

# Salt River Pima-Maricopa Indian Community (SRPMIC)



## 2015 Ambient Air Monitoring Network Report

May 2016

**Community Development Department (CDD)  
Environmental Protection & Natural Resources (EPNR)  
10005 East Osborn Road  
Scottsdale, AZ 85256**

## **INTRODUCTION**

The Salt River Pima-Maricopa Indian Community (SRPMIC) has developed an air monitoring network for measuring ambient concentrations of criteria pollutants and associated meteorological parameters. The operation of these Tribal Monitoring Sites (TMS) follows the United States Environmental Protection Agency (USEPA) State and Local Air Monitoring Sites (SLAMS) guidance recommendations and documents. This Annual Air Monitoring Network Review for 2015 is being submitted by the SRPMIC Community Development Department (CDD) Environmental Protection & Natural Resources (EPNR) Division to the United States Environmental Protection Agency (USEPA) Region 9 as outlined in 40 CFR Part 58.10. In addition, changes made to the network design and special projects conducted during 2015 and a 3-year data summary are included in this document.

## **AMBIENT MONITORING NETWORK**

The purpose of the SRPMIC air-monitoring network is to measure ambient concentrations of the selected criteria pollutants at various locations across the Community. These data are used to assess health and welfare effects and determine pollution source both on and off the Community. The criteria pollutants measured are ozone (O<sub>3</sub>), PM<sub>10</sub> and PM<sub>2.5</sub>; the meteorological parameters include wind speed, wind direction, ambient temperature, precipitation, delta temperature, solar radiation, and ambient pressure. The collection of these data began in 2002 and continues to date. The three basic monitoring objectives with six types of monitoring sites and five measuring scales were used to develop the monitoring network.

## **MONITORING OBJECTIVES**

1. Provide air pollution data to the general public in timely manner;
2. Support compliance with ambient air quality standards and emission strategy development; and
3. Support for air pollution research studies.

## **TYPES OF MONITORING SITE OBJECTIVE**

- Determine the highest concentrations expected to occur in the area covered by the network;
- Determine the representative concentrations in areas of high population density;
- Determine general background concentrations levels;
- Determine the impact of significant sources or source categories on air quality;
- Determine the extent of regional pollutant transport among populated areas, and in support of secondary standards; and
- Measure air pollution impacts on visibility, vegetation damage or other welfare-based impacts.

## SPATIAL SCALES

This SLAMS (Tribal) network consists of ambient air monitoring sites that provide data to meet the required monitoring objectives. All SRPMIC air monitoring sites have the basic monitoring objective of NAAQS comparison. Monitoring sites generally correspond to a spatial scale identified in 40 CFR Part 58 Appendix D. Spatial scale of representativeness is described in terms of the physical dimension of the air parcel nearest to a monitoring station throughout which actual pollutant concentrations are reasonably similar. Table 1 lists these spatial scales.

**Table 1: Spatial Scales**

<b>Spatial Scale</b>	<b>Dimension</b>
Microscale	Several meters up to 100 meters
Middle scale	100 meters up to 0.5 kilometers
Neighborhood Scale	0.5 kilometers to 4.0 kilometers
Urban Scale	4 kilometers to 50 kilometers
Regional Scale	Tens to hundreds of kilometers

40 CFR Part 58 Appendix D also describes the relationship between the site type and the spatial scales that are generally most appropriate for each site type. Table 2 summarizes this relationship.

**Table 2: Site Type and Scales**

<b>Site Type</b>	<b>Appropriate Siting Scales</b>
Highest Concentration	Micro, Middle, Neighborhood (Sometimes Urban)
Population	Neighborhood, Urban
Source Impact	Micro, Middle, Neighborhood
General / Background	Neighborhood, Urban, Regional
Regional Transport	Urban / Regional
Welfare-related Impact	Urban / Regional

## NETWORK DESCRIPTION

Four monitoring sites were operated by the SRPMIC during 2015 at various locations and for various durations and purposes. The site name, abbreviation, AQS Code, Site Type, Site Scale and the Criteria Pollutants monitored are included in Table 3; the location of each site, including the longitude/latitude and major cross-streets is presented in Table 4. The monitoring network meets the monitoring objectives defined in Appendix D to 40 CFR Part 58. A location map of the Community and monitoring site locations are presented in Figures 1 and 2, respectively. Photographs of the sites and associated data summaries are included at the end of this report.

**Table 3: SLAMS Summary**

Site Name	AQS Code	Site Type	Site Scale	Pollutants
Senior Center (SC)	04-013-7020	Population Exposure	Neighborhood	PM <sub>10</sub> , PM <sub>2.5</sub> , O <sub>3</sub>
Red Mountain (RM)	04-013-7021	Regional Transport, Max Ozone Conc.	Urban	O <sub>3</sub>
Lehi (LE)	04-013-7022	Population Exposure	Neighborhood	PM <sub>10</sub> , O <sub>3</sub>
High School (HS)	04-013-7024	Population Exposure	Neighborhood	PM <sub>10</sub> , O <sub>3</sub>

**Table 4: Site Locations**

Site	Latitude	Longitude	Location
SC	33° 29.294'	111° 51.339'	Osborn/Alma School Roads
RM	33° 30.475'	111° 45.277'	SR87/ Arizona Canal
LE	33° 28.472'	111° 48.303'	Oak Street/Stapley Drive
HS	33° 30.483'	111° 50.268'	Chaparral Rd/Country Club Dr

## INSTRUMENTATION

40 CFR Parts 50 and 53 define Federal Reference Methods (FRMs) and Federal Equivalent Methods (FEMs), which provide precise methodology for quantifying ambient concentrations of air pollutants. FRMs are monitoring methods that are associated with the NAAQS for the pollutant described in the appendices to 40 CFR 50 and determined by EPA to be FRMs. FEMs are alternative monitoring methods that have been designated by EPA as obtaining equivalent results when compared to the FRM, as determined by 40 CFR 53. An additional option for air monitoring agencies is the Approved Regional Method (ARM). This designation requires the applying agency to conduct specific field testing and evaluation demonstrating that the method meets Class III precision and accuracy requirements listed in Subpart C of 40 CFR Part 53.

During 2015, SRPMIC used FRMs to collect filter based PM<sub>10</sub> and PM<sub>2.5</sub> samples and FEMs for continuous PM<sub>10</sub> and ozone; a PM<sub>2.5</sub> FEM is expected to be operational in 2016. SRPMIC does not have approval for any ARMs.

Two types of PM<sub>10</sub> monitors were used throughout the monitoring network: 1) filter based low volume monitors, and 2) Tapered Element Oscillating Microbalance (TEOM) monitors which measure PM<sub>10</sub> continuously.

During 2015, the PM<sub>2.5</sub> monitors used throughout the monitoring network were filter based low volume monitors equipped with the appropriate size fractioning; a TEOM Filter Dynamics Measurement Systems (FDMS) FEM which measures PM<sub>2.5</sub> continuously is planned to be operational in 2016.

A listing of the parameters and quantity of site instrumentation is presented in Table 5.

