



MEMORANDUM

Pima County Department of Environmental Quality

TO: Alex Gallego
Assistant Superintendent Operations & Facilities Planning

DATE: 4/1/13
FROM: Beth Gorman
Senior Program Manager

RE: Pima County DEQ Beryllium Monitoring Report 4th Quarter 2012

Attached is the Pima County Department of Environmental Quality's (PDEQ) Air Monitoring Division Beryllium Monitoring Network Summary for the 4th Quarter of 2012.

Highlights:

- 107 samples collected resulting in 100 valid and 7 invalid samples (93.5% 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 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 2012



*Pima County Department of Environmental Quality
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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 2012 there was a total of 107 PM₁₀ samples collected resulting in 100 valid and 7 invalid samples; for a data recovery of 93.5 %. Ten 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 100 samples analyzed for beryllium. Beryllium concentrations are reported as <0.225 ng/m³ 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, PM₁₀ concentrations (µg/m³) calculated in standard conditions, PM₁₀ 24-hour NAAQS standard, precision measurements, beryllium analysis results, accompanying graphs and a brief explanation of all invalid samples for the 4th quarter of 2012.

PM₁₀ /Beryllium Concentrations

Monthly Summary of PM₁₀/Beryllium Data

October 2012

Date	Location	Standard Concentration PM ₁₀ (µg/m ³)	24-hour NAAQS PM ₁₀ (µg/m ³)	Beryllium (ng/m ³)
10/01/12	Los Amigos	28.9	150	<0.225
10/02/12	Los Niños	25.4	150	<0.225
10/03/12	Chaparral M.S.	25.1	150	<0.225
10/04/12	Transportation Bldg	21.9	150	<0.225
10/05/12	Sunnyside H.S.	30.2	150	<0.225
10/06/12	Ocotillo #1	19.8	150	<0.225
10/06/12	Ocotillo #2	22.5	150	<0.225
10/07/12	Los Amigos	17.9	150	<0.225
10/08/12	Los Niños	26.0	150	<0.225
10/09/12	Chaparral M.S.	30.4	150	<0.225
10/10/12	Transportation Bldg	17.1	150	<0.225
10/11/12	Sunnyside H.S.	21.9	150	<0.225
10/12/12	Ocotillo #1	10.5	150	<0.225
10/12/12	Ocotillo #2	INVALID	150	<0.225
10/13/12	Los Amigos	16.1	150	<0.225
10/14/12	Los Niños	21.2	150	<0.225
10/15/12	Chaparral M.S.	INVALID	150	<0.225
10/16/12	Transportation Bldg	22.2	150	<0.225
10/17/12	Sunnyside H.S.	33.1	150	<0.225
10/18/12	Ocotillo #1	36.7	150	<0.225
10/18/12	Ocotillo #2	39.4	150	<0.225
10/19/12	Los Amigos	35.0	150	<0.225
10/20/12	Los Niños	27.3	150	<0.225
10/21/12	Chaparral M.S.	16.5	150	<0.225
10/22/12	Transportation Bldg.	19.3	150	<0.225
10/23/12	Sunnyside H.S.	26.9	150	<0.225
10/24/12	Ocotillo #1	25.3	150	<0.225
10/24/12	Ocotillo #2	28.3	150	<0.225
10/25/12	Los Amigos	33.4	150	<0.225
10/26/12	Los Niños	43.3	150	<0.225
10/27/12	Chaparral M.S.	46.9	150	<0.225
10/28/12	Transportation Bldg.	INVALID	150	<0.225
10/29/12	Sunnyside H.S.	33.8	150	<0.225
10/30/12	Ocotillo #1	30.3	150	<0.225
10/30/12	Ocotillo #2	32.8	150	<0.225
10/31/12	Los Amigos	33.8	150	<0.225

Samples running on 10/12/12, 10/15/12 and 10/28/12 are invalid for PM₁₀ because the maximum flow rate exceeded 44 CFM (cubic feet per minute)

NAAQS = National Ambient Air Quality Standard for PM₁₀

PM₁₀ /Beryllium Concentrations (continued)

