2009 Ambient Air Monitoring
Five Year Network Assessment & Plan

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AQ 374

2009 Ambient Air Monitoring
Five Year Network Assessment & Plan

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I. INTRODUCTION

2009 Ambient Air Monitoring Five Year Network Assessment

This document constitutes the 2009 Ambient Air Monitoring Five Year Network Assessment for the Pima County air monitoring network. The Pima County Department of Environmental Quality (PDEQ) has prepared this document to be submitted to the U.S. Environmental Protection Agency (USEPA), Region IX. The purpose of the Ambient Air Monitoring Five Year Network Assessment is to determine if the network is achieving the air monitoring objectives specified in 40 CFR Part 58 Appendix D, which mandate adherence to certain number, type and location requirements of monitoring sites and specific site criteria such as monitoring inlet height. The review should also determine if modifications should be made to the network (e.g. through the termination or relocation of unnecessary stations or addition of new stations). In addition, the review is necessary in order to ensure that the residents of Pima County are provided adequate, representative and useful air quality data, and to provide adequate protection to public health.

The designated ambient air pollutants that are monitored and reported by PDEQ are carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter with an aerodynamic diameter of 10 micrometers or less in size (PM_{10}) and particulate matter with aerodynamic diameter of 2.5 micrometers or less in size ($PM_{2.5}$). This pollutant data is submitted to the EPA Air Quality System (AQS) database for determination of compliance with National Ambient Air Quality Standards (NAAQS). This report provides a site by site assessment of the monitoring network with respect to EPA site criteria.

The Pima County monitoring network includes both State or Local Air Monitoring Stations (SLAMS) and Special Purpose monitors (SP). SLAMS monitors comprise the required network monitors that are used for NAAQS comparisons and follow the monitoring objectives listed on page 6. SP monitors are used to conduct special purpose studies and to enhance the network coverage of air quality monitoring data.

Schedule of EPA's review of criteria pollutants in 2009- 2011:

Primary SO_2 NAAQS- proposal submitted November 2009; final ruling anticipated June 2, 2010.
Primary NO_2 NAAQS – proposal submitted June 2009; final ruling anticipated January 10, 2010.
O_3 NAAQS- reconsideration proposal December, 2009; final ruling anticipated August 31, 2010.
Secondary NO_2 and SO_2 NAAQS- proposal due February, 2010; final ruling anticipated October 19, 2010.
Primary CO NAAQS – proposal due October, 2010; final ruling anticipated May 13, 2011.
Particulate Matter NAAQS- proposal due January, 2011; final ruling anticipated October, 2011.

PDEQ made the following network modifications in 2009:

- Pima County changed the Saguaro Park ozone designation from Special Purpose (SP) monitor to a State or Local Air Monitoring Stations (SLAMS).
- Ozone, MET, trace CO, SO_2 and NO_Y instruments have been installed at the NCore Park site.
- On 08/13/2009 the Downtown site was closed due to lack of funds to fix equipment needed to run the site, as well as generally having low levels of both CO and O_3.

Anticipated modifications to network for 2010:

- Install a Lead monitor at the NCore Park location with the intention to begin monitoring in January of 2011.
- Install a continuous Particulate Matter monitor and Relative Humidity monitor at the NCore Park site.
- Begin submitting monitor data to EPA from the NCore Park site.

II. BACKGROUND

Pima County Air Quality Control District met all the National Ambient Air Quality Standards (NAAQS) in 2009. Concentrations of the criteria pollutants have been stable over the past few years with ozone and particulate matter (PM_{10}) being the major concern for Pima County. Ozone has been very close to the standard, often within 95% of the standard. EPA has just lowered the standard further, bringing Pima County within 99% of the NAAQS. In 2009, there was one exceedance of the Particulate matter (PM_{10}) standard at the South Tucson, Orange Grove and Geronimo locations on July 22nd, which did not constitute a violation of the standard. Pima County is submitting documentation for an exceptional event designation for these exceedances. Particulate Matter (PM_{10}) levels are elevated during drought conditions and high winds have caused exceedances of the NAAQS during these conditions in previous years.

Regional Evaluation

In order to evaluate existing and proposed monitoring stations and their stated objectives, regional information is used. The regional information consists of the most current values for population, major urban developments and directions of growth, traffic and highway data, major industries and aerial photographs showing topography. Population (census tract) data can act as a guide in evaluation of the representativeness of a site for determining population exposure. The Tucson metropolitan statistical area (MSA) population is estimated at 1,021,700 for the period ending in 2009. Figure 1 on page 8 illustrates the Eastern Pima County Tucson Air Planning Area which makes up the MSA. The various incorporated areas and other agency lands are shown, as well as the named mountain peaks that define the planning area for Eastern Pima County, which includes the Tucson Metropolitan area. The Pima County MSA has seen a population growth of about 24% over the past 10 year period. This can be seen graphically in Figure 2 on page 9 which shows the areas of growth over that time period.

Average Daily Traffic (ADT)

Traffic data is necessary for site evaluations since a large portion of air pollutants in the Tucson basin are caused by vehicular traffic. Traffic volumes and density maps are used in evaluating the monitoring network. This data is routinely compiled and used by local transportation and planning agencies. An analysis of the most current traffic data indicates that the network continues to meet the requirements for the monitoring site type and corresponding spatial scales as initially established. The Average Daily Traffic (ADT) numbers are 24 - hour, two - way volume of averaged weekday traffic.

Latitude and Longitude

Latitude and Longitude data is also provided for the monitoring sites using Datum WGS84 AZ Central in Decimal Degrees.

Local Geography and Meteorology

Tucson, Arizona is a major metropolitan area situated in the Santa Cruz river valley, which is encompassed by the Sonoran Desert at an elevation between 2300 and 2800 feet. Basin and range topography characterizes the region with rugged mountain ranges encircling the valley floor with mountain peak elevations in excess of 9000 feet, thus delineating the Tucson Air Planning Area. The flat or gently rolling valley terrain slopes from the higher south and southeast toward the lower northwest following the Santa Cruz river drainage.

Ambient Air Monitoring Network Plan

The climate of Tucson is characterized by a hot season normally starting in April and ending in October, and a generally mild winter. Maximum daily temperatures from May through September are usually above 90 degrees Fahrenheit. The average rainfall is around eleven inches per year.

Tucson International Airport records show an average of 240 clear days a year (days with less than 50% total cloud cover). The remaining periods include the winter prefrontal situations more common in the north and the prolonged seasons of convective summer storms. Wind velocity and direction changes, associated with the large scale pressure systems, frequently result in localized dust storms.

The mountain-valley circulation, along with surface heating during the day and radiational cooling at night, create a predominantly southeast to northwest wind path in the basin. Airflows generally tend to be downvalley (from the southeast) at night and early morning hours, reversing to the upvalley direction (from the northwest) during the day. These downvalley / upvalley flows are strongly influenced by localized upslope / downslope terrain. The normal upvalley airflow is from the northwest, and parallels the Santa Cruz River, but decays well before sunset. This is followed by an hour of light, erratic flows which turn into the downvalley flow from the southeast, and reach their maximum and stabilized speed in four to six hours. The air temperature drops steadily during this interval until the sun rises. The downvalley direction continues for two to five hours past sunrise and then transforms into a short calm period prior to the change to upvalley flows.

The southeasterly “monsoon” regime that occurs primarily in the months of July and August is a large scale synoptic feature with considerable yearly variation both in intensity and timing. At the Tucson International Airport, the winds become strong, gusty and southeasterly with high relative humidity, cloud cover and frequent thunderstorms. The mountain – valley circulation tends to be suppressed during this time period.

Atmospheric temperature inversions occur almost daily in the Tucson air basin. During the winter months these inversions may become severe with particulate and other pollutants becoming concentrated, remaining near the ground level causing haze. When the sun sets, the ground and surface air cools faster than the air several hundred feet above the surface. Since air temperature normally decreases with increasing altitude, the warm and cool layers are reversed or “inverted”, hence the name ‘temperature inversion’. These temperature inversions are usually strongest on cold, clear winter nights, where there is an absence of cloud cover. Consequently, the inversions “lock” the pollutants near the surface. As the sun causes the cool air layer close to the ground to warm up, vertical mixing and horizontal transport disperse the air pollutants. In the early evening, the low level air inversion begins to form again and often coincides with the evening traffic rush hour.

Ambient Air Monitoring Network Plan

Definition of Monitoring Objectives, Site Types and Spatial Scales

The Pima County ambient air monitoring network is designed to meet three basic monitoring objectives. These objectives listed in **Appendix D, 1.1 of 40 CFR 58** are:

- To provide in a timely matter air pollution data to the general public;
- To comply with ambient air quality protocols and standards in order for data to be used for comparison to the NAAQS;
- To support research studies.

The monitoring stations which comprise the Pima County network are designed to meet at least one of six basic monitoring site types. As listed in **Appendix D, 1.1.1 of 40 CFR 58**, the site types:

- Determine the area of highest concentrations expected to occur in the network;
- Determine representative concentrations in areas of high population density;
- Determine the impact on ambient pollution levels of significant sources or source categories;
- Determine general background concentration levels;
- Determine the extent of regional pollution transport among populated areas;
- Determine the welfare – related impact in more rural and remote areas.

The link between general monitoring objectives, site types and the geographical location of a monitoring station is defined as the spatial scale of representativeness, and the relationship is indicated in **Table 1** (next page). The goal of each station is to represent a specific air parcel throughout which actual pollution concentrations are reasonably homogeneous. The spatial scales are defined in **Appendix D, 1.2 of 40 CFR 58** as follows:

- *Microscale* defines concentrations in air volumes associated with area dimensions from 1 meter to 100 meters;
- *Middle Scale* defines concentrations typical of areas from 100 meters to 500 meters;
- *Neighborhood Scale* defines concentrations typical of areas with dimensions in the 0.5 to 4.0 kilometer range;
- *Urban Scale* defines the overall, city – wide conditions with dimensions in the 4 to 50 kilometer range;
- *Regional Scale* usually defines a rural area with dimensions as much as hundreds of kilometers;
- *National and Global Scales* represent concentrations which characterize nations and the globe as a whole (Pima County does not employ stations under this category).

Table 1

Monitoring Site Types	Appropriate Spatial Scales
Highest Concentration	Micro, Middle, Neighborhood, sometimes Urban
Population	Neighborhood, Urban
Source Impact	Micro, Middle, Neighborhood
General / Background	Urban, Regional
Regional Transport	Urban, Regional
Welfare-Related Impacts	Urban, Regional

Figure 1

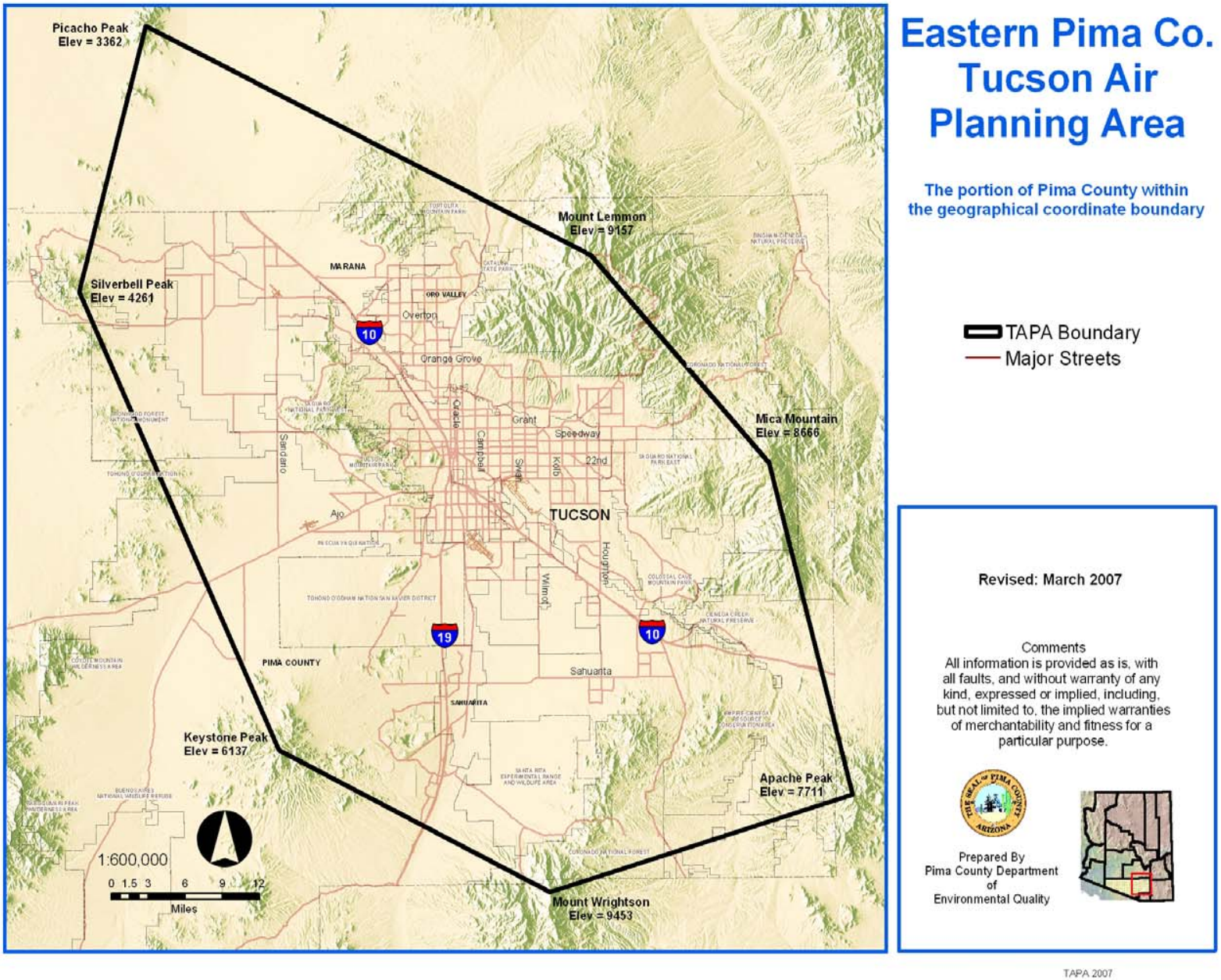
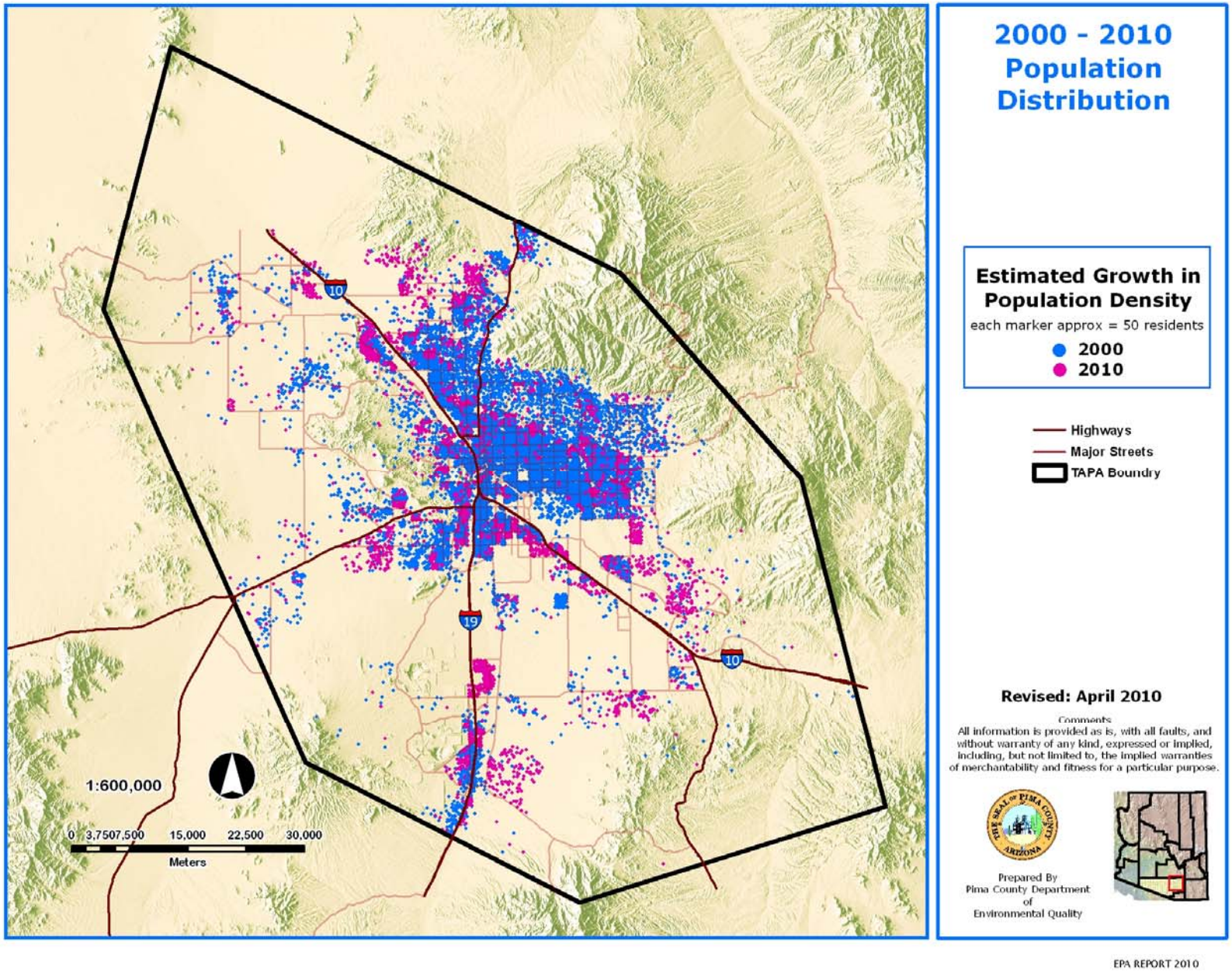

