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# MEMORANDUM

Pima County Department of Environmental Quality

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**DATE:**

**TO:** Alex Gallego  
Assistant Superintendent Operations & Facilities Planning

**FROM:** Beth Gorman  
Program Manager

**RE: Pima County DEQ Beryllium Monitoring Report 4th Quarter 2011**

Attached is the Pima County Department of Environmental Quality's (PDEQ) Air Monitoring Division Beryllium Monitoring Network Summary for the 4th Quarter of 2011.

**Highlights:**

- 109 samples collected resulting in 95 valid and 14 invalid samples (87.2% data recovery). EPA requires monitoring data recovery at 75%.
- No beryllium values were detected over the Practical Quantitation Limit (PQL).
- 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) 243-7400.

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**

**4th Quarter 2011**



*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 2011 there was a total of 109 PM<sub>10</sub> samples collected resulting in 95 valid and 14 invalid samples; for a data recovery of 87.2 %. Eight 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 97 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 2011.

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

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

October 2011

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> )
10/01/11	Los Amigos	20.6	150	<0.225
10/02/11	Los Niños	11.5	150	<0.225
10/03/11	Chaparral M.S.	12.5	150	<0.225
10/04/11	Transportation Bldg	38.1	150	<0.225
10/05/11	Sunnyside H.S.	INVALID	150	INVALID
10/06/11	Ocotillo #1	14.1	150	<0.225
10/06/11	Ocotillo #2	14.3	150	<0.225
10/07/11	Los Amigos	21.4	150	<0.225
10/08/11	Los Niños	17.6	150	<0.225
10/09/11	Chaparral M.S.	18.2	150	<0.225
10/10/11	Transportation Bldg	22.7	150	<0.225
10/11/11	Sunnyside H.S.	27.0	150	<0.225
10/12/11	Ocotillo #1	32.9	150	<0.225
10/12/11	Ocotillo #2	32.9	150	<0.225
10/13/11	Los Amigos	27.8	150	<0.225
10/14/11	Los Niños	25.6	150	<0.225
10/15/11	Chaparral M.S.	22.9	150	<0.225
10/16/11	Transportation Bldg	21.2	150	<0.225
10/17/11	Sunnyside H.S.	50.3	150	<0.225
10/18/11	Ocotillo #1	31.0	150	<0.225
10/18/11	Ocotillo #2	32.4	150	<0.225
10/19/11	Los Amigos	40.9	150	<0.225
10/20/11	Los Niños	43.9	150	<0.225
10/21/11	Chaparral M.S.	45.2	150	<0.225
10/22/11	Transportation Bldg.	30.2	150	<0.225
10/23/11	Sunnyside H.S.	25.2	150	<0.225
10/24/11	Ocotillo #1	37.6	150	<0.225
10/24/11	Ocotillo #2	37.1	150	<0.225
10/25/11	Los Amigos	28.2	150	<0.225
10/26/11	Los Niños	112.5	150	<0.225
10/27/11	Chaparral M.S.	58.1	150	<0.225
10/28/11	Transportation Bldg.	26.5	150	<0.225
10/29/11	Sunnyside H.S.	34.8	150	<0.225
10/30/11	Ocotillo #1	25.0	150	<0.225
10/30/11	Ocotillo #2	23.0	150	<0.225
10/31/11	Los Amigos	29.4	150	<0.225

Sample running on 10/05/11 invalid due to the filter not being installed by SUSD.

