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of Environmental Quality

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2008 AIR QUALITY ANNUAL REPORT

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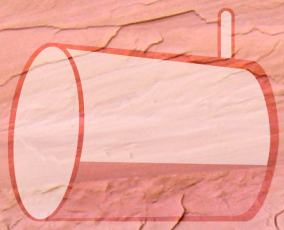

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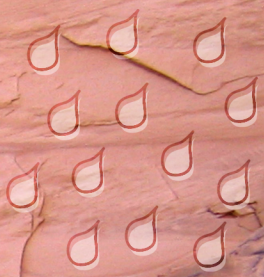

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Acknowledgments

Numerous agencies, companies, individuals, and organizations have collected the ambient air quality monitoring data presented in this report. The Arizona Department of Environmental Quality (ADEQ) publishes data from these various sources to provide a picture, which is as complete as possible, of air quality conditions throughout Arizona and gratefully acknowledges the efforts of all involved. Generally, ambient data presented in this report are collected, processed, and reported following U.S. Environmental Protection Agency (EPA) policies and procedures. Air quality data that ADEQ staff and contract operators collect have also received internal and external quality control and quality assurance checks. Data provided by other sources have been checked by the responsible organization, but not by ADEQ.

Private individuals and companies under contract to ADEQ provided invaluable field sampler operation and data processing services in support of monitoring activities during 2007. Their efforts are appreciated as they maneuvered on rooftops and metal towers to operate monitoring equipment in uncomfortable weather conditions and review instrument performance and ambient monitoring data for technical accuracy. Field staff from other public agencies also operated numerous ambient monitoring sites in Arizona, providing spatial resolution and temporal coverage of air quality conditions statewide. ADEQ recognizes the efforts of these other monitoring and reporting agencies and appreciates the opportunity to publish their data. Several industrial facilities collected and reported ambient air quality data to ADEQ, usually to satisfy permit requirements; their efforts are also acknowledged. Finally, ADEQ staff works daily installing, calibrating, maintaining, conducting quality control checks, collecting, processing, performing quality assurance tests, and reviewing and reporting data from a wide variety of ambient air monitoring instruments. These activities are necessary to provide the highest quality data to Arizona's population and to meet EPA program requirements. ADEQ management wishes to thank these staff members for their dedication to maintaining and improving the quality of our program.

This report was prepared by ADEQ's Air Quality Assessment Section, which can be contacted at 1110 W. Washington St., Phoenix, AZ 85007. The phone number is (602) 771-2274 or, toll free in Arizona at (800) 234-5677, then enter 771-2274. Our Web site is located at http://www.azdeq.gov.

Report Introduction

This report presents the results of air quality monitoring conducted throughout Arizona in 2007. Data from more than 100 monitoring sites are included in this report. In addition to the ADEQ monitoring network, air quality agencies in Maricopa, Pima, and Pinal counties also operated networks, as did several industrial facilities and federal agencies such as the National Park Service and the U.S. Forest Service. Their data are summarized in this report too. Many of the sites have multiple instruments measuring a variety of gaseous, particulate, and visibility parameters. The majority of the air quality measurements are for criteria pollutants (ozone, particulate matter, sulfur dioxide, carbon monoxide, and nitrogen dioxide) for which EPA has established National Ambient Air Quality Standards (NAAQS). Visibility-related measurements are included from a statewide network of operators.

The report on Ambient Air Quality Monitoring Networks, which begins on Page 3, discusses the purpose, measurement methods, and the specific scale of geographic resolution of each network of various air monitoring networks in Arizona.

Beginning on Page 15, the Monitoring Data report summarizes the monitoring data and shows the compliance status for criteria pollutants. It consists of three sections: measurement of traditional criteria pollutants, compliance status of the criteria pollutants, and visibility characterization. The text describes how the measurements are made and how they relate to compliance with the NAAQS.

The report on Accomplishments and Special Projects, which begins on Page 60, summarizes activities from special monitoring projects undertaken in the last few years for specific purposes. Some of these projects are to understand the regional haze problem in Class I areas, characterize ozone precursors, and conduct intensive ambient monitoring and risk assessment in the Yuma area.

The Air Quality Trends report begins on Page 68. Trends of ozone, particulate matter, carbon monoxide, and visibility are discussed. EPA changed the NAAQS for particulate matter (both PM_{10} and $PM_{2.5}$) in December 2007 and for ozone in June 2008. The NAAQS for lead changed in October 2008. These changes will affect how trends of these pollutants are viewed.

Ambient Air Quality Monitoring Networks

Figure 1 – South Phoenix monitoring station

This section describes the ambient air quality monitoring networks currently operating in Arizona. Monitoring networks for ambient air quality are established to sample pollution in a variety of representative settings to assess health and welfare effects and to assist in determining air pollution sources. The ambient monitoring networks cover both urban and rural areas of the state. These networks are operated by government agencies and regulated companies. They are composed of one or more monitoring sites whose data are compared to the NAAQS for compliance and statistically analyzed in various ways for trends. The agency or company operating a monitoring network also tracks data recovery, quality control, and quality assurance parameters for the instruments operated at their various sites. The agency or company also may measure meteorological variables at the monitoring site.

In addition to sampling for criteria pollutants, some of the agencies do special continuous monitoring for the optical characteristics of the atmosphere and manual sampling of ozone forming compounds and other hazardous air pollutants. Maricopa, Pima, and Pinal counties operate networks primarily to monitor urban air pollution. In contrast, the industrial networks are operated to determine the effects of their emissions on local air quality. The National Park Service's network tracks conditions in and around national parks and monuments. The ADEQ State network monitors a wide variety of pollutant and atmospheric characteristics, including urban, industrial, rural, and background surveillance.

The monitoring networks are operated to collect ambient air quality data to ensure that Arizona citizens are able to know local air quality conditions and help ADEQ and local air quality control agencies identify the causes of polluted air. The networks and their characteristics are shown in Table 1. A list of individual sites and monitoring parameters, based on the best available information at the time of publication, is presented in Appendix 1, page 92.

Table 1: Monitoring Networks Operating in Arizona				
Network Operator	Geographic Area Monitored	Monitoring Objective*	Measurement Scale(s)**	Pollutant(s) Monitored
Arizona Department of Environmental Quality	Statewide	1, 2, 3, 4, 5, 6	Micro, Middle, Neighborhood, Urban, Regional	SO_2, O_3, NO_2, CO, PM_{10}, $PM_{2.5}$
Arizona Portland Cement Company	Rillito	1, 3	Neighborhood	PM_{10}
ASARCO LLC	Hayden	1, 2, 3	Middle, Neighborhood	SO_2
Maricopa County Air Quality Department	Phoenix urban area, Maricopa County	1, 2, 3, 4, 5, 6	Micro, Middle, Neighborhood, Urban, Regional	SO_2, O_3, NO_2, CO, PM_{10}, $PM_{2.5}$
National Park Service	National parks and monuments	3, 4, 5, 6	Urban, Regional	SO_2, O_3, NO_2, PM_{10}, $PM_{2.5}$
Freeport McMoRan Copper and Gold Inc.	Miami	1, 2, 3	Neighborhood	SO_2, PM_{10}, $PM_{2.5}$
Phoenix Cement Company	Clarkdale	1, 3	Neighborhood	PM_{10}
Pima County Department of Environmental Quality	Tucson urban area, Pima County	1, 2, 3, 4, 5, 6	Micro, Middle, Neighborhood, Urban, Regional	SO_2, O_3, NO_2, CO, PM_{10}, $PM_{2.5}$
Pinal County Air Quality Control District	Pinal County, Phoenix urban area	1, 2, 3, 4, 5	Middle, Neighborhood, Urban, Regional	O_3, PM_{10}, $PM_{2.5}$
Tucson Electric Power Company	Tucson and Springerville	1, 2, 3	Middle, Regional	SO_2, NO_2, PM_{10}

**See Table 2 for a list of monitoring objectives*
***See Table 3 for a definition of measurement scales*

Criteria Pollutant Monitoring Networks

The federal Clean Air Act (CAA) of 1970 required EPA to assist states and localities in establishing ambient air quality monitoring networks to characterize human health exposure and public welfare effects of criteria pollutants. For each criteria pollutant, EPA specifies the monitoring objectives that define the parameters by which health exposure and public welfare are assessed and the measurement scale classifications that describe the influence of atmospheric movement at a given location.

The 1977 federal CAA amendments required each state to implement a visibility monitoring network to cover specified national parks and wilderness areas. The Phoenix and Tucson metropolitan areas also have year-round visibility monitoring networks to assess urban haze.

The networks are designed to satisfy the monitoring objectives and measurement scales defined in Tables 2 and 3. EPA updates monitoring network requirements as necessary in 40 CFR Part 58 Appendix D. The most recent revision was December 17, 2006. These requirements are based on Metropolitan Statistical Areas (MSAs) and Combined Statistical Areas (CSAs) and apply to $PM_{2.5}$, PM_{10}, and ozone (O_3). In addition, new requirements for sample frequency were made for $PM_{2.5}$ and PM_{10}. EPA will make revisions to 40 CFR Part 58 to include the new requirements for the revised NAAQS for lead (Pb) and O_3.

Table 2: Monitoring Objectives for Air Quality Monitoring Sites

Number	Definition
1	Determine highest concentrations expected to occur in the area covered by the network
2	Determine representative concentrations in areas of high population density
3	Determine the impact on ambient pollution levels of significant sources or source categories
4	Determine general background concentration levels
5	Determine the extent of regional pollutant transport among populated areas and in support of secondary standards
6	Determine the welfare-related effects in more rural and remote areas (such as visibility impairment and vegetation damage)

Table 3: Measurement Scales for Air Quality Monitoring Sites						
Measurement Scale *represents concentrations in air volumes within areas defined below*	Criteria Pollutant					
	Carbon Monoxide (CO)	Nitrogen Dioxide (NO_2)	Ozone (O_3)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10}, $PM_{2.5}$)	Lead (Pb)
Micro (0 to 100 m)	X				X	X
Middle (~100 to 500 m)	X	X	X	X	X	X
Neighborhood (~0.5 to 4 km)	X	X	X	X	X	X
Urban (~4 to 50 km)		X	X	X	X	X
Regional (~10 to 100s of km)			X	X	X	X

Criteria Pollutants – Monitoring Network and NAAQS Changes

The criteria pollutants are presently defined as carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), suspended particulate matter (PM), and total particulate lead (Pb). These pollutants are monitored with federal reference (FRM) or equivalent (FEM) methods that EPA has certified.

In October 2008, EPA established a new primary and secondary NAAQS for Pb. The standards, primary and secondary, are both 0.15 micrograms per cubic meter ($\mu g/m^3$); the previous standard was 1.5 $\mu g/m^3$. Primarily due to the introduction of non-leaded gasoline, total particulate Pb levels in Arizona have been very low for years; therefore Pb in total particulates has not been measured. However, Pb in fine particulates ($PM_{2.5}$) has been monitored as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program and Chemical Speciation Network (CSN). Recently, EPA has added PM_{10} metals to the National Air Toxics Trends Sites (NATTS) program. Pb is one of the metals analyzed in these samples. The new NAAQS will require additional Pb monitoring. EPA is preparing these monitoring guidelines.

In June 2008, EPA lowered the eight-hour O_3 standard from 0.08 parts per million (ppm) to 0.075 ppm. Recommendations for nonattainment areas are to be submitted to EPA by March of 2009. EPA also added a secondary standard to the O_3 NAAQS which is identical to the primary standard. The secondary standard is meant to protect plants from O_3 damage. EPA will provide new monitoring requirements in the fall of 2008.

In December 2006, EPA made changes to both the PM_{10} and $PM_{2.5}$ NAAQS. The annual PM_{10} NAAQS was revoked and the 24-hour $PM_{2.5}$ NAAQS was reduced from 65 to 35 $\mu g/m^3$. Nogales was the only designated nonattainment area in Arizona for $PM_{2.5}$ based on the new NAAQS.

Visibility Monitoring Networks in National Parks and Wilderness Areas

The intent of the Class I visibility monitoring program is to characterize long-term trends as completely as possible using ambient visibility measurements within constraints of an area's size, terrain, or logistics for each of the 12 federally-protected Class I areas in Arizona (see visibility maps in Appendix 4). The objectives of the visibility monitoring network are to track short-term and long-term trends in Arizona Class I areas, to assist in identifying any visibility impairment caused by existing major industrial sources, and to provide monitoring data for new or major modifications of major industrial sources. Arizona continues to participate in the IMPROVE Program as part of the overall national visibility monitoring effort. IMPROVE is a cooperative measurement effort between EPA, federal land management agencies, and state air agencies. The objectives of IMPROVE are:

- To establish current visibility and aerosol conditions in mandatory Class I areas
- To identify chemical species and emission sources responsible for existing manmade visibility impairment
- To document long-term trends for assessing progress towards the national visibility goal
- With the enactment of the regional haze rule, to provide regional haze monitoring representing all visibility-protected federal Class I areas

Class I areas were designated based on an evaluation required by Congress in the 1977 federal CAA amendments. The evaluation, which the U.S. Forest Service and National Park Service performed, reviewed the wilderness areas of parks and national forests which were designated as wilderness before 1977, were more than 6,000 acres in size, and have visual air quality as an important resource for visitors. Of the 156 Class I areas designated across the nation, 12 are located in Arizona.

The Arizona Class I visibility network consists of a combination of visibility monitoring sites established by ADEQ and those established by the IMPROVE committee. Monitoring has been conducted near or in the following Class I areas:

- Meadview
- Grand Canyon National Park - Hance Camp
- Grand Canyon National Park - Indian Gardens
- Petrified Forest National Park
- Mt. Baldy Wilderness - Greer Water Treatment Plant
- Sycamore Canyon Wilderness - Camp Raymond
- Hillside (Site was closed in June of 2005)
- Mazatzal/Pine Mountain Wildernesses - Ike's Backbone
- Sierra Ancha Wilderness - Pleasant Valley Ranger Station
- Superstition Wilderness - Tonto National Monument
- Superstition Wilderness - Queen Valley

- Saguaro National Park - West Unit
- Saguaro National Park - East Unit
- Chiricahua National Monument - Entrance Station
- Galiuro Wilderness - Muleshoe Ranch (Site was closed in June of 2005)
- Organ Pipe National Monument

Each IMPROVE site includes $PM_{2.5}$ sampling with subsequent analysis for the fine particle mass and major aerosol species, as well as PM_{10} sampling and mass analysis. Many of the sites also include optical monitoring with nephelometers or transmissometers and color photography to document scenic appearance.

More information about the IMPROVE procedures, sites, and data can be found on the IMPROVE website at http://vista.cira.colostate.edu/improve/.

Urban Haze Networks

ADEQ monitors the Phoenix and Tucson metropolitan areas with a network of instruments to characterize and quantify the extent of urban haze. There are no established federal or state standards for acceptable levels of urban haze. ADEQ began studying the nature and causes of urban hazes with a study in the winter of 1989-1990 in Phoenix and the winter of 1992-1993 in Tucson. These studies recommended long-term, year-round monitoring of visibility. In 1993, ADEQ began deploying visibility monitoring equipment in Phoenix and Tucson. These visibility monitoring data are needed to provide policymakers and the public with information, track short-term and long-term trends, assess source contributions to urban haze, and better evaluate the effectiveness of air pollution control strategies.

The current Phoenix urban haze network includes two transmissometers (located in Phoenix and Mesa) for measuring light extinction along a fixed path length of about 3 to 5 kilometers, four nephelometers for measuring light scattering, and five digital camera systems to record visual characteristics of the urban area. The current Tucson urban haze network includes one transmissometer for measuring light extinction along a fixed path length of about 3 to 5 kilometers, three nephelometers for measuring light scattering, and one digital camera system operated by Pima County to record visual characteristics of the urban area. Operation of Phoenix and Tucson area urban haze particulate monitors was discontinued at the close of 2004. Data from active PM_{10} and $PM_{2.5}$ samplers will be used to characterize chemical composition and seasonal variation on an as needed basis.

The Web site for Phoenix area visibility is http://www.phoenixvis.net/. The Web site for the Tucson area visibility is http://www.airinfonow.org/.

Photochemical Assessment Monitoring Stations Network (PAMS)

Section 182(c)(1) of the 1990 CAA Amendments required the administrator to promulgate rules for the enhanced monitoring of O_3, oxides of nitrogen (NO_x), and volatile organic compounds (VOCs) to obtain more comprehensive, and representative data on O_3 air pollution. Immediately following the promulgation of those rules, the affected states were to begin actions necessary to adopt and implement a program to improve ambient monitoring activities and the monitoring of emissions of NO_x and VOCs. Each state implementation plan (SIP) for the affected areas must contain commitments to implement the appropriate ambient monitoring network for such air pollutants. The subsequent revisions to 40 CFR 58 (1993) required states to establish photochemical assessment monitoring stations (PAMS) as part of their SIP monitoring networks in O_3 nonattainment areas classified as serious, severe, or extreme. The principal reasons for requiring the collection of additional ambient air pollutant and meteorological data are the nationwide lack of attainment of the O_3 NAAQS and the need for a more comprehensive air quality database for O_3 and its precursors. The 2006 40 CFR 58 revisions reduced the monitoring requirements for number of sites (only two sites required for the Phoenix area). The length of the monitoring season was changed from April through October to June through August.

The chief objective of the enhanced O_3 monitoring requirements is to provide air quality data that will assist air pollution control agencies in evaluating, tracking the progress of and, if necessary, refining control strategies for attaining the O_3 NAAQS. Ambient concentrations of O_3 and O_3 precursors are used to make attainment and nonattainment determinations, aid in tracking VOC and NO_x emission reductions, better characterize the nature and extent of the O_3 problem, and examine air quality trends. In addition, data from the PAMS network provide an improved database for evaluating photochemical model performance, especially for future control strategy midcourse corrections as part of the continuing air quality management process. The data are particularly useful to states in ensuring the implementation of the most cost effective regulatory controls.

The PAMS network array for an area should be fashioned to supply measurements that will assist states in understanding and solving O_3 nonattainment problems. EPA has defined a number of important monitoring objectives with the following five site types:

- Type 1 Site: Upwind and Background Characterization
- Type 2 and 2a Sites: Maximum Ozone Precursor Emissions Impact
- Type 3 Site: Maximum Ozone Concentration
- Type 4 Site: Extreme Downwind Monitoring

PAMS data include measurements of O_3, NO_x, a target list of VOCs including several carbonyls, and surface and upper air meteorology. PAMS sites measure 56 target hydrocarbons (HC) on either a daily, hourly, or three-hour basis during the O_3 season. The Type 2 sites also collect data on three carbonyl compounds (formaldehyde, acetaldehyde, and acetone) during the O_3 monitoring period. Included in the monitored VOC species are 10 compounds classified as hazardous air pollutants. All stations must measure O_3, NO_x, and surface meteorological parameters on an hourly basis. Beginning in 2007, ADEQ will operate three PAMS sites: the ADEQ JLG Supersite in central Phoenix (a Type 2 site); the wind profiler (upper air meteorology) site; and the Queen Valley site (Type 3). The South Phoenix site was changed to a toxics monitoring site in 2007. See Table 4 for a history of PAMS data collection in the Phoenix metropolitan area.

Table 4: History of PAMS Monitoring in Metropolitan Phoenix

Year	VOCs	Carbonyls
2007	JLG Supersite Queen Valley	JLG Supersite
2006	JLG Supersite Queen Valley South Phoenix	JLG Supersite South Phoenix
2005	JLG Supersite Queen Valley South Phoenix	JLG Supersite South Phoenix
2004	JLG Supersite Queen Valley South Phoenix	JLG Supersite South Phoenix
2003	None	JLG Supersite Queen Valley South Phoenix
2002	JLG Supersite Queen Valley	JLG Supersite Queen Valley South Phoenix
2001	JLG Supersite Queen Valley	JLG Supersite Queen Valley
2000	JLG Supersite	JLG Supersite
1999	JLG Supersite	JLG Supersite

National Air Toxics Trend Sites (NATTS)

The NATTS network was designed to document the concentration of certain air toxics on a national scale. ADEQ accepted federal funding in 2003 for participation in this program. Data from EPA's national monitoring activities will establish an estimate of national average concentrations for these air toxics compounds, allows EPA to evaluate the need for new NAAQS, and establish associated limits. Data from

sites in this trends network will be used to identify the probability that long-term changes or trends in ambient air concentrations are occurring. Using this information, EPA, states, and local agencies can estimate changes in the risks of human exposure. These changes can then be used to anticipate changes in environmental policy and to establish a regulatory stance. As part of the overall National Air Toxics Assessment (NATA) process, ambient air quality data are important to help assess the national toxics inventory and long-term hazardous air pollutant (HAP) trends. ADEQ's NATTS monitoring is conducted at the ADEQ JLG Supersite.

$PM_{2.5}$ Chemical Speciation Network (CSN)

The Speciation Trends Network (STN) was established to meet the regulatory requirements for monitoring $PM_{2.5}$ to determine the chemical composition of these particles. The network was established in 2000 with approximately 54 STN sites across the nation, as well as additional SLAMS speciation sites. The purpose of the network is to determine, over a period of several years, trends in concentration levels of selected ions, metals, carbon species, and organic compounds in $PM_{2.5}$. Locations are primarily in or near larger Metropolitan Stastical Areas. ADEQ operates one STN speciation sampler at the ADEQ JLG Supersite. Two IMPROVE samplers are also operated at the ADEQ JLG Supersite for the purpose of providing precision information for the IMPROVE network and to make comparisons between the speciation results from both programs. The STN is part of the larger CSN that includes IMPROVE sites.

Annual Ambient Air Monitoring Network Plan

In December 2006, EPA expanded the requirements of the former network review in the revisions to 40 CFR §58.10(a). Each government agency operating a monitoring network is required to submit to EPA a detailed network plan by July 1 of each year. The plan must be available to the public for a 30-day comment period prior to submittal to EPA. This plan describes how the monitoring network meets EPA requirements in 40 CFR Part 58 for the next 18 months. The plan includes detailed descriptions of sites and monitors to determine if siting requirements are met. The plan must also ensure that the revised minimum monitoring requirements for the network are met and must describe any proposed changes to the network to be made during the coming year. Network plans are posted on each agency's website. ADEQ's 2008 Network Monitoring Plan can be found at http://www.azdeq.gov/environ/air/monitoring/download/2008plan.pdf .

40 CFR Part 51 requires states to create, submit, and adopt SIPs to address the various issues and responsibilities involved with creating and implementing air quality programs. Subpart J of Part 51 specifies that 40 CFR Part 58 Subpart C contains the requirements for establishing air quality surveillance systems to monitor ambient air quality. These requirements are addressed in the annual network plan.

Air quality surveillance systems consist of networks of monitors at carefully chosen physical locations referred to as sites or stations. Some of the networks, sites, and monitors are:

- State and Local Air Monitoring Stations (SLAMS)
- National Core multipollutant monitoring stations (NCore)
- Photochemical Assessment Monitoring Stations (PAMS)
- Speciation Trends Network (STN)
- National Air Toxics Trends Sites (NATTS)
- Special Purpose Monitors (SPM)
- Urban Haze monitoring sites
- Interagency Monitoring of PROtected Visual Environments (IMPROVE)
- ADEQ visibility stations located in or near mandatory Class I areas (national parks, wilderness areas). Class I monitoring sites are subject to specific siting and operational guidance developed by the IMPROVE Steering Committee
- AIRNow information sites
- Source-oriented monitoring sites operated independently by permittees (Industry)
- Meteorological sites

The Annual Monitoring Network Plan identifies the purpose(s) of each monitor and provides evidence that both the siting and the operation of each monitor meet the requirements in 40 CFR Part 58 appendices A, C, D, and E as follows:

- Appendix A - Quality Assurance Requirements for SLAMS, SPMs, and Prevention of Significant Deterioration (PSD) Air Monitoring
- Appendix C - Ambient Air Quality Monitoring Methodology
- Appendix D - Network Design Criteria for Ambient Air Quality Monitoring
- Appendix E - Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring

Results of the annual network review and planning are used to determine how well the network is achieving its required air monitoring objectives, how well it meets data users' needs, and how it should be modified (through termination of existing stations, relocation of stations, establishment of new stations, monitoring of additional parameters, and/or changes to the sampling schedule) in order to continue to meet its objectives and data needs. The network review and planning are performed for the purpose of improving the network and ensuring that it provides adequate, representative, and useful air quality data. The regulations also require a network assessment to be made every fifth year in addition to the Annual Assessment, to be made by each agency.

Monitoring Methods

The gaseous criteria pollutants (SO_2, O_3, NO_2, and CO), PM_{10} and $PM_{2.5}$ (TEOMs and BAMs), and optical characteristics of the atmosphere (total light extinction, light absorption by gases, light scattering by particles, and light absorption by particles), are monitored with continuous analyzers taking approximately one pollutant sample per second. These values are averaged on an hourly basis and recorded to the correct number of significant digits, based on the form of the air quality standards and the detection limits of the instrument. In most cases, the hourly data are summarized into the appropriate multihour averages. The agency or company network operators conduct regular checks of the stability, reproducibility, precision, bias, and accuracy of these instruments. Precision, bias, and accuracy of ambient data are assessed across an entire network using statistical tests required by EPA.

Particulate matter, PM_{10} and $PM_{2.5}$, is usually a 24-hour sample, from midnight to midnight, most often on every sixth day. Using a timer, ambient air is drawn through an inlet of a specified design at a known flow rate onto a filter that collects all PM less than a diameter specified by the inlet design. The filters are weighed before and after the sample period to determine the difference in mass and then divided by the product of the flow rate with the elapsed time to arrive at a mass per unit volume concentration. Some filters are subjected to chemical analysis to determine the amount of various analytes and integrated with the flow rate and timer information to calculate their concentrations. These data are summarized into the appropriate quarterly or annual averages. These samplers are also certified as FRM or FEM. The agency or company network operators perform regular checks of the stability, reproducibility, precision, bias, and accuracy of the samplers and laboratory procedures. Again, precision, bias, and accuracy of ambient data are assessed across an entire network using statistical tests that EPA requires.

Visibility monitoring methods are generally divided into the three groups of optical, scene, and aerosol (PM). Monitoring of visibility requires qualitative and quantitative information about the causes of haze (e.g., what is in the air, the formation, transport, and deposition of pollutants) and the nature of haze (the optical effects of those pollutants to the observer). Scene conditions of visual air quality associated with haze are recorded with a camera. To document scene conditions in the Phoenix area, ADEQ is currently utilizing digital camera systems reported to the public via a Web site.

Quantitative measurement of light extinction (B_{ext}) has four components:

- Light scattering by gases (B_{sg})
- Light absorption by gases (B_{ag})
- Light scattering by particles (B_{sp})
- Light absorption by particles (B_{ap})

Mathematically, the relationship is expressed as $B_{ext} = B_{sg} + B_{ag} + B_{sp} + B_{ap}$, where the units are inverse megameters (Mm^{-1}), or the amount of light removed per million meters of distance a viewer looks through.

Total optical B_{ext} is measured directly with a device called a transmissometer. The transmissometer generates visible light in the same wavelength (550 nanometers) as the human eye detects and then transmits that light beam over a sight path of several kilometers to a photocell detector. The transmissometer's design and operation allow its data to be directly correlated with human perception of visibility through the atmosphere. Transmissometer data are also used to check the general accuracy of the sum of the components of light extinction as measured by other continuous monitors. Optical measurements of visibility have been made continuously since 1993 in Tucson and since 1994 in Phoenix.

B_{sg} is a function of air density and is unrelated to air pollution sources. This parameter is derived and does not require measurement. In contrast, the other three components of light extinction are human-caused and require measurement with continuous monitors.

B_{ag} is determined by continuously measuring NO_2 since it is the only gas normally present in urban or Class I areas that absorbs significant quantities of visible light. Several EPA FRM or FEM NO_2 monitors are deployed to verify maintenance of the NAAQS throughout Arizona, including monitoring in Tucson and Phoenix; the National Park Service network tracks NO_2 at several national parks in Arizona.

B_{sp} is determined by continuously, directly measuring particle scattering variation in a calibrated ambient sampling chamber called a nephelometer. The nephelometer samples air at ambient temperature and relative humidity conditions. Routine monitoring with this instrument began in both the Class I area and urban haze networks during 1996.

B_{ap} is determined continuously utilizing an aethalometer, which measures the quantity of light transmitted through a filter tape. Routine data collection using the aethalometer began in December 1996 in Phoenix and February 1998 in Tucson. B_{ap} is also measured intermittently using the PM sample filters collected in the Class I area networks.

Monitoring Data

Introduction

The Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for the criteria air pollutants monitored in Arizona: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with aerodynamic diameter ≤ 10 microns (PM_{10}), and particulate matter with aerodynamic diameter ≤ 2.5 microns ($PM_{2.5}$). These pollutants are monitored in Arizona by industry, county air pollution districts (Maricopa, Pinal, and Pima), the National Park Service, Forest Service, tribes (not reported in this document), and ADEQ.

The Monitoring Data section contains information and data on the criteria pollutants and the visibility networks. The 2007 data measurements are in the data tables and are organized by county. Site operator information can be found in the Site Index tables in Appendix 1. Data recovery information (valid samples as a percent of total scheduled samples) are included in the tables. The number and the percentage of valid samples are important for determining the representativeness of the average data calculations. Information about the compliance requirements and status for the criteria pollutants begins on Page 36. Visibility monitoring information for Class I areas and urban haze begins on Page 53.

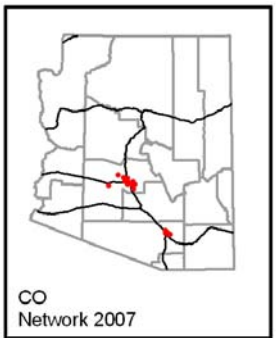
Figure 2 – Top of ADEQ's JLG Supersite monitoring station.

Figure 3 – ADEQ's Vehicle Emissions Laboratory monitoring station.

Criteria Pollutants - 2007 Data

Carbon Monoxide

CO - a colorless, odorless, tasteless gas that is produced in the incomplete combustion of fuels - has a variety of adverse health effects that arise from its ability to chemically bind to blood hemoglobin. CO successfully competes with oxygen for binding with hemoglobin and thereby impairs oxygen transport. This impaired transport leads to several central nervous system effects, such as the impairment of time interval discrimination, changes in relative brightness thresholds, increased reaction time, headache, fatigue, and dizziness. Chronic CO exposures also contribute to or exacerbate arteriosclerotic heart disease.



In Arizona's metropolitan areas, about half of CO emissions come from on-road motor vehicles; a little less than half from off-road vehicles, construction equipment, and lawn and garden equipment; with the reminder from point and area sources. This pollutant has low background levels, with highest concentrations next to busy streets, and elevated neighborhood concentrations in locations with significant amounts of emissions transported from upwind areas. Concentrations peak from November to January because emissions are highest in cold weather - automotive emissions of CO vary inversely with temperature - and because the surface layer of the atmosphere is most stable in wintertime. Hourly concentrations tend to be at their maximum during the morning rush hour and between 6 p.m. and midnight.

Controls have reduced CO emissions, and the standards have been achieved in the metropolitan Phoenix area since 1996, in stark contrast to the first half of the 1980s when more than 100 exceedances were recorded each year. Similar improvements have occurred in Tucson, where the last eight-hour exceedances were recorded in 1988. Equipping vehicles with catalytic converters and electronic ignition systems was the most effective control, but significant reductions can also be attributed to the vehicle emissions inspection program (beginning in 1976) and oxygenated fuels (beginning in 1989).

CO is monitored continuously with nondispersive infrared instruments that are deployed in urban neighborhoods and near busy roadways or intersections. In 2007, 14 monitors were operated in greater Phoenix, six monitors were operated in metropolitan Tucson, and one monitor was operated in Yuma for a special study. Table 5 presents the 2007 CO data in parts per million (ppm).

Table 5: 2007 Carbon Monoxide (in ppm) *(NAAQS one-hour 35 ppm, eight-hour 9 ppm)*						
Site or City	**One-Hour Average Value**		**Eight-Hour Average Value**		**Valid Data Recovery***	
	Max Value	**2nd High**	**Max Value**	**2nd High**	**No. of Obs.**	**%**
Maricopa County						
Buckeye [S]	3.9	1.6	1.0	0.8	5017	99
Central Phoenix	4.1	4.0	2.9	2.9	8594	98
Dysart [S]	1.8	1.7	1.3	1.3	4995	98
Glendale [S]	4.3	3.3	1.8	1.6	5026	99
Greenwood	4.6	4.6	4.0	3.0	8547	98
JLG Supersite	4.6	4.3	3.1	2.9	8069	92
Mesa [S]	3.9	2.5	2.0	2.0	4964	98
North Phoenix [S]	3.4	3.0	1.7	1.6	4904	96
South Phoenix [S]	4.9	4.3	3.1	2.3	5021	99
South Scottsdale [S]	2.7	2.6	1.6	1.6	4917	97
Tempe [S]	3.2	2.8	1.9	1.9	4970	98
West Chandler [S]	2.7	2.4	1.6	1.5	4994	98
West Indian School	6.2	5.7	5.0	3.9	8495	97
West Phoenix	6.0	6.0	4.6	4.1	8653	99
Pima County						
22nd St. & Alvernon	3.7	3.1	2.1	1.9	8640	99
22nd St. & Craycroft	2.6	2.5	1.2	1.2	8708	99
Cherry & Glenn [S]	2.8	2.7	1.9	1.5	4339	85
Children's Park	1.9	1.8	1.1	1.0	8616	98
Golf Links & Kolb [S]	2.5	2.1	1.3	1.3	4351	86
Tucson Downtown	3.4	2.7	1.9	1.4	8655	99
Yuma County						
Yuma Supersite [SS]	2.8	2.7	1.5	1.2	1732	96

*** Valid Data Recovery** shows the number of valid observations and the percentage of the possible 8760 hourly samples during the year (always less than 100 percent due to mandatory quality assurance testing requiring the monitors to be offline for several hours at a time).

[S] Seasonal monitor. Maricopa County operational during January 1 to April 1 and September 1 to December 31; 5088 sampling hours in non leap years. Pima County seasonal monitors operated January 1 to April 30 and October 1 to December 31; 5088 sampling hours in non leap years.

[ss] Special Study monitor for WASBAQS, operational during January 1 to March 15 (at 01:00); 1800 sampling hours.

Nitrogen Dioxide

NO_2 is a reddish-brown gas that is formed by the oxidation of nitric oxide (NO) - a byproduct of all combustion. Adverse health effects associated with NO_2 include risk of respiratory illness in children and vary depending on the level of NO_2 and exposure time. Short exposure to low levels may result in changes to airway responsiveness and decreased lung function in individuals with pre-existing conditions. Irreversible changes may occur to lungs due to long-term exposure to higher levels. This pollutant is of greater concern in its reduction of visibility (it causes five percent of the visibility reduction in Phoenix), its contributory role in the photochemical formation of ground level O_3, and acid rain.

Combustion emissions of NO are 95 percent NO and five percent NO_2. Because NO is rapidly oxidized to NO_2, NO emissions serve as a surrogate for NO_2. In a recent Phoenix emissions inventory, the transportation sector dominated NO emissions with 58 percent of the emissions from cars and trucks, 27 percent came from off-road vehicles such as trains and diesel powered construction vehicles, and 15 percent from other sources, including power plants, biogenic emissions from soil, and stationary combustion sources. NO and NO_2 concentrations are highest near major roadways. NO concentrations decrease rapidly with distance from the roadway, whereas NO_2 concentrations are more evenly distributed because of their formation through oxidation and their subsequent transport. Concentrations of NO_2 are highest in the late afternoon and early evening of winter, when rush hour emissions of NO are converted to NO_2 under relatively stable atmospheric conditions. Because NO reacts rapidly with O_3, nocturnal O_3 concentrations in cities are often reduced to near zero levels, while concentrations at background sites remain higher.

NO emissions from motor vehicles have been reduced through retardation of spark timing, lowering the compression ratio, exhaust gas recirculation systems, and three-way catalysts. The vehicle inspection program, with its NO_x test for light-duty gasoline vehicles 1981 and newer (in Phoenix only) has also helped reduce emissions. Reformulated gasolines also decrease NO emissions: Federal Phase II gasoline, by 1.5 percent for vehicular and 0.5 percent for off-road equipment; California Phase 2 gasoline, by 6.4 percent for vehicular and 7.7 percent for off-road equipment.

