2019 Ambient Air Monitoring
Five Year Network Assessment & Plan

Pima County Department of Environmental Quality

PIMA COUNTY
ENVIRONMENTAL QUALITY
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2019 Ambient Air Monitoring
Five Year Network Assessment & Plan

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I. INTRODUCTION

This document constitutes the 2019 Ambient Air Monitoring 5 Year Network Assessment and Plan 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 5 Year Network Assessment and Plan 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 monitored and reported by PDEQ are carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (pb) 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 contains statistical data summaries for the 2019 calendar year and provides a site by site assessment of the monitoring network with respect to EPA site criteria.

The Pima County monitoring network consist of State or Local Air Monitoring Stations (SLAMS). SLAMS monitors comprise the required network monitors that are used for NAAQS comparisons and follow the monitoring objectives listed on page 12.

Pima County has a designated NCore site at the Children's Park location, which also monitors for reactive oxides of nitrogen (NO_Y), particulate matter, coarse fraction ($PM_{10-2.5}$) and speciated $PM_{2.5}$ particulate matter.

Pima County discontinued lead monitoring per EPA approval on May 16, 2016. The highest three-month rolling average measured from March 2012 through the end of 2015 was 0.00 $\mu g/m^3$.

Pima County does not share monitoring responsibilities with Arizona Department of Environmental Quality at this time.

EPA's review of criteria pollutants:

January 1, 2020 – EPA policy assessment for review of PM standards
February, 2019 – EPA chooses to retain current sulfur dioxide standard
April, 2018 - EPA chooses to retain current nitrogen dioxide standard
October, 2015 – EPA strengthens the ozone standard to 0.070 ppm

Attachment A contains the response letter from EPA for the 2018 Ambient Air Monitoring Plan submitted by PDEQ.

Attachment B contains the approval letter from EPA for the NOy monitor location change to 22nd and Craycroft site.

2019 Modifications

1. Replace the PM_{10} FRM sampler at the Tangerine station with a continuous PM_{10} FEM monitor.
2. Replace the PM_{10} FRM sampler at the Corona de Tucson station with a continuous PM_{10} FEM monitor. Also install a digital data logger and wireless communications to achieve near real-time hourly data.
3. Continue impact analysis of development near the Tangerine ozone and PM_{10} monitoring station, and if necessary change the station spatial scale and site type to correspond with changes to area development.
4. Decreased the residence time at the 22nd & Alvernon site from 52 seconds to 16.6 seconds by installing a bypass pump.

Anticipated 2020 Modifications

1. Replace the FRM PM_{10} sampler at the Santa Clara monitoring station with a continuous FEM PM_{10} sampler. Also install a digital data logger to achieve near real-time data.
2. The 22nd & Craycroft site has been designated as a new Photochemical Assessment Monitoring Station (PAMS). Installation of required instrumentation will start in 2020 and continue until completed. Required instrumentation includes an auto gas chromatograph (GC) monitoring system, carbonyls sampling, true NO_2, NO_y, ozone, mixing height, barometric pressure, precipitation, solar radiation, UV radiation, ambient temperature, relative humidity, wind speed and wind direction.
3. PDEQ submitted a formal request to EPA for a waiver to relocate the agency's NOy monitor in concert with continued operation of a NOx monitor, pursuant to 40 CFR Part 58 Appendix D, Section 3(b)(1), from the current Children's Park NCore station to the 22nd & Craycroft PAMS station. Approval was granted by EPA on February 20th, 2020. **See attachment B**
4. PDEQ will begin the traffic assessment and site analysis/selection process for the Near-Road monitoring station per 40 CFR Part 58.13(c)(3) and Appendix D 4.3.2(a). Once site selection is approved by EPA, site installation will begin.

Near-Road Monitoring

According to 40 CFR Part 58 Appendix D, state and local air agencies are required to operate one near-road monitoring site in each Core Based Statistical Area (CBSA) with a population of 1,000,000 or more persons. With a population in the Pima County CBSA greater than 1,000,000, but less than 2,500,000, and no roadway segments carrying traffic volumes of 250,000 or more vehicles (as measured by annual average daily traffic [AADT] counts), Pima County meets the criteria for operating one near-road NO2 station. The highest AADT count for Pima County is near the I-10 and Grant road area, with a traffic count of 177,434 (2018).
The first phase in implementing a near-road NO_2 monitoring site is to:

- Identify CBSA (Core Based Statistical Area)
- Assess AADT (Annual average daily traffic)
- Assess Fleet Mix and Congestion Data
- Review Physical Site Characteristics
- Review Siting Criteria.

The second phase is to prepare a candidate site comparison matrix for prioritization. The key components in the matrix would consider:

- Accessibility to the desired location
- Safety of the site operator and the traveling public
- Availability of power and communication services
- Terrain of the road segment(s)
- Man-made barriers
- Population exposure
- Background sources
- Surrounding land use
- Meteorology

The last phase in determining a final near-road site selection would be to engage with the EPA Regional staff for feedback. To arrive at an appropriate combination of the physical considerations and population representation, site selection in Pima County defaults to locations along Interstate 10 (I-10). Because of the type of elevated roadway through much of this section, and multi-lane frontage roads paralleling I-10, installing a station within the probe to traffic lane requirement of 50 meters will be difficult. Site selection will evolve to those roadway segments where a station would both successfully fulfill the requirements, and be logistically possible. PDEQ and EPA continue to work on this Near-Road project with an anticipated monitoring start date of January 2022.

Photochemical Assessment Monitoring Stations (PAMS)

Based on 40 CFR part 58, Appendix D, State and Local air monitoring agencies were required to begin making PAMS measurements at their NCore or alternate PAMS locations by June 1, 2019. The equipment needed to measure PAMS parameters were to be purchased by USEPA using a nationally negotiated contract and delivered to the monitoring agencies. USEPA had announced that due to contract delays, the necessary equipment would not be delivered in time to begin making PAMS measurements by June 1, 2019. Per 40 CFR part 58.13 (h), "the Photochemical Assessment Monitoring sites required under appendix D of this part, section 5(a), must be physically established and operating under all requirements of this part, including the requirements of appendix A, C, D, and E of this part, no later than June 1, 2021".

The 22nd & Craycroft monitoring station (AQS ID: 04-019-1011) has been designated as a new Photochemical Assessment Monitoring Station (PAMS). This site currently monitors for ozone, $NO/NO_2/NO_x$, inside temperature, outside temperature, relative humidity (RH), vector wind speed and vector wind direction. Installation of the required PAMS instrumentation will start at the beginning of 2020 and continue until completed. Required instrumentation includes an auto gas chromatogragh (GC) monitoring system, carbonyls sampling, true NO_2, NO_y, ozone, mixing height, barometric pressure, precipitation, solar radiation, UV radiation, ambient temperature, relative humidity, wind speed and wind direction. PDEQ anticipates monitoring of all parameters starting the 2021 PAMS season.

PAMS Equipment Purchased

Parameter	**Manufacturer/Model**	**Purchase Date**	**Installation Date**
Auto GC	CAS-Chromatotec (FID)	National Contract	
Data Acquisition System (DAS)	DR DAS Envidas 64 Advantech 510	3/4/2020	
True NO2	Teledyne T-500U		
Carbonyls Sampling	ATEC 8000	1/16/2020	5/29/2020
Barometric Pressure	Met One 092	6/5/2019	5/29/2020
Precipitation	Met One 370	6/5/2019	5/29/2020
UV Radiation	Epply TUVR	6/5/2019	5/29/2020
Solar Radiation	Met One 094	6/5/2019	5/29/2020
Mixing Height	Vaisala CL-51		

General comment regarding monitoring station siting criteria:

The locations of monitoring stations in the PDEQ network require considerable planning to conform to all of the siting requirements specified in 40 CFR 58 Appendix E. Locations are chosen only after carefully considering the intent and installation logistics of each station. Some stations remain static, and easily maintain all siting criteria, and others fall victim to urban evolution and nature. Development happens and trees grow, modifying the original circumstances. Development can change those circumstances to the point that relocation or designation change of a station is required. Tree growth is more forgivable in that it can be modified by removal or trimming, but sometimes this is not possible for a number of reasons. Going to the effort of relocating a station because of tree growth is not generally practical. Modifying the station information to categorize trees as an obstruction is preferable, as long as siting criteria still meets the minimum requirements for obstructions. Most of the trees near PDEQ monitoring stations are typical of Sonoran Desert indigenous species, namely mesquite and palo verde, both of which have small, relatively sparse leaves, and in most cases do not totally block airflow, or provide large surfaces for particulate deposition. However, PDEQ has several stations that have been compromised by substantial tree growth, and in each section for those stations, the category for degrees of unrestricted airflow will reflect the reality of tree growth at those stations, and the obstructed airflow will be identified by direction in degrees.

II. BACKGROUND

Pima County Air Quality Control District met the National Ambient Air Quality Standards (NAAQS) in 2019. The criteria pollutants that are a concern for Pima County are ozone and particulate matter (PM_{10}). Ozone levels are often near 98% of the standard and in 2018 exceeded the ozone standard. Particulate matter (PM_{10}) levels are elevated during drought conditions and high winds which have caused exceedances of the NAAQS. There were no exceedances of PM_{10} in 2019.

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 2010 census shows Pima County population at 980,263 and the city of Tucson population at 520,116. **Figure 1** on page 14 illustrates the Eastern Pima County Tucson Air Planning Area (TAPA). 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 Tucson Metropolitan Statistical Area (MSA) has incurred a population increase of approximately 6.4% since the 2010 census, based on 2019 estimates, the latest available by the US Census Bureau.

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 average 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.

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.

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 Part 58** are:

1. To provide air pollution data to the general public in a timely manner;
2. To comply with ambient air quality protocols and standards in order for data to be used for comparison to the NAAQS;
3. 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 Part 58**, the site types:

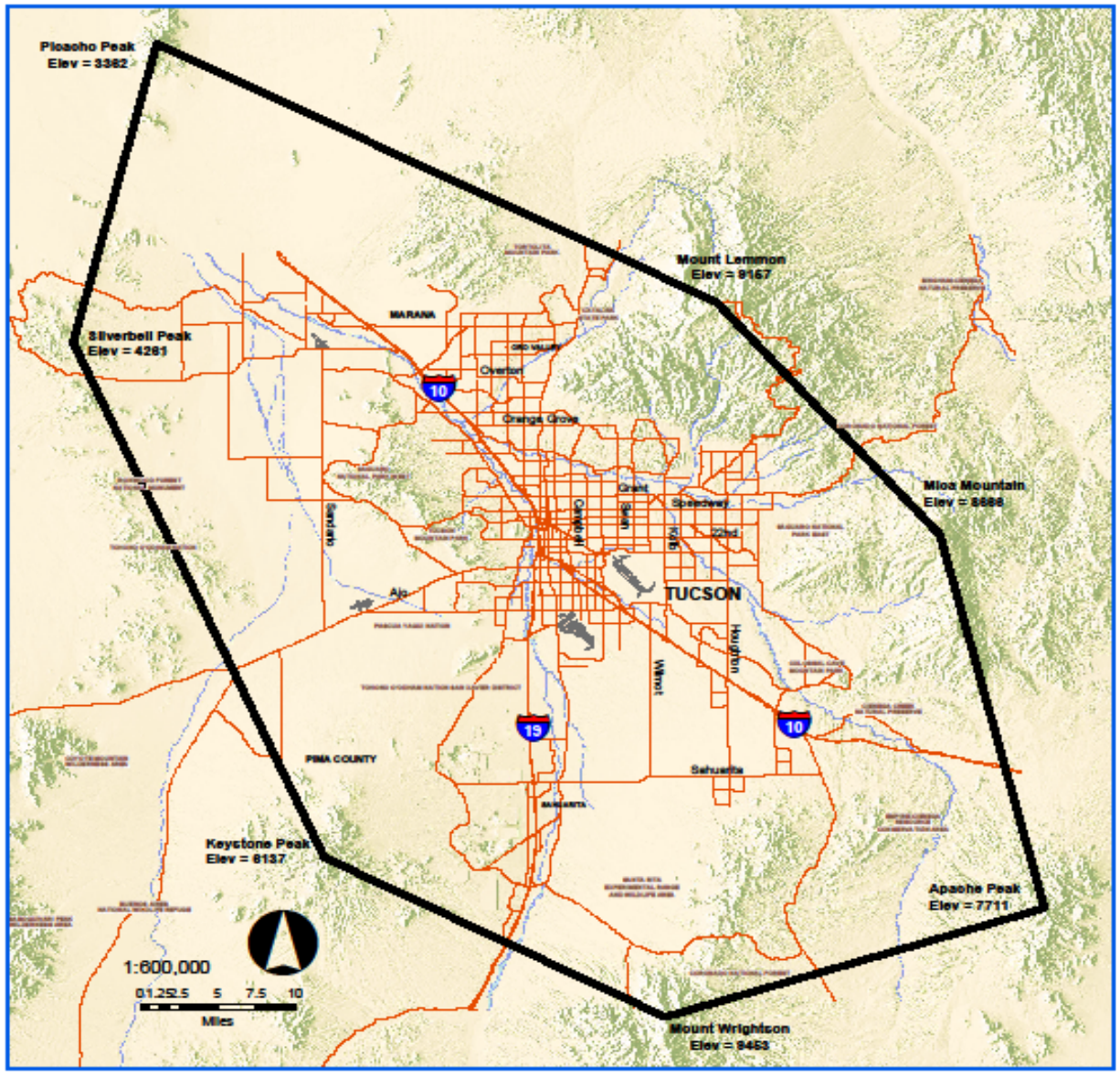
1. Determine the area of highest concentrations expected to occur in the network;
2. Determine representative concentrations in areas of high population density;
3. Determine the impact on ambient pollution levels of significant sources or source categories;
4. Det ermine general background concentration levels;
5. Determine the extent of regional pollution transport among populated areas;
6. 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 Part 58** as follows:

1. *Microscale* defines concentrations in air volumes associated with area dimensions from 1 meter to 100 meters;
2. *Middle Scale* defines concentrations typical of areas from 100 meters to 500 meters;
3. *Neighborhood Scale* defines concentrations typical of areas with dimensions in the 0.5 to 4.0 kilometer range;
4. *Urban Scale* defines the overall, city – wide conditions with dimensions in the 4 to 50 kilometer range;
5. *Regional Scale* usually defines a rural area with dimensions as much as hundreds of kilometers;
6. *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 Exposure	Neighborhood, Urban
Source Impact	Micro, Middle, Neighborhood
General / Background	Urban, Regional
Regional Transport	Urban, Regional
Welfare-Related Impacts	Urban, Regional



Eastern Pima County Tucson Air Planning Area

The portion of Pima County within the geographical coordinate boundary

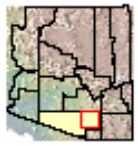
TAPA Boundary
Major Streets
Washes

Revised: March 2019

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.

