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A I R Q U A L I T Y C O N T R O L

F O R A R I Z O N A

Annual Report

Compiled: March, 1983

HONORABLE BRUCE BABBITT
Governor
State of Arizona

ARIZONA DEPARTMENT OF HEALTH SERVICES
James E. Sarn, M.D., M.P.H., Director

Prepared by The Division of Environmental Health Services
Bureau of Air Quality Control

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1. Introduction

Introduction

The State Bureau of Air Quality Control, within the Division of Environmental Health Services of the Department of Health Services has primary responsibility for the control of air pollution associated with the original State jurisdiction sources and in counties where jurisdiction has been asserted. Original jurisdiction sources include:

1. Statutory major sources, which are defined as those capable individually of generating more than 75 tons of air contaminants per day, or that are involved in copper smelting or the refining of crude oil.

2. Mobile sources, which are those capable of being operated in more than one county.

3. Activities of agencies of the State and its political subdivisions.

The State has asserted jurisdiction for all air pollution control matters in Apache, Cochise, Navajo, Santa Cruz, Yavapai, and Mohave Counties.

The purpose of the Bureau of Air Quality Control is to carry out the Legislature's intent "to exercise the police power of this state in a coordinated statewide program to control present and future sources of emission of air contaminants to the end that air polluting activities of every type shall be regulated in a manner that insures the health, safety, and general welfare of all of the citizens of the state; protects property values; and, protects plant and animal life." The Rules and Regulations for Air Pollution control provide for the attainment and maintenance of ambient air quality standards in accordance with the mandate of the Clean Air Act. To accomplish its purpose and fulfill United States Environmental Protection Agency (EPA) program objectives for the State of Arizona, the Bureau of Air Quality Control is divided into sections with the responsibilities indicated below.

1. Planning and Special Projects

One of the primary responsibilities of this Section is the development and management of the State Implementation Plan (SIP), the plan which the State follows to attain and maintain National Ambient Air Quality Standards (NAAQS). The SIP, which is required by federal law, is

composed of State and County rules and regulations for air pollution control, plus certain plans and strategies.

A major portion of the State planning activity is directed towards nonattainment areas, areas in which violations of NAAQS occur. In Arizona, where there are eleven nonattainment areas, a Nonattainment Plan (NAP) must be developed for each area. The State devises each NAP in coordination with counties, councils of government, local officials, and the U. S. EPA.

In order to check the effectiveness of each NAP, the Section reviews air pollution data in each nonattainment area for trends. The results of each review are summarized in an annual report, referred to as a reasonable further progress (RFP) report, and submitted to EPA.

The Section also coordinates the preparation, review, and recording of rules and regulations. This activity involves holding public hearings to review regulations. Subsequently, the hearing panel formulates recommendations and the regulations are certified by the Attorney General and filed with the Secretary of State.

Administration and management of the federal grant is an important task of this Section. Closely associated with this activity is the administration of fiscal matters such as budgets, contracts, and purchasing.

The Planning and Special Projects Section develops and maintains a statewide emissions inventory of all criteria pollutants; that is, pollutants for which there are ambient air quality standards.

Environmental impact statements for federally funded construction projects such as sewage treatment plants, airports, and highways are reviewed to assure that applicable regulations will be met.

2. Engineering Services

Operation and administration of the State permit system is a vital function of Engineering Services. This includes the review of applications for installation permits for new or modified sources and operating permits for existing sources. In the case of installation permits, technical data submitted with the application must be evaluated to assure that the planned facility is capable of meeting all regulations. In regards to operating permits, this Section reviews emission tests and inspection reports to determine if the source is in compliance with rules and regulations.

As a part of the permitting activity, Engineering Services maintains the master file for all sources under State permit. Also, the Section keeps abreast of the state of the art in air pollution control equipment by inspection of newly constructed facilities and by survey of literature.

Tax relief certification is another responsibility which involves certification of equipment as air pollution control devices for the purpose of special amortization.

3. Compliance

Determining the capability of sources to comply with rules and regulations is a major responsibility of the Compliance Section. This is done by conducting or evaluating mass emissions tests or observing visible emissions for each source. Compliance with applicable regulations must be demonstrated in these tests before a source can obtain an operating permit. Conditions deemed necessary to assure continuing compliance may be included in the operating permit.

In addition to checking emissions, the Compliance Section must evaluate each source's impact on air quality to verify compliance. This entails the review of air quality data obtained by State and industrial monitoring stations. Also, the Section must perform quality assurance checks on the monitors to validate the data.

If a source is found to be violating regulations, the Compliance Section initiates enforcement action by the issuance of a notice of violation (NOV) to the source operator. An effort is made to obtain voluntary action by the operator to correct the noncomplying conditions.

Beyond this a number of forms of enforcement action appropriate to the case may be taken such as:

1. Referral of the NOV to the responsible officer of the source with a written request for corrective action and response.

2. Administrative conferences designed to obtain voluntary corrective action commitments from the source.

3. Permit Denial.

4. Modification of Permit conditions to require additional pollution controls or improved work practices.

5. Orders of Abatement imposing conditions designed to resolve or mitigate the noncompliance condition(s). These orders are subject to appeal to the Air Pollution Control Hearing Board which may dismiss, uphold or modify the terms of the order.

6. Injunctive relief from the Superior Court of the county concerned may be sought against any source in violation of the terms of an Order of Abatement.

Misdemeanor criminal charges may be filed against a noncomplying source which would subject the sources to fines of up to $1,000 per day for each day that violation(s) are proven.

The investigation of citizen complaints in those areas where the State has jurisdiction is another function of compliance. These investigations sometimes require development and operation of special monitoring techniques.

The Compliance Section trains and certifies visible emissions observers from control agencies and industry in accordance with the approved method for determining the opacity of industrial plumes.

4. Technical Services

The operation of the State air quality monitoring network is the basic task of the Technical Services Section. Included in this task are the procurement, installation, calibration and servicing of monitoring instruments, plus auxiliary equipment and housing. The monitoring instruments include anemometers, wind vanes, temperature differential sensors, continuous gas analyzers, high volume particulate samplers, and data recording devices.

Data quality assurance is an important part of the monitoring network operation. In meeting this need, technicians of the Section perform quarterly multi-point calibrations on each of the 20 analyzers in the network, and semiannual calibrations of the approximately 35 high volume samplers. Biweekly precision, span and operational checks are also performed on the analyzers. At this time, the recorded data charts and magnetic tapes are brought in for analysis and report preparation.

In support of field calibration and quality assurance activities, Technical Services maintains a laboratory which provides standards for flow, temperature, mass, pressure, voltage, and pollutant concentrations. These standards are traceable to the National Bureau of Standards or other recognized agencies.

Technical Services is also responsible for the support engineering associated with the Bureau's automated data acquisition systems, including systems design, equipment procurement, and programming.

5. Monitoring

The processing and reporting of ambient air quality data from the State monitoring network is the chief function of the Monitoring Section. Based on these data, the Bureau determines the compliance status of each source with respect to air quality standards. Control strategies for each source are then developed and evaluated.

The Monitoring Section conducts mathematical modeling studies of air pollutant dispersion, from both point and area sources. This activity is a vital part of the review of permit applications submitted by proposed industrial plants. If modeled projections indicate that the source will not meet applicable standards, the plant design or operating procedures must be modified to demonstrate compliance.

Another function of modeling is the projection of vehicular-related air quality trends in urban areas to evaluate the effectiveness of current and proposed control strategies. Modeling is also performed

to delineate the spatial variation in pollutant concentrations in point and urban source areas to determine monitoring site locations and assess population exposure.

The Monitoring Section reviews the literature and performs limited studies concerning the effects of air pollution on public health, property, and visibility. This is necessary to ensure that State regulations and Bureau enforcement actions are adequate for protection of public health and welfare.

The management and coordination of emergency episode prevention activities is the responsibility of this Section. This entails close observation of meteorological and air quality conditions, forecasting air quality, issuing air pollution alerts, and determining appropriate curtailment actions.

Other Activities

In addition to the above Sections, the Bureau has technical staff members permanently assigned to the Northern and Southern Regional Offices located in Flagstaff and Tucson, respectively, to aid in enforcement and more adequately provide Bureau services on a statewide basis. Also, funding is provided by the Bureau for Legal Services and Laboratory personnel.

6. Bureau of Vehicular Emissions Inspection

The Bureau of Vehicular Emissions Inspection conducts an annual comprehensive emissions inspection program in the nonattainment areas of Pima and Maricopa Counties. This program identifies those vehicles, both old and new, which are emitting carbon monoxide and hydrocarbons well above the design levels. Repairs are then required that will return emission levels back to or close to design values for those vehicles so identified.

2. Summary of 1982 Activities

Summary of 1982 Activities

One public hearing on rules and regulations development was held in 1982 regarding revisions to particulate and sulfur dioxide (multi-point rollback) emission limits applicable to copper smelters. Comments received as part of the public hearing process of both the multi-point rollback (MPR) and new source review/prevention of significant deterioration (NSR/PSD) regulation hearings were reviewed by constituted hearing panels through filing with the Secretary of State and later submission to EPA as a State Implementation Plan (SIP) revision. Four SIP revisions were submitted to EPA in 1982.

Nonattainment area planning focused mainly on carbon monoxide and total suspended particulates plans. A revised carbon monoxide non-attainment area plan for the Maricopa County urban planning area was submitted to the EPA on October 28, 1982. The revision to the metropolitan Pima County carbon monoxide nonattainment area plan is nearing completion. After representatives of the State, Councils of Governments and major sources had reviewed the preliminary rural industrial total suspended particulates reports, it was decided to postpone plan preparation until after the inhalable standard is promulgated.

Regulation of industrial facilities under State jurisdiction in 1982 resulted in the following activities:

Source Inspections	474
Visible Emissions Tests	213
Mass Emissions Tests	145
Emissions Monitor Tests	9
Source Ambient Monitor Audits	27
Bureau Ambient Monitor Audits	11
Complaint Investigations	51
Notices of Violation Served	14

During 1982, Engineering Services coordinated a special project; namely, the review of applications by Phelps Dodge, Douglas, and Magma Copper Company for initial Nonferrous Smelter Orders. These reviews included very detailed economic analyses of the two operations, a survey of currently available control technology and future trends in the copper industry.

The State air quality monitoring network consisted of the following numbers of monitoring sites:

Pollutant	Number of Sites
Carbon Monoxide	4
Lead	14
Ozone	4
Particulates	27
Sulfur Dioxide	12

Data summaries for these sites, plus all County and industrial sites operated in 1982, are included in Appendix A. Trends in air quality data for 1976 through 1982 are also included in Appendix A.

The following air quality study reports were prepared for 1982:

"1982 Arizona State Fair Air Quality Study," Robert D. Alley.

"Preliminary Analysis of Vertical Carbon Monoxide Profiles Over Phoenix," Gary R. Neuroth.

"An Analysis and Projection of Ambient Carbon Monoxide Air Quality in the Phoenix Area," Gary R. Neuroth and W. Douglas Poynter.

"Evaluation of the Valley Model in an Area of Sloping Terrain," Gary R. Neuroth and W. Douglas Poynter.

"Arsenic Health Review," Olive M. Watterson.

The use of the audit van was further defined, with the Compliance Section using it exclusively for that purpose in auditing both the Bureau's and smelter operator's sulfur dioxide analyzers. The Technical Services Section made use of the van for field calibrations only. Both applications are considered highly successful. In addition, a dilution flow calibrator was received and checked out for use with the van equipment. It is anticipated this unit will considerably expedite the operation at significantly less cost for standard gases.

The Technical Services Section completed installation and programming required to permit local operation of the HP-9825 computer as a remote terminal for the National Computer Center (NCC) computer at Research Triangle Park, North Carolina. Reduced air pollution data are now routinely submitted to EPA by this means.

The Bureau of Vehicular Emissions Inspection determined that, of the 1.2 million vehicles tested in 1982, approximately 21 percent were gross polluters. Repairs to these vehicles improved the idle emissions of vehicles tested by 33 percent in carbon monoxide and 45 percent in hydrocarbons.

APPENDIX A. Air Quality Data

Air Quality Data

Table 1 lists the counties and towns monitored in the state, including the pollutants monitored. For reference purposes a map of Arizona is shown in Figure 1.

1982 data summaries which are tabulated in Tables 2 through 9 consist of annual mean and maximum and second highest short-term average concentrations, numbers of exceedances of short-term air quality standards, and numbers of samples collected or hours monitored. The following abbreviations and footnotes were used in these data summaries:

GENERAL

NA	Not Applicable
NR	Not Reported

OPERATORS

AEPCO	Arizona Electric Power Cooperative, Inc.
APS	Arizona Public Service Company
ICCC	Inspiration Consolidated Copper Company
JCC	Joint Control Center - A jointly owned system operated by ASARCO Incorporated and Kennecott Minerals Company
Magma	Magma Copper Company
Maricopa	Maricopa County Department of Health Services, Bureau of Air Pollution Control
Noranda	Noranda Lakeshore Mines, Incorporated
PD	Phelps Dodge Corporation
Pima	Pima County Health Department, Air Quality Control District
P-G	Pinal-Gila Counties Air Quality Control District
SRP	Salt River Project
SCE	Southern California Edison Company
State	Arizona Department of Health Services, Bureau of Air Quality Control
TEP	Tucson Electric Power Company

EQUIPMENT

Carbon Monoxide	
NDIR	Non-dispersive infrared

EQUIPMENT (Cont'd)

Nitrogen dioxide	
Color	Colorimetric
Chem	Chemiluminescent
Bubbler	Bubbler
Ozone	
Coul	Coulometric
Chem	Chemiluminescent
UV	Ultraviolet absorption
Particulates	
Hi-Vol	High volume air sampler
Sulfur Dioxide	
Coul	Coulometric
Flame	Flame photometric
Bubbler	Bubbler sampler
Fluor	Fluorescent

Footnotes:

a. All monitoring sites conform with federal monitoring criteria.

b. New site.

c. Site terminated or method discontinued.

d. Annual mean based on a limited number of samples.

e. Site operated on a seasonal schedule.

