Air Quality Report

Appendix I
to the 1998 Annual Report

Arizona Department of Environmental Quality

ADEQ 1998 Annual Report List

The Arizona Department of Environmental Quality *1998 Annual Report* and its five appendices comprise the agency submittal to the Arizona State Legislature and the Governor's Office. The volume entitled *1998 Annual Report* is designed to serve the needs of our diverse customers by presenting an overview of the department's 1998 fiscal year activities. A list of all of the 1998 annual report documents is shown below. Statutory references for mandated reports are shown in parentheses where appropriate.

1998 Annual Report (A.R.S.§ 49-104.A.6)

Air Quality Report (A.R.S.§ 49-424.10), *Appendix I*

Recycling Report (A.R.S.§ 49-832.C), Waste Programs Division, *Appendix II*

Waste Programs Report, *Appendix III*

Underground Storage Tank Assurance Fund Report (A.R.S.§ 49-1051.D)
Waste Tire Report (A.R.S.§ 44-1306.B)
WQARF Report (A.R.S.§ 49-282.G)
Pollution Prevention Report (A.R.S.§ 49-966)
Hazardous Waste Inspections and Enforcement Report (A.R.S.§ 49-105)

Groundwater Quality Report (A.R.S.§ 49-225.D), Water Quality Division, *Appendix IV*

Water Quality Report, *Appendix V*

Safe Drinking Water Report (A.R.S.§ 49-105)
Water Quality Enforcement Report (A.R.S.§ 49-105)
Aquifer Protection Permit Fee Schedule (A.R.S.§ 49-241.E)
Aquifer Protection Permit Priority List (A.R.S.§ 49-241.D)
Aquifer Protection Application Status (A.R.S.§ 49-241.E)
1997 Pesticide Annual Report (A.R.S.§ 49-303.B)

You may obtain a free copy of the *1998 Annual Report* by picking it up from ADEQ's Information Desk at 3033 North Central Avenue, Phoenix, Arizona. You may also call (602) 207-2202 or in Arizona, 1-800-234-5677, extension 2202, to request a copy. If you are interested in purchasing one or more of the appendices, please call the number above for pricing information and ordering assistance.

Air Quality Report (A.R.S.§ 49-424.10), *Appendix I*

The ADEQ Air Quality Monitoring Program tracks the quality of ambient air through a statewide network of monitoring sites. Using data collected at the monitoring sites, air quality control measures are developed and implemented to bring nonattainment areas into compliance with federal and state air quality standards.

This report contains information regarding the health and welfare effects of air pollutants. It also summarizes air quality standards, describes Arizona's air quality monitoring network, and provides 1997 air quality data summaries and air quality trends.

According to the report, carbon monoxide air quality in the Phoenix metropolitan area improved substantially since 1987. As a result, compliance with federal and state standards was achieved in the last three years. Ozone air quality in the Phoenix metropolitan area also improved, but only in the past two years, 1996 and 1997. PM_{10} air quality improvements in the rural and industrial areas of Arizona continued. Consequently, attainment of air quality standards was demonstrated in Ajo, Bullhead City, Douglas, Nogales, Paul Spur, Payson, Rillito, and Yuma. However, PM_{10} standard exceedances persist in Maricopa and Pinal counties.

Sulfur dioxide air quality in three copper smelters towns, Hayden, Miami, and San Manuel continued to be excellent since 1990 when compliance with air quality standards was achieved.

ARIZONA

DEPARTMENT OF

ENVIRONMENTAL

QUALITY

1997 Air Quality Data for Arizona

ACKNOWLEDGMENTS

The Arizona Department of Environmental Quality extends sincere appreciation to the sampler operators named below for their services, which included operating particulate samplers and mailing the samples collected at the state's monitoring sites.

Ajo ..... Charles Conner

Bullhead City ..... Jack Catt

Clarkdale ..... Harlin Lusher

Douglas ..... John Cryar

Flagstaff ..... Jack Chastain & Mark Forest

Fort Mohave ..... Jack Catt

Hayden ..... Ray Morales

Montezuma Castle National Monument ..... U. S. National Park Service Staff

Naco ..... Marvin Wooten

Nelson ..... Perry Curly

Nogales ..... Ricardo Maldonado & Ben Stapleton

Organ Pipe Cactus National Monument ..... Ami Pate

Paul Spur ..... John Cryar

Payson ..... Alice Turner

Prescott ..... Vince Gianfrancesco

Rillito ..... Carl Gremmler

Safford ..... Charlie Weaver & Sterling Smith

Sedona ..... Memi Heeder

Show Low ..... Denis Harger & Maria Dugger

Yuma ..... Leah Hamilton

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Applied Environmental Consultants for Arizona Portland Cement Company ..... Herbert Verville

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BHP Copper, Inc. ..... Jerry C. May

Cyprus Miami Mining Corporation ..... Wayne Leipold

Maricopa County Environmental Services Department ..... Steven Peplau

National Park Service ..... Jim Sisler & David Joseph

Phoenix Cement Company ..... Floyd Fusselman

Pima County Department of Environmental Quality ..... David Esposito

Pinal County Air Quality Control District ..... Donald Gabrielson

Praxair, Inc. ..... Thomas C. Ahlers

Salt River Project ..... Kevin Wanttaja

Southern California Edison Company ..... Stan Marsh

Tucson Electric Power Company ..... Cosimo DeMasi

TABLE OF CONTENTS

I. AIR QUALITY STANDARDS 1

II. AIR QUALITY MONITORING NETWORKS 4
- A. Monitoring Networks 4
- B. Data Reporting/Quality Assurance 5
- C. Special Monitoring Studies 5

III. AIR QUALITY DATA FOR 1997 14

IV. AIR QUALITY TRENDS 40
- A. Carbon Monoxide 40
- B. Lead 40
- C. Nitrogen Dioxide 40
- D. Ozone 40
- E. PM_{10} 40
- F. Sulfur Dioxide 41

TABLES

Table 1 Ambient Air Quality Standards 3

Table 2 1997 Counties and Towns Monitored 16

Table 3 1997 Carbon Monoxide Data (in ppm) 20

Table 4 1997 Lead Data (in $\mu g/m^3$) 22

Table 5 1997 Nitrogen Dioxide Data (in $\mu g/m^3$) 24

Table 6 1997 Ozone Data (in ppm) 26

Table 7 1997 PM_{10} Data (in $\mu g/m^3$) 29

Table 8 1997 $PM_{2.5}$ Data (in ug/m^3) 35

Table 9 1997 Sulfur Dioxide Data (in $\mu g/m^3$) 38

Table 10 PM_{10} Concentrations In Phoenix And Tucson Urban Areas 47

Table 11 PM_{10} Concentrations In Various Cities 48

FIGURES

Figure 1 Maricopa County Monitoring Network 8

Figure 2 Pima County Monitoring Network 10

Figure 3 State and Industrial Monitoring Networks 12

Figure 4 Carbon Monoxide Concentrations in Phoenix and Tucson 42

Figure 5 Carbon Monoxide Exceedances in Phoenix and Tucson 43

Figure 6 Lead Concentrations in Phoenix and Tucson 44

Figure 7 Ozone Concentrations in Phoenix, Tucson and Yuma 45

Figure 8 Ozone Exceedances in Phoenix 46

Figure 9 Sulfur Dioxide Exceedances in Hayden, Miami and San Manuel 49

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 and secondary standards to protect public welfare. States are required to adopt standards which are at least as stringent as 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 equal to or less than 2.5 and 10 microns 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. Other adverse effects on animals, microorganisms, and plants.
Nitrogen dioxide	Impairs the respiratory system, causing a high incidence of acute respiratory diseases. Preschool-age 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, emphysema, bronchiectasis, cardiovascular disease, and 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 and adopt revisions when new information indicates that changes are required. As a result, EPA revised the ozone standard in July 1997 from a 1-hour standard of 0.12 ppm to an 8-hour standard of 0.08 ppm, based on information indicating 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 PM_{10}, EPA made one minor change to the standards 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.

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[a]	1-hr 8-hr	0.12 ppm 0.08 ppm	0.12 ppm 0.12 ppm
$PM_{2.5}$[b]	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 state 0.14 ppm federal 80 ug/m^3 state 0.03 ppm federal	1300 ug/m^3 state 0.5 ppm federal --- --- --- ---
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

a. In July 1997 the standard was revised from 0.12 ppm for a 1-hour average to 0.08 ppm for an 8-hr average.

b. In July 1997 the EPA 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, PM_{10}, $PM_{2.5}$, and sulfur dioxide. Federal and state air quality standards for these pollutants 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 1997 by the various networks above are summarized in Section II of this report. In addition, Maricopa and Pima counties and some companies publish annual reports which include summaries of their data.

Raw data files are maintained by each of the network operators. In addition, the EPA stores raw data submitted quarterly by Maricopa and Pima counties and the state. EPA analyzes these data to evaluate progress in attaining and maintaining 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.

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.
- Hazardous Air Pollutants (HAPS),
- Border-area air quality, and
- 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 managed either 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 seven sites were operational by June, 1998. These are at Saguaro National Monument at Mt. Ord for the Mazatzal Wilderness, at Humboldt Peak for the Pine Mtn. Wilderness, at Muleshoe Ranch for Galiuro Wilderness, at Rucker Canyon for Chiricahua Wilderness, at McFadden Peak for Sierra Ancha Wilderness, and at Sycamore Canyon Wilderness. Later in 1998, monitoring equipment will be in place at Green's Peak for Mt. Baldy Wilderness.

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. This project was completed and a report was submitted to the Legislature in 1995.

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 cause 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; the results will be used in air quality modeling studies for human health risk assessment, to apportion source impacts, and for evaluation of potential controls. In the summer of 1998, a similar PM_{10}/HAPS monitoring and emissions inventory investigation will be initiated in the Douglas-Agua Prieta area.

In the Phoenix metropolitan area, enhanced monitoring of ozone, its photochemical precursors, and meteorology is planned for 1999. This monitoring is required because of the recent reclassification of this area serious for ozone nonattainment planning purposes, based on ozone concentrations monitored in recent years. Federal legislation and regulations call for the establishment of "Photochemical Assessment Monitoring Stations" (PAMS) in ozone nonattainment areas classified as serious, severe, or extreme. ADEQ will be responsible for as many as five PAMS, and is determining the most cost-effective and technically sound method to meet the enhanced monitoring requirement. This program will evolve as the PAMS program continues to be implemented over the next few years. A PAMS network description, or an approved alternative network description, including a schedule for implementation, will be submitted to EPA in the near future.

