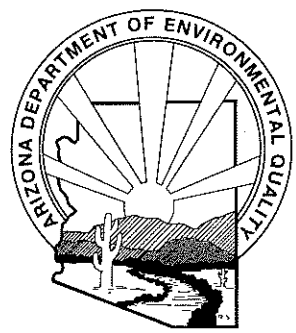
ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1994 Air Quality Data for Arizona



EQR 95-2

October, 1995

1994

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.

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

Bisbee Junction . . . . . Dave Martin

Clarkdale . . . . . Sonny Jackson

Douglas (15th Street) . . . . . John Cryar

Flagstaff . . . . . Ron Doba

Hayden . . . . . Ray Morales

Miami South . . . . . David J.H. Fletcher

Montezuma Castle National Monument . . . . . Robert Del Carlo

Naco . . . . . Steve Rich

Nelson . . . . . Perry Curly

Nogales . . . . . Ricardo Maldonado & Pat Zurich

Organ Pipe Cactus National Monument . . . . . U.S. National Park Service Staff

Paul Spur . . . . . John Cryar

Payson . . . . . Bill Merrifield

Prescott . . . . . Armando Valadez

Rillito . . . . . Carl Gremmler

Safford . . . . . Jim Moser

Sedona . . . . . Ken Griffith

Show Low . . . . . Cathy Bowles

Yuma . . . . . Burton Hale & Ahmed Naitali

ACKNOWLEDGMENTS

The Arizona Department of Environmental Quality expresses its appreciation for the assistance of the following companies and agencies and their staff who provided air quality data for this report:

Applied Environmental Consultants for Arizona Portland Cement Company . . . . . Louis Thanukos

Arizona Public Service Company . . . . . David R. Simenton

ASARCO, Incorporated . . . . . Neil A. Gambell

Cyprus Miami Mining Corporation . . . . . Wayne Leipold

Magma Copper Company . . . . . Jerry C. May

Maricopa County Environmental Services Department . . . . . Violettee Brown

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

Phoenix Cement Company . . . . . Bernard Ott

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 G. Wantlaja

Southern California Edison Company . . . . . Stan Marsh

Tucson Electric Power Company . . . . . H. Duane Bock & Prabhu Dayal

TABLE OF CONTENTS

Acknowledgement . . . . . i-ii
Table of Contents iii
Tables iv
Figures v

I. AIR QUALITY MONITORING NETWORKS 1

A. Monitoring Networks 1
B. Data Reporting/Quality Assurance 2-8

II. AIR QUALITY DATA FOR 1994 9

III. AIR QUALITY TRENDS 30

A. Carbon Monoxide 30
B. Lead 30
C. Nitrogen Dioxide 30
D. Ozone 31
E. PM_{10} 31
F. Sulfur Dioxide 32

TABLES

Table 1	Ambient Air Quality Standards	11
Table 2	1994 Counties and Towns Monitored	12
Table 3	1994 Carbon Monoxide Data (in ppm)	16
Table 4	1994 Lead Data (in $\mu g/m^3$) In TSP or PM_{10}	18
Table 5	1994 Nitrogen Dioxide Data (in $\mu g/m^3$)	20
Table 6	1994 Ozone Data (in ppm)	21
Table 7	1994 PM_{10} Data (in $\mu g/m^3$)	23
Table 8	1994 Sulfur Dioxide Data (in $\mu g/m^3$)	28
Table 9	PM_{10} Concentrations In Phoenix Urban Area	38
Table 10	PM_{10} Concentrations In Tucson Urban Area	38
Table 11	PM_{10} Concentrations In Various Cities	39

FIGURES

Figure 1	Maricopa County Monitoring Network	3
Figure 2	Pima County Monitoring Network	5
Figure 3	State and Industrial Monitoring Networks	7
Figure 4	Carbon Monoxide Concentrations in Phoenix and Tucson	33
Figure 5	Carbon Monoxide Exceedances in Phoenix and Tucson	34
Figure 6	Lead Concentrations in Phoenix and Tucson	35
Figure 7	Ozone Concentrations in Phoenix, Tucson and Yuma	36
Figure 8	Ozone Exceedances in Phoenix	37
Figure 9	Sulfur Dioxide Exceedances in Hayden, Miami and San Manuel	40

I. AIR QUALITY MONITORING NETWORKS

A. MONITORING NETWORKS

In Arizona, ambient air monitoring is conducted by a number of governmental agencies and regulated industries. A list of these 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
Cyprus Miami Mining Corp.	Miami
Magma Copper Co.	San Manuel
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
Salt River Project	Page and St. Johns
Southern California Edison Co.	Bullhead City, AZ and Laughlin, NV
Tucson Electric Power Co.	Tucson and Springerville
Praxair, Inc.	Kingman

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. Finally, the National Park Service sites in Arizona have the unique objective of monitoring visibility in pristine areas in accordance with federal regulations for visibility protection. Included in this activity are measurements of various optical parameters as well as pollutant concentrations.

B. DATA REPORTING/QUALITY ASSURANCE

Ambient air quality data collected in 1994 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.

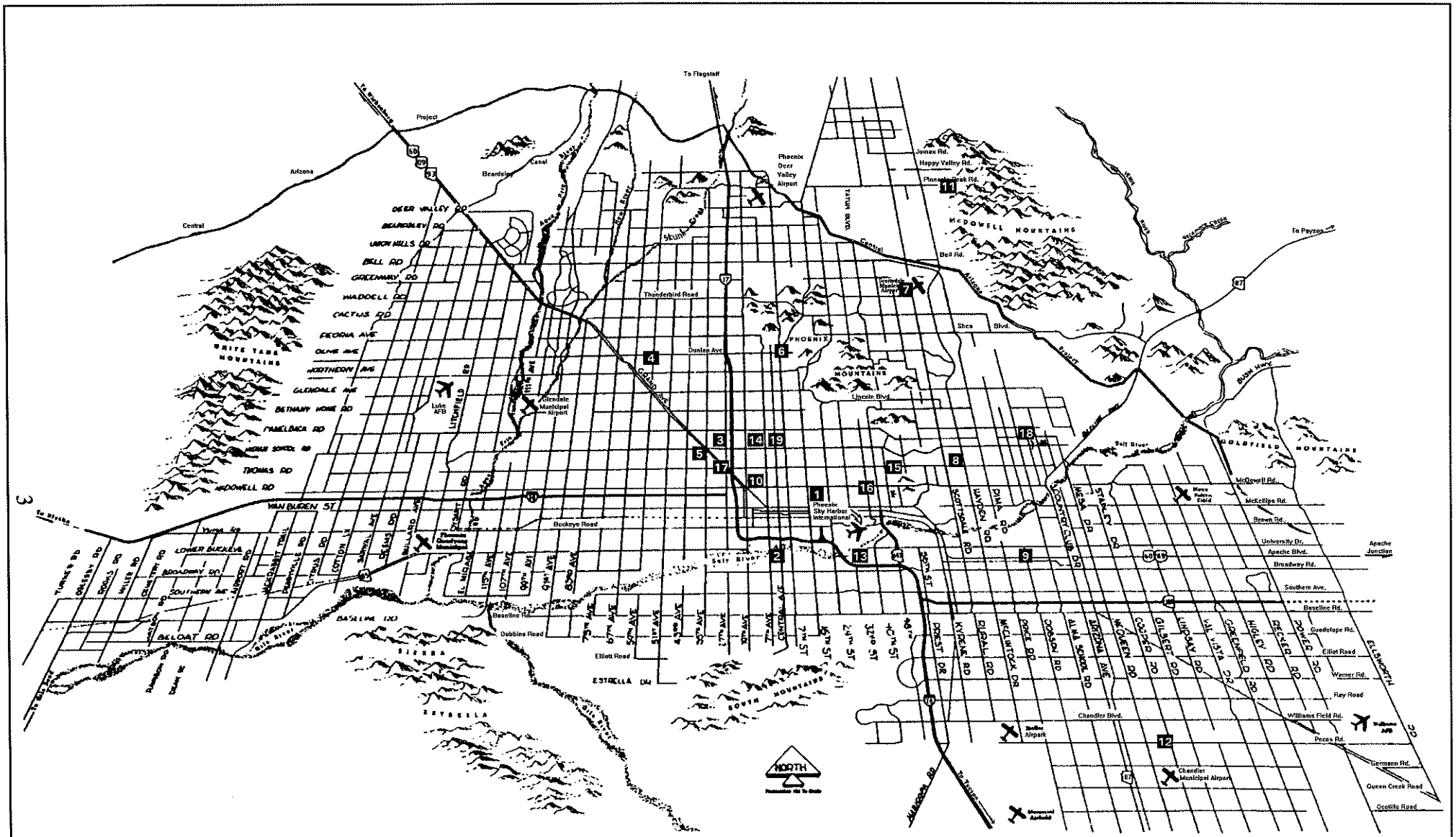


Figure 1
MARICOPA COUNTY MONITORING NETWORK

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	13665 North Scottsdale Road - Scottsdale
8	2857 North Miller - Scottsdale
9	Broadway & Brooks - Mesa
9	1826 West McDowell - Phoenix
11	24301 North Alma School - Scottsdale
12	1475 East Pecos - Chandler
13*	South 32nd Street - Phoenix
14*	4530 N. 17th Avenue, Phoenix
15*	2035 North 52nd Street - Scottsdale
16*	600 North 40th Street - Phoenix
17*	27th Avenue/Grand/Thomas - Phoenix
18*	10005 E. Osborn - Scottsdale
19*	3905 N. 7th Avenue, Phoenix

