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# MEMORANDUM

Pima County Department of Environmental Quality

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**DATE:** November 23, 2009

**TO:** Raul Ochoa  
Assistant Superintendent Operations & Facilities Planning

**FROM:** Beth Gorman  
Program Manager

**RE: Pima County DEQ Beryllium Monitoring Report 3rd Quarter 2009**

Attached is the Pima County Department of Environmental Quality's (PDEQ) Air Monitoring Division Beryllium Monitoring Network Summary for the 3<sup>rd</sup> Quarter of 2009.

**Highlights:**

- 110 samples collected resulting in 105 valid and 5 invalid samples (95.4% data recovery). EPA requires monitoring data recovery at 75%.
- A beryllium value of 0.35ng/m<sup>3</sup> was detected for July 22, 2009 at the Transportation Building monitor. PDEQ continues to work with Dr. Betterton from the University of Arizona and the Sonora Environmental Research Institute to evaluate this result.
- 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) 740-3340.

Attachment

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



**Pima County**

**Department of Environmental Quality**

**Air Monitoring Division**

**Beryllium Monitoring Network Summary**

**3rd Quarter 2009**



*Pima County Department of Environmental Quality  
150 West Congress St., 1st Floor  
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 3<sup>rd</sup> quarter of 2009 there was a total of 110 PM<sub>10</sub> samples collected resulting in 105 valid and 5 invalid samples; for a data recovery of 95.4 %. Twelve 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 107 samples analyzed for beryllium. Beryllium concentrations are reported as <0.265 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. A beryllium value of 0.35ng/m<sup>3</sup> was detected for July 22, 2009 at the Transportation Building monitor. PDEQ continues to work with Dr. Betterton from the University of Arizona and the Sonora Environmental Research Institute to evaluate this result.

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 3<sup>rd</sup> quarter of 2009.

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

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

July - 2009

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> )
07/01/09	Los Amigos	INVALID	150	INVALID*
07/02/09	Los Niños	INVALID	150	INVALID*
07/03/09	Chaparral M.S.	12.9	150	<0.265
07/04/09	Transportation Bldg	9.8	150	<0.265
07/05/09	Sunnyside H.S.	19.9	150	<0.265
07/06/09	Ocotillo #1	17.3	150	<0.265
07/06/09	Ocotillo #2	15.9	150	<0.265
07/07/09	Los Amigos	15.5	150	<0.265
07/08/09	Los Niños	19.8	150	<0.265
07/09/09	Chaparral M.S.	12.6	150	<0.265
07/10/09	Transportation Bldg	13.3	150	<0.265
07/11/09	Sunnyside H.S.	13.2	150	<0.265
07/12/09	Ocotillo #1	15.7	150	<0.265
07/12/09	Ocotillo #2	17.3	150	<0.265
07/13/09	Los Amigos	49.3	150	<0.265
07/14/09	Los Niños	20.4	150	<0.265
07/15/09	Chaparral M.S.	17.8	150	<0.265
07/16/09	Transportation Bldg	30.1	150	<0.265
07/17/09	Sunnyside H.S.	22.4	150	<0.265
07/18/09	Ocotillo #1	19.9	150	<0.265
07/18/09	Ocotillo #2	22.6	150	<0.265
07/19/09	Los Amigos	18.8	150	<0.265
07/20/09	Los Niños	30.1	150	<0.265
07/21/09	Chaparral M.S.	33.1	150	<0.265
07/22/09	Transportation Bldg	149.7	150	0.35
07/23/09	Sunnyside H.S.	15.9	150	<0.265
07/24/09	Ocotillo #1	12.5	150	<0.265
07/24/09	Ocotillo #2	13.2	150	<0.265
07/25/09	Los Amigos	20.7	150	<0.265
07/26/09	Los Ninos	16.7	150	<0.265
07/27/09	Chaparral M.S.	29.1	150	<0.265
07/28/09	Transportation Bldg	22.7	150	<0.265
07/29/09	Sunnyside H.S.	42.8	150	<0.265
07/30/09	Ocotillo #1	INVALID	150	INVALID*
07/30/09	Ocotillo #2	27.3	150	<0.265
07/31/09	Los Amigos	25.3	150	<0.265

Sample running on 7/01/09 invalid due to sampler running on wrong day. Sampler shut off for filter change.