$PM_{2.5}$ monitoring is scheduled to begin in November 1998 throughout Arizona as a result of EPA adopting $PM_{2.5}$ standards in 1997. Planning for this monitoring program has been accomplished through a cooperative effort by ADEQ, Maricopa, Pima, and Pinal Counties, Pima Association of Governments and EPA. Samplers will operate in the major metropolitan areas of Phoenix and Tucson, and in other areas of the state to determine compliance with $PM_{2.5}$ standards. $PM_{2.5}$ samplers will also be operated at remote sites to monitor the transport of $PM_{2.5}$ from urban areas to pristine Class I areas where visibility protection is a major concern. In addition, sampling will be conducted at remote sites to measure background concentrations of $PM_{2.5}$ in various regions of Arizona. A centralized laboratory for the distribution of filters and gravimetric analysis of $PM_{2.5}$ samples will be established at ADEQ. For data management purposes, ADEQ will establish a database to track filter processing, to record field, laboratory, and QA/QC data, and to prepare reports.

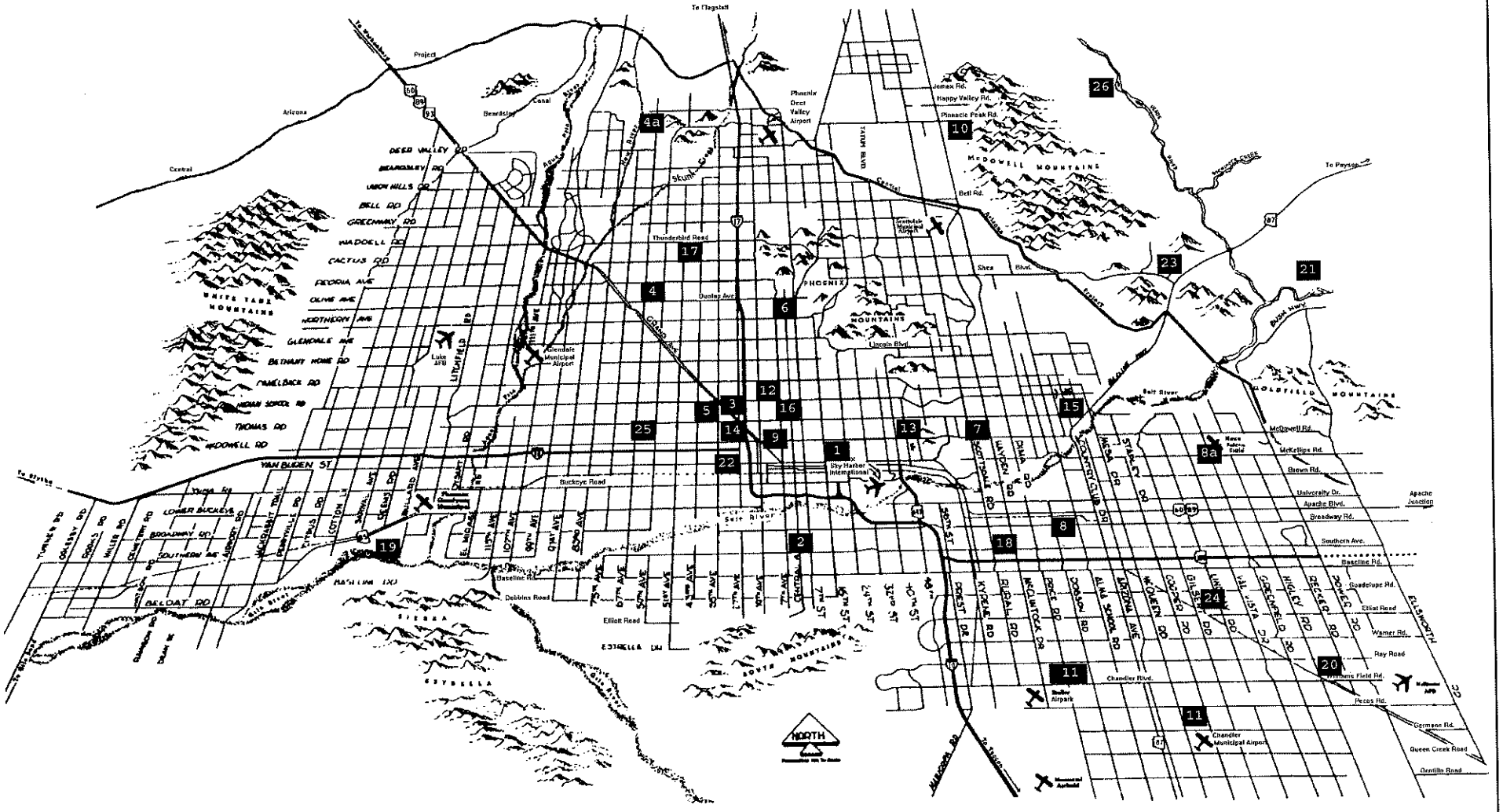


FIGURE 1

MARICOPA COUNTY MONITORING NETWORK

Map Key for Figure 1

Maricopa County Monitoring Network

Map Number	Site
1	1845 E. Roosevelt St. -- Phoenix
2	4732 S. Central Ave. -- Phoenix
3	3315 W. Indian School Rd. -- Phoenix
4	6000 W. Olive Ave. -- Glendale
4a	6801 W. Deer Valley Rd. -- Glendale/Arrowhead
5	3847 W. Earll Dr. -- Phoenix
6	601 E. Butler Dr. -- Phoenix
7	2857 N. Miller Rd. -- Scottsdale
8	Broadway Rd. & Brooks -- Mesa
8a	4530 E. McKellips Rd.-- Mesa
9	1826 W. McDowell Rd. -- Phoenix
10	25000 N. Windy Walk -- Scottsdale/Pinnacle Peak
11	1475 E. Pecos Rd. -- Chandler
11a	163 S. Price Rd. -- Chandler
12	4530 N. 17th Ave. -- Phoenix
13	2035 N. 52nd St. -- Phoenix
14	27th Ave./Grand Ave./Thomas Rd. -- Phoenix
15	10005 E. Osborn Dr. -- Scottsdale
16	3905 N. 7th Ave. -- Phoenix
17	4701 W. Thunderbird Rd. -- Phoenix
18	3340 S. Rural Rd. -- Tempe
19	15099 W. Casey Abbott -- Goodyear/Estrella
20	15500 S. Higley -- Higley
21	Sheriff's Station -- Blue Point
22	I-10/27th Ave. -- Phoenix
23	16426 E. Palisades -- Fountain Hills
24	535 N. Lindsay -- Gilbert
25	6180 W. Encanto -- Phoenix
26	Forest Rd. & Rio Verde Dr. -- Rio Verde
*	Nat. Forest Service -- Humboldt Mtn. -- see Fig.3
*	Nat. Forest Service -- Mount Ord. -- see Fig.3
*	155 N. Wegner St. -- Wickenburg -- see Fig.3

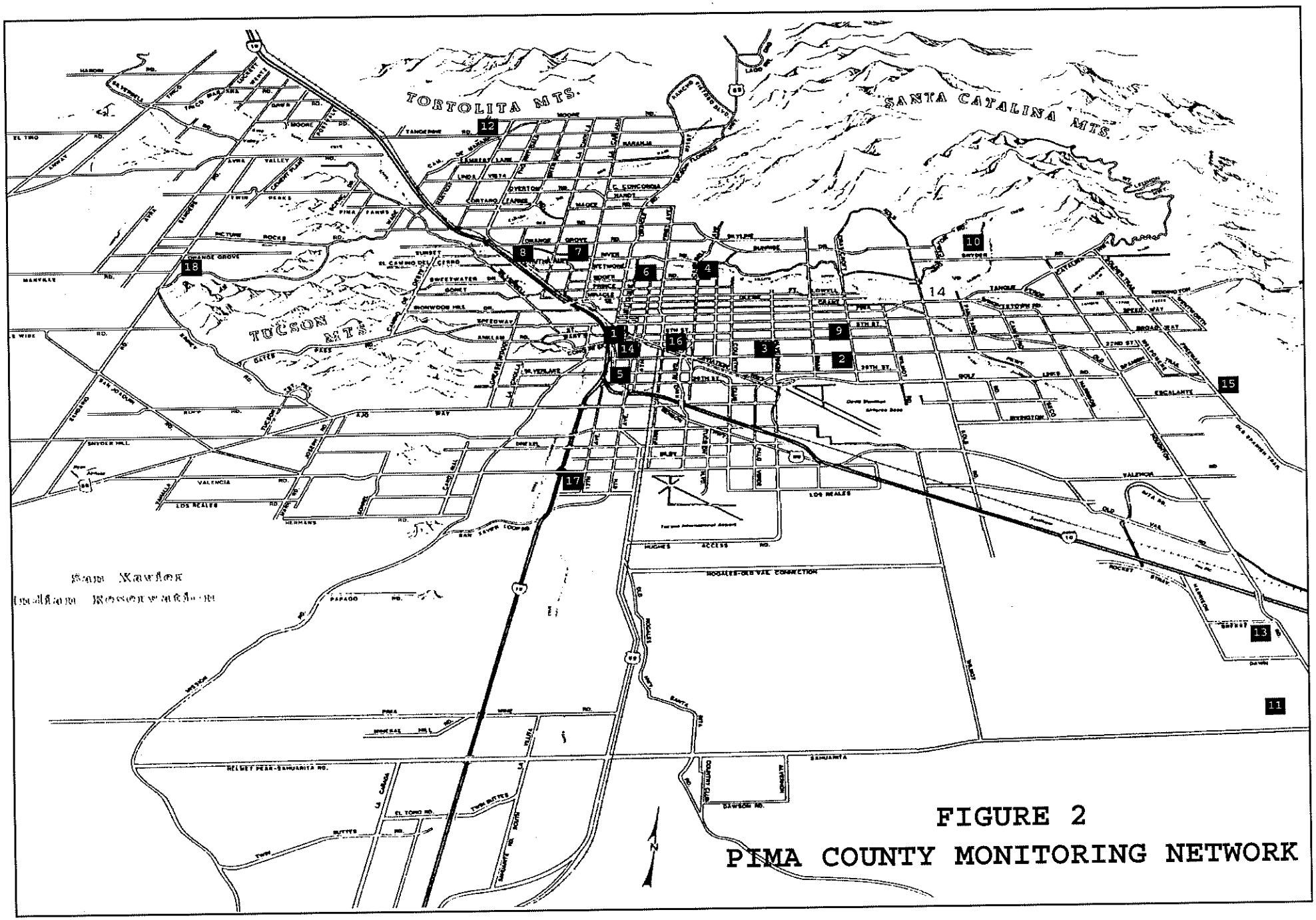


FIGURE 2
PIMA COUNTY MONITORING NETWORK

Map Key for Figure 2

Pima County Monitoring Network

Map Number	Site
1	190 W. Pennington St.
2	22nd St. & Craycroft Rd.
3	22nd St. & Alvernon Way
4	2745 N. Cherry Ave.
5	1810 S. 6th Ave. (South Tucson)
6	1016 W. Prince Rd.
7	4591 N. Pomona Rd.
8	3401 W. Orange Grove Rd.
9	2645 E. Broadway Blvd.
10	4829 N. Sabino Canyon Rd.
11	22000 S. Houghton Rd.
12	12101 N. Camino de Oeste
13	11330 S. Houghton Rd.
14	360 S. Church Ave.
15	3905 S. Old Spanish Trail (Saguaro NM East)
16	1435 N. Fremont Ave.
17	6910 S. Santa Clara Ave .
18	Maintenance Building -- Saguaro National Monument -- West
*	245 W. Esperanza Blvd. Green Valley (see Fig. 3)