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 2011**

<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>
11/01/11	Los Ninos	INVALID	150	INVALID
11/02/11	Chaparral M.S.	INVALID	150	INVALID
11/03/11	Transportation Bldg	INVALID	150	INVALID
11/04/11	Sunnyside H.S.	146.1	150	<0.225
11/05/11	Ocotillo #1	11.9	150	<0.225
11/05/11	Ocotillo #2	5.6	150	<0.225
11/06/11	Los Amigos	10.2	150	<0.225
11/07/11	Los Ninos	5.7	150	<0.225
11/08/11	Chaparral M.S.	INVALID	150	INVALID
11/09/11	Transportation Bldg	25.9	150	<0.225
11/10/11	Sunnyside H.S.	27.2	150	<0.225
11/11/11	Ocotillo #1	15.0	150	<0.225
11/11/11	Ocotillo #2	15.6	150	<0.225
11/12/11	Los Amigos	13.8	150	<0.225
11/13/11	Los Niños	3.8	150	<0.225
11/14/11	Chaparral M.S.	10.1	150	<0.225
11/15/11	Transportation Bldg	INVALID	150	INVALID
11/16/11	Sunnyside H.S.	INVALID	150	INVALID
11/17/11	Ocotillo #1	17.9	150	<0.225
11/17/11	Ocotillo #2	18.1	150	<0.225
11/18/11	Los Amigos	11.3	150	<0.225
11/19/11	Los Niños	17.9	150	<0.225
11/20/11	Chaparral M.S.	INVALID	150	<0.225
11/21/11	Transportation Bldg	15.7	150	<0.225
11/22/11	Sunnyside H.S.	INVALID	150	INVALID
11/23/11	Ocotillo #1	7.4	150	<0.225
11/23/11	Ocotillo #2	7.6	150	<0.225
11/24/11	Los Amigos	7.4	150	<0.225
11/25/11	Los Niños	6.5	150	<0.225
11/26/11	Chaparral M.S.	6.2	150	<0.225
11/27/11	Transportation Bldg	15.5	150	<0.225
11/28/11	Sunnyside H.S.	INVALID	150	INVALID
11/29/11	Ocotillo #1	25.6	150	<0.225
11/29/11	Ocotillo #2	26.1	150	<0.225
11/30/11	Los Amigos	20.4	150	<0.225

Sample running on 11/1/11 invalid due to power failure

Sample running on 11/2/11 invalid due to SUSD not changing filters resulting in a double exposure.

Sample running on 11/3/11 invalid due to no flow rate being annotated resulting in PDEQ not being able to calculate the PM10 concentration.

Sample running on 11/8/11 invalid due to SUSD not installing the filter.

Sample running on 11/15/11 invalid due to a damaged filter.

Sample running on 11/16/11 invalid due to SUSD not changing the filter resulting in triple exposure.

Sample running on 11/20/11 invalid for PM10 due to the average flow rate being over 44 CFM.

Samples running on 11/22/11 and 11/28/11 invalid due to SUSD not installing the filters.

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 2011**

<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>
12/01/11	Los Niños	14.5	150	<0.225
12/02/11	Chaparral M.S.	9.1	150	<0.225
12/03/11	Transportation Bldg	9.5	150	<0.225
12/04/11	Sunnyside H.S.	19.4	150	<0.225
12/05/11	Ocotillo #1	12.5	150	<0.225
12/05/11	Ocotillo #2	13.0	150	<0.225
12/06/11	Los Amigos	16.6	150	<0.225
12/07/11	Los Niños	INVALID	150	INVALID
12/08/11	Chaparral M.S.	INVALID	150	INVALID
12/09/11	Transportation Bldg	6.1	150	<0.225
12/10/11	Sunnyside H.S.	13.8	150	<0.225
12/11/11	Ocotillo #1	14.7	150	<0.225
12/11/11	Ocotillo #2	15.5	150	<0.225
12/12/11	Los Amigos	7.2	150	<0.225
12/13/11	Los Niños	1.3	150	<0.225
12/14/11	Chaparral M.S.	INVALID	150	INVALID
12/15/11	Transportation Bldg	INVALID	150	INVALID
12/16/11	Sunnyside H.S.	12.9	150	<0.225
12/17/11	Ocotillo #1	10.2	150	<0.225
12/17/11	Ocotillo #2	10.1	150	<0.225
12/18/11	Los Amigos	6.6	150	<0.225
12/19/11	Los Ninos	7.3	150	<0.225
12/20/11	Chaparral M.S.	16.0	150	<0.225
12/21/11	Transportation Bldg	16.4	150	<0.225
12/22/11	Sunnyside H.S.	19.4	150	<0.225
12/23/11	Ocotillo #1	11.1	150	<0.225
12/23/11	Ocotillo #2	11.7	150	<0.225
12/24/11	Los Amigos	10.5	150	<0.225
12/25/11	Los Ninos	16.0	150	<0.225
12/26/11	Chaparral M.S.	10.6	150	<0.225
12/27/11	Transportation Bldg	13.6	150	<0.225
12/28/11	Sunnyside H.S.	24.8	150	<0.225
12/29/11	Ocotillo #1	24.5	150	<0.225
12/29/11	Ocotillo #2	24.6	150	<0.225
12/30/11	Los Ninos	16.2	150	<0.225