An examination of trends follows the 1982 data summaries, presenting monitoring data for the last several years.

Table 1

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
APACHE:						
Eagar					x	
Petrified Forest (N.P.)			x		x	x
St. Johns			x	x	x	x
Springerville			x		x	x
COCHISE:						
Bisbee					x	
Douglas		x			x	x
Dragoon			x		x	x
Hereford		x			x	x
Kansas Settlement				x	x	x
McNeal						x
Paul Spur					x	
Sierra Vista	x			x	x	
COCONINO:						
Flagstaff	x			x	x	
Grand Canyon					x	
Page			x	x	x	x
GILA:						
Hayden		x			x	x
Miami		x			x	x
Payson					x	
Roosevelt					x	
Winkelman						x

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
GRAHAM:						
Safford					x	
GREENLEE:						
Morenci		x			x	x
MARICOPA:						
Boys Ranch		x			x	x
Buckeye		x			x	x
Glendale	x	x		x	x	
Mesa	x	x		x	x	
Phoenix	x	x	x	x	x	x
Scottsdale	x	x		x	x	
MOHAVE:						
Bullhead City					x	x
Davis Dam				x	x	x
Riviera					x	x
NAVAJO:						
Holbrook			x		x	x
Joseph City			x		x	x
Show Low					x	
PIMA:						
Ajo		x			x	x
Corona de Tucson					x	

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
PIMA (cont'd):						
Green Valley		x			x	x
Organ Pipe (N.M.)		x			x	
Redington						x
Rillito					x	
Tucson	x	x	x	x	x	x
Vail		x			x	x
PINAL:						
Apache Junction					x	
Casa Grande					x	
Coolidge		x	x		x	
Florence					x	
Kearney						x
Mammoth					x	x
Marana					x	
Maricopa		x	x		x	x
Oracle						x
Oracle Junction		x			x	x
San Manuel		x			x	x
Stanfield					x	
SANTA CRUZ:						
Nogales		x			x	
YAVAPAI:						
Clarkdale					x	
Montezuma Castle (N.M.)		x			x	

Table 1 (Cont'd)

Counties and Towns Monitored

COUNTY AND TOWN	CARBON MONOXIDE	LEAD	NITROGEN DIOXIDE	OZONE	PARTICULATES	SULFUR DIOXIDE
YAVAPAI (cont'd):						
Nelson					x	
Prescott	x			x	x	
YUMA:						
Yuma	x			x	x	

Figure 1

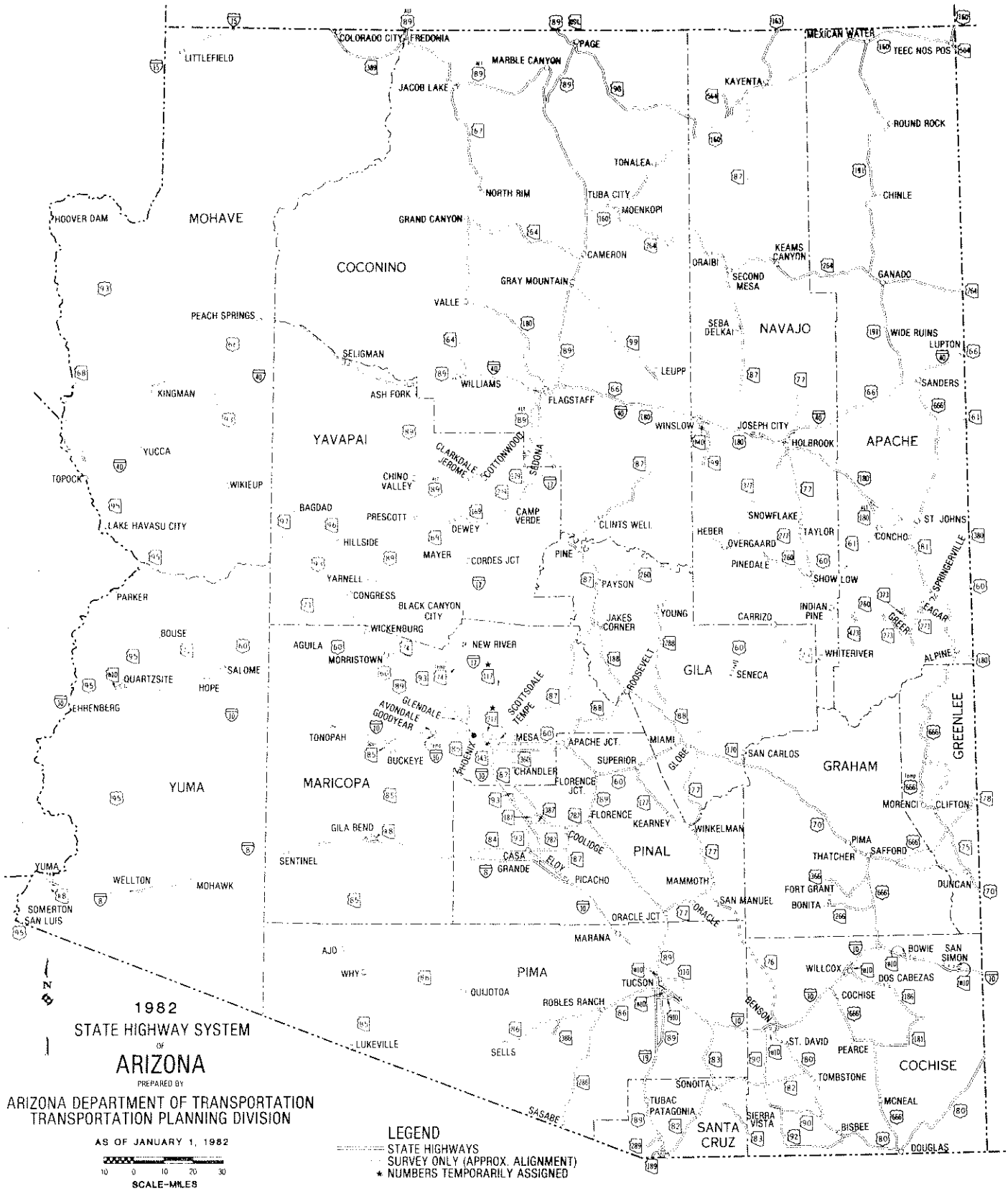

1982
STATE HIGHWAY SYSTEM
OF
ARIZONA
PREPARED BY
ARIZONA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING DIVISION
AS OF JANUARY 1, 1982
SCALE-MILES
LEGEND
STATE HIGHWAYS
SURVEY ONLY (APPROX. ALIGNMENT)
★ NUMBERS TEMPORARILY ASSIGNED
MOHAVE
COCONINO
NAVAJO
APACHE
YAVAPAI
MARICOPA
YUMA
PINAL
GILA
GRAHAM
GREENLEE
PIMA
COCHISE
SANTA CRUZ
LITTLEFIELD
COLORADO CITY
FREDONIA
PAGE
MEXICAN WATER
TEEC NOS POS
KAYENTA
ROUND ROCK
CHINLE
MARBLE CANYON
JACOB LAKE
TONALEA
NORTH RIM
TUBA CITY
MOENKOPI
HOOVER DAM
GRAND CANYON
CAMERON
KEAMS CANYON
ORAIBI
SECOND MESA
GANADO
GRAY MOUNTAIN
VALLE
PEACH SPRINGS
SELIGMAN
SEBA DELKAI
WIDE RUINS
LUPTON
SANDERS
KINGMAN
WILLIAMS
ASH FORK
FLAGSTAFF
LEUPP
WINSLOW
JOSEPH CITY
HOLBROOK
YUCCA
TOPOCK
WIKIEUP
CHINO VALLEY
CLARKDALE
JEROME
COTTONWOOD
SEDONA
BAGDAD
PRESCOTT
CAMP VERDE
CLINTS WELL
SNOWFLAKE
HEBER
TAYLOR
ST JOHNS
CONCHO
LAKE HAVASU CITY
DEWEY
HILLSIDE
MAYER
CORDES JCT
PINE
OVERGAARD
PINEDALE
SHOW LOW
SPRINGERVILLE
EAGAR
GREER
YARNELL
PAYSON
PARKER
CONGRESS
BLACK CANYON CITY
JAKES CORNER
YOUNG
CARRIZO
INDIAN PINE
WHITERIVER
ALPINE
BOUSE
WICKENBURG
AGUILA
NEW RIVER
MORRISTOWN
SENECA
SALOME
QUARTZSITE
HOPE
EHRENBERG
GLENDALE
AVONDALE
GOODYEAR
SCOTTSDALE
TEMPE
ROOSEVELT
TONOPAH
MESA
APACHE JCT
MIAMI
GLOBE
SAN CARLOS
BUCKEYE
PHOENIX
SUPERIOR
CHANDLER
FLORENCE JCT
MORENCI
CLIFTON
FLORENCE
KEARNEY
WINKELMAN
GILA BEND
COOLIDGE
PIMA
SAFFORD
THATCHER
SENTINEL
CASA GRANDE
FLOY
PICACHO
MAMMOTH
FORT GRANT
DUNCAN
YUMA
WELLTON
MOHAWK
SOMERTON
SAN LUIS
SAN MANUEL
BONITA
ORACLE JCT
ORACLE
MARANA
AJO
WHY
QUIJOTOA
TUCSON
ROBLES RANCH
BOWIE
SAN SIMON
WILLCOX
DOS CABEZAS
COCHISE
BENSON
LUKEVILLE
SELLS
ST. DAVID
PEARCE
TOMBSTONE
SONOITA
TUBAC
PATAGONIA
SASABE
SIERRA VISTA
MCNEAL
BISBEE
DOUGLAS

Table 2

1982 Carbon Monoxide Data[a] (in mg/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR. AVERAGE MAX.	1-HR. AVERAGE 2ND HIGH	8-HR. AVERAGE MAX	8-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 8-HR. STANDARD DAYS	NO. OF EXCEEDANCES OF 8-HR. STANDARD TIMES	NO. OF SAMPLES
COCHISE:										
Sierra Vista[e]	Fry Blvd.	State	NDIR	19	17	6	5	0	0	3941
COCONINO:										
Flagstaff[e]	2501 N. 4th St.	State	NDIR	15	14	7	7	0	0	3747
MARICOPA:										
Glendale	6000 W. Olive	Maricopa	NDIR	11	11	6	6	0	0	6243
Mesa	Broadway & Brooks	Maricopa	NDIR	14	14	9	7	0	0	8351
Phoenix	4732 S. Central	Maricopa	NDIR	16	14	10	9	0	0	6965
Phoenix	8531 N. 6th St.	Maricopa	NDIR	17	15	7	7	0	0	3008
Phoenix	1845 E. Roosevelt	Maricopa	NDIR	23	22	16	15	17	20	8621
Phoenix[b]	3315 W. Ind. Sch.	Maricopa	NDIR	31	30	21	21	46	67	7560
Phoenix[b]	4202 W. Bellview	Maricopa	NDIR	27	26	20	20	21	29	1382
Scottsdale	2857 N. Miller	Maricopa	NDIR	17	17	11	10	1	1	7711
Scottsdale	13665 N. Sctsdl.	Maricopa	NDIR	11	9	5	5	0	0	2866
PIMA:										
Tucson	151 W. Congress	Pima	NDIR	18	18	10	10	0	0	8322
Tucson	22nd & Craycroft	Pima	NDIR	14	11	7	6	0	0	7655

Table 2 (Cont'd)

1982 Carbon Monoxide Data (in mg/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HR. AVERAGE MAX.	1-HR. AVERAGE 2ND HIGH	8-HR. AVERAGE MAX.	8-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 8-HR. STANDARD DAYS	NO. OF EXCEEDANCES OF 8-HR. STANDARD TIMES	NO. OF SAMPLES
PIMA (cont'd):										
Tucson	22nd & Alvernon	Pima	NDIR	31	23	13	13	5	5	7919
YAVAPAI:										
Prescott[e]	Co. Maint. Yard	State	NDIR	17	16	8	7	0	0	3823
YUMA:										
Yuma[e]	1485 Second Ave.	State	NDIR	14	13	5	5	0	0	3217

STATE AND FEDERAL STANDARD (mg/m^3): (Primary and Secondary)

1-Hour Average	8-Hour Average
40	10

Table 3

1982 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
COCHISE:										
Douglas	1.2 mi. N. of Smelter	State	.15	.07	.20	.11	13	13	15	14
Douglas	0.8 mi. N. of Smelter	PD	.19	.07	.08	.05	15	14	15	16
Douglas	1012 G. Avenue	PD	.38	.25	.21	.27	15	15	15	15
Douglas	Pirtleville	PD	.17	.08	.08	.07	15	15	14	15
Douglas	City Park	State	.21	.25	.21	.12	5	4	7	12
Hereford	PD Exper. Farm	PD	.02	.01	0	.01	15	15	15	15
GILA:										
Hayden	164 4th Ave.	JCC	.18	.17	.19	.28	12	13	13	13
Hayden	Jail	State	.24	.32	.44	.26	12	14	13	14
Hayden	M-R Ranch	State	.35	.38	.41	.40	12	14	12	14
Miami	Fire Station	State	.31	.16	.16	.15	14	14	14	16
Miami[c]	Jones Ranch	State	.15	.18	-	-	6	13	-	-
GREENLEE:										
Morenci	Cadillac Point	PD	.04	.02	0	.02	14	15	15	16
Morenci	Fina Station	PD	.17	.07	.01	.09	14	15	15	16