NO_2 is monitored continuously with chemiluminescence instruments, which also determine NO concentrations and NO_x (the sum of NO_2 and NO) concentrations. These instruments are located in urban neighborhoods where either the emissions are dense or where O_3 concentrations tend to be at their maximum. In addition, these monitors are located near major coal-fired electrical power plants. Ten monitors were operated in Arizona in 2007. Table 6 presents the NO_2 data available in 2007.

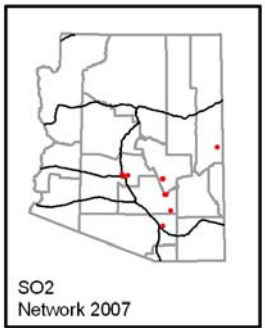
Table 6: 2007 Nitrogen Dioxide (in ppm) *(NAAQS Annual Mean 0.053 ppm)*				
Site or City	**Annual Average**	**Maximum Value**	**Valid Data Recovery ***	
		One-Hour Average	**No. of Obs.**	**%**
Apache County				
TEP - Springerville - Coyote Hills	0.0010	0.037	8436	96
Maricopa County				
Buckeye	0.0102	0.069	7337	84
Central Phoenix	0.0237	0.077	8520	97
Greenwood	0.0290	0.094	8427	96
JLG Supersite	0.0206	0.076	8563	98
South Scottsdale	0.0163	0.068	8137	93
West Phoenix	0.0209	0.082	8422	96
Pima County				
22nd St. & Craycroft	0.0134	0.058	8661	99
Children's Park	0.0131	0.049	8070	92
Yuma County				
Yuma Game & Fish[ss]	0.0139	0.060	2345	96

*** Valid Data Recovery** shows the number of valid observations and the percentage of the possible 8760 hourly samples during the year (always less than 100 percent due to mandatory quality assurance testing requiring the monitors to be offline for several hours at a time).

[ss] Special Study monitor for WASBAQS, operational during January 1 to April 12 (at 12:00pm); 2436 sampling hours.

Sulfur Dioxide

Exposure to SO_2, a colorless gas with a pungent, irritating odor at elevated concentrations, alters the mechanical function of the upper airway, including increasing the nasal flow resistance and decreasing the nasal mucus flow rate. Short-term exposures result in an exaggerated air flow resistance in about 10 percent of the subjects tested and produce acute constriction of airways in strenuously exercising asthmatics.



In Arizona, the principal source of SO_2 emissions has been the smelting of sulfide copper ore. Most fuels contain trace quantities of sulfur and their combustion releases both gaseous SO_2 and particulate sulfate. A recent emissions inventory for Phoenix shows 32 percent of SO_2 emissions come from point sources, 26 percent from area sources, 23 percent from off-road vehicles and equipment, and 19 percent from on-road motor vehicles. SO_2 is removed from the atmosphere through dry deposition on plants and is converted to sulfuric acid and eventually to sulfate. SO_2 has extremely low background levels, with elevated concentrations found downwind of large point sources. Concentrations in urban areas are low and are homogeneously distributed, with annual averages varying from 0.0006 ppm to 0.0180 ppm, well within the annual standard of 0.03 ppm.

Major controls were installed in Arizona's copper smelters in the 1980s, which reduced SO_2 emissions substantially. Vehicular emissions of SO_2 and sulfate have been reduced through lowering the sulfur content in diesel fuel and gasoline.

SO_2 is monitored continuously with pulsed fluorescence instruments, most of which are clustered around copper smelters or coal-fired electric power plants. In 2007, 10 reporting monitors were sited near copper smelters, one near a power plant, four in urban areas, and one in Yuma for a special study. Table 7 presents the SO_2 data collected in Arizona in 2007.

Table 7: 2007 Sulfur Dioxide (in ppm)
(Primary NAAQS Annual Average 0.030 ppm [80 µg/m^3], 24-hour Average 0.14 ppm [365 µg/m^3], Secondary NAAQS three-hour 0.5 ppm [1300 µg/m^3])

Site or City	Annual Average	Maximum Value				Valid Data Recovery *	
		Three-Hour Average		24-Hour Average			
		Max Value	2nd High	Max Value	2nd High	No. of Obs.	%
Apache County							
TEP - Springerville - Coyote Hills	0.0006	0.031	0.010	0.009	0.003	8611	98
Gila County							
ASARCO - Globe Hwy.	0.0180	0.360	0.298	0.088	0.075	8760	100
ASARCO - Hayden - Garfield Ave.	0.0100	0.240	0.218	0.075	0.067	8760	100
ASARCO - Montgomery Ranch	0.0140	0.302	0.160	0.074	0.049	8760	100
FMMI - Miami - Jones Ranch	0.0070	0.164	0.148	0.047	0.033	8606	98
FMMI - Miami - Townsite	0.0060	0.135	0.100	0.023	0.021	8755	99
Hayden Old Jail, ADEQ	0.0102	0.225	0.174	0.043	0.043	7985	91
Hayden Old Jail, ASARCO	0.0070	0.020	0.125	0.035	0.024	8760	100
Miami Ridgeline, ADEQ	0.0045	0.117	0.097	0.047	0.031	8658	99
Maricopa County							
Central Phoenix	0.0015	0.011	0.009	0.005	0.005	8622	98
JLG Supersite	0.0024	0.007	0.007	0.004	0.004	8721	99
South Scottsdale	0.0019	0.006	0.006	0.005	0.004	8431	96
Pima County							
22nd St. & Craycroft	0.0012	0.013	0.008	0.003	0.003	8689	99
San Manuel	0.0023	0.010	0.010	0.004	0.004	8006	91
Pinal County							
ASARCO - Hayden Junction	0.0050	0.167	0.103	0.045	0.024	8760	100
Yuma County							
Yuma Supersite [ss]	0.0017	0.003	0.003	0.002	0.002	1735	96

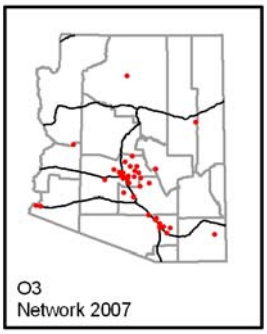
* **Valid Data Recovery** shows the number of valid observations and the percentage of the possible 8760 hourly samples during the year (always less than 100 percent due to mandatory quality assurance testing requiring the monitors to be offline for several hours at a time).

[ss] Special Study monitor for WASBAQS, operational during January 1 to March 15 (at 01:00); 1800 sampling hours.

Note: Sulfur dioxide conversion factor: ppm = (µg/m^3) / 2620.

Ozone

O_3 - a colorless, slightly odorous gas - is both a natural component of the atmosphere, through its photochemical formation from natural sources of CO, hydrocarbons (HC), and NO, and an important air contaminant in urban atmospheres. In the stratosphere, O_3 blocks harmful ultraviolet radiation. In the urban atmosphere, its formation from anthropogenic emissions of HC and NO leads to concentrations harmful to people, animals, plants, and materials. O_3 causes significant physiological and pathological changes in both animals and humans at concentrations present in many urban environments. Short-term (one to two hours) exposures to concentrations in the range of 0.1 ppm to 0.4 ppm induce changes in lung function, including increased respiratory rates, increased pulmonary resistance, decreased tidal volumes, and changes in lung mechanics. Symptomatic responses in exercising adults include throat dryness, chest tightness, substernal pain, cough, wheeze, pain on deep inspiration, shortness of breath, and headache. These symptoms also have been observed at lower concentrations for longer exposures. Evidence suggests that O_3 exposure makes the respiratory airways more susceptible to other bronchoconstrictive challenges. Animal studies suggest that O_3 exposure interferes with or inhibits the immune system. O_3 at ambient concentrations injures the stomates, which are the cells that regulate plant respiration, resulting in flecks on the upper leaf surfaces of dichotomous plants and the death of the tips of coniferous needles. O_3 is considered by plant scientists to be the most important of all of the phytotoxic air pollutants, causing over 90 percent of all plant injury from air pollution on a global basis.



O_3 is formed photochemically by the reaction of VOC and NO. High O_3 concentrations are a summer phenomenon caused when sunlight, biogenic emissions, and evaporative HC emissions peak. VOC emissions in greater Phoenix come from cars and trucks (31 percent), off-road vehicles and equipment such as lawn mowers (27 percent), small stationary sources (20 percent), biogenic emissions from grass, shrubs, and trees (17 percent), and point sources (5 percent). NO_x comes from cars and trucks (58 percent), off-road vehicles such as construction equipment and trains (27 percent), electric power plants (7 percent), small stationary sources (4 percent), and biogenic emissions from soil (4 percent). O_3 has relatively high background levels, with the daily maximum in remote areas being about one-half to three-quarters of the daily maximum in the urban areas. In an urban area, the highest O_3 concentrations tend to occur on the downwind edge, although high concentrations do occur less frequently in the central city. Urban O_3 concentrations are low to near zero at night, rise rapidly through the morning and peak in the afternoon.

Controls to reduce the precursors of O_3 - VOC and NO_x - have been successfully implemented for years. NO_x and VOC from vehicular exhaust have been reduced through engine modifications and three-way catalytic converters. Evaporative HC from vehicles have been reduced through better engineered fuel tanks and auxiliary plumbing combined

with carbon absorption canisters. Additional reductions of vehicular VOC have come through ADEQ's vehicle emissions inspection program, which tests all gasoline fueled vehicles for HC (Phoenix and Tucson), through vapor capturing equipment for gasoline tankers, vapor recovery systems at retail gas stations (Phoenix area only), and cleaner burning gasoline (Phoenix area only). Stationary source HC have been reduced through a variety of better control equipment required by stricter regulations. Despite these efforts, the continued population growth in Arizona combined with the high natural background O_3, may make achieving the eight-hour standard difficult.

Ultraviolet absorption instruments monitor O_3 continuously in urban neighborhoods for population exposure, areas downwind of urban areas for maximum concentration, and remote areas for background. In 2007, 39 reporting O_3 monitors were in operation. Tables 8 and 9 present the 2007 Arizona O_3 data.

Table 8: 2007 Ozone (in ppm), One-Hour Averages *(NAAQS one-hour 0.12 ppm)*						
Site or City	**Max Value**	**2nd High**	**3rd High**	**4th High**	**Valid Data Recovery***	
					No. of Days	**%**
Cochise County						
Chiricahua Entrance Station	0.075	0.073	0.073	0.073	355	97
Coconino County						
Grand Canyon NP - The Abyss	0.080	0.080	0.075	0.073	355	97
Gila County						
Tonto NM [S]	0.094	0.091	0.087	0.086	209	98
La Paz						
Alamo Lake [S]	0.088	0.083	0.080	0.076	212	99
Maricopa County						
Blue Point	0.074	0.071	0.071	0.071	364	99
Buckeye [S]	0.078	0.078	0.076	0.073	213	99
Cave Creek [S]	0.095	0.091	0.089	0.089	214	100
Central Phoenix	0.090	0.089	0.089	0.083	364	99
Dysart [S]	0.080	0.079	0.077	0.075	208	97
Falcon Field [S]	0.092	0.092	0.092	0.090	208	97
Fountain Hills	0.095	0.092	0.090	0.088	360	99
Glendale [S]	0.092	0.086	0.086	0.086	214	100
Humboldt Mountain [S]	0.089	0.088	0.087	0.086	214	100
JLG Supersite	0.098	0.092	0.090	0.089	365	100
North Phoenix	0.096	0.095	0.095	0.095	363	99
Pinnacle Peak	0.093	0.088	0.085	0.085	363	99
Rio Verde [S]	0.098	0.097	0.092	0.092	210	98
South Phoenix	0.094	0.089	0.084	0.083	363	99
South Scottsdale	0.099	0.097	0.096	0.094	361	99
Tempe [S]	0.100	0.095	0.089	0.088	209	98
West Chandler [S]	0.097	0.092	0.092	0.089	214	100
West Phoenix	0.092	0.089	0.088	0.088	365	100
Navajo County						
Petrified Forest NP South	0.080	0.077	0.074	0.074	313	86
Pima County						
22nd & Craycroft	0.088	0.083	0.080	0.079	365	100
Children's Park	0.081	0.079	0.077	0.077	361	99
Coachline	0.077	0.073	0.072	0.070	364	99
Green Valley	0.085	0.074	0.071	0.071	360	99
Rose Elementary	0.082	0.081	0.081	0.079	363	99
Saguaro NP East	0.084	0.083	0.081	0.081	361	99
Tangerine	0.080	0.076	0.075	0.075	365	100
Tucson Downtown	0.079	0.079	0.076	0.074	362	99

Table 8: 2007 Ozone (in ppm), One-Hour Averages ***(NAAQS one-hour 0.12 ppm)***						
Site or City	**Max Value**	**2nd High**	**3rd High**	**4th High**	**Valid Data Recovery***	
					No. of Days	**%**
Tucson Fairgrounds	0.085	0.079	0.078	0.077	359	98
Pinal County						
Apache Junction Maintenance Yard	0.098	0.096	0.095	0.094	360	99
Casa Grande Airport	0.079	0.078	0.075	0.074	361	99
Combs School [S ##]	0.075	0.072	0.071	0.070	213	99
Maricopa County Complex [S]	0.067	0.065	0.064	0.063	212	99
Pinal Air Park [S]	0.078	0.073	0.070	0.070	213	99
Queen Valley [S]	0.089	0.088	0.088	0.087	214	100
Yuma County						
Yuma Game & Fish [S]	0.101	0.087	0.087	0.081	212	99

*** Valid Data Recovery** shows the number of days with at least 75 percent (18 or more hours) of valid data recovery. It also shows the percentage of the total number of scheduled sampling days that meet that criterion. Scheduled sampling days for non-seasonal monitors in 2007 was 365.

[S] Seasonal monitor, operational during April 1 to November 1; 214 scheduled sampling days in the season.

Site also known as Queen Creek

Table 9: 2007 Ozone (in ppm), Eight-Hour Averages

(NAAQS eight-hour changed from 0.08 ppm to 0.075 ppm effective April, 2008)

Based on the 0.08 ppm NAAQS there are no exceedances in 2007, however there are several exceedances with the use of the new 0.075 NAAQS.

Bold denotes the 4th highest value exceeds the eight-hour 0.075 ppm NAAQS.

Site or City	Max Value	2nd High	3rd High	4th High	Daily Exceed-ances	Valid Data Recovery *	
						No. of Days	%
Cochise County							
Chiricahua Entrance Station	0.073	0.070	0.068	0.067	0	352	96
Coconino County							
Grand Canyon NP - The Abyss	0.072	0.070	0.070	0.069	0	352	96
Gila County							
Tonto NM [S]	0.078	0.076	0.076	**0.076**	6	209	98
La Paz							
Alamo Lake [S]	0.081	0.076	0.073	0.072	2	212	99
Maricopa County							
Blue Point	0.066	0.066	0.059	0.058	0	364	99
Buckeye [S]	0.066	0.066	0.064	0.064	0	213	99
Cave Creek [S]	0.083	0.079	0.079	**0.077**	5	214	100
Central Phoenix	0.073	0.073	0.070	0.070	0	361	99
Dysart [S]	0.069	0.069	0.068	0.065	0	207	97
Falcon Field [S]	0.080	0.074	0.074	0.073	1	207	97
Fountain Hills	0.083	0.078	0.074	0.074	2	356	98
Glendale [S]	0.075	0.075	0.074	0.071	0	214	100
Humboldt Mountain [S]	0.080	0.079	0.079	**0.078**	5	213	99
JLG Supersite	0.077	0.076	0.076	**0.076**	4	365	100
North Phoenix	0.081	0.081	0.080	**0.078**	7	362	99
Pinnacle Peak	0.076	0.076	0.075	0.075	2	363	99
Rio Verde [S]	0.082	0.082	0.080	**0.079**	10	211	99
South Phoenix	0.079	0.077	0.073	0.072	2	363	99
South Scottsdale	0.082	0.077	0.077	**0.077**	6	358	98
Tempe [S]	0.084	0.077	0.077	**0.076**	4	208	97
West Chandler [S]	0.084	0.079	0.074	0.072	2	214	100
West Phoenix	0.079	0.077	0.076	0.074	3	364	99
Navajo County							
Petrified Forest NP South	0.074	0.071	0.069	0.069	0	278	76
Pima County							
22nd & Craycroft	0.070	0.070	0.068	0.068	0	365	100
Children's Park	0.072	0.071	0.071	0.071	0	358	98
Coachline	0.068	0.067	0.066	0.064	0	363	99
Green Valley	0.074	0.068	0.067	0.065	0	357	98
Rose Elementary	0.073	0.072	0.070	0.069	0	362	99
Saguaro NP East	0.075	0.073	0.073	0.073	0	358	98

Table 9: 2007 Ozone (in ppm), Eight-Hour Averages
(NAAQS eight-hour changed from 0.08 ppm to 0.075 ppm effective April, 2008)
Based on the 0.08 ppm NAAQS there are no exceedances in 2007, however there are several exceedances with the use of the new 0.075 NAAQS.
Bold denotes the 4th highest value exceeds the eight-hour 0.075 ppm NAAQS.

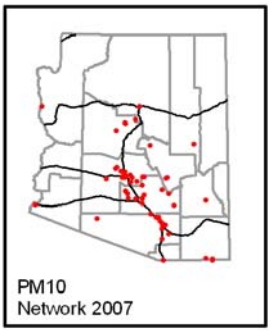
Site or City	Max Value	2nd High	3rd High	4th High	Daily Exceed-ances	Valid Data Recovery *	
						No. of Days	%
Tangerine	0.071	0.070	0.069	0.069	0	365	100
Tucson Downtown	0.071	0.068	0.068	0.067	0	362	99
Tucson Fairgrounds	0.073	0.072	0.071	0.071	0	353	97
Pinal County							
Apache Junction Maintenance Yard	0.083	0.080	0.079	**0.077**	6	360	99
Casa Grande Airport	0.071	0.071	0.071	0.070	0	357	98
Combs School [S ##]	0.063	0.062	0.061	0.057	0	213	99
Maricopa County Complex [S]	0.061	0.060	0.059	0.059	0	211	99
Pinal Air Park [S]	0.072	0.071	0.068	0.066	0	213	99
Queen Valley [S]	0.077	0.077	0.076	**0.076**	4	214	100
Yuma County							
Yuma Game & Fish [S]	0.085	0.078	0.078	0.074	3	201	94

*** Valid Data Recovery** shows the number of days with at least 75 percent (18 or more hours) of valid data recovery. It also shows the percentage of the total number of scheduled sampling days that meet that criterion. Scheduled sampling days for non-seasonal monitors was 365.

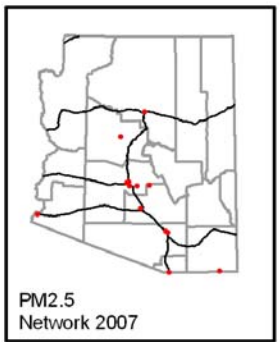
[S] Seasonal monitor, operational during April 1 to November 1; 214 scheduled sampling days in the season.

Site also known as Queen Creek

Particulate Matter Smaller Than 10 Microns (PM_{10}) and Smaller Than 2.5 Microns ($PM_{2.5}$)



Particulate matter is a collective term describing very small solid or liquid particles that vary considerably in size, geometry, chemical composition, and physical properties. Produced by natural processes (pollen and wind erosion) and by human activity (soot, fly ash, and dust from paved and unpaved roads), particulates contribute to visibility reduction, pose a threat to public health, and cause economic damage through soil disturbance. Coarse particulates (2.5 to 10 microns) are formed through mechanical processes such as the grinding of matter and the atomization of liquids. Some fine particulates ($PM_{2.5}$) are formed by the condensation of vapors or by their subsequent growth through coagulation or agglomeration. Others are emitted directly from the sources, either by combustion or from mechanical grinding of soils. Fine particulates can also be classified as primary - produced within and emitted from a source with little subsequent change - or secondary - formed in the atmosphere from gaseous emissions. Secondary particulate nitrates and sulfates, for example, form in the atmosphere from the oxidation of gaseous SO_2 and NO_2. In contrast, most atmospheric carbon is primary, having been emitted directly from combustion sources, although some of the organic carbon in the aerosol is secondary, having been formed by the complex photochemistry of gaseous VOCs.



The size, shape, and chemical composition of particulates determine their health effects. Particles larger than 10 microns are deposited in the upper respiratory tract. Particles from 2.5 to 10 microns are inhaled and deposited in the upper parts of the respiratory system. Particles smaller than 2.5 microns are respired and enter the pulmonary tissues to be deposited there. Particles in the size range of 0.1 to 2.5 microns are most efficiently deposited in the alveoli, where their effective toxicity is greater than larger particles because of the higher relative content of toxic heavy metals, sulfates, and nitrates. Epidemiological studies have shown causal relationships between particulates and excess mortality, aggravation of bronchitis, and small reversible changes in pulmonary function in children. Acidic aerosols have been linked to the inability of the upper respiratory tract and pulmonary system to remove harmful particles.

Coarse particulate emissions are mostly geological and are dominated by dust from three activities: the constant grinding (re-entraining) of dust from paved roads, driving on unpaved roads, and earth moving associated with construction. Soil dust from these sources and others contribute more than 70 percent of the coarse particulates in Phoenix. In other urban and rural areas, this mixture of sources will vary. Agricultural and mining areas, for example, will be more heavily influenced by emissions from these activities. On days with winds in excess of 15 miles per hour, wind erosion of soil contributes to this loading.

With a more diverse chemical composition, fine particulate ($PM_{2.5}$) emissions are more evenly distributed among a larger number of sources. At the ADEQ JLG Supersite, receptor modeling indicates gasoline and diesel engine exhaust account for more than two-thirds of the $PM_{2.5}$ emissions. Soil dust contributes another 10.5 percent.

$PM_{2.5}$ concentrations tend to be at their highest in the central portions of urban areas, diminishing to background levels at the urban fringe. In contrast, PM_{10} concentrations are not spatially distributed smoothly because each monitoring site is strongly influenced by the degree of localized emissions of coarse particulates. Background concentrations of PM_{10} are about 40 percent of the urban maxima (20 $\mu g/m^3$ for an annual average background versus about 50 $\mu g/m^3$ for the urban maximum). Background concentrations of $PM_{2.5}$ are about 5 $\mu g/m^3$, in contrast to the urban maxima of 12 to 15 $\mu g/m^3$. Concentrations of both size ranges of particulates tend to be higher in the late fall and winter, when atmospheric dispersion is at a seasonal low. PM_{10} maximum concentrations can occur in any season, provided nearby sources of coarse particulates are present or when strong and gusty winds suspend soil disturbed by human activities. Hourly concentrations of particulates tend to peak during those hours of the worst dispersion, which is from sunset to midmorning.

Controls to reduce particulates have been in place for decades, beginning with an ordinance that required watering to reduce dust from construction in Pima County in the 1960s. Maricopa County's umbrella dust abatement rule, Rule 310, has been revised many times through the years and now regulates construction dust, trackout dust from construction sites, and dust from unpaved parking and vacant lots. Efforts to reduce dust resuspended from paved roads have concentrated on eliminating trackout from construction sites, curbing and stabilizing road shoulders, and investigating more efficient street sweepers. Secondary fine particulates have been reduced by vehicular emission controls, which have reduced their precursor gases. Reducing gaseous HC emissions, for example, has led to reductions in ambient concentrations of secondary organic carbon. In Maricopa County, the Governor's Agricultural Best Management Practices Committee developed a rule containing best management practices for agricultural activities (AgBMP) to reduce particulate emissions from tilling and harvesting activities of cropland and non-cropland. In a recent PM_{10} State Implementation Plan (SIP), the Maricopa Association of Governments (MAG) committed to implement 77 new measures, including enhanced enforcement of the county dust rules, implementation of AgBMP, diesel engine replacement, and retirement programs and requirements for cleaner burning fireplaces.

Particulates are monitored by pulling ambient air through a filter, generally for 24 hours every sixth day, weighing the filter before and after, and measuring the volume of air sampled. The monitoring instruments are fitted with different aerodynamic devices to segregate particle size fractions. Particulates also can be monitored continuously with a tapered element oscillating microbalance (TEOM) instrument or a beta attenuation mass monitor (BAM), which utilizes a beam sensing through a paper tape.

The 2007 PM_{10} data reported in Table 10 represent 73 monitors throughout Arizona and two in Mexico, located in Agua Prieta and Nogales, Sonora. TEOM data are included for those sites in the Phoenix metropolitan area that were required to change to everyday monitoring from every sixth day. BAM data are included for sites in Pima County. Data from collocated monitors are included; these data are for precision purposes as a quality control measure. The data are reported in standard conditions (adjusted to 25^{o} C and 1 atmosphere pressure) as required by EPA.

EPA began a nationwide program to measure $PM_{2.5}$ using federal reference method (FRM) monitors in anticipation of a new federal standard for fine particulates in 1999. Eleven FRM samplers were located in Arizona. The fine particulate portion of the PM_{10} measurement made by dichot monitors has been measured for many years in Arizona and has served as an approximation for the $PM_{2.5}$ measurement; however it is not exactly equivalent to that measurement. The data are reported in ambient conditions (local temperature and pressure) as required by EPA. Particulate data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program are not included. In 2006, the EPA changed the 24-hour $PM_{2.5}$ NAAQS from 65 $\mu g/m^3$ to 35 $\mu g/ m^3$, with the effective date of December 16, 2006. The EPA also eliminated the annual standard for PM_{10}, but retained the 24-hour standard of 150 $\mu g/m^3$.

Figure 4 – Nogales Post Office monitoring station.

Figure 5 – Yuma Courthouse monitoring station.

Table 10: 2007 PM_{10} Data (in µg/m^3)
(NAAQS 24-hour Average 150 µg/m^3)
Bold denotes an exceedances, defined as any daily value greater then 150 µg/m^3 after rounding to the nearest 10 µg/m^3.**

Site or City	Method	Annual Average	24-Hour Average		Valid Data Recovery *	
			Max Value	2nd High	No. of Days	%
Apache County						
TEP - Springerville - Coal Yard [1]	TEOM	26.9	**914**	**244**	361	99
TEP - Springerville - Coyote Hills [1]	TEOM	11.7	49	44	361	99
Cochise County						
Douglas Red Cross [4]	Partisol	28.2	94	73	59	98
Paul Spur Chemical Lime Plant (1) [4]	Partisol	28.8	87	63	58	97
Paul Spur Chemical Lime Plant (2) [4]	Partisol	27.7	103	66	59	98
Coconino County						
Flagstaff Middle School [4]	Partisol	21.2	56	42	58	97
Sedona Post Office [4] (closed 12/31/2007)	Partisol	13.7	33	29	55	92
Gila County						
FMMI - Miami - Golf Course (1) [4] #	Dichot	23.0	64	52	42	70
FMMI - Miami - Golf Course (2) [4] #	Dichot	19.9	46	45	52	87
Hayden Old Jail, ADEQ [4]	Partisol	34.4	72	69	58	97
Miami Ridgeline, FMMI [4]	Dichot	11.9	51	28	59	98
Payson Well Site [4]	Partisol	23.0	62	43	58	97
Graham County						
Safford [4] (closed 12/31/2007)	Partisol	22.3	62	54	59	98
Maricopa County						
Bethune Elementary School [4]	Partisol	53.1	136	133	57	95
Buckeye [1]	TEOM	52.5	**195**	**166**	365	100
Central Phoenix [1]	TEOM	42.4	**267**	149	365	100
Coyote Lakes [1] # (opened 4/2/2007)	TEOM	47.8	**331**	**273**	274	100
Durango Complex [1]	TEOM	59.5	**155**	152	360	99
Dysart [4]	Hi-Vol	35.9	111	94	58	97
Glendale [4]	Hi-Vol	34.1	92	74	58	97
Greenwood [1]	TEOM	50.0	124	123	362	99
Higley [1]	TEOM	53.0	**230**	**199**	352	96
JLG Supersite [4]	Partisol	34.1	85	70	59	98
JLG Supersite [1]	TEOM	36.2	**521**	94	363	99
Mesa [4]	Hi-Vol	32.3	110	70	60	100
North Phoenix [4]	Hi-Vol	33.5	78	77	60	100
South Phoenix [1 & 4] # (continuous monitor opened 7/1/2007)	Hi-Vol/ TEOM	55.6	**171**	**160**	214	100
South Scottsdale [4]	Hi-Vol	30.6	73	61	60	100
West Chandler [4]	Hi-Vol	36.4	104	99	60	100
West Forty Third [1]	TEOM	71.8	**227**	**225**	363	99

Table 10: 2007 PM_{10} Data (in µg/m^3)
(NAAQS 24-hour Average 150 µg/m^3)
Bold denotes an exceedances, defined as any daily value greater then 150 µg/m^3 after rounding to the nearest 10 µg/m^3.**

Site or City	Method	Annual Average	24-Hour Average		Valid Data Recovery *	
			Max Value	2nd High	No. of Days	%
West Phoenix [1]	TEOM	47	124	116	365	100
Mohave County						
Bullhead City [4]	Partisol	20.3	52	51	59	98
Navajo County						
Show Low [4] (closed 12/31/2007)	Partisol	16	75	47	59	98
Pima County						
Ajo [4] #	Partisol	32.0	124	71	53	88
Broadway & Swan [4]	Partisol	26.2	80	80	59	98
Corona De Tucson [4]	Partisol	17.1	50	48	57	95
Geronimo [1] # (opened 7/1/2007)	TEOM	32.8	104	77	177	96
Green Valley [1]	BAM	20.4	123	77	363	99
Green Valley Fire Administration [1] # (opened 7/11/2007)	BAM	14.8	57	48	80	98
Orange Grove [2]	Partisol	29.2	95	95	363	99
Prince Road [4]	Partisol	31.7	99	62	59	98
Rillito, ADEQ [4]	Partisol	40.7	**208**	124	60	100
Rillito, APCC [3]	Hi-Vol	26.2	65	55	108	89
Santa Clara [4]	Partisol	28.4	92	60	59	98
South Tucson [2]	Partisol	31.4	97	96	361	99
Tangerine [4]	Partisol	22.0	88	44	60	100
Pinal County						
Apache Junction Fire Station [4]	Hi-Vol	18.1	48	40	54	90
Casa Grande Downtown [4]	Hi-Vol	35.3	112	80	57	95
Casa Grande Downtown [1] # (opened March 2007)	TEOM	55.2	**983**	**256**	275	96
Combs School [1] # (opened 3/20/2007)	TEOM	89.9	**970**	**867**	282	92
Coolidge Maintenance Yard [4]	Hi-Vol	35.5	82	76	57	95
Cowtown [4]	RAAS	167.5	**759**	**490**	55	92
Cowtown [1]	TEOM	181.3	**1014**	**979**	362	99
Eloy City Complex [4] # (closed 3/3/2007)	Hi-Vol	25.8	46	36	10	100
Eloy County Complex [4] # (opened 3/4/2007)	Partisol	42.3	136	127	50	100
Mammoth County Complex [4]	Hi-Vol	12.7	40	29	56	93
Maricopa County Complex[1]	TEMO	73.7	**724**	**525**	363	99
Pinal Air Park [4]	Hi-Vol	29.5	113	61	57	95
Pinal County Housing Complex (1) [4]	Hi-Vol	56.0	**224**	113	59	98
Pinal County Housing Complex (2) [4]	Hi-Vol	62.3	**341**	145	60	100

Table 10: 2007 PM_{10} Data (in µg/m^3)
(NAAQS 24-hour Average 150 µg/m^3)
Bold denotes an exceedances, defined as any daily value greater then 150 µg/m^3 after rounding to the nearest 10 µg/m^3.**

Site or City	Method	Annual Average	24-Hour Average		Valid Data Recovery *	
			Max Value	2nd High	No. of Days	%
Pinal County Housing Complex [1]	TEOM	83.7	**2253**	**1839**	354	97
Riverside Maintenance Yard [1]	Hi-Vol	23.6	65	53	56	93
Stanfield [4]	RASS	90.9	**374**	**350**	58	97
Stanfield [1]	TEOM	84.3	**1062**	**482**	358	98
Santa Cruz County						
Nogales Post Office [4]	Partisol	52.1	**191**	134	58	97
Nogales Post Office [1]	BAM	65.0	**233**	**211**	357	98
Yavapai County						
PCC Clarkdale - NW [4]	Dichot	14.0	50	30	60	100
PCC Clarkdale - SE [4]	Dichot	18.5	52	38	60	100
Prescott Valley [4] #	Partisol	21.5	63	55	53	88
Yuma County						
Yuma Courthouse (1) [4]	Partisol	45.7	147	143	59	98
Yuma Courthouse (2) [4]	Partisol	45.6	**195**	**165**	60	100
Yuma Courthouse [1]	TEOM	51.9	**349**	**320**	365	100
Mexico						
Agua Prieta Fire Station [4]	Dichot	46.8	104	94	57	95
Nogales Sonora Fire Station [4]	Dichot	62.7	**170**	**159**	56	93

***Valid data recovery** shows the number of valid observations and the percentage of scheduled samples that were valid. For continuous monitors (TEOM and BAM), the number of valid days is used for data recovery.

[1] Samples collected every hour - 8760 sample hours (365 days) in non leap years
[2] Samples collected every day - 365 sample days in non leap years
[3] Samples collected every third day - 122 sample days in non leap years
[4] Samples collected every sixth day - 61 sample days in non leap years
[#]Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available.

(1) Indicates the Primary monitor (used for NAAQS compliance) in a collocated pair of monitors.
(2) Indicates the Secondary monitor (used for precision and accuracy) in a collocated pair of monitors.

Exceedances due to Exceptional Events that have been concurred on by the EPA are excluded from the annual statistics.

** The NAAQS requirement for the annual average value to be less than 50 µg/m^3 was removed as of December 17, 2006.

Table 11: 2007 $PM_{2.5}$ Data (in µg/m^3) *(NAAQS Annual Average 15µg/m^3, 24-hour Average 35 µg/m^3)*						
Site or City	**Method**	**Annual Average**	**24-Hour Average**		**Valid Data Recovery ***	
			Max	**2nd High**	**No. of Days**	**%**
Cochise County						
Douglas Red Cross [4]	FRM	6.79	32.2	16.9	56	92
Coconino County						
Flagstaff Middle School [4]	FRM	8.00	47.5	30.2	58	95
Gila County						
Payson Well Site [4]	FRM	9.38	26.8	21.9	59	97
Maricopa County						
JLG Supersite [3]	FRM	9.48	26.1	25.2	121	99
Mesa [3]	FRM	9.72	24.3	19.7	117	96
South Phoenix [3]	FRM	12.27	32.2	30.3	118	97
West Phoenix (1) [3]	FRM	10.89	33.0	31.3	119	98
West Phoenix (2) [3] #	FRM	10.96	34.3	27.5	69	57
Pima County						
Children's Park [3]	FRM	5.71	13.4	12.7	114	93
Orange Grove [2]	FRM	5.84	20.7	15.9	198	54
Pinal County						
Apache Junction Fire Station [3]	FRM	6.96	15.9	14.8	108	89
Casa Grande Downtown [4]	FRM	10.25	26.6	25.2	117	96
Cowtown [4]	FRM	22.50	59.7	53.9	55	90
Santa Cruz County						
Nogales Post Office (1) [4]	FRM	12.30	30.0	28.2	59	97
Nogales Post Office (2) [4]	FRM	12.11	30.8	28.8	60	100

***Valid data recovery** shows the number of valid observations and the percentage of scheduled samples that were valid.

[1] Samples collected every hour - 8760 sample hours (365 sample days) in non leap years.
[2] Samples collected every day - 365 sample days in non leap years.
[3] Samples collected every third day - 122 sample days in non leap years.
[4] Samples collected every sixth day - 61 sample days in non leap years.

(1) Indicates the Primary monitor (used for NAAQS compliance) in a collocated pair of monitors.
(2) Indicates the Secondary monitor (used for precision and accuracy) in a collocated pair of monitors.

[#]Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available.

