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# MEMORANDUM

Pima County Department of Environmental Quality

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**DATE:** 3/2/15

**TO:** Dr. Eugenia Favela  
Superintendent

**FROM:** Beth Gorman  
Senior Program Manager

Hector Encinas  
Chief Financial Officer

**RE: Pima County DEQ Beryllium Monitoring Report 4th Quarter 2014**

Attached is the Pima County Department of Environmental Quality's (PDEQ) Air Monitoring Division Beryllium Monitoring Network Summary for the 4th Quarter of 2014.

**Highlights:**

- 108 samples collected resulting in 70 valid and 38 invalid samples (64.81% data recovery). EPA requires monitoring data recovery at 75%.
- No beryllium values were detected over the Practical Quantitation Limit (PQL).
- The PQL was updated from 0.265 to 0.225 to reflect the lowest standard used in the analysis.
- PDEQ and SUSD staff are continuing to employ stringent monitoring protocols to ensure quality data is being collected properly to better protect public health.

For additional information on this report, please contact me at Pima County Department of Environmental Quality at (520) 724-7400.

Attachment

Cc: Ursula Nelson, Pima County Department of Environmental Quality Director  
Richard Grimaldi, Pima County Department of Environmental Deputy Director



**PIMA COUNTY**

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**ENVIRONMENTAL QUALITY**

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**Pima County**

**Department of Environmental Quality**

**Air Monitoring Division**

**Beryllium Monitoring Network Summary**

**4th Quarter 2014**

*Pima County Department of Environmental Quality  
33 N. Stone Avenue, Suite 700  
Tucson, Arizona 85701*

## **Summary**

The Pima County Department of Environmental Quality has contracted with the Pima County Regional Wastewater Reclamation Department (RWRD) to perform analysis on filters sampled in the Beryllium Monitoring Network located in the Sunnyside Unified School District.

For the 4th quarter of 2014 there was a total of 108 PM<sub>10</sub> samples collected resulting in 70 valid and 38 invalid samples, for a data recovery of 64.81%. Seven samples were collected to be used as precision checks as recommended in *40 CFR, Part 58, Appendix A, Section 5.3.1*. All samples run for a 24-hour period as specified in *40 CFR, Part 50, Appendix B*.

There were a total of 70 samples analyzed for beryllium. Beryllium concentrations are reported as <0.225 ng/m<sup>3</sup> PQL (Practical Quantitation Level). In the preamble to a November 13, 1985 rulemaking (50 FR 46906), the PQL was defined as “the lowest concentration of an analyte that can be reliably measured within specific limits of precision and accuracy during routine laboratory operating conditions.” The Agency has used the PQL to estimate or evaluate the minimum concentration at which most laboratories can be expected to reliably measure a specific chemical contaminant during day-to-day analysis.

The following pages display the sampling dates, sampling locations, PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) calculated in standard conditions, PM<sub>10</sub> 24-hour NAAQS standard, precision measurements, beryllium analysis results, accompanying graphs and a brief explanation of all invalid samples for the 4th quarter of 2014.