Sample running on 12/7/11 invalid due to no flow rate being annotated resulting in PDEQ not being able to calculate the PM10 concentration.

Sample running on 12/8/11 invalid due to double exposure

Sample running on 12/14/11 due to PDEQ not changing the filter due to heavy thunderstorms.

Sample running on 12/15/11 invalid due it actually running on 12/16/11.

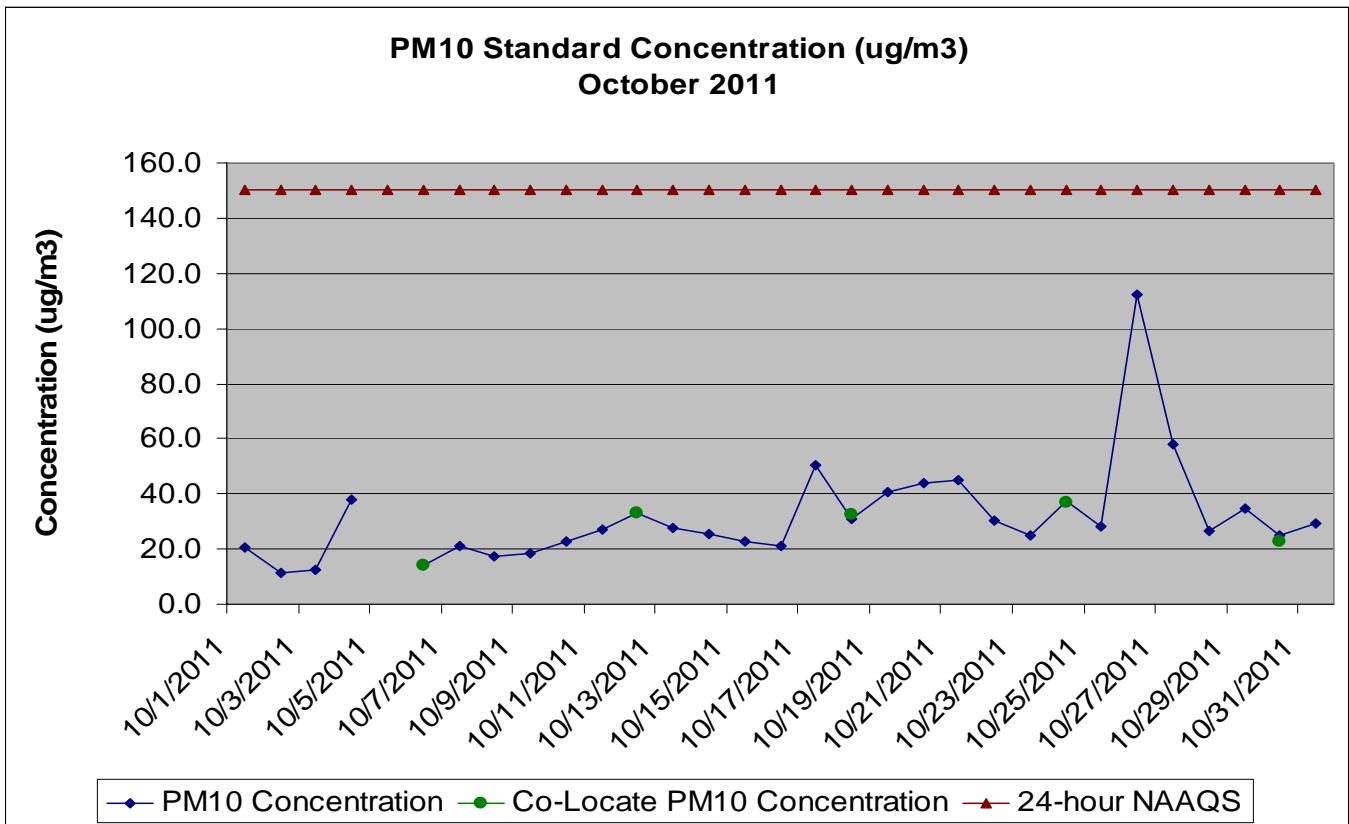
NAAQS = National Ambient Air Quality Standard for PM<sub>10</sub>