Table 3 (Cont'd)

1982 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
GREENLEE (cont'd):										
Morenci	Fairbanks	PD	.04	.02	.01	.04	14	15	15	15
Morenci	Standpipe	PD	.01	.01	0	.01	14	15	15	15
Morenci	Stargo	PD	.05	.03	0	.03	14	15	15	16
Morenci	Stargo	State	.05	.04	.05	.12	15	13	13	14
MARICOPA:										
Boys Ranch	GM Prov. Ground[c]	PD	.06	.04	-	-	14	15	-	-
Buckeye	North 4th Street[c]	PD	.14	.07	-	-	15	14	-	-
Glendale	6000 W. Olive	Maricopa	.30	.30	.30	.60	13	15	15	12
Mesa	Broadway & Brooks	Maricopa	.30	.20	.30	.40	12	12	14	16
Phoenix	15 E. Monroe[c]	PD	.51	.30	-	-	15	15	-	-
Phoenix	1845 E. Roosevelt	Maricopa	.60	.40	.40	.80	14	15	12	13
Phoenix	201 N. Central	PD	.20	.13	-	-	15	15	-	-
Phoenix	8531 N. 6th Street	Maricopa	.40	.40	.30	.80	15	15	15	14
Phoenix	4732 S. Central	Maricopa	.50	.30	.30	.70	15	15	15	16
Phoenix[b]	1826 W. McDowell	Maricopa	-	-	.70	1.20	-	-	14	11

Table 3 (Cont'd)

1982 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
MARICOPA (cont'd):										
Scottsdale	13665 N. Scottsdale Rd.	Maricopa	.30	.30	-	-	15	5	-	-
Scottsdale	2857 N. Miller Rd.	Maricopa	.50	.30	.40	.70	13	14	15	16
PIMA:										
Ajo	Well Road	State	.08	.03	.07	.12	15	15	15	15
Ajo	Camelback Mountain	PD	.01	0	.01	.01	15	15	15	16
Ajo	Oxidation Pond	PD	.05	.02	0	.02	15	15	15	16
Ajo	South of Tailings Dam	PD	.02	.01	0	.01	15	15	15	16
Ajo	Town Square	PD	.06	.03	.04	.07	14	15	15	16
Green Valley	2 mi. N. of Townsite[c]	PD	.13	.07	.05	.05	15	15	13	14
Organ Pipe	Visitors Center	State	.02	.02	.03	.09	14	13	9	13
Tucson	7920 E. Tanque Verde	Pima	.20	.14	.12	.19	15	15	13	16
Tucson	32 North Stone	PD	.19	.11	.13	.17	14	14	15	15
Tucson	Pomona Road[c]	PD	.49	.28	.20	.50	15	15	14	13
Tucson	1016 W. Prince Road	Pima	.58	.43	.38	.55	15	15	15	16
Vail	El Paso Natural Gas. Co.[c]	PD	.06	.03	.02	.02	15	15	15	16

Table 3 (Cont'd)

1982 Lead Data
High Volume Sampler (in ug/m^3)

CITY AND COUNTY	SITE LOCATION	OPERATOR	QUARTERLY AVERAGE 1	2	3	4	NO. OF SAMPLES 1	2	3	4
PINAL:										
Coolidge	2 mi. North of Town[C]	PD	.07	.04	-	-	15	14	-	-
Maricopa	6.5 mi. N.W. of Town[C]	PD	.06	.01	-	-	15	14	-	-
Oracle Junction	Highways 89 & 77[C]	PD	.10	.09	.07	-	15	14	13	-
San Manuel	LDS Church	State	.05	.04	.06	.10	14	15	15	16
SANTA CRUZ:										
Nogales	U. S. Post Office	State	.47	.42	.33	.96	3	9	10	2
YAVAPAI:										
Montezuma Castle	Maint. Building	State	.03	.03	.07	.10	15	14	13	14

STATE AND FEDERAL STANDARD (ug/m^3): Calendar Quarter Average
(Primary and Secondary) 1.5

Table 4

1982 Nitrogen Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	AVERAGE	MAXIMUM 1-HOUR	MAXIMUM 24-HOUR	NO. OF SAMPLES 1-HOUR	NO. OF SAMPLES 24-HOUR
APACHE:								
Petrified Forest	Visitors Center	APS	Chem.	8[d]	71	18	5427	NA
St. Johns[c]	Airport	SRP	Bubbler	4[d]	NA	6	NA	10
St. Johns[c]	Plant Site	SRP	Bubbler	5[d]	NA	8	NA	8
St. Johns	Mesa Parada	SRP	Bubbler	4[d]	NA	7	NA	35
St. Johns	Mesa Parada	SRP	Chem.	3[d]	51	NR	2760	NA
Springerville	Airport	TEP	Chem.	4	53	25	8339	NA
Springerville	4 mi. N.E. of Town	TEP	Chem.	3	50	12	8461	NA
COCONINO:								
Page	Water Tower	SRP	Chem.	9	81	31	7591	NA
MARICOPA:								
Phoenix	1845 E. Roosevelt	Maricopa	Chem.	59[d]	602	209	5512	NA
Phoenix[c]	15 E. Monroe	PD	Chem.	67[d]	249	141	4209	NA
MOHAVE:								
Bullhead City	224 N. Main St.	SCE	Chem.	29	109	58	8044	NA

Table 4 (Cont'd)

1982 Nitrogen Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	AVERAGE	MAXIMUM 1-HOUR	MAXIMUM 24-HOUR	NO. OF SAMPLES 1-HOUR	NO. OF SAMPLES 24-HOUR
NAVAJO:								
Holbrook	Leroux Substation	APS	Chem.	7[d]	130	25	4452	NA
Joseph City	Environmental Lab	APS	Chem.	15[d]	92	27	4757	NA
Joseph City	Cholla Power Plant	APS	Chem.	9[d]	90	20	6064	NA
PIMA:								
Tucson	22nd & Craycroft	Pima	Chem.	39	263	109	7151	NA
Tucson	151 W. Congress	Pima	Chem.	68	508	208	7294	NA
Tucson[c]	32 N. Stone	PD	Chem.	28[d]	165	85	3863	NA
PINAL:								
Coolidge[c]	2 mi. N. of Town	PD	Chem.	16[d]	96	28	3862	NA
Maricopa[c]	6.5 mi. N.W. of Town	PD	Chem.	7[d]	49	19	3210	NA

STATE AND FEDERAL STANDARD (ug/m^3): Annual Average
(Primary and Secondary) 100

Table 5

1982 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HOUR AVERAGE MAX.	1-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF STD.	COMPLIANCE STATUS EXCEEDANCES	NO. OF SAMPLES
APACHE:								
St. Johns	Mesa Parada	SRP	U.V.	.10	.09	0	0	6168
COCHISE:								
Kansas Settlement	1 mi W. of Cotton Gin	AEPCO	U.V.	.04	.04	0	0	7428
Sierra Vista[e]	Fry Boulevard	State	U.V.	.08	.08	0	0	2659
COCONINO:								
Flagstaff[e]	2501 N. 4th St.	State	U.V.	.09	.09	0	0	4121
Page	Water Tower	SRP	U.V.	.07	.07	0	0	8300
MARICOPA:								
Glendale	6000 W. Olive	Maricopa	U.V.	.15	.12	1	1.3	7546
Mesa	Broadway & Brooks	Maricopa	U.V.	.11	.10	0	0	6137
Phoenix[c]	15 E. Monroe	PD	U.V.	.03	.03	0	0	4327
Phoenix[c]	2035 N. 52nd St.	Maricopa	U.V.	.11	.11	0	3.0	5422
Phoenix	3315 W. Ind. Sch.	Maricopa	U.V.	.12	.12	0	0	4272
Phoenix	1845 E. Roosevelt	Maricopa	U.V.	.14	.14	1	3.3	8223
Phoenix	8531 N. 6th St.	Maricopa	U.V.	.14	.13	1	5.0	7382

Table 5 (Cont'd)

1982 Ozone Data (in ppm)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	1-HOUR AVERAGE MAX.	1-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF STD.	COMPLIANCE STATUS EXCEEDANCES	NO. OF SAMPLES
MARICOPA (cont'd):								
Phoenix	4732 S. Central	Maricopa	U.V.	.11	.11	0	.3	7893
Scottsdale	2857 N. Miller Rd.	Maricopa	U.V.	.12	.11	0	1.0	7384
Scottsdale	13665 N. Sctsdl. Rd.	Maricopa	U.V.	.07	.07	0	.5	2898
PIMA:								
Saguaro Nat. Mon.E	Visitors Center	Pima	U.V.	.10	.09	0	0	4786
Tucson	151 W. Congress	Pima	U.V.	.12	.11	0	0	8326
Tucson	22nd & Craycroft	Pima	U.V.	.12	.12	0	0	7451
Tucson	9101 N. Thornydale	Pima	U.V.	.12	.10	0	0	6624
Tucson	4591 N. Pomona	Pima	U.V.	.13	.12	1	.3	7763
YAVAPAI:								
Prescott[e]	Co. Maint. Yard	State	U.V.	.10	.10	0	0	2748
YUMA:								
Yuma[e]	1485 2nd Avenue	State	U.V.	.10	.10	0	0	3710

STATE AND FEDERAL STANDARD: (Primary and Secondary) The standard is .12 ppm (235 ug/m^3) for the maximum daily 1-hour concentration. Compliance status is determined by computing the average number of days that the 1-hour standard has been exceeded per year for the past three years. No more than 1.0 exceedances per year over the last three years is permitted.

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
COCHISE (cont'd):								
Dragoon	N. Dragoon Mts.	AEPCO	24	156	106	0	1	253
Hereford	P.D. Exper. Farm.	PD	27	121	101	0	0	61
Kansas Settlement	1 mi. W. of cotton gin	AEPCO	31	144	121	0	0	243
Paul Spur	Housing Area	State	303	854	739	28	44	47
Sierra Vista	Bartow Drive	State	45	124	106	0	0	54
COCONINO:								
Flagstaff	218 N. Leroux Street	State	77[d]	417	229	1	5	34
Grand Canyon	Hopi Point	State	12	47	33	0	0	56
Lechee	Coppermine Road	SRP	19	152	53	0	1	53
Page	Water Tower[c]	SRP	36[d]	123	88	0	0	30
Page	Airport[b]	SRP	51[d]	176	98	0	1	21
Page	Airport	State	36	85	78	0	0	57
Wahweap	Water Tank[b]	SRP	22[d]	447	52	1	1	20

Table 6

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
APACHE:								
Eagar[c]	Town Hall	State	67[d]	142	136	0	0	17
Petrified Forest	Visitors Center	APS	14	188	105	0	1	226
St. Johns	Airport	SRP	19	83	58	0	0	60
St. Johns	Mesa Parada	SRP	13	33	33	0	0	60
St. Johns	Patterson Wellfield	SRP	13	29	26	0	0	57
Springerville	#1, Airport	TEP	15	104	47	0	0	357
Springerville	4 mi. N.E.	TEP	11	67	43	0	0	337
COCHISE:								
Bisbee	Warren-City Hall	State	32[d]	84	56	0	0	43
Douglas	1.2 mi. N. of Smelter	State	54	131	119	0	0	55
Douglas	0.8 mi. N. of Smelter	PD	43	132	115	0	0	60
Douglas	1012 G. Avenue	PD	85	267	235	1	7	60
Douglas	Pirtleville	PD	58	162	132	0	1	59
Douglas	City Park	State	90[d]	267	209	1	7	44

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
GILA:								
Hayden	164 4th Ave.	JCC	70	213	183	0	3	51
Hayden	Jail	State	132	525	455	11	22	53
Hayden	Montgomery Ranch	State	44	94	92	0	0	52
Miami	Fire Station	State	69	212	125	0	1	58
Miami[c]	Jones Ranch	State	44[d]	78	72	0	0	19
Payson	Courthouse	P-G	110	368	356	4	13	51
Roosevelt	Ranger Station	P-G	26	68	63	0	0	60
GRAHAM:								
Safford	523 - 10th Ave.	State	107	285	254	1	19	59
GREENLEE:								
Morenci	Cadillac Point	PD	26	161	90	0	1	60
Morenci	Fina Station	PD	39	122	106	0	0	59
Morenci	Fairbanks	PD	58	200	195	0	5	59
Morenci	Stargo	PD	36	186	168	0	2	60

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
GREENLEE (cont'd):								
Morenci	Standpipe	PD	16	46	38	0	0	59
Morenci	Stargo	State	35	171	104	0	1	55
MARICOPA:								
Boys Ranch[c]	G. M. Prov. Grds.	PD	54[d]	164	147	0	1	29
Buckeye[c]	N. 4th Street	PD	96[d]	196	160	0	2	29
Glendale	6000 W. Olive Avenue	Maricopa	84	254	170	0	4	56
Mesa	Broadway & Brooks	Maricopa	74	224	140	0	1	55
Phoenix[c]	15 E. Monroe Street	PD	89[d]	135	133	0	0	30
Phoenix	1845 E. Roosevelt	Maricopa	90	218	174	0	4	54
Phoenix[b]	1826 W. McDowell	Maricopa	140[d]	280	220	1	17	33
Phoenix[c]	201 N. Central	PD	60[d]	96	86	0	0	30
Phoenix	8531 N. 6th Street	Maricopa	86	226	167	0	3	60
Phoenix	4732 S. Central	Maricopa	121	252	228	0	21	61
Scottsdale	2857 N. Miller Road	Maricopa	84	281	151	1	2	58
Scottsdale	13665 N. Scottsdale Rd.	Maricopa	65[d]	125	114	0	0	20