Criteria Pollutants - Compliance

Carbon Monoxide

There are two NAAQS for CO: a one-hour standard and an eight-hour standard (most critical for compliance). The one-hour standard is 35 ppm and the eight-hour standard is 9 ppm. According to 40 CFR part 50, compliance for both standards is determined by having no more than one exceedance per calendar year. EPA determines attainment of the standard at all sites in the nonattainment (or monitoring) area by evaluating two calendar years of data from each site. The highest of the second-highest value in a two-year period must not exceed the standard of 35 ppm (greater than or equal to 35.5 ppm) for the one-hour standard or 9 ppm (greater than or equal to 9.5 ppm) for the eight-hour standard.

No exceedances of the one-hour or eight-hour standards were recorded in 2006 or 2007. The data are presented in Table 12 and Table 13.

Table 12: 2006-2007 One-Hour Carbon Monoxide Compliance (in ppm)

NAAQS for one-hour carbon monoxide: The highest of the second-highest values in a two-year period must not exceed 35 ppm.

2006-2007 One-Hour Carbon Monoxide NAAQS Compliance Values by County		
County	Exceedances	Violations
Maricopa	0	0
Pima	0	0
Summary: 20 of 20 monitors in compliance		

Table 12: 2006-2007 One-Hour Carbon Monoxide Compliance (in ppm)

Site or City	2006		2007		Compliance Value
	Max Value	2nd High	Max Value	2nd High	
Maricopa County					
Buckeye [S]	1.2	1.2	3.9	1.6	1.6
Central Phoenix	6.0	4.8	4.1	4.0	4.8
Dysart [S]	1.3	1.3	1.8	1.7	1.7
Glendale [S]	3.8	2.9	4.3	3.3	3.3
Greenwood	6.3	5.2	4.6	4.6	5.2
JLG Supersite	5.3	4.5	4.6	4.3	4.5
Mesa [S]	4.1	3.5	3.9	2.5	3.5
North Phoenix [S]	3.5	3.3	3.4	3.0	3.3
South Phoenix [S]	5.2	4.7	4.9	4.3	4.7
South Scottsdale [S]	5.5	3.1	2.7	2.6	3.1
Tempe [S]	3.7	3.4	3.2	2.8	3.4
West Chandler [S]	2.7	2.6	2.7	2.4	2.6
West Indian School	7.8	7.7	6.2	5.7	7.7
West Phoenix	7.2	6.5	6.0	6.0	6.5

Table 12: 2006-2007 One-Hour Carbon Monoxide Compliance (in ppm)					
Site or City	**2006**		**2007**		**Compliance Value**
	Max Value	**2nd High**	**Max Value**	**2nd High**	
Pima County					
22nd St. & Alvernon	3.4	3.4	3.7	3.1	3.4
22nd St. & Craycroft	3.2	2.9	2.6	2.5	2.9
Cherry & Glenn [S]	3.4	3.3	2.8	2.7	3.3
Children's Park	1.7	1.7	1.9	1.8	1.8
Golf Links & Kolb [S]	3.8	2.9	2.5	2.1	2.9
Tucson Downtown	2.9	2.6	3.4	2.7	2.7

[S] Seasonal monitor. Maricopa County monitors operate during January 1 to April 1 and September 1 to December 31. Pima County monitors operate during January 1 to May 1 and October 1 to December 31.

Table 13: 2006-2007 Eight-Hour Carbon Monoxide Compliance (in ppm)

NAAQS for eight-hour carbon monoxide: The highest of the second-highest values in a two-year period must not exceed 9 ppm.

2006-2007 Eight-Hour Carbon Monoxide NAAQS Compliance Values by County		
County	Exceedances	Violations
Maricopa	0	0
Pima	0	0
Summary: 20 of 20 monitors in compliance		

Table 13: 2006-2007 Eight-Hour Carbon Monoxide Compliance (in ppm)

Site or City	2006		2007		Compliance Value
	Max Value	2nd High	Max Value	2nd High	
Maricopa County					
Buckeye [S]	0.7	0.6	1.0	0.8	0.8
Central Phoenix	3.8	3.2	2.9	2.9	3.2
Dysart [S]	0.9	0.8	1.3	1.3	1.3
Glendale [S]	1.9	1.8	1.8	1.6	1.8
Greenwood	3.6	3.5	4.0	3.0	3.5
JLG Supersite	3.0	2.9	3.1	2.9	2.9
Mesa [S]	2.8	2.0	2.0	2.0	2.0
North Phoenix [S]	2.0	1.9	1.7	1.6	1.9
South Phoenix [S]	3.2	2.7	3.1	2.3	2.7
South Scottsdale [S]	2.1	1.9	1.6	1.6	1.9
Tempe [S]	2.5	2.4	1.9	1.9	2.4
West Chandler [S]	2.2	2.0	1.6	1.5	2.0
West Indian School	5.3	4.5	5.0	3.9	4.5
West Phoenix	5.0	4.6	4.6	4.1	4.6
Pima County					
22nd St. & Alvernon	2.0	1.8	2.1	1.9	1.9
22nd St. & Craycroft	1.6	1.4	1.2	1.2	1.4
Cherry & Glenn [S]	2.3	2.0	1.9	1.5	2.0
Children's Park	1.1	1.0	1.1	1.0	1.0
Golf Links & Kolb [S]	1.8	1.6	1.3	1.3	1.6
Tucson Downtown	1.4	1.2	1.9	1.4	1.4

[S] Seasonal monitor. Maricopa County monitors operate during January 1 to April 1 and September 1 to December 31. Pima County monitors operate during January 1 to May 1 and October 1 to December 31.

Nitrogen Dioxide

The NAAQS for NO_2 is 0.053 ppm for an annual average. The standard is attained when the annual arithmetic mean concentration in a calendar year is less than or equal to 0.053 ppm. To demonstrate attainment, the annual mean must be based upon hourly data that are at least 75 percent complete. NO_2 annual averages near Arizona power plants range from 2 percent to 17 percent of the standard and in the urban areas, from 20 percent to 60 percent. All Arizona sites were in compliance with the NAAQS. Refer to Table 6 for the 2007 averages.

Table 14: 2007 Nitrogen Dioxide NAAQS Compliance Values by County

County	Annual Average	
	Exceedances	Violations
Maricopa	0	0
Pima	0	0
Yuma	0	0
Summary:10 of 10 monitors in compliance		

Sulfur Dioxide

There are three NAAQS for SO_2, two primary (annual average and 24-hour block average) and one secondary (three-hour block average). The annual average standard is 0.030 ppm (80 µg/m^3), not to be exceeded in a calendar year. The 24-hour block average standard is 0.14 ppm (365 µg/m^3), not to be exceeded more than once per calendar year. The 24-hour average is calculated from midnight to midnight (calendar day); 18 or more valid hours must be present for each calendar day. The maximum and second-highest 24-hour average is used to determine compliance with the standard. The annual average and 24-hour averages must be based on valid hourly data that are at least 75 percent complete in each calendar quarter.

The secondary three-hour standard is 0.5 ppm (1300 µg/m^3), not to be exceeded more than once per calendar year. The three-hour averages are determined from successive, non-overlapping three-hour blocks starting at midnight each calendar day. To demonstrate attainment the second highest three-hour average must be based upon hourly data that are at least 75 percent complete in each calendar quarter. All three hours of the block must be available to calculate a valid average. However, if only one or two hourly averages are available and the three-hour average would exceed the level of the standard when zeroes are substituted for the missing hours, the block would be considered valid.

In Arizona in 2007, the maximum concentration sites - all near copper smelters - comply with these standards; the concentrations ranging from 2 to 60 percent of the three-hour, 1 to 60 percent of the 24-hour and 2 to 54 percent of the annual average standards. Sites near power plants are close to background levels, with annual averages near 1 µg/m^3. See Table 7 for the 2007 averages.

Table 15: 2007 Sulfur Dioxide Average NAAQS Compliance Values by County						
County	**Annual Average**		**Three-Hour Average**		**24-Hour Average**	
	Exceedances	**Violations**	**Exceedances**	**Violations**	**Exceedances**	**Violations**
Gila	0	0	0	0	0	0
Maricopa	0	0	0	0	0	0
Pima	0	0	0	0	0	0
Pinal	0	0	0	0	0	0
Summary:15 out of 15 monitors in compliance						

Ozone - One-hour

The NAAQS one-hour standard for O_3 is 0.12 ppm. Compliance with this standard is attained when, for a three-year period, the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (0.124 ppm for rounding) is equal to or less than one. An exceedance day is defined as any day having one or more hourly averages equal to or greater than 0.125 ppm. Hourly averages for at least 75 percent of the hours sampled (18-24 hours per day) must be present. There were no exceedances of the one-hour standard in Arizona in 2007.

As there have been no violations of the one-hour O_3 standard since 1996, on May 15, 2001, EPA found that Maricopa County had reached attainment for the one-hour O_3 standard. A maintenance plan and redesignation request developed by MAG, demonstrating how the area will maintain compliance with the one-hour standard, was submitted to EPA on April 21, 2004.

Ozone - Eight-hour

On April 15, 2004, the Phoenix area was designated nonattainment for the new, more stringent, eight-hour O_3 standard. The one-hour standard was revoked one year following the effective date of the eight-hour designation on June 15, 2005. However, certain control measures developed and implemented for the one-hour standard are required to remain in place to ensure continued progress toward attainment of the new eight-hour standard.

EPA developed the eight-hour O_3 standard in response to human exposure studies that showed adverse health effects occur at lower O_3 concentrations extending over several hours. After its proposal in 1997 and after a protracted legal battle, the eight-hour standard was officially promulgated in 2003 and nonattainment area boundaries established. The eight-hour O_3 standard was 0.08 ppm (0.084 ppm for rounding) for a daily maximum eight-hour average. Then in 2008 the eight-hour standard was reviewed and changed to 0.075 ppm, effective April 2008. The eight-hour standard is met when the three-year average of the annual fourth-highest daily maximum eight-hour average O_3 concentration is less than or equal to 0.08 ppm (0.075 ppm as of April 2008). The data in Table 16 are for those sites in operation in 2005 to 2007 and have been evaluated based on both the 0.08 ppm and the 0.075 ppm standards.

Table 16: 2005 to 2007 Eight-Hour Ozone Compliance (in ppm)

NAAQS: The three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration is less than or equal to 0.08 ppm effective in 1997.

2005 to 2007 Eight-Hour Ozone 1997 NAAQS of 0.080 ppm Compliance Values by County				
County	Eight-Hour Exceedances *			Sites in Violation
	2005	2006	2007	
Cochise	0	0	0	0
Coconino	1	0	0	0
Gila	2	2	0	0
La Paz	0	0	0	0
Maricopa	25	17	1	0
Navajo	0	1	0	0
Pima	1	0	0	0
Pinal	3	5	0	0
Yuma	0	0	1	0
Summary:39 of 39 monitors in compliance for 2005 to 2007				

* Includes all eight-hour exceedances.

Table 16: 2005 to 2007 Eight-Hour Ozone Compliance (in ppm)

NAAQS: The three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration is less than or equal to 0.075 ppm effective in 2008.

2005 to 2007 Eight-Hour Ozone 2008 NAAQS of 0.075 ppm Compliance Values by County				
County	Eight-Hour Exceedances *			Sites in Violation
	2005	2006	2007	
Cochise	0	1	0	0
Coconino	4	1	0	0
Gila	17	17	6	1
La Paz	1	1	2	0
Maricopa	122	169	53	11
Navajo	2	1	0	0
Pima	15	13	0	1
Pinal	22	26	10	2
Yuma	7	1	3	0
Summary:24 of 39 monitors in compliance for 2005 to 2007				

Table 16: 2005 to 2007 Eight-Hour Ozone Compliance (in ppm)
Bold denotes exceedances and sites in violation of the 2008 NAAQS of 0.075 ppm.
Bold with grey background denotes exceedances of the 1997 NAAQS of 0.08 ppm.

Site or City	Fourth-Highest Value			Three-Year Average
	2005	2006	2007	
Cochise County				
Chiricahua Entrance Station	0.072	0.074	0.067	0.071
Coconino County				
Grand Canyon NP - The Abyss	**0.079**	0.070	0.069	0.072
Gila County				
Tonto NM [S]	**0.084**	**0.081**	**0.076**	**0.080**
La Paz County				
Alamo Lake [S] (opened 05/20/2005)	0.071	0.073	0.072	0.072
Maricopa County				
Blue Point	**0.081**	0.062	0.058	0.067
Buckeye [S]	0.065	0.067	0.064	0.065
Cave Creek [S]	**0.082**	**0.080**	**0.077**	**0.079**
Central Phoenix	0.075	**0.080**	0.070	0.075
Dysart [S]	0.066	0.072	0.065	0.067
Falcon Field [S]	**0.076**	**0.079**	0.073	**0.076**
Fountain Hills	**0.088**	**0.084**	0.074	**0.082**
Glendale [S]	**0.076**	**0.078**	0.071	0.075
Humboldt Mountain [S]	**0.087**	**0.079**	**0.078**	**0.081**
JLG Supersite	**0.076**	**0.076**	**0.076**	**0.076**
North Phoenix	**0.084**	**0.085**	**0.078**	**0.082**
Pinnacle Peak	**0.083**	**0.076**	0.075	**0.078**
Rio Verde [S]	**0.087**	**0.083**	**0.079**	**0.083**
South Phoenix	**0.076**	0.069	0.072	0.072
South Scottsdale	**0.077**	**0.080**	**0.077**	**0.078**
Tempe [S]	**0.076**	**0.079**	**0.076**	**0.077**
West Chandler [S]	0.075	**0.081**	0.072	**0.076**
West Phoenix	0.068	**0.082**	0.074	0.074
Navajo County				
Petrified Forest NP South	0.070	0.071	0.069	0.070
Pima County				
22nd St. & Craycroft	0.074	0.069	0.068	0.070
Children's Park	0.075	0.072	0.071	0.072
Coachline	0.066	0.071	0.064	0.067
Green Valley	0.068	0.070	0.065	0.067
Rose Elementary	0.067	0.067	0.069	0.067
Saguaro NP East	**0.079**	**0.076**	0.073	**0.076**
Tangerine	0.073	**0.076**	0.069	0.072
Tucson Downtown	0.070	0.073	0.067	0.070

Table 16: 2005 to 2007 Eight-Hour Ozone Compliance (in ppm)

Bold denotes exceedances and sites in violation of the 2008 NAAQS of 0.075 ppm.
Bold with grey background denotes exceedances of the 1997 NAAQS of 0.08 ppm.

Site or City	Fourth-Highest Value			Three-Year Average
	2005	2006	2007	
Tucson Fairgrounds	0.073	0.068	0.071	0.070
Pinal County				
Apache Junction Maintenance Yard	0.068	**0.084**	**0.077**	**0.076**
Casa Grande Airport	0.072	0.073	0.070	0.071
Combs School [S ##]	0.067	0.071	0.057	0.065
Maricopa County Complex [S]	0.061	0.068	0.059	0.062
Pinal Air Park [S]	**0.077**	0.070	0.066	0.071
Queen Valley [S]	**0.084**	**0.079**	**0.076**	**0.079**
Yuma County				
Yuma Game & Fish [S]	**0.078**	0.073	0.074	0.075

[S] Seasonal monitor, operational during April 1 to Nov. 1.

[#] Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available.

Site also known as Queen Creek

N/A - Data are not available

Notes:
Data follow EPA truncation and averaging rules. Data published in previous annual reports may be slightly different.

Particulate Matter - PM_{10}

The NAAQS for particulate matter 10 microns and smaller in diameter (PM_{10}) were changed December 17, 2006. The annual NAAQS was eliminated; the 24-hour NAAQS of 150 µg/m^3 was retained. In this year's report, the annual NAAQS statistics are included for historical purposes.

The annual standard was attained when, for a three-year period, the expected annual arithmetic mean concentration was less than or equal to 50µg/m^3. This three-year average is determined by calculating the quarterly averages for each year (with 75 percent data recovery in each quarter) to determine the calendar year average and then averaging the three years together. This mean is rounded to the nearest 1 µg/m^3 for comparison to the standard.

Compliance with the 24-hour PM_{10} standard is attained when the expected exceedance rate is one or less per year measured over three years. A sample value is rounded to the nearest 10 µg/m^3 for comparison with the standard to determine if it is an exceedance (i.e., a sample value of 154 µg/m^3 is not an exceedance because it rounds to 150 µg/m^3; a sample value of 155 µg/m^3 is an exceedance because it rounds to 160 µg/m^3). Since the majority of monitoring sites do not collect daily samples, the expected exceedance rate must be calculated by quarter following EPA guidelines. The same requirements of 75 percent completeness and three consecutive years of data apply.

Tables 17 and 18 present the 2005 to 2007 expected exceedance rates for the PM_{10} annual arithmetic means and maximum 24-hour average values.

Table 17: 2005 to 2007 Annual Average PM_{10} Compliance (in µg/m^3, Standard Conditions)

NAAQS: The expected annual arithmetic mean (average of three most recent annual means) is less than or equal to 50 µg/m^3.

The expected annual arithmetic mean is rounded to the nearest 1 µg/m^3 for comparison to the standard.

2005 to 2007 PM_{10} Annual Average NAAQS Compliance Values, By County				
County	Sites above Standard			Sites in Violation
	2005	2006	2007	
Apache	0	0	0	0
Cochise	0	0	0	0
Coconino	0	0	0	0
Gila	0	0	0	0
Graham	0	0	0	0
Maricopa	7	7	6	7
Mohave	0	0	0	0
Navajo	0	0	0	0
Pima	0	0	0	0
Pinal	4	4	6	3
Santa Cruz	1	1	1	1
Yavapai	0	0	0	0
Yuma	0	0	1	0
Summary: 57 of 69 monitors in compliance				

Table 17: 2005 to 2007 Annual Average PM_{10} Compliance (in µg/m^3) **Bold** denotes value above the standard.				
Site or City	**2005**	**2006**	**2007**	**Expected Annual Mean**
Apache County				
TEP - Springerville - Coal Yard	15.4	19.0	26.9	20
TEP - Springerville - Coyote Hills	10.3	11.2	11.7	11
Cochise County				
Douglas Red Cross	34.4	30.9	28.2	31
Paul Spur Chemical Lime Plant	27.6#	27.3	28.8	N/A
Coconino County				
Flagstaff Middle School	17.0#	18.0	21.2	N/A
Sedona Post Office (closed 12/31/2007)	12.2#	13.3	13.7	N/A
Gila County				
FMMI - Miami - Golf Course	21.0	20.4	23.0#	N/A
Hayden Old Jail, ADEQ	29.9#	33.4	34.4	N/A
Miami Ridgeline, FMMI	12.4	14.2	11.9	39
Payson Well Site	22.1#	23.7	23.0	N/A
Graham County				
Safford (closed 12/31/2007)	20.8#	22.6	22.3	N/A
Maricopa County				
Bethune Elementary School	**58.6**	**61.7**	**53.1**	**58**
Buckeye [E]	**52.7**	**53.0**	**52.5**	**53**
Central Phoenix - every 6th day monitor (closed 12/31/2005)	38.5	N/A	N/A	N/A
Central Phoenix [E]	37.1	42.0	42.4	41
Chandler (closed 12/31/2005)	49.4	N/A	N/A	N/A
Coyote Lakes (opened 4/2/2007)	N/A	N/A	47.8#	N/A
Durango Complex [E]	**66.4**	**69.0**	**59.5**	**65**
Dysart	29.0	32.3	35.9	32
Glendale	29.0	36.3#	34.1	N/A
Greenwood [E] - continuous monitor beginning 1/1/2006	**51.7**	**51.7**	50.0	**51**
Higley [E]	**51.4**	**60.4**	**53.0**	**55**
JLG Supersite	30.9	35.4	34.1	33
JLG Supersite [E]	29.3	36.8	36.2	34
Mesa	30.0	30.5	32.3	31
North Phoenix	29.6	34.4	33.5	33
South Phoenix [E] - continuous monitor beginning 7/1/2007	**54.7**	**55.0**	**55.6**	**55**
South Scottsdale	34.0	32.9	30.6	33
West Chandler [E]	34.2	33.3	36.4	35
West Forty Third [E]	**73.9**	**79.8**	**71.8**	**75**

Table 17: 2005 to 2007 Annual Average PM_{10} Compliance (in µg/m^3) **Bold** denotes value above the standard.				
Site or City	**2005**	**2006**	**2007**	**Expected Annual Mean**
West Phoenix - continuous monitor beginning 1/1/2006	44.5	49.8	47.0	47
Mohave County				
Bullhead City	18.6#	19.3	20.3	N/A
Navajo County				
Show Low (closed 12/31/2007)	13.7#	15.5	16.0	N/A
Pima County				
Ajo	22.7	25.3	32.0#	N/A
Broadway & Swan	23.7	26.8	26.2	26
Corona de Tucson	15.4	22.6	17.1	18
Geronimo (opened 7/1/2007)	N/A	N/A	32.8#	N/A
Green Valley [E]	17.4	16.8	20.4	18.2
Green Valley Fire Administration [E] (opened 7/1/2007)	N/A	N/A	14.8#	N/A
Orange Grove [E]	29.2	31.8	29.2	30
Prince Road	37.0 #	35.2	31.7	N/A
Rillito, ADEQ	39.1	39.7	40.7	40
Rillito, APCC (1-in-3 day schedule)	26.8	28.5	26.2	27
Santa Clara	26.5	35.5	28.4	30
South Tucson	30.2	34.3	31.4	32
Tangerine	19.1	22.9	22.0	21
Pinal County				
Apache Junction Fire Station	19.9	23.6	18.1	21
Casa Grande Downtown	30.9	35.9	35.3	34
Casa Grande Downtown [E] (opened March 2007)	N/A	N/A	**55.2#**	N/A
Combs School [E] (opened 3/20/2007)	N/A	N/A	**89.9#**	N/A
Coolidge Maintenance Yard	36.0	44.0	35.5	39
Cowtown (opened August 2005)	**294.4#**	**220.1**	**167.5**	N/A
Cowtown [E]	**200.4#**	**230.4**	**181.3**	N/A
Eloy County Complex	33.4	38.8	42.3	38
Mammoth County Complex	13.6	14.8	12.7	14
Maricopa County Complex [E]	**70.1**	**78.6**	**73.7**	**74**
Pinal Air Park	22.3	29.5	29.5	27
Pinal County Housing Complex	**56.7**#	**64.3**	**56.0**	N/A
Pinal County Housing Complex [E]	**68.7**	**87.1**	**83.7**	**80**
Riverside Maintenance Yard [E]	18.1	23.3	23.6	22
Stanfield	**52.1**	**81.4**	**90.9**	**75**
Stanfield [E] (opened February 2006)	N/A	**82.6#**	**84.3**	N/A

Table 17: 2005 to 2007 Annual Average PM_{10} Compliance (in µg/m^3)
Bold denotes value above the standard.

Site or City	2005	2006	2007	Expected Annual Mean
Santa Cruz County				
Nogales Post Office	**56.9**	**64.0**	**52.1**	**58**
Nogales Post Office [E]	**65.9**	**82.3**	**65.0**	**71**
Yavapai County				
PCC Clarkdale - NW	14.7	15.3	14.0	15
PCC Clarkdale - SE	21.8	19.7	18.5	20
Prescott Valley	14.8#	18.9#	21.5	N/A
Yuma County				
Yuma Courthouse	34.9	40.1	45.7	40
Yuma Courthouse [E]	47.5#	46.9	**51.9**	N/A
Mexico				
Agua Prieta Fire Station	**68.1**	**52.7**	46.8	**56**
Nogales Fire Station	**62.9**	**75.9**	**62.7**	**67**

# Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available in one or more calendar quarters.

[E] Indicates every day/continuous monitoring.

N/A - Data are not available

Notes:
For collocated sites, data from the Primary monitor (POC 1) are used for the Annual Average calculations. However, if valid data recovery is between 50 percent and 75 percent, data from the Secondary (POC 2) monitor can be used. If no Secondary data are available, data substitution can be made following the EPA document, 'Guideline on Exceptions to Data Requirements for Determining Attainment of Particulate Matter Standards.'

Table 18: 2005 to 2007 Maximum 24-Hour Average PM_{10} Compliance (in $\mu g/m^3$, Standard Conditions)

NAAQS: Expected occurrence of exceedances (samples equal to or greater than 150 µg/m3) is one or less over three consecutive years.

Sample values are rounded to the nearest 10 $\mu g/m^3$ to determine exceedance; values less than or equal to 154 $\mu g/m^3$ are not exceedances; values greater than or equal to 155 $\mu g/m^3$ are exceedances.

2005 to 2007 PM_{10} Maximum 24-Hour Compliance Values, By County				
County	Sites with Exceedances			Sites in Violation
	2005	2006	2007	
Apache	1	1	1	1
Cochise	0	0	0	0
Coconino	0	0	0	0
Gila	0	0	0	0
Graham	0	0	0	0
Maricopa	6	5	8	8
Mohave	0	0	0	0
Navajo	0	0	0	0
Pima	0	0	1	1
Pinal	4	4	6	3
Santa Cruz	1	1	1	1
Yavapai	0	0	0	0
Yuma	0	1	1	0
Summary: 55 of 69 monitors in compliance				

Table 18: 2005 to 2007 Maximum 24-Hour Average PM_{10} Compliance (in $\mu g/m^3$)
Bold denotes value above the standard.

Site or City	2005		2006		2007		Three-Year Avg Expected Rate of Exceedance
	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	
Apache County							
TEP - Springerville - Coal Yard	**198**	**3.0**	**298**	**3.0**	**914**	**5.0**	**3.7**
TEP - Springerville - Coyote Hills	29	0	56	0	49	0	0
Cochise County							
Douglas Red Cross	86	0	87	0	94	0	0
Paul Spur Chemical Lime Plant	76#	0	76	0	87	0	N/A
Coconino County							
Flagstaff Middle School	38#	0	37	0	56	0	N/A
Sedona Post Office (closed 12/31/2007)	34#	0	36	0	33	0	N/A
Gila County							
FMMI - Miami - Golf Course	40	0	90	0	64#	0	N/A
Hayden Old Jail, ADEQ	124#	0	102	0	72	0	N/A
Miami Ridgeline, FMMI	23	0	106	0	51	0	0
Payson Well Site	81#	0	66	0	62	0	N/A
Graham County							
Safford (closed 12/31/2007)	50#	0	50	0	62	0	N/A

Table 18: 2005 to 2007 Maximum 24-Hour Average PM_{10} Compliance (in µg/m^3)
Bold denotes value above the standard.

Site or City	2005		2006		2007		Three-Year Avg Expected Rate of Exceedance
	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	
Maricopa County							
Bethune Elementary School	**198**	**6.4**	140	0	136	0	**2.1**
Buckeye [E]	**169**	**2.0**	**272**	**3.0**	**195**	**2.0**	**2.3**
Central Phoenix (closed 12/31/2005)	125	0	N/A	N/A	N/A	N/A	N/A
Central Phoenix [E]	116	0	134	0	**267**	**1.0**	0.3
Chandler (closed 12/31/2005)	130	0	N/A	N/A	N/A	N/A	N/A
Coyote Lakes (opened 4/2/2007)	N/A	N/A	N/A	N/A	**313#**	**2.0**	N/A
Durango Complex [E]	**206**	**13.0**	**240**	**9.0**	**155**	**1.0**	**7.7**
Dysart	76	0	67	0	111	0	0
Glendale	84	0	60#	0	92	0	N/A
Greenwood [E] - continuous monitor beginning 1/1/2006	**173**	**6.1**	**166**	**1.0**	124	0	**2.4**
Higley [E]	142	0	**170**	**2.1**	**230**	**5.1**	**2.4**
JLG Supersite	100	0	91	0	85	0	0
JLG Supersite [E]	82	0	148	0	**521**	**1.0**	0.3
Mesa	86	0	75	0	110	0	0
North Phoenix	81	0	79	0	78	0	0
South Phoenix [E] - continuous monitor beginning 7/1/2007	147	0	132	0	**171**	**7.5**	**2.5**
South Scottsdale	121	0	76	0	73	0	0
West Chandler [E]	94	0	77	0	104	0	0
West Forty Third [E]	**233**	**13.1**	**260**	**18.7**	**227**	**6.0**	**12.6**
West Phoenix [E] - continuous monitor beginning 1/1/2006	**155**	**6.0**	147	0	124	0	**2.0**
Mohave County							
Bullhead City	48#	0	72	0	52	0	N/A
Navajo County							
Show Low (closed 12/31/2007)	37#	0	58	0	75	0	N/A
Pima County							
Ajo	45	0	54	0	124#	0	N/A
Broadway & Swan	46	0	60	0	80	0	0
Corona De Tucson	33	0	144	0	50	0	0
Geronimo (opened 7/1/2007)	N/A	N/A	N/A	N/A	104#	0	N/A
Green Valley	54	0	81	0	123	0	0
Green Valley Fire Administration [E] (opened 7/1/2007)	N/A	N/A	N/A	N/A	57#	0	N/A

Table 18: 2005 to 2007 Maximum 24-Hour Average PM_{10} Compliance (in µg/m^3)
Bold denotes value above the standard.

Site or City	2005		2006		2007		Three-Year Avg Expected Rate of Exceedance
	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	
Orange Grove [E]	98	0	101	0	95	0	0
Prince Road	88#	0	72	0	99	0	N/A
Rillito, ADEQ	84	0	122	0	**208**	**11.0**	**3.7**
Rillito, APCC (1-in-3 day schedule)	84	0	86	0	65	0	0
Santa Clara	82	0	104	0	92	0	0
South Tucson	73	0	109	0	97	0	0
Tangerine	37	0	104	0	88	0	0
Pinal County							
Apache Junction Fire Station	47	0	73	0	48	0	0
Casa Grande Downtown	79	0	81	0	112	0	0
Casa Grande Downtown [E] (opened March 2007)	N/A	N/A	N/A	N/A	**983#**	**7.0**	N/A
Combs School (opened 3/20/2007)	N/A	N/A	N/A	N/A	**970#**	**44.6**	N/A
Coolidge Maintenance Yard	81	0	106	0	82	0	0
Cowtown (opened August 2005)	**788#**	N/A	**606**	**278.2**	**759**	**166.2**	N/A
Cowtown [E]	**770#**	**163**	**1079**	**243.1**	**1014**	**190.4**	N/A
Eloy County Complex	73	0	99	0	136	0	0
Mammoth County Complex	33	0	31	0	40	0	0
Maricopa County Complex [E]	**239**	**18**	**429**	**19**	**724**	**20.1**	**19.0**
Pinal Air Park	122	0	77	0	113	0	0
Pinal County Housing Complex	**158#**	**6.4**	153	0	**224**	**6.5**	N/A
Pinal County Housing Complex [E]	**326**	**17**	**763**	**31**	**2253**	**19.5**	**22.5**
Riverside Maintenance Yard	35	0	83	0	65	0	0
Stanfield	**173**	**6.0**	**182**	**13.1**	**374**	**39.6**	**19.6**
Stanfield [E] (opened February 2006)	N/A	N/A	**727#**	**21**	**1062**	**25.2**	N/A
Santa Cruz County							
Nogales Post Office	**280**	**18.4**	**240**	**20.4**	**191**	**6.1**	**15.0**
Nogales Post Office [E]	**351**	**29.6**	**271**	**47.9**	**233**	**14.0**	**30.5**
Yavapai County							
PCC Clarkdale - NW	31.5	0	27	0	50	0	0
PCC Clarkdale – SE	43.1	0	38	0	52	0	0
Prescott Valley	53#	0	56#	0	63	0	N/A
Yuma County							
Yuma Courthouse	94	0	151	0	147	0	0

Table 18: 2005 to 2007 Maximum 24-Hour Average PM_{10} Compliance (in µg/m^3)
Bold denotes value above the standard.

Site or City	2005		2006		2007		Three-Year Avg Expected Rate of Exceedance
	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	Max 24-Hr Avg	Exp. Exc.	
Yuma Courthouse [E]	134#	0	**198**	**5.1**	**349**	**13.0**	N/A
Mexico							
Agua Prieta Fire Station	**172**	**6**	**159**	**11.7**	104	0	**5.9**
Nogales Fire Station	**240**	**10.2**	**195**	**14.1**	**170**	**12.3**	**12.2**

# Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available in one or more calendar quarters.

[E] Indicates every day/continuous monitoring.

N/A - Data are not available

Particulate Matter – $PM_{2.5}$

The NAAQS for particulate matter 2.5 microns and smaller in diameter ($PM_{2.5}$) are 15.0 µg/m^3 for the annual arithmetic mean concentration and 35 µg/m^3 for the 24-hour average concentrations, which changed from 65 µg/m^3 December 17, 2006. Appendix N Part 50 of the 40 CFR will be used to assess the compliance of the monitors operating in Arizona during 2007.

The annual $PM_{2.5}$ standard is met when the three-year average of annual means is less than or equal to 15.0 µg/m^3. This three-year average is determined by calculating the quarterly averages for each year (with 75 percent data recovery in each quarter) to determine the calendar year average and then averaging the three years together.

The 24-hour standard is met when the three-year average of the yearly 98th percentile value is less than or equal to 35 µg/m^3. There must also be 75 percent data completeness for each year.

Please note that the data in Table 19 are from FRMs. In prior years, the dichot fine measurement was used as an approximate equivalent for $PM_{2.5}$, but the FRMs provide a more accurate measurement of this pollutant. Data are collected and reported in local conditions.

In February of 2004, Arizona requested that all parts of the State (except for tribal areas) be designated attainment/unclassifiable for the $PM_{2.5}$ NAAQS. A new request was submitted in December 2007 and approved in August 2008, designating nonattainment for Nogales – same area as PM_{10} nonattainment.

Table 19: 2005 to 2007 Annual Average $PM_{2.5}$ Compliance (in µg/m^3, local conditions)

NAAQS: The three-year average of annual means is less than or equal to 15 µg/m^3

2005 to 2007 $PM_{2.5}$ Annual Average NAAQS Compliance Values, By County				
County	Sites with Exceedances			Sites in Violation
	2005	2006	2007	
Cochise	0	0	0	0
Coconino	0	0	0	0
Gila	0	0	0	0
Maricopa	0	0	0	0
Pima	0	0	0	0
Pinal	1	1	1	1
Santa Cruz	0	1	0	0
Summary: 12 of 13 federal reference monitors in compliance				

Table 19: 2005 to 2007 Annual Average $PM_{2.5}$ Compliance (in µg/m^3)
***Bold** denotes a value above the standard.*

Site or City Federal Reference Monitors	2005	2006	2007	Three-Year Average
Cochise County				
Douglas Red Cross	7.33	6.78	7.69	7.27
Coconino County				
Flagstaff Middle School	6.01	6.61	8.00	6.87
Gila County				
Payson Well Site	8.38#	9.04	9.38	N/A
Maricopa County				
JLG Supersite	9.72	10.22	9.48	9.81
Mesa (opened 4/28/2005)	8.92#	9.66	9.72	N/A
South Phoenix	12.84	12.69	12.27	12.60
West Phoenix	12.91	13.52	10.89	12.44
Pima County				
Children's Park	5.91	5.79	5.71	5.80
Orange Grove	6.32	5.80	5.84	5.99
Pinal County				
Apache Junction Fire Station	5.52	5.31	6.96	5.93
Casa Grande Downtown	7.33	7.55	10.25	8.38
Cowtown	**33.10**	**22.70**	**22.50**	**26.10**
Santa Cruz County				
Nogales Post Office	13.10	**15.59**	12.30	13.66

# Indicates the data do not satisfy EPA's summary criteria, usually meaning less than 75 percent valid data recovery available in one or more calendar quarters.

Table 20: 2005 to 2007 24-Hour Average $PM_{2.5}$ Compliance (in µg/m^3, local conditions)

NAAQS: The three-year average of the 98th percentile values is less than or equal to 35 µg/m^3.

Note: The three-year average is rounded to the nearest 1 µg/m^3 for comparison to the standard.

2005 to 2007 $PM_{2.5}$ 24-Hour Average NAAQS Compliance Values, By County				
County	Sites with Exceedances			Sites in Violation
	2005	2006	2007	
Cochise	0	0	0	0
Coconino	0	0	0	0
Gila	0	0	0	0
Maricopa	1	0	0	0
Pima	0	0	0	0
Pinal	1	1	1	1
Santa Cruz	0	1	0	1
Summary: 11 of 13 federal reference monitors in compliance				

Table 20. 2005 to 2007 24-Hour Average $PM_{2.5}$ Compliance (in µg/m^3)
Bold denotes a vale above the standard.

