouse	Pinal	Wedd'g	20	37	33	0	57
Apache Junction	North Cty Courthouse	Pinal	Wedd'g	20	34	32	0	59
Casa Grande	401 Marshall Rd.	Pinal	Wedd'g	30	73	64	0	57
Coolidge	County Highway Yard	Pinal	Wedd'g	34	98	73	0	59
Eleven Mile Corner	Rodeo Grounds	Pinal	SA321B	66	160	160	2	49
Eloy	Eloy Fire Department	Pinal	SA321B	35	81	77	0	59
Mammonth	County Courthouse	Pinal	SA1200	20	33	32	0	52
Marana	Pinal Air Park	Pinal	SA1200	22	48	47	0	60
Maricopa	Edwards Residence	Pinal	SA321B	46	119	89	0	58
Stanfield	County Courthouse	Pinal	Wedd'g	33	100	83	0	61
SANTA CRUZ:								
Nogales	U.S. Post Office	State	Dichot	42[c]	114	104	0	42
YAVAPAI:								
Clarkdale	SEofCTI Flyash Silo	PC	Dichot	28	79	65	0	61

Table 7 (Cont'd)
1996 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND HIGH	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
YAVAPAI (Cont'd):								
Clarkdale	Clarkdale School	State	Dichot	16	33	30	0	50
Clarkdale	NW of Cement Plant	PC	Dichot	22	52	50	0	61
Hillside	Sheriff Repeater St.	State	Dichot	10[c]	22	21	0	38
Montezuma Castle	Maintenance Bldg	State	Dichot	13[c]	26	22	0	45
Nelson	Chemstar Lime Plant	State	Dichot	22	47	45	0	57
Prescott	City Admin. Bldg	State	Wedd'g	14	29	25	0	50
YUMA:								
Yuma	2795 Avenue B	State	Dichot	36[c]	103	83	0	40

STATE AND FEDERAL STANDARDS (ug/m^3): Annual Average 50; 24-Hour 150

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m^3

Table 8
1996 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 3-HR AVG	MAXIMUM 24-HR	NUMBER OF EXCEEDANCES 3-HR STD	NUMBER OF EXCEEDANCES 24-HR	NUMBER OF SAMPLES
APACHE:									
St. Johns	Mesa Parada	SRP	Fluor	8	52	15	0	0	8039
Springerville	4 mi. NE of town	TEP	Fluor	3	73	18	0	0	7483
Springerville	Airport	TEP	Fluor	0	31	11	0	0	7684
Springerville	1 mi NNE-unit 1	TEP	Fluor	3	118	31	0	0	7649
COCONINO:									
Page	Glen Canyon Dam	SRP	Fluor	4	152	44	0	0	8201
GILA:									
Hayden	Garfield Ave.	ASARCO	Fluor	22	796	336	0	0	8452
Hayden	Jail	ASARCO	Fluor	20	529	88	0	0	8428
Hayden	Hayden Jct	ASARCO	Fluor	9	374	52	0	0	8429
Hayden	Montgomery Ranch	ASARCO	Fluor	47	1170	286	0	0	8442
Hayden	Jail	State	Fluor	16	527	81	0	0	8618
Miami	Ridgeline-Linden	State	Fluor	8	338	110	0	0	8082
Miami	Jones Ranch	CMMC	Fluor	11	593	146	0	0	8774
Miami	W/B Pump Station	CMMC	Fluor	2	106	22	0	0	8778
Miami	Town Site	CMMC	Fluor	5	360	65	0	0	8776
Winkleman	1 mi.N Jct. 77/177	ASARCO	Fluor	52	727	226	0	0	8425
MARICOPA:									
Phoenix	1128 N. 27th Ave	Maricopa	Fluor	8	39	10	0	0	6781
Phoenix	3847 W. Earll	Maricopa	Fluor	5	26	13	0	0	7754
Phoenix	1845 E. Roosevelt	Maricopa	Fluor	8	63	18	0	0	7509
Scottsdale	2857 N.Miller Rd	Maricopa	Fluor	10	26	16	0	0	8407

Table 8 (Cont'd)
1996 Sulfur Dioxide Data (in ug/m³)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 3-HR AVG	MAXIMUM 24-HR	NUMBER OF EXCEEDANCES 3-HR STD	NUMBER OF EXCEEDANCES 24-HR	NUMBER OF SAMPLES
MOHAVE:									
Alonas Way	1285 Alonas Way	SCE	Fluor	2	47	15	0	0	8563
PIMA:									
Green Valley	7515 W.Magee Ranch	State	Fluor	3	144	29	0	0	4965
Tucson	22nd & Craycroft	Pima	Fluor	4	24	10	0	0	8649
PINAL:									
San Manuel	Townsite	BHP	Fluor	18	1068	167	0	0	8765
San Manuel	Golf Course	BHP	Fluor	13	379	319	0	0	8777
San Manuel	Dorm Site	BHP	Fluor	15	415	101	0	0	8777
San Manuel	LDS Church	BHP	Fluor	11	2369	338	1	0	8183
San Manuel	Hospital	BHP	Fluor	21	631	145	0	0	8774