## PM<sub>10</sub> /Beryllium Concentrations

### Monthly Summary of PM<sub>10</sub>/Beryllium Data

October 2014

Date	Location	Standard Concentration PM <sub>10</sub> (µg/m <sup>3</sup> )	24-hour NAAQS PM <sub>10</sub> (µg/m <sup>3</sup> )	Beryllium (ng/m <sup>3</sup> )
10/01/14	Sunnyside H.S.	INVALID	INVALID	INVALID
10/02/14	Ocotillo #1	INVALID	INVALID	INVALID
10/02/14	Ocotillo #2	INVALID	INVALID	INVALID
10/03/14	Los Amigos	INVALID	INVALID	INVALID
10/04/14	Los Niños	INVALID	INVALID	INVALID
10/05/14	Chaparral M.S.	INVALID	INVALID	INVALID
10/06/14	Transportation Bldg	INVALID	INVALID	INVALID
10/07/14	Sunnyside H.S.	INVALID	INVALID	INVALID
10/08/14	Ocotillo #1	INVALID	INVALID	INVALID
10/08/14	Ocotillo #2	INVALID	INVALID	INVALID
10/09/14	Los Amigos	INVALID	INVALID	INVALID
10/10/14	Los Niños	INVALID	INVALID	INVALID
10/11/14	Chaparral M.S.	INVALID	INVALID	INVALID
10/12/14	Transportation Bldg.	INVALID	INVALID	INVALID
10/13/14	Sunnyside H.S.	INVALID	INVALID	INVALID
10/14/14	Ocotillo #1	INVALID	INVALID	INVALID
10/14/14	Ocotillo #2	INVALID	INVALID	INVALID
10/15/14	Los Amigos	INVALID	INVALID	INVALID
10/16/14	Los Niños	INVALID	INVALID	INVALID
10/17/14	Chaparral M.S.	INVALID	INVALID	INVALID
10/18/14	Transportation Bldg.	INVALID	INVALID	INVALID
10/19/14	Sunnyside H.S.	INVALID	INVALID	INVALID
10/20/14	Ocotillo #1	INVALID	INVALID	INVALID
10/20/14	Ocotillo #2	INVALID	INVALID	INVALID
10/21/14	Los Amigos	INVALID	INVALID	INVALID
10/22/14	Los Niños	INVALID	INVALID	INVALID
10/23/14	Chaparral M.S.	INVALID	INVALID	INVALID
10/24/14	Transportation Bldg.	INVALID	INVALID	INVALID
10/25/14	Sunnyside H.S.	INVALID	INVALID	INVALID
10/26/14	Ocotillo #1	INVALID	INVALID	INVALID
10/26/14	Ocotillo #2	19.5	150	<0.225
10/27/14	Los Amigos	17.0	150	<0.225
10/28/14	Los Ninos	20.1	150	<0.225
10/29/14	Chaparral M.S.	INVALID	INVALID	INVALID
10/30/14	Transportation Bldg.	23.9	150	<0.225
10/31/14	Sunnyside H.S.	INVALID	INVALID	INVALID

Samples running on 10/1, 10/2, 10/3, 10/4, 10/5, 10/6, 10/7, 10/8, 10/10, 10/11, 10/12, 10/13 and 10/14 invalid due to filters not being installed.

Sample running on 10/9 invalid due to part of filter missing compromising mass concentration calculation.

Samples running on 10/15, 10/25 and 10/29 invalid due to no end time annotated.

Samples running on 10/16, 10/17, 10/18, 10/19 and 10/23 invalid due to sampler over-run (>25hrs) caused by improper set-up.

Samples running on 10/20 and 10/24 invalid due to sampler under-run (<23hrs) caused by improper set-up.

Sample running on 10/21 and 10/22 invalid due to samplers not running caused by improper set-up.

Samples running on 10/26 and 10/31 invalid due to no ending flow rate annotated.