Monthly Summary of PM₁₀/Beryllium Data

November 2012

Date	Location	Standard Concentration PM₁₀ (µg/m³)	24-hour NAAQS PM₁₀ (µg/m³)	Beryllium (ng/m³)
11/01/12	Los Ninos	34.8	150	<0.225
11/02/12	Chaparral M.S.	24.8	150	<0.225
11/03/12	Transportation Bldg	18.0	150	<0.225
11/04/12	Sunnyside H.S.	28.7	150	<0.225
11/05/12	Ocotillo #1	40.0	150	<0.225
11/05/12	Ocotillo #2	43.1	150	<0.225
11/06/12	Los Amigos	39.0	150	<0.225
11/07/12	Los Ninos	INVALID	150	INVALID
11/08/12	Chaparral M.S.	INVALID	150	INVALID
11/09/12	Transportation Bldg	10.7	150	<0.225
11/10/12	Sunnyside H.S.	18.7	150	<0.225
11/11/12	Ocotillo #1	17.6	150	<0.225
11/11/12	Ocotillo #2	18.3	150	<0.225
11/12/12	Los Amigos	19.6	150	<0.225
11/13/12	Los Niños	INVALID	150	INVALID
11/14/12	Chaparral M.S.	INVALID	150	INVALID
11/15/12	Transportation Bldg	30.2	150	<0.225
11/16/12	Sunnyside H.S.	37.9	150	<0.225
11/17/12	Ocotillo #1	25.7	150	<0.225
11/17/12	Ocotillo #2	26.5	150	<0.225
11/18/12	Los Amigos	8.0	150	<0.225
11/19/12	Los Niños	25.2	150	<0.225
11/20/12	Chaparral M.S.	31.7	150	<0.225
11/21/12	Transportation Bldg	24.2	150	<0.225
11/22/12	Sunnyside H.S.	22.8	150	<0.225
11/23/12	Ocotillo #1	INVALID	150	INVALID
11/23/12	Ocotillo #2	26.6	150	<0.225
11/24/12	Los Amigos	38.0	150	<0.225
11/25/12	Los Niños	24.4	150	<0.225
11/26/12	Chaparral M.S.	33.6	150	<0.225
11/27/12	Transportation Bldg	24.5	150	<0.225
11/28/12	Sunnyside H.S.	33.7	150	<0.225
11/29/12	Ocotillo #1	INVALID	150	INVALID
11/29/12	Ocotillo #2	35.9	150	<0.225
11/30/12	Los Amigos	28.7	150	<0.225

Samples running on 11/07/12, 11/08/12, 11/13/12, 11/14/12, 11/23/12 and 11/29/12 are all invalid due to the filters not being changed out resulting in double exposures.

NAAQS = National Ambient Air Quality Standard for PM₁₀

PM₁₀ /Beryllium Concentrations (continued)