Site or City Federal Reference Monitors	98th Percentile Samples **			Three-Year Average
	2005	2006	2007	
Cochise County				
Douglas Red Cross [2]	16.0	14.0	32.2	21
Coconino County				
Flagstaff Middle School [2]	12.7	13.7	30.2	19
Gila County				
Payson [2]	22.9	23.4	21.9	23
Maricopa County				
JLG Supersite [3]	28.2	24.6	23.5	25
Mesa (opened 4/28/2005) [3]	17.5	20.1	18.3	19
South Phoenix [3]	36.4	28.8	29.2	31
West Phoenix [3]	**40.5**	28.8	27.2	32
Pima County				
Children's Park [3]	10.7	12.1	12.0	12
Orange Grove [1]	12.0	11.2	13.6	12
Pinal County				
Apache Junction Fire Station [3]	10.6	9.3	14.6	12
Casa Grande Downtown [2]	16.9	15.4	22.4	18
Cowtown [2]	**78.9**	**48.9**	**53.9**	**61**
Santa Cruz County				
Nogales Post Office [2]	33.0	**56.2**	28.2	**39**

** The 98th percentile value will be the second highest value for sites on an every 6th day sample schedule. The 98th percentile value will be the 3rd highest value for sites on an every 3rd day sample schedule.

[1] Samples collected every day - 365 sample days in non leap years

[2] Samples collected every sixth day - 61 sample days in non leap years.

[3] Samples collected every third day - 122 sample days in non leap years.

Visibility Data

Visibility monitoring is conducted using the following methods: aerosol, optical, and scene. Aerosol measurements include the physical properties of the ambient atmospheric particles (chemical composition, size, shape, concentration, temporal, and spatial distribution and other physical properties) through which a scene is viewed. The chemical species that comprise a particulate sample have different extinction efficiencies. Extinction efficiency is the extent to which an individual or a specific particle will either scatter or absorb light, thus blocking the light's path to one's eye. The overall impact of particles can be estimated by tabulating the effect of all the component species. This method is the primary approach used in the national regional haze rule for estimating present visibility and charting trends for future plan reviews. Optical methods measure either light scattering or light extinction continuously. Scene measurements are photograph-based with subsequent analysis.

Figure 6 – Pleasant Valley monitoring station.

ADEQ operates several types of monitors designed to characterize different optical phenomena. Visibility data from these monitors can be expressed by several different measurement units: deciview, inverse megameters, and visual range. An inverse megameter (Mm^{-1}) (units used by ADEQ) is a representation of the ratio between how much light is not received by a sensor compared to the amount of light that leaves a source. Higher numbers mean worse visibility.

Class I Areas

ADEQ began a visibility monitoring program in 1997, in anticipation of the implementation of a federal regional haze rule. The program is directed at Class I areas in partnership with Arizona's federal land managers. Arizona's Class I areas are participating in the IMPROVE program, which consists of aerosol sampling only. The aerosol samplers collect 24-hour samples every third day and are analyzed to determine the content of the particulate collected. ADEQ added nephelometers for measuring light scattering at some of the sites. The nephelometers are continuous monitors, providing readings every five minutes which are averaged into hourly and 24-hour values. The continuous measurements provide insight into variation in visibility impairment with time as well as advancing the understanding of the relationship between particles and light scattering.

Table 21 summarizes the nephelometer data from locations in or near Arizona Class I areas from 1998 to 2007. The data are summarized into three categories for all hours (24 hours a day): the average visibility of the dirtiest 20 percent of the sampled hours, the mean visibility of all hours, and the average visibility of the cleanest 20 percent of the sampled hours. As natural background levels are 15 Mm^{-1}, this table shows that on average most sites are within background, with the exceptions being Camp Raymond, Ike's Backbone, and Petrified Forest National Park in 2007, Tucson Mountain in 2002 to 2006, and Pleasant Valley in 2003.

Table 21: Visibility in Class I Areas (Nephelometer Data in Mm^{-1})

Site and Wilderness Area	Year	Mm^{-1} (24 hour Averages)		
		Mean of the Dirtiest 20% Sampled Hours	Mean of all Sampled Hours	Mean of the Cleanest 20% Sampled Hours
Camp Raymond *Sycamore Canyon Wilderness*	1999	28	13	4
	2000	28	13	3
	2001	28	13	3
	2002	30	13	3
	2003	32	14	3
	2004	25	12	3
	2005	33	14	3
	2006	32	14	4
	2007	50	19	3
Chiricahua National Monument	2004	18	9	3
	2005	21	10	2
	2006	18	7	0
	2007	31	13	3
Greer Water Treatment Plant *Mt. Baldy Wilderness*	2002	26	10	2
	2003	26	10	1
	2004	17	8	1
	2005	23	9	1

Table 21: Visibility in Class I Areas (Nephelometer Data in Mm^{-1})				
Site and Wilderness Area	**Year**	**Mm^{-1} (24 hour Averages)**		
		Mean of the Dirtiest 20% Sampled Hours	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
	2006	21	9	2
	2007	29	12	2
Hance Camp *Grand Canyon NP*	1998	23	10	2
	1999	21	9	2
	2000	20	8	1
	2001	22	9	1
	2002	20	9	2
	2003	26	11	2
	2004	19	9	2
	2005	25	10	1
	2006	21	9	2
	2007	24	11	2
Humboldt Mountain * *Mazatzal Wilderness and Pine Mountain Wilderness*	1998	24	9	0
	1999	25	12	3
	2000	28	13	3
	2001	21	9	1
	2002	24	8	0
	2003	36	16	3
Ike's Backbone *Mazatzal/Pine Mountain Wildernesses*	2002	24	10	2
	2003	30	12	2
	2004	24	11	3
	2005	26	12	4
	2006	23	12	4
	2007	31	15	4
Indian Gardens *Grand Canyon NP*	2005	26	10	2
	2006	21	9	3
	2007	27	11	2
Mount Ord * *Mazatzal Wilderness*	1998	28	12	2
	1999	22	11	3
McFadden Peak * *Sierra Ancha Wilderness*	1998	24	10	1
	1999	18	7	0
Muleshoe Ranch * *Chiracahua National Monument Wilderness, Galiuro Wilderness, Chiricahua Forest Service Wilderness*	1998	24	11	4
	1999	20	11	3
	2000	22	11	3
	2001	24	12	4
	2002	25	12	4
	2003	25	11	3
	2004	20	8	1
	2005	21	10	4

Table 21: Visibility in Class I Areas (Nephelometer Data in Mm^{-1})				
Site and Wilderness Area	**Year**	**Mm^{-1} (24 hour Averages)**		
		Mean of the Dirtiest 20% Sampled Hours	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
Organ Pipe National Monument	2004	21	10	3
	2005	23	12	4
	2006	21	9	1
	2007	27	13	4
Petrified Forest National Park	2004	20	9	3
	2005	24	11	3
	2006	23	9	1
	2007	39	17	4
Pleasant Valley Ranger Station *Sierra Ancha Wilderness*	2001	28	14	5
	2002	27	13	3
	2003	33	15	4
	2004	20	10	3
	2005	28	13	4
	2006	25	11	2
	2007	24	10	1
Rucker Canyon * *Chiricahua Wilderness*	1998	30	12	3
	1999	20	10	4
	2000	18	8	1
Tucson Mountain *Saguaro National Park (Includes both the West facilities support building and the National Park Service well site)*	1998	30	12	2
	1999	24	13	6
	2000	23	12	5
	2001	22	11	3
	2002	31	16	6
	2003	35	17	6
	2004	32	16	5
	2005	31	16	5
	2006	27	15	6
	2007	29	14	5

* Site Closed:
Humboldt Mountain closed in 2004; McFadden Peak closed in 2000; Mount Ord closed in 2000; Muleshoe Ranch closed in 2006; Rucker Canyon closed in 2001

Urban Haze

Besides the Class I areas, ADEQ also operates transmissometers and nephelometers in Phoenix and Tucson. Data from these instruments through 2007 are presented in Table 22. The data are separated into categories for all hours and for six-hours. Each category is further summarized into the average visibility for the dirtiest 20 percent of the sampled hours, the mean visibility of all hours, and the cleanest average visibility for the 20 percent of the sampled hours. As visual range in miles may be a more familiar unit, the values in Mm^{-1} in Table 22 can be converted to Visual Range in miles by the expression ($2431/b_{ext}$). A few conversions are given here:

Mm^{-1}	*Miles*	*Comment*
136	18	Highest in the Table
100	24	
50	48	
2	1216	Lowest in the Table

Table 22: Phoenix and Tucson Urban Haze Data 1998 to 2007 (in Mm^{-1})

Site	Year	24 Hour Samples			5 a.m. to 11 a.m.		
		Mean of the Dirtiest 20% Sampled Hours	Mean of all Sampled Hours	Mean of the Cleanest 20% Sampled Hours	Mean of the Dirtiest 20% Sampled Hours	Mean of all Sampled Hours	Mean of the Cleanest 20% Sampled Hours
Mesa Transmissometer	2004	106	60	24	110	65	29
	2005	121	72	35	123	78	44
	2006	115	70	37	117	75	42
	2007	118	79	46	124	86	53
Phoenix Transmissometer	1998	133	78	45	136	84	50
	1999	127	72	38	128	77	42
	2000	131	74	38	134	80	42
	2001	118	69	36	118	73	42
	2002	124	75	42	125	79	46
	2003	131	72	36	135	78	42
	2004	121	69	35	126	75	42
	2005	126	72	36	128	78	43
	2006	125	69	32	126	76	40
	2007	121	78	47	127	84	53
Phoenix Nephelometer (Supersite)	1998	91	35	10	77	34	13
	1999	87	36	11	74	36	14
	2000	93	39	12	80	39	15
	2001	73	32	12	66	33	15
	2002	72	33	12	62	33	14
	2003	79	34	11	73	35	14
	2004	72	30	9	61	30	11
	2005	80	33	9	73	33	11

Table 22: Phoenix and Tucson Urban Haze Data 1998 to 2007 (in Mm^{-1})							
Site	**Year**	**24 Hour Samples**			**5 a.m. to 11 a.m.**		
		Mean of the Dirtiest 20% Sampled Hours	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**	**Mean of the Dirtiest 20% Sampled Hours**	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
	2006	88	39	12	80	40	14
	2007	75	33	11	70	33	13
Phoenix Nephelometer (Dysart)	2004	46	22	7	52	27	9
	2005	41	20	8	41	23	10
	2006	44	21	6	49	25	9
	2007	37	18	5	37	20	7
Phoenix Nephelometer (Estrella Mountain)	2004	54	24	7	68	32	10
	2005	76	35	12	77	39	14
	2006	50	23	7	64	31	10
	2007	48	21	5	58	27	7
Phoenix Nephelometer (Vehicle Emissions)	2004	69	29	9	64	31	12
	2005	76	35	12	73	37	15
	2006	56	26	8	53	27	11
	2007	55	26	9	53	27	11
Queen Valley Nephelometer	2004	26	11	2	25	10	2
	2005	32	15	5	31	15	5
	2006	25	12	3	22	11	3
	2007	28	15	5	27	14	5
Tucson Transmissometer	1998	102	57	28	119	69	34
	1999	90	57	35	107	65	38
	2000	98	56	27	114	66	31
	2001	96	55	26	109	66	33
	2002	87	49	24	109	61	29
	2003	88	52	26	107	62	30
	2004	97	58	27	113	67	32
	2005	101	61	31	125	76	39
	2006	83	47	22	100	56	28
	2007	92	51	22	103	60	28
Tucson Nephelometer (U of A Central)	1998	45	21	4	47	23	7
	1999	43	23	10	41	24	11
	2000	40	20	8	40	22	9
	2001	42	23	10	44	25	13
	2002	38	20	7	42	22	9
	2003	43	23	9	45	25	11
	2004	38	20	8	42	22	10
	2005	45	24	10	47	27	12
	2006	39	19	5	40	21	7

Table 22: Phoenix and Tucson Urban Haze Data 1998 to 2007 (in Mm^{-1})							
Site	**Year**	**24 Hour Samples**			**5 a.m. to 11 a.m.**		
		Mean of the Dirtiest 20% Sampled Hours	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**	**Mean of the Dirtiest 20% Sampled Hours**	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
	2007	42	22	8	43	24	11
Tucson Nephelometer (Craycroft)	2001	38	19	8	N/A	N/A	N/A
	2002	37	18	7	N/A	N/A	N/A
	2003	52	25	7	N/A	N/A	N/A
	2004	42	21	8	43	22	9
	2005	35	19	7	44	25	11
	2006	41	22	9	40	23	11
	2007	39	19	6	39	21	8
Tucson Nephelometer (Children's Park)	2004	41	20	8	43	23	10
	2005	35	19	7	35	20	8
	2006	38	20	8	40	23	11
	2007	48	24	9	48	28	13

N/A - Data are not available

Accomplishments and Special Projects

Introduction

This section summarizes some of ADEQ's accomplishments and special projects during 2007 and 2008.

ADEQ is responsible for preparing and submitting documents to EPA which identify nonattainment areas, describe activities that will help the areas reach attainment, and document their attainment status (see Nonattainment and Attainment Areas map in Appendix 4). The ADEQ Air Quality Division Planning Section is responsible for these activities and some of their accomplishments during this period are described in this section.

Figure 7 – Mexico Supersite, Western Arizona/Sonora Border Air Quality Study

In addition to ADEQ's statewide regulatory ambient air monitoring program, the ADEQ Air Quality Division conducts special monitoring projects to provide a better understanding of air pollutant science in Arizona and the Southwest. Data are employed in advanced computer models that help to explain and predict the relationship between emissions and air pollutant concentrations under a variety of conditions. Control strategies are modeled to predict the most effective methods to attain and maintain the National Ambient Air Quality Standards (NAAQS) in Arizona. Issues related to the international border, identification of potential air pollution hotspots, improved visibility and reduction of regional haze, and appropriate responses to smoke and other air pollution hazards to protect public health fall under special projects. The knowledge gained from these studies can then be used by decision makers to choose the most effective control strategies that will continue to improve Arizona's air quality.

Miami PM_{10} Planning Area Maintenance Plan and Pending Redesignation

In 1987, EPA designated the combined Hayden/Miami area as a single Group I PM_{10} nonattainment area. Effective May 29, 2007, EPA finalized a boundary redesignation to divide the single Hayden/Miami PM_{10} nonattainment area into two separate PM_{10} nonattainment areas roughly along the ridgeline of the Pinal Mountains [March 28, 2007; 72 FR 14422].

No violations had been monitored in the Miami PM_{10} nonattainment area since monitoring began there in 1987. ADEQ discontinued its last Miami PM_{10} monitoring site (known as Nolan Ranch, Miami South, or Jones Ranch) in 1994. Since 1991, two monitors have continued operating in this area, both Special Purpose Monitors (SPMs) operated by Freeport McMoran Copper and Gold Inc. (formerly Phelps Dodge Corporation). Monitoring data collected at the SPMs have been certified by ADEQ as meeting EPA's quality assurance requirements and entered into the EPA Air Quality System (AQS) for 2003 to present. Freeport McMoran Copper and Gold Inc.

have also made a written commitment to ADEQ to submit its Miami monitoring data to ADEQ on a quarterly basis in the future. EPA finalized its Clean Data Finding for this area in the same Federal Register notice as the boundary redesignation. This finding means that reasonable further progress (RFP) requirements, an attainment demonstration, and nonattainment area contingency measures are not required.

The ADEQ Air Quality Division developed a ten-year Maintenance Plan and submitted it to EPA with a Redesignation Request in June 2008. EPA's approval is pending.

Five Percent Annual Reasonable Further Progress for Metropolitan Phoenix [Maricopa County-Apache Junction, Pinal County] Serious PM_{10} Nonattainment Area Plan Revision

On August 21, 2007, EPA published in the Federal Register [72 FR 43537] a Final Rule effective September 20, 2007, approving a number of Maricopa County rules and measures as Best Available Control Measures (BACM) and Most Stringent Measures (MSM). Although the control measures address exceedances that occurred in the 32-square-mile Salt River sub-area of the Maricopa Serious PM_{10} Nonattainment Area, they apply to the entire Nonattainment Area. EPA did not approve the submitted attainment demonstration, however, because of continued PM_{10} exceedances.

In response to EPA's Finding of Failure to Attain the PM_{10} standard by December 31, 2006, for Metropolitan Phoenix [June 6, 2007; 72 FR 31183], ADEQ submitted a State Implementation Plan (SIP) Revision to EPA in December 2007. Maricopa County is historicaly the second Serious PM_{10} nonattainment area in the nation subject to the 5 percent annual RFP requirement. San Joaquin Valley was the first and has since been redesignated to attainment status by EPA and Owens Valley, California, is the third. San Joaquin Valley's exceedances occur during high wind events and Owens Valley exceedances have resulted from the draining of Owens Lake. In contrast, Maricopa County PM_{10} exceedances occur primarily during stagnant wintertime morning conditions.

Clean Air Act (CAA) Section 189(d) required submittal of a SIP revision to EPA by December 31, 2007, demonstrating attainment by 5 percent annual reductions of the emission inventory in PM_{10} or PM_{10} precursor emissions until attainment is achieved. Control strategies and reporting requirements were developed by stakeholders through the Maricopa Association of Governments (MAG) committee process and the 2007 Arizona legislative session culminating in adoption of Senate Bill 1552 (Laws 2007, Chapter 292). Stakeholders included Pinal County, as one of its townships is in the planning area. ADEQ worked with MAG and Maricopa County Air Quality Department (MCAQD) to finalize the base case emissions inventory with improved Windblown Dust and Agricultural source category emissions estimates. ADEQ also worked with EPA, MCAQD, MAG, and Sierra Research to refine the attainment modeling demonstration to simulate ambient conditions and to show the air quality benefits of the strategies adopted to achieve the NAAQS. The submitted SIP Revision demonstrates attainment for the years 2008 to 2010.

Selected control measures target many categories of pollution sources: agriculture; commercial, and residential construction; road construction; sand and gravel mining; leaf blowing; off-road vehicles; open burning including hospitality industry chimineas; primary and secondary paved

roads; unpaved parking lots, ingress and egress areas at residential and commercial buildings meeting size thresholds; unpaved public roads and shoulders; and windblown dust from disturbed land (including areas in the river bottom) and vacant lots.

Public education; Basic Training of water truck and water pull drivers as well as superintendents of sites meeting size thresholds; comprehensive training of Dust Control Coordinators at sites meeting other size thresholds; and expanded distribution of High Pollution Advisories (HPA) are other important control strategies. MCAQD is also improving enforcement by adding 51 inspectors for construction sites and vacant lands and 40 additional support employees, including supervisors. ADEQ developed the following outreach materials and has posted them on the ADEQ web site: Fact Sheet about the New Off-Highway Vehicle Law; Map of Off-Highway Vehicle Areas with Restrictions; Training for Leaf Blower Operators, Pointers for Operating a Leaf Blower in English and Spanish, and Leaf Blower Frequently Asked Questions.

Tracking implementation of the control measures on standardized forms developed by MAG is the continuing responsibility of ADEQ and the other stakeholders to ensure attainment by the end of 2010.

Rillito PM_{10} Planning Area Limited Maintenance Plan and Pending Redesignation

The Rillito Group I Area was designated and classified as a moderate PM_{10} nonattainment area upon enactment of the 1990 CAA amendments, effective November 15, 1990. ADEQ submitted a moderate area PM_{10} plan for the Rillito area on November 14, 1991, which EPA found to be incomplete. On April 22, 1994, ADEQ submitted a revised PM_{10} plan for Rillito. EPA also found the revised plan to be incomplete and did not take any further action on it. Effective October 10, 2006, EPA published a Clean Data Finding for the 1992 to 1994 data period and subsequent years [August 8, 2006; 71 FR 44920]. ADEQ developed a 10-year Limited Maintenance Plan (LMP) and redesignation request and submitted it to EPA in June 2008, after a stakeholder meeting in the planning area. To qualify for the LMP option, an area should be attaining the NAAQS and the average PM_{10} design value (DV) for the area, based upon the most recent five years of air quality data at monitors in the area, should be less than 98 $\mu g/m^3$ for the 24-hour PM_{10} standard. If the area cannot meet this test, EPA offers another option to qualify for an LMP. To meet this qualification, the average DV of the site must be less than the area's site specific Critical Design Value (CDV). When that calculation was performed, this area's average DV (119 $\mu g/m^3$) was less than the CDV (142 $\mu g/m^3$), indicating that this area has a very low probability of exceeding the NAAQS in the future and qualified for the LMP option. EPA's approval is pending. Upon approval, ADEQ must annually demonstrate continued eligibility for the LMP option for this planning area.

Yuma PM_{10} Maintenance Plan, Pending Redesignation Request and Exceptional Events Demonstrations

Yuma was designated nonattainment for PM_{10} in 1990. ADEQ developed a SIP for Yuma in 1991 that demonstrated the area could meet the federal NAAQS by December 1994. After several consecutive years of clean monitoring data, ADEQ convened stakeholders to prepare an attainment demonstration and maintenance plan. EPA made a Clean Data Finding for 1998

to 2001 and subsequent years for Yuma on March 14, 2006 [71 FR 13021] that became effective May 16, 2006. As a result, RFP requirements, an attainment demonstration, and nonattainment contingency measures were not required. ADEQ continued to work with the stakeholder group and submitted the Redesignation Request and 10-year Maintenance Plan to EPA on August 16, 2006. BACM for all significant sources of PM_{10} contributing to the PM_{10} concentrations in Yuma County include enforcement to prevent traffic and trespass on unpaved Irrigation District canal roads, Agricultural Best Management Practices (AgBMP) for windblown dust, control measures for other disturbed land and vacant lots, and requirements for uncovered trucks hauling particulate matter. A public outreach campaign was developed involving bilingual brochures, a public service announcement, and a video for the general public. Dust Control Action Forecasts are provided three days in advance by ADEQ to sources, including construction site contractors, public works, and agricultural sources notified by the Department of Agriculture, to enable them to reschedule activities that would disturb soils or to add control measures.

Additional analyses were prepared by ADEQ to quantify the emission reductions from the implementation of AgBMP, which began in Yuma August 1, 2005. This work was accomplished with the help of Yuma farmers, conservation agents, and Arizona Department of Agriculture personnel. In 2007, ADEQ adopted the Yuma AgBMP rule as a supplemental contingency measure in the Maintenance Plan to meet the requirements of CAA Section 175A(d).

EPA promulgated an Exceptional Events Rule to replace its Exceptional Events Policy and its Natural Events Policy. In 2007, EPA noted that 12 exceedances of the 24-hour PM_{10} standard had occurred at the BAM SPM in Yuma. Because the SPM had been in operation since November 2004, more than 24 months, EPA could consider its ambient monitoring data in its determinations of attainment of the NAAQS pursuant to EPA's latest monitoring rules [October 17, 2006. 71 FR 61302 revising Title 40 CFR § 58.20(c)]. ADEQ evaluated each of these 12 exceedances for data flagging pursuant to EPA's Exceptional Events Rule. ADEQ determined that all 12 events qualify for exception, scheduled a Natural Events Stakeholder meeting in Yuma on November 13, 2007, a 30-day public comment period beginning August 11, 2008, and submitted the documentation to EPA in September 2008. Upon concurrence, EPA would be able to complete the redesignation process.

Maricopa Eight-Hour Ozone Nonattainment Area Plan

MAG developed a plan that included the Apache Junction why do we say township here? Don't know let's use 'area' instead Township in Pinal County and submitted it to ADEQ on June 12, 2007. ADEQ submitted it to EPA on June 14, 2007, with the understanding that it would have to be supplemented after EPA responds to a court remand of its Phase I Implementation Rule (*South Coast Air Quality Management District, et al. v. U.S. EPA*, No. 04-1200, issued December 22, 2006). Quality assured monitoring data for 2005 to 2007 recorded no violations, demonstrating attainment of the ozone (O_3) NAAQS. MAG is developing a Maintenance Plan and Redesignation Request through its committee process for adoption by ADEQ and submittal to EPA in early 2009.

Ajo PM_{10} Clean Data Finding, Maintenance Plan, and Redesignation Request

EPA made a Clean Data Finding for 2002 to 2004 for Ajo on February 8, 2006 [71 FR 6352] that became effective April 10, 2006. This finding eliminates otherwise applicable requirements for a RFP, an attainment demonstration, and nonattainment contingency measures. ADEQ has completed an emissions inventory and rollback modeling demonstration of continued attainment for the next 12 years. ADEQ will complete development of the Maintenance Plan for submittal to EPA with a Redesignation Request in early 2009.

Western Arizona/Sonora Border Air Quality Study

The purpose of this special study is to determine the sources and movement of air pollutants as well as to assess their health impacts on residents of far southwestern Arizona and adjacent regions of Mexico. To accomplish this, ADEQ, in partnership with local, state, federal, and tribal governments, identified six phases to the study: identifying study requirements and collecting meteorological data; siting study for pollutant monitor locations; monitor deployment; data collection; air quality modeling; and health risk assessment. The monitoring data collection phase of the project was completed in April 2007. Meteorological data from seven sites and air quality data from three sites were collected. Data quality assurance procedures on all of the meteorological, gases, particulate matter, and four types of chemical data will be completed by December 2008. An emissions inventory has been compiled and will be used in the air quality modeling and health risk assessment phases of the study.

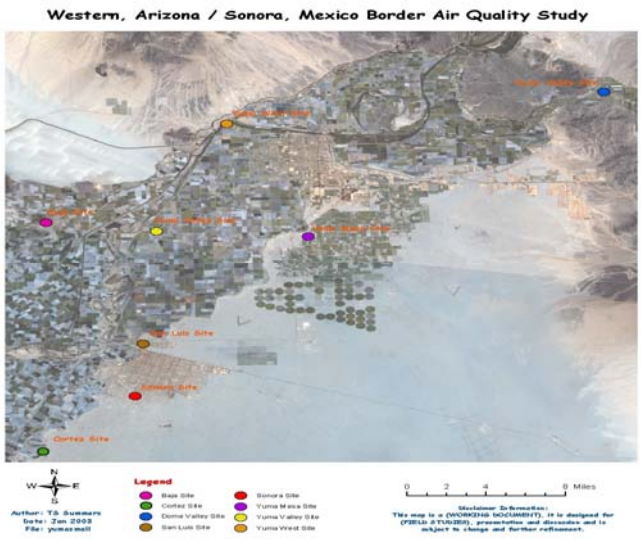


Figure 8 – Map of Western Arizona/Sonora Border Air Quality Study monitoring locations.

Joint Air Toxics Assessment Project

The Joint Air Toxics Assessment Project (JATAP) has been a collaborative effort among federal, state, county, city, and tribal air quality agencies. JATAP began in 2000 and was implemented in a number of phases with the primary monitoring phase completed in 2006. Seven monitoring sites were involved using canister and cartridge sample collection. The results from each monitor were compared to each other and to national monitoring and risk assessment results, background concentration estimates, the results from other urban studies, and to cancer and non-cancer health benchmarks. In 2008, EPA provided a staff member on temporary assignment to summarize the monitoring results and coordinate efforts to move the project into a three-part risk assessment phase: stationary source, mobile source, and near roadway exposures.

Regional Haze

Regional haze is caused by the emissions of air pollutants from a wide variety of sources located over a large geographic area. The haze obscures scenic vistas, which degrades our parks and wilderness areas and interferes with people's enjoyment and recreation in those areas. In 1977, the federal CAA set a goal to remedy any existing visibility impairment and prevent any future impairment, from man-made pollution at 158 national parks and wilderness areas known as mandatory Federal Class I areas. The Regional Haze SIP submitted to EPA in December 2003, focused on four of the 12 national parks and wilderness areas in Arizona: Grand Canyon National Park, Petrified Forest National Park, Sycamore Canyon Wilderness, and Mount Baldy Wilderness. Emissions data and modeling related to long-term strategies for large stationary sources are still under analysis throughout the country. Therefore, the remaining eight Class I areas will be addressed in a SIP to be submitted to EPA later how much later? than the December 17, 2007 deadline. Revisions and updates to the 2003 SIP will be sent to EPA either late 2008 or early 2009.

The 2003 Regional Haze SIP relied on a demonstration of how the state is implementing the recommendations of the Grand Canyon Visibility Transport Commission to satisfy reasonable progress toward the national visibility goal. All SIPs from this point on will need to assess the current conditions at a Class I area and then determine what strategies would be necessary should the area be found to have impaired visibility. Areas with good visibility will need to determine strategies to assure those areas maintain good air quality. Western states developing SIPs under sections 309(g) and 308 of the Federal Regional Haze Rule will have assistance with the assessment and strategies portion of the SIP from the Western Regional Air Partnership (WRAP).

ADEQ will have an expanded role regarding regional haze. Extensive fire regulations and policy were developed for the 2003 Regional Haze SIP and the now-certified Enhanced Smoke Management Plan will continue to be an important part of regional haze. ADEQ will perform emissions tracking and modeling necessary to determine specific conditions at Arizona Class I areas beyond what WRAP will provide. Arizona will continue to implement the sulfur dioxide (SO_2) Milestones and Backstop Trading Program - a voluntary program for stationary sources emitting 100 tons or more per year of SO_2 that will be integrated into existing permits, and with emissions tracked annually. The annual SO_2 emissions for the stationary sources have been reported to WRAP beginning in 2004; emissions are compiled into a regional Milestone Report for the participating western states and sent to EPA annually. Should a milestone, representing markers on a decreasing regional emissions cap, be exceeded, the backstop trading program would be activated. Strategies for NO_x are currently more conventional than trading. Additional information on regional haze can be found at http://www.wrapair.org/309/index.html

EPA's Revisions to Eight-Hour Ozone Standard

NAAQS are reviewed periodically to incorporate current scientific knowledge and to provide a review process for public and scientific input. The last review of the O_3 standards was completed July 18, 1997, at which time the eight-hour standard was set at the level of 0.08 part per million (ppm).

The average of the most recent three-year fourth-highest measurements is compared to 0.084 ppm to determine compliance with the standard. The secondary standard was set equal to the primary standard.

On March 12, 2008, EPA revised the eight-hour primary standard (for protection of public health) to 0.075 ppm. The secondary standard (for protection of public welfare) was made identical to the revised primary standard, 0.075 ppm. EPA selected the levels for the final standards after completing an extensive review of thousands of scientific studies on the impact of ground level O_3 on public health and the environment. This newly available evidence identifies important new health end points associated with O_3 exposure, including mortality, increased asthma medication use, school absenteeism, and cardiac related effects. Furthermore, studies of asthmatics indicate that they experience larger and more serious responses to O_3 that last longer than responses for healthy individuals. In addition, new scientific evidence since the last review of the O_3 NAAQS continues to show that repeated exposure to O_3 damages sensitive vegetation and trees, including those in forests and parks, leading to reduced growth and productivity, increased susceptibility to disease and pests, and damaged foliage.

States must make recommendations to EPA no later than March 2009 for areas to be designated attainment, nonattainment, and unclassifiable. EPA will issue final designations of attainment, nonattainment, and unclassifiable areas no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, EPA will issue designations no later than March 2011. States must submit a SIP outlining how they will reduce pollution to meet the standards by a date that EPA will establish in a separate rule. That date will be no later than three years after EPA's final designations. If EPA issues designations in 2010, then these plans would be due no later than 2013. States are required to meet the standards by deadlines that may vary based on the severity of the problem in the area. EPA will issue a separate rule to address monitoring requirements necessary to implement the new standards. EPA intends to propose a monitoring rule in 2008 and issue a final rule by March 2009.

EPA's Revisions to Lead Standard

On October 15, 2008, EPA substantially strengthened the NAAQS for lead (Pb). The revised standards are 10 times tighter than the previous standards and will improve health protection for at-risk groups, especially children. EPA has revised the level of the primary (health-based) standard from 1.5 micrograms per cubic meter ($\mu g/m^3$), to 0.15 $\mu g/m^3$, measured as total suspended particles (TSP). EPA has revised the secondary (welfare-based) standard to be identical in all respects to the primary standard.

Scientific evidence about Pb and health has expanded dramatically since EPA issued the initial standard of 1.5 $\mu g/m^3$ in 1978. More than 6,000 new studies on Pb health effects, environmental effects, and Pb in the air have been published since 1990. Evidence from health studies shows that adverse effects occur at much lower levels of Pb in blood than previously thought. Children are particularly vulnerable to the effects of Pb. Exposures to low levels of Pb early in life have been linked to effects on IQ, learning, memory, and behavior. There is no known safe level of Pb in the body.

EPA has revised the averaging time and form of the Pb NAAQS. These are the air quality statistics that are compared to the level of the standards to determine whether an area meets or violates the standards. EPA changed the calculation method for the averaging time to use to a 'rolling' three-month period with a maximum (not-to-be-exceeded) form, evaluated over a three-year period. This replaces the current approach of using calendar quarters. A rolling three-month average considers each of the 12 three-month periods associated with a given year, not just the four calendar quarters within that year.

EPA is redesigning the Pb monitoring network to assess compliance with the revised Pb standards. EPA will require state and local monitoring agencies to conduct monitoring taking into account Pb sources that are expected to, or have been shown to, exceed the standards. At a minimum, monitors must be placed in areas with sources of Pb emissions greater than or equal to one ton or more per year, to measure the maximum concentration.

EPA also will require a monitor to be operated in each of the 101 urban areas with populations greater than 500,000 to gather information on the general population's exposure to Pb in air and ensure protection against sources of airborne dust containing Pb. EPA estimates that 236 new or relocated monitoring sites will be necessary nation wide to satisfy these monitoring requirements. Approximately half of all newly required monitors are to be operational by January 1, 2010, with the other half of the monitors operational by January 1, 2011. Currently, no monitors in Arizona are designated for Pb data collection.

States are required to make recommendations for areas to be designated attainment, nonattainment, or unclassifiable by October 2009. If tribes choose to submit recommendations, they must also provide them to EPA by October 2009. Final designations of all attainment, nonattainment, and unclassifiable areas will be effective no later than January 2012. However, EPA intends to complete initial designations as soon as possible where data are sufficient from existing monitoring network. States are required to submit a SIP outlining how they will reduce pollution to meet the standards no later than June 2013. States are required to meet the standards no later than January 2017.

Trends

Introduction

This section examines the degree to which air quality in Arizona's cities and counties has been improving or deteriorating during the years that data have been collected, quality assured, and recorded. Compliance with EPA's National Ambient Air Quality Standards (NAAQS) is a separate, though related, issue that was explored at length in a separate section of this report.

Figure 9 – Average Best & Average Worst Visibility Impairment in the Phoenix Area

Phasing out leaded gasoline in the mid-1970s significantly reduced the concentration of airborne lead in Arizona to levels that allowed monitoring to be discontinued and valuable monitoring resources to be reallocated. Installation of effective controls on copper smelters in the 1980s caused concentrations of sulfur dioxide (SO_2) to decrease rapidly. Catalytic converters, fuel injection, and the success of the Vehicle Emissions Inspection program produced dramatic reductions in the concentrations of carbon monoxide (CO) since the 1970s. Visibility, the aspect of the atmosphere obvious to the population, has been measured continuously in urban and pristine parts of the state long enough to establish clear trends.

Ozone (O_3) and particulates, PM_{10} and $PM_{2.5}$, were the primary concerns in Arizona in 2007 and will likely continue in the future. These are common concerns across much of the United States. O_3 concentrations in the greater Phoenix area were already close to the maximum allowed by the NAAQS in 2007. But, in March 2008, the O_3 standard was reduced from 0.08 parts per million (ppm) to 0.075 ppm. Due to this change, many Phoenix area sites will exceed the NAAQS in 2008. PM_{10} concentrations already exceed the standards in some areas. These facts emphasize the importance of the trends documented in this section.