PIMA COUNTY
ENVIRONMENTAL QUALITY

Prepared By
Pima County Department
of
Environmental Quality



TAPA 2018

III. SUMMARY TABLES AND MAP

Table 2
Active Particulate Monitoring Sites for 2019
(Map located on Page 16)

Map #	Pollutant		Address	Site Name
3	PM_{10}	$PM_{2.5}$	2498 N. Geronimo	Geronimo
4	PM_{10}		1601 S. 6th Ave.	South Tucson
5	PM_{10}		22000 S. Houghton Rd.	Corona de Tucson
6	PM_{10}		6910 S. Santa Clara Ave.	Santa Clara School
7	PM_{10}	$PM_{2.5}$	601 N. La Canada Dr.	Green Valley
8		$PM_{2.5}$	400 W. River Rd.	Children's Park NCore
9	PM_{10}	$PM_{2.5}$	3401 W. Orange Grove Rd.	Orange Grove
10	PM_{10}		12101 N. Camino de Oeste	Tangerine
11		$PM_{2.5}$	710 W. Michigan	Rose Elementary
12		$PM_{2.5}$	9597 N. Coachline Blvd.	Coachline

Table 3
Active Gaseous Pollutant Monitoring Sites for 2019
(Map located on Page 16)

Map #	Pollutant					Address	Site Name
1		O_3		NO_2		1237 S. Beverly Ave.	Craycroft & 22nd St.
2	CO					3895 E. 22nd St.	Alvernon & 22nd St.
7		O_3				601 N. La Canada Dr.	Green Valley
8	CO	O_3	SO_2	NO_2	NO_Y	400 W. River Rd.	Children's Park NCore
10		O_3				12101 N. Camino de Oeste	Tangerine
11		O_3				710 W. Michigan	Rose Elementary
12		O_3				9597 N. Coachline Blvd.	Coachline
13		O_3				11330 S. Houghton Rd.	Fairgrounds
14		O_3				3905 S. Old Spanish Trail	Saguaro National Park, East

Figure 2

2019 Ambient Air Monitoring Five Year Network Assessment and Plan

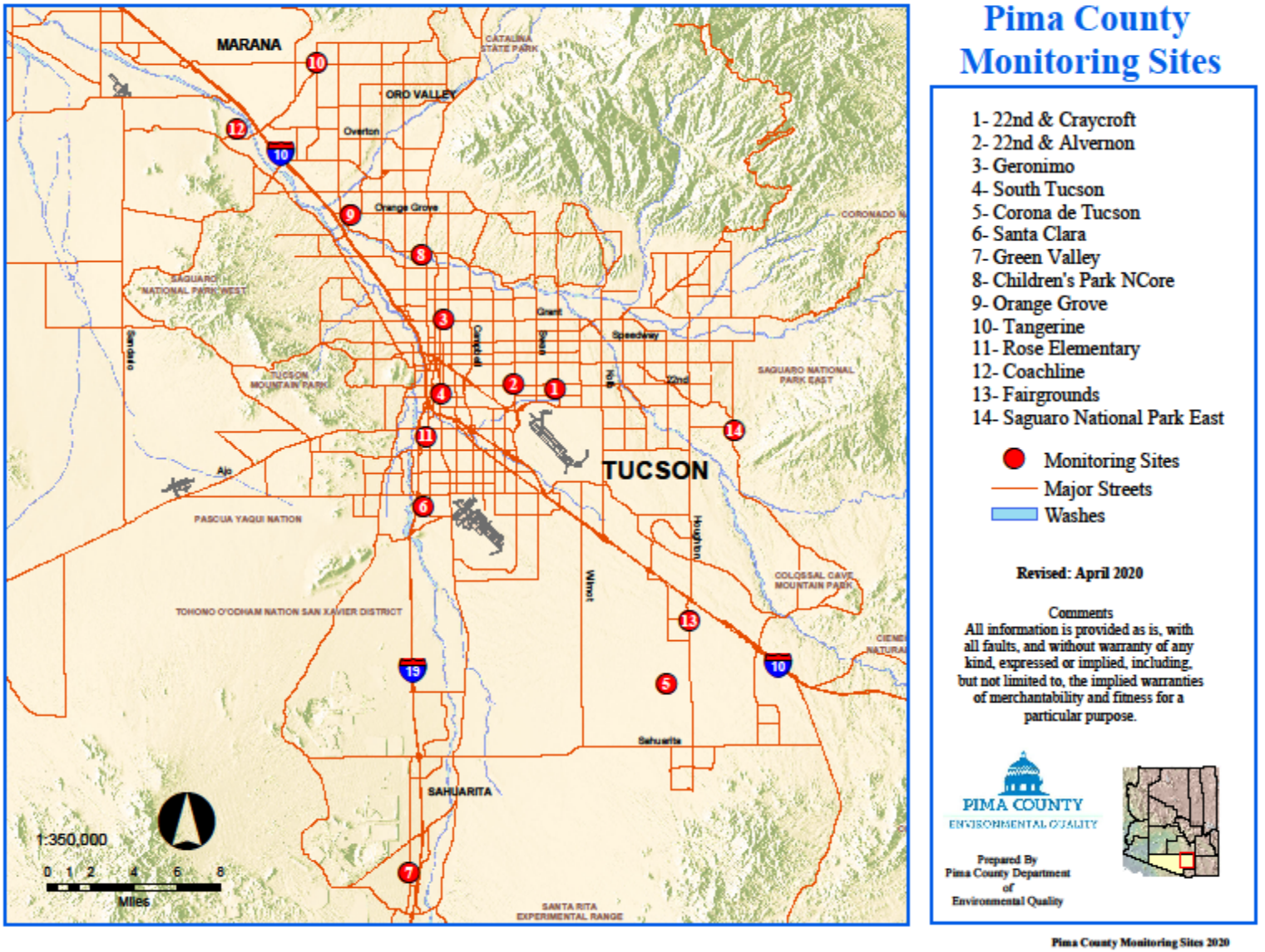


Table 4
Ambient Air Monitoring Network Summary
(Key Located on Page 21)

CARBON MONOXIDE											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (FEET)** (f)	**SAMPLE HEIGHT (METER)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Alvernon & 22nd St. 3895 E. 22nd Street	04-019-1014	42101	SLAMS	Mar-75 Present	054	2516	3.8	Microscale	Continuous	1	Highest Concentration
Children's Park NCore 400 W. River Road	04-019-1028	42101	SLAMS	Oct-98 Present	554	2286	4.25	Neighborhood	Continuous	1	Population Exposure

NITROGEN DIOXIDE											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (FEET)** (f)	**SAMPLE HEIGHT (METER)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Craycroft & 22nd St. 1237 S. Beverly Ave.	04-019-1011	42602	SLAMS	Jan-73 Present	074	2582	4.4	Neighborhood	Continuous	1	Population Exposure
Children's Park NCore 400 W. River Road	04-019-1028	42602	SLAMS	May-98 Present	074	2286	4.25	Neighborhood	Continuous	1	Highest Concentration
REACTIVE OXIDES OF NITROGEN											
Children's Park NCore 400 W. River Road	04-019-1028	42600	SLAMS	Oct-10 Present	674	2286	10.0	Neighborhood	Continuous	1	Population Exposure

SULFUR DIOXIDE											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (FEET)** (f)	**SAMPLE HEIGHT (METER)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Children's Park NCore 400 W. River Road	04-019-1028	42401	SLAMS	October -10 Present	560	2286	4.25	Neighborhood	Continuous	1	Population Exposure

OZONE											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (FEET)** (f)	**SAMPLE HEIGHT (METER)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Craycroft & 22nd St. 1237 S. Beverly Ave.	04-019-1011	44201	SLAMS	July-73 Present	047	2582	4.4	Neighborhood	Continuous	1	Population Exposure
Green Valley 601 N. La Canada Dr.	04-019-1030	44201	SLAMS	July-03 Present	047	2910	3.3	Neighborhood	Continuous	1	Population Exposure
Children's Park NCore 400 W. River Road	04-019-1028	44201	SLAMS	Sept-97 Present	047	2286	4.25	Neighborhood	Continuous	1	Population Exposure
Tangerine 12101 N Camino De Oeste	04-019-1018	44201	SLAMS	Oct-89 Present	047	2638	3.75	Urban	Continuous	1	Highest Concentration
Rose Elementary 710 W Michigan	04-019-1032	44201	SLAMS	July-03 Present	047	2387	4.1	Neighborhood	Continuous	1	Population Exposure
Coachline 9597 N Coachline Blvd	04-019-1034	44201	SLAMS	July-03 Present	047	2110	3.4	Neighborhood	Continuous	1	Population Exposure
Fairgrounds 11330 S Houghton Rd	04-019-1020	44201	SLAMS	Oct-89 Present	047	3078	3.6	Urban	Continuous	1	General / Background
Saguaro National Park 3905 S Old Spanish Trail	04-019-0021	44201	SLAMS	Jun-82 Present	047	3089	4.1	Neighborhood	Continuous	1	Maximum Ozone Concentration

PM10											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (Feet)** (f)	**SAMPLE HEIGHT (Meter)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Geronimo 2498 N. Geronimo	04-019-1113	81102	SLAMS	June- 07 Present	122	2452	4.6	Neighborhood	Continuous	1	Population Exposure
South Tucson 1601 S. 6th Ave.	04-019-1001	81102	SLAMS	Sep-88 Present	122	2420	6.9	Neighborhood	Continuous	5	Population Exposure
Corona De Tucson 22000 S. Houghton Rd.	04-019-0008	81102	SLAMS	Mar-87 Present	122	3078	2.1	Regional	Continuous 01/2019	1	General / Background
Santa Clara 6910 S. Santa Clara Ave.	04-019-1026	81102	SLAMS	Jul-94 Present	126	2540	6.45	Neighborhood	6 Day Collocated Every 12 Day	1 2	Population Exposure
Green Valley 601 N. La Canada Dr.	04-019-1030	81102	SLAMS	Feb-01 Present	122	2910	4.25	Neighborhood	Continuous	1	Population Exposure
Orange Grove 3401 W. Orange Grove Rd.	04-019-0011	81102	SLAMS	Jan-85 Present	122	2234	2.65	Neighborhood	Continuous	5	Highest Concentration
Tangerine 12101 N. Camino De Oeste	04-019-1018	81102	SLAMS	Jan-94 Present	122	2638	4 .5	Urban	Continuous 01/2019	1	General / Background

CHEMICAL SPECIATION											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (Feet)** (f)	**SAMPLE HEIGHT (Meter)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Children's Park NCore 400 W. River Road	04-019-1028	88502	SLAMS	Feb-02 Present	810	2286	3.0	Neighborhood	3 Day	5	Population Exposure

PM 2.5											
SITE NAME AND LOCATION	**SITE ID** (a)	**PARAMETER** (b)	**CLASSIFICATION** (c)	**DATES** (d)	**METHOD** (e)	**SITE ELEVATION (Feet)** (f)	**SAMPLE HEIGHT (Meter)** (g)	**SPATIAL SCALE** (h)	**SAMPLE FREQUENCY** (i)	**POC** (j)	**MONITORING SITE TYPE** (h)
Geronimo 2498 N. Geronimo	04-019-1113	88502	Other	July-03 Present	733	2452	4.6	Neighborhood	Continuous	3	Population Exposure
Green Valley 601 N. La Canada Dr.	04-019-1030	88502	Other	July-03 Present	733	2910	4.8	Neighborhood	Continuous	3	Population Exposure
Children's Park NCore 400 W. River Road	04-019-1028	88101	SLAMS	Jan-99 Present	145	2286	3.1	Neighborhood	Collocated Every 6 Day Collocated Every 3 Day	2	Population Exposure
Children's Park NCore 400 W. River Road	04-019-1028	88101	SLAMS	Jan-11 Present	170	2286	4.3	Neighborhood	Continuous	3	Population Exposure
Orange Grove 3401 W. Orange Grove Rd	04-019-0011	88101	SLAMS	Jan-99 Present	170	2234	2.65	Neighborhood	Continuous	3	Population Exposure
Rose Elementary 710 W. Michigan	04-019-1032	88502	Other	July-03 Present	733	2387	4.9	Neighborhood	Continuous	3	Population Exposure
Coachline 9597 N. Coachline Blvd	04-019-1034	88502	Other	July-03 Present	733	2100	4.9	Neighborhood	Continuous	3	Population Exposure

KEY TO SUMMARY TABLES

Information Provided Based On EPA's 2019 Air Quality System (AQS) Data.

(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) Site Elevation - Site Elevation In Feet
(g) Sample Height - Sample Inlet Height In Meters, Specific Height Range Required For Uniform Collection
(h) Spatial Scale And Monitoring Site Type - Described On Page 11
(i) Sample Frequency - 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

IV. CURRENT MONITORING NETWORK EVALUATIONS

PM_{10} MONITORING NETWORK REQUIREMENTS

The PDEQ PM_{10} network consists of seven monitoring sites in eastern Pima County, Arizona. The 2019 network used several different types of PM_{10} samplers: R& P Partisol 2000, R& P Partisol-Plus 2025 Sequential and BAM 1020. **40 CFR Part 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 2019.

Table 5
2019 PM_{10} Design Criteria

Population Pima County	MSA 8520 Tucson Population Category		Max Concentration Site 2017-2019	Max Concentration ($\mu g/m^3$)	PM_{10} Sites # Required	PM_{10} Sites # Operating
2010 Census 980,263	500,000 – 1,000,000		Geronimo	89	1-2 SLAMS monitors	7 SLAMS monitors
[a]2019 Estimated Population 1,047,279	>1,000,000				2-4 SLAMS monitors	

a. U.S. Census Bureau 2019 population estimate of the Tucson area (MSA 8520) is 1,047,279

Violation History

The PM_{10} 24 hour standard remains at 150 $\mu g/m^3$. 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 had been changed from every six day sampling to every day sampling, as indicated in **40 CFR Part 50, app. K** and **40 CFR Part 58.13.** Exceedances of the 24 hour standard have been recorded at monitoring sites in the PDEQ PM_{10} network at the following locations: In 2013, one exceedance on April 8th at the South Tucson location and on April 9th there was one exceedance each, at the South Tucson, Geronimo, and Green Valley stations. These exceedances may also be considered as an Exceptional Event dependent on approval from EPA. In 2014, there were three exceedances on July 25 at the Green Valley, Geronimo, Orange Grove monitoring sites. These exceedances may also be considered as an Exceptional Event dependent on approval from EPA. In 2015 through 2019, there were no recorded exceedances for PM_{10}.

Quality Assurance for Particulate Matter PM_{10}

All data quality assessment requirements, as outlined in **40 CFR Part 58, app. A**, have been met for 2019. The precision of PM_{10} data is derived from the co-located PM_{10} samplers at the Santa Clara site. 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.

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.

Table 6
Precision and Accuracy Tests

Protocol	Instrument	Frequency	Date Completed 2019
Flow rate verification	Met One BAM 1020	Weekly	
Flow Rate Audit	BAM 1020	Semi Annually	Green Valley 03/11, 06/07, 09/03, 12/20 Geronimo 03/11, 06/03, 09/05, 12/10 South Tucson 03/27, 06/11, 09/10, 12/20 Orange Grove 03/11, 06/03, 09/10, 12/10 Corona de Tucson 03/13, 06/05, 09/03, 12/18 Tangerine 03/14, 06/04, 08/29, 12/11
Flow rate verification	R& P Partisol 2000, R& P Partisol-Plus 2025 Sequential	Monthly	
Flow Rate Audit	R& P Partisol 2000, R& P Partisol-Plus 2025 Sequential	Semi Annually	Santa Clara 03/27, 06/25, 09/05, 12/26 Santa Clara (co-located) 03/27, 06/25, 09/05, 12/16
NPAP Audit			None

Table 7
Collocated PM_{10} Monitors

Method	# Required Collocation Monitors	# Collocated Monitors
81102	1	1

Table 8
2019 Annual Summary Statistics
(NAAQS: 150 μg/m^3 24- Hour Average)

Site	Highest 24- Hour Value (μg/m^3)	2nd Highest 24-Hour Value (μg/m^3)	Annual Average (μg/m^3)
Orange Grove 0011	68	44	20.9
Corona de Tucson 0008	58	56	12.4
Santa Clara 1026	31	28	15.5
Green Valley 1030	36	29	10.2
Geronimo 1113	89	55	24.2
Tangerine 1018	53	38	12.3
South Tucson 1001	72	51	23.6

Particulate Matter Weigh Lab

Pima County Department of Environmental Quality closed its filter weigh lab. All gravimetric analysis of filters is now performed by an outside contracted laboratory

Sampling Schedule Calculation

The design value for the Tucson area network was determined using the PM_{10} SIP Development Guideline, Section 6.3.1 "Table look-up" procedure. Three years of sampling data, 2017 – 2019, were used. For that period, the Geronimo monitoring location was determined to have the highest design value (including possible exceptional events). That value was 90μg/m³. The ratio of this value to the 24 hour standard of 150 μg/m³, .60, was then compared to the brackets in Figure 1 from 40 CFR 58.12(e) to arrive at a minimum PM_{10} sampling frequency of every sixth day. Geronimo is a continuous monitor sampling site.