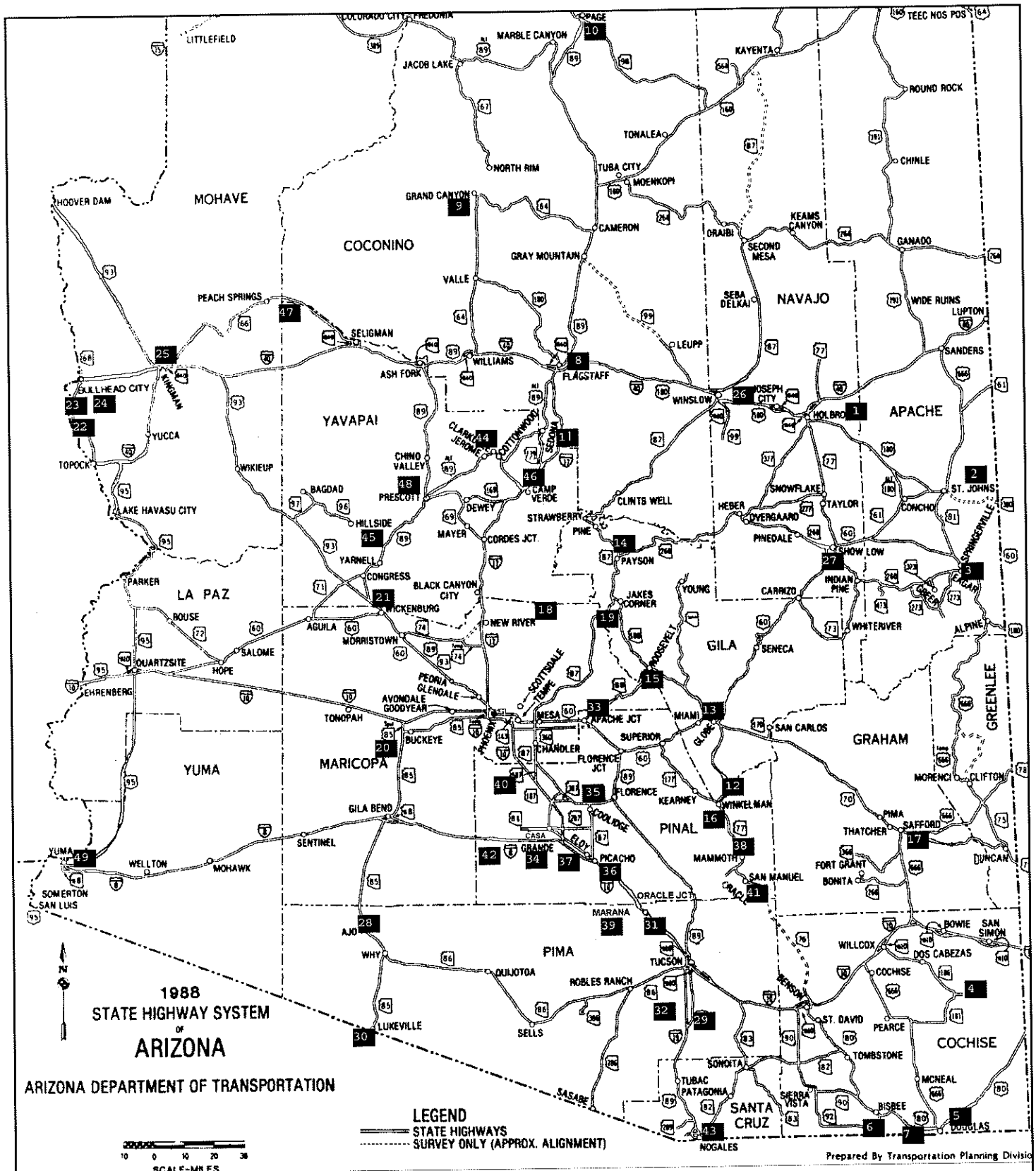


FIGURE 3
STATE, COUNTY & INDUSTRIAL MONITORING NETWORK

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	Humboldt Mtn
19		Mount Ord
20		Palo Verde
21		Wickenburg
22	Mohave	Alonas Way
23		Bullhead City
24		Fort Mohave
25		Kingman
26	Navajo	Joseph City
27		Show Low
28	Pima	Ajo
29		Green Valley
30		Organ Pipe
31		Rillito
32		Sierrita
33	Pinal	Apache Junction
34		Casa Grande
35		Coolidge
36		Eleven Mile Corner
37		Eloy
38		Mammoth
39		Marana
40		Maricopa
41		San Manuel
42		Stanfield
43	Santa Cruz	Nogales
44	Yavapai	Clarkdale
45		Hillside
46		Montezuma Castle
47		Nelson
48		Prescott
49	Yuma	Yuma

III. AIR QUALITY DATA FOR 1997

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

The 1997 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

$PM_{2.5}$

Dichot	Dichotomous
Imp.	Improve

Sulfur Dioxide

Fluor	Fluorescent

Table 2
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	$PM_{2.5}$	Sulfur Dioxide
APACHE:							
Petrified Forest		X			X	X	
St. Johns			X	X	X	X	X
Springerville			X		X	X	X
COCHISE:							
Chiricahua					X	X	
Douglas					X	X	
Naco					X		
Paul Spur					X	X	
COCONINO:							
Flagstaff					X	X	
Grand Canyon		X			X	X	
Page			X	X			X
Sedona					X		
GILA:							
Hayden					X	X	X
Miami					X	X	X
Payson					X	X	
Tonto (NM)		X			X	X	
Winkelman							X
MARICOPA:							
Chandler	X			X	X		
Fountain Hills				X			

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	$PM_{2.5}$	Sulfur Dioxide
MARICOPA (Cont'd):							
Gilbert	X			X	X		
Glendale	X			X	X		
Goodyear					X		
Higley					X		
Mesa	X			X	X		
Palo Verde			X	X	X	X	
Phoenix	X	X	X	X	X	X	X
Scottsdale	X			X	X		
Tempe					X	X	
Tonto National Forest						X	
Wickenburg					X		
MOHAVE:							
Alonas Way			X		X		X
Bullhead City					X	X	
Fort Mohave					X	X	
Kingman					X		
NAVAJO:							
Joseph City					X		
Show Low					X		
PIMA:							
Ajo					X	X	

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	$PM_{2.5}$	Sulfur Dioxide
PIMA (Cont'd):							
Green Valley					X		X
Organ Pipe					X	X	
Rillito					X	X	
Saguaro National Monument East				X			
Saguaro National Monument West						X	
Tucson	X	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	X	
YAVAPAI:							
Clarkdale		X			X	X	
Hillside					X	X	

Table 2 (Cont'd)
1997 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	$PM_{2.5}$	Sulfur Dioxide
YAVAPI (Cont'd):							
Montezuma Castle NM					X	X	
Nelson					X	X	
Prescott					X		
YUMA:							
Yuma				X	X	X	

Table 3
1997 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE		8-HR AVERAGE		NUMBER OF EXCEEDANCES		NUMBER OF SAMPLE
				MA	2ND HI	MAX	2ND HI	DAY	TIMES	
MARICOPA:										
Chandler	163 S. Price	Maricopa	GFC	3.8	3.6	2.7	2.6	0	0	7871
Gilbert	525 N. Lindsay	Maricopa	GFC	4.6	3.7	2.2	2.1	0	0	8277
Glendale	6000 W. Olive	Maricopa	GFC	5.4	5.2	3.9	3.0	0	0	6230
Mesa	Broadway & Brooks	Maricopa	GFC	7.5	7.0	4.7	4.4	0	0	8118
Phoenix	4732 S. Central	Maricopa	GFC	7.3	7.1	4.5	4.4	0	0	7587
Phoenix	1845 E. Roosevelt	Maricopa	GFC	9.4	9.0	7.2	7.1	0	0	8191
Phoenix	601 E. Butler	Maricopa	GFC	8.7	7.5	4.0	3.3	0	0	8060
Phoenix	3315 W. Indian School	Maricopa	GFC	10.8	10.3	8.2	7.3	0	0	8316
Phoenix	3847 W. Earll	Maricopa	GFC	11.7	10.3	7.1	7.0	0	0	7597
Phoenix	4530 N. 17th Ave	state	GFC	10.0	8.6	7.7	7.6	0	0	3539
Phoenix	27th Ave./Grand/Thomas	state	GFC	12.6	11.7	9.5	7.7	1	0	3266
Phoenix	3905 N. 7th Ave.	state	GFC	8.9	8.3	6.5	6.3	0	0	3606
Phoenix	I-10 & 27th Ave.	Maricopa	GFC	9.7	8.9	7.5	6.9	0	0	8147
Phoenix	6180 W. Encanto	Maricopa	GFC	8.3	7.9	6.6	6.2	0	0	6874
Scottsdale	2857 N. Miller	Maricopa	GFC	6.3	6.1	4.1	3.9	0	0	7845

Table 3 (Cont'd)
1997 Carbon Monoxide Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR AVERAGE MA	1-HR AVERAGE 2ND HI	8-HR AVERAGE MAX	8-HR AVERAGE 2ND HI	NUMBER OF EXCEEDANCES DAY	NUMBER OF EXCEEDANCES TIMES	NUMBER OF SAMPLE
PIMA:										
Tucson	190 W. Pennington	Pima	GFC	8.2	7.8	4.8	4.4	0	0	8658
Tucson	22nd & Craycroft	Pima	GFC	7.2	6.9	3.4	2.6	0	0	8643
Tucson	22nd & Alvernon	Pima	GFC	9.0	8.6	5.3	4.4	0	0	8738
Tucson	2745 N. Cherry	Pima	GFC	6.5	5.6	4.1	3.4	0	0	8206
PINAL:										
Apache Junction	County Courthouse	Pinal	GFC	2.2	2.0	1.6	1.0	0	0	8660
Casa Grande	Airport N. Pinal	Pinal	GFC	1.5	1.5	1.3	1.3	0	0	8628