* State operated

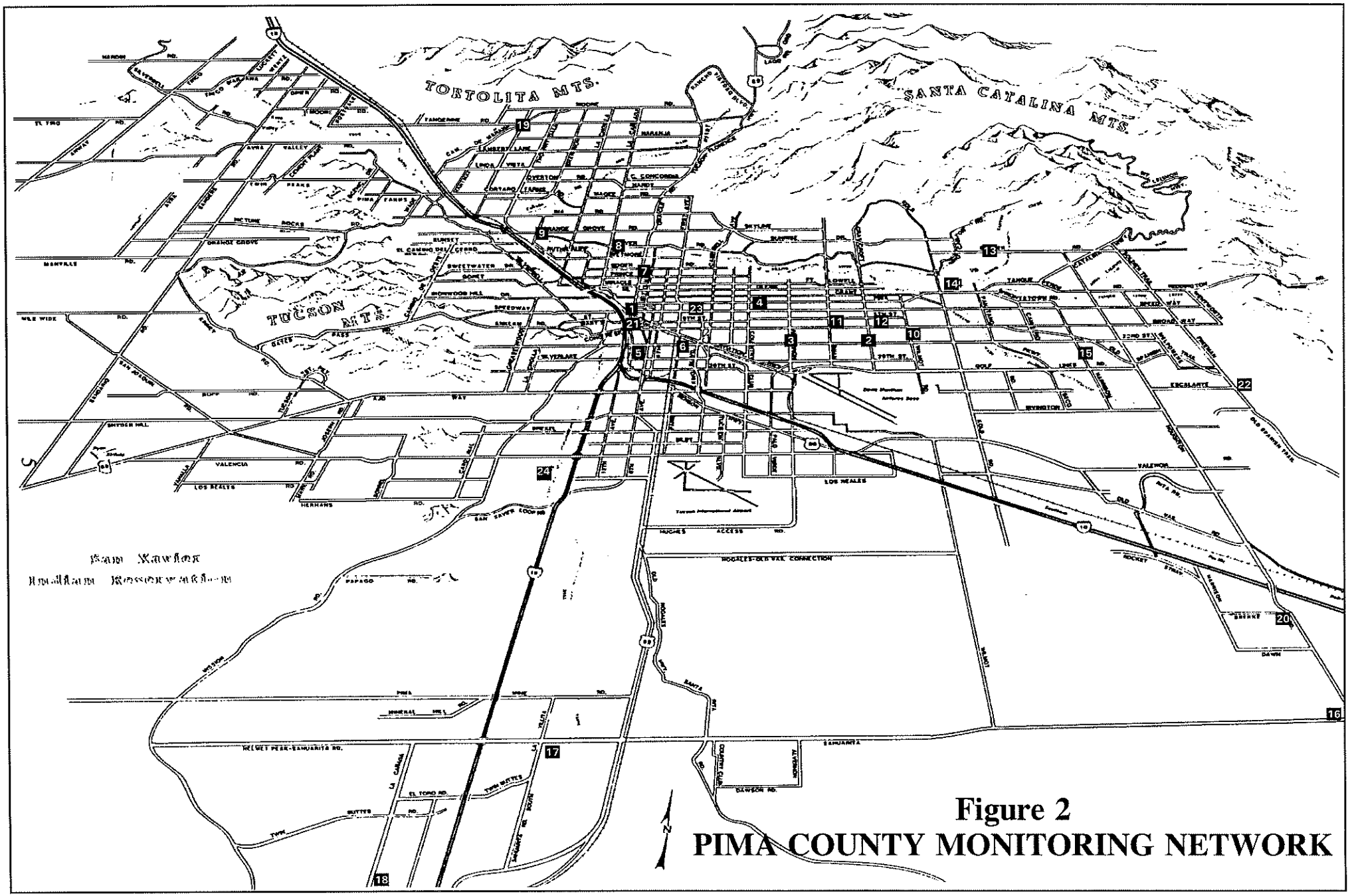


Figure 2
PIMA COUNTY MONITORING NETWORK

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	2nd Street & Palm
7	1016 West Prince
8	4591 North Pomona
9	3401 West Orange Grove
10	346 North Cloverland - Highland Park
11	2645 East Broadway
12	Broadway & Craycroft
13	4829 North Sabino Canyon
14	7290 East Tanque Verde
15	2181 South Harrison
16	22000 South Houghton - Corona de Tucson
17	350 West Helmet Peak - Sahuarita Jr. High School
18	241 West Esperanza - Green Valley
19	12101 North Camino de Oeste - Tangerine
20	11330 South Houghton Rd. Pima County Fair Grounds
21	260 South Church - Community Center
22	3905 S. Old Spanish Trail
23	1435 N. Fremont Ave., UofA Respiratory Science Lab
24	6910 S. Santa Clara

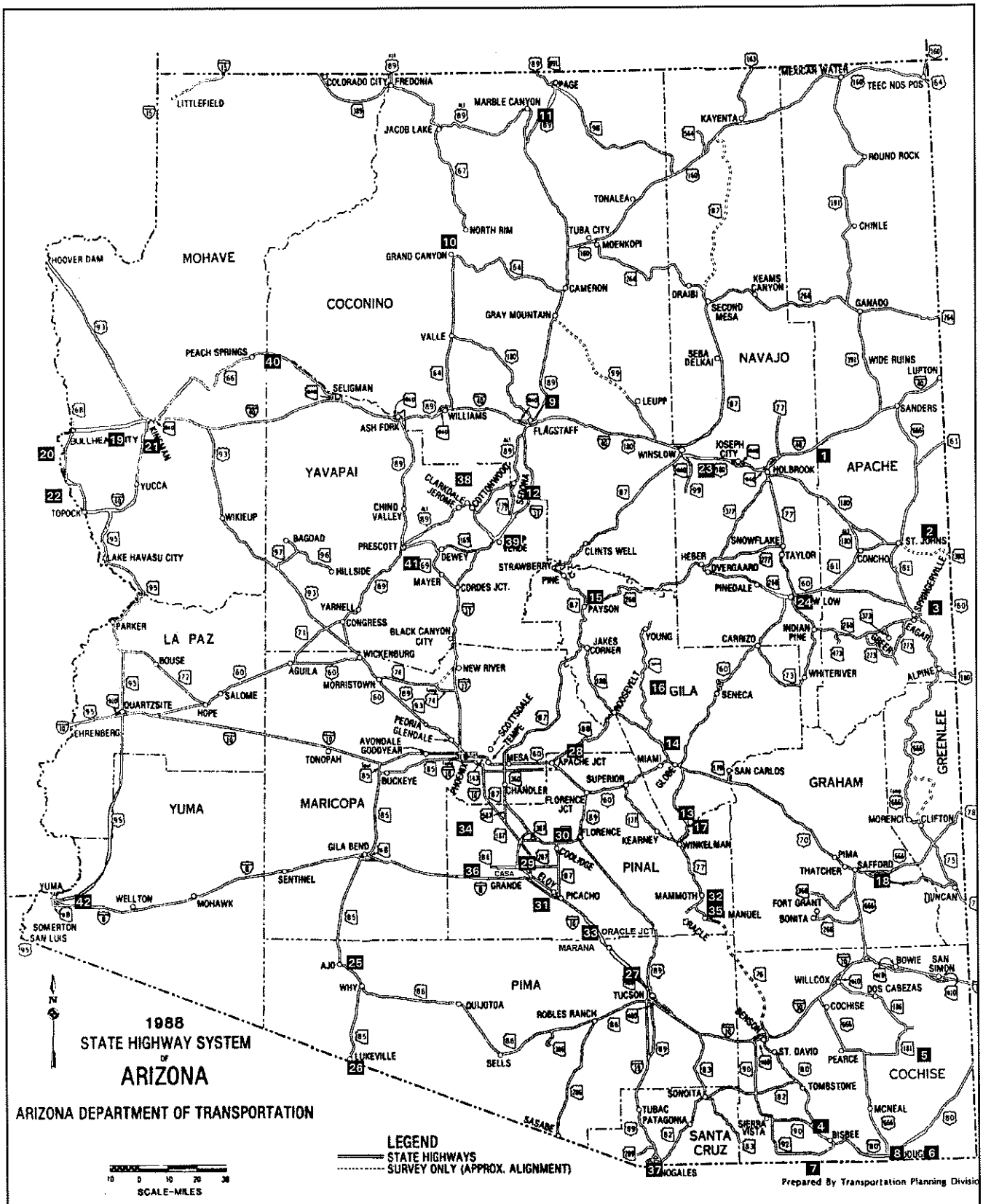


Figure 3
STATE, COUNTY & INDUSTRIAL MONITORING NETWORK

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	Bisbee Junction
5		Chiricahua
6		Douglas
7		Naco
8		Paul Spur
9	Coconino	Flagstaff
10		Grand Canyon
11		Page
12		Sedona
13	Gila	Hayden
14		Miami
15		Payson
16		Tonto
17		Winkelman
18	Graham	Safford
19	Mohave	Bullhead City
20		Holiday Shores
21		Kingman
22		Riviera
23	Navajo	Joseph City
24		Show Low
25	Pima	Ajo
26		Organ Pipe
27		Rillito
28	Pinal	Apache Junction
29		Casa Grande
30		Coolidge
31		Eloy
32		Mammoth
33		Marana
34		Maricopa
35		San Manuel
36		Stanfield
37	Santa Cruz	Nogales
38	Yavapai	Clarkdale
39		Montezuma Castle
40		Nelson
41		Prescott
42	Yuma	Yuma

II. AIR QUALITY DATA FOR 1994

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

1994 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
CM . . . . . Cyprus Miami Mining Corporation
Magma . . . . . Magma Copper Company
Maricopa . . . . . Maricopa County Environmental Svcs Department
NPS . . . . . National Park Service
Pima . . . . . Pima County Department of Environmental Quality
Pinal . . . . . Pinal County Air Quality Control District
SRP . . . . . Salt River Project
SCE . . . . . Southern California Edison Company
State . . . . . Arizona Department of Environmental Quality
TEP . . . . . Tucson Electric Power Company
PRAX . . . . . Praxair, Inc.