NAAQS = National Ambient Air Quality Standard for PM<sub>10</sub>

**PM<sub>10</sub> /Beryllium Concentrations (continued)**

**Monthly Summary of PM<sub>10</sub>/Beryllium Data**

**November 2014**

<b>Date</b>	<b>Location</b>	<b>Standard Concentration PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>24-hour NAAQS PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>Beryllium (ng/m<sup>3</sup>)</b>
11/01/14	Ocotillo #1	14.8	150	<0.225
11/02/14	Ocotillo #2	16.6	150	<0.225
11/03/14	Los Amigos	12.2	150	<0.225
11/03/14	Los Niños	INVALID	INVALID	INVALID
11/04/14	Chaparral M.S.	INVALID	INVALID	INVALID
11/05/14	Transportation Bldg	18.2	150	<0.225
11/06/14	Sunnyside H.S.	20.9	150	<0.225
11/07/14	Ocotillo #1	22.5	150	<0.225
11/07/14	Ocotillo #2	24.3	150	<0.225
11/08/14	Los Amigos	INVALID	INVALID	INVALID
11/09/14	Los Niños	19.7	150	<0.225
11/10/14	Chaparral M.S.	22.1	150	<0.225
11/11/14	Transportation Bldg	INVALID	INVALID	INVALID
11/12/14	Sunnyside H.S.	17.0	150	<0.225
11/13/14	Ocotillo #1	15.9	150	<0.225
11/13/14	Ocotillo #2	16.9	150	<0.225
11/14/14	Los Amigos	16.1	150	<0.225
11/15/14	Los Niños	19.3	150	<0.225
11/16/14	Chaparral M.S.	28.6	150	<0.225
11/17/14	Transportation Bldg.	24.4	150	<0.225
11/18/14	Sunnyside H.S.	19.7	150	<0.225
11/19/14	Ocotillo #1	25.6	150	<0.225
11/19/14	Ocotillo #2	30.3	150	<0.225
11/20/14	Los Amigos	26.9	150	<0.225
11/21/14	Los Niños	37.1	150	<0.225
11/22/14	Chaparral M.S.	27.0	150	<0.225
11/23/14	Transportation Bldg.	28.2	150	<0.225
11/24/14	Sunnyside H.S.	37.2	150	<0.225
11/25/14	Ocotillo #1	33.5	150	<0.225
11/25/14	Ocotillo #2	40.0	150	<0.225
11/26/14	Los Amigos	39.7	150	<0.225
11/27/14	Los Niños	30.4	150	<0.225
11/28/14	Chaparral M.S.	19.4	150	<0.225
11/29/14	Transportation Bldg.	11.4	150	<0.225
11/30/14	Sunnyside H.S.	16.1	150	<0.225

Samples running on 11/3, 11/8 and 11/11 invalid due to part of filter missing compromising mass concentration calculation.  
 Sample running on 11/4 invalid due to sampler over-run (>25hrs) caused by equipment malfunction.

NAAQS = National Ambient Air Quality Standard for PM<sub>10</sub>

**PM<sub>10</sub> /Beryllium Concentrations (continued)**

**Monthly Summary of PM<sub>10</sub>/Beryllium Data**

**December 2014**

<b>Date</b>	<b>Location</b>	<b>Standard Concentration PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>24-hour NAAQS PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>Beryllium (ng/m<sup>3</sup>)</b>
12/01/14	Ocotillo #1	43.9	150	<0.225
12/01/14	Ocotillo #2	49.3	150	<0.225
12/02/14	Los Amigos	42.7	150	<0.225
12/03/14	Los Niños	22.4	150	<0.225
12/04/14	Chaparral M.S.	7.2	150	<0.225
12/05/14	Transportation Bldg.	13.7	150	<0.225
12/06/14	Sunnyside H.S.	INVALID	INVALID	INVALID
12/07/14	Ocotillo #1	17.0	150	<0.225
12/07/14	Ocotillo #2	20.6	150	<0.225
12/08/14	Los Amigos	INVALID	INVALID	INVALID
12/09/14	Los Niños	25.1	150	<0.225
12/10/14	Chaparral M.S.	18.2	150	<0.225
12/11/14	Transportation Bldg.	17.0	150	<0.225
12/12/14	Sunnyside H.S.	20.1	150	<0.225
12/13/14	Ocotillo #1	8.7	150	<0.225
12/13/14	Ocotillo #2	11.2	150	<0.225
12/14/14	Los Amigos	7.0	150	<0.225
12/15/14	Los Niños	13.6	150	<0.225
12/16/14	Chaparral M.S.	14.9	150	<0.225
12/17/14	Transportation Bldg.	3.7	150	<0.225
12/18/14	Sunnyside H.S.	7.9	150	<0.225
12/19/14	Ocotillo #1	11.8	150	<0.225
12/19/14	Ocotillo #2	12.0	150	<0.225
12/20/14	Los Amigos	10.9	150	<0.225
12/21/14	Los Niños	13.9	150	<0.225
12/22/14	Chaparral M.S.	12.9	150	<0.225
12/23/14	Transportation Bldg.	11.0	150	<0.225
12/24/14	Sunnyside H.S.	15.6	150	<0.225
12/25/14	Ocotillo #1	17.4	150	<0.225
12/25/14	Ocotillo #2	18.7	150	<0.225
12/26/14	Los Amigos	10.3	150	<0.225
12/27/14	Los Niños	12.4	150	<0.225
12/28/14	Chaparral M.S.	12.3	150	<0.225
12/29/14	Transportation Bldg.	13.5	150	<0.225
12/30/14	Sunnyside H.S.	15.7	150	<0.225
12/31/14	Ocotillo #1	10.9	150	<0.225
12/31/14	Ocotillo #2	12.6	150	<0.225

