



Wood Buffalo Environmental Association

JUNE 2017 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
July 27, 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta



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July 27, 2017

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**RE: Monthly Ambient Air Quality Monitoring Report June 2017
Wood Buffalo Environmental Association**

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Enclosed is the June 2017 Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Wood Buffalo Environmental Association regional air quality monitoring network.

The continuous ambient air quality monitoring network stations are:

AMS 1 - Fort McKay – Bertha Ganter
AMS 2 - Mildred Lake
AMS 3 - Lower Camp B (meteorology)
AMS 4 - Buffalo Viewpoint
AMS 5 - Mannix
AMS 6 - Patricia McInnes
AMS 7 - Athabasca Valley
AMS 8 - Fort Chipewyan
AMS 9 - Barge Landing
AMS 11 - Lower Camp (air quality)
AMS 13 - Fort McKay South
AMS 14 - Anzac
AMS 15 - Horizon
AMS 16 - Muskeg River
AMS 17 - Wapasu
AMS 18 - Stony Mountain
AMS 19 - Firebag
AMS 20 - MacKay River
AMS 21 - Conklin
AMS 22 – Janvier
AMS 23 – Fort Hills
AMS 500 - Christina Lake
AMS 502 - Surmont

This report is submitted by WBEA on behalf its members and for some members to satisfy the requirements contained in their EPEA Approvals (as amended):



Member	EPEA Approval No.
Athabasca Oil Corporation	289664-00-00; 241311-00-00
Brion Energy	254465-00-00
Canadian Natural Resources Ltd.	149968-01-00
Cenovus Energy	48522-01-00
Connacher Oil and Gas Ltd.	240008-00-00
ConocoPhillips Canada	48263-01-00
Devon Canada Corporation	224816-00-00
Finning Canada Ltd.	Not Applicable
Fort Hills Energy Corporation	151469-01-00
Hammerstone Corporation	189942-00-00
Husky Oil Operations Ltd.	206355-01-00
Imperial Oil Ltd.	00046586-00-00
Inter Pipeline Offgas Ltd.	73203-02-00
MEG Energy Corporation	00216466-01-00
Nexen Energy ULC.	137467-01-00; 236394-00-00
Shell Canada Energy	20809-01-00
Suncor Energy Inc.	094-02-00
Sunshine Oilsands Ltd.	305529-00-00
Syncrude Canada Ltd.	026-02-00
Teck Resources Ltd.	EIA Application
Total E&P Canada Ltd.	228044-00-00

Government and Non-Industrial Organizations

Alberta Energy Regulator
Alberta Environment & Parks
Alberta Health Services
Alberta Health & Wellness
Environment Canada
Health Canada
Parks Canada
Pembina Institute for Appropriate Development
Regional Municipality of Wood Buffalo
Saskatchewan Environment

Aboriginal Communities

Chipewyan Prairie Dene First Nation	Fort McKay Métis Local 63
Christina River Dene Nation Council	Fort McMurray First Nation 468
Fort McKay First Nation	Fort McMurray Métis Local 1935

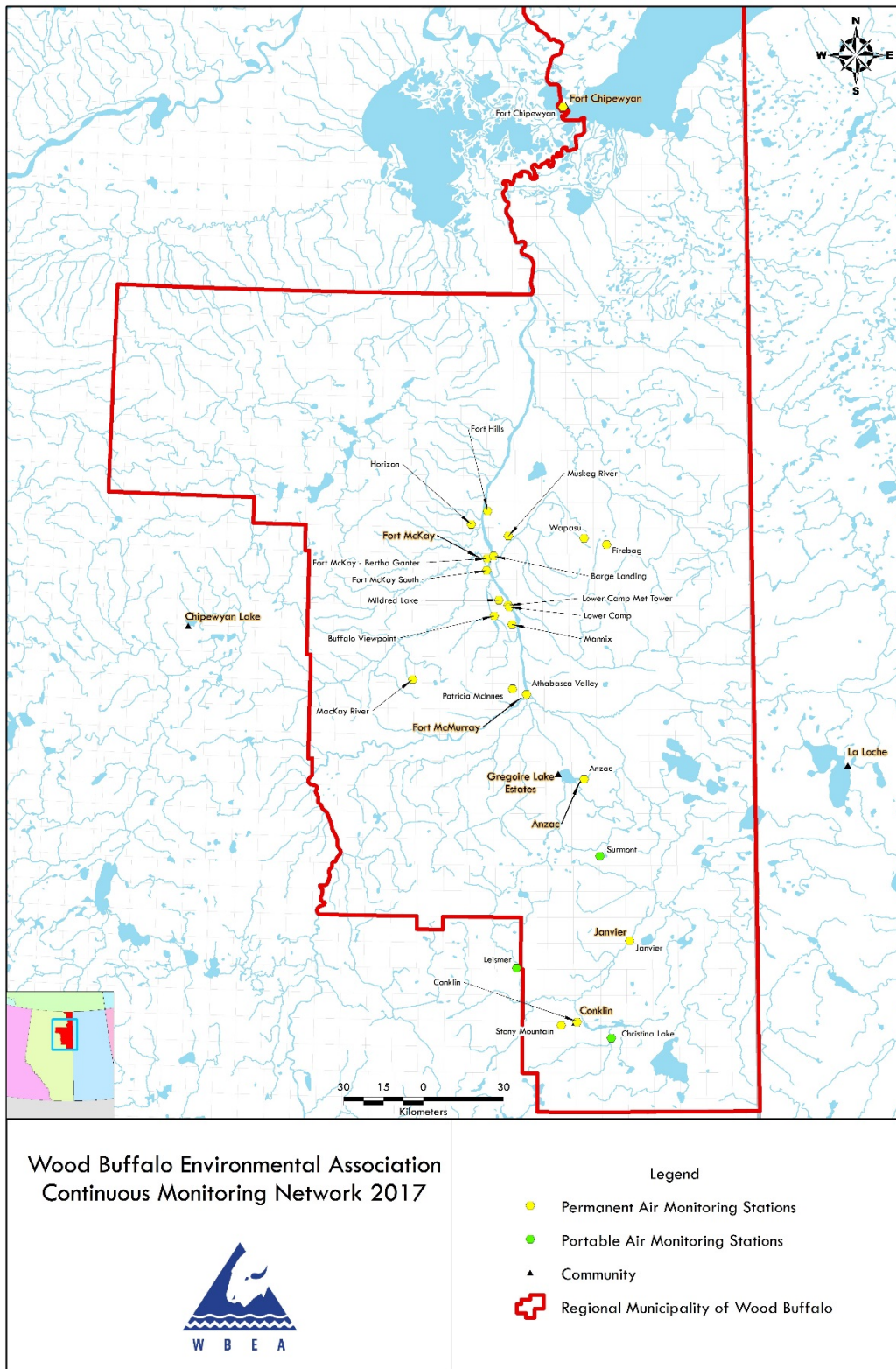


Figure 1: Map of WBEA Continuous Monitoring Network.

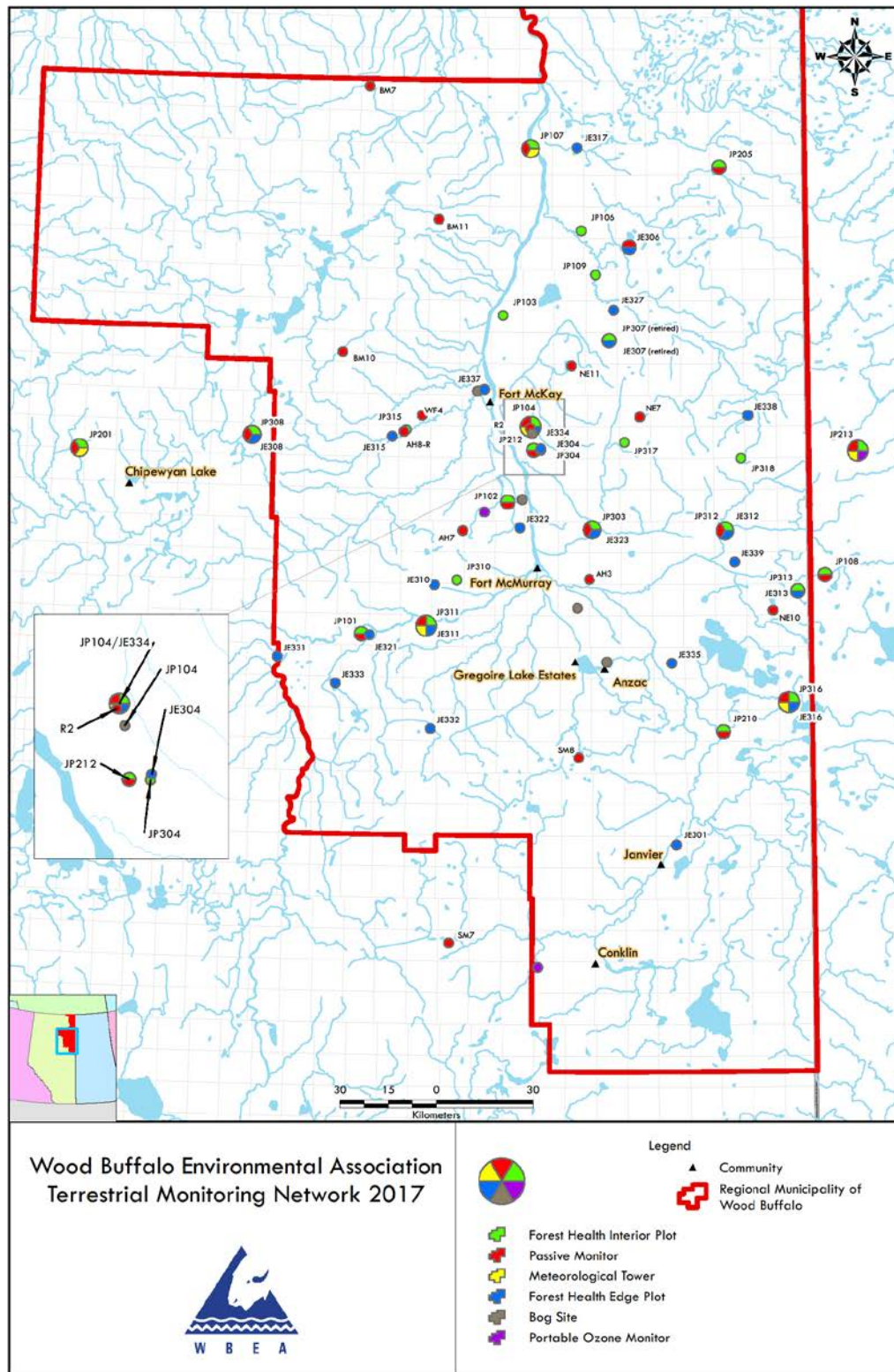


Figure 2: Map of WBEA Terrestrial Monitoring Network.

The following operational notes are provided as per the Air Monitoring Directive requirements.

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for CO, NH₃, NO₂, H₂S, and SO₂.

There were 6 ambient ground level concentrations in excess of the 24-hour PM_{2.5} air quality objective reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there were 6 concentrations in excess of the 24-hour PM_{2.5} air quality objective.

There were 3 ambient ground level concentrations in excess of the 1-hour O₃ air quality objective reported to the Energy and Environmental Response Centre. After data processing to account for analyzer drift with baseline correction, there were 3 concentrations in excess of the 1-hour O₃ air quality objective.

The following table provides the status of the incidents and final data averages.

Site	Parameter	Date / Time	Reference	Period	Concentration ppb or ug/m ³		Status
					Reported	Final	
AMS 1 Fort McKay - Bertha Ganter	PM _{2.5}	02June17, 24:00	325182	24hr	38	38	exc
AMS 13 Fort McKay South	PM _{2.5}	02June17, 24:00	325183	24hr	40	40	exc
AMS 15 Horizon	PM _{2.5}	02June17, 24:00	325179	24hr	44	44	exc
AMS 16 Muskeg River	PM _{2.5}	02June17, 24:00	325180	24hr	43	43	exc
AMS 23 Fort Hills	PM _{2.5}	01June17, 24:00	325120	24hr	35	35	exc
AMS 23 Fort Hills	PM _{2.5}	02June17, 24:00	325120	24hr	58	58	exc
AMS 6 Patricia McInnes	O ₃	02June17, 13:00	327615	1hr	87	87	late
AMS 6 Patricia McInnes	O ₃	02June17, 14:00	327615	1hr	88	88	late
AMS 7 Athabasca Valley	O ₃	02June17, 14:00	327617	1hr	95	95	late

*status legend:

- late exceedance, raw values were not found to be in exceedance in real time, and/or were not reported, but final values were found to be an exceedance after data processing.
- exc exceedance, raw values reported in real time were confirmed to be in exceedance after data processing.
- nae not an exceedance, raw values reported in real time were found not in exceedance after data processing.
- ret retracted, reported exceedance was found to be not an exceedance after investigation of measurement system status and/or validation of raw data in conjunction with all associated measurement parameters.

1.1 Data Processing and Validation

Concentrations reported in near real-time were raw values. The final values were determined after processing of data for reporting. For all parameters except $PM_{2.5}$, the final 5-minute data values were determined by subtracting from the raw 5-minute data values, the daily zero responses interpolated to the time of each raw 5-minute value. The final 5-minute data values were then rounded to one decimal place greater than the reporting precision indicated in the Air Monitoring Directive (AMD). The final 1-hour data values were calculated from final 5-minute data values and then rounded to reporting precision. The final 24-hour data values were calculated from final 1-hour values.

After data processing and validation, NO_2 concentrations were re-calculated from baseline-corrected NO_x and NO concentrations. Specifically, the NO concentration was subtracted from the NO_x concentration to determine the NO_2 concentration. In cases where the NO_x and/or NO values exceeded the operating range of the analyzer, values reported for NO_2 were determined as the largest of either the difference between baseline-corrected NO_x and NO values, or the NO_2 value reported by the data acquisition system with baseline correction applied.

1.2 Revisions to AEP Airdata Warehouse

There were no revisions to historical data stored at the AEP Airdata Warehouse with this monthly report.

2.0 Operational Status

Continuous Monitoring

In June 2017, there was 1 instance of a compliance monitoring instrument operating less than 90% of the time.

The Fine Particulate Matter ($PM_{2.5}$) analyzer at Fort Chipewyan AMS operated less than 90% of the time in June 2017, which is a contravention of the Air Monitoring Directive (1989, as amended), Chapter 6, Clause DQ 4-C.

There were two events that contributed to a total of 93 hours of invalid data:

1. During daily network system checks, data appeared indicative of potential debris in the sampling system. A site visit on June 1 revealed debris on the filter tape and in the sample chamber. The analyzer was removed for maintenance and replaced with a backup unit.
2. On June 19, the $PM_{2.5}$ analyzer signal flatlined and a site visit was planned. The technician was unable to reach the air monitoring station until June 21 due to flight availability. The sample tape was found to be broken and was re-spooled.

In June 2017, the $PM_{2.5}$ analyzer at Fort Chipewyan AMS operated for 87% of the reporting period. This incident was reported to Alberta Environment and Parks on July 21, 2017 (reference number 327347).

In June 2017, there were no instances of a non-compliance monitoring instrument operating less than 90% of the time.

Intermittent Monitoring

Results for integrated monitoring of precipitation, PAH, VOC, PM_{2.5} and PM₁₀, and passive samples for May 2017 are included with this report.

3.0 Monitoring Notes

General Network Notes

WBEA commissioned a permanent air monitoring station at the Fort Hills oil sands project on June 1, 2017. This station is equipped with ambient air quality analyzers for SO₂, TRS, THC, NO, NO₂, NO_x, and PM_{2.5}. Temperature, wind speed and direction, and relative humidity are also continuously measured.

The Ammonia (NH₃) analyzer currently operates on a 0 to 2500 ppb operating range with a detection level of 5 ppb in the WBEA network. In data processing, values less than 5 ppb have been considered below detection levels and are reported as zero.

Monitoring notes for the continuous monitoring stations are provided on a station by station basis.

Station 1, Fort McKay - Bertha Ganter

An internal WBEA audit taking place June 15 and 16 interrupted the normal operations of all air quality analyzers for 2 to 11 hours.

A new calibrator was installed at the station on June 22. Maintenance to reinitiate span checks and associated recovery time affected the normal operations of all air quality analyzers for 1 to 4 hours.

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1-2 hours following the daily spans have been reported as invalid for a total of 57 hours this month.

Maintenance and cleaning of the sample manifold on June 22 interrupted the normal operations of the NO_x, SO₂, THC, and TRS analyzers for 1 hour.

Three instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 10 hours this month.

Station operator activities on June 26 affected the normal operation of the THC analyzer for one hour.

The temperature sensors at 2 and 10 m are independent sensors and are not an integrated delta-t system. Although reported values are representative of ambient temperatures, they may not be suitable as measurements of vertical temperature gradients.

Station 2, Mildred Lake

The automated daily zero/span response of the THC analyzer did not meet operational criteria on June 16. Station operator activities to investigate and verify analyzer response interrupted the routine operation of the THC analyzer for 7 hours. On June 28, the THC analyzer failed to meet operational criteria once again. Further investigation, pump replacement, and subsequent calibration affected the normal operations of the analyzer for 25 hours.

Station 3, Lower Camp - Meteorology

Spurious values in the output signal of the 167m elevation vertical wind speed sensor resulted in 2 hours of downtime this month.

Station 4, Buffalo Viewpoint

Maintenance and cleaning of the sample manifold on June 22 interrupted the normal operation of the H₂S analyzer for 1 hour.

Station temperature fluctuations on June 1 and 2 affected the normal operation of the THC analyzer for 26 hours.

Flat-lines in the output signal of the wind sensor resulted in 1 hour of invalid data this reporting period.

Station 5, Mannix

No operational issues to report this month.

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1-2 hours following each daily span has been reported as invalid for a total of 47 hours this month.

Maintenance and cleaning of the sample manifold on June 8 interrupted the normal operations of the NO_x, O₃, SO₂, THC, and TRS analyzers for 1 hour.

A power outage at the station on June 16 affected the normal operation of all analyzers for 2 to 3 hours.

A data collection error on June 21 interrupted the data collection of all parameters for 1 hour this reporting period.

Two instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 2 hours this month.

Station 7, Athabasca Valley

The automated daily zero/span response of the NO_x analyzer did not meet operational criteria on June 1. On-site investigation revealed sample flow and pressure issues, which required repairs and analyzer calibration. Data was flagged from the last valid daily span on May 31 until maintenance was completed on June 1, resulting in 14 hours of invalid data. Subsequent stabilization time resulted in an additional 19 hours of invalid data.

Maintenance and cleaning of the sample manifold on June 9 interrupted the normal operations of the all air quality analyzers for 1 hour.

There were two issues associated with operation of the THC analyzer resulting in 8 hours of invalid data. A flame out in the FID unit of the analyzer on June 9 interrupted the normal operation of the THC analyzer for 4 hours. Maintenance to improve baseline response interrupted the normal operation of the analyzer for an additional 4 hours.

Five instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 8 hours this month.

Station 8, Fort Chipewyan

The solar radiation and surface leaf wetness sensors experienced multiple episodes of interference on its sensor surface resulting in inconsistent measurements. Data for these periods were flagged, resulting in 2 to 5 hours of invalid data this reporting period.

There were two issues associated with operation of the PM_{2.5} analyzer resulting in 93 hours of invalid data this month. Intermittent spikes and spurious readings from the PM_{2.5} analyzer discovered during daily system checks lead to an investigation through remote diagnostics. There were no issues found with the PM_{2.5} analyzer itself and data appeared consistent with foreign debris in the sample chamber. An on-site visit on June 1 lead to the discovery of a spider in the equipment. The analyzer was removed from service for shop cleaning and replaced with a backup unit. Data was invalidated for 35 hours. Flat-lines in the output signal of the PM_{2.5} analyzer beginning on June 19 resulted in 58 hours of invalid data this reporting period.

Station 9, Barge Landing

An internal WBEA audit on June 20 interrupted the normal operations of all air quality analyzers for 1 to 2 hours.

The normal operations of all air quality analyzers were interrupted on June 25 for 1 hour to confirm analyzer responses to in-situ calibrator concentrations.

Sample pump failure and maintenance to replace the pump and recalibrate on June 24 interrupted the routine operation of the TRS analyzer for 10 hours.

Flat-lines in the output signal of the wind sensor resulted in 2 hours of invalid data this reporting period.

Station 11, Lower Camp

Station temperature fluctuations on June 29 and 30 affected the normal operation of all air quality analyzers for 42 hours.

Flat-lines in the output signal of the wind sensor on June 23 resulted in 1 hour of invalid data this reporting period.

Station 13, Fort McKay South

Maintenance and cleaning of the sample manifold on June 7 interrupted the normal operations of the O₃ and TRS analyzers for 1 hour.

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM_{2.5} analyzer for 5 hours.

Station 14, Anzac

Installation of a hydrogen generator at the station on June 23 affected the normal operation of the THC analyzer for 2 hours.

One instance of unstable operation due to baseline drift on June 17 affected the normal operation of the PM_{2.5} analyzer for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 2 hours of invalid data this reporting period.

Station 15, Horizon

Maintenance and cleaning of the sample manifold on June 14 interrupted the normal operation of the NO_x, SO₂, and THC analyzers for 1 hour.

Station 16, Muskeg River

A power outage at the station on June 25 affected the normal operation of all analyzers for 3 hours.

Unstable operation due to baseline drift on June 3 affected the normal operation of the PM_{2.5} analyzer for 1 hour.

Numerous instances of unstable operation due to baseline drift as a result of fluctuating station temperature affected the normal operation of the THC analyzer for 42 hours this month.

Station 17, Wapasu

An internal WBEA audit taking place June 27 and 30 interrupted the normal operations of all air quality analyzers for 1 to 3 hours.

Maintenance and cleaning of the sample manifold on June 20 interrupted the normal operation of the H₂S and O₃ analyzers for 1 hour.

Station 18, Stony Mountain

An internal WBEA audit taking place June 7 and 8 interrupted the normal operations of all air quality analyzers for 2 to 3 hours.

Replacement of the carrier gas cylinder at the station on June 27 affected the normal operation of the THC analyzer for 2 hours.

Calibration and maintenance of the precipitation gauge on June 26 resulted in 1 hour of invalid data this reporting period.

Flat-lines in the output signal of the wind sensor resulted in 1 hour of invalid data this reporting period.

Station 19, Firebag

No operational issues to report this month.

Station 20, MacKay River

Five instances of intermittent unstable operation due to baseline drift affected the normal operation of the H₂S analyzer for a total of 7 hours this reporting period.

Maintenance to replace the power distribution card on June 28 interrupted the data collection of all parameters for 1 hour this reporting period.

Station 21, Conklin

An internal WBEA audit taking place June 8 and 9 interrupted the normal operations of all air quality analyzers for 1 to 3 hours.

Maintenance and cleaning of the sample manifold on June 19 interrupted the normal operations of the NO_x, O₃, SO₂, and THC analyzers for 1 hour.

Sample pump failure and maintenance to replace the pump and recalibrate on June 30 interrupted the routine operation of the NO_x analyzer for 23 hours.

One instance of unstable operation due to baseline drift on June 28 affected the normal operation of the PM_{2.5} analyzer for 2 hours.

Replacement of the calibration gas cylinder at the station on June 22 affected the normal operation of the TRS analyzer for 2 hours.

Flat-lines in the output signal of the wind sensor resulted in 4 hours of invalid data this reporting period.

Station 22, Janvier

Replacement of the fuel gas cylinder at the station on June 2 affected the normal operation of the THC analyzer for 2 hours.

Flat-lines in the output signal of the PM_{2.5} analyzer resulted in 18 hours of invalid data this reporting period.

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM_{2.5} analyzer for 17 hours.

Station 23, Fort Hills

Note: install calibration files are included with routine monthly calibration files, in the report section of this station. This station officially commenced operation on June 1, 2017.

Maintenance and cleaning of the sample manifold on May 11 interrupted the normal operations of the TRS and O₃ analyzers for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 10 hours of invalid data this reporting period.

Station 500, Christina Lake

Maintenance and cleaning of the sample manifold on June 21 interrupted the normal operation of the H₂S analyzer for 1 hour.

Station 502, Surmont

Maintenance and cleaning of the sample manifold on June 21 interrupted the normal operation of the H₂S analyzer for 1 hour.

If additional information is required, please contact either Mike Martineau at (780) 715 1770 ext. 222 or the Wood Buffalo Environmental Association at (780) 799 4420.

Yours sincerely,

Wood Buffalo Environmental Association

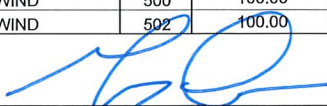
Mike Martineau
Data Lead

Sanjay Prasad
Air Quality Scientist

R00_1706

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
 MONTHLY AIR MONITORING SUMMARY
 for AMD SECTION III.B.1(c)

APPROVAL NUMBERS		REPORT DATE		CONTINUOUS AMBIENT MONITORING				
		MONTH	YEAR					
		6	2017					
		CONTINUOUS AMBIENT MONITORING						
				ONE-HOUR AVERAGE		24-HOUR AVERAGE		
		PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
289664-00-00		SO2(ppm)	1	99.44	0.030	0	0.004	0
241311-00-00		SO2(ppm)	2	100.00	0.048	0	0.007	0
254465-00-00		SO2(ppm)	4	100.00	0.046	0	0.008	0
149968-01-00		SO2(ppm)	5	100.00	0.048	0	0.010	0
48522-01-00		SO2(ppm)	6	99.31	0.046	0	0.004	0
240008-00-00		SO2(ppm)	7	99.86	0.034	0	0.004	0
48263-01-00		SO2(ppm)	8	100.00	0.003	0	0.001	0
151469-01-00		SO2(ppm)	11	94.17	0.137	0	0.027	0
224816-00-00		SO2(ppm)	13	100.00	0.023	0	0.004	0
189942-00-00		SO2(ppm)	14	100.00	0.006	0	0.001	0
206355-00-00		SO2(ppm)	15	99.86	0.014	0	0.003	0
46586-00-00		SO2(ppm)	16	99.58	0.029	0	0.004	0
73203-02-00		SO2(ppm)	17	99.72	0.030	0	0.006	0
216466-01-00		SO2(ppm)	18	99.72	0.002	0	0.001	0
137467-01-00		SO2(ppm)	19	100.00	0.015	0	0.004	0
236394-00-00		SO2(ppm)	20	100.00	0.016	0	0.003	0
20809-01-00		SO2(ppm)	21	99.58	0.003	0	0.001	0
094-02-00		SO2(ppm)	22	100.00	0.004	0	0.001	0
305529-00-00		SO2(ppm)	23	100.00	0.014	0	0.002	0
026-02-00		SO2(ppm)	500	100.00	0.019	0	0.005	0
228044-00-00		SO2(ppm)	502	100.00	0.016	0	0.006	0
		H2S(ppm)	2	100.00	0.002	0	0.001	0
		H2S(ppm)	4	99.86	0.002	0	0.000	0
		H2S(ppm)	5	100.00	0.005	0	0.002	0
		H2S(ppm)	11	94.17	0.006	0	0.001	0
		H2S(ppm)	17	99.58	0.002	0	0.000	0
		H2S(ppm)	19	100.00	0.003	0	0.000	0
		H2S(ppm)	20	98.89	0.004	0	0.001	0
		H2S(ppm)	500	99.86	0.002	0	0.000	0
		H2S(ppm)	502	98.89	0.003	0	0.001	0
		TRS(ppm)	1	99.44	0.002	0	0.001	0
		TRS(ppm)	6	99.44	0.001	0	0.001	0
		TRS(ppm)	7	99.86	0.001	0	0.000	0
		TRS(ppm)	9	98.19	0.001	0	0.000	0
		TRS(ppm)	13	99.86	0.001	0	0.000	0
		TRS(ppm)	14	100.00	0.001	0	0.000	0
		TRS(ppm)	15	100.00	0.001	0	0.001	0
		TRS(ppm)	18	99.72	0.000	0	0.000	0
		TRS(ppm)	21	99.44	0.001	0	0.000	0
		TRS(ppm)	22	100.00	0.000	0	0.000	0
		TRS(ppm)	23	99.86	0.001	0	0.000	0
		THC(ppm)	1	99.31	3.4	-	2.2	-
		THC(ppm)	2	95.56	3.8	-	2.5	-
		THC(ppm)	4	96.39	3.5	-	2.6	-
		THC(ppm)	5	100.00	3.6	-	2.5	-
		THC(ppm)	6	99.31	2.6	-	2.0	-
		THC(ppm)	7	98.75	2.5	-	2.1	-
		THC(ppm)	9	99.72	3.4	-	2.5	-
		THC(ppm)	11	94.17	3.6	-	2.6	-
		THC(ppm)	13	100.00	3.3	-	2.3	-
		THC(ppm)	14	99.72	2.5	-	2.1	-
		THC(ppm)	15	99.86	4.7	-	2.6	-
		THC(ppm)	16	93.75	4.9	-	3.1	-
		THC(ppm)	17	99.86	2.6	-	2.2	-
		THC(ppm)	18	99.44	2.2	-	2.0	-
		THC(ppm)	19	100.00	3.0	-	2.3	-
		THC(ppm)	20	100.00	2.6	-	2.2	-
		THC(ppm)	21	99.72	2.5	-	2.1	-
		THC(ppm)	22	99.58	2.1	-	1.9	-
		THC(ppm)	23	99.44	5.0	-	2.0	-
		O3(ppm)	1	99.58	0.056	0	0.038	-
		O3(ppm)	6	99.44	0.088	2	0.045	-
		O3(ppm)	7	99.86	0.095	1	0.045	-
		O3(ppm)	8	100.00	0.059	0	0.045	-

APPROVAL NUMBERS		REPORT DATE						
		MONTH	YEAR					
		6	2017					
289664-00-00 241311-00-00 254465-00-00 149968-01-00 48522-01-00 240008-00-00 48263-01-00 151469-01-00 224816-00-00 189942-00-00 206355-00-00 46586-00-00 73203-02-00 216466-01-00 137467-01-00 236394-00-00 20809-01-00 094-02-00 305529-00-00 026-02-00 228044-00-00		CONTINUOUS AMBIENT MONITORING						
					ONE-HOUR AVERAGE		24-HOUR AVERAGE	
		PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
		O3(ppm)	13	99.86	0.063	0	0.038	-
		O3(ppm)	14	100.00	0.058	0	0.043	-
		O3(ppm)	17	99.58	0.057	0	0.044	-
		O3(ppm)	18	99.72	0.064	0	0.053	-
		O3(ppm)	21	99.58	0.066	0	0.049	-
		O3(ppm)	22	100.00	0.065	0	0.050	-
		NO2(ppm)	1	99.17	0.028	0	0.007	-
		NO2(ppm)	6	99.31	0.013	0	0.005	-
		NO2(ppm)	7	95.42	0.014	0	0.006	-
		NO2(ppm)	8	100.00	0.008	0	0.003	-
		NO2(ppm)	13	100.00	0.030	0	0.008	-
		NO2(ppm)	14	100.00	0.006	0	0.002	-
		NO2(ppm)	15	99.86	0.024	0	0.008	-
		NO2(ppm)	16	99.58	0.039	0	0.015	-
		NO2(ppm)	17	99.58	0.019	0	0.004	-
		NO2(ppm)	18	99.58	0.003	0	0.001	-
		NO2(ppm)	19	100.00	0.016	0	0.005	-
		NO2(ppm)	20	100.00	0.020	0	0.006	-
		NO2(ppm)	21	96.25	0.019	0	0.005	-
		NO2(ppm)	22	100.00	0.002	0	0.001	-
		NO2(ppm)	23	100.00	0.031	0	0.010	-
		NO2(ppm)	500	100.00	0.013	0	0.004	-
		NO2(ppm)	502	100.00	0.019	0	0.004	-
		CO(ppm)	7	99.86	0.4	0	0.2	-
		NH3(ppm)	1	90.00	0.020	0	0.004	-
		NH3(ppm)	6	92.92	0.038	0	0.012	-
		PM2.5(ug/m3)	1	98.33	192.0	-	37.5	1
		PM2.5(ug/m3)	6	99.44	135.0	-	20.8	0
		PM2.5(ug/m3)	7	98.89	173.8	-	22.3	0
		PM2.5(ug/m3)	8	87.08	22.5	-	7.6	0
		PM2.5(ug/m3)	13	99.31	199.9	-	39.7	1
		PM2.5(ug/m3)	14	99.86	43.2	-	10.0	0
		PM2.5(ug/m3)	15	100.00	278.3	-	45.4	1
		PM2.5(ug/m3)	16	99.44	234.2	-	42.9	1
		PM2.5(ug/m3)	17	100.00	74.7	-	20.1	0
		PM2.5(ug/m3)	18	100.00	11.7	-	8.3	0
		PM2.5(ug/m3)	21	99.72	57.0	-	11.8	0
		PM2.5(ug/m3)	22	95.14	23.5	-	7.1	0
		PM2.5(ug/m3)	23	98.33	285	-	58	2
		WIND	1	100.00	-	-	-	-
		WIND	2	100.00	-	-	-	-
		WIND	4	99.86	-	-	-	-
		WIND	5	100.00	-	-	-	-
		WIND	6	100.00	-	-	-	-
		WIND	7	100.00	-	-	-	-
		WIND	8	100.00	-	-	-	-
		WIND	9	99.72	-	-	-	-
		WIND	11	99.86	-	-	-	-
		WIND	13	100.00	-	-	-	-
		WIND	14	99.72	-	-	-	-
		WIND	15	100.00	-	-	-	-
		WIND	16	100.00	-	-	-	-
		WIND	17	100.00	-	-	-	-
		WIND	18	99.86	-	-	-	-
		WIND	19	100.00	-	-	-	-
		WIND	20	99.86	-	-	-	-
		WIND	21	99.44	-	-	-	-
		WIND	22	100.00	-	-	-	-
		WIND	23	100.00	-	-	-	-
		WIND	500	100.00	-	-	-	-
		WIND	502	100.00	-	-	-	-
								
SIGNATURE OF ASSOCIATION REPRESENTATIVE					FOR ALBERTA ENVIRONMENT USE ONLY			



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	681	35	39	99.44	30	0	4	0
TRS(ppb) Average	682	34	38	99.44	2	0	1	0
THC(ppm) Average	680	35	40	99.31	3.4	-	2.2	-
NMHC(ppm) Average	680	35	40	99.31	1.371	-	0.132	-
CH4(ppm) Average	680	35	40	99.31	2.6	-	2.1	-
O3 (ppb) Average	683	34	37	99.58	56	0	38	-
NO2 (ppb) Average	678	36	42	99.17	28	0	7	-
NO (ppb) Average	678	36	42	99.17	24	-	4	-
NOX (ppb) Average	678	36	42	99.17	40	-	11	-
NH3 (ppb) Average	604	44	116	90	20	0	4	-
PM2.5 (ug/m3) Average	706	2	14	98.33	192	-	37.5	1
Wind Speed 10 m (km/h) Average	718	2	2	100	29	-	19	-
Wind Direction 10 m (deg) Average	718	2	2	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	29.4	-	22.3	-
Temperature 10 m (C) Average	720	0	0	100	28.1	-	22.5	-
Relative Humidity (%) Average	720	0	0	100	98	-	91	-
Precipitation (mm) Total	720	0	0	100	14	-	22.8	-
Leaf Wetness (% of range) Average	720	0	0	100	56	-	14	-
Global Solar Radiation (W/m2) Average	720	0	0	100	990	-	355	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	681	0.7	2	-	0	0	0	0	0	2	30
TRS (ppb) Average	682	0.4	0	-	0	0	0	0	0	1	2
THC (ppm) Average	680	2.05	0.2	-	1.9	1.9	1.9	2	2.1	2.2	3.4
NMHC(ppm) Average	680	0.049	0.098	-	0	0	0	0	0.1	0.2	1.371
CH4(ppm) Average	680	2	0.1	-	1.9	1.9	1.9	2	2	2.1	2.6
O3 (ppb) Average	683	24.4	11	-	0	10	16	24	33	38	56
NO2 (ppb) Average	678	3.2	4	-	0	0	1	2	4	9	28
NO (ppb) Average	678	0.9	3	-	0	0	0	0	1	2	24
NOX (ppb) Average	678	4.2	6	-	0	0	1	2	5	10	40
NH3 (ppb) Average	604	0.1	2	-	0	0	0	0	0	0	20
PM2.5 (ug/m3) Average	706	8.21	13.2	-	0	1.3	2.5	5.4	10	16.3	192
Wind Speed 10 m (km/h) Average	718	8.3	6	-	0	2	4	7	11	17	29
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	16.17	5.2	-	3.3	9.4	12.5	15.6	20.2	23.1	29.4
Temperature 10 m (C) Average	720	16.25	4.8	-	4.5	10.2	12.9	16	19.8	22.6	28.1
Relative Humidity (%) Average	720	64	22	-	21	32	45	66	85	92	98
Precipitation (mm) Total	720	-	-	76.12	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	2.6	9	-	-2	-2	-1	-1	1	12	56
Global Solar Radiation (W/m2) Average	720	230.9	269	-	0	0	3	106	416	701	990

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER Fort McKAY (AMS 1)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NOX, SO2, O3, THC	26 Jun 2017 13:00	26 Jun 2017 13:00	1	Maintenance - reinitiated daily QA check
NOX, SO2, THC, TRS	22 Jun 2017 12:00	22 Jun 2017 12:00	1	Maintenance - manifold cleaning
SO2	16 Jun 2017 09:00	16 Jun 2017 10:00	2	Maintenance - WBEA internal audit
TRS	16 Jun 2017 11:00	16 Jun 2017 12:00	2	Maintenance - WBEA internal audit
TRS	26 Jun 2017 12:00	26 Jun 2017 12:00	1	Maintenance - reinitiated daily QA check
THC	16 Jun 2017 08:00	16 Jun 2017 09:00	2	Maintenance - WBEA internal audit
THC	26 Jun 2017 11:00	26 Jun 2017 11:00	1	Maintenance - Station operator on site
O3	16 Jun 2017 12:00	16 Jun 2017 13:00	2	Maintenance - WBEA internal audit
NO2, NO, NOX	15 Jun 2017 11:00	15 Jun 2017 14:00	4	Maintenance - WBEA internal audit
NH3	01 Jun 2017 06:00	30 Jun 2017 06:00	57	Stabilization after daily span
NH3	15 Jun 2017 11:00	15 Jun 2017 21:00	11	Maintenance - WBEA internal audit
NH3	26 Jun 2017 13:00	26 Jun 2017 16:00	4	Maintenance - reinitiated daily QA check
PM2.5	03 Jun 2017 04:00	03 Jun 2017 10:00	7	Unstable operation - excessive baseline drift
PM2.5	15 Jun 2017 16:00	15 Jun 2017 17:00	2	Power Failure
PM2.5	27 Jun 2017 12:00	27 Jun 2017 13:00	2	Unstable operation - excessive baseline drift
PM2.5	28 Jun 2017 09:00	28 Jun 2017 09:00	1	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 30 ppb on Jun 25 10:00	Maximum Daily Average: 3.8 ppb on Jun 1
Minimum Value: 0 ppb on Jun 1 11:00	Hours of Data: 681
Maximum Diurnal Average: 2.5 ppb at hour 10	Hours of Missing Data: 39
Monthly Average: 0.7 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.0 ppb on Jun 5	Percent Operational Time: 99.4
Minimum Diurnal Average: 0.1 ppb at hour 3	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 8	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	1	0	0	0	0	0	0	0	0	0	1	10	22	19	3	1	2	8	10	5	3	2	3.8	22
2-Jun	1	0	Z	0	0	0	0	0	1	2	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0.6	2
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jun	0	0	0	0	Z	0	0	1	1	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0.4	1
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	Z	0	0	0	0	0	0	0	1	23	8	6	0	0	0	0	0	0	0	0	0	0	0	0	1.7	23
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	0	0	0	0	0	0.5	3
9-Jun	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	Z	0	0	0	0	1	5	3	3	3	1	2	4	1	2	2	1	1	1	0	0	0	0	0	1.4	5
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	Z	0	0	1	M	M	16	9	4	2	1	2	5	0	0	0	0	0	0	0	1.9	16
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	Z	0	0	0	3	3	2	4	7	8	2	0	0	0	1	0	0	1	1	0	0	1	1.6	8
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Jun	0	Z	0	0	0	0	0	0	19	30	9	3	4	2	8	2	1	1	2	2	0	0	2	3	3.8	30
26-Jun	3	2	Z	3	3	4	5	7	4	3	3	2	M	2	3	2	2	2	2	1	0	0	0	0	2.5	7
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0.4	2
29-Jun	1	1	1	1	1	Z	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0.9	2
30-Jun	Z	0	0	0	0	0	0	0	0	1	2	3	4	1	0	0	0	0	0	0	0	0	0	0	0.7	4

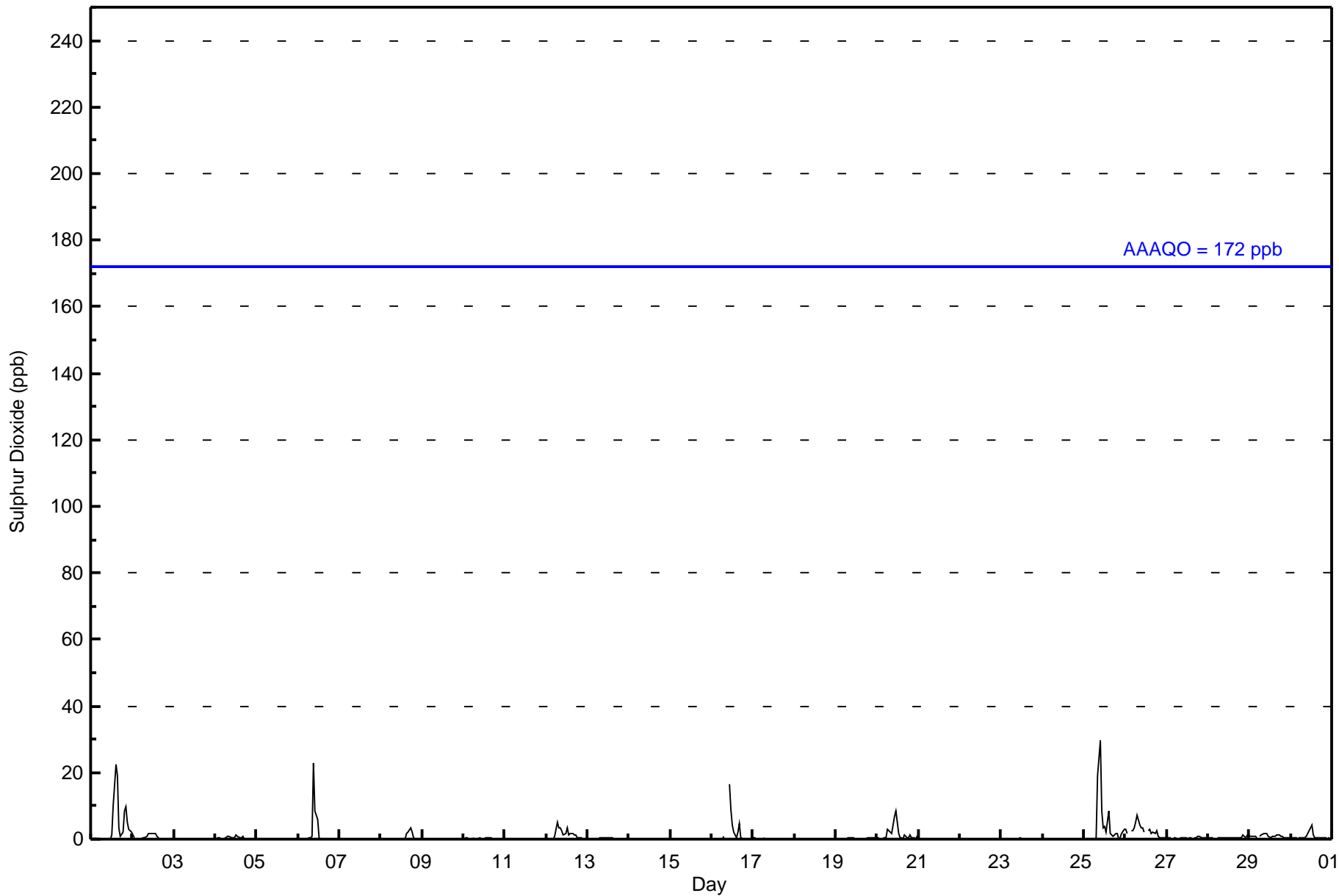
0.3	0.2	0.1	0.2	0.2	0.3	0.5	0.6	1.2	2.5	1.8	1.4	0.9	0.8	1.4	1.0	0.7	0.4	0.4	0.5	0.5	0.3	0.3	0.3	Diurnal Average
3	2	1	3	3	4	5	7	19	30	16	9	4	10	22	19	5	3	2	8	10	5	3	3	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	675	99.12	99.12
11 - 20	3	0.44	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	115	45	24	22	18	14	35	91	50	17	20	17	40	60	47	58	673
11 - 20	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	115	45	24	22	18	14	38	94	50	17	20	17	40	60	47	58	679

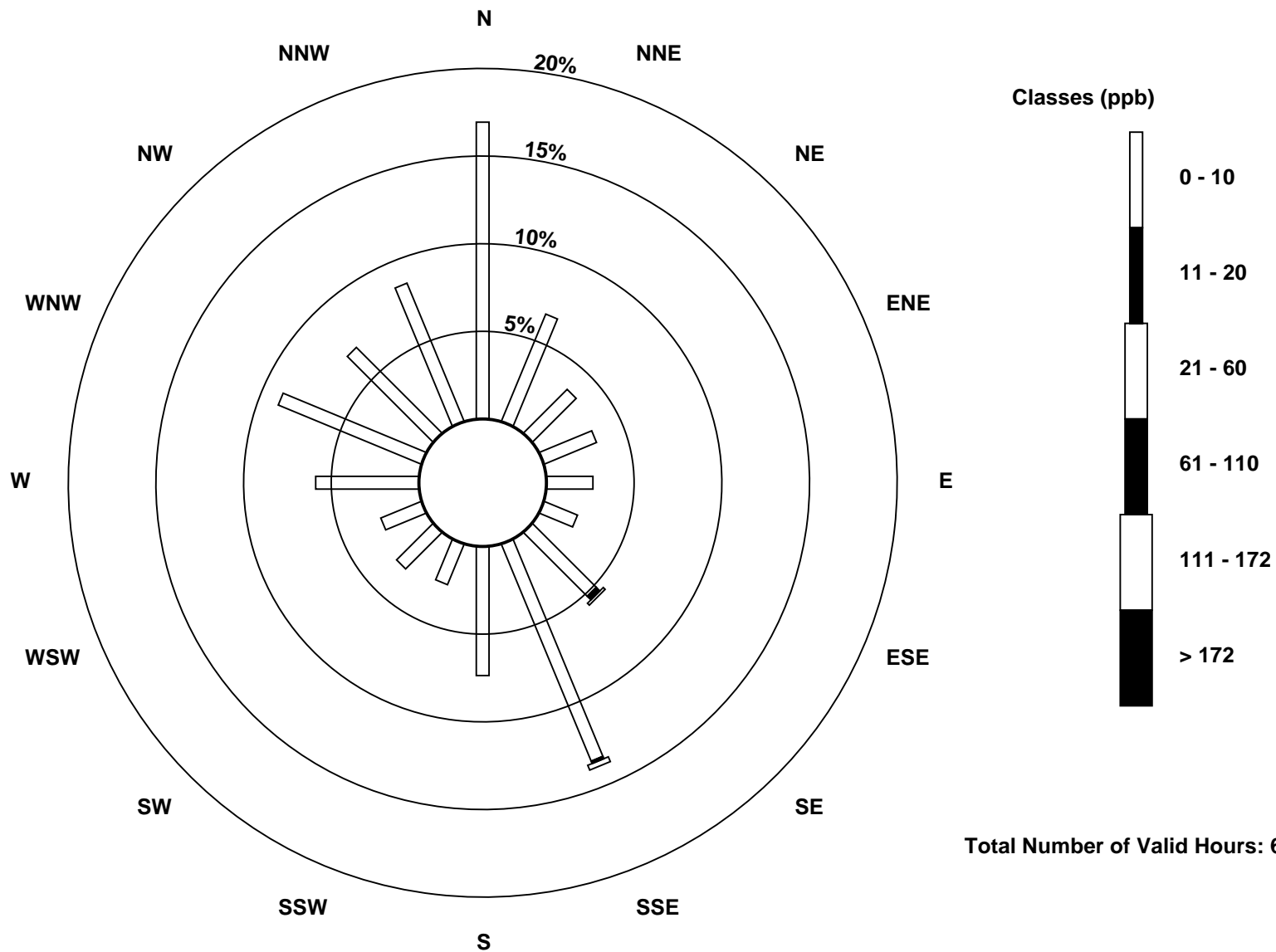
Total Number of Valid Hours: 679

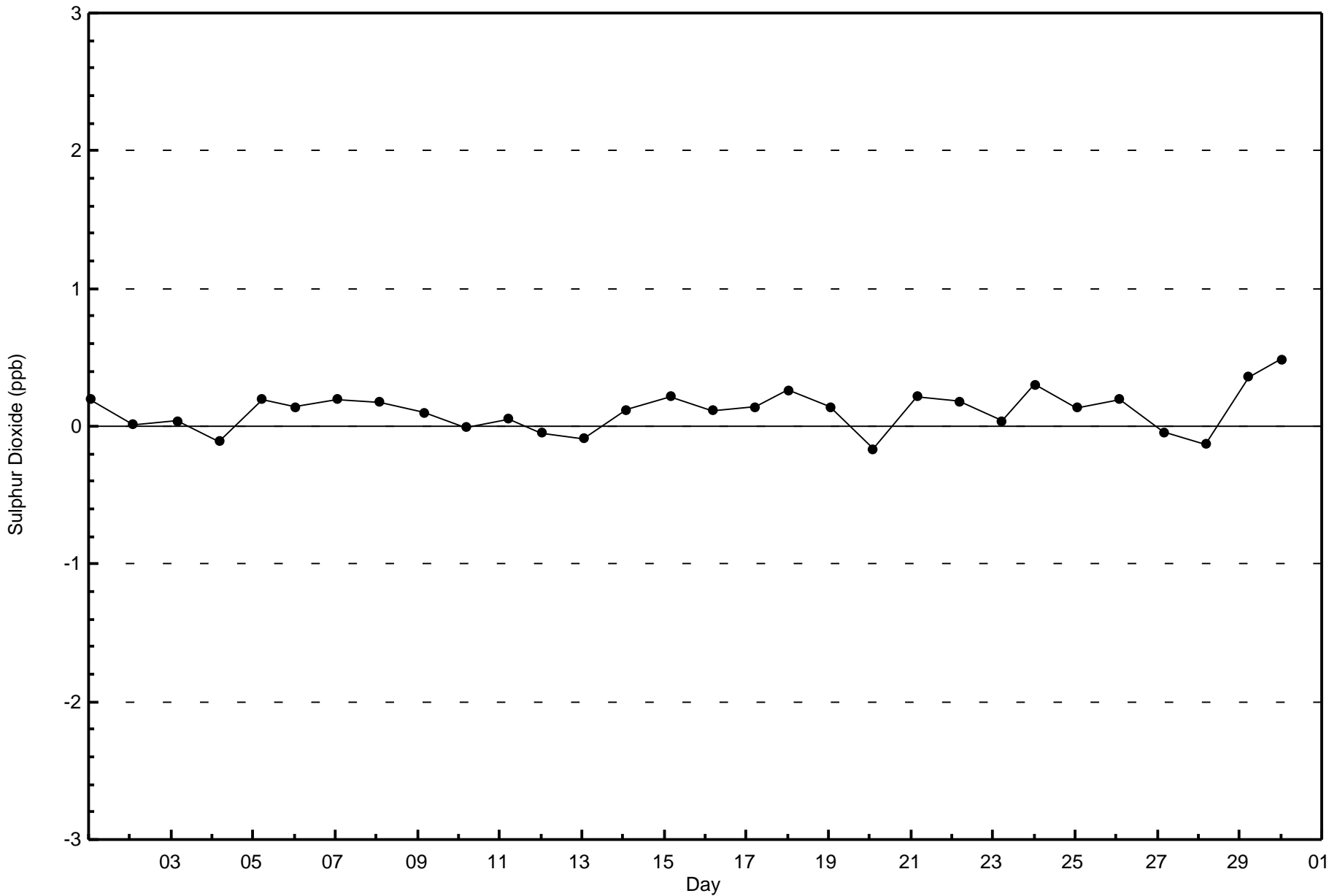
Total Number of Hours: 720

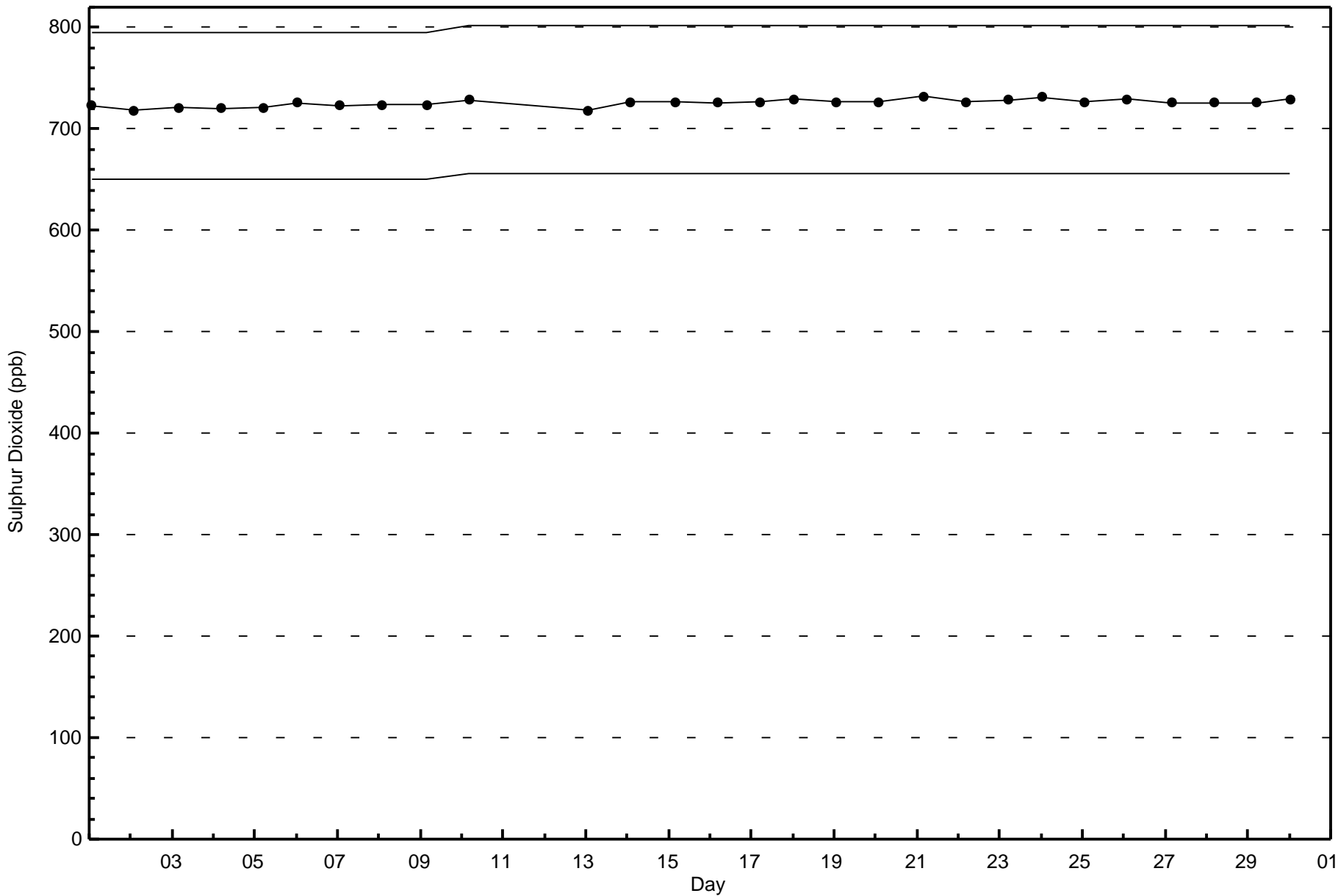


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 20 08:00	Maximum Daily Average: 0.7 ppb on Jun 20		Hours of Data:	682
Minimum Value: 0 ppb on Jun 6 04:00	Minimum Daily Average: 0.3 ppb on Jun 21		Hours of Missing Data:	38
Maximum Diurnal Average: 0.6 ppb at hour 10	Minimum Diurnal Average: 0.4 ppb at hour 18		Hours of Calibration:	34
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	1	1	Z	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0.5	1
2-Jun	1	1	0	0	Z	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.6	1
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
4-Jun	1	0	1	1	1	0	Z	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
5-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
6-Jun	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
7-Jun	1	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1
8-Jun	0	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
10-Jun	0	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
12-Jun	0	0	Z	0	0	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0.6	1
13-Jun	0	0	0	Z	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
15-Jun	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
16-Jun	1	0	0	0	0	0	Z	0	1	1	M	M	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
17-Jun	1	1	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.5	1
18-Jun	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
19-Jun	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.4	0
20-Jun	1	0	0	0	Z	1	1	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0.7	2
21-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
23-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
24-Jun	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
25-Jun	0	0	0	Z	1	1	1	1	1	2	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0.6	2
26-Jun	1	1	1	1	Z	1	1	1	1	1	1	M	1	0	0	0	0	0	0	0	0	0	0	0	0.6	1
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
28-Jun	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Jun	0	1	1	1	1	1	0	Z	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.5	1
30-Jun	0	0	Z	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1

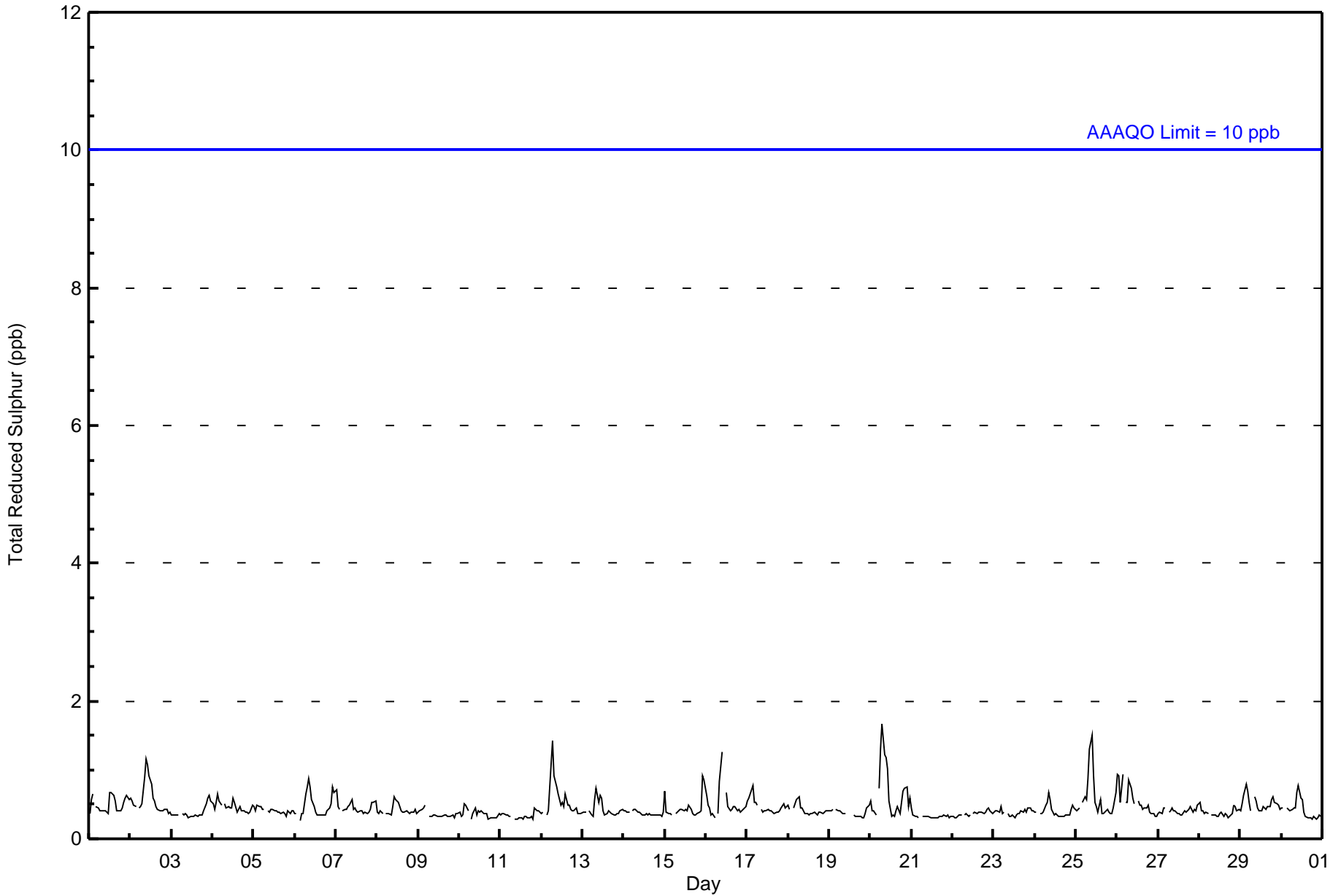
0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	Diurnal Average
1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	0	0	1	1	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	682	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	118	46	23	21	21	14	37	88	52	17	20	21	36	59	48	59	680
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	118	46	23	21	21	14	37	88	52	17	20	21	36	59	48	59	680

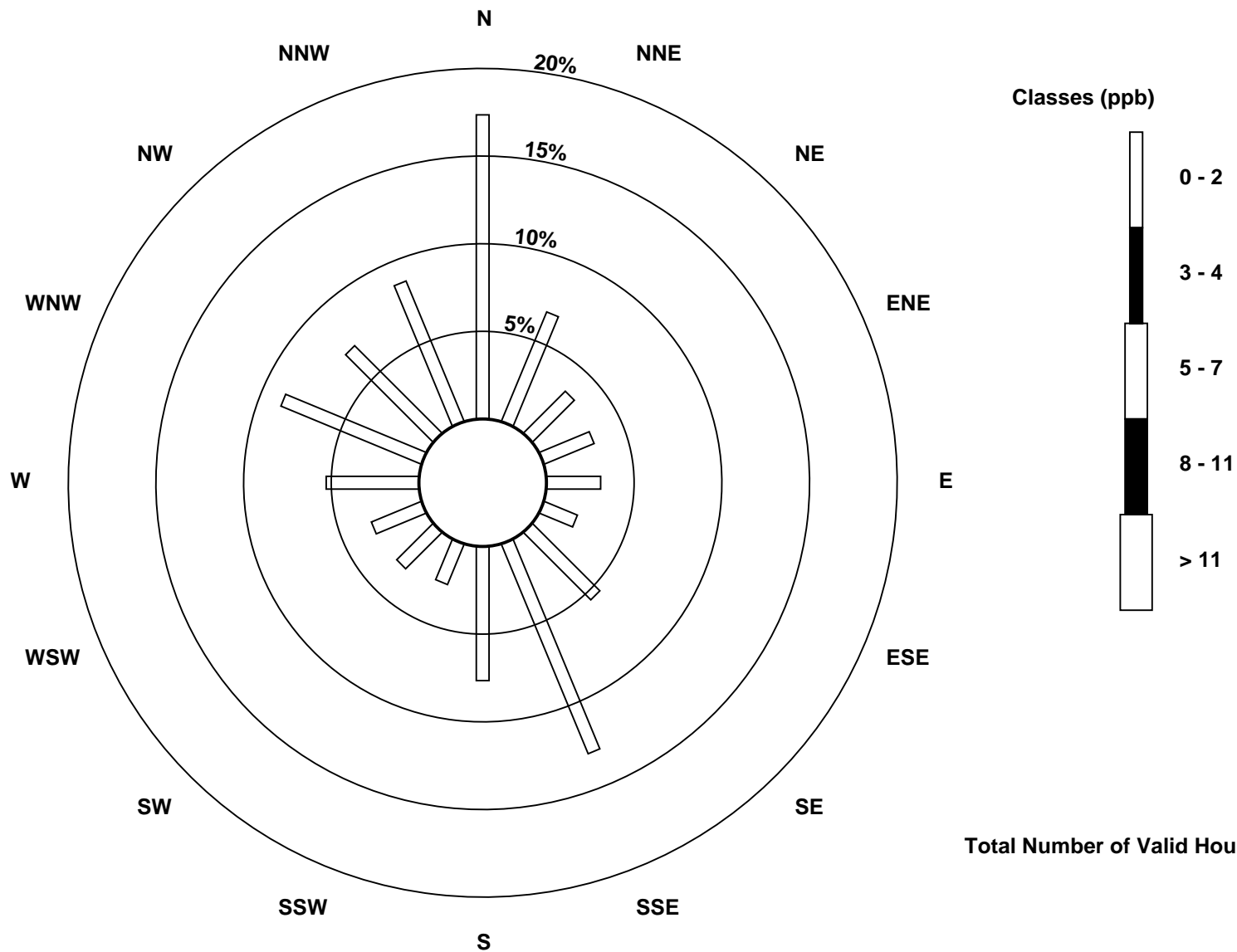
Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

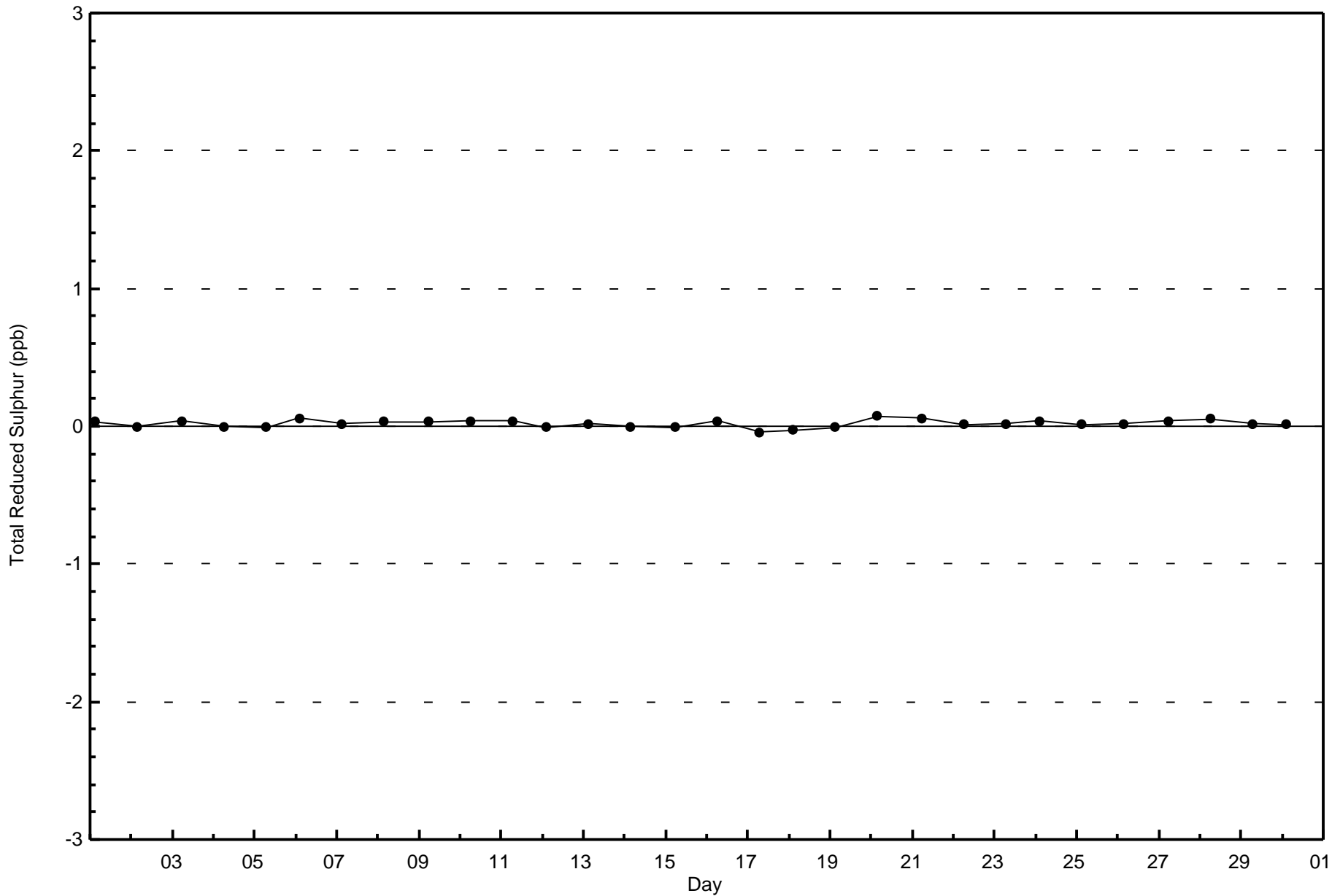
Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter (AMS 1)

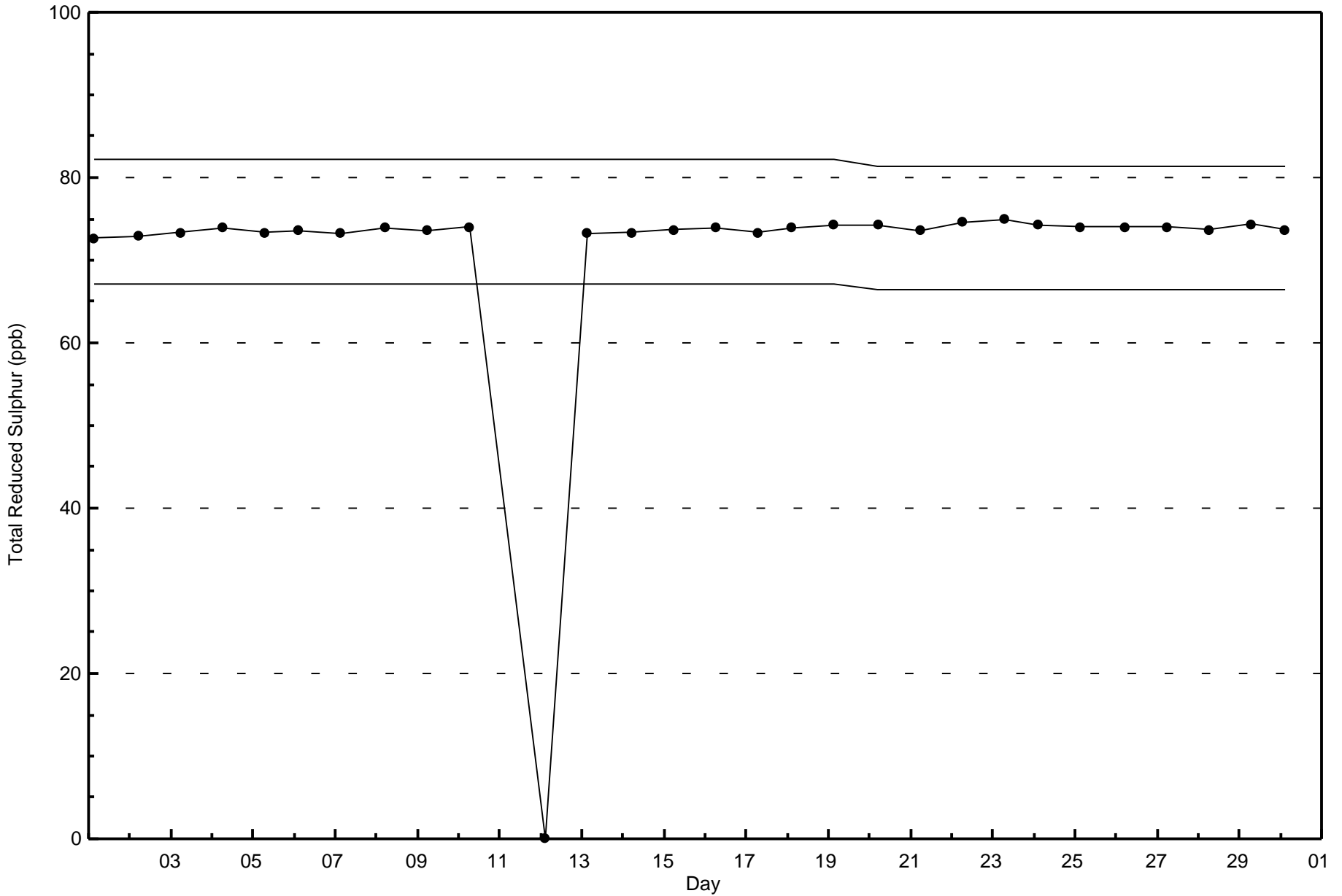




Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - June 2017

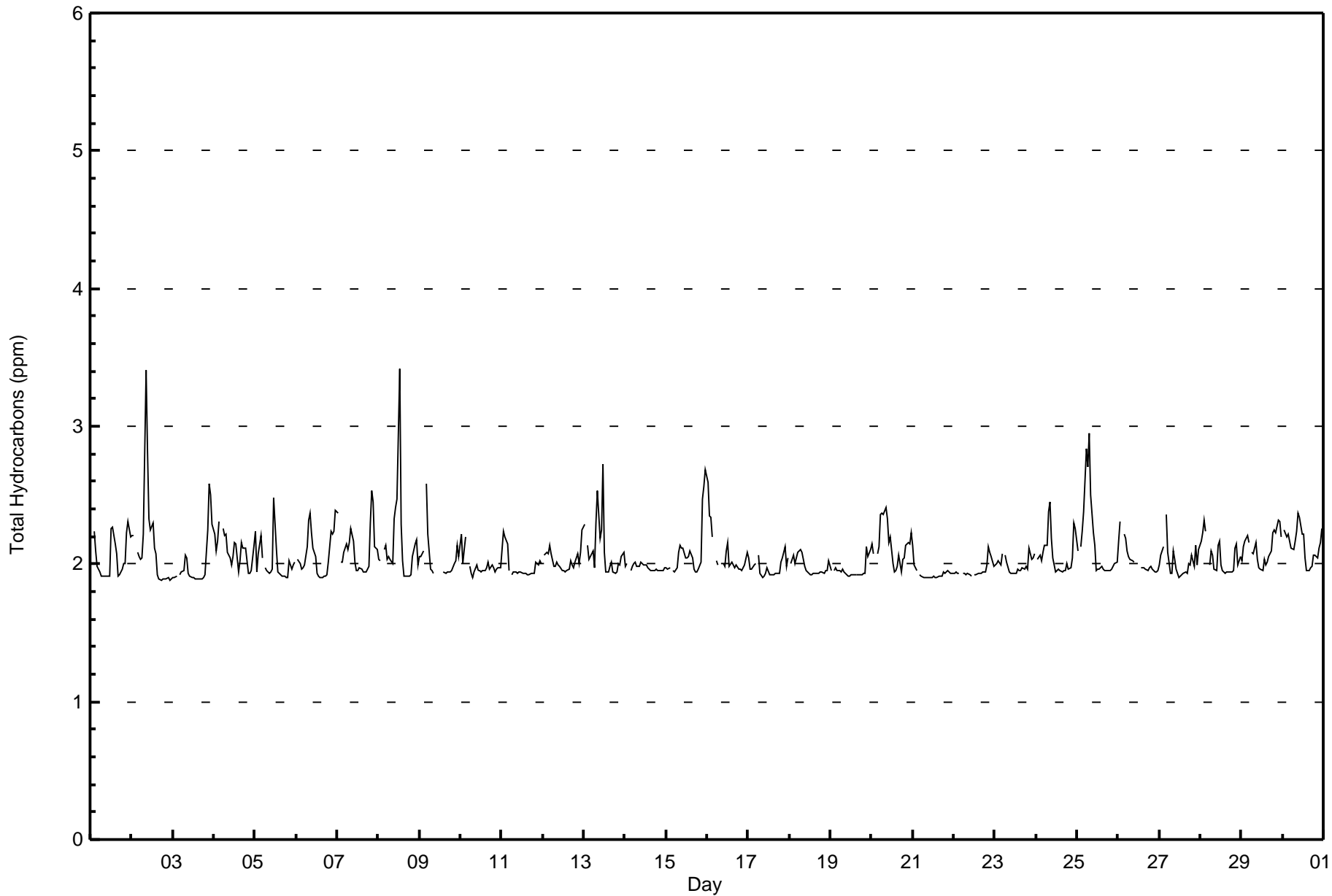






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	443	65.15	65.15
2.1 - 3.0	235	34.56	99.71
3.1 - 10.0	2	0.29	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	70	29	18	15	14	7	23	59	29	8	14	7	30	46	28	44	441
2.1 - 3.0	44	16	6	6	4	7	14	34	22	9	6	10	10	14	19	14	235
3.1 - 10.0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	115	45	24	22	18	14	37	93	51	17	20	17	40	60	47	58	678

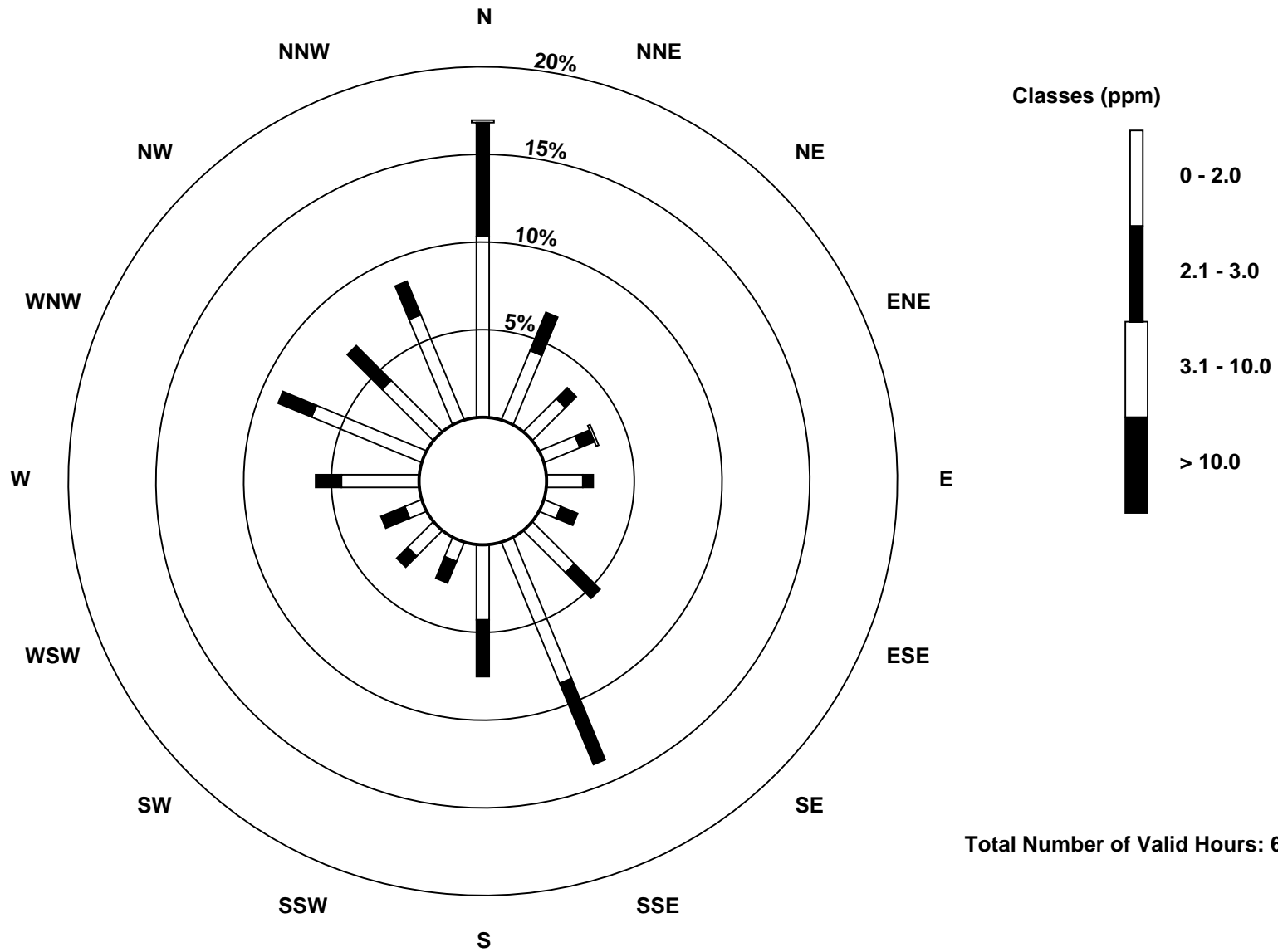
Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter (AMS 1)



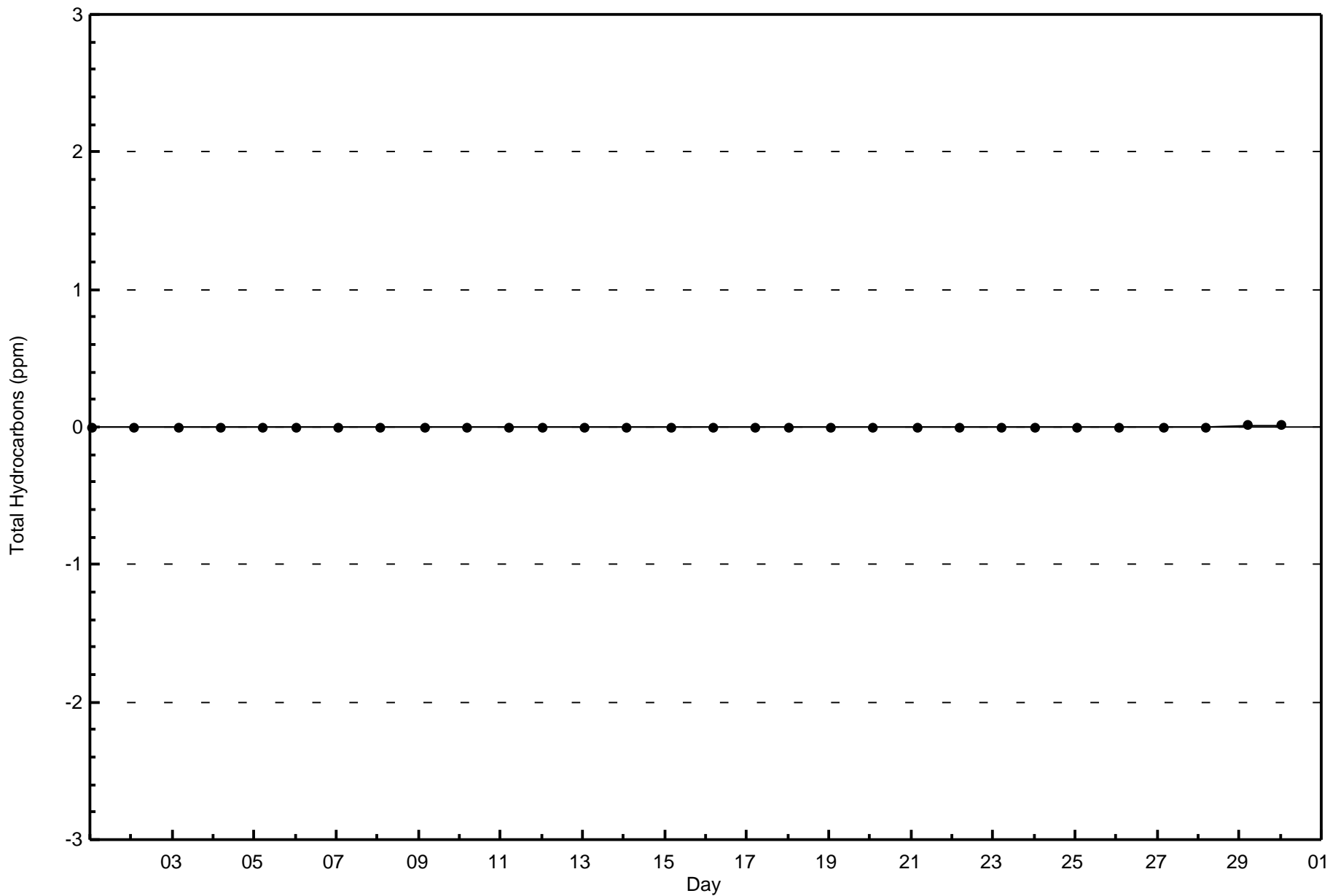


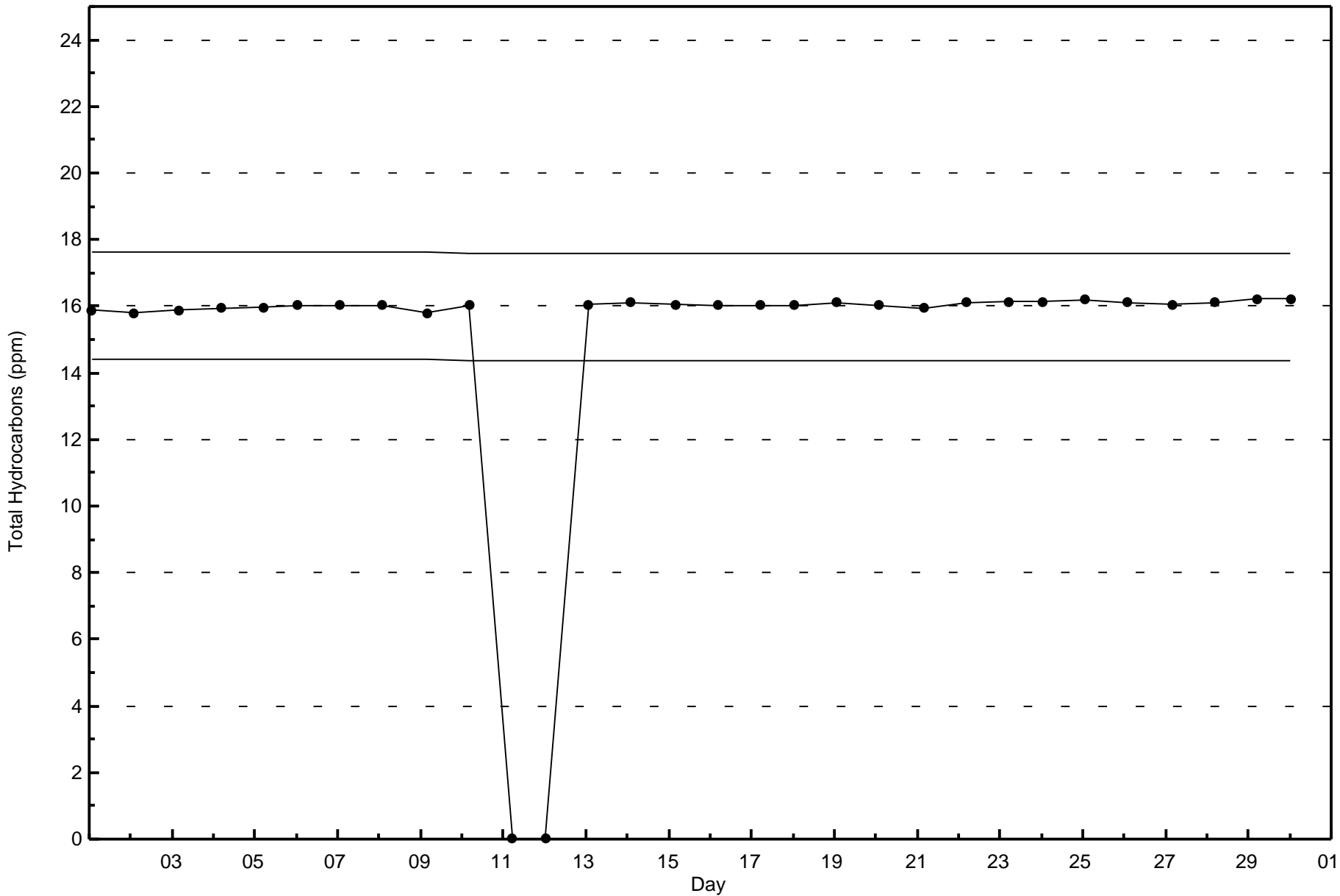
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

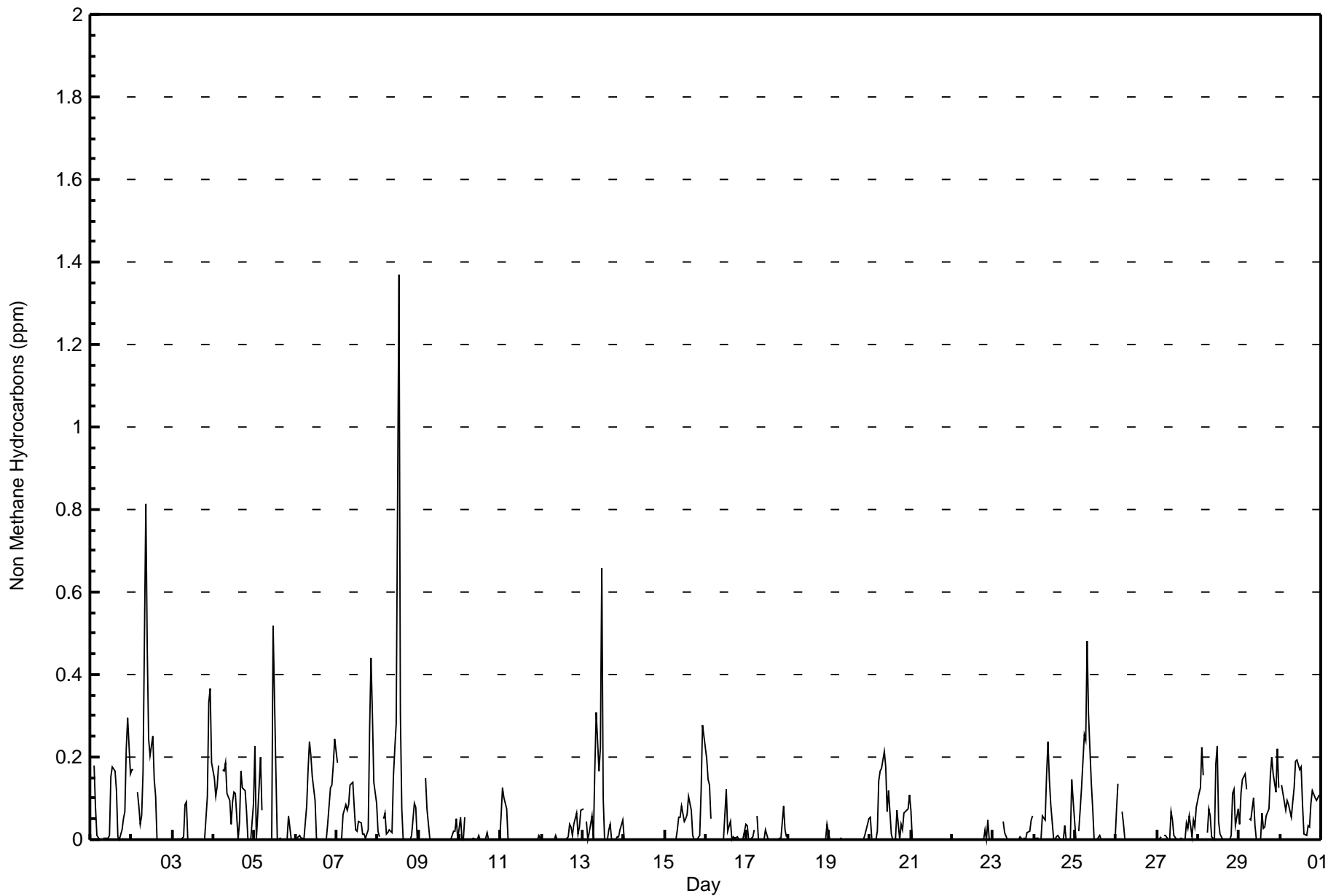
Fort McKay - Bertha Ganter - June 2017

Maximum Value: 1.371 ppm on Jun 8 13:00	Maximum Daily Average: 0.132 ppm on Jun 2	Hours in Service: 720
Minimum Value: 0.000 ppm on Jun 1 01:00	Minimum Daily Average: 0.000 ppm on Jun 14	Hours of Data: 680
Maximum Diurnal Average: 0.098 ppm at hour 9	Minimum Diurnal Average: 0.010 ppm at hour 18	Hours of Missing Data: 40
Monthly Average: 0.049 ppm	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.4	Hours of Calibration: 35
		Percent Operational Time: 99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.000	Z	0.181	0.077	0.010	0.002	0.001	0.000	0.003	0.002	0.003	0.009	0.153	0.175	0.167	0.118	0.008	0.000	0.025	0.052	0.069	0.220	0.295	0.158	0.075	0.295
2-Jun	0.170	0.171	Z	0.115	0.081	0.037	0.057	0.163	0.815	0.464	0.246	0.205	0.251	0.147	0.103	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.132	0.815
3-Jun	0.001	0.000	0.000	Z	0.000	0.000	0.007	0.086	0.090	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.105	0.332	0.365	0.188	0.051	0.365
4-Jun	0.150	0.106	0.129	0.180	Z	0.168	0.166	0.188	0.113	0.095	0.038	0.092	0.116	0.111	0.000	0.045	0.167	0.125	0.118	0.067	0.000	0.000	0.000	0.090	0.098	0.188
5-Jun	0.229	0.000	0.061	0.200	0.072	Z	0.001	0.000	0.000	0.000	0.002	0.518	0.162	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.057	0.518
6-Jun	Z	0.005	0.012	0.003	0.003	0.000	0.081	0.171	0.237	0.202	0.153	0.095	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.125	0.132	0.181	0.244	0.073	0.244
7-Jun	0.185	Z	0.001	0.002	0.060	0.085	0.071	0.084	0.132	0.138	0.077	0.024	0.021	0.044	0.042	0.013	0.014	0.004	0.024	0.269	0.442	0.301	0.141	0.087	0.098	0.442
8-Jun	0.021	0.007	Z	0.050	0.065	0.014	0.016	0.023	0.018	0.153	0.220	0.280	1.371	0.304	0.076	0.002	0.000	0.000	0.000	0.000	0.010	0.088	0.077	0.002	0.121	1.371
9-Jun	0.003	0.001	0.001	Z	0.149	0.073	0.002	0.000	0.000	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.020	0.050	0.000	0.018	0.149
10-Jun	0.056	0.004	0.000	0.053	Z	0.000	0.000	0.000	0.005	0.000	0.000	0.010	0.000	0.000	0.000	0.005	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.056
11-Jun	0.056	0.126	0.101	0.074	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.016	0.126	
12-Jun	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.037	0.029	0.009	0.036	0.063	0.014	0.029	0.070	0.013	0.070
13-Jun	0.074	Z	0.042	0.002	0.018	0.057	0.000	0.169	0.308	0.168	0.225	0.659	0.101	0.000	0.001	0.025	0.037	0.000	0.000	0.000	0.007	0.007	0.022	0.049	0.086	0.659
14-Jun	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
15-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.023	0.056	0.054	0.082	0.044	0.051	0.061	0.106	0.070	0.011	0.000	0.000	0.000	0.011	0.117	0.278	0.251	0.053	0.278
16-Jun	0.196	0.147	0.132	0.050	Z	0.000	0.000	M	M	0.000	0.000	0.061	0.122	0.021	0.045	0.001	0.007	0.005	0.005	0.000	0.000	0.001	0.002	0.039	0.040	0.196
17-Jun	0.034	0.000	0.000	0.007	0.023	Z	0.057	0.000	0.000	0.000	0.000	0.022	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.082	0.025	0.008	0.011	0.082
18-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.002	0.038
19-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.024	0.051	0.004	0.051
20-Jun	0.055	0.003	Z	0.000	0.019	0.142	0.166	0.171	0.213	0.177	0.068	0.119	0.015	0.000	0.000	0.004	0.070	0.000	0.037	0.025	0.063	0.070	0.075	0.108	0.070	0.213
21-Jun	0.072	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.072
22-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.049	0.000	0.000	0.003	0.049
23-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.044	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.018	0.020	0.047	0.058	0.009	0.058
24-Jun	Z	0.002	0.004	0.000	0.000	0.058	0.046	0.157	0.236	0.145	0.085	0.002	0.000	0.008	0.012	0.000	0.000	0.000	0.034	0.000	0.000	0.001	0.145	0.094	0.045	0.236
25-Jun	0.000	Z	0.020	0.070	0.125	0.254	0.240	0.481	0.300	0.136	0.075	0.000	0.000	0.000	0.010	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.075	0.481
26-Jun	0.073	0.137	Z	0.068	0.038	0.001	0.000	0.000	0.000	0.000	M	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.137
27-Jun	0.000	0.000	0.005	Z	0.010	0.010	0.000	0.001	0.066	0.046	0.009	0.000	0.000	0.000	0.002	0.001	0.000	0.041	0.027	0.057	0.008	0.048	0.030	0.078	0.019	0.078
28-Jun	0.110	0.125	0.224	0.156	Z	0.017	0.073	0.058	0.007	0.000	0.183	0.228	0.043	0.014	0.000	0.000	0.000	0.000	0.000	0.011	0.113	0.124	0.032	0.073	0.069	0.228
29-Jun	0.036	0.110	0.147	0.161	0.124	Z	0.050	0.047	0.103	0.035	0.001	0.001	0.000	0.065	0.028	0.032	0.056	0.073	0.157	0.202	0.161	0.117	0.221	0.124	0.089	0.221
30-Jun	Z	0.133	0.092	0.071	0.096	0.084	0.056	0.091	0.125	0.189	0.193	0.170	0.177	0.084	0.013	0.011	0.034	0.030	0.089	0.120	0.103	0.094	0.102	0.109	0.098	0.193

0.061	0.043	0.046	0.054	0.036	0.040	0.038	0.067	0.098	0.069	0.059	0.091	0.092	0.036	0.020	0.011	0.016	0.010	0.018	0.030	0.046	0.062	0.072	0.064	Diurnal Average	
0.229	0.171	0.224	0.200	0.149	0.254	0.240	0.481	0.815	0.464	0.246	0.659	1.371	0.304	0.167	0.118	0.167	0.125	0.157	0.269	0.442	0.332	0.365	0.251	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	369	54.26	54.26
0.006 - 0.05	115	16.91	71.18
0.06 - 0.1	123	18.09	89.26
> 0.1	73	10.74	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	57	15	8	9	12	7	17	53	21	8	15	8	29	42	26	40	367
0.006 - 0.05	23	12	8	6	1	4	5	15	10	3	2	2	4	9	5	6	115
0.06 - 0.1	22	7	7	2	4	1	9	13	18	5	1	3	5	6	10	10	123
> 0.1	13	11	1	5	1	2	6	12	2	1	2	4	2	3	6	2	73
Totals	115	45	24	22	18	14	37	93	51	17	20	17	40	60	47	58	678

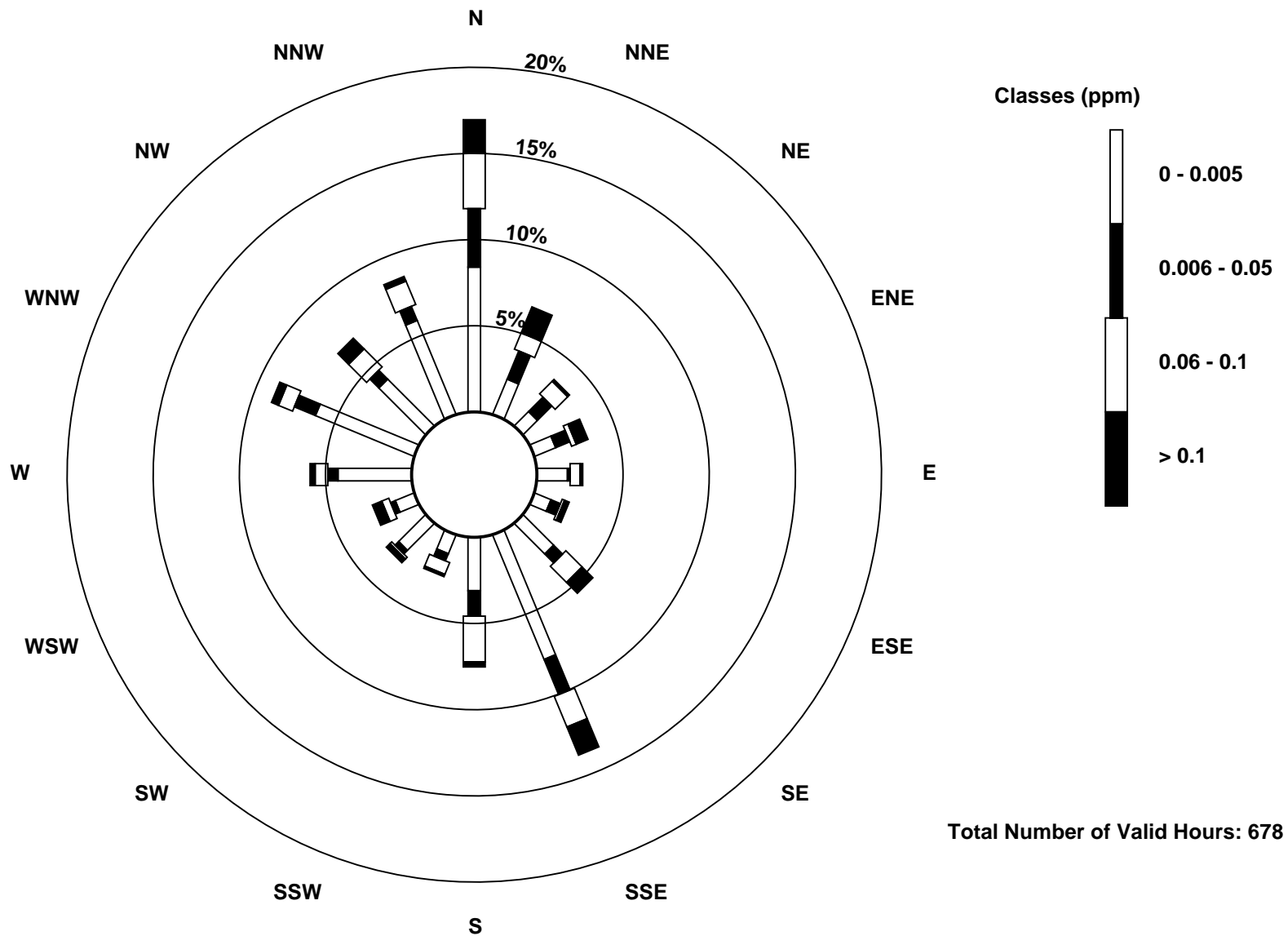
Total Number of Valid Hours: 678

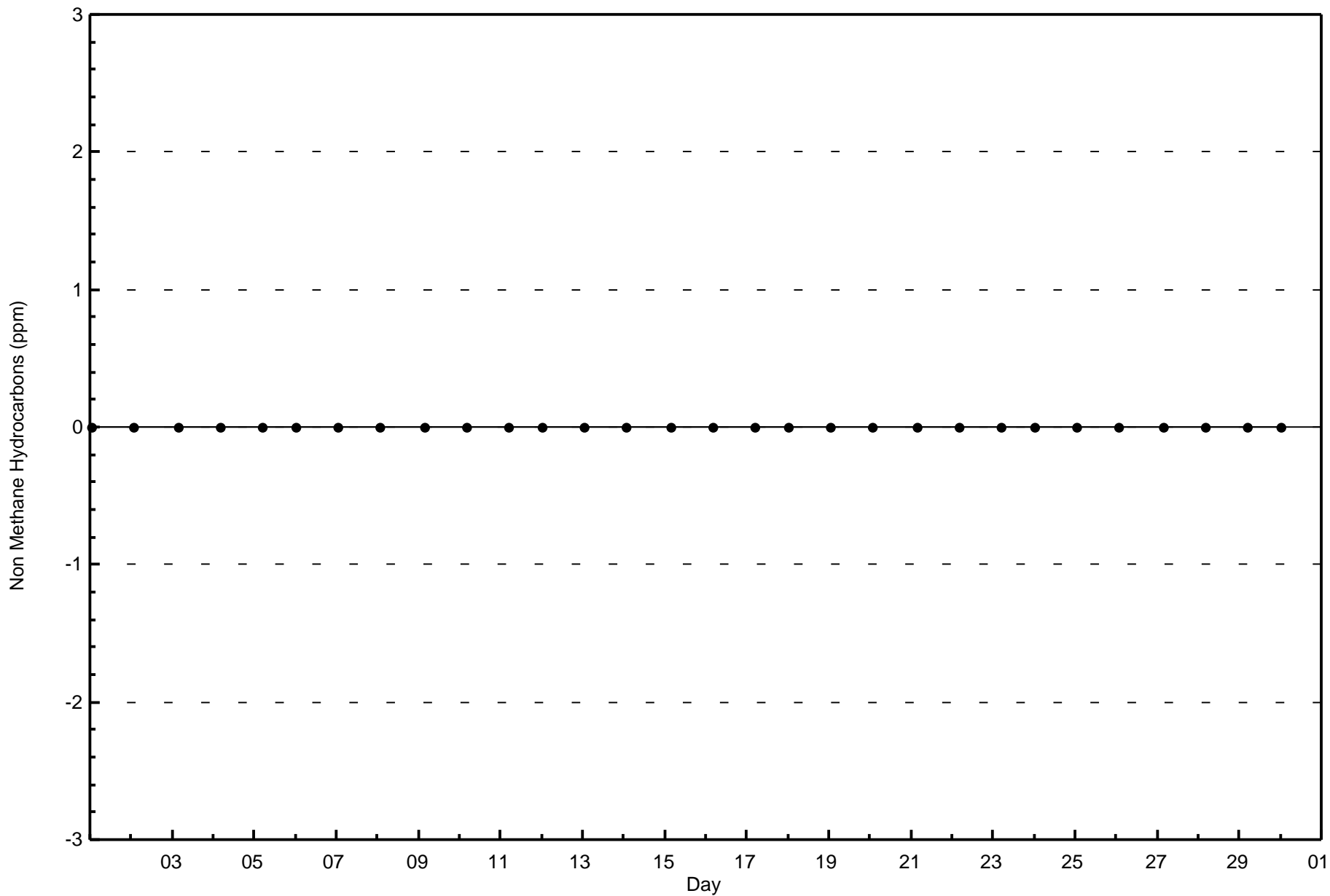
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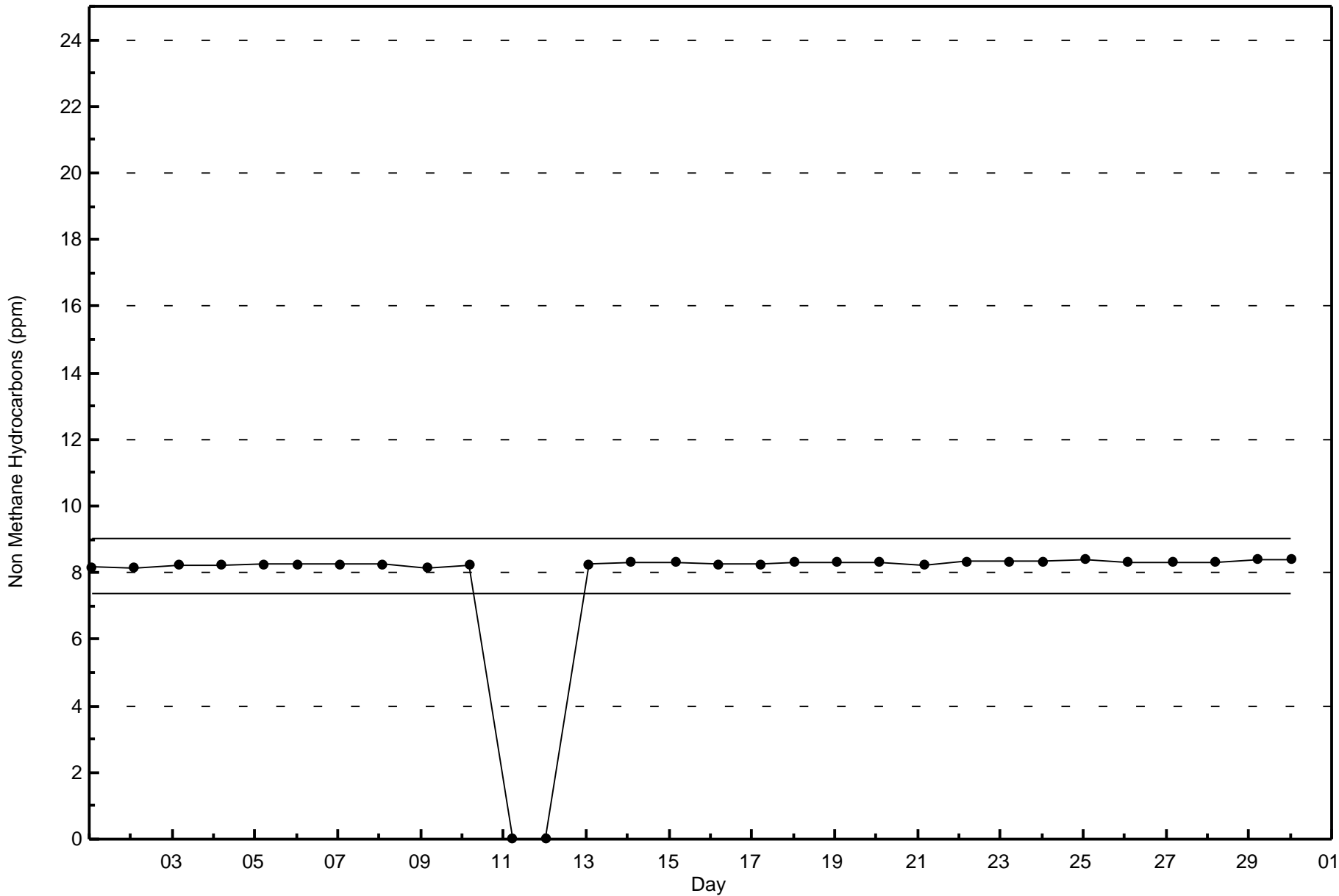


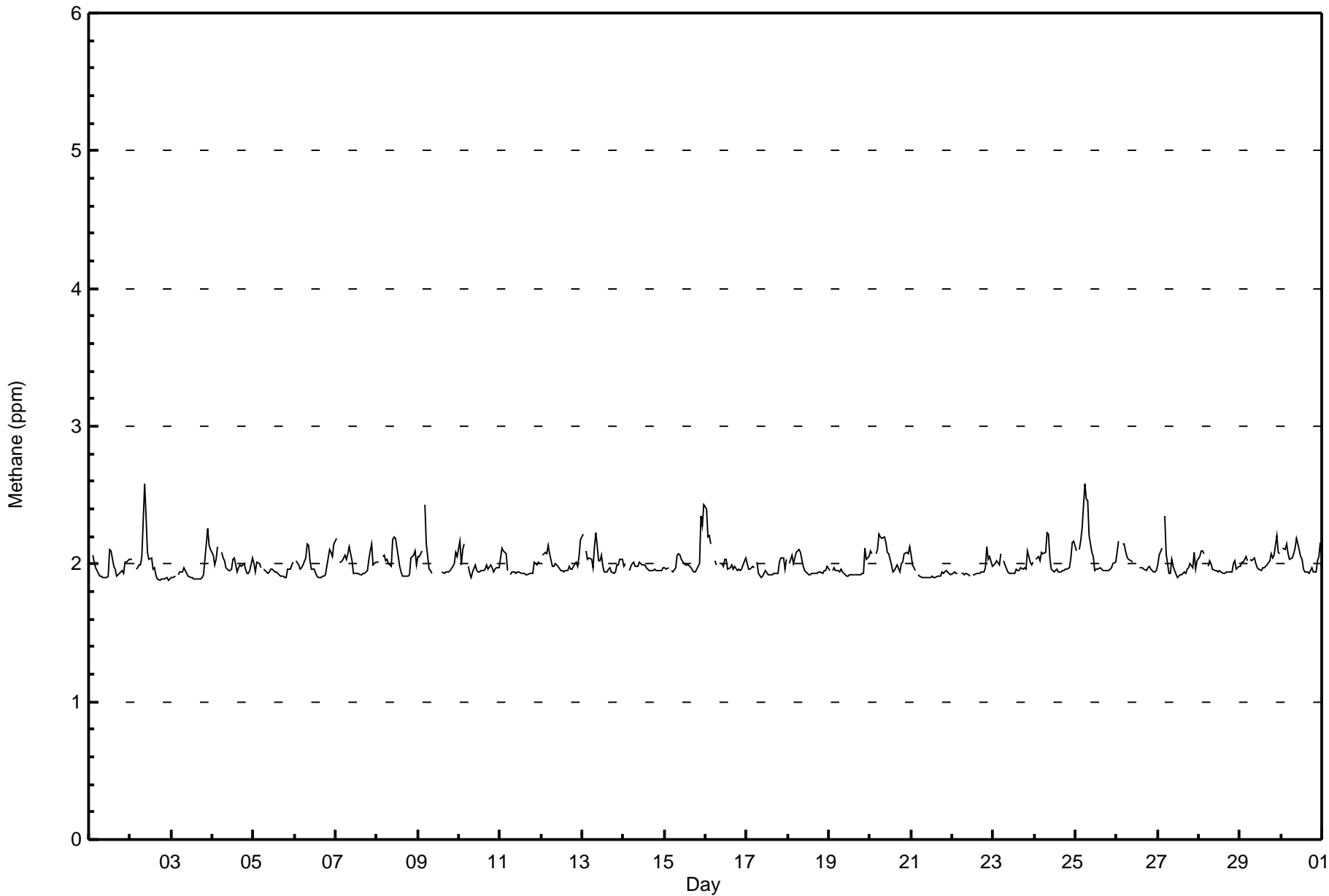
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter (AMS 1)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	537	78.97	78.97
2.1 - 3.0	143	21.03	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	85	36	20	20	16	9	28	71	43	11	15	14	33	48	37	49	535
2.1 - 3.0	30	9	4	2	2	5	9	22	8	6	5	3	7	12	10	9	143
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	115	45	24	22	18	14	37	93	51	17	20	17	40	60	47	58	678

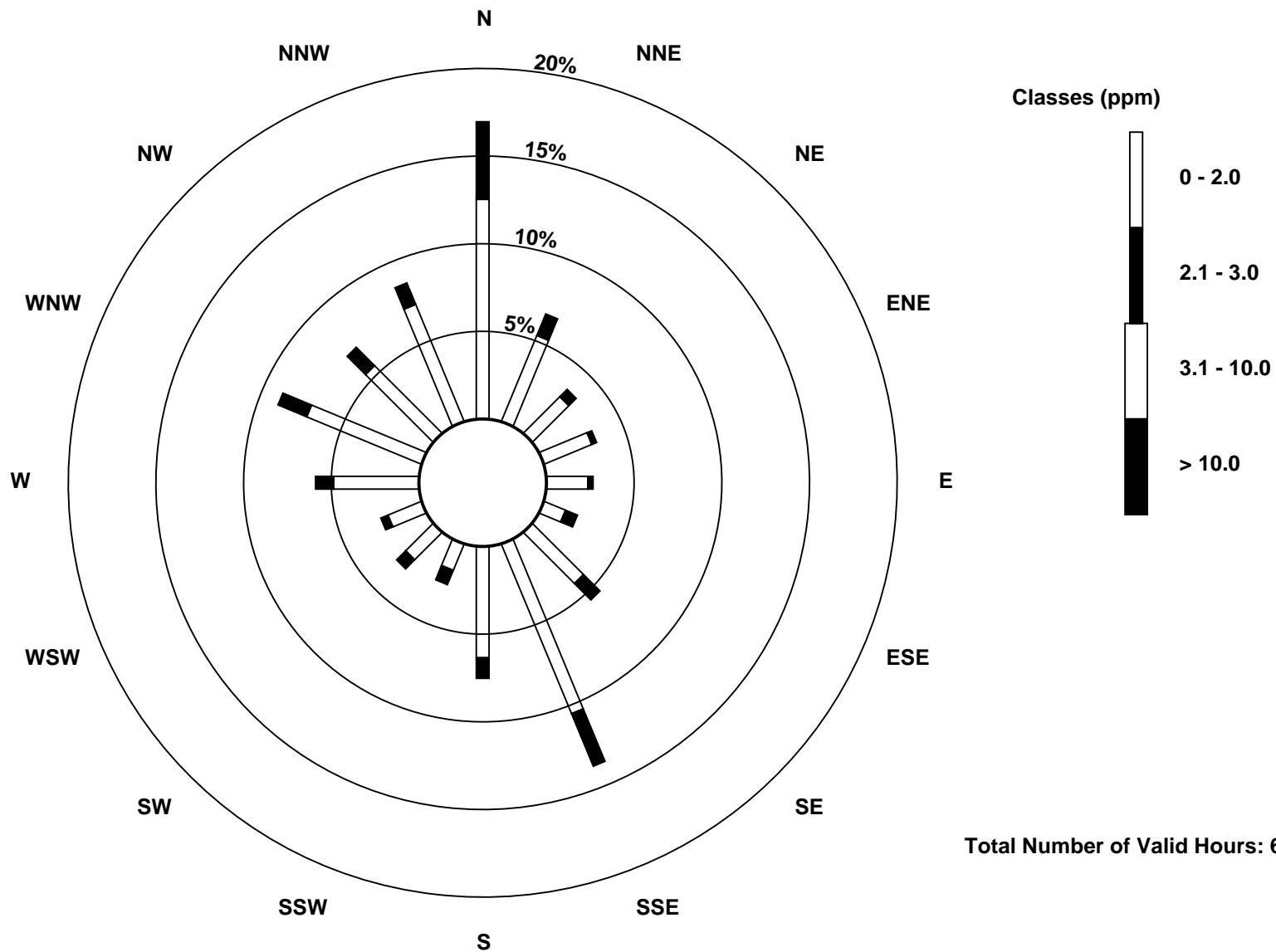
Total Number of Valid Hours: 678

Total Number of Hours: 720

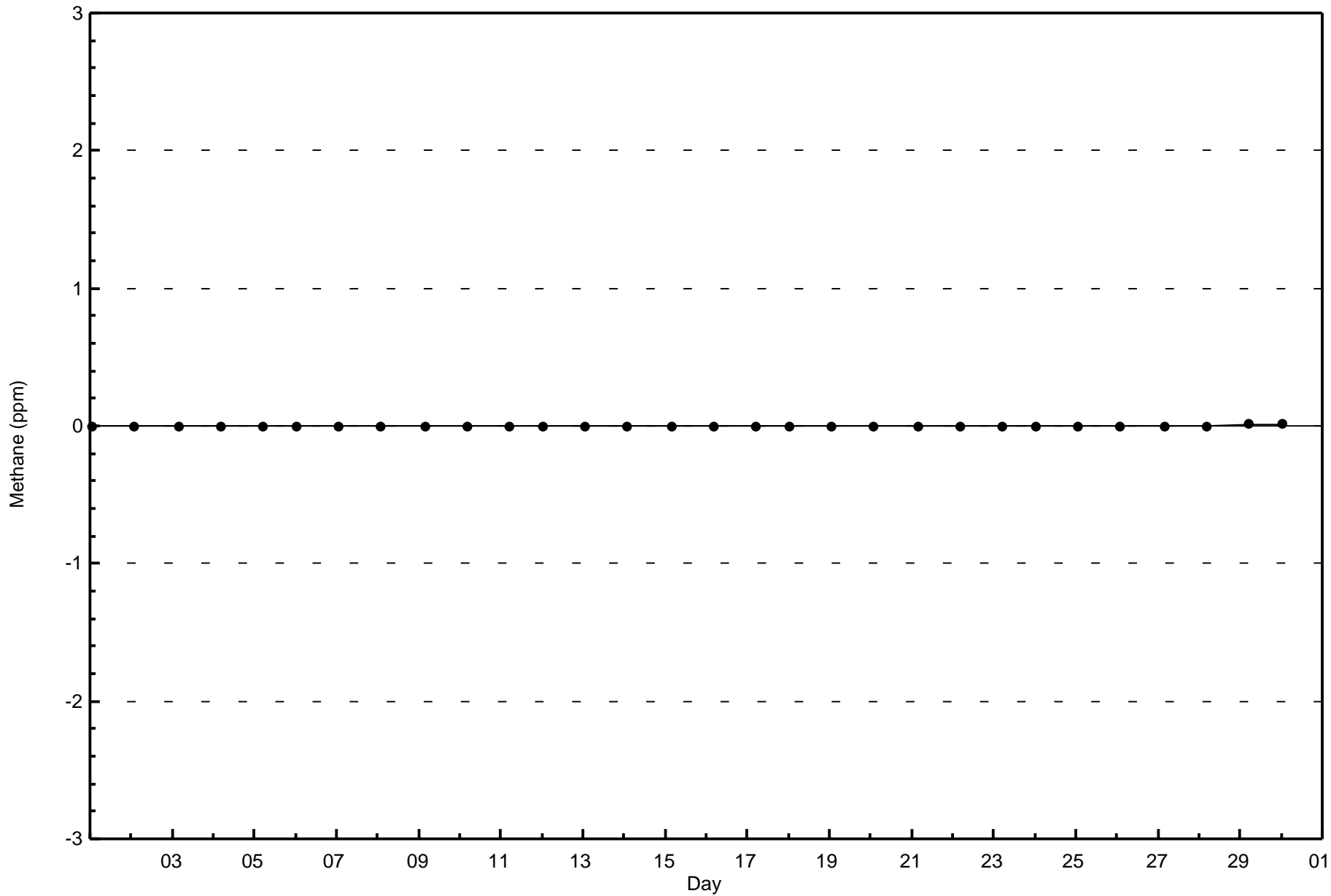


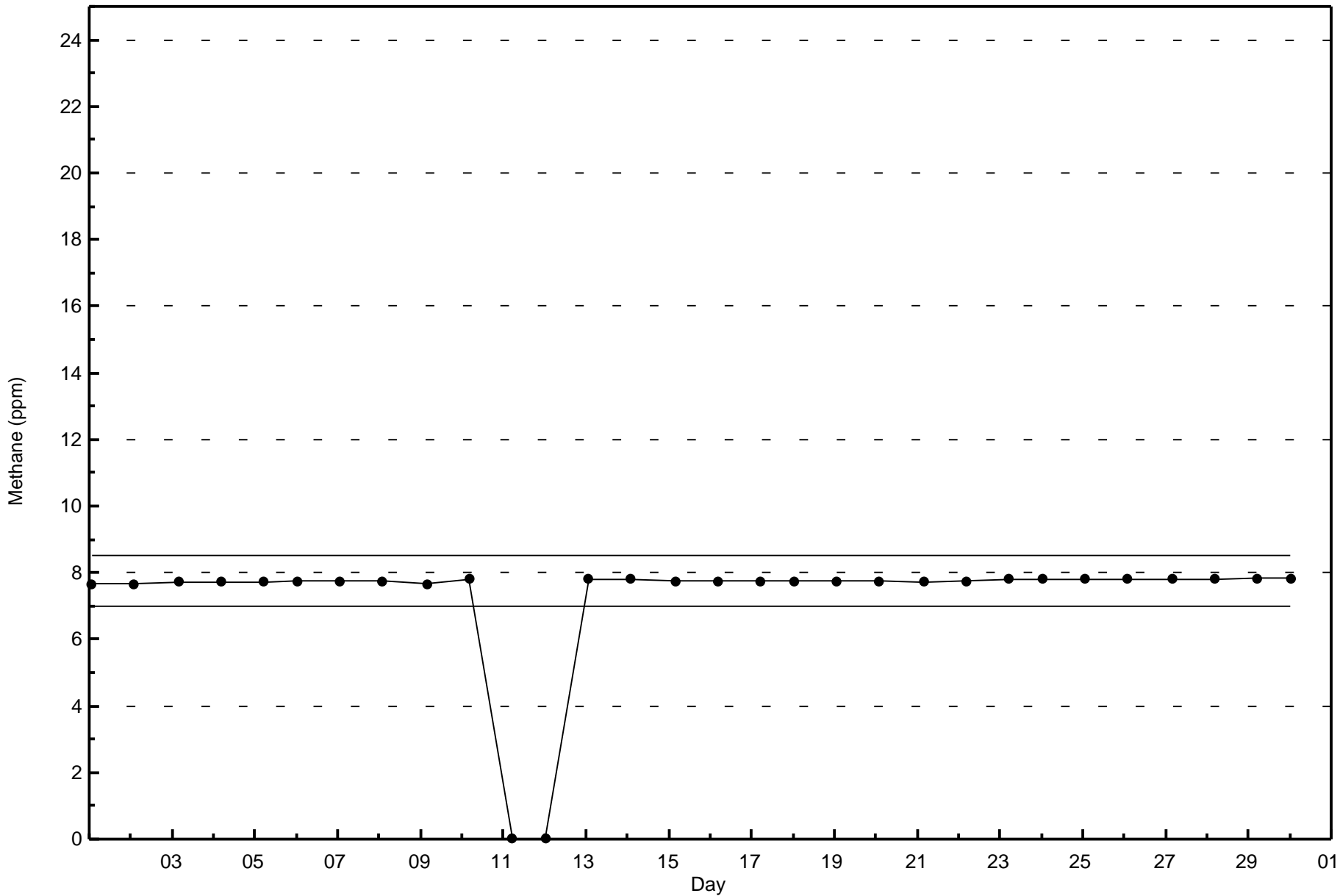
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter (AMS 1)



Total Number of Valid Hours: 678





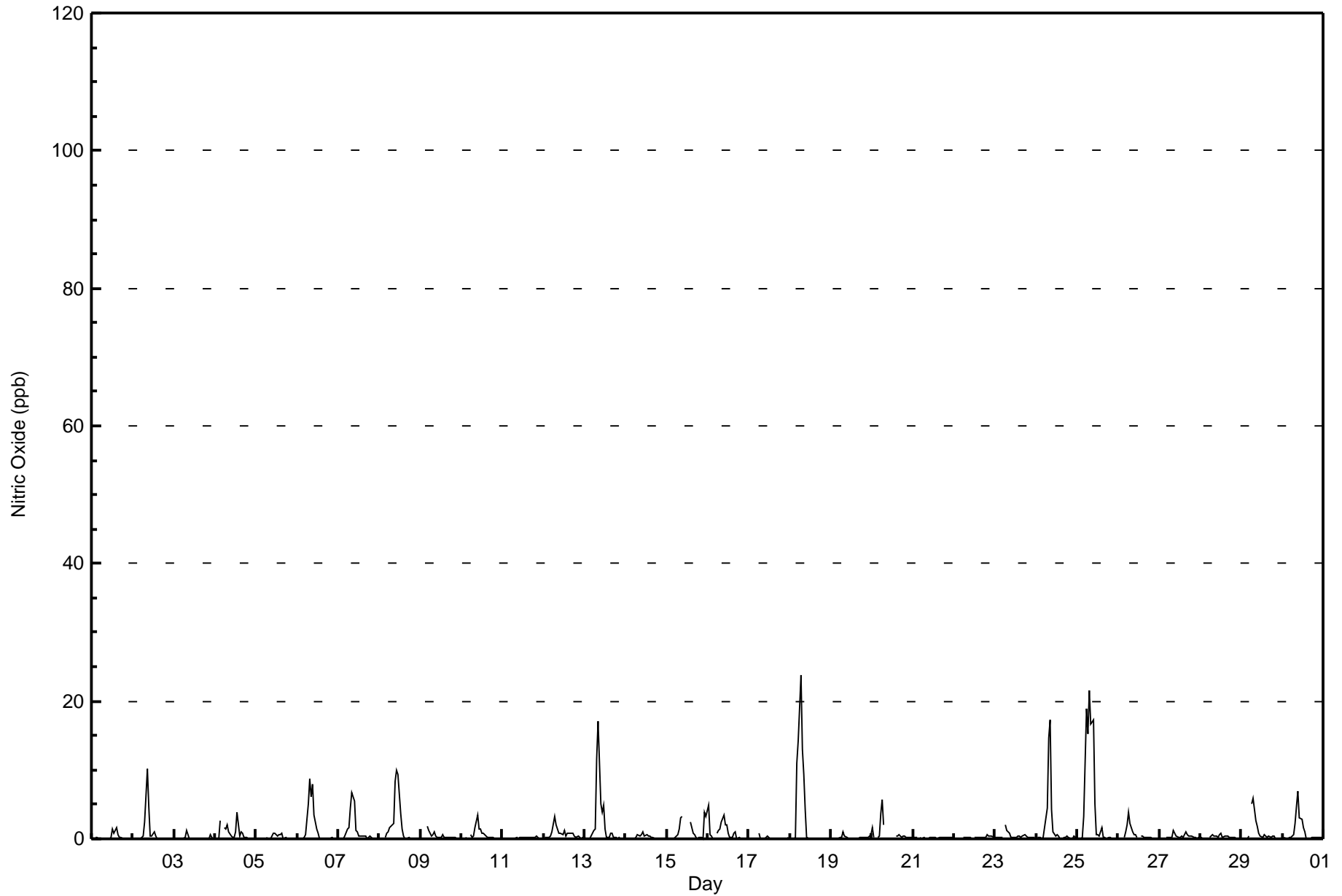


Maximum Value: 24 ppb on Jun 18 07:00		Maximum Daily Average: 4.5 ppb on Jun 25		Hours in Service: 720																																													
Minimum Value: 0 ppb on Jun 1 01:00		Minimum Daily Average: 0.1 ppb on Jun 17		Hours of Data: 678																																													
Maximum Diurnal Average: 3.8 ppb at hour 9		Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Missing Data: 42																																													
Monthly Average: 0.9 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 17		Hours of Calibration: 36																																													
				Percent Operational Time: 99.2																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0.2	2																							
2-Jun	0	0	Z	0	0	0	0	2	10	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.9	10																							
3-Jun	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1																							
4-Jun	0	0	0	3	Z	2	1	2	1	0	0	0	1	4	0	1	1	0	0	0	0	0	0	0	0.7	4																							
5-Jun	0	0	0	0	0	Z	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0.2	1																							
6-Jun	Z	0	0	0	0	1	5	9	6	8	3	2	1	0	0	0	0	0	0	0	0	0	0	0	1.5	9																							
7-Jun	0	Z	0	0	0	1	2	4	7	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	7																							
8-Jun	0	0	Z	0	1	1	2	2	2	8	10	9	4	2	0	0	0	0	0	0	0	0	0	0	1.8	10																							
9-Jun	0	0	0	Z	2	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	2																							
10-Jun	0	0	0	0	Z	1	0	0	2	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3																							
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
12-Jun	Z	0	0	0	0	1	3	2	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0.7	3																							
13-Jun	0	Z	0	0	0	1	1	12	17	5	4	5	1	0	0	1	1	0	0	0	0	0	0	0	2.2	17																							
14-Jun	0	0	Z	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
15-Jun	0	0	0	Z	0	0	1	1	3	3	M	M	M	M	2	1	1	0	0	0	0	0	4	3	1.1	4																							
16-Jun	5	1	0	0	Z	1	1	1	2	4	2	2	1	0	0	1	1	0	0	0	0	0	0	0	1.0	5																							
17-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
18-Jun	Z	0	0	0	11	14	24	13	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3	24																							
19-Jun	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1																							
20-Jun	2	0	Z	0	0	4	6	2	C	C	C	C	C	C	0	0	1	0	0	0	0	0	0	0	--	6																							
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1																							
23-Jun	0	0	0	0	0	Z	2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	2																							
24-Jun	Z	0	0	0	0	2	4	15	17	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2.0	17																							
25-Jun	0	Z	0	0	3	19	15	22	17	17	5	1	1	0	2	0	0	0	0	0	0	0	0	0	4.5	22																							
26-Jun	0	0	Z	0	1	2	4	2	1	1	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0.6	4																							
27-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.3	1																							
28-Jun	0	0	0	0	Z	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
29-Jun	0	0	0	0	0	Z	5	6	3	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.9	6																							
30-Jun	Z	0	0	0	0	0	1	2	5	7	3	3	2	1	0	0	0	0	0	0	0	0	0	0	1.1	7																							
																								0.3	0.1	0.1	0.2	0.9	2.0	2.7	3.5	3.8	2.8	1.3	1.1	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.2	Diurnal Average	
																								5	1	0	3	11	19	24	22	17	17	10	9	4	4	2	1	1	1	1	0	1	0	1	4	3	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	676	99.71	99.71
21 - 40	2	0.29	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



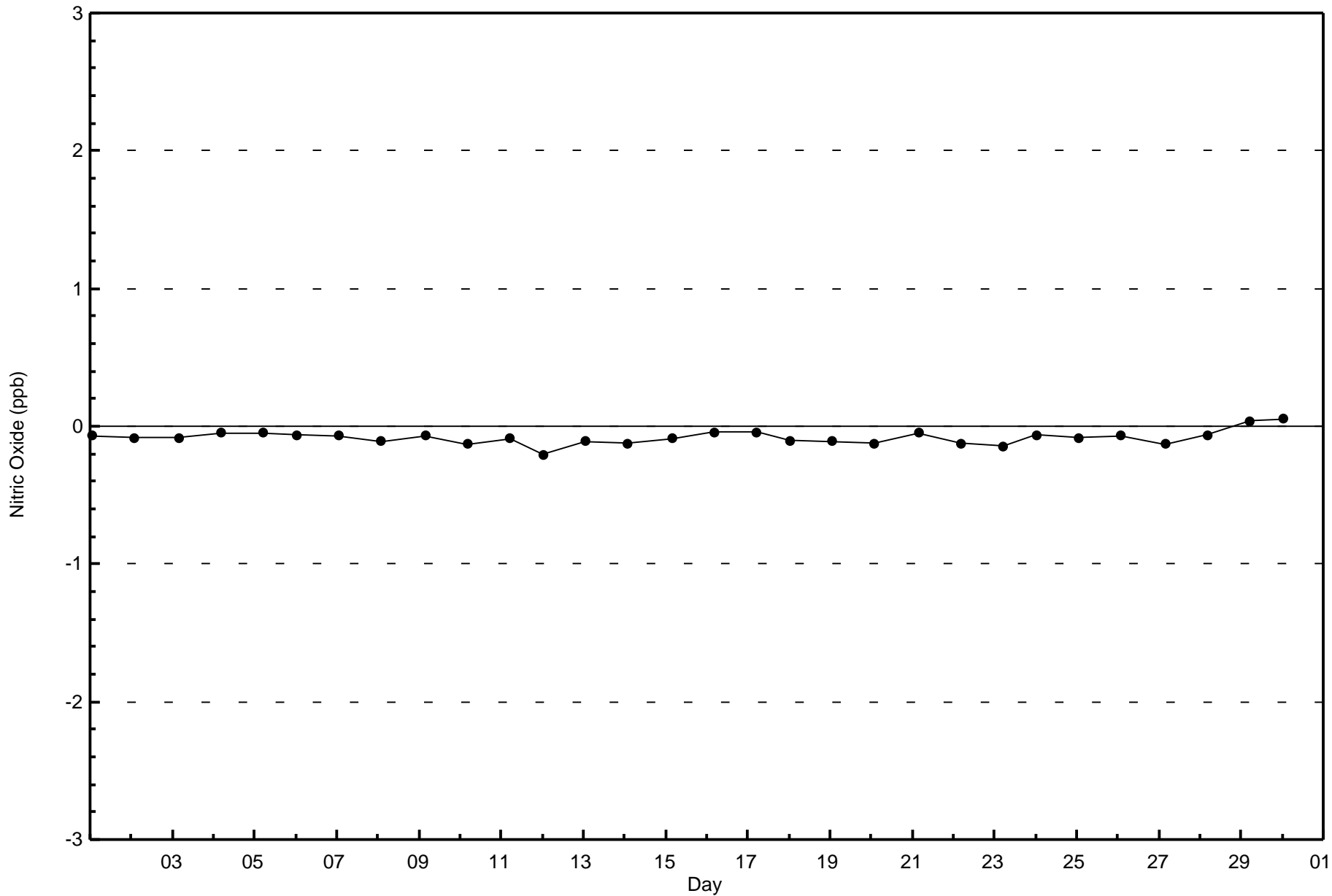
**Wood Buffalo Environmental Association
Frequency Distribution**

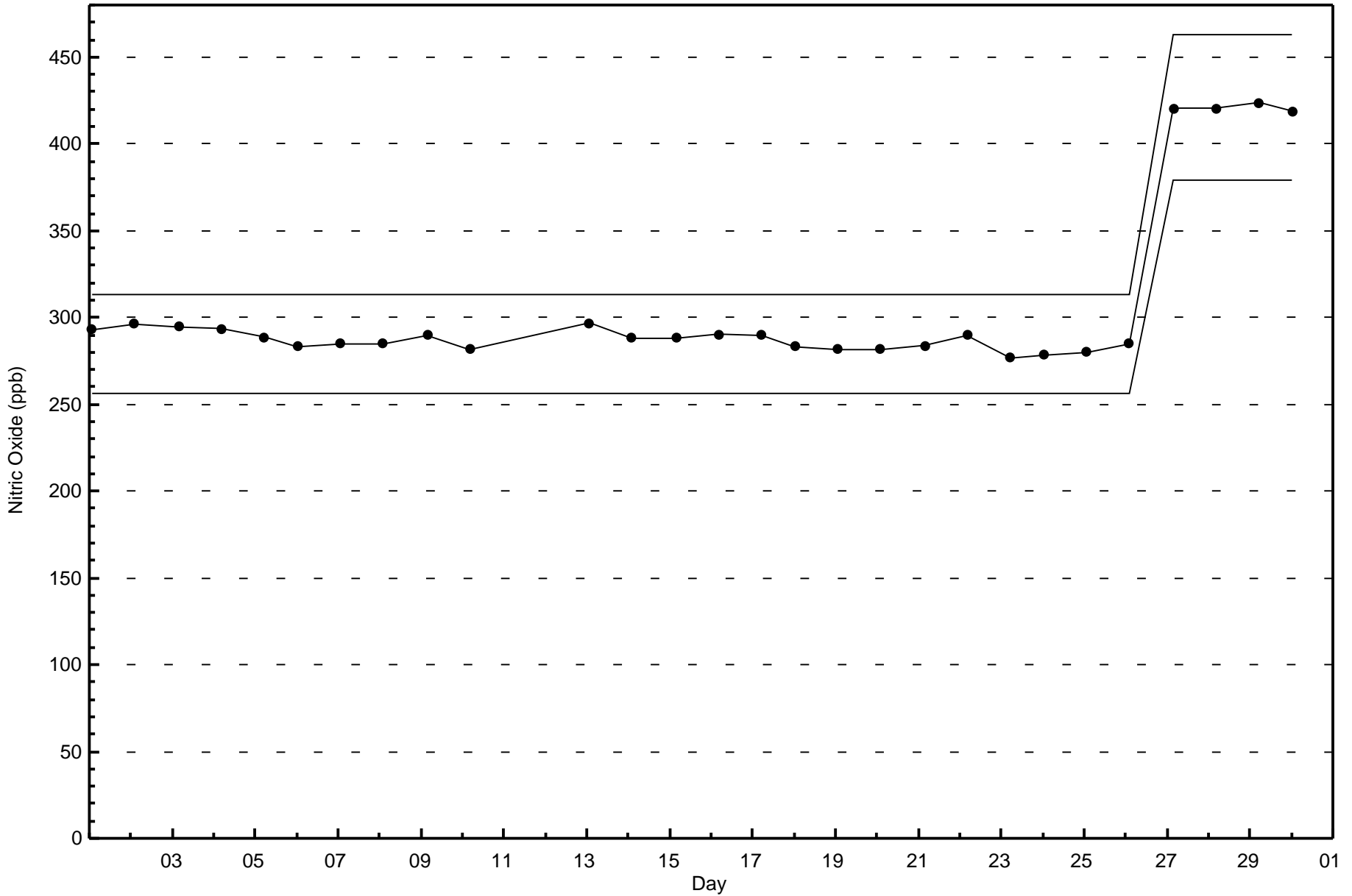
**Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	116	46	24	22	18	15	37	90	50	16	19	17	40	60	47	57	674
21 - 40	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	46	24	22	18	15	38	90	51	16	19	17	40	60	47	57	676

Total Number of Valid Hours: 676

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 28 ppb on Jun 2 10:00	Maximum Daily Average: 6.7 ppb on Jun 25		Hours of Data:	678
Minimum Value: 0 ppb on Jun 3 06:00	Minimum Daily Average: 0.4 ppb on Jun 21		Hours of Missing Data:	42
Maximum Diurnal Average: 5.5 ppb at hour 9	Minimum Diurnal Average: 1.4 ppb at hour 18		Hours of Calibration:	36
Monthly Average: 3.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 9 P ₉₉ = 18		Percent Operational Time:	99.2

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	14	16	2	1	0	0	0	0	0	1	5	3	5	4	2	3	2	2	3	5	5	3	3.4	16	
2-Jun	4	4	Z	2	1	1	1	4	27	28	12	10	11	5	3	2	1	1	1	1	0	0	0	0	5.2	28	
3-Jun	0	0	0	Z	0	0	0	2	2	0	0	0	0	0	0	0	0	0	1	1	1	14	21	11	2.3	21	
4-Jun	6	4	6	12	Z	4	3	4	4	4	3	3	7	11	2	5	6	4	3	3	0	0	1	10	4.5	12	
5-Jun	4	1	3	6	5	Z	4	2	1	3	5	5	2	3	2	3	1	1	1	1	4	1	2	2	2.6	6	
6-Jun	Z	1	1	1	1	1	6	9	9	13	7	5	3	1	0	0	0	0	0	2	8	9	18	17	4.9	18	
7-Jun	16	Z	5	4	8	9	7	8	11	11	4	4	2	2	2	2	2	1	3	2	4	10	12	11	6.0	16	
8-Jun	7	8	Z	10	13	11	10	8	7	12	14	14	10	7	3	1	2	2	2	2	2	2	2	1	6.5	14	
9-Jun	1	1	1	Z	11	6	2	2	2	1	1	1	1	1	0	1	1	1	1	2	4	2	4	4	2.1	11	
10-Jun	9	5	5	6	Z	3	1	0	3	6	3	3	2	3	2	3	4	2	3	1	1	1	1	0	2.9	9	
11-Jun	4	5	6	6	0	Z	0	0	0	0	0	1	0	0	1	0	1	1	1	1	6	2	2	4	1.8	6	
12-Jun	Z	2	2	2	2	6	12	9	4	6	4	2	3	2	3	3	4	3	2	2	4	2	5	8	3.9	12	
13-Jun	9	Z	5	2	2	3	3	10	14	7	7	9	4	1	1	3	3	1	1	1	3	2	5	5	4.4	14	
14-Jun	2	2	Z	0	2	1	3	3	3	2	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1.0	3	
15-Jun	1	0	0	Z	1	1	2	3	4	4	M	M	M	M	4	3	2	1	0	2	4	7	18	14	3.6	18	
16-Jun	10	6	4	2	Z	3	3	3	4	5	5	3	2	2	3	5	3	2	0	1	1	1	3	3	3.3	10	
17-Jun	6	2	2	4	3	Z	4	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4	3	3	1.4	6	
18-Jun	Z	1	1	2	15	14	17	12	11	7	0	0	0	0	0	0	0	0	0	0	0	0	1	3	3.6	17	
19-Jun	0	Z	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	1	1	1	3	6	9	1.1	9	
20-Jun	14	3	Z	3	3	7	11	9	C	C	C	C	C	C	2	2	4	1	2	5	3	2	5	5	--	14	
21-Jun	4	4	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	1	2	2	4	2	1	0.5	4	
23-Jun	0	0	0	0	0	Z	2	2	1	1	0	0	1	1	1	1	2	2	3	2	2	2	4	3	1.3	4	
24-Jun	Z	1	1	0	0	2	4	10	14	7	2	1	1	1	0	0	1	1	1	2	1	1	3	4	2.6	14	
25-Jun	3	Z	3	4	6	12	13	17	19	19	10	2	3	3	7	2	1	1	2	2	2	6	11	9	6.7	19	
26-Jun	6	3	Z	7	16	15	13	7	4	3	3	2	M	2	3	2	3	2	3	3	1	1	0	0	4.5	16	
27-Jun	0	1	1	Z	2	3	1	2	4	3	1	0	1	1	1	4	4	4	5	5	1	3	2	5	2.3	5	
28-Jun	8	7	7	6	Z	2	3	2	1	1	1	1	2	1	1	1	1	1	2	2	5	6	3	5	3.1	8	
29-Jun	3	3	3	4	5	Z	6	6	4	4	2	2	2	4	4	4	4	4	8	9	5	2	3	1	3.9	9	
30-Jun	Z	2	1	0	2	2	3	4	5	7	7	6	7	5	1	0	0	0	0	1	1	1	1	1	2.5	7	

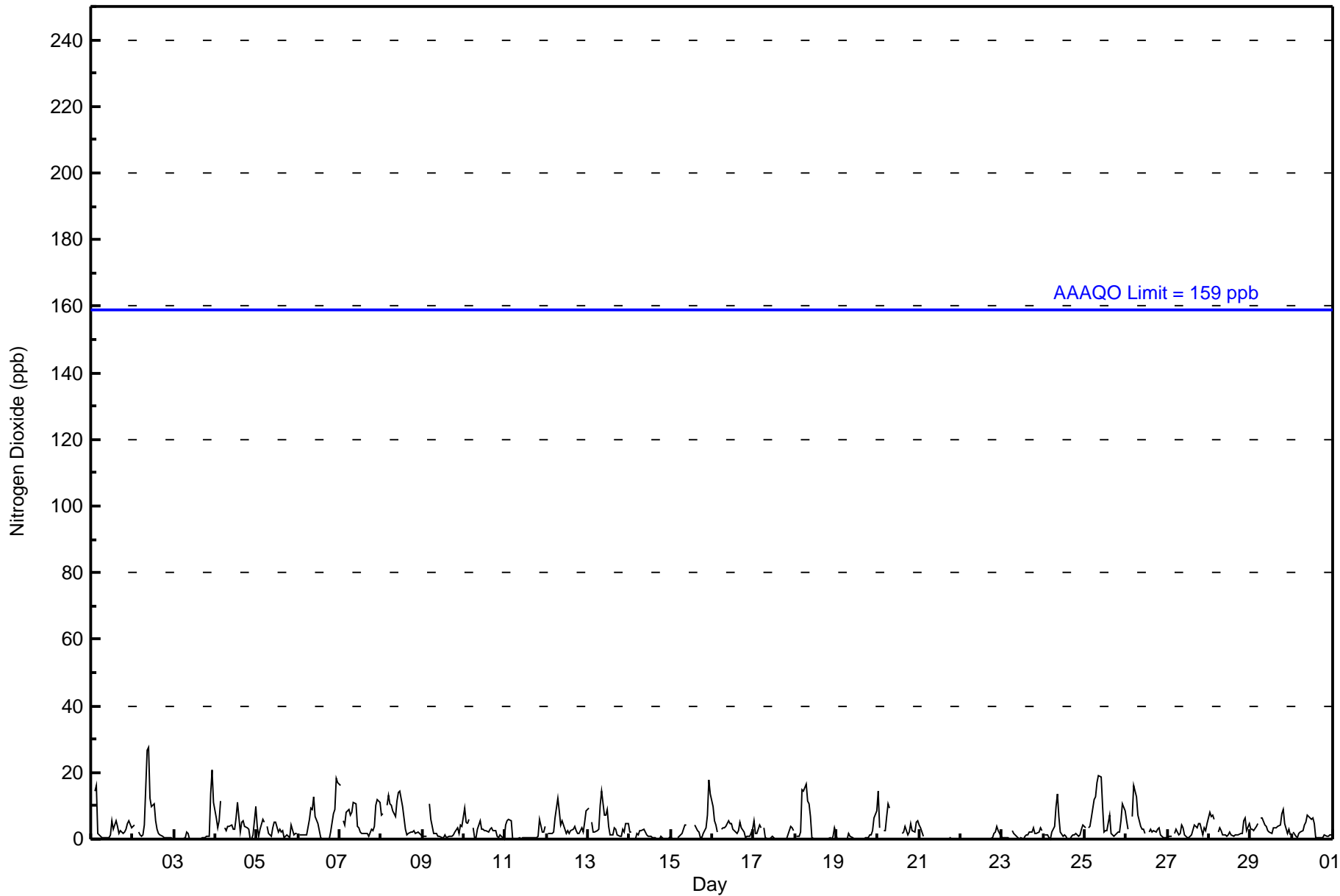
4.8	2.6	2.9	4.0	3.9	4.3	4.4	4.7	5.5	5.3	3.4	2.9	2.5	2.1	1.7	1.6	1.7	1.4	1.7	1.9	2.3	3.1	4.7	4.7	Diurnal Average	
16	8	14	16	16	15	17	17	27	28	14	14	11	11	7	5	6	4	8	9	8	14	21	17	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	115	46	24	21	18	15	38	90	51	16	19	17	40	60	46	57	673
21 - 40	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	46	24	22	18	15	38	90	51	16	19	17	40	60	47	57	676

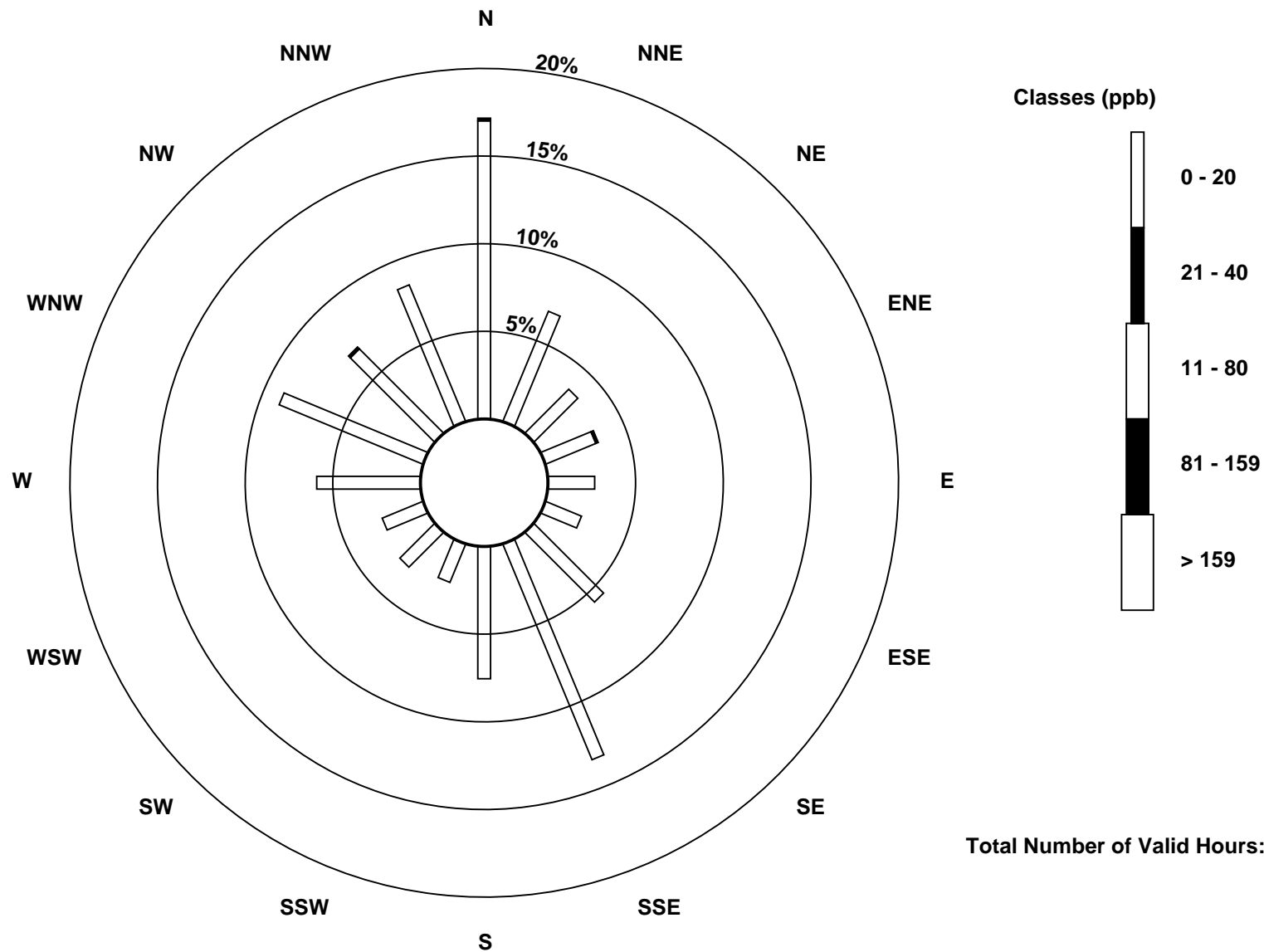
Total Number of Valid Hours: 676

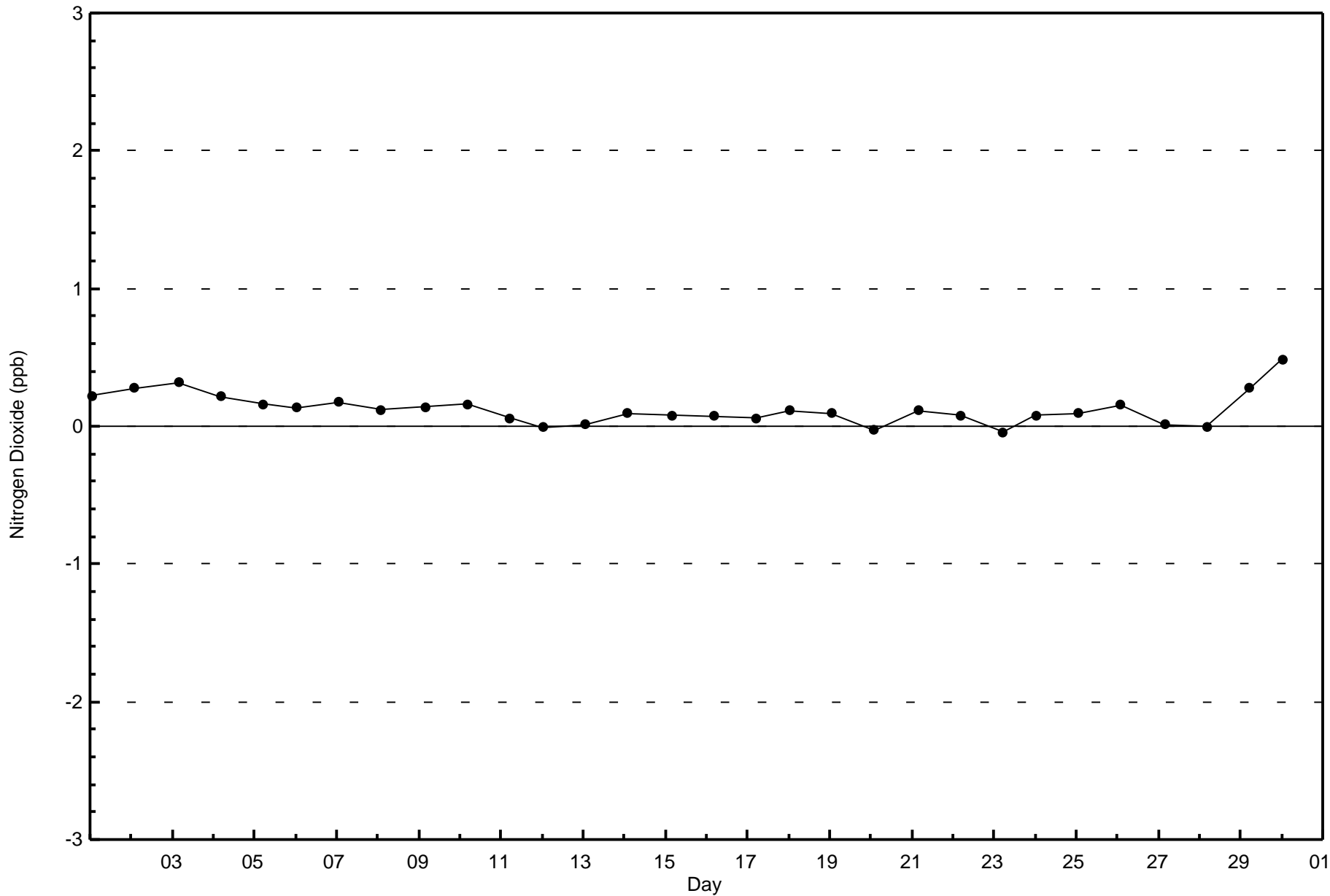
Total Number of Hours: 720

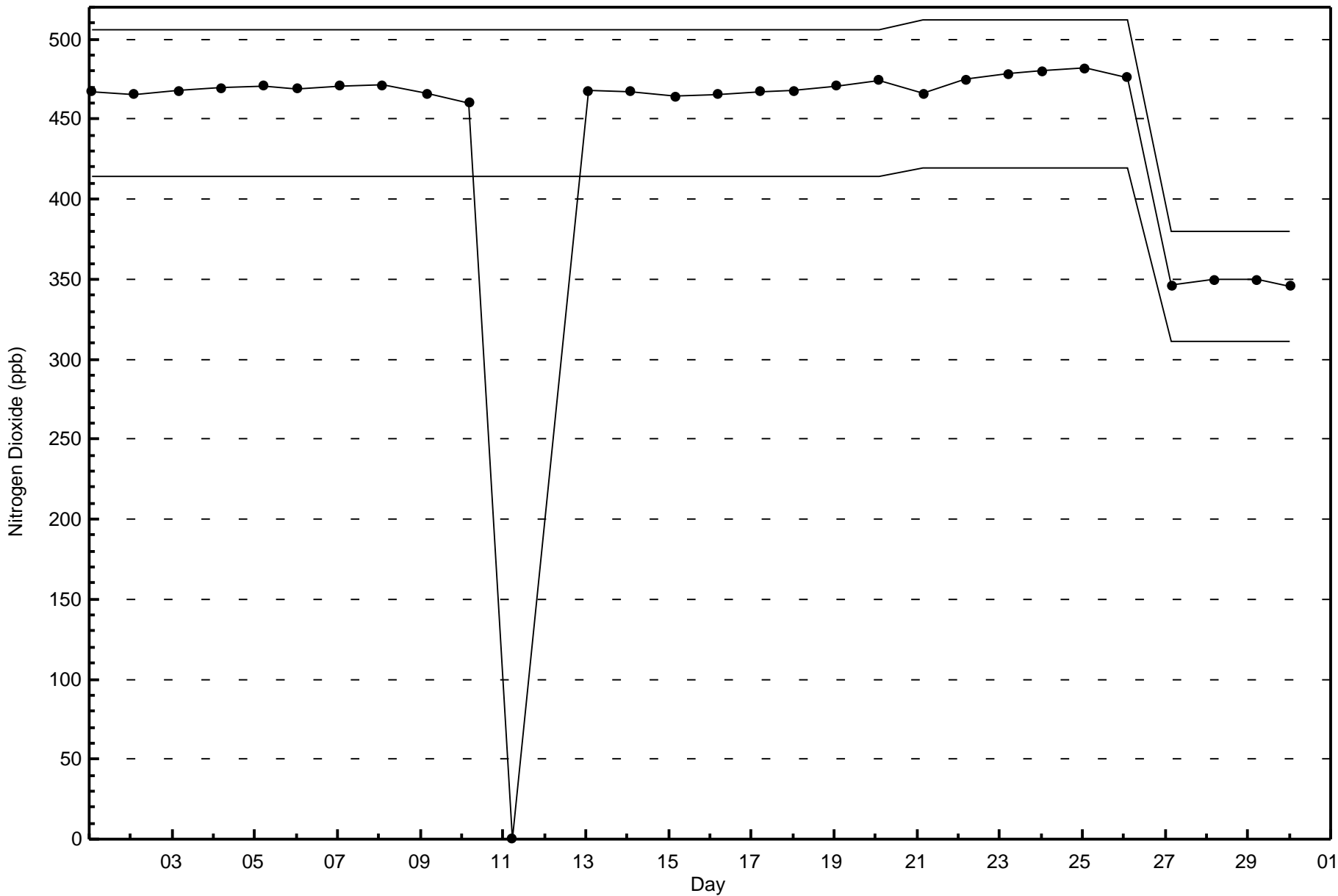


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association
Summary of Hour Averages

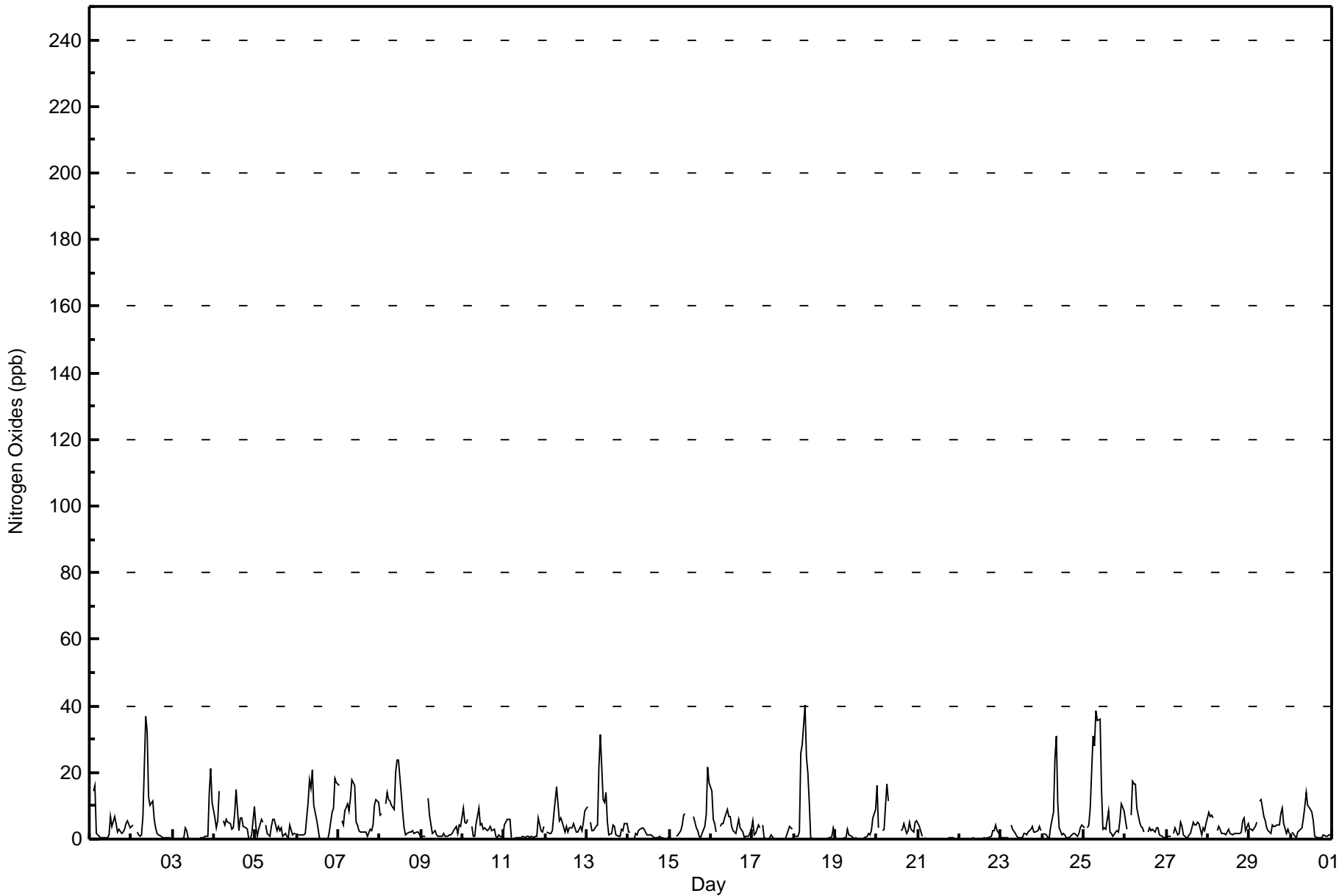
Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2017

Maximum Value: 40 ppb on Jun 18 07:00																		Maximum Daily Average: 11.2 ppb on Jun 25						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 3 11:00																		Minimum Daily Average: 0.5 ppb on Jun 21						Hours of Data: 678		
Maximum Diurnal Average: 9.2 ppb at hour 9																		Minimum Diurnal Average: 1.6 ppb at hour 18						Hours of Missing Data: 42		
Monthly Average: 4.2 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 10 P ₉₉ = 31						Hours of Calibration: 36		
																		Percent Operational Time: 99.2								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	14	16	2	1	0	0	0	0	0	1	7	4	7	4	2	3	2	2	3	5	5	3	3.6	16
2-Jun	4	4	Z	2	1	1	1	7	37	32	13	10	11	6	3	2	1	1	1	1	0	0	0	6.1	37	
3-Jun	0	0	0	Z	0	0	1	4	3	0	0	0	0	0	0	0	0	0	1	1	1	14	21	2.5	21	
4-Jun	6	4	6	14	Z	5	4	6	5	5	3	3	7	15	3	6	6	4	4	3	0	0	1	5.2	15	
5-Jun	4	1	3	6	5	Z	4	2	1	4	6	6	3	4	3	3	1	2	1	1	4	1	2	2.9	6	
6-Jun	Z	1	1	1	1	2	11	18	15	21	10	6	4	1	0	0	0	0	0	2	8	9	18	6.4	21	
7-Jun	16	Z	5	4	8	10	9	12	18	16	5	4	3	2	2	2	2	1	3	2	4	10	12	7.1	18	
8-Jun	7	8	Z	10	14	12	12	10	9	20	24	24	13	8	3	1	2	2	2	2	2	2	1	8.3	24	
9-Jun	1	1	1	Z	12	7	2	2	3	1	1	1	1	2	1	1	1	1	2	2	4	2	4	2.5	12	
10-Jun	9	5	5	6	Z	4	1	1	4	9	4	5	3	3	3	3	4	3	3	1	1	1	0	3.4	9	
11-Jun	4	5	6	6	0	Z	0	0	0	0	1	1	0	1	1	1	1	1	1	1	6	2	2	1.9	6	
12-Jun	Z	2	2	2	2	7	16	11	6	6	5	2	4	2	3	4	5	4	2	2	4	2	5	4.6	16	
13-Jun	10	Z	5	2	3	4	4	22	31	12	11	14	5	1	2	4	4	1	1	1	3	2	5	6.6	31	
14-Jun	2	2	Z	0	2	1	3	3	3	3	2	1	1	1	1	0	0	0	1	0	0	0	0	1.3	3	
15-Jun	1	0	0	Z	1	1	2	4	7	7	M	M	M	M	7	3	3	1	0	2	4	7	22	4.7	22	
16-Jun	14	6	5	2	Z	4	5	5	6	9	7	7	4	3	2	4	6	3	2	0	1	1	1	4.3	14	
17-Jun	6	1	2	4	3	Z	4	0	0	0	1	1	0	0	0	0	0	0	0	0	1	4	3	1.5	6	
18-Jun	Z	1	1	2	26	29	40	25	20	11	1	0	0	0	0	0	0	0	0	0	0	0	1	7.0	40	
19-Jun	0	Z	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	1	1	2	1	3	1.3	9	
20-Jun	16	3	Z	3	3	10	16	11	C	C	C	C	C	C	2	3	5	2	3	5	3	2	5	--	16	
21-Jun	5	4	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5	
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	1	2	3	4	3	0.7	4	
23-Jun	0	0	1	1	0	Z	4	3	2	1	0	0	1	2	1	2	3	4	2	2	2	4	3	1.7	4	
24-Jun	Z	2	1	0	0	4	8	24	31	11	3	1	2	1	0	0	1	1	2	2	1	2	3	4.6	31	
25-Jun	3	Z	3	4	9	31	28	38	36	36	15	3	3	3	9	2	2	1	2	2	2	5	11	11.2	38	
26-Jun	6	3	Z	7	17	17	17	9	5	4	3	2	M	2	3	2	3	2	3	4	1	1	1	5.1	17	
27-Jun	1	1	1	Z	2	3	1	2	5	4	1	0	1	1	2	5	4	4	5	5	1	3	3	2.6	5	
28-Jun	8	7	7	6	Z	2	4	3	2	2	1	2	3	2	1	2	2	2	2	2	5	6	3	3.4	8	
29-Jun	3	3	3	4	5	Z	11	12	7	6	3	3	2	4	4	4	4	4	8	9	5	2	3	4.8	12	
30-Jun	Z	2	1	0	2	2	3	7	10	14	10	9	8	6	1	0	0	0	0	1	1	1	1	3.5	14	
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerospan																		C - Calibration						M - Maintenance		



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	658	97.05	97.05
21 - 40	20	2.95	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	114	42	24	21	17	14	35	88	48	16	19	17	40	59	46	56	656
21 - 40	2	4	0	1	1	1	3	2	3	0	0	0	0	1	1	1	20
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	46	24	22	18	15	38	90	51	16	19	17	40	60	47	57	676

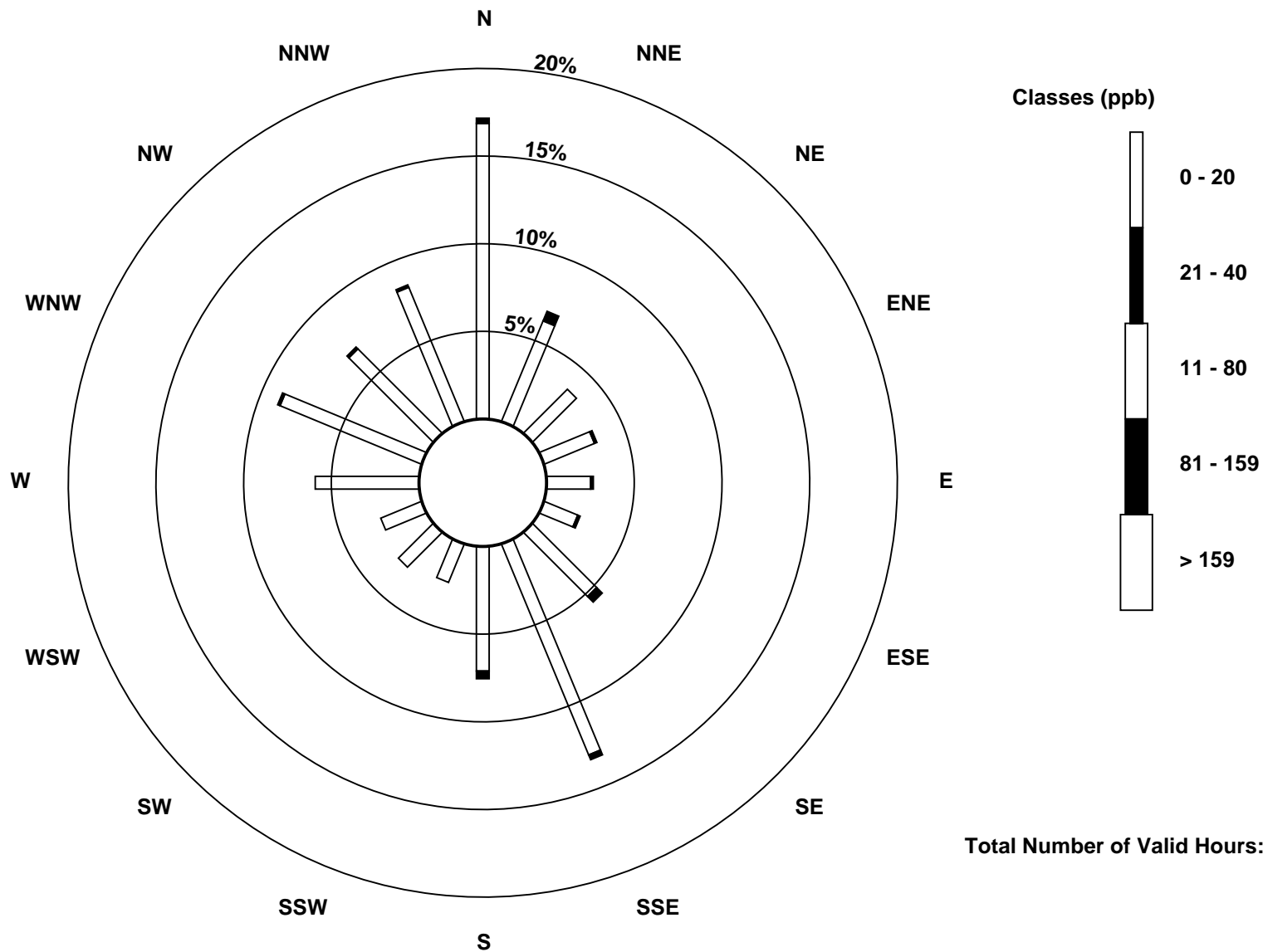
Total Number of Valid Hours: 676

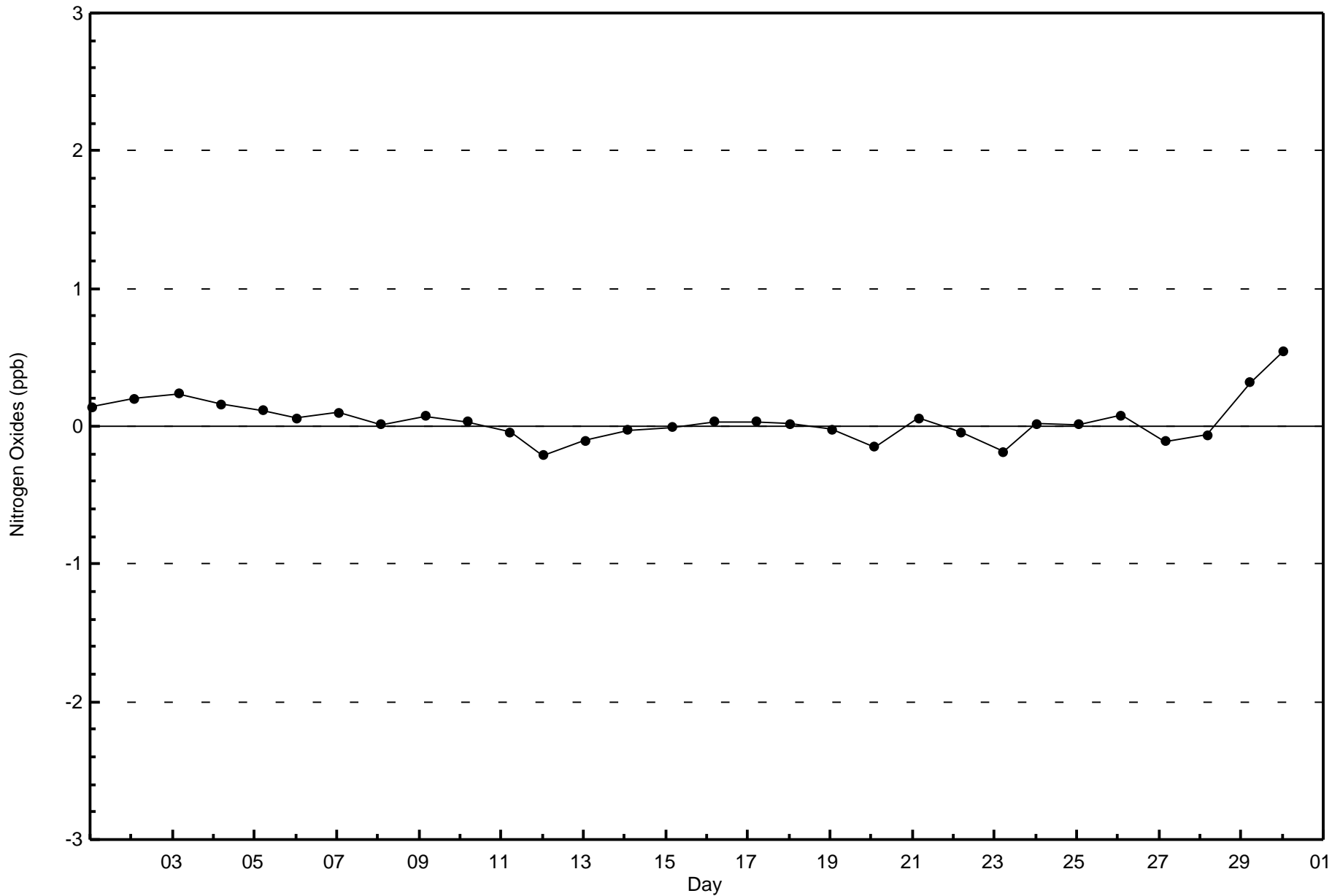
Total Number of Hours: 720

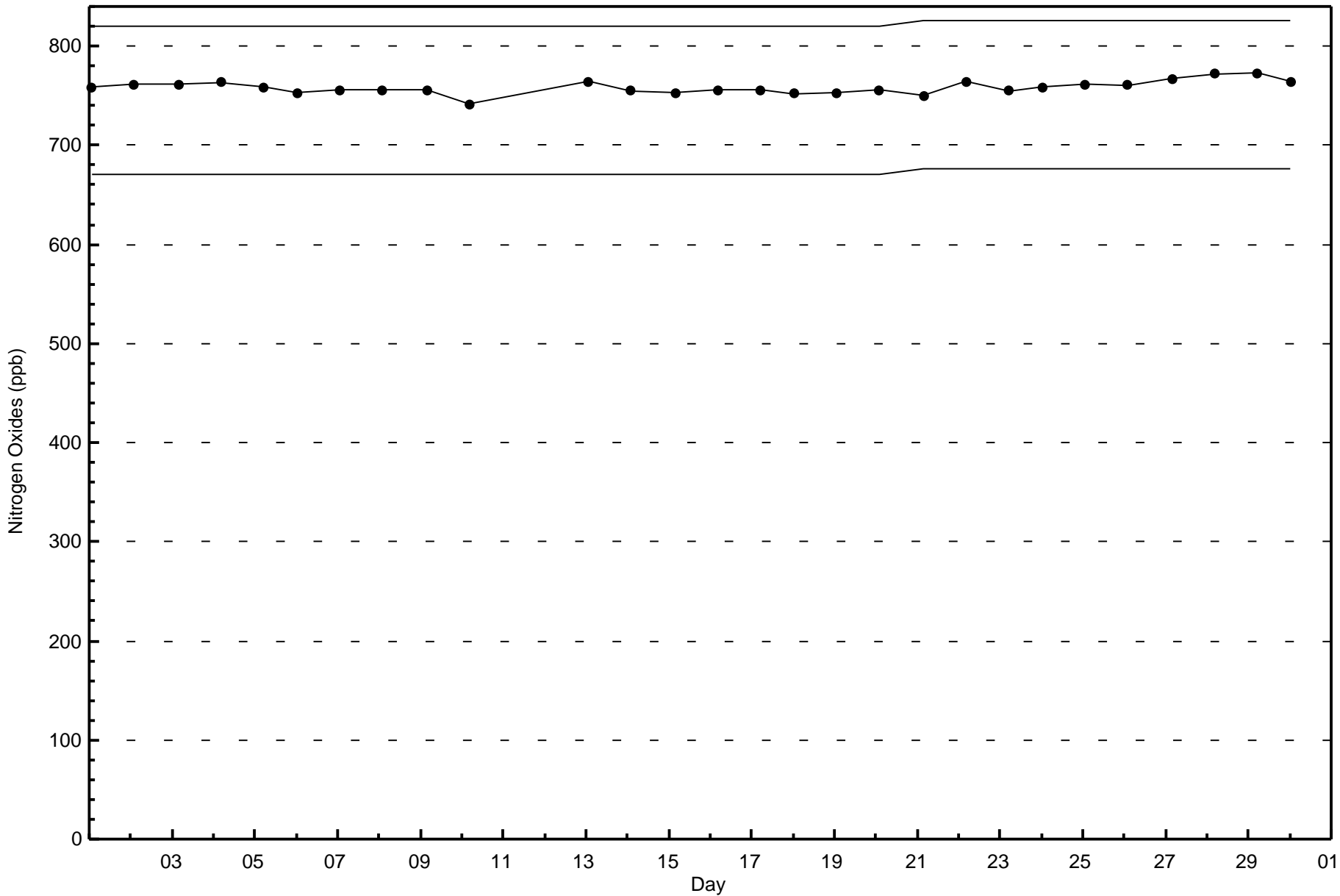


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 56 ppb on Jun 2 11:00	Maximum Daily Average: 38.1 ppb on Jun 26		Hours of Data:	683
Minimum Value: 0 ppb on Jun 16 01:00	Minimum Daily Average: 12.9 ppb on Jun 30		Hours of Missing Data:	37
Maximum Diurnal Average: 34.7 ppb at hour 5	Minimum Diurnal Average: 12.9 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 24.4 ppb	Percentiles: P ₁ = 3 P ₁₀ = 10 Q ₁ = 16 Median = 24 Q ₃ = 33 P ₉₀ = 38 P ₉₉ = 52		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	49	41	Z	19	29	29	31	28	27	25	23	23	21	28	38	43	43	42	43	37	35	22	18	17	31.0	49
2-Jun	13	8	8	Z	9	9	11	13	15	40	56	54	55	48	44	41	42	42	39	33	30	30	28	22	30.0	56
3-Jun	18	17	14	13	Z	15	13	15	17	20	29	31	32	33	34	33	33	33	33	31	20	12	4	7	22.0	34
4-Jun	8	14	9	4	4	Z	12	17	31	32	31	27	29	22	39	34	36	35	39	48	50	48	46	34	28.2	50
5-Jun	41	40	35	35	36	38	Z	37	35	36	36	36	39	42	44	43	43	41	42	40	37	37	24	17	37.2	44
6-Jun	10	Z	7	5	8	10	11	13	23	24	31	36	37	40	39	38	38	37	38	33	26	26	16	16	24.5	40
7-Jun	11	21	Z	18	15	14	17	18	18	21	30	27	32	34	35	36	35	34	31	30	27	20	16	16	24.2	36
8-Jun	19	18	13	Z	12	14	14	14	16	14	16	21	33	43	52	54	54	52	49	44	37	30	24	27	29.1	54
9-Jun	26	20	14	14	Z	20	24	25	26	28	29	29	30	33	36	38	38	38	38	35	33	34	27	24	28.6	38
10-Jun	19	25	23	19	19	Z	31	32	31	28	33	36	39	38	39	38	36	31	30	28	29	23	23	21	29.1	39
11-Jun	15	15	17	18	22	22	Z	29	33	34	34	35	36	38	37	37	37	37	37	35	26	26	20	14	28.5	38
12-Jun	11	Z	8	7	5	14	15	20	27	24	20	28	30	31	27	29	24	26	27	21	19	19	14	9	19.7	31
13-Jun	6	4	Z	7	8	10	16	11	12	21	26	26	33	35	37	38	32	30	30	29	27	19	16	16	21.3	38
14-Jun	19	20	22	Z	20	20	19	18	18	18	19	18	19	19	19	19	19	19	19	18	19	19	19	18	18.9	22
15-Jun	19	19	17	17	Z	15	13	12	11	12	12	14	14	14	17	19	20	22	23	24	22	12	1	0	15.3	24
16-Jun	0	1	2	9	9	Z	16	18	19	21	25	M	M	32	36	36	34	29	25	24	18	16	9	11	18.7	36
17-Jun	13	21	19	11	16	12	Z	11	17	19	22	24	28	34	37	37	37	38	37	33	27	15	13	12	23.1	38
18-Jun	14	Z	10	10	3	5	5	14	16	24	33	35	36	37	37	34	34	32	32	31	33	33	31	26	24.5	37
19-Jun	24	23	Z	17	16	15	16	19	26	29	31	29	28	28	29	30	32	33	29	29	28	18	11	4	23.7	33
20-Jun	3	9	7	Z	5	4	5	10	15	15	20	28	29	35	36	32	28	30	28	27	27	23	16	15	19.5	36
21-Jun	15	19	18	18	Z	21	22	26	24	24	22	22	21	21	19	18	16	13	23	31	28	26	21	22	21.3	31
22-Jun	21	20	21	23	23	Z	23	27	C	C	C	C	27	28	28	27	27	27	27	25	20	12	10	13	22.5	28
23-Jun	12	12	10	11	9	12	Z	19	25	30	31	32	32	33	34	34	32	32	29	29	21	18	15	9	22.5	34
24-Jun	11	Z	5	8	8	8	9	10	11	22	28	29	31	33	34	37	38	37	37	35	33	25	17	11	22.5	38
25-Jun	13	10	Z	5	4	3	7	8	15	17	28	38	42	47	47	47	44	44	43	42	38	33	26	26	27.3	47
26-Jun	26	27	32	Z	17	20	23	32	38	43	46	48	M	51	51	50	49	49	46	42	39	37	37	36	38.1	51
27-Jun	31	27	23	22	Z	26	29	23	22	23	26	28	20	20	23	22	25	20	22	19	13	10	11	10	21.5	31
28-Jun	9	12	15	15	13	Z	13	14	16	17	19	21	24	26	29	29	31	32	33	31	23	18	18	15	20.6	33
29-Jun	17	15	14	11	10	8	Z	13	18	26	31	35	38	40	43	44	45	45	42	35	27	16	9	10	25.8	45
30-Jun	5	Z	5	3	4	7	9	8	7	9	16	24	32	31	25	21	20	20	14	10	10	9	6	3	12.9	32

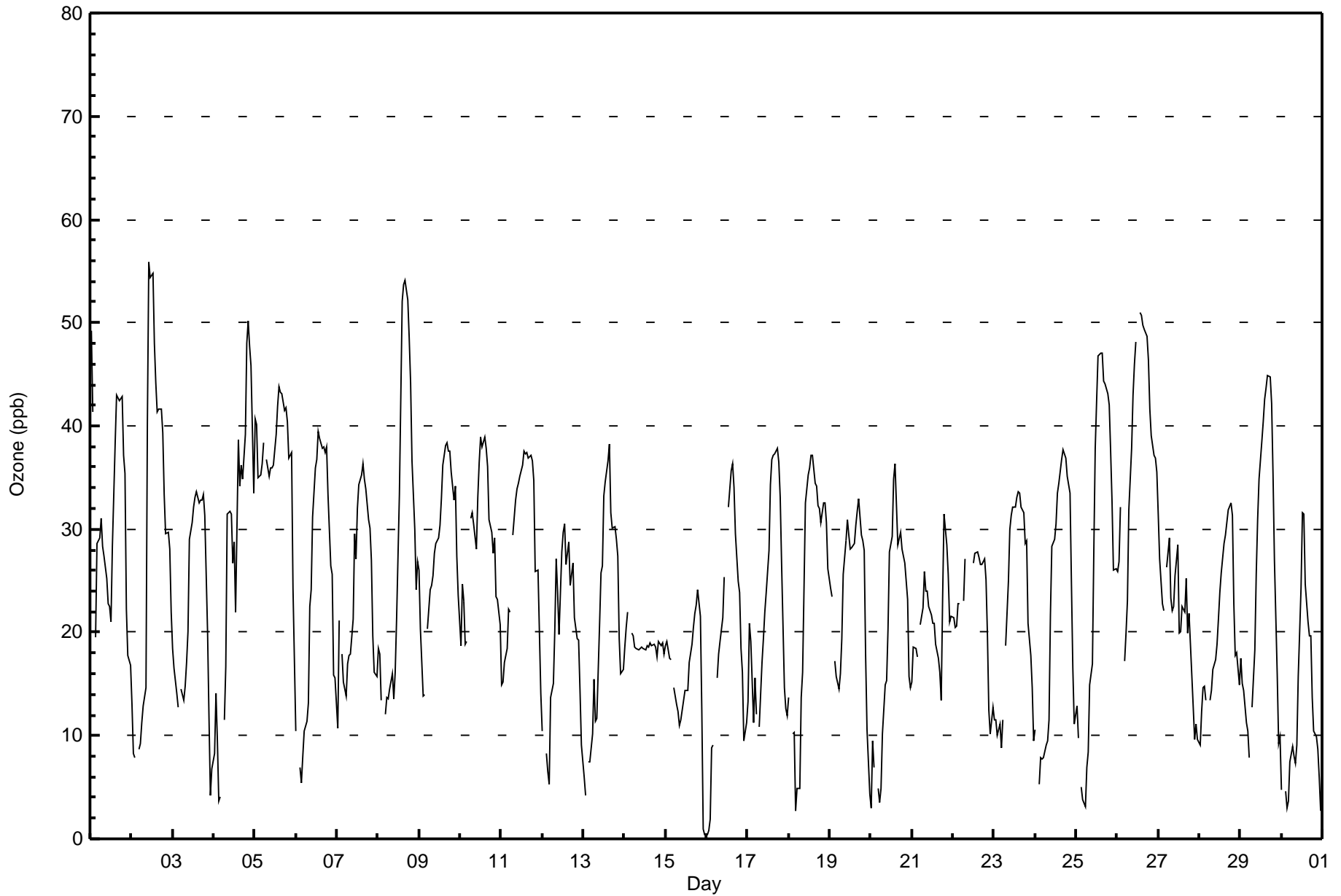
16.6	18.4	14.8	13.6	12.9	14.8	16.2	18.5	21.0	24.0	27.7	29.9	31.0	33.1	34.7	34.6	34.1	33.3	32.8	31.1	27.4	22.8	18.2	16.0	Diurnal Average	
49	41	35	35	36	38	31	37	38	43	56	54	55	51	52	54	54	52	49	48	50	48	46	36	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	283	41.43	41.43
21 - 50	391	57.25	98.68
51 - 82	9	1.32	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	54	8	8	5	5	5	11	26	28	11	8	15	22	29	20	28	283
21 - 50	61	36	15	16	16	9	26	60	25	7	11	4	17	29	29	28	389
51 - 82	2	2	0	0	0	0	0	5	0	0	0	0	0	0	0	0	9
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	117	46	23	21	21	14	37	91	53	18	19	19	39	58	49	56	681

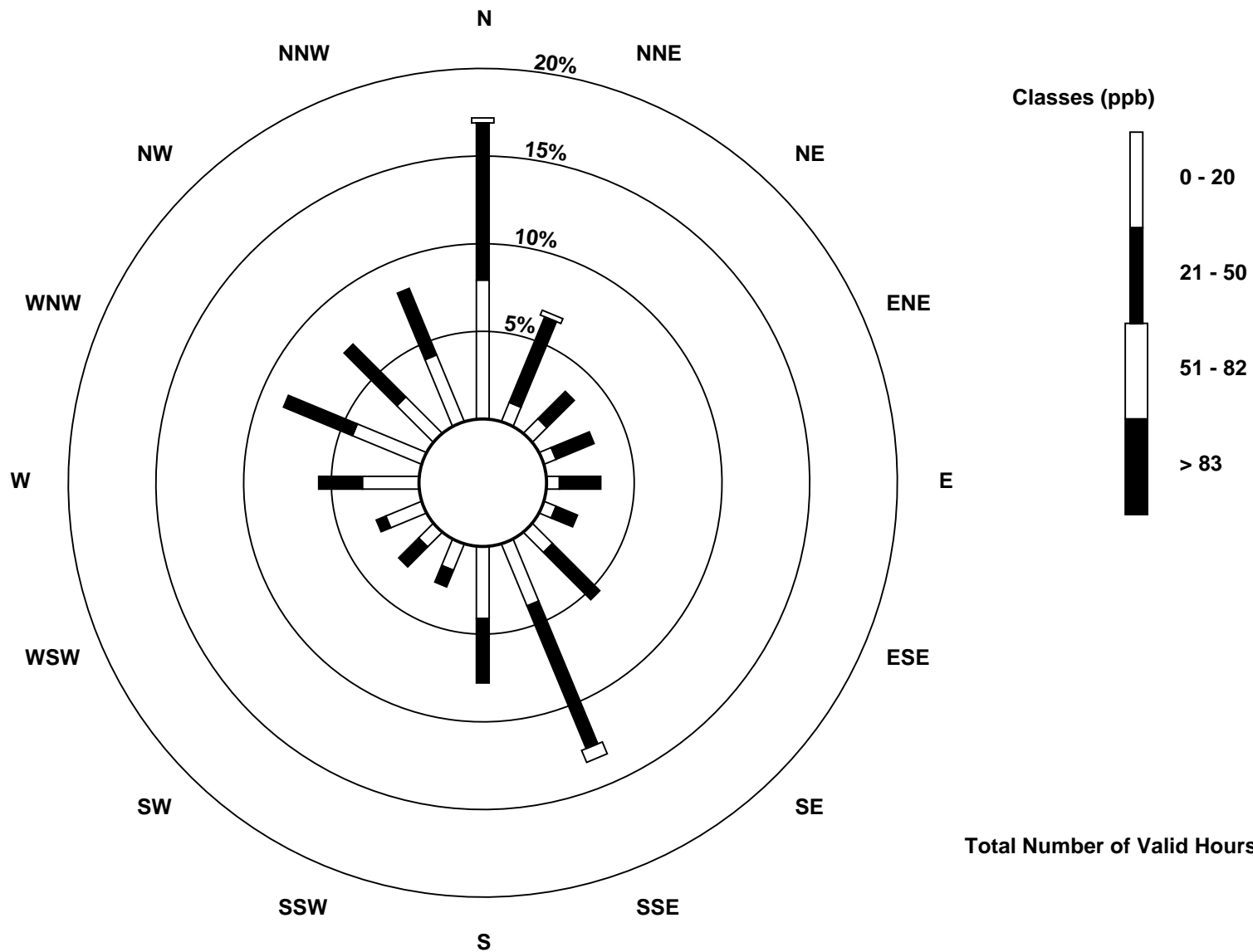
Total Number of Valid Hours: 681

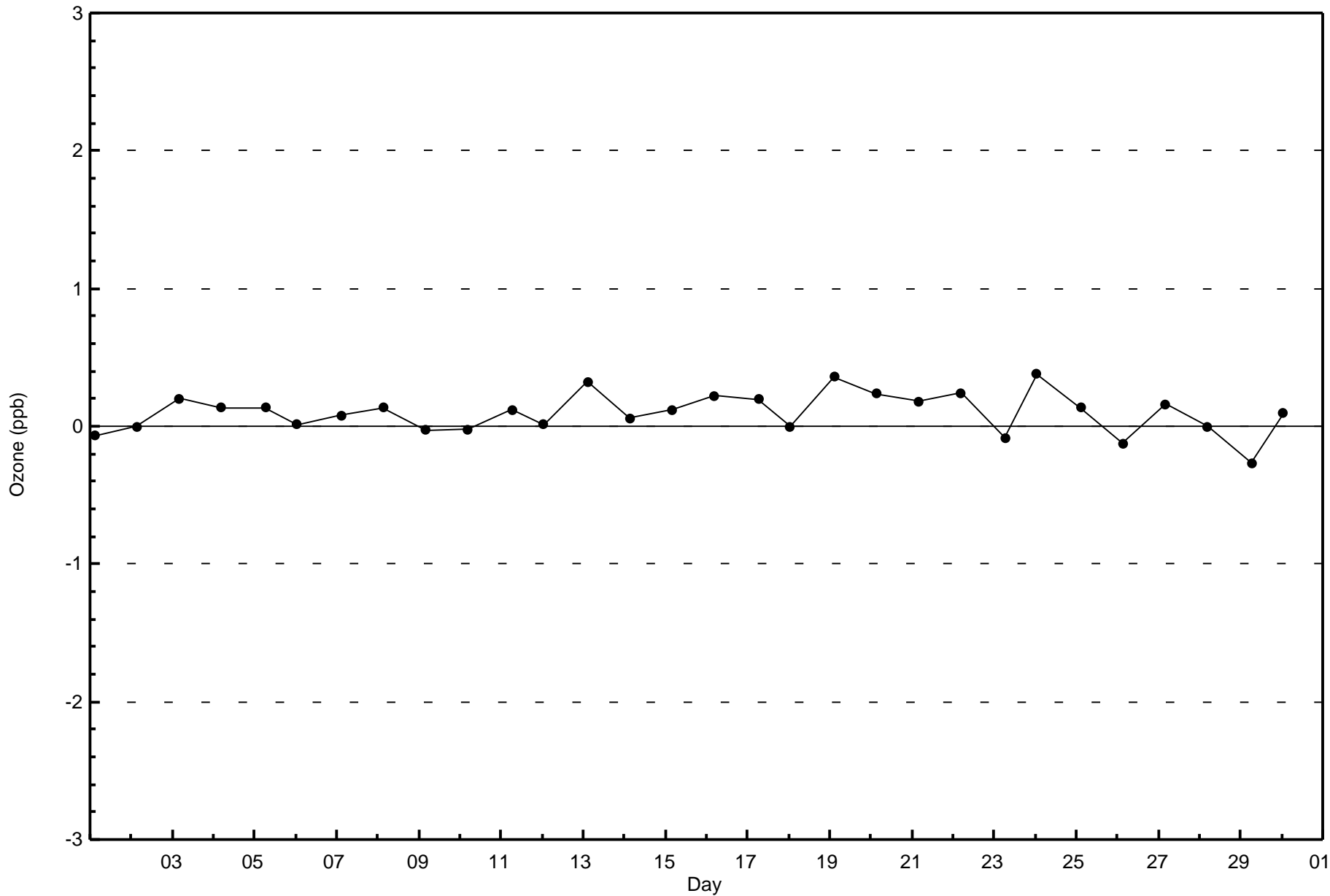
Total Number of Hours: 720

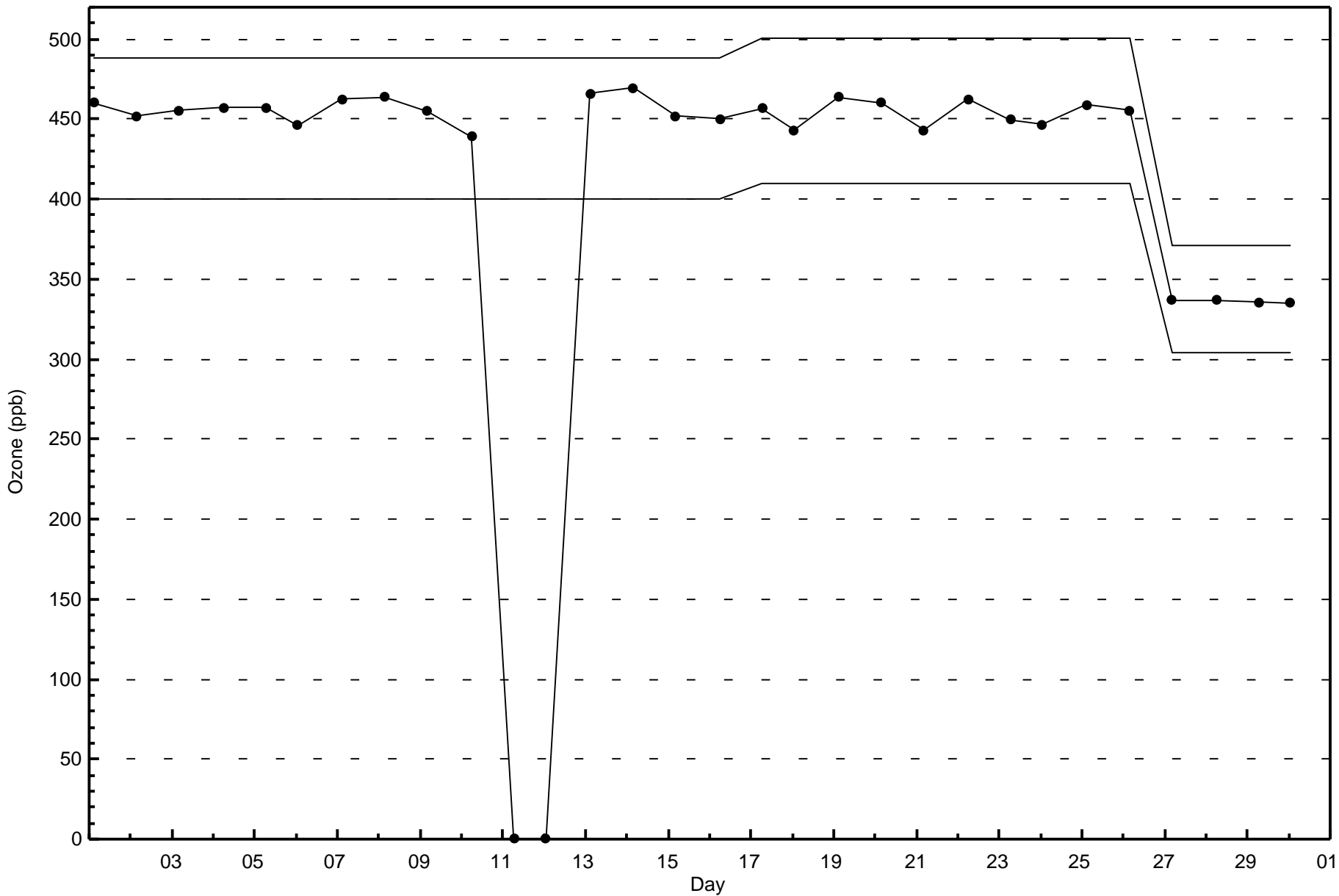


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter (AMS 1)









Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO):	24-hr: 1	Hours in Service:	720
Maximum Value: 192.0 µg/m ³ on Jun 2 11:00	Maximum Daily Average: 37.5 µg/m ³ on Jun 2	Hours of Data:	706
Minimum Value: 0.0 µg/m ³ on Jun 21 13:00	Minimum Daily Average: 0.7 µg/m ³ on Jun 21	Hours of Missing Data:	14
Maximum Diurnal Average: 14.0 µg/m ³ at hour 10	Minimum Diurnal Average: 5.8 µg/m ³ at hour 5	Hours of Calibration:	2
Monthly Average: 8.21 µg/m ³	Percentiles: P ₁ = 0.1 P ₁₀ = 1.3 Q ₁ = 2.5 Median = 5.4 Q ₃ = 10.0 P ₉₀ = 16.3 P ₉₉ = 42.1	Percent Operational Time:	98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	4.8	7.4	7.7	6.5	5.7	5.9	22.5	12.6	4.9	3.2	3.6	7.2	17.3	18.9	26.0	15.0	11.8	10.2	10.1	16.3	19.0	29.7	29.1	15.1	12.9	29.7
2-Jun	23.6	25.2	20.0	16.7	12.9	12.2	13.5	12.0	74.5	191.0	192.0	128.4	68.1	30.5	28.1	21.1	8.9	6.7	4.2	4.9	4.0	0.7	0.6	0.6	37.5	192.0
3-Jun	0.6	0.7	0.1	UO	UO	UO	UO	UO	UO	UO	0.5	0.8	0.7	0.9	1.1	1.5	2.0	1.7	2.1	2.7	3.4	3.6	5.1	--	5.1	
4-Jun	4.9	5.3	6.8	8.4	6.9	6.5	6.9	4.9	3.2	3.5	2.8	3.4	3.8	4.3	3.2	6.1	8.6	9.1	5.4	3.6	2.5	2.2	2.5	4.5	5.0	9.1
5-Jun	3.7	3.0	4.1	2.2	2.4	1.8	1.6	1.0	1.0	1.2	1.7	2.0	2.2	2.5	2.7	2.2	2.1	1.9	1.7	2.1	2.8	1.8	2.1	2.1	2.2	4.1
6-Jun	2.3	2.1	2.2	2.5	3.2	4.1	7.1	7.3	5.8	13.4	5.8	5.6	3.9	2.2	1.8	2.3	2.9	3.6	2.8	6.3	8.9	9.3	9.4	10.7	5.2	13.4
7-Jun	11.4	9.2	9.5	8.6	8.7	11.4	18.5	21.0	15.3	11.7	11.0	11.9	11.9	10.3	10.1	10.6	7.4	4.9	5.5	6.0	5.3	8.1	10.4	5.1	10.2	21.0
8-Jun	5.7	6.2	7.2	6.2	9.3	7.4	9.6	12.7	20.9	23.8	16.4	17.9	16.9	13.3	9.5	8.5	11.1	13.0	17.5	14.7	13.6	15.5	17.1	15.7	12.9	23.8
9-Jun	13.5	16.4	14.6	15.0	12.2	8.5	31.6	29.8	21.8	17.5	18.4	18.6	14.0	15.8	24.1	14.1	7.8	5.8	5.4	6.9	10.7	9.0	8.1	4.1	14.3	31.6
10-Jun	14.6	2.3	1.7	18.1	4.9	7.4	5.8	5.2	6.4	8.7	9.8	8.6	7.3	8.2	8.6	15.8	17.0	8.2	9.4	4.8	11.4	3.8	1.5	1.8	8.0	18.1
11-Jun	2.9	4.0	6.2	9.4	3.3	2.8	4.3	6.8	22.6	13.8	7.2	6.6	6.0	9.2	4.9	4.9	10.4	5.0	6.4	5.2	6.0	6.4	33.1	21.3	8.7	33.1
12-Jun	15.8	4.0	3.8	3.6	3.5	6.5	7.0	15.0	14.5	12.3	7.5	4.9	7.8	7.4	9.6	4.8	5.6	2.9	2.7	3.1	3.0	4.6	6.8	7.0	6.8	15.8
13-Jun	7.8	8.7	8.9	9.1	9.2	8.9	7.7	10.4	6.7	3.7	3.5	5.1	8.3	10.3	12.5	14.4	11.7	8.7	7.2	7.0	7.9	5.9	6.1	5.7	8.1	14.4
14-Jun	2.8	4.5	2.1	1.2	1.4	1.2	1.0	0.9	1.2	1.9	3.2	4.3	5.0	5.0	3.2	3.5	4.3	4.3	3.4	2.2	1.9	1.7	1.7	1.7	2.7	5.0
15-Jun	1.8	1.8	2.0	2.0	2.0	2.3	2.6	2.6	2.6	3.5	4.4	3.3	2.3	2.5	4.0	PF	PF	3.2	2.7	3.4	3.8	4.4	4.4	4.2	3.0	4.4
16-Jun	3.6	4.0	3.6	2.8	2.5	2.4	1.8	1.7	2.0	2.9	3.3	3.9	4.2	3.8	4.7	8.4	11.2	11.4	5.6	1.9	1.3	1.4	1.5	1.8	3.8	11.4
17-Jun	1.9	0.6	0.5	1.5	1.4	3.8	1.4	0.6	0.1	0.1	0.4	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.1	1.6	2.7	13.4	9.5	7.8	2.3	13.4
18-Jun	5.2	4.7	5.9	5.5	6.7	5.7	5.4	4.1	3.3	3.1	1.6	1.6	1.6	2.2	2.4	2.0	1.7	2.0	1.7	1.7	2.0	2.3	2.3	3.5	3.3	6.7
19-Jun	2.0	1.8	1.8	1.8	1.9	1.7	1.5	1.8	2.1	2.3	2.2	1.9	2.9	2.7	2.0	2.3	2.0	3.1	5.7	5.7	5.8	15.2	16.0	21.3	4.5	21.3
20-Jun	15.0	9.9	10.7	8.3	8.9	13.0	14.3	14.4	15.5	13.7	9.3	11.6	8.6	3.6	3.1	1.9	3.1	1.1	1.5	1.5	1.7	1.8	2.0	3.9	7.4	15.5
21-Jun	3.0	1.1	0.7	0.6	0.9	1.0	0.8	0.3	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.2	0.5	1.2	1.4	1.7	2.0	1.1	0.8	0.7	3.0
22-Jun	0.7	0.8	0.9	0.8	1.0	1.0	1.1	0.9	1.2	1.4	1.6	1.7	3.1	2.1	2.4	2.9	2.9	3.0	2.7	3.8	2.5	9.1	6.4	3.4	2.4	9.1
23-Jun	2.8	3.0	3.0	3.2	2.9	27.1	58.9	47.5	48.2	25.2	25.5	C	C	3.5	4.7	4.2	4.9	5.5	5.5	5.5	10.1	5.7	9.8	9.4	14.4	58.9
24-Jun	7.5	8.4	7.2	6.2	5.8	6.2	6.2	10.0	10.8	7.2	4.6	3.3	3.3	4.1	3.2	3.4	4.0	3.1	4.0	4.0	8.3	18.3	29.5	14.9	7.6	29.5
25-Jun	9.3	8.9	6.9	8.5	6.9	8.5	7.0	9.1	7.6	8.2	6.2	4.6	10.2	17.1	23.8	15.9	10.0	6.9	7.6	10.0	8.7	17.9	21.2	18.6	10.8	23.8
26-Jun	17.5	14.0	10.5	12.3	13.5	12.8	12.6	12.9	12.4	10.1	10.7	11.7	18.6	12.7	12.6	12.4	10.7	12.0	13.2	11.8	9.7	6.9	6.4	6.2	11.8	18.6
27-Jun	6.2	6.3	5.9	7.8	5.7	6.2	4.9	4.9	4.0	3.6	2.6	UO	UO	0.3	0.3	0.7	1.0	2.7	3.7	5.2	1.4	5.6	3.6	3.4	3.9	7.8
28-Jun	4.3	3.2	4.1	4.1	3.2	3.9	2.9	0.8	UO	0.2	0.3	1.4	4.3	9.1	18.8	25.5	30.6	32.2	29.6	28.6	25.3	23.5	13.8	16.9	12.5	32.2
29-Jun	15.3	17.3	16.0	16.1	12.7	9.0	7.9	7.5	7.0	6.1	8.0	9.3	9.3	9.2	10.4	11.6	13.1	12.8	17.8	26.8	18.3	10.2	14.1	6.3	12.2	26.8
30-Jun	7.0	8.2	6.8	7.8	8.7	7.5	7.1	7.1	7.0	11.4	13.2	15.0	12.8	8.2	5.0	5.0	5.3	5.2	5.3	7.5	5.1	5.2	5.6	5.4	7.6	15.0

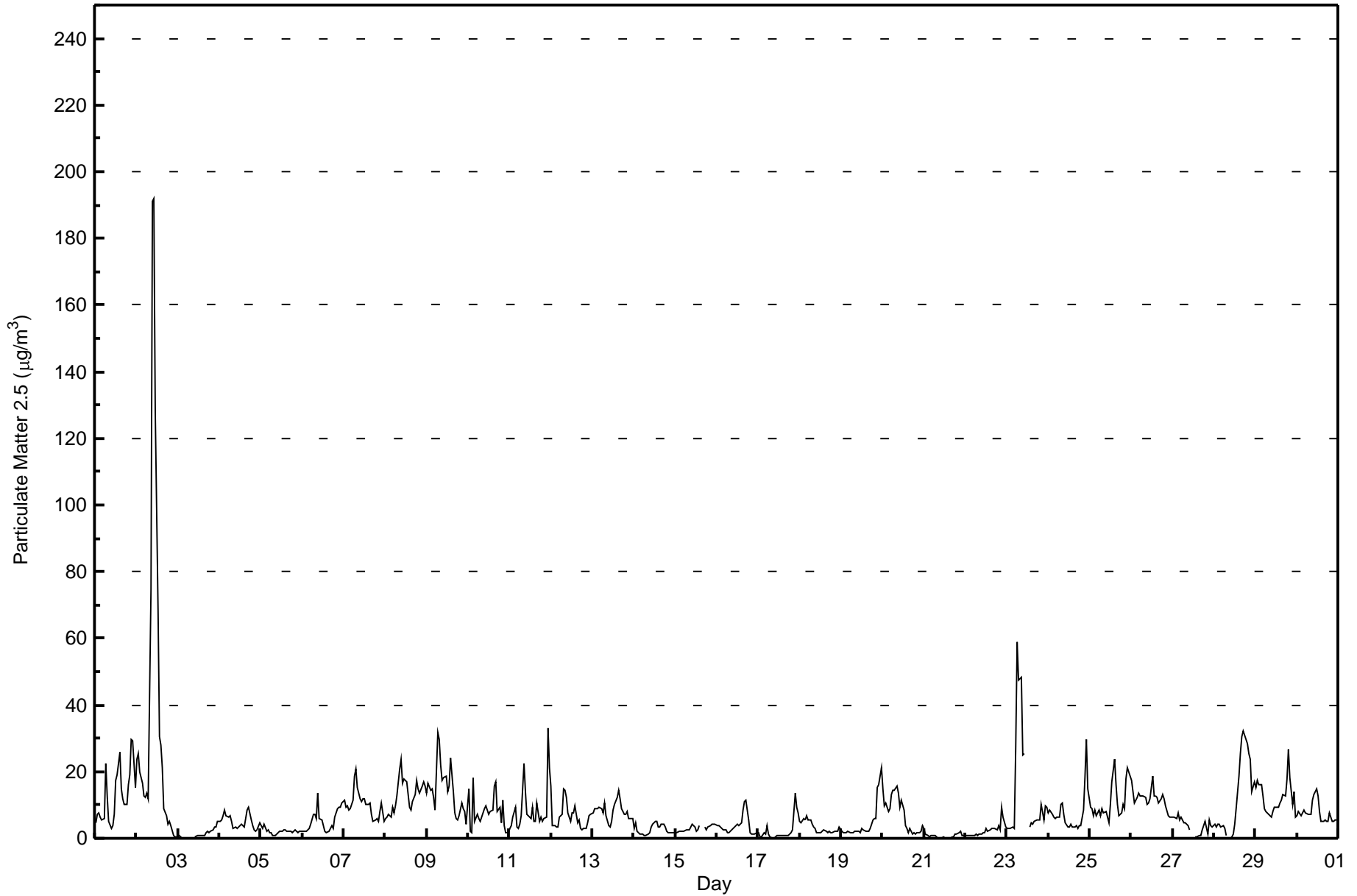
7.3	6.4	6.0	6.8	5.8	6.8	9.4	9.2	11.5	14.0	12.6	10.6	9.1	7.4	8.1	7.6	7.3	6.4	6.4	6.8	6.9	8.2	9.3	7.6	Diurnal Average
23.6	25.2	20.0	18.1	13.5	27.1	58.9	47.5	74.5	191.0	192.0	128.4	68.1	30.5	28.1	25.5	30.6	32.2	29.6	28.6	25.3	29.7	33.1	21.3	Diurnal Maximum

C - Calibration UO - Unstable Operation PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	300	42.49	42.49
6 - 15	268	37.96	80.45
16 - 25	57	8.07	88.53
26 - 80	21	2.97	91.50
> 81.0	3	0.42	91.93

Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	60	15	13	10	11	4	18	24	22	9	11	6	18	23	19	37	300
6 - 15	45	20	7	5	9	8	19	54	22	5	7	8	14	12	20	13	268
16 - 25	10	7	0	1	1	1	1	12	9	3	2	4	2	2	1	1	57
26 - 80	3	3	1	4	0	1	0	2	1	1	0	2	0	2	0	1	21
> 81.0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Totals	121	45	21	20	21	14	38	92	54	18	20	20	34	39	40	52	649

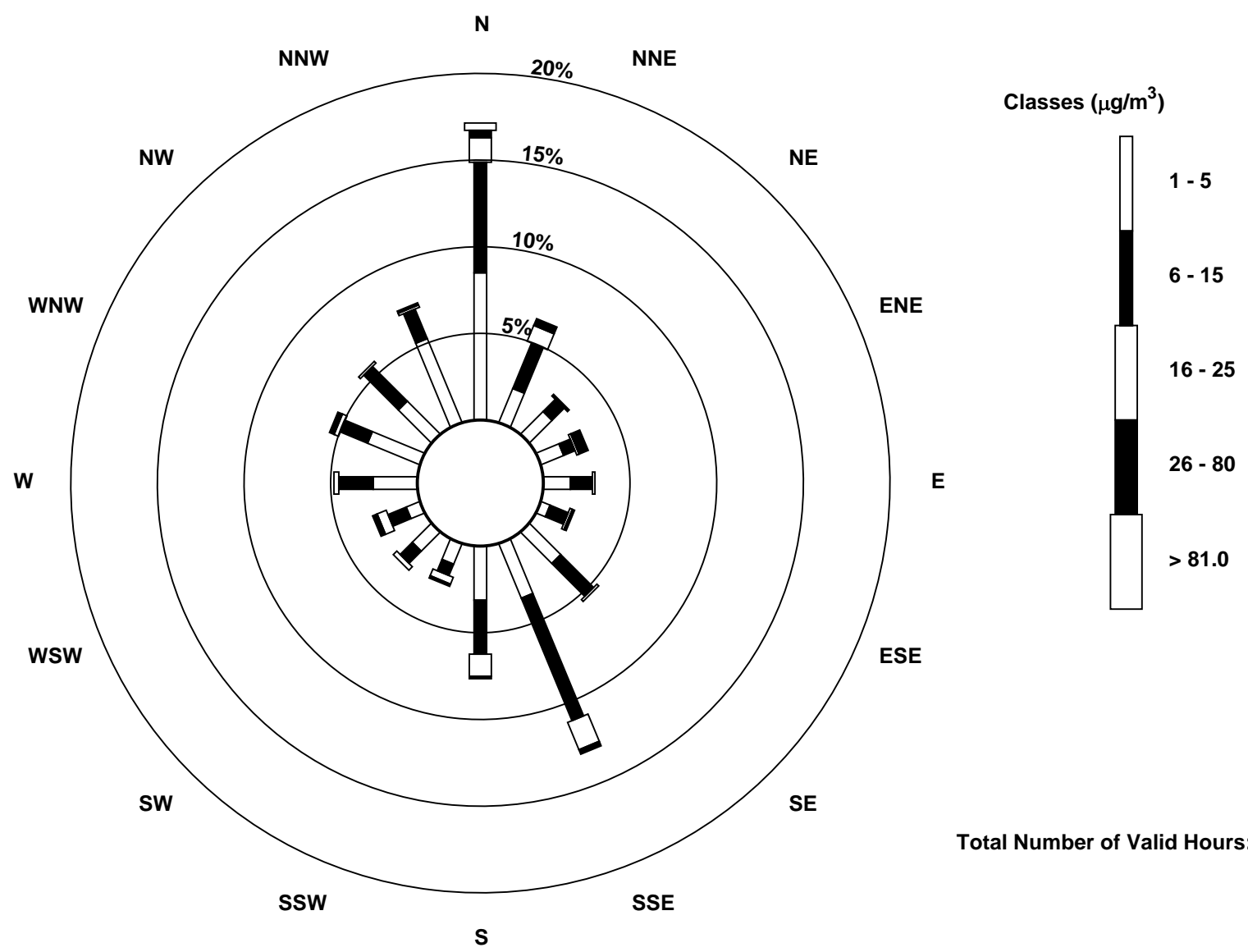
Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter (AMS 1)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH₃) - ppb

Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO): 1-hr: 0	Hours in Service: 720
Maximum Value: 20 ppb on Jun 2 11:00	Maximum Daily Average: 3.9 ppb on Jun 2
Minimum Value: 0 ppb on Jun 1 01:00	Hours of Data: 604
Maximum Diurnal Average: 0.8 ppb at hour 10	Hours of Missing Data: 116
Monthly Average: 0.1 ppb	Hours of Calibration: 44
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = -6	Percent Operational Time: 90.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
2-Jun	0	0	0	0	0	Z	RE	RE	0	16	20	19	15	11	0	0	0	0	0	0	0	0	0	0	0	0	3.9	20
3-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
4-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
5-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
6-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
7-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
8-Jun	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
9-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
10-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
11-Jun	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
12-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
13-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
14-Jun	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
15-Jun	0	0	0	0	0	0	Z	RE	RE	0	M	M	M	M	M	M	M	M	M	M	M	M	M	M	0	0	--	0
16-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
17-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
18-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
19-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
20-Jun	0	0	0	0	0	Z	RE	RE	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0	
21-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
22-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0	
23-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
24-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
25-Jun	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
26-Jun	0	0	0	0	0	Z	RE	RE	0	0	0	0	M	M	M	M	RE	0	0	0	0	0	0	0	0	--	0	
27-Jun	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
28-Jun	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
29-Jun	0	0	0	0	0	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
30-Jun	0	0	0	Z	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	

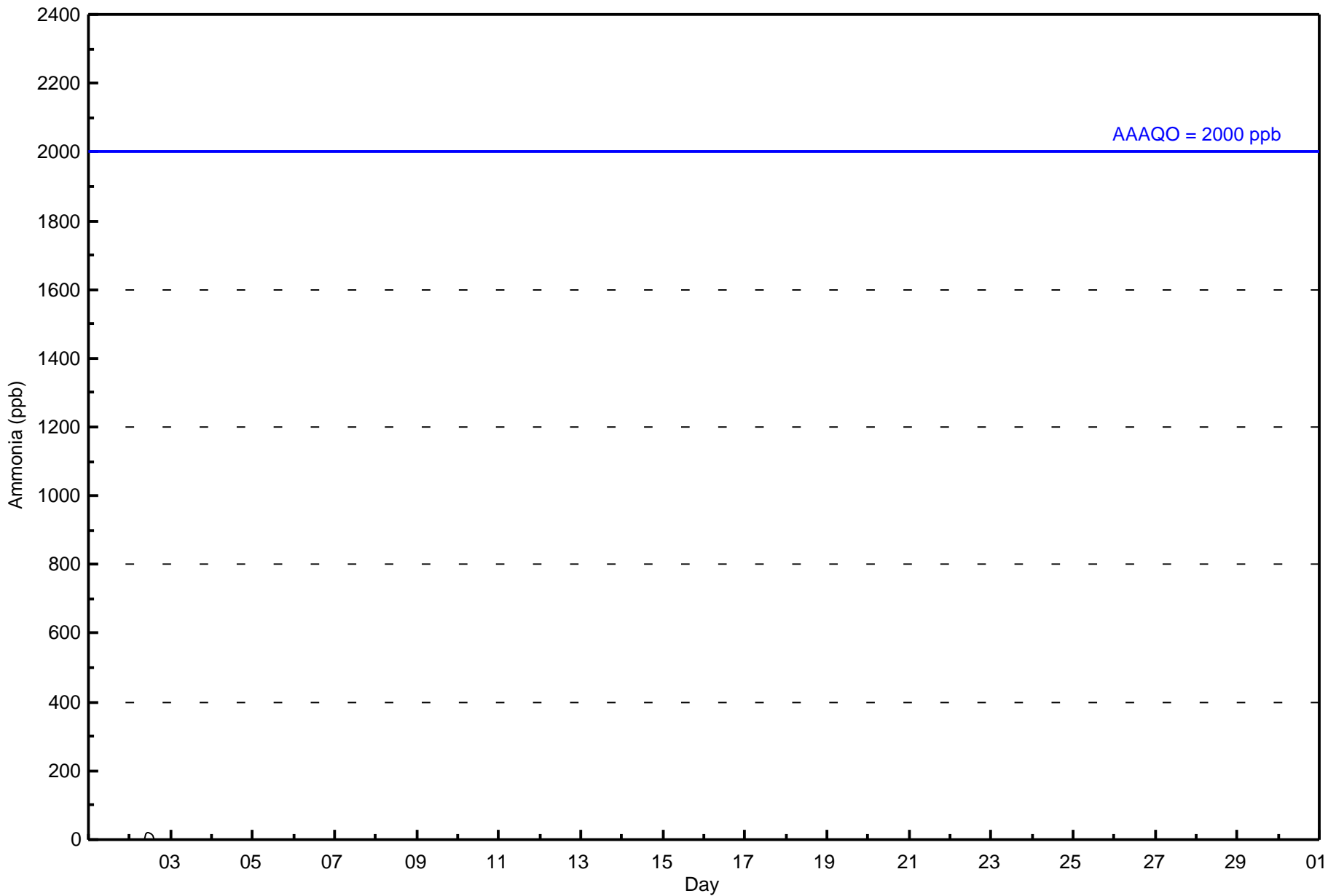
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.7	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0	0	0	0	0	0	0	0	0	0	16	20	19	15	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance RE - Recovery
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	599	99.17	99.17
6 - 10	0	0.00	99.17
11 - 15	2	0.33	99.50
16 - 20	3	0.50	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 604

Total Number of Hours: 720



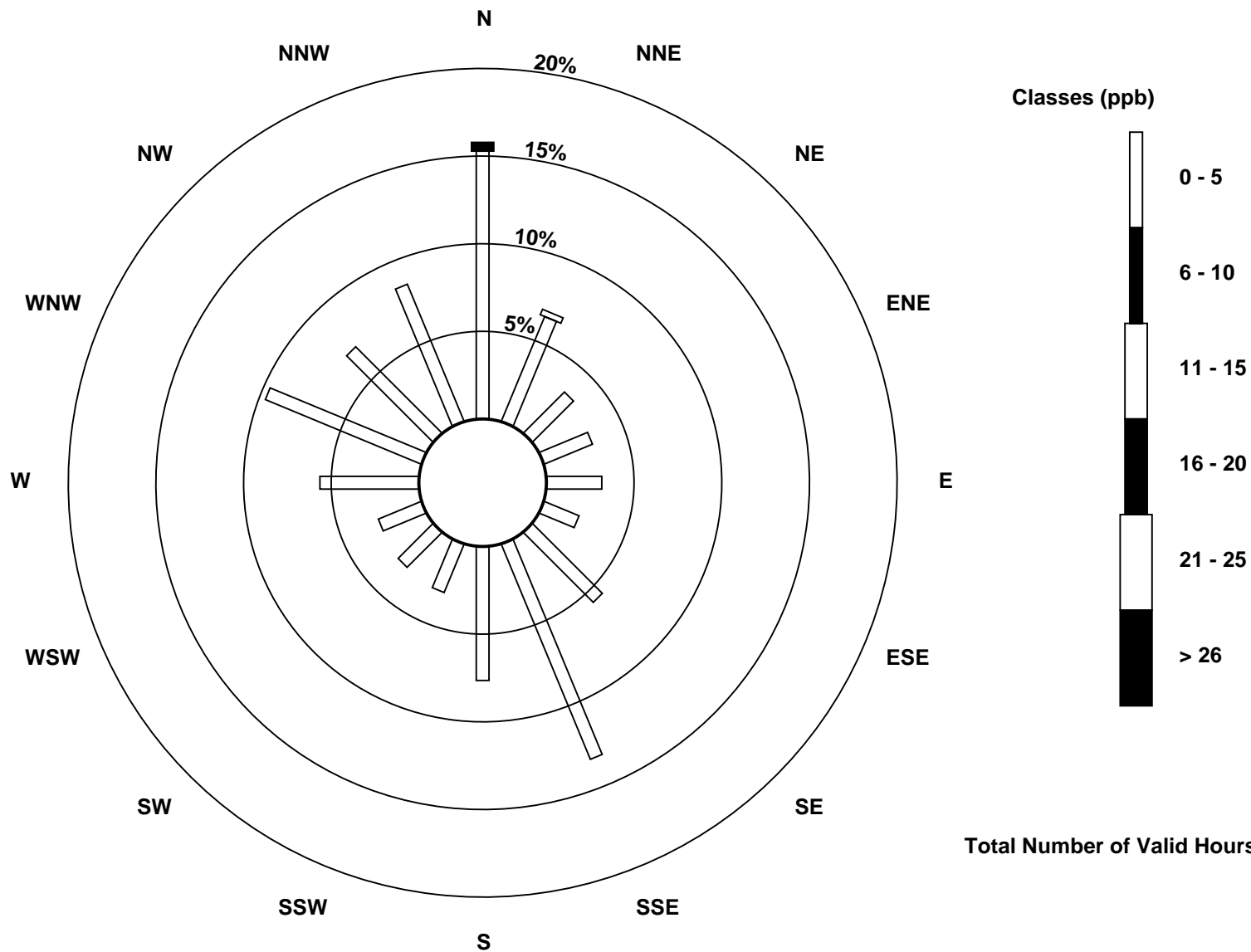
Wood Buffalo Environmental Association
Frequency Distribution

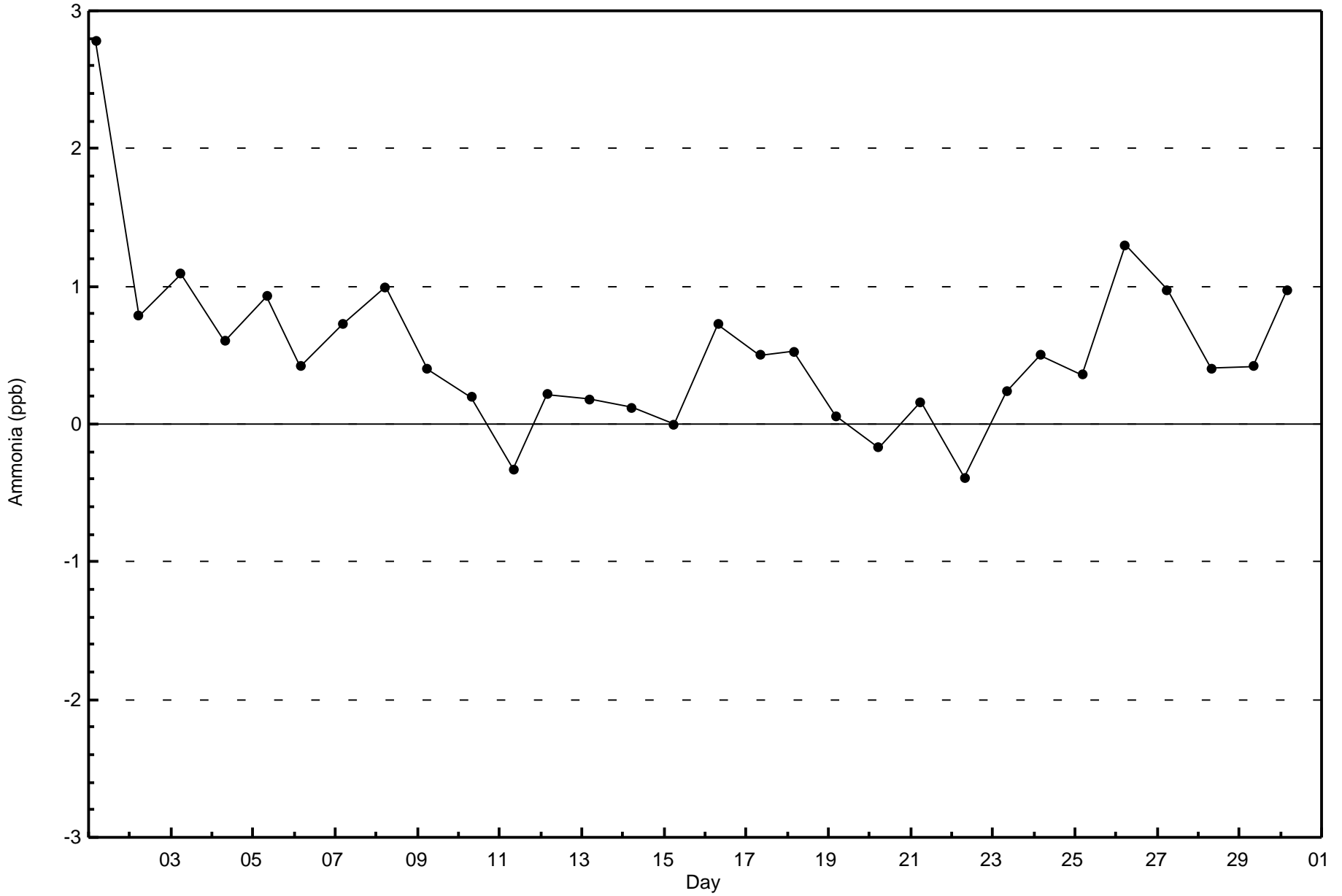
Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - June 2017

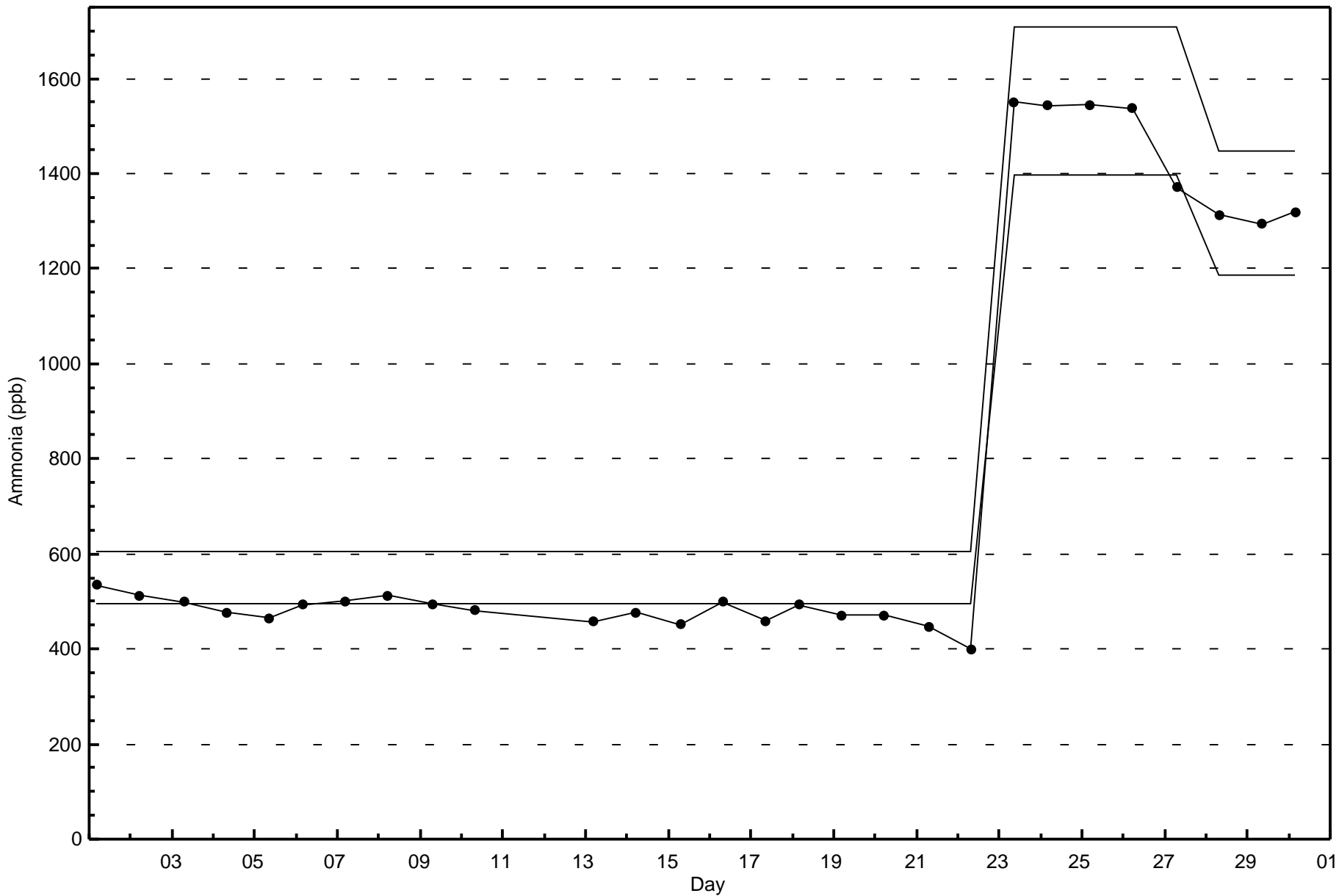
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	92	39	20	18	19	13	34	80	46	18	17	16	34	58	42	51	597
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16 - 20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	95	41	20	18	19	13	34	80	46	18	17	16	34	58	42	51	602

Total Number of Valid Hours: 602

Total Number of Hours: 720









Wood Buffalo Environmental Association
Summary of Hour Averages

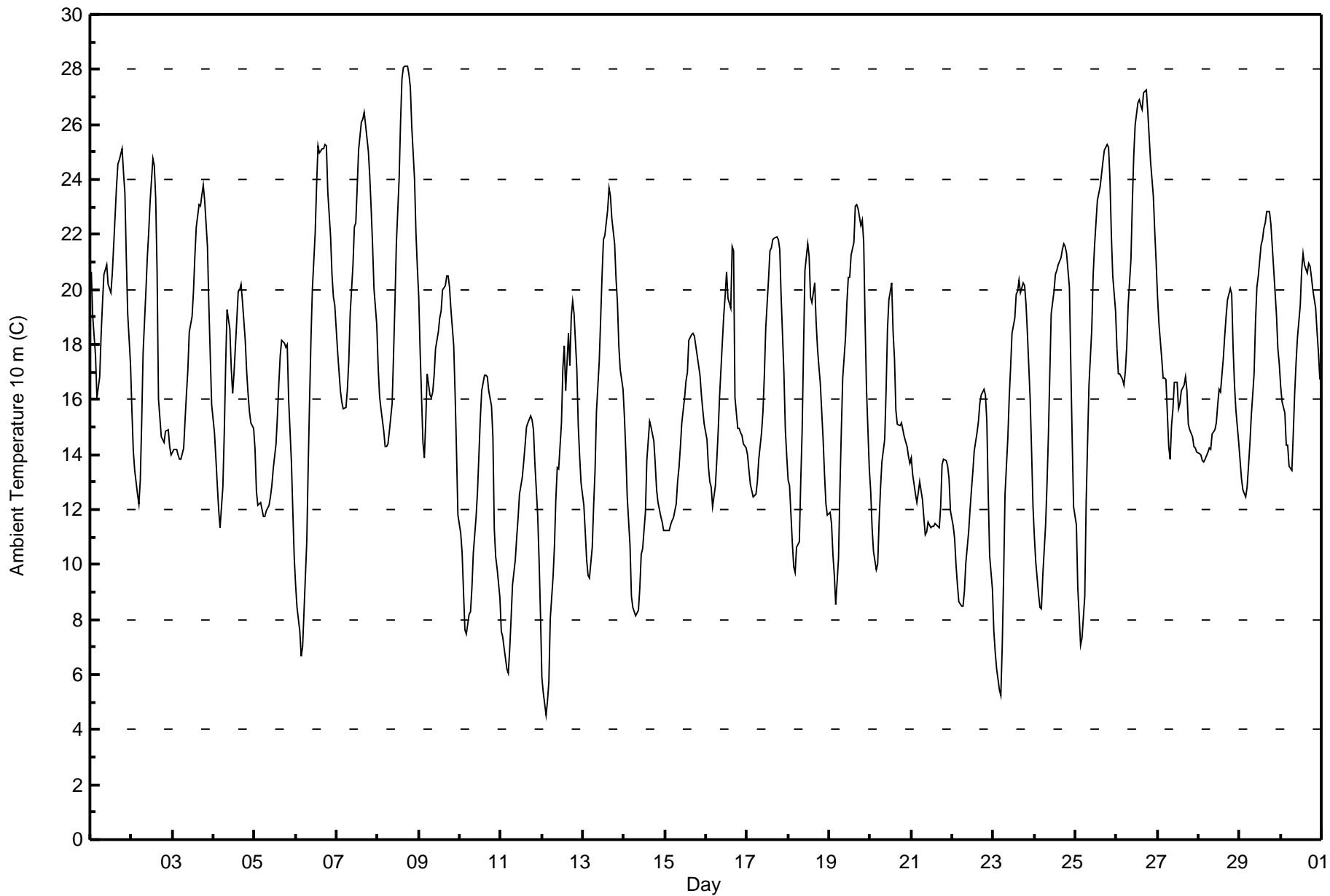
Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - June 2017

Maximum Value: 28.1 C on Jun 8 18:00		Maximum Daily Average: 22.5 C on Jun 26		Hours in Service: 720																																													
Minimum Value: 4.5 C on Jun 12 03:00		Minimum Daily Average: 11.0 C on Jun 11		Hours of Data: 720																																													
Maximum Diurnal Average: 20.4 C at hour 16		Minimum Diurnal Average: 11.2 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 16.25 C		Percentiles: P ₁ = 6.0 P ₁₀ = 10.2 Q ₁ = 12.9 Median = 16.0 Q ₃ = 19.8 P ₉₀ = 22.6 P ₉₉ = 27.1		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	20.6	19.0	18.3	17.6	16.1	16.8	18.4	19.5	20.5	20.9	20.2	20.0	19.9	20.6	22.7	23.8	24.5	24.7	25.1	24.3	23.5	21.2	19.1	17.3	20.6	25.1																							
2-Jun	15.6	14.1	13.4	12.5	12.2	13.0	15.2	17.7	19.9	21.2	22.1	23.2	24.8	24.5	23.3	20.6	16.0	14.6	14.5	14.5	14.9	14.9	14.3	14.0	17.1	24.8																							
3-Jun	14.1	14.2	14.2	14.0	13.8	13.8	14.2	15.3	16.2	17.1	18.5	19.0	19.9	21.2	22.3	23.1	23.0	23.4	23.8	23.2	21.6	19.4	17.6	15.8	18.3	23.8																							
4-Jun	14.8	13.9	12.9	12.0	11.4	12.8	14.7	17.2	19.3	18.6	17.2	16.2	17.0	18.0	19.9	20.0	20.2	19.6	18.2	17.0	16.2	15.5	15.2	14.9	16.4	20.2																							
5-Jun	14.2	12.7	12.1	12.2	12.0	11.8	11.7	11.9	12.1	12.4	12.9	13.5	14.4	15.4	16.6	17.6	18.2	18.1	17.9	18.0	16.0	13.7	11.9	10.3	14.1	18.2																							
6-Jun	9.2	8.4	7.6	6.7	7.0	8.3	10.9	13.6	16.0	18.3	20.0	22.1	23.8	25.2	25.0	25.1	25.1	25.3	25.2	23.6	21.9	20.5	19.7	19.4	17.8	25.3																							
7-Jun	17.8	17.0	16.3	15.9	15.6	15.7	16.4	17.4	19.1	20.9	22.3	22.4	23.7	25.1	26.1	26.2	26.4	26.0	25.0	24.1	22.9	21.6	20.1	18.7	20.9	26.4																							
8-Jun	17.2	16.1	15.7	14.8	14.3	14.3	14.4	14.9	15.9	17.6	19.5	21.6	24.1	26.1	27.6	28.1	28.1	28.1	27.8	27.4	26.0	24.0	22.1	20.8	21.1	28.1																							
9-Jun	19.7	17.7	14.5	13.9	15.2	16.9	16.2	16.1	16.3	16.9	17.8	18.5	19.0	19.2	20.0	20.1	20.5	20.5	20.1	19.3	18.0	16.2	14.1	11.8	17.4	20.5																							
10-Jun	11.1	10.4	9.0	7.6	7.5	8.2	8.3	9.1	10.4	11.7	12.6	14.0	15.3	16.3	16.9	16.9	16.8	16.3	15.8	14.6	11.3	10.3	9.9	8.8	12.0	16.9																							
11-Jun	7.6	7.4	7.0	6.2	6.0	6.9	8.0	9.3	10.2	11.0	11.7	12.6	13.2	13.7	14.3	15.0	15.2	15.4	15.3	14.9	13.7	11.8	10.2	8.2	11.0	15.4																							
12-Jun	5.9	5.3	4.5	5.1	5.8	8.0	9.6	10.7	12.4	13.5	13.5	15.1	17.1	18.0	16.3	18.4	17.2	19.0	19.6	19.1	17.1	15.0	13.9	12.9	13.0	19.6																							
13-Jun	12.2	11.2	10.2	9.6	9.5	10.6	12.2	13.4	15.6	17.4	18.9	20.5	21.8	22.0	22.9	23.7	23.4	22.6	21.7	20.4	19.5	18.0	17.1	16.4	17.1	23.7																							
14-Jun	15.3	14.1	12.5	10.7	8.8	8.5	8.3	8.2	8.3	9.1	10.4	10.6	11.9	13.8	14.5	15.2	15.0	14.5	13.7	12.7	12.3	11.8	11.5	11.2	11.8	15.3																							
15-Jun	11.2	11.2	11.2	11.4	11.6	11.7	12.2	13.0	13.5	14.3	15.2	16.0	16.7	17.0	18.2	18.4	18.4	18.3	18.0	17.6	16.9	16.2	15.6	15.1	15.0	18.4																							
16-Jun	14.6	13.6	13.0	12.8	12.1	12.8	13.8	14.9	16.1	18.1	19.1	19.8	20.7	19.7	19.3	21.6	21.4	16.1	15.0	15.0	14.8	14.7	14.4	14.2	16.1	21.6																							
17-Jun	14.0	13.4	12.9	12.4	12.5	12.6	13.0	13.8	14.8	15.5	16.9	18.6	20.4	21.4	21.5	21.8	21.9	21.9	21.8	21.4	19.7	17.0	14.9	14.0	17.0	21.9																							
18-Jun	13.1	12.8	10.8	9.9	9.7	10.6	10.8	13.0	14.9	17.8	20.7	21.7	21.2	19.7	19.5	20.2	18.8	17.8	17.2	16.6	14.6	13.3	12.2	11.8	15.4	21.7																							
19-Jun	11.9	11.5	10.4	9.6	8.5	10.2	12.7	14.9	16.8	18.3	19.5	20.5	20.4	21.3	21.7	23.0	23.1	22.9	22.3	22.5	21.7	18.8	16.4	13.5	17.2	23.1																							
20-Jun	12.7	11.3	10.5	9.8	10.0	11.6	12.8	13.7	14.5	16.3	18.6	19.6	20.2	18.5	17.5	15.6	15.1	15.0	15.2	14.9	14.7	14.3	13.9	13.7	14.6	20.2																							
21-Jun	13.9	13.3	12.6	12.3	12.6	13.0	12.3	11.7	11.1	11.2	11.5	11.3	11.4	11.4	11.5	11.4	11.3	12.1	13.6	13.8	13.8	13.6	13.1	12.0	12.3	13.9																							
22-Jun	11.4	10.9	10.0	9.3	8.7	8.5	8.5	9.1	10.0	11.2	12.0	12.7	13.4	14.2	14.8	15.2	15.8	16.2	16.4	16.1	15.2	12.6	10.3	9.1	12.1	16.4																							
23-Jun	7.6	6.8	6.2	5.4	5.3	7.0	9.6	12.5	14.6	16.1	17.2	18.4	19.0	19.8	19.9	20.3	19.9	20.2	20.1	19.5	18.4	16.0	14.1	12.1	14.4	20.3																							
24-Jun	11.0	10.1	8.9	8.4	8.4	9.6	11.4	12.9	14.7	17.0	19.1	19.9	20.5	20.7	20.9	21.2	21.5	21.6	21.6	21.3	20.1	17.3	14.5	12.1	16.0	21.6																							
25-Jun	11.5	9.2	8.1	7.1	7.3	8.9	12.3	14.5	16.5	18.6	20.5	21.6	22.4	23.2	23.7	24.2	24.7	25.0	25.3	25.2	24.0	22.0	20.5	19.2	18.1	25.3																							
26-Jun	17.9	16.9	16.9	16.7	16.5	17.0	17.9	19.4	21.1	23.2	24.9	26.0	26.8	26.9	26.7	26.5	27.1	27.2	26.5	25.6	24.7	23.4	22.1	21.0	22.5	27.2																							
27-Jun	19.7	18.8	17.5	16.8	16.8	16.7	14.3	13.8	15.1	15.7	16.6	16.6	15.7	15.9	16.3	16.5	16.9	16.3	15.1	14.9	14.7	14.3	14.2	14.1	16.0	19.7																							
28-Jun	14.0	14.0	13.8	13.7	13.8	14.1	14.2	14.2	14.7	14.9	15.2	15.8	16.4	16.2	17.5	18.3	19.0	19.6	20.0	19.8	17.9	16.5	15.6	14.4	16.0	20.0																							
29-Jun	13.8	13.1	12.7	12.4	12.8	13.6	14.4	15.4	16.9	18.8	20.1	20.5	21.6	21.8	22.2	22.4	22.8	22.8	22.4	21.6	20.8	19.1	17.8	17.3	18.2	22.8																							
30-Jun	16.5	15.9	15.5	14.4	14.3	13.6	13.4	14.8	16.2	17.3	18.2	19.4	20.7	21.3	20.9	20.6	21.0	20.8	20.5	20.0	19.3	18.4	17.7	16.7	17.8	21.3																							
																								13.7	12.8	12.0	11.4	11.2	11.9	12.7	13.9	15.1	16.4	17.4	18.3	19.1	19.6	20.0	20.4	20.3	20.1	19.8	19.3	18.2	16.7	15.5	14.4	Diurnal Average	
																								20.6	19.0	18.3	17.6	16.8	17.0	18.4	19.5	21.1	23.2	24.9	26.0	26.8	26.9	27.6	28.1	28.1	28.1	27.8	27.4	26.0	24.0	22.1	21.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 10 m (AT 10m) - C
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	67	9.31	9.31
10 - 20	484	67.22	76.53
> 20	169	23.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

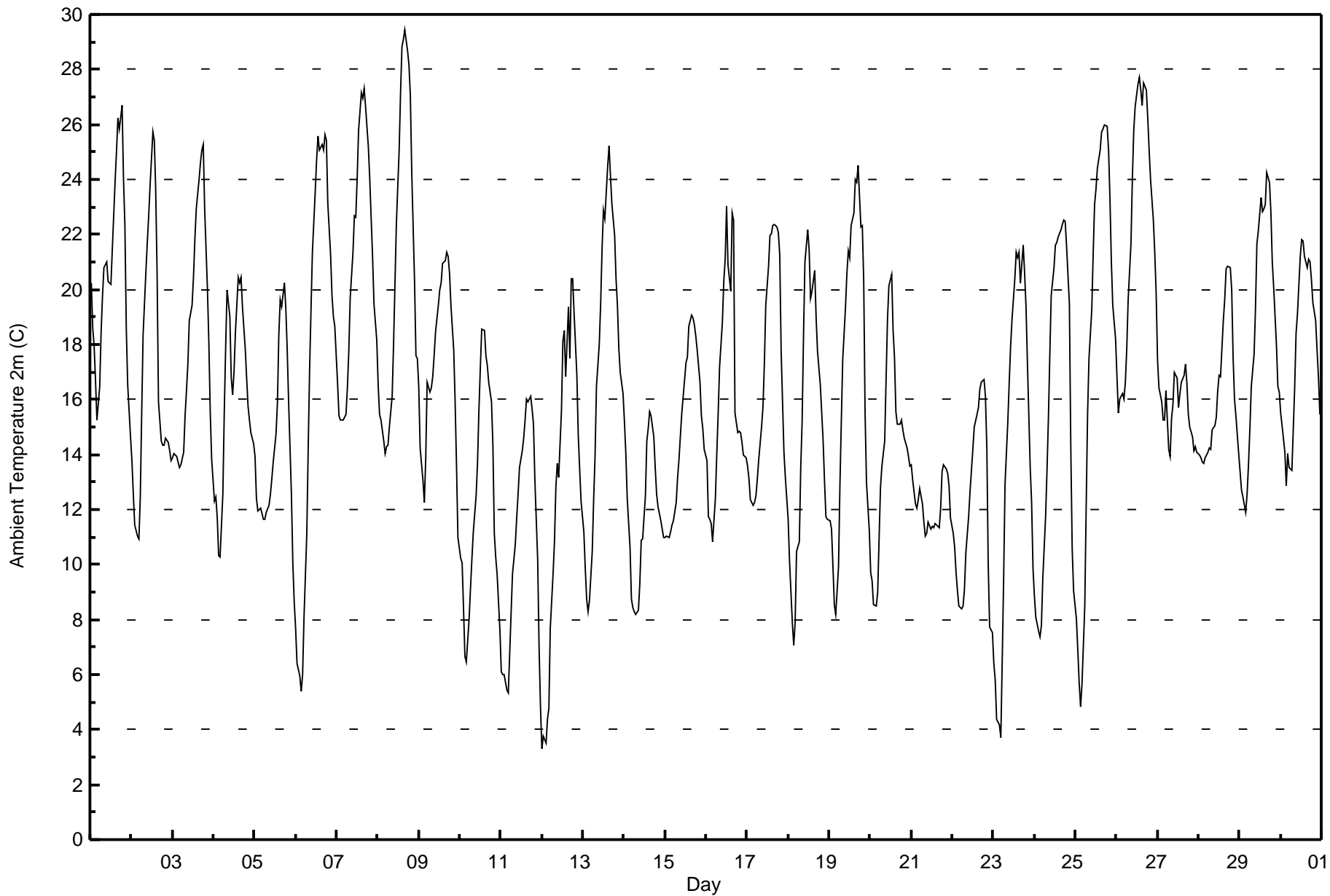


Maximum Value: 29.4 C on Jun 8 17:00		Maximum Daily Average: 22.3 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 3.3 C on Jun 12 01:00		Minimum Daily Average: 10.8 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 21.1 C at hour 16		Minimum Diurnal Average: 10.4 C at hour 4		Hours of Missing Data: 0																																												
Monthly Average: 16.17 C		Percentiles: P ₁ = 4.8 P ₁₀ = 9.4 Q ₁ = 12.5 Median = 15.6 Q ₃ = 20.2 P ₉₀ = 23.1 P ₉₉ = 27.4		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.2	18.6	17.9	16.7	15.3	16.5	18.5	19.8	20.8	21.0	20.3	20.2	20.2	21.5	23.9	25.0	26.2	25.8	26.7	24.0	22.3	18.6	16.5	14.7	20.5	26.7																						
2-Jun	13.8	12.5	11.4	11.0	10.9	12.5	15.5	18.3	20.6	21.7	22.7	23.8	25.8	25.4	23.7	20.6	15.9	14.5	14.4	14.3	14.6	14.5	14.1	13.8	16.9	25.8																						
3-Jun	13.9	14.0	13.9	13.7	13.5	13.6	14.1	15.4	16.3	17.3	18.9	19.4	20.4	21.8	22.9	24.0	24.6	25.1	25.3	23.0	20.0	18.1	15.5	13.8	18.3	25.3																						
4-Jun	12.3	12.5	11.7	10.3	10.3	12.5	15.5	17.9	20.0	19.0	16.8	16.2	17.0	18.5	20.4	20.3	20.5	19.4	17.9	16.8	15.8	15.2	14.8	14.4	16.1	20.5																						
5-Jun	13.9	12.4	12.0	12.1	11.9	11.7	11.7	11.9	12.2	12.5	13.1	13.7	14.7	15.9	18.4	19.6	19.4	20.2	19.3	17.8	15.9	12.5	10.0	8.7	14.2	20.2																						
6-Jun	7.7	6.4	6.0	5.4	6.0	8.1	11.2	14.3	17.1	19.3	21.3	23.6	24.7	25.6	25.1	25.3	25.1	25.6	25.4	23.2	21.3	19.8	19.0	18.6	17.7	25.6																						
7-Jun	16.6	15.4	15.3	15.3	15.2	15.5	16.4	17.8	19.7	21.3	22.7	22.6	24.0	25.8	27.2	27.0	27.3	26.6	25.2	24.0	22.6	21.2	19.5	18.1	20.9	27.3																						
8-Jun	16.5	15.5	15.2	14.5	14.0	14.3	14.4	15.0	16.1	18.0	20.2	22.4	25.1	27.2	28.8	29.1	29.4	28.7	28.2	27.0	24.3	20.3	17.6	17.5	20.8	29.4																						
9-Jun	16.5	14.2	13.1	12.2	13.9	16.6	16.3	16.4	16.8	17.6	18.5	19.4	20.0	20.2	21.0	21.1	21.3	21.2	20.6	19.4	17.8	15.9	13.6	11.0	17.3	21.3																						
10-Jun	10.2	10.1	8.4	6.7	6.5	8.0	9.2	10.2	11.2	12.5	13.7	15.6	17.1	18.5	18.5	17.6	17.2	16.6	15.9	14.4	11.1	10.3	9.6	7.6	12.4	18.5																						
11-Jun	6.1	6.0	6.0	5.4	5.4	6.8	8.2	9.7	10.7	11.7	12.6	13.6	14.1	14.6	15.2	16.0	15.9	16.1	15.7	15.1	13.1	10.2	7.0	4.8	10.8	16.1																						
12-Jun	3.3	3.8	3.5	4.4	4.8	7.7	9.7	10.8	12.8	13.7	13.2	15.6	18.1	18.5	16.9	19.4	17.5	20.4	20.4	19.2	16.9	14.7	13.5	12.3	13.0	20.4																						
13-Jun	11.2	9.9	8.7	8.3	8.7	10.5	12.4	13.9	16.5	18.0	19.5	21.5	22.9	22.6	24.5	25.2	24.1	23.2	22.0	20.4	19.4	17.9	17.0	16.2	17.3	25.2																						
14-Jun	15.2	14.0	12.4	10.6	8.8	8.4	8.3	8.2	8.4	9.3	10.9	10.9	12.5	14.5	14.9	15.6	15.4	14.6	13.5	12.6	12.1	11.6	11.3	11.0	11.9	15.6																						
15-Jun	11.0	11.0	11.0	11.2	11.4	11.6	12.3	13.2	13.8	14.7	15.5	16.7	17.3	17.5	18.7	19.1	19.0	18.7	18.3	17.8	16.6	15.4	14.9	14.2	15.0	19.1																						
16-Jun	13.8	11.7	11.7	11.5	10.9	12.4	14.0	15.5	17.2	18.8	20.3	21.1	23.0	20.9	19.9	22.8	22.5	15.5	14.8	14.9	14.8	14.4	14.0	13.9	16.3	23.0																						
17-Jun	13.6	13.1	12.4	12.1	12.3	12.5	13.1	13.8	15.0	15.7	17.3	19.4	20.9	22.0	22.0	22.3	22.4	22.3	22.1	21.2	17.8	14.1	13.2	12.4	16.8	22.4																						
18-Jun	11.7	10.1	7.9	7.1	7.9	10.5	10.8	13.5	15.2	18.4	21.0	22.2	21.4	19.7	19.9	20.7	19.0	17.7	17.1	16.5	14.5	13.0	11.8	11.6	15.0	22.2																						
19-Jun	11.6	11.3	10.0	8.5	8.2	9.9	12.9	15.2	17.5	19.4	20.6	21.4	21.1	22.3	22.8	24.0	23.9	24.5	22.3	22.3	20.3	15.5	13.0	11.2	17.1	24.5																						
20-Jun	9.7	9.4	8.5	8.5	9.0	10.9	12.8	13.6	14.5	16.7	18.9	20.2	20.6	18.5	17.6	15.6	15.1	15.1	15.3	14.9	14.6	14.2	13.9	13.6	14.2	20.6																						
21-Jun	13.6	13.1	12.2	12.0	12.4	12.8	12.2	11.6	11.0	11.2	11.5	11.3	11.4	11.4	11.5	11.4	11.3	12.1	13.4	13.6	13.5	13.3	12.9	11.7	12.2	13.6																						
22-Jun	11.1	10.6	9.7	9.0	8.5	8.4	8.5	9.1	10.4	11.7	12.7	13.4	14.2	15.0	15.5	15.7	16.4	16.6	16.8	16.1	14.2	10.0	7.7	7.5	12.0	16.8																						
23-Jun	6.4	5.8	4.4	4.2	3.7	6.5	9.4	12.9	15.2	16.6	17.9	18.9	20.4	21.4	21.2	21.4	20.2	21.6	20.6	19.4	17.4	13.5	12.3	9.9	14.2	21.6																						
24-Jun	8.9	8.1	7.6	7.4	7.8	9.5	11.7	13.4	15.3	17.6	19.8	20.8	21.6	21.7	21.9	22.1	22.4	22.5	22.5	21.6	19.4	14.3	10.6	9.1	15.7	22.5																						
25-Jun	8.0	6.9	5.7	4.8	5.6	8.5	12.1	15.5	17.5	19.3	21.3	23.1	23.6	24.4	25.1	25.7	25.8	26.0	25.9	25.1	23.3	21.0	19.4	18.2	18.0	26.0																						
26-Jun	16.8	15.5	16.0	16.2	16.0	16.7	17.9	19.6	21.6	24.0	25.8	26.7	27.5	27.7	27.3	26.7	27.5	27.3	26.2	25.0	24.0	22.5	21.3	19.9	22.3	27.7																						
27-Jun	17.4	16.4	15.9	15.3	15.2	16.3	14.2	13.9	15.3	15.8	17.0	16.8	15.7	16.2	16.6	16.9	17.3	16.6	15.5	15.0	14.7	14.1	14.3	14.1	15.7	17.4																						
28-Jun	14.0	13.9	13.7	13.7	13.9	14.1	14.2	14.2	14.9	15.0	15.3	16.3	16.9	16.8	18.9	19.6	20.7	20.8	20.8	20.0	17.5	16.0	15.4	14.0	16.3	20.8																						
29-Jun	13.4	12.7	12.4	11.9	12.6	13.6	15.0	16.5	17.7	19.3	21.7	22.1	23.3	22.8	22.9	23.1	24.2	23.9	22.8	21.0	20.1	18.0	16.5	16.3	18.5	24.2																						
30-Jun	15.5	15.0	14.1	12.9	14.0	13.5	13.4	14.9	16.4	18.4	19.1	21.2	21.8	21.8	21.2	20.8	21.1	21.0	20.3	19.5	18.9	17.8	16.8	15.5	17.7	21.8																						
																								12.5	11.7	11.0	10.4	10.5	11.7	12.9	14.2	15.6	16.9	18.0	19.0	19.9	20.4	20.8	21.1	21.0	20.7	20.2	19.2	17.6	15.6	14.2	13.2	Diurnal Average
																								20.2	18.6	17.9	16.7	16.0	16.7	18.5	19.8	21.6	24.0	25.8	26.7	27.5	27.7	28.8	29.1	29.4	28.7	28.2	27.0	24.3	22.5	21.3	19.9	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	83	11.53	11.53
10 - 20	454	63.06	74.58
> 20	183	25.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

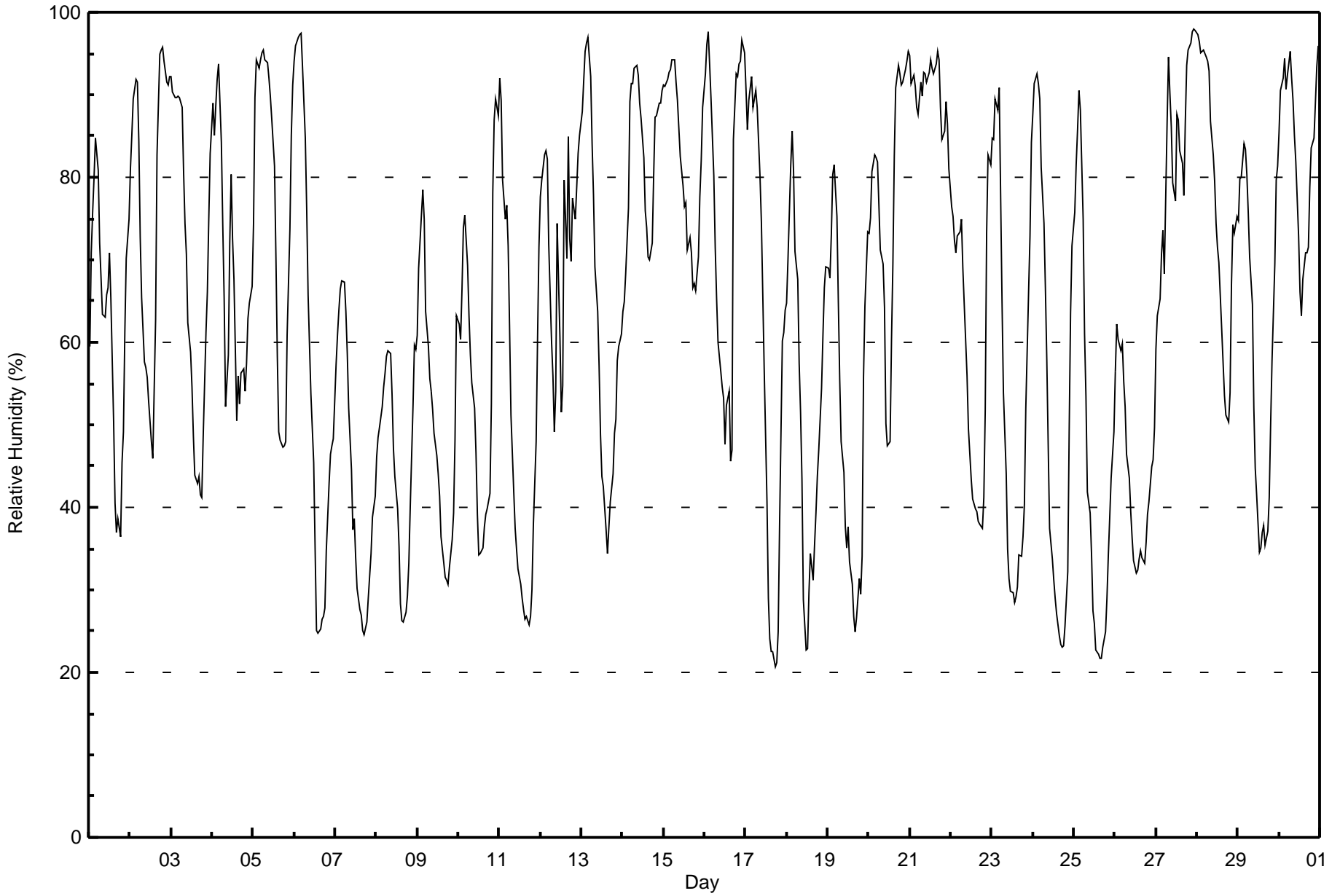
Fort McKay - Bertha Ganter - June 2017

Maximum Value: 98 % on Jun 27 23:00														Maximum Daily Average: 90.6 % on Jun 21														Hours in Service: 720	
Minimum Value: 21 % on Jun 17 18:00														Minimum Daily Average: 43.7 % on Jun 7														Hours of Data: 720	
Maximum Diurnal Average: 83.9 % at hour 5														Minimum Diurnal Average: 45.8 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 64.0 %														Percentiles: P ₁ = 23 P ₁₀ = 32 Q ₁ = 45 Median = 66 Q ₃ = 85 P ₉₀ = 92 P ₉₉ = 97														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	59	71	76	80	85	81	72	68	63	63	66	67	71	65	50	40	37	39	36	45	49	61	70	75	62.1	85			
2-Jun	81	85	90	92	92	84	73	65	58	57	56	53	48	46	54	63	83	95	95	96	94	92	91	92	76.4	96			
3-Jun	92	90	90	90	90	90	89	81	74	71	62	59	55	49	44	43	44	42	41	49	61	66	75	83	67.8	92			
4-Jun	89	85	89	92	94	84	74	65	52	59	72	80	73	68	51	56	53	56	57	54	57	63	65	67	68.9	94			
5-Jun	74	90	94	93	94	95	95	94	94	92	90	87	81	70	58	49	48	47	47	48	61	74	85	91	77.3	95			
6-Jun	94	96	97	97	97	93	85	76	66	60	54	45	35	25	25	25	27	27	28	35	43	46	47	48	57.1	97			
7-Jun	57	61	64	66	68	67	64	59	52	45	37	39	34	30	28	27	25	25	26	29	32	34	39	41	43.7	68			
8-Jun	46	48	50	52	55	56	58	59	59	54	47	44	40	35	28	26	26	27	29	33	40	52	60	59	45.2	60			
9-Jun	61	69	75	78	75	64	59	56	54	52	49	46	44	41	36	33	31	31	31	33	36	39	48	63	50.3	78			
10-Jun	62	60	67	74	75	69	63	59	55	52	47	39	34	34	35	38	39	40	42	53	78	87	90	87	57.4	90			
11-Jun	92	89	80	75	77	72	62	51	42	37	35	33	31	29	28	26	27	26	27	30	38	48	60	71	49.4	92			
12-Jun	78	80	83	83	82	72	60	56	49	54	74	61	52	55	80	70	85	73	70	77	75	79	83	85	71.5	85			
13-Jun	88	92	95	96	97	92	84	78	69	64	57	49	44	43	37	34	38	41	44	49	51	58	59	61	63.3	97			
14-Jun	64	65	68	76	89	91	91	93	94	92	89	87	82	76	74	70	72	80	87	87	89	89	91	91	82.0	94			
15-Jun	91	91	92	93	93	94	94	91	89	86	83	79	77	77	71	73	71	67	67	66	70	78	82	88	81.8	94			
16-Jun	93	96	98	94	90	80	72	65	60	57	54	53	48	52	54	46	47	85	93	92	94	94	97	95	75.3	98			
17-Jun	91	86	89	92	88	89	91	88	80	75	66	57	41	29	24	22	22	21	21	25	38	60	61	64	59.2	92			
18-Jun	65	70	82	86	81	71	68	57	52	43	29	23	23	30	34	31	35	39	44	47	54	61	67	69	52.5	86			
19-Jun	69	68	73	80	82	75	65	55	48	44	38	35	38	33	31	27	25	27	31	29	34	56	64	73	50.0	82			
20-Jun	73	75	81	83	82	82	77	71	69	64	50	48	48	60	70	83	91	94	92	91	92	93	94	95	77.4	95			
21-Jun	95	91	92	91	88	88	92	90	93	93	92	93	94	93	93	94	95	94	88	85	86	89	86	81	90.6	95			
22-Jun	76	75	72	71	73	73	75	69	65	56	50	46	43	41	40	39	38	38	37	41	52	73	83	81	58.7	83			
23-Jun	85	85	90	88	91	78	65	54	44	35	31	30	30	28	29	30	34	34	36	40	52	66	73	84	54.7	91			
24-Jun	88	91	93	91	90	81	74	67	58	48	37	34	31	29	27	24	23	23	23	26	32	49	64	72	53.1	93			
25-Jun	76	81	86	90	88	75	61	53	42	39	34	27	26	23	22	22	22	23	25	29	34	39	44	49	46.3	90			
26-Jun	57	62	60	59	60	55	52	46	43	39	36	34	32	32	34	35	34	33	36	39	41	45	46	50	44.2	62			
27-Jun	59	63	65	71	74	68	87	95	90	86	79	77	88	87	83	82	78	87	94	95	96	98	98	98	83.2	98			
28-Jun	97	96	95	95	95	95	94	93	87	83	80	74	72	70	62	58	54	51	50	54	67	74	73	75	76.8	97			
29-Jun	75	80	80	84	83	80	76	70	65	52	45	41	35	35	37	38	35	37	41	50	58	69	80	81	59.5	84			
30-Jun	85	90	92	94	91	92	95	92	89	85	82	73	66	63	68	71	71	72	79	84	85	89	93	96	83.2	96			
	77.0	79.4	81.9	83.6	83.9	79.7	75.5	70.6	65.2	61.2	57.3	53.7	50.4	48.3	46.9	45.8	46.9	48.7	50.4	53.7	59.5	67.4	72.2	75.6	Diurnal Average				
	97	96	98	97	97	95	95	95	94	93	92	93	94	93	93	94	95	95	95	96	96	98	98	98	Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort McKay - Bertha Ganter - June 2017



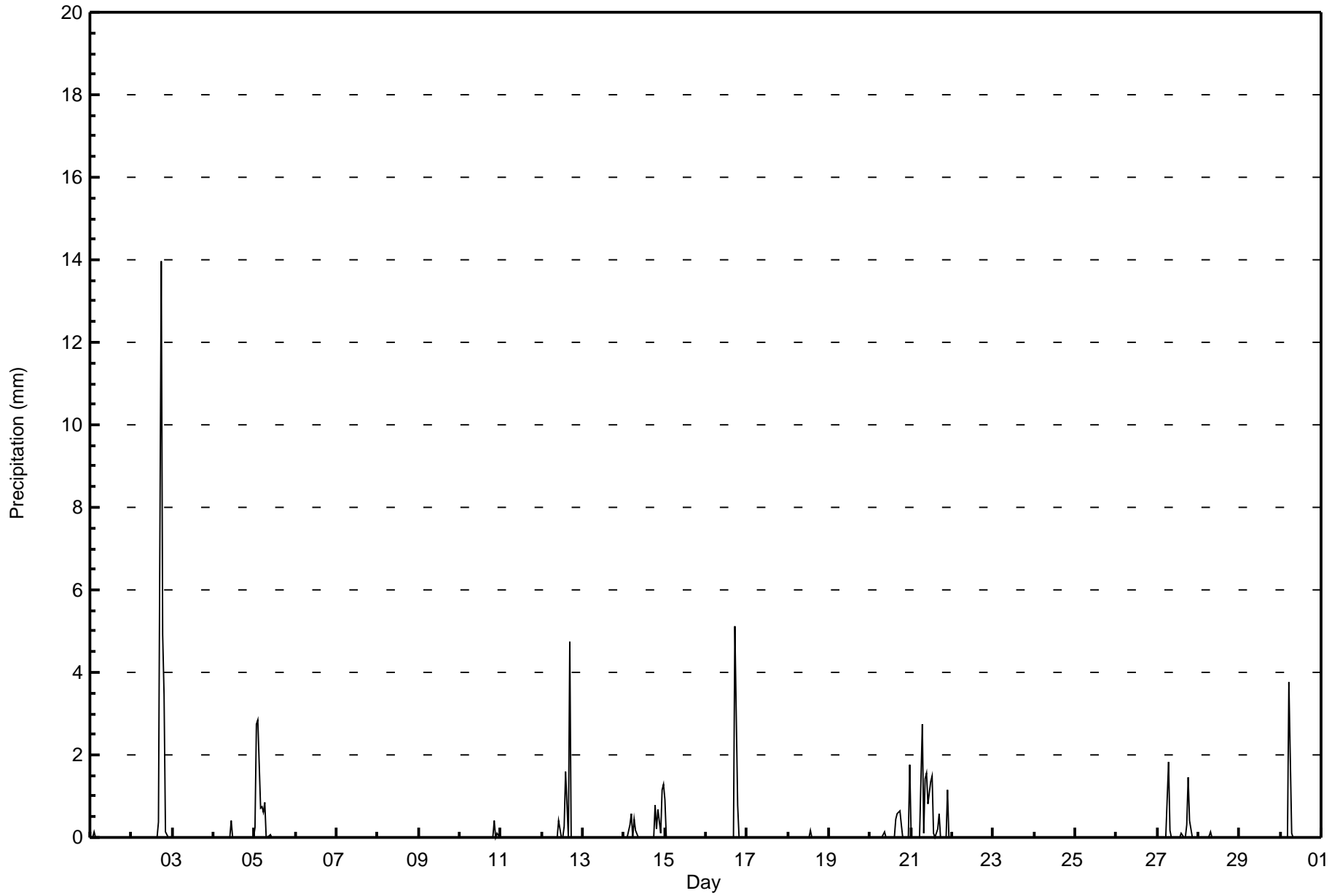


Maximum Value: 14.0 mm on Jun 2 18:00		Maximum Daily Total: 22.8 mm on Jun 2		Hours in Service: 720																						
Minimum Value: 0.0 mm on Jun 1 01:00		Minimum Daily Total: 0.0 mm on Jun 3		Hours of Data: 720																						
Maximum Diurnal Total: 20.1 mm at hour 18		Minimum Diurnal Total: 0.5 mm at hour 14		Hours of Missing Data: 0																						
Monthly Total: 76.12 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 2.4		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	14.0	4.9	3.5	0.1	0.0	0.0	0.0	22.8	14.0
3-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
5-Jun	0.2	2.7	2.8	0.7	0.7	0.6	0.8	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	2.8
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.5	0.4
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.3	1.6	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	4.8
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Jun	0.0	0.0	0.0	0.3	0.6	0.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.2	0.7	0.1	1.1	1.3	5.7	1.3
15-Jun	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.8	0.0	0.0	0.0	0.0	0.0	5.9	5.1
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
19-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6	0.6	0.3	0.0	0.0	0.0	0.0	1.8	3.8	1.8
21-Jun	0.1	0.0	0.0	0.0	0.0	0.0	2.7	0.1	1.4	1.6	0.8	1.4	1.5	0.1	0.0	0.2	0.6	0.0	0.0	0.0	0.0	1.2	0.0	0.0	11.5	2.7
22-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Jun	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	1.5	0.4	0.0	0.0	0.0	0.0	4.3	1.8
28-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Jun	0.0	0.0	0.0	0.0	0.0	3.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.8
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	680	94.44	94.44
0.4 - 0.5	7	0.97	95.42
0.6 - 0.7	8	1.11	96.53
0.8 - 1.4	10	1.39	97.92
1.5 - 10	12	1.67	99.58
> 10	1	0.14	99.72

Total Number of Valid Hours: 720

Total Number of Hours: 720



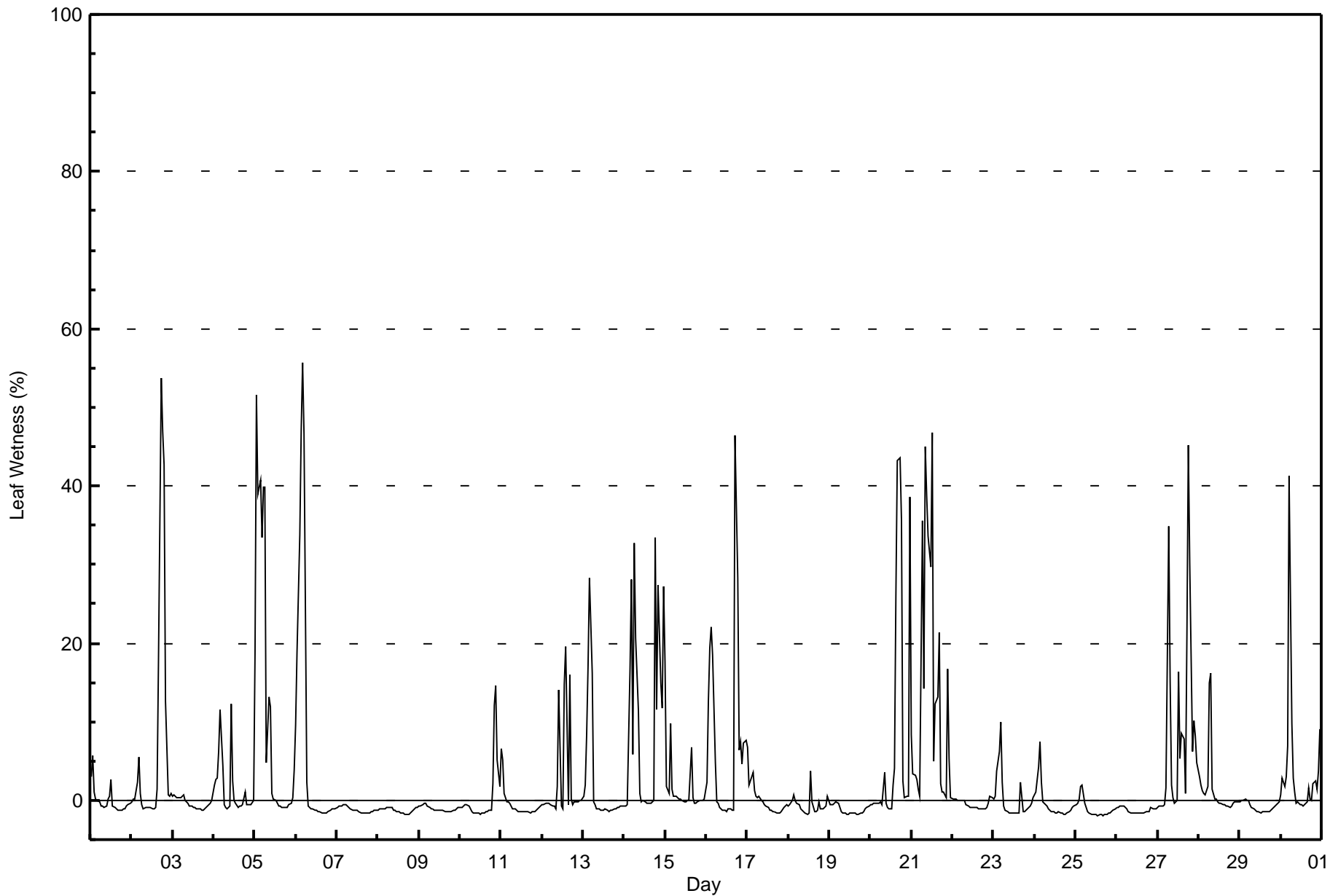
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Fort McKay - Bertha Ganter - June 2017

Maximum Value: 56 % on Jun 6 05:00																	Maximum Daily Average: 14.2 % on Jun 21																	Hours in Service: 720	
Minimum Value: -2 % on Jun 25 14:00																	Minimum Daily Average: -1.3 % on Jun 8																	Hours of Data: 720	
Maximum Diurnal Average: 6.7 % at hour 5																	Minimum Diurnal Average: 0.1 % at hour 14																	Hours of Missing Data: 0	
Monthly Average: 2.6 %																	Percentiles: P ₁ = -2 P ₁₀ = -2 Q ₁ = -1 Median = -1 Q ₃ = 1 P ₉₀ = 12 P ₉₉ = 46																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	3	6	1	0	0	0	-1	-1	-1	-1	0	0	3	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0.0	6									
2-Jun	0	0	0	2	5	1	-1	-1	-1	-1	-1	-1	-1	-1	1	18	54	47	43	13	1	0	1	1	7.4	54									
3-Jun	1	1	0	0	0	0	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.4	1									
4-Jun	2	3	3	6	12	4	-1	-1	-1	-1	12	3	0	0	-1	-1	-1	-1	1	-1	-1	-1	-1	0	1.5	12									
5-Jun	19	52	39	41	34	40	40	5	13	12	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	4	12.2	52									
6-Jun	10	19	34	47	56	47	2	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	8.0	56									
7-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.2	-1									
8-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.3	-1									
9-Jun	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.1	0									
10-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	2	12	14	5	2	0.5	14									
11-Jun	7	5	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-1	-1	-1	-1	-1	-0.5	7									
12-Jun	-1	-1	0	0	0	-1	-1	-1	-1	2	14	-1	-1	15	19	0	16	0	-1	0	0	0	0	0	2.4	19									
13-Jun	0	2	8	17	28	16	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	2.2	28									
14-Jun	-1	-1	0	17	28	6	33	21	11	1	0	0	0	0	0	0	0	0	33	12	27	15	12	27	10.0	33									
15-Jun	18	2	1	10	1	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	1.6	18									
16-Jun	2	13	19	22	18	5	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	46	28	6	8	5	7	8	7.4	46									
17-Jun	7	2	2	4	1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-1	-1	-1	0	0.0	7									
18-Jun	-1	-1	0	1	0	0	-1	-1	-1	-1	-2	-2	-2	4	0	-2	-1	-1	0	-1	-1	-1	-1	0	-0.6	4									
19-Jun	-1	-1	0	0	0	0	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.2	0									
20-Jun	-1	-1	0	0	0	0	0	0	3	0	-1	-1	-1	2	4	26	43	44	35	2	0	0	0	39	8.1	44									
21-Jun	8	3	3	3	1	1	36	14	45	39	34	30	47	5	12	13	21	2	1	1	0	17	5	0	14.2	47									
22-Jun	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.5	0									
23-Jun	0	0	4	6	10	2	-1	-1	-1	-2	-2	-2	-2	-2	-2	2	-1	-1	-1	-1	-1	0	0	0	0.2	10									
24-Jun	1	1	4	7	2	0	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-0.4	7									
25-Jun	-1	0	0	2	2	0	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.1	2									
26-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1.3	-1									
27-Jun	-1	-1	-1	-1	-1	2	35	15	2	0	0	0	16	5	9	8	1	21	45	30	6	10	8	5	8.9	45									
28-Jun	3	2	1	1	1	2	15	16	1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	1.5	16									
29-Jun	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.8	0									
30-Jun	1	3	2	3	7	41	10	3	1	0	0	-1	-1	-1	-1	0	2	0	0	2	3	1	4	9	3.6	41									
																																		Diurnal Average	
																																		Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Fort McKay - Bertha Ganter - June 2017

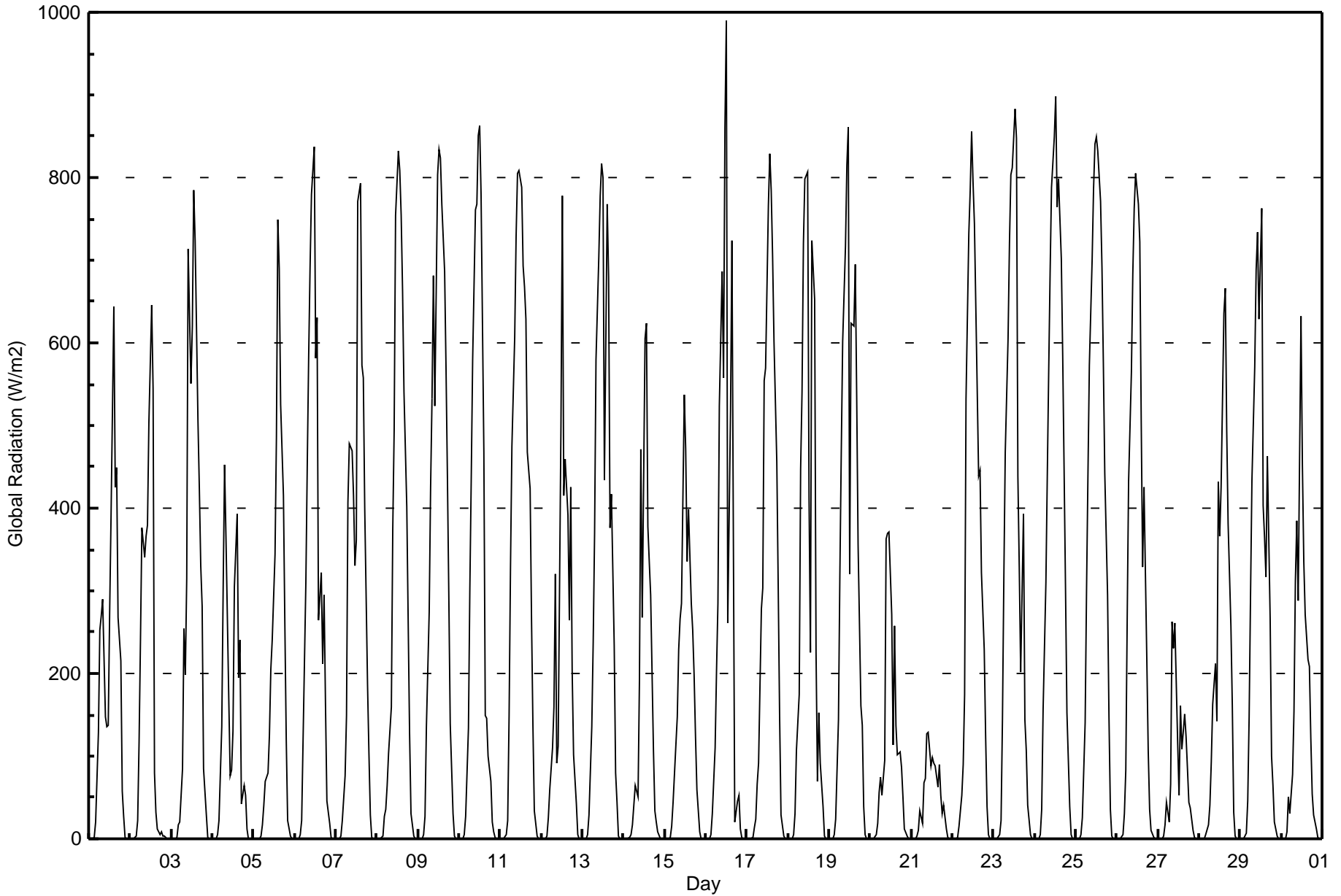
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	36	14.94	14.94
0.4 - 0.5	20	8.30	23.24
0.6 - 0.7	8	3.32	26.56
0.8 - 1.4	20	8.30	34.85
1.5 - 10	81	33.61	68.46
> 10	75	31.12	99.59