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 1

Summary of Ambient Air Quality Standards
State and Federal Standards [a]
In $\mu g/m^3$ (and ppm)

Pollutant	Averaging Time	Primary	Secondary
Carbon Monoxide[b]	1-hr. 8-hr.	40 (35) 10 (9)	40 (35) 10 (9)
Nitrogen Dioxide	Annual	100 (.05)	100 (0.5)
Ozone	1-hr.	235 (.12)	235 (.12)
PM_{10}	24-hr./Annual	150/50	150/50
Sulfur Dioxide	3-hr. 24-hr. Annual	---- 365 (.14) 80 (0.3)	1300 (.5) --- ---
Lead	Calendar Qtr.	1.5	1.5

Summary of Emergency Episode Levels
State and Federal
In $\mu g/m^3$ (and ppm)

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon Monoxide	1-hr. 4-hr. 8-hr.	---- ---- (15)	--- --- (30)	--- --- (40)	(125) (75) (50)
Nitrogen Dioxide	1-hr. 24-hr.	1130 (.6) 282 (.15)	2260 (1.2) 565 (.3)	3000 (1.6) 750 (.4)	3750 (2.0) 938 (.5)
Ozone	1-hr.	400 (.2)	800 (.4)	1000 (.5)	1200 (.6)
PM_{10}	24-hr.	350 (-)	420 (-)	500 (-)	600 (-)
Sulfur Dioxide	24-hr.	800 (.3)	1600 (.6)	2100 (.8)	2620 (1.0)

[a] Standards are not to be exceeded more than once per year with two exceptions. In the case of ozone and PM_{10}, compliance is determined by the number of days on which the O_3 or PM_{10} standard is exceeded. The number of exceedance days per year, based on a 3-year running average, is not to exceed 1.0.

[b] In mg/m^3 (and ppm)

Table 2
1994 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
APACHE:						
Petrified Forest		X	X		X	
St. Johns			X	X	X	X
Springerville			X		X	X
COCHISE:						
Bisbee Junction					X	
Chiricahua		X	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	

Table 2 (Cont'd)
1994 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
GILA (Contd.)						
Tonto (NM)		X			X	
Winkelman						X
GRAHAM:						
Safford					X	
MARICOPA:						
Chandler	X			X	X	
Gilbert	X					
Glendale	X			X	X	
Mesa	X			X	X	
Phoenix	X	X		X	X	
Scottsdale	X			X	X	
MOHAVE:						
Bullhead City			X		X	X
Holiday Shores			X	X	X	X
Kingman					X	
Riviera (Fort Mohave)					X	X
NAVAJO:						
Joseph City					X	
Show Low					X	

Table 2 (Cont'd)
1994 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
PIMA:						
Ajo					X	
Green Valley					X	
Organ Pipe (NM)					X	
Rillito					X	
Saguaro					X	
Tucson	X	X	X	X	X	X
PINAL:						
Apache Junction	X			X	X	
Casa Grande	X			X	X	
Coolidge					X	
Eloy					X	
Mammoth					X	
Marana					X	
Maricopa					X	
San Manuel						X
Stanfield					X	
SANTA CRUZ:						
Nogales		X			X	

Table 2 (Cont'd)
1994 Counties and Towns Monitored

County and Town	Carbon Monoxide	Lead	Nitrogen Dioxide	Ozone	PM_{10}	Sulfur Dioxide
YAVAPAI:						
Clarkdale		X			X	
Montezuma Castle (NM)		X			X	
Nelson					X	
Prescott					X	
YUMA:						
Yuma				X	X	

Table 3
1994 Carbon Monoxide Data (in ppm)

County and City	Site Location	Operator	Method	1-HR AVERAGE Max	1-HR AVERAGE 2nd Hi	8-HR AVERAGE Max	8-HR AVERAGE 2nd Hi	NUMBER OF EXCEEDENCES Day	NUMBER OF EXCEEDENCES Times	Number of Samples
MARICOPA:										
Gilbert[a]	525 N. Lindsay	Maricopa	GFC	**5.9**	**4.7**	**3.0**	**2.5**	**0**	**0**	**N/A**
Chandler[a]	163 S. Price	Maricopa	GFC	**4.9**	**4.7**	**2.8**	**2.6**	**0**	**0**	**N/A**
Glendale	6000 W. Olive	Maricopa	GFC	**7.5**	**7.4**	**4.8**	**4.0**	**0**	**0**	**6158**
Mesa	Broadway & Brooks	Maricopa	GFC	**8.8**	**8.7**	**5.3**	**4.9**	**0**	**0**	**6973**
Phoenix	4732 S. Central	Maricopa	GFC	**9.2**	**9.0**	**6.7**	**4.9**	**0**	**0**	**6778**
Phoenix	1845 E. Roosevelt	Maricopa	GFC	**12.9**	**11.8**	**9.7**	**7.8**	**1**	**1**	**8577**
Phoenix	601 E. Butler Dr.	Maricopa	GFC	**9.0**	**8.8**	**5.0**	**4.9**	**0**	**0**	**6632**
Phoenix	3315 W. Indian School Rd.	Maricopa	GFC	**13.2**	**13.1**	**10.5**	**10.4**	**3**	**3**	**8290**
Phoenix	3847 W. Earll	Maricopa	GFC	**13.6**	**13.3**	**10.0**	**9.6**	**2**	**2**	**8548**
Phoenix	4530 N. 17th Ave.	State	GFC	**10.9[d]**	**10.1**	**7.5**	**7.5**	**0**	**0**	**2968**
Phoenix[a]	27th Ave./Grand/Thomas	State	GFC	**13.8[d]**	**13.4**	**10.0**	**9.2**	**1**	**1**	**1067**
Phoenix	3905 N. 7th Ave.	State	GFC	**11.2[d]**	**11.0**	**7.9**	**7.7**	**0**	**0**	**2955**
Phoenix[b]	South 32nd St.	State	GFC	**4.9[d]**	**4.9**	**3.8**	**3.5**	**0**	**0**	**1907**
Phoenix[a]	SWC I-10 / 27th AVE.	Maricopa	GFC	**11.1**	**10.8**	**8.2**	**7.3**	**0**	**0**	**N/A**
Phoenix[a]	6180 W. Encanto	Maricopa	GFC	**12.9**	**12.3**	**8.9**	**7.8**	**0**	**0**	**N/A**
Phoenix[a]	3225 W Ocotillo	Maricopa	CFG	**12.4**	**11.4**	**7.8**	**7.7**	**0**	**0**	**N/A**
Scottsdale	2857 N. Miller Rd.	Maricopa	GFC	**9.0**	**8.8**	**5.0**	**5.0**	**0**	**0**	**8384**
Scottsdale	13665 N. Scottsdale Rd.	Maricopa	GFC	**7.5**	**6.5**	**3.3**	**3.1**	**0**	**0**	**4759**

Table 3 (Cont'd)
1994 Carbon Monoxide Data (in ppm)

County and City	Site Location	Operator	Method	1-HR AVERAGE Max	1-HR AVERAGE 2nd Hi	8-HR AVERAGE Max	8-HR AVERAGE 2nd Hi	NUMBER OF EXCEEDENCES Day	NUMBER OF EXCEEDENCES Times	Number of Samples
PIMA:										
Tucson	190 W. Pennington	Pima	GFC	**10.8**	**7.4**	**5.0**	**4.5**	**0**	**0**	**8023**
Tucson	22nd & Craycroft	Pima	GFC	**7.0**	**6.6**	**3.9**	**3.2**	**0**	**0**	**8086**
Tucson	22nd & Alvernon	Pima	GFC	**10.3**	**9.4**	**6.0**	**5.5**	**0**	**0**	**8422**
Tucson	2745 N. Cherry	Pima	GFC	**8.7**	**7.3**	**5.4**	**5.1**	**0**	**0**	**8014**
Tucson	4829 N. Sabino Canyon Rd.	Pima	GFC	**5.3**	**4.9**	**1.9**	**1.8**	**0**	**0**	**8655**
Tucson	4591 N. Pomona	Pima	GFC	**8.5**	**8.4**	**4.0**	**3.9**	**0**	**0**	**8626**
PINAL:										
Apache Junction	County Courthouse	Pinal	GFC	**2.6**	**2.5**	**1.6**	**1.5**	**0**	**0**	**8180**
Casa Grande	Airport N. Pinal	Pinal	GFC	**4.2**	**4.1**	**4.0**	**4.0**	**0**	**0**	**6600**

STATE AND FEDERAL STANDARD (ppm): 1-Hour Average 8-Hour Average
(Primary and Secondary) **35** **9**

Footnotes:

a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

Table 4
1994 Lead Data (in $\mu g/m^3$)
In TSP or PM_{10}

County and City	Site Location	Operator	IN	QUARTERLY AVERAGE 1	2	3	4	NUMBER OF SAMPLES 1	2	3	4
APACHE:											
Petrified Frst.	1 mi. N. of Park Headquarters	NPS	PM_{10}	.77[fg]	.73[fg]	.84[fg]	.70[fg]	25	26	22	22
COCHISE:											
Douglas	City Park	State	PM_{10}	.01	.01	.05	0	14	14	16	14
Chiricahua NM	Faraway Ranch	NPS	PM_{10}	2.1[fg]	2.1[fg]	2.6[fg]	2.0[fg]	25	25	26	27
Pirtleville	Fire Station	State	PM_{10}	—	—	—	.001	0	0	0	14
COCONINO:											
Grand Canyon NP	Hopi Point	NPS	PM_{10}	.68[fg]	.47[fg]	.69[fg]	.59[fg]	26	26	26	26
Grand Canyon NP	Indian Gardens	NPS	PM_{10}	.68[fg]	.64[fg]	.82[fg]	.75[fg]	24	24	24	20
GILA:											
Hayden	Old Town Jail	State	PM_{10}	.46	.41	.26	.23	13	15	13	11
Miami South[b]	Nolan Ranch	State	PM_{10}	.06	.03	.06	-	13	10	11	-
Tonto	Maintenance Station	NPS	PM_{10}	1.9[fg]	3.0[fg]	2.4[fg]	2.3[fg]	25	24	26	27
MARICOPA:											
Phoenix	1845 E. Roosevelt	Maricopa	TSP	.04	.03	.03	.04	11	12	15	15
Phoenix	1826 W. McDowell	Maricopa	TSP	.03	.03	.03	.05	15	15	15	9
PIMA:											
Organ Pipe	Visitor's Center	State	PM_{10}	.004	.002	.001	.003	15	12	14	15
Tucson	1016 W. Prince Rd.	Pima	TSP	.05	.02	.04	.03	15	12	16	15
Tucson	22nd & Craycroft	Pima	TSP	.02	.01	.01	.01	15	15	16	15