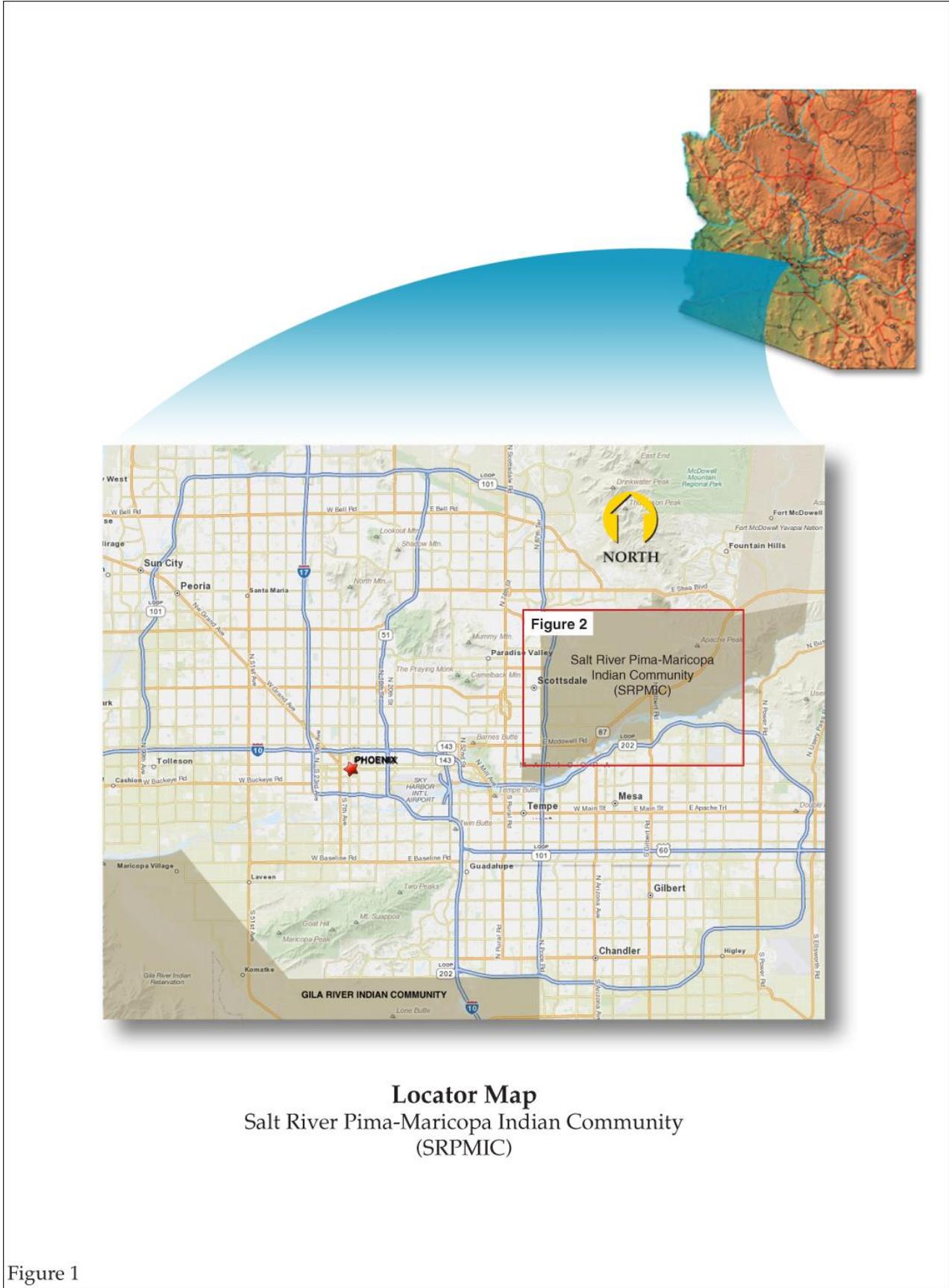
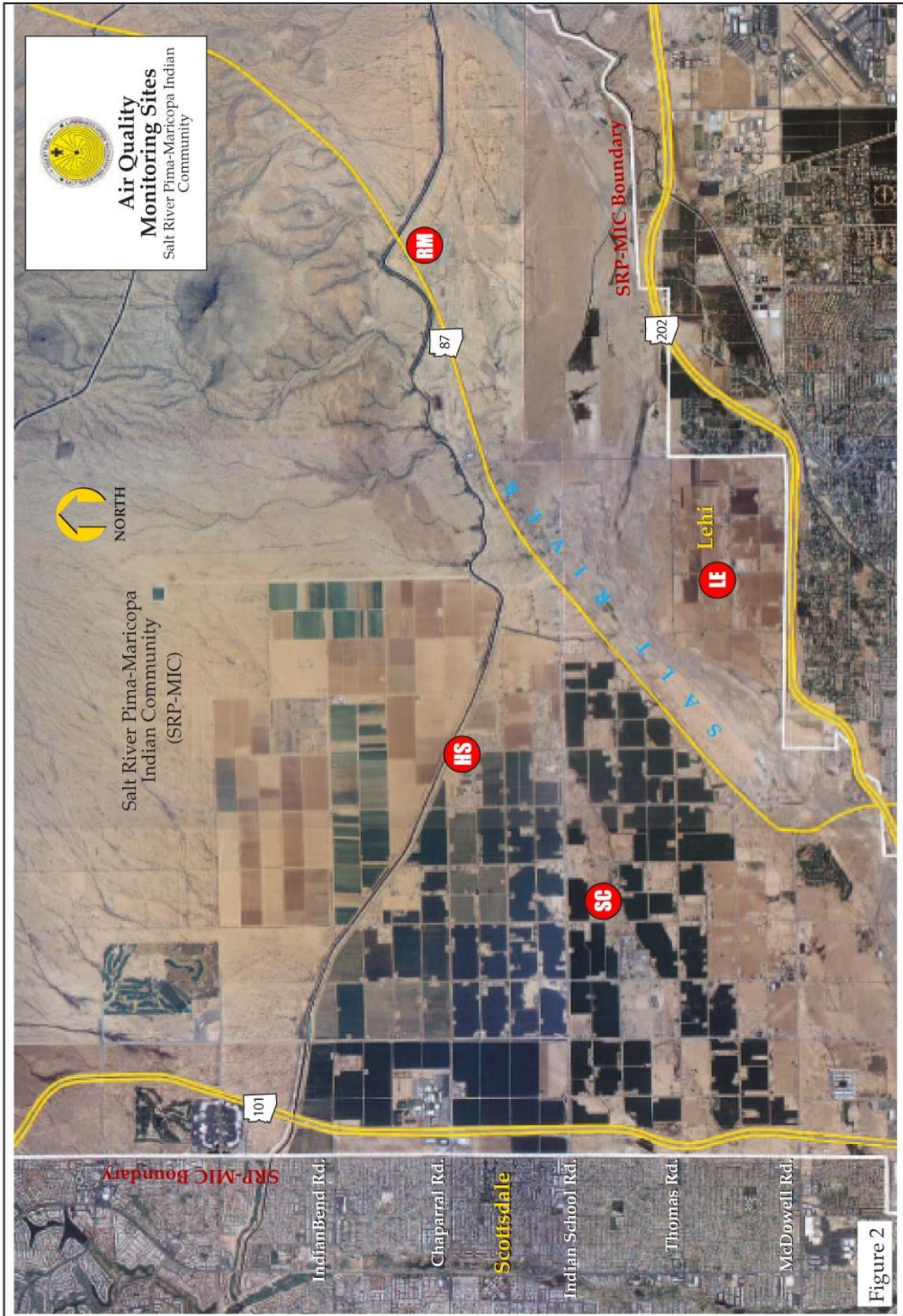


Figure 1



**Table 5: Site Instrumentation**

Site ID	PM <sub>10</sub>	PM <sub>2.5</sub>	O <sub>3</sub>	Wind System	Temp / RH	Delta Temp	Ambient Pressure	Rain	Solar Rad.	Data Logger	Total
SC	1	2	1	1	1/1	1	1	1	1	1	12
RM			1	1	1/1		1			1	6
LE	2		1*	1	1/1		1			1	8
HS	1		1*							1	3
Total	4	2	4	3	6	1	3	1	1	4	29

\* seasonal

## DATA SUMMARIES

### CRITERIA POLLUTANTS

The Federal Clean Air Act of 1970 established National Ambient Air Quality Standards (NAAQS) for six pollutants. These pollutants, referred to as the “Criteria Pollutants”, include carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), and lead (Pb). Two Federal Standards exist for most of the criteria pollutants. The primary standard defines levels deemed “. . . necessary, with an adequate margin of safety, to protect the public health.” The secondary standard defines levels “. . . necessary to protect the public welfare. . .” (40 CFR Part 50). The promulgation of these standards, however, does not prohibit any State or Tribal Community from establishing air quality standards that are more stringent. The Federal Standards are also subject to periodic review and revision as deemed necessary by the Administrator of the Environment Protection Agency (EPA). The following discussion summarizes the SRPMIC network results in relation to the monitoring objectives of the State and Local Air Monitoring Stations (SLAMS).

### Ozone (O<sub>3</sub>)

During 2015, four ozone monitors operated at various locations during various intervals. Two locations operated continuously; and two operated seasonally during the year. However, SRPMIC will not seek waivers for ozone seasonal monitoring to the two monitors and will operate year round starting 2016. SRPMIC submitted a letter to EPA Region 9 on December 18, 2015 about this information. Each location and operational period is listed in Table 5.

**Table 6: Operational Schedule for Ozone**

Site Name	Duration
Senior Center	January 1 - December 31
Red Mountain	January 1 - December 31
Lehi	April 1 - November 1
High School	April 1 - November 1

## One-hour Average Concentrations

One-hour concentrations of ozone during 2015 were moderate; no exceedance of the former one-hour ozone standard was observed. A summary of the one-hour concentrations obtained at the four locations is presented in Table 7; the distribution of the one-hour concentrations is presented in Table 8.

**Table 7: 1-Hour Summary**

Site	Max. (ppm) Date Time	2 <sup>nd</sup> High (ppm) Date Time	3 <sup>rd</sup> High (ppm) Date Time	4 <sup>th</sup> High (ppm) Date Time	Number Of Exceedances	Number of Samples
RM	0.094 6/29 1400	0.093 6/22 1500	0.092 6/20 1400	0.089 6/24 1400	0	8713
SC	0.094 6/16 1500	0.094 6/29 1300	0.092 6/29 1400	0.091 6/22 1400	0	8709
LE	0.105 6/29 1400	0.096 6/29 1300	0.094 6/20 1400	0.091 6/22 1500	0	5135
HS	0.094 6/29 1400	0.089 6/29 1300	0.086 6/22 1400	0.085 6/12 1700	0	4986

**Table 8: Distributions**

Interval:	Number of 1-Hour Average Values (ppm)							
	0.000 to 0.040	0.041 to 0.080	0.081 to 0.120	0.121 to 0.160	0.161 to 0.200	0.201 to 0.240	0.241 to 0.280	>0.280
Site								
RM	5937	2749	26	0	0	0	0	0
SC	6246	2439	20	0	0	0	0	0
LE	3013	2094	28	0	0	0	0	0
HS	3125	1847	14	0	0	0	0	0

## Eight-hour Average Concentrations

Eight-hour average concentrations of ozone were moderate to high. There were four exceedance-days of the eight-hour ozone standard and one violation of the standard. A summary of the eight-hour concentrations is presented in Table 9; the distribution of the concentrations is presented in Table 10.

**Table 9: Eight-Hour Summary**

Site	Max. (ppm) Date Time*	2 <sup>nd</sup> High (ppm) Date Time*	3 <sup>rd</sup> High (ppm) Date Time*	4 <sup>th</sup> High (ppm) Date Time*	Number Of Exceedances	Number of Samples
RM	0.079 6/20 1100	0.078 6/12 1200	0.078 6/20 1000	0.074 8/1 1200	3	8750
SC	0.079 6/12 1200	0.077 6/20 1000	0.077 6/29 1000	0.073 8/15 1100	3	8754
LE	0.082 6/29 1100	0.080 6/12 1200	0.080 6/20 1100	0.076 6/16 1000	4	5160
HS	0.078 6/12 1300	0.076 6/29 1000	0.075 6/20 1100	0.072 8/1 1100	2	5009

\*Time - Time is beginning hour (Mountain Standard Time)

**Table 10: Distribution**

Interval:	Number of Eight-Hour Average Values (ppm)							
	0.000 to 0.030	0.031 to 0.060	0.061 to 0.075	0.076 to 0.095	0.096 to 0.115	0.116 to 0.135	0.136 to 0.155	>0.155
Site								
RM	3439	5000	301	10	0	0	0	0
SC	4432	4052	262	8	0	0	0	0
LE	1713	3112	321	14	0	0	0	0
HS	1914	2875	217	3	0	0	0	0

## Particulate Matter (PM<sub>10</sub>)

During 2015, PM<sub>10</sub> samplers operated at one location on a 1 in 6 day schedule throughout the year; two locations operated continuously throughout the year. Each location and operational period is listed in Table 11.

**Table 11: Operational Schedule for PM<sub>10</sub>**

Site Name	Duration
Senior Center (continuous)	January 1 - December 31
Lehi Fire (6-day schedule)	January 1 - December 31
High School (continuous)	January 1 - December 31

## One-hour Average Concentrations

During 2015, a continuous PM<sub>10</sub> sampler operated at the High School and Senior Center. A summary of the hourly average concentrations and distribution are provided in Tables 12 and 13, respectively. One-hour average concentrations of PM<sub>10</sub> generally were low. Negative and extremely high outliers did occur, although approximately 89% of the values were less than 50 µg/m<sup>3</sup> and approximately 99% were less than 150µg/m<sup>3</sup>.