Total Number of Valid Hours: 241

Total Number of Hours: 720



Maximum Value: 990 W/m2 on Jun 16 13:00		Maximum Daily Average: 355.3 W/m2 on Jun 24		Hours in Service: 720																							
Minimum Value: 0 W/m2 on Jun 1 02:00		Minimum Daily Average: 46.5 W/m2 on Jun 21		Hours of Data: 720																							
Maximum Diurnal Average: 587.2 W/m2 at hour 13		Minimum Diurnal Average: 0.0 W/m2 at hour 2		Hours of Missing Data: 0																							
Monthly Average: 230.9 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 3 Median = 106 Q ₃ = 416 P ₉₀ = 701 P ₉₉ = 854		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	0	2	20	130	253	270	291	147	136	137	273	389	644	425	449	267	215	57	27	2	0	0	172.2	644	
2-Jun	0	0	0	3	23	118	241	376	340	367	380	504	646	543	80	33	12	5	8	3	4	0	0	0	153.6	646	
3-Jun	0	0	0	1	17	21	84	255	198	315	714	551	621	785	725	507	424	330	281	85	30	2	0	0	247.7	785	
4-Jun	0	0	0	4	23	136	303	452	365	170	77	84	131	305	393	195	241	42	64	52	13	1	0	0	127.1	452	
5-Jun	0	0	0	0	3	17	41	69	80	126	204	241	344	487	750	689	526	416	261	121	22	3	0	0	183.4	750	
6-Jun	0	0	0	5	22	119	310	453	583	692	780	837	581	630	265	321	212	295	163	47	18	2	0	0	264.0	837	
7-Jun	0	0	0	4	21	76	150	407	478	470	415	330	362	772	792	573	557	399	187	104	29	2	0	0	255.4	792	
8-Jun	0	0	0	4	28	36	65	103	159	374	495	755	832	808	755	663	540	402	262	127	31	4	0	0	268.4	832	
9-Jun	0	0	0	4	27	136	275	425	533	682	524	804	833	823	769	687	570	437	293	140	31	3	0	0	333.1	833	
10-Jun	0	0	0	5	28	134	304	438	579	760	768	850	862	780	468	149	145	99	70	21	8	1	0	0	269.6	862	
11-Jun	0	0	0	5	22	149	329	474	607	728	806	809	788	693	668	628	468	424	266	138	34	4	0	0	335.0	809	
12-Jun	0	0	0	3	25	59	111	160	320	91	113	498	778	415	459	391	264	425	204	102	42	5	0	0	186.0	778	
13-Jun	0	0	0	5	29	136	238	370	580	703	777	817	801	433	768	680	376	417	235	80	44	3	0	0	312.1	817	
14-Jun	0	0	0	1	5	18	40	65	51	192	471	268	605	624	378	335	296	107	33	21	8	0	0	0	146.5	624	
15-Jun	0	0	0	2	15	44	114	147	228	266	285	538	472	336	399	284	252	198	124	59	8	1	0	0	157.2	538	
16-Jun	0	0	0	5	30	109	204	284	523	687	557	861	990	262	519	723	370	20	45	53	12	1	0	0	260.7	990	
17-Jun	0	0	0	2	14	24	67	92	279	303	555	570	766	829	784	705	601	455	306	149	29	3	0	0	272.1	829	
18-Jun	0	0	0	5	31	107	174	447	541	721	799	808	413	226	724	653	225	69	152	91	38	4	0	0	259.4	808	
19-Jun	0	0	0	5	23	144	320	468	602	716	815	861	320	624	621	695	536	356	160	137	39	5	0	0	310.3	861	
20-Jun	0	0	0	6	18	56	75	53	95	362	369	371	271	113	257	137	101	104	86	51	12	4	0	0	105.9	371	
21-Jun	0	0	0	4	10	35	18	67	73	127	128	88	98	92	88	62	90	52	30	40	11	1	0	0	46.5	128	
22-Jun	0	0	0	2	15	53	89	175	532	732	785	857	795	744	542	440	447	322	229	123	38	5	0	0	288.6	857	
23-Jun	0	0	0	6	23	144	318	467	604	720	804	812	883	848	439	328	202	393	145	106	41	5	0	0	303.6	883	
24-Jun	0	0	0	5	36	157	311	441	565	684	788	849	899	765	798	702	583	444	302	153	39	6	0	0	355.3	899	
25-Jun	0	0	0	6	25	140	302	441	574	701	786	840	850	832	771	692	574	442	295	148	36	4	0	0	352.5	850	
26-Jun	0	0	0	5	30	83	267	433	564	683	763	804	768	721	507	328	425	217	107	36	11	2	0	0	281.5	804	
27-Jun	0	0	0	4	17	44	20	66	263	231	261	117	53	160	108	151	124	86	45	37	11	1	0	0	74.9	263	
28-Jun	0	0	0	0	4	17	41	93	164	212	143	431	366	426	636	666	495	381	258	161	31	3	0	0	188.7	666	
29-Jun	0	0	0	6	46	148	295	433	570	688	734	628	763	403	365	317	463	265	100	65	20	3	0	0	263.2	763	
30-Jun	0	0	0	8	51	31	78	154	313	384	288	632	453	336	271	218	209	122	53	28	13	2	0	0	151.8	632	
		0.0	0.0	0.1	3.9	22.7	87.3	181.2	285.9	388.4	467.8	517.3	585.1	587.2	540.1	524.7	445.9	359.3	266.3	166.1	84.5	24.3	2.8	0.1	0.0	Diurnal Average	
		0	0	0	8	51	157	329	474	607	760	815	861	990	848	798	723	601	455	306	161	44	6	0	0	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m²
Fort McKay - Bertha Ganter - June 2017

Concentration Ranges (W/m²)	Number of Hours	%	Cumulative %
0 - 20	244	33.89	33.89
21 - 100	110	15.28	49.17
101 - 300	128	17.78	66.94
301 - 600	133	18.47	85.42
601 - 900	104	14.44	99.86
> 900	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

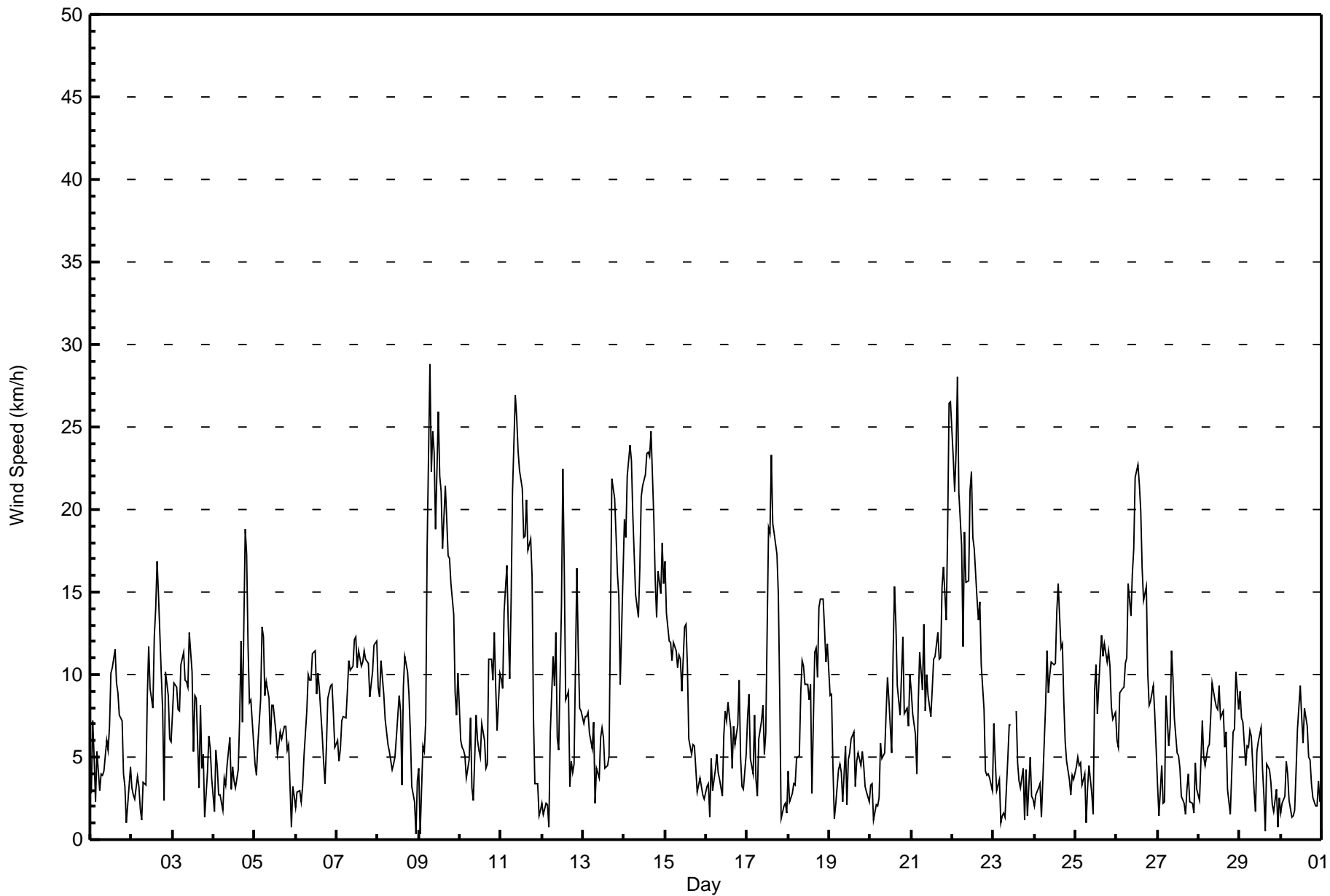


Maximum Speed: 29 km/h on Jun 9 07:00	Maximum Daily Speed Average: 19.0 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 8 23:00	Minimum Daily Speed Average: 1.4 km/h on Jun 6	Hours of Data: 718
Maximum Diurnal Speed Average: 3.8 km/h at hour 4	Minimum Diurnal Speed Average: 1.9 km/h at hour 9	Hours of Missing Data: 2
Monthly Average Velocity: 2.7 km/h 342.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 17 P ₉₉ = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SE3	S7	S5	W2	WNW5	W3	WSW4	SW4	SW4	SSW6	SW5	SSE7	SSE10	SSE10	SSE12	SE9	SE9	SE8	SE7	ESE4	SE3	WSW1	WSW2	WNW4	S3.9	SSE12
2-Jun	WSW3	W3	WSW2	S4	S3	SSE2	E1	SE4	ENE3	N9	N12	N9	NNE8	NNE12	N14	WNW17	W15	W10	WNW8	WSW2	WNW10	WNW9	W6	WNW6	NW4.2	WNW17
3-Jun	W8	W10	WNW9	WNW8	WNW8	WNW11	NW11	NW10	NW10	WNW9	WNW13	WNW10	NW5	NW9	NW9	NE3	SE8	E4	E5	NE1	N4	N6	NW6	WNW4	NW5.5	WNW13
4-Jun	NE2	SSE5	S4	W3	S3	SW2	SE4	NW3	SE5	SE6	S3	S4	SSW4	S3	NW4	N7	N12	NW7	WNW17	NNW12	N8	NNW9	N6	NNW2.6	NW19	
5-Jun	ENE5	E4	NNW6	N9	NNW13	N12	NNW9	NNW10	NNW9	N6	NNW8	NW8	NW6	NNW5	ESE6	E7	NE6	E7	SE7	S5	NE6	ENE1	W3	WNW3	N3.8	NNW13
6-Jun	WSW2	WSW3	W3	SW2	S3	SSE5	SSE8	SSE10	SE10	SSE10	SSE11	SE11	SSE9	SSW10	W9	W6	W5	N3	NW6	N9	N9	N9	N8	N6	S1.4	SE11
7-Jun	NW6	NW5	NNW6	N7	N7	NNW7	N9	N11	N10	N10	N12	N12	N10	NNE11	NNE10	NNE11	NNE11	NNE11	NNE11	NNE9	N9	N10	N12	N12	N9.3	N12
8-Jun	NNW9	NNW9	N11	N9	N7	N7	NW6	NNW5	N4	N5	NNE5	NNE6	N9	NNE8	NNE3	SSE9	SSE11	S10	SSE9	SE6	ESE3	SSE2	S0	SSE4	NNE2.1	SSE11
9-Jun	SSW4	SW0	NNW6	NNW5	N7	N18	N29	N22	N25	N23	N19	N26	N22	N21	NNE18	N21	N19	NNE17	NNE17	NNE16	NNE14	NNE9	N8	N10	N15.1	N29
10-Jun	N6	NE6	N5	NNW5	N4	ENE5	ESE7	E3	N2	NNE8	NE6	E5	E5	E7	ENE6	NNE4	NNE5	N11	NNW11	NW10	NNW13	N9	NNW7	NW10	N4.7	NNW13
11-Jun	WNW10	WNW9	NW14	NW17	WNW13	WNW10	NNW14	NW21	NW27	NW26	NW24	NW22	NW21	NW18	NNW18	NNW21	NW18	NNW18	NW16	NNE7	N3	NNE3	WNW1	SSW2	NW14.1	NW27
12-Jun	W2	WNW1	W2	WSW2	SE1	SSE6	SSE11	SSE9	SSE13	SSE6	SSE5	SSE14	SSE22	SSE16	SSE8	SE9	ENE3	ENE5	NE4	NNE5	NNW16	N12	N8	N8	SE3.1	SSE22
13-Jun	NNW7	NW7	NW7	NW8	NW6	NNW6	N7	ESE2	E4	NNE4	NE6	NNE7	NNE6	NNW4	NNE5	NE5	N13	N22	N21	N18	N16	N15	N9	N16	N8.2	N22
14-Jun	N19	N18	N22	N24	N23	N20	N17	N15	N13	N16	N21	N21	N22	N23	N23	N23	N25	NNW20	N16	NNW14	N16	NNW15	NNW18	NNW16	N19.0	N25
15-Jun	NNW17	NNW14	NNW12	NNW12	N11	N12	N11	N10	N11	N11	NNW9	N13	N13	N11	N6	NE5	NE6	ENE6	ENE4	ENE3	N4	NNW3	NNW3	NW2	N8.1	NNW17
16-Jun	WNW3	NW3	SSE1	ESE5	E3	SSE4	SSE5	SE4	ESE4	S3	SSE6	SSE8	SE7	ENE8	NNE7	N4	SSE7	SSE6	W7	WNW10	SE5	S3	SE3	SSE5	SE2.2	WNW10
17-Jun	SSE7	SSE9	SSE5	SSE4	S8	SSW4	WSW3	W6	W7	WNW8	NNW5	NW6	NW19	NW19	WNW23	WNW19	NW19	WNW17	NW15	NNW9	WNW1	WSW2	SSW2	WSW2	WNW6.3	WNW23
18-Jun	NW4	W2	W3	SW3	S3	S5	S5	SSE9	S11	S11	SW9	SW9	SW8	SSW9	WNW3	W11	W12	WNW10	NW14	NW15	N15	NNW13	WNW11	WNW12	W4.8	N15
19-Jun	WNW9	W9	W4	W1	WSW2	W4	W5	WNW4	S2	SE6	SSE2	SSW5	S5	S6	SSE7	SW3	SW5	SSE5	S4	S5	S4	S3	SW3	SSW2	SW2.9	W9
20-Jun	WNW3	WSW3	WSW1	SW2	SSW2	S3	SSE6	S5	SSE5	SSE8	SSE10	SSE8	SW5	SSW11	S15	S13	SSE9	SSE8	SSE10	SSE12	SSE8	SE8	SE7	SSE10	S6.4	S15
21-Jun	S9	S8	S6	WSW4	WNW8	WNW11	W9	WNW13	W8	WNW10	WNW9	W7	WNW9	WNW11	WNW11	WNW13	WNW11	WNW11	NNW15	NNW17	NW13	NNW19	NNW26	NNW27	WNW9.0	NNW27
22-Jun	N23	NNW21	NNW23	NNW28	N21	NNW18	N12	NNW19	N16	N16	N21	N22	N18	N18	N15	N13	N14	N11	N8	N4	NNW4	WSW4	WSW4	W3	NNW14.3	NNW28
23-Jun	WNW7	WNW5	NW3	WNW4	NW1	SSW1	NNW2	ENE1	NNE5	N7	NNE7	C	C	ENE8	E5	E4	NNE3	SE4	ESE1	W4	WNW1	WNW5	W3	W2	NNW1.5	ENE8
24-Jun	SW2	W3	SW3	WSW3	W1	NNW4	N8	N11	NNE9	N10	NNE11	NNE11	N14	N16	N12	N12	N8	NE6	NNE5	NE4	WNW3	WNW4	W4	W4	N5.8	N16
25-Jun	WNW4	WNW5	WNW4	WNW5	W3	WNW4	NNE1	SE3	SE4	SE3	E2	SSE9	SSE11	SSE8	SSE11	SSE12	SSE11	SSE12	SSE11	SE11	SE11	SE8	S7	S8	SSE5.0	SSE12
26-Jun	SSE6	SSE6	SSE9	SSE9	SSE9	SSE11	SSE11	SSE16	SSE14	SSE16	SSE18	SSE22	SSE23	SSE22	SSE20	SSE16	SSE14	SSE15	SSE10	SE8	SE8	SE9	SSE8	SSE6	SSE12.6	SSE23
27-Jun	SE3	ESE1	N4	E2	ESE2	SSE9	SW6	SE7	S11	S10	S7	SW5	SSW5	SSE4	SSE3	ESE2	SE2	S3	SE4	E2	W2	NE2	SE5	ENE3	SSE3.0	S11
28-Jun	NE2	NNE5	NNE7	NNE5	E5	NE6	NE6	NE7	ENE10	NE8	ENE8	ENE8	NE9	ENE7	E8	ENE6	ESE6	ENE3	NE2	S4	S7	S7	S10	S8	ENE3.9	S10
29-Jun	S9	S7	S7	SSW5	S6	S6	SSE7	SE6	S3	NE2	ESE5	SE6	E7	NE4	SSE3	S1	E5	ENE4	ENE3	SSE2	WSW2	NW3	SW1	W3	SSE2.7	S9
30-Jun	S2	SSW2	WNW3	NW5	WNW4	WSW2	ESE1	NNE1	NE2	ESE4	SSE7	SE9	SSE7	S6	W8	WNW7	WNW5	NNW5	NW3	SSW3	SW2	SSW2	S4	SSW2	SW1.4	SE9

NNW2.9	NW2.4	NW3.5	NW3.8	NNW2.9	NNW2.5	NNW2.3	NNW2.4	N1.9	N2.7	N2.9	N2.0	N2.2	N2.4	N2.7	NNW2.7	NNW3.0	N2.8	NNW3.6	N3.1	N3.8	NNW3.3	NNW2.7	NW3.0	Diurnal Average
N23	NNW21	NNW23	NNW28	N23	N20	N29	N22	NW27	NW26	NW24	N26	SSE23	N23	N23	N23	N25	N22	N21	N18	NNW16	NNW19	NNW26	NNW27	Diurnal Maximum

C - Calibration
 All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	274	38.16	38.16
6 - 11	292	40.67	78.83
12 - 19	108	15.04	93.87
20 - 28	43	5.99	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	12	15	13	13	16	12	17	19	30	15	17	21	25	24	12	13	274
6 - 11	49	24	11	9	5	3	21	58	23	4	4	0	15	29	19	18	292
12 - 19	40	6	0	0	0	0	0	14	2	0	0	0	2	9	13	22	108
20 - 28	23	1	0	0	0	0	0	5	0	0	0	0	0	1	6	7	43
29 - 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	125	46	24	22	21	15	38	96	55	19	21	21	42	63	50	60	718

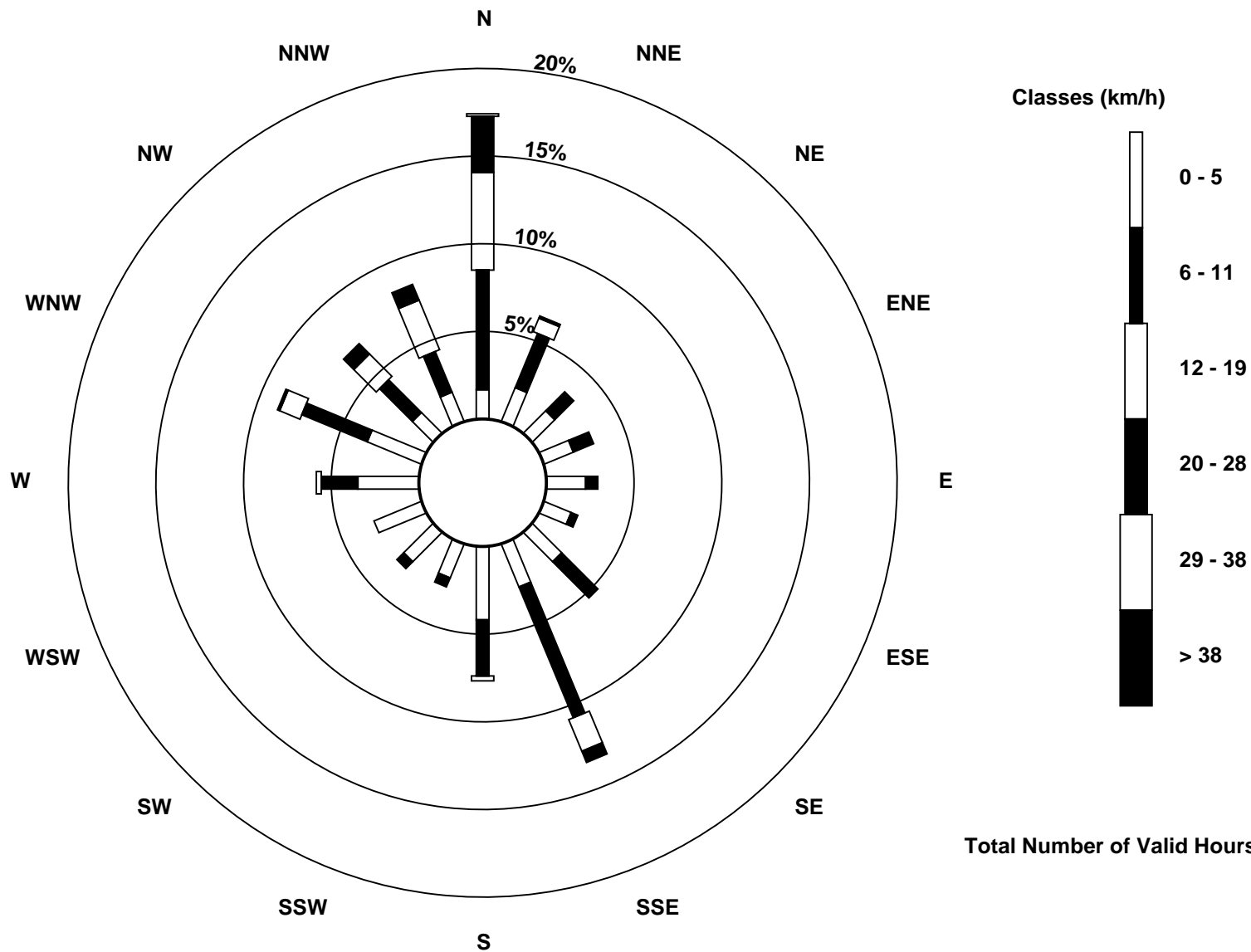
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter (AMS 1)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Jun 17 12:00	Hours of Data: 718
Minimum Value: 1 km/h on Jun 1 20:00	Hours of Missing Data: 2
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 2
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	2	1	1	2	2	2	2	2	2	3	2	2	2	3	2	2	1	1	1	1	1	1	3
2-Jun	1	1	1	1	1	1	1	1	1	3	3	3	3	4	4	5	6	4	4	2	4	4	2	2	6
3-Jun	2	3	3	2	2	2	4	3	3	3	5	3	4	5	5	2	2	1	2	1	1	1	1	1	5
4-Jun	1	1	2	2	1	1	1	2	2	1	2	1	1	2	3	2	3	2	5	3	2	2	2	2	5
5-Jun	2	2	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	1	1	3
6-Jun	1	1	1	1	1	1	2	2	2	2	2	3	3	4	4	3	3	2	4	3	2	1	2	2	4
7-Jun	2	1	2	2	1	1	2	3	3	3	4	3	4	4	4	4	4	4	4	3	3	3	2	2	4
8-Jun	3	2	2	2	1	1	1	2	1	2	2	2	4	3	3	4	4	2	2	2	1	1	1	1	4
9-Jun	1	1	1	2	2	6	8	5	7	7	6	8	7	8	7	7	6	6	5	5	5	4	2	2	8
10-Jun	2	3	1	1	1	3	3	2	3	3	3	3	3	3	2	2	2	2	2	4	4	2	2	2	4
11-Jun	2	2	3	2	2	3	4	6	6	6	6	6	5	6	6	5	5	4	4	3	1	1	1	1	6
12-Jun	1	1	1	1	1	3	3	3	3	3	4	5	5	6	3	4	5	2	2	3	3	3	2	2	6
13-Jun	1	1	2	1	2	2	3	2	2	2	2	3	3	2	4	2	6	5	5	4	4	5	3	5	6
14-Jun	4	5	5	5	5	5	5	4	4	4	5	5	5	5	5	5	5	4	4	2	3	3	4	3	5
15-Jun	3	2	2	2	2	2	2	2	2	3	2	3	3	3	3	2	2	2	2	1	1	1	1	2	3
16-Jun	1	1	1	1	1	1	2	1	1	2	2	3	3	3	2	2	5	6	3	5	2	1	1	2	6
17-Jun	2	2	2	1	2	1	2	2	3	3	3	8	5	7	7	7	7	6	3	3	1	1	1	2	8
18-Jun	1	1	1	1	1	1	1	2	2	3	4	4	3	7	6	5	5	4	3	3	4	2	3	4	7
19-Jun	2	3	2	1	1	2	2	2	2	3	2	3	2	3	3	4	2	3	2	1	1	1	2	1	4
20-Jun	2	1	1	1	1	1	1	1	1	2	2	2	2	4	5	4	2	2	2	3	2	1	1	3	5
21-Jun	2	2	1	2	3	4	4	4	3	3	3	3	3	3	4	4	3	4	4	2	5	6	6	6	6
22-Jun	6	5	6	6	6	5	3	4	5	5	6	6	5	5	6	4	3	3	3	1	1	1	1	1	6
23-Jun	2	2	1	1	1	1	1	1	2	3	4	C	C	3	3	2	3	2	1	2	1	1	1	1	4
24-Jun	1	1	2	2	1	1	3	3	3	3	4	4	5	6	5	5	4	4	2	2	2	2	1	1	6
25-Jun	2	2	1	1	1	2	1	1	2	2	2	3	3	3	3	3	3	3	3	3	2	1	1	1	3
26-Jun	1	1	2	2	2	3	3	4	3	3	4	5	5	5	5	5	4	4	3	2	2	2	2	1	5
27-Jun	1	1	1	1	1	4	4	3	3	3	3	2	2	1	2	1	1	1	2	2	1	1	1	1	4
28-Jun	1	2	2	2	2	2	2	3	4	4	3	3	4	3	3	3	3	2	1	3	2	2	3	2	4
29-Jun	2	1	2	1	1	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	2
30-Jun	1	1	2	2	1	2	1	1	1	1	2	2	2	2	3	2	2	1	2	1	1	1	1	1	3

6	5	6	6	6	6	8	6	7	7	6	8	7	8	7	7	7	7	6	5	5	5	5	6	6	
Diurnal Maximum																									

C - Calibration



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay - Bertha Ganter - June 2017

Direction of Maximum Speed: 1 deg on Jun 9 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 354.9 deg on Jun 14	Hours of Data: 718
Direction of Minimum Speed: 179 deg on Jun 8 23:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.4 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 304.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	142	179	182	265	295	273	249	229	218	199	218	162	156	153	156	144	145	145	135	110	135	247	252	300	172.6
2-Jun	255	275	239	182	188	161	101	140	67	0	354	7	30	12	352	293	280	265	282	246	284	297	269	284	311.3
3-Jun	276	280	283	284	282	303	308	315	322	295	300	298	325	314	321	38	126	98	87	44	356	356	310	327	308.8
4-Jun	35	149	190	260	188	214	136	323	145	145	169	173	194	177	313	358	354	325	311	330	336	359	347	352	328.3
5-Jun	62	88	344	4	343	350	344	330	335	353	341	321	314	337	109	90	46	90	133	175	49	71	267	302	2.2
6-Jun	258	245	262	236	178	168	154	153	145	155	147	143	160	204	273	266	277	353	312	357	356	359	1	357	188.9
7-Jun	315	321	332	349	349	347	351	354	354	5	8	6	11	12	22	20	18	19	14	15	10	7	358	356	3.0
8-Jun	345	347	350	349	351	354	322	343	354	7	15	15	4	18	29	167	156	169	161	137	105	158	179	159	15.5
9-Jun	195	236	335	336	351	3	1	1	3	7	9	5	8	11	13	7	9	12	12	12	16	29	9	355	6.3
10-Jun	5	43	358	344	10	63	104	88	349	16	37	84	80	95	78	31	21	355	343	311	340	349	333	310	11.2
11-Jun	295	292	305	307	298	290	299	316	316	316	313	313	325	316	330	331	322	329	326	12	0	20	284	212	316.6
12-Jun	264	291	264	253	137	148	156	162	162	149	151	153	153	156	151	139	64	75	37	14	348	350	353	351	138.4
13-Jun	338	315	307	308	318	335	359	105	101	30	39	33	22	337	29	53	1	356	355	355	360	1	6	358	357.7
14-Jun	357	358	349	358	3	6	8	8	6	0	357	357	357	356	357	353	349	348	355	347	349	345	341	329	354.9
15-Jun	339	341	337	340	351	353	356	358	357	358	341	354	352	353	11	38	47	60	57	66	7	341	337	312	355.2
16-Jun	289	308	164	117	101	148	156	137	123	180	152	166	134	70	29	0	151	156	266	303	125	185	145	166	143.6
17-Jun	165	156	162	160	177	196	246	270	275	294	327	323	306	305	300	302	304	303	317	329	299	246	204	245	291.9
18-Jun	311	260	274	234	183	180	188	161	177	170	219	215	232	213	286	270	278	293	307	314	351	340	300	282	264.2
19-Jun	289	281	281	278	244	267	271	289	185	143	150	210	170	175	166	219	226	148	180	186	188	191	215	194	214.3
20-Jun	292	254	247	236	211	189	157	175	160	156	166	168	232	197	177	178	161	162	148	156	155	141	139	163	170.2
21-Jun	182	180	176	247	286	287	280	285	276	283	285	280	284	282	282	284	283	286	330	338	325	334	348	347	302.6
22-Jun	349	341	341	348	349	348	350	340	353	0	350	352	358	354	360	352	350	353	2	4	327	258	257	277	348.2
23-Jun	298	301	313	287	319	205	339	72	21	6	16	C	C	64	99	88	28	137	107	270	284	291	261	260	348.2
24-Jun	227	263	215	256	261	332	6	355	13	9	18	32	25	359	350	6	358	8	40	23	53	295	293	278	1.0
25-Jun	293	303	302	298	280	300	32	142	141	143	100	157	165	167	168	155	164	159	156	149	144	164	170	172	165.9
26-Jun	168	159	165	165	165	164	163	164	156	152	153	161	160	156	153	158	159	156	164	144	124	133	154	147	156.5
27-Jun	125	114	10	81	121	162	219	146	170	183	190	220	211	153	147	123	137	182	127	92	277	35	127	74	161.3
28-Jun	39	26	21	23	98	44	41	34	73	46	61	64	34	65	81	74	117	76	52	181	172	178	174	178	74.8
29-Jun	169	176	188	194	175	175	152	146	172	46	105	136	82	51	158	172	84	78	73	154	256	312	220	272	146.9
30-Jun	190	196	284	305	293	253	118	27	42	102	152	136	161	188	280	290	282	338	308	210	223	192	183	197	223.3

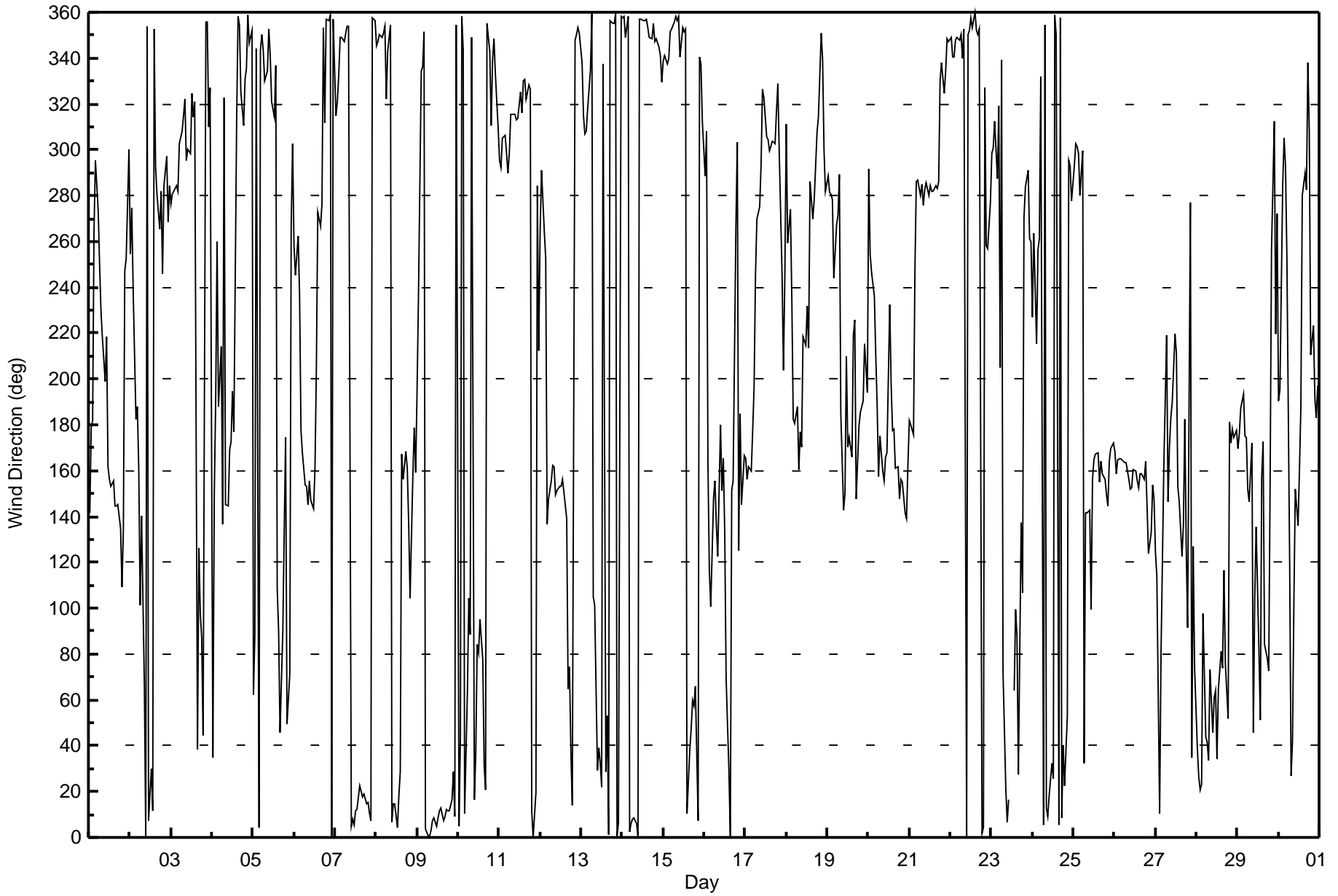
317.0	309.5	317.0	324.6	326.7	333.1	345.2	343.0	1.6	2.5	358.7	10.8	7.0	0.5	353.5	343.1	346.4	357.2	347.2	349.4	356.4	346.3	329.9	322.3
Diurnal Average																							

C - Calibration
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort McKay - Bertha Ganter - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay - Bertha Ganter - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 105 deg on Jun 10 09:00	Hours of Data: 718
Minimum Value: 7 deg on Jun 11 04:00	Hours of Missing Data: 2
Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 17 Median = 27 Q ₃ = 48 P ₉₀ = 65 P ₉₉ = 96	Hours of Calibration: 2
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	84	21	49	68	23	76	56	61	50	28	48	45	13	18	17	15	17	13	14	14	27	69	43	16	84
2-Jun	36	64	57	23	44	54	69	34	52	25	18	35	46	28	26	23	29	42	46	90	30	25	39	28	90
3-Jun	29	30	24	23	25	14	15	16	19	23	24	31	81	52	53	78	23	39	44	84	18	16	16	38	84
4-Jun	61	17	35	49	67	74	23	74	50	26	72	34	45	58	85	20	17	33	11	12	12	17	18	20	85
5-Jun	60	58	46	25	13	13	22	15	16	21	16	17	30	43	44	44	47	34	32	33	44	91	53	52	91
6-Jun	64	38	27	38	22	16	16	14	16	27	18	22	34	39	39	50	55	65	87	18	13	13	17	28	87
7-Jun	20	22	27	14	13	11	13	16	21	22	25	19	26	26	39	37	35	33	30	34	26	21	16	15	39
8-Jun	14	13	13	14	14	15	14	20	27	36	46	39	35	40	86	40	21	18	17	16	43	50	99	28	99
9-Jun	28	97	16	17	21	18	18	18	21	22	24	23	25	28	30	22	24	26	25	26	32	53	37	14	97
10-Jun	25	56	38	20	53	52	32	83	105	50	62	65	63	52	41	40	37	16	16	13	17	16	22	10	105
11-Jun	11	13	11	7	12	19	16	17	16	17	20	21	21	25	23	19	21	18	14	30	36	36	61	51	61
12-Jun	41	72	36	32	92	24	13	18	15	18	58	16	16	16	44	48	62	44	47	50	12	15	15	13	92
13-Jun	19	16	14	9	12	31	47	74	60	60	45	49	56	66	69	58	34	16	18	16	16	18	20	16	74
14-Jun	15	18	16	16	17	19	19	21	19	17	18	16	17	18	16	16	15	15	13	13	14	15	12	12	21
15-Jun	10	10	9	11	12	12	13	15	15	17	19	18	17	18	40	45	43	51	52	53	35	33	23	56	56
16-Jun	41	24	85	21	46	33	20	30	64	95	40	41	50	37	38	71	55	97	44	59	33	56	41	31	97
17-Jun	13	15	18	23	15	30	66	39	39	34	61	88	20	26	21	26	22	26	17	11	72	27	50	93	93
18-Jun	44	55	40	40	27	26	21	21	20	22	47	55	49	57	101	43	40	27	16	20	17	11	24	25	101
19-Jun	20	25	39	77	67	51	54	58	85	60	100	68	53	56	36	87	62	48	32	20	14	33	40	62	100
20-Jun	48	47	83	27	49	49	15	18	32	23	16	25	54	27	16	16	13	15	14	14	16	14	14	23	83
21-Jun	13	16	14	51	25	23	34	24	36	29	31	31	25	28	27	24	26	24	24	14	9	14	16	15	51
22-Jun	16	13	15	17	16	16	16	14	22	21	19	21	21	21	30	21	19	19	27	39	27	12	14	59	59
23-Jun	17	16	38	25	73	71	74	103	56	57	55	C	C	46	70	55	80	47	97	40	75	19	65	46	103
24-Jun	62	38	52	51	76	37	24	18	32	28	34	39	44	29	27	32	27	42	45	46	50	54	20	27	76
25-Jun	41	32	14	16	22	34	70	33	32	73	89	25	23	45	26	17	19	16	16	13	13	13	11	12	89
26-Jun	12	15	14	13	14	14	15	15	17	14	16	16	18	16	17	15	17	15	14	18	18	14	20	23	23
27-Jun	21	74	22	53	65	23	53	24	16	20	32	39	30	38	66	57	69	56	42	70	55	62	19	50	74
28-Jun	59	45	30	48	38	57	47	49	39	52	48	48	46	50	45	68	45	67	93	45	13	13	16	14	93
29-Jun	13	13	14	20	14	17	21	32	72	88	49	32	39	52	56	96	44	42	44	54	56	27	76	45	96
30-Jun	55	47	45	23	32	66	84	76	68	48	23	17	30	32	41	30	34	26	59	43	48	68	31	60	84

84	97	85	77	92	76	84	103	105	95	100	88	81	66	101	96	80	97	97	90	75	91	99	93	
Diurnal Maximum																								

C - Calibration



Wood Buffalo Environmental Association

SO₂ Calibration Summary

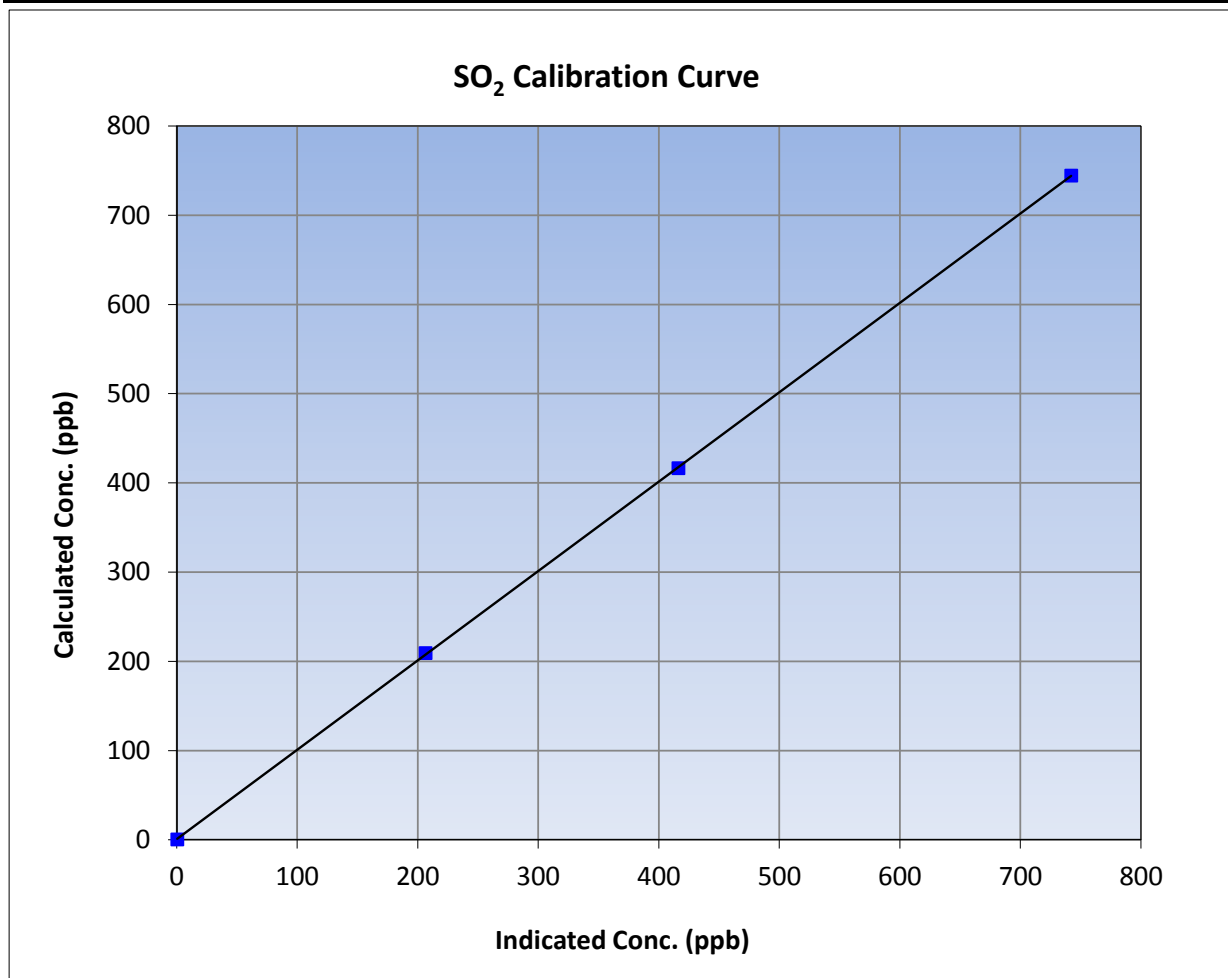
Version-03-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	May 19, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:10	End Time (MST)	13:45
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

Calibration Data

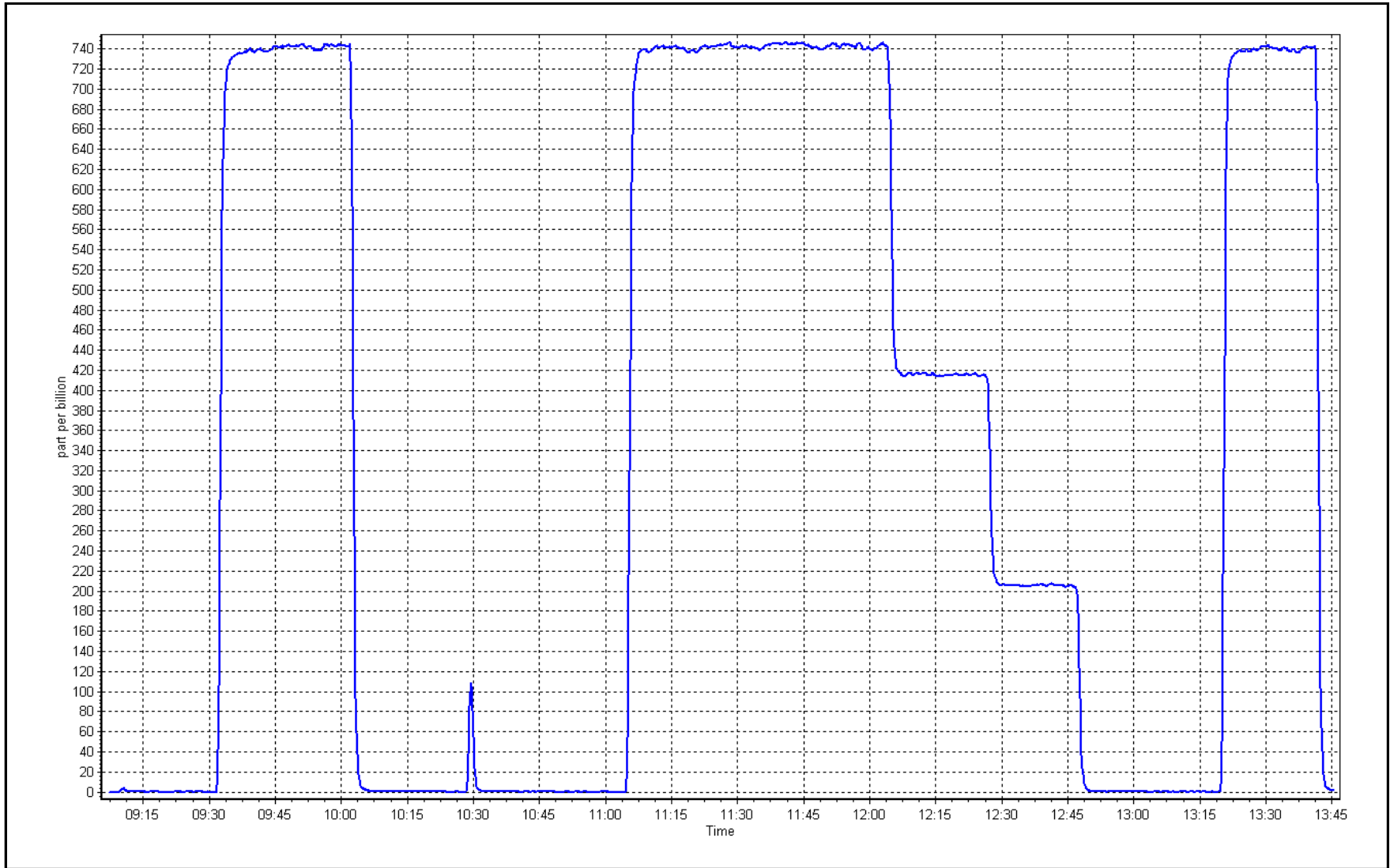
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
744.0	741.7	1.0031			
416.0	415.9	1.0001	Slope	1.001776	0.90 - 1.10
209.0	206.1	1.0139			
			Intercept	0.693401	+/-30



SO2 Calibration Plot

Date: June 9, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

TRS Calibration Summary

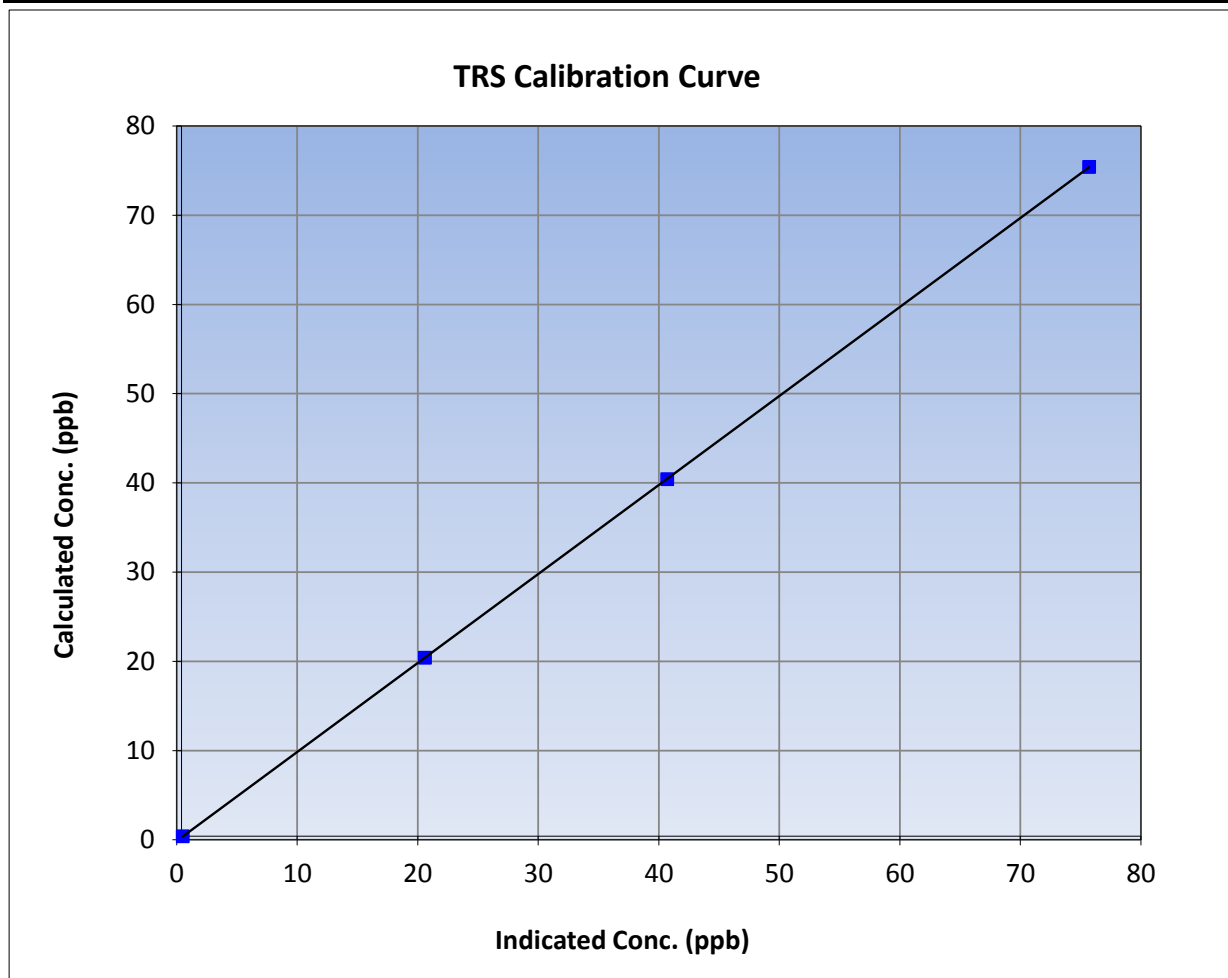
Version-03-2017

Station Information

Calibration Date	June 19, 2017	Previous Calibration	May 5, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:48	End Time (MST)	13:30
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

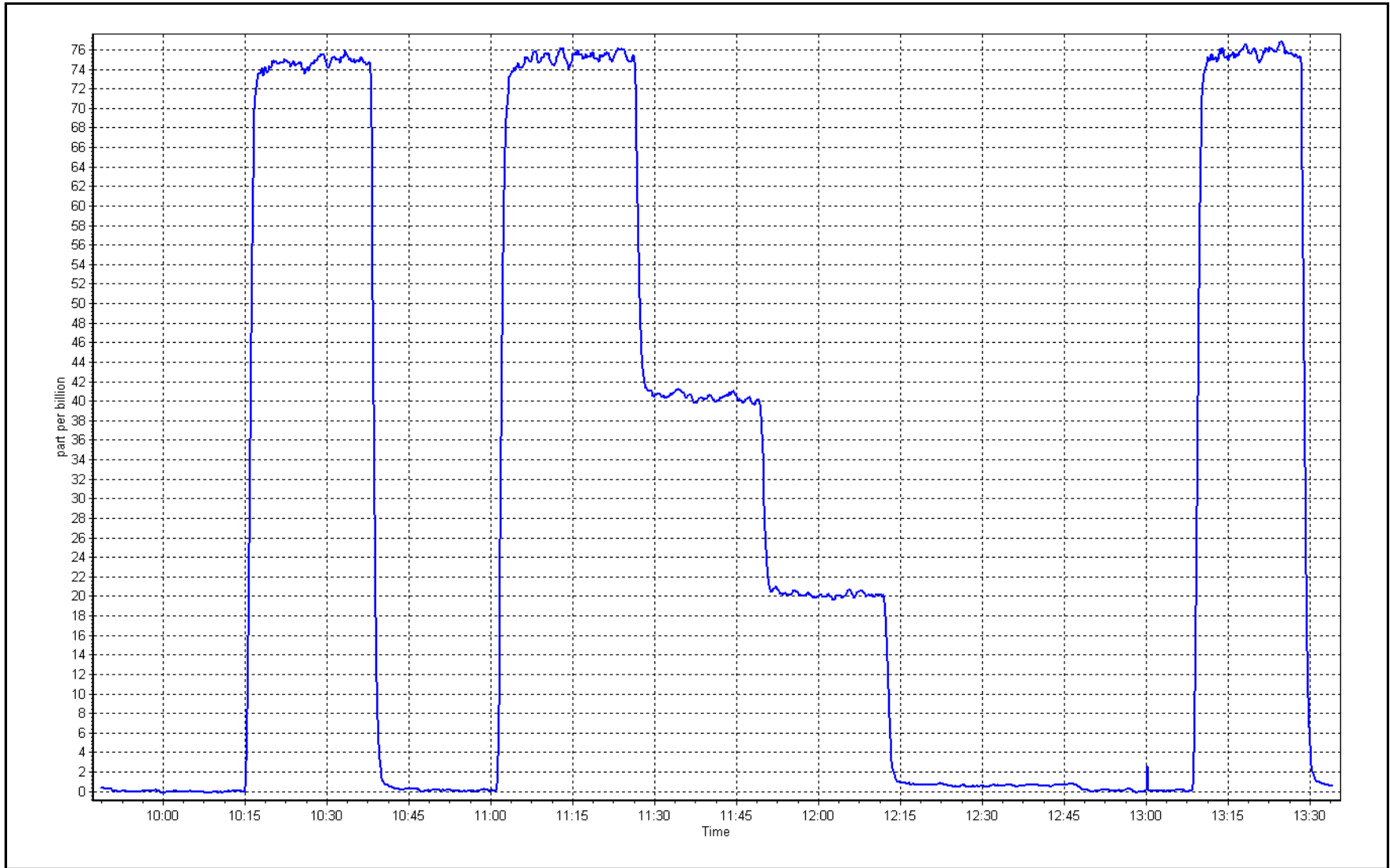
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
75.0	75.3	0.9961			
40.0	40.3	0.9930	Slope	0.997454	0.90 - 1.10
20.0	20.2	0.9901			
			Intercept	-0.133385	+/-3



TRS Calibration Plot

Date: June 19, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name: Fort McKay - Bertha Ganter Station number: AMS 01
Calibration Date: June 9, 2017 Last Cal Date: May 19, 2017
Start time (MST): 9:10 End time (MST): 13:45
Reason: Routine

Calibration Standards

Gas Cert Reference EY0000683 Cal Gas Expiry Date November-04-19
CH4 Cal Gas Conc. 515.0 ppm CH4 Equiv Conc. 1062.3 ppm
C3H8 Cal Gas Conc. 199.0 ppm Station temp. 21 Deg C
Calibrator Model Sabio 4010 Serial Number 1730512
ZAG make/model API 701H Serial Number 587

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1152430012

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.2	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	1.72E-04	1.73E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.0	Carrier Pressure	36.7	36.7
NMHC SP Ratio	4.03E-05	3.98E-05	Fuel Pressure	47.7	47.7
NMHC Peak Area	204961	207442	Air Pressure	39.0	39.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.000759	0.996263
THC Cal Offset	0.036465	0.031814
CH4 Cal Slope	1.011608	0.998454
CH4 Cal Offset	0.025223	0.028196
NMHC Cal Slope	0.990730	0.994540
NMHC Cal Offset	0.011263	0.003161

Notes: H2 generator installed after as founds. Span adjusted slightly.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5998	0.0	0.00	0.00	----
as found span	5417	83.0	16.03	15.89	1.009
calibrator zero	5998	0.0	0.00	0.00	----
high point	5417	83.0	16.03	16.07	0.998
second point	5453	46.4	8.96	8.97	1.000
third point	5474	23.3	4.50	4.44	1.014
as left zero	5998	0.0	0.00	0.00	----
as left span	5417	83.0	16.03	15.97	1.004
Average Correction Factor					1.004
Corrected As found	15.89	Prev response	15.98	*% change	0.6%

NMHC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5998	0	0.00	0.00	----
as found span	5417	83	8.26	8.25	1.002
calibrator zero	5998	0	0.00	0.00	----
high point	5417	83	8.26	8.30	0.995
second point	5453	46.4	4.62	4.65	0.993
third point	5474	23.3	2.32	2.32	1.001
as left zero	5998	0	0.00	0.00	----
as left span	5417	83	8.26	8.24	1.003
Average Correction Factor					0.996
Corrected As found	8.25	Prev response	8.32	*% change	1.0%

CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5998	0.0	0.00	0.00	----
as found span	5417	83.0	7.77	7.64	1.017
calibrator zero	5998	0.0	0.00	0.00	----
high point	5417	83.0	7.77	7.77	1.000
second point	5453	46.4	4.35	4.31	1.007
third point	5474	23.3	2.18	2.13	1.027
as left zero	5998	0.0	0.00	0.00	----
as left span	5417	83.0	7.77	7.73	1.005
Average Correction Factor					1.012
Corrected As found	7.64	Prev response	7.66	*% change	0.2%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

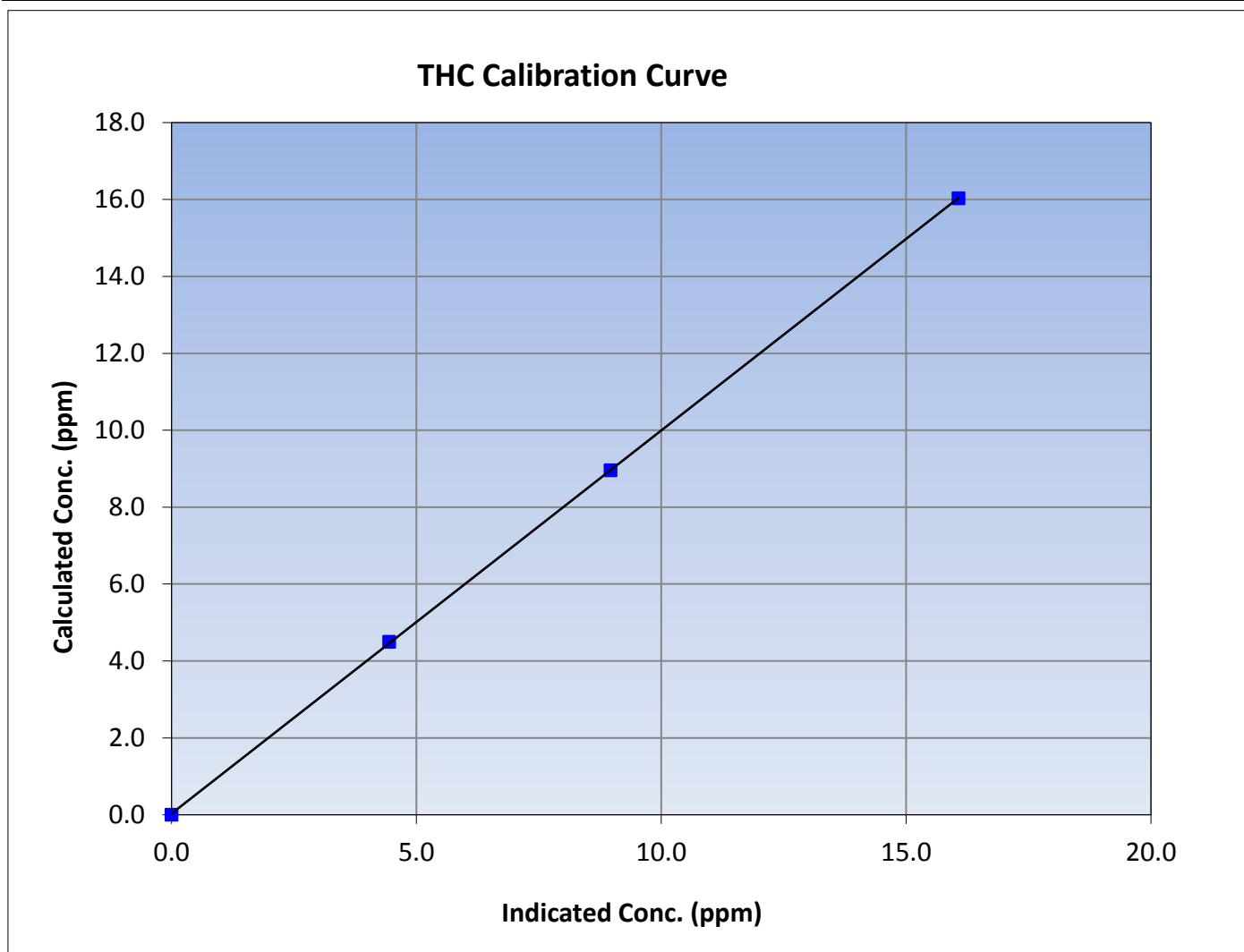
Version-02-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	AMS 01
Station Name	Fort McKay - Bertha Ganter	Station Number	42874
Start Time (MST)	9:10	End Time (MST)	13:45
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999977	≥ 0.995			
16.03	16.07	0.9975						
8.96	8.97	0.9996				Slope	0.996263	0.90 - 1.10
4.50	4.44	1.0136						
			Intercept	0.031814	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

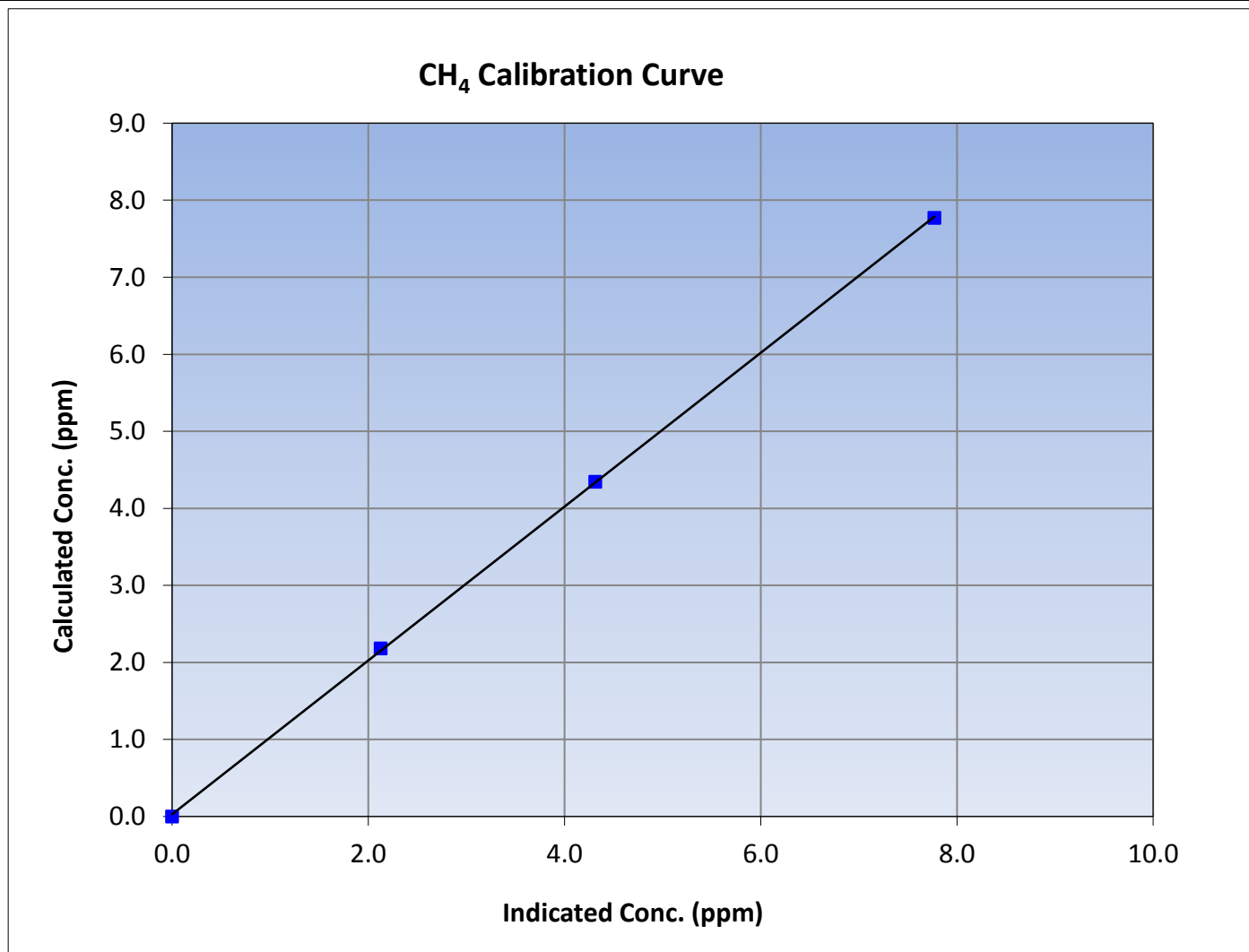
Version-02-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	AMS 01
Station Name	Fort McKay - Bertha Ganter	Station Number	42874
Start Time (MST)	9:10	End Time (MST)	13:45
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999934	≥ 0.995
7.77	7.77	1.0002			
4.35	4.31	1.0072			
2.18	2.13	1.0272			
			Slope	0.998454	0.90 - 1.10
			Intercept	0.028196	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

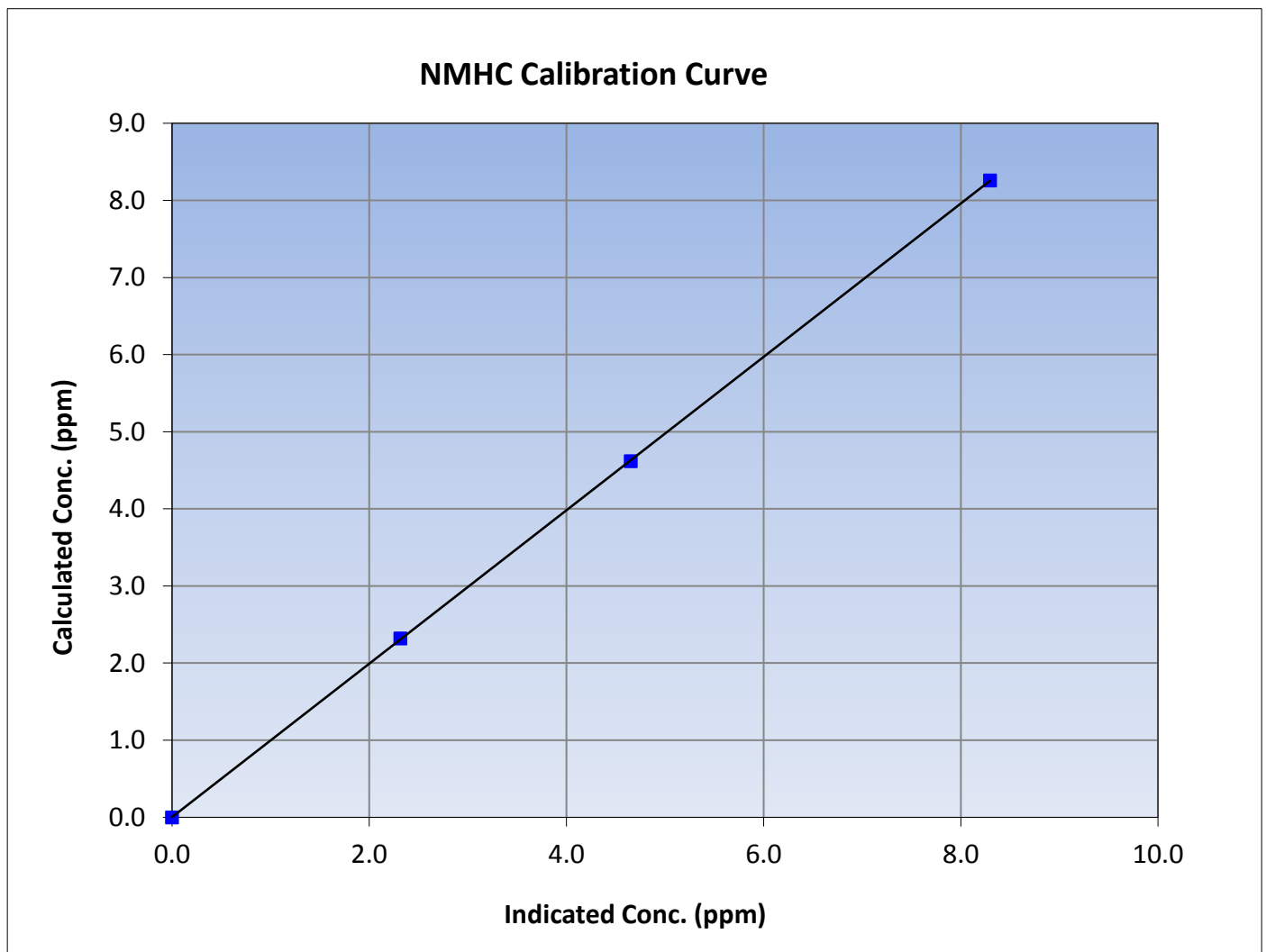
Version-02-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	AMS 01
Station Name	Fort McKay - Bertha Ganter	Station Number	42874
Start Time (MST)	9:10	End Time (MST)	13:45
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

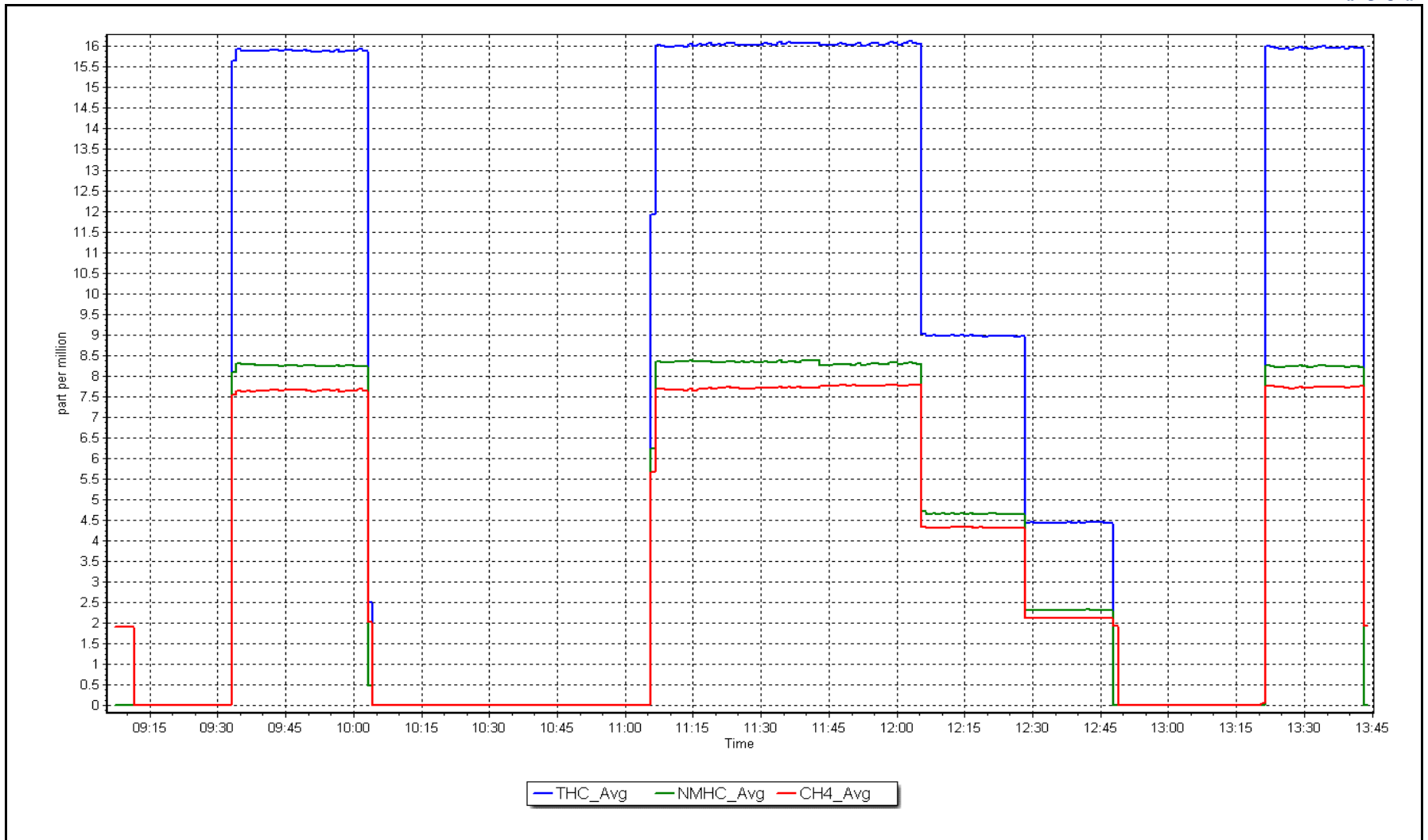
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999991	≥ 0.995
8.26	8.30	0.9954			
4.62	4.65	0.9925			
2.32	2.32	1.0011			
			Slope	0.994540	0.90 - 1.10
			Intercept	0.003161	+/-0.5



NMHC Calibration Plot

Date: June 9, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	June 20, 2017	Last Cal Date:	May 24, 2017
Start time (MST):	8:25	End time (MST):	13:40
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000683	Cal Gas Expiry Date	November-04-19
NOX Cal Gas Conc.	<u>49.7</u> ppm	NO Cal Gas Conc.	<u>49.7</u> ppb
Calibrator Model	Sabio 4010	Serial Number	1730512
ZAG make/model	API &01H	Serial Number	587

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1218153357		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.166	1.172	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.999	hamber Temperature	50.2	50.2
NO2 coefficient	1.000	1.000	Reaction cell Press	169.6	170.8
NO bkgrnd	5.9	5.9	Sample Flow	0.574	0.580
NOX bkgrnd	6.0	6.0	PMT Voltage	-791.1	-791.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.999224	0.998648
NO _x Cal Offset	1.043860	1.097506
NO Cal Slope	0.999267	0.998137
NO Cal Offset	1.126602	1.048917
NO ₂ Cal Slope	1.006882	0.999138
NO ₂ Cal Offset	1.609921	0.100798



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5997	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	----	----
as found span	5415	83.0	750.3	750.3	0.0	747.2	746.8	0.5	1.0041	1.0047
calibrator zero	5997	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	5415	83.0	750.3	750.3	0.0	750.3	750.7	-0.4	1.0000	0.9995
second point	5451	46.4	419.5	419.5	0.0	419.7	420.0	-0.2	0.9995	0.9988
third point	5474	23.3	210.7	210.7	0.0	208.0	208.2	-0.2	1.0127	1.0118
as left zero	5997	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	5415	83.0	750.3	319.9	430.4	750.8	303.5	447.3	0.9993	1.0540
Average Correction Factor									1.0041	1.0033

Corrected As found	NO _x = 747.2 ppb	NO = 746.9 ppb		*Percent Change	NO _x = 0.4%
Previous Response	NO _x = 749.8 ppb	NO = 749.7 ppb		*Percent Change	NO = 0.4%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	750.3	750.7	-0.5	1.0000	0.9995	----	----
1st NO2 (400 ppb O3)	319.9	430.8	750.8	319.9	431.0	0.9993	----	0.9995	100.0%
2nd NO2 (200 ppb O3)	497.8	252.9	751.1	497.8	253.3	0.9989	----	0.9984	100.2%
3rd NO2 (100 ppb O3)	619.1	131.6	750.5	619.1	131.3	0.9997	----	1.0023	99.8%
2nd NO ref point	----	0.0	751.5	751.6	-0.2	0.9984	0.9983	----	----
Average Correction Factor						0.9991	0.9989	1.0001	100.0%

Notes:

Span adjusted.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

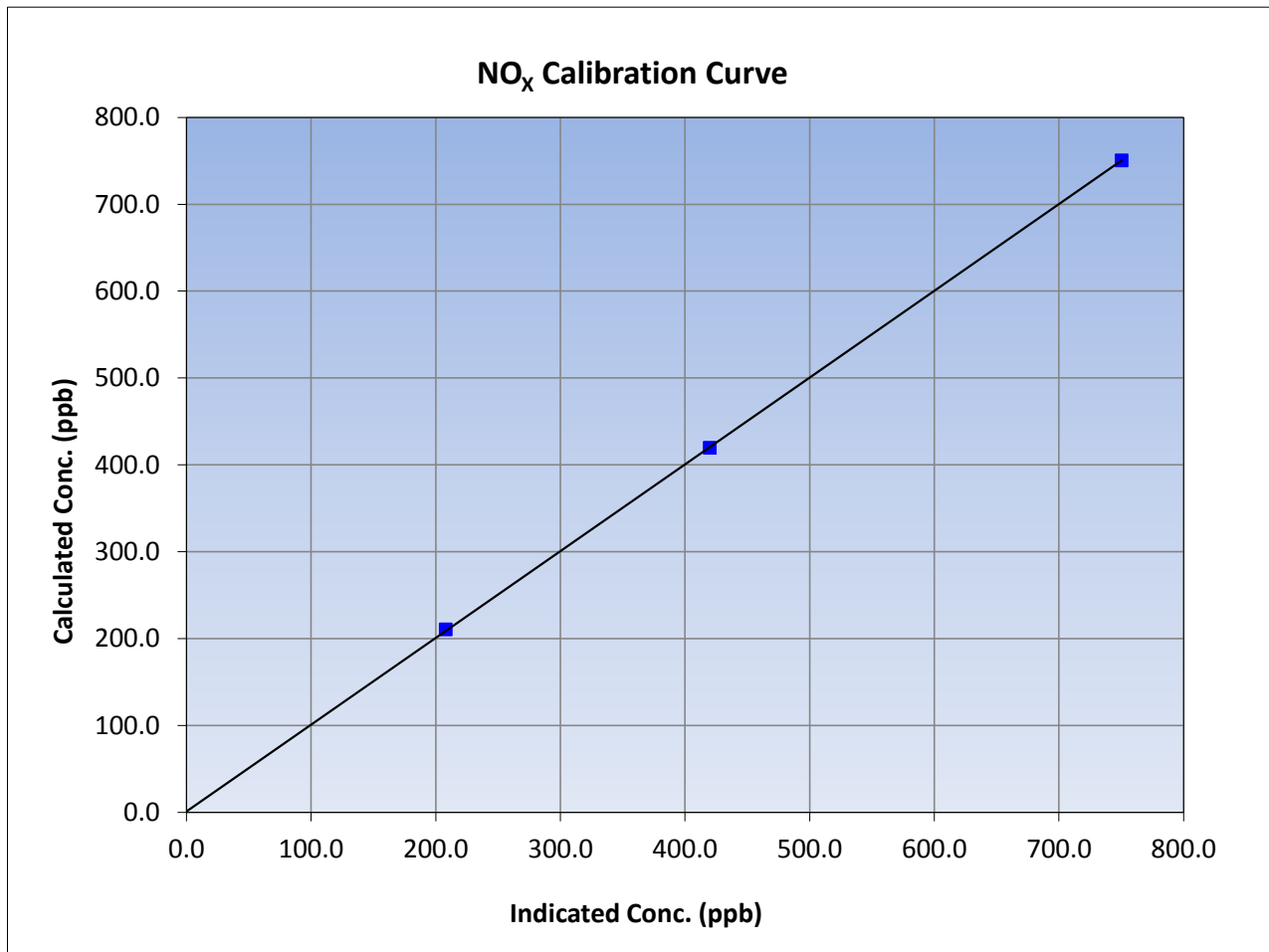
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
750.3	750.3	1.0000			
419.5	419.7	0.9995			
210.7	208.0	1.0127			
			Slope	0.998648	0.90 - 1.10
			Intercept	1.097506	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

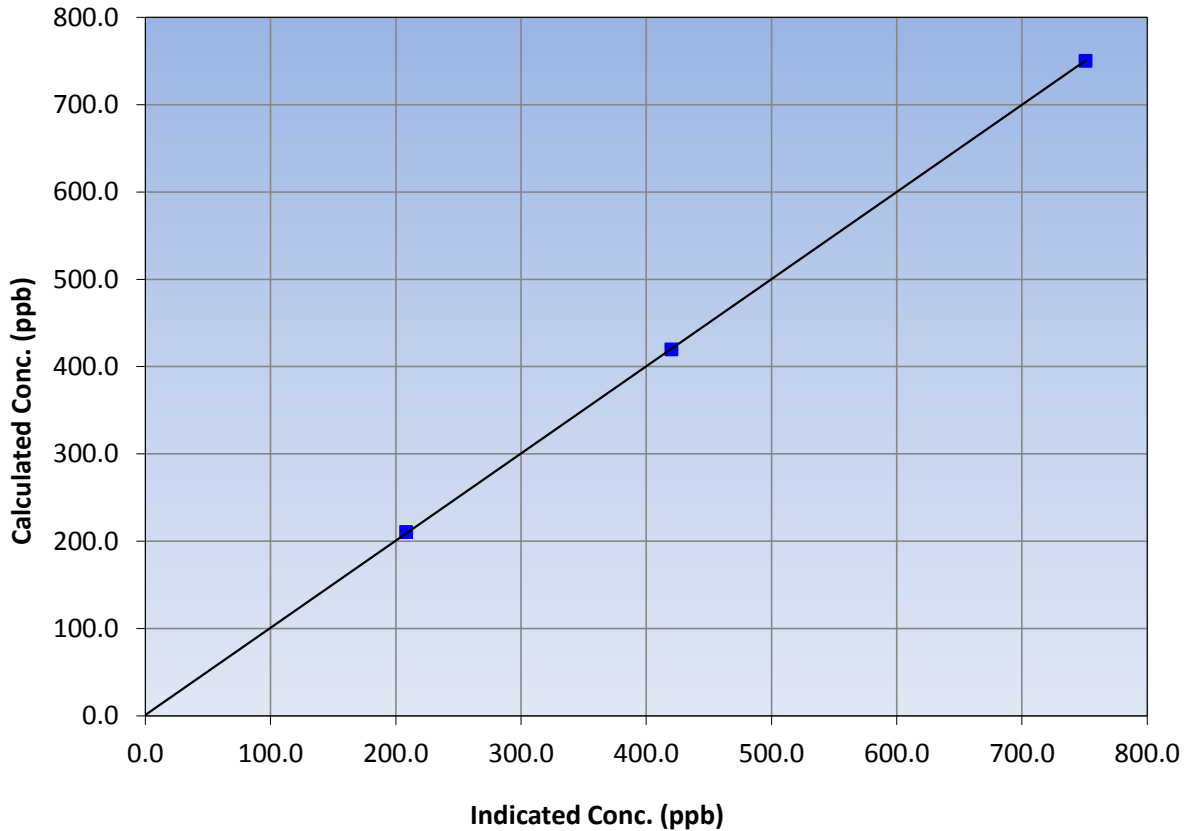
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
750.3	750.7	0.9995			
419.5	420.0	0.9988			
210.7	208.2	1.0118			
			Slope	0.998137	0.90 - 1.10
			Intercept	1.048917	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

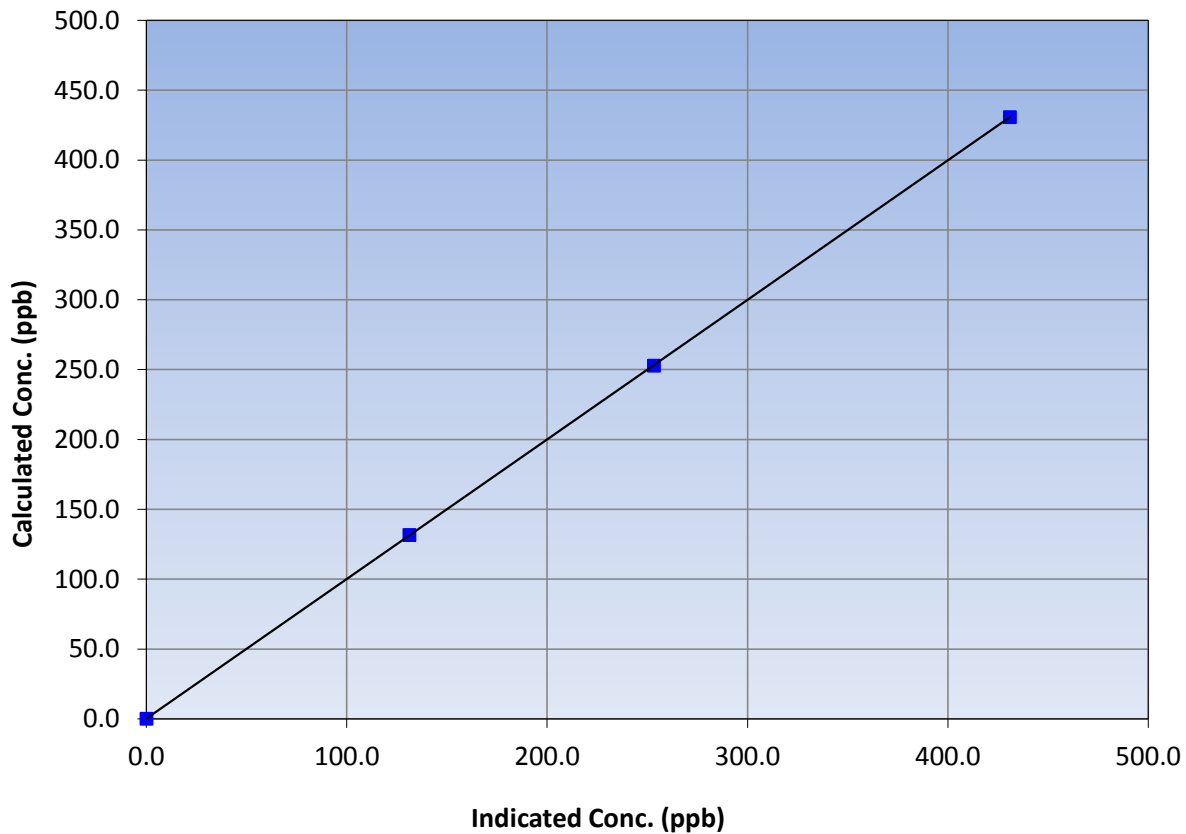
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
430.8	431.0	0.9995			
252.9	253.3	0.9984			
131.6	131.3	1.0023			
			Slope	0.999138	0.90 - 1.10
			Intercept	0.100798	+/-20

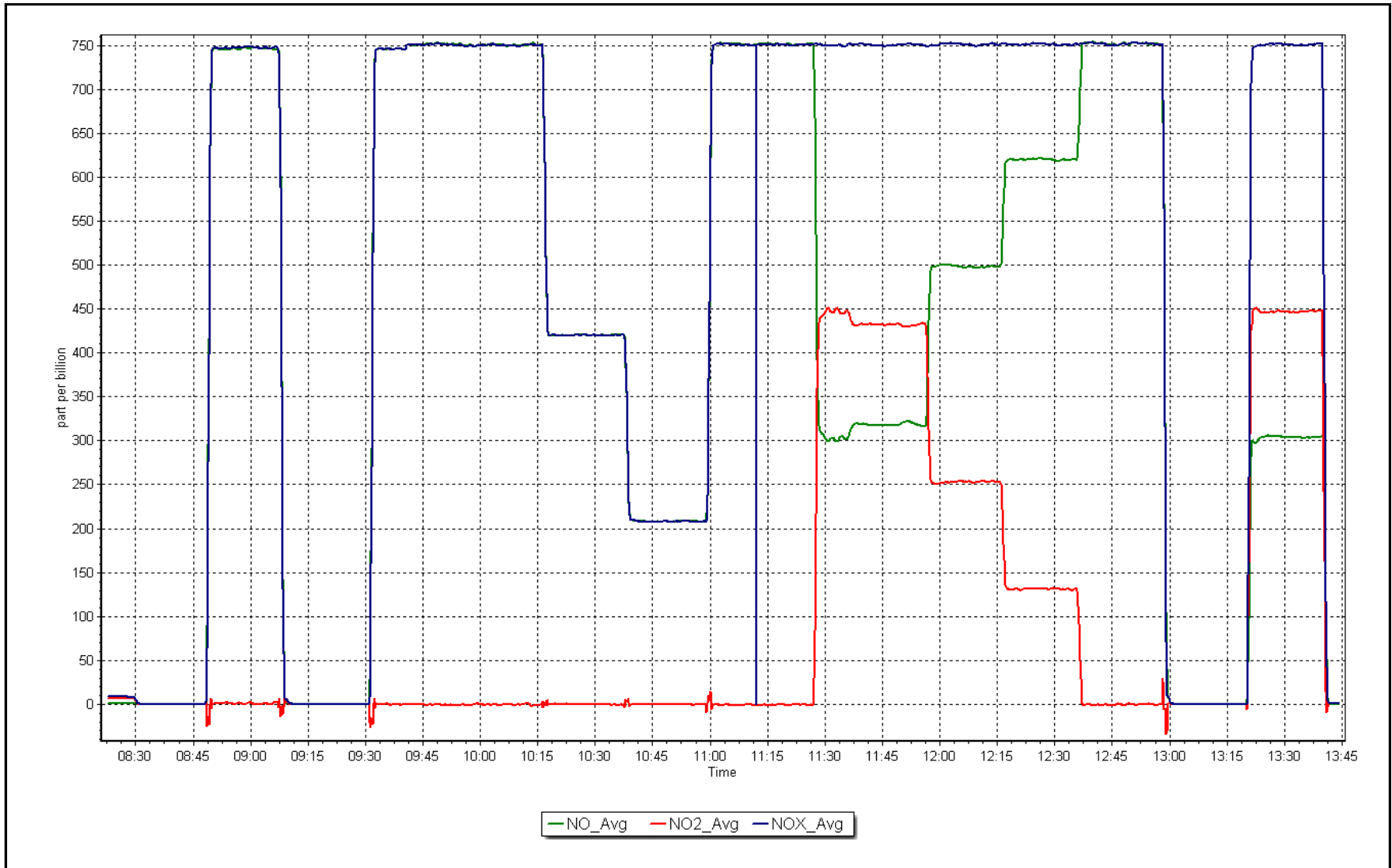
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 20, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
NOX Cal Date:	June 20, 2017	Last Cal Date:	May 24, 2017
Start time (MST):	8:25	End time (MST):	13:40
NH3 Cal Date:	June 22, 2017	Last Cal Date:	May 25, 2017
Start time (MST):	10:46	End time (MST):	14:10
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc.	<u>49.7</u>	ppm	NO Gas Cylinder #	EY0000683
NO Cal Gas Conc.	<u>49.7</u>	ppm	NO Cal Gas Expiry	November-04-19
NH3 Cal Gas Conc.	<u>95.5</u>	ppm	NH3 Gas Cylinder #	LL23123
			NH3 Cal Gas Expiry	May-24-17
Calibrator Model	Sabio 4010		Serial Number	1730512
ZAG make/model	API 701H		Serial Number	587

Analyzer Information

Analyzer make:	API T201	Analyzer serial #:	152	
	<u>Start</u>	<u>Finish</u>		
NO coefficient	1.112	1.101	NH3 Range (ppb)	<u>Start</u> 0 - 1000 ppb
NOX coefficient	1.255	1.250	NOX Range (ppb)	0 - 1000 ppb
NO2 coefficient	1.000	1.000	PMT Temperature	7.0 7.0
NH3 coefficient	0.881	0.899	Reaction cell Press	6.7 7.1
TN coefficient	1.258	1.255	Sample Flow	504 521
NO bkgrnd	-0.2	-0.2	PMT Voltage	645.0 645.0
NOX bkgrnd	-0.2	-0.2	Moly Temperature	314.6 315.5
TN bkgrnd	-0.1	-0.1	NH3 Conv Temp	825 825

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.999777	0.997832
NO _x Cal Offset	-0.178571	-0.317787
NO Cal Slope	0.999939	1.000058
NO Cal Offset	0.565373	0.711914
NO ₂ Cal Slope	1.019369	1.000423
NO ₂ Cal Offset	-5.201619	-1.986968
NH3 Cal Slope	1.002568	0.997108
NH3 Cal Offset	-2.238755	-6.745471
TN Cal Slope	0.987843	0.982499
TN Cal Offset	-3.708907	-8.385702



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5997	0.0	0.0	0.0	0.0	1.6	1.1	0.5	----	----
as found NO	5415	83.0	750.3	750.3	----	742.6	746.0	-3.4	1.010	----
calibrator zero	5997	0.0	0.0	0.0	0.0	1.2	1.7	-0.5	----	----
high NO point	5415	83.0	750.3	750.3	----	752.0	753.2	-1.2	0.998	----
NO/O3 point	5415	83.0	750.3	750.3	----	755.0	752.5	2.5	0.994	----
as found NH3	4905	94.2	1799.5	NA	1799.5	1855.8	----	1828.0	0.970	0.984
first NH3	4905	94.2	1799.5	NA	1799.5	1832.5	----	1803.8	0.982	0.998
second NH3	4948	52.4	1000.8	NA	1000.8	1039.0	----	1022.6	0.963	0.979
third NH3	4976	26.2	500.2	NA	500.2	520.7	----	511.2	0.961	0.978
Average Correction Factor									0.9957	0.9849

Corrected As found TN = 741 ppb NO_x = 744.9 ppb NH3 = 1827.5 ppb

Previous Response TN = 763.2 ppb NO_x = 750.6 ppb NH3 = 1797.1 ppb

NH3 Previous Converter Efficiency = 88.1 %

NH3 Current Converter Efficiency = 89.9 %

*Percent Change TN = 3.0%

*Percent Change NO_x = 0.8%

*Percent Change NH3 = -1.7%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5997	0.0	0.0	0.0	0.0	1.2	0.5	1.5	----	----
as found span	5415	83.0	750.3	750.3	750.3	753.2	753.8	751.1	0.9961	0.9953
calibrator zero	5997	0.0	0.0	0.0	0.0	1.7	1.4	1.2	----	----
high point	5415	83.0	750.3	750.3	750.3	753.2	749.8	752.0	0.9961	1.0007
second point	5451	46.4	419.5	419.5	419.5	419.6	420.1	419.5	0.9997	0.9985
third point	5474	23.3	210.7	210.7	210.7	210.2	206.2	209.0	1.0021	1.0216
Average Correction Factor									0.9993	1.0069

Corrected As found TN = 749.6 ppb NO_x = 752.0 ppb NO = 753.3 ppb
 Previous Response TN = 763.2 ppb NO_x = 750.6 ppb NO = 749.8 ppb

*Percent Change TN = 1.8%
 *Percent Change NO_x = -0.2%
 *Percent Change NO = -0.5%
 * = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO ₂ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point	----	0.0	752.5	749.0	3.3	0.9971	1.0017	----	----
1st NO ₂ (400 ppb O ₃)	318.1	430.9	750.4	318.1	432.3	0.9999	----	0.9968	100.3%
2nd NO ₂ (200 ppb O ₃)	497.1	251.9	751.1	497.1	253.9	0.9989	----	0.9921	100.8%
3rd NO ₂ (100 ppb O ₃)	616.4	132.6	752.0	616.4	135.6	0.9977	----	0.9779	102.3%
2nd NO ref point	----	0.0	752.6	746.4	6.2	0.9969	1.0052	----	----
Average Correction Factor						0.9984	1.0035	0.9889	101.1%

Notes:

NO_x/NO span adjusted. Second High NO point used for GPT reference. NH₃ span point set to 1800 ppb. NH₃ span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

TN Calibration Summary

Version-03-2017

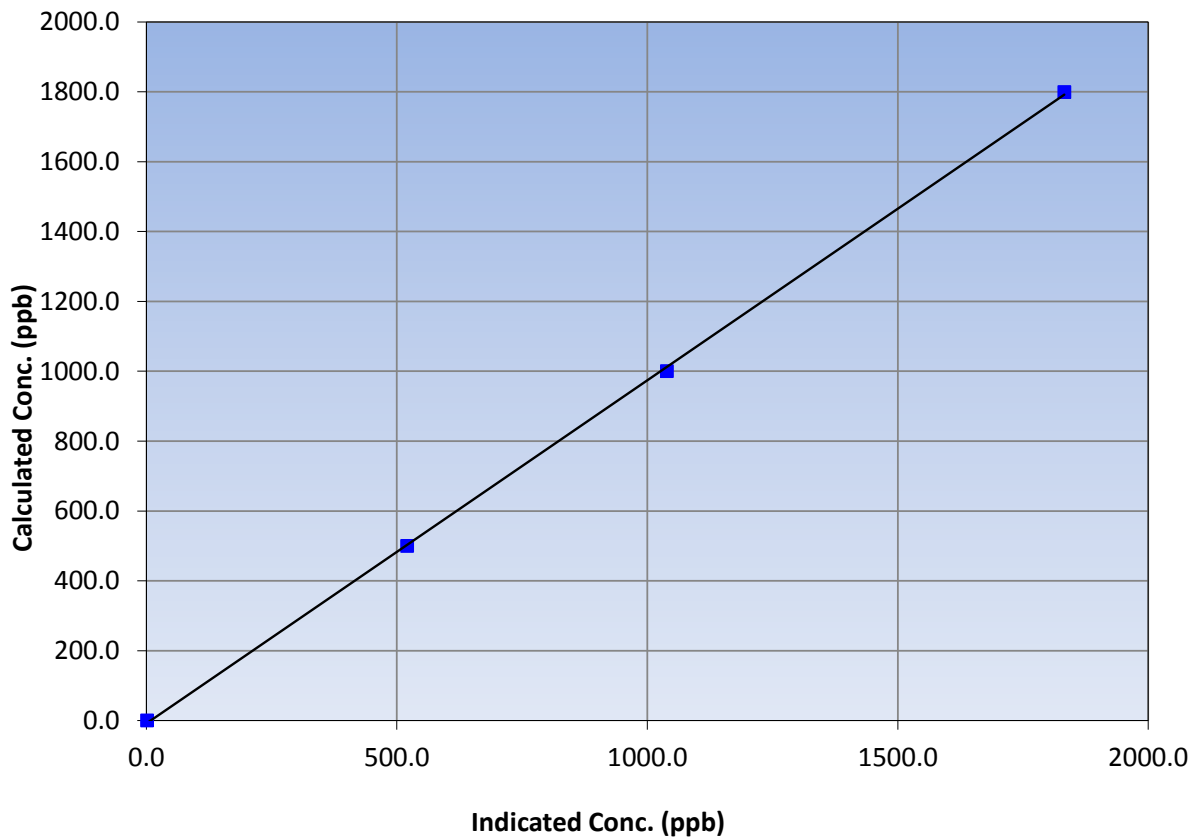
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	API T201	Analyzer serial #	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	1.2	----	Correlation Coefficient	≥0.995	
1799.5	1832.5	0.9820			
1000.8	1039.0	0.9632			
500.2	520.7	0.9606			
			Slope	0.982499	0.90 - 1.10
			Intercept	-8.385702	+/-20

TN Calibration Curve





Wood Buffalo Environmental Association

NH₃ Calibration Summary

Version-03-2017

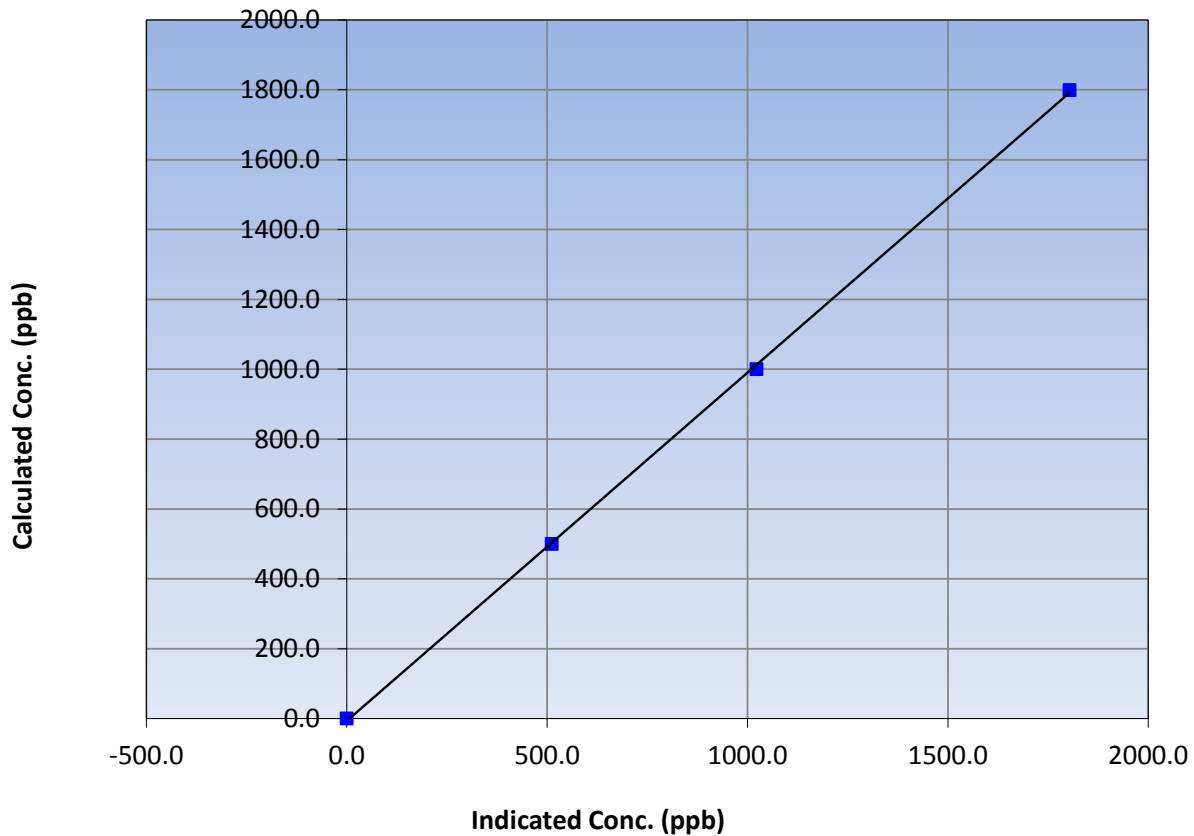
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	API T201	Analyzer serial #	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.5	----	Correlation Coefficient	≥0.995	
1799.5	1803.8	0.9976			
1000.8	1022.6	0.9786			
500.2	511.2	0.9785			
			Slope	0.997108	0.90 - 1.10
			Intercept	-6.745471	+/-20

NH₃ Calibration Curve





Wood Buffalo Environmental Association

NO_x Calibration Summary

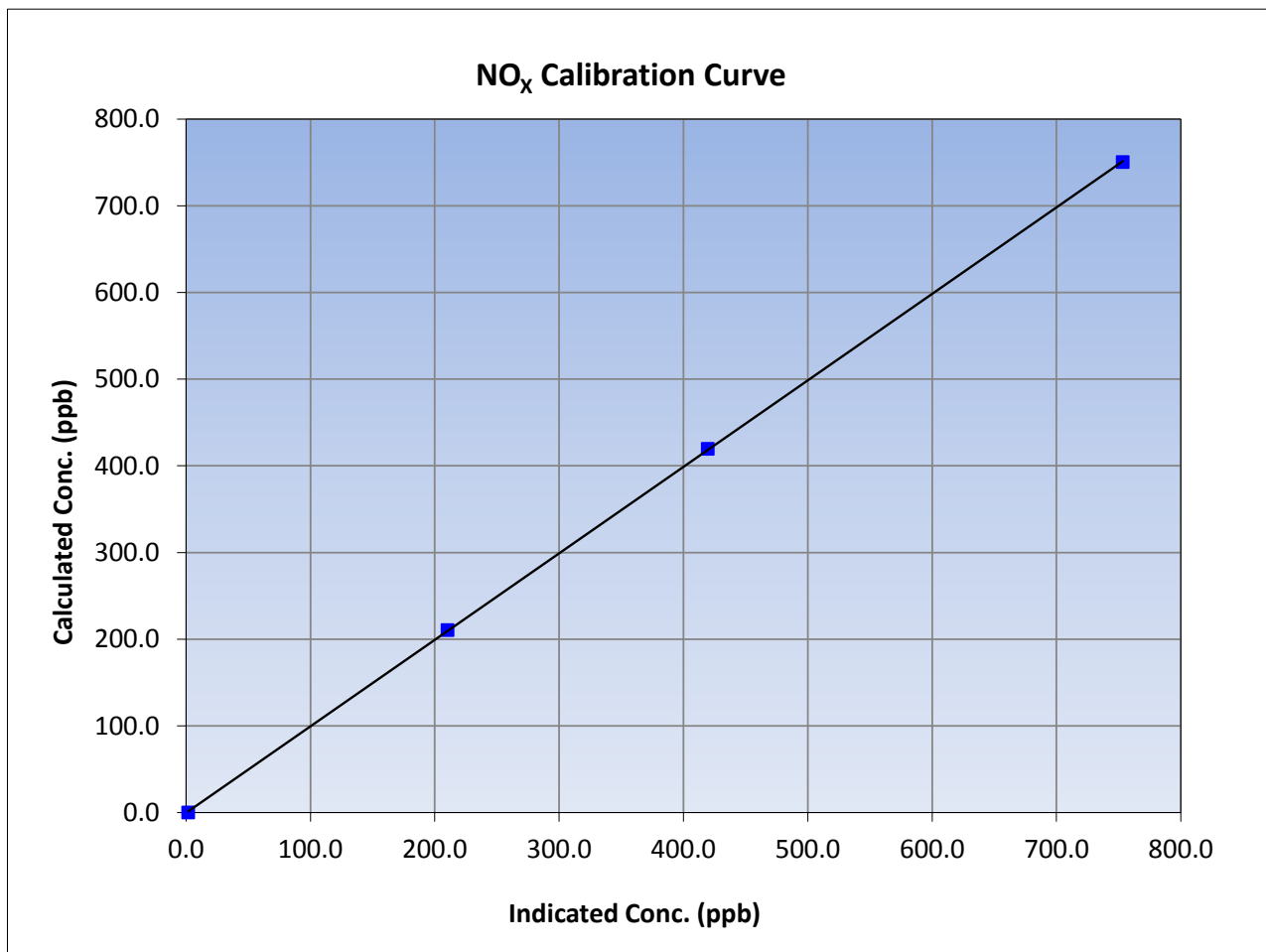
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	API T201	Analyzer serial #	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	1.7	----	Correlation Coefficient	≥0.995	
750.3	753.2	0.9961			
419.5	419.6	0.9997			
210.7	210.2	1.0021			
			Slope	0.997832	0.90 - 1.10
			Intercept	-0.317787	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

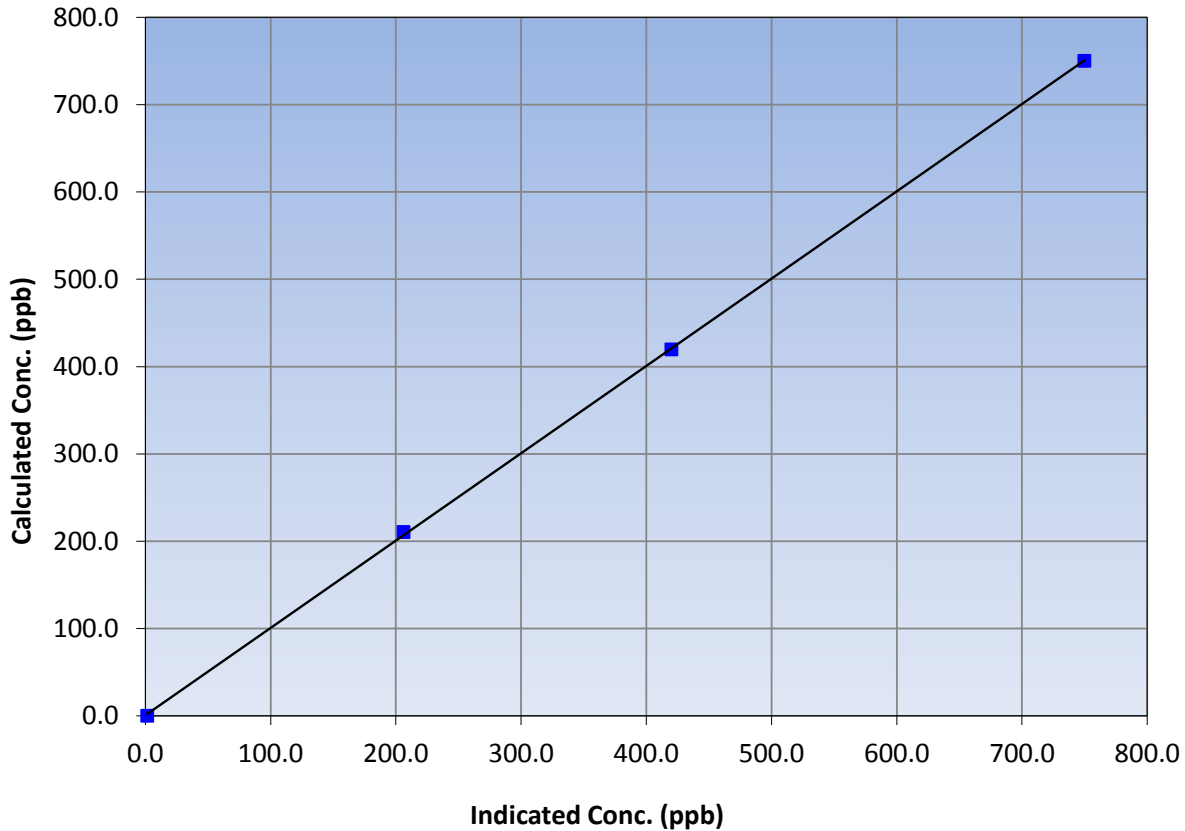
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	API T201	Analyzer serial #	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	1.4	----	Correlation Coefficient	≥0.995	
750.3	749.8	1.0007			
419.5	420.1	0.9985			
210.7	206.2	1.0216			
			Slope	1.000058	0.90 - 1.10
			Intercept	0.711914	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

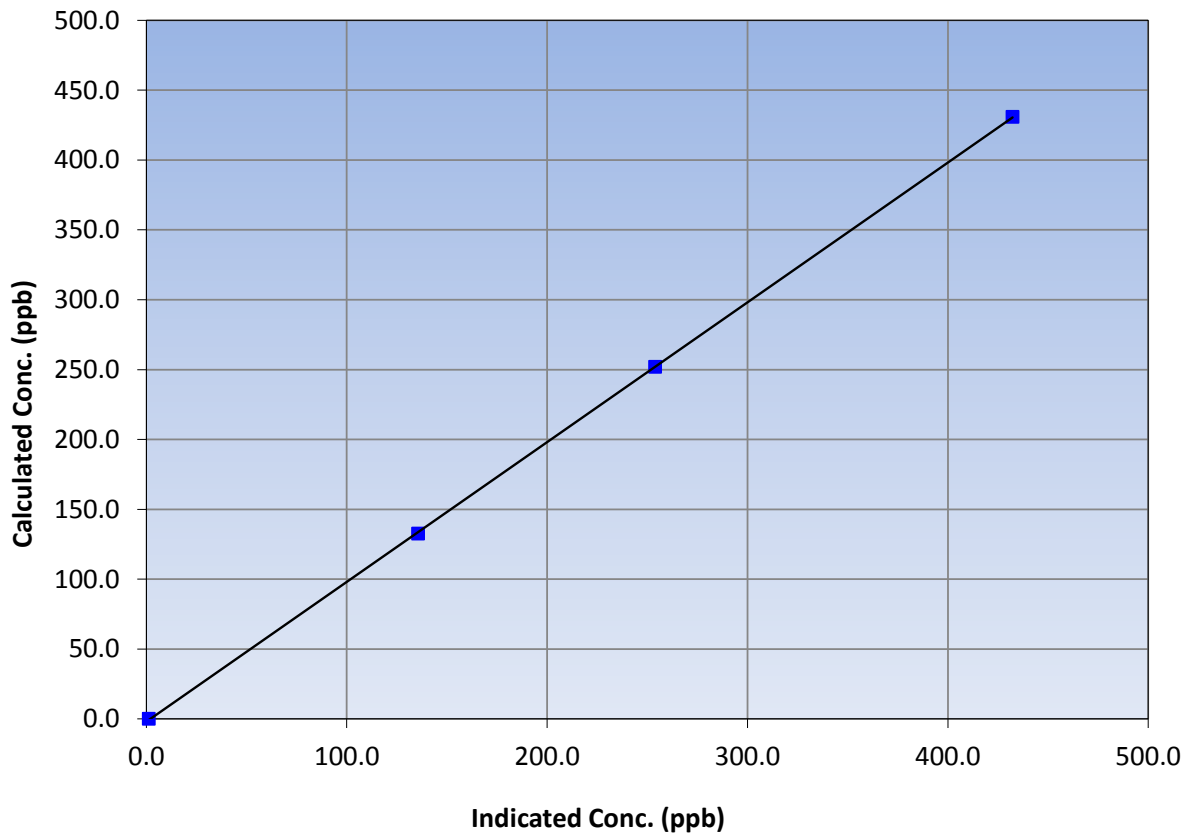
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:25	End Time (MST)	13:40
Analyzer make	API T201	Analyzer serial #	152

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	1.2	----	Correlation Coefficient	≥0.995	
430.9	432.3	0.9968			
251.9	253.9	0.9921			
132.6	135.6	0.9779			
			Slope	1.000423	0.90 - 1.10
			Intercept	-1.986968	+/-20

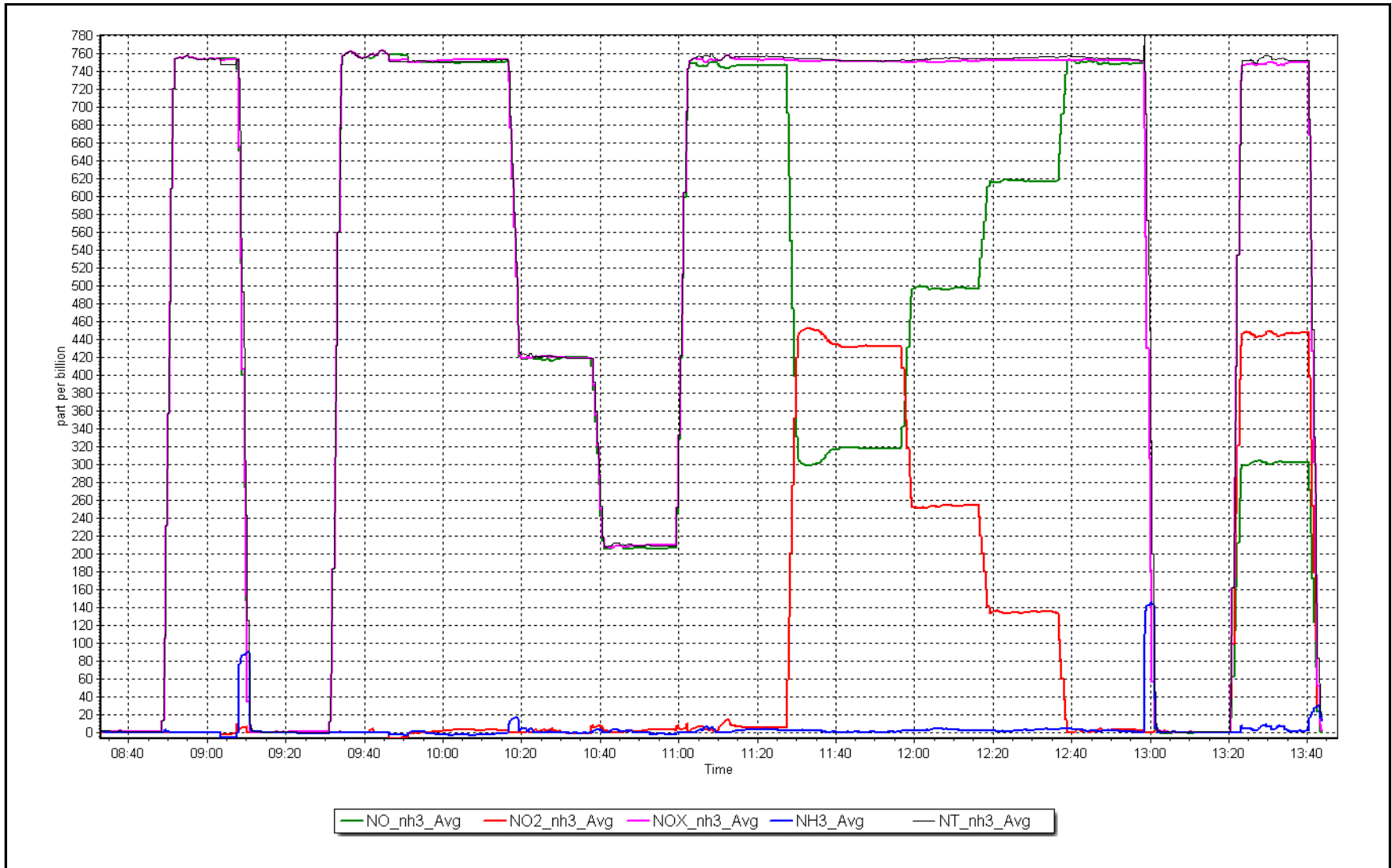
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 20, 2017

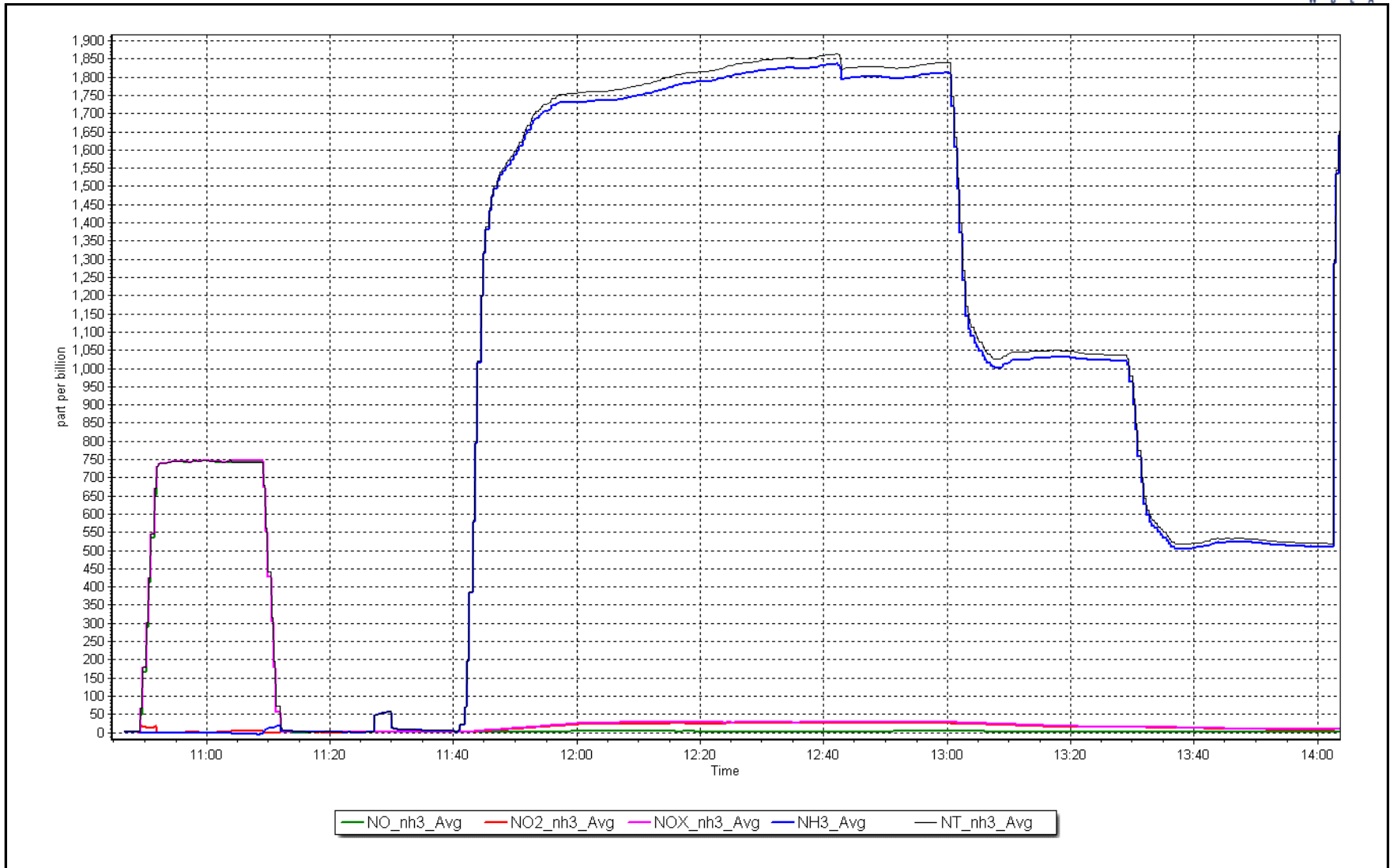
Location: Fort McKay - Bertha Ganter



NH₃ Calibration Plot

Date: June 22, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station number:	AMS 01
Calibration Date:	June 23, 2017	Last Cal Date:	May 18, 2017
Start time (MST):	10:50	End time (MST):	12:30
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1486
Particulate Fraction:	PM2.5	C14 Source S/N:	5691
Flow Meter Make/Model:	Delta-Cal	S/N:	1451
Temp/RH standard:	Delta-Cal	S/N:	1451

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	18	17.7	18	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	986	987.25	986	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	990	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.3	-----	0.3	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: April 26, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: _____	
Foil Calibration	Foil Mass: _____	Foil Mass: _____	
	Calibration Date: _____	Calibration Date: <u>April 26, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: _____	Correction Factor: _____	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Cyclone head replaced with clean head. No adjustments made to T1, P3, flow or Nephelometer.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay - Bertha Ganter	Station Number:	AMS 01
Calibration Date:	June 23, 2017	Prev Cal Date:	October 11, 2016
Start Time (MST):	10:55	End Time (MST):	12:30
Barometric Press:	987	Station Temp:	22 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P10041
WS Calibrator:	MetOne 053	Serial Number:	P15103

Shaft RPM	Actual Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.0	0.0	n/a
200	20.2	20.3	0.9957
400	39.4	39.4	0.9990
600	58.6	58.7	0.9977
800	77.8	77.8	0.9989
Average Correction Factor			0.9978

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	0.999998	0.999999	≥0.995
Calculated slope	1.001527	0.998843	0.90 - 1.10
Calculated intercept	-0.014138	-0.025014	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P22884
As Found Declination (deg west of North)	<u>18</u>	As Left Declination (deg west of North)	<u>18</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.3	n/a
90	88.5	1.0175
180	179.5	1.0028
270	268.8	1.0045
357	358.5	0.9958
Average Correction Factor		1.0052

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	0.999981	0.999967	≥0.995
Calculated slope	0.993003	0.996969	0.90 - 1.10
Calculated intercept	0.182753	0.832816	+/- 7

Notes: WS and WD sensors showed good operation, and bearings in both sensors were good. As founds declination was just slightly west of Solar noon orientation. No adjustments were made to cross arm alignment.

Calibration Performed By: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	48	0	7	0
H2S (ppb) Average	687	33	33	100	2	0	1	0
THC (ppm) Average	655	33	65	95.56	3.8	-	2.5	-
Temperature (C) Average	720	0	0	100	28.3	-	22.7	-
Relative Humidity (%) Average	720	0	0	100	100	-	91	-
Wind Speed 10 m (km/h) Average	720	0	0	100	25	-	18	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	16 Jun 2017 10:00	16 Jun 2017 16:00	7	Maintenance - address span outside of target
THC	28 Jun 2017 12:00	29 Jun 2017 12:00	25	Maintenance - address span outside of target

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	1.4	4	-	0	0	0	0	1	3	48
H2S (ppb) Average	687	0.4	0	-	0	0	0	0	0	1	2
THC (ppm) Average	655	2.2	0.3	-	1.9	2	2	2.1	2.3	2.6	3.8
Temperature 2 m (C) Average	720	16.32	4.9	-	4.3	10.4	12.8	16	19.8	22.8	28.3
Relative Humidity (%) Average	720	63.2	22	-	22	32	46	63	81	93	100
Wind Speed 10 m (km/h) Average	720	9.6	5	-	0	3	6	9	13	17	25
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Mildred Lake - June 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 48 ppb on Jun 2 17:00	Maximum Daily Average: 7.3 ppb on Jun 3		Hours of Data:	686
Minimum Value: 0 ppb on Jun 1 17:00	Minimum Daily Average: 0.0 ppb on Jun 14		Hours of Missing Data:	34
Maximum Diurnal Average: 3.7 ppb at hour 17	Minimum Diurnal Average: 0.3 ppb at hour 23		Hours of Calibration:	34
Monthly Average: 1.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 21		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	5	2	Z	0	0	1	1	5	15	3	1	0	0	2	0	1	0	0	0	1	1	3	1	0	1.9	15
2-Jun	0	0	0	Z	0	0	0	0	1	2	2	2	1	1	1	30	48	1	0	0	0	0	0	0	3.9	48
3-Jun	0	2	0	0	Z	1	0	0	0	0	5	2	1	0	0	19	45	39	20	14	6	3	3	3	7.3	45
4-Jun	5	6	5	1	1	Z	1	2	2	21	7	9	3	1	0	0	1	0	0	0	0	0	0	0	2.9	21
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	Z	0	0	0	1	1	4	4	1	3	1	0	1	5	1	2	2	0	0	0	0	0	0	1.1	5
7-Jun	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	1	1	4	1	5	5	2	1	1	2	1	1	0	1	1.2	5
9-Jun	1	8	15	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.2	15
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	4	6	10	6	2	0	0	0	0	0	0	1.2	10
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	1	Z	1	1	2	7	2	1	0	0	0	0	1	1	1	2	2	2	2	1	6	2	0	0	1.5	7
13-Jun	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	0	Z	4	4	3	4	1	3	4	0	0	1	0	0	0	0	0	0	0	2	1.1	4
17-Jun	Z	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3
18-Jun	1	Z	1	0	0	0	0	0	0	0	0	0	0	1	7	4	0	4	0	0	0	0	0	0	0.8	7
19-Jun	0	0	Z	0	0	0	0	1	4	6	2	15	8	1	2	0	1	0	0	0	0	0	0	0	1.8	15
20-Jun	0	2	0	Z	9	6	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1.1	9
21-Jun	0	0	1	19	Z	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	19
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0.2	1
24-Jun	0	Z	0	1	1	0	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
25-Jun	0	0	Z	0	0	0	0	1	2	22	16	3	3	5	0	0	0	0	1	2	6	4	0	1	2.9	22
26-Jun	0	0	0	Z	17	16	10	3	1	1	2	0	1	1	2	2	1	0	5	8	1	0	2	6	3.5	17
27-Jun	2	5	10	15	Z	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1.6	15
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	1
29-Jun	Z	0	0	0	0	0	1	3	9	25	29	17	10	3	1	1	0	0	1	1	0	0	0	0	4.5	29
30-Jun	0	Z	0	0	0	0	0	2	3	1	1	0	1	3	4	1	0	0	0	0	0	0	0	0	0.7	4

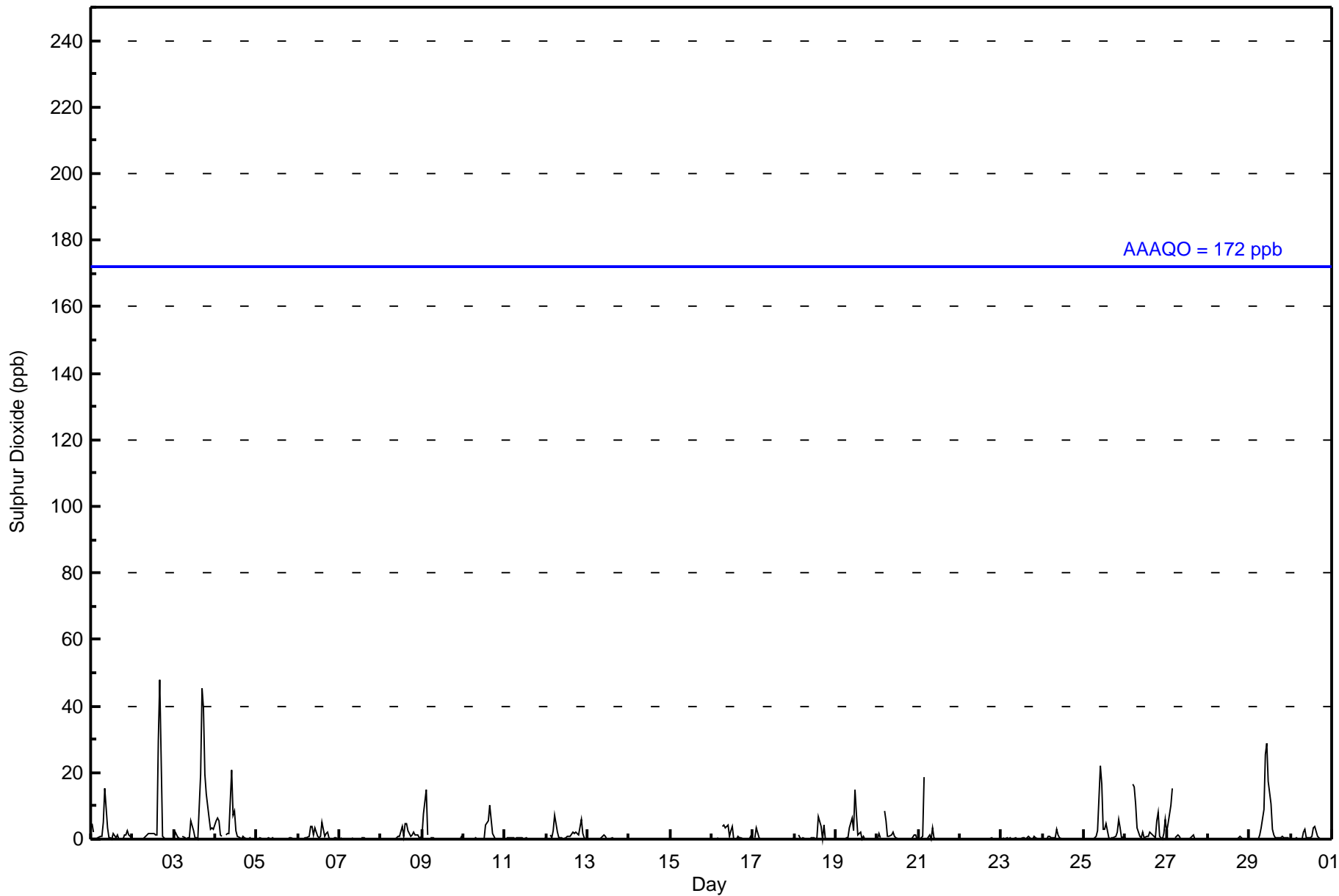
0.6	1.1	1.6	1.6	1.3	1.3	0.9	1.0	1.8	3.2	2.5	1.9	1.3	0.9	1.2	2.6	3.7	1.8	1.1	1.0	0.8	0.5	0.3	0.5	Diurnal Average	
5	8	15	19	17	16	10	5	15	25	29	17	10	5	7	30	48	39	20	14	6	4	3	6	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	666	97.08	97.08
11 - 20	12	1.75	98.83
21 - 60	8	1.17	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	112	73	28	34	23	22	24	66	52	43	30	23	15	43	27	51	666
11 - 20	0	0	0	0	0	2	3	3	0	1	0	1	0	2	0	0	12
21 - 60	0	0	0	0	1	1	1	0	0	2	1	0	0	2	0	0	8
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	112	73	28	34	24	25	28	69	52	46	31	24	15	47	27	51	686

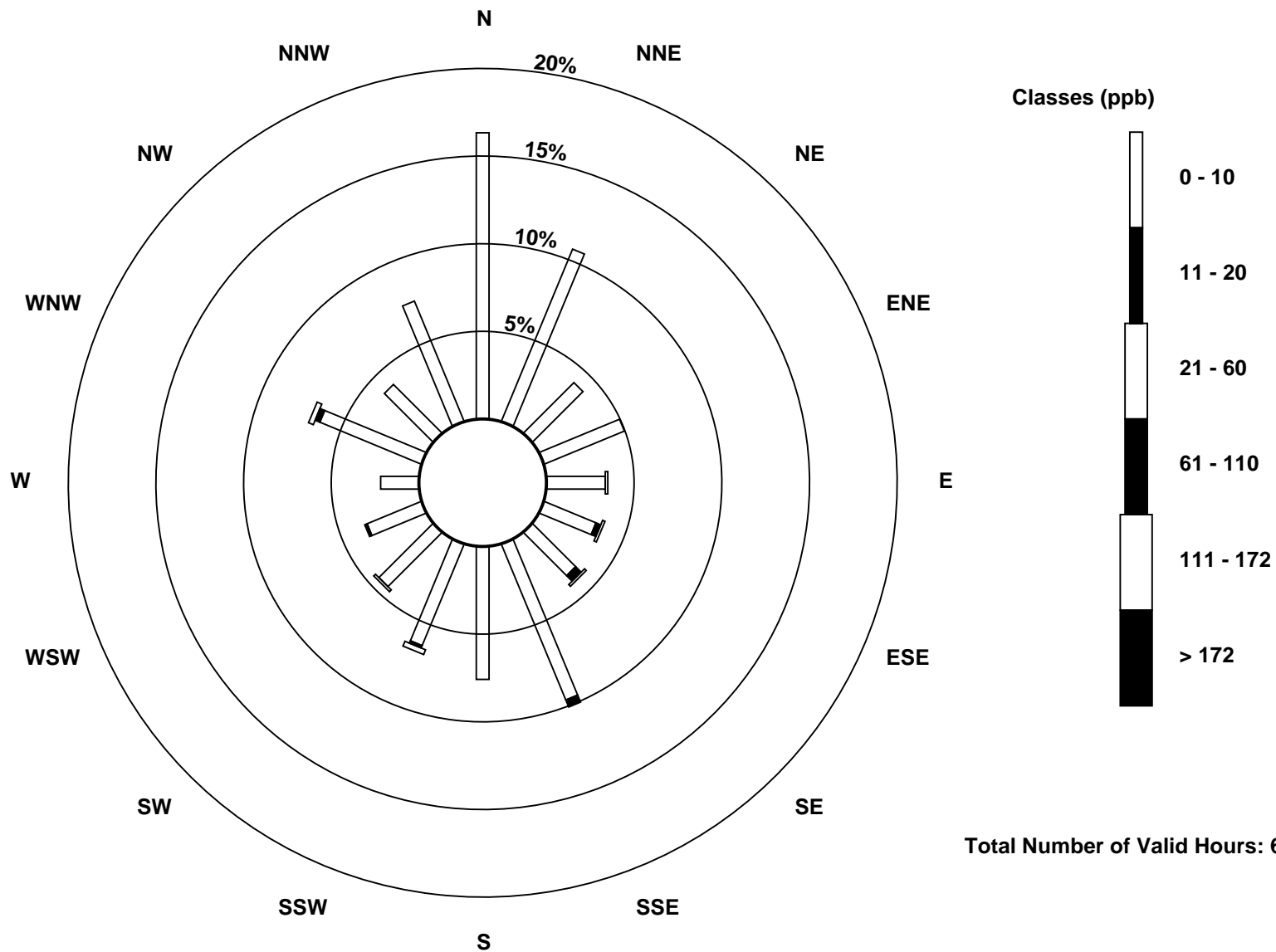
Total Number of Valid Hours: 686

Total Number of Hours: 720

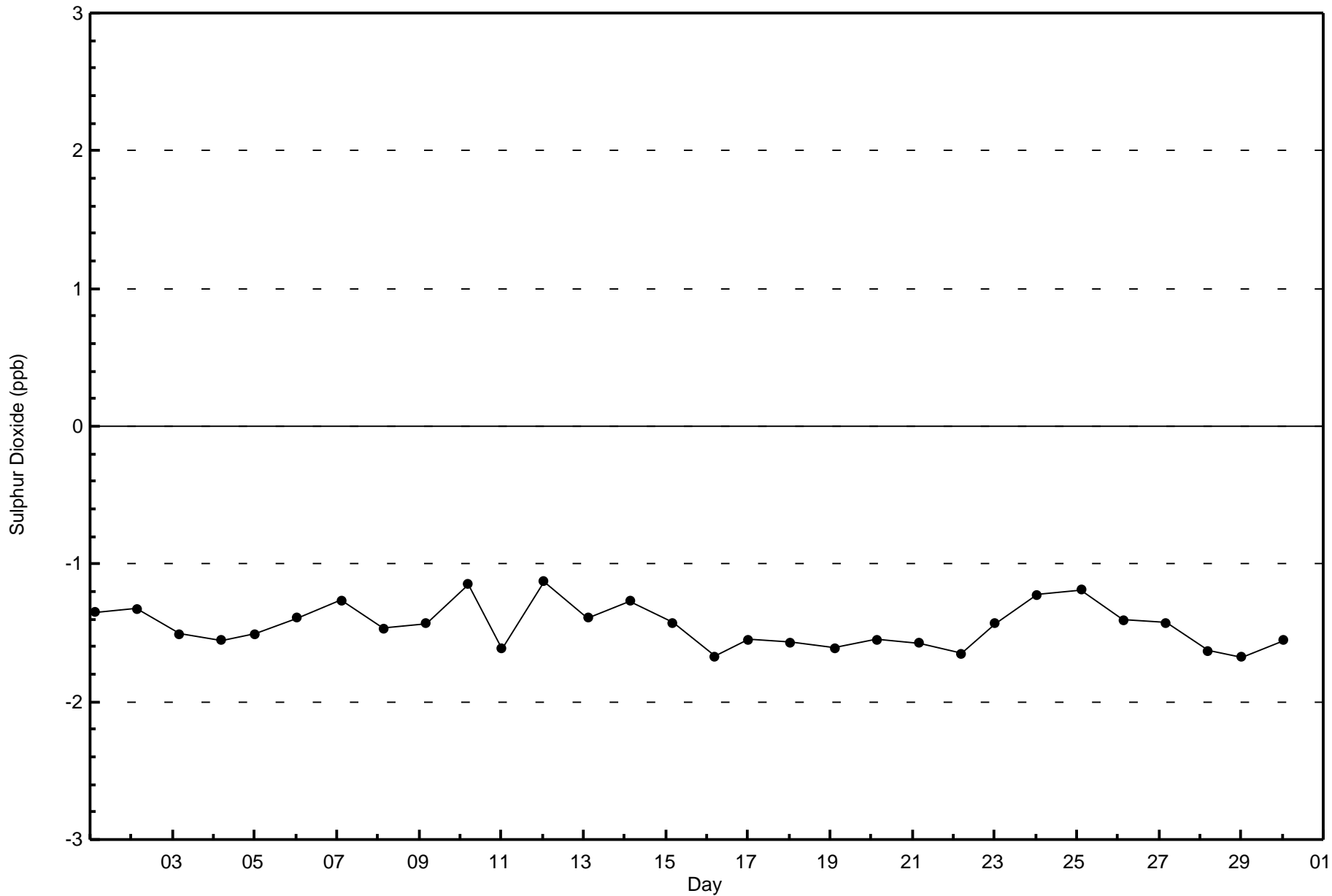


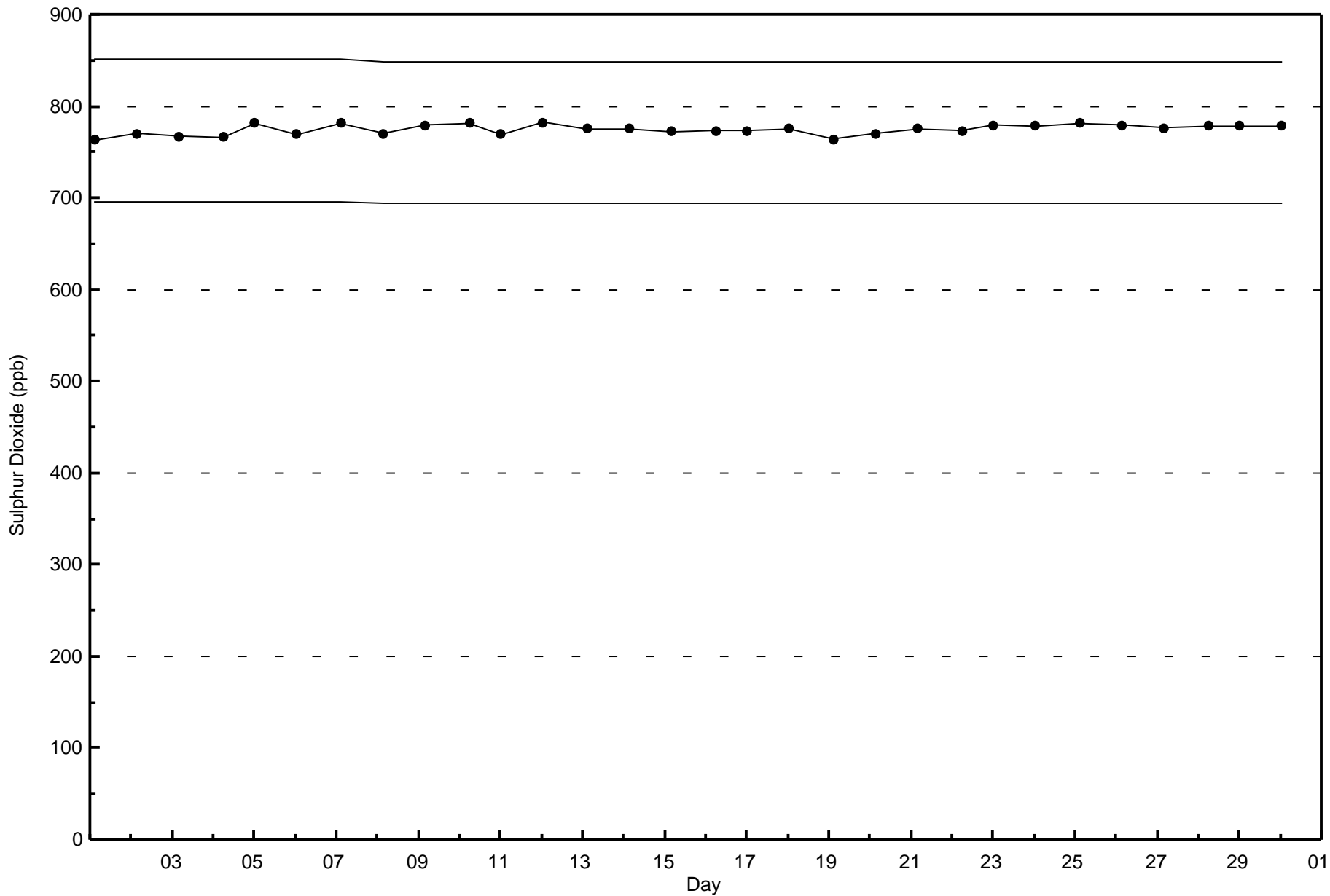
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Mildred Lake (AMS 2)



Total Number of Valid Hours: 686





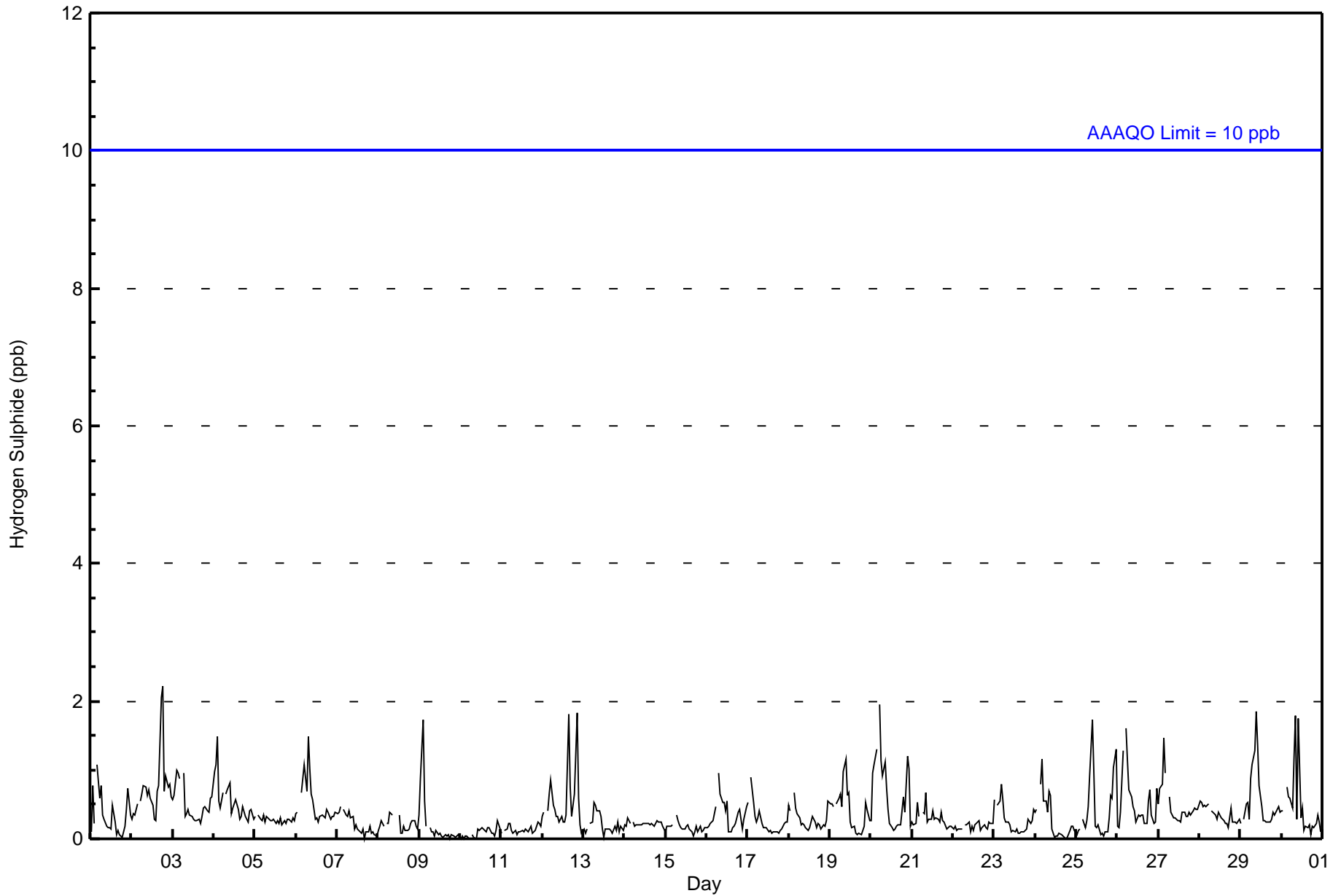


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 2 19:00	Maximum Daily Average: 0.7 ppb on Jun 2		Hours of Data:	687
Minimum Value: 0 ppb on Jun 7 17:00	Minimum Daily Average: 0.1 ppb on Jun 10		Hours of Missing Data:	33
Maximum Diurnal Average: 0.6 ppb at hour 4	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	33
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
2-Jun	0	0	0	1	Z	1	1	1	1	1	1	1	0	0	0	1	1	2	2	1	1	1	1	1	0.7	2
3-Jun	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1
4-Jun	1	1	1	1	0	1	Z	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.6	1
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
6-Jun	0	0	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
7-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jun	0	1	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
10-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	2	1	0	0	1	2	1	0	0	0	0.5	2
13-Jun	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	0	0	Z	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Jun	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
19-Jun	1	0	0	Z	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
20-Jun	0	1	1	1	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0.6	2
21-Jun	0	0	0	1	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Jun	0	0	Z	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Jun	0	0	0	Z	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	2
26-Jun	0	0	0	1	Z	2	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0.5	2
27-Jun	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
28-Jun	1	1	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
29-Jun	0	Z	0	0	1	0	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
30-Jun	0	0	Z	1	1	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2

0.3	0.4	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
1	1	2	1	1	2	1	1	1	2	2	2	1	1	1	0	2	1	2	2	1	2	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	687	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	111	76	30	32	21	23	30	68	53	44	33	25	15	46	28	52	687
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	111	76	30	32	21	23	30	68	53	44	33	25	15	46	28	52	687

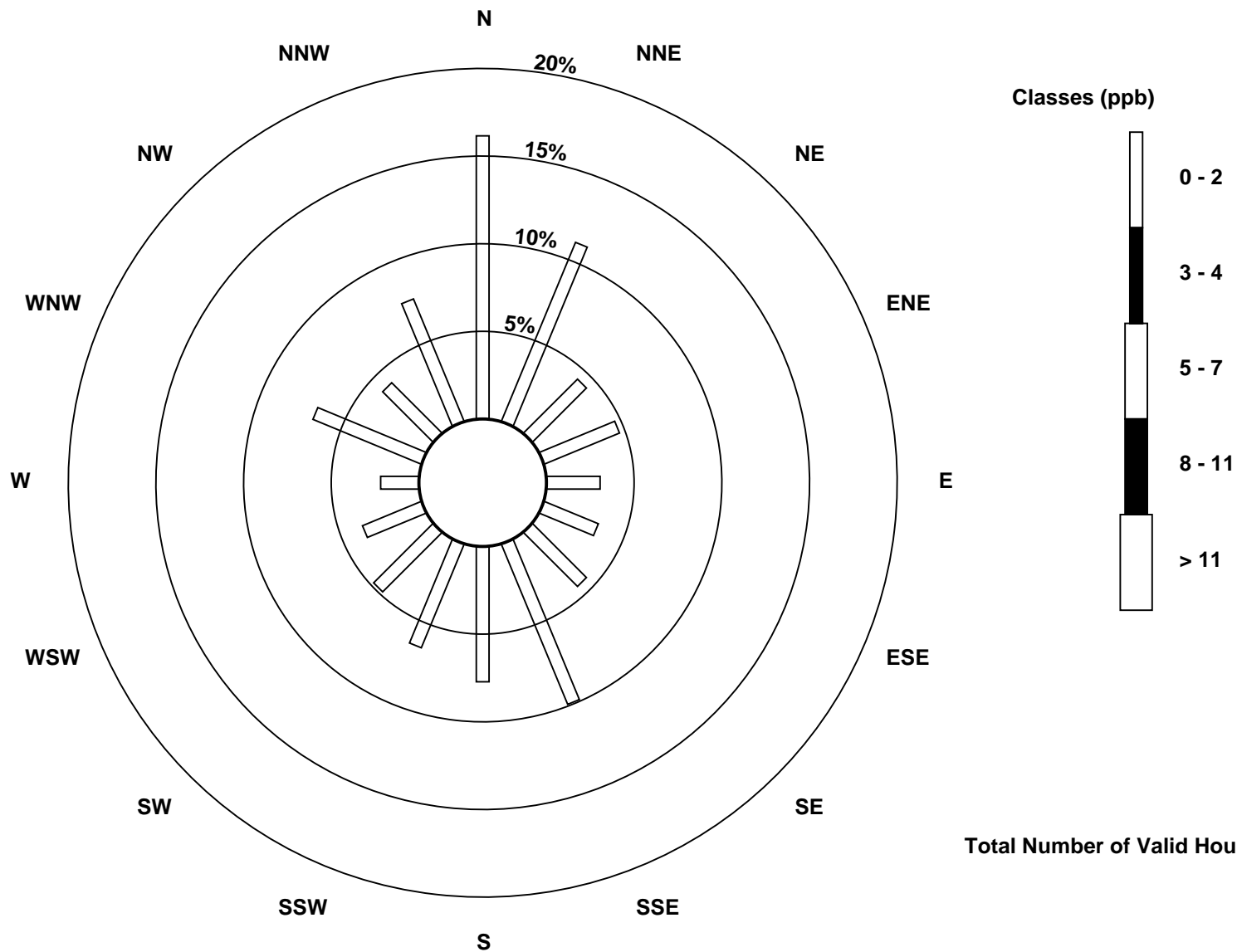
Total Number of Valid Hours: 687

Total Number of Hours: 720

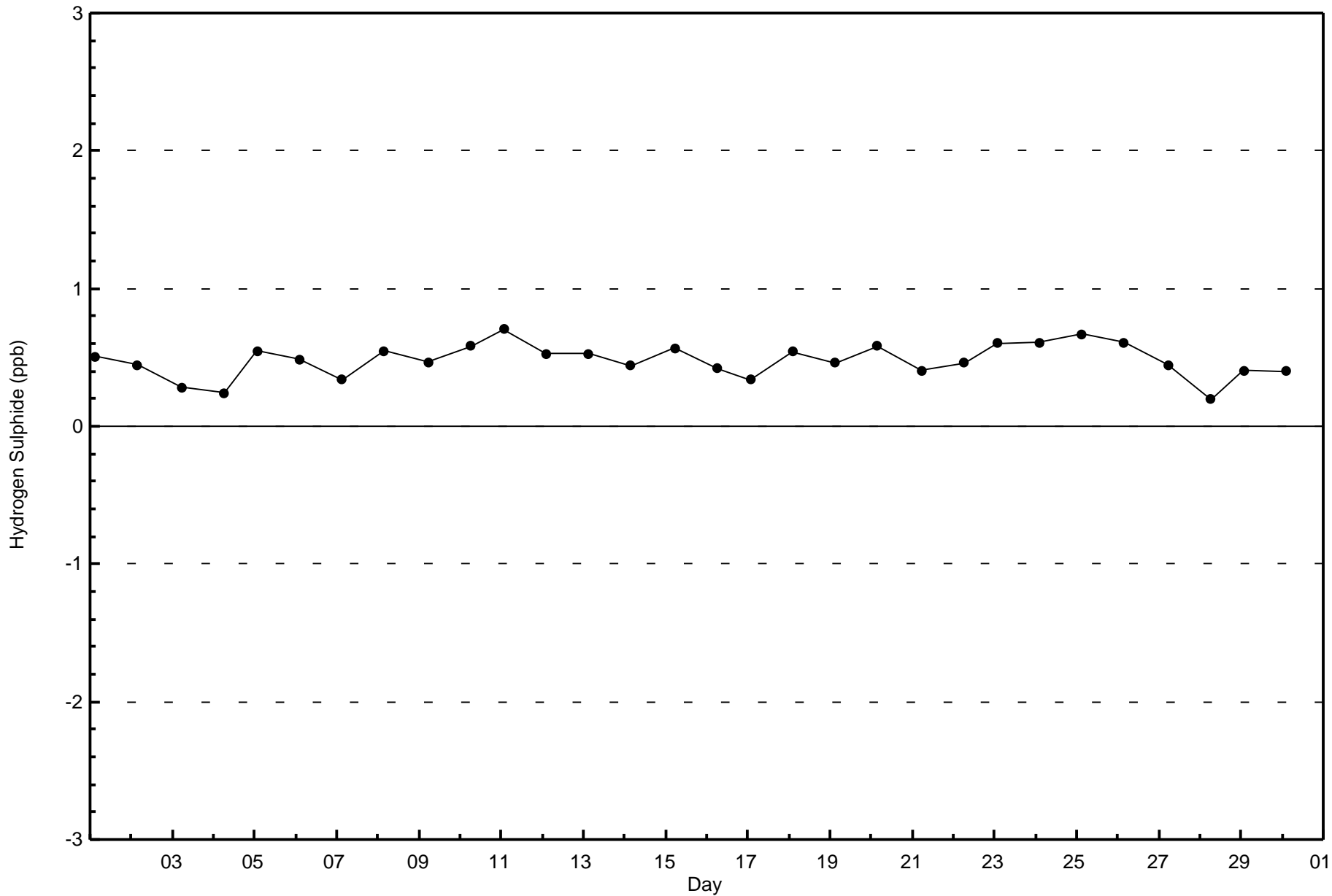


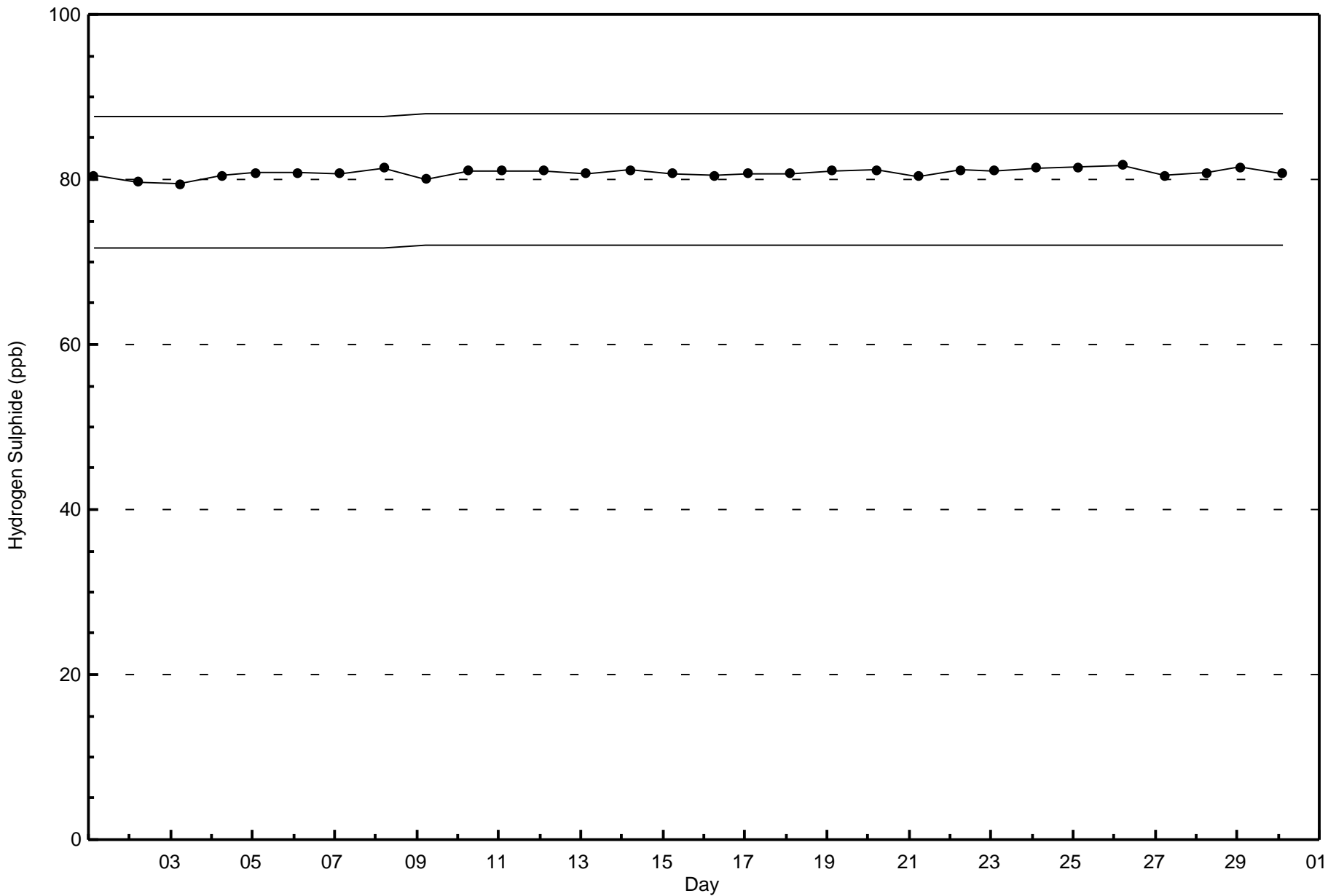
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake (AMS 2)



Total Number of Valid Hours: 687







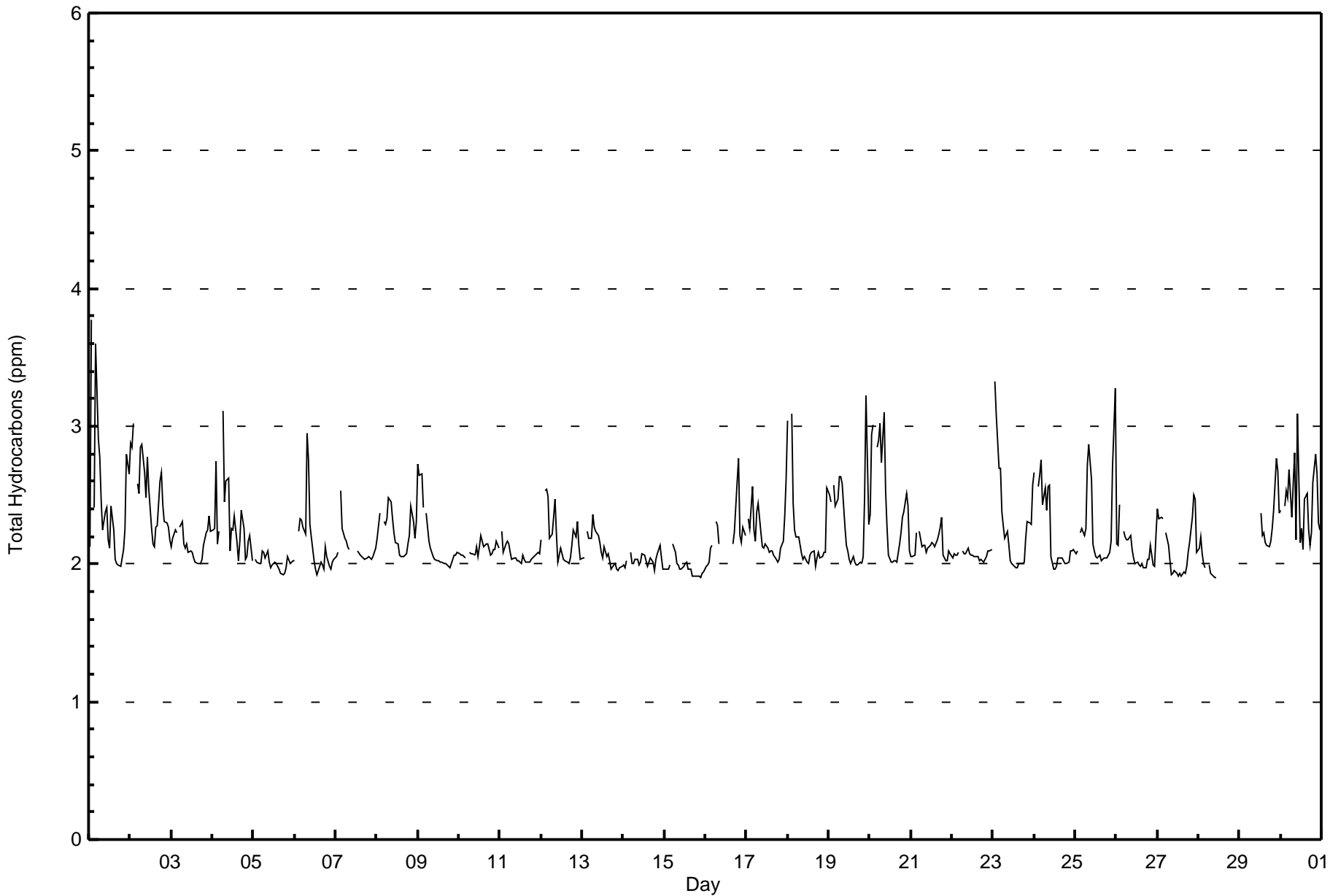
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - June 2017

Maximum Value: 3.8 ppm on Jun 1 02:00		Maximum Daily Average: 2.5 ppm on Jun 2		Hours in Service:	720																						
Minimum Value: 1.9 ppm on Jun 15 22:00		Minimum Daily Average: 2.0 ppm on Jun 15		Hours of Data:	655																						
Maximum Diurnal Average: 2.4 ppm at hour 3		Minimum Diurnal Average: 2.0 ppm at hour 17		Hours of Missing Data:	65																						
Monthly Average: 2.20 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.6 P ₉₉ = 3.1		Hours of Calibration:	33																						
				Percent Operational Time:	95.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	3.8	Z	2.4	3.6	2.9	2.8	2.5	2.2	2.4	2.4	2.2	2.1	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.8	2.6	2.4	3.8	
2-Jun	2.9	2.8	3.0	Z	2.6	2.5	2.8	2.9	2.7	2.5	2.8	2.5	2.3	2.1	2.1	2.3	2.3	2.6	2.7	2.4	2.3	2.3	2.3	2.2	2.5	3.0	
3-Jun	2.1	2.2	2.2	2.2	Z	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.2	2.1	2.3	
4-Jun	2.2	2.3	2.7	2.1	2.2	Z	3.1	2.5	2.6	2.6	2.1	2.3	2.2	2.3	2.2	2.0	2.2	2.4	2.3	2.0	2.1	2.2	2.2	2.0	2.3	3.1	
5-Jun	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.1	
6-Jun	2.0	Z	2.2	2.3	2.3	2.3	2.2	2.9	2.8	2.3	2.2	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.9	
7-Jun	2.1	2.1	Z	2.5	2.3	2.2	2.2	2.1	2.1	C	C	C	C	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.5	
8-Jun	2.2	2.3	2.4	Z	2.3	2.3	2.3	2.5	2.5	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.3	2.2	2.3	2.2	2.5	
9-Jun	2.7	2.6	2.7	2.4	Z	2.4	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.7	
10-Jun	2.1	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	
11-Jun	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	
12-Jun	2.2	Z	2.5	2.5	2.5	2.2	2.2	2.3	2.5	2.2	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.1	2.0	2.2	2.5	
13-Jun	2.0	2.0	Z	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	
14-Jun	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	
15-Jun	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	
16-Jun	2.0	2.0	2.0	2.1	2.1	Z	2.3	2.3	2.1	M	M	M	M	M	M	M	2.1	2.2	2.6	2.8	2.2	2.2	2.3	2.2	--	2.8	
17-Jun	Z	2.3	2.3	2.6	2.2	2.2	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.4	2.6	2.2	2.6	
18-Jun	3.0	Z	3.1	2.4	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.5	2.2	3.1	
19-Jun	2.5	2.4	Z	2.6	2.4	2.5	2.6	2.6	2.6	2.3	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.5	3.2	2.3	2.3	3.2	
20-Jun	2.4	2.9	3.0	Z	2.8	2.9	3.0	2.7	3.1	2.5	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.4	2.1	2.4	3.1	
21-Jun	2.1	2.0	2.1	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.1	2.0	2.0	2.1	2.1	2.1	2.3	
22-Jun	2.0	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	
23-Jun	Z	3.3	3.1	2.7	2.7	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.3	2.6	2.3	3.3	
24-Jun	2.7	Z	2.6	2.6	2.8	2.4	2.6	2.4	2.6	2.6	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.8	
25-Jun	2.1	2.1	Z	2.2	2.3	2.2	2.3	2.7	2.9	2.6	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.7	3.3	2.3	3.3	
26-Jun	2.1	2.1	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.1	2.4	
27-Jun	2.4	2.3	2.3	2.3	Z	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.3	2.5	2.5	2.1	2.1	2.5
28-Jun	2.1	2.2	2.1	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.2	
29-Jun	M	M	M	M	M	M	M	M	M	M	M	M	M	2.4	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.4	2.8	2.7	2.4	--	2.8
30-Jun	2.4	Z	2.4	2.5	2.5	2.7	2.3	2.6	2.8	2.2	3.1	2.2	2.3	2.1	2.5	2.5	2.2	2.1	2.2	2.6	2.8	2.7	2.3	2.2	2.4	3.1	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerspan C - Calibration M - Maintenance																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	218	33.28	33.28
2.1 - 3.0	427	65.19	98.47
3.1 - 10.0	10	1.53	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 655

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	42	44	14	20	10	7	2	15	10	11	10	8	3	1	4	17	218
2.1 - 3.0	70	29	10	13	12	17	26	51	26	28	18	13	12	45	23	34	427
3.1 - 10.0	0	0	1	0	1	0	0	1	4	1	0	1	0	1	0	0	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	112	73	25	33	23	24	28	67	40	40	28	22	15	47	27	51	655

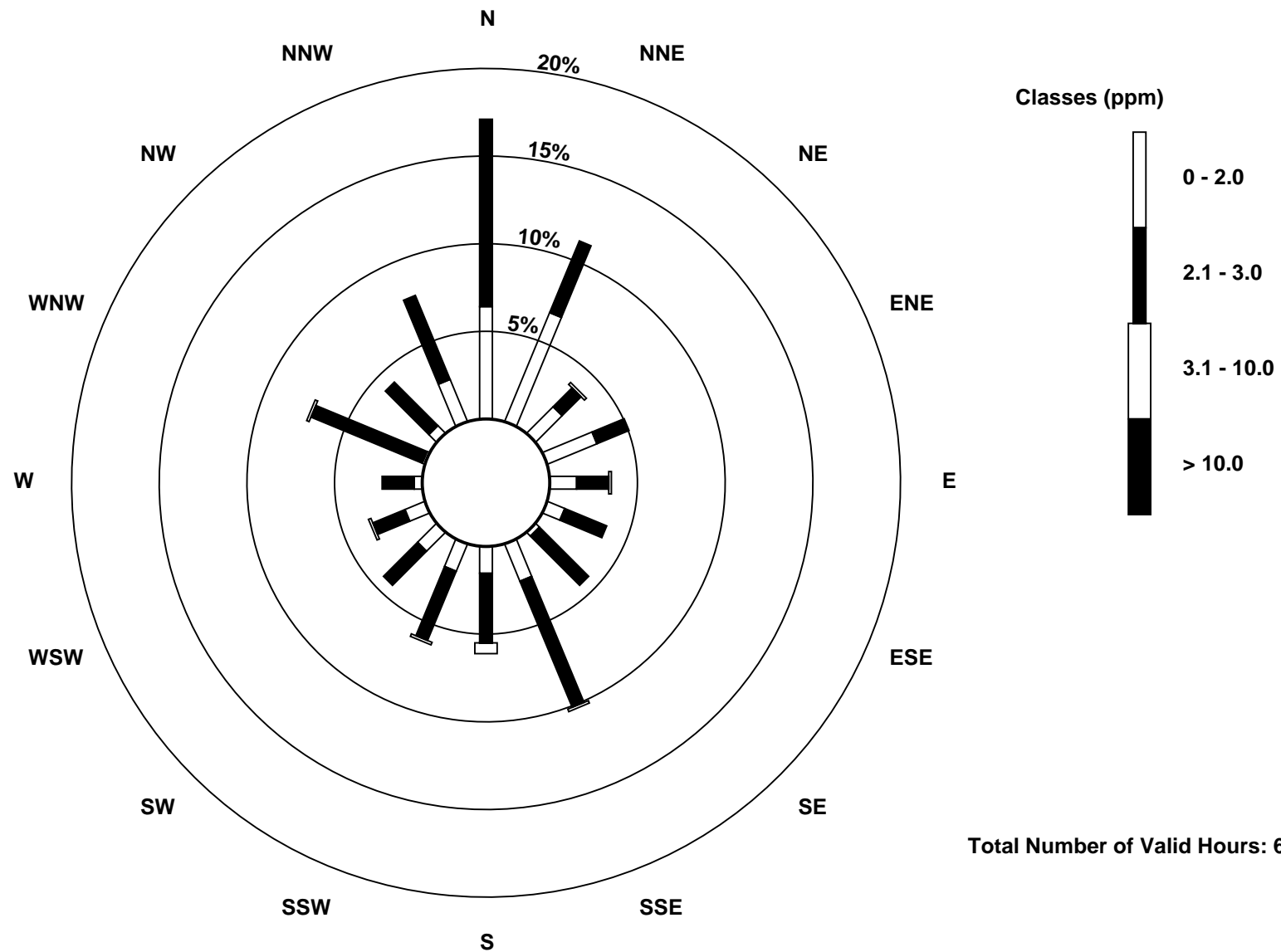
Total Number of Valid Hours: 655

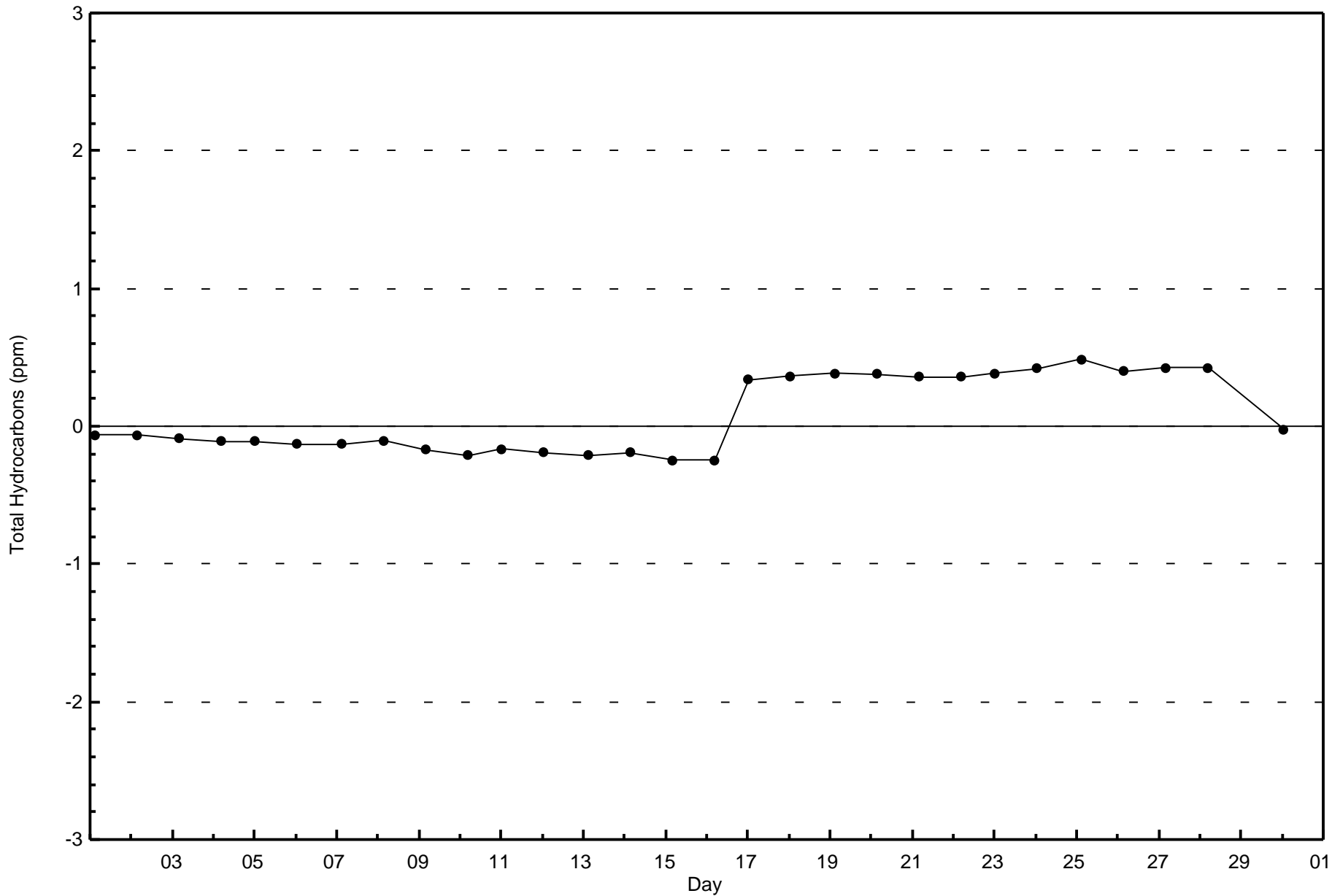
Total Number of Hours: 720

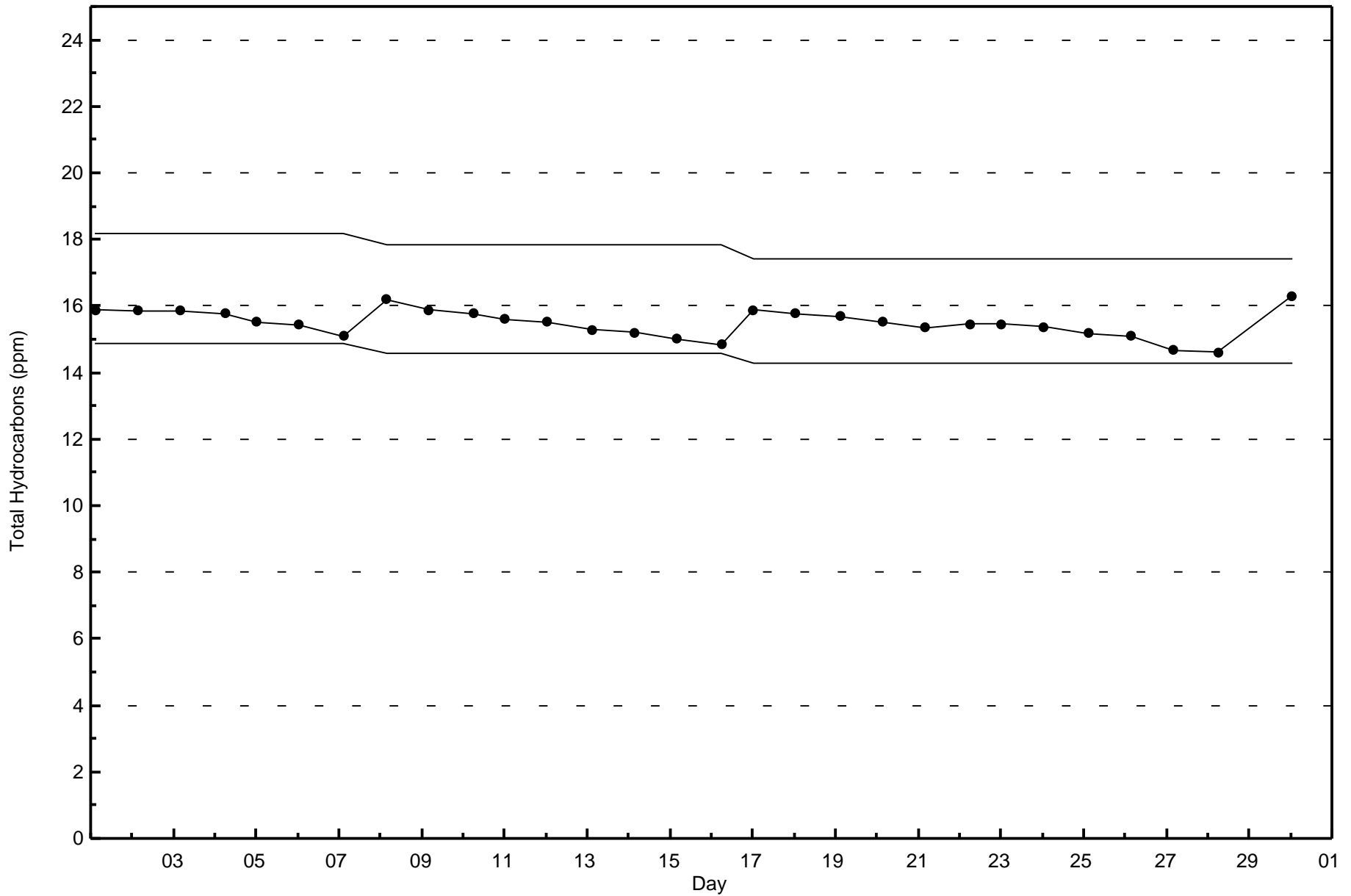


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Mildred Lake (AMS 2)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

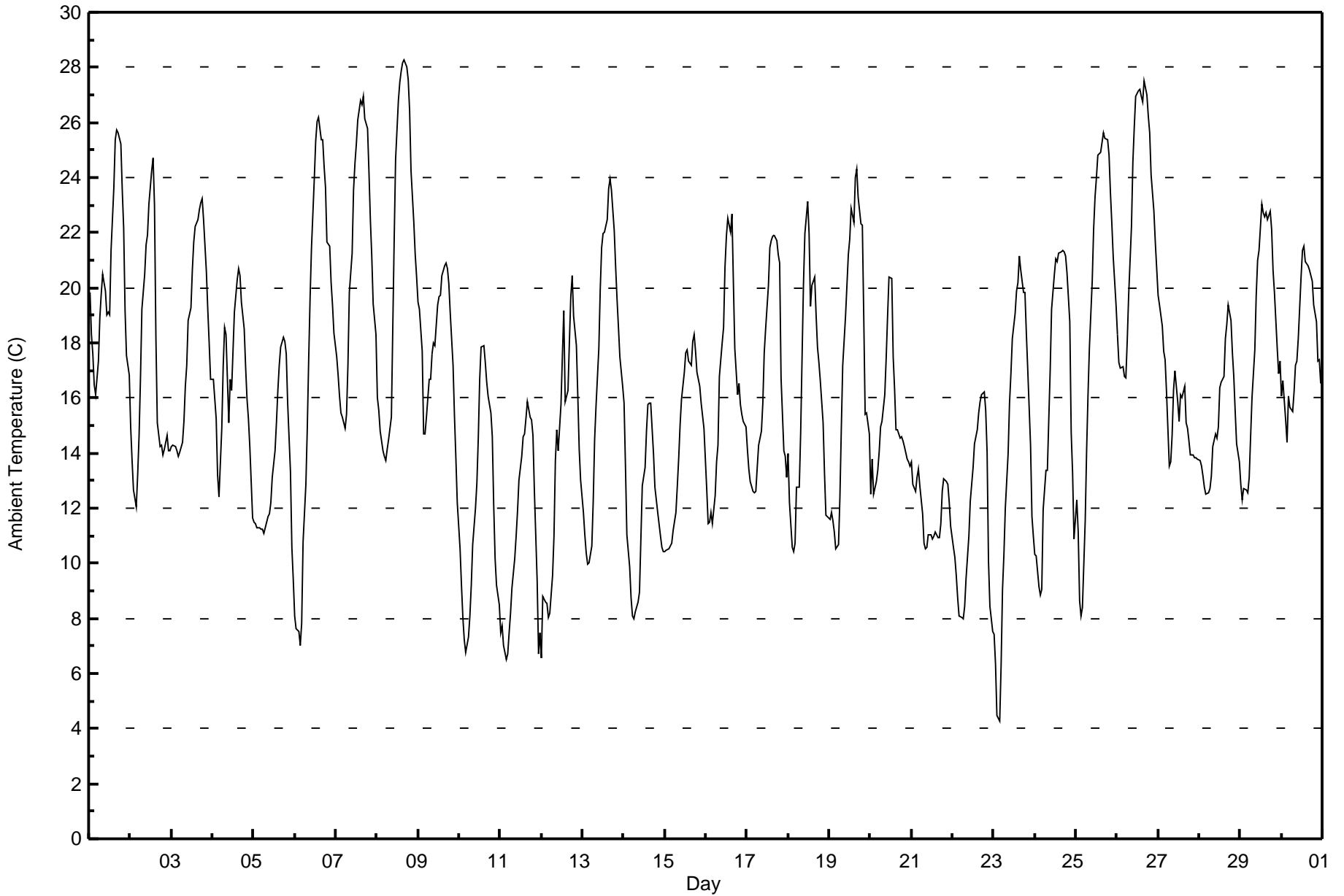
Mildred Lake - June 2017

Maximum Value: 28.3 C on Jun 8 17:00 Maximum Daily Average: 22.7 C on Jun 26																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: 4.3 C on Jun 23 04:00 Minimum Daily Average: 10.9 C on Jun 11 Maximum Diurnal Average: 20.4 C at hour 16 Minimum Diurnal Average: 11.6 C at hour 4 Monthly Average: 16.32 C Percentiles: P₁ = 6.7 P₁₀ = 10.4 Q₁ = 12.8 Median = 16.0 Q₃ = 19.8 P₉₀ = 22.8 P₉₉ = 27.4																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	19.8	18.3	17.6	16.5	16.1	17.4	18.9	19.8	20.5	19.9	19.0	19.1	19.0	21.3	23.7	25.4	25.7	25.6	25.2	23.5	22.2	19.2	17.5	16.8	20.3	25.7
2-Jun	14.9	13.7	12.7	12.0	13.2	14.6	16.7	19.2	20.5	21.6	21.9	23.0	24.3	24.7	23.0	18.2	15.1	14.2	14.3	13.9	14.1	14.6	14.1	14.1	17.0	24.7
3-Jun	14.3	14.3	14.3	14.1	13.9	14.0	14.4	15.2	16.4	17.2	18.8	19.2	20.7	21.6	22.2	22.5	22.9	23.1	23.3	22.5	20.6	19.2	18.0	16.7	18.3	23.3
4-Jun	16.7	16.0	15.3	13.2	12.4	14.9	17.1	18.6	18.3	15.1	16.7	16.3	17.7	19.1	20.3	20.7	20.4	19.5	18.5	17.1	16.0	15.2	14.2	11.6	16.7	20.7
5-Jun	11.5	11.4	11.3	11.3	11.3	11.2	11.1	11.3	11.7	11.8	12.2	13.1	14.1	15.1	16.3	17.2	17.8	18.2	18.0	17.6	15.8	13.3	10.6	9.4	13.4	18.2
6-Jun	8.1	7.6	7.5	7.0	7.8	10.8	12.9	14.9	17.4	19.6	21.4	23.9	25.3	26.0	26.2	25.4	25.4	24.4	23.7	21.6	21.5	20.2	19.4	18.3	18.2	26.2
7-Jun	17.5	16.8	16.0	15.5	15.3	14.9	15.4	17.2	19.8	21.3	23.6	24.5	25.2	26.1	26.8	26.6	27.0	26.1	25.8	24.2	22.5	21.2	19.4	18.3	21.1	27.0
8-Jun	16.0	15.6	14.8	14.1	13.9	13.7	14.1	14.5	15.3	18.5	21.8	24.6	26.8	27.5	27.9	28.2	28.3	28.0	27.6	26.4	24.2	22.4	21.2	20.4	21.1	28.3
9-Jun	19.5	19.2	17.7	14.7	14.7	15.3	16.7	16.7	17.6	18.0	17.9	19.4	19.7	19.7	20.5	20.8	20.9	20.7	20.2	19.0	17.2	15.3	13.8	12.2	17.8	20.9
10-Jun	10.5	9.2	8.0	7.2	6.8	7.3	8.1	9.2	10.7	12.0	12.9	14.5	16.7	17.8	17.9	17.3	16.6	16.1	15.5	14.6	12.1	10.2	9.2	8.5	12.0	17.9
11-Jun	7.5	7.7	7.0	6.5	6.7	7.5	8.2	9.1	10.2	11.0	11.9	13.0	13.9	14.6	14.7	15.2	15.9	15.3	15.2	14.6	12.7	9.4	6.7	7.5	10.9	15.9
12-Jun	6.6	8.8	8.6	8.5	8.1	8.2	9.6	11.0	13.7	14.8	14.1	15.7	17.5	19.2	15.9	16.3	18.0	19.7	20.4	19.0	17.9	16.1	14.1	13.0	14.0	20.4
13-Jun	11.9	11.0	10.4	10.0	10.0	10.6	12.2	14.5	15.7	17.8	19.9	21.4	22.0	22.5	23.6	24.0	23.5	22.0	20.8	19.6	18.5	17.5	16.4	17.4	24.0	24.0
14-Jun	15.8	13.5	11.0	9.8	8.8	8.1	8.0	8.2	8.6	9.0	10.9	12.8	13.5	14.8	15.8	15.8	14.0	12.8	12.3	11.9	11.0	10.6	10.4	11.8	15.8	15.8
15-Jun	10.4	10.5	10.5	10.6	10.7	11.2	11.8	12.8	13.8	15.1	16.0	17.0	17.6	17.7	17.3	17.2	18.0	18.3	17.7	16.9	16.4	15.8	15.4	14.9	14.7	18.3
16-Jun	12.6	11.4	11.5	11.8	11.4	12.5	13.7	14.3	16.8	18.0	18.5	20.7	21.9	22.5	22.0	22.7	20.2	17.8	16.1	16.5	15.8	15.4	15.2	14.9	16.4	22.7
17-Jun	14.2	13.4	12.9	12.6	12.5	12.6	13.5	14.3	14.8	15.8	17.7	18.5	20.1	21.5	21.7	21.8	21.9	21.7	21.2	20.9	16.7	14.1	13.9	13.1	16.7	21.9
18-Jun	14.0	12.2	10.6	10.4	10.7	12.8	12.8	14.7	17.5	20.1	21.9	23.2	21.9	19.3	20.1	20.4	19.0	17.8	17.3	16.7	15.1	13.3	11.8	11.7	16.1	23.2
19-Jun	11.6	11.8	11.5	11.1	10.5	10.7	12.4	14.9	17.2	19.0	20.1	21.2	21.7	22.9	22.4	24.0	24.3	23.3	22.3	22.3	18.9	15.4	15.4	14.7	17.5	24.3
20-Jun	12.5	13.8	12.5	13.0	13.4	14.1	14.9	15.2	16.1	17.4	19.0	20.4	20.3	17.5	16.3	14.9	14.8	14.5	14.6	14.4	14.2	13.8	13.7	13.5	15.2	20.4
21-Jun	13.7	12.9	12.6	13.1	13.4	12.8	11.8	10.8	10.5	10.6	11.0	11.0	10.9	11.0	11.1	11.0	11.0	11.4	12.6	13.1	13.0	12.9	12.2	11.3	11.9	13.7
22-Jun	10.6	10.2	9.5	8.8	8.1	8.0	8.0	8.5	9.5	11.0	12.3	12.9	13.5	14.3	14.8	15.5	15.9	16.1	16.2	15.6	14.1	10.1	8.4	7.5	11.6	16.2
23-Jun	7.4	6.4	4.5	4.3	6.3	9.1	10.3	12.0	14.0	15.8	16.9	18.1	19.1	19.9	20.2	21.2	20.7	19.8	18.4	17.0	14.3	11.7	11.0	14.1	21.2	
24-Jun	10.3	10.3	9.1	8.8	9.1	12.0	13.4	13.4	15.2	17.0	19.2	20.5	21.1	21.0	21.3	21.3	21.4	21.3	21.1	20.5	18.8	14.7	13.3	10.9	16.0	21.4
25-Jun	12.3	11.2	8.6	8.1	8.4	11.6	14.1	16.1	17.8	20.3	22.1	23.3	24.0	24.8	24.9	25.2	25.7	25.4	25.4	24.8	23.5	22.3	21.1	19.4	19.2	25.7
26-Jun	18.3	17.3	17.1	17.1	16.8	16.8	18.1	19.7	22.2	24.5	25.8	27.0	27.2	27.2	26.9	26.7	27.5	27.0	26.2	25.6	24.1	22.8	21.7	20.7	22.7	27.5
27-Jun	19.8	19.4	18.6	17.7	17.4	16.2	13.5	13.7	14.6	16.3	17.0	15.9	15.1	16.1	16.0	16.4	15.1	14.9	14.5	13.9	13.9	13.9	13.8	13.8	15.7	19.8
28-Jun	13.7	13.5	13.2	12.8	12.5	12.6	12.7	13.2	14.2	14.7	14.5	14.9	16.4	16.6	16.8	18.2	18.6	19.4	18.8	17.6	16.8	15.5	14.3	13.7	15.2	19.4
29-Jun	12.8	12.3	12.7	12.7	12.6	13.1	14.6	16.0	17.7	19.7	21.0	21.4	23.0	22.7	22.6	22.7	22.5	22.8	22.1	20.6	19.8	17.8	16.9	17.3	18.2	23.0
30-Jun	16.0	16.6	15.2	14.4	16.1	15.7	15.5	16.2	17.2	17.3	18.2	20.4	21.4	21.5	20.9	20.8	20.6	20.4	20.2	19.4	18.7	17.4	17.4	16.6	18.1	21.5
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mildred Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Mildred Lake - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	62	8.61	8.61
10 - 20	484	67.22	75.83
> 20	174	24.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



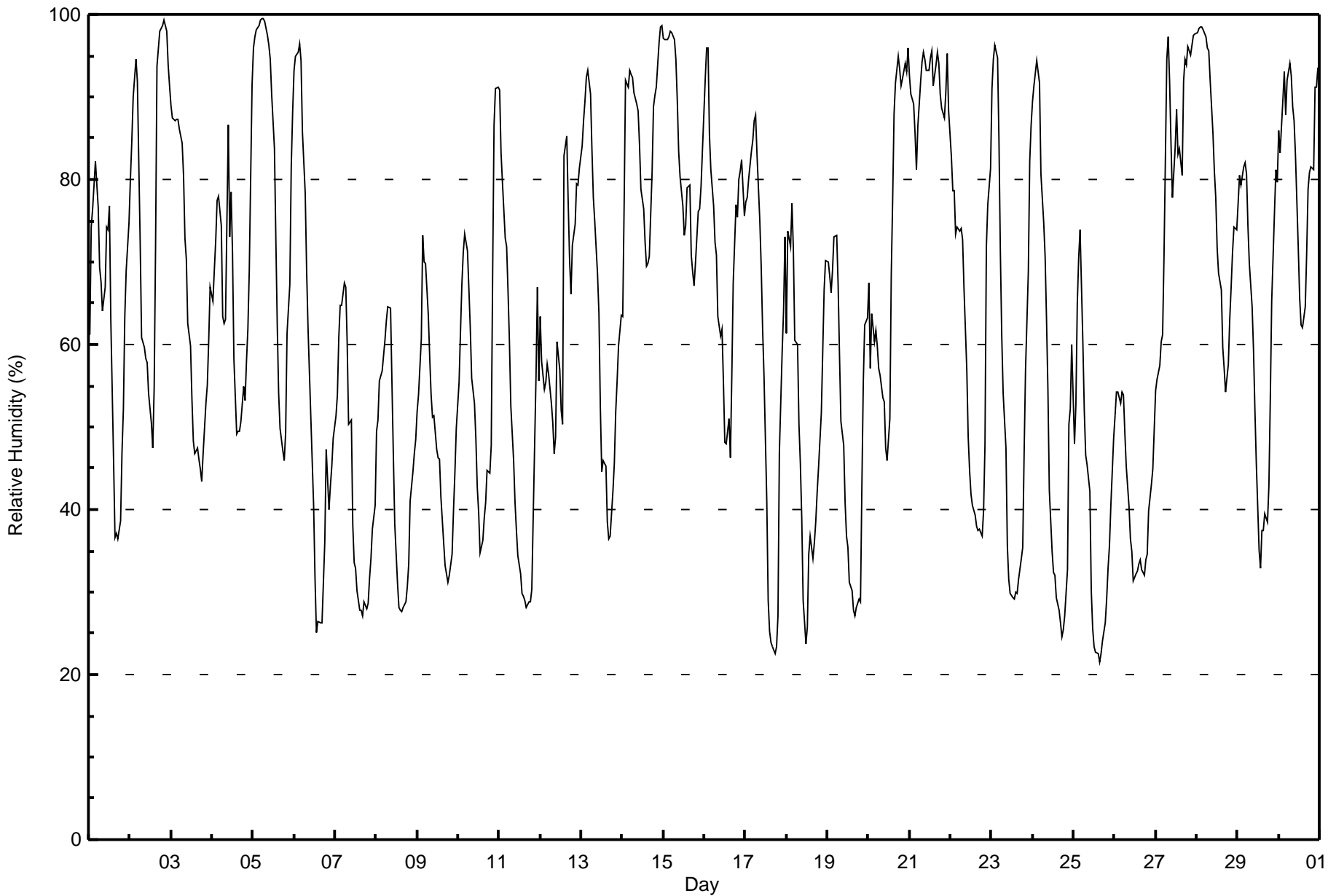
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mildred Lake - June 2017

Maximum Value: 100 % on Jun 5 06:00																	Maximum Daily Average: 91.4 % on Jun 21																	Hours in Service: 720	
Minimum Value: 22 % on Jun 25 16:00																	Minimum Daily Average: 40.1 % on Jun 25																	Hours of Data: 720	
Maximum Diurnal Average: 79.6 % at hour 4																	Minimum Diurnal Average: 47.5 % at hour 16																	Hours of Missing Data: 0	
Monthly Average: 63.2 %																	Percentiles: P ₁ = 23 P ₁₀ = 32 Q ₁ = 46 Median = 63 Q ₃ = 81 P ₉₀ = 93 P ₉₉ = 99																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	61	74	76	79	82	77	69	68	64	67	74	74	77	63	46	37	37	36	39	47	52	63	69	75	62.8	82									
2-Jun	80	85	90	95	92	82	72	61	60	58	58	54	50	48	55	72	94	98	98	99	99	98	94	91	78.4	99									
3-Jun	89	88	87	87	87	86	84	81	73	70	63	60	53	48	47	47	46	45	43	47	53	55	61	67	65.3	89									
4-Jun	65	69	72	77	78	74	63	62	63	87	73	78	71	58	49	50	49	51	55	53	58	62	69	91	65.8	91									
5-Jun	96	97	98	99	99	100	99	99	97	96	95	90	84	73	62	54	50	47	46	49	61	67	82	88	80.4	100									
6-Jun	93	95	95	96	94	86	78	69	62	57	51	40	32	25	26	26	26	31	36	47	40	43	45	49	56.0	96									
7-Jun	51	54	61	65	65	67	67	60	50	51	38	34	33	30	28	28	27	29	28	29	32	34	38	41	43.2	67									
8-Jun	49	51	56	57	59	60	63	65	64	55	47	38	31	28	28	28	28	29	31	33	41	45	47	48	45.0	65									
9-Jun	52	54	61	73	70	70	64	59	54	51	51	47	46	46	41	36	33	32	31	32	35	40	44	50	48.8	73									
10-Jun	55	61	67	71	73	71	67	62	56	53	49	43	40	35	36	39	41	45	44	48	69	87	91	91	58.1	91									
11-Jun	91	83	80	73	72	66	60	53	46	41	37	34	32	30	29	29	28	29	29	30	39	56	67	56	49.6	91									
12-Jun	63	58	55	56	58	57	53	51	47	49	60	57	52	50	83	85	77	70	66	72	75	79	79	81	63.9	85									
13-Jun	84	87	90	92	93	90	84	78	75	69	64	52	45	46	45	38	36	37	42	46	52	56	60	64	63.5	93									
14-Jun	63	77	92	91	93	93	92	91	89	88	84	79	76	72	69	70	71	81	89	90	91	97	98	99	84.8	99									
15-Jun	97	97	97	97	98	98	97	95	90	83	80	77	73	74	79	79	71	69	67	70	76	76	79	84	83.5	98									
16-Jun	92	96	96	85	81	77	72	71	63	61	62	56	48	48	51	46	56	67	77	75	80	81	82	76	70.9	96									
17-Jun	77	78	80	83	85	87	88	83	75	70	62	56	41	29	25	24	23	23	23	27	47	59	64	73	57.6	88									
18-Jun	61	74	72	77	72	60	60	50	46	39	29	24	26	35	37	34	36	38	42	45	52	59	67	70	50.2	77									
19-Jun	70	68	66	69	73	73	67	59	51	48	41	37	35	31	30	28	27	28	29	29	43	55	62	63	49.3	73									
20-Jun	67	57	64	60	62	60	57	56	54	53	47	46	51	68	78	88	92	95	93	91	92	94	93	96	71.5	96									
21-Jun	93	90	89	86	81	86	92	94	95	95	93	93	95	96	91	94	95	94	90	89	87	90	95	88	91.4	96									
22-Jun	83	79	79	73	74	74	74	73	67	57	49	45	42	41	39	38	38	38	37	40	48	72	77	81	59.0	83									
23-Jun	91	95	96	95	85	71	61	54	47	36	31	30	29	30	30	32	34	35	47	57	69	82	87	87	56.4	96									
24-Jun	89	91	94	93	92	81	75	71	63	55	42	35	32	32	29	28	26	25	25	27	33	50	52	60	54.2	94									
25-Jun	48	53	65	70	74	60	52	47	45	42	30	26	23	23	23	22	22	24	26	29	33	36	41	49	40.1	74									
26-Jun	51	54	54	53	54	54	49	45	40	36	35	31	32	33	33	34	33	32	34	34	40	43	45	50	41.7	54									
27-Jun	54	56	57	60	61	71	95	97	92	84	78	84	88	83	84	80	92	95	94	96	95	96	97	98	82.9	98									
28-Jun	98	98	98	99	98	97	96	96	92	86	81	78	72	69	67	60	57	54	58	63	67	71	74	74	79.2	99									
29-Jun	77	80	79	82	82	81	74	70	65	59	52	46	35	33	37	38	40	39	43	53	65	76	81	80	61.1	82									
30-Jun	86	83	90	93	88	92	94	93	89	87	83	72	66	62	62	65	71	79	81	82	81	91	91	94	82.2	94									
74.3																	76.1																	Diurnal Average	
98																	98																	Diurnal Maximum	
78.6																	79.6																		
79.2																	76.7																		
100																	99																		
74.0																	70.3																		
65.8																	62.7																		
58.0																	53.8																		
50.4																	47.9																		
48.0																	47.5																		
48.5																	49.8																		
51.1																	54.0																		
59.8																	66.7																		
70.9																	73.7																		
98																	99																		
98																	99																		





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Mildred Lake - June 2017

Maximum Speed: 25 km/h on Jun 12 12:00	Maximum Daily Speed Average: 17.7 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 17 21:00	Minimum Daily Speed Average: 0.7 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 3.5 km/h at hour 15	Minimum Diurnal Speed Average: 0.7 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 2.2 km/h 7.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 O ₃ = 13 P ₉₀ = 17 P ₉₉ = 24	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	NW2	S5	SW3	WSW2	WNW5	SW1	WNW5	W4	WNW5	SW6	SW5	SSW9	SSW7	SSE9	SSE9	SSW6	SSW6	SSW7	S7	ESE5	SE4	SSE4	SSW4	SW2	SSW3.7	SSE9
2-Jun	SE3	NW1	SSW3	S2	SSW5	SSW4	ESE2	N2	NNE6	N10	N10	N9	N7	NNE13	N11	WNW17	WNW17	WNW12	NW12	NW14	WNW9	NW9	WNW11	WNW13	NW5.8	WNW17
3-Jun	WNW14	WNW14	WNW13	WNW13	WNW13	WNW14	NW14	NNW13	NNW11	NW11	WNW12	NW10	NW9	NW10	N5	ESE4	E5	SE6	ESE6	SE6	SE6	SE8	E6	ESE3	NW5.1	WNW14
4-Jun	SSE10	SSE9	S10	SSW4	SW3	WSW3	NE2	SE2	WSW2	ESE4	NNE4	W4	W4	NNW5	N10	NNE10	NNE13	N10	NNW15	N17	N10	NNE8	N10	NNE13	N3.6	N17
5-Jun	NNE9	ENE7	ENE10	N12	N12	N14	NNE12	N11	N9	N10	N9	N10	NNW9	N10	NNE8	E8	E7	ENE8	E6	SSE5	ENE6	ENE5	NNE2	N2	NNE6.7	N14
6-Jun	E2	SE3	SSW3	ESE1	NE1	SE2	SSW6	S7	SSW6	SSW5	SSE7	S7	S8	SW7	W9	NW10	NW7	W3	NNE4	N2	NNE9	NNE10	NNE9	NNE8	W0.7	NNE10
7-Jun	NNE7	N8	N9	N10	NNE9	NNE8	N9	N8	N7	NNW11	NE9	NNE9	NNE14	NE13	ENE9	NE9	NE11	ENE9	ENE9	NE10	NNE9	NNE10	NNE10	NE9	NNE8.7	NNE14
8-Jun	N10	N11	N13	N11	N10	N8	N6	N6	NNE4	ENE5	E8	E8	SE11	ESE13	ESE13	SE13	SSE12	SSE12	SSE10	SE9	SE5	ESE8	ESE9	SE8	E4.5	SE13
9-Jun	SSE9	SSE10	SE4	N9	NNE8	NNE13	NNE23	NNE21	NNE21	NNE23	NE24	NE23	NNE24	NNE24	NNE22	NNE22	NNE21	NNE20	NE18	ENE18	ENE15	ENE13	ENE13	ENE10	NE14.9	NNE24
10-Jun	E12	E13	E9	E9	E7	NE6	E8	ENE4	NNE3	NNW11	N9	NE4	W6	WSW7	WSW6	SSW4	ENE4	NNE6	NNE8	NNW9	NNW16	N8	N10	N7	NNE4.4	NNW16
11-Jun	NNW7	NNW11	NNW15	NNW14	NNW15	NW16	NW18	NNW23	NNW24	NNW23	NNW20	NNW19	NNW17	NNW18	NNW18	NNW18	NNW17	N15	N14	N11	NE6	ENE6	E6	ESE7	NNW13.4	NNW24
12-Jun	SE5	S9	SE9	SSE12	SSE10	SE10	SSE14	SSE14	S13	S12	S14	SSE25	SSE23	SSE21	SSE11	SSE10	ENE7	E7	SE8	SSE9	SE4	N10	N12	N12	SSE8.2	SSE25
13-Jun	N10	N10	N10	N9	N8	NNE6	NNE5	SSW3	SSW6	SSW5	SW6	N4	N9	NNW13	NNW12	N8	N9	NNE13	NNE19	NNE16	NNE11	NNE12	NNE13	NNE15	N7.9	NNE19
14-Jun	NNE18	NNE16	NNE18	NNE23	NNE22	NNE24	NE20	NNE19	NE17	NNE16	NNE14	N22	N22	N20	NNE17	NNE16	N17	N16	NNE13	N15	N15	N15	N18	N19	NNE17.7	NNE24
15-Jun	N15	N14	N12	N13	N12	N12	N12	NNE19	NNE9	NNE6	NNW7	N9	N10	N10	ESE7	ESE8	E7	ESE6	ENE8	ENE5	NE4	ENE5	ENE5	NE3	NNE7.1	N15
16-Jun	N3	NNE4	E3	ESE6	SE6	SE7	SE6	SSE6	S7	SSW7	SSW8	S9	SW8	WSW8	SW4	WSW7	W9	WNW11	NNW6	ESE5	SW2	S5	SSE18	S3.2	SSE18	
17-Jun	SSE16	SSE15	SSE11	S8	S10	S6	WNW2	WNW11	WNW12	NW13	NNW10	NW10	NW17	NNW20	NW21	NW18	NW16	NNW16	NNW11	NNW6	WNW0	E2	SW3	SW2	NW5.2	NW21
18-Jun	SW2	SSE4	SSE4	SSW6	S5	SSW8	SW7	SSW9	SSW9	SW8	WSW10	WSW11	SW12	SW13	W11	W13	WSW14	W10	NNW14	NNW15	NNW14	NNW11	NNW9	WNW10	W5.8	NNW15
19-Jun	NNW4	WNW10	NW11	WNW8	WNW9	WNW9	WNW8	WNW5	W2	SW5	WSW4	SSW6	S7	SW5	NNW7	SW7	WSW8	SW8	SSW6	SSW6	S4	S6	SSW5	SW3	WSW4.2	NW11
20-Jun	SSE5	S6	SSE2	SE6	SSE8	SSE10	SSE9	SSE10	S9	SE10	SSE11	SSW12	SW12	SSW14	SSW16	SSW14	S12	S11	SSE16	SSE16	S12	SSE10	S10	S8	S9.5	SSE16
21-Jun	SSW12	SW9	SW8	WNW12	WNW16	WNW18	WNW19	WNW17	WNW14	WNW16	WNW13	WNW13	WNW16	WNW16	WNW19	WNW17	WNW16	WNW14	NNW15	N17	NNW15	NNW15	N21	N23	NW12.6	N23
22-Jun	N23	N20	N17	N23	N20	N20	N15	N13	N15	NNE18	N19	N21	N20	N17	N15	N17	N16	N12	NNE11	NE7	NE5	N4	NNW3	WSW3	N14.4	N23
23-Jun	WSW3	WSW2	E4	N4	NNW4	NNW5	N6	NNW6	NNW9	N12	N12	N10	N7	NE7	NW6	WNW5	N6	NE6	N4	NW4	ENE1	W1	WSW1	WSW0	N4.3	N12
24-Jun	NNW1	WSW1	SE4	SSE4	ESE3	SSE2	NNE4	N9	N9	N12	NNE10	NNE13	NNE14	NNE14	NNE13	N12	NNE12	N13	NNE10	NE7	NE5	ENE5	E7	E7	NNE6.5	NNE14
25-Jun	ESE9	ENE4	NE5	N7	N2	N2	NNW1	SSW3	SW3	SSW4	SSE7	S6	SSW4	SW7	S9	S10	S8	SSE11	SSE13	SSE13	SSE16	SSE17	SSE16	S11	SSE5.9	SSE17
26-Jun	S12	S12	SSE13	SSE16	SSE16	SSE16	SSE15	SSE15	SSE17	SSE17	SSE19	S23	SSE24	SSE23	SSE20	SSE19	SSE16	SSE19	SSE15	SSE15	ESE11	ESE13	SE12	SE9	SSE15.7	SSE24
27-Jun	SE9	SSE13	SE12	SE9	SSE11	SSW10	WSW9	SW5	SSW13	SSW11	SW6	WSW7	WSW7	S4	E6	ENE2	WSW4	WSW5	WNW6	NNW5	NW4	W1	ESE2	S2	SSW4.0	SSE13
28-Jun	E1	NE3	NNE6	NE6	ENE5	ENE6	ENE6	ENE4	ENE10	ENE12	ENE13	E11	NE11	NE14	NE10	ENE10	ESE9	SSE6	S8	S9	S9	S11	S11	S9	E4.7	NE14
29-Jun	SSW8	S8	S10	S10	S9	SSW6	SSE6	S6	SSW6	SW6	SSW7	WSW4	W6	NNW4	NNW2	N6	NE5	NNW6	N5	WNW1	WNW4	N2	N2	NW4	SW2.2	S10
30-Jun	S2	SW3	ESE2	SSW3	S2	WSW3	SSE3	SE6	SSE6	S6	S8	S8	S6	SW4	WNW8	WNW6	WSW5	WSW4	W3	NW4	NW4	SSE3	SSW4	SW3	SSW2.7	S8

ENE1.4	ENE0.7	NE1.6	N2.4	N1.9	N2.3	N2.8	N2.4	NNW2.1	NNW2.7	N2.1	NNW1.9	NNW2.5	NNW3.0	NNW3.5	NNW2.3	N2.6	N2.3	NNE3.1	NNE3.0	NE2.9	NE3.0	NE2.8	NNE2.0	Diurnal Average	
N23	N20	NNE18	NNE23	NNE22	NNE24	NNE23	NNW23	NNW24	NNW23	NE24	SSE25	NNE24	NNE24	NNE22	NNE22	NNE21	NNE20	NNE19	ENE18	NNW16	SSE17	N21	N23	Diurnal Maximum	

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

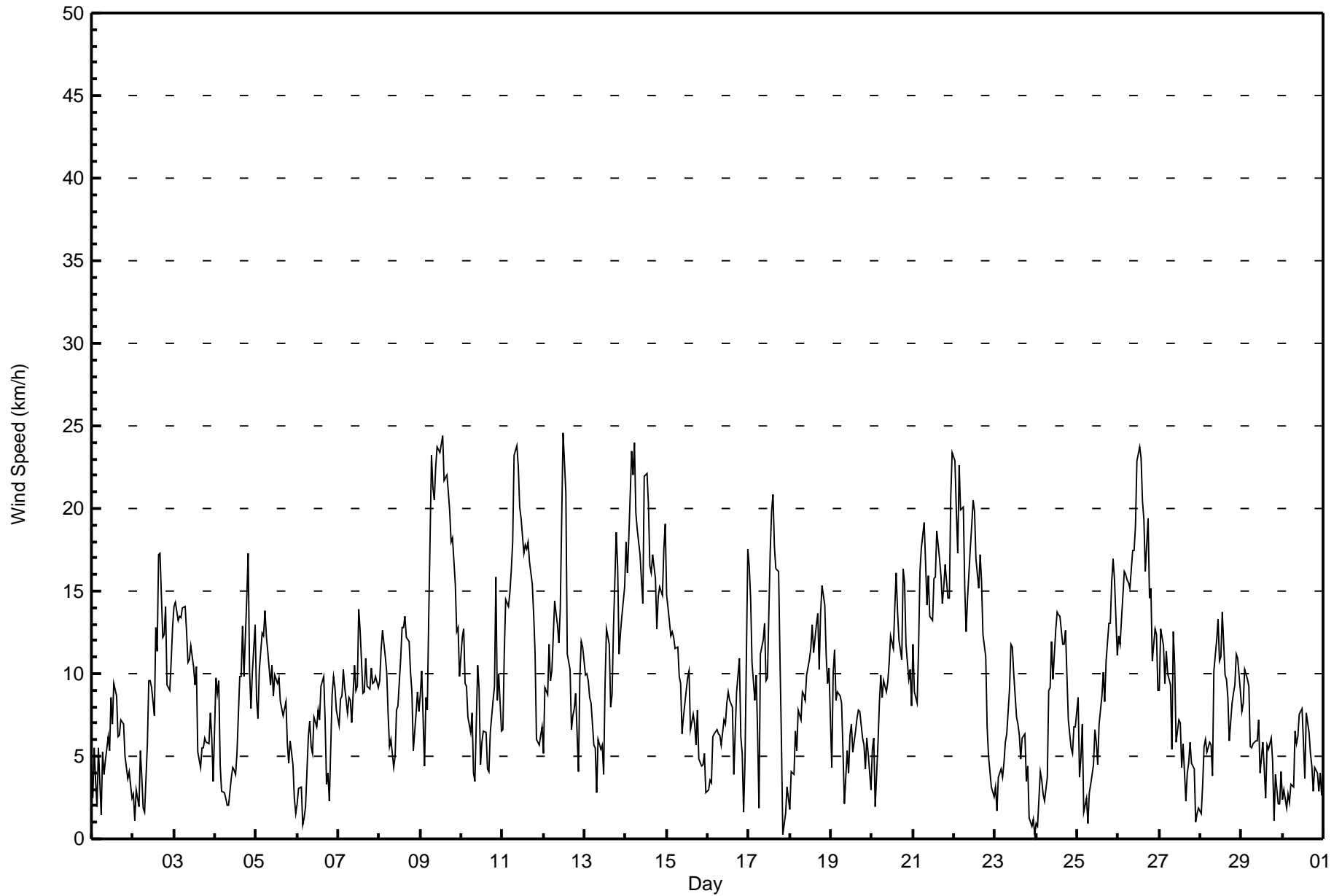
Wind Speed (WS) - km/h
Mildred Lake - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jun 9 13:00 Minimum Value: 1 km/h on Jun 22 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	2	1	2	2	2	1	2	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	3
2-Jun	2	1	1	2	2	2	1	2	3	3	2	2	3	5	3	6	5	4	4	4	3	3	4	4	6
3-Jun	4	4	4	4	4	4	4	3	3	4	4	3	4	4	4	2	2	2	2	1	1	1	1	2	4
4-Jun	2	2	2	2	1	2	1	2	4	2	2	1	2	2	2	2	3	2	6	5	3	2	2	3	6
5-Jun	4	2	3	3	2	3	2	2	2	2	2	2	2	3	3	4	2	2	2	1	5	3	2	1	5
6-Jun	1	1	2	1	1	1	1	1	2	2	2	2	3	3	4	3	3	1	1	2	2	2	2	2	4
7-Jun	1	1	2	2	2	2	2	2	2	3	3	5	4	4	4	5	5	3	4	3	2	2	2	2	5
8-Jun	2	2	2	2	1	1	2	2	1	2	3	3	4	3	4	4	3	3	3	3	1	1	1	2	4
9-Jun	1	2	1	3	2	6	6	5	6	6	6	7	7	7	6	6	6	6	6	5	4	3	4	3	7
10-Jun	3	3	3	3	2	2	2	3	3	4	4	3	3	3	3	2	2	1	2	3	5	2	3	2	5
11-Jun	1	2	3	3	3	4	5	6	6	6	6	5	6	6	5	5	5	4	3	4	2	1	1	1	6
12-Jun	1	2	3	4	3	2	4	3	3	3	4	6	5	5	6	4	3	2	3	2	2	3	2	2	6
13-Jun	2	2	1	2	2	1	2	2	2	2	2	3	4	3	2	3	3	4	4	3	4	4	4	4	4
14-Jun	6	4	5	5	5	6	6	5	5	4	4	5	5	5	5	4	5	4	3	3	3	3	3	3	6
15-Jun	3	3	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	1	1	1	1	3
16-Jun	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	2	4	5	4	3	2	2	3	4	5
17-Jun	3	3	4	2	3	3	2	3	4	4	4	4	6	6	6	5	5	4	4	2	1	1	1	1	6
18-Jun	2	1	2	1	2	2	3	3	3	3	4	4	4	5	5	5	5	4	3	3	3	2	2	3	5
19-Jun	2	3	3	2	3	3	2	2	1	2	2	3	3	4	4	3	3	3	1	2	1	1	1	2	4
20-Jun	2	2	1	2	2	2	3	3	2	2	2	3	4	5	4	3	3	3	4	3	3	2	3	2	5
21-Jun	3	3	3	5	5	5	6	5	5	5	4	4	5	5	6	6	5	4	4	4	3	5	6	5	6
22-Jun	6	6	4	6	6	5	4	3	3	5	4	5	5	5	4	4	5	3	3	2	1	1	1	1	6
23-Jun	1	1	1	2	1	2	2	2	2	3	4	4	4	4	3	2	4	3	1	2	1	1	1	2	4
24-Jun	1	2	1	1	1	1	2	2	3	3	4	5	5	4	5	4	4	3	3	2	1	1	1	1	5
25-Jun	2	1	1	2	2	1	1	1	1	1	3	3	2	3	4	4	4	3	4	3	3	3	3	2	4
26-Jun	3	3	4	3	3	4	4	3	4	3	5	6	5	5	5	4	4	4	3	4	3	3	3	2	6
27-Jun	2	3	3	2	4	3	5	3	3	3	3	3	2	1	2	2	1	2	2	2	2	1	1	1	5
28-Jun	1	1	2	1	1	1	1	1	4	4	3	3	3	3	3	3	3	3	2	2	2	3	3	3	4
29-Jun	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	2
30-Jun	1	1	1	1	1	2	1	2	2	2	2	2	2	2	3	2	2	2	1	2	2	1	1	1	3
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Mildred Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Mildred Lake - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	174	24.17	24.17
6 - 11	316	43.89	68.06
12 - 19	189	26.25	94.31
20 - 28	41	5.69	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mildred Lake - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	8	10	14	5	11	9	10	9	17	17	16	8	9	8	9	174
6 - 11	53	29	14	15	17	11	19	27	37	24	13	10	6	13	10	18	316
12 - 19	38	28	4	6	2	3	3	30	7	6	3	1	1	27	9	21	189
20 - 28	12	13	3	0	0	0	0	6	1	0	0	0	0	0	1	5	41
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	117	78	31	35	24	25	31	73	54	47	33	27	15	49	28	53	720

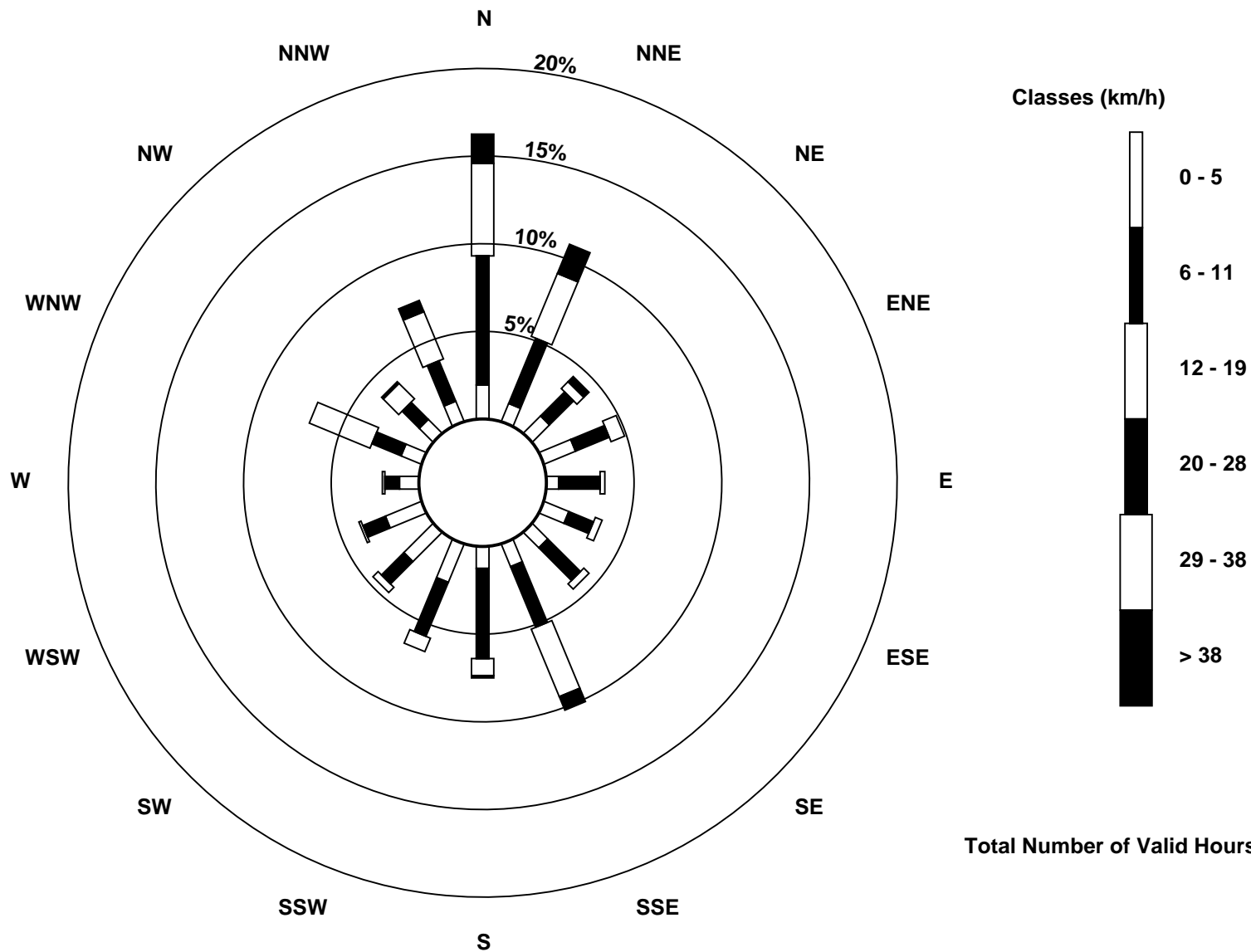
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Mildred Lake (AMS 2)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mildred Lake - June 2017

Direction of Maximum Speed: 160 deg on Jun 12 12:00 Direction of Maximum Daily Speed Average: 15.4 deg on Jun 14	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 290 deg on Jun 17 21:00 Direction of Minimum Daily Speed Average: 0.7 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 278.9 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	326	190	231	258	301	231	293	262	282	224	219	201	196	165	165	199	206	203	172	117	133	148	193	236	202.8
2-Jun	143	315	194	189	211	195	121	351	21	10	352	349	6	33	353	288	284	299	313	325	296	310	302	294	318.6
3-Jun	292	294	299	295	293	297	315	335	344	304	299	310	313	321	7	115	97	126	121	140	138	127	82	106	312.2
4-Jun	149	158	171	212	230	253	37	138	255	106	27	274	266	328	352	14	15	3	343	349	357	27	6	24	3.2
5-Jun	32	57	63	360	2	5	12	359	0	11	8	350	348	3	18	99	95	72	100	148	63	73	26	4	25.0
6-Jun	85	126	199	123	40	140	193	174	195	198	164	181	189	225	276	313	310	280	13	353	12	13	15	19	261.2
7-Jun	15	8	4	10	14	13	3	9	4	343	40	30	18	37	70	51	52	78	61	41	27	32	29	36	28.0
8-Jun	356	355	359	2	1	5	356	6	27	60	94	95	128	121	122	134	154	153	151	141	137	120	113	134	92.4
9-Jun	150	152	136	2	16	19	24	21	28	29	35	37	33	27	29	26	24	30	50	61	76	72	72	58	38.7
10-Jun	79	94	84	86	89	50	85	62	28	348	356	51	280	254	249	209	76	25	25	348	344	9	10	350	30.7
11-Jun	335	337	338	333	327	322	325	330	332	327	328	329	333	330	340	335	337	356	356	3	44	75	85	116	338.1
12-Jun	145	182	146	158	155	136	157	158	170	183	186	160	168	161	158	164	60	82	134	148	141	358	6	9	152.9
13-Jun	10	4	5	0	360	17	21	211	195	213	231	354	1	340	343	4	4	21	12	12	25	20	19	14	5.6
14-Jun	16	26	12	16	21	24	34	32	36	26	14	5	7	9	15	13	8	5	16	8	7	8	5	3	15.4
15-Jun	6	5	7	3	6	9	11	18	14	13	344	356	4	3	104	108	85	109	75	76	48	60	63	47	23.5
16-Jun	2	16	89	120	126	128	133	130	163	172	202	203	190	221	242	225	239	277	301	327	103	236	183	159	185.8
17-Jun	162	161	165	185	177	190	292	300	301	321	327	322	323	327	320	318	318	333	336	348	290	83	216	227	305.1
18-Jun	223	167	156	192	191	198	217	205	209	219	241	237	232	234	272	263	243	272	333	341	343	346	330	291	259.5
19-Jun	334	290	317	298	292	289	300	296	269	219	238	210	188	225	347	224	237	219	195	198	172	177	205	229	254.1
20-Jun	165	175	152	137	157	158	158	161	172	130	164	197	226	212	199	196	185	180	161	167	172	148	169	189	175.4
21-Jun	202	229	230	287	292	291	289	292	292	296	295	295	292	294	290	294	296	296	328	356	346	343	5	3	304.5
22-Jun	3	2	10	6	7	6	8	7	359	16	9	8	10	6	353	360	356	9	12	34	35	11	335	246	5.9
23-Jun	246	253	82	9	348	340	1	331	343	356	351	357	356	34	326	296	359	48	358	311	72	279	240	252	351.3
24-Jun	335	244	124	156	123	154	33	355	11	5	19	17	27	22	17	6	20	7	18	34	41	63	84	97	26.1
25-Jun	116	67	42	5	9	357	337	208	219	198	165	184	205	215	183	178	169	157	157	156	155	161	168	178	164.5
26-Jun	182	183	168	158	155	154	155	156	165	167	164	177	164	164	152	161	153	164	158	153	116	115	127	140	158.1
27-Jun	135	153	140	141	157	208	258	214	197	208	236	243	242	178	91	75	237	252	289	308	311	264	104	172	194.5
28-Jun	79	45	13	50	66	76	77	63	64	70	71	79	48	39	42	66	107	159	181	191	190	184	184	173	91.1
29-Jun	193	172	191	178	187	193	160	180	211	228	201	257	276	330	337	351	48	348	358	283	297	8	6	318	216.0
30-Jun	188	231	113	197	175	252	159	142	157	182	184	180	181	222	303	291	256	243	266	306	307	168	204	221	212.1

57.1 57.0 40.6 8.3 0.1 354.2 2.6 353.0 347.1 346.5 349.7 340.7 337.5 347.9 348.4 338.7 354.0 5.4 20.5 25.0 36.9 52.4 42.7 30.6

Diurnal Average

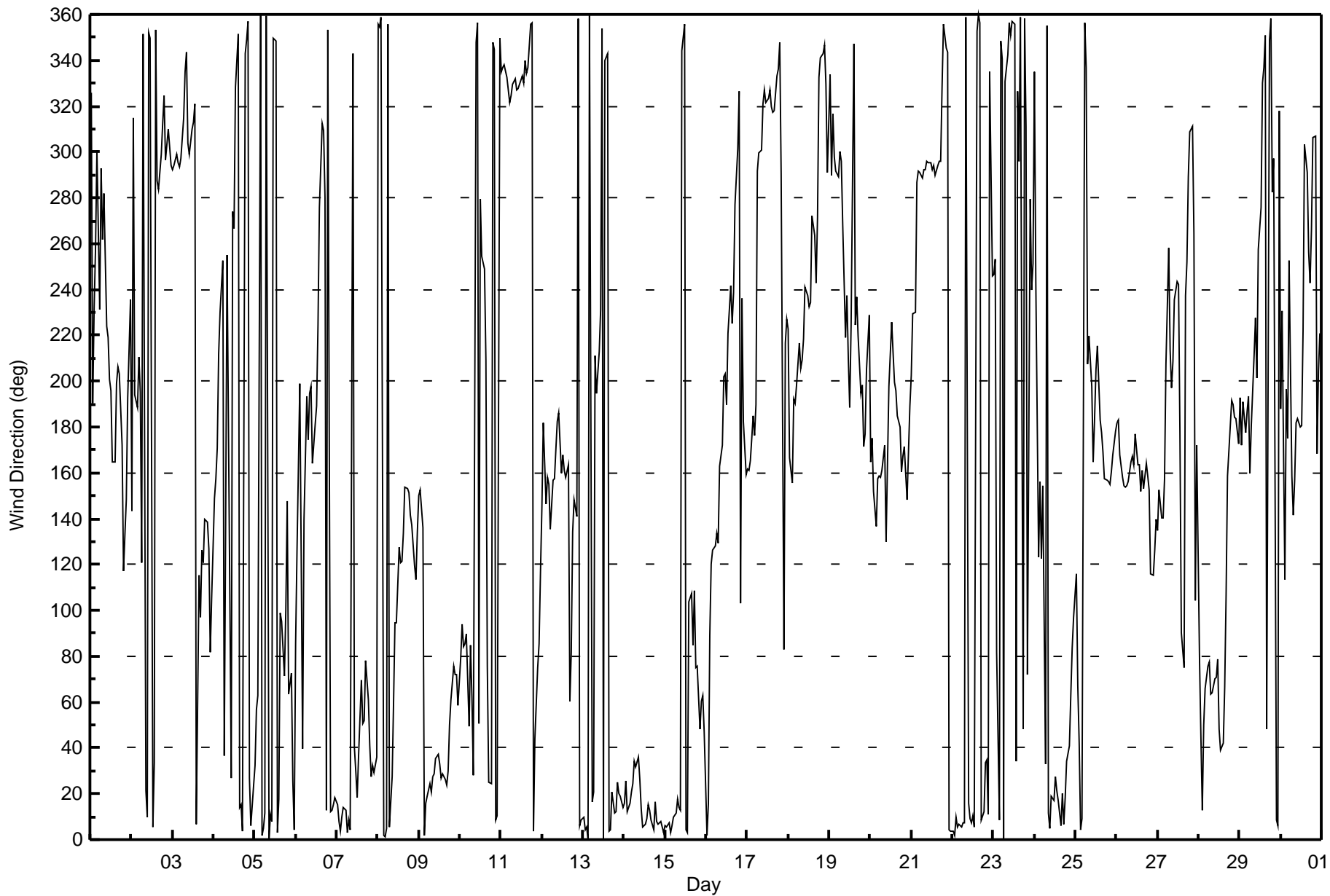
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mildred Lake - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Jun 4 09:00 Minimum Value: 7 deg on Jun 25 00:00 Percentiles: P ₁ = 10 P ₁₀ = 14 Q ₁ = 17 Median = 22 Q ₃ = 34 P ₉₀ = 54 P ₉₉ = 90																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	91	35	46	55	23	68	36	32	32	38	41	18	16	20	29	49	35	27	24	17	24	29	18	41	91
2-Jun	69	75	52	80	19	41	62	90	59	20	19	26	37	35	31	21	22	21	29	20	18	18	20	19	90
3-Jun	19	20	19	19	20	19	18	17	22	22	27	27	34	30	74	57	47	40	27	16	11	10	35	62	74
4-Jun	15	18	21	31	57	74	52	82	98	70	54	35	40	39	15	22	20	21	19	14	21	24	13	19	98
5-Jun	47	27	34	15	13	15	16	14	13	15	22	16	19	21	33	52	37	28	32	20	61	36	72	32	72
6-Jun	52	37	52	81	71	53	18	20	34	46	33	32	36	52	30	27	31	37	39	51	15	15	15	15	81
7-Jun	15	13	12	13	14	15	13	16	28	19	31	48	23	34	52	36	46	25	25	21	17	19	23	26	52
8-Jun	11	10	12	11	11	11	22	13	28	52	28	29	29	25	30	28	27	24	19	21	20	14	12	18	52
9-Jun	12	13	34	15	15	19	18	19	19	20	19	23	22	21	21	21	20	21	25	18	16	16	16	18	34
10-Jun	16	13	18	15	20	24	29	68	78	38	45	80	62	40	52	61	35	16	17	24	20	14	15	17	80
11-Jun	11	11	9	11	14	16	16	15	16	17	18	20	21	27	23	21	24	23	17	22	16	11	12	15	27
12-Jun	27	16	23	16	14	17	16	15	16	18	18	15	17	15	48	31	63	40	30	21	69	16	13	14	69
13-Jun	14	12	13	14	15	20	31	77	33	33	42	85	40	17	18	38	32	20	17	16	20	19	22	19	85
14-Jun	18	18	15	17	16	18	18	20	20	17	18	17	17	20	18	17	16	14	18	14	14	13	15	15	20
15-Jun	16	14	14	13	12	12	13	16	17	32	24	30	22	21	43	20	23	29	19	24	23	17	15	32	43
16-Jun	34	19	30	14	10	15	19	22	39	27	25	26	25	34	32	71	43	27	21	40	29	90	33	14	90
17-Jun	13	14	14	18	18	25	90	19	20	26	35	32	17	21	20	21	22	18	16	19	89	61	35	57	90
18-Jun	83	52	41	15	17	22	27	20	23	27	34	30	29	33	35	29	27	34	15	12	21	12	19	19	83
19-Jun	53	23	17	19	17	18	22	39	78	42	76	60	56	70	54	41	35	24	20	17	12	8	19	53	78
20-Jun	15	31	61	19	12	13	22	20	19	21	17	18	28	22	16	15	17	20	14	13	15	15	22	22	61
21-Jun	16	29	28	27	21	20	20	21	24	21	20	20	20	21	19	20	20	20	19	14	11	10	17	17	29
22-Jun	16	16	17	17	18	17	15	17	19	22	20	20	23	23	22	22	21	26	21	18	15	8	26	29	29
23-Jun	11	57	26	36	25	13	23	21	19	22	26	39	54	55	55	53	61	36	47	42	69	91	62	90	91
24-Jun	75	94	25	38	51	57	43	22	25	25	36	27	28	30	33	36	32	22	23	19	13	17	11	7	94
25-Jun	13	28	18	12	58	11	85	58	56	51	45	52	69	40	37	34	38	27	22	18	15	12	12	14	85
26-Jun	15	15	15	14	15	16	17	16	14	16	18	19	15	16	18	14	19	13	14	18	15	14	17	17	19
27-Jun	16	14	17	17	20	35	32	64	15	20	34	29	27	38	24	82	29	49	26	30	34	87	69	79	87
28-Jun	64	18	17	24	21	16	18	28	25	22	18	19	28	23	30	33	40	48	20	12	15	16	17	21	64
29-Jun	23	14	13	16	17	18	35	33	23	31	28	59	42	61	85	37	32	30	22	77	25	43	50	37	85
30-Jun	49	23	42	36	80	51	58	28	27	26	25	26	39	44	30	22	36	26	51	22	50	21	41	39	80
																		91 94 61 81 80 74 90 90 98 70 76 85 69 70 85 82 63 49 51 77 89 91 72 90							
Diurnal Maximum																									





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	June 7, 2017	Last Cal Date:	May 1, 2017
Start time (MST):	9:42	End time (MST):	12:39
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	51.2	ppm	Cal Gas Exp Date	2/19/18
Calibrator Make/Model	API T700		Serial Number	1185
ZAG Make/Model	APT T701		Serial Number	4767

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	JC1404901075		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 1000 ppb		PMT voltage	-653.8	-653.4
Calculated slope	1.004309	0.995099	Lamp voltage	806	806
Calculated intercept	1.360755	0.793031	Pressure	699.1	695.0
Analyzer Background	20.9	20.9	Flow	0.497	0.495
Analyzer Coefficient	0.956	0.956	Intensity	91	91

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5001	0.0	0.0	-1.4	----
as found span	4931	76.4	781.2	783.8	0.997
calibrator zero	5000	0.0	0.0	-1.4	----
high point	4931	76.4	781.2	783.8	0.997
second point	4969	38.3	391.6	393.5	0.995
third point	4986	19.2	196.4	196.8	0.998
as left zero	5003	0.0	0.0	-1.2	----
as left span	4932	76.4	781.0	790.0	0.989
Average Correction Factor					0.997

Corrected As found	785.13	Previous response	776.47	*% change	-1.1%
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* = > +/-5% change initiates investigation

Notes: No adjustments required.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

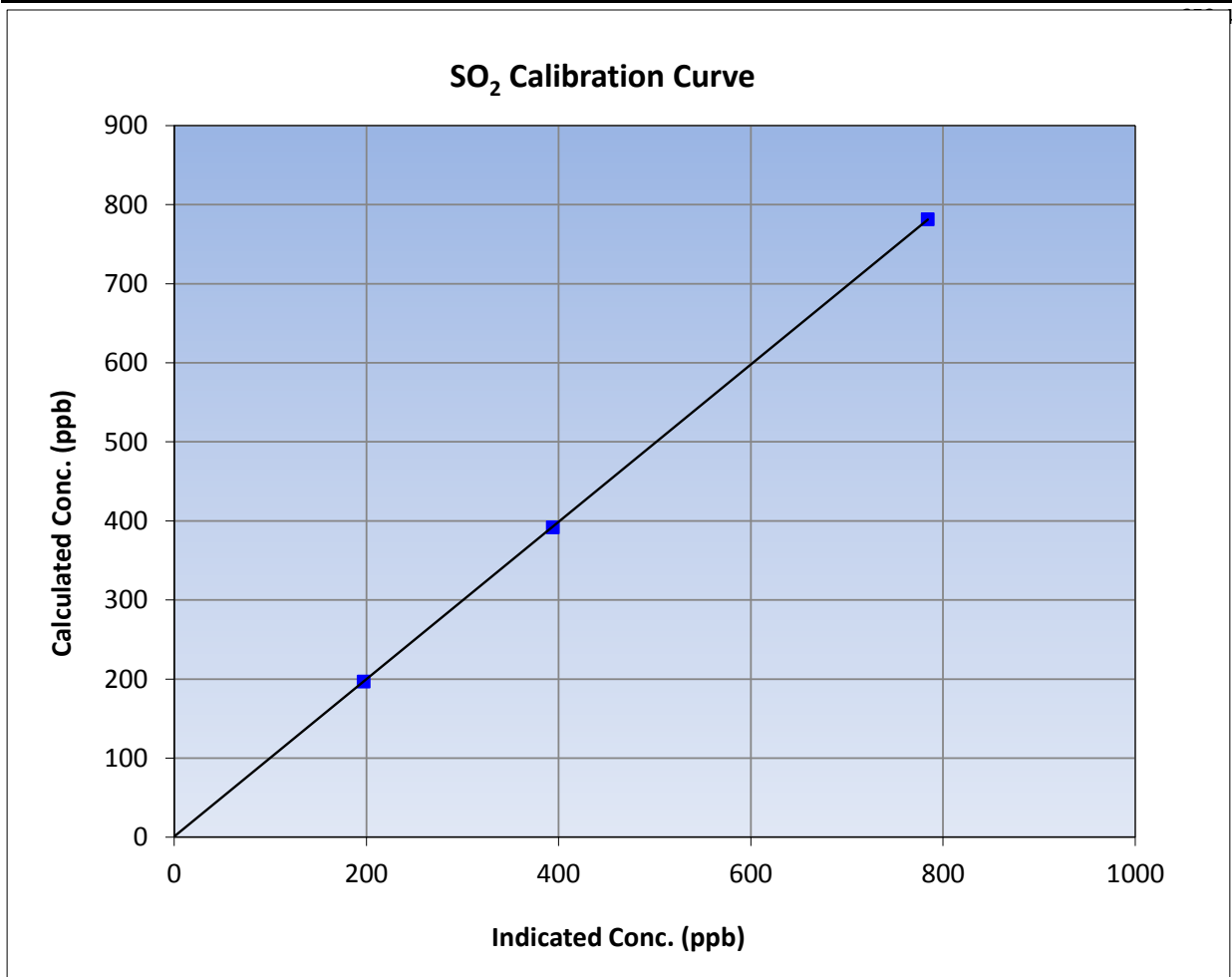
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 1, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	9:42	End Time (MST)	12:39
Analyzer make	Thermo 43i	Analyzer serial #	JC1404901075

Calibration Data

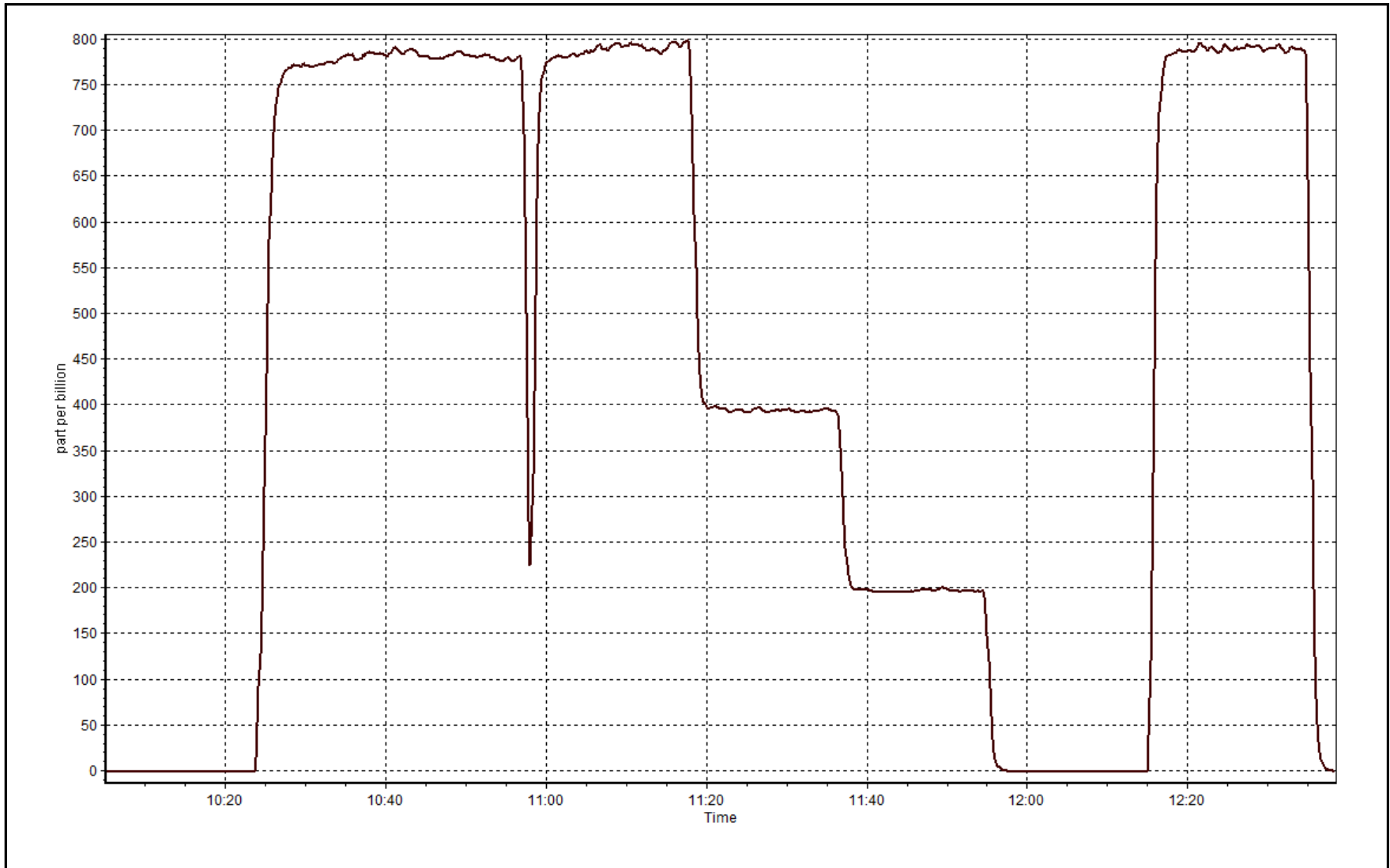
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-1.4	----	Correlation Coefficient	0.999997	≥0.995
781.2	783.8	0.9967			
391.6	393.5	0.9953	Slope	0.995099	0.90 - 1.10
196.4	196.8	0.9978			
			Intercept	0.793031	+/-30



SO2 Calibration Plot

Date: June 7, 2017

Location: Mildred Lake





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	June 8, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	9:30	End time (MST):	11:34
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.04</u>	ppm	Cal Gas Exp Date	September 9, 2017
Cal Gas Cylinder #	<u>ALM028262</u>			
Calibrator Make/Model	API T700		Serial Number	1185
ZAG Make/Model	API T701		Serial Number	825

Analyzer Information

Analyzer make: TEI 450i

Analyzer serial #: 815129107

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-601	-601
Calculated slope	0.997499	0.999083	Lamp voltage	790	789
Calculated intercept	-0.120651	-0.318313	Pressure	561.2	557.9
Analyzer Background	16.9	16.9	Flow	0.975	0.968
Analyzer Coefficient	0.976	0.976	Intensity	88	87

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5002	0.0	0.0	0.5	----
as found span	4928	80.1	80.6	81.1	0.994
calibrator zero	5000	0.0	0.0	0.5	----
high point	4927	80.1	80.6	81.1	0.994
second point	4966	40.1	40.4	40.7	0.992
third point	4988	20.1	20.2	20.3	0.997
as left zero	5004	0.0	0.0	0.5	----
as left span	3945	64.1	80.6	82.6	0.976

SO₂ Scrubber Check

			Average Correction Factor	0.994
Corrected As found	80.60	Previous response	80.93	*% change 0.4%

* = > +/-5% change initiates investigation

Notes:

No adjustments required.