## 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).

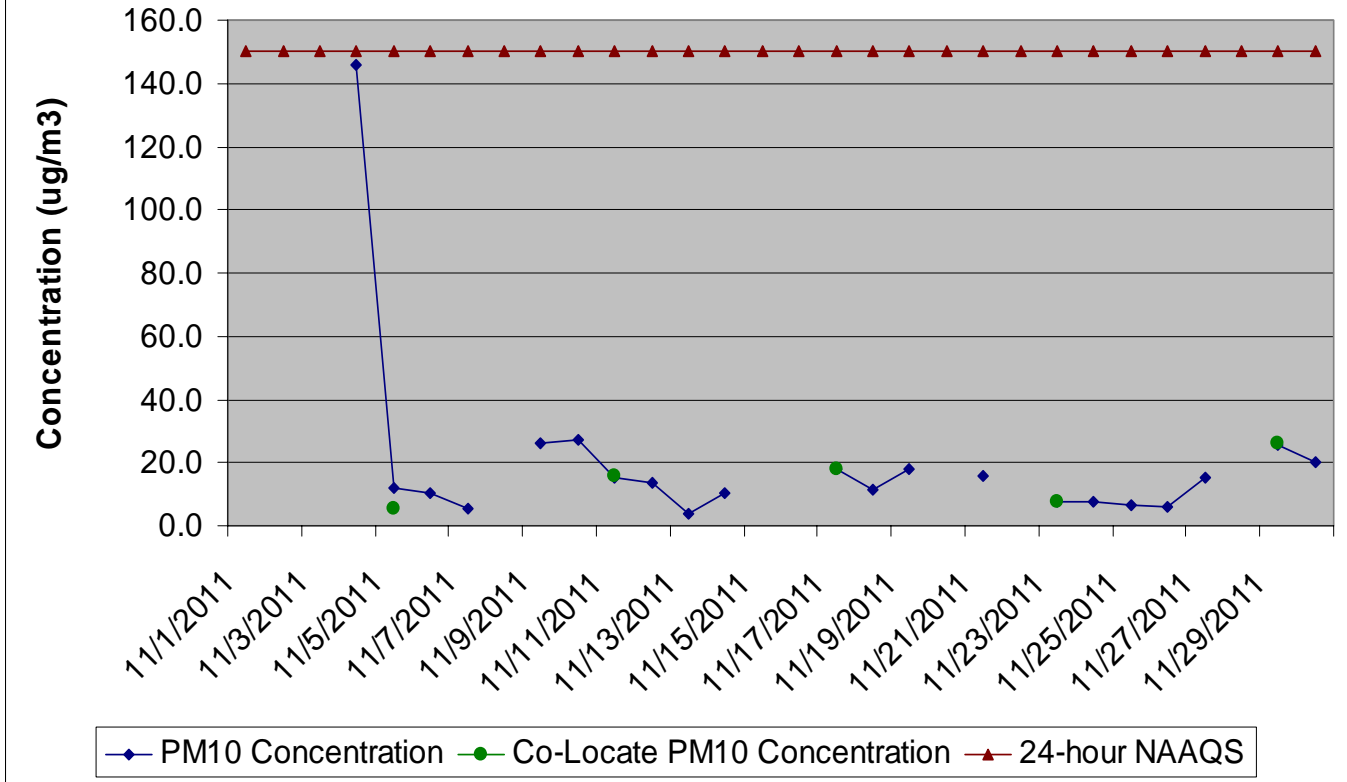
Sample Date	Primary Sampler Number	Measured PM <sub>10</sub> (µg/m <sup>3</sup> )	Duplicate Sampler Number	Measured PM <sub>10</sub> (µg/m <sup>3</sup> )	Difference (µg/m <sup>3</sup> )	Percent Difference %
10/12/11	1	32.9	2	32.9	0.0	0.00
10/18/11	1	31.0	2	32.4	1.4	4.42
10/24/11	1	37.6	2	37.1	-0.5	-1.34
10/30/11	1	25.0	2	23.0	-2.0	-8.33
11/11/11	1	15.0	2	15.6	0.6	3.92
11/17/11	1	17.9	2	18.1	0.2	1.11
11/29/11	1	25.6	2	26.1	0.5	1.93
12/29/11	1	24.5	2	24.6	0.1	0.41