Sample running on 12/6 invalid due to part of filter missing compromising mass concentration calculation.  
 Sample running on 12/8 invalid due to no ending flow rate annotated.

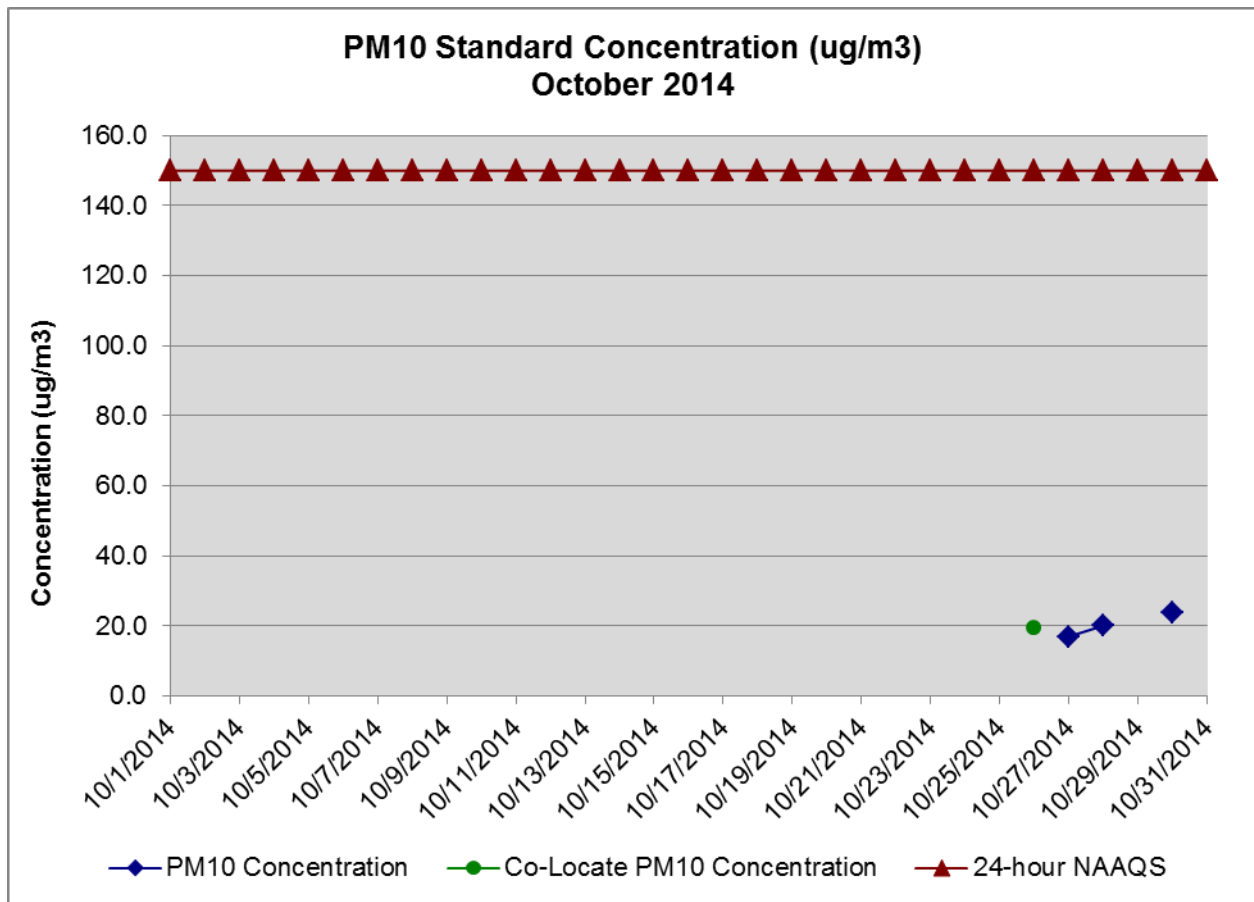
NAAQS = National Ambient Air Quality Standard for PM<sub>10</sub>

