Quarterly Results for the 2017-2018 Air Monitoring Program: October 16, 2017 - January 15, 2018

Prepared for

PCC Structurals, Inc.

March 2018

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Contents

Acronyms and Abbreviations

AB	ambient field blank
ARA	ARA Instruments
As	arsenic
ASTM	ASTM International
Be	beryllium
CH2M	CH2M HILL Engineers, Inc.
Cd	cadmium
Co	cobalt
COC	chain of custody
Cr	chromium
Cr^{6+}	hexavalent chromium
EPA	U.S. Environmental Protection Agency
Hg	mercury
ICP/MS	inductively coupled plasma mass spectrometry
LB	method blank
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MS/MSD	matrix spike/matrix spike duplicate
NFG	National Functional Guidelines
Mn	manganese
Ni	nickel
NIST	National Institute of Standards and Technology
Pb	lead
QC	quality control
RL	reporting limit
SDG	sample delivery group
Se	selenium

SECTION 1

Introduction

CH2M HILL Engineers, Inc. (CH2M) is performing air monitoring for PCC Structurals, Inc., at one location in Portland, Oregon. Samples are being collected with two ARA Instruments (ARA) N-FRM sampling and monitoring devices every 3 days according to the U.S. Environmental Protection Agency (EPA) sampling schedule. One ARA sampler is equipped to collect filter samples for metals, the other ARA sampler is configured with a sampling cane and filter cartridge to collect hexavalent chromium (Cr6+). Samples are collected for a duration of 24 hours. Filter samples are analyzed for the following metals by ALS Laboratories: arsenic (As), beryllium (Be), cadmium(Cd), total chromium (Cr), cobalt (Co), lead (Pb), manganese (Mn), nickel (Ni), and selenium (Se). Filter cartridge samples are analyzed for Cr6+ by CHESTER LabNet.

This report summarizes the quarterly results and quality assurance activities performed between October 16, 2017, and January 15, 2018. The monitoring location is shown on Figure 1.

SECTION 2

Data

CH2M conducted 31 sampling events during this reporting period; however, three samples were not collected due to sampler error. Two of the uncollected samples were for hexavalent chromium; one was for metals. An additional two samples were collected at the installation as test samples. Data completeness goals for metals and Cr6+ exceeded the project goal of 80 percent (see Table 1). Complete results are presented in Appendix A.

Table 1. 24-hour Average Data Completeness for October 16, 2017 through January 15, 2018
Quarterly Results for the 2017-2018 Air Monitoring Program: October 16, 2017 - January 15, 2018

Period	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
M1- Metals	30	31	97
M2-Cr6+	29	31	94
Total	59	62	95

SECTION 3

Field Data Quality

3.1 Field Quality Assurance and Quality Control Activities

3.1.1 Monthly Flow Verifications

The ARA N-FRM instrument's temperature, pressure, and flow rate are verified against a National Institute of Standards and Technology (NIST) traceable flowmeter at least once per month. None of the results exceeded the measurement quality objective of +/- 6 percent. Results from monthly flow verifications are presented in Appendix B.

3.1.2 Quarterly Audits

At least once per quarter the ARA N-FRM instrument's pressure and flow rate are verified against a secondary NIST traceable flowmeter. None of the results exceeded the measurement quality objective of +/- 6 percent. Results from the quarterly audit are presented in Appendix C.

3.2 Corrective Action October-November 2017

Issue: The Cr6+ sampler instrument M-2 did not successfully complete a sample run on October 19, 2017, and November 9, 2017.

Corrective Action: CH2M contacted the equipment supplier who suggested downloading the latest firmware. No issues have been detected since CH2M downloaded the firmware.

SECTION 4

Analytical Data Quality

This data quality summary section covers 59 air monitoring samples and 2 test samples. These samples were shipped to the laboratories and reported by the laboratories under 10 sample delivery groups (SDGs). Two methods were used to analyze the environmental samples and are listed in Table 2. The analyses were performed by ALS Laboratories in Salt Lake City, Utah, and CHESTER LabNet in Tigard, Oregon. Samples were collected and delivered by commercial carrier to the laboratories.

Table 2. Analytical Parameters by Laboratory
Quarterly Results for the 2017-2018 Air Monitoring Program: October 16, 2017 - January 15, 2018

Parameter	Method	Laboratory
Chromium, Hexavalent	ASTM D7614-12	CHESTER LabNet
Metals	ICP-MS	ALS Laboratories

Note:

ICP-MS = inductively coupled plasma mass spectrometry

4.1 Methodology

The SDGs were assessed by reviewing the following: (1) chain-of-custody documentation, including sample cooler temperatures and appropriate sample preservation; (2) holding-time compliance; (3) required quality control (QC) samples at the specified frequencies; (4) review of detection limits; (5) review of analytical blanks and field blanks; (6) laboratory control sample/laboratory control sample duplicates (LCS/LCSD) precision and recoveries; (7) matrix spike/matrix spike duplicate (MS/MSD) precision and recoveries; (8) laboratory precision; and (9) additional method-required QC samples.

Data flags were assigned according to the National Functional Guidelines (NFG) (EPA, 2016a, 2016b). Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will only be one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are those listed in the NFG and are defined as follows:

- J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R = The sample result was rejected because of deficiencies in the ability to analyze the sample and meet the QC criteria. The presence or absence of the analyte could not be verified.
- U = The analyte was analyzed for but was not detected above the reported sample quantitation limit or a detection in the samples was changed to a nondetected result, flagged “U” due to blank contamination.
- UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

4.2 Findings

The overall summaries of the data validation are contained in the following sections. Qualified data are listed in Appendix D.

4.2.1 Holding Time/Preservation

All method-recommended holding time and preservation criteria were met.

4.2.2 Laboratory QC Samples

4.2.2.1 Method Blanks

A method blank is a clean matrix and is carried through the same analytical procedures as the environmental samples. Method blank samples are used to monitor each preparation or analytical batch for contamination throughout the entire analytical process. Method blank samples were analyzed at the required frequency and were generally free of contamination, with the following exceptions:

- Arsenic, beryllium, and cobalt were detected below the reporting limit (RL) in one laboratory method blank (LB). Seven associated detected sample results were less than or equal to five times the blank concentration and were qualified as not detected and flagged "U."
- Lead and manganese were detected above the RL in one LB. Six associated detected sample results were less than or equal to five times the blank concentration and were qualified as not detected and flagged "U."

4.2.2.2 Field Blanks

A field, or ambient, blank is a sample collected to evaluate the ambient air conditions at the site. It uses the same sample collection techniques as the environmental samples. Field blank samples were analyzed at the required frequency and were generally free of contamination, with the following exceptions:

- Manganese was detected below the RL in one ambient field blank (AB). Three associated detected sample results were less than or equal to five times the blank concentration and were qualified as not detected and flagged "U."
- Chromium was detected above the RL in one or more ABs. Twenty-seven associated detected sample results were less than or equal to five times the blank concentration and were qualified as not detected and flagged "U."

4.2.2.3 Laboratory Control Samples

LCS samples were analyzed to assess accuracy of the analytical method in the absence of matrix effects and all acceptance criteria were met with the following exception:

- One LCS/LCSD for beryllium had a recovery that was greater than the upper control limit. One associated detected sample result was qualified as estimated and flagged "J."