Sample running on 7/02/09 invalid due to double exposure caused by filter not being changed by SUSD.

Sample running on 7/30/09 invalid due to corner of filter missing resulting in an invalid post representative weight.

\*Sample invalid for use in Beryllium analysis.

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**

**August - 2009**

<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>
08/01/09	Los Niños	23.2	150	<0.265
08/02/09	Chaparral M.S.	29.5	150	<0.265
08/03/09	Transportation Bldg	35.6	150	<0.265
08/04/09	Sunnyside H.S.	45.8	150	<0.265
08/05/09	Ocotillo #1	28.5	150	<0.265
08/05/09	Ocotillo #2	31.0	150	<0.265
08/06/09	Los Amigos	18.2	150	<0.265
08/07/09	Los Niños	26.9	150	<0.265
08/08/09	Chaparral M.S.	23.7	150	<0.265
08/09/09	Transportation Bldg	18.4	150	<0.265
08/10/09	Sunnyside H.S.	34.0	150	<0.265
08/11/09	Ocotillo #1	22.8	150	<0.265
08/11/09	Ocotillo #2	25.3	150	<0.265
08/12/09	Los Amigos	41.9	150	<0.265
08/13/09	Los Niños	11.4	150	<0.265
08/14/09	Chaparral M.S.	19.5	150	<0.265
08/15/09	Transportation Bldg	16.1	150	<0.265
08/16/09	Sunnyside H.S.	21.2	150	<0.265
08/17/09	Ocotillo #1	23.3	150	<0.265
08/17/09	Ocotillo #2	25.4	150	<0.265
08/18/09	Los Amigos	20.9	150	<0.265
08/19/09	Los Ninos	26.5	150	<0.265
08/20/09	Chaparral M.S.	29.3	150	<0.265
08/21/09	Transportation Bldg	21.4	150	<0.265
08/22/09	Sunnyside H.S.	15.5	150	<0.265
08/23/09	Ocotillo #1	12.7	150	<0.265
08/23/09	Ocotillo #2	13.6	150	<0.265
08/24/09	Los Amigos	14.2	150	<0.265
08/25/09	Los Ninos	15.1	150	<0.265
08/26/09	Chaparral M.S.	19.4	150	<0.265
08/27/09	Transportation Bldg	30.1	150	<0.265
08/28/09	Sunnyside H.S.	27.2	150	<0.265
08/29/09	Ocotillo #1	16.9	150	<0.265
08/29/09	Ocotillo #2	17.9	150	<0.265
08/30/09	Los Amigos	20.3	150	<0.265
08/31/09	Los Ninos	25.7	150	<0.265

\* Sample invalid for use in Beryllium analysis.