**Table 12: One-Hour Average PM<sub>10</sub> Concentration Summary**

Site	Max. (ug/m <sup>3</sup> ) Date	2 <sup>nd</sup> High (ug/m <sup>3</sup> ) Date	Min. (ug/m <sup>3</sup> ) Date	Annual Average (ug/m <sup>3</sup> )	Number of Samples	% Recovery
HS	1394 7/31	898 8/31	-10 11/9	31.8	8688	99.2
SC	537 11/12	648 7/31	0.0 1/5	24.9	8706	99.4

**Table 13: One-Hour Average PM<sub>10</sub> Concentration Distribution**

Interval:	Number of One-hour Average Concentrations (ug/m <sup>3</sup> )								
	≤0	0 to 50	51 to 100	101 to 150	151 to 250	251 to 500	501 to 750	751 to 1000	>1000
Site									
HS	28	7444	852	219	99	38	4	3	1
SC	7	7933	612	101	37	15	1	0	0

## Twenty-Four Hour Average Concentrations

Twenty-four hour average concentrations of PM<sub>10</sub> were generally low during 2015. There were no exceedances of the 24-hour standard and one violation of the twenty-four hour standard. A summary of the 24-hour average concentrations is presented in Table 14; the distribution of the concentrations is presented in Table 15.

**Table 14: Twenty-Four Hour Average PM<sub>10</sub> Concentration Summary**

Site	Max. (ug/m <sup>3</sup> ) Date	2 <sup>nd</sup> High (ug/m <sup>3</sup> ) Date	Number of Exceedances	Annual Average (ug/m <sup>3</sup> )	Number of Samples
HS <sup>a</sup>	137 1/3	99 6/16	0	31.4	364
SC <sup>a</sup>	69 11/26	62 9/13	0	24.6	363
LE-P <sup>b</sup>	59 1/6	57 1/12	0	22.8	60
LE-C <sup>b</sup>	58 1/6	56 1/12	0	26.5 <sup>c</sup>	43

<sup>a</sup>Continuous (TEOM)

<sup>b</sup>Filter-based (6-day schedule)

<sup>c</sup> <75% data

**Table 15: Twenty-Four Hour Average PM<sub>10</sub> Concentration Distributions**

Interval:	Number of Twenty-Four Hour Average Concentrations (ug/m <sup>3</sup> )								
	0 to 25	26 to 50	51 to 75	76 to 100	101 to 125	126 to 150	151 to 175	176 to 200	>200
Site									
HS <sup>a</sup>	166	148	42	7	0	1	0	0	0
SC <sup>a</sup>	212	139	12	0	0	0	0	0	0
LE-P <sup>b</sup>	34	20	2	0	0	0	0	0	0
LE-C <sup>b</sup>	21	16	2	0	0	0	0	0	0

<sup>a</sup>Continuous (TEOM)

<sup>b</sup>Filter-based (6-day schedule)

## Particulate Matter (PM<sub>2.5</sub>)

During 2015, PM<sub>2.5</sub> samplers operated at one location; the operational period is listed in Table 16.

**Table 16: Operational Schedule for PM<sub>2.5</sub>**

Site Name	Duration
Senior Center (6-day schedule)	January 1- December 31

Twenty-four hour average concentrations of PM<sub>2.5</sub> were low during 2015. There was no exceedance or violation of the 24-hour or annual standards during 2015. A summary of the 24-hour average concentrations is presented in Table 17 for those concentrations obtained on a 6-day schedule; the distributions of the concentrations for the corresponding schedules are presented in Table 18.

**Table 17: Twenty-Four Hour Average PM<sub>2.5</sub> Concentration Summary**

### 6-Day Schedule

Site	Max. (ug/m <sup>3</sup> ) Date	2 <sup>nd</sup> High (ug/m <sup>3</sup> ) Date	Number of Exceedances	98 <sup>th</sup> Percentile Value	Annual Average (ug/m <sup>3</sup> )	Number of Samples
SC - P <sup>c</sup>	8.6 11/26	8.1 12/20	0	8.1	4.4	47
SC - C <sup>d</sup>	9.1 11/26	8.5 12/20	0	8.5	4.8	57

<sup>c</sup>Primary Sampler

<sup>d</sup>Collocated Sampler

**Table 18: 24-Hour Average Concentration PM<sub>2.5</sub> Distributions**

### 6-Day Schedule

Interval:	Number of 24-Hour Average Concentrations (ug/m <sup>3</sup> )						
	0 to 15	16 to 30	31 to 50	51 to 70	71 to 90	91 to 110	>110
Site							
SC - P <sup>c</sup>	47	0	0	0	0	0	0
SC - C <sup>d</sup>	57	0	0	0	0	0	0

<sup>c</sup>Primary Sampler

<sup>d</sup>Collocated Sampler

## DATA COMPLETENESS

A summary of the annual data completeness for the criteria pollutants monitored during 2015 is presented in Tables 19-21. These tables represent the number of samples collected during each site's operation versus the number of scheduled samples during each site's operation.

**Table 19: Ozone (O<sub>3</sub>)**

Interval Site	Number of Actual Samples	Number of Scheduled Samples	Data Completeness (Actual/Scheduled)
<b><u>One-Hour</u></b>			
RM	8713	8760	99.5%
SC	8709	8760	99.4%
LE*	5135	5160	99.5%
HS*	4986	5160	96.6%
<b><u>Eight-Hour</u></b>			
RM	8750	8760	99.9%
SC	8754	8760	99.9%
LE*	5160	5160	100.0%
HS*	5009	5160	97.1%
<b>TOTAL</b>	<b>55216</b>	<b>55680</b>	<b>99.2%</b>

\* Seasonal

Table 20: Particulate Matter (PM)

PM <sub>10</sub> <u>Interval</u> Site	Number of Actual Samples	Number of Scheduled Samples	Data Completeness (Actual/Scheduled)
<b><u>1 in 6 days</u></b>			
LE-P <sup>b</sup>	60	60	100.0%
LE-C <sup>b</sup>	43	60	71.7%
<b><u>Continuous</u></b>			
HS <sup>a</sup>	364	365	99.7%
SC <sup>a</sup>	363	365	99.4%
<b>TOTAL PM<sub>10</sub></b>	<b>830</b>	<b>850</b>	<b>97.6%</b>
PM <sub>2.5</sub> <u>Interval</u> Site			
<b><u>1 in 6 days</u></b>			
SC - P <sup>c</sup>	47	60	78.3%
SC - C <sup>d</sup>	57	60	95.0%
<b>TOTAL PM<sub>2.5</sub></b>	<b>104</b>	<b>120</b>	<b>86.7%</b>

<sup>a</sup>Continuous (TEOM)

<sup>b</sup>Filter-based (6-day schedule)

<sup>c</sup>Primary Sampler

<sup>d</sup>Collocated Sampler

Table 21: Data Completeness Summary

Pollutant	Number of Actual Samples	Number of Scheduled Samples	Data Completeness (Actual/Scheduled)
<b>Ozone</b>	<b>55216</b>	<b>55680</b>	<b>99.2%</b>
<b>PM<sub>10</sub></b>	<b>830</b>	<b>850</b>	<b>97.6%</b>
<b>PM<sub>2.5</sub></b>	<b>104</b>	<b>120</b>	<b>86.7%</b>
<b>TOTAL</b>	<b>56150</b>	<b>56650</b>	<b>99.1%</b>

## EXCEEDANCE OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Included in Table 22 is a summary of exceedances of the NAAQS during 2015.

**Table 22: 2014 NAAQS Exceedances**

Pollutant	Interval	Site	Concentration	Date	
<b>Ozone</b>	1-Hour	None	-	-	
	8-Hour	RM	0.079	6/20	
			0.078	6/12	
			0.078	6/20	
			SC	0.079	6/12
				0.077	6/20
0.077				6/29	
		LE	0.082	6/29	
			0.080	6/12	
			0.080	6/20	
			0.076	6/16	
		HS	0.078	6/12	
			0.076	6/29	
<b>PM<sub>10</sub></b>	24-Hour	SC	-	-	
		LE	-	-	
		HS	-	-	
	Annual	None	-	-	
<b>PM<sub>2.5</sub></b>	24-Hour	None	-	-	
	Annual	None	-	-	

## VIOLATIONS OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS

### Ozone (O<sub>3</sub>)

**Table 23: Violations of the 8-hour Ozone Standard**

Site	2013 4 <sup>th</sup> High (ppm)	2014 4 <sup>th</sup> High (ppm)	2015 4 <sup>th</sup> High (ppm)	3-Year Average of 4 <sup>th</sup> High (ppm)
RM	0.075	0.080	0.074	0.076
SC	0.074	0.073	0.073	0.073
LE	0.075	0.076	0.076	0.075
HS	0.074	0.071	0.072	0.072

### Particulates - PM<sub>10</sub>

**Table 24: Violations of the Twenty-Four Hour PM<sub>10</sub> Standard**

Site	2013		2014		2015		Rate of Expected Exceedances
	24-Hr Max (ug/m <sup>3</sup> )	Expected Exceedances	24-Hr Max (ug/m <sup>3</sup> )	Expected Exceedances	24-Hr Max (ug/m <sup>3</sup> )	Expected Exceedances	
HS <sup>a</sup>	221 <sup>f</sup>	1.0	241 <sup>g</sup>	3.0	137	0	1.3
SC	111 <sup>b</sup>	0	106 <sup>a</sup>	0	69 <sup>a</sup>	0	0.0
LE <sup>b</sup>	69	0	147	0	59	0	0.0

**Table 25: Violations the Annual PM<sub>10</sub> Standard**

Site	2013 Annual Average (ug/m <sup>3</sup> )	2014 Annual Average (ug/m <sup>3</sup> )	2015 Annual Average (ug/m <sup>3</sup> )	Three-Year Average (ug/m <sup>3</sup> )
HS <sup>a</sup>	38.0	39.3	31.4	36.2
SC	34.2 <sup>b</sup>	31.8 <sup>a</sup>	24.6 <sup>a</sup>	30.2
LE <sup>b</sup>	28.2	29.9	22.8	27.0

<sup>a</sup>Continuous (TEOM)

<sup>b</sup>Filter-based (6-day schedule)

<sup>c</sup>Primary Sampler

<sup>d</sup>Collocated Sampler

<sup>e</sup><75% data

<sup>f</sup>Data submitted to AQS as high winds pursuant to Exceptional Event

<sup>g</sup>Agricultural operations

## Particulates - PM<sub>2.5</sub>

Table 26: Violations of the Twenty-Four Hour PM<sub>2.5</sub> Standard

Site	2013 Annual 98 <sup>th</sup> Percentile (ug/m <sup>3</sup> )	2014 Annual 98 <sup>th</sup> Percentile (ug/m <sup>3</sup> )	2015 Annual 98 <sup>th</sup> Percentile (ug/m <sup>3</sup> )	Three-Year Average 98 <sup>th</sup> Percentile (ug/m <sup>3</sup> )
SC-P <sup>c</sup>	10.1	11.0	8.1	9.7

Table 27: Violations the Annual PM<sub>2.5</sub> Standard

Site	2013 Annual Average (ug/m <sup>3</sup> )	2014 Annual Average (ug/m <sup>3</sup> )	2015 Annual Average (ug/m <sup>3</sup> )	Three-Year Average (ug/m <sup>3</sup> )
SC-P <sup>c</sup>	5.3	5.4	4.4	5.0

<sup>c</sup>Primary Sampler

## NETWORK INFORMATION

The following is a list of information on SRPMIC monitoring network activities that occurred during 2015.