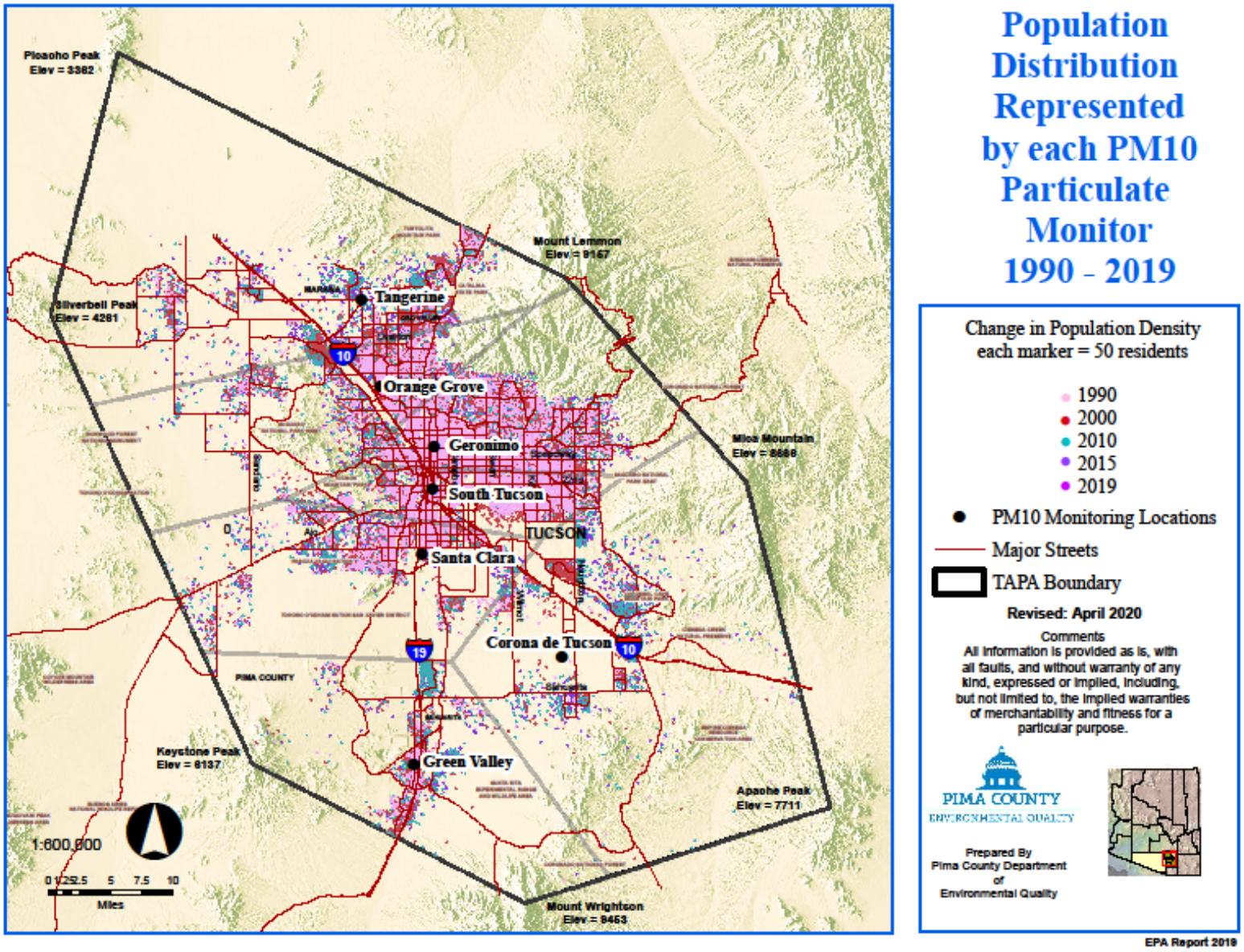
Population Growth and Distribution in the PM_{10} Network

Figure 3 represents a Thiessen Polygon analysis showing 1990 population distribution, and population distribution and growth for the years 2000, 2010, 2015 and 2020. Each polygonal area shows population distribution and growth represented by the PM_{10} monitor in that area. 2020 data demonstrates a slowdown in growth compared to previous years, with most of the growth surrounding the Tangerine monitor in the northwest portion of the TAPA, and areas to the south and east represented by the Green Valley and Corona de Tucson monitors.

All current PM_{10} monitors are fulfilling their intended purposes, with the exception of the Tangerine monitor, but as the analysis shows, there are two areas that do not have representation. The northeast area of the MSA has incurred less overall growth in the past 20 years compared to other areas, but is populated with similar density to other areas, and is somewhat isolated from the predominant down valley air flow. The other area without representation is the Avra Valley area, which is separated by the Tucson Mountains from the airshed over most of the TAPA. These shortcomings were pointed out in the previous network assessment, and to date, funding and available staffing are still the limiting factors to addressing these concerns.

The Tangerine monitor is currently classified as Urban Scale, General Background site type, which may no longer be appropriate. Developments in recent years have encroached on the site to within 50 meters to the west, and low-density housing is being built 150 meters to the south. Other development along the Tangerine Road corridor will surely follow, particularly after the Tangerine Road widening project was completed in 2018. This station has been in continuous operation since 1994 for PM_{10}. Despite the increases in construction, population density and resultant traffic, concentrations remain fairly low under normal meteorological circumstances. To more closely conform to appropriate classification, PDEQ is considering submitting a request to re-designate the site to a Neighborhood spatial scale, and Population Exposure site type.

2019 Ambient Air Monitoring Five Year Network Assessment and Plan



$PM_{2.5}$ MONITORING NETWORK REQUIREMENTS

The PDEQ $PM_{2.5}$ network consists of six monitoring sites in eastern Pima County, Arizona, **40 CFR Part 58.20, App. D. 4.7.** $PM_{2.5}$ design criteria provided guidance on the required number of SLAMS monitors. Pima County operates two FEM continuous and one FRM SLAMS monitor, and four non- regulatory continuous monitors.

Table 9
Design Criteria
2019 $PM_{2.5}$ SLAMS (FRM and FEM)

Population Pima County	MSA 8520 Tucson Population Category	Design Value Site	Annual Design Value Years 2017-2019	Daily Design Value Years 2017-2019	$PM_{2.5}$ Sites # Required	$PM_{2.5}$ Sites # Operating
2010 Census 980,263	500,000 – 1,000,000	Orange Grove	5.6µg/m^3	13µg/m^3	Requires 1 SLAMS Monitor <85% of NAAQS	2 SLAMS Monitors
2019 Estimated Population 1,047,279	>1,000,000				Requires 2 SLAMS Monitors	

Table 10
Collocated $PM_{2.5}$ Monitors

Method	# Required Collocation Monitors	# Collocated Monitors
88101 Method(s) 170 primary/145 collocated	1	1

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 proposed 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.

Regional Transport or Background:

ADEQ operates an FEM monitor at their Alamo Lake site for regional background, and an FEM monitor at their Yuma Supersite for regional transport.

The PDEQ SLAMS FRM monitor is a filter-based low-volume sampler located at the Children's Park NCore site that collects a sample for 24 hours on a 1 in 3 day cycle for precision assessment.

The PDEQ SLAMS FEM monitors at the Orange Grove and Children's park locations collect samples on a continuous hourly basis.

Continuous $PM_{2.5}$ monitoring was initiated in May, 2000 at the Green Valley site using Beta Mass Attenuation (Met One BAM 1020) and a sharp-cut cyclone. 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. These 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 $PM_{2.5}$ monitors at these four sites are operated as non-regulatory, intended only to provide information to the public. They are operated under the same Quality Control and Quality Assurance protocols as regulatory monitors to assure meaningful data are provided, but they are operated using alternative instrument settings (50 minute sample, 4 minute count time) that do not conform to FEM designation parameters for $PM_{2.5}$. This setting does not compromise the accuracy of the readings, and is inherent in the original design and designation of all FEM PM_{10} BAM 1020 monitors. The data obtained by FRM, continuous, FEM and non-regulatory monitors in Tucson are submitted quarterly to the EPA's Air Quality System (AQS) database.

Pima County Department of Environmental Quality closed its filter weigh lab. All gravimetric analysis of filters is now performed by an outside contracted laboratory

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 Children's Park NCore location in February, 2002. The samples are analyzed for forty eight elements, cations, nitrate, sulfate, organic and elemental carbon. Analysis and reporting are completed by University of California at Davis and Sonoma Technology Inc.

Violation History

The $PM_{2.5}$ standard (December 14, 2012): 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 $12ug/m^3$ 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 NAAQS were recorded in Tucson in 2019.

Quality Assurance for Particulate Matter $PM_{2.5}$

All data quality assessment requirements as outlined in **40 CFR Part 58, app. A** have been met in 2019, and include both internal and EPA PEP audits, and the co-located sampler at the Children's Park NCore site.

The accuracy of $PM_{2.5}$ sampling is assessed by auditing the flow rate every six months. 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.

Table 11
Precision and Accuracy Tests

Protocol	Instrument	Frequency	Date Completed 2019
Flow rate verification	Met One BAM 1020	Weekly	
Flow Rate Audit	Met One BAM 1020	Semi - Annually	Green Valley 03/11, 06/07, 09/03, 12/20 Geronimo 03/11, 06/03, 09/05, 12/10 Rose Elementary 03/07, 06/11, 09/06, 12/18 Coachline 03/14, 06/04, 09/06, 12/11 Children's Park NCore 03/13, 06/12, 09/05, 12/30 Orange Grove 03/11, 06/03, 08/29, 12/10
Flow rate verification	R& P Partisol-Plus 2025 Sequential R & P 2000	Monthly	
Flow Rate Audit	R& P Partisol-Plus 2025 Sequential R& P 2000 (Co-located) Met One SASS (Speciation) URG – 3000N (Speciation)	Semi - Annually	Children's Park NCore (Co-located) 03/13, 06/03, 09/05, 12/10 Children's Park NCore (Speciation, SASS) 3/21, 06/12, 09/10, 12/30 Children's Park NCore (Speciation, URG) 03/21, 06/12, 09/10, 12/30
PEP Audit			Children's Park NCore Met One BAM 1020 Orange Grove Met One BAM 1020 3/6, 5/01, 11/6

Table 12
2019 Annual Summary Statistics
(NAAQS $PM_{2.5}$: 12 µg/m^3 Annual Average, 35 µg/m^3 24 Hour Average 98th percentile)

Site	Highest 24- Hour Value (µg/m^3)	2nd Highest 24-Hour Value (µg/m^3)	98th % Value (µg/m^3)	Annual Average (µg/m^3)
Orange Grove (Meth. 170)	9.2	9.0	8.5	3.85
Children's Park NCore (Meth. 170)	11	10	8.2	3.03
Green Valley	8.5	7.8	6.3	3.03
Geronimo	18.3	12.2	10.5	5.03
Rose Elementary	17.9	11.2	9.3	4.67
Coachline	10.4	9.9	7.1	3.24

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

Figure 4 represents a Thiessen Polygon analysis showing 1990 population distribution, and population distribution and growth for the years 2000, 2010, 2015 and 2020. Each polygonal area shows population distribution and growth represented by the $PM_{2.5}$ monitor in that area. 2020 data demonstrates a slowdown in growth compared to previous years, with most of the growth in the northwest portion of the TAPA, and areas to the south and east.

Pima County operates a network of six $PM_{2.5}$ monitoring sites in the TAPA, two FEM continuous, one FRM SLAMS, and four non-regulatory continuous monitors. All current $PM_{2.5}$ monitors are fulfilling their intended purposes, but as the analysis shows, there are some areas that do not have representation. The northeast area of the MSA has incurred less overall growth in the past 20 years compared to other areas, but is populated with similar density to other areas, and is somewhat isolated from the normal down valley air flow. Considering the fairly high traffic volumes of arterial roadways in this area and the potential for stagnation due to the topography, $PM_{2.5}$ monitoring in this area would be appropriate.

The other areas without representation are the Avra Valley area, which is separated by the Tucson Mountains from the airshed over most of the TAPA, and the east side of the TAPA. The Avra Valley area is less of a concern for $PM_{2.5}$, considering the more rural aspect of the area, and the abundance of unpaved roads in the mostly wildcat development, and agricultural activity contributing more to PM_{10} particulate matter from crustal origins. The east side of the TAPA is the prevailing upwind section of the MSA, and is also less likely to incur significant $PM_{2.5}$ concentrations. This was demonstrated by operating a $PM_{2.5}$ BAM for smoke monitoring due to wildfires for an 18 month period at the Golf Links / Kolb carbon monoxide station in 2011 and 2012.

The number of PM2.5 monitors will increase by one due to Tucson's Core Base Statistical Area (CBSA) estimated to be over one million, which triggers the requirement for a Near-road monitor as required under a phase one area (40 CFR 58 Appendix D 4.7.1(b)(2) and 58.13(f)(2). Pima County

is required to install a Near-road monitoring site, which will add a highest concentration site type with a microscale spatial scale somewhere along the Interstate 10 corridor, and redefine the areas of representation. Installation should be completed by the end of 2021.

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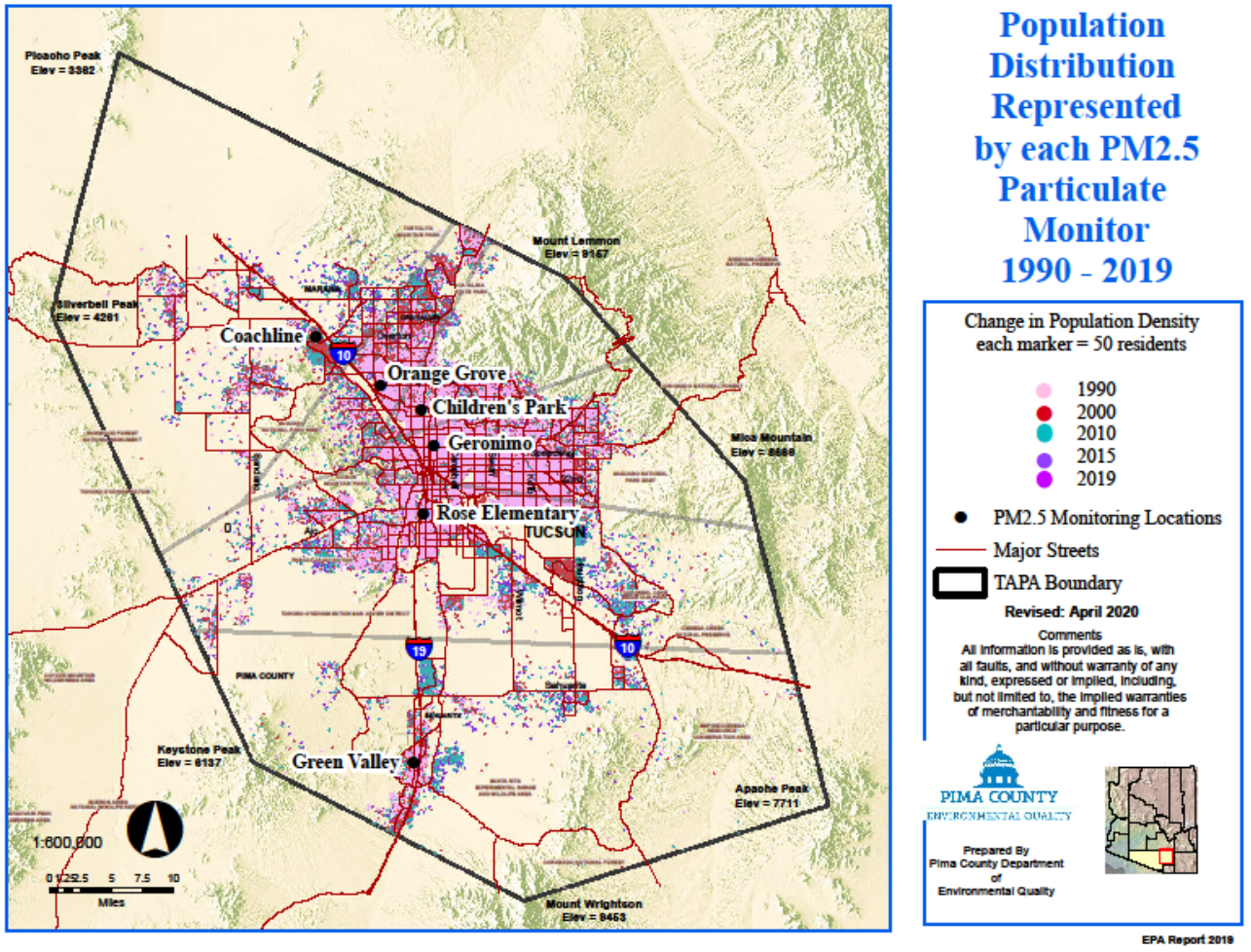

$PM_{10-2.5}$ (PM-COARSE) MONITORING NETWORK REQUIREMENTS

Pima County is monitoring for PM- Coarse at the Children's Park NCore station as part of the monitoring requirements for an NCore station. PM-Coarse is the arithmetic difference between separate but concurrent collocated measurements of PM_{10} and $PM_{2.5}$, also referred to as $PM_{10-2.5}$. Pima County is following the requirements set forth in **40 CFR Part 50, App O**. The collocation for $PM_{10-2.5}$ is fulfilled by the national NCore Network.