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**

**September - 2009**

<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>
09/01/09	Chaparral M.S.	27.5	150	<0.265
09/02/09	Transportation Bldg	22.7	150	<0.265
09/03/09	Sunnyside H.S.	24.1	150	<0.265
09/04/09	Ocotillo #1	15.3	150	<0.265
09/04/09	Ocotillo #2	17.0	150	<0.265
09/05/09	Los Amigos	14.0	150	<0.265
09/06/09	Los Niños	15.1	150	<0.265
09/07/09	Chaparral M.S.	14.6	150	<0.265
09/08/09	Transportation Bldg	19.2	150	<0.265
09/09/09	Sunnyside H.S.	23.9	150	<0.265
09/10/09	Ocotillo #1	20.6	150	<0.265
09/10/09	Ocotillo #2	22.7	150	<0.265
09/11/09	Los Amigos	17.7	150	<0.265
09/12/09	Los Niños	15.4	150	<0.265
09/13/09	Chaparral M.S.	12.1	150	<0.265
09/14/09	Transportation Bldg	13.3	150	<0.265
09/15/09	Sunnyside H.S.	22.6	150	<0.265
09/16/09	Ocotillo #1	19.3	150	<0.265
09/16/09	Ocotillo #2	22.0	150	<0.265
09/17/09	Los Amigos	21.2	150	<0.265
09/18/09	Los Niños	20.9	150	<0.265
09/19/09	Chaparral M.S.	INVALID	150	<0.265
09/20/09	Transportation Bldg	14.9	150	<0.265
09/21/09	Sunnyside H.S.	36.2	150	<0.265
09/22/09	Ocotillo #1	30.6	150	<0.265
09/22/09	Ocotillo #2	30.9	150	<0.265
09/23/09	Los Amigos	24.9	150	<0.265
09/24/09	Los Ninos	26.2	150	<0.265
09/25/09	Chaparral M.S.	INVALID	150	<0.265
09/26/09	Transportation Bldg	19.7	150	<0.265
09/27/09	Sunnyside H.S.	22.9	150	<0.265
09/28/09	Ocotillo #1	27.4	150	<0.265
09/28/09	Ocotillo #2	28.2	150	<0.265
09/29/09	Los Amigos	29.6	150	<0.265
09/30/09	Los Ninos	40.4	150	<0.265

Sample running on 09/19/09 invalid due to sample run time being <23 hours.

Sample running on 09/25/09 invalid due to sample run time being >25 hours.

\* Sample invalid for use in Beryllium analysis.

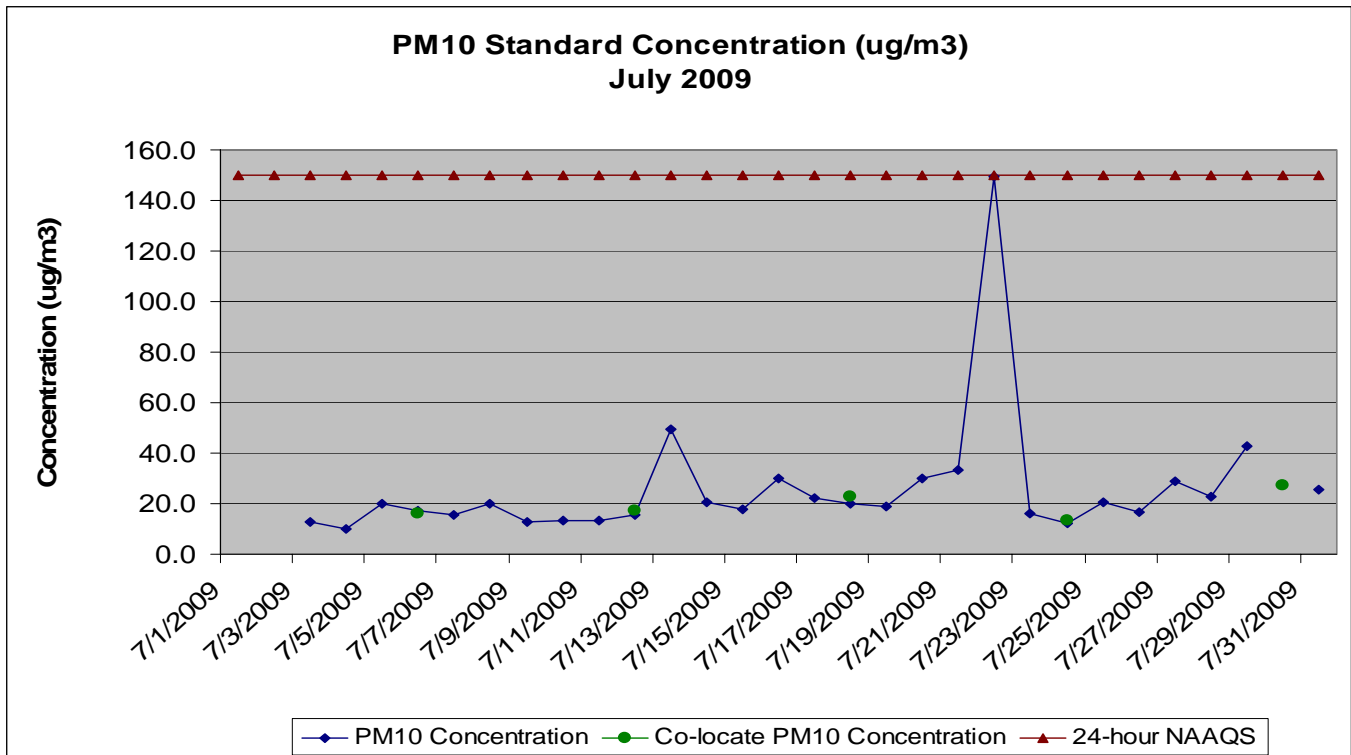
NAAQS = National Ambient Air Quality Standard for PM<sub>10</sub>