Monthly Summary of PM₁₀/Beryllium Data

December 2012

Date	Location	Standard Concentration PM₁₀ (µg/m³)	24-hour NAAQS PM₁₀ (µg/m³)	Beryllium (ng/m³)
12/01/12	Los Niños	32.7	150	<0.225
12/02/12	Chaparral M.S.	25.5	150	<0.225
12/03/12	Transportation Bldg	26.4	150	<0.225
12/04/12	Sunnyside H.S.	38.0	150	<0.225
12/05/12	Ocotillo #1	40.3	150	<0.225
12/05/12	Ocotillo #2	34.0	150	<0.225
12/06/12	Los Amigos	38.4	150	<0.225
12/07/12	Los Niños	36.4	150	<0.225
12/08/12	Chaparral M.S.	25.6	150	<0.225
12/09/12	Transportation Bldg	23.6	150	<0.225
12/10/12	Sunnyside H.S.	51.8	150	<0.225
12/11/12	Ocotillo #1	41.0	150	<0.225
12/11/12	Ocotillo #2	44.7	150	<0.225
12/12/12	Los Amigos	30.5	150	<0.225
12/13/12	Los Niños	7.1	150	<0.225
12/14/12	Chaparral M.S.	2.5	150	<0.225
12/15/12	Transportation Bldg	INVALID	150	INVALID
12/16/12	Sunnyside H.S.	8.4	150	<0.225
12/17/12	Ocotillo #1	11.1	150	<0.225
12/17/12	Ocotillo #2	13.4	150	<0.225
12/18/12	Los Amigos	15.0	150	<0.225
12/19/12	Los Ninos	13.7	150	<0.225
12/20/12	Chaparral M.S.	8.5	150	<0.225
12/21/12	Transportation Bldg	11.4	150	<0.225
12/22/12	Sunnyside H.S.	13.9	150	<0.225
12/23/12	Ocotillo #1	11.2	150	<0.225
12/23/12	Ocotillo #2	11.9	150	<0.225
12/24/12	Los Amigos	4.8	150	<0.225
12/25/12	Los Ninos	13.3	150	<0.225
12/26/12	Chaparral M.S.	15.1	150	<0.225
12/27/12	Transportation Bldg	13.5	150	<0.225
12/28/12	Sunnyside H.S.	16.9	150	<0.225
12/29/12	Ocotillo #1	16.1	150	<0.225
12/29/12	Ocotillo #2	17.8	150	<0.225
12/30/12	Los Amigos	14.6	150	<0.225
12/31/12	Los Ninos	21.0		

Sample running on 12/15/12 invalid due to sampler not running the required amount of time (23-25 hours).

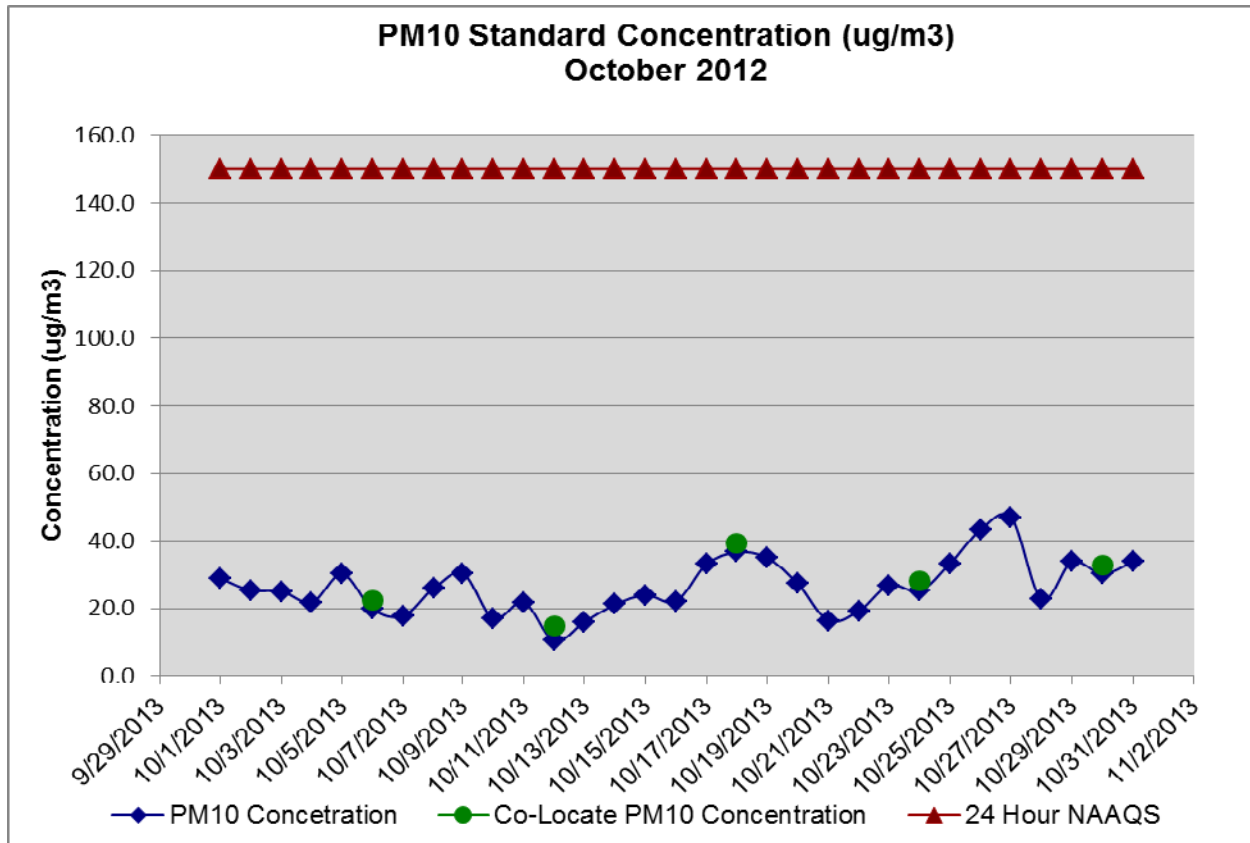
NAAQS = National Ambient Air Quality Standard for PM₁₀