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARD STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARD STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
MOHAVE:								
Bullhead City	224 N. Main Street	SCE	70	137	134	0	0	59
Davis Dam	Katherine Landing	SCE	21	86	71	0	0	57
Riviera	Ft. Mohave	SCE	35	93	87	0	0	57
NAVAJO:								
Holbrook	Leroux Substation	APS	19	163	108	0	1	231
Joseph City	3.25 mi. S.E. of Town	State	28[d]	126	103	0	0	41
Joseph City	Environmental Laboratory	APS	30	559	317	2	2	223
Joseph City	Cholla Plant	APS	15	144	99	0	0	225
Show Low	Deuce of Clubs Avenue	State	47	124	112	0	0	54
PIMA:								
Ajo	Well Road	State	68	2118	310	3	5	60
Ajo	Camelback Mountain	PD	17	92	89	0	0	61
Ajo	Oxidation Pond	PD	51	2831	294	2	4	61
Ajo	South Tailings Dam	PD	47	996	864	3	7	61
Ajo	Town Square	PD	45	206	148	0	1	61

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HR. AVERAGE MAX.	24-HR. AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
PIMA (cont'd):								
Corona de Tucson	22000 S. Houghton Rd.	Pima	21	71	63	0	0	61
Green Valley[c]	2 mi. N. of Town	PD	40	101	83	0	0	57
Green Valley	245 W. Esperanza	Pima	33	127	81	0	0	54
Organ Pipe	Visitors Center	State	24	80	76	0	0	49
Rillito	Miller's Market	State	107[d]	698	248	1	12	39
Tucson	3915 E. Ft. Lowell Rd.	Pima	89	447	164	1	2	51
Tucson	7920 E. Tanque Verde Rd.	Pima	54	114	93	0	0	59
Tucson	2181 S. Harrison Rd.	Pima	59	138	123	0	0	59
Tucson	8100 S. Nogales Hwy.	Pima	44	77	73	0	0	56
Tucson	32 N. Stone	PD	43	140	121	0	0	58
Tucson	3401 W. Orange Grove Rd.	Pima	86	176	166	0	3	59
Tucson	2202 W. Anklam Rd.	Pima	36	97	69	0	0	59
Tucson	1016 W. Prince Rd.	Pima	93	154	147	0	1	61
Tucson	1810 S. 6th Avenue	Pima	89	164	144	0	1	59
Tucson	2nd St. & Palm Ave.	Pima	59	126	112	0	0	56

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
PIMA (cont'd):								
Tucson	Irvington & Alvernon	TEP	98[d]	367	358	2	7	38
Tucson	1970 W. Ajo Way	Pima	52[d]	105	100	0	0	35
Tucson	151 W. Congress	Pima	65	163	138	0	1	135
Tucson[c]	Pomona Road	PD	107	199	187	0	12	56
Vail[c]	El Paso Nat. Gas Co.	PD	32	148	102	0	0	61
PINAL:								
Apache Junction	County Yard	P-G	57	140	114	0	0	54
Casa Grande	Indian Hwy. 6	Noranda	31	91	61	0	0	53
Coolidge[c]	2 mi. N. of Town	PD	76	185	151	0	2	30
Mammoth	County Courthouse	P-G	43	96	88	0	0	61
Marana	Marana Air Park	P-G	35	141	117	0	0	55
Maricopa[c]	6.5 mi. N.W. of Town	PD	54[d]	110	94	0	0	30
Oracle Junction[c]	Highways 89 & 77	PD	29[d]	76	55	0	0	43
San Manuel[c]	3-C Ranch	Magma	NR	27	24	0	0	5
San Manuel[b,c]	No. 10 Well	Magma	NR	27	24	0	0	9

Table 6 (Cont'd)

1982 Particulates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL GEOMETRIC MEAN	24-HOUR AVERAGE MAX.	24-HOUR AVERAGE 2ND HIGH	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL PRIMARY	NO. OF EXCEEDANCES OF 24-HR. STANDARDS STATE AND FEDERAL SECONDARY	NO. OF SAMPLES
PINAL (cont'd):								
San Manuel	Dormsite	Magma	31	65	59	0	0	52
San Manuel	Peppersauce Wash	Magma	28	108	62	0	0	52
San Manuel	Golf Course	Magma	29	79	66	0	0	58
San Manuel	LDS Church	State	36	103	74	0	0	60
San Manuel	Townsite	Magma	34	70	68	0	0	51
Stanfield	County Courthouse	P-G	74	293	215	1	6	56
SANTA CRUZ:								
Nogales	U. S. Post Office	State	136[d]	277	222	1	10	24
YAVAPAI:								
Clarkdale[b]	Fire Station	State	64[d]	175	105	0	1	36
Montezuma Castle	Maint. Building	State	24	82	61	0	0	56
Nelson	1 mi. N. of Lime Plant	State	42[d]	177	154	0	2	44
Prescott	Co. Maint. Yard	State	71	318	164	1	3	54
YUMA:								
Yuma	201 S. 2nd Avenue	State	90	322	247	1	6	59

STATE AND FEDERAL STANDARDS (ug/m3):	Annual Geometric Mean	24-Hr. Average
Primary	75	260
Secondary	60	150

Table 7

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
APACHE:											
Petrified Forest	Visitors Center	APS	Bubbler/Flame	0	26	3	0	NA	0	6984	NA
St. Johns	Mesa Parada	SRP	Bubbler	0[d]	NA	3	NA	NA	0	NA	10
St. Johns	Mesa Parada	SRP	Fluor.	0	8	3	0	0	0	7776	NA
St. Johns[c]	Airport	SRP	Bubbler	0	NA	3	NA	NA	0	NA	10
St. Johns[c]	Plant Site	SRP	Bubbler	0	NA	3	NA	NA	0	NA	8
Springerville	4 mi. N.E. of Town	TEP	Flame	4	40	13	0	0	0	8302	NA
Springerville	Airport	TEP	Flame	4	30	11	0	0	0	8573	NA
COCHISE:											
Douglas	0.8 mi. N. of Smelter	PD	Coul	27[d]	917	207	0	0	0	6404	NA
Douglas	Curtis	PD	Coul	17[d]	1643	228	1	1	0	6526	NA
Douglas	Fir	PD	Coul	16[d]	760	223	0	0	0	6540	NA
Douglas	1012 G. Street	PD	Coul	17[d]	1389	199	1	1	0	6535	NA
Douglas	Queen	PD	Coul	24[d]	2796	372	1	1	1	6423	NA
Douglas[b]	Mobile IV	PD	Coul	18[d]	1014	186	0	0	0	6534	NA
Douglas	County Hospital	PD	Coul	35[d]	1074	225	0	0	0	6528	NA
Douglas	Pirtleville	PD	Coul	20[d]	935	194	0	0	0	6537	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
COCHISE (cont'd):											
Douglas	1.2 mi. N of Smelter	State	Fluor.	25[d]	822	737	0	0	0	6046	NA
Douglas[c]	County Hospital	State	Fluor.	49[d]	1229	250	0	0	0	2451	NA
Dragoon	N. Dragoon Mts.	AEPCO	Bubbler/Flame	2	79	13	0	0	0	2115	169
Hereford	PD Exper. Farm	PD	Coul	0	121	16	0	0	0	8635	NA
Kansas Settlement	1 mi W. of Cotton Gin	AEPCO	Bubbler/Flame	2	118	21	0	0	0	2253	177
McNeal[e]	Pinedo Farm	PD	Coul	1[d]	168	24	0	0	0	5104	NA
McNeal[e]	2.6 mi. WSW of Town	State	Fluor.	2[d]	217	31	0	0	0	5338	NA
COCONINO:											
Page	Water Tower	SRP	Fluor.	4	255	86	0	0	0	8053	NA
GILA:											
Hayden	Town Hall	JCC	Coul	40	1350	261	1	1	0	8284	NA
Hayden	Fire Sta./Jail	JCC	Coul	57	1629	340	1	1	0	8607	NA
Hayden	Hayden Junction	JCC	Coul	36	1291	290	0	0	0	7937	NA
Hayden	Montgomery Ranch	JCC	Fluor.	84	1123	414	0	0	2	8367	NA
Hayden	Montgomery Ranch	State	Fluor.	89	1160	392	0	0	2	8569	NA
Hayden	Jail	State	Fluor.	57	1724	417	5	5	2	8522	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
GILA (cont'd):											
Miami	Cities Serv. Bldg.	State	Fluor.	20	1338	273	1	1	0	8466	NA
Miami	Jones Ranch	State	Fluor.	76	7556	991	22	33	17	8370	NA
Miami[c]	Lower Miam School	State	Fluor.	32[d]	2084	416	3	3	1	4278	NA
Miami[c]	Landfill	State	Fluor.	27[d]	923	293	0	0	0	1814	NA
Miami[b]	2 mi. SE of Smelter	State	Fluor.	22[d]	861	139	0	0	0	3825	NA
Miami	Burch Pump Sta.	ICCC	Fluor.	6	860	170	0	0	0	NR	NA
Miami	Town Site	ICCC	Fluor.	30	3380	790	8	11	4	NR	NA
Winkelman	School	JCC	Coul	23	1220	207	0	0	0	8182	NA
Winkelman	1 mi. N Jct. 77&177	JCC	Fluor.	73	1290	332	0	0	0	8394	NA
GREENLEE:											
Morenci	Cadillac Point	PD	Coul	27	1721	396	2	2	1	8676	NA
Morenci	Fina Station	PD	Coul	19	1231	288	0	0	0	8715	NA
Morenci	Mobile-Lower Stargo	PD	Coul	26	1669	333	2	2	0	8662	NA
Morenci[b]	Mobile-Buena Vista	PD	Coul	44[d]	5075	702	2	3	1	1927	NA
Morenci	Metcalf	PD	Coul	18	1721	383	1	1	1	8592	NA
Morenci	Standpipe	PD	Coul	19	1606	359	1	1	0	8669	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
GREENLEE (cont'd):											
Morenci	Stargo	PD	Coul	35	2025	466	5	5	2	8660	NA
Morenci	Fairbanks	PD	Coul	7	1546	197	1	1	0	8726	NA
Morenci[c]	Newtown	PD	Coul	87[d]	1695	380	3	3	1	1240	NA
Morenci	Stargo	State	Fluor.	42	2428	459	5	5	1	8237	NA
Morenci	Cadillac Point	State	Fluor.	36[d]	1324	351	1	1	0	6392	NA
MARICOPA:											
Boys Ranch[c]	GM Prov. Grounds	PD	Coul	6[d]	112	38	0	0	0	4011	NA
Buckeye[c]	N. 4th Street	PD	Coul	1[d]	23	11	0	0	0	4018	NA
Phoenix[c]	201 N. Central	PD	Coul	5[d]	148	44	0	0	0	4079	NA
Phoenix[c]	15 E. Monroe	PD	Coul	5[d]	51	30	0	0	0	4148	NA
Phoenix	1845 E. Roosevelt	Maricopa	Coul	6[d]	NR	105	0	0	0	4143	NA
MOHAVE:											
Bullhead City	224 N. Main St.	SCE	Flame	27	147	42	0	0	0	8139	NA
Davis Dam	Katherine Landing	SCE	Flame	30	238	63	0	0	0	8348	NA
Riviera	Ft. Mohave	SCE	Flame	28	175	110	0	0	0	8335	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
NAVAJO:											
Holbrook	Leroux Substation	APS	Bubbler/Flame	3	61	14	0	0	0	7931	NA
Joseph City	Environmental Lab	APS	Bubbler/Flame	2	192	25	0	0	0	7555	NA
Joseph City	Cholla Plant	APS	Bubbler/Flame	4	199	45	0	0	0	7055	NA
PIMA:											
Ajo	Town Square	PD	Coul	12[d]	532	126	0	0	0	3563	NA
Ajo	Oxidation Pond	PD	Coul	39[d]	935	362	0	0	0	3594	NA
Ajo	S. Tailings Dam	PD	Coul	14[d]	917	238	0	0	0	3584	NA
Ajo	Camelback Mountain	PD	Coul	7[d]	1153	252	0	0	0	3597	NA
Ajo	Gibson	PD	Coul	4[d]	846	207	0	0	0	3600	NA
Ajo	Shelton	PD	Coul	10[d]	846	156	0	0	0	3599	NA
Ajo	Miller	PD	Coul	1[d]	149	58	0	0	0	3599	NA
Ajo	Hotshot	PD	Coul	9[d]	307	68	0	0	0	3599	NA
Ajo	Well Road	State	Fluor.	23	1891	368	1	1	1	8441	NA
Green Valley [c]	2 mi. N. of Town	PD	Coul	0	0	0	0	0	0	8327	NA
Redington	E. of Main Ranch	Magma	Fluor.	9	645	121	0	0	0	8696	NA
Tucson	32 N. Stone	PD	Coul	1	58	20	0	0	0	7079	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
PIMA (cont'd):											
Tucson[c]	Pomona Road	PD	Coul	0	50	15	0	0	0	8500	NA
Tucson	1721 N. Tanque Verde	Pima	Fluor.	4[d]	191	40	0	0	0	3974	NA
Tucson	22nd & Craycroft	Pima	Fluor.	6[d]	157	49	0	0	0	4414	NA
Vail[c]	El Paso Nat. Gas Co.	PD	Coul	0	76	15	0	0	0	7978	NA
PINAL:											
Coolidge[c]	2 mi. N. of Town	PD	Coul	4	148	49	0	0	0	3826	NA
Kearny	202 Hammond Dr.	JCC	Coul	4	1115	198	0	0	0	4521	NA
Mammoth	Courthouse	Magma	Fluor.	8	456	92	0	0	0	8688	NA
Maricopa[c]	6.5 Mi. N of Maricopa	PD	Coul	3[d]	90	32	0	0	0	3982	NA
Oracle	Courthouse	Magma	Fluor.	12	1205	164	0	0	0	8587	NA
Oracle Junction[c]	Jct. Hwys. 89 & 77	PD	Coul	1[d]	76	21	0	0	0	6285	NA
San Manuel[c]	3-C Ranch House	Magma	Fluor.	NR	791	184	0	0	0	1192	NA
San Manuel	Townsite	Magma	Fluor.	59	1265	364	0	0	0	8680	NA
San Manuel	Golf Course	Magma	Fluor.	71	3518	514	2	3	1	8667	NA
San Manuel	Dormsite	Magma	Fluor.	73	1701	387	4	4	1	8646	NA
San Manuel	Minesite	Magma	Fluor.	51	1144	327	0	0	0	8673	NA