Calibration Performed By:



Wood Buffalo Environmental Association

H₂S Calibration Summary

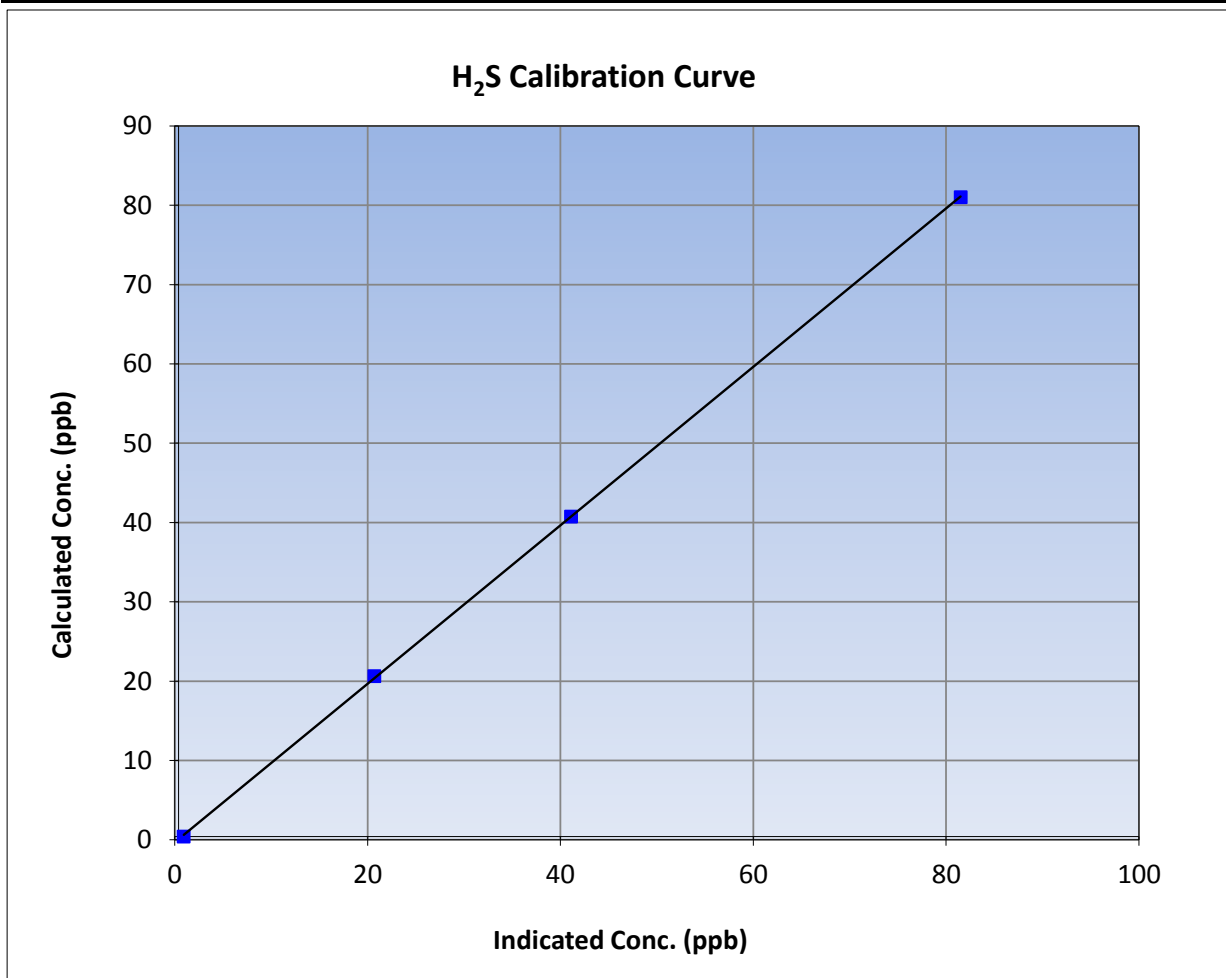
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 2, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	9:30	End Time (MST)	11:34
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

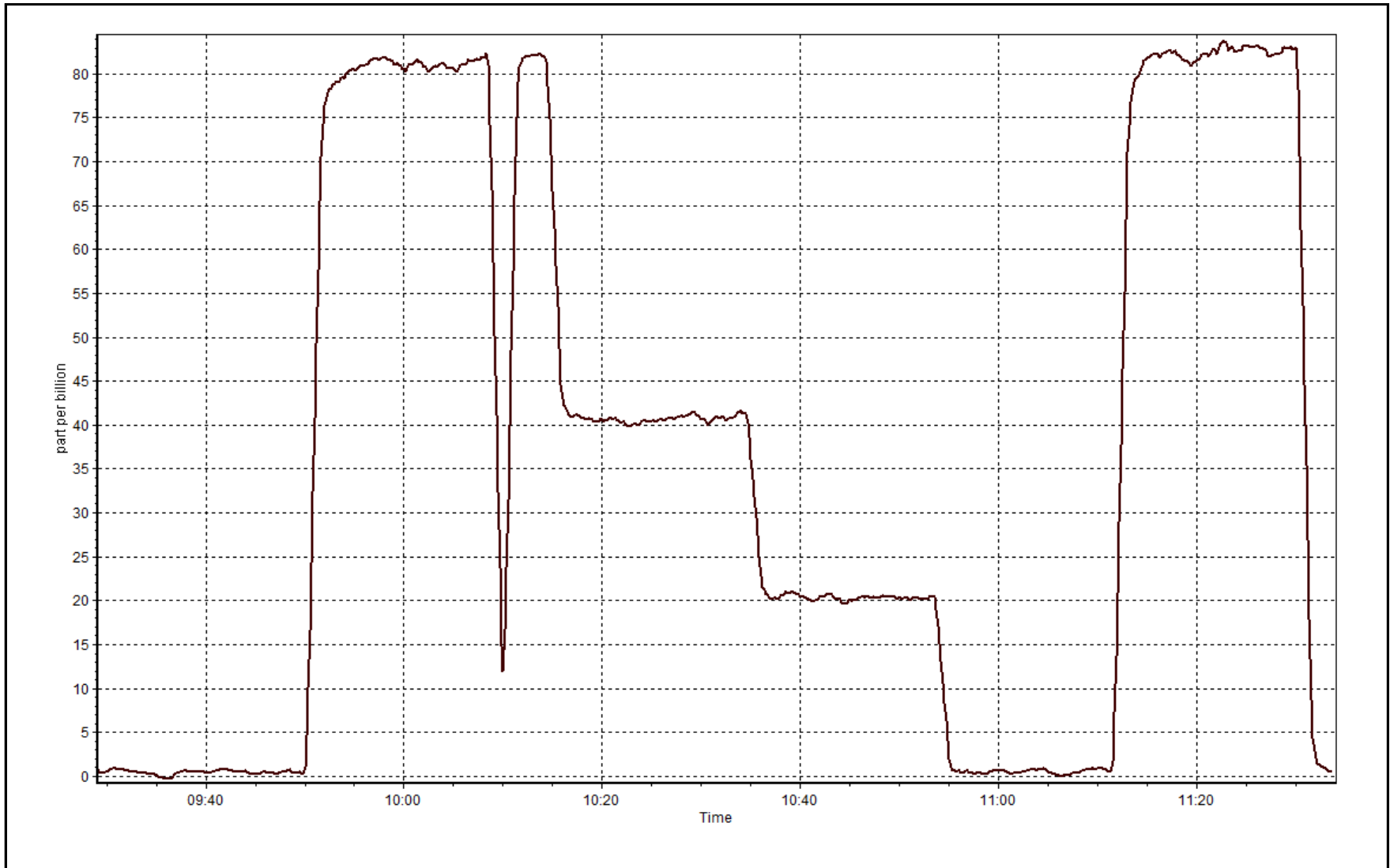
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.5	----	Correlation Coefficient	≥0.995
80.6	81.1	0.9942		
40.4	40.7	0.9919	Slope	0.90 - 1.10
20.2	20.3	0.9969		
			Intercept	+/-3



H₂S Calibration Plot

Date: June 8, 2017

Location: Mildred Lake





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	June 7, 2017	Last Cal Date:	May 1, 2017
Start time (MST):	9:42	End time (MST):	12:39
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL107930	Cal Gas Expiry Date	2/9/18
CH4 Cal Gas Conc.	509 ppm	CH4 Equiv Conc.	1081.0 ppm
C3H8 Cal Gas Conc.	208 ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	1185
ZAG Make/Model	Teledyne API 701	Serial Number	4767

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1300156231
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-301.3
Calculated slope	0.991198	Sample pressure	8.2
Calculated intercept	0.112563	Fuel pressure	21.8
Analyzer Background	0.56	Air pressure	33.1
Analyzer Coefficient	3.787	Flame temperature	143.7
			<u>Finish</u>
			-301.7
			8.2
			21.8
			33.1
			143.8

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5001	0.0	0.00	-0.15	----
as found span	4931	76.4	16.49	15.10	1.092
calibrator zero	5002	0.0	0.00	-0.15	----
high point	4931	76.4	16.49	16.45	1.003
second point	4969	38.3	8.27	8.15	1.015
third point	4987	19.2	4.15	4.00	1.036
as left zero	5003	0.0	0.00	-0.18	----
as left span	4932	76.4	16.49	16.28	1.013
Average Correction Factor					1.018
Corrected As found	15.25	Previous response	16.53	*% change	8.4%
<i>* = > +/-5% change initiates investigation</i>					

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

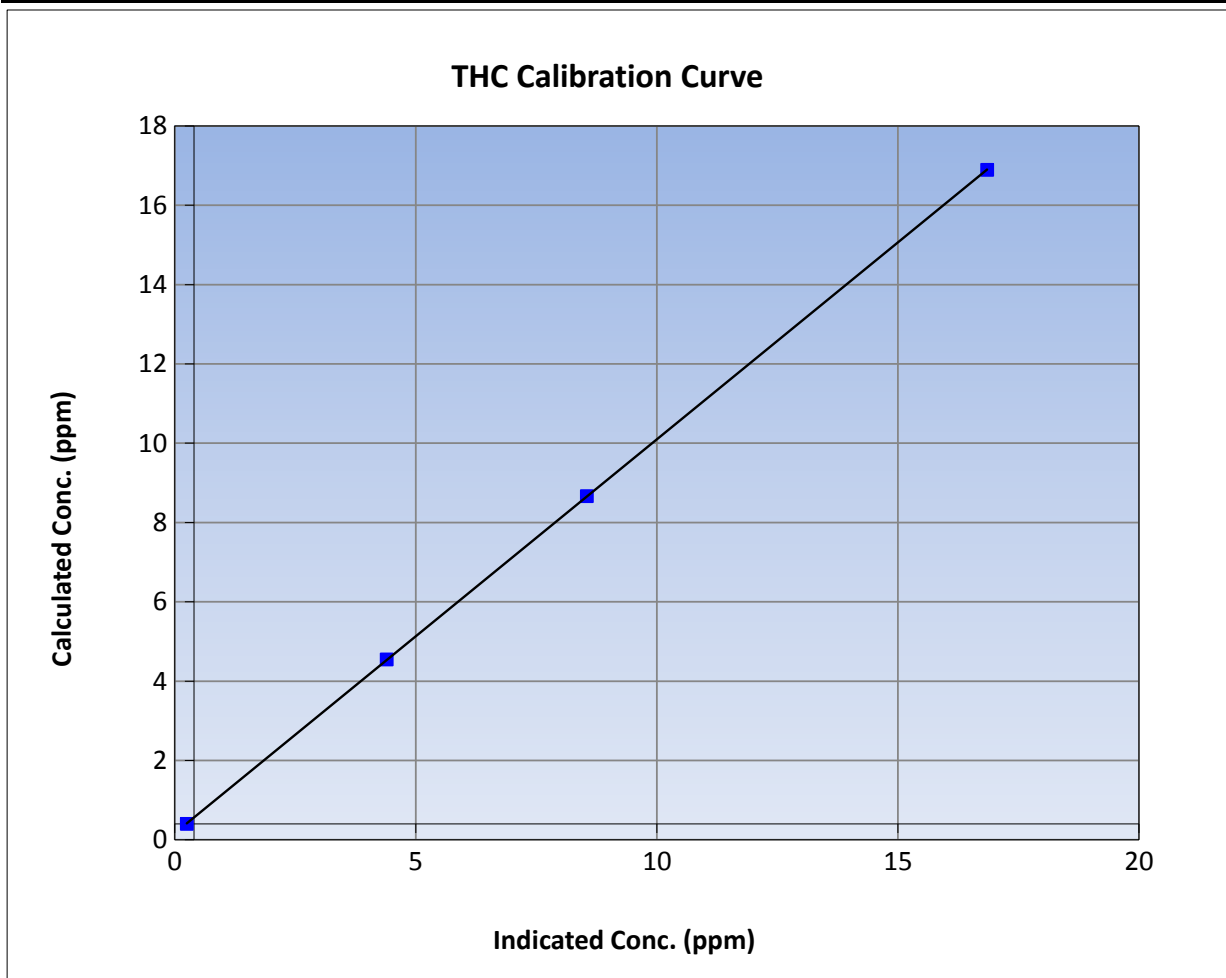
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 1, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	9:42	End Time (MST)	12:39
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

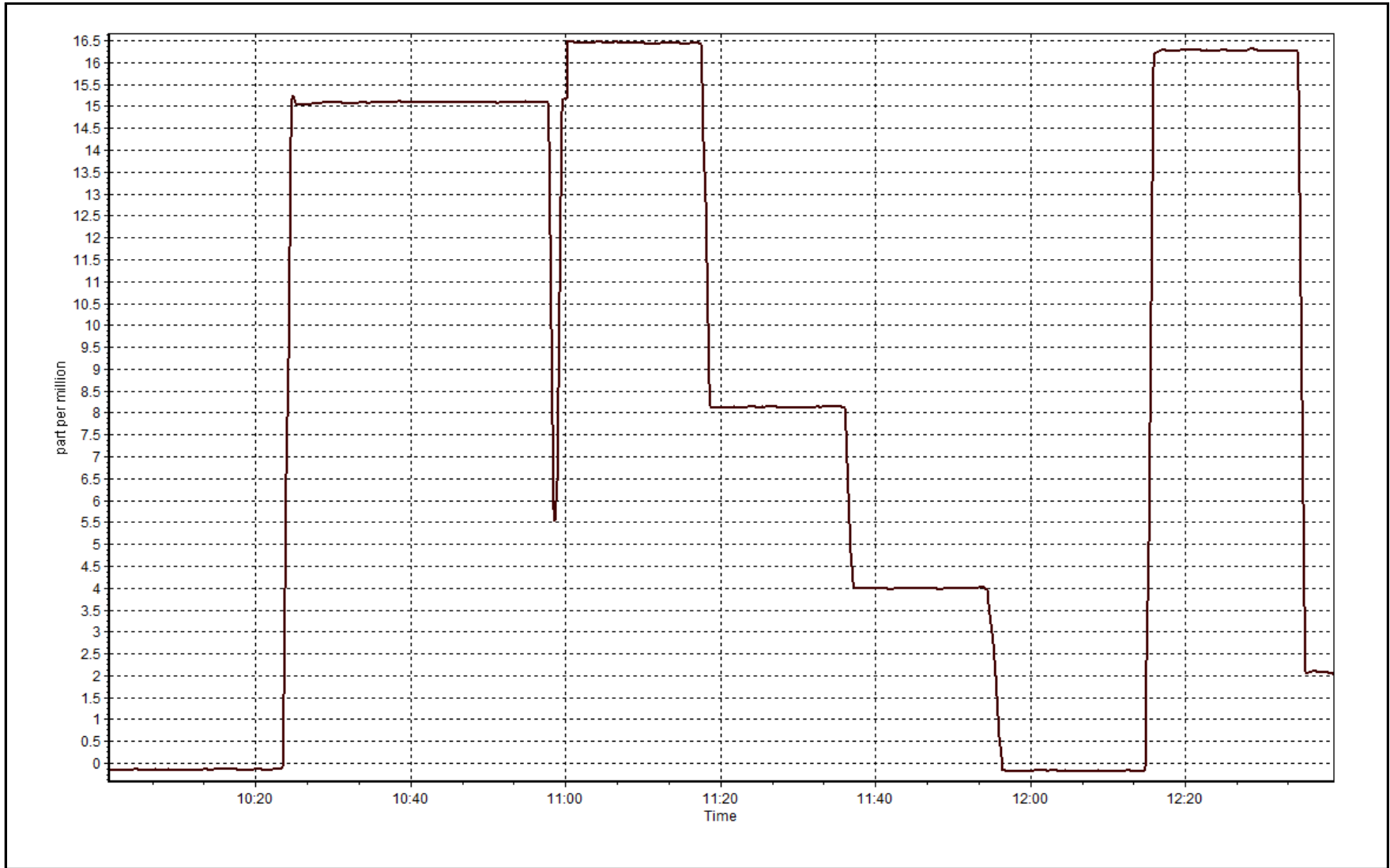
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999997	≥0.995
16.5	16.5	1.0026			
8.3	8.2	1.0145	Slope	0.993254	0.90 - 1.10
4.1	4.0	1.0365			
			Intercept	0.162371	+/-1.5



THC Calibration Plot

Date: June 7, 2017

Location: Mildred Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
Temperature 20 m (C) Average	720	0	0	100	28	-	22.7	-
Temperature 45 m (C) Average	720	0	0	100	27.8	-	22.7	-
Temperature 100 m (C) Average	720	0	0	100	27.4	-	22.5	-
Temperature 167 m (C) Average	720	0	0	100	26.8	-	22.1	-
Relative Humidity 20 m (%) Average	720	0	0	100	99	-	87.0	-
Relative Humidity 45 m (%) Average	720	0	0	100	98	-	85.0	-
Relative Humidity 100 m (%) Average	720	0	0	100	98	-	85.0	-
Relative Humidity 167 m (%) Average	720	0	0	100	98	-	86.0	-
Wind Speed 20 m (km/h) Average	720	0	0	100	23	-	16.0	-
Wind Speed 45 m (km/h) Average	720	0	0	100	32	-	20.0	-
Wind Speed 100 m (km/h) Average	720	0	0	100	46	-	31.0	-
Wind Speed 167 m (km/h) Average	720	0	0	100	51	-	32.0	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 100 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 167 m (deg) Average	720	0	0	100	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100	1	-	0.3	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100	1.5	-	1.0	-
Vertical Wind Speed 100 m (km/h) Average	720	0	0	100	3.7	-	1.9	-
Vertical Wind Speed 167 m (km/h) Average	718	0	2	99.72	4.4	-	1.9	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Vertical Wind Speed 167 m	14 Jun 2017 22:00	14 Jun 2017 23:00	2	Unstable operation - spurious values

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
Temperature 20 m (C) Average	720	16.62	4.7	-	5.2	10.9	13.4	16.2	19.9	23.1	28
Temperature 45 m (C) Average	720	16.56	4.6	-	5.7	10.9	13.4	16.2	19.8	22.8	27.8
Temperature 100 m (C) Average	720	16.35	4.4	-	6.5	10.8	13.2	16	19.6	22.4	27.4
Temperature 167 m (C) Average	720	16.15	4.4	-	6	10.6	13.1	15.9	19.2	22.2	26.8
Relative Humidity 20 m (%) Average	720	62.6	21	-	22	32	45	65	81	91	99
Relative Humidity 45 m (%) Average	720	61	21	-	21	31	43	63	79	88	98
Relative Humidity 100 m (%) Average	720	59.1	21	-	21	30	41	60	77	87	98
Relative Humidity 167 m (%) Average	720	58	21	-	21	30	40	58	75	87	98
Wind Speed 20 m (km/h) Average	720	7.3	5	-	0	2	4	6	10	15	23
Wind Speed 45 m (km/h) Average	720	10	6	-	0	2	5	9	14	19	32
Wind Speed 100 m (km/h) Average	720	14.7	9	-	0	4	7	13	21	28	46
Wind Speed 167 m (km/h) Average	720	16.9	10	-	0	5	8	15	24	32	51
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	-0.13	0.3	-	-1.3	-0.6	-0.3	-0.1	0.1	0.2	1
Vertical Wind Speed 45 m (km/h) Average	720	-0.07	0.6	-	-1.7	-0.8	-0.4	-0.1	0.3	0.7	1.5
Vertical Wind Speed 100 m (km/h) Average	720	0.23	0.7	-	-1.4	-0.4	-0.2	0.1	0.5	1	3.7
Vertical Wind Speed 167 m (km/h) Average	718	0.48	0.7	-	-1.3	-0.3	0	0.3	0.8	1.5	4.4



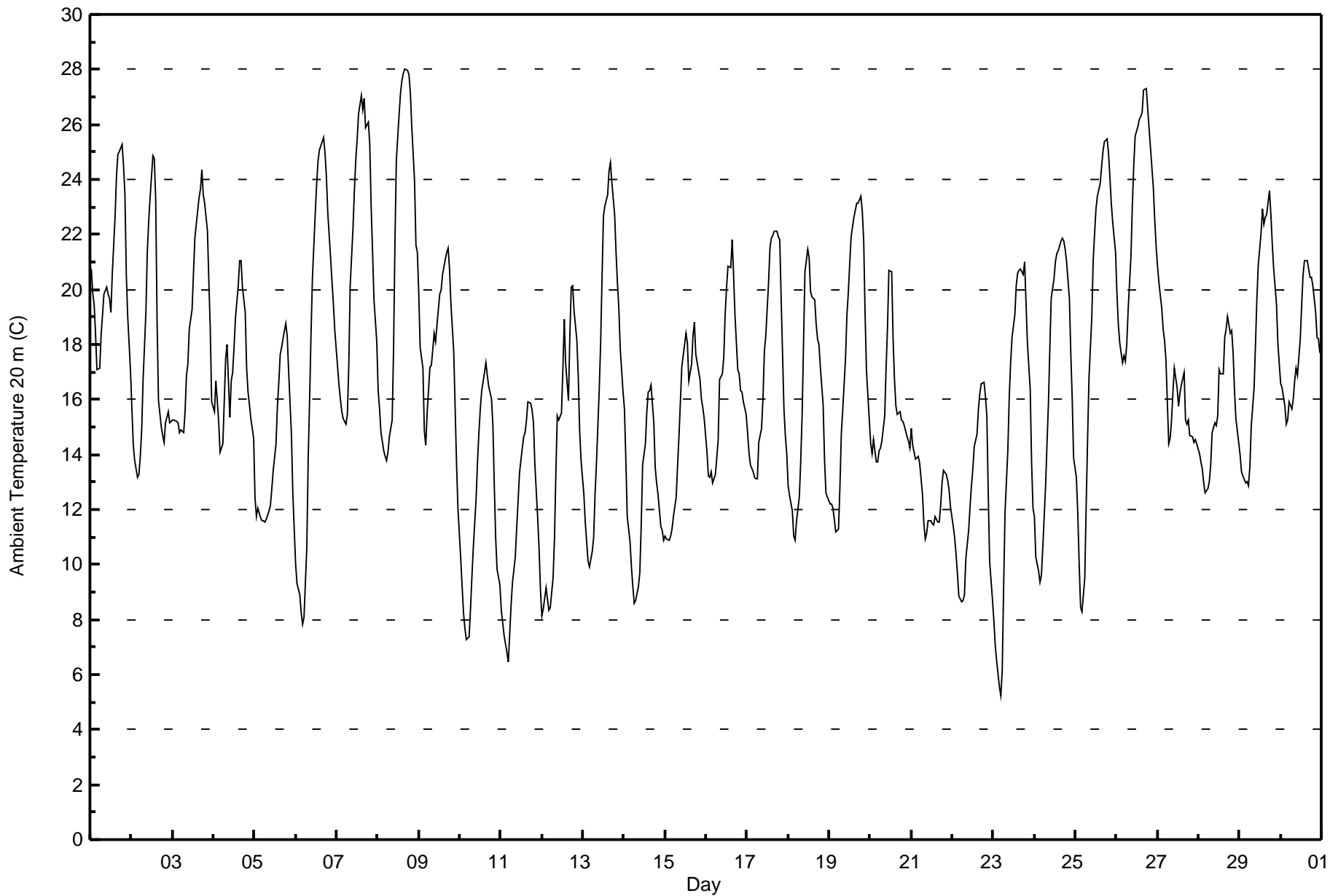
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 20 m (AT20m) - C

Lower Camp Met Tower - June 2017

Maximum Value: 28.0 C on Jun 8 17:00 Maximum Daily Average: 22.7 C on Jun 26																				Hours in Service: 720 Hours of Data: 720																												
Minimum Value: 5.2 C on Jun 23 05:00 Minimum Daily Average: 11.5 C on Jun 11 Maximum Diurnal Average: 20.5 C at hour 17 Minimum Diurnal Average: 12.0 C at hour 5 Monthly Average: 16.62 C Percentiles: P₁ = 7.3 P₁₀ = 10.9 Q₁ = 13.4 Median = 16.2 Q₃ = 19.9 P₉₀ = 23.1 P₉₉ = 27.2																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.7	19.9	19.5	18.4	17.1	17.1	18.3	19.1	19.8	20.1	19.8	19.7	19.2	20.6	22.7	24.1	24.9	25.0	25.3	24.5	23.5	20.6	19.0	17.0	20.7	25.3																						
2-Jun	15.7	14.3	13.8	13.2	13.3	13.9	14.9	16.7	19.2	21.4	22.5	23.3	24.9	24.8	23.3	18.8	16.0	15.0	14.7	14.5	15.2	15.6	15.1	15.2	17.3	24.9																						
3-Jun	15.3	15.3	15.2	15.2	14.8	14.9	14.8	15.5	16.9	17.3	18.5	19.3	20.6	21.9	22.4	23.3	23.6	24.4	23.4	23.1	22.1	20.3	18.5	15.9	18.9	24.4																						
4-Jun	15.6	16.7	16.0	15.2	14.1	14.4	15.9	17.5	18.0	15.4	16.7	17.0	17.9	19.0	20.1	21.0	21.0	20.1	19.2	17.2	16.2	15.8	15.3	14.6	17.1	21.0																						
5-Jun	12.4	11.8	12.0	11.7	11.6	11.6	11.5	11.6	11.9	12.2	12.8	13.4	14.4	15.8	16.6	17.7	17.9	18.5	18.8	18.3	17.0	14.8	12.6	11.3	14.1	18.8																						
6-Jun	10.0	9.3	8.9	8.2	7.8	8.1	10.6	13.9	16.0	18.4	20.4	22.7	23.8	24.7	25.1	25.4	25.5	24.9	24.1	22.8	21.2	20.3	19.5	18.5	17.9	25.5																						
7-Jun	17.2	16.5	16.0	15.6	15.3	15.1	15.5	17.3	20.1	22.2	23.6	24.7	25.5	26.4	27.0	26.5	27.0	25.9	26.1	25.3	23.0	21.4	19.6	18.1	21.3	27.0																						
8-Jun	16.3	15.6	14.8	14.1	14.0	13.8	14.1	14.6	15.3	17.8	21.8	24.7	26.4	27.2	27.6	27.9	28.0	28.0	27.8	27.2	25.9	24.0	21.6	21.4	21.2	28.0																						
9-Jun	19.9	17.9	17.1	14.9	14.3	15.5	17.2	17.2	17.8	18.4	18.1	19.3	19.8	20.0	20.5	21.1	21.4	21.5	20.7	19.5	17.8	15.7	13.7	12.0	18.0	21.5																						
10-Jun	10.2	9.2	8.3	7.7	7.3	7.3	8.4	9.6	10.6	12.4	13.7	14.8	15.7	16.3	17.0	17.3	16.9	16.5	16.0	15.1	12.8	10.9	9.8	9.3	12.2	17.3																						
11-Jun	8.4	7.9	7.4	6.8	6.4	7.5	8.5	9.4	10.3	11.3	12.3	13.3	14.2	14.6	14.8	15.3	15.9	15.9	15.6	15.2	13.6	11.7	10.6	9.0	11.5	15.9																						
12-Jun	8.1	8.4	9.1	8.8	8.3	8.4	9.5	10.9	13.3	15.4	15.3	15.5	17.1	18.9	17.3	16.0	18.4	20.1	20.1	19.2	18.2	16.8	14.9	13.8	14.2	20.1																						
13-Jun	12.5	11.6	10.8	10.1	9.9	10.5	11.0	12.5	13.7	16.4	18.1	20.4	22.7	23.1	23.4	24.3	24.6	23.9	22.7	21.4	20.2	19.3	17.9	16.3	17.4	24.6																						
14-Jun	15.7	13.8	11.8	10.8	9.9	9.2	8.6	8.7	9.2	9.7	11.4	13.6	14.4	15.5	16.3	16.3	16.5	15.2	13.5	13.0	12.6	11.4	11.2	10.9	12.5	16.5																						
15-Jun	11.0	10.9	10.9	11.1	11.3	11.7	12.5	13.6	14.7	15.9	17.2	18.0	18.4	18.1	16.7	17.3	18.3	18.8	17.7	17.3	16.7	16.0	15.7	15.3	15.2	18.8																						
16-Jun	14.1	13.2	13.1	13.4	13.0	13.3	13.9	14.5	16.7	16.9	17.5	19.1	20.1	20.8	20.8	21.8	20.6	19.1	17.1	16.9	16.3	16.3	15.9	15.5	16.7	21.8																						
17-Jun	14.8	14.1	13.6	13.4	13.1	13.1	13.1	14.4	15.0	16.0	17.7	18.3	20.2	21.5	21.9	22.0	22.1	22.1	21.9	21.8	19.7	15.7	14.7	14.1	17.3	22.1																						
18-Jun	12.9	12.5	11.9	11.0	10.9	11.6	12.4	13.8	15.5	18.1	20.6	21.4	21.2	19.9	19.7	19.6	18.7	18.2	18.0	17.2	15.8	13.8	12.6	12.5	15.8	21.4																						
19-Jun	12.2	12.2	12.0	11.7	11.2	11.3	12.8	14.7	15.6	17.5	19.1	19.9	20.9	21.9	22.6	22.9	23.2	23.1	23.4	22.9	21.7	19.1	17.0	15.3	17.7	23.4																						
20-Jun	14.4	14.1	14.5	13.7	13.7	14.1	14.2	14.5	15.4	17.1	18.6	20.7	20.6	18.2	16.7	15.8	15.5	15.5	15.3	15.2	15.0	14.7	14.5	14.2	15.7	20.7																						
21-Jun	14.9	14.3	13.8	13.9	13.9	13.7	12.6	11.5	10.9	11.1	11.6	11.6	11.5	11.4	11.8	11.5	11.5	12.1	12.9	13.4	13.3	13.1	12.7	12.1	12.6	14.9																						
22-Jun	11.4	11.0	10.4	9.6	8.9	8.6	8.7	8.9	10.2	11.2	12.1	12.8	13.5	14.3	14.8	15.7	16.2	16.6	16.6	16.1	15.4	12.6	10.1	8.7	12.3	16.6																						
23-Jun	8.0	7.1	6.5	5.6	5.2	6.1	9.1	11.9	14.1	16.1	17.3	18.2	19.1	20.1	20.6	20.7	20.8	20.5	21.0	19.5	18.0	16.4	13.7	12.0	14.5	21.0																						
24-Jun	11.7	10.3	9.8	9.4	9.6	10.6	12.9	14.4	15.8	17.8	19.7	20.4	21.0	21.3	21.4	21.8	21.9	21.8	21.5	21.0	19.7	17.7	16.1	13.9	16.7	21.9																						
25-Jun	13.2	11.9	10.0	8.4	8.3	9.5	12.2	14.5	16.8	19.0	21.0	22.0	22.9	23.4	23.9	24.4	25.0	25.4	25.5	24.9	24.0	23.1	22.4	21.4	18.9	25.5																						
26-Jun	19.8	18.7	18.1	17.4	17.6	17.4	18.0	19.3	21.2	23.1	24.5	25.6	26.0	26.2	26.3	26.4	27.3	27.3	26.5	25.8	25.1	23.7	22.5	21.6	22.7	27.3																						
27-Jun	20.9	20.2	19.3	18.6	18.2	17.4	14.4	14.6	15.2	16.3	17.2	16.4	15.8	16.2	16.5	17.0	15.3	15.1	15.2	14.7	14.6	14.4	14.5	14.4	16.4	20.9																						
28-Jun	14.0	13.7	13.5	13.0	12.6	12.8	13.0	13.6	14.8	15.2	15.1	15.4	17.1	16.9	17.0	18.3	18.6	19.0	18.4	18.5	17.7	16.3	15.3	14.4	15.6	19.0																						
29-Jun	14.0	13.4	13.2	13.0	13.0	12.8	13.6	15.0	16.4	18.0	19.7	20.9	22.0	22.9	22.4	22.6	22.7	23.6	22.7	21.6	20.7	19.5	18.1	17.3	18.3	23.6																						
30-Jun	16.6	16.4	15.8	15.1	15.2	15.9	15.6	16.0	16.7	17.2	16.9	18.2	19.4	20.6	21.1	21.0	20.7	20.4	20.5	20.1	19.2	18.3	18.2	17.7	18.0	21.1																						
																								14.1	13.4	12.9	12.3	12.0	12.2	12.9	14.0	15.2	16.5	17.7	18.7	19.5	20.1	20.3	20.5	20.5	20.5	20.1	19.4	18.4	17.0	15.8	14.8	Diurnal Average
																								20.9	20.2	19.5	18.6	18.2	17.4	18.3	19.3	21.2	23.1	24.5	25.6	26.4	27.2	27.6	27.9	28.0	28.0	27.8	27.2	25.9	24.0	22.5	21.6	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.92	7.92
10 - 20	484	67.22	75.14
> 20	179	24.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

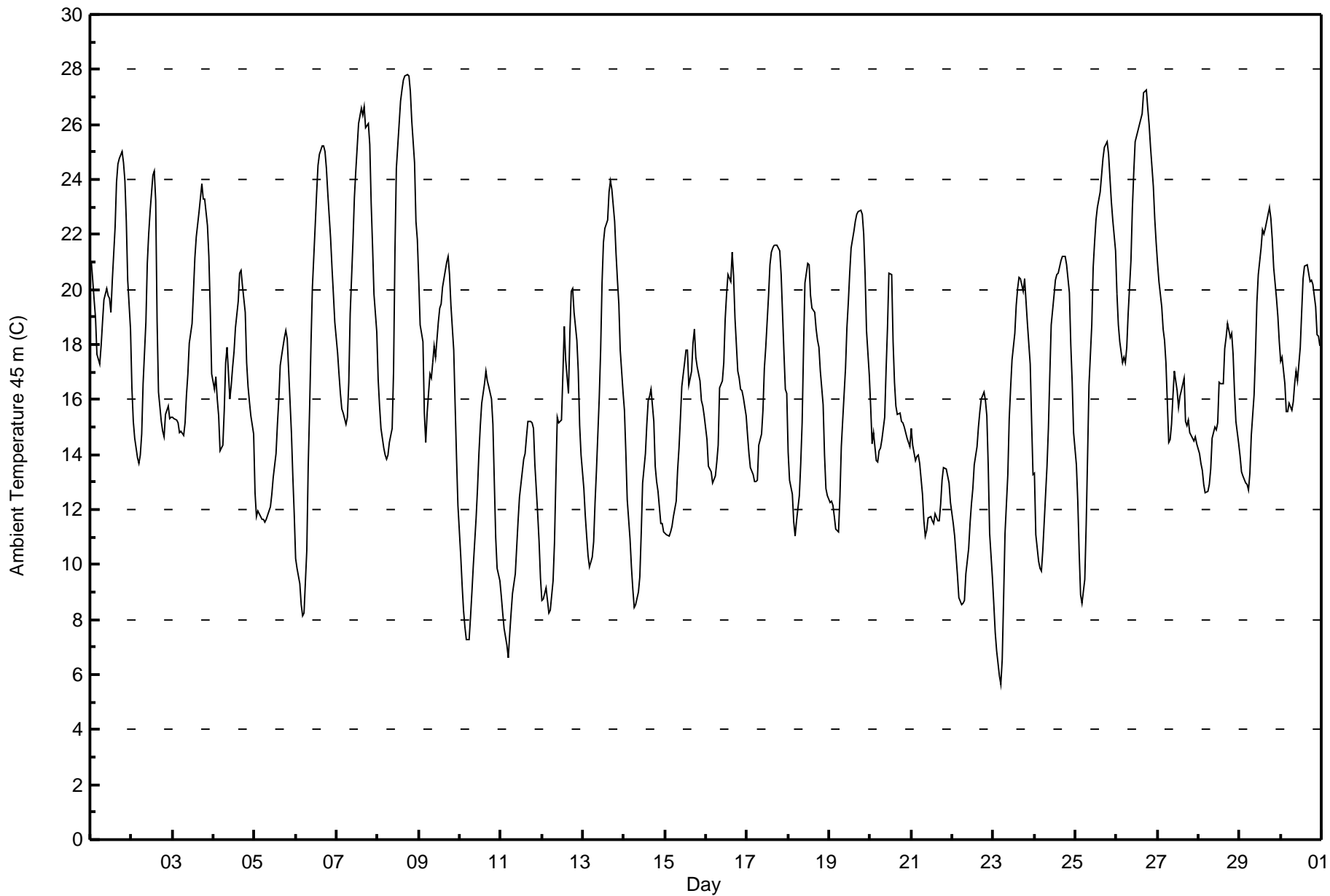


Maximum Value: 27.8 C on Jun 8 18:00		Maximum Daily Average: 22.7 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 5.7 C on Jun 23 05:00		Minimum Daily Average: 11.2 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 20.3 C at hour 17		Minimum Diurnal Average: 12.1 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 16.56 C		Percentiles: P ₁ = 7.2 P ₁₀ = 10.9 Q ₁ = 13.4 Median = 16.2 Q ₃ = 19.8 P ₉₀ = 22.8 P ₉₉ = 27.2		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	21.0	20.4	19.6	19.0	17.7	17.3	18.0	18.8	19.6	20.0	19.8	19.7	19.2	20.3	22.3	23.9	24.5	24.8	25.0	24.6	23.9	22.5	20.3	18.6	20.9	25.0																						
2-Jun	16.4	15.2	14.6	13.9	13.7	14.0	14.8	16.6	18.8	20.9	22.0	22.8	24.1	24.3	23.2	18.9	16.3	15.2	14.8	14.6	15.5	15.8	15.3	15.4	17.4	24.3																						
3-Jun	15.4	15.3	15.2	15.1	14.8	14.9	14.7	15.2	16.2	16.9	18.0	18.8	20.0	21.1	21.9	22.8	23.3	23.9	23.3	23.3	22.3	21.2	19.3	16.9	18.7	23.9																						
4-Jun	16.4	16.8	16.0	15.4	14.1	14.3	15.6	17.3	17.9	16.0	16.5	17.2	17.7	18.6	19.6	20.6	20.7	20.1	19.2	17.4	16.5	15.9	15.4	14.7	17.1	20.7																						
5-Jun	12.6	11.8	12.0	11.7	11.7	11.7	11.5	11.6	11.9	12.1	12.5	13.2	14.0	15.1	16.0	17.2	17.6	18.3	18.5	18.2	17.1	14.8	13.2	11.9	14.0	18.5																						
6-Jun	10.2	9.8	9.3	8.5	8.1	8.2	10.5	13.6	15.7	18.0	20.1	22.3	23.5	24.5	24.9	25.2	25.2	25.0	24.4	23.5	21.9	20.8	19.8	18.8	18.0	25.2																						
7-Jun	17.7	16.9	16.2	15.7	15.5	15.1	15.4	16.6	19.1	21.7	23.3	24.3	25.2	26.0	26.6	26.3	26.6	25.9	26.1	25.3	23.2	21.6	19.8	18.4	21.2	26.6																						
8-Jun	16.7	15.8	14.9	14.2	14.0	13.8	14.0	14.4	14.9	17.0	21.4	24.4	26.0	26.8	27.3	27.6	27.8	27.8	27.7	27.2	26.1	24.6	22.5	21.8	21.2	27.8																						
9-Jun	20.3	18.7	18.1	15.5	14.4	15.5	16.9	16.8	17.4	18.0	17.5	18.8	19.3	19.5	20.1	20.7	21.0	21.2	20.6	19.4	17.8	15.8	13.9	12.2	17.9	21.2																						
10-Jun	10.3	9.3	8.3	7.7	7.3	7.3	8.1	9.0	10.0	11.7	12.7	14.0	15.1	15.9	16.6	17.0	16.7	16.4	16.0	15.1	13.0	11.0	9.8	9.4	12.0	17.0																						
11-Jun	8.8	8.3	7.7	7.0	6.6	7.5	8.3	8.9	9.7	10.6	11.6	12.4	13.4	13.8	14.1	14.7	15.2	15.2	15.2	14.9	13.6	11.8	10.8	9.5	11.2	15.2																						
12-Jun	8.7	8.7	9.2	8.7	8.2	8.4	9.4	10.8	13.1	15.3	15.2	15.3	16.9	18.7	17.5	16.2	18.4	20.0	20.0	19.2	18.1	17.0	15.0	14.0	14.2	20.0																						
13-Jun	12.8	11.8	11.0	10.3	9.9	10.3	10.8	12.3	13.4	16.1	17.8	20.2	21.7	22.2	22.5	23.5	24.0	23.6	22.5	21.3	20.3	19.5	17.8	16.3	17.2	24.0																						
14-Jun	15.6	14.1	12.4	10.9	9.9	9.1	8.5	8.5	9.0	9.5	11.2	13.0	14.0	15.1	16.0	16.1	16.4	15.2	13.6	13.0	12.6	11.5	11.5	11.2	12.4	16.4																						
15-Jun	11.2	11.1	11.0	11.2	11.4	11.7	12.3	13.4	14.2	15.3	16.5	17.3	17.8	17.8	16.5	17.0	18.0	18.6	17.5	17.2	16.7	16.0	15.8	15.4	15.0	18.6																						
16-Jun	14.5	13.6	13.5	13.4	13.0	13.2	13.7	14.3	16.4	16.7	17.3	18.9	19.8	20.5	20.3	21.3	20.5	19.0	17.0	16.8	16.4	16.3	16.1	15.4	16.6	21.3																						
17-Jun	14.7	14.0	13.5	13.3	13.0	13.0	13.1	14.3	14.8	15.6	17.1	17.9	19.8	20.9	21.4	21.5	21.6	21.6	21.5	21.4	20.5	17.7	16.4	16.2	17.3	21.6																						
18-Jun	14.1	13.1	12.6	11.5	11.0	11.6	12.5	13.7	15.2	17.8	20.2	21.0	20.9	19.8	19.3	19.2	18.6	18.1	17.9	17.0	15.8	14.0	12.8	12.5	15.8	21.0																						
19-Jun	12.3	12.3	12.1	11.8	11.3	11.2	12.4	14.3	15.3	17.1	18.6	19.5	20.6	21.5	22.1	22.5	22.7	22.8	22.9	22.7	22.0	20.5	18.5	16.9	17.7	22.9																						
20-Jun	15.7	14.4	14.8	13.8	13.7	14.1	14.2	14.6	15.3	17.1	18.6	20.6	20.5	18.1	16.6	15.8	15.4	15.5	15.2	15.1	15.0	14.6	14.4	14.3	15.7	20.6																						
21-Jun	15.0	14.3	13.8	14.0	14.0	13.7	12.6	11.6	11.0	11.2	11.7	11.7	11.6	11.5	11.8	11.6	11.6	12.2	13.0	13.5	13.5	13.2	12.9	12.3	12.6	15.0																						
22-Jun	11.5	11.1	10.3	9.6	8.8	8.6	8.6	8.7	9.7	10.6	11.5	12.2	12.8	13.6	14.3	15.0	15.6	16.0	16.3	16.0	15.4	13.6	11.1	9.5	12.1	16.3																						
23-Jun	8.5	7.5	6.9	5.9	5.7	6.6	8.8	11.1	13.3	15.3	16.4	17.5	18.4	19.4	20.0	20.4	20.4	19.9	20.4	19.6	18.8	17.3	15.2	13.3	14.4	20.4																						
24-Jun	13.3	11.1	10.1	9.9	9.8	10.5	12.6	13.6	15.0	16.9	18.7	19.8	20.4	20.5	20.6	21.0	21.2	21.2	21.2	20.9	19.9	18.0	16.6	14.8	16.6	21.2																						
25-Jun	13.6	12.3	10.4	8.9	8.6	9.4	11.4	13.9	16.5	18.7	20.8	21.7	22.5	23.0	23.6	24.1	24.8	25.2	25.4	24.9	24.1	23.2	22.5	21.4	18.8	25.4																						
26-Jun	19.8	18.7	18.1	17.3	17.5	17.4	17.9	19.1	21.1	22.9	24.2	25.4	25.8	26.0	26.2	26.4	27.2	27.3	26.6	26.0	25.2	23.7	22.6	21.7	22.7	27.3																						
27-Jun	21.0	20.3	19.4	18.6	18.1	17.3	14.5	14.5	15.1	16.1	17.0	16.3	15.7	16.1	16.3	16.8	15.2	15.1	15.2	14.8	14.6	14.5	14.6	14.4	16.3	21.0																						
28-Jun	14.0	13.7	13.4	12.9	12.6	12.7	12.9	13.5	14.6	15.0	14.9	15.1	16.6	16.6	16.6	17.8	18.3	18.8	18.3	18.4	17.7	16.3	15.2	14.4	15.4	18.8																						
29-Jun	14.0	13.4	13.2	13.0	12.9	12.7	13.3	14.7	16.1	17.7	19.5	20.5	21.5	22.2	22.0	22.2	22.5	23.0	22.6	21.8	20.8	19.7	19.0	18.1	18.2	23.0																						
30-Jun	17.4	17.5	16.6	15.5	15.6	15.9	15.6	15.9	16.6	17.0	16.7	17.9	19.2	20.4	20.9	20.9	20.6	20.3	20.4	20.2	19.4	18.4	18.3	18.0	18.1	20.9																						
																								14.4	13.7	13.1	12.5	12.1	12.2	12.8	13.7	14.9	16.2	17.3	18.3	19.1	19.7	19.9	20.1	20.3	20.2	19.9	19.4	18.6	17.4	16.2	15.3	Diurnal Average
																								21.0	20.4	19.6	19.0	18.1	17.4	18.0	19.1	21.1	22.9	24.2	25.4	26.0	26.8	27.3	27.6	27.8	27.8	27.7	27.2	26.1	24.6	22.6	21.8	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C
Lower Camp Met Tower - June 2017**

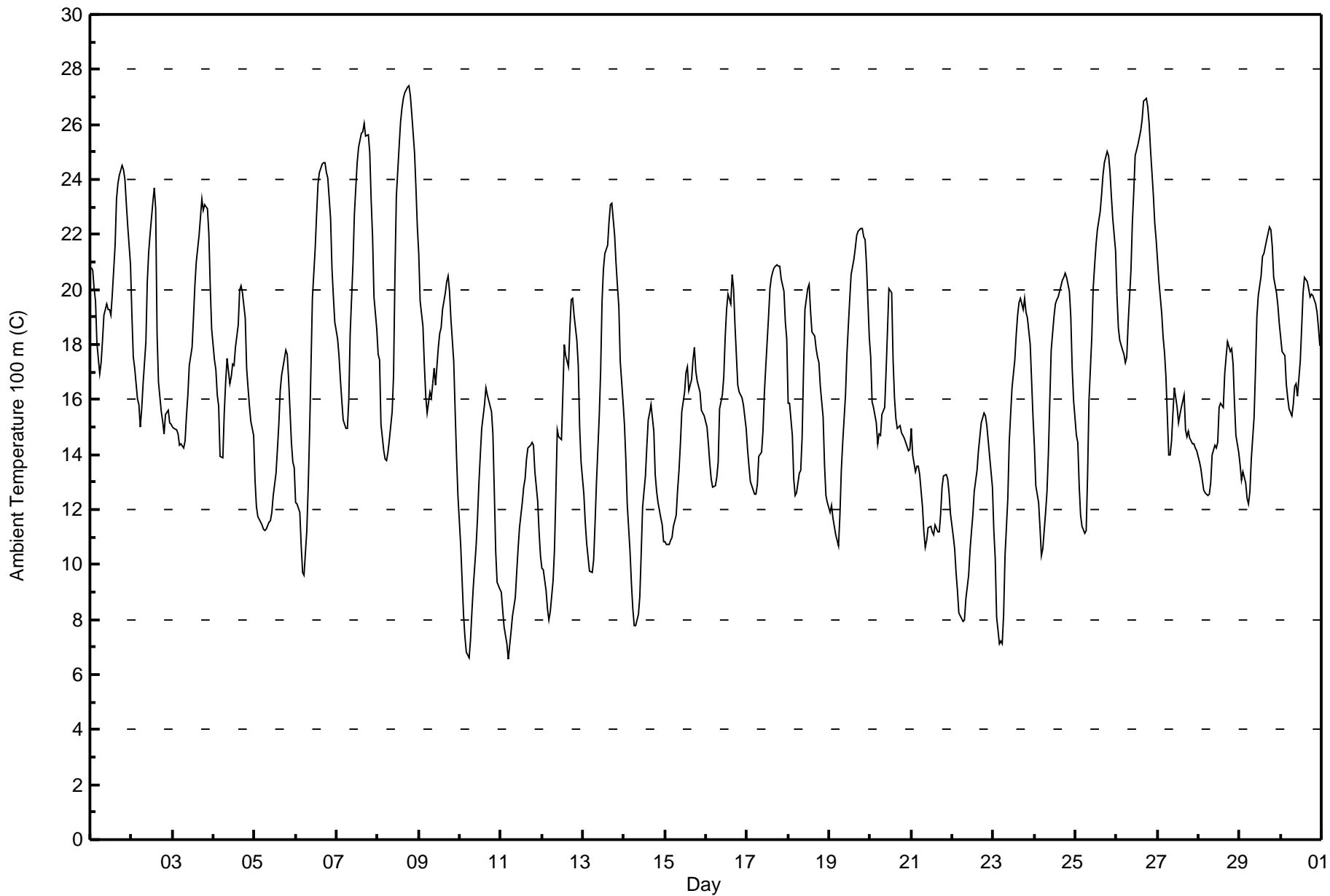
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	58	8.06	8.06
10 - 20	487	67.64	75.69
> 20	175	24.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 27.4 C on Jun 8 19:00																				Maximum Daily Average: 22.5 C on Jun 26					Hours in Service: 720																								
Minimum Value: 6.5 C on Jun 11 05:00																				Minimum Daily Average: 10.8 C on Jun 11					Hours of Data: 720																								
Maximum Diurnal Average: 19.7 C at hour 18																				Minimum Diurnal Average: 12.2 C at hour 6					Hours of Missing Data: 0																								
Monthly Average: 16.35 C																				Percentiles: P ₁ = 7.2 P ₁₀ = 10.8 Q ₁ = 13.2 Median = 16.0 Q ₃ = 19.6 P ₉₀ = 22.4 P ₉₉ = 26.7					Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	20.8	20.7	20.0	19.6	18.0	16.9	17.3	18.2	19.1	19.5	19.2	19.3	19.0	19.8	21.6	23.3	23.8	24.2	24.5	24.3	24.0	23.1	22.3	20.9	20.8	24.5																							
2-Jun	19.0	17.5	17.1	16.0	15.8	15.0	15.7	16.6	18.1	20.3	21.3	22.0	23.2	23.7	23.0	18.4	16.6	15.5	15.2	14.8	15.5	15.6	15.1	15.1	17.8	23.7																							
3-Jun	15.0	15.0	14.9	14.7	14.4	14.4	14.2	14.5	15.4	16.2	17.2	17.9	19.0	20.1	21.0	22.0	22.6	23.3	22.9	23.1	23.0	22.0	20.1	18.5	18.4	23.3																							
4-Jun	17.4	17.1	16.2	15.8	13.9	13.9	15.5	16.6	17.5	16.6	16.8	17.3	17.2	17.9	18.7	20.0	20.1	19.9	19.0	17.1	16.4	15.8	15.2	14.7	16.9	20.1																							
5-Jun	13.1	12.1	11.8	11.6	11.5	11.3	11.2	11.3	11.5	11.6	11.9	12.5	13.3	14.2	15.1	16.3	16.9	17.5	17.8	17.7	16.7	14.4	13.7	13.5	13.7	17.8																							
6-Jun	12.2	12.2	11.9	10.7	9.7	9.6	11.2	12.8	14.8	17.3	19.7	21.5	22.7	23.8	24.3	24.6	24.6	24.6	24.3	24.1	22.6	20.7	19.7	18.8	18.3	24.6																							
7-Jun	18.2	17.6	16.7	16.0	15.3	14.9	15.0	16.0	18.4	20.9	22.7	23.7	24.6	25.2	25.7	25.7	26.0	25.6	25.6	25.0	23.2	21.9	19.7	18.5	20.9	26.0																							
8-Jun	17.6	17.4	15.1	14.1	13.8	13.8	14.1	14.5	15.5	16.9	20.6	23.4	25.2	26.1	26.6	27.0	27.2	27.3	27.4	27.1	26.4	24.9	23.7	22.3	21.2	27.4																							
9-Jun	21.3	19.6	18.7	17.3	16.1	15.5	16.3	16.1	16.6	17.1	16.5	17.9	18.4	18.6	19.3	19.9	20.3	20.5	19.9	18.9	17.4	15.6	14.0	12.5	17.7	21.3																							
10-Jun	10.7	9.4	8.2	7.4	6.8	6.6	7.3	8.3	9.2	10.7	11.7	13.0	14.0	15.0	15.8	16.4	16.2	16.0	15.5	14.8	12.6	10.5	9.4	9.1	11.4	16.4																							
11-Jun	9.0	8.4	7.7	7.1	6.5	7.1	7.6	8.2	8.8	9.7	10.6	11.3	12.3	12.8	13.1	13.8	14.2	14.3	14.4	14.3	13.4	12.3	11.2	10.3	10.8	14.4																							
12-Jun	9.9	9.8	9.1	8.4	8.0	8.3	9.4	10.5	12.6	14.9	14.7	14.6	16.2	18.0	17.6	17.2	18.6	19.6	19.7	19.1	18.2	17.3	15.0	13.7	14.2	19.7																							
13-Jun	12.5	11.6	10.8	10.3	9.8	9.7	10.1	11.5	13.0	15.4	17.0	19.6	20.7	21.3	21.6	22.5	23.1	23.2	22.0	21.0	20.1	19.4	17.4	15.9	16.6	23.2																							
14-Jun	15.1	13.9	12.2	10.5	9.3	8.4	7.8	7.8	8.2	8.8	10.4	12.1	13.2	14.3	15.3	15.5	15.8	14.8	13.2	12.6	12.2	11.7	11.4	10.8	11.9	15.8																							
15-Jun	10.8	10.7	10.7	10.9	11.0	11.4	11.8	12.7	13.4	14.4	15.6	16.2	17.0	17.2	16.3	16.7	17.4	17.9	17.0	16.7	16.3	15.6	15.5	15.4	14.5	17.9																							
16-Jun	15.0	14.4	13.7	13.1	12.8	12.9	13.2	13.7	15.7	16.2	16.8	18.2	19.3	19.9	19.5	20.5	20.0	18.7	16.5	16.3	16.2	16.0	15.8	15.0	16.2	20.5																							
17-Jun	14.2	13.6	13.0	12.7	12.6	12.6	12.9	13.9	14.1	14.9	16.2	17.2	19.0	20.0	20.5	20.6	20.8	20.9	20.9	20.8	20.4	19.9	18.8	18.2	17.0	20.9																							
18-Jun	15.9	15.8	14.7	13.1	12.5	12.6	13.3	13.4	14.6	17.1	19.3	20.0	20.2	19.2	18.4	18.3	17.9	17.5	17.3	16.5	15.3	13.6	12.5	12.3	15.9	20.2																							
19-Jun	11.9	12.1	11.7	11.4	11.1	10.7	11.8	13.4	14.5	16.2	17.6	18.6	19.6	20.5	21.1	21.5	22.0	22.1	22.2	22.2	21.9	21.8	20.9	18.3	17.3	22.2																							
20-Jun	17.5	15.9	15.7	15.2	14.4	14.7	14.7	15.5	15.7	17.0	18.5	20.0	19.9	17.5	16.1	15.3	15.0	15.1	14.8	14.7	14.6	14.3	14.1	14.2	15.8	20.0																							
21-Jun	15.0	14.0	13.4	13.6	13.6	13.2	12.1	11.2	10.6	10.9	11.3	11.4	11.2	11.1	11.4	11.2	11.2	11.9	12.8	13.2	13.3	13.1	12.6	11.8	12.3	15.0																							
22-Jun	11.0	10.6	9.7	9.0	8.2	8.0	7.9	8.0	8.8	9.6	10.5	11.2	11.8	12.7	13.4	14.1	14.7	15.1	15.5	15.4	15.0	14.5	13.9	12.8	11.7	15.5																							
23-Jun	11.2	10.2	8.1	7.1	7.2	7.1	8.2	10.3	12.4	14.4	15.5	16.4	17.4	18.4	19.1	19.5	19.7	19.3	19.7	19.2	19.0	18.0	16.7	15.4	14.6	19.7																							
24-Jun	14.3	12.9	12.2	11.3	10.3	10.6	11.9	12.6	14.0	16.0	17.8	19.0	19.5	19.6	19.7	20.1	20.3	20.4	20.6	20.5	19.9	19.0	17.1	16.0	16.5	20.6																							
25-Jun	14.7	14.5	12.8	11.8	11.4	11.2	11.3	13.2	16.0	18.2	20.0	20.9	21.6	22.2	22.8	23.4	24.1	24.6	25.0	24.9	24.3	23.4	22.6	21.4	19.0	25.0																							
26-Jun	19.8	18.6	18.2	17.8	17.7	17.4	17.5	18.8	20.7	22.4	23.5	24.9	25.3	25.5	25.8	26.2	26.8	27.0	26.6	26.1	25.1	23.5	22.4	21.8	22.5	27.0																							
27-Jun	21.1	20.3	19.1	18.3	17.7	16.8	14.0	14.0	14.5	15.5	16.4	15.7	15.1	15.5	15.7	16.2	14.9	14.6	14.8	14.6	14.4	14.4	14.3	14.1	15.9	21.1																							
28-Jun	13.7	13.5	13.1	12.7	12.6	12.5	12.6	13.0	14.0	14.3	14.3	14.4	15.7	15.9	15.7	16.9	17.5	18.1	17.7	17.9	17.3	15.8	14.7	14.1	14.9	18.1																							
29-Jun	13.6	13.1	13.4	12.9	12.4	12.2	12.6	13.8	15.4	17.1	19.0	19.8	20.5	21.2	21.3	21.6	21.8	22.3	22.2	21.6	20.4	19.9	19.4	18.7	17.8	22.3																							
30-Jun	18.2	17.7	17.6	16.6	16.1	15.6	15.4	15.8	16.5	16.6	16.1	17.4	18.6	19.9	20.5	20.3	20.0	19.7	19.8	19.8	19.5	19.2	18.6	18.0	18.1	20.5																							
																								15.0	14.3	13.6	12.9	12.4	12.2	12.5	13.2	14.3	15.6	16.6	17.6	18.4	18.9	19.2	19.5	19.7	19.7	19.5	19.1	18.5	17.6	16.6	15.7	Diurnal Average	
																								21.3	20.7	20.0	19.6	18.0	17.4	17.5	18.8	20.7	22.4	23.5	24.9	25.3	26.1	26.6	27.0	27.2	27.3	27.4	27.1	26.4	24.9	23.7	22.3	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	50	6.94	6.94
10 - 20	518	71.94	78.89
> 20	152	21.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

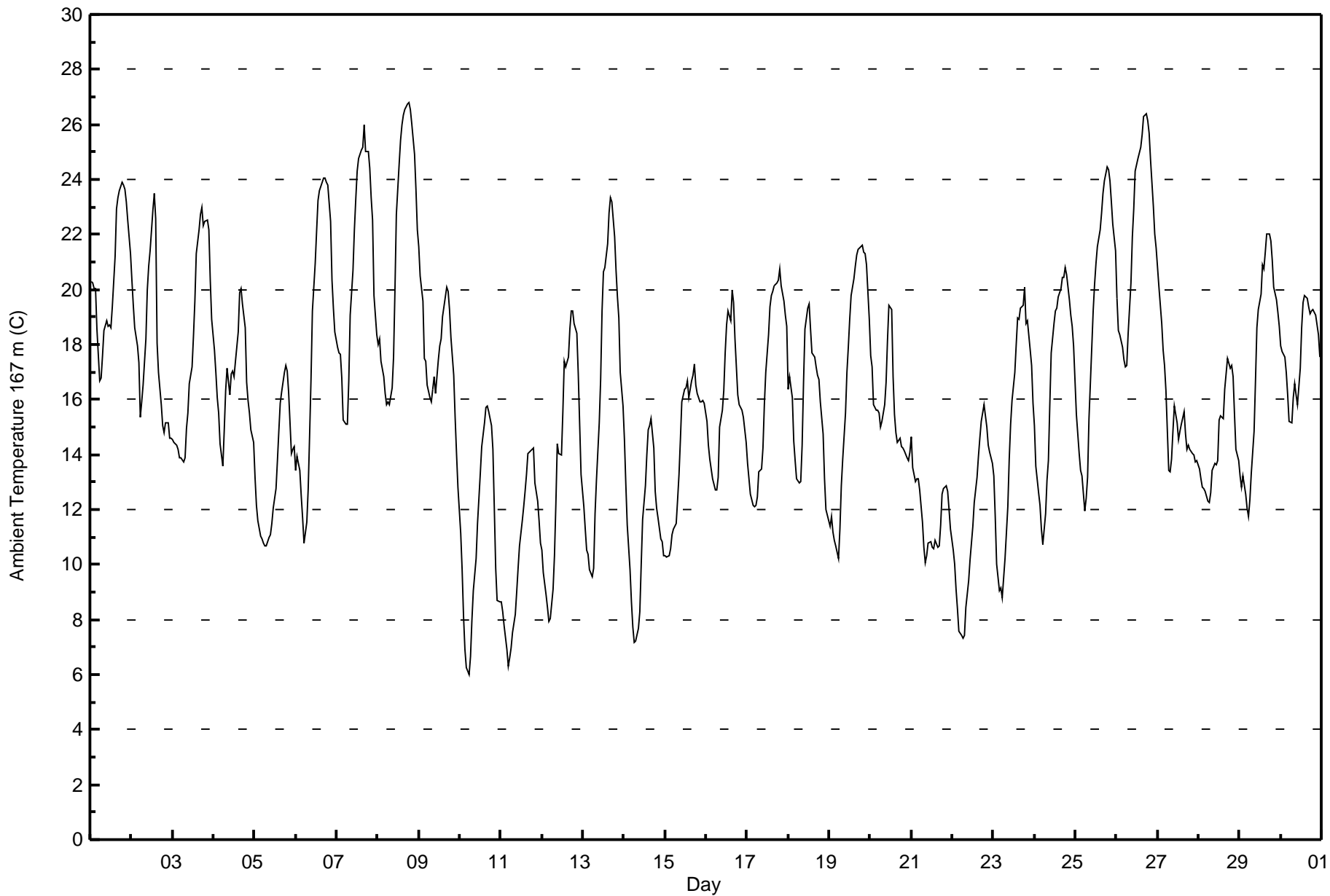


Maximum Value: 26.8 C on Jun 8 19:00		Maximum Daily Average: 22.1 C on Jun 26		Hours in Service: 720																							
Minimum Value: 6.0 C on Jun 10 06:00		Minimum Daily Average: 10.4 C on Jun 11		Hours of Data: 720																							
Maximum Diurnal Average: 19.3 C at hour 17		Minimum Diurnal Average: 12.2 C at hour 6		Hours of Missing Data: 0																							
Monthly Average: 16.15 C		Percentiles: P ₁ = 6.9 P ₁₀ = 10.6 Q ₁ = 13.1 Median = 15.9 Q ₃ = 19.2 P ₉₀ = 22.2 P ₉₉ = 26.2		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	20.3	20.3	20.0	20.1	18.5	16.7	16.8	17.6	18.5	18.9	18.6	18.7	18.6	19.4	21.2	22.9	23.3	23.6	23.9	23.8	23.6	23.2	22.5	21.3	20.5	23.9	
2-Jun	20.3	19.4	18.6	17.9	17.4	15.4	15.9	16.5	18.2	20.0	20.9	21.4	22.9	23.5	22.6	18.1	17.0	15.8	15.0	14.8	15.2	15.1	14.6	14.6	18.0	23.5	
3-Jun	14.5	14.5	14.4	14.2	13.9	13.9	13.7	13.9	15.0	15.5	16.6	17.2	18.3	19.6	21.3	22.2	22.7	23.0	22.3	22.5	22.5	22.2	20.4	18.9	18.0	23.0	
4-Jun	17.8	17.0	16.1	15.5	14.4	13.6	14.9	16.3	17.1	16.2	16.9	17.0	16.8	17.4	18.5	19.9	20.0	19.5	18.6	16.6	16.0	15.5	14.9	14.4	16.7	20.0	
5-Jun	13.2	12.1	11.6	11.0	10.9	10.8	10.7	10.7	11.0	11.1	11.5	12.1	12.8	13.8	14.9	15.8	16.3	17.0	17.2	17.0	16.3	14.1	14.2	14.3	13.3	17.2	
6-Jun	13.4	13.9	13.4	12.5	11.7	10.8	11.5	12.8	14.7	16.7	19.2	20.9	22.1	23.2	23.6	23.9	24.0	24.1	23.9	23.8	22.5	20.3	19.3	18.5	18.4	24.1	
7-Jun	17.9	17.7	17.7	16.8	15.3	15.1	15.1	16.7	19.1	20.7	22.2	23.3	24.3	24.8	25.1	25.2	26.0	25.0	25.0	24.4	23.3	22.5	19.8	18.4	20.9	26.0	
8-Jun	18.0	18.2	17.4	16.8	16.2	15.8	15.9	15.8	16.4	17.6	20.0	22.7	24.6	25.4	26.0	26.3	26.5	26.7	26.8	26.5	26.1	24.9	23.7	22.2	21.5	26.8	
9-Jun	21.5	20.5	19.6	17.5	17.4	16.5	16.1	15.9	16.4	16.8	16.2	17.5	18.0	18.2	19.0	19.7	20.1	19.9	19.3	18.3	16.9	15.3	14.1	12.8	17.6	21.5	
10-Jun	11.1	9.8	8.2	6.9	6.3	6.0	6.7	8.0	9.1	10.2	11.5	12.4	13.3	14.3	15.1	15.7	15.7	15.5	15.0	14.2	12.1	9.9	8.7	8.6	11.0	15.7	
11-Jun	8.6	8.3	7.8	6.9	6.3	6.6	7.0	7.5	8.2	9.0	9.9	10.7	11.6	12.1	12.7	13.3	14.1	14.1	14.2	14.2	13.0	12.3	11.6	10.8	10.4	14.2	
12-Jun	10.5	9.7	8.9	8.4	7.9	8.0	9.1	10.3	12.2	14.4	14.1	14.0	15.6	17.4	17.2	17.5	18.6	19.2	19.2	18.8	18.4	16.9	15.1	13.3	13.9	19.2	
13-Jun	12.1	11.3	10.5	10.4	9.8	9.5	9.9	11.8	13.1	15.2	16.7	19.2	20.6	20.8	21.7	22.8	23.4	23.2	21.9	20.7	19.7	19.0	17.0	15.8	16.5	23.4	
14-Jun	14.6	12.9	11.4	9.8	8.7	7.7	7.2	7.2	7.7	8.3	10.0	11.7	12.9	14.0	14.9	15.1	15.3	14.2	12.6	12.0	11.7	10.9	10.8	10.3	11.3	15.3	
15-Jun	10.3	10.3	10.3	10.6	11.1	11.3	11.5	12.4	13.3	14.5	15.9	16.4	16.4	16.7	16.1	16.7	16.9	17.3	16.5	16.2	15.9	15.9	16.0	15.8	14.3	17.3	
16-Jun	15.2	14.3	13.8	13.5	13.1	12.7	12.7	13.2	15.0	15.6	16.3	17.7	18.7	19.2	18.8	20.0	19.5	18.2	16.2	15.8	15.7	15.6	15.4	14.4	15.9	20.0	
17-Jun	13.7	13.1	12.6	12.1	12.1	12.2	12.5	13.4	13.5	14.2	15.8	17.0	18.4	19.4	19.8	19.9	20.1	20.2	20.4	20.8	20.2	19.6	19.1	18.7	16.6	20.8	
18-Jun	16.4	16.8	16.1	14.5	13.8	13.1	13.0	13.0	14.4	16.6	18.6	19.3	19.5	18.6	17.7	17.6	17.2	16.9	16.7	15.9	14.8	13.1	12.0	11.8	15.7	19.5	
19-Jun	11.4	11.7	11.2	10.9	10.7	10.2	11.3	12.9	13.9	15.5	17.0	17.9	18.9	19.8	20.4	20.9	21.3	21.5	21.6	21.6	21.4	21.3	20.9	18.9	16.8	21.6	
20-Jun	17.6	17.2	15.8	15.6	15.6	15.5	15.0	15.2	15.8	16.6	18.2	19.4	19.3	16.8	15.5	14.8	14.4	14.6	14.3	14.2	14.1	13.9	13.8	14.1	15.7	19.4	
21-Jun	14.6	13.5	13.0	13.1	13.1	12.7	11.5	10.6	10.1	10.3	10.8	10.8	10.6	10.6	10.9	10.6	10.7	11.4	12.6	12.7	12.9	12.6	12.0	11.3	11.8	14.6	
22-Jun	10.5	10.0	9.1	8.4	7.6	7.4	7.3	7.4	8.4	9.4	10.2	10.8	11.4	12.3	13.1	13.9	14.6	15.2	15.8	15.4	15.0	14.4	14.1	13.7	11.5	15.8	
23-Jun	13.2	11.8	10.0	9.0	9.2	8.8	9.5	10.2	12.1	13.8	15.1	16.0	17.0	18.0	19.0	18.9	19.3	19.4	20.1	18.7	18.9	17.8	17.3	15.9	15.0	20.1	
24-Jun	15.0	13.6	12.6	12.2	11.3	10.7	11.8	13.1	13.8	15.8	17.7	18.7	19.2	19.3	19.7	20.1	20.5	20.5	20.8	20.5	19.6	19.1	18.7	17.9	16.8	20.8	
25-Jun	15.5	14.8	14.0	13.4	13.2	11.9	12.4	13.2	15.3	17.9	19.2	20.2	20.9	21.6	22.2	22.8	23.5	24.0	24.4	24.4	24.0	23.2	22.4	21.4	19.0	24.4	
26-Jun	19.7	18.5	18.4	17.9	17.5	17.2	17.2	18.4	20.2	21.9	22.9	24.3	24.7	25.0	25.2	25.6	26.3	26.4	26.1	25.7	24.7	23.1	22.0	21.5	22.1	26.4	
27-Jun	20.8	20.1	18.8	17.8	17.2	16.3	13.4	13.4	13.8	14.8	15.8	15.1	14.6	14.9	15.1	15.6	14.7	14.2	14.3	14.2	14.0	14.0	13.7	13.8	15.4	20.8	
28-Jun	13.5	13.1	12.8	12.8	12.7	12.3	12.3	12.6	13.4	13.7	13.6	13.8	15.2	15.4	15.3	16.4	16.9	17.5	17.2	17.3	16.9	15.5	14.2	13.8	14.5	17.5	
29-Jun	13.2	12.8	13.2	12.6	12.1	11.7	12.4	13.3	14.9	16.7	18.6	19.3	19.8	20.9	20.8	21.3	22.0	22.0	21.8	21.0	20.1	19.6	19.2	18.7	17.4	22.0	
30-Jun	18.0	17.7	17.5	17.0	16.2	15.2	15.1	16.1	16.6	16.1	15.8	17.1	18.6	19.5	19.8	19.7	19.4	19.1	19.2	19.3	19.1	18.7	18.4	17.5	17.8	19.8	
		15.1	14.5	13.8	13.2	12.7	12.2	12.3	13.0	14.0	15.1	16.2	17.1	17.9	18.4	18.8	19.1	19.3	19.3	19.1	18.7	18.1	17.3	16.5	15.8	Diurnal Average	
		21.5	20.5	20.0	20.1	18.5	17.2	17.2	18.4	20.2	21.9	22.9	24.3	24.7	25.4	26.0	26.3	26.5	26.7	26.8	26.5	26.1	24.9	23.7	22.2	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 167 m (AT167m) - C
Lower Camp Met Tower - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	50	6.94	6.94
10 - 20	533	74.03	80.97
> 20	137	19.03	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

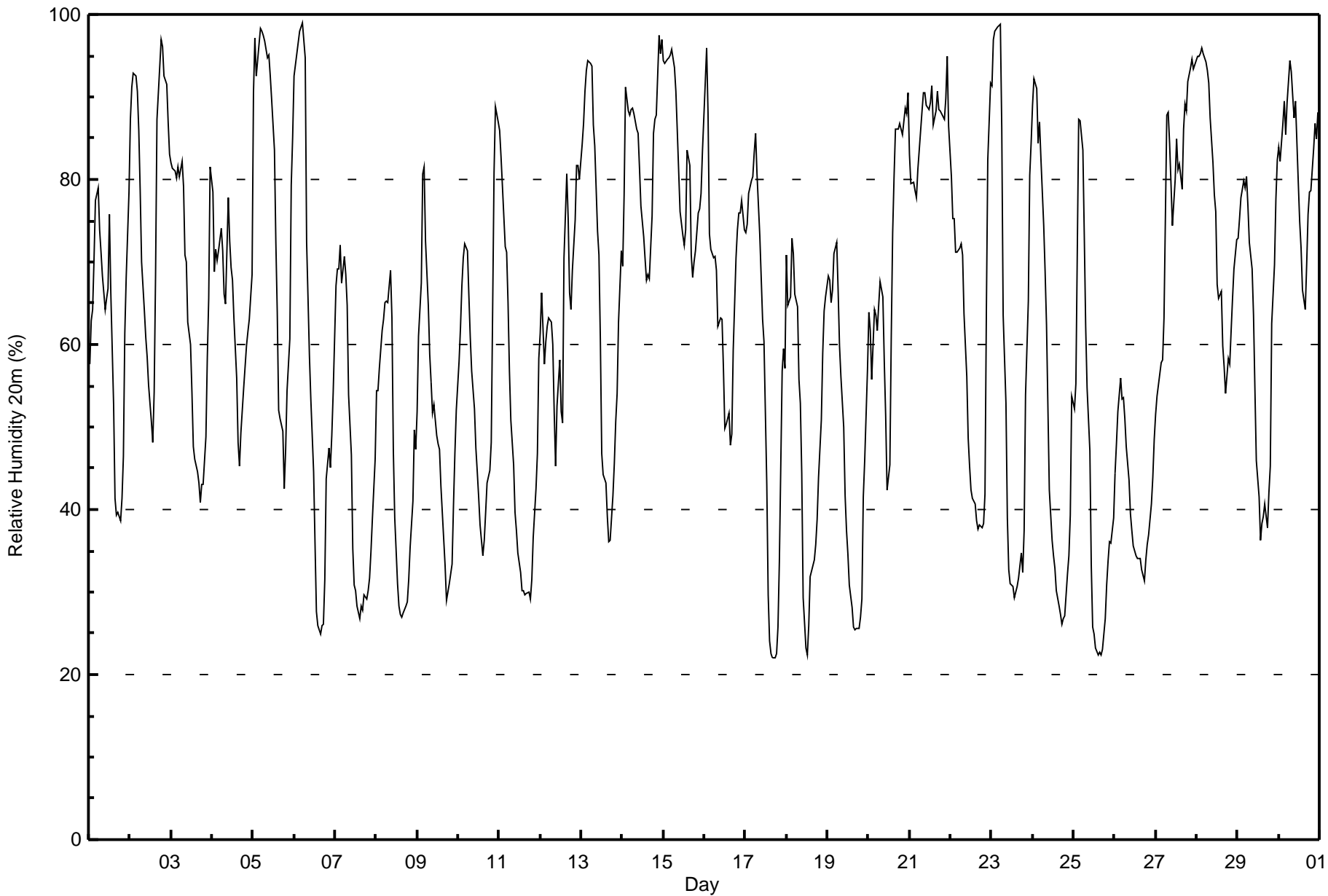
Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - June 2017

Maximum Value: 99 % on Jun 6 06:00																	Maximum Daily Average: 86.8 % on Jun 21																	Hours in Service: 720								
Minimum Value: 22 % on Jun 17 18:00																	Minimum Daily Average: 41.8 % on Jun 26																	Hours of Data: 720								
Maximum Diurnal Average: 78.8 % at hour 5																	Minimum Diurnal Average: 46.7 % at hour 16																	Hours of Missing Data: 0								
Monthly Average: 62.6 %																	Percentiles: P ₁ = 23 P ₁₀ = 32 Q ₁ = 45 Median = 65 Q ₃ = 81 P ₉₀ = 91 P ₉₉ = 98																	Hours of Calibration: 0								
																																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																		
1-Jun	58	63	64	70	78	79	74	71	68	64	66	67	76	66	53	41	39	40	39	41	46	61	68	78	61.3	79																
2-Jun	87	91	93	93	91	86	79	70	64	61	58	55	51	48	54	68	87	94	97	96	93	92	87	83	78.2	97																
3-Jun	82	81	81	80	81	80	82	79	71	70	63	60	54	48	46	45	43	41	43	43	49	58	66	81	63.7	82																
4-Jun	78	69	71	70	71	74	71	66	65	78	73	69	68	63	56	48	45	49	55	57	60	62	63	69	64.6	78																
5-Jun	91	97	93	96	98	98	98	97	95	95	92	90	84	72	64	52	51	49	43	47	54	61	79	85	78.4	98																
6-Jun	93	94	97	98	98	99	95	72	66	59	53	45	36	28	26	25	26	26	31	44	47	45	49	54	58.5	99																
7-Jun	67	69	69	72	67	71	69	65	54	47	35	31	30	28	27	28	28	30	29	30	32	35	39	46	45.7	72																
8-Jun	54	54	57	62	63	65	65	65	69	63	47	39	31	28	27	27	27	28	29	32	36	41	50	47	46.1	69																
9-Jun	52	61	67	81	82	73	65	59	55	52	53	49	48	47	43	37	33	29	30	31	33	41	47	52	50.7	82																
10-Jun	58	62	67	71	72	71	66	61	57	52	47	45	42	38	34	36	40	43	45	48	64	81	89	87	57.3	89																
11-Jun	86	83	79	72	71	65	57	51	45	40	37	35	32	30	30	30	30	29	32	37	43	47	58	47.8	86																	
12-Jun	61	66	58	60	62	63	63	60	52	45	52	58	52	51	70	81	75	66	64	69	75	82	82	80	64.5	82																
13-Jun	84	87	91	93	94	94	94	87	84	74	71	61	47	44	43	39	36	36	42	46	51	54	63	71	66.0	94																
14-Jun	69	78	91	88	88	88	89	88	86	86	81	77	73	70	68	68	68	76	86	87	88	97	95	97	82.6	97																
15-Jun	94	94	95	95	95	96	94	91	86	81	76	73	72	74	83	82	71	68	70	71	76	76	78	83	82.3	96																
16-Jun	92	96	88	73	72	70	71	69	62	63	63	57	50	50	52	48	49	59	71	74	76	76	77	74	68.0	96																
17-Jun	74	75	78	80	80	83	86	81	73	68	63	60	43	30	24	23	22	22	23	26	34	57	60	57	55.0	86																
18-Jun	71	65	66	73	71	66	65	56	53	44	29	23	22	26	32	33	34	36	39	44	51	59	64	66	49.5	73																
19-Jun	68	68	65	67	71	72	67	60	56	50	42	38	35	31	28	26	25	26	26	27	29	42	46	57	46.6	72																
20-Jun	64	62	56	64	63	62	65	68	66	58	51	42	45	61	74	80	86	86	87	86	85	89	88	90	69.9	90																
21-Jun	83	80	80	79	78	81	86	88	91	91	89	89	89	91	87	88	91	89	88	88	87	90	95	86	86.8	95																
22-Jun	80	75	75	71	71	72	72	71	64	56	49	45	42	41	41	39	38	38	38	38	42	64	82	92	58.2	92																
23-Jun	91	97	98	98	99	99	86	64	53	39	33	31	31	29	30	31	32	35	32	38	54	65	81	84	59.5	99																
24-Jun	89	92	91	84	87	83	74	69	62	52	42	36	34	33	30	28	27	26	27	27	32	34	39	54	52.3	92																
25-Jun	52	55	71	87	87	83	73	62	55	47	33	26	25	23	22	23	22	23	27	31	34	36	36	39	44.8	87																
26-Jun	44	48	52	56	53	54	51	48	44	40	38	36	34	34	34	34	33	31	34	36	37	41	44	49	41.8	56																
27-Jun	52	54	56	58	58	63	88	88	84	80	74	80	85	81	82	79	86	89	88	92	94	95	93	94	78.9	95																
28-Jun	95	95	95	96	95	94	93	92	87	82	78	76	67	66	66	60	57	54	58	58	62	66	69	73	76.4	96																
29-Jun	73	75	78	80	79	80	77	72	69	64	55	46	42	36	38	39	41	38	42	45	63	70	78	82	60.9	82																
30-Jun	84	82	87	90	85	89	94	93	90	87	89	80	75	72	67	64	70	76	78	79	84	87	85	88	82.3	94																
																	74.2	75.6	77.0	78.6	78.8	78.5	76.9	72.0	67.6	62.9	57.8	53.9	50.5	48.1	47.7	46.7	47.1	47.8	49.6	52.1	56.8	63.2	67.9	71.9	Diurnal Average	
																	95	97	98	98	99	99	98	97	95	95	92	90	89	91	87	88	91	94	97	96	94	97	95	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %
Lower Camp Met Tower - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	143	19.86	19.86
40 - 60	165	22.92	42.78
60 - 80	223	30.97	73.75
80 - 100	189	26.25	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

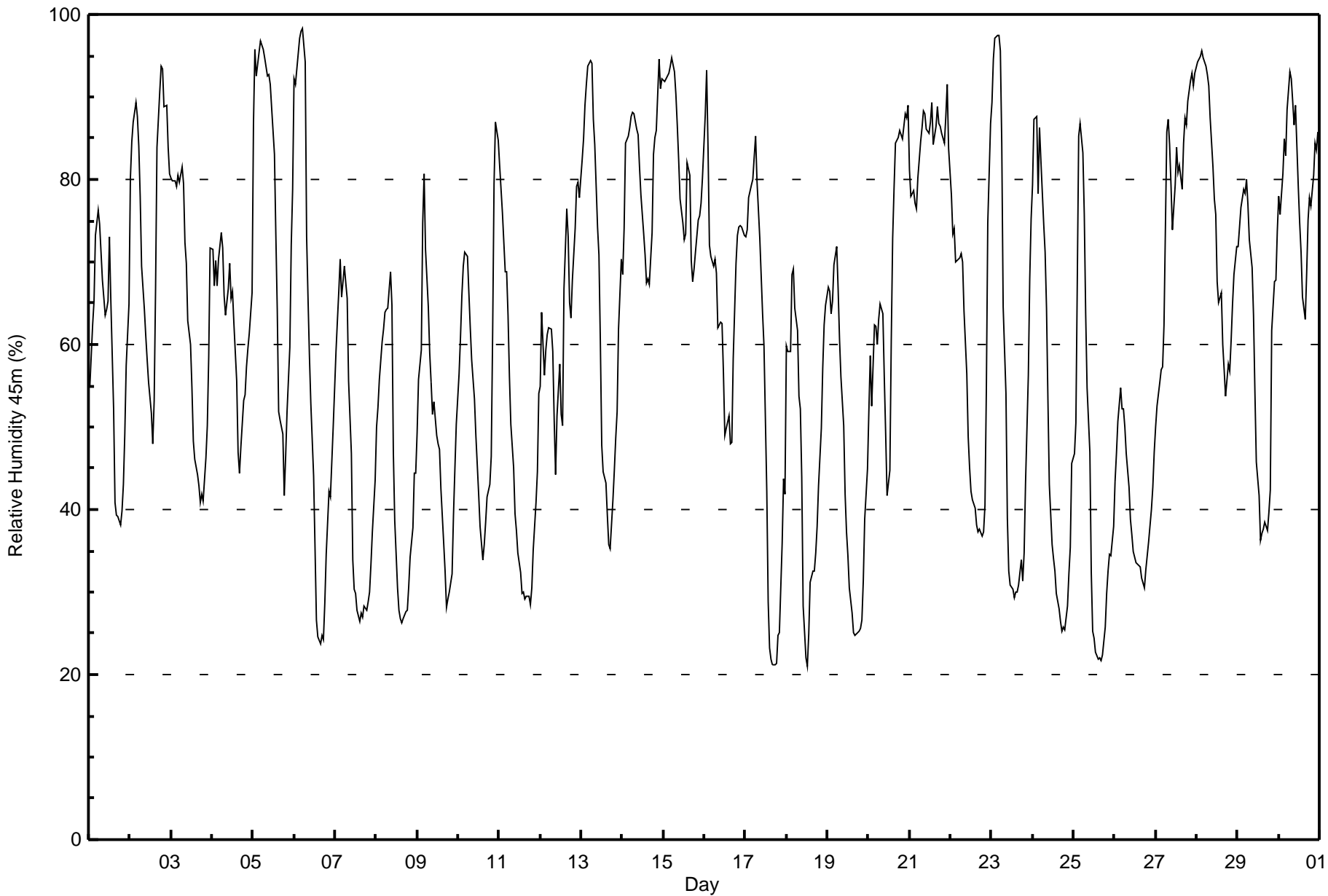
Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - June 2017

Maximum Value: 98 % on Jun 6 06:00 Maximum Daily Average: 84.7 % on Jun 21																		Hours in Service: 720 Hours of Data: 720								
Minimum Value: 21 % on Jun 18 13:00 Minimum Daily Average: 40.8 % on Jun 26 Maximum Diurnal Average: 77.5 % at hour 5 Minimum Diurnal Average: 45.9 % at hour 16 Monthly Average: 61.0 % Percentiles: P ₁ = 22 P ₁₀ = 31 Q ₁ = 43 Median = 63 Q ₃ = 79 P ₉₀ = 88 P ₉₉ = 97																		Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	55	59	62	65	73	76	75	71	68	63	64	65	73	65	52	41	39	39	38	40	43	49	57	65	58.3	76
2-Jun	80	85	87	89	88	84	78	69	64	61	58	55	52	48	53	67	84	91	94	93	89	89	84	81	75.9	94
3-Jun	80	80	80	79	81	80	82	79	72	70	63	60	55	48	46	44	43	41	42	41	46	50	59	72	62.2	82
4-Jun	72	67	70	67	70	73	72	66	63	67	70	66	67	62	56	47	44	48	53	54	57	60	61	66	62.4	73
5-Jun	87	96	92	95	97	96	96	95	93	93	92	89	83	73	64	52	51	49	42	46	52	60	72	79	76.8	97
6-Jun	92	92	95	97	98	98	94	73	66	59	53	44	35	27	25	24	25	24	29	35	42	42	46	50	56.8	98
7-Jun	59	63	66	70	66	70	67	66	56	47	34	30	30	28	26	27	27	28	28	29	30	33	37	44	44.2	70
8-Jun	50	52	56	60	62	64	64	64	69	65	47	39	31	28	27	26	27	28	28	31	34	38	44	44	44.9	69
9-Jun	49	56	59	75	81	71	65	59	55	52	53	49	48	47	43	36	32	28	29	30	32	39	45	50	49.3	81
10-Jun	56	61	66	70	71	71	66	62	58	53	49	46	42	38	34	36	39	42	43	46	61	79	87	85	56.7	87
11-Jun	82	79	76	69	69	64	56	50	45	40	37	35	32	30	30	29	29	29	28	31	35	41	45	54	46.5	82
12-Jun	55	64	56	59	61	62	62	59	51	44	51	58	51	50	67	76	73	65	63	68	74	79	80	78	62.8	80
13-Jun	82	85	89	91	94	94	94	87	84	74	71	60	48	45	43	39	36	35	41	45	49	52	62	70	65.5	94
14-Jun	69	74	84	85	86	88	88	88	86	85	81	78	73	71	67	68	67	74	83	85	86	95	91	92	81.1	95
15-Jun	92	92	93	93	94	95	93	90	87	82	78	75	73	73	82	80	70	68	69	71	75	76	77	80	81.6	95
16-Jun	88	93	84	72	71	70	70	69	62	63	62	57	49	50	51	48	48	58	70	73	74	74	74	73	66.8	93
17-Jun	73	74	78	79	80	83	85	80	73	68	64	60	42	29	23	22	21	21	21	25	25	36	44	42	52.0	85
18-Jun	60	59	59	68	69	64	62	54	52	44	28	22	21	25	31	32	33	35	38	43	50	57	62	65	47.2	69
19-Jun	67	66	64	65	70	72	67	61	56	50	42	37	34	31	28	25	25	25	25	26	27	31	39	45	44.8	72
20-Jun	52	59	53	62	62	60	63	65	64	56	49	42	45	61	73	79	84	85	86	85	85	88	88	89	68.1	89
21-Jun	81	78	79	77	76	80	85	86	88	88	86	86	87	89	84	86	89	87	86	86	84	88	91	84	84.7	91
22-Jun	78	73	74	70	70	71	71	70	64	56	49	45	42	41	40	38	37	38	37	37	41	55	75	87	56.6	87
23-Jun	89	95	97	98	97	96	84	65	54	39	33	31	30	29	30	30	31	34	31	35	43	56	68	75	57.1	98
24-Jun	79	87	88	78	86	82	75	71	64	53	43	36	34	33	30	28	26	25	26	25	28	32	35	46	50.5	88
25-Jun	47	50	68	85	87	83	76	64	55	47	32	25	24	23	22	22	22	22	26	30	33	35	34	38	43.7	87
26-Jun	43	47	51	55	52	52	50	47	43	39	37	35	34	33	33	33	32	31	33	34	36	40	43	47	40.8	55
27-Jun	50	53	55	57	57	62	86	87	84	79	74	79	84	81	82	79	84	88	87	90	92	93	91	93	77.8	93
28-Jun	94	94	95	96	95	94	93	91	87	81	78	76	68	65	66	60	57	54	58	57	60	65	68	72	76.0	96
29-Jun	72	74	77	79	78	80	77	73	69	64	54	46	42	36	37	38	38	37	40	42	62	68	68	74	59.3	80
30-Jun	78	76	81	85	83	89	93	92	89	87	89	79	75	71	66	63	69	75	78	77	80	84	83	86	80.3	93
	70.4	72.7	74.4	76.4	77.5	77.4	76.2	71.8	67.4	62.3	57.4	53.4	50.1	47.7	47.1	45.9	46.1	46.7	48.4	50.3	54.2	59.4	63.7	67.5	Diurnal Average	
	94	96	97	98	98	98	96	95	93	93	92	89	87	89	84	86	89	91	94	93	92	95	91	93	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 45m (RH45m) - %
Lower Camp Met Tower - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	153	21.25	21.25
40 - 60	175	24.31	45.56
60 - 80	229	31.81	77.36
80 - 100	163	22.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

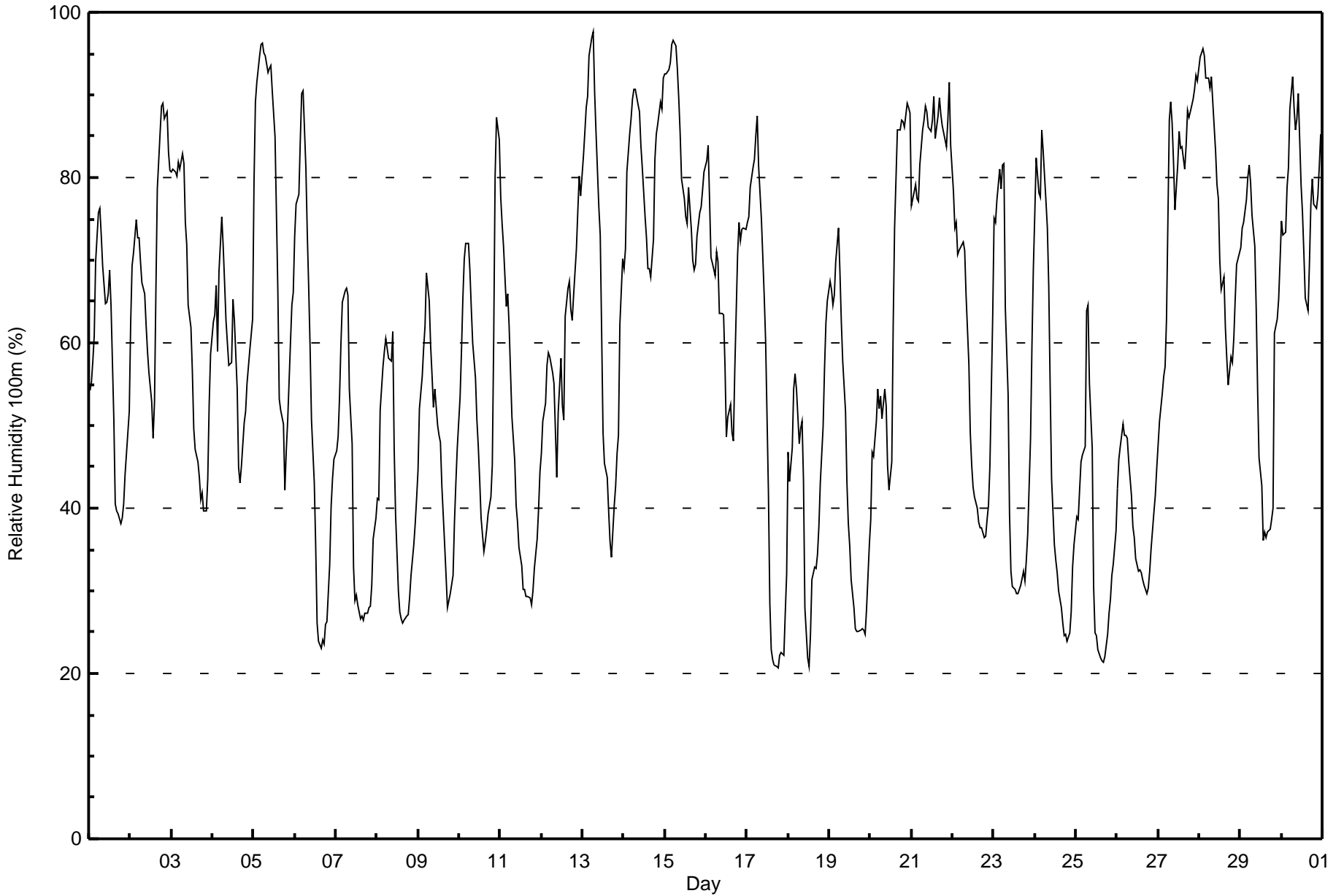
Lower Camp Met Tower - June 2017

Maximum Value: 98 % on Jun 13 07:00														Maximum Daily Average: 84.8 % on Jun 21														Hours in Service: 720	
Minimum Value: 21 % on Jun 17 19:00														Minimum Daily Average: 36.0 % on Jun 25														Hours of Data: 720	
Maximum Diurnal Average: 74.7 % at hour 7														Minimum Diurnal Average: 45.5 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 59.1 %														Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 41 Median = 60 Q ₃ = 77 P ₉₀ = 87 P ₉₉ = 96														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	54	55	58	61	70	76	76	73	69	65	65	66	69	64	51	41	40	39	38	39	40	44	47	52	56.3	76			
2-Jun	62	69	71	75	73	73	70	67	66	62	59	56	53	48	53	66	79	85	89	89	87	88	83	81	71.0	89			
3-Jun	81	81	81	80	82	81	83	82	75	72	65	62	57	50	47	46	44	41	42	40	40	44	52	59	61.8	83			
4-Jun	63	63	67	59	69	75	72	67	63	57	58	58	65	63	54	45	43	45	50	52	55	57	59	63	59.2	75			
5-Jun	79	89	92	95	96	96	95	95	93	93	94	91	85	76	66	53	52	50	42	47	50	60	65	66	75.8	96			
6-Jun	73	77	78	84	90	91	81	73	67	59	51	43	35	26	24	23	24	24	26	26	33	40	44	46	51.6	91			
7-Jun	47	49	53	60	65	66	67	66	54	48	33	29	30	28	27	27	26	27	27	28	28	31	36	39	41.3	67			
8-Jun	41	41	52	57	59	61	59	58	58	61	47	39	30	27	27	26	26	27	27	29	32	36	38	41	41.7	61			
9-Jun	45	52	56	59	62	68	65	60	56	52	54	50	49	48	43	36	32	28	29	30	32	38	43	47	47.2	68			
10-Jun	53	59	65	70	72	72	69	64	60	56	51	47	43	39	35	36	38	39	41	45	61	80	87	85	57.0	87			
11-Jun	78	74	72	64	66	62	56	51	46	40	38	35	33	30	30	29	29	29	28	30	33	36	40	44	44.8	78			
12-Jun	47	51	53	57	59	58	56	55	49	44	52	58	52	51	63	67	68	64	63	66	71	76	80	78	59.9	80			
13-Jun	83	85	88	90	95	97	98	90	85	77	73	61	49	45	44	40	36	34	40	43	47	49	62	70	65.9	98			
14-Jun	69	71	81	85	87	89	91	91	89	88	84	81	75	73	69	69	68	72	82	85	87	89	88	92	81.5	92			
15-Jun	93	93	93	94	96	97	96	93	90	86	80	78	75	74	79	74	70	69	70	73	76	76	78	81	82.6	97			
16-Jun	82	84	77	70	70	68	71	70	64	64	63	57	49	51	53	49	48	57	71	75	72	74	74	74	66.1	84			
17-Jun	75	75	79	81	82	85	88	81	75	70	66	60	42	28	23	22	21	21	21	22	22	22	27	32	50.9	88			
18-Jun	47	43	47	54	56	54	48	50	50	43	28	22	21	25	31	33	33	34	38	43	50	57	62	65	43.1	65			
19-Jun	68	66	65	66	70	74	69	62	58	52	43	38	36	31	28	26	25	25	25	25	25	25	28	36	44.4	74			
20-Jun	39	47	46	50	54	52	54	51	54	52	45	42	46	62	74	80	86	86	87	87	86	89	89	88	64.4	89			
21-Jun	77	77	79	78	77	82	86	87	89	88	86	86	87	90	85	88	90	88	86	85	84	87	92	84	84.8	92			
22-Jun	78	74	75	71	71	72	72	71	66	58	49	45	43	41	40	38	38	38	36	37	39	40	45	63	54.1	78			
23-Jun	75	75	77	81	79	82	82	64	54	39	32	31	30	30	30	30	31	32	31	34	37	48	60	69	51.3	82			
24-Jun	75	82	78	78	86	83	77	74	67	55	44	36	34	32	30	28	26	25	25	24	25	27	33	36	49.1	86			
25-Jun	39	39	42	46	47	47	64	65	55	47	30	25	25	23	22	22	21	22	25	27	29	32	33	37	36.0	65			
26-Jun	42	46	48	50	49	49	48	46	42	38	36	34	32	33	32	31	31	30	30	32	35	40	41	45	39.2	50			
27-Jun	48	51	54	56	57	63	87	89	87	82	76	81	86	84	84	81	84	88	87	88	90	91	92	92	78.2	92			
28-Jun	95	95	96	95	92	92	91	92	89	83	79	77	70	66	68	62	58	55	58	58	60	65	69	71	76.6	96			
29-Jun	72	74	75	77	80	82	79	75	72	64	54	46	43	36	37	36	37	38	39	40	61	63	65	70	58.9	82			
30-Jun	75	73	73	79	81	88	92	88	86	87	90	79	76	71	65	64	70	77	80	77	76	78	81	85	78.9	92			
65.1 67.0 69.0 70.8 73.0 74.5 74.7 71.7 67.5 62.7 57.5 53.8 50.6 48.2 47.1 45.5 45.7 46.3 47.8 49.2 52.1 56.0 59.8 62.9														Diurnal Average															
95 95 96 95 96 97 98 95 93 93 94 91 87 90 85 88 90 88 89 89 90 91 92 92														Diurnal Maximum															



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 100m (RH100m) - %
Lower Camp Met Tower - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	170	23.61	23.61
40 - 60	192	26.67	50.28
60 - 80	209	29.03	79.31
80 - 100	149	20.69	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

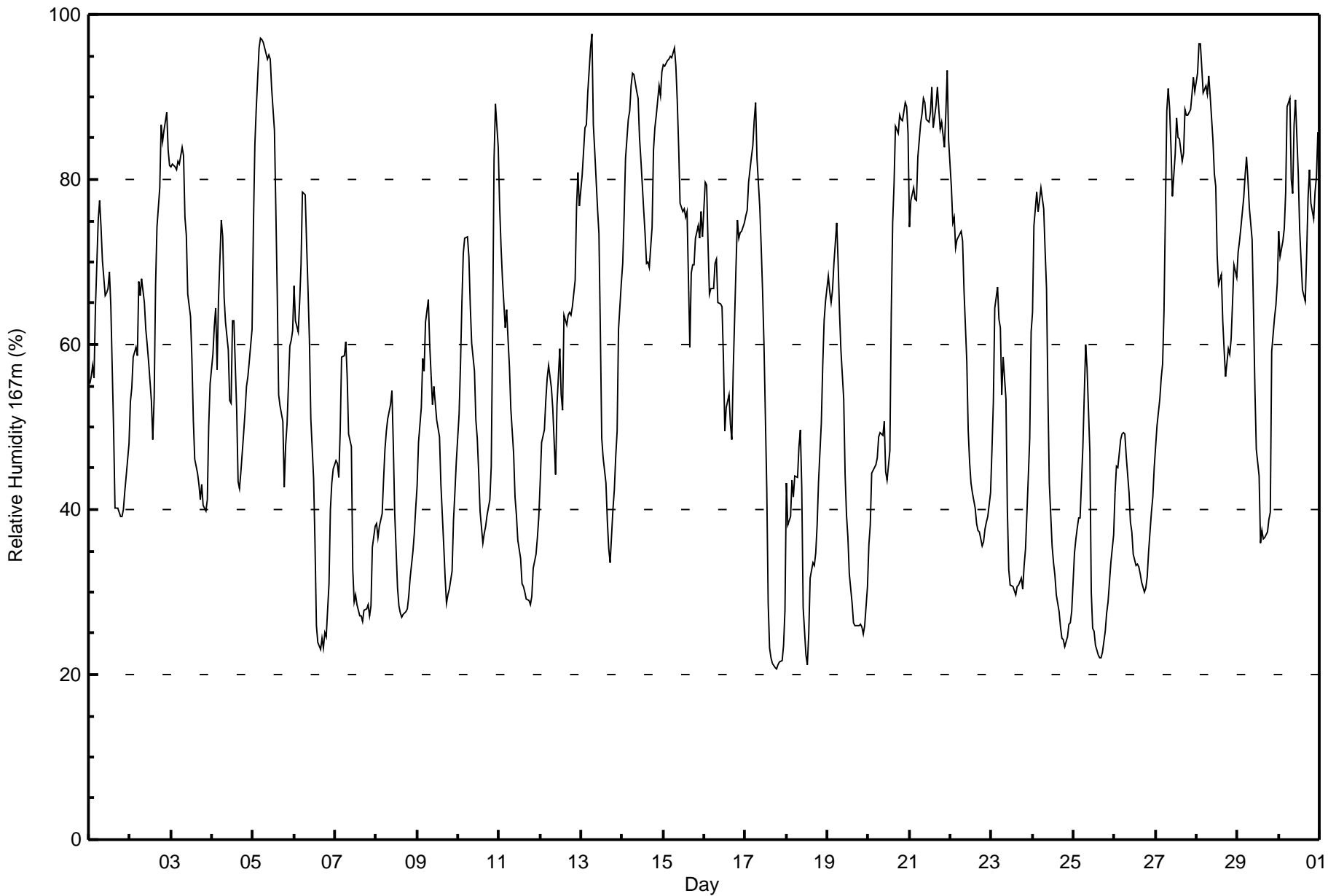
Lower Camp Met Tower - June 2017

Maximum Value: 98 % on Jun 13 07:00																			Maximum Daily Average: 85.6 % on Jun 21						Hours in Service: 720																								
Minimum Value: 21 % on Jun 17 19:00																			Minimum Daily Average: 34.6 % on Jun 25						Hours of Data: 720																								
Maximum Diurnal Average: 72.8 % at hour 7																			Minimum Diurnal Average: 45.3 % at hour 16						Hours of Missing Data: 0																								
Monthly Average: 58.0 %																			Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 40 Median = 58 Q ₃ = 75 P ₉₀ = 87 P ₉₉ = 96						Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	55	56	57	56	64	75	77	74	70	66	66	67	69	65	50	40	40	40	39	39	40	42	44	48	55.9	77																							
2-Jun	53	55	59	60	59	68	66	68	65	62	60	58	53	48	54	67	74	79	87	85	86	88	84	82	67.4	88																							
3-Jun	82	82	82	81	82	82	84	83	75	73	66	63	58	51	46	44	43	41	43	40	40	41	50	55	62.0	84																							
4-Jun	59	62	64	57	66	75	73	66	63	59	53	53	63	63	52	43	42	45	49	52	55	56	58	62	57.9	75																							
5-Jun	75	84	89	96	97	97	97	96	95	95	95	91	86	76	66	54	52	51	43	48	50	60	60	62	75.6	97																							
6-Jun	67	63	62	65	70	78	78	72	67	61	51	44	36	26	24	23	24	23	25	25	31	40	43	45	47.6	78																							
7-Jun	46	46	44	49	58	59	60	56	49	48	33	29	30	29	27	27	26	28	28	29	27	28	35	38	38.7	60																							
8-Jun	38	37	38	40	44	47	50	51	53	54	48	40	31	28	28	27	27	28	28	29	32	35	37	40	37.8	54																							
9-Jun	43	48	52	58	57	63	65	60	56	53	55	51	50	49	43	36	32	29	30	30	32	39	42	46	46.6	65																							
10-Jun	51	57	65	71	73	73	71	65	60	57	51	49	45	40	36	37	38	39	41	45	62	82	89	84	57.6	89																							
11-Jun	77	72	68	62	64	61	57	52	47	42	39	36	34	31	31	30	29	29	28	30	33	35	37	39	44.3	77																							
12-Jun	43	48	50	53	56	57	55	52	48	44	53	59	54	52	64	62	64	64	64	65	68	77	81	77	58.7	81																							
13-Jun	81	83	86	87	90	96	98	87	83	76	73	62	49	46	43	39	35	34	40	42	46	50	62	67	64.8	98																							
14-Jun	70	76	83	87	88	91	93	93	91	90	85	82	76	73	70	70	69	74	84	86	88	91	90	93	83.1	93																							
15-Jun	94	94	94	95	95	95	96	94	89	84	77	76	76	75	76	60	69	70	70	73	74	73	76	73	81.1	96																							
16-Jun	80	79	72	66	67	67	70	70	65	65	65	58	50	52	54	50	48	57	69	75	73	74	74	75	65.6	80																							
17-Jun	76	76	80	83	84	87	89	82	77	72	66	60	42	29	23	22	21	21	21	21	21	22	24	28	51.1	89																							
18-Jun	43	38	39	44	41	44	44	48	50	43	28	22	21	25	32	34	33	35	38	43	50	57	63	65	40.9	65																							
19-Jun	68	66	65	67	70	75	70	64	59	53	44	39	37	32	29	26	26	26	26	26	26	25	26	31	44.8	75																							
20-Jun	36	38	44	45	45	46	49	49	49	51	45	43	47	64	75	80	87	86	88	87	87	89	89	86	62.6	89																							
21-Jun	74	77	79	78	77	83	87	88	90	89	87	87	88	91	86	89	91	89	86	87	84	88	93	85	85.6	93																							
22-Jun	79	75	75	72	73	73	74	73	67	58	50	46	43	42	40	38	37	37	36	36	38	39	39	42	53.4	79																							
23-Jun	47	53	64	67	63	62	54	59	53	40	33	31	31	30	30	31	31	32	30	33	35	44	49	61	44.3	67																							
24-Jun	64	74	79	76	78	79	76	71	67	54	43	36	34	32	30	28	26	24	24	23	25	26	26	28	46.7	79																							
25-Jun	35	36	38	39	39	48	54	60	57	47	30	26	25	24	22	22	22	23	25	27	29	31	33	37	34.6	60																							
26-Jun	42	45	45	49	49	49	49	46	42	39	37	35	33	33	33	32	31	30	30	32	35	40	42	45	39.3	49																							
27-Jun	48	50	53	56	58	64	88	91	89	84	78	83	87	85	85	82	83	88	88	88	89	90	92	91	78.8	92																							
28-Jun	93	96	96	94	91	91	90	92	90	85	81	79	71	67	69	63	59	56	59	59	61	65	70	68	76.9	96																							
29-Jun	71	73	74	78	81	83	80	77	73	64	55	47	44	36	38	36	37	37	39	40	59	63	65	67	59.0	83																							
30-Jun	74	71	72	74	79	89	90	80	78	87	90	81	74	70	67	65	71	78	81	77	75	78	80	86	77.8	90																							
																								62.1	63.7	65.6	66.7	68.6	71.9	72.8	70.6	67.2	63.1	57.9	54.4	51.2	48.9	47.3	45.3	45.7	46.4	48.0	49.1	51.7	55.6	58.4	60.2	Diurnal Average	
																								94	96	96	96	97	97	98	96	95	95	95	91	88	91	86	89	91	89	88	88	89	91	93	93	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 167m (RH167m) - %
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity 167m (RH167m) - %
Lower Camp Met Tower - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	181	25.14	25.14
40 - 60	202	28.06	53.19
60 - 80	201	27.92	81.11
80 - 100	136	18.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2017

Maximum Speed: 23 km/h on Jun 12 13:00	Maximum Daily Speed Average: 15.4 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 22 23:00	Minimum Daily Speed Average: 0.7 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 2.4 km/h at hour 16	Minimum Diurnal Speed Average: 0.2 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 0.7 km/h 337.4 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 6 O ₃ = 10 P ₉₀ = 15 P ₉₉ = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SE3	SSE4	SW5	NNW1	NNW4	NNW2	W3	W7	WSW8	WSW10	WSW7	S6	SE4	SSE10	SSE8	ESE4	SE5	SSE4	SE3	SE4	SE4	SSE2	ENE0	NW0	S2.4	SSE10
2-Jun	W1	NNW2	SSE3	ESE2	SSE3	SE5	SE6	SE3	WSW1	N2	NW6	NW5	NNW4	NNE9	NNW8	W23	WNW22	NW9	NNW5	NNW9	WNW9	NW7	WNW10	WNW14	NW4.6	W23
3-Jun	WNW14	WNW14	WNW16	WNW19	WNW15	WNW15	NNW9	NNW7	N7	NW8	NW9	WNW8	WNW6	NW7	NNE5	NE3	SSE1	NE1	SSE8	SSE5	SE2	SSE3	NNE2	N5	NW5.6	WNW19
4-Jun	N1	SSE3	SSE7	S5	SW5	SW2	ESE2	SSE3	WSW5	NNW6	N3	WNW7	WNW5	NNW3	N5	N8	N11	NNW7	NNW8	NNW11	NNW4	NNE6	N5	NNW8	NNW2.9	N11
5-Jun	NW7	NNE2	E2	NNW7	NNW6	NNW8	N7	NNW7	NNW6	NNW6	N5	NNW6	NNW7	NNW7	NNE4	ENE5	SSE7	SSE4	ESE3	SSE5	ENE4	E1	N2	N2	N2.9	NNW8
6-Jun	ESE1	N1	N1	NNW2	NNW3	WNW2	SSE2	SSE7	SSE6	SE5	SSE8	SE7	SSE6	S5	W9	W10	NNW3	WSW3	NNW3	NW1	NNW5	NNW5	NNW4	NNW3	SW0.7	W10
7-Jun	N3	N4	N4	N4	NNW3	NNW3	NNW4	N4	NNW5	WSW4	E4	ENE1	W2	NE2	E5	ESE6	ENE4	E6	E6	ENE6	NNE7	NE6	NW4	N5	NNE2.7	NNE7
8-Jun	N6	N9	N6	N4	NNW3	NNW4	NNW3	N4	N4	N5	SSE5	SSE4	SE9	SSE10	SE12	SSE11	SE11	SE10	SE11	SE8	ESE6	SE5	ESE2	SE5	ESE3.0	SE12
9-Jun	SE5	N2	N3	N6	NNW4	N6	N15	N16	NNE16	NNE16	NNE17	NNE17	NNE18	NNE19	NNE18	NNE17	NNE16	NE12	ENE12	ENE11	ENE11	ENE7	ENE7	NE7	NNE10.5	NNE19
10-Jun	ENE9	E8	ENE4	NNE1	ENE3	NNE5	E4	NNE2	WNW5	NNW6	N8	NW6	W8	WSW7	WSW7	NW2	NNE3	NNE6	N5	NNW6	NNW10	N7	N7	NNW4	N3.2	NNW10
11-Jun	NW6	NNW6	NNW8	NNW9	NNW7	NW11	NW14	NNW15	NNW15	NNW15	NNW14	NNW11	NNW12	NNW13	N11	NNW10	N10	N10	N10	N7	NE4	NE2	E3	E2	NNW8.8	NNW15
12-Jun	ESE3	SE4	SSE10	SSE9	SSE10	SE10	SSE9	SSE9	SSE10	S13	S16	SSE20	SSE23	SSE21	ESE6	SSE9	E4	SE8	SSE11	SSE12	SSE7	N5	NNW6	N5	SSE8.3	SSE23
13-Jun	NNW3	NNW4	N3	NNW3	NNW4	N3	ENE2	SE4	SE4	SE3	SSW3	SSE3	N5	NNW8	N7	N6	N5	N9	N15	N12	NNE6	NNE9	NNE8	N10	N4.4	N15
14-Jun	N10	N12	N12	N15	N14	N14	NNE14	NNE13	NNE13	N10	N9	N12	N14	N13	NNE13	N13	N12	N10	N8	N9	N9	N8	N10	N10	N11.5	N15
15-Jun	NNW8	NNW7	NNW6	NNW5	N6	N5	N6	N4	N5	N5	NNW3	N6	NNW7	NNW5	SE6	ESE4	E3	ENE2	E5	NNW1	NE2	NNE1	NNE1	NNE2	N3.2	NNW8
16-Jun	NNW1	NNW1	SE2	S3	SSE4	SSE3	E2	ESE4	SSE6	SSE8	SSE7	SSE6	SSE9	SW8	WSW10	W1	S9	WNW7	NW8	NNE2	ESE3	S2	SSE5	SSE15	S3.1	SSE15
17-Jun	SSE16	SSE14	SSE10	SSE8	S11	SSE7	SE6	NW9	WNW14	NW11	N5	NNE4	NW12	NW13	NW16	NW15	NW13	NNW11	NNW8	NNW2	S2	SSE1	SSE2	SSE3	WNW2.7	NW16
18-Jun	ESE1	SE7	ESE1	SE5	SE8	SE10	SSE6	S6	SSE9	SSE5	W8	W11	WSW14	SW13	W13	W16	W17	W12	NW8	NNW10	NNW9	NNW7	NNW6	WNW5	WSW3.8	W17
19-Jun	NW4	WNW4	NW4	NW5	NW6	WNW3	WNW5	W2	SW6	WSW4	W5	WSW5	WSW5	WSW6	WSW9	WSW9	WSW8	W9	NW4	S2	SE6	SSE3	SE2	ENE2	W3.5	WSW9
20-Jun	SSE5	SE7	SE9	SSE11	SSE9	SSE11	SSE10	SSE8	SE4	SSE7	SSE8	SSW10	SW18	SSW17	SSW14	SSW12	S13	S13	SSE16	SSE15	S14	SE9	SSE10	SSE12	S10.0	SW18
21-Jun	SSW9	SW9	SW6	W10	WNW11	WNW15	WNW19	WNW16	WNW15	WNW13	WNW11	WNW12	WNW14	WNW15	WNW17	WNW17	WNW17	WNW12	NNW9	NNW11	NNW9	NNW6	N13	N16	WNW10.5	WNW19
22-Jun	N14	N14	N15	N16	N16	NNW12	N10	N10	N12	N14	N16	N17	N14	N13	N12	N12	N11	N9	N7	NNE6	N2	SSW0	SW0	SW0	N10.3	N17
23-Jun	ESE1	N1	NE0	SE1	NNW2	NW1	NNW1	NNW3	N5	NW7	N7	N8	N7	NNW4	NNE2	WSW4	NNW4	N4	N3	NW3	NNW2	NW2	N2	SSE2	NNW2.7	N8
24-Jun	NNW1	ENE1	ESE2	E3	ESE2	SE4	ESE2	N4	NNW5	N8	N8	N9	N9	N11	N12	N8	N8	N9	NNE8	NNE5	NNE4	NE0	NE2	NE1	N4.4	N12
25-Jun	ESE2	NNW4	NNW5	NNW3	NW1	N2	N2	NNE2	E1	S2	SSE6	SE5	W4	S5	S8	SSE9	S10	SSE8	SSE11	SSE12	SSE14	SSE16	S18	S19	SSE5.1	S19
26-Jun	S17	S15	SSE16	SSE15	SSE17	SSE17	SSE18	SSE18	SSE15	SSE18	SSE17	SSE19	SSE22	SSE22	SSE20	SSE17	SSE15	SSE18	SSE13	SE10	SE9	SE8	SSE9	SE9	SSE15.4	SSE22
27-Jun	SE10	SE9	SE11	SSE11	SSE14	SSW14	W13	SW7	SSW10	SSW9	SSW7	WSW10	WSW7	SSE2	ESE2	NW1	WSW9	WSW8	W7	N3	E2	E1	E1	SE2	SSW4.6	SSE14
28-Jun	E2	NE3	NNE3	N2	ENE1	ENE3	ENE3	NE2	ENE6	ENE8	ENE9	ENE5	ENE6	NNE9	NNE6	E5	SE7	S7	SSE9	SSW6	S8	S14	SSE16	SSE11	ESE3.4	SSE16
29-Jun	SSE10	SSE9	SSE9	SSE12	SSE14	SSE8	SE7	SE6	SSE5	SSE5	SSW3	WNW2	WNW3	N5	NW4	N5	NNE3	NW4	N3	WNW1	W6	NW2	N2	NNW2	SSE2.2	SSE14
30-Jun	SE2	SE4	SE2	E0	ESE3	SW1	ESE2	SE4	SSE8	SSE5	SSE7	SSE8	SSE8	SE4	WNW2	W7	W6	W5	WSW6	WSW6	SE3	SE7	SE4	SE5	SSE2.8	SSE8

SE0.3 ENE0.5 ESE0.4 NW0.6 SW0.2 NW0.5 N1.0 NNW1.2 NW1.2 NW1.3 NNW1.0 NW1.1 NNW1.8 NW1.5 NNW2.3 NW2.4 NW1.8 NW1.3 NNE1.4 NE1.1 ENE1.1 E1.0 NE0.8 ENE0.8	Diurnal Average
S17 S15 SSE16 WNW19 SSE17 SSE17 WNW19 SSE18 NNE16 SSE18 NNE17 SSE20 SSE23 SSE22 SSE20 W23 WNW22 SSE18 SSE16 SSE15 SSE14 SSE16 S18 S19	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

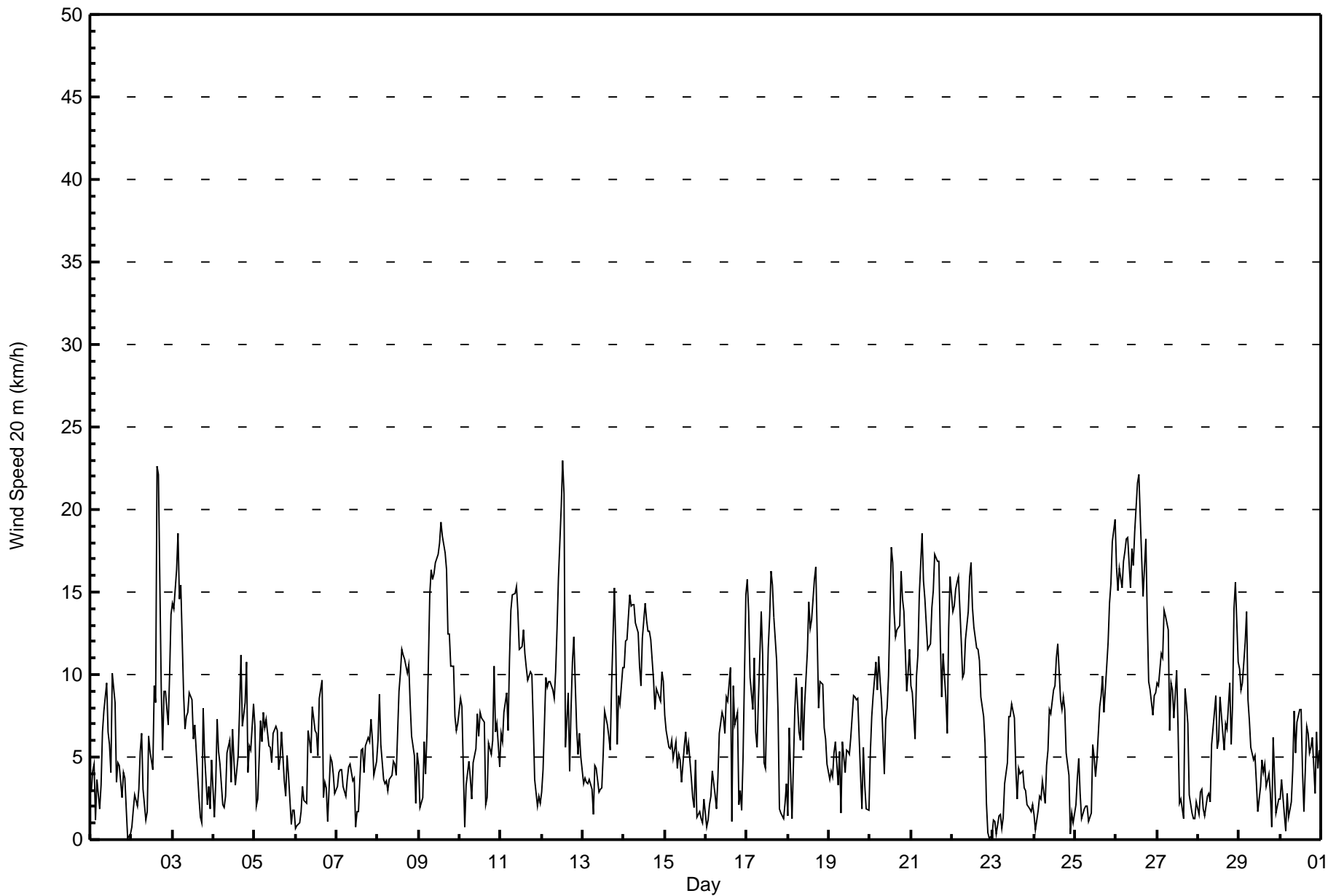
Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 2 17:00 Minimum Value: 0 km/h on Jun 23 00:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	3	3	1	1	1	3	3	3	4	3	3	2	4	3	2	2	2	2	1	2	1	1	1	4
2-Jun	1	2	2	1	2	2	2	1	1	2	3	2	2	5	4	9	9	5	4	4	4	4	5	5	9
3-Jun	6	6	7	7	6	6	4	4	4	5	5	4	4	5	2	2	2	2	3	2	2	1	2	2	7
4-Jun	1	3	5	3	3	1	1	2	6	3	2	2	2	2	3	4	3	4	5	2	3	2	3	6	
5-Jun	4	2	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3	2	1	2	3	2	1	1	4
6-Jun	1	1	1	1	1	1	2	2	2	2	3	3	3	3	4	4	3	2	1	1	2	1	1	1	4
7-Jun	2	2	2	2	1	1	2	2	2	2	3	2	3	4	5	4	3	3	3	3	3	3	2	2	5
8-Jun	2	3	4	2	1	1	1	2	1	2	2	2	4	5	5	5	5	4	4	3	2	2	2	3	5
9-Jun	3	2	2	3	1	4	6	6	7	6	8	8	7	8	7	7	7	6	6	6	5	4	3	3	8
10-Jun	4	4	3	2	2	2	2	2	3	4	4	3	4	4	3	2	1	2	2	3	5	3	4	2	5
11-Jun	2	2	3	3	2	5	6	7	7	7	6	6	6	6	5	5	5	5	4	4	2	1	1	1	7
12-Jun	1	3	4	4	4	4	4	3	4	4	5	7	7	8	7	5	4	5	4	4	4	2	2	2	8
13-Jun	2	2	1	2	2	2	1	2	2	2	2	2	3	3	3	3	3	4	5	4	2	3	4	4	5
14-Jun	5	5	6	6	5	6	6	6	5	4	4	5	6	5	5	5	5	4	4	4	4	4	4	4	6
15-Jun	3	3	2	3	3	2	3	3	2	2	2	3	3	3	3	2	1	1	3	1	1	1	1	1	3
16-Jun	1	1	3	1	2	2	2	2	3	3	2	3	3	4	5	3	4	4	5	2	1	2	3	5	5
17-Jun	4	4	4	3	3	3	2	6	5	5	3	3	5	7	7	7	6	5	3	2	1	1	2	1	7
18-Jun	2	2	2	2	3	3	3	3	4	3	5	5	6	8	7	7	6	5	4	4	4	3	2	2	8
19-Jun	2	4	2	3	3	2	3	2	3	3	3	3	4	4	4	5	4	3	2	2	1	2	2	2	5
20-Jun	2	3	2	3	4	4	3	3	3	3	3	4	7	5	4	4	3	4	5	4	4	4	5	5	7
21-Jun	3	4	2	5	4	6	7	7	6	5	5	5	6	6	7	7	7	6	5	5	4	4	6	7	7
22-Jun	6	6	6	7	7	5	5	5	5	5	6	7	6	6	5	6	5	5	4	3	1	0	0	0	7
23-Jun	1	1	1	1	1	1	1	2	2	4	4	4	4	3	2	4	4	3	2	1	1	1	1	1	4
24-Jun	1	1	1	2	2	2	2	2	2	3	4	4	4	5	5	4	4	4	3	3	2	1	1	1	5
25-Jun	2	1	2	2	1	1	1	1	1	1	4	3	3	4	4	4	4	3	3	3	4	4	4	4	4
26-Jun	4	4	4	5	5	5	6	5	4	5	6	6	7	7	7	6	6	6	4	4	3	4	3	3	7
27-Jun	3	3	4	4	5	5	6	3	3	3	2	4	3	2	1	3	3	3	3	2	1	1	1	1	6
28-Jun	1	1	1	1	1	1	1	1	5	4	5	3	4	4	4	3	3	4	3	2	3	4	4	5	5
29-Jun	3	2	2	3	4	3	3	2	2	2	1	2	3	3	2	2	2	2	1	1	2	1	1	1	4
30-Jun	1	1	1	1	2	2	2	2	3	3	3	3	3	2	3	3	3	2	2	2	2	2	2	2	3
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	307	42.64	42.64
6 - 11	276	38.33	80.97
12 - 19	129	17.92	98.89
20 - 28	8	1.11	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

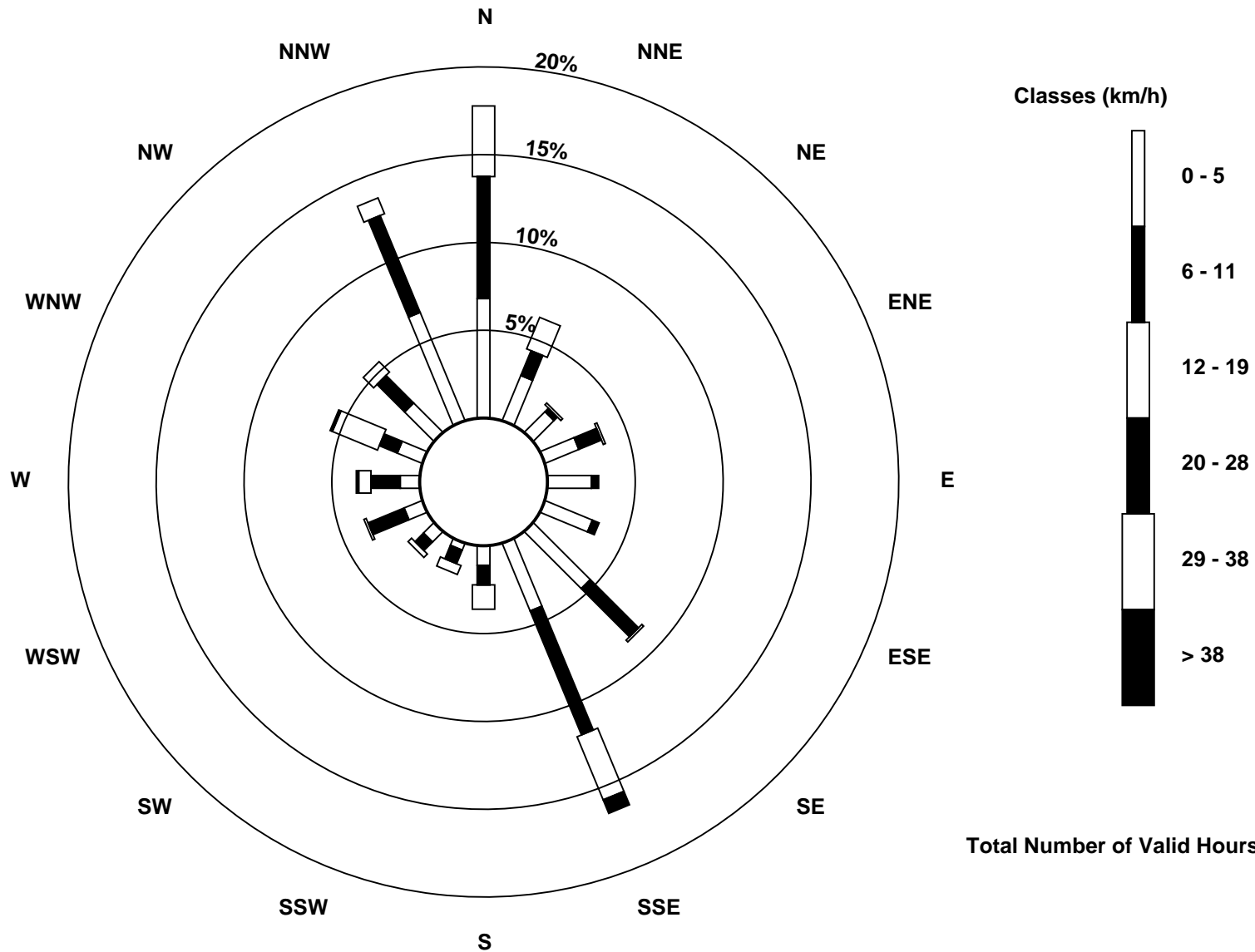
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower (AMS 3)





Maximum Speed: 32 km/h on Jun 2 17:00	Maximum Daily Speed Average: 19.6 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 6 01:00	Minimum Daily Speed Average: 0.8 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 3.4 km/h at hour 16	Minimum Diurnal Speed Average: 0.2 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 1.5 km/h 344.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 5 Median = 9 Q ₃ = 14 P ₉₀ = 19 P ₉₉ = 27	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SE3	SSE6	SW7	NW1	NW5	WNW2	W5	WSW9	WSW11	SW13	WSW9	S7	SE5	SE12	SE10	ESE4	SE5	SE5	SE4	ESE5	SE5	SE6	ESE2	N1	S3.1	SW13
2-Jun	NW1	NNW3	SSE3	SE4	SE6	SE7	SE7	SE3	W2	NNW3	NW9	NW7	NNW5	N13	NNW12	W32	W32	WNW15	NNW8	NW13	WNW14	WNW11	WNW15	WNW20	WNW6.8	W32
3-Jun	WNW21	WNW20	WNW23	WNW27	WNW22	WNW22	NW13	NW10	NNW11	WNW11	WNW12	W11	WNW8	NW9	NNE7	NE3	SE1	NE1	SE10	SE8	SE4	SE6	E2	N6	WNW7.6	WNW27
4-Jun	ESE2	SSE6	SSE10	S7	SW6	SW3	E2	SE3	WSW8	NW10	N4	W10	W6	NW4	N7	N11	N16	NNW10	NNW13	NNW17	N7	NNE9	N8	NNW13	NNW4.2	NNW17
5-Jun	NW11	NNE4	ENE5	NNW12	NNW10	NNW12	NNW11	NNW12	NNW9	NNW9	NNW6	NW9	NW9	NNW9	N5	ENE6	SSE7	SSE4	E3	SSE6	NE6	E2	NNE3	NNW2	N4.7	NNW12
6-Jun	NE0	NNW1	WNW1	N2	N3	NW2	SE3	SE8	SE7	SE6	SE9	SE8	SSE7	S6	W12	W13	NW4	SW5	NNW5	NW2	NNW8	NNW8	NNW7	NNW5	WSW0.8	W13
7-Jun	N6	N7	N7	NNW7	NNW5	NNW4	NNW6	NNW5	NNW6	WSW4	E6	ENE2	WNW2	NE3	ENE7	E8	NE7	E9	ENE10	NE9	NNE12	NE11	NNW5	N7	NNE4.5	NNE12
8-Jun	NNW10	NNW13	NNW9	NNW6	NNW5	NNW5	NNW5	NNW5	NNW5	N5	SE5	SE4	SE11	SE13	SE15	SE14	SE14	SE14	SE15	ESE12	ESE10	ESE10	ESE7	SE7	ESE4.2	SE15
9-Jun	SE8	NNW2	NNE2	N8	NNW6	N9	N21	N23	N23	NNE24	NNE24	NNE26	NNE27	NNE28	N26	NNE25	NNE24	NE19	NE20	ENE17	ENE17	ENE13	ENE11	NE12	NNE15.6	NNE28
10-Jun	ENE14	E13	ENE7	NNE1	ENE4	NNE7	ENE5	NNE3	WNW5	NNW7	NNW9	NW8	W9	WSW9	WSW9	WNW3	N4	NNE9	N8	NNW9	NNW16	N10	N11	NNW7	N4.6	NNW16
11-Jun	NW10	NNW10	NW12	NW14	NW10	NW15	NW19	NW21	NNW21	NW21	NW19	NNW16	NW16	NNW18	NNW15	NNW14	NNW13	NNW14	NNW14	N10	NE7	NE3	E3	ESE3	NNW12.4	NNW21
12-Jun	SE5	SE7	SE14	SE13	SE13	SE14	SE13	SE11	SSE12	SSE14	S18	SSE25	SSE27	SSE24	E8	SSE11	E7	SE10	SE14	SSE15	SE10	N8	NNW11	NNW8	SE10.2	SSE27
13-Jun	NNW6	NNW7	NNW6	NNW6	NNW6	N4	NE2	ESE5	SE5	ESE3	S3	SE3	NNW6	NNW11	N9	N8	N7	N13	N21	N16	NNE9	NNE14	NNE13	N15	N6.8	N21
14-Jun	N15	N18	N18	N21	N21	N20	NNE20	N19	N18	N14	N13	NNW18	N21	N18	N18	N18	N17	N14	N12	NNW14	NNW14	N13	NNW16	NNW15	N16.7	N21
15-Jun	NNW12	NNW11	NNW10	NNW9	NNW9	NNW8	NNW9	N6	NNW7	N6	NNW4	N7	NNW9	NNW7	SE8	ESE5	ENE3	ENE3	ENE8	NNW1	NE3	NNE2	NE2	NNE3	N4.8	NNW12
16-Jun	N2	NW2	SE3	SSE4	SE6	SE5	ESE3	ESE5	SE7	SE9	SSE8	SSE7	SSE10	SW11	WSW14	W1	S12	WNW10	WNW11	N3	E5	SSE3	SE6	SE19	SSE3.7	SE19
17-Jun	SSE18	SSE17	SE13	SSE9	SSE13	SSE8	SE6	WNW13	WNW19	NW15	NNW6	N6	NW16	NW19	NW22	WNW20	NW19	NW15	NNW11	NNW3	S1	SE2	S2	SE5	WNW4.0	NW22
18-Jun	SE2	SE10	SE2	SE7	SE10	SE12	SSE8	SSE7	SE11	SE6	WSW11	W15	WSW19	SW16	W19	W23	WSW25	W18	NW11	NNW14	NNW14	NNW11	NW9	WNW6	WSW5.6	WSW25
19-Jun	NW5	WNW6	NW6	WNW7	WNW9	WNW5	WNW7	W2	SW7	WSW5	W6	SW6	WSW6	WSW7	WSW11	WSW11	WSW11	WSW11	WNW5	S2	SE6	SSE6	SE4	E2	WSW4.7	WSW11
20-Jun	SE8	SE9	SE11	SE14	SE12	SSE14	SE13	SE12	SE6	SE9	SE11	S11	SSW21	SSW18	SSW16	S14	SSE14	S14	SSE18	SSE17	SSE15	SE12	SSE12	SSE14	SSE12.1	SSW21
21-Jun	S11	SW11	SSW8	W15	W16	W21	W26	W22	W21	W19	NNW17	WNW18	W20	WNW21	W24	WNW24	WNW24	WNW18	NW13	NNW17	NNW14	NNW10	N18	N24	WNW15.1	W26
22-Jun	NNW21	NNW21	N22	NNW22	N23	NNW18	NNW15	NNW15	NNW17	N19	N22	N24	N19	N18	N16	NNW16	N15	N12	N11	NNE9	N4	WNW1	WNW1	WNW1	N14.9	N24
23-Jun	E1	N2	W0	SSE1	NNW1	NNW1	NNW2	NW4	NNW5	NW10	N10	NNW10	NNW9	NNW6	NNE4	WSW6	NNW6	N7	N5	NW3	NNW4	W2	NW3	SE3	NNW3.6	NNW10
24-Jun	WSW3	N2	SE2	ESE4	SE4	SE4	E2	N5	NNW7	NNW10	NNW10	N12	N12	N15	N16	NNW11	N11	N12	N11	NNE9	NNE8	ENE2	ENE2	SE2	N5.8	N16
25-Jun	ESE5	N4	NNW7	N5	NW2	N2	N2	NNE2	E1	SSE1	SE7	ESE6	W5	S5	SSE9	SSE10	SSE12	SE10	SSE13	SSE14	SSE17	SSE18	SSE21	SSE22	SSE5.9	SSE22
26-Jun	SSE18	SSE17	SSE19	SE20	SE22	SE23	SE23	SE22	SSE18	SSE21	SE22	SE23	SE28	SE28	SE26	SE23	SE19	SSE21	SE18	SE15	ESE13	SE10	SE12	SE14	SE19.6	SE28
27-Jun	SE14	SE14	SE16	SE16	SE17	SSW16	WSW18	SW9	S12	S11	SSW9	SW13	SW9	SE3	E3	WNW1	SW12	WSW12	W10	NNW3	ENE1	ESE1	ESE1	ESE3	S6.1	WSW18
28-Jun	E2	NE4	NNE4	NNE3	ENE4	ENE4	ENE5	NE3	ENE9	ENE12	ENE14	ENE9	NE9	NNE13	NNE10	ENE7	SE8	SSE8	SSE11	SSW7	S10	SSE16	SSE18	SSE13	E5.0	SSE18
29-Jun	SSE12	SSE11	SE11	SSE14	SSE16	SE11	SE8	SE7	SE5	SSE5	SSW4	WNW2	WNW4	N6	NW6	N7	N5	NW5	NNW5	NE1	W9	NW2	NW3	NW3	SSE2.3	SSE16
30-Jun	SE2	SSE3	SE4	SE2	ESE5	SW2	E3	SE6	SE10	SE6	SE9	SE9	SE9	SE5	WNW3	W10	WSW10	WSW8	WSW8	WSW9	SE3	SE9	SE5	SE6	SSE3.6	SE10

NNE0.4	NE0.9	ENE0.8	NNW1.0	N0.2	NNW0.8	NNW1.7	NNW2.0	NW2.1	NNW2.2	NNW1.7	NW1.9	NNW2.4	NW2.4	NNW3.3	NW3.4	NW2.7	NW2.0	NNE2.6	NNE2.4	NE2.3	ENE2.0	NE1.6	NE1.3	Diurnal Average	
NNW21	NNW21	WNW23	WNW27	N23	SE23	W26	N23	N23	NNE24	NNE24	NNE26	SE28	NNE28	N26	W32	W32	SSE21	N21	NNW17	SSE17	SSE18	SSE21	NNW24	Diurnal Maximum	

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

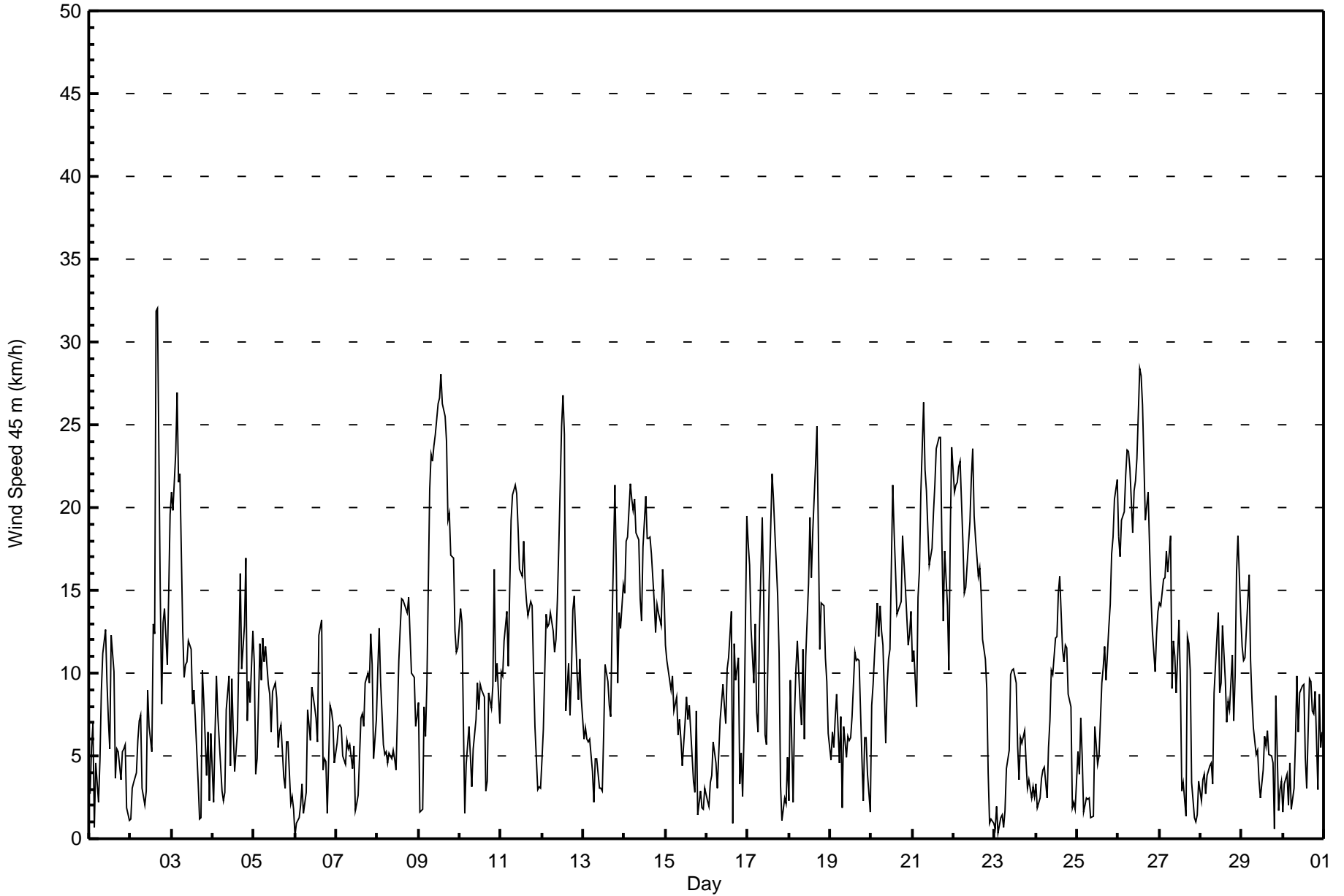
Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jun 4 09:00 Minimum Value: 1 km/h on Jun 22 23:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	3	3	1	2	2	3	3	3	5	3	3	2	4	3	2	3	2	2	2	2	1	2	1	5
2-Jun	1	1	2	2	2	2	2	1	2	2	3	2	2	6	5	9	9	5	5	5	4	5	5	5	9
3-Jun	6	6	6	6	5	6	4	4	4	5	5	4	4	5	2	2	2	2	2	3	2	2	2	1	6
4-Jun	2	4	6	4	3	2	1	2	10	3	3	2	3	2	3	4	4	3	5	6	3	4	3	4	10
5-Jun	5	3	4	4	3	3	3	3	3	3	2	2	3	3	3	4	3	3	2	2	5	2	2	1	5
6-Jun	2	2	1	1	1	1	2	3	2	2	3	3	3	4	4	4	4	2	2	1	2	2	2	1	4
7-Jun	2	2	2	2	2	1	2	2	2	2	4	2	4	5	5	6	4	3	4	4	4	4	3	2	6
8-Jun	2	3	4	2	1	1	2	2	2	2	2	2	5	5	6	5	5	5	4	4	2	2	4	4	6
9-Jun	5	2	2	3	2	6	6	6	8	7	9	9	9	8	8	8	7	7	7	7	5	4	3	3	9
10-Jun	4	5	5	2	2	2	3	2	3	5	4	4	4	4	4	2	1	2	3	4	5	4	4	3	5
11-Jun	2	2	3	3	3	5	5	7	7	7	7	6	6	6	6	6	5	5	4	5	3	2	2	2	7
12-Jun	2	4	4	4	5	5	4	4	4	4	5	8	8	8	7	6	6	7	4	3	4	3	3	2	8
13-Jun	2	2	2	2	2	2	1	2	2	2	2	2	2	4	3	3	3	4	6	4	3	3	5	4	6
14-Jun	6	5	6	6	6	6	7	7	6	5	5	6	6	5	6	5	5	5	4	4	5	4	5	5	7
15-Jun	3	4	3	3	3	2	3	3	2	2	2	3	3	3	4	2	2	2	4	1	2	2	1	1	4
16-Jun	2	1	4	2	3	3	2	2	3	2	2	3	3	5	5	3	4	4	5	2	1	2	4	6	6
17-Jun	4	4	5	4	3	3	2	8	5	5	3	3	6	8	7	7	6	5	4	2	1	1	2	2	8
18-Jun	2	3	2	2	3	3	3	3	4	3	6	5	6	9	8	7	5	6	4	4	5	4	3	3	9
19-Jun	2	5	2	3	3	3	4	3	3	3	3	4	4	4	4	5	4	3	2	2	2	1	2	2	5
20-Jun	3	3	1	3	4	4	3	3	4	3	3	4	9	5	4	4	3	4	5	4	4	4	5	5	9
21-Jun	3	4	2	6	5	7	7	6	6	5	5	5	5	6	6	7	7	7	6	5	4	4	7	7	7
22-Jun	6	7	6	7	8	6	6	5	5	6	7	7	7	6	6	6	5	6	4	4	2	1	1	1	8
23-Jun	1	1	1	1	1	1	1	2	2	4	4	4	4	3	3	5	6	3	2	1	2	2	1	2	6
24-Jun	2	1	2	2	3	2	2	3	2	3	4	5	4	6	4	4	4	4	4	3	2	2	1	2	6
25-Jun	3	2	2	2	1	1	1	1	1	1	5	3	4	4	4	4	5	3	4	4	5	5	5	5	5
26-Jun	4	4	4	5	6	6	7	5	5	6	7	7	8	7	7	7	6	5	5	4	4	4	4	4	8
27-Jun	3	4	4	5	5	6	6	4	3	3	3	4	3	2	2	4	3	3	4	2	1	1	1	1	6
28-Jun	1	1	2	2	2	2	2	2	6	5	5	4	5	4	5	4	4	5	4	3	3	4	4	5	6
29-Jun	3	2	2	3	3	3	3	2	2	2	1	3	3	3	3	2	2	2	1	1	3	1	1	1	3
30-Jun	1	1	1	1	3	2	2	2	3	3	3	3	3	3	4	3	3	2	2	2	2	2	2	2	4
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	205	28.47	28.47
6 - 11	262	36.39	64.86
12 - 19	183	25.42	90.28
20 - 28	68	9.44	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

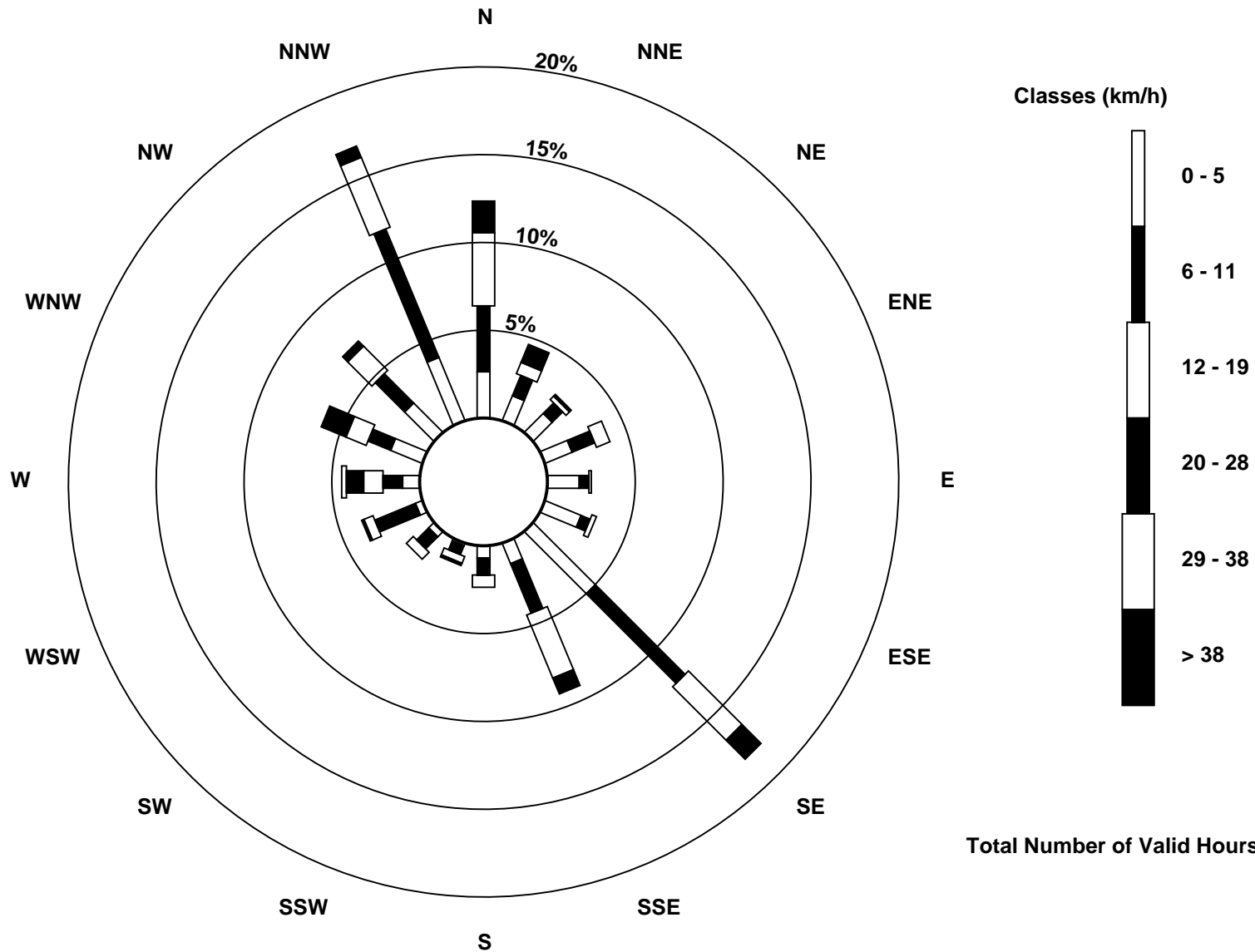
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 45 m (WS45m) - km/h
Lower Camp Met Tower (AMS 3)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - June 2017

Maximum Speed: 46 km/h on Jun 2 17:00	Maximum Daily Speed Average: 30.1 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 27 16:00	Minimum Daily Speed Average: 1.0 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 5.2 km/h at hour 22	Minimum Diurnal Speed Average: 0.3 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 2.0 km/h 5.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 13 Q ₃ = 21 P ₉₀ = 28 P ₉₉ = 38	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	NNE1	SSE6	SW11	W5	WNW7	W6	W7WSW10	WSW11	SW15	SW12	SSW9	SSE6	SE15	SE11	SE3	SE5	SE6	SE5	ESE7	SE8	SE9	S5	SSW3	SSW4.5	SW15	
2-Jun	SE6	SSE1	S3	SSE4	SSW5	SSW5	SE2	NE1	NW3	NNW6	NW12	NW9	NNW7	NNE19	NNW19	W45	W46	WNW27	NW16	NW24	WNW23	WNW18	WNW22	WNW27	WNW11.3	W46
3-Jun	W29	WNW29	WNW34	WNW37	W31	WNW31	NW20	NW14	NNW13	WNW13	WNW15	W13	WNW10	NW12	NNE8	NE4	E1	ENE2	SE11	SE12	SE12	SE16	SE13	SE10	WNW9.1	WNW37
4-Jun	SE15	SE19	SSE15	SSW11	SW8	WSW3	NE1	ESE4	WSW10	NW11	N6	W12	W8	NW5	NNW10	N17	N23	N17	NNW21	NNW27	N15	NNE20	NNE17	N20	N6.0	NNW27
5-Jun	N17	NE9	ENE14	NNW18	N16	NNW20	N17	NNW17	NNW15	N13	N9	NNW12	NNW11	NNW11	N7	ENE9	SE7	SE5	E4	SSE7	ENE10	E6	ENE3	SSE1	N7.5	NNW20
6-Jun	E2	SE5	SSE5	SE5	SSE4	SE3	SSE5	SE11	SE9	SSE6	SE9	SE8	SSE8	SSW8	W16	W17	NW6	SW7	NNW5	NE4	NNE13	N11	N11	N8	SSE1.0	W17
7-Jun	N9	N11	N14	N14	N9	N9	NNW10	N7	NNW7	W4	E9	ENE5	NNW3	NE5	ENE11	E11	NE11	E15	E15	ENE15	NE24	NE25	NNE8	NNE9	NE8.4	NE25
8-Jun	N12	N10	N15	NNW11	NNW10	N8	NNW6	NNW7	NE3	NE4	ESE6	ESE6	SE16	SE19	SE20	SE19	SE20	SE21	SE22	SE21	ESE22	SE20	SE19	SE17	ESE8.1	ESE22
9-Jun	SE22	SE11	SE8	NNE7	NNE13	N18	N32	N33	NNE32	NNE34	NNE34	NNE36	NNE38	NNE38	NNE38	NNE37	NNE34	NE28	NE29	ENE27	ENE26	ENE23	ENE24	ENE26	NNE23.0	NNE38
10-Jun	ENE31	E30	E18	ENE6	E8	NE9	E8	NE5	NW5	NNW9	N11	NW9	W10	WSW10	WSW9	WNW3	NNE4	NNE13	NNE13	N14	NNW25	N14	N16	N12	NNE6.6	ENE31
11-Jun	NW16	NW18	NW23	NW24	NW19	NW23	NW26	NW31	NNW29	NW27	NW24	NW22	NW22	NW23	NNW21	NNW19	NNW19	NNW21	NNW19	N15	NE14	ENE13	ESE10	SE11	NNW17.3	NW31
12-Jun	SE13	SSE16	SE19	SE19	SE20	SE22	SE24	SE20	SSE17	SSE18	S21	SE35	SSE34	SSE33	ESE12	SSE15	E14	SE14	SE20	SSE19	SE19	N13	N17	N14	SE15.6	SSE35
13-Jun	N10	N12	N10	NNW12	NNW12	N6	NE3	ESE4	ESE4	ESE3	SSE2	E1	N8	NNW14	N12	N10	N10	N19	N31	N26	NNE16	NNE20	NNE20	N23	N10.8	N31
14-Jun	N24	N28	N29	N32	N31	N31	NNE29	NNE26	NNE26	N22	N20	NNW25	N30	N26	NNE26	N27	N26	N23	N20	N23	N22	N21	N26	NNW25	N25.5	N32
15-Jun	NNW19	NNW19	NNW16	NNW16	N15	N13	N12	N10	N9	N7	N4	N8	NNW11	NNW10	ESE13	E8	ENE6	ENE4	ENE13	ENE5	NE7	ENE6	ENE6	E4	NNE7.6	NNW19
16-Jun	NE1	SE3	SE11	SE11	SE13	SE16	SE8	SE8	SE8	SE11	SSE8	SSE7	SSE12	SSW12	WSW14	SSE2	S13	W11	WNW18	N5	E10	SE5	SSE8	SE31	SSE6.3	SE31
17-Jun	SSE23	SSE24	SE24	SSE15	SSE15	S7	SSW3	WNW19	WNW25	NW19	NNW8	N8	NW21	NW25	NW30	WNW27	NW24	NW21	NNW16	NNW7	NNE3	E4	S4	S4	WNW5.8	NW30
18-Jun	WSW4	SE9	SSE5	SSE9	S8	S9	SW9	S6	SSE13	SE7	WSW14	WSW19	SW21	SW19	W24	W28	WSW27	WSW23	NW16	NNW21	NNW22	NNW19	NNW17	W12	W8.6	WSW28
19-Jun	NW7	W11	NW10	NNW12	W15	W8	WNW9	WNW3	WSW7	WSW6	W7	WSW7	WSW7	W9	WSW13	WSW12	WSW12	WSW12	WNW6	S4	SSE7	S12	SSW12	SSW6	WSW7.1	W15
20-Jun	SSE10	SSE15	SSE9	SSE14	SSE17	SSE21	SSE18	SSE17	SE12	SE14	SE16	S13	SW26	SSW22	SSW20	S17	S16	SSE19	SSE25	SSE23	SSE21	SE20	SSE21	S13	SSE16.2	SW26
21-Jun	SSW18	SW17	SW14	W22	W24	W29	W36	W30	W29	W26	W23	WNW23	W27	WNW29	W32	WNW33	WNW34	WNW29	NW25	NNW29	NNW26	NNW19	N29	N36	WNW22.1	W36
22-Jun	N33	N34	N33	N33	N34	NNW28	N24	N23	N24	N27	N31	N33	N28	N25	N22	NNW23	N21	N18	N16	NNE14	NNE8	NNE6	NW4	W9	N22.3	N34
23-Jun	W11	W8	N6	NNW4	NNW4	NNW4	NNW4	NW5	NNW6	NW12	N14	NNW14	NNW12	NNW8	N6	WSW7	N8	N9	N6	N2	N4	W4	W8	SW2	NNW5.6	NNW14
24-Jun	W9	WSW5	SE8	SSE9	SE10	SSE5	E2	N6	NNW9	NNW12	N13	N16	N16	N20	N15	N14	N17	NNE17	NNE13	NE17	ENE15	E10	ESE12	NNE7.3	N20	
25-Jun	ESE15	SE6	N2	NNE4	NE2	N2	NNW2	NW2	ENE1	E2	SE9	ESE6	W5	S6	SSE12	SE14	SSE14	SE13	SSE17	SE25	SE32	SSE28	SSE30	SSE26	SSE9.8	SE32
26-Jun	S25	S24	SSE27	SSE33	SSE37	SE40	SE38	SSE31	SSE25	SSE28	SE34	SE35	SE44	SE40	SE39	SE36	SE28	SSE28	SE31	SE26	ESE23	ESE19	SE21	SE23	SE30.1	SE44
27-Jun	SE25	SE25	SE26	SE27	SE25	S20	WSW22	SW12	SSW13	SSW12	SSW11	SW15	SW11	SSE3	E5	NE0	SW14	WSW14	W13	WNW5	NW2	WSW3	SE2	SE6	S8.6	SE27
28-Jun	SE6	E2	NNE5	ENE9	ESE12	ESE9	E8	NE6	ENE14	ENE18	ENE21	ENE13	NE14	NNE17	NNE15	ENE10	ESE11	SSE9	SSE12	SSW8	S12	S20	SSE19	SSE18	E7.7	ENE21
29-Jun	SSE13	SSE12	S10	SSE17	SSE18	SE14	SE10	SE8	ESE5	SSE4	SSE3	W3	WNW5	N8	NW7	N9	NNE7	NW6	N5	E4	W10	NNW5	NNW4	NW5	SSE2.1	SSE18
30-Jun	WSW4	SW5	SE4	SSE5	SSE4	WSW5	SSE2	SE12	SSE13	SSE7	SE11	SE9	SE11	SE5	WNW5	WSW12	WSW12	WSW9	WSW8	WSW10	W3	SSE3	SSW7	S4	S4.3	SSE13

E1.2 ESE1.6 ENE1.5 NNW1.0 NNE0.3 NW1.3 NNW2.3 NNW2.9 NNW2.8 NNW3.2 N2.6 NNW2.6 NW2.9 NNW3.4 NNW4.3 NW4.1 NW3.6 NNW2.8 NNE4.0 NE4.4 NE5.0 ENE5.2 ENE3.1 ENE2.2 N33 N34 WNW34 WNW37 SSE37 SE40 SE38 N33 NNE32 NNE34 NNE34 NNE36 SE44 SE40 SE39 W45 W46 WNW29 N31 NNW29 SE32 SSE28 SSE30 N36	Diurnal Average
	Diurnal Maximum

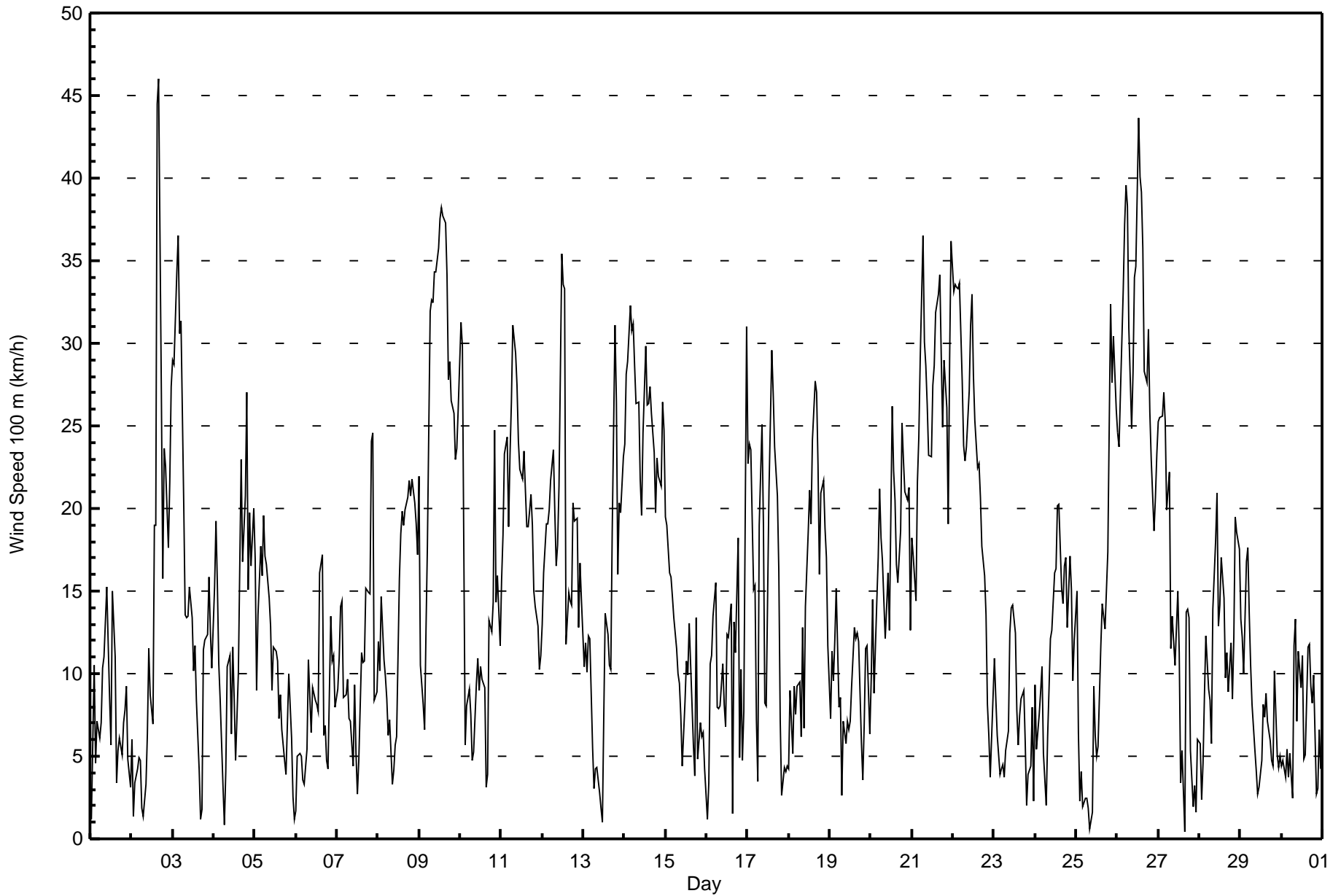
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 18 14:00 Minimum Value: 1 km/h on Jun 22 23:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	4	2	2	3	3	3	4	2	2	4	2	3	2	3	2	2	3	2	3	1	1	2	2	2	4
2-Jun	2	1	1	2	2	2	1	1	2	3	2	2	3	7	5	7	9	6	7	6	4	6	7	5	9
3-Jun	5	5	5	4	4	5	5	5	3	5	5	3	4	5	2	2	1	2	2	1	2	6	4	3	6
4-Jun	3	6	5	3	5	2	1	2	10	3	2	3	3	2	2	3	3	4	6	6	4	5	3	5	10
5-Jun	6	3	6	4	3	3	2	3	3	2	2	2	2	3	3	4	2	3	2	2	9	6	2	2	9
6-Jun	2	1	2	2	3	2	4	1	2	2	2	2	3	5	4	4	3	2	1	1	4	2	3	2	5
7-Jun	2	2	2	3	1	1	2	1	2	3	4	4	5	6	7	7	4	3	3	4	3	4	5	3	7
8-Jun	2	3	2	2	1	2	2	3	1	2	2	3	4	5	5	4	5	4	4	3	2	2	4	3	5
9-Jun	2	5	5	4	2	7	5	5	6	6	7	7	6	6	6	5	7	7	6	6	5	4	4	3	7
10-Jun	3	4	9	4	3	2	3	2	3	5	4	3	4	4	4	3	2	1	3	4	5	4	4	4	9
11-Jun	3	2	3	2	3	5	5	7	7	6	7	6	6	6	6	6	5	4	4	5	2	5	3	3	7
12-Jun	3	4	2	3	4	4	3	6	4	4	5	9	10	7	10	4	7	7	3	3	4	4	2	2	10
13-Jun	2	2	3	2	4	2	2	1	1	2	2	2	2	3	3	3	3	5	4	3	3	3	5	3	5
14-Jun	7	6	6	5	4	5	6	6	5	4	4	5	4	5	4	4	4	5	3	3	4	4	3	4	7
15-Jun	3	3	2	2	2	2	2	2	2	1	2	2	3	2	4	2	2	2	4	2	3	3	3	1	4
16-Jun	1	2	4	3	3	4	3	2	3	2	3	2	3	6	4	5	4	5	5	4	3	3	7	4	7
17-Jun	4	4	5	4	3	4	2	7	3	4	4	5	6	8	6	7	6	5	3	2	2	1	3	3	8
18-Jun	3	4	3	2	2	3	4	3	3	3	6	5	5	11	7	7	3	4	5	4	4	3	4	5	11
19-Jun	2	5	3	4	4	4	3	2	3	2	3	3	4	4	4	4	3	3	2	2	2	2	4	4	5
20-Jun	5	5	2	3	2	3	2	3	2	3	2	4	9	6	6	4	3	5	7	5	5	4	5	5	9
21-Jun	5	4	3	6	5	6	7	7	5	5	5	5	5	6	6	6	6	7	6	4	4	5	8	6	8
22-Jun	6	6	5	7	8	6	7	4	4	4	5	6	7	6	6	6	4	6	4	3	2	1	1	2	8
23-Jun	2	2	2	2	1	1	1	2	2	5	4	4	5	4	3	5	7	4	2	1	2	3	3	3	7
24-Jun	4	3	2	3	4	2	1	3	2	3	3	5	4	4	5	5	5	3	3	2	2	2	3	3	5
25-Jun	4	4	2	1	1	1	1	1	1	1	5	4	3	4	4	5	5	4	5	5	4	6	6	5	6
26-Jun	4	5	6	5	3	3	3	5	4	5	4	6	5	6	4	5	6	5	3	3	4	5	3	2	6
27-Jun	2	2	3	3	6	7	6	4	4	3	3	4	2	2	1	3	2	3	3	3	1	2	1	2	7
28-Jun	2	1	2	2	2	1	2	2	9	5	5	4	4	3	6	4	4	5	4	3	5	4	4	4	9
29-Jun	3	3	3	3	3	2	1	2	1	1	2	3	3	3	3	2	2	2	1	3	2	1	1	2	3
30-Jun	2	2	2	3	2	3	2	2	3	3	2	2	1	3	5	2	2	2	1	1	3	2	3	2	5
Diurnal Maximum																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	122	16.94	16.94
6 - 11	196	27.22	44.17
12 - 19	197	27.36	71.53
20 - 28	136	18.89	90.42
29 - 38	63	8.75	99.17
> 38	6	0.83	100.00

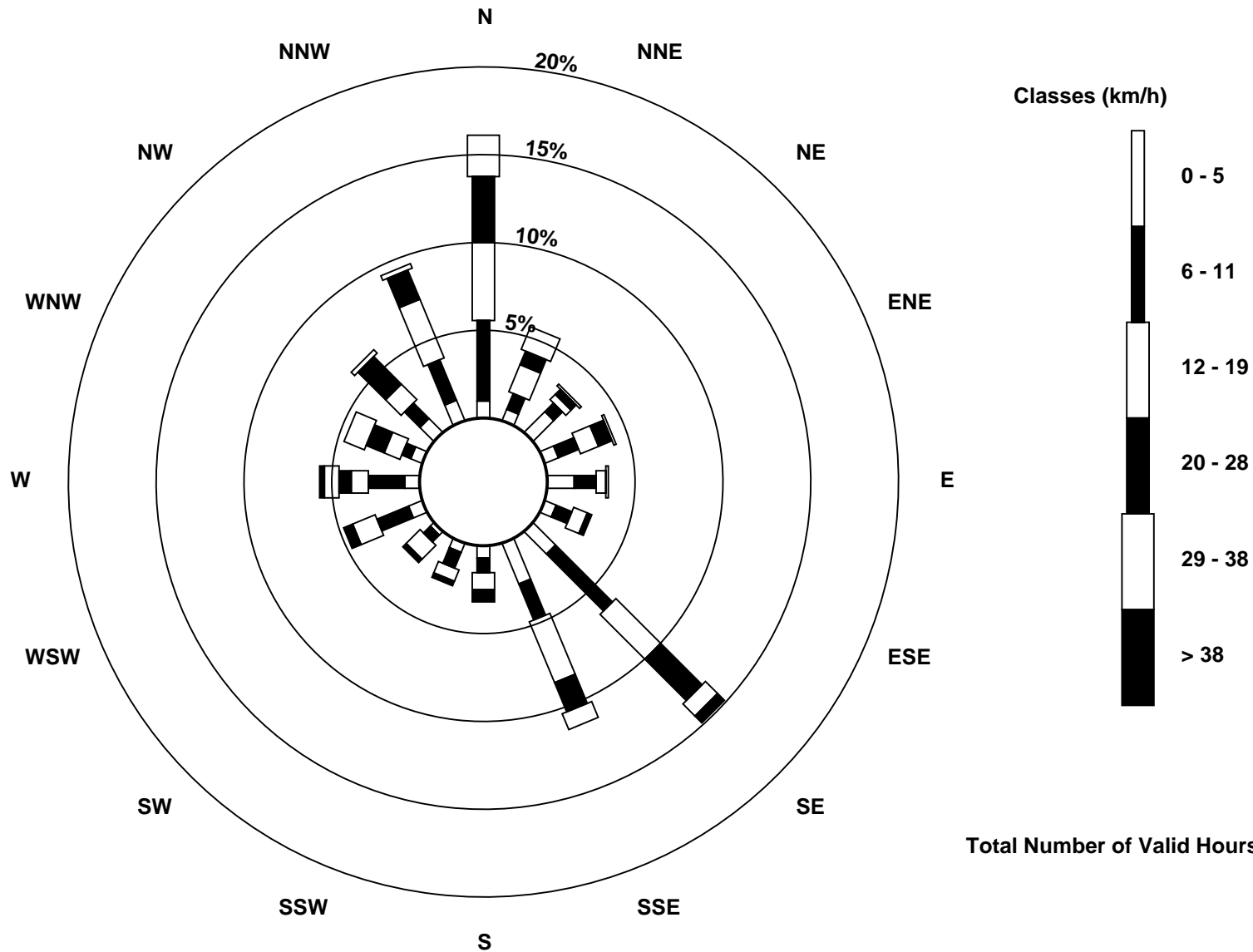
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower (AMS 3)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - June 2017

Maximum Speed: 51 km/h on Jun 2 17:00	Maximum Daily Speed Average: 31.5 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 28 02:00	Minimum Daily Speed Average: 1.8 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 7.7 km/h at hour 22	Minimum Diurnal Speed Average: 1.5 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 2.2 km/h 0.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 15 Q ₃ = 24 P ₉₀ = 32 P ₉₉ = 42	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	NW3	S5	SSW5	SW6	W10	W12	W9	W11	W12WSW17	WSW14	SSW10	SSW5	SSE13	SSE9	SSE2	SE4	SE5	SE4	SE6	SE8	SSE10	S10	SSW8	SSW5.2	WSW17	
2-Jun	S5	SW5	WSW4	WSW5	SW9	WSW10	NW4	NNW3	NNW5	NNW10	NNW12	NW10	NNW8	NNE19	N21	W48	W51	WNW37	NW22	NW32	WNW29	WNW22	WNW25	WNW32	WNW15.0	W51
3-Jun	WNW35	WNW35	WNW40	WNW41	WNW35	WNW37	NW26	NW16	NNW14	NNW15	NNW17	NNW15	NNW12	NW13	N7	NE4	NE1	E2	SE10	SE11	SE12	SE22	SE21	SE19	WNW10.4	WNW41
4-Jun	SE25	SE24	SSE16	SW12	SW4	W3	WNW3	ENE6	W11	NW10	NNW6	NNW10	NNW8	NW6	NNW12	N18	N24	N19	NNW24	NNW34	N19	NNE27	NNE24	NNE25	N7.3	NNW34
5-Jun	NNE22	NE16	ENE24	N18	N17	N22	N19	N19	N15	N14	N10	NNW13	NNW13	NNW11	N8	ENE9	SE6	SE4	E4	SSE7	ENE12	E11	SE7	S7	NNE8.8	ENE24
6-Jun	SSE4	S11	S14	S15	S12	S6	S7	SSE9	SSE7	S7	SSE8	SE8	SSE7	SW10	W18	W20	WNW8	WSW9	NNW5	NE5	NNE20	NNE16	NNE15	NE10	S2.5	NNE20
7-Jun	NNE10	NE11	NE14	NNE18	NNE13	NNE13	N9	NNE9	N7	WNW4	ENE11	ENE7	N4	NE5	ENE13	E12	NE12	E18	E17	ENE18	NE32	ENE33	ENE17	ENE11	NE11.8	ENE33
8-Jun	ENE7	E8	NNE8	NE10	ENE6	ESE4	SE4	SE2	SE12	ESE11	E8	ESE8	SE17	SE19	SE20	SE20	SE21	SE22	SE22	SE23	SE26	SE27	SE27	SE25	SE13.7	SE27
9-Jun	SE29	SE24	SSE18	NNE3	NE16	NNE25	NNE33	N33	NNE34	NNE36	NNE36	NNE38	NNE39	NNE38	NNE39	NNE39	NNE35	NE30	ENE32	ENE31	ENE32	ENE32	ENE34	ENE35	NE25.1	NNE39
10-Jun	E44	E42	E30	E13	ESE13	ENE10	E8	NE5	NNW6	NNW10	N11	NW10	NNW10	WSW10	WSW9	W4	NNE4	NNE14	NNE14	N17	NNW29	N16	N19	N16	NE8.1	E44
11-Jun	NNW18	NNW25	NNW31	NW32	NW26	NW29	NW29	NW34	NNW33	NW29	NW26	NW24	NW24	NW25	NNW22	NNW21	NNW20	NNW23	NNW21	N17	NE17	ENE18	E18	ESE19	NNW19.8	NW34
12-Jun	SSE17	SSE18	SSE20	SSE20	SSE20	SSE21	SSE23	SSE21	SSE19	S23	S26	SSE37	SSE34	SSE34	ESE13	SSE15	ESE15	SE13	SSE20	SSE19	SSE19	N11	NNE15	NNE18	SSE16.8	SSE37
13-Jun	NNE15	NNE15	N11	N14	N15	N8	N4	NE2	ESE2	ENE3	SE2	NNW1	NNW7	NNW14	N13	N11	N11	NNE19	N32	NNE29	NE20	NE25	NE25	NNE30	NNE12.9	N32
14-Jun	N29	NNE33	N34	N37	N34	NNE35	NNE31	NNE27	NNE28	NNE23	NNE22	N28	N30	N27	NNE26	N29	N27	NNE26	N24	N28	N27	N32	N31	N30	N28.8	N37
15-Jun	N21	N20	N17	N18	NNE21	NNE21	NNE15	NNE11	N9	N7	N4	NNW8	NNW12	N10	ESE14	ENE9	ENE7	ENE5	E16	ENE11	ENE12	ENE17	E16	ESE11	NNE9.9	NNE21
16-Jun	SE6	SE10	SE17	SE18	SE17	SE19	SE13	SE10	SE8	SE9	S7	S6	SSE12	SSW13	WSW15	S2	S14	W11	WNW23	NNW7	E10	SE7	SSE8	SE32	SSE8.0	SE32
17-Jun	SSE24	SSE27	SSE24	SSE15	SSE15	SSW8	WSW6	WNW22	WNW26	NW21	NW10	NNW10	NW24	NW28	NW32	WNW29	NW26	NW24	NNW18	NNW9	NNE5	ENE6	SSE5	SW5	WNW7.4	NW32
18-Jun	WNW6	SSE3	SSE7	S12	SW14	SW13	SW14	SSW8	S11	S5	WSW16	WSW21	WSW23	SW22	W28	W31	WSW31	W25	NW18	NNW24	NNW24	NNW22	NNW21	WNW15	W11.7	WSW31
19-Jun	NW9	W16	NW14	WNW15	WNW18	WNW11	WNW9	WNW4	WSW7	WSW6	W7	WSW8	WSW8	W11	WSW14	WSW14	WSW14	WSW13	W7	SSW4	SSE7	S11	SW16	SW17	W8.9	WNW18
20-Jun	S7	S15	SSW9	S13	SSW12	S14	S18	SSE18	SSE15	SE17	SSE17	SSW15	SW29	SSW26	SSW26	S22	S20	SSE25	SSE27	SSE25	SSE23	SSE22	SSE24	SSW18	S17.6	SW29
21-Jun	SW23	WSW21	WSW19	W28	W31	W35	W42	W36	W35	W30	NNW27	NNW27	W32	NNW33	W37	WNW39	WNW40	WNW35	NW32	NNW35	NNW33	NNW25	N35	N42	WNW26.7	W42
22-Jun	N39	N40	N37	N37	N37	N32	N27	N25	N25	N28	N32	N34	N30	N27	N24	N24	N22	N19	N17	NNE15	NNE12	NNE12	N10	NW8	N25.2	N40
23-Jun	W14	W16	W11	NW10	NNW13	NNW10	NNW8	NW7	NNW13	NNW15	NNW15	NNW14	N9	N6	WSW8	N9	NNE9	N6	NNE2	N4	WNW3	WNW9	W6	W6	NNW7.7	W16
24-Jun	W10	W12	S2	S5	SSW5	SW6	NW1	NNW6	NNW9	N13	N13	N17	N17	N21	N21	N16	N15	N17	NNE18	NNE14	NE20	ENE21	E23	E27	NNE8.7	E27
25-Jun	ESE27	SE14	SSE7	E2	SE7	SW2	WSW4	SW4	SW1	ENE2	SE11	SE6	W6	S6	SSE12	SSE14	SSE14	SE14	SSE19	SSE28	SSE37	SSE32	SSE34	S32	SSE12.4	SSE37
26-Jun	S31	S34	S35	SSE31	SSE34	SSE37	SSE35	SSE26	SSE23	SSE29	SE36	SSE35	SSE44	SSE40	SE40	SSE37	SE30	SSE29	SE33	SE30	SE29	ESE26	SE26	SE27	SSE31.5	SSE44
27-Jun	SE30	SE30	SE29	SE30	SE29	SSW21	WSW27	SW14	SSW16	SSW14	SW12	WSW15	WSW12	SSE3	ESE6	ESE1	SW11	WSW17	W15	W8	W4	WSW7	S2	SE4	S9.8	SE30
28-Jun	SE5	SSE0	NNE4	ENE7	ESE10	SE9	ESE9	NE8	ENE18	ENE19	ENE22	ENE14	NE15	NE18	NE15	ENE11	ESE11	SSE8	SSE10	SSW10	SSW14	S25	S24	S20	ESE7.3	S25
29-Jun	S15	S13	SSW15	S16	S15	SSE11	SE8	SE7	SE5	SSE4	SSE3	W4	WNW6	NNW9	NW8	NNW9	NNE7	NW6	N5	E7	W9	NNW7	NNW8	NW8	SSW1.8	S16
30-Jun	W7	WSW9	SW2	SSW5	SSW5	W7	SW4	SE13	SSE12	S7	SSE9	S7	SSE8	S3	WNW7	WSW13	WSW14	WSW11	WSW9	W11	WNW7	SW3	SW9	SW6	SW5.7	WSW14

ESE2.4	SSE2.5	SE1.8	NW1.9	NNW1.5	NW2.9	NW3.3	NNW3.3	NNW3.2	NNW3.4	N2.7	NNW3.4	NW3.7	NNW3.8	NNW4.8	NW4.9	NW4.1	NNW3.5	NNE4.6	NNE5.2	NE6.5	ENE7.7	ENE5.5	E3.3	Diurnal Average
E44	E42	WNW40	WNW41	N37	SSE37	W42	W36	W35	NNE36	SE36	NNE38	SSE44	SSE40	SE40	W48	W51	WNW37	SE33	NNW35	SSE37	ENE33	N35	N42	Diurnal Maximum

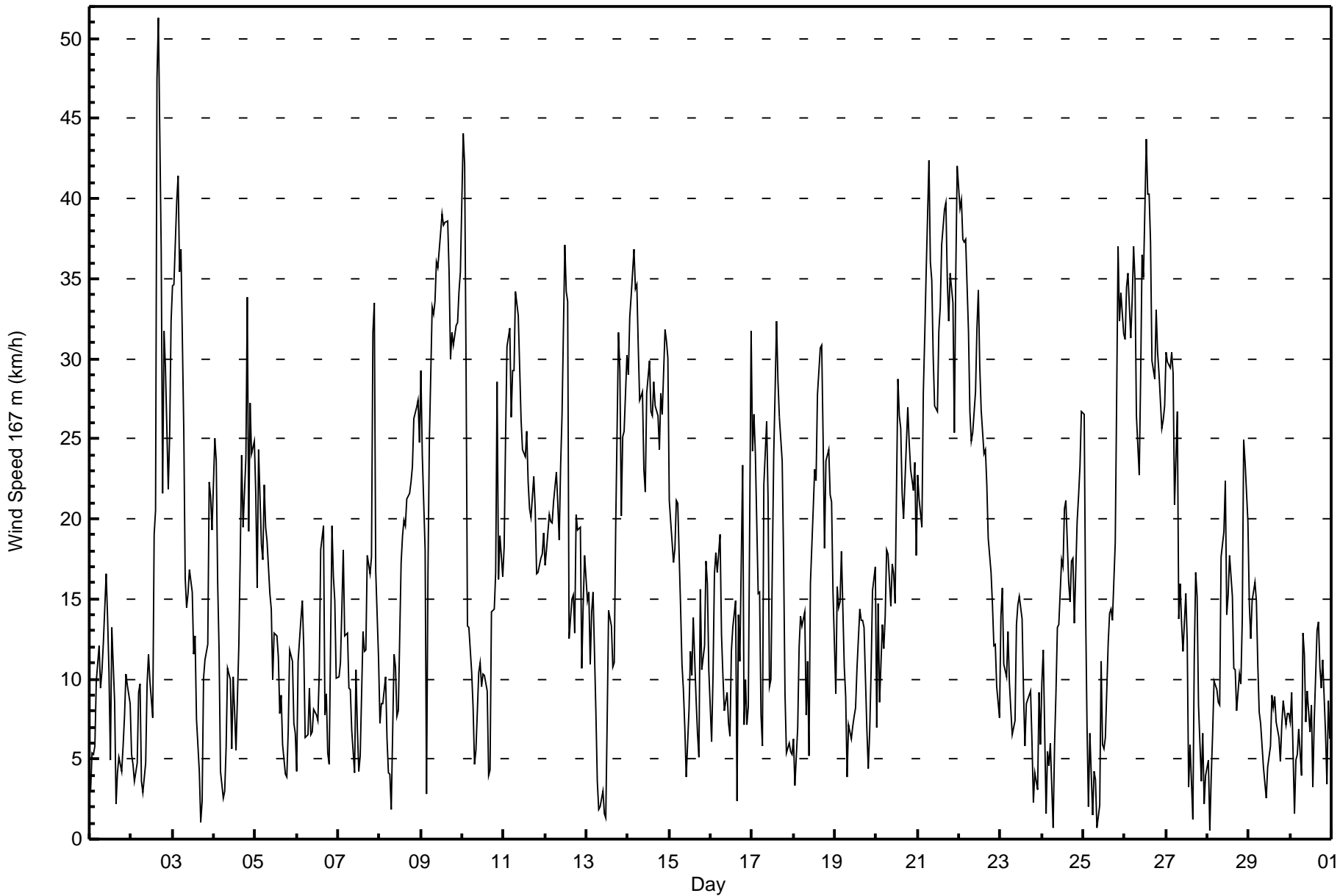
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 19 km/h on Jun 2 18:00 Minimum Value: 1 km/h on Jun 28 04:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 10																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	4	2	2	3	3	3	4	2	2	4	3	3	2	3	2	2	2	2	3	2	2	2	2	4	4
2-Jun	2	1	1	2	2	1	2	1	2	2	2	2	3	7	5	9	9	19	7	6	5	7	8	4	19
3-Jun	4	5	4	3	3	5	5	5	3	5	5	3	4	5	3	3	1	2	2	2	7	5	3	7	
4-Jun	3	3	4	4	3	2	1	2	10	3	2	2	3	2	2	3	3	7	5	5	7	4	7	10	
5-Jun	6	4	6	5	3	2	3	3	3	3	2	2	2	3	3	5	3	3	2	2	11	8	3	2	11
6-Jun	3	2	1	2	3	2	3	3	1	2	3	2	3	5	4	4	3	2	1	1	6	4	3	2	6
7-Jun	2	2	2	2	2	2	1	1	1	3	5	5	5	6	8	7	4	3	3	5	2	1	11	4	11
8-Jun	3	3	3	1	2	2	2	3	3	2	2	3	4	4	5	4	4	3	3	2	2	2	3	3	5
9-Jun	2	4	6	2	4	6	5	5	6	6	7	7	7	6	6	6	8	7	6	6	5	3	2	2	8
10-Jun	4	3	7	7	4	2	3	2	3	5	4	4	4	4	4	3	2	1	2	4	5	4	4	6	7
11-Jun	3	3	3	3	4	5	5	7	6	6	6	6	6	5	6	5	5	4	4	5	2	2	3	3	7
12-Jun	3	3	4	4	4	4	3	6	4	4	5	8	9	7	10	6	6	5	3	4	4	3	3	2	10
13-Jun	2	3	2	2	2	2	2	1	2	2	2	2	3	3	3	3	5	4	4	3	3	7	4	7	
14-Jun	7	7	6	5	5	5	6	7	6	5	4	4	4	4	5	4	4	5	3	4	4	18	11	5	18
15-Jun	3	3	3	2	2	2	3	2	2	1	2	3	2	2	3	2	1	2	3	3	4	3	3	2	4
16-Jun	3	2	2	1	2	4	2	2	3	2	2	2	3	6	4	5	3	6	5	5	4	2	8	4	8
17-Jun	4	4	5	3	3	2	3	5	3	5	4	6	6	8	6	7	5	5	3	2	2	1	2	3	8
18-Jun	3	3	3	3	1	2	3	2	3	3	7	5	5	12	7	6	2	4	5	3	4	4	3	5	12
19-Jun	3	6	4	3	2	3	3	3	3	3	3	3	4	4	3	5	3	3	2	2	2	1	3	8	8
20-Jun	3	5	4	3	3	4	2	2	2	2	3	5	8	5	5	4	3	4	5	5	4	4	5	4	8
21-Jun	3	4	3	6	4	6	6	6	5	5	4	5	4	5	5	6	5	6	5	3	3	6	7	6	7
22-Jun	5	6	5	7	7	6	6	4	4	4	5	5	7	6	5	6	4	5	4	3	2	1	1	1	7
23-Jun	3	2	2	5	2	1	1	1	2	4	4	4	5	3	4	6	7	4	2	2	1	2	3	3	7
24-Jun	2	4	1	1	2	2	1	3	2	3	3	5	4	5	5	5	4	3	2	3	1	2	3	5	5
25-Jun	6	5	3	1	2	2	1	2	1	2	4	3	4	4	5	5	4	4	5	6	4	6	3	2	6
26-Jun	2	3	4	4	5	5	5	5	4	6	4	6	5	6	4	4	5	5	3	2	4	5	3	2	6
27-Jun	2	3	4	3	6	6	6	4	3	3	4	5	3	3	1	3	3	3	2	3	1	3	1	2	6
28-Jun	2	1	1	1	3	2	1	2	8	5	5	4	4	3	5	4	4	4	3	2	4	3	4	3	8
29-Jun	2	2	3	2	2	2	2	1	1	1	2	3	3	3	2	2	2	2	1	2	3	1	1	2	3
30-Jun	2	2	1	2	2	4	2	2	2	3	3	1	2	2	5	3	2	1	2	2	3	1	3	2	5
																		Diurnal Maximum							





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	84	11.67	11.67
6 - 11	192	26.67	38.33
12 - 19	188	26.11	64.44
20 - 28	133	18.47	82.92
29 - 38	105	14.58	97.50
> 38	18	2.50	100.00

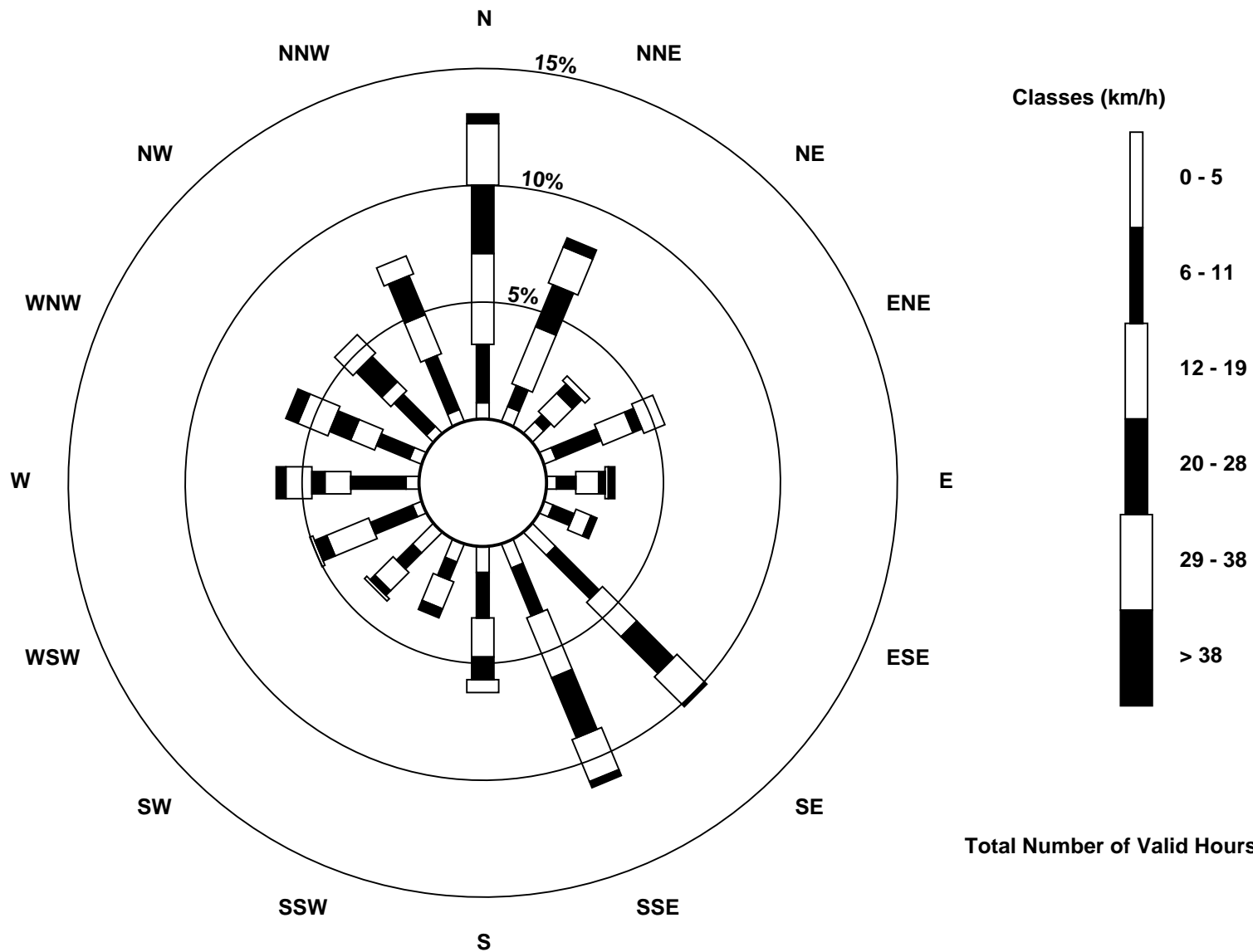
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower (AMS 3)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - June 2017

Direction of Maximum Speed: 164 deg on Jun 12 13:00 Direction of Maximum Daily Speed Average: 156.0 deg on Jun 26	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 219 deg on Jun 22 23:00 Direction of Minimum Daily Speed Average: 0.7 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 323.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	142	159	235	332	334	333	278	263	251	237	245	184	140	155	147	121	146	149	135	135	129	148	62	315	187.4
2-Jun	266	337	148	116	152	137	144	143	252	353	324	323	344	12	337	279	286	304	340	330	301	309	297	296	305.0
3-Jun	294	297	303	299	293	299	328	330	349	308	304	285	296	325	28	55	157	55	157	148	142	148	22	5	306.8
4-Jun	3	166	165	190	224	232	107	155	251	332	351	287	282	329	3	358	355	347	340	344	348	21	349	344	333.2
5-Jun	324	33	80	334	339	348	352	338	344	346	354	327	329	348	15	76	159	166	117	165	57	89	9	357	355.2
6-Jun	111	8	351	344	334	291	160	147	149	145	151	144	157	188	274	277	334	237	346	307	342	332	345	341	226.8
7-Jun	3	8	1	351	329	345	338	351	343	247	94	70	268	53	83	108	57	89	85	57	29	37	323	2	28.7
8-Jun	360	358	355	350	337	339	342	354	349	356	158	157	138	147	143	147	141	143	140	131	112	127	104	141	120.1
9-Jun	142	358	1	353	343	349	6	1	14	19	19	27	22	17	14	16	22	51	60	68	72	68	64	52	26.2
10-Jun	72	90	77	14	61	31	81	24	303	338	354	317	280	249	246	305	16	14	10	342	335	356	359	336	353.3
11-Jun	313	333	328	328	331	321	320	329	338	331	327	338	338	338	351	346	352	353	351	358	46	39	80	99	338.4
12-Jun	119	142	151	152	154	144	157	155	161	173	183	159	164	160	118	167	97	143	149	165	147	354	341	352	155.9
13-Jun	340	337	351	347	344	3	72	132	137	125	202	163	352	339	357	358	11	5	1	5	27	17	25	355	6.4
14-Jun	356	11	354	358	3	9	17	13	14	10	6	350	3	3	14	6	8	6	357	353	353	354	349	350	3.1
15-Jun	338	340	335	339	350	353	352	4	349	354	340	3	329	339	140	112	82	76	82	329	41	25	21	30	359.9
16-Jun	333	338	137	177	152	157	97	121	158	157	162	162	160	219	254	276	191	295	312	13	111	178	148	151	176.5
17-Jun	167	165	155	168	175	160	145	306	300	314	349	14	320	324	316	310	315	334	348	336	178	153	154	150	291.8
18-Jun	117	136	114	131	131	140	150	173	150	162	264	269	249	227	280	269	260	268	324	346	336	339	328	289	254.0
19-Jun	321	297	320	313	319	289	291	264	236	238	263	239	258	252	258	247	258	260	308	175	144	148	126	64	263.8
20-Jun	151	125	146	158	152	156	149	148	144	159	152	197	220	205	208	192	174	183	168	168	178	158	166	155	172.3
21-Jun	194	226	215	272	282	292	285	287	286	288	295	296	292	297	289	297	298	301	332	344	338	343	358	354	297.4
22-Jun	350	353	3	353	356	347	349	352	353	6	4	2	359	359	1	353	0	2	8	25	358	213	219	220	358.0
23-Jun	103	358	40	132	343	310	339	327	351	325	354	352	357	346	26	256	342	1	355	315	342	317	352	148	344.8
24-Jun	339	61	122	95	123	132	108	355	341	353	355	4	1	4	358	355	360	357	14	27	29	55	52	49	8.4
25-Jun	120	348	344	340	307	357	360	27	98	170	151	128	276	180	177	158	171	159	165	167	166	167	171	169	165.9
26-Jun	171	171	166	157	156	154	155	160	161	162	150	159	154	153	150	156	152	167	155	139	129	142	148	143	156.0
27-Jun	142	143	143	148	156	200	263	224	201	198	212	242	238	157	104	312	239	247	275	355	96	101	89	130	196.7
28-Jun	82	44	17	356	69	62	65	46	67	73	68	73	62	27	32	82	140	171	163	204	177	172	161	157	115.6
29-Jun	168	161	155	159	163	151	140	138	148	167	202	283	298	8	320	5	13	318	352	293	270	319	357	329	164.5
30-Jun	129	130	138	100	119	232	102	146	150	151	148	152	149	143	289	269	267	263	246	247	141	139	146	130	167.7

139.9 75.3 102.3 319.3 232.1 304.1 349.7 340.9 319.2 321.1 329.1 306.3 293.4 317.5 327.3 307.0 303.9 311.2 30.5 35.9 66.5 78.8 48.8 63.7

Diurnal Average

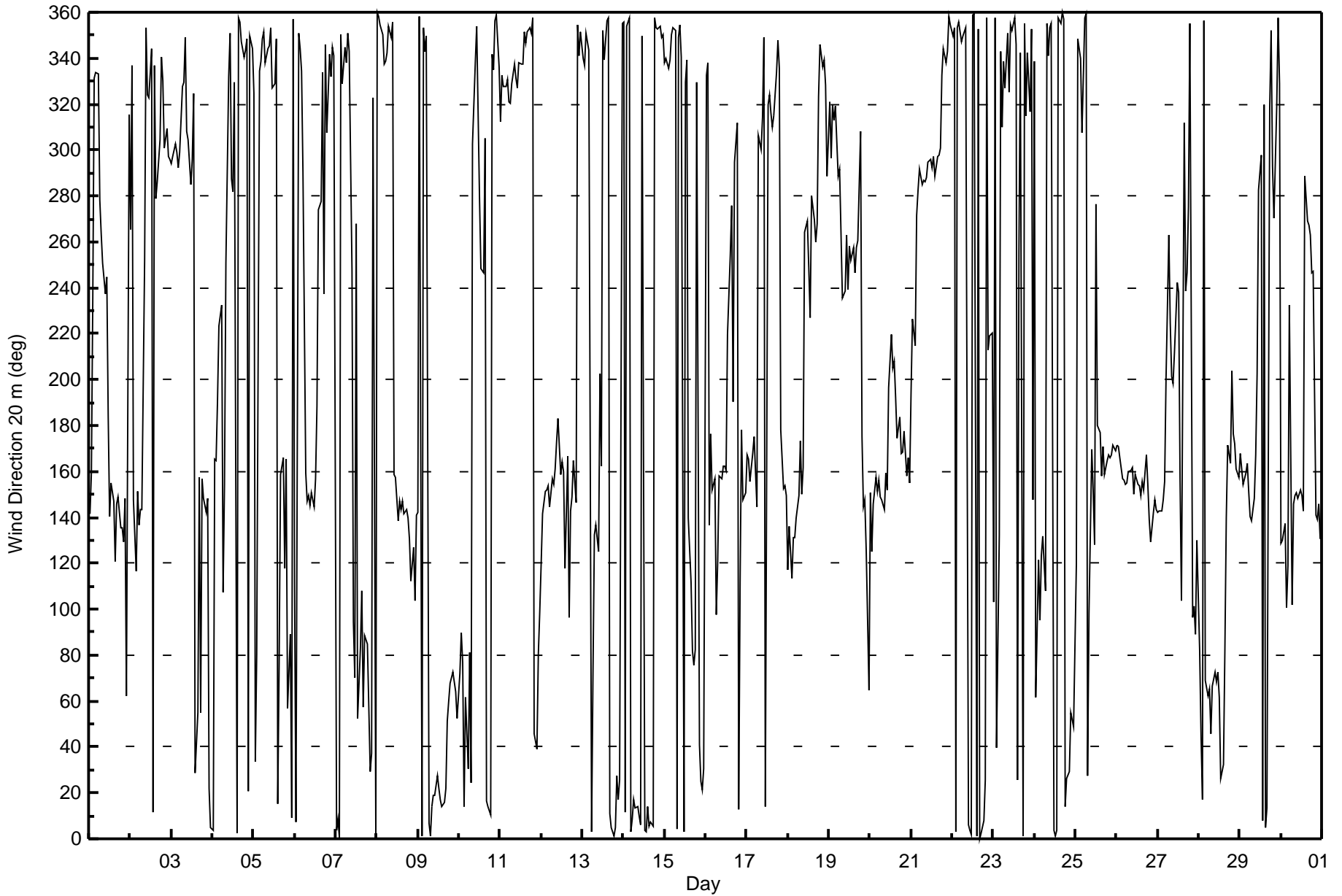
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Jun 24 22:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 7 deg on Jun 26 00:00																										
Percentiles: P ₁ = 11 P ₁₀ = 18 Q ₁ = 21 Median = 28 Q ₃ = 43 P ₉₀ = 70 P ₉₉ = 99																										
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	76	39	46	76	30	61	65	27	19	18	24	43	33	18	19	45	41	36	60	20	20	37	104	84	104	
2-Jun	76	64	43	70	42	16	18	29	86	77	24	28	38	35	28	20	21	30	44	31	21	40	27	19	86	
3-Jun	21	21	20	19	21	22	23	25	26	33	31	32	53	51	44	80	84	75	15	35	61	28	77	23	84	
4-Jun	74	67	40	39	36	49	50	46	62	27	52	20	41	42	29	22	20	29	25	23	52	32	29	26	74	
5-Jun	36	72	88	27	23	22	25	23	25	26	37	22	25	30	55	53	28	50	43	21	69	92	69	62	92	
6-Jun	100	86	72	36	17	40	42	21	21	29	18	27	33	49	23	23	80	66	24	42	15	19	22	31	100	
7-Jun	17	19	22	25	18	24	24	27	27	54	79	97	78	92	68	47	65	29	33	39	28	33	48	21	97	
8-Jun	14	14	44	24	24	19	21	34	25	30	35	41	25	30	27	22	23	22	20	21	18	18	81	58	81	
9-Jun	80	76	82	18	17	40	24	21	27	28	30	30	28	25	27	27	28	38	37	36	29	29	27	24	82	
10-Jun	29	31	57	102	47	31	59	79	50	59	35	43	44	35	29	82	44	21	27	23	22	27	31	35	102	
11-Jun	15	16	16	15	18	18	20	25	24	26	26	35	35	32	30	34	29	26	23	34	37	47	35	56	56	
12-Jun	52	30	19	22	23	23	22	20	17	15	14	19	17	16	74	35	71	40	19	15	44	33	18	22	74	
13-Jun	26	27	24	43	26	38	82	31	40	61	61	62	37	26	32	33	38	24	21	21	28	21	43	20	82	
14-Jun	28	24	21	22	23	25	27	26	26	25	28	24	23	24	28	23	24	25	26	23	23	25	22	23	28	
15-Jun	23	26	24	24	26	25	23	46	29	28	45	34	30	44	33	28	42	50	46	61	58	71	68	37	71	
16-Jun	73	62	95	32	45	78	75	40	25	18	16	21	21	35	24	99	25	43	32	61	23	62	25	19	99	
17-Jun	11	17	22	19	16	15	14	70	19	26	60	42	29	31	25	25	29	24	21	56	41	50	40	31	70	
18-Jun	87	25	97	20	15	16	38	38	20	36	36	26	20	42	28	23	18	22	30	22	23	21	27	29	97	
19-Jun	34	70	34	22	23	52	40	85	34	46	43	42	53	49	31	33	31	25	37	71	14	33	51	71	85	
20-Jun	13	28	10	11	18	16	18	16	44	19	18	20	16	11	12	18	13	13	14	12	11	20	21	16	44	
21-Jun	19	24	16	27	23	22	22	21	22	21	22	21	21	22	19	21	21	29	26	22	22	26	23	22	29	
22-Jun	21	23	23	23	23	25	28	27	27	26	25	24	26	27	28	26	28	34	31	34	35	73	90	83	90	
23-Jun	51	53	82	63	44	73	66	34	38	30	31	33	41	63	85	75	68	39	32	30	47	56	62	53	85	
24-Jun	69	81	42	65	56	25	61	30	32	29	28	36	26	26	23	33	33	26	26	33	24	105	68	76	105	
25-Jun	85	30	21	29	87	41	34	42	83	69	35	45	82	79	32	28	20	26	19	13	13	12	11	7	87	
26-Jun	10	12	11	13	15	16	17	14	14	13	20	18	18	18	18	18	21	15	18	19	20	25	18	18	25	
27-Jun	16	22	17	19	19	32	24	33	15	19	19	18	22	61	51	74	23	21	23	47	48	99	69	36	99	
28-Jun	55	21	25	64	91	46	39	42	57	41	37	43	58	33	48	51	36	27	18	18	22	15	11	21	91	
29-Jun	14	14	10	11	11	21	21	24	24	24	28	100	69	44	43	33	38	30	29	94	33	78	38	35	100	
30-Jun	25	16	51	98	75	76	64	32	20	36	22	19	19	34	94	21	23	24	21	16	68	10	27	27	98	
		100	86	97	102	91	78	82	85	86	77	79	100	82	92	94	99	84	75	60	94	69	105	104	84	
		Diurnal Maximum																								





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - June 2017

Direction of Maximum Speed: 276 deg on Jun 2 17:00 Direction of Maximum Daily Speed Average: 144.0 deg on Jun 26	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 49 deg on Jun 6 01:00 Direction of Minimum Daily Speed Average: 0.8 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 322.9 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	128	154	233	322	304	301	273	255	243	231	238	182	133	143	139	112	132	139	127	122	127	129	104	350	181.6
2-Jun	325	333	154	140	146	135	133	125	263	341	318	315	339	7	331	268	276	291	327	317	289	297	288	286	294.1
3-Jun	284	285	292	288	282	289	318	321	339	300	298	276	290	317	18	41	137	45	145	134	136	129	95	4	296.6
4-Jun	121	147	148	183	218	231	88	140	248	325	351	274	272	321	354	351	346	335	337	349	22	352	342		332.4
5-Jun	324	20	75	328	333	340	345	331	336	340	347	322	322	341	2	63	147	155	100	157	55	92	19	342	348.8
6-Jun	49	342	293	357	351	306	145	135	137	135	139	135	147	185	266	271	318	234	338	315	343	328	338	339	258.1
7-Jun	349	352	354	345	332	343	334	346	334	251	84	59	282	42	74	96	47	79	76	55	30	35	333	354	23.8
8-Jun	344	343	346	347	338	338	338	346	346	350	141	139	129	135	133	136	132	133	129	123	108	123	117	135	106.7
9-Jun	135	328	32	352	340	349	3	358	10	16	16	25	17	13	11	13	17	47	53	60	66	62	57	49	23.7
10-Jun	66	83	73	28	61	26	70	31	303	335	345	309	275	243	242	287	8	13	9	338	329	349	353	339	354.1
11-Jun	313	329	323	323	326	315	312	321	328	321	318	328	326	327	343	337	344	345	343	352	41	55	95	119	330.3
12-Jun	129	141	138	136	139	131	137	139	149	165	173	147	154	149	95	154	80	134	138	155	138	350	336	345	141.8
13-Jun	342	337	344	347	341	359	47	119	124	112	189	146	348	332	349	352	3	2	357	3	26	16	23	349	2.0
14-Jun	351	8	350	352	358	5	12	11	9	6	1	341	359	357	11	1	2	3	354	347	345	349	341	341	357.8
15-Jun	336	336	333	338	343	348	347	0	344	352	346	355	322	332	127	102	70	70	74	347	35	21	38	29	356.3
16-Jun	349	320	124	152	139	128	103	112	146	145	154	153	149	214	247	273	178	284	301	2	98	162	143	140	164.4
17-Jun	157	155	142	153	165	153	139	293	290	306	342	2	313	314	306	301	305	323	337	336	181	144	180	142	289.4
18-Jun	139	129	128	134	131	136	151	167	141	146	257	260	240	223	271	261	250	259	315	337	329	333	325	282	249.5
19-Jun	318	285	314	299	303	287	283	271	234	238	261	236	254	249	251	241	252	253	295	172	146	153	146	100	257.4
20-Jun	146	127	133	146	142	148	138	141	136	145	141	186	212	194	199	182	166	171	156	158	168	145	151	149	161.0
21-Jun	188	221	211	263	272	281	274	276	275	277	284	286	281	286	279	285	286	287	321	337	333	339	351	349	288.4
22-Jun	342	345	360	347	349	340	344	346	348	4	359	356	354	353	355	346	354	357	4	22	3	294	300	283	352.0
23-Jun	79	349	273	167	338	339	336	316	344	320	349	346	348	338	23	253	343	359	351	317	329	269	324	143	336.3
24-Jun	251	7	137	118	124	124	90	352	332	345	347	1	355	356	352	348	351	349	10	25	32	74	60	124	3.0
25-Jun	121	5	341	350	325	354	352	23	88	154	138	116	271	176	166	147	161	146	153	150	147	156	162	161	150.9
26-Jun	164	164	156	143	142	141	142	146	149	148	138	146	143	144	140	143	142	156	142	131	119	130	137	131	144.0
27-Jun	134	133	136	139	145	193	252	217	191	188	204	235	231	144	91	299	231	239	264	336	68	113	105	115	188.1
28-Jun	91	47	14	25	77	67	62	41	62	65	65	66	55	26	28	70	127	159	153	194	171	165	153	148	99.4
29-Jun	160	151	146	150	154	141	132	130	134	159	193	285	289	359	312	359	6	312	344	42	262	311	324	306	154.8
30-Jun	124	148	144	134	123	234	98	129	140	139	139	139	138	138	293	261	256	255	240	240	141	133	146	130	165.1

28.4 34.1 58.8 335.0 353.8 330.1 345.2 340.9 322.6 329.5 342.6 319.0 300.2 325.4 327.1 305.2 306.0 317.8 20.0 28.1 43.9 65.3 34.8 39.1

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

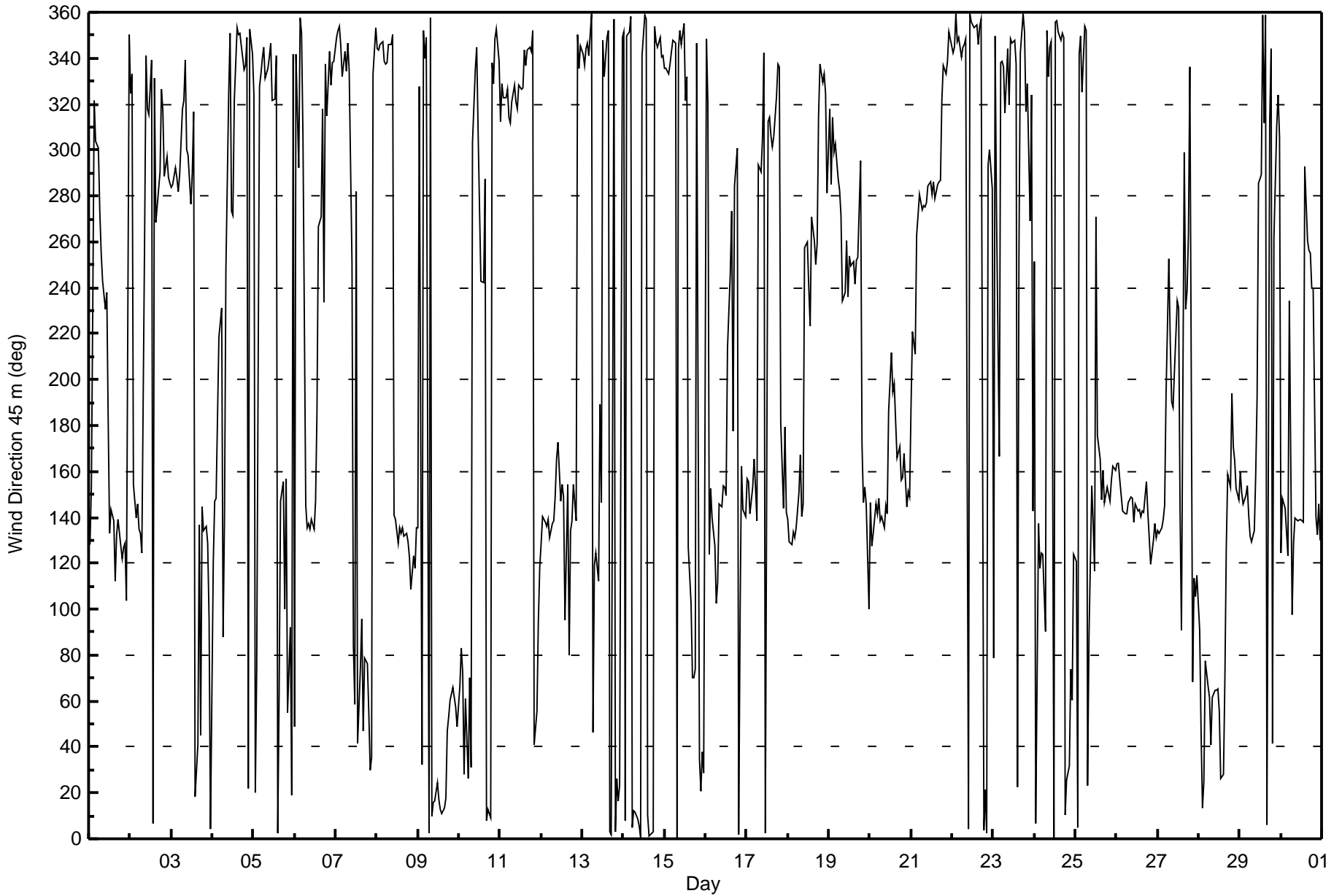
Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jun 6 01:00 Minimum Value: 5 deg on Jun 30 22:00 Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 15 Median = 21 Q ₃ = 35 P ₉₀ = 59 P ₉₉ = 90																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	76	34	30	73	24	82	48	17	11	12	16	40	25	13	12	47	34	32	56	17	11	12	71	52	82	
2-Jun	35	45	31	49	17	12	14	29	61	75	17	22	30	27	24	12	13	18	40	27	14	35	21	12	75	
3-Jun	13	15	12	11	13	14	18	17	18	28	25	27	43	42	35	62	85	72	11	15	24	15	59	28	85	
4-Jun	66	42	31	36	30	39	51	45	56	19	68	15	35	41	24	16	15	24	22	16	42	20	23	21	68	
5-Jun	27	56	67	18	15	14	16	17	16	16	31	16	18	26	45	44	26	55	45	18	62	72	70	66	72	
6-Jun	102	91	58	23	19	68	40	16	16	24	14	20	33	47	13	16	60	61	21	34	12	10	14	18	102	
7-Jun	11	14	15	14	11	14	15	21	23	52	73	85	82	90	61	43	48	17	21	30	15	19	46	18	90	
8-Jun	8	9	19	14	13	11	14	17	20	35	36	41	21	21	22	18	18	16	14	13	12	7	54	27	54	
9-Jun	34	75	79	16	11	35	18	16	19	20	22	20	19	18	19	19	20	24	23	23	17	17	15	15	79	
10-Jun	15	19	45	100	38	22	48	70	45	53	28	35	35	33	26	70	41	15	21	18	16	21	21	28	100	
11-Jun	9	10	11	10	12	13	14	18	16	19	19	28	29	25	24	27	23	18	18	28	22	68	34	42	68	
12-Jun	20	17	14	16	17	17	16	16	15	12	11	15	15	15	69	36	61	38	15	14	36	29	12	15	69	
13-Jun	16	14	15	18	14	27	64	27	38	58	65	68	24	20	23	25	32	19	15	16	17	12	30	14	68	
14-Jun	23	16	15	16	16	19	18	21	19	20	21	15	17	18	19	21	20	15	16	16	14	15	15	23	23	
15-Jun	14	16	15	16	15	16	14	25	20	21	34	29	25	39	19	23	21	37	44	31	63	41	69	54	69	
16-Jun	47	43	86	30	31	52	52	26	21	13	15	18	16	34	18	102	24	42	22	50	14	53	20	14	102	
17-Jun	10	15	18	18	14	15	10	68	12	22	52	32	23	25	19	20	22	18	14	32	48	30	38	35	68	
18-Jun	76	17	74	8	10	14	36	37	15	37	27	18	14	41	21	15	9	14	26	15	17	14	22	24	76	
19-Jun	33	54	23	19	20	39	34	85	28	39	34	44	49	45	24	24	22	19	33	68	17	10	33	75	85	
20-Jun	9	19	7	8	12	12	14	11	35	16	13	20	16	13	14	16	9	10	13	12	8	17	19	14	35	
21-Jun	17	23	16	19	15	15	15	13	13	13	15	13	14	13	12	14	13	21	22	14	14	20	18	15	23	
22-Jun	15	16	17	16	17	17	19	18	23	20	19	18	21	20	22	19	22	25	21	24	19	63	52	45	63	
23-Jun	54	31	79	83	56	78	61	26	33	24	25	27	38	58	72	76	65	29	23	33	36	53	27	90	90	
24-Jun	49	53	42	59	43	21	59	25	25	21	22	31	20	21	17	25	25	19	19	19	12	74	58	79	79	
25-Jun	42	39	13	13	50	24	28	35	74	73	35	39	71	84	30	25	19	23	16	13	12	11	8	6	84	
26-Jun	7	9	10	10	12	12	13	12	11	11	14	15	14	14	13	13	16	14	13	11	16	18	12	12	18	
27-Jun	10	14	12	13	16	33	16	30	14	17	18	13	16	58	39	68	20	12	16	43	61	97	75	24	97	
28-Jun	42	23	24	50	36	27	28	34	47	27	24	28	47	24	35	41	31	25	15	18	18	11	9	16	50	
29-Jun	12	12	8	10	9	16	16	19	20	21	29	97	56	36	31	23	27	29	27	83	24	41	38	18	97	
30-Jun	51	26	12	46	64	75	53	26	15	30	17	13	14	31	89	15	14	14	15	11	73	5	27	19	89	
	102	91	86	100	64	82	64	85	74	75	73	97	82	90	89	102	85	72	56	83	73	97	75	90		
Diurnal Maximum																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - June 2017

Direction of Maximum Speed: 274 deg on Jun 2 17:00 Direction of Maximum Daily Speed Average: 145.1 deg on Jun 26	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 36 deg on Jun 27 16:00 Direction of Minimum Daily Speed Average: 1.0 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 313.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	17	158	229	259	284	271	270	256	247	231	235	196	153	142	141	128	128	139	129	122	136	145	169	194	192.6
2-Jun	146	161	170	166	206	210	143	46	305	328	325	320	340	14	344	268	274	289	309	309	286	289	288	285	292.6
3-Jun	281	283	290	287	281	288	311	322	336	300	299	277	289	321	13	38	99	73	137	133	129	127	131	126	290.9
4-Jun	130	137	148	204	230	248	51	109	257	323	357	270	272	318	346	353	356	360	341	341	353	25	12	4	349.3
5-Jun	357	37	75	342	349	346	358	344	348	350	356	330	325	340	357	65	142	138	93	156	59	90	64	161	5.3
6-Jun	84	136	162	145	160	129	150	132	133	147	142	134	148	205	262	269	306	236	338	53	20	360	2	6	154.5
7-Jun	358	358	354	354	351	353	343	350	337	266	84	59	328	47	76	89	48	84	81	69	44	51	32	21	34.9
8-Jun	354	1	350	348	345	349	346	345	50	38	114	114	129	134	130	134	131	134	131	129	121	130	129	137	112.4
9-Jun	138	143	135	12	27	9	9	4	14	18	19	26	20	16	16	15	22	50	55	64	68	65	63	63	33.3
10-Jun	77	88	90	76	95	49	80	44	320	332	349	315	276	244	241	286	17	16	16	349	329	357	0	357	20.2
11-Jun	326	326	326	321	321	313	313	321	327	319	318	325	323	326	341	333	346	348	343	358	49	78	107	133	332.2
12-Jun	140	149	142	143	144	141	144	144	154	168	176	146	153	148	111	147	88	138	143	152	142	1	356	1	141.8
13-Jun	6	355	349	346	342	1	36	107	120	102	165	96	352	330	350	353	4	10	3	9	32	32	31	3	7.5
14-Jun	360	10	358	358	3	10	15	14	13	10	7	343	5	2	13	7	6	9	2	357	355	359	349	347	3.2
15-Jun	346	345	346	348	357	5	2	11	355	359	0	353	328	339	115	91	73	70	77	63	48	59	78	101	13.5
16-Jun	43	139	131	126	132	132	130	125	137	139	163	159	147	209	241	168	176	276	294	352	90	137	151	141	152.9
17-Jun	154	152	141	147	161	170	203	290	290	304	332	351	312	314	307	301	307	322	334	347	21	95	178	191	292.4
18-Jun	241	129	158	161	172	175	215	187	151	141	254	257	235	226	268	259	247	257	317	335	329	342	332	281	259.2
19-Jun	318	275	311	289	280	280	287	284	243	244	259	241	251	261	247	239	251	250	283	180	159	178	205	204	254.2
20-Jun	157	156	150	152	148	155	154	155	145	133	144	190	214	202	204	187	172	166	154	154	162	145	150	174	164.6
21-Jun	212	229	226	262	270	279	271	276	271	276	281	282	279	284	278	282	284	285	315	343	339	342	357	354	288.9
22-Jun	349	350	1	352	354	346	354	352	352	5	1	357	356	353	358	348	354	1	8	25	19	14	311	260	355.2
23-Jun	260	266	360	348	327	333	334	317	333	325	349	347	345	346	8	249	349	9	3	355	355	261	265	220	328.1
24-Jun	260	255	135	148	146	152	80	353	330	345	353	7	359	357	355	349	354	350	16	29	37	64	93	110	14.0
25-Jun	120	130	1	22	50	352	338	306	75	82	132	123	266	176	161	145	163	142	151	144	146	155	160	167	148.9
26-Jun	174	171	160	149	147	145	145	148	150	147	139	145	143	143	142	144	143	153	143	137	122	123	134	137	145.1
27-Jun	137	137	138	140	143	189	249	225	196	192	212	235	233	148	97	36	234	240	259	283	306	249	133	131	183.8
28-Jun	128	88	29	75	102	111	98	53	69	71	67	69	53	33	31	68	113	152	156	200	183	172	164	155	100.8
29-Jun	165	160	176	161	157	145	131	127	120	154	165	276	286	351	312	353	14	319	356	84	265	337	333	308	158.5
30-Jun	245	217	130	163	154	255	157	131	149	152	140	141	133	143	289	256	253	251	240	246	275	165	210	172	190.3

95.0 116.1 76.3 345.9 25.5 323.1 336.1 345.9 333.6 340.3 359.8 332.7 313.3 335.7 336.9 310.8 321.4 335.9 23.2 38.7 53.2 66.2 61.9 74.3

Diurnal Average

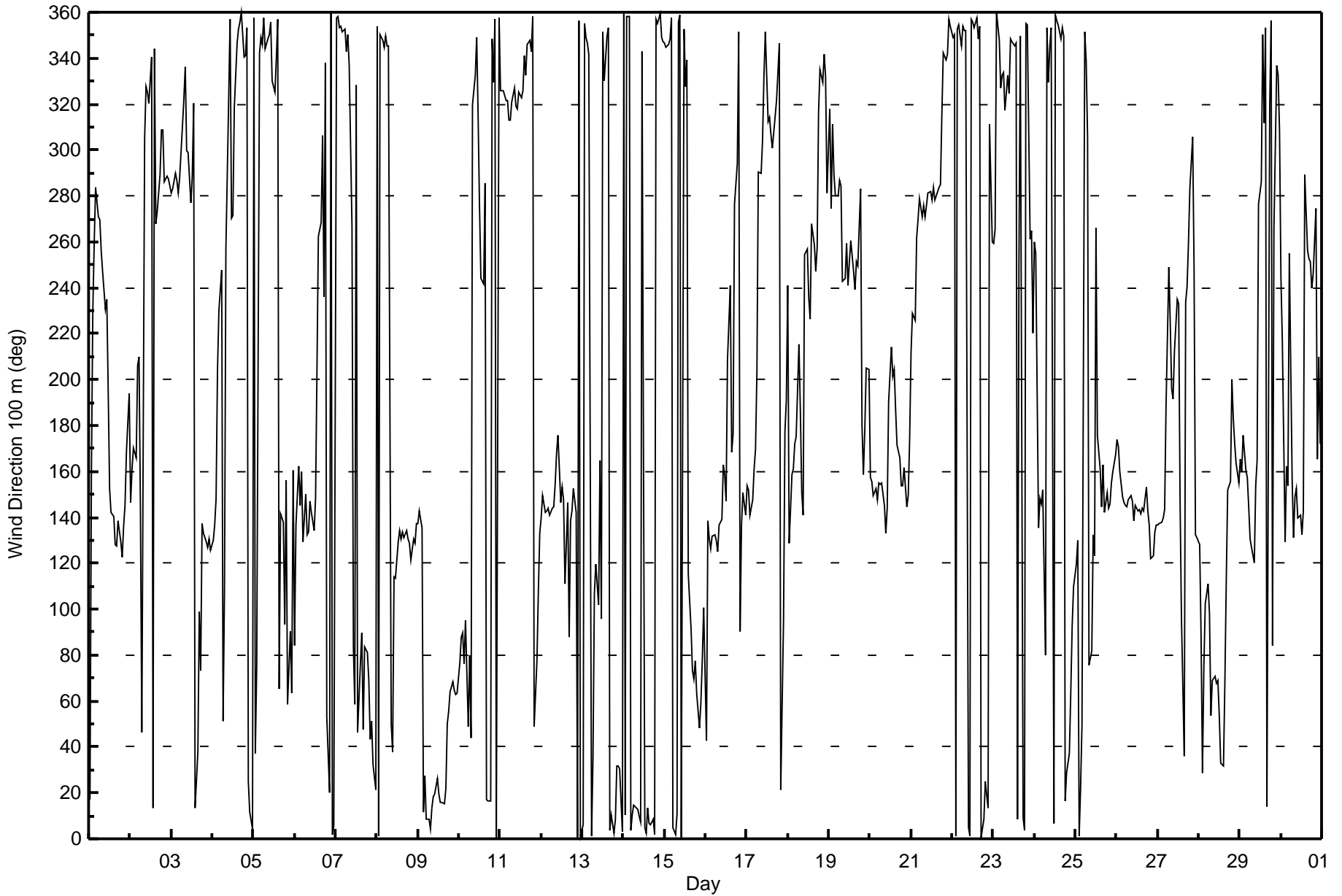
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Jun 25 09:00 Minimum Value: 3 deg on Jun 27 01:00 Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 10 Median = 14 Q ₃ = 24 P ₉₀ = 43 P ₉₉ = 83		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	85	28	10	27	11	26	32	10	8	9	10	29	25	7	8	46	24	32	46	14	17	12	12	55	85	
2-Jun	18	81	19	19	20	21	35	85	38	23	14	18	24	20	22	7	8	9	29	21	9	27	13	9	85	
3-Jun	8	10	6	6	9	9	12	13	13	20	22	24	33	30	28	43	80	64	9	4	7	10	8	10	80	
4-Jun	10	9	13	29	21	61	90	30	50	20	39	14	11	34	11	8	8	16	22	13	22	7	13	15	90	
5-Jun	20	40	28	16	11	10	10	14	11	11	23	16	14	21	35	34	26	50	42	14	56	47	47	72	72	
6-Jun	57	13	15	20	32	30	26	6	8	21	14	21	25	44	9	10	43	37	37	15	16	14	12	14	57	
7-Jun	12	9	7	7	8	7	6	10	18	51	69	76	99	73	45	39	36	11	12	23	7	8	43	24	99	
8-Jun	11	18	5	6	5	10	11	22	41	54	22	25	11	12	13	10	13	7	7	7	5	4	5	5	54	
9-Jun	3	23	33	55	10	18	8	8	10	11	11	11	11	10	11	10	14	16	14	14	10	8	6	5	55	
10-Jun	5	7	19	62	22	20	29	39	48	40	26	33	29	27	21	68	42	5	11	18	15	12	11	17	68	
11-Jun	8	4	5	5	8	9	9	13	11	15	16	22	23	20	19	19	17	12	12	21	14	13	17	13	23	
12-Jun	10	8	6	7	7	7	5	8	12	10	9	10	11	9	64	38	51	34	10	12	14	26	10	9	64	
13-Jun	10	7	11	7	9	14	45	26	24	53	84	90	20	15	14	18	21	14	7	7	13	8	21	9	90	
14-Jun	12	8	7	9	8	10	10	12	10	10	13	11	9	11	10	7	10	12	11	7	8	9	6	7	13	
15-Jun	7	6	5	7	7	9	10	11	12	10	26	21	18	29	18	14	21	28	16	43	21	29	21	24	43	
16-Jun	70	37	12	13	10	9	16	12	14	7	16	18	14	31	15	96	22	40	13	43	7	28	31	5	96	
17-Jun	8	10	5	12	10	23	36	12	6	17	40	26	17	19	15	15	19	11	9	13	49	19	46	41	49	
18-Jun	69	39	36	11	11	26	18	31	13	41	18	13	11	37	14	11	6	11	25	9	12	8	16	19	69	
19-Jun	27	20	16	15	11	19	22	77	29	32	27	38	37	29	16	22	17	14	26	55	15	8	21	42	77	
20-Jun	22	10	19	8	7	5	6	8	10	10	10	18	11	13	11	14	8	9	10	9	6	9	12	21	22	
21-Jun	13	16	10	12	11	12	10	9	9	9	11	10	9	10	10	9	9	12	18	8	7	12	10	9	18	
22-Jun	8	9	9	9	9	10	12	11	15	11	11	11	14	12	16	15	16	20	11	14	10	11	33	7	33	
23-Jun	7	11	25	30	18	12	20	17	20	18	18	20	29	41	55	73	59	21	19	54	18	40	11	63	73	
24-Jun	15	33	10	12	8	13	56	21	18	15	17	25	16	14	12	19	23	14	11	13	6	11	16	14	56	
25-Jun	11	38	81	16	67	20	33	62	100	70	32	46	68	73	24	22	18	23	15	7	5	9	5	7	100	
26-Jun	6	8	6	5	4	3	4	6	8	9	5	9	5	8	5	6	11	11	4	5	8	11	6	3	11	
27-Jun	3	3	4	4	11	34	11	22	14	19	14	8	12	51	22	76	16	9	11	34	59	52	59	15	76	
28-Jun	13	38	26	10	14	8	20	27	33	16	14	17	37	14	25	30	21	24	14	14	14	10	9	11	38	
29-Jun	11	11	16	7	8	9	7	8	16	16	35	86	49	27	23	17	16	18	39	64	15	20	28	26	86	
30-Jun	19	19	27	43	35	42	60	12	9	23	7	10	7	35	74	11	8	8	10	11	92	23	22	30	92	
		85	81	81	62	67	61	90	85	100	70	84	90	99	73	74	96	80	64	46	64	92	52	59	72	
		Diurnal Maximum																								





Maximum Value: 1.0 km/h on Jun 25 23:00		Maximum Daily Average: 0.3 km/h on Jun 26		Hours in Service: 720																						
Minimum Value: -1.3 km/h on Jun 9 14:00		Minimum Daily Average: -0.6 km/h on Jun 9		Hours of Data: 720																						
Maximum Diurnal Average: 0.0 km/h at hour 1		Minimum Diurnal Average: -0.3 km/h at hour 15		Hours of Missing Data: 0																						
Monthly Average: -0.13 km/h		Percentiles: P ₁ = -0.9 P ₁₀ = -0.6 Q ₁ = -0.3 Median = -0.1 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.1	0.1	0.0	-0.2	-0.2	0.0	-0.1	0.1	0.0	0.0	0.2	0.0	0.1	0.2	-0.1	0.0	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.2
2-Jun	0.0	0.0	0.1	-0.1	0.0	0.2	-0.1	0.0	0.4	-0.1	-0.2	-0.3	-0.2	-0.5	-0.3	-0.8	-0.8	-0.1	-0.4	-0.4	-0.4	-0.3	-0.3	-0.5	-0.2	0.4
3-Jun	-0.4	-0.3	-0.7	-0.4	-0.3	-0.5	-0.3	-0.2	-0.2	-0.2	-0.4	-0.2	-0.1	-0.3	-0.5	-0.1	0.2	0.0	0.1	0.1	0.1	0.1	-0.1	-0.2	-0.2	0.2
4-Jun	0.0	0.0	0.2	0.3	0.0	0.1	0.0	0.1	0.0	0.0	-0.3	-0.4	-0.4	-0.2	-0.1	0.0	-0.2	-0.6	-0.4	-0.3	-0.3	-0.3	-0.2	-0.4	-0.2	0.3
5-Jun	-0.3	-0.2	0.0	-0.1	-0.1	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	-0.4	0.0	-0.4	0.2	0.4	0.1	0.2	-0.3	-0.1	-0.1	0.0	-0.1	0.4
6-Jun	0.0	0.0	0.0	0.0	-0.2	-0.2	0.1	0.2	0.5	0.2	0.1	0.4	0.0	0.1	-0.2	-0.4	0.0	0.0	-0.2	0.0	-0.3	-0.4	-0.2	-0.1	0.0	0.5
7-Jun	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	-0.5	-0.4	0.2	-0.3	-0.2	-0.1	-0.1	-0.1	-0.3	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	0.2
8-Jun	-0.2	-0.4	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	0.5	0.2	0.0	0.3	-0.1	0.0	-0.1	0.0	-0.1	-0.2	-0.3	0.1	0.0	0.0	-0.1	0.5
9-Jun	0.0	0.0	-0.1	-0.3	-0.3	-0.3	-0.7	-1.1	-0.8	-0.6	-0.6	-0.9	-0.8	-1.3	-0.8	-0.8	-1.0	-0.8	-1.0	-0.7	-0.8	-0.5	-0.5	-0.6	-0.6	0.0
10-Jun	-0.5	-0.5	-0.3	-0.1	-0.2	-0.3	-0.1	-0.5	-0.3	-0.1	-0.4	-0.1	0.0	-0.1	0.0	0.0	-0.3	-0.3	-0.3	-0.3	-0.4	-0.2	-0.3	-0.2	-0.2	0.0
11-Jun	-0.3	-0.4	-0.4	-0.5	-0.4	-0.7	-0.7	-0.6	-0.6	-0.6	-0.7	-0.2	-0.5	-0.5	-0.7	-0.5	-0.5	-0.4	-0.5	-0.4	-0.2	-0.1	-0.1	0.0	-0.4	0.0
12-Jun	0.1	0.1	0.0	-0.1	-0.1	0.0	0.1	0.0	0.2	0.5	0.6	0.5	0.4	0.2	-0.2	0.2	-0.2	0.0	0.0	0.4	0.1	-0.3	-0.4	-0.3	0.1	0.6
13-Jun	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	0.0	0.0	0.0	0.2	0.1	0.3	-0.4	-0.5	-0.3	-0.2	-0.3	-0.5	-0.8	-0.5	-0.3	-0.5	-0.4	-0.4	-0.3	0.3
14-Jun	-0.5	-0.6	-0.4	-0.6	-0.7	-0.8	-0.9	-0.7	-0.6	-0.6	-0.5	-0.4	-0.7	-0.9	-0.6	-0.6	-0.6	-0.5	-0.3	-0.3	-0.4	-0.3	-0.2	-0.2	-0.5	-0.2
15-Jun	-0.3	-0.2	-0.1	-0.2	0.0	-0.2	-0.3	-0.1	-0.1	-0.1	0.1	-0.1	-0.3	-0.4	0.3	0.0	-0.1	-0.1	-0.3	0.0	-0.1	-0.1	0.0	-0.1	-0.1	0.3
16-Jun	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	0.0	0.1	0.2	-0.1	0.1	0.2	0.0	-0.3	0.3	-0.2	-0.3	-0.1	-0.1	0.1	0.1	0.3	0.0	0.3
17-Jun	0.5	0.8	0.1	0.4	0.4	0.3	0.0	-0.2	-0.4	-0.6	-0.2	-0.1	-0.7	-0.7	-0.6	-0.6	-0.6	-0.5	-0.4	-0.1	0.1	0.1	0.1	0.1	-0.1	0.8
18-Jun	-0.2	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.1	-0.1	0.1	-0.2	-0.1	0.1	-0.3	-0.5	-0.3	-0.3	-0.4	-0.4	-0.5	-0.3	-0.3	-0.3	-0.1	0.4
19-Jun	-0.2	-0.2	-0.2	-0.3	-0.4	-0.2	-0.2	0.1	0.0	0.4	0.1	-0.1	-0.2	-0.1	0.1	0.0	-0.2	-0.3	-0.3	0.0	0.1	0.2	0.0	0.0	-0.1	0.4
20-Jun	0.1	-0.2	0.1	0.2	0.0	0.3	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.3	0.1	0.3	0.6	0.7	0.5	0.4	0.8	0.3	0.4	0.3	0.2	0.8
21-Jun	0.5	0.0	0.1	-0.4	-0.4	-0.6	-0.5	-0.6	-0.6	-0.6	-0.4	-0.4	-0.7	-0.6	-0.9	-0.5	-0.5	-0.4	-0.2	-0.3	-0.2	-0.3	-0.6	-0.7	-0.4	0.5
22-Jun	-0.4	-0.5	-0.7	-0.5	-0.7	-0.5	-0.2	-0.4	-0.7	-0.7	-1.1	-1.1	-0.7	-0.7	-0.7	-0.6	-0.5	-0.4	-0.3	-0.5	-0.1	0.1	0.0	0.1	-0.5	0.1
23-Jun	0.1	0.0	0.0	0.1	0.0	-0.1	-0.2	-0.1	-0.4	-0.3	-0.3	-0.5	-0.4	-0.2	-0.3	0.0	-0.5	-0.3	0.0	-0.2	-0.1	0.0	0.0	0.1	-0.1	0.1
24-Jun	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.5	-0.5	-0.7	-0.6	-0.7	-1.0	-0.5	-0.5	-0.5	-0.5	-0.3	-0.2	0.0	0.0	0.1	-0.3	0.1
25-Jun	-0.1	-0.2	-0.4	-0.1	0.0	-0.1	-0.1	-0.2	0.2	0.5	0.4	-0.1	-0.1	0.1	0.2	0.2	0.4	0.2	0.3	0.4	0.2	0.5	1.0	0.9	0.2	1.0
26-Jun	0.7	0.8	0.5	0.3	0.6	0.6	0.2	0.0	0.3	0.1	0.4	0.4	0.4	0.1	0.1	0.2	0.2	0.6	0.2	-0.1	-0.4	0.0	0.0	-0.1	0.3	0.8
27-Jun	-0.1	0.0	-0.2	0.2	0.2	0.3	-0.3	0.2	0.3	0.3	0.4	0.0	0.0	0.1	-0.1	0.0	-0.1	-0.1	-0.3	-0.1	0.0	0.0	0.1	0.0	0.0	0.4
28-Jun	0.0	-0.3	-0.3	-0.1	0.0	-0.3	-0.1	-0.1	-0.6	-0.4	-0.7	-0.3	-0.4	-0.5	-0.4	-0.4	0.1	0.2	0.2	0.3	0.5	0.7	0.4	0.1	-0.1	0.7
29-Jun	0.4	0.3	0.2	0.3	0.4	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.0	-0.2	-0.3	-0.3	-0.1	-0.3	-0.2	0.0	-0.3	0.0	0.0	-0.1	0.4
30-Jun	0.0	0.1	0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	0.1	0.2	0.4	0.4	0.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.2	0.2	0.1	0.0	0.4
																								0.0	0.7	
																								-0.1	0.8	
																								-0.1	0.5	
																								-0.1	0.4	
																								-0.1	0.6	
																								-0.1	0.6	
																								-0.1	0.4	
																								-0.2	0.3	
																								-0.1	0.5	
																								-0.1	0.5	
																								-0.1	0.6	
																								-0.1	0.5	
																								-0.1	0.6	
																								-0.2	0.4	
																								-0.2	0.3	
																								-0.3	0.3	
																								-0.2	0.3	
																								-0.2	0.6	
																								-0.2	0.7	
																								-0.2	0.5	
																								-0.1	0.4	
																								-0.1	0.8	
																								-0.1	0.7	
																								-0.1	1.0	
																								-0.1	0.9	
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 20 m (VW20m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.0 km/h on Jun 9 12:00 Minimum Value: 0.1 km/h on Jun 22 23:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.6 Q ₃ = 2.2 P ₉₀ = 3.2 P ₉₉ = 4.6																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.7	0.5	0.7	0.3	0.6	0.6	1.2	1.5	1.5	1.5	1.2	1.3	1.0	2.1	2.0	1.3	1.4	1.3	0.8	0.5	0.3	0.3	0.2	0.2	2.1
2-Jun	0.1	0.3	0.3	0.5	0.5	0.8	1.0	0.9	1.0	1.0	1.5	1.4	1.5	2.6	2.1	4.5	4.4	2.3	1.6	2.2	2.0	1.9	2.1	2.8	4.5
3-Jun	3.1	3.2	3.5	3.8	3.2	3.4	2.2	1.8	1.9	2.1	2.3	2.2	2.1	2.3	1.8	1.5	1.1	1.0	1.2	0.9	0.4	0.5	0.6	0.7	3.8
4-Jun	0.5	1.4	1.5	1.1	0.8	0.6	1.0	1.1	1.6	1.0	1.0	1.1	1.1	1.5	1.9	2.5	1.6	2.0	2.7	1.1	1.7	1.3	1.8	2.7	
5-Jun	1.7	0.9	1.6	1.7	1.4	1.9	1.7	1.7	1.5	1.5	1.3	1.5	1.7	1.8	1.7	1.9	1.5	1.3	0.9	0.8	1.6	0.9	0.3	0.2	1.9
6-Jun	0.3	0.2	0.1	0.2	0.3	0.4	0.8	1.7	1.7	1.7	1.7	1.9	1.6	1.6	1.9	2.0	1.2	0.6	0.4	0.1	0.6	0.7	0.6	0.4	2.0
7-Jun	0.4	0.6	0.8	0.8	0.4	0.5	0.8	1.2	1.3	1.5	1.6	1.2	1.4	1.8	2.5	1.9	1.8	1.5	1.8	1.8	1.9	1.9	0.9	0.7	2.5
8-Jun	0.9	1.5	1.3	0.7	0.6	0.6	0.6	0.9	0.9	1.5	1.4	1.6	2.3	2.4	2.5	2.5	2.5	2.3	2.3	1.8	1.3	0.8	0.7	0.5	2.5
9-Jun	0.9	0.6	0.4	0.9	0.6	1.6	3.6	3.8	4.1	4.3	4.7	5.0	4.9	4.9	4.9	4.7	4.4	3.9	3.8	3.4	3.0	2.1	1.8	1.7	5.0
10-Jun	2.4	2.3	1.6	1.0	1.1	1.3	1.5	1.4	1.8	2.2	2.3	2.1	2.4	2.0	1.7	1.0	0.6	1.4	1.3	1.3	2.5	1.6	1.8	1.2	2.5
11-Jun	0.8	1.1	1.6	1.7	1.4	2.3	3.1	3.6	3.8	3.6	3.4	3.1	3.3	3.3	2.9	2.7	2.7	2.5	2.3	1.9	1.1	0.6	0.6	0.5	3.8
12-Jun	0.5	0.9	2.2	2.3	2.4	2.4	2.4	2.0	2.0	1.9	1.9	3.9	3.6	3.6	2.6	1.8	2.2	1.8	2.2	1.8	1.6	1.1	1.3	1.1	3.9
13-Jun	0.7	0.9	0.6	0.7	0.8	0.9	1.0	1.4	1.4	1.5	1.4	1.5	1.7	2.0	2.0	1.9	1.7	2.1	3.4	2.7	1.5	2.1	2.5	2.3	3.4
14-Jun	2.7	3.0	3.0	3.5	3.5	3.7	3.7	3.4	3.4	2.7	2.5	3.1	3.4	3.2	3.4	3.1	2.9	2.5	2.0	2.3	2.2	2.0	2.4	2.5	3.7
15-Jun	1.9	1.8	1.4	1.3	1.5	1.2	1.4	1.3	1.5	1.5	1.5	1.9	1.8	1.4	1.6	1.2	0.9	0.9	1.5	0.5	0.7	0.6	0.4	0.3	1.9
16-Jun	0.2	0.2	0.9	0.8	1.0	1.3	0.9	1.1	1.5	1.5	1.3	1.5	1.6	1.9	2.2	1.7	1.6	1.7	2.0	0.9	0.6	0.5	1.1	3.3	3.3
17-Jun	2.2	2.1	2.4	1.6	1.5	1.0	0.9	2.4	2.9	2.6	1.9	1.6	2.8	3.3	3.8	3.4	3.2	2.5	1.8	0.6	0.2	0.2	0.3	0.3	3.8
18-Jun	0.6	1.0	0.5	0.5	1.0	1.7	1.3	1.4	2.2	1.5	2.1	2.5	2.4	2.7	3.1	3.4	3.2	2.6	2.0	2.2	2.2	1.6	1.4	1.1	3.4
19-Jun	0.7	1.3	1.1	1.1	1.3	1.1	1.4	1.3	1.5	1.5	1.8	1.8	1.9	2.0	2.2	1.9	1.9	1.7	0.9	0.7	0.4	0.4	0.3	0.6	2.2
20-Jun	0.4	1.2	0.7	1.6	1.8	1.9	1.9	1.7	1.0	1.1	1.5	1.6	2.2	2.1	1.8	1.5	1.6	1.7	2.4	2.2	1.6	1.8	1.9	1.7	2.4
21-Jun	1.3	1.5	1.1	2.2	2.4	3.2	4.0	3.3	3.1	2.7	2.4	2.6	3.0	3.2	3.5	3.7	3.8	3.0	2.3	2.8	2.2	1.6	3.1	3.8	4.0
22-Jun	3.3	3.4	3.6	3.7	3.8	3.0	2.6	2.6	3.2	3.5	3.8	4.2	3.6	3.3	3.0	2.9	2.9	2.5	2.1	1.6	0.6	0.2	0.1	0.1	4.2
23-Jun	0.2	0.2	0.1	0.3	0.2	0.3	0.8	1.1	1.5	2.1	2.3	2.3	1.9	1.6	1.9	2.1	1.3	0.9	0.4	0.3	0.3	0.2	0.3	0.3	2.3
24-Jun	0.3	0.2	0.3	0.4	0.6	0.8	1.0	1.4	1.7	2.1	2.1	2.4	2.4	2.8	2.8	2.2	2.1	2.1	1.5	0.9	0.4	0.5	0.5	0.5	2.8
25-Jun	0.9	0.4	0.6	0.4	0.2	0.5	0.8	0.8	1.2	1.3	1.6	1.7	1.7	1.7	1.7	2.0	1.8	1.6	1.8	2.0	2.5	2.0	2.1	1.8	2.5
26-Jun	1.8	1.9	2.1	3.1	3.4	3.7	4.0	3.4	2.6	2.9	3.9	3.7	4.6	4.4	4.2	3.6	3.1	2.6	2.7	2.1	2.0	1.7	1.8	1.9	4.6
27-Jun	1.9	2.3	2.4	2.6	2.5	2.0	2.4	1.4	1.5	1.5	1.3	1.5	1.1	1.0	0.9	1.0	1.3	1.4	1.4	0.6	0.3	0.4	0.3	0.6	2.6
28-Jun	0.4	0.6	0.7	0.7	0.8	0.8	1.0	0.8	2.2	2.6	2.8	1.9	2.5	2.5	2.2	1.9	1.9	1.4	1.6	1.1	1.3	1.9	2.2	2.1	2.8
29-Jun	1.3	1.3	1.0	1.7	1.8	1.9	1.7	1.6	1.4	1.4	1.4	1.4	1.4	1.6	1.7	1.2	1.3	1.0	1.0	0.6	0.2	1.0	0.3	0.2	1.9
30-Jun	0.2	0.3	0.2	0.1	0.5	0.6	0.7	1.1	1.4	1.1	1.7	2.0	1.8	1.3	1.3	1.4	1.4	1.1	0.9	0.9	0.6	0.6	0.8	0.7	2.0
Diurnal Maximum																									



Maximum Value: 1.5 km/h on Jun 25 23:00		Maximum Daily Average: 1.0 km/h on Jun 26		Hours in Service: 720																						
Minimum Value: -1.7 km/h on Jun 2 17:00		Minimum Daily Average: -0.8 km/h on Jun 21		Hours of Data: 720																						
Maximum Diurnal Average: 0.1 km/h at hour 22		Minimum Diurnal Average: -0.2 km/h at hour 15		Hours of Missing Data: 0																						
Monthly Average: -0.07 km/h		Percentiles: P ₁ = -1.4 P ₁₀ = -0.8 Q ₁ = -0.4 Median = -0.1 Q ₃ = 0.3 P ₉₀ = 0.7 P ₉₉ = 1.2		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.2	0.4	0.1	0.1	-0.4	-0.2	0.2	-0.1	0.2	0.3	0.2	0.5	0.2	0.5	0.6	0.2	0.3	0.4	0.2	0.3	0.4	0.5	0.2	0.1	0.2	0.6
2-Jun	0.0	0.0	0.2	0.3	0.3	0.6	0.5	0.1	0.5	0.1	-0.4	-0.4	0.1	-0.3	-0.6	-1.6	-1.7	-0.6	-0.5	-0.7	-0.7	-0.6	-0.9	-1.1	-0.3	0.6
3-Jun	-0.9	-0.7	-1.4	-1.5	-1.1	-0.9	-0.6	-0.6	-0.6	-0.5	-0.5	-0.3	-0.1	-0.3	-0.4	-0.1	0.3	0.0	0.6	0.5	0.2	0.5	0.1	-0.3	-0.4	0.6
4-Jun	0.1	0.2	0.5	0.7	0.1	0.1	0.0	0.2	-0.2	-0.6	-0.4	-0.7	-0.2	-0.1	0.1	-0.4	-0.8	-0.4	-0.6	-0.6	-0.4	-0.1	-0.3	-0.6	-0.2	0.7
5-Jun	-0.6	-0.2	0.2	-0.6	-0.4	-0.4	-0.4	-0.6	-0.3	-0.4	-0.3	-0.5	-0.5	-0.4	0.0	-0.1	0.4	0.6	0.3	0.3	0.0	0.1	0.0	0.0	-0.2	0.6
6-Jun	0.0	0.0	0.0	0.1	-0.2	-0.1	0.2	0.7	0.8	0.3	0.6	0.7	0.1	0.2	-0.4	-0.8	-0.1	0.0	-0.3	0.0	-0.5	-0.6	-0.5	-0.3	0.0	0.8
7-Jun	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	-0.5	-0.3	0.3	0.0	0.0	-0.2	0.0	0.3	0.2	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	-0.3	-0.4	-0.2	0.3
8-Jun	-0.6	-0.9	-0.4	-0.3	-0.3	-0.4	-0.2	-0.3	-0.3	-0.3	0.8	0.5	0.4	0.8	0.6	0.6	0.5	0.6	0.5	0.5	0.2	0.6	0.5	0.4	0.1	0.8
9-Jun	0.5	0.0	0.1	-0.5	-0.5	-0.4	-0.7	-1.1	-1.0	-0.7	-0.6	-0.9	-0.8	-1.0	-0.7	-0.5	-0.7	-0.4	-0.6	-0.2	-0.5	-0.2	-0.3	-0.3	-0.5	0.5
10-Jun	-0.1	0.2	0.0	-0.2	-0.2	-0.2	0.0	-0.5	-0.4	-0.1	-0.4	0.1	0.1	-0.1	-0.2	0.0	-0.3	-0.4	-0.2	-0.4	-1.0	-0.3	-0.4	-0.4	-0.2	0.2
11-Jun	-0.6	-0.7	-0.5	-1.1	-0.7	-1.2	-1.3	-1.1	-1.3	-1.5	-0.8	-0.5	-0.5	-0.8	-1.0	-0.7	-0.6	-0.6	-0.8	-0.3	-0.1	0.0	0.1	0.2	-0.7	0.2
12-Jun	0.2	0.4	0.5	0.3	0.5	0.6	0.3	0.4	0.4	0.6	0.3	1.2	0.9	1.2	-0.1	0.3	0.2	0.4	0.6	0.8	0.4	-0.5	-0.6	-0.2	0.4	1.2
13-Jun	-0.3	-0.4	-0.3	-0.3	-0.3	-0.2	0.2	0.3	0.2	0.5	0.1	0.4	-0.6	-0.5	-0.5	-0.1	-0.3	-0.4	-0.9	-0.6	-0.2	-0.3	-0.3	-0.7	-0.2	0.5
14-Jun	-0.7	-0.8	-0.8	-0.8	-0.9	-0.7	-1.0	-0.5	-0.6	-0.4	-0.4	-0.5	-0.8	-0.9	-0.5	-0.6	-0.7	-0.4	-0.5	-0.4	-0.4	-0.5	-0.6	-0.8	-0.6	-0.4
15-Jun	-0.5	-0.4	-0.3	-0.2	-0.2	-0.2	-0.4	-0.1	-0.2	-0.1	0.2	0.0	-0.2	-0.5	0.6	0.2	0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.6
16-Jun	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.4	0.5	0.5	0.2	0.5	0.3	-0.2	-0.3	0.3	-0.4	-0.5	-0.1	0.1	0.2	0.5	0.9	0.1	0.9
17-Jun	1.0	1.1	0.7	0.6	0.4	0.5	0.3	-0.7	-1.1	-1.0	-0.1	-0.2	-1.0	-1.2	-1.5	-1.4	-1.1	-0.8	-0.6	-0.1	0.0	0.1	0.1	0.4	-0.2	1.1
18-Jun	0.1	0.7	0.2	0.4	0.6	0.7	0.8	0.5	0.6	0.1	0.1	-0.3	0.1	0.0	-0.7	-0.8	-0.4	-0.7	-0.7	-0.8	-0.7	-0.4	-0.5	-0.5	-0.1	0.8
19-Jun	-0.4	-0.4	-0.4	-0.5	-0.6	-0.4	-0.2	0.3	0.0	0.5	0.1	-0.2	-0.4	-0.1	0.1	0.0	-0.4	-0.4	-0.5	0.2	0.4	0.4	0.2	0.2	-0.1	0.5
20-Jun	0.7	0.3	0.5	1.0	0.5	1.0	0.4	0.6	0.4	0.5	0.5	0.2	-0.1	-0.2	-0.3	0.1	0.7	0.8	1.2	0.9	0.9	0.8	0.7	0.9	0.5	1.2
21-Jun	0.3	0.1	0.0	-0.8	-0.7	-0.9	-1.3	-1.2	-1.1	-1.0	-0.7	-0.9	-1.1	-1.4	-1.4	-1.3	-1.4	-0.5	-0.5	-0.8	-0.6	-0.5	-0.9	-1.1	-0.8	0.3
22-Jun	-0.8	-0.8	-0.7	-0.9	-0.9	-0.6	-0.1	-0.6	-0.7	-0.7	-1.0	-1.1	-0.9	-0.9	-0.7	-1.0	-0.8	-0.4	-0.3	-0.3	-0.1	0.0	0.0	0.0	-0.6	0.0
23-Jun	0.1	0.0	0.1	0.0	0.0	-0.1	-0.3	-0.1	-0.2	-0.5	-0.5	-0.3	-0.3	-0.2	-0.2	0.1	-0.5	-0.4	-0.1	-0.3	-0.2	0.0	0.1	0.2	-0.1	0.2
24-Jun	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.0	0.1	-0.7	-0.5	-0.7	-0.7	-0.7	-1.2	-0.4	-0.6	-0.5	-0.3	-0.2	-0.1	0.0	0.1	0.1	-0.2	0.3
25-Jun	0.2	-0.2	-0.6	-0.1	0.0	-0.1	0.0	0.1	0.3	0.7	0.7	0.3	0.0	0.0	0.3	0.8	0.5	0.7	0.7	0.9	1.0	1.1	1.5	1.2	0.4	1.5
26-Jun	1.0	1.0	1.1	0.8	1.3	1.2	1.3	0.8	0.7	1.0	1.2	1.2	1.4	1.2	1.3	1.0	1.1	1.1	0.8	0.6	0.4	0.5	0.5	0.6	1.0	1.4
27-Jun	0.6	0.7	0.7	0.8	1.0	0.4	-0.3	0.1	0.0	0.2	0.3	0.2	0.1	0.2	0.1	0.1	0.0	0.3	-0.4	-0.2	0.0	0.1	0.2	0.0	0.2	1.0
28-Jun	0.1	-0.4	-0.3	-0.1	0.1	-0.1	-0.1	0.0	-0.3	0.0	-0.3	-0.1	0.1	-0.5	-0.2	0.0	0.5	0.2	0.5	0.4	0.8	0.9	1.0	0.5	0.1	1.0
29-Jun	0.6	0.7	0.6	0.8	0.8	0.5	0.5	0.7	0.3	0.3	0.1	0.4	0.3	-0.2	-0.3	-0.2	0.0	-0.4	-0.1	0.1	-0.4	-0.1	0.0	-0.1	0.2	0.8
30-Jun	0.2	0.2	0.2	0.2	0.3	0.0	-0.1	0.1	0.4	0.3	0.7	0.7	0.8	0.3	-0.2	-0.1	0.0	0.0	0.1	0.0	0.2	0.7	0.3	0.5	0.2	0.8
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 45 m (VW45m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.2 km/h on Jun 9 15:00 Minimum Value: 0.1 km/h on Jun 2 01:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.7 Q ₃ = 2.4 P ₉₀ = 3.4 P ₉₉ = 4.7																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.8	0.6	0.9	0.3	0.7	0.7	1.4	1.6	1.3	1.5	1.4	1.2	0.9	2.1	1.9	1.4	1.7	1.3	0.9	0.5	0.4	0.4	0.3	0.3	2.1
2-Jun	0.1	0.3	0.4	0.5	0.6	0.9	0.9	0.9	1.2	1.1	1.6	1.6	1.7	2.7	2.2	4.7	4.8	2.6	1.8	2.4	2.1	1.9	2.1	2.7	4.8
3-Jun	3.3	3.3	3.5	3.5	3.2	3.5	2.5	2.1	1.9	2.2	2.6	2.3	2.5	2.6	1.9	1.6	1.2	1.2	1.1	0.8	0.6	0.6	0.7	0.9	3.5
4-Jun	0.9	1.6	1.6	1.3	1.0	0.7	1.0	1.1	1.6	0.9	1.0	1.2	1.3	1.8	1.9	2.5	1.7	2.2	2.9	1.3	1.8	1.6	2.0	2.9	2.9
5-Jun	1.8	1.1	1.9	1.9	1.6	2.1	1.8	1.9	1.5	1.6	1.5	1.5	1.8	2.0	2.0	2.1	1.6	1.5	1.1	0.9	1.8	1.1	0.3	0.3	2.1
6-Jun	0.3	0.2	0.2	0.2	0.3	0.3	0.8	1.8	1.7	1.7	1.6	1.9	1.9	1.9	2.0	2.2	1.2	0.7	0.3	0.1	0.7	0.9	0.7	0.6	2.2
7-Jun	0.5	0.7	0.9	0.9	0.5	0.5	0.9	1.1	1.4	1.8	1.7	1.3	1.7	1.9	2.6	1.8	1.9	1.7	1.6	1.9	2.1	2.1	1.1	0.9	2.6
8-Jun	1.0	1.5	1.3	0.7	0.6	0.6	0.7	1.0	0.8	1.5	1.5	1.9	2.2	2.5	2.6	2.3	2.4	2.3	2.1	1.7	1.4	0.8	1.0	0.6	2.6
9-Jun	1.0	0.7	0.6	0.8	0.6	1.8	4.0	4.2	4.4	4.7	5.0	5.1	5.0	5.1	5.2	5.0	4.5	4.1	3.9	3.6	3.1	2.2	1.8	1.8	5.2
10-Jun	2.4	2.5	1.7	1.2	1.3	1.4	1.7	1.5	1.9	2.5	2.4	2.5	2.6	2.1	2.0	1.2	0.6	1.4	1.5	1.5	2.7	1.8	2.1	1.3	2.7
11-Jun	0.8	1.2	1.7	1.8	1.5	2.5	3.2	4.0	3.9	3.9	3.8	3.6	3.6	3.6	3.0	2.9	2.8	2.6	2.4	2.0	1.1	0.8	0.8	0.7	4.0
12-Jun	0.7	1.1	2.2	2.4	2.5	2.7	2.5	2.2	2.1	2.2	2.4	4.1	3.8	3.7	2.9	2.0	2.4	1.9	2.2	1.6	1.6	1.3	1.5	1.4	4.1
13-Jun	0.9	1.0	0.7	0.9	0.9	1.0	1.1	1.5	1.6	1.6	1.5	1.7	1.8	2.2	2.0	2.1	1.8	2.3	3.6	2.9	1.5	1.9	2.6	2.3	3.6
14-Jun	2.8	3.1	3.1	3.6	3.7	4.0	4.0	3.8	3.6	3.1	2.7	3.3	3.7	3.2	3.6	3.5	3.1	2.8	2.1	2.5	2.4	2.2	2.6	2.6	4.0
15-Jun	2.1	2.0	1.7	1.7	1.7	1.4	1.4	1.4	1.6	1.5	1.7	2.1	1.8	1.4	1.6	1.1	1.0	0.9	1.6	0.6	0.9	0.7	0.7	0.3	2.1
16-Jun	0.3	0.3	1.0	1.1	1.2	1.5	1.0	1.2	1.6	1.5	1.3	1.5	1.6	1.9	2.2	1.9	1.5	1.8	2.3	1.1	0.7	0.5	1.2	3.3	3.3
17-Jun	2.2	2.2	2.7	1.7	1.5	1.1	0.8	2.4	2.7	2.6	2.1	1.6	3.1	3.6	4.0	3.6	3.3	2.9	1.9	0.7	0.3	0.3	0.4	0.5	4.0
18-Jun	0.7	0.9	0.6	0.6	1.0	1.6	1.3	1.3	2.1	1.6	2.4	2.7	2.3	2.8	3.3	3.4	2.8	2.4	2.1	2.5	2.4	1.9	1.7	1.3	3.4
19-Jun	0.9	1.5	1.3	1.3	1.6	1.2	1.6	1.4	1.7	1.7	2.1	2.0	2.1	2.4	2.4	2.0	1.9	1.7	1.0	0.9	0.6	0.6	0.6	0.7	2.4
20-Jun	0.6	1.3	0.7	1.5	1.8	1.8	1.8	1.7	1.1	1.0	1.4	1.8	2.5	2.2	2.2	1.9	1.8	2.2	2.6	2.3	1.7	2.0	2.2	1.7	2.6
21-Jun	1.5	1.7	1.4	2.3	2.9	3.5	4.3	3.5	3.4	2.9	2.6	2.6	3.1	3.2	3.8	3.8	3.7	3.4	2.6	3.2	2.5	1.9	3.4	4.1	4.3
22-Jun	3.6	3.9	3.9	4.0	4.0	3.5	3.1	2.8	3.3	3.8	4.0	4.2	3.9	3.4	3.2	3.1	2.9	2.6	2.4	1.8	0.7	0.2	0.1	0.1	4.2
23-Jun	0.2	0.3	0.2	0.4	0.3	0.3	0.8	1.3	1.6	2.3	2.5	2.6	2.5	2.0	1.8	2.1	2.3	1.4	1.1	0.4	0.3	0.3	0.3	0.5	2.6
24-Jun	0.4	0.4	0.4	0.4	0.8	0.8	1.1	1.6	1.9	2.1	2.1	2.5	2.4	2.9	2.6	2.5	2.3	2.2	2.3	1.6	1.0	0.5	0.6	0.7	2.9
25-Jun	1.0	0.6	0.6	0.5	0.3	0.5	0.9	1.0	1.3	1.3	1.7	1.9	2.0	1.9	2.1	2.3	1.9	1.8	1.9	2.2	2.9	2.5	2.3	1.8	2.9
26-Jun	1.9	2.2	2.4	3.2	3.6	4.0	4.2	3.5	2.6	2.9	3.9	3.9	4.7	4.4	4.3	3.8	3.2	2.8	2.8	1.9	2.1	1.9	1.7	1.7	4.7
27-Jun	1.8	2.3	2.3	2.7	2.5	2.1	2.3	1.6	1.7	1.8	1.4	1.5	1.3	0.9	1.0	1.0	1.2	1.5	1.4	0.7	0.3	0.4	0.5	0.7	2.7
28-Jun	0.6	0.6	0.7	0.9	1.0	0.9	1.0	0.8	2.1	2.8	2.8	2.1	2.7	2.6	2.4	2.0	2.0	1.6	1.6	1.1	1.4	2.0	2.2	2.3	2.8
29-Jun	1.5	1.3	1.1	1.7	1.7	2.0	1.6	1.6	1.6	1.4	1.5	1.6	1.9	1.9	1.3	1.3	1.1	1.1	0.6	0.4	0.9	0.3	0.3	0.2	2.0
30-Jun	0.3	0.5	0.2	0.2	0.6	0.7	0.7	1.2	1.4	1.2	1.8	1.9	1.8	1.3	1.4	1.5	1.6	1.2	0.9	0.7	0.7	0.5	0.9	0.9	1.9
Diurnal Maximum																									



Maximum Value: 3.7 km/h on Jun 25 21:00		Maximum Daily Average: 1.9 km/h on Jun 26		Hours in Service: 720																						
Minimum Value: -1.4 km/h on Jun 11 09:00		Minimum Daily Average: -0.4 km/h on Jun 11		Hours of Data: 720																						
Maximum Diurnal Average: 0.4 km/h at hour 22		Minimum Diurnal Average: 0.1 km/h at hour 9		Hours of Missing Data: 0																						
Monthly Average: 0.23 km/h		Percentiles: P ₁ = -1.2 P ₁₀ = -0.4 Q ₁ = -0.2 Median = 0.1 Q ₃ = 0.5 P ₉₀ = 1.0 P ₉₉ = 2.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	-0.2	0.4	0.6	0.0	-0.3	-0.4	0.2	0.0	0.5	1.0	0.9	0.6	0.0	0.7	0.3	-0.1	-0.2	0.1	0.5	0.2	0.4	0.4	0.1	0.2	0.2	1.0
2-Jun	0.2	0.1	0.1	0.2	0.0	-0.1	0.1	-0.3	0.2	0.1	-0.3	-0.1	0.5	1.0	0.0	-0.1	-0.5	0.3	-0.3	0.0	-0.4	-0.3	-0.9	-0.9	-0.1	1.0
3-Jun	-0.2	-0.3	-1.3	-1.3	-0.3	-0.7	-0.3	-0.6	-0.5	-0.3	0.5	0.3	0.5	0.4	0.2	-0.9	0.3	-0.2	0.4	0.6	0.8	0.7	0.8	0.3	0.0	0.8
4-Jun	0.4	1.4	0.8	0.9	0.8	0.1	0.0	0.3	0.0	-0.5	-0.5	-0.3	0.0	-0.1	-0.4	-0.2	-0.1	0.2	-0.5	-0.4	-0.1	0.6	0.6	-0.2	0.1	1.4
5-Jun	0.1	-0.3	0.6	-0.2	0.0	-0.1	0.1	-0.3	-0.2	0.0	-0.1	-0.5	-0.2	0.2	0.3	0.3	0.0	0.3	0.3	0.2	0.1	0.4	0.1	0.1	0.0	0.6
6-Jun	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.4	0.3	0.1	0.3	0.3	0.0	-0.1	-0.1	-0.3	0.1	0.3	-0.3	0.0	0.0	-0.2	-0.2	-0.1	0.1	0.4
7-Jun	-0.2	-0.4	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3	1.3	0.1	0.4	-0.3	0.3	0.5	-0.1	0.8	0.1	-0.1	0.2	0.2	0.5	0.4	-0.3	0.1	1.3
8-Jun	-0.4	-0.6	-0.1	-0.2	-0.1	-0.5	-0.2	-0.2	0.0	-0.1	0.5	0.3	0.2	1.1	0.9	0.7	0.9	1.0	0.7	0.6	0.6	0.8	1.0	0.6	0.3	1.1
9-Jun	1.5	0.7	0.6	-0.1	-0.1	0.0	0.0	-0.2	-0.1	0.3	0.7	-0.5	0.1	-0.3	-0.1	0.7	0.5	0.2	-0.2	0.3	-0.2	-0.1	-0.2	-0.3	0.1	1.5
10-Jun	0.2	0.6	0.8	0.2	0.2	0.0	-0.1	-0.3	-0.5	0.7	0.3	1.7	1.2	0.9	-0.1	0.4	-0.4	-0.1	0.4	0.1	-0.8	0.0	0.4	0.4	0.3	1.7
11-Jun	-0.5	-0.5	-0.7	-1.2	-0.7	-0.6	-1.4	-1.2	-1.4	-1.2	-0.1	0.4	0.1	-0.6	-0.7	-0.8	0.0	0.1	-0.7	0.1	0.2	0.5	-0.2	0.4	-0.4	0.5
12-Jun	0.4	1.0	0.7	1.3	1.8	1.5	1.8	1.5	1.4	0.2	-0.4	2.5	1.7	2.4	0.7	0.6	1.1	1.0	1.7	0.8	1.5	0.1	-0.1	0.1	1.1	2.5
13-Jun	0.0	0.0	-0.1	-0.3	-0.2	0.3	0.3	0.5	-0.2	0.9	0.4	0.8	-0.8	0.1	-0.8	-0.3	-0.3	0.1	-0.1	0.2	0.0	0.2	0.2	0.2	0.0	0.9
14-Jun	-0.1	-0.3	0.4	0.5	-0.1	0.0	-0.7	0.0	0.2	0.4	0.0	-0.5	0.3	0.5	0.1	0.0	-0.1	0.6	0.1	0.3	0.1	0.3	-0.4	-0.3	0.1	0.6
15-Jun	-0.3	-0.3	-0.2	-0.2	0.2	0.3	0.1	0.6	0.2	-0.1	-0.2	0.0	0.6	-0.3	0.8	0.2	0.1	-0.2	0.2	-0.1	0.1	0.0	0.0	0.0	0.1	0.8
16-Jun	0.0	0.1	0.0	0.3	0.3	1.5	0.3	0.0	0.3	0.3	0.4	-0.2	0.7	1.0	0.3	0.2	0.5	0.0	0.2	0.1	0.0	0.2	0.5	2.3	0.4	2.3
17-Jun	3.3	2.1	2.6	1.4	0.7	0.4	-0.2	-0.5	-1.3	-0.8	0.6	-0.4	-0.4	-1.1	-0.9	-0.9	-0.7	-1.0	-0.7	0.0	-0.1	0.2	0.1	0.2	0.1	3.3
18-Jun	-0.1	0.7	0.2	0.3	0.0	0.2	0.5	0.5	0.5	0.3	0.2	0.0	1.0	0.6	-0.1	-0.2	0.6	0.0	-0.4	-0.8	-0.6	-0.3	-0.4	-0.5	0.1	1.0
19-Jun	-0.5	0.6	-0.4	-0.3	0.0	-0.4	-0.1	0.7	-0.1	0.8	0.3	0.0	-0.5	0.1	0.7	0.4	0.0	-0.2	-0.3	0.1	0.3	0.2	0.3	-0.1	0.1	0.8
20-Jun	0.7	-0.1	-0.2	1.1	0.8	1.9	1.0	0.7	1.0	0.4	0.5	-0.1	0.7	0.0	-0.3	-0.2	-0.3	0.5	2.2	2.4	0.9	2.3	1.9	0.1	0.7	2.4
21-Jun	0.8	0.6	0.5	-0.3	0.1	0.0	-0.3	-0.7	-0.7	-0.2	-0.5	-0.2	-0.4	-0.6	-0.4	-0.6	-0.7	0.8	-0.1	-0.7	-0.5	-0.1	0.3	-0.1	-0.2	0.8
22-Jun	-0.2	-0.3	0.1	0.5	0.0	-0.4	0.8	0.1	-0.3	0.0	-0.1	-0.3	-0.8	-0.5	-0.3	-0.3	-0.7	0.4	-0.1	0.0	0.0	0.1	-0.1	0.0	-0.1	0.8
23-Jun	0.1	0.0	0.1	0.0	0.1	0.0	-0.2	-0.1	0.0	-0.1	0.0	0.4	0.5	-0.2	0.1	0.6	-0.2	-0.3	-0.1	-0.3	0.0	0.0	-0.1	0.0	0.0	0.6
24-Jun	-0.2	0.3	0.7	0.6	0.8	0.4	0.3	0.4	0.8	-0.2	-0.5	-0.3	-0.1	-0.4	-1.1	0.1	-0.2	-0.2	0.4	0.1	0.1	0.5	0.0	0.3	0.1	0.8
25-Jun	0.5	0.2	0.1	0.0	0.1	0.1	0.1	0.4	0.4	0.7	0.5	-0.1	0.1	0.2	-0.2	0.9	0.3	0.5	1.3	2.7	3.7	2.4	0.8	0.2	0.7	3.7
26-Jun	0.0	0.2	1.0	2.3	2.7	2.6	2.9	2.4	2.0	1.8	2.5	2.9	3.3	2.7	2.1	2.7	1.8	1.9	2.4	1.2	1.0	1.1	0.9	1.3	1.9	3.3
27-Jun	1.3	1.7	1.4	1.4	1.5	1.2	0.7	0.4	-0.2	-0.1	0.4	1.1	1.0	0.2	0.4	0.0	0.6	1.1	0.5	0.2	-0.1	0.3	0.0	0.1	0.6	1.7
28-Jun	0.2	-0.1	-0.4	0.6	0.8	0.3	0.1	-0.1	-0.2	0.0	-0.2	-0.2	0.4	0.1	0.2	0.9	0.5	0.1	0.5	0.5	0.5	0.5	0.8	0.8	0.3	0.9
29-Jun	0.0	0.3	-0.4	0.6	0.7	1.1	0.6	0.4	0.0	-0.1	-0.2	1.0	0.7	0.0	0.0	0.0	-0.2	-0.2	0.3	0.2	-0.4	0.0	0.0	-0.2	0.2	1.1
30-Jun	0.0	0.1	0.2	0.6	0.3	0.1	0.0	0.6	0.4	0.3	0.8	0.3	0.2	0.3	0.0	0.7	0.7	0.6	0.4	0.3	0.1	0.0	-0.1	-0.1	0.3	0.8
																								Diurnal Average		
																								Diurnal Maximum		
																								0.2 3.3		
																								0.3 2.1		
																								0.3 2.6		
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																								0.3 2.7		
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																								0.1 2.0		
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																								0.4 2.4		
																								0.2 1.9		
																								0.1 2.3		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 100 m (VW100m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.0 km/h on Jun 9 11:00 Minimum Value: 0.2 km/h on Jun 22 23:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.1 Median = 1.7 Q ₃ = 2.5 P ₉₀ = 3.2 P ₉₉ = 4.5																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.8	0.8	1.1	0.8	0.9	1.3	1.5	1.7	1.5	1.8	1.7	1.6	1.0	1.4	1.3	1.1	1.7	1.6	1.1	0.6	0.6	0.8	0.6	0.8	1.8
2-Jun	0.4	0.3	0.4	0.5	0.6	0.5	0.4	0.5	1.3	1.2	1.7	1.9	2.0	3.0	1.8	3.1	3.6	2.2	2.1	2.2	2.1	2.1	2.2	3.2	3.6
3-Jun	3.2	3.5	2.8	2.5	2.5	2.9	2.8	2.1	2.3	2.5	2.9	2.9	3.2	3.3	2.3	1.8	1.2	1.4	1.0	0.6	0.7	0.9	1.0	1.2	3.5
4-Jun	1.8	1.7	1.6	1.4	1.1	0.7	0.7	1.1	1.4	1.1	0.7	0.6	1.3	1.2	1.3	1.5	1.8	1.4	2.0	3.2	1.2	1.8	1.9	2.1	3.2
5-Jun	1.8	1.7	2.9	1.6	1.4	1.8	1.9	1.8	1.6	1.4	1.5	1.7	2.1	2.7	2.4	2.6	2.0	1.7	1.3	0.9	1.7	1.5	0.5	0.3	2.9
6-Jun	0.4	0.3	0.5	0.6	0.5	0.4	0.8	1.0	0.8	1.3	1.2	1.6	2.2	2.4	1.8	1.9	1.7	1.1	0.5	0.2	1.2	1.5	1.3	1.0	2.4
7-Jun	0.8	0.9	0.5	0.7	0.7	0.4	0.5	1.0	1.2	2.0	2.2	1.8	2.1	2.7	3.0	1.7	2.4	1.6	1.8	1.9	1.7	2.0	2.1	1.6	3.0
8-Jun	1.1	1.4	0.9	0.5	0.5	0.5	0.4	0.8	0.6	1.0	1.5	2.1	2.2	2.7	2.9	2.7	2.4	2.1	1.7	1.2	1.0	0.9	1.4	1.1	2.9
9-Jun	1.2	1.6	1.4	0.7	0.7	1.7	3.6	3.3	3.8	4.5	5.0	4.6	5.0	4.7	4.4	4.5	4.6	4.5	3.9	4.0	3.3	2.3	1.6	1.5	5.0
10-Jun	1.6	1.8	2.0	2.1	1.8	1.7	2.2	2.2	2.5	3.2	3.2	3.3	3.5	3.1	2.8	1.7	0.6	0.8	1.4	1.5	2.2	2.1	2.2	1.6	3.5
11-Jun	0.9	0.9	1.5	1.7	1.7	2.5	3.3	4.3	4.0	4.0	4.3	4.2	4.6	4.0	3.6	3.5	3.0	3.1	2.5	2.2	0.9	1.1	1.5	1.2	4.6
12-Jun	0.9	1.7	1.9	2.0	2.1	2.0	1.9	1.7	2.2	2.4	2.2	3.7	4.0	3.4	3.8	2.6	2.5	1.9	1.9	1.6	1.3	1.3	1.2	1.2	4.0
13-Jun	1.0	0.9	0.5	0.7	0.8	1.3	1.3	1.5	1.1	1.9	1.5	1.9	2.0	2.6	1.9	2.2	2.0	1.9	2.5	2.3	1.5	1.6	2.6	2.1	2.6
14-Jun	2.6	2.8	2.5	3.2	3.5	3.8	4.0	3.8	3.6	3.0	2.7	3.5	3.0	3.3	3.3	2.7	2.7	2.5	1.7	2.1	2.4	2.2	1.7	2.2	4.0
15-Jun	1.7	1.4	0.9	1.1	1.1	1.5	1.2	1.5	1.5	1.5	1.7	1.8	2.2	1.4	1.3	0.8	1.0	0.8	1.5	1.0	1.6	1.3	1.3	0.4	2.2
16-Jun	0.5	0.7	1.5	1.8	1.6	1.7	1.2	1.1	1.5	1.2	1.2	1.7	1.5	2.9	2.4	2.3	1.7	2.1	2.3	1.4	0.5	0.8	1.5	2.1	2.9
17-Jun	2.6	2.3	1.6	1.7	1.8	1.0	0.9	2.0	2.2	2.8	2.5	1.8	3.5	3.9	3.8	3.5	3.7	3.0	1.9	0.9	0.5	0.4	0.7	0.7	3.9
18-Jun	0.9	0.9	1.0	0.9	0.9	1.5	1.6	1.3	1.7	1.8	2.9	3.2	3.1	3.1	3.4	2.8	2.5	2.2	2.0	2.2	2.4	1.7	1.4	1.6	3.4
19-Jun	1.1	1.9	1.7	1.4	1.7	1.7	1.5	1.7	2.2	2.3	2.9	2.7	2.9	3.2	3.0	2.9	2.7	2.2	1.2	1.2	0.9	0.8	1.0	1.5	3.2
20-Jun	1.0	1.5	1.2	1.3	1.2	1.6	1.4	1.3	1.0	1.2	1.3	2.3	3.0	2.6	2.4	1.9	1.8	2.4	3.1	2.7	1.9	1.5	2.0	1.9	3.1
21-Jun	1.9	2.4	1.9	2.4	3.1	3.8	3.9	3.5	3.4	3.1	2.9	2.9	3.1	3.5	3.7	3.8	3.4	3.0	2.9	2.8	2.5	1.8	3.1	3.6	3.9
22-Jun	3.6	3.8	3.5	4.0	4.0	3.7	3.5	2.9	2.9	3.2	3.7	3.3	3.4	3.5	3.1	3.2	2.7	2.8	2.0	2.0	1.0	0.6	0.2	0.4	4.0
23-Jun	0.7	0.7	0.6	0.7	0.4	0.5	0.6	1.4	1.8	2.8	2.7	3.4	3.0	2.9	2.3	2.9	2.4	1.5	1.1	0.6	0.4	0.4	0.6	0.5	3.4
24-Jun	0.7	0.8	0.5	0.7	1.0	0.9	1.4	1.7	2.4	2.5	2.3	2.8	2.7	2.8	2.8	3.2	2.5	2.2	2.3	1.4	0.7	0.7	1.6	1.9	3.2
25-Jun	1.8	1.0	0.8	0.4	0.3	0.2	0.5	0.8	1.4	1.8	1.7	2.0	2.7	2.9	2.5	2.5	2.5	2.1	2.1	2.0	2.4	3.0	2.4	1.5	3.0
26-Jun	1.7	2.4	2.3	2.1	2.5	2.6	2.6	2.7	2.7	2.7	2.8	3.3	3.2	3.4	2.9	2.8	2.7	2.9	1.8	1.3	2.2	2.4	1.8	1.1	3.4
27-Jun	1.0	1.2	1.4	1.7	2.3	2.3	2.5	1.8	1.9	2.2	2.1	1.7	1.3	1.0	1.1	1.2	1.0	1.5	1.4	1.0	0.6	1.1	0.7	0.6	2.5
28-Jun	0.6	0.5	0.8	0.8	1.0	0.7	0.7	0.8	2.1	2.7	2.8	2.3	3.0	2.7	2.5	2.7	2.5	1.7	1.3	1.3	1.2	1.8	2.4	2.2	3.0
29-Jun	1.8	1.3	1.4	1.4	1.5	1.5	1.0	1.2	1.3	0.9	1.4	2.1	2.9	2.5	1.7	1.1	0.9	1.3	1.1	0.7	1.1	0.3	0.3	0.4	2.9
30-Jun	0.5	0.7	0.3	0.7	0.5	1.0	0.7	0.9	1.3	1.2	1.3	0.9	0.9	1.2	1.3	1.6	1.7	1.3	1.2	0.8	0.8	0.5	1.3	1.2	1.7
3.6 3.8 3.5 4.0 4.0 3.8 4.0 4.3 4.0 4.5 5.0 4.6 5.0 4.7 4.4 4.5 4.6 4.5 3.9 4.0 3.3 3.0 3.1 3.6																									
Diurnal Maximum																									



Maximum Value: 4.4 km/h on Jun 25 21:00	Maximum Daily Average: 1.9 km/h on Jun 26	Hours in Service: 720
Minimum Value: -1.3 km/h on Jun 17 15:00	Minimum Daily Average: -0.2 km/h on Jun 11	Hours of Data: 718
Maximum Diurnal Average: 0.8 km/h at hour 22	Minimum Diurnal Average: 0.2 km/h at hour 9	Hours of Missing Data: 2
Monthly Average: 0.48 km/h	Percentiles: P ₁ = -1.1 P ₁₀ = -0.3 Q ₁ = 0.0 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.5 P ₉₉ = 2.6	Hours of Calibration: 0
		Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	-0.3	0.5	0.3	0.3	0.1	-0.5	0.2	0.1	0.6	1.3	1.4	1.2	0.4	0.6	-0.1	-0.4	-0.5	0.1	0.8	0.4	0.5	0.5	0.4	0.8	0.4	1.4																						
2-Jun	0.5	0.4	0.3	0.2	0.7	0.3	0.0	-0.1	0.2	0.1	-0.3	0.0	0.6	1.3	0.5	0.2	0.0	1.5	0.4	0.6	-0.1	0.1	-0.5	-0.7	0.2	1.5																						
3-Jun	-0.2	0.1	-0.9	-1.1	0.1	-0.4	0.0	-0.3	-0.3	0.3	1.3	0.4	1.0	0.5	0.2	-1.1	0.4	-0.2	0.2	0.5	1.0	1.5	1.4	1.1	0.2	1.5																						
4-Jun	1.6	2.1	0.6	1.2	0.8	0.1	0.0	0.5	0.1	-0.4	-0.3	0.1	-0.3	-0.6	-0.2	-0.1	0.4	-0.2	-0.1	0.4	1.2	1.3	-0.1	-0.1	0.3	2.1																						
5-Jun	0.3	0.1	1.8	0.3	0.2	0.2	0.2	0.2	-0.1	0.2	0.2	0.1	-0.3	-0.2	0.4	0.0	0.4	-0.1	0.1	0.6	0.2	0.9	1.1	0.6	0.3	0.3	1.8																					
6-Jun	0.2	0.2	0.0	0.1	0.1	0.3	0.2	0.3	0.0	0.3	0.1	0.2	0.0	0.1	0.3	-0.1	0.5	0.5	-0.1	0.1	0.6	0.4	-0.1	0.1	0.2	0.6																						
7-Jun	0.0	-0.2	-0.1	0.0	-0.1	-0.1	0.1	0.0	-0.1	1.5	0.5	0.6	-0.5	0.7	0.6	-0.1	1.3	0.4	0.3	1.0	1.2	1.7	1.6	0.2	0.4	1.7																						
8-Jun	0.0	-0.1	0.3	0.2	0.4	0.3	0.4	0.2	0.5	0.6	0.2	-0.2	-0.3	1.0	1.1	0.4	0.6	0.8	0.7	1.1	1.3	1.5	1.6	0.8	0.6	1.6																						
9-Jun	1.8	2.3	1.5	0.2	0.2	0.4	0.6	-0.1	0.3	0.8	1.0	-0.8	0.5	-0.2	0.3	0.8	0.7	0.3	0.3	0.8	0.3	0.6	0.8	1.2	0.6	2.3																						
10-Jun	1.7	2.8	2.6	0.6	0.4	0.2	0.4	-0.2	-0.6	0.8	0.5	2.0	1.9	0.9	0.1	0.3	-0.5	0.2	0.8	0.1	-0.5	0.2	0.4	0.6	0.7	2.8																						
11-Jun	-0.3	-0.4	-0.5	-1.1	-0.9	-0.7	-1.2	-1.1	-1.2	-1.0	0.2	1.0	0.5	-0.8	-0.5	-0.5	0.3	0.4	-0.7	0.3	0.8	1.2	0.8	1.1	-0.2	1.2																						
12-Jun	1.0	1.0	0.7	1.1	1.3	0.8	1.6	1.9	1.1	-0.1	-0.3	2.5	1.4	2.6	1.1	0.8	1.8	1.0	1.6	0.7	1.4	0.5	0.1	0.3	1.1	2.6																						
13-Jun	0.2	0.0	0.0	0.1	0.0	0.2	0.1	0.1	-0.4	0.7	0.4	0.8	-1.1	0.5	-1.0	-0.6	-0.2	0.4	0.2	0.4	0.4	0.6	0.8	0.5	0.1	0.8																						
14-Jun	0.1	0.1	0.8	0.5	0.3	0.3	-0.1	0.3	0.0	0.9	0.4	0.0	0.6	1.0	0.2	-0.1	0.3	1.1	0.2	0.4	0.3	0.6	0.8	0.2	0.4	1.1																						
15-Jun	0.1	0.1	0.0	0.2	0.7	0.8	0.7	0.7	0.3	-0.2	-0.6	0.0	1.1	0.1	1.2	0.2	0.0	0.1	0.8	0.3	0.6	0.4	0.9	0.7	0.4	1.2																						
16-Jun	0.4	1.0	0.6	1.0	0.8	2.2	0.7	-0.1	0.1	0.2	0.5	-0.2	0.8	1.7	0.7	0.6	1.0	0.3	0.8	0.3	0.4	0.6	0.9	2.3	0.7	2.3																						
17-Jun	3.2	2.5	2.9	1.3	0.5	0.7	-0.2	0.0	-1.0	-0.6	1.3	-0.4	0.2	-0.8	-1.3	-0.4	-0.2	-1.0	-0.8	0.2	-0.1	0.3	0.7	0.4	0.3	3.2																						
18-Jun	0.0	0.3	0.7	0.5	0.7	1.0	1.2	0.7	0.2	0.1	0.4	0.3	1.7	1.4	0.2	0.5	0.9	0.5	-0.5	-0.6	-0.1	0.1	-0.1	-0.3	0.4	1.7																						
19-Jun	-0.1	1.4	-0.3	-0.1	0.6	-0.2	0.0	0.5	-0.3	0.8	0.4	0.2	-0.4	-0.1	1.0	0.6	0.2	-0.1	-0.4	0.3	0.4	0.5	1.4	1.1	0.3	1.4																						
20-Jun	0.4	0.3	0.1	0.6	0.6	0.9	0.7	0.8	1.4	0.7	0.7	0.6	2.2	2.1	1.5	0.7	-0.4	0.0	2.0	2.6	1.2	2.7	2.2	1.2	1.1	2.7																						
21-Jun	2.3	1.5	1.0	0.1	0.6	0.7	0.7	0.3	0.1	0.6	0.4	0.6	0.3	0.2	0.5	0.1	-0.4	1.7	0.5	-0.3	-0.1	0.5	0.3	0.4	0.5	2.3																						
22-Jun	0.3	0.2	0.3	1.0	0.6	0.2	1.2	0.2	-0.1	0.0	0.0	-0.1	-0.6	-0.7	-0.2	-0.4	-0.6	0.5	-0.1	0.6	0.3	0.2	0.1	-0.1	0.1	1.2																						
23-Jun	0.0	0.1	0.4	-0.1	-0.2	0.0	0.2	-0.2	-0.1	-0.2	0.5	0.6	0.7	-0.7	0.5	0.6	-0.1	-0.3	-0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.7																						
24-Jun	-0.1	0.7	0.2	0.5	0.4	0.5	0.1	0.3	0.5	0.0	-0.1	-0.2	0.3	-0.4	-1.3	0.1	-0.2	0.0	0.4	0.2	0.4	1.1	0.5	1.5	0.2	1.5																						
25-Jun	1.6	0.9	0.3	0.2	0.4	0.1	0.3	0.1	0.5	0.4	0.1	-0.5	-0.4	0.7	0.2	1.2	0.5	0.7	1.5	3.4	4.4	2.4	0.6	-0.1	0.8	4.4																						
26-Jun	-0.2	-0.5	0.8	1.9	2.3	2.3	2.6	2.1	1.9	2.1	2.7	3.2	3.4	2.6	1.8	2.4	1.8	2.0	2.3	1.5	1.9	2.1	1.3	1.4	1.9	3.4																						
27-Jun	1.6	1.9	1.7	1.5	1.6	1.8	1.2	0.9	0.9	0.8	1.0	1.7	1.4	0.4	0.4	0.0	0.7	1.4	1.3	0.7	0.1	0.8	0.1	0.3	1.0	1.9																						
28-Jun	0.4	0.2	-0.1	0.9	0.9	0.8	0.4	0.0	0.2	0.3	0.4	0.2	0.6	0.2	0.4	0.8	0.4	-0.2	0.3	1.3	1.5	1.0	0.4	0.4	0.5	1.5																						
29-Jun	0.1	0.7	0.3	0.2	0.2	0.6	0.4	0.0	0.0	-0.1	-0.4	1.1	0.9	0.1	0.4	0.1	-0.2	-0.4	0.2	0.6	-0.3	0.0	0.2	0.0	0.2	1.1																						
30-Jun	0.3	0.6	0.2	0.6	0.3	0.3	0.1	0.8	0.0	0.5	0.7	0.2	0.4	0.1	0.1	1.0	1.0	0.9	0.5	0.4	0.2	0.1	0.3	0.0	0.4	1.0																						
																								0.6	0.7	0.5	0.4	0.5	0.5	0.4	0.3	0.2	0.4	0.4	0.5	0.6	0.5	0.3	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.6	0.5	Diurnal Average
																								3.2	2.8	2.9	1.9	2.3	2.3	2.6	2.1	1.9	2.1	2.7	3.2	3.4	2.6	1.8	2.4	1.8	2.0	2.3	3.4	4.4	2.7	2.2	2.3	Diurnal Maximum

UO - Unstable Operation



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 167 m (VW167m) - km/h
Lower Camp Met Tower - June 2017

Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0	Hours in Service: 720
Maximum Value: 13.8 km/h on Jun 2 18:00	Hours of Data: 718
Minimum Value: 0.2 km/h on Jun 22 23:00	Hours of Missing Data: 2
Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.8 Q ₃ = 2.7 P ₉₀ = 3.5 P ₉₉ = 5.0	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	1.1	0.8	0.7	0.7	0.9	1.6	1.2	1.2	1.1	1.5	1.6	1.4	1.0	1.6	1.3	1.0	1.6	2.1	1.3	0.8	0.6	0.7	0.7	1.0	2.1
2-Jun	0.5	0.4	0.3	0.6	0.5	0.5	0.2	0.3	1.1	1.0	1.4	1.9	2.6	3.4	2.3	3.1	4.0	13.8	2.5	2.1	2.2	2.2	2.5	3.2	13.8
3-Jun	3.0	3.5	2.8	2.4	2.1	2.4	2.7	2.0	2.6	3.0	3.4	3.1	3.9	3.6	2.4	2.1	1.2	1.5	1.3	0.9	0.6	1.1	1.5	1.6	3.9
4-Jun	1.6	1.9	1.9	1.3	1.0	0.6	0.5	1.1	1.4	1.4	0.7	0.8	1.2	1.3	1.2	1.5	1.9	1.5	1.9	2.5	1.2	1.5	2.0	2.5	2.5
5-Jun	2.3	1.5	2.6	1.7	1.5	1.5	2.1	1.8	1.9	1.7	1.6	1.8	2.0	3.2	2.7	2.9	1.8	1.9	1.7	0.9	1.6	1.9	0.7	0.4	3.2
6-Jun	0.4	0.5	0.5	0.6	0.6	0.4	0.5	0.7	0.7	1.1	1.2	1.8	2.3	2.7	1.8	1.9	1.8	1.2	0.7	0.3	1.2	2.0	1.7	1.3	2.7
7-Jun	1.0	1.2	0.5	0.8	0.8	0.5	0.5	0.7	0.9	2.2	2.7	2.1	2.4	3.2	3.3	1.9	2.6	1.4	1.8	1.9	1.2	1.0	2.3	2.0	3.3
8-Jun	1.7	1.5	1.3	0.7	1.0	0.4	0.7	1.2	0.9	0.8	1.5	1.8	2.8	3.6	3.7	3.1	2.9	2.6	2.1	1.2	0.9	0.9	1.5	1.4	3.7
9-Jun	2.0	1.9	1.8	0.7	0.8	1.8	4.0	3.7	4.3	5.0	5.4	5.0	5.8	5.3	5.2	4.9	4.9	4.7	4.2	3.6	3.0	1.8	0.8	0.8	5.8
10-Jun	0.7	1.1	1.7	2.7	1.7	1.3	2.4	2.6	2.7	3.6	3.5	3.7	4.0	3.4	3.2	1.9	0.6	0.5	1.4	1.4	1.9	2.3	2.3	1.7	4.0
11-Jun	0.9	0.8	1.0	1.6	2.1	2.6	3.5	4.4	4.1	4.4	4.8	5.1	5.3	4.6	4.1	4.2	3.4	3.4	2.7	2.2	0.7	0.8	1.5	1.1	5.3
12-Jun	1.0	1.6	2.1	2.0	2.1	2.6	2.4	2.0	2.1	1.8	1.7	4.1	3.9	3.7	5.1	3.6	3.4	2.2	1.8	1.4	1.5	1.8	1.3	1.4	5.1
13-Jun	1.2	1.2	0.8	0.6	0.8	0.9	1.2	0.7	0.8	1.9	1.5	2.2	2.0	3.0	1.8	2.4	2.7	2.4	2.6	2.7	1.7	1.6	2.6	2.0	3.0
14-Jun	2.8	3.4	3.3	3.5	3.6	4.1	4.1	4.4	3.9	3.3	2.8	3.1	3.4	3.6	3.6	3.0	2.9	2.6	1.7	2.3	2.6	UO	UO	1.4	4.4
15-Jun	1.7	1.1	1.1	1.2	1.1	0.9	1.5	1.5	1.5	1.4	1.3	1.9	2.3	1.4	1.6	0.7	1.0	1.0	1.5	1.3	1.5	1.3	1.4	0.5	2.3
16-Jun	0.8	1.1	1.1	1.7	1.7	1.6	1.4	1.2	1.5	1.3	0.9	1.6	1.9	2.9	2.4	2.5	1.3	2.3	2.2	1.8	0.8	0.8	1.4	2.2	2.9
17-Jun	2.7	2.5	2.0	1.7	1.5	0.7	1.0	2.2	2.2	3.0	3.3	2.4	4.1	4.4	4.3	4.1	4.1	3.0	1.9	1.0	0.5	0.4	0.7	0.8	4.4
18-Jun	1.3	0.9	1.3	1.0	0.9	1.4	1.6	1.1	1.3	1.9	3.0	3.1	3.3	2.9	3.2	2.7	2.0	1.8	1.8	1.9	2.2	1.8	1.5	2.0	3.3
19-Jun	1.4	2.3	2.1	1.6	1.5	1.8	1.6	1.8	2.3	2.3	2.8	3.0	3.3	3.3	3.6	3.3	2.8	2.3	1.6	1.3	0.9	0.7	0.9	1.7	3.6
20-Jun	0.8	1.0	1.7	1.0	1.1	1.0	0.8	1.0	1.0	1.4	1.7	1.8	3.0	2.2	2.2	1.5	1.3	2.2	3.2	2.8	1.7	1.8	2.1	2.0	3.2
21-Jun	2.1	2.7	2.2	2.2	3.0	3.9	3.6	3.4	3.2	3.1	3.0	3.2	2.9	3.3	3.7	3.6	3.4	3.1	3.1	2.3	1.8	1.9	3.3	3.4	3.9
22-Jun	3.5	3.5	3.4	4.1	4.2	3.8	3.5	2.8	3.1	3.7	4.4	4.0	4.1	3.9	3.6	3.6	3.1	3.4	2.4	2.1	0.9	0.6	0.2	0.4	4.4
23-Jun	0.4	0.5	0.8	0.6	0.5	0.4	0.5	1.2	1.9	2.8	3.3	3.8	3.7	3.4	2.5	3.1	2.9	1.8	1.3	0.9	0.4	0.5	0.4	0.5	3.8
24-Jun	0.6	0.9	0.3	0.5	0.5	0.5	1.1	1.9	2.4	2.7	2.7	3.4	3.4	3.1	3.3	3.8	3.0	2.6	2.7	1.5	0.5	0.4	0.7	1.8	3.8
25-Jun	2.2	1.9	1.1	0.4	0.6	0.3	0.4	0.6	1.2	1.8	1.8	2.0	3.0	3.3	2.5	2.8	2.5	2.3	2.4	2.2	3.1	3.4	1.9	1.0	3.4
26-Jun	1.1	1.2	1.3	2.5	2.9	3.0	3.1	2.9	2.9	3.1	3.1	3.6	3.7	3.9	3.4	3.4	2.8	3.4	2.2	1.3	2.0	2.4	2.2	1.8	3.9
27-Jun	1.2	1.8	1.5	1.7	2.3	2.3	2.3	1.7	1.5	1.9	2.4	1.6	1.2	0.9	1.0	1.3	0.8	1.1	1.2	1.2	0.8	1.3	0.8	0.6	2.4
28-Jun	0.7	0.5	0.6	0.6	0.5	0.5	0.5	0.7	2.0	2.6	2.8	2.4	3.5	2.8	2.9	3.1	2.7	1.9	1.3	1.1	0.9	1.1	1.4	1.7	3.5
29-Jun	1.4	1.0	1.3	0.8	0.9	1.2	0.8	0.7	0.9	0.8	1.3	2.1	3.1	3.4	2.1	1.4	0.9	1.2	1.2	0.7	1.2	0.3	0.3	0.4	3.4
30-Jun	0.4	0.6	0.2	0.6	0.5	1.0	0.6	1.1	0.9	1.1	1.1	0.6	0.8	1.1	1.5	1.6	1.4	1.2	1.1	0.9	1.0	0.6	1.1	1.4	1.6

3.5	3.5	3.4	4.1	4.2	4.1	4.1	4.4	4.3	5.0	5.4	5.1	5.8	5.3	5.2	4.9	4.9	13.8	4.2	3.6	3.1	3.4	3.3	3.4	
Diurnal Maximum																								

UO - Unstable Operation



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100	46	0	8	0
H2S (ppb) Average	684	35	36	99.86	2	0	0	0
THC (ppm) Average	662	32	58	96.39	3.5	-	2.6	-
Temperature (C) Average	720	0	0	100	27.6	-	21.8	-
Relative Humidity (%) Average	720	0	0	100	98	-	90	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	33	-	21	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	1.4	5	-	0	0	0	0	1	3	46
H2S (ppb) Average	684	0.3	0	-	0	0	0	0	0	1	2
THC (ppm) Average	662	2.35	0.2	-	2.1	2.2	2.2	2.3	2.4	2.6	3.5
Temperature 2 m (C) Average	720	16	4.6	-	5.7	10.4	12.7	15.6	19.2	22.3	27.6
Relative Humidity (%) Average	720	65.3	20	-	22	35	49	67	83	92	98
Wind Speed 10 m (km/h) Average	719	10	6	-	0	3	6	8	13	19	33
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	22 Jun 2017 10:00	22 Jun 2017 10:00	1	Maintenance - sample manifold cleaning
THC	01 Jun 2017 01:00	02 Jun 2017 02:00	26	Unstable Operation - station temperature fluctuations
Wind Speed, Wind Direction	23 Jun 2017 21:00	23 Jun 2017 21:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

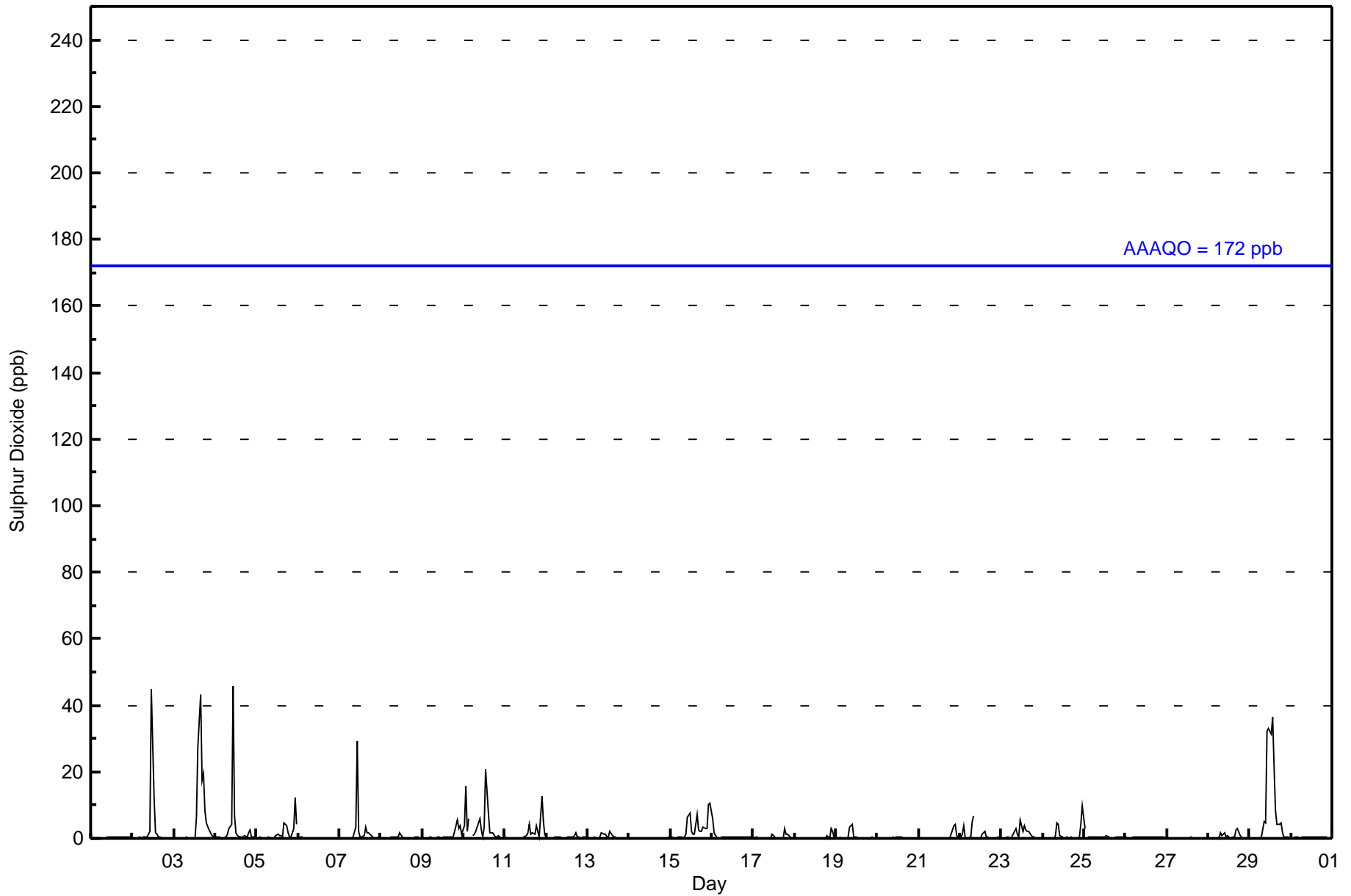
Buffalo Viewpoint - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 46 ppb on Jun 4 11:00	Maximum Daily Average: 8.2 ppb on Jun 29		Hours of Data:	687
Minimum Value: 0 ppb on Jun 18 06:00	Minimum Daily Average: 0.1 ppb on Jun 27		Hours of Missing Data:	33
Maximum Diurnal Average: 4.3 ppb at hour 11	Minimum Diurnal Average: 0.2 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 1.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 31		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
2-Jun	0	0	Z	0	0	0	0	0	1	1	2	45	12	2	1	0	0	0	0	0	0	0	0	0	2.9	45
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	6	27	43	17	20	8	5	3	2	1	1	5.8	43	
4-Jun	1	0	0	0	Z	0	1	1	3	4	46	7	1	1	1	1	0	1	0	2	3	1	0	3.2	46	
5-Jun	0	0	1	0	0	Z	0	0	0	0	0	1	1	1	1	0	5	4	2	0	3	12	4	1.6	12	
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
7-Jun	0	Z	0	0	0	0	0	0	0	3	29	2	0	0	1	3	2	2	1	1	0	0	1	2.0	29	
8-Jun	0	0	Z	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	5	3	4	1	0.8	5
10-Jun	4	16	2	6	Z	1	1	2	4	6	2	1	3	21	8	2	2	2	1	0	1	0	0	3.7	21	
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	1	2	4	1	2	1	4	2	0	13	5	1	1.7	13	
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	0	0	0	1	0	0	0.4	2	
13-Jun	0	Z	0	0	0	0	0	0	2	1	1	0	0	2	1	0	0	0	0	0	0	0	0	0.4	2	
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
15-Jun	0	0	0	Z	0	0	0	0	0	1	6	8	2	1	1	7	3	2	2	3	3	3	10	11	2.9	11
16-Jun	6	2	1	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6	
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	3	1	1	0	0	0.4	3	
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	2	0	0.4	3
19-Jun	0	Z	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4	
20-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	4	1	0	0.5	4
22-Jun	0	1	4	1	Z	1	1	5	7	C	C	C	0	1	2	0	0	0	0	0	0	0	0	1.2	7	
23-Jun	0	0	0	0	0	Z	0	1	3	1	1	6	2	4	2	2	2	1	0	0	0	0	0	1.2	6	
24-Jun	Z	0	0	0	0	0	0	1	5	4	1	0	0	0	0	0	0	0	0	0	1	4	10	1.2	10	
25-Jun	3	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	3	
26-Jun	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1	
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Jun	0	0	0	0	Z	1	0	2	1	2	0	1	1	0	0	2	3	1	0	0	0	0	0	0.6	3	
29-Jun	0	0	0	0	0	Z	0	0	5	5	32	33	31	36	22	9	4	4	5	2	0	0	0	8.2	36	
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	

0.7	0.9	0.4	0.4	0.2	0.2	0.3	0.6	1.2	1.3	4.3	3.8	2.0	2.7	2.5	2.4	1.5	1.5	1.0	0.8	0.8	1.2	1.5	1.1	Diurnal Average
6	16	4	6	0	1	1	5	7	6	46	45	31	36	27	43	17	20	8	5	5	13	12	11	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	669	97.38	97.38
11 - 20	7	1.02	98.40
21 - 60	11	1.60	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	90	74	23	21	14	21	41	94	51	23	25	20	49	46	37	39	668
11 - 20	1	1	0	0	3	1	0	1	0	0	0	0	0	0	0	0	7
21 - 60	0	1	2	0	0	0	0	0	0	0	0	0	3	2	3	0	11
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	91	76	25	21	17	22	41	95	51	23	25	20	52	48	40	39	686

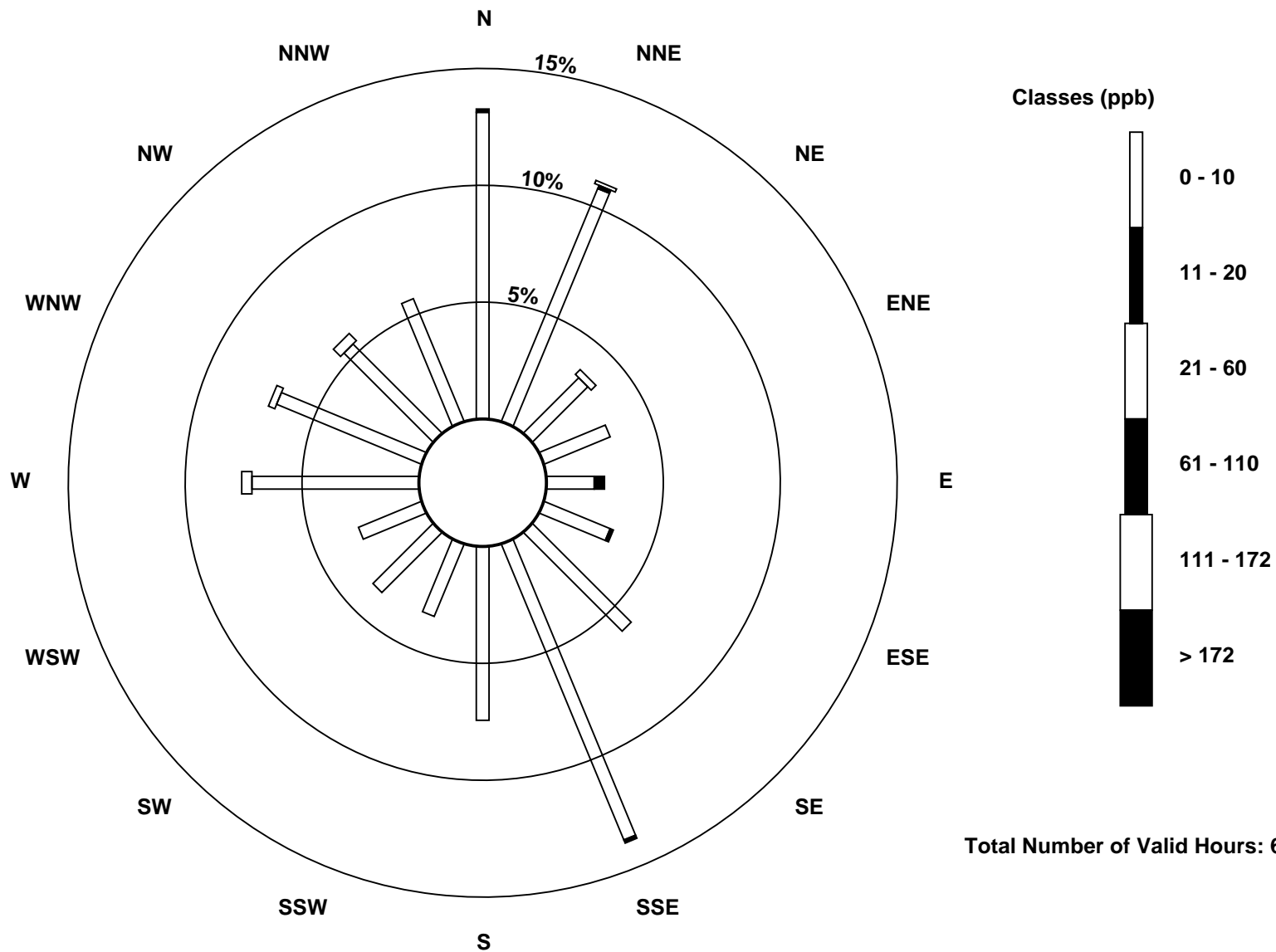
Total Number of Valid Hours: 686

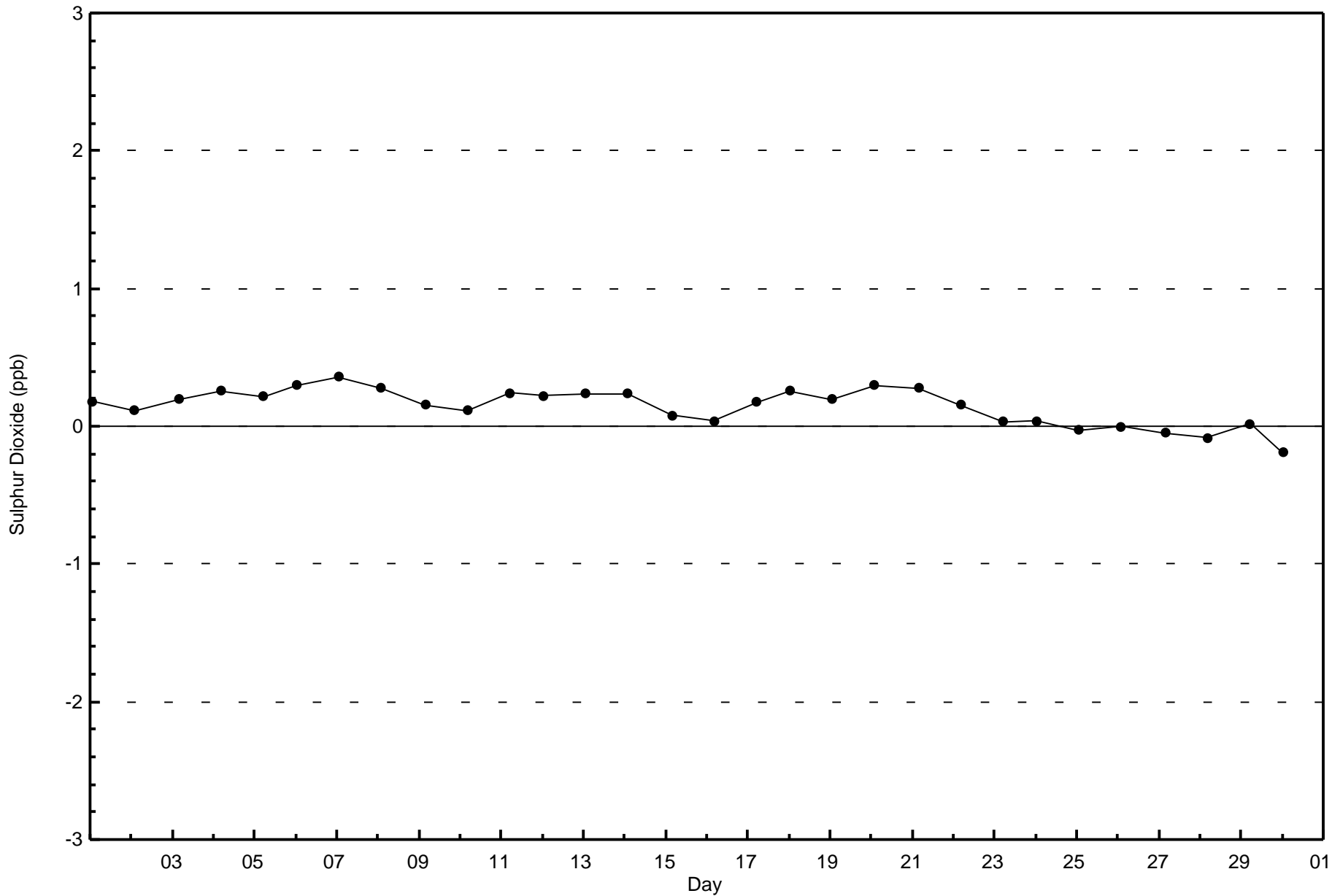
Total Number of Hours: 720

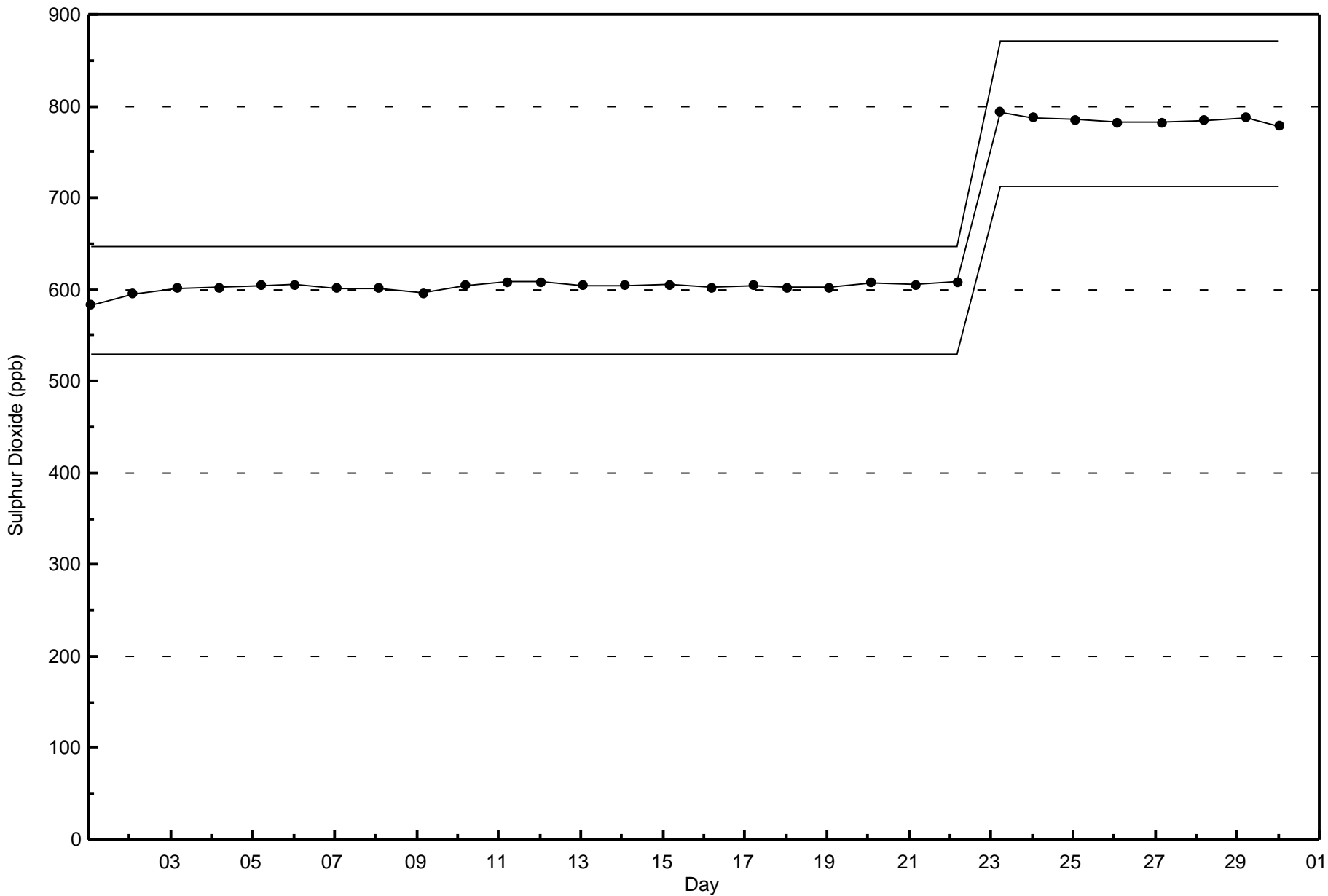


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint (AMS 4)









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Buffalo Viewpoint - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 12 17:00	Maximum Daily Average: 0.5 ppb on Jun 2		Hours of Data:	684
Minimum Value: 0 ppb on Jun 17 01:00	Minimum Daily Average: 0.1 ppb on Jun 17		Hours of Missing Data:	36
Maximum Diurnal Average: 0.4 ppb at hour 5	Minimum Diurnal Average: 0.2 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
4-Jun	0	0	0	0	1	Z	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.4	1
5-Jun	0	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
6-Jun	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Jun	0	0	Z	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Jun	0	0	0	Z	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jun	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2	1
12-Jun	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0.3	2
13-Jun	0	0	Z	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0.4	1
16-Jun	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Jun	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	0	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1	
23-Jun	0	0	0	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Jun	0	Z	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1	
25-Jun	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jun	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

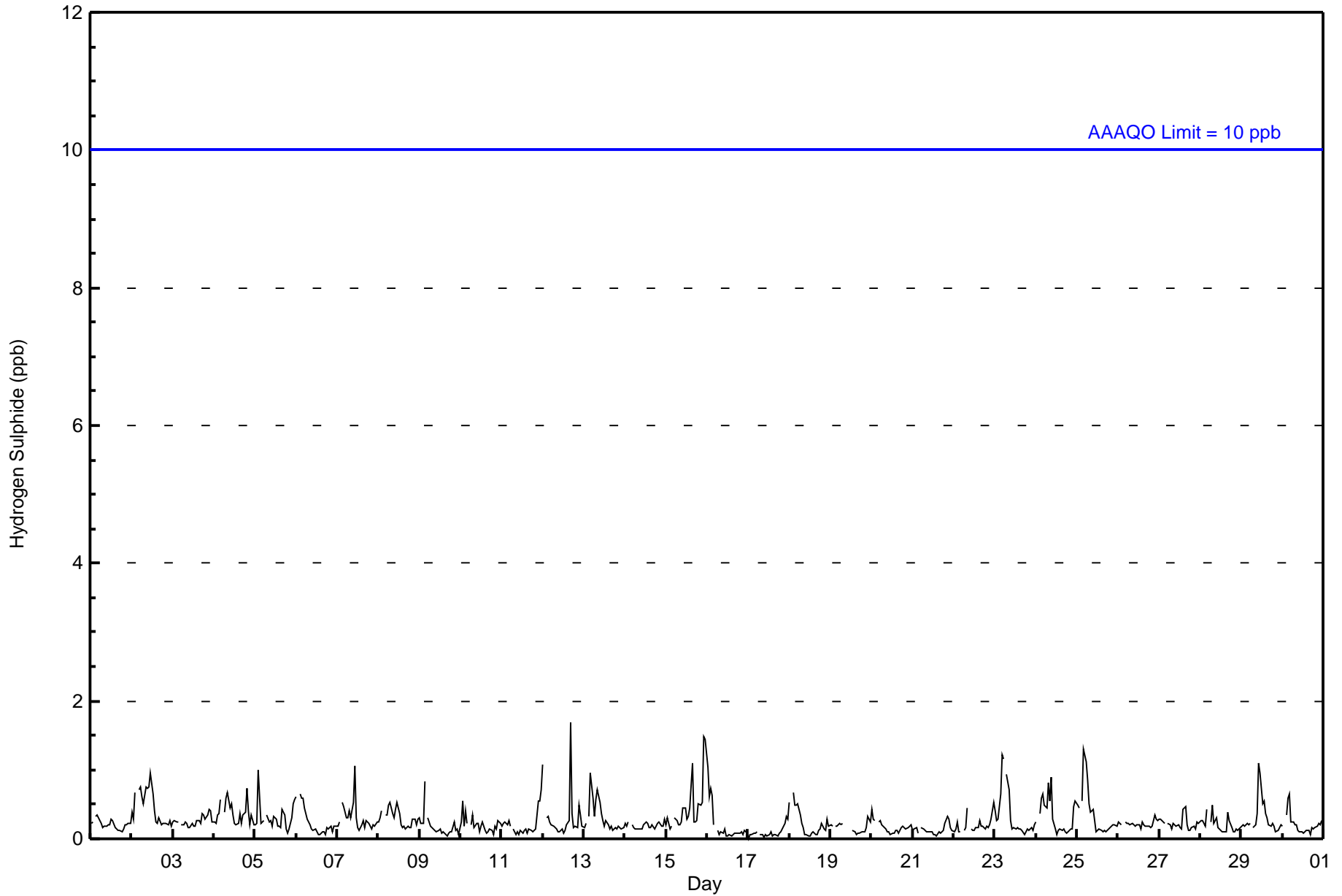
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	2	0	0	1	0	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	93	76	25	21	17	21	40	98	50	25	24	19	52	45	36	41	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	93	76	25	21	17	21	40	98	50	25	24	19	52	45	36	41	683