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

Table 4
1997 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 Headquarters	NPS	$PM_{2.5}$	0.001	0.001	0.001	0.001	21	22	17	23
COCHISE:											
Douglas	City Park	state	PM_{10}	0.006	0.008	0.006	0.008	15	15	13	13
Chiricahua NM	Faraway Ranch	NPS	$PM_{2.5}$	0.002	0.002	0.001	0.002	24	27	26	25
COCONINO:											
Grand Canyon NP	Hopi Point	NPS	$PM_{2.5}$	0.001	0.001	0.000	0.001	23	27	26	23
Grand Canyon NP	Indian Gardens	NPS	$PM_{2.5}$	0.001	0.001	0.001	0.001	19	22	12	3
GILA:											
Hayden	Old Town Jail	state	PM_{10}	0.27	0.423	0.292	0.513	15	15	15	13
Tonto National Monument	Maintenance Station	NPS	$PM_{2.5}$	0.006	0.003	0.002	0.005	25	27	26	24
MARICOPA:											
Palo Verde	36248 W. Elliot	state	PM10	0.017	0.018	0.017	0.056	15	15	13	9
Phoenix	1845 E. Roosevelt	Maricopa	TSP	0.012	0.019	0.014	0.018	13	13	13	15
Phoenix	1826 W. McDowell	Maricopa	TSP	0.028	0.026	0.020	0.025	12	15	12	15
PIMA:											
Organ Pipe	Visitor's Center	state	PM_{10}	0.007	0.003	0.003	0.008	14	15	15	16
Tucson[b]	1016 W. Prince Rd.	Pima	TSP	.023	-	-	-	11	-	-	-

Table 4 (Cont'd)
1997 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
PIMA (Cont'd)											
Tucson[b]	22nd & Craycroft	Pima	TSP	0.011	-	-	-	15	-	-	-
SANTA CRUZ:											
Nogales	U.S. Post Office	state	PM_{10}	0.017	0.009	0.007	0.012	12	14	13	12
YAVAPAI:											
Clarkdale	NW Cement Plant	PC	PM_{10}	0.000	0.002	0.002	0.011	15	15	15	16
Clarkdale	SE Cement plant	PC	PM_{10}	0.005	0.000	0.004	0.003	15	15	15	16
Clarkdale	School	state	PM_{10}	0.003	0.001	0.003	0.024	11	9	14	14
Hillside	Sheriff Repeater Station	state	PM_{10}	0.002	0.001	0.001	0.001	14	13	11	9
Montezuma Castle	Maintenance Building	state	PM_{10}	0.001	0.004	0.003	0.004	13	8	13	6

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

Table 5
1997 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	40	21	7951
Springerville	Airport	TEP	Chem	4	38	13	7460
Springerville	4 mi. NE of town	TEP	Chem	2	55	11	7710
Springerville	1 mi. NNE of stack 1	TEP	Chem	4	79	15	7507
COCONINO:							
Page	Glen Canyon Dam	SRP	Chem	4	52	21	8555
MARICOPA:							
Palo Verde	36248 W. Elliot	state	Chem	6	70	19	3925
Phoenix	4530 N. 17th Ave.	state	Chem	62	209	201	6812
Phoenix	1845 E. Roosevelt	Maricopa	Chem	58	215	100	7172
Phoenix	I-10 & 27th Ave.	Maricopa	Chem	56	158	111	6413
Phoenix	3847 W. Earll	Maricopa	Chem	53	190	120	7505
Scottsdale	2857 N. Miller Rd.	Maricopa	Chem	N/A	154	90	1496
MOHAVE:							
Alonas Way	1285 Alonas Way	SCE	Chem	18	103	47	8710

Table 5 (Cont'd)
1997 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
PIMA:							
Tucson	22nd & Craycroft	Pima	Chem	34	130	64	8671

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

Table 6
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	1-HR AVG MAX	1-HR AVG 2ND HI	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
APACHE:							
St. Johns	Mesa Parada	SRP	.07	.06	0	.057	8033
COCHISE:							
Chiricahua NM	Faraway Ranch	NPS	.07	.07	0	.065	7822
COCONINO:							
Grand Canyon	2 mi. W. Hopi Point	NPS	.08	.07	0	.073	8035
Page	Glen Canyon Damn	SRP	.07	.07	0	.063	8540
GILA:							
Rye[abd]	RV Center	state	.08	.07	0	.057	1589
MARICOPA:							
Blue Point	Sheriff's Station	Maricopa	.10	.10	0	.084	8510
Chandler	163 S. Price	Maricopa	.10	.10	0	.078	7915
Fountain Hills	16426 E. Palisades	Maricopa	.11	.11	0	.089	8428
Glendale-Arrowhead	6801 W. Deer Valley	Maricopa	.07	.07	0	.061	4499
Glendale	6000 W. Olive	Maricopa	.10	.09	0	.077	6296
Humbolt Mountain	USFS Building	Maricopa	.10	.10	0	.082	3834
Mesa	4530 E McKellips Rd.	Maricopa	.10	.10	0	.082	8428
Mesa	Broadway & Brooks	Maricopa	.11	.10	0	.083	8258
Mount Ord	USFS Building	Maricopa	.11	.11	0	.085	5726

Table 6 (Cont'd)
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	1-HR AVG MAX	1-HR AVG 2ND HI	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
MARICOPA (Cont'd):							
Palo Verde[d]	36248 W. Elliot	state	.10	.09	0	.078	5704
Phoenix	2035 N. 52nd Street	Maricopa	.11	.11	0	.086	8369
Phoenix	1845 E. Roosevelt	Maricopa	.11	.10	0	.078	8208
Phoenix	601 E. Bulter	Maricopa	.11	.11	0	.092	8174
Phoenix	3847 W. Earll	Maricopa	.10	.10	0	.092	7516
Phoenix	4732 S. Central	Maricopa	.10	.10	0	.075	8066
Phoenix[d]	4530 N. 17th Ave.	state	.10	.10	0	.080	5741
Phoenix	6180 W. Encanto	Maricopa	.10	.10	0	.078	6919
Pinnacle Peak	25000 N. Windy Walk	Maricopa	.11	.11	0	.083	8418
Rio Verde	Forest Rd. & Rio Verde Dr.	Maricopa	.11	.10	0	.086	3460
Roosevelt Lake	Visitor's Center	Maricopa	.11	.10	0	.088	3309
Scottsdale	2857 N. Miller Rd.	Maricopa	.10	.10	0	.077	7875
Scottsdale[d]	10005 E. Osborn	state	.11	.10	0	.083	5790
PIMA:							
Saguaro NM E	3905 S. Old Spanish Trail	Pima	.10	.09	0	.080	8489
Tucson	190 W. Pennington	Pima	.08	.08	0	.065	8602

Table 6 (Cont'd)
1997 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	1-HR AVG MAX	1-HR AVG 2ND HI	NUMBER OF 1-HR EXCEEDANCES	4TH HIGHEST 8-HR AVG	NUMBER OF SAMPLES
PIMA (Cont'd):							
Tucson	22nd & Craycroft	Pima	.11	.10	0	.077	8690
Tucson	11330 S. Houghton	Pima	.08	.08	0	.066	8688
Tucson[a]	400 W. Power Road	Pima	.09	.09	0	.065	3368
Tucson	12101 N. Camino deOeste	Pima	.08	.08	0	.070	8676
PINAL:							
Apache Junction	County Courthouse	Pinal	.11	.10	0	.082	8665
Casa Grande	Airport - N. Pinal	Pinal	.08	.08	0	.072	8655
YAVAPAI:							
Hillside[d]	Sheriffs Repeater Station	state	.09	.08	0	.078	4230
YUMA:							
Yuma[d]	1485 Second Ave.	state	.10	.10	0	.078	5559

STATE AND FEDERAL STANDARDS (ppm):	Maximum Daily 1-HR Average	Maximum Daily 8-HR Average
Old	0.12	
New		0.08

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

Table 7
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
APACHE:								
Petrified Forest	1 mi. from Visitor Center	NPS	Improve	9	43	30	0	80
St Johns	Mesa Parada	SRP	Dichot	7	18	18	0	58
St. Johns	Carrizo Draw	SRP	Dichot	8	32	18	0	61
Springerville	Coyote Hills	TEP	Dichot	8	22	19	0	120
Springerville	Plant Site	TEP	Dichot	10	34	33	0	116
COCHISE:								
Chiricahua NM	Faraway Ranch	NPS	Improve	9	35	22	0	100
Douglas	High School	state	Dichot	26	55	55	0	56
Naco	Port of Entry	state	SA1200	33	113	47	0	55
Paul Spur	Housing area	state	Dichot	39	77	74	0	49
COCONINO:								
Flagstaff	5701 E. Railroad	state	Wedd'g	15	40	39	0	61
Flagstaff	Middle School	state	Dichot	15	32	32	0	60
Grand Canyon	Hopi Point	NPS	Improve	8	31	31	0	96
Grand Canyon	Indian Gardens	NPS	Improve	14	82	58	0	80
Sedona	Post Office	state	SA322	11	24	23	0	44
GILA:								
Hayden	Old Town Jail	state	Dichot	36	158	67	1	58
Miami	Golf Course	CMMC	Dichot	27	67	62	0	61

Table 7 (Cont'd)
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
GILA (Cont'd):								
Miami	Ridgeline	CMMC	Dichot	14	33	29	0	59
Miami[b]	Barcon Building US60	state	TEOM	50	161	154	1	7663
Payson	US West Building	state	Dichot	25	81	67	0	59
Tonto	Maintenance Station	NPS	Improve	12	42	28	0	98
GRAHAM:								
Safford[c]	523 Tenth Ave.	state	SA1200	29	95	62	0	45
MARICOPA:								
Chandler	1475 E. Pecos Rd.	Maricopa	SA1200	61	221	148	1	57
Chandler W.	163 S. Price Rd.	Maricopa	SA1200	45	194	162	2	57
Gilbert	535 N. Lindsay Road	Maricopa	SA1200	49	170	108	1	55
Glendale	6000 W. Olive	Maricopa	SA321B	38	170	87	1	57
Goodyear/Estrella	15099 W. Casey Abbott	state	Dichot	35	179	146	1	50
Higley	15500 S. Higley	state	Dichot	64	288	234	2	56
Maryvale	6180 W. Encanto	Maricopa	SA1200	49	345	161	2	61
Mesa	Broadway & Brooks	Maricopa	SA1200	43	129	119	0	59
Palo Verde	36248 W. Elliot Rd.	state	Dichot	20	124	73	0	52
Phoenix	4732 S. Central	Maricopa	SA321B	55	160	114	1	61
Phoenix	3847 W. Earll	Maricopa	SA321B	51	224	137	1	60