Ozone

One-Hour Ozone Concentrations

Maximum one-hour O_3 concentrations have declined in Phoenix, Tucson, and Yuma since 1981 (Figure 10). These decreases have been: Phoenix 36 percent, Tucson 31 percent, and Yuma 14 percent. Only one exceedance of the one-hour O_3 standard has been recorded after 1996. The one-hour standard was officially declared attained on May 16, 2001. Changes in emissions would not be expected to produce proportional changes in concentration because of the relatively high background level of O_3 and its photochemical formation from hydrocarbons (HC) and nitrogen oxides (NO). Yuma and Tucson have met the one-hour standard consistently since monitoring began. In the Phoenix airshed the standard was exceeded regularly through the mid 1990s, with a gradual decrease to 1996,

after which, the concentrations remained steady and just below the standard until 2005. In 2005, the network-maximum one-hour O_3 concentration increased in the Phoenix area beyond the exceedance level (but did not constitute a violation, see Chapter 2, one-hour O_3 standard) at one site in the Phoenix area. Concentrations decreased below the standard again in 2006 and much further in 2007.

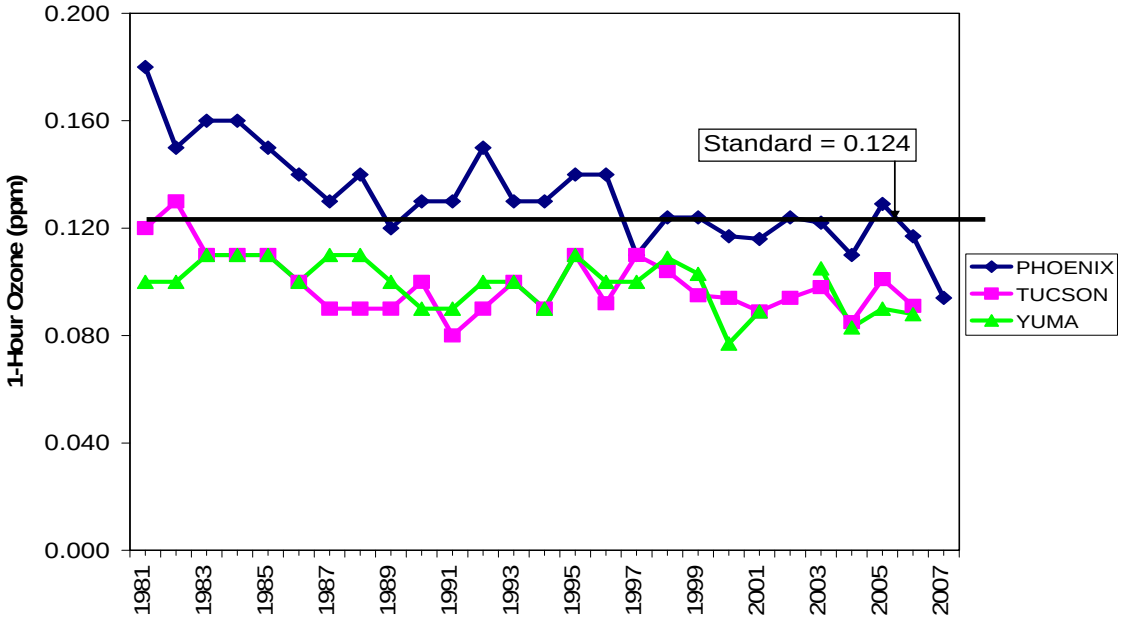


Figure 10 – Maximum one-hour ozone concentrations in three Arizona cities

Eight-Hour Ozone Concentrations

The eight-hour O_3 standard, adopted by EPA in 1997 but not officially implemented until 2003 because of litigation, is expressed as the three-year average of the annual fourth-highest concentration, not to exceed 0.08 ppm. Due to instrument precision and rounding, however, this standard translates into a numerical value of 0.084 ppm: any value 0.085 ppm and above is an exceedance.

Illustrated in Figure 11 are the three-year averages from eight of the monitoring sites listed in Table 23 that have extended periods of operation. Although there is considerable site-to-site variability, the recent concentrations are slightly higher, with Apache Junction showing the greatest increase.

Reviewing Metro Phoenix sites together (Figure 12), the maximum value fluctuates at or above the standard with a range from 0.085 ppm to 0.089 ppm until the 2002 to 2004 period and then begins a steady decline. The average of these sites follows a similar pattern until the 2005 to 2007 period when the slope increases slightly upward and is now positive.

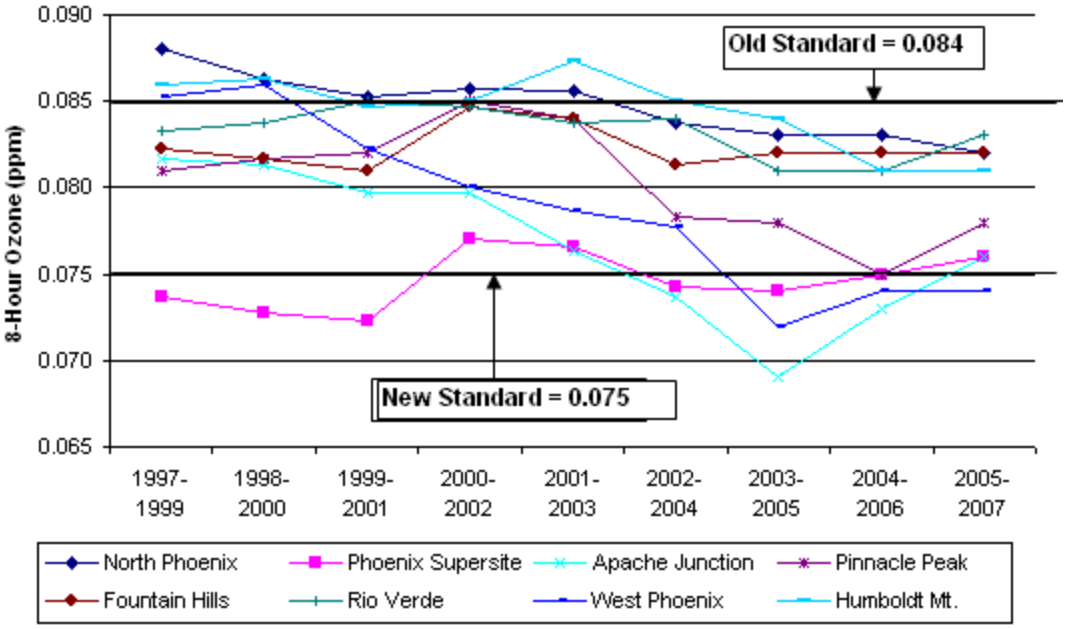


Figure 11 – Phoenix area eight-hour ozone trends: three-year averages of the annual fourth-highest concentrations

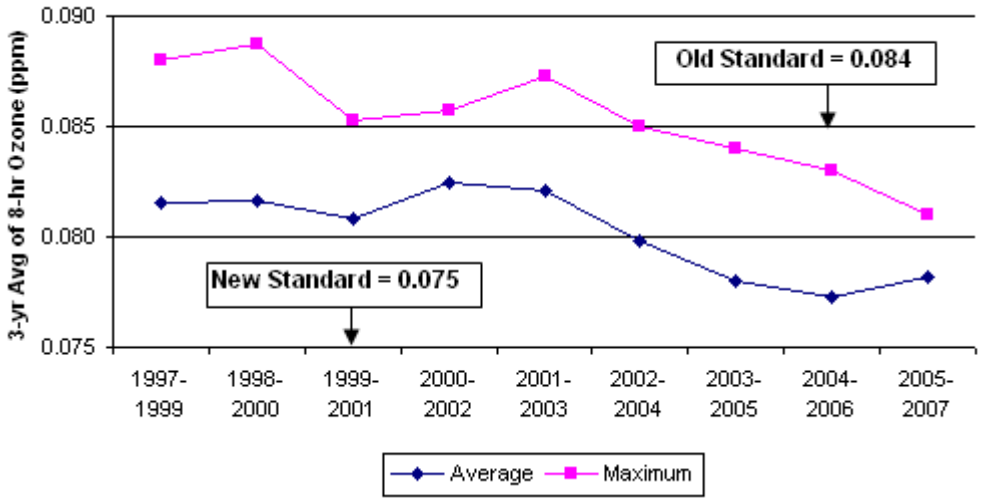


Figure 12 – Phoenix area eight-hour ozone trends: three-year averages of the annual fourth-highest concentrations, expressed as the average and maximum of nine long-term sites

Table 23: Three-Year Averages of the Annual Fourth-Highest Eight-Hour Ozone Concentrations in Phoenix and Environs

*(Units are in ppm). **Bold** values in yellow cells equal or exceed the operational standard of 0.084 ppm)*

Site	1998-2000	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007
Apache Junction	0.0813	0.0797	0.0797	0.0763	0.0737	0.069	0.073	0.076
Blue Point	**0.0887**	**0.0853**	0.0843	0.0840	0.0823	0.080	0.072	0.072
Cave Creek	N/A	0.0830	0.0845	0.0840	0.0817	0.080	0.079	0.080
Falcon Field	0.0817	0.0810	0.0800	0.0813	0.0777	0.075	0.075	0.076
Fountain Hills	0.0817	0.0810	0.0847	0.0840	0.0813	0.082	0.082	0.082
Hillside	0.0833	0.0810	0.0827	0.0773	0.0777	0.072	Closed	Closed
Humboldt Mt.	**0.0863**	0.0847	**0.0850**	**0.0873**	**0.0850**	0.084	0.081	0.081
JLG Supersite	0.0727	0.0723	0.0770	0.0766	0.0743	0.074	0.075	0.076
Maryvale	0.0830	0.0783	0.0790	0.0800	0.0835	0.083	Closed	Closed
North Phoenix	**0.0863**	**0.0853**	**0.0857**	**0.0856**	0.0837	0.083	0.083	0.082
Pinnacle Peak	0.0817	0.0820	**0.0850**	0.0840	0.0783	0.078	0.075	0.078
Queen Valley	N/A	0.0790	0.0810	0.0830	0.0810	0.081	0.078	0.080
Rio Verde	0.0837	**0.0850**	0.0847	0.0837	0.0840	0.081	0.081	0.083
South Scottsdale	0.0760	0.0760	0.0787	0.0783	0.0763	0.076	0.076	0.078
Tonto Monument	N/A	N/A	**0.0870**	**0.0855**	0.0827	0.081	0.080	0.080
West Chandler	0.0733	0.0747	0.0793	0.0797	0.0770	0.074	0.075	0.076
West Phoenix	**0.0860**	0.0823	0.0800	0.0786	0.0777	0.072	0.074	0.075
Maximum	***0.0887***	***0.0853***	***0.0857***	***0.0873***	***0.0850***	*0.084*	*0.083*	*0.082*
n ≥ 0.085 ppm	5	3	4	3	1	0	0	0

N/A - Data not available.

In greater Phoenix, 20 of the 33 sites recorded an annual fourth-highest O_3 values in excess of 0.084 ppm from 1996 to 2006. During this time the trend is a decrease in O_3 exceedances in metropolitan Phoenix. Nine sites that have been in operation since 1996 to 2007 exemplify this trend. In 1996 six sites recorded fourth-highest values greater than 0.084 pmm, compared to no sites recording an exceedance in 2007. In addition to the number of site exceedances decreasing, the recorded concentration values decreased from 1996 to 2007: ADEQ JLG Supersite 0.087 ppm to 0.076 ppm; South Phoenix 0.084 ppm to 0.072 ppm; South Scottsdale 0.089 ppm to 0.077 ppm; and North Phoenix 0.092 ppm to 0.078 ppm.

Looking at the specific statistical form of the standard (the three-year average of the annual fourth-highest eight-hour O_3 concentration) metropolitan Phoenix did not exceed the standard in the three-year period from 2005 to 2007. In addition, the extent and severity have been decreasing with time.

These trends are consistent with the decreasing one-hour maximum O_3 trends; however, most of the decrease in eight-hour O_3 concentrations occurred since 2000, five years later than the decrease in the one-hour O_3 concentrations. This trend suggests that, barring sustained unfavorable meteorological conditions or exceptional events (e.g. major wildfires), attainment of the standard would have continued under the 0.08 ppm standard in greater Phoenix.

Long-term trends of the fourth-highest O_3 concentrations in Tucson fluctuate greatly. In recent years, 2000 to 2007, the concentrations have become steadier, holding between 0.060 ppm and 0.080 ppm (Figure 13). The fourth-highest values have not exceeded 0.084 ppm since 1998, indicating nine years of attainment of the 0.08 ppm O_3 standard.

A similar pattern in eight-hour O_3 trends also characterizes Yuma. Although the values are slightly higher than Tucson's, since 2003 the yearly consecration fluctuation has decreased. From 2003 to 2007 the rage of values is between 0.07 ppm and 0.08 ppm (Figure 14). Though overall the values and range are higher than Tucson, Yuma has not recorded an exceedance of the 0.08 ppm standard since 1986.

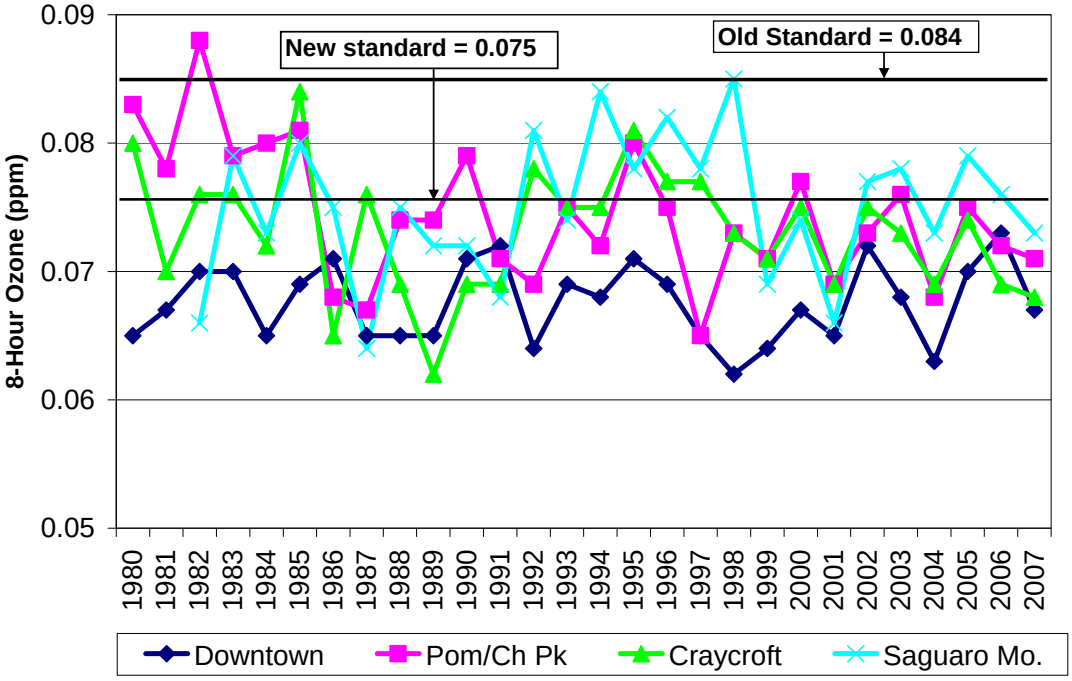


Figure 13 – Annual fourth-highest eight-hour ozone concentrations in Tucson

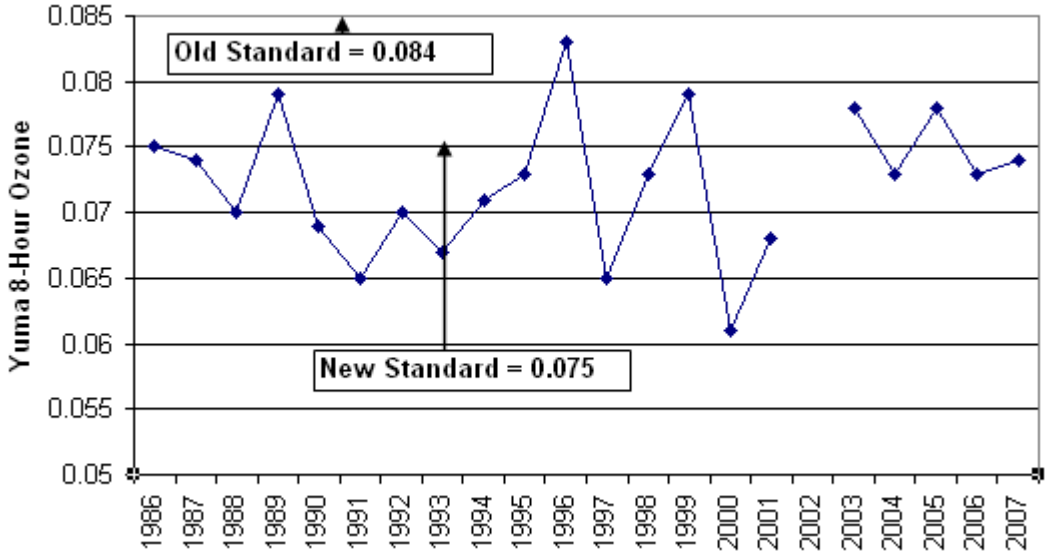


Figure 14 – Annual fourth-highest eight-hour ozone concentrations in Yuma

Particulates

PM_{10}

Phoenix-
The long-term trend of PM_{10} concentrations has decreased at most sites throughout the state in both urban and rural settings. In the short-term concentrations have reversed. For example, annual PM_{10} concentrations in South Phoenix averaged 63 $\mu g/m^3$ from 1985 to1987, but only 52 $\mu g/m^3$ from 2004 to 2006, a decrease of 17 percent. However, the three-year average of 2005 to 2007 increased to 55 $\mu g/m^3$, which was a 5.7 percent increase over the 2004 to 2006 period. The three-year averages, 2005 to 2007, also increased from 2004 to 2006 concentrations at Central Phoenix (4.3 percent), West Phoenix (6.8 percent), and North Phoenix (10.1 percent).

Figure 15 shows three-year moving averages for sites in several areas in Phoenix and all sites show what appears to be trend reversals. While a few years of data may not be sufficient to make a reliable trend, it appears that, for these four sites, and those in Figure 16, there is an upward movement in the average PM_{10} concentrations in the Phoenix Metropolitan area. The annual concentrations presented in Table 24 are graphically demonstrated in Figure 15 and Figure 16.

Some of the concentration increases at sites could be directly related to local activities. South Phoenix and Durango sites are influenced by emissions from sources in the industrial Salt River area. Without any nearby industrial or earthmoving activity, West Phoenix PM_{10} concentrations would appear to be the result of the transport of metropolitan wide emissions into this part of town. Two miles southeast of West Phoenix, Greenwood combines the high regional concentrations with its close proximity to a major arterial street and freeway.

The highest PM_{10} concentrations in metropolitan Phoenix are in southwest Phoenix, along the Salt River from about 7th Street to 59th Avenue. Although most of the area is industrial, there are many residential areas. The PM_{10} record in this area since 1994 is shown in Figure 17. The West 43rd Avenue site is the replacement for the Salt River site.

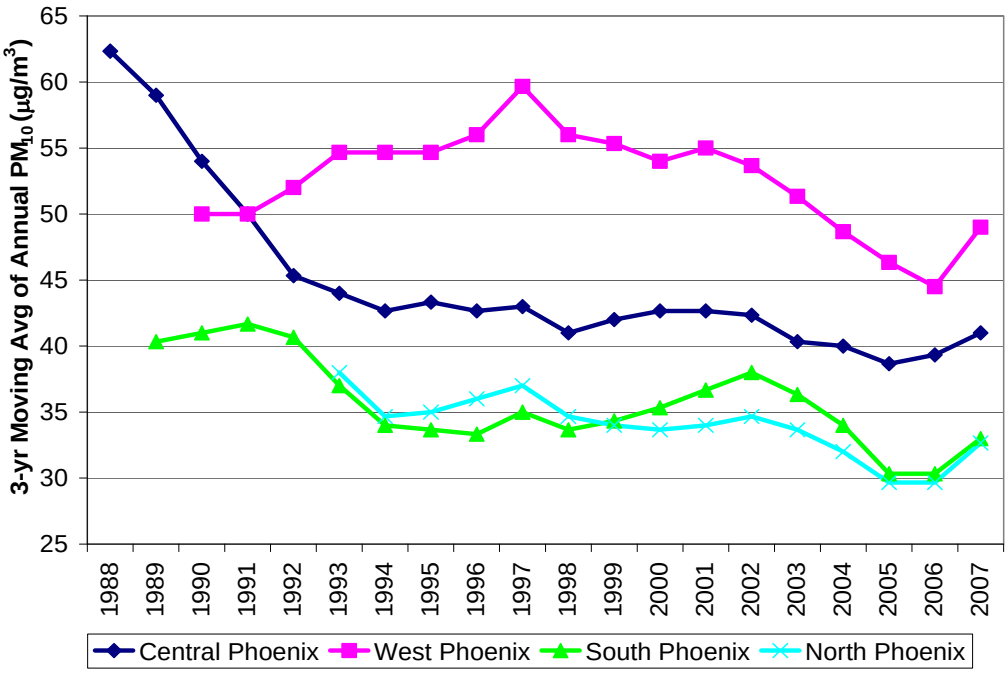


Figure 15 – Three-year moving averages of annual average PM_{10} at four Phoenix sites ("2007" is the average of years 2005, 2006, and 2007).

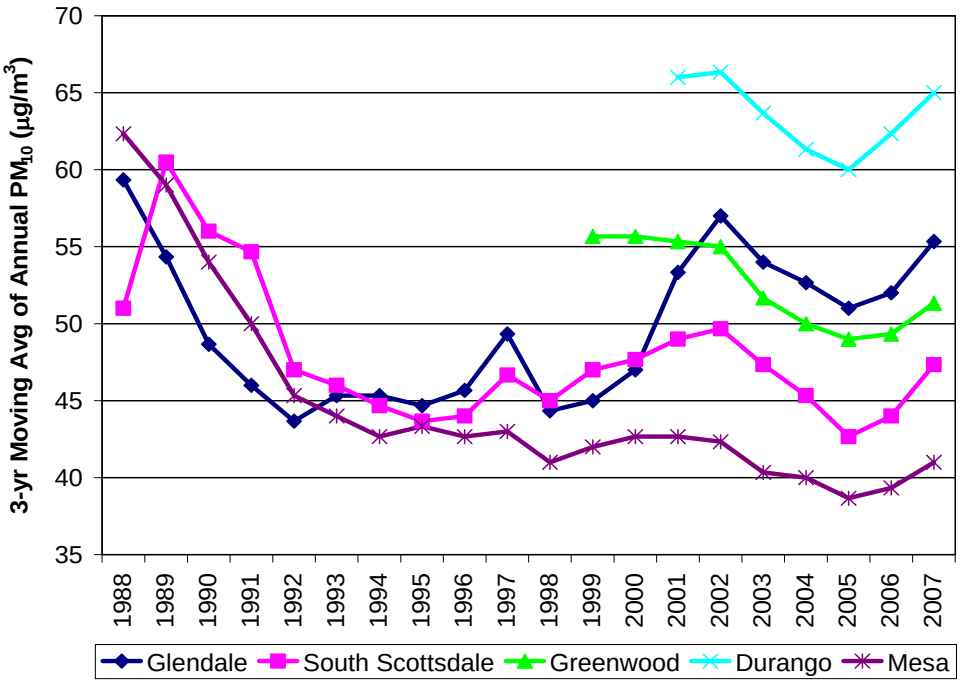


Figure 16 – Three-year moving averages of PM_{10} at other metropolitan Phoenix sites

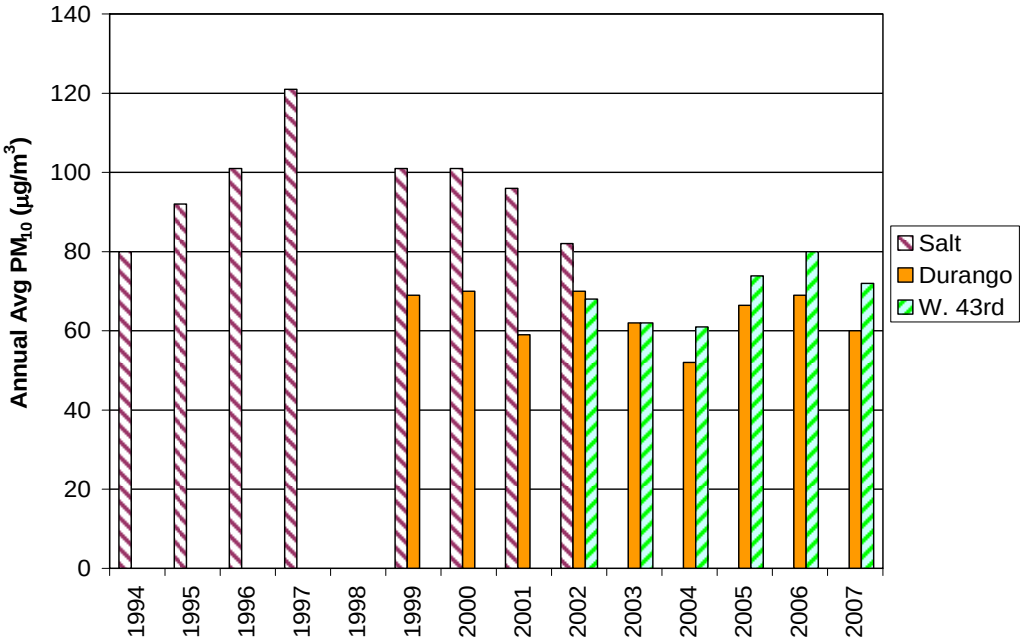


Figure 17 – Annual PM_{10} concentrations in the Salt River area

Table 24: Annual PM_{10} Concentrations in Metropolitan Phoenix ($\mu g/m^3$)

Bold values in yellow cells exceed the annual standard of 50 $\mu g/m^3$

Year	*Central Phoenix*	*Chandler*	*Glendale*	*North Phoenix*	*South Phoenix*	*West Phoenix*	*Mesa*	*South Scottsdale*	*Greenwood*	*Durango*
1992	42	**56**	34	35	48	47	29	34	N/A	N/A
1993	43	**58**	35	34	44	44	35	34	N/A	N/A
1994	43	50	33	35	44	43	36	38	N/A	N/A
1995	44	**56**	33	36	46	44	35	36	N/A	N/A
1996	41	**62**	34	37	47	45	33	35	N/A	N/A
1997	44	**61**	38	38	**55**	**51**	43	41	**61**	N/A
1998	38*	45	29	29	31*	39	29	34	50	N/A
1999	44	**60**	36	35	49	**51**	35	40	**56**	**69**
2000	46	**57**	41	37	**61**	**53**	37	40	**61**	**70**
2001	38	48	33	30	50	43	30	33	49	**59**
2002	43	**56**	40	37	**60**	**53**	36	37	**55**	**70**
2003	40	50	36	34	**52**	46	34	36	**51**	**62**
2004	37	40	26	25	46	37	23	26	44	**52**
2005	39	49	29	30	**55**	45	30	34	**52**	**66**
2006	42	*Closed*	36	34	**55**	50	31	33	**52**	**69**
2007	42	*Closed*	34	34	**56**	47	32	31	50	**60**

* Does not satisfy EPA summary criteria of 75 percent data recovery.
N/A - Date are not available

Tucson-

As seen in Figure 18, the Tucson background site of Corona de Tucson and the rural site of Green Valley have had fairly constant average concentrations of PM_{10} until recently when the concentrations started to increase. The four long-term urban sites all showed substantial decreases from the mid-1980s until about 2005, at which point higher concentrations were recorded. Orange Grove had a three-year average of 41.7 $\mu g/m^3$ from 1987 to 1989, but decreased 32 percent to a concentration of 28.3 $\mu g/m^3$ by the 2003 to 2005 period and then climbed to 30.0 $\mu g/m^3$ two years later. South Tucson, Prince Road, and Broadway/Swan showed a similar pattern (Figure 18), of an early decrease, followed by a period of increases, a period of decreases, and now what appears to be a period of increases.

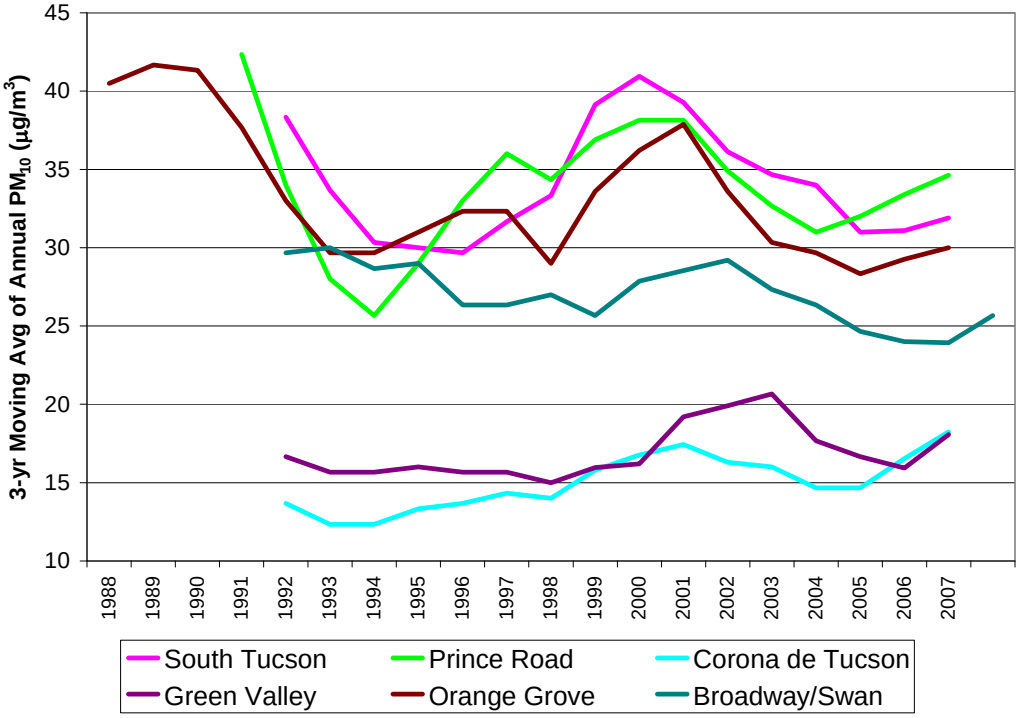


Figure 18 – Three-year moving averages of annual average PM_{10} at six metropolitan Tucson sites

Other Sites in Arizona-

Throughout the rest of the state, PM_{10} concentrations declined since the late 1980s at many sites until about 2004. Figure 19 presents three-year moving averages for the sites with higher historic concentrations. Favorable long-term trends existed from the late 1980s until the last few years for a group of high-concentration sites outside of the Phoenix area. However, the concentrations have increased in the last two years. These sites include Payson and Paul Spur, where concentrations have been reduced by 60 percent or more; Douglas where concentrations have been reduced by nearly half; Rillito which has decreased 40 percent; and Yuma which has decreased 18 percent.

For most of the sites, nearly all of the improvement took place from the late 1980s to the mid-1990s. The percentage improvement during this 10-year period varied from 24 percent to 65 percent, depending on the site, which is a remarkable decrease. After this period, two sites continued to decrease (Paul Spur and Payson); three sites (Nogales, Yuma, and Rillito) increased until the early part of 2000; and two sites remained about the same (Douglas and Hayden). Between 2001 and 2005 Nogales and Yuma had a deceasing trend, and Rillito leveled out. In each of these localities, road paving, better industrial dust controls, and (in Payson only) cleaner fireplaces and woodstoves can be given credit for the improvement. All of these PM_{10} emission reductions were accomplished through State Implementation Plan (SIP) activities led by the ADEQ.

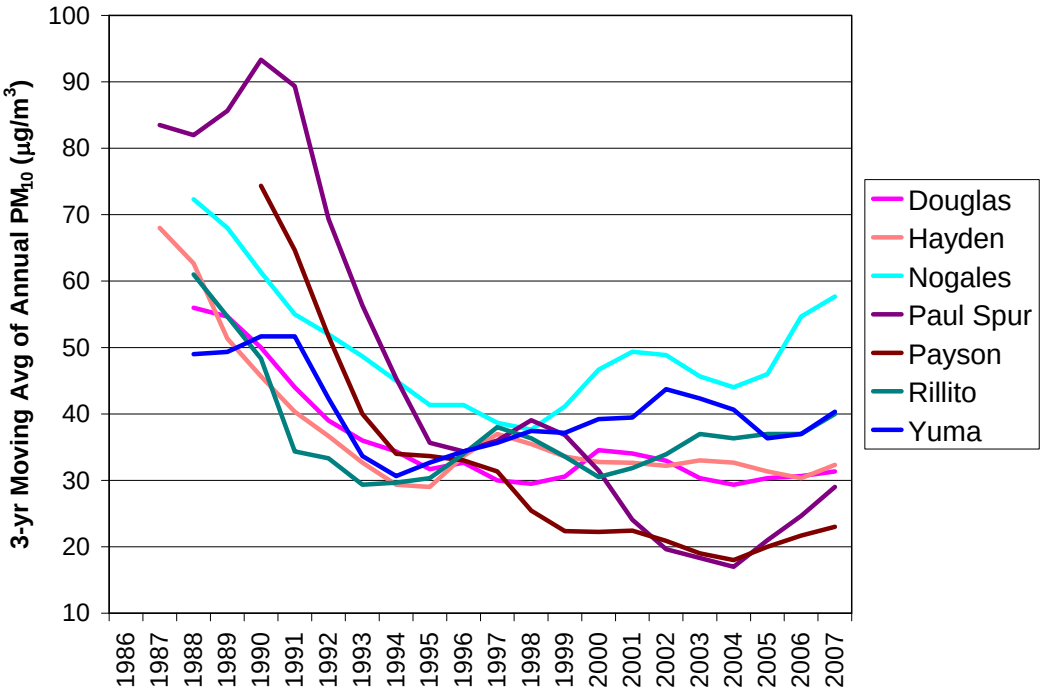


Figure 19 – Three-year moving averages of the annual average PM_{10} concentrations at sites with higher historic concentrations

PM_{10} concentrations at sites at lower elevations and with lower concentrations have also decreased until recently, with Ajo concentrations reduced by 44 percent, Bullhead City by 56 percent, and Safford by 50 percent. Other sites with lower concentrations at lower elevations were steady or slightly decreasing until recently (Figure 20).

Low-concentration sites at higher elevations, all within the 50 µg/m^3 annual standard for their periods of record, have also noticeably declined since the mid-1980s. Clarkdale decreased 20 percent; Flagstaff 50 percent; Prescott 17 percent; and Show Low 38 percent. (The site in Prescott was moved to Prescott Valley in 2002.) Part of these decreases can be attributed to cleaner-burning wood stoves and fireplaces. A shift toward a neutral or positive trend is seen in Figure 21.