STATE AND FEDERAL STANDARDS (ug/m³):	3-Hour Average	24-Hour Average	Annual Average
	1300	365	80

Footnotes:
a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal basis
e. Site operated on an event basis
f. Units for Pb are ng/m³

IV. AIR QUALITY TRENDS

A. CARBON MONOXIDE

From 1987 through 1993 CO concentrations in Phoenix and Tucson declined gradually (See Figure 4). In 1994 and 1995, however, concentrations increased in Phoenix at both the microscale site, Indian School Road, and Roosevelt Street, the neighborhood scale site. In 1996 carbon monoxide levels decreased at all three trend sites in the graph. These variations were most likely due to changes in meteorological conditions. This ten year trend is also evident in the graph of exceedances of the 8-hour standard, 9 ppm, in Figure 5. In this graph the microscale, hotspot nature of the Indian School Road site is clearly evident in 1989 when 20 exceedances occurred.

B. LEAD

Lead concentrations during the past ten years were well below the quarterly standard, 1.5 ug/m^3, in both major urban areas (See Figure 5). This is the result of major reductions in lead emissions from cars from the mid-1970's through the early 1980's.

C. NITROGEN DIOXIDE

Concentrations have remained far below the annual standard, 100 ug/m^3, in both Phoenix and Tucson in the last ten years. In Phoenix annual averages have been in the 25-50 ug/m^3 range compared with 30-40 ug/m^3 in Tucson. The data for Phoenix is very limited in terms of years and sites.

D. OZONE

The plot of 1-hour ozone concentrations in Figure 7 does not show any clear, long-term pattern. Thus, it appears that there is no significant change in the highest 1-hour values for Phoenix, Tucson, and Yuma.

Exceedances of the 1-hour standard, 0.12 ppm, follow a different pattern (See Figure 8). In Phoenix large fluctuations occurred from year-to-year. One factor which has probably affected the data is expansion of the monitoring network. Maricopa County has installed several new sites in the past 2-3 years in the eastern part of the area where higher ozone concentrations occur.

In Tucson and Yuma no exceedances of the 1-hour standard have been monitored.

E. PM_{10}

For the Phoenix metropolitan area the PM_{10} data in Table 9 suggest no significant changes except at the North Phoenix and Chandler sites. At North Phoenix the annual average decreased appreciably in 1992 , whereas at Chandler a sizable increase was monitored in 1996. Chandler remains the only trend site exceeding the annual and 24-hour standards in the area.

In the Tucson area PM_{10} concentrations have been lower than in the Phoenix area (See Table 10). Thus, no exceedances of the annual standard have been monitored in Tucson. For the most part annual averages have not changed significantly with one exception. At the Prince Road site, PM_{10} concentrations declined in 1991, and increased later in 1995. Finally, it should be noted that no exceedances of the 24-hour standard have been monitored in Tucson since 1988 when two exceedances were measured at the Orange Grove Road site.

In other areas of Arizona, annual PM_{10} levels have not varied except in Paul Spur. At the Paul Spur site the annual average decreased substantially in 1993. As a result, Paul Spur has been in compliance with the annual and 24-hour standards. In 1996 the Naco annual average declined significantly to 32 ug/m^3 from 45 ug/m^3 in 1995.

F. SULFUR DIOXIDE

From 1990 through 1996 the maximum number of 3-hour exceedances in any of the three Arizona smelter towns has been one per year (See Figure 9). Thus, the smelter towns were in compliance with air quality standards during this period since one exceedance per year is allowed. The number of 3-hour exceedances is plotted as the trend indicator because this is the most restrictive standard for sulfur dioxide. Miami continues to have the best record among the three smelter towns with no exceedances since 1987.