Table 7 (Cont'd)
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
MARICOPA (Cont'd):								
Phoenix	1845 E. Roosevelt	Maricopa	BA321B	44	108	96	0	55
Phoenix	601 E Butler	Maricopa	SA321B	38	152	81	0	51
Phoenix	4530 N. 17th Ave.	state	Dichot	39	131	82	0	57
Phoenix	4530 N. 17th Ave.	state	TEOM	36	147	143	0	7328
Phoenix	27th Ave./I-10	state	Dichot	49	148	103	0	53
Phoenix	27th Ave./I-10	state	TEOM	45	161	113	1	7792
Phoenix	27th Ave./I-10	Maricopa	SA1200	61	220	125	1	56
Phoenix	4701 W. Thunderbird	state	Dichot	34	164	92	1	55
Scottsdale	2857 N. Miller Rd.	Maricopa	SA321B	41	154	84	0	60
Tempe	3340 S. Rural	state	Dichot	36	90	74	0	56
Wickenburg	155 N. Tegner St.	Maricopa	SA321B	32	125	65	0	48
MOHAVE:								
Alona's Way	1285 Alona's Way	SCE	SA321B	21	51	43	0	57
Bullhead City[b]	224 N. Main	state	TEOM	26	139	85	0	7104
Bullhead City[ac]	990 Highway 95	state	Dichot	15	30	22	0	10
Fort Mohave	Fort Mohave	state	Dichot	15	68	44	0	57
Kingman	I-40/Griffith Rd.	Praxair	SA1200	12	34	32	0	111
NAVAJO:								
Joseph City	Third & Tanner	APS	Wedd'g	15	35	21	0	61

Table 7 (Cont'd)
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
NAVAJO (Cont'd):								
Show Low[c]	Deuce of Clubs Ave.	state	Wedd'g	16	127	35	0	44
PIMA:								
Ajo	Well Road	state	Dichot	20	65	50	0	49
Corona de Tucson	22000 S. Houghton	Pima	SA1200	15	34	31	0	61
Green Valley	245 W. Esperanza	Pima	SA1200	16	42	30	0	60
Organ Pipe NM	Visitors Center	state	Dichot	10	75	29	0	59
Rillito	8820 W. Water	state	Dichot	40	129	128	0	58
Rillito	8820 W. Water	APCC	Wedd'g	26	77	67	0	110
Tucson	2645 E. Broadway	Pima	SA1200	28	58	57	0	61
Tucson	6910 S. Santa Clara	Pima	SA1200	27	64	46	0	61
Tucson	360 S. Church	Pima	SA1200	29	72	71	0	248
Tucson	3401 W. Orange Grove	Sta/Pima	Dichot	31	68	66	0	61
Tucson	1016 W. Prince Rd	Pima	SA1200	34	62	58	0	50
Tucson	1810 S. 6th Ave	Pima	SA1200	33	72	69	0	61
Tucson	22nd/Craycroft	Sta/Pima	Dichot	26	63	56	0	61
Tucson	12101 N. CaminodeOeste	Sta/Pima	Dichot	15	40	31	0	61
Tucson	11330 S. Houghton Rd.	Sta/Pima	Dichot	16	41	33	0	61
Tucson	1435 N. Fremont	Sta/Pima	Dichot	27	58	53	0	61
Tucson	4829 N. Sabino Canyon	Pima	Wedd'g	17	36	35	0	59

Table 7 (Cont'd)
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
PINAL:								
Apache Junction	South County Courthouse	Pinal	Wedd'g	25	81	58	0	61
Apache Junction	North County Courthouse	Pinal	Wedd'g	28	81	57	0	60
Casa Grande[f]	401 Marshall Rd.	Pinal	Wedd'g	35	188	76	1	60
Coolidge[f]	County Highway Yard	Pinal	Wedd'g	41	156	102	1	61
Eleven Mile Crn.[f]	Rodeo Grounds	Pinal	SA321B	62	407	230	2	58
Eloy[f]	Eloy Fire Department	Pinal	SA321B	44	348	82	1	55
Mammonth	County Courthouse	Pinal	SA1200	22	46	46	0	57
Marana	Pinal Air Park	Pinal	SA1200	26	65	62	0	60
Maricopa[f]	Edwards Residence	Pinal	SA321B	73	855	685	2	59
Stanfield[f]	County Courthouse	Pinal	Wedd'g	53	608	157	2	60
SANTA CRUZ:								
Nogales	U.S. Post Office	state	Dichot	31	126	93	0	51
YAVAPAI:								
Clarkdale	SEofCTI Flyash Silo	PC	Dichot	24	50	45	0	61
Clarkdale	Clarkdale School	state	Dichot	15	33	27	0	48
Clarkdale	NW of Cement Plant	PC	Dichot	24	63	62	0	61
Hillside	Sheriff Repeater St.	state	Dichot	12	85	38	0	47
Montezuma Castle[e]	Maintenance Building	state	Dichot	12	31	22	0	42

Table 7 (Cont'd)
1997 PM_{10} Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	24-HOUR AVERAGE MAX	24-HOUR AVERAGE 2ND	NUMBER OF EXCEEDANCES 24-HR STD	NUMBER OF SAMPLES
YAVAPAI (Cont'd:)								
Nelson	Chemstar Lime Plant	state	Dichot	14	53	40	0	55
Prescott	City Administration Building	state	Wedd'g	14	38	33	0	50
YUMA:								
Yuma[c]	2795 Avenue B	state	Dichot	36	108	83	0	34

STATE & FEDERAL STANDARDS (ug/m^3):	Annual Average	24-Hour
Old	50	150 (Not to be exceeded more than once per year)
New	50	150 (Not to be exceeded by the 99th percentile)

See Table 1 for details on the standards.

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. PM_{10} exceedances identified by Pinal County to have been caused by high winds. Additional information can be found in the Natural Events Action Plan as adopted on December 3, 1997 by the Pinal County Board of Supervisors under Resolution No.12397-AQC.

Table 8
1997 $PM_{2.5}$ Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98th PERCENTILE FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
APACHE:						
Petrified Forest	1 mi. from Visitor Center	NPS	Improve	4	11	82
St Johns	Mesa Parada	SRP	Dichot	4	7	58
St. Johns	Carrizo Draw	SRP	Dichot	4	7	61
Springerville	Coyote Hills	TEP	Dichot	4	8	121
Springerville	Plant Site	TEP	Dichot	4	8	116
COCHISE:						
Chiricahua NM	Faraway Ranch	NPS	Improve	5	12	100
Douglas	High School	state	Dichot	6	11	56
Paul Spur	Housing area	state	Dichot	9	25	49
COCONINO:						
Flagstaff	Middle School	state	Dichot	5	15	60
Grand Canyon	Hopi Point	NPS	Improve	3	16	95
Grand Canyon	Indian Gardens	NPS	Improve	5	21	55
GILA:						
Hayden	Old Town Jail	state	Dichot	9	17	58
Miami	Golf Course	CMMC	Dichot	8	14	61
Miami	Ridgeline	CMMC	Dichot	6	8	59
Payson	US West Building	state	Dichot	12	51	59
Tonto	Maintenance Station	NPS	Improve	5	10	102

Table 8 (Cont'd)
1997 $PM_{2.5}$ Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98th PERCENTILE FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
MARICOPA:						
Higley	15500 S. Higley	state	Dichot	10	23	56
Goodyear/Estrella	15099 W. Casey Abbott	state	Dichot	8	21	50
Palo Verde	36248 W. Elliot	state	Dichot	5	11	52
Phoenix	4530 N.17th Ave.	state	Dichot	12	32	57
Phoenix	4701 W. Thunderbird	state	Dichot	9	20	55
Tempe	3340 S. Rural	state	Dichot	10	26	56
Tonto Nat'l Forest	Mount Ord	state	Improve	4	8	88
MOHAVE:						
Fort Mohave	Fort Mohave	state	Dichot	4	10	57
PIMA:						
Ajo	Well Road	state	Dichot	5	11	49
Organ Pipe NM	Visitors Center	state	Dichot	4	13	59
Rillito	8820 W. Water	state	Dichot	6	27	58
Saguaro Nat'l Mon	West Unit	state	Improve	5	11	86
Tucson	3401 W. Orange Grove	Sta/Pima	Dichot	9	21	61
Tucson	22nd/Craycroft	Sta/Pima	Dichot	7	12	61
Tucson	12101 N. Camino de Oeste	Sta/Pima	Dichot	5	10	61
Tucson	11330 S. Houghton Rd.	Sta/Pima	Dichot	6	9	61
Tucson	1435 N. Fremont	Sta/Pima	Dichot	8	17	61

Table 8 (Cont'd)
1997 $PM_{2.5}$ Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	98th PERCENTILE FOR 24-HOUR AVERAGES	NUMBER OF SAMPLES
SANTA CRUZ:						
Nogales	U.S. Post Office	state	Dichot	13	43	51
YAVAPAI:						
Clarkdale	SEofCTI Flyash Silo	PC	Dichot	5	25	61
Clarkdale	Clarkdale School	state	Dichot	4	9	48
Clarkdale	NW of Cement Plant	PC	Dichot	5	14	61
Hillside	Sheriff Repeater Station	state	Dichot	3	10	47
Montezuma Castle[c]	Maintenance Building	state	Dichot	4	9	42
Nelson	Chemstar Lime Plant	state	Dichot	5	15	55
YUMA:						
Yuma[c]	2795 Avenue B	state	Dichot	6	16	34

	Annual Average	24-Hour
STATE & FEDERAL STANDARDS (ug/m^3):	15	65 (Not to be exceeded by the 98th percentile)

See Table 1 for details on the standards.