4.2.2.4 Matrix Spike

MS samples were analyzed as required by the analytical methods to assess accuracy and to identify possible matrix effects associated with the samples. Only the "parent" samples are qualified for MS issues, but data users should take into consideration low spike recoveries when evaluating other sample locations. In some cases, other laboratory samples were used to fulfill the laboratory's QC batch requirements. When samples from the site were selected for MS analyses, all acceptance criteria were met.

4.2.2.5 Laboratory Duplicates

Laboratory duplicates were performed as required by the analytical methods to assess precision of the method. In some cases, other laboratory samples were used to fulfill the laboratory's QC batch requirements. When samples from the site were used, all precision criteria were met.

4.2.3 Chain of Custody

Required procedures were followed and were generally free of errors.

4.3 Overall Assessment

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data meets validation requirements. The following summary highlights the precision, accuracy, representativeness, completeness, and comparability findings for the above-defined events:

- Precision of the data was verified through the review of the laboratory data quality indicators that include laboratory duplicate relative percent differences. Precision was acceptable.
- Accuracy of the data was verified through the review of the LCS and MS recoveries, as well as the evaluation of method and field blank data. Accuracy was generally acceptable with the exception of one beryllium result that was qualified as estimated due to LCS recovery issues.
- Method and field blanks were generally free of contamination with the exception of several metal compounds (arsenic, beryllium, cobalt, chromium, lead, and manganese) being qualified as not detected due to method and field blank contamination. Data users should consider the impact to any result that is qualified as estimated as it may contain a bias which could affect the quality of the data.
- Representativeness of the data was verified through the sample's collection, storage, and preservation procedures and the verification of holding-time compliance. All data were reported from analyses within the recommended holding time.
- Comparability of the data was verified through the use of standard EPA analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

SECTION 5

Summary

This report summarizes data collected for the first monitoring quarter: October 16, 2017, through January 15, 2018. Field and laboratory quality assurance procedures were acceptable during this monitoring period.

SECTION 6

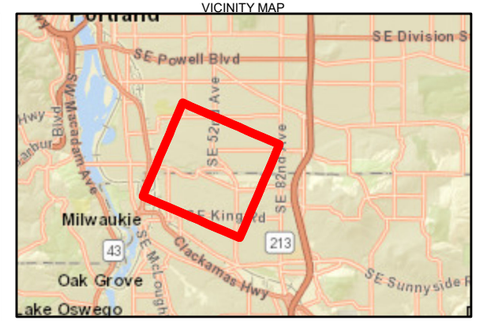
References

U.S. Environmental Protection Agency (EPA). 2016a. *National Functional Guidelines for Superfund Organic Methods Data Review.* September.

U.S. Environmental Protection Agency (EPA). 2016b. *National Functional Guidelines for Superfund Inorganic Methods Data Review.* September.

Figure

VICINITY MAP



Legend

- Air Monitoring Station

N

0 1,200 Feet

Figure 1. Monitoring Location

ch2m

Appendix A
Complete Results

Expanded Monthly Report - Air Quality Monitoring Results

Springwater Corridor

Data quality key

Flag	Description
J	Estimated value. Either below the quantitation limit, or because of issues during sampling or analysis.
NA	No sample collected
R	Data of unacceptable quality

Comparison Values for Metals in Air

	Arsenic, Total (ng/m^3)	Beryllium, Total (ng/m^3)	Cadmium, Total (ng/m^3)	Chromium, Total (ng/m^3)	Cobalt, Total (ng/m^3)	Hexavalent Chromium Cr(VI), (ng/m^3)	Lead, Total (ng/m^3)	Manganese, Total (ng/m^3)	Nickel, Total (ng/m^3)	Selenium, Total (ng/m^3)
Urban Background from NATTS sites	0.2 - 1.4	< MDL	0.04 - 0.5	1.6 - 4	0.05 - 0.3	0.01 - 0.08	2 - 10	3.2 - 19.5	0.8 - 2.8	0.1 - 1
DEQ Ambient Benchmark	0.2	0.4	0.6	NA	100	0.08	150	90	4	NA
Risk Based Concentrations (RBC) acute	200	20	30	NA	NA	300	150	300	200	20,000

Statistics of Daily Values

	Arsenic, Total (ng/m^3)	Beryllium, Total (ng/m^3)	Cadmium, Total (ng/m^3)	Chromium, Total (ng/m^3)	Cobalt, Total (ng/m^3)	Hexavalent Chromium Cr(VI), (ng/m^3)	Lead, Total (ng/m^3)	Manganese, Total (ng/m^3)	Nickel, Total (ng/m^3)	Selenium, Total (ng/m^3)
Minimum Detected Amount	0.18	0.17	0.17	9.8	0.17	0.0431	0.26	0.79	1.8	NA
Maximum Detected Amount	11	0.19	0.47	15	3	0.1710	5	17	5	NA
Average[1]	1.6	0.16	0.20	3.01	0.32	0.05	1.89	4.21	2.24	NA
Standard Deviation[1]	2.3	0.005	0.09	3.68	0.44	0.033	1.55	4.33	1.07	NA
Times above the RBC acute	0	0	0	0	0	0	0	0	0	0

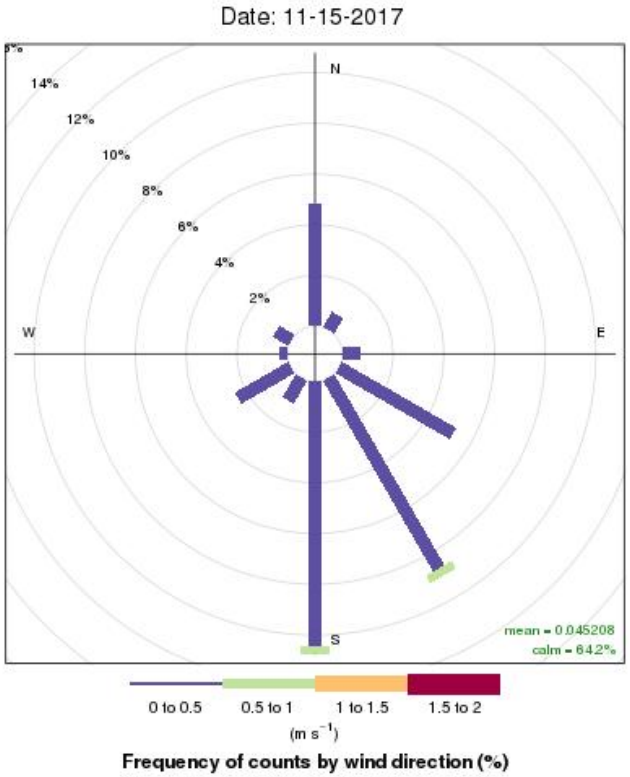
1 Calculated by using ProUCL 5, Kaplan Meier method with non-detects