FIGURE 4

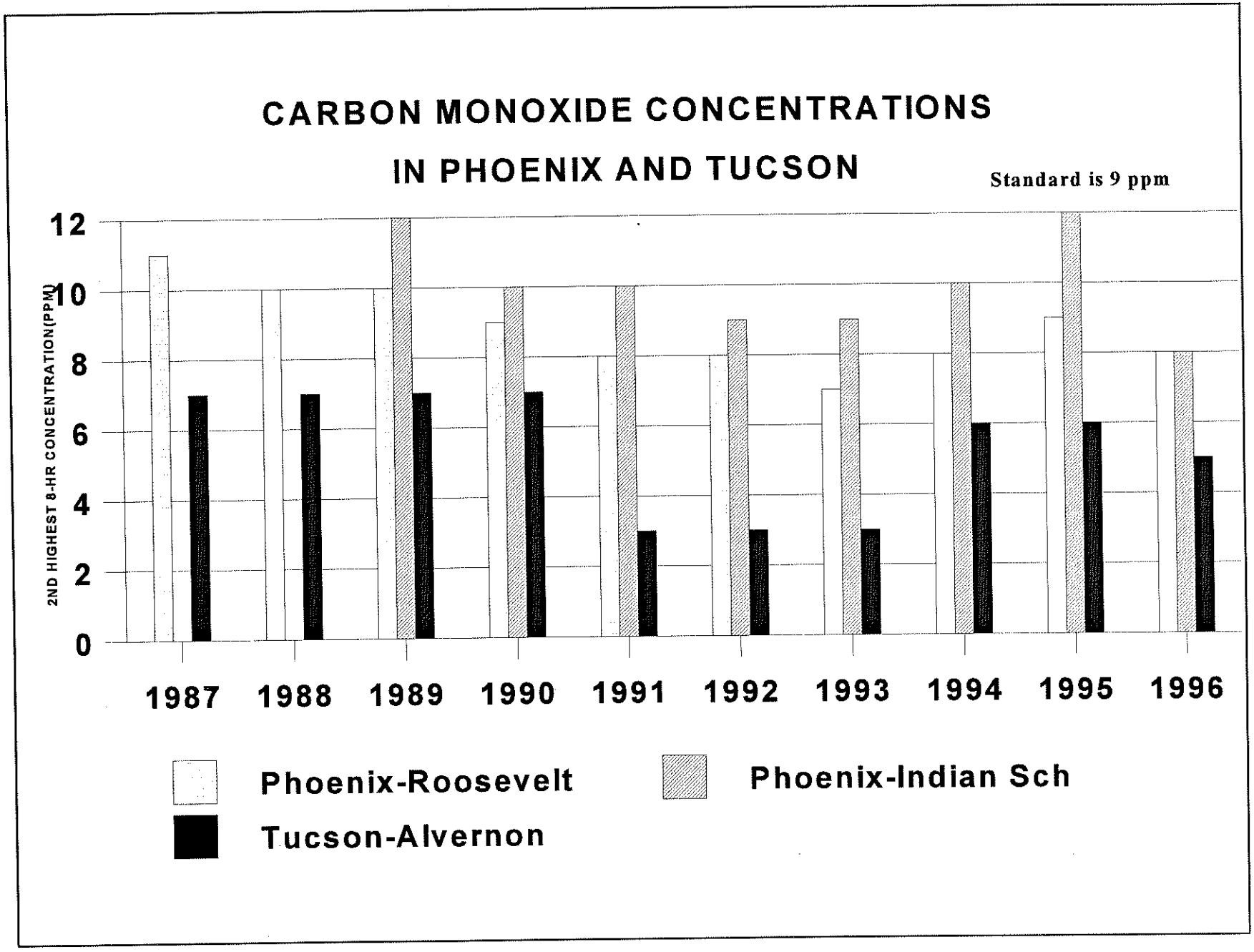

CARBON MONOXIDE CONCENTRATIONS
IN PHOENIX AND TUCSON
Standard is 9 ppm
2ND HIGHEST 8-HR CONCENTRATION(PPM)
12
10
8
6
4
2
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Phoenix-Roosevelt
Phoenix-Indian Sch
Tucson-Alvernon

