Quarterly Results for the 2017-2018 Air Monitoring Program: April 16, 2018 - July 15, 2018

Prepared for

PCC Structurals, Inc.

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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
Cr	chromium
Cr^{6+}	hexavalent chromium
EPA	U.S. Environmental Protection Agency
ICP/MS	inductively coupled plasma mass spectrometry
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
RPD	relative percent difference
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 (M1), and the other ARA sampler is configured with a sampling cane and filter cartridge to collect hexavalent chromium (Cr6+) (M2). 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 April 16, 2018, and July 15, 2018. The monitoring location is shown on Figure 1.

SECTION 2

Data

CH2M conducted 30 sampling events during this reporting period. 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 April 16, 2018, through July 15, 2018
Quarterly Results for the 2017-2018 Air Monitoring Program: April 16, 2018 - July 15, 2018

Period	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
M1- Metals	30	30	100
M2 - Cr6+	30	30	100
Total	60	60	100

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 Actions April - July 2018

None.

SECTION 4

Analytical Data Quality

This quarterly report covers 60 air monitoring samples. These samples were reported under six sample delivery groups (SDGs) by the laboratories in this reporting period. 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: April 16, 2018 - July 15, 2018

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

Notes:

ASTM = ASTM International

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) detection limits; (5) 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 and 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 utilized are those listed in the NFG. The data flags are defined as follows:

- J1 = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample due to concentrations between the detection limit and quantitation limit.
- J2 = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample due to flags applied during the validation process.
- 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. Data flagged “R” should not be used in a decision-making process.
- 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 and 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, nickel, or beryllium were detected below the reporting limit (RL) in one or more laboratory method blanks (LB). A total of 13 associated detected sample results were less than or equal to five times the blank concentrations and were qualified as not detected and flagged “U.”
- Lead and manganese were detected above the RL in one or more laboratory method blanks (LB). A total of 39 associated detected sample results were less than or equal to five times the blank concentrations 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:

- Beryllium or manganese were detected below the RL in one ambient field blank (AB). Six associated detected sample results were less than or equal to five times the blank concentrations and were qualified as not detected and flagged “U.”
- Chromium was detected above the RL in one or more ABs. A total of 13 associated detected sample results were less than or equal to five times the blank concentrations 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 exceptions:

- One LCS result for beryllium had a recovery that was greater than the upper control limit. Five associated detected sample results were qualified as estimated and flagged “J.”
- The relative percent difference (RPD) between the LCS and LCS duplicate results for lead and manganese exceeded the control limit. A total of 19 associated detected sample results were 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 can be used to support the decision-making process. 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 LCS and laboratory duplicate RPDs. Precision was acceptable except that two metal compounds were qualified as estimated due to LCS RPD issues.
- 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 except that several beryllium results were qualified as estimated due to LCS recovery issues. Method and field blanks were free of contamination except that several metal compounds were 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 decision-making process.
- Representativeness of the data was verified through the sample's collection, storage, and preservation procedures and the verification of holding-time compliance. 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.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid.

SECTION 5

Summary

This report summarizes data collected for the second monitoring quarter: April 16, 2018, through July 15, 2018. Field and laboratory quality assurance procedures were acceptable during this monitoring period.

SECTION 6

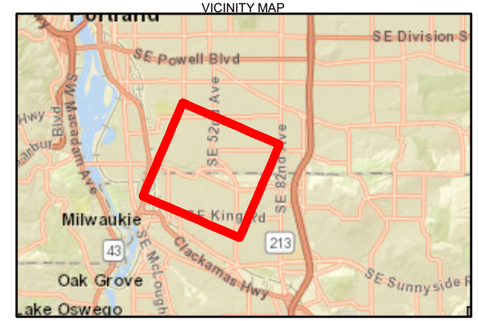
References

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 Quarterly Report – Cumulative Air Quality Monitoring Results - April 16th, 2018 to July 15th, 2018

Springwater Corridor

Data quality key

Flag	Description
J1	Estimated value. Below the quantitation limit and above the detection limit.
J2	Estimated value. Flags applied during the validation process.
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	2,000

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	0.17	0.16	0.17	6.9	0.16	0.0208	0.21	0.55	1.6	NA
Maximum Detected Amount	11	0.19	2.8	51	2.5	0.4620	9.1	18	6.4	NA
Average[1]	0.39	NA	0.17	10.43	0.21	0.044	0.68	2.21	1.72	NA
Standard Deviation[1]	0.43	NA	0.07	11.45	0.14	0.0851	0.89	3.81	0.65	NA
Times above the RBC acute	0	0	0	0	0	0	0	0	0	NA

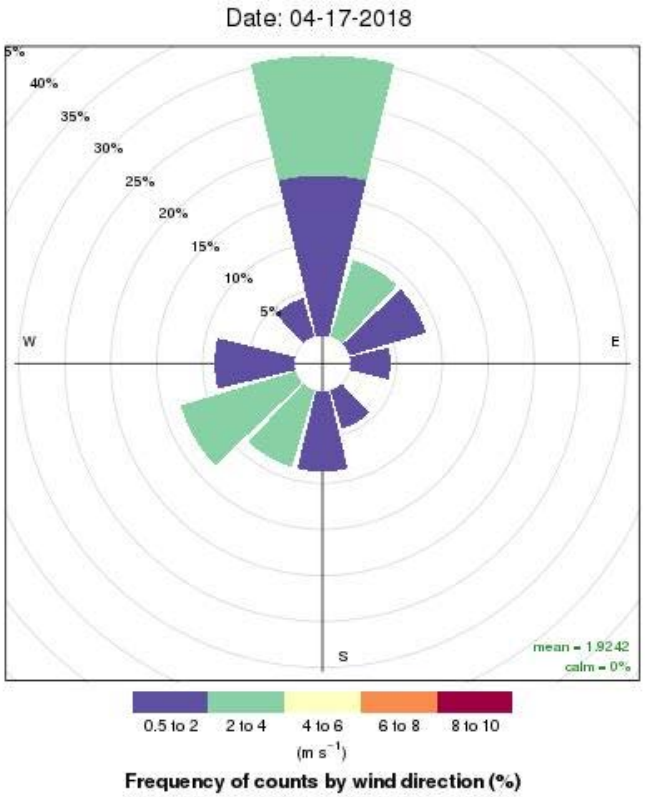
1 Calculated by using ProUCL 5, Kaplan Meier method with non-detects