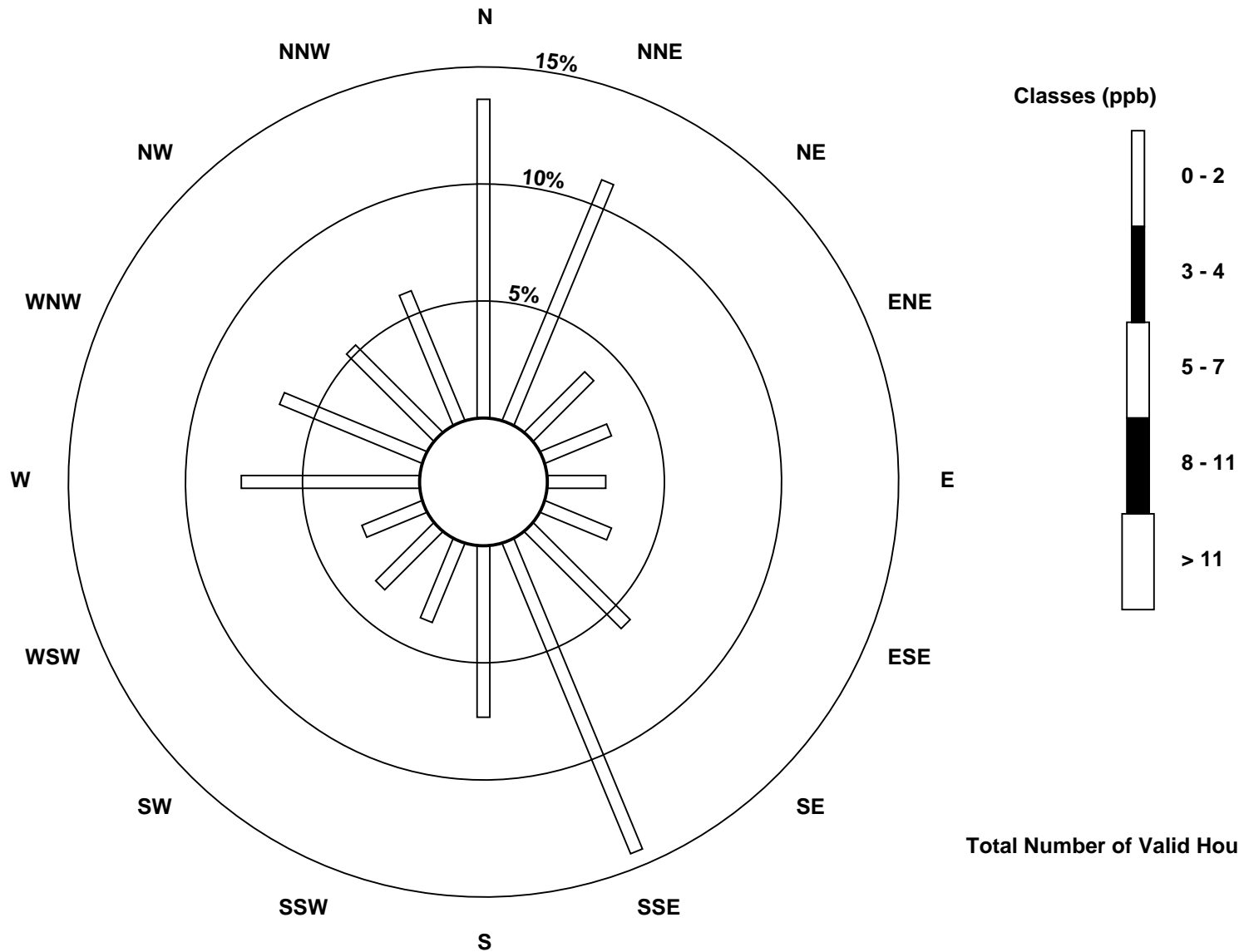
Total Number of Valid Hours: 683

Total Number of Hours: 720

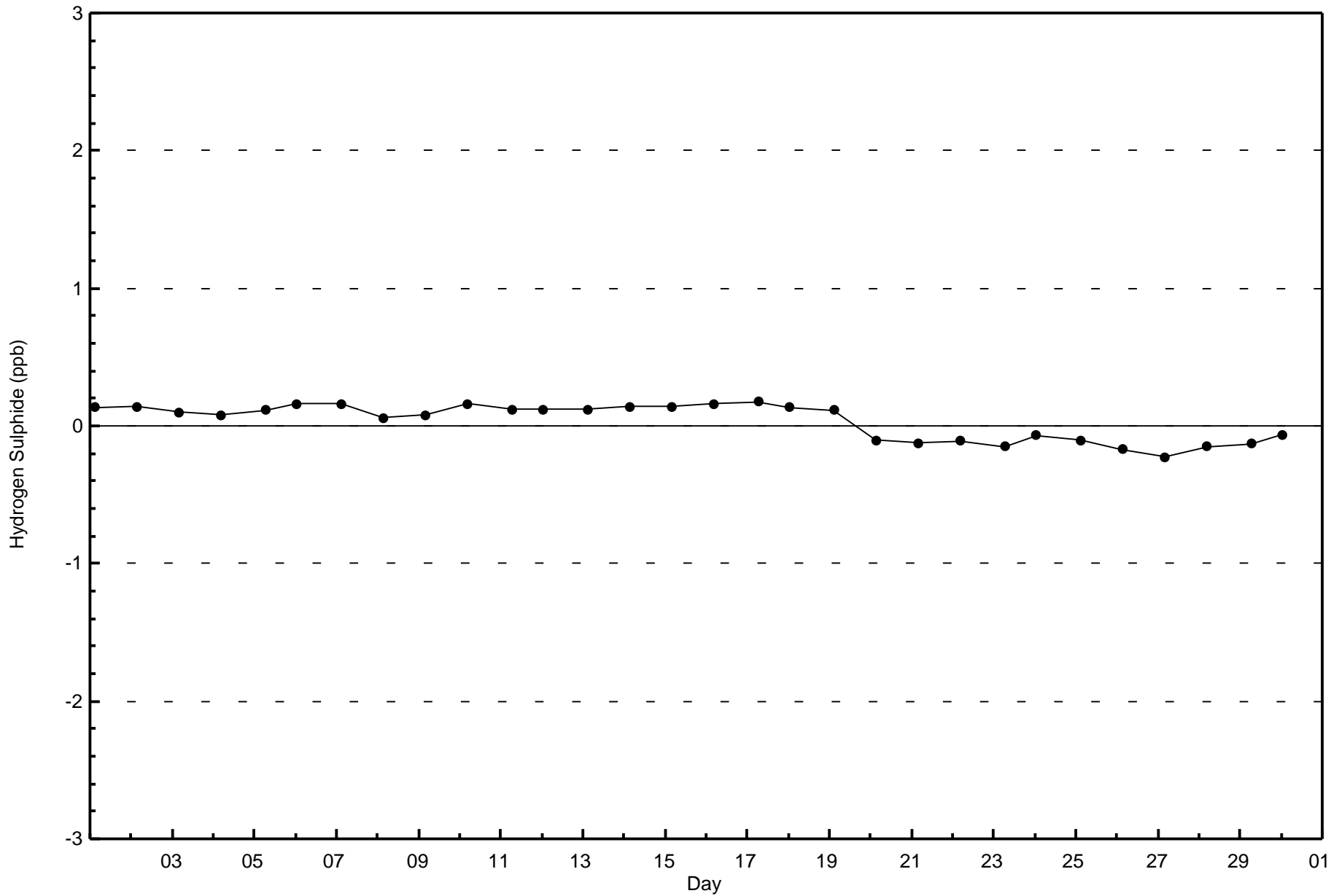


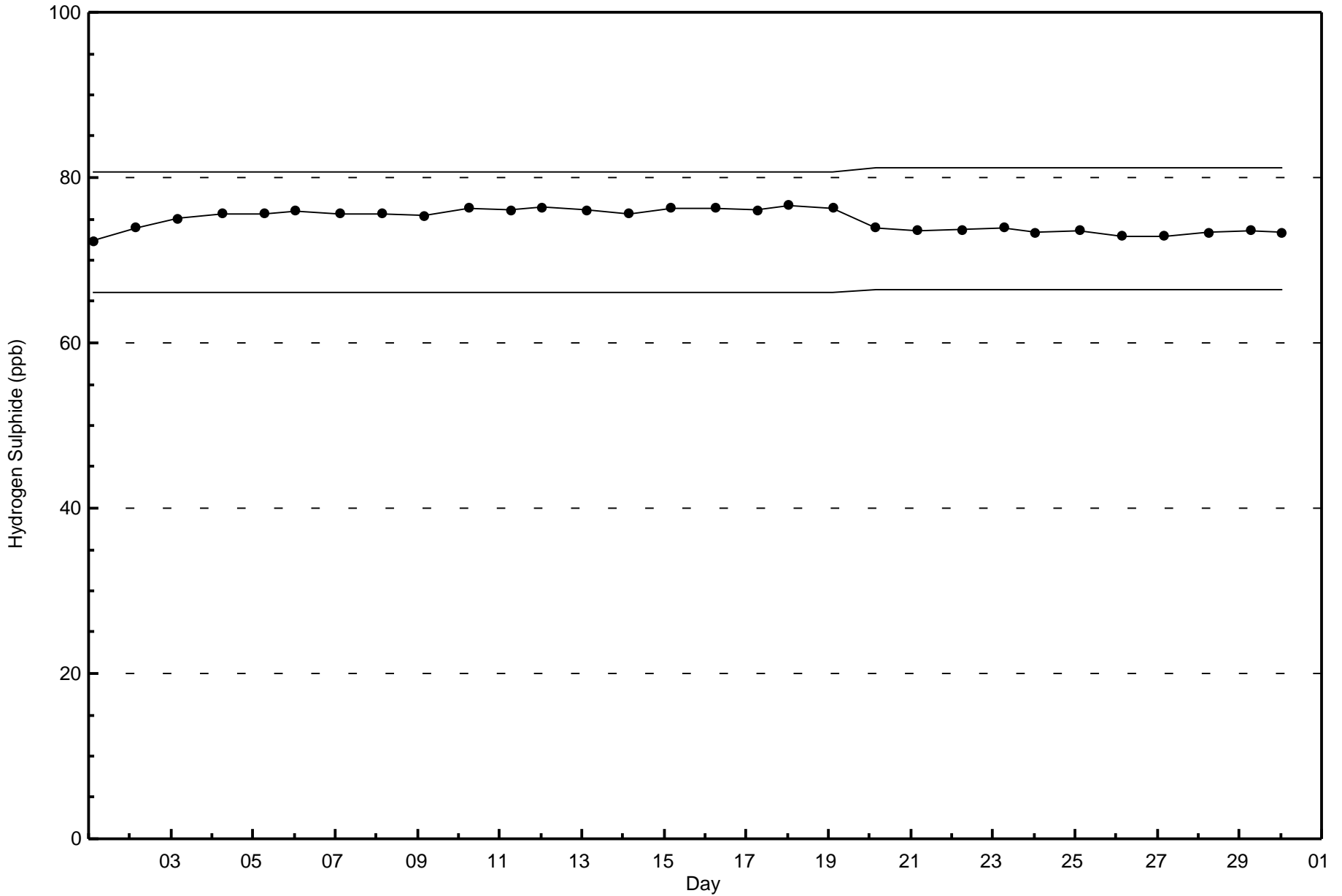
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 683







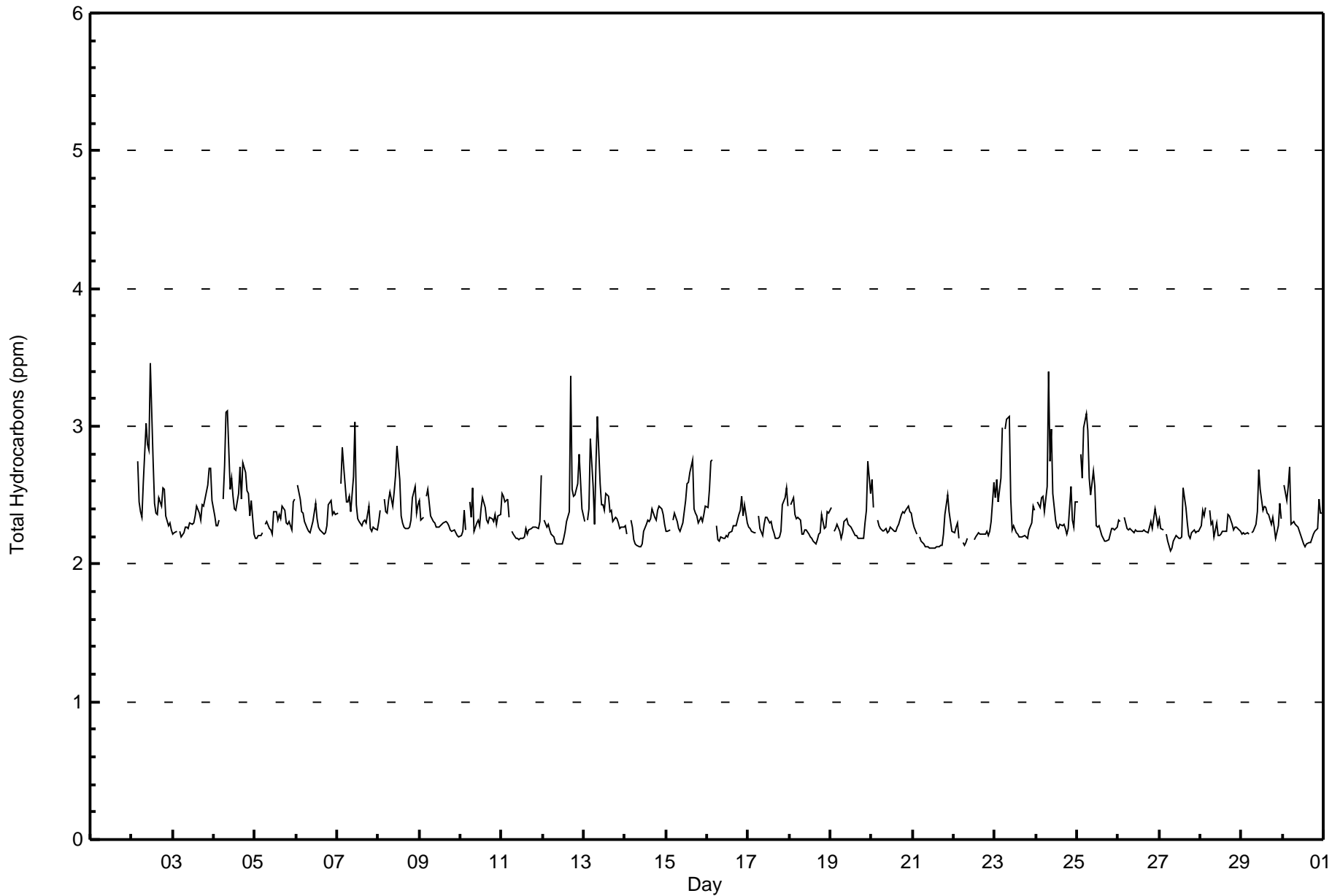
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - June 2017

Maximum Value: 3.5 ppm on Jun 2 12:00		Maximum Daily Average: 2.6 ppm on Jun 2		Hours in Service: 720																							
Minimum Value: 2.1 ppm on Jun 27 07:00		Minimum Daily Average: 2.2 ppm on Jun 21		Hours of Data: 662																							
Maximum Diurnal Average: 2.4 ppm at hour 5		Minimum Diurnal Average: 2.3 ppm at hour 14		Hours of Missing Data: 58																							
Monthly Average: 2.35 ppm		Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.6 P ₉₉ = 3.1		Hours of Calibration: 32																							
				Percent Operational Time: 96.4																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
2-Jun	UO	UO	Z	2.7	2.4	2.4	2.3	2.6	3.0	2.9	2.8	3.5	2.7	2.4	2.4	2.4	2.5	2.4	2.6	2.5	2.3	2.3	2.3	2.2	2.6	3.5	
3-Jun	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.4	2.4	2.5	2.6	2.7	2.7	2.5	2.4	2.7	
4-Jun	2.3	2.3	2.3	2.3	Z	2.5	2.7	3.1	3.1	2.5	2.6	2.5	2.4	2.4	2.5	2.7	2.5	2.7	2.7	2.5	2.5	2.4	2.5	2.2	2.5	3.1	
5-Jun	2.2	2.2	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.4	2.4	2.3	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.5	2.5	2.3	2.5	
6-Jun	Z	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.4	2.4	2.4	2.3	2.6	
7-Jun	2.4	Z	2.6	2.9	2.7	2.4	2.5	2.5	2.4	2.6	3.0	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.3	2.3	2.2	2.4	3.0	
8-Jun	2.3	2.4	Z	2.5	2.4	2.4	2.5	2.5	2.4	2.5	2.6	2.9	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.6	2.4	2.4	2.4	2.9	
9-Jun	2.5	2.3	2.3	Z	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	
10-Jun	2.2	2.2	2.4	2.3	Z	2.5	2.3	2.5	2.2	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.3	2.5	
11-Jun	2.5	2.5	2.4	2.5	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.3	2.6	
12-Jun	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.2	2.2	2.3	2.4	3.4	2.5	2.5	2.5	2.6	2.8	2.6	2.4	2.4	3.4	
13-Jun	2.3	Z	2.3	2.4	2.9	2.6	2.3	2.7	3.1	2.6	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	3.1	
14-Jun	2.3	2.2	Z	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.4	
15-Jun	2.2	2.2	2.2	Z	2.3	2.4	2.3	2.3	2.2	2.3	2.3	2.5	2.6	2.6	2.7	2.8	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.8	
16-Jun	2.4	2.5	2.8	2.8	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.3	2.4	2.3	2.3	2.8	
17-Jun	2.3	2.3	2.2	2.2	2.2	Z	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.6	2.4	2.3	2.6	
18-Jun	Z	2.4	2.5	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.3	2.4	2.4	2.3	2.5	
19-Jun	2.4	Z	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.7	2.5	2.3	2.7	
20-Jun	2.6	2.4	Z	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.6	
21-Jun	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.5	2.4	2.3	2.2	2.2	2.5	
22-Jun	2.2	2.3	2.3	2.2	Z	2.2	2.1	2.2	2.2	C	C	C	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.6	2.2	2.6	
23-Jun	2.5	2.6	2.5	2.6	3.0	Z	3.0	3.1	3.1	2.5	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	3.1	
24-Jun	Z	2.4	2.4	2.5	2.5	2.4	2.6	3.4	2.7	3.0	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.6	2.3	2.3	2.5	2.5	3.4	
25-Jun	2.5	Z	2.8	2.6	3.0	3.1	3.0	2.6	2.5	2.7	2.6	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	3.1	
26-Jun	2.3	2.3	Z	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	
27-Jun	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.6	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.6	
28-Jun	2.3	2.4	2.4	2.4	Z	2.4	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.3	2.3	2.3	2.2	2.3	2.4	
29-Jun	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.4	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.7
30-Jun	Z	2.6	2.5	2.6	2.7	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.4	2.3	2.7	
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerspan			
																								C - Calibration			
																								UO - Unstable Operation			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	653	98.64	98.64
3.1 - 10.0	9	1.36	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



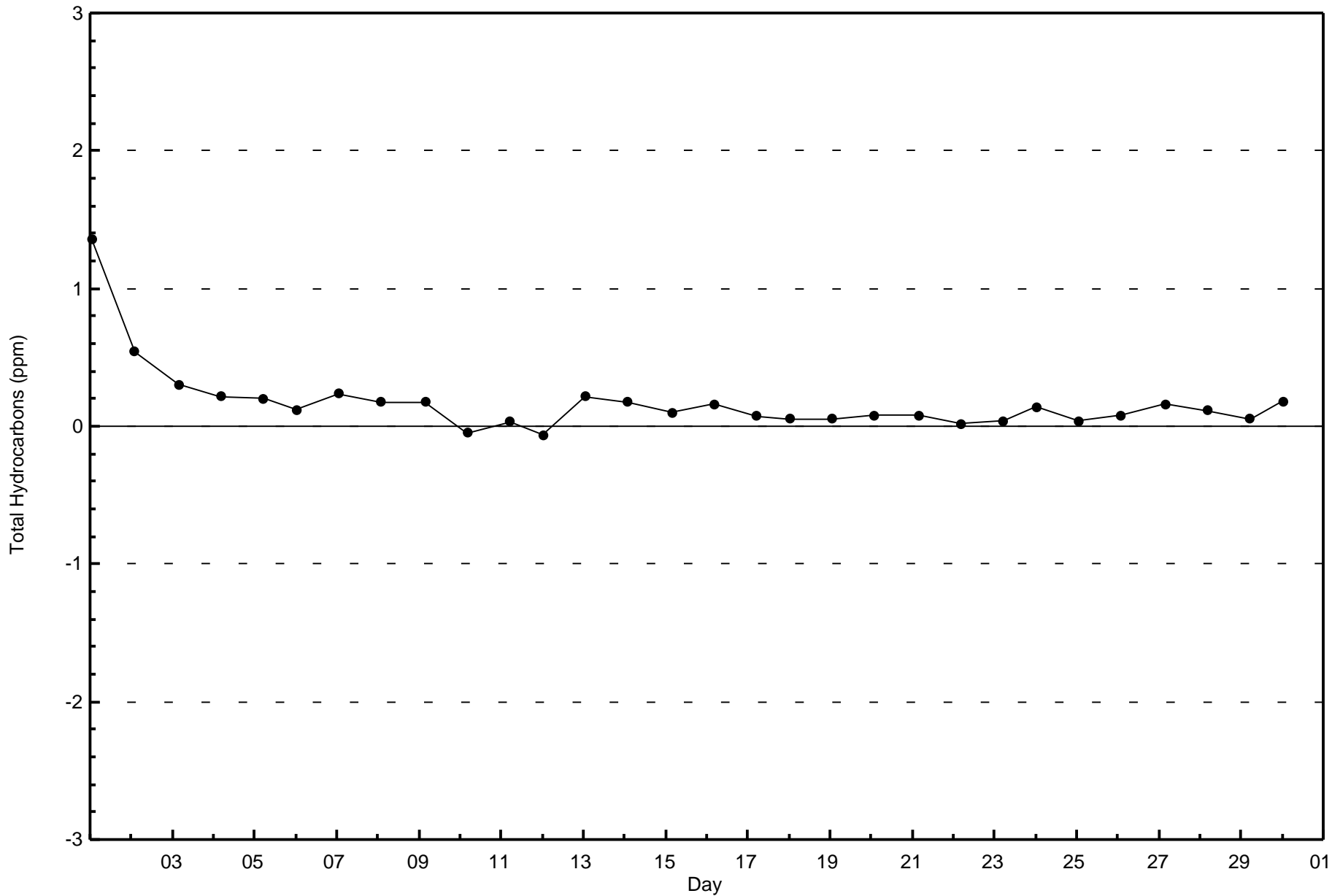
**Wood Buffalo Environmental Association
Frequency Distribution**

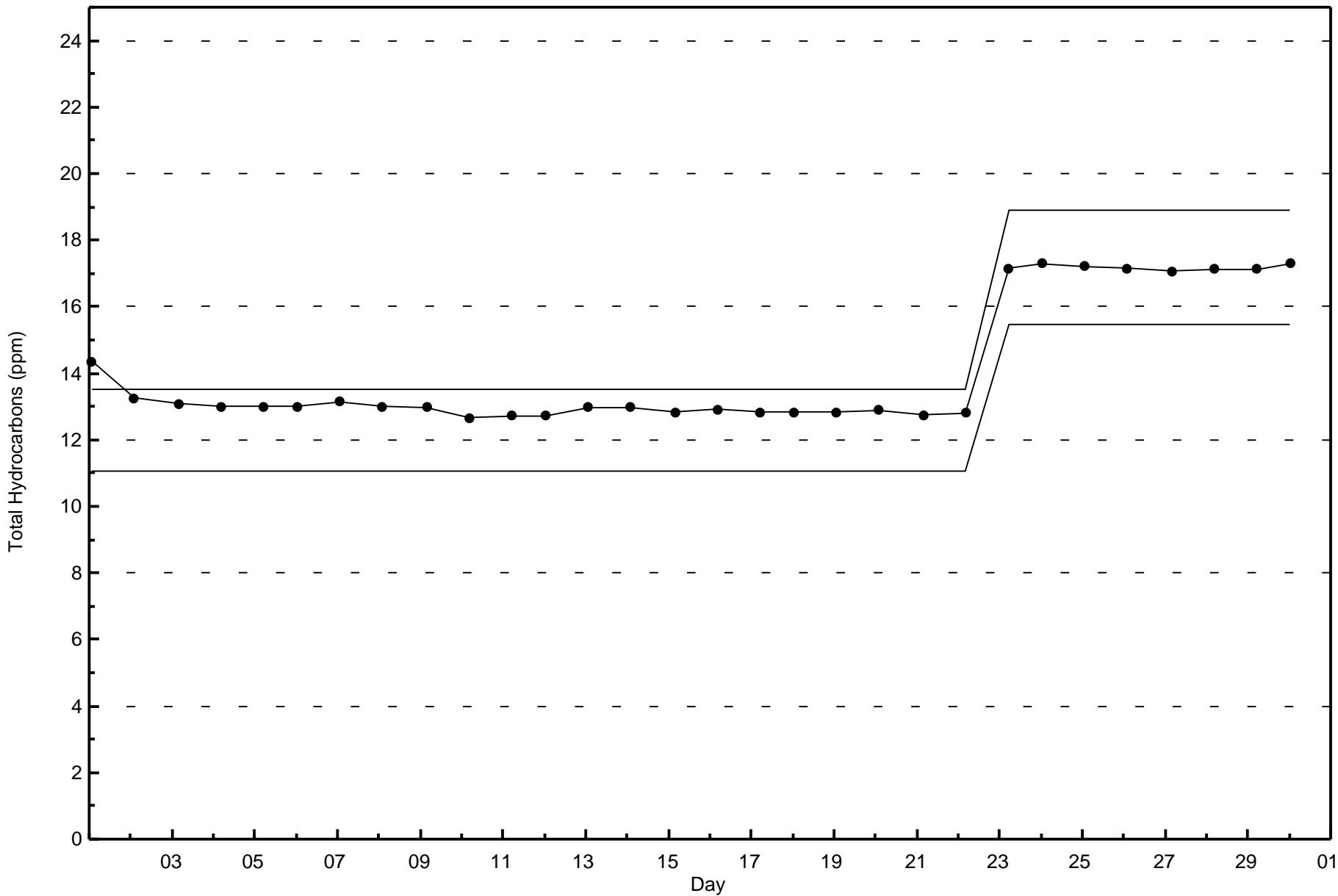
**Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	90	75	25	21	17	21	36	93	48	19	21	18	47	45	38	38	652
3.1 - 10.0	1	1	0	0	0	1	0	0	0	0	0	0	1	2	2	1	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	91	76	25	21	17	22	36	93	48	19	21	18	48	47	40	39	661

Total Number of Valid Hours: 661

Total Number of Hours: 720







Wood Buffalo Environmental Association
Summary of Hour Averages

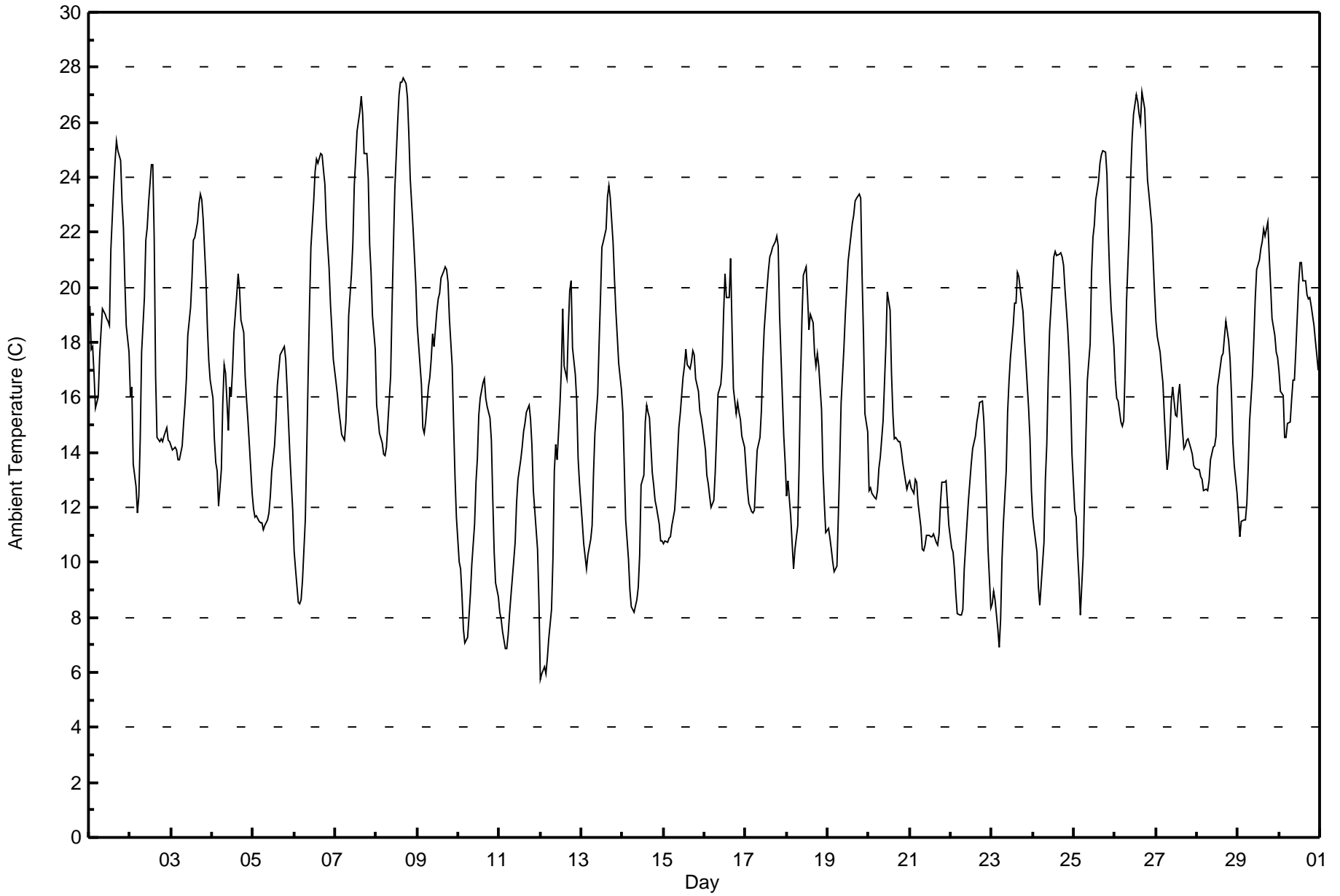
Ambient Temperature (AT) - C
Buffalo Viewpoint - June 2017

Maximum Value: 27.6 C on Jun 8 17:00		Maximum Daily Average: 21.8 C on Jun 26		Hours in Service: 720																						
Minimum Value: 5.7 C on Jun 12 01:00		Minimum Daily Average: 11.2 C on Jun 11		Hours of Data: 720																						
Maximum Diurnal Average: 19.9 C at hour 16		Minimum Diurnal Average: 11.2 C at hour 5		Hours of Missing Data: 0																						
Monthly Average: 16.00 C		Percentiles: P ₁ = 6.9 P ₁₀ = 10.4 Q ₁ = 12.7 Median = 15.6 Q ₃ = 19.2 P ₉₀ = 22.3 P ₉₉ = 26.9		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	19.3	17.8	17.8	16.8	15.6	16.0	17.5	18.4	19.2	19.0	18.9	18.7	18.6	21.3	23.6	24.6	25.3	25.0	24.6	23.1	22.2	20.2	18.6	17.6	20.0	25.3
2-Jun	16.0	16.4	13.6	12.8	11.8	12.4	14.5	17.6	19.6	21.7	22.2	23.1	24.5	24.5	21.7	16.8	14.5	14.4	14.5	14.4	14.6	14.9	14.4	14.4	16.9	24.5
3-Jun	14.2	14.1	14.2	14.1	13.7	13.7	14.2	15.1	15.8	16.7	18.3	19.3	20.4	21.7	21.8	22.4	23.0	23.4	23.2	22.5	20.3	18.6	17.3	16.6	18.1	23.4
4-Jun	16.0	14.5	13.7	13.3	12.1	13.4	15.8	17.2	16.9	14.8	16.4	16.0	17.0	18.4	19.7	20.5	20.0	18.8	18.4	16.8	15.9	15.1	14.3	12.5	16.1	20.5
5-Jun	12.0	11.7	11.7	11.5	11.4	11.4	11.2	11.3	11.5	11.8	12.4	13.3	14.2	15.2	16.4	17.0	17.5	17.7	17.9	17.4	16.3	13.9	12.9	11.9	13.7	17.9
6-Jun	10.4	9.7	8.6	8.5	8.6	9.4	11.5	14.0	16.7	19.2	21.5	23.1	24.2	24.6	24.5	24.9	24.8	24.3	23.7	22.3	20.7	19.4	18.5	17.4	17.9	24.9
7-Jun	16.5	16.0	15.5	15.1	14.6	14.4	15.1	16.7	19.0	20.5	21.6	23.7	24.6	25.7	26.4	26.9	26.3	24.9	24.9	24.0	21.5	20.6	19.0	17.7	20.5	26.9
8-Jun	15.7	15.3	14.7	14.3	13.9	13.9	14.2	15.1	16.8	19.3	21.6	23.6	26.0	27.0	27.5	27.5	27.6	27.4	26.9	25.6	24.0	22.2	21.2	20.1	20.9	27.6
9-Jun	18.6	17.9	16.5	14.9	14.7	15.1	16.4	16.8	17.4	18.3	17.9	19.1	19.6	19.8	20.4	20.6	20.8	20.6	20.2	18.9	17.1	15.1	13.1	11.7	17.6	20.8
10-Jun	10.0	9.8	8.8	7.6	7.1	7.3	8.0	8.8	9.9	11.4	12.9	13.8	15.3	16.0	16.5	16.7	16.0	15.7	15.3	14.4	12.3	10.4	9.2	8.8	11.7	16.7
11-Jun	8.2	7.9	7.5	6.9	6.9	7.4	8.1	8.8	10.0	10.7	12.2	13.0	13.7	14.2	14.8	15.1	15.4	15.7	15.2	14.3	12.6	11.2	10.5	8.6	11.2	15.7
12-Jun	5.7	6.0	6.2	6.0	6.5	7.2	8.3	10.1	13.3	14.3	13.7	15.7	17.0	19.2	17.1	16.7	18.5	19.9	20.3	17.8	16.8	15.9	13.8	12.9	13.3	20.3
13-Jun	11.4	10.7	10.2	9.7	10.3	10.8	11.3	13.2	14.7	16.1	18.0	19.6	21.5	21.7	22.1	23.3	23.7	23.2	21.6	20.3	19.1	18.2	17.2	16.3	16.8	23.7
14-Jun	15.5	13.5	11.5	10.1	9.0	8.4	8.3	8.2	8.6	9.1	10.3	12.8	13.2	15.1	15.7	15.4	15.3	13.3	12.8	12.3	12.0	11.4	10.8	10.8	11.8	15.7
15-Jun	10.7	10.8	10.7	10.9	10.9	11.3	11.9	12.7	13.8	14.9	15.4	16.7	17.1	17.8	17.2	17.0	17.3	17.7	17.5	16.7	16.2	15.5	15.3	14.9	14.6	17.8
16-Jun	14.1	13.2	12.9	12.4	12.0	12.3	13.3	14.6	16.1	16.5	17.2	19.1	20.5	19.6	19.6	21.1	18.6	16.3	15.4	15.8	15.4	15.2	14.6	14.2	15.8	21.1
17-Jun	13.4	12.7	12.1	11.8	11.8	11.9	13.1	14.1	14.5	15.5	17.2	18.4	19.9	20.6	21.1	21.2	21.5	21.7	21.9	21.5	19.0	16.0	14.6	13.6	16.6	21.9
18-Jun	12.4	13.0	11.7	10.7	9.7	10.5	11.3	13.6	16.7	18.9	20.5	20.7	19.7	18.4	19.0	18.7	17.6	17.1	17.6	17.1	15.6	13.4	12.1	11.1	15.3	20.7
19-Jun	11.2	10.9	10.5	10.0	9.7	9.9	11.7	13.6	15.8	17.8	19.0	20.0	20.9	21.4	22.3	22.6	23.1	23.3	23.4	23.2	20.4	18.2	15.4	14.7	17.0	23.4
20-Jun	12.6	12.7	12.5	12.4	12.3	12.6	13.4	13.8	15.1	16.5	17.9	19.8	19.1	16.9	15.4	14.5	14.6	14.4	14.4	14.1	13.6	13.0	12.7	12.9	14.5	19.8
21-Jun	13.0	12.7	12.5	13.0	12.9	12.2	11.3	10.5	10.4	10.6	11.0	11.0	10.9	10.9	11.0	10.7	10.6	11.1	12.1	12.9	12.9	13.0	12.2	11.3	11.7	13.0
22-Jun	10.5	10.4	9.7	8.8	8.1	8.1	8.1	8.3	9.7	11.4	12.2	12.9	13.6	14.1	14.6	15.1	15.4	15.8	15.8	15.2	13.9	12.2	10.5	8.3	11.8	15.8
23-Jun	8.5	8.9	8.6	7.6	6.9	7.9	10.1	11.4	13.3	15.5	16.6	17.4	18.6	19.4	20.5	20.4	19.5	19.1	18.2	17.4	15.6	14.5	12.6	14.5	20.5	
24-Jun	11.6	11.2	10.4	9.1	8.4	9.2	10.7	13.0	14.3	16.6	18.4	20.1	21.1	21.3	21.1	21.2	21.3	21.1	20.8	19.9	18.4	17.4	16.1	13.9	16.1	21.3
25-Jun	11.9	11.6	10.4	9.4	8.1	10.2	12.5	14.7	16.6	18.0	20.6	21.8	22.3	23.2	23.9	24.5	24.8	25.0	24.9	24.1	22.0	20.3	19.2	17.9	18.2	25.0
26-Jun	16.6	15.9	15.8	15.1	14.9	15.2	17.0	19.5	22.2	24.1	25.4	26.3	27.0	26.8	26.3	26.0	27.1	26.5	25.2	23.9	23.4	22.3	21.1	19.8	21.8	27.1
27-Jun	18.8	18.2	17.7	17.0	16.5	15.3	13.4	13.8	14.6	15.9	16.4	15.4	15.3	16.1	16.5	14.8	14.1	14.2	14.4	14.5	14.1	13.9	13.5	13.4	15.3	18.8
28-Jun	13.4	13.4	13.1	13.0	12.6	12.6	12.6	12.9	13.8	14.2	14.2	14.6	16.4	16.7	17.5	17.6	18.2	18.8	18.0	17.4	16.1	14.4	13.5	12.5	14.9	18.8
29-Jun	11.7	10.9	11.5	11.5	11.6	12.1	13.5	15.1	16.8	18.1	19.6	20.7	21.0	21.4	21.7	22.1	21.9	22.4	21.2	20.0	18.9	18.2	17.7	17.5	17.4	22.4
30-Jun	16.9	16.2	16.0	14.5	14.6	15.0	15.1	15.9	16.6	16.6	17.7	20.1	20.9	20.9	20.2	20.3	19.7	19.6	19.7	19.3	18.6	18.0	17.5	17.0	17.8	20.9
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Buffalo Viewpoint - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Buffalo Viewpoint - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	60	8.33	8.33
10 - 20	512	71.11	79.44
> 20	148	20.56	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

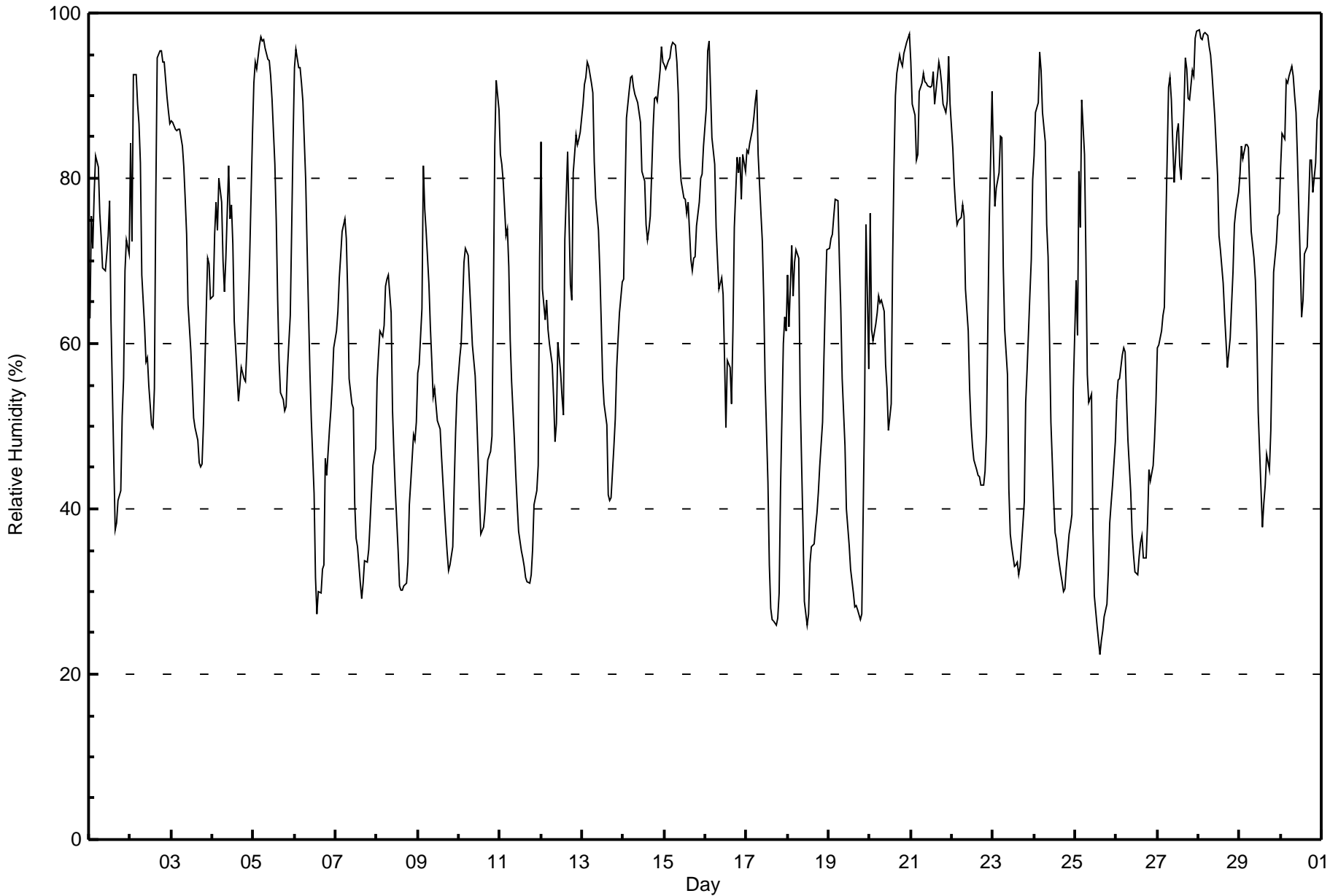


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Buffalo Viewpoint - June 2017**

Maximum Value: 98 % on Jun 28 01:00 Maximum Daily Average: 90.4 % on Jun 21																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 22 % on Jun 25 15:00 Minimum Daily Average: 44.6 % on Jun 26 Maximum Diurnal Average: 81.1 % at hour 5 Minimum Diurnal Average: 50.1 % at hour 15 Monthly Average: 65.3 % Percentiles: P ₁ = 27 P ₁₀ = 35 Q ₁ = 49 Median = 67 Q ₃ = 83 P ₉₀ = 92 P ₉₉ = 97																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	63	75	72	78	83	81	76	73	69	69	71	73	77	63	46	38	38	41	42	51	56	69	73	71	64.5	83
2-Jun	84	72	93	92	89	87	82	68	62	58	58	55	50	50	55	78	95	95	95	94	94	90	88	87	78.0	95
3-Jun	87	87	86	86	86	86	84	81	77	73	65	59	55	51	50	48	46	45	45	50	64	70	70	65	67.4	87
4-Jun	66	73	77	74	80	77	70	66	70	81	75	77	72	63	56	53	55	57	56	56	59	64	70	85	68.1	85
5-Jun	92	94	93	96	97	97	97	96	94	94	92	90	82	75	65	58	54	53	52	52	57	63	74	85	79.3	97
6-Jun	93	96	93	93	91	89	80	72	64	57	51	42	32	27	30	30	33	33	46	44	50	52	55	59	58.9	96
7-Jun	62	64	68	71	74	75	73	66	56	53	52	41	36	35	31	29	31	34	34	35	38	42	45	47	49.6	75
8-Jun	56	59	61	61	62	67	68	68	64	52	47	42	35	31	30	30	31	31	34	40	43	49	48	51	48.3	68
9-Jun	56	58	64	82	76	74	67	62	58	54	55	51	50	50	46	40	37	35	33	33	35	43	49	54	52.5	82
10-Jun	58	60	65	70	71	71	67	64	60	56	52	47	42	37	38	40	43	46	47	49	65	84	92	88	58.8	92
11-Jun	83	82	80	73	74	69	60	55	48	44	41	37	35	34	33	32	31	31	32	35	40	42	45	70	50.3	83
12-Jun	84	67	63	65	62	60	58	53	48	50	60	56	54	51	72	83	75	67	65	81	85	84	85	86	67.3	86
13-Jun	89	91	92	94	94	92	90	82	78	74	69	63	56	53	50	42	41	41	47	51	57	61	64	67	68.2	94
14-Jun	68	78	87	91	92	92	91	90	89	88	87	81	80	74	73	74	75	86	90	90	89	93	96	94	85.3	96
15-Jun	94	93	94	95	96	96	96	94	90	83	80	78	77	76	77	70	69	70	70	74	77	80	81	84	83.1	96
16-Jun	88	95	97	91	85	82	74	70	67	68	66	58	50	58	57	53	62	74	83	81	83	78	83	81	74.2	97
17-Jun	83	83	84	86	87	89	91	83	76	72	65	55	43	33	28	27	26	26	27	30	42	60	63	62	59.3	91
18-Jun	68	62	72	66	70	71	70	54	46	38	29	26	27	33	35	36	38	39	42	45	51	59	66	71	50.6	72
19-Jun	72	73	73	75	77	77	70	64	56	48	40	38	36	33	30	28	28	28	27	27	40	52	74	57	51.0	77
20-Jun	76	62	60	62	64	66	65	65	64	57	55	50	53	70	81	90	93	95	94	94	95	96	97	97	75.0	97
21-Jun	94	89	88	82	83	90	92	93	92	92	91	91	91	93	89	92	94	93	91	89	88	89	95	89	90.4	95
22-Jun	84	79	76	74	75	75	77	76	67	62	54	50	48	46	45	44	44	43	43	45	49	62	75	90	61.8	90
23-Jun	83	77	79	81	85	85	69	62	56	42	37	35	33	33	34	32	33	38	41	53	57	66	70	80	56.7	85
24-Jun	83	88	89	95	93	88	84	74	70	61	51	41	37	36	35	32	31	30	30	33	37	38	39	55	56.3	95
25-Jun	68	61	81	74	90	83	71	56	53	54	38	30	28	26	22	24	25	27	28	32	38	41	43	48	47.5	90
26-Jun	53	56	56	59	60	59	53	48	42	37	34	32	32	34	36	37	34	34	38	45	43	45	48	53	44.6	60
27-Jun	60	60	62	63	64	74	91	92	89	84	79	86	87	82	80	89	95	93	90	89	93	92	97	98	82.8	98
28-Jun	98	97	97	98	98	97	96	95	93	87	84	80	73	71	67	64	60	57	61	65	69	74	76	78	80.6	98
29-Jun	81	84	82	84	84	84	78	74	70	68	61	52	42	38	41	43	47	45	49	59	69	72	75	76	64.9	84
30-Jun	81	85	85	92	92	92	93	92	90	88	83	70	63	65	71	72	77	82	82	78	82	87	88	91	82.6	93
	76.9	76.6	79.0	80.1	81.1	80.9	77.8	73.0	68.6	64.8	60.7	56.2	52.5	50.7	50.1	50.2	51.3	52.4	53.8	56.7	61.5	66.6	70.8	74.0	Diurnal Average	
	98	97	97	98	98	97	97	96	94	94	92	91	91	93	89	92	95	95	95	94	95	96	97	98	Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - June 2017

Maximum Speed: 33 km/h on Jun 22 00:00	Maximum Daily Speed Average: 20.4 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 19 19:00	Minimum Daily Speed Average: 0.4 km/h on Jun 6	Hours of Data: 719
Maximum Diurnal Speed Average: 4.9 km/h at hour 15	Minimum Diurnal Speed Average: 0.8 km/h at hour 3	Hours of Missing Data: 1
Monthly Average Velocity: 2.8 km/h 352.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 8 O ₃ = 13 P ₉₀ = 19 P ₉₉ = 30	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	S4	SSW5	SSW5	SW3	WNW9	W5	W9	W9	WSW7	SW6	WSW7	SSW7	SSW5	SE8	SSW5	SW3	SW2	SE6	SE5	SE5	SE5	SSE6	S6	S5	SSW3.7	W9	
2-Jun	SSE4	W3	SSE5	S6	SSE7	SSE5	SSE2	NNE1	N3	N5	N7	NW4	N7	NNE10	NW13	W27	WNW18	WNW13	NW14	NW12	W13	W17	WNW9	W13	WNW5.9	W27	
3-Jun	W19	W19	WNW19	NW17	WNW17	WNW18	NW18	NW12	NW11	WNW14	WNW14	NW10	NW8	N9	NE7	NE6	NNE6	E4	SE7	SE5	SE6	SE7	SSE8	SSE7	WNW6.4	W19	
4-Jun	S5	S6	SSE7	SW6	SSW5	WSW3	NNE2	N4	WNW6	NNE1	NNE3	WSW6	W7	NW5	NW7	N12	N16	N14	NNW18	N22	N16	NNE13	N12	NNE14	NNW5.4	NNW22	
5-Jun	NNE11	NE9	ENE12	N11	N13	N15	N15	N14	N14	N13	N12	N8	NNW8	N9	N10	NNE8	NE7	ESE7	SE6	SSE7	SSE6	E7	ENE7	SSE2	S3	NNE6.2	N15
6-Jun	SSE2	S6	S6	SSW5	S6	S6	SSE5	SSE5	SE5	SSW4	SE4	NW2	NW4	WNW7	WNW8	WNW9	WNW5	SSE1	N2	NE1	NNE8	NNE12	NNE10	N6	WNW0.4	NNE12	
7-Jun	NNW6	N7	N9	NNE10	N7	NNE7	N7	NNE9	NNE7	NW5	WNW7	N3	NNE9	N11	NNE12	NE9	ENE7	E9	E9	ENE10	NE12	NE11	NE11	NE8	WNNE7.3	NNE12	
8-Jun	N7	N7	NNE9	NE8	NNE9	NE6	NE4	NE3	ESE4	SE8	ESE7	E7	ESE8	ESE12	ESE13	SE12	ESE13	ESE12	SE11	SE8	ESE7	SE7	SSE6	SSE7	ESE5.9	ESE13	
9-Jun	SSE8	SSE6	SSE4	NNW3	NNE10	NNE15	NNE27	NNE23	NNE24	NNE27	NNE30	NNE26	NNE32	NNE30	NNE30	NNE31	NNE29	NNE25	NE21	ENE20	ENE17	ENE14	ENE12	ENE12	NNE17.8	NNE32	
10-Jun	ENE14	E16	E13	E10	E9	E9	E8	E6	NNE7	NNW7	NNW8	N7	NNW6	WNW5	SW3	SE2	E3	NNE10	NNE12	N13	NNW19	NNE13	NNE17	N14	NNE6.4	NNW19	
11-Jun	NNW12	NNW14	NNW16	NNW17	NW16	NNW17	NW19	NNW21	NNW25	NW23	NNW19	NNW18	NNW17	NNW15	NNW16	NNW17	NNW16	NNW14	NNW15	N13	NNE9	E9	E6	S5	NNW13.8	NNW25	
12-Jun	SSE5	SSE7	SSE9	SSE10	SSE11	SSE12	SSE12	S11	SSE10	S9	S13	SSE20	SSE18	SE16	NE1	SW1	ESE5	SE4	SE8	SE7	SSE7	NNE7	NNE14	NNE12	SSE7.0	SSE20	
13-Jun	N9	N10	N8	N9	NNW10	N7	NE5	N3	NNE4	NNE6	NNE6	NE6	NNE7	NNW11	N11	N7	NNE10	N14	N25	NNE21	NNE15	NNE19	NNE19	NNE22	N10.5	N25	
14-Jun	NNE19	NNE20	N22	N23	N24	NNE25	NNE23	NNE27	NNE22	NNE19	N14	N24	N26	N21	N21	N20	N21	N23	N16	N17	N19	N17	N15	N19	N20.4	NNE27	
15-Jun	N17	N16	N15	N14	NNE13	NNE12	NNE12	NNE12	NNE10	NNE5	WNW2	NW6	WNW7	NW6	ENE6	SE3	SW4	WSW4	WNW2	ENE5	ENE6	ENE8	ENE4	ESE1	N5.9	N17	
16-Jun	WNW2	S1	ESE4	SE6	SSE6	SSE6	SSE8	SSE6	ESE7	ESE7	S5	S5	SSE7	SW11	SW8	W2	WSW8	WNW8	NW13	WNW5	SSE4	SW5	SSE5	SSE10	S3.1	NW13	
17-Jun	S10	SSE10	SSE8	S7	SSE7	S5	WNW7	WNW13	NW14	NW10	NW6	NW16	NW19	NNW20	NW23	NW19	NW17	NW13	NNW8	NW4	SE1	SSW4	SSW4	S6	WNW6.0	NW23	
18-Jun	SSW6	SW2	SSW4	SSE8	SSE8	SSE5	S4	SSW7	SSW7	WSW7	W13	W13	SW14	WSW13	W22	W17	W16	W11	NNW11	NNW16	NNW17	N18	NW12	W13	W6.9	W22	
19-Jun	W9	W14	W11	W12	WNW11	W9	WNW11	W8	WNW6	WNW5	WNW6	NW5	W6	SW6	WNW9	WNW8	WNW8	WNW2	WSW0	S1	SE5	S5	S7	SSW8	W6.0	W14	
20-Jun	SSE10	SSE7	SSE9	SSE7	SSE9	SE7	SSE7	SSE6	SSE6	SE8	SSE7	SSW10	SW18	SSW14	S11	S9	S9	SSE7	SSE11	SSE10	SSE8	SSE8	S8	SSE6	SSE8.3	SW18	
21-Jun	S8	SW9	SW10	W17	W24	W24	W26	W24	W24	W25	W20	WNW18	W20	WNW20	W24	WNW22	WNW19	WNW19	NW18	N24	NNW20	NNW19	N29	N33	WNW16.3	N33	
22-Jun	N30	N30	N29	N32	N31	N25	N20	N17	N19	NNE19	NNE20	N24	N21	N19	N17	N16	N15	N15	NNE13	NNE9	NE7	WSW1	WSW2	SSW5	N17.5	N32	
23-Jun	W6	W9	W8	NNW4	WSW1	W0	NW6	WNW6	NW6	N7	NNE12	N8	NNE5	N3	WSW6	W4	NE2	NE10	N3	WNW5	AF	SSW5	W5	SW5	NW3.3	NNE12	
24-Jun	S3	SW5	SSE4	S6	S6	SSE4	W2	NNW6	NNE8	N9	NNW8	N10	N14	N16	N15	NNE14	N11	N14	N12	NNE9	NE8	ENE7	E7	SSE2	NNE5.4	N16	
25-Jun	SSW3	WNW1	NW5	WNW5	SW2	W3	W3	SSE2	ESE3	NNE5	E5	SE6	ESE7	ESE7	SSE9	S7	SSE9	SE10	SSE11	SE8	SE10	SSE10	SSE9	SSE10	SSE4.3	SSE11	
26-Jun	SSE11	SSE11	SSE13	SSE11	SSE12	SSE13	SSE14	SSE11	SSE11	S16	S18	S20	S18	SSE18	SE17	SE15	SE16	SSE14	SE9	SE9	SE8	ESE10	SE9	SSE8	SSE12.5	S20	
27-Jun	SSE8	SSE9	SSE11	SSE11	SSE9	SSW10	W16	SW7	SSW8	SSW9	SW9	SW9	SW7	SE3	ESE5	W4	SW1	W9	W9	WNW4	WSW3	WSW4	SSE3	S3	SSW4.9	W16	
28-Jun	N0	W2	WNW3	NE7	NE7	ESE4	SE3	ENE7	ENE6	E12	ENE15	ENE13	NE11	NE16	NNE15	ENE9	ESE7	SSE5	SSE6	SSE6	S8	SSE9	SSE10	SSE9	E4.6	NE16	
29-Jun	S5	SSE8	SSE9	SSE8	SSE6	SSE5	SE5	S3	NW2	N4	NW0	W5	NW6	W4	W5	S1	SE2	N3	WSW6	W7	WNW4	NW4	WNW3	W4	SW1.9	SSE9	
30-Jun	SW5	S4	S3	SSW3	S4	W4	SSE4	SSE5	S7	S6	S7	SSW8	SW6	WNW3	NW8	W8	WSW7	WSW6	WSW6	WSW6	WNW5	S5	S5	S6	SW4.1	NW8	

N1.0	NW1.0	NNW0.8	NNW1.9	NNW1.7	NNW2.1	NNW3.1	NNW3.6	NNW3.7	NNW3.2	NNW3.1	NNW3.3	NNW3.8	NNW4.2	NNW4.9	NNW4.4	NNW3.6	N3.5	N3.5	N4.0	NNE3.7	NE3.4	NE2.5	NNE1.2	Diurnal Average
N30	N30	N29	N32	N31	N25	NNE27	NNE27	NNW25	NNE27	NNE30	NNE26	NNE32	NNE30	NNE30	NNE31	NNE29	NNE25	N25	N24	NNW20	NNW19	N29	N33	Diurnal Maximum

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

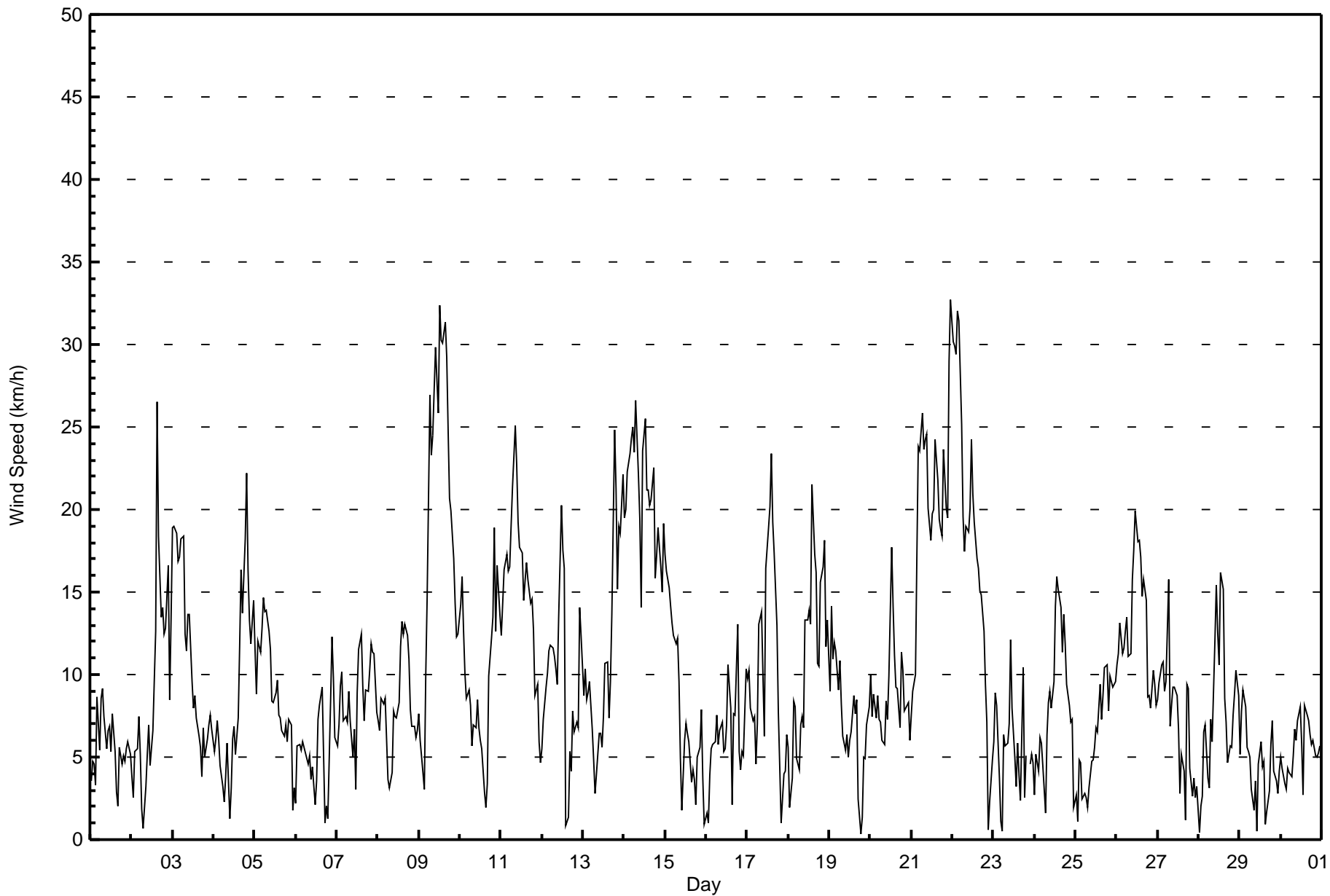
Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 2 15:00	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 1 km/h on Jun 19 22:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	1	2	2	3	3	2	2	3	3	2	2	2	3	3	3	2	2	1	1	1	1	1	3
2-Jun	2	2	1	2	2	2	2	1	1	2	3	3	3	7	9	5	6	3	4	4	3	4	3	4	9
3-Jun	4	4	5	4	4	4	4	3	3	4	4	3	3	3	2	2	2	2	2	1	1	1	1	2	5
4-Jun	1	1	2	2	2	2	1	3	3	2	2	2	2	2	4	3	3	3	6	5	4	3	3	4	6
5-Jun	4	3	4	2	3	3	3	3	3	3	2	2	3	3	3	3	2	2	2	2	4	4	2	2	4
6-Jun	2	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	1	1	1	3	2	1	2	3
7-Jun	2	2	2	2	2	2	1	2	2	2	2	2	4	4	5	4	3	2	2	3	3	2	2	2	5
8-Jun	1	1	2	1	1	1	1	1	2	3	2	3	3	4	4	4	4	3	3	2	1	1	1	1	4
9-Jun	2	2	1	2	2	7	6	5	6	6	7	7	7	7	7	7	6	6	6	5	4	3	2	2	7
10-Jun	3	4	4	3	2	3	3	2	2	3	4	3	3	3	3	2	2	3	3	4	5	3	4	3	5
11-Jun	3	4	4	4	4	4	5	6	7	6	5	5	5	5	5	5	5	4	4	4	2	1	1	1	7
12-Jun	1	2	2	2	3	3	3	3	3	3	4	7	6	5	8	7	3	2	2	3	2	3	3	3	8
13-Jun	2	2	2	2	2	2	1	2	2	2	2	2	2	3	3	2	3	4	5	4	4	4	4	5	5
14-Jun	7	6	5	6	5	6	6	6	5	5	3	6	6	5	4	5	4	5	3	3	4	4	4	4	7
15-Jun	4	3	3	3	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	1	3	1	3	2	4
16-Jun	1	1	1	1	1	2	2	2	2	2	2	2	3	4	2	2	4	6	4	4	1	1	2	3	6
17-Jun	3	3	2	2	2	2	3	4	4	3	2	5	5	5	6	6	4	5	4	1	1	1	2	1	6
18-Jun	2	2	2	1	1	1	1	2	2	3	4	4	4	7	6	5	4	4	4	4	5	4	3	5	7
19-Jun	4	2	3	3	3	2	3	2	2	2	2	2	3	3	3	3	3	1	1	1	1	1	1	2	4
20-Jun	1	2	1	2	2	2	1	1	2	2	2	4	5	4	4	2	3	2	4	3	2	2	2	3	5
21-Jun	2	4	3	5	5	5	6	6	5	6	5	5	4	5	5	5	5	5	4	6	5	5	7	7	7
22-Jun	7	7	7	7	7	6	5	4	5	4	5	6	6	5	5	4	4	4	3	3	2	2	2	1	7
23-Jun	1	2	2	2	1	2	1	1	2	4	3	4	3	4	3	2	3	4	3	2	AF	1	1	2	4
24-Jun	2	2	2	1	2	2	2	2	2	3	3	4	5	4	4	4	4	4	3	2	1	1	2	1	5
25-Jun	1	2	1	2	1	1	1	1	2	2	2	3	3	3	3	4	3	3	4	2	3	2	2	2	4
26-Jun	2	3	3	2	3	3	4	3	4	5	5	7	6	6	5	4	5	5	3	2	3	3	3	2	7
27-Jun	2	2	3	3	2	4	5	2	2	2	3	3	2	1	1	4	2	2	2	2	2	2	1	1	5
28-Jun	1	1	2	2	2	1	1	2	3	4	4	3	3	5	5	3	3	2	2	1	2	2	2	2	5
29-Jun	2	2	2	2	2	1	1	2	1	2	2	2	2	1	2	1	1	1	1	3	2	2	2	1	3
30-Jun	1	1	2	2	1	1	1	1	2	2	2	2	2	1	3	2	2	1	1	1	1	1	1	1	3

7	7	7	7	7	7	6	6	7	6	7	7	7	7	9	7	6	6	6	6	6	5	5	7	7	
Diurnal Maximum																									

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	178	24.76	24.76
6 - 11	312	43.39	68.15
12 - 19	162	22.53	90.68
20 - 28	54	7.51	98.19
29 - 38	13	1.81	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	8	6	2	3	7	15	23	22	15	12	8	16	16	11	5	178
6 - 11	28	27	17	10	12	10	22	70	26	10	12	11	16	18	11	12	312
12 - 19	38	24	2	8	3	5	4	9	4	1	2	1	13	13	16	19	162
20 - 28	16	14	1	1	0	0	0	1	1	0	0	0	10	3	2	5	54
29 - 38	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	98	79	26	21	18	22	41	103	53	26	26	20	55	50	40	41	719

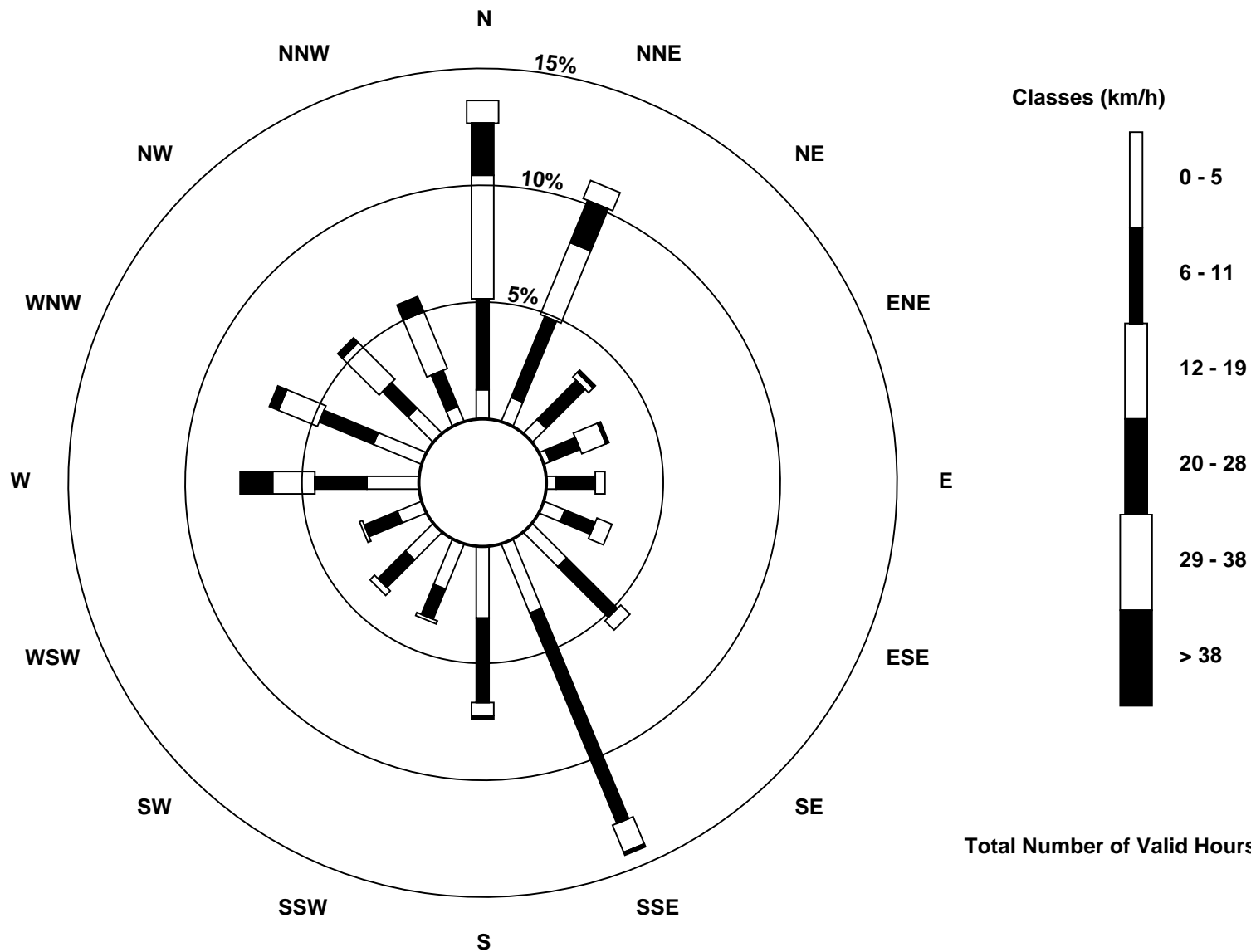
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 719



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - June 2017

Direction of Maximum Speed: 2 deg on Jun 22 00:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 7.6 deg on Jun 14	Hours of Data: 719
Direction of Minimum Speed: 237 deg on Jun 19 19:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.4 deg on Jun 6	Percent Operational Time: 99.9
Monthly Average Direction: 277.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	173	212	206	231	287	268	269	264	257	224	249	196	193	143	201	221	225	142	143	137	142	153	180	175	209.0
2-Jun	153	263	165	188	167	164	154	16	354	9	356	321	359	17	312	276	302	302	311	309	275	273	286	281	294.5
3-Jun	279	279	290	304	283	284	309	323	304	289	302	306	321	357	43	37	24	83	137	135	133	130	147	153	300.0
4-Jun	170	175	164	219	213	250	15	356	294	12	33	254	264	315	321	3	9	6	342	349	358	28	6	12	348.6
5-Jun	16	46	59	354	354	358	4	354	360	3	359	346	357	3	24	37	109	143	159	160	84	73	167	183	20.1
6-Jun	150	191	188	194	184	185	148	161	128	197	139	320	309	301	302	286	302	148	353	41	17	26	27	9	297.9
7-Jun	346	2	7	15	9	12	356	15	12	319	297	351	16	8	28	49	59	83	85	63	38	50	43	49	26.7
8-Jun	8	11	20	36	29	34	40	42	109	129	114	97	114	115	119	124	122	123	127	128	121	134	152	155	102.4
9-Jun	147	159	155	344	29	18	23	14	17	19	24	30	19	18	18	19	31	54	60	68	70	72	73	73	31.4
10-Jun	72	89	94	84	93	89	89	81	18	338	348	359	344	298	233	124	98	28	20	351	331	16	15	2	32.6
11-Jun	335	327	333	327	324	327	323	328	333	323	332	329	327	335	341	331	337	335	345	360	33	83	97	179	335.0
12-Jun	161	164	163	159	156	158	159	169	167	173	173	155	160	146	38	214	114	135	144	134	150	14	12	15	150.3
13-Jun	1	359	357	351	333	5	54	0	20	28	33	48	16	333	355	358	14	11	9	12	26	18	27	21	11.1
14-Jun	15	19	1	6	11	17	25	23	22	19	3	360	357	2	7	8	1	358	8	359	2	3	353	353	7.6
15-Jun	359	359	0	4	14	13	15	20	20	24	284	305	290	326	76	138	226	249	292	74	60	62	68	120	9.1
16-Jun	302	174	123	141	151	147	164	153	106	121	169	181	148	222	234	279	251	289	304	290	156	236	166	148	186.4
17-Jun	169	159	165	172	162	185	299	302	304	318	322	315	317	328	317	323	319	322	330	313	136	192	209	187	302.9
18-Jun	202	230	203	163	159	166	191	206	213	239	267	261	226	240	272	267	269	276	333	336	335	357	324	270	269.1
19-Jun	279	271	266	271	282	281	285	281	283	289	287	306	265	231	284	285	300	290	237	171	138	173	190	205	269.3
20-Jun	150	150	151	154	149	145	148	158	149	144	156	197	216	203	190	175	171	164	151	168	161	153	174	166	168.0
21-Jun	176	216	222	264	272	276	276	279	273	275	277	283	280	283	281	284	288	288	313	352	345	343	1	2	294.3
22-Jun	360	357	358	3	3	358	5	360	355	15	15	11	7	5	5	10	4	5	12	32	41	257	239	207	4.5
23-Jun	262	277	278	343	252	280	320	302	315	353	14	4	20	4	237	278	40	41	349	294	AF	210	267	229	317.9
24-Jun	188	231	153	182	170	153	271	329	13	2	341	2	11	6	5	13	5	4	10	26	36	67	83	159	14.1
25-Jun	201	297	308	347	218	273	266	147	122	24	99	136	106	121	155	171	150	137	149	146	145	155	164	165	148.1
26-Jun	161	163	164	157	155	152	152	151	165	178	175	176	175	147	145	143	141	147	146	132	136	117	137	152	154.8
27-Jun	147	153	150	151	168	210	260	218	202	209	229	229	235	133	102	263	225	260	276	284	245	243	148	180	207.9
28-Jun	351	266	295	49	56	117	142	59	74	86	64	64	48	35	30	57	107	167	165	166	173	161	168	164	84.7
29-Jun	173	161	165	157	168	151	132	169	326	349	318	276	305	268	267	189	138	349	237	261	294	314	284	278	219.5
30-Jun	218	184	183	210	176	266	166	165	180	172	169	203	220	285	304	271	242	249	244	256	284	185	188	190	217.0

1.1 320.6 348.1 345.8 338.4 337.3 338.8 341.8 342.5 345.2 343.6 330.9 332.5 347.9 339.0 335.8 348.0 359.5 3.1 11.2 28.3 44.3 39.4 22.5

Diurnal Average

AF - Analyzer Failure

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

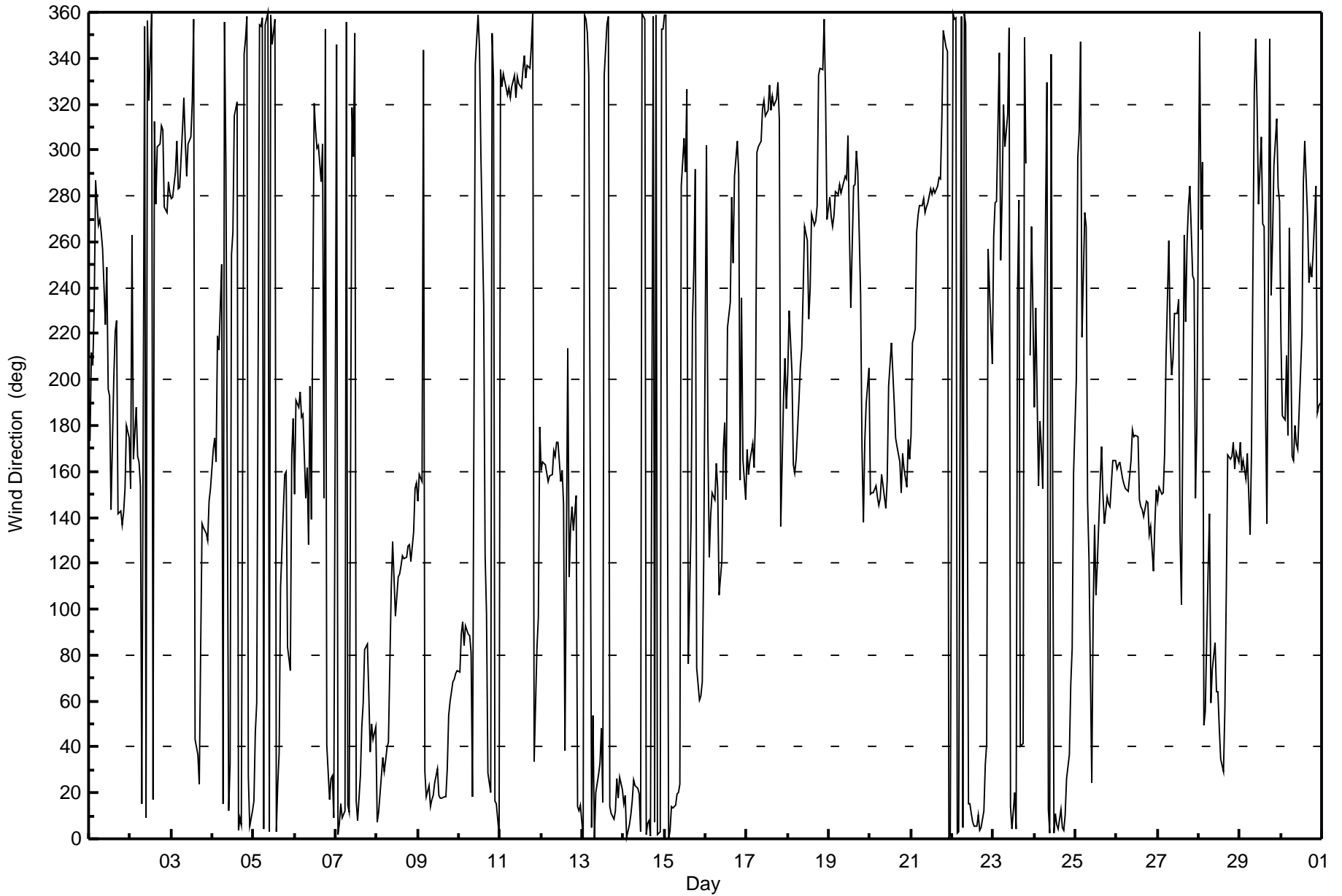
Wind Direction (WD) - deg
Buffalo Viewpoint - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 116 deg on Jun 29 11:00	Hours of Data: 719
Minimum Value: 7 deg on Jun 8 05:00	Hours of Missing Data: 1
Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 18 Median = 22 Q ₃ = 32 P ₉₀ = 56 P ₉₉ = 89	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	62	51	34	47	13	22	17	16	20	49	36	21	26	28	42	58	79	40	26	11	10	16	17	11	79
2-Jun	40	52	25	25	19	20	60	66	37	34	28	33	39	39	50	17	25	23	19	22	13	13	24	18	66
3-Jun	14	15	18	18	17	16	17	19	18	23	21	31	36	35	35	34	34	65	24	17	9	14	17	22	65
4-Jun	22	23	33	20	40	36	56	43	48	96	64	21	23	27	27	26	18	22	22	21	17	20	21	96	
5-Jun	23	30	36	20	16	18	18	18	17	20	28	25	23	23	36	31	42	46	24	22	29	21	73	50	73
6-Jun	64	13	12	14	14	15	22	43	39	63	64	83	77	41	22	20	48	77	52	87	21	12	12	25	87
7-Jun	36	26	15	17	15	17	17	16	21	41	21	60	29	26	24	33	35	13	11	20	15	14	15	23	60
8-Jun	26	18	19	12	7	10	42	28	49	28	36	32	30	28	21	24	21	19	19	16	14	14	17	18	49
9-Jun	18	21	23	60	14	18	17	19	18	19	19	20	18	21	20	19	20	20	17	20	15	14	13	12	60
10-Jun	14	15	16	18	15	19	23	44	30	47	39	41	50	64	74	53	25	18	17	27	22	17	17	17	74
11-Jun	18	16	16	15	16	19	18	20	19	19	21	22	24	29	26	24	27	25	27	28	29	10	23	18	29
12-Jun	20	24	21	22	21	21	23	24	23	23	23	24	27	26	86	85	61	55	26	35	19	61	16	15	86
13-Jun	16	14	28	16	13	22	28	72	53	32	36	43	35	27	23	27	24	22	22	20	16	17	18	16	72
14-Jun	17	18	19	19	19	18	17	17	17	20	19	21	21	20	18	20	18	18	18	18	17	17	19	18	21
15-Jun	17	18	18	17	14	15	16	16	20	44	101	32	26	36	50	60	23	30	74	21	14	12	25	71	101
16-Jun	59	94	20	18	17	21	23	31	26	22	37	53	46	25	26	79	48	72	18	37	30	9	39	22	94
17-Jun	22	24	23	23	21	41	24	20	20	25	46	21	22	20	21	19	20	22	26	26	79	32	39	17	79
18-Jun	39	90	66	9	9	17	23	20	26	36	24	26	17	38	18	20	13	26	20	19	26	23	22	17	90
19-Jun	36	11	14	11	16	15	19	23	35	39	40	69	55	56	31	37	28	70	101	57	13	18	11	18	101
20-Jun	7	16	12	22	15	16	18	20	24	21	27	28	16	20	23	22	23	26	23	24	22	20	23	34	34
21-Jun	21	24	22	15	12	14	15	15	13	13	15	16	15	16	16	16	18	21	18	20	18	19	22	20	24
22-Jun	20	20	21	21	20	21	19	21	23	19	19	20	21	20	23	20	22	22	21	21	11	93	47	12	93
23-Jun	17	11	14	64	70	85	20	26	33	45	24	45	69	81	46	49	82	19	63	16	AF	11	26	40	85
24-Jun	43	27	59	28	28	19	59	35	23	30	33	32	30	27	26	25	27	27	24	19	12	14	29	65	65
25-Jun	37	77	17	25	37	18	17	71	56	29	62	59	44	49	30	49	32	24	26	21	20	20	20	20	77
26-Jun	20	21	20	20	20	21	22	25	26	25	27	26	26	26	24	24	24	24	23	18	28	17	23	22	28
27-Jun	19	21	23	23	22	37	18	30	22	21	20	17	19	52	24	85	91	17	18	27	52	31	32	23	91
28-Jun	84	58	55	15	23	29	32	20	27	22	21	18	30	19	23	28	42	46	25	18	20	20	21	19	84
29-Jun	32	17	18	20	28	22	32	64	88	61	116	68	25	31	28	85	70	58	10	15	38	70	59	35	116
30-Jun	18	30	37	56	48	29	43	35	33	31	32	30	29	36	21	18	20	19	16	20	14	20	25	16	56

84	94	66	64	70	85	60	72	88	96	116	83	77	81	86	85	91	77	101	87	79	93	73	71	
Diurnal Maximum																								

AF - Analyzer Failure





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	June 22, 2017	Last Cal Date:	May 5, 2017
Start time (MST):	8:50	End time (MST):	11:25
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.7</u>	ppm	Cal Gas Exp Date	September 8, 2019
Cal Gas Cylinder #	<u>LL107929</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	11551008
ZAG Make/Model	API 701		Serial Number	4297

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: JC1327300932

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-593.1	-576.5
Calculated slope	0.996098	0.999111	Lamp voltage	830	830
Calculated intercept	-0.361703	0.099867	Pressure	698.2	698.2
Analyzer Background	11.7	11.6	Flow	0.509	0.509
Analyzer Coefficient	0.817	0.990	Intensity	85	85

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.2	----
as found span	4938	60.3	599.6	615.5	0.974
calibrator zero	5000	0.0	0.0	-0.1	----
high point	4914	80.5	801.1	801.5	0.999
second point	4959	40.2	399.7	400.4	0.998
third point	4981	20.1	199.8	199.5	1.001
as left zero	5000	0.0	0.0	0.0	----
as left span	4914	80.5	801.1	799.3	1.002

Average Correction Factor				1.000
Corrected As found	615.30	Previous response	602.30	*% change -2.1%

* = > +/-5% change initiates investigation

Notes:

PMT adjusted, zero and span adjusted; calibration points switched to 800, 400, 200ppb

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

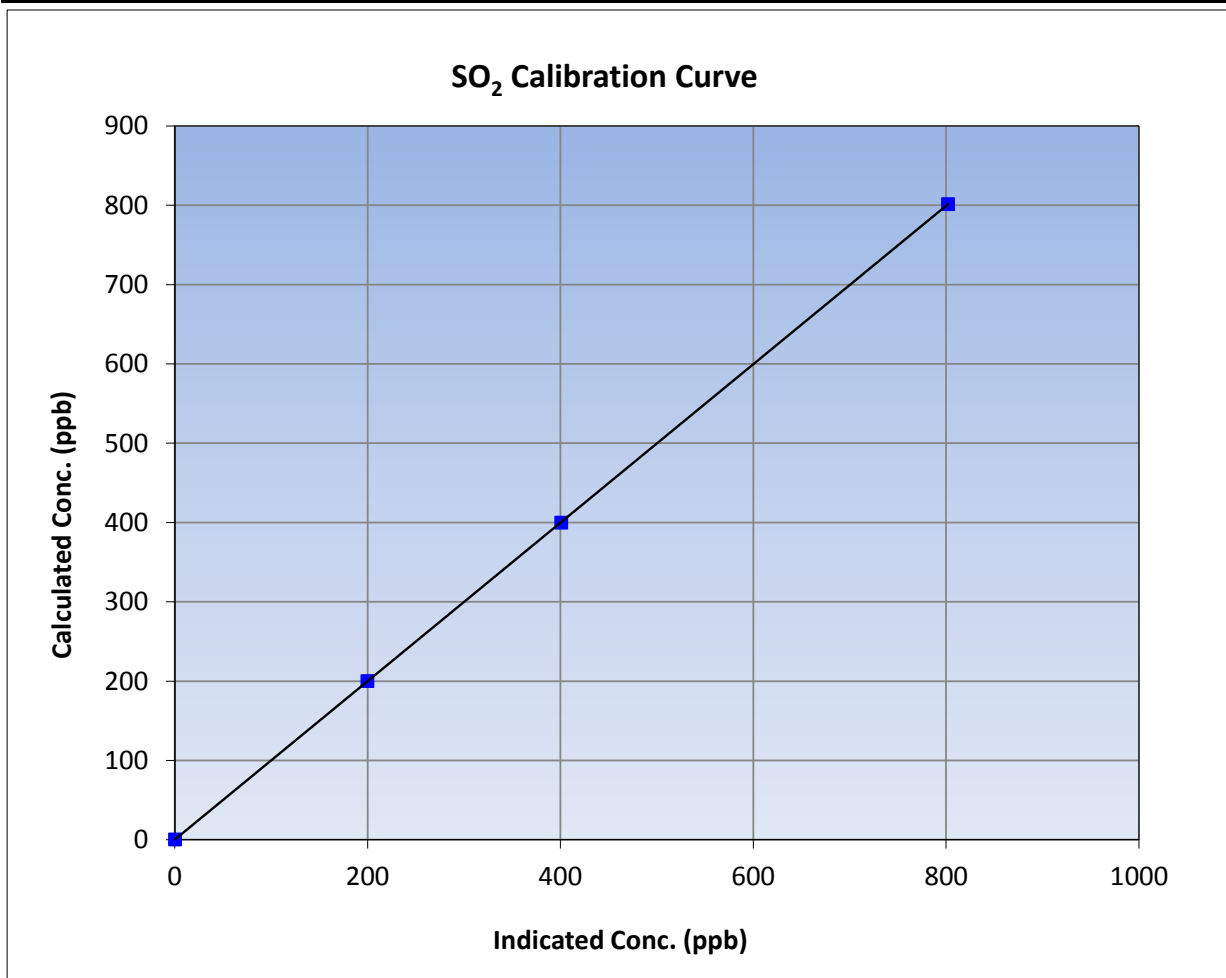
Version-03-2017

Station Information

Calibration Date	June 22, 2017	Previous Calibration	May 5, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:50	End Time (MST)	11:25
Analyzer make	Thermo 43i	Analyzer serial #	JC1327300932

Calibration Data

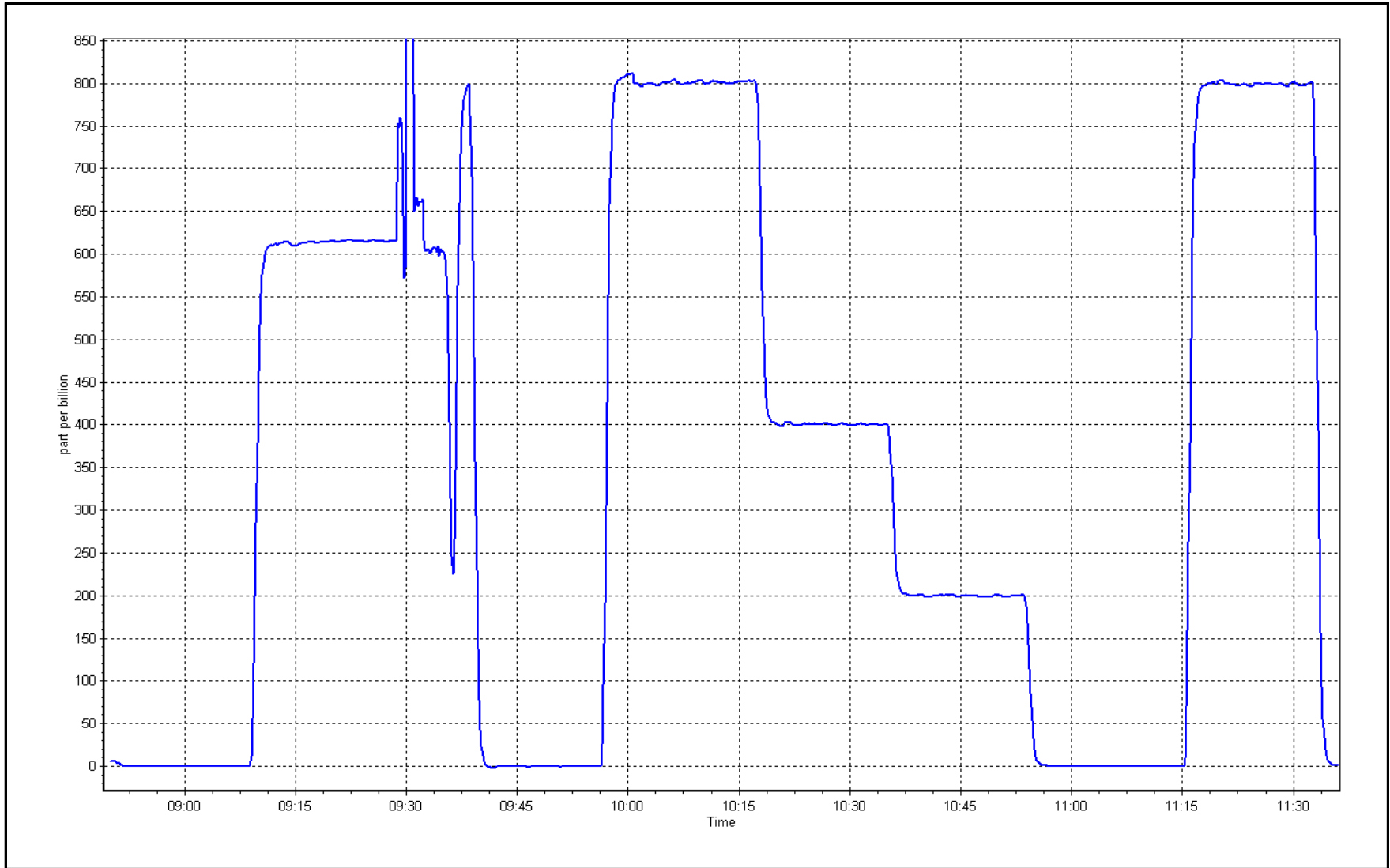
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999999	≥0.995
801.1	801.5	0.9994			
399.7	400.4	0.9981	Slope	0.999111	0.90 - 1.10
199.8	199.5	1.0013			
			Intercept	0.099867	+/-30



SO2 Calibration Plot

Date: June 22, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

H₂S Calibration Summary

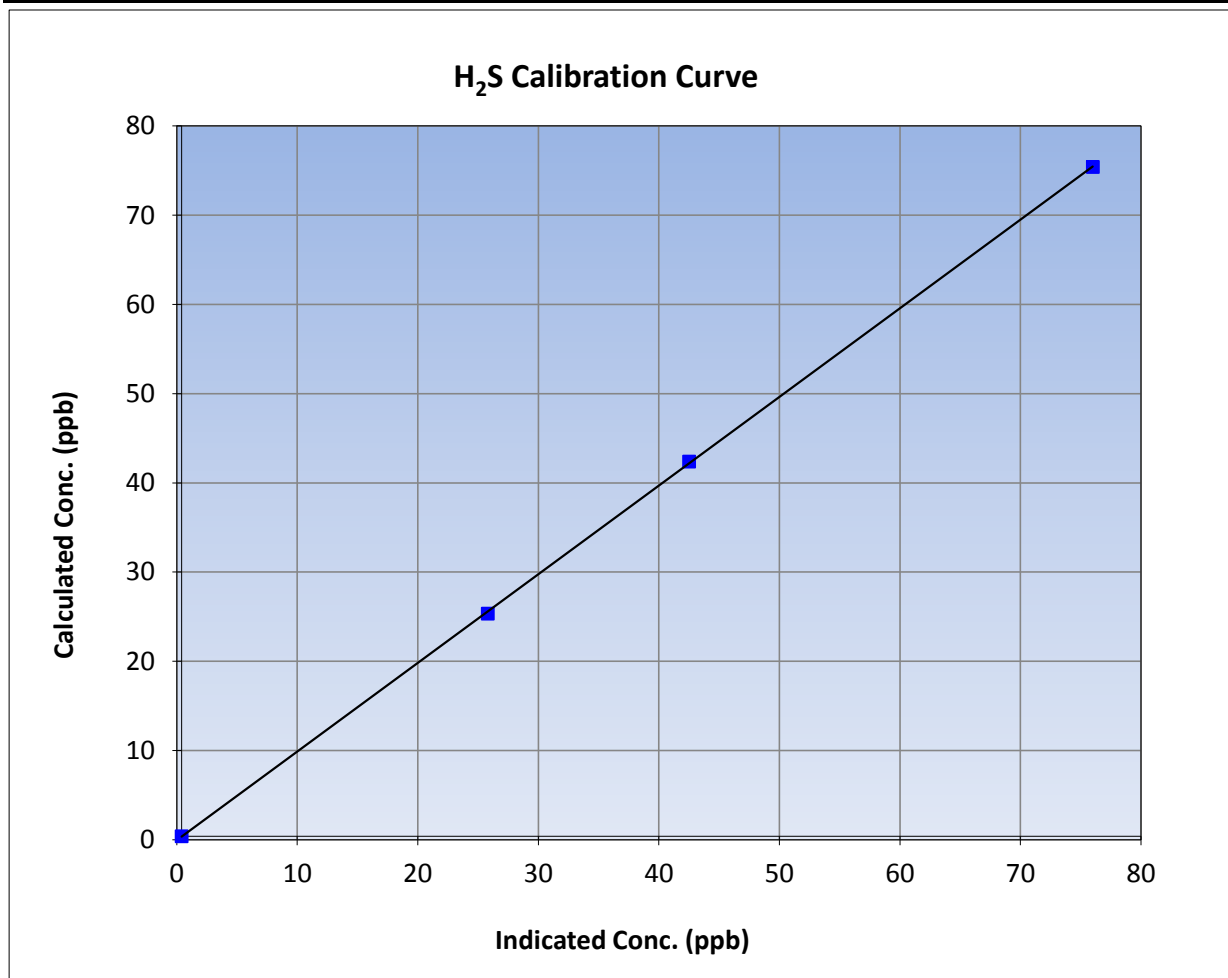
Version-03-2017

Station Information

Calibration Date	June 19, 2017	Previous Calibration	May 5, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:45	End Time (MST)	12:42
Analyzer make	Thermo 450i	Analyzer serial #	1336160094

Calibration Data

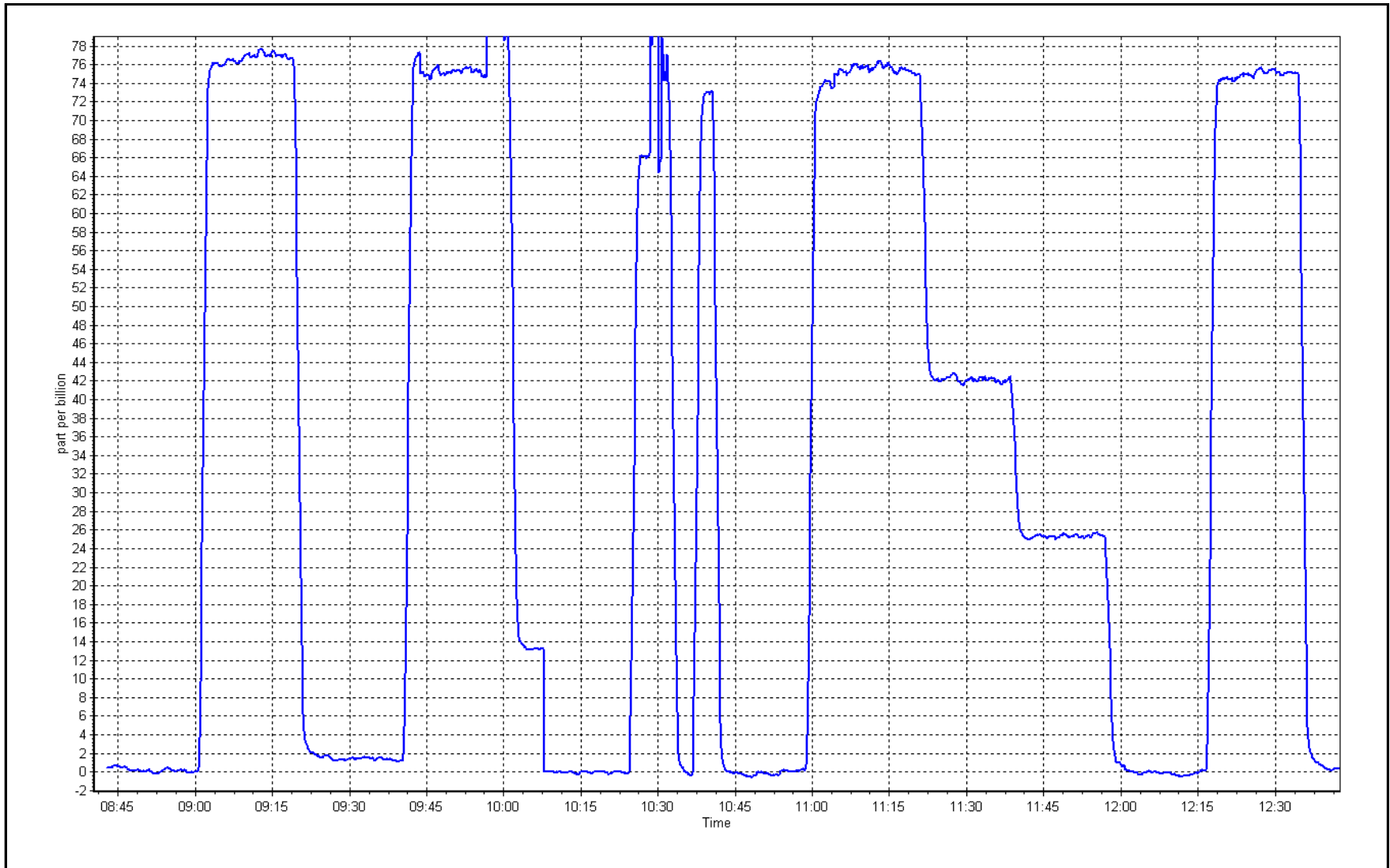
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient	≥0.995
75.0	75.6	0.9922		
42.0	42.1	0.9971	Slope	0.90 - 1.10
25.0	25.4	0.9824		
			Intercept	+/-3



H₂S Calibration Plot

Date: June 19, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Buffalo Viewpoint	Station number:	AMS 04
Calibration Date:	June 22, 2017	Last Cal Date:	May 20, 2017
Start time (MST):	8:50	End time (MST):	11:34
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL107929	Cal Gas Expiry Date	September-08-18
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11551008
ZAG Make/Model	API 701	Serial Number	4297

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1170050149
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-287.0
Calculated slope	1.004560	Sample pressure	8.7
Calculated intercept	-0.104661	Fuel pressure	19.3
Analyzer Background	3.490	Air pressure	34.6
Analyzer Coefficient	3.899	Flame temperature	147.7

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.00	-0.06	----
as found span	4938	60.3	12.80	12.65	1.012
calibrator zero	5000	0.0	0.00	-0.01	----
high point	4914	80.5	17.10	17.05	1.003
second point	4959	40.2	8.53	8.52	1.002
third point	4981	20.1	4.27	4.27	0.999
as left zero	5000	0.0	0.00	0.02	----
as left span	4914	80.5	17.10	17.09	1.001
Average Correction Factor					1.001
Corrected As found	12.71	Previous response	12.85	*% change	1.1%

* = > +/-5% change initiates investigation

Notes: Hydrogen changed out, zero adjusted, calibration points switched to 17.10, 8.53, 4.27ppm

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

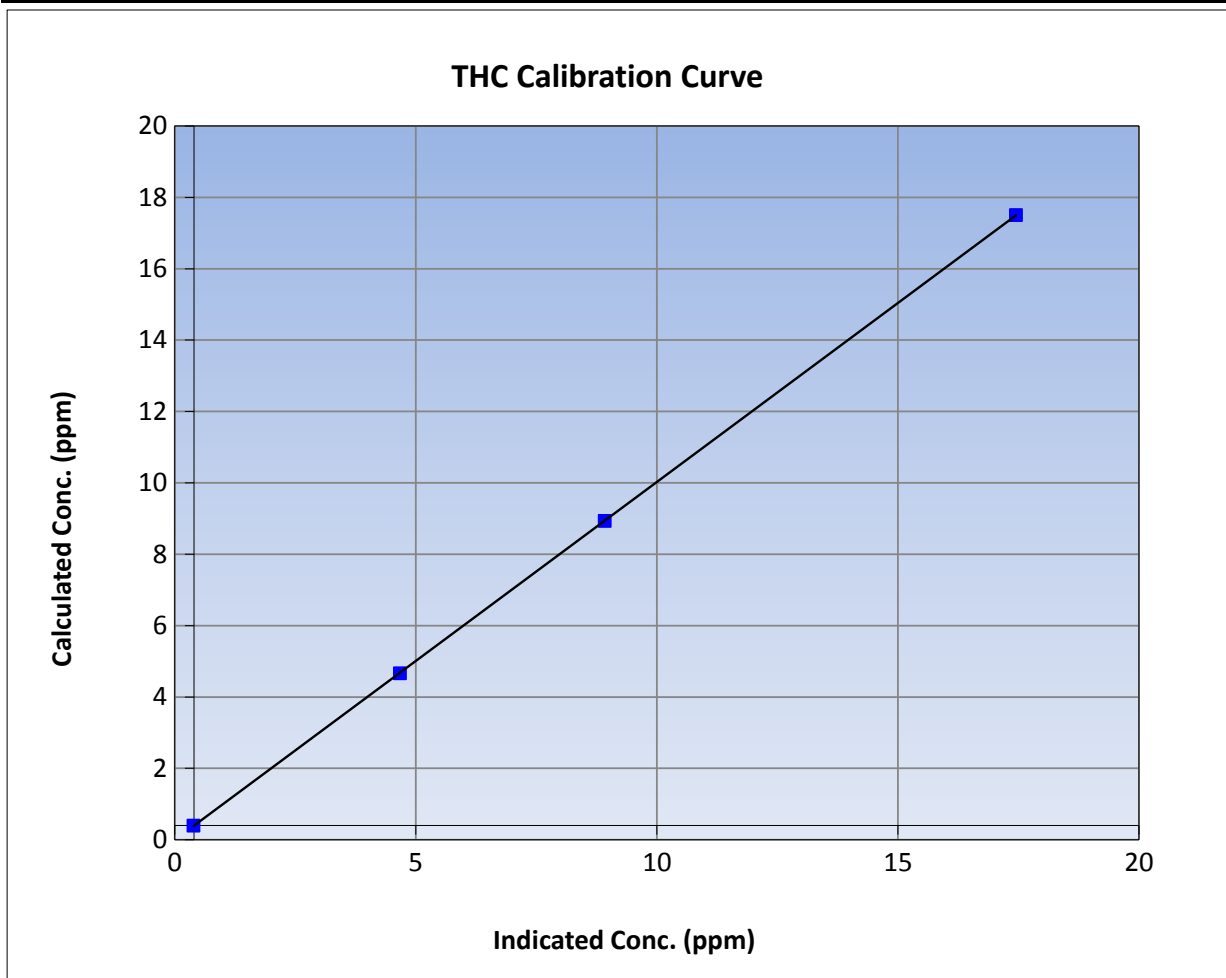
Version-03-2017

Station Information

Calibration Date	June 22, 2017	Previous Calibration	May 20, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:00	End Time (MST)	11:34
Analyzer make	Thermo 51i-LT	Analyzer serial #	1170050149

Calibration Data

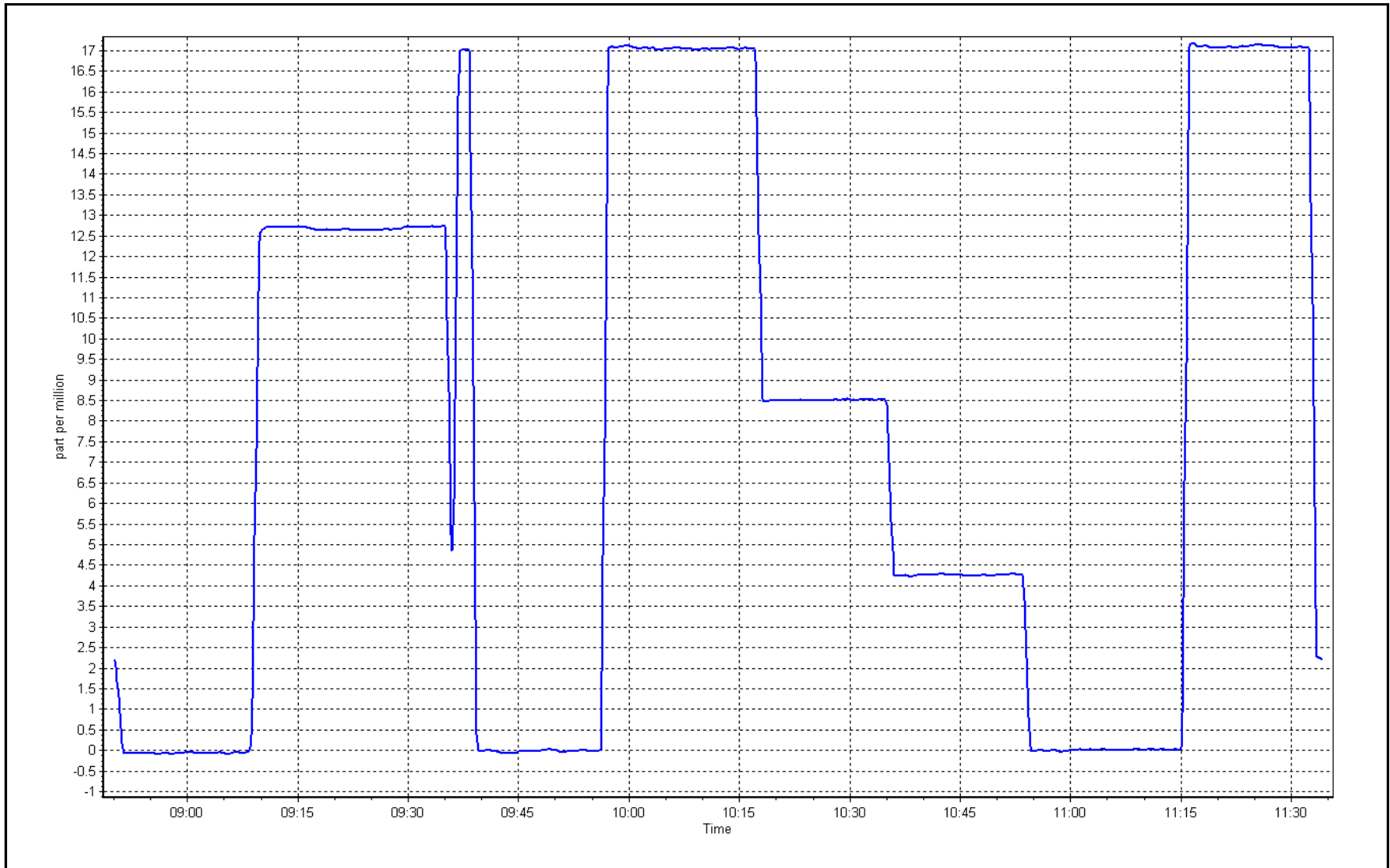
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999997	
17.1	17.1	1.0032			≥0.995
8.5	8.5	1.0016	Slope	1.003030	
4.3	4.3	0.9989			0.90 - 1.10
			Intercept	-0.004089	+/-1.5



THC Calibration Plot

Date: June 22, 2017

Location: Buffalo Viewpoint





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 5
MANNIX
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)

JUNE 2017

MONTHLY SUMMARY for
AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	48	0	10	0
H2S (ppb) Average	686	34	34	100	5	0	2	0
THC (ppm) Average	687	33	33	100	3.6	-	2.5	-
Temperature 2 m (C) Average	720	0	0	100	27.3	-	21.7	-
Temperature 20 m (C) Average	720	0	0	100	27.5	-	22.2	-
Temperature 45 m (C) Average	720	0	0	100	27.3	-	22	-
Temperature 75 m (C) Average	720	0	0	100	26.9	-	21.8	-
Temperature 90 m (C) Average	720	0	0	100	26.8	-	21.7	-
Relative Humidity 2 m (%) Average	720	0	0	100	97	-	93	-
Relative Humidity 20 m (%) Average	720	0	0	100	96	-	88	-
Relative Humidity 45 m (%) Average	720	0	0	100	97	-	88	-
Relative Humidity 75 m (%) Average	720	0	0	100	98	-	87	-
Relative Humidity 90 m (%) Average	720	0	0	100	98	-	88	-
Wind Speed 20 m (km/h) Average	720	0	0	100	35	-	21	-
Wind Speed 45 m (km/h) Average	720	0	0	100	41	-	27	-
Wind Speed 75 m (km/h) Average	720	0	0	100	45	-	30	-
Wind Speed 90 m (km/h) Average	720	0	0	100	47	-	32	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 75 m (deg) Average	720	0	0	100	-	-	-	-
Wind Direction 90 m (deg) Average	720	0	0	100	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0	0	100	1.6	-	0.9	-
Vertical Wind Speed 45 m (km/h) Average	720	0	0	100	2.5	-	1.7	-
Vertical Wind Speed 75 m (km/h) Average	720	0	0	100	1.3	-	0.6	-
Vertical Wind Speed 90 m (km/h) Average	720	0	0	100	2.1	-	0.9	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
<hr/>				
No operational issues to report				

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	2.2	5	-	0	0	0	0	2	6	48
H2S (ppb) Average	686	0.5	1	-	0	0	0	0	1	1	5
THC (ppm) Average	687	2.29	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.6
Temperature 2 m (C) Average	720	16.14	4.7	-	4.9	10.3	12.5	15.9	19.6	22.5	27.3
Temperature 20 m (C) Average	720	16.29	4.5	-	6.6	10.8	13	16	19.5	22.4	27.5
Temperature 45 m (C) Average	720	16.16	4.4	-	6.5	10.6	12.9	15.9	19.3	22.3	27.3
Temperature 75 m (C) Average	720	16	4.4	-	6.5	10.4	12.9	15.7	19	22.1	26.9
Temperature 90 m (C) Average	720	15.94	4.4	-	6.4	10.4	13	15.6	18.9	21.9	26.8
Relative Humidity 2 m (%) Average	720	63.6	21	-	24	34	45	64	83	93	97
Relative Humidity 20 m (%) Average	720	59.4	21	-	21	30	41	59	77	89	96
Relative Humidity 45 m (%) Average	720	58.7	21	-	20	30	41	59	76	89	97
Relative Humidity 75 m (%) Average	720	58.2	21	-	21	30	40	57	76	89	98
Relative Humidity 90 m (%) Average	720	58.2	21	-	21	30	40	57	76	89	98
Wind Speed 20 m (km/h) Average	720	10.5	6	-	0	4	6	9	14	20	35
Wind Speed 45 m (km/h) Average	720	14.4	8	-	1	5	8	13	19	27	41
Wind Speed 75 m (km/h) Average	720	15.9	9	-	1	5	8	14	22	30	45
Wind Speed 90 m (km/h) Average	720	16.9	10	-	1	6	9	15	24	32	47
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	720	0.21	0.4	-	-0.9	-0.3	-0.1	0.1	0.5	0.8	1.6
Vertical Wind Speed 45 m (km/h) Average	720	0.22	0.8	-	-2	-0.7	-0.2	0.1	0.7	1.2	2.5
Vertical Wind Speed 75 m (km/h) Average	720	0.24	0.4	-	-1.2	-0.3	0	0.2	0.5	0.8	1.3
Vertical Wind Speed 90 m (km/h) Average	720	0.4	0.4	-	-0.8	0	0.1	0.4	0.6	0.8	2.1



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 48 ppb on Jun 2 10:00	Maximum Daily Average: 10.5 ppb on Jun 14		Hours of Data:	686
Minimum Value: 0 ppb on Jun 18 16:00	Minimum Daily Average: 0.1 ppb on Jun 28		Hours of Missing Data:	34
Maximum Diurnal Average: 6.9 ppb at hour 10	Minimum Diurnal Average: 0.6 ppb at hour 22		Hours of Calibration:	34
Monthly Average: 2.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 29		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
2-Jun	0	0	0	Z	0	0	0	1	23	48	11	3	9	4	3	1	0	0	0	0	0	0	0	0	4.5	48
3-Jun	0	0	0	0	Z	0	0	2	4	1	1	1	0	5	28	19	12	9	5	4	2	1	1	1	4.2	28
4-Jun	1	1	0	0	0	Z	1	9	5	19	6	19	13	2	6	3	10	4	4	1	3	2	0	33	6.2	33
5-Jun	Z	4	0	1	2	2	9	7	1	1	2	4	12	6	6	3	0	0	0	0	0	0	0	0	2.7	12
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	0	0.4	2
7-Jun	2	2	Z	4	3	5	8	17	11	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2.5	17
8-Jun	0	0	5	Z	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6
9-Jun	0	0	0	0	Z	4	6	18	14	9	4	C	C	C	C	1	0	0	0	0	0	0	0	0	3.0	18
10-Jun	0	0	0	0	0	Z	0	0	3	5	2	6	6	2	4	3	4	3	0	1	2	1	2	2	2.0	6
11-Jun	Z	1	0	1	3	6	8	6	2	2	2	1	1	1	1	1	1	1	1	2	0	0	0	0	1.8	8
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	4	3	0	0	0	0	0	2	7	0.9	7
13-Jun	2	3	Z	2	1	4	37	7	13	44	5	4	2	7	7	5	2	0	21	14	0	0	15	8.5	44	
14-Jun	6	24	4	Z	31	30	4	11	7	18	11	7	15	27	5	16	7	1	8	2	2	5	1	1	10.5	31
15-Jun	1	1	1	4	Z	4	0	0	0	0	1	3	4	1	0	0	1	0	0	0	0	1	1	0	1.1	4
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jun	Z	0	0	0	0	0	0	0	0	5	3	8	11	22	1	2	3	2	3	5	2	1	1	0	3.1	22
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0.2	2
19-Jun	0	0	Z	0	0	0	1	6	5	7	10	4	0	0	0	0	0	0	0	0	0	0	0	0	1.5	10
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	6	0.4	6
22-Jun	1	1	4	1	1	Z	1	1	1	3	1	1	1	0	2	1	0	2	2	1	0	0	1	0	1.1	4
23-Jun	Z	0	0	0	1	1	1	3	2	2	1	0	1	1	1	2	3	0	0	1	1	1	0	0	1.0	3
24-Jun	0	Z	0	0	0	0	0	2	47	24	9	3	1	2	0	7	0	1	2	0	0	0	0	0	4.3	47
25-Jun	0	0	Z	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jun	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jun	Z	0	0	0	0	0	0	0	22	16	2	4	13	16	7	5	2	1	4	4	2	0	0	0	4.4	22
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

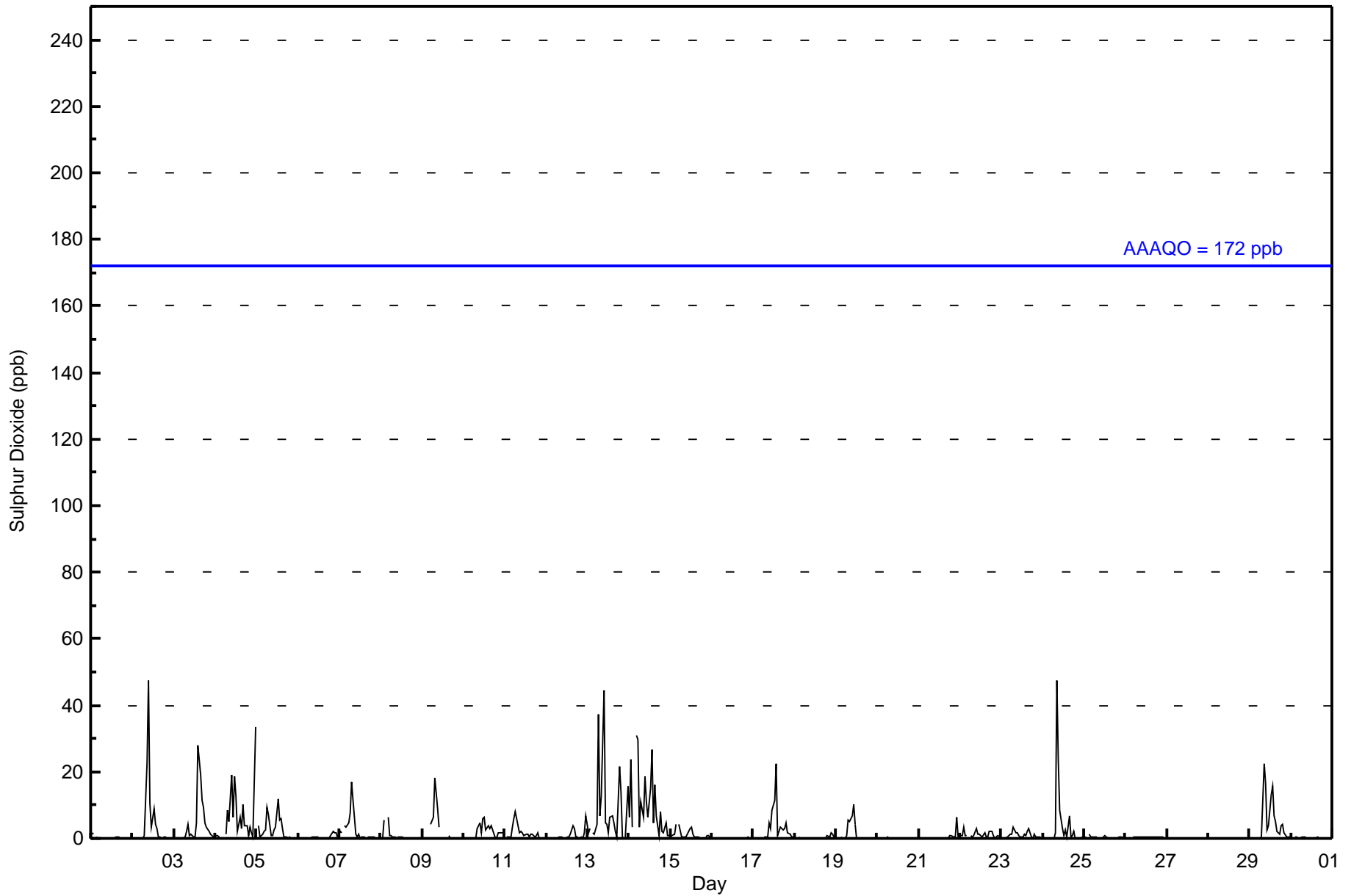
0.6	1.5	0.7	0.6	2.1	2.4	2.7	3.1	5.4	6.9	2.4	2.4	3.2	3.4	2.5	2.5	1.7	0.9	1.8	1.3	0.6	0.6	0.6	2.1	Diurnal Average	
6	24	5	4	31	30	37	18	47	48	11	19	15	27	28	19	12	9	21	14	3	5	6	33	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	648	94.46	94.46
11 - 20	23	3.35	97.81
21 - 60	15	2.19	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mannix - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	32	25	33	24	27	100	77	26	16	18	26	74	31	37	63	648
11 - 20	11	1	1	0	1	1	0	0	0	0	0	1	4	3	0	0	23
21 - 60	8	1	0	1	0	0	1	0	0	0	0	0	0	0	2	2	15
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	34	26	34	25	28	101	77	26	16	18	27	78	34	39	65	686

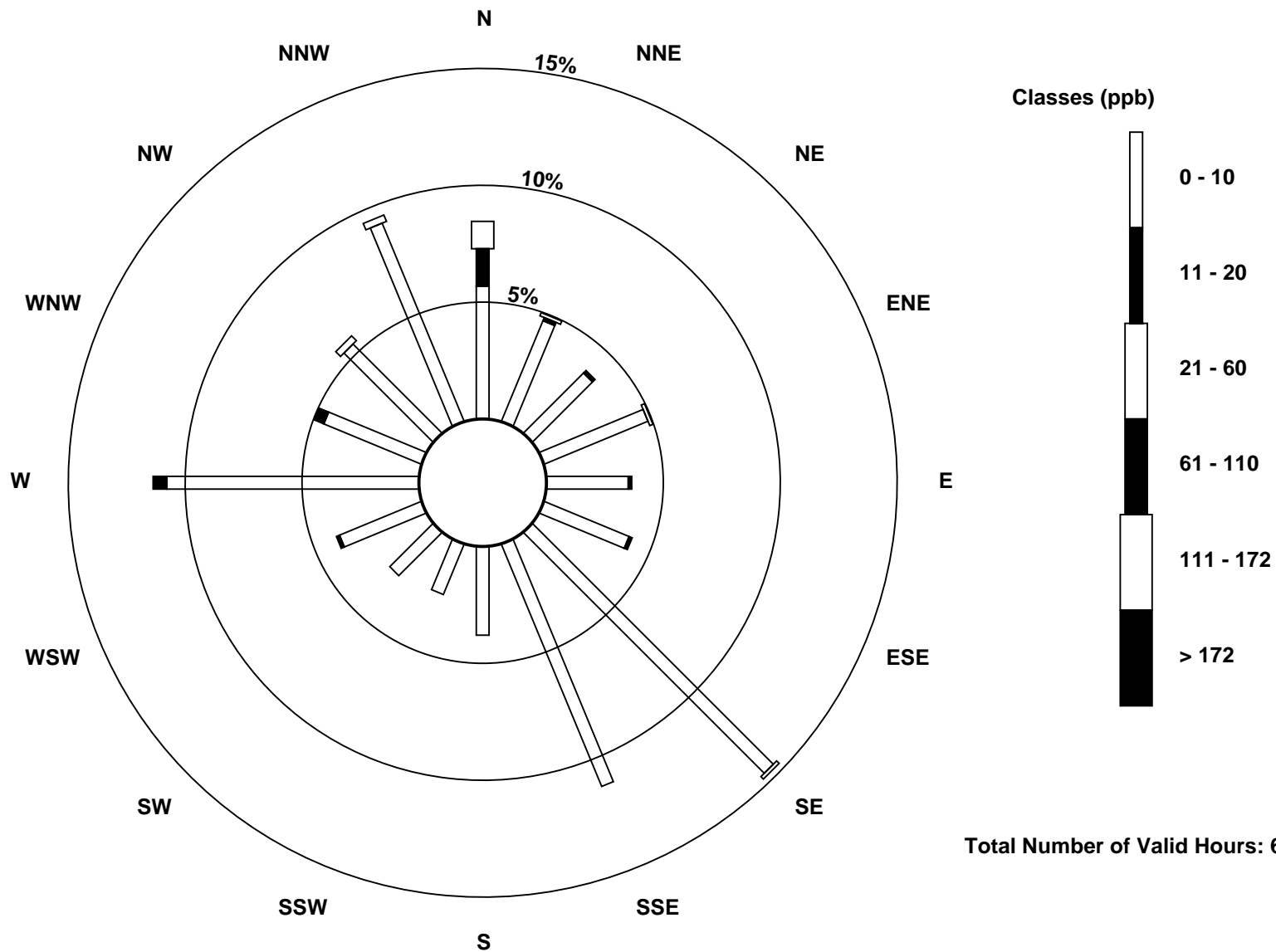
Total Number of Valid Hours: 686

Total Number of Hours: 720

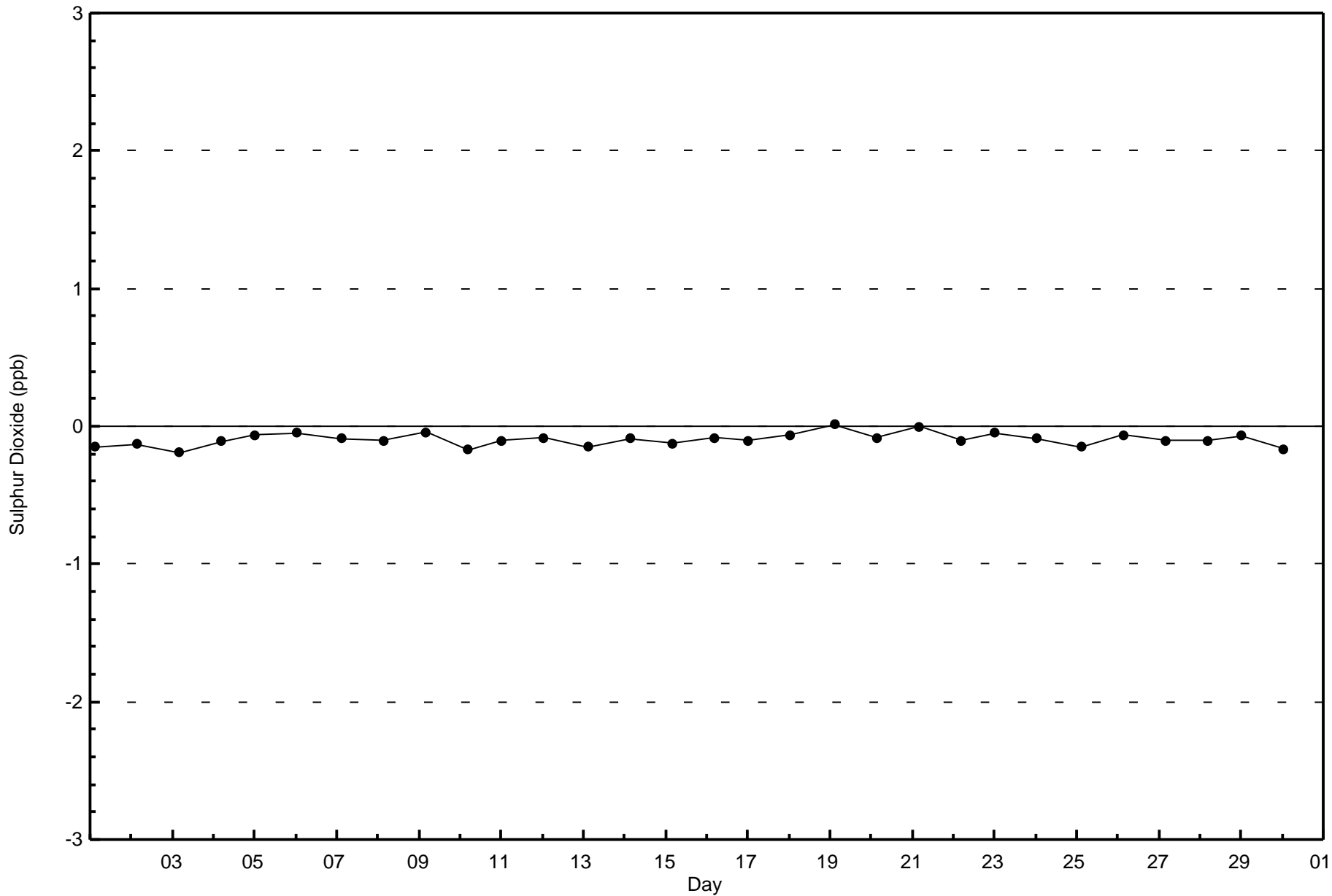


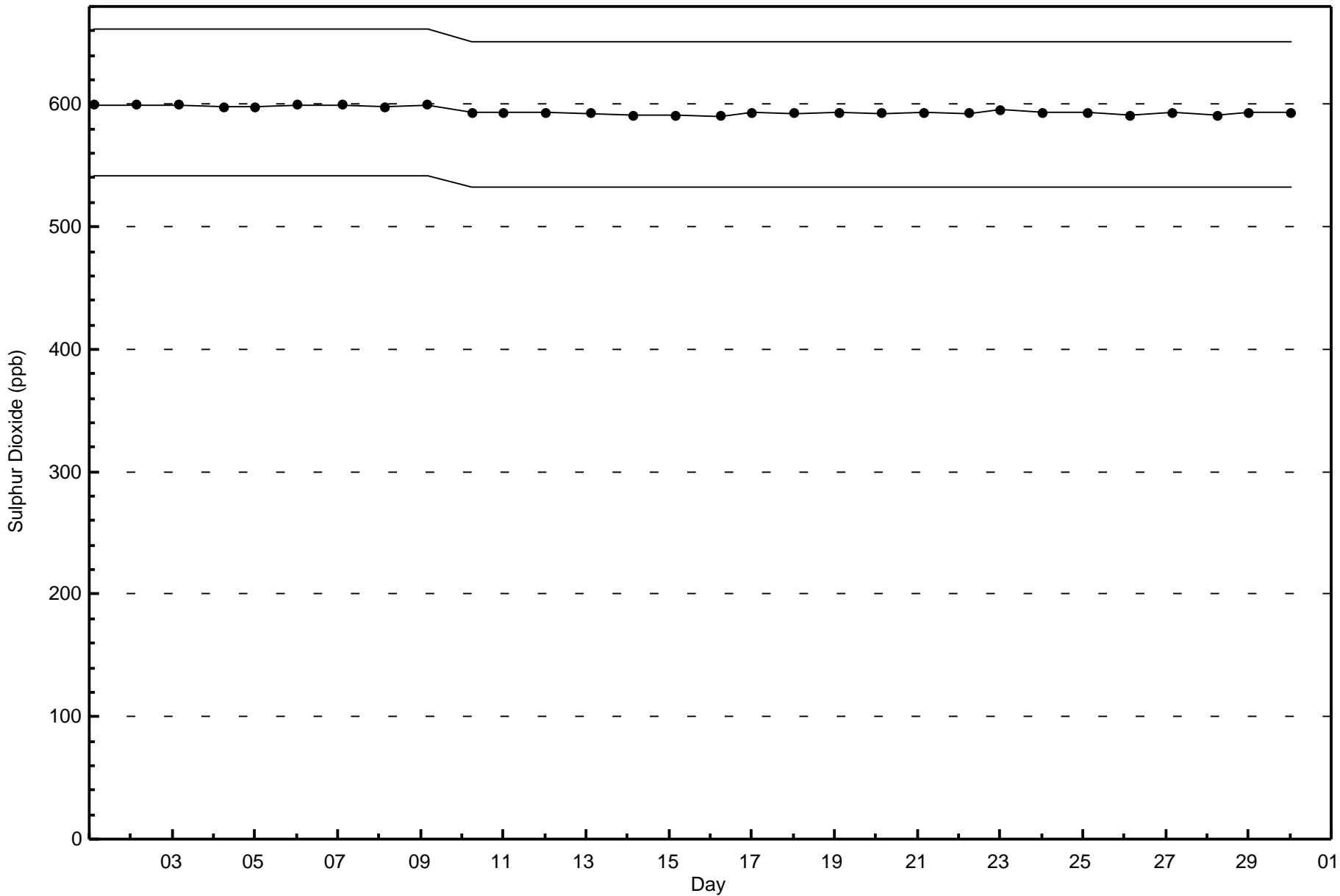
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Mannix (AMS 5)



Total Number of Valid Hours: 686





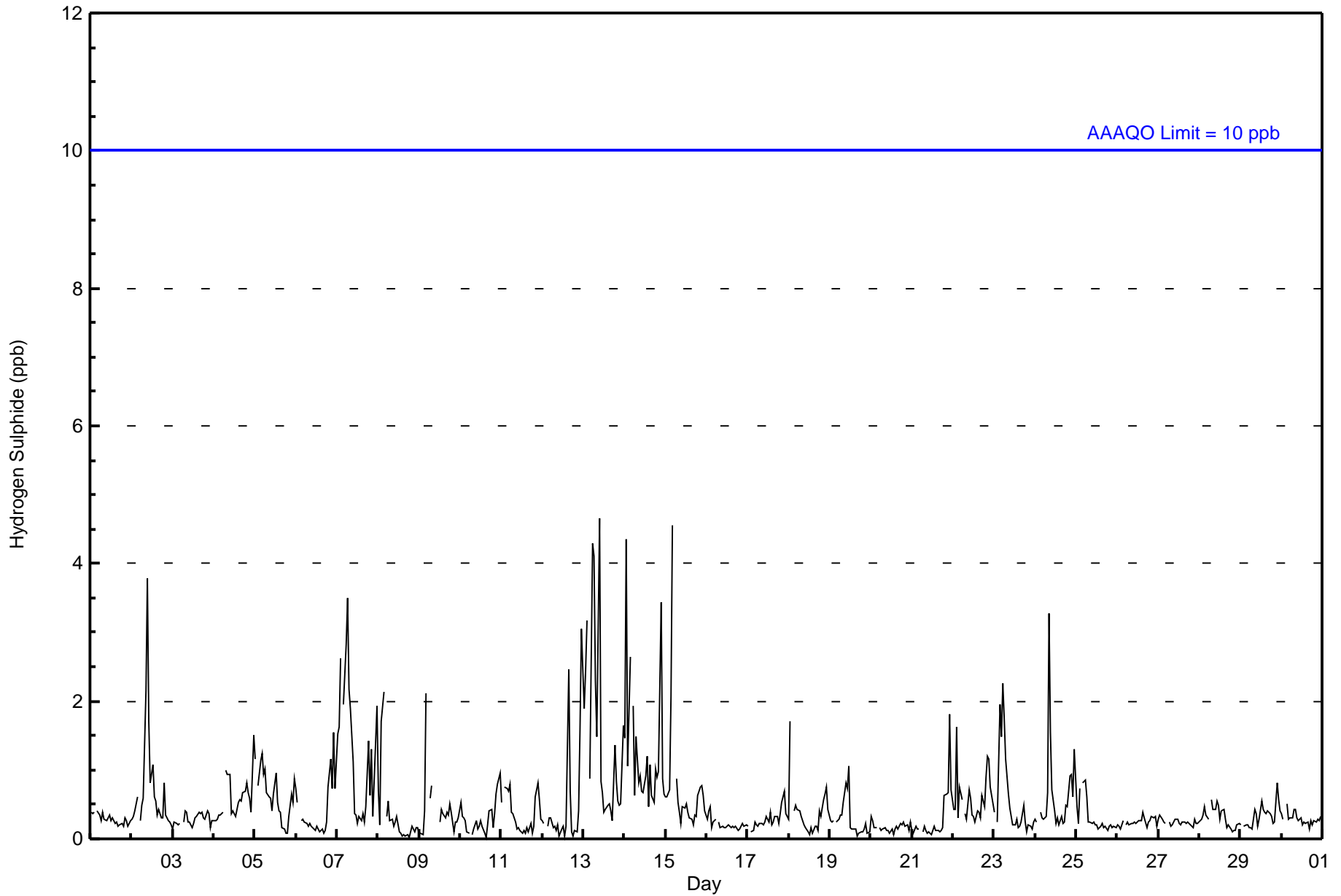


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppb on Jun 13 10:00	Maximum Daily Average: 1.5 ppb on Jun 13		Hours of Data:	686
Minimum Value: 0 ppb on Jun 8 19:00	Minimum Daily Average: 0.2 ppb on Jun 20		Hours of Missing Data:	34
Maximum Diurnal Average: 0.8 ppb at hour 6	Minimum Diurnal Average: 0.3 ppb at hour 15		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
2-Jun	0	0	0	1	Z	0	0	1	2	4	2	1	1	1	1	0	0	0	0	1	0	0	0	0	0.7	4
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
4-Jun	0	0	0	0	0	0	Z	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	2	0.6	2
5-Jun	1	Z	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	1	1	1	0.6	1
6-Jun	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0.4	2
7-Jun	2	2	3	Z	2	3	4	2	2	1	0	0	0	0	0	0	0	0	1	1	1	0	1	2	1.2	4
8-Jun	1	0	2	2	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
9-Jun	0	0	0	0	2	Z	1	1	C	C	C	C	0	0	0	0	0	0	1	0	0	0	0	0	0.4	2
10-Jun	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
11-Jun	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.4	1
12-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	2	3	0.5	3
13-Jun	2	2	3	Z	1	4	4	2	1	5	1	1	0	0	1	0	0	1	1	1	1	0	1	2	1.5	5
14-Jun	1	4	1	3	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1.3	4
15-Jun	1	1	1	2	5	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0.7	5
16-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1
18-Jun	0	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.4	2
19-Jun	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	0.3	2
22-Jun	0	0	2	0	1	1	Z	0	0	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	0.6	2
23-Jun	0	Z	0	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
24-Jun	0	0	Z	0	0	0	0	1	3	2	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0.6	3
25-Jun	0	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
30-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1

0.5	0.7	0.7	0.7	0.8	0.8	0.7	0.6	0.6	0.7	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.5	0.6	0.5	0.6	Diurnal Average	
2	4	3	3	5	4	4	2	3	5	2	1	1	1	1	2	1	1	1	1	1	3	2	3	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	672	97.96	97.96
3 - 4	12	1.75	99.71
5 - 7	2	0.29	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



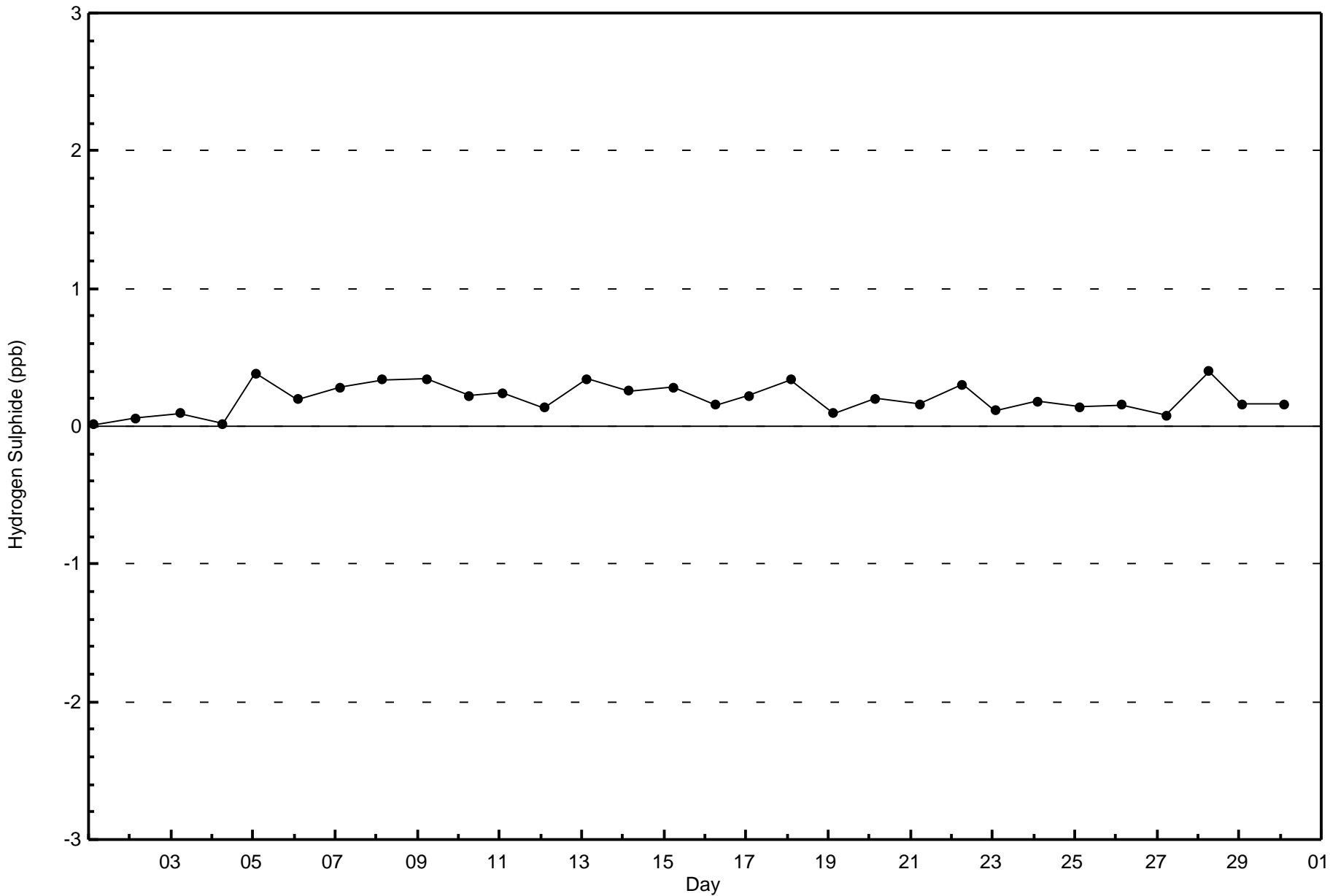
Wood Buffalo Environmental Association
Frequency Distribution

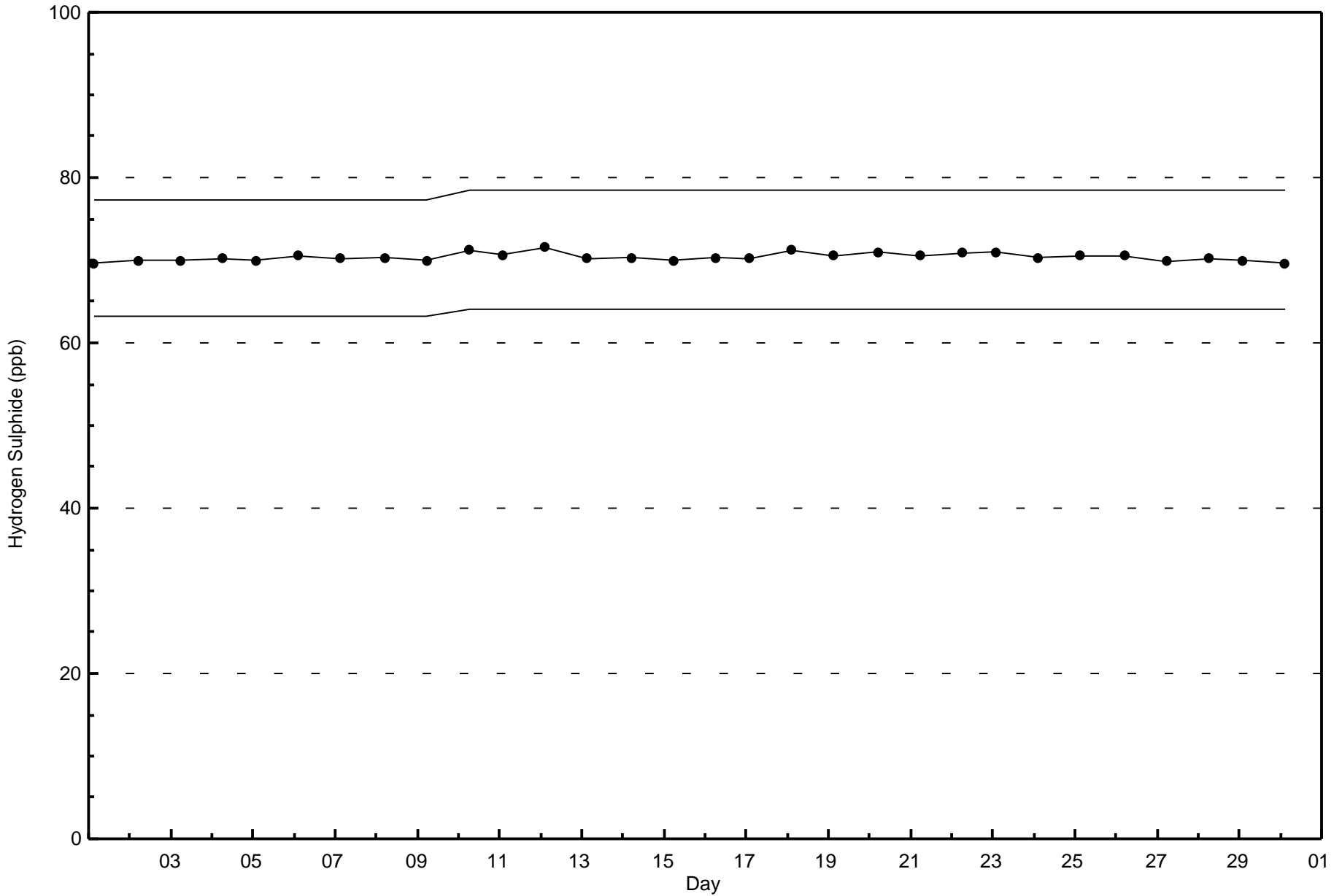
Hydrogen Sulphide (H₂S) - ppb
Mannix - June 2017

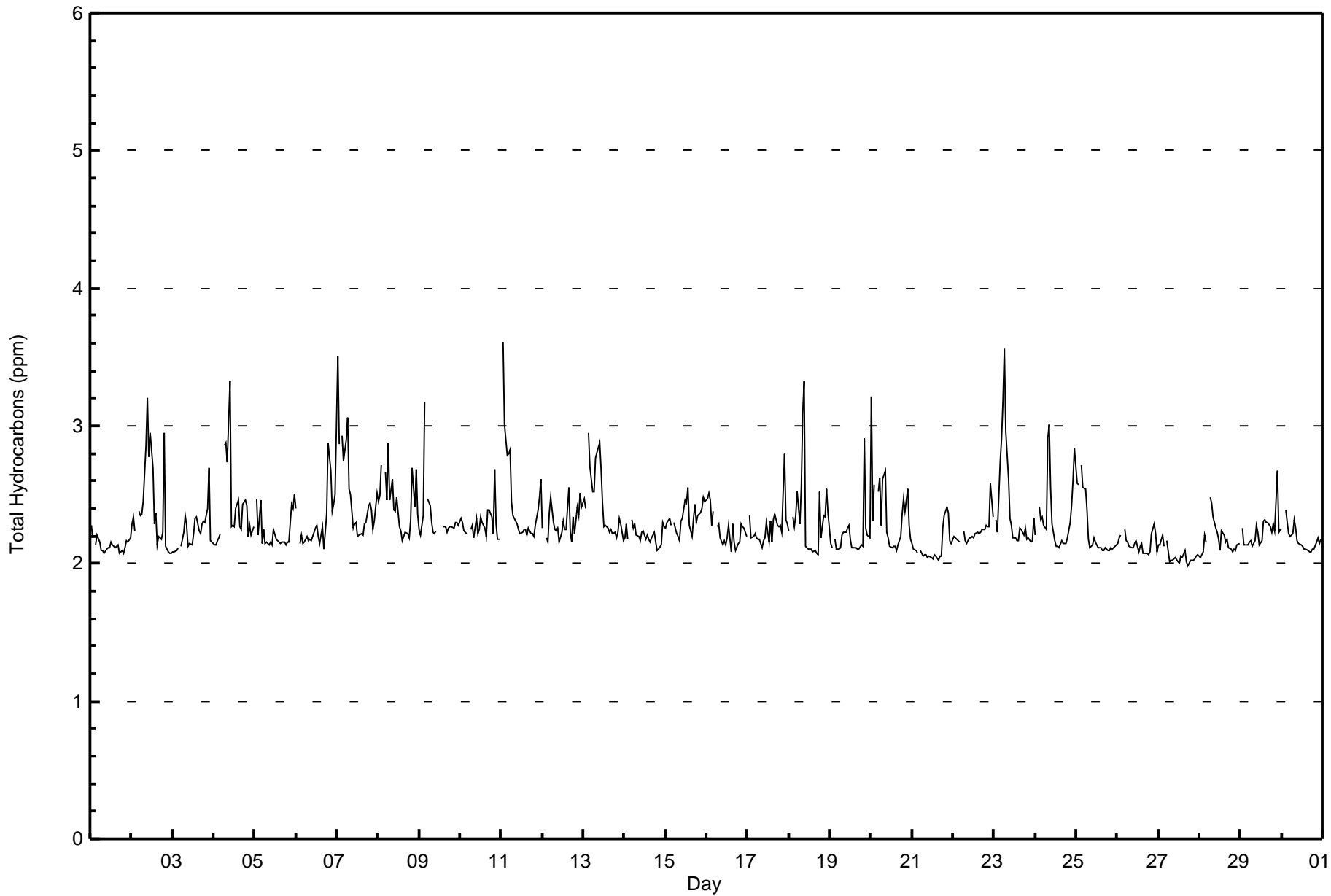
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	50	33	27	33	24	27	102	76	24	16	20	27	80	33	36	64	672
3 - 4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	12
5 - 7	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	33	27	34	24	27	102	76	24	16	20	27	80	33	37	67	686

Total Number of Valid Hours: 686

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	19	2.77	2.77
2.1 - 3.0	657	95.63	98.40
3.1 - 10.0	11	1.60	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mannix - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	1	0	0	1	5	1	2	4	5	0	0	0	19
2.1 - 3.0	57	34	25	34	23	28	100	74	21	15	16	23	73	31	39	64	657
3.1 - 10.0	2	0	1	0	1	0	1	2	0	0	0	0	0	3	0	1	11
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	59	34	26	34	25	28	101	77	26	16	18	27	78	34	39	65	687

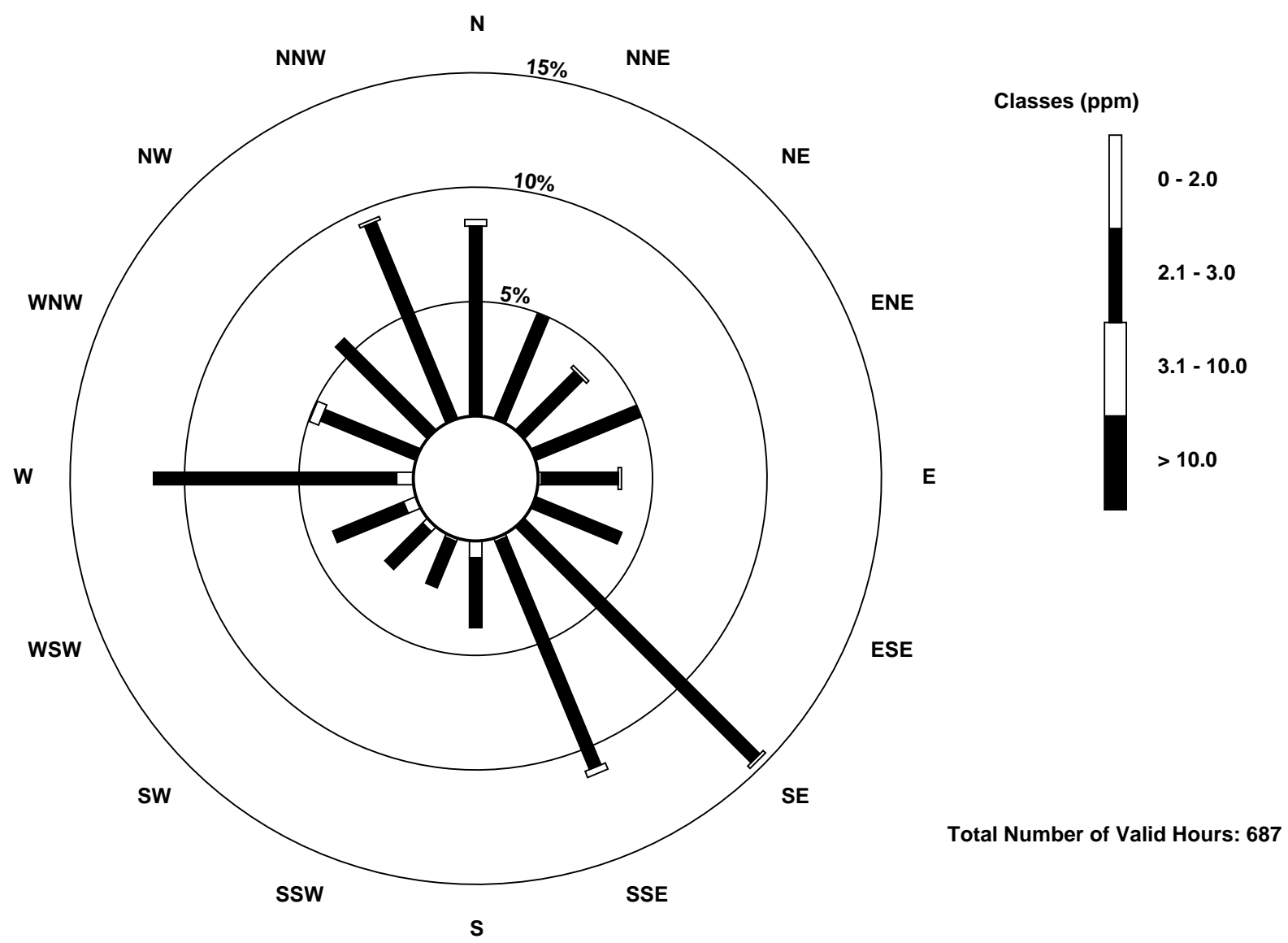
Total Number of Valid Hours: 687

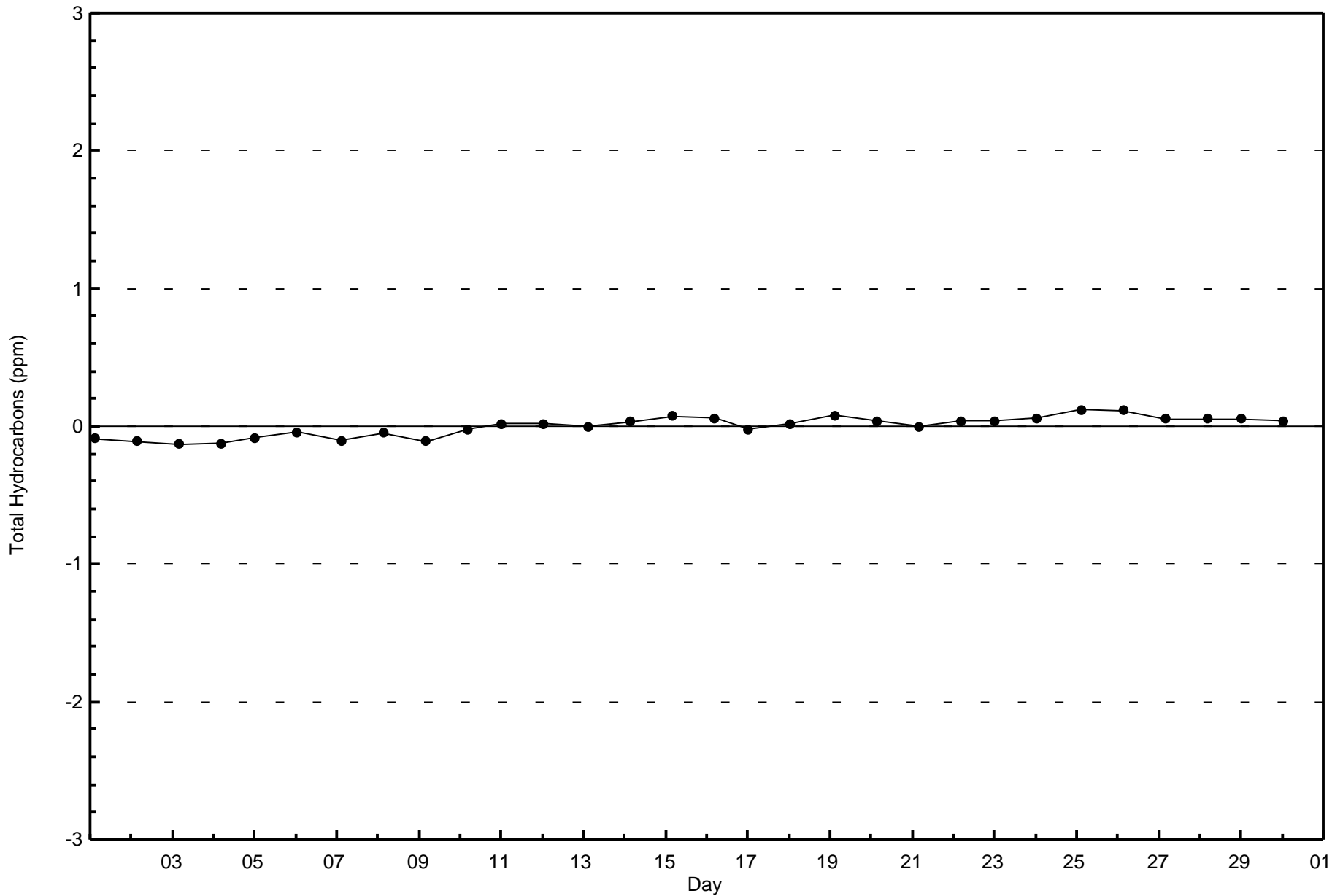
Total Number of Hours: 720

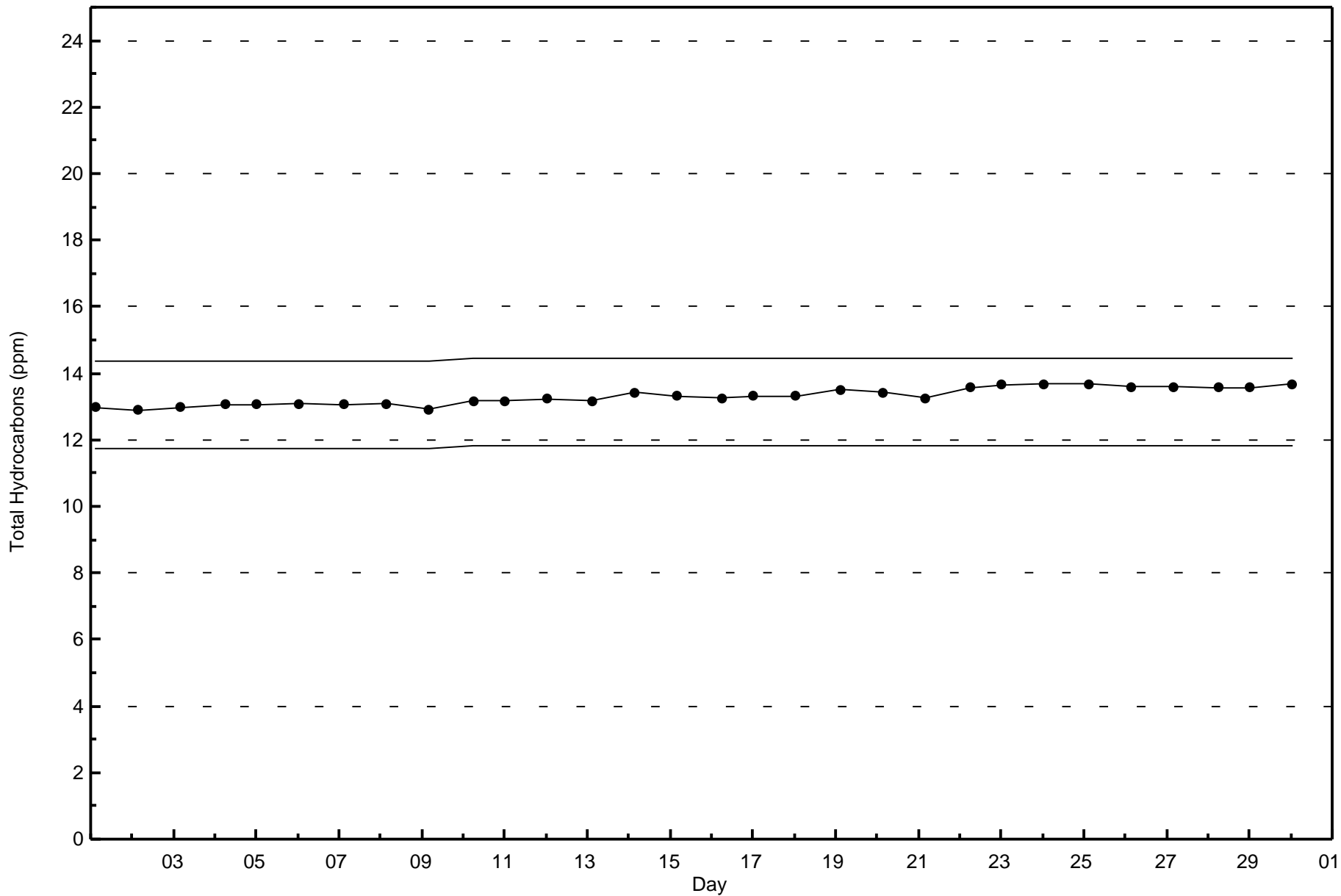


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Mannix (AMS 5)







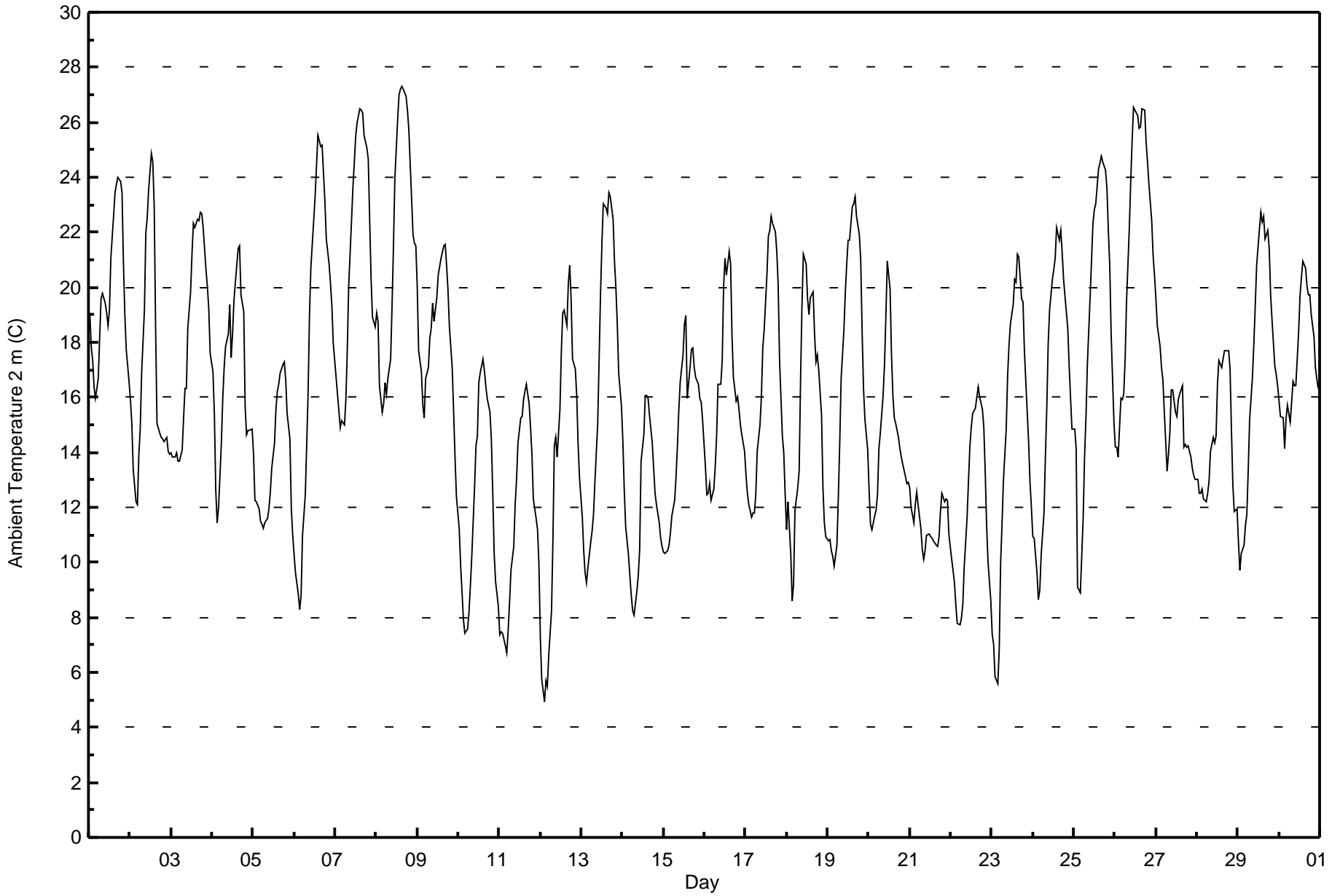


Maximum Value: 27.3 C on Jun 8 16:00		Maximum Daily Average: 21.7 C on Jun 8		Hours in Service: 720																																												
Minimum Value: 4.9 C on Jun 12 03:00		Minimum Daily Average: 11.4 C on Jun 21		Hours of Data: 720																																												
Maximum Diurnal Average: 20.3 C at hour 15		Minimum Diurnal Average: 11.3 C at hour 4		Hours of Missing Data: 0																																												
Monthly Average: 16.14 C		Percentiles: P ₁ = 6.7 P ₁₀ = 10.3 Q ₁ = 12.5 Median = 15.9 Q ₃ = 19.6 P ₉₀ = 22.5 P ₉₉ = 26.5		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	19.0	17.8	17.3	16.3	16.0	16.7	18.2	19.6	19.8	19.4	19.1	18.6	19.2	21.0	22.7	23.4	23.8	24.0	23.9	23.4	20.9	19.0	17.8	16.6	19.7	24.0																						
2-Jun	15.9	15.1	13.4	12.2	12.1	13.9	14.8	16.9	19.2	21.9	22.5	23.6	24.8	24.6	22.9	18.5	15.1	14.7	14.5	14.5	14.4	14.5	14.0	14.0	17.0	24.8																						
3-Jun	14.0	13.8	13.8	14.0	13.7	13.7	14.1	15.3	16.3	16.3	18.5	19.8	21.2	22.3	22.2	22.5	22.4	22.7	22.7	22.1	20.6	20.0	19.2	17.6	18.3	22.7																						
4-Jun	16.9	15.4	12.6	11.5	12.0	14.3	16.0	17.1	17.8	18.3	19.4	17.4	18.3	19.5	20.8	21.4	21.5	19.7	19.1	15.7	14.6	14.8	14.8	14.9	16.8	21.5																						
5-Jun	14.0	12.2	12.2	12.0	11.5	11.4	11.2	11.4	11.6	12.0	12.5	13.4	14.4	15.5	16.2	16.5	16.9	17.2	17.3	16.7	15.4	14.5	11.9	11.0	13.7	17.3																						
6-Jun	10.3	9.6	8.8	8.3	8.8	11.0	12.5	14.3	16.2	19.0	20.7	22.4	23.3	24.4	25.5	25.1	25.2	24.1	23.2	21.8	20.8	20.1	19.3	18.0	18.0	25.5																						
7-Jun	16.7	16.1	15.5	14.9	15.2	15.0	15.9	17.7	20.0	22.4	23.6	24.5	25.5	26.0	26.5	26.4	26.4	25.6	25.0	24.6	22.5	20.4	18.9	18.6	21.0	26.5																						
8-Jun	19.1	18.8	16.4	15.5	15.8	16.5	16.1	16.7	17.4	19.3	21.4	24.0	26.1	27.0	27.2	27.3	27.2	26.9	26.4	25.7	24.5	21.9	21.6	21.5	21.7	27.3																						
9-Jun	20.0	17.7	16.9	15.7	15.2	16.7	17.1	18.1	18.5	19.4	18.8	19.6	20.4	20.8	21.0	21.5	21.6	20.8	19.9	18.6	17.1	15.5	13.8	12.4	18.2	21.6																						
10-Jun	11.2	9.9	9.0	7.9	7.4	7.6	8.2	9.1	10.2	12.8	14.2	14.6	16.5	16.9	17.4	17.0	16.4	16.0	15.4	14.4	12.5	10.3	9.3	8.4	12.2	17.4																						
11-Jun	7.4	7.5	7.4	7.0	6.7	7.5	8.5	9.7	10.6	12.1	13.0	14.4	15.3	15.3	15.9	16.2	16.5	15.8	14.9	13.9	12.3	11.6	11.2	9.9	11.7	16.5																						
12-Jun	7.3	5.8	4.9	5.7	5.5	6.6	8.2	10.8	14.2	14.5	13.8	15.6	17.6	19.0	19.2	18.6	20.1	20.8	19.6	17.4	17.0	16.1	14.3	13.1	13.6	20.8																						
13-Jun	11.7	10.4	9.6	9.2	9.8	10.7	11.2	11.7	12.9	15.1	17.3	19.7	21.5	23.0	22.9	22.7	23.4	23.3	22.5	21.0	20.0	18.6	16.9	15.7	16.7	23.4																						
14-Jun	14.4	12.6	11.3	10.2	9.5	8.8	8.2	8.1	9.0	9.5	10.5	13.7	14.6	16.1	16.1	16.0	15.4	14.4	13.4	12.5	12.1	11.4	10.9	10.6	12.1	16.1																						
15-Jun	10.4	10.3	10.4	10.7	11.1	11.7	12.3	13.1	14.3	15.5	16.6	17.6	18.7	19.0	16.0	17.1	17.7	17.8	17.1	16.7	16.5	16.0	15.8	15.1	14.9	19.0																						
16-Jun	13.5	12.4	12.5	12.8	12.2	12.6	13.5	14.6	16.4	16.5	17.3	20.0	21.1	20.5	21.3	20.9	18.3	16.7	15.9	16.0	15.6	15.0	14.6	14.0	16.0	21.3																						
17-Jun	13.2	12.5	12.1	11.6	11.8	11.8	12.4	14.0	15.0	16.0	17.8	18.4	20.5	21.9	22.1	22.6	22.3	22.0	21.3	20.1	17.4	14.6	14.0	12.4	16.6	22.6																						
18-Jun	11.2	12.2	10.3	8.6	9.2	11.9	12.7	13.3	16.6	19.3	21.2	20.8	19.6	19.0	19.6	19.8	18.3	17.3	17.5	17.0	15.4	12.7	11.4	10.9	15.2	21.2																						
19-Jun	10.8	10.8	10.4	10.2	9.9	10.6	12.4	14.3	16.7	18.5	19.8	20.8	21.7	21.7	22.9	23.1	23.3	22.6	21.9	21.0	18.4	16.3	15.2	14.1	17.0	23.3																						
20-Jun	12.6	11.4	11.2	11.7	11.9	12.5	14.2	14.7	16.1	17.2	18.9	20.9	19.9	17.5	16.1	15.3	15.1	14.5	14.2	13.8	13.6	13.1	12.9	12.9	14.7	20.9																						
21-Jun	12.7	12.0	11.5	12.1	12.6	12.1	11.3	10.5	10.1	10.4	11.0	11.0	10.9	10.9	10.8	10.6	10.6	11.0	11.8	12.5	12.2	12.3	12.2	11.1	11.4	12.7																						
22-Jun	10.1	9.7	9.2	8.4	7.8	7.7	8.0	8.5	9.9	11.6	12.9	14.2	14.9	15.4	15.6	16.0	16.4	16.0	15.6	14.9	13.3	11.4	10.0	8.6	11.9	16.4																						
23-Jun	7.4	7.0	5.9	5.6	6.8	9.9	11.4	13.0	14.8	16.8	17.9	18.7	19.4	20.3	20.2	21.2	21.1	19.6	19.5	17.7	16.6	14.4	12.9	12.0	14.6	21.2																						
24-Jun	10.9	10.9	9.6	8.6	9.0	10.3	11.8	13.8	15.6	18.0	19.1	20.3	20.6	21.1	22.2	21.7	22.1	21.2	20.3	19.7	18.5	17.2	16.0	14.9	16.4	22.2																						
25-Jun	14.8	14.1	9.1	9.0	8.9	11.6	13.8	15.2	17.2	19.7	21.0	22.3	22.8	23.0	24.3	24.5	24.7	24.6	24.2	23.6	22.1	20.8	18.3	15.1	18.5	24.7																						
26-Jun	14.2	14.2	13.8	16.0	15.9	16.1	17.4	19.5	22.2	23.9	25.3	26.5	26.3	26.2	25.8	25.8	26.5	26.4	25.3	24.5	23.8	22.4	21.2	20.4	21.7	26.5																						
27-Jun	19.6	18.6	17.8	17.1	16.6	15.5	13.3	13.9	14.8	16.3	16.3	15.4	15.3	15.9	16.1	16.4	14.2	14.3	14.2	14.2	13.8	13.4	13.2	13.0	15.4	19.6																						
28-Jun	13.0	12.5	12.5	12.7	12.3	12.2	12.5	13.0	14.0	14.5	14.4	14.6	16.5	17.4	17.1	17.4	17.7	17.7	17.7	17.0	14.8	12.8	11.8	12.0	14.5	17.7																						
29-Jun	10.7	9.7	10.3	10.6	11.3	11.7	13.4	15.2	16.7	17.9	19.3	20.8	22.1	22.7	22.4	22.6	21.8	22.0	21.4	19.7	18.8	17.1	16.8	16.4	17.2	22.7																						
30-Jun	15.9	15.3	15.3	14.1	15.2	15.7	15.1	15.8	16.6	16.4	16.4	18.4	19.7	20.3	20.9	20.7	20.0	19.7	19.7	19.0	18.2	17.1	16.7	16.3	17.4	20.9																						
																								13.3	12.6	11.7	11.3	11.4	12.1	12.9	14.0	15.4	16.7	17.7	18.7	19.6	20.1	20.3	20.3	20.1	19.7	19.2	18.3	17.1	15.8	14.9	14.0	Diurnal Average
																								20.0	18.8	17.8	17.1	16.6	16.7	18.2	19.6	22.2	23.9	25.3	26.5	26.3	27.0	27.2	27.3	27.2	26.9	26.4	25.7	24.5	22.4	21.6	21.5	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2 m (AT2m) - C
Mannix - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2 m (AT2m) - C
Mannix - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	63	8.75	8.75
10 - 20	495	68.75	77.50
> 20	162	22.50	100.00

Total Number of Valid Hours: 720

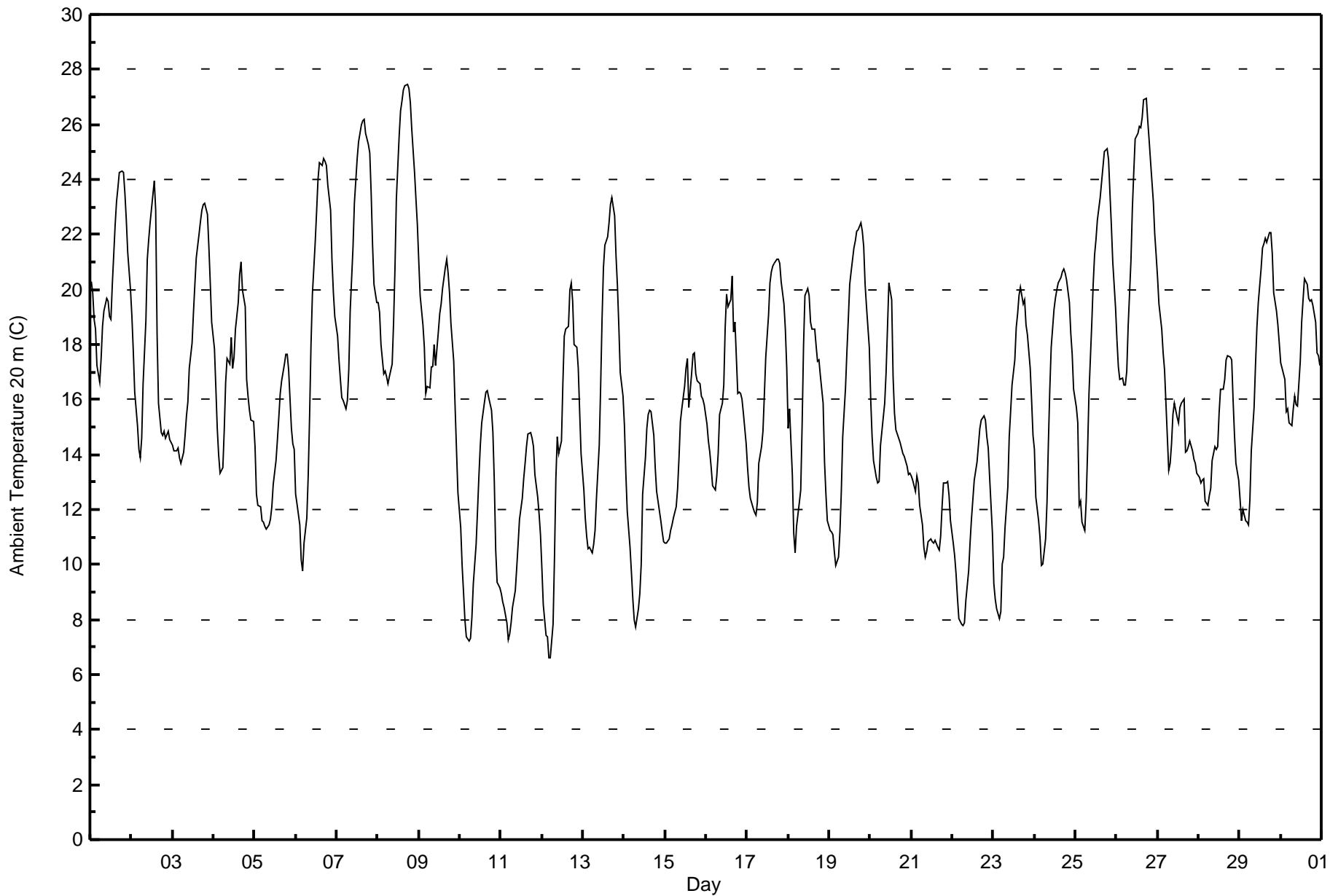
Total Number of Hours: 720



Summary of Hour Averages

Mannix - June 2017

Maximum Value: 27.5 C on Jun 8 18:00		Maximum Daily Average: 22.2 C on Jun 8		Hours in Service: 720																																												
Minimum Value: 6.6 C on Jun 12 05:00		Minimum Daily Average: 11.1 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 19.7 C at hour 17		Minimum Diurnal Average: 12.1 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 16.29 C		Percentiles: P ₁ = 7.4 P ₁₀ = 10.8 Q ₁ = 13.0 Median = 16.0 Q ₃ = 19.5 P ₉₀ = 22.4 P ₉₉ = 26.8		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.3	19.9	18.9	18.5	17.3	16.6	17.5	18.7	19.2	19.7	19.6	19.0	18.9	20.2	22.3	23.2	23.7	24.2	24.3	24.2	23.5	22.5	21.4	20.0	20.6	24.3																						
2-Jun	19.0	17.8	16.3	15.0	14.2	13.9	14.6	16.6	18.9	21.1	21.8	22.4	23.4	23.9	22.9	18.3	15.8	14.8	14.7	14.9	14.6	14.8	14.5	14.4	17.5	23.9																						
3-Jun	14.3	14.1	14.1	14.2	13.9	13.7	14.1	14.7	15.4	15.9	17.1	18.0	19.2	20.2	21.2	22.0	22.5	22.9	23.1	23.1	22.7	21.6	20.2	18.8	18.2	23.1																						
4-Jun	17.9	16.4	15.0	14.0	13.3	13.5	14.9	16.6	17.5	17.3	18.2	17.1	17.5	18.6	19.5	20.5	21.0	20.0	19.4	16.7	16.1	15.6	15.2	15.2	17.0	21.0																						
5-Jun	14.3	12.5	12.2	12.1	11.6	11.5	11.4	11.3	11.4	11.6	12.1	12.9	13.8	14.6	15.3	16.2	16.7	17.3	17.7	17.7	17.1	14.9	14.4	14.2	13.9	17.7																						
6-Jun	12.6	12.2	11.4	10.2	9.8	10.8	11.7	13.2	15.4	18.0	19.8	21.7	22.8	24.0	24.6	24.5	24.8	24.7	24.5	23.8	22.9	21.0	19.9	19.0	18.5	24.8																						
7-Jun	18.3	17.4	16.7	16.1	16.0	15.7	15.9	17.1	19.2	21.5	23.1	23.9	24.8	25.4	26.0	26.1	26.2	25.7	25.3	25.0	23.5	21.6	20.2	19.5	21.3	26.2																						
8-Jun	19.5	19.1	18.0	16.9	17.1	16.8	16.6	16.8	17.3	18.8	20.7	23.3	25.6	26.5	26.9	27.3	27.4	27.5	27.3	26.8	25.9	24.2	23.3	22.4	22.2	27.5																						
9-Jun	21.1	19.8	18.7	17.9	16.2	16.5	16.4	17.2	17.2	18.0	17.2	18.5	19.1	19.5	20.0	20.8	21.1	20.6	19.9	18.8	17.4	15.7	14.1	12.6	18.1	21.1																						
10-Jun	11.3	9.9	9.0	8.0	7.4	7.2	7.3	8.1	9.3	10.7	11.9	13.2	14.4	15.2	15.9	16.3	16.3	16.1	15.6	14.8	13.0	10.5	9.4	9.2	11.7	16.3																						
11-Jun	9.0	8.6	8.4	7.9	7.3	7.5	7.9	8.4	9.1	9.9	10.7	11.6	12.4	13.1	13.7	14.3	14.7	14.8	14.6	14.3	13.3	12.5	11.8	11.1	11.1	14.8																						
12-Jun	9.9	8.6	7.4	7.4	6.6	6.6	7.8	10.2	13.1	14.6	14.0	14.5	16.6	18.3	18.6	18.7	20.0	20.3	19.6	18.0	17.9	17.1	15.6	14.0	14.0	20.3																						
13-Jun	12.7	11.7	11.0	10.6	10.6	10.4	10.8	11.3	12.4	14.3	16.5	18.9	20.8	21.6	21.9	22.4	23.1	23.3	22.7	21.2	20.1	18.7	17.0	16.1	16.7	23.3																						
14-Jun	15.0	13.3	11.9	10.6	9.7	8.7	8.0	7.7	8.4	9.0	10.0	12.5	13.9	14.9	15.5	15.6	14.7	13.5	12.7	12.3	11.6	11.2	10.9	12.0	15.6																							
15-Jun	10.8	10.8	11.0	11.2	11.4	11.7	12.1	12.8	13.9	15.2	15.7	16.5	17.1	17.5	15.7	16.9	17.7	17.7	16.9	16.7	16.6	16.1	16.0	15.8	14.7	17.7																						
16-Jun	15.1	14.5	14.1	13.5	12.9	12.7	13.2	14.0	15.5	15.9	16.5	18.6	19.8	19.4	19.6	20.5	18.4	18.8	16.2	16.3	16.2	16.0	15.5	14.4	16.2	20.5																						
17-Jun	13.5	12.8	12.4	12.0	11.9	11.8	12.3	13.7	14.3	14.9	16.2	17.6	19.1	20.3	20.6	20.8	21.0	21.1	21.1	20.9	20.3	19.5	18.5	17.1	16.8	21.1																						
18-Jun	14.9	15.7	13.3	11.1	10.4	11.4	12.3	12.7	15.1	18.0	19.8	20.0	19.8	18.8	18.6	18.6	17.9	17.4	17.5	16.9	15.8	13.7	12.6	11.6	15.6	20.0																						
19-Jun	11.3	11.2	11.1	10.5	10.0	10.3	11.2	12.7	14.6	16.4	17.7	18.9	20.2	20.7	21.5	21.8	22.1	22.2	22.4	22.1	21.6	20.2	19.4	17.9	17.0	22.4																						
20-Jun	16.0	14.7	13.8	13.2	12.9	13.0	14.3	14.8	15.8	17.0	18.6	20.2	19.6	16.8	15.5	14.9	14.7	14.5	14.3	14.0	13.9	13.6	13.3	13.3	15.1	20.2																						
21-Jun	13.2	13.1	12.7	13.2	13.0	12.2	11.5	10.6	10.2	10.5	10.8	10.9	10.8	10.8	10.9	10.6	10.5	11.0	12.1	13.0	13.0	13.0	12.5	11.6	11.7	13.2																						
22-Jun	10.8	10.3	9.6	8.8	8.0	7.8	7.8	7.9	8.7	9.8	10.8	11.7	12.4	13.1	13.7	14.4	14.9	15.2	15.4	15.3	14.7	14.3	13.2	11.1	11.7	15.4																						
23-Jun	9.3	8.8	8.4	8.0	8.3	10.0	10.3	11.4	12.8	14.6	15.6	16.5	17.4	18.6	19.1	19.8	20.1	19.5	19.6	18.7	18.4	17.1	16.0	14.7	14.7	20.1																						
24-Jun	14.2	12.4	11.6	11.0	10.0	10.0	10.9	12.3	14.5	16.4	17.9	19.3	19.7	20.0	20.2	20.5	20.6	20.7	20.6	20.3	19.5	18.4	17.7	16.4	16.5	20.7																						
25-Jun	15.7	15.2	12.1	12.3	11.6	11.2	12.3	14.1	16.2	18.8	20.2	21.3	21.8	22.5	23.3	23.9	24.5	25.0	25.1	24.7	23.5	22.3	21.0	19.3	19.1	25.1																						
26-Jun	18.1	17.2	16.7	16.8	16.5	16.5	17.0	18.7	21.1	22.9	24.3	25.5	25.7	25.9	25.9	26.2	26.9	26.9	26.1	25.4	24.7	23.2	22.0	21.3	22.2	26.9																						
27-Jun	20.4	19.5	18.6	17.7	17.1	15.8	13.4	13.7	14.4	15.5	15.9	15.3	15.2	15.7	15.9	16.0	14.1	14.1	14.3	14.5	14.1	13.9	13.7	13.3	15.5	20.4																						
28-Jun	13.2	13.0	13.1	13.1	12.3	12.2	12.5	12.8	13.8	14.3	14.2	14.3	15.5	16.4	16.3	16.7	17.5	17.6	17.6	17.4	16.0	14.7	13.7	13.1	14.6	17.6																						
29-Jun	12.4	11.6	12.0	11.6	11.5	11.4	12.3	14.1	15.7	17.2	18.6	19.5	20.7	21.5	21.7	21.8	21.7	22.1	22.1	21.3	19.9	19.2	18.7	18.0	17.4	22.1																						
30-Jun	17.4	17.1	16.8	15.6	15.7	15.1	15.1	15.6	16.1	15.8	15.8	17.4	18.8	19.6	20.4	20.2	19.7	19.6	19.6	19.4	18.8	17.7	17.6	17.3	17.6	20.4																						
																								14.7	14.0	13.2	12.6	12.1	12.1	12.4	13.3	14.5	15.8	16.7	17.7	18.6	19.1	19.4	19.7	19.7	19.7	19.4	19.0	18.2	17.2	16.3	15.5	Diurnal Average
																								21.1	19.9	18.9	18.5	17.3	16.8	17.5	18.7	21.1	22.9	24.3	25.5	25.7	26.5	26.9	27.3	27.4	27.5	27.3	26.8	25.9	24.2	23.3	22.4	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 20 m (AT20m) - C
Mannix - June 2017

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	49	6.81	6.81
10 - 20	519	72.08	78.89
> 20	152	21.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

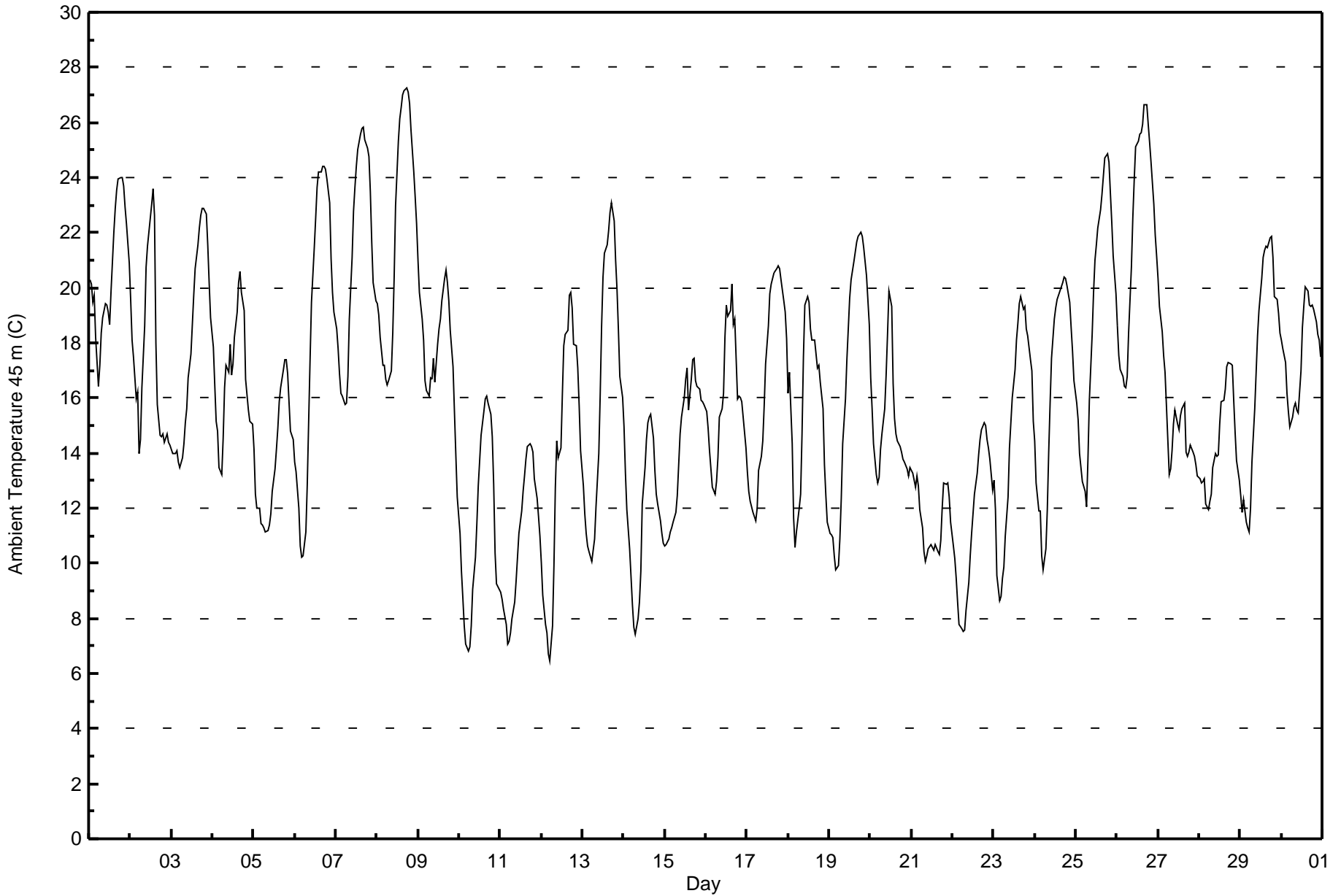
Mannix - June 2017

Maximum Value: 27.3 C on Jun 8 18:00 Maximum Daily Average: 22.0 C on Jun 8																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: 6.5 C on Jun 12 06:00 Minimum Daily Average: 10.8 C on Jun 11 Maximum Diurnal Average: 19.4 C at hour 17 Minimum Diurnal Average: 11.9 C at hour 6 Monthly Average: 16.16 C Percentiles: P ₁ = 7.4 P ₁₀ = 10.6 Q ₁ = 12.9 Median = 15.9 O ₃ = 19.3 P ₉₀ = 22.3 P ₉₉ = 26.6																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	20.3	20.1	19.5	19.7	18.2	16.4	17.2	18.3	18.9	19.4	19.4	19.1	18.7	19.9	22.0	22.9	23.5	24.0	24.0	24.0	23.7	22.9	22.3	20.9	20.6	24.0
2-Jun	19.6	18.1	17.5	16.0	16.2	14.0	14.5	16.4	18.6	20.7	21.5	22.0	23.0	23.6	22.6	18.0	15.8	14.7	14.6	14.7	14.4	14.7	14.4	14.3	17.5	23.6
3-Jun	14.1	14.0	14.0	14.1	13.7	13.5	13.9	14.4	15.1	15.6	16.7	17.6	18.7	19.7	20.7	21.6	22.2	22.6	22.9	22.9	22.7	21.6	20.2	18.9	18.0	22.9
4-Jun	17.9	16.5	15.2	14.8	13.5	13.2	14.6	16.4	17.2	16.9	17.9	16.8	17.2	18.2	19.1	20.2	20.6	19.8	19.2	16.7	16.1	15.5	15.1	15.1	16.8	20.6
5-Jun	14.2	12.5	12.0	12.0	11.5	11.4	11.3	11.1	11.2	11.4	11.8	12.6	13.4	14.1	14.9	15.9	16.4	17.0	17.4	17.4	16.9	14.8	14.6	14.5	13.8	17.4
6-Jun	13.7	13.3	12.0	10.6	10.2	10.3	11.2	12.9	15.2	17.4	19.5	21.4	22.5	23.6	24.2	24.2	24.4	24.4	24.3	24.0	23.1	21.0	19.9	19.1	18.4	24.4
7-Jun	18.5	17.8	16.9	16.2	16.1	15.7	15.8	16.8	18.9	21.1	22.8	23.6	24.4	25.0	25.6	25.8	25.8	25.4	25.0	24.7	23.5	21.7	20.2	19.5	21.1	25.8
8-Jun	19.4	19.0	18.2	17.2	17.2	16.7	16.5	16.6	17.0	18.4	20.4	23.0	25.3	26.1	26.5	27.0	27.1	27.3	27.1	26.7	25.7	24.2	23.3	22.3	22.0	27.3
9-Jun	21.0	19.8	18.8	18.1	16.6	16.3	16.1	16.7	16.7	17.4	16.6	17.9	18.5	18.9	19.5	20.3	20.6	20.2	19.5	18.5	17.1	15.5	14.0	12.4	17.8	21.0
10-Jun	11.1	9.7	8.8	7.7	7.1	6.8	7.0	7.7	9.0	10.2	11.4	12.8	13.7	14.6	15.5	16.0	16.1	15.8	15.4	14.6	12.9	10.4	9.2	9.1	11.4	16.1
11-Jun	9.0	8.7	8.3	7.8	7.1	7.2	7.5	8.0	8.6	9.4	10.2	11.1	11.9	12.6	13.2	13.8	14.2	14.3	14.2	14.0	13.1	12.3	11.7	11.0	10.8	14.3
12-Jun	10.0	8.9	7.8	7.5	6.7	6.5	7.7	9.9	12.7	14.4	13.9	14.2	16.1	17.9	18.3	18.5	19.7	19.9	19.3	18.0	17.9	17.1	15.7	14.1	13.9	19.9
13-Jun	12.8	11.8	11.1	10.6	10.4	10.1	10.5	10.9	12.1	14.0	16.1	18.6	20.4	21.3	21.5	22.1	22.7	23.1	22.4	21.0	19.9	18.5	16.8	16.0	16.4	23.1
14-Jun	15.0	13.3	12.0	10.5	9.5	8.5	7.7	7.4	8.0	8.6	9.7	12.2	13.5	14.5	15.1	15.3	15.4	14.6	13.4	12.5	12.1	11.6	11.1	10.7	11.7	15.4
15-Jun	10.6	10.7	10.9	11.1	11.3	11.5	11.8	12.4	13.6	14.7	15.3	16.0	16.7	17.1	15.6	16.7	17.4	17.4	16.6	16.4	16.3	15.9	15.9	15.8	14.5	17.4
16-Jun	15.5	14.9	14.1	13.4	12.8	12.5	13.0	13.8	15.3	15.6	16.2	18.2	19.4	18.9	19.2	20.2	18.7	18.8	16.0	16.0	16.0	15.9	15.3	14.2	16.0	20.2
17-Jun	13.3	12.6	12.2	11.8	11.7	11.6	12.0	13.4	13.9	14.4	15.7	17.2	18.6	19.8	20.1	20.4	20.5	20.7	20.8	20.7	20.3	19.5	19.1	18.1	16.6	20.8
18-Jun	16.2	16.9	14.3	11.6	10.6	11.1	12.0	12.5	14.7	17.5	19.4	19.7	19.5	18.5	18.1	18.1	17.6	17.1	17.2	16.6	15.6	13.6	12.5	11.5	15.5	19.7
19-Jun	11.1	11.0	10.9	10.3	9.7	9.9	10.9	12.3	14.3	16.0	17.4	18.5	19.6	20.3	20.9	21.3	21.7	21.9	22.0	21.9	21.5	20.9	20.4	18.6	16.8	22.0
20-Jun	16.7	15.6	14.3	13.2	12.9	13.1	14.1	14.7	15.6	16.8	18.3	19.9	19.3	16.5	15.3	14.7	14.5	14.2	14.0	13.8	13.7	13.4	13.1	13.5	15.1	19.9
21-Jun	13.4	13.3	12.8	13.2	12.8	12.0	11.3	10.4	10.1	10.2	10.5	10.7	10.6	10.5	10.7	10.4	10.3	10.8	12.0	12.9	12.9	12.9	12.4	11.5	11.6	13.4
22-Jun	10.7	10.2	9.5	8.6	7.8	7.6	7.5	7.6	8.3	9.3	10.3	11.1	11.8	12.5	13.3	13.9	14.5	14.9	15.1	15.0	14.5	14.2	13.8	12.7	11.4	15.1
23-Jun	13.0	12.0	9.6	8.6	8.8	9.5	9.9	11.0	12.4	14.2	15.1	16.0	17.0	18.1	18.7	19.4	19.7	19.2	19.3	18.5	18.3	17.4	17.0	15.2	14.9	19.7
24-Jun	14.5	12.9	11.9	11.9	10.3	9.7	10.5	11.9	14.0	15.8	17.5	18.9	19.3	19.6	19.7	20.0	20.2	20.4	20.3	20.1	19.5	18.6	17.7	16.6	16.3	20.4
25-Jun	15.8	15.2	14.0	13.5	13.0	12.6	12.1	13.8	15.9	18.3	19.9	21.0	21.6	22.2	22.8	23.4	24.0	24.7	24.9	24.6	23.4	22.4	21.2	19.8	19.2	24.9
26-Jun	18.6	17.5	17.0	16.8	16.4	16.4	16.8	18.4	20.8	22.5	23.9	25.1	25.3	25.6	25.6	25.9	26.6	26.7	26.0	25.3	24.5	23.1	21.9	21.2	22.0	26.7
27-Jun	20.3	19.3	18.4	17.6	16.9	15.7	13.2	13.4	14.1	15.1	15.6	15.0	14.9	15.4	15.6	15.8	14.0	13.9	14.1	14.3	14.0	13.9	13.6	13.2	15.3	20.3
28-Jun	13.1	12.9	13.0	13.1	12.2	12.0	12.3	12.5	13.5	14.0	13.9	13.9	15.1	15.8	15.9	16.3	17.1	17.3	17.2	17.2	15.9	14.7	13.7	13.0	14.4	17.3
29-Jun	12.5	11.9	12.3	11.5	11.3	11.1	12.0	13.7	15.6	16.9	18.3	19.2	20.3	21.1	21.3	21.5	21.4	21.8	21.8	21.1	19.7	19.6	19.1	18.3	17.2	21.8
30-Jun	18.1	17.8	17.3	16.2	15.5	14.9	15.3	15.7	15.8	15.5	15.5	17.0	18.6	19.3	20.1	19.9	19.4	19.3	19.4	19.2	18.8	18.3	18.1	17.5	17.6	20.1
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 45 m (AT45m) - C
Mannix - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C
Mannix - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	50	6.94	6.94
10 - 20	529	73.47	80.42
> 20	141	19.58	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

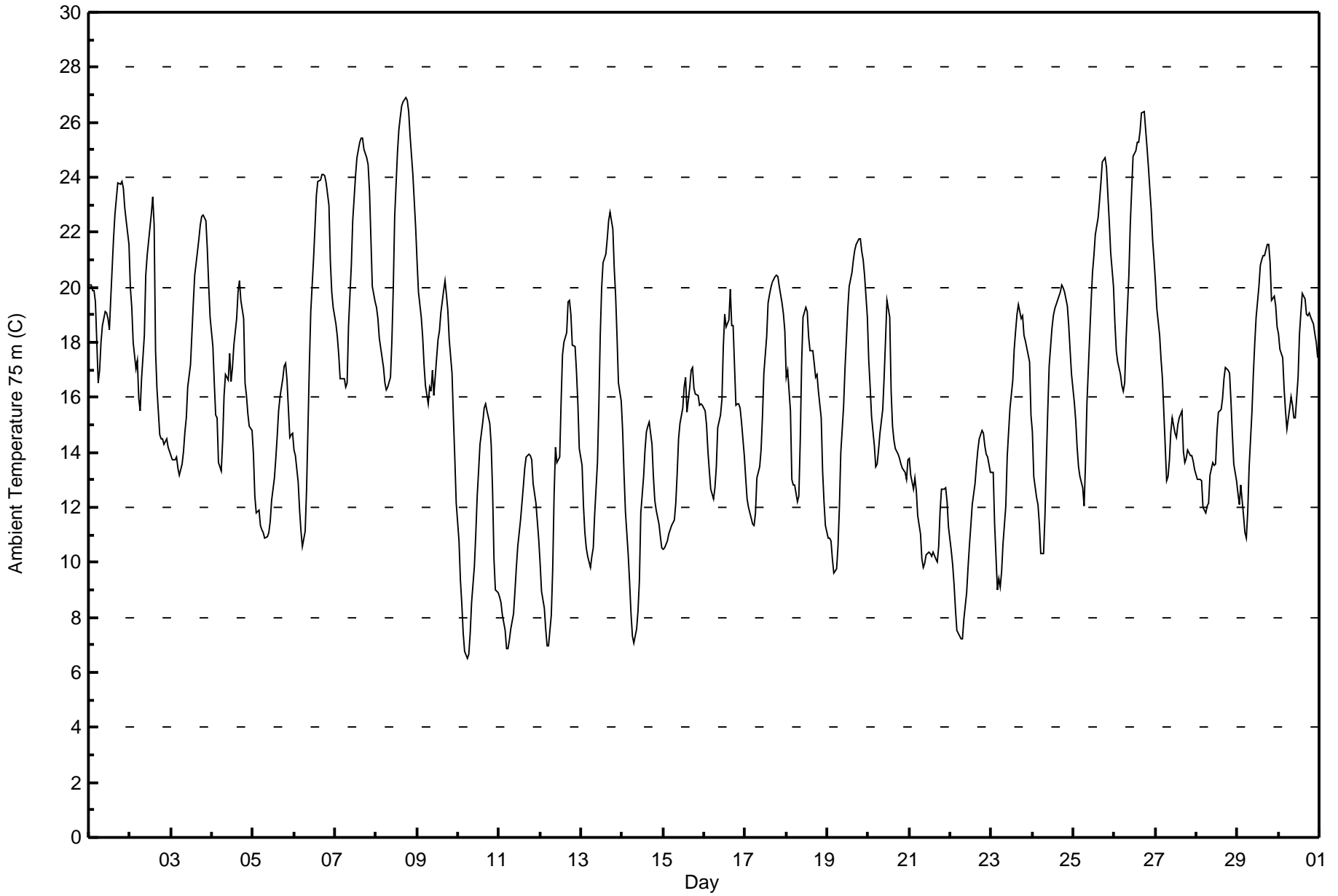


Maximum Value: 26.9 C on Jun 8 18:00		Maximum Daily Average: 21.8 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 6.5 C on Jun 10 06:00		Minimum Daily Average: 10.5 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 19.1 C at hour 17		Minimum Diurnal Average: 12.0 C at hour 6		Hours of Missing Data: 0																																												
Monthly Average: 16.00 C		Percentiles: P ₁ = 7.0 P ₁₀ = 10.4 Q ₁ = 12.9 Median = 15.7 Q ₃ = 19.0 P ₉₀ = 22.1 P ₉₉ = 26.3		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.1	20.1	19.9	19.9	19.5	16.5	17.0	18.0	18.6	19.1	19.1	18.9	18.5	19.6	21.8	22.7	23.3	23.8	23.8	23.8	23.6	22.9	22.4	21.6	20.6	23.8																						
2-Jun	20.0	19.3	18.0	17.0	17.4	16.0	15.5	16.7	18.3	20.4	21.1	21.6	22.7	23.3	22.3	17.7	16.3	14.6	14.5	14.5	14.3	14.5	14.2	14.1	17.7	23.3																						
3-Jun	13.9	13.7	13.7	13.8	13.4	13.2	13.6	14.0	14.8	15.3	16.4	17.2	18.3	19.4	20.4	21.3	21.8	22.3	22.6	22.6	22.4	21.4	20.1	18.9	17.7	22.6																						
4-Jun	17.8	16.5	15.3	15.3	13.6	13.3	14.4	16.0	16.8	16.7	17.6	16.6	17.1	17.9	18.9	19.8	20.2	19.5	18.9	16.5	16.1	15.4	15.0	14.8	16.7	20.2																						
5-Jun	13.9	12.4	11.8	11.9	11.3	11.2	11.1	10.9	10.9	11.1	11.5	12.3	13.1	13.8	14.6	15.5	16.0	16.7	17.1	17.2	16.6	14.6	14.7	14.7	13.5	17.2																						
6-Jun	14.1	13.9	12.9	11.9	11.1	10.6	11.2	12.7	14.9	17.2	19.1	21.0	22.2	23.3	23.8	23.9	24.1	24.1	24.0	23.8	23.0	20.9	19.8	19.3	18.4	24.1																						
7-Jun	18.6	18.2	17.6	16.7	16.7	16.7	16.4	16.5	18.6	20.8	22.4	23.3	24.0	24.7	25.3	25.4	25.4	25.0	24.7	24.5	23.5	21.8	20.1	19.5	21.1	25.4																						
8-Jun	19.2	18.9	18.1	17.4	17.1	16.5	16.3	16.4	16.7	18.1	20.0	22.6	24.9	25.7	26.2	26.6	26.8	26.9	26.8	26.4	25.5	24.1	23.1	22.2	21.8	26.9																						
9-Jun	21.0	19.8	18.9	18.2	17.2	16.4	15.7	16.4	16.2	17.0	16.1	17.5	18.1	18.4	19.1	19.9	20.2	19.7	19.2	18.1	16.9	15.3	13.8	12.2	17.5	21.0																						
10-Jun	10.8	9.4	8.5	7.4	6.7	6.5	6.7	7.4	8.6	9.9	11.0	12.4	13.3	14.3	15.1	15.6	15.8	15.5	15.1	14.3	12.6	10.1	9.0	8.9	11.0	15.8																						
11-Jun	8.8	8.6	8.1	7.5	6.9	6.9	7.1	7.6	8.2	9.0	9.8	10.6	11.5	12.2	12.8	13.4	13.8	13.9	13.9	13.7	12.9	12.1	11.5	10.8	10.5	13.9																						
12-Jun	10.0	9.0	8.3	7.6	7.0	7.0	8.1	9.8	12.5	14.2	13.6	13.8	15.8	17.6	18.0	18.3	19.5	19.5	19.0	17.9	17.8	16.9	15.8	14.1	13.8	19.5																						
13-Jun	13.5	12.0	11.1	10.5	10.2	9.8	10.2	10.5	11.7	13.6	15.7	18.2	20.0	20.9	21.2	21.7	22.4	22.7	22.1	20.7	19.7	18.2	16.5	15.9	16.2	22.7																						
14-Jun	14.8	13.2	11.9	10.3	9.2	8.1	7.3	7.0	7.6	8.3	9.4	11.8	13.1	14.1	14.7	15.0	15.1	14.3	13.1	12.3	11.9	11.4	10.9	10.5	11.5	15.1																						
15-Jun	10.5	10.5	10.8	11.0	11.2	11.3	11.6	12.1	13.2	14.5	15.0	15.6	16.4	16.7	15.4	16.4	17.0	17.1	16.3	16.1	16.1	15.7	15.8	15.7	14.3	17.1																						
16-Jun	15.5	15.0	14.0	13.3	12.7	12.3	12.7	13.5	14.9	15.3	15.9	17.8	19.0	18.6	18.8	19.9	18.6	18.6	15.7	15.8	15.8	15.6	15.1	13.9	15.8	19.9																						
17-Jun	13.0	12.3	12.0	11.6	11.4	11.3	11.8	13.1	13.5	14.1	15.3	16.9	18.2	19.4	19.7	20.0	20.2	20.4	20.4	20.4	20.1	19.4	19.0	18.4	16.3	20.4																						
18-Jun	16.8	17.0	15.5	13.0	12.8	12.8	12.2	12.4	14.4	17.2	18.9	19.3	19.1	18.2	17.7	17.7	17.2	16.7	16.9	16.2	15.3	13.3	12.2	11.4	15.6	19.3																						
19-Jun	10.9	10.9	10.8	10.1	9.6	9.7	10.6	12.0	14.0	15.7	17.0	18.1	19.2	20.0	20.6	21.0	21.3	21.5	21.7	21.8	21.3	21.0	20.5	18.9	16.6	21.8																						
20-Jun	17.4	16.4	15.3	14.2	13.5	13.6	14.1	14.7	15.5	16.7	18.1	19.5	18.9	16.2	14.9	14.4	14.2	13.9	13.8	13.6	13.4	13.3	13.0	13.7	15.1	19.5																						
21-Jun	13.8	13.2	12.7	13.0	12.6	11.7	11.0	10.1	9.8	10.0	10.2	10.4	10.3	10.2	10.4	10.1	10.0	10.6	11.8	12.7	12.7	12.7	12.2	11.3	11.4	13.8																						
22-Jun	10.4	9.9	9.2	8.3	7.5	7.3	7.2	7.2	7.9	8.9	9.8	10.6	11.3	12.1	12.9	13.5	14.1	14.5	14.8	14.7	14.2	13.9	13.9	13.3	11.2	14.8																						
23-Jun	13.3	13.3	11.4	9.0	9.4	9.1	9.7	10.7	12.0	13.8	14.7	15.6	16.6	17.8	18.4	19.0	19.4	18.9	19.0	18.3	18.1	17.5	17.3	15.4	14.9	19.4																						
24-Jun	14.7	13.1	12.4	12.1	11.4	10.3	10.3	11.7	13.7	15.5	17.1	18.5	19.0	19.2	19.4	19.7	19.8	20.1	20.0	19.8	19.3	18.6	17.7	16.8	16.3	20.1																						
25-Jun	15.8	15.2	14.2	13.5	13.1	12.7	12.1	13.6	15.7	18.3	19.5	20.6	21.2	21.9	22.5	23.1	23.8	24.5	24.7	24.4	23.3	22.4	21.2	20.1	19.1	24.7																						
26-Jun	18.7	17.7	17.3	16.8	16.4	16.2	16.5	18.1	20.5	22.3	23.6	24.7	25.0	25.2	25.3	25.7	26.4	26.4	25.7	25.1	24.3	22.8	21.7	21.0	21.8	26.4																						
27-Jun	20.2	19.2	18.2	17.4	16.7	15.5	12.9	13.1	13.8	14.7	15.3	14.7	14.5	15.0	15.3	15.5	14.0	13.7	13.8	14.1	13.9	13.9	13.7	13.4	15.1	20.2																						
28-Jun	13.0	13.0	13.0	13.0	12.0	11.8	12.0	12.2	13.2	13.7	13.5	13.6	14.7	15.5	15.5	16.0	16.7	17.1	17.0	16.9	15.8	14.6	13.6	13.0	14.2	17.1																						
29-Jun	12.5	12.1	12.8	11.7	11.1	10.9	11.9	13.5	15.5	16.8	18.0	18.9	20.0	20.8	21.0	21.2	21.2	21.5	21.5	20.9	19.5	19.7	19.3	18.5	17.1	21.5																						
30-Jun	18.3	17.7	17.4	16.3	15.5	14.9	15.6	16.0	15.7	15.3	15.3	16.7	18.3	19.1	19.8	19.6	19.0	19.0	19.0	18.9	18.6	18.3	18.0	17.4	17.5	19.8																						
																								15.0	14.4	13.7	13.0	12.5	12.0	12.1	12.8	13.9	15.1	16.0	17.0	17.8	18.4	18.7	19.0	19.1	19.1	18.9	18.5	18.0	17.1	16.4	15.7	Diurnal Average
																								21.0	20.1	19.9	19.9	19.5	16.7	17.0	18.1	20.5	22.3	23.6	24.7	25.0	25.7	26.2	26.6	26.8	26.9	26.8	26.4	25.5	24.1	23.1	22.2	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 75 m (AT75m) - C
Mannix - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 75 m (AT75m) - C
Mannix - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	56	7.78	7.78
10 - 20	531	73.75	81.53
> 20	133	18.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

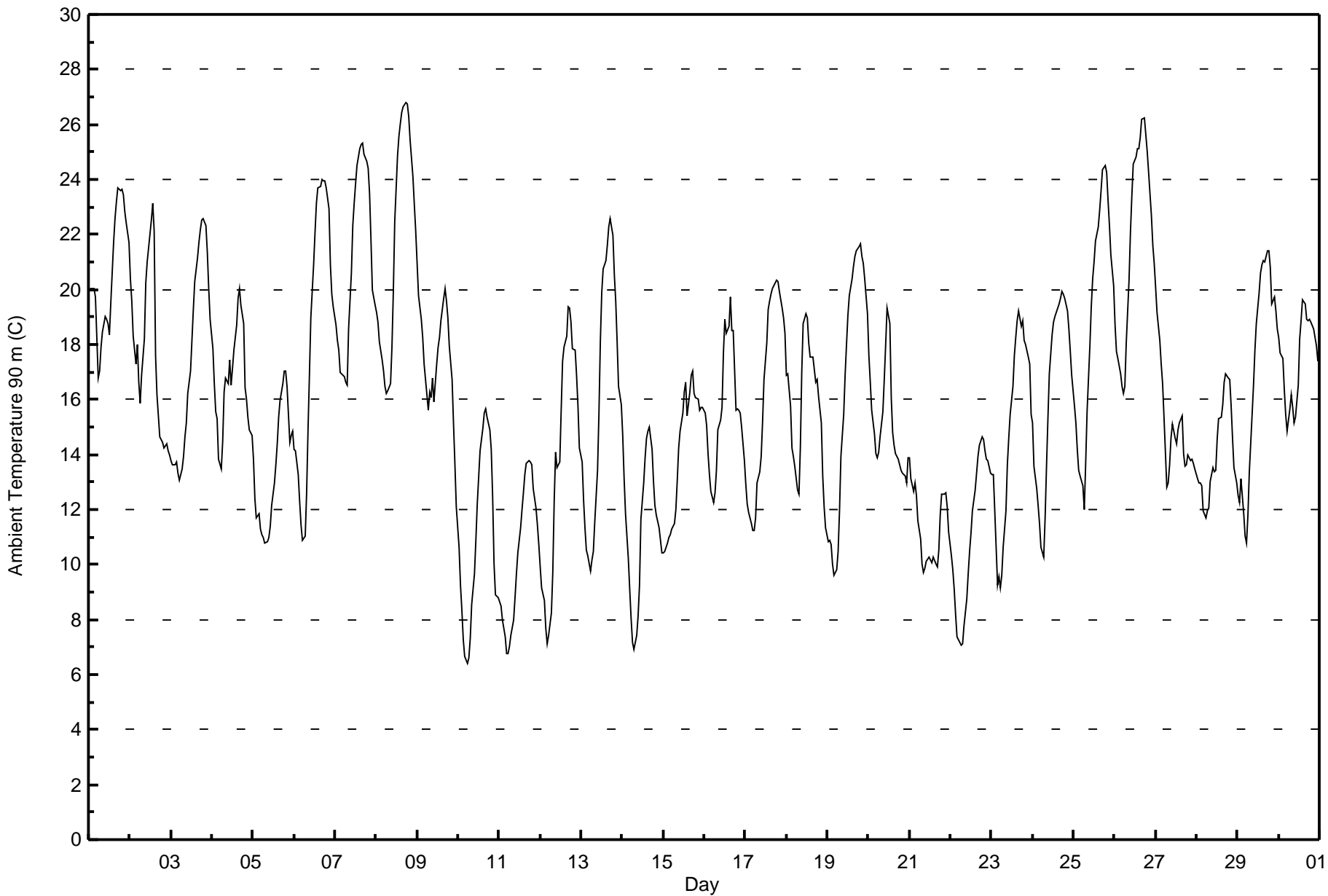
Mannix - June 2017

Maximum Value: 26.8 C on Jun 8 18:00		Maximum Daily Average: 21.7 C on Jun 26		Hours in Service: 720																																													
Minimum Value: 6.4 C on Jun 10 06:00		Minimum Daily Average: 10.4 C on Jun 11		Hours of Data: 720																																													
Maximum Diurnal Average: 19.0 C at hour 17		Minimum Diurnal Average: 12.1 C at hour 7		Hours of Missing Data: 0																																													
Monthly Average: 15.94 C		Percentiles: P ₁ = 7.1 P ₁₀ = 10.4 Q ₁ = 13.0 Median = 15.6 Q ₃ = 18.9 P ₉₀ = 21.9 P ₉₉ = 26.2		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	20.0	20.0	20.0	20.1	19.7	16.8	17.0	17.9	18.5	19.0	18.9	18.8	18.4	19.5	21.7	22.6	23.2	23.7	23.6	23.6	23.4	22.8	22.4	21.7	20.6	23.7																							
2-Jun	20.4	19.6	18.3	17.3	18.0	16.6	15.9	16.9	18.2	20.2	21.0	21.5	22.5	23.1	22.1	17.6	16.2	14.7	14.5	14.4	14.2	14.4	14.1	14.0	17.7	23.1																							
3-Jun	13.8	13.6	13.6	13.7	13.3	13.1	13.5	13.9	14.6	15.1	16.2	17.0	18.2	19.3	20.3	21.1	21.7	22.2	22.5	22.6	22.3	21.3	20.0	18.9	17.6	22.6																							
4-Jun	17.8	16.6	15.6	15.3	13.8	13.5	14.5	16.3	16.8	16.6	17.5	16.5	17.1	17.8	18.7	19.7	20.1	19.4	18.8	16.4	16.0	15.4	14.9	14.7	16.7	20.1																							
5-Jun	13.9	12.4	11.7	11.8	11.3	11.1	11.0	10.8	10.8	11.0	11.4	12.1	13.0	13.6	14.4	15.4	15.9	16.6	17.0	17.0	16.5	14.5	14.7	14.8	13.4	17.0																							
6-Jun	14.2	14.1	13.2	12.3	11.4	10.9	11.0	12.6	14.9	16.9	19.0	20.9	22.0	23.2	23.7	23.8	24.0	24.0	23.9	23.7	23.0	20.9	19.8	19.4	18.4	24.0																							
7-Jun	18.7	18.2	17.8	17.0	17.0	16.8	16.6	16.5	18.5	20.6	22.3	23.1	23.9	24.5	25.1	25.3	25.3	24.9	24.6	24.4	23.5	21.8	20.0	19.4	21.1	25.3																							
8-Jun	19.2	18.8	18.1	17.5	17.0	16.5	16.2	16.3	16.6	17.9	19.9	22.5	24.8	25.6	26.1	26.5	26.6	26.8	26.8	26.3	25.4	24.1	23.1	22.1	21.7	26.8																							
9-Jun	20.9	19.8	18.9	18.3	17.3	16.7	15.6	16.3	16.1	16.8	15.9	17.3	17.9	18.2	18.9	19.7	20.1	19.6	19.0	18.0	16.7	15.2	13.7	12.1	17.4	20.9																							
10-Jun	10.6	9.2	8.4	7.3	6.6	6.4	6.6	7.3	8.5	9.7	10.9	12.2	13.2	14.1	15.0	15.5	15.6	15.4	14.9	14.2	12.5	10.0	8.9	8.8	10.9	15.6																							
11-Jun	8.7	8.5	8.0	7.4	6.8	6.8	7.0	7.4	8.0	8.8	9.7	10.4	11.4	12.0	12.6	13.3	13.7	13.8	13.7	13.6	12.7	12.0	11.4	10.7	10.4	13.8																							
12-Jun	9.9	9.1	8.7	7.7	7.1	7.4	8.3	9.7	12.3	14.1	13.5	13.7	15.6	17.4	17.9	18.3	19.4	19.3	18.8	17.8	17.8	16.9	15.8	14.2	13.8	19.4																							
13-Jun	13.7	12.4	11.3	10.5	10.3	9.8	10.2	10.5	11.5	13.4	15.5	18.1	19.9	20.8	21.1	21.6	22.3	22.6	21.9	20.6	19.6	18.1	16.5	15.8	16.2	22.6																							
14-Jun	14.7	13.1	11.8	10.2	9.1	8.0	7.2	6.9	7.4	8.1	9.2	11.6	13.0	13.9	14.6	14.8	15.0	14.2	13.0	12.2	11.8	11.4	10.9	10.4	11.4	15.0																							
15-Jun	10.4	10.5	10.8	11.0	11.1	11.3	11.5	12.0	13.1	14.2	14.8	15.5	16.3	16.6	15.4	16.3	16.9	17.0	16.2	16.0	16.0	15.6	15.7	15.7	14.2	17.0																							
16-Jun	15.5	15.1	14.0	13.3	12.6	12.3	12.6	13.4	14.9	15.2	15.7	17.7	18.9	18.4	18.6	19.7	18.5	18.5	15.6	15.6	15.6	15.5	15.0	13.8	15.7	19.7																							
17-Jun	12.9	12.2	11.9	11.5	11.2	11.3	11.7	13.0	13.4	13.9	15.2	16.7	18.1	19.3	19.6	19.8	20.0	20.2	20.3	20.3	19.9	19.3	19.0	18.4	16.2	20.3																							
18-Jun	16.9	16.9	15.7	14.2	13.9	13.6	12.7	12.6	14.2	17.0	18.8	19.1	19.0	18.1	17.5	17.5	17.1	16.6	16.7	16.1	15.1	13.2	12.1	11.3	15.7	19.1																							
19-Jun	10.8	10.9	10.7	10.0	9.6	9.8	10.5	11.9	13.9	15.5	16.9	18.0	19.1	19.8	20.4	20.9	21.2	21.4	21.6	21.6	21.2	20.9	20.4	19.1	16.5	21.6																							
20-Jun	17.6	16.6	15.6	14.8	14.0	13.9	14.1	14.6	15.5	16.7	18.0	19.3	18.8	16.1	14.8	14.3	14.0	13.8	13.6	13.4	13.3	13.2	13.0	13.9	15.1	19.3																							
21-Jun	13.9	13.1	12.7	13.0	12.5	11.6	10.9	10.0	9.7	9.9	10.1	10.3	10.2	10.1	10.3	10.0	9.9	10.5	11.8	12.6	12.6	12.6	12.1	11.2	11.3	13.9																							
22-Jun	10.3	9.8	9.1	8.2	7.4	7.2	7.1	7.1	7.8	8.7	9.7	10.5	11.1	11.9	12.7	13.3	13.9	14.4	14.7	14.6	14.1	13.8	13.8	13.3	11.0	14.7																							
23-Jun	13.3	13.3	12.0	9.2	9.6	9.2	9.6	10.6	11.9	13.7	14.6	15.5	16.5	17.6	18.3	18.9	19.2	18.7	18.9	18.2	18.0	17.6	17.3	15.4	14.9	19.2																							
24-Jun	15.2	13.6	12.8	12.2	11.5	10.6	10.2	11.7	13.6	15.3	17.0	18.4	18.8	19.0	19.2	19.5	19.7	19.9	19.8	19.7	19.2	18.6	17.7	16.9	16.2	19.9																							
25-Jun	15.8	15.2	14.2	13.4	13.2	12.9	12.0	13.7	15.5	17.9	19.4	20.4	21.0	21.7	22.3	22.9	23.6	24.4	24.5	24.3	23.3	22.3	21.3	20.2	19.0	24.5																							
26-Jun	18.7	17.7	17.5	16.9	16.5	16.2	16.5	18.1	20.4	22.1	23.4	24.6	24.8	25.1	25.1	25.5	26.2	26.2	25.6	25.0	24.3	22.7	21.6	20.9	21.7	26.2																							
27-Jun	20.1	19.2	18.2	17.3	16.6	15.3	12.8	12.9	13.6	14.6	15.1	14.6	14.4	14.9	15.2	15.4	14.0	13.6	13.6	14.0	13.8	13.8	13.7	13.5	15.0	20.1																							
28-Jun	13.1	13.0	13.0	12.9	11.9	11.7	11.9	12.1	13.0	13.5	13.4	13.4	14.6	15.3	15.4	15.8	16.6	16.9	16.8	16.7	15.8	14.6	13.5	13.0	14.1	16.9																							
29-Jun	12.5	12.3	13.1	11.8	11.0	10.8	11.8	13.4	15.5	16.5	17.8	18.8	19.9	20.6	20.9	21.0	21.0	21.4	21.4	20.8	19.5	19.7	19.2	18.6	17.1	21.4																							
30-Jun	18.3	17.7	17.5	16.4	15.5	14.9	15.7	16.2	15.7	15.2	15.3	16.5	18.2	18.9	19.6	19.5	18.9	18.8	18.9	18.8	18.6	18.2	17.9	17.4	17.4	19.6																							
																								15.1	14.4	13.8	13.1	12.6	12.1	12.1	12.8	13.8	14.9	15.9	16.8	17.7	18.2	18.6	18.8	19.0	19.0	18.8	18.4	17.9	17.0	16.3	15.7	Diurnal Average	
																								20.9	20.0	20.0	20.1	19.7	16.8	17.0	18.1	20.4	22.1	23.4	24.6	24.8	25.6	26.1	26.5	26.6	26.6	26.8	26.8	26.3	25.4	24.1	23.1	22.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 90 m (AT90m) - C
Mannix - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 90 m (AT90m) - C
Mannix - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	57	7.92	7.92
10 - 20	536	74.44	82.36
> 20	127	17.64	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



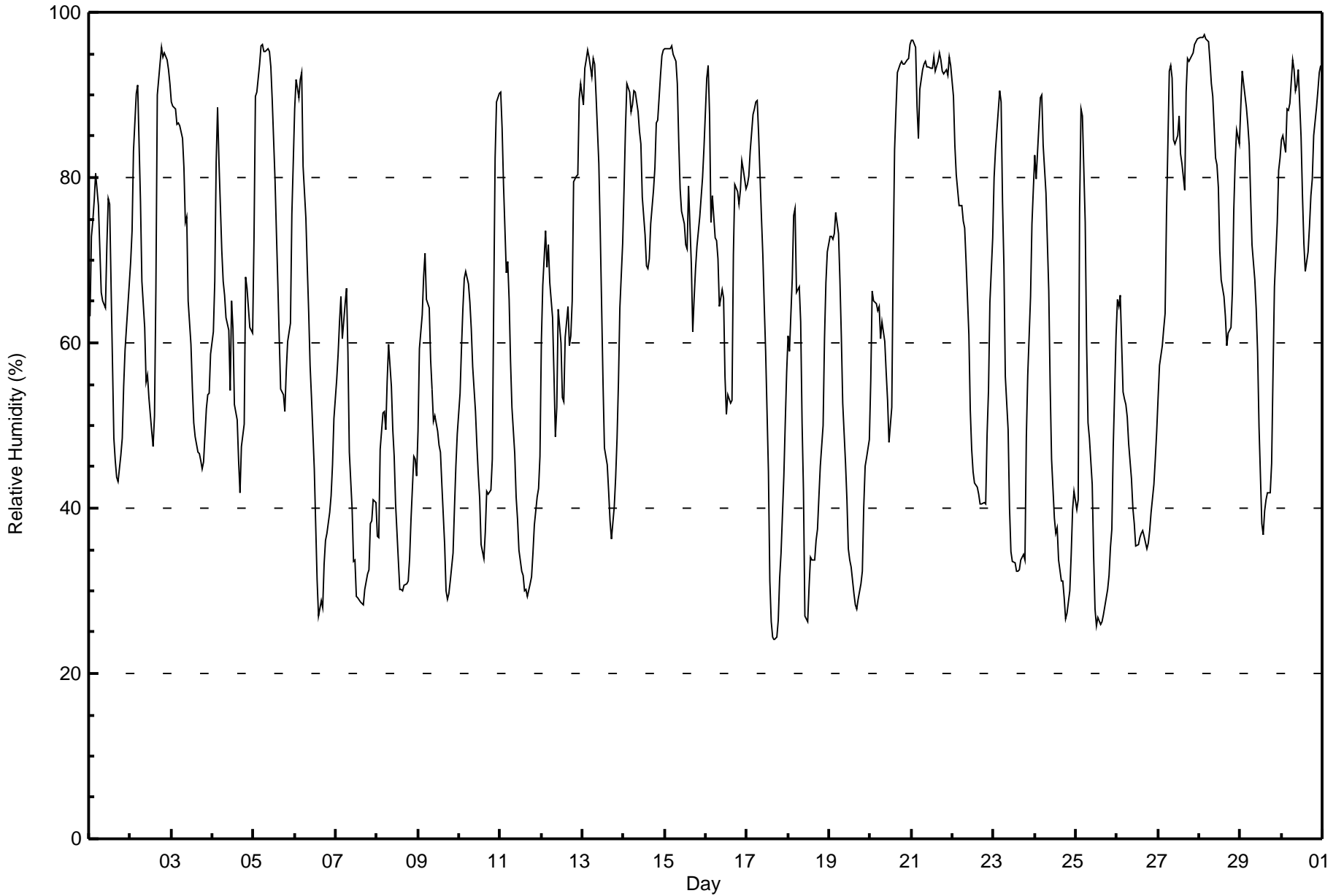
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - June 2017

Maximum Value: 97 % on Jun 28 04:00														Maximum Daily Average: 93.2 % on Jun 21														Hours in Service: 720	
Minimum Value: 24 % on Jun 17 17:00														Minimum Daily Average: 41.9 % on Jun 8														Hours of Data: 720	
Maximum Diurnal Average: 80.0 % at hour 4														Minimum Diurnal Average: 48.2 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 63.6 %														Percentiles: P ₁ = 26 P ₁₀ = 34 Q ₁ = 45 Median = 64 Q ₃ = 83 P ₉₀ = 93 P ₉₉ = 96														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	63	73	75	77	80	77	71	66	65	64	72	77	77	67	48	46	44	43	46	48	55	59	62	67	63.5	80			
2-Jun	70	74	83	90	91	84	77	68	62	55	56	53	49	47	51	67	90	94	96	95	95	94	93	91	76.1	96			
3-Jun	89	89	88	87	87	86	85	81	75	75	65	60	55	50	49	47	47	46	45	46	52	54	54	59	65.3	89			
4-Jun	61	68	82	89	82	71	67	66	63	61	54	65	62	52	51	46	42	47	50	68	67	64	62	61	62.6	89			
5-Jun	73	90	90	94	96	96	95	95	96	95	93	89	80	73	67	61	54	54	52	57	60	62	76	82	78.3	96			
6-Jun	88	92	90	92	93	81	75	69	64	57	53	45	38	31	27	29	28	33	36	37	40	42	45	51	55.7	93			
7-Jun	56	59	63	66	61	65	67	59	47	40	34	34	29	29	29	28	28	30	32	33	38	39	41	41	43.5	67			
8-Jun	37	36	47	52	52	50	55	60	55	50	46	41	34	30	30	30	31	31	31	34	39	46	46	44	41.9	60			
9-Jun	49	59	63	68	71	65	64	58	54	51	51	49	48	47	43	36	30	29	30	31	35	40	45	49	48.5	71			
10-Jun	54	59	64	68	69	67	65	62	57	52	48	44	41	36	34	37	42	42	42	46	65	82	89	90	56.4	90			
11-Jun	90	86	79	69	70	65	58	52	47	41	39	35	32	32	30	30	29	31	32	35	38	41	42	46	47.9	90			
12-Jun	60	67	73	69	72	67	63	56	49	52	64	60	53	53	61	64	60	61	65	79	80	80	90	91	66.3	91			
13-Jun	89	93	94	95	95	92	94	94	90	82	74	64	55	47	45	42	39	36	40	44	49	55	64	72	68.5	95			
14-Jun	79	86	91	90	88	89	90	90	88	86	84	78	73	69	69	70	74	78	81	87	87	92	95	95	83.8	95			
15-Jun	96	96	96	96	96	95	94	91	84	79	76	74	72	71	79	70	61	65	69	72	75	78	80	84	81.2	96			
16-Jun	92	94	88	75	78	73	72	70	64	66	65	56	51	54	53	53	71	79	78	77	78	82	81	79	72.1	94			
17-Jun	79	80	83	88	88	89	89	85	75	71	65	59	44	31	26	24	24	24	26	32	35	44	50	56	57.1	89			
18-Jun	61	59	68	75	76	66	67	63	50	42	27	26	30	34	34	34	36	37	41	45	50	61	67	71	50.9	76			
19-Jun	73	73	73	73	76	73	68	61	53	45	41	35	34	33	30	28	28	29	31	32	40	45	46	48	48.7	76			
20-Jun	55	66	65	65	64	64	61	63	60	56	53	48	52	70	83	88	93	94	94	94	94	94	94	96	73.6	96			
21-Jun	97	97	96	89	85	91	93	94	94	93	93	93	93	95	93	94	95	94	93	93	93	92	95	94	93.2	97			
22-Jun	90	84	80	79	77	77	75	74	70	61	52	47	44	43	43	42	41	41	41	41	49	54	65	73	59.9	90			
23-Jun	80	83	86	90	89	77	69	56	49	40	35	34	33	32	32	33	34	34	34	49	56	66	74	79	56.0	90			
24-Jun	83	80	86	90	90	84	78	72	66	55	46	39	37	38	34	31	31	29	27	27	30	34	40	42	52.8	90			
25-Jun	40	41	76	88	87	75	60	50	48	43	34	28	26	27	26	26	27	28	30	32	35	37	48	61	44.7	88			
26-Jun	65	64	66	54	53	53	51	48	44	40	38	35	36	36	37	37	37	35	36	37	39	43	46	49	45.0	66			
27-Jun	53	57	60	62	64	76	93	94	92	85	84	85	87	83	82	79	90	94	94	94	95	96	96	97	83.0	97			
28-Jun	97	97	97	97	97	96	94	91	90	82	82	79	71	68	66	63	60	61	62	66	76	82	86	84	81.0	97			
29-Jun	89	93	91	88	87	84	78	72	68	64	59	50	38	37	40	41	42	42	45	56	67	75	81	82	65.3	93			
30-Jun	85	85	83	88	88	89	94	93	91	91	93	85	78	72	69	71	74	78	80	85	88	91	93	94	84.9	94			
	73.1	76.0	79.2	80.0	80.0	77.2	75.5	71.7	67.0	62.5	59.2	55.6	51.8	49.6	48.6	48.2	49.4	50.7	52.0	55.7	60.0	64.2	68.2	70.9	Diurnal Average				
	97	97	97	97	97	96	95	95	96	95	93	93	93	95	93	94	95	94	96	95	95	96	96	97	Diurnal Maximum				





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - June 2017

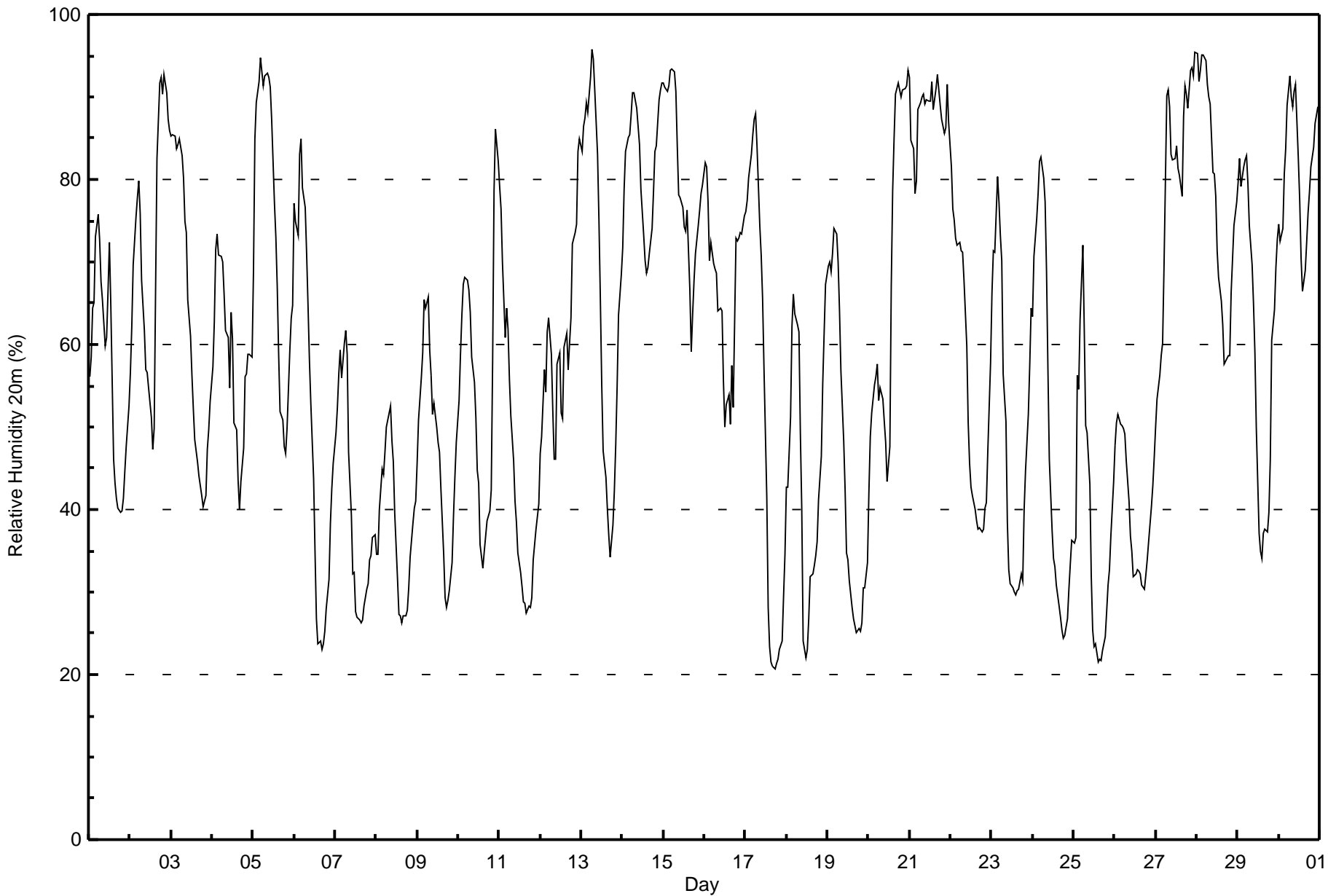
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	129	17.92	17.92
40 - 60	182	25.28	43.19
60 - 80	205	28.47	71.67
80 - 100	204	28.33	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 96 % on Jun 13 07:00																			Maximum Daily Average: 88.2 % on Jun 21						Hours in Service: 720	
Minimum Value: 21 % on Jun 17 18:00																			Minimum Daily Average: 38.0 % on Jun 25						Hours of Data: 720	
Maximum Diurnal Average: 74.9 % at hour 6																			Minimum Diurnal Average: 45.8 % at hour 16						Hours of Missing Data: 0	
Monthly Average: 59.4 %																			Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 41 Median = 59 Q ₃ = 77 P ₉₀ = 89 P ₉₉ = 95						Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	56	58	64	65	73	76	73	68	65	60	61	67	72	65	46	43	41	40	40	40	41	45	48	52	56.6	76
2-Jun	57	62	70	75	78	80	76	68	62	57	57	55	51	47	50	66	82	92	92	90	93	90	87	86	71.8	93
3-Jun	85	85	85	84	84	85	83	80	75	74	65	61	56	52	48	46	44	43	42	40	42	47	50	53	62.9	85
4-Jun	57	63	72	73	71	71	70	66	62	61	55	64	61	51	50	44	40	43	47	56	56	59	59	59	58.7	73
5-Jun	69	85	89	92	95	93	91	93	93	92	91	87	77	73	67	59	52	51	48	47	50	59	63	65	74.2	95
6-Jun	77	75	73	83	85	79	77	71	65	58	53	44	35	27	24	24	23	24	25	28	32	38	43	46	50.3	85
7-Jun	49	52	56	59	56	60	62	59	47	39	32	32	28	27	27	26	27	28	30	31	34	34	37	37	40.4	62
8-Jun	35	35	40	45	44	47	50	51	53	48	46	39	31	27	27	26	27	27	28	31	34	38	40	41	38.0	53
9-Jun	46	51	56	59	65	64	66	59	56	52	53	50	48	47	43	35	29	28	29	30	34	39	44	48	47.1	66
10-Jun	53	59	64	67	68	68	67	64	59	55	51	45	43	36	33	35	37	39	40	42	58	79	86	82	55.4	86
11-Jun	79	76	70	61	64	62	56	51	46	41	38	35	32	31	29	29	28	28	28	29	34	38	39	41	44.4	79
12-Jun	47	49	57	54	61	63	59	52	46	46	58	59	52	51	60	61	57	60	63	72	74	75	83	85	60.2	85
13-Jun	83	86	88	89	88	92	96	95	91	83	75	66	55	47	44	40	37	34	38	42	48	55	63	68	66.8	96
14-Jun	72	79	83	85	85	88	90	91	89	86	84	79	73	70	69	69	71	74	79	83	84	90	91	92	81.5	92
15-Jun	92	91	91	91	93	93	93	91	84	78	78	77	74	74	76	67	59	64	68	71	74	76	78	79	79.7	93
16-Jun	82	82	77	70	72	70	69	69	64	64	64	56	50	53	54	50	57	52	73	73	73	73	73	76	66.5	82
17-Jun	76	77	80	83	85	87	88	84	74	71	66	57	41	28	23	22	21	21	21	22	23	24	29	35	51.7	88
18-Jun	43	43	51	62	66	64	62	61	49	40	24	22	23	27	32	32	33	34	36	41	46	55	61	67	44.9	67
19-Jun	70	70	69	71	74	73	70	64	57	48	42	35	34	31	28	27	26	25	26	25	26	30	31	34	45.3	74
20-Jun	42	49	52	55	56	58	53	55	53	51	48	43	48	67	79	85	90	92	91	90	91	91	91	93	67.6	93
21-Jun	92	85	84	78	80	89	89	90	90	89	90	89	89	92	88	91	93	91	89	87	86	86	92	87	88.2	93
22-Jun	82	76	75	73	72	72	71	71	68	60	51	46	43	42	40	39	38	38	37	38	40	41	47	58	54.8	82
23-Jun	66	71	71	80	77	73	70	56	51	38	33	31	30	30	30	30	30	32	31	40	45	51	57	64	49.6	80
24-Jun	63	71	75	78	82	83	80	77	69	57	46	38	34	33	31	28	27	25	24	25	27	30	33	36	48.9	83
25-Jun	36	37	56	55	63	72	62	50	49	43	32	25	23	24	22	22	22	23	25	28	31	33	37	43	38.0	72
26-Jun	48	51	52	50	50	50	49	46	41	37	35	32	32	33	32	32	31	30	32	34	36	40	43	46	40.1	52
27-Jun	50	53	56	59	60	69	90	91	89	83	82	82	84	81	81	78	88	91	90	89	93	94	93	95	80.1	95
28-Jun	95	92	93	95	95	94	91	90	89	81	81	78	71	68	65	62	58	58	59	59	66	70	74	77	77.6	95
29-Jun	80	83	79	81	82	83	79	74	70	65	59	50	37	35	34	37	38	37	40	46	61	64	69	73	60.7	83
30-Jun	75	73	74	81	84	89	93	90	89	91	92	83	78	70	66	69	72	76	78	81	84	87	88	89	81.2	93
																			65.2 67.3 70.1 71.9 73.7 74.9 74.2 70.9 66.5 61.6 58.0 54.2 50.3 47.9 46.6 45.8 45.9 46.7 48.3 50.3 53.8 57.8 61.0 63.6						Diurnal Average	
																			95 92 93 95 95 94 96 95 93 92 92 89 89 92 88 91 93 92 92 90 93 94 93 95						Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Mannix - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	166	23.06	23.06
40 - 60	201	27.92	50.97
60 - 80	197	27.36	78.33
80 - 100	156	21.67	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



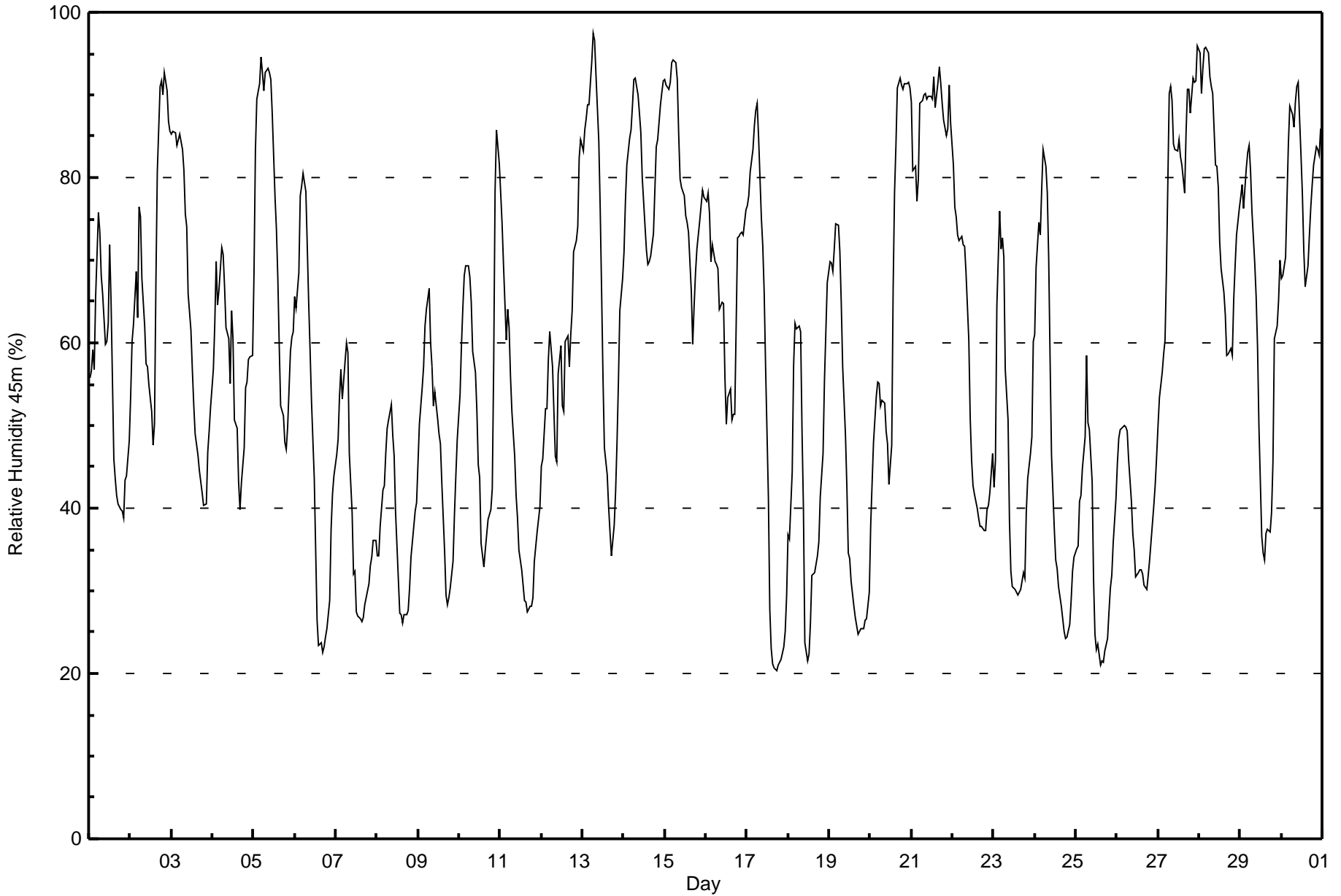
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

Mannix - June 2017

Maximum Value: 97 % on Jun 13 07:00																			Maximum Daily Average: 87.8 % on Jun 21						Hours in Service: 720	
Minimum Value: 20 % on Jun 17 18:00																			Minimum Daily Average: 34.5 % on Jun 25						Hours of Data: 720	
Maximum Diurnal Average: 74.2 % at hour 7																			Minimum Diurnal Average: 45.7 % at hour 17						Hours of Missing Data: 0	
Monthly Average: 58.7 %																			Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 41 Median = 59 Q ₃ = 76 P ₉₀ = 89 P ₉₉ = 95						Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	56	57	59	57	66	76	73	68	66	60	60	62	72	65	46	44	42	41	40	40	39	43	44	48	55.1	76
2-Jun	54	60	62	69	63	76	75	68	62	57	57	55	52	48	50	67	81	91	92	90	93	90	87	86	70.2	93
3-Jun	85	86	85	84	85	85	83	81	76	74	66	62	57	53	49	46	45	43	42	40	41	47	49	52	63.1	86
4-Jun	57	62	70	65	66	72	71	67	62	60	55	64	61	51	50	43	40	43	47	55	55	58	58	58	57.9	72
5-Jun	69	83	90	91	95	93	91	93	93	93	92	88	78	74	68	60	52	51	48	47	50	59	61	61	74.0	95
6-Jun	66	64	68	78	79	80	78	72	65	59	53	44	35	26	23	24	23	23	24	25	29	37	42	44	48.4	80
7-Jun	46	48	53	57	53	58	60	59	47	39	32	32	27	27	27	26	27	28	30	31	33	34	36	36	39.5	60
8-Jun	34	34	38	42	43	47	50	51	53	49	46	40	31	27	27	26	27	27	28	30	34	38	40	41	37.6	53
9-Jun	45	50	55	57	62	64	67	60	57	52	54	51	49	48	43	35	30	28	29	30	34	39	44	48	47.1	67
10-Jun	54	60	64	68	69	69	68	65	59	56	52	45	44	36	33	35	37	39	40	42	57	78	86	82	55.7	86
11-Jun	78	74	69	60	64	62	56	52	46	42	39	35	33	31	29	29	27	28	28	29	34	37	39	40	44.2	78
12-Jun	45	46	52	52	58	61	57	52	46	46	56	60	52	52	60	61	57	61	64	71	72	74	82	85	59.3	85
13-Jun	83	86	87	89	89	94	97	97	92	84	76	66	56	47	44	40	37	34	38	42	48	55	64	68	67.3	97
14-Jun	71	77	82	85	86	89	92	92	90	88	85	80	74	71	69	70	71	73	78	84	85	89	90	92	81.7	92
15-Jun	92	91	91	92	94	94	94	92	85	80	79	78	75	75	73	66	60	64	69	71	75	77	79	78	80.1	94
16-Jun	77	78	76	70	72	70	69	69	64	65	65	56	50	53	54	51	51	51	73	73	73	73	73	76	66.0	78
17-Jun	77	78	81	83	86	88	89	85	75	72	66	57	41	28	23	21	21	20	21	21	22	23	25	29	51.4	89
18-Jun	37	36	44	57	62	62	62	61	49	40	24	22	22	26	32	32	33	34	36	41	47	55	61	67	43.5	67
19-Jun	70	70	69	71	74	74	71	65	57	49	42	35	34	31	28	27	26	25	25	25	25	26	27	30	44.9	74
20-Jun	38	43	48	54	55	55	52	53	53	49	48	43	48	66	78	84	91	92	91	91	91	91	92	91	66.5	92
21-Jun	89	81	81	77	80	89	89	90	90	90	90	90	90	92	88	92	93	91	89	87	85	86	91	87	87.8	93
22-Jun	81	76	75	73	72	73	72	72	68	60	51	46	43	42	40	39	38	38	37	37	40	40	42	47	54.3	81
23-Jun	43	46	64	76	71	73	70	57	51	38	32	31	30	30	29	30	30	32	32	39	43	47	49	60	46.0	76
24-Jun	61	69	75	73	79	83	81	78	70	58	46	37	34	33	31	28	27	25	24	24	26	29	32	34	48.2	83
25-Jun	35	35	41	41	45	49	58	50	50	43	31	25	23	24	21	22	21	23	24	27	30	32	36	41	34.5	58
26-Jun	45	49	49	50	50	50	49	46	41	37	35	32	32	33	32	32	31	30	32	34	36	40	43	46	39.8	50
27-Jun	50	53	56	59	60	69	90	91	89	84	83	83	85	82	82	78	85	91	91	88	92	92	92	96	80.1	96
28-Jun	95	90	93	96	96	95	92	91	90	82	81	79	72	69	66	63	59	59	59	58	65	69	73	76	77.9	96
29-Jun	78	79	76	81	83	84	81	76	70	66	59	50	37	35	34	37	37	37	40	46	61	62	65	70	60.1	84
30-Jun	68	68	70	77	84	89	88	86	89	91	91	83	78	71	67	69	73	76	79	82	84	83	83	86	79.8	91
																			62.6 64.4 67.5 69.5 71.4 74.1 74.2 71.2 66.9 62.1 58.3 54.3 50.4 48.1 46.6 45.9 45.7 46.7 48.3 50.1 53.3 56.9 59.4 61.8						Diurnal Average	
																			95 91 93 96 96 95 97 97 93 93 92 90 90 92 88 92 93 92 92 91 93 92 92 96						Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Mannix - June 2017

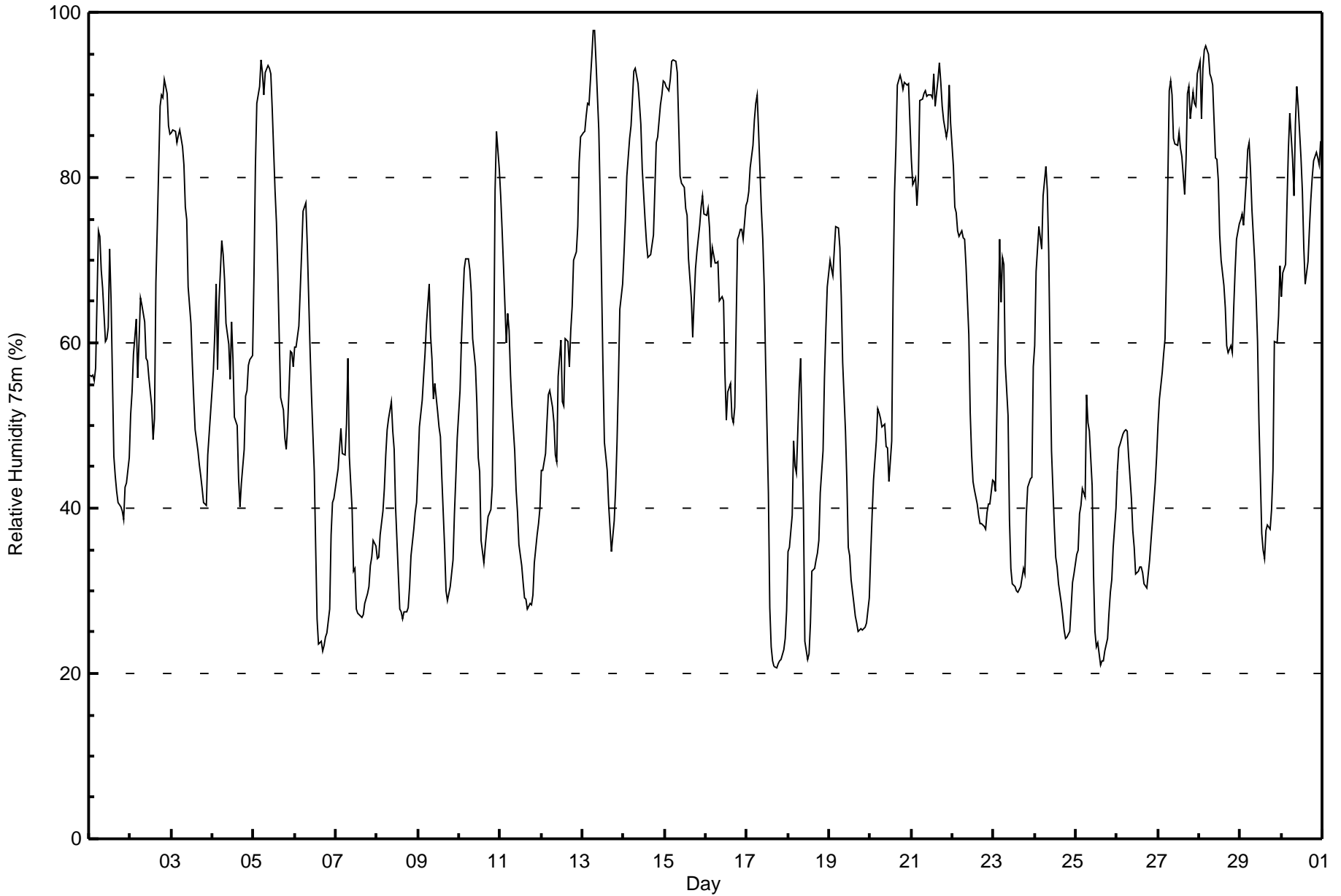
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	173	24.03	24.03
40 - 60	202	28.06	52.08
60 - 80	194	26.94	79.03
80 - 100	151	20.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 98 % on Jun 13 08:00																			Maximum Daily Average: 87.5 % on Jun 21						Hours in Service: 720	
Minimum Value: 21 % on Jun 17 18:00																			Minimum Daily Average: 33.7 % on Jun 25						Hours of Data: 720	
Maximum Diurnal Average: 72.9 % at hour 7																			Minimum Diurnal Average: 45.7 % at hour 17						Hours of Missing Data: 0	
Monthly Average: 58.2 %																			Percentiles: P ₁ = 21 P ₁₀ = 30 Q ₁ = 40 Median = 57 Q ₃ = 76 P ₉₀ = 89 P ₉₉ = 94						Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	56	56	56	56	57	74	73	69	67	60	60	62	71	65	46	44	42	41	40	40	39	43	43	46	54.3	74
2-Jun	51	54	59	63	56	60	65	65	63	58	58	56	52	48	51	67	74	89	90	90	92	90	86	85	67.6	92
3-Jun	85	86	86	84	85	86	84	81	76	75	67	62	57	53	49	47	45	44	42	41	40	46	49	51	63.5	86
4-Jun	57	61	67	57	65	72	71	68	62	60	56	62	58	51	50	43	40	43	47	54	54	57	58	59	57.2	72
5-Jun	68	81	89	91	94	93	90	93	94	93	93	88	78	75	68	61	53	52	48	47	50	59	59	57	74.0	94
6-Jun	59	59	62	66	71	76	77	72	66	59	54	44	35	27	23	24	23	23	24	25	28	37	41	41	46.5	77
7-Jun	44	45	47	50	47	47	50	58	46	40	32	33	28	27	27	27	27	29	30	30	33	34	36	35	37.6	58
8-Jun	34	34	37	40	42	46	50	51	53	49	47	40	32	28	28	27	27	27	28	31	34	37	39	41	37.6	53
9-Jun	45	50	53	56	59	62	67	61	58	53	55	52	50	49	44	35	30	29	30	30	34	39	44	48	47.2	67
10-Jun	54	60	65	69	70	70	69	66	61	57	53	46	44	36	33	35	37	39	40	43	57	78	86	81	56.3	86
11-Jun	78	74	69	60	64	62	56	52	47	42	40	36	33	31	29	29	28	28	28	29	33	37	38	40	44.3	78
12-Jun	45	45	47	50	54	54	52	50	46	46	56	60	53	52	61	60	57	62	64	70	71	74	82	85	58.2	85
13-Jun	85	86	87	89	89	95	98	98	94	86	78	67	57	48	45	41	38	35	38	42	48	55	64	67	67.9	98
14-Jun	71	75	80	85	86	90	93	93	91	89	86	81	75	72	70	71	73	79	84	85	89	90	92	92	82.1	93
15-Jun	92	91	90	92	94	94	94	93	87	80	79	79	76	76	70	65	61	65	69	71	74	76	78	76	80.1	94
16-Jun	75	76	74	69	72	70	70	70	65	66	65	56	51	54	55	51	50	52	72	73	74	74	73	77	66.0	77
17-Jun	77	78	81	84	87	89	90	86	76	73	67	58	42	28	23	21	21	21	21	22	22	23	24	28	51.7	90
18-Jun	35	35	39	48	45	44	55	58	49	40	24	22	22	26	32	33	34	35	36	42	47	56	62	67	41.0	67
19-Jun	70	69	68	71	74	74	71	66	58	49	43	35	34	31	28	27	26	25	25	25	25	26	26	29	44.9	74
20-Jun	34	39	43	48	52	52	51	50	50	48	47	43	48	67	78	84	91	92	92	91	92	91	91	87	65.0	92
21-Jun	82	79	80	77	80	89	90	90	90	90	90	90	90	93	89	92	94	92	89	87	85	86	91	87	87.5	94
22-Jun	81	76	76	73	73	73	73	73	69	61	52	46	43	42	41	39	38	38	38	37	40	41	40	43	54.5	81
23-Jun	43	42	52	73	65	70	70	57	51	39	33	31	30	30	30	30	31	33	32	39	43	44	44	57	44.5	73
24-Jun	60	69	74	73	71	78	81	78	71	58	47	38	34	33	31	28	27	25	24	24	25	28	31	32	47.6	81
25-Jun	34	35	39	40	42	41	54	50	49	43	32	25	23	24	21	22	22	23	24	27	30	31	35	40	33.7	54
26-Jun	45	47	48	49	49	49	49	46	41	37	35	32	32	33	33	32	31	30	32	34	36	41	43	46	39.7	49
27-Jun	50	53	56	59	60	69	90	92	90	85	84	84	85	84	83	78	82	90	91	87	90	89	89	92	79.7	92
28-Jun	94	87	93	95	96	95	93	92	91	82	82	80	73	70	67	64	60	59	60	59	64	69	73	74	78.0	96
29-Jun	75	76	74	80	83	84	81	76	70	65	60	50	37	35	34	37	38	37	40	45	60	60	63	69	59.6	84
30-Jun	66	69	70	77	83	88	82	78	87	91	89	82	78	71	67	70	74	77	80	82	83	82	81	84	78.8	91
	61.5	62.9	65.4	67.4	68.8	71.5	72.9	71.0	67.3	62.5	58.8	54.7	50.8	48.6	46.9	46.1	45.7	46.9	48.5	50.0	52.9	56.4	58.6	60.6	Diurnal Average	
	94	91	93	95	96	95	98	98	94	93	93	90	90	93	89	92	94	92	92	92	91	92	91	92	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 75m (RH75m) - %
Mannix - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	175	24.31	24.31
40 - 60	213	29.58	53.89
60 - 80	185	25.69	79.58
80 - 100	147	20.42	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



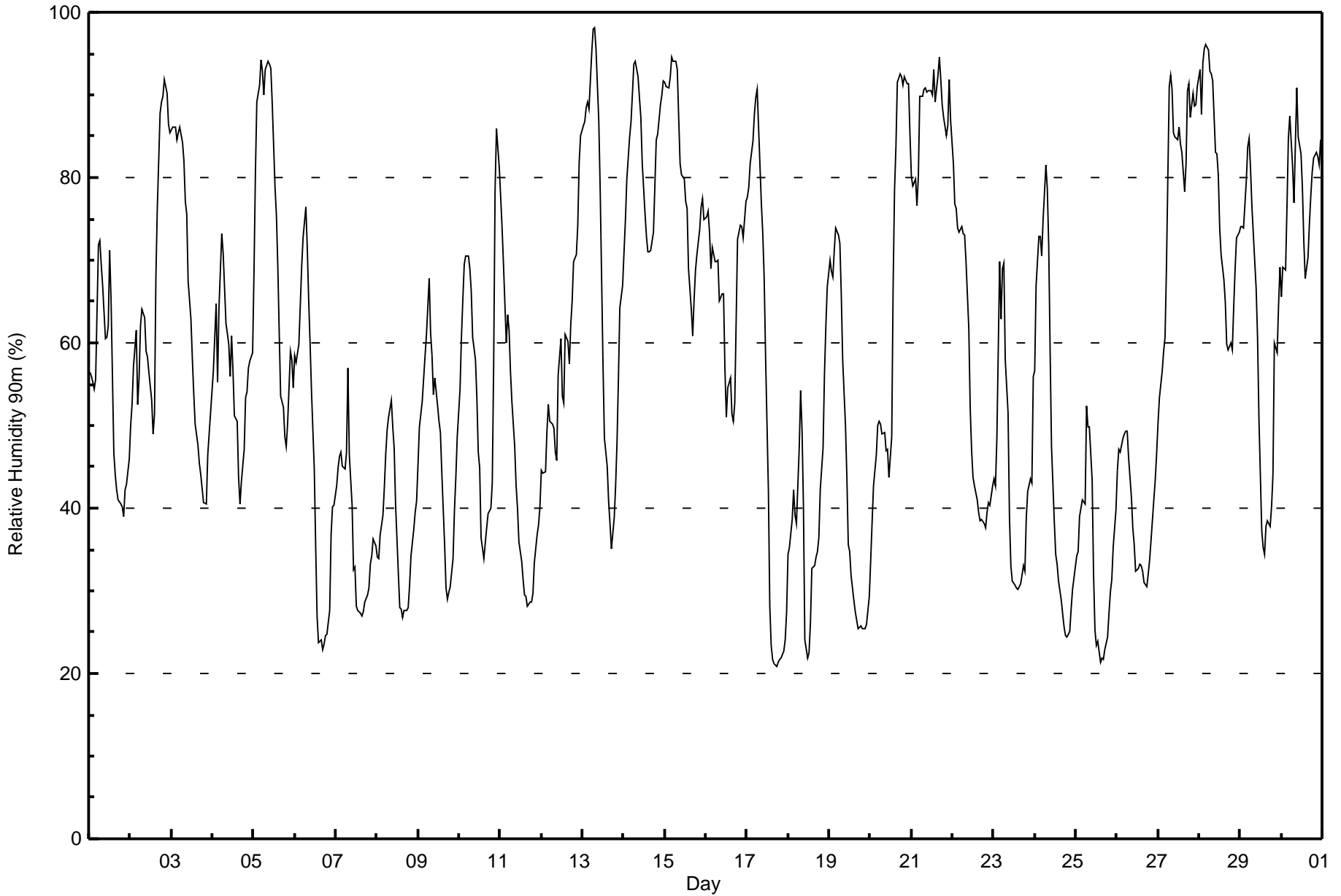
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 90m (RH90m) - %

Mannix - June 2017

Maximum Value: 98 % on Jun 13 08:00																			Maximum Daily Average: 87.7 % on Jun 21						Hours in Service: 720																								
Minimum Value: 21 % on Jun 17 18:00																			Minimum Daily Average: 33.6 % on Jun 25						Hours of Data: 720																								
Maximum Diurnal Average: 72.5 % at hour 7																			Minimum Diurnal Average: 46.1 % at hour 17						Hours of Missing Data: 0																								
Monthly Average: 58.2 %																			Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 40 Median = 57 Q ₃ = 76 P ₉₀ = 89 P ₉₉ = 95						Hours of Calibration: 0																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	56	56	55	54	56	72	72	69	67	61	61	62	71	65	47	44	42	41	41	40	39	42	43	46	54.3	72																							
2-Jun	50	53	57	62	52	56	62	64	63	59	58	56	53	49	51	68	76	88	89	90	92	90	86	85	67.1	92																							
3-Jun	86	86	86	85	85	86	84	82	77	76	67	63	58	54	50	48	45	44	42	41	41	46	49	52	63.9	86																							
4-Jun	57	61	65	55	64	73	71	67	62	60	56	61	57	51	50	44	40	43	47	53	54	57	58	59	56.9	73																							
5-Jun	69	81	89	91	94	93	90	93	94	94	93	89	79	75	69	61	54	52	49	47	50	59	58	54	74.1	94																							
6-Jun	58	58	60	64	69	73	76	72	65	60	54	45	35	27	24	24	23	24	25	25	28	37	40	40	46.1	76																							
7-Jun	43	45	46	47	45	45	47	57	46	40	33	33	28	28	27	27	27	29	29	30	33	34	36	35	37.2	57																							
8-Jun	34	34	37	39	43	47	50	51	53	50	47	40	32	28	28	27	28	28	28	31	34	38	40	41	37.7	53																							
9-Jun	45	50	53	56	58	61	68	61	58	54	56	52	50	49	44	36	30	29	30	31	34	40	44	49	47.4	68																							
10-Jun	54	61	65	69	70	71	69	66	61	58	53	47	45	37	34	36	38	39	40	43	58	79	86	81	56.6	86																							
11-Jun	78	74	69	60	63	61	56	53	47	43	40	36	33	31	30	29	28	29	29	30	33	37	38	40	44.5	78																							
12-Jun	45	44	44	49	52	50	50	50	47	46	56	61	53	53	61	60	58	62	65	70	71	74	82	85	57.9	85																							
13-Jun	86	87	89	89	88	95	98	98	96	87	78	68	57	49	45	41	38	35	39	43	48	56	64	67	68.3	98																							
14-Jun	71	75	80	85	87	90	94	94	92	90	87	82	76	73	71	71	73	79	85	85	89	90	92	92	82.5	94																							
15-Jun	91	91	91	92	95	94	94	93	87	82	80	80	77	76	69	64	61	65	69	71	74	76	78	75	80.2	95																							
16-Jun	75	76	73	69	72	70	70	70	65	66	66	57	51	55	56	51	50	53	73	73	74	74	73	77	66.2	77																							
17-Jun	78	79	82	84	88	90	91	86	77	73	68	58	42	28	23	22	21	21	21	22	22	23	24	27	52.0	91																							
18-Jun	34	35	39	42	39	38	47	54	50	40	24	22	22	26	33	33	34	35	36	42	47	56	62	67	40.0	67																							
19-Jun	70	69	68	71	74	73	72	66	58	50	44	36	35	32	29	27	26	25	26	25	25	25	26	29	45.1	74																							
20-Jun	34	38	43	47	50	51	50	49	49	47	47	44	49	67	79	84	92	93	92	91	92	91	91	85	64.7	93																							
21-Jun	80	79	80	77	80	90	90	91	91	90	91	91	90	93	89	92	95	92	89	87	85	86	92	87	87.7	95																							
22-Jun	82	77	76	74	73	74	73	73	70	62	52	47	44	43	41	40	39	39	38	38	39	41	40	43	54.8	82																							
23-Jun	43	43	48	70	63	69	70	58	52	39	33	31	31	30	30	31	31	33	32	39	42	44	43	56	44.2	70																							
24-Jun	57	67	73	73	70	75	82	79	72	59	47	38	34	33	31	29	27	26	25	24	25	28	30	32	47.3	82																							
25-Jun	34	35	39	40	41	40	52	50	50	43	32	25	23	24	21	22	22	23	24	27	30	31	35	40	33.6	52																							
26-Jun	45	47	47	49	49	49	49	46	41	38	36	32	33	33	33	32	31	31	32	34	36	41	43	47	39.7	49																							
27-Jun	50	53	57	59	61	69	91	92	91	85	85	85	86	84	83	78	82	91	91	87	90	89	89	91	80.0	92																							
28-Jun	93	88	94	96	96	95	93	93	92	83	83	80	74	71	68	65	60	59	60	59	64	69	73	73	78.3	96																							
29-Jun	74	74	74	80	84	85	81	76	70	67	61	51	37	35	34	38	38	38	40	44	60	59	65	69	59.7	85																							
30-Jun	66	69	69	76	85	87	81	77	84	91	85	83	79	72	68	70	74	78	81	82	83	83	81	85	78.7	91																							
																								61.3	62.7	64.9	66.8	68.2	70.7	72.5	71.0	67.6	63.0	59.1	55.1	51.2	49.1	47.3	46.5	46.1	47.2	48.7	50.1	53.0	56.4	58.6	60.3	Diurnal Average	
																								93	91	94	96	96	95	98	98	96	94	93	91	90	93	89	92	95	93	92	91	92	91	92	92	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 90m (RH90m) - %
Mannix - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	174	24.17	24.17
40 - 60	216	30.00	54.17
60 - 80	182	25.28	79.44
80 - 100	148	20.56	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 35 km/h on Jun 2 16:00	Maximum Daily Speed Average: 18.2 km/h on Jun 21	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 06:00	Minimum Daily Speed Average: 0.8 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 3.8 km/h at hour 15	Minimum Diurnal Speed Average: 0.3 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 1.3 km/h 336.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 29	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SW3	S4	W6	W8	W10	W5	WSW8	W7	W8	SW7	SW5	SSW6	SE6	SE9	SE7	SE8	ESE7	SE6	SSE5	SSE5	SSE6	SSE7	S6	SSW4	SSW3.7	W10
2-Jun	SE5	SSE3	S5	S4	S7	S4	SE3	SE2	NNE1	N2	WNW6	W9	NW6	NNE11	WNW12	W35	W26	W18	WNW9	WNW14	W16	W20	W13	W20	W7.6	W35
3-Jun	W24	W25	W21	W23	W24	W22	WNW19	NW13	WNW11	W14	W15	W13	NW9	NW10	NNW5	NE5	ESE8	E7	ESE7	ESE6	E5	ESE8	SE13	SE12	W7.4	W25
4-Jun	SE14	SE12	SSE11	S8	SW4	SW4	NW2	E5	W3	WNW10	W7	W13	W9	WNW9	NW9	N11	N14	N12	NNW14	NNW17	NNW11	N12	N16	N18	NNW4.5	N18
5-Jun	NNW10	NNW9	ENE17	NNW6	NNW8	NNW9	N12	NNW11	NNW9	NNW9	N8	NNW7	N7	NNW7	N5	E6	E7	E6	ESE6	SSE5	ENE4	ENE8	SE4	SE5	NNW4.8	ENE17
6-Jun	ESE1	SSE6	SSE6	SE6	SSE6	SE4	SE4	SE5	ESE5	SE5	ESE7	ESE7	ESE8	NNW2	W11	WNW10	WNW11	WNW5	WNW4	NNW4	NNE7	NNE12	NNE9	NNE7	ENE0.8	NNE12
7-Jun	N6	N7	N8	N8	N9	N8	NNW4	N3	NNE4	NE7	ENE7	ENE3	NE6	NE4	ENE5	ENE9	E14	E12	ENE11	ENE12	NNE8	NNE10	NNE10	NE8	NE6.5	E14
8-Jun	E14	E12	N5	N4	ESE5	ESE6	ESE5	SE4	ESE6	ESE11	E8	E9	ESE9	ESE13	ESE14	SE13	ESE12	SE12	SE13	SE10	ESE8	SE9	ESE10	ESE12	ESE8.5	E14
9-Jun	SE11	SE11	SE7	E3	N10	N14	NNE25	N22	N23	N24	N30	NNE22	N28	N29	N29	NNE25	NE24	NE24	NE23	NE23	NE20	NE20	NE16	NE17	NNE17.5	N30
10-Jun	ENE18	ENE16	ENE14	E15	E15	E12	E10	NE6	ENE6	NW6	WNW8	NNE2	WSW7	W8	WSW9	W6	NE2	NNE9	NNE11	N12	NW16	N10	N13	NNW10	NNE5.1	ENE18
11-Jun	NW9	NNW10	NW13	NW17	WNW16	WNW18	WNW20	WNW21	NW22	NW21	NW19	NW16	NW16	NW15	NW15	NW13	NW13	NNW12	NNW13	NNW11	NNE8	ENE8	E9	ESE9	NW12.0	NW22
12-Jun	SE9	SSE10	SSE11	SSE12	SSE10	SSE12	SSE12	SSE12	SSE12	SSE13	SSE16	SE22	SSE21	SE20	SE8	NNE6	SSE16	SSE15	SE14	SE6	SE9	E4	N6	N9	SE10.2	SE22
13-Jun	N8	NNW6	NNW4	NW2	NW5	NNW4	NW2	N4	W2	ENE5	ENE5	NE3	ENE6	NNW7	N10	NNE9	NE9	NNE11	N20	N22	NE14	NE16	NNE13	N19	NNE7.6	N22
14-Jun	NNW13	N23	NNW19	N25	N18	N22	NNE21	N22	N19	N18	N14	N14	N18	N17	N17	N16	NNE19	N19	NNW15	NNW16	N15	NNW15	NNW13	N15	N17.3	N25
15-Jun	NNW13	NNW12	NNW12	NNW12	N12	N15	N12	NNE2	NE3	ENE1	W3	NW4	NW6	NW6	ENE11	ENE8	E5	ENE5	ENE10	ENE7	NE5	ENE7	ENE5	E5	NNE5.5	N15
16-Jun	S3	SE4	SE4	SE8	SE6	SE9	SE6	SE6	SE8	SE7	SSE7	SE7	SE9	SW12	WSW10	SE8	SSE12	SW5	W15	W8	SSE2	SSW2	SE8	SE14	SSE4.9	W15
17-Jun	SE14	SE12	SE9	SSE7	SSE7	SSE6	SW3	W13	WNW18	WNW17	WNW10	WNW10	WNW21	NW20	WNW26	WNW21	WNW20	WNW15	NW9	NNW6	N3	SSE2	SW3	SW6	W6.7	WNW26
18-Jun	WSW6	NE4	S8	SSE8	SSE6	SSE6	SSE4	SE5	SSE10	SSE6	WSW16	WSW13	SW13	SSW14	W24	W22	W19	W15	NW9	NW12	NW15	NNW14	NNW11	W13	WSW6.6	W24
19-Jun	W8	W12	W13	WSW11	W15	W12	W10	W9	W5	WSW4	WSW8	NW6	W4	WSW6	SW7	W8	W9	WSW7	S4	SE6	SE7	S7	SSW9	S6	WSW6.4	W15
20-Jun	SE7	SSE10	SSE7	SE9	SE8	SSE10	SSE9	SSE8	SSE6	SE8	SSE6	SSW12	SSW16	SSW16	SSW13	S10	SSE11	SE11	SE13	SE13	SSE10	SE12	SSE11	S10	SSE9.5	SSW16
21-Jun	S9	SSW8	SSW7	WSW13	W18	W27	W34	W29	W24	W26	W23	W22	W25	W27	W30	W29	W26	W27	WNW19	NNW17	NW15	NNW14	NNW20	NNW24	W18.2	W34
22-Jun	NNW22	NNW21	NNW23	NNW21	NNW22	NNW19	NNW20	NNW16	NNW13	NNW16	N21	NNW20	NNW18	NNW17	NNW14	NNW14	NNW15	NNW12	N10	NNE10	NNE6	N4	W5	WSW7	NNW14.6	NNW23
23-Jun	W11	W12	W4	NNE5	SE2	NE0	WNW3	WNW6	NW7	NNW11	NNW11	NNW11	NNW10	NNW9	NW6	WSW7	NW6	NE10	ENE7	WNW5	W5	W7	W7	W2	NW4.9	W12
24-Jun	W7	WSW11	SSE3	SSE4	SE4	SSE4	SSW3	WSW4	N4	NNW5	NNW5	N7	N11	NNW11	NNW14	NNW12	NW12	NNW10	NNE12	NNE10	NNE10	NE9	ENE9	ENE7	N4.4	NNW14
25-Jun	E10	E8	W5	NW3	SSW1	SW2	SSW3	SE5	SSE2	SE3	ESE6	SE2	S1	ESE6	SSE10	SSE13	SSE11	SE11	SE13	SE12	SE14	SE15	SSE14	SSE13	SE6.5	SE15
26-Jun	SSE15	SSE15	SSE14	SE16	SE17	SE19	SE17	SE15	SE14	SE18	SE20	SSE23	SE26	SE22	SE21	SE18	SE17	SE16	SE14	SE12	SE10	ESE10	SE11	SE12	SE16.1	SE26
27-Jun	SE11	SE12	SE12	SE14	SE12	S11	WSW12	S6	S10	S7	SSE9	SW11	SW6	SE4	E6	W7	W6	WSW10	WSW8	WSW4	SSW4	S6	SSE5	SSE4	S5.5	SE14
28-Jun	S3	SW6	WSW6	N1	SE4	SE5	E5	ENE8	ENE7	E16	ENE16	NE14	NE12	NNE16	NNE13	ENE12	E8	SE8	SSE7	S6	SSE12	SSE11	SSE10	SSE8	E4.9	ENE16
29-Jun	SSE8	SSE8	SSE8	SSE10	SSE9	SE8	SE6	SE5	SE3	E3	ESE4	WSW3	W4	WSW4	WNW6	WNW6	NNE7	NNE6	W2	W4	W7	WNW5	W4	W5	S1.7	SSE10
30-Jun	WSW6	SW3	SE4	S5	S4	SW6	SSE1	SE6	SSE8	SSE6	SSE7	SSE7	SE7	SSE6	SW3	W9	WSW10	WSW8	WSW5	SW5	SSW3	SSE6	S5	S4	SSW4.0	WSW10

SE0.4 SSE1.0 S0.3 W0.4 W0.7 W1.0 NW2.0 NNW2.1 NW1.5 NNW1.9 NW1.9 NNW1.9 NW2.3 NW2.8 NW3.8 NW3.7 NW1.6 N1.4 NNE2.5 NNE3.1 NNE2.4 NE2.9 NE1.9 NE1.1	Diurnal Average
W24 W25 NNW23 N25 W24 W27 W34 W29 W24 W26 N30 SSE23 N28 N29 W30 W35 W26 W27 NE23 NE23 NE20 NE20 NNW20 NNW24	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods

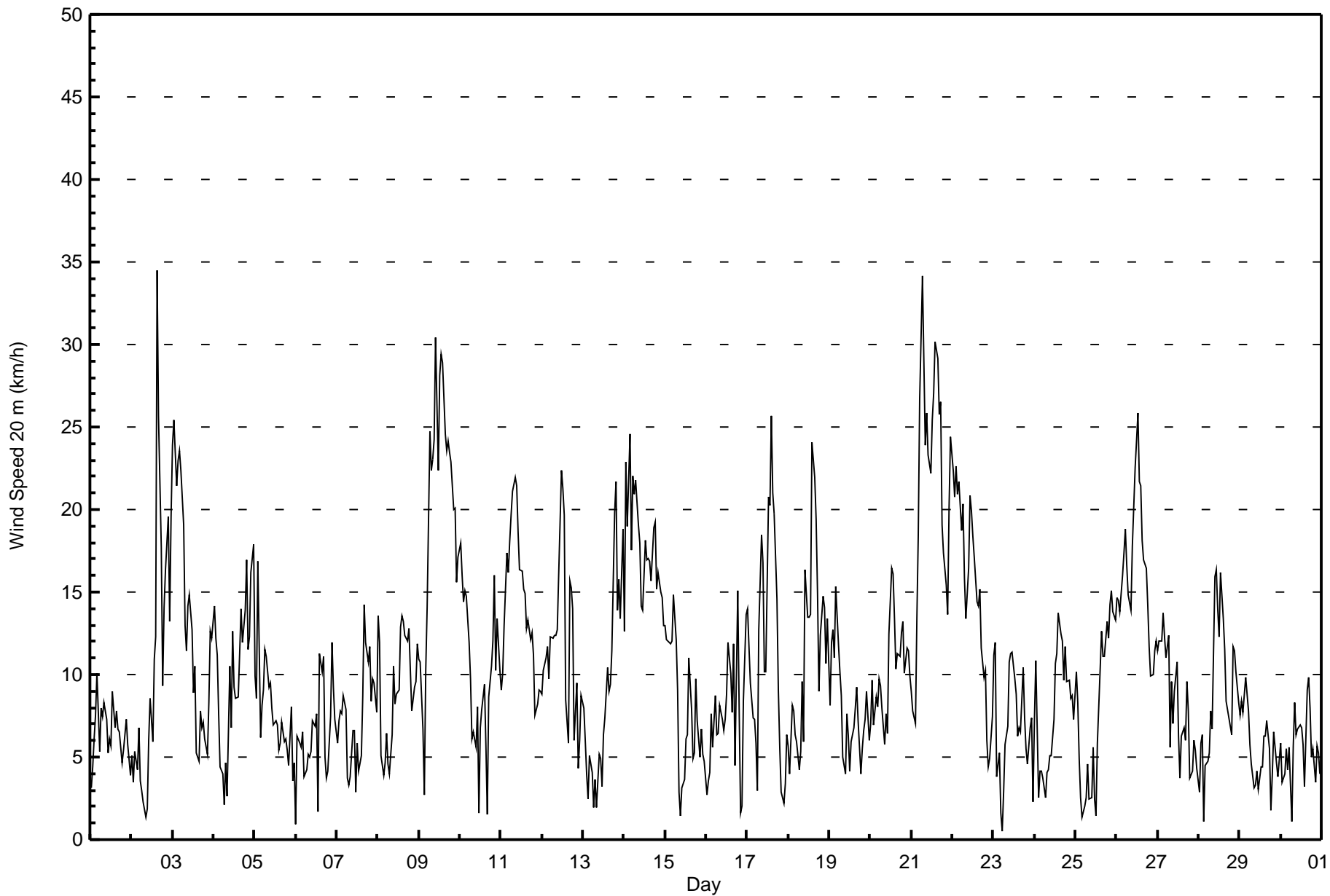


Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 20 m (WS20m) - km/h

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 2 15:00 Minimum Value: 1 km/h on Jun 23 02:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	2	1	2	3	2	3	2	3	2	2	3	3	3	3	3	3	2	2	1	1	1	2	3
2-Jun	2	2	2	2	2	2	2	1	2	2	4	4	3	5	11	6	9	5	4	7	3	4	4	4	11
3-Jun	4	4	4	5	4	4	5	5	5	4	4	4	4	4	3	3	3	2	2	2	2	3	4	4	5
4-Jun	4	3	3	2	2	2	2	2	4	4	3	4	3	4	5	6	4	6	7	5	5	4	6	7	
5-Jun	5	5	5	3	3	3	5	4	3	3	3	3	4	4	3	3	3	4	2	2	5	3	2	1	5
6-Jun	2	2	2	2	2	2	2	2	2	2	3	3	3	4	5	3	4	2	1	1	3	3	3	2	5
7-Jun	2	2	2	3	2	2	2	2	2	4	4	3	3	3	4	4	3	3	3	3	3	2	2	2	4
8-Jun	4	4	2	2	2	2	2	2	2	3	3	3	4	5	5	5	4	5	4	3	3	3	4	4	5
9-Jun	4	3	2	2	4	6	8	7	7	8	9	7	9	8	8	8	6	6	6	6	6	5	4	4	9
10-Jun	5	4	4	4	4	3	4	3	3	4	4	3	4	4	4	3	2	4	4	4	6	4	6	4	6
11-Jun	3	3	5	6	5	6	6	8	7	7	7	7	6	6	6	6	7	6	5	4	2	3	2	3	8
12-Jun	2	3	3	3	2	3	3	4	5	4	6	7	8	7	8	5	8	6	5	3	4	3	2	3	8
13-Jun	3	2	2	2	2	2	2	2	2	2	2	4	4	4	3	3	4	7	7	4	5	5	6	7	7
14-Jun	7	7	6	9	9	8	7	7	6	6	5	5	7	6	6	6	5	5	8	6	6	5	5	5	9
15-Jun	4	4	4	4	4	4	4	3	2	2	3	3	3	3	6	2	2	2	3	2	2	2	2	2	6
16-Jun	1	2	5	3	2	3	2	2	3	3	2	3	4	6	4	4	4	8	5	6	1	2	6	5	8
17-Jun	4	4	4	3	3	3	2	6	5	5	4	5	7	7	8	7	7	6	4	3	1	1	3	2	8
18-Jun	3	3	2	2	2	2	2	3	4	4	5	4	7	8	7	6	5	5	4	5	5	4	4	2	8
19-Jun	4	3	4	2	3	3	3	2	3	2	3	3	4	4	4	5	4	4	3	2	2	2	2	2	5
20-Jun	3	3	2	3	3	3	3	2	2	2	3	7	7	8	6	4	4	4	6	4	4	4	4	4	8
21-Jun	3	3	4	4	6	5	6	6	5	4	4	4	4	4	5	5	5	5	5	6	5	6	7	9	9
22-Jun	8	7	8	7	9	7	6	6	5	7	7	7	8	7	6	5	5	5	4	4	3	1	2	2	9
23-Jun	1	1	4	2	1	1	2	2	3	4	5	5	4	4	3	4	4	4	3	3	2	1	2	3	5
24-Jun	2	4	2	2	2	2	1	2	2	3	3	5	4	6	6	5	5	4	4	3	2	2	3	2	6
25-Jun	3	3	2	1	1	1	1	2	2	2	3	2	3	4	5	5	4	4	4	4	4	4	3	3	5
26-Jun	4	4	3	5	4	5	5	5	5	6	7	8	8	7	7	6	6	6	4	4	3	4	4	4	8
27-Jun	4	4	4	4	5	5	4	3	4	3	3	4	3	2	2	7	4	3	2	2	1	2	2	2	7
28-Jun	2	2	1	2	2	2	2	2	3	4	5	4	4	5	4	4	3	3	3	2	4	3	3	3	5
29-Jun	2	2	3	3	3	2	2	2	2	2	2	2	3	4	3	4	3	2	2	1	2	2	1	1	4
30-Jun	1	3	2	2	2	2	2	2	3	3	3	3	2	2	3	3	4	2	2	2	2	1	1	1	4
																	Diurnal Maximum								
																	8 7 8 9 9 8 8 8 7 8 9 8 9 8 11 8 9 8 8 7 6 6 7 9								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	152	21.11	21.11
6 - 11	303	42.08	63.19
12 - 19	190	26.39	89.58
20 - 28	67	9.31	98.89
29 - 38	8	1.11	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Mannix - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	4	8	8	8	5	24	14	12	7	11	6	16	5	6	8	152
6 - 11	17	21	7	17	12	19	42	47	15	4	7	18	25	14	18	20	303
12 - 19	25	6	6	9	6	4	35	17	0	5	2	4	18	9	13	31	190
20 - 28	11	4	6	0	0	0	6	2	0	0	0	0	20	6	3	9	67
29 - 38	3	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	66	35	27	34	26	28	107	80	27	16	20	28	84	34	40	68	720