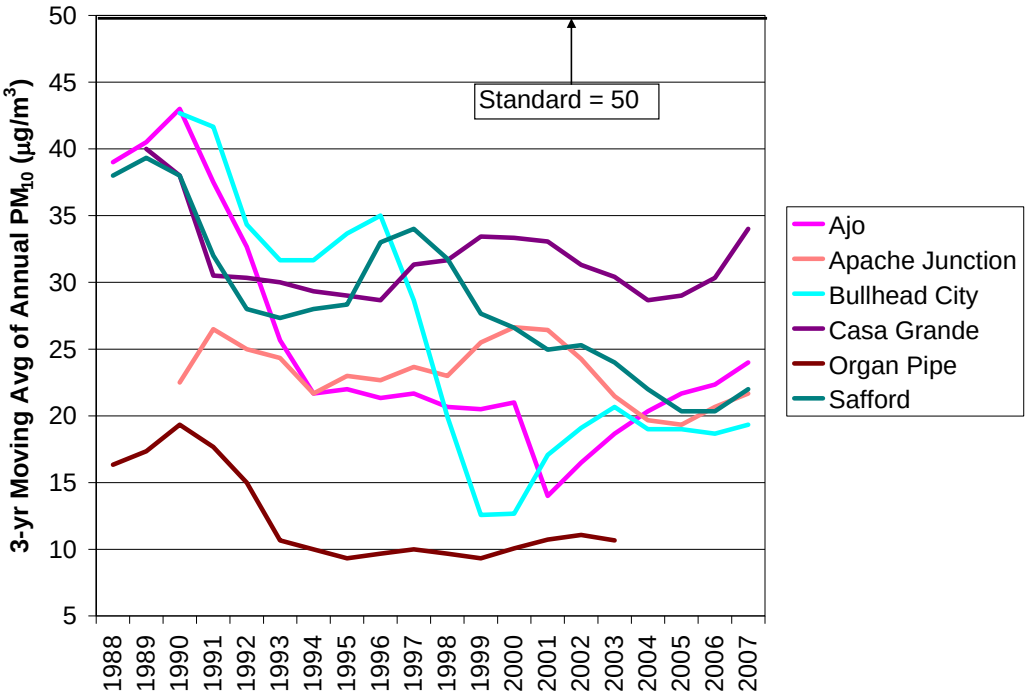


Figure 20 – Three-year moving averages of annual average PM_{10} concentrations at sites with lower concentrations at lower elevations

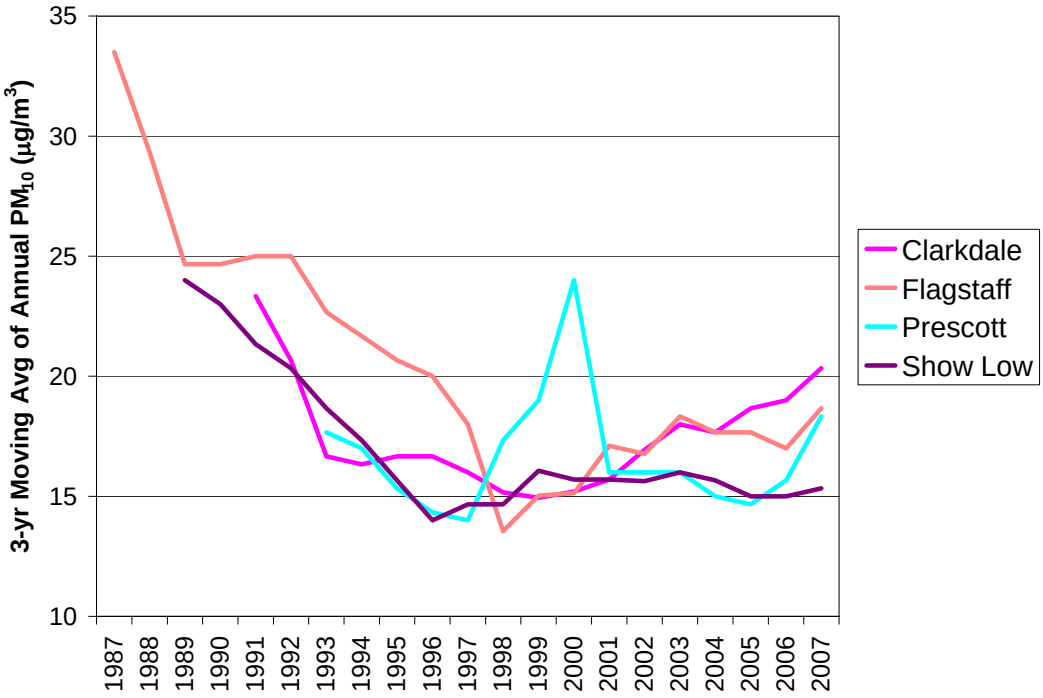


Figure 21 – Three-year moving averages of annual average PM_{10} concentrations at sites with lower concentrations at higher elevations

$PM_{2.5}$

$PM_{2.5}$ has not been monitored as long as PM_{10}. Measurements of this fine particle fraction were taken with dichotomous samplers at all sites until the late 1990s, when monitoring with $PM_{2.5}$ reference instruments began. The dichotomous samplers give an approximate cutpoint between fine and coarse particles somewhere in the range of 2.5 to 3.0 microns. Consequently, measurements taken with these samplers should be termed "fine particulates" or "PM_{fine}", and not "$PM_{2.5}$." In Arizona, the earliest measurements began in 1991 in towns in rural areas, in 1994 in Tucson, and 1995 in Phoenix. These data are presented in Tables 25a, b, and c, and Figures 22, 23, and 24.

Statewide $PM_{2.5}$ concentrations are displayed in Table 25a and Figure 22. From these data there are no clear statewide trends, rather only site treads. At Payson the $PM_{2.5}$ concentrations showed a decrease trend of 48 percent, from 1991 to 1999, followed by a period of more constant concentrations from 2000 to 2007. Nogales has a large fluctuation in concentrations and no clear trend. The Douglas site has a steady range of 6.0 $\mu g/m^3$ to 7.7 $\mu g/m^3$ from 1997 to 2007. Flagstaff also has fairly constant concentrations from 2001 to 2006, but has an increase concentration in 2007.

In the greater Phoenix area, fine particulate trends decreased from 1995 through 1998, but varied thereafter as seen in Figure 23. Site trends are also important. ADEQ JLG Supersite has a downward treaded in $PM_{2.5}$ concentrations, with a spike in 2002. West Phoenix showed an increase trend from 2002 to 2006, followed by a year of decreased concentration in 2007. The Mesa site has shown an increase in values since 2005. Apache Junction has the lowest concentration of all the greater Phoenix area sites. This site had a decreasing trend from 1999 to 2006, with an increase in concentration in 2007.

In metropolitan Tucson (Figure 24), records show that the $PM_{2.5}$ concentrations at Orange Grove and Children's Park have gradually decreased since monitoring began. The concentration range between the two sites is fairly similar with only 0.1 $\mu g/m^3$ difference in concentration value for 2007.

Overall, exceedances of the annual $PM_{2.5}$ standard occurred for four years in Payson, one year in Higley, and one year in Nogales (Table 25a & b). ADEQ JLG Supersite, Nogales, and the central area of Phoenix have the highest concentrations of fine particulates. Flagstaff and the urban fringe of Tucson (the Tangerine and Fairgrounds sites) have the lowest concentrations.

Table 25a: Annual PM_{fine} and $PM_{2.5}$ Concentrations Throughout Arizona (in µg/m^3)

Bold values in yellow exceed the annual standard of 15 µg/m^3.

Year	Yuma	Flagstaff	Payson	Nogales	Douglas
1991	7.6	N/A	**17.9**	12.3	8.5
1992	5.7	N/A	**17.2**	12.6	7.9
1993	6.1	5.4	13.0	9.7	7.9
1994	8.3	4.9	**15.8**	10.4	8.1
1995	7.2	5.8	**15.7**	14.3	7.7
1996	8.7	11.2	14.4	13.3	8.3
1997	6.0	5.0	12.2	11.3	6.0
1998	8.3	4.7	10.9	12.5	6.8
1999	7.9	8.4	9.8	12.5	7.9
2000	8.7	6.9	10.0	12.8	7.1
2001	10.0	7.1	8.8	10.7	7.2
2002	N/A	7.1	10.0	12.1	7.4
2003	N/A	5.6	8.9	11.3	6.4
2004	N/A	6.8	9.5	10.8	7.1
2005	N/A	6.0	8.3	13.1	7.3
2006	N/A	6.6	9.0	**15.6**	6.8
2007	N/A	8.0	9.4	12.3	7.7

N/A - Data are not available.

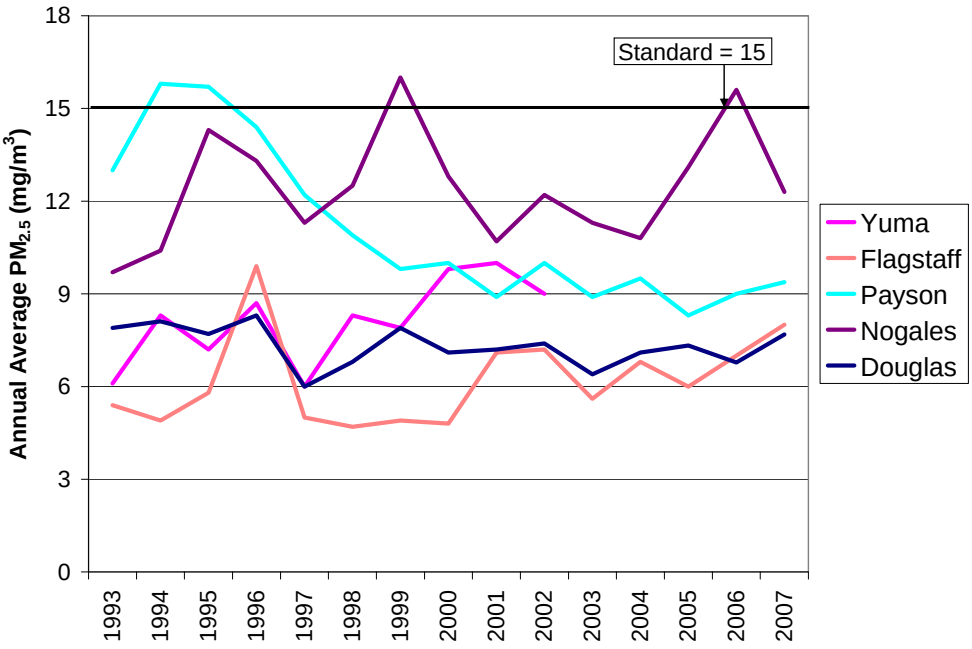


Figure 22 – Statewide annual averages of $PM_{2.5}$

Table 25b: Annual PM_{fine} and $PM_{2.5}$ Concentrations in the Phoenix Metropolitan Area (in µg/m^3)

Bold values in yellow exceed the annual standard of 15 µg/m^3.

Year	Higley	Tempe	Supersite	ASU West	Estrella	West PHX	Apache Junction
1995	**15.4**	10.0	12.6	11.1	11.7	N/A	N/A
1996	11.1	10.0	13.4	10.5	11.1	N/A	N/A
1997	10.4	9.8	12.1	9.1	7.9	N/A	N/A
1998	9.4	9.4	10.9	8.3	7.1	N/A	N/A
1999	11.1	10.7	12.2	9.1	8.9	N/A	7.4
2000	10.0	10.3	11.4	8.5	7.7	13.8	7.2
2001	N/A	9.3	9.2	N/A	7.4	10.8	6.2
2002	N/A	10.3	11.6	N/A	6.7	12.5	6.3
2003	N/A	9.6	11.2	N/A	7.3	10.6	6.3
2004	N/A	N/A	9.7	N/A	N/A	11.6	5.5
2005	N/A	N/A	9.7	N/A	N/A	12.9	5.5
2006	N/A	N/A	10.2	N/A	N/A	13.5	5.3
2007	N/A	N/A	9.5	N/A	N/A	10.9	7.0

N/A - Data are not available.

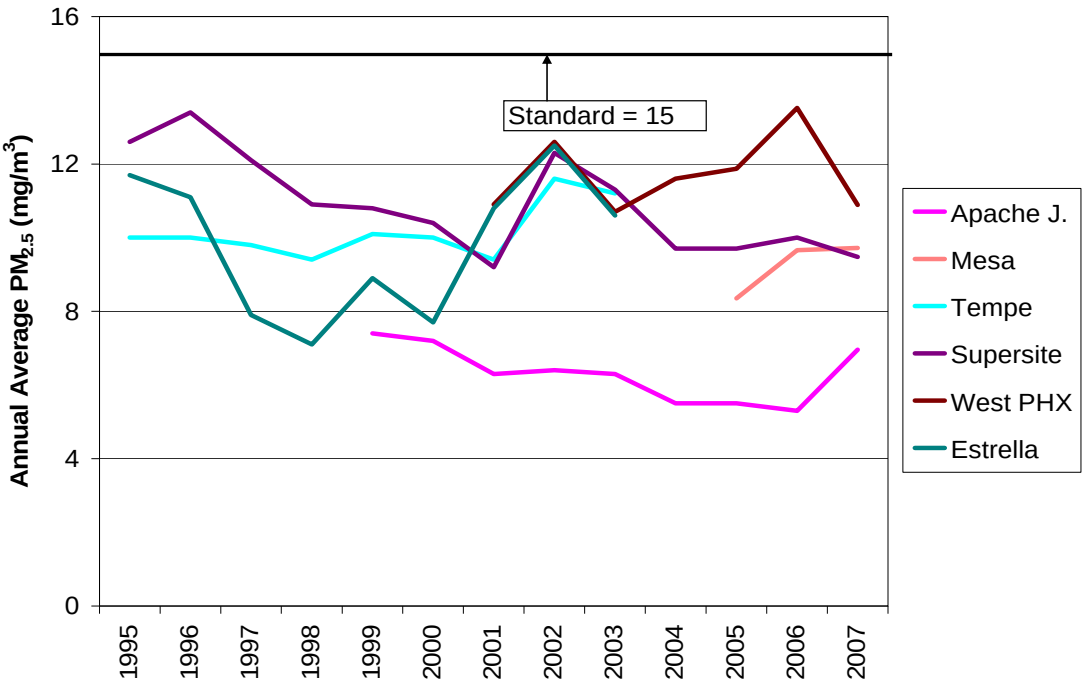


Figure 23 – Metropolitan Phoenix annual averages of $PM_{2.5}$.

Table 25c: Annual PM_{fine} and $PM_{2.5}$ Concentrations in the Tucson Metropolitan Area (in µg/m^3)

Bold values in yellow exceed the annual standard of 15 µg/m^3.

Year	Orange Grove	22/Craycroft	Tangerine	Fairgrounds	Central	Children's Park
1994	9.4	7.9	5.3	5.8	8.9	N/A
1995	8.9	8.6	5.3	5.1	8.9	N/A
1996	8.2	6.4	4.9	4.7	7.7	N/A
1997	8.7	7.3	5.1	5.5	8.4	N/A
1998	7.3	6.3	5.0	5.0	7.5	N/A
1999	9.6	7.5	N/A	N/A	7.2	8.7
2000	7.7	N/A	N/A	N/A	7.8	6.8
2001	7.6	6.0	N/A	N/A	7.6	6.8
2002	6.3	8.6	N/A	N/A	8.3	6.6
2003	6.4	7.5	N/A	N/A	9.7	6.5
2004	5.8	N/A	N/A	N/A	N/A	6.6
2005	6.3	N/A	N/A	N/A	N/A	5.9
2006	5.8	N/A	N/A	N/A	N/A	5.8
2007	5.8	N/A	N/A	N/A	N/A	5.7

N/A - Data are not available.

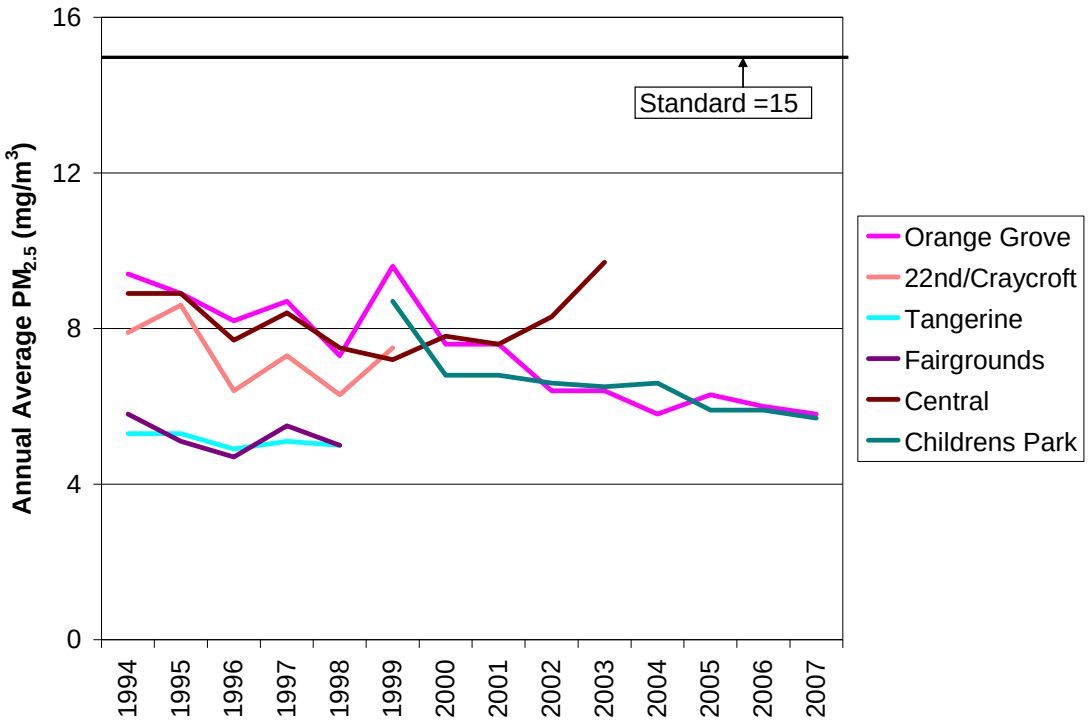


Figure 24 – Metropolitan Tucson annual averages of $PM_{2.5}$

Visibility

Optical measurements of visibility have been made continuously since 1993 in Tucson and since 1994 in Phoenix. Light extinction, the degree to which light is reduced by its interaction with particles and gases in the atmosphere, is measured continuously with transmissometers. These measurements have been divided into six categories: the mean of the dirtiest 20 percent of all hours, the mean of all hours, and the mean of the cleanest 20 percent of all hours, for both the entire day and the 5 a.m. to 11 a.m. period. The units of measurement are inverse megameters (Mm^{-1}): the higher the light extinction value in Mm^{-1}, the more visibility is reduced. Tables 26a and 26b present these light extinction data, while Figures 25 and 26 illustrate visibility trends in more practical measures of Visual Range in miles.

Table 26a: Annual Average Light Extinction in Phoenix (Mm^{-1})

Year	All Hours			5 a.m.-11 a.m.		
	Mean of the Dirtiest 20% Sampled Hours	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**	**Mean of the Dirtiest 20% Sampled Hours**	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
1994	N/A	64	29	N/A	70	33
1995	141	77	38	137	80	43
1996	134	78	43	130	80	45
1997	131	81	48	136	87	53
1998	133	78	45	136	84	50
1999	127	72	38	128	77	42
2000	131	74	38	134	80	42
2001	118	69	36	118	73	42
2002	124	75	42	125	79	46
2003	131	72	36	135	78	42
2004	121	69	35	126	75	42
2005	126	72	36	128	78	43
2006	125	69	32	126	76	40
2007	121	78	47	126	84	40

Table 26b: Annual Average Light Extinction in Tucson (Mm^{-1})						
	All Hours			**5-11 a.m.**		
Year	**Mean of the Dirtiest 20% Sampled Hours**	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**	**Mean of the Dirtiest 20% Sampled Hours**	**Mean of all Sampled Hours**	**Mean of the Cleanest 20% Sampled Hours**
1993	101	60	34	139	74	37
1994	95	59	36	109	68	41
1995	104	62	35	116	69	38
1996	99	62	37	113	71	40
1997	93	60	36	108	68	38
1998	102	57	28	119	69	34
1999	90	57	35	107	65	38
2000	98	56	27	114	66	31
2001	96	55	26	109	66	33
2002	87	49	24	109	61	29
2003	88	52	26	107	62	30
2004	97	58	27	113	67	32
2005	101	61	31	125	76	39
2006	83	47	22	100	56	28
2007	92	51	22	103	60	28

Distinct trends from these data are somewhat difficult to discern, partly because of the year-to-year variability and partly because the long-term changes for most categories are rather small. In Figures 25 and 26, these light extinction data have been plotted as three-year moving averages and converted to the more practical units of Visual Range in miles. The number shown as 2002, for example, is the average of 2000, 2001, and 2002.

In Phoenix, the gradual increase in visibility in the 20 percent dirtiest category is evident. The visible range in the most recent period (2005 to 2007) in this category is 11 percent higher than the first full three-year period. The mean and the best 20 percent also increased until the 2004 to 2006 three-year average showed a decrease. What has happened in this period (1996 to 1998 compared to 2005 to 2007) is that visibility has gotten better with 9 percent increase for the dirtiest 20 percent, 8 percent increase for the mean, and 12 percent increase in the cleanest 20 percent.

Visibility in Tucson has improved over the 15-year period when considering the three-year averages for all three statistics: the dirtiest, the mean, and the cleanest (Figure 26). The improvement in the 20 percent dirtiest days was 9 percent, which is the same as the improvement in Phoenix. The mean visibility has increased by 14 percent and remarkable improvement has been realized in the 20 percent cleanest category with a 40 percent increase.

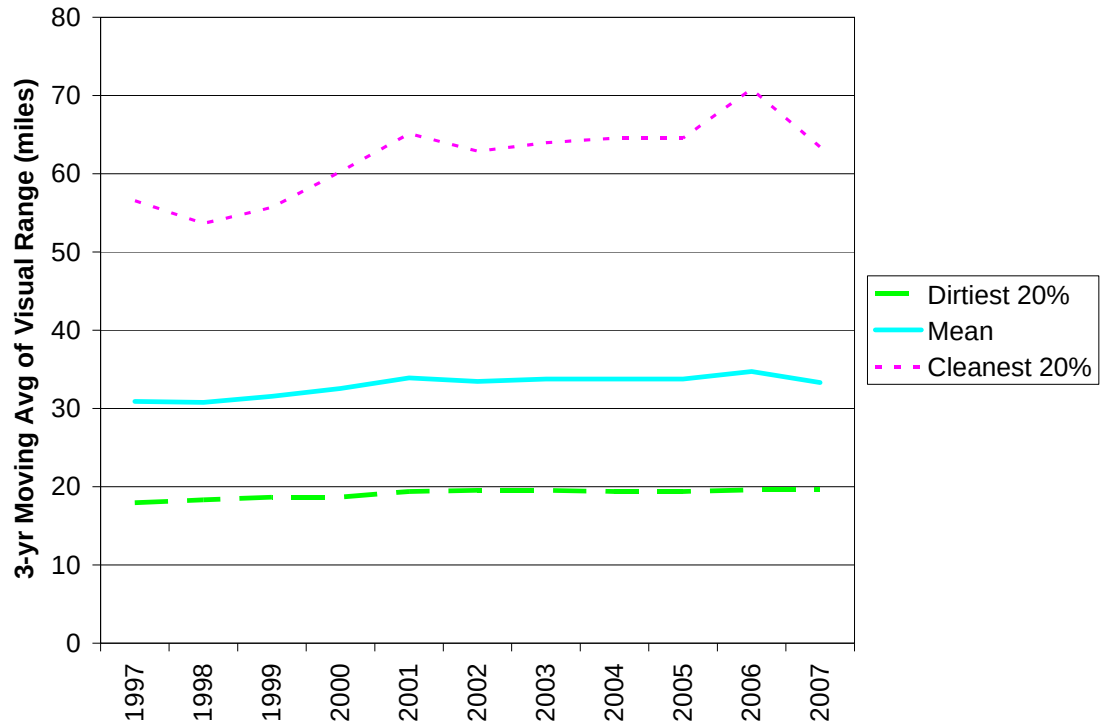


Figure 25 – Visibility trends for Phoenix, three-year moving averages, for all hours

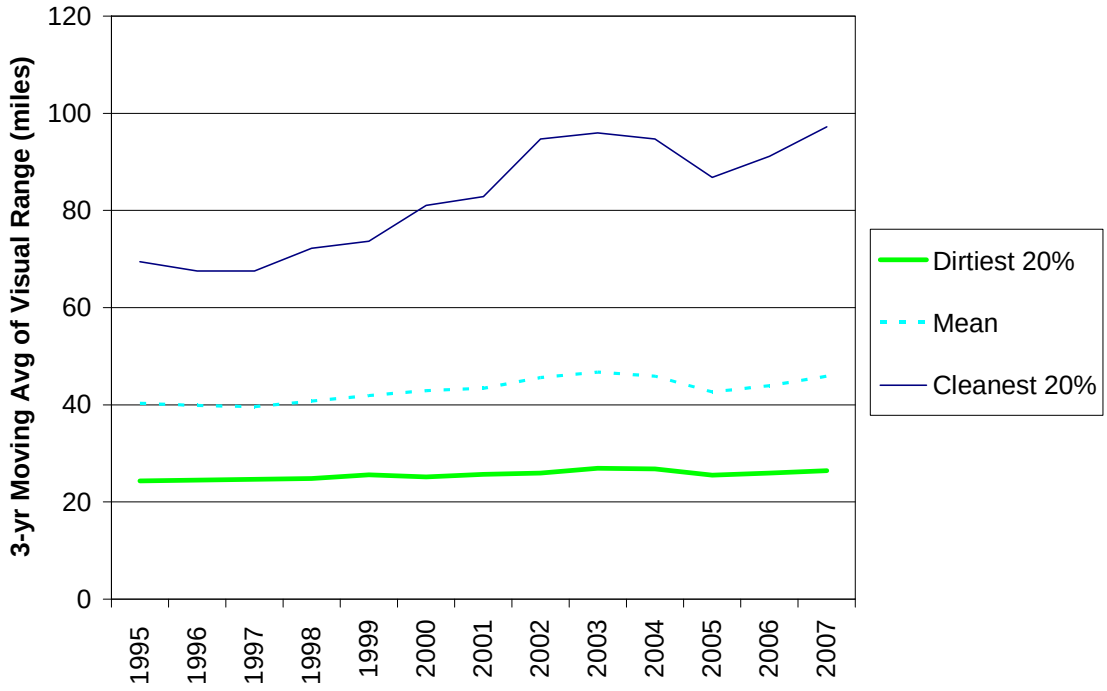


Figure 26 – Visibility trends for Tucson, three-year moving averages, for all hours

Over all, during the 13-year period, there has been a 9 percent increase in visibility for the dirtiest days in Phoenix and in Tucson. While the worst of the brown clouds are still quite evident, especially on winter mornings, their frequency and severity over both cities have diminished.

An interesting intercity trend (Figure 27) appears in the cleanest 20 percent category, where, in the first years of monitoring, Tucson and Phoenix had equal values. As the 1990s progressed, however, Tucson's cleanest days grew decidedly cleaner, while Phoenix's cleanest days saw decreased visibility for the first half of the period, followed by a gradual increase, a leveling off, an increase, and lastly, a decrease in 2007. In the 2005 to 2007 period, Tucson's cleanest days were significantly cleaner (54 percent) than in Phoenix.

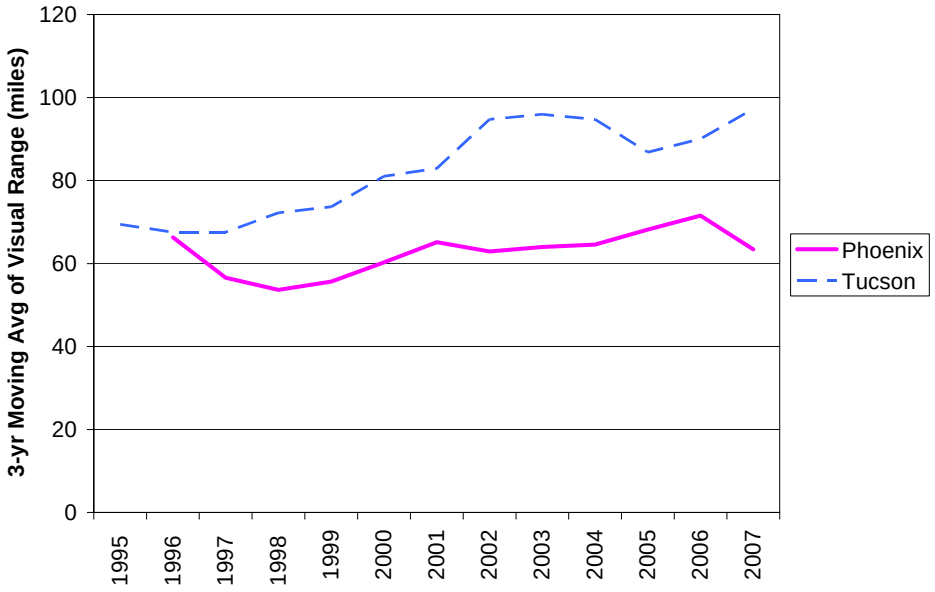


Figure 27 – Visibility trends for all hours for Phoenix and Tucson, shown as three-year moving averages

Seasonal patterns vary between the two cites, with the mean and dirtiest 20 percent in Phoenix showing more pronounced winter and fall maxima than Tucson. Both cities show little seasonal variation in the cleanest 20 percent of all hours. The poorer visibility in Phoenix comes as no surprise to those Arizonans familiar with both airsheds.

In the following discussion of visibility, light scattering is compared between the urban and rural areas of the state (Figure 28). In each statistical category rural light scattering is considerably lower than urban light scattering. On the dirtiest 20 percent days, light scattering values in Phoenix are about four times higher than in the rural areas, while values in Tucson are about three times as high as rural areas. Values for the mean and 20 percent cleanest days show comparable results.

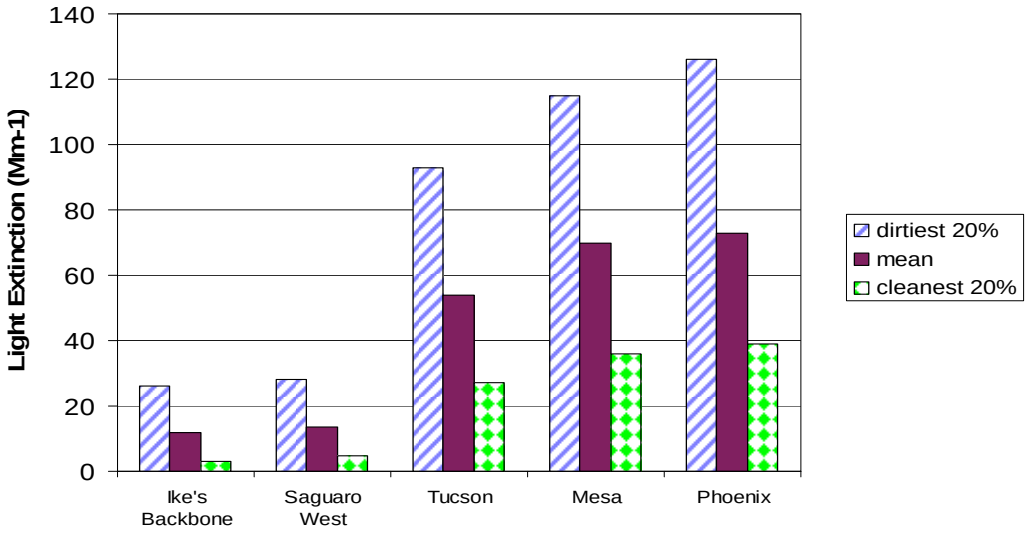


Figure 28 – Comparison of light scattering on the cleanest 20%, mean, and dirtiest 20% of days for urban and rural areas.

Carbon Monoxide

Since the mid- to late 1970s, CO concentrations have declined dramatically. In Tucson, the maximum annual eight-hour concentration at 22nd Street and Alvernon declined from 12.0 ppm in 1978 to 2.1 ppm in 2007, a decrease of 82 percent (Figure 29). In Phoenix at 18th Street and Roosevelt (Central Phoenix), the decline was from 23.0 ppm in 1975 to 2.9 ppm in 2007, a decrease of 87 percent (Figure 30). The number of exceedances of the eight-hour standard in Phoenix decreased from 75 to 0 at Central Phoenix. The entire Phoenix network of CO monitors recorded over 100 exceedances each year from 1981 through 1986, with an average of 134 per year. The last recorded exceedance was in 1999. Most of this improvement can be attributed to federal new vehicle emission standards, augmented by emission reductions from the vehicle inspection and maintenance program, which began in 1976; the use of oxygenated fuels in the winter, beginning in 1989; and cleaner burning gasoline, beginning in 1997. In 2007, the maximum concentration measured in the Phoenix Area CO network was 6.0 ppm, 33 percent below the NAAQS.

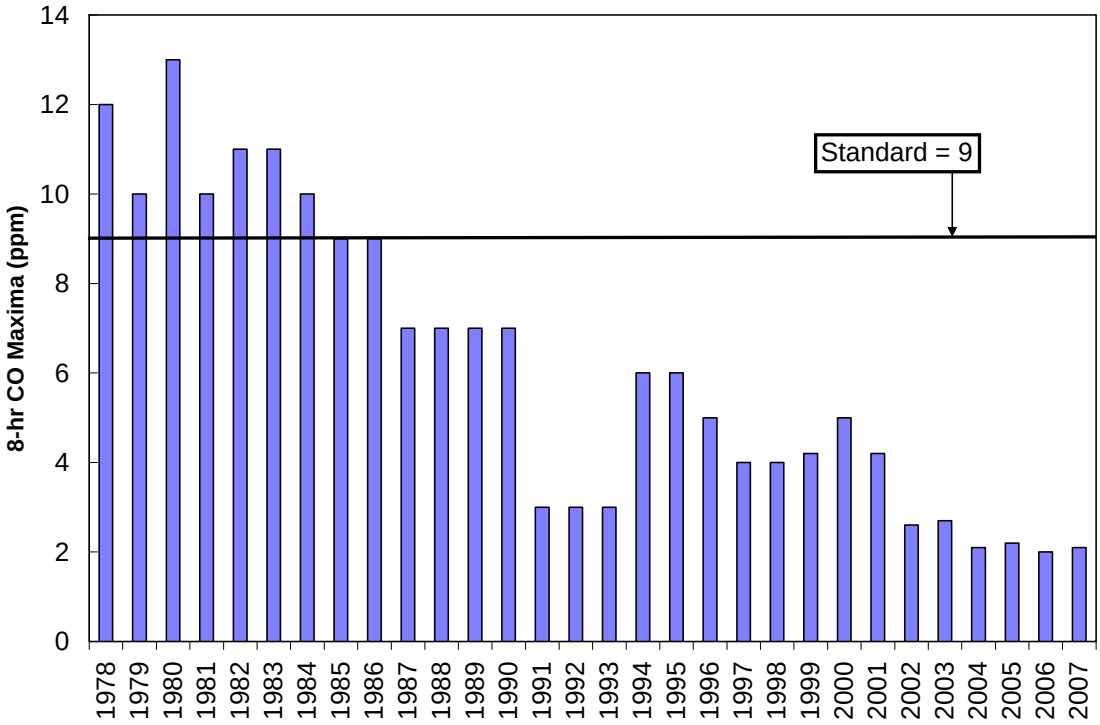


Figure 29 – Eight-hour carbon monoxide maxima at 22nd St. and Alvernon in Tucson

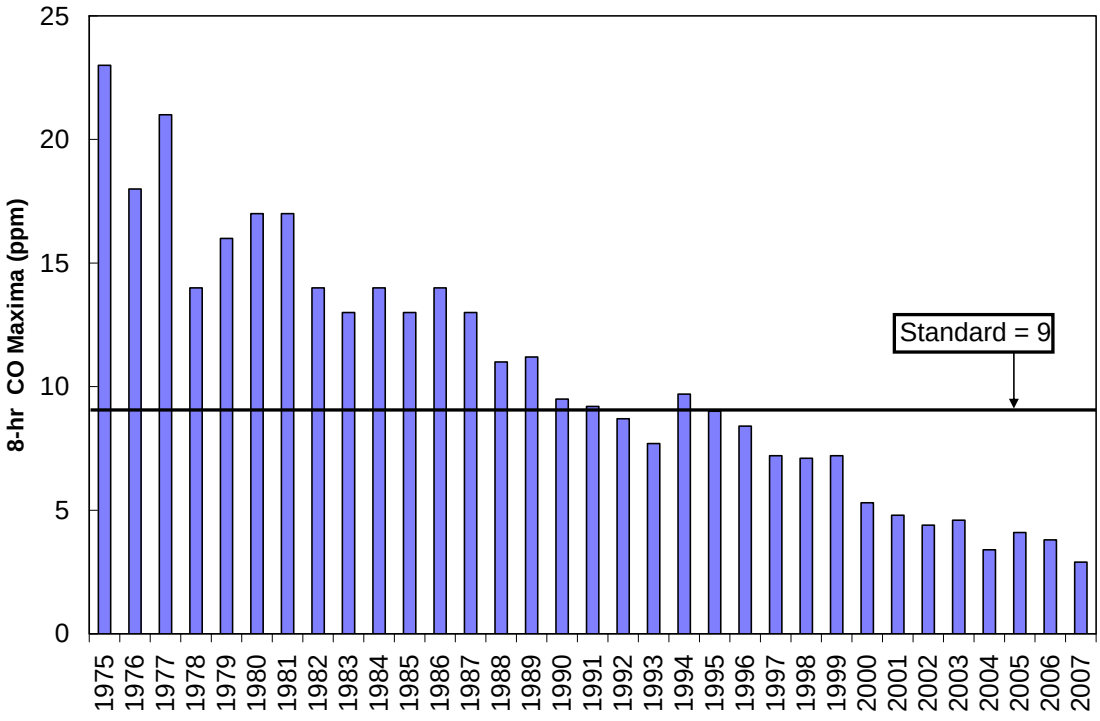


Figure 30 – Eight-hour carbon monoxide maxima at 18th Street and Roosevelt in Central Phoenix

Conclusions

Since monitoring of air pollutants began in the late 1960s in Arizona, considerable progress has been made in reducing concentrations of lead (Pb), SO_2, and CO. Pb has been reduced to near background levels; SO_2 concentrations near copper smelters, which chronically exceeded the standards until the mid 1980s, are now well within the standards; and CO concentrations, which regularly exceeded standards in neighborhoods and near busy intersections in Phoenix (and to a far lesser extent in Tucson), now meet the standards. One-hour O_3 concentrations in Phoenix have met the standard since 1997, the first years since monitoring began. Phoenix one-hour O_3 concentrations in the 1980s and early 1990s ranged as high as 0.18 ppm (the standard was 0.12 ppm), in contrast to the highest, most recent reading of 0.14 ppm in 1996. In 1995 to 1997, 12 monitoring sites in greater Phoenix exceeded the eight-hour O_3 standard; in 2005 to 2007 no sites exceeded the standard.