The $PM_{10-2.5}$ is described on page 40.

Table 13
PM-Coarse Annual Summary Statistics

Site	Highest 24- Hour Value ($\mu g/m^3$)	2nd Highest 24-Hour Value ($\mu g/m^3$)	Annual Average ($\mu g/m^3$)
Children's Park NCore PM10 – PM2.5 (86101)	30.0	23.0	10.46

OZONE (O_3) MONITORING NETWORK REQUIREMENTS

Ozone (O_3) is currently being monitored at seven locations in Tucson and one location in Green Valley. Pima County monitors year round for ozone. EPA has revised the minimum monitoring requirements for ozone. The design criteria for ozone monitoring is described in **40 CFR Part 58, app. D, Table D-2**. Due to Pima County being designated as attainment for ozone, no Enhanced Monitoring Plan is required (40 CFR 58.10 (a)(11);App D 5 (h)

Table 14
O_3 Design Criteria

Population Pima County	MSA 8520 Tucson Population Category	Design Value Site	8- Hour Design Value (2017-2019)	O_3 Sites # Required	O_3 Sites # Operating
2010 Census 980,263	500,000 – 1,000,000	Saguaro Park	0.069 ppm	Requires 2 SLAMS Monitors	8 SLAMS Monitors
2019 Estimated Population 1,047,279	>1,000,000			Same Requirement	

Violation History

On October 26, 2015, EPA strengthened the ozone standard from 0.075 ppm to 0.070 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 did not exceeded the ozone standard in 2019.

Quality Assurance for Ozone

All data quality assessment requirements outlined in **40 CFR Part 58, app. A,** have been met in 2019. The requirements include precision checks at a minimum of every other week with a check gas range between 0.005 and 0.08 ppm with Pima County performing the precision check at 0.070 ppm, representing the highest level we are likely to achieve. The annual internal audits for accuracy are performed with four point check levels at zero, and between 0.020 – 0.039 ppm, 0.040 – 0.069 ppm and 0.070 – 0.089 ppm. Pima County maintains an ozone primary standard which is verified annually 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.

Table 15
Ozone Audit Dates 2019

Site	Audit Dates
Craycroft & 22nd St.	06/10, 12/23
Children's Park NCore	03/19, 09/13
Fairgrounds	06/14, 12/18
Tangerine	03/14, 08/29
Saguaro Park	06/05, 12/18
Coachline	03/14, 09/06
Rose Elementary	06/11, 12/18
Green Valley	06/07, 12/20

NPAP Ozone TTP Audit Dates 2019

Site	Audit Date
Rose Elementary	8/21
Green Valley	8/21

Table 16
2019 Annual Summary Statistics
(NAAQS: 0.070 ppm 4th highest 8- Hour Average)

Site	1st Max. 1-HR Avg (ppm)	1st Max. 8- HR Avg (ppm)	4th Max. 8- HR Avg (ppm)
Craycroft & 22nd St. 1011	.080	.071	.065
Children's Park NCore 1028	.077	.071	.065
Fairgrounds 1020	.074	.069	.064
Tangerine 1018	.072	.067	.065
Saguaro Park 0021	.079	.071	.065
Coachline 1034	.072	.066	.063
Rose Elementary 1032	.067	.060	.059
Green Valley 1030	.068	.064	.060

Population Growth and Distribution in the Ozone Network

Figure 5 represents a Thiessen Polygon analysis showing 1990 population distribution, and population distribution and growth for the years 2000, 2010, 2015 and 2020. Each polygonal area shows population distribution and growth represented by the ozone monitor in that area. 2020 data demonstrates a slowdown in growth compared to previous years, with most of the growth in the northwest portion of the TAPA, and areas to the south and southeast.

With ozone being one of the two primary pollutants of concern in Pima County, most of the TAPA has representation, considering the relatively homogenous nature of peak ozone concentrations throughout the area. Based on the population of the MSA and the most recent design value for ozone, 2-4 SLAMS monitors are required, and there is no requirement for additional monitors. PDEQ currently operates eight SLAMS ozone monitors, well above the required minimum. Appropriate representation for ozone in Pima County has always been a priority, and current monitor locations provide widespread coverage of the populated portions of the TAPA, including areas with the most growth in the past 20 years, primarily the northwest area, represented by the Tangerine and Coachline monitors, and the southeast area, represented by the Fairgrounds and Green Valley monitors.

Two monitors are located in areas that in the past were identified as having higher than normal pediatric asthma hospital admission rates. The Rose Elementary and Coachline monitors were installed in these areas to provide representation for these sensitive groups, and are located to provide an upwind / downwind component serving both a concentrated minority population and an area of newer subdivisions in the northwest portion of the MSA.

No changes to the ozone monitoring network are proposed at this

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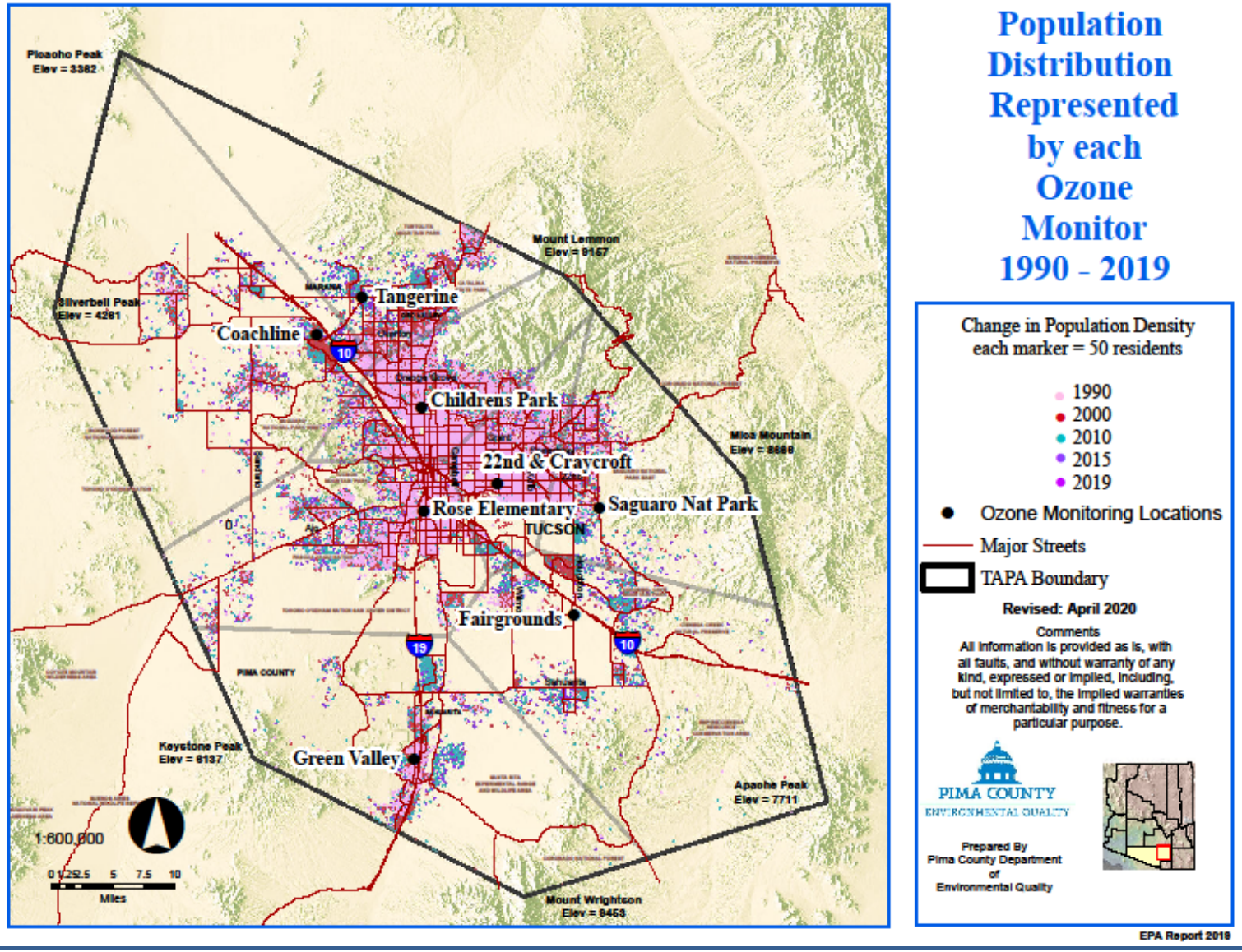

CARBON MONOXIDE (CO) MONITORING NETWORK REQUIREMENTS

Carbon Monoxide is being monitored at two locations in eastern Pima County. The revised requirements for Carbon Monoxide **40 CFR Part 58, app. D, 4.2** state that there is no minimum number of CO monitoring sites required.

In February of 2018, Pima County received approval from EPA to discontinue CO monitoring at the State or Local Air Monitoring Station (SLAMS) monitor at 22nd & Craycroft and the Special Purpose Monitors (SPMs) at the Golf Links & Kolb and Cherry & Glenn monitoring sites. CO is currently being monitored at the Alvernon and 22nd St. location and the Children's Park NCore location.

Table 17
2019 CO Design Criteria

Population Pima County	MSA 8520 Tucson Population Category	1- Hour Design Value (2017-2019)	CO Monitors # Required	CO Monitors # Operating
2010 Census 980,263	500,000 – 1,000,000	1.6 ppm	No Specific Requirement	2 SLAMS Monitors
2019 Estimated Population 1,047,279	>1,000,000		[a] Requires 1	

a. Requires one, collocated with one required Near-Road NO_2 monitor, per **40 CFR Part 58, app. D, 4.2.1 and 4.3.2.** Refer to Page 7 of this Plan for additional information on Near-Road Monitoring.

Motor vehicles are the primary source of carbon monoxide (CO) in the Tucson area. 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.

Violation History

No exceedances of the National Ambient Air Quality Standards for CO were recorded in Tucson from 1989 through 2019. 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. The plan allows for additional mobile monitoring of CO at high volume intersections, and a microscale site located at Golf Links & Kolb was established, September, 2002 and was operational until March, 2018.

Quality Assurance for Carbon Monoxide

All data quality assessment requirements as outlined in **40 CFR Part 58, app. A,** have been met in 2019. The precision of SLAMS automated analyzers is based on one-point precision QC checks with a minimum frequency of every two weeks, when each analyzer is challenged by a known concentration of a check gas. For CO the concentrations are between 0.5 and 5.0 ppm. The annual internal audits for accuracy are performed with four point check levels at zero, and between 0.200 - 0.899 ppm, 0.900 - 2.99 ppm, and 3.000 - 7.999 ppm. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.

Table 18
Carbon Monoxide Audit Dates 2019

Site	Audit Dates
Children's Park NCore	03/19, 08/30
Alvernon & 22nd St	03/20, 09/03

NPAP Carbon Monoxide TTP Audit Dates 2019

Site	Audit Date
None	

Table 19
2019 Annual Carbon Monoxide Summary Statistics
(NAAQS: 35ppm 1-Hour Average, 9ppm 8- Hour Average)

Site	1st Max. 1- HR Avg (ppm)	2nd Max. 1- HR Avg (ppm)	1st Max. 8- HR Avg (ppm)	2nd Max. 8- HR Avg (ppm)
Children's Park NCore 1028	0.8	0.7	0.5	0.5
Alvernon & 22nd St 1014	1.3	1.2	0.7	0.6

Population Growth and Distribution in the Carbon Monoxide network

Figure 6 represents a Thiessen Polygon analysis showing 1990 population distribution, and population distribution and growth for the years 2000, 2010, 2015 and 2020. Each polygonal area shows population distribution and growth represented by the carbon monoxide monitor in that area. 2020 data demonstrates a slowdown in growth compared to previous years, with most of the growth in the northwest portion of the TAPA, and areas to the south and east.

Carbon monoxide levels have steadily declined from the levels of the 1980's to current wintertime inversion measurements approximately one tenth of the standard. Current ambient concentrations challenge the low-level measurement capabilities of instrumentation unless it has enhanced trace-level configuration with three decimal place accuracy. This would seem a clear indicator that carbon monoxide is not a serious concern in Pima County. Pima County reduced the number of CO monitors from five to two at the beginning of 2018 after being granted approval from EPA to reduce the number of monitors. There are no minimum number of CO monitoring sites required. The only two SLAMS CO monitors in Pima County are currently operated on a 0 to 5 ppm range and one of those monitors is located downwind of a busy intersection, designated as a highest concentration site type with a microscale spatial scale. The other monitor is located at Pima County's NCore station, designated as a population exposure site type with a neighborhood spatial scale.

Unfortunately, the number of CO monitors will increase to three due to Tucson's Core Base Statistical Area (CBSA) estimated to be over one million, which triggers the requirement for a Near-road monitor as required under a phase one area (40 CFR 58, Appendix D 4.2.1(a) and 58.13(e)(2). Pima County is required to install a Near-road monitoring site, which will add a highest concentration site type with a microscale spatial scale somewhere along the Interstate 10 corridor, and redefine the areas of representation. Installation should be completed by the end of 2021.

