DRAFT

MEMORANDUM

Date: February 23, 2001

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Air Quality in Pima County**

Background

Air quality is a topic that is being analyzed as part of the Sonoran Desert Conservation Plan and the County's Amendment to the Comprehensive Plan. The Conservation Plan includes an Environmental Impact Statement which assesses the impact of conservation alternatives on air quality. The state law that defines the elements of the County's Comprehensive Plan update calls for "consideration of air quality and access to incident solar energy for all general categories of land use." In addition to being addressed as part of the Land Use Element of the Comprehensive Plan, the state law calls for air quality assessments as a part of the Environmental Planning Element of the Comprehensive Plan.

The attached study entitled *Air Quality in Pima County* is an introduction to this topic which will be integrated into the land use and conservation plans that develop over the next months. The air quality study is summarized in this memorandum according to the major sections of the report:

- Why is air quality a concern?
- How is air quality regulated?
- What are the air pollutants, sources and effects in Pima County?
- What are the trends in air quality in Pima County?
- What air pollution control programs are in place?

Why is Air Quality a Concern?

The first page of the air quality study lists a variety of problems that stem from air pollution and cites this statistic which answers the question, why is air quality a concern in Pima County?: "As population continues to grow, Pima County is experiencing a geometric increase in daily vehicle miles traveled (VMT). For example, in 1990 the population was 667,000 and the VMT was 12,500,000 miles per day. In 2001, the population has increased 29 percent to 861,000, however the VMT has increased 60 percent to nearly 20,000,000 miles per day. The benefits acquired with federally-mandated reductions in tailpipe emissions are being counteracted by the large increase in vehicle miles traveled."

How is Air Quality Regulated in Pima County?

Pages two and three of the air quality study describe the roles of government entities in regulating air quality in Pima County. Passed in 1970, the Clean Air Act has standards established by the Environmental Protection Agency. The Act is administered primarily through state and local governmental entities. In Pima County, three entities have roles: the Arizona Department of Environmental Quality; the Pima County Department of Environmental Quality; and the Pima Association of Governments.

- The Arizona Department of Environmental Quality (ADEQ) has the primary authority in the State of Arizona for air pollution control and abatement.

- The Pima County Department of Environmental Quality (PDEQ) is the local air pollution control agency for Pima County with jurisdiction over air pollution sources not under state jurisdiction and delegated authority from the State to (1) regulate certain stationary sources and portable air pollution sources, and (2) operate the Voluntary No-Drive Days (Clean Air) Program. PDEQ is responsible for monitoring the ambient air quality of the region by collecting and analyzing air quality data.

- Pima Association of Governments is designated as the lead air planning organization for Pima County and addresses regional air quality issues in keeping with federal, state, and local requirements.

Air Pollutants, Sources and Effects

Pages three through seven of the attached study define and describe the following air pollutants: Ground-level Ozone; Carbon Monoxide; Particulate Matter; Nitrogen Dioxide; Sulfur Dioxide; Lead; Volatile Organic Compounds; Air Toxics; Odors; and Regional Haze and Visibility Impairment.

In establishing permissible levels of regulated pollutants, the Environmental Protection Agency protects human health under primary standards, and the environment and property under a secondary set of standards. These standards are called the National Ambient Air Quality Standards. When a geographic area fails to meet the primary standards, that area is deemed to be a "nonattainment" area. A five tier classification system for the severity of nonattainment defines the nature and timelines of clean up requirements.

Air Quality Trends in Pima County

Pages seven through fourteen of the study detail the trends of various pollutants as measured by the Air Quality Index. Pima County's Department of Environmental Quality collects the information that is reported to the public through the media regarding air quality.

- In describing the index for carbon monoxide the study states: "There has been a gradual reduction in the maximum Air Quality Index values for carbon monoxide for the 5-year period [1995-1999], and the number of "Good" AQI days remained steadily high."

- In describing the index for particulate matters, the study states: "The Air Quality Index was in the 'unhealthful' range a number of times in 1999, and the number of 'good' Air Quality Index days was steady from 1996 through 1998, and usually low in 1999."

- In describing the ozone index, the study states: "The number of 'good' Air Quality Index days has steadily decreased since 1996."

It is notable that in 1978 Tucson was designated as being in nonattainment based on carbon monoxide concentrations. After implementation of effective corrective programs, the Environmental Protection Agency redesignated the area to the status of "maintenance." Keeping carbon monoxide levels low will be a challenge in the future as the number of vehicle miles being traveled increases with population growth and Tucson's automobile dependent lifestyle. Likewise, ozone trends have remained level for the last half decade but summer levels approach the limits of standards. Concentrations are likely to increase as automobile trips increase for the growing Tucson population.

Air Pollution Control Programs

Pages fourteen through sixteen of the air quality study describe programs established to redress both stationary and mobile causes of air pollution. The following programs reflect the extent to which air quality programs are transportation control measures:

- Federal Motor Vehicle Emissions Control Program
- Arizona Vehicle Emissions Inspection Program
- Arizona Oxyfuels Program
- Pima Association of Governments Travel Reduction Program
- Pima County Voluntary No-Drive Days (Clean Air) Program
- Pima County Voluntary Vehicle Repair and Retrofit Program
- Pima County Voluntary Lawn and Garden Equipment Collection Program
- Mass Transit
- Rideshare Program

Conclusion

For both purposes of the drafting the Environmental Impact Statement and meeting the state law definition of elements that are to be included in the comprehensive plan, Pima County has started to integrate air quality considerations into the regional planning effort. The attached study on *Air Quality in Pima County* introduces and sets the stage for further development of this important topic.

Attachment

Executive Summary

This report is a primer on air quality in Pima County. It was prepared by the Pima County Department of Environmental Quality, and provides a summary of air quality information, regulations, pollutants and their controls. The report was prepared as an initial effort towards providing input to the Sonoran Desert Conservation Plan process, regarding air quality impacts of human activities to the environment.

The report details the general impacts of air quality on the environment, and reviews the regulations governing the levels of common air pollutants in outdoor air. The report also examines these pollutants with respect to their sources and effects, and details trends observed in monitored data for these pollutants. Programs that are in place in Pima County to address reducing or maintaining healthy air pollution levels are also discussed.