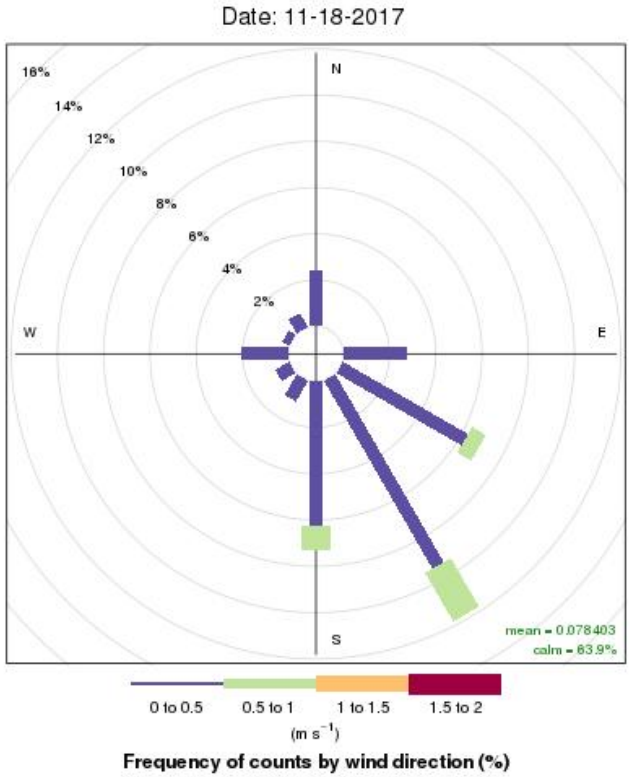
Daily Data

Sampled	Type	Arsenic, Total (ng/m^3)	Beryllium, Total (ng/m^3)	Cadmium, Total (ng/m^3)	Chromium, Total (ng/m^3)	Cobalt, Total (ng/m^3)	Hexavalent Chromium Cr(VI), (ng/m^3)	Lead, Total (ng/m^3)	Manganese, Total (ng/m^3)	Nickel, Total (ng/m^3)	Selenium, Total (ng/m^3)
10/16/2017	24 hr	2.7	<0.16	0.33 J	<1.6	0.54	<0.0347	5	9.7	4.8 J	<6.2
10/19/2017	24 hr	0.18 J	<0.16	<0.16	<1.6	<0.16	NA	0.28 J	0.81	<1.6	<6.2
10/22/2017	24 hr	3	<0.16	<0.16	<1.6	0.26 J	<0.0347	3	5.1	2 J	<6.2
10/25/2017	24 hr	0.49 J	<0.16	<0.16	<1.6	0.27 J	<0.0347	1.4	11	<1.6	<6.2
10/28/2017	24 hr	5	<0.16	0.45 J	<1.6	1	0.0771 J	4.4	15	5.2 J	<6.2
10/31/2017	24 hr	4.2	<0.16	0.21 J	13	0.29 J	<0.0347	3.5	8.5	1.9 J	<6.2
11/03/2017	NA	NA	NA	NA	NA	NA	<0.0347	NA	NA	NA	NA
11/06/2017	24 hr	0.54	0.19 J	<0.16	15	0.47 J	0.0681 J	0.97	3.2	3.5 J	<6.2
11/09/2017	24 hr	1.1	<0.16	<0.16	9.8	<0.16	NA	0.95	1.4	<1.6	<6.2
11/12/2017	24 hr	0.52	<0.16	<0.16	11	<0.16	<0.0347	0.88	0.79	<1.6	<6.2
11/15/2017	24 hr	0.2 J	<0.16	<0.16	<1.6	<0.16	<0.0347	<0.16	<0.16	<1.6	<6.2
11/18/2017	24 hr	11	<0.16	0.28 J	<1.6	0.19 J	<0.0347	3.5	<0.16	<1.6	<6.2
11/21/2017	24 hr	1.1	0.17 J	<0.16	<1.6	0.28 J	0.0431 J	<0.16	<0.16	<1.6	<6.2
11/24/2017	24 hr	1.1	<0.16	<0.16	<1.6	0.17 J	<0.0347	3	<0.16	<1.6	<6.2
11/27/2017	24 hr	<0.16	<0.16	0.32 J	<1.6	<0.16	<0.0347	0.99	3.4	<1.6	<6.2
11/30/2017	24 hr	<0.16	<0.16	<0.16	<1.6	<0.16	<0.0312	2.4	3.7	<1.6	<6.2
12/03/2017	24 hr	1.9	<0.16	<0.16	<1.6	<0.16	<0.0347	1.6	1.3	<1.6	<6.2
12/06/2017	24 hr	<0.16	<0.16	<0.16	<1.6	<0.16	0.0896 J	0.9	7.6	4.5 J	<6.2
12/09/2017	24 hr	<0.16	<0.16	<0.16	<1.6	<0.16	0.0667 J	1.2	3.8	2.7 J	<6.2
12/12/2017	24 hr	<0.16	<0.16	0.3 J	<1.6	<0.16	0.1710 J	3.4	4.9	3.9 J	<6.2
12/15/2017	24 hr	6.2	<0.16	0.47 J	<1.6	0.18 J	<0.0347	4.9	5.2	<1.6	<6.2
12/18/2017	24 hr	0.37 J	<0.16	<0.16	<1.6	<0.16	<0.0347	0.26 J	<0.16	<1.6	<6.2
12/21/2017	24 hr	2.6	<0.16	0.17 J	<1.6	0.2 J	<0.0347	2.7	6.3	<1.6	<6.2
12/24/2017	24 hr	0.32 J	<0.16	<0.16	<1.6	<0.16	<0.0347	1.7	<0.16	<1.6	<6.2
12/27/2017	24 hr	2.5	<0.16	0.32 J	<1.6	0.28 J	<0.0347	4.8	17	1.9 J	<6.2
12/30/2017	24 hr	1	<0.16	<0.16	<1.6	2.5	0.0965 J	2.4	3.7	2.8 J	<6.2
01/02/2018	24 hr	0.22 J	<0.16	<0.16	<1.6	0.4 J	0.1150 J	0.68	5.2	3.3 J	<6.2
01/05/2018	24 hr	0.42 J	<0.16	<0.16	<1.6	<0.16	<0.0347	0.36 J	1.6	<1.6	<6.2
01/08/2018	24 hr	0.3 J	<0.16	<0.16	<1.6	<0.16	0.0708 J	0.71	2.2	<1.6	<6.2
01/11/2018	24 hr	<0.16	<0.16	<0.16	<1.6	<0.16	<0.0347	<0.16	<0.16	<1.6	<6.2
01/14/2018	24 hr	<0.16	<0.16	<0.16	<1.6	0.2 J	0.0590 J	0.38 J	3.7	1.8 J	<6.2

Wind Roses

Note: No wind data recorded for December 21st to 22nd and December 27th to 28th of 2017. Therefore, no wind roses can be produced for those same days.