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



Sample running on 10/05/11 invalid due to the filter not being installed by SUSD.

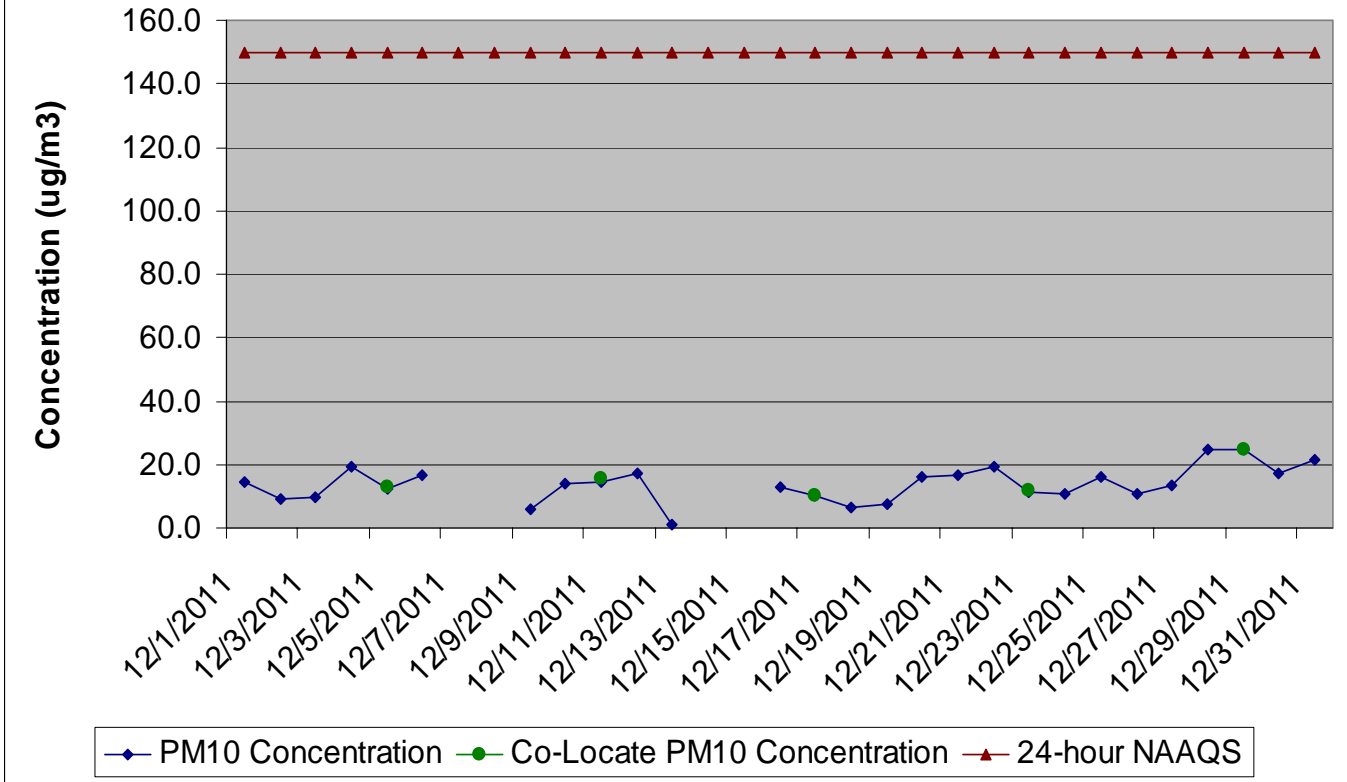
### PM10 Standard Concentration (ug/m3) November 2011