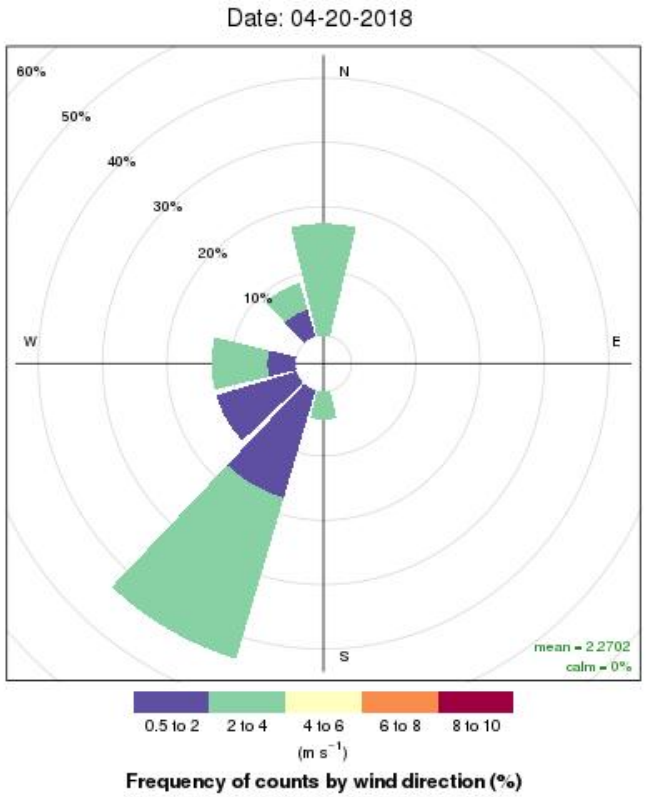
Daily Data

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)
04/17/2018	24 hr	<0.16	<0.78	<0.16	51	<0.16	<0.0208	2.3	3.2	<1.6	<6.2
04/20/2018	24 hr	<0.16	<0.78	<0.16	<1.60	<0.16	<0.0208	0.97	<0.16	<1.6	<6.2
04/23/2018	24 hr	<0.16	<0.78	0.55	38	0.94	0.214	1.1	12	5.20 J1	<6.2
04/26/2018	24 hr	<0.16	<0.78	<0.16	33	0.19 J1	<0.0208	1.7	11	<1.6	<6.2
04/29/2018	24 hr	<0.16	<0.78	<0.16	15	<0.16	<0.0208	0.76	1.1	<1.6	<6.2
05/2/2018	24 hr	<0.16	<0.78	<0.16	9.9	0.27 J1	<0.0208	2.8	9.6	<1.6	<6.2
05/5/2018	24 hr	<0.16	<0.78	<0.16	10	0.17 J1	<0.0208	3.8	6.2	<1.6	<6.2
05/8/2018	24 hr	<0.16	<0.78	<0.16	6.9	<0.16	<0.0208	0.97	4.3	<1.6	<6.2
05/11/2018	24 hr	<0.16	<0.78	<0.16	12	<0.16	<0.0208	0.95	3.6	<1.6	<6.2
05/14/2018	24 hr	<0.16	<0.78	<0.16	14	0.20 J1	<0.0208	1.4	12	<1.6	<6.2
05/17/2018	24 hr	0.19 J1	<0.16	<0.16	13	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
05/20/2018	24 hr	0.31 J1	<0.16	<0.16	11	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
05/23/2018	24 hr	0.42 J1	<0.16	<0.16	13	0.23 J1	<0.0208	<0.78	<0.78	<1.6	<6.2
05/26/2018	24 hr	1.2	<0.16	<0.16	<1.6	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
05/29/2018	24 hr	<0.16	<0.16	<0.16	11	0.16 J1	0.0208 J1	<0.78	<0.78	<1.6	<6.2
06/01/2018	24 hr	1.1	<0.16	<0.16	14	0.17 J1	0.0569 J1	<0.78	<0.78	<1.6	<6.2
06/04/2018	24 hr	0.22 J1	<0.16	<0.16	12	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
06/07/2018	24 hr	0.33 J1	<0.16	<0.16	10	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
06/10/2018	24 hr	0.74	<0.16	<0.16	10	<0.16	0.0326 J1	<0.78	<0.78	<1.6	<6.2
06/13/2018	24 hr	0.18 J1	<0.16	<0.16	10	<0.16	<0.0208	<0.78	<0.78	<1.6	<6.2
06/16/2018	24 hr	1.8	<0.16	<0.16	<1.6	0.2 J1	<0.0208	<0.16	<0.16	<1.6	<6.2
06/19/2018	24 hr	0.31 J1	<0.16	<0.16	<1.6	0.37 J1	<0.0208	<0.16	<0.16	<1.6	<6.2
06/22/2018	24 hr	0.29 J1	<0.16	<0.16	<1.6	0.18 J1	<0.0208	<0.16	<0.16	<1.6	<6.2
06/25/2018	24 hr	0.21 J1	<0.16	<0.16	<1.6	<0.16	<0.0208	<0.16	<0.16	<1.6	<6.2
06/28/2018	24 hr	0.26 J1	<0.16	<0.16	<1.6	<0.16	<0.0208	<0.16	<0.16	<1.6	<6.2
07/01/2018	24 hr	<0.16	<0.16	<0.16	<1.6	0.23 J1	<0.0208	<0.16	<0.16	<1.6	<6.2
07/04/2018	24 hr	1.5	<0.16	<0.16	<1.6	0.16 J1	0.462	<0.16	<0.16	<1.6	<6.2
07/07/2018	24 hr	0.17 J1	<0.16	<0.16	<1.6	<0.16	<0.0208	<0.16	<0.16	<1.6	<6.2
07/10/2018	24 hr	0.2 J1	<0.16	<0.16	<1.6	0.2 J1	<0.0208	<0.16	<0.16	<1.6	<6.2
07/13/2018	24 hr	0.21 J1	<0.16	<0.16	<1.6	0.31 J1	0.034 J1	<0.16	<0.16	<1.6	<6.2

Wind Roses

Wind speed and direction data are collected in the Oregon DEQ air quality monitoring station located in SE Lafayette in SE Portland.





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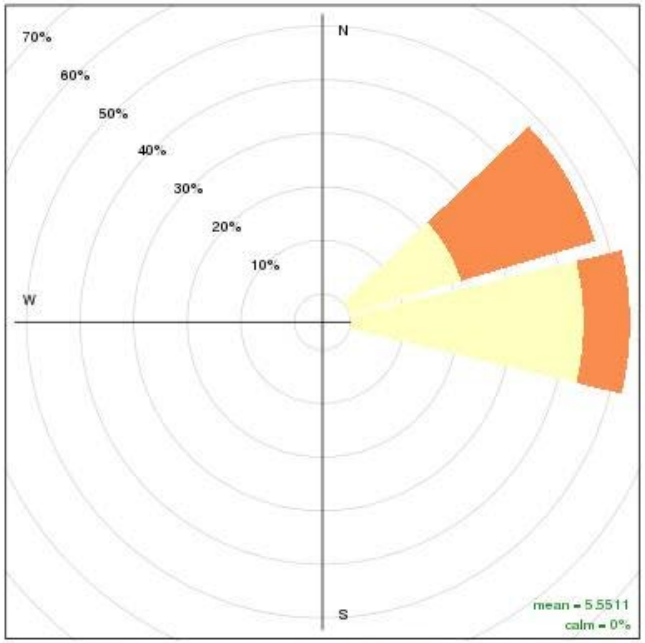
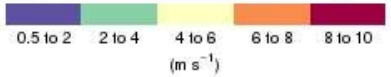
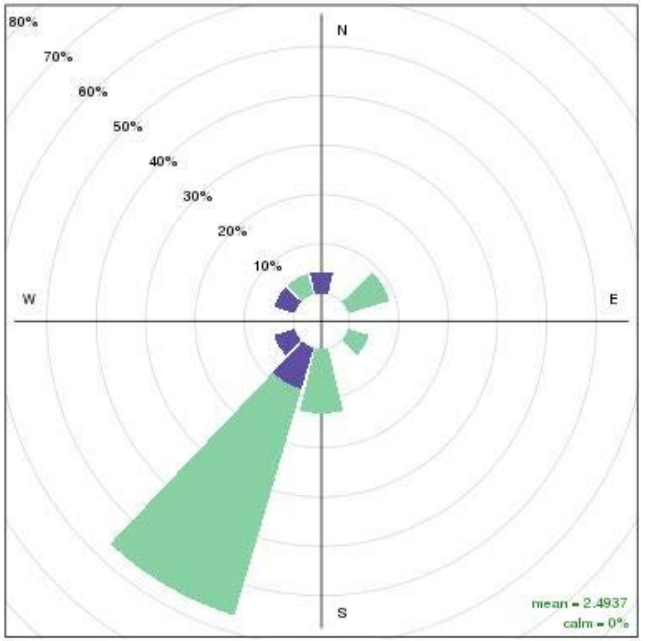
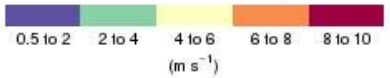




Frequency of counts by wind direction (%)

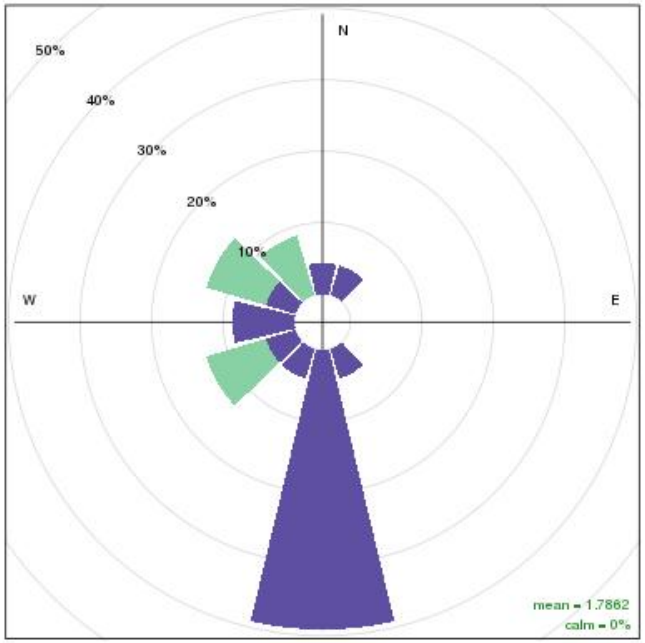
Date: 04-26-2018





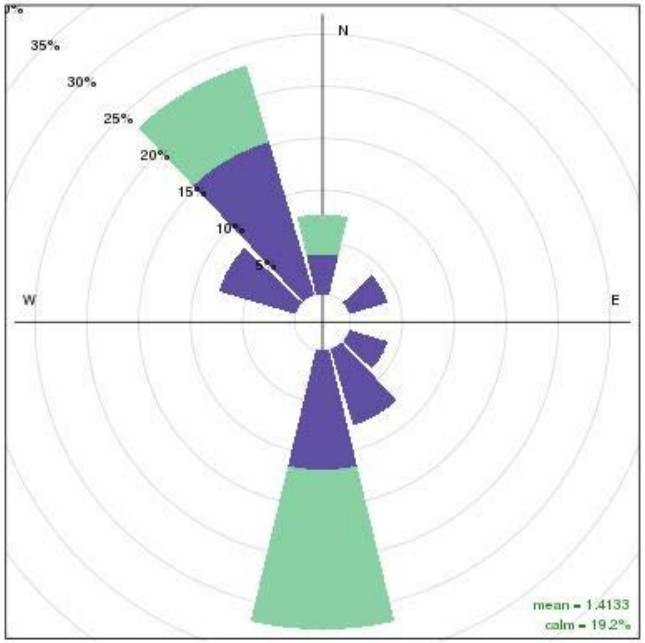
Frequency of counts by wind direction (%)