### Precision of Duplicate Pairs – PM10

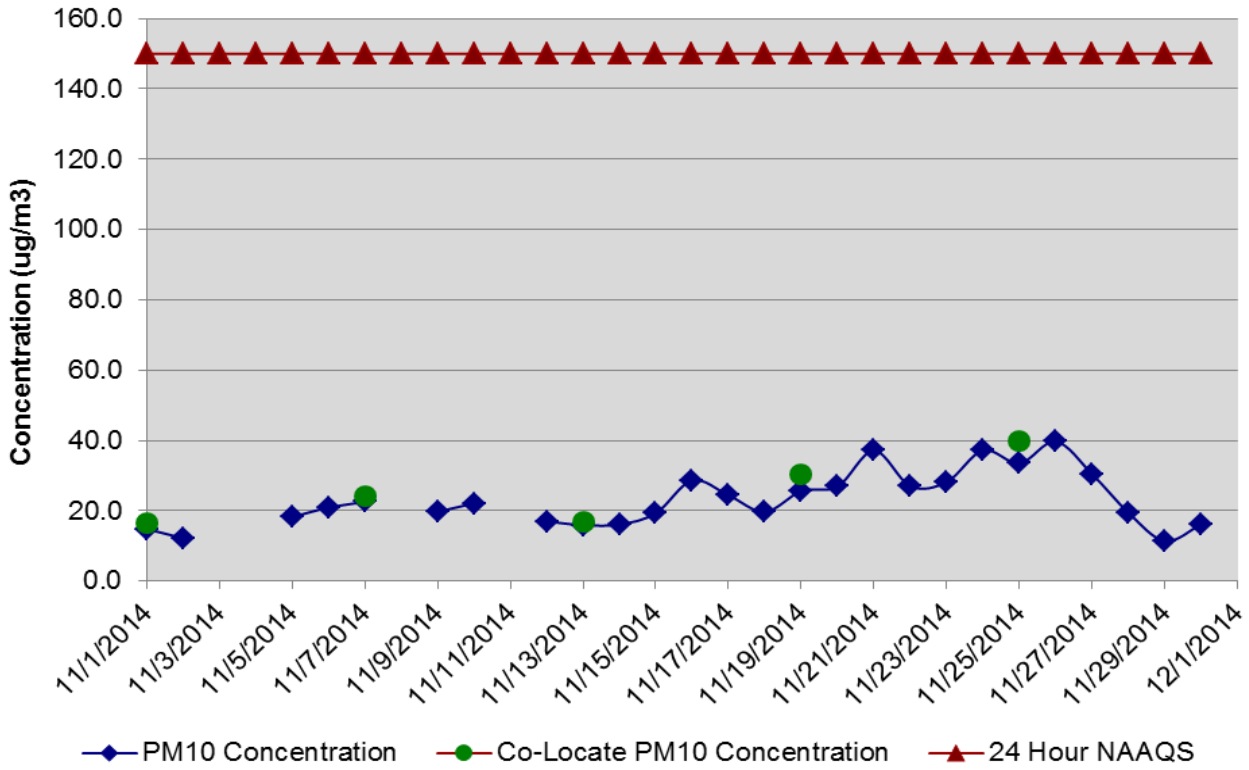
At low concentrations, agreement between the measurements of collocated samplers, expressed as relative percent difference, may be relatively poor. For this reason, collocated measurement pairs are selected for use in the precision and bias calculations only when both measurement pairs are equal to or above  $15\mu\text{g}/\text{m}^3$  (40CFR58, Appendix A, Section 4c).