Sample running on 11/1/11 invalid due to power failure  
 Sample running on 11/2/11 invalid due to SUSD not changing filters resulting in a double exposure.  
 Sample running on 11/3/11 invalid due to no flow rate being annotated resulting in PDEQ not being able to calculate the PM10 concentration.  
 Sample running on 11/8/11 invalid due to SUSD not installing the filter.  
 Sample running on 11/15/11 invalid due to a damaged filter.  
 Sample running on 11/16/11 invalid due to SUSD not changing the filter resulting in triple exposure.  
 Sample running on 11/20/11 invalid for PM10 due to the average flow rate being over 44 CFM.  
 Samples running on 11/22/11 and 11/28/11 invalid due to SUSD not installing the filters.



**PM10 Standard Concentration (ug/m3)  
December 2011**



Sample running on 12/7/11 invalid due to no flow rate being annotated resulting in PDEQ not being able to calculate the PM10 concentration.

Sample running on 12/8/11 invalid due to double exposure

Sample running on 12/14/11 due to PDEQ not changing the filter due to heavy thunderstorms.

Sample running on 12/15/11 invalid due it actually running on 12/16/11.

## Audit Results

Audits were performed on all of the samplers for the 4th quarter of 2011. 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 =** 286.5  
**Audit Date:** 12/21/11      **Ps =** 694.7  
**Motor:** 1424      **Temp c =** 15.72  
**Temp f:** 60.3      **Ta =** 288.7  
**Press:** 27.166      **Pa =** 690.0  
**Altim:** 29.825      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.44	33.6	1.88	0.89
13	2.96	31.2	1.63	0.83
10	2.49	28.8	1.40	0.77
7	1.69	24.0	1.02	0.65
5	1.11	19.7	0.73	0.55

Orifice dH2O      2.338  
 Sample dPex      1.3  
 Orifice Qa(m3/m)      0.790784  
 Sample Qa dPex      27.84913

Audit flow rate % diff: 5.40 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.338	27.91	0.79
Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.33	29.43	0.83

**Sampler Audit Relationship**  
**m = 0.024**  
**b = 0.081**  
**r = 1.000**

### 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 =** 286.5  
**Audit Date:** 12/21/11      **Ps =** 694.7  
**Motor:** 1418      **Temp c =** 14.78  
**Temp f:** 58.6      **Ta =** 287.8  
**Press:** 27.283      **Pa =** 693.0  
**Altim:** 29.952      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.32	32.9	1.97	0.90
13	2.85	30.6	1.67	0.83
10	2.39	28.1	1.43	0.77
7	1.62	23.4	1.03	0.65
5	1.05	19.1	0.74	0.55

Orifice dH2O      2.246  
 Sample dPex      1.4  
 Orifice Qa(m3/m)      0.773067  
 Sample Qa dPex      27.23117

Audit flow rate % diff: 5.34 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.246	27.29	0.77
Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.37	28.75	0.81

**Sampler Audit Relationship**  
**m = 0.025**  
**b = 0.069**  
**r = 0.998**

**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 =** 286.5  
**Audit Date:** 12/21/11      **Ps =** 694.7  
**Motor:** 1419      **Temp c =** 15.11  
**Temp f:** 59.2      **Ta =** 288.1  
**Press:** 27.244      **Pa =** 692.0  
**Altim:** 29.910      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.26	32.6	1.42	0.77
13	2.82	30.5	1.18	0.70
10	2.38	28.1	0.93	0.62
7	1.65	23.6	0.54	0.47
5	1.07	19.3	0.23	0.31