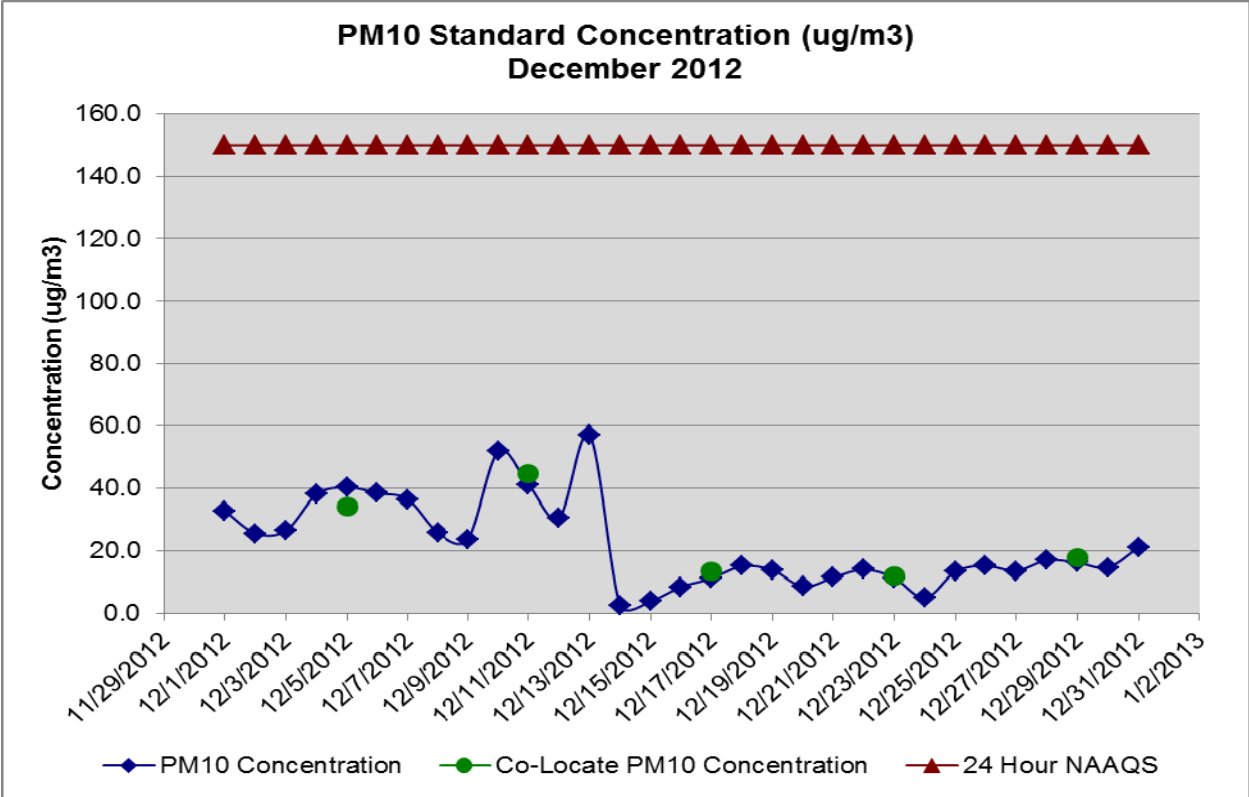