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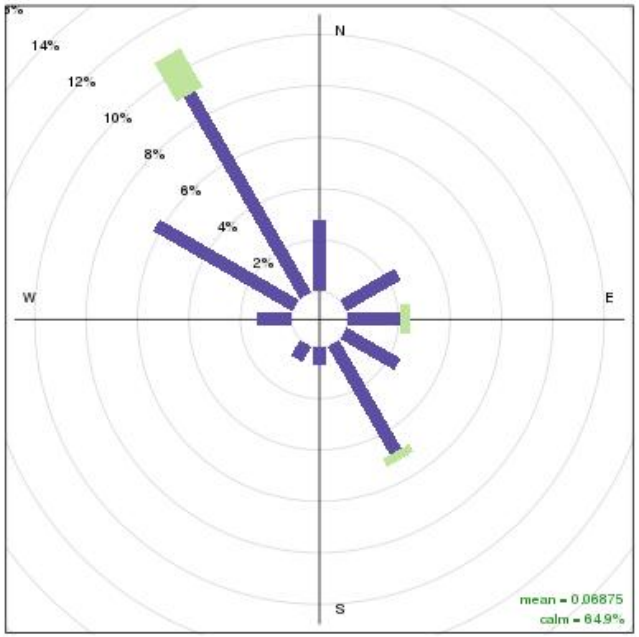

Frequency of counts by wind direction (%)

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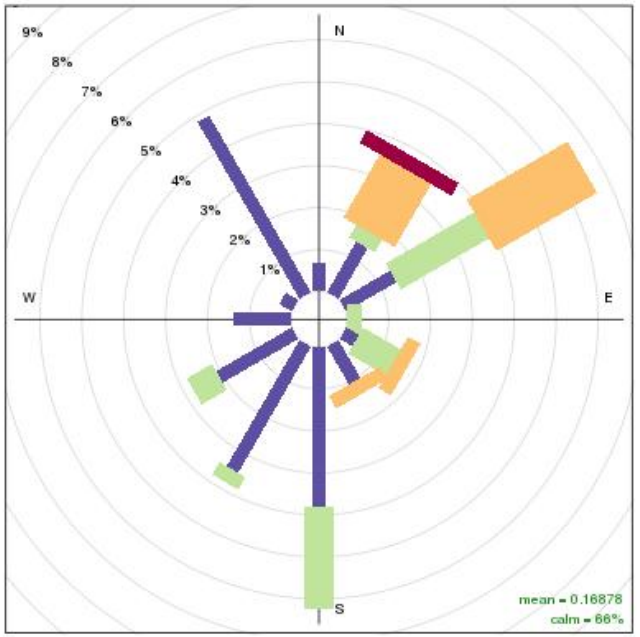

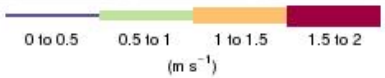

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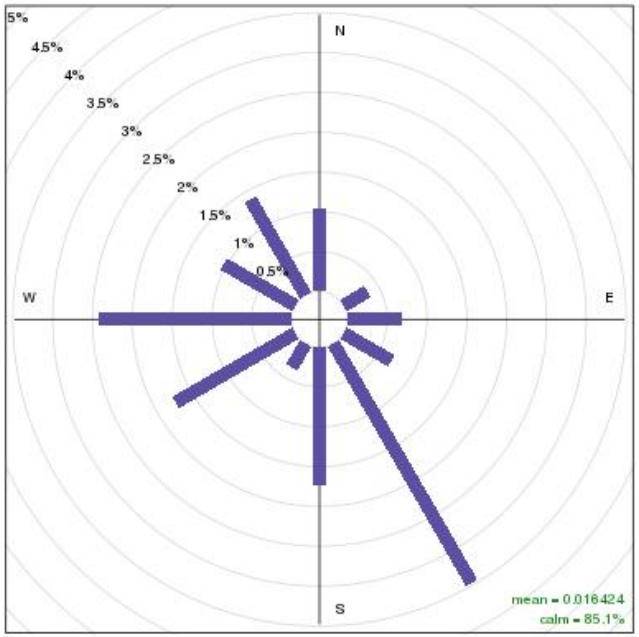

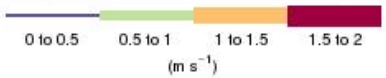

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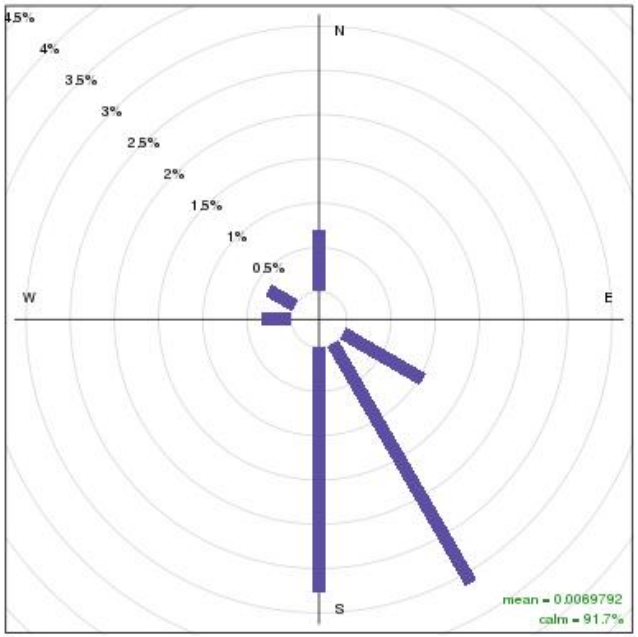

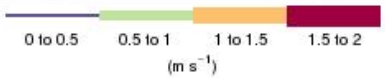

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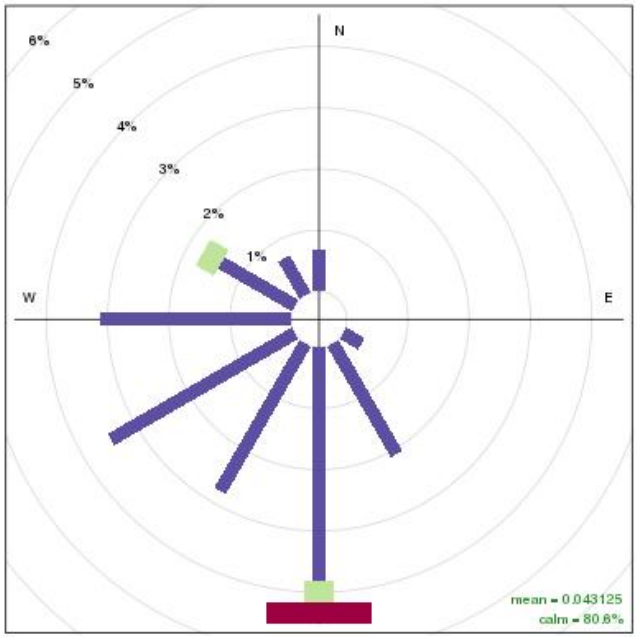

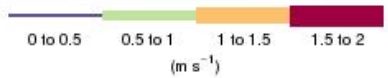

Frequency of counts by wind direction (%)