There are many impacts that human activities can have on the quality of the air in a region. As growth and development continues throughout Pima County, it is critical that we consider a variety of factors in order to maintain good air quality. Appropriate controls must be implemented to protect public health during earthmoving activities and to reduce the creation of wildcat subdivisions with unpaved roads. Challenges also include improving and expanding transportation routes and methods, as well as continued monitoring of the increasing number of stationary pollution sources to prevent deterioration of air quality.

The location of pollution sources with less than adequate controls across the border in Mexico, has often resulted in poor air quality around the regions in which they are found. With some residents of Pima County indicating that they relocated here due to the clean air, good visibility, and the reported health benefits from such factors, it becomes increasingly important for ample discussions on maintaining good air quality to be factored into regional growth and development plans.

An air quality element will be developed for the Sonoran Desert Conservation Plan process that will address solutions to many of the above issues in Pima County. Other issues identified during the process as being important towards maintaining good air quality in Pima County will also be incorporated into the document. These issues will include discussions on the impacts of urbanization, growth and development on air quality, public awareness of air quality issues, programs that can help improve air quality in Pima County, and recommendations for items needing further study.

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AIR QUALITY PRIMER
Sonoran Desert Conservation Plan

1. WHY IS AIR QUALITY A CONCERN ?

There is no element on this planet that is more critical to human life than air. Air tainted with pollution can cause illness; burning eyes and nose, itchy, irritated throat, as well as difficulty in breathing. Some chemicals found in polluted air cause cancer, birth defects, brain and nerve damage, long-term injury to the lungs and breathing passages or even death. In a year 2000 survey of Pima County residents, 52 percent complained that they, or someone in their household, suffered vision or breathing problems as a direct result of air pollution.

In addition, air pollution can damage the environment. Trees, lakes and animals have been harmed by air pollution across the planet. Air pollutants have thinned the protective ozone layer above the Earth. This loss of stratospheric ozone can cause adverse changes in the environment as well as increased skin cancer and cataracts. Increased emissions of carbon dioxide have contributed to the warming of our atmosphere.

A more perceptible problem caused by air pollution is the creation of haze, which reduces visibility and obscures the clarity, texture, and form of the surrounding natural world. The Tucson area is in the unique situation of being in close proximity to two national parks designated as Class I Wilderness Areas under the federal Clean Air Act, to both the east and the west of the metropolitan area. These parks contain a concentration of desert vegetation, animals species, and vistas surpassed by few locations on this planet. The degradation of air quality and visibility would reduce the natural beauty of these locations, and correspondingly may reduce the number of visitors bringing revenue to Pima County. In addition, implementation of more stringent federal regulations may be required to protect these wilderness areas from further air quality deterioration.

Air pollution can also damage property. In high enough levels, it can stain buildings and even cause deterioration of stone, damaging structures, monuments and statues.

As population continues to grow, Pima County is experiencing a geometric increase in daily vehicle miles traveled (VMT). For example, in 1990 the population was 667,000 and the VMT was 12,500,000 miles per day. In 2001, the population has increased 29 percent to 861,000, however the VMT has increased 60 percent to nearly 20,000,000 miles per day. The benefits acquired with federally-mandated reductions in tailpipe emissions are being counteracted by the large increase in vehicle miles traveled.

2. HOW IS AIR QUALITY REGULATED IN PIMA COUNTY ?

The federal Clean Air Act is the law that regulates state and local ambient air quality. It was first passed in 1970 and has been modified several times over the years including a major revision in 1990. Although the 1990 Clean Air Act is a federal law covering the entire country, the states do much of the work to carry out the Act. States also have the ability to delegate some of their authority to local governments.

Under the Clean Air Act, the United States Environmental Protection Agency (EPA) sets limits on the concentrations of common air pollutants in the outdoor air anywhere in the United States. This ensures

that all residents of the United States have the same basic health and environmental protections. The law allows individual states to have stronger pollution controls, but states are not allowed to have weaker pollution controls than those set for the whole country.

States, in general, are required to develop state implementation plans (SIP) that detail how the state will maintain or reduce emissions enough to meet the National Ambient Air Quality Standards (NAAQS), and protect public health. A SIP is a collection of regulations the state will use to clean up polluted areas. The state is required to involve the public, through hearings and opportunities to comment in the development of each state implementation plan. The EPA must approve each SIP, and if a SIP isn't acceptable, the EPA can take over enforcing the Clean Air Act in that state by issuing a federal implementation plan (FIP). Regions within states that have exceeded air pollution limits set by the federal government are classified as being in non-attainment of the federal standard.

One of the major breakthroughs in the 1990 Clean Air Act is a permit program for larger stationary sources of air pollution. Under this provision, permits are issued by states or, if delegated the authority by the state, county governments. These permits includes information on which pollutants are being released, how much may be released, what kinds of steps the source must take to reduce pollution and monitor emissions. Businesses seeking permits have to pay permit fees which help pay the costs of air pollution control activities such as monitoring, compliance assistance, and enforcement.

2.1 The Role of the Arizona Department of Environmental Quality (ADEQ)

The Arizona Department of Environmental Quality (ADEQ) has the primary authority in the state of Arizona for air pollution control and abatement. ADEQ is charged with:

1) maintaining a SIP that provides for enforcement of the NAAQS and protection of visibility as required by the Clean Air Act;
2) adopting rules with respect to compliance with and attainment of the NAAQS; and
3) assuring that regional air quality plans are implemented.

ADEQ has jurisdiction over portable, mobile and some stationary air pollution sources and is responsible for development of stationary source permitting procedures and standards. ADEQ is also responsible for:

4) providing technical assistance to political subdivisions of the State for implementing air pollution control programs;
5) conducting research on the amounts of hazardous air pollutants in the air and their impacts on human health;
6) managing and implementing programs under the Air Quality Fee Fund including the regional Travel Reduction Program and the Voluntary No-Drive Days (Clean Air) Program;
7) implementing the Vehicle Emissions & Inspection Programs; and
8) conducting research on vehicular emissions and clean burning fuels.

ADEQ may delegate authority to a county for implementing air pollution control statutes.