Table 7 (Cont'd)

1982 Sulfur Dioxide Data (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	METHOD	ANNUAL AVERAGE	MAX. AVERAGE 3-HR.	MAX. AVERAGE 24-HR.	NO. OF EXCEEDANCES OF STANDARDS 3-HR. DAYS	3-HR. TIMES	24-HR. TIMES	NO. OF SAMPLES 1-HR.	NO. OF SAMPLES 24-HR.
PINAL (cont'd):											
San Manuel	LDS Church	State	Fluor.	47	1064	303	0	0	0	8058	NA
Winkelman	1 mi. S Jct. 77 & 177	JCC	Coul	18	1370	283	1	1	0	8263	NA

STATE AND FEDERAL STANDARDS (ug/m^3):	Annual Average	24-Hr. Average	3-Hr. Average
Primary	80	365	-
Secondary	-	-	1300

Table 8

1982 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
APACHE:					
Eagar[c]	Town Hall	State	2.5[d]	11.0	17
Springerville	Airport	TEP	.2	2.0	181
Springerville	4 mi N.E. of Town	TEP	.2	3.2	145
COCHISE:					
Bisbee	Warren-City Hall	State	1.9[d]	4.1	43
Douglas	City Park	State	2.3[d]	4.2	22
Douglas	1.2 mi. N. of Smelter	State	1.5	2.9	55
Paul Spur	Housing Area	State	2.5	5.7	47
Sierra Vista	Bartow Drive	State	2.3	8.6	54
COCONINO:					
Flagstaff	218 N. Leroux Street	State	2.7[d]	11.5	34
Grand Canyon	Hopi Point	State	1.8[d]	4.5	26
Page	Airport	State	2.6	13.4	57
GILA:					
Hayden	Jail	State	2.1	4.2	53
Hayden	Montgomery Ranch	State	2.3	4.7	52

Table 8 (Cont'd)

1982 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
GILA (cont'd):					
Miami	Fire Station	State	2.3	4.8	58
Miami[c]	Jones Ranch	State	2.8[d]	7.0	19
GRAHAM:					
Safford	523 10th Avenue	State	2.3	4.6	59
GREENLEE:					
Morenci	Stargo	State	1.9	5.9	55
MARICOPA:					
Glendale	6000 W. Olive Avenue	Maricopa	3.5	9.7	53
Mesa	Broadway & Brooks	Maricopa	2.7	9.2	52
Phoenix	1845 E. Roosevelt	Maricopa	3.1	14.1	51
Phoenix	4732 S. Central	Maricopa	3.1	10.2	60
Phoenix	8531 N. 6th Street	Maricopa	2.9	12.3	59
Phoenix[b]	1826 W. McDowell	Maricopa	3.1[d]	16.8	33
Scottsdale	2857 N. Miller Road	Maricopa	2.8	6.9	55
Scottsdale	13665 N. Scottsdale Road	Maricopa	2.5[d]	6.9	19

Table 8 (Cont'd)

1982 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
NAVAJO:					
Joseph City	3.25 mi. S.E. of Town	State	1.7[d]	4.0	41
Show Low	Deuce of Clubs Avenue	State	2.2	8.6	54
PIMA:					
Ajo	Well Road	State	2.2	6.2	60
Organ Pipe	Visitors Center	State	2.3	8.2	49
Rillito	Miller's Market	State	3.6[d]	9.0	39
Tucson	Irvington & Alvernon	TEP	1.0[d]	2.4	37
PINAL:					
San Manuel	LDS Church	State	2.1	6.9	60
SANTA CRUZ:					
Nogales	U. S. Post Office	State	2.2[d]	4.5	24
YAVAPAI:					
Clarkdale	Fire Station	State	2.7[d]	11.8	36
Montezuma Castle	Maint. Building	State	2.0	4.7	56
Nelson	1 mi. N. of Lime Plant	State	1.8[d]	6.0	44
Prescott	Co. Maint. Yard	State	2.9	6.4	54

Table 8 (Cont'd)

1982 Nitrates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
YUMA:					
Yuma	201 S. 2nd Avenue	State	3.8	11.4	59

Table 9

1982 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
APACHE:					
Eagar[c]	Town Hall	State	4.1[d]	13.6	17
Springerville	Airport	TEP	1.6	6.5	357
Springerville	4 mi. N.E. of Town	TEP	1.6	6.4	334
COCHISE:					
Bisbee	Warren-City Hall	State	5.3[d]	10.4	43
Douglas	1.2 mi. N. of Smelter	State	6.2	11.9	55
Douglas	City Park	State	6.5[d]	11.4	22
Paul Spur	Housing Area	State	8.2	25.6	47
Sierra Vista	Bartow Drive	State	4.6	10.8	54
COCONINO:					
Flagstaff	218 N. Leroux	State	4.0[d]	7.1	34
Grand Canyon	Hopi Point	State	4.1[d]	12.1	26
Page	Airport	State	4.1	8.0	57
GILA:					
Hayden	Jail	State	9.8	20.3	53
Hayden	Montgomery Ranch	State	8.5	20.1	52
Miami	Fire Station	State	8.8	84.7	58

Table 9 (Cont'd)

1982 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
GILA (cont'd):					
Miami[c]	Jones Ranch	State	7.9[d]	22.8	19
GRAHAM:					
Safford	523 10th Avenue	State	5.0	8.4	59
GREENLEE:					
Morenci	Stargo	State	6.1	16.5	55
MARICOPA:					
Glendale	6000 W. Olive Avenue	Maricopa	5.1	13.4	54
Mesa	Broadway & Brooks	Maricopa	4.6	14.1	55
Phoenix	1845 E. Roosevelt	Maricopa	4.6	12.2	53
Phoenix	4732 S. Central	Maricopa	5.0	12.3	61
Phoenix	8531 N. 6th Street	Maricopa	4.7	10.8	60
Phoenix[b]	1826 W. McDowell	Maricopa	6.0[d]	14.3	32
Scottsdale	2857 N. Miller Road	Maricopa	4.9	10.5	58
Scottsdale	13665 N. Scottsdale Road	Maricopa	3.9[d]	9.3	20

Table 9 (Cont'd)

1982 Sulfates Data
High Volume Sampler (in ug/m^3)

COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
NAVAJO:					
Joseph City	3.25 mi. S.E. of Town	State	4.8[d]	12.1	41
Show Low	Deuce of Clubs Avenue	State	4.8	10.9	54
PIMA:					
Ajo	Well Road	State	4.2	8.9	60
Corona de Tucson	22000 S. Houghton	Pima	2.1[d]	5.1	24
Green Valley	245 W. Esperanza	Pima	2.4[d]	5.8	22
Organ Pipe	Visitors Center	State	3.4	11.7	49
Rillito	Miller's Market	State	5.2[d]	10.4	39
Tucson	3915 E. Ft. Lowell Rd.	Pima	3.4[d]	9.0	22
Tucson	151 W. Congress	Pima	3.5[d]	6.5	24
Tucson	1810 S. 6th Avenue	Pima	3.4[d]	6.9	24
Tucson	3401 W. Orange Grove Rd.	Pima	3.8[d]	10.0	24
Tucson	1016 W. Prince Rd.	Pima	3.8[d]	7.9	24
Tucson	Irvington & Alvernon	TEP	4.6[d]	11.8	38
PINAL:					
San Manuel	LDS Church	State	7.4	19.0	60

Table 9 (Cont'd)

1982 Sulfates Data
High Volume Sampler (in ug/m^3)

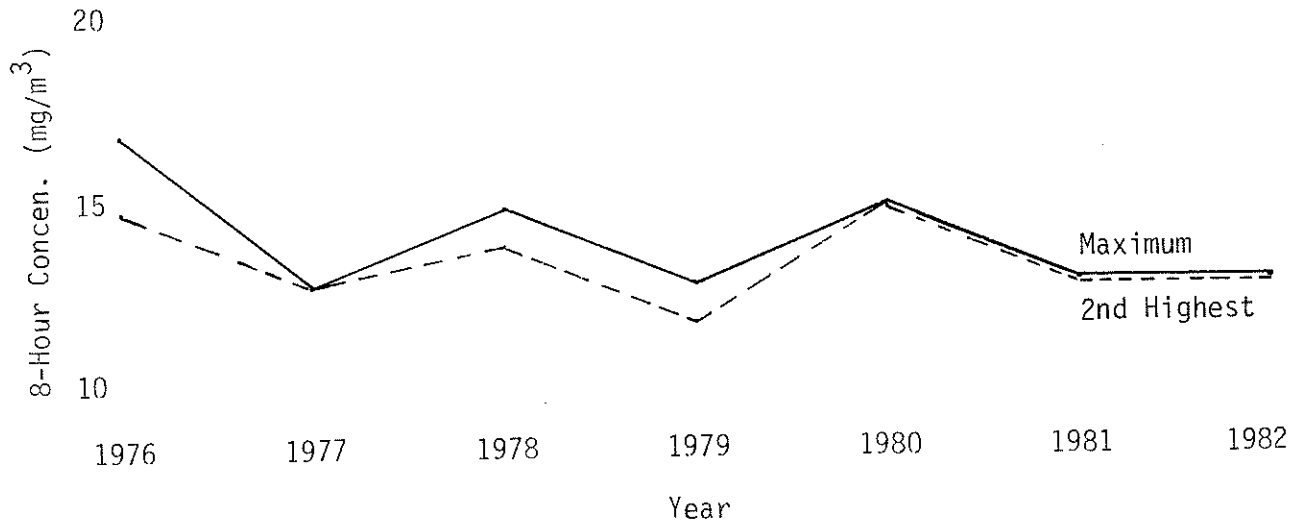
COUNTY AND CITY	SITE LOCATION	OPERATOR	ANNUAL AVERAGE	MAXIMUM 24-HOUR AVERAGE	NO. OF SAMPLES
SANTA CRUZ:					
Nogales	U. S. Post Office	State	5.4[d]	8.3	24
YAVAPAI:					
Clarkdale	Fire Station	State	4.8[d]	20.4	36
Montezuma Castle	Maint. Building	State	3.5	8.1	56
Nelson	1 mi. N. of Lime Plant	State	3.4[d]	7.1	44
Prescott	Co. Maint. Yard	State	4.0	8.9	54
YUMA:					
Yuma	201 S. 2nd Avenue	State	4.1	7.9	59

Data Trends

In Tucson, concentrations in 1982 were about the same as in 1981 as illustrated in Figure 4. The maximum 8-hour value remained the same, 13 mg/m^3, as did the second highest reading. The general trend from 1976 through 1982 has been a gradual decline, from 15 mg/m^3 to 13 mg/m^3 for the second highest 8-hour concentration.

Figure 4

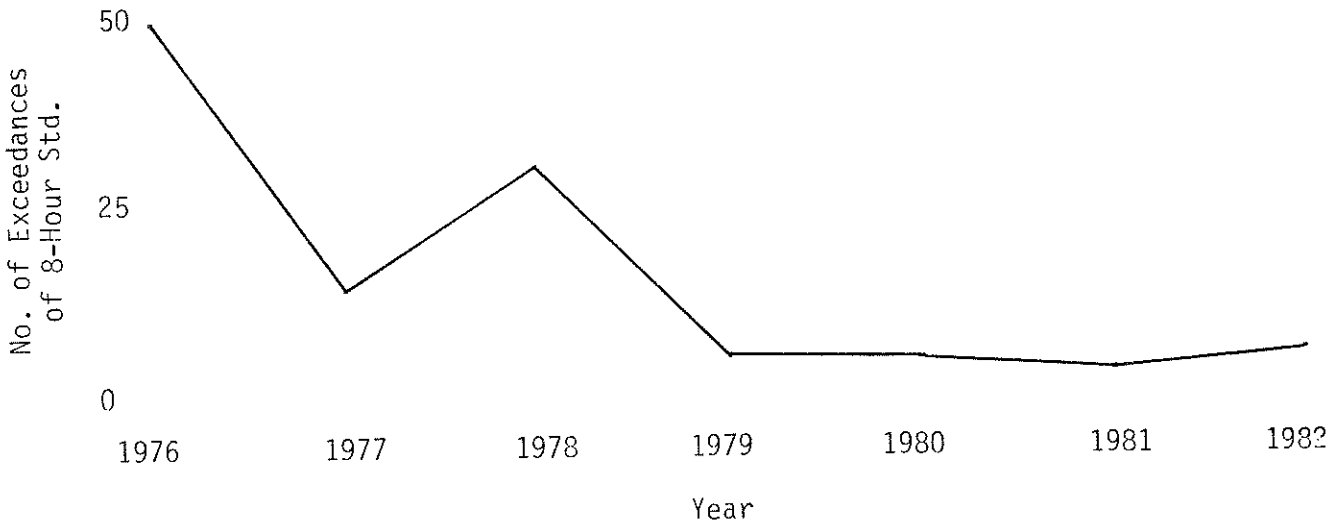
Carbon Monoxide Concentrations in Tucson
(Alvernon & 22nd)



The number of exceedances of the 8-hour standard were slightly higher in 1982, 5 as compared with 3 in 1981. Such an increase is insignificant when the data for 1976 through 1982 in Figure 5 are considered. Exceedances decreased from 50 in 1976 to only 6 in 1979. Subsequently, they have ranged between 3 and 6 per year.