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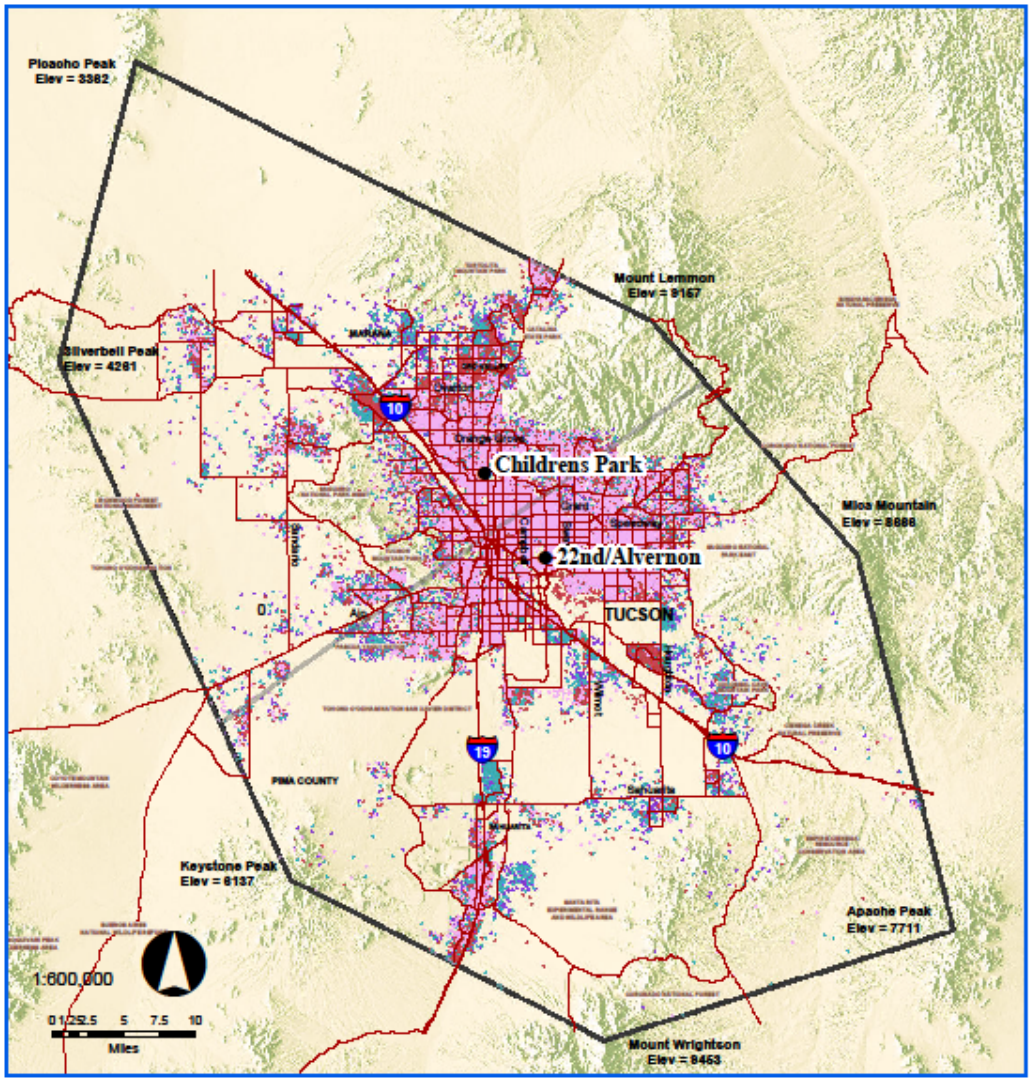


Population Distribution Represented by each Carbon Monoxide Monitor 1990 - 2019

Change in Population Density
each marker = 50 residents

- 1990
- 2000
- 2010
- 2015
- 2019

Carbon Monoxide Monitoring Locations

Major Streets

TAPA Boundary

Revised: April 2020

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 p[illegible]

PIMA COUNTY
ENVIRONMENTAL QUALITY

Prepared By
Pima County Department
of
Environmental Quality

EPA Report 2019

NITROGEN DIOXIDE (NO_2) MONITORING NETWORK REQUIREMENTS

Nitrogen dioxide (NO_2) is currently measured at two locations in Tucson. The Environmental Protection Agency has revised the NO_2 requirements. The **40 CFR Part 58, app. D, 4.3**, design criteria document states that there are no minimum requirements for the number of NO_2 monitoring sites in Pima County.

Table 20
2019 NO_2 Design Criteria

Population Pima County	MSA 8520 Tucson Population Category	Annual Design Value	1- Hour 98th Percentile Design Value	# of Required NO_2 Monitors	# of NO_2 Monitors
2010 Census 980,263	500,000 – 1,000,000	7.48 ppb	38.0 ppb	No Requirement	2 SLAMS monitors
2019 Estimated Population 1,047,279	>1,000,000			[a] Require 1 microscale	1 SLAMS microscale monitor
				[b] Requires 1 area-wide	1 SLAMS area-wide monitor

a. Requires one microscale near-road NO_2 monitor for populations over 1,000,000 per **40 CFR Part 58, app. D, 4.3.2.**
b. Requires one area-wide NO_2 monitor for populations greater than 1,000,000 per **40 CFR Part 58, app. D, 4.3.3(a).**

Historical Nitrogen Dioxide Monitoring

Nitrogen dioxide (NO_2) levels remain well below federal standards. The Craycroft and 22nd St. monitor had 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 NO_2 analyzer was operating at the Pomona site from 1988 until 1996, when the site was closed. The site was re-established at the Children's Park location in May, 1998, one mile east of the original Pomona Site, and allows for continued monitoring on the north side of Tucson and in the lower valley area.

A NO_2 analyzer was operating at the Downtown site until early 1989. From 1995 to December 2001, NO_2 monitoring was conducted at Saguaro National Park East to establish baseline conditions in a Class I Wilderness Area.

Quality Assurance for NO_2

All data quality assessment requirements outlined in **40 CFR Part 58, app. A**, have been met for 2019.

The requirements include precision QC checks with a minimum frequency of every other week with a check gas range between 0.005 and 0.08 ppm and annual internal audits for accuracy with four point check levels at zero, and between 0.0080 - 0.0199 ppm, 0.0200 - 0.0499 ppm and 0.0500 - 0.0999 ppm. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis. The precision and accuracy tests are reported in ppb.

Table 21
Nitrogen Dioxide Audit Dates 2019

Site	Audit Date
Craycroft & 22nd St.	6/10, 12/23
Children's Park NCore	3/19, 08/30

NPAP Nitrogen Dioxide TTP Audit Dates 2019

Site	Audit Date
None	

Table 22
2019 Annual Summary Statistics
(NAAQS: 100 ppb 1- Hour Average with the form of the standard being the 98th percentile of the 1-hour concentrations averaged over three years)
(53 ppb Annual Average)

Site	1st Max. 1- Hour Avg (ppb)	1 - Hour 98th Percentile (ppb)	Annual Mean (ppb)
Craycroft & 22nd St. 1011	41.5	35.8	7.48
Children's Park NCore 1028	33.9	30.1	7.26

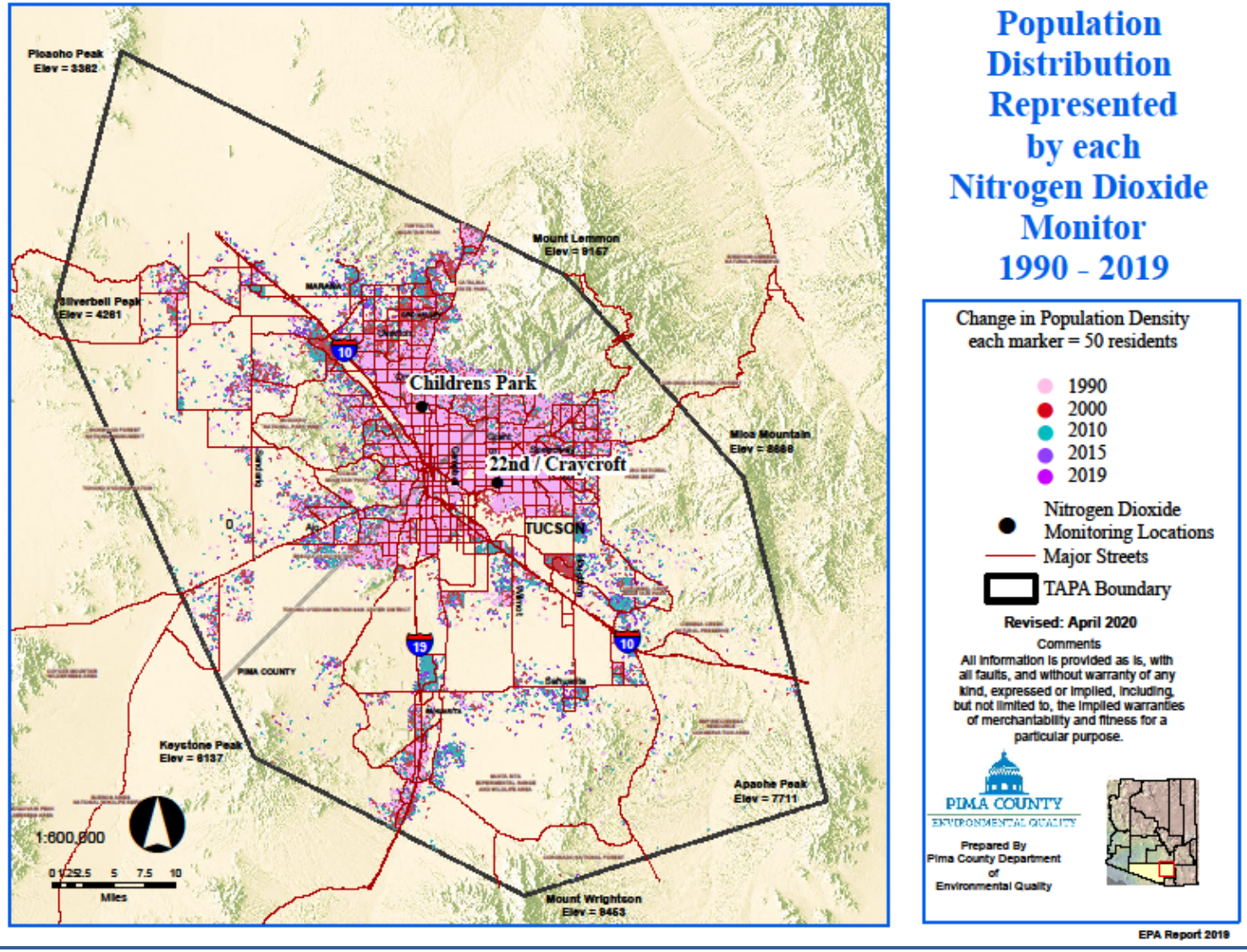
Population Growth and Distribution in the Nitrogen Dioxide Network

Figure 7 represents a Thiessen Polygon analysis showing 1990 population distribution, and population distribution and growth for the years 2000, 2010, 2015 and 2020. Each polygonal area shows population distribution and growth represented by the nitrogen dioxide monitor in that area. 2020 data demonstrates a slowdown in growth compared to previous years, with most of the growth in the northwest portion of the TAPA, and areas to the south and east.

Nitrogen Dioxide monitoring has been ongoing in Pima County since 1975, at the 22nd/Craycroft station, and various other locations throughout the years. The Children's Park monitor was added in 1998 as a permanent site, bringing the currently operational total to two. This neatly divides the TAPA, with upwind and downwind representation within the core of the MSA.

As with carbon monoxide, NO_2 concentrations have steadily decreased from the levels recorded in the 1970's and 1980's. Unlike CO, however, NO_2 monitoring remains important in view of the ozone precursor aspect of this pollutant, and no reduction of monitors will occur. Instead, the number of monitors will increase to three due to Tucson's Core Base Statistical Area (CBSA) estimated to be over one million, which triggers the requirement for a Near-road monitor as required under a phase one area (40 CFR 58, Appendix D 4.3.2(a) and 58.13(c)(3). Pima County is required to install a Near-road monitoring site, which will add a highest concentration site type with a microscale spatial scale somewhere along the Interstate 10 corridor, and redefine the areas of representation. Installation should be completed by the end of 2021.

2019 Ambient Air Monitoring Five Year Network Assessment and Plan



REACTIVE OXIDES OF NITROGEN (NO_Y) MONITORING NETWORK REQUIREMENTS

Reactive Oxides of Nitrogen are currently monitored at one location in Pima County fulfilling the NCore site requirement.

Quality Assurance for NO_y

All data quality assessment requirements outlined in **40 CFR Part 58, app. A**, have been met for 2019.

The requirements include precision QC checks with a minimum frequency of every other week with a check gas range between 0.005 and 0.08 ppm and annual internal audits for accuracy with four point check levels at zero, and between 0.0080 - 0.0199 ppm, 0.0200 - 0.0499 ppm and 0.0500 - 0.0999 ppm. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis. The precision and accuracy tests are reported in ppb.

Table 23
Reactive Oxides of Nitrogen Audit Dates 2019

Site	Audit Dates
Children's Park NCore	3/19, 8/30

NPAP Reactive Oxides of Nitrogen TTP Audit Dates 2019

Site	Audit Dates
None	None

Table 24
2019 Annual Summary Statistics

Site	1st Max. 1- Hour Avg (ppb)	Annual Mean (ppb)
Children's Park NCore 1028	85.2	8.67

SULFUR DIOXIDE (SO_2)MONITORING NETWORK REQUIREMENTS

Sulfur Dioxide (SO_2) is currently monitored at one location in Pima County. On October 1, 2010, an SO_2 trace monitor was added at the Children's Park NCore location as required for an NCore site. The SO_2 monitor at the Craycroft & 22nd St. site was discontinued on December 31, 2010.

The Environmental Protection Agency has revised the SO_2 requirements. The design criteria indicated in **40 CFR Part 58, app. D, 4.4**, states that there are no minimum requirements for the number of SO_2 monitoring sites.

Table 25
2019 SO_2 Design Criteria

Population Pima County	MSA 8520 Tucson Population Category	Total SO_2 Based on 2019 NEI (b) (tons/year)	Population Weighted Emissions Index (a)	1- HR Design Value (ppb)	# of Required SO_2 Monitors	# of SO_2 Monitors
2010 Census 980,263	500,000 – 1,000,000	111.4	116.7	2.0	No Requirement	1 NCore SLAMS
2019 Estimated Population 1,047,279	>1,000,000				No Requirement	

(a) - million persons - tons/year

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. With new trace SO_2 monitoring we can now get more accurate readings at very low levels. There are no major stationary sources of SO_2 in the Tucson air planning area.

Quality Assurance for SO_2

All data quality assessment requirements outlined in **40 CFR Part 58, app. A**, have been met for 2019.

The requirements include precision checks every other week with a check gas range between 0.005 and 0.08 ppm and annual internal audits for accuracy with four point check levels at zero, and between 0.0050 - 0.0079 ppm, 0.0080 – 0.0199 ppm and 0.0200 – 0.0499 ppm. All valid precision and accuracy tests are reported to the Air Quality System (AQS) database on a quarterly basis.

Table 26
Sulfur Dioxide Audit Dates 2019

Site	Audit Dates
Children's Park NCore	3/20, 8/30

NPAP Sulfur Dioxide TTP Audit Dates 2019

Site	Audit Dates
None	None

Table 27
2019 Annual Summary Statistics
Sulfur Dioxide NAAQS
(75 ppb 1- Hour Average with the form of the standard being the 99th percentile of the 1- hour daily maximum concentrations, averaged over 3 years)

Site	1st Max. 1- Hour Avg (ppb)	1–Hour 99th Percentile (ppb)	Annual Mean (ppb)
Children's Park NCore 1028	1.5	1.0	0.11

Population Growth and Distribution in the Sulfur Dioxide Network

No Thiessen Polygon analysis for sulfur dioxide was performed for the simple reason that there is only one SO_2 monitor in the TAPA, so the entire TAPA is the effective area of representation.

SO_2 monitoring has a long history in Pima County at various locations, but with the closure of copper smelters in the region decades past, SO_2 concentrations have dropped to near zero, with an occasional spike up to a one hour reading at or below one tenth of the current standard. This was further reduced when the only local significant source of SO_2, at the Tucson Electric Power Sundt Generating Station, was fully converted to natural gas in 2017. This has reduce the necessity of SO_2 monitoring to fulfilling the NCore requirement to operate a monitor at the Children's Park station.