2.2 The Role of the Pima County Department of Environmental Quality (PDEQ)

The Pima County Department of Environmental Quality (PDEQ) is the local air pollution control agency for Pima County. PDEQ has jurisdiction over air pollution sources not under state jurisdiction. PDEQ is delegated authority from the State of Arizona to regulate certain stationary sources and portable air pollution sources, and also to operate the Voluntary No-Drive Days (Clean Air) Program and other air pollution reduction programs. PDEQ is responsible for monitoring the ambient air quality of the region by collecting and analyzing air quality data.

Within PDEQ, the Director is designated as the Air Pollution Control Officer and has the authority to enforce certain regulations and implement air pollution reduction and maintenance plans.

2.3 The Role of the Pima Association of Governments (PAG)

Pima Association of Governments (PAG) is a non-profit Arizona corporation with a governing board composed of elected officials from six jurisdictions. PAG has been designated by the Governor of Arizona as the lead air planning organization for Pima County and addresses regional air quality issues in keeping with federal, state, and local requirements. PAG, together with the State, is responsible for determining which elements of the state implementation plans will be planned, implemented, and enforced by State and local governments. Failure to meet the requirements set forth by federal regulations can result in economic sanctions and/or civil lawsuits. PAG is responsible for the development of air pollution reduction and maintenance area plans, for implementing the PAG Travel Reduction and RideShare Programs, and for making transportation/air quality conformity determinations.

3. AIR POLLUTANTS, THEIR SOURCES AND EFFECTS

Some air pollutants are commonly found throughout the United States. These pollutants can negatively affect health, harm the environment, and cause property damage. EPA has termed these common air pollutants "criteria pollutants" because the agency established regulations for these pollutants by first developing health-based criteria as the basis for setting permissible levels. These permissible levels are called National Ambient Air Quality Standards (NAAQS). One set of limits, primary standards, protect human health; another set of limits, secondary standards, are intended to prevent environmental and property damage. A geographic area that meets the primary standard is called an attainment area; areas that don't meet the primary standard are called nonattainment areas.

If air quality monitoring efforts indicate that pollutant levels do not meet the NAAQS, EPA and the state cooperate to identify the nonattainment area for that particular pollutant. Then, the EPA classifies the nonattainment area according to the level of concentrations of that pollutant. There are five classes of nonattainment areas ranging from marginal to extreme. The 1990 Clean Air Act uses this new classification system to tailor clean-up requirements to the severity of the pollution and set realistic deadlines for reaching clean-up goals. If the deadlines are missed, the law allows more time to clean up, but usually a nonattainment area that has missed a deadline will have to meet the stricter clean-up requirements set for more polluted areas.

3.1 Ground-level Ozone

One criteria pollutant is called ground-level ozone (or smog), not to be confused with stratospheric ozone, which is a naturally occurring layer that protects Earth from damaging solar radiation. Ground-level ozone is produced by the combination of pollutants from many sources, including motor vehicles, smokestacks, cars, paints and solvents. When the ingredients (or precursors) of ground-level ozone are emitted into the air, they rise into the sky and move on the prevailing winds. Ozone levels are dependent on atmospheric conditions such as temperature, humidity, sunlight, and the concentrations of two precursors (oxides of nitrogen and volatile organic compounds). If the day is hot, windless, and sunny, ozone will form more easily. Weather and geography play an important role in the creation and dispersion of air pollutants, especially in the case of ground-level ozone.

The primary health effect associated with ozone is impaired lung function and irritation of the mucous membranes in the nose and throat causing coughing and choking. Ozone also aggravates chronic respiratory diseases like asthma and bronchitis. In addition, the photochemical oxidants that accompany ozone are powerful eye irritants.

3.2 Carbon Monoxide

Carbon monoxide (CO) is a criteria pollutant that is a colorless, odorless gas produced by the incomplete combustion of fuels. Stagnant weather conditions usually occur in winter months and are often the times when CO levels are the highest. The major source of CO in our community is motor vehicles, which release over 65 percent of the CO emissions in Pima County.

The fundamental health effect from CO lies in its ability to replace oxygen in the red blood cells, reducing the amount of oxygen that can reach body cells. Symptoms of high CO concentrations may include dizziness, slowed reaction times, and headaches.

3.3 Particulate Matter

The third criteria pollutant of concern in the Pima County area is particulate matter. Particulate matter (PM_{10} and $PM_{2.5}$) are terms used to describe small particles suspended in the air. PM_{10} refers to the specific range of particles 10 micrometers or less in size and are also called fine particulate. $PM_{2.5}$ is a subset of PM_{10} having a specific range of particles 2.5 micrometers or less, which is also referred to as very fine particulate. Particle composition can include everything from fine dust to carbon (soot), and can be microscopic or visible to the naked eye.

Particulate matter in Pima County is generated from a variety of sources including traffic on unpaved roads, unpaved shoulders, and paved streets, combustion, earth-moving, mining, construction, and agricultural activities. The natural desert background comprises about one-third of the typical urban PM_{10} concentrations.

The PM_{10} and $PM_{2.5}$ particles are inhalable and able to pass through the body's filtering system posing a health risk to the public. Health risks posed by inhaled particulates are influenced both by the penetration and deposition of particles in the various regions of the respiratory tract, and by the

biological responses to these deposited materials. Studies have shown that smaller particles pose a greater health risk because they can be deposited deeper into the respiratory system.

Particulate matter in the air is also a primary contributor to impaired visibility. In addition, deposition of particulates can soil buildings, enhance metal corrosion, and reduce agricultural yields.

3.4 Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a poisonous and highly reactive gas produced by high-temperature combustion processes, and also formed photochemically from nitric oxide. The major source of NO_2 in Pima County is motor vehicles. Although high levels of NO_2 irritate the respiratory system, its principal harm in Pima County comes from the ozone that it helps to form by reacting with atmospheric oxygen and volatile organic compounds. NO_2 is a yellow-brown gas that can also limit visibility and increase urban haze.

3.5 Sulfur Dioxide

In the past, the major source of SO_2 was copper smelters. A reduction in the number of smelters and technological improvements in pollution controls have substantially reduced these emissions. Many types of respiratory diseases such as coughs, colds, asthma and bronchitis are associated with high levels of sulfur dioxide. In addition, SO_2 can cause impairment of visibility at high concentrations.