Sample Date	Primary Sampler Number	Measured PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	Duplicate Sampler Number	Measured PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	Difference ( $\mu\text{g}/\text{m}^3$ )	Percent Difference %
11/7/14	1	22.5	2	24.3	-1.8	-7.41
11/13/14	1	15.9	2	16.9	-1.0	-5.92
11/19/14	1	25.6	2	30.3	-4.7	-15.51
11/25/14	1	33.5	2	40.0	-6.5	-16.25
12/1/14	1	43.9	2	49.3	-5.4	-10.95
12/7/14	1	17.0	2	20.6	-3.6	-17.48
12/25/14	1	17.4	2	18.7	-1.3	-6.95

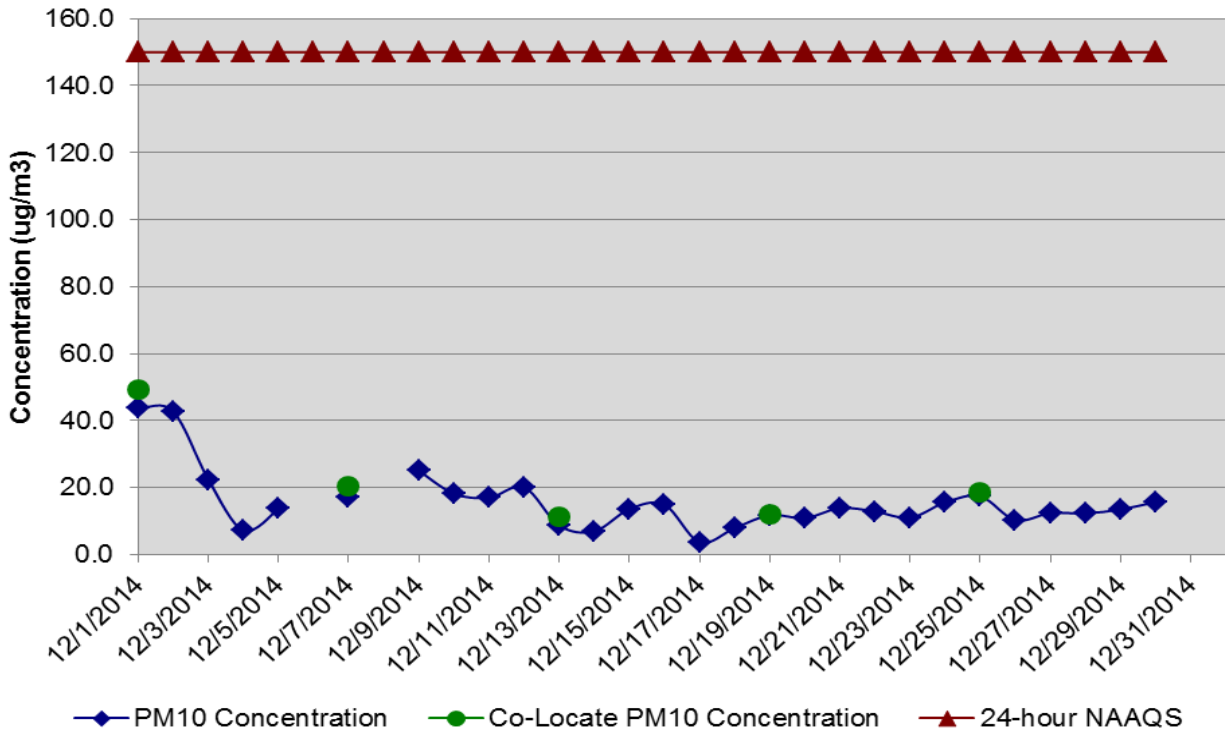
### PM<sub>10</sub> Concentration Charts



**PM10 Standard Concentration (ug/m3)  
November 2014**



**PM10 Standard Concentration (ug/m3)  
December 2014**





## Audit Results

Audits were performed on all of the samplers for the 4<sup>th</sup> quarter of 2014. If the audit flow rate percent difference is  $\leq \pm 10\%$ , the sampler calibration is accepted. Differences exceeding  $\pm 10\%$  require sampler recalibration. Differences exceeding  $\pm 15\%$  will result in invalidation of all data subsequent to the last calibration or valid flow check. The following pages display the audit results for each sampling location.