Eastern Pima Co.
Tucson Air
Planning Area
The portion of Pima County within
the geographical coordinate boundary
TAPA Boundary
Major Streets
Picacho Peak
Elev = 3362
Mount Lemmon
Elev = 9157
Silverbell Peak
Elev = 4261
Mica Mountain
Elev = 8666
MARANA
ORO VALLEY
Overton
Orange Grove
Grant
Speedway
22nd
Sandario
Oracle
Campbell
Swan
Kolb
Houghton
Wilmot
Ajo
TUCSON
Sahuarita
SAHUARITA
PIMA COUNTY
Keystone Peak
Elev = 6137
Apache Peak
Elev = 7711
Mount Wrightson
Elev = 9453
1:600,000
0 1.5 3 6 9 12
Miles
Revised: March 2007
Comments
All information is provided as is, with all faults, and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Prepared By
Pima County Department
of
Environmental Quality
TAPA 2007

Figure 2


2000 - 2010
Population
Distribution
Estimated Growth in
Population Density
each marker approx = 50 residents
2000
2010
Highways
Major Streets
TAPA Boundry
10
19
10
1:600,000
0 3,7507,500 15,000 22,500 30,000
Meters
Revised: April 2010
Comments
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Prepared By
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Environmental Quality
EPA REPORT 2010

III. PIMA COUNTY AIR QUALITY MONITORING NETWORK SUMMARY TABLES AND MAP

Ambient Air Monitoring Network Plan

Active Particulate Monitoring Sites

Table 2

Map #	Pollutant		Address	Site Name
4	PM_{10}	$PM_{2.5}$	2498 N. Geronimo	Geronimo
5	PM_{10}		1601 S. 6th Ave.	South Tucson
6	PM_{10}		1016 W. Prince Rd.	Prince Road
7	PM_{10}		4625 E. Broadway Blvd.	Broadway & Swan
8	PM_{10}		22000 S. Houghton Rd.	Corona de Tucson
9	PM_{10}		6910 S. Santa Clara Ave.	Santa Clara School
10	PM_{10}	$PM_{2.5}$	601 N. La Canada Dr.	Green Valley
11		$PM_{2.5}$	400 W. River Rd.	Park
12	PM_{10}	$PM_{2.5}$	3401 W. Orange Grove Rd.	Orange Grove
13	PM_{10}		12101 N. Camino de Oeste	Tangerine
14		$PM_{2.5}$	710 W. Michigan	Rose Elementary
15		$PM_{2.5}$	9597 N. Coachline Blvd.	Coachline
	PM_{10}	$PM_{2.5}$	as studies require	Mobile 2

Map located on Page 11

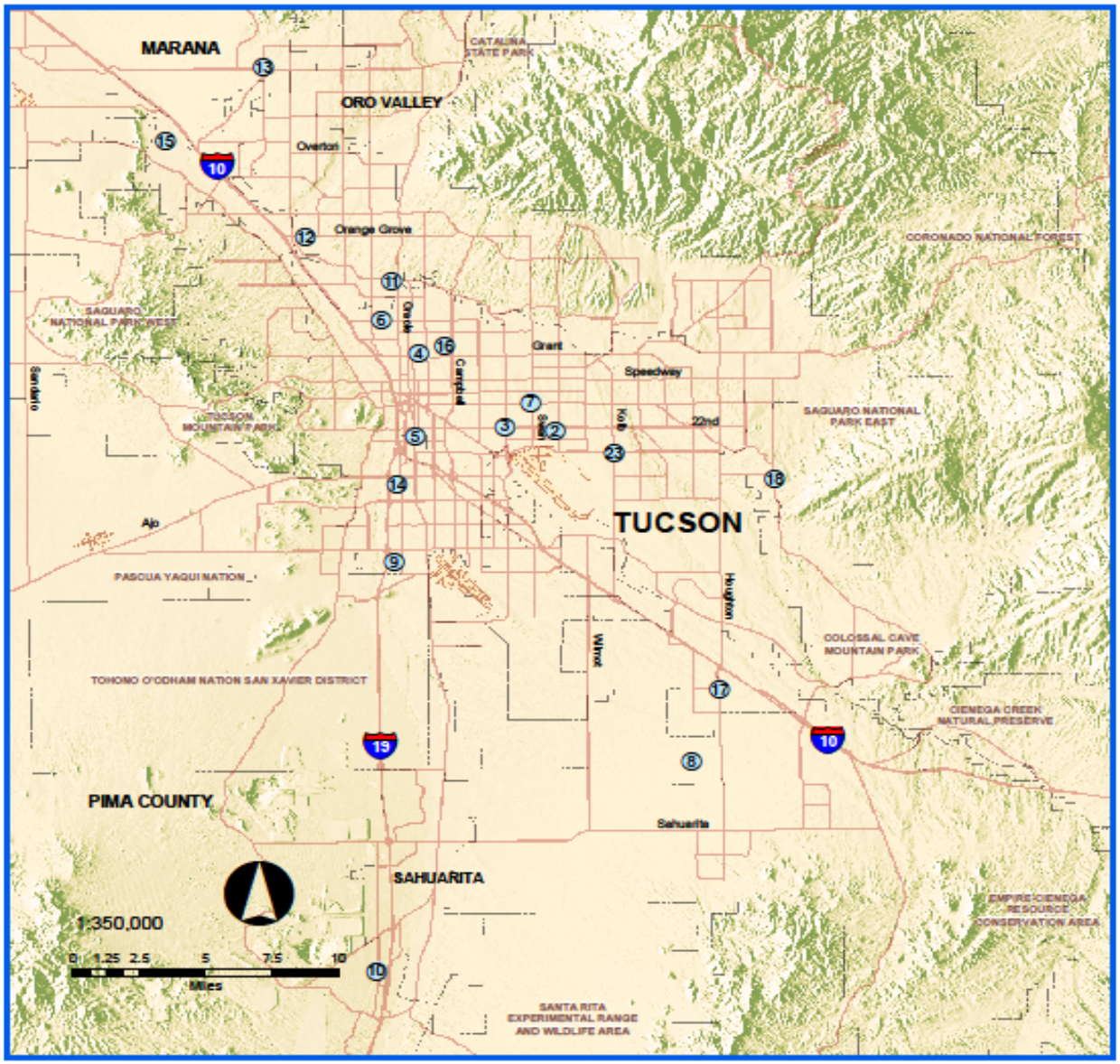
Ambient Air Monitoring Network Plan

Active Gaseous Pollutant Monitoring Sites

Table 3

Map #	Pollutant				Address	Site Name
2	CO	O_3	SO_2	NO_2	1237 S. Beverly Ave.	22nd & Craycroft
3	CO				3895 E. 22nd St.	22nd & Alvernon
10		O_3			601 N. La Canada Dr.	Green Valley
11	CO	O_3		NO_2	400 W. River Rd.	Park
13		O_3			12101 N. Camino de Oeste	Tangerine
14		O_3			710 W. Michigan	Rose Elementary
15		O_3			9597 N. Coachline Blvd.	Coachline
16	CO				2745 N. Cherry Ave.	Cherry & Glenn
17		O_3			11330 S. Houghton Rd.	Fairgrounds
18		O_3			3905 S. Old Spanish Trail	Saguaro National Park, East
23	CO				2601 S. Kolb Rd.	Golf Links & Kolb
	CO	O_3			as studies require	Mobile 1 & 2

Map located on page 12



Pima County Monitoring Sites

2 - 22nd / Craycroft
3 - 22nd / Alvernon
4 - Geronimo
5 - South Tucson
6 - Prince Road
7 - Broadway / Swan
8 - Corona de Tucson
9 - Santa Clara
10 - Green Valley
11 - Children's Park
12 - Orange Grove
13 - Tangerine
14 - Rose Elementary
15 - Coachline
16 - Cherry / Glenn
17 - Fairgrounds
18 - Saguaro National Park East
23 - Golf Links / Kolb

Monitoring Sites
Major Streets

Revised: April 2010

Comments
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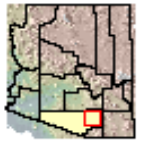
Prepared By
Pima County Department of Environmental Quality



PIMA MONITORING SITES 2010 b

Ambient Air Monitoring Network Summary Table
Table 4
CARBON MONOXIDE - PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
22ND & CRAYCROFT 1237 S. BEVERLY AVE.	004-019-1011	42101	SLAMS	Jul-73 PRESENT	54	2582	4.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
22ND & ALVERNON 3895 E.22ND STREET	004-019-1014	42101	SLAMS	Mar-75 PRESENT	54	2516	3.4	MICROSCALE	CONTINUOUS	1	HIGHEST CONCENTRATION
PARK 400 W. RIVER ROAD	004-019-1028	42101	SP	Oct-98 PRESENT	088/054/093	2286	4.25	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
CHERRY & GLENN 2745 N. CHERRY AVE.	004-019-1021	42101	SP	Feb-89 March-09 **CLOSED**	54	2400	4.9	NEIGHBORHOOD	Cont/Seasonal Jan. 1 – March 31 Oct. 1- Dec. 31	1	POPULATION EXPOSURE
GOLF LINKS & KOLB 2601 SOUTH KOLB	004-019-1031	42101	SP	Sept-02 PRESENT	093/054	2661	3	MICROSCALE	Cont/Seasonal Jan. 1 – March31 Oct. 1- Dec. 31	1	HIGHEST CONCENTRATION

NITROGEN DIOXIDE - PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
22ND & CRAYCROFT 1237 S. BEVERLY AVE.	004-019-1011	42602	SLAMS	Jan-73 PRESENT	74	2582	4.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
PARK 400 W. RIVER ROAD	004-019-1028	42602	SP	May-98 PRESENT	099	2286	4.25	URBAN	CONTINUOUS	1	HIGHEST CONCENTRATION

Key located on page 15

Ambient Air Monitoring Network Summary Table

SULFUR DIOXIDE -PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
22ND & CRAYCROFT 1237 S. BEVERLY AVE.	004-019-1011	42401	SLAMS	Jul-73 PRESENT	60	2582	4.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE

OZONE - PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
22ND & CRAYCROFT 1237 S. BEVERLY AVE.	004-019-1011	44201	SLAMS	Jul-73 PRESENT	087	2582	4.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
GREEN VALLEY 601 N. LA CANADA DR.	004-019-1030	44201	SP	July-03 PRESENT	047	2910	3.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
PARK 400 W. RIVER ROAD	004-019-1028	44201	SLAMS	Sep-97 PRESENT	047	2286	4.25	URBAN	CONTINUOUS	1	POPULATION EXPOSURE
TANGERINE 12101 N. CAMINO DE OESTE	004-019-1018	44201	SP	Oct-89 PRESENT	047	2638	3.75	URBAN	CONTINUOUS	1	HIGHEST CONCENTRATION
ROSE ELEMENTARY 710 W. MICHIGAN	004-019-1032	44201	SP	July-03 PRESENT	087	2387	4.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
COACHLINE 9597 N. COACHLINE BLVD	004-019-1034	44201	SP	July-03 PRESENT	087	2110	3.1	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
FAIRGROUNDS 11330 S. HOUGHTON RD.	004-019-1020	44201	SP	Oct-89 PRESENT	047	3078	3.6	URBAN	CONTINUOUS	1	NATURAL BACKGROUND
SAGUARO NATIONAL PARK 3905 S. OLD SPANISH TRAIL	004-019-0021	44201	SLAMS	Jun-82 PRESENT	047	3089	4.1	NEIGHBORHOOD	CONTINUOUS	1	HIGHEST CONCENTRATION

Key located on page 15

Ambient Air Monitoring Network Summary Table
PM_{10}- PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
GERONIMO 2498 N. GERONIMO	04-019-1113	81102	SP	June- 07 PRESENT	079	2452	4.6	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
SOUTH TUCSON 1601 S. 6TH AVE.	04-019-1001	81102	SLAMS	Sep-88 PRESENT	127	2420	6.9	NEIGHBORHOOD	1 DAY collocated every 6 day	1	POPULATION EXPOSURE
PRINCE ROAD 1016 W. PRINCE RD.	04-019-1009	81102	SLAMS	Jul-87 PRESENT	126	2315	4.6	MICROSCALE	6 DAY	1	SOURCE IMPACT
BROADWAY/SWAN 4625 E. BROADWAY BLVD	04-019-1023	81102	SP	Jun-90 PRESENT	126	2532	8.8	NEIGHBORHOOD	6 DAY	1	SOURCE IMPACT
CORONA DE TUCSON 22000 S. HOUGHTON RD.	04-019-0008	81102	SLAMS	Mar-87 PRESENT	126	3078	2.1	REGIONAL	6 DAY	1	BACKGROUND
SANTA CLARA 6910 S. SANTA CLARA AVE.	04-019-1026	81102	SP	Jul-94 PRESENT	126	2540	6.45	NEIGHBORHOOD	6 DAY	1	POPULATION EXPOSURE
GREEN VALLEY 601 N. LA CANADA DR.	04-019-1030	81102	SP	Feb-01 PRESENT	122/079	2910	4.8	NEIGHBORHOOD	CONTINUOUS	1	POPULATION EXPOSURE
ORANGE GROVE 3401 W. ORANGE GROVE RD.	04-019-0011	81102	SLAMS	Jan-85 PRESENT	127	2234	2.65	NEIGHBORHOOD	1 DAY collocated every 6 day	2	HIGHEST CONCENTRATION
TANGERINE 12101 N. CAMINO DE OESTE	04-019-1018	81102	SP	Jan-94 PRESENT	126	2638	4.5	URBAN	6 DAY	1	BACKGROUND

Key located on page 15

Ambient Air Monitoring Network Summary Table
$PM_{2.5}$- PIMA COUNTY MONITORING NETWORK

SITE NAME AND LOCATION	SITE ID (a)	PARAMETER (b)	CLASSI-FICATION (c)	DATES (d)	METHOD (e)	ELEV. FEET (f)	SMPL HEIGHT (M) (g)	SPATIAL SCALE (h)	SMPL FREQ (i)	POC (j)	MONITORING SITE TYPE (h)
GERONIMO 2498 N. GERONIMO	004-019-1113	88501	SP	July-03 PRESENT	731	2452	4.6	NEIGHBORHOOD	CONTINUOUS	3	POPULATION EXPOSURE
GREEN VALLEY 601 N. LA CANADA DR.	004-019-1030	88501	SP	July-03 PRESENT	731	2910	4.8	NEIGHBORHOOD	CONTINUOUS	3	POPULATION EXPOSURE
PARK 400 W. RIVER ROAD	004-019-1028	88101	SLAMS	Jan-99 PRESENT	118	2286	3.1	NEIGHBORHOOD	3 DAY collocated every 12 day	1	POPULATION EXPOSURE
PARK 400 W. RIVER ROAD	004-019-1028	88502	SP SPECIATION	Feb-02 PRESENT	810	2286	3.0		6 DAY	5	POPULATION EXPOSURE
ORANGE GROVE 3401 W. ORANGE GROVE RD.	004-019-0011	88101	SLAMS	Jan-99 PRESENT	118	2234	2.65	NEIGHBORHOOD	3 DAY	1	POPULATION EXPOSURE
ROSE ELEMENTARY 710 W. MICHIGAN	004-019-1032	88501	SP	July-03 PRESENT	731	2387	4.9	NEIGHBORHOOD	CONTINUOUS	3	POPULATION EXPOSURE
COACHLINE 9597 N. COACHLINE BLVD	004-019-1034	88501	SP	July-03 PRESENT	731	2100	4.9	NEIGHBORHOOD	CONTINUOUS	3	POPULATION EXPOSURE

Key:
a - Site ID - site identification code used in the AQS database
b - Parameter - code used in the AQS database to describe the pollutant monitored
c - Classification – described on page 2
d - Dates - dates sampling began and ended
e - Method - code used in the AQS database indicating the type of instrument used
f - Elev. feet - site elevation in feet
g - SPL (M) Height - sample inlet height in meters, specific height range required for uniform collection
h - Spatial Scale and Monitoring site type - described on page 6
i - SMPL Freq - frequency of sampling days
j - POC - parameter occurrence code used to distinguish between two or more instruments measuring the same parameter at the same time

Information provided based on EPA'S 2009 Air Quality System (AQS) data.