3.6 Lead

Monitoring for lead was discontinued in Pima County in 1997, after PDEQ received permission for exemption for lead monitoring by EPA. Pima County has negligible levels of lead in the ambient air, due in large part to the elimination of lead in gasoline and the lack of any significant stationary point source lead emissions.

3.7 Volatile Organic Compounds

Volatile organic compounds, or VOCs, are found in gasoline, paints, solvents, and many consumer products from hair spray to charcoal lighter fluid. These compounds are primary precursors in the formation of ground-level ozone, and in many instances control strategies for reducing ambient levels of ozone are based on limiting VOC emissions.

3.8 Air Toxics

Air toxics, or hazardous air pollutants (HAPS), can cause cancer, fertility problems, and other very serious illnesses as well as environmental damage. The Clean Air Act provided the EPA with the authority to list air toxics for regulation and then to regulate the chemicals. Up until 1990, the agency listed and regulated seven air toxics. The 1990 Act includes a list of 189 HAPS selected by Congress on

the basis of potential health and/or environmental hazard. EPA is now required to regulate these listed air toxics. The 1990 Act also allows EPA to add new chemicals to the list as necessary.

Air toxics have killed people swiftly when high concentrations were released. The 1984 release of methyl isocyanate at a pesticide-manufacturing plant in Bhopal, India, killed approximately 4,000 people and injured more than 200,000. HAPS are released from sources throughout the country and from motor vehicles. Gasoline contains toxic chemicals that escape from liquid gasoline and form a vapor that is released into the air, if special controls are not present at the pump. In addition, when motor vehicles burn gasoline, HAPS are emitted from the tailpipes. Air toxics are also released from small stationary sources such as dry cleaners and auto paint shops, and large stationary sources such as chemical factories and incinerators.

3.9 Odors

Odor pollution can be a major cause of discomfort and nuisance, affecting the well-being and sometimes health of human beings. Offensive odors in the ambient air are often regulated through local ordinances or through the air quality permitting system. Under Pima County Code, *"no person shall emit gaseous or odorous materials from equipment, operations or premises under his control in such quantities or concentrations as to cause air pollution"*. Air pollution is defined here as the presence in the outdoor atmosphere of one or more air contaminants or combination thereof in sufficient quantities, which either alone or in connection with other substances, by reason of their concentration and duration are or tend to be injurious to human, plant, or animal life; or causes damage to property; or unreasonably interferes with the enjoyment of life or property of a substantial part of a community, or obscures visibility; or which in any way degrades the quality of the ambient air below the standards established by the Board of Supervisors.

Odor complaints from businesses with air quality permits are usually regulated through the permit conditions. The majority of the odor complaints in Pima County are caused by the use of paint products. Other sources of complaints have included fireplaces, motor vehicle exhaust, landfills, tallow plants, and wastewater treatment plants.

3.10 Regional Haze and Visibility Impairment

The scenic vistas in Pima County become impaired when light is absorbed, scattered, or extinguished by substances in the air. This impairment can be attributed to natural or man-made sources of air pollution. There are two terms that are generally used to describe this view-obscuring phenomenon: visibility impairment, and regional or urban haze. Visibility impairment means any humanly perceptible change in visibility (light extinction, visual range, contrast, coloration) from that which would have existed under natural conditions. Regional or urban haze means visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. Such sources include, but are not limited to, major and minor stationary sources, mobile sources, and area sources.

Meteorological conditions have a significant impact on the presence of visibility impairing pollutants in the ambient air. High wind speeds effect the dispersal of emitted pollutants, and low wind speeds during stagnant conditions can lead to the accumulation of pollutants in the air. Wind direction, as well as

topography of the area, can also effect the geographic location of regional haze. Temperature inversions (which occur when the surface air is cooler than the air above, causing the surface air to be "locked in" with little rising and mixing) produces strong air stability, which causes the visibility impairing pollutants to be more concentrated and to remain near the ground level. As the surface temperature increases through the day, the air becomes more turbulent and mixing occurs allowing the pollutants to disperse. Humidity also plays a role in observed haze because particulate matter may contain chemical constituents that are hydroscopic and absorb water when humidity is elevated, causing an increase in light extinction.

The federal government has promulgated laws to protect visibility in states that contain national parks, such as Arizona. The provisions in these laws mandate that the states prepare an implementation plan to assure that reasonable progress will be made in preventing or remedying existing and future visibility impairment. To comply with the EPA rules and track visibility over time, monitors have been set up in several areas of the Arizona, including Pima County. The visibility monitoring network in Tucson is reported by the ADEQ and maintained by the PDEQ. The visibility and urban haze network is part of an ongoing study to measure the chemical composition of Tucson's atmosphere through optical, gaseous, particulate, and meteorological measurements that attempt to explain the nature of the haze and sources that contribute to light extinction.

4. AIR QUALITY TRENDS IN PIMA COUNTY

4.1 Air Quality Index

The Air Quality Index (AQI), previously known as the Pollutant Standard Index (PSI), is an index of air quality devised by the EPA. It serves as a uniform indicator by which daily air pollution levels are reported to the public. Air quality information is collected by PDEQ monitors located throughout Eastern Pima County. The information is then relayed to the media and the general public using easily understood AQI values.

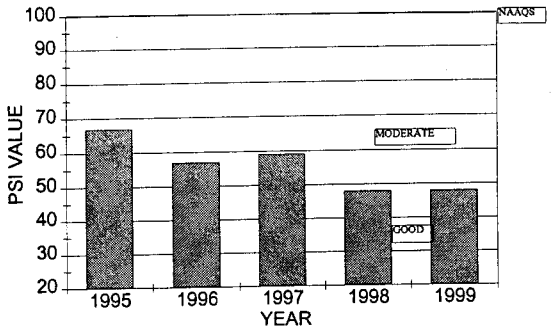
The AQI values represent the percentage of the federal health standard that a pollutant's measured value falls in. For example, the 1-hour standard for ozone is 0.120 ppm, so a concentration of .084 ppm, which is 70 percent of the standard, would be reported as an AQI of 70.

The AQI qualitative descriptors are good (within the range of 0-50), moderate (within the range of 51-100), unhealthy for sensitive groups (within the range of 101-150), unhealthy (within the range of 151-200), very unhealthy (201-300) and hazardous (301-500). Therefore, in the example cited above, with an AQI of 70, the ground-level ozone level would be considered in the moderate range.