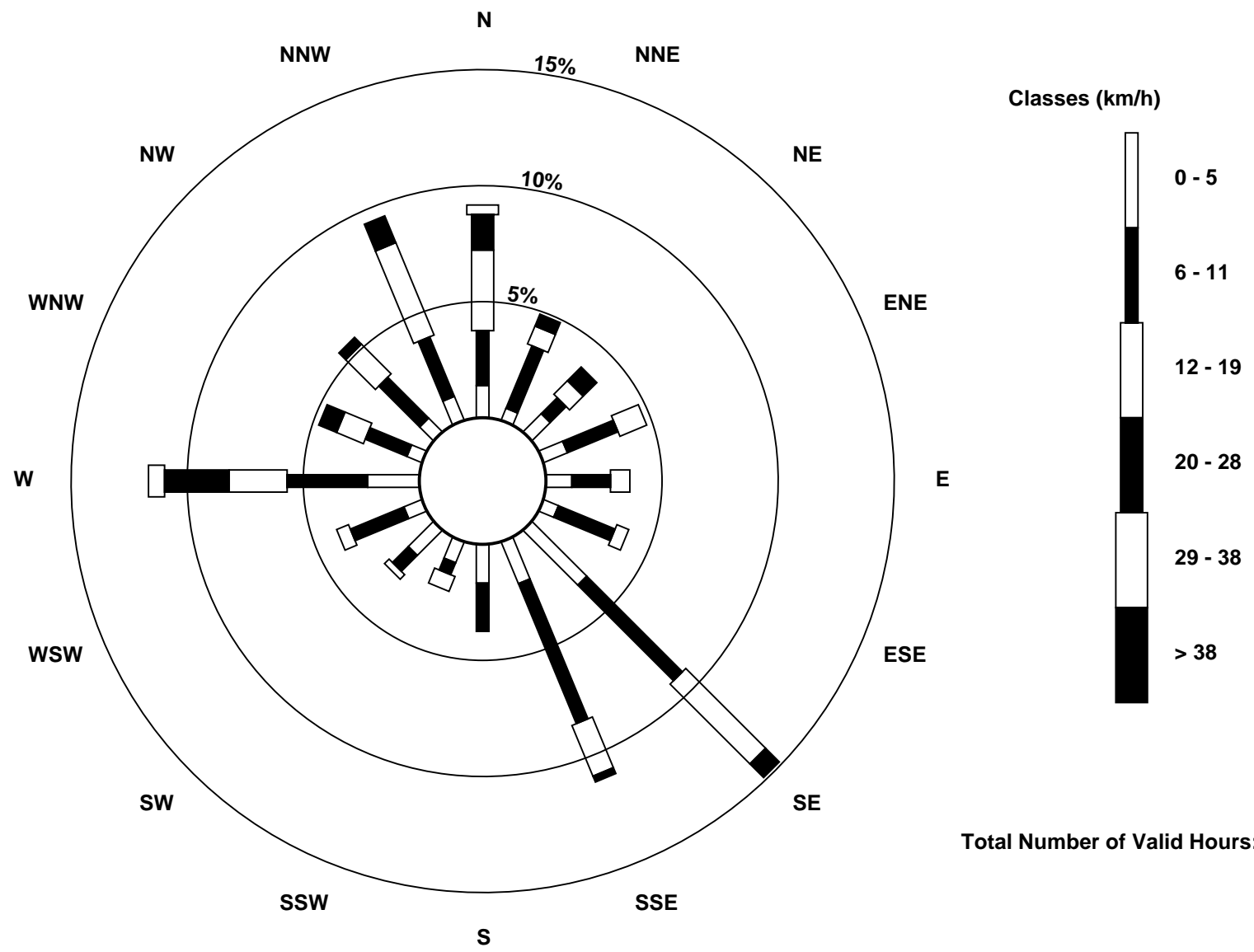
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 20 m (WS20m) - km/h
Mannix (AMS 5)





Maximum Speed: 41 km/h on Jun 9 11:00	Maximum Daily Speed Average: 25.1 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 24 03:00	Minimum Daily Speed Average: 1.0 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 5.4 km/h at hour 15	Minimum Diurnal Speed Average: 0.2 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 2.0 km/h 334.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 13 Q ₃ = 19 P ₉₀ = 27 P ₉₉ = 35	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SW3	SE5	WSW8	WSW10	W14	W8	WSW9	W8	WSW9	SW10	SW7	SSW11	SE7	SE11	ESE8	SE9	ESE7	SE8	SSE7	SSE7	SE10	SE10	S13	S11	S5.2	W14
2-Jun	SE8	SSE8	S7	SSE7	SSW9	S8	SE3	SSE2	NNW2	NNW3	WNW8	W11	NW8	NNE14	WNW16	W39	W33	W23	WNW15	WNW20	W20	W23	W18	W23	W9.8	W39
3-Jun	W28	W29	W26	W29	W27	W26	WNW26	WNW19	WNW16	W17	W18	W15	NW12	NW14	NNW7	NE6	E9	E7	E8	E7	E7	ESE11	SE18	SE19	W9.0	W29
4-Jun	SE21	SE18	SSE18	S13	SW8	SW6	WNW3	E5	W4	WNW15	W7	W15	W11	WNW12	NW13	NNW16	NNW20	NNW18	NNW21	NW27	NNW19	N19	N24	N26	NNW6.8	NW27
5-Jun	NNW15	NNE13	NE22	NNW11	NNW14	NNW15	N18	NNW17	NNW14	NNW14	N11	NNW11	NNW11	NNW10	N7	ENE7	E8	E7	ESE7	SE7	ENE6	ENE10	SE7	SE8	N7.4	NE22
6-Jun	SE5	SE12	SSE12	SE11	SE13	SE5	SE5	SE6	ESE5	SE7	ESE8	E7	ESE8	WNW3	W15	WNW13	WNW14	WNW7	WNW5	NW7	N11	N18	NNE14	NNE11	E1.0	N18
7-Jun	N10	N11	N13	N13	N14	N11	NNW6	NNW4	N5	NE8	ENE7	ENE3	NNE7	NNE5	NE6	ENE10	ENE17	ENE14	NE13	ENE15	NNE11	NNE14	NNE13	NE10	NNE8.9	ENE17
8-Jun	E17	E15	NNE6	NE5	ESE7	E8	ESE6	ESE5	E7	E12	E9	ENE10	ESE10	ESE16	ESE16	ESE15	ESE15	ESE14	SE16	ESE13	ESE10	SE12	ESE13	ESE15	ESE10.7	E17
9-Jun	ESE15	SE16	ESE10	E5	N15	N20	N34	N30	N31	N33	N41	NNE29	N38	N39	N38	NNE32	NE29	NE30	NE29	NE30	NE28	NE26	NE22	NE23	NNE23.3	N41
10-Jun	NE23	ENE20	ENE19	ENE18	E18	ENE14	E12	NE7	ENE7	NW8	WNW11	N3	WSW8	W9	WSW11	W7	NNE2	NNE11	NNE14	N18	NW25	N16	NNW20	NNW16	NNE7.3	NW25
11-Jun	NW16	WNW18	NW22	NW27	WNW26	WNW27	WNW28	WNW30	NW32	WNW30	WNW26	NW23	WNW22	NW22	NW21	NW18	NW19	NNW19	NNW18	NNW17	NNE11	NE11	ENE12	ESE12	NW18.1	NW32
12-Jun	SE14	SSE18	SSE20	SSE18	SSE16	SE18	SE18	SE17	SE17	SSE19	SSE25	SE28	SE28	SE25	ESE11	N8	SSE22	SSE21	SE18	SE9	ESE14	E7	N11	N14	SE14.4	SE28
13-Jun	N13	NNW12	NNW8	NW6	NW10	NNW7	NW3	N5	W3	ENE6	NE6	NE4	NE7	NNW10	N14	NNE11	NNE11	NNE14	N26	N30	NE18	NE21	NNE19	N27	N10.9	N30
14-Jun	NNW20	N34	NNW30	N35	N26	N31	N28	N30	N27	N25	N20	N19	N25	N22	N23	N24	N22	N27	NNW24	NNW25	NNW24	NNW23	NNW21	N25.1	N35	
15-Jun	NNW21	NNW20	NNW20	NNW19	N19	N22	N17	N11	NNE4	NE1	W3	NW5	NW9	NW9	ENE14	NE8	ENE5	ENE6	ENE11	NE9	NE7	NE9	ENE6	E7	N8.3	N22
16-Jun	SE6	SE8	ESE6	ESE9	ESE8	ESE11	SE8	ESE7	ESE9	SE9	SSE8	SE10	SE11	SSW15	SW12	SE10	SSE18	SSW7	W20	W10	SE2	S2	SE11	SE19	SSE6.6	W20
17-Jun	SE19	SE16	SE12	SE11	SSE10	SSE9	SW4	W17	W24	W21	WNW13	WNW14	WNW28	WNW29	WNW33	WNW29	WNW27	WNW21	WNW13	NW9	N5	ESE3	SSW4	SW8	W9.1	WNW33
18-Jun	WSW11	N3	SSE16	SSE15	SE11	SSE9	SSE6	SE6	SSE13	SSE8	SW20	SW17	SW19	SSW21	WSW28	W25	WSW22	WSW17	NW14	NW20	NW23	NNW22	NW18	W17	WSW8.7	WSW28
19-Jun	W11	W16	W17	WSW14	W18	W14	W11	W10	WSW6	WSW4	WSW9	NW8	W6	WSW7	SW9	W10	WSW10	SW9	S6	SE7	SE8	SSE13	SSW17	SSW11	WSW8.1	W18
20-Jun	SSE12	SSE17	SSE14	SE15	SE13	SE17	SE14	SE12	SE8	SE10	SE8	S19	SSW26	S28	SSW22	SSE17	SSE15	SE15	SE17	SE18	SE14	SE17	SSE18	S18	SSE14.9	S28
21-Jun	S17	SSW15	SSW14	WSW18	WSW23	WSW31	W39	W33	WSW29	W29	W27	W25	W29	W30	W35	W33	W29	W31	WNW26	NNW27	NW25	NNW22	NNW30	NNW36	W21.9	WSW39
22-Jun	NNW33	NNW31	NNW33	NNW32	NNW32	NNW29	NNW29	NNW24	NNW20	NNW23	NNW29	NNW28	NNW27	NNW24	NNW21	NNW20	NNW21	NNW16	NNW14	N14	N9	NNW6	WNW4	WSW10	NNW21.3	NNW33
23-Jun	WSW17	WSW18	W8	N8	NW2	WNW2	WNW4	WNW8	NW10	NW15	NW16	NW16	NW14	NNW13	NW9	WSW8	NW9	NNE12	ENE8	WNW7	W5	WSW9	W12	W5	WNW7.4	WSW18
24-Jun	W9	WSW14	SE1	S5	SE8	SSE5	SW3	W4	N6	NNW7	NNW7	N9	N15	NNW16	NNW20	NNW17	NW18	NNW14	NNE15	NNE12	NNE15	NE15	ENE12	ENE10	N6.7	NNW20
25-Jun	E13	E11	WSW6	NNE3	SE3	SSE2	S3	SE6	SSE3	SE3	ESE6	SE3	S2	ESE7	SSE15	SSE17	SSE16	SE14	SE17	SE17	SE21	SE23	SE22	SSE23	SE9.5	SE23
26-Jun	SSE25	SSE25	SE23	SE23	SE25	SE26	SE23	SE19	SE18	SE23	SE26	SE29	SE33	SE27	SE27	SE24	SE23	SE21	SE19	SE16	ESE13	ESE12	ESE15	SE17	SE21.8	SE33
27-Jun	ESE15	SE16	ESE16	SE18	SE17	S16	WSW16	S8	SSE14	S11	SSE11	SW15	SSW9	SE4	E7	WSW8	WSW7	WSW12	WSW9	WSW5	SSW6	S11	SSE9	SSE8	S7.7	SE18
28-Jun	S5	SSW10	WSW9	NNW3	ESE5	SE6	E6	NE9	ENE8	ENE19	NE20	NE17	NNE15	NNE20	NNE17	NE14	ENE10	SE10	SSE10	S10	SSE19	SSE19	SSE18	SSE14	E5.9	NNE20
29-Jun	SSE13	SSE14	S17	SSE16	SSE13	SE11	SE7	SE5	SE3	ESE3	ESE5	SW4	W6	WSW5	WNW9	WNW9	N9	N7	W3	W5	W9	WNW8	WNW6	W6	S2.5	S17
30-Jun	WSW10	SW6	SE5	S10	S7	SW8	W1	ESE7	SE11	SSE10	SSE10	SSE9	SE8	SSE7	SW4	W11	SW12	WSW9	WSW6	SW8	SW5	S9	SSW10	S7	SSW5.7	SW12

SE0.8 SSE1.5 SSE0.6 W0.2 W0.9	NNW1.3 NW3.1 NW3.3 NW2.6 NW2.8 NW2.7	NNW2.8 NW3.4 NW3.9 NW5.4 NW4.9 NW2.5 N2.3 N3.6 N5.0	NNE3.9 NE4.3 NE2.9 NE1.4	Diurnal Average
NNW33 N34 NNW33 N35 NNW32	WSW31 WSW39 W33 NW32 N33 N41 SE29 N38 N39 N38 W39 W33 W31 NE29 N30 NE28 NE26	NNW30 NNW36	Diurnal Maximum	

All monthly, daily, and diurnal averages have been calculated using vector methods

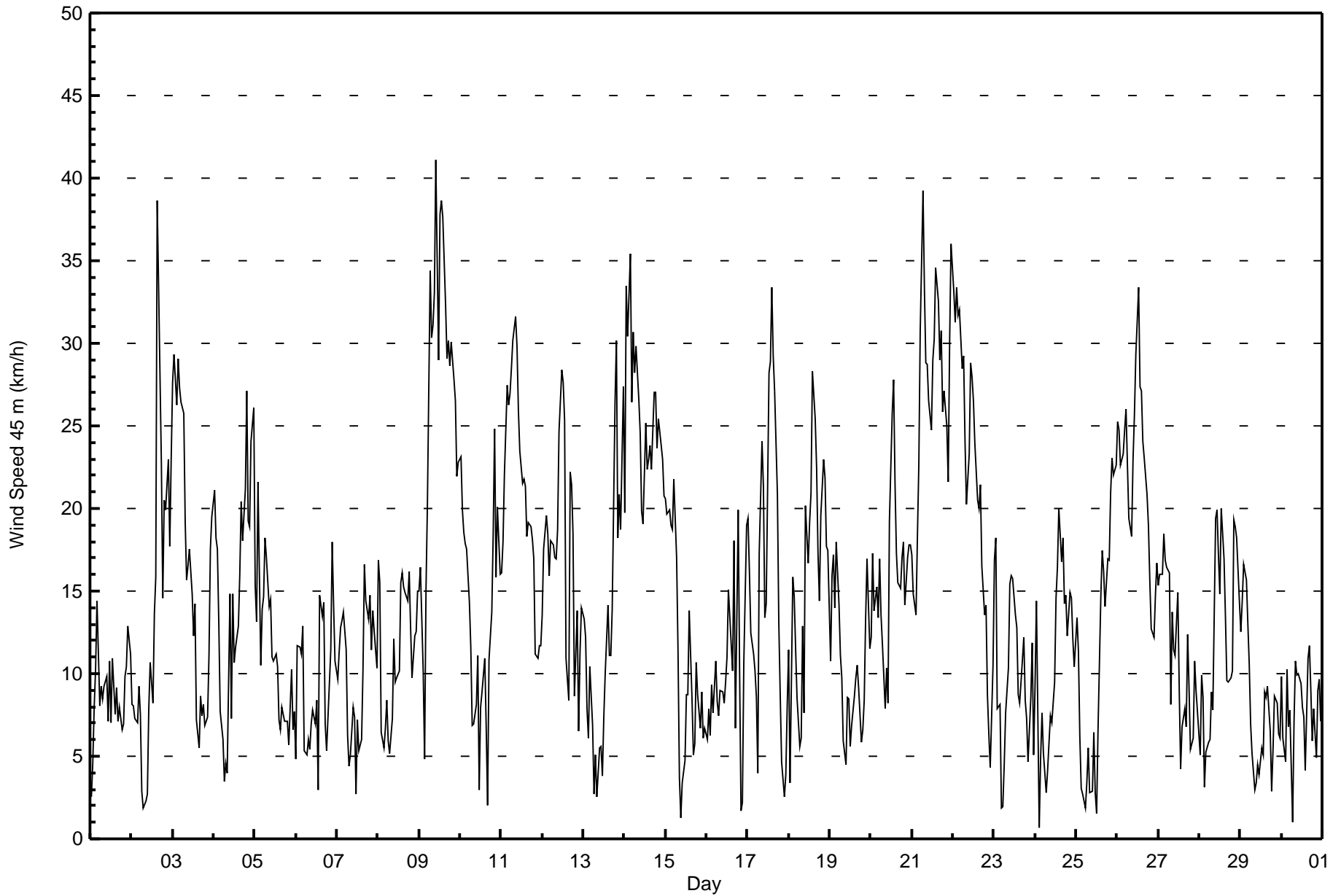


Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 45 m (WS45m) - km/h

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jun 12 17:00 Minimum Value: 1 km/h on Jun 25 06:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	2	2	3	3	2	3	2	3	2	3	3	3	2	3	3	3	2	2	1	1	1	3	3
2-Jun	2	2	2	1	2	2	2	1	3	2	4	3	3	6	10	7	9	5	4	6	3	4	2	3	10
3-Jun	3	4	3	4	3	3	4	4	4	4	4	3	3	3	3	3	3	2	2	2	2	5	4	4	5
4-Jun	4	3	2	2	3	2	2	2	5	4	4	2	2	2	2	4	5	4	6	6	5	7	4	5	7
5-Jun	6	6	6	3	2	3	5	3	3	3	3	3	4	4	2	3	3	2	2	2	7	3	2	2	7
6-Jun	2	2	3	3	3	2	2	2	2	2	3	3	3	4	5	3	4	2	2	1	4	3	3	2	5
7-Jun	2	2	2	3	2	2	2	2	2	4	4	4	3	3	5	4	3	3	3	3	5	3	2	3	5
8-Jun	5	5	2	2	3	2	2	2	2	3	3	3	5	5	5	4	4	5	4	4	3	4	4	4	5
9-Jun	4	3	3	3	5	6	8	6	6	6	8	7	8	7	7	8	6	7	6	6	5	5	4	4	8
10-Jun	5	5	4	4	3	3	4	3	4	4	4	4	3	4	4	2	2	4	4	3	5	5	5	3	5
11-Jun	3	3	4	4	4	4	4	7	6	6	6	6	5	5	5	5	6	6	4	3	3	3	3	3	7
12-Jun	3	4	3	3	2	3	3	3	5	4	5	7	8	7	9	6	10	5	4	3	5	3	2	3	10
13-Jun	2	2	3	3	2	2	2	2	2	3	2	2	4	5	3	3	3	4	6	6	4	6	6	5	6
14-Jun	7	6	6	8	10	7	7	6	5	5	5	7	5	5	5	5	5	4	8	5	5	5	4	4	10
15-Jun	3	3	3	3	3	3	3	3	2	2	3	2	2	2	7	2	2	2	3	2	1	2	2	2	7
16-Jun	2	2	5	2	2	4	3	2	2	2	2	3	4	6	4	5	3	8	3	7	2	2	8	5	8
17-Jun	4	4	4	3	3	3	2	6	4	4	4	6	6	5	6	5	5	5	4	2	1	1	4	3	6
18-Jun	2	4	2	2	2	2	2	3	3	4	6	4	9	9	6	5	4	5	3	4	5	3	3	2	9
19-Jun	4	3	3	2	3	3	3	2	3	2	3	3	4	5	4	5	4	4	3	2	1	2	2	4	5
20-Jun	6	3	2	3	3	3	3	2	2	3	4	6	5	7	5	4	3	4	6	3	3	4	3	3	7
21-Jun	3	2	3	4	6	5	6	6	5	4	4	3	4	4	5	4	4	4	4	5	5	6	7	8	8
22-Jun	6	6	7	6	8	6	5	5	5	6	7	6	7	5	5	5	5	5	4	4	4	2	2	3	8
23-Jun	1	1	4	2	2	2	2	2	3	4	4	4	4	4	4	4	4	4	3	3	2	3	2	6	6
24-Jun	2	3	2	2	2	2	2	2	2	3	4	5	4	5	5	4	4	4	3	2	3	2	3	2	5
25-Jun	3	3	2	1	1	1	1	2	2	2	3	3	3	4	6	5	4	4	4	4	3	4	3	2	6
26-Jun	3	3	3	4	4	4	4	5	4	5	7	7	7	6	7	6	6	6	4	4	4	4	4	4	7
27-Jun	4	4	4	4	5	5	5	4	3	2	3	4	3	2	2	8	4	4	2	2	1	2	1	2	8
28-Jun	4	1	2	1	2	2	2	2	4	5	5	4	4	5	4	4	3	3	2	2	4	2	2	2	5
29-Jun	2	1	2	3	2	2	2	2	2	2	3	2	3	4	3	4	3	2	2	1	2	3	3	2	4
30-Jun	1	4	4	1	2	2	2	3	2	2	2	2	2	2	3	2	4	2	2	1	2	1	1	1	4
																		7 6 7 8 10 7 8 7 6 6 8 7 9 9 10 8 10 8 8 8 7 7 7 8 8							
Diurnal Maximum																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	77	10.69	10.69
6 - 11	248	34.44	45.14
12 - 19	220	30.56	75.69
20 - 28	122	16.94	92.64
29 - 38	49	6.81	99.44
> 38	4	0.56	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h
Mannix - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	4	3	2	2	6	14	4	5	1	6	3	9	6	3	4	77
6 - 11	15	9	12	15	16	21	38	18	12	8	10	23	18	9	12	12	248
12 - 19	17	14	5	11	5	16	38	30	7	4	5	9	13	12	13	21	220
20 - 28	18	1	8	1	0	0	18	8	1	3	1	3	13	12	10	25	122
29 - 38	11	2	4	0	0	0	2	0	0	0	0	2	11	5	1	11	49
> 38	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	4
Totals	68	30	32	29	23	43	110	60	25	16	22	41	65	44	39	73	720

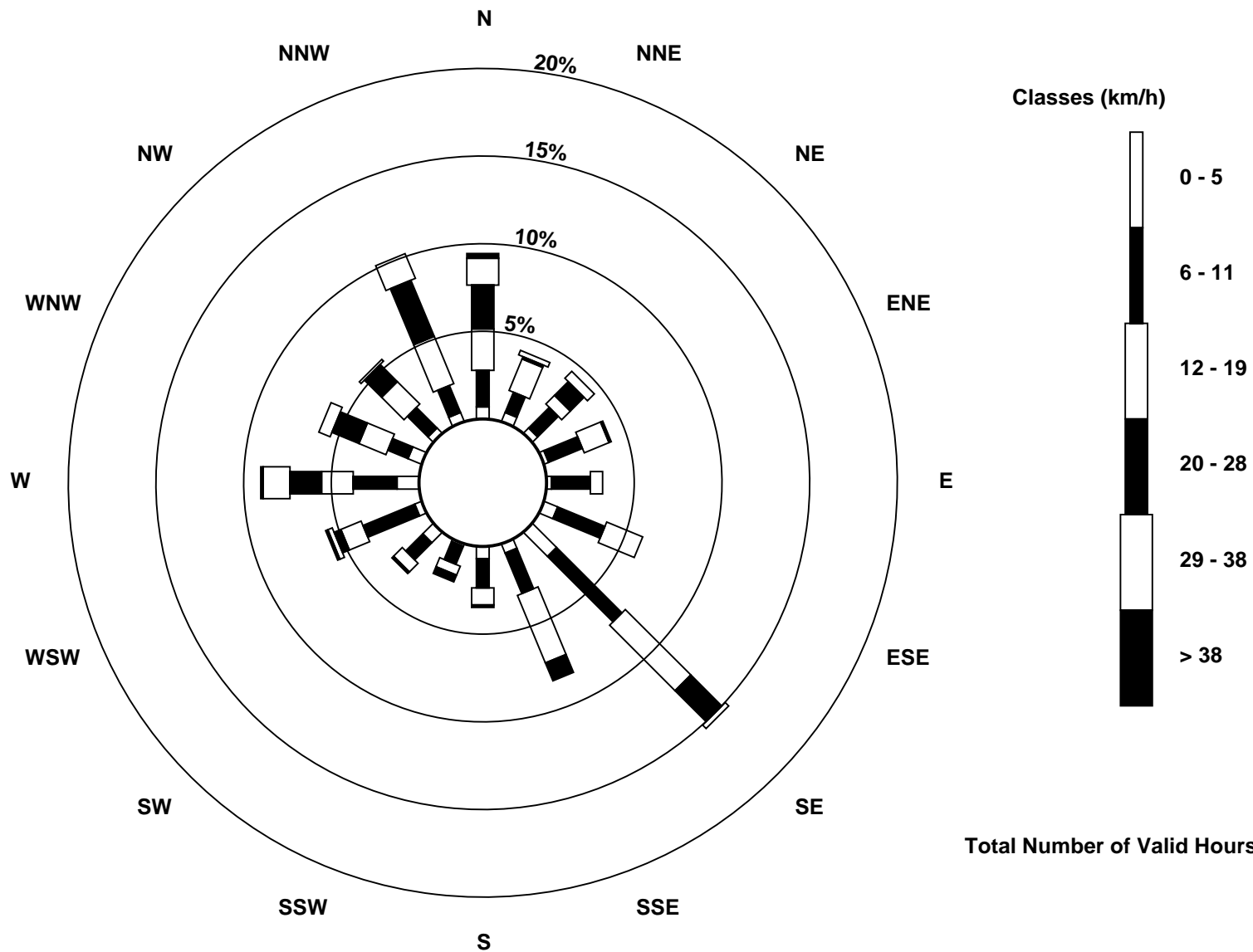
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 45 m (WS45m) - km/h
Mannix (AMS 5)





Maximum Speed: 45 km/h on Jun 9 11:00	Maximum Daily Speed Average: 28.9 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 2 08:00	Minimum Daily Speed Average: 1.5 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 6.2 km/h at hour 20	Minimum Diurnal Speed Average: 0.0 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 345.1 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 14 Q ₃ = 22 P ₉₀ = 30 P ₉₉ = 41	Percent Operational Time: 100.0

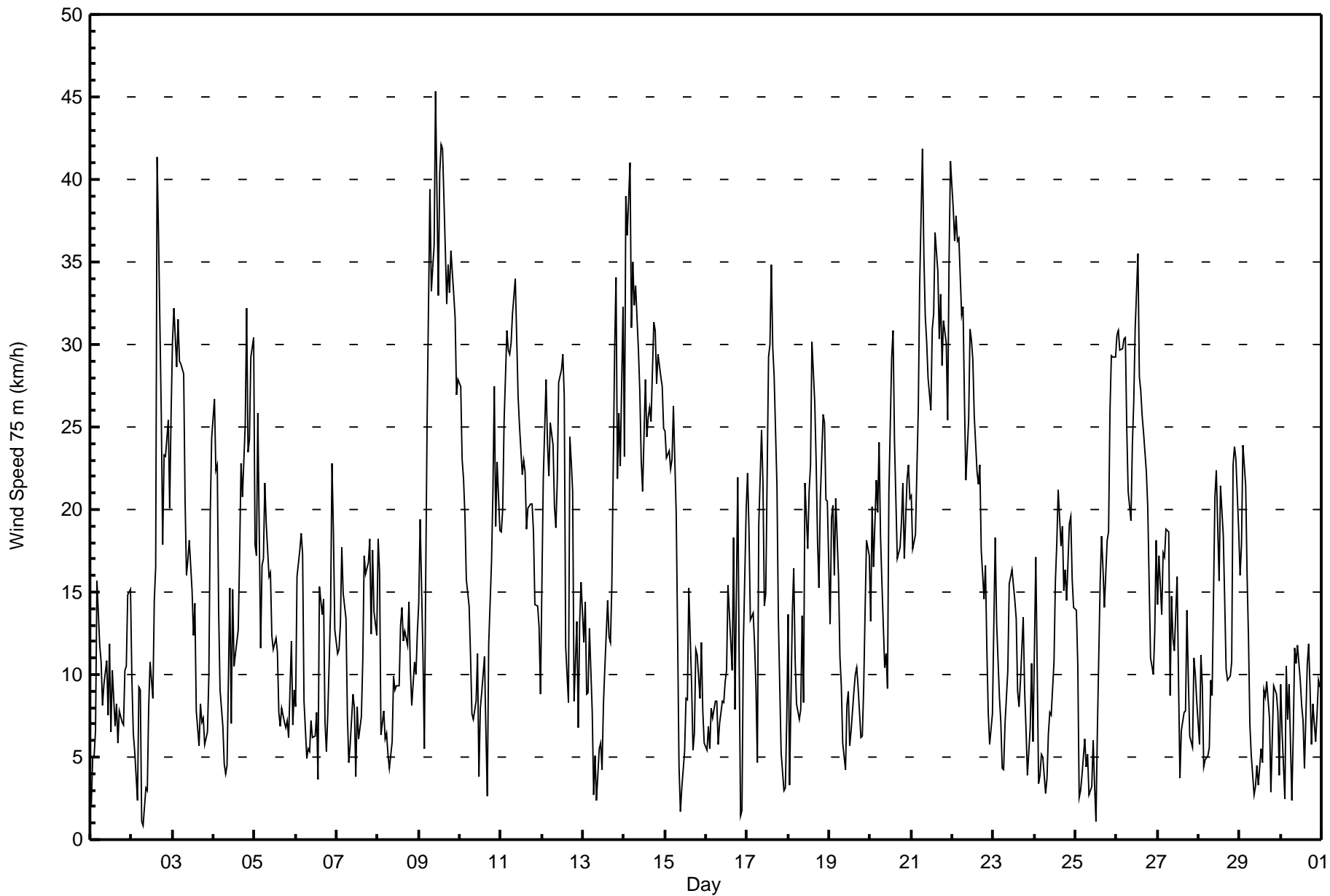
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WNW2	SE5	SSW5	WSW7	W16	W12	W11	W8	WSW9	SW11	SW8	SSW12	SSE7	SE10	ESE7	SE8	ESE6	SE8	SSE7	SSE7	SE10	SE11	SSE15	S15	S5.4	W16
2-Jun	SSE10	S6	SSW5	S2	SW9	SW9	SW1	ESE1	NNW3	N3	WNW8	W11	NW9	NNE15	NW17	W41	W37	W26	WNW18	WNW23	W23	W25	W20	W26	W11.7	W41
3-Jun	W30	W32	W29	W32	W29	W29	WNW28	NW21	WNW16	W17	W18	W15	NW12	NW14	NNW8	NNE6	E8	E7	E7	E6	E7	ESE10	SE20	SE24	W9.7	W32
4-Jun	SE27	SE22	SSE23	S14	WSW9	WSW7	NW5	E4	W5	NW15	W7	W15	WNW10	WNW11	NW13	NNW17	N23	N21	NNW25	NNW32	NNW23	N24	N29	N30	NNW7.9	NNW32
5-Jun	NNW18	NNE17	NE26	NNW12	N17	NNW17	N22	NNW19	NNW16	NNW16	N12	NNW12	NNW12	NNW11	N8	ENE7	E8	E7	ESE7	SE7	NE6	ENE12	SE7	SE9	NNE9.0	ENE26
6-Jun	SSE8	SSE16	SSE18	SSE19	SSE17	SSE8	SSE5	SE6	SE5	SSE7	ESE6	E6	ESE8	WNW4	W15	WNW14	WNW15	WNW7	WNW5	NNW8	NNE14	NNE23	NNE19	NNE13	ESE1.5	NNE23
7-Jun	NNE11	NNE12	N13	N18	NNE15	NNE13	N8	NNW5	NNE6	NE9	ENE8	ENE4	NNE8	NE6	NE7	ENE11	ENE17	ENE16	ENE17	ENE18	NE12	NNE18	NE14	ENE12	NE10.6	ENE18
8-Jun	E18	E16	NE6	ENE8	ESE6	E6	ESE5	ESE4	ESE6	E10	E9	E9	ESE9	ESE13	ESE14	ESE12	ESE13	ESE12	SE14	ESE10	ESE8	ESE11	ESE10	ESE13	ESE9.7	E18
9-Jun	ESE14	SE19	SE11	ESE6	NNE16	N26	N39	N33	N35	N36	N45	NNE33	N40	N42	N42	NNE36	NE32	NE35	NE33	NE36	NE33	NE32	NE27	NE28	NNE26.6	N45
10-Jun	NE27	ENE23	ENE22	ENE20	E16	ENE14	ENE11	NE8	NE7	NW8	NW11	N4	WSW8	W9	WSW11	W7	NNE3	NNE12	NNE17	N21	NW27	N19	N23	NNW19	NNE8.6	NE27
11-Jun	NW19	NW20	NW25	NW31	WNW30	WNW29	WNW30	WNW32	NW34	WNW30	NW27	NW25	WNW22	NW23	NW22	NW19	NW20	NNW20	NNW20	NNW19	NNE14	NE14	ENE13	ESE9	NW19.7	NW34
12-Jun	SE15	SSE22	SSE28	SSE24	SSE22	SE25	SE24	SE20	SSE19	SSE22	SSE28	SE28	SE29	SE27	SE12	N8	SSE24	SSE23	SE21	SE8	ESE13	E7	N13	N16	SE16.9	SE29
13-Jun	NNE12	N14	NNW9	NW9	NNW13	NNW8	NNW3	N5	WNW2	ENE5	ENE6	NE4	NE8	NNW10	N14	NNE12	NE12	NNE15	N30	N34	NE22	NE26	NNE23	N32	NNE12.5	N34
14-Jun	N23	N39	NNW37	N41	N31	N35	N32	N34	N30	N27	N23	N21	N28	N24	N26	N26	N25	N31	N31	NNW28	NNW29	N28	NNW27	NNW25	N28.9	N41
15-Jun	NNW25	NNW25	NNW24	N22	N23	N26	N20	N12	NE5	NE2	WNW3	NW5	WNW9	WNW8	ENE15	NE9	ENE5	ENE6	ENE12	NE11	NE9	NE12	ENE8	E6	N10.2	N26
16-Jun	SE5	SE7	ESE5	ESE8	SE7	ESE8	SE8	ESE6	ESE7	SE8	SSE8	SE10	SE10	SSW15	SW12	SE10	SSE18	SSW8	W22	W11	ESE1	S2	SE12	SE20	SSE6.2	W22
17-Jun	SE22	SE19	SE13	SE14	SSE12	SSE9	WSW5	W19	W25	WNW22	WNW14	WNW15	WNW29	WNW30	WNW35	WNW30	WNW28	WNW21	NW13	NW9	N5	E3	SSW3	SW7	W9.2	WNW35
18-Jun	WSW14	NNW3	SSE14	SSE16	S11	S8	S7	SSE8	SSE14	S8	SW22	SW18	SW21	SSW23	WSW30	W26	WSW23	W18	NW15	NW21	NW26	NNW25	NNW21	W20	WSW9.9	WSW30
19-Jun	W13	W20	W20	W16	W21	W16	W11	W9	W6	W4	WSW8	NW9	W6	WSW7	SW9	W10	WSW10	SW9	S6	SE6	SE9	SSE14	SSW18	SSW17	WSW8.7	W21
20-Jun	SSE13	S20	SSE17	SSE22	SSE20	SSE24	SE18	SE16	SE10	SE11	SE9	S21	SSW29	S31	SSW24	SSE21	SSE17	SE18	SE19	SE22	SE17	SE22	SSE23	S21	SSE18.0	S31
21-Jun	S21	SSW18	SSW18	WSW22	WSW26	W34	W42	W35	WSW32	W30	W28	W26	W31	W32	W37	W34	W30	W33	WNW29	NNW31	NNW30	NNW25	NNW35	NNW41	W24.0	W42
22-Jun	NNW38	NNW36	NNW38	NNW36	NNW36	NNW32	NNW32	NNW27	NNW22	NNW25	NNW31	NNW30	NNW29	NNW26	NNW22	NNW21	NNW23	NNW18	N15	NNE17	NNE12	N8	NNW6	WSW8	NNW23.9	NNW38
23-Jun	W13	WSW18	W13	N9	NW7	NW4	NW4	NW7	NW10	NW16	NW16	NW16	NNW15	NNW13	NW9	WSW8	NW10	NNE13	ENE9	WNW7	WNW4	W7	W11	W6	NW8.0	WSW18
24-Jun	W12	W17	NNW3	SSE4	SSE5	S5	SW3	WNW4	N6	NNW8	NNW8	N11	N16	NNW18	NNW21	NNW18	NNW19	NNW15	NNE16	NNE14	NNE19	NE20	ENE16	ENE14	N8.0	NNW21
25-Jun	E14	E11	W3	NE3	SE4	SSE6	SSE4	SE5	SSE3	SE3	ESE6	ESE3	SSE1	ESE7	SSE16	SSE18	SSE16	SE14	SE18	SE19	SE26	SE29	SE29	SSE29	SE11.1	SE29
26-Jun	SSE31	SSE31	SSE30	SE30	SE30	SE30	SE25	SE21	SE19	SE24	SE27	SE31	SE35	SE28	SE27	SE26	SE25	SE22	SE20	SE16	ESE11	ESE10	ESE13	SE18	SE23.8	SE35
27-Jun	ESE14	SE17	ESE14	SE17	SE17	S19	WSW19	SSW9	SSE15	S12	SSE11	SW16	SSW10	SE4	E7	WSW8	W8	WSW14	WSW10	WSW6	SW6	S11	SSE10	S8	S8.0	S19
28-Jun	S6	SW11	W9	NNW4	ESE5	ESE5	E6	NE10	ENE9	ENE21	NE22	NE19	NNE16	NNE21	NNE18	NE15	ENE10	SE10	SSE10	S11	SSE23	SSE24	SSE23	SSE19	E6.5	SSE24
29-Jun	SSE16	S18	S24	SSE21	SSE16	SSE12	SE7	SE5	ESE3	ESE3	ESE5	SW3	W6	WSW5	WNW9	WNW9	NNE10	NNE7	W3	WSW6	W9	NW9	NW8	NW4	S3.2	S24
30-Jun	WSW9	SW6	SE2	S11	S7	WSW9	W2	ESE7	SE12	SSE11	SSE12	SSE10	SE8	SSE7	SW4	W11	SW12	WSW9	SW6	SW8	WSW6	SSW8	SSW10	SSW9	SSW5.9	SW12

ESE1.1 SSE1.5 SE0.8 NE0.0 W1.4	NNW1.7 NW3.5	NNW3.6 NNW2.9	NNW3.0 NNW2.9	NNW3.5 NNW4.2	NNW5.7 NNW5.3	NNW2.9 N2.9	N4.5 N6.2	NNE5.2 NE6.1	NE4.3	ENE1.8	Diurnal Average														
NNW38 N39	NNW38 N41	NNW36 N35	W42 W35	N35 N36	N45	NNE33 N40	N42 N42	W41 W37	NE35 NE33	NE36 NE33	NE32	NNW35	NNW41	Diurnal Maximum											

All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 12 17:00 Minimum Value: 1 km/h on Jun 25 06:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	3	1	2	6	4	4	2	2	3	2	4	3	3	2	4	3	3	3	2	1	2	1	5	6
2-Jun	2	3	2	1	4	2	2	1	2	2	3	3	3	6	10	7	8	6	5	6	3	4	3	3	10
3-Jun	4	4	3	4	3	4	4	5	4	3	4	3	3	3	3	3	3	2	2	2	2	6	5	4	6
4-Jun	4	2	2	3	4	1	2	2	6	4	4	2	2	2	3	4	6	5	6	6	7	8	4	5	8
5-Jun	6	7	6	3	2	3	4	3	3	3	3	3	4	4	3	4	3	3	2	2	8	4	4	2	8
6-Jun	3	2	2	2	3	3	2	2	2	2	2	3	3	5	5	3	4	2	1	1	6	3	2	2	6
7-Jun	1	3	3	2	3	2	1	1	2	4	4	4	3	3	5	4	3	3	3	3	5	3	2	4	5
8-Jun	5	5	3	3	3	2	2	2	2	3	3	3	5	6	6	5	5	6	6	4	3	5	4	5	6
9-Jun	6	4	4	3	8	6	7	6	5	5	6	7	7	6	6	8	6	7	6	5	5	4	3	4	8
10-Jun	5	6	5	4	4	4	4	2	3	4	3	4	3	4	4	2	2	4	3	3	6	5	5	4	6
11-Jun	3	3	5	4	4	4	4	6	6	6	6	6	5	5	5	5	6	6	4	3	3	3	3	3	6
12-Jun	4	4	3	3	3	2	2	4	5	4	5	8	8	9	9	7	11	5	4	4	7	4	2	3	11
13-Jun	3	2	3	3	3	2	2	2	2	2	2	3	5	3	3	3	3	6	6	5	7	6	5	7	7
14-Jun	7	5	6	7	10	7	6	5	5	5	5	7	4	4	5	4	4	8	5	5	5	4	4	4	10
15-Jun	3	3	2	2	3	3	3	3	2	2	3	2	2	2	7	3	2	2	3	2	1	2	2	2	7
16-Jun	3	3	3	3	3	3	4	3	3	3	2	3	4	6	4	6	4	7	3	7	2	2	9	6	9
17-Jun	4	4	4	3	3	3	2	5	4	4	4	6	6	5	5	5	4	5	4	2	2	1	4	3	6
18-Jun	3	4	4	2	2	3	2	3	3	4	6	5	9	10	6	5	4	5	3	5	5	3	3	3	10
19-Jun	5	3	3	2	2	3	2	2	3	2	3	3	4	5	4	5	4	3	3	3	2	2	2	5	5
20-Jun	8	3	2	3	3	2	3	2	3	4	4	6	6	7	5	4	3	5	6	4	3	4	3	3	8
21-Jun	3	2	4	4	6	4	6	6	5	4	4	4	4	4	5	4	4	4	4	5	4	7	7	8	8
22-Jun	6	6	7	6	7	7	5	5	5	6	6	6	7	5	5	5	5	4	5	3	4	2	3	2	7
23-Jun	2	1	5	2	1	2	2	2	3	4	4	4	4	4	4	3	4	5	2	3	2	3	3	5	5
24-Jun	4	3	4	2	2	2	2	2	2	3	4	4	5	4	5	5	4	4	4	2	3	2	3	3	5
25-Jun	4	4	2	1	2	1	1	2	2	2	3	3	3	4	6	5	4	5	5	5	4	3	3	2	6
26-Jun	3	2	2	3	3	5	5	6	5	6	9	7	8	8	9	7	7	7	6	6	5	4	5	5	9
27-Jun	6	6	5	6	6	5	5	4	3	2	4	4	3	2	3	8	4	4	3	1	1	2	2	2	8
28-Jun	3	1	1	1	2	3	2	2	4	5	5	4	4	5	5	4	3	4	2	2	4	2	2	3	5
29-Jun	3	2	1	3	3	2	2	2	2	2	2	2	3	4	3	4	3	2	2	1	2	2	3	3	4
30-Jun	2	3	2	2	2	2	3	3	2	2	2	2	3	2	3	2	3	2	3	1	3	2	1	1	3
Diurnal Maximum																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	76	10.56	10.56
6 - 11	219	30.42	40.97
12 - 19	189	26.25	67.22
20 - 28	143	19.86	87.08
29 - 38	83	11.53	98.61
> 38	10	1.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	1	4	3	2	12	8	6	2	4	4	2	6	7	5	6	76
6 - 11	7	7	11	11	17	26	24	17	12	6	12	20	18	7	14	10	219
12 - 19	12	24	7	12	4	11	23	24	5	6	4	4	16	6	12	19	189
20 - 28	21	3	7	5	0	0	25	18	5	2	2	3	14	6	11	21	143
29 - 38	14	3	6	0	0	0	8	4	1	1	0	2	16	10	2	16	83
> 38	7	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	10
Totals	65	38	35	31	23	49	88	69	25	19	22	31	72	36	44	73	720

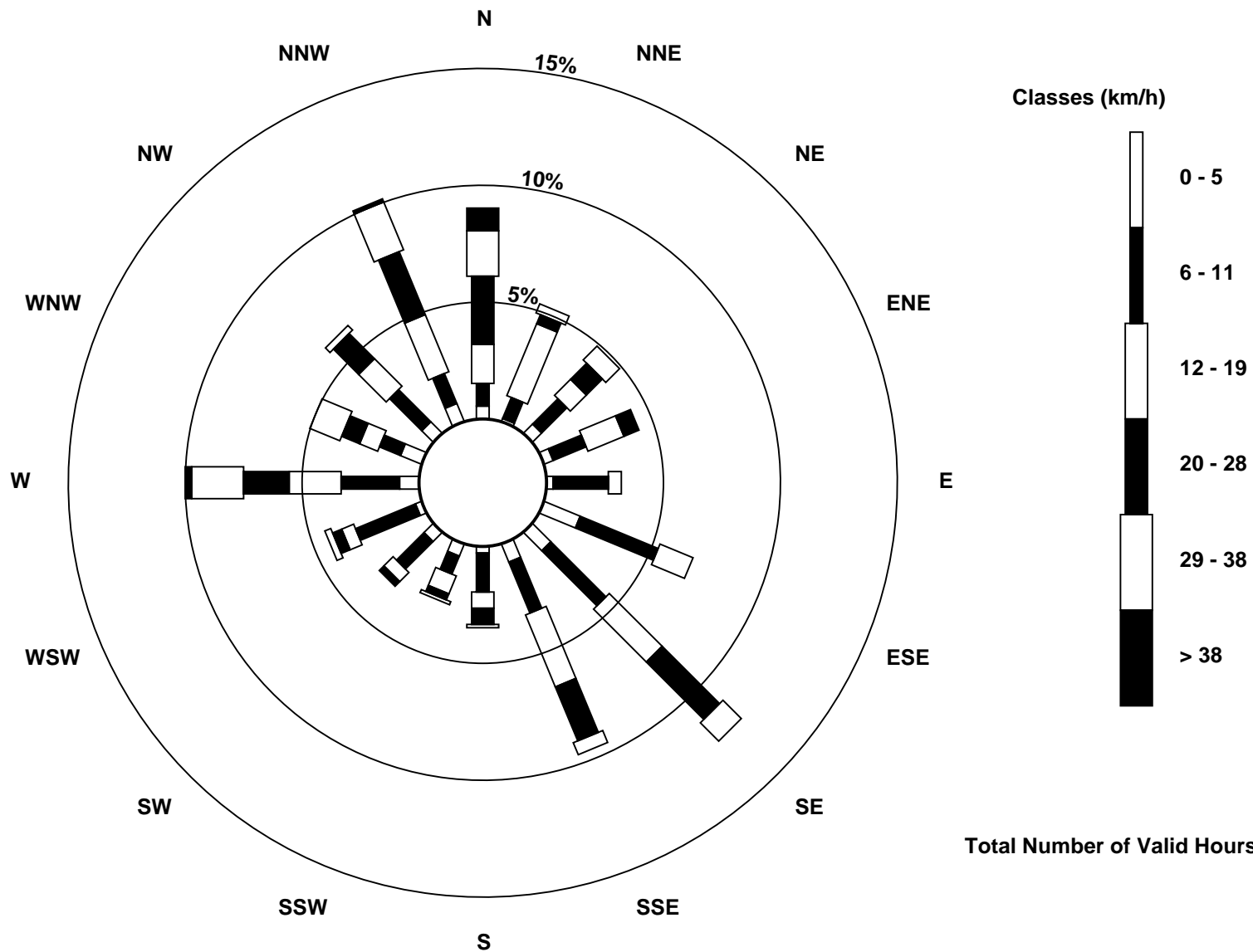
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 75 m (WS75m) - km/h
Mannix (AMS 5)





Maximum Speed: 47 km/h on Jun 9 11:00	Maximum Daily Speed Average: 30.4 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 25 03:00	Minimum Daily Speed Average: 1.5 km/h on Jun 6	Hours of Data: 720
Maximum Diurnal Speed Average: 6.7 km/h at hour 22	Minimum Diurnal Speed Average: 0.3 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 345.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 15 Q ₃ = 24 P ₉₀ = 32 P ₉₉ = 43	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WNW3	SE6	S5	WSW5	W14	W15	W12	W8WSW10	SW11	SW8	SSW12	SSE7	SE11	SE8	SE9	ESE7	SE8	SSE7	SSE7	SE10	SE11	S16	S17	S5.8	S17	
2-Jun	S10	SSW4	SW4	W2	WSW9	SW12	WNW3	E1	NNW4	N3	WNW8WNW11	NW9	NNE15	NW17	W44	W44	W29WNW21WNW26	W26	W28WNW22	W28	W13.6	W44				
3-Jun	W32	W35	W31	W34	W31	W31WNW31	NW22WNW17	W18	W19	W16	NW13	NW15	NNW8	NE6	E10	E8	E8	ESE8	E9	ESE14	SE22	SE26	W10.0	W35		
4-Jun	SE29	SE23	SSE24	SSW14	WSW8	WSW8	NW6	E4	W4	NW16	W7	W16WNW11WNW12	NNW13	NNW18	N24	N22	NNW27	NNW35	N25	N26	N32	N32	NNW8.5	NNW35		
5-Jun	N19	NNE19	ENE27	N12	N17	NNW18	N22	NNW20	NNW17	NNW17	N13	NNW12	N13	NNW12	N8	ENE7	E9	E8	ESE8	SE8	ENE6	ENE13	ESE8	SE10	NNE9.3	ENE27
6-Jun	SSE10	SSE17	SSE18	S21	S15	SSE8	SSE5	SE6	SE6	SSE8	ESE7	ESE7	ESE9	WNW4	W16WNW14WNW15	WNW7	WNW5	NNW8	NNE15	NNE25	NNE20	NE14	SE1.5	NNE25		
7-Jun	NNE11	NNE11	NNE11	NNE18	NNE14	NNE12	NNE6	NNW5	NNE6	NE9	ENE8	ENE4	NNE8	NE6	NE8	ENE11	ENE17	ENE17	ENE18	ENE20	NE12	NE19	NE14	ENE14	NE10.8	ENE20
8-Jun	E22	E20	ENE7	E9	ESE9	ESE11	ESE8	ESE6	ESE9	E14	E10	E10	ESE11	ESE17	ESE17	ESE16	ESE16	ESE15	SE17	ESE14	ESE13	ESE14	ESE16	ESE18	ESE12.9	E22
9-Jun	SE18	SE21	SE15	ESE8	NNE15	N28	N41	N34	N36	N37	N47	NNE34	N42	N43	N43	NNE37	NE33	NE36	NE34	NE37	NE34	NE33	NE29	NE30	NNE27.3	N47
10-Jun	ENE29	ENE25	ENE23	ENE21	E20	E16	E12	ENE8	NE7	NW9	NW12	N4	WSW8	W9WSW11	W7	NNE3	NNE12	NNE18	N22	NW29	N20	N24	N20	NNE8.9	NW29	
11-Jun	NW20	NW21	NW27	NW33	NW32WNW32WNW32WNW34	NW36	NW32	NW28	NW26	NW23	NW24	NW23	NW20	NW21	NNW21	NNW21	NNW19	NNE15	ENE15	E15	ESE12	NW20.7	NW36			
12-Jun	SE17	SSE23	SSE32	SSE27	SSE25	SE29	SE26	SE22	SSE20	SSE23	SSE29	SE30	SE30	SE28	SE12	N8	SSE26	SSE23	SSE22	SE11	ESE17	E8	N13	NNE15	SE18.4	SSE32
13-Jun	NE10	N13	NNW8	NNW9	NNW14	N8	NNW2	N5	NNW2	ENE5	ENE6	NE4	ENE8	NNW11	N15	NNE12	NE12	NNE16	N31	N36	NE23	NE27	NNE24	N35	NNE12.7	N36
14-Jun	N25	N41	NNW39	N43	N33	N36	NNE33	N35	N31	N28	N24	N22	N29	N25	N26	NE27	N26	N33	N32	NNW30	N31	N31	NNW31	NNW27	N30.4	N43
15-Jun	NNW27	NNW25	N25	N24	N25	N28	N21	NNE12	NE4	NE1	NW3	NW5	NW8	NW9	ENE16	N10	ENE5	ENE7	ENE12	NE12	NE9	NE13	ENE9	ESE9	NNE10.7	N28
16-Jun	ESE6	ESE8	ESE9	ESE11	SE10	ESE12	SE10	ESE8	ESE9	SE9	SSE8	SE10	SE11	SSW16	SW12	SE11	SSE18	SSW9WNW24	W12	ESE2	SSE2	SE13	SE22	SSE7.1	WNW24	
17-Jun	SE23	SE21	SE15	SE15	SSE13	S10	WSW5	W21	W26WNW22WNW15WNW16WNW31	NW32WNW36WNW31WNW29WNW22	NW14	NW10	N5	E4	SSW3	SW7	W9.6	WNW36								
18-Jun	W15	NW3	SSE12	S16	SSW10	SSW8	SSW8	SSE9	SSE14	S9WSW22WSW18	SW22	SSW23	W31	W27WSW24	W19	NW16	NNW22	NW28	NNW27	NNW22	W22	WSW11.1	W31			
19-Jun	W15	W22WNW23	W18	W23WNW18	W11	W9	W6	WSW5	WSW9	NW9	W6	WSW7	SW9	W10	W11WSW10	S7	SE7	SE9	S14	SSW18	SW20	WSW9.4	WNW23			
20-Jun	S14	S20	S16	SSE22	SSE20	SSE25	SSE20	SE17	SE12	SE13	SSE10	S21	SSW30	SSW31	SSW25	S21	SSE17	SE19	SE20	SE23	SSE18	SE24	SSE25	SSW21	SSE18.7	SSW31
21-Jun	S21	SSW19	SW21WSW24	W28	W36	W45	W38WSW34	W32	W30	W28	W33	W34	W39	W37	W33	W36WNW32	NNW34	NNW33	NNW28	N37	NNW44	W26.1	W45			
22-Jun	NNW41	NNW40	N40	NNW39	NNW39	NNW34	NNW34	NNW28	NNW23	NNW26	N32	NNW32	NNW31	NNW27	NNW23	NNW22	NNW24	NNW18	N15	NNE17	NNE13	N8	N7	W7	NNW25.3	NNW41
23-Jun	W13	W18	W15	NNW9	NW9	NW6	NW4	NW7	NW10	NW16	NW16	NW17	NNW15	NNW14	NW9	WSW8	NW10	NNE13	ENE9	WNW7	WNW4	WNW6	W10	W7	NW8.4	W18
24-Jun	W14	W19	NNW5	SSE4	S4	SSW5	WSW3	WNW4	N7	NNW8	NNW8	N11	N16	NNW19	NNW22	N18	NNW20	NNW16	NNE17	NNE15	NNE20	NE21	ENE18	E16	N8.6	NNW22
25-Jun	E18	E15	W1	ENE3	SE5	SSE7	SSE5	SE6	SSE3	SE4	ESE7	SE3	SSE2	ESE7	SSE16	SSE19	SSE17	SE15	SE19	SE20	SE28	SE32	SSE32	SSE32	SE12.2	SSE32
26-Jun	SSE32	SSE33	SSE33	SE32	SE33	SE33	SE27	SE23	SE20	SE25	SE28	SE32	SE37	SE29	SE30	SE27	SE26	SE24	SE23	SE19	ESE16	ESE15	ESE18	SE21	SE25.9	SE37
27-Jun	ESE18	SE21	ESE17	SE19	SE20	S20WSW20	SSW9	S15	S12	SSE12	SW16	SW10	SE4	E8	WSW8	W8WSW15WSW10	W7	SW6	S11	SSE9	S7	S8.3	SE21			
28-Jun	SSW6	SW11	W9	NNW5	ESE6	ESE6	E7	ENE10	ENE9	ENE22	NE23	NE19	NNE16	NNE21	NNE19	NE14	ENE10	SE10	SSE10	S11	SSE23	SSE25	SSE24	SSE21	ESE6.6	SSE25
29-Jun	SSE17	S20	S27	SSE23	SSE17	SSE13	SE7	SSE5	SE3	ESE4	ESE5	SW3	W6	WSW5	NW9	WNW9	NNE10	NNE7	W3	WSW6WNW10	NW9	NW8	NW4	S3.8	S27	
30-Jun	WSW9	SW7	SE3	S10	SSW9WSW10	W3	SE8	SSE12	S11	SSE13	SSE10	SE9	SSE7	WSW5	W11WSW12	WSW9	WSW6	SW9	WSW7	SSW7	SW10	SW10	SSW6.3	SSE13		

SE1.3 SSE1.6 SSE1.1WSW0.3 W1.6WNW2.1 NW3.6NNW3.5 NW2.9NNW2.9NNW3.0 NW3.1 NW3.7 NW4.2 NW5.9 NW5.4 NW3.1 N2.9 N4.7 N6.4 NNE5.4 NE6.7 NE4.8 ENE2.0	Diurnal Average
NNW41 N41 N40 N43 NNW39 N36 W45 W38 N36 N37 N47 NNE34 N42 N43 N43 W44 W44 W36 NE34 NE37 NE34 NE33 N37 NNW44	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



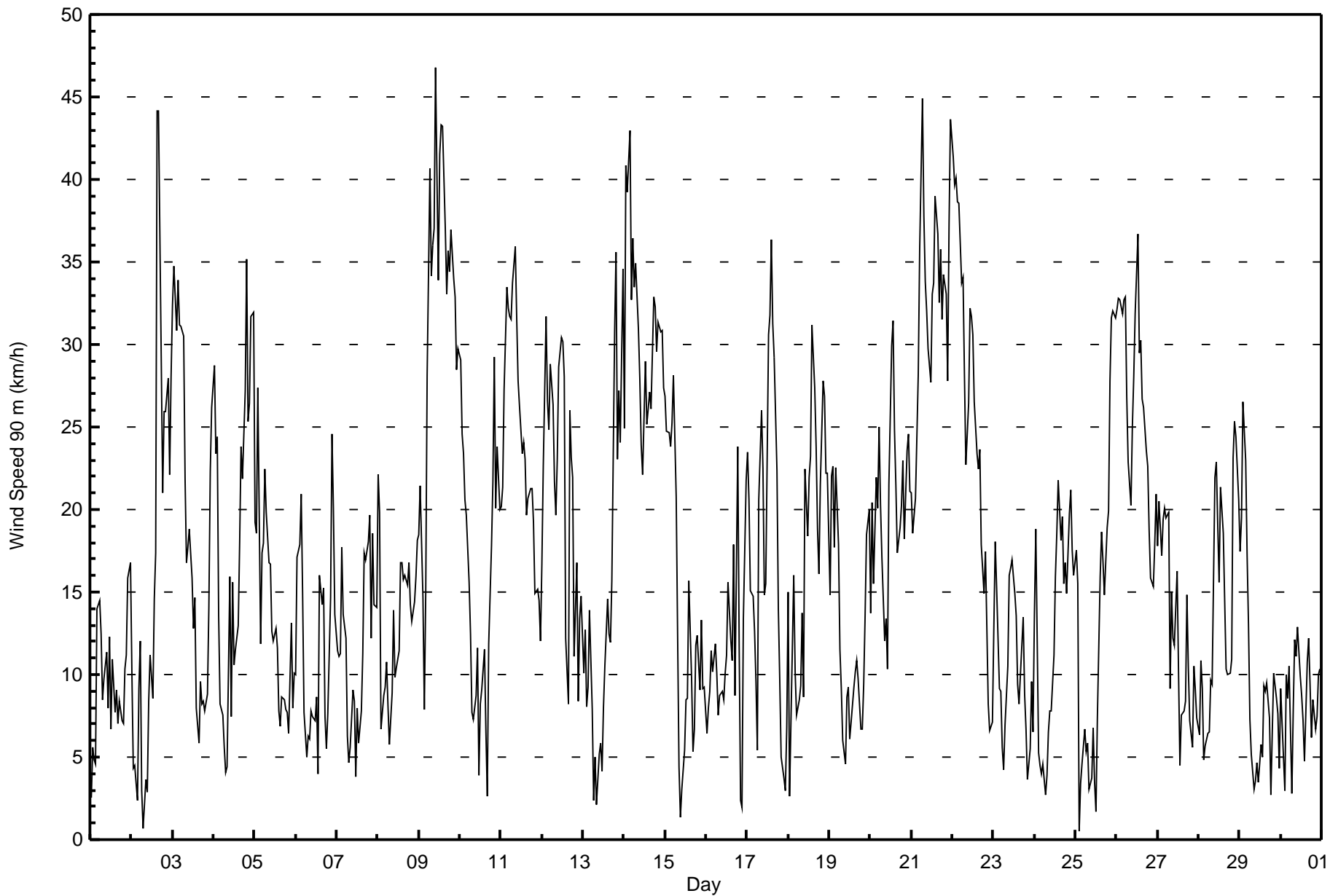
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 90 m (WS90m) - km/h

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 19 km/h on Jun 2 17:00 Minimum Value: 1 km/h on Jun 25 06:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	3	1	1	5	4	5	2	2	3	2	4	3	3	2	3	3	3	2	2	1	2	2	5	5
2-Jun	3	2	1	1	3	3	3	1	3	2	3	3	3	6	10	8	19	9	8	6	4	4	3	3	19
3-Jun	4	4	4	4	3	4	4	5	4	4	4	3	3	3	3	3	2	2	2	2	5	5	4	5	5
4-Jun	4	2	2	3	3	2	2	2	6	4	4	3	2	2	3	4	6	5	7	6	7	8	4	5	8
5-Jun	6	7	6	4	2	3	4	3	3	3	3	3	4	4	3	3	3	3	2	2	7	3	3	3	7
6-Jun	3	1	1	2	4	1	1	1	2	2	2	3	3	5	5	3	4	2	2	1	6	3	2	3	6
7-Jun	1	3	3	2	3	3	1	1	2	4	4	4	3	3	5	4	3	3	3	3	4	3	3	4	5
8-Jun	5	5	4	3	3	3	2	2	3	3	3	3	5	5	5	4	4	5	5	3	4	4	4	4	5
9-Jun	5	3	3	4	8	5	7	6	4	5	6	7	7	6	6	8	6	6	6	5	5	4	3	4	8
10-Jun	5	5	5	4	4	3	4	2	3	4	4	4	4	3	3	2	2	4	3	3	6	5	6	4	6
11-Jun	3	3	5	4	4	4	4	7	6	6	6	6	5	5	6	5	6	6	4	3	3	2	3	3	7
12-Jun	4	4	3	4	3	2	2	4	5	4	5	7	8	8	9	7	9	4	4	3	6	5	2	3	9
13-Jun	2	2	2	3	3	2	2	2	2	2	2	2	3	5	3	3	3	4	6	5	4	7	7	5	7
14-Jun	8	5	5	7	10	7	6	5	5	5	5	5	7	4	5	5	4	4	8	5	5	5	4	5	10
15-Jun	3	3	2	2	3	2	4	3	2	2	3	2	2	2	7	3	2	2	3	2	1	2	2	2	7
16-Jun	2	2	4	3	2	3	4	2	2	2	2	3	4	5	4	6	3	7	4	8	2	1	9	4	9
17-Jun	3	3	4	3	3	2	3	5	4	4	4	7	6	5	5	5	4	5	4	2	2	1	3	3	7
18-Jun	3	4	4	1	2	2	2	3	3	4	6	5	9	10	6	5	4	5	3	5	5	3	4	3	10
19-Jun	5	3	4	2	2	4	2	2	3	2	3	3	4	5	4	5	4	4	3	3	2	2	3	5	5
20-Jun	8	3	2	4	2	1	2	1	3	3	4	6	5	6	5	3	3	4	6	4	3	4	3	4	8
21-Jun	2	3	4	5	6	5	6	6	5	4	4	4	4	4	5	5	4	5	4	5	4	7	7	8	8
22-Jun	6	6	7	6	7	7	5	5	5	6	6	6	7	5	5	5	5	5	5	3	4	2	3	2	7
23-Jun	2	1	5	2	1	2	2	2	3	4	4	5	4	4	4	3	4	5	2	3	2	3	3	4	5
24-Jun	5	3	4	2	1	1	2	2	2	3	4	5	4	5	5	4	4	4	4	2	3	1	3	3	5
25-Jun	4	4	2	1	2	1	1	2	2	1	3	2	3	4	6	4	3	4	4	5	3	3	2	2	6
26-Jun	3	3	2	2	3	4	4	5	4	5	8	7	7	7	6	7	6	7	5	4	4	5	4	4	8
27-Jun	4	4	4	5	5	6	5	4	3	2	3	4	3	2	3	8	3	5	3	2	1	2	2	2	8
28-Jun	3	1	1	1	2	3	2	2	4	4	5	4	4	5	5	4	3	3	2	2	4	2	2	3	5
29-Jun	3	3	1	2	2	2	2	2	2	2	2	2	3	4	3	4	3	2	2	1	2	1	3	3	4
30-Jun	2	3	1	3	2	2	4	2	2	2	2	2	2	2	3	2	3	2	2	1	3	2	1	1	4
																	Diurnal Maximum								
																	8 7 7 7 10 7 7 7 6 6 8 7 9 10 10 8 19 9 8 8 7 8 9 8								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	66	9.17	9.17
6 - 11	209	29.03	38.19
12 - 19	178	24.72	62.92
20 - 28	155	21.53	84.44
29 - 38	94	13.06	97.50
> 38	18	2.50	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - June 2017

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	1	3	4	3	3	6	7	2	3	2	6	5	7	5	5	66
6 - 11	7	8	8	14	11	26	25	14	9	9	10	18	18	8	16	8	209
12 - 19	11	21	9	9	7	20	15	17	9	5	3	3	18	7	10	14	178
20 - 28	23	5	4	6	3	0	27	19	7	4	3	4	10	8	12	20	155
29 - 38	18	3	8	1	0	0	12	7	0	2	0	1	17	9	6	10	94
> 38	8	0	0	0	0	0	0	0	0	0	0	0	4	0	0	6	18
Totals	71	38	32	34	24	49	85	64	27	23	18	32	72	39	49	63	720

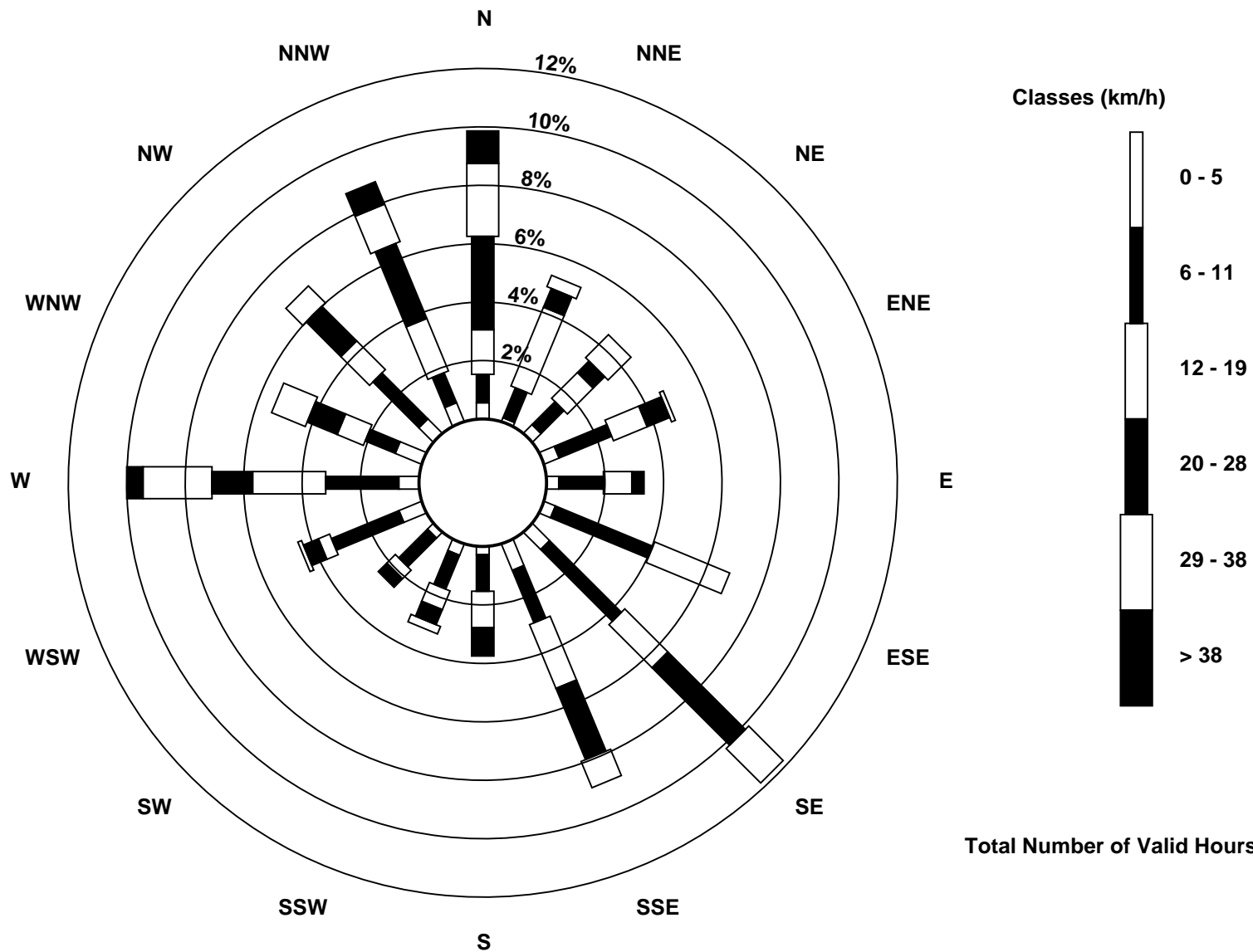
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed 90 m (WS90m) - km/h
Mannix (AMS 5)





Direction of Maximum Speed: 268 deg on Jun 2 16:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 274.6 deg on Jun 21	Hours of Data: 720
Direction of Minimum Speed: 49 deg on Jun 23 06:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.8 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 280.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	219	171	259	270	273	267	256	269	259	233	233	193	144	135	126	131	121	139	168	152	153	152	187	203	197.4
2-Jun	138	158	176	172	184	175	128	141	17	8	295	280	323	22	301	268	275	271	289	292	264	269	279	273	272.7
3-Jun	272	271	276	277	271	272	287	305	302	276	277	275	308	310	348	50	102	96	103	105	91	118	135	136	277.9
4-Jun	140	142	151	175	227	214	306	95	260	302	271	277	281	296	325	349	350	350	344	330	347	9	10	4	333.6
5-Jun	336	31	61	332	335	333	356	342	341	342	0	337	351	341	3	86	88	101	116	149	67	67	128	138	16.7
6-Jun	107	152	151	138	151	144	144	140	120	146	113	103	107	330	277	290	286	289	289	330	14	16	26	15	73.9
7-Jun	358	6	359	0	10	7	338	360	22	49	76	75	37	37	63	66	79	79	62	69	28	15	18	46	38.5
8-Jun	86	86	10	9	102	102	120	135	106	103	89	87	106	112	123	125	118	125	132	129	118	135	114	118	110.0
9-Jun	130	140	124	82	9	8	14	9	6	6	9	21	9	8	10	18	51	51	54	46	44	47	47	50	28.6
10-Jun	60	74	76	79	92	85	88	51	78	326	301	28	243	265	249	268	52	24	17	357	318	360	352	346	30.3
11-Jun	321	296	314	310	300	298	296	301	311	305	305	317	305	309	312	323	315	338	343	347	28	63	86	118	315.9
12-Jun	146	160	158	156	151	147	152	153	151	155	164	138	147	143	129	20	153	161	146	124	128	89	351	3	145.2
13-Jun	356	344	329	316	316	340	319	9	265	77	65	55	62	347	1	28	41	24	8	7	50	50	22	2	16.5
14-Jun	347	2	341	355	2	8	15	7	8	6	11	353	5	6	10	4	11	13	3	342	344	349	335	333	359.9
15-Jun	327	330	338	346	354	9	7	13	41	68	275	309	306	315	78	66	81	77	69	57	51	60	72	94	15.2
16-Jun	187	143	127	127	125	133	135	125	127	139	153	146	141	216	237	143	161	218	279	276	147	196	145	137	161.4
17-Jun	141	141	139	150	154	159	215	281	282	283	289	296	293	305	285	299	299	302	307	327	4	147	219	218	279.7
18-Jun	257	40	172	155	147	155	152	139	152	165	240	241	224	213	263	267	259	263	316	326	316	337	328	264	253.9
19-Jun	269	259	273	256	268	271	262	271	263	254	251	311	266	257	224	269	260	243	183	144	144	174	195	184	249.6
20-Jun	144	155	151	145	142	147	150	150	151	135	149	195	210	195	201	173	154	144	144	146	149	141	153	181	161.7
21-Jun	172	194	204	250	260	262	264	267	260	267	265	268	267	267	267	267	271	272	284	330	326	331	346	343	274.6
22-Jun	340	338	346	342	342	338	343	340	331	345	349	343	338	339	339	331	339	346	353	18	12	358	266	241	341.0
23-Jun	263	265	270	24	133	49	295	300	310	311	319	322	323	334	306	250	313	39	68	287	266	264	261	271	304.3
24-Jun	264	246	157	165	140	156	211	256	10	345	341	7	4	347	334	348	326	342	22	25	24	43	74	64	357.7
25-Jun	80	100	281	319	203	216	192	146	152	127	109	144	173	114	163	159	156	143	146	138	141	143	148	155	143.3
26-Jun	159	159	151	139	138	136	136	136	142	139	144	148	144	143	135	142	145	143	136	134	128	115	125	132	140.5
27-Jun	126	134	128	136	139	189	247	191	171	175	155	223	217	124	92	260	262	244	251	244	204	191	157	162	178.5
28-Jun	176	214	246	357	131	141	90	59	70	79	59	54	36	33	28	60	80	142	162	177	164	159	163	153	92.5
29-Jun	149	157	167	150	151	144	141	146	127	95	114	239	273	243	301	302	17	17	266	266	281	283	271	261	187.0
30-Jun	242	234	135	185	176	225	166	124	150	166	159	158	126	152	225	278	238	247	246	227	209	165	188	169	192.7

143.1 168.1 188.6 274.2 258.9 278.3 309.0 327.0 318.8 326.8 316.8 300.8 311.5 319.8 308.4 309.6 318.6 2.1 24.6 12.9 27.3 52.4 52.5 52.9

Diurnal Average

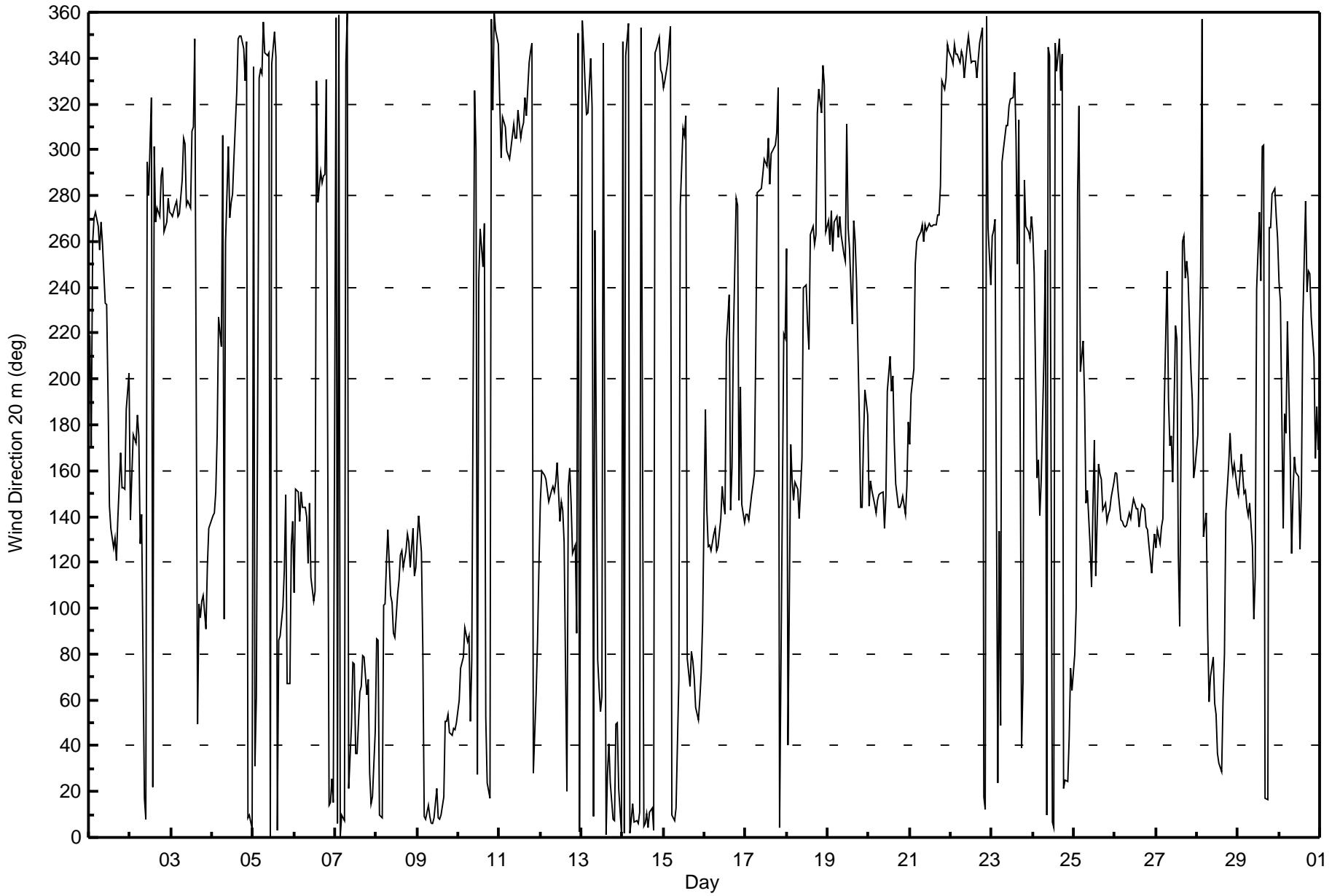
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg
Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jun 24 00:00 Minimum Value: 4 deg on Jun 23 02:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 14 Median = 18 Q ₃ = 27 P ₉₀ = 48 P ₉₉ = 88																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	61	21	21	6	8	43	14	21	16	22	27	23	33	15	23	22	24	22	24	12	8	9	14	44	61
2-Jun	23	21	22	33	16	28	40	28	90	82	47	29	46	24	47	8	14	14	21	23	9	9	12	7	90
3-Jun	7	7	7	9	8	8	12	21	22	11	17	17	31	28	52	66	17	24	25	15	19	17	12	11	66
4-Jun	10	11	10	24	39	29	56	19	89	22	19	10	16	21	22	24	26	18	28	17	15	16	13	16	89
5-Jun	36	40	17	39	18	19	18	20	17	17	23	29	33	38	43	43	26	30	27	16	46	20	41	13	46
6-Jun	83	15	15	13	12	17	19	20	24	31	22	26	31	87	26	21	20	23	26	20	18	11	15	17	87
7-Jun	16	11	12	19	14	12	26	34	35	44	51	90	52	64	71	40	16	16	14	12	28	11	22	16	90
8-Jun	14	15	34	33	40	14	12	18	14	13	27	23	26	20	21	17	19	16	13	12	16	13	14	13	40
9-Jun	12	11	11	55	12	15	13	15	14	15	14	19	13	14	14	18	16	15	15	13	12	11	11	12	55
10-Jun	13	14	14	14	11	16	23	38	35	57	43	89	47	36	32	28	85	20	14	22	23	23	17	16	89
11-Jun	18	14	16	15	15	13	14	18	16	17	19	22	24	25	25	31	26	27	20	17	19	18	13	18	31
12-Jun	13	10	11	11	11	11	11	13	16	14	14	11	13	13	85	70	23	18	12	43	18	64	16	16	85
13-Jun	17	18	39	42	22	28	67	44	78	53	43	69	48	41	22	20	25	18	13	13	19	18	23	15	78
14-Jun	23	14	16	16	21	15	14	15	15	14	16	23	17	17	16	14	14	12	16	16	16	16	17	17	23
15-Jun	15	14	15	15	15	11	12	16	62	84	77	57	28	30	19	14	21	22	14	14	15	15	17	47	84
16-Jun	32	30	83	12	14	15	17	15	17	17	18	27	25	42	27	38	15	71	13	40	65	61	46	13	83
17-Jun	11	12	14	14	15	17	47	15	12	15	22	27	17	19	13	15	17	18	28	28	42	23	54	25	54
18-Jun	39	65	18	11	11	19	19	17	21	51	19	23	24	33	18	16	20	15	19	22	23	14	17	15	65
19-Jun	20	11	10	17	8	11	14	15	41	50	25	51	60	65	49	51	24	30	51	17	9	18	12	25	65
20-Jun	11	11	14	11	12	11	11	12	14	12	19	26	18	20	19	18	13	14	15	13	11	11	14	18	26
21-Jun	14	20	25	14	11	8	8	9	11	8	8	8	8	7	8	7	7	8	17	16	15	14	17	15	25
22-Jun	14	15	16	15	16	18	16	17	19	20	16	19	20	23	25	21	21	25	24	20	23	17	46	12	46
23-Jun	4	4	69	21	70	86	60	27	30	23	28	30	32	39	50	41	53	29	20	35	19	8	14	99	99
24-Jun	17	11	52	33	22	29	45	49	51	48	51	48	23	27	22	30	22	28	17	17	11	12	15	13	52
25-Jun	14	37	20	39	55	20	38	23	56	56	43	79	94	49	31	19	22	17	13	12	10	10	10	9	94
26-Jun	11	11	11	10	10	10	11	12	15	12	14	13	13	14	12	13	15	12	11	11	14	15	13	11	15
27-Jun	10	13	11	10	21	36	16	39	21	22	25	15	27	44	22	94	31	13	15	23	14	17	16	19	94
28-Jun	42	11	14	73	19	21	18	18	21	15	15	14	22	19	22	25	22	31	27	19	13	12	12	16	73
29-Jun	16	12	16	13	13	13	19	30	44	48	40	58	51	79	37	59	39	26	78	18	19	14	42	18	79
30-Jun	8	49	32	20	35	19	94	17	17	22	19	21	19	19	61	13	17	14	22	13	43	10	12	21	94
																		83 65 83 73 70 86 94 49 90 84 77 90 94 87 85 94 85 71 78 43 65 64 54 99							
Diurnal Maximum																									





Direction of Maximum Speed: 3 deg on Jun 9 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 354.8 deg on Jun 14	Hours of Data: 720
Direction of Minimum Speed: 137 deg on Jun 24 03:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.0 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 288.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	235	145	239	255	270	266	253	262	255	227	225	192	142	130	122	126	114	130	167	148	143	140	171	182	189.7
2-Jun	135	154	179	164	203	175	130	147	346	343	293	278	318	14	302	263	272	269	287	290	263	265	276	268	268.7
3-Jun	268	266	272	275	267	268	283	302	299	273	276	271	304	308	338	34	94	91	97	99	87	114	129	133	275.3
4-Jun	135	137	147	175	232	224	302	87	268	301	270	273	278	295	321	342	346	346	338	325	343	5	4	359	331.0
5-Jun	338	19	54	331	338	332	354	339	337	337	357	331	344	333	353	78	80	90	111	145	57	58	124	130	7.1
6-Jun	131	145	153	145	145	143	144	135	123	144	106	96	104	301	276	287	283	282	286	324	8	10	20	13	82.2
7-Jun	1	5	356	360	4	5	341	346	11	38	74	62	20	28	49	58	69	69	56	63	26	16	21	49	30.0
8-Jun	81	80	17	35	102	99	113	123	101	95	84	78	103	104	116	117	112	118	124	119	108	124	109	112	103.2
9-Jun	122	131	120	93	5	3	7	2	0	1	3	14	3	2	5	12	43	42	44	38	36	39	39	42	21.9
10-Jun	52	64	67	69	85	78	79	47	64	319	303	7	242	259	246	262	21	17	12	350	313	352	347	343	17.1
11-Jun	317	300	311	306	298	295	294	297	307	300	301	314	301	307	309	320	311	335	337	341	23	53	76	112	312.6
12-Jun	137	151	149	152	149	141	142	146	146	151	159	132	141	137	123	358	149	157	141	124	121	86	350	0	139.7
13-Jun	357	345	334	318	317	338	316	356	277	64	56	37	51	336	354	19	32	18	2	2	42	40	17	358	7.0
14-Jun	345	358	339	351	357	2	9	1	2	1	4	349	359	0	5	360	5	6	357	340	342	348	334	331	354.8
15-Jun	327	329	337	345	354	3	2	6	30	36	280	309	306	314	64	54	65	67	61	48	42	47	66	91	4.9
16-Jun	141	127	118	117	120	121	127	117	119	133	149	142	135	209	229	141	154	200	277	273	133	187	139	132	152.3
17-Jun	136	135	130	144	150	158	219	278	278	281	287	294	289	301	282	294	295	297	303	321	352	110	203	225	277.7
18-Jun	252	356	165	153	146	154	155	137	150	166	234	234	218	203	258	261	253	258	311	322	312	332	325	262	247.9
19-Jun	267	259	273	257	266	270	261	267	253	254	249	308	260	252	222	264	257	234	176	135	136	165	194	202	243.9
20-Jun	149	158	148	143	140	143	145	143	144	127	146	187	202	188	194	167	150	139	138	141	144	137	148	179	157.9
21-Jun	170	196	204	247	256	257	259	261	254	262	259	263	262	262	262	262	267	267	284	327	323	328	344	340	271.5
22-Jun	336	335	343	338	340	335	339	337	329	342	345	339	334	335	334	328	336	341	346	11	11	345	301	240	337.6
23-Jun	248	249	275	9	319	286	295	301	308	309	318	319	323	330	304	246	308	28	59	285	269	258	266	272	299.3
24-Jun	270	254	137	170	146	160	215	267	355	339	333	358	1	342	331	344	323	336	13	18	17	35	63	65	351.6
25-Jun	79	93	254	33	125	150	171	138	152	125	108	138	182	110	157	154	151	138	140	133	137	139	143	150	137.6
26-Jun	156	155	146	134	133	131	131	131	137	134	138	142	138	137	129	136	140	137	129	126	118	108	118	127	135.4
27-Jun	120	127	121	128	134	186	242	188	167	171	152	218	209	125	87	252	257	239	248	243	203	179	151	164	173.0
28-Jun	179	209	249	344	122	130	83	51	61	70	49	45	28	26	21	49	70	137	158	172	160	154	159	151	94.2
29-Jun	151	158	169	148	150	143	134	141	124	102	110	227	270	239	299	299	8	10	265	260	278	301	294	274	186.5
30-Jun	251	233	131	178	179	235	279	116	146	164	155	156	125	150	226	273	231	241	237	222	222	180	198	190	193.7

131.4 159.6 168.2 269.3 275.0 289.1 315.5 325.3 315.7 323.1 317.7 298.5 307.2 314.5 308.0 308.2 318.6 352.4 8.3 360.0 16.7 42.9 44.9 56.1

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

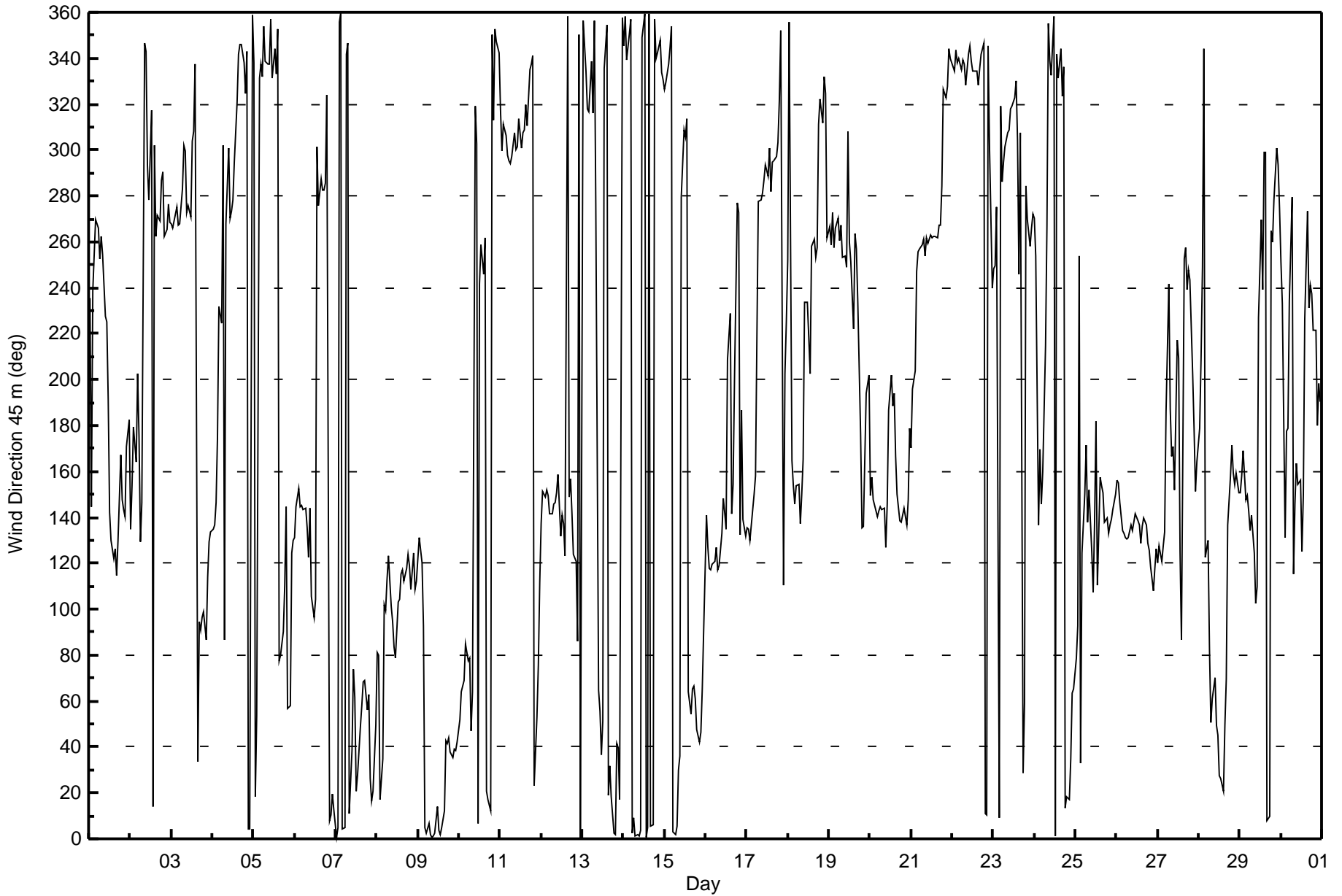
Wind Direction 45 m (WD45m) - deg

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 96 deg on Jun 30 07:00	Hours of Data: 720
Minimum Value: 1 deg on Jun 23 01:00	Hours of Missing Data: 0
Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 10 Median = 13 Q ₃ = 22 P ₉₀ = 41 P ₉₉ = 84	Hours of Calibration: 0
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	74	38	28	7	8	26	10	14	13	17	24	20	45	11	21	17	20	18	16	10	6	12	6	18	74
2-Jun	11	11	16	19	21	10	38	31	87	64	39	22	34	19	45	7	12	12	14	19	8	8	9	6	87
3-Jun	6	6	6	7	7	6	10	15	18	9	15	13	24	21	35	56	14	22	23	14	12	14	9	7	56
4-Jun	6	6	5	24	30	24	47	19	90	17	18	7	13	15	14	18	19	14	24	12	11	10	8	10	90
5-Jun	32	32	12	32	10	14	10	16	11	11	17	22	22	29	35	44	24	27	26	13	46	19	23	8	46
6-Jun	43	6	8	8	5	12	13	17	19	26	20	24	32	92	23	16	16	16	21	9	17	8	10	13	92
7-Jun	12	7	8	9	10	8	15	22	25	34	49	92	42	54	69	32	14	13	10	11	30	9	16	17	92
8-Jun	12	12	34	27	24	11	11	14	13	11	22	22	26	19	20	15	17	13	10	10	13	10	11	12	34
9-Jun	9	6	8	46	11	11	8	9	9	9	8	13	8	9	10	15	13	12	13	9	8	8	8	10	46
10-Jun	10	11	11	13	10	13	19	31	35	52	38	83	40	32	29	23	81	15	10	19	19	17	11	9	83
11-Jun	12	6	9	9	8	8	9	13	12	12	15	18	21	21	19	27	21	20	15	11	15	12	12	15	27
12-Jun	10	5	5	5	6	6	6	8	10	9	9	9	10	11	81	73	22	12	8	34	14	62	11	9	81
13-Jun	10	10	40	12	13	15	58	37	64	40	32	60	49	43	16	16	19	15	9	7	18	13	17	9	64
14-Jun	16	8	9	10	12	9	10	9	9	9	10	19	11	10	10	9	8	8	11	9	10	10	11	9	19
15-Jun	8	9	7	8	8	6	7	10	44	90	64	52	19	22	15	12	19	20	13	12	10	10	12	19	90
16-Jun	8	11	59	9	11	12	15	13	14	12	13	21	23	38	23	36	9	39	10	29	81	64	49	9	81
17-Jun	7	9	10	10	12	11	43	11	9	12	19	23	12	14	10	11	12	13	25	24	35	22	57	25	57
18-Jun	24	70	17	6	6	13	17	15	14	47	17	19	18	29	16	15	19	14	13	16	19	8	12	13	70
19-Jun	15	8	7	14	6	8	11	12	30	44	21	41	54	57	36	39	21	23	45	13	6	13	9	15	57
20-Jun	14	7	8	6	7	6	8	8	11	8	15	21	14	10	11	13	8	11	12	9	7	6	10	14	21
21-Jun	6	11	18	11	9	6	7	7	8	7	7	7	7	6	6	6	6	7	16	10	9	9	12	10	18
22-Jun	9	9	10	10	11	12	10	11	12	14	11	14	14	17	20	18	14	19	20	14	17	12	40	8	40
23-Jun	1	2	35	23	71	62	34	20	17	18	20	23	26	27	44	37	37	27	17	31	22	7	9	71	71
24-Jun	14	10	85	44	14	20	44	33	33	31	37	37	16	19	14	25	15	23	11	11	7	9	11	10	85
25-Jun	12	29	25	32	37	23	29	19	50	42	39	77	93	42	29	12	17	14	9	9	6	6	6	4	93
26-Jun	5	4	6	6	6	7	7	8	11	9	13	10	10	11	10	9	11	9	8	8	13	13	11	8	13
27-Jun	8	11	8	7	19	34	12	40	16	13	24	9	22	47	18	80	30	10	14	24	14	11	11	12	80
28-Jun	27	11	11	59	22	17	16	16	23	13	12	12	16	14	18	21	17	28	20	12	6	6	5	11	59
29-Jun	14	8	10	8	8	7	13	23	44	41	42	46	41	72	29	45	27	21	67	12	15	13	33	30	72
30-Jun	8	17	45	21	30	16	96	15	13	17	12	15	14	16	59	10	12	11	19	10	38	9	8	15	96

74	70	85	59	71	62	96	40	90	90	64	92	93	92	81	80	81	39	67	34	81	64	57	71	
Diurnal Maximum																								





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - June 2017

Direction of Maximum Speed: 5 deg on Jun 9 11:00 Direction of Maximum Daily Speed Average: 358.3 deg on Jun 14	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 120 deg on Jun 2 08:00 Direction of Minimum Daily Speed Average: 1.5 deg on Jun 6	Percent Operational Time: 100.0
Monthly Average Direction: 290.1 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	282	124	204	249	266	266	260	261	254	226	226	194	148	131	122	127	114	131	164	148	140	141	168	183	189.4
2-Jun	155	172	205	191	236	219	217	120	341	353	302	280	324	17	308	265	274	274	291	293	269	268	279	272	275.4
3-Jun	269	268	275	277	270	270	286	305	301	275	277	273	305	313	342	32	91	89	96	98	89	117	130	135	277.4
4-Jun	134	136	148	189	243	246	313	79	276	306	277	274	285	298	325	344	349	351	341	328	348	8	8	2	338.6
5-Jun	347	25	56	345	349	340	360	343	342	342	2	335	348	338	359	69	79	87	111	142	55	60	125	132	12.3
6-Jun	149	152	156	159	161	158	152	135	130	147	108	99	106	288	276	290	283	284	290	327	13	16	27	32	119.5
7-Jun	18	22	9	10	23	22	6	343	17	43	74	61	24	34	47	59	68	70	60	67	40	32	37	66	39.5
8-Jun	83	83	44	67	109	101	114	115	103	94	84	80	103	104	117	117	115	119	124	116	107	120	109	115	102.9
9-Jun	123	131	127	107	13	9	9	4	3	4	5	17	6	4	8	15	44	44	46	40	39	42	43	47	25.2
10-Jun	55	65	68	69	87	78	78	54	54	325	309	4	248	261	249	263	15	20	15	353	315	356	352	347	19.0
11-Jun	321	307	316	310	302	299	298	299	310	303	304	314	302	310	310	323	313	336	339	343	29	56	77	110	316.2
12-Jun	135	149	147	153	152	142	138	143	149	152	160	133	141	138	126	357	151	156	143	132	123	87	2	8	140.4
13-Jun	20	356	341	326	327	348	330	359	298	63	57	42	53	339	358	22	34	20	5	4	45	43	24	3	12.2
14-Jun	352	1	345	355	0	5	11	4	5	4	6	353	3	3	8	2	8	8	359	344	348	354	341	336	358.3
15-Jun	334	338	346	353	1	7	6	11	35	38	303	320	310	316	58	51	58	68	62	51	46	47	71	95	10.2
16-Jun	128	124	121	120	124	119	127	116	118	131	148	143	134	208	225	140	153	192	280	278	106	170	141	132	153.6
17-Jun	136	135	130	143	151	166	241	279	279	283	290	296	291	303	284	296	297	299	306	323	354	82	195	230	279.7
18-Jun	256	338	158	164	177	180	172	148	155	173	235	236	218	203	258	261	254	259	314	326	315	335	329	267	251.2
19-Jun	271	265	278	268	273	279	267	269	259	259	252	311	260	250	221	265	257	234	176	132	134	164	199	212	248.7
20-Jun	161	172	166	151	150	147	145	142	138	126	144	186	202	188	193	167	151	138	139	140	145	137	148	189	160.0
21-Jun	182	205	211	250	258	260	260	263	255	264	262	266	263	265	264	264	269	270	289	331	327	332	348	344	274.3
22-Jun	340	338	348	341	343	338	343	340	331	345	348	342	338	338	337	332	338	344	349	15	17	352	346	258	341.8
23-Jun	260	258	270	353	317	308	307	308	312	313	322	323	328	335	312	249	309	31	59	294	282	273	272	274	306.7
24-Jun	275	262	343	166	166	173	234	285	359	346	340	4	6	345	335	348	329	341	16	20	20	38	63	74	356.8
25-Jun	85	96	264	53	142	154	163	132	152	124	105	119	162	106	157	154	150	137	139	134	136	141	145	153	138.1
26-Jun	160	158	147	135	134	133	133	133	139	135	139	142	139	137	130	136	139	136	128	126	116	107	118	128	136.9
27-Jun	123	129	122	127	136	187	243	192	167	172	154	218	210	128	87	255	259	241	252	255	217	178	155	177	178.1
28-Jun	187	218	262	348	115	120	83	54	62	72	52	47	29	29	24	49	69	134	158	171	162	154	160	154	96.7
29-Jun	157	169	176	155	156	148	133	141	121	103	103	230	268	242	303	301	14	15	273	257	281	317	315	309	183.1
30-Jun	253	232	129	180	187	249	281	122	143	166	153	155	134	153	231	273	234	243	236	225	242	199	209	212	200.8

118.5	156.6	142.6	52.0	279.0	293.0	322.8	332.2	322.7	331.1	328.8	309.1	313.2	320.4	313.4	313.3	325.5	359.0	10.3	3.5	18.6	43.2	48.5	58.8	
Diurnal Average																								

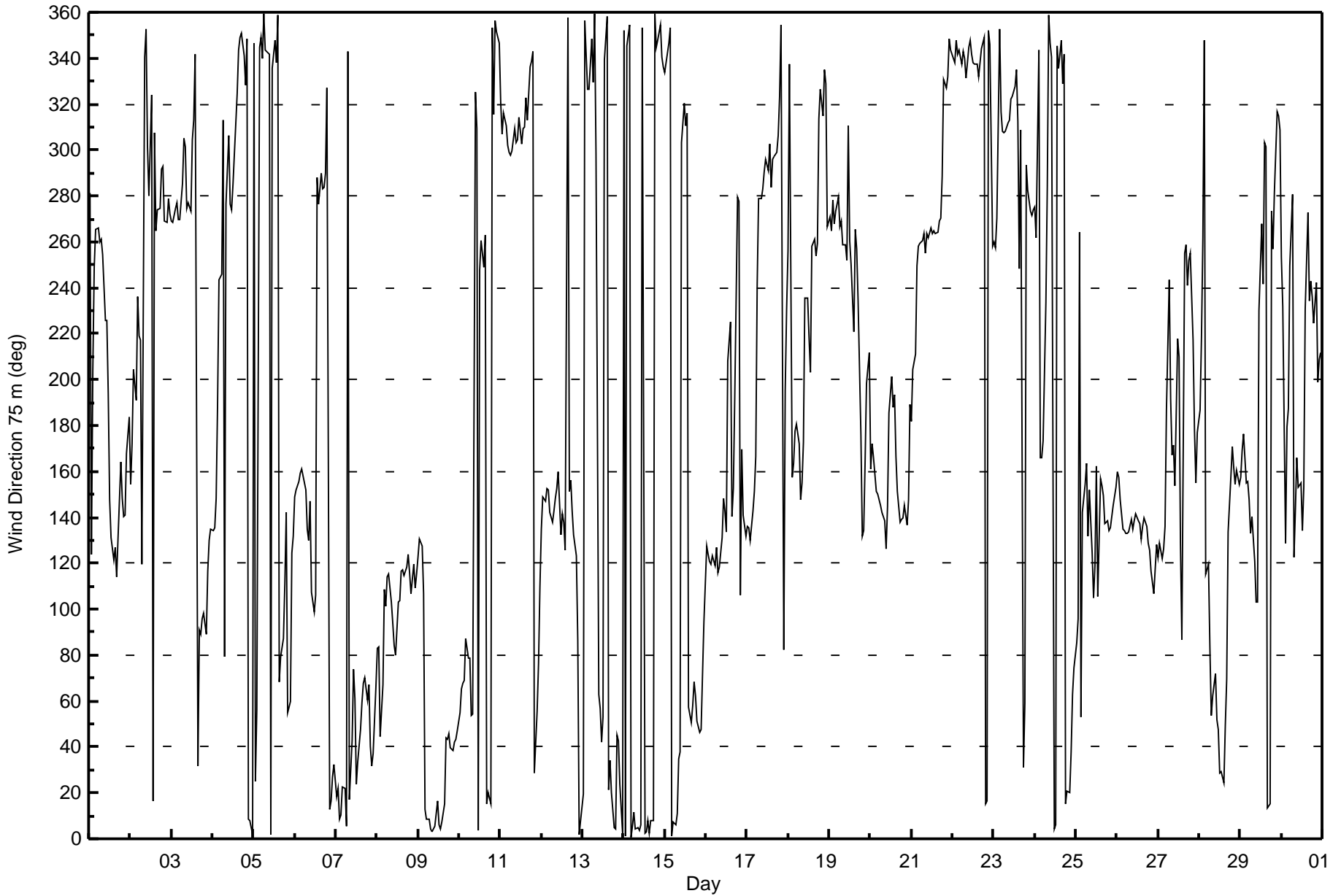
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 75 m (WD75m) - deg
Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Jun 25 13:00 Minimum Value: 2 deg on Jun 23 02:00 Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 22 P ₉₀ = 37 P ₉₉ = 79																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	71	33	32	19	7	14	9	12	12	16	24	20	51	12	21	16	20	15	14	14	5	13	4	8	71	
2-Jun	10	23	27	35	15	10	77	82	56	80	39	21	31	15	46	7	11	11	12	18	7	8	7	5	82	
3-Jun	6	6	6	6	7	6	9	14	18	9	14	13	24	19	31	55	14	21	22	17	13	17	9	6	55	
4-Jun	5	4	5	22	35	22	41	26	94	18	22	6	12	17	13	17	17	13	23	11	11	6	6	7	94	
5-Jun	30	27	10	32	9	11	7	16	11	9	16	21	22	27	32	38	22	22	25	13	44	18	17	9	44	
6-Jun	22	4	5	3	3	11	19	18	17	22	19	25	33	95	22	16	14	15	17	7	18	7	8	10	95	
7-Jun	13	10	8	7	10	9	12	20	22	27	45	93	33	45	54	30	11	11	8	10	30	8	14	16	93	
8-Jun	11	10	42	16	18	15	15	18	17	13	19	19	25	19	19	16	17	14	12	15	16	14	15	14	42	
9-Jun	11	6	9	37	22	10	6	8	6	7	7	12	7	7	8	14	12	10	12	7	6	6	6	8	37	
10-Jun	8	10	10	11	12	13	18	25	29	44	37	75	36	27	28	22	72	12	8	17	18	14	10	9	75	
11-Jun	11	7	8	8	7	7	9	13	11	12	15	18	20	21	18	26	20	19	14	11	14	9	11	17	26	
12-Jun	10	5	3	4	5	5	3	7	8	8	8	9	9	9	80	70	20	11	7	30	13	58	11	9	80	
13-Jun	14	5	27	7	10	14	53	38	68	35	25	51	40	38	15	12	17	15	7	6	18	10	14	8	68	
14-Jun	15	6	8	9	10	9	8	7	8	7	8	16	10	9	9	8	7	6	9	8	9	9	10	8	16	
15-Jun	7	7	6	6	6	4	5	9	33	78	66	49	20	24	14	10	18	18	10	9	8	7	9	17	78	
16-Jun	14	11	34	13	14	15	15	15	15	11	14	20	21	37	22	36	9	38	9	21	80	76	47	8	80	
17-Jun	6	8	9	9	11	18	40	8	8	11	18	22	11	13	9	10	11	12	25	24	33	20	71	22	71	
18-Jun	22	77	26	8	13	22	19	12	13	44	15	18	18	30	16	14	19	15	13	16	19	6	13	12	77	
19-Jun	12	6	7	11	6	7	11	13	28	49	24	36	55	76	32	34	19	20	45	18	6	14	10	6	76	
20-Jun	21	7	9	4	5	3	6	6	11	9	17	21	12	9	10	11	8	10	11	8	6	4	10	15	21	
21-Jun	9	11	15	10	8	6	7	7	8	7	7	7	6	6	6	6	6	7	16	9	7	9	10	8	16	
22-Jun	7	8	9	8	9	11	9	10	11	12	10	13	12	16	17	16	14	17	20	13	11	12	27	18	27	
23-Jun	3	2	24	27	36	19	29	21	17	18	20	21	24	23	41	42	36	26	14	34	29	13	10	54	54	
24-Jun	11	11	61	52	32	22	52	43	27	31	34	29	13	18	13	25	15	23	11	9	4	8	8	9	61	
25-Jun	11	19	61	26	27	11	21	17	48	35	36	64	100	41	25	12	15	14	9	8	5	5	4	5	100	
26-Jun	4	4	6	4	4	5	6	8	10	9	12	9	8	10	10	8	10	8	8	9	15	16	14	8	16	
27-Jun	10	10	11	8	18	34	11	35	16	12	24	8	20	44	17	85	13	9	15	25	18	12	10	13	85	
28-Jun	25	13	11	51	24	17	20	14	20	12	10	10	13	12	15	19	16	24	20	12	5	5	4	8	51	
29-Jun	11	10	7	6	8	6	10	20	38	34	35	51	39	75	29	41	26	18	69	8	14	12	30	36	75	
30-Jun	10	11	40	31	27	16	92	15	12	16	10	12	14	16	58	9	11	11	21	11	28	8	7	6	92	
																	71 77 61 52 36 34 92 82 94 80 66 93 100 95 80 85 72 38 69 34 80 76 71 54									
Diurnal Maximum																										





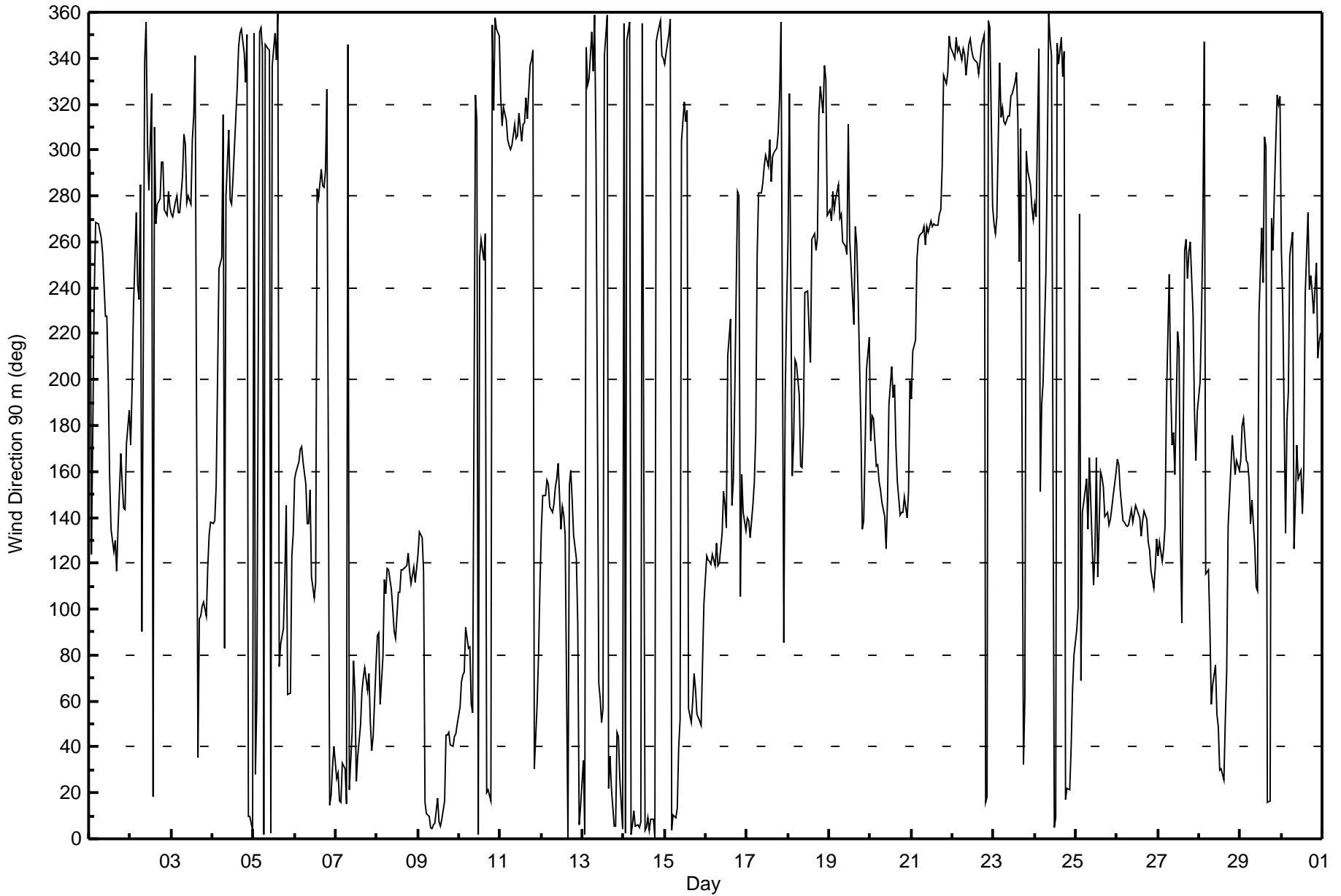
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 90 m (WD90m) - deg

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 96 deg on Jun 15 10:00 Minimum Value: 2 deg on Jun 12 07:00 Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 12 Q ₃ = 20 P ₉₀ = 36 P ₉₉ = 78																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	73	29	26	26	8	10	9	12	11	15	22	19	45	11	18	15	17	14	15	16	5	14	5	7	73
2-Jun	8	33	29	57	9	7	62	77	47	83	37	21	31	14	45	8	20	11	12	17	6	7	7	5	83
3-Jun	5	6	5	6	7	6	9	14	16	9	13	12	23	20	32	52	13	19	19	12	7	12	8	5	52
4-Jun	3	3	7	20	51	18	40	29	94	18	21	4	13	18	13	17	16	13	23	12	11	6	5	7	94
5-Jun	28	26	9	34	8	10	6	16	11	9	17	21	21	26	31	42	21	21	22	13	45	19	9	11	45
6-Jun	17	3	5	3	5	10	17	18	14	22	15	23	33	95	21	15	13	15	17	7	18	7	7	8	95
7-Jun	14	12	9	6	7	7	12	20	23	26	45	95	32	47	55	29	11	11	8	10	31	7	14	15	95
8-Jun	10	9	44	14	12	7	9	13	11	9	17	19	22	16	16	12	13	10	9	9	10	9	9	9	44
9-Jun	8	6	7	32	28	9	6	7	6	7	6	11	7	7	8	14	12	10	11	7	5	6	6	8	32
10-Jun	8	10	10	11	9	13	17	24	29	45	35	75	37	27	26	20	71	12	7	16	17	13	9	9	75
11-Jun	11	7	7	7	7	7	8	12	11	12	15	17	19	20	17	25	20	18	13	12	13	9	11	11	25
12-Jun	10	6	3	4	5	3	2	7	8	8	9	9	9	10	83	67	20	10	7	29	8	56	12	11	83
13-Jun	15	5	27	7	9	15	67	40	75	37	26	55	45	38	15	11	17	14	7	6	18	10	13	8	75
14-Jun	14	5	7	8	9	8	7	7	8	6	7	15	9	8	8	7	6	5	8	7	8	16	20	7	20
15-Jun	6	7	5	6	5	3	5	8	34	96	66	48	22	24	15	12	19	17	10	8	8	8	9	10	96
16-Jun	11	7	19	8	11	10	12	10	11	11	12	19	20	36	21	33	9	37	9	18	78	75	42	8	78
17-Jun	6	7	9	8	11	21	35	8	7	11	18	21	10	12	9	9	10	12	24	24	34	16	71	26	71
18-Jun	19	84	32	15	14	28	19	9	14	41	14	16	16	30	15	14	18	14	13	15	19	6	12	11	84
19-Jun	12	5	7	10	5	6	10	13	29	44	22	34	55	66	29	32	19	19	44	18	6	14	10	6	66
20-Jun	24	9	11	4	6	3	5	5	11	6	17	20	11	9	9	11	8	9	11	7	6	4	10	15	24
21-Jun	10	10	13	9	8	6	6	7	8	7	7	7	6	6	6	6	6	7	16	8	7	8	10	8	16
22-Jun	7	7	8	7	8	10	8	9	11	12	9	12	12	15	17	15	13	16	20	12	9	13	18	19	20
23-Jun	6	3	18	22	26	16	29	20	16	17	19	19	23	23	39	43	35	25	15	35	34	21	12	51	51
24-Jun	10	12	52	50	36	23	63	40	25	32	33	28	13	17	12	24	14	22	10	8	4	8	8	8	63
25-Jun	9	13	92	25	20	10	15	14	41	26	34	61	95	42	23	12	14	13	8	8	4	5	3	5	95
26-Jun	4	4	6	3	4	4	6	7	10	9	12	10	8	10	10	8	10	8	7	7	11	11	9	7	12
27-Jun	7	9	7	7	18	34	11	33	16	12	24	7	18	40	14	82	11	8	15	22	18	14	10	12	82
28-Jun	24	11	11	49	23	12	18	14	20	12	10	10	13	12	15	20	16	23	20	11	5	5	4	7	49
29-Jun	10	10	6	5	8	6	9	19	35	33	38	51	34	74	27	39	24	18	82	7	14	13	26	33	82
30-Jun	11	13	28	34	22	16	75	10	11	15	9	12	15	17	56	10	9	11	19	11	21	6	7	6	75
	73	84	92	57	51	34	75	77	94	96	66	95	95	95	83	82	71	37	82	35	78	75	71	51	
Diurnal Maximum																									





Maximum Value: 1.6 km/h on Jun 9 18:00		Maximum Daily Average: 0.9 km/h on Jun 26		Hours in Service: 720																						
Minimum Value: -0.9 km/h on Jun 11 09:00		Minimum Daily Average: -0.3 km/h on Jun 22		Hours of Data: 720																						
Maximum Diurnal Average: 0.3 km/h at hour 18		Minimum Diurnal Average: 0.1 km/h at hour 7		Hours of Missing Data: 0																						
Monthly Average: 0.21 km/h		Percentiles: P ₁ = -0.7 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.1 Q ₃ = 0.5 P ₉₀ = 0.8 P ₉₉ = 1.4		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	-0.1	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.1	-0.1	0.5	0.7	0.4	0.6	0.3	0.4	0.2	0.3	0.4	0.3	-0.1	0.0	0.2	0.7
2-Jun	0.3	0.1	-0.1	0.0	-0.2	0.2	0.2	0.1	0.2	0.0	0.2	0.3	0.1	0.2	-0.1	-0.1	-0.2	0.1	-0.2	-0.4	0.2	0.3	-0.1	0.3	0.1	0.3
3-Jun	0.1	0.2	0.1	0.0	0.1	0.3	-0.5	-0.4	-0.4	0.0	-0.2	-0.1	0.1	-0.4	0.3	0.4	0.7	1.0	0.7	0.7	0.6	0.8	0.8	0.8	0.2	1.0
4-Jun	0.8	0.7	0.7	0.0	-0.1	-0.1	0.1	0.5	0.2	-0.4	0.0	0.2	0.0	-0.1	-0.2	-0.1	0.1	-0.1	-0.2	-0.4	-0.2	-0.1	0.0	0.1	0.1	0.8
5-Jun	-0.1	0.4	1.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	-0.2	-0.1	0.0	0.0	0.3	0.2	0.2	0.5	0.7	0.6	0.4	0.4	0.8	0.3	0.2	0.2	1.1
6-Jun	0.0	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.5	0.4	1.0	0.8	0.8	0.4	-0.1	-0.3	-0.2	0.0	0.0	-0.1	0.0	0.0	0.2	0.0	0.2	1.0
7-Jun	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.3	0.3	0.5	0.8	0.7	0.2	0.2	0.6	0.7	1.4	1.1	1.1	1.3	0.2	0.0	-0.1	0.5	0.4	1.4
8-Jun	1.2	1.3	0.0	0.0	0.4	0.7	0.4	0.4	0.9	0.9	0.8	1.0	1.0	1.1	1.0	1.0	1.1	1.0	0.8	0.7	0.6	0.4	0.9	1.0	0.8	1.3
9-Jun	0.7	0.6	0.7	0.3	-0.1	-0.2	0.1	0.0	-0.1	-0.1	-0.2	0.7	0.0	-0.2	-0.2	0.6	1.5	1.6	1.5	1.3	1.3	1.1	1.0	1.0	0.5	1.6
10-Jun	1.4	1.4	1.2	1.3	1.4	1.1	0.9	0.5	0.6	0.1	0.1	0.3	0.0	-0.1	-0.3	0.0	0.3	0.3	0.2	0.0	-0.6	0.0	-0.2	-0.2	0.4	1.4
11-Jun	-0.3	-0.4	-0.5	-0.7	-0.6	-0.8	-0.7	-0.5	-0.9	-0.8	-0.7	-0.4	-0.5	-0.2	-0.4	-0.1	-0.3	0.1	-0.2	-0.2	0.3	0.9	1.0	0.7	-0.3	1.0
12-Jun	0.4	0.5	0.5	0.6	0.5	0.7	0.7	0.7	0.8	0.7	0.5	1.1	1.3	1.1	0.8	0.3	0.7	0.6	0.9	0.5	0.7	0.4	-0.1	-0.1	0.6	1.3
13-Jun	-0.1	0.0	0.0	-0.1	0.0	0.1	-0.1	0.3	0.1	0.4	0.5	0.1	0.4	-0.2	-0.1	0.5	0.5	0.2	-0.2	-0.1	0.9	1.0	0.2	-0.1	0.2	1.0
14-Jun	-0.2	-0.4	-0.3	-0.4	-0.2	-0.3	0.0	-0.2	0.1	-0.2	0.1	-0.1	0.0	-0.1	0.0	-0.3	0.1	0.1	-0.3	-0.2	-0.1	-0.3	-0.5	-0.4	-0.2	0.1
15-Jun	-0.5	-0.3	0.0	-0.2	-0.1	0.0	0.0	0.2	0.4	0.6	0.0	0.3	0.0	0.0	0.9	0.8	0.6	0.7	0.9	0.7	0.6	0.6	0.5	0.6	0.3	0.9
16-Jun	0.0	0.3	0.3	0.5	0.5	0.5	0.6	0.6	0.5	0.4	0.1	0.6	0.7	-0.2	-0.2	0.5	0.5	-0.1	-0.2	0.1	0.2	0.0	0.4	0.8	0.3	0.8
17-Jun	0.7	0.7	0.4	0.5	0.4	0.3	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.5	-0.7	-0.3	-0.8	-0.7	-0.6	-0.2	-0.1	0.1	0.0	-0.1	-0.2	-0.1	0.7
18-Jun	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.4	-0.3	-0.2	-0.2	0.0	-0.3	0.0	-0.1	0.0	-0.3	-0.2	-0.5	-0.4	-0.3	-0.1	0.0	0.5
19-Jun	0.2	0.1	0.1	-0.1	-0.1	0.1	-0.1	-0.2	-0.2	-0.4	-0.3	0.0	0.4	0.1	0.1	0.0	0.1	-0.1	0.4	0.2	0.4	0.1	-0.2	-0.1	0.0	0.4
20-Jun	0.3	0.4	0.3	0.5	0.6	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.0	-0.3	-0.1	-0.3	0.1	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.1	0.7
21-Jun	0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.3	0.0	-0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	-0.1	-0.2	-0.5	-0.6	-0.6	-0.6	-0.3	-0.6	-0.1	0.2
22-Jun	-0.5	-0.5	-0.6	-0.4	-0.4	-0.3	-0.7	-0.2	-0.2	-0.3	-0.6	-0.4	-0.2	-0.4	-0.2	-0.5	-0.3	-0.1	-0.1	0.3	0.0	-0.1	-0.1	-0.1	-0.3	0.3
23-Jun	0.1	-0.1	0.0	0.1	0.1	0.2	0.2	-0.1	0.0	-0.3	-0.3	-0.3	-0.3	0.0	-0.2	0.1	0.0	0.5	0.8	0.0	0.0	0.0	0.0	0.1	0.0	0.8
24-Jun	0.0	-0.3	0.0	0.0	0.3	0.2	0.1	0.0	0.2	0.4	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.3	0.0	0.3	0.3	0.2	0.4	0.8	0.7	0.1	0.8
25-Jun	1.2	0.8	-0.3	-0.2	0.1	0.0	0.2	0.2	0.1	0.5	0.6	0.6	0.3	0.5	0.4	0.5	0.4	0.5	0.6	0.6	0.8	0.8	0.9	0.7	0.4	1.2
26-Jun	0.7	0.7	0.8	0.7	0.7	0.9	0.9	0.9	0.7	1.0	1.1	1.3	1.3	1.2	1.3	1.1	1.2	1.0	0.8	0.6	0.7	0.8	0.7	0.8	0.9	1.3
27-Jun	0.7	0.7	0.8	0.7	0.7	0.2	-0.2	0.0	0.2	0.2	0.5	-0.3	0.0	0.6	0.7	0.2	0.0	-0.2	-0.1	0.2	-0.1	-0.1	0.3	0.3	0.2	0.8
28-Jun	0.1	-0.2	-0.1	0.1	0.4	0.4	0.8	0.5	0.8	1.5	1.2	0.9	0.4	0.9	0.6	0.9	0.7	0.4	0.2	0.1	0.4	0.5	0.5	0.5	0.5	1.5
29-Jun	0.5	0.4	0.3	0.7	0.6	0.6	0.4	0.3	0.2	0.4	0.2	-0.1	0.0	0.0	-0.1	0.0	0.2	-0.1	0.1	0.2	0.1	-0.1	-0.1	0.0	0.2	0.7
30-Jun	-0.1	0.0	0.2	-0.1	0.2	-0.2	0.1	0.5	0.4	0.2	0.5	0.4	0.5	0.5	0.1	-0.1	-0.2	-0.1	0.1	-0.1	0.0	0.1	-0.1	0.0	0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.6 km/h on Jun 9 11:00 Minimum Value: 0.2 km/h on Jun 17 22:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.7 Q ₃ = 2.2 P ₉₀ = 2.9 P ₉₉ = 3.9																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.4	0.5	0.4	0.2	0.9	0.9	1.1	1.2	1.1	1.1	0.9	0.9	1.1	1.7	1.6	1.6	1.4	1.4	1.0	0.7	0.5	0.5	0.5	0.4	1.7
2-Jun	0.4	0.4	0.5	0.4	0.7	0.7	0.6	0.8	1.0	1.3	1.4	1.7	1.7	1.9	2.3	2.8	2.6	2.1	1.6	2.1	1.5	1.6	1.6	1.7	2.8
3-Jun	2.1	2.1	2.1	2.5	2.0	2.0	2.5	2.2	2.0	1.5	1.9	2.0	2.2	2.2	1.8	1.7	1.6	1.5	1.1	0.9	0.6	1.2	1.9	1.7	2.5
4-Jun	2.1	1.6	1.2	1.0	0.6	0.8	0.9	1.1	1.6	1.8	1.3	1.5	1.4	1.6	1.9	2.2	2.7	2.2	2.6	3.0	2.0	1.9	2.5	2.9	3.0
5-Jun	2.2	1.7	2.2	1.4	1.6	1.8	2.1	2.1	1.7	1.8	1.5	1.7	1.8	1.9	1.9	1.8	1.5	1.5	1.2	0.9	1.1	1.2	0.4	0.3	2.2
6-Jun	0.5	0.6	0.6	0.7	0.9	0.8	1.0	1.2	1.3	1.6	1.6	1.8	1.7	2.0	2.0	1.7	1.8	1.0	0.6	0.6	0.9	1.6	1.3	0.8	2.0
7-Jun	0.7	0.8	0.9	1.1	1.2	0.9	0.7	1.0	1.3	1.7	1.8	1.7	1.8	1.8	1.9	2.1	1.9	1.6	1.8	1.2	1.2	1.2	1.1	2.1	2.1
8-Jun	1.9	1.6	0.7	0.6	1.0	1.0	0.8	0.7	1.2	1.6	1.7	1.8	2.0	2.2	2.3	2.3	2.2	2.0	2.0	1.7	1.4	1.5	1.6	1.8	2.3
9-Jun	1.9	1.4	1.0	0.7	1.2	2.2	3.6	3.3	3.7	3.7	4.6	3.6	4.2	4.2	4.2	3.9	3.3	3.6	3.2	3.3	2.9	2.7	2.2	2.5	4.6
10-Jun	2.7	2.5	2.2	1.9	1.9	1.9	1.7	1.6	1.6	2.2	2.2	1.9	2.1	2.0	1.8	1.3	1.1	1.2	1.7	2.1	2.8	2.0	2.4	2.0	2.8
11-Jun	1.7	1.7	2.4	3.0	2.7	2.8	2.9	3.3	3.4	3.2	3.0	3.0	2.9	2.8	2.8	2.7	2.7	2.7	2.4	2.0	1.2	1.2	1.1	1.3	3.4
12-Jun	1.1	1.4	1.6	1.7	1.4	1.8	1.7	1.8	2.1	2.0	2.7	3.1	3.0	2.8	2.8	1.8	2.7	2.5	2.0	1.1	1.5	1.4	0.8	1.2	3.1
13-Jun	1.0	1.0	0.7	0.5	1.2	1.1	0.8	1.2	1.2	1.6	1.7	1.7	1.9	2.0	2.0	1.8	1.8	1.8	2.9	3.2	2.1	2.5	2.4	3.1	3.2
14-Jun	2.5	3.4	3.5	4.0	3.3	3.5	3.2	3.5	3.1	2.9	2.4	2.6	3.0	2.9	2.7	2.7	2.4	2.7	2.9	2.9	2.9	2.6	2.6	2.6	4.0
15-Jun	2.3	2.1	2.2	2.1	2.1	2.2	1.9	1.5	1.1	1.1	1.4	1.6	1.5	1.7	1.6	1.3	1.3	1.1	1.4	1.1	0.9	1.0	0.7	0.7	2.3
16-Jun	0.2	0.6	1.1	1.3	0.9	1.5	1.2	1.2	1.5	1.3	1.2	1.8	1.9	2.0	1.8	1.6	1.8	1.0	1.9	1.2	0.5	0.4	1.6	2.1	2.1
17-Jun	2.1	1.7	1.4	1.2	1.1	1.0	0.6	2.0	2.6	2.3	2.0	2.0	3.0	3.1	3.3	3.0	2.9	2.4	1.8	1.1	0.4	0.2	0.4	0.4	3.3
18-Jun	0.5	0.8	1.0	0.9	0.8	1.0	0.7	1.0	1.8	1.7	2.4	2.2	2.4	2.7	2.8	2.4	2.2	1.7	1.8	2.4	2.7	2.5	2.1	1.4	2.8
19-Jun	0.9	1.4	1.4	1.2	1.2	1.4	1.3	1.5	1.4	1.5	1.7	2.0	2.0	1.7	1.9	1.8	1.7	1.4	1.2	1.0	0.6	0.8	1.0	0.6	2.0
20-Jun	1.0	1.2	0.9	1.2	1.2	1.4	1.3	1.1	1.0	1.2	1.3	2.5	2.8	3.2	2.5	1.9	1.8	1.7	2.0	2.0	1.5	1.7	1.7	1.8	3.2
21-Jun	1.5	1.3	1.5	1.8	2.1	2.4	3.0	2.4	2.6	2.2	2.1	1.9	2.2	2.1	2.5	2.3	2.1	2.3	2.3	3.2	2.8	2.4	3.6	4.0	4.0
22-Jun	3.8	3.5	3.9	3.7	3.9	3.4	3.5	3.0	2.6	3.1	3.6	3.5	3.5	3.2	2.8	2.7	2.9	2.3	1.9	1.8	1.0	0.6	0.5	0.4	3.9
23-Jun	0.4	0.3	0.3	0.4	0.4	0.4	1.0	1.4	1.8	2.2	2.4	2.5	2.4	2.4	2.0	1.7	1.7	1.8	1.2	0.9	0.5	0.3	0.4	0.5	2.5
24-Jun	0.5	0.7	0.3	0.4	0.6	0.7	1.0	1.2	1.5	1.8	1.7	1.9	2.0	2.4	2.7	2.5	2.4	2.0	1.8	1.3	1.3	1.0	1.1	0.9	2.7
25-Jun	1.3	1.3	0.6	0.4	0.2	0.4	0.9	1.0	1.2	1.4	1.5	1.6	1.6	1.8	2.2	2.2	2.1	1.8	1.8	1.8	2.0	2.2	1.9	1.6	2.2
26-Jun	2.1	2.1	1.8	2.3	2.5	2.7	2.5	2.3	2.2	2.6	2.9	3.1	3.3	3.1	3.2	2.7	2.5	2.3	2.2	1.7	1.7	1.8	1.8	1.8	3.3
27-Jun	1.7	1.9	1.8	1.9	2.0	2.1	1.7	1.3	1.8	1.5	1.5	1.7	1.1	1.1	1.2	1.3	0.7	1.2	1.1	0.6	0.5	0.8	0.8	0.7	2.1
28-Jun	0.7	0.8	0.5	0.6	0.7	0.8	0.9	1.2	1.3	2.2	2.3	2.0	2.1	2.8	2.2	2.1	1.7	1.5	1.4	1.1	1.8	1.7	1.8	1.2	2.8
29-Jun	1.0	1.0	1.3	1.5	1.4	1.2	1.1	1.2	1.3	1.4	1.4	1.3	1.6	1.8	1.5	1.7	1.4	1.0	0.8	0.5	0.8	0.6	0.4	0.4	1.8
30-Jun	0.4	0.3	0.5	0.6	0.8	0.9	0.5	1.0	1.3	1.2	1.2	1.5	1.5	1.1	1.2	1.2	1.2	0.9	0.8	0.7	0.5	0.6	0.6	0.4	1.5
Diurnal Maximum																									



Maximum Value: 2.5 km/h on Jun 26 12:00 Maximum Daily Average: 1.7 km/h on Jun 26																				Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Minimum Value: -2.0 km/h on Jun 22 01:00 Minimum Daily Average: -1.0 km/h on Jun 22 Maximum Diurnal Average: 0.3 km/h at hour 2 Minimum Diurnal Average: 0.1 km/h at hour 20 Monthly Average: 0.22 km/h Percentiles: P ₁ = -1.6 P ₁₀ = -0.7 Q ₁ = -0.2 Median = 0.1 Q ₃ = 0.7 P ₉₀ = 1.2 P ₉₉ = 2.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.3	0.1	0.0	-0.2	0.0	-0.1	0.3	0.0	0.1	0.1	0.3	0.9	1.1	0.4	0.8	0.1	0.6	0.5	0.6	0.9	0.8	0.5	0.4	0.3	1.1
2-Jun	0.6	0.4	0.2	0.3	0.0	0.2	0.2	0.0	0.3	0.1	0.3	0.5	0.1	-0.3	-0.2	-0.3	-0.7	-0.1	-0.5	-0.4	0.0	0.0	-0.1	0.1	0.0	0.6
3-Jun	-0.2	0.1	0.0	-0.2	-0.2	-0.2	-0.7	-0.6	-0.6	-0.3	-0.2	-0.3	-0.1	-0.5	0.4	0.2	0.4	1.0	0.6	0.9	0.5	0.9	1.4	1.5	0.2	1.5
4-Jun	1.5	1.2	1.5	0.5	-0.1	0.0	0.1	0.5	0.2	-0.4	0.0	0.1	-0.1	0.0	-0.3	-0.2	0.1	-0.7	-0.4	-1.1	-0.9	-0.5	-0.8	-0.7	0.0	1.5
5-Jun	-0.5	-0.1	0.3	-0.3	-0.6	-0.7	-0.5	-0.7	-0.7	-0.8	-0.4	-0.2	-0.1	0.3	0.1	0.0	0.2	0.7	0.9	0.8	0.3	0.7	0.5	0.6	0.0	0.9
6-Jun	0.3	0.9	0.7	0.8	0.9	0.5	0.5	0.5	0.8	0.7	1.3	1.0	1.2	0.4	0.3	-0.3	-0.2	-0.1	0.1	-0.3	-0.2	-0.5	-0.3	-0.1	0.4	1.3
7-Jun	-0.3	-0.3	-0.5	-0.5	-0.4	-0.4	-0.2	0.4	0.0	0.4	0.8	0.8	0.2	-0.1	0.3	0.4	0.9	0.7	0.7	0.9	0.1	-0.5	-0.3	0.2	0.1	0.9
8-Jun	0.7	1.2	0.1	0.1	0.6	0.7	0.5	0.6	0.9	0.6	0.8	0.9	1.0	0.9	1.2	1.3	1.4	1.2	1.1	0.9	0.9	0.8	1.0	0.9	0.8	1.4
9-Jun	1.1	1.2	0.9	0.4	-0.5	-0.8	-0.5	-1.0	-1.1	-1.2	-1.4	0.1	-1.5	-1.4	-1.5	-0.2	0.5	0.7	0.8	0.4	0.2	0.4	0.2	0.3	-0.2	1.2
10-Jun	0.6	0.9	0.7	0.9	1.0	0.8	0.7	0.4	0.4	0.3	0.3	0.3	0.2	-0.4	-0.1	-0.2	0.2	0.0	0.0	-0.7	-0.9	-0.6	-0.8	-0.8	0.1	1.0
11-Jun	-0.7	-0.3	-0.5	-0.8	-0.6	-0.9	-0.7	-0.1	-1.0	-0.9	-0.6	-0.5	-0.5	0.0	-0.3	0.0	-0.1	-0.4	-0.7	-0.7	-0.2	0.7	0.7	1.0	-0.3	1.0
12-Jun	1.0	1.2	1.4	1.3	1.3	1.7	1.5	1.4	1.6	1.6	1.8	1.8	2.3	1.9	1.3	0.0	1.8	1.6	1.9	0.5	1.0	0.5	-0.5	-0.5	1.2	2.3
13-Jun	-0.4	-0.4	-0.2	-0.2	-0.2	-0.3	-0.1	0.2	0.4	0.3	0.4	-0.4	0.2	-0.4	-0.6	0.2	0.1	-0.2	-0.9	-1.3	0.4	0.4	-0.3	-1.2	-0.2	0.4
14-Jun	-0.8	-1.3	-1.5	-1.4	-0.8	-1.2	-0.8	-1.0	-0.5	-0.9	-0.5	-0.5	-0.5	-0.7	-0.8	-0.8	-0.7	-0.8	-1.3	-1.1	-1.1	-1.0	-1.2	-1.2	-0.9	-0.5
15-Jun	-1.1	-0.9	-0.9	-0.9	-0.8	-0.8	-0.7	-0.1	0.4	0.9	0.1	0.3	-0.1	0.0	0.6	0.5	0.5	0.7	0.4	0.5	0.4	0.3	0.3	0.5	0.0	0.9
16-Jun	0.5	1.0	0.7	0.7	0.7	0.8	1.0	0.7	0.5	0.7	0.3	1.0	1.2	0.3	-0.1	1.0	1.1	0.2	-0.2	-0.1	0.2	0.0	0.8	1.6	0.6	1.6
17-Jun	1.4	1.4	1.0	1.1	0.9	0.7	0.1	0.0	0.1	-0.3	-0.3	-0.2	-0.6	-0.8	-0.3	-0.6	-0.7	-0.5	-0.3	-0.3	0.0	0.1	0.1	0.0	0.1	1.4
18-Jun	0.0	0.1	1.0	0.8	0.6	0.5	0.4	0.5	1.3	0.7	-0.1	0.3	0.5	0.7	-0.3	0.1	0.2	0.0	-0.3	-0.6	-0.9	-1.2	-0.8	-0.2	0.1	1.3
19-Jun	0.1	-0.1	-0.1	-0.3	-0.4	0.1	-0.2	-0.6	-0.2	-0.2	0.0	0.0	1.1	0.1	0.6	0.0	0.2	-0.1	0.8	0.2	0.5	0.7	0.2	0.1	0.1	1.1
20-Jun	0.9	1.2	1.1	1.3	1.3	1.5	1.3	0.9	0.7	0.6	0.9	0.9	0.4	1.0	0.4	1.1	1.5	1.3	1.4	1.8	1.2	1.4	1.4	0.7	1.1	1.8
21-Jun	0.9	0.2	0.3	-0.1	-0.1	-0.3	-0.5	-0.3	-0.3	-0.2	-0.1	-0.1	0.0	0.1	-0.3	0.0	-0.4	-0.3	-0.5	-1.5	-1.2	-1.2	-1.3	-2.0	-0.4	0.9
22-Jun	-2.0	-1.7	-1.4	-1.6	-1.6	-1.6	-1.8	-1.0	-0.5	-0.9	-1.6	-1.3	-0.9	-1.1	-0.8	-0.9	-1.0	-0.1	-0.5	0.0	-0.1	-0.4	-0.1	-0.2	-1.0	0.0
23-Jun	0.0	-0.3	-0.2	-0.2	-0.1	0.2	0.3	-0.1	0.0	-0.1	-0.3	-0.4	-0.4	-0.2	-0.7	0.6	0.1	0.2	0.4	0.0	-0.1	-0.1	-0.2	0.1	-0.1	0.6
24-Jun	-0.2	-0.2	0.0	0.2	0.5	0.3	0.2	0.1	0.0	0.7	0.0	-0.1	-0.6	-0.3	-0.8	-0.4	-0.6	0.0	0.0	-0.1	-0.3	0.0	0.6	0.6	0.0	0.7
25-Jun	1.0	0.8	-0.2	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.6	0.7	0.9	0.9	1.2	1.3	1.1	1.3	1.2	1.7	1.8	1.9	1.9	0.9	1.9
26-Jun	1.9	1.8	1.9	1.6	1.7	1.9	1.7	1.7	1.6	1.7	2.0	2.5	2.4	2.1	2.0	1.9	2.1	2.0	1.2	0.9	1.0	0.9	0.9	1.4	1.7	2.5
27-Jun	1.0	1.2	1.1	1.3	1.1	0.8	0.0	0.4	1.1	0.8	1.1	0.1	0.5	0.6	0.6	0.0	-0.1	-0.1	0.0	0.1	0.0	0.5	0.7	0.5	0.6	1.3
28-Jun	0.3	-0.1	0.0	0.0	0.5	0.7	0.8	0.2	0.5	0.9	0.9	0.4	-0.3	0.4	0.4	0.4	0.5	0.9	0.9	0.6	1.4	1.5	1.3	1.1	0.6	1.5
29-Jun	1.1	1.0	1.0	1.3	1.2	1.1	0.8	0.6	0.3	0.7	-0.1	-0.3	-0.2	0.3	0.1	0.0	-0.1	-0.1	0.0	0.2	0.0	-0.2	-0.2	-0.1	0.4	1.3
30-Jun	0.0	0.0	0.4	0.3	0.4	-0.1	0.0	0.7	0.8	0.5	1.1	0.9	0.9	0.9	0.2	0.1	0.0	-0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.3	1.1
																								Diurnal Average		
																								Diurnal Maximum		



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.2 km/h on Jun 22 03:00 Minimum Value: 0.1 km/h on Jun 1 04:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.2 Median = 1.8 Q ₃ = 2.4 P ₉₀ = 3.0 P ₉₉ = 4.0																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.5	0.4	0.3	0.1	0.6	1.0	1.2	1.6	1.3	1.1	1.0	0.8	1.3	2.0	2.0	2.2	1.9	2.0	1.5	0.8	0.3	0.3	0.2	0.2	2.2
2-Jun	0.4	0.4	0.3	0.3	0.3	0.5	0.5	0.8	1.2	1.5	1.8	2.2	2.2	2.1	2.3	3.3	2.5	1.8	1.4	2.0	1.5	1.6	1.5	1.6	3.3
3-Jun	2.1	2.3	2.0	2.3	2.0	2.1	2.2	2.2	2.0	1.6	2.3	2.4	2.6	2.8	2.5	2.0	2.1	1.8	1.5	1.2	0.7	1.6	2.2	1.7	2.8
4-Jun	2.1	1.4	1.1	1.1	0.6	0.8	1.1	1.3	1.7	1.8	1.6	1.4	1.3	1.8	2.2	2.8	3.1	2.4	2.8	3.1	1.9	2.0	2.5	3.1	3.1
5-Jun	2.3	1.4	2.4	1.4	1.6	1.7	1.9	1.8	1.6	1.7	1.4	2.0	2.4	2.3	2.3	2.3	1.9	2.0	1.7	1.2	1.1	1.3	0.5	0.3	2.4
6-Jun	0.5	0.3	0.4	0.7	0.7	0.8	1.0	1.3	1.7	2.1	2.0	2.2	2.3	2.3	2.4	2.1	1.7	1.1	0.9	0.4	1.0	1.5	1.4	0.6	2.4
7-Jun	0.6	0.6	0.7	1.0	0.8	0.7	0.7	1.2	1.7	2.0	2.2	2.1	2.2	2.4	2.3	2.3	2.4	1.9	1.8	1.9	1.2	1.2	1.2	1.5	2.4
8-Jun	2.4	1.8	0.9	0.8	1.4	1.3	1.1	1.0	1.5	2.0	2.4	2.2	2.6	2.8	2.6	2.8	2.5	2.4	2.1	2.1	1.8	1.9	2.0	2.3	2.8
9-Jun	2.1	1.5	1.0	0.8	0.9	2.1	3.6	3.1	3.4	3.5	4.0	3.8	3.9	4.0	4.1	3.9	3.5	3.5	3.4	3.1	2.7	2.7	2.1	2.5	4.1
10-Jun	2.9	2.9	2.4	2.3	2.3	2.3	2.1	2.1	1.9	2.7	2.7	2.5	2.7	2.5	2.5	1.9	1.4	1.5	1.9	2.0	2.6	2.0	2.4	2.0	2.9
11-Jun	1.5	1.4	2.5	2.8	2.5	2.7	2.8	3.7	3.6	3.2	3.6	3.6	3.4	3.4	3.3	3.2	3.0	3.1	2.6	2.2	1.4	1.3	1.2	1.4	3.7
12-Jun	1.1	0.9	1.3	1.2	1.2	1.6	1.5	1.8	2.2	2.0	2.2	3.4	3.4	3.3	3.5	1.9	2.6	2.4	2.2	1.3	1.4	1.5	0.6	1.0	3.5
13-Jun	0.6	0.7	0.5	0.5	1.1	1.0	1.0	1.4	1.6	1.9	2.1	2.1	2.4	2.5	2.3	2.1	2.2	2.1	2.9	2.9	2.2	2.4	2.6	3.0	3.0
14-Jun	2.8	3.1	3.4	4.0	3.7	3.2	3.2	3.2	3.0	2.8	2.6	3.0	3.3	3.1	2.7	2.5	2.2	2.6	2.6	2.8	3.0	2.9	2.7	2.5	4.0
15-Jun	2.3	1.9	1.9	1.7	2.1	1.8	1.6	1.6	1.5	1.3	1.8	2.1	2.1	2.1	1.5	1.5	1.7	1.4	1.7	1.3	1.0	1.0	0.8	0.6	2.3
16-Jun	0.4	0.8	1.3	1.2	1.0	1.6	1.4	1.4	1.7	1.6	1.5	2.3	2.5	2.3	2.3	2.0	1.2	0.9	1.7	1.1	0.6	0.5	1.9	2.3	2.5
17-Jun	2.1	2.0	1.4	1.1	1.1	0.9	0.8	1.8	2.6	2.4	2.3	2.3	2.8	3.5	3.3	3.2	2.9	2.4	1.9	1.2	0.4	0.3	0.5	0.4	3.5
18-Jun	0.7	1.1	0.8	0.7	0.7	0.8	0.7	1.0	2.0	2.2	2.8	2.8	2.5	2.8	3.2	3.0	2.4	1.8	1.9	2.4	2.6	2.1	1.9	1.1	3.2
19-Jun	1.1	1.3	1.4	1.4	1.2	1.3	1.4	1.6	1.8	1.8	2.4	2.7	2.7	2.3	2.6	2.4	2.3	1.9	1.7	1.2	0.7	0.4	0.5	0.4	2.7
20-Jun	1.0	0.9	1.0	1.2	1.1	1.2	1.4	1.0	1.1	1.2	1.5	2.4	2.7	2.7	2.3	1.8	1.7	2.0	2.4	2.3	1.6	1.7	1.7	1.5	2.7
21-Jun	1.1	1.2	1.8	2.3	2.4	2.6	3.2	2.8	3.0	2.7	2.4	2.1	2.4	2.5	2.8	2.6	2.2	2.2	2.1	3.2	2.9	2.4	3.9	3.9	3.9
22-Jun	3.7	3.8	4.2	3.9	4.0	3.6	3.3	2.9	2.9	3.5	3.5	3.7	4.1	3.6	3.3	3.0	3.2	2.7	2.2	2.0	1.2	0.8	0.6	0.5	4.2
23-Jun	0.3	0.2	0.4	0.4	0.4	0.6	1.2	1.7	2.1	2.6	2.9	2.9	2.9	2.9	2.4	2.3	2.1	1.5	0.8	0.6	0.2	0.2	0.6	0.6	2.9
24-Jun	0.5	0.4	0.3	0.4	0.6	0.6	1.0	1.3	2.0	2.3	2.3	2.5	2.5	2.9	3.1	2.9	2.6	2.7	2.2	1.4	1.3	0.9	1.4	1.2	3.1
25-Jun	1.7	1.5	0.8	0.3	0.3	0.3	1.0	1.3	1.5	1.7	2.2	2.0	2.1	2.5	2.6	2.5	2.3	2.2	2.1	1.9	2.2	2.1	1.8	1.1	2.6
26-Jun	1.5	1.3	1.5	2.1	2.3	2.6	2.5	2.5	2.6	3.1	3.2	3.5	3.7	3.5	3.6	3.0	2.9	2.8	2.4	2.0	2.0	2.3	2.2	1.8	3.7
27-Jun	1.8	1.8	1.8	1.8	2.1	1.9	1.8	1.4	1.7	1.7	1.8	1.5	1.3	1.3	1.5	1.4	0.8	1.1	1.2	0.7	0.3	0.8	0.6	0.5	2.1
28-Jun	0.6	0.5	0.4	0.6	0.8	0.9	1.0	1.2	1.6	2.4	2.5	1.8	2.3	3.0	2.7	2.5	2.2	2.0	1.7	0.9	1.2	1.2	1.2	1.2	3.0
29-Jun	0.9	0.5	0.9	1.3	1.2	1.2	1.4	1.5	1.6	1.8	2.0	1.9	2.2	2.4	1.9	2.1	1.6	1.4	0.9	0.6	0.8	0.3	0.5	0.3	2.4
30-Jun	0.3	0.2	0.5	0.4	0.7	0.8	0.5	0.9	1.1	1.1	1.2	1.7	1.8	1.6	1.5	1.4	1.4	1.1	1.0	0.6	0.6	0.3	0.2	0.3	1.8
Diurnal Maximum																									



Summary of Hour Averages

Mannix - June 2017

Maximum Value: 1.3 km/h on Jun 2 12:00		Maximum Daily Average: 0.6 km/h on Jun 20		Hours in Service: 720																						
Minimum Value: -1.2 km/h on Jun 22 01:00		Minimum Daily Average: -0.4 km/h on Jun 22		Hours of Data: 720																						
Maximum Diurnal Average: 0.4 km/h at hour 18		Minimum Diurnal Average: 0.1 km/h at hour 24		Hours of Missing Data: 0																						
Monthly Average: 0.24 km/h		Percentiles: $P_1 = -0.9$ $P_{10} = -0.3$ $Q_1 = 0.0$ Median = 0.2 $Q_3 = 0.5$ $P_{90} = 0.8$ $P_{99} = 1.2$		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	-0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.5	0.1	0.1	0.1	0.2	0.3	0.3	0.1	0.2	-0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.5
2-Jun	0.3	0.3	0.1	0.1	0.0	0.0	0.1	0.1	0.3	0.2	0.6	1.3	0.3	-0.1	0.3	0.7	0.5	1.0	0.2	0.8	0.8	0.9	0.8	0.8	0.8	1.3
3-Jun	0.6	0.7	0.8	0.6	0.6	0.5	0.2	0.1	-0.1	0.3	0.6	0.0	0.2	-0.1	0.6	0.4	-0.3	0.7	0.3	0.6	0.4	0.4	0.3	0.2	0.8	
4-Jun	0.2	0.2	0.8	0.3	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.5	0.2	0.4	0.2	0.2	1.2	-0.2	0.3	-0.4	-0.1	0.2	-0.3	-0.2	1.2	
5-Jun	0.0	-0.1	-0.1	0.0	-0.1	-0.3	-0.1	-0.1	-0.3	-0.3	-0.6	-0.1	0.2	0.1	0.8	0.3	-0.4	-0.3	0.4	0.4	0.5	0.2	0.4	0.2	0.1	0.8
6-Jun	0.2	0.8	0.6	0.7	0.7	0.3	0.2	0.2	0.4	0.3	1.2	0.7	1.2	1.0	1.0	0.0	0.3	0.1	0.4	-0.1	0.0	-0.2	-0.1	0.1	1.2	
7-Jun	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.8	1.0	0.6	-0.5	0.3	0.1	0.5	0.3	0.5	0.4	0.4	-0.2	-0.2	0.0	1.0	
8-Jun	-0.2	0.6	0.3	0.2	0.5	0.7	0.2	0.3	0.6	0.1	0.5	0.6	0.5	0.4	0.4	0.5	0.8	0.4	0.0	0.2	0.8	-0.1	0.6	0.0	0.8	
9-Jun	0.0	0.1	0.2	0.1	-0.1	-0.4	0.0	-0.4	-0.6	-0.7	-0.9	0.5	-1.0	-0.7	-0.8	0.2	0.5	0.5	0.7	0.3	0.1	0.1	0.1	0.0	0.7	
10-Jun	0.4	0.5	0.3	0.1	0.1	0.3	0.3	0.1	0.2	0.7	0.6	0.7	0.4	-0.5	0.1	0.0	0.1	0.1	0.1	-0.3	0.2	-0.2	-0.1	-0.1	0.7	
11-Jun	-0.1	0.5	0.3	0.2	0.6	0.2	0.4	1.2	0.3	0.4	0.8	0.4	0.3	0.9	0.5	0.9	0.7	0.3	-0.1	-0.3	0.0	0.5	0.3	0.2	1.2	
12-Jun	0.3	0.7	0.8	0.6	1.0	1.1	0.4	0.5	0.8	0.9	1.0	0.0	0.8	0.3	0.6	0.3	0.9	1.0	0.9	0.1	0.3	0.0	-0.1	-0.2	1.1	
13-Jun	0.1	0.1	0.1	0.1	0.1	-0.1	0.1	0.3	0.6	0.4	0.2	-0.5	0.2	0.0	-0.3	0.2	0.2	0.0	-0.2	-0.9	0.2	0.3	-0.2	-0.6	0.6	
14-Jun	-0.3	-1.0	-0.6	-0.1	0.2	-0.5	-0.3	-0.5	0.2	-0.5	-0.4	0.0	0.1	-0.2	-0.3	-0.3	-0.4	-0.5	-0.7	-0.2	-0.1	-0.2	-0.6	-0.6	0.2	
15-Jun	-0.4	-0.3	-0.4	-0.4	-0.3	-0.3	-0.4	0.1	0.2	1.1	0.2	0.4	0.4	0.4	0.2	0.4	0.5	0.6	0.3	0.3	0.3	0.1	0.0	0.4	1.1	
16-Jun	0.2	0.4	0.6	0.2	0.3	0.1	0.5	0.3	0.1	0.1	-0.1	0.5	0.7	0.2	-0.1	0.6	0.4	0.2	0.4	0.3	0.2	0.1	0.1	0.2	0.7	
17-Jun	0.1	0.3	0.2	0.4	0.5	0.5	0.1	0.6	1.1	0.4	0.1	0.4	0.4	0.2	1.0	0.6	0.4	0.3	0.4	-0.1	0.1	0.0	0.2	0.1	1.1	
18-Jun	0.2	0.2	0.7	0.3	0.2	0.2	0.2	0.3	0.8	0.4	0.2	0.7	0.6	0.5	0.3	1.0	0.9	0.5	0.5	0.3	-0.1	-0.6	-0.3	0.3	1.0	
19-Jun	0.4	0.4	0.5	0.1	-0.1	0.5	0.1	-0.7	0.2	0.1	0.0	0.2	1.2	0.2	0.6	0.1	0.4	0.2	0.7	-0.2	-0.1	0.4	0.0	0.0	1.2	
20-Jun	0.6	0.5	0.7	1.1	1.1	1.2	0.7	0.4	0.3	-0.1	0.4	0.6	0.3	0.5	0.3	0.7	1.0	0.4	0.4	0.6	0.5	0.3	0.7	0.1	1.2	
21-Jun	0.4	0.1	0.3	0.2	0.4	0.5	0.9	0.9	0.7	0.9	0.9	0.7	0.8	1.1	0.7	1.0	0.7	0.9	0.7	-0.6	-0.5	-0.6	-0.6	-0.9	1.1	
22-Jun	-1.2	-0.8	-0.5	-1.2	-0.8	-0.8	-1.2	-0.4	0.1	-0.4	-0.8	-0.5	-0.3	-0.6	-0.2	-0.3	-0.4	0.2	0.0	0.4	0.1	-0.3	0.0	0.0	0.4	
23-Jun	0.3	0.1	0.2	-0.1	0.0	0.3	0.4	0.1	0.3	0.8	0.4	0.0	-0.1	-0.1	-0.6	0.9	0.5	0.5	0.2	0.3	-0.1	0.2	0.2	0.3	0.9	
24-Jun	0.1	0.1	0.0	0.2	0.2	0.0	0.1	0.2	0.1	1.1	0.1	0.0	-0.4	0.0	-0.3	0.4	-0.2	0.6	0.0	0.0	-0.1	0.0	0.4	0.1	1.1	
25-Jun	0.5	0.4	0.1	0.1	0.2	0.3	0.2	0.0	0.1	0.1	0.4	0.5	0.7	0.4	0.4	0.4	0.9	0.6	0.2	0.3	0.2	0.5	1.1	1.3	1.3	
26-Jun	1.1	1.2	1.1	0.1	0.1	0.3	0.3	0.5	0.9	0.2	0.9	1.1	0.3	0.9	0.0	0.1	0.6	0.5	-0.1	-0.1	0.3	0.6	0.1	0.3	1.2	
27-Jun	0.1	0.0	-0.2	0.0	0.3	0.4	0.3	0.2	0.7	0.4	0.6	0.0	0.4	0.4	0.3	0.1	-0.1	0.0	0.2	0.2	0.0	0.4	0.5	0.2	0.7	
28-Jun	0.2	-0.1	0.2	0.0	0.1	0.5	0.5	0.1	0.2	0.0	0.7	0.2	-0.2	0.6	0.5	-0.1	0.2	0.6	0.5	0.4	0.9	1.1	0.8	0.7	1.1	
29-Jun	0.7	0.6	0.6	1.1	0.8	0.7	0.3	0.2	-0.1	0.6	-0.3	-0.5	-0.1	0.4	0.5	0.2	0.1	0.2	0.2	0.5	0.2	0.1	0.0	0.1	1.1	
30-Jun	0.2	0.0	0.1	0.2	0.3	0.0	0.0	0.4	0.3	0.2	0.8	0.9	0.5	0.7	0.3	0.3	0.2	0.1	0.3	0.1	0.2	0.0	0.1	0.0	0.9	
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Vertical Wind Speed 75 m (VW75m) - km/h

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.3 km/h on Jun 22 03:00 Minimum Value: 0.1 km/h on Jun 23 02:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.9 Q ₃ = 2.6 P ₉₀ = 3.1 P ₉₉ = 3.9																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.7	0.5	0.4	0.2	0.5	1.1	1.2	1.7	1.4	1.1	1.0	0.8	1.1	2.2	2.5	2.4	2.1	2.2	1.6	0.8	0.3	0.7	0.2	0.2	2.5
2-Jun	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6	1.3	1.7	2.1	2.4	2.4	2.3	2.2	3.2	2.4	1.7	1.4	2.0	1.4	1.7	1.5	1.6	3.2
3-Jun	2.0	2.3	2.1	2.4	2.1	2.3	2.4	2.1	2.2	1.8	2.4	2.6	3.0	2.9	3.0	2.4	2.4	2.2	1.9	1.6	1.3	2.2	2.4	1.5	3.0
4-Jun	1.8	1.0	0.9	1.1	0.4	0.7	1.1	1.3	1.7	1.8	1.6	1.0	1.2	1.8	2.5	2.9	3.1	2.1	2.6	2.8	1.7	1.7	2.2	2.9	3.1
5-Jun	2.4	1.2	2.4	1.5	1.4	1.8	1.8	1.8	1.5	1.4	1.7	2.1	2.7	2.5	2.7	2.5	2.3	2.5	2.2	1.3	1.1	1.3	0.8	0.7	2.7
6-Jun	0.6	0.4	0.4	0.4	0.6	0.6	0.9	1.2	1.8	2.2	2.2	2.4	2.7	2.5	2.7	2.3	1.9	1.1	1.0	0.4	1.0	1.5	1.2	0.7	2.7
7-Jun	0.6	0.6	0.5	0.8	0.6	0.7	0.5	1.1	1.9	2.1	2.6	2.3	2.8	2.7	2.7	2.6	2.6	2.1	1.7	1.8	1.4	1.1	1.4	1.9	2.8
8-Jun	3.2	2.5	1.2	1.2	1.8	1.8	1.4	1.2	1.9	2.7	2.6	2.6	3.1	3.4	3.1	3.1	3.0	2.6	2.3	2.4	2.4	2.2	2.8	3.1	3.4
9-Jun	2.5	1.6	1.2	1.1	0.7	1.8	3.1	2.7	2.7	3.2	3.6	3.9	3.9	3.9	4.0	3.7	3.5	3.3	3.2	2.5	2.2	2.3	1.7	2.2	4.0
10-Jun	2.8	2.9	2.6	2.5	3.2	2.7	2.5	2.3	2.3	3.2	3.2	2.9	3.1	2.9	2.7	2.3	1.6	1.5	1.7	1.6	2.4	1.7	2.4	2.2	3.2
11-Jun	1.5	1.5	2.4	2.8	2.4	2.7	3.0	3.8	3.5	3.6	4.0	4.1	3.9	3.7	3.7	3.7	3.4	3.2	2.6	2.2	1.1	1.2	1.5	2.1	4.1
12-Jun	1.2	0.8	1.1	1.1	1.2	1.1	1.1	1.6	2.2	1.9	2.1	3.5	3.6	3.2	3.1	2.1	2.7	2.4	1.9	1.6	1.9	1.8	0.6	0.8	3.6
13-Jun	0.6	0.5	0.5	0.5	1.0	0.8	1.2	1.4	1.8	2.0	2.2	2.3	2.7	2.9	2.5	2.3	2.5	2.2	2.7	2.6	1.9	2.2	2.5	2.7	2.9
14-Jun	3.1	2.6	3.1	3.6	3.9	3.3	3.2	3.0	2.9	2.5	2.4	3.0	3.0	3.0	2.5	2.4	2.1	2.1	2.6	2.6	2.9	3.0	2.6	2.5	3.9
15-Jun	2.1	1.8	1.6	1.4	2.0	1.4	1.3	1.4	1.6	1.6	1.9	2.3	2.4	2.5	1.4	1.4	1.8	1.6	1.8	1.3	0.9	1.0	0.9	1.3	2.5
16-Jun	0.6	1.1	1.6	1.6	1.2	1.8	1.6	1.6	2.0	1.8	1.5	2.4	2.8	2.5	2.4	2.2	1.2	1.2	1.7	1.2	0.8	0.6	1.8	2.3	2.8
17-Jun	2.0	1.9	1.5	0.9	1.0	0.7	0.7	2.0	2.7	2.6	2.6	2.7	3.0	3.6	3.6	3.5	3.2	2.6	2.1	1.2	0.4	0.5	0.7	0.6	3.6
18-Jun	0.7	1.4	0.9	0.5	0.5	0.6	0.6	0.9	2.0	2.2	3.1	3.0	2.3	2.6	3.3	3.4	2.7	1.9	2.0	2.6	2.2	1.7	1.8	0.9	3.4
19-Jun	1.1	1.1	1.4	1.3	0.9	1.1	1.4	1.6	2.0	2.0	2.8	3.0	3.1	2.6	2.9	2.8	2.7	2.2	2.1	1.2	0.7	0.4	0.5	0.3	3.1
20-Jun	0.9	0.8	1.0	0.8	0.8	0.7	1.0	0.8	1.0	1.3	1.6	2.5	2.4	2.7	2.2	1.8	1.7	2.1	2.5	2.2	1.4	1.3	1.4	1.5	2.7
21-Jun	1.1	1.4	2.0	2.5	2.6	2.8	3.3	3.1	3.1	2.8	2.6	2.4	2.5	2.7	3.1	2.7	2.2	2.3	2.3	3.0	2.5	2.3	4.0	3.8	4.0
22-Jun	3.5	3.6	4.3	3.6	3.9	3.6	3.2	2.9	3.1	3.5	3.7	4.0	4.0	3.9	3.5	3.3	3.5	3.0	2.2	1.8	1.2	1.1	0.7	0.6	4.3
23-Jun	0.2	0.1	0.6	0.5	0.5	0.6	1.2	1.7	2.2	2.8	3.2	3.1	3.2	3.3	2.6	2.6	2.8	2.2	1.8	1.0	0.7	0.3	0.2	0.9	3.3
24-Jun	0.5	0.5	0.3	0.6	0.4	0.5	1.0	1.2	2.2	2.6	2.6	2.8	2.9	3.1	3.4	3.2	2.9	2.9	2.2	1.3	0.7	0.7	1.5	1.5	3.4
25-Jun	2.4	2.5	1.0	0.3	0.4	0.4	0.9	1.3	1.3	1.8	2.6	2.5	2.6	2.9	2.8	2.8	2.6	2.6	1.9	1.8	2.0	1.8	1.5	0.9	2.9
26-Jun	1.3	1.2	1.2	1.5	1.8	2.4	2.4	2.6	2.8	3.2	3.5	3.6	3.9	3.6	3.6	3.1	2.9	2.8	2.3	2.1	2.5	3.0	2.7	1.9	3.9
27-Jun	2.2	2.0	2.2	2.1	2.2	1.8	1.9	1.5	1.7	1.8	1.8	1.2	1.2	1.5	1.8	1.5	0.8	1.0	1.2	0.8	0.4	1.0	0.5	0.3	2.2
28-Jun	0.5	0.4	0.3	0.7	0.8	1.0	1.2	1.3	1.8	2.5	2.4	1.7	2.7	3.1	2.9	2.6	2.6	2.2	1.8	0.9	0.8	1.0	1.0	0.9	3.1
29-Jun	1.0	0.5	0.7	0.9	1.0	0.9	1.3	1.5	1.6	1.9	2.3	2.3	2.6	2.6	2.3	2.2	1.9	1.7	1.0	0.6	0.8	0.3	0.4	0.3	2.6
30-Jun	0.3	0.2	0.5	0.4	0.5	0.7	0.5	1.0	1.0	0.9	1.3	1.8	2.0	1.6	1.7	1.4	1.4	1.2	1.0	0.5	0.6	0.3	0.2	0.3	2.0
Diurnal Maximum																									
3.5 3.6 4.3 3.6 3.9 3.6 3.3 3.8 3.5 3.6 4.0 4.1 4.0 3.9 4.0 3.7 3.5 3.3 3.2 3.0 2.9 3.0 4.0 3.8																									



Summary of Hour Averages

Mannix - June 2017

Maximum Value: 2.1 km/h on Jun 4 17:00		Maximum Daily Average: 0.9 km/h on Jun 9		Hours in Service: 720																						
Minimum Value: -0.8 km/h on Jun 19 08:00		Minimum Daily Average: 0.1 km/h on Jun 27		Hours of Data: 720																						
Maximum Diurnal Average: 0.5 km/h at hour 18		Minimum Diurnal Average: 0.3 km/h at hour 24		Hours of Missing Data: 0																						
Monthly Average: 0.40 km/h		Percentiles: $P_1 = -0.4$ $P_{10} = 0.0$ $Q_1 = 0.1$ Median = 0.4 $Q_3 = 0.6$ $P_{90} = 0.8$ $P_{99} = 1.6$		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.2	0.2	0.1	0.1	0.4	0.3	0.5	0.0	0.0	0.0	-0.1	0.2	0.3	0.0	0.1	-0.3	0.1	0.0	0.2	0.3	0.2	0.1	0.0	0.1	0.5
2-Jun	0.1	0.1	0.1	0.1	0.0	-0.1	0.1	0.1	0.4	0.3	0.6	1.5	0.5	0.5	0.7	0.3	1.6	1.1	0.5	0.8	0.5	0.7	0.7	0.7	0.5	1.6
3-Jun	0.6	0.5	0.6	0.5	0.4	0.2	0.4	0.3	0.2	0.2	0.6	-0.1	0.4	0.1	0.7	0.6	-0.2	0.7	0.3	0.6	0.5	0.2	0.6	0.7	0.4	0.7
4-Jun	0.8	0.7	0.3	0.1	0.1	0.1	0.4	0.4	0.3	0.3	0.1	0.3	0.2	0.5	0.5	0.8	2.1	0.6	1.1	0.3	0.7	1.3	0.8	0.9	0.6	2.1
5-Jun	0.5	0.6	0.5	0.4	0.5	0.3	1.0	0.6	0.3	0.1	0.4	0.6	0.4	1.3	0.4	-0.3	-0.2	0.4	0.3	0.4	0.4	0.6	0.1	0.1	0.4	1.3
6-Jun	0.1	0.3	0.0	0.0	0.1	0.1	0.1	0.1	0.4	0.2	1.1	0.7	1.2	1.1	1.1	0.1	0.2	0.1	0.5	0.1	0.6	0.8	0.6	0.4	0.4	1.2
7-Jun	0.4	0.4	0.3	0.8	0.5	0.4	0.2	0.4	0.5	0.4	1.1	1.1	1.0	-0.3	0.5	0.3	0.9	0.7	0.9	0.8	0.8	0.4	0.0	0.1	0.5	1.1
8-Jun	0.0	0.8	0.5	0.4	0.3	0.5	0.2	0.4	0.5	0.0	0.6	0.6	0.4	0.3	0.3	0.3	0.7	0.3	-0.1	0.1	0.4	-0.2	0.4	-0.2	0.3	0.8
9-Jun	0.0	0.5	0.4	0.1	0.4	0.6	1.5	0.9	0.7	0.6	0.7	1.6	0.6	0.8	0.7	1.7	1.5	1.4	1.5	1.3	1.0	0.9	0.9	0.6	0.9	1.7
10-Jun	1.0	0.9	0.7	0.4	0.5	0.7	0.4	0.2	0.4	0.8	0.8	0.8	0.2	-0.7	0.0	0.0	0.2	0.5	0.7	0.4	0.7	0.6	0.8	0.8	0.5	1.0
11-Jun	0.2	0.7	0.7	0.6	0.7	0.6	0.6	1.6	0.8	0.8	1.2	0.7	0.6	1.4	0.9	1.5	1.2	0.9	0.4	0.4	0.5	0.9	0.6	0.2	0.8	1.6
12-Jun	0.5	0.2	0.2	0.0	0.6	1.2	0.7	0.5	0.5	0.4	0.3	0.2	0.6	0.1	1.0	0.6	0.6	0.4	0.8	0.1	0.1	0.1	0.4	0.4	0.4	1.2
13-Jun	0.4	0.6	0.3	0.3	0.6	0.2	0.3	0.4	0.6	0.6	0.2	-0.5	0.2	0.3	0.1	0.6	0.6	0.6	0.9	0.4	0.9	1.0	0.5	0.6	0.5	1.0
14-Jun	0.7	0.5	0.8	1.6	1.9	0.8	0.9	0.8	1.4	0.3	0.6	0.8	1.2	0.6	0.8	0.6	0.4	0.7	0.4	0.8	1.0	1.0	0.4	0.3	0.8	1.9
15-Jun	0.4	0.6	0.4	0.5	0.6	0.8	0.4	0.6	0.1	1.4	0.2	0.5	0.6	0.5	0.5	0.7	0.6	0.6	0.6	0.5	0.6	0.4	0.1	0.2	0.5	1.4
16-Jun	0.3	0.5	0.8	0.2	0.4	0.2	0.5	0.1	-0.2	0.1	-0.3	0.4	0.5	-0.1	-0.5	0.5	-0.1	0.0	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.8
17-Jun	0.3	0.4	0.1	0.4	0.3	0.3	0.0	0.6	1.0	0.3	0.2	0.5	0.5	0.5	0.9	0.8	0.7	0.5	0.6	0.1	0.3	0.1	0.2	0.0	0.4	1.0
18-Jun	0.1	0.3	0.3	-0.2	-0.1	0.0	0.0	0.3	0.4	0.2	-0.2	0.4	0.2	0.1	0.0	0.8	0.7	0.4	0.8	0.8	0.4	0.1	0.2	0.2	0.3	0.8
19-Jun	0.4	0.4	0.6	0.0	-0.3	0.5	0.0	-0.8	0.1	0.0	-0.2	0.4	1.1	0.1	0.5	0.0	0.3	0.2	0.6	-0.2	-0.2	0.1	-0.4	-0.2	0.1	1.1
20-Jun	0.2	0.0	0.3	0.5	0.6	0.7	0.6	0.4	0.2	-0.1	0.3	0.2	-0.2	-0.2	-0.3	0.4	0.8	0.5	0.7	0.8	0.5	0.6	0.4	-0.4	0.3	0.8
21-Jun	-0.1	-0.3	0.0	0.1	0.2	0.2	0.1	0.3	0.3	0.5	0.7	0.5	0.4	0.9	0.2	0.7	0.4	0.6	0.8	0.1	0.1	0.1	0.9	0.6	0.3	0.9
22-Jun	0.0	0.3	0.8	-0.3	0.2	0.2	-0.2	0.3	0.5	0.2	0.0	0.4	0.5	0.0	0.4	0.3	0.1	0.8	0.6	1.1	0.7	0.0	0.2	0.0	0.3	1.1
23-Jun	0.1	0.0	0.3	0.2	0.2	0.4	0.4	0.1	0.5	1.0	0.8	0.3	0.1	0.2	-0.6	0.8	0.8	1.0	0.3	0.3	-0.1	0.2	0.2	0.3	0.3	1.0
24-Jun	0.1	0.0	0.2	0.1	0.1	-0.1	0.2	0.4	0.3	1.4	0.4	0.4	0.2	0.6	0.2	1.1	0.2	1.2	0.5	0.4	0.6	0.5	0.8	0.3	0.4	1.4
25-Jun	0.6	0.5	0.1	0.2	0.1	0.3	0.1	-0.2	-0.1	0.0	0.4	0.4	0.7	0.3	0.0	0.1	0.6	0.7	0.1	0.4	0.4	0.5	0.6	0.4	0.3	0.7
26-Jun	0.1	0.2	0.5	0.9	1.0	1.0	0.7	0.5	1.0	0.3	0.8	0.9	0.1	1.0	-0.1	0.2	0.4	0.5	0.0	-0.1	0.2	0.4	-0.3	0.4	0.4	1.0
27-Jun	0.1	0.3	-0.4	-0.1	0.1	0.1	0.0	0.0	0.4	0.2	0.5	-0.2	0.2	0.3	0.3	0.1	-0.1	-0.2	0.1	0.2	-0.1	0.1	0.3	0.1	0.1	0.5
28-Jun	0.1	-0.3	0.2	0.1	0.2	0.5	0.6	0.3	0.3	0.3	1.3	0.6	0.4	1.3	1.2	0.2	0.4	0.5	0.3	0.2	0.1	0.4	0.1	0.3	0.4	1.3
29-Jun	0.3	0.1	0.0	0.3	0.4	0.5	0.2	0.1	-0.1	0.6	-0.2	-0.7	-0.3	0.2	0.6	0.3	0.5	0.5	0.5	0.5	0.2	0.3	0.2	0.2	0.2	0.6
30-Jun	0.2	-0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.3	0.1	0.5	0.8	0.6	0.6	0.2	0.2	0.1	0.1	0.2	0.0	0.2	-0.1	0.0	-0.1	0.2	0.8
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 90 m (VW90m) - km/h

Mannix - June 2017

Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0 Maximum Value: 13.6 km/h on Jun 2 17:00 Minimum Value: 0.1 km/h on Jun 23 02:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.9 Q ₃ = 2.7 P ₉₀ = 3.3 P ₉₉ = 4.1																								Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	0.8	0.5	0.4	0.2	0.4	1.0	1.1	1.7	1.5	1.1	1.0	0.8	1.0	2.3	2.6	2.4	2.2	2.4	1.7	0.8	0.2	0.4	0.2	0.2	2.6
2-Jun	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.6	1.3	1.9	2.1	2.5	2.5	2.4	2.2	4.0	13.6	4.1	3.7	1.8	1.6	1.7	1.5	1.6	13.6
3-Jun	2.0	2.4	2.2	2.3	2.1	2.4	2.3	2.1	2.2	1.9	2.6	2.7	3.2	3.1	3.2	2.5	2.2	2.1	1.8	1.3	0.8	1.8	2.5	1.5	3.2
4-Jun	1.6	0.9	0.9	1.2	0.5	0.7	1.1	1.2	1.5	1.8	1.5	0.9	1.0	1.8	2.6	2.9	3.1	2.2	2.4	2.4	1.6	1.6	2.2	2.8	3.1
5-Jun	2.5	1.3	2.5	1.6	1.4	1.8	1.8	1.8	1.3	1.4	1.7	2.2	2.9	2.8	2.6	2.6	2.4	2.5	2.1	1.4	1.2	1.2	0.6	0.6	2.9
6-Jun	0.6	0.3	0.2	0.4	0.6	0.5	0.8	1.1	1.8	2.1	2.2	2.5	2.7	2.7	2.8	2.3	2.0	1.2	1.1	0.3	1.0	1.6	1.1	0.8	2.8
7-Jun	0.6	0.6	0.5	0.8	0.5	0.7	0.5	1.0	2.0	2.2	2.8	2.4	3.0	2.7	2.8	2.7	2.6	1.8	1.6	1.7	1.4	1.2	1.5	2.1	3.0
8-Jun	2.7	2.1	1.4	1.2	1.7	1.2	1.4	1.2	1.4	2.0	2.6	2.5	3.2	3.1	3.3	3.1	2.9	2.4	2.0	2.2	1.9	2.2	2.3	2.8	3.3
9-Jun	2.4	1.4	0.9	1.0	0.7	1.8	3.0	2.7	2.8	3.4	3.6	4.0	4.0	4.0	4.1	3.7	3.7	3.3	3.0	2.5	2.3	2.2	1.8	2.1	4.1
10-Jun	2.9	2.9	2.7	2.5	2.6	2.5	2.5	2.4	2.5	3.3	3.4	3.1	3.1	3.0	2.9	2.4	1.6	1.5	1.6	1.5	2.4	1.6	2.5	2.2	3.4
11-Jun	1.5	1.4	2.3	2.7	2.3	2.6	3.1	3.9	3.6	3.8	4.1	4.3	4.0	3.8	4.0	4.1	3.7	3.2	2.6	2.2	1.0	1.1	1.2	1.7	4.3
12-Jun	1.1	0.7	1.0	1.1	1.3	0.8	0.8	1.5	2.3	1.9	2.2	3.8	3.8	3.4	3.3	2.4	2.9	2.6	1.9	1.5	1.4	1.8	0.6	0.8	3.8
13-Jun	0.6	0.6	0.5	0.4	1.0	0.8	1.2	1.4	1.9	1.9	2.2	2.4	2.9	3.1	2.6	2.5	2.6	2.4	2.8	2.5	1.9	2.2	2.5	2.8	3.1
14-Jun	3.3	2.6	2.9	3.6	4.1	3.5	3.2	3.1	3.0	2.4	2.5	3.1	3.1	3.1	2.7	2.4	1.9	2.2	2.6	2.6	3.0	3.6	2.5	2.4	4.1
15-Jun	2.0	1.8	1.5	1.5	2.0	1.3	1.3	1.3	1.6	1.6	1.8	2.5	2.5	2.5	1.5	1.3	1.8	1.6	1.8	1.2	0.9	1.0	1.0	0.6	2.5
16-Jun	0.6	1.0	1.3	1.2	1.0	1.5	1.5	1.6	2.0	1.7	1.6	2.6	3.0	2.8	2.5	2.4	1.3	1.4	1.7	1.1	0.6	0.6	1.8	2.4	3.0
17-Jun	2.1	1.8	1.4	0.8	1.0	0.8	0.7	2.0	2.9	2.6	2.7	2.7	3.0	3.6	3.7	3.6	3.3	2.8	2.2	1.3	0.5	0.4	0.7	0.7	3.7
18-Jun	0.8	1.4	0.9	0.5	0.4	0.6	0.5	0.9	2.1	2.5	3.3	3.1	2.4	2.7	3.4	3.8	2.7	1.9	1.9	2.6	2.0	1.6	1.6	0.9	3.8
19-Jun	1.1	1.1	1.4	1.4	0.9	1.1	1.3	1.5	2.0	2.2	2.9	3.3	3.2	2.7	2.9	3.0	2.8	2.4	2.2	1.3	0.8	0.4	0.5	0.3	3.3
20-Jun	0.8	0.9	1.1	0.8	0.8	0.6	0.9	0.8	0.9	1.0	1.7	2.6	2.4	2.8	2.3	1.9	1.8	2.2	2.5	2.1	1.4	1.3	1.4	1.6	2.8
21-Jun	1.2	1.4	2.1	2.7	2.7	2.9	3.3	3.2	3.2	3.0	2.5	2.4	2.5	2.6	3.0	2.7	2.3	2.4	2.3	2.9	2.4	2.2	4.0	3.8	4.0
22-Jun	3.4	3.5	4.4	3.5	3.6	3.4	3.3	2.8	3.1	3.4	3.8	4.2	4.0	4.2	3.7	3.5	3.6	3.1	2.4	1.7	1.2	1.2	0.8	0.6	4.4
23-Jun	0.2	0.1	0.7	0.6	0.5	0.6	1.2	1.8	2.3	2.9	3.4	3.2	3.2	3.4	2.7	2.7	2.9	2.3	1.8	1.0	0.7	0.4	0.2	0.9	3.4
24-Jun	0.5	0.5	0.4	0.5	0.4	0.6	0.9	1.3	2.3	2.7	2.7	3.0	3.2	3.2	3.4	3.4	3.0	3.0	2.4	1.2	0.6	0.7	1.5	1.4	3.4
25-Jun	2.0	1.6	1.0	0.3	0.4	0.4	0.9	1.3	1.3	1.9	2.8	2.5	2.7	3.0	3.1	3.2	2.8	2.8	2.0	1.9	1.9	1.8	1.4	0.8	3.2
26-Jun	1.4	1.2	0.9	1.4	1.8	2.3	2.6	2.8	3.0	3.4	3.7	4.0	4.1	3.9	3.5	3.5	2.9	2.9	2.1	2.0	2.3	2.7	2.6	1.9	4.1
27-Jun	2.0	1.8	1.9	2.0	2.2	3.0	1.9	1.5	1.6	1.9	2.0	1.2	1.3	1.5	1.7	1.6	0.8	1.1	1.3	0.8	0.4	1.0	0.5	0.3	3.0
28-Jun	0.5	0.3	0.3	0.7	0.7	1.0	1.1	1.3	1.8	2.5	2.4	1.8	3.0	3.1	3.1	2.6	2.6	2.3	2.0	1.0	0.8	0.9	1.0	0.9	3.1
29-Jun	1.0	0.5	0.5	0.8	0.9	0.8	1.3	1.4	1.7	2.0	2.4	2.3	2.6	2.9	2.5	2.3	2.0	1.8	1.0	0.7	0.8	0.4	0.4	0.3	2.9
30-Jun	0.3	0.3	0.4	0.4	0.4	0.7	0.6	0.7	0.9	0.9	0.9	1.8	2.1	1.7	1.6	1.4	1.4	1.1	1.1	0.5	0.6	0.3	0.2	0.3	2.1
Diurnal Maximum																									
3.4 3.5 4.4 3.6 4.1 3.5 3.3 3.9 3.6 3.8 4.1 4.3 4.1 4.2 4.1 4.1 13.6 4.1 3.7 2.9 3.0 3.6 4.0 3.8																									



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	June 9, 2017	Last Cal Date:	May 8, 2017
Start time (MST):	10:59	End time (MST):	14:10
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.2</u>	ppm	Cal Gas Exp Date	November 4, 2019
Cal Gas Cylinder #	<u>EY0000646</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	14300410
ZAG Make/Model	API T701		Serial Number	138

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 108841399

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	635	-635
Calculated slope	0.998856	0.998443	Lamp voltage	816	817
Calculated intercept	0.608347	0.529561	Pressure	687.0	692.2
Analyzer Background	7.2	7.2	Flow	0.463	0.468
Analyzer Coefficient	0.923	0.911	Intensity	92	91

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4998	0.0	0.0	0.2	----
as found span	4935	61.0	600.7	607.2	0.989
calibrator zero	4998	0.0	0.0	0.2	----
high point	4933	61.0	601.0	601.8	0.999
second point	4970	30.5	300.1	299.4	1.002
third point	4981	15.2	149.7	148.9	1.005
as left zero	4998	0.0	0.0	0.1	----
as left span	4933	61.0	601.0	601.2	1.000
Average Correction Factor					1.002
Corrected As found	607.05	Previous response	600.80	*% change	-1.0%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfinds. Adjusted the span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

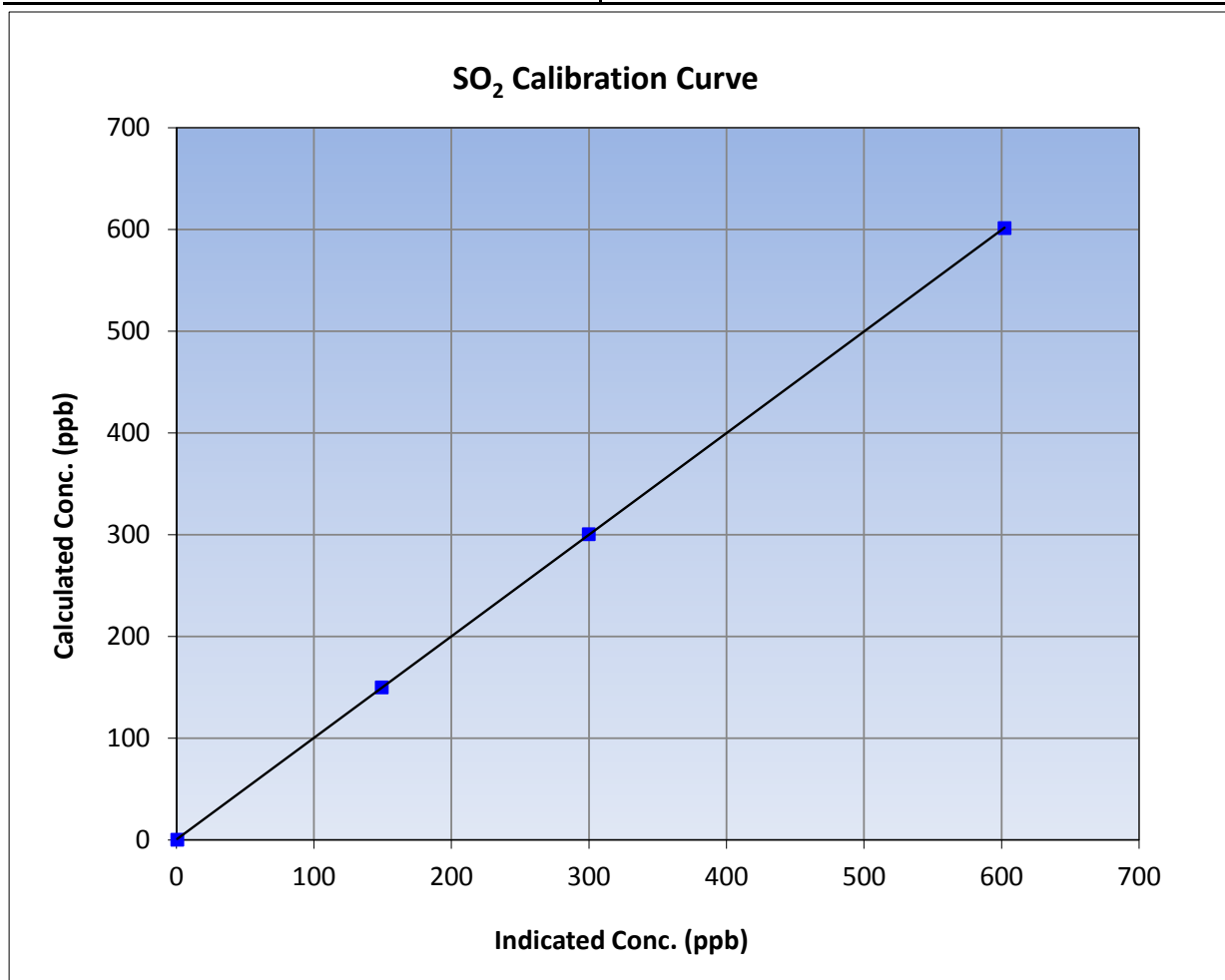
Version-03-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	May 8, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	10:59	End Time (MST)	14:10
Analyzer make	Thermo 43i	Analyzer serial #	108841399

Calibration Data

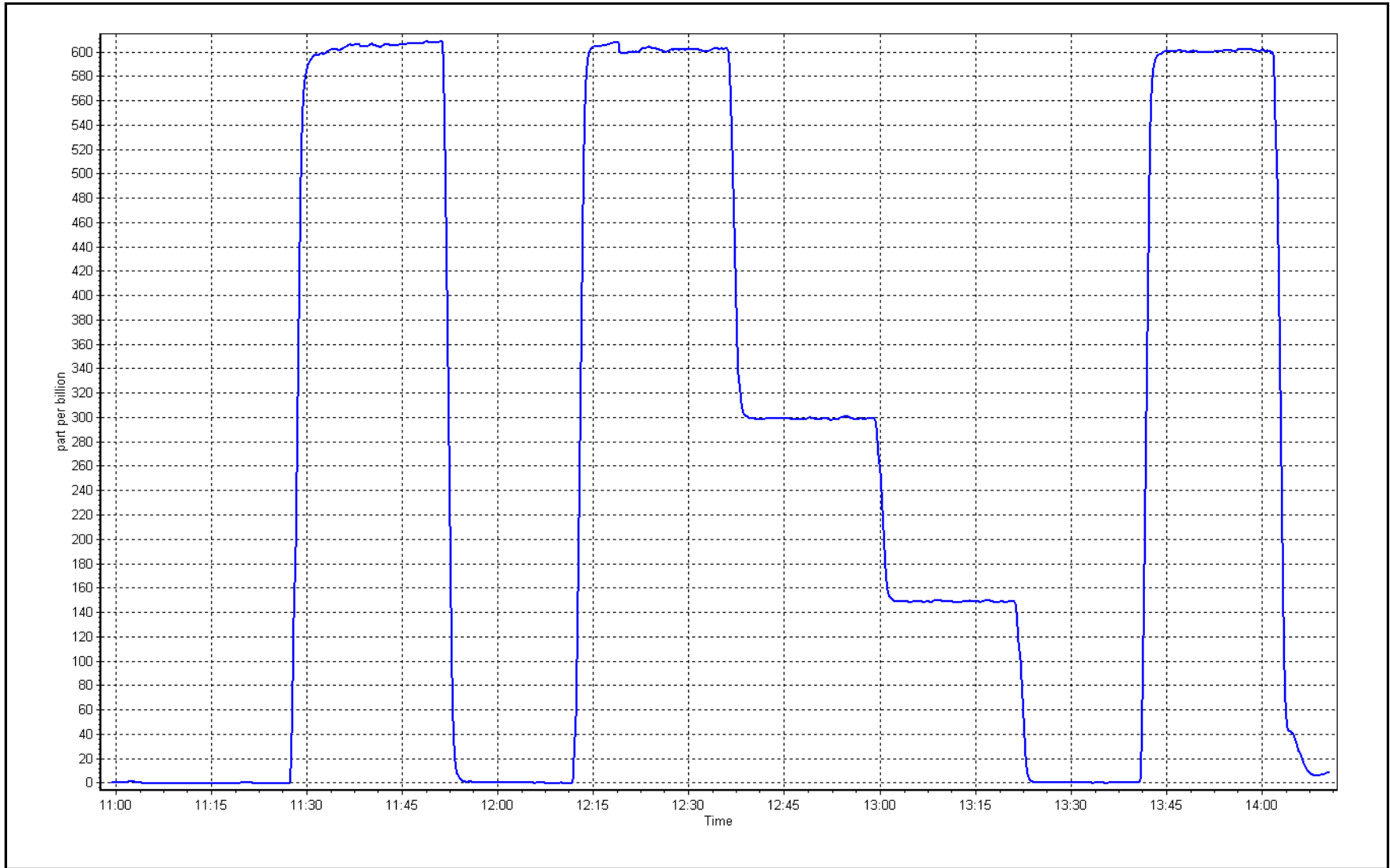
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.2	----	Correlation Coefficient	≥0.995
601.0	601.8	0.9986		
300.1	299.4	1.0023	Slope	0.90 - 1.10
149.7	148.9	1.0053		
			Intercept	+/-30



SO2 Calibration Plot

Date: June 9, 2017

Location: Mannix





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	June 9, 2017	Last Cal Date:	May 8, 2017
Start time (MST):	8:08	End time (MST):	11:20
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.03</u>	ppm	Cal Gas Exp Date	December 2, 2019
Cal Gas Cylinder #	<u>ET0005008</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	14300410
ZAG Make/Model	API T701		Serial Number	138

Analyzer Information

Analyzer make:	Thermo 430i	Analyzer serial #:	815129108		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 100 ppb	PMT voltage	-644	-644	
Calculated slope	0.994693	0.998573	Lamp voltage	796	796
Calculated intercept	0.021241	-0.109818	Pressure	526.8	532.2
Analyzer Background	16.4	16.4	Flow	1.001	1.011
Analyzer Coefficient	0.971	0.971	Intensity	96	97

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5997	0.0	0.0	0.0	----
as found span	5912	85.2	71.5	71.6	0.998
calibrator zero	5997	0.0	0.0	0.0	----
high point	5912	85.2	71.5	71.6	0.998
second point	5951	45.4	38.1	38.3	0.994
third point	5967	28.4	23.8	24.1	0.989
as left zero	5997	0.0	0.0	0.1	----
as left span	5912	85.2	71.5	72.1	0.991
SO2 Scrubber Check	4982	15.2	152.1	0.9	----
Average Correction Factor					0.994
Corrected As found	71.60	Previous response	71.82	*% change	0.3%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after asfinds. Scrubber check compelled with the mix gas cylinder at site. No adjustments made.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

H₂S Calibration Summary

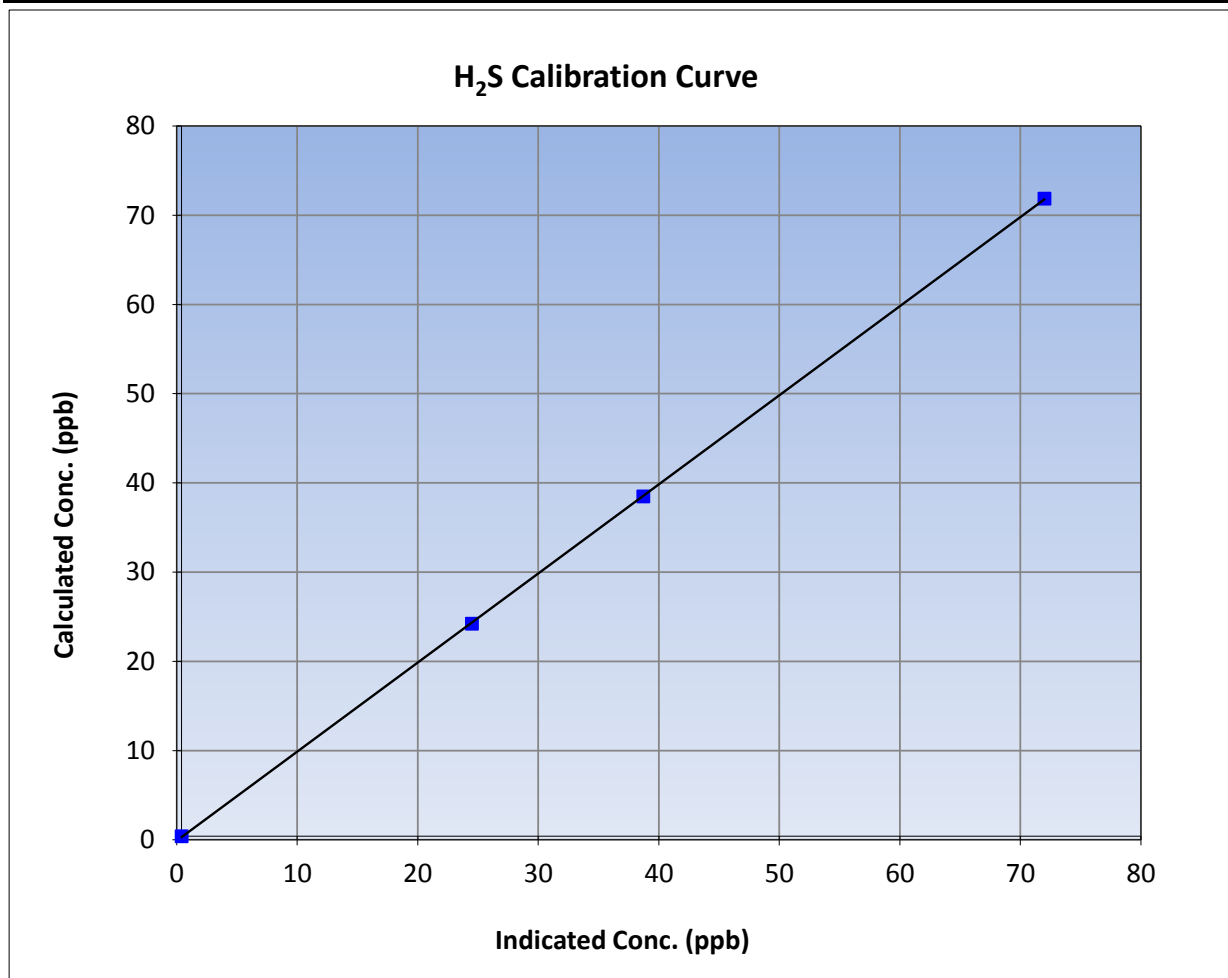
Version-03-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	May 8, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	8:08	End Time (MST)	11:20
Analyzer make	Thermo 430i	Analyzer serial #	815129108

Calibration Data

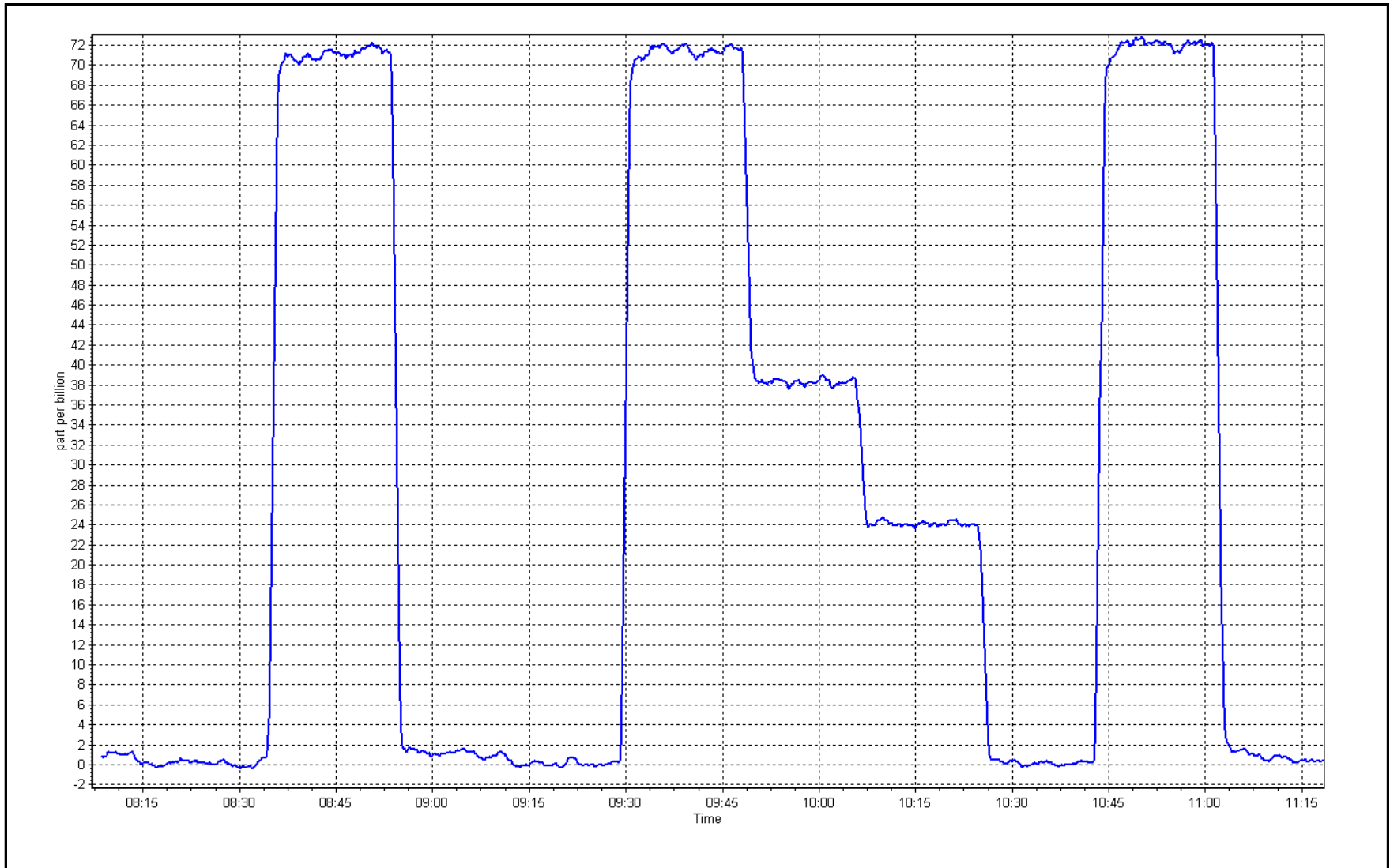
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.0	----	Correlation Coefficient	≥0.995
71.5	71.6	0.9980		
38.1	38.3	0.9943	Slope	0.90 - 1.10
23.8	24.1	0.9887		
			Intercept	+/-3



H₂S Calibration Plot

Date: June 9, 2017

Location: Mannix





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	June 9, 2017	Last Cal Date:	May 8, 2017
Start time (MST):	10:59	End time (MST):	14:05
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000646	Cal Gas Expiry Date	November 4, 2019
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1064.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4080	Serial Number	14300410
ZAG Make/Model	Teledyne API 701	Serial Number	138

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-296
Calculated slope	1.002758	Sample pressure	9.4
Calculated intercept	-0.022395	Fuel pressure	20.2
Analyzer Background	3.480	Air pressure	42.3
Analyzer Coefficient	3.603	Flame temperature	162.2

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4997	0.0	0.00	-0.08	----
as found span	4935	61.0	12.99	12.82	1.013
calibrator zero	4997	0.0	0.00	-0.02	----
high point	4933	61.0	13.00	13.03	0.998
second point	4970	30.5	6.49	6.45	1.007
third point	4981	15.2	3.24	3.26	0.993
as left zero	4997	0.0	0.00	0.00	----
as left span	4933	61.0	13.00	13.02	0.998
Average Correction Factor					0.999
Corrected As found	12.90	Previous response	12.98	*% change	0.6%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

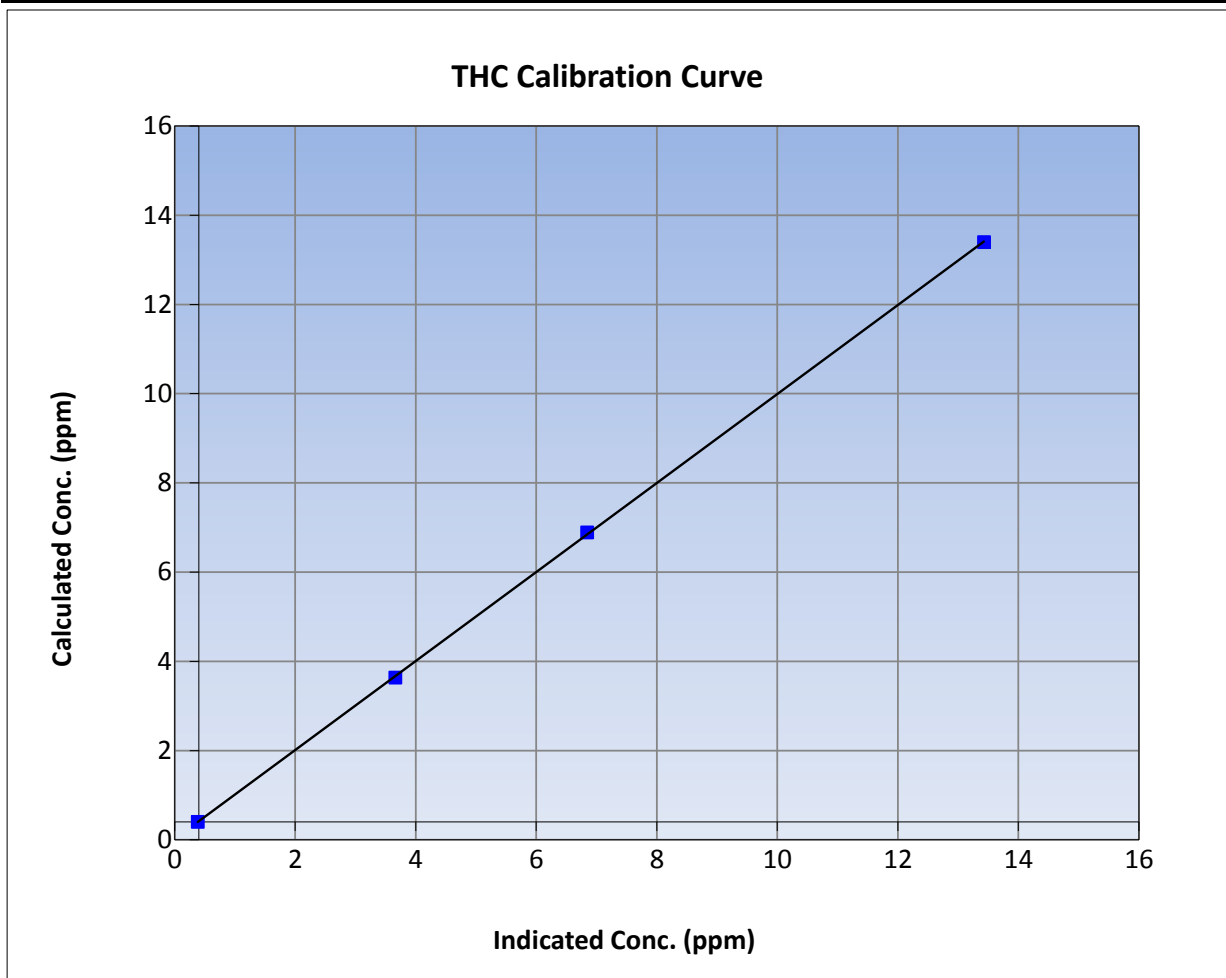
Version-03-2017

Station Information

Calibration Date	June 9, 2017	Previous Calibration	May 8, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	10:59	End Time (MST)	14:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

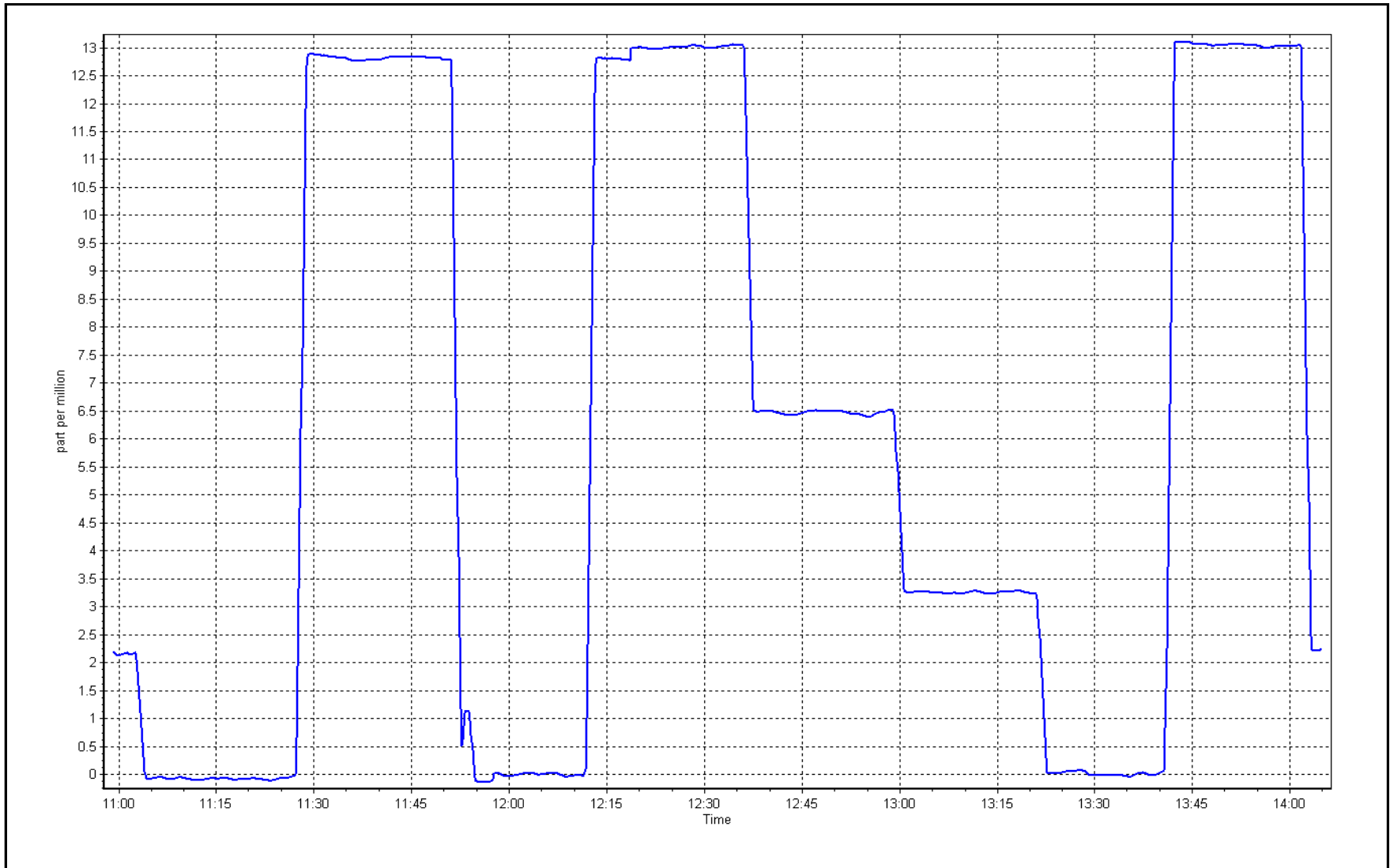
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999966	≥0.995
13.0	13.0	0.9977			
6.5	6.4	1.0068	Slope	0.997522	0.90 - 1.10
3.2	3.3	0.9926			
			Intercept	0.015617	+/-1.5



THC Calibration Plot

Date: June 9, 2017

Location: Mannix





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	678	37	42	99.31	46	0	4	0
TRS (ppb) Average	682	34	38	99.44	1	0	1	0
THC (ppm) Average	678	37	42	99.31	2.6	-	2	-
NMHC(ppm) Average	678	37	42	99.31	0.114	-	0.008	-
CH4(ppm) Average	678	37	42	99.31	2.6	-	2	-
O3 (ppb) Average	682	34	38	99.44	88	2	45	-
NO2 (ppb) Average	678	37	42	99.31	13	0	5	-
NO (ppb) Average	678	37	42	99.31	19	-	3	-
NOX (ppb) Average	678	37	42	99.31	30	-	8	-
NH3 (ppb) Average	622	47	98	92.92	38	0	12	-
PM2.5 (ug/m3) Average	713	3	7	99.44	135	-	20.8	0
Temperature 2 m (C) Average	720	0	0	100	28.5	-	22.7	-
Relative Humidity (%) Average	720	0	0	100	99	-	88	-
Wind Speed 10 m (km/h) Average	720	0	0	100	31	-	20	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	678	0.8	3	-	0	0	0	0	0	2	46
TRS (ppb) Average	682	0.3	0	-	0	0	0	0	0	1	1
THC (ppm) Average	678	1.92	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.6
NMHC(ppm) Average	678	0	0.006	-	0	0	0	0	0	0	0.114
CH4(ppm) Average	678	1.92	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.6
O3 (ppb) Average	682	32.5	10	-	9	19	24	33	40	45	88
NO2 (ppb) Average	678	2.5	2	-	0	0	1	2	3	5	13
NO (ppb) Average	678	0.9	2	-	0	0	0	0	1	2	19
NOX (ppb) Average	678	3.4	4	-	0	0	1	3	4	7	30
NH3 (ppb) Average	622	0.6	4	-	0	0	0	0	0	0	38
PM2.5 (ug/m3) Average	713	5.92	8.2	-	0.1	1.4	2.5	4.4	7.2	10.8	135
Temperature 2 m (C) Average	720	16.18	5.1	-	2.9	10.2	12.4	15.8	19.9	23.1	28.5
Relative Humidity (%) Average	720	60.7	22	-	22	30	42	61	81	90	99
Wind Speed 10 m (km/h) Average	720	10.6	6	-	0	3	6	9	15	21	31
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	21 Jun 2017 09:00	21 Jun 2017 09:00	1	DAS collection error - data not recorded
NOX, O3, THC, TRS, SO2	08 Jun 2017 10:00	08 Jun 2017 10:00	1	Maintenance - sample manifold cleaned
NH3, NO2, SO2	16 Jun 2017 03:00	16 Jun 2017 05:00	3	Station power failure
TRS, THC, PM2.5, O3	16 Jun 2017 03:00	16 Jun 2017 05:00	3	Station power failure
PM2.5	10 Jun 2017 07:00	10 Jun 2017 07:00	1	Unstable operation - excessive baseline drift
PM2.5	21 Jun 2017 17:00	21 Jun 2017 17:00	1	Unstable operation - excessive baseline drift
NH3	01 Jun 2017 04:00	30 Jun 2017 04:00	47	Stabilization after daily span



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Patricia McInnes - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 46 ppb on Jun 2 13:00	Maximum Daily Average: 3.5 ppb on Jun 2		Hours of Data:	678
Minimum Value: 0 ppb on Jun 8 02:00	Minimum Daily Average: 0.0 ppb on Jun 18		Hours of Missing Data:	42
Maximum Diurnal Average: 2.2 ppb at hour 13	Minimum Diurnal Average: 0.2 ppb at hour 24		Hours of Calibration:	37
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 11		Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
2-Jun	0	0	0	0	0	Z	0	0	1	5	4	9	46	11	1	2	0	0	0	0	0	0	0	0	3.5	46	
3-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.2	1	
4-Jun	0	0	0	0	0	0	0	1	Z	6	13	26	9	1	0	0	0	3	2	1	2	2	0	0	3.1	26	
5-Jun	2	1	Z	0	0	1	1	2	2	2	3	2	1	2	1	0	0	0	0	0	0	0	0	1.0	3		
6-Jun	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0	
7-Jun	2	2	1	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2	
8-Jun	0	0	0	0	0	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
9-Jun	0	0	0	0	0	0	Z	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4	
10-Jun	0	0	0	0	0	0	0	Z	0	0	0	1	1	3	3	3	4	4	3	1	0	0	0	2	1.1	4	
11-Jun	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
12-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.3	1	
13-Jun	0	0	0	0	Z	0	1	1	5	7	5	1	1	1	1	1	0	0	0	1	1	0	0	1.2	7		
14-Jun	1	2	3	4	6	Z	1	0	1	0	1	0	1	0	0	0	0	0	0	2	3	3	2	0	1.4	6	
15-Jun	0	0	1	1	1	2	Z	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
16-Jun	0	0	PF	PF	PF	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
17-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
18-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	
19-Jun	0	0	0	0	Z	0	2	5	8	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8	
20-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
21-Jun	0	0	0	0	0	0	Z	0	DF	0	0	0	0	0	0	0	0	0	0	0	1	3	3	2	1	0.5	3
22-Jun	0	0	0	0	0	0	0	Z	0	2	3	3	3	4	4	3	3	2	2	1	0	0	0	0	1.4	4	
23-Jun	0	0	Z	0	0	0	1	10	14	2	1	2	3	2	2	1	0	0	0	0	0	0	0	0	1.8	14	
24-Jun	0	0	0	Z	0	0	0	0	0	3	3	2	1	1	1	2	3	3	2	1	0	0	0	0	1.0	3	
25-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
26-Jun	0	0	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	1	
27-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
28-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
29-Jun	0	0	Z	0	0	0	0	0	0	1	1	1	1	2	6	10	11	10	13	9	7	3	1	0	3.3	13	
30-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	

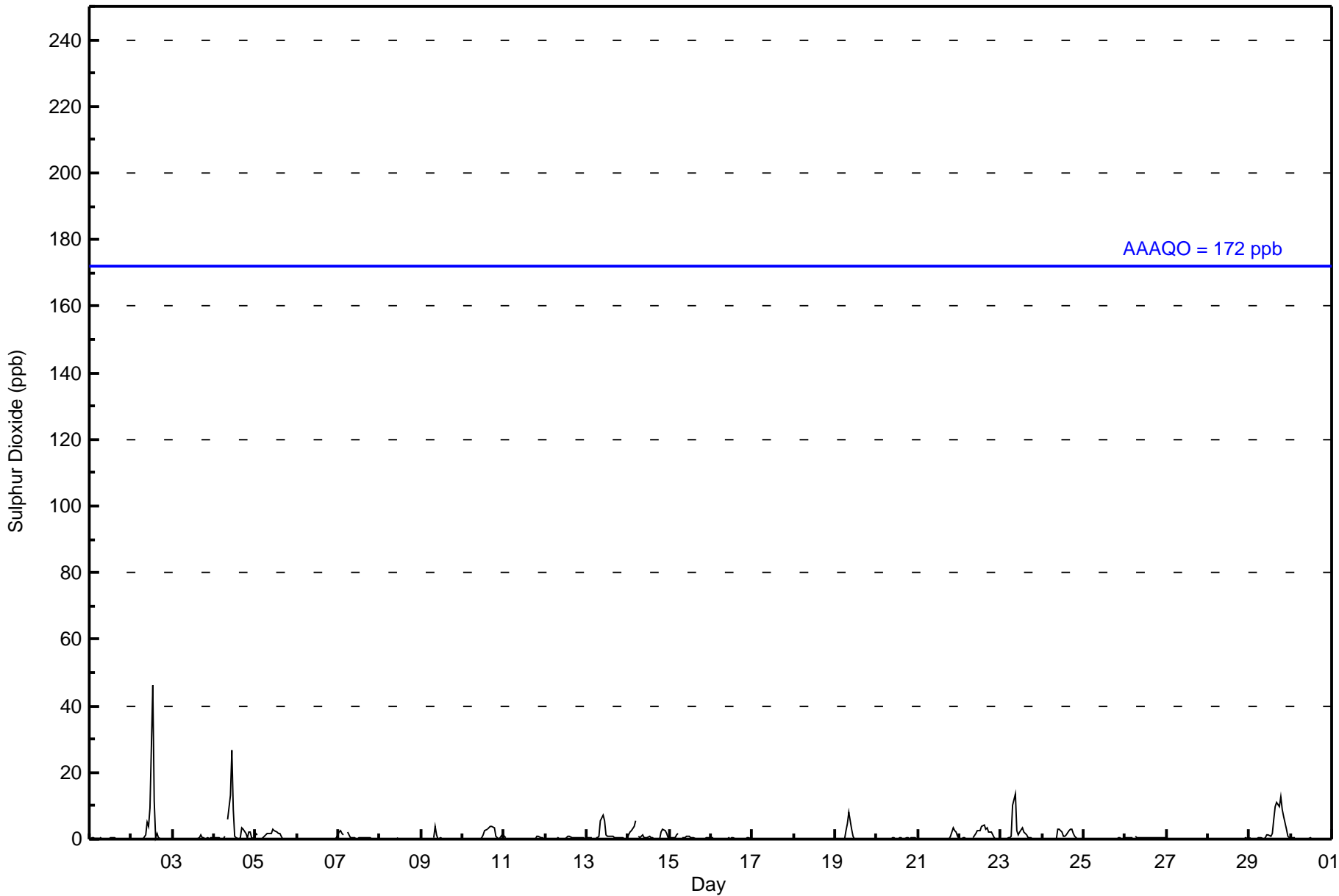
0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.9	1.6	1.5	1.8	1.2	2.2	1.0	0.8	0.9	1.0	0.9	0.8	0.7	0.7	0.5	0.3	0.2	Diurnal Average	
2	2	3	4	6	2	2	10	14	13	26	9	46	11	6	10	11	10	13	9	7	3	2	2	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	671	98.97	98.97
11 - 20	5	0.74	99.71
21 - 60	2	0.29	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	96	29	30	19	18	51	61	38	32	37	38	34	30	49	47	62	671
11 - 20	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5
21 - 60	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	30	19	18	51	61	38	32	37	38	34	30	49	47	66	678

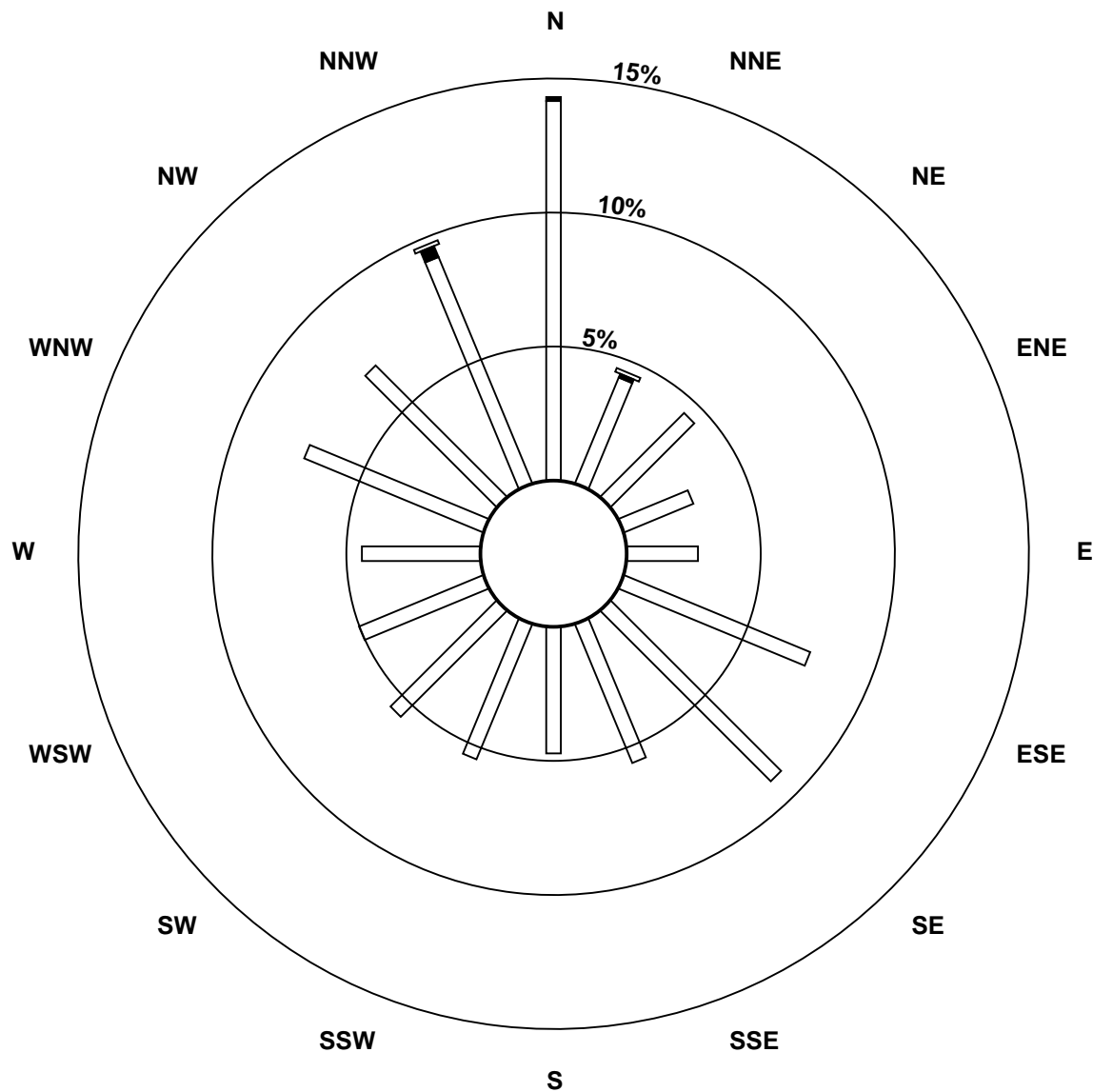
Total Number of Valid Hours: 678

Total Number of Hours: 720

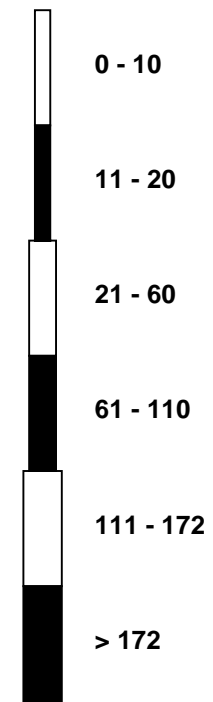


Wood Buffalo Environmental Association
Wind Rose Jun 2017

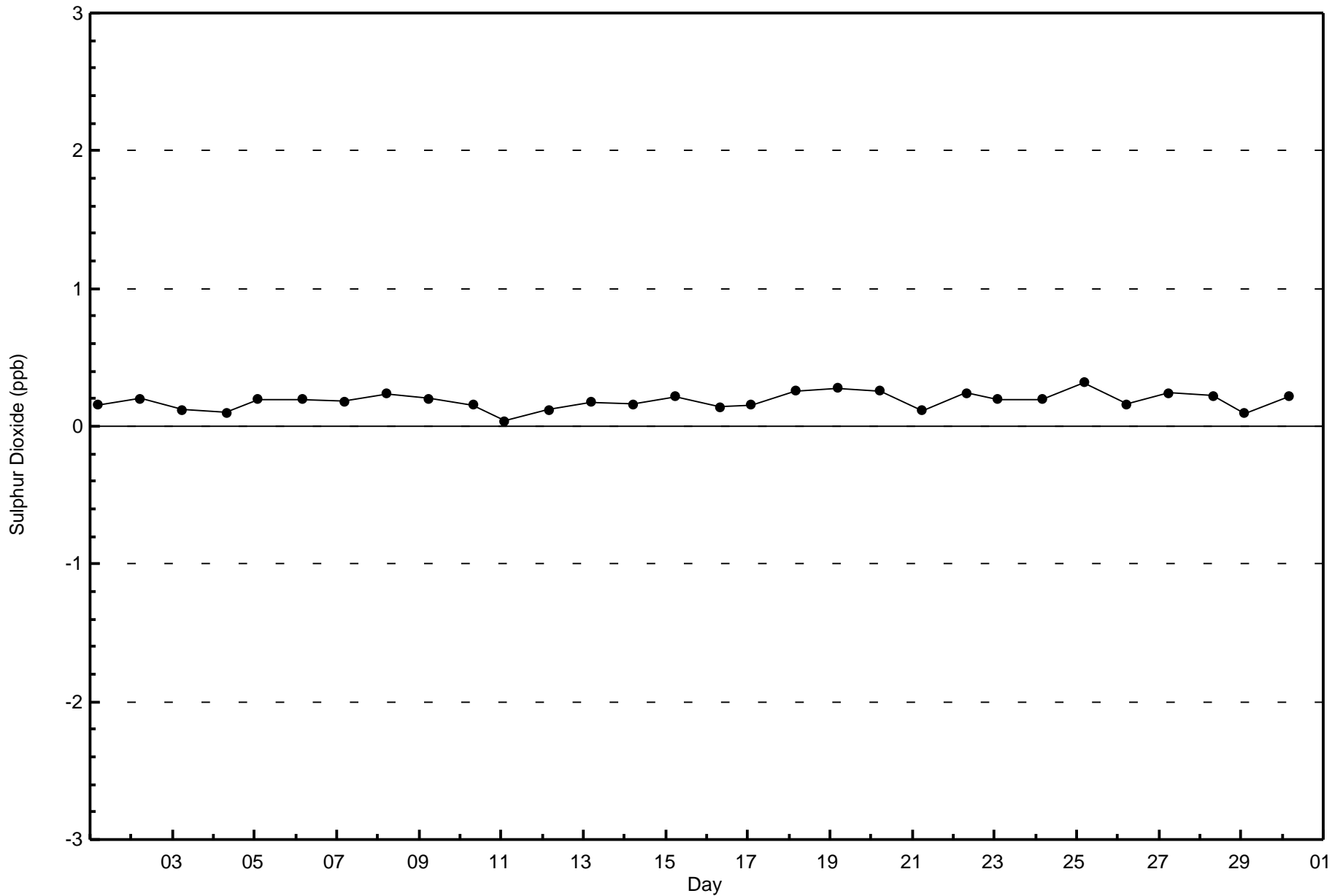
Sulphur Dioxide (SO₂) - ppb
Patricia McInnes (AMS 6)

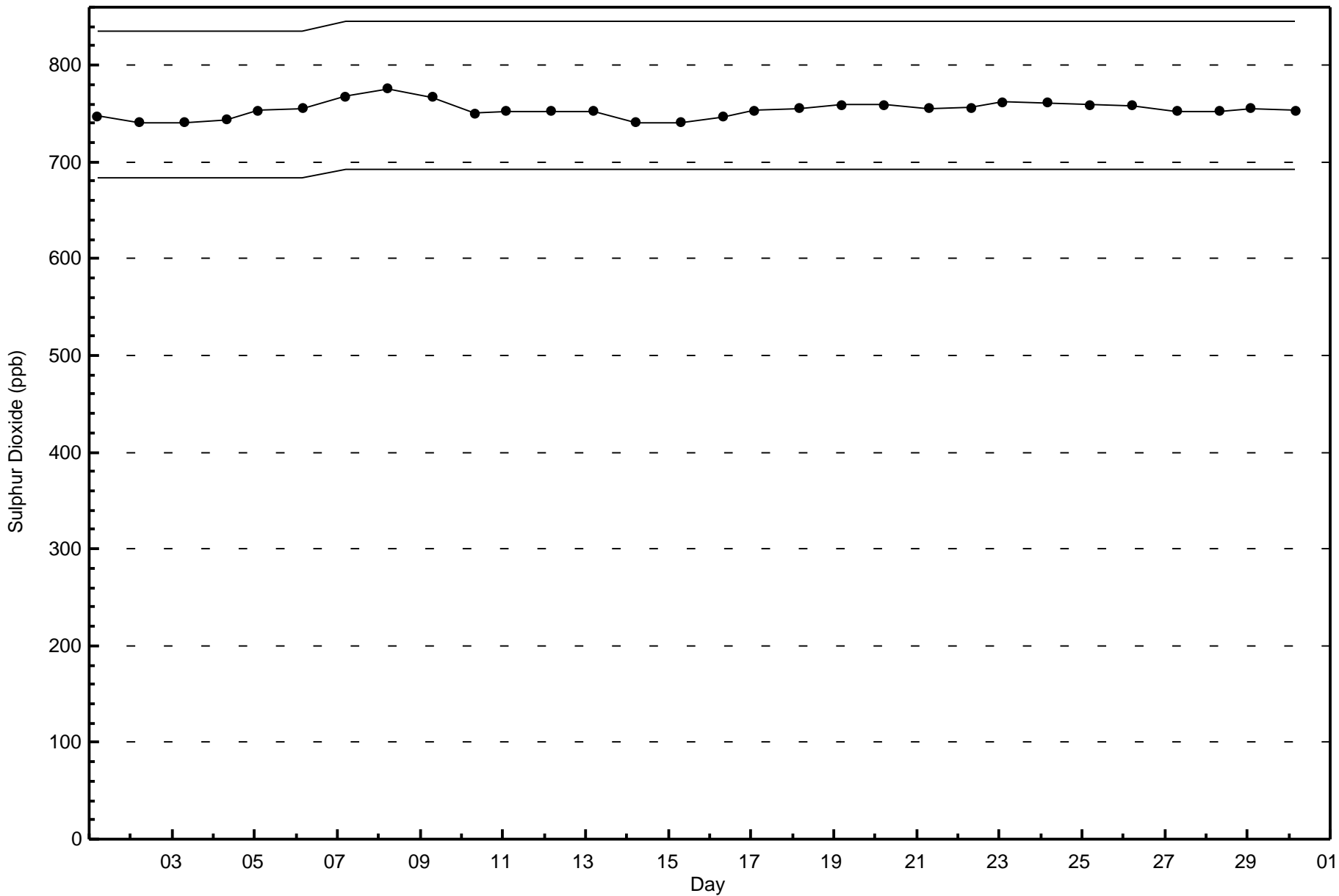


Classes (ppb)



Total Number of Valid Hours: 678







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 9 05:00	Maximum Daily Average: 0.6 ppb on Jun 14		Hours of Data:	682
Minimum Value: 0 ppb on Jun 23 17:00	Minimum Daily Average: 0.3 ppb on Jun 19		Hours of Missing Data:	38
Maximum Diurnal Average: 0.5 ppb at hour 5	Minimum Diurnal Average: 0.3 ppb at hour 15		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1	
2-Jun	1	1	0	1	1	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
4-Jun	0	0	0	1	1	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.4	1
5-Jun	0	1	0	Z	1	1	1	1	1	1	C	C	C	C	0	0	0	0	0	0	0	0	0	1	0.4	1	
6-Jun	1	1	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Jun	1	1	0	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
8-Jun	0	0	0	0	0	1	Z	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jun	0	0	1	1	1	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Jun	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Jun	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Jun	1	1	1	1	1	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jun	1	1	1	1	1	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.6	1
15-Jun	0	0	0	0	1	1	1	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Jun	0	0	PF	PF	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
18-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Jun	0	0	0	0	0	0	0	Z	DF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jun	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
23-Jun	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Jun	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
27-Jun	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Jun	0	0	0	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0.4	1
30-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0

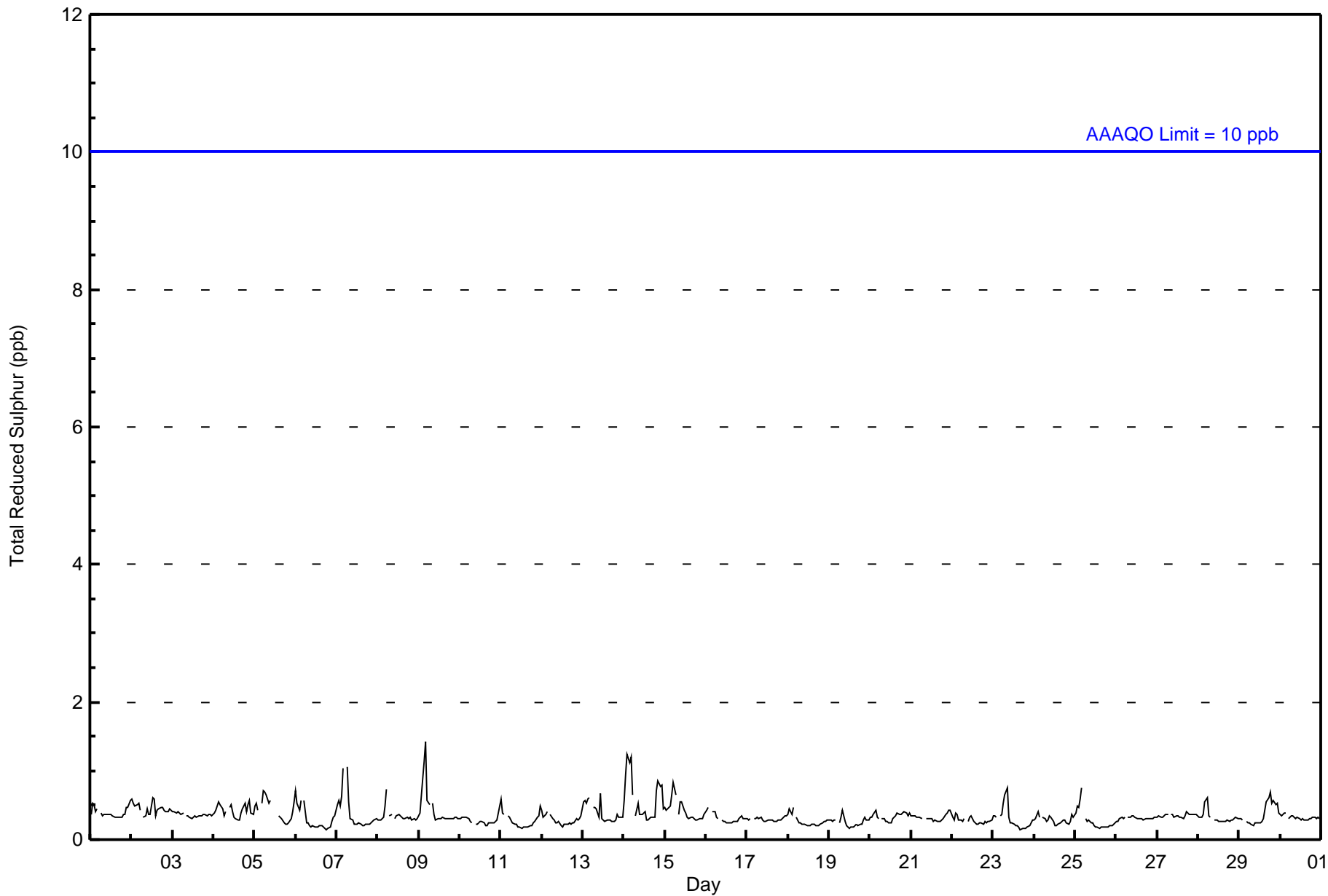
0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	682	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



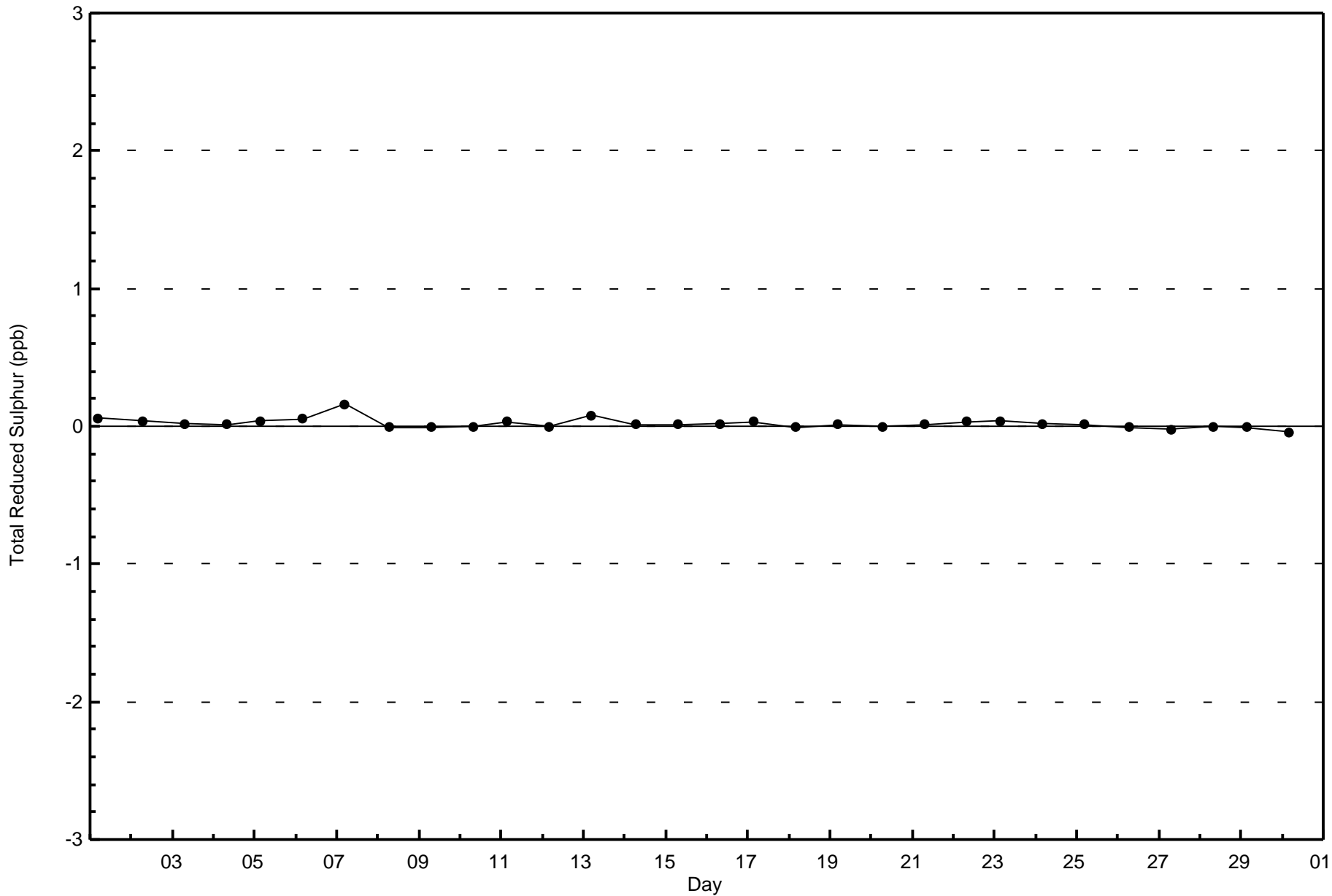
Wood Buffalo Environmental Association
Frequency Distribution

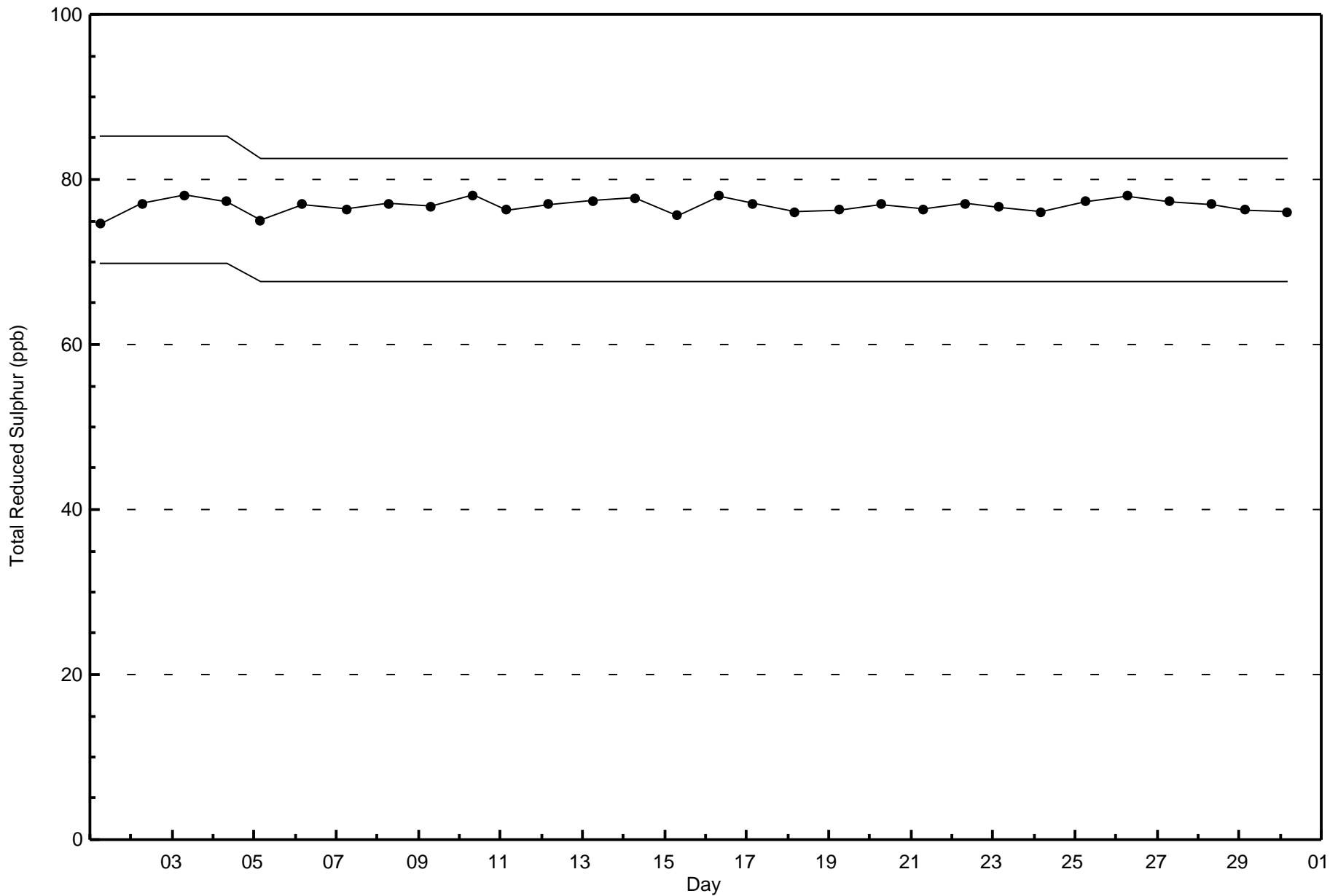
Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	95	31	32	18	18	52	61	36	36	38	37	35	32	50	48	63	682
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	95	31	32	18	18	52	61	36	36	38	37	35	32	50	48	63	682

Total Number of Valid Hours: 682

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

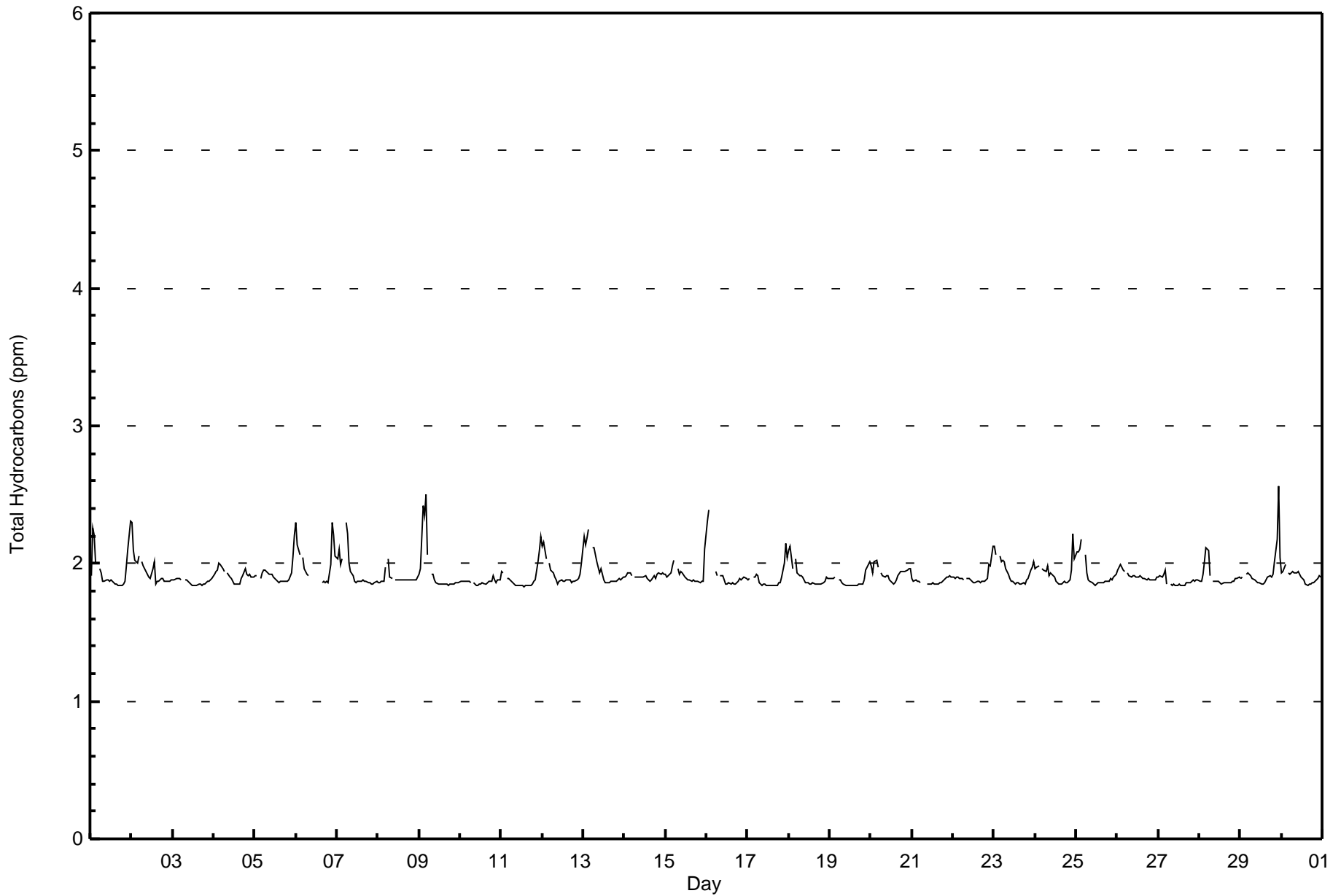
Patricia McInnes - June 2017

Maximum Value: 2.6 ppm on Jun 29 23:00 Maximum Daily Average: 2.0 ppm on Jun 13																								Hours in Service: 720		
Minimum Value: 1.8 ppm on Jun 11 14:00 Minimum Daily Average: 1.9 ppm on Jun 10																								Hours of Data: 678		
Maximum Diurnal Average: 2.0 ppm at hour 3 Minimum Diurnal Average: 1.9 ppm at hour 15																								Hours of Missing Data: 42		
Monthly Average: 1.92 ppm Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.3																								Hours of Calibration: 37		
																								Percent Operational Time: 99.3		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1.9	2.3	2.2	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.3	1.9	2.3	
2-Jun	2.3	2.1	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.3
3-Jun	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	1.9	1.9	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Jun	1.9	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	1.9	2.2	
6-Jun	2.3	2.1	2.1	Z	2.0	2.0	1.9	1.9	C	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	2.0	2.3	2.2	2.1	--	2.3
7-Jun	2.0	2.1	2.0	2.0	Z	2.3	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	2.3
8-Jun	1.9	1.9	1.9	1.9	2.0	Z	2.0	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
9-Jun	1.9	2.0	2.4	2.4	2.5	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.5	2.5
10-Jun	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
11-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.2	1.9	2.2
12-Jun	2.1	2.2	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2
13-Jun	2.2	2.1	2.2	2.2	Z	2.1	2.1	2.1	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
14-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Jun	1.9	1.9	1.9	1.9	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	2.1	1.9
16-Jun	2.3	2.4	PF	PF	PF	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4
17-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.0	1.9	2.1
18-Jun	2.1	2.1	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	1.9	2.0
20-Jun	2.0	1.9	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
21-Jun	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	DF	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Jun	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	1.9	2.1
23-Jun	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1
24-Jun	2.0	2.0	2.0	Z	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.0	1.9	2.2
25-Jun	2.1	2.1	2.1	2.2	Z	2.1	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
26-Jun	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Jun	1.9	1.9	1.9	1.9	2.0	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Jun	1.9	1.9	1.9	2.0	2.1	2.1	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
29-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.6	2.0	1.9	2.6
30-Jun	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerspan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure		



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Patricia McInnes - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	627	92.48	92.48
2.1 - 3.0	51	7.52	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	92	28	30	18	18	51	61	38	29	31	34	28	26	45	38	60	627
2.1 - 3.0	5	3	0	1	0	0	0	0	3	6	4	6	4	4	9	6	51
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	30	19	18	51	61	38	32	37	38	34	30	49	47	66	678

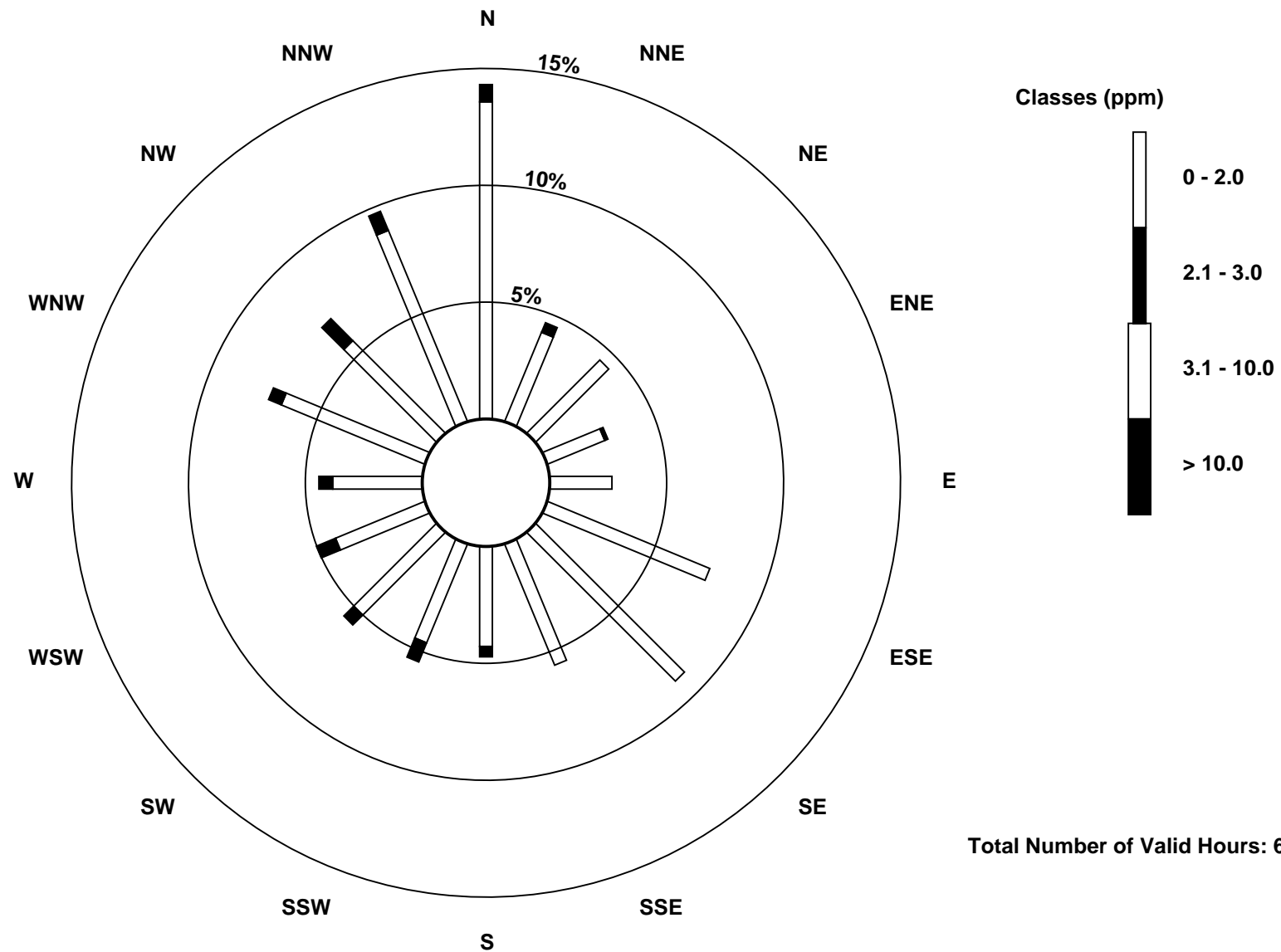
Total Number of Valid Hours: 678

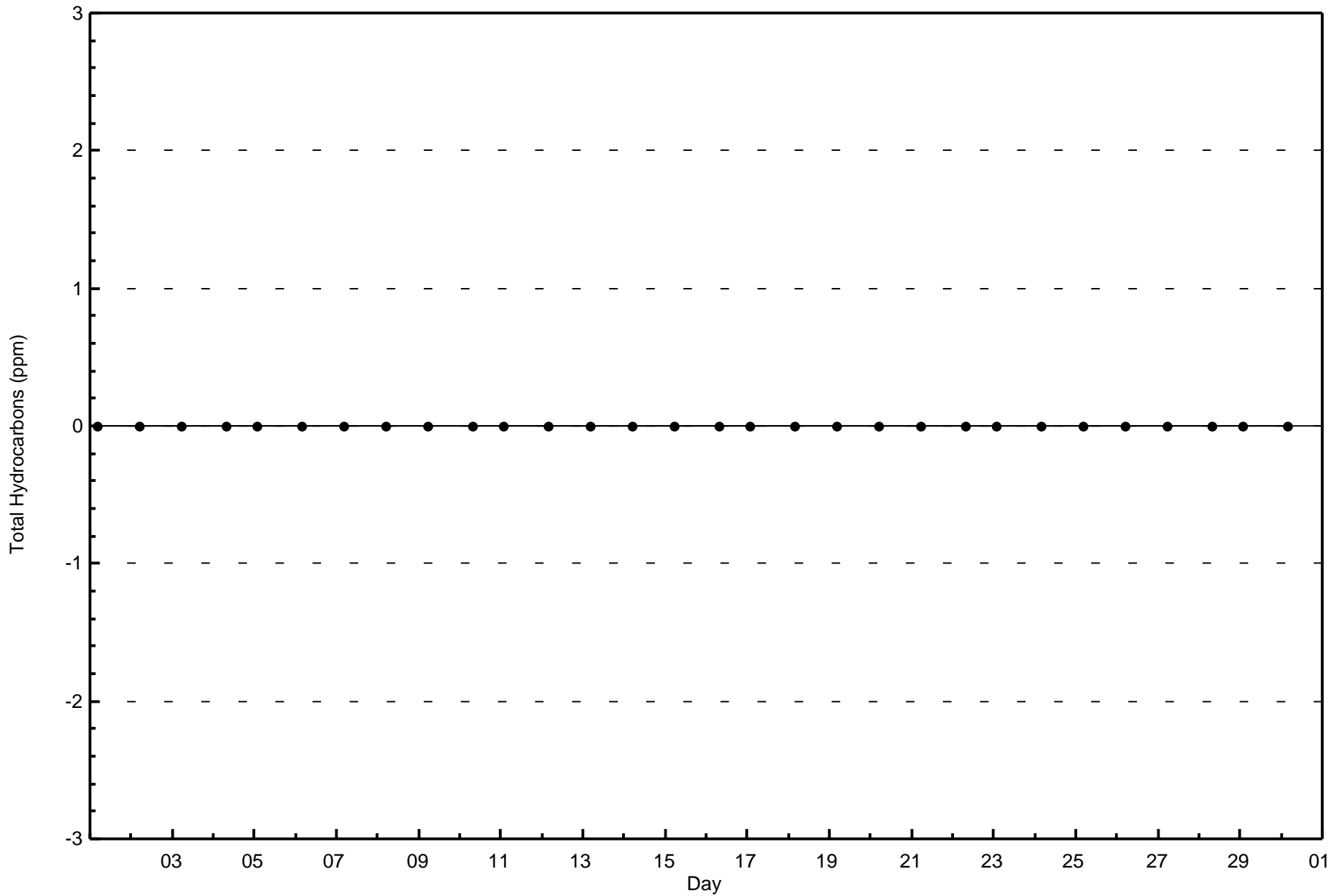
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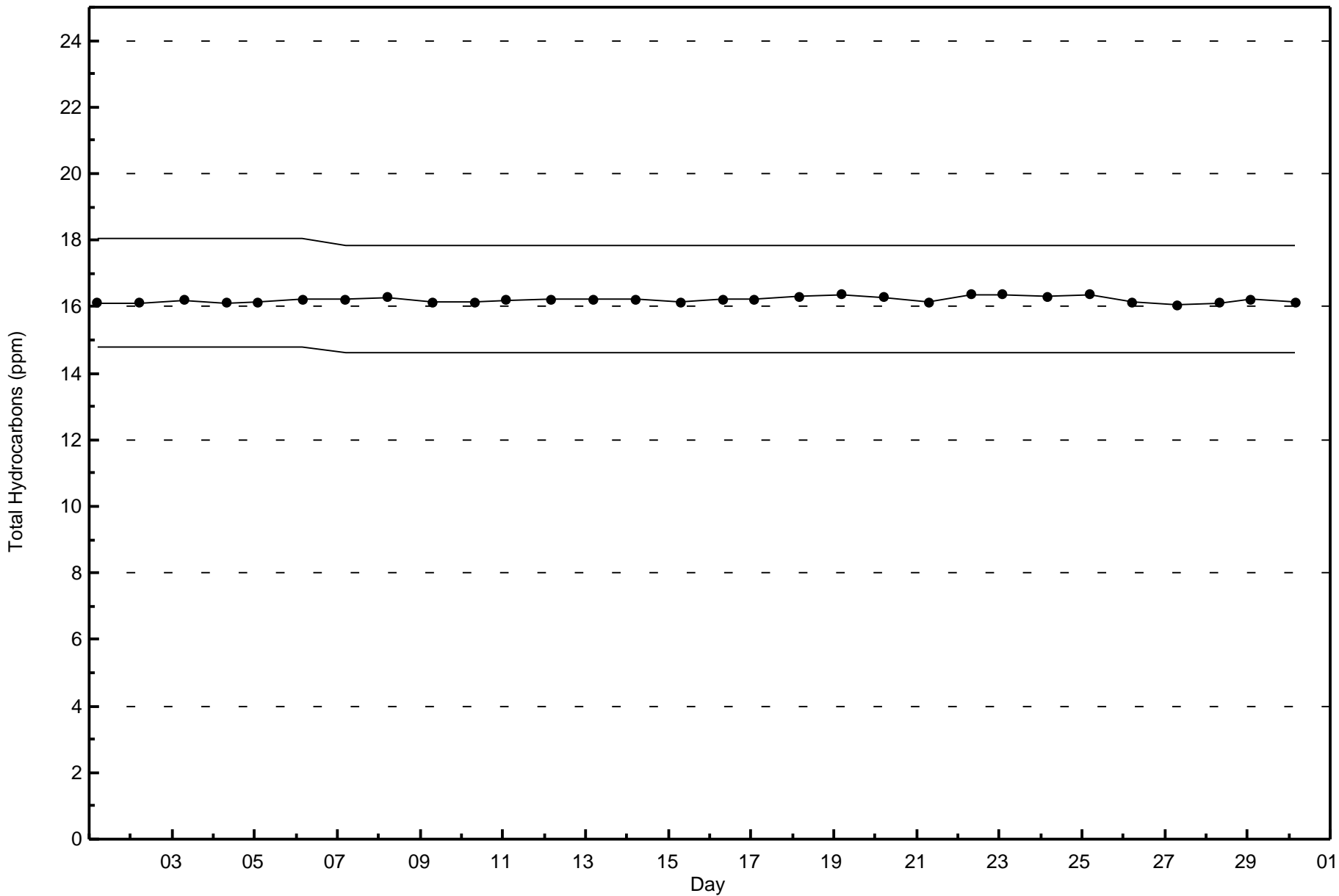


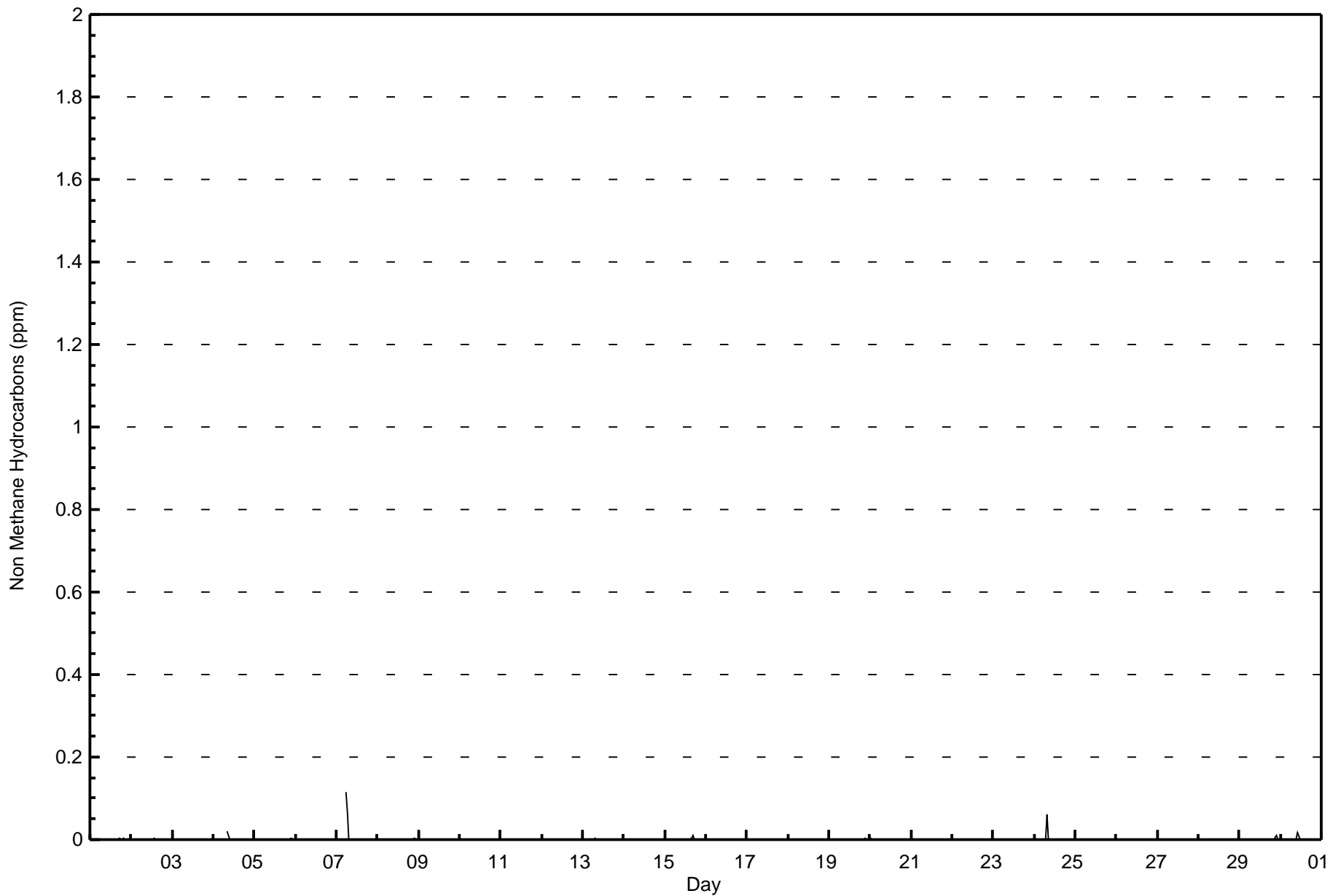
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	671	98.97	98.97
0.006 - 0.05	4	0.59	99.56
0.06 - 0.1	3	0.44	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	95	31	30	18	18	50	61	37	32	37	38	34	30	48	47	65	671
0.006 - 0.05	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	4
0.06 - 0.1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	30	19	18	51	61	38	32	37	38	34	30	49	47	66	678

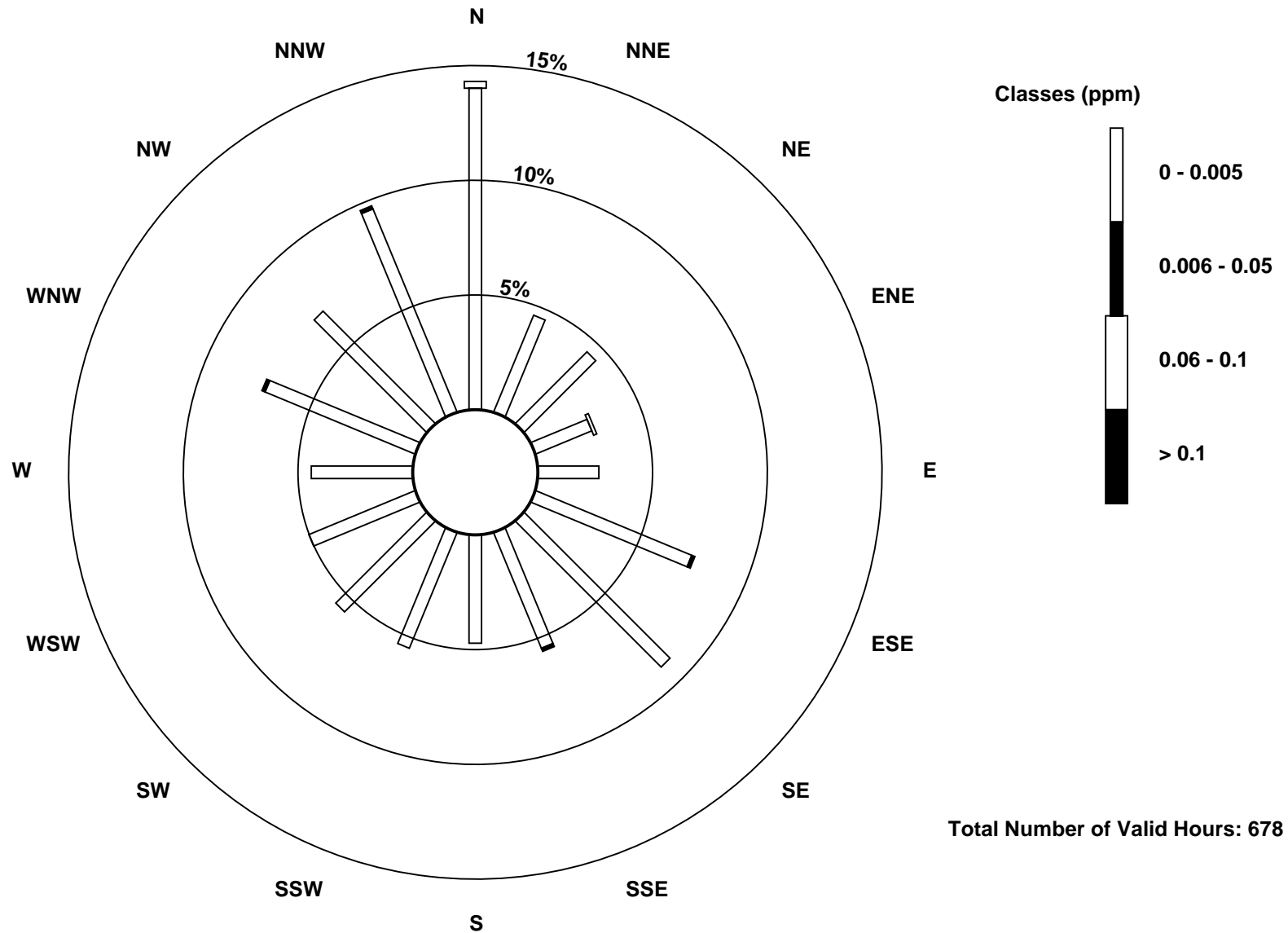
Total Number of Valid Hours: 678

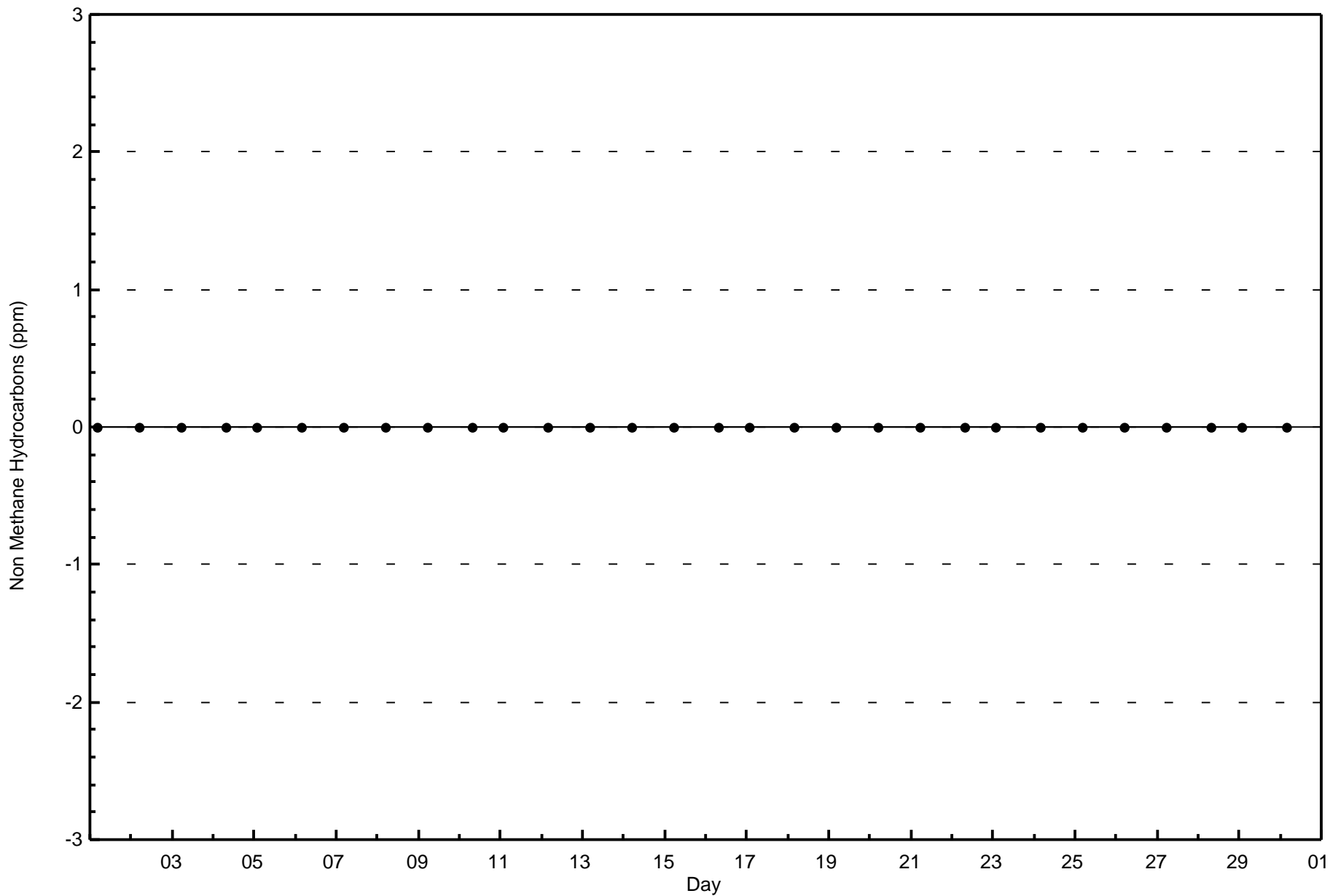
Total Number of Hours: 720

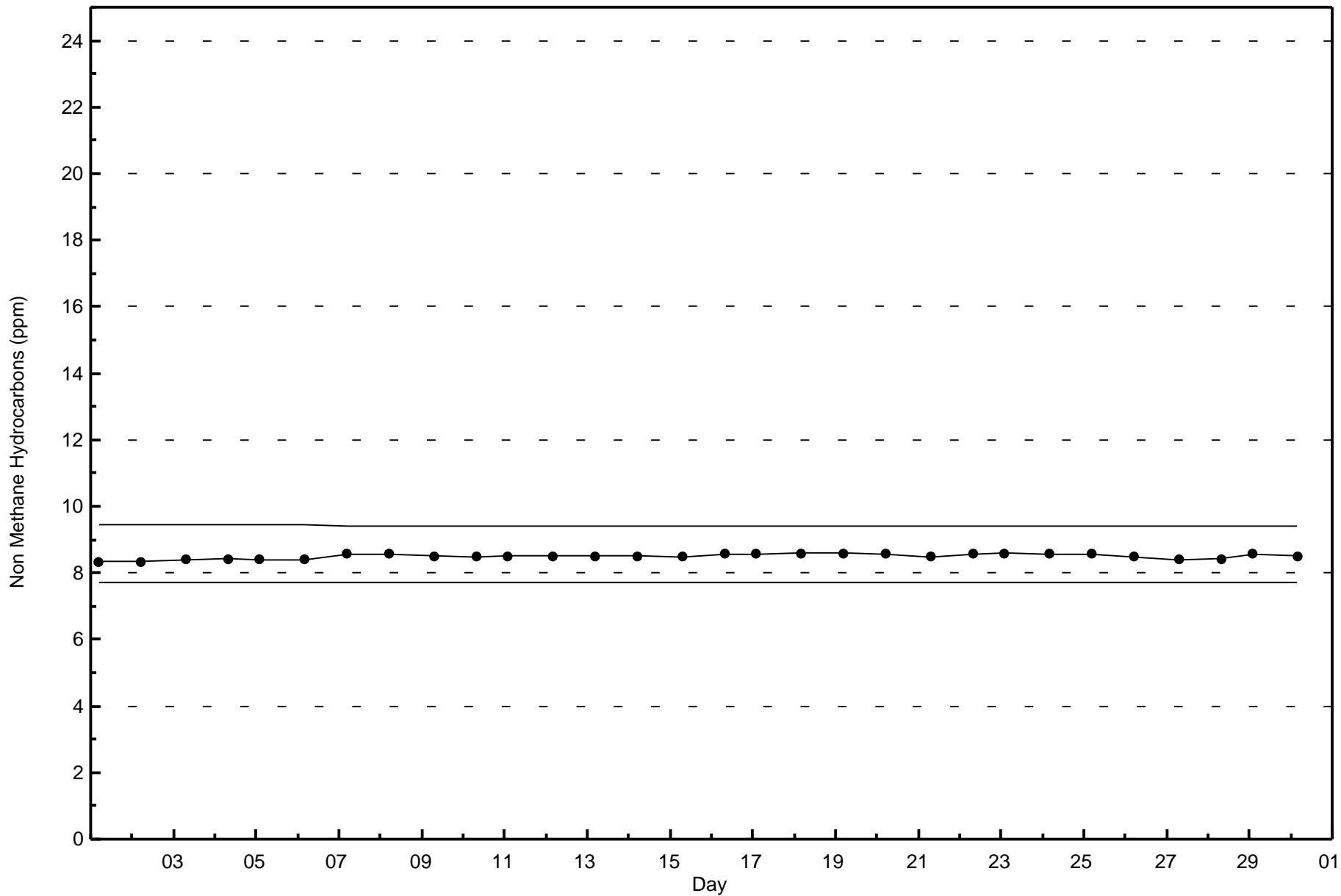


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

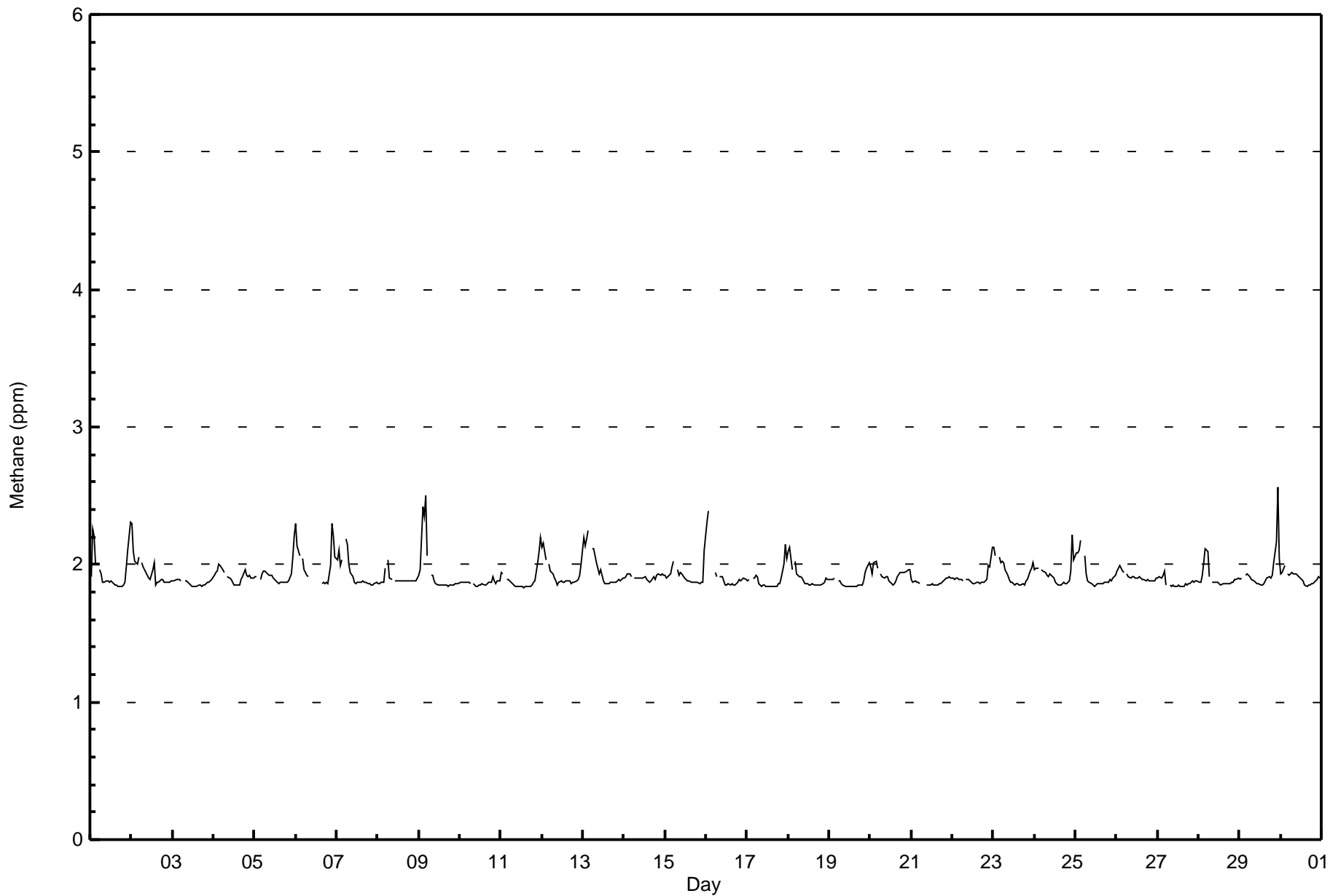
Patricia McInnes - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.6 ppm on Jun 29 23:00	Maximum Daily Average: 2.0 ppm on Jun 13		Hours of Data:	678
Minimum Value: 1.8 ppm on Jun 11 14:00	Minimum Daily Average: 1.9 ppm on Jun 10		Hours of Missing Data:	42
Maximum Diurnal Average: 2.0 ppm at hour 3	Minimum Diurnal Average: 1.9 ppm at hour 15		Hours of Calibration:	37
Monthly Average: 1.92 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.3		Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1.9	2.3	2.2	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.3	1.9	2.3	
2-Jun	2.3	2.1	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.3
3-Jun	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	1.9	1.9	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0
5-Jun	1.9	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	1.9	2.2	
6-Jun	2.3	2.1	2.1	Z	2.0	2.0	1.9	1.9	C	C	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	2.0	2.3	2.2	2.1	--	2.3
7-Jun	2.0	2.1	2.0	2.0	Z	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	2.2
8-Jun	1.9	1.9	1.9	1.9	2.0	Z	2.0	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
9-Jun	1.9	2.0	2.4	2.4	2.5	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.5	2.5
10-Jun	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
11-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.2	1.9	2.2
12-Jun	2.1	2.2	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.2
13-Jun	2.2	2.1	2.2	2.2	Z	2.1	2.1	2.1	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
14-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
15-Jun	1.9	1.9	1.9	1.9	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	2.1	
16-Jun	2.3	2.4	PF	PF	PF	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4
17-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.0	1.9	2.1
18-Jun	2.1	2.1	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	1.9	2.0
20-Jun	2.0	1.9	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0
21-Jun	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	DF	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Jun	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	1.9	2.1
23-Jun	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1
24-Jun	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.0	1.9	2.2
25-Jun	2.1	2.1	2.1	2.2	Z	2.1	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
26-Jun	2.0	2.0	2.0	2.0	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Jun	1.9	1.9	1.9	1.9	2.0	1.8	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Jun	1.9	1.9	1.9	2.0	2.1	2.1	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
29-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.6	2.0	1.9	2.6
30-Jun	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0

2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	Diurnal Average	
2.3	2.4	2.4	2.4	2.5	2.2	2.1	2.1	2.0	1.9	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.3	2.6	2.3	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	627	92.48	92.48
2.1 - 3.0	51	7.52	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Patricia McInnes - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	92	28	30	18	18	51	61	38	29	31	34	28	26	45	38	60	627
2.1 - 3.0	5	3	0	1	0	0	0	0	3	6	4	6	4	4	9	6	51
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	30	19	18	51	61	38	32	37	38	34	30	49	47	66	678