IV. CURRENT MONITORING NETWORK EVALUATIONS

Ambient Air Monitoring Five Year Network Assessment

PM_{10} MONITORING NETWORK

The PDEQ PM_{10} network consists of nine monitoring sites in eastern Pima County, Arizona. The 2009 network used several different types of PM_{10} samplers: R& P Partisol 2000, R& P Partisol-Plus 2025 Sequential, TEOM 1400 and the Met One Beta Attenuation 1020. **40 CFR 58, app. D, 4.6** Particulate matter (PM_{10}) design criteria, provided guidance in determining the minimum number of required PM_{10} SLAMS sites for 2009. The population for the Tucson, Arizona Metropolitan Statistical Area (MSA) is estimated to be 1,021,700 for the year ending 2009.

PM_{10} Design Criteria
Table 5

MSA Population Category	Medium Concentration Area [1]	# of PM_{10} Monitors
>1,000,000	Requires 4-8 SLAMS monitors	4 SLAMS monitors
>1,000,000	No requirement for SP	5 SP monitors

[1] Medium concentration ambient PM_{10} data show ambient concentrations less than 80 % of the PM_{10} NAAQS.

Violation History

The PM_{10} 24 hour standard remains at 150 $\mu g/m^3$. Since the promulgation of the PM_{10} standard, July 31, 1987, exceedances of the 24 hour standard have been recorded at monitoring sites in the PDEQ PM_{10} network. The Orange Grove site recorded two exceedances of the NAAQS during the 4th quarter of 1988 and the Downtown site recorded three during the 2nd quarter of 1989 (Downtown site was discontinued, September 1999). In 1999, the PM_{10} standard was violated with four recorded exceedances at the Orange Grove location and two exceedances at the South Tucson location. Subsequently, the monitoring schedules for the Orange Grove and South Tucson locations have been changed from every six day sampling to every day sampling, as indicated in **40 CFR 50, app. K** and **40 CFR 58.13.** In 2002 and 2003 there were a total of two exceedances at the Orange Grove location and two exceedances at the South Tucson location. These exceedances do not constitute a violation of the standard. In 2008, there was one exceedance of the standard at the Santa Clara site, which is in the process of an Exceptional Event designation dependant on approval from EPA. In 2009 there was one exceedance at the Orange Grove, South Tucson and Geronimo locations on July 22nd, these exceedances may also be considered as an Exceptional Event dependant on approval from EPA.

Quality Assurance for Particulate Matter PM_{10}

All data quality assessment requirements, as outlined in **40 CFR 58, app. A**, have been met. The precision of PM_{10} data is derived from the co-located PM_{10} samplers at the South Tucson and Orange Grove sites; the difference in concentration between the two samplers running side-by-side is used to calculate the precision of the data. At the end of each calendar quarter, a combined precision probability interval for monitors is calculated by EPA.

PM_{10} MONITORING NETWORK

The accuracy of PM_{10} sampling is assessed by auditing the flow rate of at least 25% of the samplers each calendar quarter, such that each sampler is audited at least once per year. The difference in the flow rate between the audit flow measurement and the flow indicated by the sampler is used to calculate accuracy.

A combined accuracy probability interval is calculated for PM_{10} along with separate probability limits for each audit concentration level for automated analyzers, and reported to EPA quarterly.

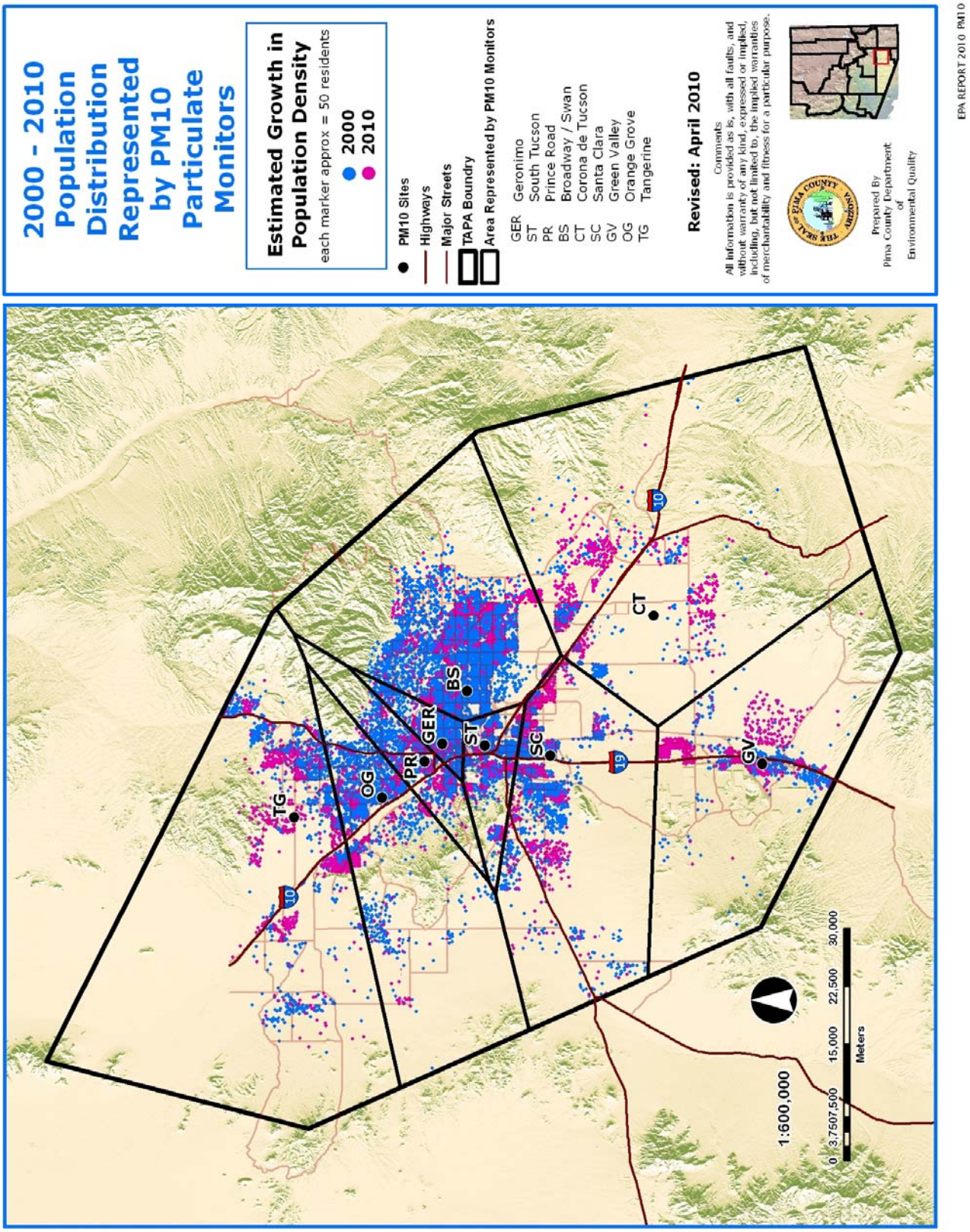
Particulate Matter Weigh Lab

Pima County Department of Environmental Quality operates a filter weigh lab for the processing of Pima County's PM_{10} and $PM_{2.5}$ network filters, excluding $PM_{2.5}$ speciation filters. This weigh lab follows all requirements set forth in **Appendix L of 40 CFR 50.**

Population Growth and Distribution in the PM_{10} network

By looking at Figure 4 it is easy to see how the population has grown over the past ten years in Pima County. By using the Thiessen Polygons it is possible to see the areas of impact for each of the current monitoring sites. Looking at the growth and the density of population as well as land use gives an indication of the validity and representativeness of the sites in the network. Currently all of the PM_{10} monitoring sites are fulfilling their requirements. What is apparent is the need for at least two more particulate sites in the MSA. The North East foothills and the Avra Valley areas need to have monitors as they are not properly served by the current network configuration. This is due mostly to geographical barriers which break up the air shed and population growth within these areas. Financial limitations will be the main determining factor in establishing new sites. Should funding become available in the future new sites in these areas will be a priority.

Figure 4


2000 - 2010 Population Distribution Represented by PM10 Particulate Monitors
Estimated Growth in Population Density
each marker approx = 50 residents
2000
2010
PM10 Sites
Highways
Major Streets
TAPA Boundry
Area Represented by PM10 Monitors
GER Geronimo
ST South Tucson
PR Prince Road
BS Broadway / Swan
CT Corona de Tucson
SC Santa Clara
GV Green Valley
OG Orange Grove
TG Tangerine
Revised: April 2010
Comments
All information is provided as is, with all faults, and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Prepared By
Pima County Department of Environmental Quality
EPA REPORT 2010 PM10
1:600,000
0 3,7507,500 15,000 22,500 30,000
Meters

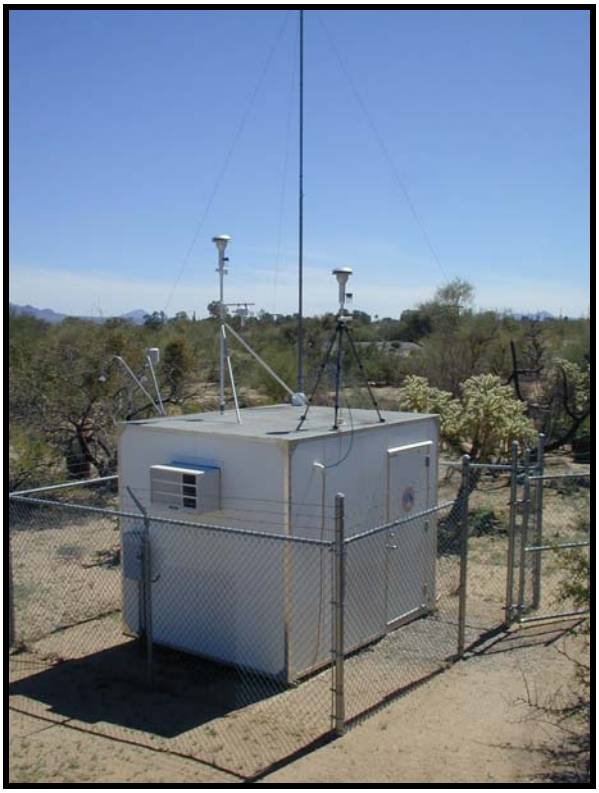
PM_{10} MONITORING NETWORK

Ambient Air Monitoring Network Plan

Site Name:	**GREEN VALLEY**	
AQS code:	040191030	
Address:	601 N. La Canada Drive, Green Valley, AZ	
Latitude/ Longitude:	31.87952 / -110.996440	
Elevation:	2910	
Method:	122 ; 079	
Number of monitors:	1	
Type of monitor:	Met One Beta Attenuation 1020 ; Thermo Scientific TEOM 1400AB	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of daily observations:	354	
Annual arithmetic mean:	17.2 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Sampling frequency:	Every day	
Probe height:	4.25 meters above the ground of the Pima County Government Center.	
Surrounding landscape:	Dirt, sparse desert vegetation	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a residential / commercial area. Open pit copper mines and tailings ponds are located four kilometers to the west of the community.	
Nearest roads distance & direction to monitor /ADT:	**1**	100 meters west of La Canada /2006 ADT of 15,200
	2	0.5 kilometers west of Interstate 19 /2006 ADT of 30,000
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

GREEN VALLEY: AIRS # 040191030



Comments: This site is fifty kilometers south of Downtown Tucson in the retirement community of Green Valley. PM_{10} monitoring commenced in September 1989 at the established TSP site there. ASARCO and Freeport-McMoRan operate several open pit mines and tailings ponds just west of the community. The monitoring objective is to monitor the impact of this potentially significant source of airborne particulates. The monitor was relocated in February 2001, approximately 1 kilometer north of the original Esperanza site, to the Pima County Government Center at 601 N. La Canada Drive. The move was necessitated by warranty requirements of the new roof at the original site and a request by the property management firm to vacate. The new site is considered a continuation of the original site. PM_{10} levels were below the health standards in the years 1989 through 2009. This site remains an important site because of the sensitive population in the mostly retirement community. This fragile population contends with a higher than average level of respiratory disease and therefore relies on the site for real time pollution information to assist in their daily outdoor activities. This site is also helpful to the young town of Sahuarita which has grown up just to the North of Green Valley. This town has a younger less susceptible population but with the Southerly flow pattern is also served by the monitoring site to their South.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**CORONA de TUCSON**	
AQS code:	040190008	
Address:	22001 S. Houghton Road, Tucson, AZ	
Latitude/ Longitude:	32.00474 / -110.79260	
Elevation:	3078	
Method:	126	
Number of monitors:	1	
Type of monitor:	R&P 2000	
Monitoring site type:	Determine natural desert (background) concentrations	
Classification:	SLAMS	
Scale:	Regional	
Number of daily observations:	60	
Annual arithmetic mean:	18.4 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Sampling frequency:	Every sixth day	
Probe height:	2.1 meters	
Surrounding landscape:	Gravel within enclosure; dirt, sparse desert vegetation surrounding	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in an undisturbed natural desert area.	
Nearest roads distance & direction to monitor /ADT:	**1**	1.6 kilometers west of Houghton Road with a 2006 ADT of 8,000.
	2	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

CORONA de TUCSON: AIRS # 040190008

Comments: This site is the only regional scale monitor in the network. PM_{10} sampling was started here in September 1988, in conjunction with existing total suspended particulates (TSP) sampling. This site exhibits the lowest network concentrations. TSP sampling was discontinued in May 1989. Hi - Vol sampling for PM_{10} was substituted with dichotomous sampling during the last quarter of 1989 in support of the state sponsored Tucson PM_{10} Source Apportionment Study. Hi - Vol PM_{10} sampling resumed in January 1990. Low -Vol PM_{10} R& P 2000 sampling began in March, 2006 and continues to the present. This site is the best look available for natural desert particulate levels in Pima County. The site has a history stretching over 20 years showing trends in particulate levels though all types of weather conditions. This site is historically significant and will remain an important monitoring site for the foreseeable future.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**ORANGE GROVE**	
AQS code:	040190011	
Address:	3401 W. Orange Grove Road, Tucson, AZ	
Latitude/ Longitude:	32.32255 / -111.037700	
Elevation:	2234	
Method:	127	
Number of monitors:	2	
Type of monitor:	R&P 2025 Sequential	
Monitoring site type:	Highest Concentration	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of daily observations:	362	
Annual arithmetic mean:	27.0 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	One exceedance on 07/22/2009	
Historical exceedances:	Exceedances of the 24 – hour standard: two in 1988, four in 1999, one in 2002, one in 2003, one in 2009	
Sampling frequency:	The sampling frequency started out with every other day sampling. It was changed to daily after the exceedance in July 1985. The sampling frequency remained as daily until the end of 1986. Every other day sampling was resumed until the two exceedances were recorded in the fourth quarter 1988. Every day sampling was immediately initiated and continued until April 1991 when every other day sampling was resumed. The site was placed on every sixth day sampling in October 1993. The exceedances of the NAAQS in 1999 commenced everyday sampling on September 9, 1999.	
Collocated Monitor:	Every day ; reported every 6^{th} day	
Probe height:	2.65 meters above the ground in a city water well site	
Distance between collocated monitors:	1.2m	
Surrounding landscape:	Gravel in fenced compound, dirt road shoulders, weeds	
Degrees of unrestricted air flow:	270	
Location description:	This site is situated in a residential area with light commerce and industry. There is an asphalt batch plant with a large gravel pit less than three kilometers to the west of the site in the Santa Cruz River bed area.	
Nearest roads distance & direction to monitor /ADT:	**1**	37 meters west of Camino de la Tierra and 70 meters south of Orange Grove Road with a 2007 ADT of 22,000
	2	2 kilometers east of Interstate 10 with a 2006 ADT of 105,000
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

ORANGE GROVE: AIRS # 040190011

Comments: Established in February 1985, this site is the oldest of the PM_{10} monitoring sites in the network. Orange Grove was chosen as the initial PM_{10} monitoring site and the design value site for Group II in the Tucson air planning area based on historically high TSP data. This neighborhood scale site is located near the confluence of the Santa Cruz, Rillito, and Canada del Oro Rivers in the Tucson Valley, toward the northern portion of the air planning area. This site is situated near the freeway and railway tracks, therefore elevated PM_{10} values are expected in this area. Dichotomous sampling was started at this site in July of 1993. The dichotomous ran in co-location with a HI-VOL- SA/1200 model from 1993 to 1996. The site was converted to dichotomous only operations on October 1, 1996 continuing until December 1998. Hi-Vol sampling resumed in January 1999, but was replaced with co-located low volume sequential samplers in 2004. As can be seen in Figure 4 this site is in a fairly densely populated area increasing the importance of monitoring at this site. With its historic data background, and its elevated readings, this site will remain one of the major sites for the Pima County MSA.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**SOUTH TUCSON**	
AQS code:	040191001	
Address:	1601 S. 6th Avenue, South Tucson, AZ	
Latitude/ Longitude:	32.20195 / -110.967900	
Elevation:	2420	
Method:	127	
Number of monitors:	2	
Type of monitor:	R&P 2025 Sequential	
Monitoring objective:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of daily observations:	357	
Annual arithmetic mean:	30.1 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	One exceedance on 07/22/2009	
Historical exceedances:	Exceedances of the 24 – hour standard: two in 1999; two in 2002; one in 2009	
Sampling frequency:	The exceedances of the NAAQS in 1999 commenced everyday sampling on June 23, 1999.	
Collocated Monitor:	Every day; reported every 6th day	
Probe height:	6.9 meters above the ground on the roof of the South Tucson Governmental Complex Building.	
Distance between collocated monitors:	1.7m	
Surrounding landscape:	Roof, gravel and desert landscaping surrounding building	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a dense residential / commercial area. There are numerous unpaved alleys and lots in the vicinity.	
Nearest roads distance & direction to monitor /ADT:	**1**	41 meters east of South 6th Avenue with a 2005 ADT of 21,000
	2	south of 22nd Street with a 2004 ADT of 34,000
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