Table 4 (Cont'd)
1994 Lead Data (in $\mu g/m^3$)
In TSP or PM_{10}

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}	.02	.02	.02	.02	13	14	14	11
YAVAPAI:											
Clarkdale	NW Cement Plant	PC	PM_{10}	.006	-	-	.004	1	0	0	1
Clarkdale	SE Cement Plant	PC	PM_{10}	.002	.004	.002	.005	2	3	3	2
Clarkdale	Clarkdale Fire Station	State	PM_{10}	.004	.003	.003	.004	15	12	12	15
Montezuma Castle	Maintenance Building	State	PM_{10}	.002	.001	.002	.003	10	14	13	15

STATE AND FEDERAL STANDARD ($\mu g/m^3$): Calendar Quarter Average
(Primary and Secondary) **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 schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

Table 5
1994 Nitrogen Dioxide Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	Maximum 1-HR	Maximum 24-HR	No. of 1-HR Samples
APACHE:							
St. Johns	Mesa Parada	SRP	Chem	8	75	17	7685
Springerville	Airport	TEP	Chem	4	60	23	7447
Springerville	4 mi. NE of town	TEP	Chem	4	75	28	7622
Springerville	1 mi. NNE of unit 1 stack	TEP	Chem	2	60	15	6599
Springerville	1 mi. ESE of unit 1 stack	TEP	Chem	4	66	13	7387
Springerville	1 mi. SSE of unit 1 stack	TEP	Chem	4	66	15	6464
Springerville	12.2 mi. SE of unit 1 stack	TEP	Chem	2	72	13	7279
COCONINO:							
Page	Glen Canyon Dam	SRP	Chem	4	34	14	6520
MARICOPA:							
Phoenix	4530 N. 17th Ave.	State	Chem	48	192	105	4239
MOHAVE:							
Bullhead City	224 N. Main	SCE	Chem	26	124	NR	8410
Holiday Shores	1436 Tonto Dr.	SCE	Chem	26	220	NR	8322
PIMA:							
Tucson	22nd & Craycroft	Pima	Chem	35	137	72	8436
Tucson	4591 N. Pomona Avenue	Pima	Chem	39	179	77	8557

STATE AND FEDERAL STANDARD ($\mu g/m^3$): Annual Average
(Primary and Secondary) **100**

Footnotes:

a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

Table 6
1994 Ozone Data (in ppm)

County and City	Site Location	Operator	Method	1-HR MAX Day	2nd HI Day	Number of Exceedances	Number of Samples
APACHE:							
St. Johns	Mesa Parada	SRP	UV	.07	.07	0	8122
COCONINO:							
Grand Canyon	2 mi. W. of Hopi Point	NPS	UV	.08	.08	0	8156
Page	Glen Canyon Dam	SRP	UV	.07	.07	0	8560
MARICOPA:							
Chandler[a]	163 S. Price	Maricopa	UV	.12[d]	.10	0	4885
Glendale	6000 W. Olive	Maricopa	UV	.12	.11	0	8629
Mesa	Broadway & Brooks	Maricopa	UV	.12	.12	0	6964
Mesa	4530 E. McKellips Rd.	Maricopa	UV	.13	.12	1	8243
Mesa[a]	6001 S. Power Rd.	State	UV	.12[d]	.11	0	3431
Phoenix	2035 52nd St.	Maricopa	UV	.12	.12	0	5367
Phoenix	1845 E. Roosevelt	Maricopa	UV	.11	.11	0	8693
Phoenix	601 E. Butler	Maricopa	UV	.13	.11	1	8493
Phoenix	600 N. 40th St.	State	UV	.14[d]	.13	3	4343
Phoenix	3847 W. Earll	Maricopa	UV	.11	.10	0	8582
Phoenix	4732 S. Central	Maricopa	UV	.10	.10	0	8369
Phoenix[a]	23636 N. 7th St.	Maricopa	UV	.12	.12	0	6900
Phoenix	4530 N. 17th Ave.	State	UV	.14[d]	.13	2	4210
Phoenix[a]	6180 W. Encanto	Maricopa	UV	.11	.09	0	6861
Scottsdale	2857 N. Miller	Maricopa	UV	.12	.12	0	8155
Scottsdale	13665 N. Scottsdale Rd.	Maricopa	UV	.12	.11	0	5701

Table 6 (Cont'd)
1994 Ozone Data (in ppm)

County and City	Site Location	Operator	Method	1-HR MAX Day	2nd HI Day	Number of Exceedances	Number of Samples
MARICOPA (Cont'd):							
Scottsdale	24301 N. Alma School Rd.	Maricopa	UV	**.14**	**.12**	**1**	**8581**
Scottsdale	10005 E. Osborn	State	UV	**.15**[d]	**.13**	**2**	**4095**
MOHAVE:							
Holiday Shores	1436 Tonto Drive	SCE	UV	**.11**	**.11**	**0**	**8497**
PIMA:							
Saguaro NM E	3905 S. Old Spanish Trail	Pima	UV	**.11**	**.10**	**0**	**8589**
Tucson	190 W. Pennington	Pima	UV	**.08**	**.08**	**0**	**8701**
Tucson	22nd & Craycroft	Pima	UV	**.09**	**.09**	**0**	**8605**
Tucson	4591 N. Pomona	Pima	UV	**.09**	**.09**	**0**	**8563**
Tucson	11330 S. Houghton	Pima	UV	**.09**	**.09**	**0**	**8687**
Tucson	12101 N. Camino de Oeste	Pima	UV	**.08**	**.08**	**0**	**8631**
Tucson	4829 W. Sabino Canyon Rd.	Pima	UV	**.08**	**.08**	**0**	**8673**
PINAL:							
Apache Junction	County Court House	Pinal	UV	**.11**	**.11**	**0**	**8122**
Casa Grande	Airport - N. Pinal	Pinal	UV	**.09**	**.09**	**0**	**7814**
YUMA:							
Yuma	1485 Second Ave.	State	UV	**.11**[d]	**.09**	**0**	**3842**

STATE AND FEDERAL STANDARD: The standard is .12ppm (235 $\mu g/m^3$) for the maximum daily 1-hour concentration, not to be exceeded (Primary and Secondary) more than three times in three years. No more than 1.0 exceedances per year over the last three years is permitted.

Footnotes:

a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of samples
d. Site operated on a seasonal schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

Table 7 (Cont'd)
1994 PM_{10} Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	24-Hr Average MAX	24-Hr Average 2nd Hi	Number of Exceedances 150 $\mu g/m^3$	Number of Samples
GILA:								
Hayden	Old Town Jail	State	Dichot	26	67	66	0	54
Miami	Golf Course	CMMC	Dichot	26	68	63	0	109
Miami	Ridgeline	CMMC	Dichot	14	38	33	0	109
Miami South[b]	Ridgeline - Linden St.	State	Dichot	15[c]	33	29	0	34
Payson	USWest Building	State	Dichot	30	92	88	0	57
Tonto	Maintenance Station	NPS	Improve	10	35	30	0	100
GRAHAM:								
Safford	523 Tenth Ave.	State	SA1200	26	50	49	0	55
MARICOPA:								
Chandler	1475 E. Pecos Rd.	Maricopa	SA1200	50	127	114	0	56
Glendale	6000 W. Olive	Maricopa	SA321B	33	76	54	0	51
Mesa	Broadway & Brooks	Maricopa	SA1200	36[c]	73	51	0	43
Phoenix	4732 S. Central	Maricopa	SA321B	44	97	89	0	56
Phoenix	3847 W. Earll	Maricopa	SA321B	43	98	93	0	53
Phoenix	1845 E. Roosevelt	Maricopa	SA321B	43	92	80	0	54
Phoenix	601 E. Butler	Maricopa	SA321B	35	73	66	0	51
Scottsdale	2857 N. Miller Rd.	Maricopa	SA321B	38	76	65	0	50

Table 7 (Cont'd)
1994 PM_{10} Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	24-Hr Average MAX	24-Hr Average 2nd HI	Number of Exceedances 150 $\mu g/m^3$	Number of Samples
MOHAVE:								
Bullhead City	224 N. Main	SCE	SA321B	34	86	70	0	59
Holiday Shores	1436 Tonto Dr.	SCE	SA321B	23	44	40	0	61
Kingman	I-40 and Griffith Rd.	PRAXAIR	SA1200	8	38	29	0	95
Riviera	Fort Mohave	SCE	SA321B	25	66	50	0	59
NAVAJO:								
Joseph City	Third & Tanner	APS	Wedd'g	15	29	25	0	61
Show Low	Deuce of Clubs Ave.	State	Wedd'g	14[c]	69	41	0	43
PIMA:								
Ajo	Well Road	State	Dichot	19[c]	38	30	0	44
Corona de Tucson	22000 S. Houghton	Pima	SA1200	13	28	21	0	60
Green Valley	245 W. Esperanza	Pima	SA1200	16	29	26	0	57
Organ Pipe NM	Visitors Center	State	Dichot	9	22	17	0	55
Rillito	8820 W. Water	State	Dichot	28	63	63	0	59
Rillito	Gremler Residence	APCC	Wedd'g	30	66	65	0	105
Tucson	Broadway & Swan	Pima	SA1200	26	61	52	0	61
Tucson[a]	6910 S. Santa Clara	Pima	SA1200	22	42	41	0	48
Tucson	360 S. Church	Pima	SA1200	29	71	58	0	243
Tucson	Golf Link & Harrison	Pima	SA1200	19	32	31	0	58
Tucson	.5m E. Irvington & Alvernon	TEP	SA321B	22	44	39	0	56
Tucson	3401 W. Orange Grove	Pima	SA321B	31	52	48	0	61