## 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 15µg/m<sup>3</sup> (40CFR58, Appendix A, Section 4c).

Sample Date	Primary Sampler Number	Measured PM <sub>10</sub> (µg/m <sup>3</sup> )	Duplicate Sampler Number	Measured PM <sub>10</sub> (µg/m <sup>3</sup> )	Difference (µg/m <sup>3</sup> )	Percent Difference %
7/6/09	1	17.3	2	15.9	1.4	-8.43
7/12/09	1	15.7	2	17.3	1.6	9.70
7/18/09	1	19.9	2	22.6	2.7	12.71
8/5/09	1	28.5	2	31.0	2.5	8.40
8/11/09	1	22.8	2	25.3	2.5	10.40
8/17/09	1	23.3	2	25.4	2.1	8.62
8/29/09	1	16.9	2	17.9	1.0	5.75
9/4/09	1	15.3	2	17.0	1.7	10.53
9/10/09	1	20.6	2	22.7	2.1	9.70
9/16/09	1	19.3	2	22.0	2.7	13.08
9/22/09	1	30.6	2	30.9	0.3	0.98
9/28/09	1	27.4	2	28.2	0.8	2.88

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

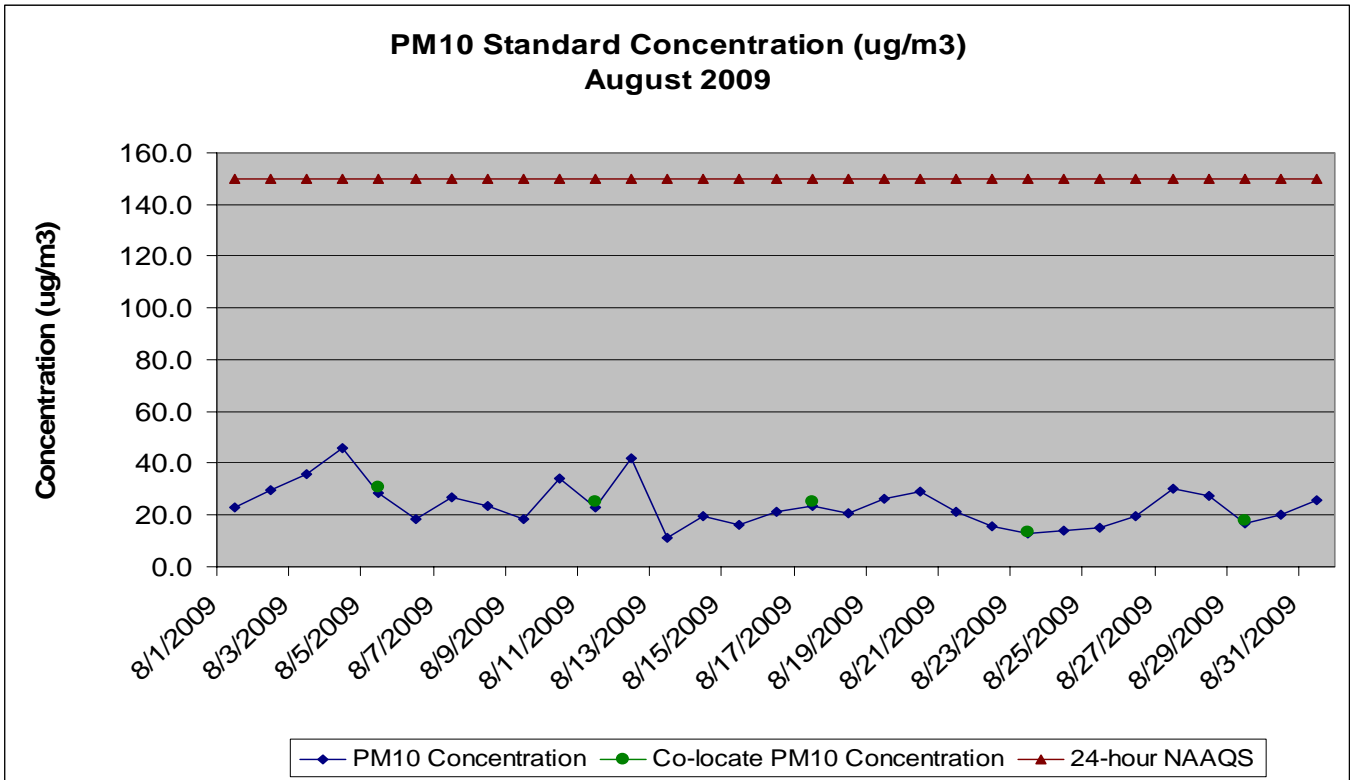


Sample running on 7/1/09 invalid due to sampler running on wrong day. Sampler shut off for filter change.

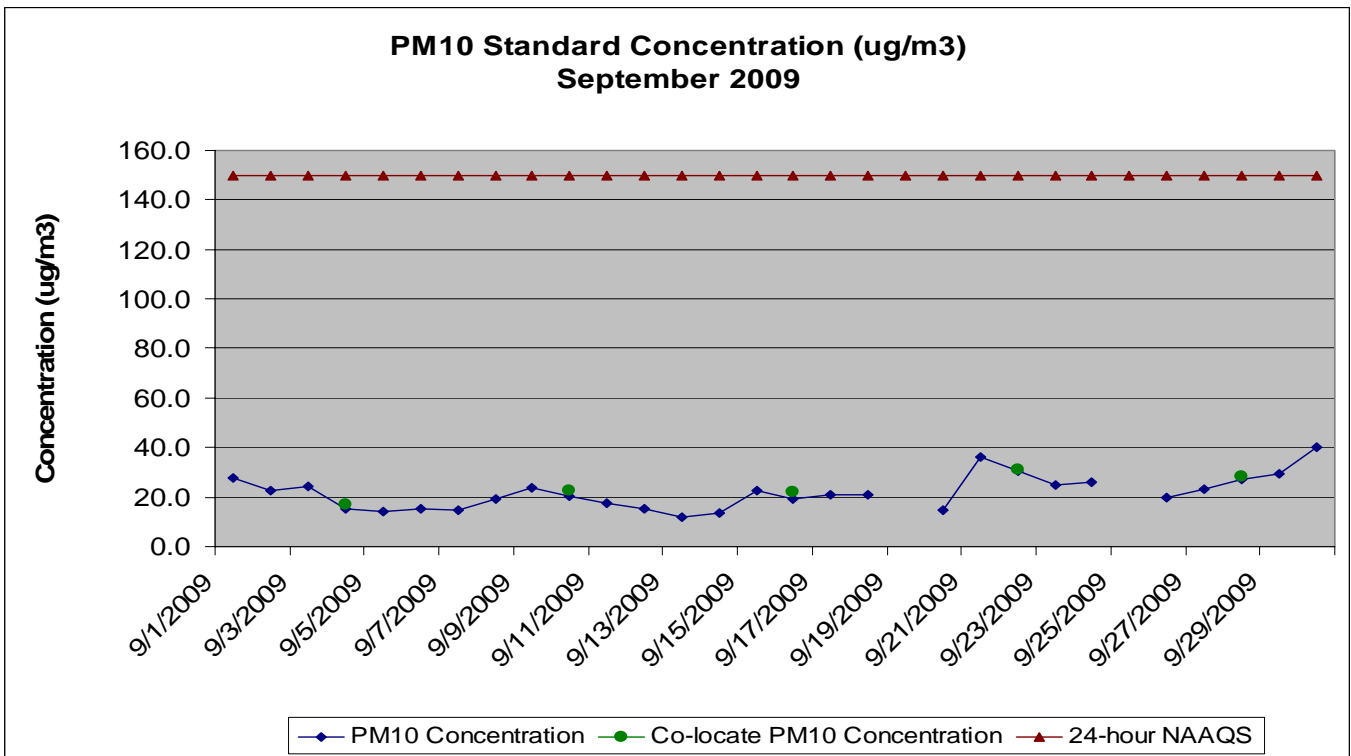
Sample running on 7/02/09 invalid due to double exposure caused by filter not being changed by SUSD.