### Ozone Monitoring:

During 2015, four ozone monitors were reported operational. Two site monitors from Lehi and the High School continue to operate April 1 to November 1 as seasonal monitors, while ozone monitors at the Senior Center and Red Mountain sites continue to operate year-round. On December 18, 2015 SRPMIC notified EPA Region 9 in a letter not to pursue waivers to operate ozone seasonal monitors at Lehi and High School but decided to operate both sites year-round beginning January 2016. This regards to recent ozone National Ambient Air Quality Standard (NAAQS) revisions that it was appropriate for SRPMIC to operate year-round as the area is in non-attainment and the network still exceeds the current standard. A prior separate letter was sent to EPA Region 9 on March 31, 2015 informing of SRPMIC to start ozone seasonal monitoring for 2015 but did not mentioned of waivers for the Lehi and High School monitors.

There were four exceedance-days of the eight-hour primary standard for ozone and one violation of the eight-hour primary standard NAAQS for the three-year average of the fourth highest concentration. Tables 22 and 23 present the data summaries for the eight-hour ozone report.

On October 1, 2015, EPA updated the ozone NAAQS from .075 ppm to .070 ppm that will reduce the ozone pollution and to improve the public health protection. SRPMIC will continue the active efforts to implement the updated standards and reviewing the ozone designations process.

## **PM<sub>10</sub> Monitoring:**

During 2015, three PM<sub>10</sub> monitors were reported operational. Two site monitors at the Senior Center and High School sites operated continuously, collecting hourly data while the PM<sub>10</sub> samplers at Lehi site was filter-based and operated on a 1 in 6-day schedule.

There were no exceedance-days of the 24-hour primary standard for PM<sub>10</sub> of 150ug/m<sup>3</sup> and one violation of the 24-hour standard of expected number of exceedances. Tables 14 and 24 provide data summaries of PM<sub>10</sub> exceedances.

The Lehi PM<sub>10</sub> collocate monitor commenced operation on March 25, 2015. Lehi is the only collocated site since Senior Center manual PM<sub>10</sub> method collocation was removed on May 2014 in replacement of TEOM continuous monitor. The manual collocation sampling at Lehi is on a 1 in 6-day schedule for purposes of precision assessment for the network and both the primary and collocate samplers are FRM filter-based having the same EPA FRM method designation on standard condition collection.

On June 29, 2015 Air Quality Program (AQP) started sending the daily air quality PM<sub>10</sub> data from High School monitor and meteorological wind speed and wind direction data to Rousseau Farm Company at their request to keep track of their farming activities based from the recorded data. Rousseau Farms in their past agricultural practices had exploited several high PM<sub>10</sub> concentrations of dust measured at High School monitor (three exceedances in 2014) that was a concern after noticeable elevated PM<sub>10</sub> started to appear and it was addressed by AQP staff at Rousseau and SRPMIC meeting on June 26, 2015. By supporting Rousseau Farms the daily air quality data has enabled them to manage their activities better and have not observed any high concentrations of PM<sub>10</sub> measurement.

## **PM<sub>2.5</sub> Monitoring:**

Two PM<sub>2.5</sub> monitors were reported operational in AQS for 2015. Primary and collocate PM<sub>2.5</sub> FRM filter-based low volume monitors both operated on 1 in 6-day schedules at the Senior Center site. There was no exceedance or violation of the 24-hour or annual NAAQS during 2015.

The primary sampler had issues of down-time in third quarter after loss power from thunderstorm that followed with multiple circuit card/component changes and had affected the stability of filter temperature during the collection period. Several maintenance and calibrations that followed for corrective action.

The modification of sampling frequency to PM<sub>2.5</sub> FRM network at the Senior Center occurred after SRPMIC requested in a letter to EPA Region 9 on August 21, 2008 to reduce the sampling schedule of the primary monitor to a 1 in 6-day from a 1 in 3-day schedule due to lack of filter support from the laboratory (former laboratory) which created minimal data reports. This was critical to data completeness and AQP staffing issues. EPA Region 9 approved the request to reduce sampling frequency at the Senior Center site from 1 in 3-day schedule to a 1 in 6-day schedule in a written letter on October 2008.

## **Network and Non-Regulatory Information:**

An independent auditor conducts a quarterly audit on SRPMIC air monitoring network. Criteria pollutants ozone, PM<sub>10</sub> and PM<sub>2.5</sub> are audited quarterly and all meteorological parameters are done twice annually.

On each quarter, SRPMIC submitted the results of all valid measurement quality checks of precision and accuracy data to AQS. The SRPMIC monitoring network meets the minimum data assessment requirements for SLAMS sites of 40 CFR Part 58 Appendix A and 40 CFR Part 58.16 in reporting of all ambient air quality data and associated quality assurance data for criteria pollutant of ozone, PM<sub>10</sub> and PM<sub>2.5</sub> to the AQS database.

The 2014 SRPMIC Data Certification document packet was sent to EPA Region 9 on April 17, 2015, a requirement to 40 CFR Part 58.15.

The following is the EPA Audits conducted in 2015:

- EPA Ozone NPAP Through-the-Probe Audit conducted at Senior Center Air Monitoring Station on May 12, 2015; and
- EPA PM<sub>2.5</sub> PEP Audits conducted: February 5 & 11, 2015, May 12, 2015, July 29, 2015, August 4, 2015 and November 2, 2015 at Senior Center Air Monitoring Station.

The final 2014 SRPMIC Air Monitoring Network Review report document was sent to EPA Region 9 on June 24, 2015.

On September 30, 2015 SRPMIC submitted their 5-Year Air Monitoring Assessment report document to the EPA Region 9.

AQP conducted air quality equipment audit and equipment calibrations at two locations for the White Mountain Apache Tribe to assist air program remain in compliance with EPA standards on September 8-9, 2015.

Meteorological system (All-In-One) was installed in early 2016 at the High School site to monitor parameters wind speed/wind direction, relative humidity, temperature and pressure. The parameters is not in the data collection network as the systems different application is being worked.

The AQP continues to submit hourly data (FTP) of ozone and PM<sub>10</sub> to AIRNow data center that was first established with ozone reports in 2007. SRPMIC relies on Sonoma Techs AIRNow reporting tools of navigational mapping of hourly data comparisons with local monitors and the site trajectory for source traces.

The AQP continues to provide public outreach using a Flag Communication Network in which color flags are changed based upon daily air quality conditions that reflect air quality index (AQI) colors. They are setup at five different locations, including one at Salt River High School. AQP also distributes public outreach information of air quality advisories through the SRPMIC website and digital signage displays that reports of high pollution and health watch advisories.

### **Proposed Changes Within Next 18 Months:**

AQP installed a continuous PM<sub>10</sub> Thermo 1405 monitor at Lehi air monitoring station in October 2015 to monitor side-by-side with the FRM samplers to compare the data results for several months then introduced as a reporting monitor. The 1405 will replace the collocated site, primary and collocated filter-based FRM samplers that eventually will have all SRPMIC PM<sub>10</sub> network a continuous monitors.

The new PM<sub>2.5</sub> Thermo 1405 FDMS continuous FEM monitor was installed and projected to be operational in early 2017 as reporting monitor at Senior Center air monitoring station. The 1405 FDMS need more time for data assessments with current FRM samplers and continuous monitor is not fully functional. The FEM will be designated as primary monitor and shall be collocated with an FRM audit monitor that will be operate on 1 and 12-day schedule. The site is the only location that monitors PM<sub>2.5</sub> with a primary and collocated filter-based R&P FRM 2000 that collects in local conditions.