LEAD MONITORING NETWORK REQUIREMENTS

On October 15, 2008 EPA strengthened the lead standard. The primary standard of 1.5 µg/m3 was lowered to 0.15µg/m3, measured as total suspended particles (TSP). The secondary standard is identical to the primary standard. Per 40 CFR 58 Appendix D, section 4.5, at a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year. According to the 2014 National Air Emissions Inventory (NEI) from EPA, Pima County had no sources of lead of one ton or more. That meant that Pima County was required to perform area monitoring only, which was done at the Children's Park NCore location. Monitoring and reporting began on February 27, 2012, and was discontinued May 2016 per approval by EPA.

Table 28
Lead (Pb) Design Criteria

Population Pima County	MSA 8520 Tucson Population Category	Total Pb Based on 2019 NEI (tons/year)	Lead Design Value (ppb)	# of Required Lead Monitors	# of Lead Monitors
2010 Census 980,263	500,000 – 1,000,000	.0226	***	1	0
2019 Estimated Population 1,047,279	>1,000,000			1	

Historical Lead Monitoring

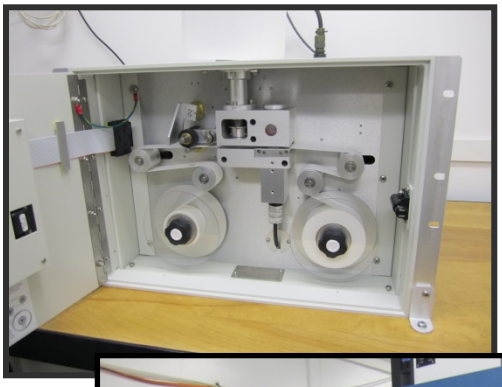
Lead concentrations are extremely low in Tucson. Lead monitoring began in Pima County in 1975 at eight TSP sampling locations. In August, 1978, lead analyses were discontinued at all but two sites. Magnetic Observatory (University of Arizona) and Prince Road were selected to represent a neighborhood 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 Magnetic Observatory sites were moved to the 22nd & Craycroft site. 22nd & Craycroft and Prince Road sites remained until March of 1997, when lead monitoring was discontinued due to non- detectable concentrations.

V. DETAILED SITE AND MONITOR INFORMATION

CHILDREN'S PARK NCore: AQS # 040191028



Site Description	
Site Name	**CHILDREN'S PARK NCore**
AQS ID	040191028
Address	400 W. River Road, Tucson, AZ
Latitude / Longitude	32.295150 / -110.982300
Elevation	2286
Surrounding landscape	Gravel in walled compound, dirt parking lot, dry river bed
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.

MONITORING INFORMATION

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**$PM_{2.5}$ PRIMARY MONITOR**
Method Code	170
Number of monitors	1
Parameter code / POC	88101 / 3
Basic monitoring objective / Statement of Purpose	NAAQS Comparison / Population Exposure
Site Type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical Lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	Neighborhood
Number of hourly observations	8350
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.3 meters
Degrees of unrestricted air flow	360
Height of tree above probe	5.4 meters
Distance from supporting structure	1.81 meters (to roof top)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	16 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	1.83 meters
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	YES
Site meets 40 CFR 58, Appx. A,C,D,E	YES
MSA	Tucson, AZ 8520

Comments: Continuous $PM_{2.5}$ sampling began at this neighborhood scale site on January 23, 2011.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**$PM_{2.5}$ COLLOCATED**
Method Code	145
Number of monitors	1
Parameter code/ POC	88101 / POC 2
Basic monitoring objective / Statement of Purpose	To comply with ambient air quality protocols and standards in order for data to be used for comparison to the NAAQS
Site Type	Population Exposure
Instrument Manufacturer / Model	R & P / Partisol-Plus 2025i
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical Lab	IML
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	Neighborhood
Number of daily observations	102
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Every six days. Changed to every three days March 25, 2019.
Probe height	4.4 meters above the ground on a platform on top of shelter
Degrees of unrestricted air flow	360
Height of tree above probe	5.3 meters
Distance from supporting structure	2.44 meters (to roof top)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	17 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	1.8 meters/every six days; Changed to every three days March, 2019. / R& P 2025
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	Yes
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This is the collocated monitor for Children's Park NCore $PM_{2.5}$.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**PM COARSE PM_{10}-$PM_{2.5}$ (OTHER)**
Method Code	176
Number of monitors	2
Parameter code / POC	86101/ 1
Basic monitoring objective / Statement of Purpose	Research support / NCore requirement
Site Type	Population exposure
Instrument Manufacturer / Model	R & P / Partisol-Plus 2025 Sampler Pair
Quarterly flow rate Audit dates	03/14, 06/15, 09/06, 12/17
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical Lab	IML
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	Neighborhood
Number of daily observations	106
Number / Dates of exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Every sixth day; Changed to every three days March 25, 2019
Probe height	4.4 meters above the ground on a platform on top of shelter
Degrees of unrestricted air flow	360
Height of tree above probe	5.3 meters
Distance from supporting structure	2.44 meters (to roof top)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	15 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ schedule / Collocated monitor type	1.4 m / every six days; Changed to every three days March, 2019. / R& P 2025
Nearest roads distance & direction to monitor /ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: The subtraction method for determining the coarse PM fraction was initiated in 2011, using a matched pair of Partisol- Plus samplers.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**$PM_{2.5}$ SPECIATION**
Method code	810
Number of monitors	1
Parameter code / POC	Speciated parameters/ 5
Basic monitoring objective / Statement of purpose	Research support for the Chemical Speciation Network (CSN)
Site type	Population Exposure
Instrument Manufacturer / Model	Met One/ Super SASS
FRM/FEM/ARM/other	Other
Collecting agency / Reporting agency	Pima County Department of Environmental Quality/ RTP
Analytical lab	UCD
Monitor type	SLAMS
Monitor Network Affiliation	CSN Supplemental ; NCore
Scale	Neighborhood
Number of daily observations	117 SASS ; 120 URG
Number / Dates of exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Every three days
Probe height	3 meters above the ground on a platform located in a city water well site.
Degrees of unrestricted air flow	290, from 290 to 200, includes predominant wind direction from 135 (SE)
Height of tree above probe	6.7 meters
Distance from supporting structure	1.83 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	SASS 5.2 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	Collocation is fulfilled by the National NCore network.
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: Sampling began for $PM_{2.5}$ Speciation in 2000.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**CARBON MONOXIDE**
Method code	554
Number of monitors	1
Parameter code / POC	42101/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / NCore requirement
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 48i -TLE
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	Neighborhood
Number of hourly observations	8518
Number / Dates of standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.25 meters above the ground on a shelter in a city water well site
Probe material / Residence time	FEP Teflon/ 11.64 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	5.45 meters
Distance from supporting structure	1.70 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	18.6 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This site began monitoring for Carbon Monoxide in October, 1998.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Maintenance of long term ozone monitoring at this location
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	Neighborhood
Number of hourly observations	8633
Number / Dates of 8-hour standard exceedances in 2019	One - 7/25
Historical exceedances	One in 1999; One in 2002; One in 2014;One in 2017; Three in 2018
Current Sampling frequency / Season	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 / 12.3 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	5.45 meters
Distance from supporting structure	1.73 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	15.2 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ schedule/collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This site began August of 1997 and is a relocation (1.5 kilometers, northeast) of the 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 low altitude and the prevailing southeasterly winds.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**NITROGEN DIOXIDE**
Method code	074
Number of monitors	1
Parameter code / POC	42602/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Maintenance of long term monitoring at this location
Site type	Highest Concentration
Instrument Manufacturer / Model	Thermo Scientific / 42i
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	Proposed NCore
Scale	Neighborhood / Area Wide Monitoring
Number of hourly observations	8575
Number / Dates of standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	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 / 6.1 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	5.45 meters
Distance from supporting structure	1.70 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	18.6 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ schedule/collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: The site began monitoring for Nitrogen Dioxide in May, 1998, and is a relocation (1.5 kilometers, northeast) of the Pomona site.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**REACTIVE OXIDES OF NITROGEN (NO_Y)**
Method code	674
Number of monitors	1
Parameter code / POC	42600/ 1
Basic monitoring objective / Statement of purpose	Research support / Comply with NCore requirements
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 42i - Y
FRM/FEM/ARM/other	n/a
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	neighborhood
Number of hourly observations	8347
Number / Dates of standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / season	Continuous
Probe height	10.0 meters above the ground on a shelter located in a city water well site
Probe material / Residence time	FEP Teflon / 0.6 seconds to converter; 5.68 seconds from converter to analyzer.
Degrees of unrestricted air flow	360
Height of tree above probe	-0.3 meters
Distance from supporting structure	0.36 meters probe to mast; 7.31 meters probe to shelter
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	24.3 meters, horizontal, inlet well above tree tops
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ schedule/collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: The site began monitoring for reactive oxides of nitrogen in October, 2010 for the NCore site requirements, using a Thermo 42i-y instrument with remote converter mounted at the requisite 10 meters.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**SULFUR DIOXIDE**
Method code	560
Number of monitors	1
Parameter code / POC	42401/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Comply with NCore requirements
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 43i - TLE
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Monitor Network Affiliation	NCore
Scale	neighborhood
Number of hourly observations	8567
Number / Dates of 1-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	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 / 10.79 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	5.45 meters
Distance from supporting structure	1.70 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	18.6 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: Sulfur Dioxide sampling began October 1, 2010 to conform to NCore site requirements.

Site Name	**CHILDREN'S PARK NCore**
Pollutant	**METEOROLOGICAL DATA**
Method code	061, 040, 011
Number of monitors	4
Parameter code / POC	61103, 61104, 62101, 62201
Basic monitoring objective / Statement of purpose	Research support / Source determination for criteria pollutants
Site type	n/a
Instrument Manufacturer / Model	WD/WS –MET ONE 50.5; Temp/RH – VAISALA HMP45AC
FRM/FEM/ARM/other	n/a
Collecting agency / Reporting agency	PDEQ, PDEQ
Analytical lab	n/a
Monitor type	n/a
Scale	n/a
Number of daily observations	365
Number / Dates of 24-hour standard exceedances in 2019	n/a
Historical exceedances	n/a
Current Sampling frequency / Season	continuous
Probe height	WD/WS – 10m ; Temp/RH – 4.25m
Degrees of unrestricted air flow	360
Height of tree above probe	n/a
Distance from supporting structure	n/a
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	WD/WS – 16.5m ; Temp/RH – 12.8m
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Arizona State Route 77 runs north - south 0.5 kilometers to the east, providing six lanes of heavily used arterial routing with a 2012 ADT of 44,000.
	River Road runs east – west 0.5 kilometers to the north, with a 2018 ADT of 37,773
Site meets 40 CFR 58, Appx. A,C,D,E	YES
MSA	Tucson, AZ 8520

GREEN VALLEY: AQS # 040191030

Site Description	
Site Name	**GREEN VALLEY**
AQS ID	040191030
Address	601 N. La Canada Drive, Green Valley, AZ
Latitude / Longitude	31.87952 / -110.996440
Elevation	2910
Surrounding landscape	Dirt, sparse desert vegetation
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.

MONITORING INFORMATION

Site Name	**GREEN VALLEY**
Pollutant	**PM_{10}**
Method code	122
Number of monitors	1
Parameter code / POC	81102/1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Provide air pollution data to the public in a timely manner
Site type	Population Exposure
Instrument Manufacturer / Model	Met One/ BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8279
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	April 9, 2013; July 25, 2014.
Current Sampling frequency / Season	Continuous
Probe height	4.25 meters above the ground on a shelter near the Pima County Government Center.
Degrees of unrestricted air flow	360
Height of tree above probe	0.25 meters
Distance from supporting structure	1.63 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	12.5 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	100 meters west of La Canada with a 2018 ADT of 11,046
	0.5 kilometers west of Interstate 19 with a 2018 ADT of 37,595
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
CBSA	Green Valley, AZ 46060
MSA	Tucson, AZ 8520

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 population exposure to 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 new site is considered a continuation of the original site. PM_{10} levels were below the health standards in the years 1989 through 2012. In 2013, there was one exceedance resulting from an intense regional dust storm that may be considered as an Exceptional Event, dependent on approval from EPA.

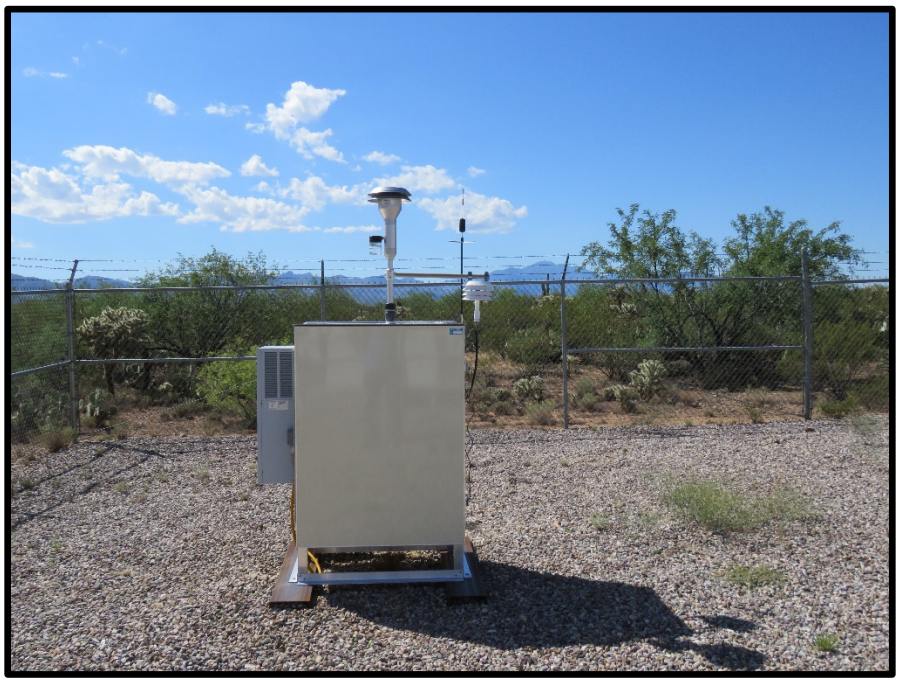
Site Name	**GREEN VALLEY**
Pollutant	**$PM_{2.5}$**
Method code	733
Number of monitors	1
Parameter code / POC	88502/3
Basic monitoring objective / Statement of purpose	Provide air pollution data to the public in a timely manner / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	Met-One / BAM 1020
FRM/FEM/ARM/other	other
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	OTHER
Scale	Neighborhood
Number of hourly observations	8236
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.25 meters above the ground on a shelter near the Pima County Government Center.
Degrees of unrestricted air flow	360
Height of tree above probe	0.25 meters
Distance from supporting structure	2.03 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	10.7 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	100 meters west of La Canada with a 2018 ADT of 11,046
	0.5 kilometers west of Interstate 19 with a 2018 ADT of 37,595
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	n/a
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
CBSA	Green Valley, AZ 46060
MSA	Tucson, AZ 8520

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.

Site Name	**GREEN VALLEY**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201/1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Provide air pollution data to the public in a timely manner
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS January, 2017
Scale	Neighborhood
Number of hourly observations	8450
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	June 15, 2017
Current Sampling frequency / Season	Continuous
Probe height	3.3 meters above the ground on a shelter near the Pima County Government Center.
Probe material / Residence time	FEP Teflon / 12.49 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	1.2 meters
Distance from supporting structure	1.4 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	10.8 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	100 meters west of La Canada with a 2018 ADT of 11,046
	0.5 kilometers west of Interstate 19 with a 2018 ADT of 37,595
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
CBSA	Green Valley, AZ 46060
MSA	Tucson, AZ 8520

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.

CORONA de TUCSON: AQS # 040190008



Site Description	
Site Name	**CORONA de TUCSON**
AQS ID	040190008
Address	22001 S. Houghton Road, Tucson, AZ
Latitude / Longitude	32.00474 / -110.79260
Elevation	3078
Surrounding landscape	Gravel within enclosure; dirt, sparse desert vegetation surrounding
Location description	This site is situated in an undisturbed natural desert area.