FIGURE 5

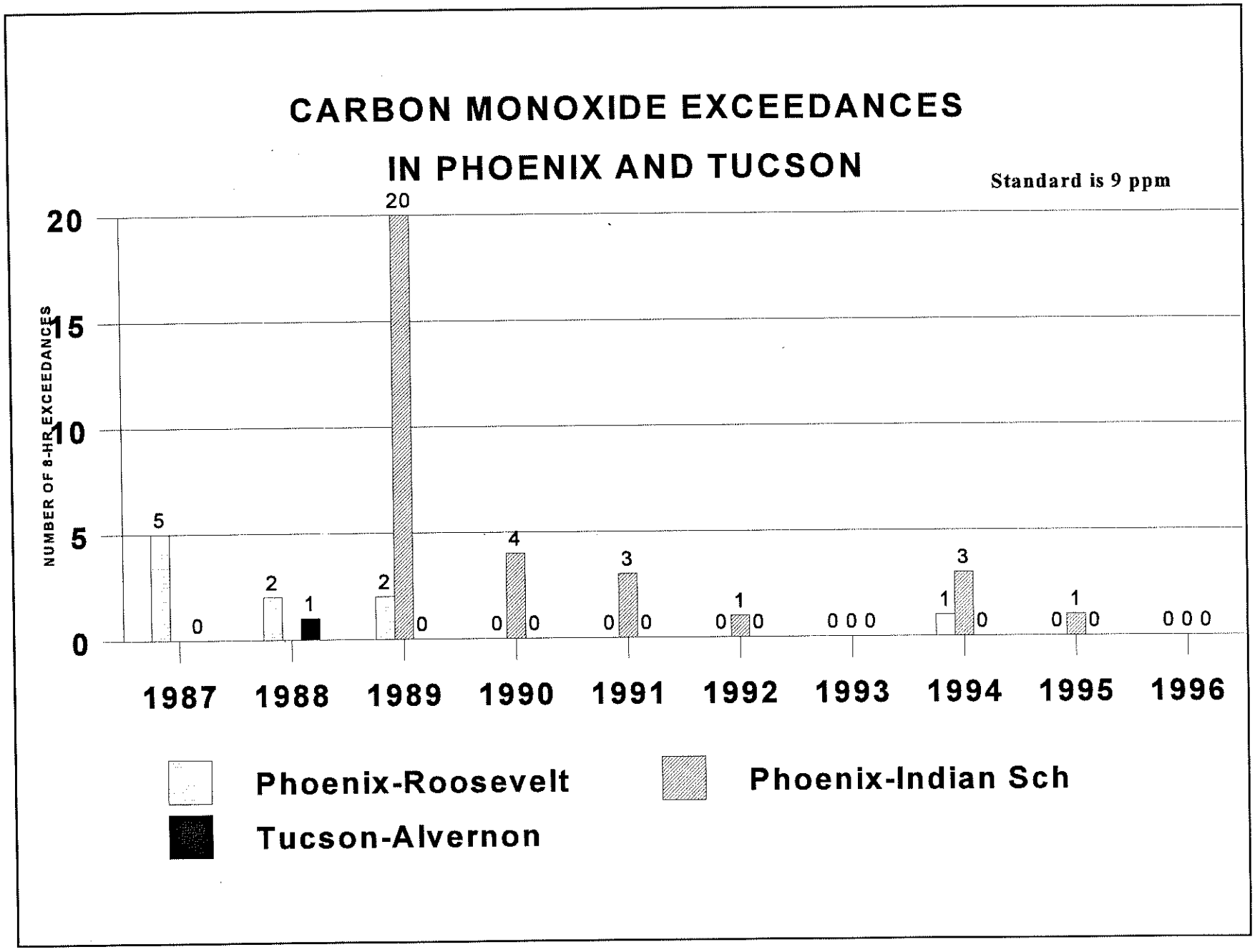

CARBON MONOXIDE EXCEEDANCES
IN PHOENIX AND TUCSON
Standard is 9 ppm
NUMBER OF 8-HR EXCEEDANCES
20
15
10
5
0
5
0
2
1
2
20
0
0
4
0
0
3
0
0
1
0
0 0 0
1
3
0
1
0
0
0 0 0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Phoenix-Roosevelt
Phoenix-Indian Sch
Tucson-Alvernon