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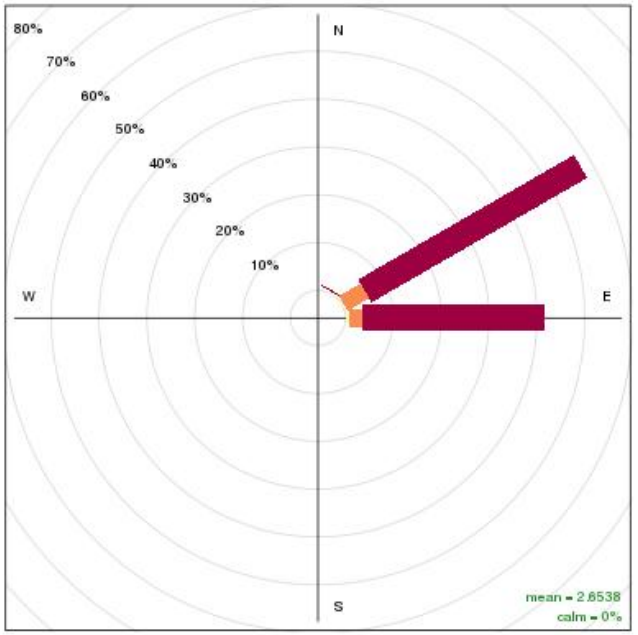

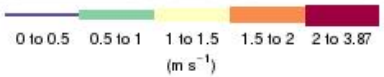

Frequency of counts by wind direction (%)

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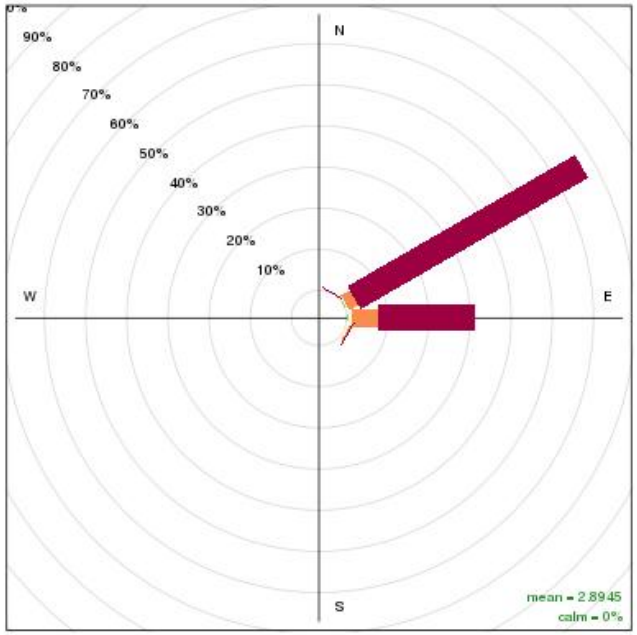

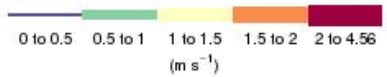

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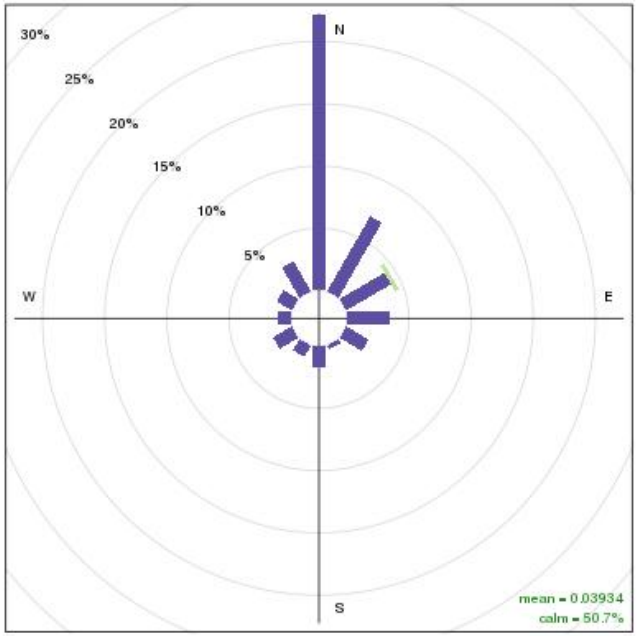

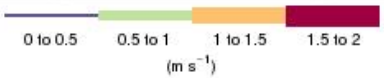

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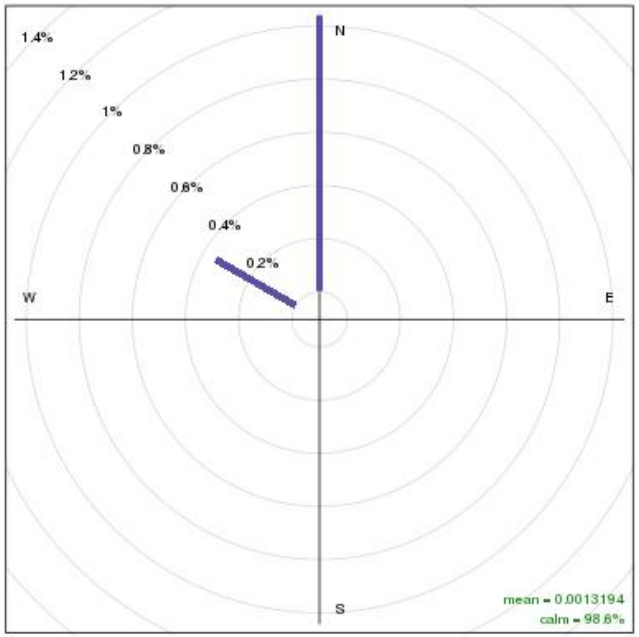
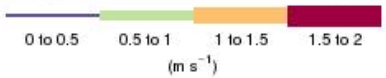
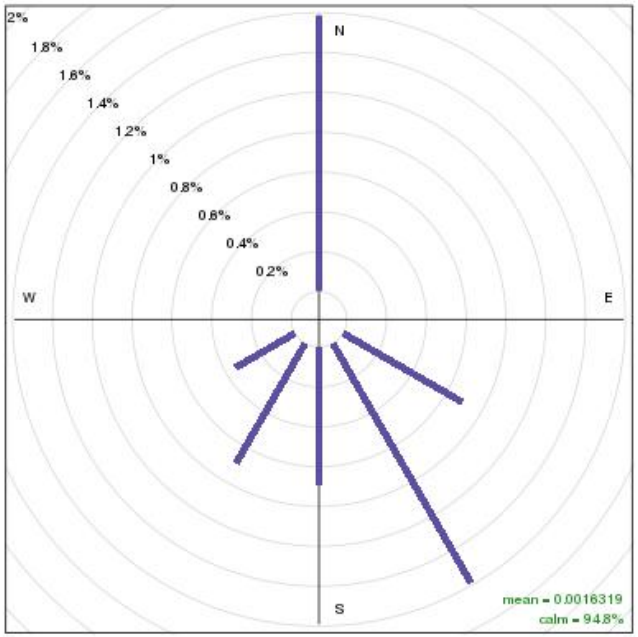
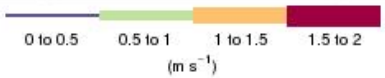




Frequency of counts by wind direction (%)