Table 7 (Cont'd)
1994 PM_{10} Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	24-Hr Average MAX	24-Hr Average 2nd Hi	Number of Exceedances 150 $\mu g/m^3$	Number of Samples
PIMA (Cont'd) :								
Tucson	3401 W. Orange Grove	State/Pima	Dichot	26	65	43	0	60
Tucson	1016 W. Prince Rd.	Pima	SA1200	25	67	46	0	56
Tucson	1810 S. 6th Ave.	Pima	SA1200	27	58	54	0	60
Tucson[b]	2nd St. & Palm Ave.	Pima	SA1200	26	55	42	0	27
Tucson	22nd/Craycroft	State/Pima	Dichot	33	82	80	0	60
Tucson	12101 N. Camino de Oeste	State/Pima	Dichot	12	24	22	0	60
Tucson	11330 S. Houghton Rd.	State/Pima	Dichot	12	31	23	0	60
Tucson	1435 N. Fremont	State/Pima	Dichot	28	56	50	0	60
PINAL:								
Apache Junction	South County Courthouse	Pinal	Wedd'g	21	61	47	0	57
Apache Junction	North County Courthouse	Pinal	Wedd'g	22	58	41	0	54
Casa Grande	401 Marshall Rd.	Pinal	Wedd'g	27	61	57	0	53
Casa Grande	Near pit	Cyprus/AEC	Wedd'g	24	46	41	0	56
Coolidge	County Highway Yard	Pinal	Wedd'g	38	132	77	0	59
Eloy	Eloy Fire Department	Pinal	SA321B	31	63	54	0	56
Mammoth	County Courthouse	Pinal	SA1200	21	35	35	0	33
Marana	Pinal Air Park	Pinal	SA1200	28	54	50	0	56
Maricopa	Edwards Residence	Pinal	SA321B	42	93	93	0	56
Stanfield	County Courthouse	Pinal	Wedd'g	27	62	49	0	56

Table 7 (Cont'd)
1994 PM_{10} Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	24-Hr Average MAX	24-Hr Average 2nd HI	Number of Exceedances 150 $\mu g/m^3$	Number of Samples
SANTA CRUZ:								
Nogales	U.S. Post Office	State	Dichot	39	116	95	0	52
YAVAPAI:								
Clarkdale	SE of CTI Flyash Silos	PC	Dichot	28	50	48	0	61
Clarkdale	Clarkdale School	State	Dichot	17	39	35	0	54
Clarkdale	Northwest of Cement Plant	PC	Dichot	20	51	47	0	57
Hillside[a]	Sheriff's Repeater St.	State	Dichot	4[c]	7	7	0	6
Montezuma Castle	Maintenance Building	State	Dichot	11	23	19	0	52
Nelson	Chemstar Lime Plant	State	Dichot	19	55	41	0	50
Prescott	City Administration	State	Wedd'g	15	29	29	0	49
YUMA:								
Yuma	2795 Avenue B	State	Dichot	32[c]	66	54	0	37

STATE AND FEDERAL STANDARDS (ug/m^3): Annual Arithmetic Mean 24-Hour Average
(Primary and Secondary) **50** **150**

Footnotes:

a. New site
b. Site terminated
c. Invalid annual average due to insufficent number of samples
d. Site operated on a seasonal schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

Table 8
1994 Sulfur Dioxide Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	MAX 3-Hr	MAX 24-Hr	NO. OF EXCEEDANCES 3-Hr Days	NO. OF EXCEEDANCES 24-Hr Times	1-Hr Samples
APACHE:									
St. Johns	Mesa Parada	SRP	Fluor	7	69	20	0	0	7716
Springerville	4 mi. NE of town	TEP	Fluor	3	142	42	0	0	7656
Springerville	Airport	TEP	Fluor	3	60	21	0	0	7262
Springerville	1 mi. NNE-unit 1 stack	TEP	Fluor	3	115	26	0	0	7595
Springerville	1 mi. ESE-unit 1 stack	TEP	Fluor	8	204	37	0	0	7093
Springerville	1 mi. SSE-unit 1 stack	TEP	Fluor	11	176	50	0	0	6222
Springerville	12.2 mi. SE-unit 1 stack	TEP	Fluor	5	66	29	0	0	7164
COCONINO:									
Page	Glen Canyon Dam	SRP	Fluor	12	269	77	0	0	7687
GILA:									
Hayden	Garfield Ave.	ASARCO	Fluor	22	633	268	0	0	8617
Hayden	Jail	ASARCO	Fluor	16	444	70	0	0	8602
Hayden	Hayden Junction	ASARCO	Fluor	14	457	72	0	0	8618
Hayden	Montgomery Ranch	ASARCO	Fluor	36	1096	180	0	0	8649
Hayden	Jail	State	Fluor	21	464	453	0	0	7444
Miami[b]	Nolan Ranch	State	Fluor	16	566	121	0	0	7830
Miami	Jones Ranch	CMMC	Fluor	8	527	166	0	0	8760
Miami	Whtfld./Burch Pump Station	CMMC	Fluor	0	57	11	0	0	8760
Miami	Town Site	CMMC	Fluor	4	273	42	0	0	8760
Winkelman	1 mile north Jct. 77 & 177	ASARCO	Fluor	38	1776	332	1	0	8610

Table 8 (Cont'd)
1994 Sulfur Dioxide Data (in $\mu g/m^3$)

County and City	Site Location	Operator	Method	Annual Average	MAX 3-Hr	MAX 24-Hr	NO. OF EXCEEDANCES 3-Hr. Days	NO. OF EXCEEDANCES 24-Hr. Times	1-Hr Samples
MOHAVE:									
Bullhead City	224 N. Main	SCE	Fluor	3	100	21	0	0	8410
Holiday Shores	1436 Tonto Dr.	SCE	Fluor	5	217	37	0	0	8410
Riviera	Fort Mohave	SCE	Fluor	8	118	34	0	0	8410
PIMA:									
Tucson	22nd & Craycroft	Pima	Fluor	4	26	10	0	0	7417
PINAL:									
Oracle[b]	Courthouse	Magma	Fluor	5	150	35	0	0	2875
Oracle[b]	3 C Ranch	Magma	Fluor	4	80	23	0	0	2875
San Manuel	Townsite	Magma	Fluor	15	410	121	0	0	8740
San Manuel	Golf Course	Magma	Fluor	10	925	273	0	0	8749
San Manuel	Dormsite	Magma	Fluor	13	766	113	0	0	6857
San Manuel[b]	Minesite	Magma	Fluor	13	667	177	0	0	2877
San Manuel	LDS Church	State	Fluor	10	720	466	0	0	7857
San Manuel[b]	Elks	Magma	Fluor	24	920	125	0	0	4773
San Manuel	Hospital	Magma	Fluor	23	1632	223	1	0	8746

STATE AND FEDERAL STANDARDS ($\mu g/m^3$):	Annual Average	24-Hour Average	3-Hour Average
Primary	**80**	**365**	---
Secondary	---	---	**1300**

Footnotes:

a. New site
b. Site terminated
c. Invalid annual average due to insufficient number of number of samples
d. Site operated on a seasonal schedule
e. Site operated on an event basis
f. Units for Pb are ng/m^3
g. Data for Pb are for particles smaller than 2.5 μm

III. AIR QUALITY TRENDS

A. CARBON MONOXIDE

In Phoenix a continuous decrease in carbon monoxide levels from 1985 through 1990 is apparent in the trend graph plotted in Figure 4. Thereafter, concentrations at both trend sites exhibit little change. The second highest 8-hour concentration for each year was selected as the trend indicator. To represent the Phoenix metropolitan area the neighborhood scale site at 1845 East Roosevelt Street, and the microscale site, 3315 West Indian School Road were chosen.

In Tucson concentrations also declined overall, but the year to year variations are different from those observed in Phoenix. After decreasing in 1987, concentrations remained steady through 1990. Then, in 1991 a sharp decrease was monitored, followed by no change in 1992 and 1993. In 1994 the second highest concentration rose substantially, from 3 ppm to 6 ppm. These fluctuations are rather puzzling. For the Tucson urban area the microscale monitor located at 22nd and Alvernon Way was selected. These monitoring stations were chosen because they have a long-term database, and they monitor the highest concentrations.

This decreasing trend in carbon monoxide levels in Phoenix is exaggerated by the plots of exceedances of the air quality standard in Figure 5. Thus, from a statistical perspective the trends in the second highest 8-hour concentrations are more meaningful. However, the exceedance trend data are important for compliance and planning purposes. One interesting feature of the graph is the exceedance data for 1993 and 1994. In 1993 no exceedance was monitored in Phoenix for the first time ever. However, in 1994 four exceedances were recorded at the two trend sites.

B. LEAD

A substantial decrease in lead concentrations in Phoenix and Tucson was monitored from 1985 through 1989 as indicated by Figure 6. Subsequently, lead levels in both cities have remained at 0.05 to 0.10 $\mu g/m^3$. This is well below the air quality standard, 1.5 $\mu g/m^3$ for the maximum quarterly average. Prior to 1985 lead concentrations had also declined each year as a result of reduced lead emissions from motor vehicles.

C. NITROGEN DIOXIDE

No long-term data for nitrogen dioxide for the Phoenix area is available due to problems with equipment operation and quality assurance. However, the limited amount of data collected in recent years indicates that the annual average has varied from 25 to 50 $\mu g/m^3$. These values are far below the annual standard of 100 $\mu g/m^3$. Likewise, Tucson data indicates compliance with the annual standard with measurements in the range of 30 to 40 $\mu g/m^3$ since 1984.

D. OZONE

No definitive trend is apparent in the second highest 1-hour concentrations in the Phoenix urban area (see Figure 7). Since 1985 this statistic has varied randomly between 0.13 and 0.15 ppm. In contrast the data plotted in Figure 8 show a very large decrease in the number of exceedances of the 1-hour standard from 1985 through 1989. Then, the number of exceedances increases sharply in 1990 and fluctuates widely thereafter. As noted above for carbon monoxide, exceedance data are not useful statistics for determining trends but are important for compliance and planning purposes.