FIGURE 6

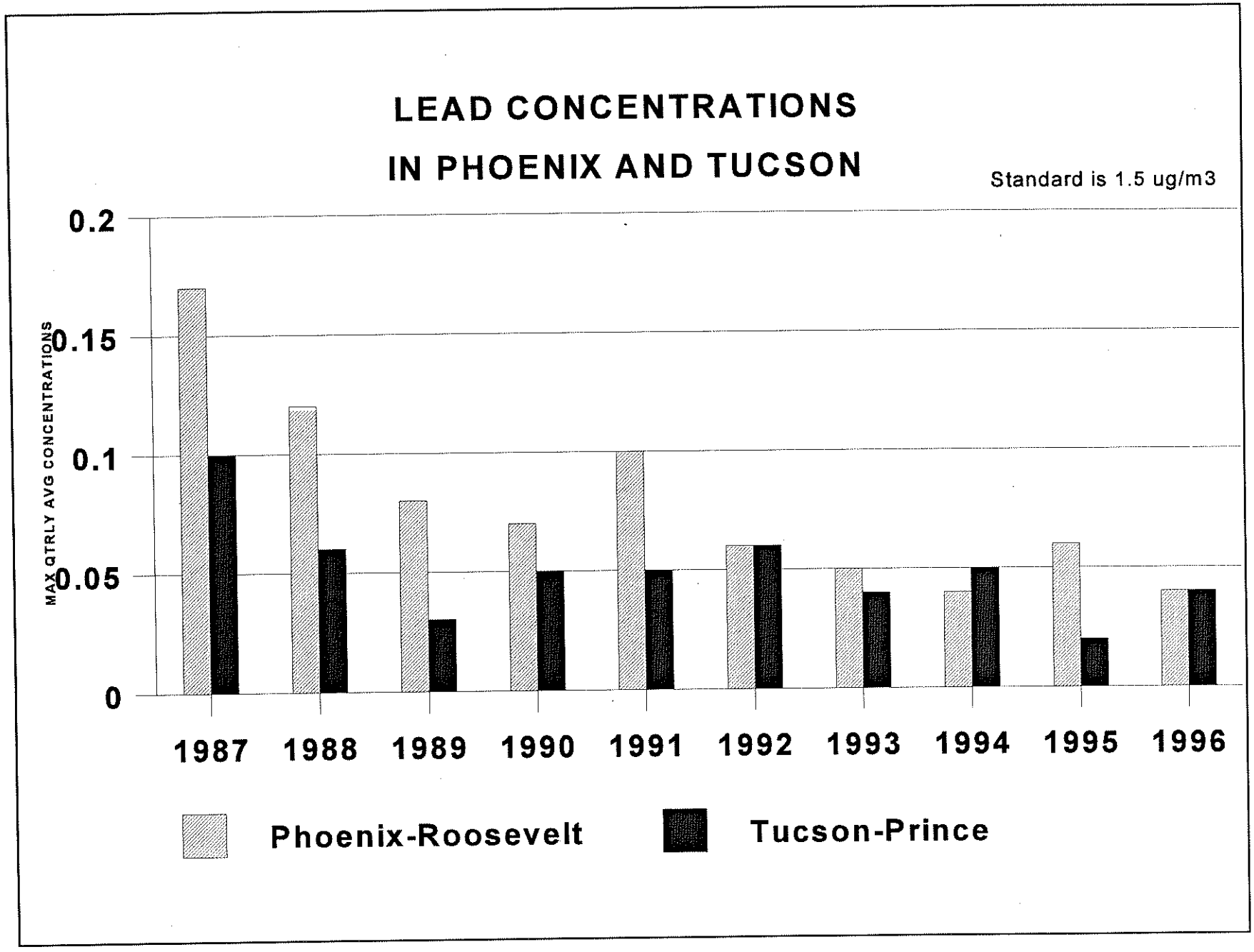

LEAD CONCENTRATIONS
IN PHOENIX AND TUCSON
Standard is 1.5 ug/m3
MAX QTRLY AVG CONCENTRATIONS
0.2
0.15
0.1
0.05
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Phoenix-Roosevelt
Tucson-Prince