MONITORING INFORMATION

Site Name	**CORONA de TUCSON**
Pollutant	PM_{10}
Method code	122
Number of monitors	1
Parameter code / POC	81102/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Upwind Background
Site type	Upwind Background
Instrument Manufacturer/Model	Met One/BAM1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Regional
Number of hourly observations	8512
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	2.08 meters (to ground)
Degrees of unrestricted air flow	360
Height of tree above probe	9.12 meters
Distance from supporting structure	2.08 meters (to ground/ free standing)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	23.4 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	1.6 kilometers west of Houghton Road with a 2018 ADT of 12,160
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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. In 2019, the low volume sampler was replaced with a Met One Bam 1020 sampler to provide near real time data to the public and at the same time reduce the filter based sampling.

ORANGE GROVE: AQS # 040190011

Site Description	
Site Name	**ORANGE GROVE**
AQS ID	040190011
Address	3401 W. Orange Grove Road, Tucson, AZ
Latitude / Longitude	32.32255 / -111.037700
Elevation	2234
Surrounding landscape	Gravel in fenced compound, dirt road shoulders
Location description	This site is situated in a residential area with light commerce and industry. There is an asphalt batch plant and redi-mix concrete operations with a large gravel pit less than three kilometers to the west of the site in the Santa Cruz River bed area.

MONITORING INFORMATION

Site Name	**ORANGE GROVE**
Pollutant	PM_{10} PRIMARY
Method code	122
Number of monitors	1
Parameter code / POC	81102/ 5 Start date 7/1/2017
Basic monitoring objective / Statement of purpose	NAAQS Comparison / Highest Concentration
Site type	Highest Concentration
Instrument Manufacturer/Model	Met One/BAM1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ /PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8116
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	Exceedances of the 24 – hour standard: two in 1988, four in 1999, one in 2002, one in 2003, one in 2009 ; one in 2014
Current Sampling frequency / Season	Continuous
Probe height	2.1 meters above the ground in a city water well site
Degrees of unrestricted air flow	360
Height of tree above probe	8.6 meters
Distance from supporting structure	2.1 meters (to ground)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	19.2 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	37 meters west of Camino de la Tierra with a 2018 ADT of 5,119 and 70 meters south of Orange Grove Road with a 2018 ADT of 24,672
	2 kilometers east of Interstate 10 with a 2018 ADT of 90,938
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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. This site is situated near the freeway and railway tracks, therefore high PM_{10} values are expected here. 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. In 2017, the low volume sequential samplers were replaced with a Met One Bam 1020 sampler to provide near real time data to the public and at the same time reduce the filter based sampling.

Site Name	**ORANGE GROVE**
Pollutant	**$PM_{2.5}$**
Method code	170
Number of monitors	1
Parameter code / POC	88101/ 3
Basic monitoring objective / Statement of purpose	NAAQS Comparison / Highest expected concentration
Site type	Population Exposure
Instrument Manufacturer / Model	Met One/ BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8186
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	2.1 meters above the ground in a city water well site
Degrees of unrestricted air flow	360
Height of tree above probe	8.6 meters
Distance from supporting structure	n/a
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	20.3 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	37 meters west of Camino de la Tierra with a 2018 ADT of 5,119 and 70 meters south of Orange Grove Road with a 2018 ADT of 24,672
	2 kilometers east of Interstate 10 with a 2018 ADT of 90,938
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	Yes
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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 located near a freeway and railroad tracks. In 2017, the low volume sequential samplers were replaced with a Met One Bam 1020 sampler to provide near real time data to the public and at the same time reduce the filter based sampling.

SOUTH TUCSON: AQS # 040191001

Site Description	
Site Name	**SOUTH TUCSON**
AQS ID	040191001
Address	1601 S. 6th Avenue, South Tucson, AZ
Latitude / Longitude	32.20195 / -110.967900
Elevation	2420
Surrounding landscape	Primarily paved parking lots; gravel and desert landscaping surrounding building.
Location description	This site is situated in a dense residential / commercial area. There are numerous unpaved alleys and lots in the vicinity.

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 were 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 every day sampling began on June 23, 1999. In March, 2004, the Hi -Vol samplers were replaced with co-located Low –Vol sequential samplers. In 2017, the low volume sequential samplers were replaced with a Met One Bam 1020 sampler to provide near real time data to the public and at the same time reduce the filter based sampling.

MONITORING INFORMATION

Site Name	**SOUTH TUCSON**
Pollutant	**PM_{10}** Primary
Method code	122
Number of monitors	1
Parameter code / POC	81102 /5
Basic monitoring objective / Statement of purpose	NAAQS Comparison / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8254
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	Exceedances of the 24 – hour standard: two in 1999; two in 2002; one in 2009; two in 2013
Current Sampling frequency / Season	Continuous
Probe height	6.9 meters above the ground on the roof of the South Tucson Governmental Complex Building.
Degrees of unrestricted air flow	360
Height of tree above probe	4.4 meters
Distance from supporting structure	2.2 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	13.2 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	41 meters east of South 6th Avenue with a 2018 ADT of 12,786
	528 meters south of 22nd Street with a 2018 ADT of 25,692
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

SANTA CLARA SCHOOL: AQS# 040191026

Site Description	
Site Name	**SANTA CLARA SCHOOL**
AQS ID	040191026
Address	6910 S. Santa Clara Avenue, Tucson, AZ
Latitude / Longitude	32.125950 / -110.982600
Elevation	2540
Surrounding landscape	Large flat roof, paved parking lots and streets, grass playground.
Location description	This site is situated in a Southwest Tucson residential district.

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. A co – located monitor was added February, 2016.

MONITORING INFORMATION

Site Name	**SANTA CLARA SCHOOL**
Pollutant	**PM_{10} Primary Monitor**
Method code	126
Number of monitors	1
Parameter code / POC	81102 /1
Basic monitoring objective / Statement of purpose	NAAQS Comparison / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	R&P 2000
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	IML
Monitor type	SLAMS
Scale	Neighborhood
Number of daily observations	56
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	One on 10/27/2008
Current Sampling frequency / Season	Every six days
Probe height	6.45 meters above the ground on the roof of the Santa Clara Elementary School.
Degrees of unrestricted air flow	360
Height of tree above probe	-1.95 meters
Distance from supporting structure	2.01 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	23.9 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	1.7 meters
Nearest roads distance & direction to monitor / ADT	450 meters east of Interstate 19 with a 2018 ADT of 49,055
	800 meters south of Valencia Road with a 2017 ADT of 43,516
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

MONITORING INFORMATION

Site Name	**SANTA CLARA SCHOOL**
Pollutant	**PM_{10}** Collocated Monitor
Method code	126
Number of monitors	1
Parameter code / POC	81102 /2
Basic monitoring objective / Statement of purpose	To comply with ambient air quality protocols and standards in order for data to be used for comparison to the NAAQS
Site type	Population Exposure
Instrument Manufacturer / Model	R&P 2000
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	IML
Monitor type	SLAMS
Scale	Neighborhood
Number of daily observations	27
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	Exceedances of the 24 – hour standard: One on 10/27/2008
Current Sampling frequency / Season	Every twelve days
Probe height	6.45 meters above the ground on the roof of the Santa Clara Elementary School.
Degrees of unrestricted air flow	360
Height of tree above probe	-1.95 meters
Distance from supporting structure	2.01 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	23.9 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / Schedule / Collocated monitor type	1.7 meters
Nearest roads distance & direction to monitor / ADT	450 meters east of Interstate 19 with a 2018 ADT of 49,055
	800 meters south of Valencia Road with a 2017 ADT of 43,516
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

TANGERINE: AQS # 040191018

Site Description	
Site Name	**TANGERINE**
AQS ID	040191018
Address	12101 N. Camino de Oeste, Tucson, AZ
Latitude / Longitude	32.425250 / -111.063500
Elevation	2638
Surrounding landscape	Dirt, sparse desert vegetation to the east; high density, tri-level and multi-unit apartments directly west of station.
Location description	This site has been situated in a relatively undisturbed natural desert area for most of its existence, but residential development in recent years have been built to within 35 meters to the west, and low density residential developments are encroaching from the south, east and north to within 3 kilometers to 5 kilometers.

MONITORING INFORMATION

Site Name	**TANGERINE**
Pollutant	**PM_{10}**
Method code	122
Number of monitors	1
Parameter code / POC	81102/ 1
Basic monitoring objective / Statement of purpose	NAAQS Comparison / General Background
Site type	General Background
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Urban
Number of hourly observations	8476
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.5 meters above the ground on a shelter on Tucson's far northwest side
Degrees of unrestricted air flow	360
Height of tree above probe	-1.5 meters
Distance from supporting structure	2.01 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	11.28 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors / schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Tangerine Road runs approximately east – west 70 meters south of the site with a 2018 ADT of 14,628
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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. In 2019, the low volume sampler was replaced with a Met One Bam 1020 sampler to provide near real time data to the public and at the same time reduce the filter based sampling.

Site Name	**TANGERINE**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201 / 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Highest Concentration
Site type	Highest Concentration
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS January, 2017
Scale	Urban
Number of hourly observations	8718
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	One in 2002; One in 2009; One in 2014; three in 2017; one in 2018
Current Sampling frequency / Season	Continuous
Probe height	3.75 meters above the ground on a shelter on Tucson's far northwest side.
Probe material / Residence time	FEP Teflon / 11.49 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	-0.75 meters
Distance from supporting structure	1.24 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	11.99 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	Tangerine Road runs approximately east – west 70 meters south of the site with a 2018 ADT of 14,628
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

GERONIMO: AQS # 040191113

Site Description	
Site Name	**GERONIMO**
AQS ID	040191113
Address	2498 N. Geronimo Tucson, AZ
Latitude / Longitude	32.251840 / -110.965300
Elevation	2398
Surrounding landscape	Dirt, dead shrubs, unpaved road shoulders
Location description	This site is situated in a residential area in a City of Tucson water well site.

MONITORING INFORMATION

Site Name	**GERONIMO**
Pollutant	**PM_{10}**
Method code	122
Number of monitors	1
Parameter code / POC	81102 / 1
Basic monitoring objective / Statement of purpose	NAAQS Comparison / Provide air pollution data to the public in a timely manner
Site type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8271
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	One on 7/22/2009; one on 04/09/2013; one on 07/25/2014
Current Sampling frequency / Season	Continuous
Probe height	4.6m
Degrees of unrestricted air flow	320, from 150 to 110, does not include predominant wind direction from 135(SE)
Height of tree above probe	3.0 meters
Distance from supporting structure	1.83 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	9.6 meters
Distance from trees	9.6 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	154.8 meters north of Grant Road with a 2018 ADT 35,399
	617.6 meters east of Stone Avenue with a 2018 ADT 35,399
	397.5 meters west of North 1st Avenue with a 2018 ADT 41,014
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This monitor was initially installed in July 1, 2007 for Air Quality Index reporting using a continuous monitor. This is a Special Purpose site situated in a residential area, monitoring for population exposure. There was one exceedance on April 9, 2013 that may be considered as an Exceptional Event dependent on the approval from EPA.

Site Name	**GERONIMO**
Pollutant	**$PM_{2.5}$**
Method code	733
Number of monitors	1
Parameter code / POC	88502 /3
Basic monitoring objective / Statement of purpose	Provide air pollution data to the public in a timely manner / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	Other
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	Other
Scale	Neighborhood
Number of hourly observations	8256
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.6 meters
Degrees of unrestricted air flow	320, from 150 to 110, does not include predominant wind direction from 135(SE)
Height of tree above probe	3.0 meters
Distance from supporting structure	1.98 meters (to roof)
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	9.8 meters
Distance from trees	9.8 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	154.8 meters north of Grant Road with a 2018 ADT 35,399
	617.6 meters east of Stone Avenue with a 2018 ADT 35,399
	397.5 meters west of North 1st Avenue with a 2018 ADT 41,014
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	n/a
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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. This is site situated in a residential area, monitoring for population exposure.

ROSE ELEMENTARY: AQS # 040191032

Site Description	
Site Name	**ROSE ELEMENTARY**
AQS ID	040191032
Address	710 W. Michigan, Tucson, AZ
Latitude / Longitude	32.173 / -110.980115
Elevation	2438
Surrounding landscape	Grass playground
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.

MONITORING INFORMATION

Site Name	**ROSE ELEMENTARY**
Pollutant	**$PM_{2.5}$**
Method code	733
Number of monitors	1
Parameter code / POC	88502/3
Basic monitoring objective / Statement of purpose	Provide air pollution data to the public in a timely manner / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	Other
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	Other
Scale	Neighborhood
Number of hourly observations	8310
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.9 meters above the ground on the roof of a shelter located on the grounds of Rose Elementary School
Degrees of unrestricted air flow	360
Height of tree above probe	-0.3 meters
Distance from supporting structure	2.39 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	11.8 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	12^{th} Avenue 235 meters to the east with a 2018 ADT of 20,213
	Ajo Way 528 meters to the north with a 2015 ADT of 23, 797
	Interstate 19 runs north-south half a kilometer to the west with a 2018 ADT 91,729
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	n/a
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

Site Name	**ROSE ELEMENTARY**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201/ 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Provide air pollution data to the public in a timely manner
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8592
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	1 in 2017; two in 2018
Current Sampling frequency / Season	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 / 11.3 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	0.5 meters
Distance from supporting structure	1.63 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	11.4 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	12th Avenue 235 meters to the east with a 2018 ADT of 20,213
	Ajo Way 528 meters to the north with a 2015 ADT of 23, 797
	Interstate 19 runs north-south half a kilometer to the west with a 2018 ADT 91,729
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

COACHLINE: AQS # 040191034

Site Description	
Site Name	**COACHLINE**
AQS ID	040191034
Address	9597 N. Coachline, Tucson, AZ
Latitude / Longitude	32.380820 / -111.127160
Elevation	2104
Surrounding landscape	Dirt within walled compound, residential neighborhood
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.

MONITORING INFORMATION

Site Name	**COACHLINE**
Pollutant	**$PM_{2.5}$**
Method code	733
Number of monitors	1
Parameter code / POC	88502/ 3
Basic monitoring objective / Statement of purpose	Provide air pollution data to the public in a timely manner / Population Exposure
Site type	Population Exposure
Instrument Manufacturer / Model	Met One / BAM 1020
FRM/FEM/ARM/other	Other
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	Other
Scale	Neighborhood
Number of hourly observations	8457
Number / Dates of 24-hour standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.9 meters above the ground on a shelter on Tucson's far northwest side
Degrees of unrestricted air flow	280, from 250 to 170, includes predominant wind direction from 135 (SE)
Height of tree above probe	2.5 meters
Distance from supporting structure	2.39 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	31.4 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	approximately 1.25 kilometers west of Interstate 10 with a 2012 ADT of 77,000 .5 kilometer north of Twin Peaks Road 2018 ADT of 6,636
Suitable for comparison to $PM_{2.5}$ Annual NAAQS	n/a
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

Site Name	**COACHLINE**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201 / 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Provide air pollution data to the public in a timely manner
Site type	Population Exposure
Instrument Manufacturer/Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8455
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	2 in 2017; 2 in 2018
Current Sampling frequency / Season	Continuous
Probe height	3.4 meters above the ground on a shelter on Tucson's far northwest side
Probe material / Residence time	FEP Teflon / 11.41 seconds
Degrees of unrestricted air flow	310, from 230 to 180, includes predominant wind direction from 135 (SE)
Height of tree above probe	4.0 meters
Distance from supporting structure	1.3 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	31.5 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	approximately 1.25 kilometers west of Interstate 10 with a 2012 ADT of 77,000
	.5 kilometer north of Twin Peaks Road 2018 ADT of 6,636
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

CRAYCROFT & 22ND ST.: AQS # 040191011

Site Description	
Site Name	**CRAYCROFT & 22ND ST.**
AQS ID	040191011/ 1
Address	1237 S. Beverly Avenue, Tucson, AZ
Latitude / Longitude	32.204420 / -110.878067
Elevation	2582
Surrounding landscape	Dirt, ephemeral weeds
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.