Sample running on 7/30/09 invalid due to corner of filter missing resulting in an invalid post representative weight.

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



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



Sample running on 09/19/09 invalid due to sample run time being <23 hours.

Sample running on 09/25/09 invalid due to sample run time being >25 hours.

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



## Audit Results

Audits were performed on all of the samplers for the 3<sup>rd</sup> quarter of 2009. 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
June	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 =** 290.1  
**Audit Date:** 09/22/09      **Ps =** 694.9  
**Motor:** 1424      **Temp c =** 32.40  
**Temp f:** 90.32      **Ta =** 305.4  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	4.62	39.6	2.52	1.05
13	3.87	36.3	2.12	0.97
10	3.21	33.1	1.70	0.86
7	2.18	27.5	1.23	0.74
5	1.37	22.0	0.86	0.62

Orifice dH2O                      3.05  
 Sample dPex                      1.7  
 Orifice Qa(m3/m)              0.915654  
 Sample Qa dPex              32.27462

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
3.05	32.32	0.92

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
1.69	33.93	0.96

Sampler Audit Relationship		
<b>m =</b>	0.025	
<b>b =</b>	0.057	
<b>r =</b>	0.995	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.2	52.7
<b>Set Point (H2O)</b>	2.8	4.3

Audit flow rate % diff: 4.95 %

### 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
June	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 =** 290.1  
**Audit Date:** 09/22/09      **Ps =** 694.9  
**Motor:** 1418      **Temp c =** 32.30  
**Temp f:** 90.14      **Ta =** 305.3  
**Press:** 27.362      **Pa =** 695.0  
**Altim:** 30.037      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.51	34.6	2.08	0.96
13	2.98	31.9	1.76	0.88
10	2.48	29.2	1.58	0.83
7	1.76	24.8	1.13	0.70
5	1.16	20.3	0.80	0.59

Orifice dH2O                      2.378  
 Sample dPex                      1.5  
 Orifice Qa(m3/m)              0.811099  
 Sample Qa dPex              28.57919

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
2.378	28.63	0.81

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
1.47	30.10	0.85

Sampler Audit Relationship		
<b>m =</b>	0.025	
<b>b =</b>	0.080	
<b>r =</b>	0.997	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.1	52.6
<b>Set Point (H2O)</b>	3.0	4.5

Audit flow rate % diff: 5.11 %

**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
June	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 =** 290.1  
**Audit Date:** 09/22/09      **Ps =** 694.9  
**Motor:** 1419      **Temp c =** 30.50  
**Temp f:** 86.9      **Ta =** 303.5  
**Press:** 27.362      **Pa =** 695.0  
**Altim:** 30.037      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	2.81	31.0	1.23	0.73
13	2.42	28.8	0.98	0.65
10	2.02	26.4	0.78	0.58
7	1.40	22.1	0.46	0.45
5	0.94	18.3	0.22	0.31

Orifice dH2O                      1.918  
 Sample dPex                        0.70  
 Orifice Qa(m3/m)                0.729209  
 Sample Qa dPex                 25.94244

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
1.918	25.74	0.73

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.73	26.77	0.76

Sampler Audit Relationship		
<b>m =</b>	0.033	
<b>b =</b>	-0.289	
<b>r =</b>	0.999	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	41.8	52.3
<b>Set Point (H2O)</b>	2.7	4.7