FIGURE 7

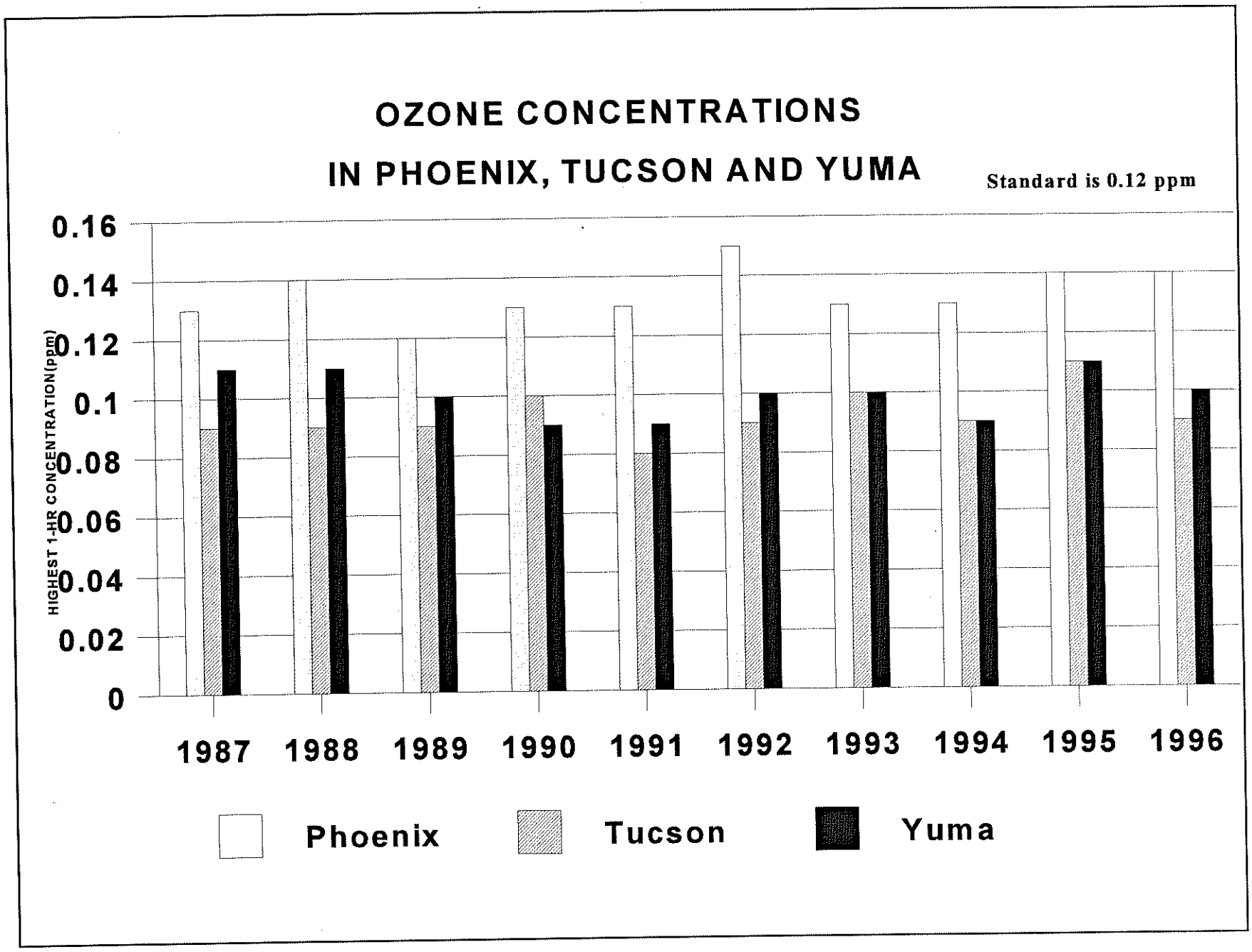

OZONE CONCENTRATIONS
IN PHOENIX, TUCSON AND YUMA
Standard is 0.12 ppm
HIGHEST 1-HR CONCENTRATION(ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Phoenix
Tucson
Yuma