Date: 04-29-2018



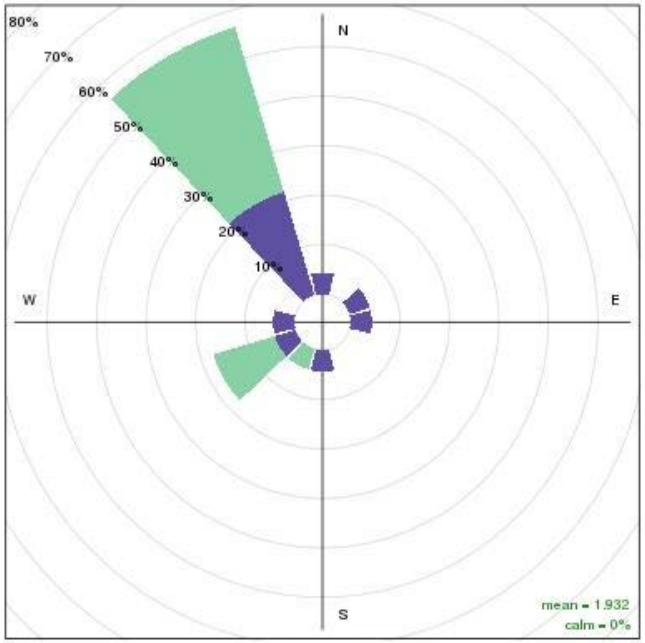
Frequency of counts by wind direction (%)

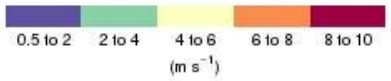
Date: 05-02-2018



Frequency of counts by wind direction (%)

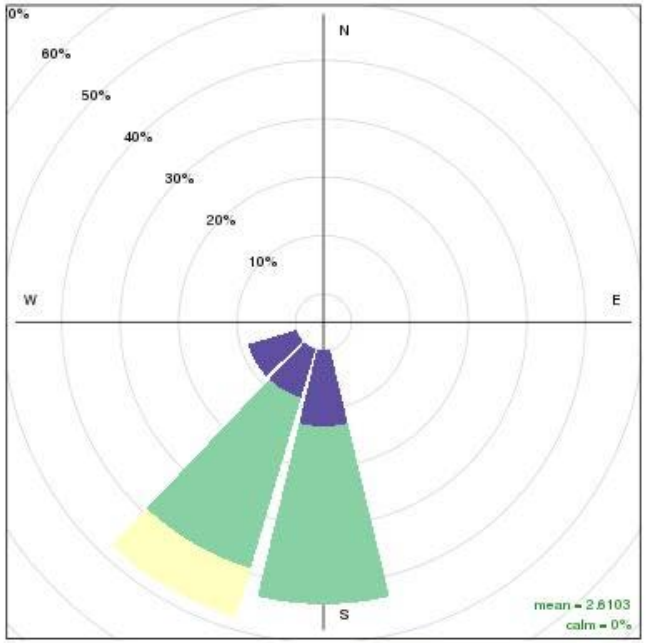
Date: 05-05-2018

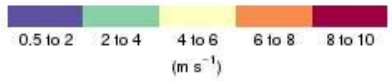




Frequency of counts by wind direction (%)

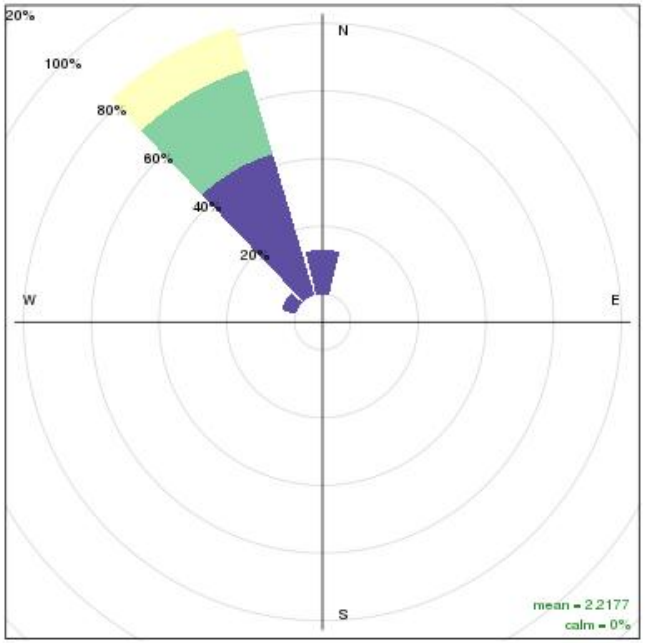
Date: 05-08-2018

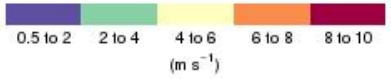




Frequency of counts by wind direction (%)

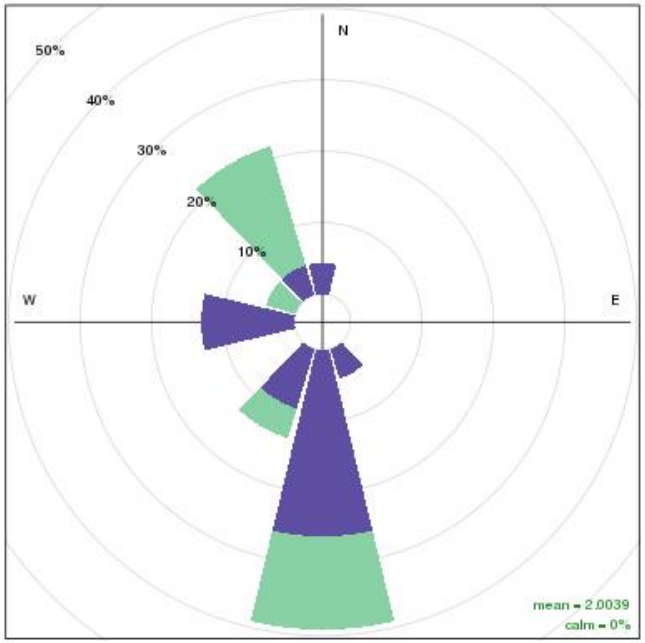
Date: 05-11-2018

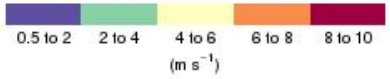




Frequency of counts by wind direction (%)

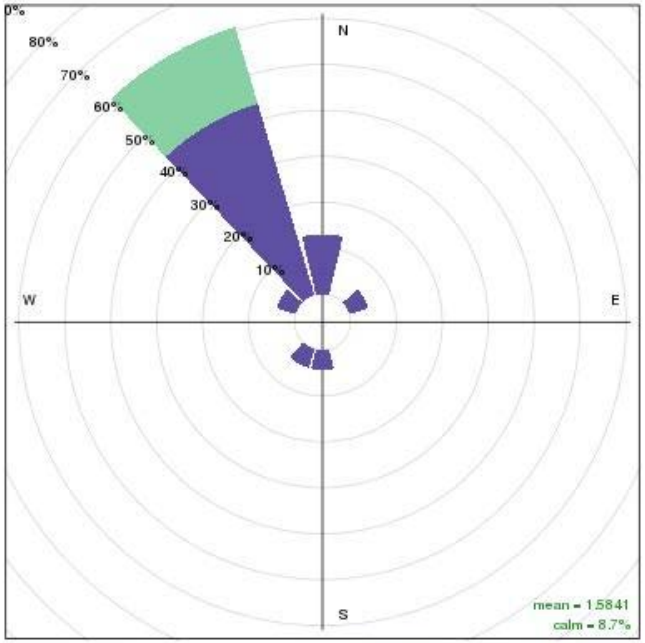
Date: 05-14-2018

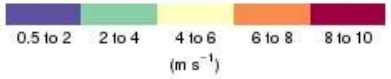




Frequency of counts by wind direction (%)