SOUTH TUCSON: AIRS # 040191001

Comments: From January 1985 to September 1988 this site approached or exceeded TSP standards. PM_{10} sampling began here in September 1988. On March 8, 1993, the samplers were relocated from the original site to the new South Tucson Governmental Complex, which is less than two blocks north and across S. 6th Avenue. Levels at this location are representative of area - wide emissions patterns with high population exposure. The annual means for 1989 through 1999 were below the health standard. The 24 - hour NAAQS was exceeded twice in 1999 and 2002. Two co-located PM_{10} samplers have been operational at this site from June 1991 to June 1999. Co-location of the PM_{10} samplers was discontinued when a third sampler was added and everyday sampling began on June 23, 1999. In March, 2004, the Hi - Vol samplers were replaced with co-located Low –Vol sequential samplers. With its long history and its population impact this site is a primary site for the network and will remain in operation.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**PRINCE ROAD**	
AQS code:	040191009	
Address:	1016 W. Prince Road, Tucson, AZ	
Latitude/ Longitude:	32.272300 / -110.989100	
Elevation:	2315	
Method:	126	
Number of monitors:	1	
Type of monitor:	R&P 2000	
Monitoring objective:	Source Impact	
Classification:	SLAMS	
Scale:	Microscale	
Number of daily observations:	61	
Annual arithmetic mean:	32.6 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2006:	0	
Historical exceedances:		
Sampling frequency:	Every sixth day	
Probe height:	4.6 meters above the ground on the roof of a small commercial building.	
Surrounding landscape:	Roof, paved parking lots street surrounding building	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a dense residential / commercial area. Numerous unpaved alleys and lots are in the vicinity.	
Nearest roads distance & direction to monitor /ADT:	**1**	14.1 meters north of Prince Road with a 2007 ADT of 24,000
	2	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

PRINCE ROAD: AIRS # 040191009

Comments: This site is located in a homogenous, dense, residential / commercial area in north central Tucson. PM_{10} sampling began here in August 1987. The site is representative of a neighborhood scale in the north central region of the air planning area where particulate levels are generally higher due to the low altitude and the prevailing southeasterly winds. The annual standard was exceeded in 1989. Power problems within the building resulted in an unusually low data recovery during the fourth quarter of 1990. Data recovery was again compromised by power problems in the 1st and 3rd quarters of 1997 and by damage to the sampler due to a storm in July, 2005. In March, 2006, the Hi -Vol sampler was replaced with a Low –Vol PM_{10} R& P 2000 sampler. This is Pima County's only microscale PM10 monitor and is a critical part of the County's network. It has a long history and still meets the requirements for which it was established. This monitor will remain in the Pima County network.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**BROADWAY & SWAN**	
AQS code:	040191023	
Address:	4625 E. Broadway Boulevard, Tucson, AZ	
Latitude/ Longitude:	32.222100 / -110.893800	
Elevation:	2532	
Method:	126	
Number of monitors:	1	
Type of monitor:	HI-VOL-SA/GMW-1200 ; R&P 2000	
Monitoring objective:	Source Impact	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of daily observations:	59	
Annual arithmetic mean:	23.9 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2006:	0	
Historical exceedances:		
Sampling frequency:	Every sixth day	
Probe height:	This sampler inlet is 8.8 meters above the ground on the roof of the office building at 4625 E. Broadway Blvd	
Surrounding landscape:	Roof, paved parking lots and streets surrounding building	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a dense residential / commercial area	
Nearest roads distance & direction to monitor /ADT:	**1**	41 meters north of East Broadway Boulevard with a 2004 ADT of 49,500
	2	114 meters west of Swan Road with a 2004 ADT of 42,500
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

BROADWAY & SWAN: AIRS # 040191023

Comments: In August of 1990 this site was relocated from an adjacent building. In May 2006, the co-located sampler was retired and the Hi-Vol sampler was replaced with a Low-Vol R&P 2000 sampler. This site is representative of many areas around the greater Tucson metro area, with its mix of densely populated neighborhoods adjacent to heavily trafficked commercial areas. This site is still fulfilling the requirements it was established for and will remain in the Pima County monitoring network.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**SANTA CLARA SCHOOL**	
AQS code:	040191026	
Address:	6910 S. Santa Clara Avenue, Tucson, AZ	
Latitude/ Longitude:	32.125950 / -110.982600	
Elevation:	2540	
Method:	126	
Number of monitors:	1	
Type of monitor:	R&P 2000	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of daily observations:	61	
Annual arithmetic mean:	26.5 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Historical exceedances:	Exceedances of the 24 – hour standard: One on 10/27/2008	
Sampling frequency:	Every sixth day	
Probe height:	6.45 meters above the ground on the roof of the Santa Clara Elementary School.	
Surrounding landscape:	Roof, paved parking lots and streets, grass playground	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a Southwest Tucson residential district.	
Nearest roads distance & direction to monitor /ADT:	**1**	450 meters east of Interstate 19 with a 2006 ADT of 60,000
	2	800 meters south of Valencia Road with a 2005 ADT of 51,600
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

SANTA CLARA SCHOOL: AIRS # 040191026

Comments: This site is located south of Interstate 10 and east of Interstate 19 and provides a representative neighborhood scale site on Tucson's south side. Being near the fringe of the city limits, this site should track transport values that develop with a southerly wind from a combination of desert, agricultural land, and silt flood plain that is found on the Tohono O'Odham Indian Reservation (San Xavier district) 500 meters south of the site. The Hi- Vol sampler was replaced in April, 2006, with a Low- Vol sampler. This site serves a growing population in the southern portion of the MSA, and is a viable representative site for the area. The site will remain in operation as a part of the Pima County monitoring network.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**TANGERINE**	
AQS code:	040191018	
Address:	12101 N. Camino de Oeste, Tucson, AZ	
Latitude/ Longitude:	32.425250 / -111.063500	
Elevation:	2638	
Method:	126	
Number of monitors:	1	
Type of monitor:	R&P 2000	
Monitoring site type:	Background	
Classification:	Special Purpose	
Scale:	Urban	
Number of daily observations:	60	
Annual arithmetic mean:	18.1 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Every sixth day	
Probe height:	4.5 meters above the ground on a shelter on Tucson's far northwest side	
Surrounding landscape:	Dirt, sparse desert vegetation	
Degrees of unrestricted air flow:	360	
Location description:	This site has been situated in a relatively undisturbed natural desert area for most of it's existence, but residential development in recent years have been built to within 2 kilometers to the northwest, and low density residential developments are encroaching from the south, east and north to within 3 kilometers to 5 kilometers.	
Nearest roads distance & direction to monitor /ADT:	**1**	Tangerine Road runs approximately east – west 70 meters south of the site with a 2005 ADT of 8,000
	2	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

TANGERINE: AIRS # 040191018

Comments: The primary objective of this site is to assess background concentrations and to assess transport impact from outlying sources during exceptional wind events**.** As part of the urban haze/ visibility study, dichotomous samplers were installed at this site in July 1993. PM_{10} data from these samplers was used to supplement the existing PM_{10} network from October 1996 to December 1998, when the dichotomous samplers were relocated and a Hi-Vol sampler was installed to continue PM_{10} monitoring. In 2005, the Hi-Vol PM_{10} sampler was replaced with a Low –Vol R& P 2000 sampler. While extensive growth has occurred in the surrounding area, this site is still performing the objectives it was established for. Its objectives may change in the future depending upon the how much more growth takes place in the area, but the site will probably remain in the network for the foreseeable future.

PM_{10} MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**GERONIMO**	
AQS code:	040191113	
Address:	2498 N. Geronimo Tucson, AZ	
Latitude/ Longitude:	32.251840 / -110.965300	
Elevation:	2452	
Method:	079	
Number of monitors:	1	
Type of monitor:	R & P TEOM	
Monitoring site type:	Special Purpose	
Classification:	Population Exposure	
Scale:	Neighborhood	
Number of daily observations:	360	
Annual arithmetic mean:	31.3 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	One exceedance on 7/22/2009	
Historical exceedances:		
Sampling frequency:	Every day; Hourly	
Probe height:	4.6m	
Surrounding landscape:	Dirt, dead shrubs, unpaved road shoulders	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a residential area in a City of Tucson water well site.	
Nearest roads distance & direction to monitor /ADT:	1	one block south of Grant Road (2006 ADT 43,000)
	2	three blocks east of Stone Avenue (2007 ADT 24,700)
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

GERONIMO: AIRS # 040191113

Comments: PM_{10} Sampling began July 1, 2007. This site was established to take the place of the old downtown site. Its primary purpose was to inform the public of particulate levels on a real time basis. This is something that was not possible with the previous site. The site has similar demographics to the Broadway Swan site but is able to provide real time reporting not available form that site. This site is fulfilling the purposes for which it was established and will remain in the Pima County monitoring network.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring five year Network assessment

The PDEQ $PM_{2.5}$ network consists of six monitoring sites in eastern Pima County, Arizona. **40 CFR 58.20, app. D. 4.7** $PM_{2.5}$ design criteria, provided guidance on the required number of SLAMS monitors. Two SLAMS Federal Reference Method (FRM) monitors were initiated in January, 1999 at the Orange Grove and Park sites. In addition to two SLAMS monitors, Pima County has four SPECIAL PURPOSE hourly monitors. The population at the time of the 2000 census was 843,746 for the Tucson, Arizona Metropolitan Statistical Area (MSA). The estimated population for the year ending 2009 was 1,021,700.

PM2.5 Design Criteria
Table 6

MSA Population Category	**Design Value <85%** [1]	**# of Required $PM_{2.5}$ Monitors**	**# of $PM_{2.5}$ Monitors**
> 1,000,000	yes	Requires 2 SLAMS Monitor	2 SLAMS Monitors
>1,000,000	No requirement for SP	No requirement for SP	4 SP Monitors

[1] Most recent 3 – year design value <85% of any $PM_{2.5}$ NAAQS

General Statement regarding changes to the $PM_{2.5}$ network:
PDEQ does not have any violating monitors or proposals to move or change any monitors at this time. In the event of changes to the $PM_{2.5}$ network or violating monitors, PDEQ would detail all information and present it to the public for comment and would forward all comments and information to EPA for approval. After approval, PDEQ would then initiate any changes.

The SLAMS FRM monitors are filter-based low-volume samplers that collect a sample for 24 hours on a one in three day cycle. A co-located sampler at the Children's Park site runs on a one in twelve day cycle for precision assessment.

Continuous $PM_{2.5}$ monitoring was initiated in May, 2000 at the Green Valley site using Beta Mass Attenuation and a sharp-cut cyclone downstream of the PM_{10} inlet to achieve the 2.5 cut-point, allowing only the fine particulates to pass on to the sample collection substrate. This installation was a pilot project and was followed by similar installations at the Rose Elementary and Coachline monitoring sites. All three sites were a part of the EMPACT project (Environmental Monitoring for Public Access and Community Tracking), designed to provide near real-time data to the public via the internet and PDEQ web pages. A fourth monitor was added at the Geronimo site to provide fine particulate data for AQI reporting. The Met One BAM 1020 monitors provide automatic concentration measurement on an hourly basis, and output the reading to the site data logger, which is then polled every hour, and the data posted on the PDEQ website. The data obtained by both FRM and continuous $PM_{2.5}$ monitors in Tucson are submitted quarterly to the EPA's Air Quality System (AQS) database.

Pima County Department of Environmental Quality operates a filter weigh lab for the processing of Pima County's PM_{10} and $PM_{2.5}$ network filters, excluding $PM_{2.5}$ speciation filters. This weigh lab follows all requirements set forth in **40 CFR 50, App. L**.

The $PM_{2.5}$ Chemical Speciation Trends Network was established by EPA in 1999 to determine the chemical speciation of fine particulates. $PM_{2.5}$ speciation monitoring began in Pima County at the Park

location in February, 2002. The samples are analyzed for total mass, forty eight elements, cations, nitrate, sulfate, organic and elemental carbon. Analysis and reporting is completed by RTI International.

Violation History

The $PM_{2.5}$ standards (effective December 17, 2006): the annual $PM_{2.5}$ standard is met when the three year average of the spatially averaged annual mean is less than or equal to 15ug/m^3 and the 24 hour standard is met when the three year average of the 98^{th} percentile value at each site is less than or equal to 35ug/m^3. No exceedances of the annual or 24 - hour $PM_{2.5}$ NAAQS have been recorded in Tucson.

Quality Assurance for Particulate Matter $PM_{2.5}$

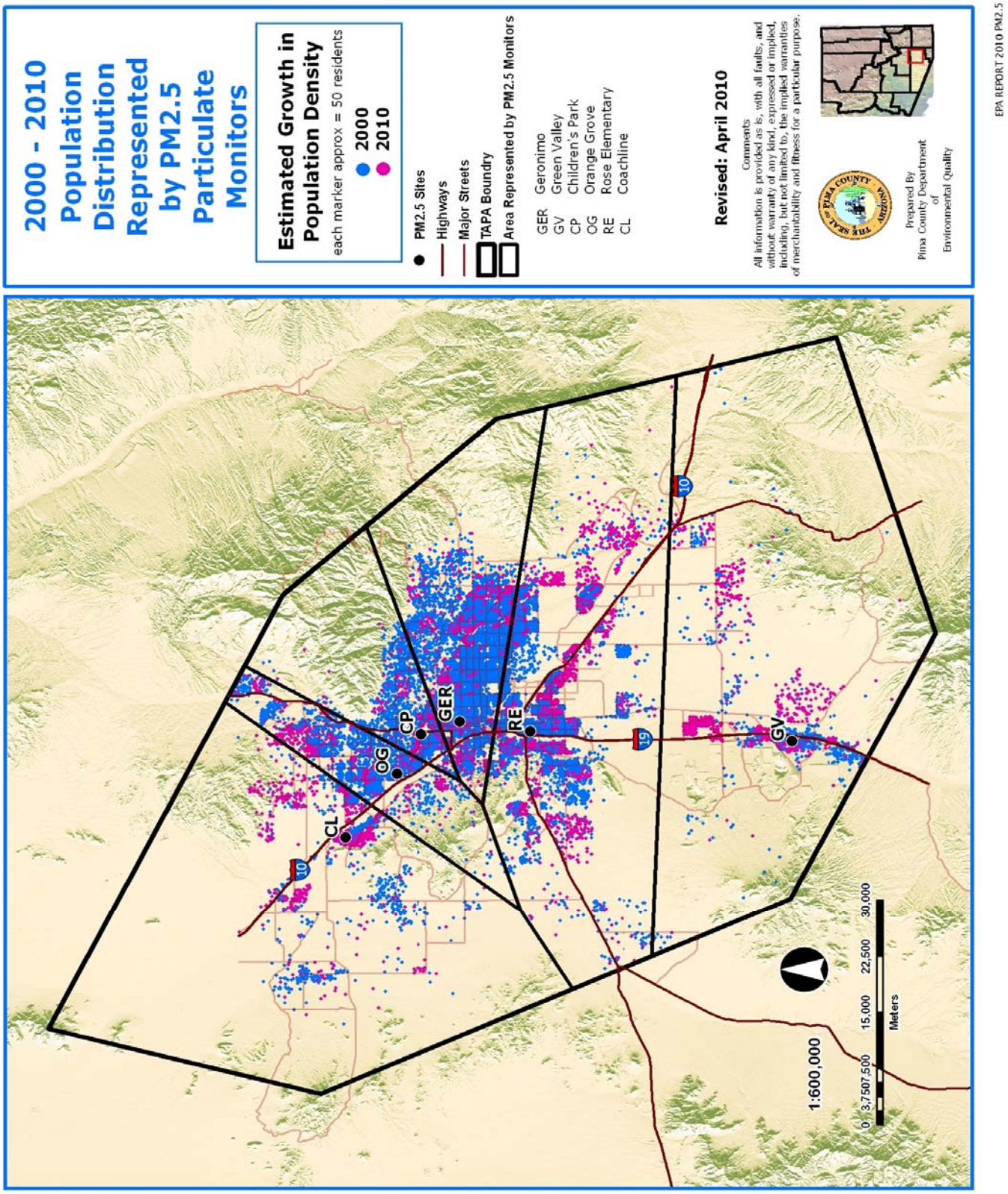
All data quality assessment requirements, as outlined in **40 CFR 58, app. A**, have been met and include both internal and EPA PEP audits, and the co-located sampler at the children's park site.

The accuracy of $PM_{2.5}$ sampling is assessed by auditing the flow rate each calendar quarter. The difference in the flow rate between the audit flow measurement and the flow indicated by the sampler is used to calculate accuracy. A combined accuracy probability interval is calculated for $PM_{2.5}$ along with separate probability limits for each audit concentration level for automated analyzers. Pima County reports the results of all valid precision and accuracy tests on a quarterly basis to the Air Quality System (AQS) database.