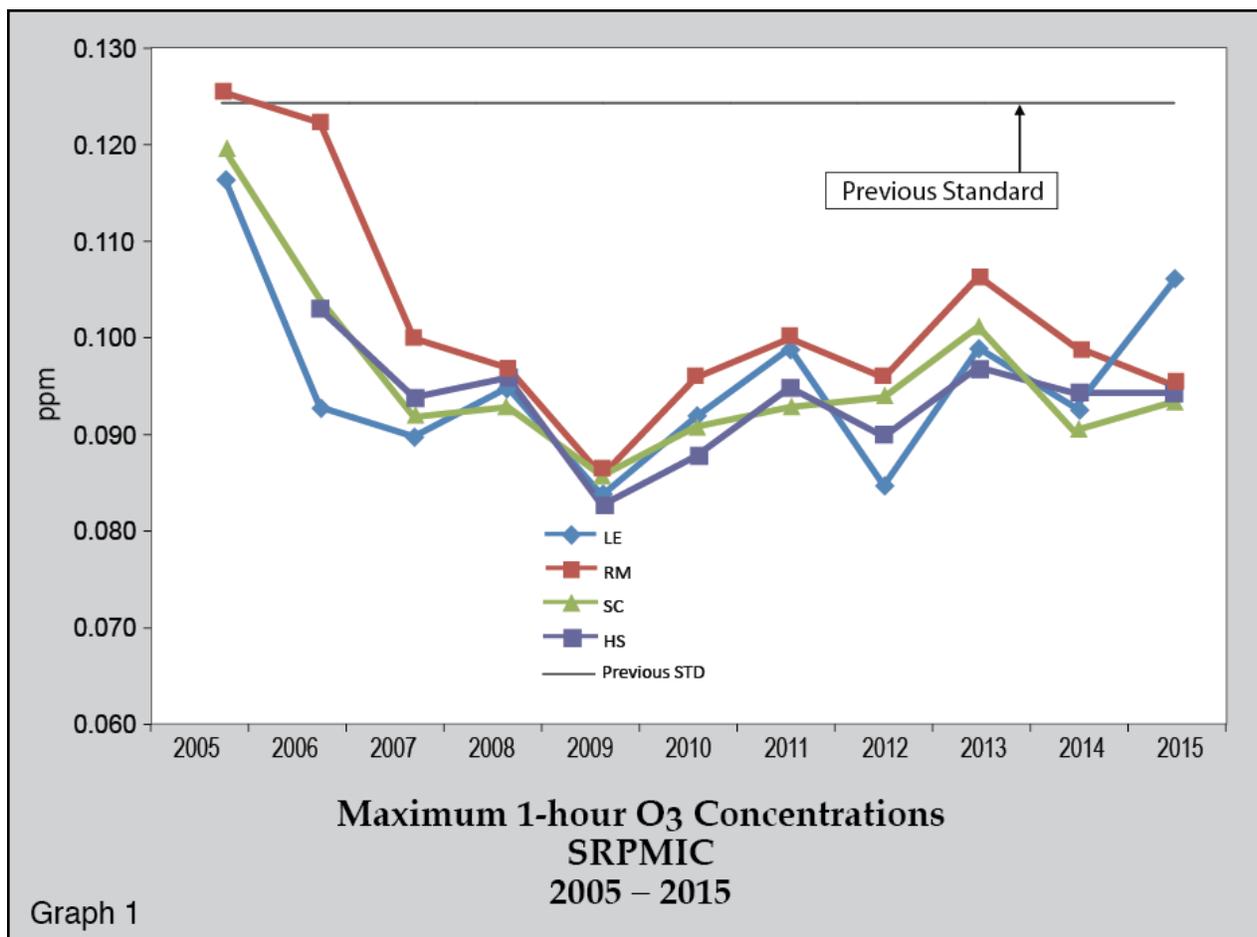
## TRENDS

The air quality in the Phoenix Metropolitan Area is generally improving despite the tremendous growth experienced in the region. Since monitoring began in the 1960s, ambient concentrations for most of the criteria pollutants have been reduced to below the NAAQS. Graphs of the trends seen in those criteria pollutants that are monitored on the SRPMIC are illustrated in Graphs 1 through 7.

### Ozone (O<sub>3</sub>)

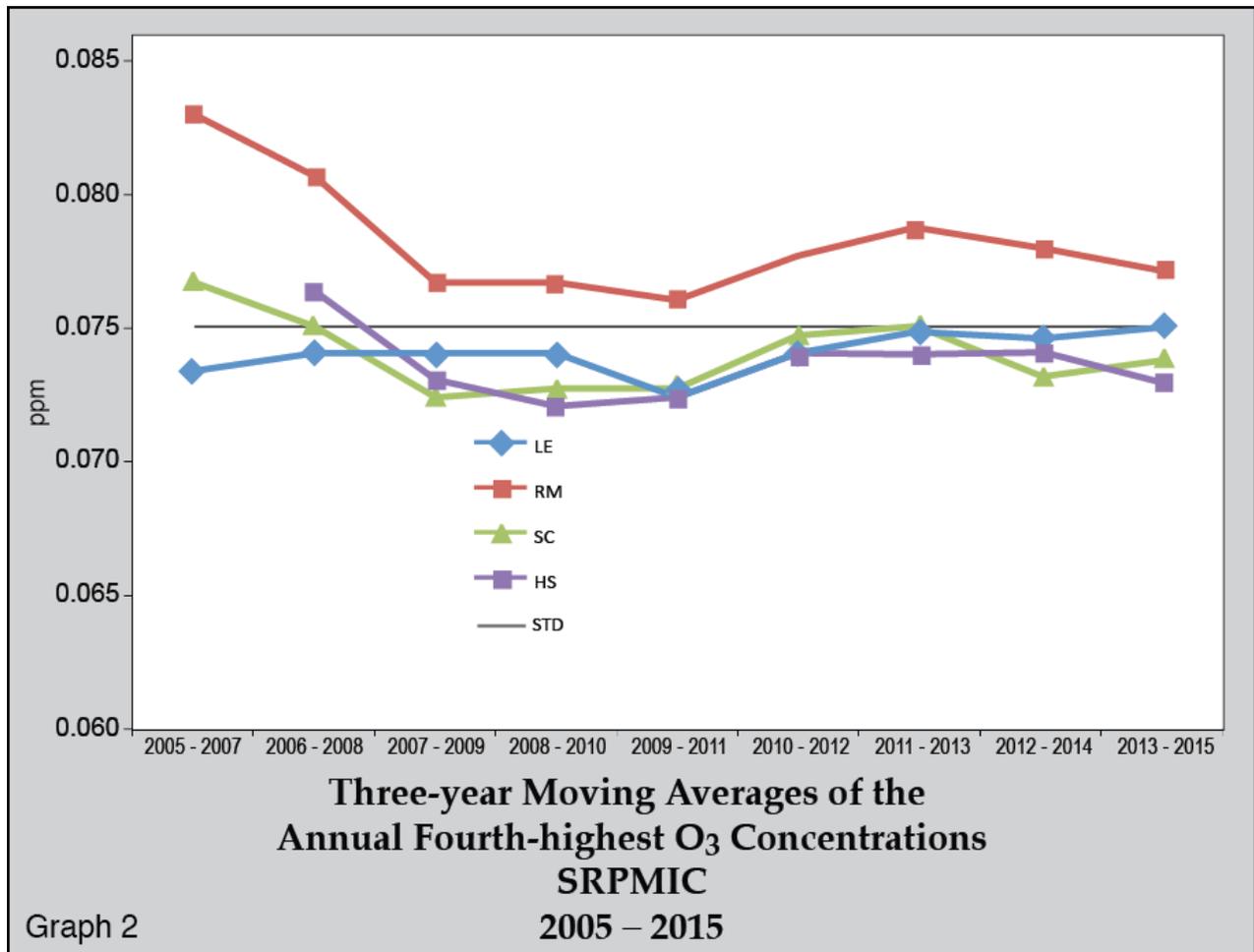
#### One-Hour Concentrations

Maximum 1-hour concentrations of O<sub>3</sub> at the SRPMIC monitoring locations have shown a large decline from 2005 to 2009 and a small overall increase occurring from 2009 to 2015. Between 2005 and 2015, maximum concentrations decreased approximately 20%. A graph of the maximum one-hour concentrations is provided in Graph 1.



## Eight-Hour Concentrations

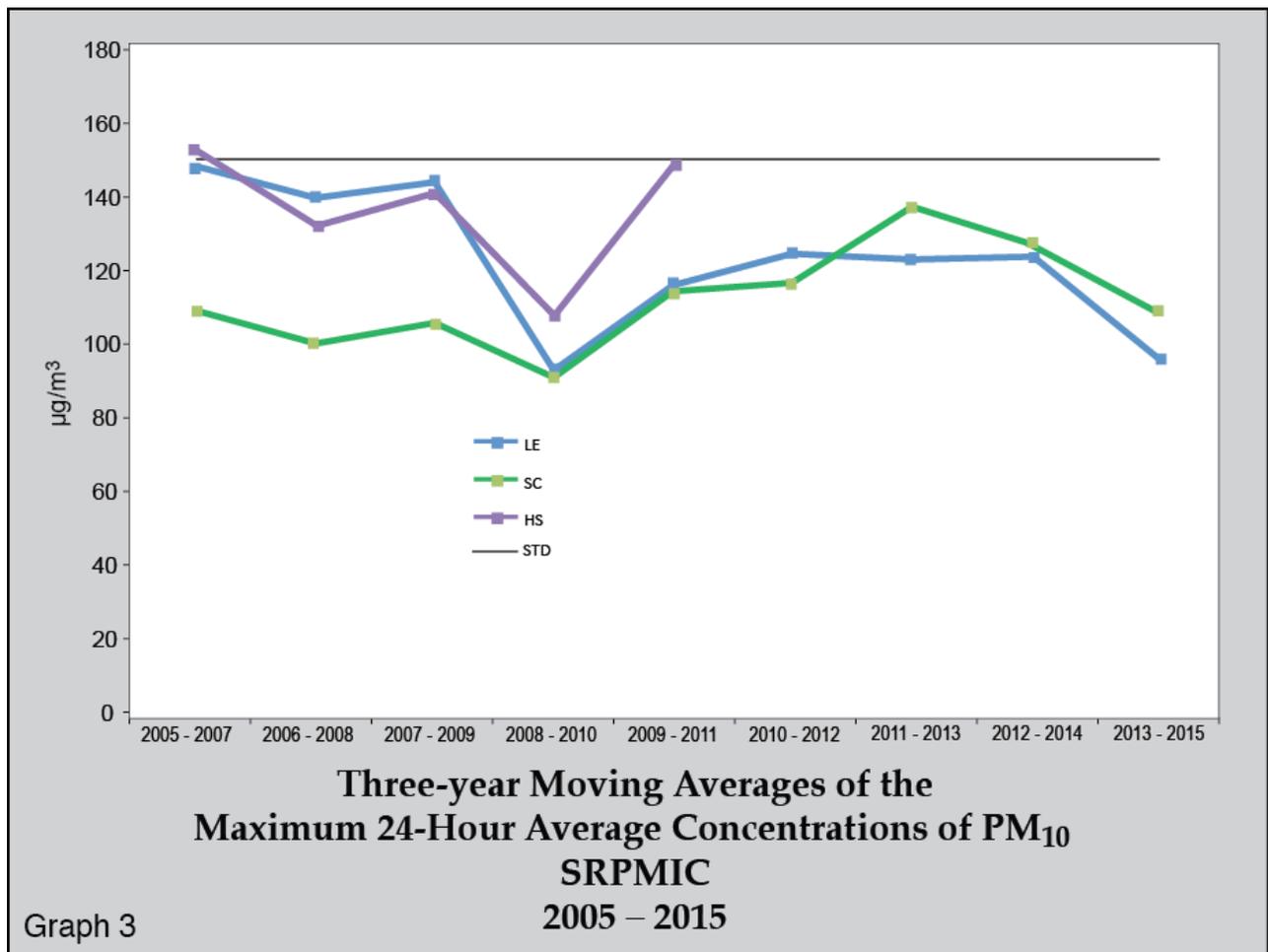
Eight-hour average concentrations of O<sub>3</sub> at the SRPMIC monitoring locations reflect the trend seen in the 1-hour concentrations. The three-year moving averages of the fourth-highest 8-hour concentration at the four locations are illustrated in Graph 2.