Audit flow rate % diff: 3.97 %

**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
June	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 =** 290.1  
**Audit Date:** 09/22/09      **Ps =** 694.9  
**Motor:** 1421      **Temp c =** 32.50  
**Temp f:** 90.50      **Ta =** 305.5  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.06	32.4	1.22	0.73
13	2.58	29.8	1.01	0.67
10	2.22	27.7	0.79	0.59
7	1.53	23.2	0.49	0.46
5	1.02	19.1	0.23	0.32

Orifice dH2O                      2.082  
 Sample dPex                        0.70  
 Orifice Qa(m3/m)                0.761501  
 Sample Qa dPex                 27.07373

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
2.082	26.88	0.76

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.75	27.96	0.79

Sampler Audit Relationship		
<b>m =</b>	0.031	
<b>b =</b>	-0.269	
<b>r =</b>	0.997	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.2	52.7
<b>Set Point (H2O)</b>	2.5	4.3

Audit flow rate % diff: 3.97 %

**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
June	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 =** 290.1  
**Audit Date:** 09/24/09      **Ps =** 694.9  
**Motor:** 1420      **Temp c =** 30.90  
**Temp f:** 87.62      **Ta =** 303.9  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.17	32.9	1.30	0.75
13	2.62	30.0	1.01	0.67
10	2.22	27.7	0.79	0.59
7	1.53	23.1	0.49	0.46
5	1.03	19.2	0.24	0.32

Orifice dH2O                      2.114  
 Sample dPex                      0.80  
 Orifice Qa(m3/m)              0.765178  
 Sample Qa dPex              27.20655

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
2.114	27.01	0.77

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.77	28.11	0.80

Sampler Audit Relationship		
<b>m =</b>	0.031	
<b>b =</b>	-0.264	
<b>r =</b>	0.999	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.0	52.4
<b>Set Point (H2O)</b>	2.5	4.2

Audit flow rate % diff: 4.03 %

**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
June	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 =** 290.1  
**Audit Date:** 09/24/09      **Ps =** 694.9  
**Motor:** 1417      **Temp c =** 31.40  
**Temp f:** 88.52      **Ta =** 304.4  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.18	32.9	1.29	0.75
13	2.68	30.3	1.14	0.71
10	2.37	28.6	1.04	0.68
7	1.62	23.8	0.63	0.53
5	1.05	19.3	0.37	0.40

Orifice dH2O                      2.18  
 Sample dPex                      0.90  
 Orifice Qa(m3/m)              0.777214  
 Sample Qa dPex              27.50486

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
2.18	27.44	0.78

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.89	28.64	0.81

Sampler Audit Relationship		
<b>m =</b>	0.027	
<b>b =</b>	-0.105	
<b>r =</b>	0.990	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.0	52.5
<b>Set Point (H2O)</b>	2.3	3.8

Audit flow rate % diff: 4.35 %

**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
June	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 =** 290.1  
**Audit Date:** 09/22/09      **Ps =** 694.9  
**Motor:** 1422      **Temp c =** 33.50  
**Temp f:** 92.3      **Ta =** 306.5  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.30507      b= -0.03648**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	2.90	31.6	1.24	0.74
13	2.49	29.4	1.01	0.67
10	2.13	27.2	0.83	0.61
7	1.43	22.5	0.54	0.49
5	0.95	18.5	0.33	0.38

Orifice dH2O                      1.98  
 Sample dPex                        0.80  
 Orifice Qa(m3/m)                0.744476  
 Sample Qa dPex                 26.35850

Audit flow rate % diff: 4.26 %

Orifice		
dH2O	Qa(CFM)	Qa(M3/m)
1.98	26.28	0.74

Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.79	27.41	0.78

Sampler Audit Relationship		
<b>m =</b>	0.027	
<b>b =</b>	-0.119	
<b>r =</b>	0.998	
	<b>pm10</b>	<b>tsp</b>
<b>Set Point (cfm)</b>	42.3	52.9
<b>Set Point (H2O)</b>	2.4	3.9