Population Growth and Distribution in the $PM_{2.5}$ network

By looking at Figure 5 it is easy to see how the population has grown over the past ten years in Pima County. By using the Thiessen Polygons it is possible to see the areas of impact for each of the current monitoring sites. Looking at the growth and the density of population as well as land use gives an indication of the validity and representativeness of the sites in the network. Currently all of the $PM_{2.5}$ monitoring sites are fulfilling their requirements. There is a need for at least two more $PM_{2.5}$ sites in the MSA. The North East foothills and the Avra Valley areas need to have monitors as they are not properly served by the current network configuration. This is due mostly to geographical barriers which break up the air shed and population growth within these areas. Financial limitations will be the main determining factor in establishing new sites. Should funding become available in the future new sites in these areas will be a priority.

Figure 5


2000 - 2010 Population Distribution Represented by PM2.5 Particulate Monitors
Estimated Growth in Population Density
each marker approx = 50 residents
2000
2010
PM2.5 Sites
Highways
Major Streets
TAPA Boundry
Area Represented by PM2.5 Monitors
GER Geronimo
GV Green Valley
CP Children's Park
OG Orange Grove
RE Rose Elementary
CL Coachline
Revised: April 2010
Comments
All information is provided as is, with all faults, and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Prepared By
Pima County Department
of
Environmental Quality
EPA REPORT 2010 PM2.5
CL
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10
19
1:600,000
0 3,750 7,500 15,000 22,500 30,000
Meters

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**ORANGE GROVE**	
AQS code:	040190011	
Address:	4301 West Orange Grove Road, Tucson, AZ	
Latitude/ Longitude:	32.322550 / -111.037700	
Elevation:	2234	
Method:	118	
Number of monitors:	1	
Type of monitor:	R&P Partisol-Plus 2025	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of daily observations:	120	
Annual arithmetic mean:	5.27 μg/m^3	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Every three days sampling	
Probe height:	2.65 meters above the ground in a city water well site	
Surrounding landscape:	Gravel in fenced compound, dirt road shoulders, weeds	
Degrees of unrestricted air flow:	270	
Location description:	This site is situated in a residential area with light commerce and industry. There is an asphalt batch plant with a large gravel pit less than three kilometers to the west of the site in the Santa Cruz River bed area.	
Nearest roads distance & direction to monitor /ADT:	**1**	37 meters west of Camino de la Tierra and 70 meters south of Orange Grove Road with a 2007 ADT of 22,000
	2	2 kilometers east of Interstate 10 with a 2006 ADT of 105,000
Suitable for comparison to NAAQS:	Yes	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

ORANGE GROVE: AIRS # 040190011

Comments: $PM_{2.5}$ sampling began at this neighborhood scale site in January, 1999. It is located near the confluence of the Santa Cruz, Rillito and Canada del Oro Rivers in the Tucson Valley, toward the northwest end of the air planning area. The site is situated near a freeway and railroad tracks, and in the vicinity of major construction projects. As can be seen by Figure 5 this site serves a fairly dense population. This site is fulfilling the requirements for which it was established and will remain in the Pima County network.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**PARK**	
AQS code:	040191028	
Address:	400 W. River Road, Tucson, AZ	
Latitude/ Longitude:	32.295150 / -110.982300	
Elevation:	2286	
Method:	118	
Number of monitors:	2	
Type of monitor:	R& P Partisol-Plus 2025	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of daily observations:	121	
Annual arithmetic mean:	5.46 $\mu g/m^3$	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Every three days; every twelve days for co-located sampler	
Probe height:	3.1 meters above the ground on a platform located in a city water well site.	
Distance between collocated monitors:	1.2m	
Surrounding landscape:	Gravel in walled compound, dirt parking lot, dry river bed	
Degrees of unrestricted air flow:	270	
Location description:	This site is located at the confluence of the Rillito River and Pima Wash, a natural low spot in the local topography. Single - family residences and a popular county park with exercise trails extend to the north, northwest, and west, respectively. Heavy commercial usage dominates to the south and east, including large shopping malls and automobile dealerships.	
Nearest roads distance & direction to monitor /ADT:	**1**	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2006 ADT of 52,000.
	2	River Road runs east – west 0.5 kilometers to the north, with a 2006 ADT of 34,400.
Suitable for comparison to NAAQS:	Yes	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

PARK: AIRS # 040191028

Comments: $PM_{2.5}$ sampling began at this neighborhood scale site in January, 1999. It provides a neighborhood site in an area with high traffic and congestion. This site is a very representative site for neighborhoods in the Tucson metro area. This is also the location chosen for the new NCore site which will go into operation before the end of 2010. Park coverage area has seen large population growth over the past few years. It is a multi pollutant site which will be the NCore and primary site in the Pima County network for many years to come.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**ROSE ELEMENTARY**	
AQS code:	040191032	
Address:	710 W. Michigan, Tucson, AZ	
Latitude/ Longitude:	32.172950 / -110.980050	
Elevation:	2387	
Method:	731	
Number of monitors:	1	
Type of monitor:	Met-One Beta Attenuation 1020	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8613	
Annual arithmetic mean:	5.44 $\mu g/m^3$	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.9 meters above the ground on the roof of a shelter located on the grounds of Rose Elementary School	
Surrounding landscape:	Grass playground	
Degrees of unrestricted air flow:	360	
Location description:	The site is located in a residential neighborhood with light commercial enterprises. The Santa Cruz River, with several sand and gravel operations, parallels the interstate one kilometer to the west.	
Nearest roads distance & direction to monitor /ADT:	**1**	12^{th} Avenue to the east with a 2006 ADT of 21,000
	2	Ajo Way to the north with a 2006 ADT of 31,100
		Interstate 19 runs north-south half a kilometer to the west with a 2006 ADT 83,800
Suitable for comparison to NAAQS:	No	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

ROSE ELEMENTARY: AIRS # 040191032

Comments: This monitor was initially installed in October of 2000 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. This area was identified as having higher than normal number of pediatric asthma cases. Pima County began reporting the $PM_{2.5}$ data to EPA July, 2003. This site provides service to a growing population in an area with high levels of sensitive individuals. It provides real time information for the use of the public which is particularly important in this area of high pediatric asthma. This site will remain in operation in the Pima County network.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**COACHLINE**	
AQS code:	040191034	
Address:	9597 N. Coachline, Tucson, AZ	
Latitude/ Longitude:	32.380820 / -111.127160	
Elevation:	2228	
Method:	731	
Number of monitors:	1	
Type of monitor:	Met-One Beta Attenuation 1020	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8406	
Annual arithmetic mean:	5.54 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.9 meters above the ground on a shelter on Tucson's far northwest side	
Surrounding landscape:	Dirt within walled compound, residential neighborhood	
Degrees of unrestricted air flow:	270	
Location description:	The site is situated in a residential neighborhood. The normally dry Santa Cruz River runs northwest between the Interstate and the neighborhood and contributes to airborne dust through previous deposition of fine clay soils throughout the floodplain. This area has previously been used for farming and ranching, and sand and gravel operations are still in operation five to ten kilometers upstream to the southwest. Considerable new construction of roads, homes and businesses throughout this burgeoning area exacerbate entrainment of the fine soils.	
Nearest roads distance & direction to monitor /ADT:	**1**	approximately 1.25 kilometers west of Interstate 10 with a 2006 ADT of 49,000
	2	.5 kilometer north of Silverbell Road 2006 ADT of 27,900
Suitable for comparison to NAAQS:	No	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

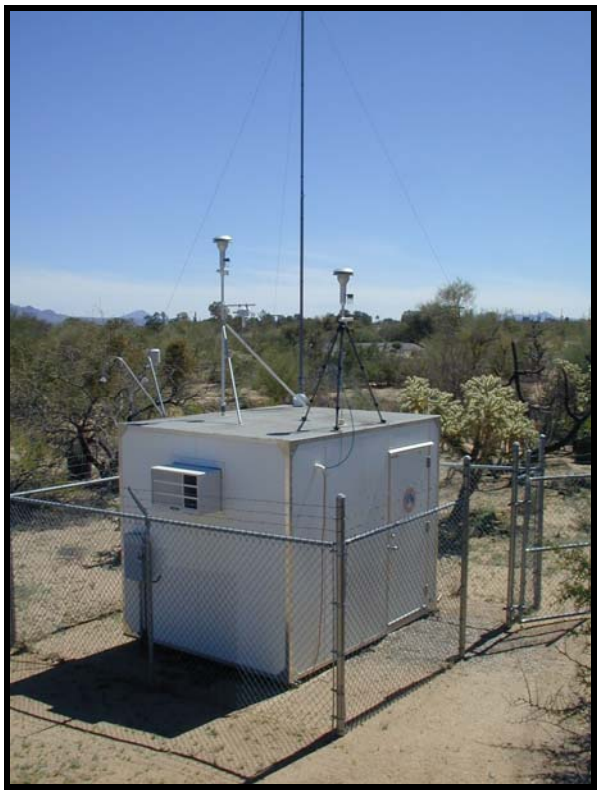
COACHLINE: AIRS # 040191034

Comments: This monitor was initially installed in March of 2001 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. This area was identified as having higher than normal number of pediatric asthma cases. Pima County began reporting the $PM_{2.5}$ data to EPA July, 2003. This site like Rose elementary provides service to a growing population in an area with high levels of sensitive individuals. It provides real time information for the use of the public which is particularly important in this area of high pediatric asthma. This site will remain in operation in the Pima County network.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**GREEN VALLEY**	
AQS code:	040191030	
Address:	601 N. La Canada Drive, Green Valley, AZ	
Latitude/ Longitude:	31.87952 / -110.996440	
Elevation:	2638	
Method:	731	
Number of monitors:	1	
Type of monitor:	Met-One Beta Attenuation 1020	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8600	
Annual arithmetic mean:	4.04 $\mu g/m^3$	
Number /dates of 24-hour standard exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.8 meters above the ground on a shelter	
Surrounding landscape:	Dirt, sparse desert vegetation	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a residential / commercial area. Open pit copper mines and tailings ponds are located four kilometers to the west of the community.	
Nearest roads distance & direction to monitor /ADT:	**1**	100 meters west of La Canada (2006 ADT of 15,200)
	2	0.5 kilometers west of Interstate 19 (2006 ADT of 30,000)
Suitable for comparison to NAAQS:	No	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

GREEN VALLEY: AIRS # 040191030



Comments: This site is fifty kilometers south of Downtown Tucson in the retirement community of Green Valley. This monitor was initially installed in May of 2000 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. Pima County began reporting the $PM_{2.5}$ data to EPA July, 2003. This site remains an important site because of the sensitive population in the mostly retirement community. This fragile population contends with a higher than average level of respiratory disease and therefore relies on the site for real time pollution information to assist in their daily outdoor activities. This site is also helpful to the young town of Sahuarita which has grown up just to the north of Green Valley. This town has a younger less susceptible population but with the southerly flow pattern is also served by the monitoring site to their south.

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**GERONIMO**	
AQS code:	040191113	
Address:	2498 N. Geronimo, Tucson, AZ	
Latitude/ Longitude:	32.251840 / -110.965300	
Elevation:	2452	
Method:	731	
Number of monitors:	1	
Type of monitor:	Met-One Beta Attenuation 1020	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8265	
Annual arithmetic mean:	8.22μg/m^3	
Number /dates of 24-hour standard exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.6 meters	
Surrounding landscape:	Dirt, dead shrubs, unpaved road shoulder	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a residential area in a City of Tucson water well site.	
Nearest roads distance & direction to monitor /ADT:	**1**	one block south of Grant Road (2006 ADT 43,000)
	2	and three blocks east of Stone Avenue (2007 ADT 24,700)
Suitable for comparison to NAAQS:	No	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

$PM_{2.5}$ MONITORING NETWORK
Ambient Air Monitoring Network Plan

GERONIMO: AIRS # 040191113

Comments: This monitor was initially installed in July of 2001 for Air Quality Index reporting using a continuous monitor. Pima County began reporting the $PM_{2.5}$ data to EPA July, 2003. The primary purpose of this site is to inform the public of particulate levels on a real time basis. This site is fulfilling the purposes for which it was established and will remain in the Pima County monitoring network.

$PM_{2.5}$ SPECIATION
Ambient Air Monitoring Network Plan

Site Name:	**PARK (Speciation)**	
AQS code:	040191028 POC 5	
Address:	400 W. River Road, Tucson, AZ	
Latitude/ Longitude:	32.295150 / -110.982300	
Elevation:	2286	
Method:	810	
Number of monitors:	1	
Type of monitor:	Met One SASS	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose PM2.5 Speciation	
Analyzing & Reporting Org	**RTP**	
Collecting Org	**Pima County Department of Environmental Quality**	
Number of daily observations:	50	
Annual arithmetic mean:	6.33 $\mu g/m^3$	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Every 6th day	
Probe height:	3 meters above the ground on a platform located in a city water well site.	
Degrees of unrestricted air flow:	270	
Surrounding landscape:	Gravel in walled compound, dirt parking lot, dry river bed	
Nearest roads distance & direction to monitor /ADT:	**1**	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2005 ADT of 49,900.
	2	River Road runs east – west 0.5 kilometers to the north, with a 2006 ADT of 34,400.
Suitable for comparison to NAAQS:	No	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

CARBON MONOXIDE MONITORING NETWORK

Ambient Air Monitoring five year Network Assessment

Motor vehicles are the primary source of carbon monoxide (CO) in the Tucson area. Data and reports from the Arizona Department of Transportation (MVD) show that there were 925,549 vehicles registered in Pima County in 2009 compared with 585,636 in 2000. In spite of increased vehicular traffic, CO levels have dropped considerably since the county began monitoring in 1973. The dramatic decrease can primarily be contributed to the progress made by automobile manufacturers in meeting federally mandated tailpipe emissions standards and to the state vehicle inspection / maintenance programs.

Carbon Monoxide is currently monitored at five locations throughout the Pima County air quality control district. The revised requirements for Carbon Monoxide **40 CFR 58, app. D, 4.2** state that there is no minimum number of CO monitoring sites required. Pima County is operating under the auspices of the revised CO Limited Maintenance Plan (LMP).

CO Design Criteria
Table 7

MSA Population Category	**# of Required CO Monitors**	**# of CO Monitors**
>1,000,000	No specific Requirement	2 SLAMS Monitors
		3 SP Monitors

Violation History

No exceedances of the National Ambient Air Quality Standards for CO were recorded in Tucson in 1989 through 2009. In January 1988, the eight - hour health standard of nine parts per million was exceeded once at two monitoring sites on the same day. The last exceedance of the eight - hour standard prior to 1988 occurred in December 1986 at a special purpose microscale location (Broadway / Craycroft). Pima County's status for CO was reclassified to attainment with the implementation of a Limited Maintenance Plan on April 25, 2000 by the EPA. The Carbon Monoxide Limited Maintenance Plan was developed in conjunction with Pima Association of Governments and approved by EPA to help mitigate any future violations.

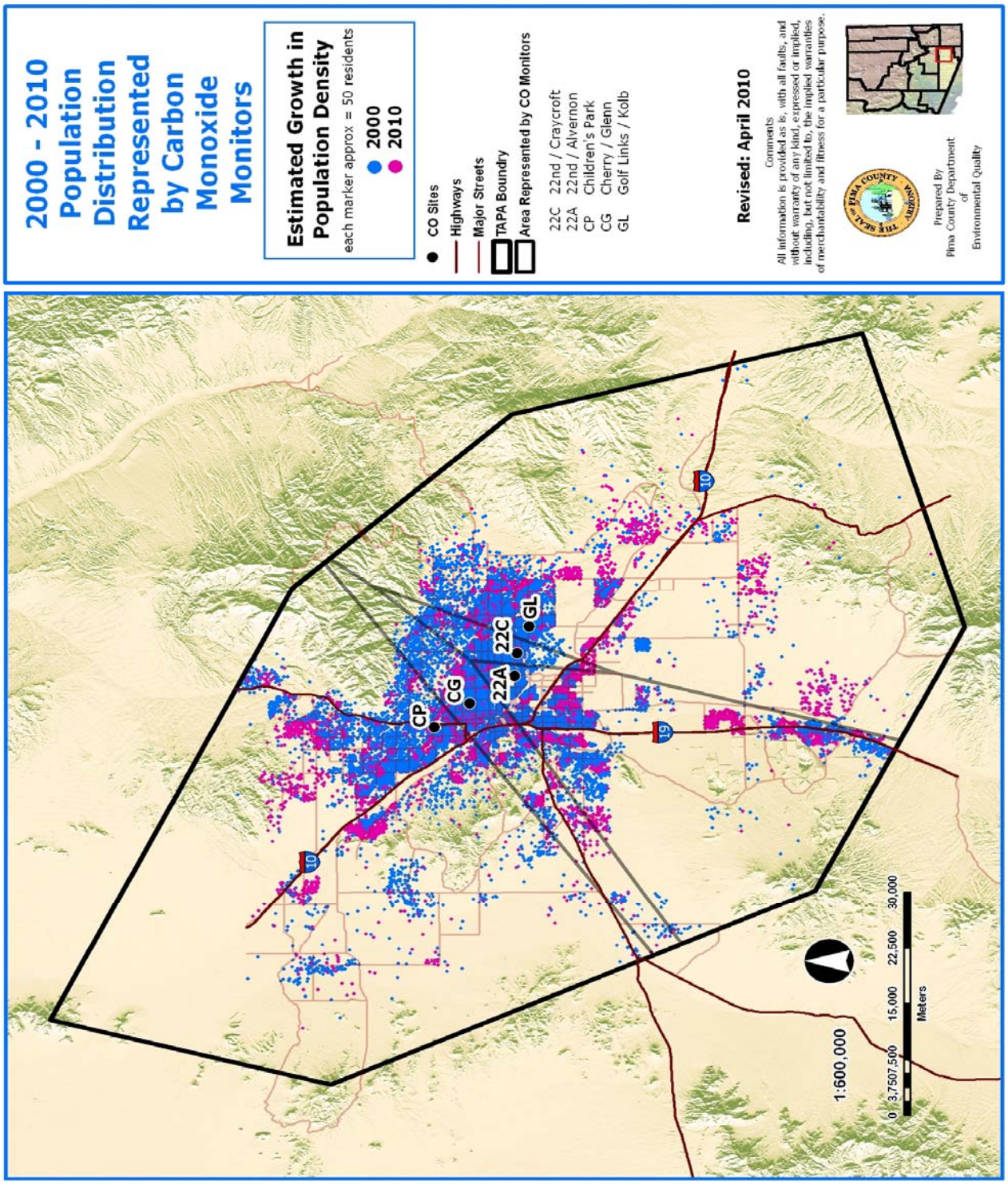
Quality Assurance for Carbon Monoxide

All data quality assessment requirements, as outlined in **40 CFR 58, app. A,** have been met. The precision of SLAMS automated analyzers is based on one-point precision checks conducted every two weeks, when each analyzer is challenged by a known concentration of a check gas. For CO the concentrations are between 8.0 and 10.0 ppm. The requirements include annual audits performed in-house for accuracy. The CO audit point level 1 is 3-8 ppm, level 2 is 15- 20 ppm and level 3 is 35-45 ppm. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.