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

Table 9
1997 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 3-HR	MAXIMUM 24-HR AVG	NUMBER OF EXCEEDANCES 3-HR STD	NUMBER OF EXCEEDANCES 24-HR	NUMBER OF SAMPLES
APACHE:									
St. Johns	Mesa Parada	SRP	Fluor	8	41	23	0	0	7982
Springerville	4 mi. NE of town	TEP	Fluor	<1	55	13	0	0	7793
Springerville	Airport	TEP	Fluor	<1	37	8	0	0	7842
Springerville	1 mi. NNE-unit 1	TEP	Fluor	3	160	34	0	0	6293
COCONINO:									
Page	Glen Canyon Dam	SRP	Fluor	5	125	36	0	0	8559
GILA:									
Hayden	Garfield Ave.	ASARCO	Fluor	22	521	283	0	0	8427
Hayden	Jail	ASARCO	Fluor	15	584	127	0	0	8401
Hayden	Hayden Junction	ASARCO	Fluor	12	285	47	0	0	8389
Hayden	Montgomery Ranch	ASARCO	Fluor	40	645	239	0	0	8199
Hayden	Jail	state	Fluor	5	697	152	0	0	8456
Miami	Ridgeline-Linden	state	Fluor	5	524	92	0	0	8347
Miami	Jones Ranch	CMMC	Fluor	10	820	138	0	0	8750
Miami	Town Site	CMMC	Fluor	3	417	57	0	0	8748
Winkleman	1 mi. N Junction 77/177	ASARCO	Fluor	43	836	315	0	0	8227
MARICOPA:									
Phoenix	I-10 & 27th Ave.	Maricopa	Fluor	5	49	26	0	0	5441
Phoenix	3847 W. Earll	Maricopa	Fluor	3	21	16	0	0	5794

Table 9 (Cont'd)
1997 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAXIMUM 3-HR	MAXIMUM 24-HR AVG	NUMBER OF EXCEEDANCES 3-HR STD	NUMBER OF EXCEEDANCES 24-HR	NUMBER OF SAMPLES
MARICOPA (Cont'd):									
Phoenix	1845 E. Roosevelt	Maricopa	Fluor	11	71	31	0	0	7417
Scottsdale	2857 N. Miller Rd	Maricopa	Fluor	8	24	18	0	0	6317
MOHAVE:									
Alonas Way	1285 Alonas Way	SCE	Fluor	5	144	28	0	0	8701
PIMA:									
Sierrita	7515W. MageeRanch Rd.	state	Fluor	3	440	55	0	0	8193
Tucson	22nd & Craycroft	Pima	Fluor	5	39	13	0	0	7583
PINAL:									
San Manuel	Townsite	BHP	Fluor	33	374	95	0	0	8725
San Manuel[b]	Golf Course	BHP	Fluor	8	197	48	0	0	4520
San Manuel	Dorm Site	BHP	Fluor	11	220	75	0	0	8751
San Manuel	LDS Church	state	Fluor	8	291	60	0	0	8626
San Manuel	Hospital	BHP	Fluor	32	705	208	0	0	8742

STANDARDS:	3-hour Average	24-Hour Average	Annual Average
State (ug/m^3)	1300	365	80
Federal (ppm)	0.5	0.14	0.03

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

IV. AIR QUALITY TRENDS

A. CARBON MONOXIDE

From 1989 through 1993 CO concentrations in Phoenix declined gradually at both trend sites, the microscale site, Indian School Road, and Roosevelt Street, the neighborhood scale site (see Figure 4). In 1994 and 1995, however, concentrations increased at these two sites, and then declined in 1996 and 1997. In Tucson, a similar trend is apparent except that concentrations decreased more steeply in 1991-1993. The trend site selected for Tucson, Alvernon Way, is a microscale site. This 10-year trend is also evident in the graph of exceedances of the 8-hour standard, 9 ppm, in Figure 5. Variations from year to year were most likely due to changes in meteorolgy. However, the 10-year trend suggests a reduction in CO emissions due to cleaner vehicles.

B. LEAD

Lead concentrations during the past 10 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 vehicles, starting in the mid-1970s due to the use of non-leaded gasoline.

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 and in Tucson, compared with the 30-40 ug/m^3 range. Since valid data for Phoenix is limited to recent years at a few sites, a trend graph was not plotted.

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 not a 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 in Phoenix (see Figure 8). The number of exceedances varied subtantially from year to year due to changes in meteorolgy. This was especially apparent in 1995-1997. Another significant factor affecting the trend data is the expansion of the monitoring network. Maricopa County installed several new sites in the past four years in the eastern part of the Valley where higher ozone concentrations occur.

In Tucson, Yuma, and Pinal County, there were not exceedances of the 1-hour standard monitored.

E. PM_{10}

For the Phoenix metropolitan area, there is not a major variation in PM_{10} levels apparent over the past six years (see Table 9). There are fluctuations in the annual averages from year to year,

probably due to changes in meteorology or land use near the sites. Chandler remains the only trend site exceeding the annual and 24-hour standards in the area. It should be noted that there are other sites in the Phoenix urban area which exceed the annual and 24-hour standards, but data is limited to a few years. These sites include Phoenix-Maryvale, Phoenix-Greenwood, Phoenix-Salt River, and Higley.

In the Tucson urban area, PM_{10} concentrations have not changed appreciably in the last six years (see Table 9) with one exception. At the Prince Road site a significant increase in concentrations occurred in 1995. Nevertheless, exceedances of the annual or 24-hour standards have not been monitored in Tucson during the past nine years.

In other areas of Arizona, annual PM_{10} levels have not varied substantially over the past six years except in Douglas, Naco, Nogales, Payson, and Paul Spur (see Table 10). In Douglas, Nogales, and Payson averages have decreased steadily during this period. Specifically, the annual average in Nogales steadily declined, from 54 ug/m^3 in 1992 to 31 ug/m^3, in 1997. As a result, Nogales was in compliance with the annual standard in 1993.

Naco and Paul Spur also experienced decreased concentrations. At Naco the PM_{10} average level declined significantly in 1996 to 32 ug/m^3, whereas at Paul Spur, a substantial decrease occurred in 1993. As a result, Paul Spur has acheived and maintained compliance with the annual and 24-hour standards.

F. SULFUR DIOXIDE

In 1989 nine exceedances of the 3-hour standard were monitored in Hayden and San Manuel (see Figure 9). Subsequently, the maximum number of 3-hour exceedances in any of the three Arizona smelter towns has been one per year. Thus, the smelter towns have been in compliance with air quality standards from 1990 through 1997, 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 has the best record among the three smelter towns without exceedances since 1987.

FIGURE 4

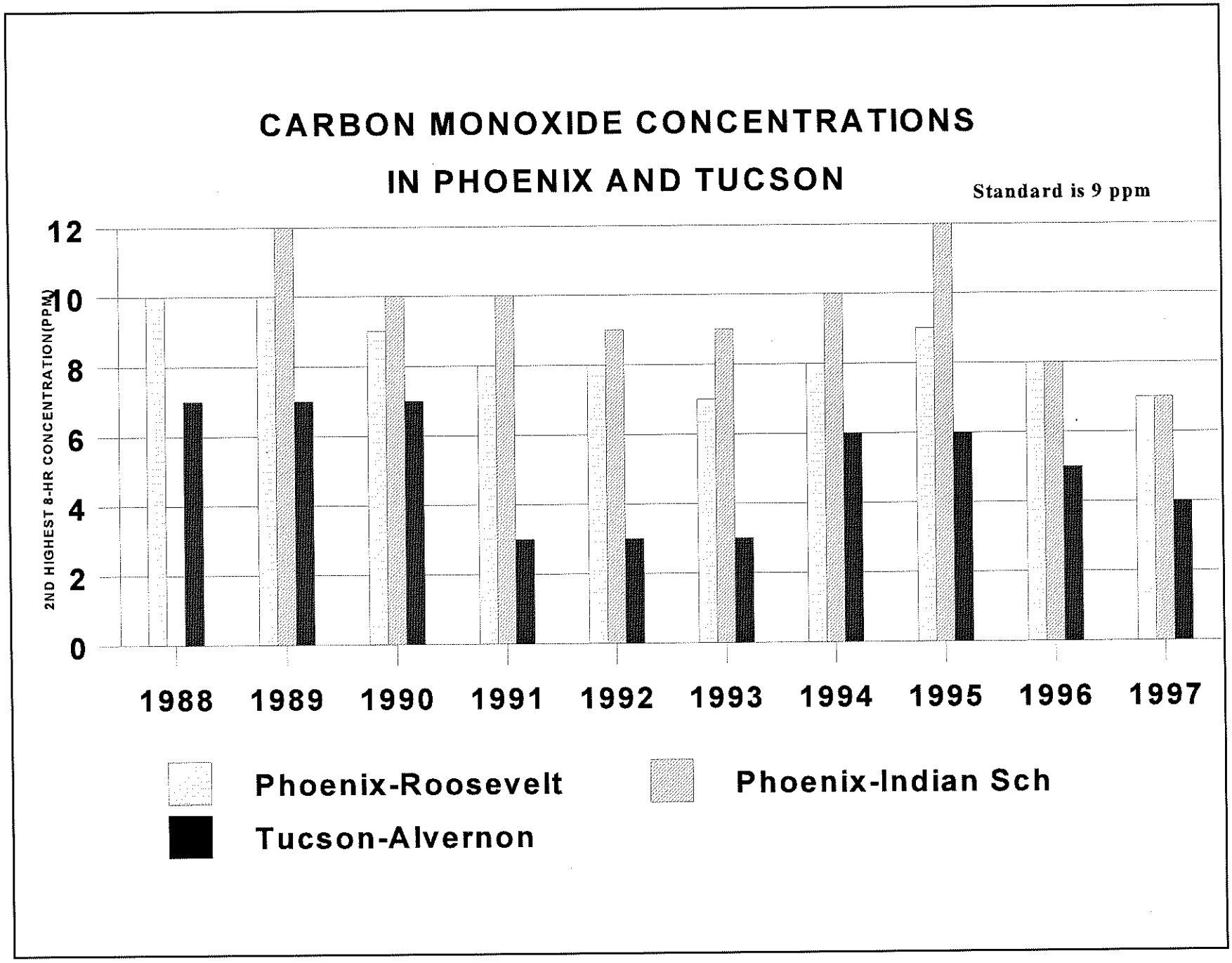

CARBON MONOXIDE CONCENTRATIONS
IN PHOENIX AND TUCSON
Standard is 9 ppm
2ND HIGHEST 8-HR CONCENTRATION(PPM)
12
10
8
6
4
2
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Phoenix-Roosevelt
Phoenix-Indian Sch
Tucson-Alvernon