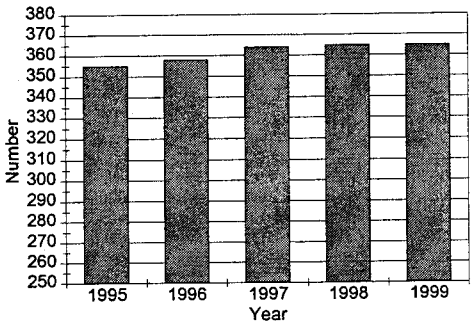
4.1.1 AQI for Carbon Monoxide

The graphs below show the trends in AQI values for carbon monoxide from 1995 through 1999. It can be seen that there has been a gradual reduction in the maximum AQI values for carbon monoxide for that 5-year period, and that the number of "Good" AQI days remained steadily high.

Carbon Monoxide
Maximum AQI Values (1995-1999)



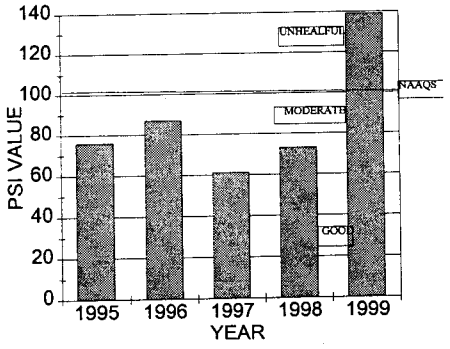
Carbon Monoxide
Number of "Good" AQI Days (1995-1999)



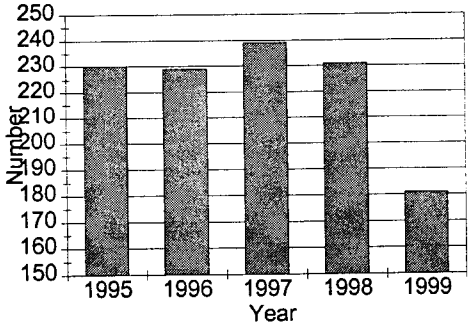
4.1.2. AQI for Particulate Matter (PM10)

The graphs below show the trends in AQI values for particulate matter (PM10) from 1995 through 1999. It can be seen that the AQI was in the "Unhealthful" range a number of times in 1999, and that the number of "Good" AQI for days was steady from 1996 through 1998, and usually low in 1999.

Particulate Matter (PM10)
Maximum AQI Values (1995-1999)



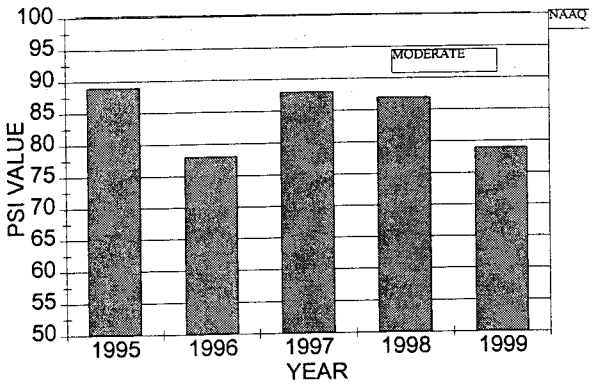
Particulate Matter (PM10)
Number of "Good" AQI Days (1995-1999)



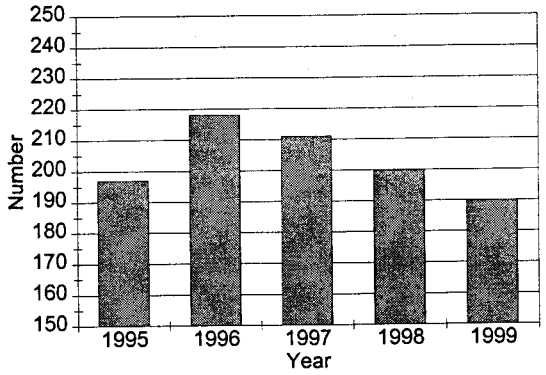
4.1.3. AQI for Ozone

The graphs below show the trends in the AQI values for ozone from 1995 through 1999. It can be seen that the peak ozone AQI levels have occurred near 85% of the standards, and that the number of "Good" AQI days has steadily decreased since 1996.

Ozone
Maximum AQI Values (1995-1999)



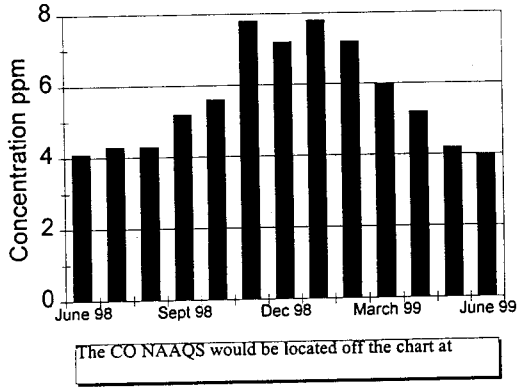
Ozone
Number of Good AQI Days (1995-1999)



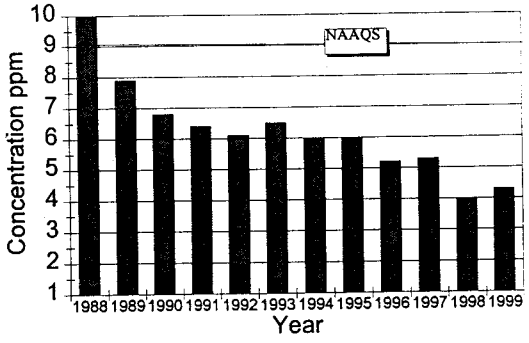
4.2. Carbon Monoxide Trends

The EPA has defined the primary (health-related) standards for carbon monoxide (CO) as being 9 ppm ($10ug/m^3$) for an 8-hr average concentration, and 35 ppm ($40ug/m^3$) for a 1-hr average concentration. These levels cannot be exceeded more than once per year. Some recent trends in carbon monoxide levels are as shown below:

Carbon Monoxide
Highest Monthly 1-Hr Averages (1998-1999)
22nd St/ Alvernon Monitoring Site



Carbon Monoxide
Highest Yearly 8-Hr Averages (1988-1999)
22nd St/ Alvernon Monitoring Site



As seen from the graphs above, the Tucson area generally has highest CO readings in the winter months. This is primarily due to stagnant air conditions in the colder winter mornings. This condition causes

pollutants to accumulate close to the ground, and high concentrations of CO are normally found near congested intersections.