Figure 5

Carbon Monoxide Exceedances in Tucson
(Alvernon & 22nd)



No exceedances were detected at the 151 West Congress and 22nd & Cray-croft monitoring sites in 1982. In fact, only one exceedance, 11 mg/m^3 at 151 West Congress in 1981, has been recorded at these two sites since 1978.

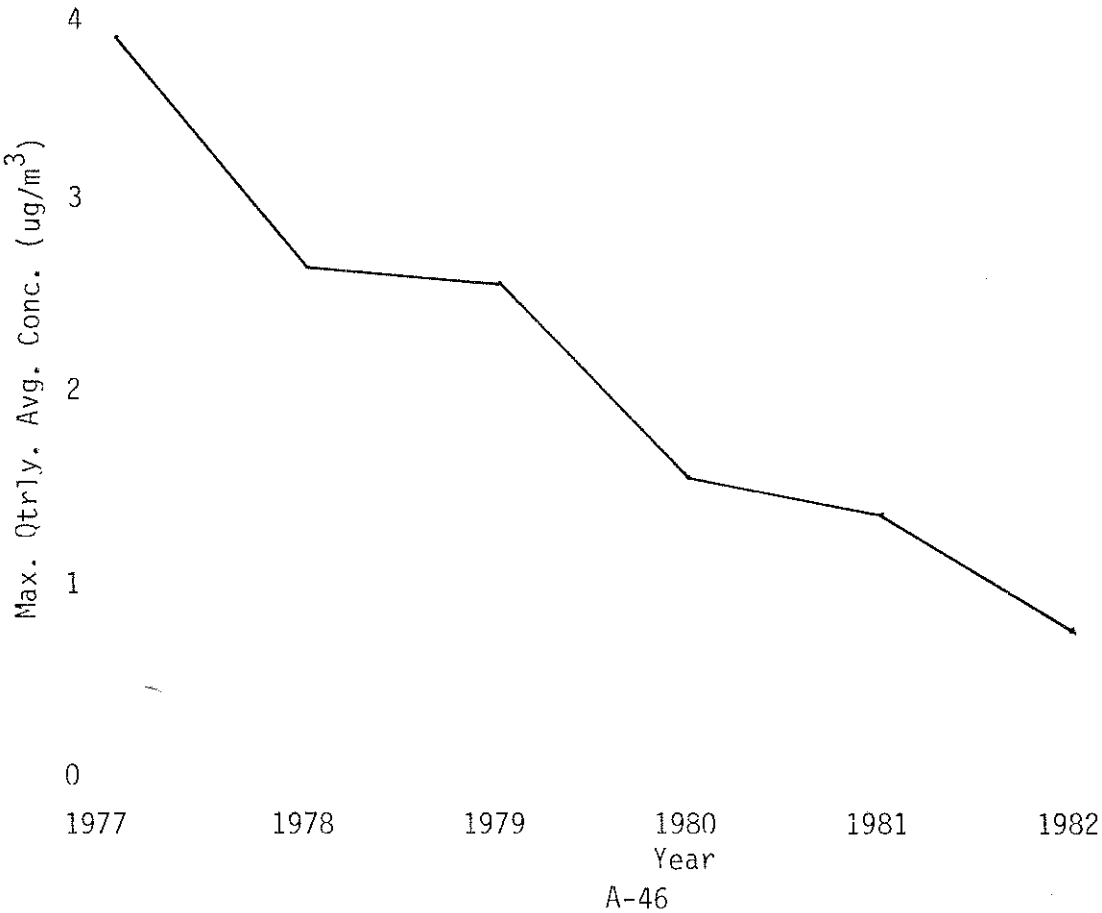
In Flagstaff, Prescott, Sierra Vista, and Yuma carbon monoxide concentrations decreased in 1982. The highest levels were recorded in Prescott, 8 mg/m^3 and 7 mg/m^3 for the two highest 8-hour concentrations. Reference to the data in Table 10 shows that no violation of the 8-hour standard has ever been detected in these cities. An exceedance level of 11 mg/m^3 was measured in Flagstaff in 1979 and in Prescott in 1980.

Lead

The maximum quarterly average concentration at 1845 East Roosevelt in Phoenix was 0.80 ug/m^3 in 1982, much lower than the 1981 maximum, 1.40 ug/m^3. Lead concentrations have continually decreased in Phoenix since 1977 when the maximum quarterly value was 3.9 ug/m^3. The trend during the last six years is graphically illustrated in Figure 6, which also shows that the air quality standard, 1.5 ug/m^3, was attained in 1981.

Figure 6

Lead Concentrations in Phoenix
(1845 East Roosevelt)



Carbon Monoxide

In 1982, carbon monoxide levels in Phoenix declined significantly at all monitoring sites. For example, at the 1845 East Roosevelt Street site the maximum and second highest 8-hour concentrations, 16 mg/m^3 and 15 mg/m^3, were 20% and 17% lower than in 1981. A sizable decrease since 1976 in concentrations at this site is apparent in Figure 2, from 21 to 15 mg/m^3 for the second highest 8-hour reading.

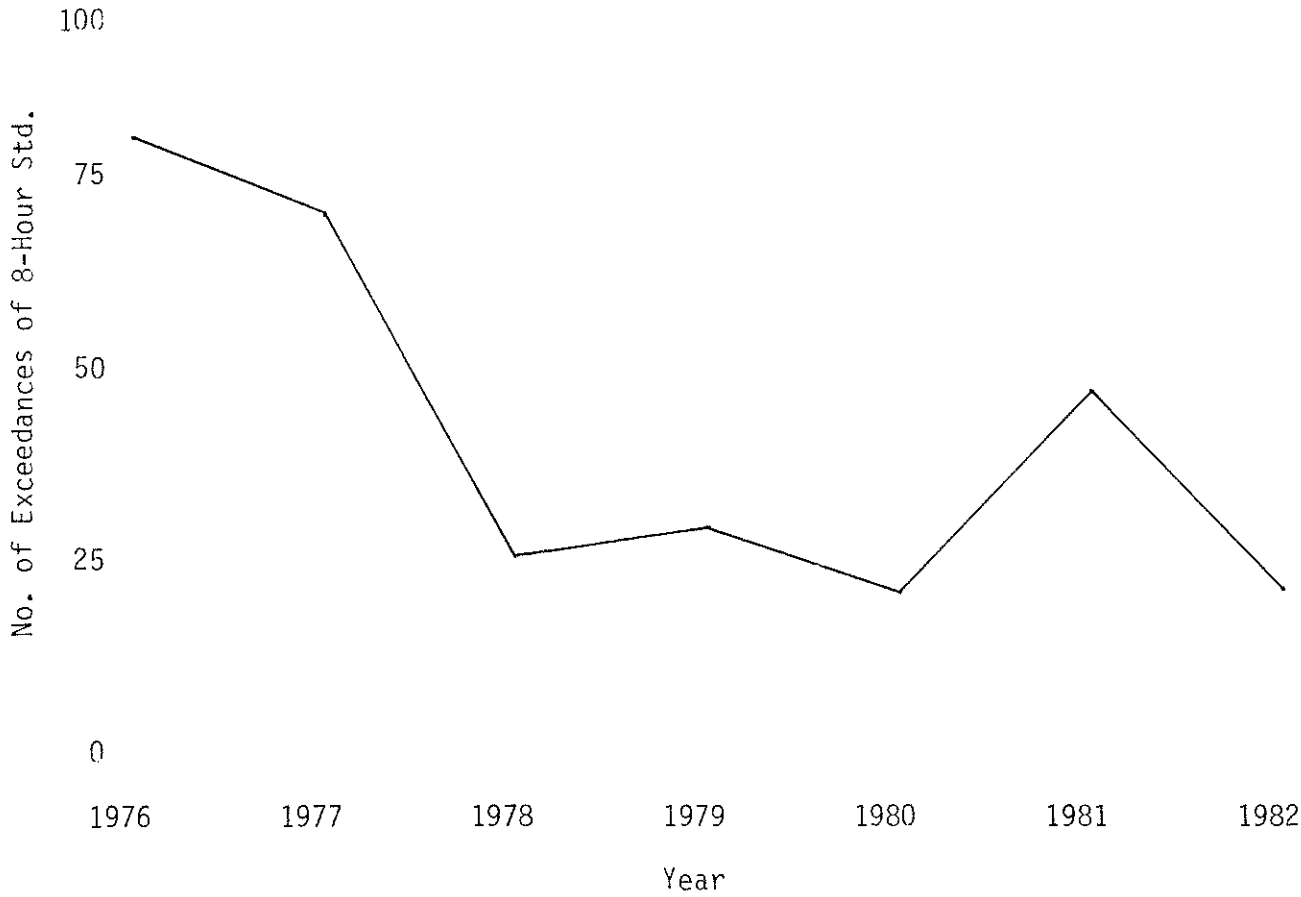
Figure 2

Carbon Monoxide Concentrations in Phoenix
(1845 East Roosevelt)

A downward trend is also indicated in the number of exceedances of the 8-hour standard at the Roosevelt Street site. Referring to Figure 3, there were 20 exceedances in 1982, down substantially from 46 in 1981 and 79 in 1976.

Figure 3

Carbon Monoxide Exceedances in Phoenix
(1845 East Roosevelt)



Data for the Roosevelt Street site were used to assess trends because of the long time span of these data. It should be noted, however, that a neighborhood-scale site installed in 1982 at 4202 West Belleview recorded higher concentrations, 20 mg/m^3, for the maximum and second highest 8-hour concentrations. In addition, more exceedances of the 8-hour standard, 29 to be exact, were detected even though the new site was not installed until late in the year.

Table 10

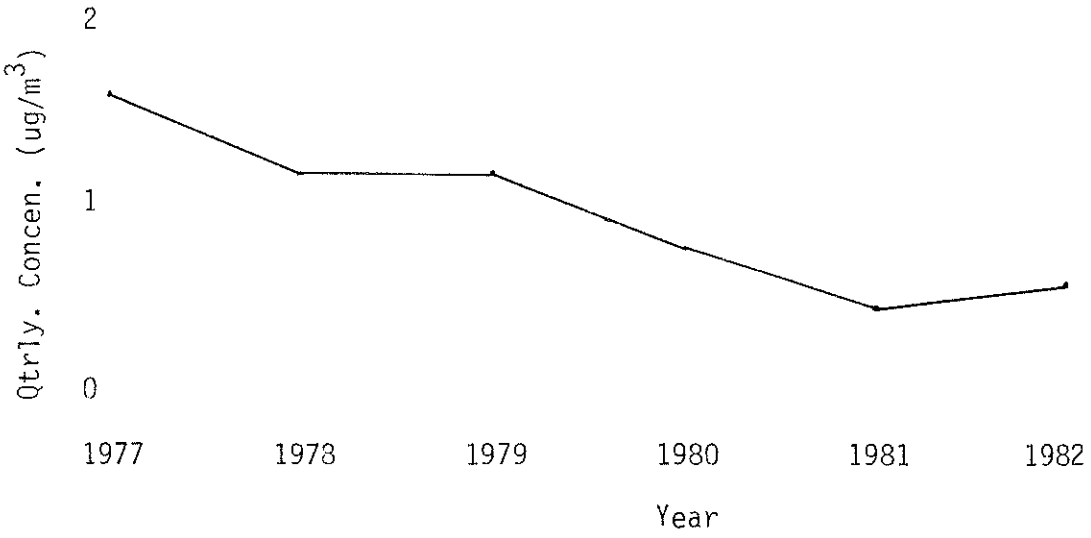
Carbon Monoxide Concentrations in Various Cities

City	Year	8-Hour Concentrations (mg/m^3)	
		Maximum	2nd High
Flagstaff	1976	6	6
	1977	5	5
	1978	10	10
	1979	11	10
	1980	10	8
	1981	10	9
	1982	7	7
Prescott	1980	11	6
	1981	9	8
	1982	8	7
Sierra Vista	1977	7	7
	1978	7	6
	1979	7	6
	1980	5	5
	1981	6	6
	1982	6	5
Yuma	1976	5	4
	1977	7	7
	1978	-	-
	1979	6	5
	1980	8	7
	1981	7	6
	1982	5	5

In Tucson, lead concentrations increased slightly in 1982 to 0.6 ug/m^3 compared with 0.5 ug/m^3 in 1981. However, the pattern over the past six years has been a gradual reduction in lead concentrations since 1977 when the maximum quarterly concentration was 1.6 ug/m^3. Figure 7 indicates that concentrations declined below the standard in 1978 in Tucson.