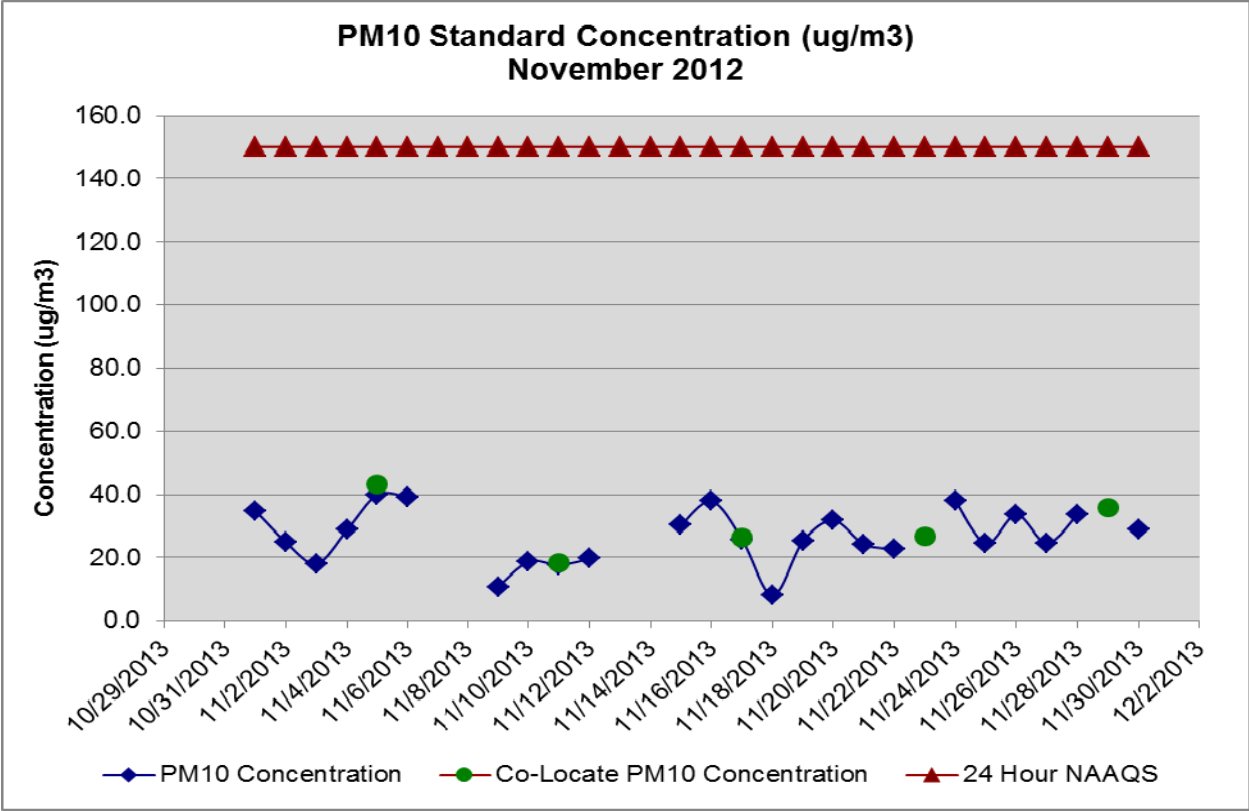
Precision of Duplicate Pairs – PM10