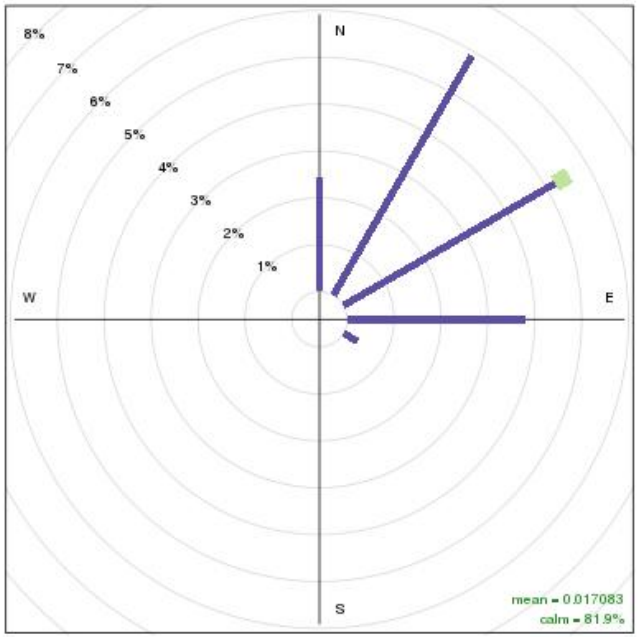
Date: 12-18-2017





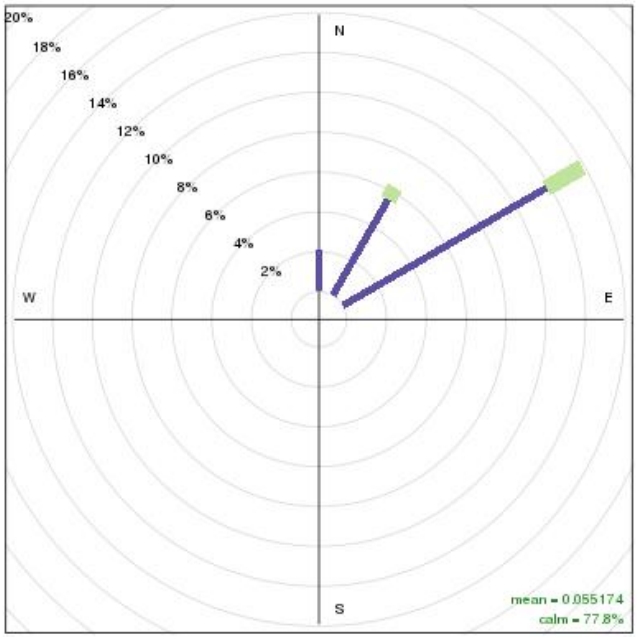
Frequency of counts by wind direction (%)

Date: 12-24-2017



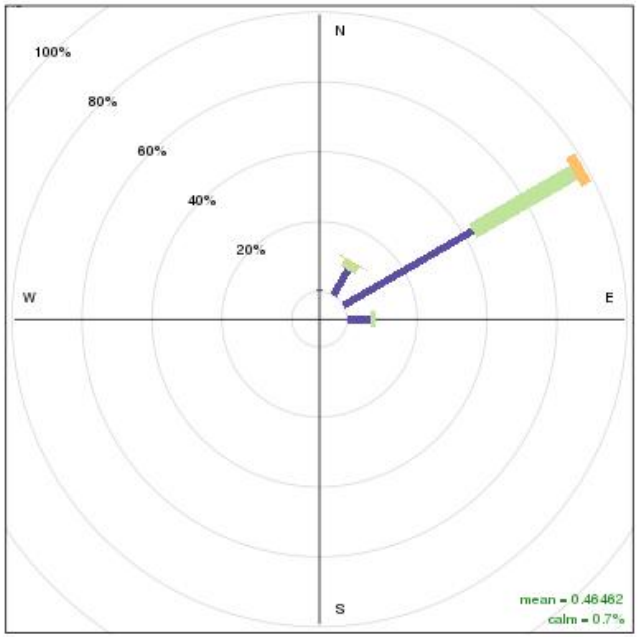
Frequency of counts by wind direction (%)

Date: 12-30-2017



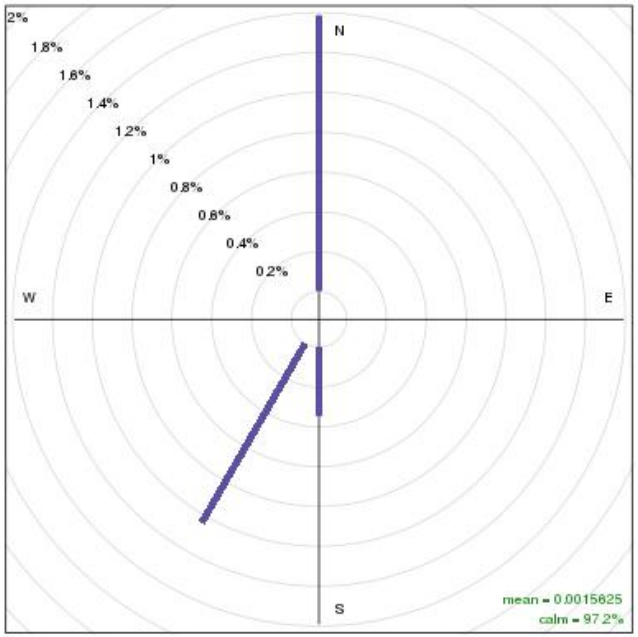
Frequency of counts by wind direction (%)

Date: 01-02-2018



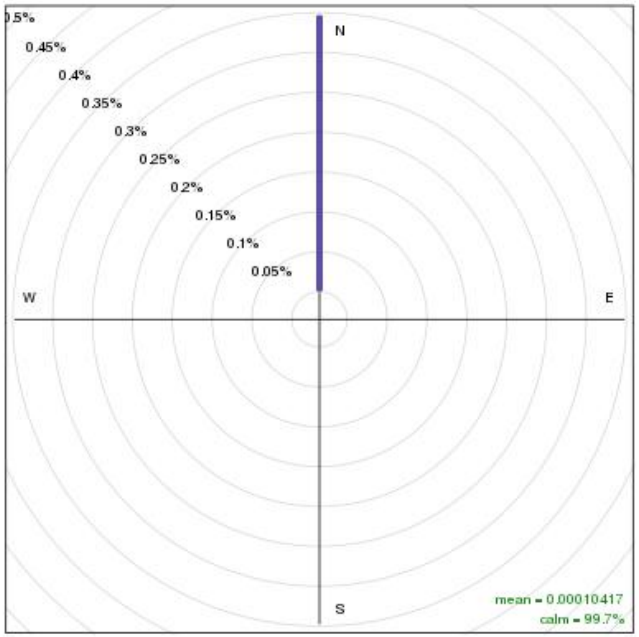
Frequency of counts by wind direction (%)

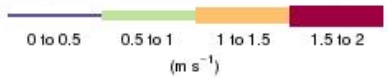
Date: 01-05-2018



Frequency of counts by wind direction (%)