Figure 7

Lead Concentrations in Tucson
(1016 West Prince)



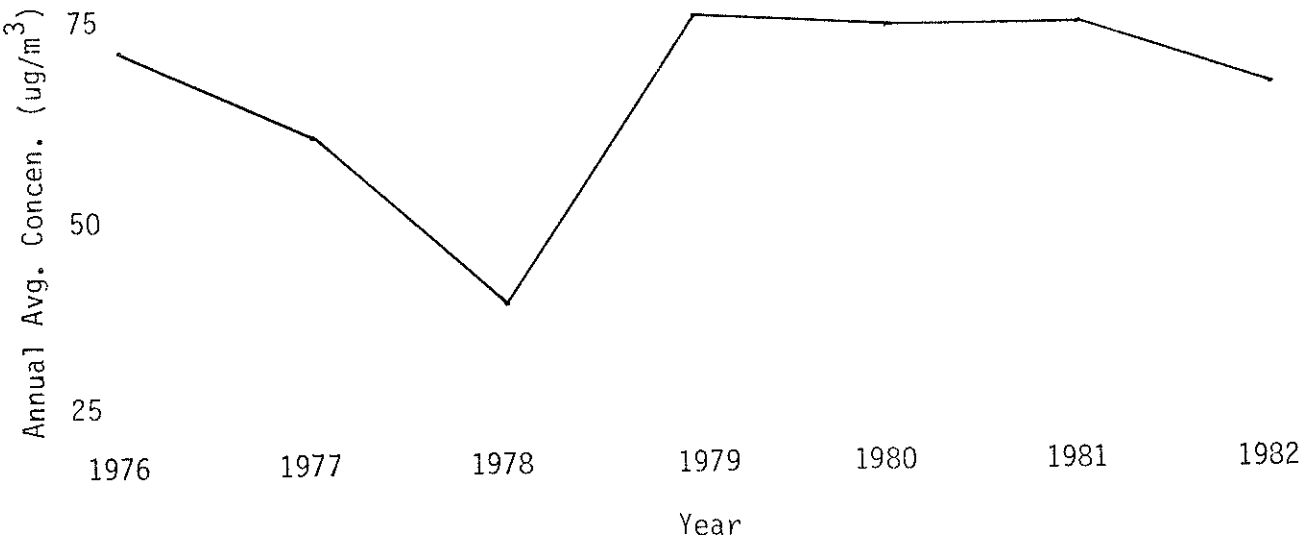
Nitrogen Dioxide

A moderate reduction in the annual average concentration was recorded in Phoenix where the 1982 average was 67 ug/m^3, down from 75 ug/m^3. Data for the last seven years, plotted in Figure 8, do not reflect any long-term increase or decrease.

None of the annual averages has exceeded the air quality standard, 100 ug/m^3.

Figure 8

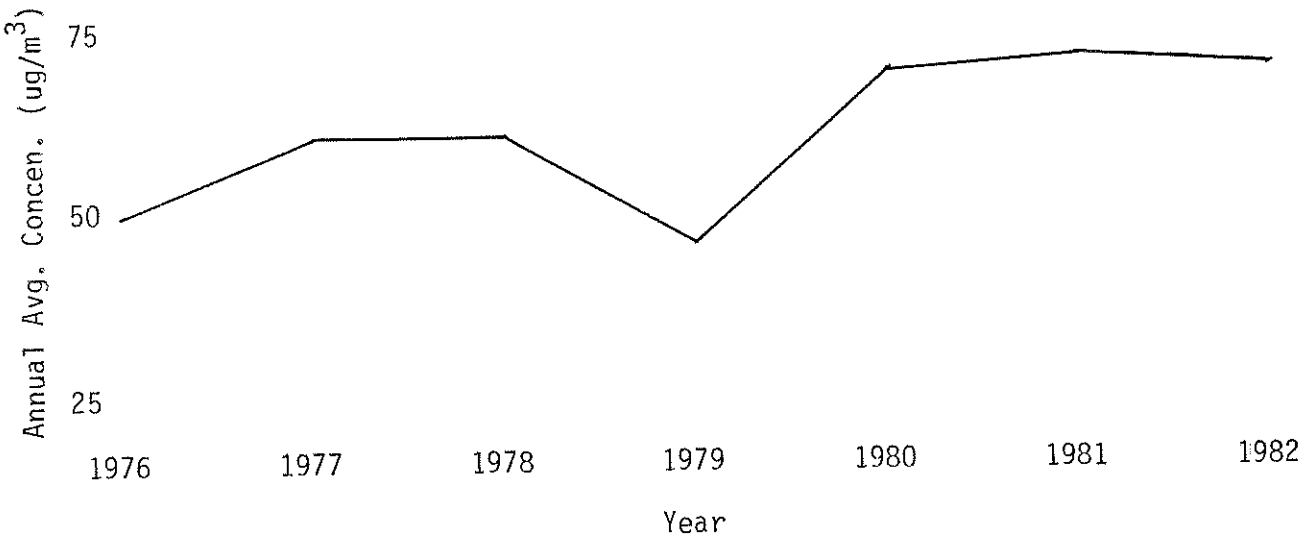
Nitrogen Dioxide Concentrations in Phoenix
(15 East Monroe)



Tucson nitrogen dioxide data reflect a slight upward trend over the past seven years, from 51 ug/m3 in 1976 to 68 ug/m3 in 1982. However, no significant change during the last three years is evident in the data which are plotted in Figure 9.

Figure 9

Nitrogen Dioxide Concentrations in Tucson
(151 West Congress)



Ozone

Ozone concentrations in Phoenix were the lowest in 1982 since 1976. Only three exceedances of the standard were detected in 1982 compared with 11 in 1981. In addition, the two highest 1-hour concentrations, .15 ppm and .14 ppm, were significantly reduced in 1982. The exceedance data are tabulated in Table 11, and the highest concentrations are listed in Table 12 below.

Table 11

Ozone Exceedances in Phoenix

Site	1976	1977	1978	1979	1980	1981	1982
1	1	4	4	4	3	6	1
2	0	0	0	1	10	4	1
3	0	0	0	1	3	0	0
4	0	0	2	1	3	0	1
5	0	0	0	0	0	1	0
Total	1	4	6	6	19	11	3

Sites: 1 - 1845 East Roosevelt, 2 - 8531 North 6th Street, 3 - 2857 North Miller Road (Scottsdale), 4 - 6000 West Olive (Glendale), 5 - 4732 South Central.

Table 12

Ozone Concentrations in Phoenix (ppm)

Year	Max 1-Hr.	Site	2nd Highest 1-Hr.	Site
1976	.13	1	.12	1
1977	.16	1	.15	1
1978	.16	1	.15	4
1979	.16	2	.14	2
1980	.17	1	.15	1,2,3,4,
1981	.18	1	.16	1,2,5
1982	.15	4	.14	1,2

Sites: 1 - 1845 East Roosevelt, 2 - 8531 North 6th Street, 3 - 2857 North Miller Road (Scottsdale), 4 - 6000 West Olive (Glendale), 5 - 4732 South Central.

In Tucson, maximum ozone concentrations have tended to increase since 1976, from .10 ppm to .13 ppm in 1982. In fact, the maximum 1-hour concentration in 1982 of .13 ppm was the first exceedance ever recorded in Tucson. Table 13 below includes the second highest as well as the maximum 1-hour values in Tucson since 1976.

Table 13

Ozone Concentrations in Tucson

Year	Max. 1-Hr. Avg. (ppm)	Site	2nd Highest 1-Hr. Avg. (ppm)	Site
1976	.10	1	.10	1
1977	.10	1,2	.10	1,2
1978	.11	2	.11	1
1979	.11	1	.10	1,2,4
1980	.12	1	.11	1,2,3
1981	.12	2	.12	2
1982	.13	3	.12	1,2,3,4

Sites: 1- 151 West Congress, 2 - Craycroft & 22nd, 3 - 4591 North Pomona, 4 - 9101 North Thoryndale.

In the smaller cities, Flagstaff, Prescott, Sierra Vista, and Yuma, highest ozone levels have been in the range of .07-.10 ppm. No long-term trend is apparent in the data for Flagstaff, Sierra Vista, and Yuma, whereas the data for Prescott is limited. Table 14 includes these data for the years, 1977-1982.

Table 14

Ozone Data in Various Cities

City	Year	Highest 1-Hr. Concentrations (ppm)	
		Maximum	2nd Highest
Flagstaff	1977	.09	.09
	1978	.08	.08
	1979	.07	.06
	1980	.08	.07
	1981	.07	.07
	1982	.09	.09
Prescott	1981	.08	.07
	1982	.10	.10
Sierra Vista	1978	.08	.08
	1979	.09	.08
	1980	.10	.09
	1981	.07	.07
	1982	.08	.08
Yuma	1980	.08	.08
	1981	.10	.10
	1982	.10	.10

Particulates

In the Phoenix area a reduction in particulate concentrations at all sampling sites was observed, ranging from 13% at the North Miller Road site in Scottsdale to 31% at the South Central Avenue site in Phoenix. The other four sampling sites listed in Table 15 below measured decreases of 16% to 20% relative to 1981 annual mean concentrations. Regarding long-term trends it appears that a gradual decline during the past six years has occurred, especially at the Roosevelt site. It remains to be seen, however, if any of the sites will attain the annual standard, 75 ug/m^3, for several consecutive years.

Table 15

Particulate Concentrations in Phoenix

Site	1977	1978	1979	1980	1981	1982
Glendale (6000 West Olive)	112	97	105	88	100	84
Mesa (Broadway & Brooks)	-	86	87	86	93	74
Phoenix (1845 East Roosevelt)	144	120	121	120	113	90
Phoenix (4732 South Central)	155	218	171	182	176	121
Phoenix (8531 North 6th Street)	109	106	117	100	108	86
Scottsdale (2857 North Miller)	118	92	99	87	97	84

In Tucson, particulates concentrations also decreased in 1982 relative to 1981 with the largest decrements, 21% and 20%, at 1810 South 6th Avenue and 3401 West Orange Grove Road. Over the past six years, however, the 3915 East Ft. Lowell Road station has shown the greatest improvement, from 155 ug/m^3 to 89 ug/m^3 for the annual mean. The West Prince Road and West Ajo Way locations have also tended to improve during this period. As in previous years, four of the sites in Table 16 exceeded the annual standard.

Table 16

Particulate Concentrations in Tucson

Site	Annual Geometric Mean Concentration (ug/m^3)					
	1977	1978	1979	1980	1981	1982
151 West Congress	68	56	70	61	67	65
2nd Street & Palm	71	61	89	75	76	59
1810 South 6th Avenue	119	117	101	97	112	89
1016 West Prince Road	122	110	129	117	101	93
7920 East Tanque Verde	67	56	61	56	62	54
1970 West Ajo Way	72	66	69	61	58	52[d]
8100 South Nogales Hwy.	50	43	54	54	54	44
3401 West Orange Grove Road	85	87	109	108	108	86
3915 East Ft. Lowell Road	155	126	120	101	98	89
2202 West Anklam Road	50	42	47	43	47	36
2181 South Harrison Road	63	55	65	59	67	59

Table 17

Particulate Concentrations in Various Cities

Site	Annual Geometric Mean Concentration (ug/m^3)					
	1977	1978	1979	1980	1981	1982
Ajo	72[d]	69	67[d]	85	86	68
Bullhead City	83	71	75	66	87	70
Douglas (U.S. 666)	46	20[d]	48	57	65[d]	54
Douglas (City Park)	82	74	121	136	128[d]	90[d]
Flagstaff	79[d]	104[d]	82[b]	81[d]	81	77[d]
Green Valley	56	45	54	39	46	33
Hayden (Jail)	92[d]	134[d]	172	152[d]	287	132
Hayden (Ranch)	57[b]	46[d]	53	50	74	44
Joseph City	55	35	40	37	34	30
Kansas Settlement	--	--	38	41	44	31
Miami (Fire Station)	99[d]	85	118	86	75	69
Morenci	47[d]	37	55	50	55[d]	35
Page	37	25[d]	34	36	38	36
Paul Spur	-	-	395	381	354[d]	303
Rillito	143[d]	100	132	114	112	107[d]
Safford	143[d]	123	159	125	107	107
San Manuel	50	26	30	29	49	36
Show Low	64	70	93	62	66	47
Sierra Vista	63[d]	53	65	52[d]	53	45
St. Johns	-	21[d]	19	24	23	19
Yuma	133	112[d]	139	126	121	90

In most of the other cities in Arizona, particulate concentrations also decreased in 1982 as indicated in Table 17. The most notable change was at Hayden (Fire Station) where the annual mean declined from 287 ug/m^3 in 1981 to 132 ug/m^3 in 1982. At a few cities, including Flagstaff, Joseph City, Page, Rillito and Safford very little variation in 1982 was indicated. Over the last six years the only consistent trend is a gradual reduction at Green Valley, Miami, and Safford.

Sulfur Dioxide

In four copper smelter cities, Ajo, Douglas, Hayden, and Morenci, concentrations were much lower in 1982 as indicated by the annual averages in Table 18. However, in Miami and San Manuel little or no change was observed. The only noticeable long-term trends are an increase in average concentrations in Ajo and a decrease in Hayden. The only exceedance of the annual standard (80 ug/m^3) in 1982 occurred at Hayden.