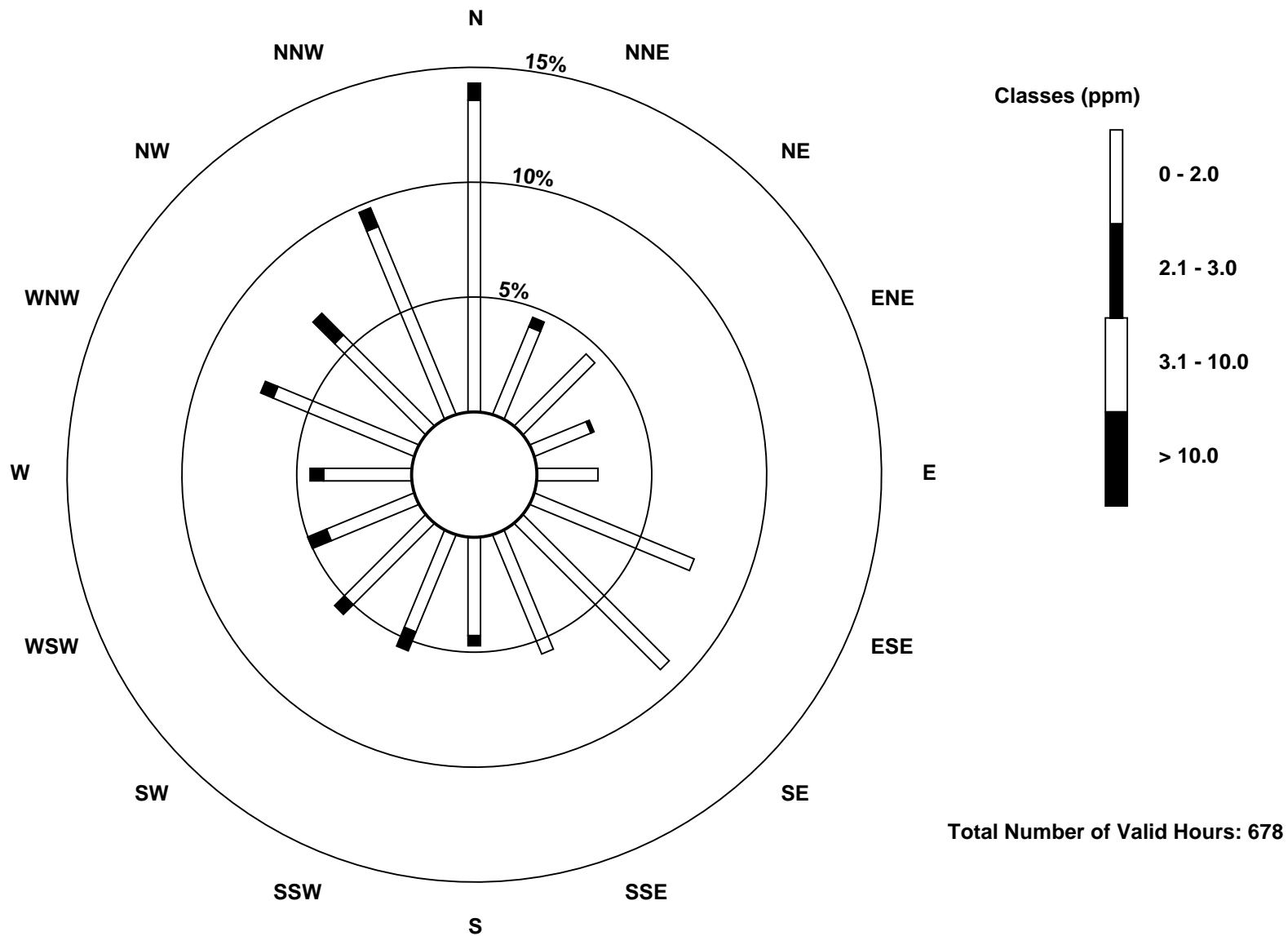
Total Number of Valid Hours: 678

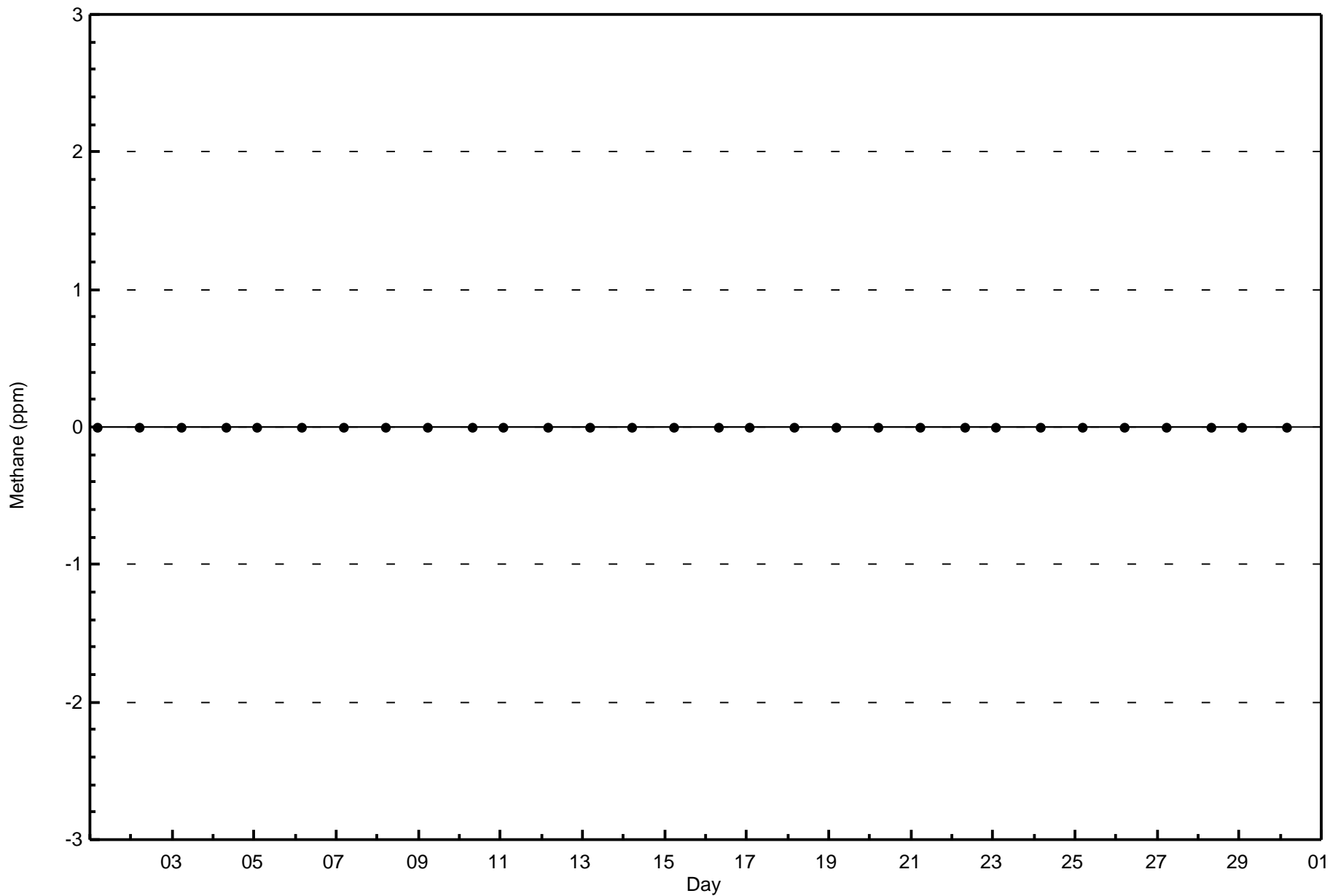
Total Number of Hours: 720

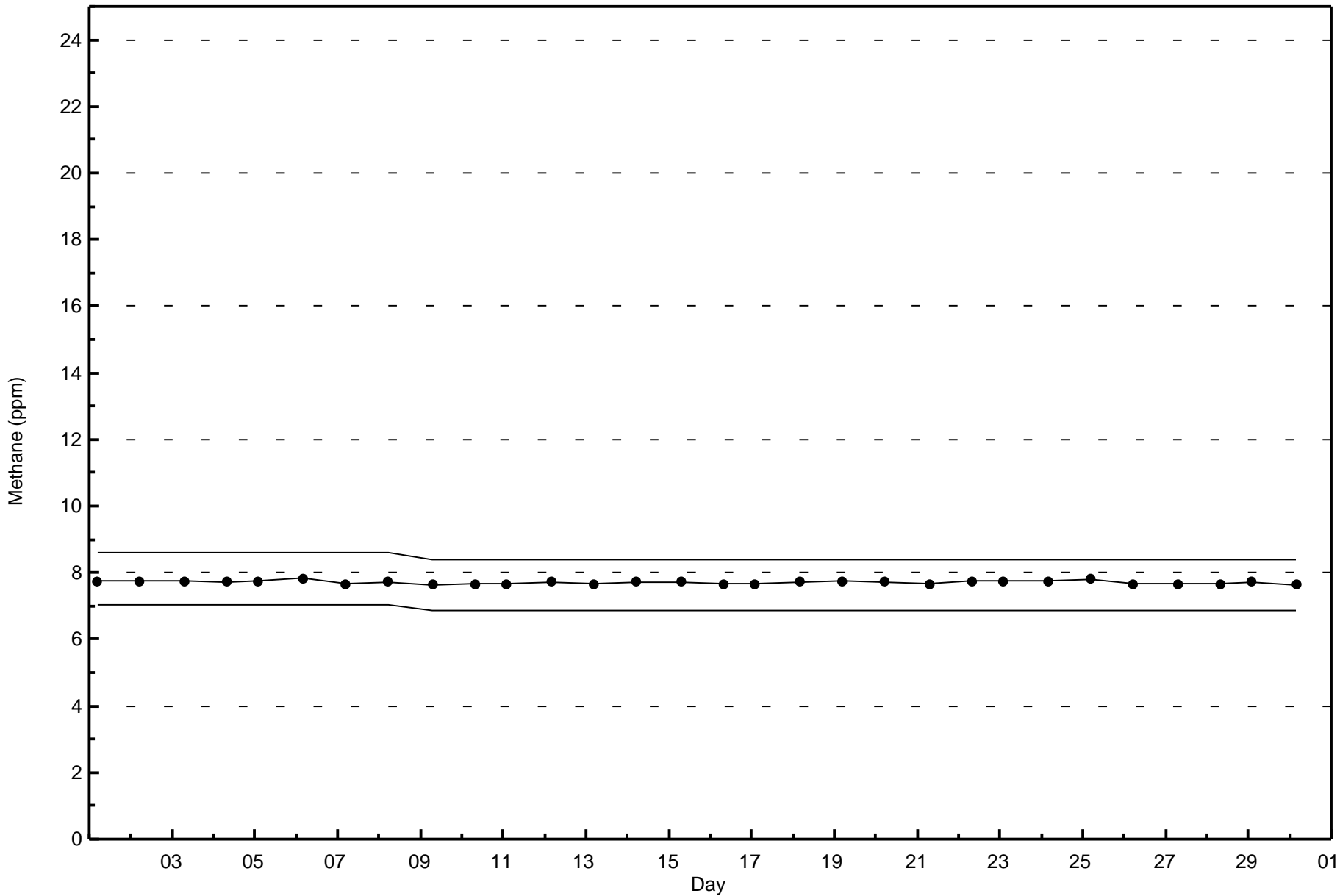


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

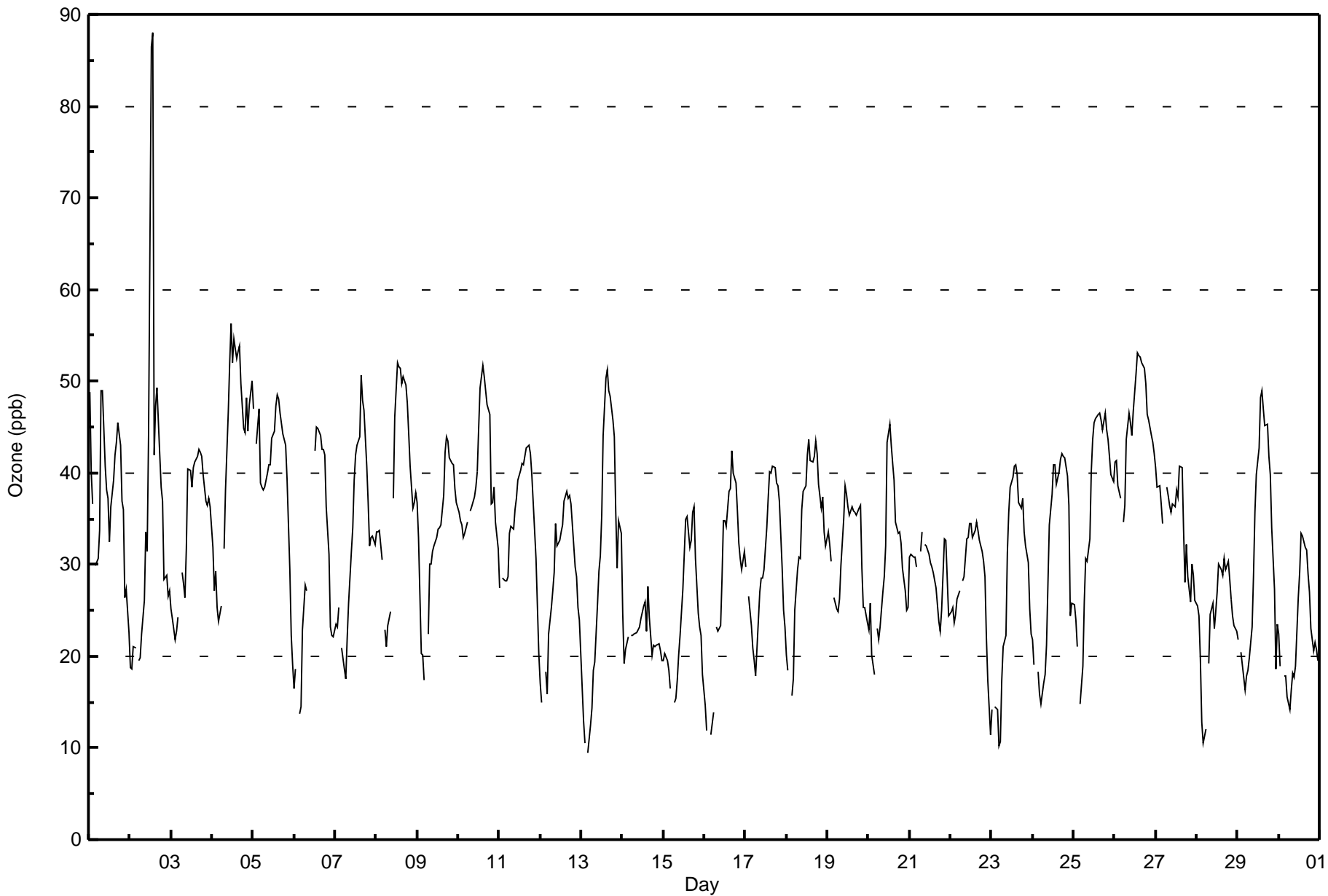
Patricia McInnes - June 2017

Number of Exceedences (AAQO):	1-hr: 2	24-hr: 0	Hours in Service:	720
Maximum Value: 88 ppb on Jun 2 14:00	Maximum Daily Average: 45.2 ppb on Jun 26		Hours of Data:	682
Minimum Value: 9 ppb on Jun 13 05:00	Minimum Daily Average: 22.5 ppb on Jun 14		Hours of Missing Data:	38
Maximum Diurnal Average: 41.8 ppb at hour 14	Minimum Diurnal Average: 21.0 ppb at hour 5		Hours of Calibration:	34
Monthly Average: 32.5 ppb	Percentiles: P ₁ = 12 P ₁₀ = 19 Q ₁ = 24 Median = 33 Q ₃ = 40 P ₉₀ = 45 P ₉₉ = 53		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	49	40	37	Z	30	31	34	49	49	41	38	37	33	36	39	42	43	45	43	37	36	26	27	23	37.6	49
2-Jun	19	19	21	21	Z	20	20	22	26	34	31	44	87	88	42	47	49	42	38	37	28	29	27	27	35.6	88
3-Jun	25	24	22	23	24	Z	29	28	26	32	40	40	38	41	41	42	43	42	42	40	37	36	37	36	34.3	43
4-Jun	32	27	29	25	24	25	Z	32	38	47	52	56	52	55	53	53	54	50	45	44	48	44	47	50	42.7	56
5-Jun	47	Z	43	47	39	38	38	38	40	41	41	44	45	47	49	48	46	44	44	43	39	29	22	19	40.5	49
6-Jun	16	19	Z	14	14	23	28	27	C	C	C	C	42	45	45	44	43	43	42	36	31	23	22	22	30.5	45
7-Jun	23	23	25	Z	21	19	18	22	26	31	34	39	42	43	44	51	48	47	41	37	32	33	33	32	33.2	51
8-Jun	33	34	34	31	Z	23	21	23	25	M	37	46	52	52	51	50	50	50	48	44	41	36	37	38	38.8	52
9-Jun	37	33	20	20	17	Z	22	30	30	31	32	33	34	34	34	38	42	44	44	42	41	41	38	37	33.7	44
10-Jun	36	35	34	33	33	35	Z	36	36	37	38	40	45	49	52	51	49	47	46	37	37	38	35	32	39.6	52
11-Jun	27	Z	29	28	28	29	33	34	34	36	37	39	40	41	41	42	43	43	42	40	37	31	26	20	34.8	43
12-Jun	17	15	Z	18	16	22	25	27	29	34	32	33	34	34	37	38	37	37	37	34	30	29	25	24	28.9	38
13-Jun	17	13	11	Z	9	12	14	18	19	26	29	31	35	44	50	51	49	48	46	44	36	30	35	33	30.5	51
14-Jun	25	19	21	22	Z	22	22	22	23	23	23	24	25	26	23	28	24	20	21	21	21	21	19	19	22.5	28
15-Jun	20	20	19	18	16	Z	15	15	17	20	22	27	31	35	35	32	33	36	36	31	25	23	22	18	24.7	36
16-Jun	15	12	PF	PF	11	14	Z	23	23	23	29	35	35	34	38	38	42	40	39	36	32	31	29	31	29.1	42
17-Jun	30	Z	27	23	21	20	18	21	27	29	28	30	34	37	40	40	41	41	39	39	37	30	25	23	30.3	41
18-Jun	20	19	Z	16	17	25	29	31	31	36	38	39	42	44	41	41	42	44	42	39	36	37	34	32	33.6	44
19-Jun	34	32	30	Z	26	25	25	26	30	35	39	38	36	35	36	36	36	35	36	36	30	25	25	24	31.8	39
20-Jun	23	26	20	18	Z	23	22	23	27	29	32	43	45	43	41	39	35	33	34	32	30	27	25	25	30.2	45
21-Jun	31	31	31	31	30	Z	31	34	DF	32	32	31	30	30	29	28	26	24	23	25	33	33	29	24	29.4	34
22-Jun	25	25	24	25	26	27	Z	28	29	33	33	34	35	33	34	35	34	33	31	30	29	22	17	11	28.4	35
23-Jun	14	Z	14	14	10	11	17	21	22	31	36	38	40	41	41	40	37	36	37	34	32	30	25	22	28.0	41
24-Jun	22	19	Z	18	16	15	17	18	21	28	34	38	41	41	39	40	41	42	42	42	40	36	24	26	30.4	42
25-Jun	26	24	21	Z	15	19	26	31	30	33	40	44	45	46	46	47	46	45	47	45	44	42	40	39	36.4	47
26-Jun	41	41	39	37	Z	35	36	44	46	46	44	47	51	53	53	53	52	51	50	46	46	44	43	42	45.2	53
27-Jun	41	38	39	37	34	Z	38	38	37	36	37	36	38	37	41	41	34	28	32	29	26	30	29	26	34.8	41
28-Jun	25	24	20	13	11	12	Z	19	25	26	23	25	27	30	30	29	31	29	30	28	26	24	23	23	24.1	31
29-Jun	22	Z	20	18	16	18	18	20	23	29	36	40	43	48	49	47	45	45	42	40	34	27	19	23	31.4	49
30-Jun	22	19	Z	18	18	16	14	16	18	18	19	26	29	33	33	32	32	29	27	23	21	21	21	19	22.8	33

27.1	25.2	26.2	23.6	21.0	22.3	24.5	27.3	28.9	32.0	34.1	37.1	40.2	41.8	40.9	41.3	40.8	39.8	38.8	36.3	33.8	31.1	28.8	27.5	Diurnal Average	
49	41	43	47	39	38	38	49	49	47	52	56	87	88	53	53	54	51	50	46	48	44	47	50	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 82 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	90	13.20	13.20
21 - 50	570	83.58	96.77
51 - 82	20	2.93	99.71
> 83	2	0.29	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	14	0	2	3	1	3	2	7	14	9	11	3	4	4	8	5	90
21 - 50	81	28	30	18	16	45	55	28	20	27	28	31	28	43	38	54	570
51 - 82	1	3	0	0	0	3	5	2	0	0	0	0	0	0	1	5	20
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Totals	96	31	32	21	17	51	62	37	34	36	39	34	32	47	47	66	682

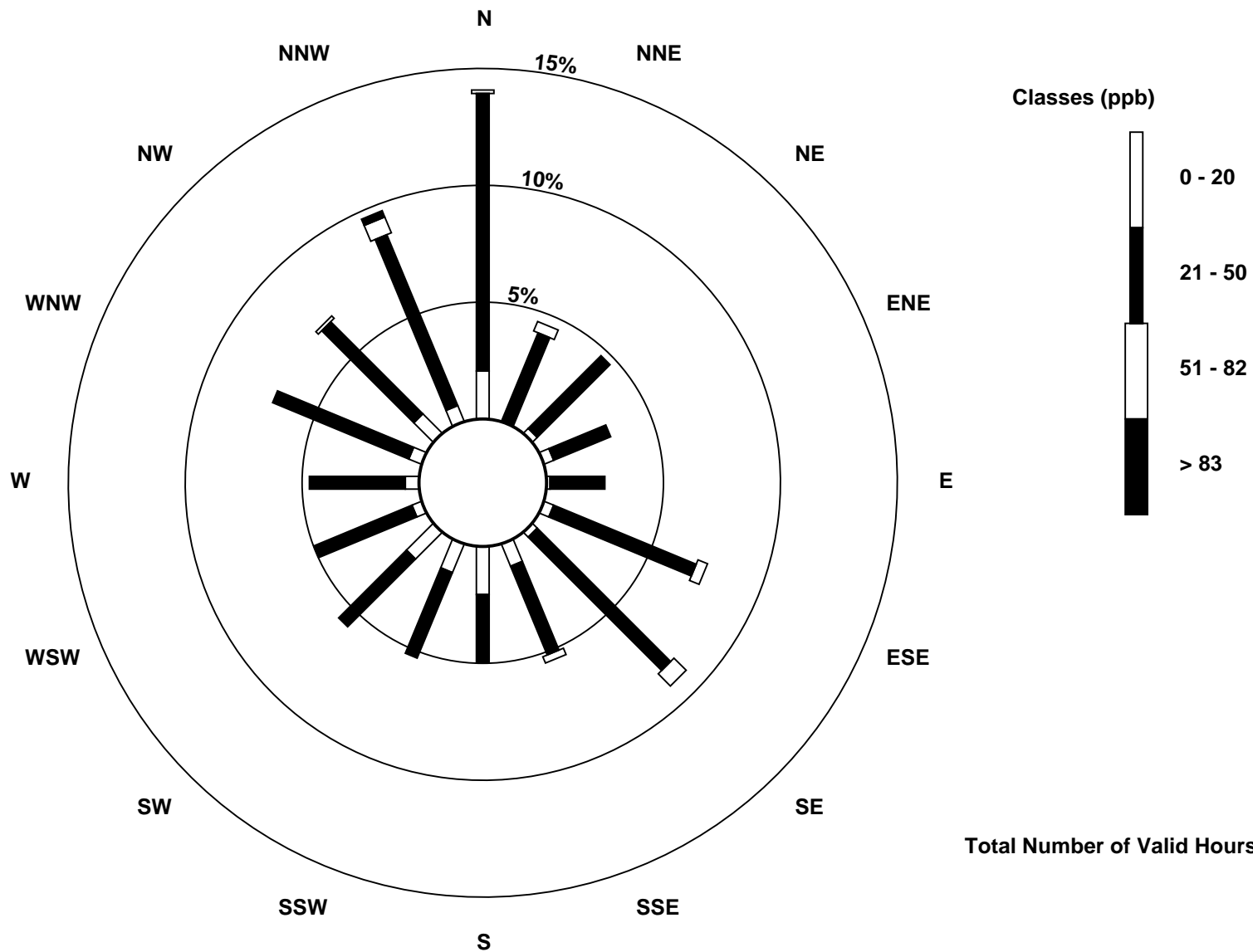
Total Number of Valid Hours: 682

Total Number of Hours: 720

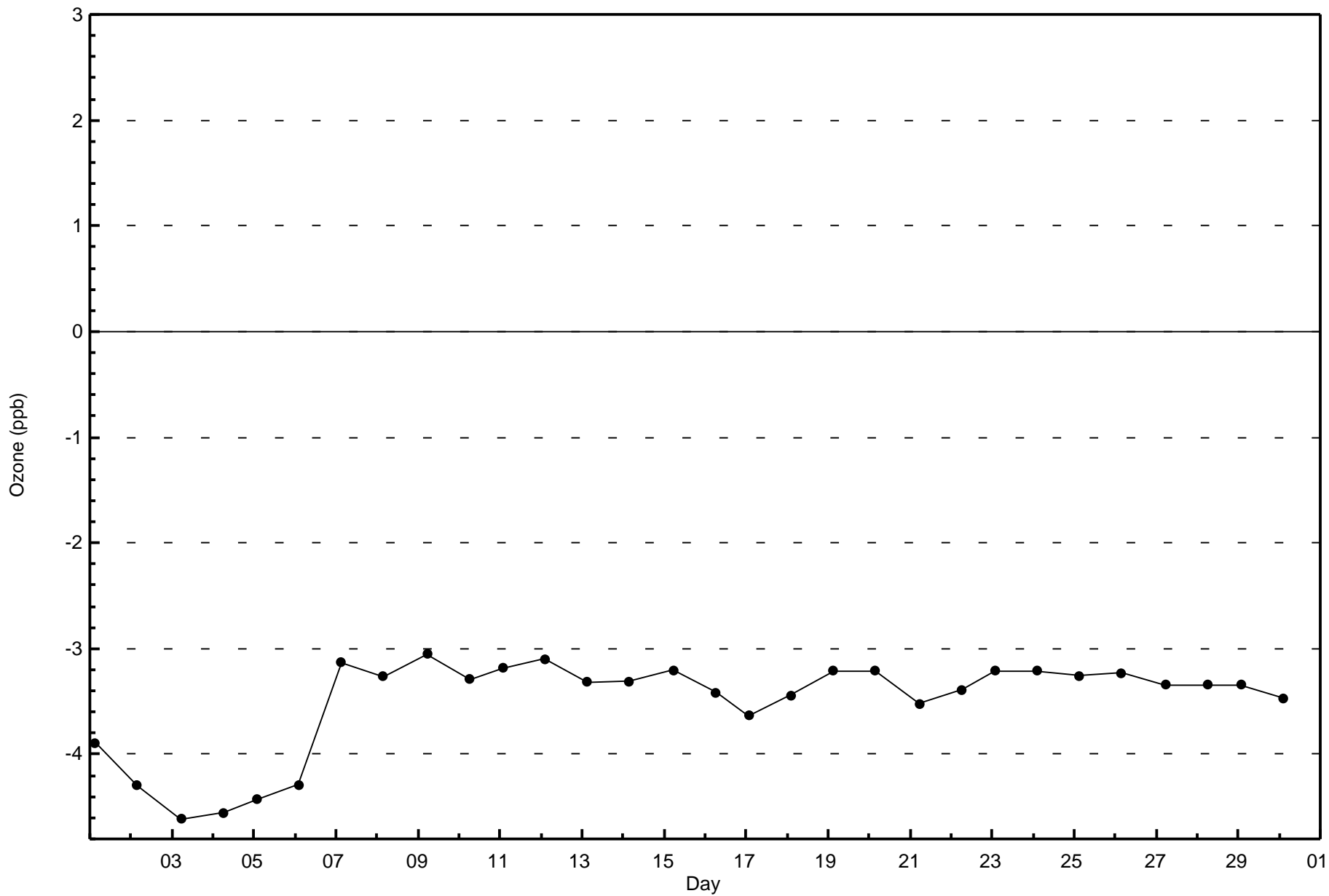


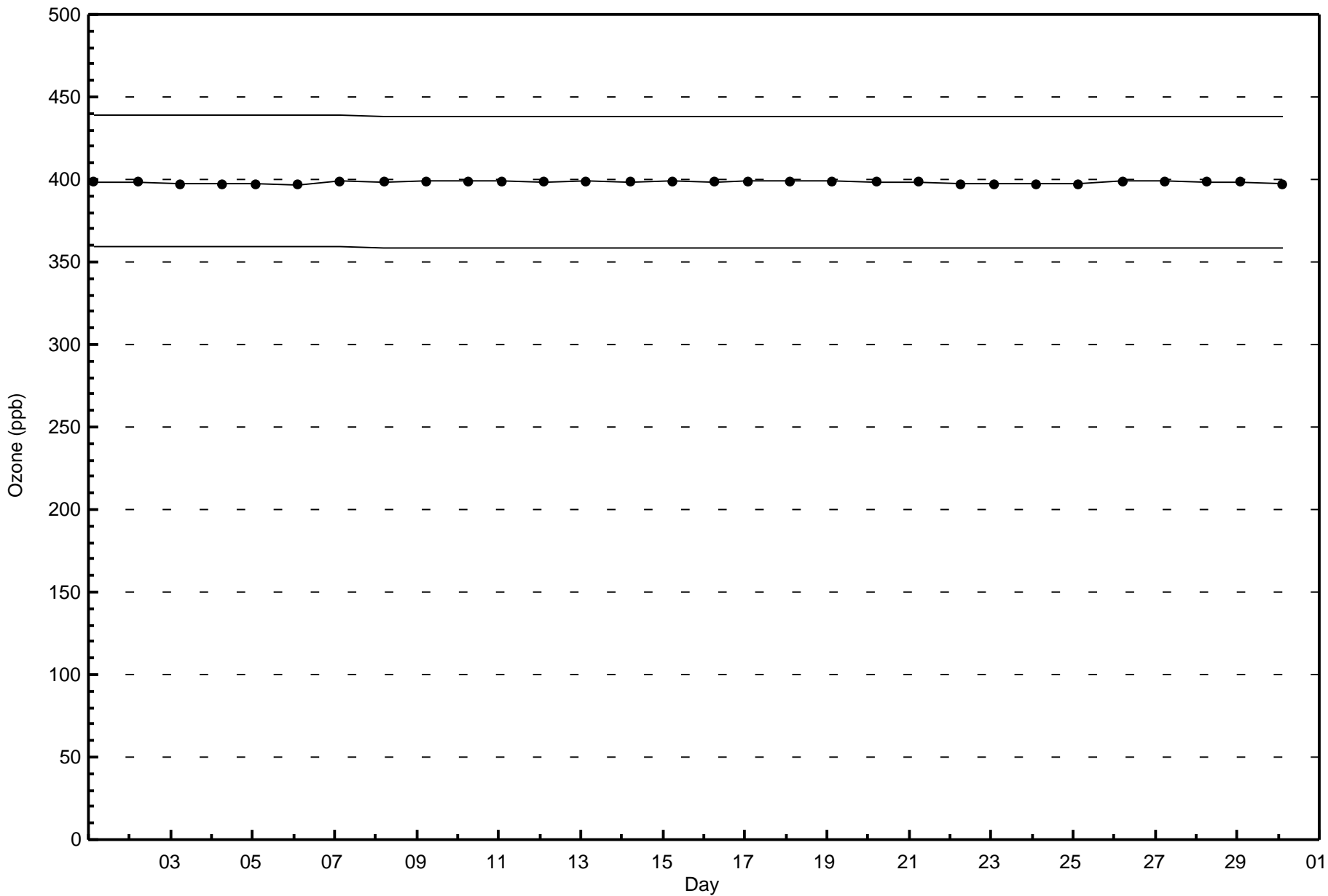
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

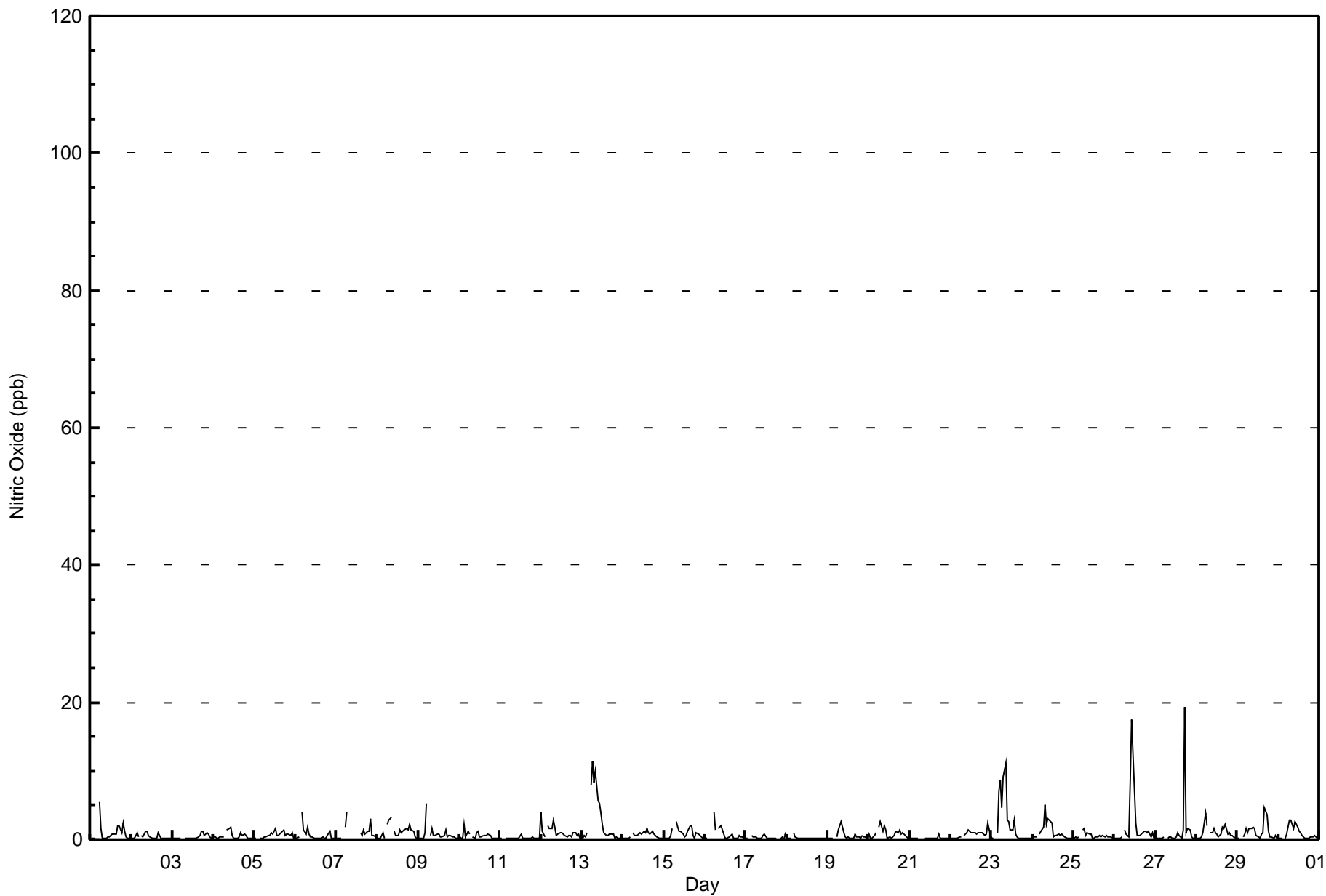
Patricia McInnes - June 2017

Maximum Value: 19 ppb on Jun 27 18:00																	Maximum Daily Average: 2.7 ppb on Jun 13																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 17 21:00																	Minimum Daily Average: 0.2 ppb on Jun 11																	Hours of Data: 678	
Maximum Diurnal Average: 2.1 ppb at hour 6																	Minimum Diurnal Average: 0.2 ppb at hour 3																	Hours of Missing Data: 42	
Monthly Average: 0.9 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 9																	Hours of Calibration: 37	
																																		Percent Operational Time: 99.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	0	0	0	Z	5	2	0	0	0	0	0	1	1	1	1	2	2	1	2	1	0	0	0	0.9	5									
2-Jun	0	0	0	1	0	Z	1	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1									
3-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0.4	1									
4-Jun	0	0	0	0	0	0	0	Z	1	2	2	1	0	0	0	0	1	1	1	1	0	0	0	0	0.6	2									
5-Jun	0	0	Z	0	0	0	0	0	1	1	1	1	2	1	1	1	1	2	1	1	1	1	0	0	0.7	2									
6-Jun	0	0	0	Z	4	1	1	2	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.6	4									
7-Jun	0	0	0	0	Z	2	4	C	C	C	C	C	C	C	1	1	1	1	1	1	3	1	1	0	--	4									
8-Jun	0	0	0	1	0	Z	2	3	3	M	1	1	1	1	1	1	1	2	1	2	1	1	0	0	1.2	3									
9-Jun	0	0	0	0	1	5	Z	1	2	1	1	1	1	0	0	1	1	0	1	1	0	0	0	0	0.8	5									
10-Jun	0	0	0	2	0	1	1	Z	0	0	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0.6	2									
11-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
12-Jun	4	1	0	Z	2	2	2	3	2	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1.1	4									
13-Jun	0	1	0	1	Z	8	11	8	10	6	5	4	2	1	1	1	1	1	1	0	0	0	0	0	2.7	11									
14-Jun	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0.7	2									
15-Jun	0	0	0	0	1	2	Z	3	2	1	1	0	1	1	1	2	2	1	0	1	1	1	0	0	0.9	3									
16-Jun	0	0	PF	PF	PF	4	2	Z	2	2	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0.8	4									
17-Jun	0	0	Z	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1									
18-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
19-Jun	0	0	0	0	Z	0	1	2	3	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0.6	3									
20-Jun	1	0	0	1	1	Z	2	3	1	2	1	0	0	0	0	1	1	1	2	1	1	1	0	0	0.9	3									
21-Jun	0	0	0	0	0	0	Z	0	DF	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1									
22-Jun	0	0	0	0	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0.8	2									
23-Jun	0	0	Z	1	7	9	5	9	11	3	3	1	1	3	1	0	0	0	0	0	0	0	0	0	2.4	11									
24-Jun	0	0	0	Z	1	1	2	5	2	3	3	2	0	1	1	1	1	1	1	1	0	0	0	0	1.1	5									
25-Jun	0	0	0	0	Z	1	2	1	1	1	1	0	0	0	0	1	0	1	0	1	0	1	0	0	0.6	2									
26-Jun	0	0	0	0	1	Z	1	1	0	8	18	12	3	1	1	1	1	1	1	1	1	0	1	0	2.3	18									
27-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	0	1	19	1	2	1	0	0	0	1.3	19									
28-Jun	0	0	0	0	1	4	2	Z	1	1	2	1	1	0	1	2	2	2	1	1	1	1	0	0	1.0	4									
29-Jun	0	0	Z	0	1	2	1	2	2	2	2	1	0	0	1	1	5	4	1	0	0	0	1	0	1.1	5									
30-Jun	0	0	0	Z	0	1	3	3	2	2	3	2	1	1	1	0	0	0	0	0	0	1	0	0	0.9	3									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure																																			



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Patricia McInnes - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	97	31	28	19	18	49	58	38	35	37	39	35	32	49	47	66	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	28	19	18	49	58	38	35	37	39	35	32	49	47	66	678

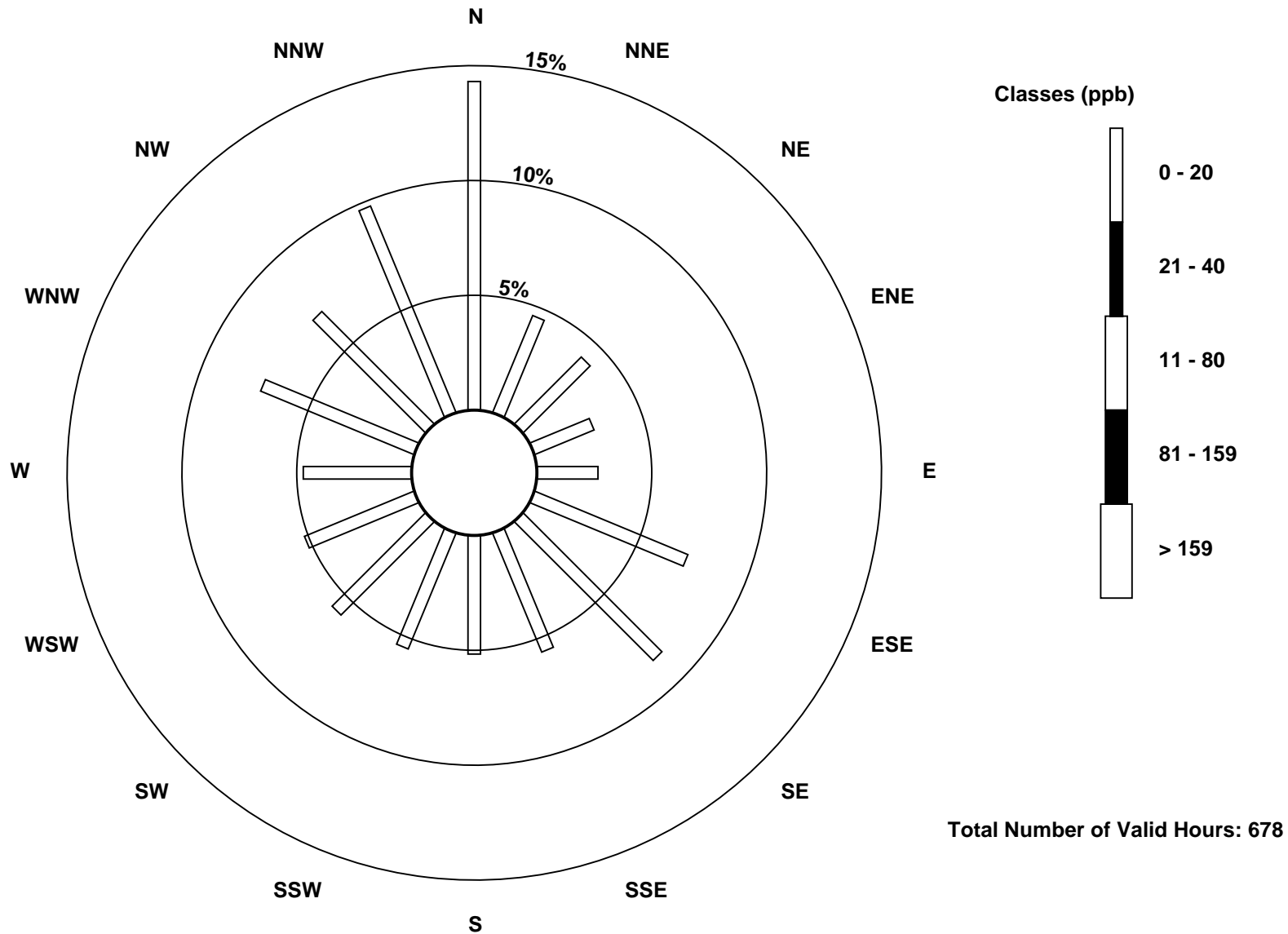
Total Number of Valid Hours: 678

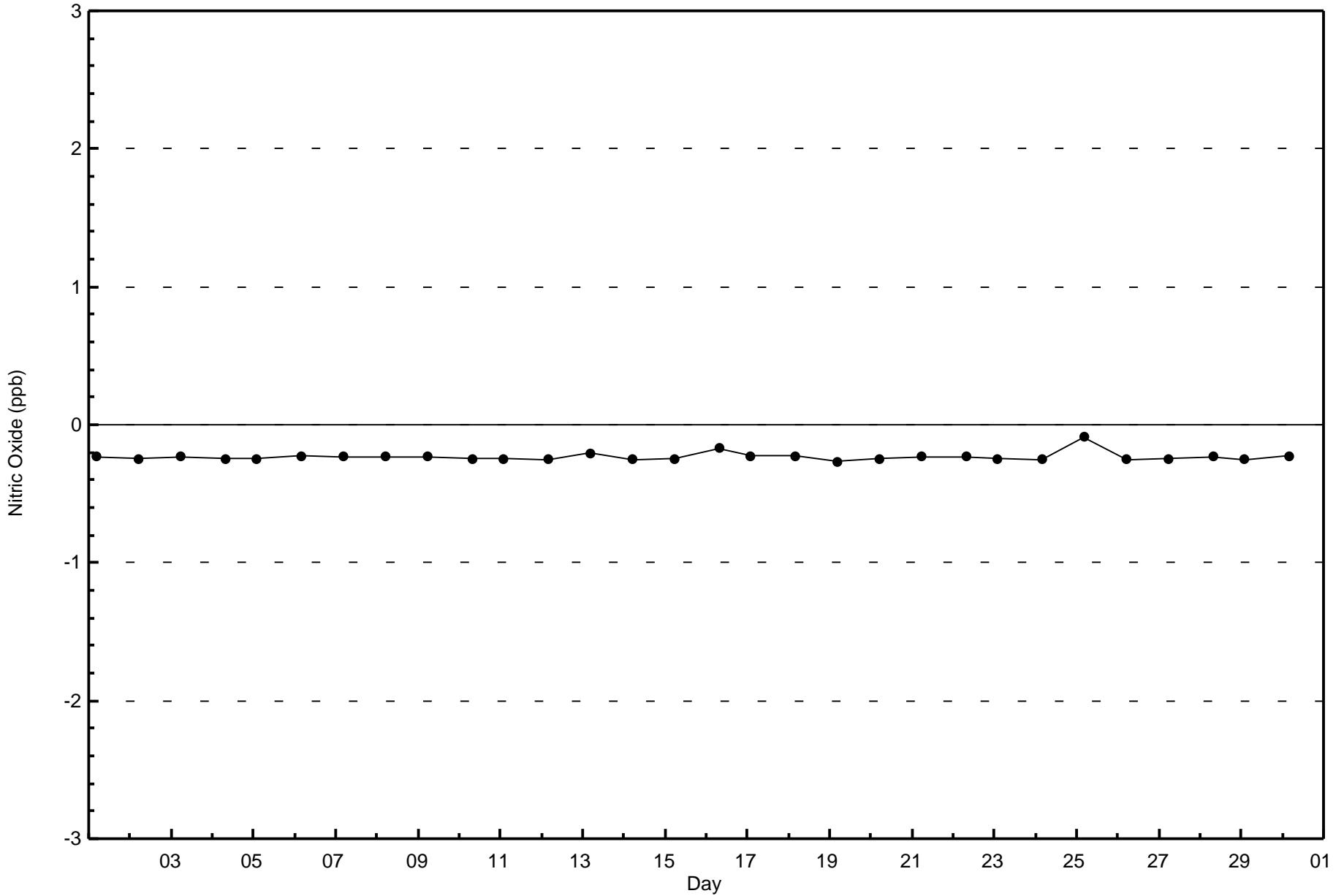
Total Number of Hours: 720

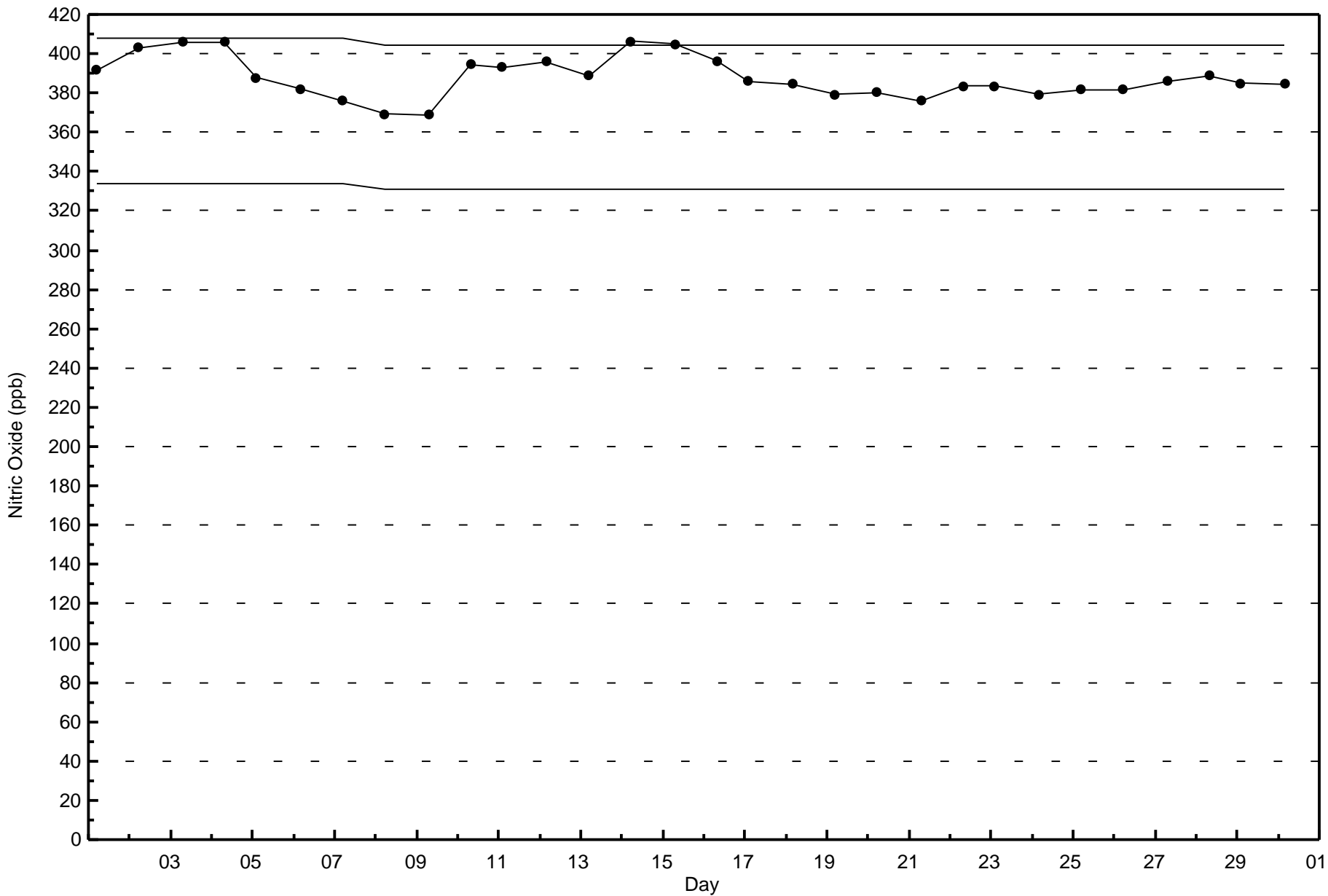


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Patricia McInnes - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 13 ppb on Jun 7 07:00	Maximum Daily Average: 5.5 ppb on Jun 13		Hours of Data:	678
Minimum Value: 0 ppb on Jun 2 21:00	Minimum Daily Average: 0.7 ppb on Jun 17		Hours of Missing Data:	42
Maximum Diurnal Average: 3.7 ppb at hour 6	Minimum Diurnal Average: 1.3 ppb at hour 15		Hours of Calibration:	37
Monthly Average: 2.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 11		Percent Operational Time:	99.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	1	1	Z	8	8	1	1	2	1	1	2	1	1	1	3	2	3	8	8	10	4	2	3.0	10
2-Jun	3	3	2	5	2	Z	2	1	3	4	2	2	8	9	1	2	4	2	1	1	0	0	0	0	2.5	9
3-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	2	2	2	3	2	2	2	0.7	3
4-Jun	3	4	2	2	2	1	1	Z	4	5	6	3	1	1	1	1	4	6	9	4	4	6	3	3	3.2	9
5-Jun	3	4	Z	1	3	3	4	5	4	4	5	3	3	2	1	2	2	2	1	2	4	10	10	4	3.6	10
6-Jun	4	2	2	Z	7	3	1	2	1	1	1	0	0	0	0	0	1	0	0	5	4	1	3	8	2.0	8
7-Jun	8	6	6	7	Z	11	13	C	C	C	C	C	C	C	2	2	3	3	4	4	6	3	2	2	--	13
8-Jun	0	0	0	3	1	Z	5	6	5	M	3	2	1	2	2	2	3	2	3	3	3	3	3	1	2.4	6
9-Jun	1	2	2	1	2	9	Z	1	3	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1.6	9
10-Jun	1	1	1	3	1	1	1	Z	1	0	2	2	2	2	3	4	5	7	7	6	2	1	1	3	2.3	7
11-Jun	3	4	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	2	2	0.9	4
12-Jun	5	4	3	Z	7	5	4	4	3	1	2	2	1	2	2	1	1	2	2	3	5	5	5	2	3.1	7
13-Jun	6	7	6	9	Z	11	11	8	10	8	7	6	4	3	3	3	4	4	3	3	3	4	2	4	5.5	11
14-Jun	4	4	4	2	3	Z	2	1	1	1	2	1	2	2	2	3	2	3	5	2	3	3	3	4	2.6	5
15-Jun	4	3	3	4	5	6	Z	3	3	2	2	2	2	2	4	6	5	4	2	3	3	3	3	2	3.3	6
16-Jun	3	3	PF	PF	PF	6	3	Z	3	3	1	1	1	1	1	1	2	0	0	2	5	5	3	1	2.2	6
17-Jun	1	1	Z	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0.7	5
18-Jun	4	4	2	Z	4	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.8	4
19-Jun	1	0	0	0	Z	1	2	3	4	2	1	0	0	0	0	0	1	1	1	1	5	5	4	2	1.4	5
20-Jun	3	1	3	5	6	Z	5	6	3	3	4	1	1	1	2	3	4	3	3	4	4	3	2	2	3.0	6
21-Jun	1	1	1	1	0	1	Z	0	DF	0	0	0	0	0	0	0	0	0	0	1	3	3	3	2	0.8	3
22-Jun	1	1	2	1	1	1	1	Z	1	1	2	2	2	2	2	1	2	2	2	3	4	5	5	2	2.0	5
23-Jun	2	1	Z	4	10	7	6	11	12	5	3	3	2	2	2	1	0	0	0	1	1	1	1	1	3.4	12
24-Jun	1	2	4	Z	2	2	2	6	3	5	6	5	2	2	1	2	2	3	2	2	4	5	9	5	3.3	9
25-Jun	3	4	1	1	Z	3	3	1	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1.7	4
26-Jun	1	1	2	2	3	Z	4	2	2	8	12	10	3	2	2	2	2	3	3	5	5	5	2	1	3.6	12
27-Jun	1	2	1	2	1	1	Z	1	1	1	1	1	1	2	2	1	2	8	4	5	7	3	1	1	2.1	8
28-Jun	1	0	2	3	2	6	4	Z	2	2	2	1	1	0	2	2	2	2	1	2	2	2	3	2	2.0	6
29-Jun	1	1	Z	2	2	2	2	2	2	3	3	2	1	1	3	6	11	10	11	9	10	7	6	2	4.2	11
30-Jun	1	1	2	Z	1	1	5	4	3	4	5	3	2	2	1	0	1	1	1	1	2	2	1	1	1.9	5

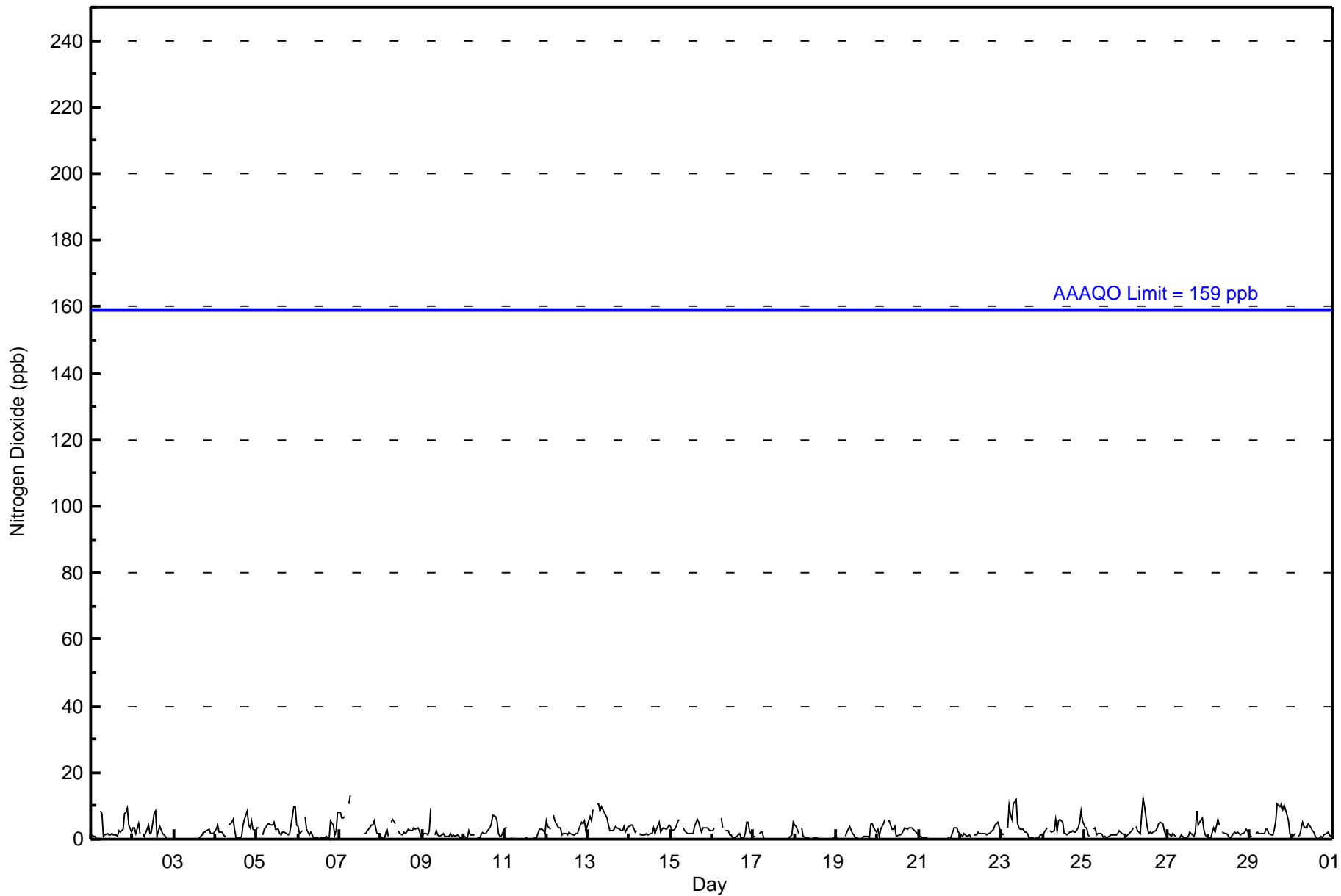
2.4	2.2	2.1	2.5	2.9	3.7	3.6	2.8	2.7	2.4	2.6	1.9	1.5	1.4	1.3	1.6	2.3	2.5	2.3	2.8	3.5	3.4	2.9	2.3	Diurnal Average	
8	7	6	9	10	11	13	11	12	8	12	10	8	9	4	6	11	10	11	9	10	10	10	8	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance DF - DAS Failure PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	97	31	28	19	18	49	58	38	35	37	39	35	32	49	47	66	678
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	28	19	18	49	58	38	35	37	39	35	32	49	47	66	678

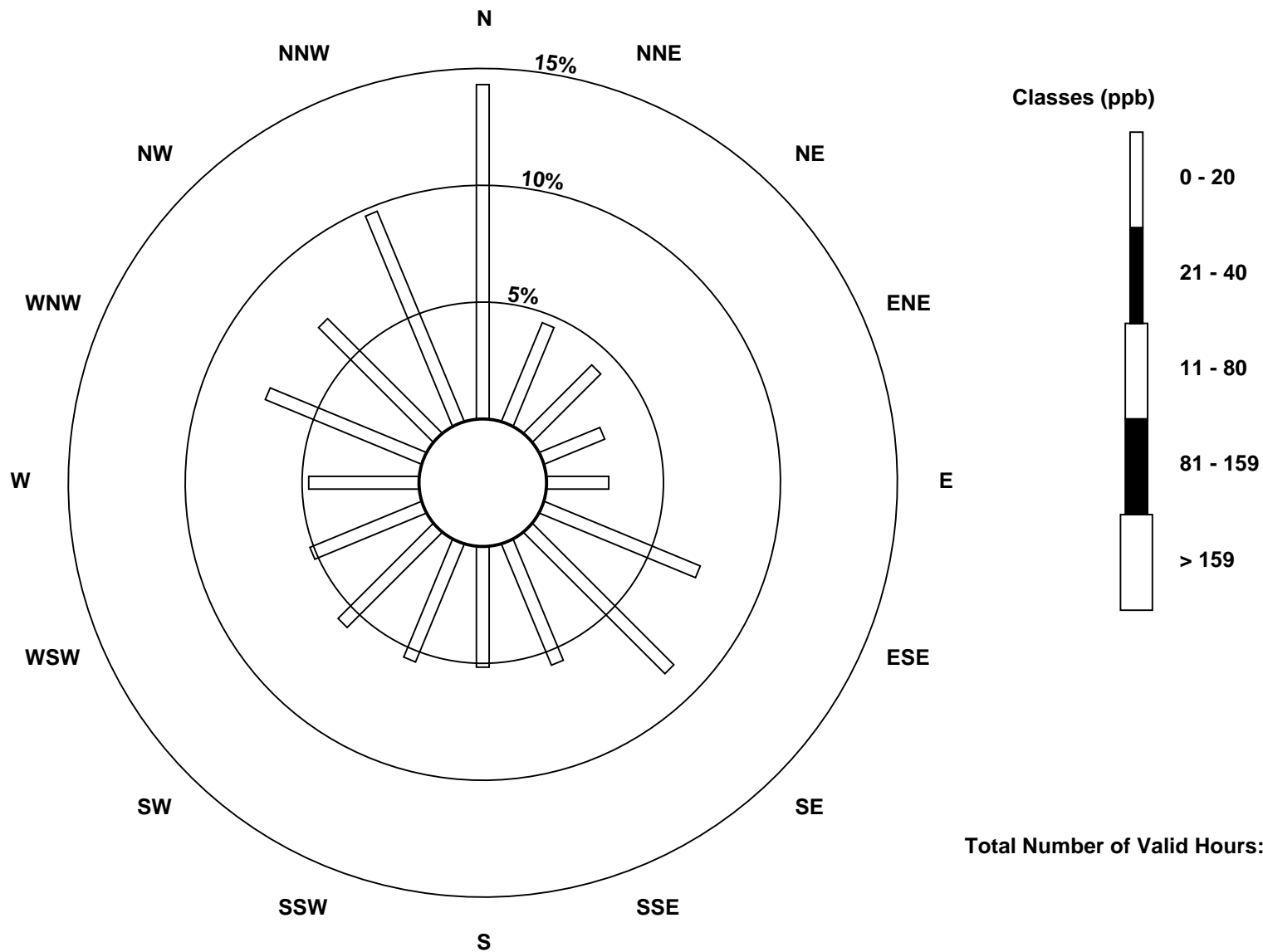
Total Number of Valid Hours: 678

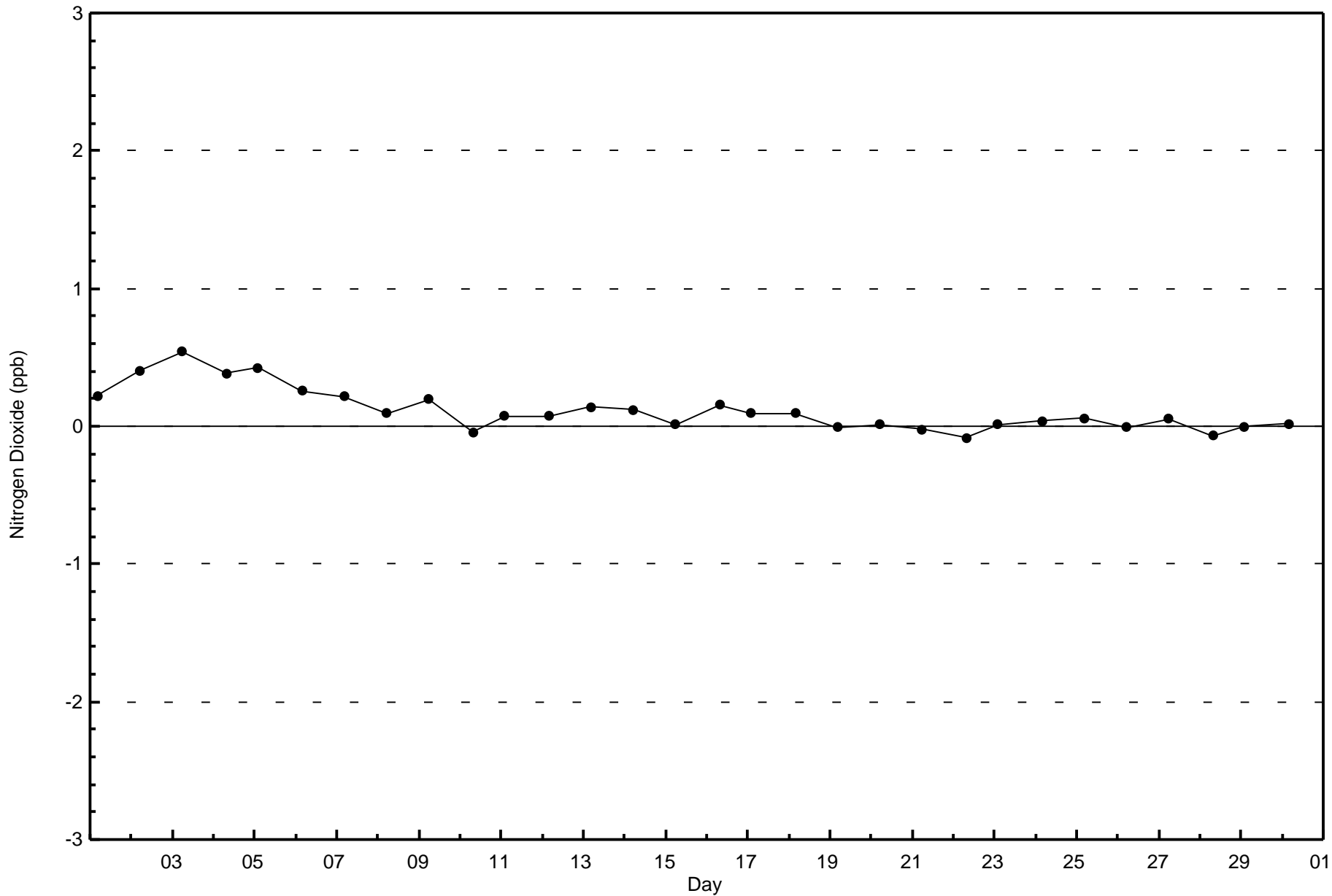
Total Number of Hours: 720

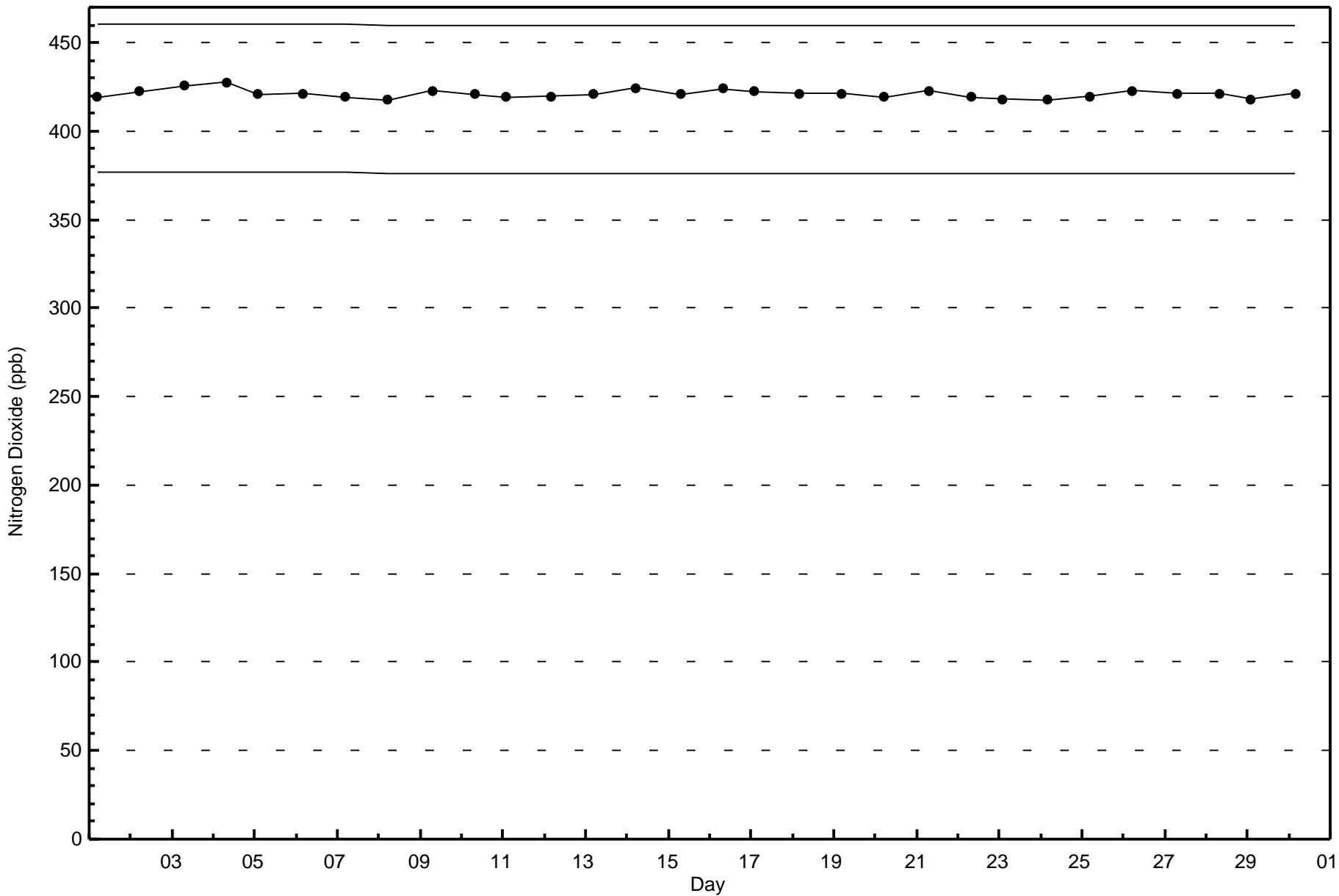


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association
Summary of Hour Averages

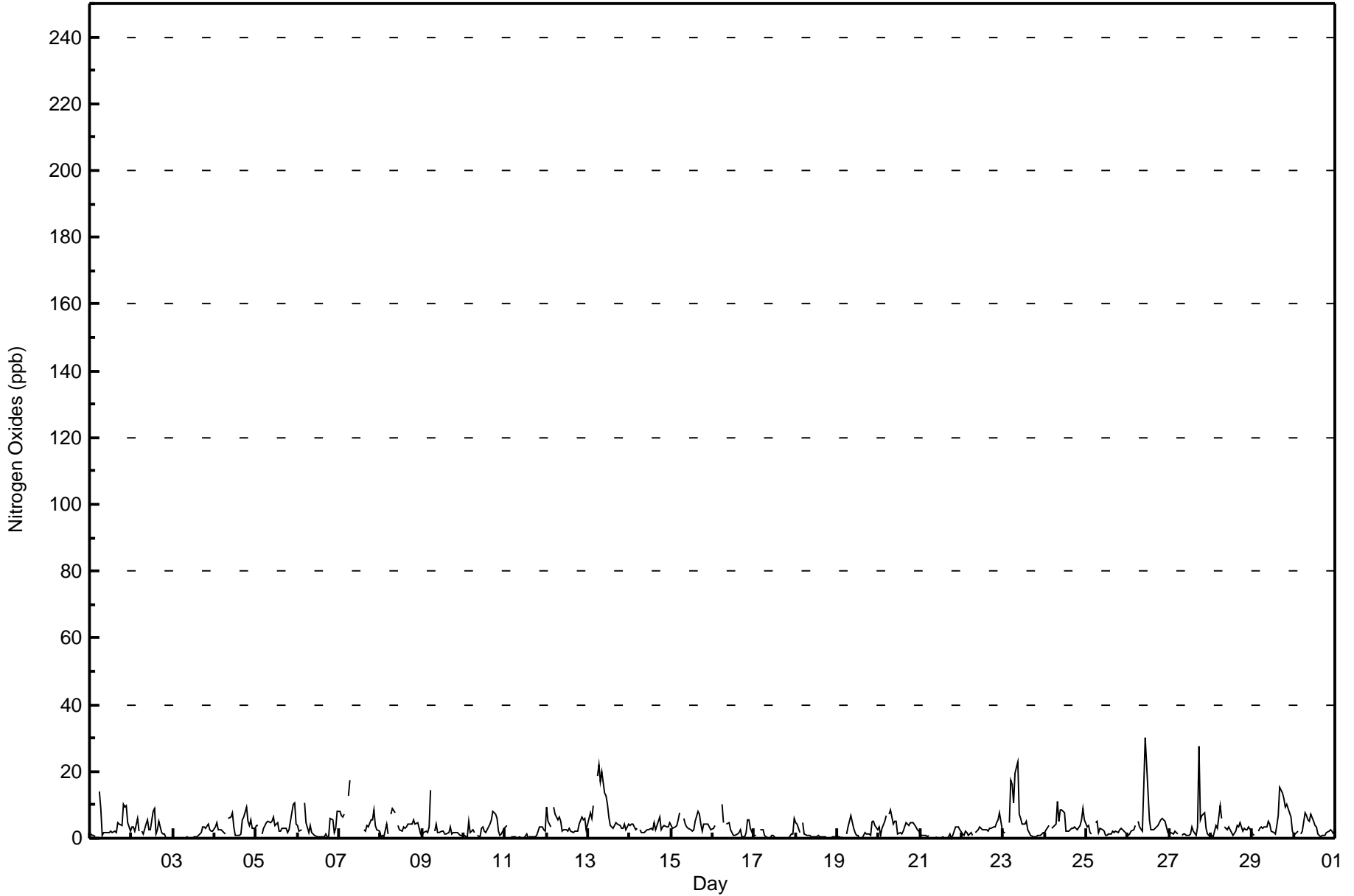
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2017

Maximum Value: 30 ppb on Jun 26 11:00																	Maximum Daily Average: 8.2 ppb on Jun 13																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 17 21:00																	Minimum Daily Average: 1.0 ppb on Jun 17																	Hours of Data: 678	
Maximum Diurnal Average: 5.8 ppb at hour 6																	Minimum Diurnal Average: 1.9 ppb at hour 15																	Hours of Missing Data: 42	
Monthly Average: 3.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 20																	Hours of Calibration: 37	
																																		Percent Operational Time: 99.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	1	1	1	1	Z	14	9	1	2	2	2	2	2	2	2	2	5	4	4	10	9	10	5	2	4.0	14									
2-Jun	3	4	2	6	2	Z	2	1	4	5	3	3	8	9	1	3	5	2	1	1	0	0	0	0	2.9	9									
3-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	3	3	3	4	3	2	2	1.2	4									
4-Jun	3	5	2	2	3	1	1	Z	6	6	8	3	1	1	1	5	6	9	5	4	6	3	3	3	3.8	9									
5-Jun	4	4	Z	1	3	4	5	5	5	5	6	4	5	2	2	3	3	6	2	2	5	10	11	4	4.2	11									
6-Jun	4	2	3	Z	11	4	2	4	2	1	1	1	0	1	0	1	1	1	0	6	5	2	3	8	2.7	11									
7-Jun	8	7	7	7	Z	13	17	C	C	C	C	C	C	C	3	2	4	4	5	5	9	4	2	2	--	17									
8-Jun	1	1	0	4	1	Z	7	9	8	M	4	3	2	3	3	3	4	4	4	5	4	5	3	1	3.6	9									
9-Jun	1	2	2	2	3	15	Z	2	4	2	2	2	2	1	1	2	3	1	2	2	2	1	1	1	2.4	15									
10-Jun	1	1	1	5	2	2	2	Z	1	1	3	3	2	2	4	4	5	8	7	6	2	1	1	3	2.9	8									
11-Jun	3	4	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	3	3	2	2	1.1	4									
12-Jun	9	5	3	Z	9	7	6	6	5	2	3	2	2	3	2	2	2	2	2	4	6	5	6	3	4.3	9									
13-Jun	6	8	6	10	Z	19	22	17	20	14	13	10	6	4	3	4	4	4	4	3	3	4	2	4	8.2	22									
14-Jun	4	4	4	3	3	Z	2	2	2	2	3	2	3	3	5	3	4	6	3	3	4	3	3	4	3.3	6									
15-Jun	4	3	3	4	6	8	Z	6	4	3	3	2	2	2	5	8	7	4	2	4	4	4	3	3	4.2	8									
16-Jun	3	4	PF	PF	PF	10	5	Z	4	5	3	2	1	1	1	2	2	1	0	2	6	6	3	1	3.0	10									
17-Jun	1	1	Z	3	3	3	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	6	1.0	6									
18-Jun	5	4	2	Z	5	1	1	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	1.1	5									
19-Jun	1	0	0	0	Z	1	3	5	7	3	2	1	1	0	0	1	2	1	1	1	5	5	4	2	2.0	7									
20-Jun	4	1	3	5	7	Z	7	8	4	5	5	1	2	1	2	3	5	4	5	4	5	3	3	2	3.9	8									
21-Jun	1	1	1	1	1	1	Z	0	DF	0	0	0	0	0	0	0	0	1	0	1	3	4	4	2	1.0	4									
22-Jun	1	1	2	2	1	2	1	Z	2	2	4	3	2	3	3	2	3	3	3	4	5	5	7	3	2.7	7									
23-Jun	2	2	Z	5	17	16	11	20	23	7	6	4	4	5	3	2	1	1	1	0	1	1	1	2	5.8	23									
24-Jun	2	2	4	Z	3	3	4	11	5	8	9	8	2	2	3	3	3	3	3	2	4	5	9	5	4.5	11									
25-Jun	4	4	2	1	Z	5	5	2	3	2	2	1	1	1	1	2	2	2	2	2	3	3	2	1	2.3	5									
26-Jun	1	1	2	3	4	Z	5	3	2	16	30	22	6	2	3	3	3	4	5	5	6	5	4	2	5.9	30									
27-Jun	1	2	1	2	1	1	Z	1	1	1	1	1	1	3	2	1	4	28	5	7	8	3	1	1	3.4	28									
28-Jun	1	1	2	4	3	10	6	Z	3	3	3	2	2	1	2	4	3	5	2	3	3	3	3	2	3.0	10									
29-Jun	1	1	Z	2	3	3	3	3	3	5	4	2	2	1	4	7	15	13	12	9	10	8	6	2	5.3	15									
30-Jun	1	1	2	Z	1	2	8	7	6	5	7	5	4	3	1	0	1	1	1	2	2	3	2	1	2.9	8									
																	2.7 2.5 2.3 3.0 3.9 5.8 5.4 4.8 4.5 3.8 4.3 3.2 2.2 2.0 1.9 2.3 3.3 4.0 3.0 3.5 4.2 3.8 3.3 2.5																	Diurnal Average	
																	9 8 7 10 17 19 22 20 23 16 30 22 8 9 5 8 15 28 12 10 10 10 11 8																	Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance			DF - DAS Failure			PF - Power Failure																							



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	673	99.26	99.26
21 - 40	5	0.74	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 20	96	31	28	19	18	48	58	37	34	37	38	35	32	49	47	66	673
21 - 40	1	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	97	31	28	19	18	49	58	38	35	37	39	35	32	49	47	66	678

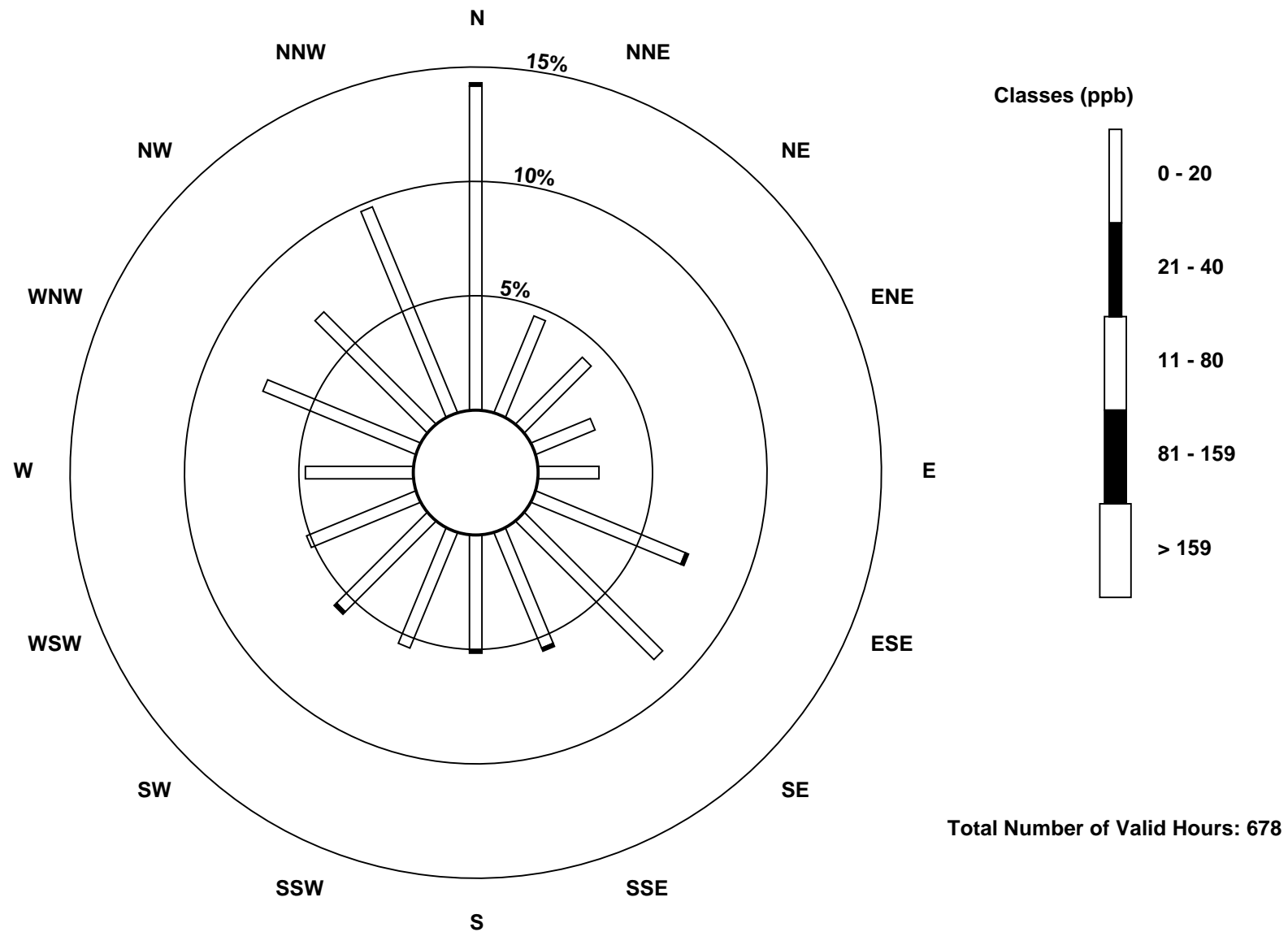
Total Number of Valid Hours: 678

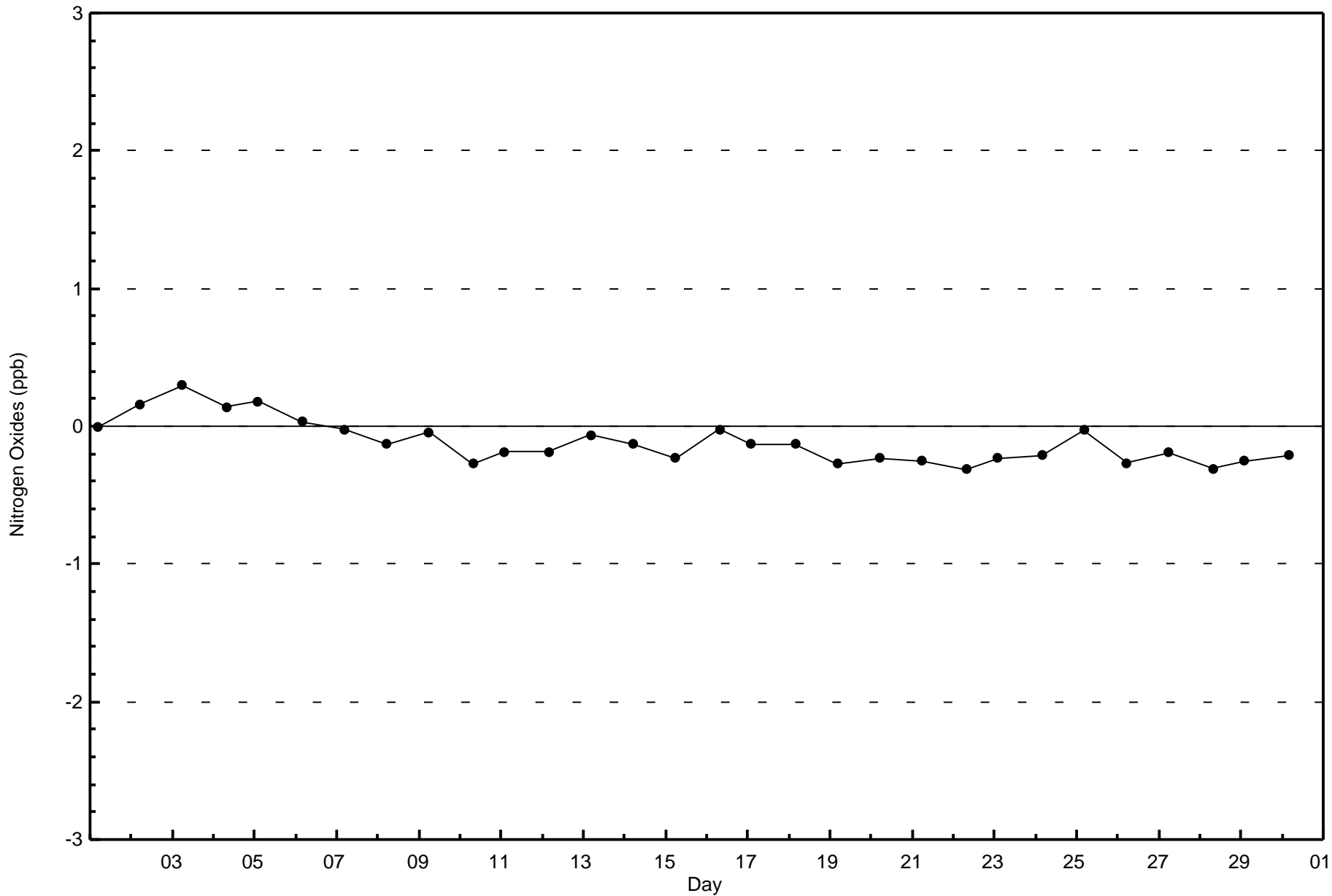
Total Number of Hours: 720

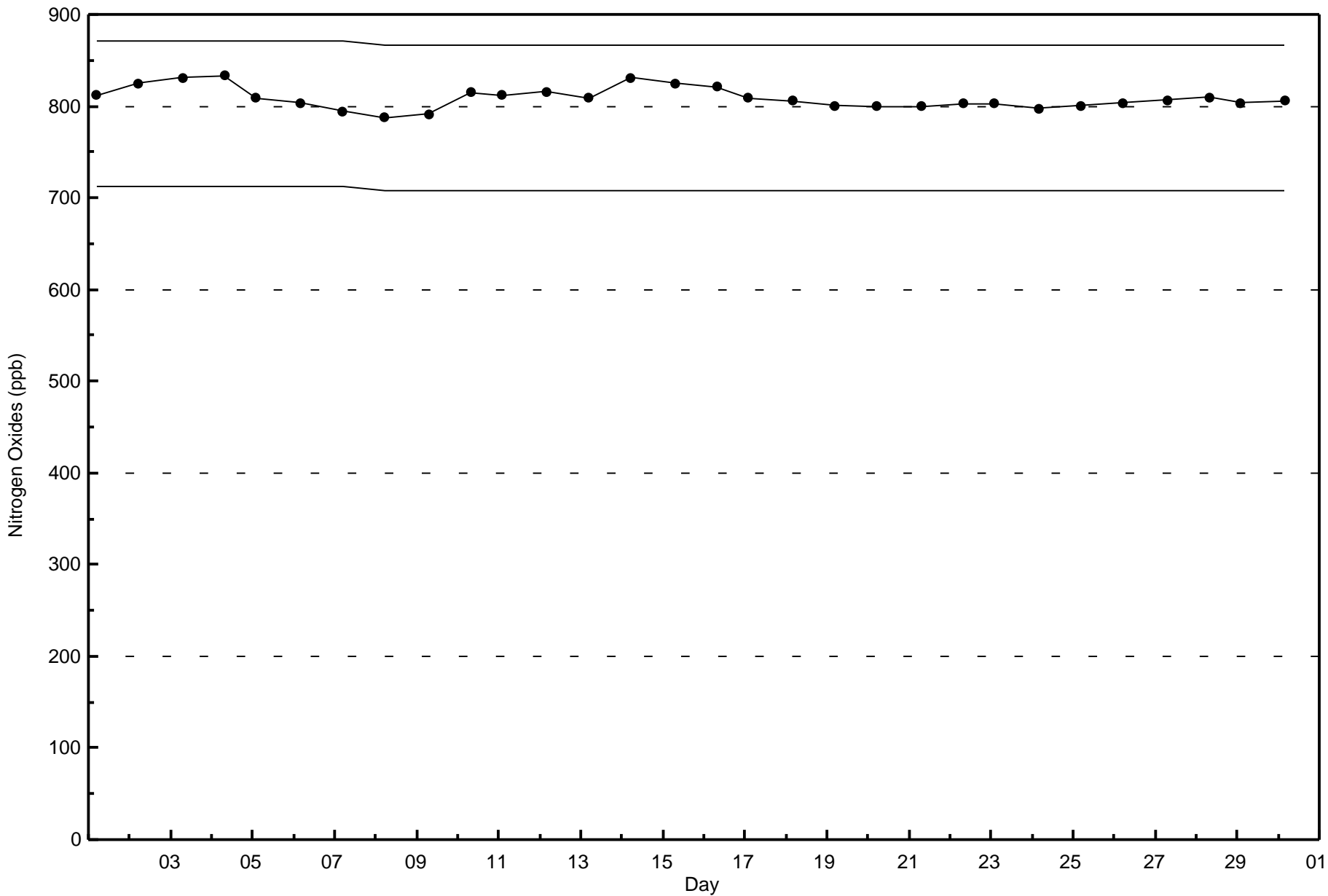


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes (AMS 6)



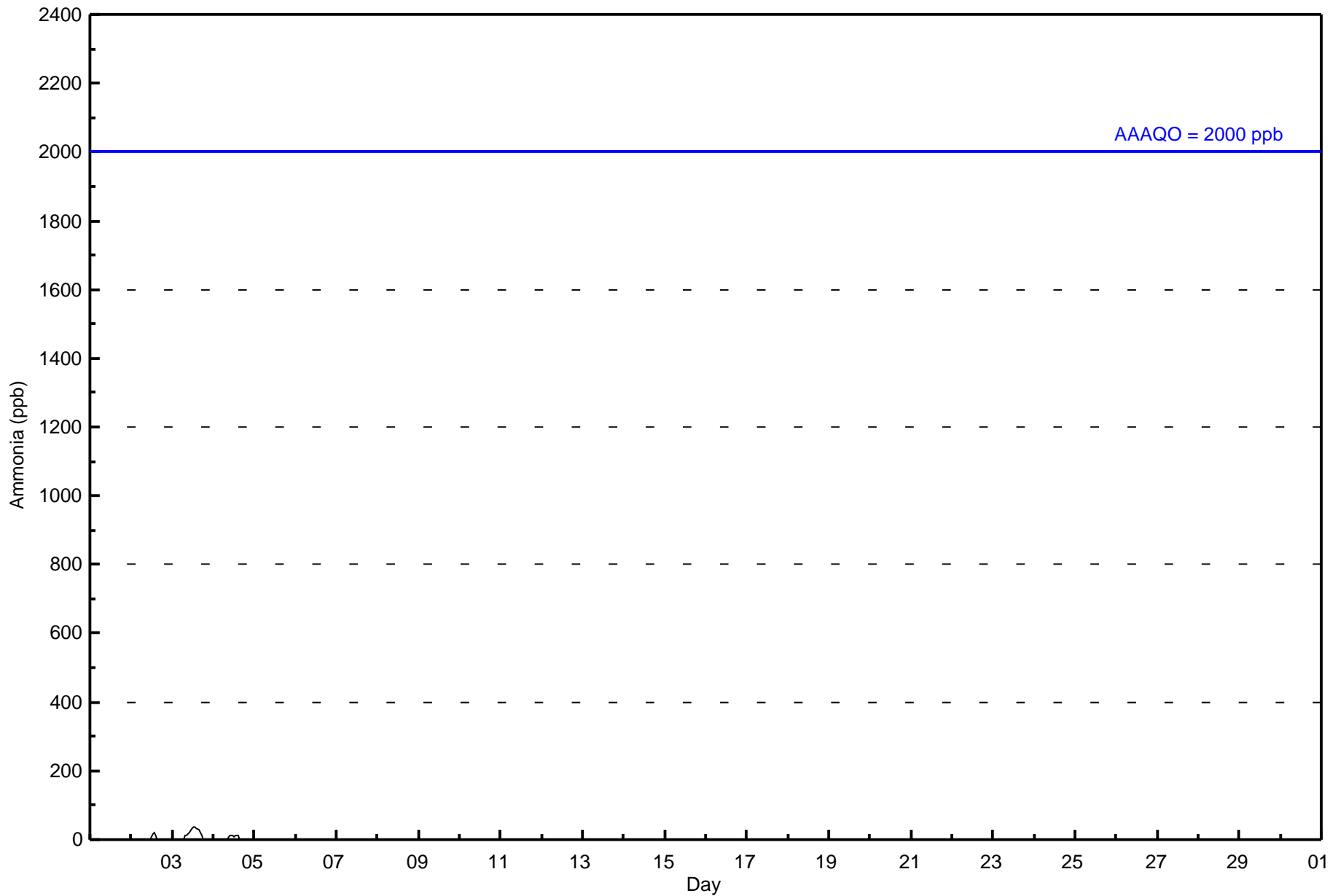






Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	602	96.78	96.78
6 - 10	2	0.32	97.11
11 - 15	9	1.45	98.55
16 - 20	3	0.48	99.04
21 - 25	1	0.16	99.20
> 26	5	0.80	100.00

Total Number of Valid Hours: 622

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ammonia (NH₃) - ppb
Patricia McInnes - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	89	30	28	16	16	38	56	37	33	27	37	30	29	39	39	58	602
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2
11 - 15	0	1	0	0	0	1	0	0	0	0	0	0	0	1	2	4	9
16 - 20	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	3
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 26	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	5
Totals	90	31	29	16	16	39	56	37	33	27	37	30	30	45	42	64	622

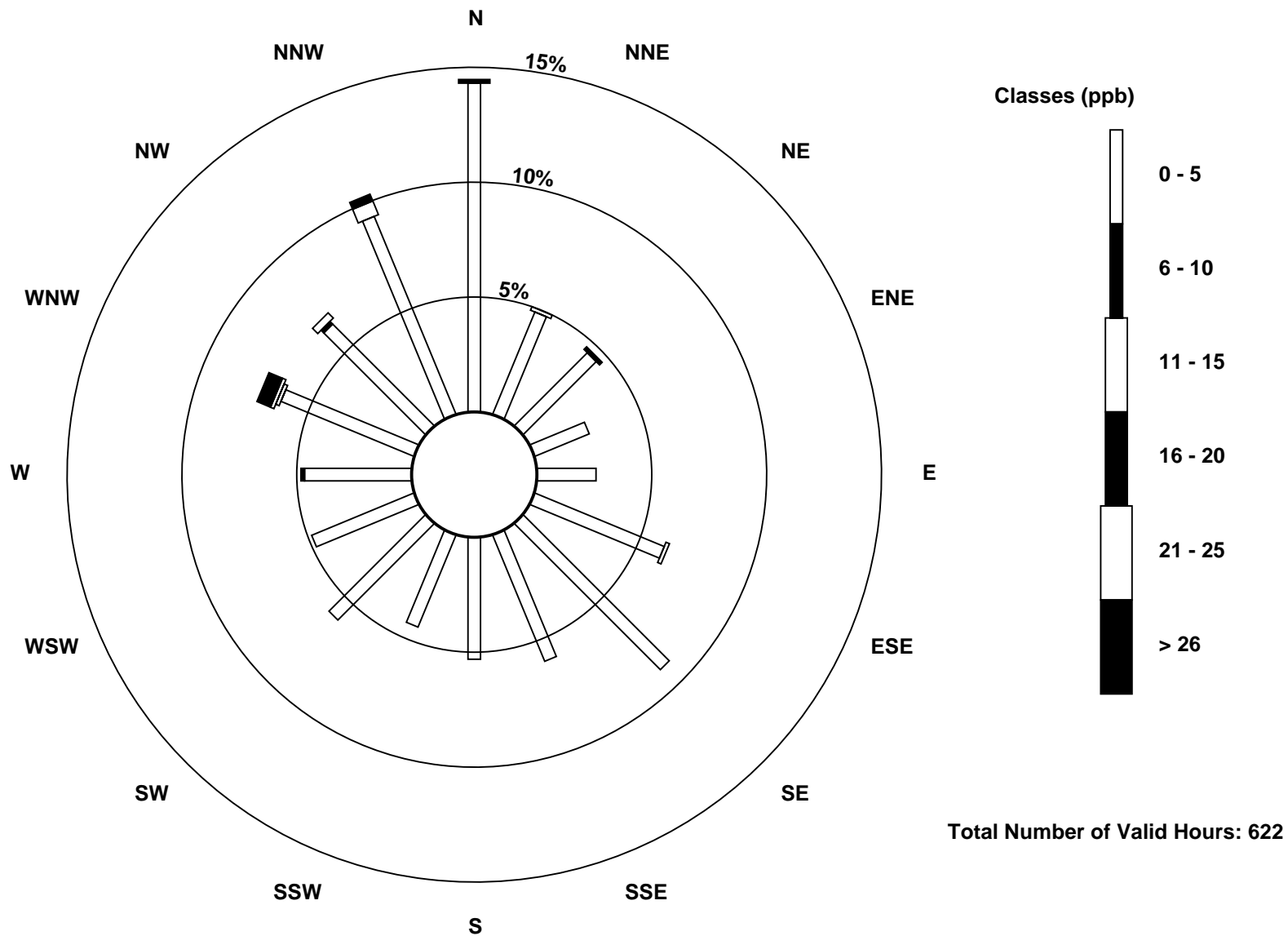
Total Number of Valid Hours: 622

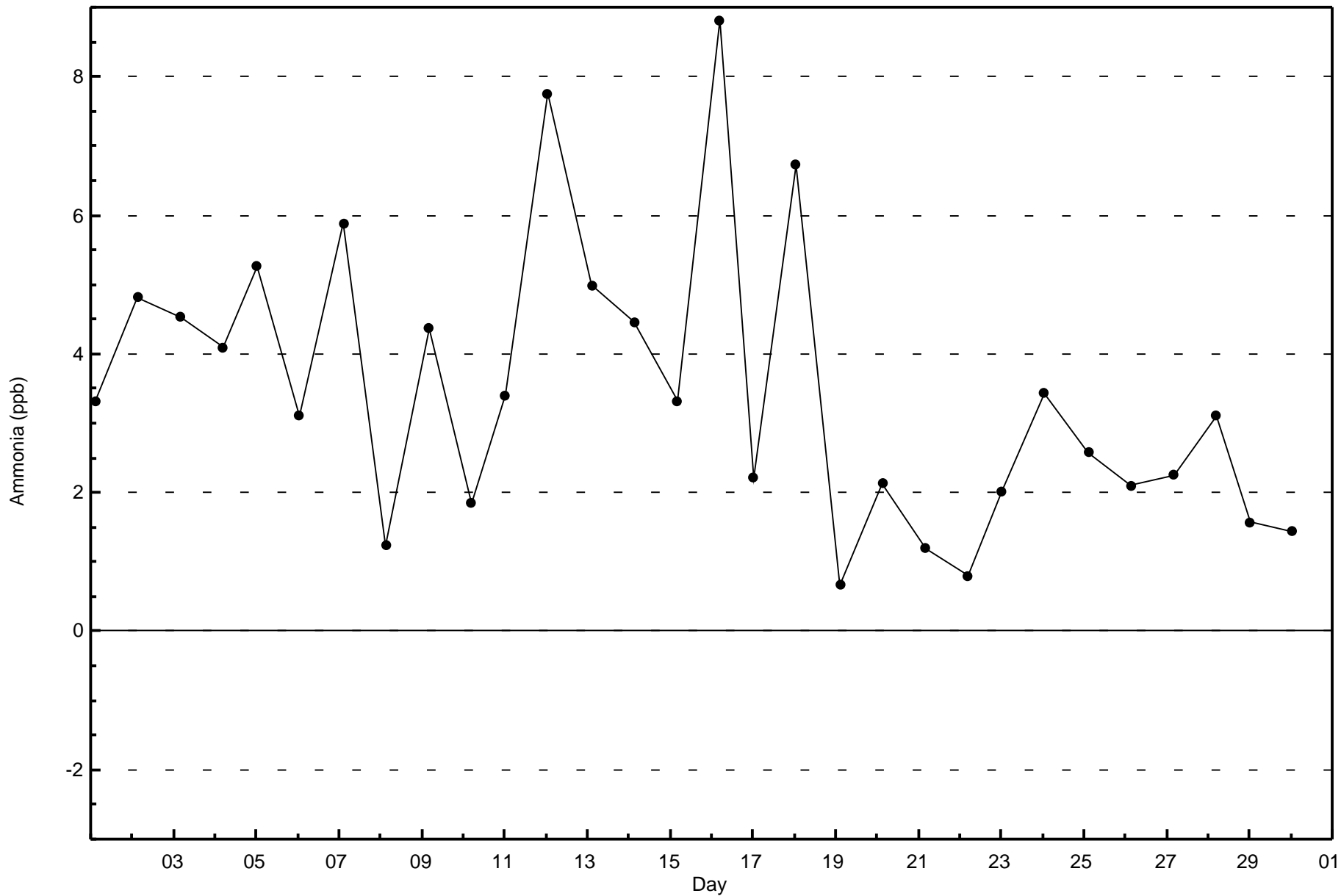
Total Number of Hours: 720

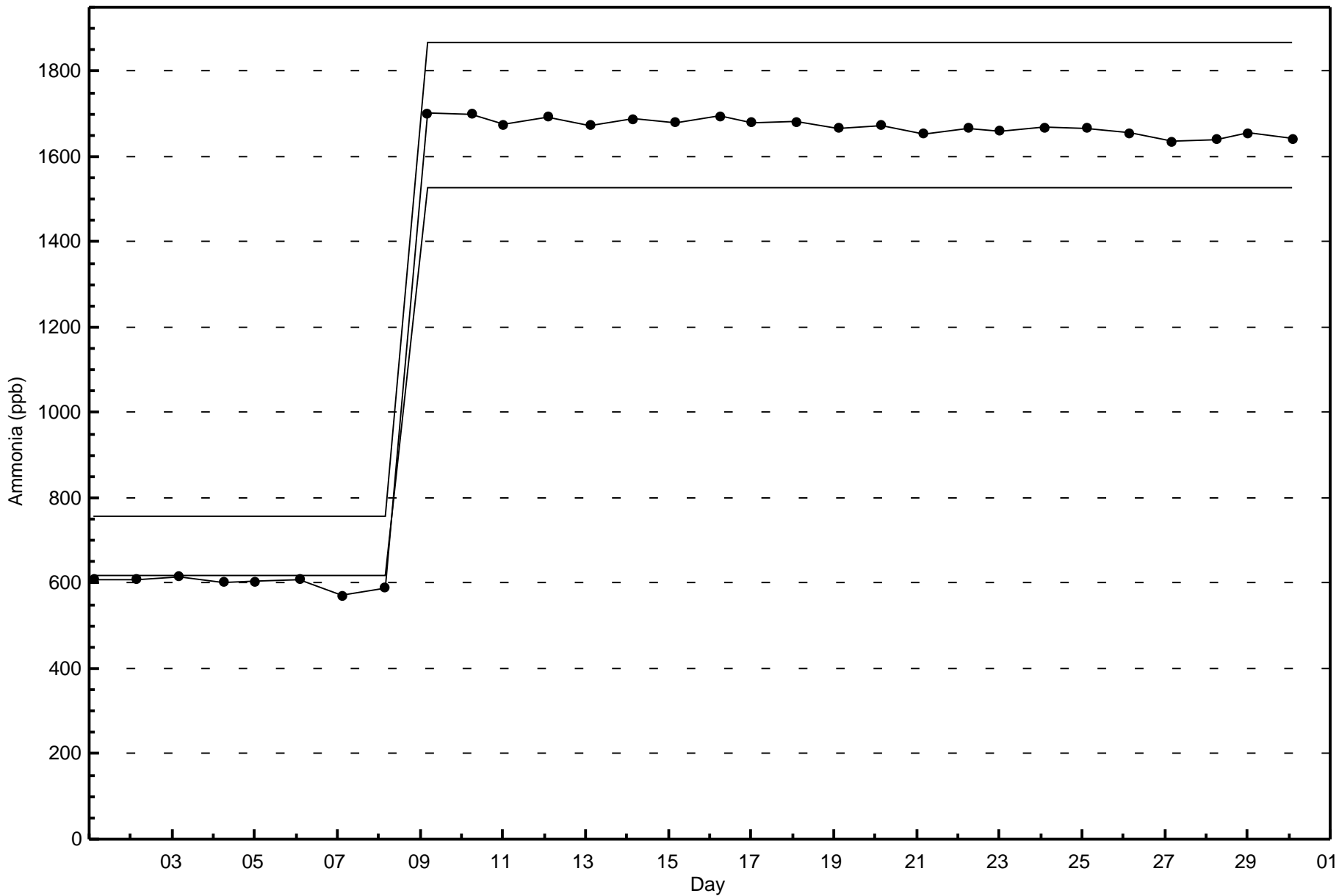


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ammonia (NH₃) - ppb
Patricia McInnes (AMS 6)









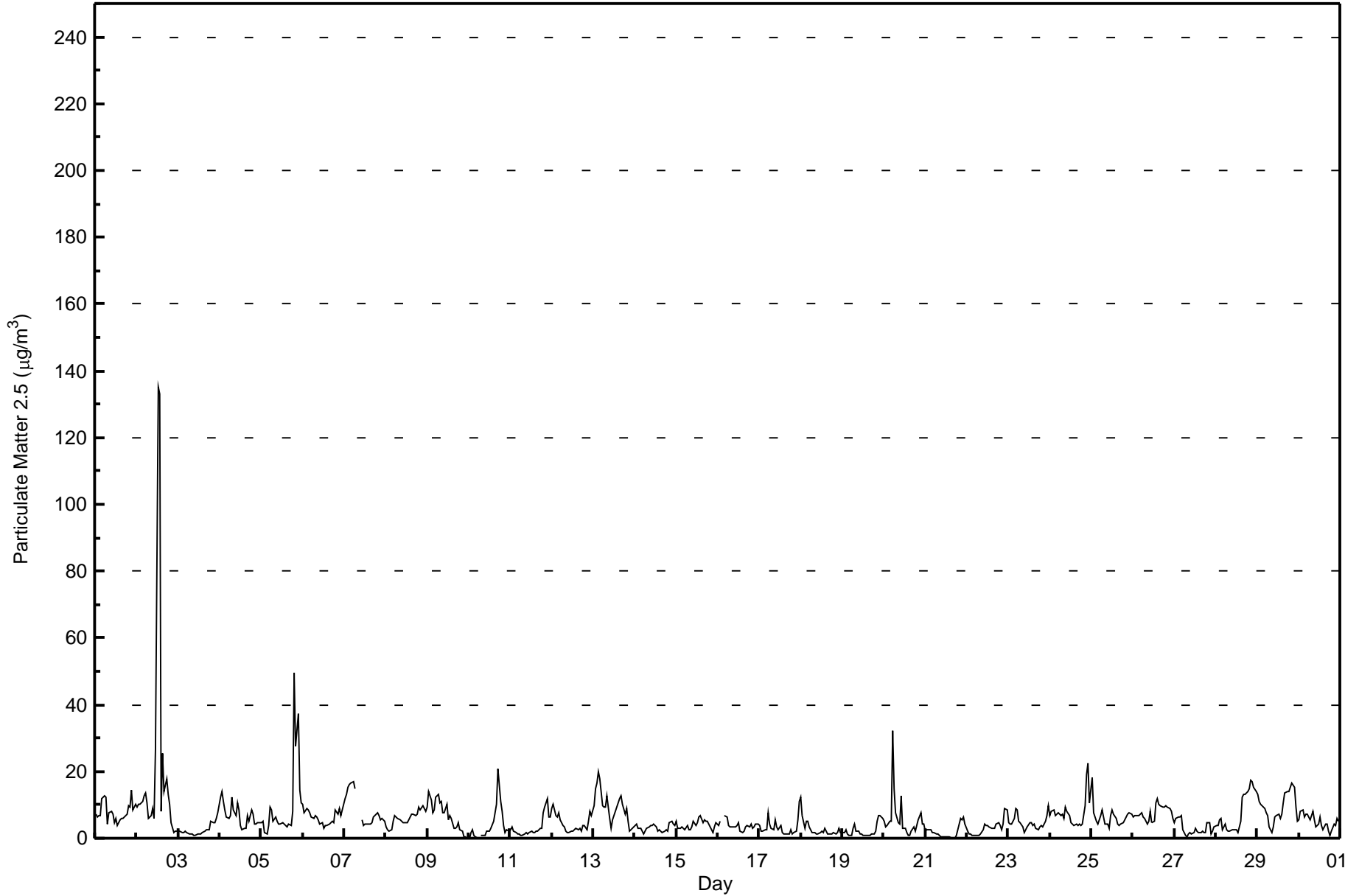
Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Patricia McInnes - June 2017

Number of Exceedences (AAAQO): 24-hr: 0		Hours in Service: 720																																														
Maximum Value: 135.0 µg/m ³ on Jun 2 13:00		Maximum Daily Average: 20.8 µg/m ³ on Jun 2																																														
Minimum Value: 0.1 µg/m ³ on Jun 10 01:00		Hours of Data: 713																																														
Maximum Diurnal Average: 8.3 µg/m ³ at hour 13		Hours of Missing Data: 7																																														
Monthly Average: 5.92 µg/m ³		Hours of Calibration: 3																																														
Minimum Daily Average: 1.9 µg/m ³ on Jun 21		Percent Operational Time: 99.4																																														
Minimum Diurnal Average: 4.1 µg/m ³ at hour 10		Percentiles: P ₁ = 0.4 P ₁₀ = 1.4 Q ₁ = 2.5 Median = 4.4 Q ₃ = 7.2 P ₉₀ = 10.8 P ₉₉ = 26.4																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	7.1	6.4	6.8	7.0	11.9	12.6	12.2	4.1	7.6	8.1	7.1	4.7	5.8	3.9	5.3	5.7	5.8	6.3	7.2	9.8	9.2	14.2	8.5	10.0	7.8	14.2																						
2-Jun	9.2	10.1	10.1	11.1	12.5	13.6	10.5	6.1	6.8	8.8	6.1	26.8	135.0	133.0	7.9	25.2	14.1	17.7	13.2	10.3	4.8	1.8	2.1	2.1	20.8	135.0																						
3-Jun	2.2	2.0	1.8	1.9	2.2	1.8	1.4	1.4	1.1	0.9	1.3	1.4	1.4	1.6	1.9	2.5	2.5	2.6	5.0	4.8	4.6	6.0	7.4	2.5	7.4																							
4-Jun	12.1	13.9	10.8	8.4	6.3	6.0	6.9	12.3	8.4	7.0	10.5	8.6	3.6	2.4	2.8	3.2	6.8	5.3	8.3	7.3	4.3	4.1	4.8	4.6	7.0	13.9																						
5-Jun	4.5	5.0	1.8	1.5	3.9	9.4	8.6	5.1	6.2	5.2	4.1	4.2	4.8	4.2	3.6	3.5	4.2	3.9	8.0	49.6	27.6	37.3	14.6	10.8	9.6	49.6																						
6-Jun	10.4	7.7	8.9	8.5	7.6	6.2	5.8	6.9	6.4	5.3	4.3	4.5	3.2	3.6	4.0	4.3	4.8	5.2	4.7	8.5	7.4	8.9	6.9	8.4	6.4	10.4																						
7-Jun	11.7	13.3	15.4	16.0	16.3	17.0	15.0	C	C	C	5.4	3.9	4.2	4.4	4.4	4.2	4.8	6.4	7.3	7.8	6.7	5.5	6.0	5.1	8.6	17.0																						
8-Jun	3.3	2.6	2.1	2.5	5.0	6.7	6.2	5.8	5.7	5.0	4.6	4.5	4.5	5.4	6.3	7.0	7.3	6.8	7.2	9.3	8.6	9.7	9.0	7.9	6.0	9.7																						
9-Jun	9.2	14.0	11.6	7.6	8.4	12.2	13.1	10.8	11.0	7.7	7.7	10.0	5.5	6.7	6.0	2.9	2.8	3.4	4.6	2.5	2.1	0.6	0.3	0.2	6.7	14.0																						
10-Jun	0.1	1.7	2.5	1.0	0.4	0.1	UO	0.7	0.9	0.7	2.3	2.2	2.1	3.0	5.0	7.5	10.3	20.7	11.1	8.2	3.7	1.8	2.5	2.3	3.9	20.7																						
11-Jun	2.5	3.5	1.9	1.7	1.4	1.1	0.9	0.8	1.2	1.6	1.4	1.9	2.2	1.7	1.8	1.9	1.9	2.8	3.1	7.5	9.4	12.0	6.3	6.2	3.2	12.0																						
12-Jun	8.8	10.0	6.8	6.3	7.8	5.3	4.0	3.5	2.3	1.9	1.9	1.9	2.2	2.5	2.9	2.5	3.0	2.0	3.7	3.7	2.5	5.1	8.1	6.9	4.4	10.0																						
13-Jun	9.8	14.8	16.3	20.1	17.6	9.9	9.5	9.2	12.6	5.9	3.0	5.5	6.7	7.9	10.7	12.0	12.6	10.3	7.4	8.7	5.2	2.1	2.4	3.5	9.3	20.1																						
14-Jun	4.0	4.2	3.0	3.0	1.9	1.4	2.1	2.8	3.6	3.7	3.8	4.2	3.5	2.3	2.6	2.0	1.9	2.0	2.6	2.2	4.5	4.9	4.0	3.9	3.1	4.9																						
15-Jun	5.2	3.0	3.2	3.4	3.1	2.7	3.8	2.7	2.4	3.5	5.1	3.7	4.7	6.6	6.7	4.5	5.4	5.0	4.9	4.3	2.4	1.5	3.3	4.5	4.0	6.7																						
16-Jun	3.8	5.1	PF	PF	6.8	6.4	3.9	3.5	3.4	3.4	3.5	3.9	4.7	2.1	1.5	2.1	3.5	3.6	3.5	4.3	3.2	3.3	4.2	4.2	3.8	6.8																						
17-Jun	3.8	2.3	2.1	2.4	2.6	7.6	4.4	2.9	2.6	5.3	3.3	2.7	3.7	1.8	1.2	1.4	1.3	1.2	2.4	1.4	1.7	2.2	5.3	10.9	3.2	10.9																						
18-Jun	12.4	6.6	2.9	5.1	5.0	3.2	1.9	1.9	1.7	1.3	1.5	1.6	1.9	1.5	3.0	1.2	1.2	1.3	1.2	1.5	1.5	1.7	2.9	1.9	2.7	12.4																						
19-Jun	1.9	1.7	2.3	1.2	0.9	0.7	2.8	4.2	2.3	2.1	1.4	1.2	1.0	1.0	0.8	0.8	1.0	1.3	1.2	2.1	5.3	6.7	6.7	5.8	2.4	6.7																						
20-Jun	5.0	3.4	4.0	5.1	5.1	32.2	14.9	7.8	4.8	4.3	12.8	3.1	3.2	1.6	0.8	0.9	2.1	3.6	2.3	3.6	5.5	7.7	4.4	4.2	5.9	32.2																						
21-Jun	2.3	2.4	2.6	2.6	1.5	1.8	1.4	1.1	0.7	0.5	0.5	0.5	0.6	0.5	0.3	0.1	UO	0.2	0.7	2.4	6.0	5.3	6.5	4.2	1.9	6.5																						
22-Jun	2.3	1.4	1.3	1.0	0.7	0.7	0.7	0.9	1.2	2.7	4.1	3.9	4.0	3.4	3.1	2.9	3.1	4.1	4.8	3.9	2.6	4.3	8.8	8.3	3.1	8.8																						
23-Jun	4.9	4.4	4.3	5.9	9.0	8.6	5.2	4.6	3.3	1.6	2.5	3.3	4.6	4.6	3.8	4.1	2.9	2.7	3.6	3.7	3.4	5.0	7.0	9.9	4.7	9.9																						
24-Jun	6.6	7.9	8.3	6.9	7.0	7.5	6.7	7.1	5.8	9.1	8.1	6.8	4.6	4.0	3.8	4.1	3.9	4.2	4.0	4.1	9.8	18.9	22.5	10.8	7.6	22.5																						
25-Jun	18.3	7.8	6.2	4.9	4.2	6.9	8.4	6.4	4.3	4.1	2.9	6.6	8.4	7.2	6.1	4.4	3.8	4.3	4.9	5.5	6.5	7.3	7.5	7.4	6.4	18.3																						
26-Jun	6.4	6.7	6.9	6.9	7.2	7.5	6.4	5.9	4.3	5.3	8.2	4.6	4.9	10.8	12.0	10.2	9.8	9.3	9.2	9.9	9.4	8.7	7.9	5.9	7.7	12.0																						
27-Jun	4.8	5.7	6.5	6.4	6.6	2.5	0.7	0.5	1.1	1.6	1.1	1.9	2.8	2.2	1.6	1.6	2.1	1.8	1.6	4.5	4.9	1.4	2.3	3.4	2.9	6.6																						
28-Jun	3.8	3.6	5.4	5.9	2.7	4.1	2.4	2.2	2.1	2.7	2.5	2.5	2.3	1.6	5.0	12.1	13.0	12.9	14.0	14.9	17.2	16.8	15.4	14.0	7.5	17.2																						
29-Jun	13.1	11.2	10.1	9.3	8.8	7.6	6.6	3.4	1.5	3.4	6.5	6.6	7.2	6.0	7.2	10.4	13.5	13.9	14.2	15.5	16.6	15.4	9.5	4.9	9.3	16.6																						
30-Jun	5.7	8.0	8.5	6.4	7.2	7.4	5.7	6.7	8.1	5.3	3.4	4.4	6.6	3.8	2.5	4.2	4.2	1.9	0.9	2.0	4.4	3.6	5.8	4.9	5.1	8.5																						
																								Diurnal Average																								
																								Diurnal Maximum																								
																								6.5	6.3	6.0	5.9	6.1	7.0	5.9	4.5	4.3	4.1	4.3	4.7	8.3	8.0	4.1	5.0	5.3	5.6	5.5	7.5	6.7	7.4	6.7	6.1	Diurnal Average
																								18.3	14.8	16.3	20.1	17.6	32.2	15.0	12.3	12.6	9.1	12.8	26.8	135.0	133.0	12.0	25.2	14.1	20.7	14.2	49.6	27.6	37.3	22.5	14.0	Diurnal Maximum
C - Calibration																								UO - Unstable Operation		PF - Power Failure																						
Alberta Ambient Air Quality Objectives (AAAQO):																								24-hr		30 µg/m ³																						





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	398	55.82	55.82
6 - 15	257	36.04	91.87
16 - 25	15	2.10	93.97
26 - 80	5	0.70	94.67
> 81.0	2	0.28	94.95

Total Number of Valid Hours: 713

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Patricia McInnes - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	71	12	19	12	9	25	29	19	17	14	21	24	18	33	37	38	398
6 - 15	23	17	7	7	6	27	32	16	21	25	18	10	8	6	8	26	257
16 - 25	2	2	0	0	0	1	0	2	0	0	0	0	1	3	2	2	15
26 - 80	0	0	0	0	0	0	3	1	0	0	0	0	1	0	0	0	5
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Totals	96	31	26	19	15	53	64	38	38	39	39	34	28	42	47	68	677

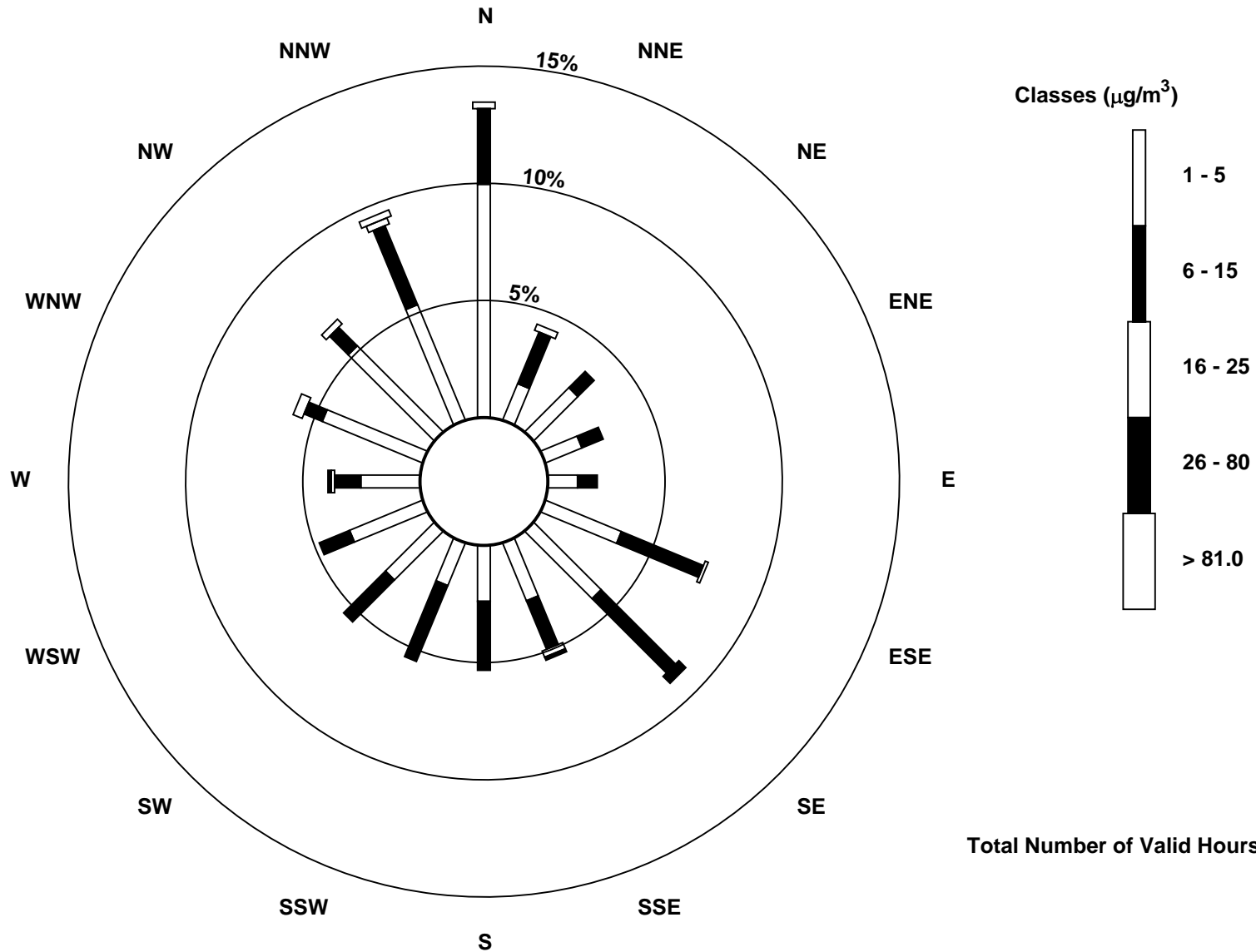
Total Number of Valid Hours: 713

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association
Summary of Hour Averages

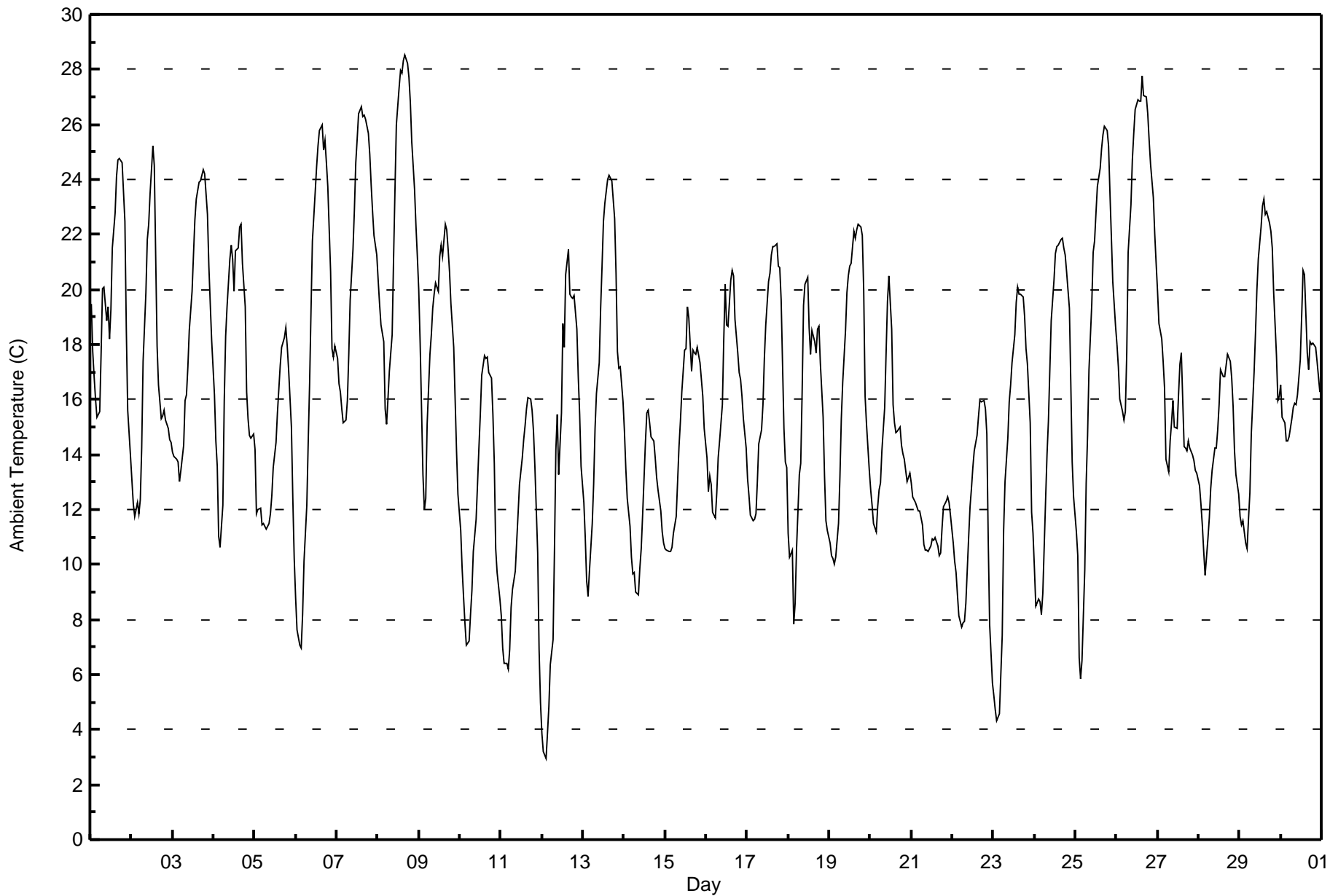
Ambient Temperature (AT) - C
Patricia McInnes - June 2017

Maximum Value: 28.5 C on Jun 8 17:00		Maximum Daily Average: 22.7 C on Jun 8		Hours in Service: 720																																												
Minimum Value: 2.9 C on Jun 12 03:00		Minimum Daily Average: 10.9 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 20.4 C at hour 15		Minimum Diurnal Average: 10.8 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 16.18 C		Percentiles: P ₁ = 4.8 P ₁₀ = 10.2 Q ₁ = 12.4 Median = 15.8 Q ₃ = 19.9 P ₉₀ = 23.1 P ₉₉ = 27.7		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	19.5	17.8	16.9	16.0	15.3	15.6	17.7	20.0	20.1	18.8	19.4	18.2	19.3	21.5	22.8	24.1	24.7	24.8	24.6	23.5	22.5	18.5	15.6	14.0	19.6	24.8																						
2-Jun	13.1	12.2	11.7	12.3	11.8	12.3	14.2	17.4	19.9	21.8	22.4	23.5	25.2	24.5	21.2	18.0	16.5	15.3	15.4	15.6	15.3	14.9	14.5	14.4	16.8	25.2																						
3-Jun	14.1	13.9	13.8	13.7	13.0	13.4	14.3	16.0	16.2	17.2	18.5	19.9	21.2	22.5	23.3	23.9	24.0	24.2	24.4	24.2	22.7	20.9	19.5	18.2	18.9	24.4																						
4-Jun	16.2	14.5	13.6	11.0	10.6	12.2	16.0	18.3	19.4	21.1	21.6	21.1	19.9	21.4	21.5	22.3	22.4	21.0	19.4	16.3	15.3	14.7	14.6	14.8	17.5	22.4																						
5-Jun	14.2	11.9	12.0	12.1	11.4	11.5	11.4	11.3	11.5	11.9	12.5	13.5	14.5	15.5	16.4	17.3	17.9	18.2	18.6	18.0	17.1	15.0	12.4	10.2	14.0	18.6																						
6-Jun	8.8	7.6	7.1	7.0	8.2	10.1	12.2	14.5	16.6	19.2	21.8	23.6	24.5	25.2	25.8	26.0	25.1	25.4	24.6	23.8	20.7	17.9	17.5	18.0	18.0	26.0																						
7-Jun	17.5	16.6	16.2	15.6	15.2	15.3	16.0	17.6	19.6	21.4	22.9	24.6	25.5	26.4	26.6	26.3	26.3	26.2	25.7	24.9	23.8	22.8	21.9	21.3	21.5	26.6																						
8-Jun	20.3	19.5	18.7	18.1	15.7	15.1	16.0	17.1	18.3	21.1	23.6	26.0	27.4	27.9	27.9	28.3	28.5	28.2	27.7	26.8	25.4	23.6	22.3	21.2	22.7	28.5																						
9-Jun	20.0	18.1	13.3	12.0	12.4	15.1	17.7	18.3	19.3	19.9	20.2	19.9	21.2	21.6	21.2	22.4	22.2	21.5	20.6	19.5	17.9	16.0	14.2	12.6	18.2	22.4																						
10-Jun	11.2	9.9	8.8	7.9	7.1	7.2	8.2	9.1	10.5	11.7	12.9	14.3	15.5	16.9	17.6	17.5	17.5	17.0	16.8	15.4	13.7	10.6	9.7	8.7	12.3	17.6																						
11-Jun	8.1	7.0	6.4	6.4	6.2	6.9	8.5	9.1	9.8	10.8	11.9	12.9	13.9	14.5	15.0	15.7	16.1	16.0	15.6	14.8	13.6	10.4	6.9	5.0	10.9	16.1																						
12-Jun	3.9	3.2	2.9	3.9	4.8	6.3	7.3	10.5	14.2	15.5	13.3	15.5	18.8	17.9	20.5	21.4	19.8	19.7	19.7	19.8	18.6	16.8	15.4	13.6	13.5	21.4																						
13-Jun	12.3	11.0	9.4	8.8	9.7	11.5	12.9	15.0	16.2	17.3	19.3	20.8	22.5	23.2	24.0	24.2	24.0	24.0	22.6	20.6	17.7	17.1	17.2	15.9	17.4	24.2																						
14-Jun	14.9	13.5	12.4	11.4	10.3	9.7	9.7	9.0	8.9	9.9	10.6	11.8	14.4	15.5	15.6	15.2	14.7	14.5	13.9	13.2	12.7	12.0	11.2	10.8	12.3	15.6																						
15-Jun	10.6	10.5	10.5	10.4	10.6	11.1	11.7	13.0	14.3	15.2	16.3	17.8	17.8	19.4	19.0	17.0	17.8	17.7	17.7	17.9	17.4	16.7	16.1	14.9	15.1	19.4																						
16-Jun	13.9	12.6	13.2	12.9	11.9	11.7	12.6	13.9	14.5	15.8	18.2	20.2	18.7	18.7	20.3	20.7	20.5	18.9	17.7	17.0	16.7	16.1	15.3	14.2	16.1	20.7																						
17-Jun	13.1	12.5	11.8	11.6	11.6	11.8	13.0	14.4	14.9	15.8	17.5	18.7	20.3	20.6	21.2	21.6	21.6	21.7	20.8	20.8	19.6	14.9	13.7	13.5	16.5	21.7																						
18-Jun	11.1	10.3	10.5	7.8	8.6	10.6	13.3	13.7	16.3	19.4	20.2	20.4	18.6	17.6	18.5	18.1	17.7	18.6	18.6	17.4	15.4	13.2	11.6	11.2	15.0	20.4																						
19-Jun	10.8	10.3	10.2	10.0	10.3	11.5	13.2	15.3	16.6	18.5	19.9	20.5	20.8	20.9	22.1	21.9	22.2	22.4	22.3	22.0	20.0	16.1	15.1	13.4	16.9	22.4																						
20-Jun	12.7	12.1	11.5	11.2	12.1	12.7	13.0	14.1	15.7	17.7	19.6	20.5	18.5	15.8	15.2	14.8	14.8	15.0	14.4	14.0	13.8	13.0	13.2	13.3	14.5	20.5																						
21-Jun	13.0	12.5	12.3	12.1	11.9	11.9	11.4	10.7	10.5	10.5	10.5	10.7	10.9	10.9	11.0	10.7	10.3	10.4	11.3	12.1	12.3	12.5	12.2	11.8	11.4	13.0																						
22-Jun	10.8	10.1	9.7	8.9	8.1	7.7	7.9	7.9	8.6	11.0	12.1	12.8	13.5	14.1	14.7	15.4	16.0	15.9	16.0	15.7	14.7	10.9	7.8	5.7	11.5	16.0																						
23-Jun	5.2	4.8	4.3	4.6	6.0	7.4	11.2	13.0	14.6	15.9	16.5	17.3	18.4	19.5	20.1	19.8	19.8	19.8	19.0	17.9	17.3	15.2	11.9	11.1	13.8	20.1																						
24-Jun	9.9	8.5	8.8	8.7	8.2	8.9	12.4	14.0	15.2	17.1	18.9	20.4	21.3	21.6	21.6	21.8	21.9	21.5	21.3	20.6	19.3	16.6	13.7	12.5	16.0	21.9																						
25-Jun	11.2	10.3	6.6	5.9	6.5	9.8	13.0	14.7	17.1	19.5	21.4	21.7	22.8	23.8	24.4	25.1	25.6	25.9	25.8	25.2	23.5	21.9	20.3	18.7	18.4	25.9																						
26-Jun	18.0	17.2	16.0	15.6	15.3	15.6	17.7	21.3	23.1	24.7	25.7	26.5	26.9	26.8	26.8	27.8	27.0	27.0	26.4	25.4	24.6	23.3	22.0	21.0	22.6	27.8																						
27-Jun	19.9	18.8	18.2	17.4	16.4	13.8	13.4	14.5	15.2	16.0	15.0	14.9	16.2	17.3	17.7	14.3	14.2	14.2	14.5	14.2	14.0	13.8	13.4	13.3	15.4	19.9																						
28-Jun	12.9	12.2	11.4	10.5	9.6	10.9	11.7	12.8	13.4	14.2	14.2	14.9	15.8	17.1	16.8	16.8	17.2	17.6	17.4	16.8	15.7	14.1	13.2	12.5	14.2	17.6																						
29-Jun	11.7	11.5	11.6	10.8	10.6	11.7	12.6	14.8	17.0	18.4	20.0	21.1	22.3	23.0	23.3	22.7	22.8	22.4	22.1	21.5	19.9	17.6	16.0	16.1	17.6	23.3																						
30-Jun	16.5	15.4	15.1	14.5	14.5	14.7	15.3	15.7	15.9	15.8	16.2	17.4	19.0	20.7	20.5	17.7	17.1	18.1	18.0	18.0	17.9	17.4	16.8	16.3	16.9	20.7																						
																								13.2	12.2	11.5	11.0	10.8	11.5	12.8	14.2	15.4	16.8	17.8	18.7	19.5	20.1	20.4	20.3	20.2	20.1	19.8	19.1	18.0	16.2	14.9	13.9	Diurnal Average
																								20.3	19.5	18.7	18.1	16.4	15.6	17.7	21.3	23.1	24.7	25.7	26.5	27.4	27.9	27.9	28.3	28.5	28.2	27.7	26.8	25.4	23.6	22.3	21.3	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Patricia McInnes - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Patricia McInnes - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	68	9.44	9.44
10 - 20	482	66.94	76.39
> 20	170	23.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



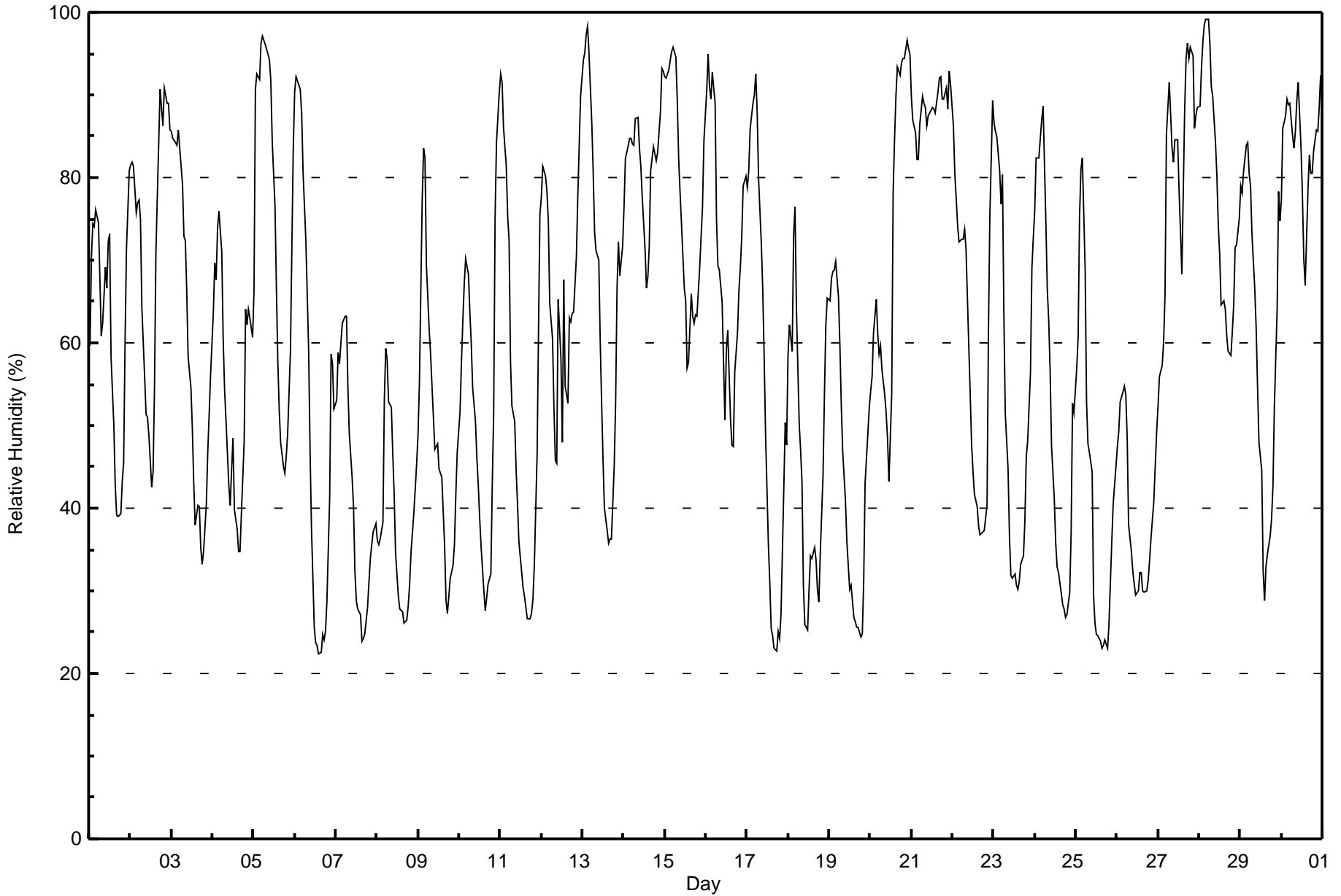
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - June 2017

Maximum Value: 99 % on Jun 28 06:00														Maximum Daily Average: 88.5 % on Jun 21														Hours in Service: 720	
Minimum Value: 22 % on Jun 6 15:00														Minimum Daily Average: 38.7 % on Jun 8														Hours of Data: 720	
Maximum Diurnal Average: 79.2 % at hour 5														Minimum Diurnal Average: 44.4 % at hour 15														Hours of Missing Data: 0	
Monthly Average: 60.7 %														Percentiles: P ₁ = 23 P ₁₀ = 30 Q ₁ = 42 Median = 61 Q ₃ = 81 P ₉₀ = 90 P ₉₉ = 96														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	60	70	74	74	76	74	68	61	62	69	67	72	73	58	50	43	39	39	39	43	46	60	71	81	61.3	81			
2-Jun	82	82	81	76	77	77	75	64	56	51	51	49	42	44	55	71	78	91	88	86	91	89	89	86	72.1	91			
3-Jun	86	85	84	84	86	84	79	73	72	66	58	55	50	43	38	40	40	35	33	35	40	47	51	56	59.2	86			
4-Jun	64	70	68	74	76	71	60	54	51	43	40	45	48	40	38	35	35	39	48	64	62	64	63	61	54.7	76			
5-Jun	66	91	93	92	96	97	97	96	95	94	92	84	76	66	58	52	48	45	44	46	49	59	71	83	74.6	97			
6-Jun	90	92	91	91	88	81	72	66	59	47	38	26	24	23	22	23	25	24	25	29	41	59	57	52	51.8	92			
7-Jun	53	59	57	60	62	63	63	55	49	44	40	32	29	28	27	24	24	25	28	31	34	36	37	38	41.6	63			
8-Jun	36	36	36	38	53	59	58	53	52	47	42	35	29	28	28	27	26	26	28	31	35	39	42	45	38.7	59			
9-Jun	49	55	77	84	82	69	62	59	55	51	47	48	45	44	44	35	29	27	29	32	33	36	42	47	49.2	84			
10-Jun	52	58	63	67	70	68	64	60	55	51	46	43	39	35	30	28	29	31	32	43	52	75	84	90	52.6	90			
11-Jun	93	91	86	81	75	72	58	52	51	45	40	36	32	30	29	28	27	27	27	29	33	47	62	76	51.1	93			
12-Jun	78	81	80	78	75	65	61	52	46	45	65	58	48	68	55	53	63	62	64	64	70	78	84	90	65.9	90			
13-Jun	94	95	97	98	95	87	81	73	71	70	60	53	46	40	37	36	36	36	45	53	67	72	68	72	66.0	98			
14-Jun	76	82	83	85	85	84	84	87	87	84	81	78	71	67	68	72	81	84	83	82	83	88	93	93	81.7	93			
15-Jun	92	92	93	94	95	96	95	89	82	78	74	67	65	57	58	66	63	62	63	63	69	73	76	84	77.0	96			
16-Jun	91	95	91	89	93	89	75	69	69	65	58	51	59	62	51	48	47	56	61	66	69	73	79	80	70.2	95			
17-Jun	79	81	86	89	90	93	88	80	72	66	58	49	36	31	25	25	23	23	25	24	27	42	50	48	54.6	93			
18-Jun	59	62	59	73	76	64	50	47	43	31	26	25	30	34	34	35	34	30	29	34	44	54	62	65	45.9	76			
19-Jun	65	68	69	69	70	66	60	52	47	41	36	33	30	31	27	26	26	26	24	25	31	43	46	52	44.2	70			
20-Jun	54	56	61	65	61	59	60	57	54	52	49	43	54	78	85	90	93	92	94	94	94	97	96	95	72.1	97			
21-Jun	90	87	85	82	82	86	90	89	88	86	87	88	88	88	88	90	92	92	90	89	91	88	93	91	88.5	93			
22-Jun	86	81	78	74	72	73	73	74	71	60	54	48	44	42	40	38	37	37	37	39	40	61	75	89	59.3	89			
23-Jun	87	86	85	81	77	80	64	51	45	37	32	32	32	31	30	31	33	34	39	46	48	56	69	73	53.2	87			
24-Jun	76	82	82	85	87	89	74	66	63	57	48	41	36	33	32	30	28	28	27	27	30	37	53	51	52.6	89			
25-Jun	57	61	75	81	82	69	53	48	47	44	30	26	25	25	24	23	23	24	23	26	31	36	40	45	42.4	82			
26-Jun	48	49	53	54	55	54	48	38	35	32	31	29	30	32	32	30	30	30	31	34	36	41	45	49	39.5	55			
27-Jun	52	56	57	60	66	85	91	88	84	82	85	85	78	74	68	88	94	96	94	96	95	86	88	88	80.7	96			
28-Jun	89	93	96	99	99	99	96	91	90	84	80	74	71	65	65	64	61	59	58	61	65	71	72	75	78.3	99			
29-Jun	79	78	81	84	84	81	79	73	67	62	55	48	45	32	29	33	34	37	39	43	52	64	78	75	59.6	84			
30-Jun	77	86	88	90	89	89	85	83	86	89	91	84	78	70	67	79	83	81	81	83	86	86	89	92	83.7	92			
																												Diurnal Average	
																												Diurnal Maximum	





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Patricia McInnes - June 2017

Maximum Speed: 31 km/h on Jun 9 11:00	Maximum Daily Speed Average: 19.4 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 27 15:00	Minimum Daily Speed Average: 1.3 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 4.6 km/h at hour 15	Minimum Diurnal Speed Average: 1.2 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 2.6 km/h 343.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 15 P ₉₀ = 21 P ₉₉ = 26	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SW4	WNW2	NW5	NW8	S3	SSW2	SSW3	W8	WSW9	WSW10	SW8	WSW7	S8	SE10	ESE10	SE10	SE8	ESE9	SE7	ESE6	SE6	SSE3	WSW3	WSW2	S2.9	ESE10
2-Jun	SSW3	S4	SW5	SSW3	SW5	SSW6	SW7	SW2	SW1	NW2	WSW9	W9	NNW10	NNW9	W17	WNW22	NNW10	WNW7	NW6	W8	WNW14	WNW16	WNW9	W12	WNW6.4	WNW22
3-Jun	WNW16	WNW17	W20	WNW18	WNW17	WNW20	WNW20	NW18	NW13	WNW14	WNW14	WNW11	WNW10	WNW10	WNW11	N6	NE8	ESE7	ENE7	ESE6	SE9	SE12	SE12	SE11	WNW7.0	WNW20
4-Jun	SE7	S7	SSE8	SSW4	SSW5	WSW7	WNW3	ENE6	NNW9	NNW18	NNE13	NNW10	NW12	NNW17	NNW20	N21	NNE21	N19	NNW20	NNW22	N14	N15	N14	N15	N9.3	NNW22
5-Jun	NW12	N16	NE14	N8	NNW8	NNW14	NNW15	NNW13	NNW11	NNW12	NNW13	NNW14	NNW14	N14	NNE14	NNE12	ENE9	NE9	ENE5	SSE8	SE6	SE4	ESE1	SW2	N7.5	N16
6-Jun	SSW2	SSW1	SSW4	S5	S5	SSW4	SSW5	SSE6	S8	S10	S8	SW11	W14	W13	WSW16	W11	NW9	NNW9	WNW9	NNE5	NW3	NNW4	NNW5	NNW9	WSW4.1	WSW16
7-Jun	NNW6	NNW7	NNW9	NNW8	NNW6	N5	N8	NE7	NE7	ESE5	SE8	ESE8	SE10	SE11	SE11	SSE10	SE5	E6	ESE9	ESE9	E8	E9	E8	E9	E4.2	SE11
8-Jun	E11	E11	E10	ENE6	NNW5	NNW4	ENE2	ESE7	ESE9	ESE10	ENE9	ENE12	ESE15	ESE17	ESE17	ESE16	ESE17	ESE16	ESE14	ESE12	ESE11	ESE11	ESE9	SE11	ESE10.1	ESE17
9-Jun	SE8	SE6	WNW1	NW2	NNW5	N14	N16	N22	N23	N29	N31	N31	N27	N29	N26	NNE26	NE27	NE25	NE24	NE23	NE20	NE18	NE17	NE14	NNE17.4	N31
10-Jun	NE13	NE11	NE12	ENE12	E12	E14	E12	ENE8	NE4	N8	N11	NNE6	N2	NNW6	NNW6	NNW6	NNE4	ESE7	NE8	N13	NNW18	NNW15	NNW9	N12	NNE7.1	NNW18
11-Jun	NW6	WNW8	NW12	NW13	NW12	WNW15	NW18	NW22	NW24	NW23	NW21	NW22	NW22	NNW17	NNW20	NNW19	NNW18	NNW17	NNW15	N14	N8	N4	NW2	NW2	NW14.1	NW24
12-Jun	SW2	SSW2	SSW3	SSW4	SSE4	SE6	SE8	ESE6	ESE9	S17	SSE15	SE21	SE19	S13	S21	S23	S21	S19	S14	SE7	ENE9	E7	ENE5	N6	SSE8.9	S23
13-Jun	NW6	WNW3	W3	NW5	NW3	WSW2	SW1	N6	N11	N11	NE11	NNE11	NNE9	NNE5	N10	NNE14	NNE17	NNE10	SSE10	W12	NNW12	N10	NNE10	NNW8	N6.2	NNE17
14-Jun	N16	N21	N22	N22	N23	N23	N22	N24	N23	N22	N20	N20	N19	N24	NNE20	NE17	NNE12	N13	N19	N20	N18	N19	NNW19	NNW18	N19.4	N24
15-Jun	N17	N17	N16	N15	N13	N11	N9	N7	NW3	NNW4	NNW4	N2	N5	NE4	ENE10	ENE10	ESE4	WSW6	WNW5	NE6	NNE7	NE6	NE5	N1	N6.2	N17
16-Jun	NW3	NW3	E4	E5	ESE3	ESE4	ESE7	ESE9	ESE8	ESE7	ESE8	ESE9	SW13	SW10	SSE7	SSE12	SE10	WSW14	W10	NNW5	E3	SE5	ESE8	SE14	SE3.9	WSW14
17-Jun	SE11	SE9	SE8	SE5	S3	S4	WNW6	NW16	WNW19	NW17	NW19	NW21	NW26	NW21	NW23	NW22	NW18	WNW16	WNW10	WNW10	WNW5	W4	WSW5	S3	NW8.8	NW26
18-Jun	S4	SSW5	SSW5	S4	S6	SSW7	SSW7	SSW12	SSW11	WSW12	SW18	SSW18	WSW19	WSW4	W13	WSW18	WSW16	WSW14	WNW14	W19	WNW16	NW15	NW9	WNW10	WSW9.1	WSW19
19-Jun	W13	WNW10	WNW8	NW8	NW12	NW9	NW7	NW2	WSW2	E3	NNW8	NW7	ENE0	W9	WNW8	SW5	WSW1	SW2	SW8	WSW4	SW3	SW5	SW6	SW5	W4.6	W13
20-Jun	SSW6	SW5	S5	S4	SSE6	SE7	SE7	SE7	SE8	SE6	S5	SW19	SW22	SW14	SSW11	S10	SE11	SE12	SE12	SE9	SE9	SE8	SSE7	SSE5	S7.1	SW22
21-Jun	S8	SSW6	SW9	WSW15	WSW14	W15	W17	W18	W16	W22	W20	W16	WNW19	WNW20	WNW24	W22	WNW24	WNW20	WNW21	NW21	NNW21	NNW18	NNW18	N26	WNW14.8	N26
22-Jun	N26	N25	N24	N26	N26	N27	N24	N18	NNW15	NNW19	N21	N22	N22	N22	N23	N21	N19	N18	N14	N11	NNE8	NW3	WSW3	W5	N17.9	N27
23-Jun	WSW6	WSW4	SW4	SW2	ENE3	WNW1	NNW2	N9	N12	NNW15	NNW15	NNW15	NNW13	N12	N9	N7	WNW8	NW7	WNW9	WNW6	W6	W4	W4	WSW7	NW5.6	NNW15
24-Jun	SSW3	S3	S5	SSW5	SSW3	S3	NE0	ENE5	NNE8	NNE10	NNE9	NNE8	N9	N12	N17	NNE16	N14	N15	N13	N11	N8	N6	NNE5	NE5	N6.0	N17
25-Jun	NNE5	NNE4	W3	NW6	NW4	S1	SSE3	SE5	ESE3	SE6	SE9	SW7	W2	S6	ESE4	ESE7	SSE8	SE13	SSE13	SSE15	SSE15	SSE13	SSE11	SSW10	SSE4.9	SE15
26-Jun	S15	S9	SE7	SE11	SE12	SE13	SE13	SSE18	S21	SSE22	SSE23	S24	SSE22	SE22	SE23	SE22	SE22	SE17	SE15	SE11	SE11	ESE9	ESE9	SE8	SE14.9	S24
27-Jun	SE9	SE8	SE10	ESE10	SSW11	WSW14	WSW8	WSW9	SSW7	SW14	SW16	SW10	SSW6	ESE8	NE0	WNW6	N6	ESE4	SSE6	ESE5	SSE3	SSW5	SW5	SSW6	SSW4.9	SW16
28-Jun	SSW7	WSW5	SSE2	SE1	W1	ENE4	ESE5	NE5	ENE9	E10	ENE13	NE16	NE15	NNE9	NE13	NE13	E11	ESE8	SE6	SSE9	SSE11	SSE10	S8	SSW6	E5.1	NE16
29-Jun	SSW7	SSW7	S8	SSE8	S7	SSE7	SSE5	SSE4	ESE3	E4	NE5	NE8	N7	N11	NNW13	NNW12	NNE11	NNE10	NNW6	NNW5	WNW3	WNW2	NNW3	WSW8	N1.3	NNW13
30-Jun	WSW7	SW4	S3	SW5	SW7	W2	E5	ESE5	SE7	SW3	SSE4	SSE7	ESE7	ESE6	SSW6	W13	WSW9	WSW8	WSW6	WSW5	SW6	SW6	SW6	SW6	SSW3.8	W13

WNW1.3	NW1.8	NNW1.2	NNW2.1	NW2.3	NW2.5	NNW2.7	NNW3.2	NNW3.1	NNW3.6	NNW3.5	NNW3.6	NNW4.1	NNW4.2	NNW4.6	N3.8	NNE3.6	N2.2	N1.9	N3.1	NNE2.7	NNE2.1	NNE1.5	NNW1.5	Diurnal Average
N26	N25	N24	N26	N26	N27	N24	N24	NW24	N29	N31	N31	N27	N29	N26	NNE26	NE27	NNE25	NE24	NE23	NNW21	N19	NNW19	N26	Diurnal Maximum

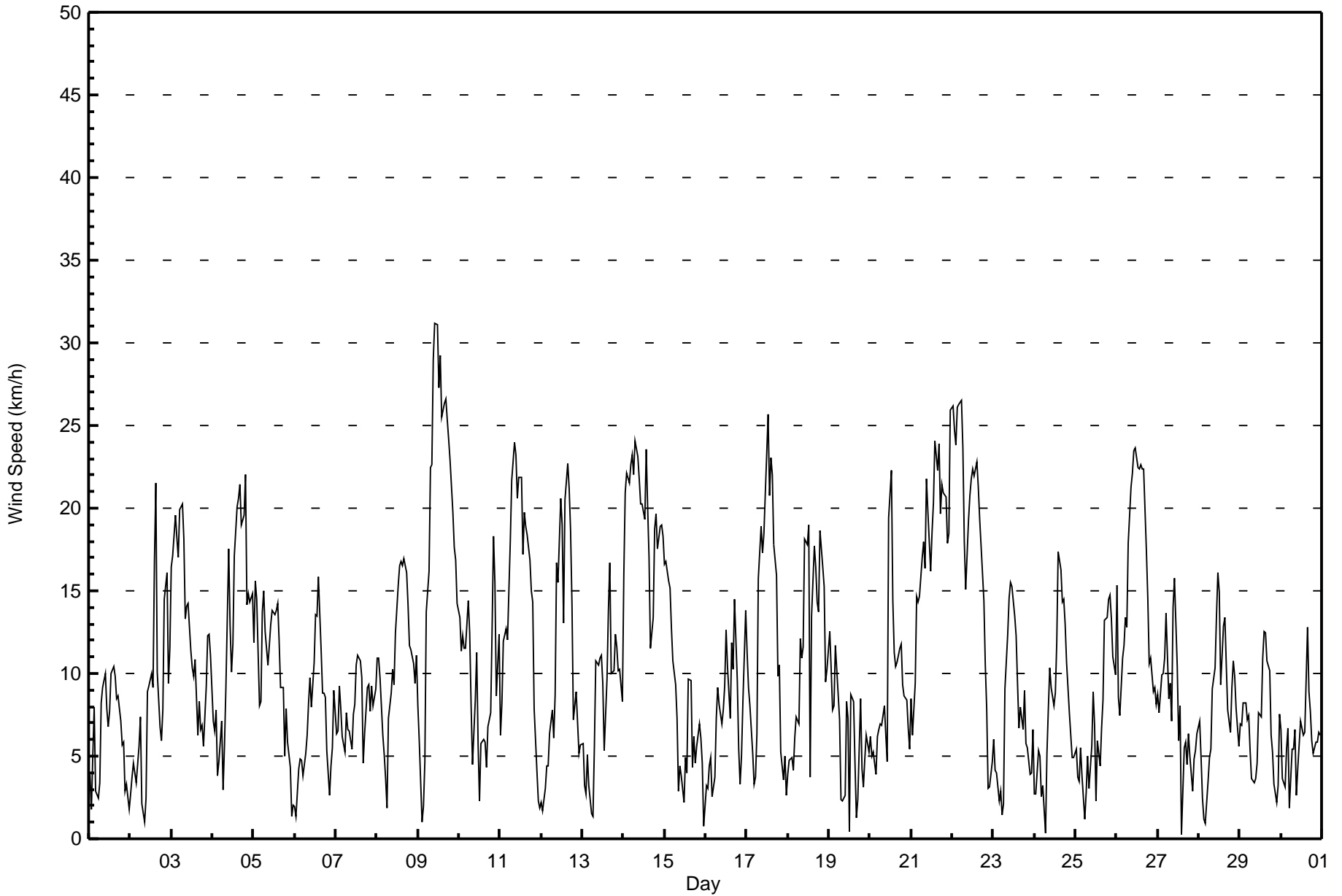
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Patricia McInnes - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Jun 18 13:00 Minimum Value: 0 km/h on Jun 16 01:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	1	2	1	2	1	2	2	2	4	3	5	2	2	2	3	3	2	2	1	2	1	1	1	5
2-Jun	1	1	1	2	2	2	2	1	1	1	4	3	3	4	4	4	5	2	1	3	4	3	3	4	5
3-Jun	4	4	4	4	3	4	4	4	3	3	3	3	4	4	4	3	3	2	2	2	3	3	3	3	4
4-Jun	2	1	2	2	1	2	1	2	6	3	4	5	3	4	4	4	4	4	5	5	3	3	3	3	6
5-Jun	3	3	4	2	2	2	3	3	2	3	3	3	3	3	4	3	3	3	2	2	2	2	2	1	4
6-Jun	2	1	2	1	2	2	1	1	4	3	3	5	4	5	4	4	4	3	3	1	1	1	3	1	5
7-Jun	2	1	2	1	1	1	2	1	2	2	2	3	3	4	3	3	2	2	2	2	1	2	1	3	4
8-Jun	3	3	3	2	1	1	2	2	2	3	2	3	5	5	4	5	5	4	3	3	3	2	2	2	5
9-Jun	3	1	2	2	4	2	6	5	5	6	6	6	5	6	7	6	6	6	6	5	5	4	4	3	7
10-Jun	3	3	3	3	3	3	3	3	2	4	4	4	3	4	3	3	3	2	4	2	4	5	2	4	5
11-Jun	1	1	2	2	2	3	4	5	5	6	5	6	6	5	5	5	5	5	3	3	2	1	1	1	6
12-Jun	1	1	1	1	1	2	2	2	3	5	4	5	4	5	6	6	5	5	4	2	2	3	2	2	6
13-Jun	1	1	1	2	1	1	1	3	3	3	3	3	3	3	4	5	3	4	3	6	4	2	2	2	6
14-Jun	5	4	4	4	5	5	5	5	5	4	4	5	5	5	4	5	3	4	4	4	4	4	4	3	5
15-Jun	4	3	3	3	2	2	2	2	1	1	2	2	2	2	6	4	2	1	1	2	2	2	1	1	6
16-Jun	0	1	1	1	1	1	2	2	2	2	3	3	3	2	3	3	3	6	4	2	1	2	3	3	6
17-Jun	3	2	3	1	1	1	5	4	3	4	4	7	6	5	6	5	5	4	4	4	1	1	1	2	7
18-Jun	2	2	1	1	1	2	3	3	3	4	5	4	12	7	9	4	4	5	3	6	4	4	2	2	12
19-Jun	2	2	3	3	4	3	2	2	2	2	4	4	3	3	4	3	2	2	3	2	1	1	1	1	4
20-Jun	1	1	1	1	1	1	2	2	2	2	2	5	6	4	3	2	3	3	3	2	2	2	3	1	6
21-Jun	3	2	4	3	3	3	6	4	4	5	5	4	5	5	5	4	5	5	4	4	4	4	6	6	6
22-Jun	5	5	5	6	7	7	5	4	4	4	5	5	5	6	6	5	5	4	3	3	2	1	1	1	7
23-Jun	1	1	1	2	1	1	2	2	3	4	4	5	4	4	4	3	3	2	4	1	1	0	1	3	5
24-Jun	1	2	1	2	1	2	1	1	2	3	3	3	4	4	4	4	4	4	3	3	1	1	1	3	4
25-Jun	3	2	1	1	1	1	1	1	1	2	3	3	3	4	4	3	4	4	3	4	4	3	2	3	4
26-Jun	4	3	2	2	2	2	2	5	5	5	6	6	6	6	5	6	6	5	4	3	3	2	2	2	6
27-Jun	2	2	3	2	4	4	4	3	3	4	4	2	2	2	5	4	2	1	2	2	1	1	1	1	5
28-Jun	2	2	1	1	1	2	1	3	3	3	4	4	3	3	4	3	3	2	3	2	2	2	2	1	4
29-Jun	1	2	2	2	1	2	1	2	2	2	2	3	4	4	4	2	3	2	2	1	1	1	1	2	4
30-Jun	1	1	1	1	1	2	2	2	1	2	2	2	2	2	2	2	1	2	1	1	1	2	1	1	2
																		Diurnal Maximum							





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Patricia McInnes - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	172	23.89	23.89
6 - 11	283	39.31	63.19
12 - 19	178	24.72	87.92
20 - 28	83	11.53	99.44
29 - 38	4	0.56	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6	6	7	8	6	12	6	10	16	21	19	12	9	9	13	12	172
6 - 11	26	14	10	10	12	34	40	19	13	17	15	14	7	19	12	21	283
12 - 19	34	7	11	3	2	8	13	6	5	2	6	10	14	14	14	29	178
20 - 28	31	4	4	0	0	0	5	3	5	0	1	0	4	8	12	6	83
29 - 38	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	101	31	32	21	20	54	64	38	39	40	41	36	34	50	51	68	720

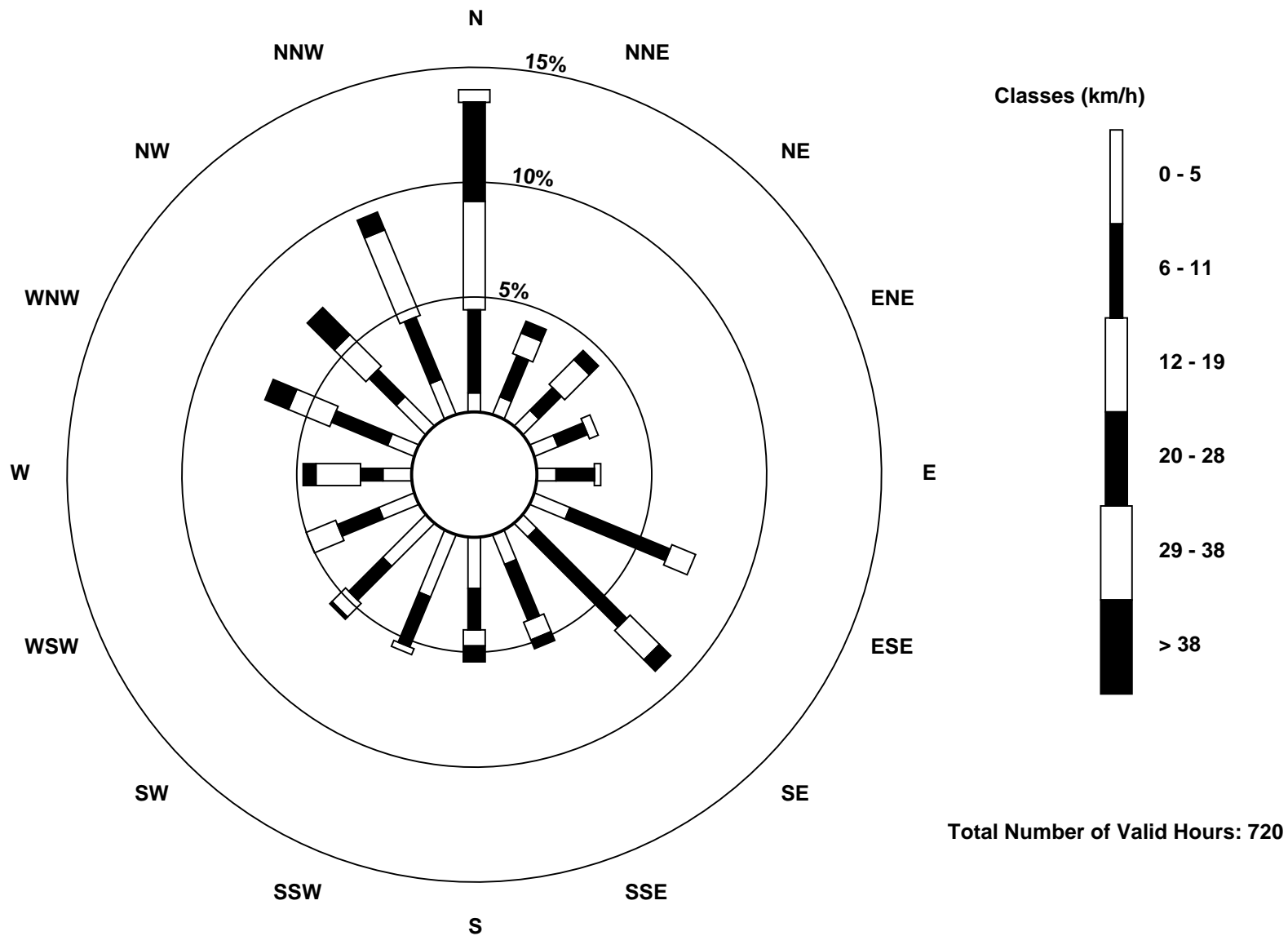
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Patricia McInnes (AMS 6)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Patricia McInnes - June 2017

Direction of Maximum Speed: 0 deg on Jun 9 11:00 Direction of Maximum Daily Speed Average: 1.3 deg on Jun 14	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 35 deg on Jun 27 15:00 Direction of Minimum Daily Speed Average: 1.3 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 300.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	235	298	315	306	177	198	208	263	258	248	234	252	172	138	121	138	132	117	137	108	135	165	239	250	187.0
2-Jun	208	185	216	196	233	206	218	228	218	326	244	270	342	340	280	299	338	288	305	278	287	287	290	278	281.3
3-Jun	282	290	281	291	289	287	300	324	324	287	296	303	295	282	293	354	37	102	71	108	135	129	139	141	296.1
4-Jun	146	169	165	204	213	238	296	59	337	348	23	333	319	333	343	354	23	354	343	342	6	355	357	359	350.2
5-Jun	326	355	50	0	330	341	345	340	336	344	342	341	345	11	26	33	63	51	71	167	127	125	110	220	3.8
6-Jun	194	200	210	181	190	203	208	156	186	185	191	231	277	274	249	278	324	328	289	17	305	327	348	340	256.6
7-Jun	332	334	347	347	346	3	7	39	43	108	145	103	136	142	146	166	129	101	103	104	99	88	91	85	87.8
8-Jun	93	95	91	61	336	342	68	117	103	105	77	78	119	112	107	110	115	117	115	107	104	108	116	124	103.8
9-Jun	124	134	297	310	344	3	4	5	2	0	0	8	7	2	8	33	37	34	36	39	49	53	51	43	20.9
10-Jun	51	46	48	59	85	86	88	75	56	359	7	30	9	347	331	327	30	120	49	354	339	332	338	0	28.0
11-Jun	318	282	312	312	305	300	316	313	307	319	318	322	325	329	336	336	340	345	344	358	359	4	312	323	324.3
12-Jun	233	197	199	199	163	146	141	114	122	180	163	133	139	169	180	183	182	181	175	140	74	89	75	6	158.7
13-Jun	326	288	273	308	317	257	229	357	357	10	38	29	24	13	5	14	19	25	160	281	334	1	20	348	0.9
14-Jun	360	356	357	356	359	3	359	353	355	358	5	6	10	20	46	25	10	2	352	357	351	348	348		1.3
15-Jun	351	350	350	352	356	359	360	357	318	329	339	358	351	52	61	65	104	248	288	48	33	45	39	353	4.5
16-Jun	321	317	94	100	117	121	118	121	116	104	103	118	215	223	158	157	146	255	277	337	89	127	123	129	145.7
17-Jun	133	127	134	140	176	188	296	309	301	308	323	321	323	312	318	313	307	303	298	285	290	268	250	185	306.2
18-Jun	173	194	194	179	184	194	211	213	199	256	234	205	249	250	266	253	255	248	288	280	298	316	311	294	250.3
19-Jun	275	288	302	311	306	313	306	325	250	95	334	320	67	273	289	222	239	222	217	253	220	221	230	214	280.2
20-Jun	211	222	183	184	160	139	144	128	135	143	169	222	223	220	201	172	132	143	129	133	127	129	160	166	170.8
21-Jun	186	197	217	237	249	279	275	279	280	271	272	272	283	282	285	280	286	291	299	323	335	337	343	355	288.8
22-Jun	349	350	356	356	349	352	353	350	341	346	1	354	351	354	349	350	351	353	351	360	30	326	247	272	351.2
23-Jun	256	244	233	215	75	291	336	4	351	345	341	341	344	354	356	350	283	309	289	297	266	266	262	241	323.1
24-Jun	208	185	170	210	202	190	45	65	29	31	29	22	2	351	355	17	8	352	0	358	355	3	25	38	9.3
25-Jun	33	28	277	315	313	190	152	125	104	131	133	229	264	181	112	105	152	143	162	148	141	153	162	198	151.5
26-Jun	186	178	131	125	125	126	129	166	170	163	168	169	163	130	130	134	136	132	135	126	126	121	117	134	145.5
27-Jun	131	134	144	123	212	241	255	232	211	218	223	232	198	116	35	301	5	122	163	119	156	213	215	196	196.5
28-Jun	193	246	163	140	264	75	116	53	65	99	77	56	49	30	45	51	84	118	138	147	155	163	173	192	93.8
29-Jun	207	208	184	162	169	162	159	158	112	90	34	36	1	349	335	343	30	23	342	335	288	296	333	248	354.1
30-Jun	240	224	173	221	231	269	91	119	143	216	151	158	116	120	193	262	255	243	249	241	219	214	226	236	210.0
	296.7	319.9	336.0	326.3	304.4	318.9	334.1	346.9	338.4	329.4	338.0	334.7	326.9	343.0	340.8	352.4	22.5	9.0	352.7	359.7	20.6	18.0	18.4	345.3	

Diurnal Average

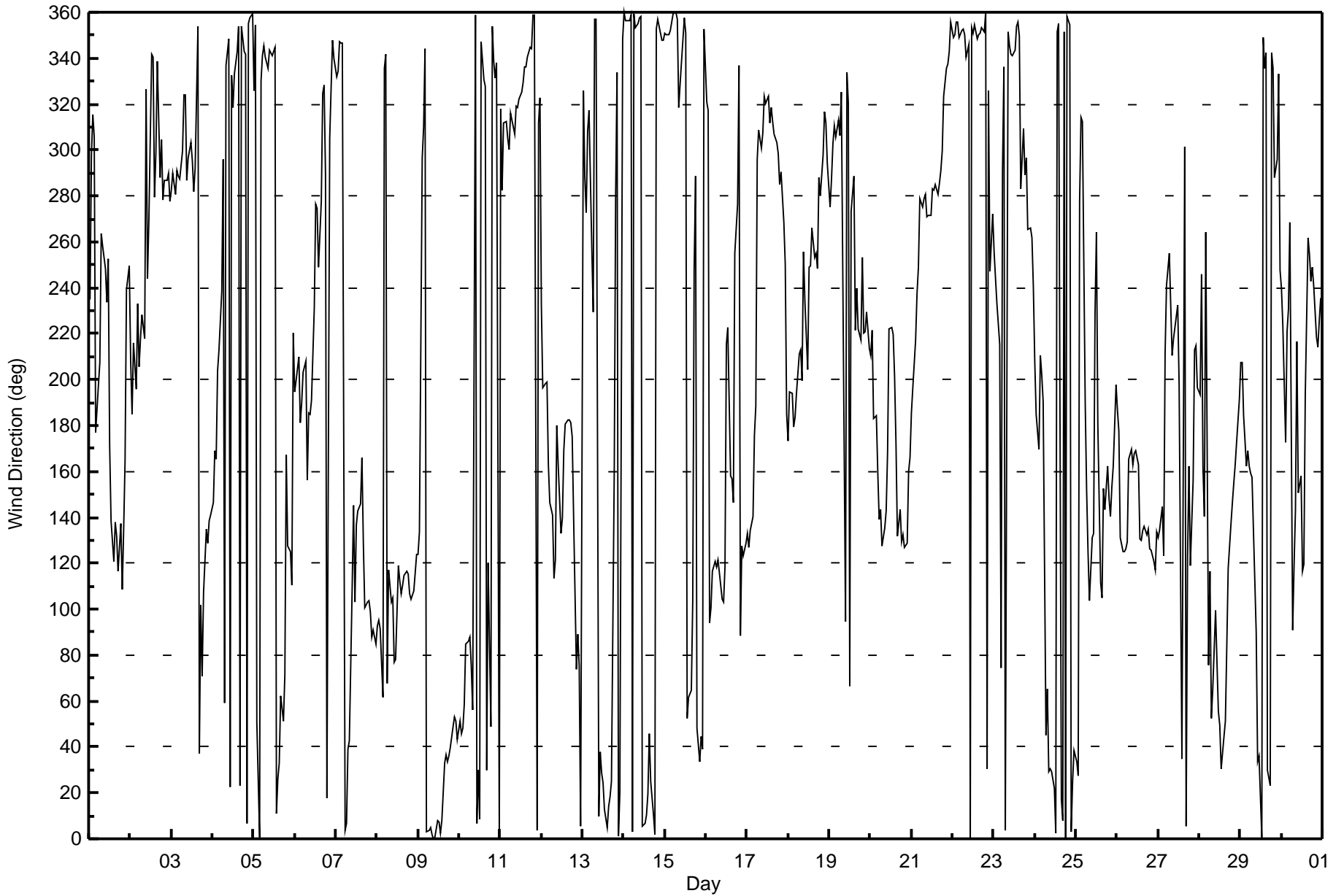
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Patricia McInnes - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Jun 10 13:00 Minimum Value: 5 deg on Jun 23 01:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 15 Median = 19 Q ₃ = 31 P ₉₀ = 52 P ₉₉ = 92																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	43	63	12	7	64	56	40	15	20	17	22	42	35	22	24	31	37	24	24	15	11	40	11	55	64	
2-Jun	68	21	19	58	17	23	16	62	87	71	31	27	25	48	21	11	45	24	29	34	15	13	17	13	87	
3-Jun	13	12	12	13	12	12	12	16	24	18	22	28	28	41	28	59	37	32	36	41	17	12	12	13	59	
4-Jun	12	17	10	31	24	12	55	36	47	18	24	30	16	17	14	20	14	17	21	13	17	15	16	16	55	
5-Jun	23	18	18	30	12	11	12	17	12	14	17	14	17	24	21	25	33	30	49	20	35	29	82	77	82	
6-Jun	52	71	13	26	20	27	31	21	34	26	33	40	25	27	21	37	41	29	18	22	31	29	26	9	71	
7-Jun	9	9	11	11	21	35	13	25	27	40	29	37	30	30	31	19	69	24	15	13	12	15	13	13	69	
8-Jun	15	14	13	24	18	11	63	22	19	22	23	23	20	18	17	21	20	21	17	12	13	12	13	11	63	
9-Jun	18	11	76	50	33	15	17	17	17	17	18	15	20	18	21	15	15	14	15	13	13	13	13	13	76	
10-Jun	12	13	14	15	19	14	18	34	66	44	33	74	100	73	57	53	60	43	37	15	15	11	12	16	100	
11-Jun	17	14	10	10	11	10	15	15	14	16	19	20	16	20	20	22	19	22	20	18	19	13	26	58	58	
12-Jun	51	63	15	16	22	14	15	27	21	16	25	16	17	24	16	15	15	16	16	37	15	26	48	18	63	
13-Jun	10	37	40	17	46	75	75	34	24	23	24	23	39	60	44	23	17	68	17	49	34	14	14	19	75	
14-Jun	16	17	16	17	17	15	17	16	16	17	17	16	16	15	13	15	13	15	15	15	14	15	13	12	17	
15-Jun	15	14	14	14	14	14	14	18	57	37	63	77	42	64	51	23	39	32	13	37	15	15	17	72	77	
16-Jun	14	18	19	15	26	38	20	17	18	22	34	31	30	18	46	21	27	45	23	30	41	19	19	14	46	
17-Jun	15	17	35	17	42	23	40	13	14	18	20	19	15	21	18	15	19	19	21	16	15	16	24	69	69	
18-Jun	17	27	21	17	15	17	36	19	19	26	26	20	47	93	61	15	19	20	18	15	13	11	13	10	93	
19-Jun	11	17	27	25	23	20	19	92	70	87	45	57	98	31	31	81	89	92	30	38	26	22	9	16	98	
20-Jun	13	13	15	18	14	15	14	16	16	27	50	18	14	13	20	17	15	16	14	15	13	12	43	21	50	
21-Jun	20	18	20	11	14	14	13	16	15	14	13	14	13	13	13	13	12	14	11	13	11	12	20	17	20	
22-Jun	14	15	16	17	15	16	16	14	13	19	18	20	21	20	21	19	20	18	20	22	12	34	24	14	34	
23-Jun	5	19	13	61	48	52	60	17	20	24	25	29	24	33	42	46	36	25	33	12	23	18	25	30	61	
24-Jun	42	53	24	32	49	30	97	28	23	22	30	41	42	41	19	21	23	23	18	17	12	11	32	46	97	
25-Jun	34	46	29	7	7	62	49	29	58	39	38	52	93	66	82	61	49	24	19	16	13	13	16	16	93	
26-Jun	13	12	13	10	11	11	11	18	16	17	16	16	23	16	15	17	15	15	13	16	12	13	12	13	23	
27-Jun	15	15	25	18	38	33	42	21	27	19	15	16	43	25	86	45	27	46	17	28	50	15	18	14	86	
28-Jun	15	30	54	60	68	63	21	29	24	18	20	16	21	29	20	18	23	33	42	22	13	12	15	13	68	
29-Jun	15	16	18	10	13	14	22	65	69	61	67	43	65	27	18	20	24	19	21	11	31	53	32	18	69	
30-Jun	12	27	31	14	15	75	29	20	25	64	32	25	33	39	43	9	12	15	14	13	19	20	14	11	75	
	68	71	76	61	68	75	97	92	87	87	67	77	100	93	86	81	89	92	49	49	50	53	82	77		
Diurnal Maximum																										





Wood Buffalo Environmental Association

SO₂ Calibration Summary

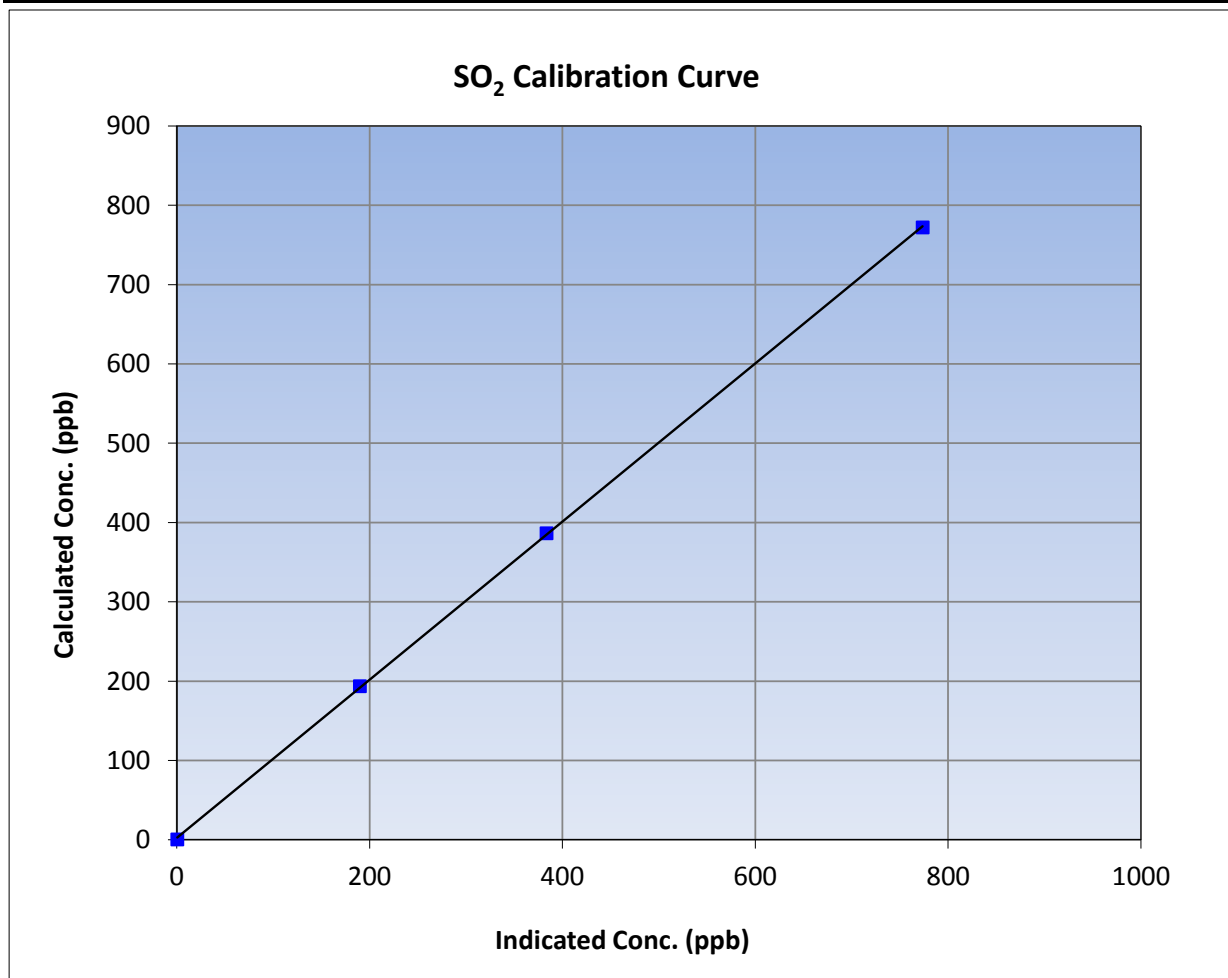
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 1, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:55	End Time (MST)	14:30
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

Calibration Data

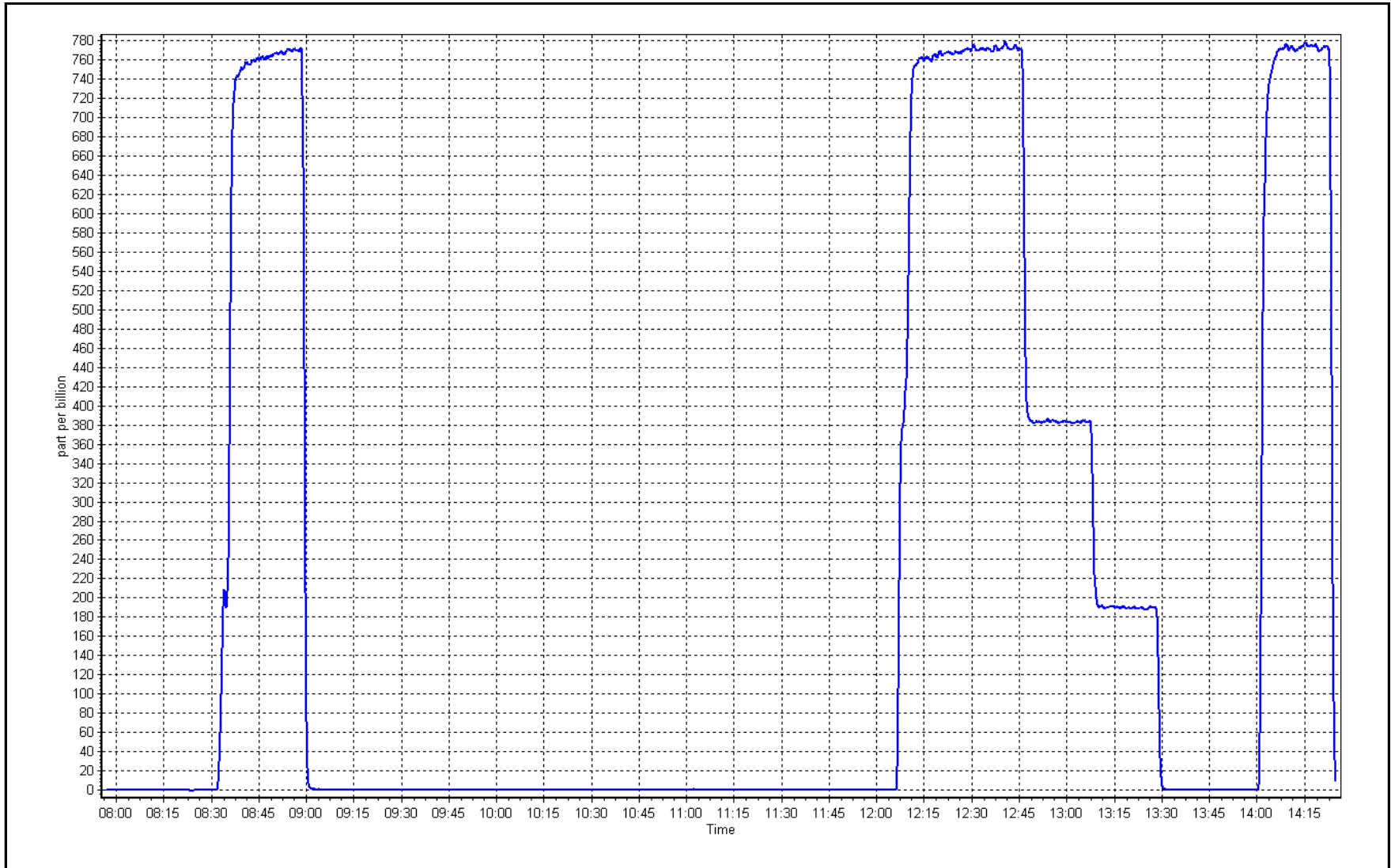
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Serial Number	Limits	
0.0	0.2	----	Serial Number	0.999953	≥0.995
771.8	773.1	0.9983	Slope	0.997116	0.90 - 1.10
386.0	383.1	1.0075	Intercept	2.275024	+/-30
193.4	189.5	1.0204			



SO2 Calibration Plot

Date: June 6, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TRS Calibration Summary

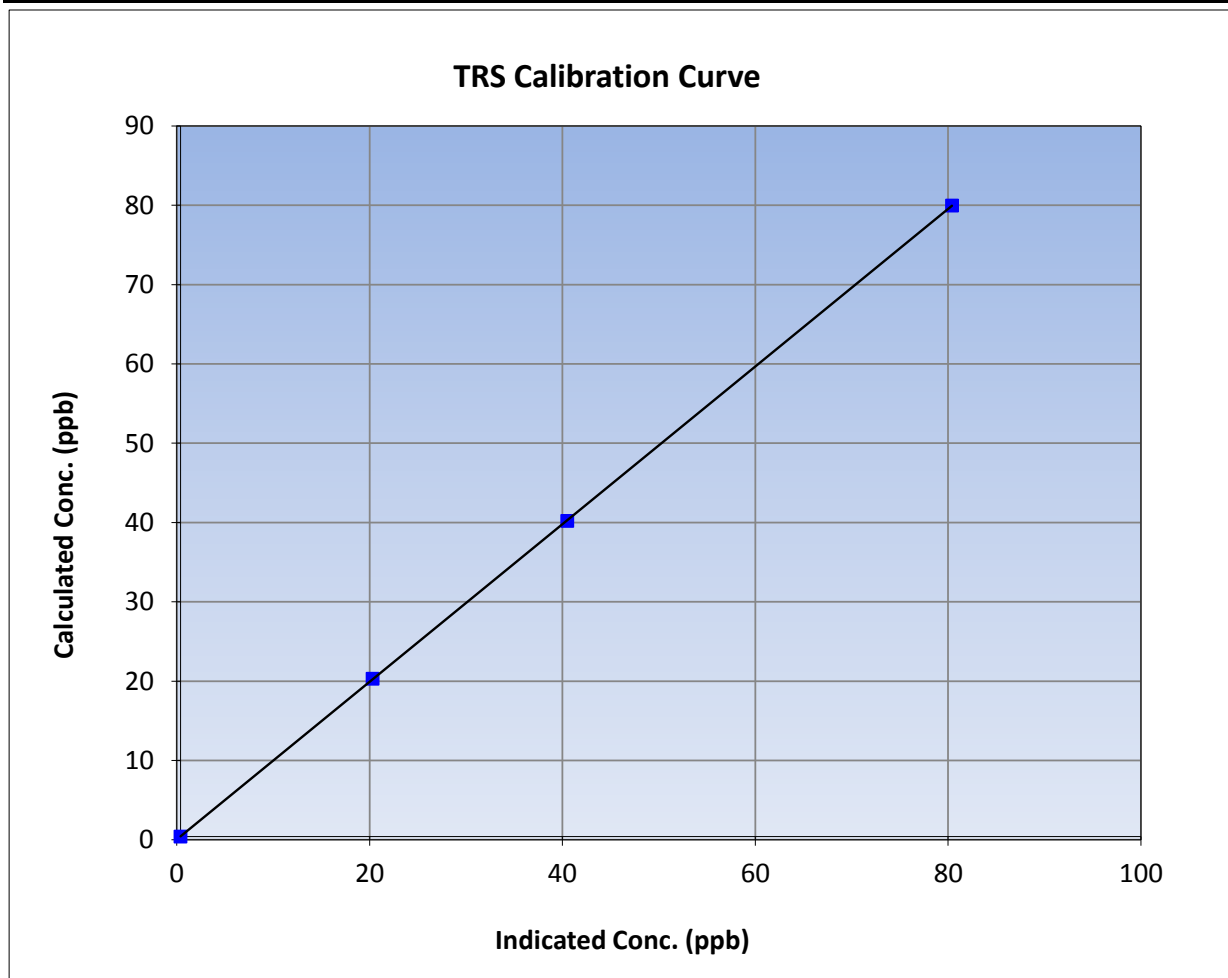
Version-03-2017

Station Information

Calibration Date	June 5, 2017	Previous Calibration	May 15, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	10:10	End Time (MST)	13:40
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

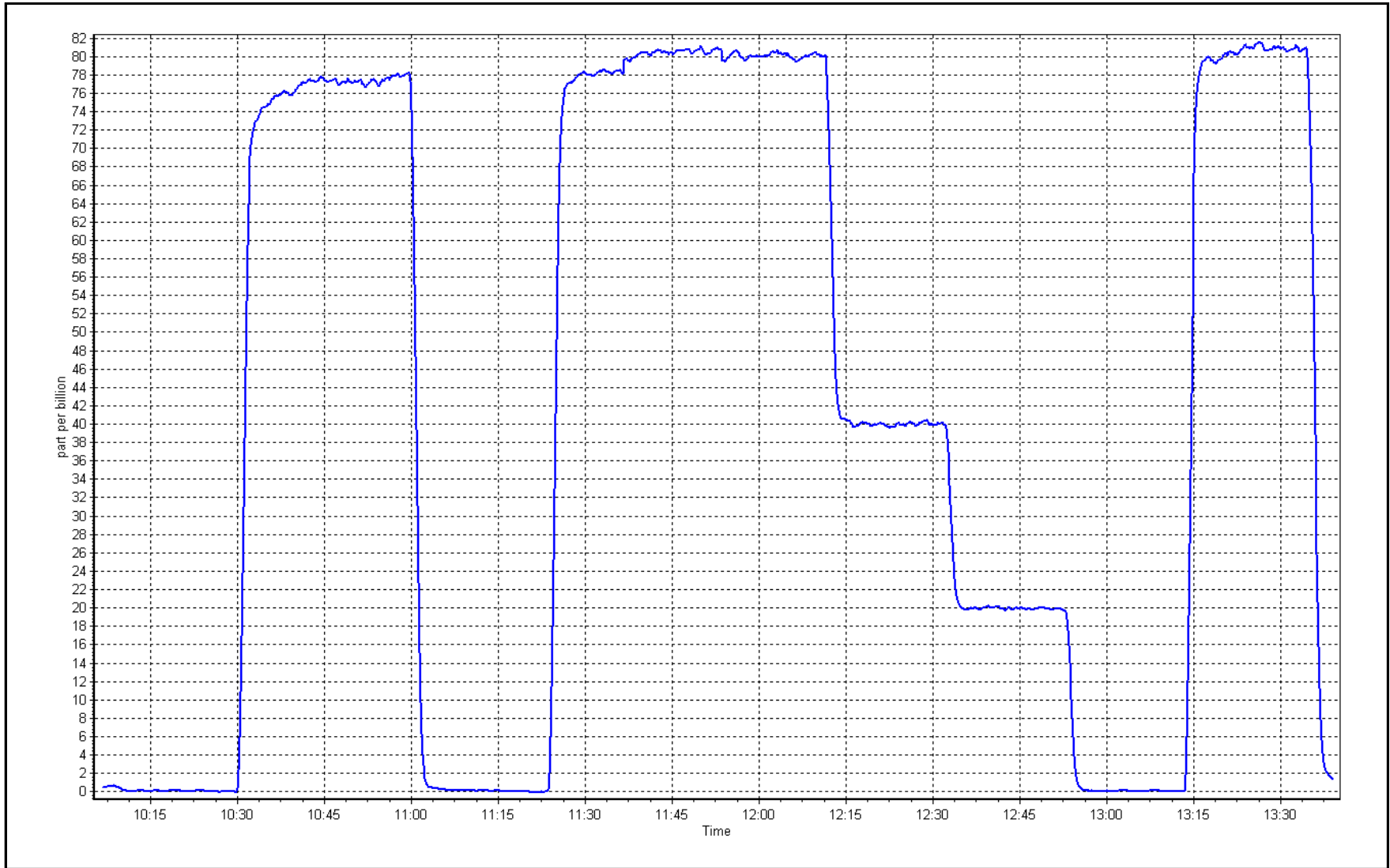
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999995	≥0.995
79.6	80.0	0.9945			
39.8	40.1	0.9928	Slope	0.993903	0.90 - 1.10
19.9	19.9	1.0003			
			Intercept	0.032352	+/-3



TRS Calibration Plot

Date: June 5, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	June 6, 2017	Last Cal Date:	May 1, 2017
Start time (MST):	7:55	End time (MST):	14:30
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL107926	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	<u>505.0</u> ppm	CH4 Equiv Conc.	1068.8 ppm
C3H8 Cal Gas Conc.	<u>205.0</u> ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	2449
ZAG make/model	API T701	Serial Number	260

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1331259521

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	2.20E-04	2.18E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.3	12.1	Carrier Pressure	35.7	35.8
NMHC SP Ratio	4.38E-05	4.46E-05	Fuel Pressure	42.3	42.3
NMHC Peak Area	195380	191861	Air Pressure	32.4	32.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.998532	1.000279
THC Cal Offset	0.054210	0.040122
CH4 Cal Slope	0.998394	0.996940
CH4 Cal Offset	0.038190	0.027573
NMHC Cal Slope	0.999836	1.003197
NMHC Cal Offset	0.014104	0.012332

Notes: H2 generator installed after as founds. Span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5537	0.0	0.00	0.00	----
as found span	5458	84.2	16.24	16.15	1.006
calibrator zero	5537	0.0	0.00	0.00	----
high point	5458	84.2	16.24	16.22	1.001
second point	5499	42.1	8.12	8.04	1.010
third point	5522	21.1	4.07	4.00	1.018
as left zero	5537	0.0	0.00	0.00	----
as left span	5458	84.2	16.24	16.23	1.000
Average Correction Factor					1.010
Corrected As found	16.15	Prev response	16.21	*% change	0.4%

NMHC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5537	0	0.00	0.00	----
as found span	5458	84.2	8.56	8.43	1.016
calibrator zero	5537	0	0.00	0.00	----
high point	5458	84.2	8.56	8.53	1.004
second point	5499	42.1	4.28	4.25	1.009
third point	5522	21.1	2.15	2.12	1.013
as left zero	5537	0	0.00	0.00	----
as left span	5458	84.2	8.56	8.53	1.004
Average Correction Factor					1.009
Corrected As found	8.43	Prev response	8.55	*% change	1.4%

CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5537	0.0	0.00	0.00	----
as found span	5458	84.2	7.67	7.72	0.994
calibrator zero	5537	0.0	0.00	0.00	----
high point	5458	84.2	7.67	7.69	0.998
second point	5499	42.1	3.84	3.80	1.011
third point	5522	21.1	1.92	1.88	1.022
as left zero	5537	0.0	0.00	0.00	----
as left span	5458	84.2	7.67	7.69	0.997
Average Correction Factor					1.010
Corrected As found	7.72	Prev response	7.65	*% change	-0.9%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

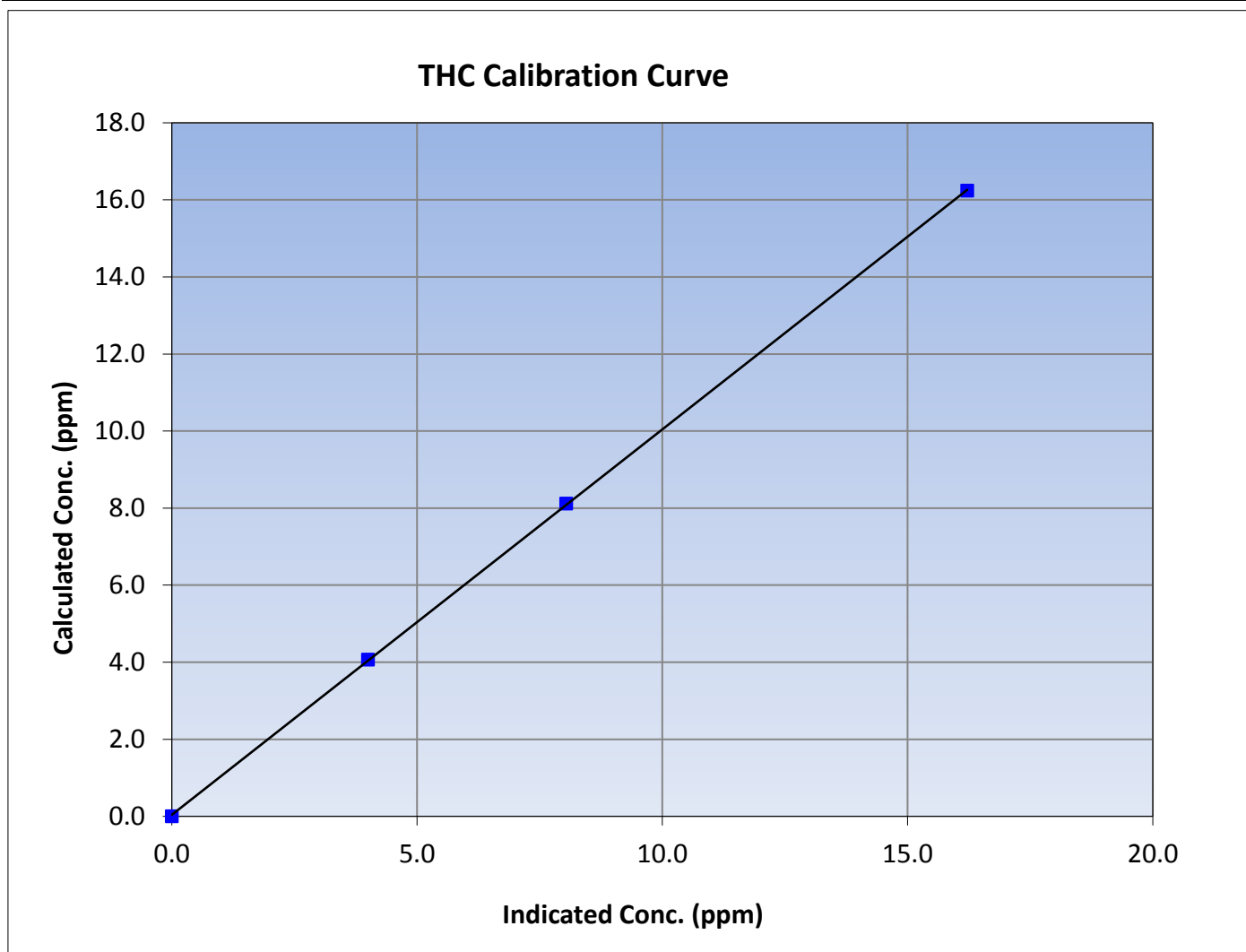
Version-02-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 1, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:55	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999970	≥ 0.995			
16.24	16.22	1.0012						
8.12	8.04	1.0096				Slope	1.000279	0.90 - 1.10
4.07	4.00	1.0178						
			Intercept	0.040122	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

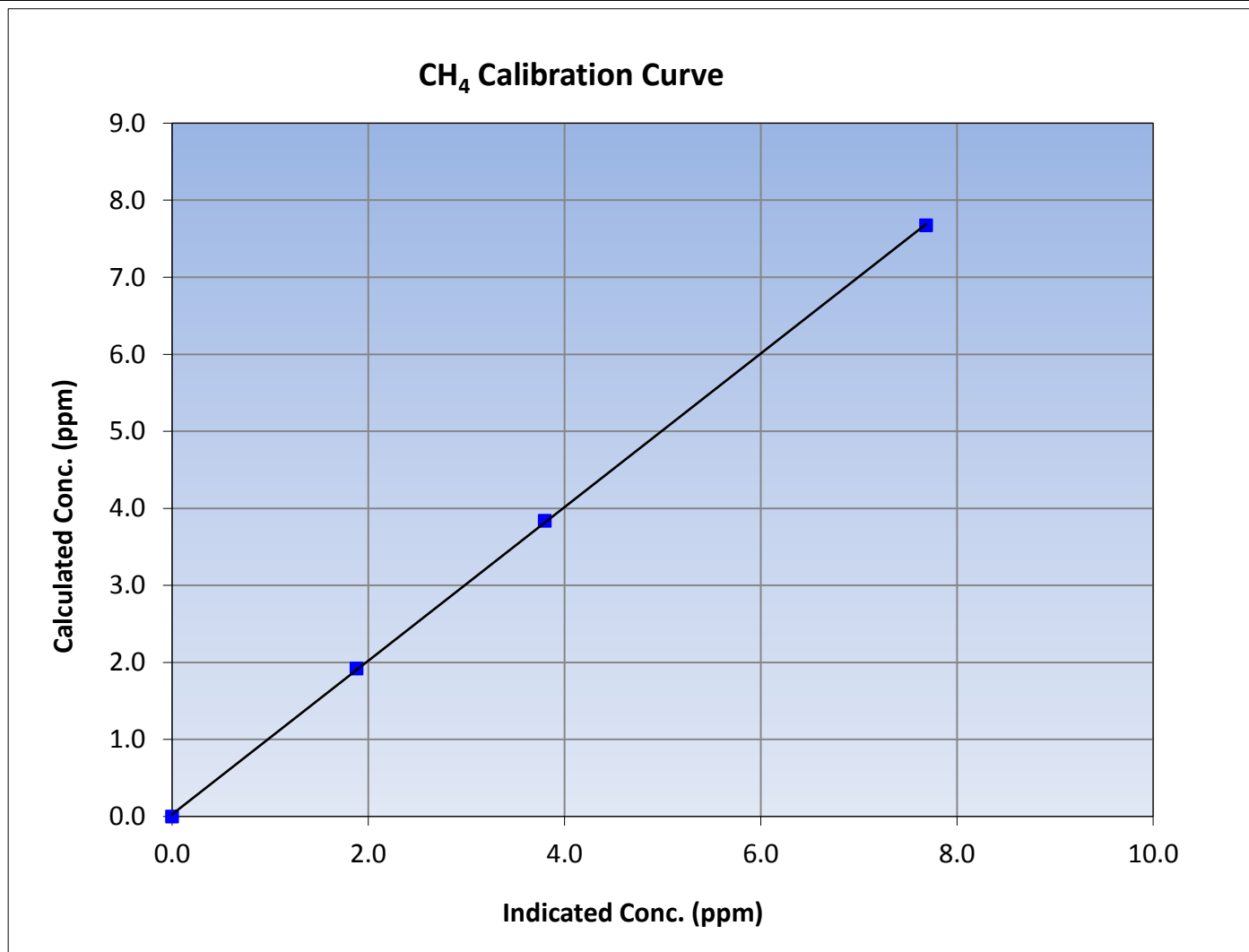
Version-02-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 1, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:55	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999937	≥ 0.995			
7.67	7.69	0.9983						
3.84	3.80	1.0105				Slope	0.996940	0.90 - 1.10
1.92	1.88	1.0225						
			Intercept	0.027573	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

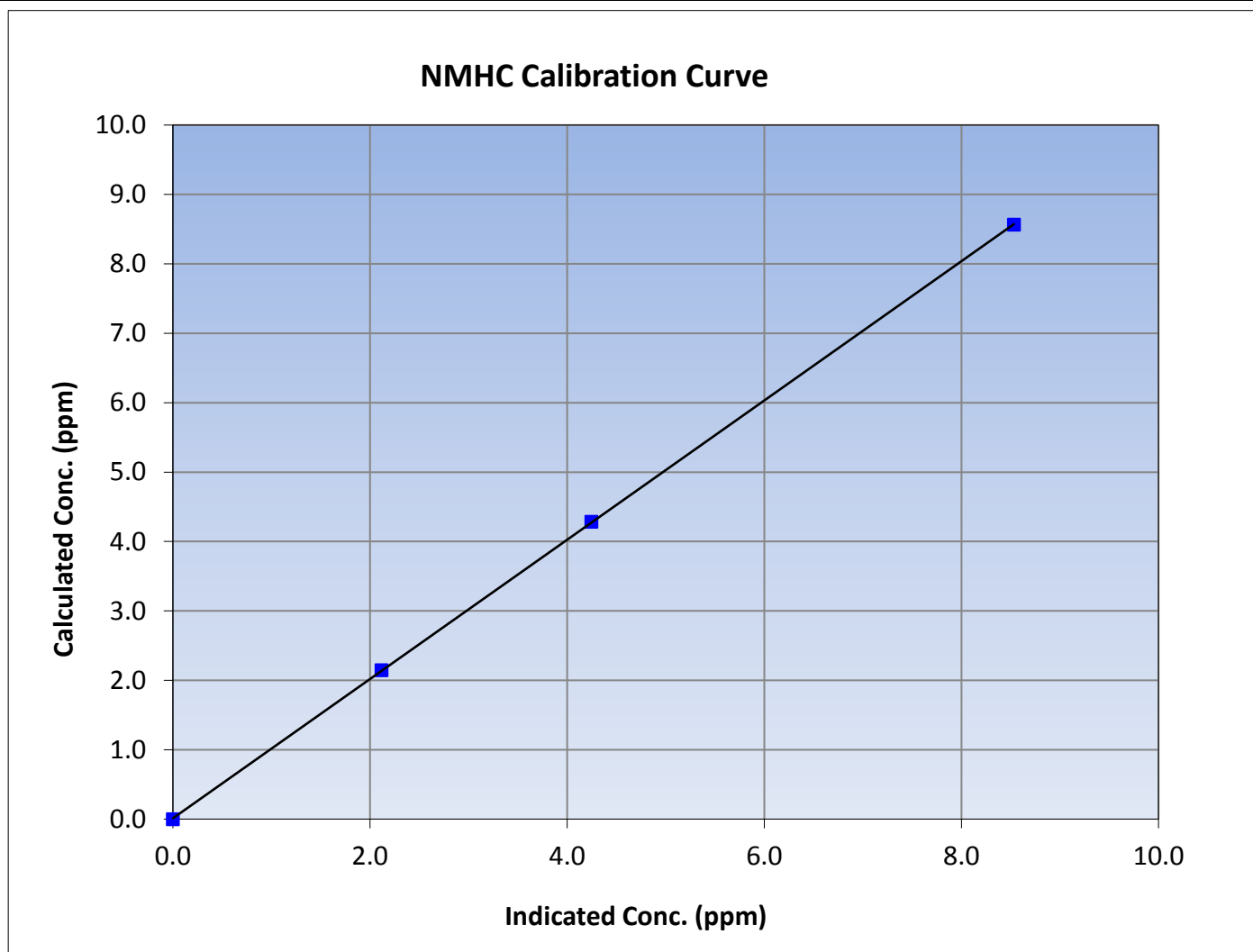
Version-02-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 1, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:55	End Time (MST)	14:30
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

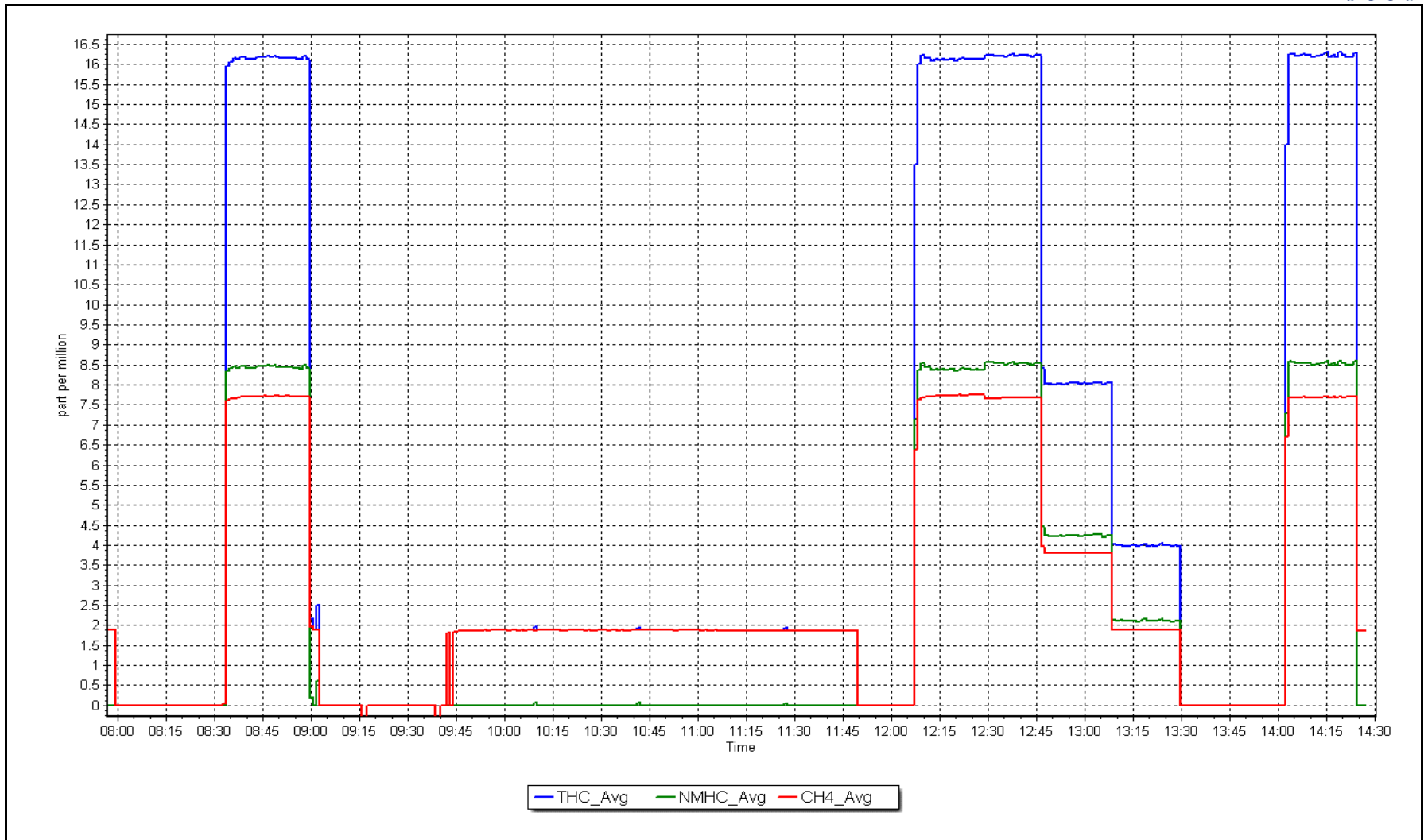
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999990	≥ 0.995			
8.56	8.53	1.0037						
4.28	4.25	1.0088				Slope	1.003197	0.90 - 1.10
2.15	2.12	1.0132						
			Intercept	0.012332	± 0.5			



NMHC Calibration Plot

Date: June 6, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

O₃ Calibration Summary

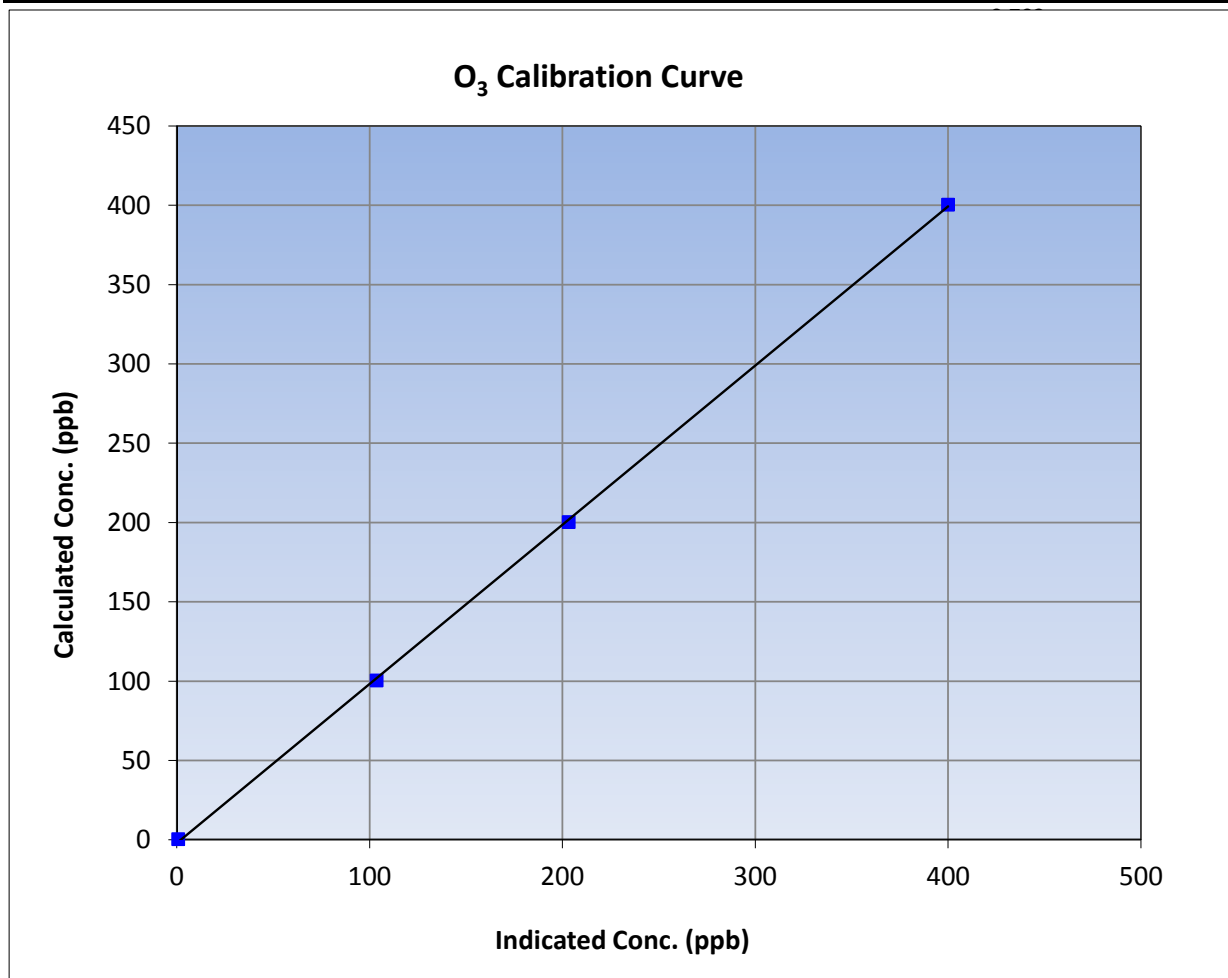
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 3, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:55	End Time (MST)	11:50
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

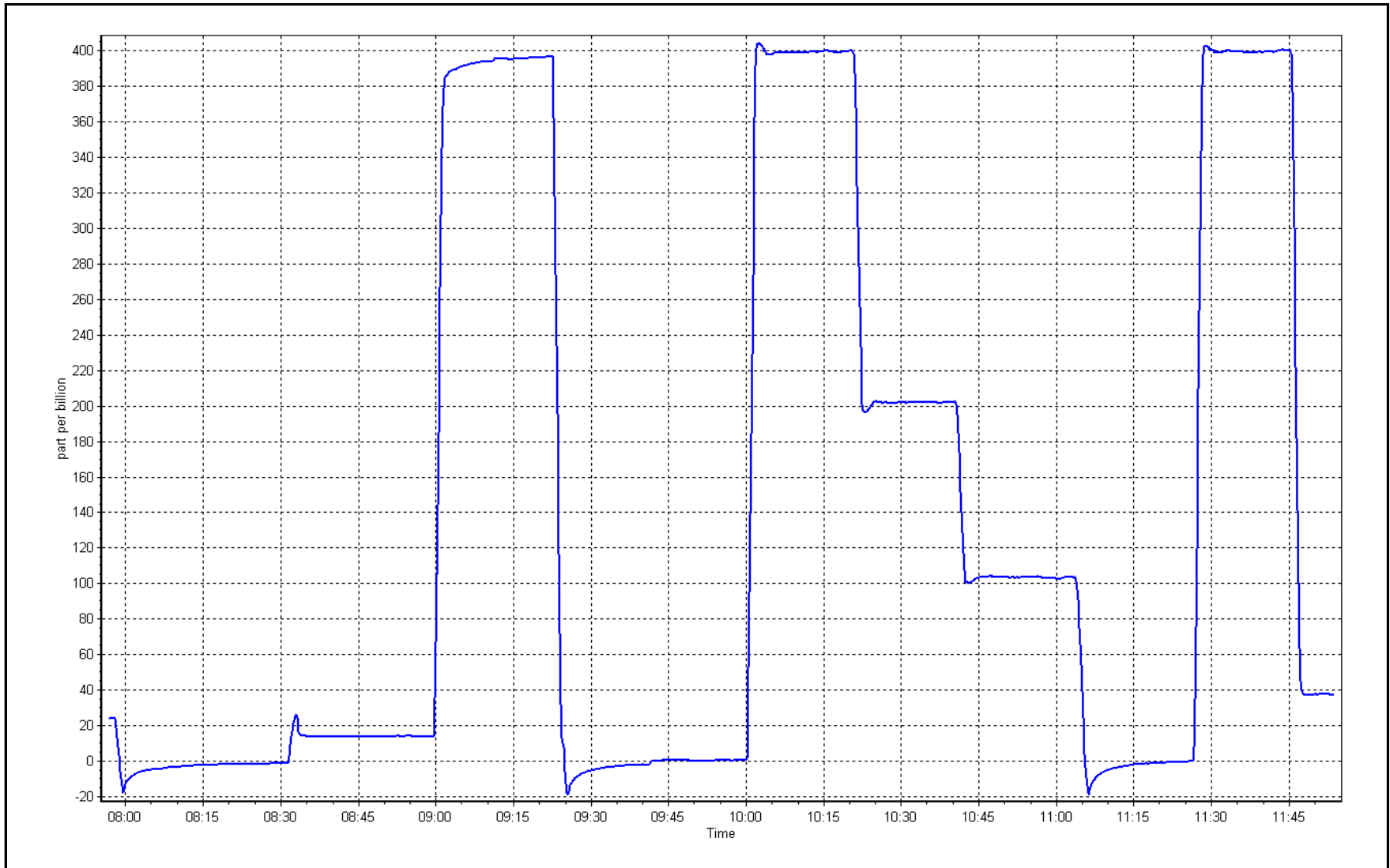
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999906	≥0.995
400.0	399.6	1.0010	Slope	1.003691	0.90 - 1.10
200.0	202.8	0.9862	Intercept	-2.151540	+/- 10
100.0	103.2	0.9690			



O₃ Calibration Plot

Date: June 6, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	June 7, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:25	End time (MST):	13:30
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL107926	Cal Gas Expiry Date	February 16, 2019
NOX Cal Gas Conc.	<u>52.4</u> ppb	NO Cal Gas Conc.	<u>52.4</u> ppb
Calibrator Model	API T700	Serial Number	2449
ZAG make/model	API T701	Serial Number	260

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1218153460		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.018	1.015	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	1.001	PMT Temperature	-3.0	-3.0
NO ₂ coefficient	1.000	1.000	Reaction cell Press	183.6	184.5
NO bkgrnd	3.0	3.0	Sample Flow	0.759	0.759
NOX bkgrnd	3.2	3.2	PMT Voltage	-772.6	-772.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.001714	1.000579
NO _x Cal Offset	1.197387	1.780840
NO Cal Slope	1.000910	0.998929
NO Cal Offset	1.363413	2.277693
NO ₂ Cal Slope	1.000060	0.999921
NO ₂ Cal Offset	-0.933430	1.389442



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Total flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5543	0.0	0.0	0.0	0.0	0.4	-0.2	0.6	----	----
as found span	5543	84.2	796.0	796.0	0.0	796.1	796.3	-0.2	0.9998	0.9996
calibrator zero	5543	0.0	0.0	0.0	0.0	0.4	-0.1	0.5	----	----
high point	5543	84.2	796.0	796.0	0.0	794.7	795.5	-0.8	1.0016	1.0006
second point	5543	42.1	398.0	398.0	0.0	395.2	395.4	-0.2	1.0071	1.0065
third point	5543	21.1	199.5	199.5	0.0	195.2	195.0	0.2	1.0219	1.0229
as left zero	5543	0.0	0.0	0.0	0.0	0.3	-0.2	0.4	----	----
as left span	5543	84.2	796.0	376.0	420.0	788.6	377.5	411.1	1.0093	0.9960
Average Correction Factor									1.0102	1.0100

Corrected As found	NO _x = 795.7 ppb	NO = 796.5 ppb		*Percent Change	NO _x = -0.3%
Previous Response	NO _x = 793.4 ppb	NO = 793.9 ppb		*Percent Change	NO = -0.3%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	790.8	789.6	1.1	1.0065	1.0081	----	----
1st NO2 (400 ppb O3)	376.0	413.6	789.3	376.0	413.2	1.0085	----	1.0010	99.9%
2nd NO2 (200 ppb O3)	578.9	210.7	787.3	578.9	208.4	1.0110	----	1.0110	98.9%
3rd NO2 (100 ppb O3)	680.5	109.1	786.3	680.5	105.8	1.0123	----	1.0312	97.0%
2nd NO ref point	----	0.0	785.5	784.4	1.0	1.0133	1.0148	----	----
Average Correction Factor						1.0113	1.0114	1.0144	98.6%

Notes:

Span adjusted.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

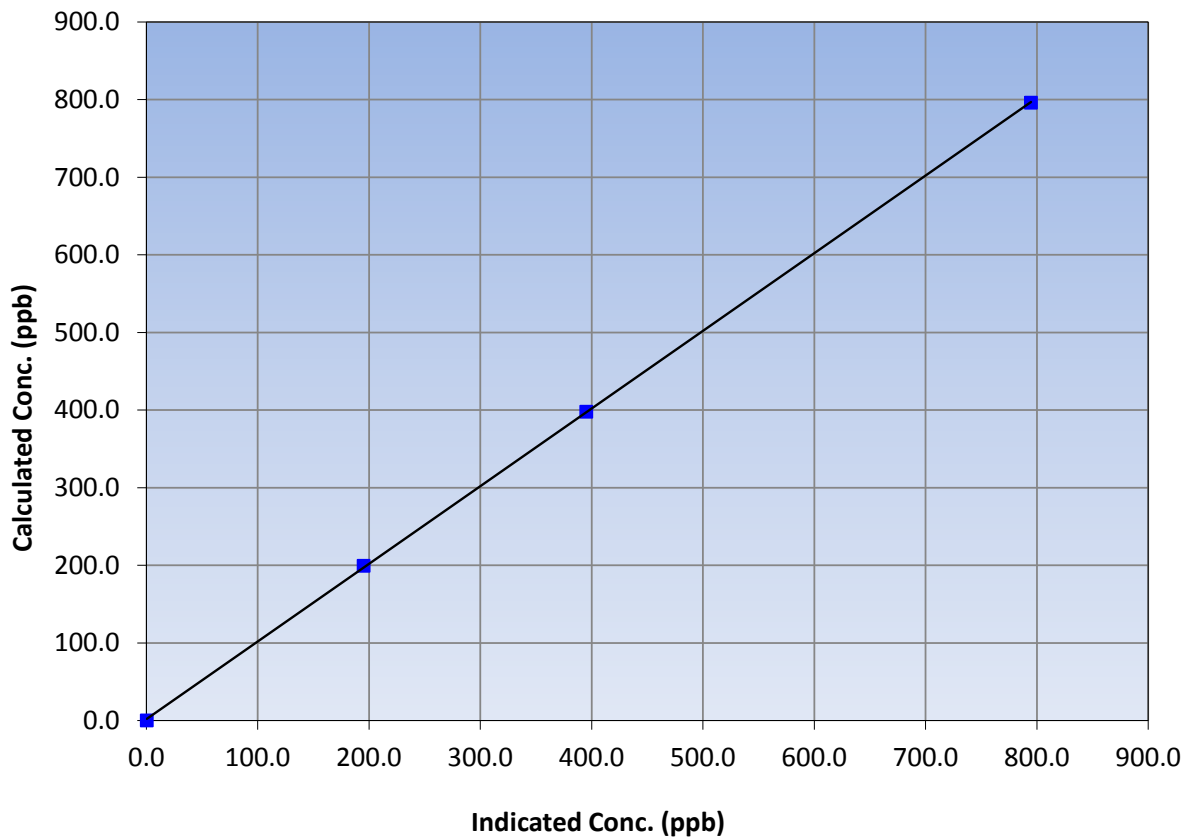
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.4	----	Correlation Coefficient	≥0.995	
796.0	794.7	1.0016			
398.0	395.2	1.0071			
199.5	195.2	1.0219			
			Slope	1.000579	0.90 - 1.10
			Intercept	1.780840	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

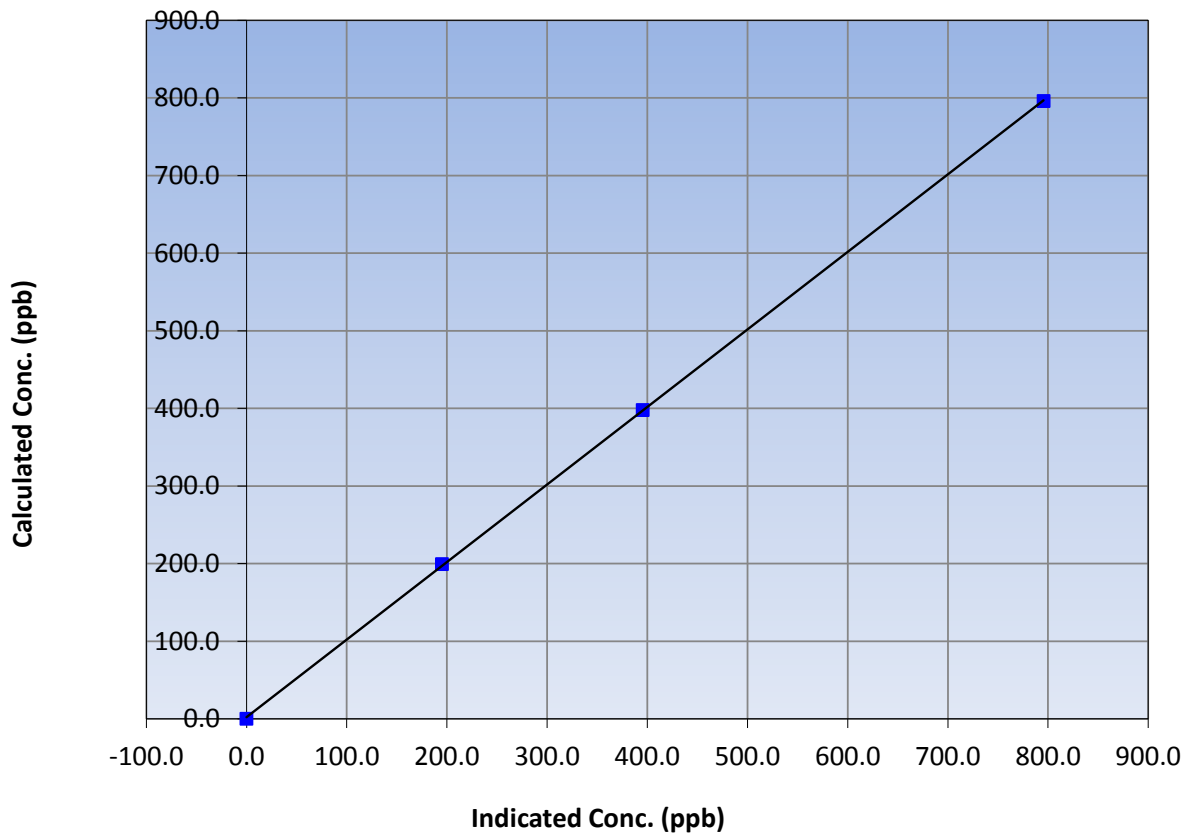
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
796.0	795.5	1.0006			
398.0	395.4	1.0065			
199.5	195.0	1.0229			
			Slope	0.998929	0.90 - 1.10
			Intercept	2.277693	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

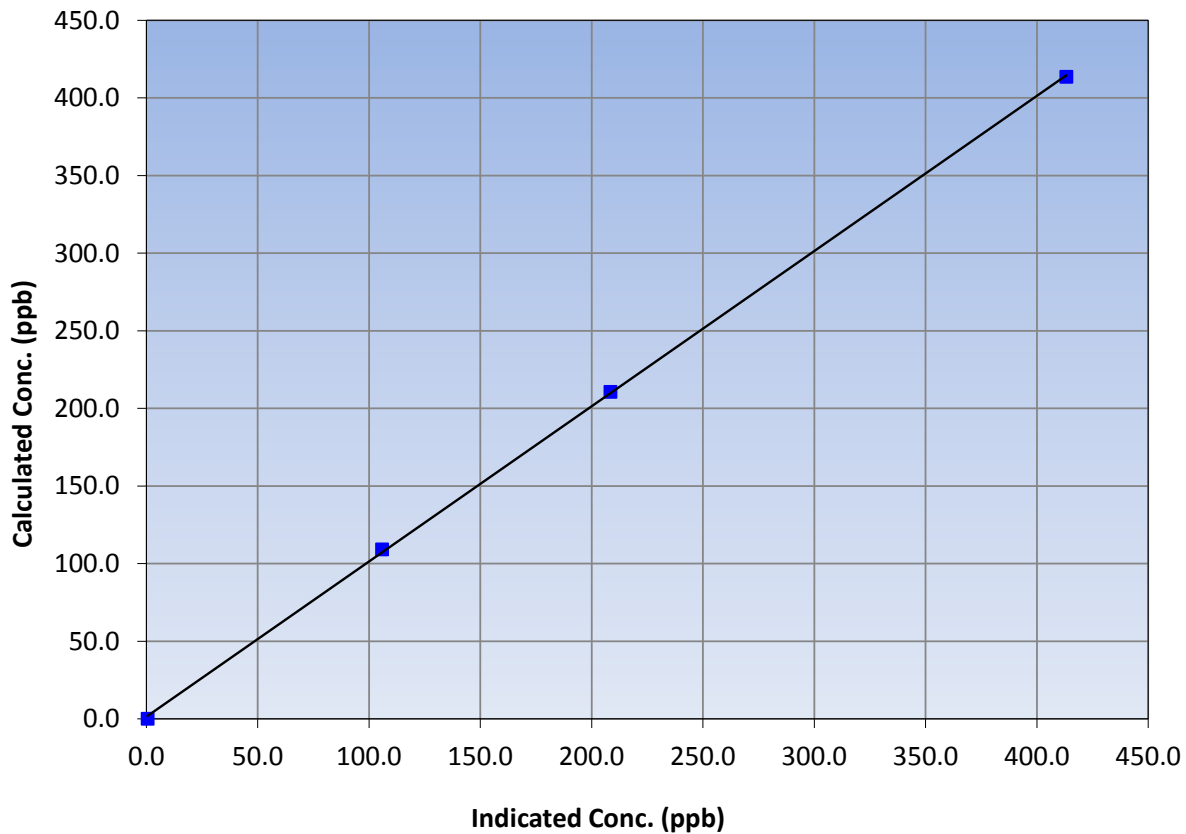
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1218153460

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.5	----	Correlation Coefficient	≥0.995	
413.6	413.2	1.0010			
210.7	208.4	1.0110			
109.1	105.8	1.0312			
			Slope	0.999921	0.90 - 1.10
			Intercept	1.389442	+/-20

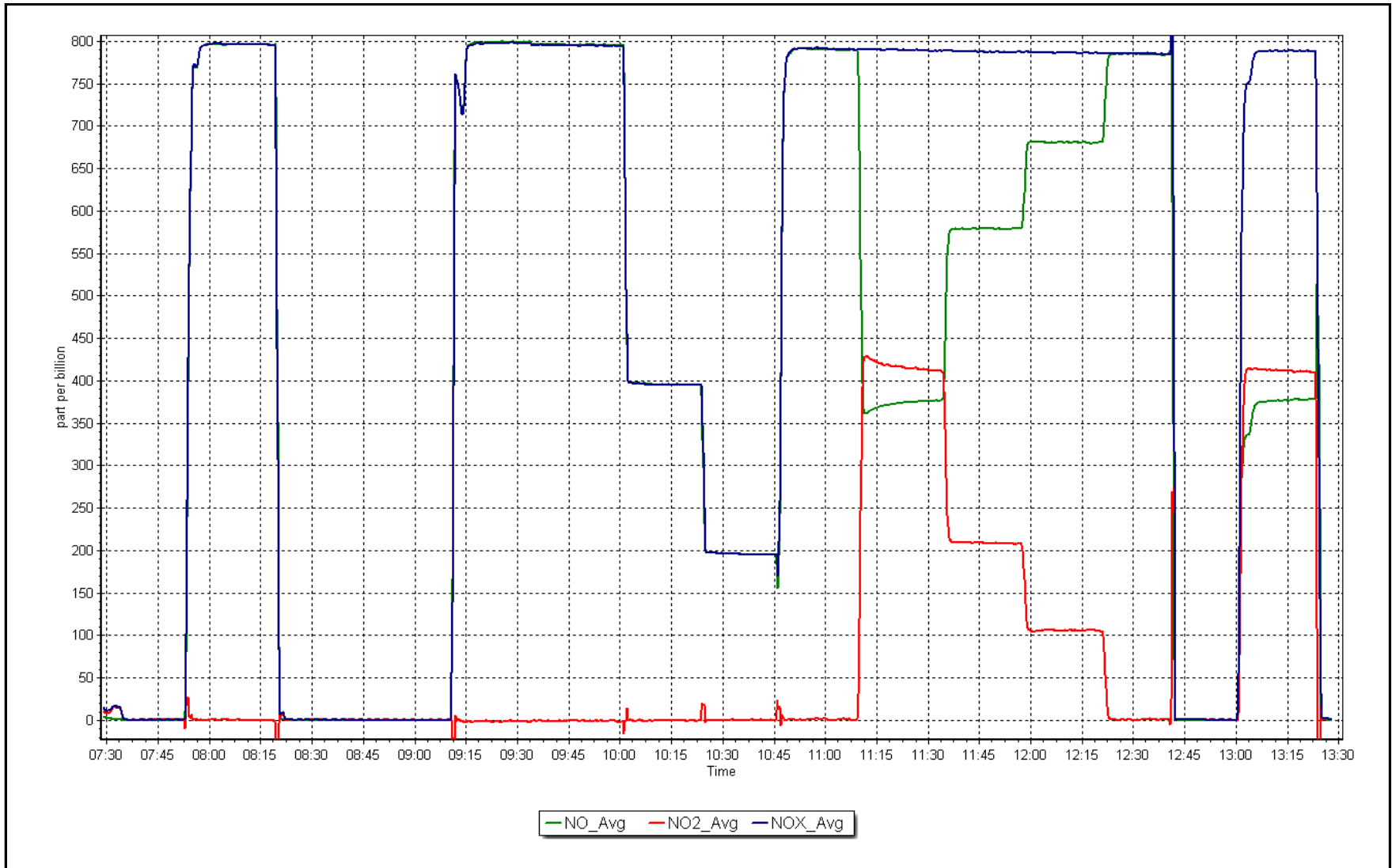
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 7, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
NOX Cal Date:	June 7, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:25	End time (MST):	12:45
NH3 Cal Date:	June 8, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:55	End time (MST):	13:00
Reason:	Routine		

Calibration Standards

NOX Cal Gas Conc.	<u>52.4</u>	ppb	NO Gas Cylinder #	LL107926
NO Cal Gas Conc.	<u>52.4</u>	ppb	NO Cal Gas Expiry	February 16, 2019
NH3 Cal Gas Conc.	<u>95.4</u>	ppm	NH3 Gas Cylinder #	SA25992
			NH3 Cal Gas Expiry	May 24, 2017
Calibrator Model	API T700		Serial Number	2449
ZAG make/model	API T701		Serial Number	260

Analyzer Information

Analyzer make:	API T201	Analyzer serial #:	215	
Converter make:	API 501	Converter serial #:	217	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	1.282	1.336	NH3 Range (ppb)	0 - 1000 ppb
NOX coefficient	1.305	1.336	NOX Range (ppb)	0 - 1000 ppb
NO2 coefficient	1.000	1.000	PMT Temperature	7.0 7.0
NH3 coefficient	0.957	1.047	Reaction cell Press	4.5 4.5
TN coefficient	1.312	1.387	Sample Flow	567 560
NO bkgnd	-6.7	-0.9	PMT Voltage	693 693
NOX bkgnd	-6.8	-0.7	Moly Temperature	315.9 315.6
TN bkgnd	-5.1	0.2	NH3 Conv Temp	825 825

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.003581	1.002689
NO _x Cal Offset	0.424974	1.827160
NO Cal Slope	1.003141	1.001446
NO Cal Offset	1.623301	3.082898
NO ₂ Cal Slope	1.005713	0.996734
NO ₂ Cal Offset	-1.820016	-0.814950
NH3 Cal Slope	1.002818	0.998950
NH3 Cal Offset	-2.061444	-1.643167
TN Cal Slope	0.980573	0.978962
TN Cal Offset	-5.069138	-2.239295



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Total flow rate (sccm)	Source gas flow rate (sccm)	Calculated TN concentration (ppb) (Cc)	Calculated NOX concentration (ppb) (Cc)	Calculated NH3 concentration (ppb) (Cc)	Indicated TN concentration (ppb) (Ic)	Indicated NOX concentration (ppb) (Ic)	Indicated NH3 concentration (ppb) (Ic)	TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5543	0.0	0.0	0.0	0.0	0.4	0.5	-0.1	----	----
as found NO	5543	84.2	796.0	796.0	----	816.2	805.0	11.2	0.975	----
calibrator zero	5543	0.0	0.0	0.0	0.0	0.6	0.6	0.0	----	----
high NO point	5543	84.2	796.0	796.0	----	797.9	793.3	4.5	0.998	----
NO/O3 point	5543	84.2	796.0	796.0	----	805.0	799.4	5.6	0.989	----
as found NH3	4544	85.1	1786.7	NA	1786.7	1984.5	----	1947.3	0.900	0.918
first NH3	4544	85.1	1786.7	NA	1786.7	1826.8	----	1789.7	0.978	0.998
second NH3	4544	47.4	995.1	NA	995.1	1018.5	----	997.4	0.977	0.998
third NH3	4544	23.7	497.6	NA	497.6	513.1	----	502.3	0.970	0.991
Average Correction Factor									0.9932	0.9955

Corrected As found TN = 815.8 ppb NO_x = 804.5 ppb NH3 = 1947.4 ppb

Previous Response TN = 816.8 ppb NO_x = 792.7 ppb NH3 = 1783.7 ppb

NH3 Previous Converter Efficiency = 95.7 %

NH3 Current Converter Efficiency = 104.7 %

*Percent Change TN = 0.1%

*Percent Change NO_x = -1.5%

*Percent Change NH3 = -8.4%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Total flow rate (sccm)	Source gas flow rate (sccm)	Calculated NO _x concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated TN concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated TN concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5543	0.0	0.0	0.0	0.0	4.1	3.5	3.8	----	----
as found span	5543	84.2	796.0	796.0	796.0	767.1	772.9	753.8	1.0376	1.0299
calibrator zero	5543	0.0	0.0	0.0	0.0	0.6	0.6	0.6	----	----
high point	5543	84.2	796.0	796.0	796.0	793.3	794.6	797.9	1.0034	1.0017
second point	5543	42.1	398.0	398.0	398.0	393.6	389.2	394.3	1.0111	1.0226
third point	5543	21.1	199.5	199.5	199.5	194.9	194.7	193.0	1.0234	1.0245
Average Correction Factor									1.0126	1.0163

Corrected As found	TN = 750 ppb	NO _x = 763.0 ppb	NO = 769.4 ppb	*Percent Change	TN = 8.9%
Previous Response	TN = 816.8 ppb	NO _x = 792.7 ppb	NO = 791.9 ppb	*Percent Change	NO _x = 3.9%
				*Percent Change	NO = 2.9%

** = > +/-5% change initiates investigation*

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO ₂ concentration (ppb) (Cc)	Indicated NO _x concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO ₂ concentration (ppb) (Ic)	NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO ₂ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point	----	0.0	799.4	795.4	3.9	0.9957	1.0007	----	----
1st NO ₂ (400 ppb O ₃)	373.4	422.0	797.7	373.4	424.2	0.9978	----	0.9948	100.5%
2nd NO ₂ (200 ppb O ₃)	582.1	213.3	796.6	582.1	214.6	0.9992	----	0.9939	100.6%
3rd NO ₂ (100 ppb O ₃)	689.3	106.1	797.0	689.3	107.7	0.9987	----	0.9851	101.5%
2nd NO ref point	----	0.0	804.5	803.4	1.1	0.9894	0.9908	----	----
Average Correction Factor						0.9963	0.9957	0.9913	100.9%

Notes: Zero adjusted. Nox/NO span adjusted. Second High NO point used as GPT reference. NH₃ point generated at 800 ppb, then 1800 ppb. Span adjusted. High percentage change from last month. See doc-it note.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

TN Calibration Summary

Version-03-2017

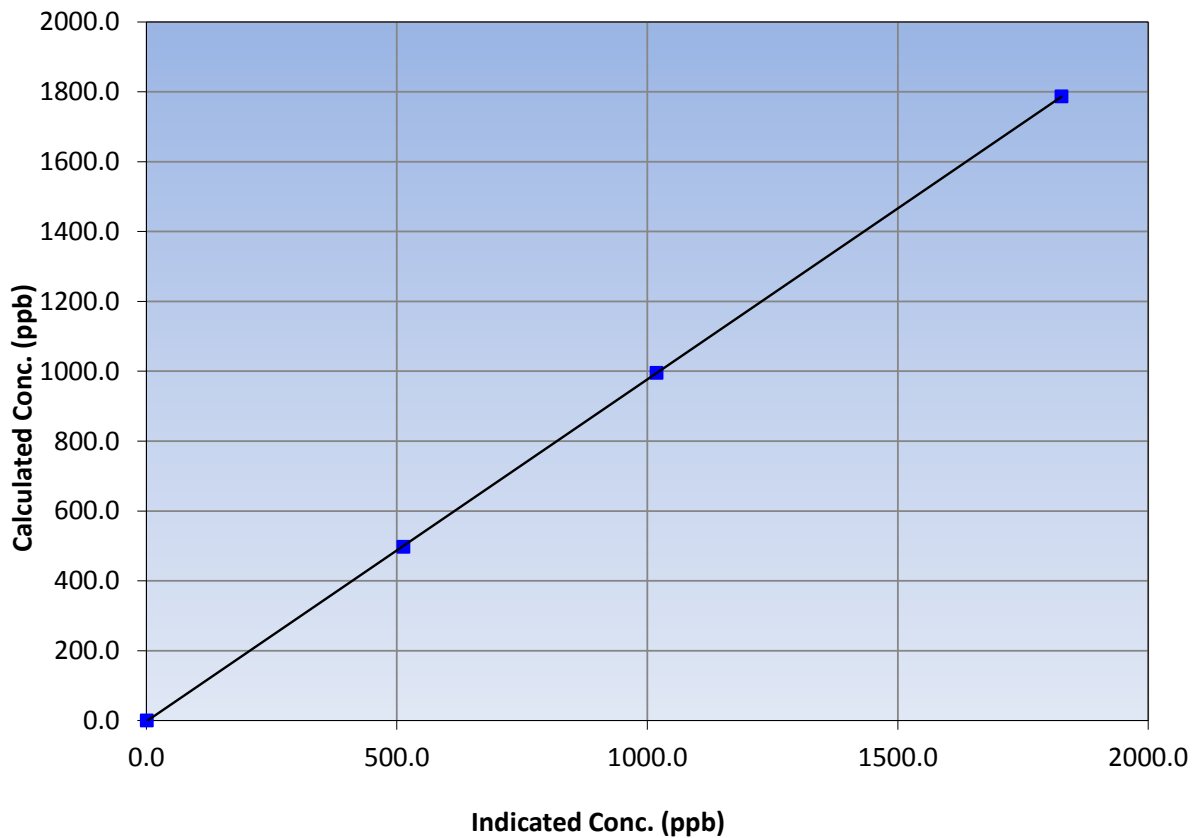
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	12:45
Analyzer make	API T201	Analyzer serial #	215

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.6	----	Correlation Coefficient	≥0.995	
1786.7	1826.8	0.9780			
995.1	1018.5	0.9771			
497.6	513.1	0.9697			
			Slope	0.978962	0.90 - 1.10
			Intercept	-2.239295	+/-20

TN Calibration Curve





Wood Buffalo Environmental Association

NH₃ Calibration Summary

Version-03-2017

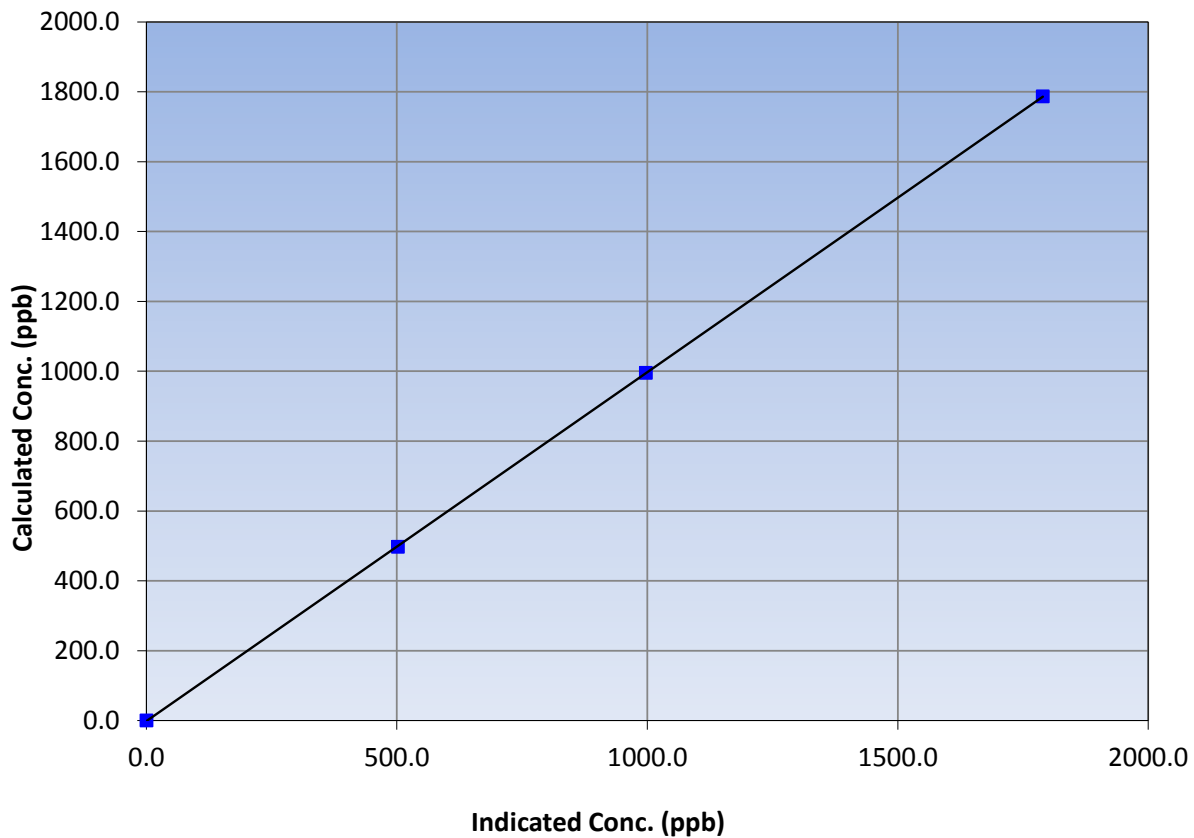
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	12:45
Analyzer make	API T201	Analyzer serial #	215

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.0	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
1786.7	1789.7	0.9983		
995.1	997.4	0.9977		
497.6	502.3	0.9906		

NH₃ Calibration Curve





Wood Buffalo Environmental Association

NO_x Calibration Summary

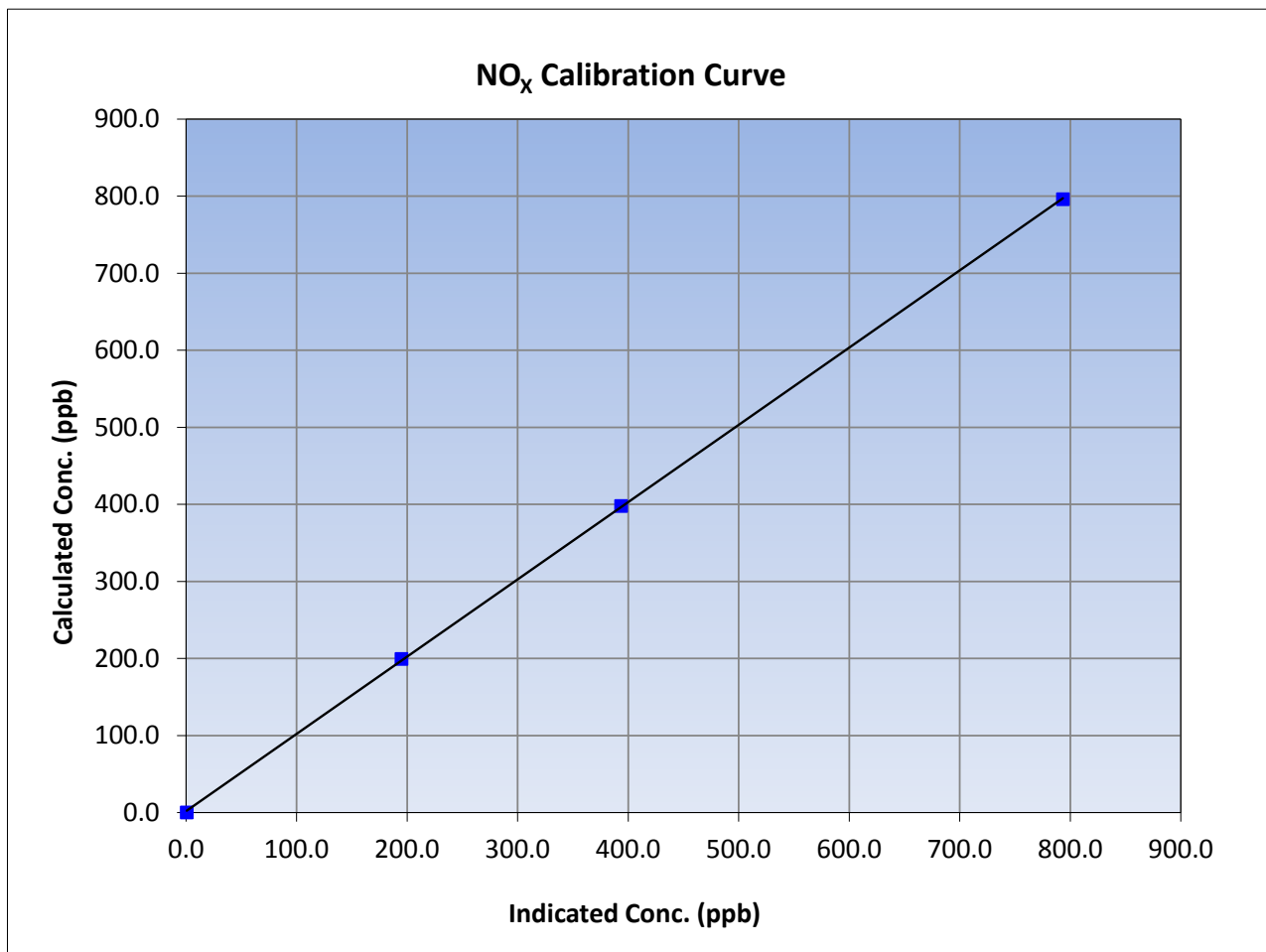
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	12:45
Analyzer make	API T201	Analyzer serial #	215

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	0.6	----	Correlation Coefficient	≥0.995
796.0	793.3	1.0034		
398.0	393.6	1.0111		
199.5	194.9	1.0234		
			Slope	0.90 - 1.10
			Intercept	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

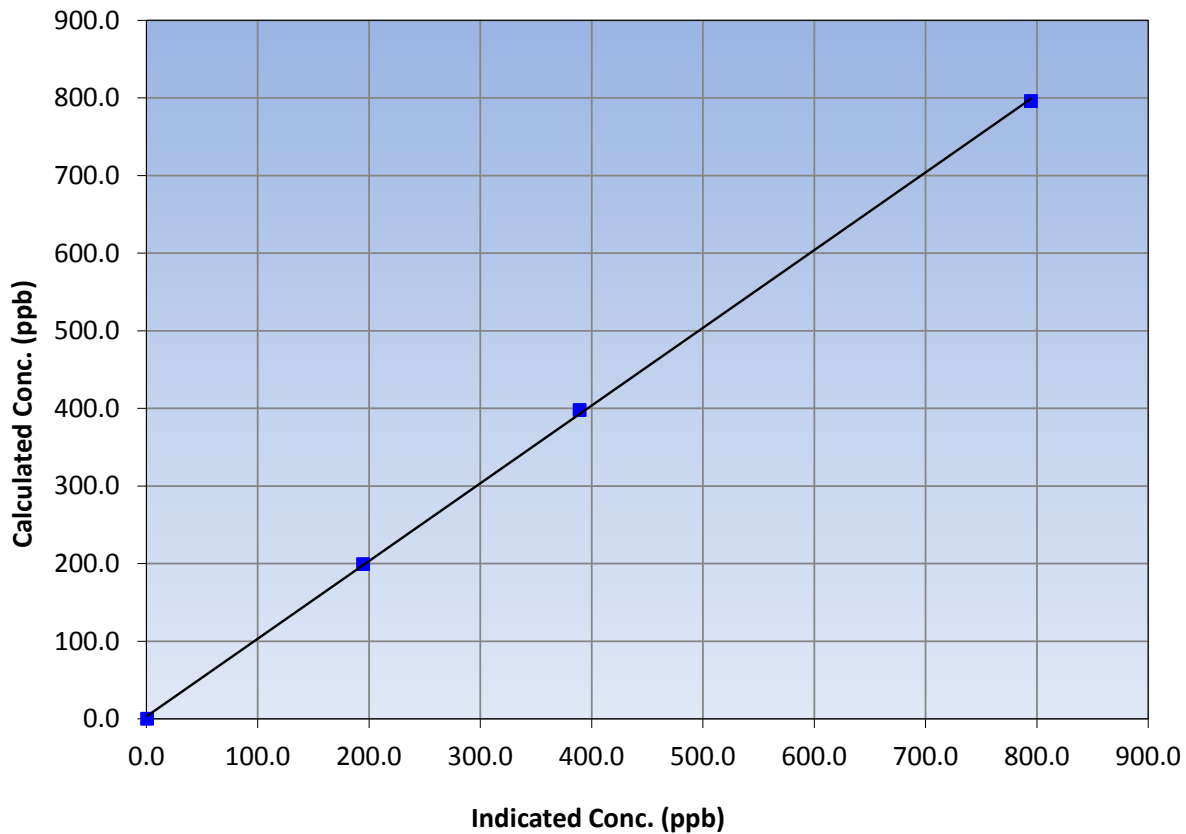
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	12:45
Analyzer make	API T201	Analyzer serial #	215

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.6	----	Correlation Coefficient	≥0.995	
796.0	794.6	1.0017			
398.0	389.2	1.0226			
199.5	194.7	1.0245			
			Slope	1.001446	0.90 - 1.10
			Intercept	3.082898	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

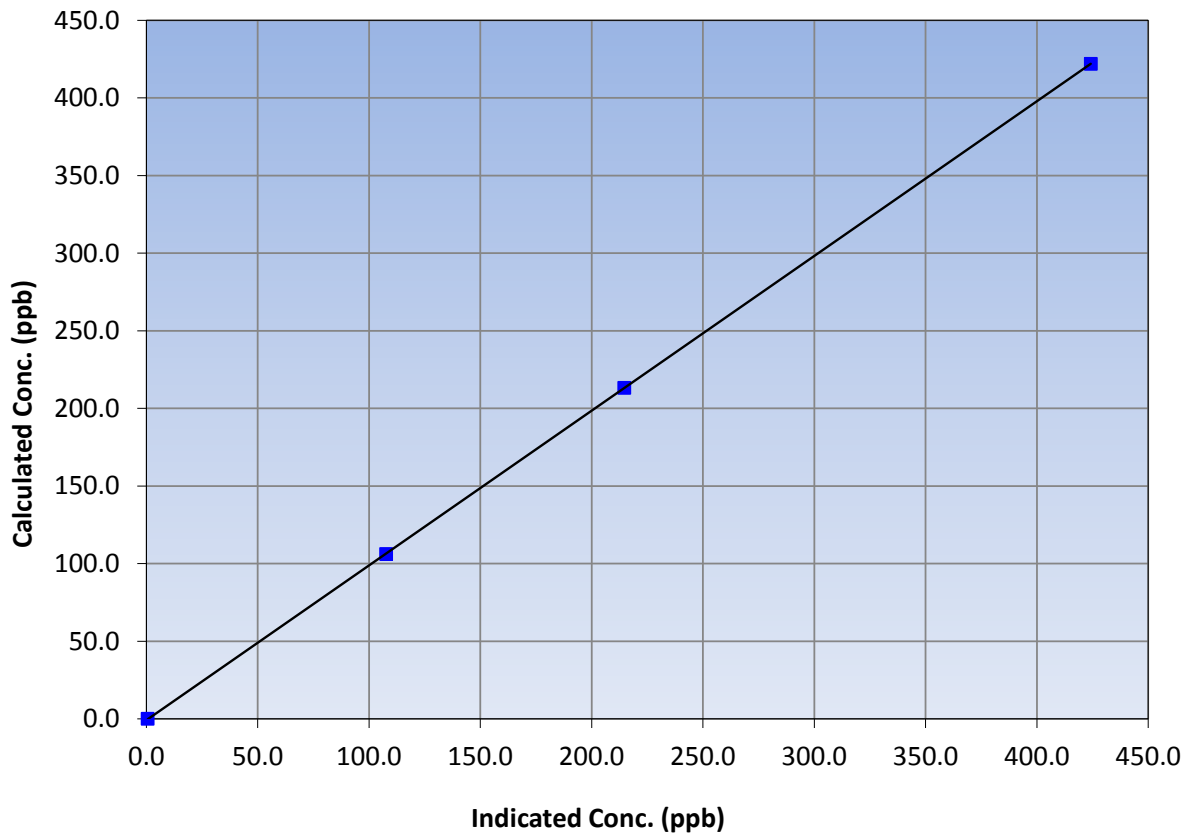
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 2, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:25	End Time (MST)	12:45
Analyzer make	API T201	Analyzer serial #	215

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.6	----	Correlation Coefficient	≥0.995	
422.0	424.2	0.9948			
213.3	214.6	0.9939			
106.1	107.7	0.9851			
			Slope	0.996734	0.90 - 1.10
			Intercept	-0.814950	+/-20

NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 7, 2017

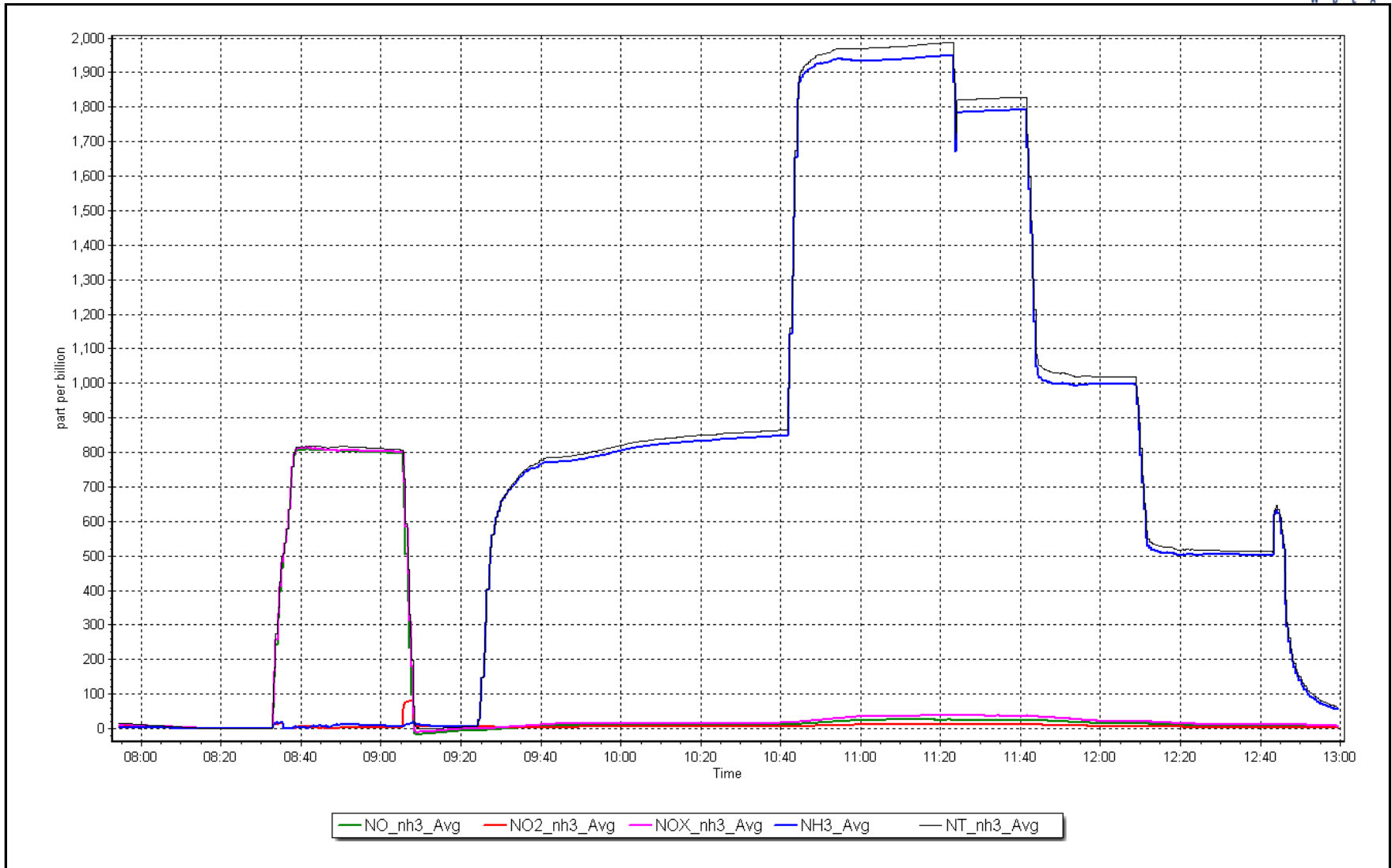
Location: Patricia McInnes



NH₃ Calibration Plot

Date: June 8, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Patricia McInnes	Station number:	AMS 06
Calibration Date:	June 7, 2017	Last Cal Date:	May 4, 2017
Start time (MST):	7:30	End time (MST):	9:45
Sharp Model:	Thermo SHARP 5030	S/N:	E-1475
Particulate Fraction:	PM2.5	C14 Source S/N:	5680
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<i>(Limits)</i>
T1 (°C)	17	17.6	17	<input type="checkbox"/>	<i>+/- 2 °C</i>
P3 (hPa)	975	972.58	975	<input type="checkbox"/>	<i>+/- 13 hPa</i>
flow (LPH)	1000	997.2	1000	<input type="checkbox"/>	<i>+/- 50 LPH</i>
Nephelometer zero	0.8	-----	0	<input checked="" type="checkbox"/>	<i>+/- 0.5 ug/m3</i>
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test:	Date of check: <u>June 7, 2017</u>	Last Cal Date: <u>January 17, 2017</u>
	Flow w/o adaptor: <u>16.62</u>	Flow w/ adaptor: <u>16.48</u>

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>2597</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1167</u>	
	Calibration Date: _____	Calibration Date: <u>April 4, 2017</u>	
<i>(Limit) +/- 5% of previous</i>	Correction Factor: _____	Correction Factor: <u>6887</u>	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<i>(Limits)</i>
T2 (°C)				<input type="checkbox"/>	<i>+/- 2 °C</i>
T3 (°C)				<input type="checkbox"/>	<i>+/- 2 °C</i>
T4 (°C)				<input type="checkbox"/>	<i>+/- 2 °C</i>
RH (%)				<input type="checkbox"/>	<i>+/- 10%</i>
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Cyclone head cleaned. No adjustments made to T1, P3, or flow. Nephelometer zero adjusted.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	35	36	99.86	34	0	4	0
TRS (ppb) Average	686	33	34	99.86	1	0	0	0
THC (ppm) Average	676	35	44	98.75	2.5	-	2.1	-
NMHC (ppm) Average	676	35	44	98.75	0.289	-	0.049	-
CH4(ppm) Average	676	35	44	98.75	2.5	-	2.1	-
O3 (ppb) Average	685	34	35	99.86	95	1	45	-
NO2 (ppb) Average	655	32	65	95.42	14	0	6	-
NO (ppb) Average	655	32	65	95.42	12	-	3	-
NOX (ppb) Average	655	32	65	95.42	25	-	8	-
PM2.5 (ug/m3) Average	711	1	9	98.89	173.8	-	22.3	0
CO(ppm) Average	686	33	34	99.86	0.4	0	0.2	-
Temperature 2 m (C) Average	720	0	0	100	28.8	-	23.2	-
Barometric Pressure (inHg) Average	720	0	0	100	29.3	-	29.2	-
Relative Humidity (%) Average	720	0	0	100	98	-	86	-
Wind Speed 10 m (km/h) Average	720	0	0	100	30	-	18	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.8	3	-	0	0	0	0	1	2	34
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	676	1.97	0.1	-	1.9	1.9	1.9	2	2	2	2.5
NMHC (ppm) Average	676	0.006	0.025	-	0	0	0	0	0	0	0.289
CH4(ppm) Average	676	1.97	0.1	-	1.9	1.9	1.9	2	2	2	2.5
O3 (ppb) Average	685	32.5	11	-	9	17	23	33	41	47	95
NO2 (ppb) Average	655	3.7	3	-	0	1	2	3	5	8	14
NO (ppb) Average	655	0.8	1	-	0	0	0	0	1	2	12
NOX (ppb) Average	655	4.5	4	-	0	1	2	4	6	9	25
PM2.5 (ug/m3) Average	711	6.72	9	-	0.1	1.9	3.1	5	8	12.4	173.8
CO(ppm) Average	686	0.1	0	-	0	0.1	0.1	0.1	0.1	0.1	0.4
Temperature 2 m (C) Average	720	16.88	4.8	-	5.3	11.2	13.3	16.4	20.3	23.6	28.8
Barometric Pressure (inHg) Average	720	28.83	0.2	-	28.5	28.6	28.7	28.8	29	29.1	29.3
Relative Humidity (%) Average	720	61.3	20	-	21	31	43	64	79	87	98
Wind Speed 10 m (km/h) Average	720	9.6	6	-	0	3	5	8	13	19	30
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	09 Jun 2017 10:00	09 Jun 2017 10:00	1	Maintenance - cleaned glass manifold
NO2, NO, NOX	01 Jun 2017 01:00	01 Jun 2017 13:00	13	Analyzer failure - exhaust line replaced
NO2, NO, NOX	01 Jun 2017 14:00	02 Jun 2017 08:00	19	Maintenance - replaced pump and subsequent stabilization time
NMHC, CH4, THC	09 Jun 2017 11:00	09 Jun 2017 14:00	4	Analyzer failure - flame went out and did not relight
NMHC, CH4, THC	14 Jun 2017 08:00	14 Jun 2017 11:00	4	Maintenance - replaced cable from pogo to input board
PM2.5	08 Jun 2017 18:00	08 Jun 2017 19:00	2	Unstable operation - excessive baseline drift
PM2.5	13 Jun 2017 23:00	13 Jun 2017 23:00	1	Unstable operation - excessive baseline drift
PM2.5	14 Jun 2017 02:00	14 Jun 2017 03:00	2	Unstable operation - excessive baseline drift
PM2.5	16 Jun 2017 20:00	16 Jun 2017 20:00	1	Unstable operation - excessive baseline drift
PM2.5	27 Jun 2017 07:00	27 Jun 2017 08:00	2	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Athabasca Valley - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 34 ppb on Jun 2 13:00	Maximum Daily Average: 4.3 ppb on Jun 4
Minimum Value: 0 ppb on Jun 2 01:00	Hours of Data: 684
Maximum Diurnal Average: 2.1 ppb at hour 11	Hours of Missing Data: 36
Monthly Average: 0.8 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.1 ppb on Jun 9	Percent Operational Time: 99.9
Minimum Diurnal Average: 0.3 ppb at hour 6	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 9	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	Z	0	0	0	0	C	C	C	C	C	34	34	1	2	1	1	0	0	0	0	0	0	4.2	34
3-Jun	0	0	0	Z	0	0	0	0	2	1	0	0	0	0	1	0	1	1	0	0	0	1	1	1	0.6	2
4-Jun	1	1	1	1	Z	1	1	2	10	13	33	13	2	1	1	6	3	1	2	2	3	1	1	1	4.3	33
5-Jun	1	2	1	0	0	Z	1	1	1	2	4	3	2	1	1	1	1	0	0	0	0	0	0	0	1.0	4
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
7-Jun	0	Z	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jun	0	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	3	4	3	3	2	0	1	1	0	0.9	4
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0.3	2
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1
13-Jun	0	Z	0	1	1	1	1	1	7	13	6	2	1	1	1	1	1	1	1	1	1	1	0	0	1.7	13
14-Jun	1	2	Z	7	7	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	2	2	1	2	1.3	7
15-Jun	2	2	2	Z	2	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jun	0	Z	0	0	0	0	0	3	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3
20-Jun	0	0	Z	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0.3	2
22-Jun	2	3	2	1	Z	0	1	3	4	4	3	2	2	2	2	3	1	1	1	1	0	0	0	0	1.6	4
23-Jun	0	0	0	0	0	Z	0	1	3	6	4	3	3	2	2	2	2	1	1	0	0	0	0	0	1.4	6
24-Jun	Z	0	0	0	0	0	0	0	0	2	3	3	1	1	0	1	1	1	1	0	0	0	0	0	0.7	3
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	Z	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0.5	1
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	1	1	5	9	8	5	3	3	3	2	1	1	2.0	9
30-Jun	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

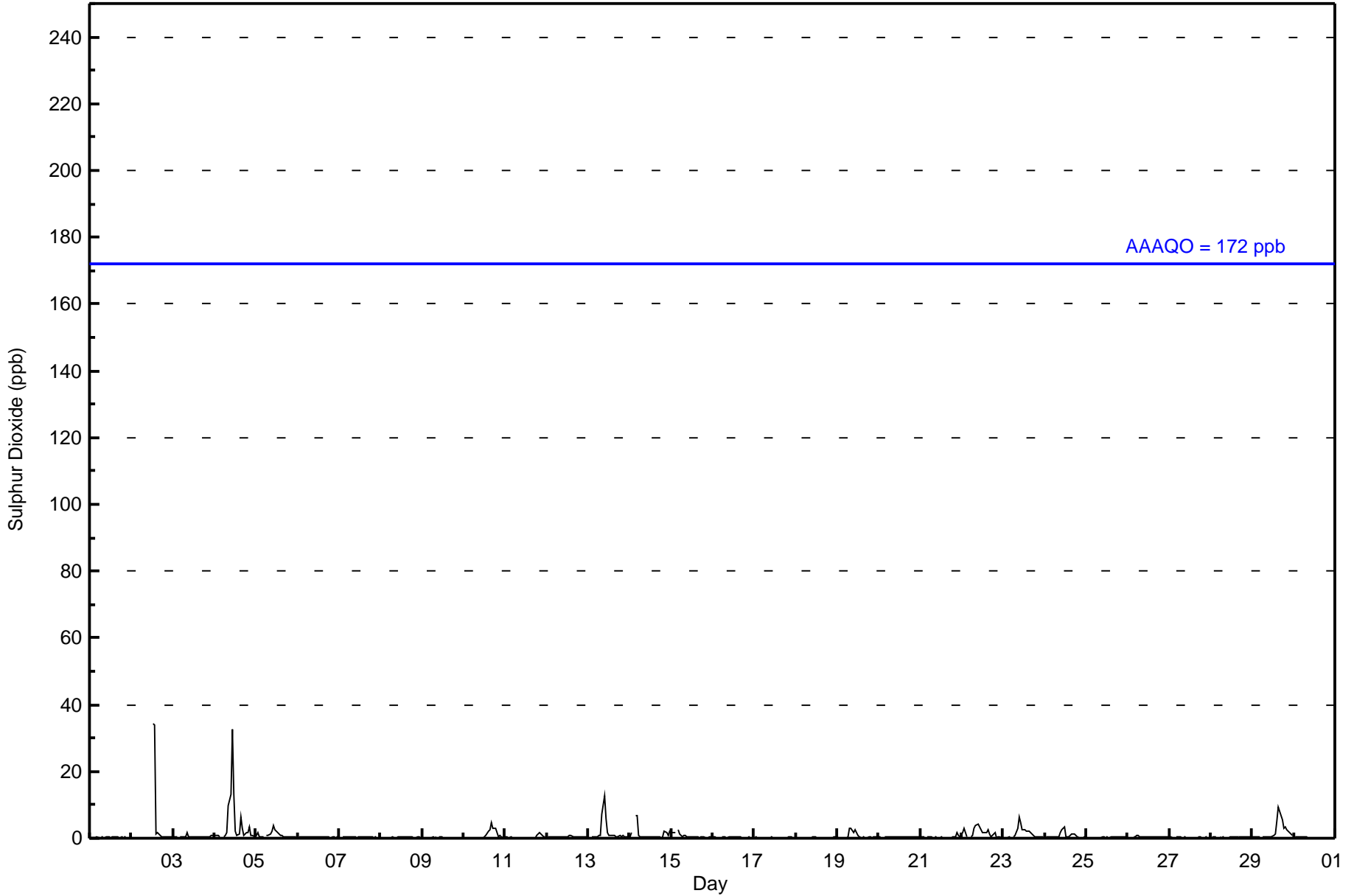
0.4	0.6	0.4	0.5	0.6	0.3	0.4	0.6	1.2	1.7	2.1	1.2	1.7	1.7	0.8	1.1	0.9	0.6	0.6	0.6	0.6	0.5	0.4	0.3	Diurnal Average		
2	3	2	7	7	1	1	3	10	13	33	13	34	34	5	9	8	5	3	3	3	3	2	1	2	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	678	99.12	99.12
11 - 20	3	0.44	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	50	15	17	26	30	50	123	42	16	17	34	25	40	27	52	114	678
11 - 20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	15	17	26	30	50	123	42	16	17	34	25	40	27	52	119	684

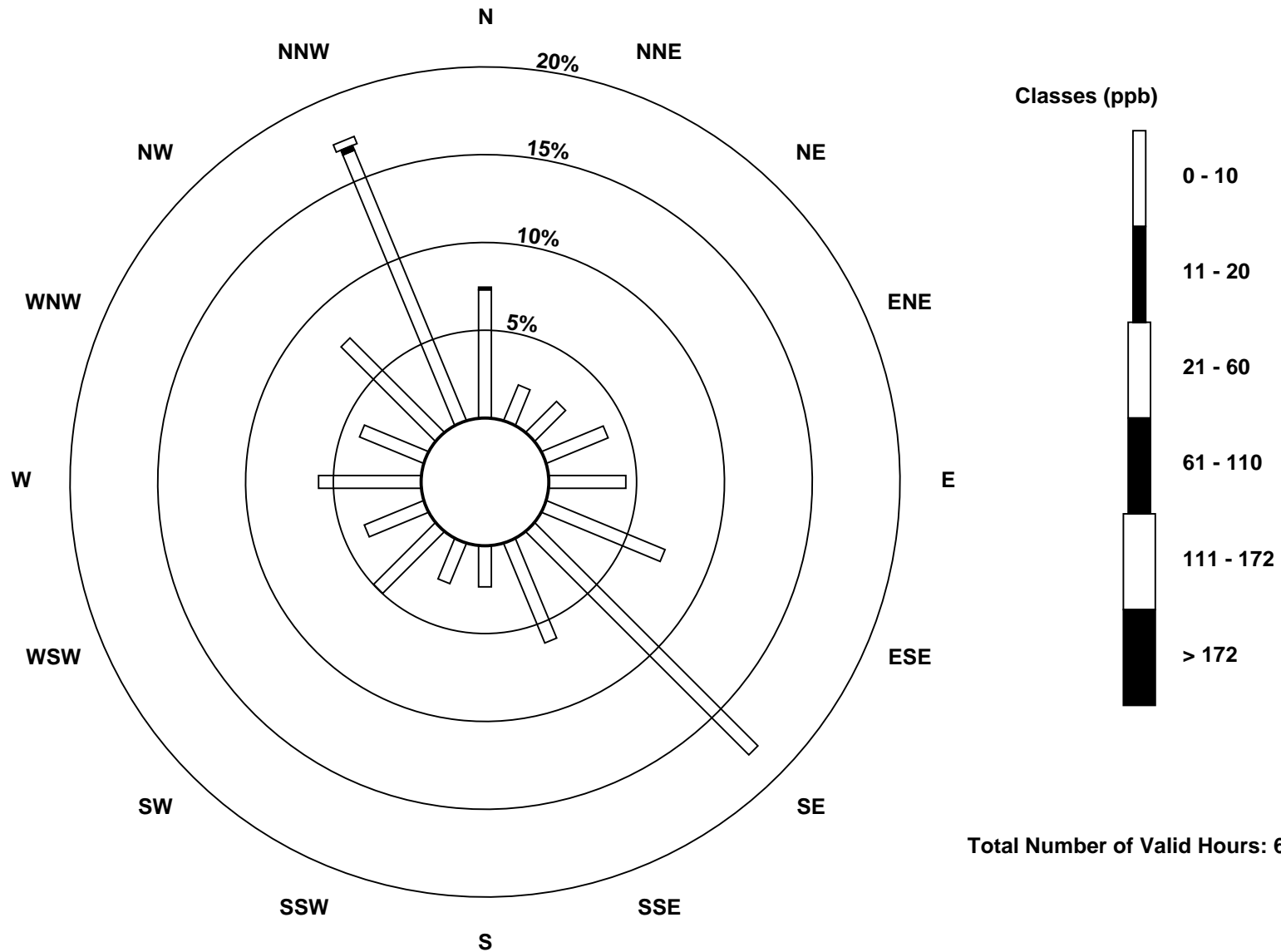
Total Number of Valid Hours: 684

Total Number of Hours: 720

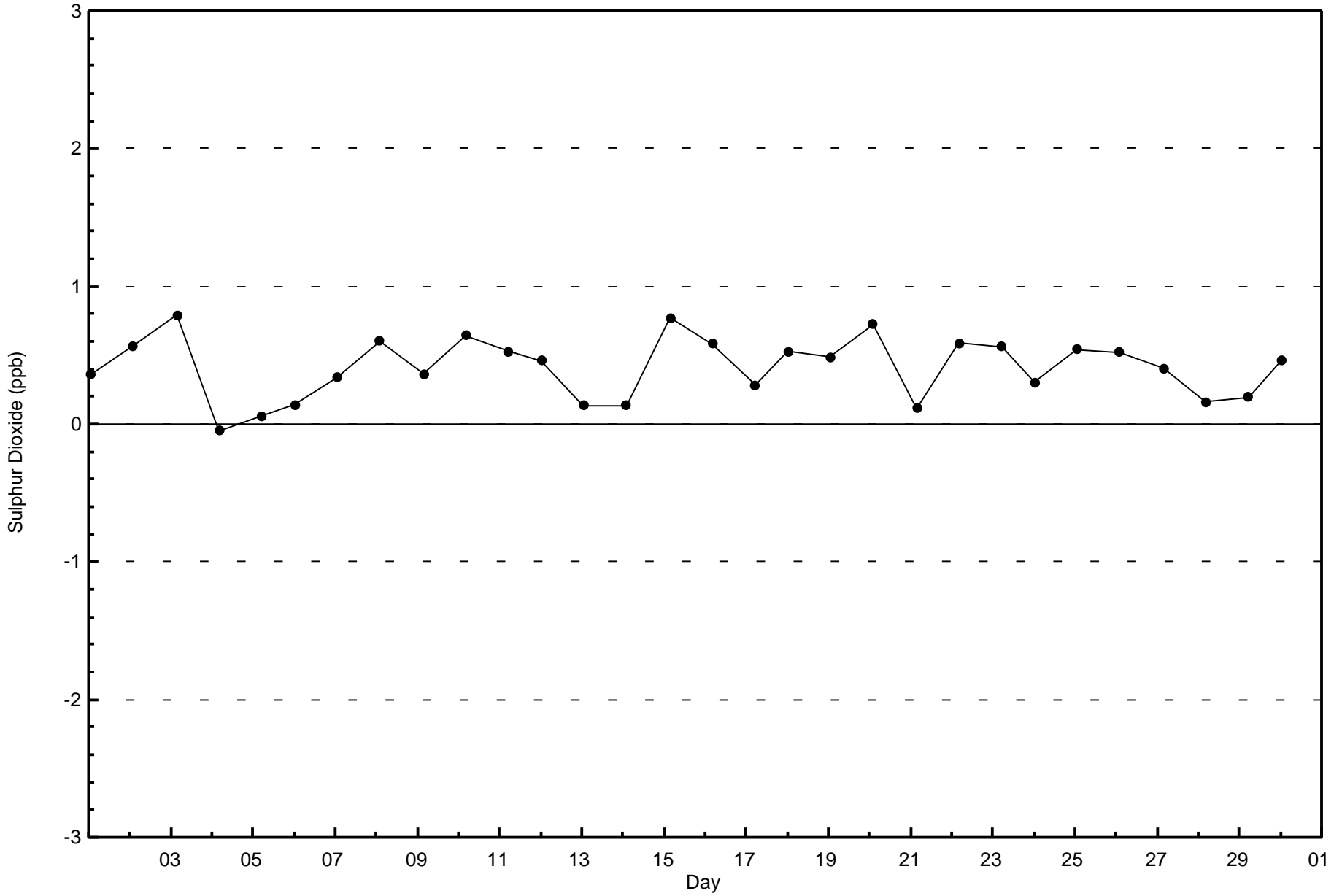


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley (AMS 7)



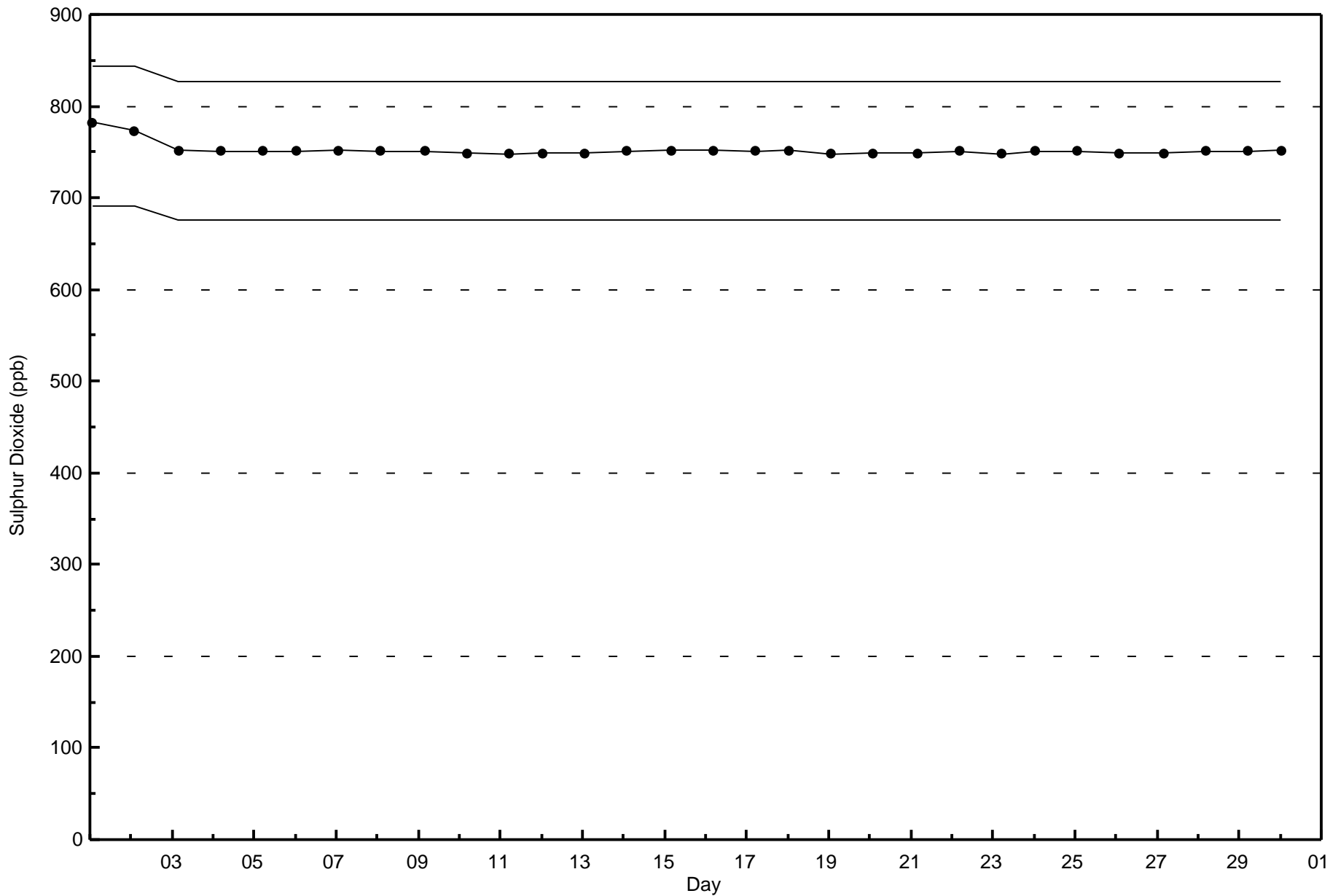
Total Number of Valid Hours: 684





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 14 05:00	Maximum Daily Average: 0.4 ppb on Jun 13		Hours of Data:	686
Minimum Value: 0 ppb on Jun 9 19:00	Minimum Daily Average: 0.2 ppb on Jun 18		Hours of Missing Data:	34
Maximum Diurnal Average: 0.4 ppb at hour 6	Minimum Diurnal Average: 0.2 ppb at hour 15		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Jun	0	1	0	0	0	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Jun	0	Z	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Jun	0	0	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Jun	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
9-Jun	0	0	0	0	Z	1	1	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Jun	0	0	Z	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jun	0	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
15-Jun	1	0	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Jun	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Jun	0	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