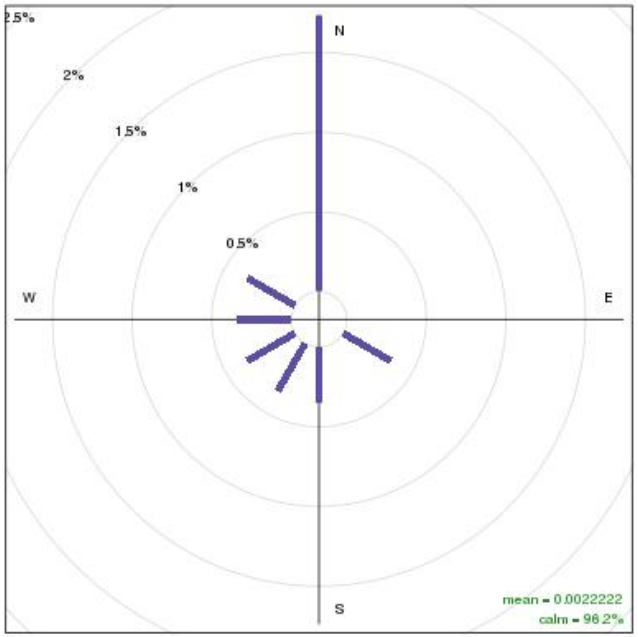
Date: 01-08-2018

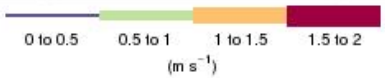




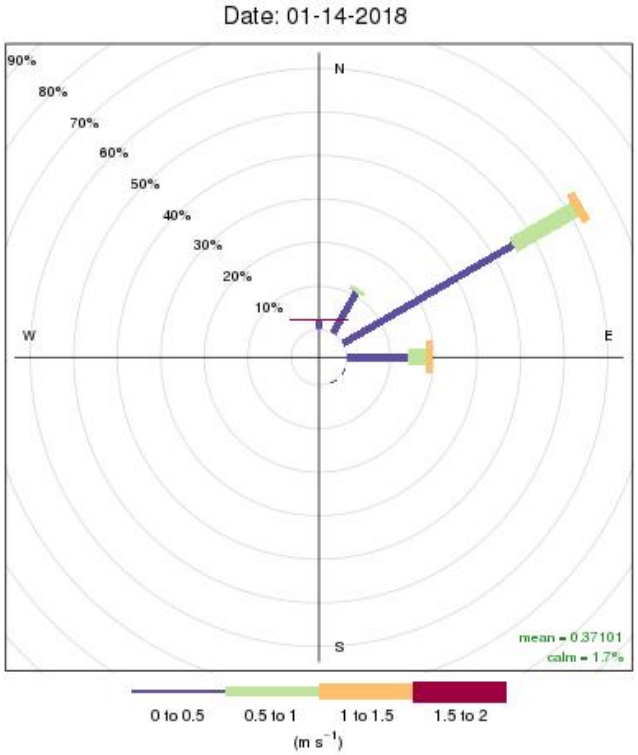
Frequency of counts by wind direction (%)

Date: 01-11-2018





Frequency of counts by wind direction (%)


Date: 01-14-2018
90%
80%
70%
60%
50%
40%
30%
20%
10%
N
W
E
S
mean = 0.37101
calm = 1.7%
0 to 0.5
0.5 to 1
1 to 1.5
1.5 to 2
(m s-1)
Frequency of counts by wind direction (%)

Appendix B
Monthly Flow Verifications

Calibration Worksheet

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	10/13/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:15	**Pressure Std:**	FTS	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	764	**FTS Temperature (°C)**	14.3
Sampler Pressure (mmHg)	765	**Sampler Temperature (°C)**	14.3
Barometric Pressure Offset	-1	**Temperature Offset:**	0

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.51	14.3	14.350091	0.050091	0.350286695
15.5	15.52	15.37	15.33941076	-0.0305892	-0.199019137
16.5	16.5	16.33	16.29934478	-0.0306552	-0.187723304
17.5	17.5	17.34	17.2788693	-0.0611307	-0.352541518
18.5	18.31	18	18.07228416	0.07228416	0.40157866

Slope	0.979524516
Intercept	0.137190268

Flow Verification PM10

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	10/13/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:05	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.74	16.48	-1.58	4%	pass
Temp (^{O}C)	14.3	14.3	0.00	2^{o}C	pass
Pressure (mmHg)	765	764	1.00	10 mmHg	pass
Clock Time	12:05	12:05	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Calibration Worksheet

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	10/13/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:40	**Pressure Std:**	FTS	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	764	**FTS Temperature (°C)**	14.1
Sampler Pressure (mmHg)	766	**Sampler Temperature (°C)**	13.8
Barometric Pressure Offset	-2	**Temperature Offset:**	0.3

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.48	14.5	14.48421419	-0.0157858	-0.10886766
15.5	15.48	15.51	15.50599817	-0.0040018	-0.025801581
16.5	16.51	16.51	16.55843568	0.04843568	0.293371773
17.5	17.48	17.57	17.54956615	-0.0204339	-0.116299684
18.5	18.5	18.6	18.59178581	-0.0082142	-0.044162308

Slope	1.021783985
Intercept	-0.311217919

Flow Verification CrVI

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	10/13/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:32	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	15	15	0.00	4%	pass
Temp (^{O}C)	13.8	14.1	0.30	2^{o}C	pass
Pressure (mmHg)	766	764	2.00	10 mmHg	pass
Clock Time	12:32	12:32	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Flow Verification PM10

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	11/4/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:05	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.71	16.36	-2.14	4%	pass
Temp (^{O}C)	8.7	9.1	0.40	2^{o}C	pass
Pressure (mmHg)	759	759	0.00	10 mmHg	pass
Clock Time	13:48	13:48	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Flow Verification CrVI

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jodi Lee	**Flow Std:**	FTS	**Serial No:**	16005
Date:	11/4/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:32	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	15.02	14.83	-1.28	4%	pass
Temp (^{O}C)	8.7	9.1	0.40	2^{o}C	pass
Pressure (mmHg)	760	759	1.00	10 mmHg	pass
Clock Time	13:53	13:52	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Flow Verification PM10

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	12/28/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:06	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.71	16.59	-0.72	4%	pass
Temp (^{O}C)	NA	NA	NA	2^{o}C	NA
Pressure (mmHg)	NA	NA	NA	10 mmHg	NA
Clock Time	NA	NA	NA	2 min/mo	NA
Leak Check	NA	0	NA	1 LPM	NA

Flow Verification CrVI

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	12/28/2017	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:06	**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	15.01	14.73	-1.90	4%	pass
Temp (^{O}C)	NA	NA	NA	2^{o}C	NA
Pressure (mmHg)	NA	NA	NA	10 mmHg	NA
Clock Time	NA	NA	NA	2 min/mo	NA
Leak Check	NA	0	NA	1 LPM	NA

Flow Verification PM10

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	1/24/2018	**Temp Std:**	FTS	**Serial No:**	16005
Time:		**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.72	16.57	-0.91	4%	pass
Temp (^{O}C)	NA	NA	NA	2^{o}C	NA
Pressure (mmHg)	NA	NA	NA	10 mmHg	NA
Clock Time	NA	NA	NA	2 min/mo	NA
Leak Check	NA	0	NA	1 LPM	NA

Flow Verification CrVI

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	1/24/2018	**Temp Std:**	FTS	**Serial No:**	16005
Time:		**Pressure Std:**	FTS	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	14.97	14.72	-1.70	4%	pass
Temp (^{O}C)	NA	NA	NA	2^{o}C	NA
Pressure (mmHg)	NA	NA	NA	10 mmHg	NA
Clock Time	NA	NA	NA	2 min/mo	NA
Leak Check	NA	0	NA	1 LPM	NA