Table 18

Sulfur Dioxide Concentrations in Various Cities
(Avgs. in ug/m^3)

Site	1977	1978	1979	1980	1981	1982
Ajo (Oxidation Pond)	24	43	51	42	65	39[d]
Douglas (County Hospital)	48	55	67	45	67	35[d]
Hayden (Montgomery Ranch)	180	133	158	93	139	84
Miami (Jones Ranch)	84	64	79	30	76	76
Morenci (Stargo)	80	78	75	98	138	42
San Manuel (Golf Course)	79	62	65	36	75	71

Substantial reductions were also recorded in the number of exceedances of the 3-hour and 24-hour standards for sulfur dioxide. The only exceptions to this trend were, as noted in annual averages, Miami and San Manuel. In Miami, the number of exceedances actually increased, whereas in San Manual little change was indicated. These data are presented in Table 19.

Table 19

Sulfur Dioxide Exceedances in Various Cities

City	Year	Number of 3-Hour Exceedances	Number of 24-Hour Exceedances
Ajo	1977	2	1
	1978	5	2
	1979	0	2
	1980	8	2
	1981	5	1
	1982	1	1
Douglas	1977	14	1
	1978	7	0
	1979	12	6
	1980	8	0
	1981	20	1
	1982	3	1
Hayden	1977	102	84
	1978	13	9
	1979	40	21
	1980	13	6
	1981	17	12
	1982	7	2
Miami	1977	50	22
	1978	34	14
	1979	56	21
	1980	13	5
	1981	31	10
	1982	41	19
Morenci	1977	61	17
	1978	44	11
	1979	27	5
	1980	73	28
	1981	89	42
	1982	17	3
San Manuel	1977	22	2
	1978	24	3
	1979	19	6
	1980	7	0
	1981	10	1
	1982	7	2
Statewide	1977	251	127
	1978	127	39
	1979	154	61
	1980	122	41
	1981	172	67
	1982	76	28

Table 19

Sulfur Dioxide Exceedances in Various Cities

City	Year	Number of 3-Hour Exceedances	Number of 24-Hour Exceedances
Ajo	1977	2	1
	1978	5	2
	1979	0	2
	1980	8	2
	1981	5	1
	1982	1	1
Douglas	1977	14	1
	1978	7	0
	1979	12	6
	1980	8	0
	1981	20	1
	1982	3	1
Hayden	1977	102	84
	1978	13	9
	1979	40	21
	1980	13	6
	1981	17	12
	1982	7	4
Miami	1977	50	22
	1978	34	14
	1979	56	21
	1980	13	5
	1981	31	10
	1982	52	23
Morenci	1977	61	17
	1978	44	11
	1979	27	5
	1980	73	28
	1981	89	42
	1982	18	3
San Manuel	1977	22	2
	1978	24	3
	1979	19	6
	1980	7	0
	1981	9	1
	1982	7	2
Statewide	1977	251	127
	1978	127	39
	1979	154	61
	1980	122	41
	1981	171	67
	1982	88	34

APPENDIX B. Summary of Air Quality Standards and Emergency Episode Levels

SUMMARY OF AMBIENT AIR QUALITY STANDARDS - STATE AND FEDERAL STDS.[a]

In ug/m3 (and ppm)

Pollutant	Averaging Time	Primary	Secondary
Carbon monoxide[b]	1-hour	40 (35)	40 (35)
	8-hour	10 (9)	10 (9)
Nitrogen dioxide	Annual	100 (.05)	100 (.05)
Ozone	1-hour	235 (.12)	235 (.12)
Particulates	24-hour	260 (-)	150 (-)
	Annual (Geom. Mean)	75 (-)	60 (-)
Sulfur dioxide	3-hour	---	1300 (.5)
	24-hour	365 (.14)	---
	Annual	80 (.03)	---
Lead	Calendar Quarter	1.5 (-)	1.5 (-)

SUMMARY OF EMERGENCY EPISODE LEVELS - STATE AND FEDERAL

In ug/m3 (and ppm)

Pollutant	Averaging Time	Alert	Warning	Emergency	Significant Harm
Carbon monoxide[b]	1-hour	---	---	---	144 (125)
	4-hour	---	---	---	86.3 (75)
	8-hour	17 (15)	34 (30)	46 (40)	57.5 (50)
Nitrogen Dioxide	1-hour	1130 (.6)	2260 (1.2)	3000 (1.6)	3750 (2.0)
	24-hour	282 (.15)	565 (.3)	750 (.4)	938 (.5)
Ozone	1-hour State	400 (.2)	800 (.4)	1000 (.5)	1200 (.6)
	Federal	200 (.1)			
Particulates	24-hour	375 (-)	625 (-)	875 (-)	1000 (-)
Sulfur dioxide	24-hour	800 (.3)	1600 (.6)	2100 (.8)	2620 (1.0)
Sulfur dioxide[c] & particulates combined	24-hour	65000 (-)	261000 (-)	393000 (-)	490000 (-)

(a) Standards are not to be exceeded more than once per year with one exception. In the case of ozone, compliance is determined by the number of days on which the ozone standard is exceeded. The number of ozone exceedance days per year, based on a 3-year running average, is not to exceed 1.0.

(b) In mg/m3 (and ppm)

(c) In $(ug/m3)^2$

APPENDIX C. Glossary of Pollutants in the Ambient Air

Glossary of Pollutants in the Ambient Air

Carbon Monoxide

Carbon monoxide is a colorless, odorless gas formed by incomplete combustion of fuels. The major source of carbon monoxide in the urban air is motor vehicle operation. Aggravation of angina pectoris and other cardiovascular diseases is its major effect on human health.

Hydrocarbons

Hydrocarbons, which are a group of compounds composed of carbon and hydrogen, are the constituents of gaseous and liquid fuels. As a result, motor vehicles, service stations and bulk fuel storage tanks are the chief origins of hydrocarbon emissions. At the concentrations found in ambient air, hydrocarbons are not harmful, but they react with nitrogen oxides to form ozone and other oxidants, substances known to be at deleterious levels in the atmosphere.

Lead

In Arizona lead originates primarily from motor vehicle operation due to the use of lead antiknock compounds in gasoline. Lead concentrations are expected to stay at acceptable levels in the Phoenix area due to increased usage of unleaded gasoline instead of leaded gasoline. The health effects of lead include damage to the blood, the kidneys, and the nervous and reproductive systems in humans, resulting in anemia, brain and kidney diseases, and infertility.

Nitrates

Nitrates is a term referring to nitric acid and salts of nitric acid which are formed in the atmosphere by various complex reactions of nitrogen oxides with other substances. Nitrates exist as finely divided particulates which inhibit visibility, damage the respiratory system, exacerbate respiratory diseases, and soil and damage materials.

Nitrogen Dioxide

Nitrogen dioxide is a reddish-brown corrosive gas produced during high temperature fuel combustion. Power plants and motor vehicles generate the bulk of nitrogen dioxide in the atmosphere. It causes pulmonary edema and bronchitis in children.

Nitrogen Oxides

In air pollution terminology, nitrogen oxides include nitrogen dioxide and nitric oxide only. Both of these gases are emitted by the same major sources; namely, motor vehicles and power plants, as a result of high temperature fuel

combustion. Nitrogen oxides react with hydrocarbons in the atmosphere to produce ozone and other oxidants.

Oxidants (Ozone)

Oxidants are oxygen-containing gases or vapors that are formed in the atmosphere by the reaction of hydrocarbons with nitrogen oxides. Since sunlight accelerates this reaction, it is referred to as the photochemical reaction and the products formed are sometimes referred to as photochemical oxidants. The principal oxidant is ozone, a pungent, bluish gas which is a triatomic form of oxygen. Oxidants irritate the eyes, nose, and throat, impair breathing, and limit physical exercise. These effects are more severe in persons with chronic lung and cardiovascular diseases.

Particulates

They are small, solid particles or liquid droplets which are suspended in the atmosphere. Examples of particulates include dust, smoke, mist and fog. Particulates reduce visibility in the atmosphere, damage the respiratory system, aggravate respiratory diseases, and soil and damage materials. Major sources of particulates in Arizona are motor vehicle traffic on paved and unpaved roads and streets, construction activity, agriculture, wood burning, industrial and power generating plants, and windblown desert lands.

Sulfates

Sulfates are a group of compounds including sulfuric acid and salts of sulfuric acid which are emitted by power plants and copper smelters. They are also produced in the atmosphere by the oxidation of sulfur dioxide. Sulfates exist as small particles which cause the same effects on visibility, human health, and materials as noted above for nitrates and particulates.

Sulfur Dioxide

Sulfur dioxide is a heavy, acrid, colorless gas generated by combustion of sulfur-containing fuels in power generating and industrial plants. Another important source in Arizona is the smelting of sulfide ore in the copper industry. Aggravation of respiratory diseases is the primary health effect of sulfur dioxide.

APPENDIX D. Air Sampling Techniques

AIR SAMPLING TECHNIQUES

Benzene Soluble Organics

Concentrations of benzene soluble organics are measured by subjecting particulate samples to a hot benzene extraction and determining the amount of particulates which dissolves in the benzene.

Carbon Monoxide

Carbon monoxide concentrations are monitored by two methods, infrared absorption or gas chromatography. The infrared absorption method is based on the fact that carbon monoxide absorbs infrared radiation at a wavelength at which other gases do not absorb infrared radiation.

The gas chromatographic technique utilizes a chromatographic column which separates carbon monoxide from other gases. Carbon monoxide is extracted from the column and converted to methane and the resulting methane is measured in a flame ionization detector.

Hydrocarbons (Nonmethane)

Hydrocarbons (nonmethane) are monitored by a gas chromatograph using a flame ionization detector. Ambient air is drawn into the chromatograph and divided into two air streams. One stream is passed directly into the flame ionization detector so that total hydrocarbons are measured. The other stream is passed through a chromatographic column in which methane is separated from other gases. Methane is then extracted from the column and measured in the flame ionization detector. Nonmethane hydrocarbon concentrations are calculated by subtracting methane concentrations from total hydrocarbon concentrations. The reason for removing methane from consideration is that it is photochemically nonreactive; that is, it does not contribute to the formation of ozone and other oxidants.

Lead

Concentrations of lead are determined by means of nitric acid extraction of particulate samples followed by atomic absorption analysis of the nitric acid extract.

Nitrates

Nitrates analysis is performed through water extraction of particulate samples and specific ion electrode analysis of the water extract.

Nitrogen Dioxide

Three methods: bubbler, chemiluminescent and colorimetric, are utilized for nitrogen dioxide sampling. The bubbler method is a manual, non-continuous procedure; whereas, the other two methods are automated and continuous. In the bubbler method the air sample is bubbled through an impinger tube filled with an aqueous solution of sodium arsenite and sodium hydroxide for 24 hours. The impinger tube is delivered to the laboratory and the absorbing solution is analyzed colorimetrically.

The chemiluminescent technique is based on the catalytic conversion of nitrogen dioxide in the air sample to nitric oxide followed by chemiluminescent analysis of the effluent from the convertor for nitric oxide. This measurement represents the concentration of nitrogen dioxide plus nitric oxide in the sample. It is necessary to concurrently monitor the concentration of nitric oxide only by chemiluminescent analysis of that part of the air sample which bypasses the catalytic convertor. The nitric oxide concentration is subtracted from the concentration of nitrogen dioxide plus nitric oxide to give the nitrogen dioxide concentration.

Ozone

There are two acceptable methods for ozone monitoring, ultraviolet (UV) and chemiluminescent. In the UV analyzer, concentrations are determined by measuring the quantity of UV radiation absorbed by ozone in the air sample.

The chemiluminescent analyzer monitors ozone by detecting the amount of light emitted due to the reaction of ozone with ethylene.

Particulates

Particulate concentrations are measured by passing a metered flow of air for 24 hours through a pre-weighed 8 x 10 inch glass fiber filter. Particulates in the air sample are trapped on the filter, which is delivered to the laboratory for reweighing. The gain in weight of the filter during sampling represents the quantity of particulates collected. The concentration is calculated by dividing the weight of particulates by the volume of air passed through the filter.

The filter is then divided into sections for chemical analysis for sulfates, nitrates, lead and other metals.

Sulfates

Concentrations of sulfates are determined by water extraction of particulate samples followed by turbidimetric analysis of the water extract.

Sulfur Dioxide

In Arizona four methods of sampling are used, including the bubbler, coulometric, fluorescent and flame photometric methods. The bubbler method is a manual, noncontinuous technique. The three other methods are continuous and automated. In the bubbler the sample is bubbled through an impinger tube filled with an aqueous solution of potassium chloride and mercuric chloride for 24 hours. After sampling, the solution is analyzed colorimetrically.

The coulometric method consists of scrubbing sample air in an aqueous solution of potassium bromide, bromine and sulfuric acid. Sulfur dioxide in the air sample reacts with bromine, causing a change in electrical potential at the anode. This voltage change is proportional to the amount of bromine which has reacted with sulfur dioxide. Thus, the voltage change is a direct indication of the sulfur dioxide concentration in the air sample.

In the fluorescent analyzer, sample air is drawn into a chamber and irradiated with ultraviolet light. Any sulfur dioxide in the air stream is excited to a higher energy state. The excited sulfur dioxide then reverts to a lower energy state by emitting radiation, which is measured by a photomultiplier tube.

The flame photometer technique is similar to the fluorescent in that emitted radiation is proportional to the sulfur dioxide concentration. In the flame photometer, however, the radiation is emitted by excited sulfur molecules rather than sulfur dioxide molecules. Sulfur molecules are produced by passing sample air into a hydrogen flame where sulfur dioxide is converted to elemental sulfur. Sulfides must be removed by a scrubber before the air sample is passed into the hydrogen flame because they will also convert to elemental sulfur.