The single most important trend described in this section appears be that the short-term trends for a majority of the PM_{10} sites are changing in the upward direction. However, because the increasing concentrations have only begun recently, most long-term trends are still downward showing that elevated concentrations of PM_{10} have been reduced substantially since the mid 1980s. By 2007, violations of the PM_{10} standard, once a common occurrence at many sites ten years ago, were limited to a few sites in southwest Phoenix, Pinal County, and Nogales. The severity of PM_{10} problems in these areas is shown in Table 27.

Table 27: PM_{10} Expected Exceedences 2005 - 2007

Site	2005	2006	2007	3-Year Avg.
Southwest-Phoenix Sites	38.2	28.7	7.0	24.7
Pinal County (all sites)	198.8	274.4	256.6	243.3
Nogales	18.4	20.4	6.1	15.0
Total	255.4	323.5	269.7	

Fine particulate concentrations ($PM_{2.5}$) have decreased in Phoenix and Tucson since the mid 1990s. Comparing three-year averages, for example, the centrally located ADEQ JLG Supersite, has decreased 23 percent. Children's Park in Tucson has decreased 19 percent and 31 percent at Orange Grove, north of Tucson. Fine particulate trends in rural Arizona, however, have not shown consistency from site to site: Nogales has increased by 20 percent, Yuma increased by 48 percent (prior to closure in 2003), and Flagstaff increased by 30 percent. Douglas and Payson have decreased by 13 percent and 44 percent, respectively.

In general, some sites' 2007 values are higher than 2005 values and could signal a shift in the trend. Most standards are met all of the time, with the exceptions being the eight-hour O_3 standard on occasional summer days in Phoenix and the PM_{10} standards on both an episodic and annual basis at those sites affected by localized dense emissions. This improved air quality (resulting from emission control programs at the federal, state and local levels) has benefited the respiratory health of the citizenry and can be considered a consequence of the public support for a cleaner environment.

Appendix 1 – Site Index

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Apache County									
Greer Water Treatment Plant (SR 260 & SR 373)	34.058 -109.440	2,503	Bscat, MET, IMPROVE	ADEQ, USFS	Class I	Regional	Visibility	16323	None
Petrified Forest NP (I-40 & Petrified Forest Rd.)	35.077 -109.769	1,766	IMPROVE	NPS	Class I	Regional	Visibility	16473	04-001-0012
TEP - Springerville – Coal Yard (Lower Coyote Rd.)	34.329 -109.156	2,125	PM_{10}, MET	TEP	SPM	Regional	Source Impact	16637	None
TEP - Springerville - Coyote Hills (Lower Coyote Rd.)	34.175 -109.231	2,285	NO_2, SO_2, PM_{10}, MET	TEP	SPM	Regional	Source Impact	16638	None
Cochise County									
Chiricahua Entrance Station (13063 E. Bonita Canyon Rd.)	32.009 -109.389	1,570	O_3, Bscat, MET, CASTNET, NADP, IMPROVE	ADEQ, EPA, NPS	Class I	Regional	Visibility	16679	04-003-8001
Douglas Red Cross (1445 E. 15th St.)	31.349 -109.539	1,231	PM_{10}, $PM_{2.5}$, IMPROVE	ADEQ	Class I, SLAMS	Neighborhood/ Regional	Population/ Visibility	16503	04-003-1005
Paul Spur Chemical Lime Plant (SR 80 & Paul Spur Rd.)	31.365 -109.730	1,278	PM_{10}	ADEQ	SLAMS	Middle	Source Impact	16391	04-003-0011
Paul Spur Chemical Lime Plant South (S. of Stoneridge Rd.)	31.354 -109.737	1,287	MET	ADEQ	SPM	Middle	Source Impact	16392	None

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Coconino County									
Flagstaff Middle School (755 N. Bonito St.)	35.206 -111.652	2,120	O_3, PM_{10}, $PM_{2.5}$	ADEQ	SLAMS	Neighborhood	Population	16707	04-005-1008
Grand Canyon NP - Hance Camp (South Rim, 2.5 miles W. of Village)	35.973 -111.984	2,235	SO_2, Bscat, MET, IMPROVE	NPS	Class I	Regional	Visibility	16682	None
Grand Canyon NP - Hopi Point Fire Tower (South Rim, N. of Village)	36.071 -112.155	2,152	NADP	NPS	Class I	Regional	Visibility	134455	None
Grand Canyon NP - In Canyon - Yavapai Museum (South Rim)	36.060 -112.117	2,177	SO_2, Visibility (camera), IMPROVE	NPS	Class I	Regional	Visibility	134456	None
Grand Canyon NP - Indian Gardens (South Rim, 4.5 miles from Bright Angel trailhead)	36.078 -112.126	1,164	Bscat, MET, IMPROVE	NPS	Class I	Regional	Visibility	16683	None
Grand Canyon NP - The Abyss (South Rim, NW of Village)	36.059 -112.182	2,073	O_3, MET, CASTNET	NPS	Class I	Regional	Visibility	134458	04-005-8001
Ike's Backbone (Fossil Creek Rd. & Childs Rd.)	34.340 -111.682	1,625	Bscat, MET, IMPROVE	ADEQ, USFS	Class I	Regional	Visibility	16421	None
Sedona Post Office (190 W. Hwy. 89A)	34.866 -111.765	1,279	PM_{10}	ADEQ	SPM	Neighborhood	Population	16512	04-005-1010
Sycamore Canyon (Camp Kimball Rd.)	35.140 -111.969	2,046	Bscat, MET, NADP, IMPROVE	ADEQ, USFS	Class I	Regional	Visibility	16476	None
Gila County									
ASARCO - Globe Hwy.	33.002 -110.765	602	SO_2	ASARCO	SPM	Neighborhood	Source Impact	16593	None

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
ASARCO - Hayden - Garfield Ave.	33.002 -110.784	620	SO_2	ASARCO	SPM	Neighborhood	Source Impact	16590	None
ASARCO - Montgomery Ranch	33.012 -110.798	709	SO_2	ASARCO	SPM	Neighborhood	Source Impact	16591	None
FMMI - Miami - Golf Course	33.419 -110.829	1,000	PM_{10}	FMMI	SPM	Neighborhood	Source Impact	16629	04-007-8000
FMMI - Miami - Jones Ranch (Cherry Flats Rd.)	33.385 -110.867	1,242	SO_2	FMMI	SPM	Regional	Source Impact	16631	None
FMMI - Miami - Townsite (Sullivan St.)	33.397 -110.874	1,035	SO_2	FMMI	SPM	Regional	Source Impact	16632	None
Hayden Old Jail (Canyon Dr. & Kennecott Ave.)	33.006 -110.786	625	SO_2, PM_{10}	ADEQ, ASARCO	SLAMS, SPM	Neighborhood	Source Impact	16326	04-007-1001
Miami Ridgeline (4030 Linden St.)	33.399 -110.858	1,085	SO_2, PM_{10}	ADEQ, FMMI	SLAMS, SPM	Neighborhood/ Regional	Source Impact	16382	04-007-0009
Payson Well Site (204 W. Aero Dr.)	34.229 -111.329	1,501	PM_{10}, MET	ADEQ	SLAMS	Neighborhood	Population	16317	04-007-0008
Pleasant Valley Ranger Station (SR 288 & Old Cherry Rd.)	34.090 -110.941	1,587	Bscat, MET, IMPROVE	ADEQ, USFS	Class I	Regional	Visibility	16446	None
Tonto NM (S. of SR 188)	33.635 -111.109	786	O_3, IMPROVE	ADEQ, USFS	SLAMS	Regional	Transport/ Visibility	16447	04-007-0010
Graham County									
Oliver Knoll (NW of Safford)	33.074 -109.865	1,173	NADP	BLM	SPM	Regional	Population	134496	None
Safford (523 S. 10th Ave.) [closed 12/31/2007]	32.833 -109.718	899	PM_{10}	ADEQ	SLAMS	Neighborhood	Population	16508	04-009-0001

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
La Paz County									
Alamo Lake (Alamo Lake State Park)	34.243 -113.558	403	O_3	ADEQ	SLAMS	Regional	Transport	34961	04-012-8000
Maricopa County									
ADEQ Building (1110 W. Washington St.)	33.448 -112.087	329	Visibility (camera)	ADEQ	Urban Haze	Urban	Visibility	21737	None
Banner Mesa Medical Center (525 W. Brown Rd.)	33.433 -111.842	454	Visibility (camera), Bext	ADEQ	Urban Haze	Urban	Urban Haze/ Visibility	19489	None
Bethune Elementary School (1310 S. 15th Ave.)	33.434 -112.093	325	PM_{10}	ADEQ	SPM	Neighborhood	Population	17786	04-013-8006
Blue Point (Usery Pass Rd. & Bush Hwy.)	33.545 -111.609	480	O_3, MET	MCAQD	SLAMS	Urban	Maximum Concentration	16417	04-013-9702
Buckeye (26449 W. 100th Dr.)	33.370 -112.620	256	CO, NO_2, O_3, PM_{10}, MET	MCAQD	SLAMS	Neighborhood/ Urban	Population/ Source Impact	21525	04-013-4011
Cave Creek (37109 N. Lava Ln.)	33.821 -112.017	584	O_3, MET	MCAQD	SLAMS	Urban	Maximum Concentration	16368	04-013-4008
Central Phoenix (1645 E. Roosevelt St.)	33.457 -112.046	340	CO, NO_2, O_3, SO_2, PM_{10}, MET	MCAQD	SLAMS	Neighborhood	Maximum Concentration/ Population	16329	04-013-3002
Coyote Lakes (20010 N. Coyote Lakes Pkwy.)	33.666 -112.310	363	PM_{10}, MET	MCAQD	SLAMS	Middle	Source Impact	127530	04-013-4014
Durango Complex (2702 RC Esterbrook Blvd.)	33.426 -112.118	480	PM_{10}, $PM_{2.5}$, MET	MCAQD	SLAMS	Middle	Maximum Concentration	16375	04-013-9812
Dysart (16825 N. Dysart Rd.)	33.637 -112.339	357	CO, O_3, PM_{10}, Bscat	ADEQ, MCAQD	SLAMS, Urban Haze	Neighborhood	Population	19550	04-013-4010
Estrella (15099 W. Casey Abbott Rd.)	33.383 -112.372	277	Bscat, MET	ADEQ	Urban Haze	Neighborhood	Population	16506	04-013-8005

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Estrella Community College (3000 N. Dysart Rd.)	33.483 -112.350	305	Visibility (camera)	ADEQ	Urban Haze	Urban	Visibility	21736	None
Falcon Field (4530 E. McKellips Rd.)	33.452 -111.733	310	O_3, MET	MCAQD	SLAMS	Neighborhood	Population	16381	04-013-1010
Fountain Hills (16426 E. Palisades Blvd.)	33.611 -111.725	440	O_3, MET	MCAQD	SLAMS	Neighborhood	Maximum Concentration	16376	04-013-9704
Glendale (6000 W. Olive Ave.)	33.569 -112.191	357	CO, O_3, PM_{10}, MET	MCAQD	SLAMS	Neighborhood	Population	16378	04-013-2001
Greenwood (1128 N. 27th Ave.)	33.460 -112.117	338	CO, NO_2, PM_{10}, MET	MCAQD	SLAMS	Middle	Population	16372	04-013-3010
Higley (15400 S. Higley Rd.)	33.310 -111.722	396	PM_{10}, MET	MCAQD	SLAMS	Neighborhood	Population	16505	04-013-4006
Humboldt Mountain (Pine Mountain Wilderness)	33.982 -111.798	1,594	O_3, MET	MCAQD	SLAMS	Regional	Maximum Concentration	16416	04-013-9508
JLG Supersite (4530 N. 17th Ave.)	33.503 -112.095	354	CO, NO_x, NO_y, O_3, SO_2, VOC, Carbonyls, Hexavalent Chromium, SVOC, PM_{10}, $PM_{2.5}$, Speciated $PM_{2.5}$, Bscat, MET, IMPROVE	ADEQ	CSN, NATTS, NCore, PAMS, SLAMS, SPM, Urban Haze	Neighborhood	Population	16328	04-013-9997
Mesa (310 S. Brooks Cir.)	33.410 -111.865	372	CO, PM_{10}, $PM_{2.5}$, MET	MCAQD	SLAMS	Neighborhood	Population	16380	04-013-1003
Mesa City Building (55 N. Center St.)	33.415 -111.830	400	Bext, MET	ADEQ	Urban Haze	Urban	Urban Haze	19686	None
North Mountain Summit (North Mountain)	33.585 -112.072	625	Visibility (camera)	ADEQ	Urban Haze	Urban	Visibility	16480	None
North Phoenix (601 E. Butler Dr.)	33.560 -112.066	379	CO, O_3, PM_{10}, MET	MCAQD	SLAMS	Neighborhood	Population	16390	04-013-1004
Phoenix Transmissometer Receiver (3600 N. 2nd Ave.)	33.490 -112.076	337	Bext, MET	ADEQ	Urban Haze	Urban	Urban Haze	16829	None

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Phoenix Transmissometer Transmitter (2000 W. Bethany Home Rd.)	33.525 -112.101	340	Bext	ADEQ	Urban Haze	Urban	Urban Haze	16330	None
Pinnacle Peak (25000 N. Windy Walk Dr.)	33.712 -111.852	800	O_3, MET	MCAQD	SLAMS	Urban	Maximum Concentration	16406	04-013-2005
Rio Verde (25608 N. Forest Rd.)	33.718 -111.671	500	O_3	MCAQD	SLAMS	Urban	Maximum Concentration	16396	04-013-9706
Salt River Pima DOAS (8805 E. McKellips Rd.)	33.444 -111.891	365	Multiple pollutants	ADEQ	SPM	Middle	Transport	128640	None
South Phoenix (33 W. Tamarisk St.)	33.403 -112.075	330	CO, O_3, Toxics , PM_{10}, $PM_{2.5}$, MET	ADEQ, MCAQD	SLAMS	Neighborhood	Population	16377	04-013-4003
South Scottsdale (2857 N. Miller Rd.)	33.479 -111.917	374	CO, NO_2, O_3, SO_2, PM_{10}, MET	MCAQD	SLAMS	Neighborhood/ Urban	Population	16398	04-013-3003
Tempe (1525 S. College Ave.)	33.412 -111.934	360	CO, O_3, MET	MCAQD	SLAMS	Neighborhood	Population	16405	04-013-4005
Vehicle Emissions Laboratory (600 N. 40th St.)	33.455 -111.996	356	Bscat, MET	ADEQ	PAMS, SLAMS, SPM	Neighborhood	Population/ Visibility	16363	04-013-9998
West Chandler (275 S. Ellis Rd.)	33.298 -111.884	360	CO, O_3, PM_{10}, MET	MCAQD	SLAMS	Middle/ Neighborhood	Population	16478	04-013-4004
West Forty Third (3940 W. Broadway Rd.)	33.406 -112.144	314	PM_{10}, MET	MCAQD	SLAMS	Middle	Maximum Concentration	16659	04-013-4009
West Indian School (3315 W. Indian School Rd.)	33.494 -112.130	340	CO, MET	MCAQD	SLAMS	Microscale	Maximum Concentration	16393	04-013-0016
West Phoenix (3847 W. Earll Dr.)	33.483 -112.142	334	CO, NO_2, O_3, PM_{10}, $PM_{2.5}$, MET	MCAQD	SLAMS	Neighborhood	Maximum Concentration/ Population	16477	04-013-0019

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Mohave County									
Bullhead City (990 Hwy. 95)	35.153 -114.566	156	PM_{10}	ADEQ	SLAMS	Neighborhood	Population	16365	04-015-1003
Meadview (Price Ferry Rd.)	36.019 -114.068	902	IMPROVE	ADEQ	Class I	Regional	Background	21298	None
Navajo County									
Petrified Forest NP South (Old SW Entrance on Old Route 180)	34.822 -109.891	1,723	O_3, Bsact, MET, CASTNET, NADP	ADEQ, NPS	Class I	Regional	Visibility	134093	04-017-0119
Show Low (561 E. Deuce of Clubs)	34.252 -110.036	1,924	PM_{10}	ADEQ	SPM	Neighborhood	Population	16603	04-017-0007
Pima County									
22^{nd} St. & Alvernon (3895 E. 22^{nd} St.)	32.207 -110.910	767	CO	PDEQ	SLAMS	Microscale	Maximum Concentration	16676	04-019-1014
22^{nd} St. & Craycroft (1237 S. Beverly Ave.)	32.204 -110.878	787	CO, O_3, NO_2, SO_2, Bscat, MET	ADEQ, PDEQ	SLAMS, Urban Haze	Neighborhood/ Urban	Population/ Visibility	16410	04-019-1011
Ajo (N. Well Rd. 1)	32.382 -112.857	515	PM_{10}, MET	ADEQ	SLAMS	Neighborhood	Population	16316	04-019-0001
Broadway & Swan (4625 E. Broadway Blvd.)	32.222 -110.893	767	PM_{10}	PDEQ	SPM	Neighborhood	Source Impact	16550	04-019-1023
Cherry & Glenn (2745 N. Cherry Ave.)	32.256 -110.948	732	CO	PDEQ	SPM	Neighborhood	Population	16675	04-019-1021
Children's Park (400 W. River Rd.)	32.295 -110.982	697	CO, NO_2, O_3, $PM_{2.5}$, Speciated $PM_{2.5}$, Bscat, MET	ADEQ, PDEQ	NCore, SLAMS, SPM, Urban Haze	Neighborhood/ Urban	Maximum Concentration/ Population/ Visibility	16551	04-019-1028
Coachline (9597 N. Coachline Blvd.)	32.380 -111.127	679	O_3, $PM_{2.5}$	PDEQ	SPM	Neighborhood	Population	21580	04-019-1034

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Corona De Tucson (22001 S. Houghton Rd.)	32.004 -110.792	938	PM_{10}	PDEQ	SLAMS	Regional	Background	16677	04-019-0008
Geronimo (2498 N. Geronimo Ave.)	32.251 -110.965	786	PM_{10}, $PM_{2.5}$	PDEQ	SPM (For AQI Purposes Only)	Neighborhood	Population	16678	04-019-1113
Golf Links & Kolb (2601 S. Kolb Rd.)	32.191 -110.840	811	CO	PDEQ	SPM	Micorscale	Maximum Concentration	19531	04-019-1031
Green Valley (601 N. La Canada Dr.)	31.879 -110.996	885	O_3, PM_{10}, $PM_{2.5}$	PDEQ	SPM	Neighborhood	Population	16685	04-019-1030
Green Valley Fire Administration (1285 W. Camino Encanto)	31.827 -111.011	917	PM_{10}, $PM_{2.5}$, MET	ADEQ	SPM	Middle	Source Impact	128562	04-019-8031
Orange Grove (3401 W. Orange Grove Rd.)	32.322 -111.037	663	PM_{10}, $PM_{2.5}$	PDEQ	SLAMS	Neighborhood	Maximum Concentration/ Population	16510	04-019-0011
Organ Pipe Cactus NM (1 mile SSW of visitor center)	31.950 -112.801	505	Bscat, MET, NADP, IMPROVE	ADEQ, NPS	Class I	Regional	Background	16681	04-019-0005
Prince Road (1016 W. Prince Rd.)	32.272 -110.989	706	PM_{10}	PDEQ	SLAMS	Microscale	Source Impact	16597	04-019-1009
Rillito (8840 W. Robinson St.)	32.414 -111.154	626	PM_{10}, MET	ADEQ, APCC	SLAMS, SPM	Neighborhood	Source Impact	16499	04-019-0020
Rose Elementary (710 W. Michigan St.)	32.172 -110.980	701	O_3, $PM_{2.5}$	PDEQ	SPM	Neighborhood	Population	16670	04-019-1032
Saguaro NP East (3905 S. Old Spanish Trail)	32.174 -110.736	938	O_3, MET, IMPROVE	NPS, PDEQ	Class I, SPM	Neighborhood/ Regional	Maximum Concentration/ Visibility	16474	04-019-0021
Saguaro NP West (N. Sandario Rd. & W. Mile Wide Rd.)	32.248 -111.217	718	Bscat, MET, IMPROVE	ADEQ, NPS	Class I	Regional	Visibility	16475	None
Santa Clara (6910 S. Santa Clara Ave.)	32.125 -110.982	774	PM_{10}	PDEQ	SPM	Neighborhood	Population	16569	04-019-1026
South Tucson (1601 S. 6th Ave.)	32.201 -110.967	744	PM_{10}	PDEQ	SLAMS	Neighborhood	Population	16635	04-019-1001

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Tangerine (12101 N. Camino de Oeste)	32.425 -111.063	804	O_3, PM_{10}	PDEQ	SPM	Urban	Background/ Maximum Concentration	16669	04-019-1018
Tucson Downtown (190 W. Pennington St.)	32.222 -110.974	721	CO, O_3	PDEQ	SPM	Neighborhood	Population	16671	04-019-0002
Tucson Fairgrounds (11330 S. Houghton Rd.)	32.047 -110.774	938	O_3	PDEQ	SPM	Urban	Background	16672	04-019-1020
Tucson Transmissometer Receiver (150 W. Congress St.)	32.221 -110.973	722	Bext, MET	ADEQ, PDEQ	Urban Haze	Urban	Urban Haze	16826	None
Tucson Transmissometer Transmitter (1501 N. Campbell Ave.)	32.240 -110.945	786	Bext	ADEQ, PDEQ	Urban Haze	Urban	Urban Haze	16655	None
Tucson - U of A Central (1100 N. Fremont Ave.)	32.240 -110.955	745	Bscat, MET	ADEQ	Urban Haze	Urban	Visibility	16662	04-019-1027
Pinal County									
Apache Junction Fire Station (3955 E. Superstition Blvd. TE)	33.420 -111.503	533	PM_{10}, $PM_{2.5}$	PCAQCD	SLAMS, SPM	Neighborhood	Population	16358	04-021-3002
Apache Junction Maintenance Yard (305 E. Superstition Blvd.)	33.421 -111.543	533	O_3, MET	PCAQCD	SLAMS	Neighborhood/ Urban	Population/ Transport	16589	04-021-3001
ASARCO - Hayden Junction (Hwy. 177)	33.011 -110.811	582	SO_2	ASARCO	SPM	Neighborhood	Source Impact	16592	None
Casa Grande Airport (660 W. Aero Dr.)	32.954 -111.762	430	O_3, MET	PCAQCD	SLAMS	Neighborhood/ Regional	Population/ Transport	16367	04-021-3003
Casa Grande Downtown (401 Marshall St.)	32.878 -111.752	420	PM_{10}, $PM_{2.5}$	PCAQCD	SLAMS	Neighborhood	Population	16588	04-021-0001
Combs School (301 E. Combs Rd.)	33.219 -111.560	359	O_3, PM_{10}	PCAQCD	SPM	Neighborhood/ Regional	Population/ Transport	16657	04-021-3009

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Coolidge Maintenance Yard (212 E. Broadway Ave.)	32.978 -111.514	445	PM_{10}	PCAQCD	SLAMS	Neighborhood	Population	7446	04-021-3004
Cowtown Road (37580 W. Maricopa-Casa Grande Hwy.)	33.010 -111.972	370	PM_{10}, $PM_{2.5}$, MET	PCAQCD	SPM	Microscale	Population/ Source Impact	19347	04-021-3013
Eloy City Complex (620 N. Main St.)	32.755 -111.555	472	PM_{10}	PCAQCD	SLAMS	Neighborhood	Population	16594	04-021-3005
Eloy County Complex (801 N. Main St.)	32.757 -111.554	472	PM_{10}	PCAQCD	SLAMS	Neighborhood	Population	134673	04-021-3014
Mammoth County Complex (118 S. Catalina Ave.)	32.719 -110.642	890	PM_{10}	PCAQCD	SLAMS	Neighborhood	Background/ Population	16600	04-021-3006
Maricopa County Complex (44625 W. Garvey Rd.)	33.059 -112.047	359	O_3, PM_{10}	PCAQCD	SPM	Neighborhood/ Regional	Population/ Transport	16656	04-021-3010
Pinal Air Park (Water Well # 2, Pinal Air Park Rd.)	32.508 -111.308	581	O_3, PM_{10}	PCAQCD	SLAMS, SPM	Regional	Background/ Transport	16552	04-021-3007
Pinal County Housing Complex (970 N. Eleven Mile Corner Rd.)	32.891 -111.570	440	PM_{10}, MET	PCAQCD	SLAMS, SPM	Neighborhood	Population/ Source Impact	18079	04-021-3011
Queen Valley (10 S. Queen Anne Dr.)	33.293 -111.285	668	NO_y, O_3, VOC, Bscat, MET, IMPROVE	ADEQ, PCAQCD	Class I, PAMS, SLAMS, SPM	Regional/ Urban	Maximum Concentration/ Transport/ Visibility	16394	04-021-8001
Riverside Maintenance Yard (56964 E. Florence Kelvin Hwy.)	33.105 -110.974	540	PM_{10}	PCAQCD	SLAMS	Neighborhood	Source Impact	21429	04-021-3012
San Manuel (1^{st} & Douglas Ave.) [closed 12/31/2007]	32.598 -110.633	332	SO_2	ADEQ	SPM	Neighborhood	Source Impact	16397	04-021-2001
Stanfield County Complex (36697 W. Papago Dr.)	32.881 -111.961	395	PM_{10}	PCAQCD	SLAMS, SPM	Neighborhood	Population	16636	04-021-3008

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Santa Cruz									
Nogales Post Office (300 N. Morley Ave.)	31.337 -110.936	1,176	PM_{10}, $PM_{2.5}$, MET	ADEQ	SLAMS, SPM	Neighborhood	Population	16511	04-023-0004
Yavapai County									
Cottonwood (1995 S. 6th St.)	34.737 -112.021	1,010	PM_{10}	ADEQ	SPM	Neighborhood	Population	134096	None
Phoenix Cement Clarkdale - NW (#2) (NW of cement plant)	34.786 -112.090	1,234	PM_{10}, MET	PCC	SPM	Regional	Source Impact	16626	None
Phoenix Cement Clarkdale - SE (#1) (SE of CTI fly ash silo)	34.772 -112.073	1,141	PM_{10}, MET	PCC	SPM	Regional	Source Impact	16628	None
Prescott College AQD (330 Grove Ave.)	34.546 -112.476	1,591	O_3, PM_{10}	ADEQ	SPM	Neighborhood	Population	133011	04-025-8033
Prescott Valley (7601 E. Civic Cir.)	34.595 -112.331	1,556	PM_{10}, $PM_{2.5}$	ADEQ	SLAMS	Neighborhood	Population	18392	04-025-2002
Yuma County									
Yuma Agriculture Center Farm (6425 W. 8th St.)	32.713 -114.708	28	MET	ADEQ	SPM	Neighborhood	Population	128530	None
Yuma Courthouse (2440 W. 28th St.)	32.677 -114.648	40	PM_{10}, $PM_{2.5}$	ADEQ	SLAMS	Neighborhood	Population	17027	04-027-0004
Yuma Game & Fish (9140 E. 28th St.)	32.677 -114.475	60	O_3	ADEQ	SLAMS	Neighborhood	Population	18690	04-027-0006
Yuma Mesa (2186 W. County 15th St.)	32.611 -114.633	62	MET	ADEQ	SPM	Neighborhood	Population	19040	None
Yuma Supersite (2323 S. Arizona Ave.)	32.690 -114.614	60	O_3	ADEQ	SLAMS	Neighborhood	Population	113219	04-027-8011

Site Index – Current Ambient Air Monitoring Locations in Arizona									
Site Name and Address	**Lat. Long.**	**Elev. (meters)**	**Parameters Measured**	**Operator**	**Network/ Program**	**Measurement Scale**	**Monitoring Objective**	**AAAD ID Number**	**AQS ID Number**
Mexico									
Agua Prieta Fire Station (Calle 6 & Ave. 15)	31.328 -109.547	1,200	PM_{10}, MET	ADEQ	SPM	Neighborhood	Population	16361	80-026-1000
Sonora Nogales Fire Station (Diaz & Ave. Adolfo Lopez Mateos)	31.325 -110.944	1,202	PM_{10}	ADEQ	SPM	Neighborhood	Population	16399	80-026-0005

Information in the site index table is based on the best information available at the date of publication.

For specific site or monitor information please see ADEQ *Air Monitoring Network Plan: For the Year 2008*, Maricopa County AQD *2007 Air Monitoring Network Review*, Pima County DEQ *2007 Ambient Air Monitoring Network Assessment & Plan*, and Pinal County Air Quality Control District *2007 Ambient Monitor Network Plan and Data Summary*.

Appendix 2 – Acronyms and Abbreviations

ADEQ	Arizona Department of Environmental Quality
AgBMP	Agricultural Best Management Practices
APCC	Arizona Portland Cement Company
AQS	Air Quality System
Area A	Designated Phoenix metropolitan area
ARM	Approved Regional Method
ASARCO	ASARCO LLC - U.S. operating subsidiary of Group Mexico
ASU	Arizona State University
B_{abs}	Light absorption
BACM	Best Available Control Measures
B_{ag}	Light absorption by gasses
BAM	Beta Attenuation Mass Monitor
B_{ap}	Light absorption by particles
B_{ext}	Light extinction
B_{scat}	Light scattering
B_{sg}	Light scattering by gasses
B_{sp}	Light scattering by particles
CAA	1990 Clean Air Act
CASTNET	Clean Air Status and Trends Network
CDV	Critical Design Value
CFR	Code of Federal Regulations
Class I	Federally designated park or wilderness area with mandated visibility protection
CMSA	Consolidated Metropolitan Statistical Area
CO	Carbon monoxide
CSA	Combined Statistical Area
CSN	Chemical Speciation Network
Delta T	Difference between two levels of temperature measurements
DV	Design Value
EPA	U.S. Environmental Protection Agency
FEM	Federal Equivalent Method
FMMI	Freeport McMoRan Copper and Gold, Inc. - Miami
FRM	Federal Reference Method
HAP	Hazardous Air Pollutant
HART	Hazardous Air Response Team
HC	Hydrocarbon
HPA	High Pollution Advisory
IMPROVE	Interagency Monitoring of Protected Visual Environments

JATAP	Joint Air Toxics Assessment Project
km	Kilometers
LMP	Limited Maintenance Plan
m	Meters
MAG	Maricopa Association of Governments
MCAQD	Maricopa County Air Quality Department
MET	Meteorological measurements (wind, temperature, relative humidity)
mm	Millimeter
Mm^{-1}	Inverse megameter
MSA	Metropolitan Statistical Area
MSM	Most Stringent Measures
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NATA	National Air Toxics Assessment
NATTS	National Air Toxics Trends Site
NCore	National Core multipollutant monitoring stations
NEAP	Natural Event Action Plan
NM	National Monument
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Sum of NO and NO_2
NPS	National Park Service
O_3	Ozone
PAMS	Photochemical Assessment Monitoring Station
Pb	Lead
PCAQCD	Pinal County Air Quality Control District
PCC	Phoenix Cement Company
PDEQ	Pima County Department of Environmental Quality
PM	Particulate Matter
PM_{10}	Particulate Matter $\leq$ 10 microns
$PM_{2.5}$	Particulate Matter $\leq$ 2.5 microns
PM_{fine}	Particulate Matter in the region of 2.5 microns
ppm	parts per million
Pressure	Barometric air pressure
PSD	Prevention of Significant Deterioration
RFP	Reasonable Further Progress
RH	Relative Humidity
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide

SO_4	Sulfate
SPM	Special Purpose Monitor
STN	Speciation Trends Network
TEOM	Tapered Element Oscillating Microbalance
TEP	Tucson Electric Power Company
TSP	Total Suspended Particulates
U of A	University of Arizona
$\mu g/m^3$	Micrograms per cubic meter
USFS	U.S. Forest Service
VOC	Volatile Organic Compounds
WASBAQS	Western Arizona/Senora Border Air Quality Study
Wind	Wind speed and direction
WRAP	Western Regional Air Partnership

Appendix 3 – Related Web Sites

Air Explorer (http://www.epa.gov/airexplorer/)
Air Explorer is a collection of user-friendly visualization tools for air quality analysts. It is linked directly to the EPA's Air Quality Subsystem database.

AirWeb: Protecting Air Quality (http://www2.nature.nps.gov/air/)
Learn about how the National Park Service Air Resources Division and the Fish and Wildlife Service Air Quality Branch strive to preserve, protect, enhance, and understand the air quality and other resources of our national parks and refuges.

Arizona Department of Environmental Quality (www.azdeq.gov)
ADEQ's Web site contains information on air quality, news releases, public meetings, and many other services that can provided that help to protect a safe and healthy environment.

Earth 911: Making Every Day Earth Day! (www.earth911.org)
That's their mission "to make every day an earth day!" so you can act on today's environmental issues, in order to preserve and maintain for today and tomorrow.

Earth's Biggest Environment Search Engine (www.webdirectory.com)
This Web site is a directory to numerous environmental subjects, from air to wildlife.

Environmental Protection Agency (www.epa.gov)
On EPA's Web site, you can find information about the federal government's role in environmental protection.

EPA – Air and Radiation (www.epa.gov/oar/oaqps)
You will breathe easier when you see EPA's air quality planning and standards Web site. They have from what's new in air to the latest projects, programs and contracts.

EPA's – AIRNow (airnow.gov/)
Easy access to local air quality forecasts, real-time data, air quality index (AQI), animated color contours of measured AQI values for geographic areas and more.

EPA's Air Quality Database (www.epa.gov/air/data/index.html)
EPA's air quality database contains extensive air data. On this site, you can find the sources that contribute to emissions, the equipment and facilities that monitor the air, maps on air-related information, and contact information for experts on specific issues regarding air and environment.

EPA – Region 9 (http://www.epa.gov/region09/)
Learn about EPA activities in Arizona, California, Hawaii, Nevada, and the Pacific Islands at the Region 9 website.

FirstGov (www.firstgov.gov)
Through this Web site, you can find more than 1,000 federal and state environmental agencies with details about the environment.

The Interagency Monitoring of Protected Visual Environments Project
(http://vista.cira.colostate.edu/improve/)
On this site, you can take a look at photos of what haze (pollution) can do to the beautiful views of our nation. You can also take a look at what is being done and how you can get involved to improve the views of our nation.

Inter Tribal Council of Arizona, Inc. (www.itcaonline.com)
The site lists the member tribes and includes information about environmental monitoring programs.

Interagency Real Time Smoke Monitoring
(http://www.satguard.com/usfs/default.asp)
This web site provides real-time smoke concentration data (along with some other meteorological information) from portable smoke monitors around the United States. Historical data from past monitoring efforts are also available.