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 ₁₀ ($\mu\text{g}/\text{m}^3$)	Duplicate Sampler Number	Measured PM ₁₀ ($\mu\text{g}/\text{m}^3$)	Difference ($\mu\text{g}/\text{m}^3$)	Percent Difference %
10/6/12	1	19.8	2	22.5	2.7	12.77
10/18/12	1	36.7	2	39.4	2.63	7.10
10/24/12	1	25.3	2	28.3	3.0	11.19
10/30/12	1	30.3	2	32.8	2.5	7.92
11/5/12	1	40.0	2	43.1	3.1	7.46
11/11/12	1	17.6	2	18.3	0.7	3.90
11/17/12	1	25.7	2	26.5	0.8	3.07
12/5/12	1	40.3	2	34.0	-6.3	-16.96
12/11/12	1	41.0	2	44.7	3.7	8.63
12/29/12	1	16.1	2	17.8	1.7	10.03

PM₁₀ Concentration Charts





Audit Results

Audits were performed on all of the samplers for the 4th quarter of 2012. 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: 12/31/12 **Ps =** 694.7
Motor: 1424 **Temp c =** 5.00
 Ta = 278.0
 Pa = 698.0
Orifice Calibration Relationship
m= 1.26505 b= -0.01422

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.78	34.6	2.12	0.92
13	3.22	32.0	1.76	0.84
10	2.68	29.2	1.51	0.78
7	1.83	24.2	1.11	0.66
5	1.22	19.9	0.78	0.56

Orifice dH2O 2.546
 Sample dPex 1.5
 Orifice Qa(m3/m) 0.80725
 Sample Qa dPex 28.4428

Audit flow rate % diff: 5.67 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.546	28.50	0.81

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.46	30.12	0.85

Sampler Audit Relationship		
m =	0.024	
b =	0.083	
r =	0.997	
	pm10	tsp
Set Point (cfm)	38.6	48.3
Set Point (H2O)	2.5	3.8

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: 12/26/12 **Ps =** 694.7
Motor: 1418 **Temp c =** 7.22
 Ta = 280.2
 Pa = 694.8
Orifice Calibration Relationship
m= 1.26505 b= -0.01422

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.93	35.5	2.29	0.96
13	3.25	32.4	1.89	0.87
10	2.77	29.9	1.61	0.81
7	1.81	24.2	1.16	0.68
5	1.16	19.5	0.76	0.55

Orifice dH2O 2.584
 Sample dPex 1.5
 Orifice Qa(m3/m) 0.81821
 Sample Qa dPex 28.8314

Audit flow rate % diff: 5.52 %

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.584	28.88	0.82

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
1.54	30.49	0.86

Sampler Audit Relationship		
m =	0.025	
b =	0.072	
r =	0.998	
	pm10	tsp
Set Point (cfm)	39.1	48.9
Set Point (H2O)	2.7	4.1

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: 12/26/12 **Ps =** 694.7
Motor: 1419 **Temp c =** 7.22

Ta = 280.2
Pa = 695.1

Orifice Calibration Relationship
m= 1.26505 b= -0.01422

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.29	32.5	1.44	0.76
13	2.80	30.1	1.19	0.69
10	2.33	27.4	0.97	0.63
7	1.62	23.0	0.55	0.47
5	1.03	18.4	0.27	0.33

Orifice dH2O 2.214
 Sample dPex 0.9
 Orifice Qa(m3/m) 0.75806
 Sample Qa dPex 26.9519

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
2.214	26.76	0.76

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
0.88	27.96	0.79

Sampler Audit Relationship		
m =	0.031	
b =	-0.234	
r =	0.998	
	pm10	tsp
Set Point (cfm)	39.1	48.9
Set Point (H2O)	2.3	4.0

Audit flow rate % diff: 4.46 %

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: 12/26/12 **Ps =** 694.7
Motor: 1421 **Temp c =** 7.22

Ta = 280.2
Pa = 695.1

Orifice Calibration Relationship
m= 1.26505 b= -0.01422

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	2.86	30.4	1.24	0.71
13	2.48	28.3	1.03	0.64
10	2.04	25.7	0.82	0.57
7	1.34	20.9	0.46	0.43
5	0.93	17.5	0.24	0.31

Orifice dH2O 1.93
 Sample dPex 0.8
 Orifice Qa(m3/m) 0.70852
 Sample Qa dPex 25.1875