In the Tucson metropolitan area ozone concentrations gradually declined from 1985 through 1991 followed by a slight increase in 1992 (see Figure 7). In Yuma ozone concentrations appear to have fluctuated between 0.09 and 0.11 ppm over the past ten years. Also, it should be noted that no exceedances of the 0.12 ppm standard were monitored in Tucson and Yuma.

E. PM_{10}

In the Phoenix urban area annual average PM_{10} concentrations have generally been in compliance with the 50 ug/m^3 standard (see Table 9). In fact, only one of the nine monitoring sites, Chandler, has exceeded the standard in recent years. During the initial years, 1988 and 1989, the Central Phoenix, South Phoenix, and West Phoenix monitors recorded annual exceedances. Subsequently, annual PM_{10} levels declined and have remained in the 42-48 ug/m^3 range at these sites from 1990-1994. A decreasing pattern is indicated for the Glendale and North Phoenix sites from 1990 through 1994. Otherwise, no significant long-term change is apparent for the network.

Finally, there have been a number of exceedances of the 24-hour standard at the West Phoenix, South Phoenix, Chandler, and Salt River sites. However, these exceedances are not useful for indicating long-term trends because they were caused by local activities

In the Tucson urban area annual average values tended to level out in 1994 after declining from 1990 through 1993 at a number of sites (see Table 10). The exception to this trend was South Tucson where the annual average decreased in 1994. At the Corona de Tucson site concentrations did not change significantly because this a background site for the area. It should be noted that no exceedances of the annual standard have been monitored in Tucson. Finally, it is noteworthy that no 24-hour exceedances have been monitored since 1988 when two were recorded at the Orange Grove Road site.

For other cities in Arizona, PM_{10} annual average concentrations for 1988 through 1994 are listed in Table 11. It can be seen that PM_{10} concentrations appear to have declined at a number of sites from 1989 through 1992 including Clarkdale, Douglas, Hayden, Miami, Nogales, Paul Spur, Payson, Rillito, Safford, and Yuma. Actually, these decreases are most likely due to QA/QC problems in operating the original sampling equipment. Furthermore, data recovery failed

to meet the state and federal 75% minimum requirement (indicated with an "a" footnote in Table 11) at several sites. Also, three of these sites, Miami, Payson, and Yuma were relocated (indicated by a "b" footnote). It appears that the replacement sites, especially in Miami, are in areas of lower PM_{10} concentrations.

In 1991 and again in 1992, another factor affected the data at a number of sites, the type of sampler used. Dichotomous samplers replaced high volume samplers at Ajo, Clarkdale, Douglas, Flagstaff, Hayden, Miami, Nogales, Organ Pipe, Paul Spur, Payson, Rillito, and Yuma (indicated by a "c" footnote). This caused measured concentrations to be lower since dichotomous samplers measure lower PM_{10} concentrations than high volume samplers. Most of these replacements were made in 1991, thus, the full effect was not observed until 1992. The greatest decreases in PM_{10} are seen in the data for Ajo, Miami, Organ Pipe, Paul Spur, Payson, Rillito and Yuma. It should be noted that dichot samplers were put into use in order to determine particle size distributions and chemical components of PM_{10},important information in determining sources.

The only site reflecting a substantial change after all these factors occurred was Paul Spur. At this site the annual average declined from 62 ug/m^3 in 1992 to 34 ug/m^3 in 1994. In addition, the second highest 24-hour concentration decreased from 132 ug/m^3 in 1992 to 77 ug/m^3 in 1994.

F. SULFUR DIOXIDE

In 1994 exceedances of the 3-hour standard were monitored for the first time since 1989 in Arizona (See Figure 9). These exceedances occurred in Hayden and San Manuel where one exceedance was monitored in each town. 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

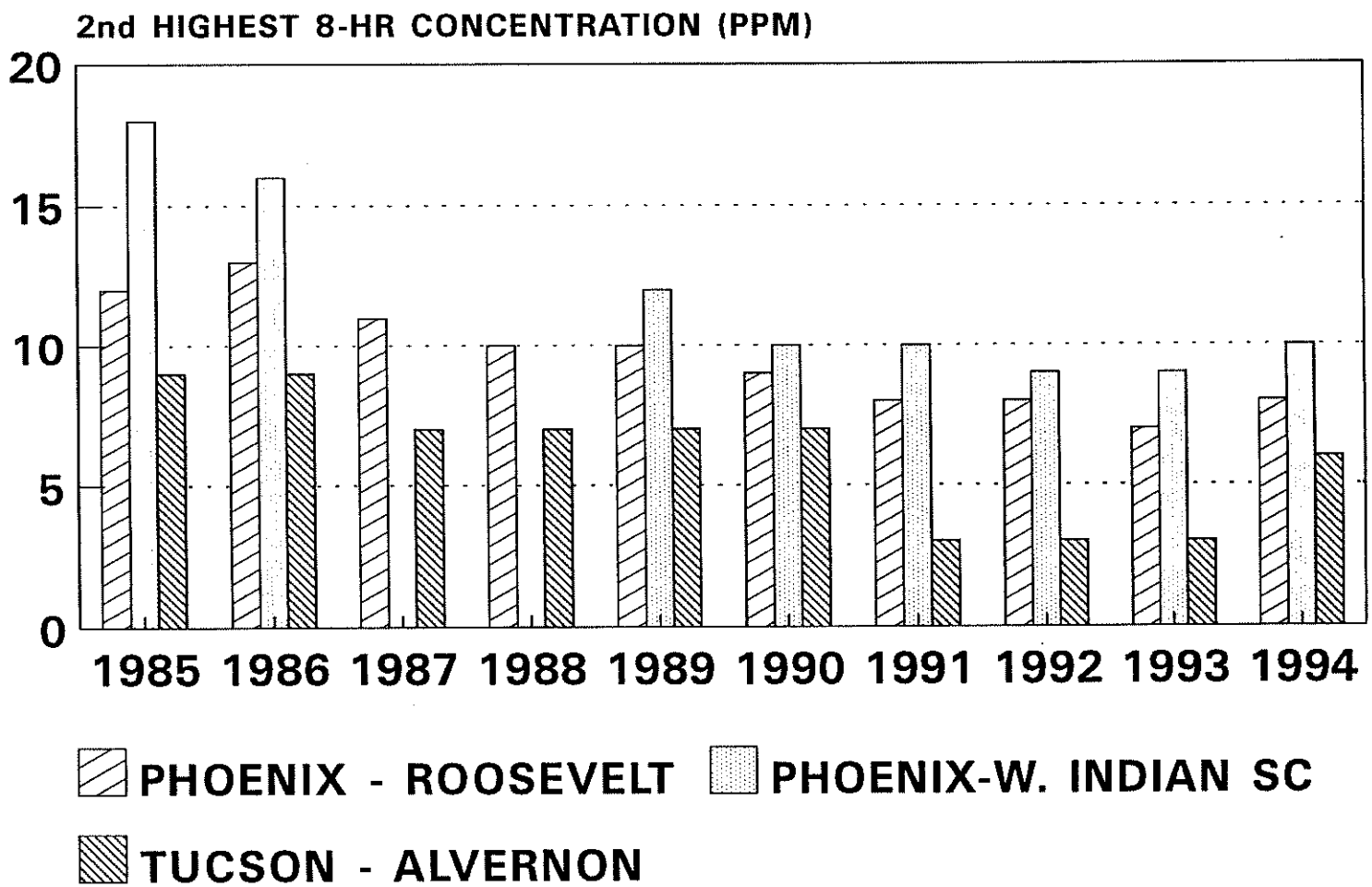
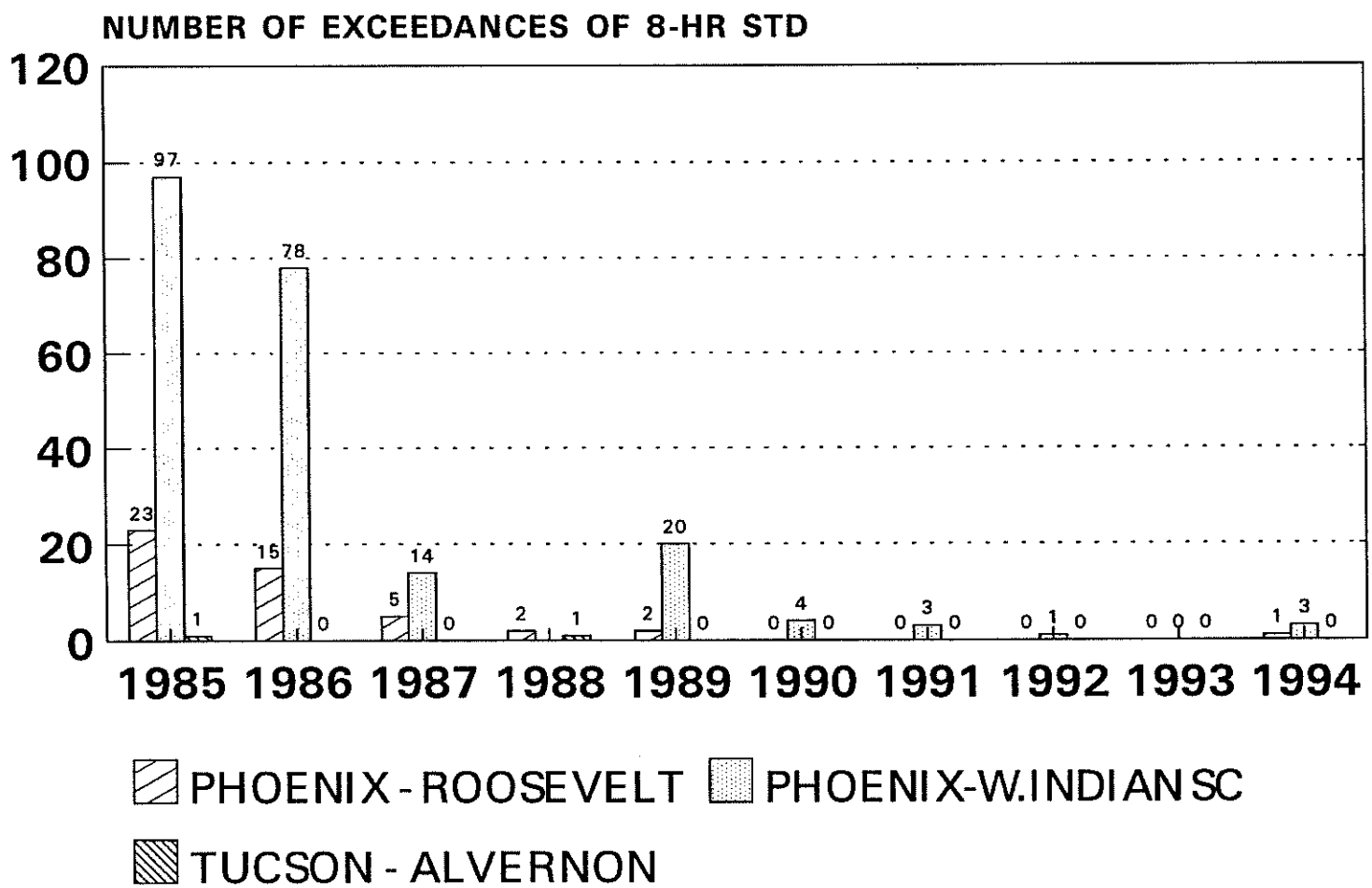
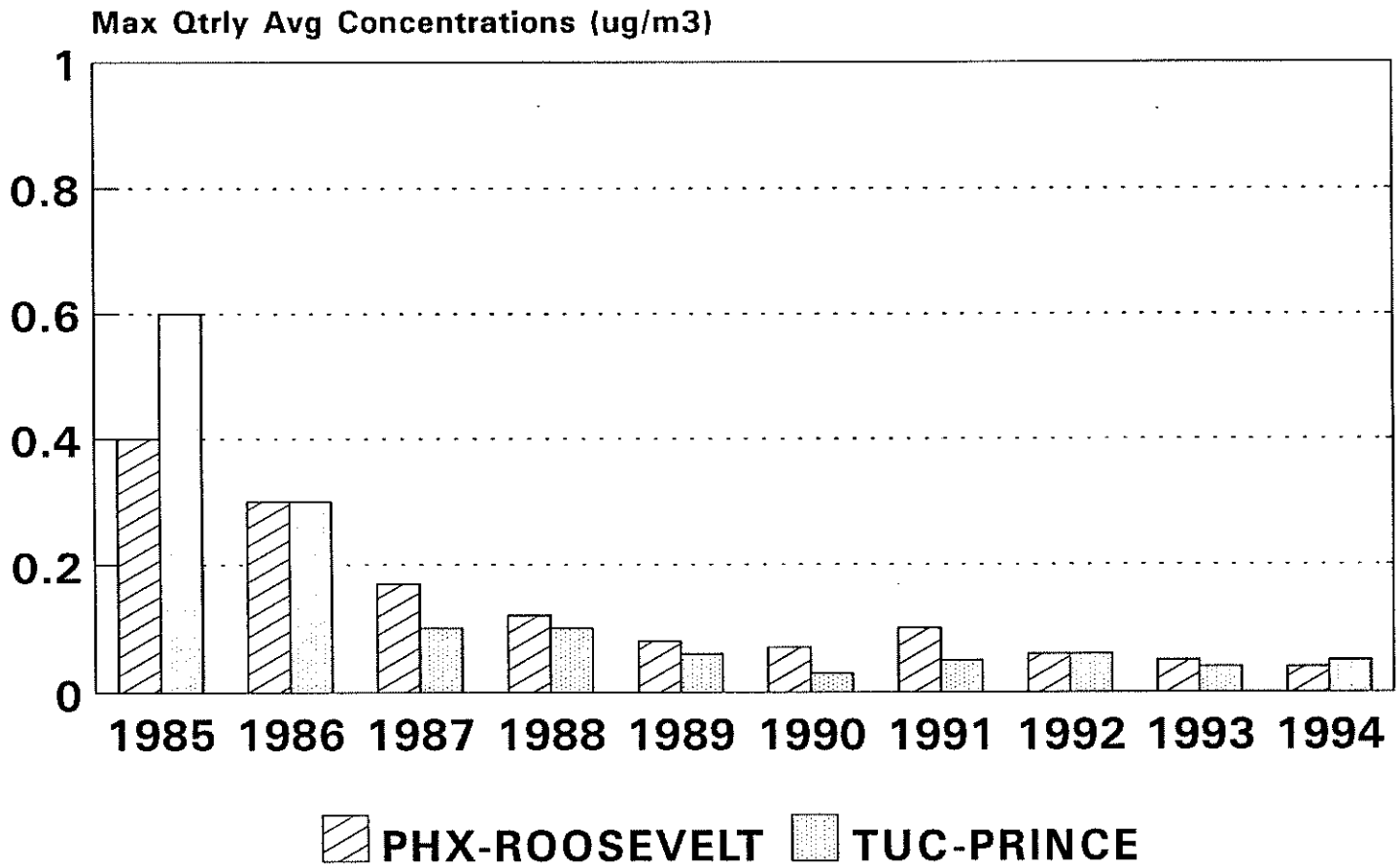