### AUDIT SPREADSHEET FOR PARTICULATES

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Chaparral M.S.      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1424      **Temp c =** 12.22  
                                  **Ta =** 285.2  
                                  **Pa =** 697.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.00758**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.87	35.5	2.43	1.00
13	3.39	33.2	2.11	0.93
10	2.88	30.6	1.83	0.87
7	1.98	25.4	1.43	0.76
5	1.46	21.7	1.08	0.66

Orifice dH2O                      2.716  
 Sample dPex                      1.8  
 Orifice Qa(m3/m)                0.84216  
 Sample Qa dPex                 29.6572

Audit flow rate % diff: 6.08 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.716	29.73	0.84

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.78	31.54	0.89

Sampler Audit Relationship		
<b>m =</b>	0.023	
<b>b =</b>	0.165	
<b>r =</b>	0.995	
	pm10	tsp
<b>Set Point (cfm)</b>	39.7	49.6
<b>Set Point (H2O)</b>	2.9	4.2

### AUDIT SPREADSHEET FOR PARTICULATES

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Sunnyside H.S.      **Ts =** 286.5  
**Audit Date:** 12/29/14      **Ps =** 694.7  
**Motor:** 1418      **Temp c =** 3.33  
                                  **Ta =** 276.3  
                                  **Pa =** 694.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.00758**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	4.96	39.7	3.06	1.10
13	4.18	36.4	2.68	1.03
10	3.51	33.4	2.33	0.96
7	2.48	28.0	1.73	0.83
5	1.72	23.3	1.31	0.72

Orifice dH2O                      3.37  
 Sample dPex                      2.2  
 Orifice Qa(m3/m)                0.92595  
 Sample Qa dPex                 32.6001

Audit flow rate % diff: 6.19 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
3.37	32.69	0.93

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
2.22	34.72	0.98

Sampler Audit Relationship		
<b>m =</b>	0.023	
<b>b =</b>	0.175	
<b>r =</b>	0.999	
	pm10	tsp
<b>Set Point (cfm)</b>	38.6	48.3
<b>Set Point (H2O)</b>	2.9	4.3

**AUDIT SPREADSHEET FOR PARTICULATES**

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Los Amigos      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1419      **Temp c =** 12.22  
                                  **Ta =** 285.2  
                                  **Pa =** 697.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.0758**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	4.34	37.6	2.23	0.96
13	3.72	34.8	1.87	0.87
10	3.16	32.1	1.50	0.78
7	2.21	26.8	1.05	0.66
5	1.54	22.3	0.65	0.52

Orifice dH2O                      2.994  
 Sample dPex                      1.5  
 Orifice Qa(m3/m)                0.88452  
 Sample Qa dPex                 31.3091

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.994	31.22	0.88

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.46	32.71	0.93

Sampler Audit Relationship		
<b>m =</b>	0.028	
<b>b =</b>	-0.113	
<b>r =</b>	0.998	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	39.7	49.6
<b>Set Point (H2O)</b>	2.5	4.1

Audit flow rate % diff: 4.73 %

**AUDIT SPREADSHEET FOR PARTICULATES**

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Los Niños      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1421      **Temp c =** 14.44  
                                  **Ta =** 287.4  
                                  **Pa =** 696.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.00758**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	4.86	40.0	2.37	0.99
13	4.16	37.0	1.91	0.89
10	3.55	34.2	1.61	0.82
7	2.47	28.5	1.14	0.69
5	1.70	23.6	0.71	0.54

Orifice dH2O                      3.348  
 Sample dPex                      1.5  
 Orifice Qa(m3/m)                0.94004  
 Sample Qa dPex                 33.2496