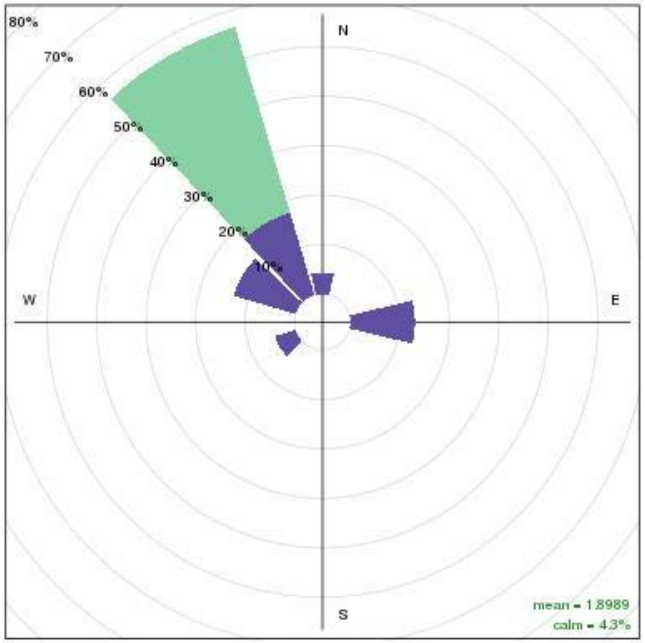
Date: 05-17-2018

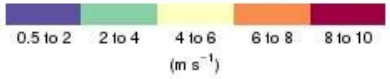




Frequency of counts by wind direction (%)

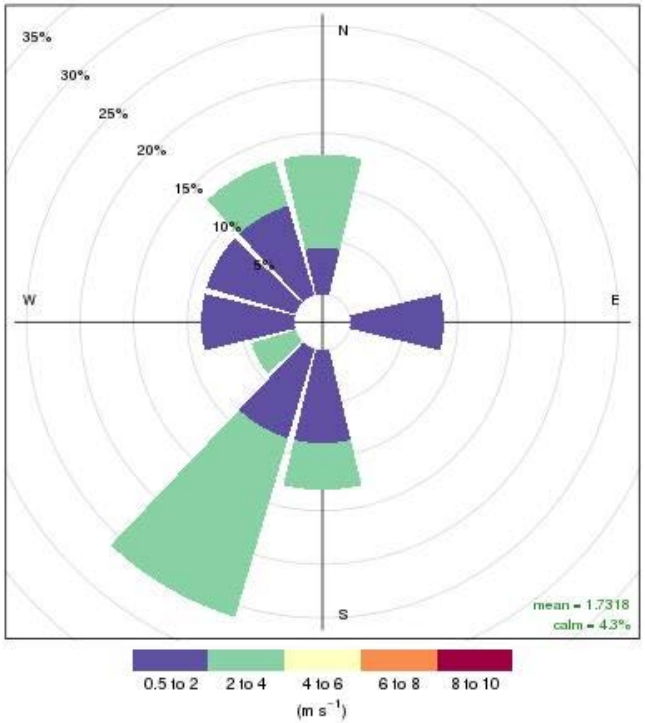
Date: 05-20-2018





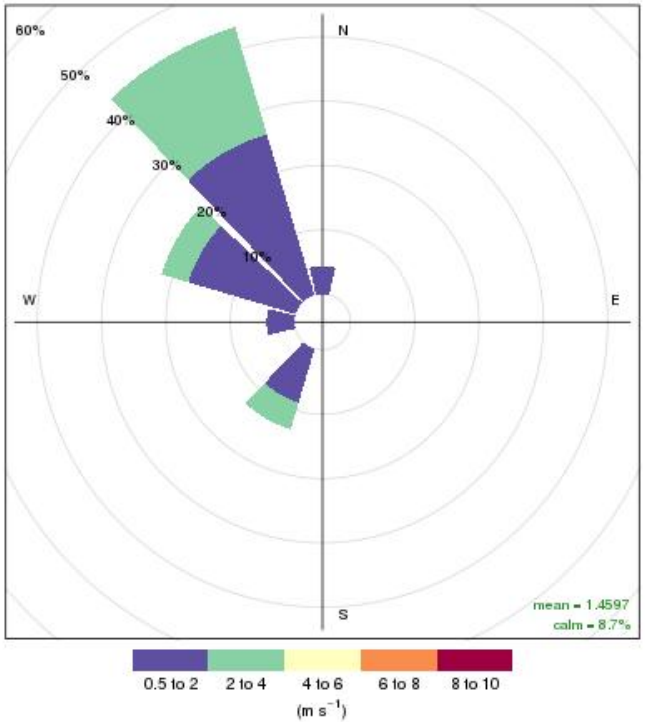
Frequency of counts by wind direction (%)

Date: 05-23-2018



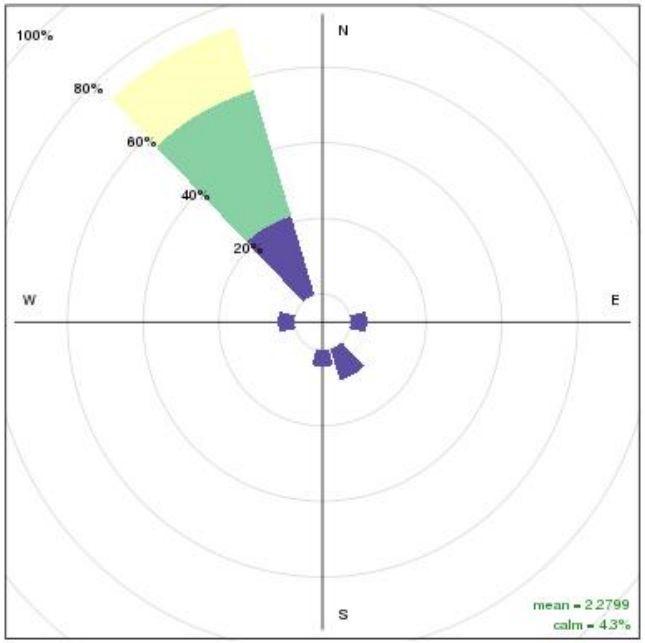
Frequency of counts by wind direction (%)

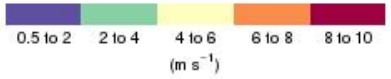
Date: 05-26-2018



Frequency of counts by wind direction (%)

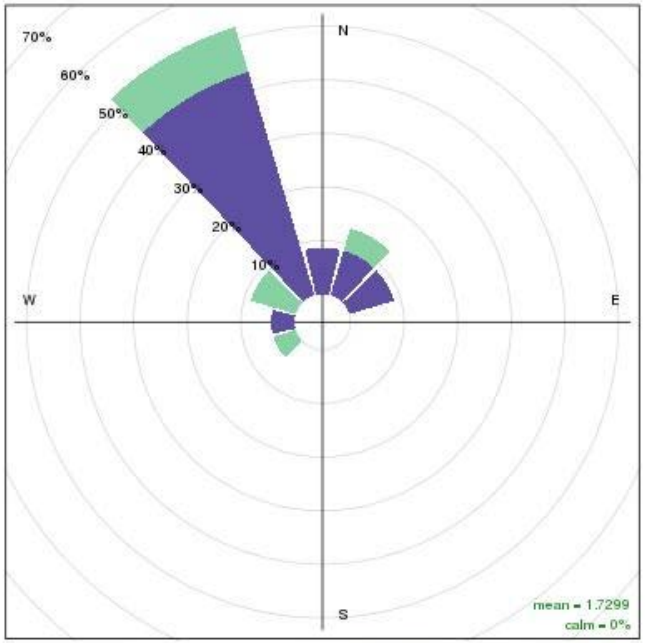
Date: 05-29-2018

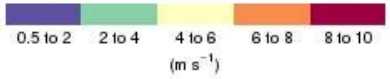




Frequency of counts by wind direction (%)