FIGURE 5

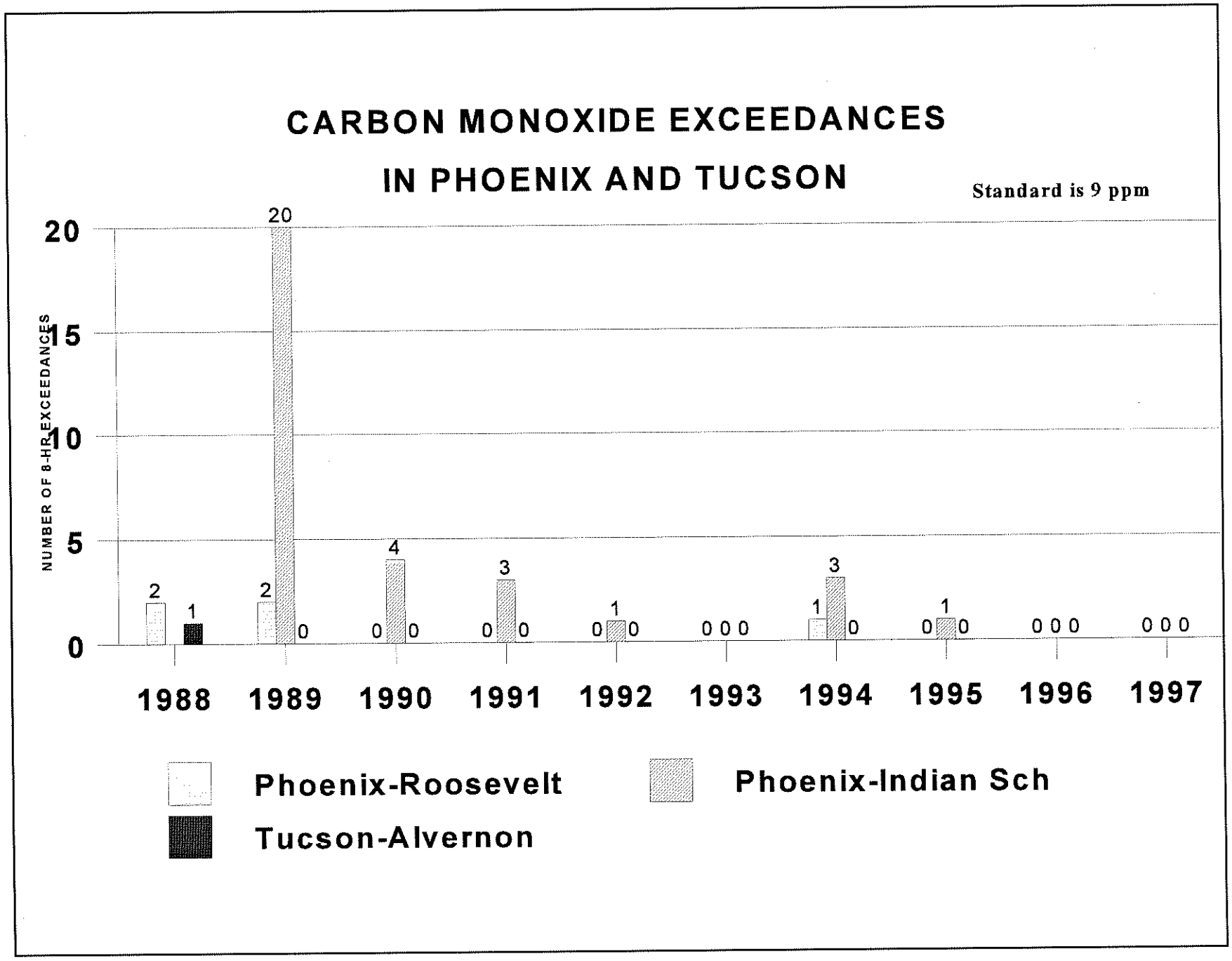

CARBON MONOXIDE EXCEEDANCES
IN PHOENIX AND TUCSON
Standard is 9 ppm
NUMBER OF 8-HR EXCEEDANCES
20
15
10
5
0
2
1
2
20
0
0
4
0
0
3
0
0
1
0
0 0 0
1
3
0
0
1
0
0 0 0
0 0 0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Phoenix-Roosevelt
Phoenix-Indian Sch
Tucson-Alvernon

FIGURE 6

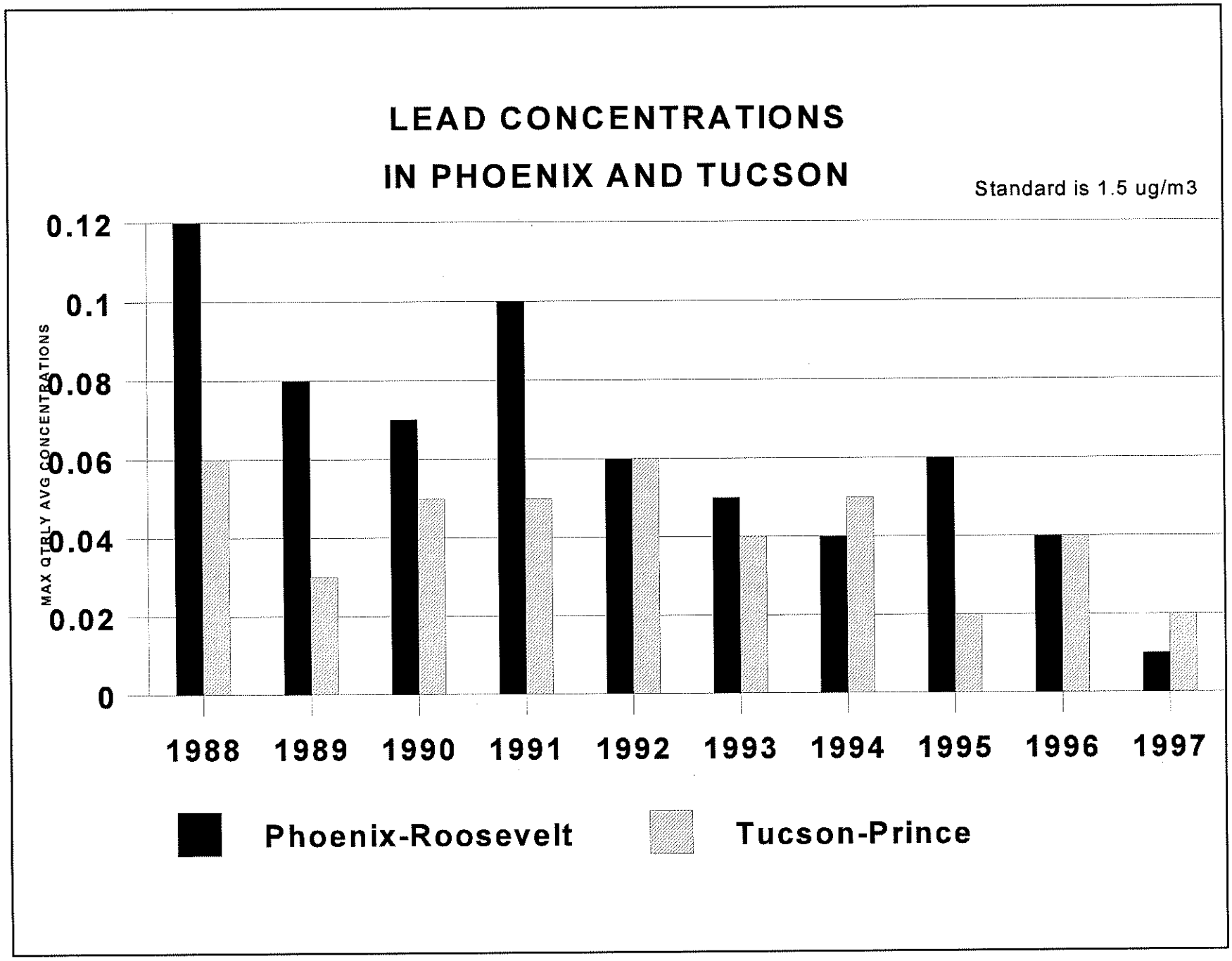

LEAD CONCENTRATIONS
IN PHOENIX AND TUCSON
Standard is 1.5 ug/m3
MAX QTRLY AVG CONCENTRATIONS
0.12
0.1
0.08
0.06
0.04
0.02
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Phoenix-Roosevelt
Tucson-Prince

FIGURE 7

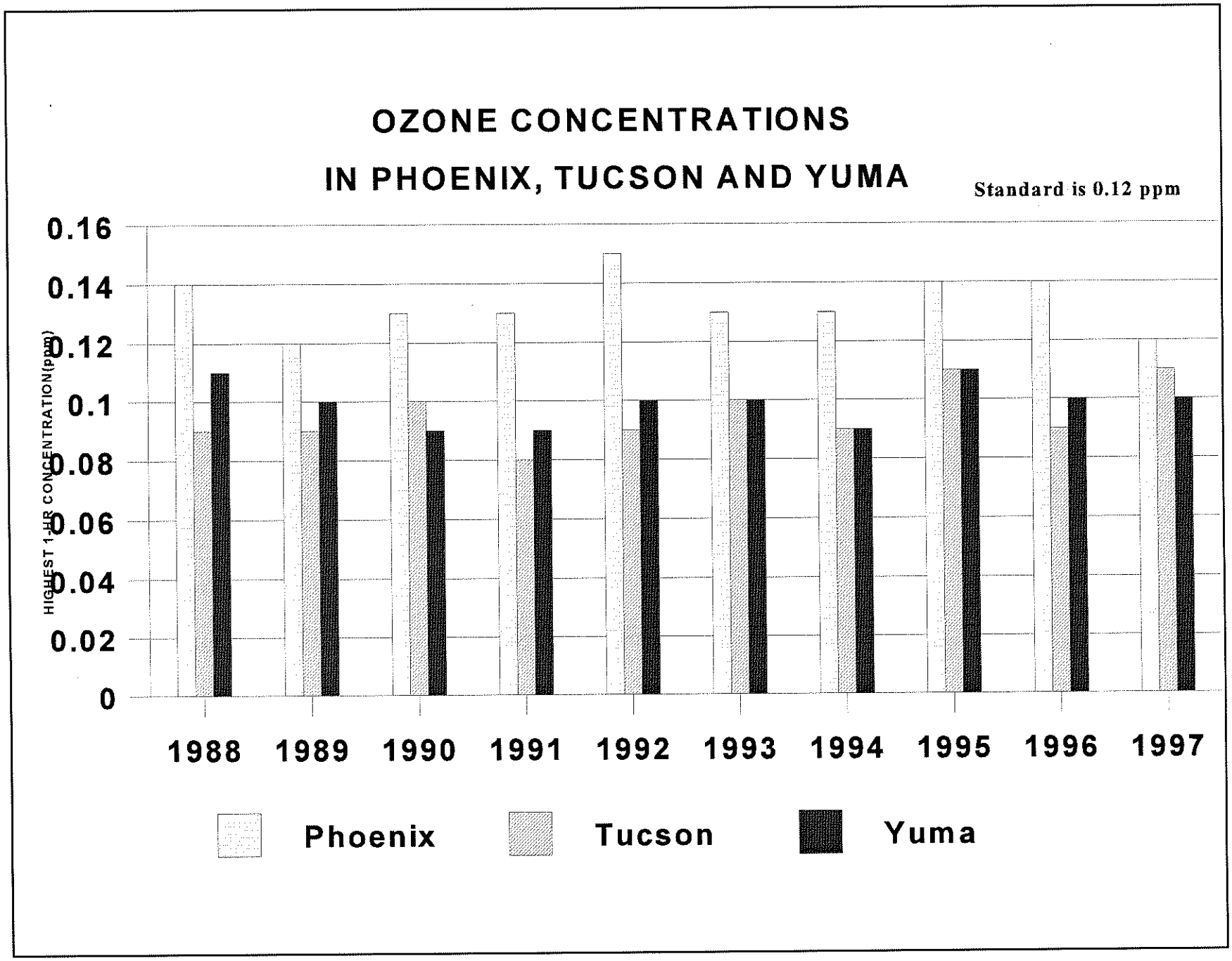

OZONE CONCENTRATIONS
IN PHOENIX, TUCSON AND YUMA
Standard is 0.12 ppm
HIGHEST 1-HR CONCENTRATION(ppm)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Phoenix
Tucson
Yuma