MONITORING INFORMATION

Site Name	**CRAYCROFT & 22ND ST.**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201 /1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Maintenance of long term monitoring at this location
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8309
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	One in 1997, 1999, 2002, 2011, 2017, 2018
Current Sampling frequency / Season	Continuous
Probe height	4.4 meters above the ground on the roof of a shelter located in a city water well site.
Probe material / Residence time	FEP Teflon / 9.06 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	10.2 meters
Distance from supporting structure	1.3 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	22.0 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	260 meters west is Craycroft Road with a 2018 ADT of 24,993
	260 meters north is 22nd Street with a 2018 ADT of 40,270
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and operated continuously to the present.

Site Name	**CRAYCROFT & 22ND ST.**
Pollutant	**NITROGEN DIOXIDE**
Method code	074
Number of monitors	1
Parameter code / POC	42602 /1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Maintenance of long term monitoring at this location
Site type	Population Exposure
Instrument Manufacturer / Model	Thermo Scientific / 42i
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood / Area Wide Monitoring
Number of hourly observations	8121
Number / Dates of standard exceedances in 2019	0
Historical exceedances	0
Current Sampling frequency / Season	Continuous
Probe height	4.4 meters above the ground on the roof of a shelter located in a city water well site
Probe material / Residence time	FEP Teflon / 10.32 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	10.2 meters
Distance from supporting structure	1.3 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	22.0 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	260 meters west is Craycroft Road with a 2018 ADT of 24,993
	260 meters north is 22nd Street with a 2018 ADT of 40,270
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

Comments: This site is one of the oldest in the monitoring network, originally established in 1973, and operated continuously to the present.

ALVERNON & 22ND ST.: AQS # 040191014

Site Description	
Site Name	**ALVERNON & 22ND ST.**
AQS ID	040191014
Address	3895 E. 22nd Street, Tucson, AZ
Latitude / Longitude	32.207390 / -110.910650
Elevation	2516
Surrounding landscape	Gravel in walled compound, paved streets and sidewalks
Location description	This site is situated in a commercial area near a high traffic count intersection. A large regional park is located to the northwest of the site.

MONITORING INFORMATION

Site Name	**ALVERNON & 22ND ST.**
Pollutant	**CARBON MONOXIDE**
Method code	054
Number of monitors	1
Parameter code / POC	42101 / 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Highest Concentration
Site type	Highest Concentration
Instrument Manufacturer / Model	TECO / 48i-TLE
FRM/FEM/ARM/other	FRM
Collecting agency / Reporting agency	PDEQ / PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Microscale
Number of hourly observations	8744
Number / Dates of standard exceedances in 2019	0
Historical exceedances	Years: 1975 - 1986 and 1988
Current Sampling frequency / Season	Continuous
Probe height	3.8 meters above the ground attached to a wall near 22nd Street at a Tucson Water well site
Probe material / Residence time	FEP Teflon / 52 seconds Changed to 18 seconds 11/19 by installing a pump.
Degrees of unrestricted air flow	320 , from 5 to 325 includes predominant wind direction from 135 (SE; directly from intersection of 22nd St. and Alvernon Way).
Height of tree above probe	5.6 meters
Distance from supporting structure	1.15 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	2.6 meters / Height of obstruction above probe = 0.9 meters
Distance from trees	10.7 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	60 meters west of Alvernon Way with a 2018 ADT of 25,604
	10 meters north of 22nd Street with a 2018 ADT of 38,904
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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. Alvernon and 22nd St. 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, Alvernon & 22nd St. 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 2018.

SAGUARO PARK EAST: AQS # 040190021

Site Description	
Site Name	**SAGUARO PARK EAST**
AQS ID	040190021
Address	3905 South Old Spanish Trail, Tucson, AZ
Latitude / Longitude	32.174538 / -110.737116
Elevation	3089
Surrounding landscape	Natural desert
Location description	This site is situated in the National Park. The nearby light residential area has no significant local sources of ozone precursors.

MONITORING INFORMATION

Site Name	**SAGUARO PARK EAST**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201 /1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Highest Concentration
Site type	Maximum ozone concentration
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS
Scale	Neighborhood
Number of hourly observations	8755
Number / Dates of 8-hour standard exceedances in 2019	1 on 07/25/19
Historical exceedances	one in 1999, 2003, 2005, 2008; three in 2011; one in 2014; five in 2017; four in 2018
Current Sampling frequency / Season	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 / 8.78 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	0.4 meters
Distance from supporting structure	1.22 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a – (trailer was removed)
Distance from trees	9.14 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	80 meters east to Old Spanish Trail with a 2018 ADT of 4,478
	105 meters south of Escalante with a 2018 ADT of 4,327
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

FAIRGROUNDS: AQS # 040191020

Site Description	
Site Name	**FAIRGROUNDS**
AQS ID	040191020
Address	11330 S. Houghton Road, Tucson, AZ
Latitude / Longitude	32.047680 / -110.774350
Elevation	3078
Surrounding landscape	Natural desert vegetation on lag gravel
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.

MONITORING INFORMATION

Site Name	**FAIRGROUNDS**
Pollutant	**OZONE**
Method code	047
Number of monitors	1
Parameter code / POC	44201 / 1
Basic monitoring objective / Statement of purpose	NAAQS comparison / Background
Site type	Background
Instrument Manufacturer / Model	Thermo Scientific / 49i
FRM/FEM/ARM/other	FEM
Collecting agency / Reporting agency	PDEQ/ PDEQ
Analytical lab	n/a
Monitor type	SLAMS January, 2017
Scale	Urban
Number of hourly observations	8712
Number / Dates of 8-hour standard exceedances in 2019	0
Historical exceedances	One in 2008 and 2011; Three in 2017
Current Sampling frequency / Season	Continuous
Probe height	3.6 meters above the ground on a shelter on Tucson's far southeast side
Probe material / Residence time	FEP Teflon / 8.53 seconds
Degrees of unrestricted air flow	360
Height of tree above probe	-0.6 meters
Distance from supporting structure	1.22 meters
Distance from obstruction on roof	n/a
Distance from obstruction not on roof	n/a
Distance from trees	42.78 meters
Distance to furnace or incinerator flue	n/a
Distance between collocated monitors/ Schedule / Collocated monitor type	n/a
Nearest roads distance & direction to monitor / ADT	53 meters west of Houghton road with a 2018 ADT of 10,240
Site meets 40 CFR 58, Appx. A,C,D,E	Yes
MSA	Tucson, AZ 8520

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.

VI. TECHNOLOGY

Monitor Status for the Pima County Network

Gas Monitors, standard NAAQS:

During the five year period since the last Network Assessment, significant progress has been made toward instrument replacement, with emphasis placed on the pollutants of greatest concern. All ozone monitors in the network are Thermo i and iQ series units, and most have been purchased within the past four years. All CO, SO2 and NOx monitors are Thermo i series units, and these have been in operation for three to four years, with no real performance issues.

All replacement monitors purchased are trace level for CO, NOx and SO_2 to conform to current CFR requirements for routine verification concentration levels.

Gas Monitors, trace level:

Trace level monitors installed in the PDEQ NCore site are i and iQ series Thermo units and have operated adequately with no significant problems since being replaced within the past three to four years. The 22nd and Alvernon CO site also uses a trace level Thermo i series unit operated on a 0 to 5 ppm scale for improved resolution at the low CO levels typically recorded in the network.

Particulate Monitors, filter based:

All filter-based particulate monitors are R&P 2000 FRM or Thermo Partisol Plus 2025 i series sequential units ranging in age from approximately 6 years to twelve years. Both the 2000 FRM and the Thermo Partisol Plus 2025 i series units have provided excellent service with minimal difficulties. The operation and service manuals provided with R&P samplers are superior, partly because of the troubleshooting flowcharts included.

In the past several years, PDEQ has been downsizing the filter based network and replacing these samplers with continuous monitors. The only filter based sampler's currently in the network are at the required NCore station and one other location.

Particulate Monitors, continuous:

Continuous particulate monitors are Met One BAM 1020 with BGI Very Sharp Cut Cyclones for $PM_{2.5}$ and BAM 1020 units for PM_{10}, ranging in age from approximately 1 to 5 years. The Met One BAM 1020 units have provided excellent service with minimal difficulties. Pima County currently operates a total of 12 Met One BAM 1020's.

Calibration Equipment and Method:

Calibration, gas dilution**:**

Thermo Environmental dynamic gas calibrators are used network-wide for all dilution calibrations. New iQ series units were purchased in 2019 for the Children's Park NCore, 22nd & Craycroft and

the 22nd & Alvernon NAAQS site. 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 both NAAQS and trace levels.

Calibration, ozone:

All ozone calibration is done using Teledyne model T703E and T703U units, all purchased within the past two to five years. A Teledyne T703 is used as a primary standard, verified annually by California ARB. All field standards are calibrated using the primary standard and a dedicated Thermo 49i 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 Teledyne is the only major manufacturer to accommodate those agencies that routinely transport their field standards.

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 NAAQS 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 activated carbon and desiccant canister portable scrubbers.

Gas Standards:

All gas standards are certified EPA Protocol grade produced by Airgas in Los Angeles. All gas standards used 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 static verification by transducer blocking and bagging. Anemometer alignment is performed with a quality compass adjusted annually to the current magnetic declination in Tucson.

Outside temperature and relative humidity sensors are calibrated annually 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 around eight to twelve 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.

Shelter Temperature:

Vaisala HPM45AC temperature/relative humidity sensors are installed in stations to monitor shelter temperature. The sensor heads are calibrated semi-annually using a Vaisala HMK15 calibration kit with certified salt solutions and a NIST traceable thermometer.

Auditing Equipment:

PDEQ uses dedicated audit equipment and gas standards for all internal audits. The audit gas calibrator used for dilution on all NAAQS monitors is an Environics Model 6103 that is 6 years old. All ozone NAAQS monitors are audited with a dedicated Teledyne T703 that is 2 years old. The NCore station has a dedicated Thermo Scientific Model 146i installed next to a Thermo Scientific Model 146iQ 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:

All NAAQS and the Children's Park NCore stations have DR DAS Envidas loggers configured for digital inputs from all trace analyzers and continuous particulate samplers, and analog inputs from meteorological sensors. These loggers are capable of metadata collection and storage, remote diagnostics and either programmed or remote operation. All loggers are polled through wireless routers.

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

ATTACHMENT A

EPA Approval of Pima County Department of Environmental Quality 2018 Ambient Air Monitoring Network Plan

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901
OCT 29 2019

Ms. Ursula Nelson
Director, Pima County Department of Environmental Quality
33 North Stone Avenue, Suite 700
Tucson, Arizona 85701-1429

Dear Ms. Nelson:

Thank you for your submission of the Pima County Department of Environmental Quality (PDEQ) *2018 Ambient Air Monitoring Plan* on June 28, 2019. We have reviewed the submitted document based on the requirements set forth in 40 CFR Part 58. Based on the information provided in the plan, the U.S. Environmental Protection Agency (EPA) approves all portions of the network plan except those specifically identified below.

Please note that we cannot approve portions of the annual network plan for which the information in the plan is insufficient to judge whether the requirement has been met, or for which the information provided does not meet the requirements as specified in 40 CFR 58.10 and the associated appendices. EPA Region 9 also cannot approve portions of the plan for which the EPA Administrator has not delegated approval authority to the regional offices. Region 9 will forward the relevant information to EPA Headquarters so that they may respond regarding your waiver request for relocating the current NOy monitor at the Children's Park NCore Station (AQS Site ID: 04-019-1028) to the PAMS station at 22nd & Craycroft (AQS Site ID: 04-019-1011). Enclosure A (*A. Annual Monitoring Network Plan Checklist*) is the checklist EPA used to review your plan for items that are required to be included in the annual network plan along with our assessment of whether the plan submitted by your agency addresses those requirements. Items highlighted in yellow are those EPA Region 9 is not acting on, as we either lack the authority to approve the specific item, or we have determined that a requirement is either not met or information in the plan is insufficient to judge whether the requirement has been met. Items highlighted in green in Enclosure A require attention in order to improve next year's plan.

All comments conveyed via this letter and enclosure should be addressed prior to submittal of next year's annual monitoring network plan to EPA.

If you have any questions regarding this letter or the enclosed comments, please feel free to contact me at (415) 947-4134 or Anna Mebust (415) 972-3265.

Sincerely,

Gwen Yoshimura, Manager
Air Quality Analysis Office

Enclosure:
A. Annual Monitoring Network Plan Checklist

cc (via email): Rupesh Patel, PDEQ
Mike Draper, PDEQ

ATTACHMENT B

EPA Approval of Pima County Department of Environmental Quality Network Modifications

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

FEB 2 0 2020

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Rupesh Patel
Air Program Manager
Pima County Department of Environmental Quality
33 N. Stone Avenue, Suite 700
Tuscon, Arizona 85701-1429

Dear Mr. Patel

This letter transmits our approval of the Pina County Department of Environmental Quality's request to shut down the agencies' NOy monitor in concert with continued operation of a NOx monitor at the Childrens Park NCore station (AQS site ID: 04-019-1028). This request is being made so that the NOy monitor can be installed and operated at the PAMS station at 22nd & Craycroft. (AQS site ID: 04-019-1011). Requests to allow monitoring for NOx instead of NOy at NCore stations are covered in our monitoring regulations (see Appendix D to Part 58, Section 3.(b)(1)). According to these rules, a waiver for measuring NOx in lieu of NOy must be approved by the Environmental Protection Agency's (EPA) Administrator. This authority has been delegated to the Director of the Air Quality Assessment Division in EPA's Office of Air Quality Planning and Standards.

In considering your request to operate NOx in lieu of NOy at the Children's Park NCore station, we worked with EPA Region 9 on an evaluation of the NOy and NOx data at the NCore station and a review of the rationale for why the PAMS station is better suited for NOy measurements. After careful consideration of your request to move the NOy monitor to the PAMS station at 22nd & Craycroft and operate NOx at NCore we are pleased to approve the shut-down of NOy at the Childrens Park NCore station. We note that PAMS measurements are required to operate minimally during June, July, and August, while NCore measurements are required to operate year-round. Since the 22nd & Craycroft site would be the only Pima County location with both NOy and true NO_2, we expect that you will operate these measurements year-round; let us know if this is not possible.

The strength of the rationale to prioritize operation of NOy at the 22nd & Craycroft site over the Children's Park site is that it allows for collocating NOy with a true NO_2 monitor at the 22nd & Craycroft site. This collocation of NOy and true NO_2 will ensure that calculations of NOz are made with the most appropriate monitoring technologies. This is consistent with our authority to allow such a waiver since differences between NOy and true NO_2 + NO are expected to be larger than differences between NOy and NOx chemiluminescence monitors, as is the case for the existing monitors at the Childrens Park NCore Station.

Thank you for your program's efforts in working through the issue of optimizing your network to meet multiple needs at NCore and PAMS. For any technical questions on NCore, you may contact Tim Hanley at hanley.tim@epa.gov and 919-541-4417. For technical questions on PAMS, you may contact Kevin Cavender at cavender.kevin@epa.gov and 919-541-2364.

Sincerely,

Richard A. Wayland

Richard A. Wayland, Division Director
Air Quality Assessment Division

cc: Gwen Yoshimura, EPA Region 9

bcc: Tim Hanley, OAQPS
Kevin Cavender, OAQPS
Anna Mebust, EPA Region 9
Randall Chang, EPA Region 9