Maricopa County Air Quality Information (http://www.maricopa.gov/aq/)
Maricopa County's Environmental Services' Web site has specific descriptions plus current and historical data on the county's air monitors.

National Atmospheric Deposition Program (http://nadp.sws.uiuc.edu/)
NADP is a nationwide network of monitoring sties collecting data on the chemistry of precipitation for geographical and temporal long-term trends.

National Tribal Environmental Council (www.ntec.org)
NTEC is a tribal government membership organization with 160 member tribes that work to protect and preserve the reservation environment.

National Weather Service (www.nws.noaa.gov)
Dive into the latest occurrences and studies of your weather and atmosphere. There are links to local weather service agencies in each state.

NOAA Research - Weather and Air Quality (http://www.oar.noaa.gov/weather/)
Information on research on all types of weather (hurricanes, tornadoes, thunderstorms, hazardous weather, etc.), weather related topics, and air quality.

Pima County Air Quality Information (www.deq.co.pima.az.us)
The Pima County Department of Environmental Quality's Web site has information about air, water and waste programs, and the latest news and regulations that affect Pima County.

Pinal County Air Quality Information
(http://pinalcountyaz.gov/Departments/AirQuality/Pages/Home.aspx)
Current air quality information from the Pinal County Air Quality Control District.

Pollen Information (www.pollen.com)
Does it feel like something is in the air? Visit pollen.com to find out about what kinds of allergens are in your air and when they are there.

The United States National Park Service (www.nps.gov)
Information about our national parks.

Visibility Information Exchange Web System (VIEWS)
(http://vista.cira.colostate.edu/views/)
The Visibility Information Exchange Web System is an online exchange of visibility data, research, and ideas designed to support the Regional Haze Rule enacted by the U.S. Environmental Protection Agency (EPA) to reduce regional haze in national parks and wilderness areas. In addition to this primary goal, VIEWS supports global efforts to better understand the effects of air pollution on visibility and to improve air quality in general.

Visibility Web Cameras (http://www.phoenixvis.net)
This page provides an overview of all Phoenix Visibility Web Cameras. Digital images from Web-based cameras are updated every 15 minutes.

Weather Underground
(http://www.wunderground.com/US/Region/US/AirQuality.html)
This web site includes weather forecasts, air quality information, and weather history.

Western Regional Air Partnership (www.wrapair.org)
WRAP is comprised of western states, tribes, and federal agencies with a focus on visibility in parks and wilderness areas in the western U.S.

Western States Air Resources Council (www.westar.org)
WESTAR is composed of 15 western states that have come together to discuss and exchange information on western regional air quality issues.

Appendix 4 – Maps

This section contains maps displaying monitor locations and location information.

Ambient Air Monitors
This map shows the location of monitors operated by ADEQ, county agencies, private industry, and federal agencies.

Criteria Pollutant Monitoring (Phoenix and Tucson Metropolitan Areas)
These maps identify the locations of monitors of criteria pollutants in Arizona's two largest metropolitan areas.

Nonattainment and Attainment Areas
This map identifies the areas in Arizona that are nonattainment for PM_{10}, SO_2, CO, and O_3.

Ozone Network
This map shows the location of ozone monitors operated by ADEQ, private industry, county agencies, and the National Park Service.

PM10 Network
The location of PM_{10} particulate monitors are shown on this map.

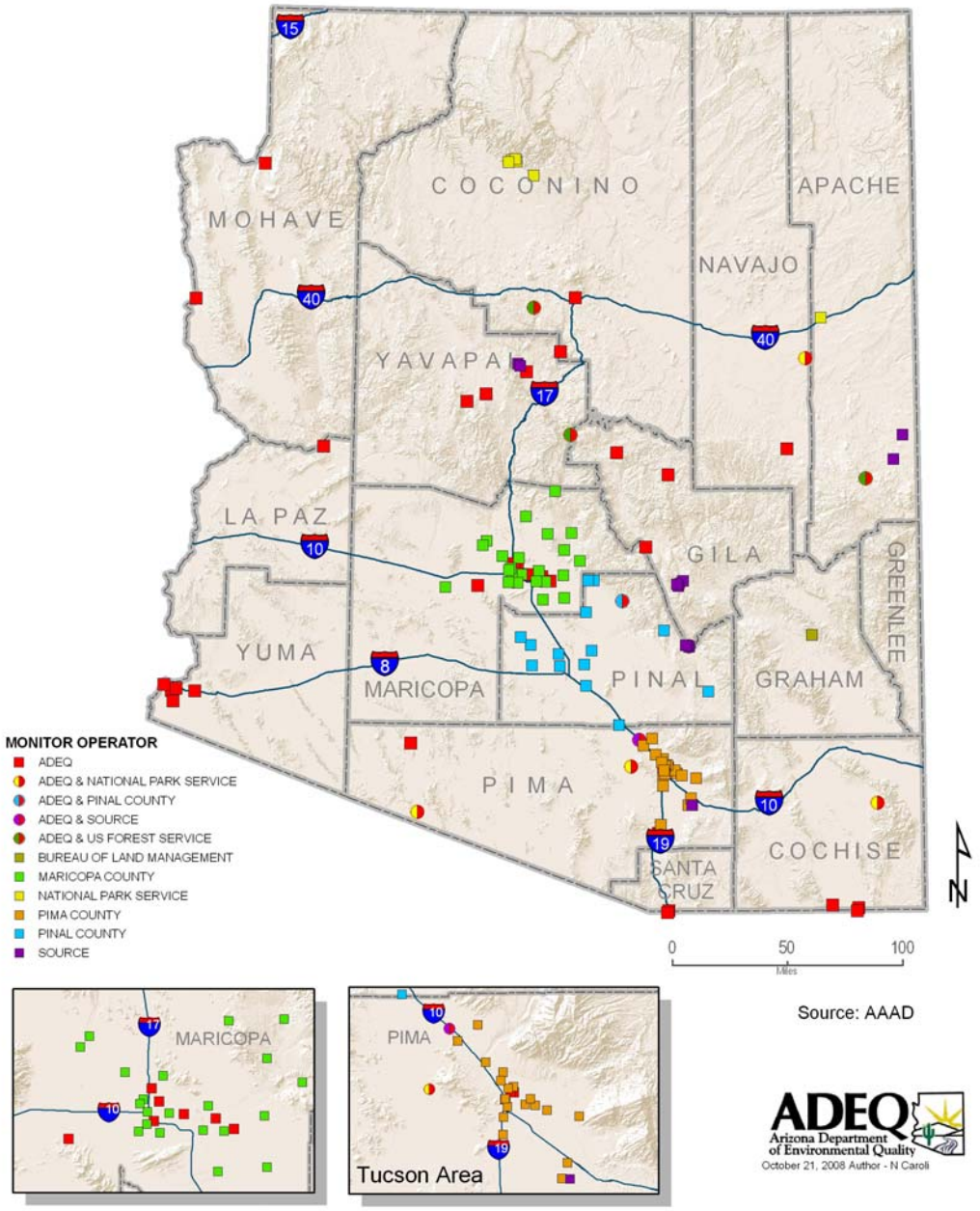
PM2.5 Network
The location of $PM_{2.5}$ particulate monitors are shown on this map.

SO2 Network
This map shows the location of the SO_2 monitors and includes the maintenance and nonattainment areas.

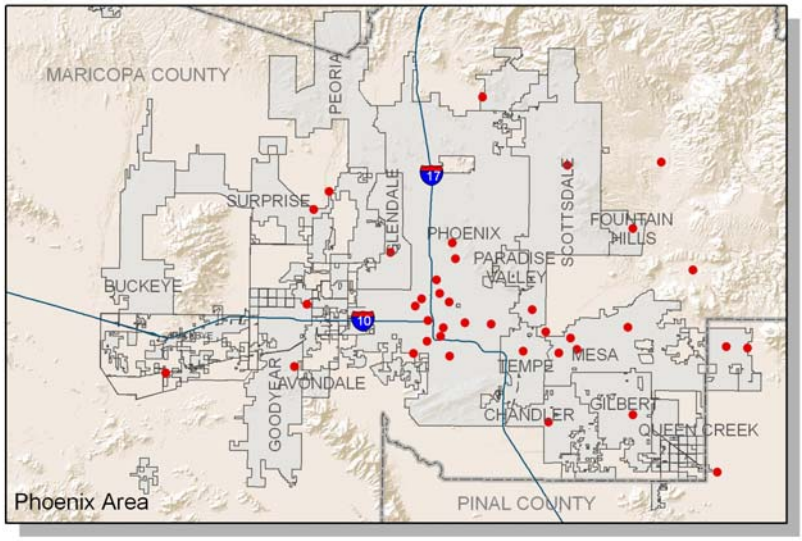
Visibility Network
Urban and regional haze visibility monitoring sites are shown on this map.

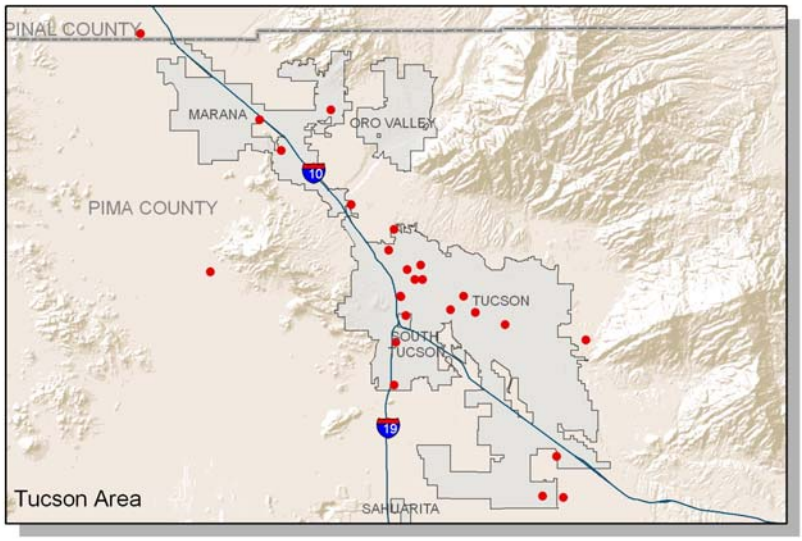
Nephelometers, Transmissometers, Cameras
This map shows the location of each of these types of monitors that ADEQ operates for the study of urban and regional visibility.

AMBIENT AIR MONITORS



CRITERIA POLLUTANT MONITORING



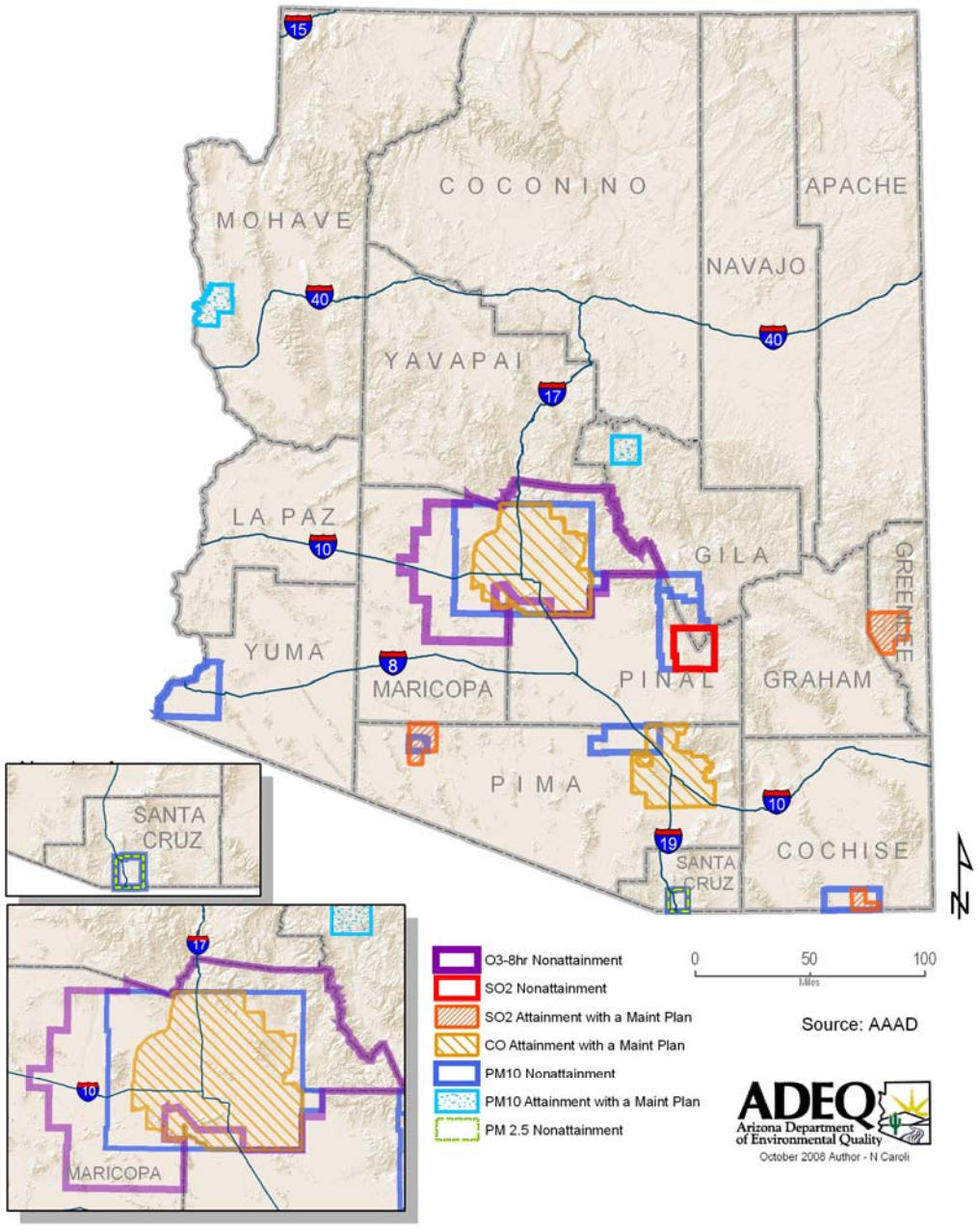


Source: AAD

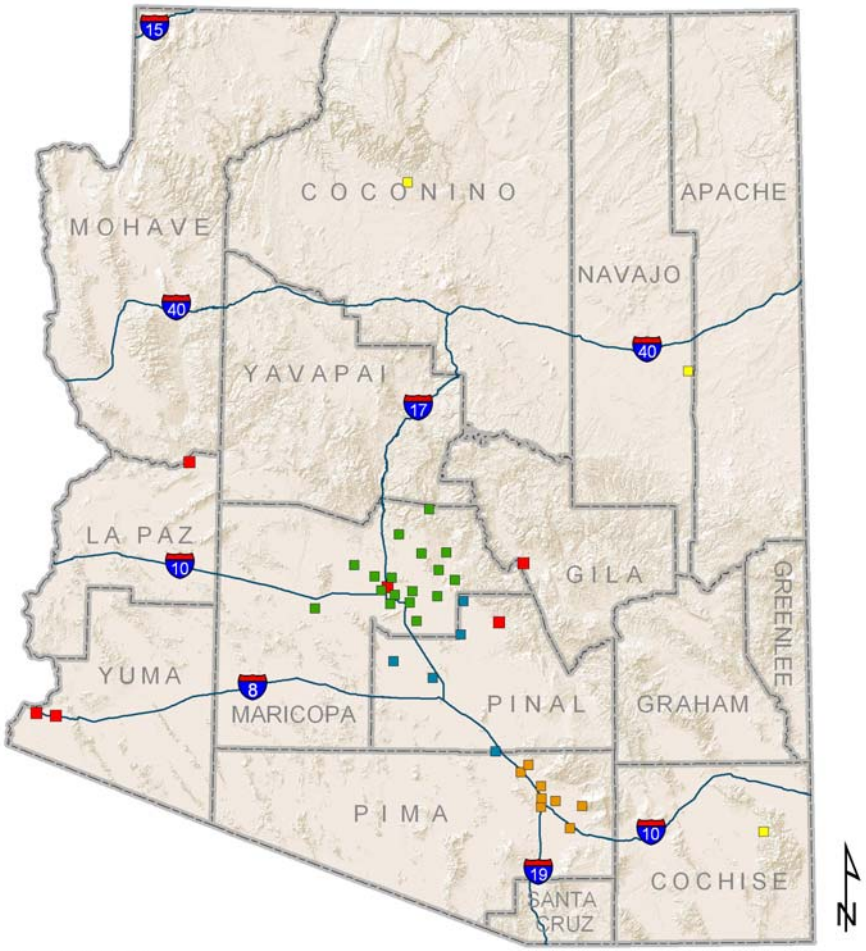
ADEQ Arizona Department of Environmental Quality

October 2008 Author - N Caroli

Nonattainment and Attainment Areas



Ozone Network



Source: AAAD

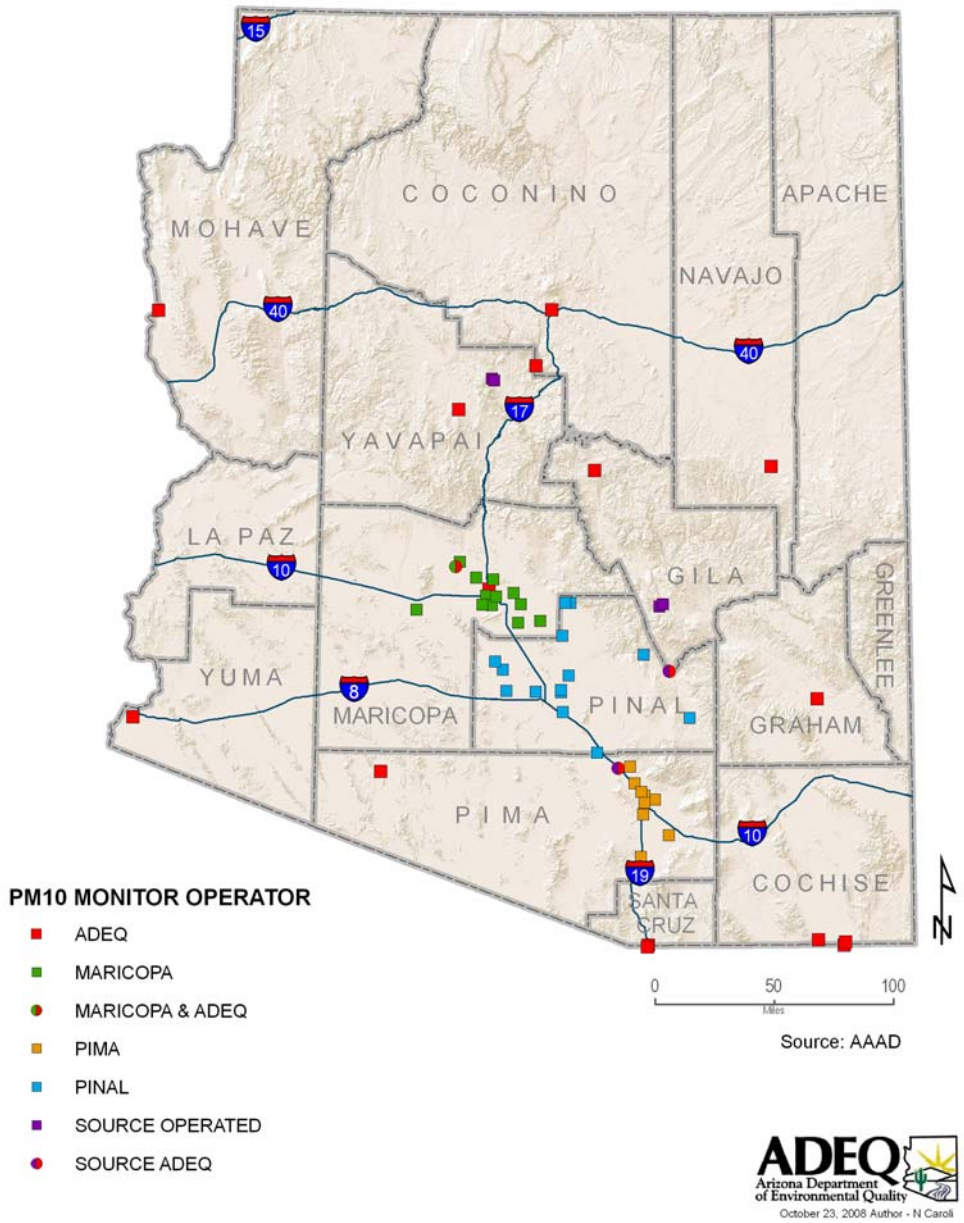
O3 MONITOR OPERATOR

- ADEQ
- NATIONAL PARKS SERVICE
- MARICOPA COUNTY
- PIMA COUNTY
- PINAL COUNTY

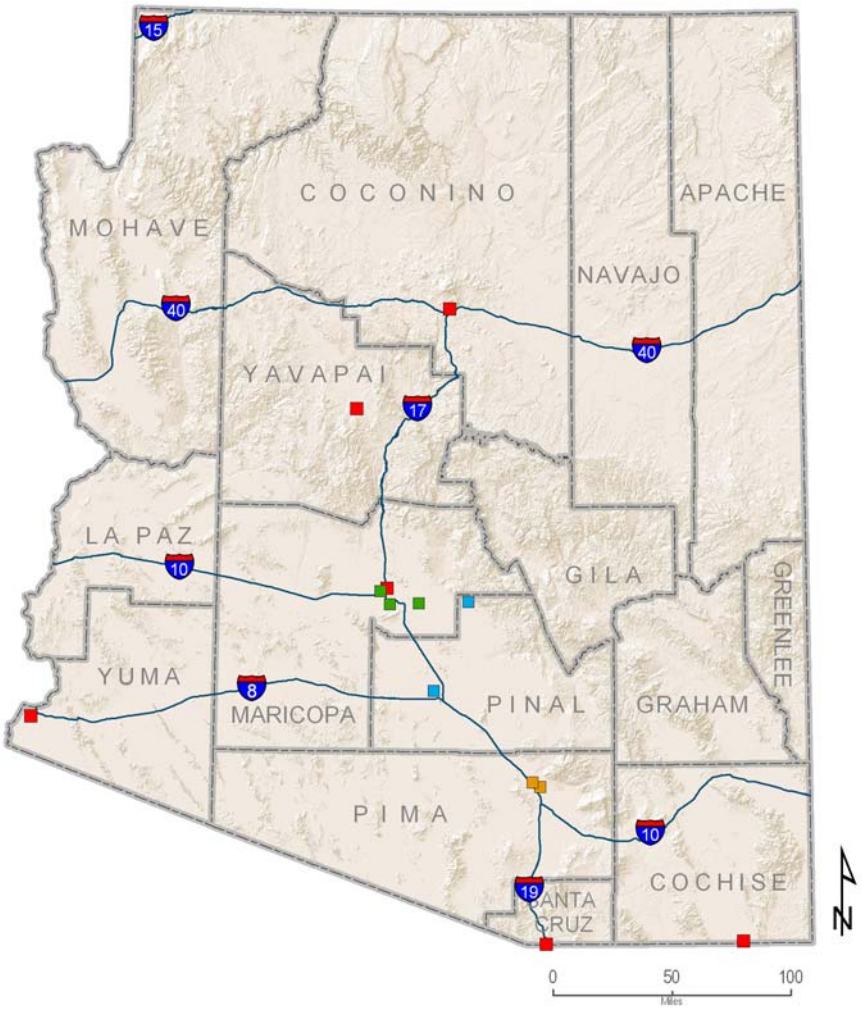
ADEQ Arizona Department of Environmental Quality

October 2008 Author - N Caroli

PM10 Network



PM 2.5 Network



Source: AAAD

PM 2.5 MONITOR OPERATOR

- ADEQ
- MARICOPA COUNTY
- PIMA COUNTY
- PINAL COUNTY

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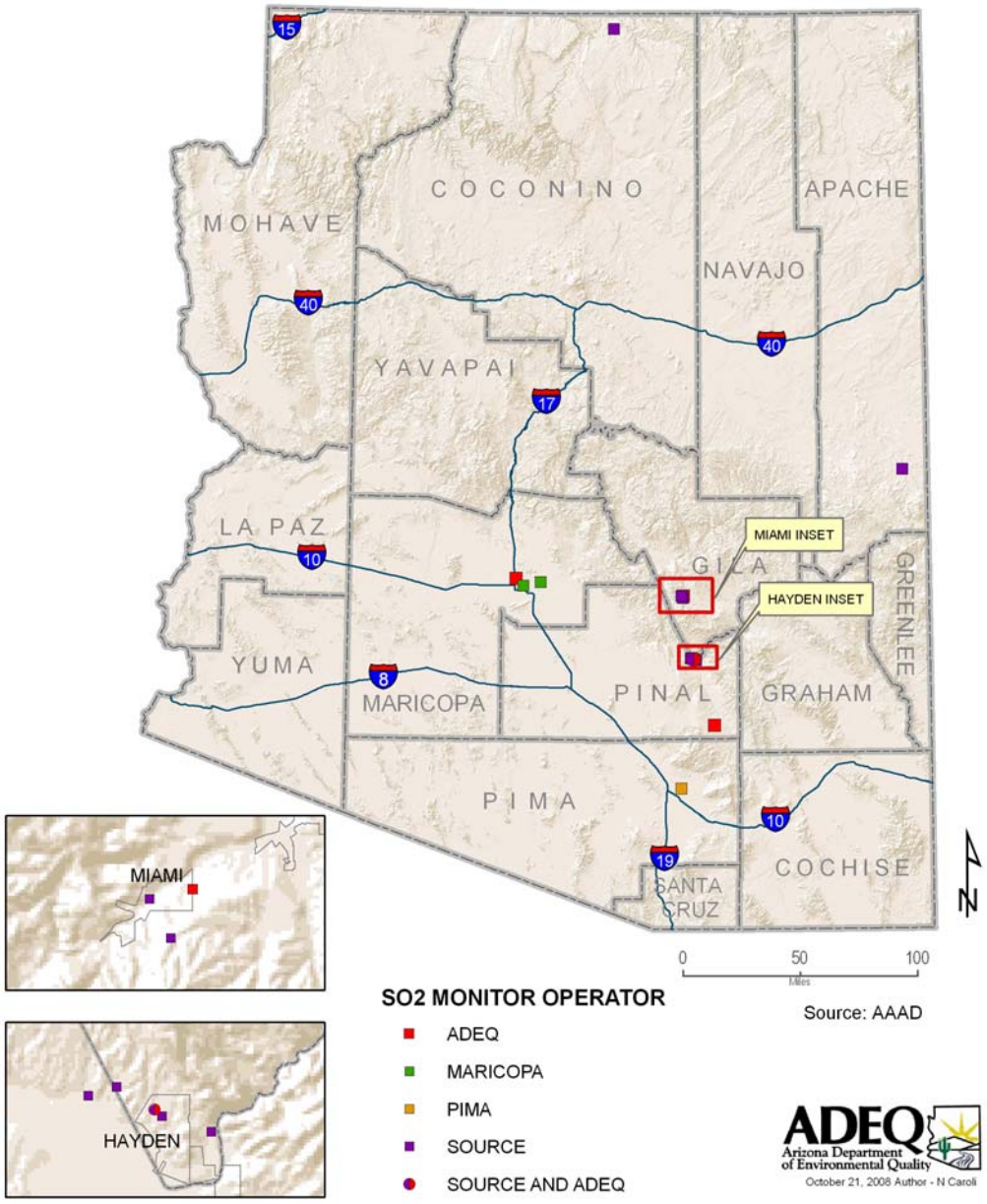
SO2 Network


COCONINO
APACHE
MOHAVE
NAVAJO
YAVAPAI
LA PAZ
MIAMI INSET
HAYDEN INSET
GILA
GREENLEE
YUMA
MARICOPA
PINAL
GRAHAM
PIMA
COCHISE
SANTA CRUZ
MIAMI
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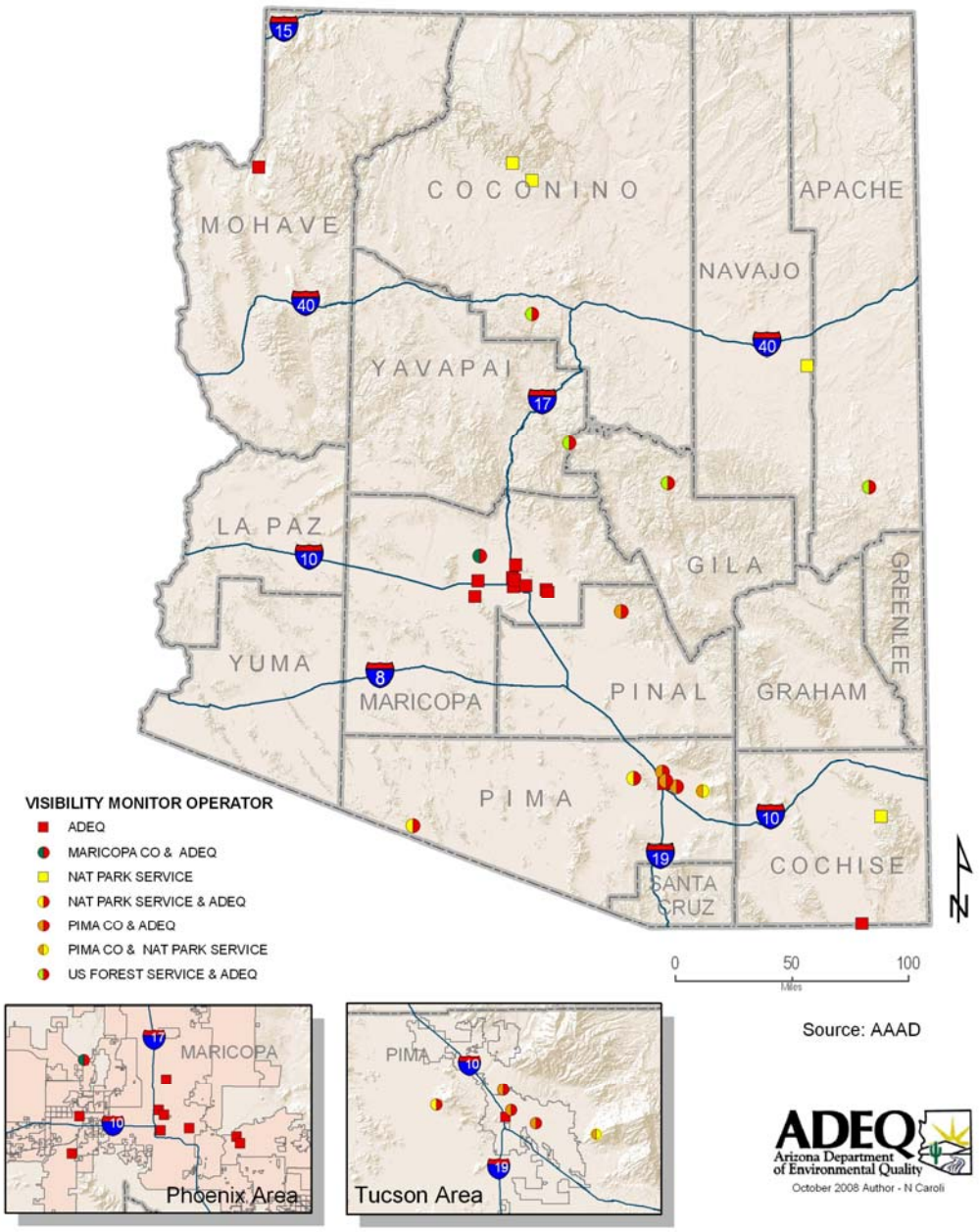
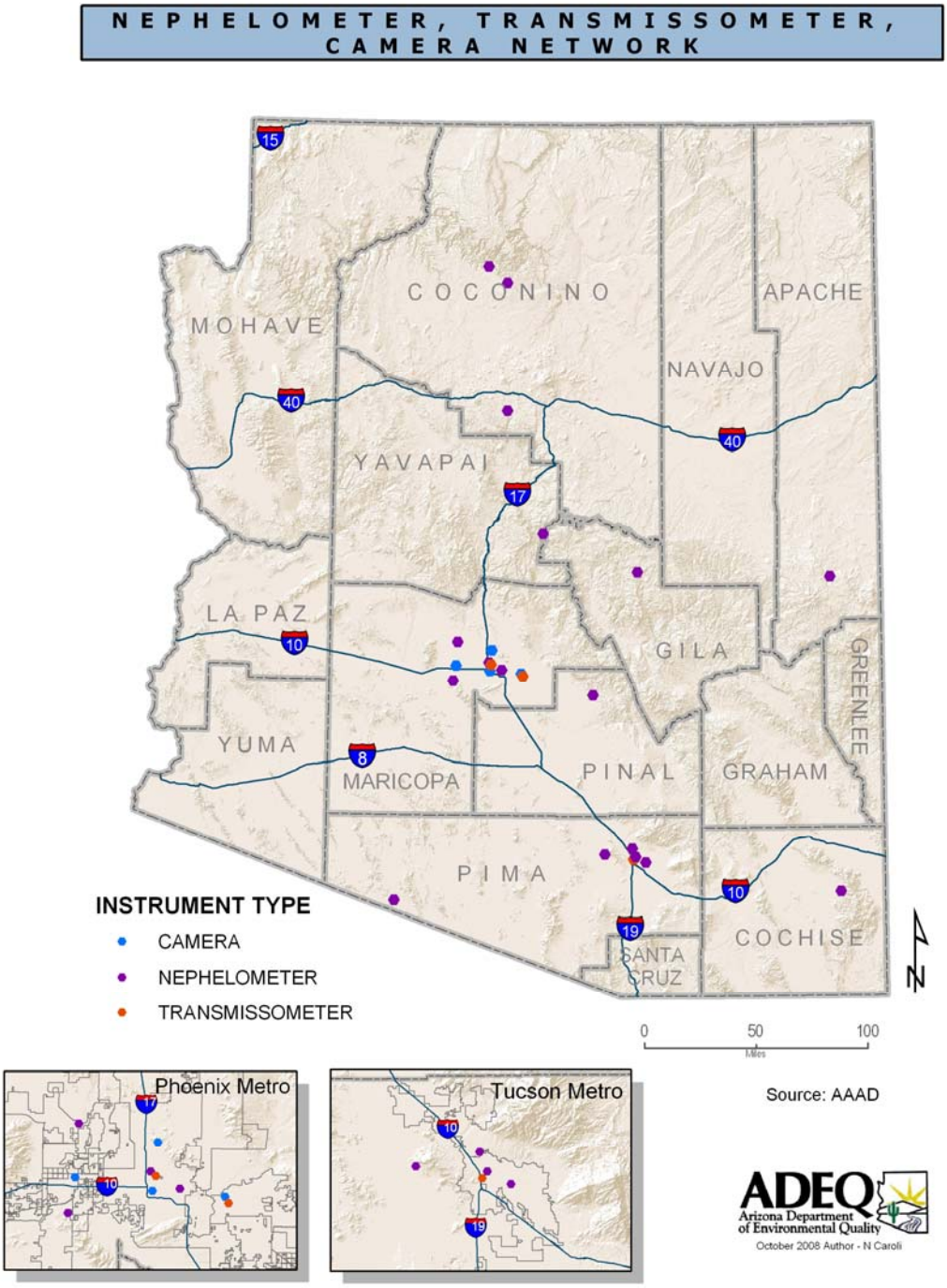
SO2 MONITOR OPERATOR
ADEQ
MARICOPA
PIMA
SOURCE
SOURCE AND ADEQ
Source: AAAD
ADEQ Arizona Department of Environmental Quality
October 21, 2008 Author - N Caroli

VISIBILITY NETWORK




NEPHELOMETER, TRANSMISSOMETER, CAMERA NETWORK
COCONINO
APACHE
MOHAVE
NAVAJO
YAVAPAI
LA PAZ
GILA
GREENLEE
YUMA
MARICOPA
PINAL
GRAHAM
PIMA
COCHISE
SANTA CRUZ
INSTRUMENT TYPE
CAMERA
NEPHELOMETER
TRANSMISSOMETER
0
50
100
Miles
N
Phoenix Metro
Tucson Metro
Source: AAAD
ADEQ
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