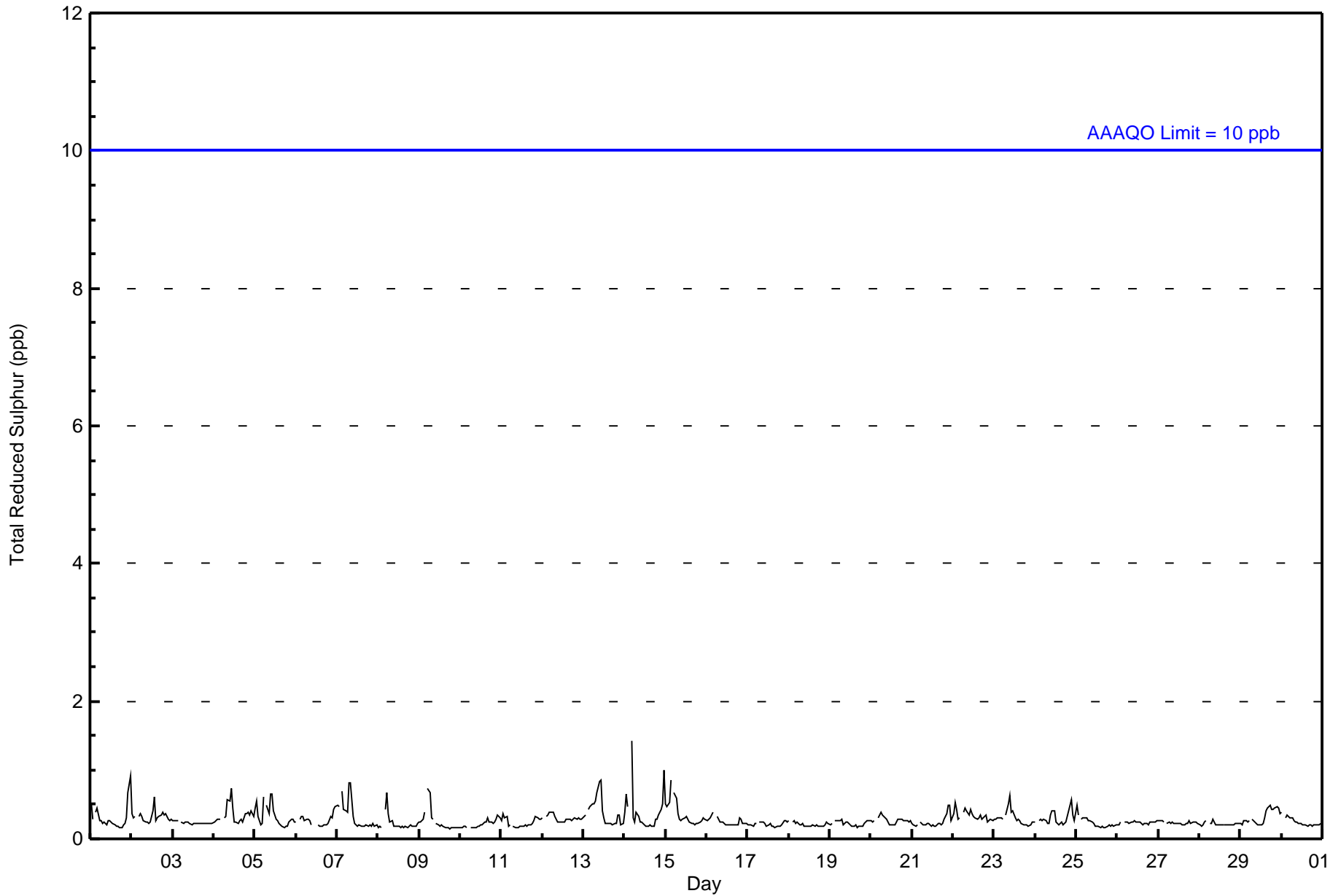
0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	Diurnal Average		
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	51	14	17	27	32	51	125	43	13	15	35	24	41	28	52	118	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	14	17	27	32	51	125	43	13	15	35	24	41	28	52	118	686

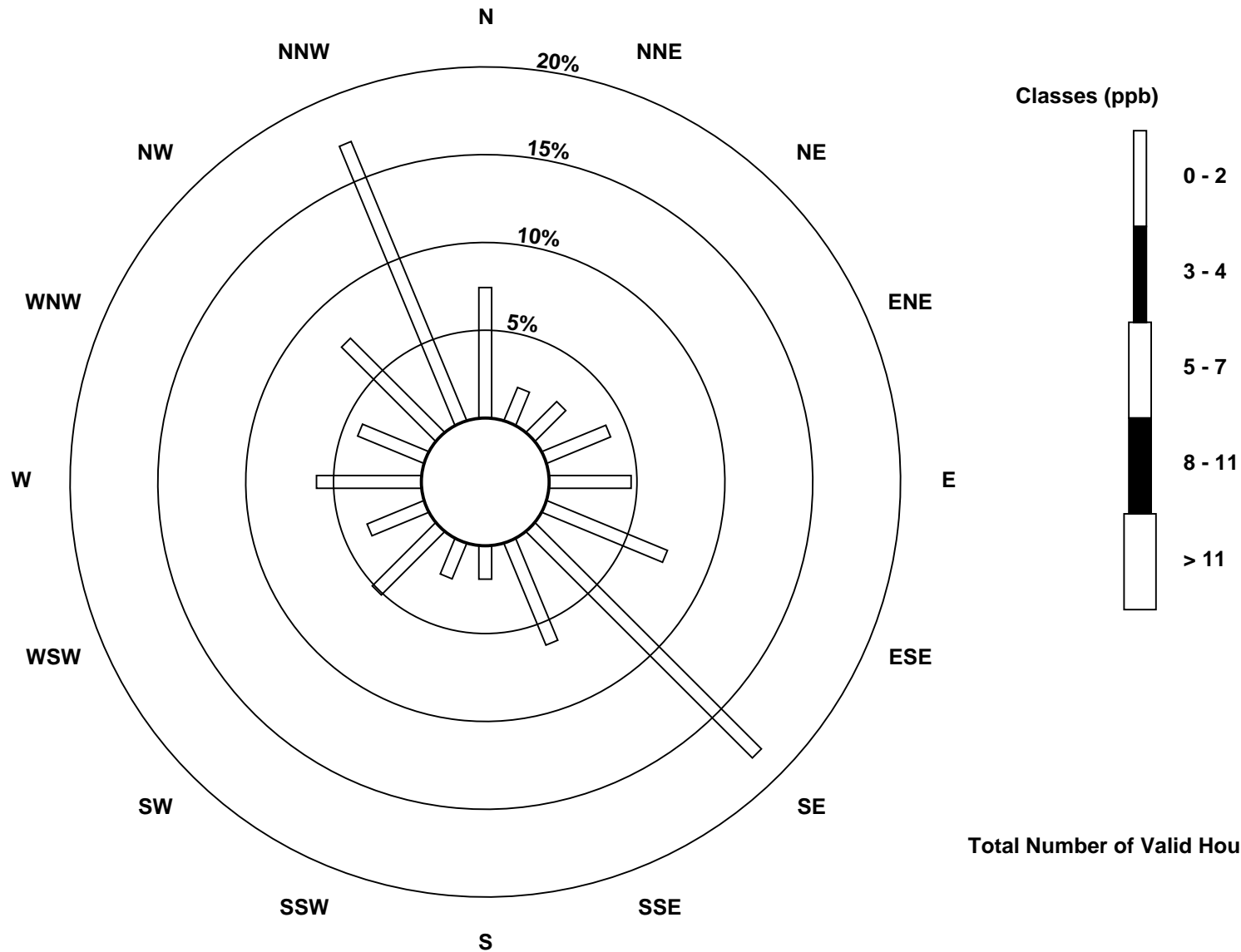
Total Number of Valid Hours: 686

Total Number of Hours: 720

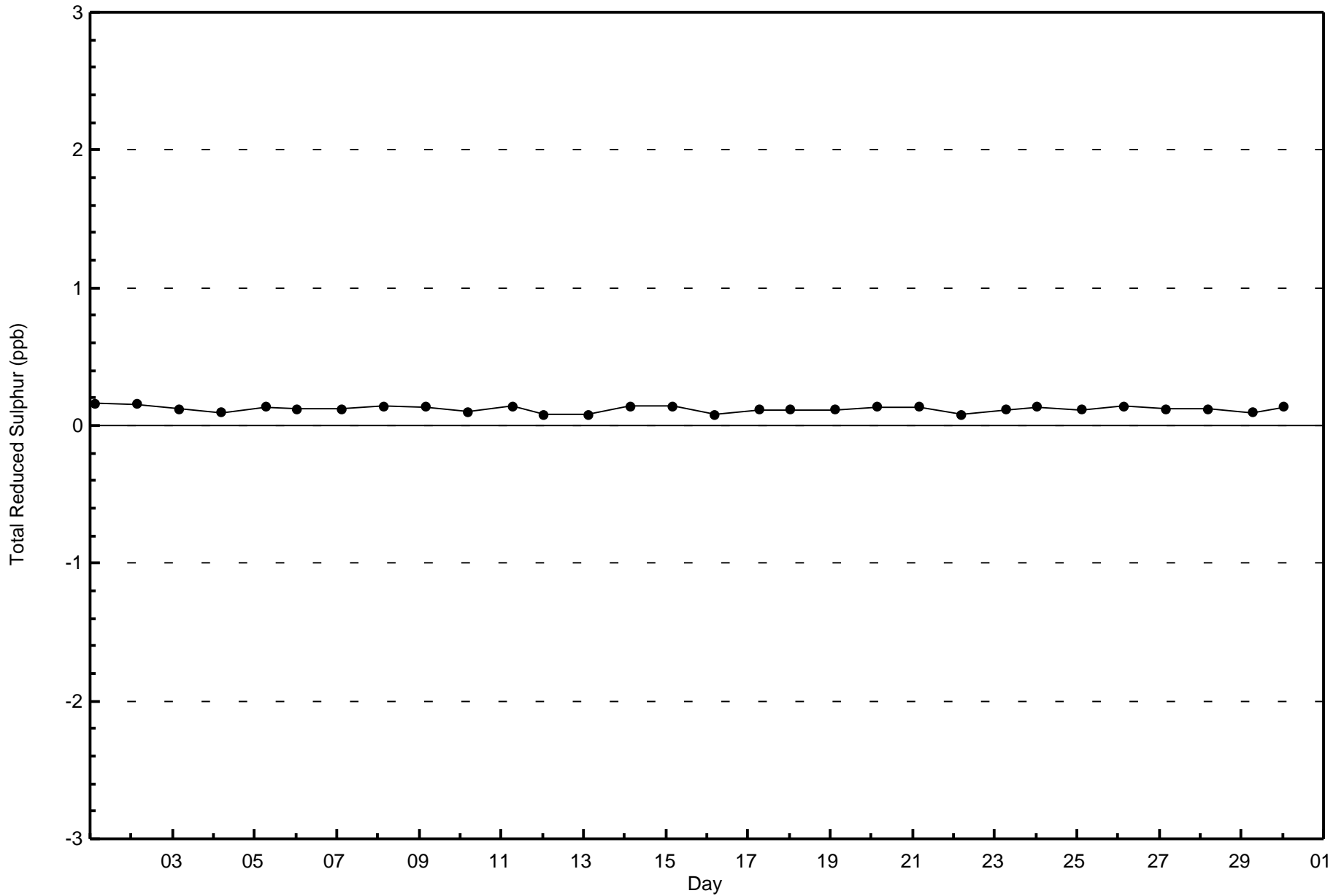


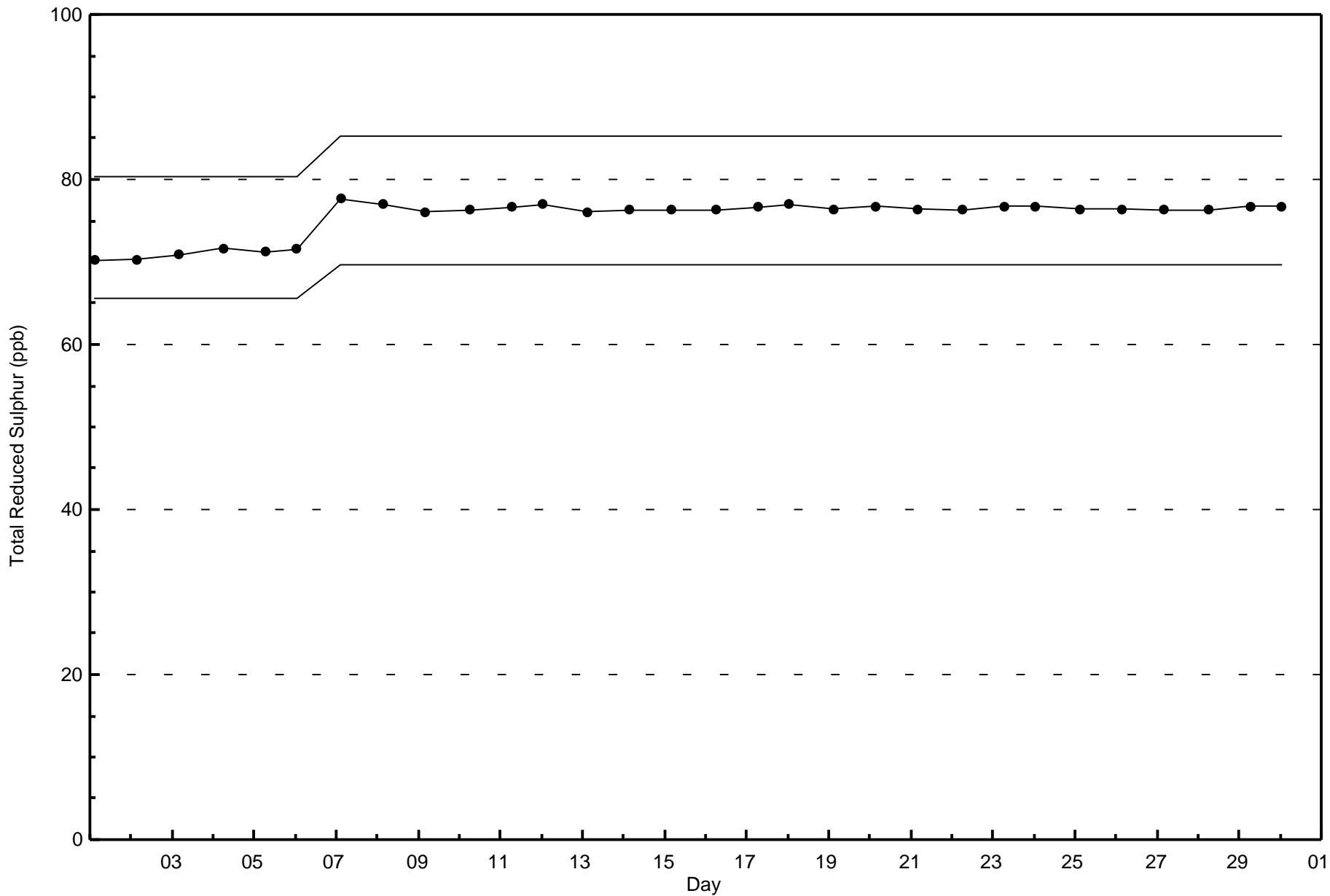
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

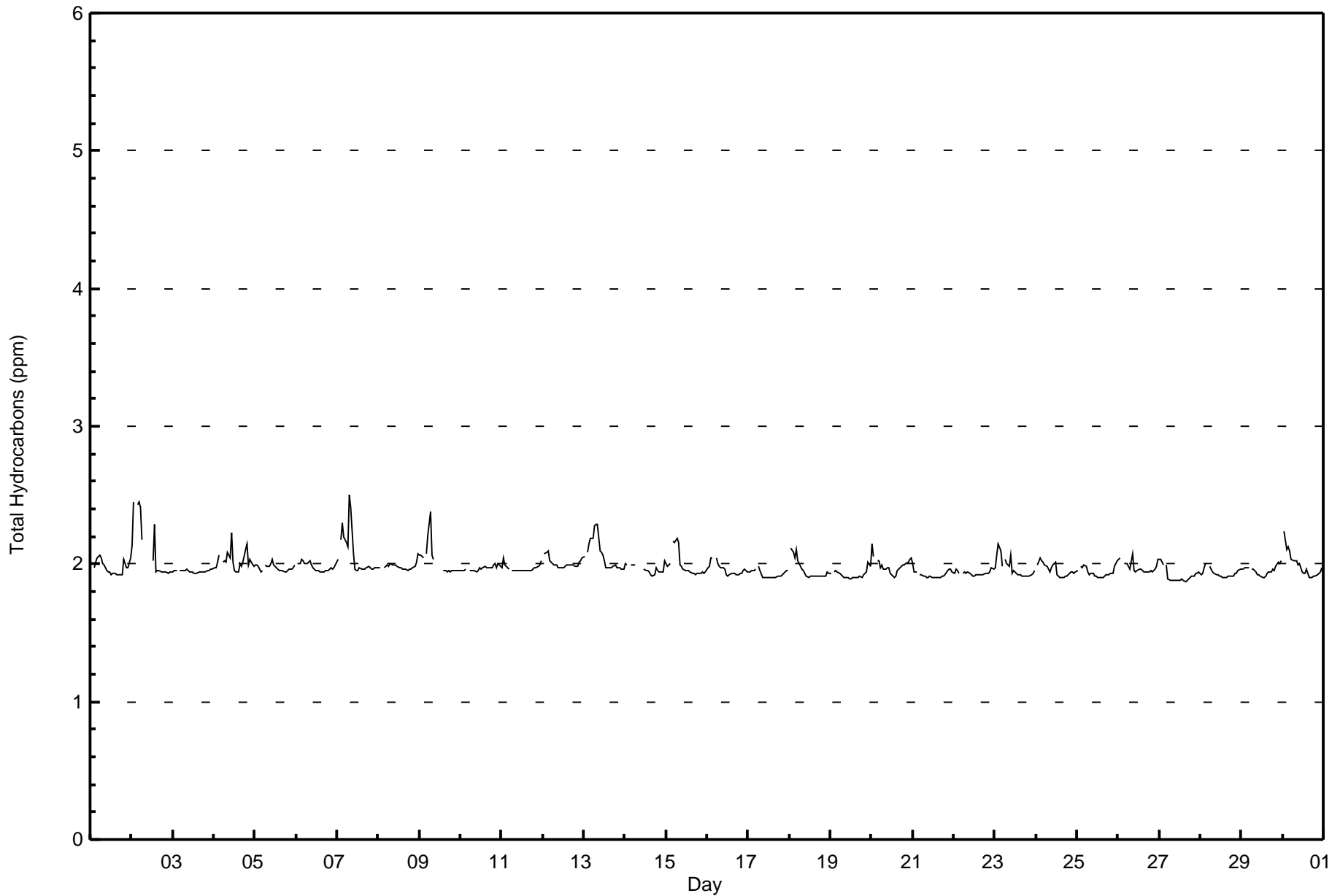
Athabasca Valley - June 2017

Maximum Value: 2.5 ppm on Jun 7 08:00		Maximum Daily Average: 2.1 ppm on Jun 2		Hours in Service: 720																							
Minimum Value: 1.9 ppm on Jun 27 16:00		Minimum Daily Average: 1.9 ppm on Jun 27		Hours of Data: 676																							
Maximum Diurnal Average: 2.0 ppm at hour 4		Minimum Diurnal Average: 1.9 ppm at hour 16		Hours of Missing Data: 44																							
Monthly Average: 1.97 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.4		Hours of Calibration: 35																							
				Percent Operational Time: 98.8																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
2-Jun	2.1	2.4	Z	2.4	2.5	2.4	2.2	C	C	C	C	C	2.0	2.3	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.5
3-Jun	1.9	1.9	2.0	Z	2.0	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4-Jun	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.1	2.0	2.2	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2
5-Jun	2.0	2.0	2.0	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7-Jun	2.0	Z	2.2	2.3	2.2	2.2	2.1	2.5	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5
8-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
9-Jun	2.1	2.1	2.0	Z	2.1	2.2	2.4	2.1	2.0	M	AF	AF	AF	AF	2.0	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.4
10-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
11-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Jun	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Jun	2.1	Z	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
14-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	M	M	M	M	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0
15-Jun	2.0	2.0	2.0	Z	2.2	2.2	2.2	2.2	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2
16-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0
17-Jun	1.9	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
18-Jun	Z	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Jun	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
20-Jun	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
21-Jun	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.0
22-Jun	1.9	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
23-Jun	2.0	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1
24-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Jun	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0
26-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1
27-Jun	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Jun	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
29-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Jun	Z	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerspan																											
C - Calibration																											
M - Maintenance																											
AF - Analyzer Failure																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	616	91.12	91.12
2.1 - 3.0	60	8.88	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	44	14	16	23	27	46	106	39	14	17	32	23	40	26	52	97	616
2.1 - 3.0	4	1	1	3	3	4	17	3	2	0	2	2	0	1	0	17	60
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	15	17	26	30	50	123	42	16	17	34	25	40	27	52	114	676

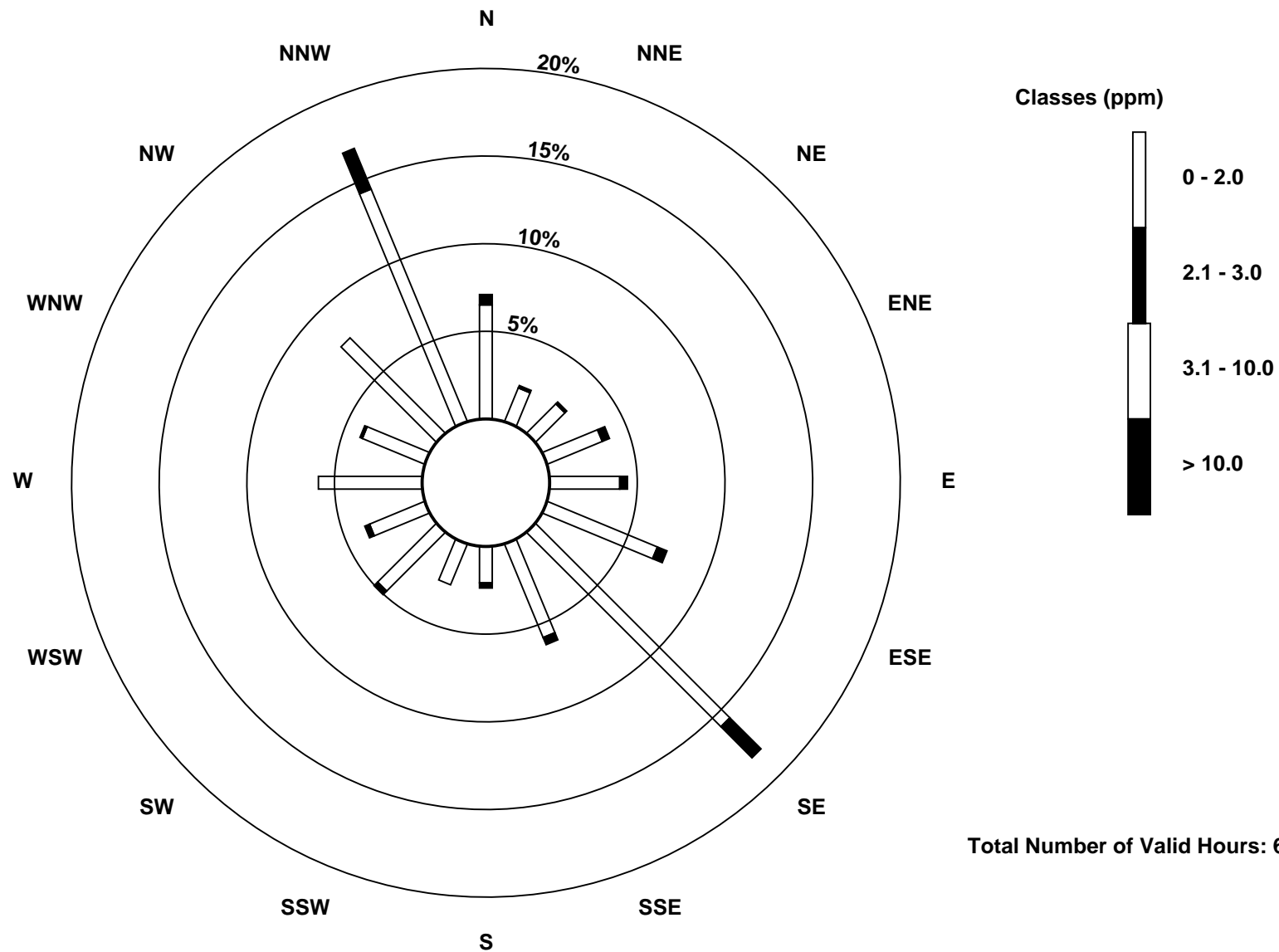
Total Number of Valid Hours: 676

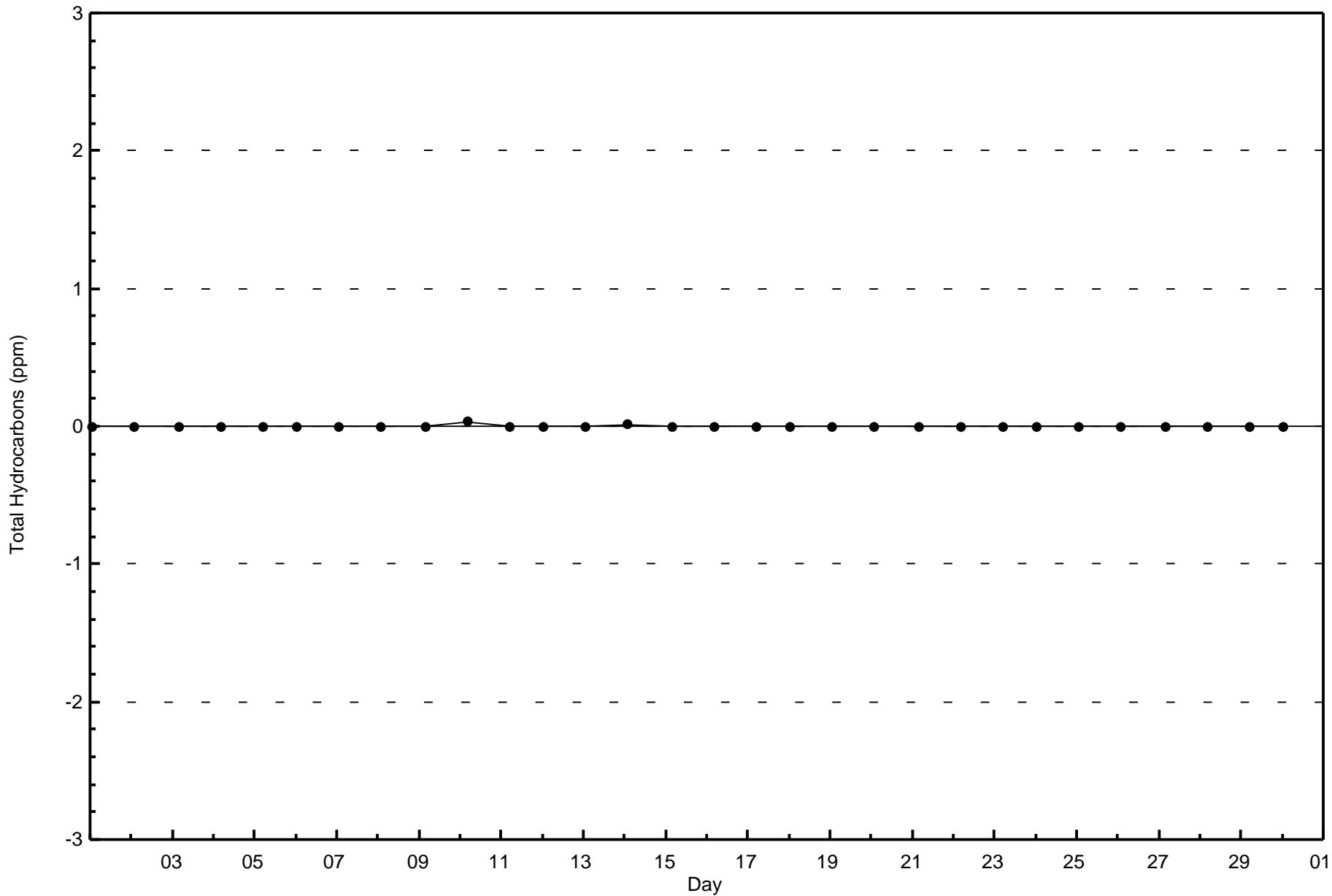
Total Number of Hours: 720

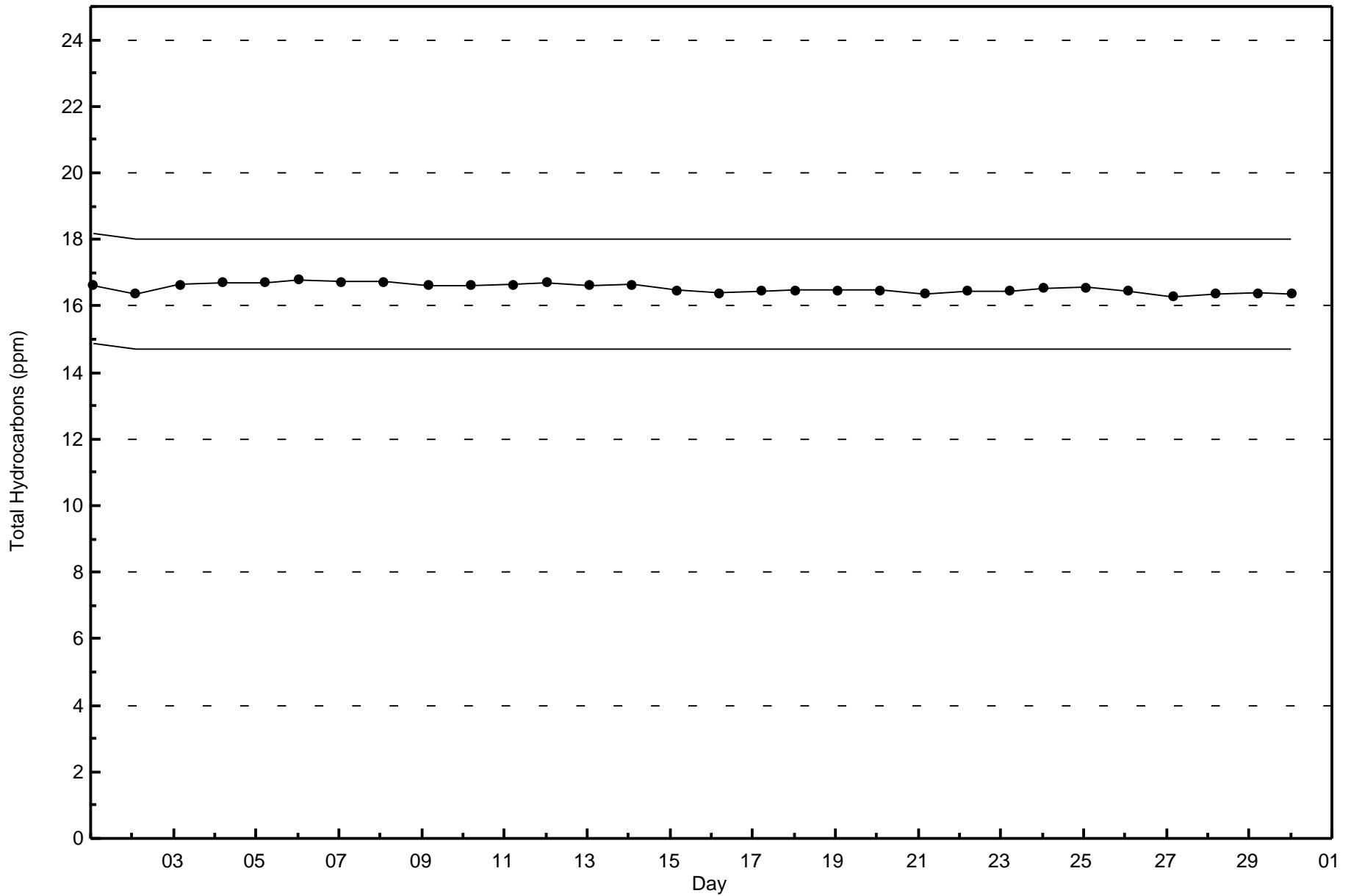


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)

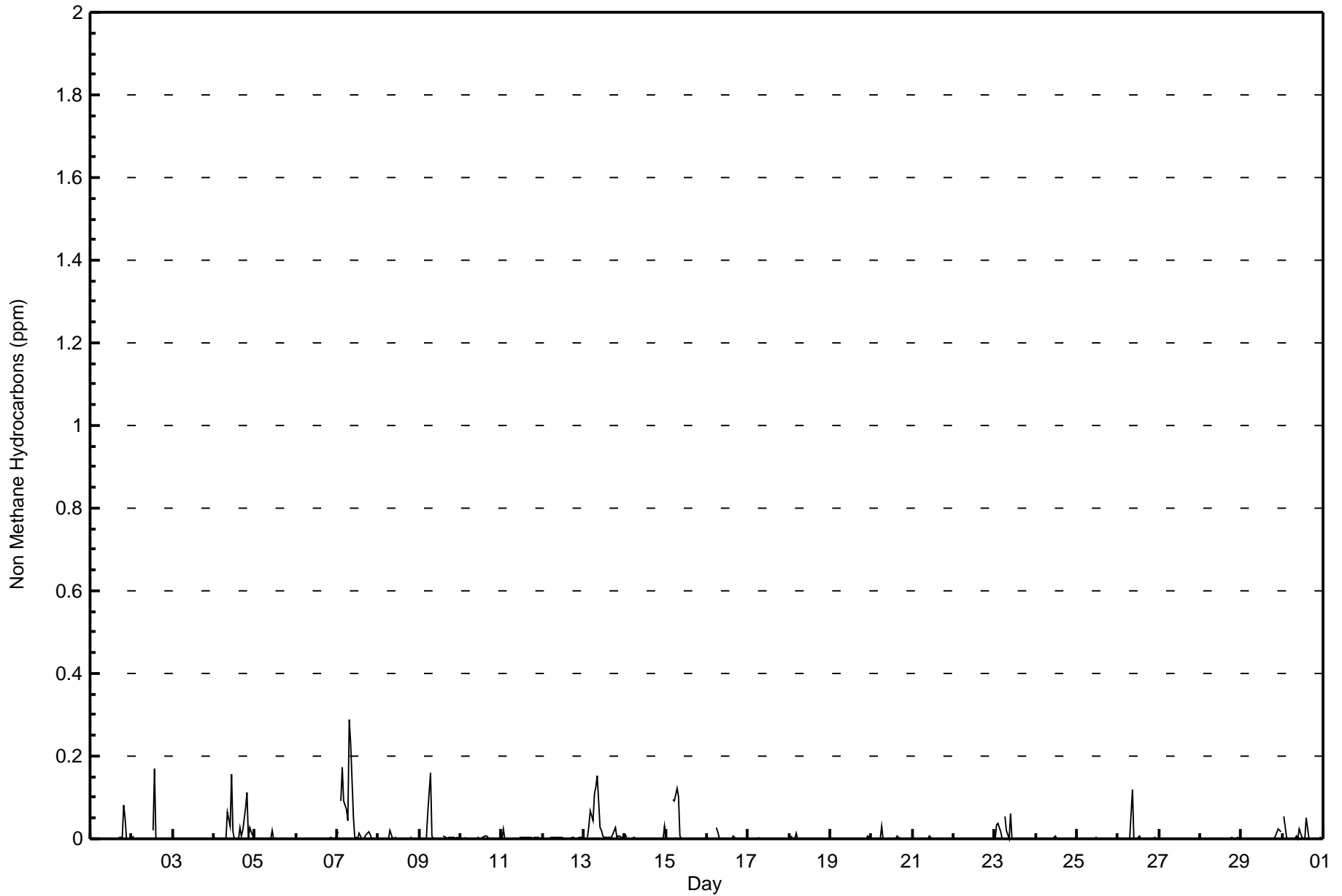








Maximum Value: 0.289 ppm on Jun 7 08:00		Maximum Daily Average: 0.049 ppm on Jun 7		Hours in Service: 720																						
Minimum Value: 0.000 ppm on Jun 1 01:00		Minimum Daily Average: 0.000 ppm on Jun 3		Hours of Data: 676																						
Maximum Diurnal Average: 0.021 ppm at hour 9		Minimum Diurnal Average: 0.001 ppm at hour 17		Hours of Missing Data: 44																						
Monthly Average: 0.006 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2		Hours of Calibration: 35																						
				Percent Operational Time: 98.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.003	0.082	0.050	0.000	0.000	0.000	0.000	0.006	0.082
2-Jun	0.000	0.008	Z	0.000	0.000	0.002	0.000	C	C	C	C	C	0.020	0.170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.170
3-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.064	0.032	0.158	0.018	0.000	0.000	0.029	0.006	0.022	0.076	0.113	0.001	0.027	0.018	0.000	0.024	0.158	
5-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.021	
6-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.005
7-Jun	0.016	Z	0.092	0.173	0.093	0.070	0.046	0.289	0.231	0.052	0.000	0.003	0.000	0.014	0.000	0.000	0.005	0.010	0.018	0.010	0.001	0.000	0.000	0.000	0.049	0.289
8-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.019
9-Jun	0.000	0.000	0.000	Z	0.000	0.060	0.161	0.007	0.000	M	AF	AF	AF	AF	0.008	0.004	0.001	0.004	0.003	0.003	0.002	0.001	0.002	0.000	0.014	0.161
10-Jun	0.001	0.000	0.000	0.004	Z	0.000	0.000	0.000	0.000	0.001	0.002	0.001	0.001	0.003	0.006	0.005	0.002	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.006
11-Jun	0.000	0.023	0.001	0.000	0.001	Z	0.000	0.000	0.001	0.001	0.001	0.003	0.004	0.005	0.002	0.004	0.003	0.002	0.002	0.003	0.002	0.004	0.001	0.002	0.003	0.023
12-Jun	Z	0.000	0.000	0.001	0.000	0.003	0.004	0.003	0.005	0.005	0.004	0.003	0.000	0.000	0.000	0.001	0.001	0.002	0.004	0.001	0.001	0.005	0.005	0.005	0.002	0.005
13-Jun	0.002	Z	0.003	0.030	0.068	0.045	0.107	0.125	0.152	0.029	0.020	0.007	0.004	0.005	0.003	0.003	0.002	0.012	0.027	0.004	0.007	0.008	0.002	0.005	0.029	0.152
14-Jun	0.009	0.005	Z	0.000	0.000	0.005	0.004	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.003	0.030
15-Jun	0.000	0.000	0.001	Z	0.095	0.092	0.121	0.103	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.121
16-Jun	0.000	0.000	0.000	0.000	Z	0.028	0.016	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.028
17-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
18-Jun	Z	0.006	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014
19-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.006
20-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.032
21-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
22-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-Jun	0.000	0.034	0.038	0.017	0.000	Z	0.055	0.021	0.001	0.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.060
24-Jun	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
25-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
26-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.119	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.006	0.119
27-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.004	0.000	0.000	0.004
29-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.024	0.019	0.017	0.003	0.024
30-Jun	Z	0.055	0.004	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.025	0.002	0.000	0.000	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.007	0.055
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	594	87.87	87.87
0.006 - 0.05	58	8.58	96.45
0.06 - 0.1	17	2.51	98.96
> 0.1	7	1.04	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	40	13	15	22	27	45	109	35	16	17	33	24	34	25	50	89	594
0.006 - 0.05	5	1	1	3	2	4	13	7	0	0	0	1	6	1	2	12	58
0.06 - 0.1	1	0	1	1	1	1	1	0	0	0	1	0	0	1	0	9	17
> 0.1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7
Totals	48	15	17	26	30	50	123	42	16	17	34	25	40	27	52	114	676

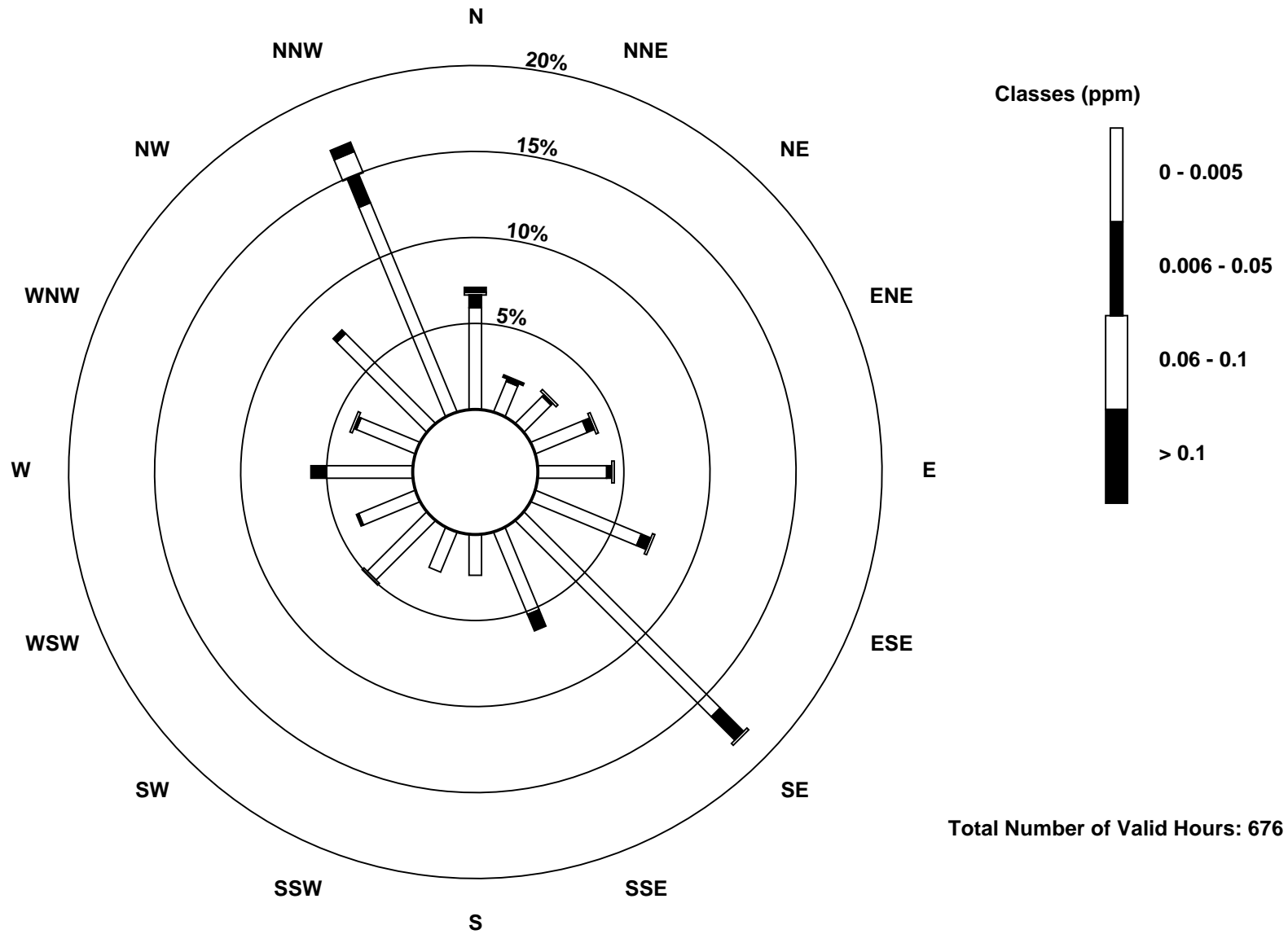
Total Number of Valid Hours: 676

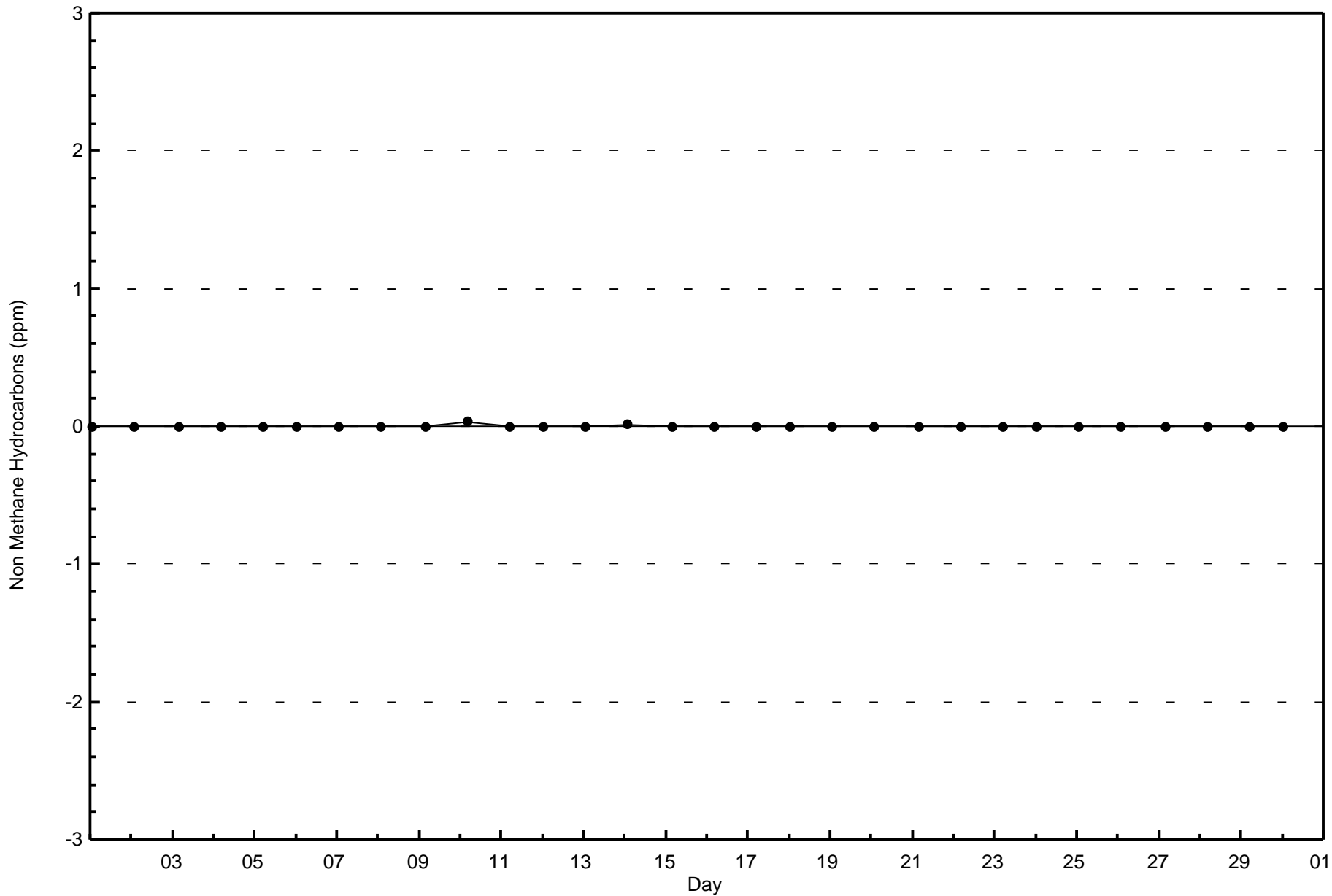
Total Number of Hours: 720

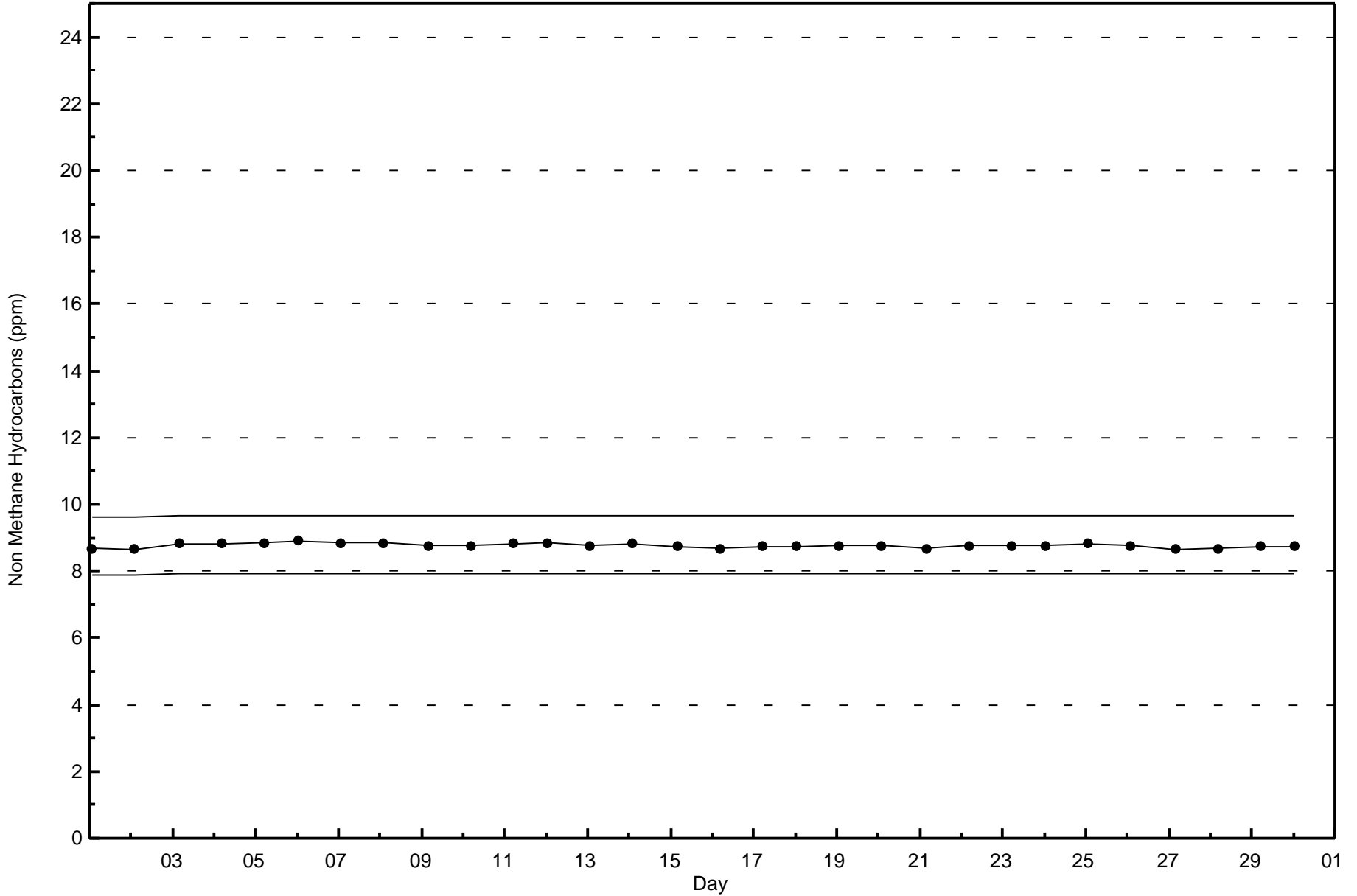


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Athabasca Valley - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.5 ppm on Jun 2 05:00	Maximum Daily Average: 2.1 ppm on Jun 2		Hours of Data:	676
Minimum Value: 1.9 ppm on Jun 27 16:00	Minimum Daily Average: 1.9 ppm on Jun 27		Hours of Missing Data:	44
Maximum Diurnal Average: 2.0 ppm at hour 4	Minimum Diurnal Average: 1.9 ppm at hour 15		Hours of Calibration:	35
Monthly Average: 1.97 ppm	Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.2		Percent Operational Time:	98.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1
2-Jun	2.1	2.4	Z	2.4	2.5	2.4	2.2	C	C	C	C	C	2.0	2.1	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.5
3-Jun	1.9	1.9	2.0	Z	2.0	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4-Jun	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
5-Jun	2.0	2.0	2.0	1.9	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7-Jun	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
8-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1
9-Jun	2.1	2.1	2.0	Z	2.1	2.1	2.2	2.1	2.0	M	AF	AF	AF	AF	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.2
10-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
11-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Jun	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
14-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	M	M	M	M	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0
15-Jun	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
16-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0
17-Jun	1.9	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
18-Jun	Z	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
19-Jun	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
20-Jun	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
21-Jun	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	2.0
22-Jun	1.9	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
23-Jun	2.0	2.0	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1
24-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Jun	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0
26-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0
27-Jun	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
28-Jun	1.9	1.9	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0
29-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0
30-Jun	Z	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2

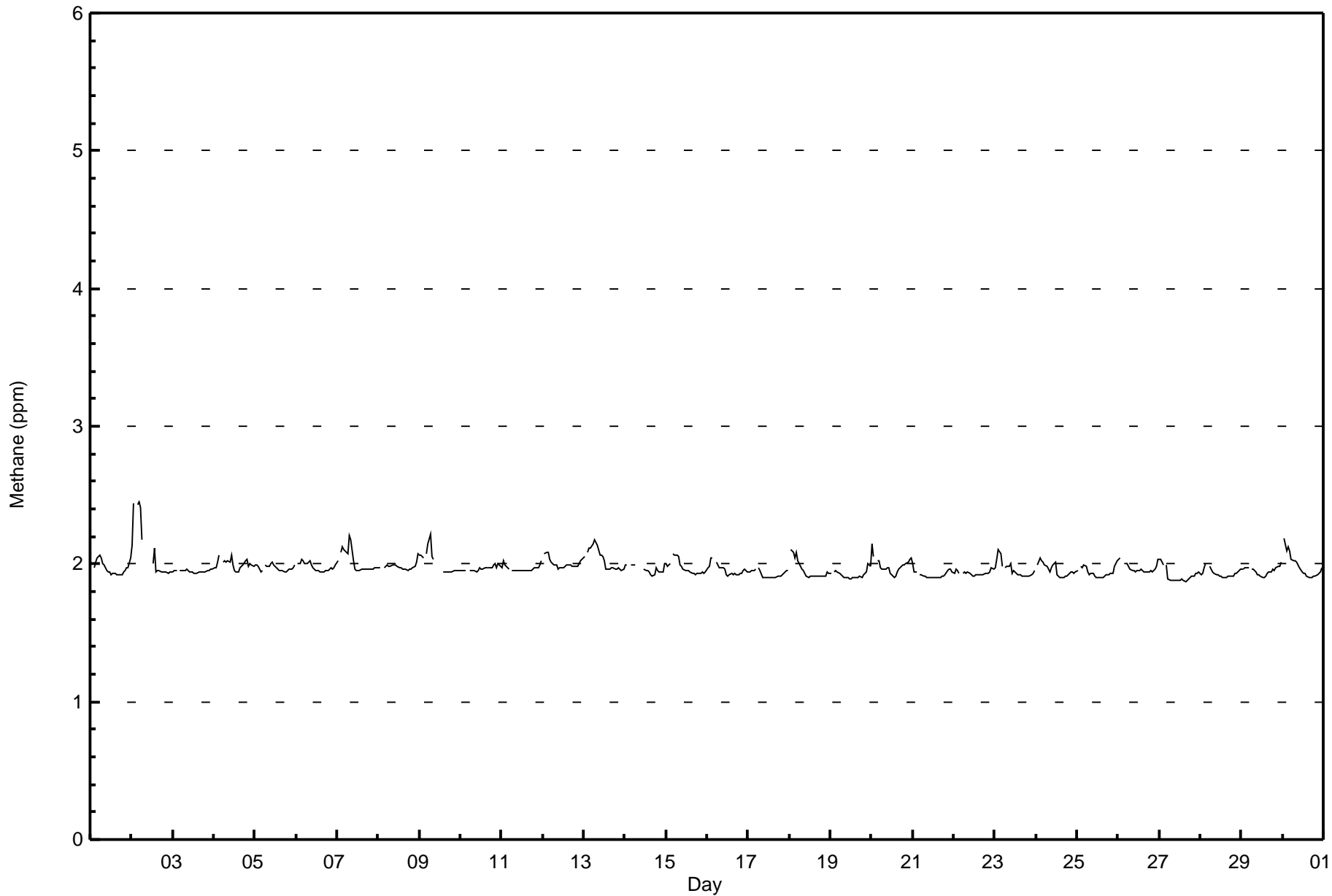
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	Diurnal Average	Diurnal Maximum
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----------------	-----------------

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Athabasca Valley - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	623	92.16	92.16
2.1 - 3.0	53	7.84	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	44	14	16	23	27	47	108	39	14	17	32	23	40	27	52	100	623
2.1 - 3.0	4	1	1	3	3	3	15	3	2	0	2	2	0	0	0	14	53
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	15	17	26	30	50	123	42	16	17	34	25	40	27	52	114	676

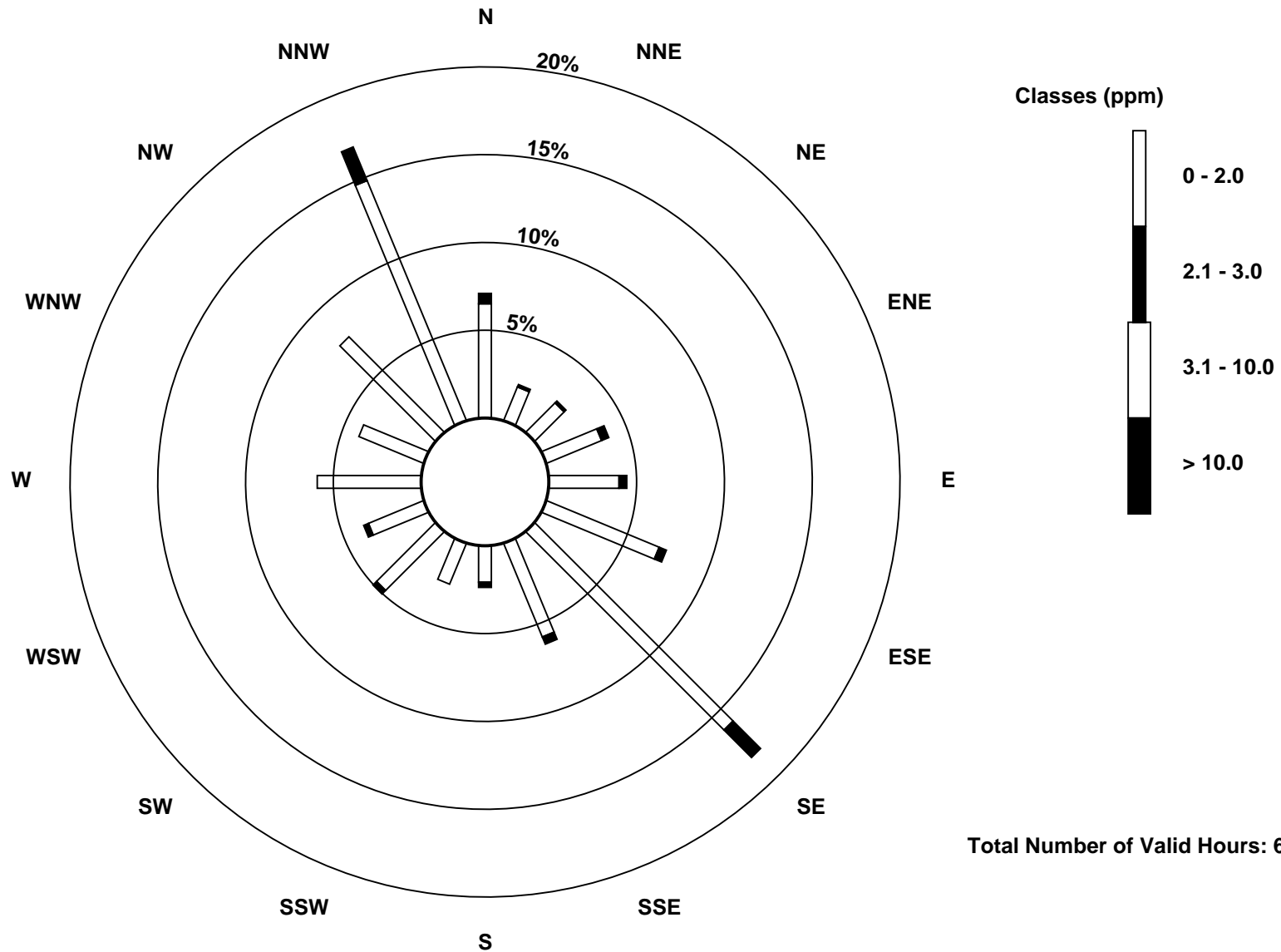
Total Number of Valid Hours: 676

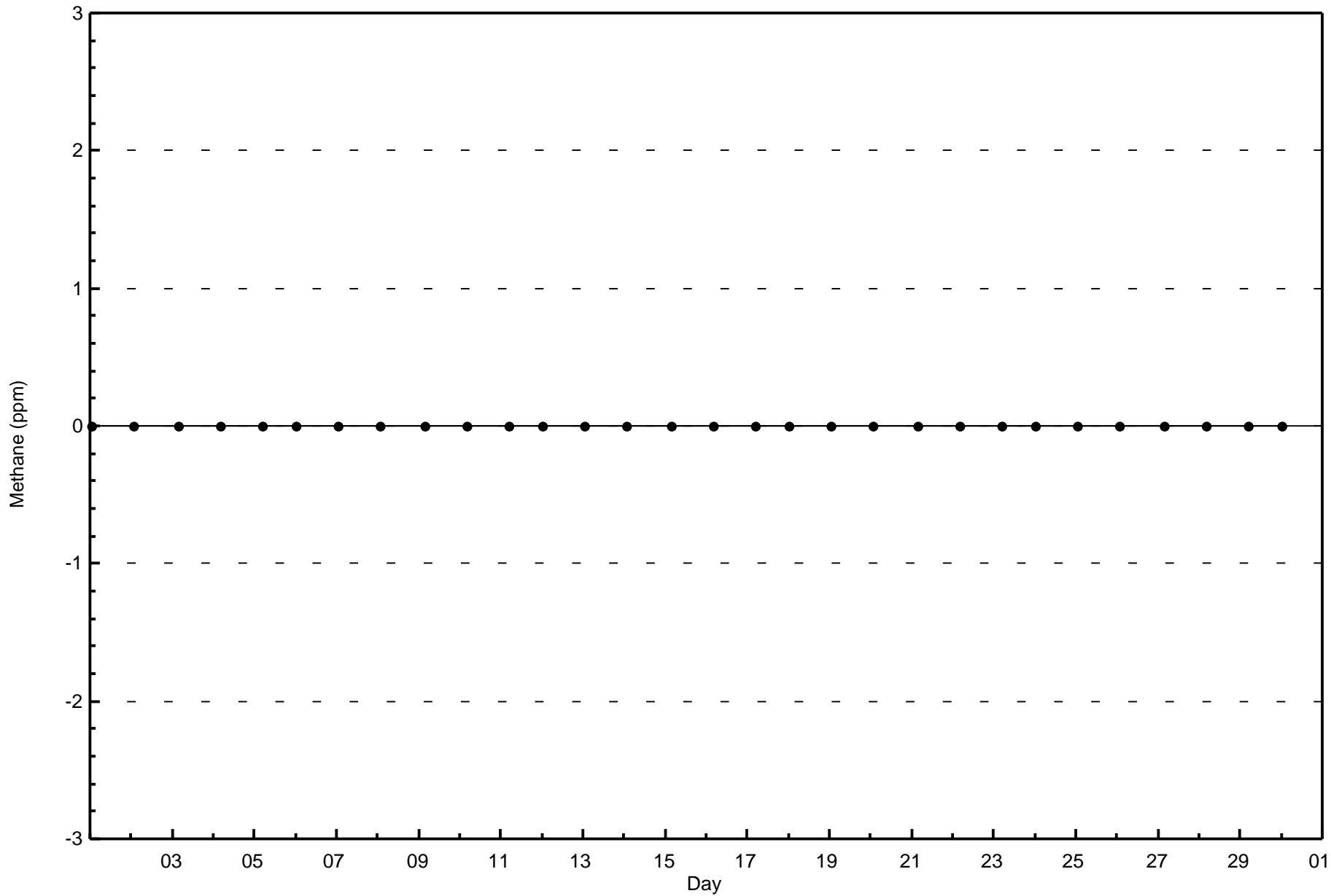
Total Number of Hours: 720

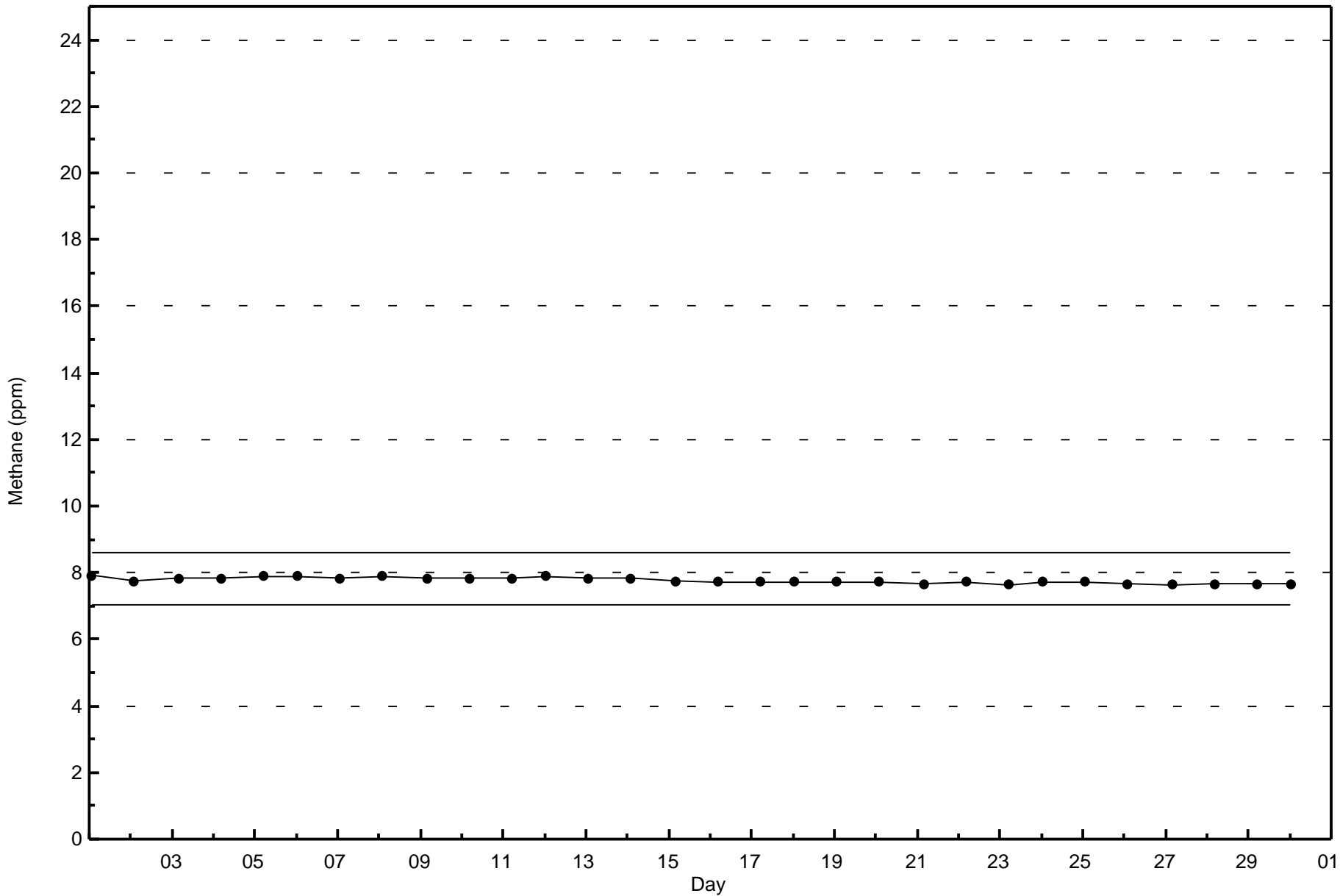


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Athabasca Valley - June 2017

Number of Exceedences (AAAQO):	1-hr: 1	24-hr: 0	Hours in Service:	720
Maximum Value: 95 ppb on Jun 2 14:00	Maximum Daily Average: 45.5 ppb on Jun 26		Hours of Data:	685
Minimum Value: 9 ppb on Jun 23 02:00	Minimum Daily Average: 21.6 ppb on Jun 30		Hours of Missing Data:	35
Maximum Diurnal Average: 43.7 ppb at hour 14	Minimum Diurnal Average: 21.4 ppb at hour 6		Hours of Calibration:	34
Monthly Average: 32.5 ppb	Percentiles: P ₁ = 11 P ₁₀ = 17 Q ₁ = 23 Median = 33 Q ₃ = 41 P ₉₀ = 47 P ₉₉ = 55		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	47	38	31	Z	27	34	35	41	43	40	31	32	35	37	43	48	47	47	46	41	32	24	21	18	36.4	48
2-Jun	18	14	14	13	Z	12	14	18	20	23	28	29	69	95	42	47	50	44	41	35	32	29	29	28	32.3	95
3-Jun	27	26	24	24	25	Z	31	30	28	30	41	44	42	42	43	44	45	45	44	41	36	37	38	38	35.8	45
4-Jun	36	29	25	18	23	29	Z	32	33	44	48	60	55	57	54	51	58	54	47	44	48	42	45	45	42.5	60
5-Jun	45	45	46	52	46	38	38	Z	40	C	C	C	C	48	50	50	48	47	47	42	36	24	26	21	41.5	52
6-Jun	20	17	Z	15	15	15	19	23	27	31	37	42	44	47	47	46	46	44	43	39	23	18	17	17	30.0	47
7-Jun	15	12	11	Z	12	11	12	19	21	24	32	38	43	41	45	50	48	47	43	40	36	32	30	30	30.1	50
8-Jun	33	33	34	29	Z	16	17	21	23	28	34	45	52	54	53	51	51	51	49	49	42	38	35	31	37.8	54
9-Jun	29	27	23	19	18	Z	17	31	33	M	33	34	35	36	36	39	45	47	46	46	46	43	40	39	34.7	47
10-Jun	38	37	36	36	36	36	Z	38	39	39	40	41	45	51	54	55	51	51	50	41	37	40	31	34	41.5	55
11-Jun	34	29	30	30	33	31	36	Z	37	39	40	41	43	44	44	44	45	46	44	42	39	37	28	24	37.3	46
12-Jun	22	20	Z	19	21	21	23	27	30	35	31	34	35	34	37	37	37	38	34	33	34	32	28	25	29.9	38
13-Jun	20	17	13	Z	11	10	14	18	20	26	34	31	35	47	53	51	48	45	46	44	37	34	40	38	31.8	53
14-Jun	27	20	23	24	Z	23	23	22	23	23	23	24	25	25	25	29	30	27	20	23	24	22	22	20	23.8	30
15-Jun	20	20	19	16	14	Z	12	13	18	19	23	26	29	35	35	32	34	38	37	35	33	26	24	19	25.0	38
16-Jun	18	14	15	14	14	15	Z	23	23	24	26	34	36	36	38	39	41	39	36	35	31	33	33	33	28.3	41
17-Jun	32	30	29	26	22	20	18	Z	27	30	31	31	34	38	42	42	43	43	41	40	31	18	19	20	30.8	43
18-Jun	16	14	Z	22	22	26	29	30	32	35	39	40	43	45	43	43	43	44	45	42	38	39	36	34	34.7	45
19-Jun	34	33	32	Z	27	26	26	26	28	35	39	44	43	40	37	38	37	38	37	34	25	20	18	15	31.8	44
20-Jun	14	19	20	19	Z	19	18	21	22	25	27	43	46	44	39	35	36	34	37	34	31	27	25	22	28.6	46
21-Jun	27	31	32	35	35	Z	30	33	33	33	33	31	31	31	30	29	27	25	23	25	35	35	32	27	30.5	35
22-Jun	26	23	25	26	26	28	Z	30	30	34	35	37	37	36	36	37	37	36	34	32	32	23	18	18	30.2	37
23-Jun	15	9	10	10	12	12	15	Z	27	31	37	39	42	43	44	44	42	41	40	36	34	29	25	19	28.5	44
24-Jun	17	14	Z	13	14	13	15	18	25	33	33	35	42	43	41	42	43	44	44	44	35	29	26	23	29.8	44
25-Jun	21	20	18	Z	15	20	22	28	29	31	39	45	50	50	48	49	48	47	48	47	45	41	40	37	36.3	50
26-Jun	37	34	36	34	Z	33	37	40	46	48	52	54	56	56	55	55	55	55	52	48	46	41	41	36	45.5	56
27-Jun	33	34	36	38	34	Z	40	39	37	38	38	36	36	38	43	39	39	34	34	32	26	24	23	23	34.5	43
28-Jun	26	23	19	16	16	17	Z	19	21	27	26	27	30	34	33	32	31	32	30	28	24	22	19	15	24.6	34
29-Jun	18	18	14	14	13	15	14	Z	22	31	37	39	46	51	55	54	50	47	46	40	28	22	20	21	31.2	55
30-Jun	14	16	Z	15	14	14	13	14	15	16	18	27	30	36	35	32	33	30	27	24	20	19	19	14	21.6	36

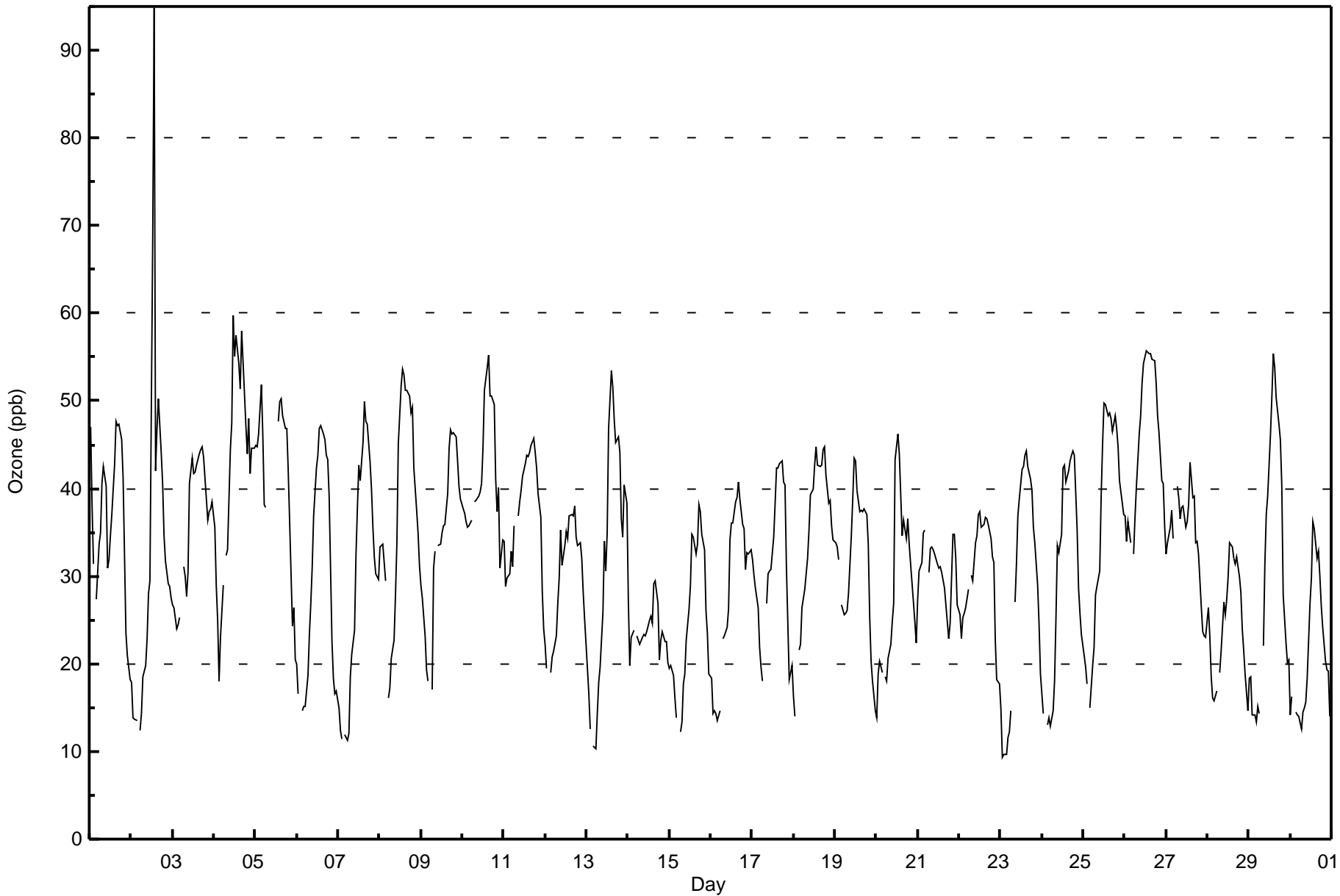
25.9	23.9	24.5	23.1	21.8	21.4	22.7	26.2	28.3	31.2	33.9	37.3	41.0	43.7	42.7	42.8	42.8	42.0	40.3	37.9	33.9	30.0	28.2	26.1	Diurnal Average	
47	45	46	52	46	38	40	41	46	48	52	60	69	95	55	55	58	55	52	49	48	43	45	45	Diurnal Maximum	

Z - zeronspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	126	18.39	18.39
21 - 50	524	76.50	94.89
51 - 82	34	4.96	99.85
> 83	1	0.15	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	4	0	2	7	7	13	48	11	6	2	2	4	3	2	1	14	126
21 - 50	39	14	14	22	22	33	69	31	10	14	33	21	38	26	50	88	524
51 - 82	7	0	1	0	2	4	8	2	0	0	0	0	0	0	0	10	34
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Totals	50	14	17	29	31	50	125	44	16	16	35	25	41	28	51	113	685

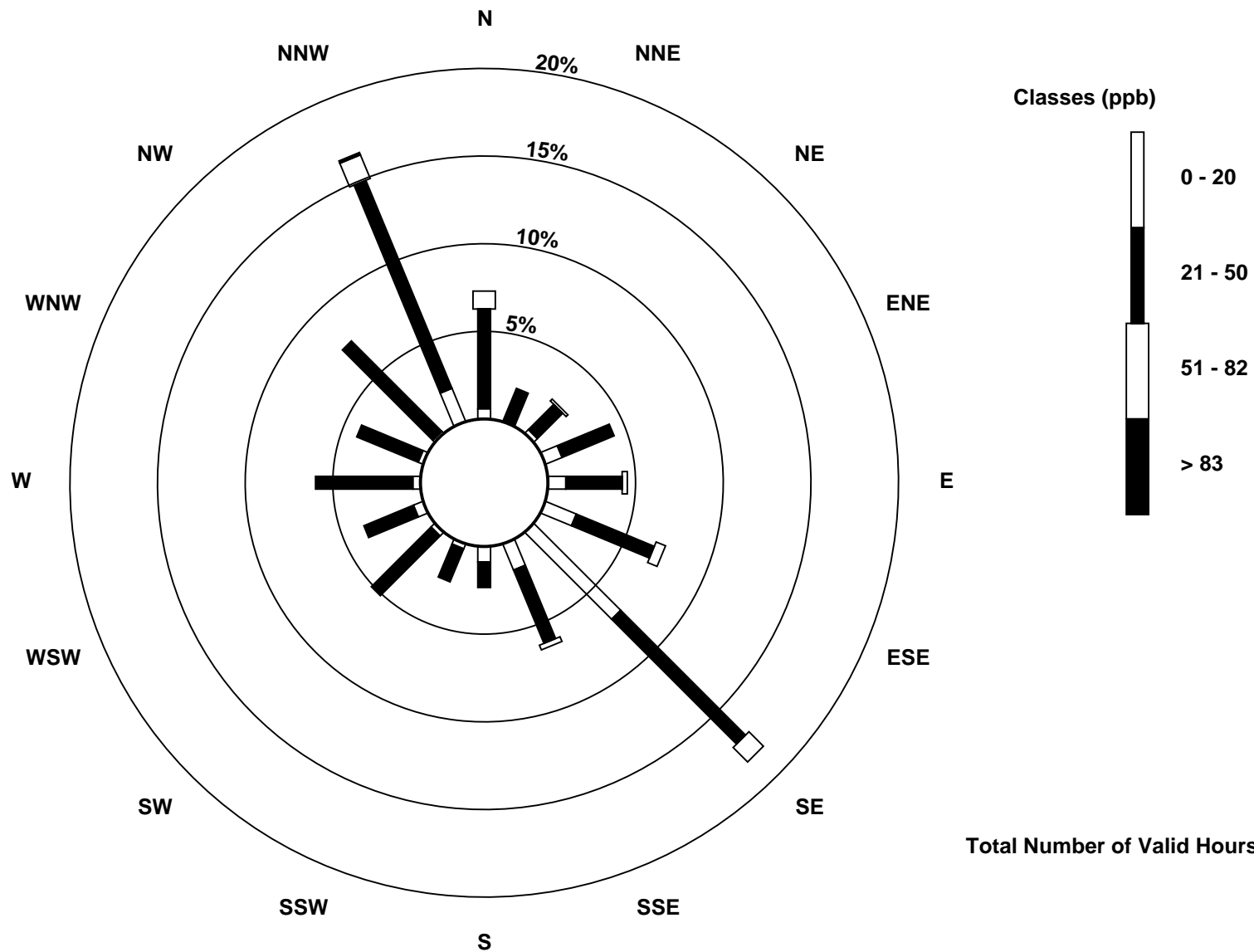
Total Number of Valid Hours: 685

Total Number of Hours: 720

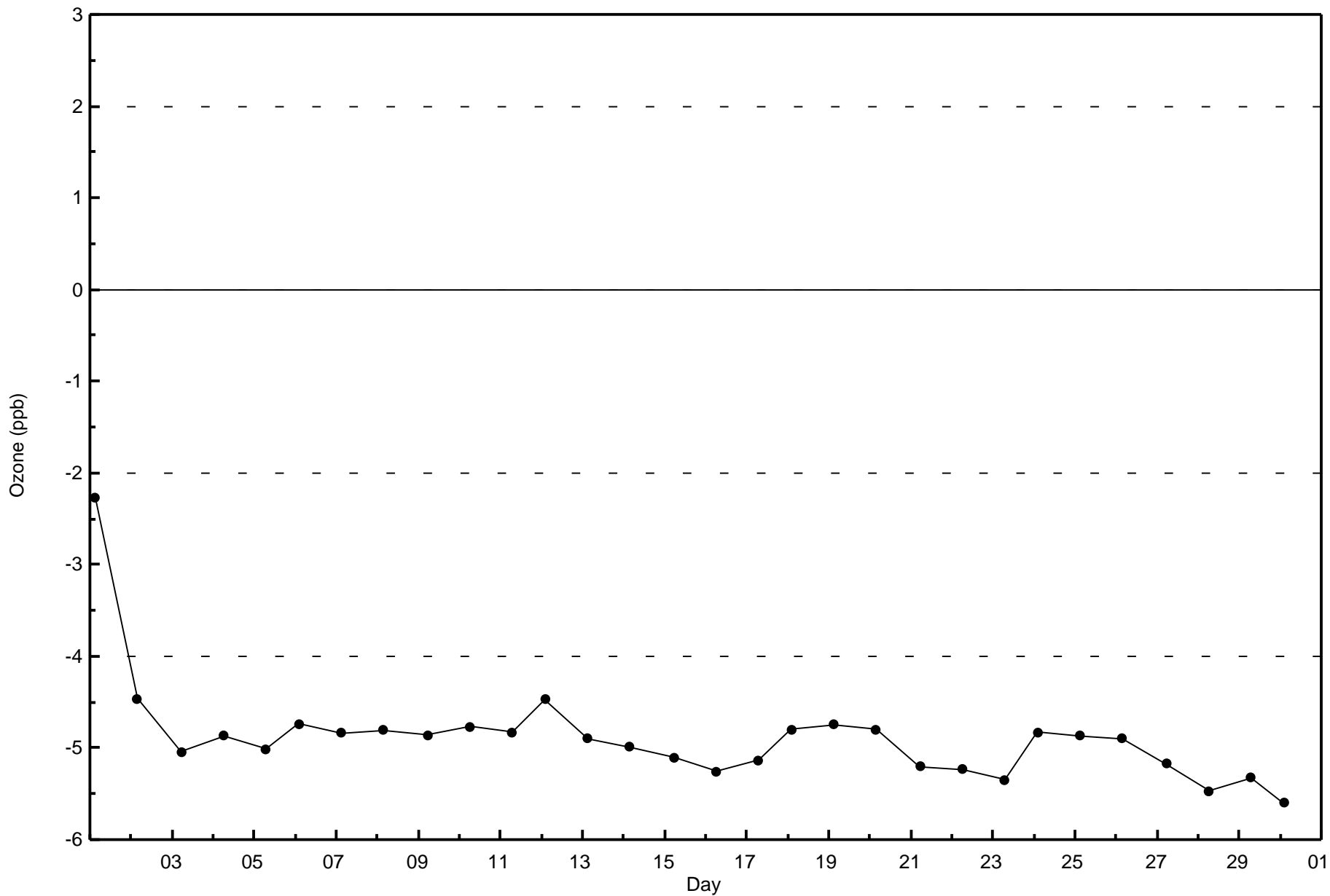


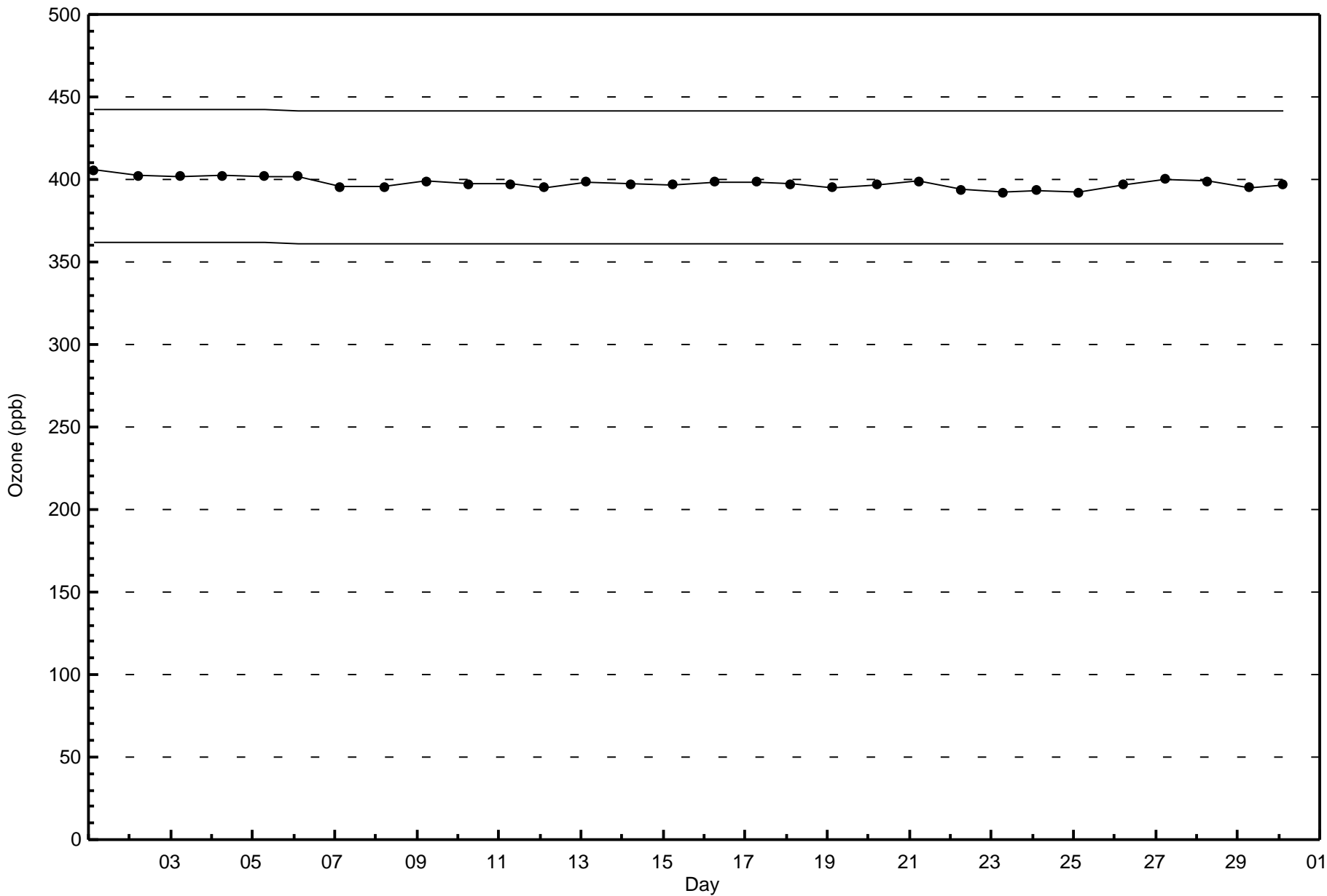
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O_3) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association
Summary of Hour Averages

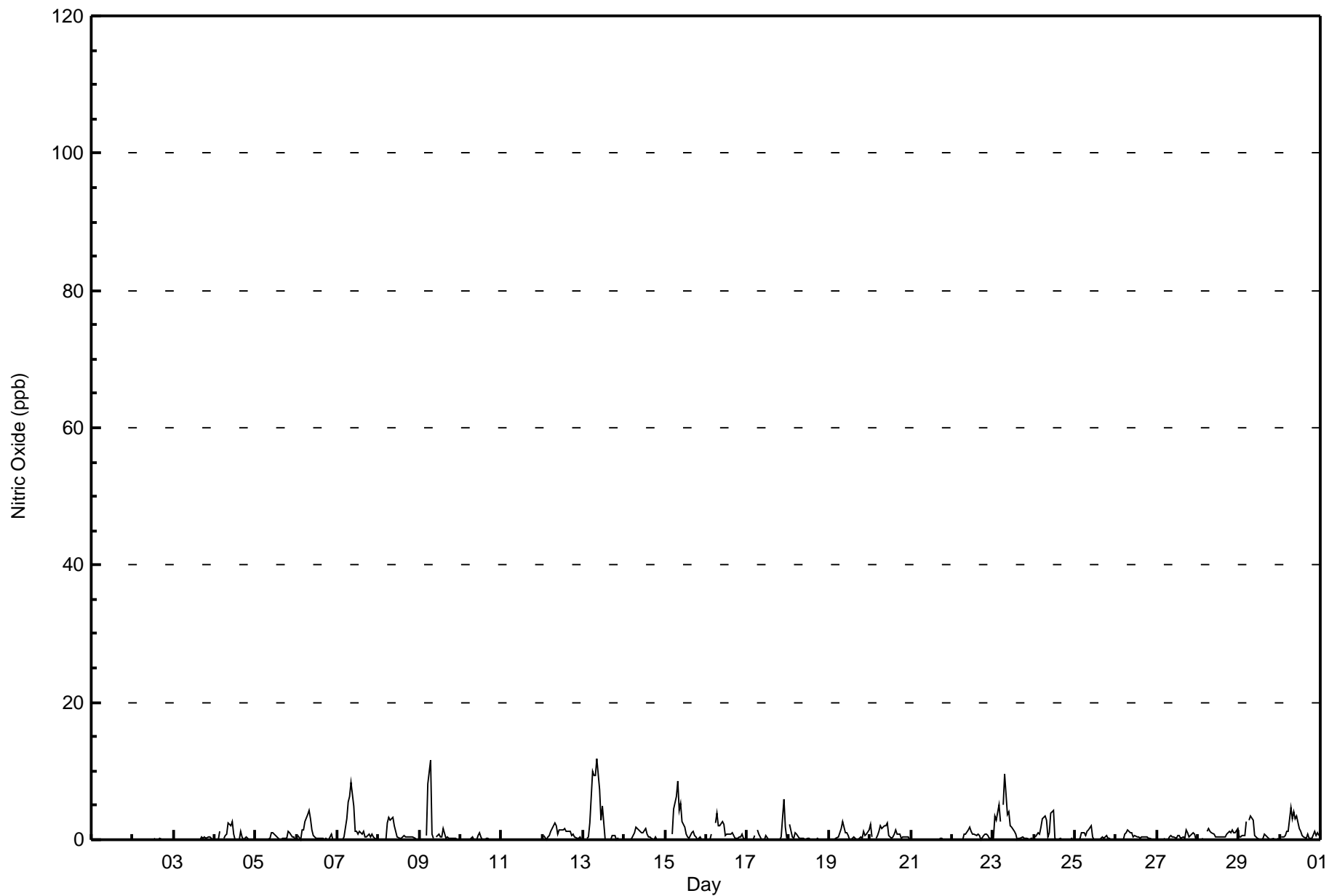
Nitric Oxide (NO) - ppb
Athabasca Valley - June 2017

Maximum Value: 12 ppb on Jun 13 09:00														Maximum Daily Average: 2.7 ppb on Jun 13														Hours in Service: 720			
Minimum Value: 0 ppb on Jun 2 14:00														Minimum Daily Average: 0.0 ppb on Jun 11														Hours of Data: 655			
Maximum Diurnal Average: 2.6 ppb at hour 7														Minimum Diurnal Average: 0.1 ppb at hour 1														Hours of Missing Data: 65			
Monthly Average: 0.8 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 9														Hours of Calibration: 32			
																												Percent Operational Time: 95.4			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	--	--					
2-Jun	M	M	M	M	M	M	M	M	M	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0					
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0					
4-Jun	0	0	0	1	Z	0	1	1	2	2	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0.6	3					
5-Jun	0	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1					
6-Jun	Z	1	0	1	1	3	4	4	3	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0.9	4					
7-Jun	0	Z	0	0	0	3	5	6	8	5	1	1	1	1	1	1	0	0	1	0	1	0	0	0	1.7	8					
8-Jun	0	0	Z	0	0	3	3	3	3	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.9	3					
9-Jun	0	0	0	Z	1	8	12	1	0	M	1	1	0	0	2	0	0	0	0	0	0	0	0	0	1.2	12					
10-Jun	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1					
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0					
12-Jun	Z	1	0	0	1	1	2	2	2	1	1	1	1	2	1	1	1	1	1	1	0	0	0	0	1.0	2					
13-Jun	0	Z	0	0	2	10	9	9	12	7	3	5	2	0	0	0	0	1	1	0	0	0	0	0	2.7	12					
14-Jun	0	0	Z	0	0	1	1	2	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0.5	2					
15-Jun	0	0	0	Z	1	4	6	9	4	5	3	2	1	0	0	1	1	1	1	0	0	0	0	0	1.7	9					
16-Jun	0	0	0	1	Z	3	4	2	2	3	2	1	1	1	1	1	1	0	0	0	0	1	0	0	1.0	4					
17-Jun	0	0	0	0	1	Z	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	6	2	0	0.5	6					
18-Jun	Z	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2					
19-Jun	0	Z	0	0	0	0	1	2	3	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0.6	3					
20-Jun	2	0	Z	0	1	1	2	2	2	2	3	1	0	0	1	1	1	1	1	0	0	0	0	0	1.0	3					
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0					
22-Jun	0	0	0	0	Z	0	0	1	1	1	2	1	1	1	1	1	1	0	1	1	1	1	0	0	0.6	2					
23-Jun	0	3	3	5	3	Z	5	10	4	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	1.9	10					
24-Jun	Z	0	1	1	2	3	3	3	0	1	4	4	0	0	0	0	0	0	0	0	0	0	0	0	1.0	4					
25-Jun	0	Z	0	0	1	1	1	1	2	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	2					
26-Jun	0	0	Z	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1					
27-Jun	0	0	0	Z	0	0	0	0	1	0	1	0	1	1	0	0	0	1	1	0	1	1	1	0	0.4	1					
28-Jun	0	0	0	0	Z	1	2	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	2	0.7	2					
29-Jun	0	0	1	1	3	Z	3	4	3	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.7	4					
30-Jun	Z	0	0	1	1	1	5	3	4	3	4	2	1	1	0	0	1	0	0	0	1	1	1	1	1.4	5					
																												Diurnal Average			
																												Diurnal Maximum			
Z - zerspan														C - Calibration														M - Maintenance		AF - Analyzer Failure	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	655	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 655

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	15	17	26	27	43	120	40	14	14	29	22	40	27	52	119	655
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	15	17	26	27	43	120	40	14	14	29	22	40	27	52	119	655

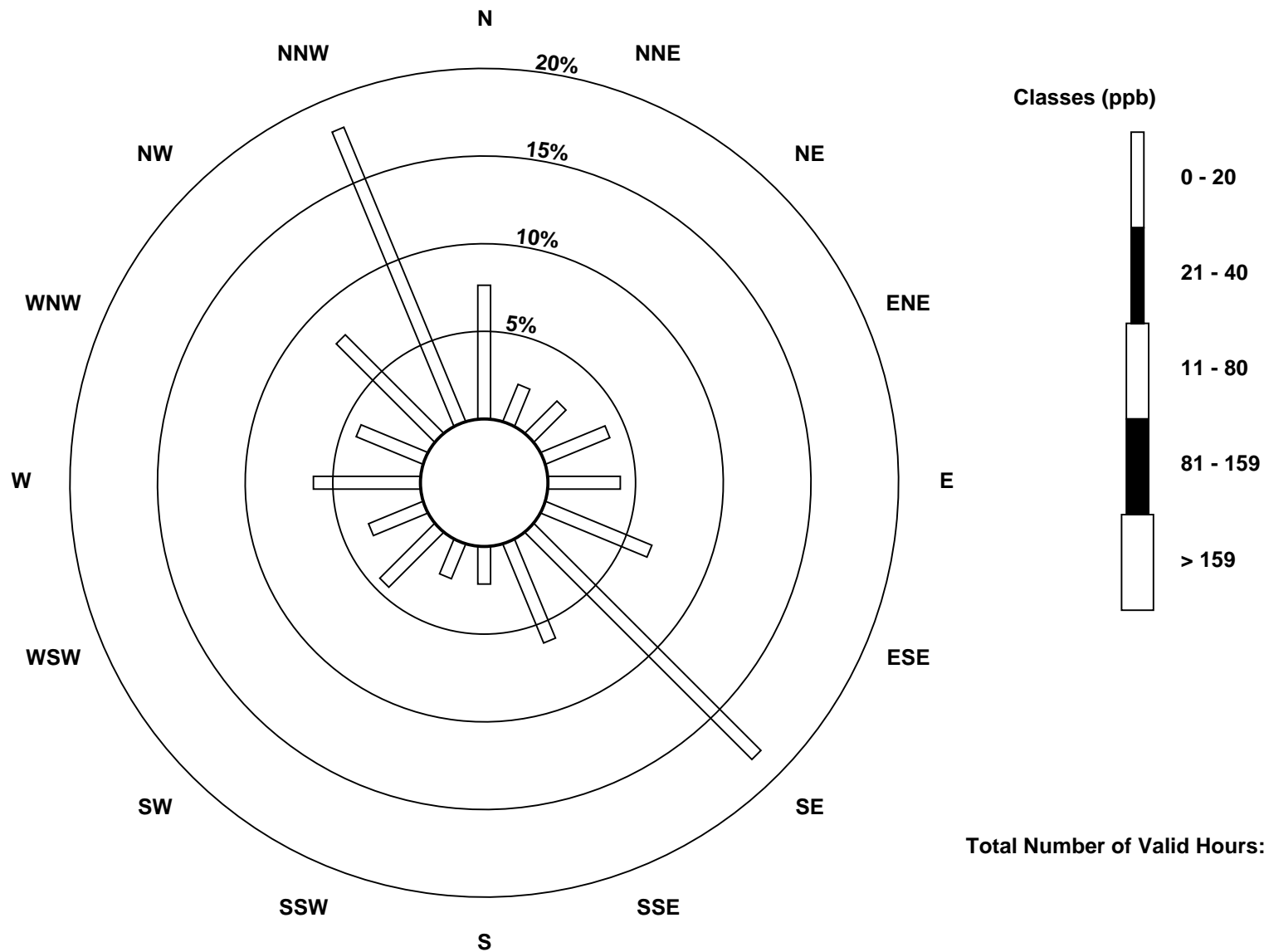
Total Number of Valid Hours: 655

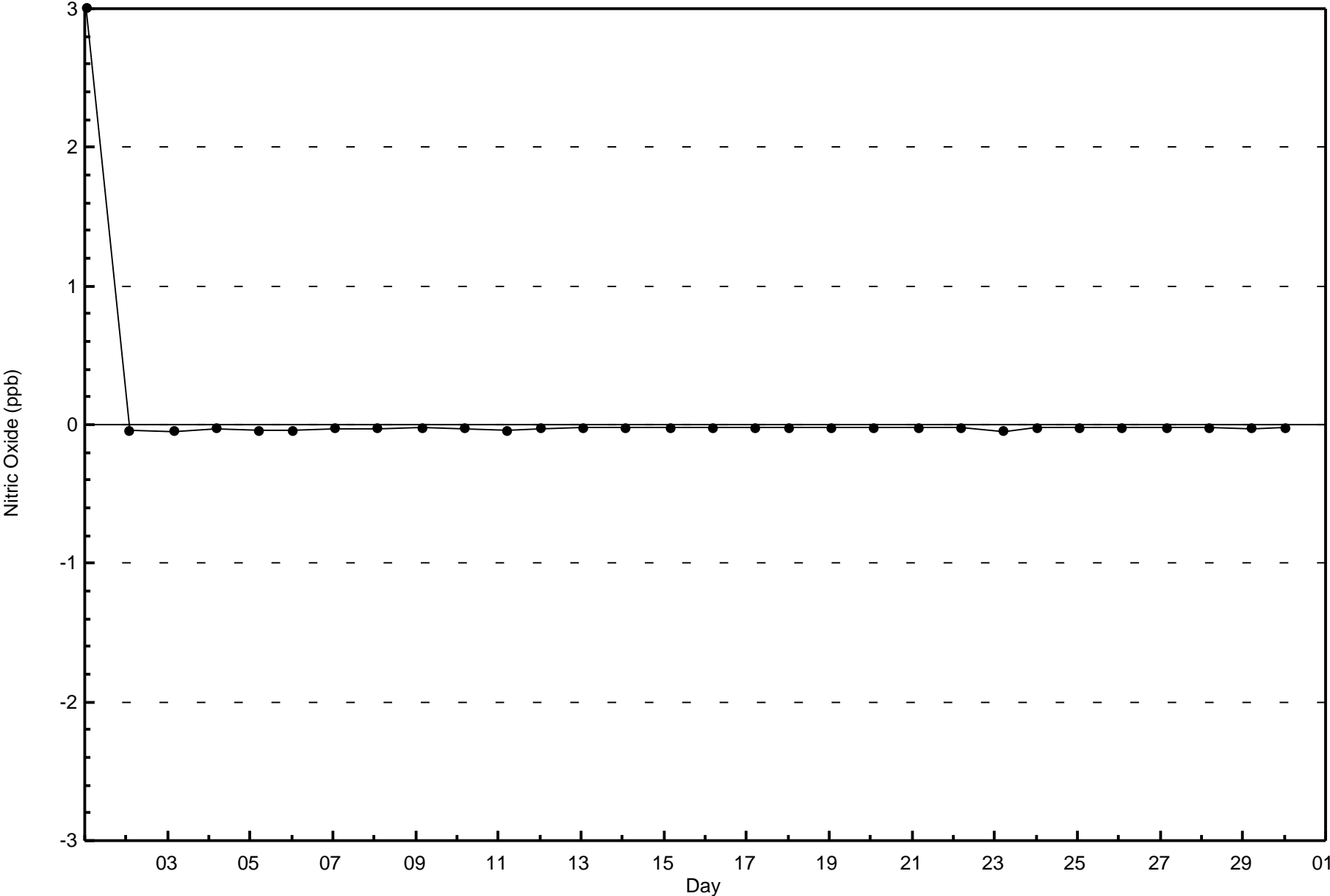
Total Number of Hours: 720

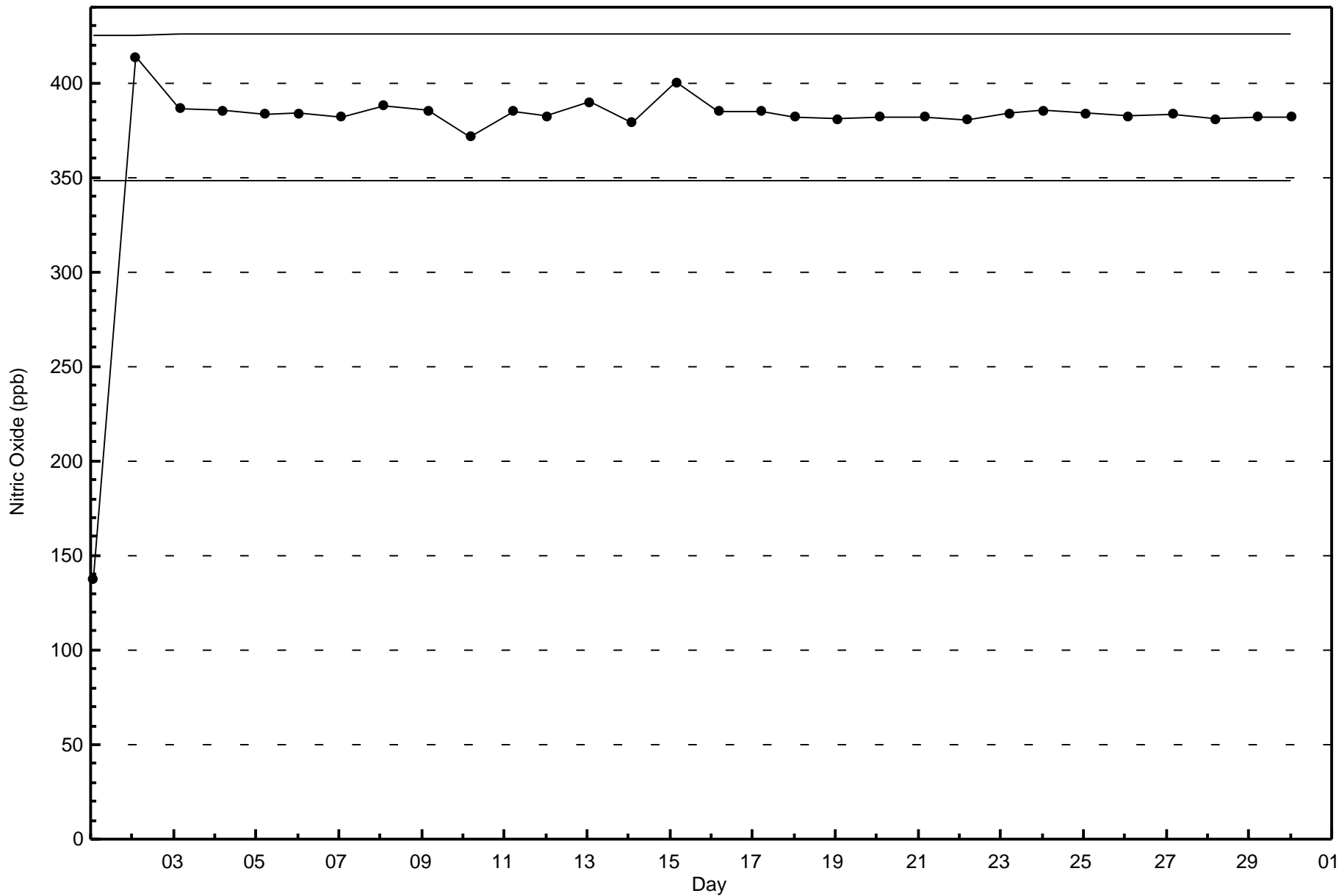


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Jun 8 06:00	Maximum Daily Average: 6.1 ppb on Jun 7		Hours of Data:	655
Minimum Value: 0 ppb on Jun 3 12:00	Minimum Daily Average: 1.2 ppb on Jun 3		Hours of Missing Data:	65
Maximum Diurnal Average: 5.7 ppb at hour 22	Minimum Diurnal Average: 2.0 ppb at hour 15		Hours of Calibration:	32
Monthly Average: 3.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 8 P ₉₉ = 13		Percent Operational Time:	95.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	--	--
2-Jun	M	M	M	M	M	M	M	M	M	C	C	C	C	6	11	4	4	4	5	4	5	3	1	1	1	--	11
3-Jun	1	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	2	6	4	4	3	1.2	6	
4-Jun	3	3	3	9	Z	2	2	3	7	7	10	6	2	1	2	6	4	6	10	8	6	10	7	8	5.3	10	
5-Jun	7	5	4	1	3	Z	6	7	6	7	7	5	3	3	1	1	1	0	1	6	9	13	6	7	4.7	13	
6-Jun	Z	7	4	5	3	4	4	5	5	2	2	2	1	1	1	2	2	2	2	3	12	9	9	7	4.1	12	
7-Jun	8	Z	11	12	8	10	9	13	14	8	3	3	3	4	3	5	4	2	2	1	3	5	5	3	6.1	14	
8-Jun	1	1	Z	1	6	14	11	9	6	4	3	2	2	2	2	3	2	1	1	2	2	4	5	2	3.7	14	
9-Jun	2	2	3	Z	3	12	14	3	2	M	2	2	2	2	2	1	0	0	0	0	0	0	0	0	2.3	14	
10-Jun	0	0	0	0	Z	0	0	1	0	0	2	3	2	2	2	3	5	5	4	6	3	2	6	4	2.1	6	
11-Jun	2	4	2	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	4	5	5	1.4	5	
12-Jun	Z	8	6	7	5	5	5	4	4	4	6	3	3	6	4	4	4	3	4	4	2	3	3	3	4.2	8	
13-Jun	3	Z	5	7	5	9	8	9	11	10	6	8	5	2	2	3	4	4	7	5	4	3	1	2	5.3	11	
14-Jun	5	4	Z	3	4	3	3	3	3	3	3	3	3	3	2	1	1	1	5	3	2	3	2	5	3.0	5	
15-Jun	4	3	4	Z	8	10	9	8	5	5	3	3	3	3	3	5	6	4	5	6	6	3	2	4	4.9	10	
16-Jun	3	3	3	3	Z	4	6	3	4	4	3	1	2	3	2	3	3	2	3	3	5	5	4	1	3.2	6	
17-Jun	1	1	1	1	4	Z	4	2	1	0	1	1	0	1	0	0	0	0	1	1	6	13	8	4	2.3	13	
18-Jun	Z	11	7	6	6	3	2	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	2	2	2.3	11	
19-Jun	1	Z	1	1	2	3	3	4	4	3	3	2	1	1	1	1	0	1	2	3	7	7	7	9	2.8	9	
20-Jun	12	7	Z	3	4	3	5	4	5	4	5	3	2	3	6	8	5	5	5	5	5	6	5	5	5.0	12	
21-Jun	4	4	2	Z	1	2	3	2	1	2	2	2	1	1	1	2	2	2	2	2	3	4	4	2	2.1	4	
22-Jun	2	5	2	1	Z	1	3	3	3	3	3	2	2	2	2	2	2	1	2	3	4	8	4	1	2.6	8	
23-Jun	5	11	9	7	5	Z	4	7	5	7	5	5	3	2	2	2	2	3	3	4	4	3	3	5	4.5	11	
24-Jun	Z	6	7	6	6	5	3	4	2	3	8	8	2	2	2	2	2	1	1	2	8	12	9	7	4.6	12	
25-Jun	6	Z	7	4	5	3	2	2	3	4	2	1	1	1	1	1	1	2	2	3	4	6	4	4	3.1	7	
26-Jun	5	8	Z	4	5	6	5	5	4	4	3	3	3	3	3	3	3	3	4	5	5	8	5	3	4.3	8	
27-Jun	4	2	2	Z	3	2	2	3	4	2	2	2	2	2	2	5	3	9	7	5	7	8	6	5	3.9	9	
28-Jun	2	4	6	4	Z	3	4	2	3	1	0	0	0	1	0	1	1	1	3	4	6	7	8	10	3.1	10	
29-Jun	5	4	5	4	6	Z	3	3	3	2	2	1	1	1	3	6	6	6	6	10	13	11	10	8	5.2	13	
30-Jun	Z	9	8	8	7	6	8	5	6	5	6	4	3	3	3	3	4	2	3	3	5	4	5	7	4.9	9	

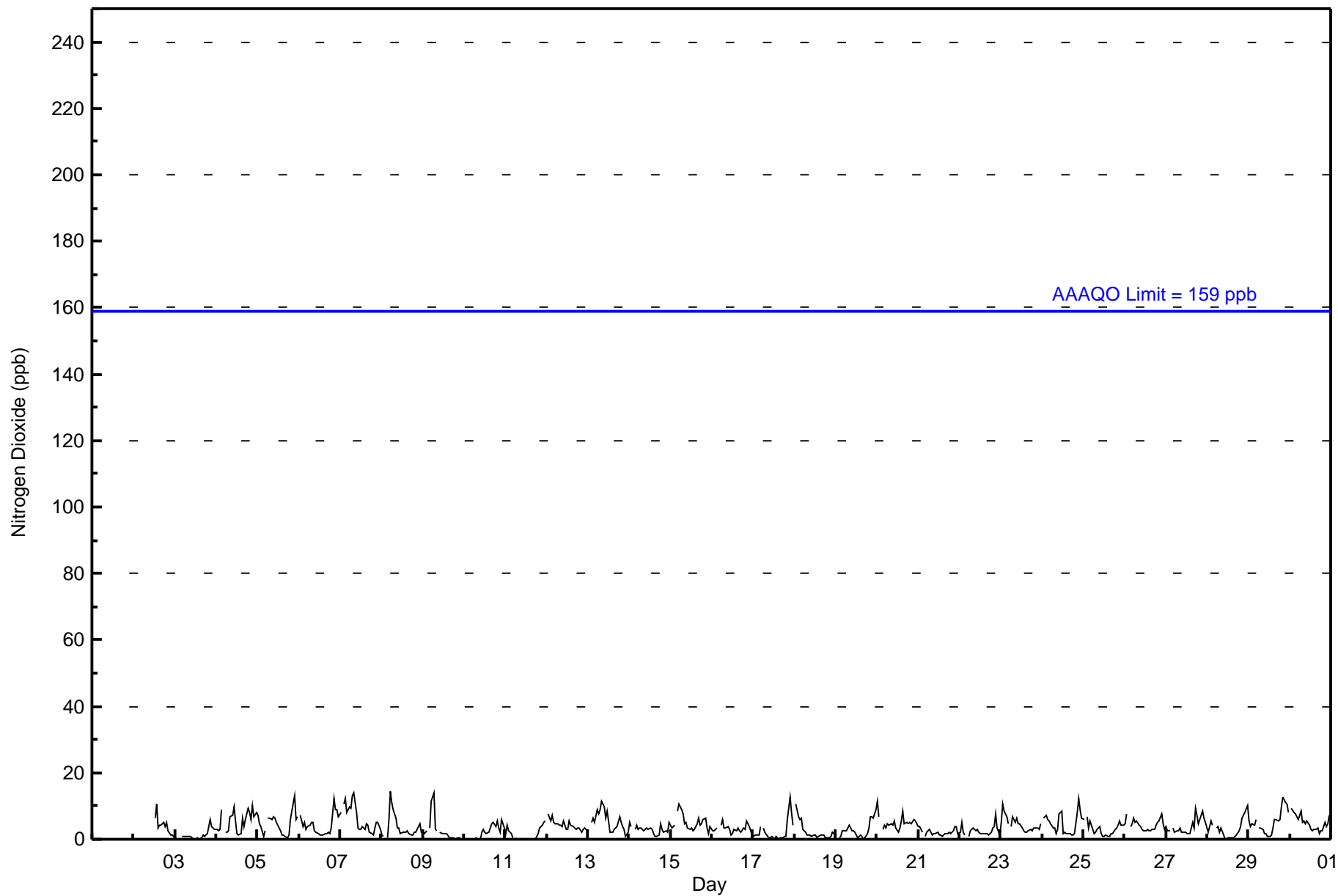
3.7	4.6	4.2	4.3	4.4	4.8	4.6	4.1	4.0	3.5	3.3	2.7	2.1	2.2	2.0	2.6	2.5	2.6	3.1	3.6	5.0	5.7	4.8	4.3	Diurnal Average	
12	11	11	12	8	14	14	13	14	10	10	8	6	11	6	8	6	9	10	10	13	13	10	10	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	655	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 655

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	15	17	26	27	43	120	40	14	14	29	22	40	27	52	119	655
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	15	17	26	27	43	120	40	14	14	29	22	40	27	52	119	655

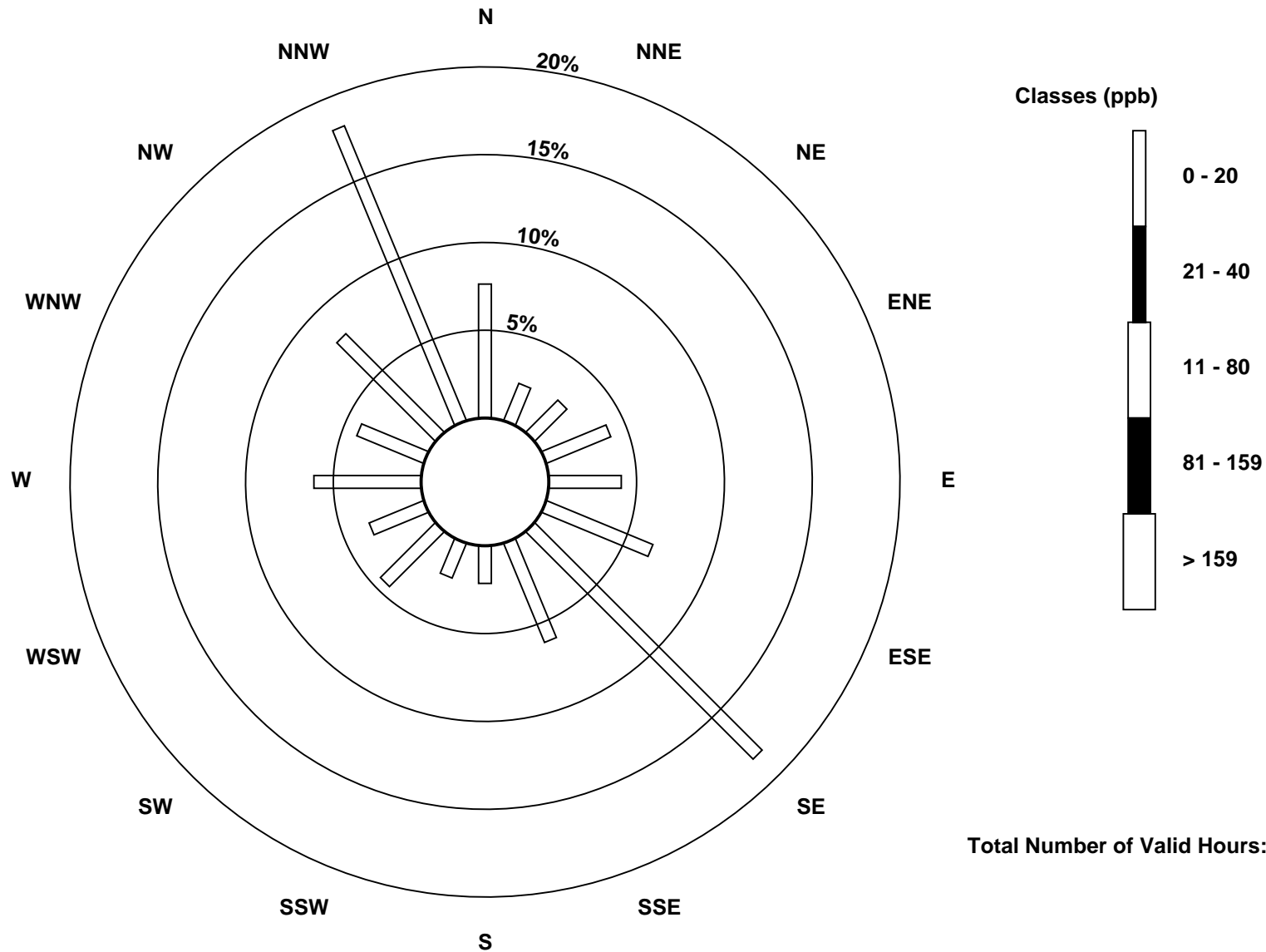
Total Number of Valid Hours: 655

Total Number of Hours: 720

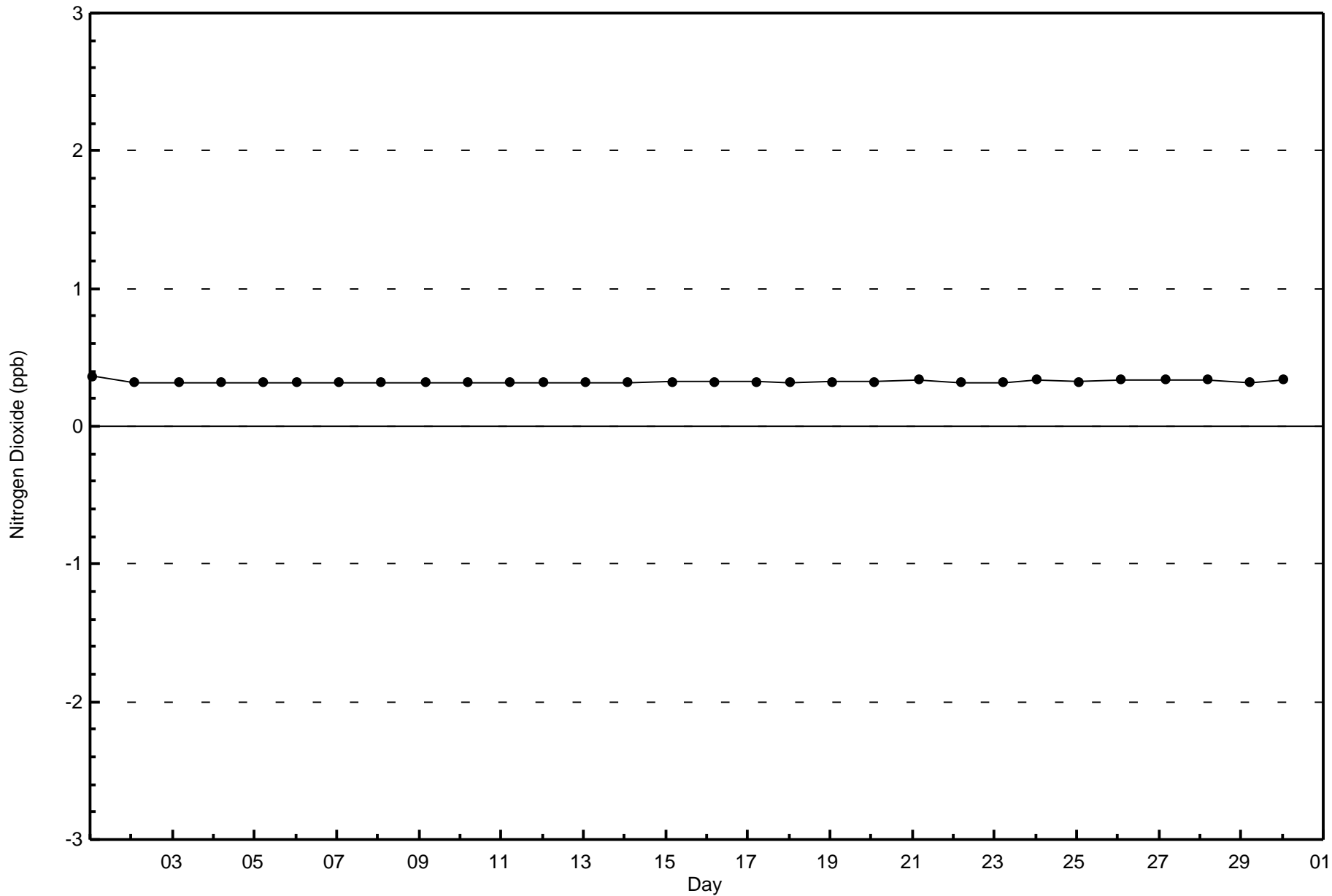


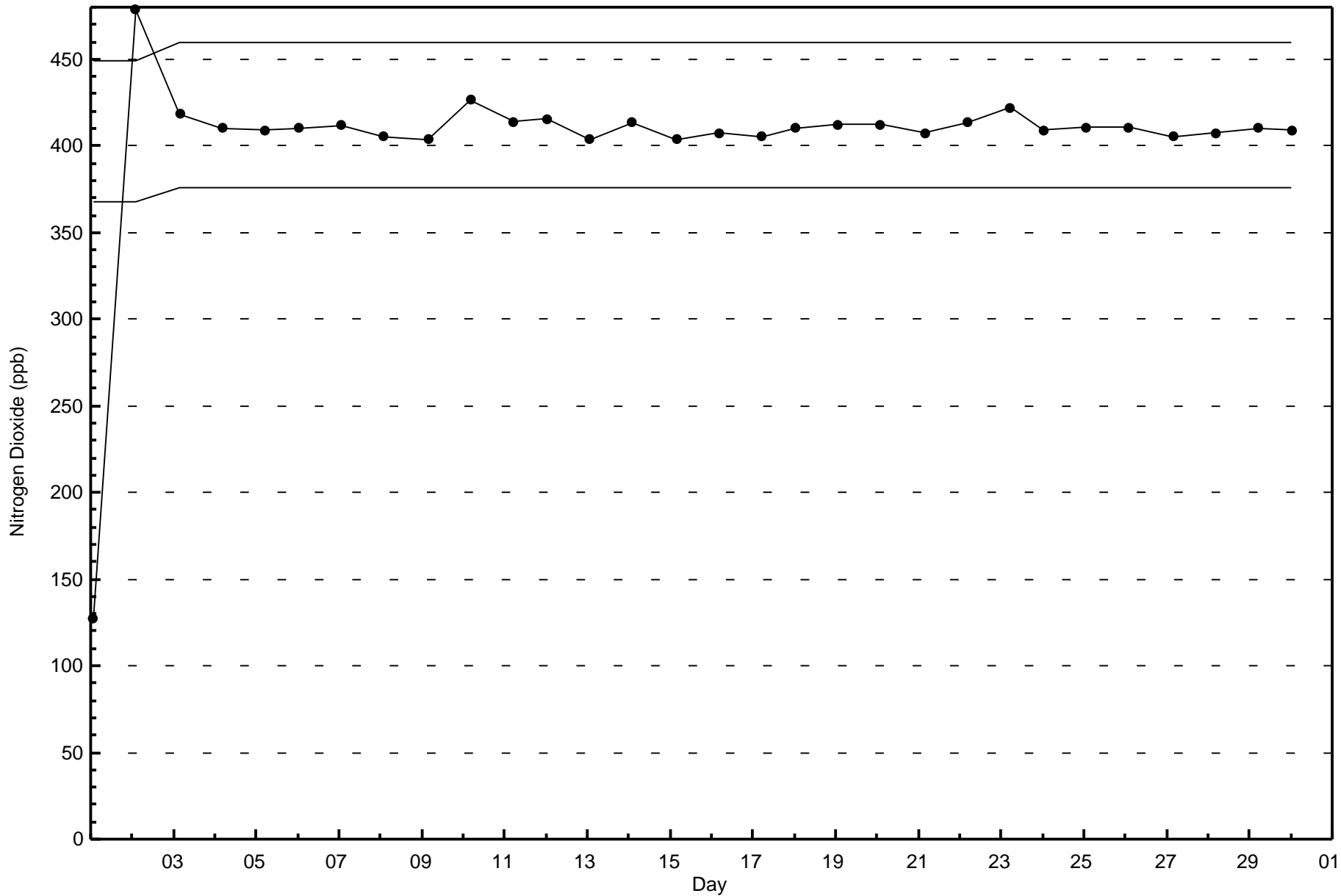
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 655







Wood Buffalo Environmental Association
Summary of Hour Averages

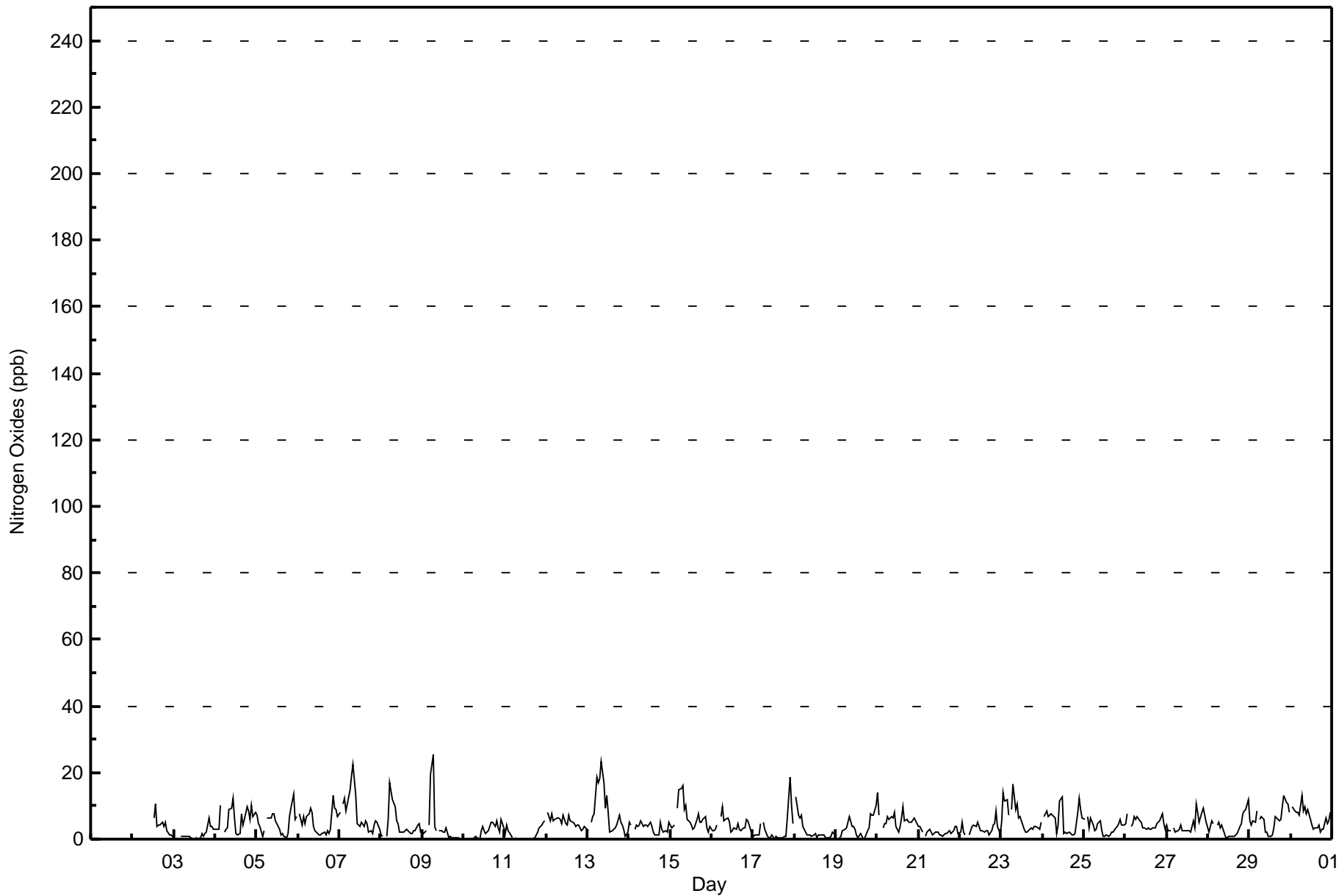
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2017

Maximum Value: 25 ppb on Jun 9 07:00														Maximum Daily Average: 8.0 ppb on Jun 13										Hours in Service: 720			
Minimum Value: 0 ppb on Jun 11 08:00														Minimum Daily Average: 1.3 ppb on Jun 3										Hours of Data: 655			
Maximum Diurnal Average: 7.2 ppb at hour 7														Minimum Diurnal Average: 2.3 ppb at hour 15										Hours of Missing Data: 65			
Monthly Average: 4.5 ppb														Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 6 P ₉₀ = 9 P ₉₉ = 18										Hours of Calibration: 32			
																								Percent Operational Time: 95.4			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	--	--	
2-Jun	M	M	M	M	M	M	M	M	M	C	C	C	C	7	11	4	4	4	5	4	5	3	1	1	1	--	11
3-Jun	1	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	2	1	2	2	6	4	4	3	1.3	6	
4-Jun	3	3	3	10	Z	2	3	3	9	9	12	6	2	1	2	8	4	6	10	8	6	10	7	8	5.9	12	
5-Jun	7	5	4	1	3	Z	6	6	6	8	8	6	4	3	1	2	1	1	2	7	10	14	6	7	5.0	14	
6-Jun	Z	8	4	7	4	7	8	9	8	4	3	2	1	1	2	2	1	3	2	3	13	9	9	7	5.1	13	
7-Jun	8	Z	11	12	8	13	15	19	22	13	4	4	4	5	4	6	5	2	3	2	4	5	5	3	7.7	22	
8-Jun	1	1	Z	1	6	17	15	12	10	6	4	2	2	2	3	3	2	2	2	2	3	4	5	2	4.6	17	
9-Jun	2	2	2	Z	4	19	25	4	2	M	2	3	2	2	3	1	1	1	1	0	1	0	0	0	3.6	25	
10-Jun	0	0	0	0	Z	0	0	1	0	0	3	4	2	2	2	4	5	5	4	5	3	2	6	4	2.3	6	
11-Jun	2	4	2	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	4	5	5	1.4	5	
12-Jun	Z	8	6	8	6	6	7	7	6	5	7	4	4	7	6	5	5	4	4	4	3	3	4	3	5.2	8	
13-Jun	3	Z	5	7	7	19	17	18	23	17	9	13	8	2	2	3	3	4	7	5	4	3	1	2	8.0	23	
14-Jun	5	4	Z	3	4	4	4	5	4	4	4	5	4	2	1	1	1	1	5	3	2	3	2	5	3.5	5	
15-Jun	4	3	4	Z	9	15	15	16	9	10	6	5	4	3	3	6	8	5	5	6	7	3	2	4	6.7	16	
16-Jun	3	3	3	4	Z	7	10	5	6	7	5	2	3	3	3	4	3	2	3	3	6	6	4	1	4.2	10	
17-Jun	1	1	1	1	5	Z	5	3	1	0	1	1	0	1	0	0	0	0	1	1	7	18	10	5	2.8	18	
18-Jun	Z	13	7	6	7	4	2	1	1	1	1	1	2	1	1	1	1	1	0	1	1	1	2	2	2.6	13	
19-Jun	1	Z	1	1	3	3	4	5	7	4	4	3	1	1	2	1	0	0	2	3	8	7	7	10	3.4	10	
20-Jun	14	7	Z	3	5	5	7	6	7	7	8	4	2	4	6	10	5	6	5	5	5	6	6	5	5.9	14	
21-Jun	4	4	2	Z	1	2	3	2	1	2	2	2	1	1	1	2	2	2	3	2	3	4	4	2	2.2	4	
22-Jun	2	5	2	1	Z	1	3	4	4	4	5	4	3	2	2	2	2	1	3	4	5	8	4	2	3.2	8	
23-Jun	5	14	11	12	7	Z	9	17	9	11	6	7	4	3	2	2	2	3	3	4	4	3	3	5	6.4	17	
24-Jun	Z	7	8	7	7	7	7	6	2	4	11	13	2	2	2	2	1	1	1	2	8	12	9	7	5.6	13	
25-Jun	6	Z	7	4	7	4	3	3	5	6	2	1	1	1	1	1	1	2	2	4	5	6	4	4	3.5	7	
26-Jun	5	8	Z	4	5	7	6	7	6	5	4	3	3	3	3	3	3	3	4	5	6	8	5	3	4.7	8	
27-Jun	4	2	2	Z	4	2	3	3	4	2	3	3	2	2	2	5	4	11	8	5	8	9	7	5	4.4	11	
28-Jun	2	4	6	5	Z	4	5	4	4	2	1	1	1	1	1	1	1	2	4	5	8	8	9	12	3.8	12	
29-Jun	6	4	5	5	9	Z	6	7	6	2	2	1	1	1	3	7	7	6	6	10	13	11	10	8	5.9	13	
30-Jun	Z	10	8	8	8	7	13	8	10	8	9	6	4	3	3	3	3	4	2	3	3	6	5	6	8	6.3	13
														3.8 5.0 4.4 4.8 5.2 6.8 7.2 6.5 6.2 5.2 4.5 3.7 2.6 2.5 2.3 3.1 2.8 2.9 3.5 3.8 5.4 6.2 5.0 4.5										Diurnal Average			
														14 14 11 12 9 19 25 19 23 17 12 13 8 11 6 10 8 11 10 10 13 18 10 12										Diurnal Maximum			
Z - zerspan			C - Calibration			M - Maintenance			AF - Analyzer Failure																		



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	652	99.54	99.54
21 - 40	3	0.46	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 655

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	14	17	26	27	43	120	40	14	14	29	22	40	27	52	117	652
21 - 40	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	15	17	26	27	43	120	40	14	14	29	22	40	27	52	119	655

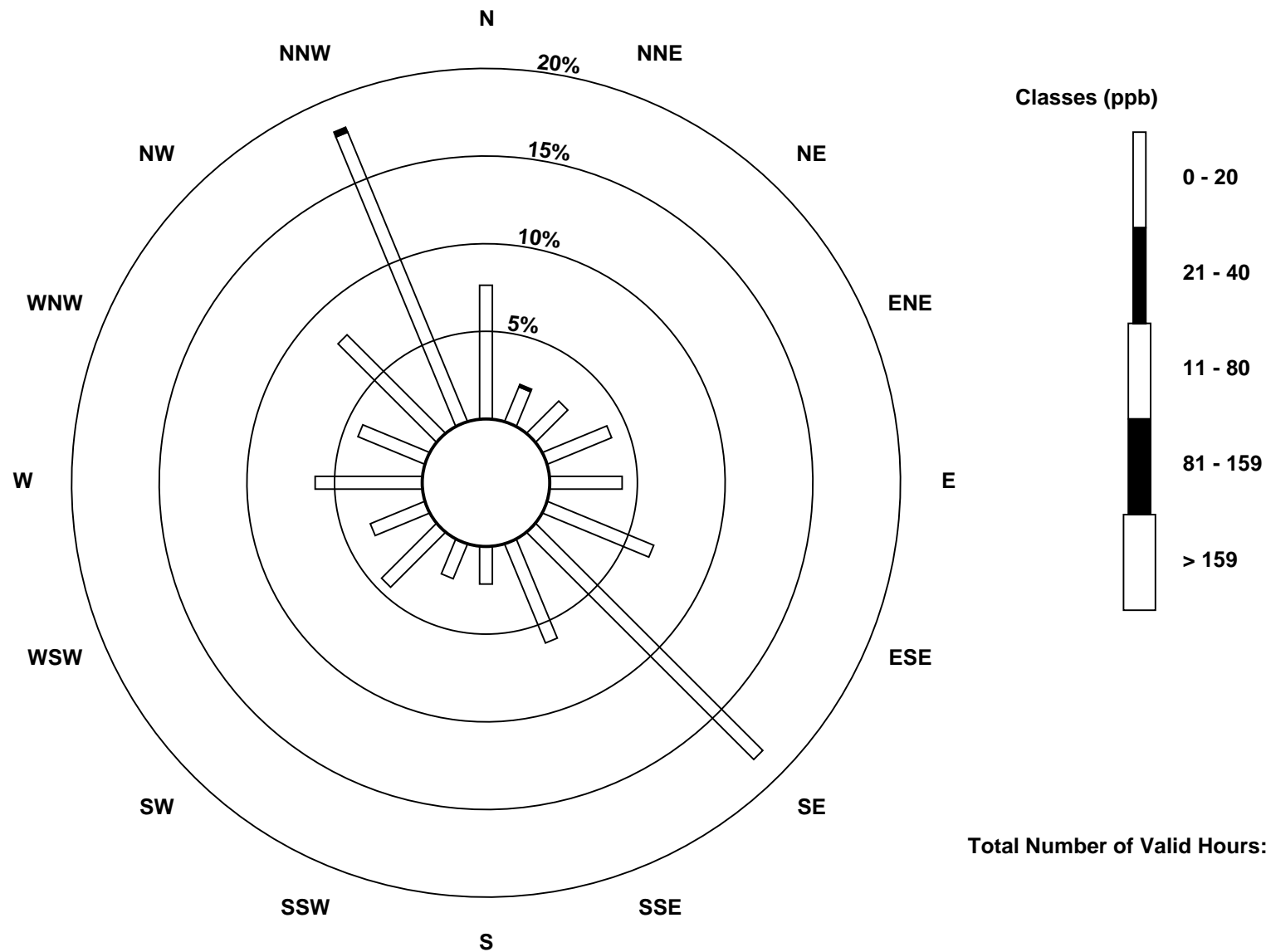
Total Number of Valid Hours: 655

Total Number of Hours: 720

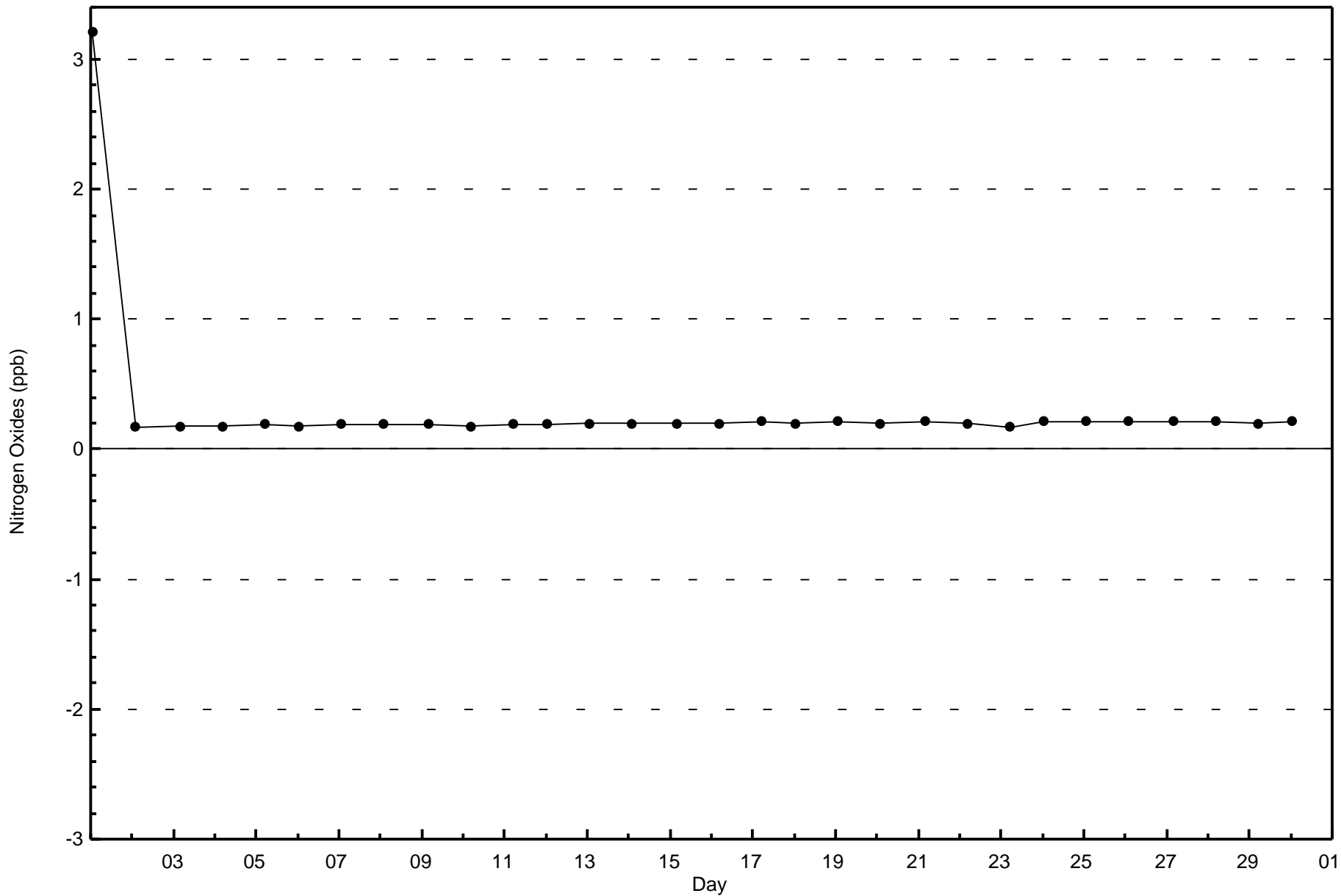


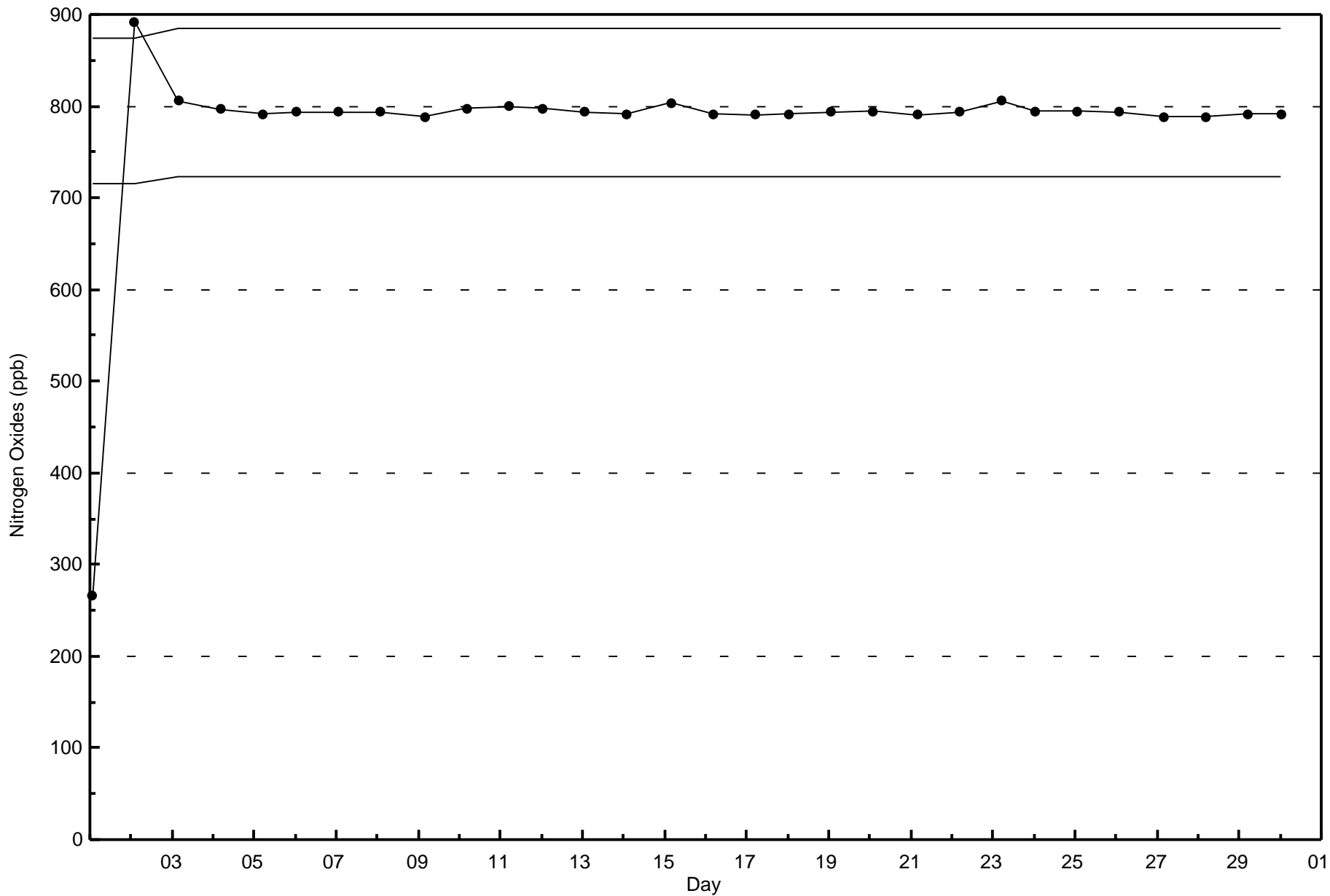
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 655







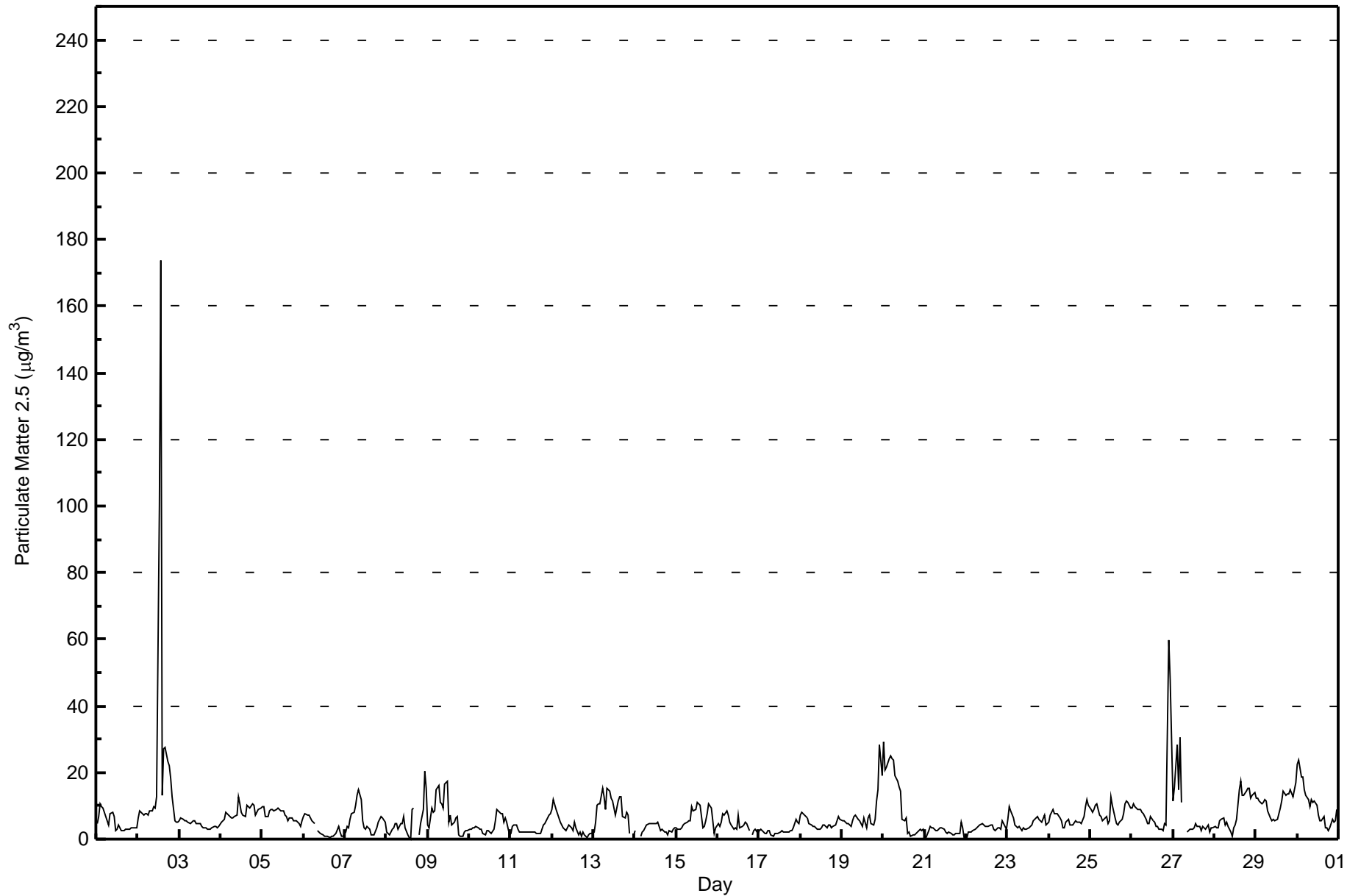
Summary of Hour Averages

Athabasca Valley - June 2017

Number of Exceedences (AAAQO): 24-hr: 0	Hours in Service: 720
Maximum Value: 173.8 µg/m ³ on Jun 2 14:00	Maximum Daily Average: 22.3 µg/m ³ on Jun 2
Minimum Value: 0.1 µg/m ³ on Jun 8 15:00	Hours of Data: 711
Maximum Diurnal Average: 10.5 µg/m ³ at hour 14	Hours of Missing Data: 9
Monthly Average: 6.72 µg/m ³	Hours of Calibration: 1
Minimum Daily Average: 2.4 µg/m ³ on Jun 21	Percent Operational Time: 98.9
Minimum Diurnal Average: 4.9 µg/m ³ at hour 15	
Percentiles: P ₁ = 0.6 P ₁₀ = 1.9 Q ₁ = 3.1 Median = 5.0 Q ₃ = 8.0 P ₉₀ = 12.4 P ₉₉ = 29.1	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	4.5	6.9	10.6	9.6	9.1	6.8	5.5	4.3	7.5	8.1	6.8	2.7	3.0	4.1	2.7	2.5	2.6	2.8	2.9	3.1	3.3	3.3	3.5	3.6	5.0	10.6																							
2-Jun	6.5	8.6	8.2	7.2	7.5	7.8	7.4	8.6	8.6	9.8	9.2	12.8	99.9	173.8	13.0	27.2	27.5	23.1	21.9	18.4	12.7	5.3	5.3	5.1	22.3	173.8																							
3-Jun	5.5	6.3	5.9	5.4	5.5	5.2	4.7	5.1	5.4	5.6	4.5	4.5	4.5	3.7	3.6	3.5	3.1	3.0	3.0	3.4	4.0	3.9	3.6	3.8	4.4	6.3																							
4-Jun	5.1	5.7	6.0	7.9	7.7	6.7	6.3	6.2	6.7	7.0	12.6	10.4	7.9	7.2	6.9	10.2	9.8	9.5	10.6	10.4	7.1	7.9	8.7	9.2	8.1	12.6																							
5-Jun	10.0	9.7	6.7	6.7	8.3	8.8	8.7	8.5	8.9	9.5	8.9	8.6	8.3	7.4	6.7	5.6	6.2	6.3	5.7	5.7	5.6	4.9	4.0	5.5	7.3	10.0																							
6-Jun	7.0	7.5	7.3	7.1	6.5	5.5	4.7	C	2.5	2.2	1.8	1.1	0.8	0.8	0.6	0.4	0.7	0.8	1.3	1.8	3.7	2.0	0.7	0.7	2.9	7.5																							
7-Jun	2.1	3.8	3.5	5.8	7.5	8.1	10.4	13.3	14.9	11.8	5.3	3.5	3.1	3.9	3.0	1.5	1.1	1.3	3.5	5.0	6.0	6.8	6.4	5.0	5.7	14.9																							
8-Jun	2.2	1.6	1.3	2.9	3.3	4.5	4.7	3.1	4.9	4.5	7.0	3.4	1.4	0.4	0.1	9.1	9.4	UO	UO	1.3	4.5	8.9	20.5	15.3	5.2	20.5																							
9-Jun	4.1	3.4	9.4	8.0	8.6	14.8	16.2	10.9	10.7	9.2	16.5	17.6	5.1	7.2	4.2	5.0	6.4	7.0	1.2	0.9	1.0	2.1	2.6	2.7	7.3	17.6																							
10-Jun	2.9	3.2	3.2	3.6	3.8	3.4	2.8	3.1	1.7	1.3	2.4	2.4	2.1	1.9	2.8	5.5	8.8	8.5	7.5	7.7	5.0	6.4	5.1	1.4	4.0	8.8																							
11-Jun	1.9	3.8	4.1	4.1	3.1	2.2	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.0	1.7	1.8	1.8	3.0	4.3	4.5	6.4	7.1	7.8	3.2	7.8																							
12-Jun	8.8	11.7	8.7	7.5	6.2	4.9	3.5	3.1	2.7	3.2	4.1	3.4	2.7	5.0	3.2	1.4	2.3	0.8	2.2	1.2	0.4	1.2	1.7	1.9	3.8	11.7																							
13-Jun	2.1	4.9	10.0	10.4	10.5	15.2	12.6	9.1	15.3	14.6	12.1	11.6	9.2	7.2	11.6	12.6	12.6	7.0	6.3	8.0	7.2	1.8	UO	1.3	9.3	15.3																							
14-Jun	2.5	UO	UO	0.8	2.2	2.7	3.5	4.0	4.6	4.6	4.5	4.5	4.7	5.3	3.9	2.6	3.0	2.1	2.1	1.3	2.4	2.1	2.8	3.5	3.2	5.3																							
15-Jun	3.3	3.1	3.0	3.5	4.3	4.5	4.9	5.7	5.5	9.6	8.3	8.8	10.9	10.4	10.0	3.4	3.6	5.5	7.5	10.6	9.4	5.7	1.5	3.2	6.1	10.9																							
16-Jun	4.5	3.8	5.1	7.6	7.4	8.3	7.3	5.0	4.4	3.2	3.3	3.0	7.4	3.2	3.7	4.1	5.1	4.8	2.4	UO	1.4	2.4	2.8	1.8	4.4	8.3																							
17-Jun	2.4	2.8	2.4	1.6	1.8	2.5	2.4	1.4	0.9	1.6	1.8	1.8	2.2	2.4	2.2	2.2	2.2	2.2	2.4	2.4	3.4	5.9	5.2	4.6	2.5	5.9																							
18-Jun	7.1	8.2	7.4	6.8	6.4	4.8	4.4	3.8	3.9	3.5	3.0	3.1	3.5	4.0	4.2	3.6	4.3	4.2	3.6	4.0	4.4	5.5	6.8	5.9	4.8	8.2																							
19-Jun	5.4	5.3	5.1	4.9	4.5	3.9	5.5	6.9	7.0	5.9	5.4	4.8	4.0	6.5	3.3	6.3	7.1	4.6	4.3	6.0	11.6	14.9	28.6	19.2	7.5	28.6																							
20-Jun	29.4	20.6	21.8	24.0	25.2	24.4	23.6	19.3	17.4	15.6	14.2	5.9	5.6	6.2	1.7	2.1	0.9	1.1	1.1	1.9	2.3	2.8	2.7	2.9	11.4	29.4																							
21-Jun	1.2	0.5	2.5	3.6	3.6	3.3	2.5	2.6	3.0	3.5	3.2	2.8	1.9	1.8	2.0	1.9	1.3	1.4	1.5	1.8	1.9	5.0	3.5	0.6	2.4	5.0																							
22-Jun	0.6	2.1	2.3	2.2	2.4	3.0	3.5	3.6	4.4	4.6	4.3	4.0	3.8	3.9	4.1	4.4	3.1	2.6	3.2	3.3	3.1	5.4	4.5	3.1	3.4	5.4																							
23-Jun	5.8	9.6	8.4	6.5	4.2	3.6	3.5	3.7	2.7	3.4	2.9	3.2	3.6	3.6	4.4	5.6	6.0	6.6	5.8	5.4	5.3	7.1	4.3	4.6	5.0	9.6																							
24-Jun	5.3	7.1	8.9	7.5	7.4	7.8	6.5	5.6	3.5	3.2	4.9	5.8	4.4	4.1	4.2	5.4	5.1	5.2	5.1	4.6	6.8	9.9	11.8	10.4	6.3	11.8																							
25-Jun	8.8	8.2	8.7	10.2	10.5	7.3	6.6	5.6	6.1	6.8	4.7	5.6	12.8	10.0	6.4	4.5	4.2	4.9	5.7	7.8	10.5	11.4	11.0	9.2	7.8	12.8																							
26-Jun	9.4	10.7	9.8	9.0	9.0	9.0	7.9	7.8	5.7	4.8	4.7	6.8	5.4	5.1	3.9	3.6	3.0	3.1	2.6	4.6	4.3	59.7	48.0	29.8	11.2	59.7																							
27-Jun	11.5	15.9	28.2	14.7	30.3	11.2	UO	UO	1.9	2.4	3.0	2.8	3.5	4.9	3.6	3.7	2.4	3.7	3.5	3.2	4.2	2.3	3.2	3.5	7.4	30.3																							
28-Jun	3.8	3.3	3.6	5.4	5.7	6.4	4.1	5.1	3.8	2.0	1.0	3.3	4.1	6.1	15.0	17.2	13.1	13.2	14.2	15.2	15.1	12.3	13.1	13.8	8.3	17.2																							
29-Jun	12.5	12.1	11.6	10.6	11.0	12.0	11.6	8.5	6.6	5.7	6.0	5.3	6.1	7.4	9.4	11.3	14.4	13.2	13.5	13.5	14.8	12.7	14.9	17.0	10.9	17.0																							
30-Jun	22.7	23.6	18.8	18.5	15.0	13.0	11.7	9.7	11.8	10.9	11.4	10.3	7.2	5.6	5.4	6.6	3.3	3.2	2.4	3.3	5.8	5.0	5.6	8.9	10.0	23.6																							
																								6.6	7.4	8.0	7.5	7.9	7.4	6.9	6.3	6.2	6.0	6.0	5.5	8.0	10.5	4.9	5.8	5.8	5.3	5.2	5.5	5.7	7.7	8.3	6.8	Diurnal Average	
																								29.4	23.6	28.2	24.0	30.3	24.4	23.6	19.3	17.4	15.6	16.5	17.6	99.9	173.8	15.0	27.2	27.5	23.1	21.9	18.4	15.1	59.7	48.0	29.8	Diurnal Maximum	

C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	382	53.73	53.73
6 - 15	274	38.54	92.26
16 - 25	24	3.38	95.64
26 - 80	9	1.27	96.91
> 81.0	2	0.28	97.19

Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	28	11	9	15	20	26	58	19	9	9	22	11	25	18	32	70	382
6 - 15	20	3	7	12	7	21	57	23	5	7	14	14	14	8	18	44	274
16 - 25	1	0	0	1	0	1	15	1	0	0	0	0	0	1	1	3	24
26 - 80	0	1	0	0	1	2	1	1	2	0	0	0	1	0	0	0	9
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Totals	49	15	16	28	28	50	131	44	16	16	36	25	40	27	51	119	691

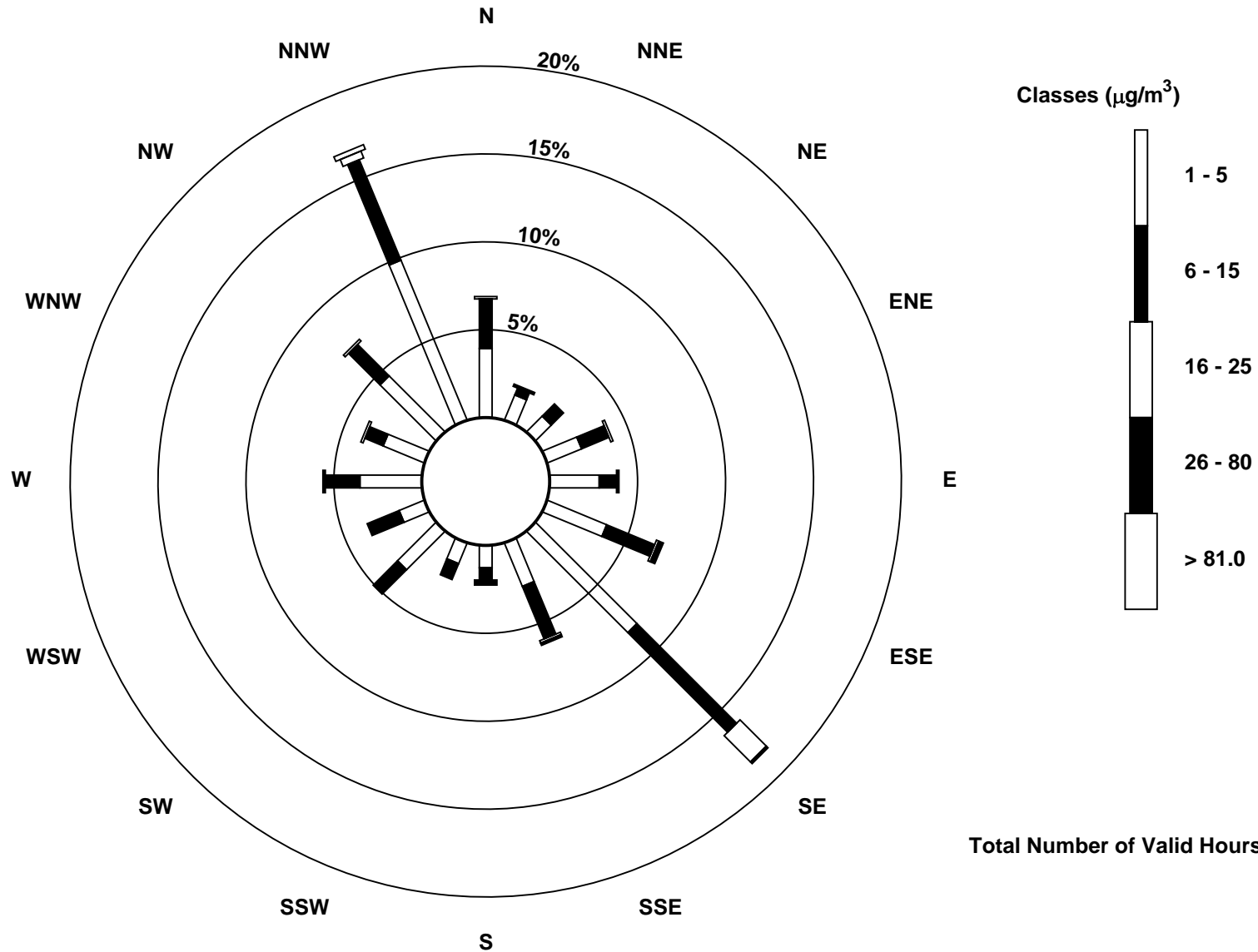
Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association
Summary of Hour Averages

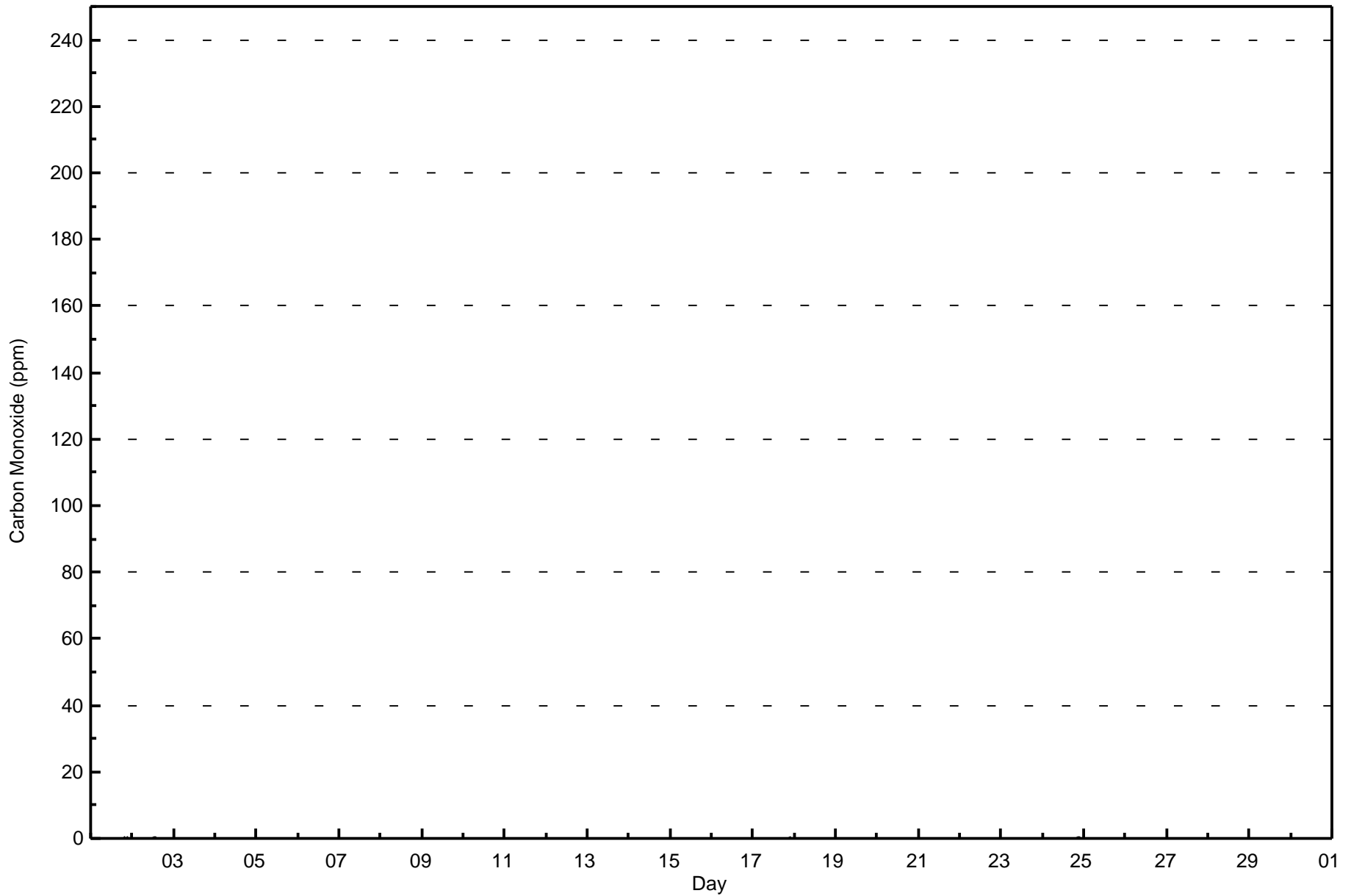
Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.4 ppm on Jun 2 14:00 Maximum Daily Average: 0.2 ppm on Jun 2														Hours in Service: 720 Hours of Data: 686 Hours of Missing Data: 34 Hours of Calibration: 33 Percent Operational Time: 99.9												
Minimum Value: 0.0 ppm on Jun 6 03:00 Minimum Daily Average: 0.1 ppm on Jun 11 Maximum Diurnal Average: 0.1 ppm at hour 22 Minimum Diurnal Average: 0.1 ppm at hour 4 Monthly Average: 0.10 ppm Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.2																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.3
2-Jun	0.1	0.2	0.1	0.1	0.1	0.2	Z	0.1	0.2	0.2	0.1	0.1	0.2	0.4	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2
3-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
5-Jun	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1
6-Jun	0.1	0.1	0.0	0.0	Z	0.1	0.1	C	C	C	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2
7-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
8-Jun	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
9-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	M	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
10-Jun	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
11-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1
12-Jun	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
13-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
14-Jun	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
15-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
16-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
17-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.1
18-Jun	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
19-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2
20-Jun	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
21-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
22-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
23-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
24-Jun	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2
25-Jun	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
26-Jun	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2
27-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
28-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2
29-Jun	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2
30-Jun	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm																										



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	685	99.85	99.85
0.4 - 0.5	1	0.15	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	52	15	16	28	31	49	123	46	15	16	36	27	43	25	49	114	685
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	15	16	28	31	49	123	46	15	16	36	27	43	25	49	115	686

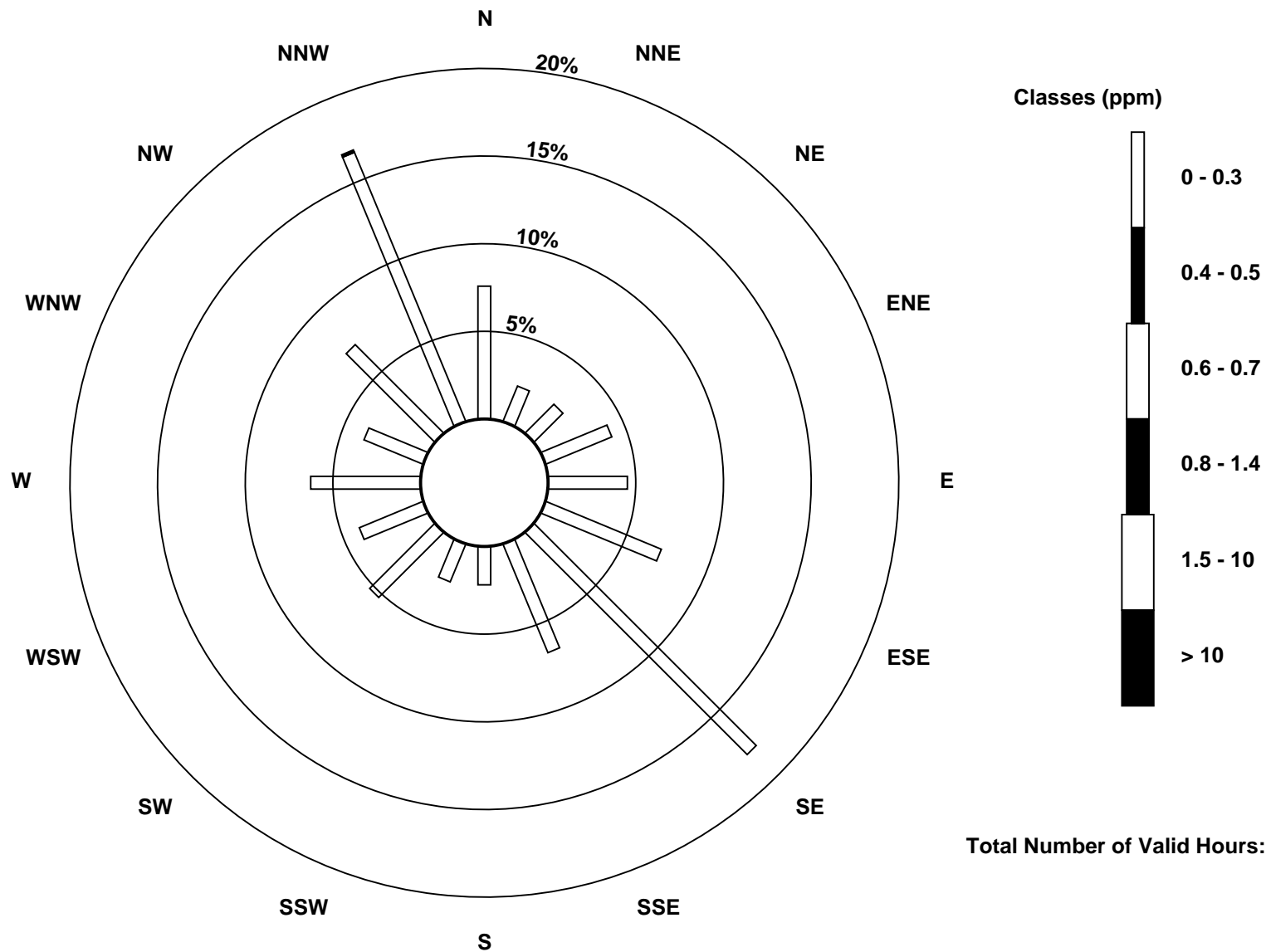
Total Number of Valid Hours: 686

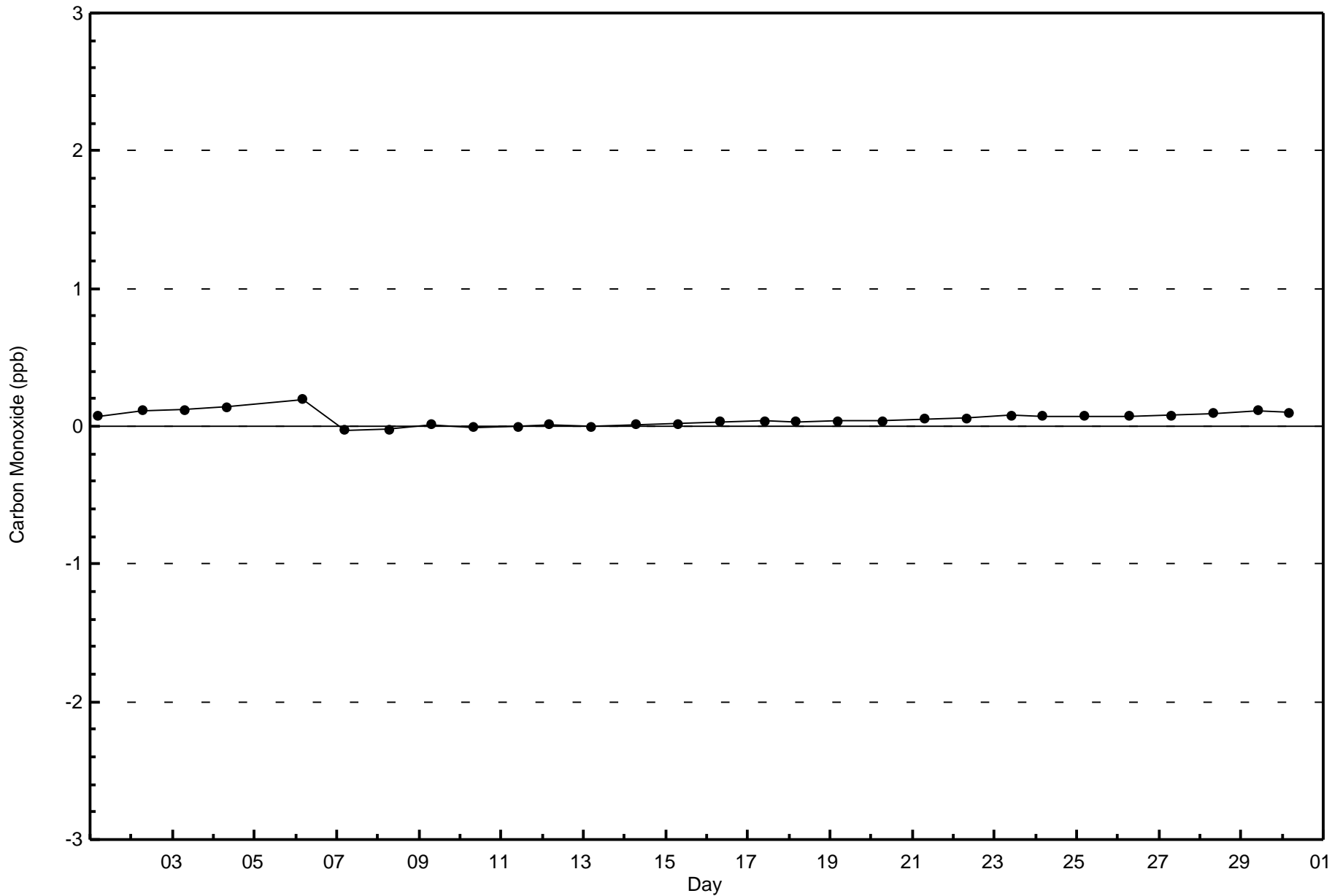
Total Number of Hours: 720

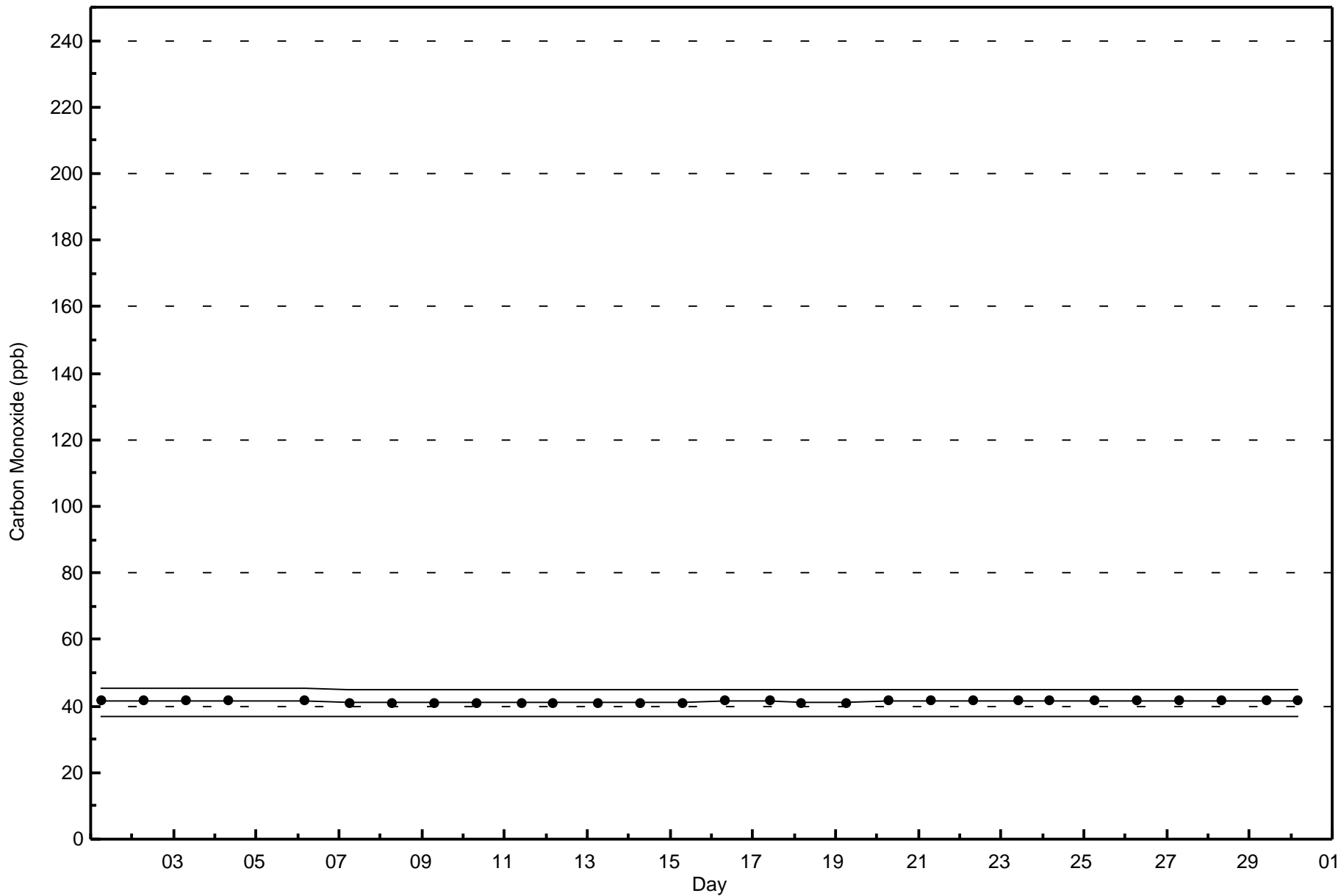


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association
Summary of Hour Averages

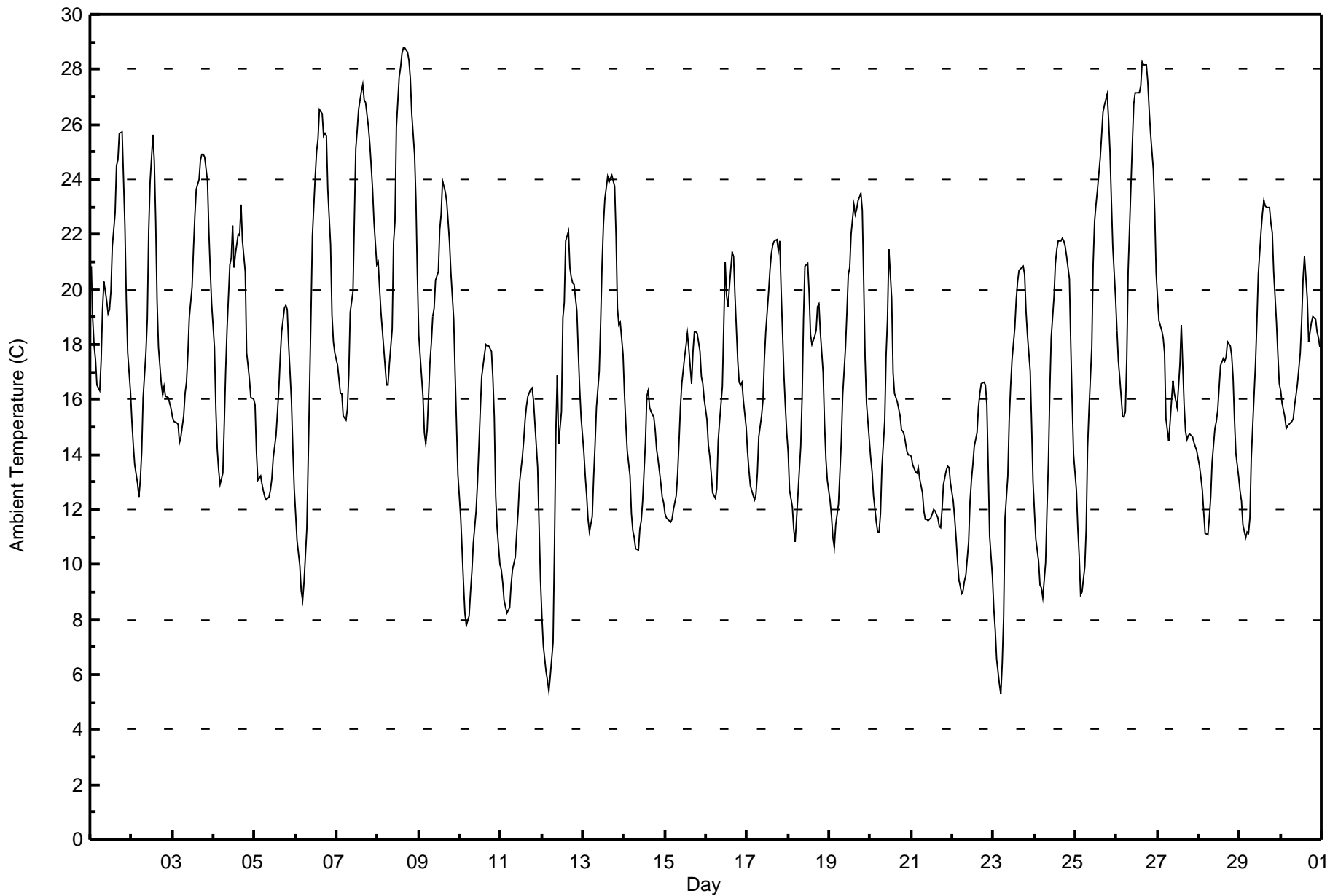
Ambient Temperature (AT) - C
Athabasca Valley - June 2017

Maximum Value: 28.8 C on Jun 8 16:00		Maximum Daily Average: 23.2 C on Jun 8		Hours in Service: 720																																												
Minimum Value: 5.3 C on Jun 23 05:00		Minimum Daily Average: 12.2 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 20.9 C at hour 15		Minimum Diurnal Average: 11.9 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 16.88 C		Percentiles: P₁ = 6.4 P₁₀ = 11.2 Q₁ = 13.3 Median = 16.4 Q₃ = 20.3 P₉₀ = 23.6 P₉₉ = 28.1		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.9	18.9	18.0	17.4	16.5	16.3	17.4	19.2	20.3	19.6	19.1	19.3	19.9	21.5	22.8	24.5	24.7	25.7	25.7	24.0	22.3	19.6	17.7	16.3	20.3	25.7																						
2-Jun	15.2	14.3	13.6	12.9	12.5	13.1	14.1	16.1	17.7	18.9	22.1	23.9	25.6	24.6	22.5	19.6	17.9	16.6	16.1	16.5	16.1	16.1	15.9	15.7	17.4	25.6																						
3-Jun	15.3	15.2	15.2	15.1	14.4	14.7	15.4	16.2	16.6	17.6	18.9	20.1	21.5	22.7	23.7	24.0	24.7	24.9	24.8	23.9	22.1	20.7	19.5	19.5	19.7	24.9																						
4-Jun	17.9	15.6	14.2	13.4	12.9	13.3	15.1	17.0	18.5	20.9	21.2	22.3	20.8	21.3	22.0	22.0	23.1	21.8	20.7	17.7	17.2	16.7	16.1	16.0	18.2	23.1																						
5-Jun	15.8	14.1	13.1	13.2	12.9	12.7	12.5	12.3	12.4	12.7	13.1	13.9	14.7	15.5	16.4	17.5	18.5	19.3	19.4	19.3	18.0	15.9	14.2	12.8	15.0	19.4																						
6-Jun	11.8	10.9	10.0	9.1	8.7	9.3	11.3	13.9	16.5	19.1	22.0	24.1	25.0	25.5	26.5	26.4	25.6	25.7	25.6	23.7	21.6	19.1	18.1	17.7	18.6	26.5																						
7-Jun	17.2	16.7	16.2	16.2	15.4	15.3	15.7	16.9	19.2	19.9	22.6	25.1	25.8	26.5	27.2	27.4	26.9	26.8	25.9	25.3	24.5	23.6	22.5	20.9	21.7	27.4																						
8-Jun	21.0	20.0	19.2	17.9	17.2	16.5	16.5	17.3	18.5	21.7	22.5	25.9	27.7	28.1	28.6	28.8	28.8	28.6	28.3	27.7	26.4	24.9	23.3	20.6	23.2	28.8																						
9-Jun	18.4	17.6	16.1	14.8	14.4	14.9	17.3	18.0	19.0	19.3	20.4	20.7	22.2	22.7	24.0	23.6	23.2	22.5	21.7	20.6	18.9	16.9	15.1	13.3	19.0	24.0																						
10-Jun	11.7	10.5	9.3	8.3	7.8	8.1	9.0	9.7	10.8	12.0	13.0	14.3	15.6	16.8	17.7	18.0	17.9	17.9	17.7	16.8	15.3	12.5	11.3	10.0	13.0	18.0																						
11-Jun	9.8	9.4	8.7	8.2	8.3	8.4	9.3	9.8	10.3	11.1	11.9	12.9	13.9	14.5	15.3	15.8	16.1	16.4	16.4	16.0	15.1	13.5	11.4	9.5	12.2	16.4																						
12-Jun	8.1	7.1	6.1	5.8	5.4	5.9	7.2	10.6	14.8	16.9	14.4	15.6	18.9	19.5	21.8	22.1	20.8	20.5	20.3	20.2	19.2	17.7	16.4	15.3	14.6	22.1																						
13-Jun	14.1	13.2	12.5	11.6	11.2	11.8	13.2	14.3	15.7	17.1	18.8	20.9	22.4	23.3	24.1	23.9	24.1	24.2	23.7	22.0	19.3	18.7	18.8	17.7	18.2	24.2																						
14-Jun	16.2	15.1	14.1	13.2	11.9	11.3	11.0	10.6	10.5	11.3	11.6	12.3	14.5	16.1	16.3	15.7	15.6	15.4	14.9	14.2	13.8	13.0	12.5	12.3	13.5	16.3																						
15-Jun	11.8	11.7	11.6	11.6	11.6	12.0	12.5	13.3	14.4	15.7	16.6	17.5	18.0	18.4	17.8	16.6	17.7	18.4	18.4	18.4	18.4	17.8	16.8	16.6	16.0	15.5	18.4																					
16-Jun	15.3	14.4	13.9	13.3	12.6	12.4	12.8	14.5	15.2	16.5	18.7	21.0	19.8	19.4	20.7	21.3	21.2	19.8	17.4	16.6	16.5	16.6	16.0	15.0	16.7	21.3																						
17-Jun	14.1	13.4	12.9	12.5	12.4	12.6	13.3	14.6	15.4	16.0	17.4	18.4	19.9	20.7	21.3	21.6	21.8	21.8	21.4	21.8	20.0	16.9	15.8	14.8	17.1	21.8																						
18-Jun	14.1	12.7	12.1	11.3	10.8	11.6	13.4	14.3	16.1	19.0	20.9	21.0	19.9	18.4	18.0	18.3	18.5	19.4	19.5	18.5	17.0	15.2	13.8	13.1	16.1	21.0																						
19-Jun	12.3	11.8	11.0	10.6	11.5	12.2	13.3	14.5	16.2	17.9	19.2	20.6	20.8	22.0	23.1	22.7	22.9	23.2	23.5	22.9	20.3	17.5	15.9	14.5	17.5	23.5																						
20-Jun	13.9	13.4	12.5	11.6	11.2	11.2	11.9	13.5	15.2	17.6	18.9	21.5	19.7	17.0	16.2	16.1	15.9	15.4	14.9	14.9	14.7	14.1	14.0	14.0	15.0	21.5																						
21-Jun	13.9	13.6	13.4	13.3	13.5	13.1	12.6	12.0	11.6	11.6	11.6	11.7	11.8	12.0	12.0	11.7	11.4	11.3	12.0	12.9	13.4	13.6	13.5	13.0	12.5	13.9																						
22-Jun	12.3	11.7	11.0	10.2	9.5	9.0	9.1	9.4	9.6	10.9	12.3	13.1	13.6	14.3	14.8	15.7	16.2	16.6	16.6	16.5	15.8	13.5	11.1	9.5	12.6	16.6																						
23-Jun	8.4	7.6	6.6	5.6	5.3	6.4	8.1	11.7	13.2	15.3	16.5	17.4	18.6	19.6	20.3	20.7	20.7	20.9	20.5	19.2	18.3	17.0	15.1	13.0	14.4	20.9																						
24-Jun	11.9	10.9	10.1	9.2	9.1	8.8	10.1	12.0	13.7	16.3	18.3	19.7	20.9	21.5	21.8	21.7	21.8	21.8	21.6	21.2	20.4	17.9	15.9	14.0	16.3	21.8																						
25-Jun	12.7	11.3	10.3	8.9	9.0	9.9	11.3	14.2	15.6	17.9	20.9	22.5	23.1	23.6	24.8	25.6	26.5	26.7	27.1	26.2	25.0	23.2	21.6	19.7	19.1	27.1																						
26-Jun	18.5	17.4	16.8	15.4	15.4	15.5	17.5	20.7	23.8	25.3	26.7	27.2	27.1	27.2	27.4	28.3	28.1	28.2	27.6	26.5	25.7	24.4	22.8	20.6	23.1	28.3																						
27-Jun	19.7	18.9	18.5	18.2	17.7	15.3	14.5	15.2	16.0	16.7	16.2	15.7	16.5	17.3	18.7	15.8	14.9	14.5	14.7	14.7	14.6	14.4	14.3	14.2	16.1	19.7																						
28-Jun	13.6	13.2	12.7	11.9	11.2	11.1	11.7	12.5	13.7	14.9	15.2	15.6	16.4	17.3	17.5	17.4	17.5	18.1	17.9	17.6	16.8	15.2	14.0	13.2	14.8	18.1																						
29-Jun	12.7	12.3	11.4	11.0	11.2	11.1	11.7	13.9	16.2	17.3	18.8	20.5	22.1	22.8	23.2	23.0	23.0	23.0	22.4	22.1	20.6	18.8	17.6	16.6	17.6	23.2																						
30-Jun	16.3	15.9	15.4	14.9	15.1	15.1	15.2	15.3	15.8	16.1	16.6	17.7	18.9	20.4	21.2	19.7	18.1	18.4	18.8	19.0	18.9	18.5	18.3	17.9	17.4	21.2																						
																								14.5	13.6	12.9	12.2	11.9	12.0	12.8	14.1	15.4	16.8	17.9	19.1	19.9	20.4	20.9	20.9	20.8	20.8	20.5	19.9	18.9	17.5	16.3	15.2	Diurnal Average
																								21.0	20.0	19.2	18.2	17.7	16.5	17.5	20.7	23.8	25.3	26.7	27.2	27.7	28.1	28.6	28.8	28.8	28.6	28.3	27.7	26.4	24.9	23.3	20.9	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	45	6.25	6.25
10 - 20	491	68.19	74.44
> 20	184	25.56	100.00

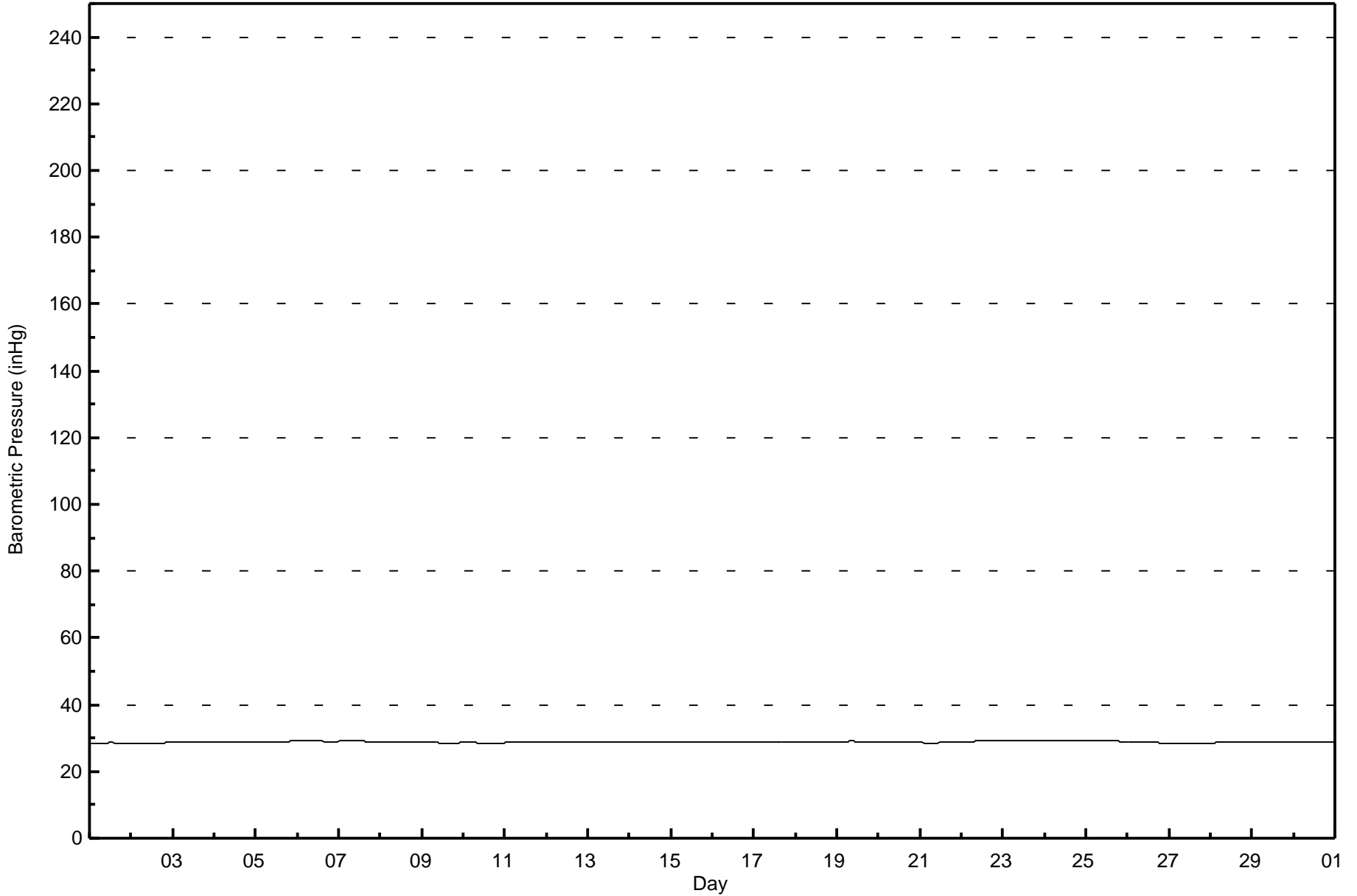
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Athabasca Valley - June 2017

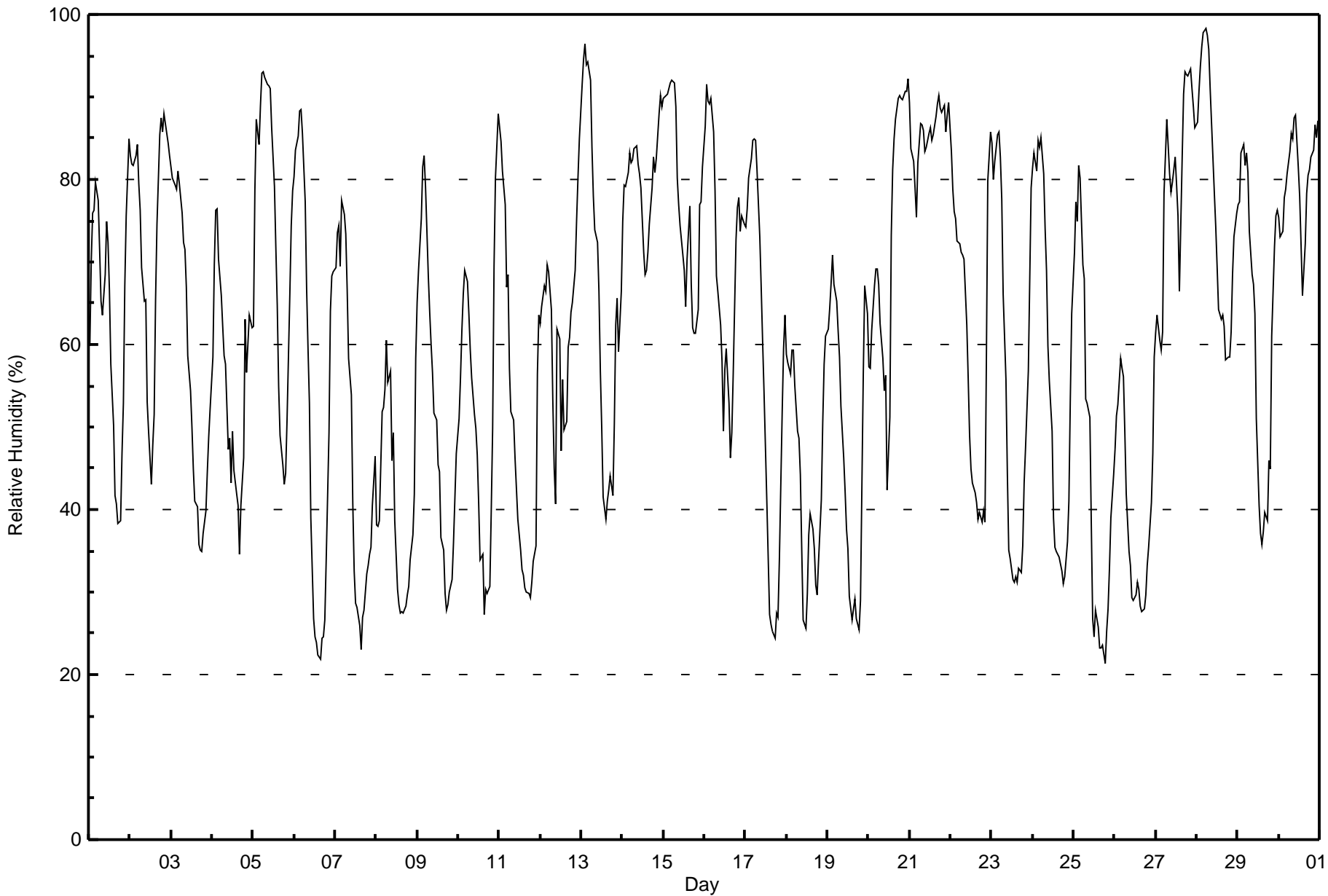




Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Athabasca Valley - June 2017

Maximum Value: 98 % on Jun 28 06:00														Maximum Daily Average: 85.7 % on Jun 21														Hours in Service: 720	
Minimum Value: 21 % on Jun 25 19:00														Minimum Daily Average: 40.0 % on Jun 26														Hours of Data: 720	
Maximum Diurnal Average: 77.5 % at hour 5														Minimum Diurnal Average: 45.5 % at hour 15														Hours of Missing Data: 0	
Monthly Average: 61.3 %														Percentiles: P ₁ = 24 P ₁₀ = 31 Q ₁ = 43 Median = 64 Q ₃ = 79 P ₉₀ = 87 P ₉₉ = 94														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	60	70	76	76	80	77	72	65	64	68	75	72	67	58	50	42	41	38	39	47	53	67	76	85	63.2	85			
2-Jun	83	82	82	83	84	79	76	69	65	65	53	50	43	48	52	66	75	85	87	86	88	86	84	83	73.1	88			
3-Jun	82	80	79	79	81	80	76	72	71	67	59	54	50	45	41	40	36	35	35	37	40	45	49	52	57.7	82			
4-Jun	58	70	76	76	70	66	62	59	58	47	49	43	50	45	42	41	35	41	46	63	57	60	64	62	55.7	76			
5-Jun	62	79	87	84	89	93	93	92	92	91	91	86	79	72	65	55	49	45	43	44	51	66	74	79	73.4	93			
6-Jun	80	84	85	88	88	86	77	67	60	53	39	27	25	24	22	22	24	25	27	34	49	64	68	69	53.6	88			
7-Jun	69	74	74	69	77	76	73	67	58	54	41	32	29	28	26	23	27	28	32	33	35	35	41	46	47.8	77			
8-Jun	38	38	39	52	52	55	60	55	57	46	49	39	30	29	28	28	27	28	30	31	34	37	42	58	40.9	60			
9-Jun	65	69	75	81	83	79	68	64	60	57	52	51	45	45	37	35	30	28	29	30	31	36	41	47	51.6	83			
10-Jun	51	56	62	66	69	68	64	59	56	52	50	47	41	34	35	27	30	30	31	40	50	69	80	88	52.2	88			
11-Jun	86	85	81	77	67	68	57	52	51	46	43	39	35	33	32	31	30	30	29	31	34	36	56	64	49.6	86			
12-Jun	63	65	67	66	70	69	64	53	45	41	62	61	47	56	50	51	60	61	64	65	69	75	80	85	61.9	85			
13-Jun	92	94	96	94	94	92	84	78	74	72	66	57	50	42	39	41	42	44	42	50	62	66	59	67	66.6	96			
14-Jun	75	79	79	81	83	82	82	84	84	82	81	79	71	68	69	71	75	79	83	81	83	88	90	89	79.9	90			
15-Jun	90	90	90	91	92	92	92	89	80	77	74	71	69	65	70	77	67	62	61	61	64	77	77	82	77.5	92			
16-Jun	86	92	89	89	90	86	79	68	66	62	58	49	57	59	53	46	49	56	73	77	78	74	76	75	70.3	92			
17-Jun	74	76	80	83	85	85	85	81	73	67	61	54	41	34	27	26	25	24	28	27	34	52	59	64	56.1	85			
18-Jun	59	58	56	59	59	55	50	49	44	35	27	26	30	37	40	38	35	31	30	34	41	51	58	61	44.2	61			
19-Jun	62	64	67	71	67	65	62	58	52	46	42	38	35	30	27	28	29	27	25	29	43	57	67	64	48.2	71			
20-Jun	57	57	62	67	69	69	67	63	58	54	56	42	51	73	81	85	87	90	90	90	90	91	91	92	72.2	92			
21-Jun	89	84	82	79	75	82	87	87	86	83	84	86	86	85	85	88	89	90	89	88	89	86	88	89	85.7	90			
22-Jun	83	79	76	75	72	72	71	71	70	62	56	49	45	43	42	41	39	40	38	40	39	58	80	86	59.5	86			
23-Jun	84	80	82	85	86	83	78	66	56	44	35	34	31	31	32	31	33	32	36	43	47	57	68	79	55.6	86			
24-Jun	81	83	81	85	84	85	81	74	69	60	56	50	39	35	35	34	33	32	31	32	36	41	53	64	56.4	85			
25-Jun	71	77	75	82	80	70	68	53	53	51	39	27	25	28	26	23	23	24	21	25	28	33	39	44	45.2	82			
26-Jun	47	51	53	58	57	56	49	42	35	33	29	29	30	31	30	28	28	28	30	33	35	41	47	59	40.0	59			
27-Jun	61	64	60	59	62	78	87	84	81	78	80	83	79	76	66	83	90	93	93	93	93	91	89	86	79.6	93			
28-Jun	87	91	94	96	98	98	97	96	91	83	78	74	69	64	63	64	62	58	58	59	62	68	73	76	77.5	98			
29-Jun	77	77	83	84	82	83	81	74	68	67	64	51	41	37	36	37	40	39	46	45	61	72	76	76	62.3	84			
30-Jun	75	73	74	78	79	81	83	86	85	88	88	82	78	72	66	72	78	80	81	83	84	87	85	87	80.1	88			
																								Diurnal Average					
																								Diurnal Maximum					





Maximum Speed: 30 km/h on Jun 9 10:00	Maximum Daily Speed Average: 17.9 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 16 21:00	Minimum Daily Speed Average: 1.0 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 5.4 km/h at hour 11	Minimum Diurnal Speed Average: 0.2 km/h at hour 6	Hours of Missing Data: 0
Monthly Average Velocity: 2.0 km/h 340.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 27	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SSW1	W3	WSW4	WSW3	S3	SW8	SSW5	SW5	SW6	SW6	SSW5	N1	SW4	SSE5	ESE9	E8	E7	ESE6	ESE6	ESE6	ESE1	WSW1	S1	E2	S2.4	ESE9
2-Jun	SE2	SE2	SSE1	SSE3	ESE3	SE4	ESE3	ENE3	ENE4	NW3	SW8	SW10	NNW5	NNW9	NNW21	W15	NNE9	NW8	NNW7	WNNW7	NW9	W11	W12	W13	WNW3.8	WNW21
3-Jun	W16	W17	W19	W16	W19	W28	NNW21	NW19	NW17	NNW12	NNW16	NW13	NW7	NW8	NW8	NNE6	ENE6	NE4	E7	ESE8	SE9	SE11	SE13	SE11	WNW6.7	W28
4-Jun	SSE8	S3	SSE5	SE5	SSE5	SSW5	ESE3	NNE1	NNW5	N12	NNW14	NNW12	NNW16	NNW15	N13	N15	N16	NNW17	NNW18	NNW18	NNE14	N13	NNW12	NNW12	N7.8	NNW18
5-Jun	NNW12	NNW13	NE12	NE9	NNW9	NNW13	NNW16	NNW14	NW11	NNW13	NNW13	NNW12	NNW12	NNW13	NNW12	N9	NE5	NE4	ESE5	SSE7	SE5	SSW2	ENE2	ESE5	NNW6.8	NNW16
6-Jun	SE7	SE6	SE7	SE7	SE11	SE10	SE8	ESE7	SE2	S1	SW3	SSW11	W11	W15	WSW12	W14	NW10	N6	NNW4	NNW4	W2	NNW3	NNW2	WSW3	SW2.2	W15
7-Jun	W4	ENE2	NNW4	N4	NE3	E3	ENE3	N4	NNE2	ESE7	SE7	SSE8	SE9	SSE13	SSE13	SSE9	SE4	ENE5	E8	E9	ESE5	ESE3	ESE3	ESE1	ESE3.5	SSE13
8-Jun	ESE5	ESE4	ESE3	NNE3	N4	N5	NE2	ESE3	E3	SSE6	NW5	ENE7	ESE12	ESE15	ESE13	ESE15	E15	E16	E13	E9	ESE9	ESE8	SE8	E7	ESE6.7	E16
9-Jun	ENE4	N1	WSW2	WSW4	WSW1	NNW11	NNW10	NNW21	NNW22	NNW30	NNW29	N21	N18	N18	NE19	NE20	NE21	ENE21	NE21	ENE20	ENE20	ENE16	NE14	NE10	NNE12.4	NNW30
10-Jun	NE9	NNE8	NNE8	NNE7	E8	ENE8	E12	E8	NNW3	NW7	NNW14	NW10	NW7	NW6	N7	N7	N6	SE2	NE5	N9	NNW19	NNW21	NNW11	NNW13	N6.7	NNW21
11-Jun	NW10	NNW10	NW12	NNW12	WNNW17	WNNW19	NW21	NW25	NW28	NW27	NW23	NNW20	NNW19	NNW19	NW21	NNW18	NNW17	NNW17	N14	N12	N7	N3	SSW1	ESE3	NW14.7	NW28
12-Jun	SE5	SE5	SE6	SE6	SE7	SE9	SE10	SE7	SE8	SSE16	SSE12	SE19	SE18	SE13	SSE16	S17	SSE16	SSE15	SE11	SE9	E7	ESE6	ESE6	E3	SE9.6	SE19
13-Jun	E3	ESE3	S2	WSW4	SW4	SE3	ENE2	N6	NNW11	NNW11	NNW11	NNW12	NNW11	NNW9	NNW10	N12	NNW15	SSE12	SSE8	WSW3	NW12	N8	NE6	NW7	NNW4.6	NNW15
14-Jun	NNW17	NNW20	NNW23	NNW24	NNW23	NNW19	NNW21	NNW26	NNW27	NNW22	NNW19	NNW20	N14	N12	NNE11	NNE13	NNE10	N9	NNW17	NNW20	NNW17	NNW18	NNW19	NNW17	NNW17.9	NNW27
15-Jun	NNW16	NNW13	NNW14	NNW11	NNW9	NNW10	NNW9	NNW8	NW3	N4	NW4	NW5	NNW6	NW6	NE8	NE1	SW7	SW6	SW5	SW3	WSW2	NNW3	NNW3	W0	NNW5.2	NNW17
16-Jun	SW3	SE2	ESE4	SSE5	SE6	SE5	SSE5	SE8	SE7	SSE7	E3	S4	SW15	WSW11	SSW5	SSE10	ESE5	WSW13	WNNW6	N6	E0	ESE6	ESE7	SE14	SSE3.7	SW15
17-Jun	SE15	SE10	SE10	SE8	SSE6	SE7	S2	NW5	NW18	NW16	NW17	NNW15	NNW25	NNW22	NW24	NW21	NNW19	NNW18	NNW13	WNNW12	W4	SSW2	SE2	SE2	NW6.7	NW25
18-Jun	SSE4	SSE5	SSE5	SSE4	SE7	SE8	S4	SW7	SW8	SW10	SW17	SW17	SW19	W7	W12	WSW19	WSW14	WSW12	WNNW16	W25	WNNW18	NW20	NW12	W12	WSW8.4	W25
19-Jun	WSW5	W7	SW7	SW11	SSW3	NW5	NW3	NNW4	W4	NNW3	WNNW2	ENE5	NW4	W2	SSW8	WNNW5	NW5	NNW5	SW7	WSW4	SW2	SSW1	ESE3	SE1	W2.6	SW11
20-Jun	S5	SE9	SE10	SE11	SE13	SE12	SE10	SE8	SE8	SSE1	N2	SW13	WSW19	SW12	SSW7	SSE6	SE10	SE12	SE12	SE11	SE10	SE10	SE10	SE6	SSE7.3	WSW19
21-Jun	SE7	SSE6	S6	SW10	WSW15	W11	W11	NNW15	NNW16	W16	W16	NNW11	W15	NNW18	NNW22	W22	W25	W14	WNNW6	NNW13	NNW19	NNW18	NNW16	N21	WNW11.3	W25
22-Jun	NNW26	NNW25	NNW24	N21	N22	N21	NNW27	NNW23	NNW19	NNW18	N17	N20	N21	N19	N17	N17	NNW17	NNW16	N13	N9	NNE6	WSW3	E2	E2	NNW16.3	NNW27
23-Jun	ESE3	SE4	SE8	SE8	ESE7	E5	ENE5	NNE2	NNW8	NNW14	NNW13	N12	N12	N12	NNW11	N7	NW2	S1	WSW9	W8	SW8	WSW2	SW5	S3	NNW2.4	NNW14
24-Jun	SSE2	SSE4	SE6	SE6	SE7	ESE6	ENE3	NNW8	NNW11	NNW10	NNW12	NNW11	NW13	NNW19	NNW18	NNW15	NNW14	NNW13	NNW11	NNW5	NNW6	W6	WSW1	W6	NNW5.6	NNW19
25-Jun	WNNW3	WSW4	SE3	SSW2	SSE2	ESE5	E5	E4	NW2	NW4	WSW4	W3	WNNW5	NW7	ENE6	ENE6	SE8	SE12	SSE11	SE16	SE14	SE10	SE12	SE11	SE3.6	SE16
26-Jun	SE9	SE6	SE10	ESE9	SE12	SE11	SE13	SE12	SE14	SSE14	SSE17	SSE23	SE24	SE23	SE23	SE23	SE21	SE18	SE14	ESE9	ESE7	SE7	ESE7	E4	SE13.5	SE24
27-Jun	SE4	SE6	SSE8	SE11	S10	SW13	SW8	SSW7	SSW7	SW13	SW14	WSW9	SE3	E8	NNE2	W12	NNW4	SE6	ESE6	ESE6	SE5	SE5	SE6	SSE7	S4.3	SW14
28-Jun	SE7	SE3	SE4	SE7	SE7	ESE4	SE4	NNW2	ENE1	E10	E15	ENE14	ENE13	ENE9	ENE11	ENE12	E10	ESE7	SSE11	SE9	SSE10	SSE8	SE5	SSE5	ESE6.4	E15
29-Jun	SSE6	SE7	SE9	SE10	SE9	SE12	SE9	ESE7	ENE4	WNNW4	W5	NW5	N9	NNW8	NNW10	NNW11	N7	N7	NNW6	NNW3	W3	W3	W2	SE2	NE1.0	SE12
30-Jun	ESE3	SE5	SE6	SE5	ESE5	ESE6	SE6	ESE6	SE6	E4	SE4	SE6	ENE5	NW4	W4	W13	SW8	SW7	SW5	SSW4	S3	S2	SSE4	SE4	SSE2.8	W13

NNE0.3	NNW0.5	ESE0.8	ESE0.7	SSE0.8	W0.2	N1.4	NNW3.4	NW4.5	NW4.8	NW5.4	NW3.9	NW4.3	NNW4.9	NNW4.1	NNW3.3	N3.0	NNE1.7	NNE1.6	NNE2.0	NNE2.0	N1.7	NE0.8	NE1.0		Diurnal Average
NNW26	NNW25	NNW24	NNW24	NNW23	W28	NNW27	NNW26	NW28	NNW30	NNW29	SSE23	NW25	SE23	NW24	SE23	W25	ENE21	NE21	W25	ENE20	NNW21	NNW19	N21		Diurnal Maximum

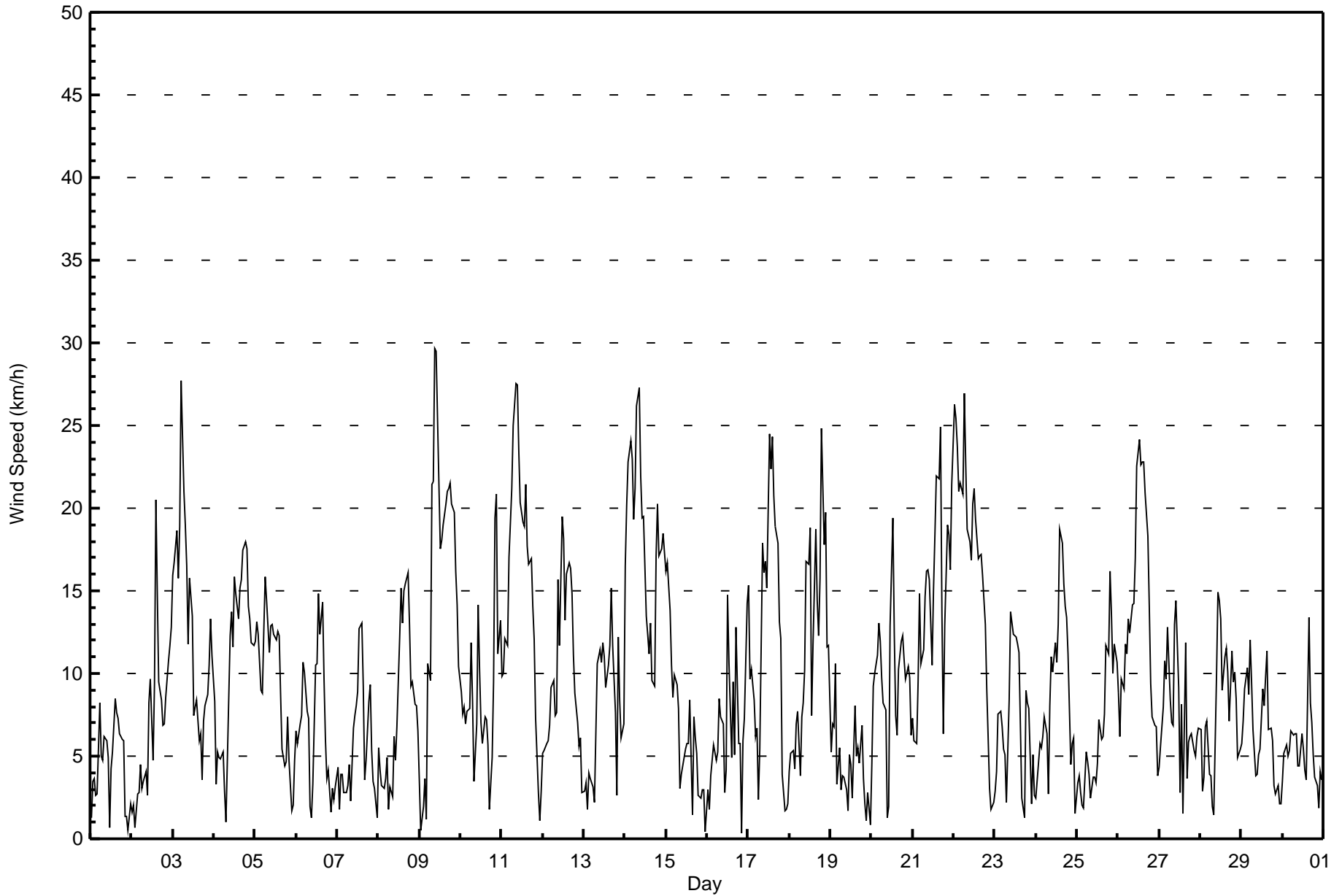
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jun 18 13:00 Minimum Value: 1 km/h on Jun 29 20:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	1	2	3	2	2	2	2	5	4	2	3	2	3	3	3	2	2	2	2	2	2	2	2	5
2-Jun	2	2	1	2	2	2	2	2	2	1	5	2	3	3	4	6	5	2	2	3	3	3	2	4	6
3-Jun	3	3	4	4	4	4	4	4	3	4	5	4	3	4	4	3	2	1	2	2	2	3	3	3	5
4-Jun	3	2	3	2	2	2	1	2	2	4	3	2	3	4	3	4	4	4	5	5	4	4	4	3	5
5-Jun	3	4	5	5	2	2	3	3	2	2	3	3	2	3	3	3	3	2	3	2	2	2	2	2	5
6-Jun	2	2	2	2	2	2	1	2	2	3	2	4	5	4	4	5	4	2	2	2	1	2	2	2	5
7-Jun	1	1	1	1	1	2	1	1	1	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2	3
8-Jun	1	2	2	1	1	1	1	2	2	2	1	4	4	5	4	4	4	5	3	3	3	2	2	1	5
9-Jun	2	1	1	2	2	3	4	5	5	7	7	8	6	7	6	5	5	6	5	5	4	3	3	3	8
10-Jun	2	2	2	2	3	2	4	3	2	4	4	4	3	4	3	3	2	2	1	3	6	6	3	5	6
11-Jun	1	2	3	3	4	3	4	5	5	6	6	6	6	5	5	5	5	4	4	3	3	1	1	2	6
12-Jun	2	2	1	2	2	2	2	3	4	4	4	6	5	5	6	5	5	4	3	2	2	2	2	2	6
13-Jun	2	1	2	2	2	1	1	3	2	2	2	2	2	2	3	4	5	4	2	6	7	2	3	2	7
14-Jun	4	4	5	5	3	5	5	4	4	6	4	4	5	3	3	4	3	3	4	4	4	3	3	4	6
15-Jun	2	2	3	3	2	2	2	2	1	2	1	1	1	1	5	3	2	1	2	2	1	1	1	1	5
16-Jun	2	1	2	1	1	1	1	2	2	2	2	3	4	2	2	3	3	6	5	2	2	2	3	4	6
17-Jun	4	4	4	2	2	1	2	5	3	4	8	5	6	6	5	6	4	4	5	5	2	2	2	4	8
18-Jun	2	2	2	3	2	2	2	3	3	3	5	4	11	8	7	5	3	5	4	7	4	4	4	3	11
19-Jun	3	3	2	3	3	3	1	1	2	2	2	3	3	2	4	3	2	2	3	2	2	2	2	2	4
20-Jun	1	3	3	2	2	2	2	3	2	2	1	6	4	4	2	2	3	2	3	3	2	3	3	2	6
21-Jun	2	2	2	3	5	3	3	5	3	4	4	3	6	4	6	6	5	8	4	6	3	3	4	6	8
22-Jun	7	5	7	7	6	5	6	6	4	5	4	6	5	5	4	4	5	4	3	3	2	1	2	1	7
23-Jun	1	1	2	2	2	1	1	2	2	2	3	3	3	3	3	2	2	2	7	3	1	2	3	3	7
24-Jun	1	2	1	1	1	1	1	2	2	2	2	3	3	4	4	4	3	3	3	2	1	2	2	2	4
25-Jun	2	2	2	1	1	1	2	1	1	1	2	2	3	2	3	3	4	4	4	4	3	2	3	2	4
26-Jun	3	2	2	2	3	2	3	3	4	5	5	6	6	6	6	6	5	5	4	3	2	2	2	2	6
27-Jun	2	2	3	4	3	6	3	2	2	5	4	3	2	2	5	8	2	2	2	1	2	1	2	1	8
28-Jun	1	1	1	1	2	1	2	1	3	3	3	4	3	3	4	4	3	3	2	3	3	3	2	1	4
29-Jun	1	2	2	2	2	3	2	2	2	1	1	2	2	2	2	3	2	2	2	1	1	2	1	3	3
30-Jun	2	1	2	2	1	1	2	2	2	1	2	2	2	1	2	4	2	2	2	1	1	1	1	1	4
Diurnal Maximum																									
7 5 7 7 6 6 6 6 5 7 8 8 11 8 7 8 5 8 7 7 7 6 4 6																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	223	30.97	30.97
6 - 11	253	35.14	66.11
12 - 19	186	25.83	91.94
20 - 28	56	7.78	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	5	7	14	14	24	31	17	13	12	10	17	13	9	15	13	223
6 - 11	16	8	4	8	13	25	75	18	2	5	18	3	8	5	15	30	253
12 - 19	20	2	3	4	5	4	21	10	1	0	9	7	18	11	13	58	186
20 - 28	7	0	3	3	0	0	5	1	0	0	0	0	4	3	10	20	56
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	15	17	29	32	53	132	46	16	17	37	27	43	28	53	123	720

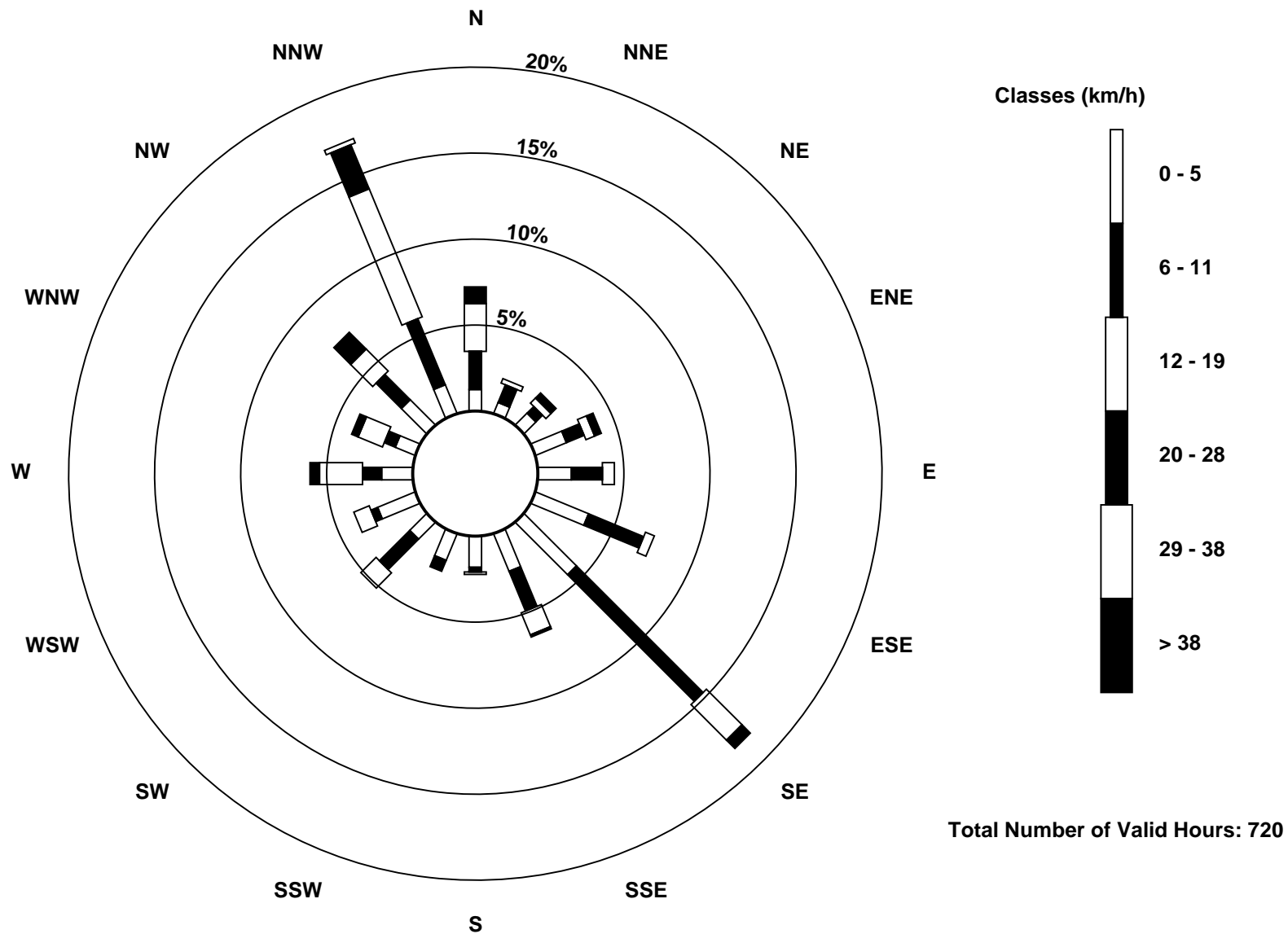
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - June 2017

Direction of Maximum Speed: 341 deg on Jun 9 10:00 Direction of Maximum Daily Speed Average: 343.6 deg on Jun 14	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 79 deg on Jun 16 21:00 Direction of Minimum Daily Speed Average: 1.0 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 313.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	207	269	253	249	189	218	197	222	215	224	209	351	222	167	117	98	96	119	112	115	108	243	183	80	170.9	
2-Jun	133	127	152	165	116	141	118	67	75	323	223	220	327	347	285	281	32	319	331	294	309	278	273	270	290.1	
3-Jun	274	278	267	276	274	274	292	323	321	299	286	310	324	316	325	20	63	47	89	108	132	126	139	143	291.4	
4-Jun	150	190	162	145	167	210	104	13	301	2	343	341	335	343	354	356	8	346	342	346	15	352	344	347	350.3	
5-Jun	314	343	50	42	324	332	337	330	316	329	332	332	334	335	341	354	38	51	107	162	163	129	197	77	115	345.4
6-Jun	127	130	132	137	129	132	125	123	139	185	232	208	259	264	257	261	306	1	332	338	267	294	283	249	215.3	
7-Jun	276	68	332	358	51	99	59	4	16	114	142	164	128	168	152	158	133	73	89	91	105	109	102	109	119.0	
8-Jun	112	107	104	18	353	351	51	111	79	154	324	66	120	112	117	112	99	96	101	98	111	123	134	101	103.4	
9-Jun	72	10	238	256	253	343	348	344	344	341	341	352	358	360	50	54	47	58	48	65	63	60	51	42	20.6	
10-Jun	38	26	20	24	82	78	83	81	329	320	328	314	317	326	359	5	359	136	47	359	338	330	335	339	359.4	
11-Jun	311	286	309	331	303	287	310	318	313	310	323	332	329	331	325	335	332	341	351	353	354	358	193	110	322.1	
12-Jun	145	140	135	140	136	136	141	134	128	166	166	130	130	138	166	169	167	150	136	125	82	103	110	85	142.2	
13-Jun	84	110	187	257	235	145	57	359	345	347	337	340	341	336	339	349	344	149	167	256	320	350	42	323	342.9	
14-Jun	337	338	339	343	336	345	344	337	335	343	342	339	2	353	12	24	14	5	339	340	342	333	338	334	343.6	
15-Jun	330	334	337	343	347	341	333	330	305	351	310	324	340	325	56	36	230	234	224	233	256	332	336	267	327.8	
16-Jun	234	143	118	148	142	144	151	144	127	159	80	171	224	238	205	153	110	250	295	11	79	120	121	126	163.7	
17-Jun	129	131	136	140	153	132	187	316	306	311	324	327	326	327	321	316	313	319	293	286	273	200	134	133	314.3	
18-Jun	150	160	157	150	144	136	180	216	222	215	224	226	233	268	276	238	257	244	288	279	297	305	308	276	250.2	
19-Jun	239	272	219	229	204	318	312	327	266	295	295	68	309	265	203	283	324	346	235	257	219	203	118	146	261.9	
20-Jun	170	143	138	136	132	132	142	130	135	168	2	224	239	231	207	154	128	128	126	134	131	134	145	136	152.2	
21-Jun	145	154	171	230	248	274	275	291	284	269	274	282	281	282	282	271	270	267	282	339	335	334	335	349	286.9	
22-Jun	341	337	346	352	355	350	337	341	327	346	357	354	352	354	357	352	346	345	356	1	28	254	86	97	348.0	
23-Jun	113	138	137	135	118	94	74	12	348	339	344	351	359	353	338	354	312	177	254	260	227	256	222	170	344.5	
24-Jun	151	151	141	134	135	126	117	65	341	336	340	336	336	322	338	341	342	344	342	340	335	332	266	239	342.4	
25-Jun	287	237	140	212	152	123	88	96	306	310	258	269	283	318	70	66	145	131	164	139	140	140	144	134	141.0	
26-Jun	136	145	133	121	130	129	135	136	141	147	167	147	140	129	130	134	140	128	132	121	120	131	119	101	135.3	
27-Jun	134	133	151	133	181	231	235	201	201	226	235	238	141	83	25	266	339	145	114	117	127	137	142	147	182.6	
28-Jun	141	143	128	125	136	115	136	327	71	98	82	69	76	69	66	63	93	104	149	143	155	151	141	156	106.6	
29-Jun	153	145	138	135	140	133	137	116	67	301	276	323	356	347	340	346	353	360	337	340	262	275	265	141	51.0	
30-Jun	108	130	132	130	123	117	137	103	128	83	135	138	76	318	264	261	217	228	231	197	183	177	159	144	156.8	

16.2 333.7 106.9 106.8 154.8 274.9 353.7 344.2 321.5 318.5 313.3 323.1 325.9 330.3 337.2 335.8 2.5 29.8 19.1 14.0 16.1 354.8 55.3 49.3

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

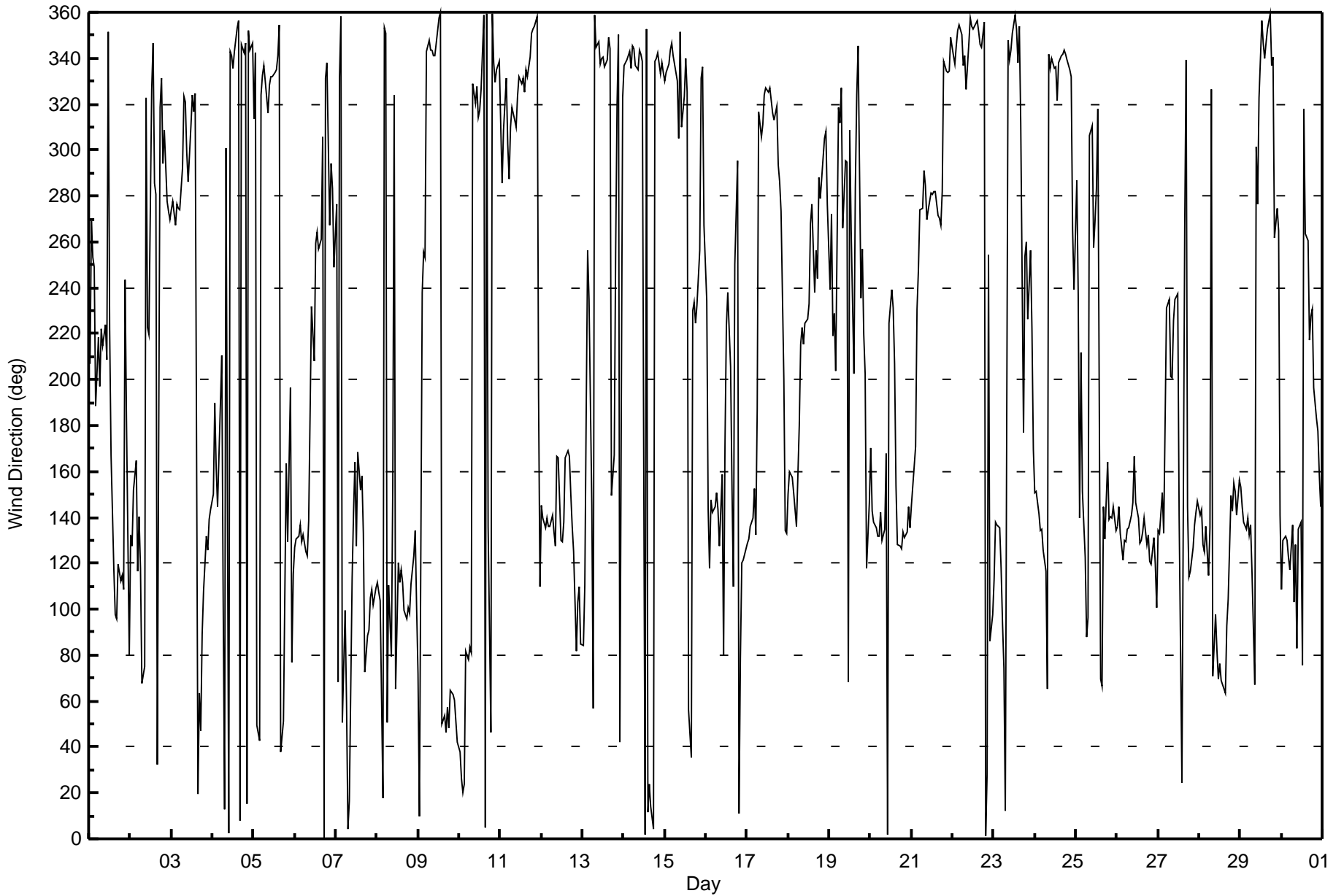
Wind Direction (WD) - deg
Athabasca Valley - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jun 20 10:00 Minimum Value: 8 deg on Jun 15 14:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 17 Median = 22 Q ₃ = 41 P ₉₀ = 66 P ₉₉ = 91																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	81	17	16	88	57	20	39	26	71	74	36	89	46	56	31	41	31	40	35	22	84	68	93	75	93
2-Jun	67	58	65	47	48	29	47	48	20	26	49	16	67	27	13	41	48	35	17	20	25	16	10	13	67
3-Jun	13	12	12	15	13	10	14	16	13	22	21	22	43	49	49	52	32	49	17	26	22	17	13	18	52
4-Jun	21	73	51	25	29	31	67	80	32	19	15	16	14	16	19	18	19	17	17	20	20	22	18	20	80
5-Jun	26	21	32	50	11	12	11	15	11	13	15	14	14	14	15	41	54	51	49	23	44	67	83	31	83
6-Jun	27	23	17	17	13	11	17	21	89	96	84	30	41	24	24	25	41	33	46	29	71	20	66	62	96
7-Jun	23	70	20	24	35	59	32	27	79	37	31	39	35	18	20	31	62	37	13	13	24	37	79	83	83
8-Jun	27	31	46	35	34	17	62	68	64	56	37	59	38	25	29	25	22	19	20	18	21	18	14	24	68
9-Jun	61	76	73	34	95	15	18	15	16	16	13	24	26	29	28	20	23	19	20	17	16	15	17	19	95
10-Jun	16	16	17	21	26	22	20	32	72	55	18	31	43	55	41	35	25	82	51	20	15	11	22	20	82
11-Jun	14	15	19	15	17	14	14	16	15	17	17	17	21	18	18	18	21	17	21	18	20	39	88	52	88
12-Jun	30	21	18	27	17	17	16	29	33	18	30	16	20	22	24	16	21	20	21	18	31	29	45	62	62
13-Jun	40	43	78	36	38	44	72	46	16	17	9	11	13	11	13	19	19	45	31	80	36	27	53	19	80
14-Jun	14	13	15	16	10	17	17	10	9	16	16	15	22	20	22	19	19	18	13	12	17	11	11	11	22
15-Jun	9	9	12	19	22	14	9	16	31	48	17	19	14	8	47	86	11	17	18	22	51	41	52	68	86
16-Jun	41	70	43	29	18	23	26	19	31	36	66	73	26	11	62	31	73	61	50	21	91	30	26	15	91
17-Jun	15	20	34	24	28	13	54	43	13	23	23	16	19	20	20	21	20	15	20	19	40	80	78	79	80
18-Jun	41	25	22	66	21	17	47	24	19	16	15	19	48	73	37	14	18	24	26	11	14	9	12	14	73
19-Jun	47	46	16	14	59	37	48	38	38	64	80	59	51	90	49	60	38	46	54	25	77	84	63	96	96
20-Jun	27	13	15	14	11	11	16	19	16	99	74	32	13	14	28	31	17	15	16	17	15	15	23	22	99
21-Jun	19	22	42	30	13	18	19	17	14	15	15	20	13	12	13	15	11	66	75	21	10	9	14	19	75
22-Jun	15	12	19	21	22	21	12	16	21	24	21	21	20	21	20	22	23	18	20	23	22	46	73	57	73
23-Jun	54	23	11	12	27	28	16	66	15	12	17	22	24	22	17	32	80	83	50	28	9	79	47	68	83
24-Jun	61	56	19	27	21	13	31	63	14	11	13	14	21	24	16	14	14	16	13	12	24	20	22	93	93
25-Jun	65	67	49	61	80	30	51	44	60	35	63	69	66	26	59	52	68	27	25	17	16	17	15	13	80
26-Jun	16	20	16	17	16	15	13	15	20	24	27	19	16	16	17	18	17	17	16	21	18	19	22	65	65
27-Jun	33	25	28	32	36	33	19	24	27	15	14	21	66	17	77	49	64	36	30	22	26	24	20	16	77
28-Jun	18	28	24	22	18	30	46	68	77	22	15	18	18	36	26	25	26	34	24	22	19	22	30	16	77
29-Jun	25	16	13	13	15	13	15	29	62	33	14	31	24	21	14	19	22	24	12	29	34	55	64	66	66
30-Jun	48	31	24	27	22	19	22	25	28	29	50	27	41	29	50	13	18	17	18	14	37	69	26	29	69
	81	76	78	88	95	59	72	80	89	99	84	89	67	90	77	86	80	83	75	80	91	84	93	96	
	Diurnal Maximum																								



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Athabasca Valley - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 2, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:25	End time (MST):	11:44
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.2</u>	ppm	Cal Gas Exp Date	February 16, 2019
Calibrator Make/Model	Teledyne API 700		Serial Number	2445
ZAG Make/Model	Teledyne API 701		Serial Number	1864

Analyzer Information

Analyzer make: Thermo 45C

Analyzer serial #: 630718530

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-619	-619
Calculated slope	0.992275	1.002224	Lamp voltage	801	802
Calculated intercept	0.570142	1.402052	Pressure	685.1	695.7
Analyzer Background	18.1	18.1	Flow	0.475	0.479
Analyzer Coefficient	1.012	1.012	Intensity	43450	43828

SO₂ Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.3	----
as found span	4978	78.8	766.7	783.7	0.978
calibrator zero	5000	0.0	0.0	0.5	----
high point	4978	78.8	766.7	765.0	1.002
second point	4973	39.5	387.7	383.1	1.012
third point	4994	19.8	194.3	191.5	1.015
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	78.8	763.4	767.0	0.995
Average Correction Factor					1.010

Corrected As found	783.40	Previous response	772.08	*% change	-1.4%
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* = > +/-5% change initiates investigation

Notes:

Span adjusted, no maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

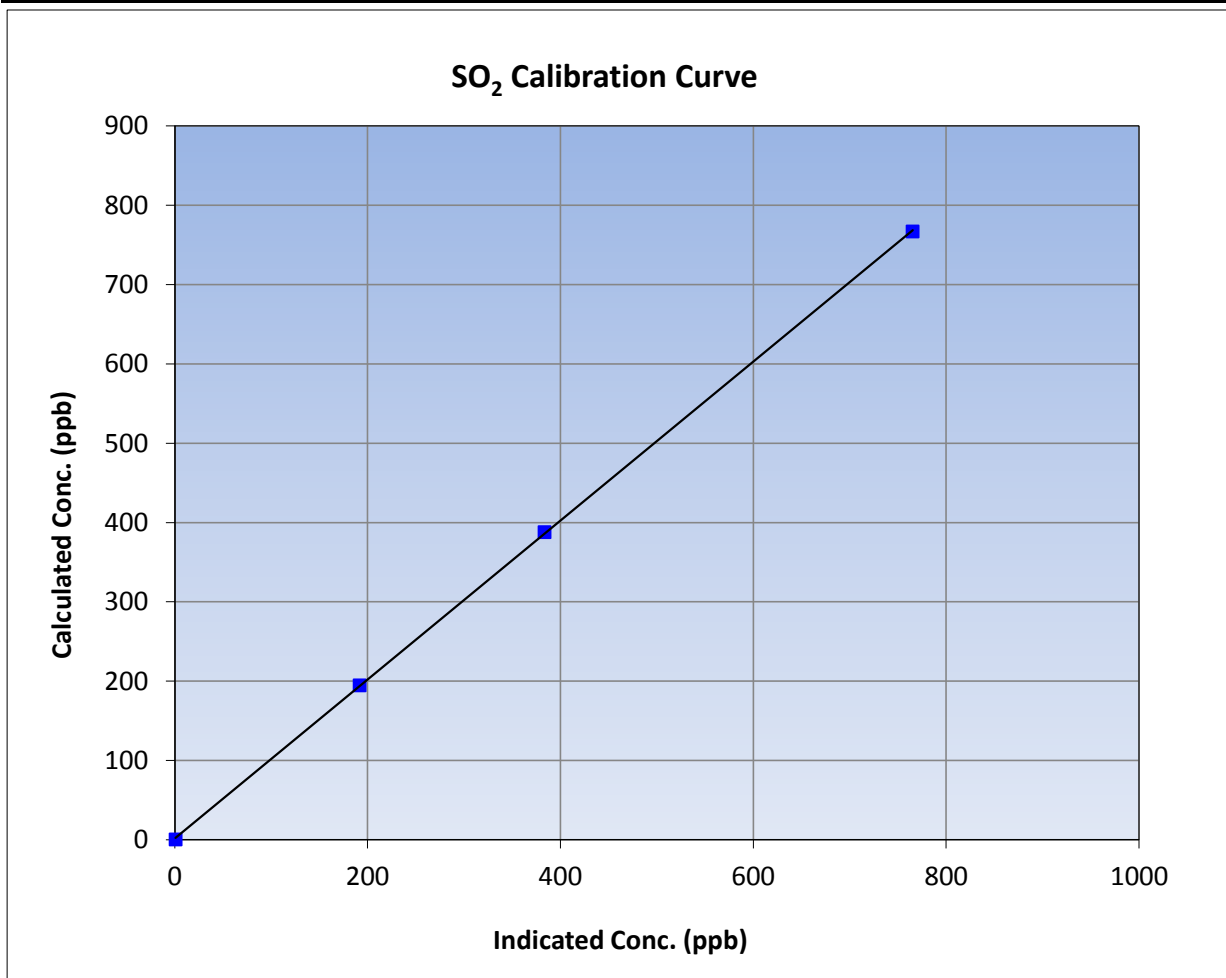
Version-03-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:44
Analyzer make	Thermo 45C	Analyzer serial #	630718530

Calibration Data

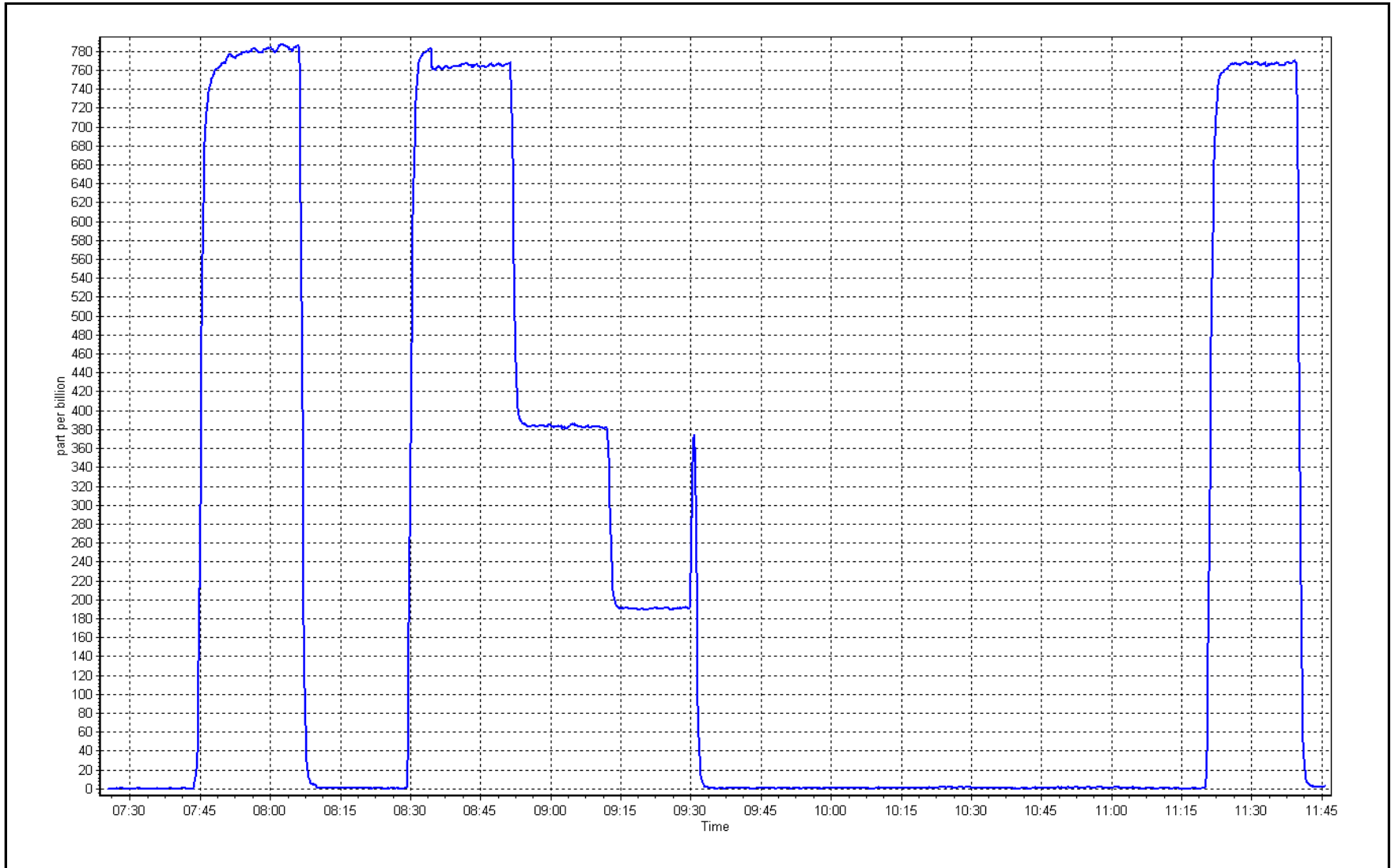
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.5	----	Correlation Coefficient	0.999962	≥0.995
766.7	765.0	1.0022	Slope	1.002224	0.90 - 1.10
387.7	383.1	1.0120	Intercept	1.402052	+/-30
194.3	191.5	1.0146			



SO2 Calibration Plot

Date: June 2, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

TRS Calibration Summary

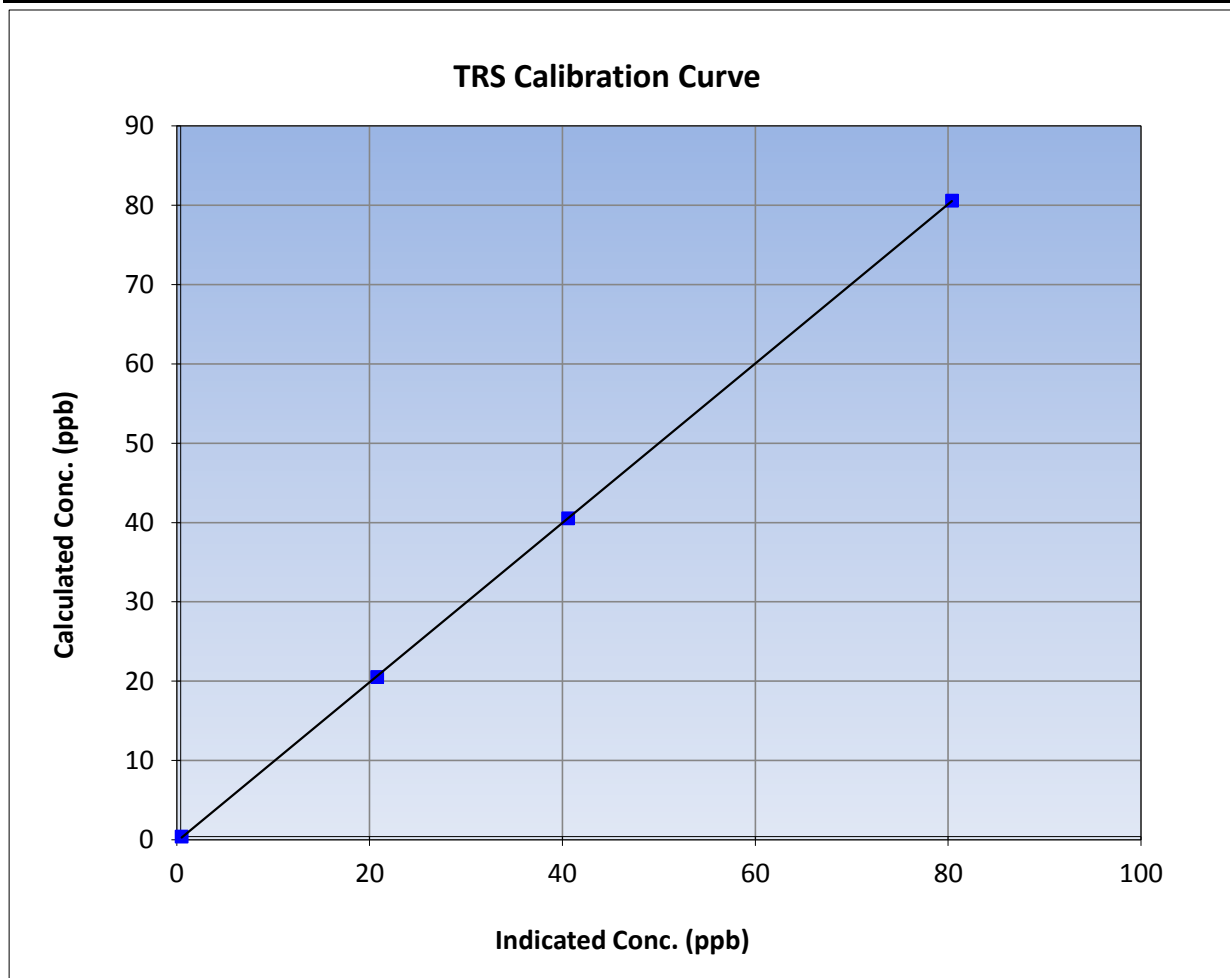
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:48	End Time (MST)	12:30
Analyzer make	Thermo 43i LTE	Analyzer serial #	1507864683

Calibration Data

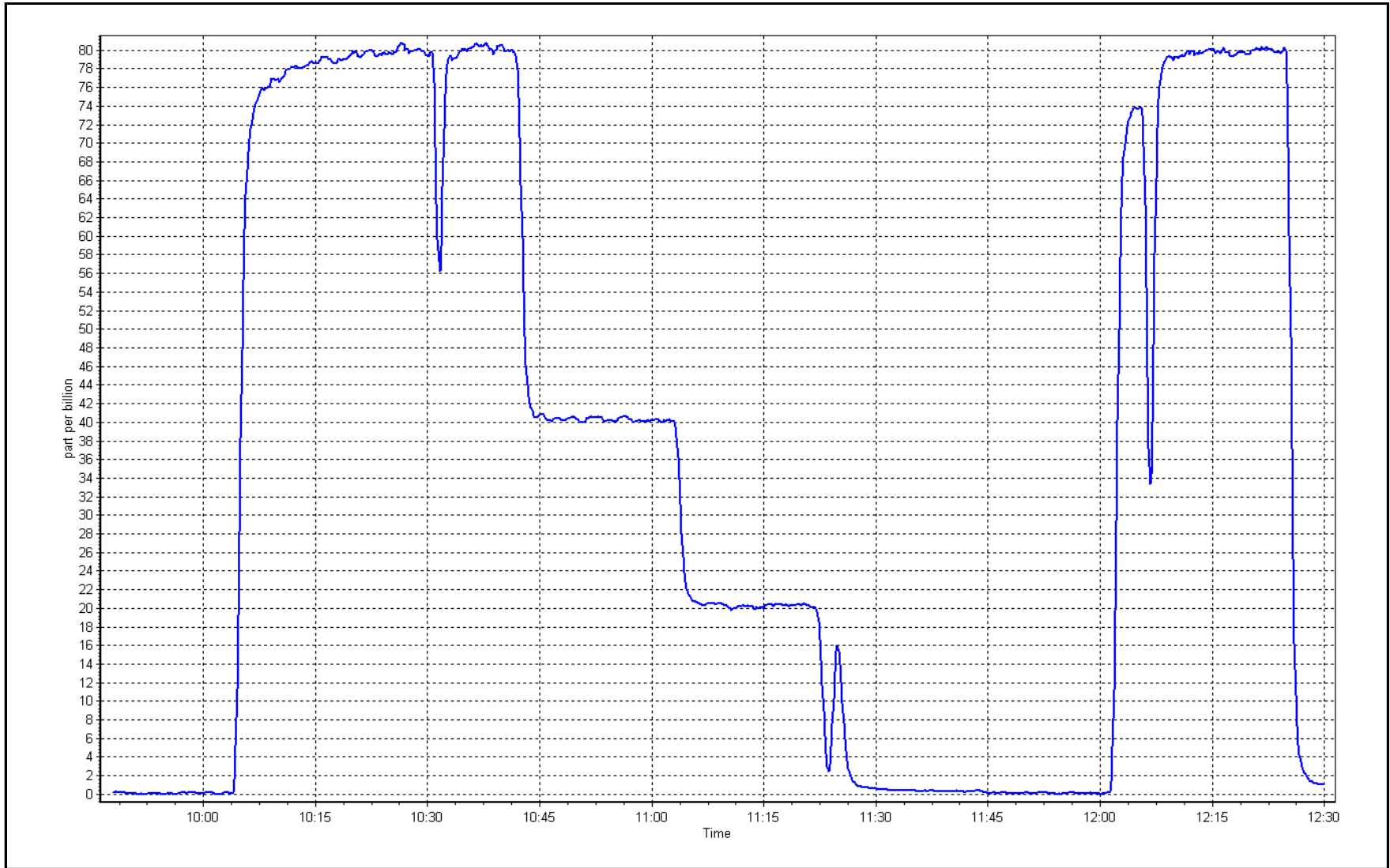
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999989	
80.2	80.0	1.0024			≥0.995
40.1	40.2	0.9987	Slope	1.004586	
20.1	20.4	0.9867			0.90 - 1.10
			Intercept	-0.219034	+/-3



TRS Calibration Plot

Date: June 6, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 2, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:25	End time (MST):	11:41
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL110103	Cal Gas Expiry Date	February-16-19
CH4 Cal Gas Conc.	<u>488.0</u> ppm	CH4 Equiv Conc.	1035.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	25 Deg C
Calibrator Model	Teledyne API 700	Serial Number	2445
ZAG make/model	Teledyne API 701	Serial Number	1864

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1426262594

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	0.000214	0.000216	Flame Temp	405.0	405.0
CH4 Retention time	12.8	12.8	Carrier Pressure	36.1	36.1
NMHC SP Ratio	4.13E-05	4.19E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	211723	208495	Air Pressure	25.9	25.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.001607	0.991203
THC Cal Offset	0.016458	0.011522
CH4 Cal Slope	1.002516	0.984458
CH4 Cal Offset	0.013915	0.020912
NMHC Cal Slope	1.000662	0.992297
NMHC Cal Offset	0.000559	-0.001032

Notes: span adjusted, Nitrogen changed out

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	16.40	16.37	1.002
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.40	16.55	0.991
second point	4973	39.5	8.22	8.26	0.996
third point	4994	19.8	4.10	4.13	0.994
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	16.54	16.55	0.999
Average Correction Factor					0.994
Corrected As found	16.37	Prev response	16.36	*% change	-0.1%

NMHC Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0	0.00	0.00	----
as found span	4973	78.8	8.67	8.62	1.006
calibrator zero	5000	0	0.00	0.00	----
high point	4973	78.8	8.67	8.74	0.992
second point	4973	39.5	4.35	4.38	0.992
third point	4994	19.8	2.17	2.19	0.991
as left zero	5000	0	0.00	0.00	----
as left span	4932	78.8	8.74	8.74	1.000
Average Correction Factor					0.992
Corrected As found	8.62	Prev response	8.67	*% change	0.5%

CH4 Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	7.73	7.75	0.998
calibrator zero	5000	0.0	0.00	0.00	----
high point	5000	78.8	7.69	7.81	0.985
second point	4973	39.5	3.88	3.88	0.999
third point	4994	19.8	1.93	1.94	0.997
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	7.80	7.81	0.998
Average Correction Factor					0.994
Corrected As found	7.75	Prev response	7.70	*% change	-0.7%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

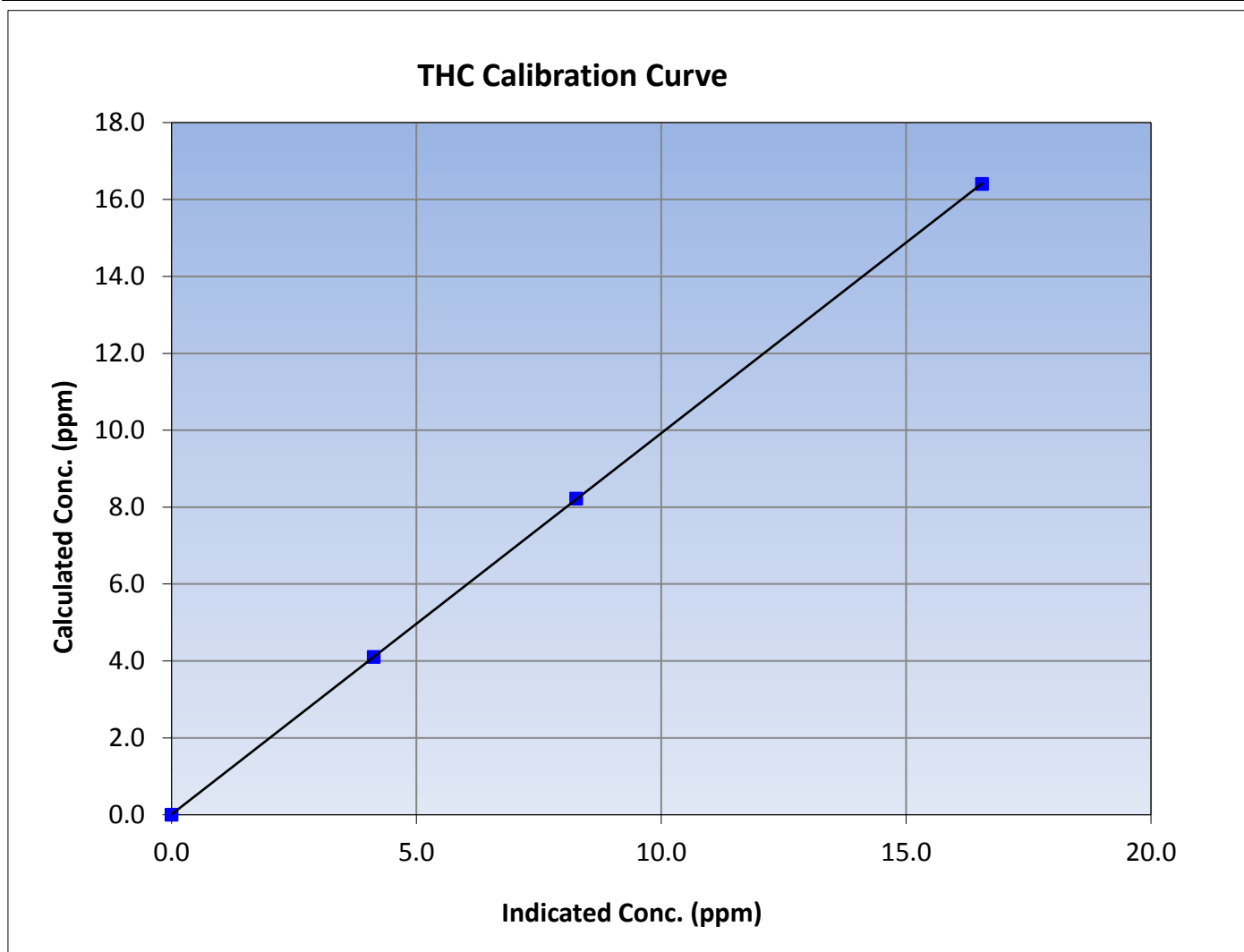
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999994	≥ 0.995			
16.40	16.55	0.9912						
8.22	8.26	0.9955				Slope	0.991203	0.90 - 1.10
4.10	4.13	0.9938						
			Intercept	0.011522	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

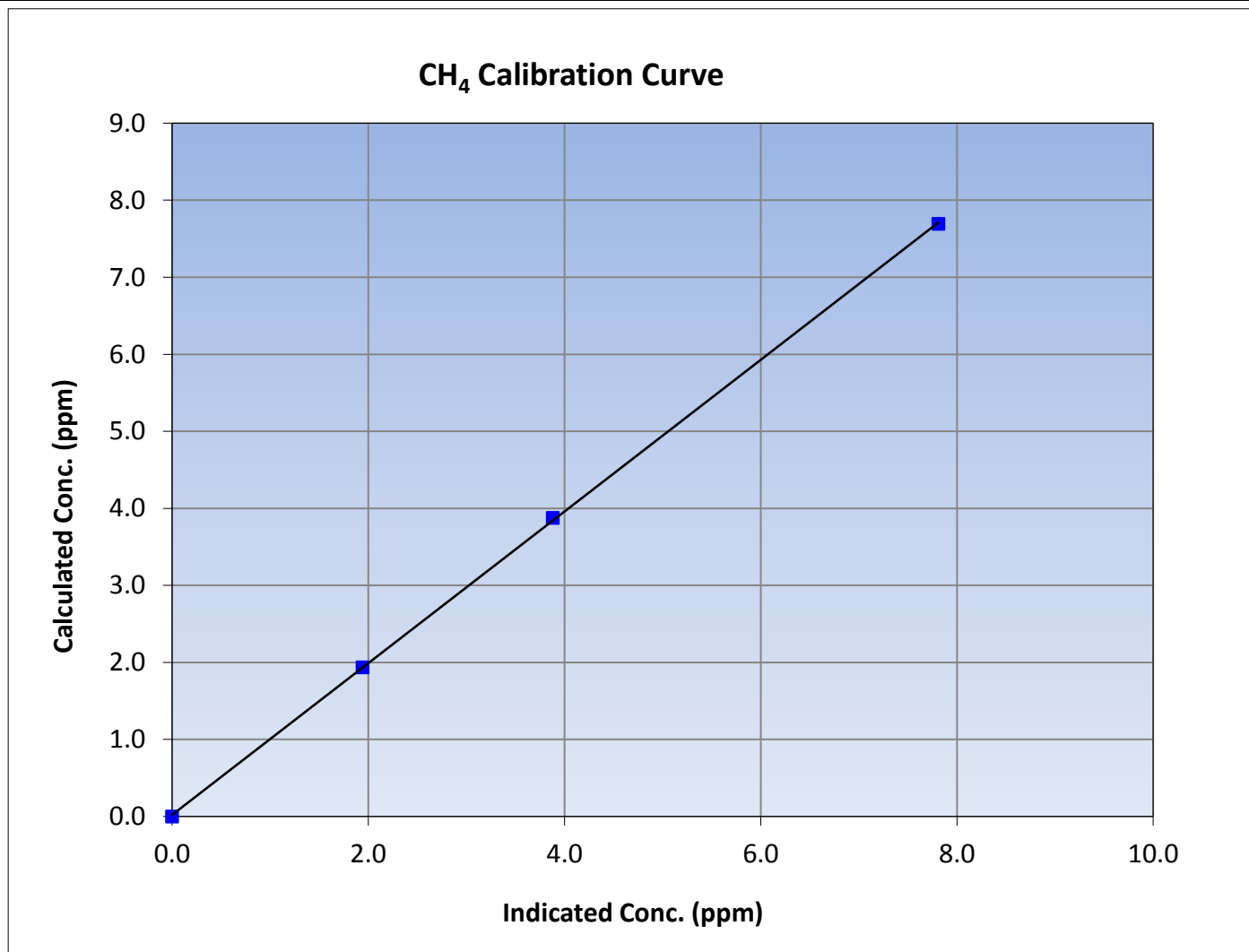
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999936	≥ 0.995			
7.69	7.81	0.9847						
3.88	3.88	0.9990				Slope	0.984458	0.90 - 1.10
1.93	1.94	0.9973						
			Intercept	0.020912	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

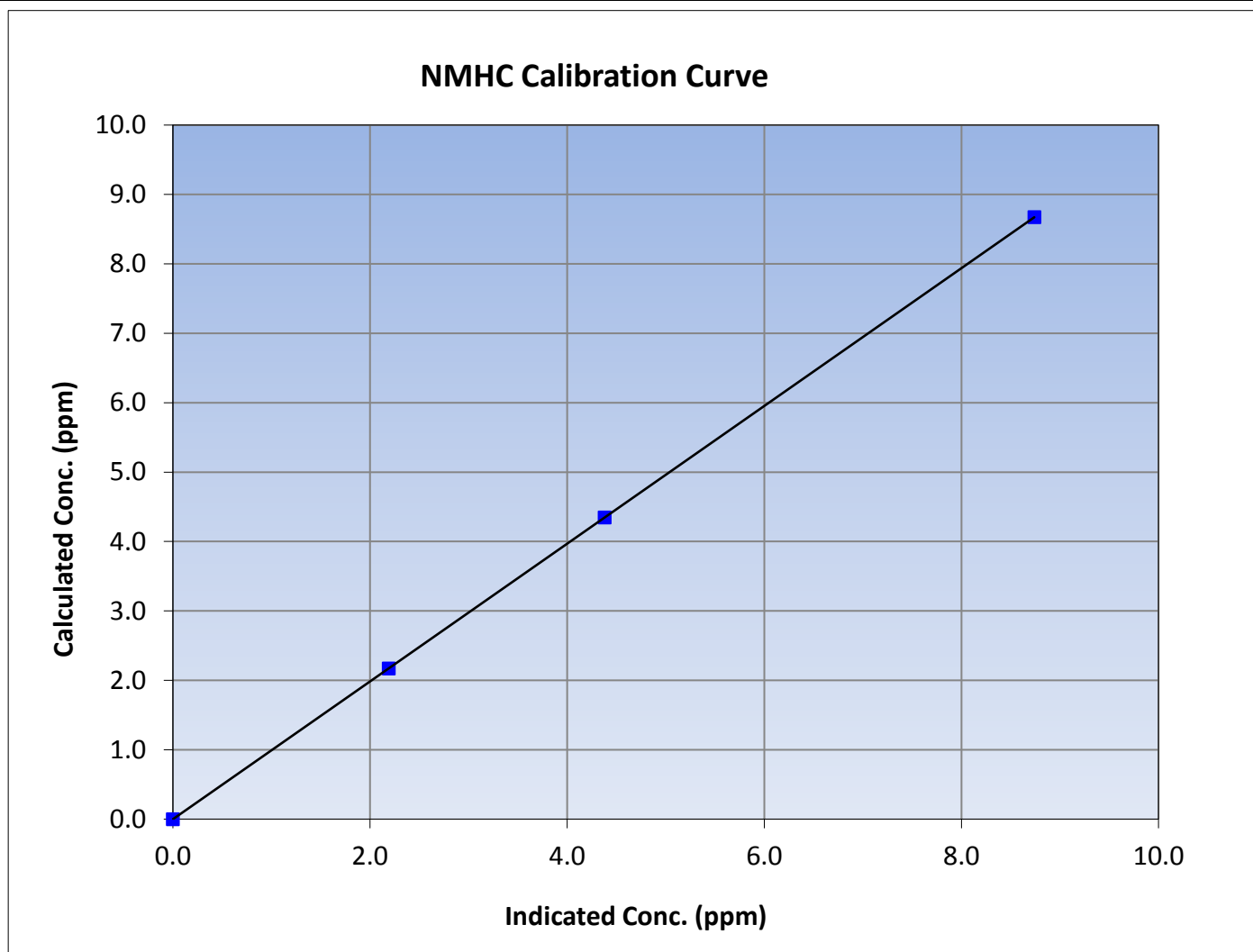
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

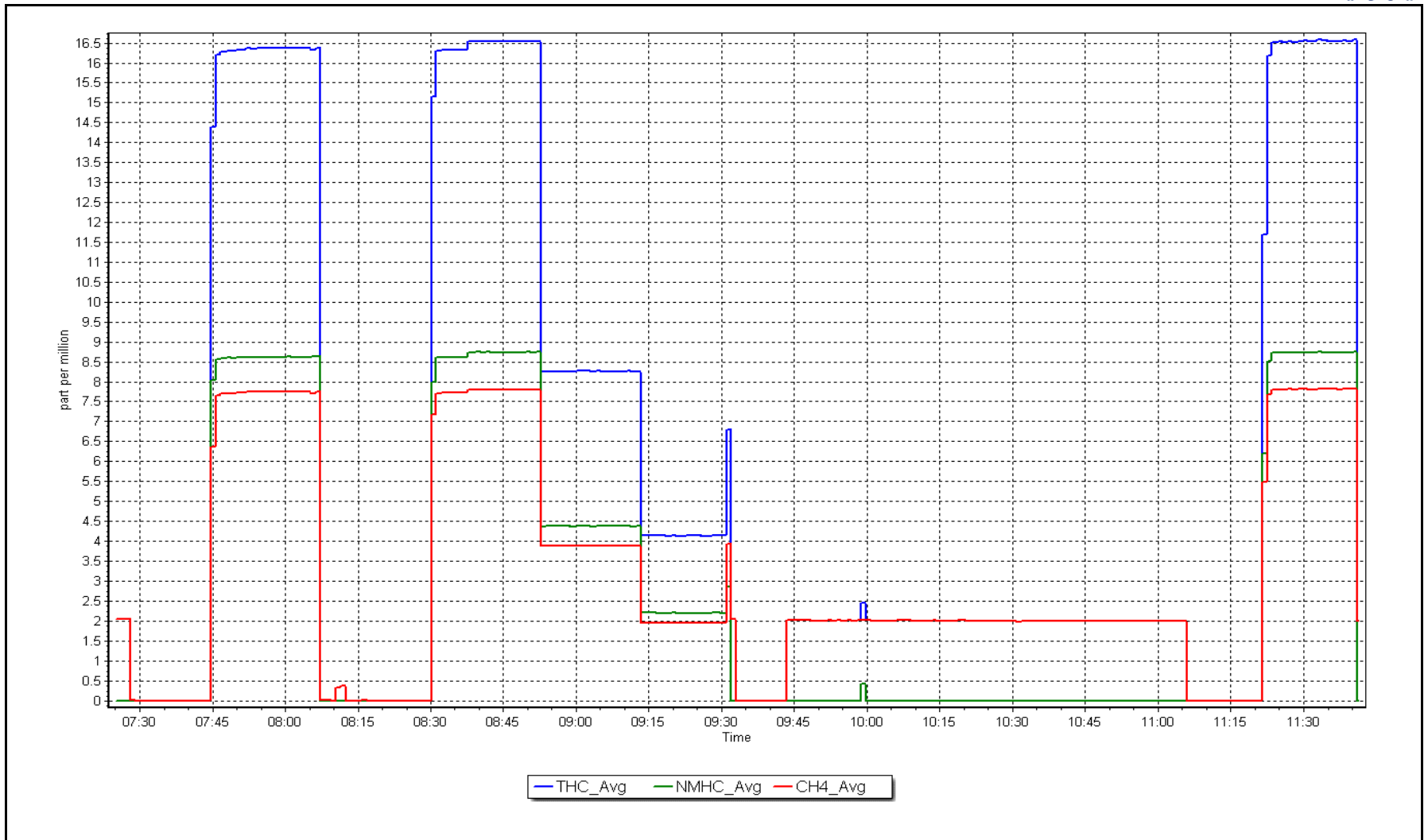
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	1.000000	≥ 0.995
8.67	8.74	0.9922			
4.35	4.38	0.9924			
2.17	2.19	0.9907			
			Slope	0.992297	0.90 - 1.10
			Intercept	-0.001032	+/-0.5



NMHC Calibration Plot

Date: June 2, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 14, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	8:13	End time (MST):	10:21
Reason:	Maintenance Cable from pogo to input board changed out		

Calibration Standards

Gas Cert Reference	LL110103	Cal Gas Expiry Date	February-16-19
CH4 Cal Gas Conc.	<u>488.0</u> ppm	CH4 Equiv Conc.	1035.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	25 Deg C
Calibrator Model	Teledyne API 700	Serial Number	2445
ZAG make/model	Teledyne API 701	Serial Number	1864

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1426262594

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.0	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	0.000214	0.000213	Flame Temp	405.0	405.0
CH4 Retention time	12.8	12.8	Carrier Pressure	36.1	36.1
NMHC SP Ratio	4.13E-05	4.13E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	211723	211476	Air Pressure	25.9	25.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.991203	0.996641
THC Cal Offset	0.011522	0.009554
CH4 Cal Slope	0.984458	1.000072
CH4 Cal Offset	0.020912	0.010649
NMHC Cal Slope	0.992297	0.992427
NMHC Cal Offset	-0.001032	0.000955

Notes: Cable from input board to pogo changed out, as founds done after cable replaced; span adjusted

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	16.40	16.68	0.983
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.40	16.46	0.997
second point	4973	39.5	8.22	8.22	1.000
third point	4994	19.8	4.10	4.11	0.999
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	16.54	16.55	0.999
Average Correction Factor					0.999
Corrected As found	16.68	Prev response	16.54	*% change	-0.9%

NMHC Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	8.67	8.86	0.979
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.67	8.74	0.992
second point	4973	39.5	4.35	4.37	0.995
third point	4994	19.8	2.17	2.19	0.991
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	8.74	8.74	1.000
Average Correction Factor					0.993
Corrected As found	8.86	Prev response	8.74	*% change	-1.4%

CH4 Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.00	----
as found span	4973	78.8	7.73	7.82	0.989
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	7.73	7.73	1.000
second point	4973	39.5	3.88	3.85	1.007
third point	4994	19.8	1.93	1.92	1.008
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	7.80	7.81	0.998
Average Correction Factor					1.005
Corrected As found	7.82	Prev response	7.83	*% change	0.2%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

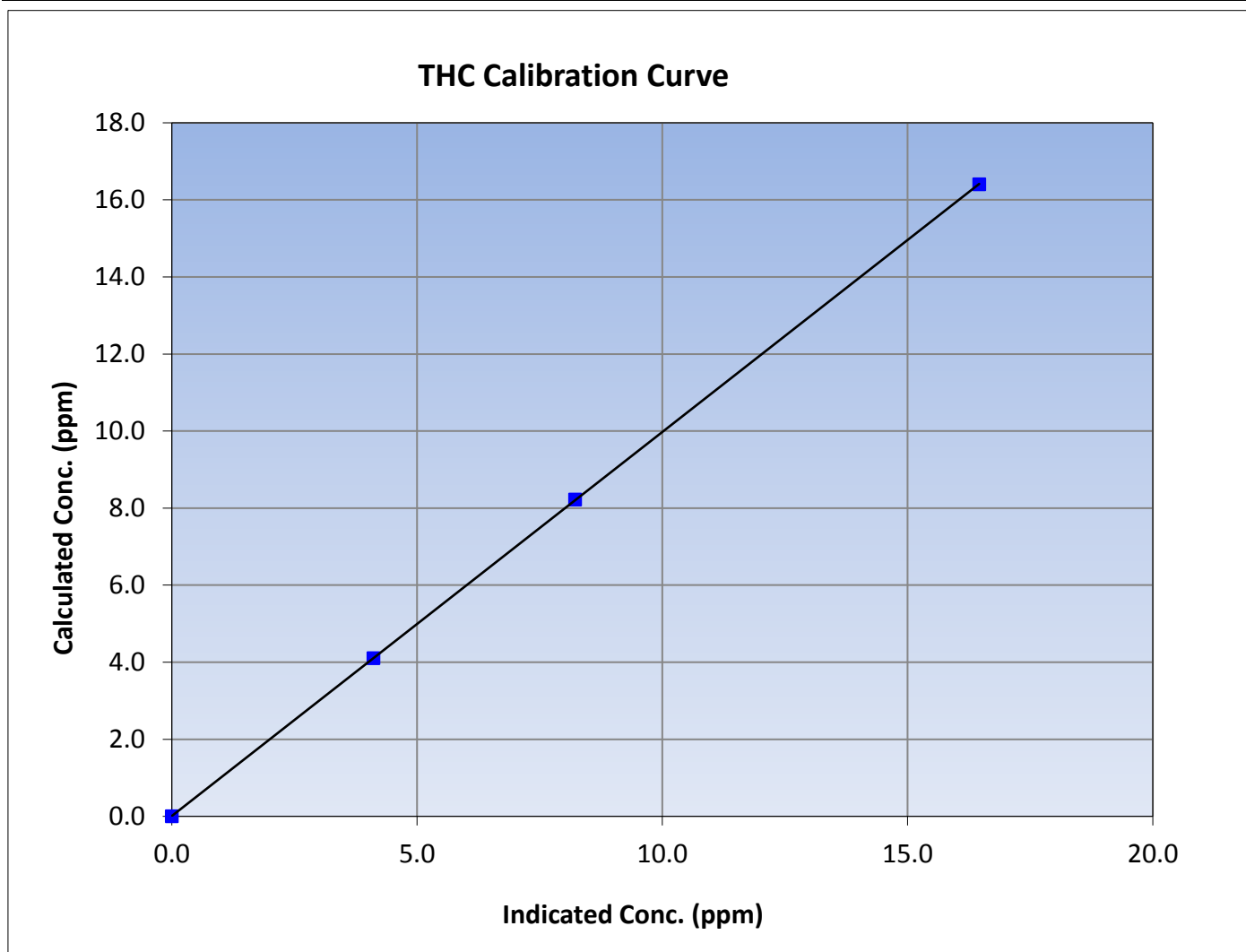
Version-02-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	8:13	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999996	≥ 0.995			
16.40	16.46	0.9966						
8.22	8.22	1.0004				Slope	0.996641	0.90 - 1.10
4.10	4.11	0.9987						
			Intercept	0.009554	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

Version-02-2017

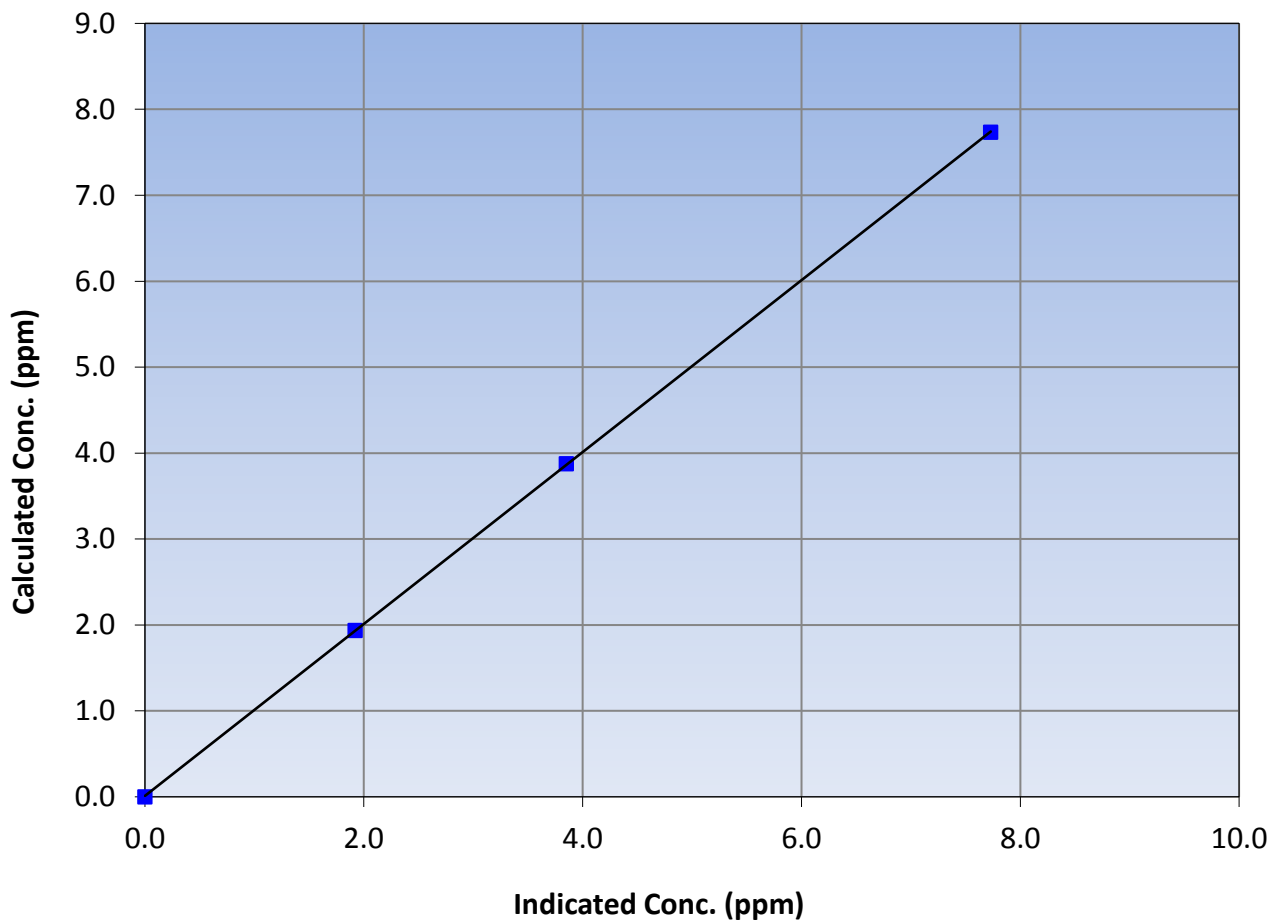
Station Information

Calibration Date	June 14, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	8:13	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999987	≥ 0.995
7.73	7.73	1.0003			
3.88	3.85	1.0068			
1.93	1.92	1.0077			
			Slope	1.000072	0.90 - 1.10
			Intercept	0.010649	+/-0.5