## Particulate Matter (PM<sub>10</sub>)

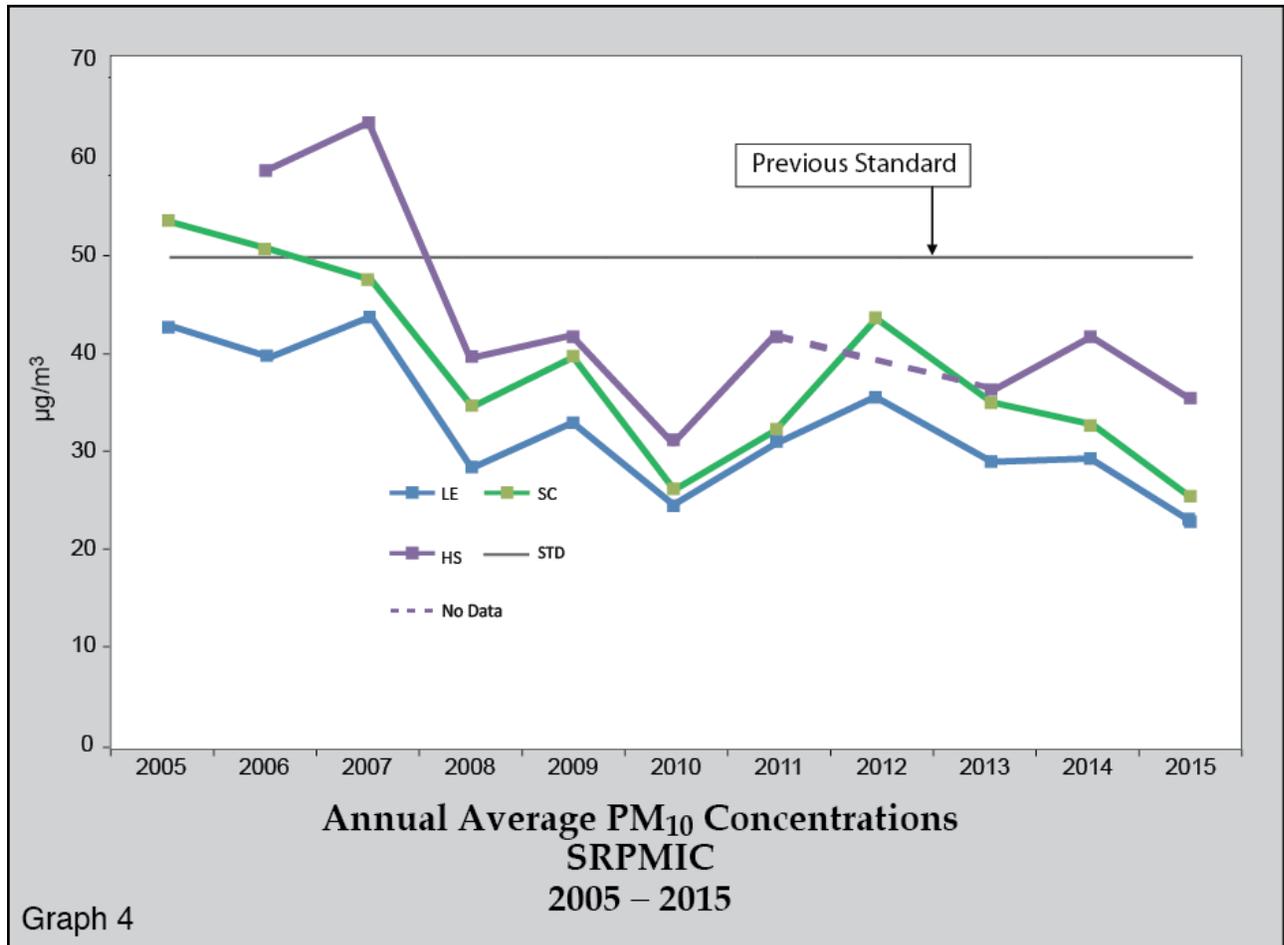
### Twenty-Four Hour Concentrations

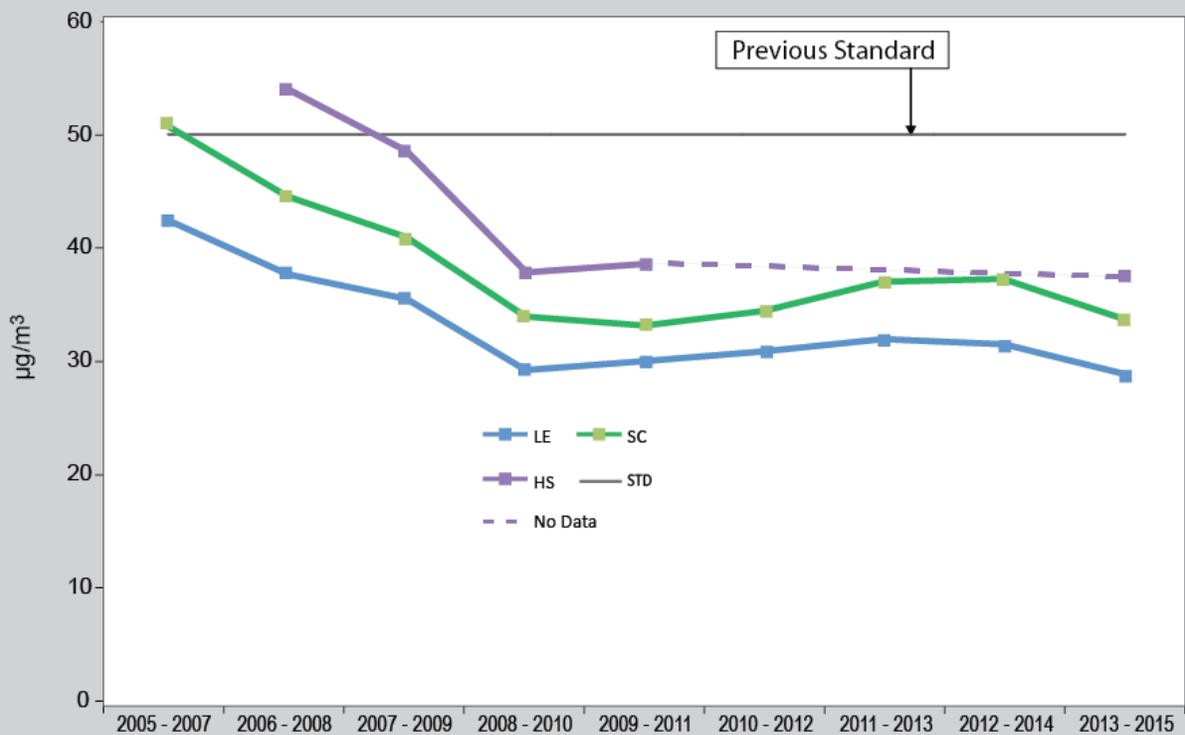
Maximum twenty-four hour average concentrations of PM<sub>10</sub> at the three monitoring locations have remained below the standard since 2006. A sharp decline occurred during 2008-2010, followed by a general increase through 2013 and a general decrease through 2015. A graph of the trend is provided in Graph 3.



## Annual Concentrations

Annual average concentrations of PM<sub>10</sub> at the SRPMIC locations have shown a general decline between 2005 and 2015. There has been no exceedance of the previous annual standard since 2007; a graph is presented in Graph 4. A graph of the three-year moving averages of the annual PM<sub>10</sub> concentrations is provided in Graph 5. Data recovery at the High School (HS) location was less than 75% during 2012, therefore, data for 2012 were not included in Graphs 4 and 5.





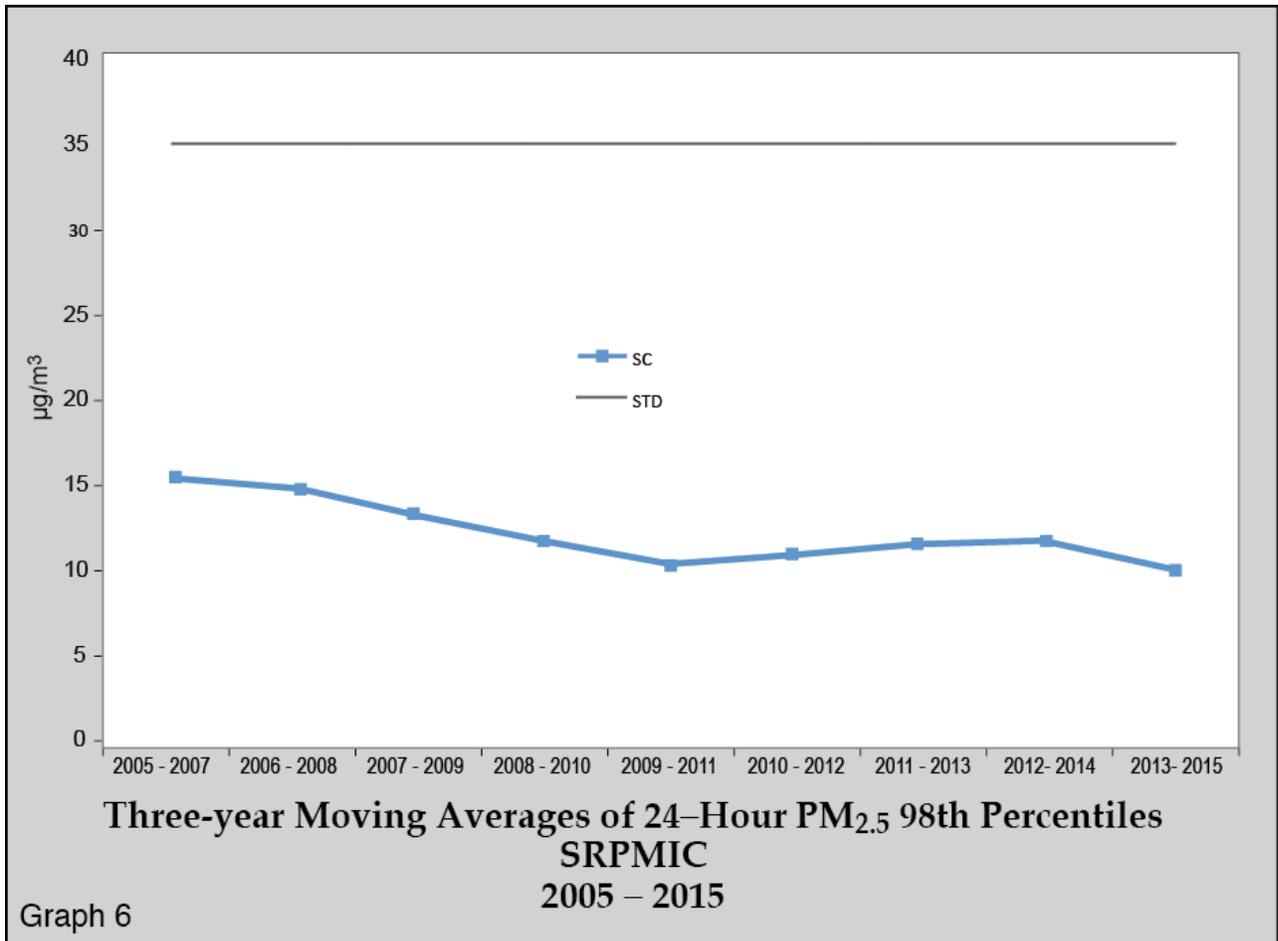
**Three-year Moving Averages of Annual PM<sub>10</sub> Concentrations  
SRPMIC  
2005 – 2015**