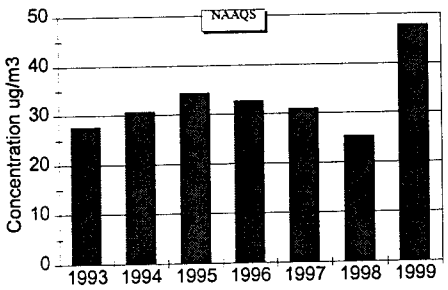
The graphs also show that Tucson exceeded the CO standard for the last time in 1988. The metropolitan area of Tucson was designated as being in nonattainment of the federal standards in 1978. In the 1970s and early 1980s, Pima County frequently did not meet the standards for carbon monoxide. Several programs were implemented locally to combat carbon monoxide emissions including the Oxygenated Fuel Program, the Vehicle Emissions and Inspection Program, the Travel Reduction Program, the Voluntary No-Drive Day Program (Clean Air Program), improvements to mass transit and various transportation control measures. During that same time period, the federal tailpipe emission standards for new cars was modified to significantly reduce CO emissions from motor vehicles.

In the year 2000, the EPA redesignated Pima County from a nonattainment area for carbon monoxide to a maintenance area. As a maintenance area, Pima County is required maintain existing control measures for CO, to assure that the levels of this pollutant are maintained below the NAAQS. The maintenance area plan for CO, known as the Carbon Monoxide Limited Maintenance Plan (CO LMP) also includes requirements for monitoring major intersections in the Tucson metropolitan area to analyze trends in CO levels. The current levels of CO remain below 40 percent of the NAAQS, but with population continuing to grow in Pima County and more vehicle miles being traveled, these levels could increase in the future.

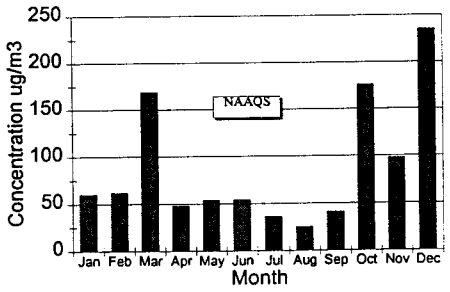
4.3 Particulate Matter (PM_{10}) Trends

The EPA has defined the primary (health-related) standards for particulate matter of 10 microns or less (PM_{10}) as being 50ug/m^3 for the annual average concentration, and 150ug/m^3 for a 24-hr average concentration. The secondary (welfare-related) standards are the same as the primary standards. The standard is attained when the expected number of exceedances in a year averaged over three years is less than or equal to one. Some recent trends in PM_{10} levels are as shown below:

Particulate Matter (PM_{10})
Annual Average (1993-1999)
Orange Grove Monitoring Site



Particulate Matter (PM_{10})
Highest Monthly 24-Hr Averages (1999)
Orange Grove Monitoring Site



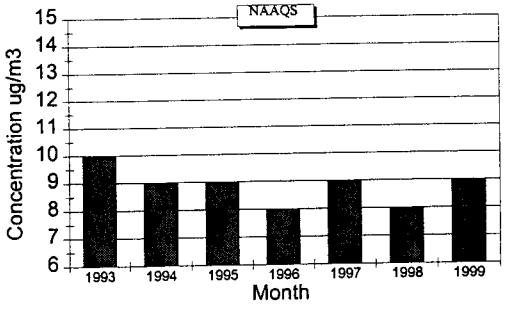
As seen from the graphs above, the annual average levels of PM_{10} remains below the federal standard, although the levels were close to the standard in 1999. It can be seen that in 1999 the Tucson area had levels of the PM_{10} concentrations that exceeded the federal 24-Hr standard several times. In fact, Pima County violated the federal standards by recording exceedances of the standard on four separate days in 1999. This situation would ordinarily require the Pima County area to be designated as being in nonattainment of the federal standard. However, by being able to demonstrate to the EPA and ADEQ conclusively that these events were caused by unusually high wind events, Pima County has utilized provisions in the Clean Air Act that will allow the region to remain in attainment of the standards. These provisions call for the development of a comprehensive plan to protect public health and welfare from future high wind natural events, to be called the Natural Events Action Plan (NEAP). Details of this process can be found at the web site http://www.deq.co.pima.az.us/air/pcneap/pcneaphome.htm

The provisions in the 1990 Clean Air Act that allow for Pima County to remain in attainment are detailed in the 1996 EPA Natural Events Policy and the 1999 ADEQ Exceptional and Natural Events Policy. These policies contain key timelines which must be achieved towards development of the NEAP. Failure to meet those submittal deadlines could result in a nonattainment designation from the EPA. The NEAP, currently being prepared by PDEQ in conjunction with ADEQ, must be submitted to the EPA by June 23, 2001. The control measures to be implement as part of the NEAP are required to be in place by December 23, 2001. This plan, if approved by EPA and ADEQ, will allow Pima County to remain in compliance with the standards (or in attainment) for PM_{10}.