Population Growth and Distribution in the CO network

By looking at figure 6 it is easy to see how the population has grown over the past ten years in Pima County. By using the Thiessen Polygons it is possible to see the areas of impact for each of the current monitoring sites. Looking at the ADT in the areas shown as having high growth makes it possible to determine whether the current monitoring sites are still viable and representative for the total area of coverage. For CO monitoring a high ADT intersection with similar congestion in any area will yield similar CO levels for the same ADT. This has been proven in Pima County by our hotspot monitoring of intersections over the years. This means that the current monitors are performing well at providing meaningful data for the network. The only area where a future site may become necessary is in the far north where traffic patterns have changed considerably over the past ten years and the ADT and congestion has been steadily on the rise. These areas such as Orange Grove Road and Oracle have been monitored under the limited maintenance plan and have given readings as high as 22nd and Alvernon , which is one of our microscale sites. It still appears that our micro scale sites are providing representative readings but further spot monitoring should be done in the future to assure their continued usefulness. Pima County currently has two Micro scale and Three Neighborhood scale CO sites. It is probable that in the next five years one of the neighborhood sites, Cherry Glenn, will be eliminated as it appears to be redundant. By looking at Figure 6 it can be seen that the CG site lies in a narrow strip between Children's Park and 22nd and Craycroft sites. All three of these sites are neighborhood sites and share similar CO levels. Cherry Glenn is also the only single pollutant neighborhood site which makes it the most expensive to operate. This means, from a network efficiency and financial practicality point of view, Cherry Glenn may be a candidate for closure in the foreseeable future. Cherry Glenn is currently operated as a seasonal site to keep costs down.

Figure 6


2000 - 2010 Population Distribution Represented by Carbon Monoxide Monitors
Estimated Growth in Population Density
each marker approx. = 50 residents
2000
2010
CO Sites
Highways
Major Streets
TAPA Boundry
Area Represented by CO Monitors
22C 22nd / Craycroft
22A 22nd / Alvernon
CP Children's Park
CG Cherry / Glenn
GL Golf Links / Kolb
Revised: April 2010
Comments
All information is provided as is, with all faults, and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Prepared By
Pima County Department
of
Environmental Quality
EPA REPORT 2010 CO
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CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**22ND STREET & CRAYCROFT**	
AQS code:	040191011	
Address:	1237 S. Beverly Avenue, Tucson, AZ	
Latitude/ Longitude:	32.204420 / -110.878150	
Elevation:	2582	
Method:	054	
Number of monitors:	1	
Type of monitor:	Instrumental non-dispersive infrared	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of hourly observations:	8715	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground on the roof of a shelter located in a city water well site.	
Probe material / Residence time:	FEP Teflon / 2.5 seconds	
Surrounding landscape:	Dirt, ephemeral weeds	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a predominately residential eastside area with commercial activity lining nearby arterial routes. There is a large covered water reservoir north of the location.	
Nearest roads distance & direction to monitor /ADT:	**1**	260 meters west is Craycroft Road with 2006 ADT of 33,800
	2	260 meters north is 22nd Street with a 2004 ADT of 52,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

22ND STREET & CRAYCROFT: AIRS # 040191011

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and has operated continuously to the present. This site has seen very small amounts of growth during the past ten years as indicated by Fig 6 While this monitoring site is somewhat outdated and redundant it is a historical site and as such provides trend data which cannot be obtained anywhere else. This monitor is located in a site which monitors other pollutants as well. This makes it very economical to run, so it will probably remain as a site in the PDEQ network for some years to come. By maintaining this site the historic trend data will continue to provide useful information.

CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**22ND STREET & ALVERNON**	
AQS code:	040191014	
Address:	3895 E. 22nd Street, Tucson, AZ	
Latitude/ Longitude:	32.207390 / -110.910650	
Elevation:	2516	
Method:	054	
Number of monitors:	1	
Type of monitor:	Instrumental non-dispersive infrared	
Monitoring site type:	Highest Concentration	
Classification:	SLAMS	
Scale:	Microscale	
Number of hourly observations:	8717	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	Years: 1975 - 1986 and 1988	
Sampling frequency:	Continuous	
Probe height:	3.4 meters above the ground attached to a wall near 22nd Street at a Tucson Water well site	
Probe material / Residence time:	FEP Teflon / 19.4 seconds	
Surrounding landscape:	Gravel in walled compound, paved streets and sidewalks	
Degrees of unrestricted air flow:	270	
Location description:	This site is situated in a commercial area. A large regional park is located to the northwest of the site.	
Nearest roads distance & direction to monitor /ADT:	**1**	60 meters west of Alvernon Way with a 2004 ADT of 36,900
	2	10 meters north of 22nd Street with a 2006 ADT of 44,800
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

22ND STREET & ALVERNON: AIRS # 040191014

Comments: The site was relocated in October, 2001 to a Tucson Water well site 50 meters west of the original location. The move was necessitated by an intersection improvement project and anticipated construction on the northwest corner. The shelter was moved again in January, 2004, to a different corner within the well site, and the probe was attached to a wall in virtually the same location as before the shelter was moved, so airflow from the intersection would remain unrestricted. 22nd & Alvernon continues to measure the highest CO concentrations in the network. The prevailing morning- hour southeasterly winds usually disperse CO generated in the intersection. During stagnant conditions, especially during the winter inversion formation, CO generated in the intersection has a longer residence time. Although population exposure is limited at this location, 22nd & Alvernon is representative of worst-case intersections in Tucson. This site has been operating continuously since 1975. No exceedances of the eight-hour health standard were recorded in 1989 through 2009. This site is PDEQ's primary microscale site. It is at one of the highest ADT intersections in the city and provides data representative of other high traffic intersections. It serves an area that has seen fairly high growth in the past ten years as indicated on the map in figure 6. For these reasons this site will continue to be a prime site within the Pima County network.

CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**CHERRY & GLENN**	
AQS code:	040191021	
Address:	2745 N. Cherry Avenue, Tucson, AZ	
Latitude/ Longitude:	32.25658 / -110.948650	
Elevation:	2400	
Method:	054	
Number of monitors:	1	
Type of monitor:	Instrumental non-dispersive infrared	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	3158; Seasonal monitor operation from Jan 1-March 31 and Oct.1 – Dec. 31	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.9 meters above the ground on a shelter in a city water well site.	
Probe material / Residence time:	FEP Teflon / 2.7 seconds	
Surrounding landscape:	Gravel in fenced compound, paved parking lot, streets	
Degrees of unrestricted air flow:	360	
Location description:		
Nearest roads distance & direction to monitor /ADT:	**1**	0.8 kilometers north of Grant Road with a 2006 ADT of 41,400
	2	0.5 kilometers west of Campbell Avenue with a 2006 ADT of 39,800.
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

CHERRY & GLENN: AIRS # 040191021

Comments: Cherry & Glenn was established as a special purpose site in February 1989, in order to assess the CO levels at a distance (less than 1 kilometer) from a typical high-volume intersection. This site has historically recorded very low levels of CO during the summer months. Consequently, in 2001, seasonal monitoring began with sampling from October through April. This site has not proven to be very productive or especially useful and serves a population which could be covered by the current Park site, soon to be the new NCore site. The area covered has shown medium growth over the last ten years (figure 6) but is the same general population and transportation makeup of the Park and 22nd and Craycroft sites. This site would be a likely target for closure within the next five years as it has proven to be of limited use and for the most part a redundant site.

CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**PARK**	
AQS code:	040191028	
Address:	400 W. River Road, Tucson, AZ	
Latitude/ Longitude:	32.295150 / -110.982300	
Elevation:	2286	
Method:	054 / 093	
Number of monitors:	1	
Type of monitor:	Instrumental non-dispersive infrared	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8338	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	4.25 meters above the ground on a shelter in a city water well site	
Probe material / Residence time:	FEP Teflon/ 3.1 seconds	
Surrounding landscape:	Gravel in walled compound, dirt parking lot, dry river bed	
Degrees of unrestricted air flow:	270	
Location description:	This site is located at the confluence of the Rillito River and Pima Wash, a natural low spot in the local topography. Single - family residences and a popular county park with exercise trails extend to the north, northwest, and west, respectively. Heavy commercial usage dominates to the south and east, including large shopping malls and automobile dealerships.	
Nearest roads distance & direction to monitor /ADT:	**1**	State Route 77 runs north – south 0.5 kilometers to the east with a 2006 ADT of 52,000
	2	River Road runs east – west 0.5 kilometers to the north, with a 2006 ADT of 34,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

PARK: AIRS # 040191028

Comments: This site began monitoring for Carbon Monoxide in October, 1998. It provides a neighborhood site in an area with high traffic and congestion. This site is a very representative site for neighborhoods in the Tucson metro area. This is also the location chosen for the new NCore site which will go into operation before the end of 2010. Park coverage area has seen the largest population growth of any of the CO sites in the network. It is a multi pollutant site which will be the NCore and primary site in the Pima County network.

CARBON MONOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**GOLF LINKS & KOLB**	
AQS code:	040191031	
Address:	2601 South Kolb Road	
Latitude/ Longitude:	32.191180 / -110.840550	
Elevation:	2661	
Method:	054 / 093	
Number of monitors:	1	
Type of monitor:	Instrumental non-dispersive infrared	
Monitoring site type:	Highest Concentration	
Classification:	Special Purpose	
Scale:	Microscale	
Number of hourly observations:	4351 ; Seasonal Monitor operating Jan. 1- April 30 and Oct. 1 – Dec. 31	
Number /dates of exceedances in 2009:	0	
Historical exceedances:	0	
Sampling frequency:	Continuous	
Probe height:	3.0 meters above the ground on a pole located next to Kolb road	
Probe material / Residence time:	FEP Teflon / 34.9 seconds	
Surrounding landscape:	Dirt lot and easement, paved street	
Degrees of unrestricted air flow:	360	
Location description:	This site is located near the southeast corner of Golf Links and Kolb roads in a City of Tucson water reservoir site. Light commercial enterprises occupy all four corners and separate the intersection from residential neighborhoods.	
Nearest roads distance & direction to monitor /ADT:	**1**	100 meters south of Golf Links, with a 2006 ADT of 38,500
	2	2 meters east of Kolb Road, with a 2007 ADT of 42,000.
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

GOLF LINKS & KOLB: AIRS # 040191031

Comments: Golf Links & Kolb was established as a special purpose site in September 2002, as part of the Carbon Monoxide Limited Maintenance Plan. Inlet placement qualifies it as a microscale site, and sighting it on the southeastern quarter of the intersection provides an opposite wind direction compliment to the 22/Alvernon site. This site is operated seasonally, from October through March. This site is the newest site in the network and will remain in operation for the foreseeable future. The coverage area has experienced relatively high growth, as indicated in Figure 6, over the last ten years and is expected to continue to grow. The site has high ADT and moderate to high congestion, making it an ideal microscale CO site.

OZONE MONITORING NETWORK
Ambient Air Monitoring five year Network Assessment

Ozone (O_3) is currently being monitored at eight locations in Tucson and one location in Green Valley EPA has revised the minimum monitoring requirements for ozone. The design criteria for ozone monitoring is described in **40 CFR 58, app. D, Table D-2**.

O_3 Design Criteria
Table 8

MSA (8520)	**Design Value [1]**	**# of O_3 Monitors**
> 1,000,000	Requires 2 SLAMS Monitors	2 SLAMS Monitors
> 1,000,000	No Requirement for SP	7 SP Monitors

[1] Most recent 3- year design value concentration of >= 85% of any O_3 NAAQS.

Violation History

On March 12, 2008, EPA strengthened the ground level ozone standard, effective May 27, 2008. The primary standard of 0.08 ppm has been lowered to 0.075 ppm , keeping the form of the standard as the three year average of the fourth –highest daily maximum eight hour average ozone concentration. The secondary standard is identical to the primary standard. Pima County's final designation of compliance of this standard is still in review. Pima County will be in compliance of the standard if years 2006, 2007 and 2008 are used with our highest average being 0.074 ppm at the Saguaro Park location. While higher maximum one - hour and second high one - hour ozone values tend to be measured near the urban core, the more suburban and rural sites measure higher overall average ozone concentrations. In general the east side (Saguaro National Park East) is the area with the highest average ozone levels. The situation may be caused by the topography of the valley and the way air flows within it. The precursor pollutants are emitted, and in conjunction with sunlight and heat, will form ozone, which is typically transported by air currents to outlying areas.

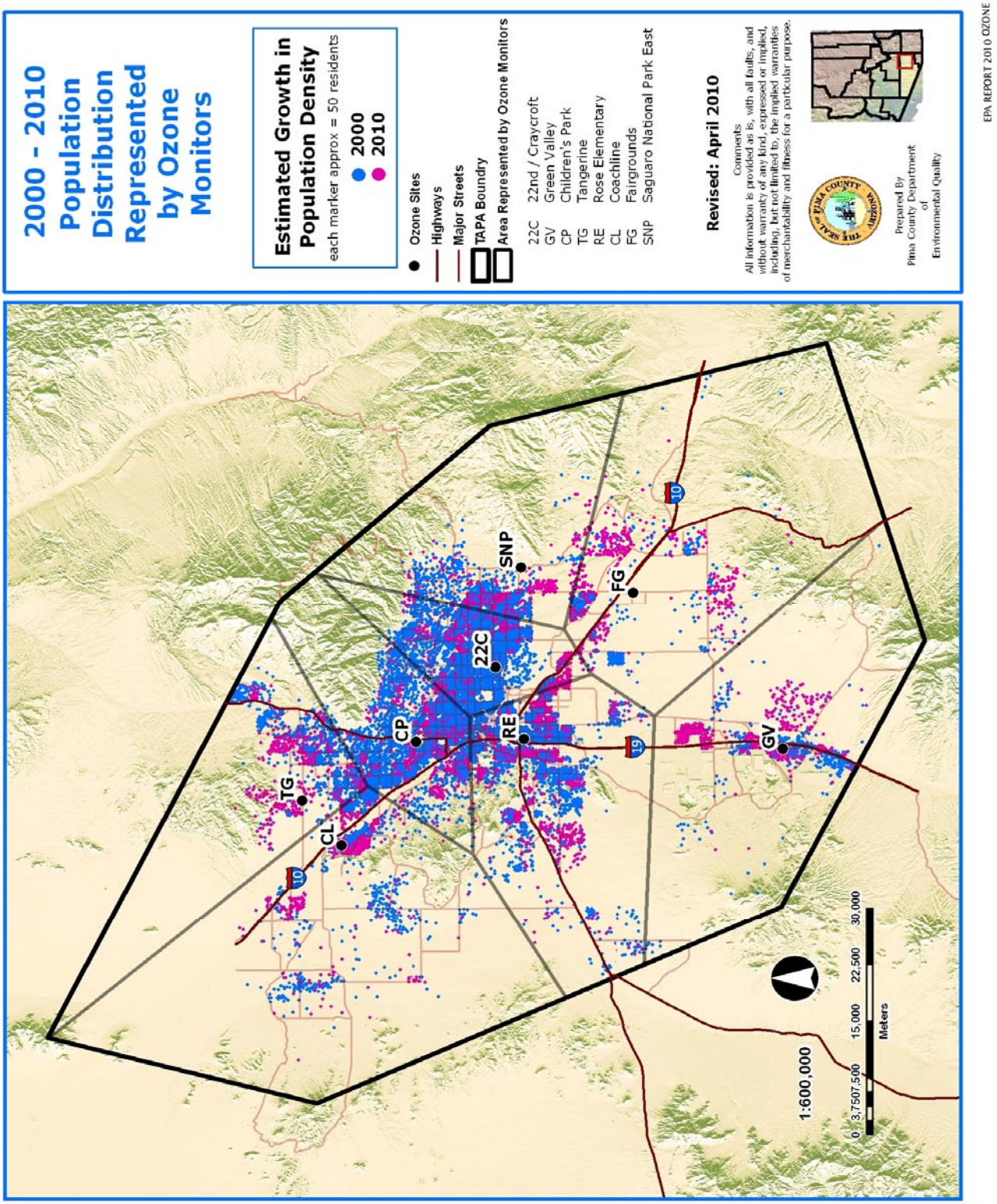
Quality Assurance for Ozone

All data quality assessment requirements outlined in **40 CFR 58, app. A,** have been met in 2009. The requirements include precision checks every other week with a check gas range between 0.01 and 0.10 ppm* and annual internal audits for accuracy with four point check levels at zero, 0.035ppm, 0.080ppm, and 0.140ppm. Pima County maintains an ozone primary standard which is verified for accuracy by the California Air Resources Board in Sacramento. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.
* We are doing all precision checks at .075 ppm without any variation, however, the identified range is still valid.