FIGURE 8

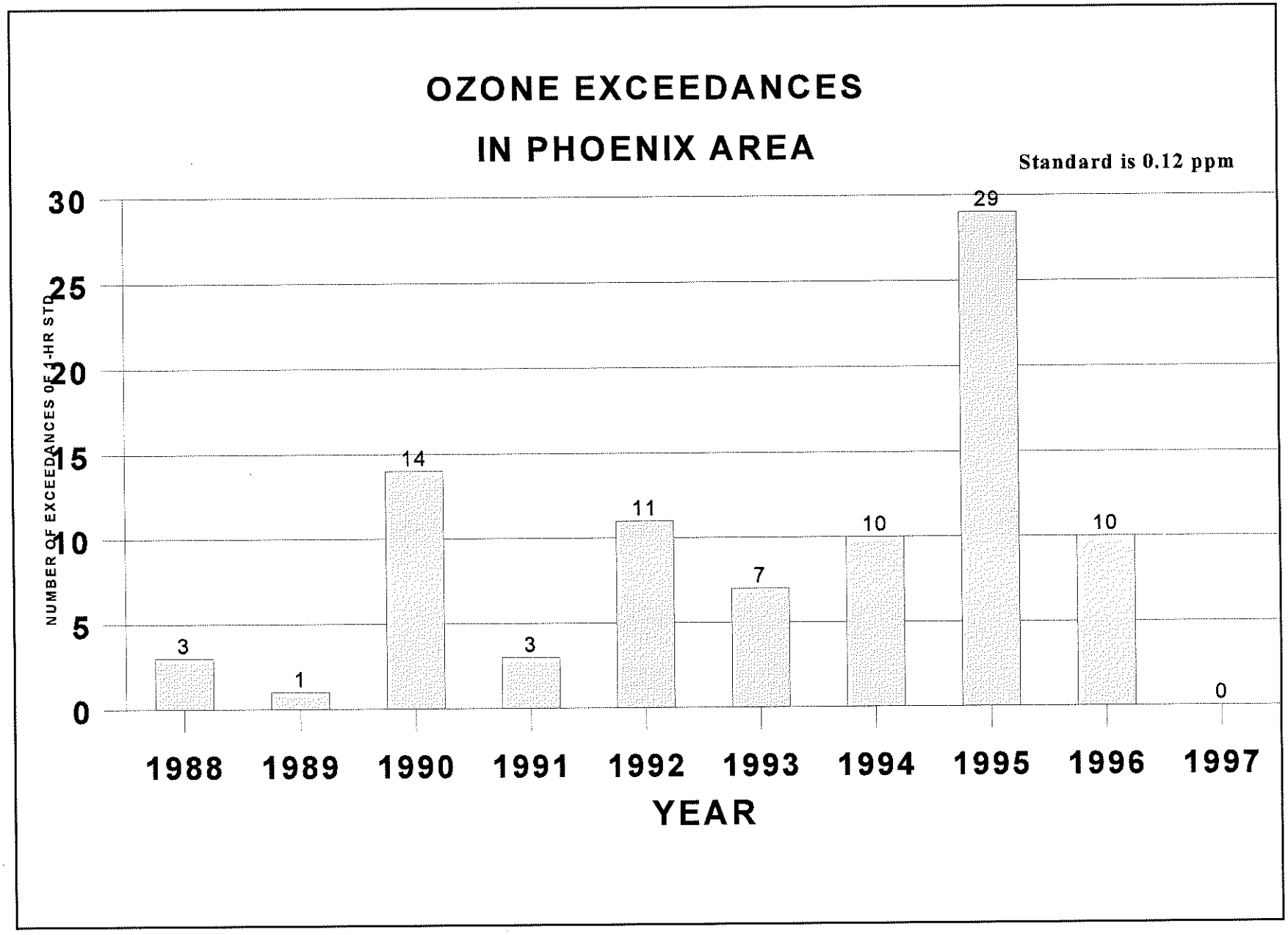

OZONE EXCEEDANCES
IN PHOENIX AREA
Standard is 0.12 ppm
NUMBER OF EXCEEDANCES OF 1-HR STD
30
25
20
15
10
5
0
3
1
14
3
11
7
10
29
10
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
YEAR

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

PHOENIX URBAN AREA						
SITE	1992	1993	1994	1995	1996	1997
Central Phoenix	42[a]	43[a]	43	44	41	44
Chandler	56[a]	58[a]	50	53	62	61
Glendale	34[a]	35	33	33	34	38
North Phoenix	35[a]	34	35	36	37	38
South Phoenix	48	44	44	46	47	55
West Phoenix	47[a]	44	43	44	45	51
Mesa	29[a]	35	36[a]	35	33	43
South Scottsdale	34	34[a]	38	36	35	41
TUCSON URBAN AREA						
SITE	1992	1993	1995	1995	1996	1997
South Tucson	32	32	27	31	31	33
Prince Road	28	24	25	38	36	34
Corona de Tucson	12	12	13	15	13	15
Green Valley	15	16	16	16	15	16
Orange Grove	30	28	31	34	32	31
Broadway/Swan	36[a]	25	26	28	25	28

a. Invalid annual average due to insufficient number of samples

Annual standard - 50 $\mu g/m^3$ for a 3-year running average

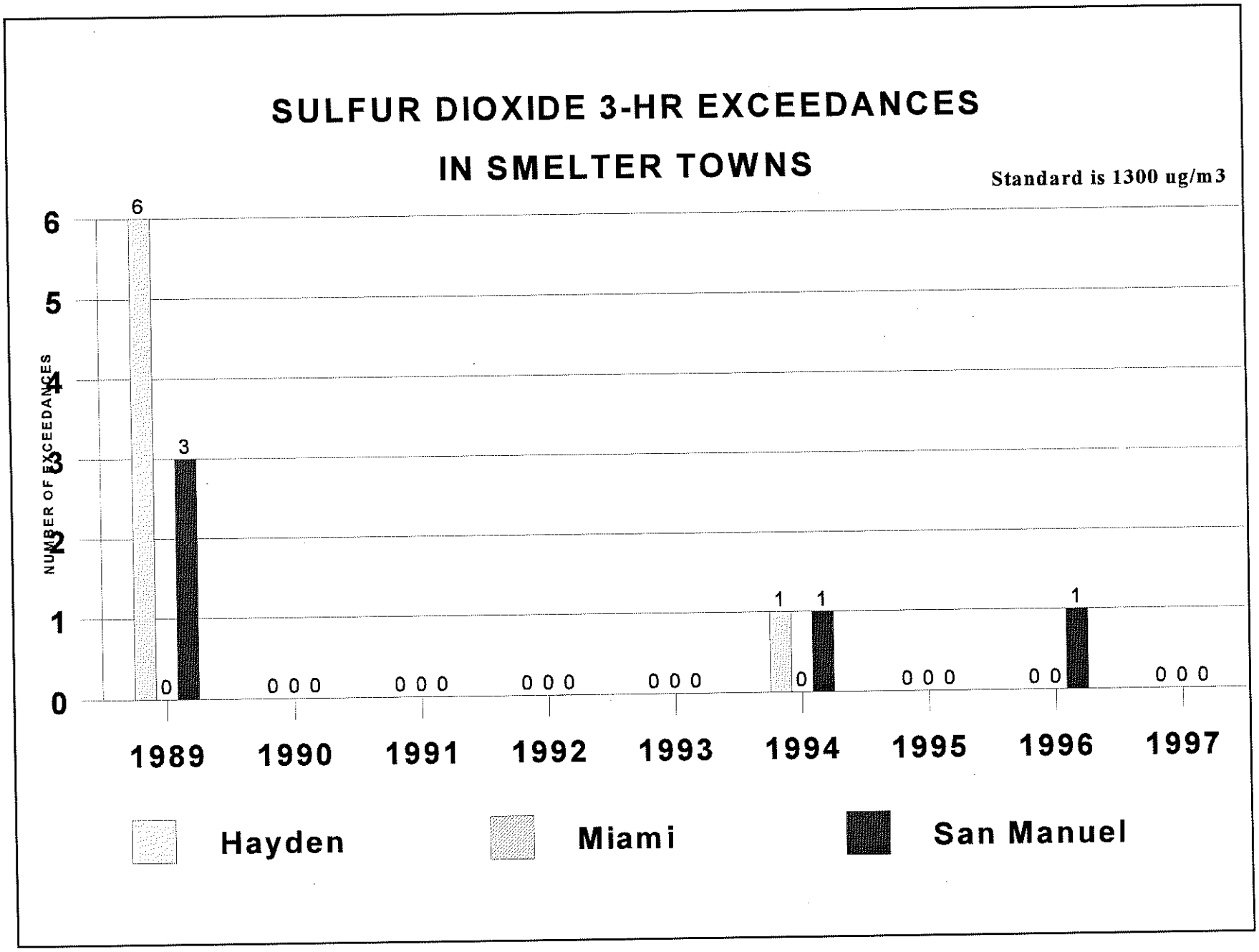
Table 11
PM_{10} Concentrations in Various Cities
Annual Average ($\mu g/m^3$)

SITE	1992	1993	1994	1995	1996	1997
Ajo	23	23[a]	19[a]	24	21	20
Apache Junction	22	21	22	26	20	25
Bullhead City	30	31	34	36	35	15[abc]
Casa Grande	30	31	27	29	30	35
Clarkdale	16[abc]	16	17	17	16	15
Douglas	40	29	34	32	32[b]	26
Flagstaff	24[bc]	22[a]	19	21	--[d]	15
Hayden	35	27	26	34	41	36
Joseph City	17	16	15	16[a]	14	15
Montezuma Castle	16	12	11	13	13	12[a]
Naco	64[ab]	48	39[a]	45	32	33
Nelson	-	20	19	18	22	14
Nogales	54	42	39	43	42	31
Organ Pipe	11	10	9	9	11	10
Paul Spur	62	40	34	33	36	39
Payson	40	32	30	39	30	25
Prescott	19	17	15	14	14	14
Rillito	33	28	28	35	39	40
Safford	32	26	26	33	40	29
Show Low	21	17[a]	14[a]	16[a]	12	16[a]
Yuma	29	31	32[a]	35	36	36[a]

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 $\mu g/m^3$ for a 3-year running average

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
6
0
3
0 0 0
0 0 0
0 0 0
0 0 0
1
0
1
0 0 0
0 0
1
0 0 0
1989
1990
1991
1992
1993
1994
1995
1996
1997
Hayden
Miami
San Manuel

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   Air Quality Report, *Appendix I*

   Recycling Report, *Appendix II*

   Waste Programs Report, *Appendix III*

   Groundwater Quality Report, *Appendix IV*

   Water Quality Report, *Appendix V*

2. This is the first ADEQ annual report I have read. Yes No

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4. I found explanations: very concise concise not concise

5. I found the information: very understandable understandable not understandable

6. I found the information: very useful useful not useful

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_____

_____

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