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
3.348	33.18	0.94

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.55	34.79	0.99

Sampler Audit Relationship		
<b>m =</b>	0.026	
<b>b =</b>	-0.077	
<b>r =</b>	0.996	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	40.1	50.1
<b>Set Point (H2O)</b>	2.3	3.7

Audit flow rate % diff: 4.82 %

**AUDIT SPREADSHEET FOR PARTICULATES**

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Ocotillo #1      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1420      **Temp c =** 10.00  
                                  **Ta =** 283.0  
                                  **Pa =** 698.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.00758**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.73	34.7	1.63	0.81
13	3.15	31.9	1.29	0.72
10	2.61	29.0	1.00	0.64
7	1.72	23.5	0.48	0.44
5	1.15	19.2	0.24	0.31

Orifice dH2O      2.472  
 Sample dPex      0.9  
 Orifice Qa(m3/m)      0.79943  
 Sample Qa dPex      28.5289

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.472	28.22	0.80

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.93	29.50	0.84

Sampler Audit Relationship		
<b>m =</b>	0.033	
<b>b =</b>	-0.317	
<b>r =</b>	0.999	
<b>Set Point (cfm)</b>	<b>pm10</b>	<b>tsp</b>
<b>Set Point (H2O)</b>	39.3	49.2
	2.3	4.1

Audit flow rate % diff: 4.51 %

**AUDIT SPREADSHEET FOR PARTICULATES**

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Ocotillo #2      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1425      **Temp c =** 10.00  
                                  **Ta =** 283.0  
                                  **Pa =** 698.0  
**Orifice Calibration Relationship**  
**m= 1.24282      b= 0.00758**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	4.47	38.0	1.85	0.87
13	3.91	35.6	1.53	0.79
10	3.45	33.4	1.30	0.73
7	2.13	26.2	0.86	0.59
5	1.52	22.1	0.56	0.48

Orifice dH2O      3.096  
 Sample dPex      1.2  
 Orifice Qa(m3/m)      0.89538  
 Sample Qa dPex      31.6512

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
3.096	31.61	0.90

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
1.22	33.21	0.94

Sampler Audit Relationship		
<b>m =</b>	0.023	
<b>b =</b>	-0.033	
<b>r =</b>	0.992	
<b>Set Point (cfm)</b>	<b>pm10</b>	<b>tsp</b>
<b>Set Point (H2O)</b>	39.3	49.2
	1.9	3.0

Audit flow rate % diff: 5.05 %

**AUDIT SPREADSHEET FOR PARTICULATES**

Month	Ts	Ps
Jan	288.8	693.9
Feb	292.4	693.2
Mar	296.0	692.8
Apr	298.9	692.9
May	300.6	692.9
Jun	300.3	693.4
Jul	297.6	694.0
Aug	293.8	694.5
Sep	290.1	694.9
Oct	287.2	695.3
Nov	285.8	695.2
Dec	286.5	694.7

**Sampler:** Transportation      **Ts =** 286.5  
**Audit Date:** 12/24/14      **Ps =** 694.7  
**Motor:** 1422      **Temp c =** 14.44  
                                          **Ta =** 297.4  
                                          **Pa =** 696.0  
**Orifice Calibration Relationship**  
                                          **m= 1.24282      b= 0.00758**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.53	34.1	1.84	0.87
13	3.07	31.8	1.54	0.80
10	2.54	28.9	1.32	0.74
7	1.81	24.3	1.01	0.65
5	1.36	21.1	0.73	0.55

Orifice dH2O                      2.462  
 Sample dPex                        1.3  
 Orifice Qa(m3/m)                0.80524  
 Sample Qa dPex                  28.4077

Audit flow rate % diff: 5.42 %

dH2O	Orifice	
	Qa (CFM)	Qa (M3/m)
2.462	28.43	0.81

dPex	Sampler w/Orifice	
	Qa (CFM)	Qa (M3/m)
1.29	29.97	0.85

Sampler Audit Relationship		
<b>m =</b>	0.024	
<b>b =</b>	0.056	
<b>r =</b>	0.994	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	40.1	50.1
<b>Set Point (H2O)</b>	2.4	3.7