Appendix C
Quarterly Audit Results

Flow Audit PM10

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jodi Lee	**Flow Std:**	Delta Cal	**Serial No:**	605
Date:	2/9/2018	**Temp Std:**	Delta Cal	**Serial No:**	605
Time:	12:30	**Pressure Std:**	Delta Cal	**Serial No:**	605

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.7	16.85	0.89	4%	pass
Temp (^{O}C)	9.7	9.8	0.10	2^{o}C	pass
Pressure (mmHg)	767	768	1.00	10 mmHg	pass
Clock Time	12:30	12:30	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	NA

Flow Audit CrVI

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jodi Lee	**Flow Std:**	Delta Cal	**Serial No:**	605
Date:	10/13/2017	**Temp Std:**	Delta Cal	**Serial No:**	605
Time:	13:10	**Pressure Std:**	Delta Cal	**Serial No:**	605

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	14.95	15.36	2.67	4%	pass
Temp (^{O}C)	14.5	14.3	0.20	2^{o}C	pass
Pressure (mmHg)	766	762.5	3.50	10 mmHg	pass
Clock Time	13:10	13:10	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Appendix D
Data Qualifiers

SDG	Matrix	Sample ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
1730533	AIR	M1-20171012	ICP-MS	Chromium	ug/m3	0.011	U	AB>RL
1730533	AIR	M1-20171016	ICP-MS	Chromium	ug/m3	0.015	U	AB>RL
1730533	AIR	M1-20171019	ICP-MS	Chromium	ug/m3	0.011	U	AB>RL
1730533	AIR	M1-20171022	ICP-MS	Chromium	ug/m3	0.014	U	AB>RL
1730533	AIR	M1-20171025	ICP-MS	Chromium	ug/m3	0.0085	U	AB>RL
1730533	AIR	M1-20171028	ICP-MS	Chromium	ug/m3	0.022	U	AB>RL
1733334	AIR	M1-20171115	ICP-MS	Chromium	ug/m3	0.012	U	AB>RL
1733334	AIR	M1-20171115	ICP-MS	Lead	ug/m3	0.00021	U	LB>RL
1733334	AIR	M1-20171115	ICP-MS	Manganese	ug/m3	0.0016	U	LB>RL
1733334	AIR	M1-20171118	ICP-MS	Chromium	ug/m3	0.013	U	AB>RL
1733334	AIR	M1-20171118	ICP-MS	Manganese	ug/m3	0.0014	U	LB>RL
1733334	AIR	M1-20171121	ICP-MS	Beryllium	ug/m3	0.00017	J	LCS>UCL; LCSD>UCL
1733334	AIR	M1-20171121	ICP-MS	Chromium	ug/m3	0.013	U	AB>RL
1733334	AIR	M1-20171121	ICP-MS	Lead	ug/m3	0.0011	U	LB>RL
1733334	AIR	M1-20171121	ICP-MS	Manganese	ug/m3	0.0023	U	LB>RL
1733334	AIR	M1-20171124	ICP-MS	Chromium	ug/m3	0.012	U	AB>RL
1733334	AIR	M1-20171124	ICP-MS	Manganese	ug/m3	0.0019	U	LB>RL
1735258	AIR	M1-20171127	ICP-MS	Arsenic	ug/m3	0.00056	U	LB<RL
1735258	AIR	M1-20171127	ICP-MS	Chromium	ug/m3	0.013	U	AB>RL
1735258	AIR	M1-20171130	ICP-MS	Arsenic	ug/m3	0.00075	U	LB<RL
1735258	AIR	M1-20171130	ICP-MS	Chromium	ug/m3	0.011	U	AB>RL
1735258	AIR	M1-20171130	ICP-MS	Cobalt	ug/m3	0.00024	U	LB<RL
1735258	AIR	M1-20171203	ICP-MS	Beryllium	ug/m3	0.00033	U	LB<RL
1735258	AIR	M1-20171203	ICP-MS	Chromium	ug/m3	0.008	U	AB>RL
1735258	AIR	M1-20171206	ICP-MS	Chromium	ug/m3	0.014	U	AB>RL
1735258	AIR	M1-20171206	ICP-MS	Cobalt	ug/m3	0.00084	U	LB<RL
1735258	AIR	M1-20171209	ICP-MS	Chromium	ug/m3	0.012	U	AB>RL
1735258	AIR	M1-20171209	ICP-MS	Cobalt	ug/m3	0.00076	U	LB<RL
1735258	AIR	M1-20171212	ICP-MS	Chromium	ug/m3	0.016	U	AB>RL
1735258	AIR	M1-20171212	ICP-MS	Cobalt	ug/m3	0.00078	U	LB<RL

SDG	Matrix	Sample ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
1801966	AIR	M1-20171215	ICP-MS	Chromium	ug/m3	0.012	U	AB>RL
1801966	AIR	M1-20171218	ICP-MS	Chromium	ug/m3	0.011	U	AB>RL
1801966	AIR	M1-20171218	ICP-MS	Manganese	ug/m3	0.00084	U	AB<RL
1801966	AIR	M1-20171221	ICP-MS	Chromium	ug/m3	0.01	U	AB>RL
1801966	AIR	M1-20171224	ICP-MS	Chromium	ug/m3	0.0092	U	AB>RL
1801966	AIR	M1-20171224	ICP-MS	Manganese	ug/m3	0.00088	U	AB<RL
1801966	AIR	M1-20171227	ICP-MS	Chromium	ug/m3	0.013	U	AB>RL
1801966	AIR	M1-20171230	ICP-MS	Chromium	ug/m3	0.018	U	AB>RL
1801966	AIR	M1-20180102	ICP-MS	Chromium	ug/m3	0.015	U	AB>RL
1801966	AIR	M1-20180105	ICP-MS	Chromium	ug/m3	0.01	U	AB>RL
1801966	AIR	M1-20180108	ICP-MS	Chromium	ug/m3	0.014	U	AB>RL
1801966	AIR	M1-20180111	ICP-MS	Chromium	ug/m3	0.016	U	AB>RL
1801966	AIR	M1-20180111	ICP-MS	Manganese	ug/m3	0.00067	U	AB<RL
1801966	AIR	M1-20180114	ICP-MS	Chromium	ug/m3	0.029	U	AB>RL

Validation Reasons:

AB<RL	The analyte was detected at a concentration less than the reporting limit in the ambient field blank
AB>RL	The analyte was detected at a concentration greater than the reporting limit in the ambient field blank
LB<RL	The analyte was detected at a concentration less than the reporting limit in the laboratory method blank
LB>RL	The analyte was detected at a concentration greater than the reporting limit in the laboratory method blank
LCS>UCL	The laboratory control sample was recovered greater than the upper control limit
LCSD>UCL	The laboratory control sample duplicate was recovered greater than the upper control limit

Validation Flags:

U	The analyte was analyzed for but was not detected above the reported sample quantitation limit or a detection in the samples was changed to a non-detected result, flagged “U” due to blank contamination.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Notes:

ug/m3	micrograms per cubic meter