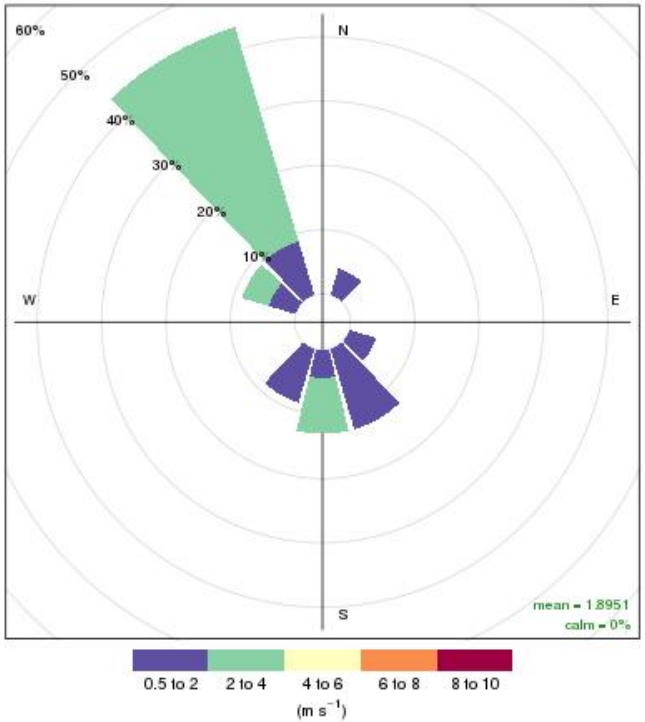
Date: 06-01-2018





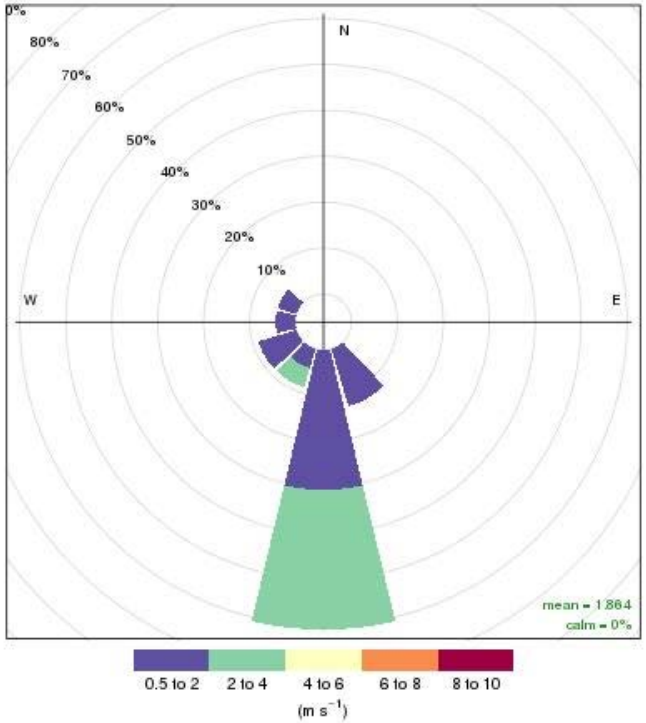
Frequency of counts by wind direction (%)

Date: 06-04-2018



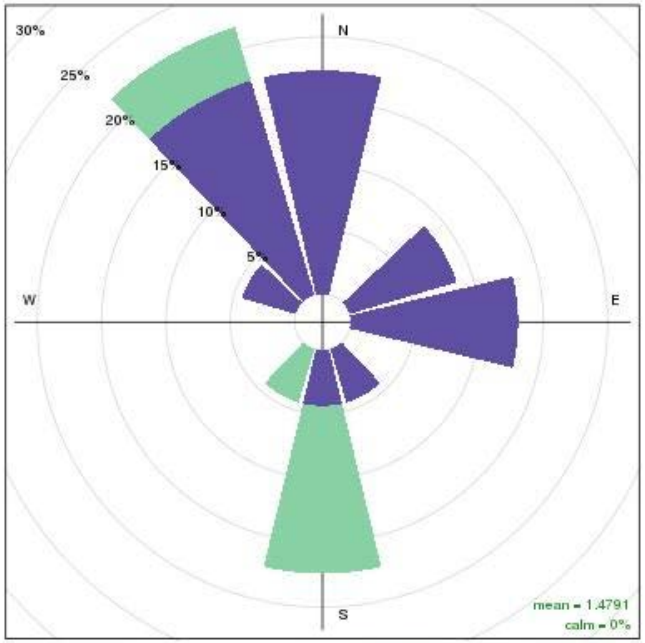
Frequency of counts by wind direction (%)

Date: 06-07-2018



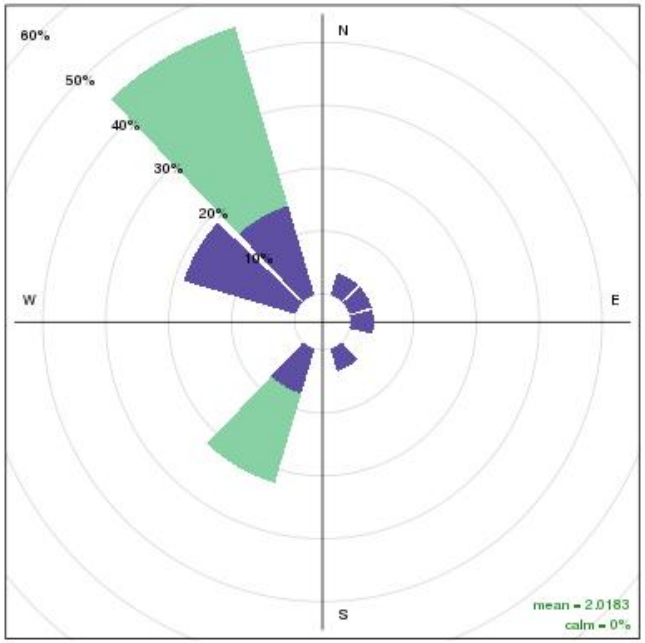
Frequency of counts by wind direction (%)

Date: 06-10-2018



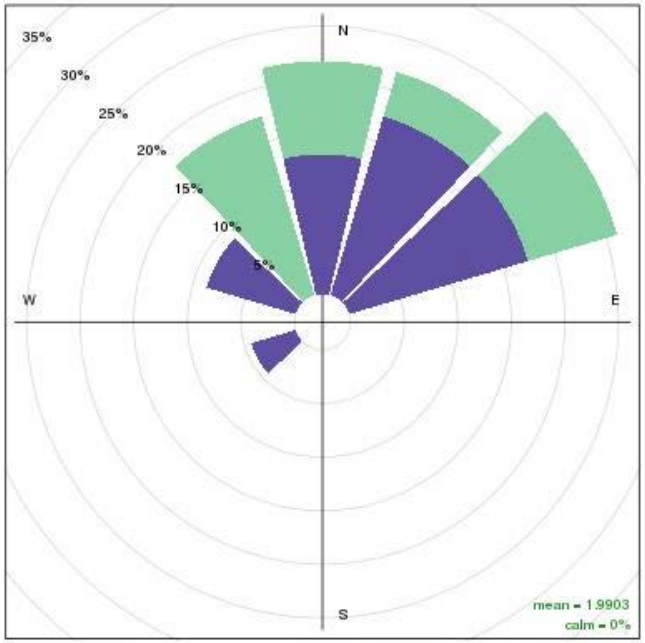
Frequency of counts by wind direction (%)

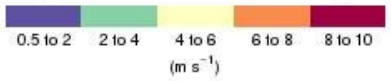
Date: 06-13-2018



Frequency of counts by wind direction (%)

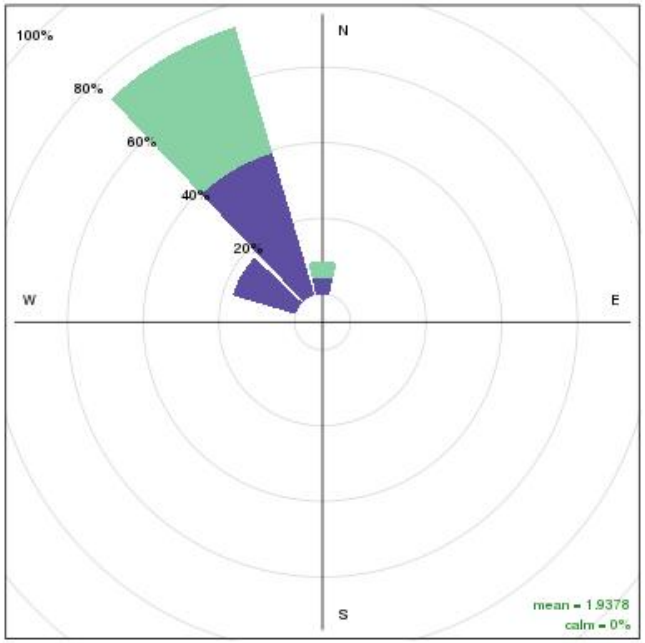
Date: 06-16-2018

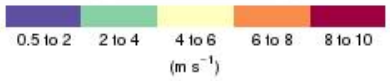




Frequency of counts by wind direction (%)