FIGURE 5
CARBON MONOXIDE EXCEEDANCES IN PHOENIX AND TUCSON



STANDARD IS 9 PPM

FIGURE 6
LEAD CONCENTRATIONS IN PHOENIX AND TUCSON



Standard is 1.5 (ug/m3)

FIGURE 7
OZONE CONCENTRATIONS
IN PHOENIX, TUCSON AND YUMA

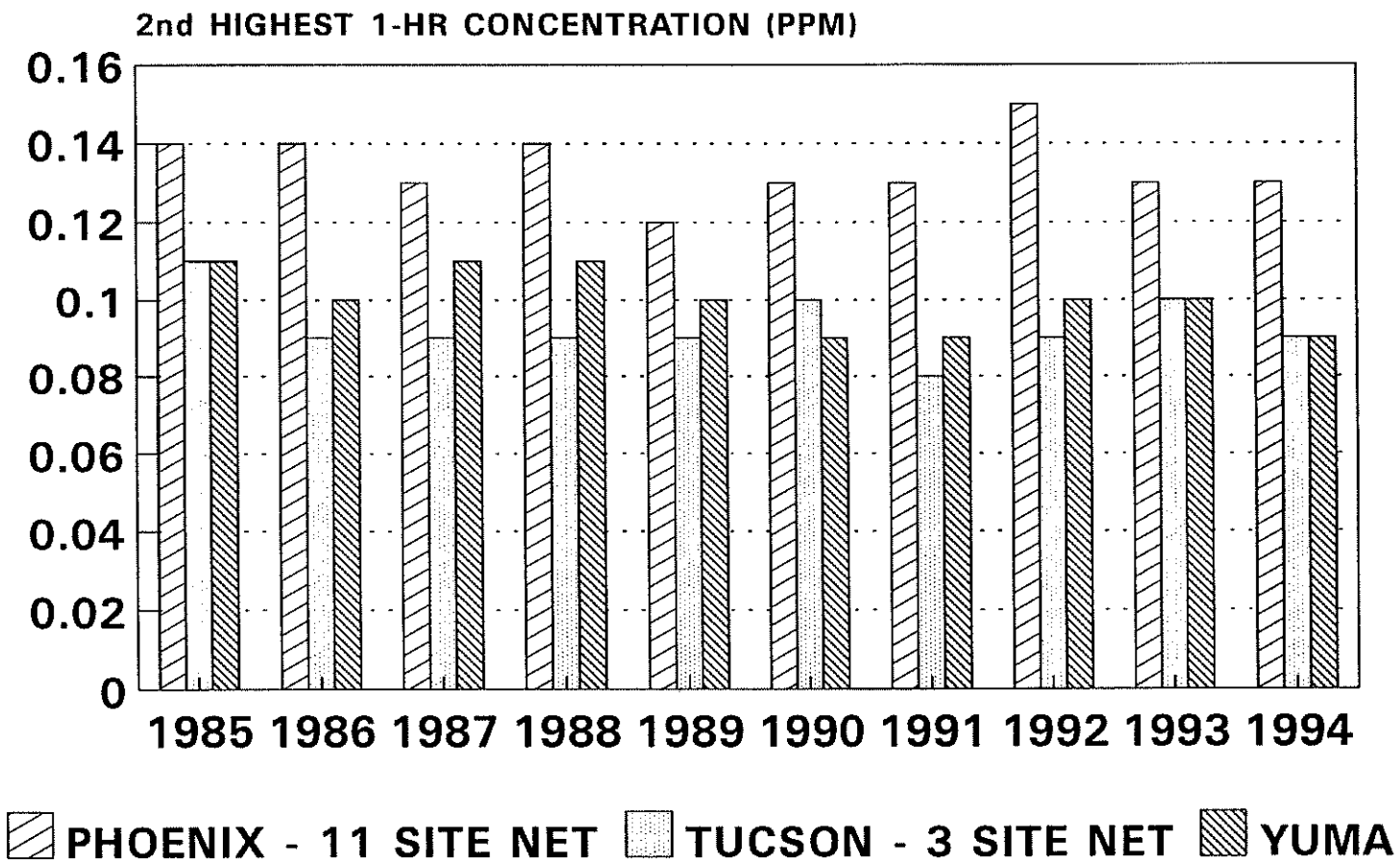
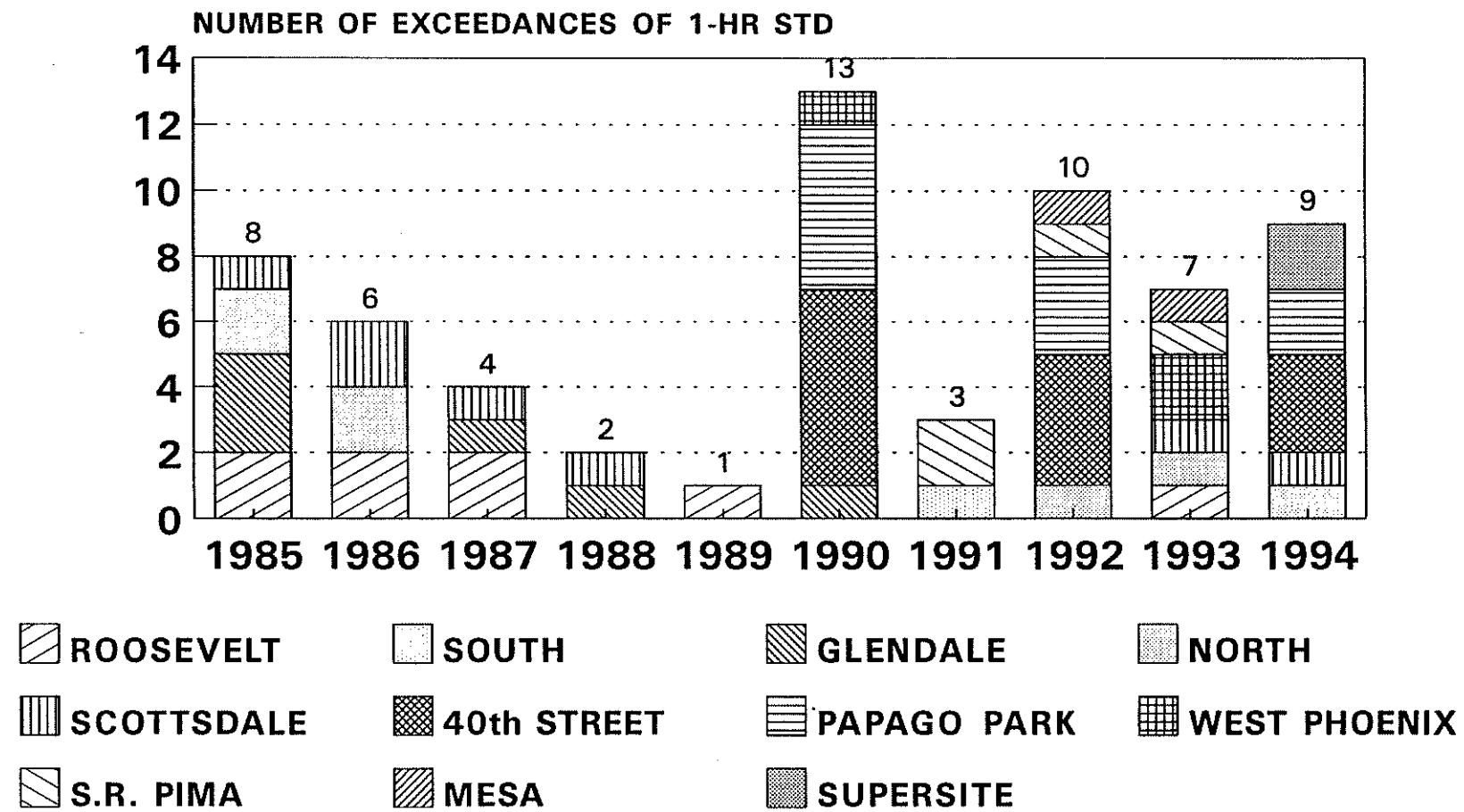