Orifice		
dH2O	Qa (CFM)	Qa (M3/m)
1.93	25.01	0.71

Sampler w/Orifice		
dPex	Qa (CFM)	Qa (M3/m)
0.76	26.14	0.74

Sampler Audit Relationship		
m =	0.030	
b =	-0.213	
r =	0.998	
	pm10	tsp
Set Point (cfm)	39.1	48.9
Set Point (H2O)	2.4	4.0

Audit flow rate % diff: 4.47 %

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 =** 286.5
Audit Date: 12/26/12 **Ps =** 694.7
Motor: 1420 **Temp c =** 7.78
 Ta = 280.8
 Pa = 694.8
Orifice Calibration Relationship
 m= 1.26505 b= -0.01422

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.00	31.1	1.30	0.72
13	2.58	28.9	1.03	0.65
10	2.15	26.4	0.80	0.57
7	1.45	21.8	0.46	0.43
5	0.96	17.8	0.22	0.30

Orifice dH2O 2.028
 Sample dPex 0.8
 Orifice Qa(m3/m) 0.72686
 Sample Qa dPex 25.8754
 Audit flow rate % diff: 4.39 %

dH2O	Orifice	
	Qa (CFM)	Qa (M3/m)
2.028	25.66	0.73

dPex	Sampler w/Orifice	
	Qa(CFM)	Qa(M3/m)
0.76	26.79	0.76

Sampler Audit Relationship		
m =	0.032	
b =	-0.260	
r =	0.999	
Set Point (cfm)	pm10 39.2	tsp 49.0
Set Point (H2O)	2.3	4.1

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 =** 286.5
Audit Date: 12/26/12 **Ps =** 694.7
Motor: 1417 **Temp c =** 7.22
 Ta = 280.2
 Pa = 6945.1
Orifice Calibration Relationship
 m= 1.26505 b= -0.01422

Plate No.	Orifice dH20	Qa Orifice	Sampler dPex	Sampler dPext
18	3.30	32.6	1.46	0.77
13	2.82	30.2	1.23	0.70
10	2.33	27.4	0.99	0.63
7	1.55	22.5	0.63	0.50
5	1.03	18.4	0.35	0.38

Orifice dH2O 2.206
 Sample dPex 0.9
 Orifice Qa(m3/m) 0.75671
 Sample Qa dPex 26.8105
 Audit flow rate % diff: 4.72 %

dH2O	Orifice	
	Qa (CFM)	Qa (M3/m)
2.206	26.71	0.76

dPex	Sampler w/Orifice	
	Qa (CFM)	Qa (M3/m)
0.93	27.98	0.79

Sampler Audit Relationship		
m =	0.027	
b =	-0.119	
r =	0.998	
Set Point (cfm)	pm10 39.1	tsp 48.9
Set Point (H2O)	2.2	3.7

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 =** 286.5
Audit Date: 12/26/12 **Ps =** 694.7
Motor: 1422 **Temp c =** 7.22
 Ta = 280.2
 Pa = 694.8
Orifice Calibration Relationship
 m= 1.26505 b= -0.01422

Plate No.	Orifice dH2O	Qa Orifice	Sampler dPex	Sampler dPext
18	3.95	35.6	1.80	0.85
13	3.34	32.8	1.43	0.76
10	2.68	29.4	1.11	0.67
7	1.74	23.8	0.69	0.53
5	1.13	19.2	0.37	0.39

Orifice dH2O 2.568
 Sample dPex 1.1
 Orifice Qa(m3/m) 0.81571
 Sample Qa dPex 28.931

Audit flow rate % diff: 4.75 %

dH2O	Orifice	
	Qa (CFM)	Qa (M3/m)
2.568	28.79	0.82

dPex	Sampler w/Orifice	
	Qa (CFM)	Qa (M3/m)
1.08	30.17	0.85

Sampler Audit Relationship		
m =	0.028	
b =	-0.143	
r =	0.998	
	pm10	tsp
Set Point (cfm)	39.1	48.9
Set Point (H2O)	2.2	3.7