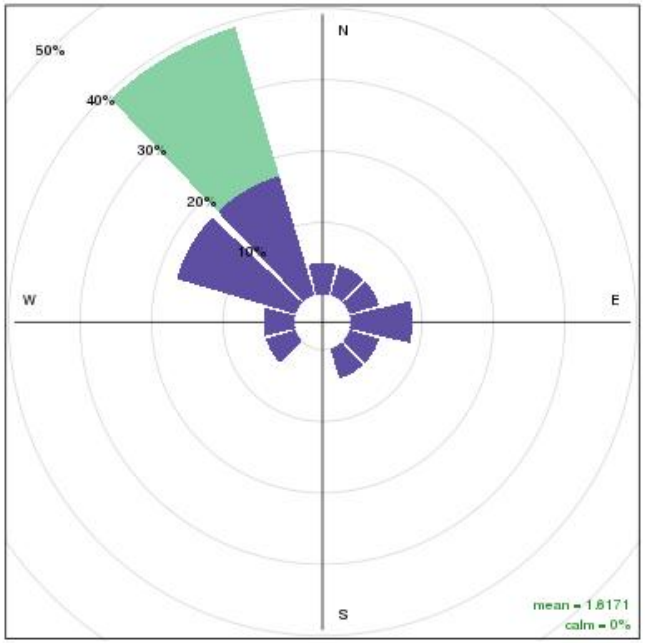
Date: 06-19-2018

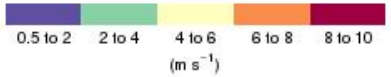




Frequency of counts by wind direction (%)

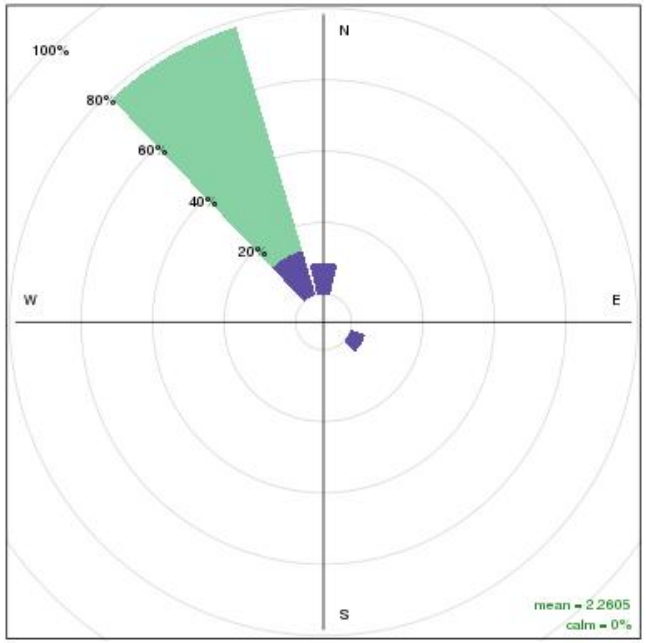
Date: 06-22-2018

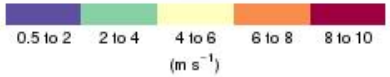




Frequency of counts by wind direction (%)

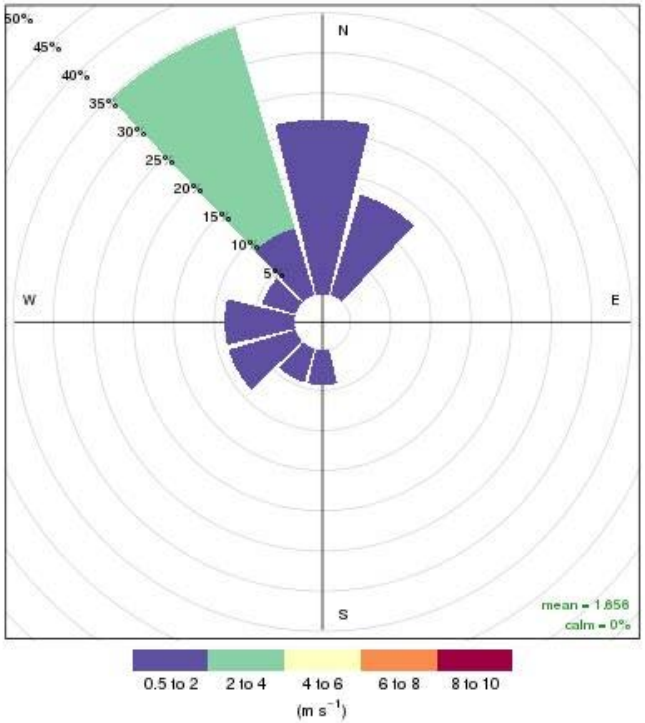
Date: 06-25-2018





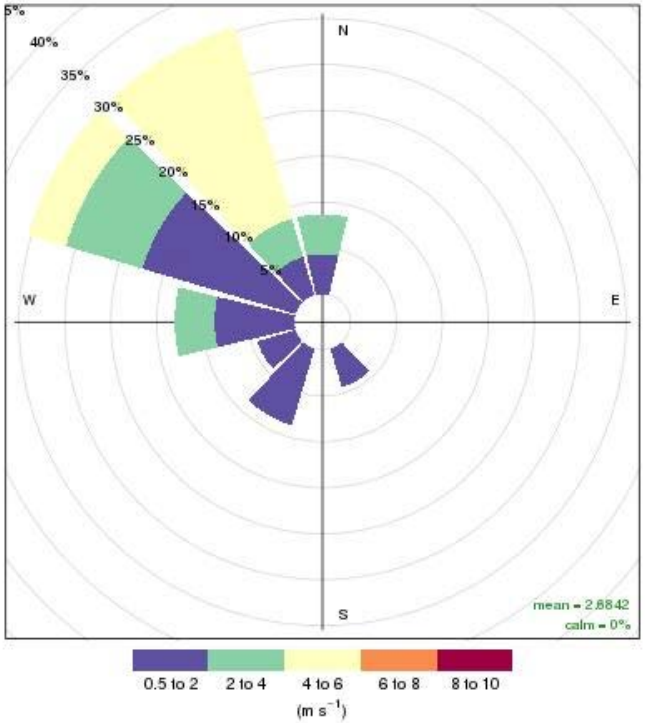
Frequency of counts by wind direction (%)

Date: 06-28-2018



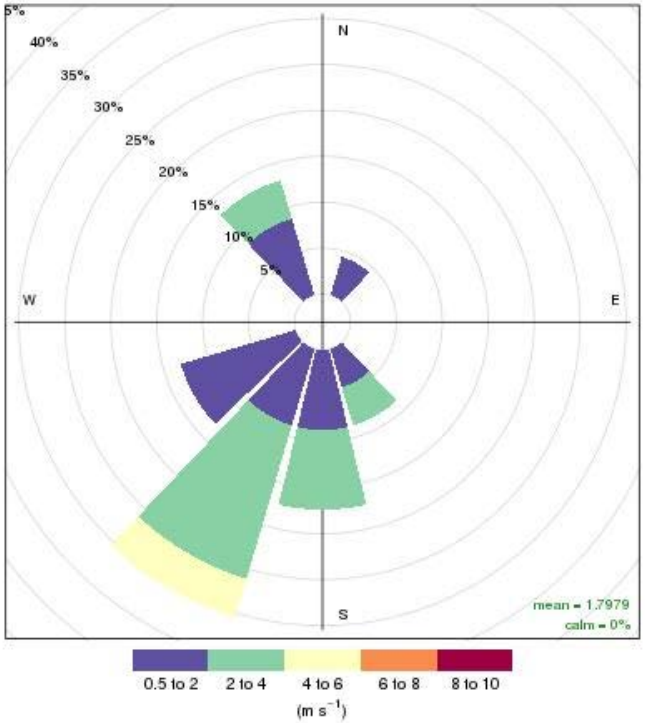
Frequency of counts by wind direction (%)

Date: 07-01-2018

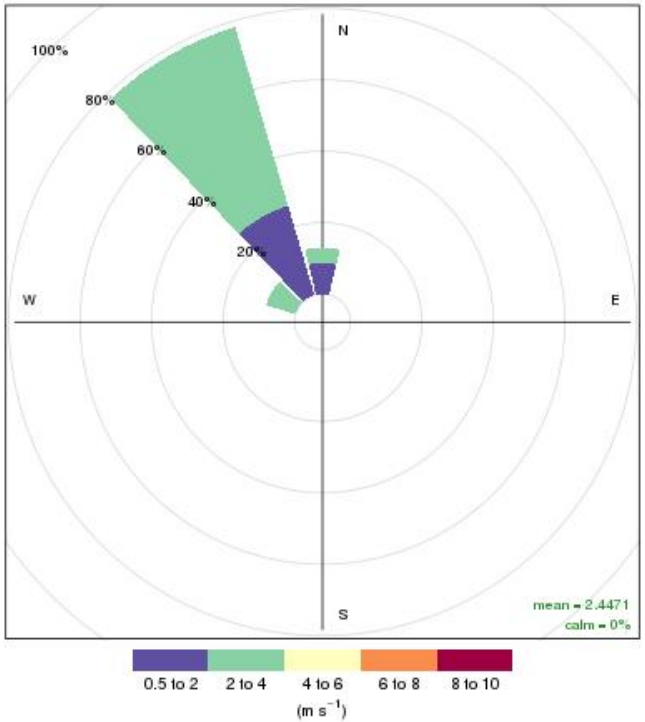


Frequency of counts by wind direction (%)