FIGURE 8
OZONE EXCEEDANCES
FOR PHOENIX 11 SITE NETWORK



STANDARD IS .12 PPM

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

SITE	1989	1990	1991	1992	1993	1994
Central Phoenix	57	47[a]	46	42[a]	43[a]	43
Chandler	-	50[a]	50	56[a]	58[a]	50
Glendale	38[a]	46[a]	42	34[a]	35	33
North Phoenix	-	47	45	35[a]	34	35
South Phoenix	55	41	44	48	44	44
West Phoenix	71	48	47	47[a]	44	43
Mesa	-	37	36	29[a]	35	36[a]
South Scottsdale	42	39	34	34	34[a]	38

[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	1989	1990	1991	1992	1993	1994
South Tucson	47	46	34	32	32	27
Prince Road	52	43[a]	32	28	24	25
Corona de Tucson	20[a]	16	13	12	12	13
Green Valley	21	19	16	15	16	16
Orange Grove	44	38[a]	31	30	28	31
Golf Links Harrison	29	25	20	20	19	19
University of Arizona	43	38	30	29	25	26
Broadway/Swan	25	29	35	36[a]	25	26

[a] Invalid annual average due to insufficient number of samples
Annual standard - 50 $\mu g/m^{32}$

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

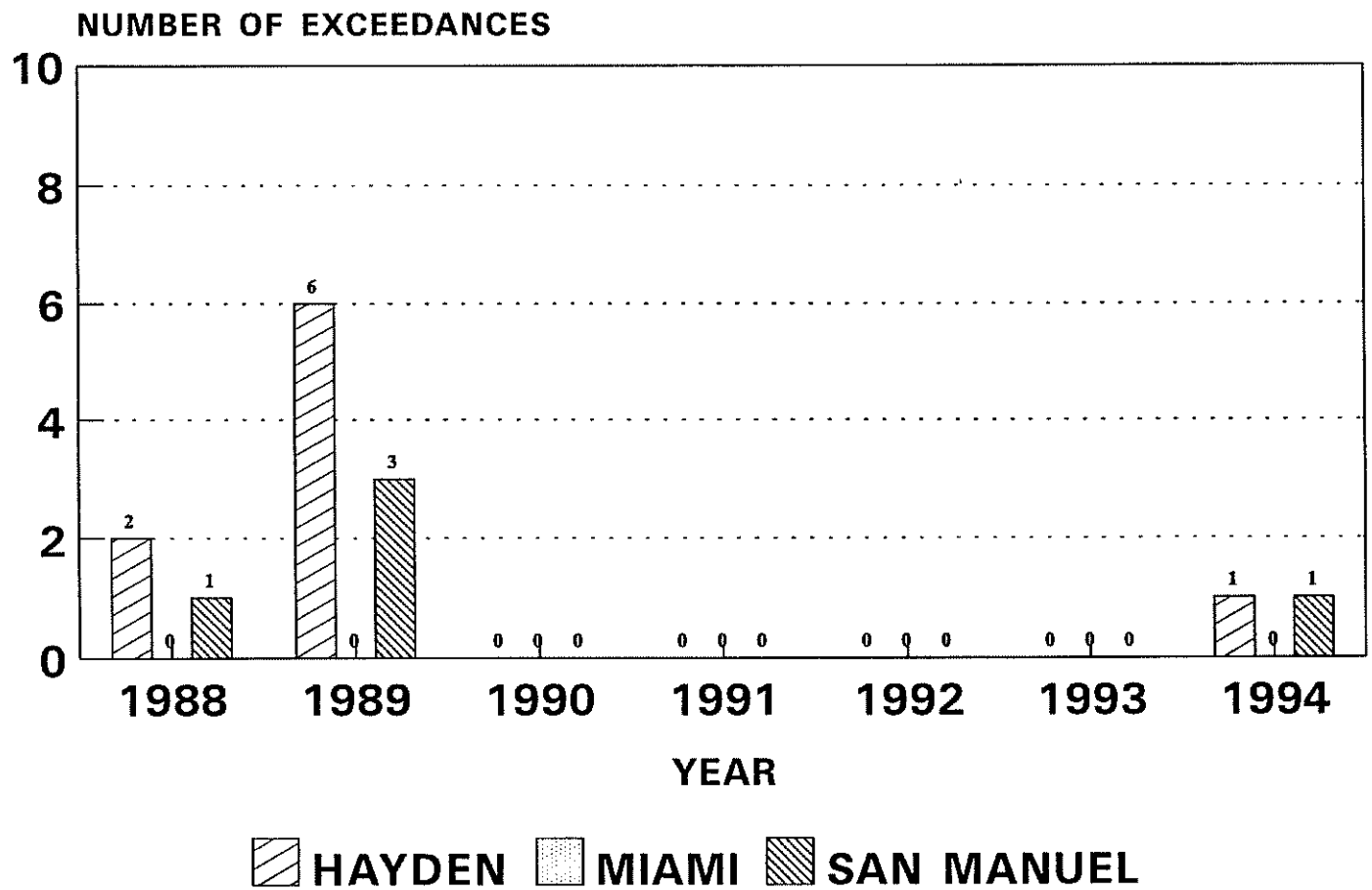
SITE	1989	1990	1991	1992	1993	1994
Ajo	41[a]	44[a]	31[ac]	23	23[a]	19[a]
Bisbee Junction	-	-	-	22	16	18[a]
Bullhead City	52	39	34	30	31	34
Apache Junction	16[a]	23[a]	30	22	21	22
Casa Grande	43[a]	32	29[a]	30	31	27
Clarkdale	24[a]	28[a]	18	16[abc]	16	17
Douglas	55[a]	38[a]	39[c]	40	29	34
Flagstaff	24[a]	29[a]	22	24[bc]	22[a]	19
Hayden	46	35	36[c]	35	27	26
Joseph City	26	21	21	17	16	15
Miami	28	27[ab]	15[abc]	14[a]	13	15[a]
Montezuma Castle	-	-	12[c]	16	12	11
Naco	-	-	-	64[ab]	48	39[a]
Nogales	63	52	50[c]	54	42	39
Organ Pipe	19	23	11[c]	11	10	9
Paul Spur	122	79[a]	67[c]	62	40	34
Payson	79	67	48[abc]	40	32	30
Prescott	-	-	17[ac]	19	17	15
Rillito	94	40	27[c]	33	28	28
Safford	44	28	24	32	26	26
Show Low	23	22	18[a]	21	17[a]	14[a]
Yuma	52[a]	57	48[c]	29	31	32[a]

[a] Invalid annual average due to insufficient number of samples
[b] Site Relocated Mid Year
[c] Sampler type changed

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

FIGURE 9

SULFUR DIOXIDE 3 - HR EXCEEDANCES IN SMELTER TOWNS



Air Quality Standard is 1300 ug/m3 (3hr)