FIGURE 8

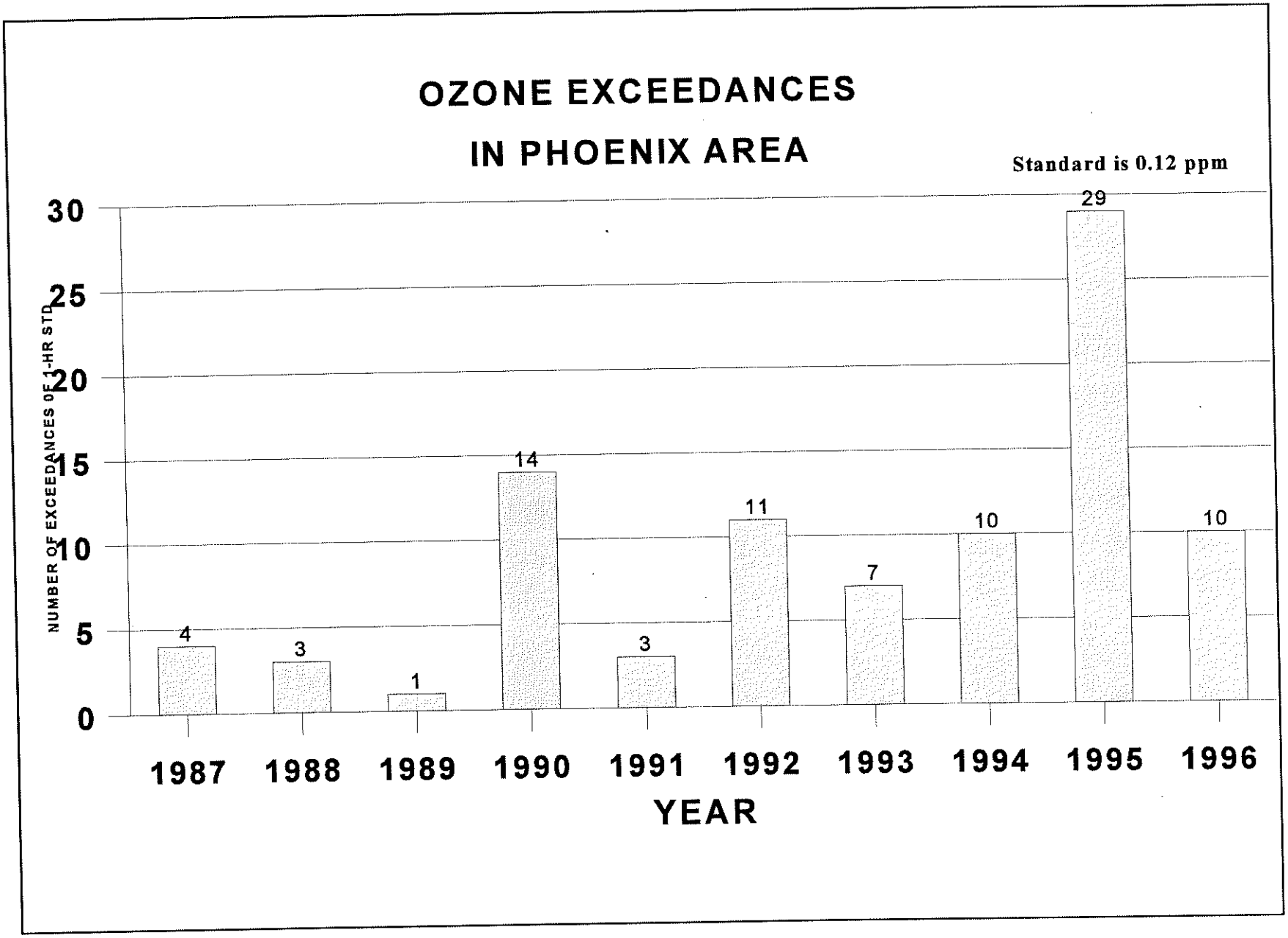

OZONE EXCEEDANCES
IN PHOENIX AREA
Standard is 0.12 ppm
NUMBER OF EXCEEDANCES OF 1-HR STD
30
25
20
15
10
5
0
4
3
1
14
3
11
7
10
29
10
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
YEAR

Table 9
PM_{10} Concentrations in Phoenix Urban Area
Annual Average ($\mu g/m^3$)

SITE	1991	1992	1993	1994	1995	1996
Central Phoenix	46	42[a]	43[a]	43	44	41
Chandler	50	56[a]	58[a]	50	53	62
Glendale	42	34[a]	35	33	33	34
North Phoenix	45	35[a]	34	35	36	37
South Phoenix	44	48	44	44	46	47
West Phoenix	47	47[a]	44	43	44	45
Mesa	36	29[a]	35	36[a]	35	33
South Scottsdale	34	34	34[a]	38	36	35

a. Invalid annual average due to insufficient number of samples
Annual standard - 50 $\mu g/m^3$

Table 10
PM_{10} Concentrations in Tucson Urban Area
Annual Average ($\mu g/m^3$)

SITE	1991	1992	1993	1995	1995	1996
South Tucson	34	32	32	27	31	31
Prince Road	32	28	24	25	38	36
Corona de Tucson	13	12	12	13	15	13
Green Valley	16	15	16	16	16	15
Orange Grove	31	30	28	31	34	32
Broadway/Swan	35	36[a]	25	26	28	25

a. Invalid annual average due to insufficient number of samples
Annual standard - 50 $\mu g/m^3$