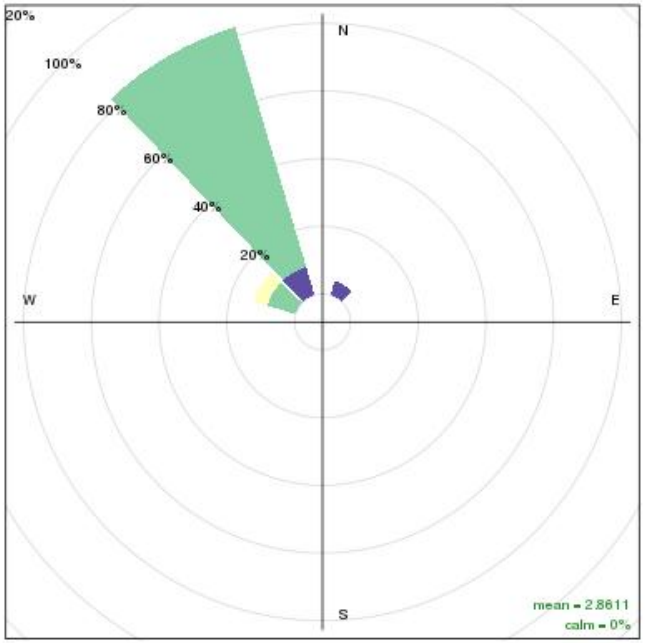
Date: 07-04-2018

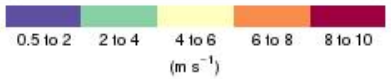


Date: 07-07-2018



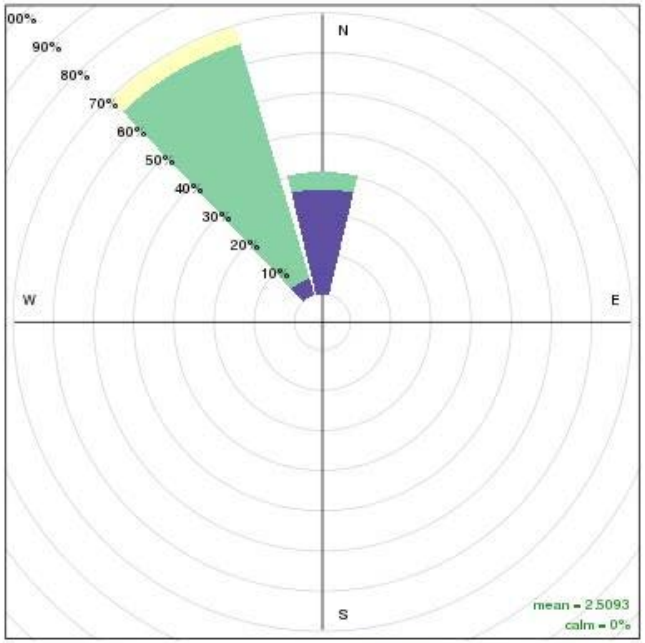
Date: 07-10-2018

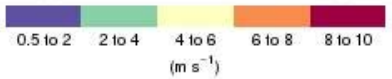




Frequency of counts by wind direction (%)

Date: 07-13-2018





Frequency of counts by wind direction (%)

Appendix B
Monthly Flow Verifications

Calibration Worksheet

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Shannon Bartow	**Flow Std:**	FTS	**Serial No:**	16005
Date:	4/18/2018	**Temp Std:**	FTS	**Serial No:**	16005
Time:	13:10	**Pressure Std:**	FTS	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	763	**FTS Temperature (°C)**	15.3
Sampler Pressure (mmHg)	763	**Sampler Temperature (°C)**	15.1
Barometric Pressure Offset	0	**Temperature Offset:**	0.2

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.58	14.6	14.62120819	0.02120819	0.145261599
15.5	15.5	15.6	15.58063286	-0.01936714	-0.124148313
16.5	16.51	16.63	16.63391429	0.00391429	0.023537548
17.5	17.5	17.7	17.66633867	-0.03366133	-0.190177022
18.5	18.47	18.65	18.67790598	0.02790598	0.14962993

Slope	1.042852902
Intercept	-0.583587117

	Indicated Flow (Sampler)	Actual Flow (FTS)	
Flowrate Before	--	--	lpm
Flowrate After	NA	NA	lpm

Calibration Worksheet

Air Monitor: M1

Site Information

Location:	Portland, OR	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	S Bartow	**Flow Std:**	FTS-A	**Serial No:**	16005
Date:	4/21/2018	**Temp Std:**	FTS-A	**Serial No:**	16005
Time:	15:16	**Pressure Std:**	FTS-A	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	769	**FTS Temperature (°C)**	18.3
Sampler Pressure (mmHg)	769	**Sampler Temperature (°C)**	18.2
Barometric Pressure Offset	0	**Temperature Offset:**	0.1

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.53	14.53	14.56044238	0.03044238	0.209513939
15.5	15.49	15.54	15.54255325	0.00255325	0.016430211
16.5	16.51	16.66	16.58604606	-0.07395394	-0.443901174
17.5	17.5	17.58	17.59884791	0.01884791	0.107212223
18.5	18.51	18.61	18.6321104	0.0221104	0.118809224

Slope	1.023032166
Intercept	-0.304214999

Flow Verification PM10

Site Information

Location:	Portland, OR	**Sampler:**	N-FRM	**Serial No:**	16005
Tech:	P Molzahn	**Flow Std:**	FTS-A	**Serial No:**	16005
Date:	5/30/2018	**Temp Std:**	FTS-A	**Serial No:**	16005
Time:	12:30	**Pressure Std:**	FTS-A	**Serial No:**	16005

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.69	16.71	0.12	4%	pass
Temp (^{O}C)	15.5	15.2	0.30	2^{o}C	pass
Pressure (mmHg)	758	758	0.00	10 mmHg	pass
Clock Time	12:30	12:30	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Calibration Worksheet

Site Information

Location:	M1	**Sampler:**	N-FRM	**Serial No:**	16021
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	6/26/2018	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:40	**Pressure Std:**	FTS	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	764	**FTS Temperature (°C)**	21.7
Sampler Pressure (mmHg)	764	**Sampler Temperature (°C)**	21.7
Barometric Pressure Offset	0	**Temperature Offset:**	0

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.51	14.49	14.49635265	0.00635265	0.043841621
15.5	15.45	15.46	15.44375875	-0.01624125	-0.105053379
16.5	16.51	16.49	16.5121103	0.0221103	0.134083102
17.5	17.51	17.54	17.51998913	-0.02001087	-0.114087059
18.5	18.5	18.51	18.51778917	0.00778917	0.042080864

Slope	1.007878826
Intercept	-0.127969119

	Indicated Flow (Sampler)	Actual Flow (FTS)	
Flowrate Before	16.72	16.74	lpm
Flowrate After	NA	NA	lpm

Calibration Worksheet

Site Information

Location:	M2	**Sampler:**	N-FRM	**Serial No:**	16020
Tech:	Jeff Kosta	**Flow Std:**	FTS	**Serial No:**	16005
Date:	6/26/2018	**Temp Std:**	FTS	**Serial No:**	16005
Time:	12:45	**Pressure Std:**	FTS	**Serial No:**	16005

Site Conditions

FTS Pressure (mmHg)	764	**FTS Temperature (°C)**	20.5
Sampler Pressure (mmHg)	765	**Sampler Temperature (°C)**	20.6
Barometric Pressure Offset	-1	**Temperature Offset:**	-0.1

Calibration Information

Set Flow Rate	Indicated Flow (Sampler)	Actual Flow (FTS)	Adjusted Flow	Difference	Percent Error
14.5	14.51	14.66	14.68636155	0.02636155	0.17981955
15.5	15.47	15.7	15.65298752	-0.04701248	-0.299442576
16.5	16.49	16.66	16.68002761	0.02002761	0.120213735
17.5	17.49	17.69	17.68692966	-0.00307034	-0.017356361
18.5	18.47	18.67	18.67369367	0.00369367	0.019783987

Slope	1.006902052
Intercept	0.076212777

	Indicated Flow (Sampler)	Actual Flow (FTS)	
Flowrate Before	15.00	15.20	lpm
Flowrate After	NA	NA	lpm

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:	6/15/2015	**Temp Std:**	Delta Cal	**Serial No:**	605
Time:	13:30	**Pressure Std:**	Delta Cal	**Serial No:**	605