Graph 5

## Particulate Matter (PM<sub>2.5</sub>)

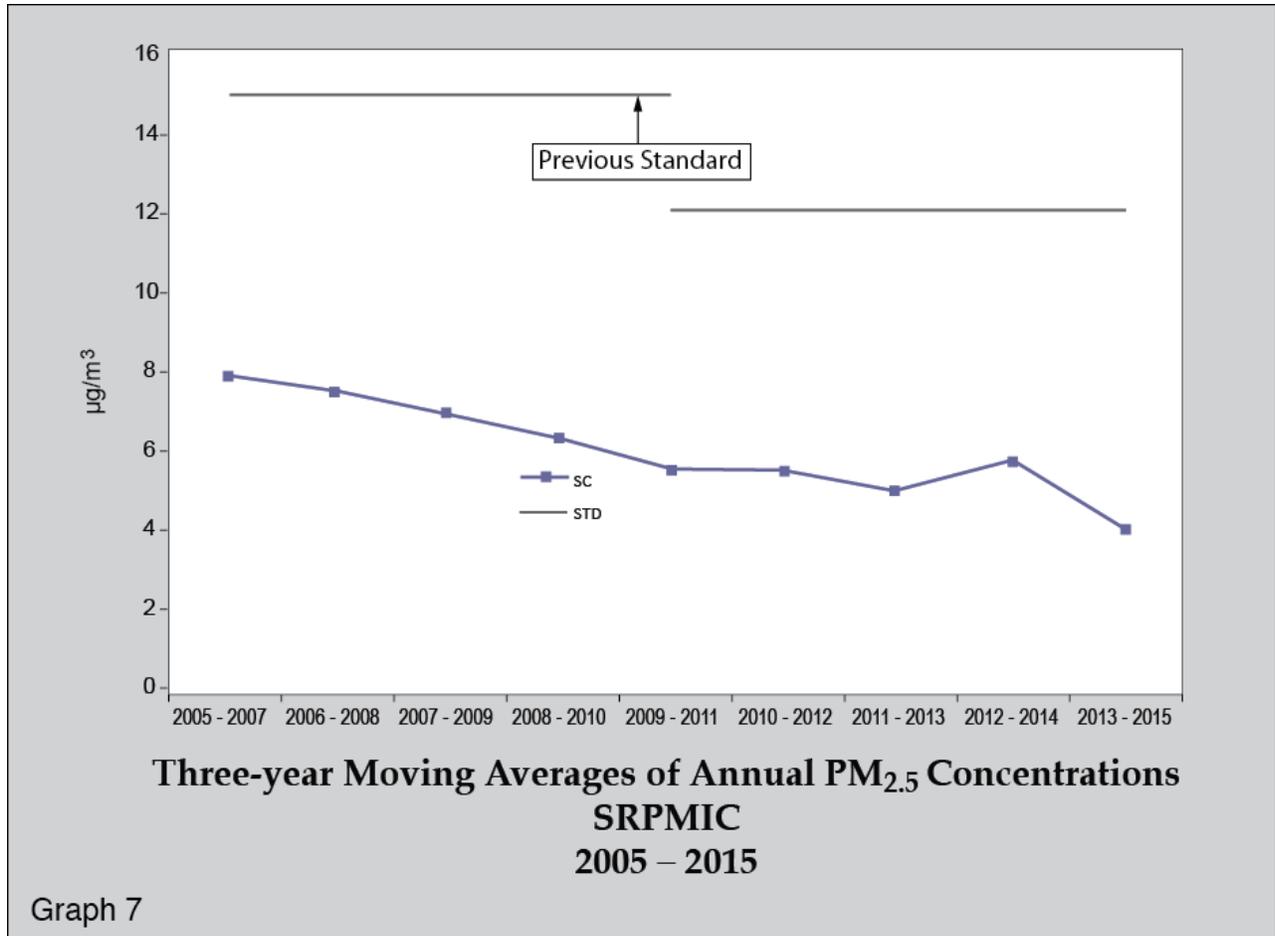
### 98<sup>th</sup> Percentiles

Concentrations of PM<sub>2.5</sub> were well below the standard. A graph of the three-year moving averages of the 98<sup>th</sup> percentile of the 24-hour average concentrations is provided in Graph 6. Data collected during 2007 was included in the moving averages although data recovery for that year was less than 75%.



## Annual Concentrations

Annual average concentrations of PM<sub>2.5</sub> at the SRPMIC locations have shown a general decline since 2005, although a slight increase occurred during 2012-2014. A graph of the three-year moving averages of the annual PM<sub>2.5</sub> concentrations is provided in Graph 7. Data collected during 2007 was included in the moving averages although data recovery for that year was less than 75%.



## SITE DESCRIPTIONS

### Senior Center (SC)



Site Name	Senior Center
AQS ID	04 013 7020
GPS Coordinates	33°29.294', 111°51.339'
Address	10844 East Osborn Road, Scottsdale, AZ 85356
County	Maricopa
Representative Area	CBSA Phoenix-Mesa-Scottsdale
Distance to Roadways (m)	Osborn Road (22.3), Alma School Road (156)
Traffic Count (AADT)	Rural road with no official traffic count available

**Site Description:** The Senior Center (SC) site commenced operation in October 2004 after relocated from the Desert Eagle Secondary School Air Station. The site is located just west of the Senior Service Center at the northeast section of Osborn Road and Alma School Road approximately one half mile from the Two Waters Administration Tribal Complex. The site is situated in the midst of neighborhood homes with agricultural fields to the south and sparse open fields to the north.

The criteria pollutants of ozone and particulate matter of PM<sub>10</sub> and PM<sub>2.5</sub> are monitored at this station. The network design for the FRMs PM<sub>10</sub> and PM<sub>2.5</sub> monitoring is established as primary and collocated sample measurements until 2014 PM<sub>10</sub> continuous TEOM was installed as through-the-roof sampling and the PM<sub>10</sub> collocated monitor was removed. The meteorological parameter of wind speed, wind direction, atmospheric pressure, relative humidity, precipitation, ambient temperature and the delta temperature measurement are also monitored at this site. The data acquisition network of hourly data reports is in-house along with the ozone calibration monitors.

**Table 28: Senior Center**

<b>Pollutant, POC</b>	<b>Ozone, 1</b>	<b>PM<sub>10</sub> (continuous), 3</b>	<b>PM<sub>2.5</sub>, 1 &amp; 2</b>
Parameter code	44201	81102	88101
Monitor make & model	Thermo 49i	R&P TEOM 1400ab	R&P FRM 2000 (both)
Date started	February 10, 2011	January 1, 2014	May 2004 (both)
Basic monitoring objective(s)	NAAQS comparison, Public info	NAAQS comparison, Public info	NAAQS comparison, Public info
Monitor type(s)	SLAMS (tribal)	SLAMS (tribal)	SLAMS (tribal)
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Site type(s)	Population exposure, regional transport	Population exposure	Population exposure
Primary, Collocated	Primary	Primary	Primary, Collocated
FRM/FEM/ARM	FEM	FEM	FRM/FRM
Method code	047	079	117/117
Collecting Agency	SRPMIC	SRPMIC	SRPMIC
Analytical lab	NA	NA	IML/IML
Reporting Agency	SRPMIC	SRPMIC	SRPMIC
Sampling Frequency	Continuous	Continuous	1 in 6/1 in 6
Sampling Season	Year-round	Year-round	Year-round (both)
Probe height (m)	4.2	4.3	3.1/3.1
Airflow arch (degrees)	360	360	360/360
Distance from drip line of nearest tree(s) (m)	14.6	16.7	17.7/14.7
Distance between QA collocated monitors (m)	NA	NA	2.9/2.9
Distance to furnace or incinerator (m)	NA	NA	NA/NA
Distance from supporting structure (m)	1.5	1.9	1.9/1.9
Distance from obstructions on roof - horizontal (m)	NA	NA	NA/NA
Distance from obstructions on roof - vertical height (m)	NA	NA	NA/NA
Distance from obstructions not on roof - horizontal (m)	NA	NA	NA/NA
Distance from obstructions not on roof - vertical height (m)	NA	NA	NA/NA
Probe material	Borosilicate glass	NA	NA/NA

Residence time (s)	10	NA	NA/NA
Ground cover	Gravel	Gravel	Gravel/Gravel
Will there be changes within next 18 months? (Y/N)	N	N	Y/Y
Is it suitable for comparison against annual PM <sub>2.5</sub> ? (Y/N)	NA	NA	Y
Frequency of flow rate verification	NA	Biweekly	Biweekly (both)
Frequency of one-point QC check	Biweekly	NA	NA/NA
Dates of Audit Evaluation	3-26-15, 6-25-15, 9-24-15, 12-17-15	3-26-15, 6-25-15, 9-24-15, 12-17-15	3-26-15, 6-25-15, 9-24-15, 12-17-15 (both)

Meteorological measurements at the Senior Center site include wind speed, wind direction, ambient temperature, relative humidity, barometric pressure, precipitation, differential temperature and solar radiation.