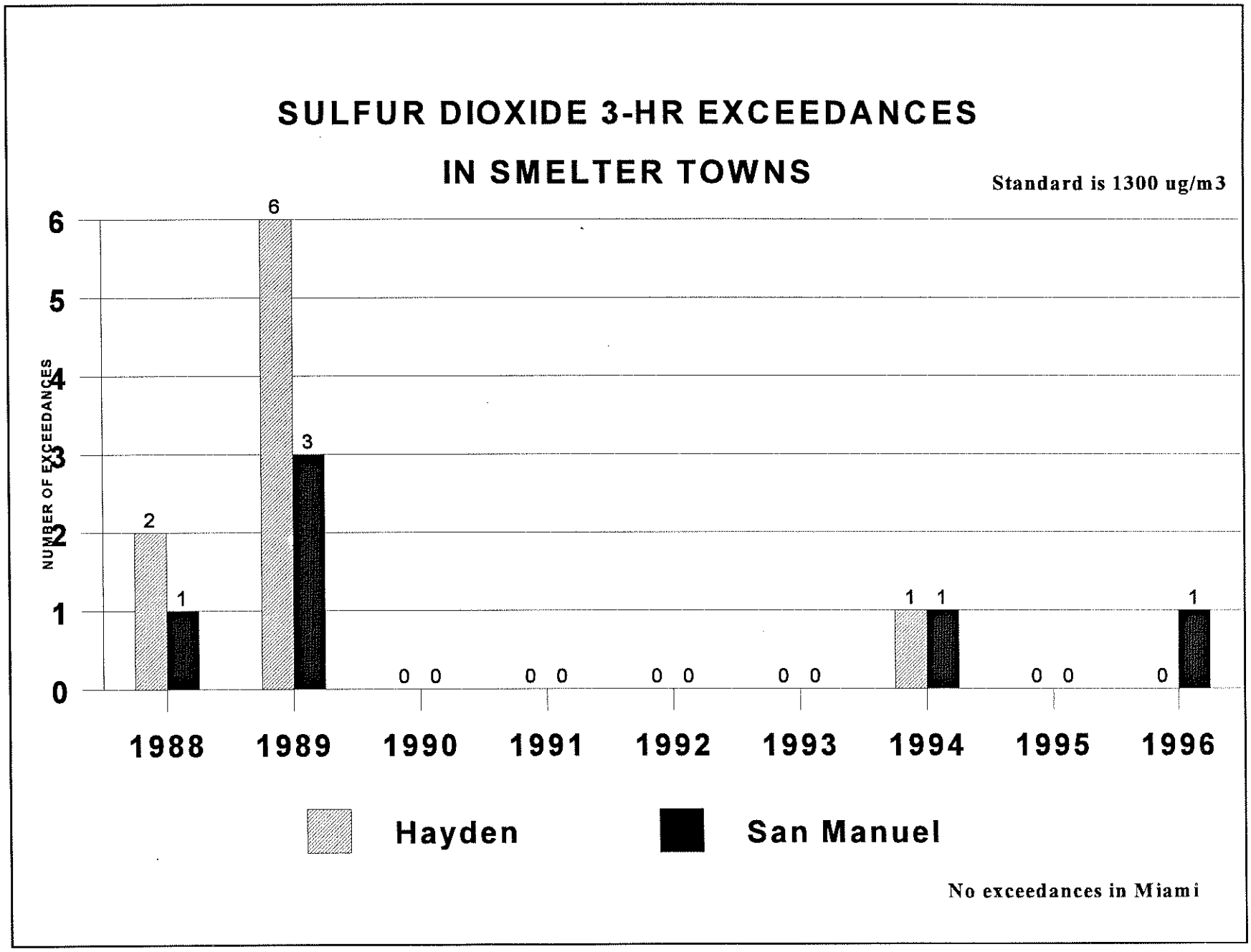
Table 11
PM_{10} Concentrations in Various Cities
Annual Average ($\mu g/m^3$)

SITE	1991	1992	1993	1994	1995	1996
Ajo	31[ac]	23	23[a]	19[a]	24	21
Apache Junction	30	22	21	22	26	20
Bullhead City	34	30	31	34	36	35
Casa Grande	29[a]	30	31	27	29	30
Clarkdale	18	16[abc]	16	17	17	16
Douglas	39[c]	40	29	34	32	32[b]
Flagstaff	22	24[bc]	22[a]	19	21	--[d]
Hayden	36	35	27	26	34	41
Joseph City	21	17	16	15	16[a]	14
Montezuma Castle	12	16	12	11	13	13
Naco	-	64[ab]	48	39[a]	45	32
Nelson	-	-	20	19	18	22
Nogales	50[c]	54	42	39	43	42
Organ Pipe	11[c]	11	10	9	9	11
Paul Spur	67[c]	62	40	34	33	36
Payson	48[abc]	40	32	30	39	30
Prescott	17[ac]	19	17	15	14	14
Rillito	27[c]	33	28	28	35	39
Safford	24	32	26	26	33	40
Show Low	18[a]	21	17[a]	14[a]	16[a]	12
Yuma	48[c]	29	31	32[a]	35	36

a. Invalid annual average due to insufficient number of samples
b. Site Relocated Mid Year
c. Sampler type changed
d. Very few samples collected

Annual standard - 50 $\mu g/m^3$

FIGURE 9


SULFUR DIOXIDE 3-HR EXCEEDANCES
IN SMELTER TOWNS
Standard is 1300 ug/m3
NUMBER OF EXCEEDANCES
0
1
2
3
4
5
6
2
1
6
3
0 0
0 0
0 0
0 0
1 1
0 0
0
1
1988
1989
1990
1991
1992
1993
1994
1995
1996
Hayden
San Manuel
No exceedances in Miami