Population Growth and Distribution in the Ozone network

By looking at Figure 7 it is easy to see how the population has grown over the past ten years in Pima County. By using the Thiessen Polygons it is possible to see the areas of impact for each of the current monitoring sites. Looking at the growth and the density of population as well as land use gives an indication of the validity and representativeness of the sites in the network. The new rules for Ozone will probably cause Pima County to go into non-attainment status. If this happens a reevaluation of the current network will have to be undertaken. Currently all of the Ozone monitoring sites are fulfilling their requirements. It would be preferable to have at least two more Ozone sites in the MSA. The northeast foothills and the Avra Valley areas have no monitors which leaves them underserved by the current network configuration. This is due mostly to geographical barriers which break up the air shed and population growth within these areas. Financial limitations will be the main determining factor in establishing new sites. Should funding become available in the future new sites in these areas will be a priority.

Figure 7


2000 - 2010 Population Distribution Represented by Ozone Monitors
Estimated Growth in Population Density
each marker approx = 50 residents
2000
2010
Ozone Sites
Highways
Major Streets
TAPA Boundry
Area Represented by Ozone Monitors
22C 22nd / Craycroft
GV Green Valley
CP Children's Park
TG Tangerine
RE Rose Elementary
CL Coachline
FG Fairgrounds
SNP Saguaro National Park East
Revised: April 2010
Comments
All information is provided as is, with all faults, and without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Prepared By
Pima County Department
of
Environmental Quality
EPA REPORT 2010 OZONE
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OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**SAGUARO PARK EAST**	
AQS code:	040190021	
Address:	3905 South Old Spanish Trail, Tucson, AZ	
Latitude/ Longitude:	32.174520 / -110.737160	
Elevation:	2286	
Method:	047	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Highest Concentration	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of hourly observations:	8741	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground in Saguaro National Park East on the roof of a shelter that is one kilometer south of the administration building.	
Probe material / Residence time:	FEP Teflon / 3.5 seconds	
Surrounding landscape:	Natural desert	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in the National Park. The nearby light residential area has no significant local sources of ozone precursors.	
Nearest roads distance & direction to monitor /ADT:	**1**	80 meters east to Old Spanish Trail with a 2006 ADT of 6,200
	2	105 meters south of Escalante with a 2006 ADT of 4,000
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

SAGUARO PARK EAST: AIRS # 040190021

Comments: The Saguaro National Park site has been active since 1982. The operation of the site was taken over by the National Park Service in 1987. The Park Service returned operation of the site to Pima County in 1993. Geographically, Saguaro National Park is on the eastern edge of the Tucson metropolitan area. Ozone data from this site has been used to study how the levels of ozone affect natural vegetation. This site is fulfilling its requirements and will remain in the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**22ND STREET & CRAYCROFT**	
AQS code:	040191011	
Address:	1237 S. Beverly Avenue, Tucson, AZ.	
Latitude/ Longitude:	32.204420 / -110878150	
Elevation:	2582	
Method:	087	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of hourly observations:	8731	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground on the roof of a shelter located in a city water well site.	
Probe material / Residence time:	FEP Teflon / 4.3 seconds	
Surrounding landscape:	Dirt, ephemeral weeds	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a predominately residential eastside area with commercial activity lining nearby arterial routes. There is a large covered water reservoir north of the location.	
Nearest roads distance & direction to monitor /ADT:	**1**	260 meters west is Craycroft Road with 2006 ADT of 33,800
	2	260 meters north is 22nd Street with a 2004 ADT of 52,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

22ND STREET & CRAYCROFT: AIRS # 040191011

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and operated continuously to the present. This site is very representative of many areas in the MSA and has a long history of data. For these reasons, and because of continued growth in the area, it continues to be a useful site and will remain in the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**TANGERINE**	
AQS code:	040191018	
Address:	12101 N. Camino de Oeste, Tucson, AZ	
Latitude/ Longitude:	32.425250 / -111.063500	
Elevation:	2638	
Method:	047	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Highest Concentration	
Classification:	Special Purpose	
Scale:	Urban	
Number of hourly observations:	8629	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	3.75 meters above the ground on a shelter on Tucson's far northwest side.	
Probe material / Residence time:	FEP Teflon / 4.2 seconds	
Surrounding landscape:	Dirt, sparse desert vegetation	
Degrees of unrestricted air flow:	360	
Location description:	This site has been situated in a relatively undisturbed natural desert area for most of it's existence, but residential developments in recent years have been built to within 2 kilometers to the north west, and low density residential developments are encroaching from the south, east and north to within 3 kilometers to 5 kilometers.	
Nearest roads distance & direction to monitor /ADT:	**1**	Tangerine Road runs approximately east - west 70 meters south of the site with a 2005 ADT of 8,000.
	2	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

TANGERINE: AIRS # 040191018

Comments: Tangerine was established in November 1989. Ozone concentrations at this site have been the highest in the network on occasion. This may be due to the prevailing southeasterly winds transporting ozone from the urban area. Concentrations remain high well into the night and early morning. The area covered by this site has experienced substantial growth which can be seen in Figure 7. This growth along with high concentrations makes this site important in the analysis of Ozone formation in the MSA. For these reasons the Tangerine site will remain an important part of the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**FAIRGROUNDS**	
AQS code:	040191020	
Address:	11330 S. Houghton Road, Tucson, AZ	
Latitude/ Longitude:	32.047650 / -110.774350	
Elevation:	3078	
Method:	047	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Natural Background	
Classification:	Special Purpose	
Scale:	Urban	
Number of hourly observations:	8655	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	3.6 meters above the ground on a shelter on Tucson's far southeast side	
Probe material / Residence time:	FEP Teflon / 3.5 seconds	
Surrounding landscape:	Natural desert vegetation on lag gravel	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in an undisturbed natural desert area to the north and east. The Pima County Fairgrounds and drag strip are located directly southwest of the site.	
Nearest roads distance & direction to monitor /ADT:	**1**	53 meters west of Houghton road with a 2006 ADT of 8,000
	2	
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

FAIRGROUNDS: AIRS # 040191020

Comments: Fairgrounds was established in October 1989. Ozone concentrations at this site have been the highest in the network on occasion. This may be due to the afternoon wind shift that takes place almost daily in the Tucson basin. The wind may be transporting urban ozone precursors or stable ozone to the far east end of the Tucson air planning area. While the area around this site has seen relatively large population growth the importance of this site is in its ability to provide information on transport of precursors and Ozone. Because of the importance of the data in analysis of movement of Ozone and precursors this site will remain an important site in the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**PARK**	
AQS code:	040191028	
Address:	400 W. River Road, Tucson, AZ	
Latitude/ Longitude:	32.295150 / -110.982300	
Elevation:	2286	
Method:	047	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Urban	
Number of hourly observations:	8726	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.25 meters above the ground on a shelter located in a city water well site.	
Probe material / Residence time:	FEP Teflon / 5.3 seconds	
Surrounding landscape:	Gravel in walled compound, dirt parking lot, dry river bed	
Degrees of unrestricted air flow:	270	
Location description:	This site is located at the confluence of the Rillito River and Pima Wash, a natural low spot in the local topography. Single - family residences and a popular county park with exercise trails extend to the north, northwest, and west, respectively. Heavy commercial usage dominates to the south and east, including large shopping malls and automobile dealerships.	
Nearest roads distance & direction to monitor /ADT:	**1**	State Route 77 runs north – south 0.5 kilometers to the east with a 2006 ADT of 52,000
	2	River Road runs east – west 0.5 kilometers to the north, with a 2006 ADT of 34,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

PARK: AIRS # 040191028

Comments: This site began August of 1997 and is a relocation (1.5 kilometers, northeast) of the old Pomona site. This site is representative of a neighborhood scale in the north central region of the air planning area where ozone levels are generally expected to be high due to the prevailing southeasterly winds. The area covered by this site has experienced high levels of population growth in a very representative central urban area of the MSA. This site will be the new NCore site and will be an integral part of the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**ROSE ELEMENTARY**	
AQS code:	040191032	
Address:	710 W. Michigan, Tucson, AZ	
Latitude/ Longitude:	32.172950 / -110.980050	
Elevation:	2387	
Method:	087	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8669	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground on the roof of a shelter located on the grounds of Rose Elementary School.	
Probe material / Residence time:	FEP Teflon / 4.6 seconds	
Surrounding landscape:	Grass playground	
Degrees of unrestricted air flow:	360	
Location description:	The site is located in a residential neighborhood with light commercial enterprises bordering to the east, and the Santa Cruz River, with several sand and gravel operations, parallels the interstate another half kilometer to the west.	
Nearest roads distance & direction to monitor /ADT:	**1**	12^{th} Avenue to the east with a 2006 ADT of 21,000
	2	Ajo Way to the north with a 2006 ADT of 31,100
	3	Interstate 19 runs north-south half a kilometer to the west with a 2006 ADT 80,000
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

ROSE ELEMENTARY: AIRS # 040191032

Comments: This site was initially established in October of 2000 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. This area was identified as having higher than normal number of pediatric asthma cases. Pima County began reporting the ozone data to EPA July, 2003. This site provides service to a growing population in an area with high levels of sensitive individuals. It provides real time information for the use of the public which is particularly important in this area of high pediatric asthma. This site will remain in operation in the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**COACHLINE**	
AQS code:	040191034	
Address:	9597 N. Coachline Blvd. Tucson, AZ	
Latitude/ Longitude:	32.380820 / -111.127160	
Elevation:	2228	
Method:	087	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8712	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	3.1 meters above the ground on a shelter on Tucson's far northwest side	
Probe material / Residence time:	FEP Teflon / 4.6 seconds	
Surrounding landscape:	Dirt within walled compound, residential neighborhood	
Degrees of unrestricted air flow:	270	
Location description:	The site is situated in a residential neighborhood.	
Nearest roads distance & direction to monitor /ADT:	**1**	approximately 1.25 kilometers west of Interstate 10 with a 2006 ADT of 49,000
	2	.5 kilometer north of Silverbell Road 2006 ADT of 27,900
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

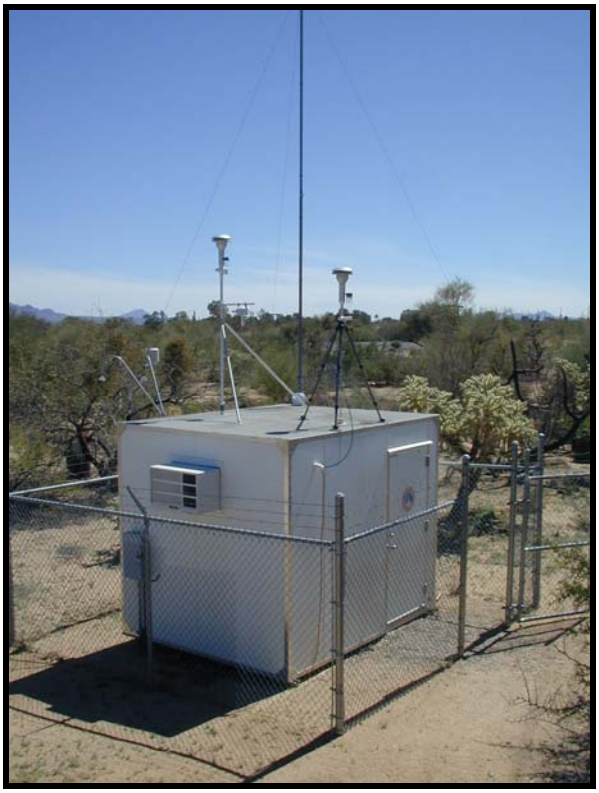
COACHLINE: AIRS # 040191034

Comments: This site was initially established in April of 2001 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. This area was identified as having higher than normal number of pediatric asthma cases. Pima County began reporting the ozone data to EPA July, 2003. This site provides service to a rapidly growing population in an area with high levels of sensitive individuals. It provides real time information for the use of the public which is particularly important in this area of high pediatric asthma. This site will remain in operation in the Pima County network.

OZONE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**GREEN VALLEY**	
AQS code:	040191030	
Address:	601 N. La Canada Drive	
Latitude/ Longitude:	31.87952 / -110.996440	
Elevation:	2638	
Method:	047	
Number of monitors:	1	
Type of monitor:	Instrumental ultra violet radiation absorption	
Monitoring site type:	Population Exposure	
Classification:	Special Purpose	
Scale:	Neighborhood	
Number of hourly observations:	8692	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	3.1 meters above the ground on a shelter	
Probe material / Residence time:	FEP Teflon / 3.5 seconds	
Surrounding landscape:	Dirt, sparse desert vegetation	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a residential / commercial area. Open pit copper mines and tailings ponds are located four kilometers to the west of the community.	
Nearest roads distance & direction to monitor /ADT:	**1**	100 meters west of La Canada (2006 ADT of 15,200)
	2	0.5 kilometers west of Interstate 19 (2006 ADT of 32,000).
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

GREEN VALLEY: AIRS # 040191030



Comments: This site is fifty kilometers south of Downtown Tucson in the retirement community of Green Valley. This site was initially established in April of 2002 as part of the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. Pima County began reporting the ozone data to EPA July, 2003. This site remains an important site because of the sensitive population in the mostly retirement community. This fragile population contends with a higher than average level of respiratory disease and therefore relies on the site for real time pollution information to assist in their daily outdoor activities. This site is also helpful to the young town of Sahuarita which has grown up just to the north of Green Valley. This town has a younger less susceptible population but with the southerly flow pattern is also served by the monitoring site to their south.

NITROGEN DIOXIDE MONITORING NETWORK
`Ambient Air Monitoring five year Network Assessment

Nitrogen dioxide (NO_2) is currently measured at two locations in Tucson. The Environmental Protection Agency (EPA) has proposed new standards and site locations for NO_2 monitoring. To meet these requirements PDEQ will be considering changes to the current network. The changes may require that the current neighborhood site be closed in order to open a near roadway site. Changes will depend on the final ruling by the EPA.

NO_2 Design Criteria
Table 9

MSA Population estimate	**# of EPA Proposed NO_2 Monitors**	**# of NO_2 Monitors currently in Network**
1,021,000	1 Community wide	1 SLAMS Monitor, Neighborhood
1,021,000	1 Near roadway	1 SP Monitor, Urban

Historical Nitrogen Dioxide Monitoring

Nitrogen dioxide levels remain well within federal standards. The Craycroft and 22nd St. monitor has been operational since 1973, measuring typical neighborhood NO_2 concentrations. Much of the data has been used in studies measuring the effects of NO_2 as a precursor to ozone formation.

A NOx analyzer was operating at the Pomona site from 1988 until 1996, when the site was closed. The re-establishment of the site at the Park location in May, 1998, allows for a more central urban monitoring site.

A NOx analyzer was operating at the Downtown site until early 1989. From 1995 to December 2001, NOx monitoring was conducted at Saguaro National Park East in order to establish baseline conditions in a Class I Wilderness Area.

Quality Assurance for NO_2

All data quality assessment requirements outlined in **40 CFR 58, app. A**, have been met.
The requirements include precision checks every other week with a check gas range between 0.08 and 0.10 ppm and annual internal audits for accuracy with three point check levels between 0.03 - 0.08 ppm, 0.15 – 0.20 ppm and 0.35 – 0.45ppm . All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.