## Red Mountain (RM)



Site Name	Red Mountain
AQS ID	04 013 7021
GPS Coordinates	33°30.475', 111°45.277'
Address	15115 Beeline Highway, Scottsdale, AZ 85256
County	Maricopa
Representative Area	CBSA Phoenix-Mesa-Scottsdale
Distance to Roadways (m)	Beeline Highway (608)
Traffic Count (AADT)	Rural road with no official traffic count

**Site Description:** The monitoring site is located south of the old Red Mountain Trap & Sheet building. The Trap and Skeet facility was closed and all buildings removed that used to provide RV hookups. A large portion of the area is open-range populated with creosote scrubs and desert plants and is approximately half mile southeast of State Highway 87 Beeline Highway. The monitoring station was established in the summer of 2002 and monitoring immediately followed. In May 2010 the monitoring station was upgraded with a new monitoring shelter, new meteorological tower and the electrical connection was revamped.

The criteria pollutant ozone is monitored at this site to represent urban and regional scales. The meteorological system of wind speed, wind direction, atmospheric pressure, ambient temperature and relative humidity are also monitored at this station. The data acquisition instrument of hourly data reports is in-house along with the ozone monitor calibration system.

**Table 29: Red Mountain**

<b>Pollutant, POC</b>	<b>Ozone, 1</b>
Parameter code	44201
Monitor make & model	Thermo 49i
Date started	January 27, 2012
Basic monitoring objective(s)	NAAQS comparison, Public info
Monitor type(s)	SLAMS (tribal)
Spatial scale	Urban, regional
Site type(s)	Highest concentration, regional transport
Primary, Collocated	Primary
FRM/FEM/ARM	FEM
Method code	047
Collecting Agency	SRPMIC
Analytical lab	NA
Reporting Agency	SRPMIC
Sampling Frequency	Continuous
Sampling Season	Year-round
Probe height (m)	4.1
Airflow arch (degrees)	360
Distance from drip line of nearest tree(s) (m)	NA
Distance between QA collocated monitors (m)	NA
Distance to furnace or incinerator (m)	NA
Distance from supporting structure (m)	1.5
Distance from obstructions on roof -horizontal (m)	NA
Distance from obstructions on roof - vertical height (m)	NA
Distance from obstructions not on roof - horizontal (m)	NA
Distance from obstructions not on roof - vertical height (m)	NA
Probe material	Borosilicate glass
Residence time (s)	9
Ground cover	Gravel
Will there be changes within next 18 months? (Y/N)	N
Is it suitable for comparison against annual PM <sub>2.5</sub> ? (Y/N)	N
Frequency of flow rate verification	NA
Frequency of one-point QC check	Biweekly
Dates of Audit Evaluation	3-26-15, 6-25-15, 9-24-15, 12-17-15

Meteorological measurements at the Red Mountain site include wind speed, wind direction, ambient temperature, relative humidity and barometric pressure.

## Lehi (LE)



Site Name	Lehi
AQS ID	04 013 7022
GPS Coordinates	33°28.472', 111°48.303'
Address	3250 North Stapley Drive, Mesa, AZ 85203
County	Maricopa
Representative Area	CBSA Phoenix-Mesa-Scottsdale
Distance to Roadways (m)	Stapley Drive 18.3), Oak Street (81)
Traffic Count (AADT)	Rural road with no official traffic count available - east

**Site Description:** The Lehi monitoring site was situated primarily for ozone saturation studies during the summer months then developed into a monitoring station in January 2005. Community developed areas such as the Lehi Community Recreation Building is diagonally across the intersection. The monitoring site is inside the Police/Fire Substation building and also located on the roof for PM and meteorological monitoring. The site is bordered on the north and east by agricultural field, on the west by neighborhood homes, a Booster Pump Facility adjacently north and the Community Recreation Center directly south.

The SRPMIC monitors the ambient air quality particulate matter (PM<sub>10</sub>) with the collocation started March 2015 from this site and also monitors the meteorological system of wind speed, wind direction, relative humidity, barometric pressure, precipitation and ambient temperature along with the data acquisition system. The criteria pollutant ozone is monitored here seasonally from April 1 to November 1 each year.

**Table 30: Lehi**

<b>Pollutant, POC</b>	<b>Ozone, 1</b>	<b>PM<sub>10</sub>, 1</b>	<b>PM<sub>10</sub>, 2</b>
Parameter code	44201	81102	88101
Monitor make & model	Teledyne T400	R&P FRM 2000	R&P FRM 2000
Date started	May 21, 2014	December 2004	March 2015
Basic monitoring objective(s)	NAAQS comparison, Public info	NAAQS comparison, Public info	NAAQS comparison, Public info
Monitor type(s)	SLAMS (tribal)	SLAMS (tribal)	SLAMS (tribal)
Spatial scale	Neighborhood	Neighborhood	Neighborhood
Site type(s)	Population exposure, regional transport	Population exposure	Population exposure
Primary, Collocated	Primary	Primary	Collocated
FRM/FEM/ARM	FEM	FRM	FRM
Method code	087	098	098
Collecting Agency	SRPMIC	SRPMIC	SRPMIC
Analytical lab	NA	IML	IML
Reporting Agency	SRPMIC	SRPMIC	SRPMIC
Sampling Frequency	Continuous	1 in 6	1 in 6
Sampling Season	Seasonal	Year-round	Year-round
Probe height (m)	6.7	6.4	6.4
Airflow arch (degrees)	360	360	360
Distance from drip line of nearest tree(s) (m)	9.1	10	12.6
Distance between QA collocated monitors (m)	NA	2.6	2.6
Distance to furnace or incinerator (m)	Furnace (16.7)	Furnace (35.2)	Furnace (35.2)
Distance from supporting structure (m)	2.4	2.3	2.3
Distance from obstructions on roof - horizontal (m)	27.5	7	4.4
Distance from obstructions on roof - vertical height (m)	2.3	2.1	2.1
Distance from obstructions not on roof - horizontal (m)	NA	NA	NA
Distance from obstructions not on roof - vertical height (m)	NA	NA	NA
Probe material	Borosilicate glass	NA	NA

Residence time (s)	8.9	NA	NA
Ground cover	Pavement, gravel	Pavement, gravel	Pavement, gravel
Will there be changes within next 18 months? (Y/N)	N	Y	Y
Is it suitable for comparison against annual PM <sub>2.5</sub> ? (Y/N)	N	N	N
Frequency of flow rate verification	NA	Biweekly	Biweekly
Frequency of one-point QC check	Biweekly	NA	NA
Dates of Audit Evaluation	6-25-15, 9-24-15	3-26-15, 6-25-15, 9-24-15, 12-17-15	6-25-15, 9-24-15, 12-17-15

Meteorological measurements at the Lehi site include wind speed, wind direction, ambient temperature, relative humidity and barometric pressure.

## High School (HS)



Site Name	High School
AQS ID	04 013 7024
GPS Coordinates	33°30.483', 111°50.268'
Address	4827 North Country Club Drive, Scottsdale, AZ 85256
County	Maricopa
Representative Area	CBSA Phoenix-Mesa-Scottsdale
Distance to Roadways (m)	North Country Club Drive (141), Chaparral Road (172)
Traffic Count (AADT)	Rural road with no official traffic count

**Site Description:** The High School site was located on the property of Salt River High School in the annex of the Maintenance Electrical Facility room and then moved the monitoring section next door in March 2012 to have better access for student outreach. The site was established in April 2006 after relocating from the Early Childhood Education Center Air Station because the ozone monitoring site did not meet the sitting criteria due to facility expansion to the adjacent building. The site has been operational since July 2002. The area had rapid facility growth that included the new High School that commenced in the fall 2006, an Elementary School to the southeast, residential homes constructed to the east, and several new school ballparks to the east. The Central Arizona Project Aqueduct Canal borders along the north section and surrounding the area are open agricultural fields to the north and south.

Particulate matter (PM<sub>10</sub>) is one of the criteria pollutants monitored at this site. The ozone seasonal monitoring is monitored at this facility from April 1 to November 1 each year.

**Table 31: High School**

<b>Pollutant, POC</b>	<b>Ozone, 1</b>	<b>PM<sub>10</sub> (continuous), 2</b>
Parameter code	44201	81102
Monitor make & model	Thermo 49i	Thermo TEOM 1405
Date started	April 21, 2014	October 1, 2012
Basic monitoring objective(s)	NAAQS comparison, Public info	NAAQS comparison, Public info
Monitor type(s)	SLAMS (tribal)	SLAMS (tribal)
Spatial scale	Neighborhood	Neighborhood
Site type(s)	Population exposure, regional transport	Population exposure
Primary, Collocated	Primary	Primary
FRM/FEM/ ARM	FEM	FEM
Method code	047	079
Collecting Agency	SRPMIC	SRPMIC
Analytical lab	NA	NA
Reporting Agency	SRPMIC	SRPMIC
Sampling Frequency	Continuous	Continuous
Sampling Season	Seasonal	Year-round
Probe height (m)	7.3	6.7
Airflow arch (degrees)	360	360
Distance from drip line of nearest tree(s) (m)	12.2	16.1
Distance between QA collocated monitors (m)	NA	NA
Distance to furnace or incinerator (m)	Furnace (33.6)	Furnace (30.6)
Distance from supporting structure (m)	1.9	1.9
Distance from obstructions on roof - horizontal (m)	15	11.6
Distance from obstructions on roof - vertical height (m)	1.9	1.9
Distance from obstructions not on roof - horizontal (m)	NA	NA
Distance from obstructions not on roof - vertical height (m)	NA	NA
Probe material	Borosilicate glass	NA
Residence time (s)	10	NA
Ground cover	Pavement, gravel	Pavement, gravel
Will there be changes within next 18 months? (Y/N)	N	N
Is it suitable for comparison against annual PM <sub>2.5</sub> ? (Y/N)	N	N
Frequency of flow rate verification	NA	Biweekly

Frequency of one-point QC check	Biweekly	NA
Dates of Audit Evaluation	6-25-15, 9-24-15	3-26-15, 6-25-15, 9-24-15, 12-17-15

There are no meteorological measurements at High School site.