Orifice dH2O                      2.236  
 Sample dPex                      0.9  
 Orifice Qa(m3/m)                0.772379  
 Sample Qa dPex                 27.49916

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.236	27.26	0.77

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
0.86	28.38	0.80

Sampler Audit Relationship	
<b>m =</b>	0.034
<b>b =</b>	-0.346
<b>r =</b>	0.999

Audit flow rate % diff: 4.07 %

**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 =** 286.5  
**Audit Date:** 12/21/11      **Ps =** 694.7  
**Motor:** 1421      **Temp c =** 18.50  
**Temp f:** 65.3      **Ta =** 291.5  
**Press:** 27.166      **Pa =** 690.0  
**Altim:** 29.825      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.01	31.6	1.23	0.72
13	2.49	28.9	1.00	0.65
10	2.18	27.1	0.79	0.58
7	1.51	22.8	0.48	0.45
5	1.00	18.8	0.21	0.30

Orifice dH2O                      2.038  
 Sample dPex                      0.7  
 Orifice Qa(m3/m)                0.744311  
 Sample Qa dPex                 26.48578

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.038	26.27	0.745

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
0.74	27.34	0.77

Sampler Audit Relationship	
<b>m =</b>	0.033
<b>b =</b>	-0.316
<b>r =</b>	0.996

Audit flow rate % diff: 4.01 %

**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:** 09/29/11      **Ps =** 694.9  
**Motor:** 1420      **Temp c =** 28.00  
**Temp f:** 82.4      **Ta =** 301.0  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.44	34.2	1.39	0.78
13	2.89	31.4	1.09	0.69
10	2.40	28.8	0.85	0.61
7	1.63	23.9	0.52	0.47
5	1.06	19.6	0.22	0.31

Orifice dH2O                      2.284  
 Sample dPex                      0.8  
 Orifice Qa(m3/m)              0.795490  
 Sample Qa dPex              28.31042

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.284	28.08	0.80
Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.81	29.23	0.83

Sampler Audit Relationship	
<b>m =</b>	0.031
<b>b =</b>	-0.295
<b>r =</b>	0.997

Audit flow rate % diff: 4.06 %

**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:** 09/29/11      **Ps =** 694.9  
**Motor:** 1417      **Temp c =** 28.00  
**Temp f:** 82.40      **Ta =** 301.0  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.79	35.8	1.58	0.83
13	3.24	33.2	1.21	0.72
10	2.71	30.5	1.11	0.69
7	1.85	25.4	0.67	0.54
5	1.19	20.7	0.40	0.42

Orifice dH2O                      2.556  
 Sample dPex                      1.0  
 Orifice Qa(m3/m)              0.839224  
 Sample Qa dPex              29.71606

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.556	29.62	0.84
Sampler w/Orifice		
dPex	Qa(CFM)	Qa(M3/m)
0.99	30.92	0.88

Sampler Audit Relationship	
<b>m =</b>	0.027
<b>b =</b>	-0.133
<b>r =</b>	0.990

Audit flow rate % diff: 4.33 %

**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:** 09/30/11      **Ps =** 694.9  
**Motor:** 1422      **Temp c =** 31.70  
**Temp f:** 89.06      **Ta =** 304.7  
**Press:** 27.323      **Pa =** 694.0  
**Altim:** 29.995      **Orifice Calibration Relationship**  
    **m= 1.31697      b= -0.05235**

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.06	32.5	1.31	0.76
13	2.58	29.9	1.10	0.69
10	2.13	27.3	0.88	0.62
7	1.49	23.1	0.56	0.50
5	0.98	19.0	0.31	0.37

Orifice dH2O                      2.048  
 Sample dPex                        0.8  
 Orifice Qa(m3/m)                0.759766  
 Sample Qa dPex                 26.93271

Audit flow rate % diff: 4.12 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.048	26.82	0.76
Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
0.83	27.93	0.79

Sampler Audit Relationship	
<b>m =</b>	0.029
<b>b =</b>	-0.178
<b>r =</b>	0.999