NITROGEN DIOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**22ND STREET & CRAYCROFT**	
AQS code:	040191011	
Address:	1237 S. Beverly Avenue, Tucson, AZ.	
Latitude/ Longitude:	32.204420 / -110878150	
Elevation:	2582	
Method:	074	
Number of monitors:	1	
Type of monitor:	Instrumental chemiluminescence	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of hourly observations:	8674	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground on the roof of a shelter located in a city water well site	
Probe material / Residence time:	FEP Teflon / 4.4 seconds	
Surrounding landscape:	Dirt, ephemeral weeds	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a predominately residential eastside area with commercial activity lining nearby arterial routes. There is a large covered water reservoir north of the location.	
Nearest roads distance & direction to monitor /ADT:	**1**	260 meters west is Craycroft Road with 2006 ADT of 33,800
	2	260 meters north is 22nd Street with a 2004 ADT of 52,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

22ND STREET & CRAYCROFT: AIRS # 040191011

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and operated continuously to the present. This site is under consideration for closure to facilitate the activation of a near roadway site. This change will depend on the changes in rules by the EPA. If the near roadway site is not required then monitoring at this site will continue for its historic value.

NITROGEN DIOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**PARK**	
AQS code:	040191028	
Address:	400 W. River Road, Tucson, AZ	
Latitude/ Longitude:	32.295150 / -110.982300	
Elevation:	2286	
Method:	099	
Number of monitors:	1	
Type of monitor:	Instrumental chemiluminescence	
Monitoring site type:	Highest Concentration	
Classification:	Special Purpose	
Scale:	Urban	
Number of hourly observations:	8383	
Number /dates of exceedances in 2009:	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.25 meters above the ground on a shelter located in a city water well site	
Probe material / Residence time:	FEP Teflon / 5.1 seconds	
Surrounding landscape:	Gravel in walled compound, dirt parking lot, dry river bed	
Degrees of unrestricted air flow:	270	
Location description:	This site is located at the confluence of the Rillito River and Pima Wash, a natural low spot in the local topography. Single - family residences and a popular county park with exercise trails extend to the north, northwest, and west, respectively. Heavy commercial usage dominates to the south and east, including large shopping malls and automobile dealerships	
Nearest roads distance & direction to monitor /ADT:	**1**	State Route 77 runs north – south 0.5 kilometers to the east with a 2006 ADT of 52,000
	2	River Road runs east – west 0.5 kilometers to the north, with a 2006 ADT of 34,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

NITROGEN DIOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

PARK: AIRS # 040191028

Comments: The site began monitoring for nitrogen dioxide in May, 1998, and is a relocation (1.5 kilometers, northeast) of the old Pomona site. This site has been chosen as the new NCore site for Pima County and will continue monitoring oxides of nitrogen using a trace monitor.

SULFUR DIOXIDE MONITORING NETWORK
Ambient Air Monitoring five year Network Assessment

Sulfur dioxide (SO_2) is currently being monitored at one location in Pima County. The Environmental Protection Agency has revised the SO_2 requirements. The design criteria indicated in **40 CFR 58, app. D, 4.4**, states that there are no minimum requirements for the number of SO_2 monitoring sites. The SO_2 standard is currently under review by the EPA and changes may be forthcoming in the near future. It is our assumption that one monitor will be required for Pima County and that it will be located at our NCore site at children's park.

SO_2 Design Criteria
Table 10

MSA Population Category	**# of Required SO_2 Monitors**	**# of SO_2 Monitors**
>1,000,000	Required only for the NCore site	1 SLAMS Monitor

Historical Sulfur Dioxide Monitoring

Ambient concentrations of sulfur dioxide (SO_2) in Tucson have historically remained well below all federal standards, and in recent years have been extremely low (approaching the noise level of the instrumentation). SO_2 is not considered a problem in Pima County. The only major stationary sources of SO_2 possibly affecting ambient concentrations in the Tucson air planning area are the coal burning generators at the Irvington Road power plant operated by Tucson Electric Power.

Quality Assurance for SO_2

All data quality assessment requirements outlined in **40 CFR 58, app. A**, have been met.
The requirements include precision checks every other week with a check gas range between 0.08 and 0.10 ppm and annual internal audits for accuracy with three point check levels between 0.03 - 0.08 ppm, 0.15 – 0.20 ppm and 0.35 – 0.45ppm . All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.

SULFUR DIOXIDE MONITORING NETWORK
Ambient Air Monitoring Network Plan

Site Name:	**22ND STREET & CRAYCROFT**	
AQS code:	040191011	
Address:	1237 S. Beverly Avenue, Tucson, AZ	
Latitude/ Longitude:	32.204420 / -110878150	
Elevation:	2582	
Method:	060	
Number of monitors:	1	
Type of monitor:	Instrumental Pulsed Fluorescent	
Monitoring site type:	Population Exposure	
Classification:	SLAMS	
Scale:	Neighborhood	
Number of hourly observations:	8702	
Number /dates of exceedances in 2009 :	0	
Historical exceedances:		
Sampling frequency:	Continuous	
Probe height:	4.1 meters above the ground on the roof of a shelter located in a city water well site	
Probe material / Residence time:	FEP Teflon / 7.3 seconds	
Surrounding landscape:	Dirt, ephemeral weeds	
Degrees of unrestricted air flow:	360	
Location description:	This site is situated in a predominately residential eastside area with commercial activity lining nearby arterial routes. There is a large covered water reservoir north of the location. There are no significant local sources of SO_2 in the area	
Nearest roads distance & direction to monitor /ADT:	**1**	260 meters west is Craycroft Road with 2006 ADT of 33,800
	2	260 meters north is 22nd Street with a 2004 ADT of 52,400
Site meets 40 CFR 58, Appx. A,C,D,E	Yes	

22ND STREET & CRAYCROFT: AIRS # 040191011

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and operated continuously to the present. This site will be moved to park as part of the NCore site.

LEAD MONITORING NETWORK
Ambient Air Monitoring five year Network Assessment

Lead sampling and analysis was discontinued at the end of March, 1997, in Pima County. The Environmental Protection Agency regulations allowing for the cessation of ambient lead monitoring in most areas of the country, except in areas with stationary sources of lead. Most urban areas have seen a dramatic decrease in ambient lead levels since the phase out and ban of lead in gasoline.

On October 15, 2008 EPA strengthened the lead standard. Research and technology has shown that adverse health effects occur at much lower levels of lead in blood than previously thought. Children are particularly vulnerable to the effects of lead. The primary standard of 1.5 ug/m3 has been lowered to 0.15ug/m3, measured as total suspended particles (TSP).The secondary standard is identical to the primary standard. According to the 2005 National Air Emissions Inventory (NEI) from EPA, Pima County has no sources of lead of one ton or more. This means that Pima County will be required to perform area monitoring only, which will be done at the Park location. Monitoring is anticipated to commence prior to January 2011.

Historical Lead Monitoring

Lead concentrations are extremely low in Tucson. Lead monitoring began in Pima County in 1975 at eight TSP sampling locations. In August, 1978, lead analyses were discontinued at all but two sites. Magnetic Observatory (University of Arizona) and Prince Road were selected to represent a neighborhood site and roadway site, respectively. Lead sampling was started at a third site (Broadway & Swan) in January 1983.

Lead analysis at Magnetic Observatory was discontinued in 1983 due to lack of detectable levels of lead. A TSP sampler was installed at South Tucson in 1991 for purposes of lead analysis. This site, along with the other two remaining sites, (Prince Road and Broadway & Swan) adequately fulfilled the siting criteria for measuring potential highest urban concentrations of lead in the particulate monitoring network.

In March of 1992 the Broadway & Swan lead analysis was discontinued and the TSP samplers from the South Tucson and the University of Arizona sites were moved to the 22nd & Craycroft site. 22nd & Craycroft and Prince Road sites remained until March of 1997.

With the new lead standard from the EPA PDEQ will once again begin monitoring for lead. The monitor will be located at the new NCore site at Park. This single monitor will meet PDEQs requirements for lead monitoring, and will start taking data prior to January 2011.

V. TECHNOLOGY

Monitor Status for the Pima County Network

Gas Monitors, standard NAAQS:

Most standard NAAQS gas monitors in the PDEQ network are over five years old and some are over ten years old. The most recent replacements are two Thermo I series ozone monitors and these are approximately three years old. All other Thermo monitors are C series (CO, O3, NOx). We also run API O3, CO and NOx monitors in the E and A series, and a pair of the first Model 400 ozone monitors.

Currently deployed monitors are pushing lifespan limits and some are well beyond those limits; all should be replaced on a five-year schedule. Replacement monitors should be trace level for CO, NOx and SO2 to conform to current CFR requirements and pollutant concentration levels.

Current generation API and Thermo monitors operate well enough if line power is stabilized with UPS or SOLA line conditioners. This appears to be an issue only with newer monitors. The older units we run from all manufacturers are much more tolerant of power deviations and interruptions.

Instrument manuals provided with current generation monitors are acceptable from API and almost useless from Thermo. This is discussed further in the gas dilution calibrator section below.

Customer service from API is very responsive and mostly not very helpful from Thermo. This is discussed further in the filter based particulate monitors and ozone calibration sections below.

Gas Monitors, trace level:

All trace level monitors installed in the PDEQ NCore site are I series Thermo units and have operated adequately with no significant problems since deployment in mid 2009. Installation of the NOy unit required careful planning and execution to assemble the external converter “kit.” The NOy analyzer also presents maintenance issues that could be improved with a change to a photolytic converter. When part of an analyzer is perched ten meters up a tower, it presents challenges when maintenance is required, even when the converter can be easily lowered to a reasonable working height using a cable/winch system.

Particulate Monitors, filter based:

All filter-based particulate monitors are R&P 2000 FRM or 2025 sequential units ranging in age from less than one year to approximately seven years. The 2000 FRM units have provided excellent service with minimal difficulties. The 2025 sequential units have been more problematic due to the nature of the filter exchange system and associated pneumatics. PDEQ operates four of these samplers on an every day schedule, and this has accelerated wear and tear on those units from both a normal operation perspective as well as increased maintenance disassembly. The operation and service manuals provided with R&P samplers are superior, partly because of the troubleshooting flowcharts included. Factory support has been less helpful since the acquisition of the R&P product line by Thermo Fisher Scientific and the move of manufacturing operations to Franklin, MA. The one truly knowledgeable support tech for R&P products is difficult to contact directly due to heavy demand.

Particulate Monitors, continuous:

Continuous particulate monitors are Met One BAM 1020 with BGI Very Sharp Cut Cyclones for $PM_{2.5}$ and Thermo Fisher RP TEOM 1400ab units for PM_{10}. This division of instrument and particle size is based on better performance with the BAM 1020 in the lower $PM_{2.5}$ concentration ranges with the addition of the simplistic Very Sharp Cut Cyclone, as opposed to the TEOM and the complex, expensive and user-unfriendly FDMS system adapted to the TEOM platform to provide adequate low-concentration $PM_{2.5}$ performance. Even Thermo sales representatives do not recommend the FDMS system. Both the BAM 1020 and TEOM 1400ab operate adequately for PM_{10} use. PDEQ uses the TEOM for PM_{10} because it has virtually no moving parts and requires somewhat less attention to maintenance.

Customer support from Met One has been responsive to past criticisms, particularly in the area of instrument manuals. Early versions of the BAM 1020 were delivered with a minimal manual, but as the instrument evolved, so did the manual. Additionally, when further maintenance information was requested, PDEQ was provided with an expanded service manual covering problems and solutions that has proved very helpful and reduced the need to contact the factory for assistance.

Calibration Equipment and Method:

Calibration, gas dilution**:**

Thermo Environmental/Fisher Scientific dynamic gas calibrators are used network-wide for all dilution calibrations, C series units for NAAQS sites and I series for NCore trace level monitors. We have not experienced significant difficulty with any of these units but do not use them for ozone calibrations, and none are equipped with photometers. All are equipped for GPT and have performed well at NAAQS levels; less well for trace DIF (NO_2) levels in the lower concentration ranges. The addition of photometers to the trace units may improve low-end performance, but based on disastrous performance in the past with Thermo ozone calibrators, we are reluctant to consider this change. These calibrators are capable of remote operation.

As funding becomes available and trace level analyzers are brought on line to conform to current CFR requirements and pollutant concentration levels, gas dilution calibrators and zero air generators will need to be purchased to provide the lower calibration and routine check concentrations required by these analyzers.

Our technical staff has been complaining for many years to Thermo on the inadequacy of their instrument manuals, and this inadequacy is epitomized by the manuals we received with our I series gas calibrators, which apparently had not been proofread prior to being printed and distributed. The errors begin on the Table of Contents pages, which all read the same page in each section for all subjects, requiring the user to painstakingly thumb through the book looking for the needed information. Some sections are incomplete, requiring the user to either attempt to contact someone at the factory that might have an answer, or figure it out based on previous experience, intuition and a willingness to experiment to see what happens. To further exacerbate this situation, a direct complaint, made *in person, with contact information provided* to the Thermo Fisher Engineering Manager of Air Quality Instruments, has resulted in silence since the 2009 convention in Nashville, despite a promise to “look into it and get back to you.”

Calibration, ozone:

All ozone calibration is done using API model 401, 401x and 703E units. An API 401 is used as a primary standard, verified annually by California ARB. All field standards are calibrated using the primary standard and a dedicated master standard. The field standards are transported from site to site on

a weekly basis for calibrations, precision, zero and span checks. Since no in situ calibrators are used in the PDEQ ozone network, the transportability factor becomes an issue, and to date API is the only major manufacturer to accommodate those agencies that routinely transport their field standards. The Model 401 was a suitcase-sized unit with carry handle but heavy at 60 pounds. The Model 401x was 20 pounds lighter and a dramatic improvement. The current Model 703E is lighter yet and signifies the willingness of API to listen to its customers and produce products accordingly. Further to that, the initial shipments of Model 703E calibrators, including ours, demonstrated performance issues that the manufacturer corrected with design improvements, even after the warranty had expired, with no charge. API staff contacted *us* to expedite this update. This is the type of customer service that competing manufacturers would do well to emulate.

Considering the somewhat rugged use that the field standards are subjected to in a typical day of routine checks at a number of sites, most of our current inventory is beginning to require increased maintenance, and one has experienced catastrophic failure. New replacements should be rotated into inventory.

Thermo's response to inquiry about transportable ozone field standards has been to suggest that primary ozone standards be installed at all ozone monitoring sites, thus eliminating the need to transport. While this would in fact be advantageous from a time utilization standpoint as regards periodic re-calibration requirements of a field standard, the capital outlay would be significant, and not within realistic budgetary considerations.

Zero Air Source:

All zero air sources used in the PDEQ network in conjunction with dilution calibration are compressor based with various configurations of catalyst and desiccant. API Model 701 units are used at NAQQS stations. The NCore station uses a Thermo Model 111 that has been modified with a desiccant chamber between the compressor/tank and the scrubber unit, and a final carbon output scrubber. All zero air is filtered upstream of gas calibrator zero air inlets to prevent mass flow controller contamination.

Ozone field standards use carbon and desiccant canister portable scrubbers.

Gas Standards:

All gas standards are certified EPA Protocol grade produced by Airgas in Los Angeles. Gas standards used for NCore monitoring are lower concentrations suitable for trace-level dilutions.

Meteorological Calibration Devices:

PDEQ uses sonic anemometers network-wide. Field calibrations are not possible with this type of unit. The units are initially factory calibrated in a closed-loop wind tunnel and provided with calibration documentation. The only field verification possible is with a second co-located unit with recent factory calibration, and transducer blocking and bagging for signal verification. Anemometer alignment is performed with a quality compass adjusted annually to the current magnetic declination in Tucson.

Temperature and relative humidity sensors are calibrated using a Vaisala HMK15 calibration kit with certified salt solutions and a NIST traceable thermometer.

Sampling Manifold:

PDEQ does not use sampling manifolds. Sample inlets are FEP teflon tubing installed as short as possible to minimize sample residence time, which is typically less than ten seconds. Inlet tubing is changed routinely to eliminate sample degradation from contamination in the tubing. The NCore station is set up so that all calibration, routine check and audit gases are routed to the probe and are then exposed to the same inlet conditions as the sample air.

Auditing Equipment:

PDEQ uses dedicated audit equipment and gas standards for all internal audits. The audit gas calibrator used on all NAAQS monitors is an Environics Model 6103 that is approximately seven years old and still functional, but is past its effective service life and needs to be replaced with a newer unit capable of trace level dilutions. The NCore station has a dedicated Thermo Scientific Model 146i installed next to the identical site calibrator. Both the audit and site calibrator are plumbed identically using different gas standards of the same concentrations in two segregated racks.

Meteorological audit equipment consists of a dedicated Vaisala HMK15 calibration kit with certified salt solutions and a NIST traceable thermometer for relative humidity and temperature probe audits. Sonic anemometer verifications are done using a co-located sonic anemometer, and transducer blocking and bagging for signal verification. Anemometer alignment verification is performed with a quality compass adjusted annually to the current magnetic declination in Tucson.

Data Acquisition System:

NAAQS stations use ESC Model 8816 data loggers configured for analog input signals, and basic fax modems polled through standard telephone lines. This system has been adequate for some time, but will require upgrading to digital-ready loggers as trace-level analyzers are brought on line.

The NCore station has a DR DAS Envidas logger configured for digital inputs from all trace analyzers and analog inputs from meteorological sensors. This logger is capable of metadata collection and storage, remote diagnostics and either programmed or remote operation. This station also has an ESC 8816 for analog inputs from the NAAQS CO and NOx analyzers. Both loggers are polled through fax modems using a single phone line and a switching unit.

Automated central polling, data analysis and reporting is done using an Envitech / DR DAS data acquisition suite.