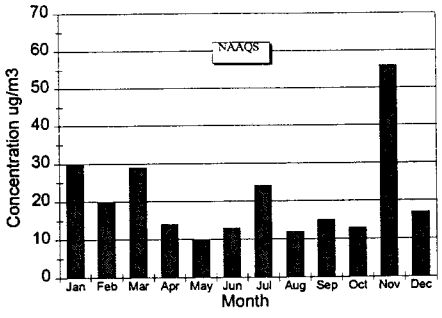
4.4 Particulate Matter ($PM_{2.5}$) Trends

The EPA has defined the primary (health-related) standards for particulate matter of 2.5 microns or less ($PM_{2.5}$) as being 15ug/m^3 for the annual average concentration, and 65ug/m^3 for a 24-hr average concentration. The secondary (welfare-related) standards are the same as the primary standards. Some recent trends in $PM_{2.5}$ levels are as shown below:

Particulate Matter ($PM_{2.5}$)
Annual Average (1993-1999)
Orange Grove Monitoring Site



Particulate Matter ($PM_{2.5}$)
Highest Monthly 24-Hr Averages (1999)
Orange Grove Monitoring Site

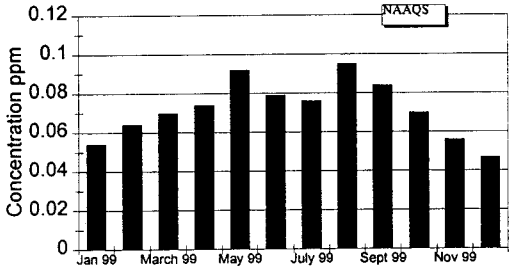


As seen from the graphs above, the annual average levels of $PM_{2.5}$ remain well below the federal standards, and that the monthly maximum $PM_{2.5}$ levels in 1999 were also in general well below the standards.

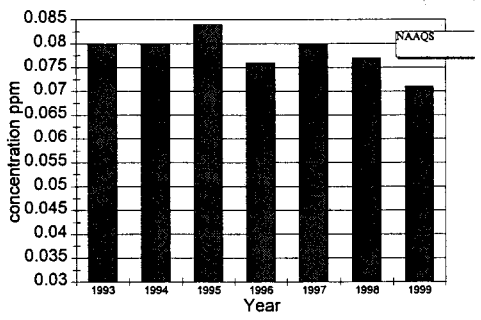
4.5 Ozone Trends

The EPA has defined the primary (health-related) standards for ozone as being 0.12 ppm (235 ug/m^3) for the 1-Hr average concentration, and 0.08 ppm (157ug/m^3) for the 8-hr average concentration. The secondary (welfare-related) standards are the same as the primary standards. Some recent trends in ozone levels are as shown below:

Ozone
Highest Monthly 1-Hr Averages (1999)
22nd St/ Craycroft Monitoring Site



Ozone
Fourth Highest 8-Hr Averages (1993-1999)
Saguaro Park East Monitoring Site



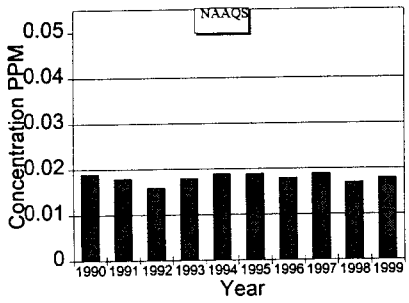
As seen from the graphs above, the levels of ozone in general are higher in the summer months. This is due to intense sunlight, high heat, and stable air conditions. Oxides of nitrogen and volatile organic compounds are the precursor pollutants that react in the presence of sunlight and heat to form ozone. This process increases during the summer. The graphs of the 8-Hr average concentrations show that over the past 7 years, the levels of ozone have hovered closed to that standard. There have been no violations or exceedances of the ozone NAAQS in Pima County since 1982. Ozone levels have remained relatively steady for the past five years, with 1999 summer levels approaching but not exceeding the NAAQS.

The fluctuation in ground-level ozone is due more to changing weather conditions than to lower emissions from any particular source. During the next hot summer, levels could easily be seen matching or exceeding the relatively high ozone concentrations seen in 1995. Since the major source of precursors to ozone is motor vehicle use, concerns rise as the county's population continues to grow and more cars are being driven more miles in Pima County.

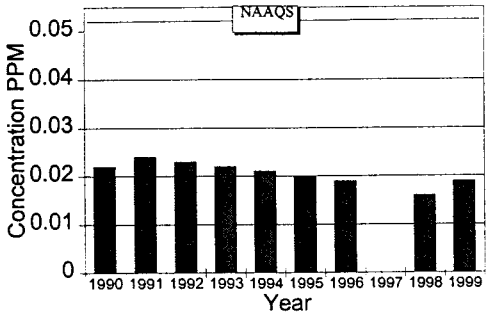
4.6 Nitrogen Dioxide Trends

The EPA has defined the primary (health-related) standards for nitrogen dioxide as being 0.053 ppm ($100ug/m^3$) for the annual average concentration. The secondary (welfare-related) standards are the same as the primary standards. Some recent trends in nitrogen dioxide levels are as shown below:

Nitrogen Dioxide
Annual Averages (1990-1999)
22nd St/ Craycroft Monitoring Site



Nitrogen Dioxide
Annual Averages (1990-1999)
Pomona/Children's Park Monitoring Site



As seen from the graphs above, the levels of nitrogen dioxide monitored for are well below the federal standards.

4.7 Sulfur Dioxide Trends

The EPA has defined the primary (health-related) standards for sulfur dioxide as being 0.03 ppm ($80ug/m^3$) for the annual arithmetic mean concentration, and 0.14 ppm ($365ug/m^3$) for the 24-Hr average concentrations. The secondary (welfare-related) standards is 0.5 ppm ($1{,}300ug/m^3$) for a 3-Hr average concentration. Sulfur dioxide levels in eastern Pima County average in general below 10 percent of the federal standards.

4.8 VOCs, Air Toxics and Odors Trends

Monitoring studies in VOCs and air toxics are in general costly, and are carried out periodically by ADEQ and by local agencies as funding permits.

4.9 Regional Haze and Visibility Trends

Field studies in the Tucson area conducted by ADEQ have shown that particles less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$) cause the majority of light scattering, leading to reduced

visibility. Scattering and absorption of light by gases have been found to be minor contributors to the light extinction in the Tucson area. Nitrogen dioxide, a pollutant normally present in the area from automobile emissions, absorbs significant quantities of light and also causes reduced visibility.

A report issued in 1999 by ADEQ indicated that light extinction trends remained steady in Tucson as opposed to Phoenix, where it has increased dramatically. Light extinction in the Tucson area is highest in November through January and shows a small weekday-weekend difference with weekend values about 13 percent lower than the average weekday values.

An additional challenge in maintaining good visibility and minimizing regional haze is the fact that land management agencies are planning to increase the amount of prescribed fires. This increase in controlled burns will result in increased air emissions at a time when state, local and tribal air quality agencies are faced with the need to reduce air emissions to increase the number of clear days. It will be critically important for air quality agencies and land management agencies to work together to minimize the impact on visibility and regional haze as a result of increased burning.