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	16.72	16.93	1.24	4%	pass
Temp (^{O}C)	18.5	18.8	0.30	2^{o}C	pass
Pressure (mmHg)	758	756.5	1.50	10 mmHg	pass
Clock Time	13:32	13:32	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:	6/15/2018	**Temp Std:**	Delta Cal	**Serial No:**	605
Time:	13:40	**Pressure Std:**	Delta Cal	**Serial No:**	605

Calibration Information

Action	Indicated (Sampler)	Actual (FTS)	Error	Control Limits	Pass/Fail
Flow Rate (LPM)	15.03	15.34	2.02	4%	pass
Temp (^{O}C)	18.8	18.7	0.10	2^{o}C	pass
Pressure (mmHg)	759	756.5	2.50	10 mmHg	pass
Clock Time	13:40	13:40	0.00	2 min/mo	pass
Leak Check	NA	0	NA	1 LPM	pass

Appendix D
Data Qualifiers

Appendix D. Data Qualifiers

2017-2018 Air Monitoring Program, PCC Structurals, Inc., Portland, Oregon

SDG	Matrix	Sample ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
1813836	AIR	M1-20180417_Port	ICP-MS	Arsenic	µg/m3	0.00047	U	LB<RL
1813836	AIR	M1-20180420	ICP-MS	Arsenic	µg/m3	0.0004	U	LB<RL
1813836	AIR	M1-20180420	ICP-MS	Cadmium	µg/m3	0.00025	U	AB>RL
1813836	AIR	M1-20180420	ICP-MS	Chromium	µg/m3	0.03	U	AB>RL
1813836	AIR	M1-20180420	ICP-MS	Manganese	µg/m3	0.0045	U	AB<RL
1813836	AIR	M1-20180423_Port	ICP-MS	Arsenic	µg/m3	0.00024	U	LB<RL
1813836	AIR	M1-20180426	ICP-MS	Arsenic	µg/m3	0.0013	U	LB<RL
1813836	AIR	M1-20180502	ICP-MS	Arsenic	µg/m3	0.00076	U	LB<RL
1813836	AIR	M1-20180505	ICP-MS	Arsenic	µg/m3	0.0013	U	LB<RL
1813836	AIR	M1-20180511	ICP-MS	Arsenic	µg/m3	0.00023	U	LB<RL
1817145	AIR	M1-20180517	ICP-MS	Lead	µg/m3	0.0012	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180517	ICP-MS	Manganese	µg/m3	0.0076	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180520	ICP-MS	Lead	µg/m3	0.001	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180520	ICP-MS	Manganese	µg/m3	0.0048	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180523	ICP-MS	Lead	µg/m3	0.0017	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180523	ICP-MS	Manganese	µg/m3	0.012	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180526	ICP-MS	Chromium	µg/m3	0.011	U	AB>RL
1817145	AIR	M1-20180526	ICP-MS	Lead	µg/m3	0.0021	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180526	ICP-MS	Manganese	µg/m3	0.0037	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180529	ICP-MS	Lead	µg/m3	0.00077	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180529	ICP-MS	Manganese	µg/m3	0.0085	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180601	ICP-MS	Lead	µg/m3	0.0027	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180601	ICP-MS	Manganese	µg/m3	0.013	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180601	ICP-MS	Nickel	µg/m3	0.0016	U	LB<RL
1817145	AIR	M1-20180604	ICP-MS	Lead	µg/m3	0.00077	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180604	ICP-MS	Manganese	µg/m3	0.007	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180607	ICP-MS	Lead	µg/m3	0.0022	U	LB>RL; LCSRPD (J2)

Appendix D. Data Qualifiers

2017-2018 Air Monitoring Program, PCC Structurals, Inc., Portland, Oregon

SDG	Matrix	Sample ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
1817145	AIR	M1-20180607	ICP-MS	Manganese	µg/m3	0.007	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180610	ICP-MS	Lead	µg/m3	0.0019	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180610	ICP-MS	Manganese	µg/m3	0.0028	U	LB>RL; LCSRPD (J2)
1817145	AIR	M1-20180613	ICP-MS	Manganese	µg/m3	0.007	U	LB>RL; LCSRPD (J2)
1820027	AIR	M1-20180616	ICP-MS	Chromium	µg/m3	0.012	U	AB>RL
1820027	AIR	M1-20180616	ICP-MS	Lead	µg/m3	0.0026	U	LB>RL
1820027	AIR	M1-20180616	ICP-MS	Manganese	µg/m3	0.007	U	LB>RL
1820027	AIR	M1-20180619	ICP-MS	Beryllium	µg/m3	0.00017	U	LB<RL; LCS>UCL (J2)
1820027	AIR	M1-20180619	ICP-MS	Beryllium	µg/m3	0.00017	U	AB<RL; LB<RL
1820027	AIR	M1-20180619	ICP-MS	Chromium	µg/m3	0.0095	U	AB>RL
1820027	AIR	M1-20180619	ICP-MS	Lead	µg/m3	0.0016	U	LB>RL
1820027	AIR	M1-20180619	ICP-MS	Manganese	µg/m3	0.02	U	LB>RL
1820027	AIR	M1-20180622	ICP-MS	Beryllium	µg/m3	0.00029	U	AB<RL; LB<RL; LCS>UCL (J2)
1820027	AIR	M1-20180622	ICP-MS	Chromium	µg/m3	0.0097	U	AB>RL
1820027	AIR	M1-20180622	ICP-MS	Lead	µg/m3	0.00094	U	LB>RL
1820027	AIR	M1-20180622	ICP-MS	Manganese	µg/m3	0.0053	U	LB>RL
1820027	AIR	M1-20180625	ICP-MS	Beryllium	µg/m3	0.00027	U	AB<RL; LB<RL; LCS>UCL (J2)
1820027	AIR	M1-20180625	ICP-MS	Chromium	µg/m3	0.0087	U	AB>RL
1820027	AIR	M1-20180625	ICP-MS	Lead	µg/m3	0.00083	U	LB>RL
1820027	AIR	M1-20180625	ICP-MS	Manganese	µg/m3	0.0072	U	LB>RL
1820027	AIR	M1-20180628	ICP-MS	Beryllium	µg/m3	0.00021	U	AB<RL; LB<RL; LCS>UCL (J2)
1820027	AIR	M1-20180628	ICP-MS	Chromium	µg/m3	0.012	U	AB>RL
1820027	AIR	M1-20180628	ICP-MS	Lead	µg/m3	0.00094	U	LB>RL
1820027	AIR	M1-20180628	ICP-MS	Manganese	µg/m3	0.006	U	LB>RL
1820027	AIR	M1-20180701	ICP-MS	Chromium	µg/m3	0.011	U	AB>RL
1820027	AIR	M1-20180701	ICP-MS	Lead	µg/m3	0.00053	U	LB>RL
1820027	AIR	M1-20180701	ICP-MS	Manganese	µg/m3	0.0043	U	LB>RL
1820027	AIR	M1-20180704	ICP-MS	Chromium	µg/m3	0.02	U	AB>RL
1820027	AIR	M1-20180704	ICP-MS	Lead	µg/m3	0.0036	U	LB>RL

Appendix D. Data Qualifiers

2017-2018 Air Monitoring Program, PCC Structurals, Inc., Portland, Oregon

SDG	Matrix	Sample ID	Method	Analyte	Units	Final Result	Validation Flag	Validation Reason
1820027	AIR	M1-20180704	ICP-MS	Manganese	µg/m3	0.014	U	LB>RL
1820027	AIR	M1-20180707	ICP-MS	Chromium	µg/m3	0.011	U	AB>RL
1820027	AIR	M1-20180707	ICP-MS	Lead	µg/m3	0.001	U	LB>RL
1820027	AIR	M1-20180707	ICP-MS	Manganese	µg/m3	0.0036	U	LB>RL
1820027	AIR	M1-20180710	ICP-MS	Beryllium	µg/m3	0.00017	U	AB<RL; LB<RL; LCS>UCL (J2)
1820027	AIR	M1-20180710	ICP-MS	Chromium	µg/m3	0.0072	U	AB>RL
1820027	AIR	M1-20180710	ICP-MS	Lead	µg/m3	0.0013	U	LB>RL
1820027	AIR	M1-20180710	ICP-MS	Manganese	µg/m3	0.0085	U	LB>RL
1820027	AIR	M1-20180713	ICP-MS	Chromium	µg/m3	0.021	U	AB>RL
1820027	AIR	M1-20180713	ICP-MS	Lead	µg/m3	0.0018	U	LB>RL
1820027	AIR	M1-20180713	ICP-MS	Manganese	µg/m3	0.0088	U	LB>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.
LCSRPD	The relative percent difference between laboratory control sample and the associated duplicate was greater than the 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 nondetected 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.

Note:

µg/m3	micrograms per cubic meter