5. AIR POLLUTION CONTROL PROGRAMS

Air pollution control programs can generally be divide into categories of programs for stationary and mobile sources. Stationary source controls are usually monitored and enforced using a permitting program. Mobile source programs are implemented by monitoring mobile sources emissions, and by use of regional programs to encourage reduced operation of mobile air pollution sources. Motor vehicles are the major contributors to the primary air pollutants found in our community: carbon monoxide; particulate matter; and the precursors to ground-level ozone. As a result, transportation control measures are the predominant strategies used to improve air quality in Pima County. In general, control measures that reduce traffic congestion, also reduce the concentration of air pollutants.

5.1 Air Quality Permitting Program

The 1990 Clean Air Act is a permit program for larger stationary sources of air pollution. Under this provision, permits are issued by states or, if delegated the authority by the state, county governments. These permits includes information on which pollutants are being released, how much may be released, what kinds of steps the source must take to reduce pollution and monitor emissions. Businesses seeking permits have to pay permit fees which help pay the costs of air pollution control activities such as monitoring, compliance assistance, and enforcement.

5.2 Federal Motor Vehicle Emissions Control Program

The federal government has reduced the level of tailpipe emissions allowable to manufactures of on-road vehicles dramatically over the last ten years. The standards have recently been extended to heavy-duty vehicles and may continue to become more stringent in the future. This tailpipe emissions control program continues to be the most effective control measure for carbon monoxide.

5.3 Arizona Vehicle Emissions Inspection Program (VEIP)

ADEQ oversees the VEIP in the areas of the state required to have this program. The primary purpose of the VEIP is to identify vehicles on an annual basis that do not meet state emissions standards. Vehicles that do not pass the emissions test are required to be repaired and re-inspected. By requiring regular maintenance of the vehicles, the VEIP is the basic tool to maintain the long-term benefits of the federal tailpipe emissions control program. A one-time waiver for the life of the vehicle is granted for vehicles that have been repaired as required, but still fail the re-inspection.

5.4 Arizona Oxyfuels Program

In Pima County oxygenated fuel is required from October 1 through March 31 for gasoline-fueled vehicles. In recent years, the predominant oxygenate used has been ethanol. The use of methyl tertiary butyl ether (MTBE) has been discontinued, due to its persistence as a contaminant of groundwater. The Oxyfuels Program was implemented in 1990 to reduce carbon monoxide levels in Pima County.

5.5 PAG Travel Reduction Program

The Travel Reduction Program (TRP) was created in 1988 when Pima County, the Cities of Tucson and South Tucson, and the Towns of Marana and Oro Valley each passed TRP Ordinances. The Town of Sahuarita passed their ordinance in 1996 to join the Travel Reduction Program.

The purpose of the TRP is to improve regional air quality and reduce traffic congestion by encouraging the use of alternate modes of transportation such as carpooling, taking the bus, bicycling, and walking by employees of local major employers. In addition, the TRP promotes alternative fuel vehicles, modified work schedules, and telecommuting. All employers with 100 or more full-time employees at a single site are required to participate in the TRP. TRP benefits are based on the number of vehicle miles not driven, gallons of gasoline not used, dollars saved and reduction in tons of air pollution produced.

5.6 Pima County Voluntary No-Drive Days (Clean Air) Program

Since 1989, the state-mandated PDEQ Clean Air Program has been promoting various clean air strategies to encourage the general public to take actions to reduce air pollution. These strategies include providing K-12 classroom presentations and air quality curricula packets, teacher trainings, speakers bureau, smoking vehicle hotline, public education at community outreaches, and sponsoring or co-sponsoring annual events such as the Car Care Clinic, Bike Fest, Walk Our Kids to School Day, the Clean Air Challenge, Earth Day, and more.

5.7 Pima County Voluntary Vehicle Repair and Retrofit Program (V2R2)

In 1999, PDEQ began implementing the state-mandated V2R2 program to address highly polluting older vehicles. Under this program, owners of vehicles 12 years of age or older that fail the state emissions test, may receive financial assistance to repair the vehicle to pass the test. Based on emissions tests before and after the V2R2 repairs, the average reduction in vehicle tailpipe emissions is approximately 80 percent.

5.8 Pima County Voluntary Lawn and Garden Equipment Collection Program

Since 1998, the PDEQ has held a state-mandated voluntary collection of high-polluting gas-powered 2 and 4 stroke motors housed in lawn mowers. The program was expanded in 1999 and 2000 to include other gas-powered gardening equipment such as leaf blowers, string trimmers, chain saws, etc. Individuals who voluntarily dropped off their equipment received vouchers for the purchase of electric or manual equipment.

5.9 Mass Transit

Sun Tran provides the fixed route transit service to the Tucson area. A specified fleet size (199 buses) and ridership (14.5 million per year) is required to comply with commitments made by the City of Tucson to help maintain air quality. In addition, Sun Tran has begun conversion of their bus fleet to compressed natural gas (CNG) fuel. By mid-2001, the fleet will be comprised of more than one-half CNG buses. Most of the service is within the City of Tucson (92%), but it also extends into the county (7%), South Tucson and Oro Valley.

5.10 Rideshare Program

The federally-funded RideShare Program was established in 1974 with a mission to promote carpooling and other alternate modes of travel to improve air quality, save energy, and decrease traffic congestion. Locally, the Rideshare Program is administered by PAG and distributes materials promoting carpooling and maintains a computerized database of individuals interested in carpooling.

The PAG RideShare program maintains several special databases including a parent pool to aid in the formation of carpools for transporting children to and from school. In addition, another database is the out-of-county database that matches people who are interested in carpooling into or out of Pima County on a regular basis. RideShare produces an annual Bike Map, provides information on telecommuting, and supports and supplements the PAG TRP.

6. REFERENCES

Behavior Research Center documents, 1999.
The Plain English Guide to the Clean Air Act - Environmental Protection Agency, 1993.
Draft Air Quality Element - Hank Eyrich, Pima Association of Governments, 2000.
1999 Air Quality Data Summary - Pima County Department of Environmental Quality, 2000.