CH₄ Calibration Curve





Wood Buffalo Environmental Association

NMHC Calibration Summary

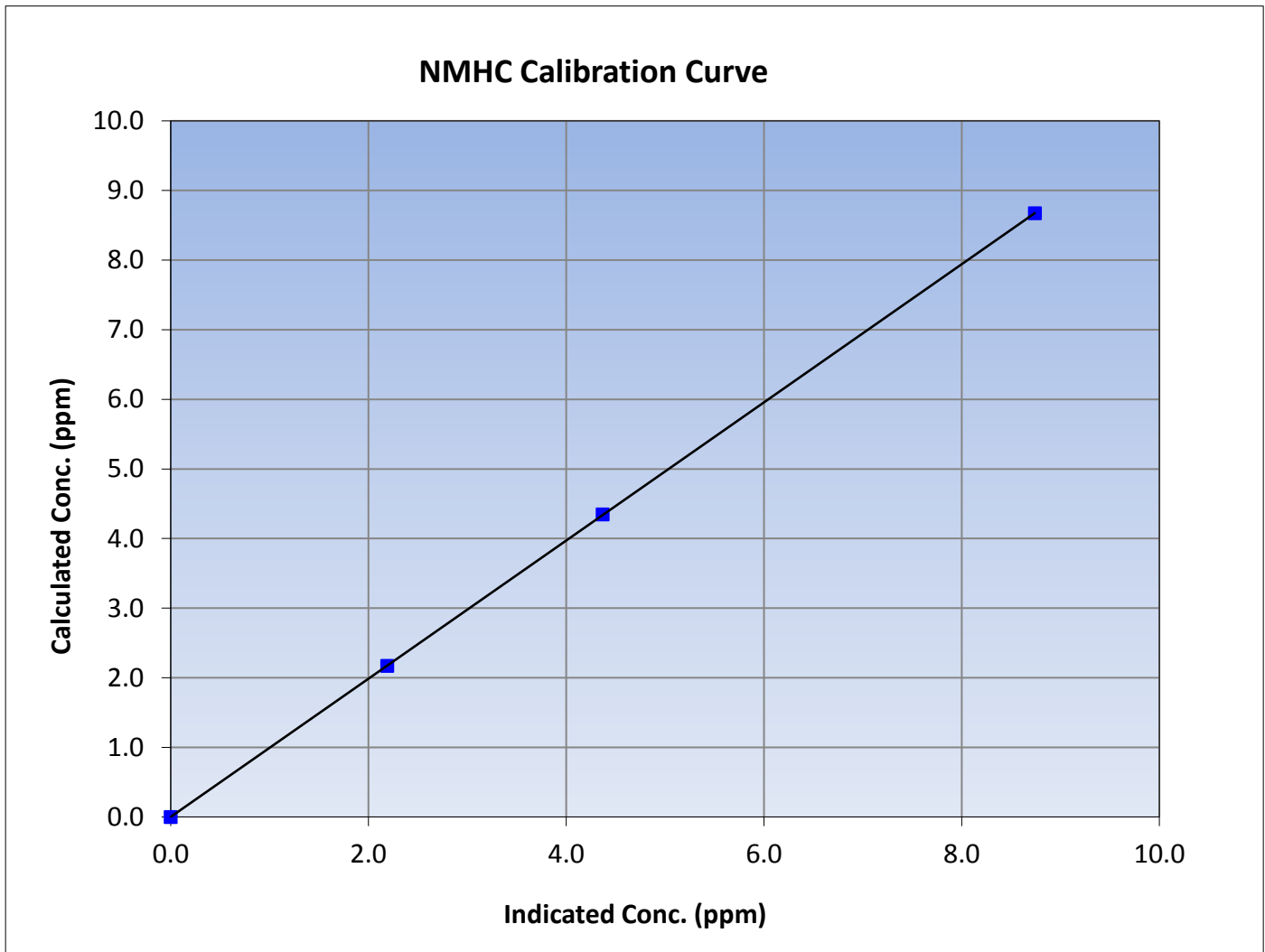
Version-02-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	8:13	End Time (MST)	11:41
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

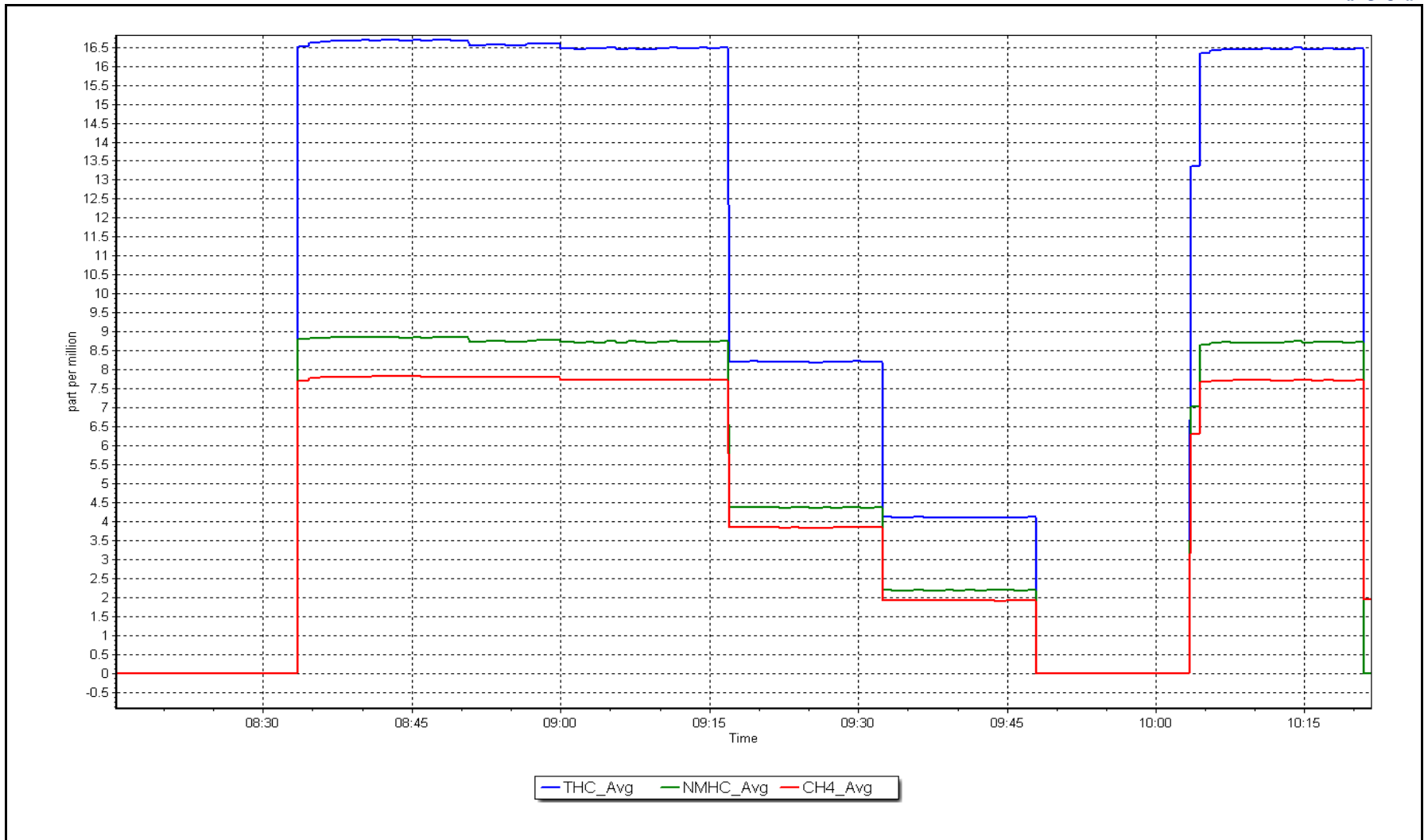
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999997	≥ 0.995
8.67	8.74	0.9922			
4.35	4.37	0.9947			
2.17	2.19	0.9907			
			Slope	0.992427	0.90 - 1.10
			Intercept	0.000955	+/-0.5



NMHC Calibration Plot

Date: June 14, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

O₃ Calibration Summary

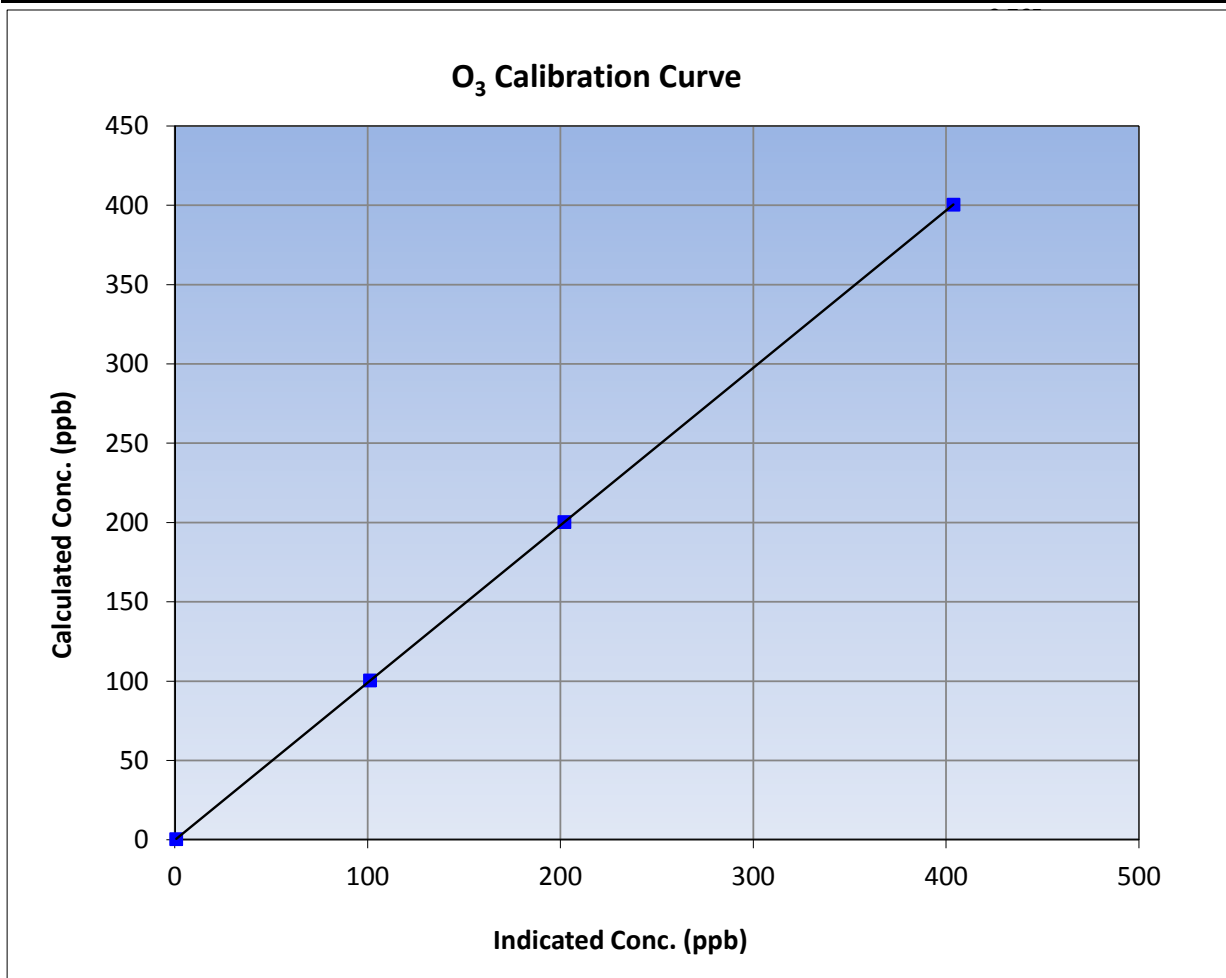
Version-03-2017

Station Information

Calibration Date	June 5, 2017	Previous Calibration	May 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:58	End Time (MST)	12:51
Analyzer make	Thermo 49i	Analyzer serial #	1507964700

Calibration Data

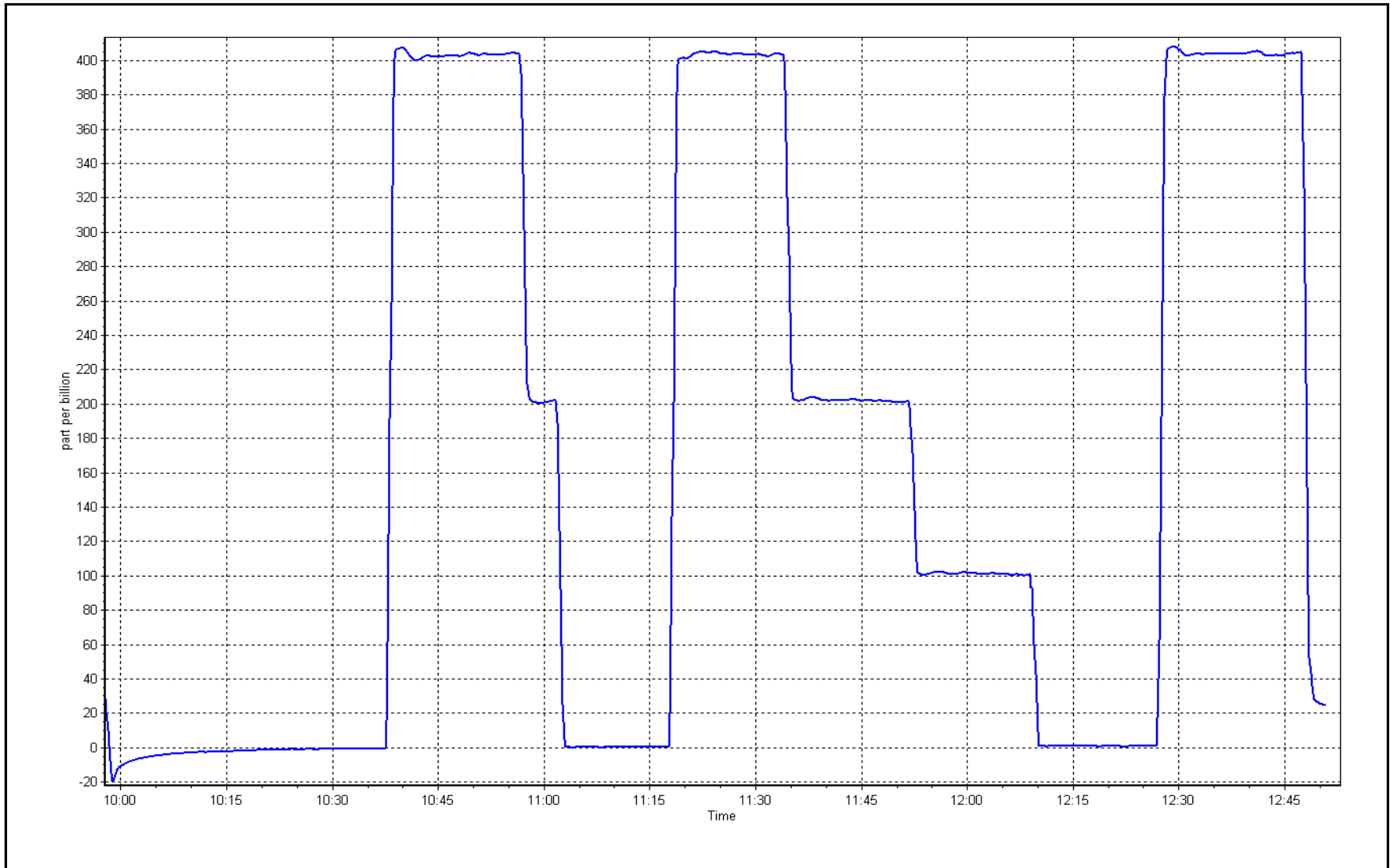
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.4	----	Correlation Coefficient	0.999999	≥0.995
400.0	403.4	0.9916	Slope	0.992428	0.90 - 1.10
200.0	201.6	0.9921	Intercept	-0.238034	+/- 10
100.0	100.9	0.9911			



O₃ Calibration Plot

Date: June 5, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 1, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	12:24	End time (MST):	13:52
Reason:	Maintenance	Pump change out	

Calibration Standards

NO Gas Cylinder #	LL110103	Cal Gas Expiry Date	Saturday, February 16, 2019
NOX Cal Gas Conc.	<u>50.8</u> ppb	NO Cal Gas Conc.	<u>50.8</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	2445
ZAG make/model	Teledyne API T701	Serial Number	1864

Analyzer Information

Analyzer make: Thermo 42C			Analyzer serial #: 601114773		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.239	1.239	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.998	0.998	PMT Temperature	-3.6	-3.6
NO ₂ coefficient	1.000	1.000	Reaction cell Press	388.6	131.0
NO bkgrnd	3.5	3.5	Sample Flow	0.452	0.912
NOX bkgrnd	3.6	3.6	PMT Voltage	-784	-784

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002040	0.925023
NO _x Cal Offset	-0.552868	-0.647516
NO Cal Slope	0.998997	0.922584
NO Cal Offset	-0.274878	0.000000
NO ₂ Cal Slope	0.997508	
NO ₂ Cal Offset	1.000311	



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
as found span	4932	78.8	811.6	811.6	0.0	266.4	267.6	-1.0	3.0467	3.0331
calibrator zero	5009	0.0	0.0	0.0	0.0	0.7	0.0	0.5	----	----
high point	4973	78.8	805.0	805.0	0.0	870.9	872.5	-1.3	0.9243	0.9226
second point										
third point										
as left zero										
as left span										
Average Correction Factor									0.9243	0.9226

Corrected As found	NO _x = 266.2 ppb	NO = 267.6 ppb		*Percent Change	NO _x = 204.5%
Previous Response	NO _x = 810.5 ppb	NO = 812.7 ppb		*Percent Change	NO = 203.7%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point									
1st NO2 (400 ppb O3)									
2nd NO2 (200 ppb O3)									
3rd NO2 (100 ppb O3)									
2nd NO ref point									
Average Correction Factor									

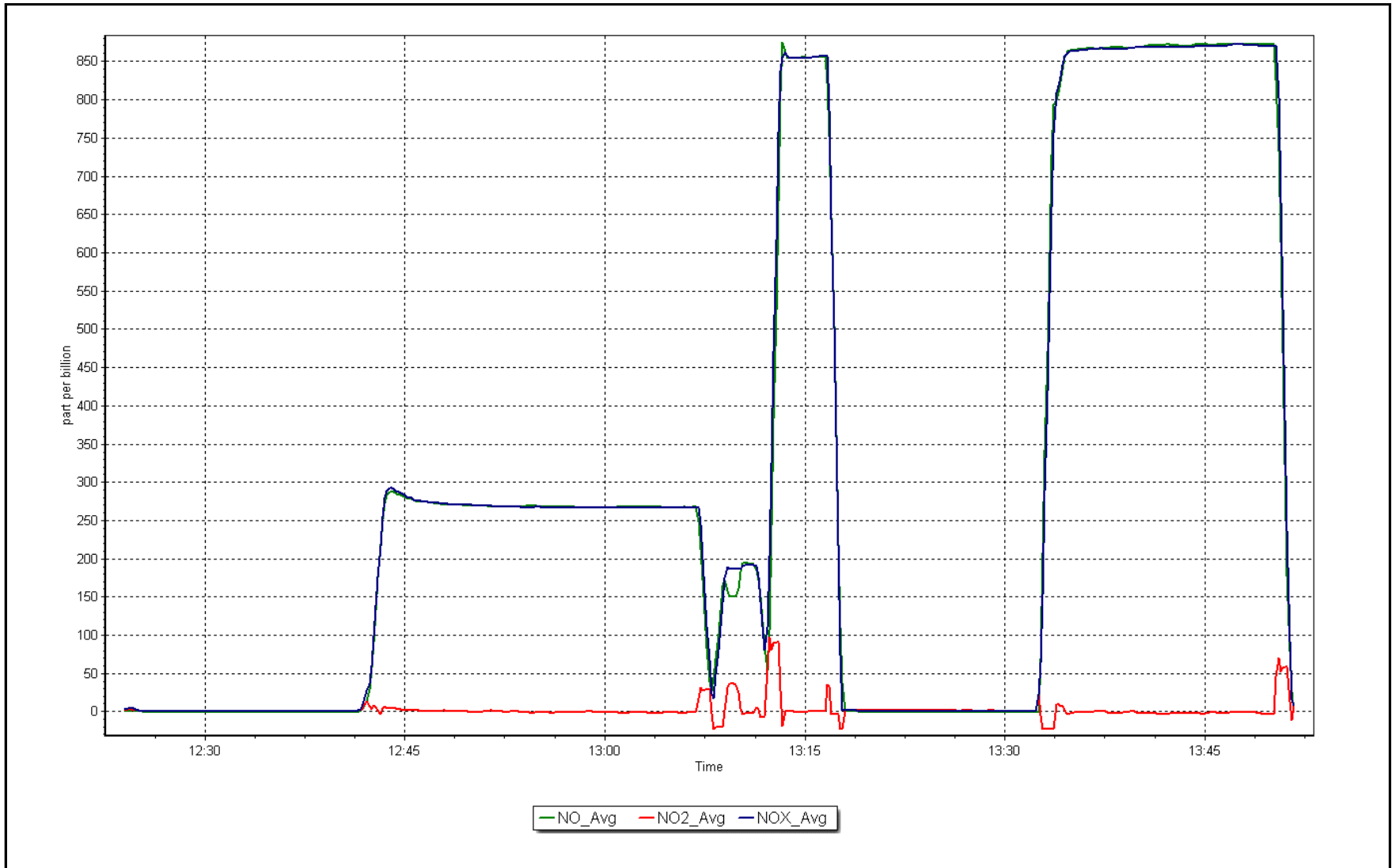
Notes: Changed the Pump and charcoal temporary exhaust line attached

Calibration Performed By: Melissa Lemay

NO_x Calibration Plot

Date: June 1, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 2, 2017	Last Cal Date:	June 1, 2017
Start time (MST):	7:25	End time (MST):	11:44
Reason:	Routine	Exhaust line changed	

Calibration Standards

NO Gas Cylinder #	LL110103	Cal Gas Expiry Date	February-16-19
NOX Cal Gas Conc.	<u>50.8</u> ppb	NO Cal Gas Conc.	<u>50.8</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	2445
ZAG make/model	Teledyne API T701	Serial Number	1864

Analyzer Information

Analyzer make: Thermo 42C			Analyzer serial #: 601114773		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.239	1.239	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.998	0.998	PMT Temperature	-3.6	-3.6
NO2 coefficient	1.000	1.000	Reaction cell Press	131.4	157.1
NO bkgrnd	3.5	3.5	Sample Flow	0.914	0.812
NOX bkgrnd	3.6	3.6	PMT Voltage	-784	-784

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.932712	1.006084
NO _x Cal Offset	-0.652899	0.107348
NO Cal Slope	0.930254	1.006444
NO Cal Offset	0.000000	0.107123
NO ₂ Cal Slope		1.005724
NO ₂ Cal Offset		0.816310



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
as found span	4973	78.8	805.0	805.0	0.0	890.7	891.5	-0.7	0.9037	0.9029
calibrator zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
high point	4973	78.8	805.0	805.0	0.0	800.4	800.0	-0.6	1.0057	1.0062
second point	4973	39.5	403.5	403.5	0.0	400.0	400.0	0.3	1.0087	1.0087
third point	4994	19.7	200.4	200.4	0.0	199.3	199.4	0.2	1.0055	1.0050
as left zero	5009	0.0	0.0	0.0	0.0	0.2	0.0	0.3	----	----
as left span	4973	78.8	805.0	380.1	424.9	790.5	379.2	411.2	1.0183	1.0024
Average Correction Factor									1.0066	1.0066

Corrected As found	NO _x = 890.5 ppb	NO = 891.5 ppb		*Percent Change	NO _x = -3.0%
Previous Response	NO _x = 863.7 ppb	NO = 865.3 ppb		*Percent Change	NO = -2.9%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	798.4	799.1	-1.4	1.0082	1.0073	----	----
1st NO2 (400 ppb O3)	380.1	419.0	796.5	380.1	416.3	1.0106	----	1.0065	99.4%
2nd NO2 (200 ppb O3)	593.4	205.7	796.7	593.4	203.3	1.0104	----	1.0118	98.8%
3rd NO2 (100 ppb O3)	694.0	105.1	796.4	694.0	102.5	1.0107	----	1.0254	97.5%
2nd NO ref point	----	0.0	796.4	798.2	-1.7	1.0107	1.0085	----	----
Average Correction Factor						1.0106	1.0079	1.0146	98.6%

Notes: Exhaust line changed out, span adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

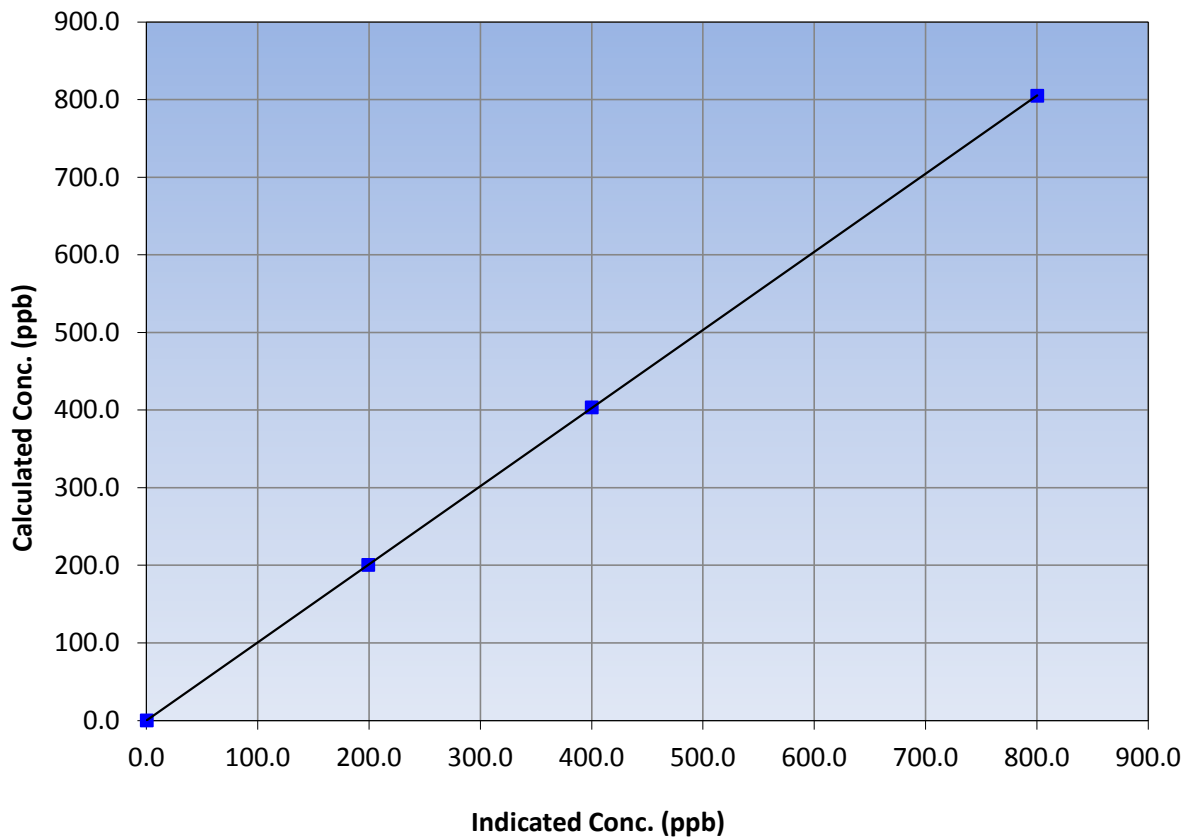
Station Information

Calibration Date	June 2, 2017	Previous Calibration	June 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:44
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
805.0	800.4	1.0057			
403.5	400.0	1.0087			
200.4	199.3	1.0055			
			Slope	1.006084	0.90 - 1.10
			Intercept	0.107348	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

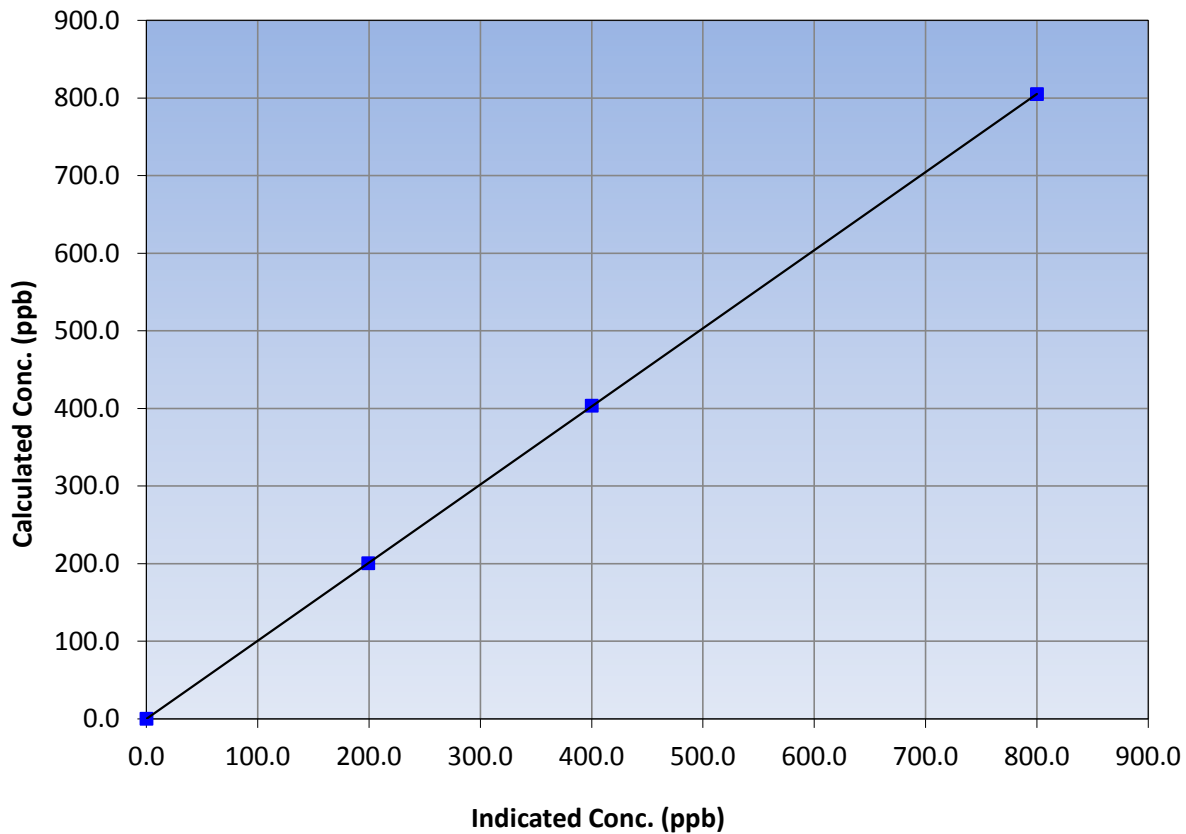
Station Information

Calibration Date	June 2, 2017	Previous Calibration	June 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:44
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
805.0	800.0	1.0062			
403.5	400.0	1.0087			
200.4	199.4	1.0050			
			Slope	1.006444	0.90 - 1.10
			Intercept	0.107123	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

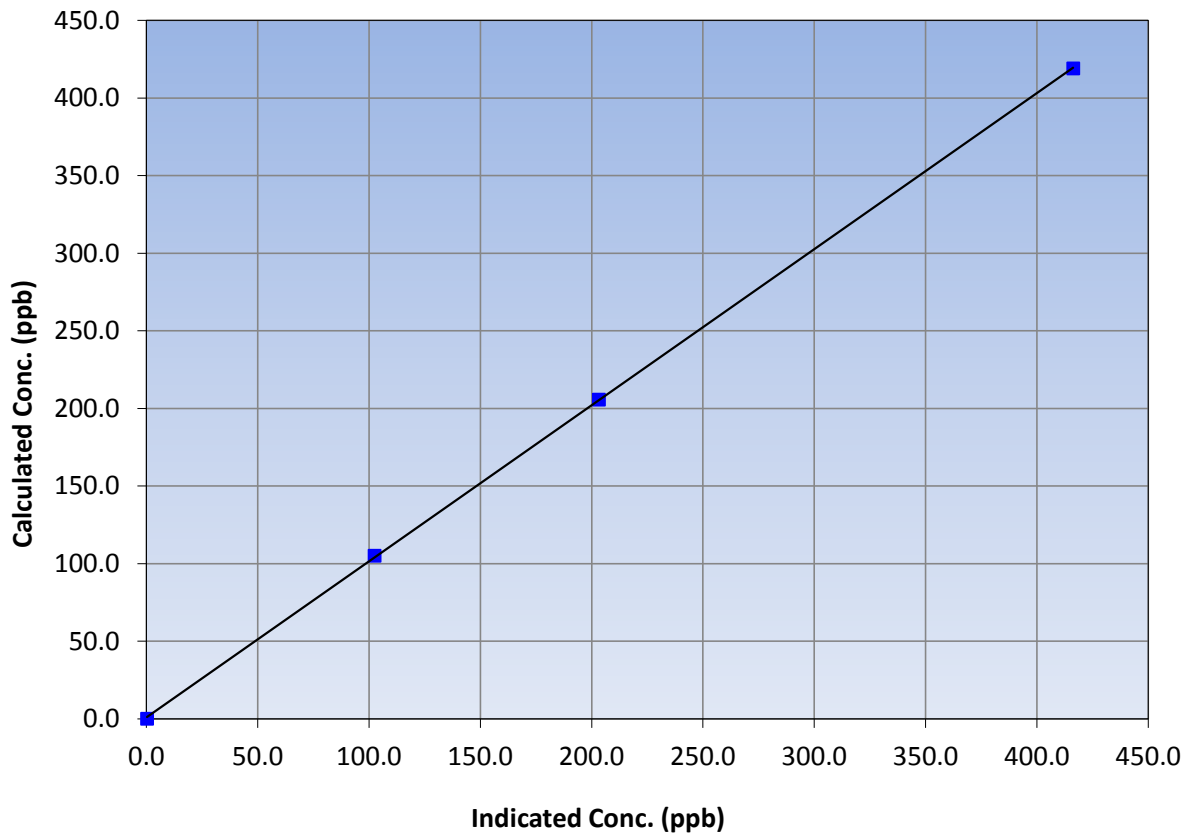
Station Information

Calibration Date	June 2, 2017	Previous Calibration	June 1, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:25	End Time (MST)	11:44
Analyzer make	Thermo 42C	Analyzer serial #	601114773

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
419.0	416.3	1.0065			
205.7	203.3	1.0118			
105.1	102.5	1.0254			
			Slope	0.999968	0.90 - 1.10
			Intercept	1.005724	+/-20

NO₂ Calibration Curve





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	June 6, 2017	Last Cal Date:	May 2, 2017
Start time (MST):	7:03	End time (MST):	7:52
Sharp Model:	Thermo 5030	S/N:	E515
Particulate Fraction:	PM2.5	C14 Source S/N:	3256
Flow Meter Make/Model:	Delta Cal	S/N:	1045
Temp/RH standard:	Delta Cal	S/N:	1045

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	12	13	12	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	991	985	991	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1005	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	2.3	-----	-0.1	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: April 5, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>2518</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1337</u>	
	Calibration Date: _____	Calibration Date: <u>April 5, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: _____	Correction Factor: _____	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Cyclone head cleaned; Nephelometer adjusted

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association

CO Calibration Summary

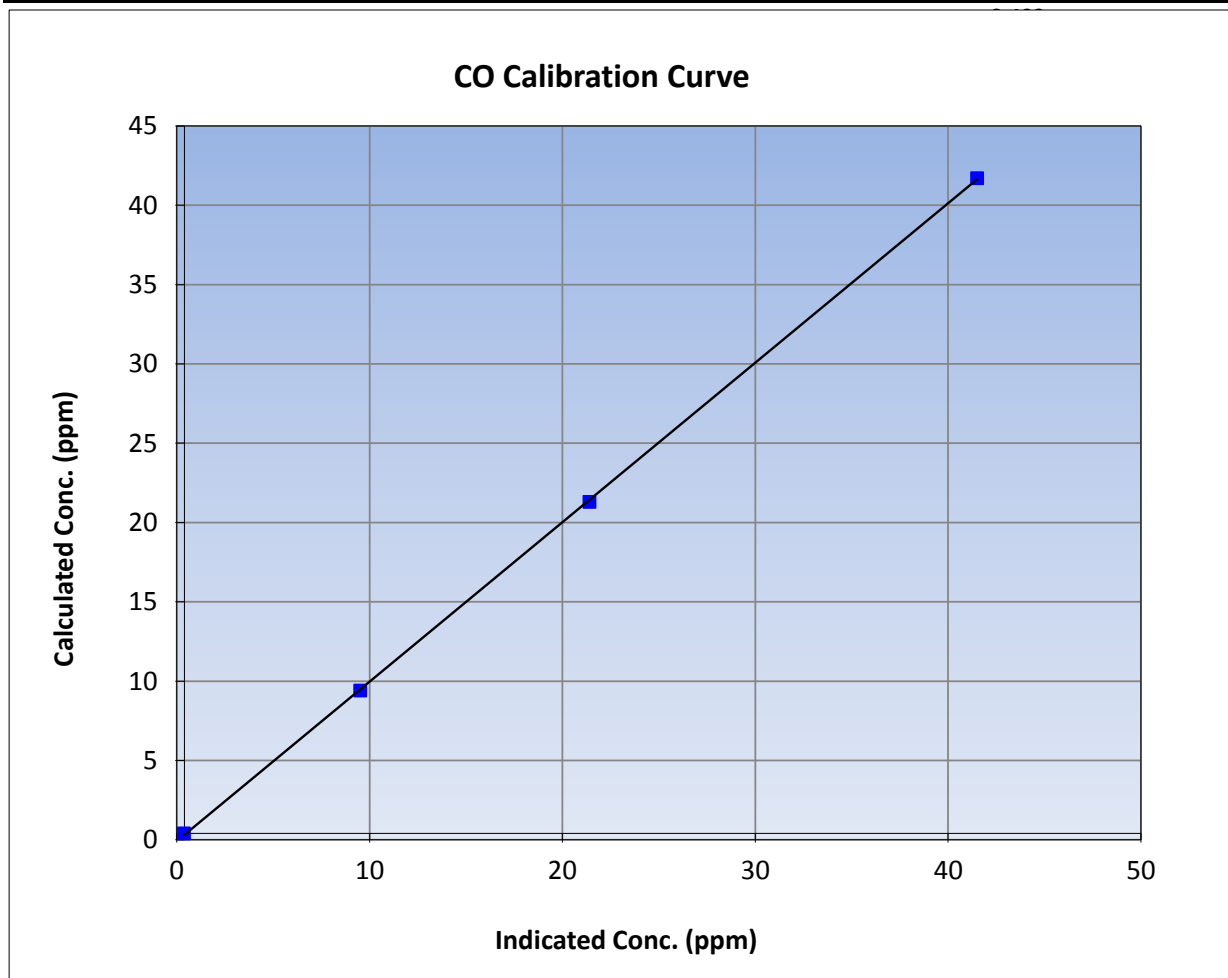
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 9, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:15	End Time (MST)	12:23
Analyzer make	Thermo 48i-LTE	Analyzer serial #	1408761381

Calibration Data

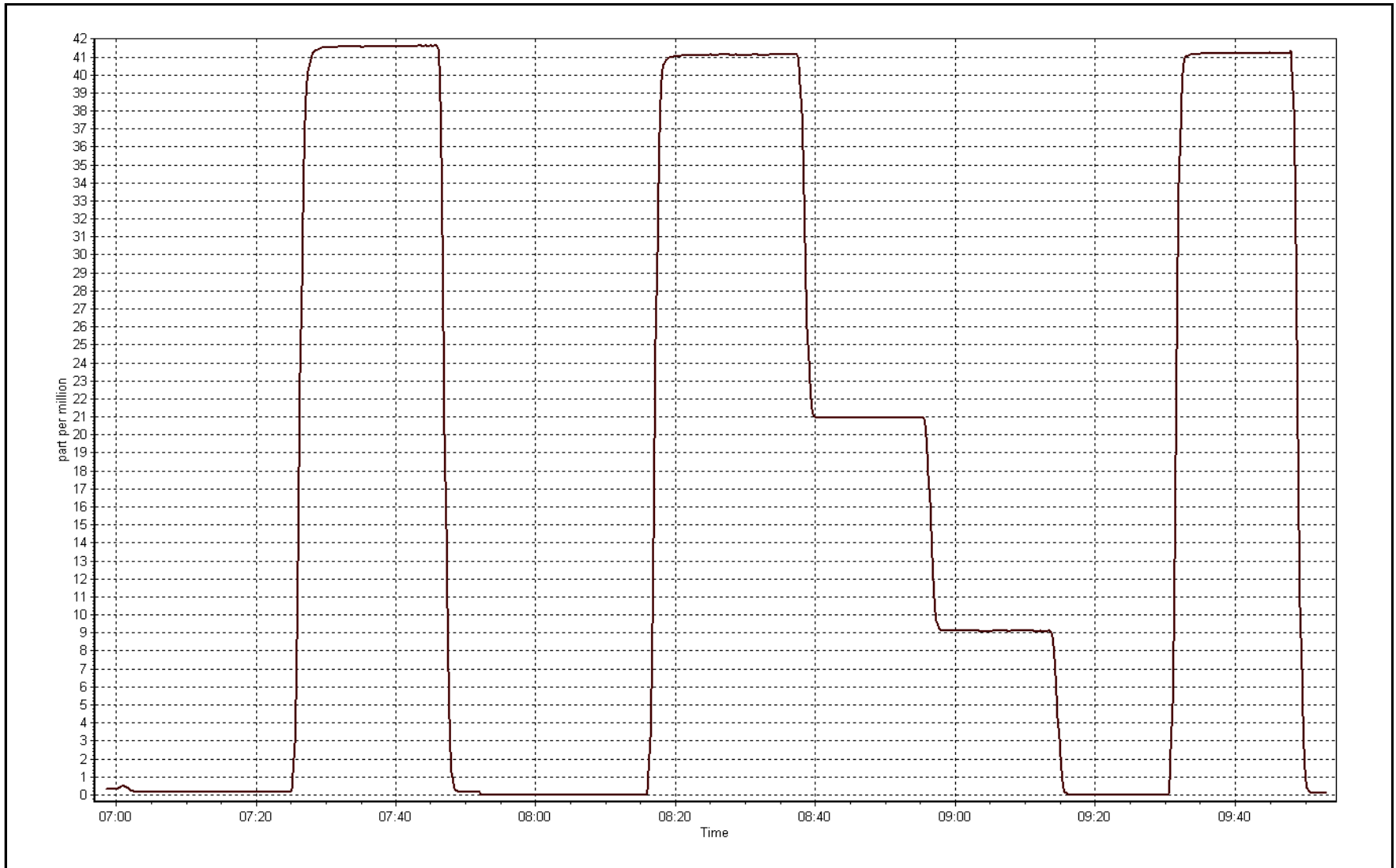
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999963	≥0.995
41.3	41.1	1.0051			
20.9	21.0	0.9957	Slope	1.005489	0.90 - 1.10
9.0	9.1	0.9883			
			Intercept	-0.089150	+/-1.5



CO Calibration Plot

Date: June 6, 2017

Location: Athabasca Valley





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	3	0	1	0
O3(ppb) Average	687	33	33	100	59	0	45	-
NO2(ppb) Average	685	35	35	100	8	0	3	-
NO(ppb) Average	685	35	35	100	2	-	0	-
NOX(ppb) Average	685	35	35	100	9	-	3	-
PM2.5(ug/m3) Average	625	2	95	87.08	22.5	-	7.6	0
Wind Speed 10 m (km/h) Average	720	0	0	100	43	-	30	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	27.4	-	22.1	-
Relative Humidity (%) Average	720	0	0	100	100	-	85	-
Precipitation (mm) Total	720	0	0	100	11.4	-	17.5	-
Leaf Wetness (% of range) Average	718	0	2	99.72	54	-	9	-
Global Solar Radiation (W/m2) Average	715	0	5	99.31	936	-	395	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2(ppb) Average	685	0.1	0	-	0	0	0	0	0	0	0	3
O3(ppb) Average	687	30.6	7	-	15	21	26	30	35	40	59	59
NO2(ppb) Average	685	0.4	1	-	0	0	0	0	0	1	8	8
NO(ppb) Average	685	0.1	0	-	0	0	0	0	0	0	2	2
NOX(ppb) Average	685	0.4	1	-	0	0	0	0	0	1	9	9
PM2.5(ug/m3) Average	625	3.32	2.6	-	0.8	1.6	2	2.6	3.8	5.2	22.5	22.5
Wind Speed 10 m (km/h) Average	720	15.4	8	-	1	6	9	14	21	26	43	43
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	15.59	3.9	-	5.4	10.2	12.9	15.6	18.4	20.6	27.4	27.4
Relative Humidity (%) Average	720	63.7	18	-	24	39	49	63	77	88	100	100
Precipitation (mm) Total	720	-	-	30.99	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	718	1	5	-	-1	-1	-1	-1	0	5	54	54
Global Solar Radiation (W/m2) Average	715	264.1	287	-	0	0	9	142	470	750	936	936

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	01 Jun 2017 01:00	02 Jun 2017 11:00	35	Unstable operation - debris in chamber
PM 2.5	19 Jun 2017 01:00	21 Jun 2017 10:00	58	Flat line in sensor output signal
Solar Global Radiation	12 Jun 2017 01:00	12 Jun 2017 04:00	4	Unstable operation
Solar Global Radiation	13 Jun 2017 11:00	13 Jun 2017 11:00	1	Unstable operation
Surface Leaf Wetness	11 Jun 2017 16:00	11 Jun 2017 16:00	1	Unstable operation
Surface Leaf Wetness	12 Jun 2017 01:00	12 Jun 2017 01:00	1	Unstable operation



Wood Buffalo Environmental Association
Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Jun 1 23:00	Maximum Daily Average: 0.9 ppb on Jun 1		Hours of Data:	685
Minimum Value: 0 ppb on Jun 2 22:00	Minimum Daily Average: 0.0 ppb on Jun 23		Hours of Missing Data:	35
Maximum Diurnal Average: 0.1 ppb at hour 23	Minimum Diurnal Average: 0.0 ppb at hour 15		Hours of Calibration:	35
Monthly Average: 0.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	2	1	1	0	0	0	0	0	C	C	C	C	C	1	0	0	0	0	1	2	3	2	0.9	3
2-Jun	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Jun	Z	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
20-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
26-Jun	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

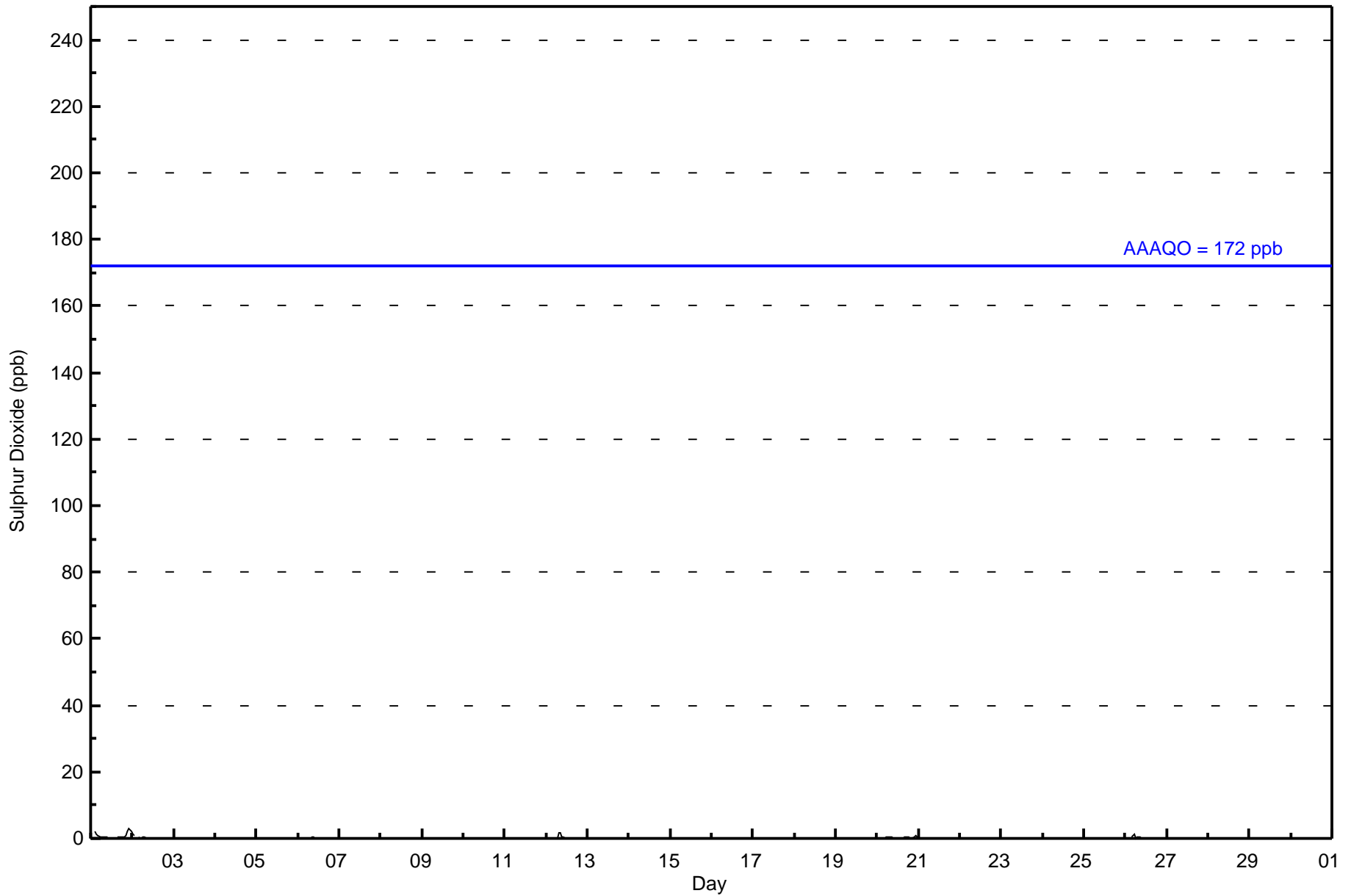
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1	1	2	1	1	1	1	0	2	1	0	0	0	0	0	0	1	0	0	0	0	1	2	3	2	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685

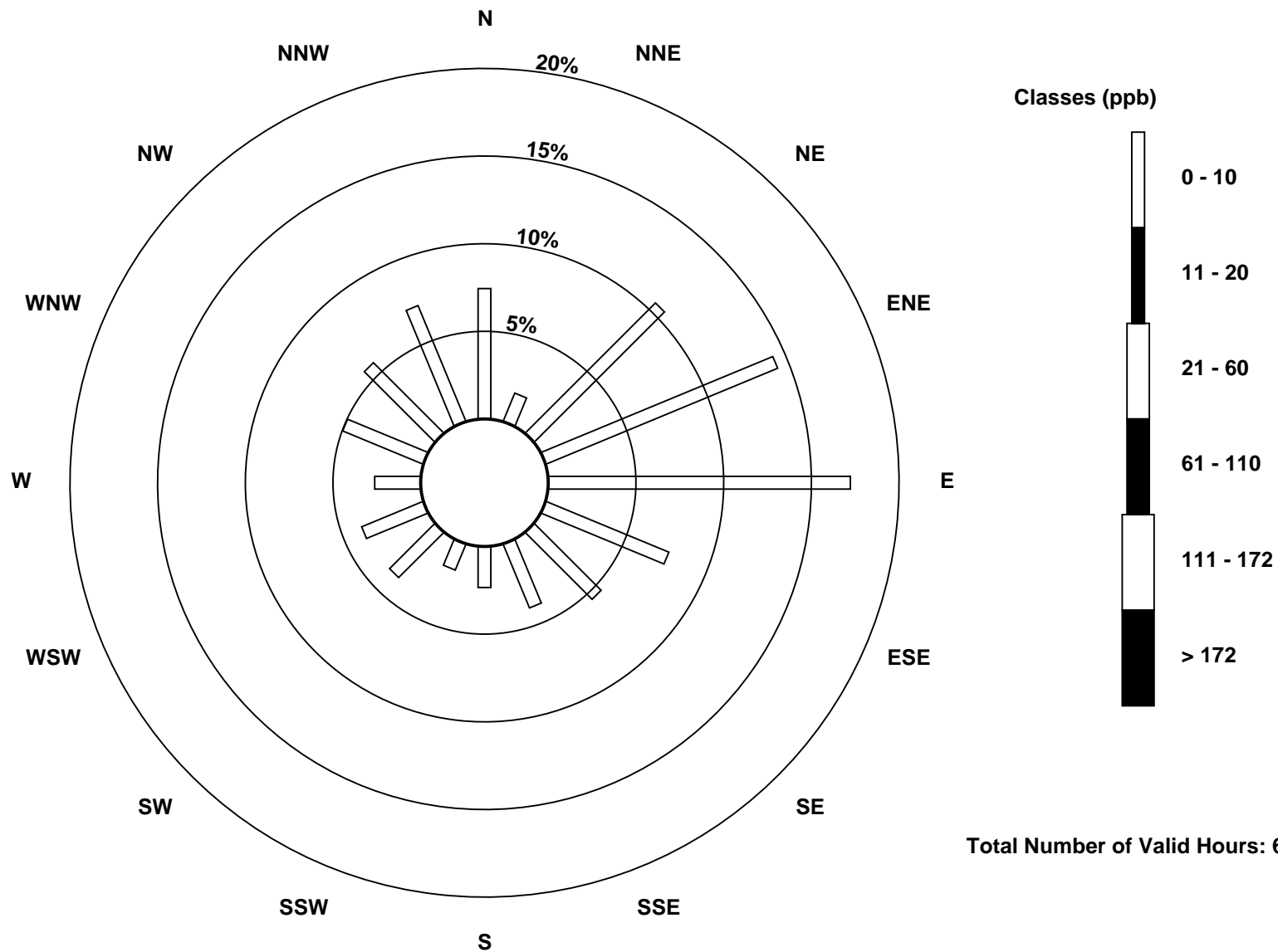
Total Number of Valid Hours: 685

Total Number of Hours: 720

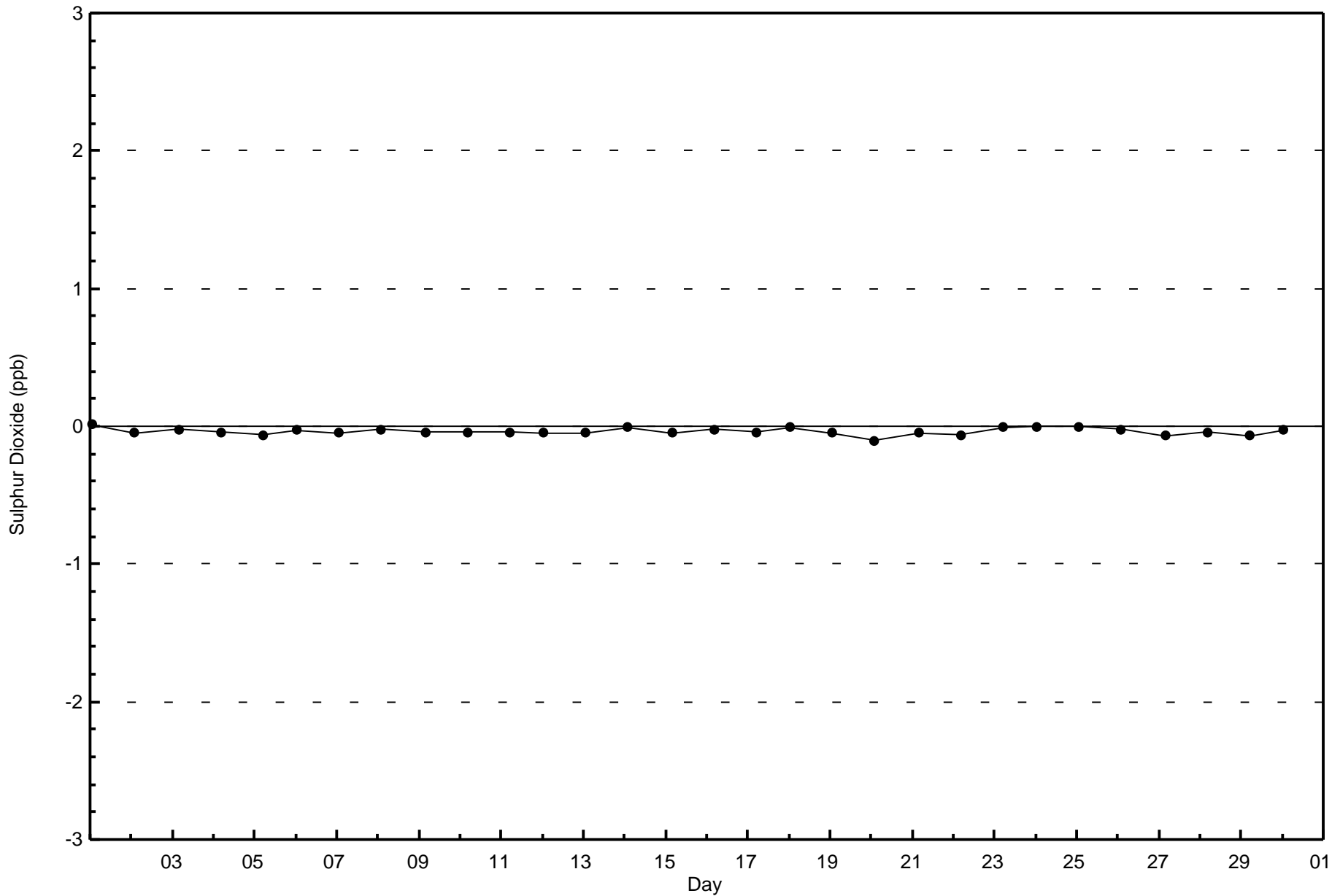


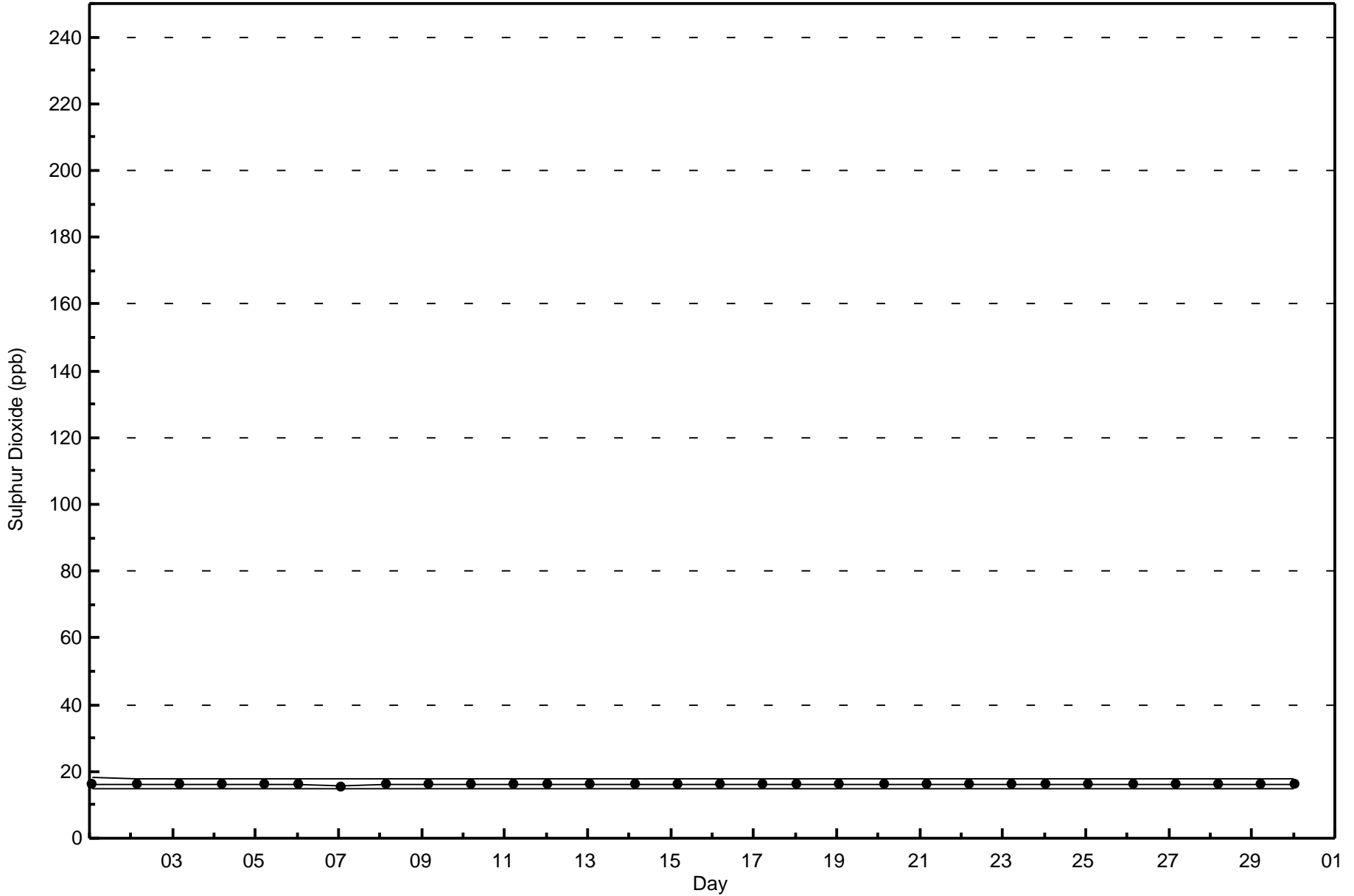
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 685

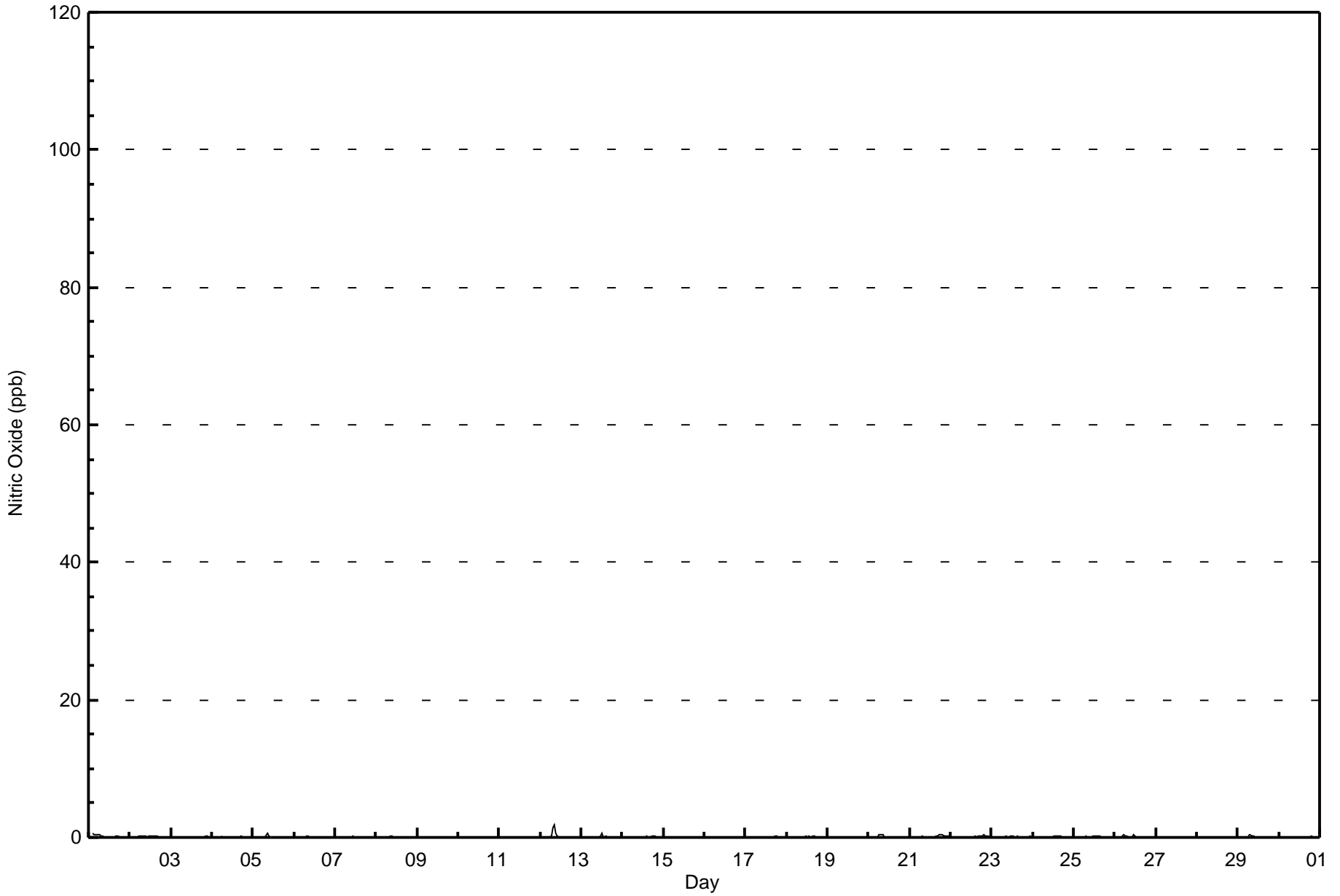






Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685

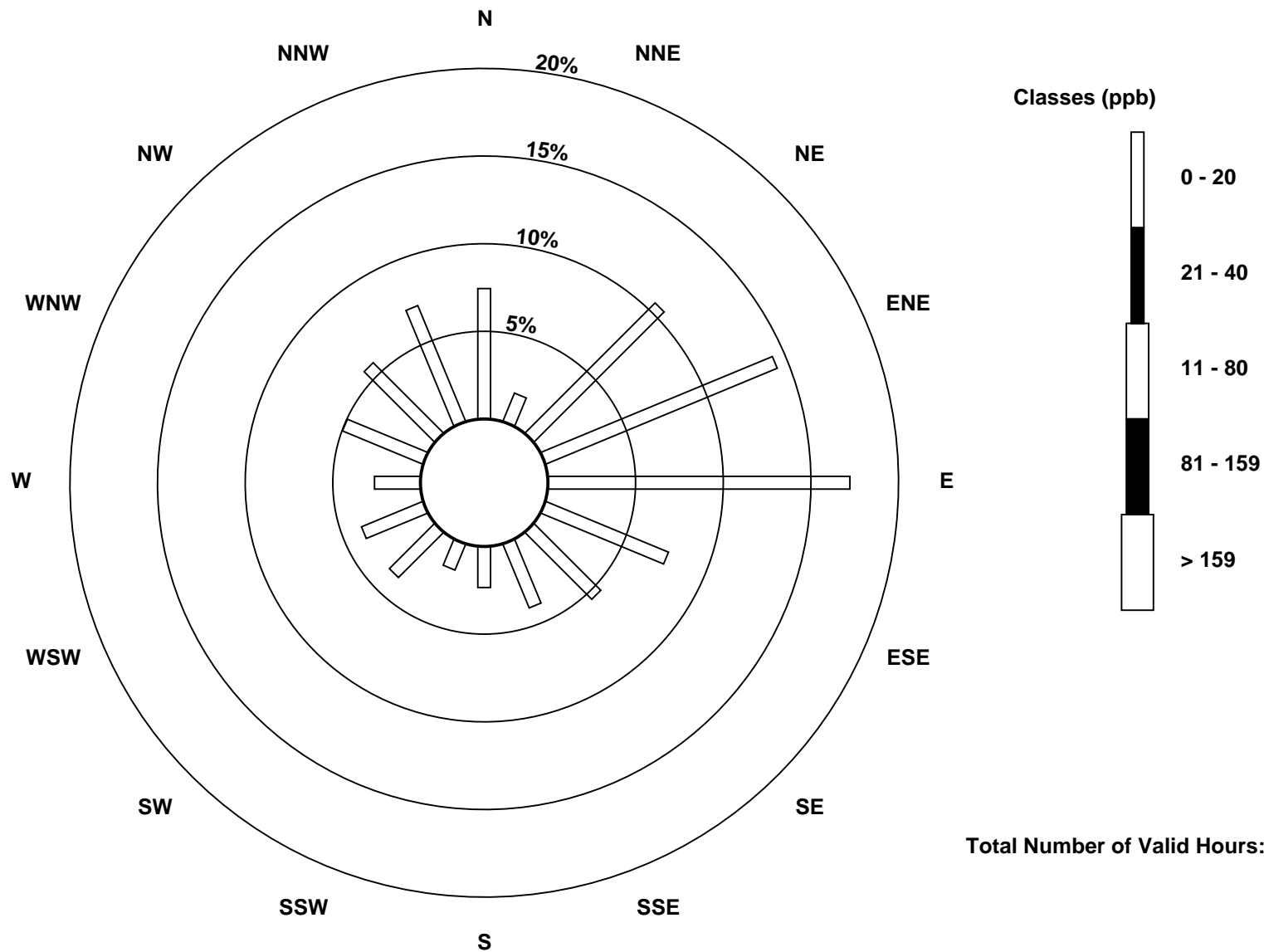
Total Number of Valid Hours: 685

Total Number of Hours: 720

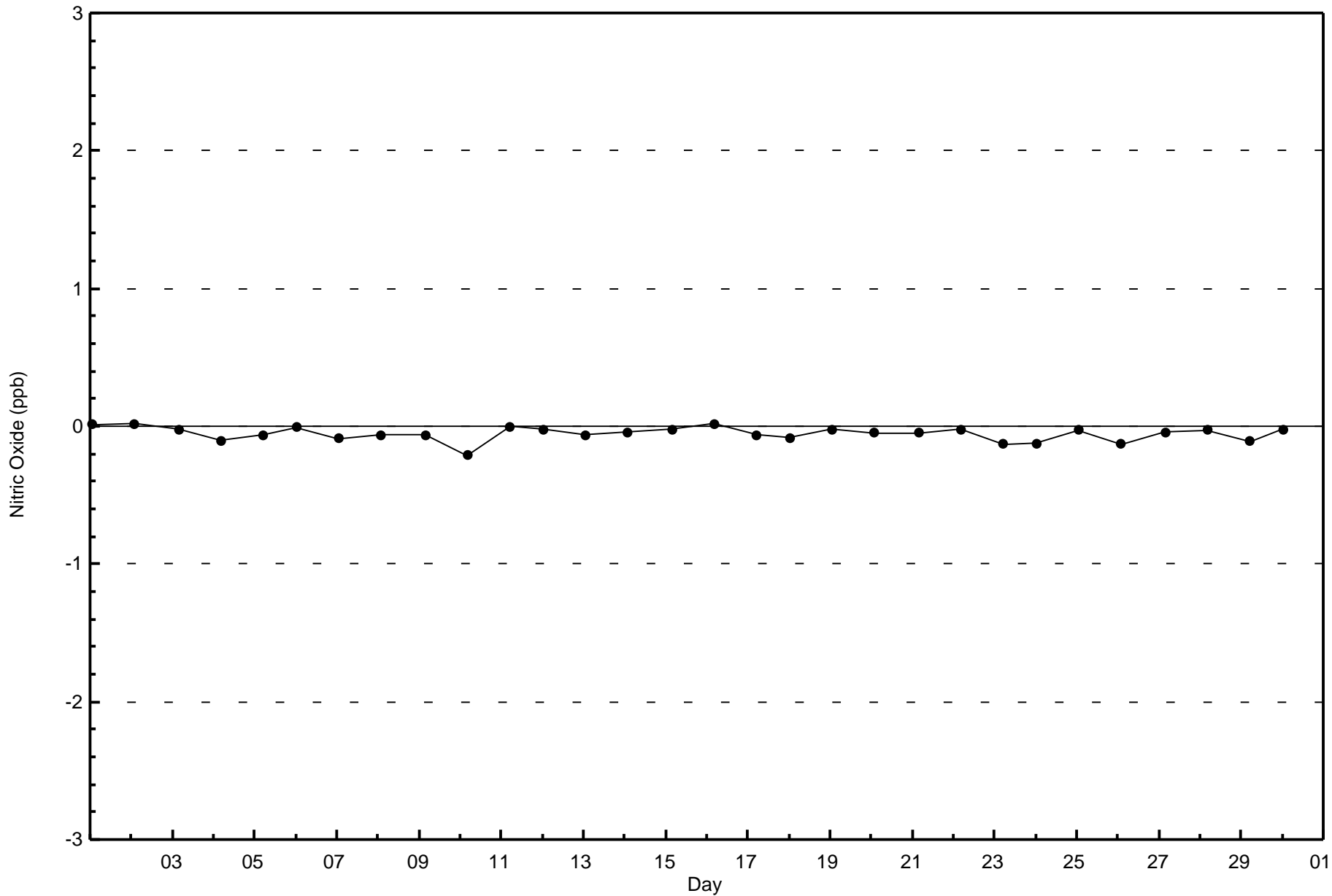


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



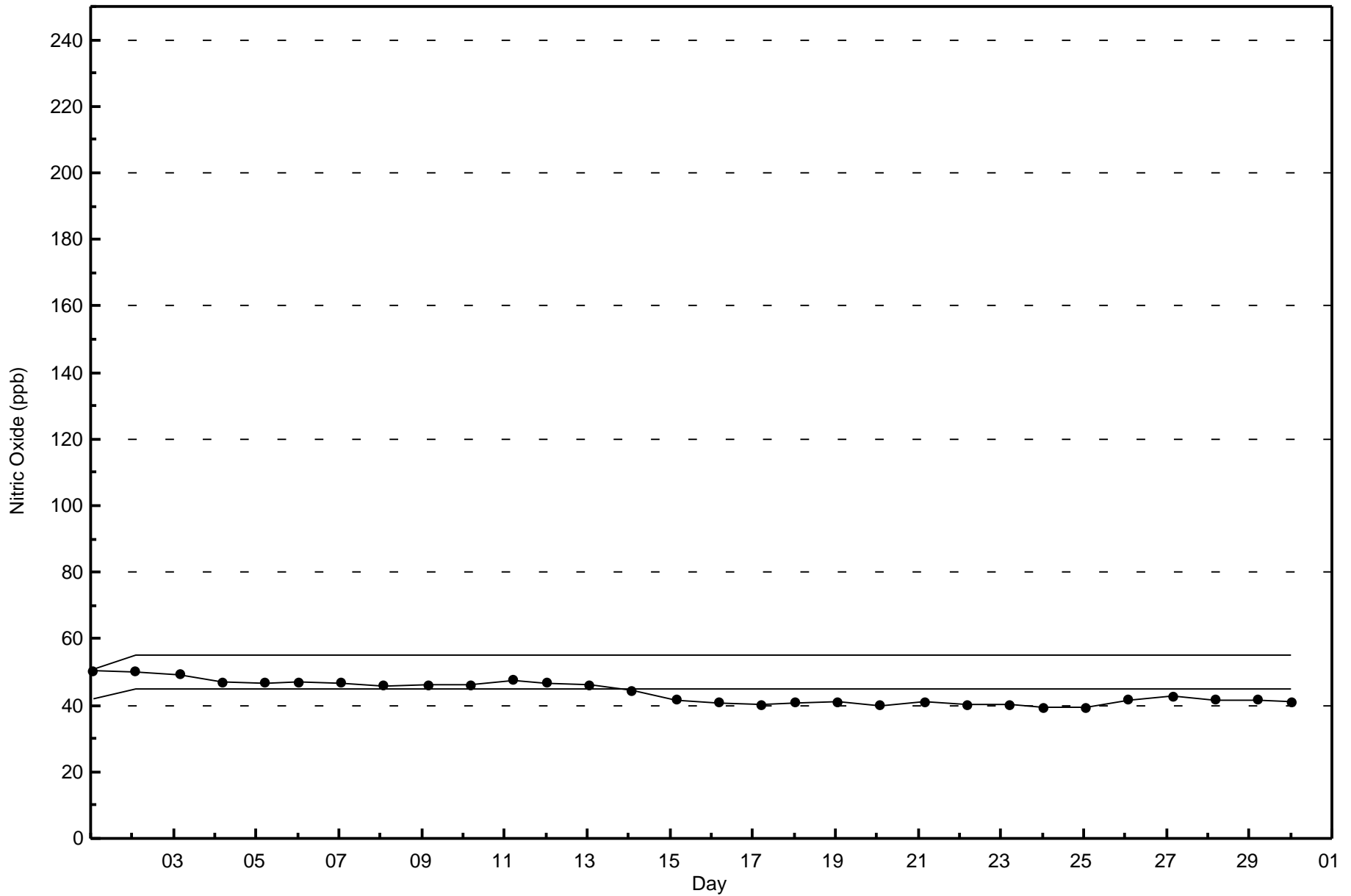
Total Number of Valid Hours: 685





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort Chipewyan - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Chipewyan - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 8 ppb on Jun 1 03:00	Maximum Daily Average: 2.7 ppb on Jun 1		Hours of Data:	685
Minimum Value: 0 ppb on Jun 4 01:00	Minimum Daily Average: 0.1 ppb on Jun 24		Hours of Missing Data:	35
Maximum Diurnal Average: 0.6 ppb at hour 23	Minimum Diurnal Average: 0.2 ppb at hour 14		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	8	6	5	4	4	2	2	2	C	C	C	C	C	2	2	1	1	2	1	1	2	2	2.7	8
2-Jun	2	2	Z	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2
4-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
5-Jun	0	0	0	0	1	Z	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
6-Jun	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0.4	4
7-Jun	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
9-Jun	1	2	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
12-Jun	Z	0	0	0	0	0	1	4	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	0	1	1	0	0.3	1
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
18-Jun	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	0	1	0.3	1
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
20-Jun	0	0	Z	0	0	1	2	2	2	0	0	0	0	0	1	1	1	1	1	1	1	1	2	1	0.8	2
21-Jun	1	1	0	Z	0	0	1	1	1	1	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0.6	1
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.3	1
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	0	Z	1	2	2	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0.6	2
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.2	1
28-Jun	0	1	1	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
29-Jun	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	1	0	0.3	3

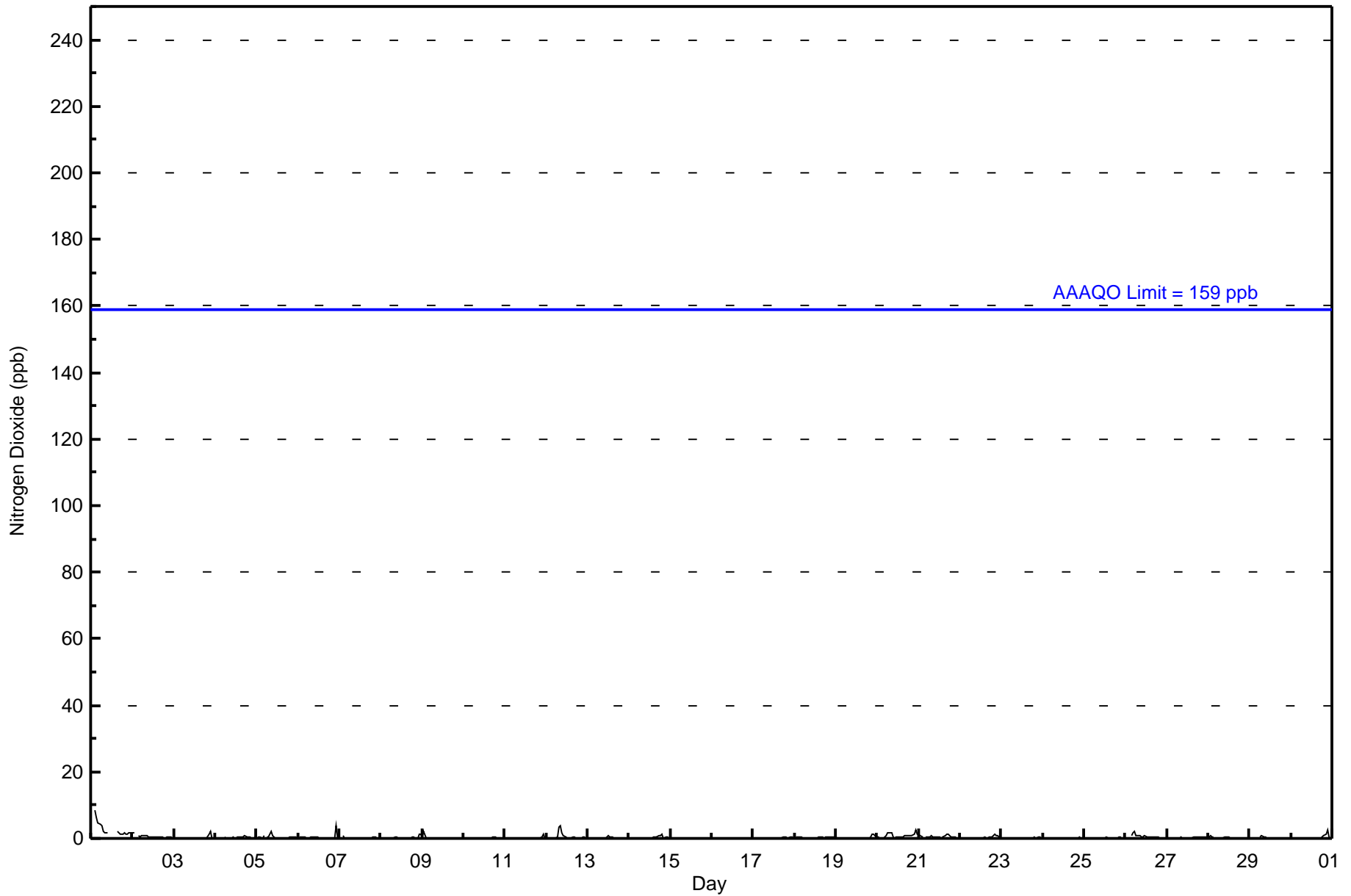
0.3	0.3	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.3	Diurnal Average
2	2	8	6	5	4	4	4	4	4	2	1	1	1	0	1	2	2	1	1	2	1	3	4	2	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685

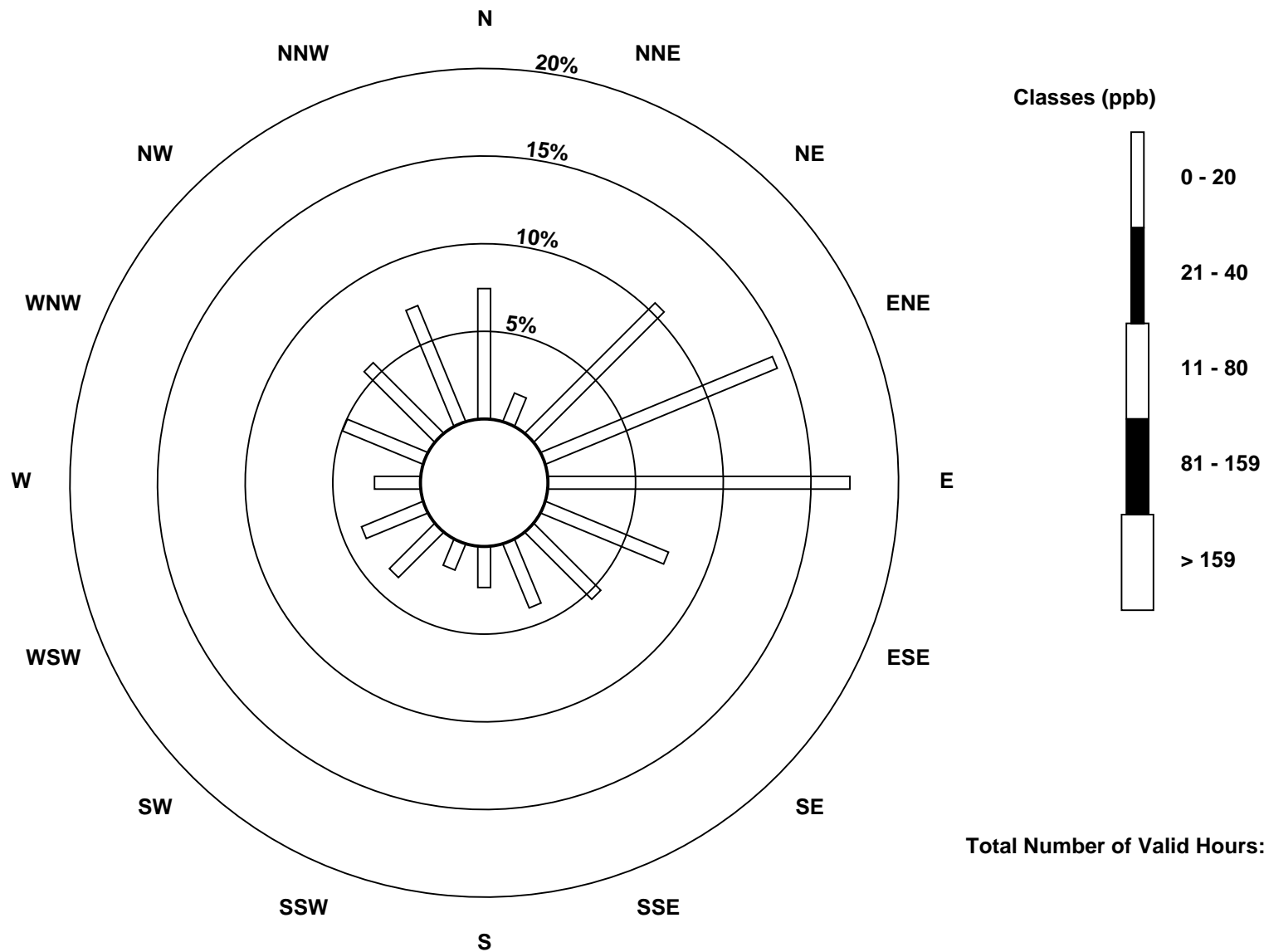
Total Number of Valid Hours: 685

Total Number of Hours: 720

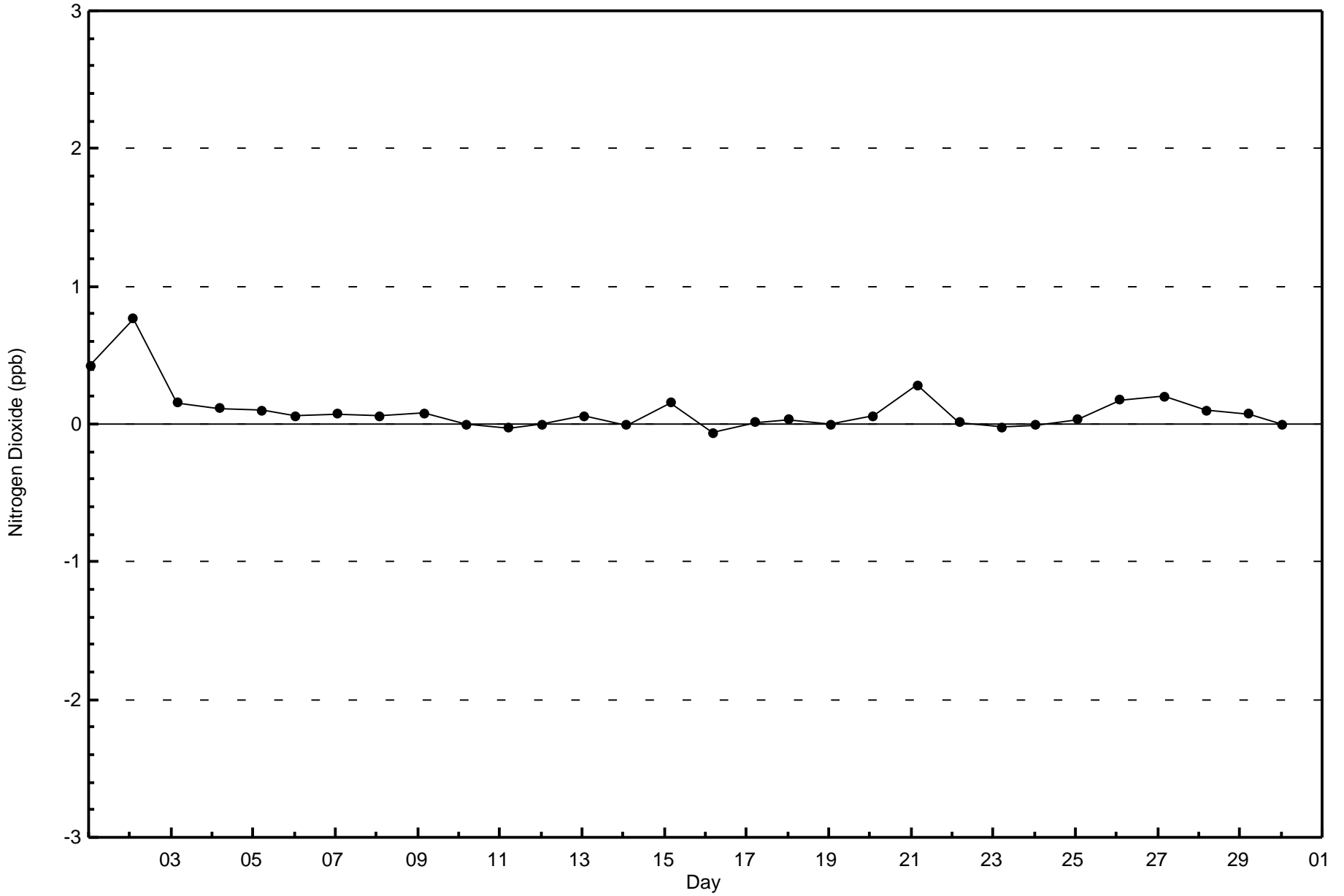


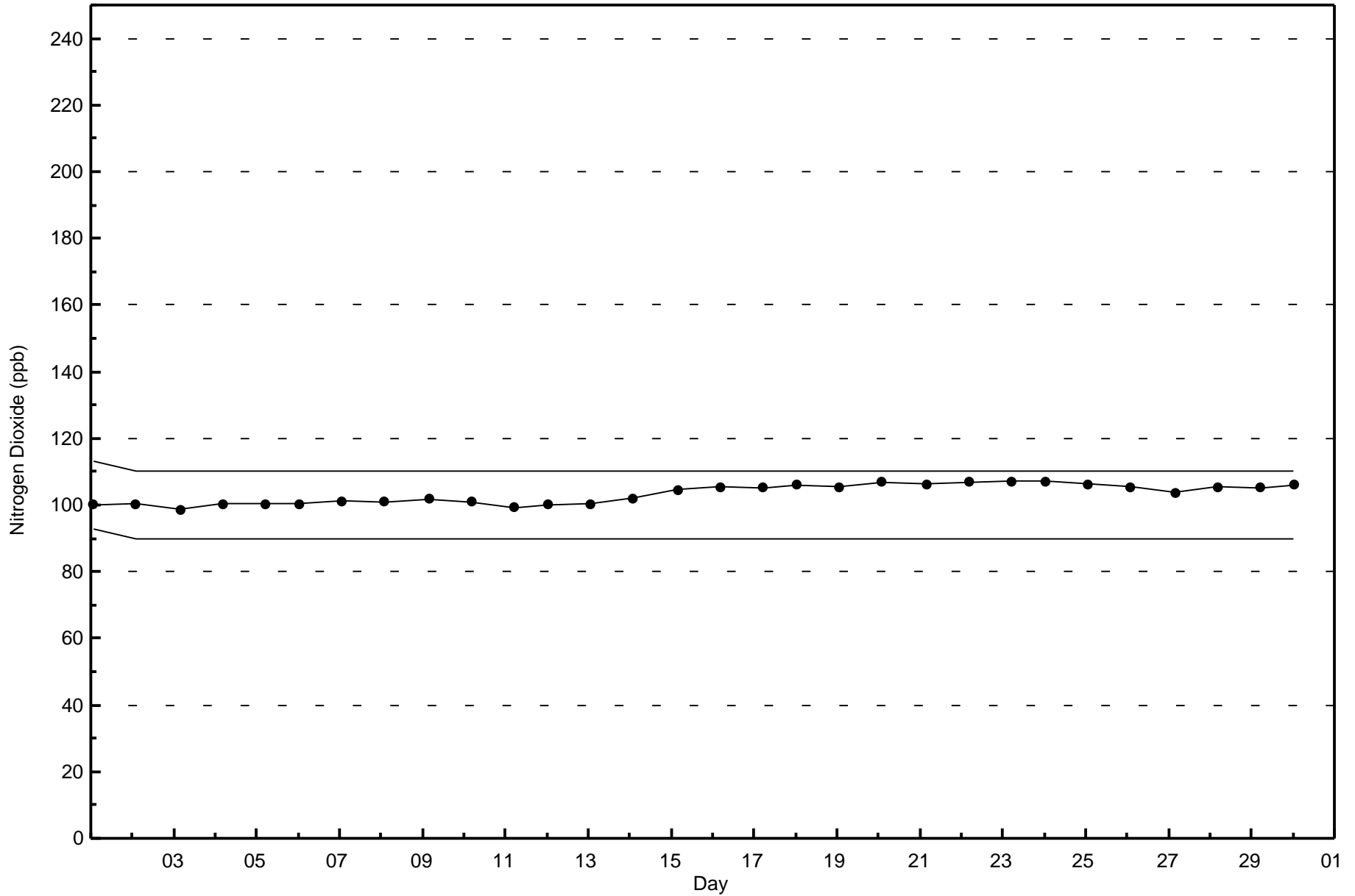
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association
Summary of Hour Averages

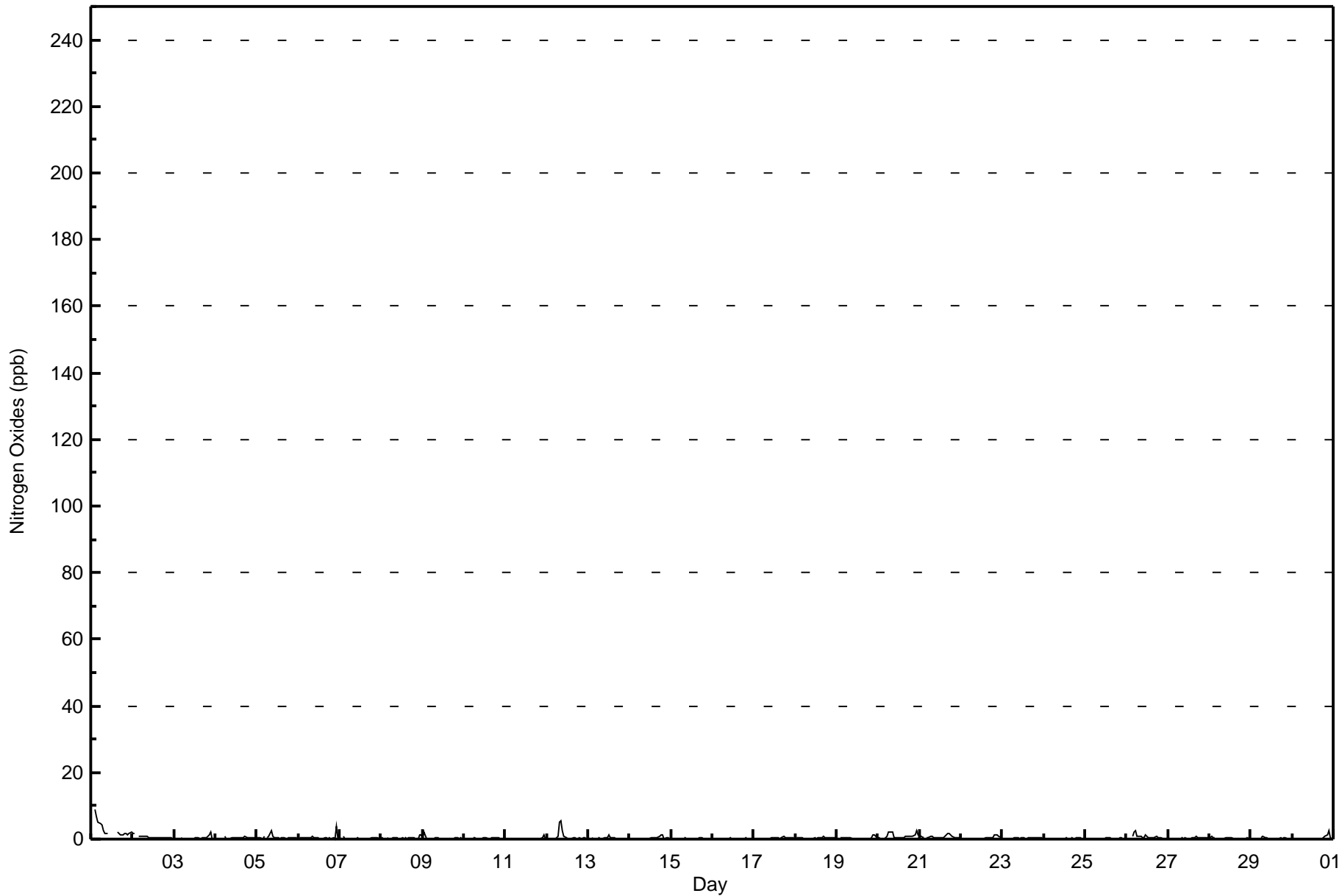
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2017

Maximum Value: 9 ppb on Jun 1 03:00 Maximum Daily Average: 2.8 ppb on Jun 1 Minimum Value: 0 ppb on Jun 27 07:00 Minimum Daily Average: 0.1 ppb on Jun 16 Maximum Diurnal Average: 0.6 ppb at hour 23 Minimum Diurnal Average: 0.2 ppb at hour 14 Monthly Average: 0.4 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4		Hours in Service: 720 Hours of Data: 685 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	1	Z	9	7	5	5	4	3	2	2	C	C	C	C	C	2	2	1	1	2	2	1	2	2	2.8	9																							
2-Jun	2	2	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2																							
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.3	2																							
4-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1																							
5-Jun	0	0	0	0	1	Z	1	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3																							
6-Jun	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0.5	4																							
7-Jun	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1																							
9-Jun	1	2	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1																							
12-Jun	Z	0	0	0	0	0	1	5	6	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	6																							
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1																							
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	0	0.3	1																							
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1																							
18-Jun	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	1	0.4	1																							
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1																							
20-Jun	0	0	Z	0	0	1	2	2	2	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	0.9	2																							
21-Jun	1	1	0	Z	0	0	1	1	0	1	0	1	0	0	0	1	2	2	1	1	0	1	0	0	0.6	2																							
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0.3	1																							
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
26-Jun	0	0	Z	1	2	2	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0.7	2																							
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1																							
28-Jun	0	1	1	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
29-Jun	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0.3	2																							
																								0.3	0.3	0.6	0.5	0.5	0.5	0.4	0.6	0.6	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.3	Diurnal Average	
																								2	2	9	7	5	5	4	5	6	3	1	1	1	1	1	2	2	2	2	1	2	2	4	2	Diurnal Maximum	
Z - zerospan C - Calibration																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	12	72	98	118	52	37	27	16	11	25	26	18	34	39	49	685

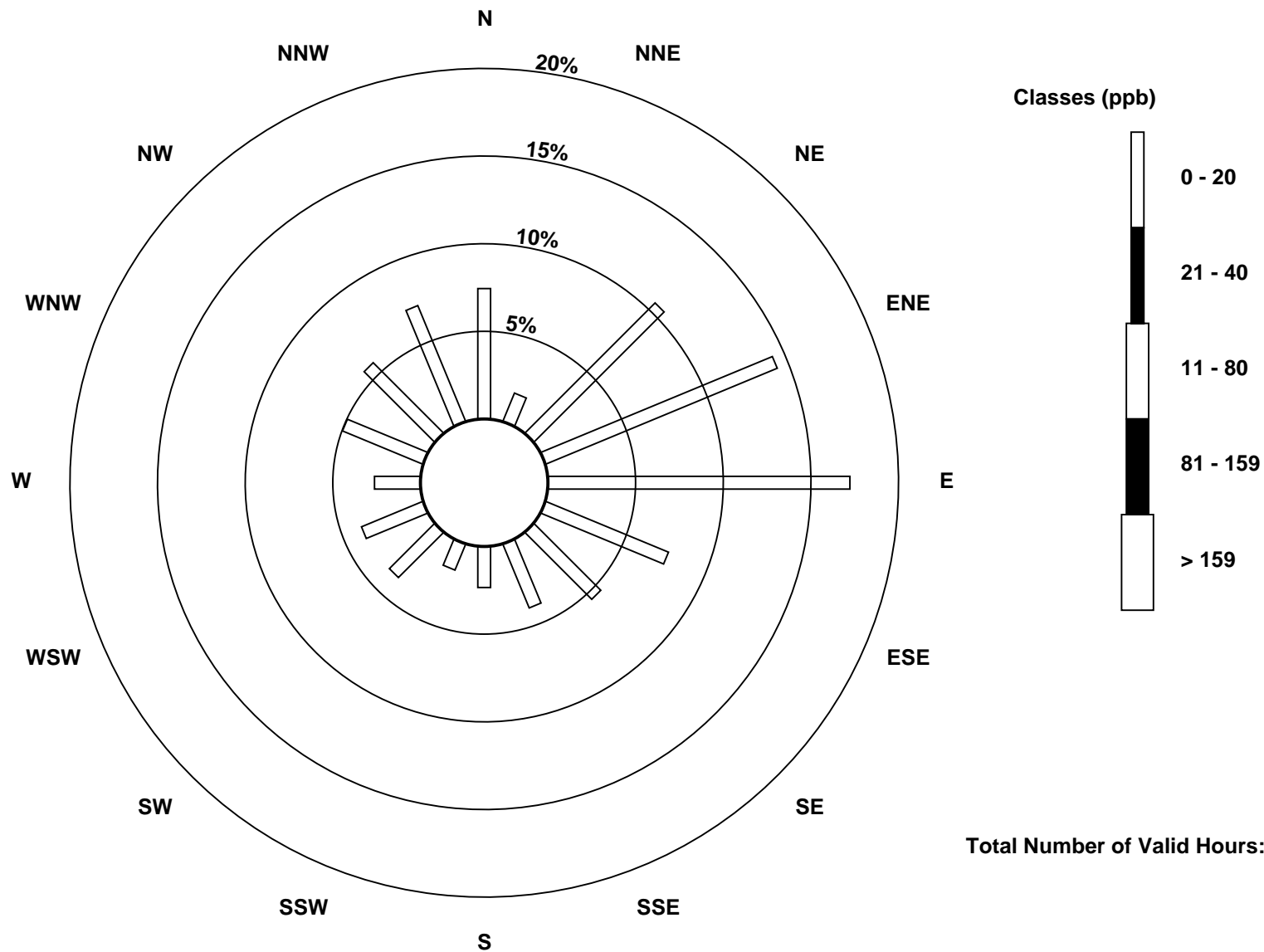
Total Number of Valid Hours: 685

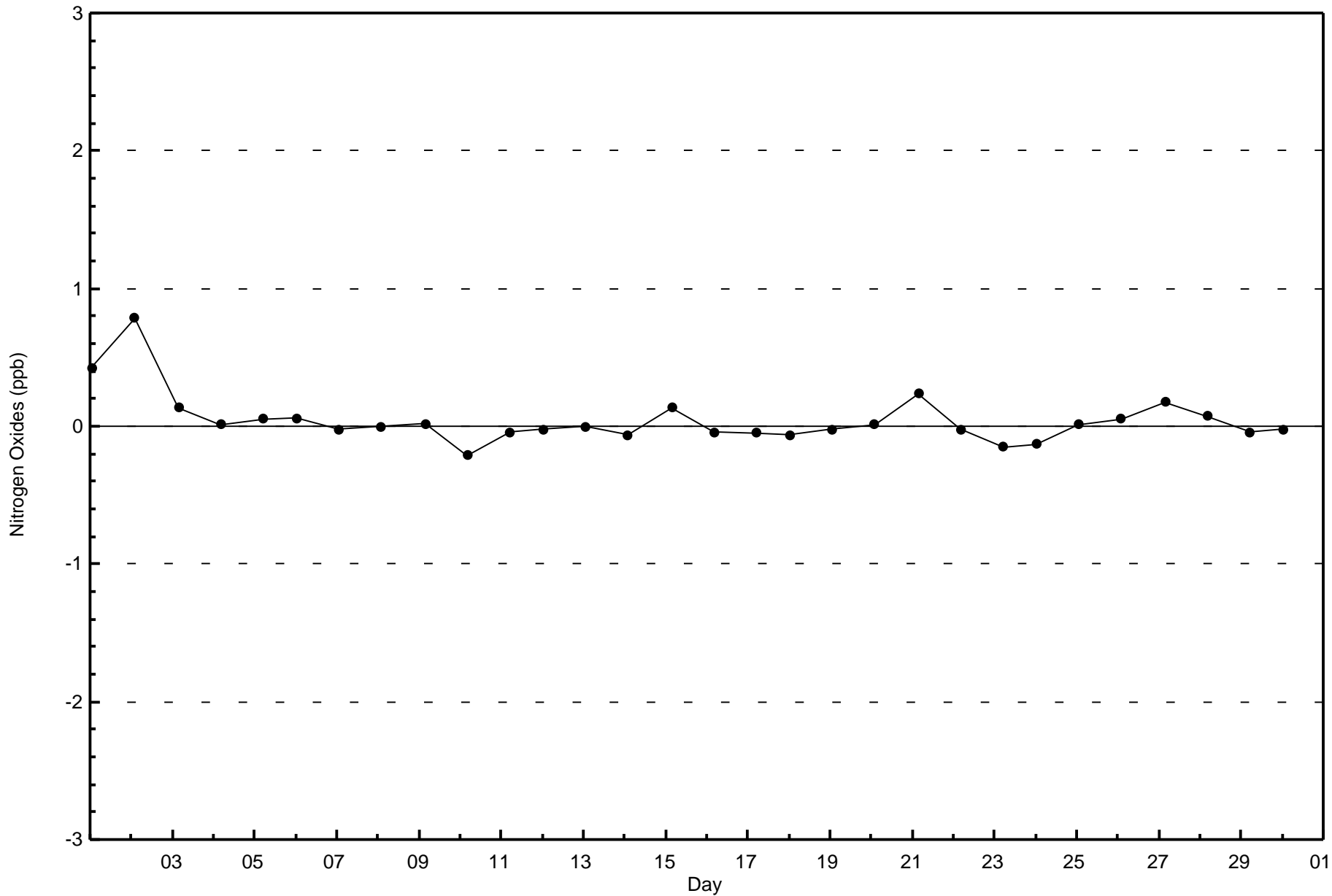
Total Number of Hours: 720

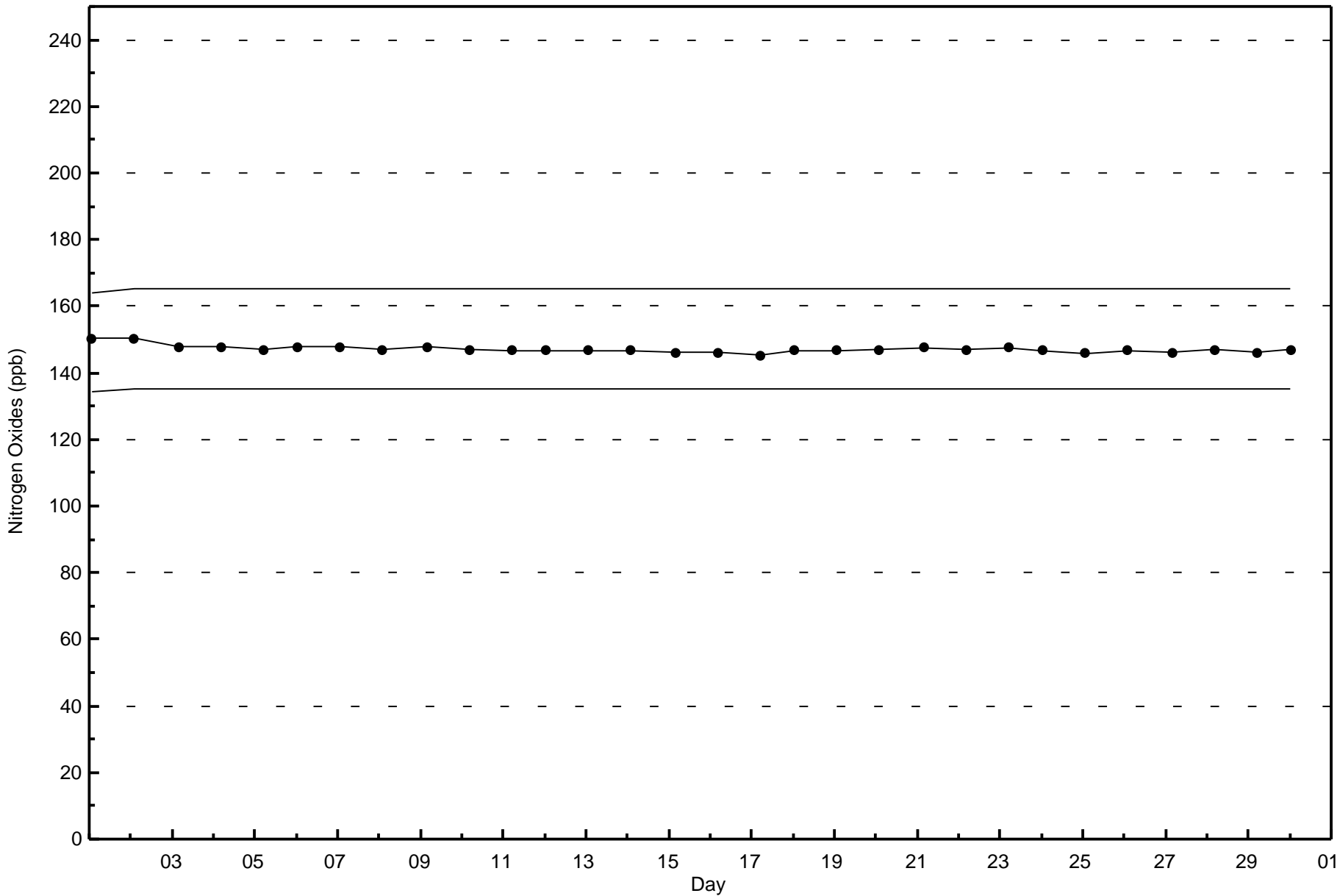


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

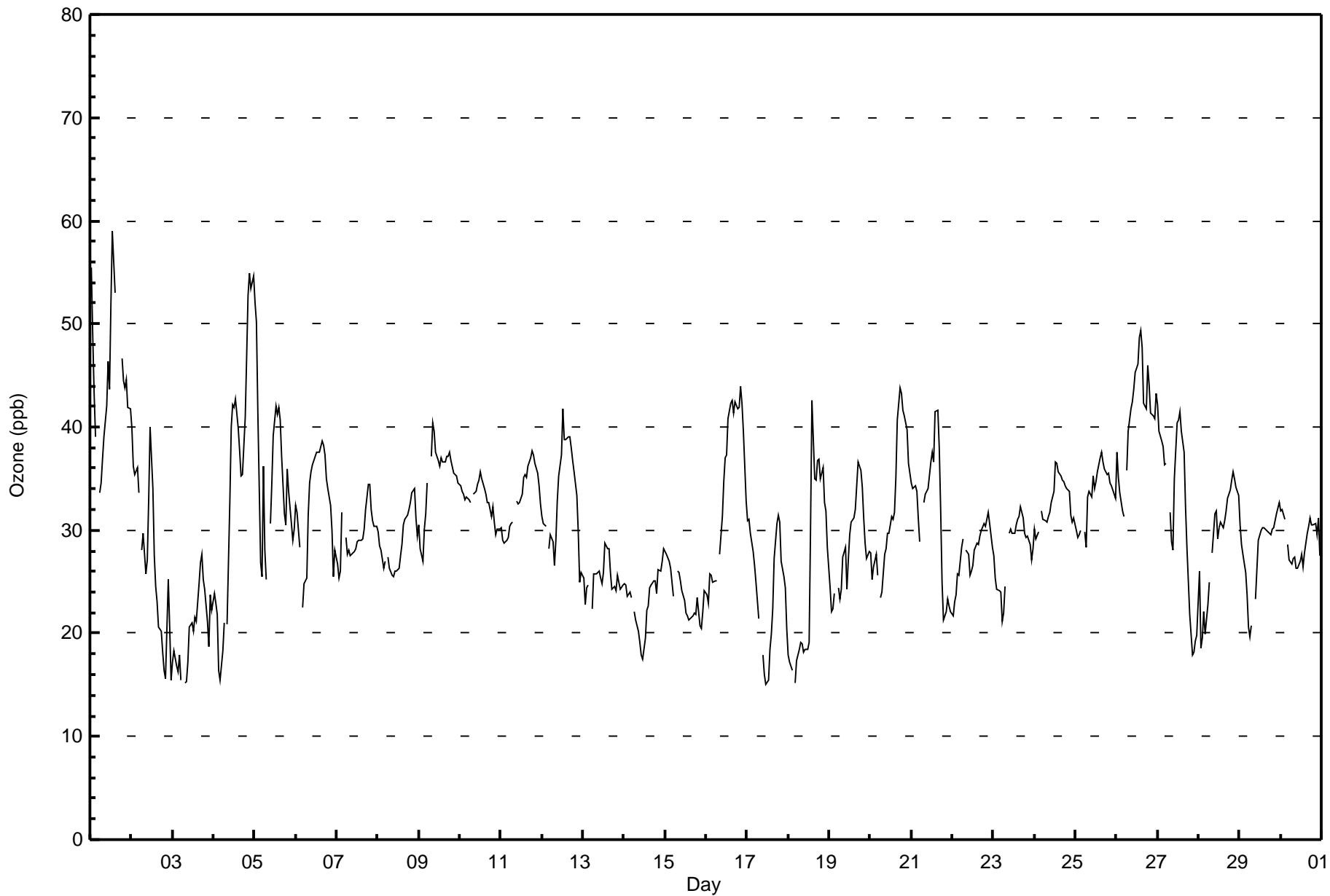
Fort Chipewyan - June 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 59 ppb on Jun 1 14:00	Maximum Daily Average: 44.5 ppb on Jun 1		Hours of Data:	687
Minimum Value: 15 ppb on Jun 17 12:00	Minimum Daily Average: 20.4 ppb on Jun 3		Hours of Missing Data:	33
Maximum Diurnal Average: 33.7 ppb at hour 15	Minimum Diurnal Average: 26.3 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 30.6 ppb	Percentiles: P ₁ = 15 P ₁₀ = 21 Q ₁ = 26 Median = 30 Q ₃ = 35 P ₉₀ = 40 P ₉₉ = 53		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	56	49	43	39	Z	34	35	37	39	42	46	44	52	59	53	C	C	C	47	44	44	45	42	42	44.5	59	
2-Jun	40	36	35	36	34	Z	28	30	26	27	33	40	34	27	25	23	21	20	18	16	16	25	21	15	27.2	40	
3-Jun	17	18	17	16	18	15	Z	15	15	17	21	21	20	22	21	25	27	28	25	24	21	19	24	22	20.4	28	
4-Jun	24	23	22	16	15	18	21	Z	21	33	40	42	42	43	40	38	35	35	41	47	53	55	53	55	35.3	55	
5-Jun	52	50	42	27	26	36	28	25	Z	31	35	39	42	41	42	41	37	32	30	36	34	31	29	30	35.4	52	
6-Jun	32	32	28	Z	22	25	25	31	35	36	36	37	37	38	38	39	38	37	35	34	32	30	25	28	32.7	39	
7-Jun	27	25	26	32	Z	29	28	28	27	28	28	28	29	29	29	29	30	32	34	34	32	31	30	30	29.4	34	
8-Jun	30	28	28	26	27	Z	27	26	26	25	26	26	26	28	29	31	31	31	32	33	34	34	31	29	28.9	34	
9-Jun	30	28	27	30	32	35	Z	37	40	40	38	37	36	37	37	37	37	37	38	37	35	35	35	35	35.2	40	
10-Jun	34	34	33	33	33	33	33	Z	34	34	34	34	35	36	35	34	33	33	31	32	31	30	30	30	32.9	36	
11-Jun	30	29	29	29	29	30	31	31	Z	33	33	33	34	35	35	35	36	37	38	37	36	35	34	33	33.1	38	
12-Jun	31	31	30	Z	28	30	29	27	29	33	35	37	42	39	39	39	39	38	37	36	33	30	25	26	33.1	42	
13-Jun	25	23	24	25	Z	22	26	26	26	26	25	25	26	29	28	28	26	24	25	24	26	25	24	25	25.3	29	
14-Jun	25	25	24	24	23	Z	22	21	20	19	18	17	20	22	23	24	25	25	25	24	26	26	27	28	23.2	28	
15-Jun	28	28	27	26	25	24	Z	26	26	25	24	23	22	22	21	22	22	22	22	23	21	20	22	24	23.7	28	
16-Jun	24	23	26	26	25	25	25	Z	28	31	35	37	37	41	42	43	41	42	42	42	44	42	40	33	34.5	44	
17-Jun	31	31	30	28	27	25	23	21	Z	18	16	15	15	18	20	22	27	31	31	31	27	25	24	20	24.3	31	
18-Jun	18	17	16	Z	15	17	18	19	19	18	18	18	19	30	43	35	35	37	37	35	36	33	32	28	25.9	43	
19-Jun	24	22	22	24	Z	24	23	24	27	28	24	27	30	31	31	32	34	37	36	34	31	29	27	28	28.3	37	
20-Jun	28	25	27	28	26	Z	23	24	28	28	30	30	31	31	32	35	41	44	43	42	41	40	36	36	32.5	44	
21-Jun	35	34	34	34	31	29	Z	33	34	34	34	37	38	37	42	42	38	32	25	21	22	23	23	22	31.8	42	
22-Jun	22	23	24	26	26	28	29	Z	28	28	26	26	27	28	29	29	29	30	31	30	31	32	31	28	27.8	32	
23-Jun	27	25	24	24	24	21	22	25	Z	30	30	30	30	31	31	31	32	31	30	29	29	29	27	28	27.9	32	
24-Jun	30	29	30	Z	32	31	31	31	31	32	33	34	37	37	36	35	35	35	34	34	34	34	32	31	31	32.7	37
25-Jun	30	29	30	30	Z	30	28	33	34	33	35	34	35	36	37	38	37	36	35	35	35	34	34	33	33.5	38	
26-Jun	38	35	34	32	31	Z	36	40	42	42	44	45	46	49	49	48	42	42	46	44	41	41	41	43	41.3	49	
27-Jun	42	40	39	38	36	36	Z	32	29	28	35	40	41	42	40	38	32	28	25	22	18	18	19	20	32.1	42	
28-Jun	26	19	20	22	20	23	25	Z	28	32	32	29	30	31	30	31	32	33	34	35	36	35	34	33	29.1	36	
29-Jun	30	29	28	26	24	21	20	21	Z	23	26	29	30	30	30	30	30	30	29	30	30	32	32	33	27.9	33	
30-Jun	32	32	31	Z	29	27	27	27	27	26	26	27	28	26	28	30	30	31	30	31	31	30	31	28	28.9	32	

30.6	29.1	28.3	27.8	26.3	26.8	26.5	27.6	28.7	29.3	30.5	31.4	32.3	33.3	33.7	33.1	32.9	32.8	32.9	32.6	32.0	31.5	30.5	29.9	Diurnal Average	
56	50	43	39	36	36	36	40	42	42	46	45	52	59	53	48	42	44	47	47	53	55	53	55	Diurnal Maximum	

Z - zeronspan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 82 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	52	7.57	7.57
21 - 50	626	91.12	98.69
51 - 82	9	1.31	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	5	2	2	4	12	1	0	0	0	0	1	3	2	6	7	7	52
21 - 50	47	13	68	96	100	51	38	23	17	9	24	24	16	27	32	41	626
51 - 82	0	0	0	0	2	1	5	1	0	0	0	0	0	0	0	0	9
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	15	70	100	114	53	43	24	17	9	25	27	18	33	39	48	687

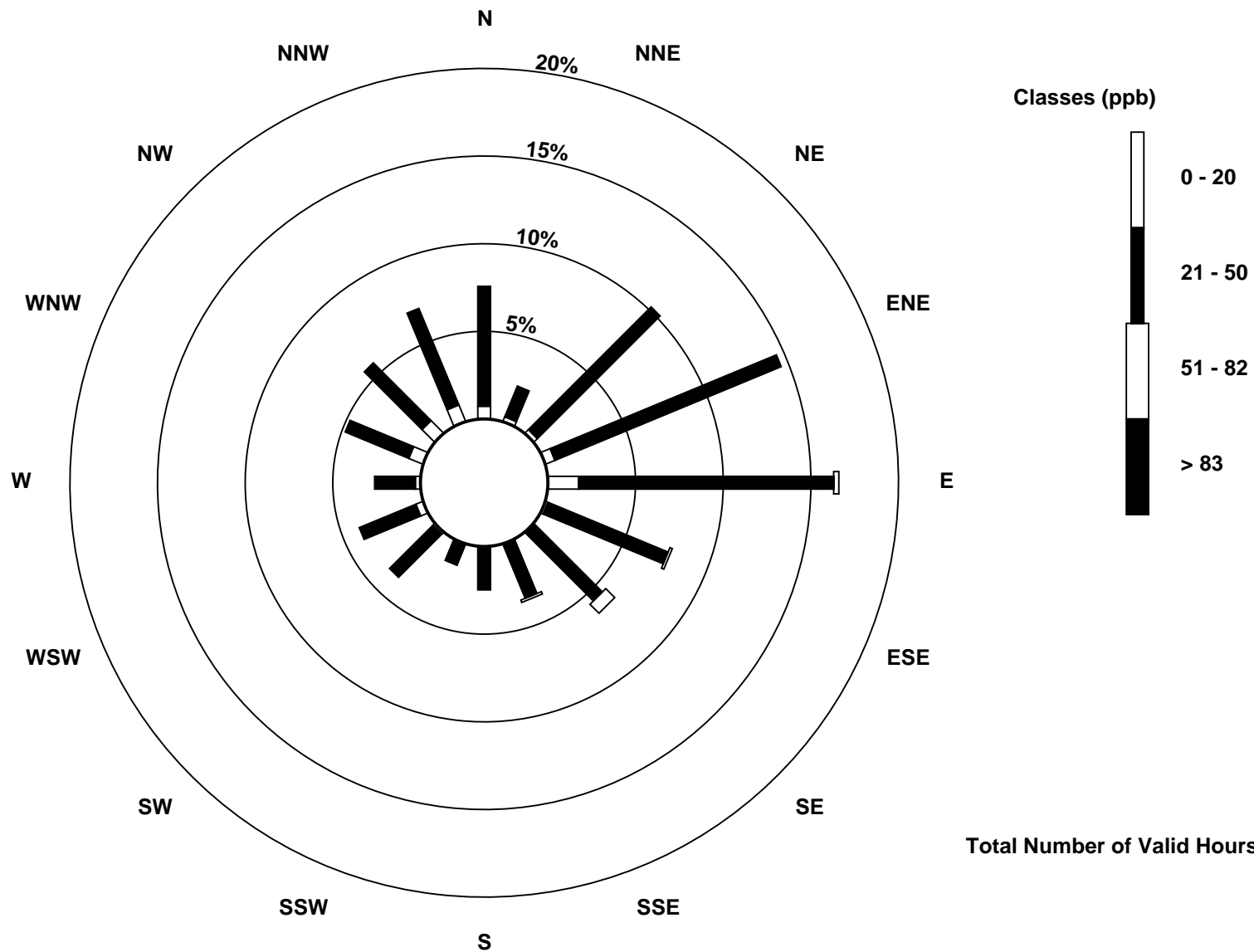
Total Number of Valid Hours: 687

Total Number of Hours: 720

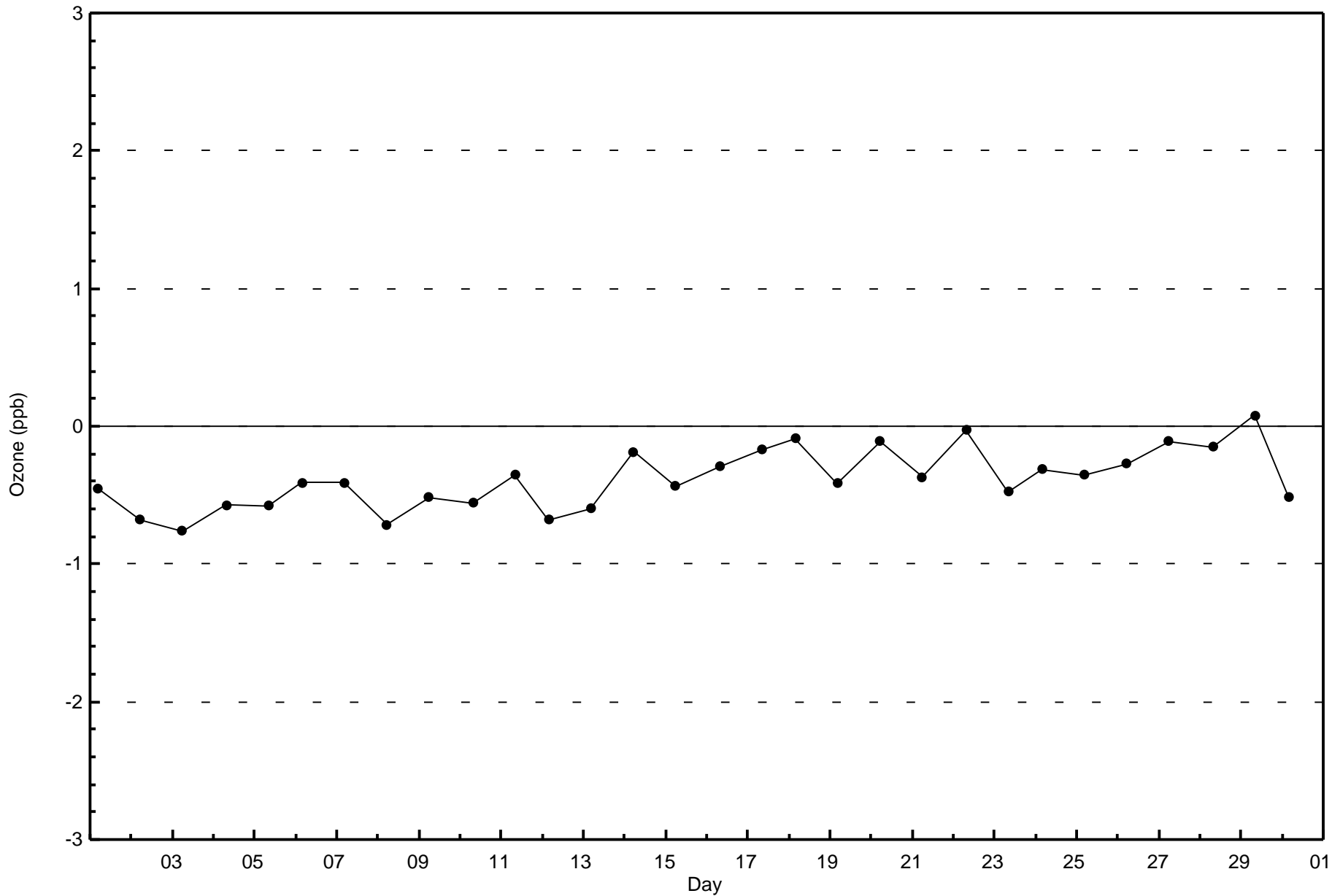


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)



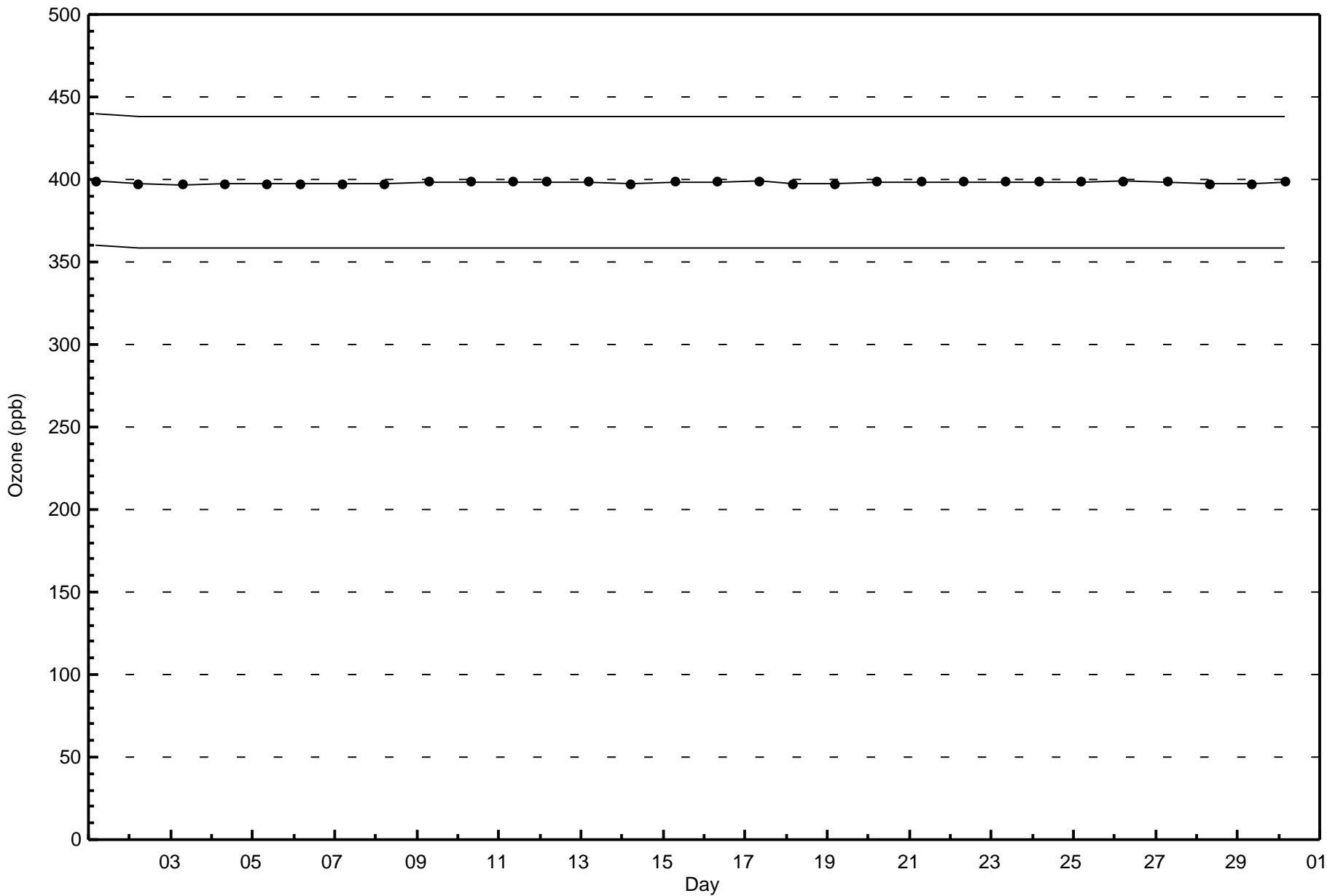
Total Number of Valid Hours: 687





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Fort Chipewyan - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Fort Chipewyan - June 2017

Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 22.5 µg/m ³ on Jun 28 11:00	Maximum Daily Average: 7.6 µg/m ³ on Jun 26	Hours of Data:	625
Minimum Value: 0.8 µg/m ³ on Jun 22 11:00	Minimum Daily Average: 1.5 µg/m ³ on Jun 15	Hours of Missing Data:	95
Maximum Diurnal Average: 4.2 µg/m ³ at hour 22	Minimum Diurnal Average: 2.8 µg/m ³ at hour 12	Hours of Calibration:	2
Monthly Average: 3.32 µg/m ³	Percentiles: P ₁ = 1.0 P ₁₀ = 1.6 Q ₁ = 2.0 Median = 2.6 Q ₃ = 3.8 P ₉₀ = 5.2 P ₉₉ = 16.3	Percent Operational Time:	87.1

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
2-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	10.4	8.9	8.5	7.2	7.0	6.6	5.9	6.5	6.8	5.7	4.5	--	10.4
3-Jun	2.8	2.4	2.6	3.1	2.8	2.8	2.7	2.9	3.1	3.2	2.7	2.1	1.7	1.8	1.9	1.7	1.8	1.7	2.5	2.8	2.9	3.8	2.4	2.2	2.5	3.8	
4-Jun	2.2	2.0	2.2	2.7	3.0	2.9	2.2	2.0	2.0	1.8	1.5	1.7	2.3	3.2	4.0	4.3	4.7	4.6	4.2	3.6	3.5	2.2	1.5	1.5	2.7	4.7	
5-Jun	1.6	1.7	1.8	1.9	2.3	2.5	2.4	2.3	3.0	2.7	2.7	2.5	2.2	2.2	2.1	2.2	2.2	1.9	2.7	5.2	4.7	3.8	3.6	3.2	2.6	5.2	
6-Jun	2.2	2.0	1.9	1.8	1.8	2.0	2.2	2.8	2.9	3.0	2.4	1.9	1.8	2.5	2.8	3.3	4.0	4.1	4.0	4.1	4.4	4.0	4.1	4.0	2.9	4.4	
7-Jun	5.3	6.2	5.7	4.4	3.8	3.6	3.4	3.2	2.7	2.7	2.8	3.0	3.1	3.2	3.3	3.9	4.2	4.4	4.4	4.6	4.7	4.5	4.3	3.8	4.0	6.2	
8-Jun	3.8	3.7	3.5	3.8	3.6	3.1	2.9	2.3	2.3	2.3	2.3	2.1	2.0	1.9	2.1	2.3	2.6	3.3	3.7	3.8	4.0	4.2	4.1	3.6	3.1	4.2	
9-Jun	3.8	4.0	4.3	3.9	3.7	3.4	3.0	2.5	3.1	3.5	3.2	3.0	2.9	2.9	2.8	3.1	2.6	2.4	2.6	2.6	2.3	2.1	2.2	2.1	3.0	4.3	
10-Jun	2.1	1.9	1.9	1.9	1.7	1.8	1.9	1.7	1.6	1.6	1.6	1.4	1.8	1.9	2.2	2.0	1.9	7.7	4.3	3.3	3.1	2.9	2.9	2.7	2.4	7.7	
11-Jun	2.6	2.5	2.5	2.6	2.6	2.4	2.0	2.0	2.2	2.3	2.2	2.2	2.4	2.4	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.6	
12-Jun	2.2	2.2	2.3	2.4	2.5	2.6	3.0	5.4	3.6	2.7	3.3	3.0	3.4	5.5	5.7	4.6	3.4	3.0	2.5	2.1	2.2	2.8	5.1	3.4	3.3	5.7	
13-Jun	3.9	4.2	4.7	4.3	3.7	2.6	2.0	2.3	2.4	2.5	2.6	2.6	2.6	1.8	1.9	1.3	1.4	1.6	1.7	2.2	2.8	3.2	2.7	2.8	2.7	4.7	
14-Jun	2.5	2.2	2.1	2.2	2.6	2.6	2.8	3.3	3.1	3.0	2.8	2.5	1.8	1.6	1.5	1.6	1.5	1.6	1.7	1.4	1.4	1.3	1.3	1.3	2.1	3.3	
15-Jun	1.1	1.1	1.2	1.3	1.2	1.2	1.1	1.0	1.3	1.0	0.9	1.0	1.1	1.2	1.4	1.7	2.0	2.1	2.2	2.5	2.0	2.2	2.3	2.4	1.5	2.5	
16-Jun	2.2	2.2	2.2	2.2	2.2	2.3	2.1	1.9	1.8	1.6	1.6	1.5	1.5	1.6	1.5	1.7	1.7	1.5	1.5	1.6	1.5	1.6	1.5	1.4	1.8	2.3	
17-Jun	1.3	1.4	1.6	1.8	1.8	1.7	1.6	1.6	1.8	2.5	2.9	3.8	4.6	3.6	2.9	2.3	2.5	2.0	1.9	2.1	2.0	2.0	2.1	2.1	2.3	4.6	
18-Jun	1.9	1.8	1.9	2.2	2.0	1.7	1.8	2.1	1.9	2.0	1.7	1.8	2.1	2.4	1.9	2.2	2.4	3.3	3.7	2.8	2.3	2.4	2.3	2.3	2.2	3.7	
19-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
20-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
21-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	3.9	5.3	3.3	3.3	3.0	6.6	10.4	10.6	8.9	5.6	6.8	6.5	5.0	2.8	--	10.6	
22-Jun	1.7	1.7	1.1	1.1	1.0	0.9	1.0	1.0	1.0	1.0	0.8	0.9	0.9	0.9	2.1	2.1	3.0	4.1	4.5	9.0	16.8	17.5	17.5	4.8	4.0	17.5	
23-Jun	3.3	2.9	1.9	1.9	1.8	1.8	1.8	1.8	1.6	2.1	1.6	1.7	1.9	1.9	2.1	2.2	3.0	2.5	2.6	2.7	2.7	2.8	4.3	2.6	2.3	4.3	
24-Jun	2.6	2.7	2.6	2.6	2.4	2.5	2.5	2.6	2.5	2.5	2.6	2.7	2.5	2.6	2.8	2.8	3.0	4.1	3.6	3.0	3.0	3.7	4.2	4.2	2.9	4.2	
25-Jun	5.2	5.6	5.5	5.0	4.9	3.5	2.6	1.9	1.7	1.8	1.8	1.9	2.0	1.8	1.7	1.9	2.5	2.8	3.9	9.8	13.6	14.4	13.9	12.2	5.1	14.4	
26-Jun	18.0	16.8	14.6	14.0	14.7	12.2	9.0	7.3	7.3	7.4	6.7	5.6	4.6	3.7	3.9	4.1	4.5	3.3	3.8	4.2	4.0	4.6	4.2	4.3	7.6	18.0	
27-Jun	4.6	4.7	4.8	5.0	4.9	5.0	5.0	4.8	5.7	4.8	3.8	3.2	3.1	3.0	3.5	3.9	3.3	2.4	2.5	2.7	2.6	2.8	3.2	3.3	3.9	5.7	
28-Jun	3.0	3.2	4.2	4.2	4.4	3.6	4.2	5.5	8.3	21.7	22.5	11.2	12.9	8.8	4.1	3.6	3.1	2.5	2.3	2.3	2.4	2.6	2.9	2.7	6.1	22.5	
29-Jun	2.8	2.8	3.0	4.4	6.7	8.2	6.5	6.0	5.4	3.6	1.5	1.6	2.0	1.9	1.9	2.2	2.6	2.7	2.8	2.9	2.9	2.6	2.7	2.6	3.4	8.2	
30-Jun	3.6	4.5	4.5	4.3	3.2	1.9	2.1	2.1	1.9	2.0	2.1	2.5	2.7	2.4	2.0	2.1	2.3	2.6	2.8	3.1	3.8	4.8	5.2	4.2	3.0	5.2	

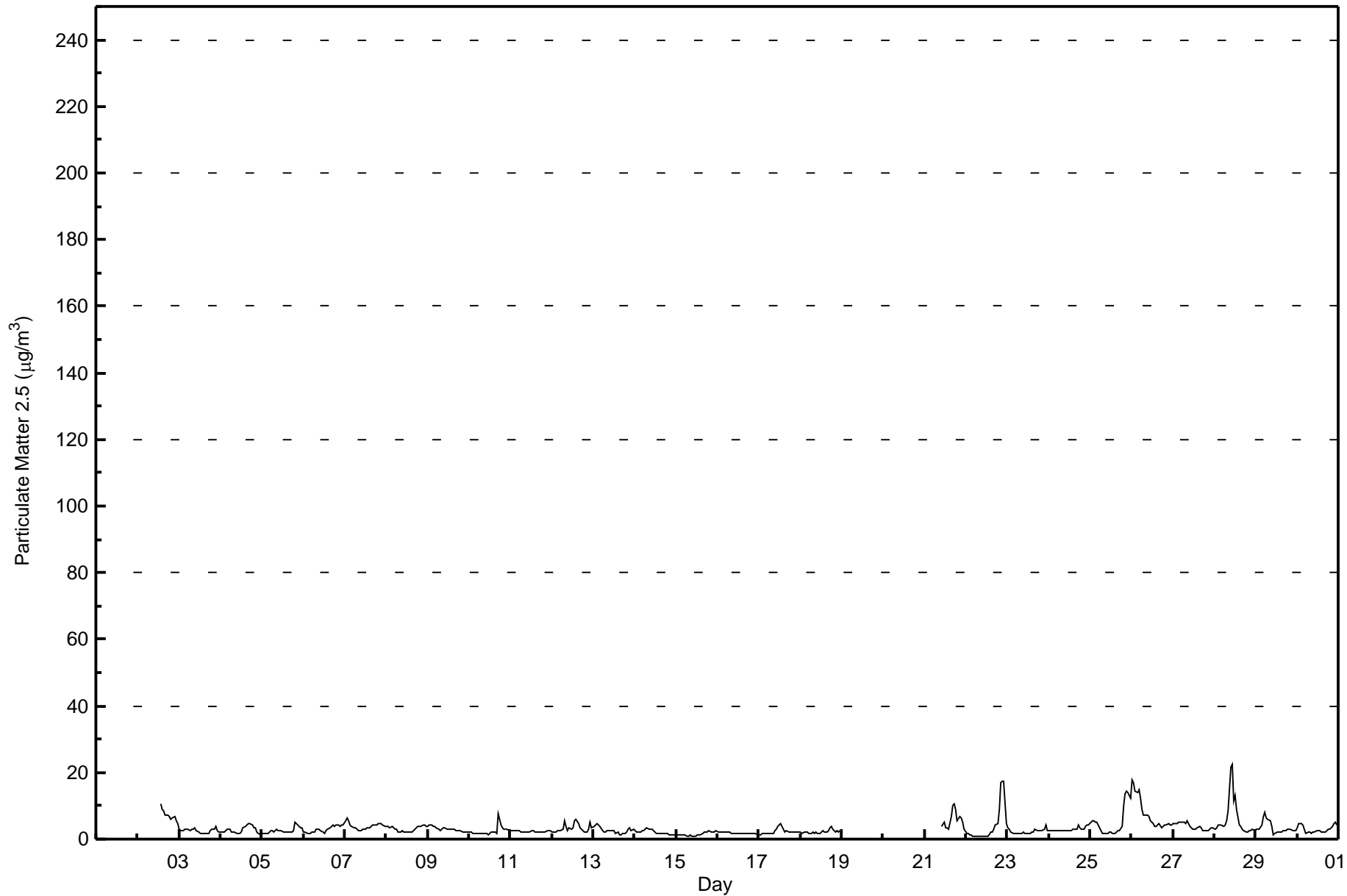
3.5	3.5	3.4	3.4	3.4	3.1	2.9	2.9	3.0	3.4	3.3	2.8	2.8	3.0	2.8	3.0	3.2	3.4	3.3	3.6	4.1	4.2	4.2	3.3	Diurnal Average	
18.0	16.8	14.6	14.0	14.7	12.2	9.0	7.3	8.3	21.7	22.5	11.2	12.9	10.4	8.9	8.5	10.4	10.6	8.9	9.8	16.8	17.5	17.5	12.2	Diurnal Maximum	

C - Calibration AF - Analyzer Failure UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	559	89.44	89.44
6 - 15	49	7.84	97.28
16 - 25	7	1.12	98.40
26 - 80	0	0.00	98.40
> 81.0	0	0.00	98.40

Total Number of Valid Hours: 625

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	35	15	66	87	95	47	29	20	9	6	15	21	16	28	36	34	559
6 - 15	10	0	2	8	5	2	3	4	3	1	1	0	0	1	3	6	49
16 - 25	1	0	0	2	0	0	1	1	0	0	0	0	0	0	0	2	7
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	46	15	68	97	100	49	33	25	12	7	16	21	16	29	39	42	615

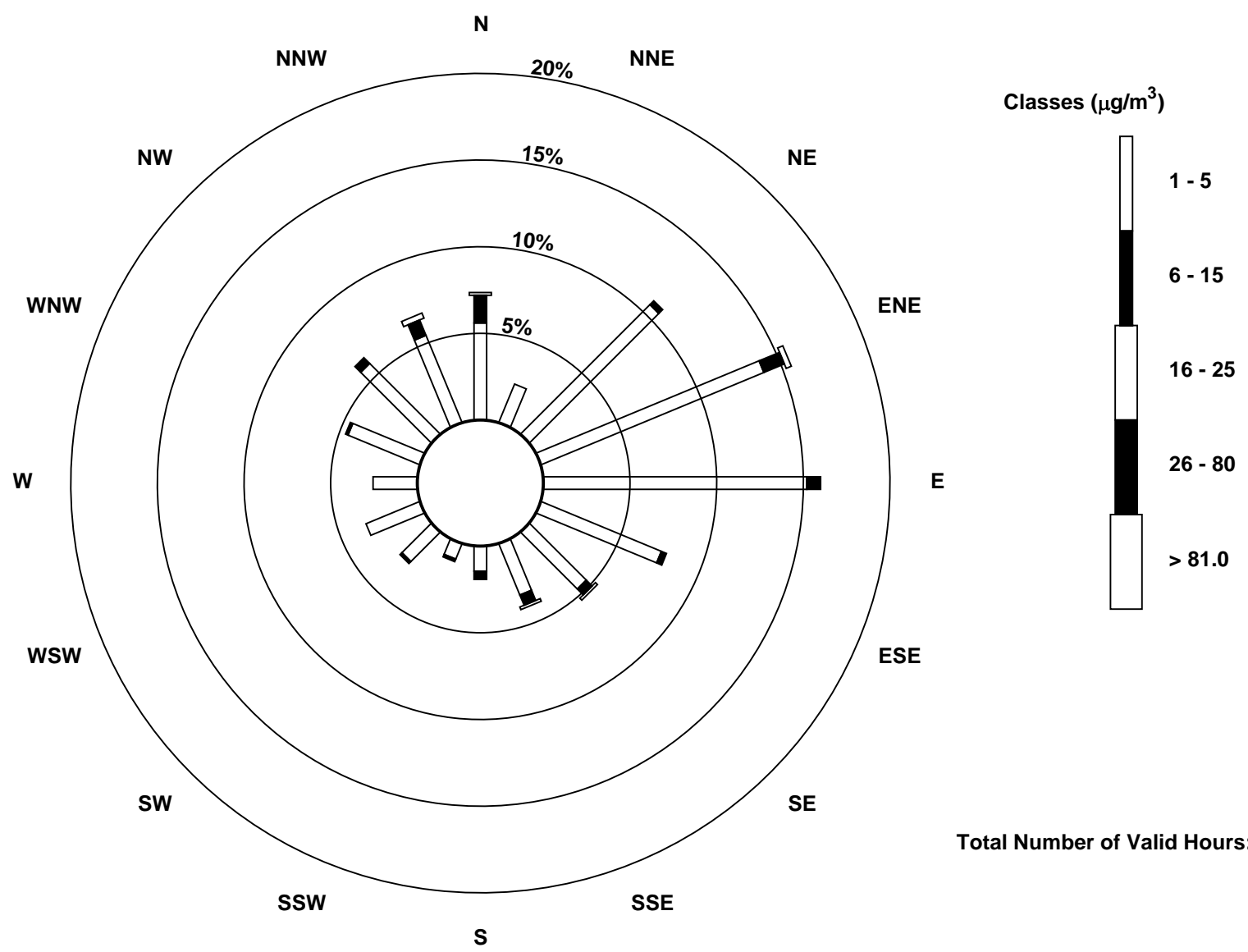
Total Number of Valid Hours: 625

Total Number of Hours: 720



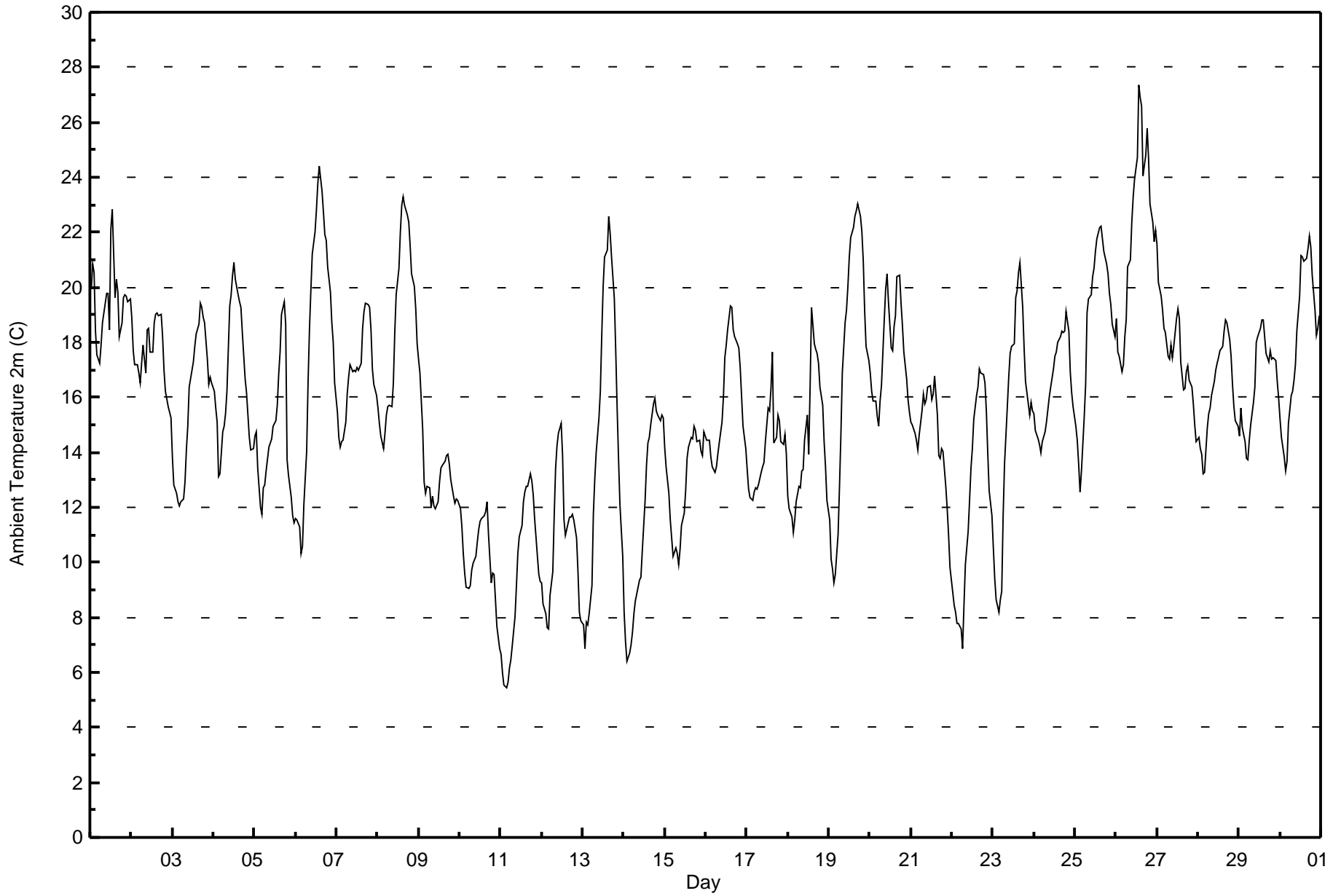
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)





Maximum Value: 27.4 C on Jun 26 14:00		Maximum Daily Average: 22.1 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 5.4 C on Jun 11 04:00		Minimum Daily Average: 9.5 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 18.4 C at hour 16		Minimum Diurnal Average: 12.3 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 15.59 C		Percentiles: P ₁ = 6.6 P ₁₀ = 10.2 Q ₁ = 12.9 Median = 15.6 Q ₃ = 18.4 P ₉₀ = 20.6 P ₉₉ = 24.7		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	19.9	20.8	20.6	18.4	17.6	17.2	17.9	18.7	19.1	19.8	19.8	18.5	22.1	22.8	19.6	20.3	19.8	18.2	18.7	19.6	19.7	19.7	19.5	19.6	19.5	22.8																						
2-Jun	18.8	17.7	17.2	17.2	16.9	16.5	17.3	17.9	16.9	18.5	18.5	17.6	17.6	18.7	19.0	19.0	18.9	19.0	18.2	17.0	16.2	15.6	15.5	15.3	17.6	19.0																						
3-Jun	13.9	12.8	12.5	12.2	12.0	12.2	12.3	12.9	14.1	15.0	16.4	17.0	17.3	17.8	18.3	18.7	19.4	19.3	18.9	18.7	17.4	16.5	16.7	16.5	15.8	19.4																						
4-Jun	16.2	15.6	15.1	13.1	13.2	14.7	14.9	15.4	16.2	19.3	19.7	20.5	20.9	20.3	19.7	19.5	19.3	18.4	16.7	16.2	15.4	14.6	14.1	14.1	16.8	20.9																						
5-Jun	14.6	14.7	13.4	12.0	11.8	12.7	12.8	13.3	14.2	14.3	14.5	14.9	15.2	15.7	16.8	17.7	19.0	19.5	18.7	13.8	13.2	12.4	11.7	11.5	14.5	19.5																						
6-Jun	11.6	11.6	11.3	10.3	10.6	12.1	14.1	16.5	18.5	19.9	21.2	22.0	22.9	23.8	24.4	23.5	22.7	21.9	21.7	20.8	19.8	18.7	18.0	16.5	18.1	24.4																						
7-Jun	15.5	14.5	14.2	14.4	14.4	15.1	16.1	16.7	17.2	16.9	17.0	16.9	17.1	17.0	17.2	18.5	19.1	19.4	19.4	19.2	18.4	17.0	16.5	16.0	16.8	19.4																						
8-Jun	15.6	15.0	14.6	14.1	14.7	15.4	15.7	15.7	15.7	16.5	18.4	19.7	20.7	22.0	23.0	23.3	23.0	22.6	22.4	21.5	20.5	20.1	19.2	17.9	18.6	23.3																						
9-Jun	17.4	16.9	14.8	12.9	12.5	12.8	12.7	12.0	12.4	12.1	11.9	12.2	12.9	13.4	13.5	13.7	13.9	13.9	13.6	13.0	12.4	12.1	12.3	12.3	13.2	17.4																						
10-Jun	12.0	11.3	10.3	9.6	9.1	9.0	9.1	9.7	10.0	10.2	10.7	11.2	11.5	11.6	11.7	11.9	12.2	11.0	9.2	9.6	9.6	8.6	7.7	6.8	10.2	12.2																						
11-Jun	6.6	6.0	5.5	5.4	5.6	6.2	6.5	7.0	8.0	9.1	10.3	10.9	11.3	12.2	12.6	12.8	12.8	13.2	13.0	12.5	11.6	10.2	9.6	9.3	9.5	13.2																						
12-Jun	9.2	8.5	8.1	7.6	7.6	8.8	9.7	11.7	13.4	14.2	14.7	15.1	13.9	11.5	11.0	11.4	11.6	11.7	11.7	11.5	10.9	9.7	8.2	7.9	10.8	15.1																						
13-Jun	7.7	6.9	7.8	7.7	8.1	9.2	11.8	13.0	14.0	15.3	16.2	18.3	20.0	21.1	21.3	22.6	22.0	21.1	19.6	17.7	15.6	13.8	12.1	10.2	14.7	22.6																						
14-Jun	8.2	7.1	6.4	6.7	7.0	7.5	8.1	8.6	9.1	9.4	9.5	10.4	12.2	13.5	14.3	14.6	15.0	15.8	16.0	15.5	15.3	15.2	15.3	15.2	11.5	16.0																						
15-Jun	14.2	13.5	12.5	11.5	10.9	10.2	10.5	10.3	9.9	10.5	11.3	11.8	12.6	13.8	14.2	14.6	14.5	15.0	14.8	14.4	14.4	14.1	13.9	14.8	12.8	15.0																						
16-Jun	14.5	14.4	14.4	13.8	13.5	13.3	13.5	13.9	14.3	15.1	16.0	17.5	17.9	18.4	19.3	19.3	18.5	18.2	17.9	17.8	17.1	16.0	15.0	14.1	16.0	19.3																						
17-Jun	13.4	12.7	12.4	12.3	12.5	12.7	12.6	12.8	13.3	13.5	13.6	14.4	15.6	15.5	16.3	17.6	14.3	14.5	15.4	15.2	14.4	14.3	14.6	13.9	14.1	17.6																						
18-Jun	12.4	12.0	11.6	11.1	11.5	12.2	12.8	12.7	13.3	13.4	14.4	15.4	13.9	16.4	19.3	18.0	17.7	17.6	17.2	16.4	15.7	14.4	13.5	12.2	14.4	19.3																						
19-Jun	11.5	10.1	9.8	9.2	9.6	11.0	12.8	14.6	16.9	18.7	19.2	20.0	21.1	21.8	22.2	22.6	22.8	23.0	22.6	22.0	21.0	19.1	17.8	17.4	17.4	23.0																						
20-Jun	16.9	16.2	15.8	15.9	15.3	15.0	15.9	16.4	18.8	20.0	20.5	19.5	17.8	17.7	18.5	18.9	20.4	20.4	19.4	18.6	17.7	16.7	15.9	15.5	17.7	20.5																						
21-Jun	15.1	15.0	14.7	14.4	14.1	14.6	15.5	16.1	15.8	15.9	16.4	16.4	15.9	16.1	16.8	15.3	13.9	13.8	14.1	14.0	12.8	12.0	11.0	9.8	14.6	16.8																						
22-Jun	8.9	8.5	8.2	7.8	7.8	7.6	6.8	8.4	9.9	11.1	12.3	13.4	14.1	15.2	16.1	16.4	17.0	16.9	16.8	16.5	15.5	14.0	12.6	11.7	12.2	17.0																						
23-Jun	10.5	9.4	8.6	8.2	8.7	9.0	11.7	13.6	15.7	16.7	17.6	17.9	17.9	19.6	20.6	20.9	19.3	17.8	16.6	16.2	15.4	15.8	15.5	15.1	20.9	20.9																						
24-Jun	15.4	14.8	14.5	14.3	14.0	14.4	14.7	15.1	15.5	16.0	16.4	17.0	17.5	17.6	18.0	18.2	18.4	18.4	18.4	19.1	18.4	16.9	16.2	15.7	16.5	19.1																						
25-Jun	14.9	14.4	13.6	12.6	13.3	15.3	16.5	19.1	19.6	19.7	20.4	20.7	21.3	21.7	22.2	22.2	21.8	21.3	20.8	20.5	19.8	19.4	18.6	18.2	18.7	22.2																						
26-Jun	18.9	17.6	17.5	16.9	17.2	18.2	18.8	20.8	21.0	22.4	23.3	24.0	24.7	27.4	26.9	26.6	24.1	24.8	25.8	24.7	23.1	22.4	21.7	22.1	22.1	27.4																						
27-Jun	21.6	20.2	19.7	19.2	18.5	18.4	17.5	17.4	17.9	17.5	17.8	18.9	19.2	18.9	17.3	16.2	16.3	17.0	17.1	16.6	16.4	15.8	15.0	14.4	17.7	21.6																						
28-Jun	14.5	14.1	13.9	13.2	13.3	14.9	15.4	15.6	16.1	16.6	17.0	17.3	17.4	17.7	17.8	18.4	18.8	18.7	18.1	17.5	16.5	15.7	15.2	14.9	16.2	18.8																						
29-Jun	14.6	15.6	14.9	14.4	13.8	13.8	14.4	15.0	15.8	16.4	18.0	18.2	18.5	18.8	18.8	18.2	17.6	17.3	17.7	17.4	17.4	17.3	16.6	16.0	16.5	18.8																						
30-Jun	15.2	14.5	13.8	13.3	13.7	15.1	16.1	16.2	16.6	17.2	18.4	19.7	21.2	21.1	20.9	21.1	21.4	21.9	21.5	20.4	19.2	18.3	18.5	19.0	18.1	21.9																						
																								14.0	13.4	12.9	12.3	12.3	12.8	13.5	14.2	15.0	15.7	16.4	16.9	17.4	18.0	18.2	18.4	18.2	18.1	17.8	17.1	16.4	15.5	14.9	14.5	Diurnal Average
																								21.6	20.8	20.6	19.2	18.5	18.4	18.8	20.8	21.0	22.4	23.3	24.0	24.7	27.4	26.9	26.6	24.1	24.8	25.8	24.7	23.1	22.4	21.7	22.1	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	70	9.72	9.72
10 - 20	564	78.33	88.06
> 20	86	11.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



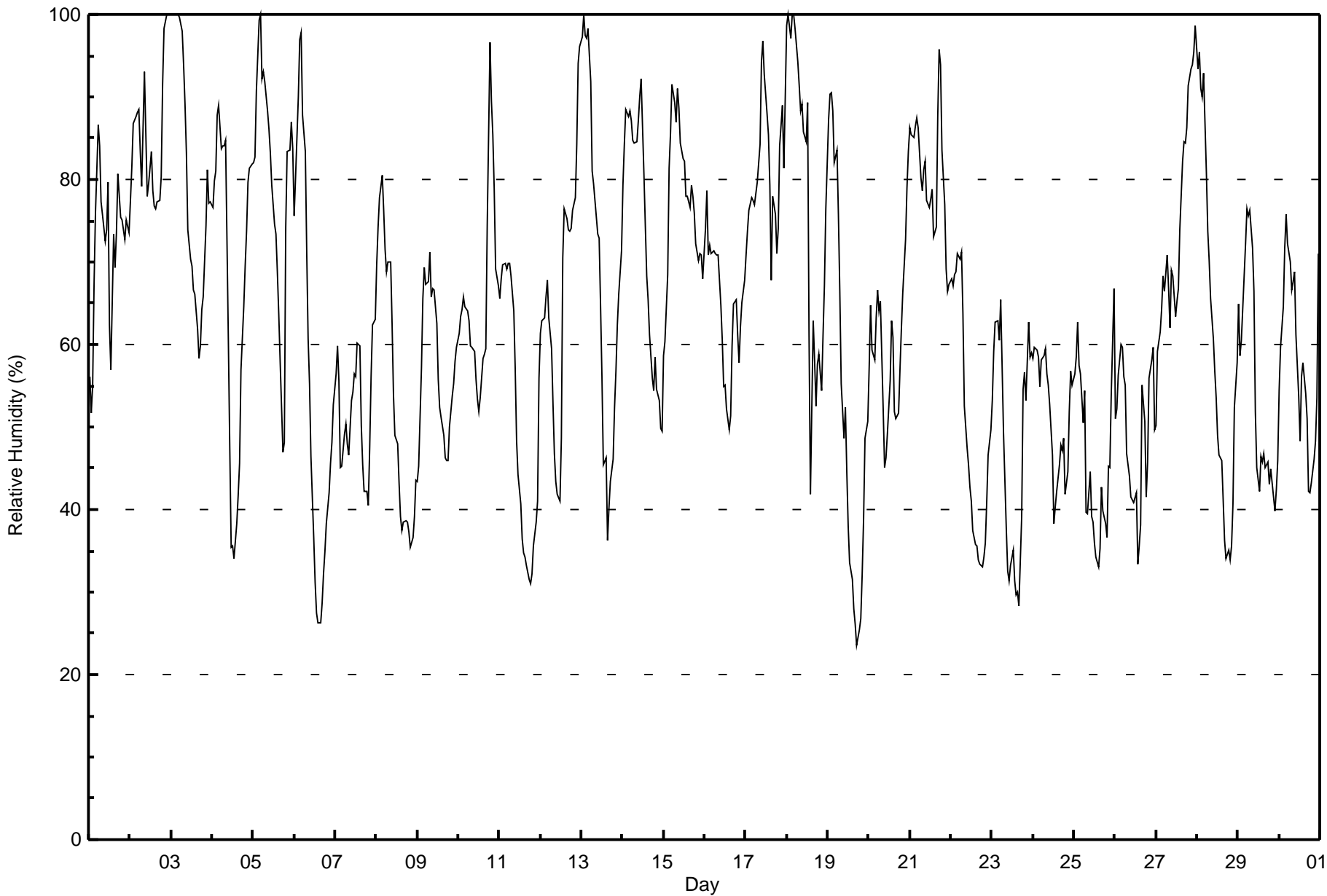
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort Chipewyan - June 2017

Maximum Value: 100 % on Jun 2 22:00																	Maximum Daily Average: 85.4 % on Jun 2																	Hours in Service: 720	
Minimum Value: 24 % on Jun 19 18:00																	Minimum Daily Average: 46.0 % on Jun 25																	Hours of Data: 720	
Maximum Diurnal Average: 76.9 % at hour 5																	Minimum Diurnal Average: 52.3 % at hour 16																	Hours of Missing Data: 0	
Monthly Average: 63.7 %																	Percentiles: P ₁ = 28 P ₁₀ = 39 Q ₁ = 49 Median = 63 Q ₃ = 77 P ₉₀ = 88 P ₉₉ = 100																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	56	52	55	67	76	87	84	77	76	73	74	80	62	57	73	69	74	81	75	75	74	73	75	74	71.6	87									
2-Jun	77	82	87	88	88	89	84	79	93	86	78	79	83	79	77	76	77	77	80	91	98	100	100	100	85.4	100									
3-Jun	100	100	100	100	100	100	98	94	89	83	74	70	69	67	66	62	58	60	64	66	74	81	77	77	80.4	100									
4-Jun	77	80	81	88	89	84	84	84	85	60	47	35	36	34	38	42	46	57	65	69	74	80	81	82	66.5	89									
5-Jun	82	83	91	99	100	92	93	92	88	86	83	79	75	73	69	64	58	47	48	74	83	84	87	84	79.8	100									
6-Jun	76	80	90	97	98	88	83	71	61	55	46	37	31	27	26	26	29	32	35	38	42	46	48	53	54.8	98									
7-Jun	56	60	56	45	45	49	50	48	47	53	54	56	56	60	60	50	45	42	42	40	47	56	62	63	51.9	63									
8-Jun	70	74	78	81	76	71	69	70	70	63	54	49	48	43	39	37	39	39	38	37	35	37	39	44	54.1	81									
9-Jun	43	45	57	66	69	67	68	71	66	67	67	63	56	52	51	49	46	46	46	50	54	55	58	60	57.1	71									
10-Jun	61	63	64	66	65	64	63	60	60	59	56	53	52	54	58	59	60	74	97	89	85	79	69	67	65.7	97									
11-Jun	66	68	70	70	69	70	70	68	64	57	48	44	41	36	35	34	33	32	31	32	36	38	41	56	50.4	70									
12-Jun	61	63	63	66	68	63	59	53	47	43	42	41	49	70	76	75	74	74	74	76	78	84	94	96	66.3	96									
13-Jun	97	100	97	97	98	92	81	79	78	73	73	65	56	45	46	36	40	43	46	52	57	62	66	71	68.9	100									
14-Jun	79	84	88	88	88	87	85	84	85	87	90	92	81	74	68	65	61	56	54	58	55	53	50	49	73.5	92									
15-Jun	59	60	68	81	86	91	89	87	91	89	84	83	82	78	78	77	79	78	76	72	70	71	71	68	77.9	91									
16-Jun	74	79	71	72	71	71	71	71	71	65	61	55	55	52	50	51	60	65	65	61	58	62	65	68	64.3	79									
17-Jun	71	74	76	78	77	77	78	80	84	94	97	93	88	85	79	68	78	76	71	74	84	89	81	90	80.9	97									
18-Jun	99	100	97	100	100	98	94	91	88	89	86	85	89	61	42	63	58	53	58	59	54	61	67	76	77.9	100									
19-Jun	87	90	91	88	82	84	76	66	55	49	52	45	38	34	31	28	26	24	25	27	32	39	49	51	52.8	91									
20-Jun	57	65	59	58	63	67	64	65	52	45	46	49	56	63	61	52	51	52	57	62	66	73	79	83	60.2	83									
21-Jun	86	85	85	86	87	86	80	79	81	82	77	77	78	79	73	74	88	96	94	83	77	69	66	67	80.7	96									
22-Jun	68	67	68	69	71	70	71	64	52	47	45	43	41	37	36	36	34	33	33	34	36	41	47	50	49.8	71									
23-Jun	53	59	63	63	60	65	58	49	38	32	31	33	35	31	30	30	28	39	55	57	53	63	58	59	47.7	65									
24-Jun	58	60	59	58	55	58	59	59	56	55	53	47	38	40	42	45	48	47	49	42	44	52	57	55	51.6	60									
25-Jun	57	58	63	57	56	50	54	40	39	45	39	38	36	34	33	35	43	40	38	37	45	45	54	67	46.0	67									
26-Jun	51	52	56	60	60	56	55	47	44	42	41	41	42	33	36	38	55	51	42	46	56	58	60	50	48.8	60									
27-Jun	50	59	62	64	68	66	71	67	62	69	68	63	65	67	74	82	85	84	86	91	93	94	95	99	74.4	99									
28-Jun	93	95	91	90	93	81	74	70	66	61	57	54	49	47	46	41	36	34	35	34	36	41	52	58	59.7	95									
29-Jun	65	59	61	68	72	76	76	76	72	66	52	45	42	46	46	47	45	46	43	45	43	40	42	46	55.0	76									
30-Jun	54	60	65	72	76	72	70	67	68	69	61	54	48	56	58	54	51	42	42	43	46	48	54	71	58.3	76									
	69.5	71.9	73.7	76.1	76.9	75.8	73.7	70.3	67.6	64.8	61.3	58.2	55.9	53.9	53.3	52.3	53.5	54.0	55.5	57.3	59.6	62.4	64.9	67.7	Diurnal Average										
	100	100	100	100	100	100	98	94	93	94	97	93	89	85	79	82	88	96	97	91	98	100	100	100	Diurnal Maximum										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Fort Chipewyan - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	81	11.25	11.25
40 - 60	240	33.33	44.58
60 - 80	246	34.17	78.75
80 - 100	140	19.44	98.19

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

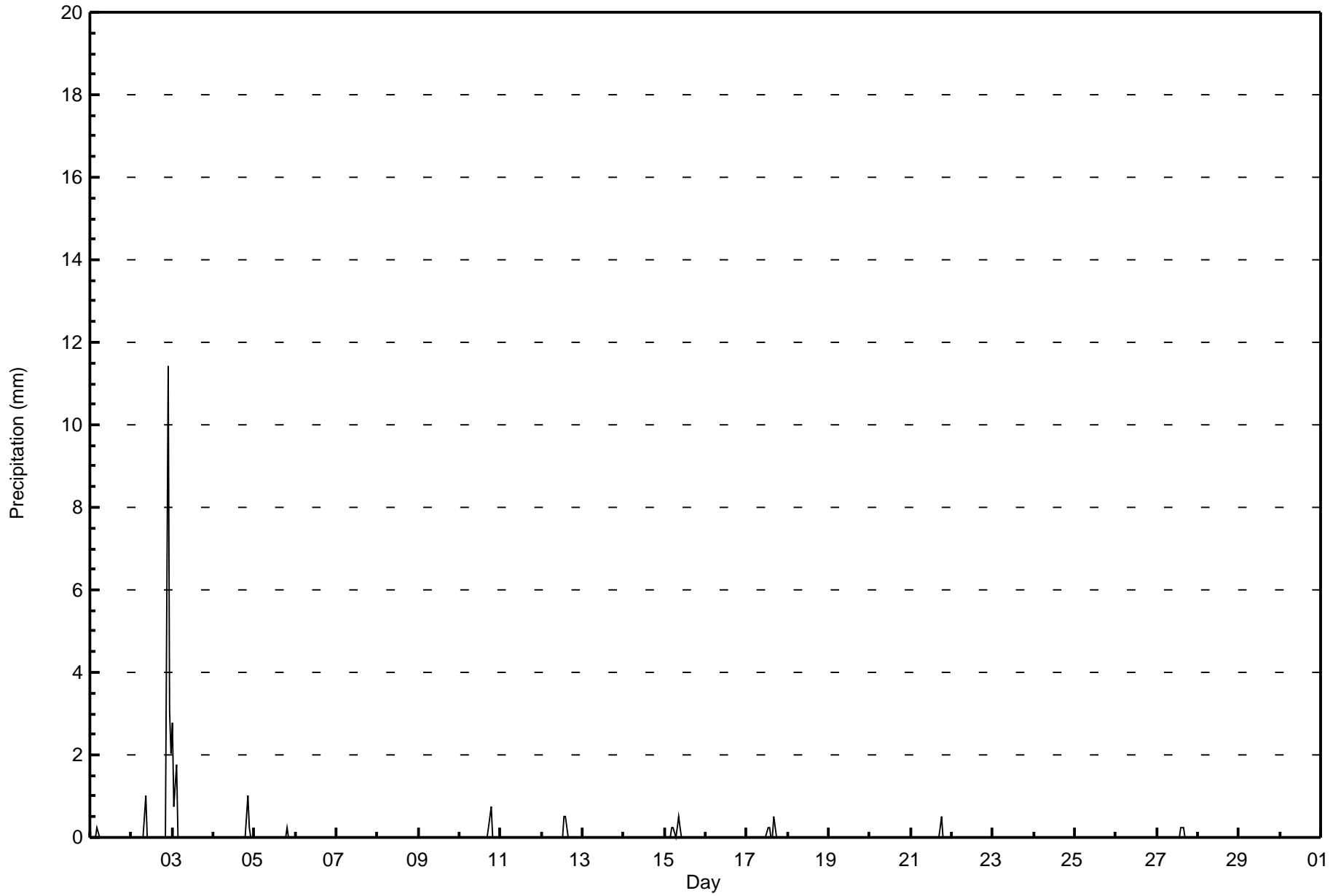
Fort Chipewyan - June 2017

Maximum Value: 11.4 mm on Jun 2 22:00		Maximum Daily Total: 17.5 mm on Jun 2		Hours in Service: 720																							
Minimum Value: 0.0 mm on Jun 1 01:00		Minimum Daily Total: 0.0 mm on Jun 6		Hours of Data: 720																							
Maximum Diurnal Total: 11.7 mm at hour 22		Minimum Diurnal Total: 0.0 mm at hour 4		Hours of Missing Data: 0																							
Monthly Total: 30.99 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.0		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	3.0	2.0	17.5	11.4	
3-Jun	2.8	0.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	2.8	
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.3	0.0	0.0	1.8	1.0	
5-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.3	
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	0.0	0.0	0.0	0.0	1.0	0.8	
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Jun	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5	
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.8	0.5	
22-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	
28-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		2.8	0.8	1.8	0.0	0.5	0.3	0.0	0.3	1.5	0.3	0.0	0.0	0.3	0.8	0.8	0.3	0.5	0.5	1.3	0.8	1.0	11.7	3.0	2.0	Diurnal Average	
		2.8	0.8	1.8	0.0	0.3	0.3	0.0	0.3	1.0	0.3	0.0	0.0	0.3	0.5	0.5	0.3	0.5	0.3	0.8	0.5	1.0	11.4	3.0	2.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Fort Chipewyan - June 2017**

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	705	97.92	97.92
0.4 - 0.5	6	0.83	98.75
0.6 - 0.7	0	0.00	98.75
0.8 - 1.4	4	0.56	99.31
1.5 - 10	4	0.56	99.86
> 10	1	0.14	100.00

Total Number of Valid Hours: 720

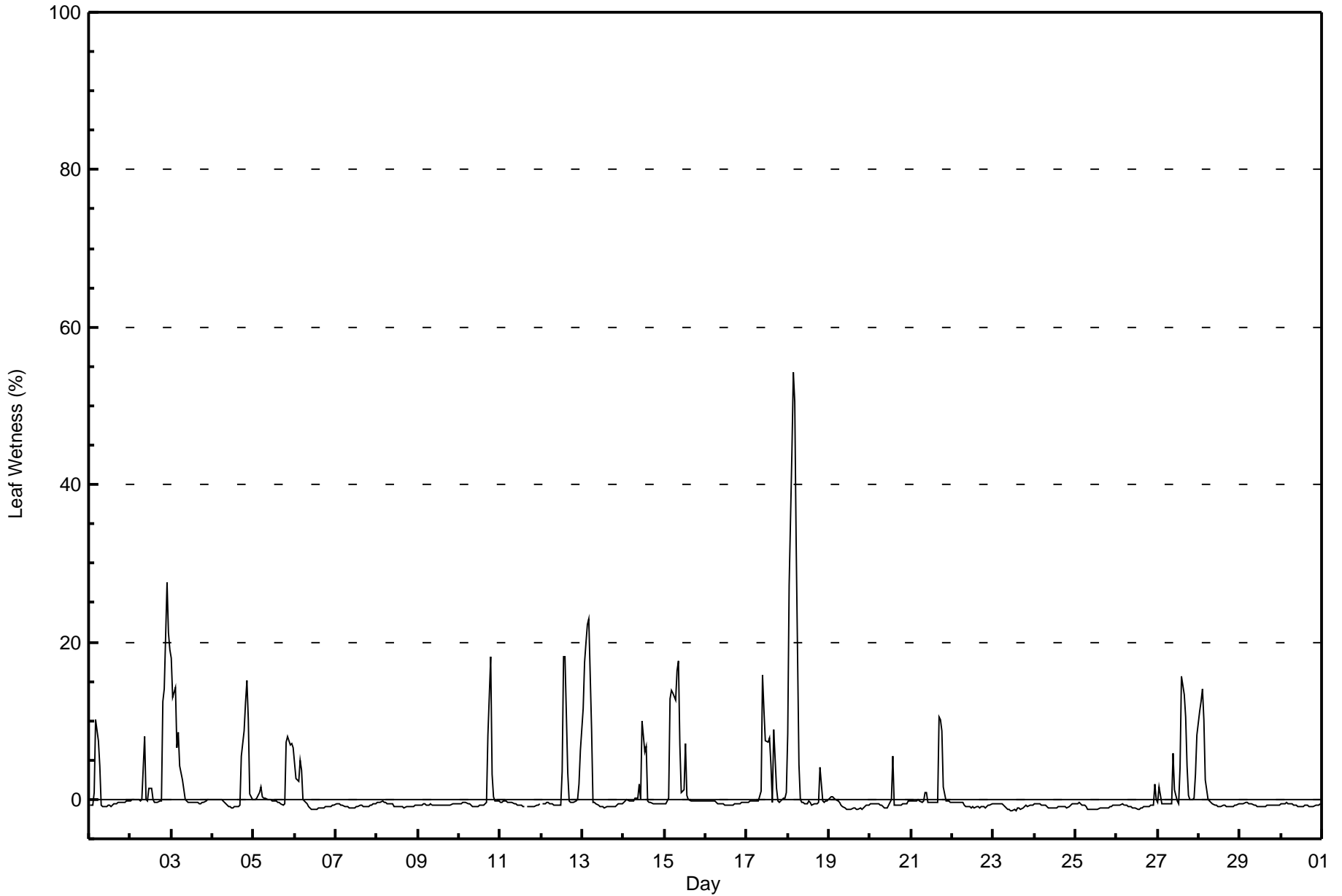
Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Leaf Wetness (SW) - %
Fort Chipewyan - June 2017

Maximum Value: 54 % on Jun 18 04:00														Maximum Daily Average: 9.2 % on Jun 18														Hours in Service: 720	
Minimum Value: -1 % on Jun 23 14:00														Minimum Daily Average: -1.0 % on Jun 25														Hours of Data: 718	
Maximum Diurnal Average: 3.5 % at hour 5														Minimum Diurnal Average: -0.3 % at hour 11														Hours of Missing Data: 2	
Monthly Average: 1.0 %														Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = -1 Median = -1 Q ₃ = 0 P ₉₀ = 5 P ₉₉ = 20														Hours of Calibration: 0	
																												Percent Operational Time: 99.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	-1	-1	-1	1	10	7	4	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0.4	10			
2-Jun	0	0	0	0	0	0	0	0	8	0	0	1	1	0	0	0	0	0	0	12	14	28	21	19	4.3	28			
3-Jun	18	13	14	7	9	4	2	1	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	2.6	18			
4-Jun	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	6	9	12	15	10	1	0	1.8	15			
5-Jun	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	7	8	7	7	7	1.5	8			
6-Jun	5	3	2	5	4	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0	5			
7-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.8	-1			
8-Jun	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0			
9-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	-1			
10-Jun	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	8	18	3	0	0	0	0	0.7	18			
11-Jun	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	UO	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0			
12-Jun	UO	0	0	0	0	-1	-1	-1	-1	-1	-1	4	18	18	3	0	0	0	0	0	0	0	2	6	1.9	18			
13-Jun	12	17	20	22	23	9	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	3.7	23			
14-Jun	0	0	0	0	0	0	0	0	0	2	0	10	6	7	0	0	0	-1	-1	0	0	0	-1	-1	0.8	10			
15-Jun	-1	0	0	13	14	13	13	16	18	7	1	1	7	0	0	0	0	0	0	0	0	0	0	0	4.2	18			
16-Jun	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.5	0			
17-Jun	0	0	0	0	0	0	0	0	1	16	11	7	7	8	4	0	9	1	0	0	0	0	0	1	2.6	16			
18-Jun	8	27	44	54	51	33	4	0	0	0	0	-1	0	0	-1	-1	0	-1	0	4	0	0	0	0	9.2	54			
19-Jun	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0			
20-Jun	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	6	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.4	6			
21-Jun	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	11	10	9	2	0	0	0	0	1.2	11			
22-Jun	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0			
23-Jun	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.9	0			
24-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.9	-1			
25-Jun	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1.0	0			
26-Jun	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	2	0	-0.7	2			
27-Jun	0	2	-1	-1	-1	-1	0	0	-1	6	1	0	-1	4	16	13	10	4	0	0	0	0	3	8	2.6	16			
28-Jun	11	12	14	10	2	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1.5	14			
29-Jun	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0			
30-Jun	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0			
																								Diurnal Average					
																								Diurnal Maximum					
UO - Unstable Operation																													





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Leaf Wetness (SW) - %
Fort Chipewyan - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	19	14.62	14.62
0.4 - 0.5	3	2.31	16.92
0.6 - 0.7	1	0.77	17.69
0.8 - 1.4	11	8.46	26.15
1.5 - 10	52	40.00	66.15
> 10	42	32.31	98.46

Total Number of Valid Hours: 130

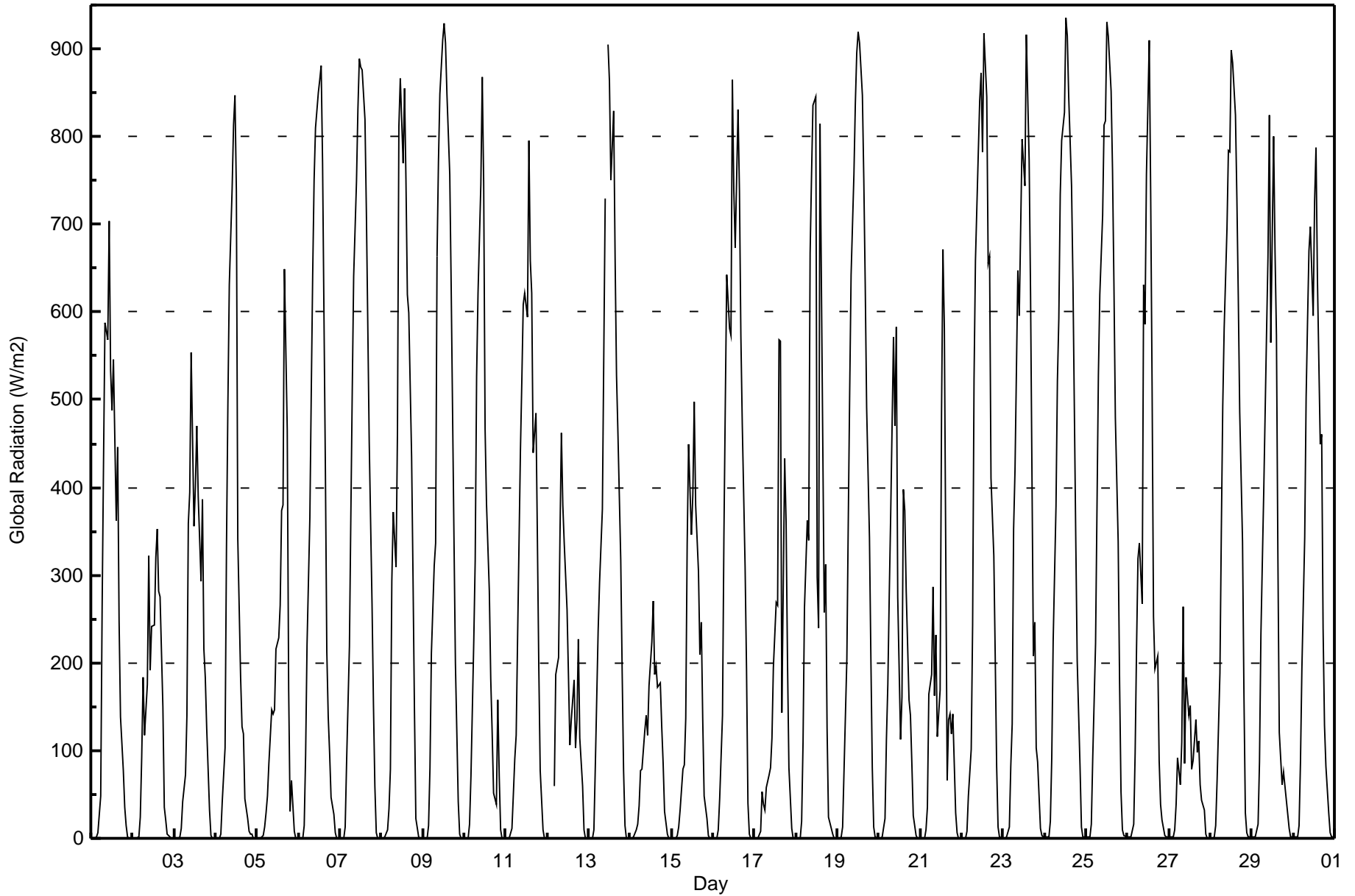
Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Global Radiation (GR) - W/m2
Fort Chipewyan - June 2017

Maximum Value: 936 W/m2 on Jun 24 13:00		Maximum Daily Average: 395.3 W/m2 on Jun 19		Hours in Service: 720																						
Minimum Value: 0 W/m2 on Jun 1 01:00		Minimum Daily Average: 74.7 W/m2 on Jun 27		Hours of Data: 715																						
Maximum Diurnal Average: 605.4 W/m2 at hour 12		Minimum Diurnal Average: 0.4 W/m2 at hour 1		Hours of Missing Data: 5																						
Monthly Average: 264.1 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 9 Median = 142 Q ₃ = 470 P ₉₀ = 750 P ₉₉ = 914		Hours of Calibration: 0																						
				Percent Operational Time: 99.3																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	2	6	48	262	430	588	569	703	533	488	546	362	446	249	139	78	35	15	1	0	0	229.2	703
2-Jun	0	0	0	2	25	92	184	118	175	322	192	242	242	321	353	281	276	150	35	21	4	1	1	0	126.5	353
3-Jun	0	0	0	1	11	42	72	140	359	394	554	357	400	470	390	293	387	215	184	126	32	4	0	0	184.6	554
4-Jun	0	0	0	4	42	102	331	496	631	741	814	846	738	342	184	127	119	46	23	8	4	5	0	0	233.5	846
5-Jun	0	0	0	3	13	29	48	85	146	142	147	215	228	266	373	381	649	466	171	31	66	8	0	0	144.5	649
6-Jun	0	0	1	15	95	220	365	508	643	750	811	849	865	880	770	418	212	138	96	46	28	7	0	0	321.6	880
7-Jun	0	0	1	13	86	219	368	510	641	749	831	888	880	877	819	713	585	452	267	153	60	6	0	0	380.0	888
8-Jun	0	0	1	10	34	79	293	372	309	465	812	866	770	855	750	620	599	435	298	148	22	2	0	0	322.5	866
9-Jun	0	0	1	14	80	210	311	336	663	771	849	910	929	907	849	757	630	485	340	200	42	5	0	0	387.0	929
10-Jun	0	0	1	15	72	226	317	527	622	745	867	747	467	382	281	182	121	52	38	157	71	9	1	0	245.9	867
11-Jun	0	0	1	11	50	90	118	228	441	522	608	622	594	796	659	622	439	485	342	197	77	9	1	0	288.0	796
12-Jun	UO	UO	UO	UO	60	188	206	346	462	381	337	260	185	106	134	181	103	134	227	114	59	9	1	0	174.6	462
13-Jun	0	0	1	10	82	236	292	334	375	729	UO	904	863	750	829	662	528	461	318	190	76	14	0	0	332.9	904
14-Jun	0	0	1	10	16	38	78	78	122	139	118	173	223	270	187	196	172	178	128	85	30	4	0	0	93.6	270
15-Jun	0	0	0	3	12	33	80	84	137	335	449	346	392	498	380	304	209	247	137	48	23	4	0	0	154.9	498
16-Jun	0	0	0	10	45	140	344	497	642	581	574	865	740	674	830	738	573	471	309	193	41	5	0	0	344.7	865
17-Jun	0	0	0	9	54	39	33	57	73	80	115	195	269	265	569	567	143	433	361	202	80	12	1	0	148.2	569
18-Jun	0	0	1	20	109	262	363	339	667	756	835	845	297	239	815	444	257	312	125	24	12	4	0	0	280.4	845
19-Jun	0	1	1	14	78	205	361	508	643	757	837	896	919	907	846	750	632	491	343	205	80	13	1	0	395.3	919
20-Jun	0	0	1	23	112	175	277	366	572	470	583	275	113	162	397	373	281	158	140	86	26	3	0	0	191.5	583
21-Jun	0	0	0	9	35	165	187	287	162	232	116	170	484	672	582	65	135	142	119	141	29	7	0	0	155.8	672
22-Jun	0	0	0	8	48	101	242	523	658	782	840	872	782	917	845	656	664	410	322	207	83	13	1	1	373.9	917
23-Jun	1	0	1	13	81	130	352	421	648	596	695	797	744	917	846	773	619	208	247	103	86	12	3	2	345.6	917
24-Jun	2	2	2	19	92	225	378	521	593	734	796	828	936	915	845	744	635	488	340	203	82	13	2	2	391.5	936
25-Jun	2	2	2	16	91	222	375	529	619	710	813	818	930	915	851	761	632	480	338	177	54	10	3	2	389.6	930
26-Jun	2	2	2	16	96	218	319	337	267	630	586	756	909	733	515	254	194	208	89	39	20	3	1	1	258.3	909
27-Jun	1	1	1	10	39	92	61	110	263	85	183	140	152	78	89	135	98	111	61	44	32	5	1	0	74.7	263
28-Jun	1	1	1	15	66	189	352	493	581	696	785	782	898	885	824	729	617	486	339	165	28	7	1	1	372.5	898
29-Jun	1	1	2	17	87	232	314	394	577	662	825	565	800	668	573	327	121	60	75	60	44	10	1	1	267.4	825
30-Jun	1	1	2	14	87	194	344	502	589	670	697	596	726	787	638	450	461	240	129	82	30	6	1	1	301.9	787
																								Diurnal Average		
																								Diurnal Maximum		
0.4 0.4 0.9 11.2 60.1 148.0 254.2 349.3 462.3 539.9 599.0 605.4 598.7 600.0 579.6 465.0 377.9 292.8 200.6 116.3 44.5 7.0 0.7 0.4																										
2 2 2 23 112 262 378 529 667 782 867 910 936 917 851 773 664 491 361 207 86 14 3 2																										
UO - Unstable Operation																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - June 2017

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	216	30.21	30.21
21 - 100	99	13.85	44.06
101 - 300	142	19.86	63.92
301 - 600	130	18.18	82.10
601 - 900	115	16.08	98.18
> 900	13	1.82	100.00

Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Fort Chipewyan - June 2017

Maximum Speed: 43 km/h on Jun 9 11:00	Maximum Daily Speed Average: 29.5 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 5 03:00	Minimum Daily Speed Average: 3.7 km/h on Jun 23	Hours of Data: 720
Maximum Diurnal Speed Average: 10.1 km/h at hour 17	Minimum Diurnal Speed Average: 5.5 km/h at hour 5	Hours of Missing Data: 0
Monthly Average Velocity: 7.7 km/h 72.9 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 14 Q ₃ = 21 P ₉₀ = 26 P ₉₉ = 38	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	E20	WNW9	WNW7	SW5	SSW6	SE3	E7	E6	E9	E9	E9	E9	SE2	SE5	E9	E5	E5	E8	E11	E7	E9	E7	E6	ESE6	E5.2	E20
2-Jun	ENE5	NE3	ENE6	ENE9	NE7	NW5	N8	N6	NNW10	N9	N9	ENE7	NE4	N11	NNW10	NNW11	NNW9	NNW9	NNW10	NNW8	NW8	NW10	NW12	NW13	N6.7	NW13
3-Jun	NNW16	NW15	NW16	WNW18	WNW21	WNW18	WNW16	NW15	WNW15	NW14	WNW14	WNW15	W17	W15	W11	W8	W3	ESE1	SW9	SW6	SE2	ESE8	SE13	SE20	WNW8.4	WNW21
4-Jun	SE22	SE21	SE12	N5	NNE6	ENE14	E21	E13	E11	SW11	WSW17	W14	WSW13	W14	W6	W3	WNW3	SE8	S8	S16	SE22	SSE17	SE12	SSE6.2	SE27	
5-Jun	ESE8	ESE7	S1	WNW6	NW6	NNE4	N4	N2	WNW3	W7	WSW7	WSW9	WSW9	WSW9	W9	WNW8	NW3	NNW6	NW6	NW11	SW7	NW6	SW7	WSW9	W3.7	NW11
6-Jun	WSW9	WSW9	WSW8	W9	WNW10	WNW10	WSW8	WSW10	WSW10	SW12	WSW10	WSW14	SW13	W8	SW14	SW16	NW9	NW7	NW10	NNW8	N8	NNE8	NE3	N3	W7.0	SW16
7-Jun	N7	N7	NE9	NE7	NE10	NE11	ENE14	ENE18	ENE21	E23	E24	E25	E25	E23	E25	E26	E26	ENE25	ENE21	ENE17	ENE15	ENE13	ENE14	ENE14	ENE16.6	E26
8-Jun	ENE15	ENE14	ENE18	ENE15	ENE20	E23	E23	ENE23	ENE20	ENE20	ENE23	ENE22	ENE20	ENE24	ENE25	ENE24	ENE25	ENE22	ENE20	NE19	NE17	NE15	NNE7	N6	ENE18.7	ENE25
9-Jun	NNE13	N13	NNE19	NE21	NE19	NE22	NE30	NE29	NE34	ENE40	ENE43	ENE41	NE38	NE39	NE40	NE38	NE34	NE32	NE33	NE30	NE28	NE28	ENE29	ENE32	NE29.5	ENE43
10-Jun	E38	E33	ESE31	ESE31	ESE29	ESE22	ESE14	E12	E12	ESE14	ESE13	ESE10	E12	E12	E13	E9	ESE3	WNW13	NW11	NW12	WNW12	WNW13	NW16	WNW17	E9.0	E38
11-Jun	WNW19	WNW19	WNW19	WNW19	WNW20	NW20	NW22	NW21	NW21	NW22	NW21	NW18	NW18	NW18	NW16	NW17	NW16	NW16	NW13	NNW9	N6	NNE9	NE10	ESE11	NW14.5	NW22
12-Jun	SE19	SE21	SSE23	SSE23	SSE20	SE20	SE18	SSE17	SSE23	SSE22	SSE24	SSE28	SSE23	SE24	E24	E35	E38	ENE33	ENE27	ENE20	NNE8	NNW5	NNW6	N4	ESE15.6	E38
13-Jun	NE2	W7	NW3	N3	SSW7	SW5	SSW5	SSW6	SE3	SE5	E8	SE8	SSE8	WNW1	SE8	NNW4	NNW14	NNW16	NNW17	N18	N19	N16	N16	N16	NNW4.1	NNW19
14-Jun	N11	N9	NNW8	NNW12	NNW9	NNW11	NNW13	NNW10	NNW10	N11	N11	N11	N13	NE15	NE13	ENE17	NE14	NNE15	NNE13	NE9	NE13	NNE14	NE19	NE29	NNE11.3	NE29
15-Jun	ENE30	ENE25	ENE26	ENE28	NE23	NE22	ENE23	NE20	NE22	NE25	NE22	NE16	ENE17	NE18	ENE22	ENE21	ENE21	ENE20	NE16	NE10	NE10	NE11	ENE18	ENE20.2	ENE30	
16-Jun	E22	E17	ESE23	ESE22	ESE23	ESE23	ESE25	E23	E26	ENE27	ENE24	ENE28	ENE27	ENE30	ENE30	ENE33	E34	E32	E31	E34	ESE35	ESE34	ESE36	SE34	E26.8	ESE36
17-Jun	ESE28	ESE28	ESE28	ESE26	ESE22	SE19	SE17	SE12	SSE9	SW8	WSW9	W5	NNW3	NW11	NNW12	N7	N9	E17	ESE16	E14	E15	E14	E11	E9	ESE9.7	ESE28
18-Jun	ENE9	E8	E6	ENE8	ENE8	E12	E15	E16	E19	E23	E16	E17	E23	ESE16	E12	ESE13	ESE10	ESE18	ESE16	S17	WSW7	N6	WNW3	WNW8	E10.2	E23
19-Jun	WNW8	NW9	WNW9	WNW9	WNW9	WNW12	W9	W9	W8	WSW10	WSW14	WSW12	WSW12	SW13	SW14	SW13	SW11	SSW7	SW8	WSW6	SW5	SE2	E3	ESE3	WSW7.3	WSW14
20-Jun	E6	E6	SE9	SE12	ESE9	ESE11	ESE9	E6	SSE5	SW12	WSW12	SW20	S7	ESE14	E15	E20	SE7	SSW28	SSW26	SSW25	S21	S22	S16	S13	SSE9.6	SSW28
21-Jun	SSE11	SE14	SE11	SE8	N2	NE4	NNW5	NW5	N6	E5	NNE6	ENE13	E26	E25	ENE26	N14	N14	N11	N16	N19	N18	N19	N20	N20	NE8.0	ENE26
22-Jun	N17	N17	N13	N15	N10	NNW15	NNW18	N16	NNW17	N18	NNW16	NNW17	NNW15	NNW15	NNW14	NNW14	NNW12	NNW11	NNW13	N9	N7	N6	NNW8	NNW8	NNW13.2	N18
23-Jun	NNW9	NNW11	NNW12	NNW12	NNW11	NW6	NNW5	NW6	NW6	NW3	SW6	WSW10	WSW12	SSW11	SW11	SW12	WNW5	E13	E22	ENE18	ENE20	ENE22	E28	E28	NE3.7	E28
24-Jun	E26	ESE21	E20	ESE18	ESE15	E14	E16	E15	E15	ESE15	ESE16	ESE13	E16	E20	E18	E19	E17	E19	E14	SSE5	S10	S6	SSE8	S7	ESE13.8	E26
25-Jun	S6	SSW6	SW8	SW4	SSW4	SSE5	SSE5	S8	SE12	E13	ESE16	E16	E16	E15	E15	E18	E23	E24	ENE22	ENE20	ENE17	ENE13	ENE13	E19	E10.4	E24
26-Jun	SE20	SSE20	S21	S22	S22	SSE18	SE22	SSE24	SSE27	SSE25	SE22	SE24	SE25	SSE24	SE21	SE14	ESE11	ESE12	SSE19	SE16	ESE16	SE17	ESE21	SE30	SE19.5	SE30
27-Jun	SE25	ESE16	E18	E24	ENE28	ENE30	ENE29	NE25	NE30	ENE33	ENE30	ENE38	E42	E38	SSE24	SSW7	N6	N5	W6	WNW7	WNW7	W5	WSW6	WSW5	E15.0	E42
28-Jun	N5	ENE5	NE7	NE8	NNE12	ENE23	E28	E29	ENE26	ENE26	ENE27	ENE27	ENE29	ENE28	ENE27	ENE23	NE22	NE20	NE22	NE22	NE17	NE16	NE15	NE15	ENE19.4	E29
29-Jun	ENE16	E22	E21	E19	ESE15	ESE13	E11	E18	E24	E22	E23	E26	ENE24	E26	ENE23	ENE24	ENE20	NE16	NE14	ENE17	NE13	NE13	NE14	NE13	ENE17.8	E26
30-Jun	NE10	NE10	NE8	NE9	NE11	NE10	ENE18	ENE22	E22	E22	E22	ENE21	E20	E20	E22	E23	ENE21	ENE19	NE12	NNE12	NNE11	N7	NE12	E20	ENE15.0	E23

E8.3	E6.2	E5.8	E5.7	ENE5.5	ENE6.8	ENE8.4	ENE7.9	ENE8.2	ENE8.3	ENE7.7	E8.1	E8.8	E9.3	ENE9.7	ENE9.4	ENE10.1	ENE9.9	ENE8.6	ENE7.1	ENE6.5	ENE6.6	ENE6.6	E7.8	Diurnal Average
E38	E33	ESE31	ESE31	ESE29	ENE30	NE30	NE29	NE34	ENE40	ENE43	ENE41	E42	NE39	NE40	NE38	E38	ENE33	NE33	ESE34	ESE35	ESE34	ESE36	ESE34	Diurnal Maximum

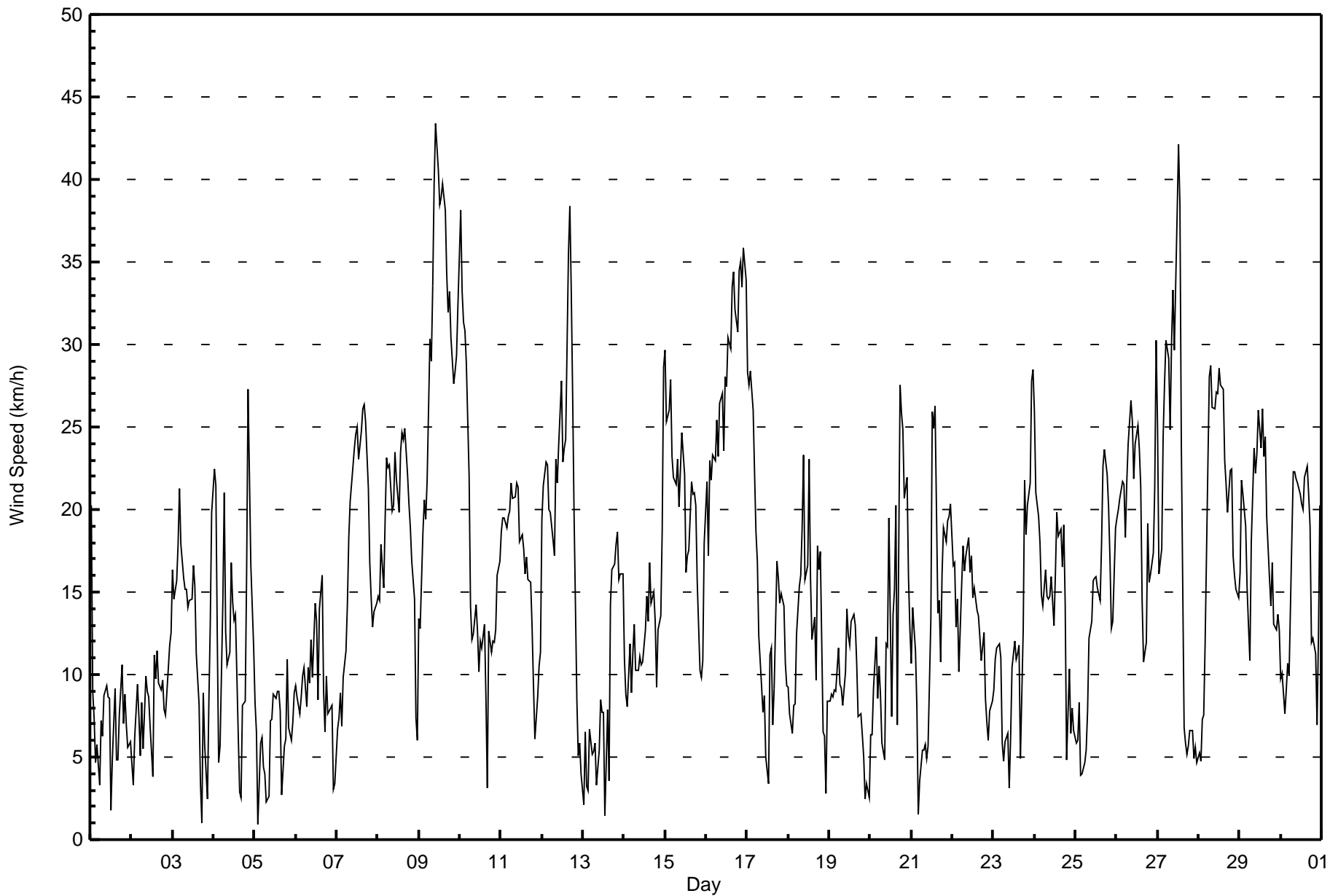
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 20 12:00 Minimum Value: 1 km/h on Jun 5 07:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	8	3	2	2	2	2	2	2	1	2	2	4	2	3	2	2	2	1	2	1	1	1	1	2	8
2-Jun	2	2	2	3	3	2	3	3	3	3	3	2	4	3	4	3	3	3	3	3	2	3	4	4	4
3-Jun	5	4	4	5	5	5	4	4	5	5	5	4	4	4	3	3	2	3	2	1	1	4	2	2	5
4-Jun	2	2	5	3	3	4	2	3	2	4	4	4	4	3	3	2	2	4	5	6	6	6	3	3	6
5-Jun	1	1	2	2	2	1	1	2	1	2	2	2	2	2	2	2	3	3	2	8	2	4	2	2	8
6-Jun	1	3	1	2	1	2	2	2	2	3	3	4	4	3	4	4	3	3	3	2	2	2	1	2	4
7-Jun	4	3	3	3	2	2	3	3	3	2	2	2	2	2	2	3	2	3	3	2	2	1	1	2	4
8-Jun	2	2	2	2	3	3	2	3	3	3	3	3	3	3	4	4	3	4	3	3	3	3	5	2	5
9-Jun	4	3	5	5	4	5	6	6	7	7	7	7	7	7	7	7	6	6	6	6	6	5	5	6	7
10-Jun	3	3	3	3	3	4	2	3	3	3	2	2	2	1	2	2	4	5	4	4	3	4	5	4	5
11-Jun	5	4	5	5	6	6	7	7	7	7	7	6	7	7	6	6	6	5	5	4	2	1	1	5	7
12-Jun	2	2	2	3	2	2	2	3	4	3	4	5	8	4	4	4	5	4	4	4	3	1	1	2	8
13-Jun	2	2	3	2	3	2	1	2	2	2	1	2	2	3	3	4	5	6	6	5	6	5	6	6	6
14-Jun	5	3	3	4	3	3	4	4	3	3	3	4	5	4	3	4	4	4	4	2	2	3	5	5	5
15-Jun	5	4	5	4	4	4	4	4	3	4	4	4	3	3	3	3	3	3	3	3	2	3	3	3	5
16-Jun	3	3	4	3	5	2	2	2	2	4	3	4	4	4	4	4	3	2	3	3	3	3	3	3	5
17-Jun	2	2	2	3	2	2	2	2	1	2	2	2	3	3	4	3	5	3	2	1	2	3	5	2	5
18-Jun	2	2	1	1	2	2	2	3	2	3	2	2	6	5	3	2	4	3	2	6	8	2	2	1	8
19-Jun	2	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	3	3	2	2	1	1	1	1	4
20-Jun	1	1	4	3	3	2	3	3	2	3	3	9	2	1	2	2	7	5	4	4	3	3	3	2	9
21-Jun	3	2	1	2	2	1	2	2	3	2	3	7	3	2	5	5	5	4	6	6	6	7	6	7	7
22-Jun	6	6	5	5	4	6	6	6	6	6	6	6	6	6	5	5	5	4	5	3	2	1	1	1	6
23-Jun	1	2	2	2	2	2	2	2	2	3	3	4	3	3	3	3	5	3	2	3	3	4	2	5	5
24-Jun	2	3	2	1	2	3	1	1	1	1	1	2	2	1	2	1	1	3	4	4	1	2	2	3	4
25-Jun	2	1	1	2	2	1	2	1	3	1	2	3	2	2	2	3	3	2	3	3	2	2	2	3	3
26-Jun	3	3	3	2	3	3	3	4	5	4	4	3	4	5	3	2	2	5	3	2	1	1	5	5	5
27-Jun	3	2	4	4	3	4	4	4	4	6	4	5	4	4	6	5	2	2	3	1	1	1	1	1	6
28-Jun	2	2	1	1	5	3	5	3	4	4	5	4	4	5	4	5	4	4	4	4	3	2	2	2	5
29-Jun	2	4	2	2	2	1	2	2	3	2	3	3	4	4	3	4	4	3	3	3	2	2	2	2	4
30-Jun	1	1	1	1	2	2	3	2	3	2	2	2	2	2	2	3	2	4	3	3	3	2	4	2	4
																	Diurnal Maximum								
																	8 6 5 5 6 6 7 7 7 7 7 9 8 7 7 7 7 6 6 8 8 7 6 7								





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	62	8.61	8.61
6 - 11	208	28.89	37.50
12 - 19	228	31.67	69.17
20 - 28	174	24.17	93.33
29 - 38	42	5.83	99.17
> 38	6	0.83	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	1	5	2	4	3	7	4	1	2	4	1	4	5	5	6	62
6 - 11	25	7	18	6	24	11	7	4	7	7	11	18	12	13	15	23	208
12 - 19	18	7	23	26	39	20	13	5	4	0	9	8	3	16	16	21	228
20 - 28	2	0	15	52	46	13	15	14	5	3	1	0	0	2	6	0	174
29 - 38	0	0	11	13	9	8	1	0	0	0	0	0	0	0	0	0	42
> 38	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	6
Totals	53	15	74	102	123	55	43	27	17	12	25	27	19	36	42	50	720

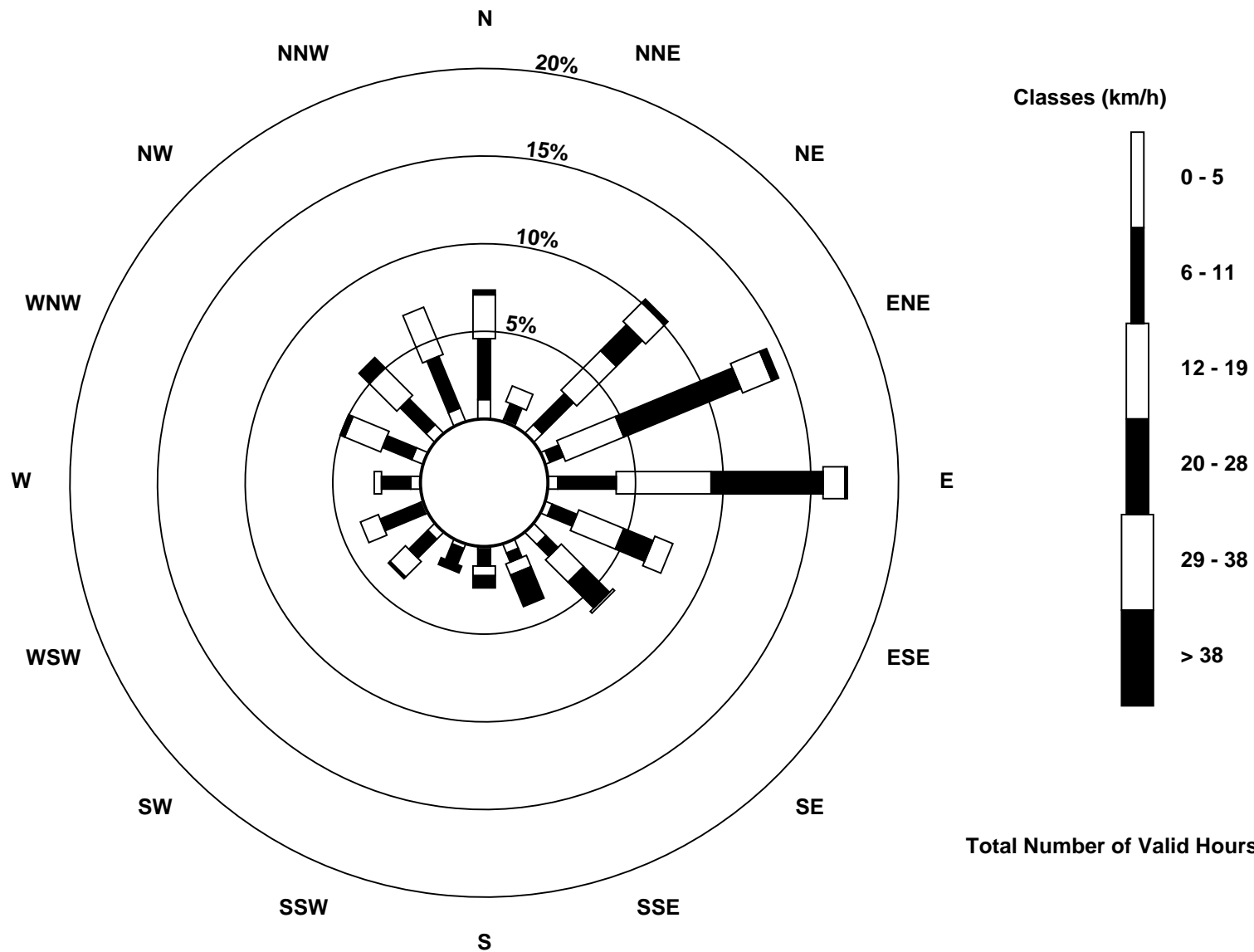
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - June 2017

Direction of Maximum Speed: 71 deg on Jun 9 11:00 Direction of Maximum Daily Speed Average: 52.5 deg on Jun 9	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 170 deg on Jun 5 03:00 Direction of Minimum Daily Speed Average: 3.7 deg on Jun 23	Percent Operational Time: 100.0
Monthly Average Direction: 334.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	85	287	293	235	210	130	98	81	84	90	92	81	125	132	90	99	94	83	82	86	90	86	97	120	92.8
2-Jun	74	51	64	61	46	310	1	4	339	351	355	65	47	7	348	333	344	337	335	342	326	309	309	323	352.3
3-Jun	333	321	306	296	296	293	301	315	298	305	302	301	281	273	272	280	278	119	217	230	127	121	142	135	291.4
4-Jun	129	124	142	353	19	63	82	91	87	231	253	259	256	267	263	263	288	138	183	170	142	141	156	135	149.1
5-Jun	122	122	170	295	318	31	9	352	286	280	249	243	253	245	279	287	324	342	322	319	235	318	232	238	278.6
6-Jun	242	243	253	271	282	283	253	253	256	229	241	237	235	261	223	232	304	325	317	337	1	17	42	349	264.1
7-Jun	351	5	36	54	52	53	62	63	67	88	85	85	93	89	85	80	80	76	78	70	64	59	61	61	72.5
8-Jun	67	70	74	60	71	85	80	75	72	73	77	75	68	69	58	63	66	63	62	56	48	53	20	4	66.5
9-Jun	17	4	20	40	46	45	49	54	55	63	71	69	52	52	54	55	49	47	49	49	48	50	59	73	52.5
10-Jun	90	101	115	119	112	114	120	101	97	104	109	108	98	101	98	90	103	300	308	311	293	303	307	291	99.1
11-Jun	294	289	289	292	298	305	308	314	317	320	317	321	318	311	317	312	322	324	324	341	353	29	47	112	314.7
12-Jun	131	143	147	153	149	133	141	163	166	160	150	167	161	140	93	81	79	74	70	65	29	342	327	351	122.6
13-Jun	45	279	318	357	208	234	211	207	133	135	94	141	159	284	132	333	338	335	344	350	349	351	355	360	346.8
14-Jun	4	9	337	338	342	331	339	341	348	354	352	355	11	36	43	65	40	31	32	44	38	29	37	54	18.8
15-Jun	61	59	60	64	55	49	54	64	56	55	53	56	44	64	56	65	63	57	59	44	48	48	54	68	57.3
16-Jun	79	82	108	111	108	102	102	92	81	75	71	75	73	74	74	76	79	82	85	101	111	115	119	124	92.1
17-Jun	118	114	114	113	118	133	137	146	166	222	248	267	327	316	338	11	360	91	104	100	84	90	101	87	109.9
18-Jun	77	79	82	74	73	79	83	88	89	89	94	97	98	123	99	102	108	105	105	179	252	350	300	288	96.2
19-Jun	289	309	295	287	291	287	281	281	267	249	247	249	243	232	222	234	214	211	222	238	226	137	92	109	253.2
20-Jun	86	95	144	145	112	118	121	95	155	223	238	220	178	115	91	82	143	213	201	192	183	181	185	174	167.8
21-Jun	160	143	145	146	7	34	331	319	353	86	12	72	88	88	77	4	7	349	7	4	358	358	5	6	38.8
22-Jun	4	3	0	1	354	343	347	356	345	352	339	342	333	342	340	328	342	343	344	353	359	349	343	342	347.7
23-Jun	333	338	340	343	343	315	329	316	313	320	226	257	239	199	227	217	289	86	79	68	68	62	83	89	42.9
24-Jun	94	106	97	106	108	85	83	87	94	104	104	107	101	97	98	95	96	84	79	165	187	180	161	180	102.3
25-Jun	190	211	229	225	194	166	163	179	137	91	105	86	88	87	89	87	83	80	68	69	71	72	75	90	93.4
26-Jun	130	161	172	174	169	152	129	151	161	152	146	136	127	163	143	144	105	104	155	140	121	125	123	133	144.2
27-Jun	135	119	87	80	77	74	74	55	55	70	68	76	86	90	151	193	8	2	278	290	282	261	244	237	82.0
28-Jun	353	57	56	47	33	66	80	81	77	69	63	60	61	62	68	58	43	43	56	50	47	45	54	51	59.7
29-Jun	57	83	86	97	115	112	99	84	83	80	81	79	63	81	68	68	61	54	52	57	54	50	49	48	74.1
30-Jun	56	55	49	54	52	52	69	77	81	86	81	78	83	89	88	83	78	59	35	21	15	6	45	88	69.2

82.3	85.6	88.6	82.8	76.7	72.9	73.5	72.7	73.0	78.1	76.6	81.6	80.3	82.0	78.4	68.3	56.6	59.1	59.9	59.1	62.0	59.5	69.0	80.3
Diurnal Average																							

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

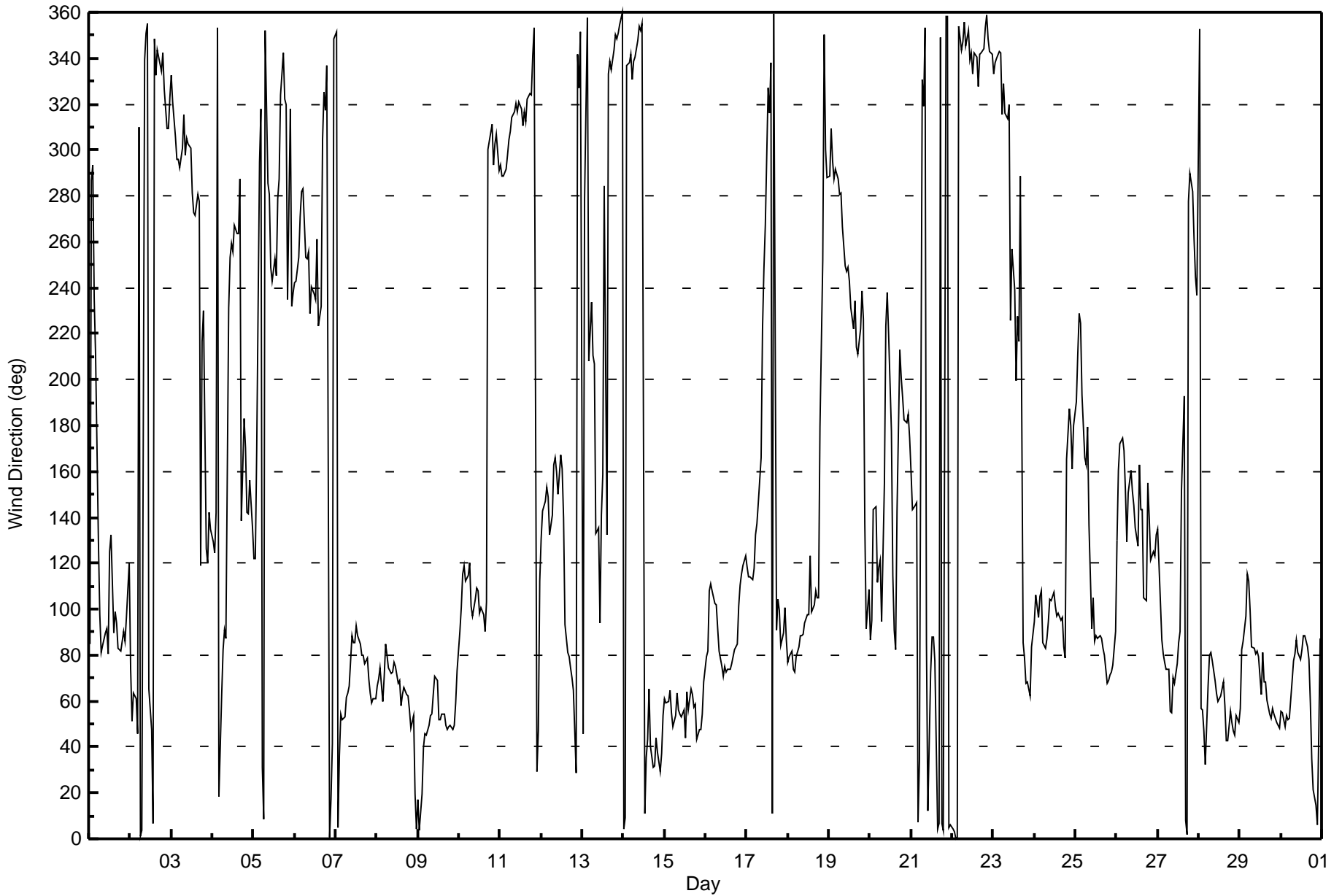
Wind Direction (WD) - deg
Fort Chipewyan - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Jun 13 14:00 Minimum Value: 3 deg on Jun 18 10:00 Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 9 Median = 14 Q ₃ = 24 P ₉₀ = 36 P ₉₉ = 78																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	65	24	24	28	33	53	14	11	9	7	12	15	74	69	12	33	31	9	5	10	7	8	20	23	74
2-Jun	39	48	21	11	22	40	27	40	19	23	24	50	68	24	27	24	27	23	21	21	22	18	19	21	68
3-Jun	23	21	17	17	16	16	20	22	19	21	25	18	17	19	21	26	63	91	18	10	45	25	6	5	91
4-Jun	7	7	56	54	45	15	6	6	9	38	20	24	23	19	29	34	52	34	63	20	12	15	10	19	63
5-Jun	14	18	78	21	19	27	36	52	41	18	24	22	22	19	22	27	92	57	37	66	34	41	13	7	92
6-Jun	9	12	10	15	9	12	28	22	21	22	28	23	25	50	17	15	43	42	21	22	18	28	31	46	50
7-Jun	48	30	17	34	12	9	10	10	12	5	5	5	7	5	5	6	6	7	7	8	9	7	8	7	48
8-Jun	7	7	7	8	8	10	9	8	8	9	8	10	11	12	10	10	10	9	9	11	12	10	65	49	65
9-Jun	15	18	20	13	14	14	11	12	13	11	10	12	13	12	12	13	13	13	11	11	11	10	10	11	20
10-Jun	7	9	8	6	7	7	13	17	15	12	13	14	12	10	9	13	80	21	20	19	18	18	18	17	80
11-Jun	17	14	15	16	18	19	19	23	23	23	23	27	25	27	28	25	25	27	30	26	20	9	5	36	36
12-Jun	7	7	7	7	6	7	8	12	9	10	9	13	17	12	14	5	8	7	8	10	18	22	20	37	37
13-Jun	53	27	65	24	37	36	15	27	67	47	15	20	30	101	33	96	28	25	26	22	21	23	24	23	101
14-Jun	28	23	28	22	26	20	19	24	22	22	21	25	23	17	14	11	19	15	14	11	10	13	14	11	28
15-Jun	10	9	11	8	9	9	10	9	10	10	10	12	13	11	11	8	9	9	10	11	11	12	11	9	13
16-Jun	6	8	13	8	20	7	5	7	6	8	9	8	9	8	8	7	5	4	6	7	6	5	5	6	20
17-Jun	6	6	6	7	9	8	9	9	18	33	17	30	78	26	25	38	41	13	8	13	5	22	53	25	78
18-Jun	10	15	17	10	10	6	5	7	8	3	5	5	14	24	18	14	49	11	6	34	67	25	55	15	67
19-Jun	12	13	10	13	11	14	18	18	28	32	24	24	29	25	23	26	21	26	19	19	7	35	21	35	35
20-Jun	16	21	42	8	29	15	18	31	50	18	23	12	40	7	10	5	61	10	9	6	8	8	8	8	61
21-Jun	21	9	11	10	73	32	43	42	53	55	54	35	4	4	13	37	24	23	23	23	24	24	23	23	73
22-Jun	24	23	25	25	26	24	25	27	26	27	28	28	35	30	35	30	33	31	24	30	20	12	11	10	35
23-Jun	11	13	17	18	18	31	58	24	37	79	54	34	27	16	27	30	76	31	8	8	8	9	8	6	79
24-Jun	6	8	5	5	7	11	6	6	6	5	5	10	9	4	4	5	5	5	13	64	10	17	10	24	64
25-Jun	23	8	10	38	32	17	36	16	14	12	16	6	4	4	5	5	5	6	9	7	10	8	8	6	38
26-Jun	17	12	8	6	7	12	7	15	11	10	11	8	10	14	14	15	12	25	10	7	11	9	8	4	25
27-Jun	6	15	17	7	7	7	10	10	9	14	10	7	5	14	24	65	30	27	30	12	11	27	17	24	65
28-Jun	41	28	17	17	18	10	9	7	9	13	12	12	13	12	9	15	13	15	11	10	10	9	7	8	41
29-Jun	7	13	8	7	7	7	14	7	7	6	7	8	9	9	9	10	11	11	11	10	11	9	8	8	14
30-Jun	9	10	10	8	10	14	9	7	10	6	7	7	6	4	3	6	8	12	16	18	18	25	17	14	25
																	Diurnal Maximum								
																	65 48 78 54 73 53 58 52 67 79 54 50 78 101 35 96 92 91 63 66 67 41 65 49								



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Chipewyan - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

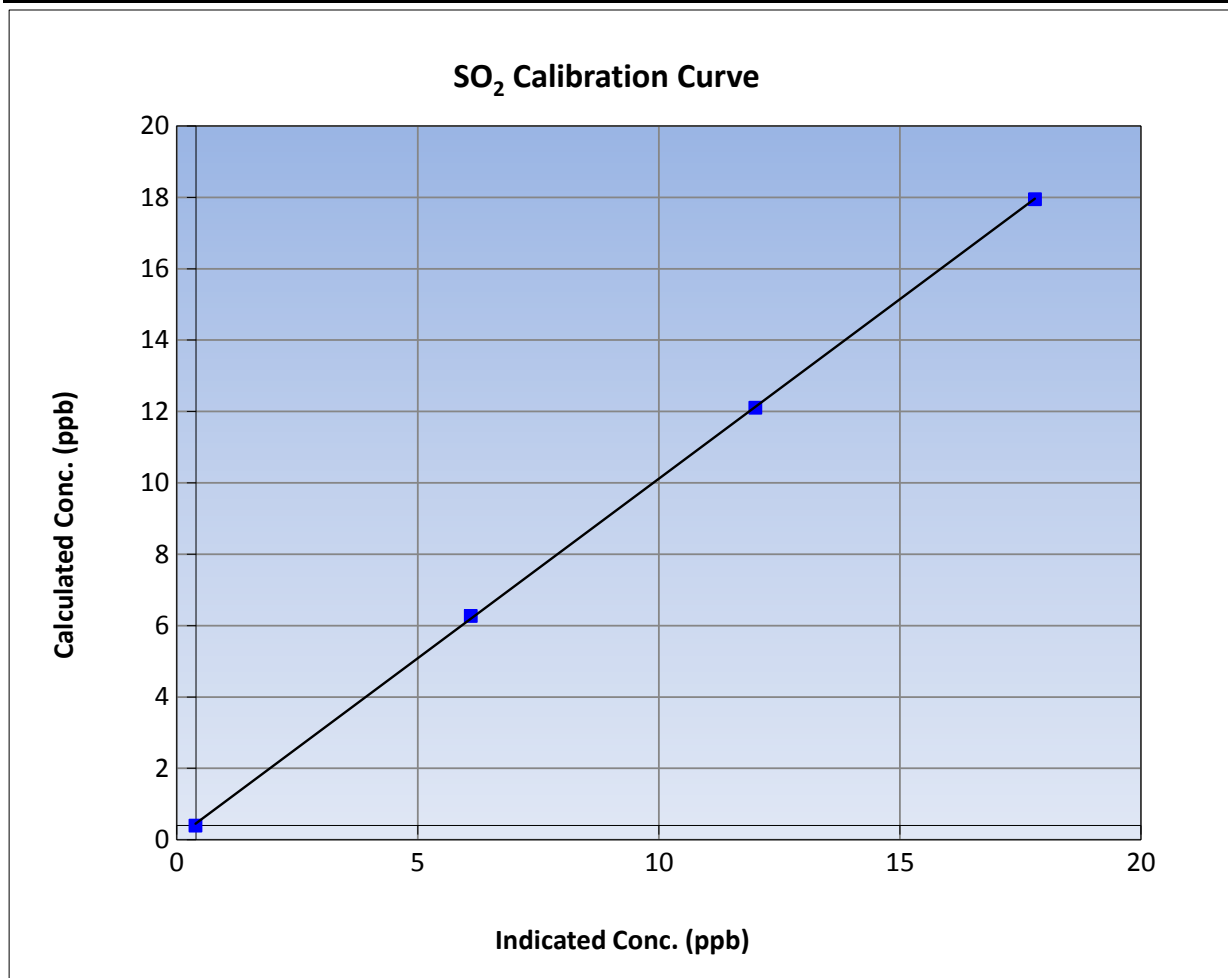
Version-03-2017

Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	10:15	End Time (MST)	15:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

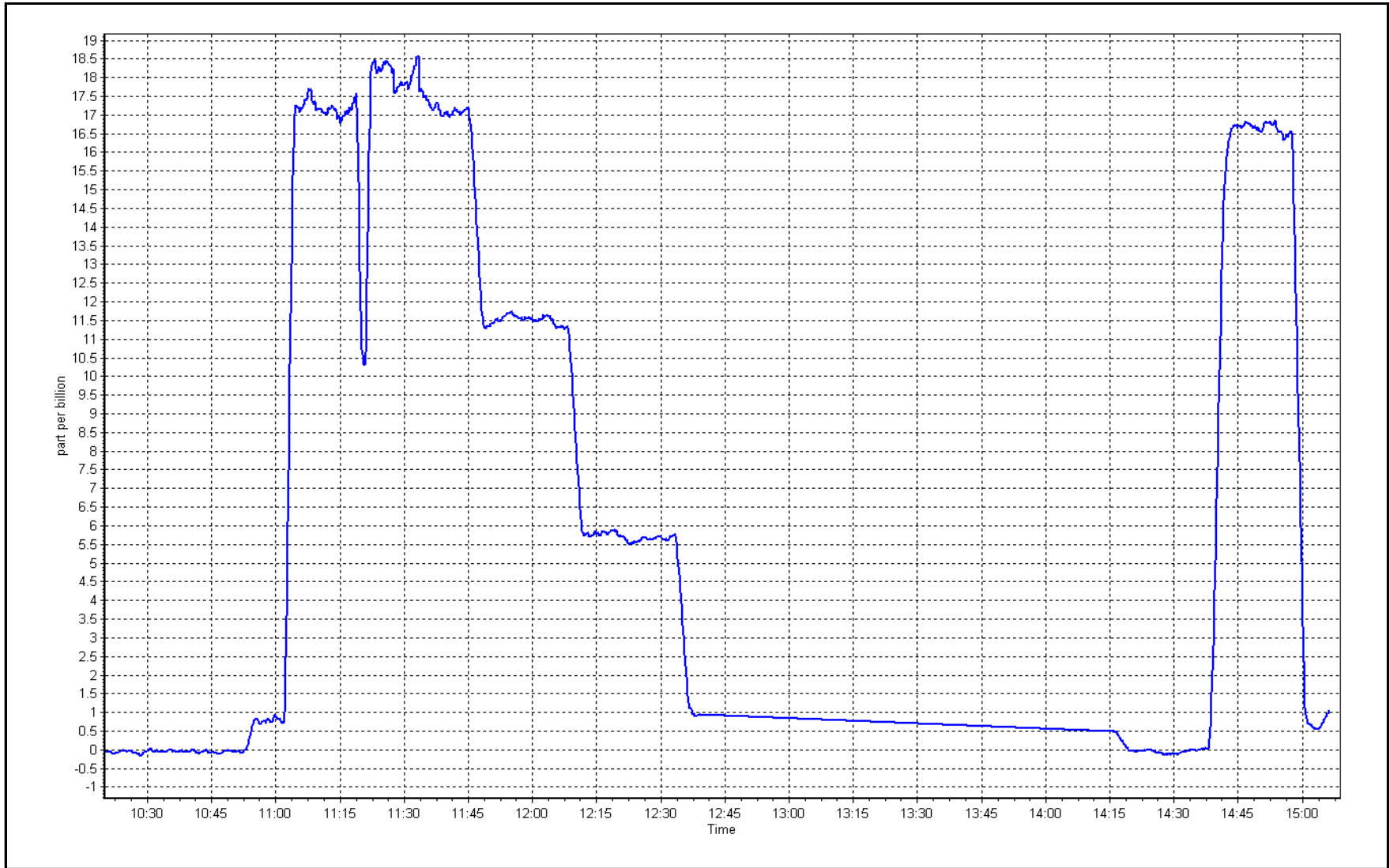
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999944	≥0.995
17.5	17.4	1.0085			
11.7	11.6	1.0096	Slope	1.005937	0.90 - 1.10
5.9	5.7	1.0307			
			Intercept	0.059329	+/-30



SO2 Calibration Plot

Date: June 1, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

O₃ Calibration Summary

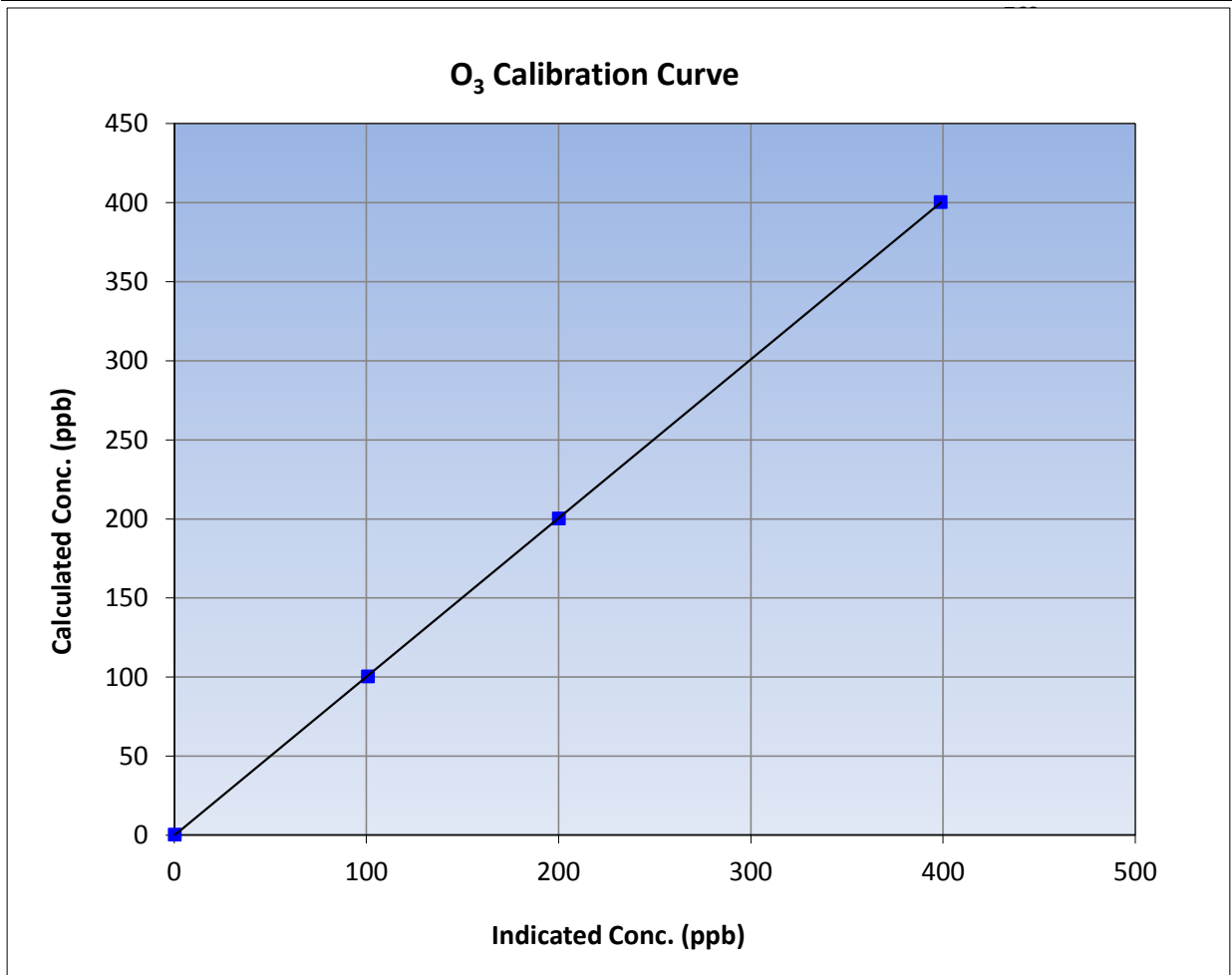
Version-03-2017

Station Information

Calibration Date	May 11, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	15:30	End Time (MST)	17:40
Analyzer make	API T400	Analyzer serial #	1020

Calibration Data

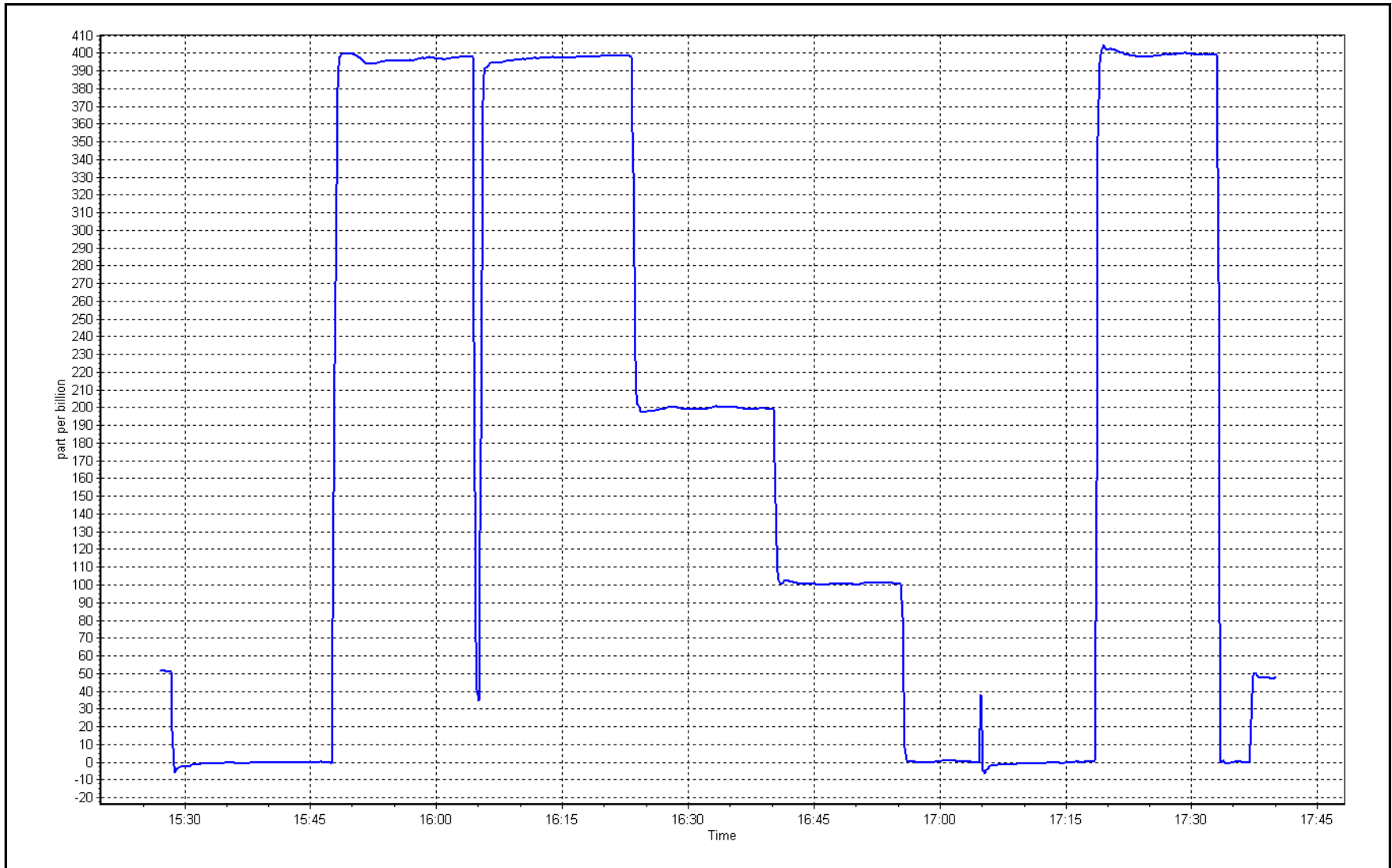
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.1	----	Correlation Coefficient	0.999993	≥0.995
400.0	398.4	1.0040			
200.0	199.8	1.0010	Slope	1.004326	0.90 - 1.10
100.0	100.4	0.9960			
			Intercept	-0.380476	+/- 10



O₃ Calibration Plot

Date: May 11, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	June 1, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	10:15	End time (MST):	15:05
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL79696	Cal Gas Expiry Date	February 13, 2018
NOX Cal Gas Conc.	<u>20.1</u> ppb	NO Cal Gas Conc.	<u>20.1</u> ppb
Calibrator Model	API T700	Serial Number	2656
ZAG make/model	ATI T701	Serial Number	4698

Analyzer Information

Analyzer make: API T200u			Analyzer serial #: 11039		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO slope	1.337	1.313	NOX Range (ppb)	0 - 1000 ppb	
NOX slope	1.350	1.328	PMT Temperature	5.1	5.1
NO2 slope	1.000	1.000	Reaction cell Press	4.3	4.3
NO offset	0.1	0.1	Sample Flow	1090	1090
NOX offset	0.2	0.2	PMT Voltage	502.0	502.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.997384	1.000128
NO _x Cal Offset	0.261742	0.090805
NO Cal Slope	0.994583	0.999345
NO Cal Offset	0.290473	0.281941
NO ₂ Cal Slope	1.005161	1.004438
NO ₂ Cal Offset	-0.021296	-0.061416



Wood Buffalo Environmental Association

NO_x Calibration Summary

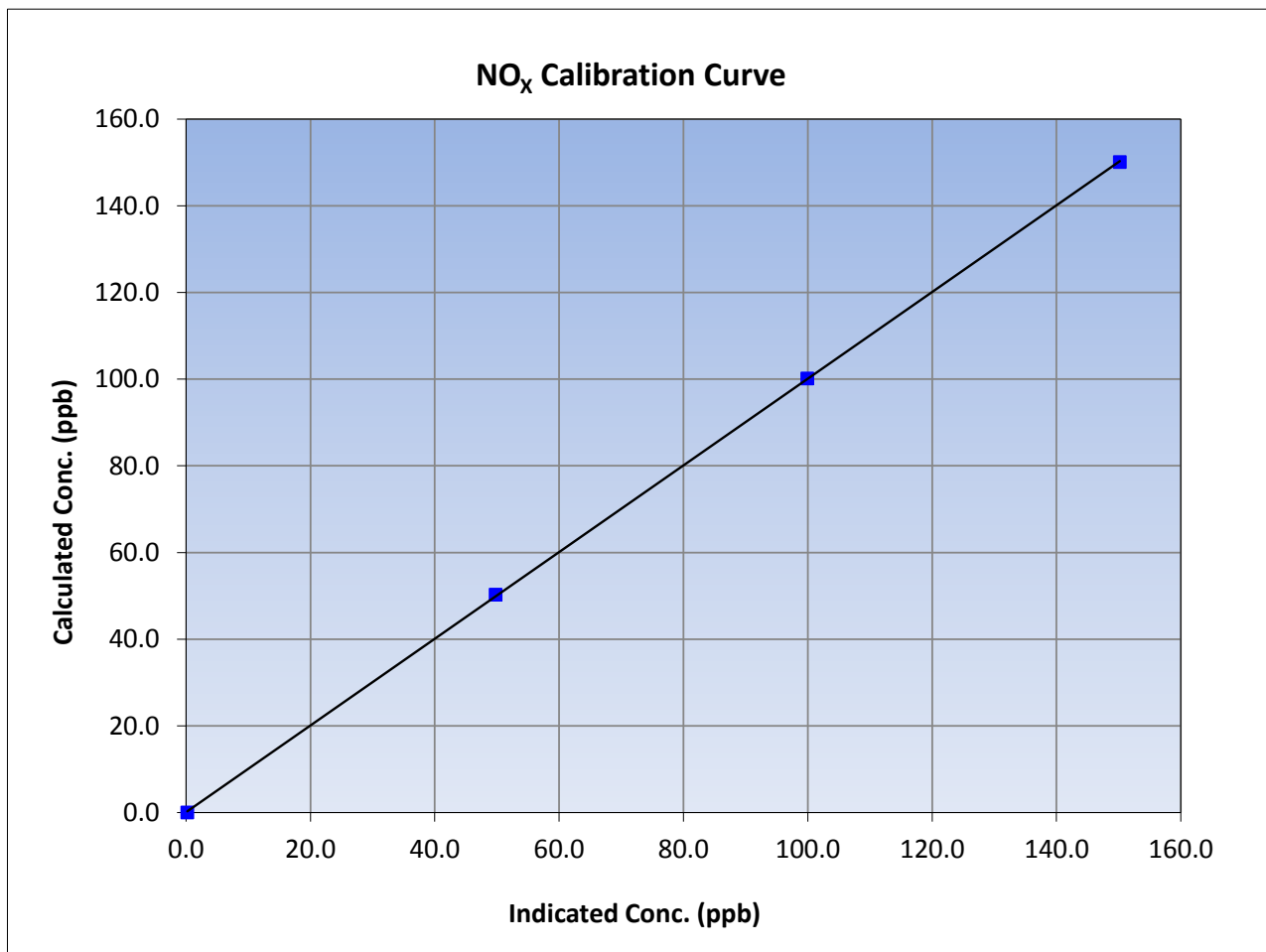
Version-03-2017

Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	10:15	End Time (MST)	15:05
Analyzer make	API T200u	Analyzer serial #	11039

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
150.1	150.2	0.9992			
100.2	99.9	1.0027			
50.3	49.8	1.0090			
			Slope	1.000128	0.90 - 1.10
			Intercept	0.090805	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

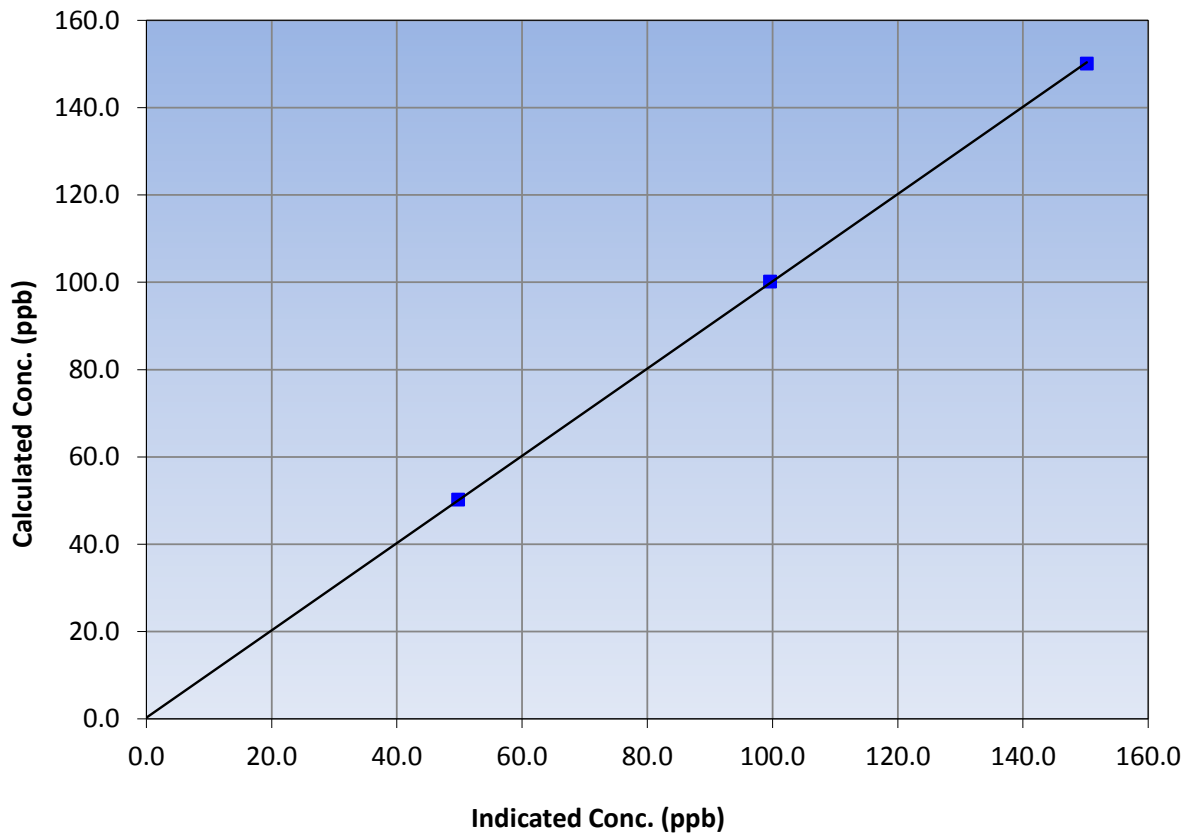
Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	10:15	End Time (MST)	15:05
Analyzer make	API T200u	Analyzer serial #	11039

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
150.1	150.2	0.9992			
100.2	99.6	1.0057			
50.3	49.8	1.0090			
			Slope	0.999345	0.90 - 1.10
			Intercept	0.281941	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

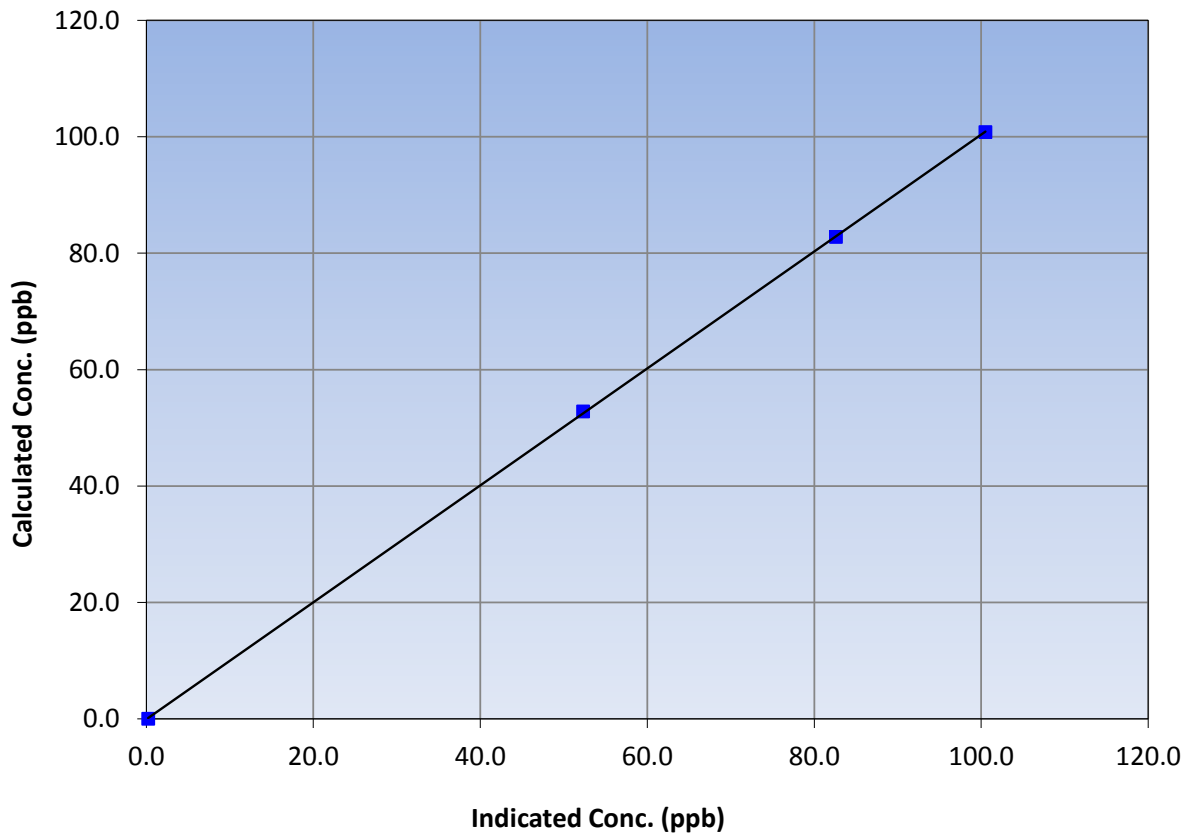
Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	10:15	End Time (MST)	15:05
Analyzer make	API T200u	Analyzer serial #	11039

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
100.8	100.5	1.0030			
82.8	82.6	1.0024			
52.8	52.3	1.0096			
			Slope	1.004438	0.90 - 1.10
			Intercept	-0.061416	+/-20

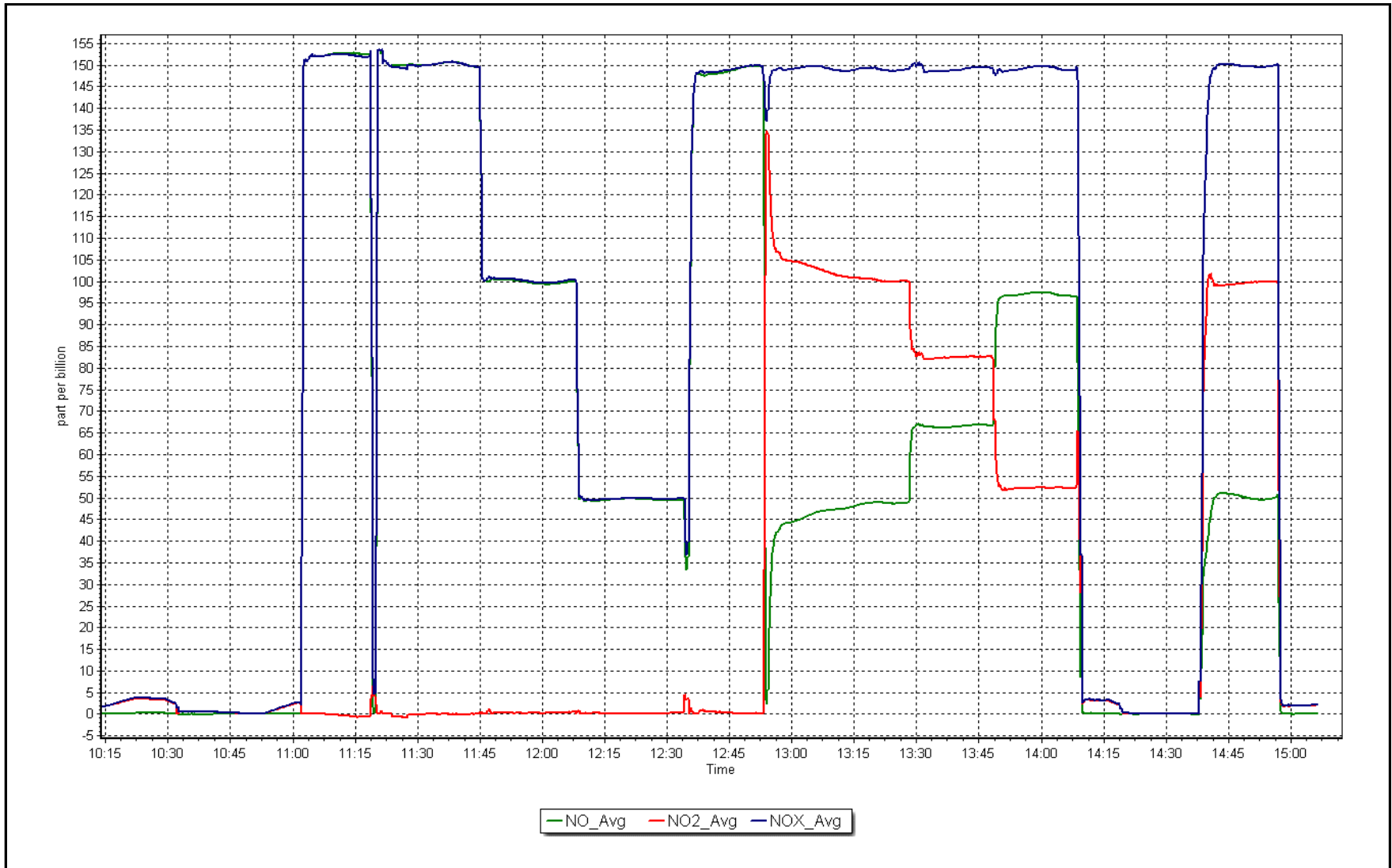
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 1, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Fort Chipewyan	Station number:	AMS 08
Calibration Date:	June 2, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	10:00	End time (MST):	
Sharp Model:	Thermo 5030	S/N:	CM-2383
Particulate Fraction:	PM2.5	C14 Source S/N:	10384
Flow Meter Make/Model:	Delta Cal	S/N:	1451
Temp/RH standard:	Delta Cal	S/N:	1451

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	18	18.5	18	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	972	971.2	972	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1015	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero		-----	0.3	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test:	Date of check:	<u>June 2, 2017</u>	Last Cal Date:	<u>March 23, 2017</u>
	Flow w/o adaptor:	<u>16.7</u>	Flow w/ adaptor:	<u>16.45</u>

(Limit) 0.4 LPM

Adjusted

Foil Calibration

(Limit) +/- 5% of previous

	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
Foil S/N:	<u>5868</u>	Foil S/N: _____	
Foil Mass:	<u>1324</u>	Foil Mass: _____	
Calibration Date:	<u>September 11, 2013</u>	Calibration Date: _____	
Correction Factor:	<u>7056</u>	Correction Factor: <u>7039</u>	0.24%

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:		June 2, 2017			
Date Pump Rebuilt/Replaced:		Not available			

Notes: Sharp installed to replace E-2025 Sharp. Cyclone head and sample tube cleaned. Slight flow adjustment, leak check and foil test all verified OK. Nephelometer zero check performed but no adjustments done.

Calibration by: Kelly Baragar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
TRS(ppb) Average	674	33	46	98.19	1	0	0	0
THC(ppm) Average	685	33	35	99.72	3.4	-	2.5	-
Temperature (C) Average	720	0	0	100	29.5	-	22.8	-
Relative Humidity (%) Average	720	0	0	100	99	-	93	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	18	-	11	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
TRS(ppb) Average	674	0.3	0	-	0	0	0	0	0	0	0	1
THC(ppm) Average	685	2.21	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.4	
Temperature (C) Average	720	16.28	5.1	-	3.8	10	12.5	16	20.1	23.3	29.5	
Relative Humidity (%) Average	720	64.1	22	-	21	33	45	66	84	94	99	
Wind Speed 10 m (km/h) Average	718	6	3	-	0	2	3	5	8	11	18	
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	20 Jun 2017 11:00	20 Jun 2017 12:00	2	Maintenance - WBEA internal audit
TRS	24 Jun 2017 02:00	24 Jun 2017 08:00	7	Analyzer failure - pump siezed
TRS	24 Jun 2017 09:00	24 Jun 2017 11:00	3	Maintenance - pump replacement and recalibration
TRS	25 Jun 2017 10:00	25 Jun 2017 10:00	1	Maintenance - verify daily QA response
THC	20 Jun 2017 13:00	20 Jun 2017 13:00	1	Maintenance - WBEA internal audit
THC	25 Jun 2017 10:00	25 Jun 2017 10:00	1	Maintenance - verify daily QA response
Wind Speed, Wind Direction	17 Jun 2017 22:00	17 Jun 2017 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	29 Jun 2017 23:00	29 Jun 2017 23:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

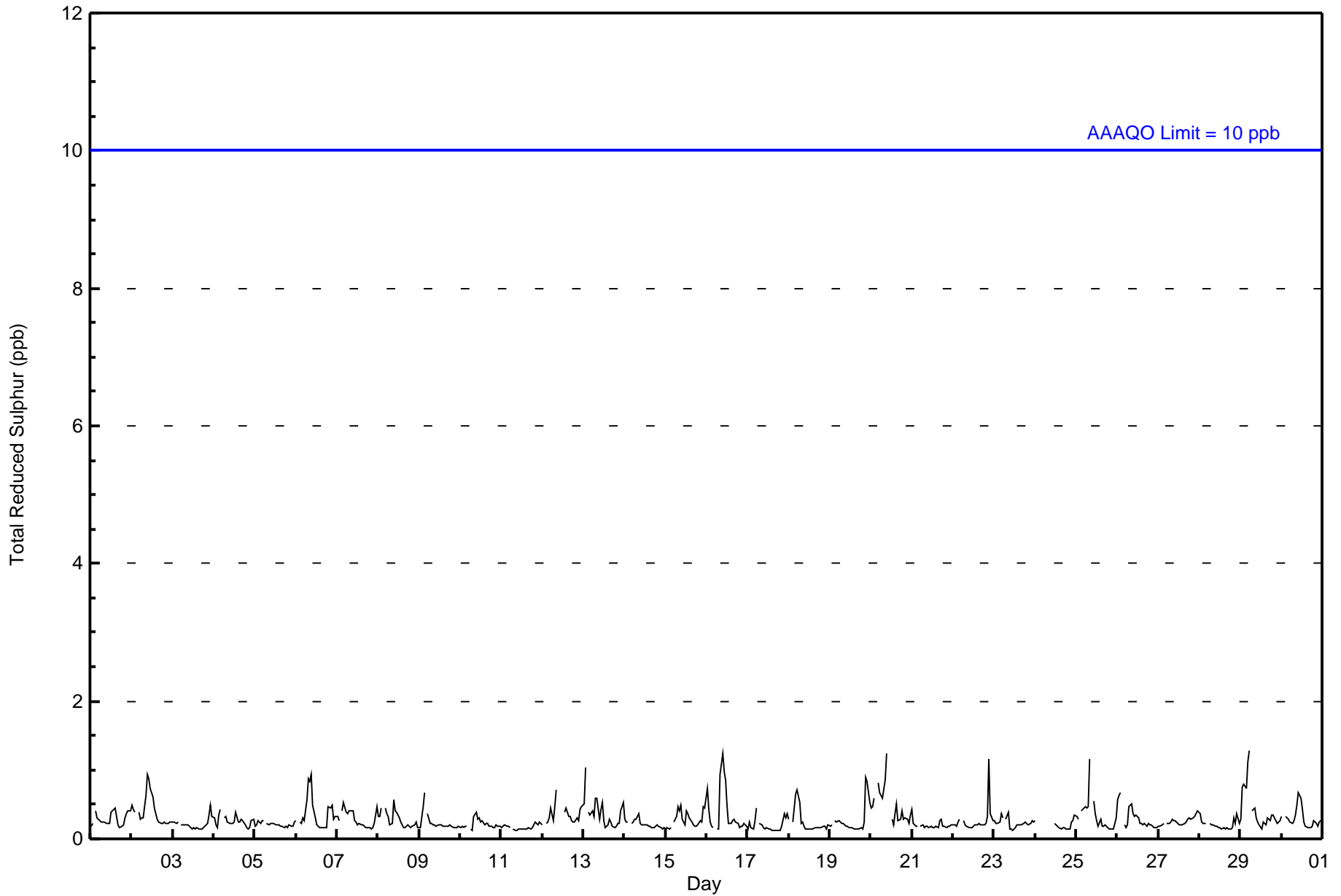
Barge Landing - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 29 06:00	Maximum Daily Average: 0.5 ppb on Jun 20		Hours of Data:	674
Minimum Value: 0 ppb on Jun 17 19:00	Minimum Daily Average: 0.2 ppb on Jun 11		Hours of Missing Data:	46
Maximum Diurnal Average: 0.4 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 18		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	98.2

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
2-Jun	0	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
6-Jun	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
7-Jun	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
8-Jun	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
9-Jun	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
12-Jun	0	Z	0	0	0	0	0	0	1	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
13-Jun	1	1	Z	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1	
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
16-Jun	1	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
18-Jun	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
20-Jun	0	0	1	Z	1	1	1	1	1	1	M	M	0	0	0	1	0	0	0	0	0	0	0	0	0.5	1	
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1	
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
24-Jun	0	AF	AF	AF	AF	AF	AF	AF	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0	
25-Jun	0	0	Z	0	0	0	0	0	1	M	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
26-Jun	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
29-Jun	0	1	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
30-Jun	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	

0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	674	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 674

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	91	64	45	31	28	27	41	70	27	31	21	34	39	30	34	59	672
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	91	64	45	31	28	27	41	70	27	31	21	34	39	30	34	59	672

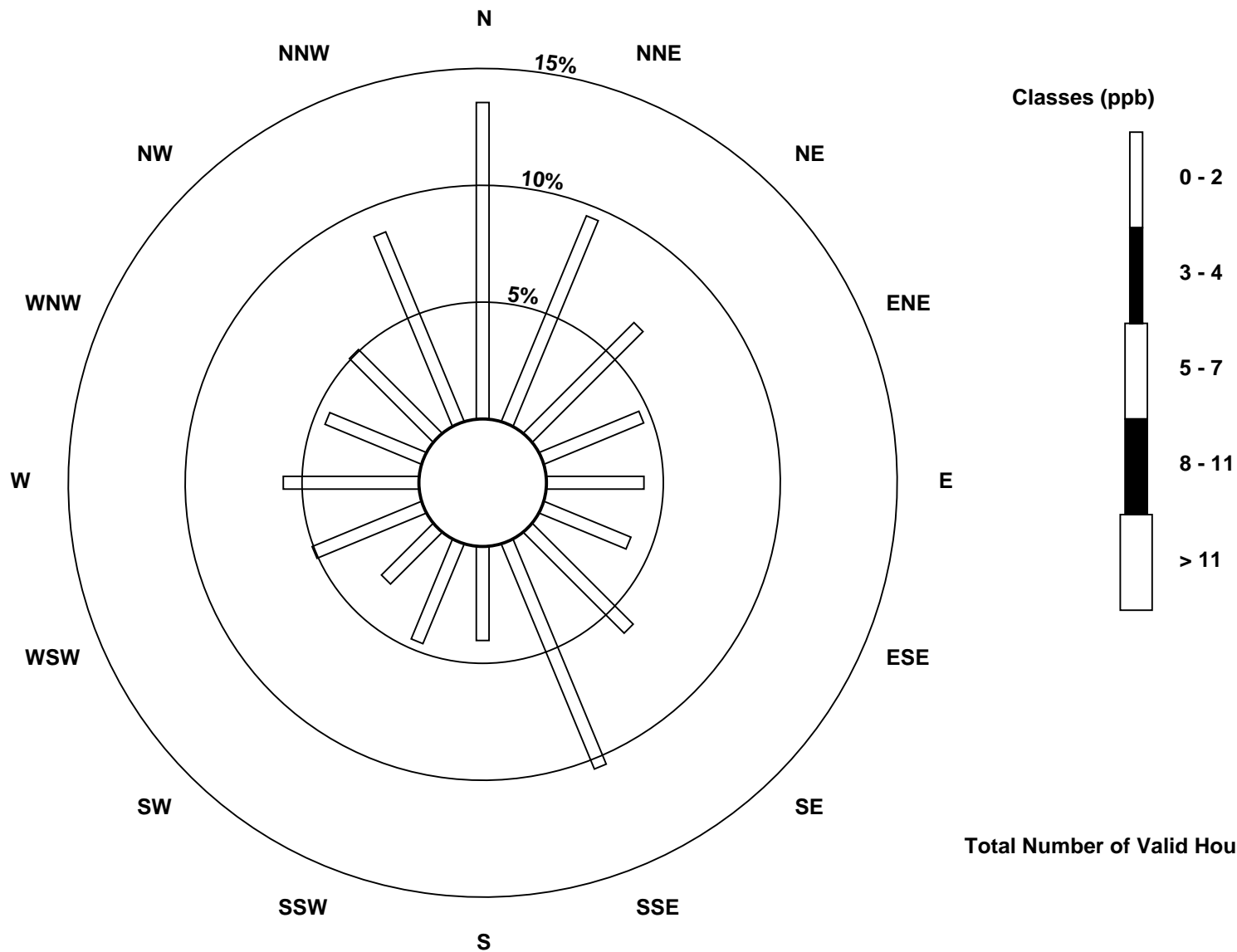
Total Number of Valid Hours: 672

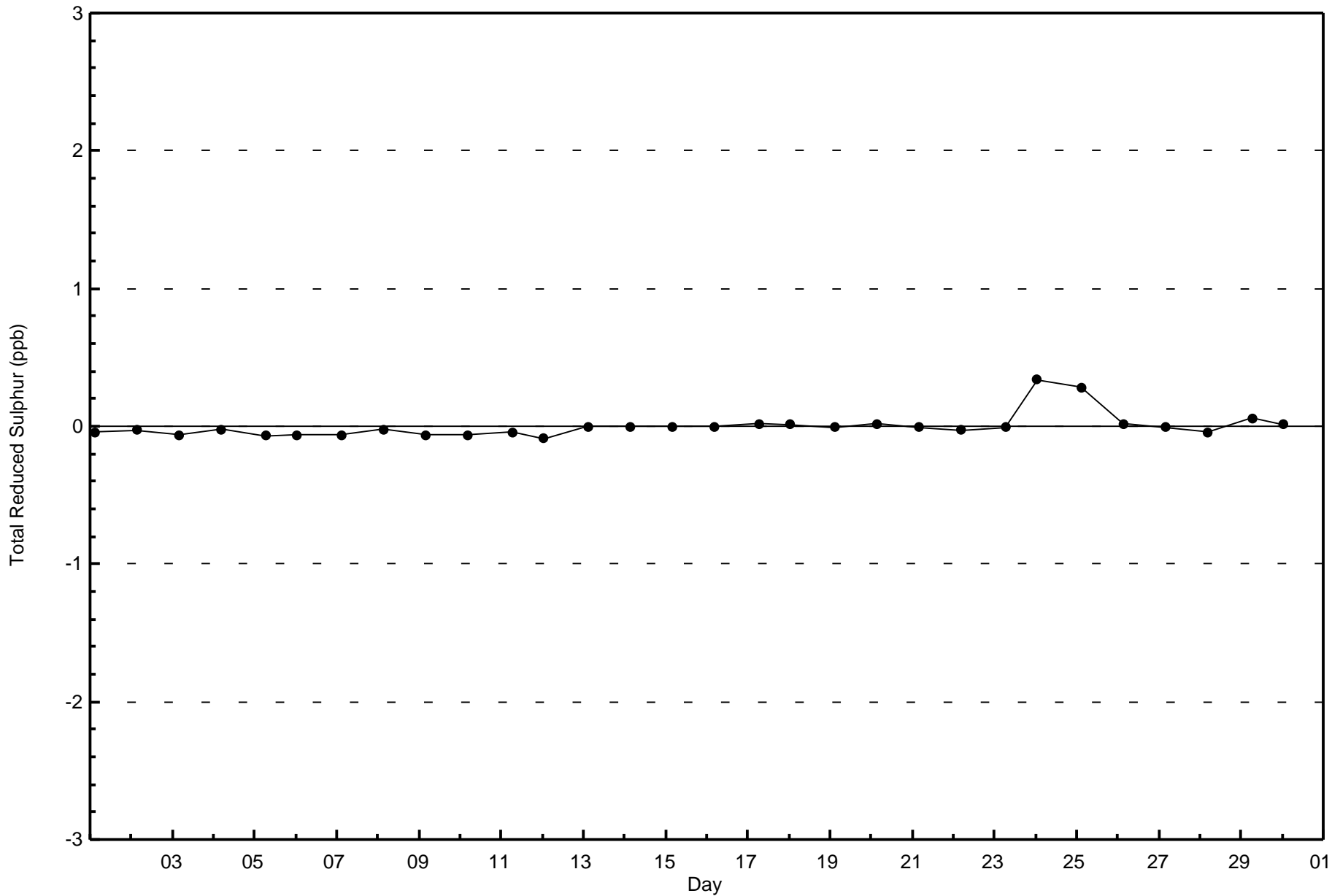
Total Number of Hours: 720

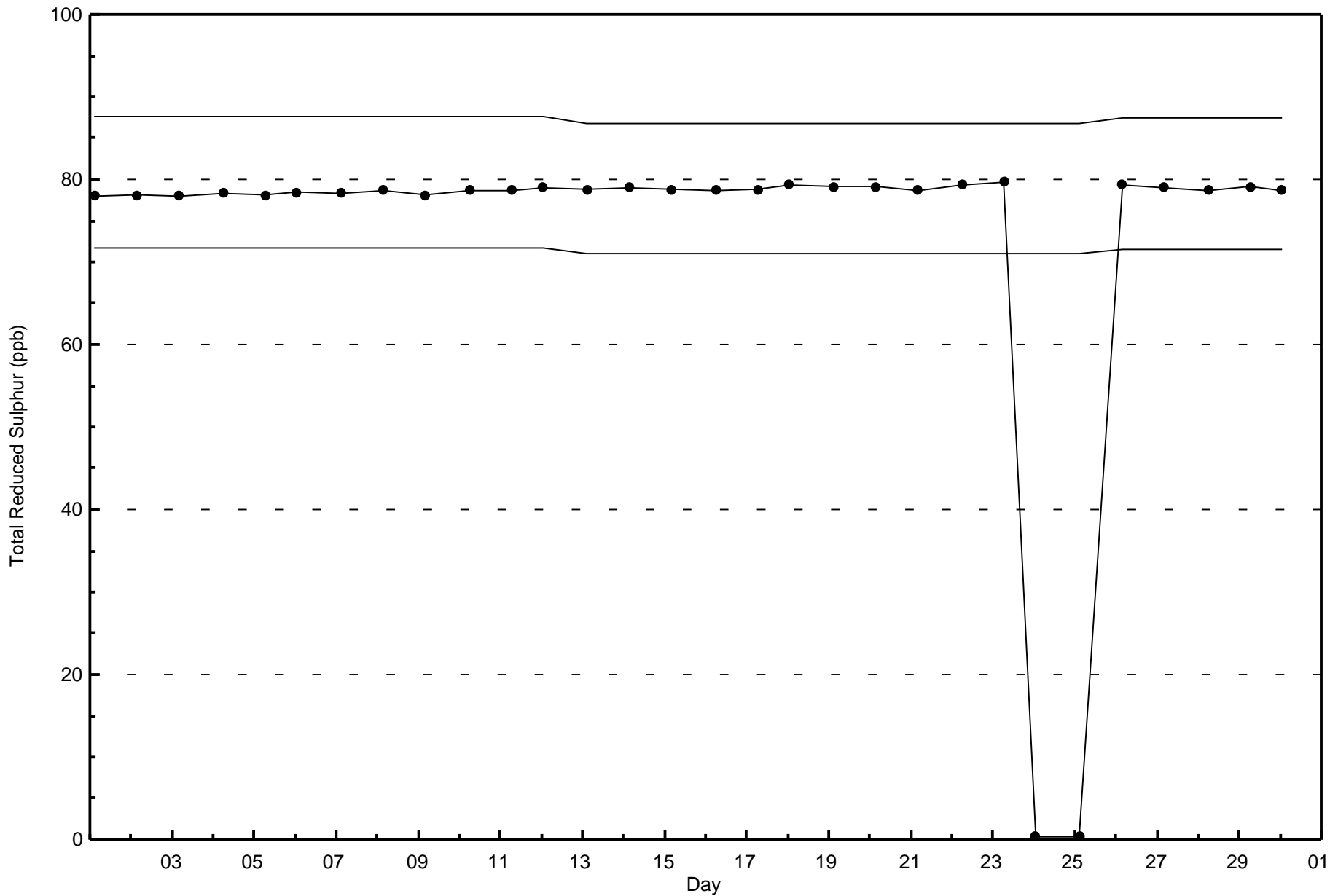


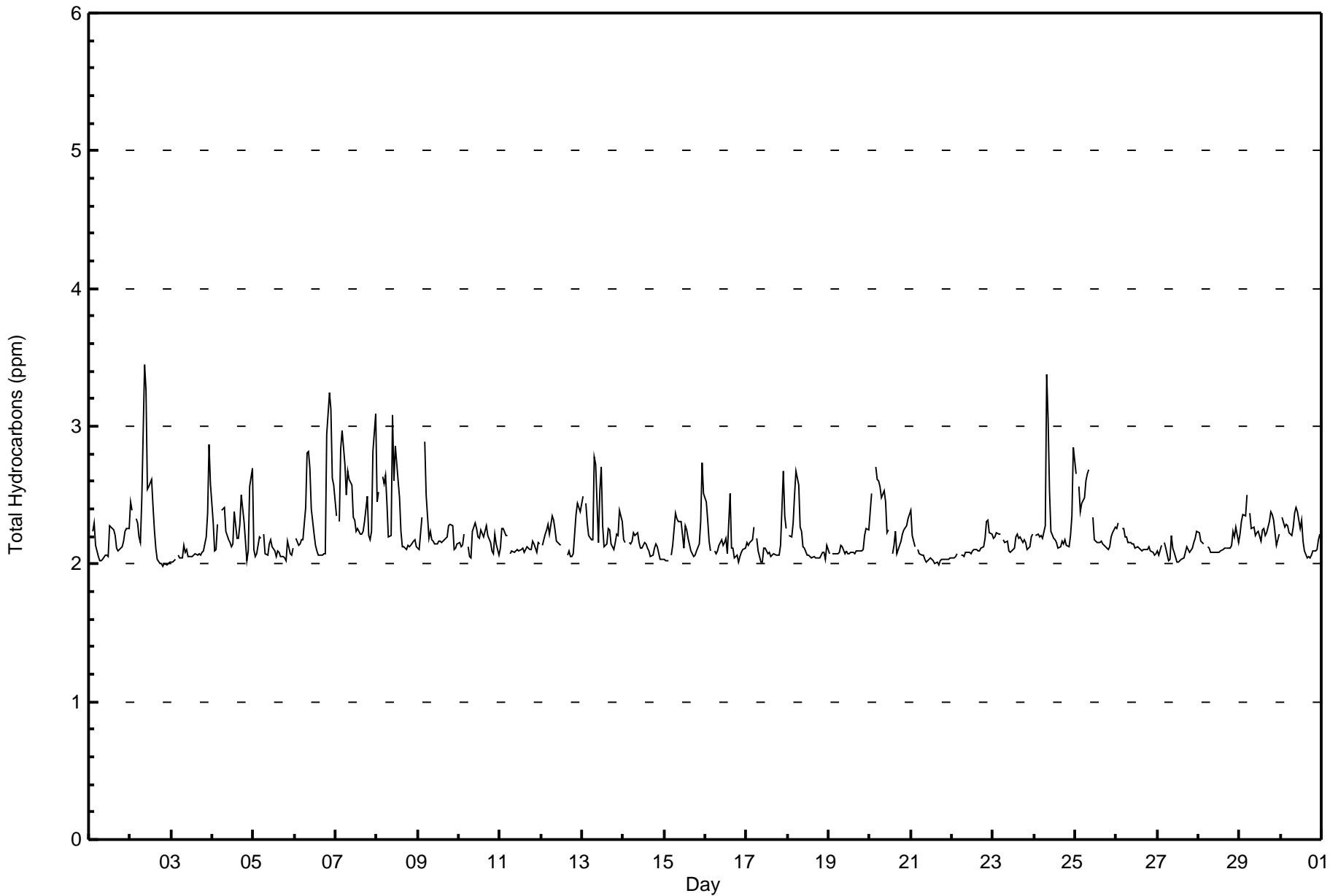
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	65	9.49	9.49
2.1 - 3.0	612	89.34	98.83
3.1 - 10.0	8	1.17	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	8	0	0	1	0	0	1	3	2	2	4	4	16	11	3	10	65
2.1 - 3.0	82	64	44	32	27	27	41	66	27	32	16	30	24	20	32	46	610
3.1 - 10.0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	93	67	44	33	27	27	42	69	29	34	20	34	40	31	35	58	683

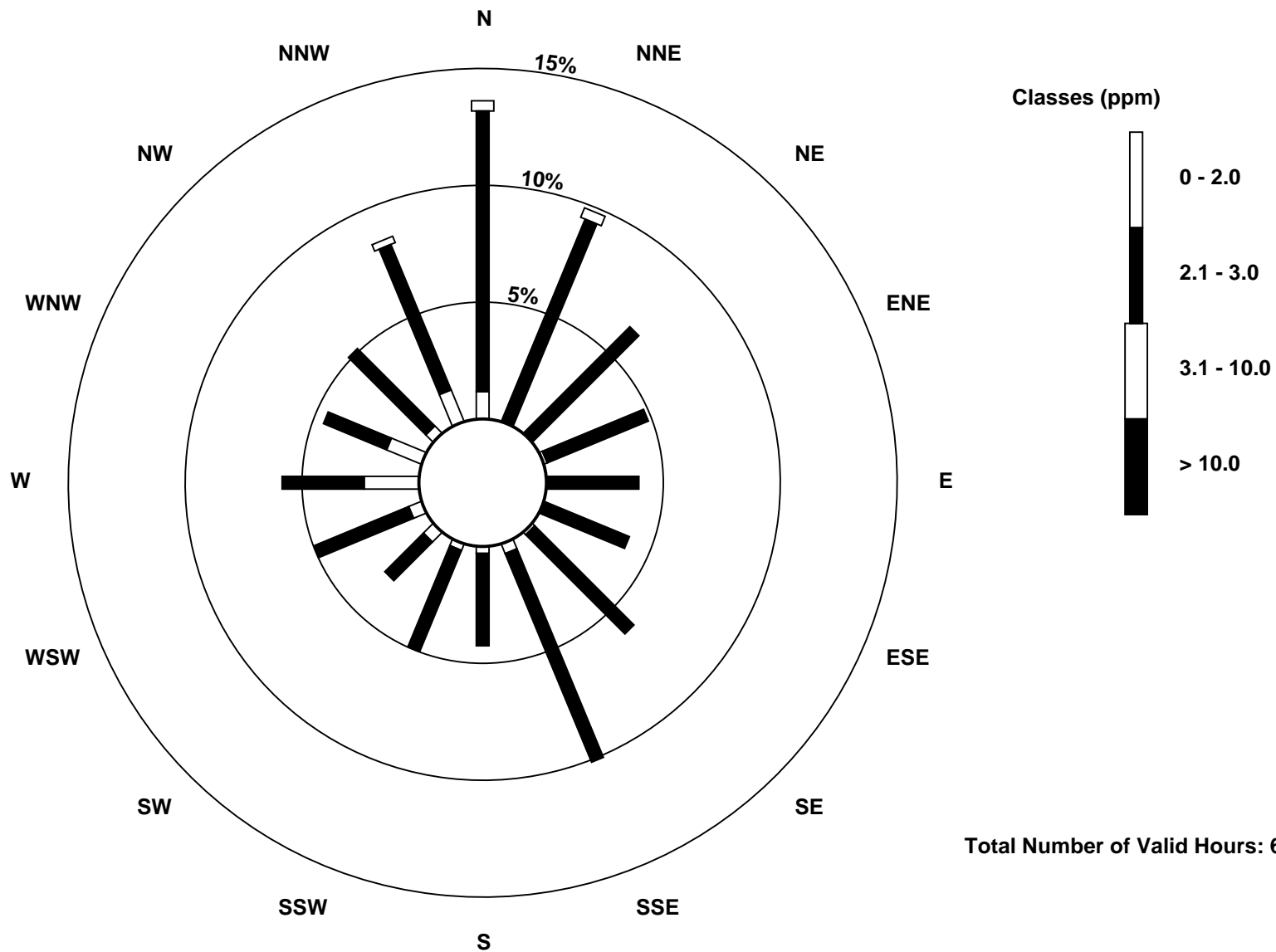
Total Number of Valid Hours: 683

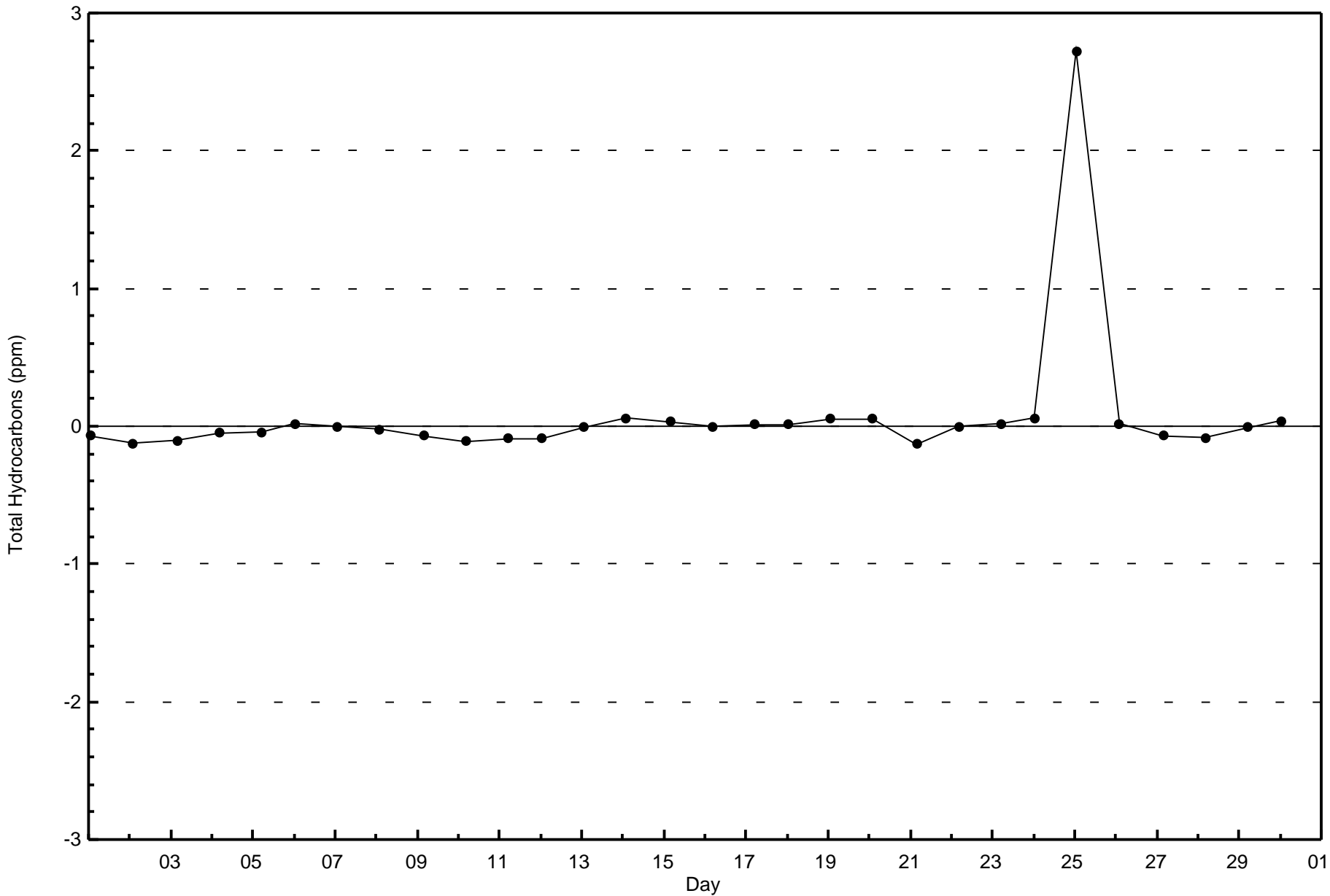
Total Number of Hours: 720

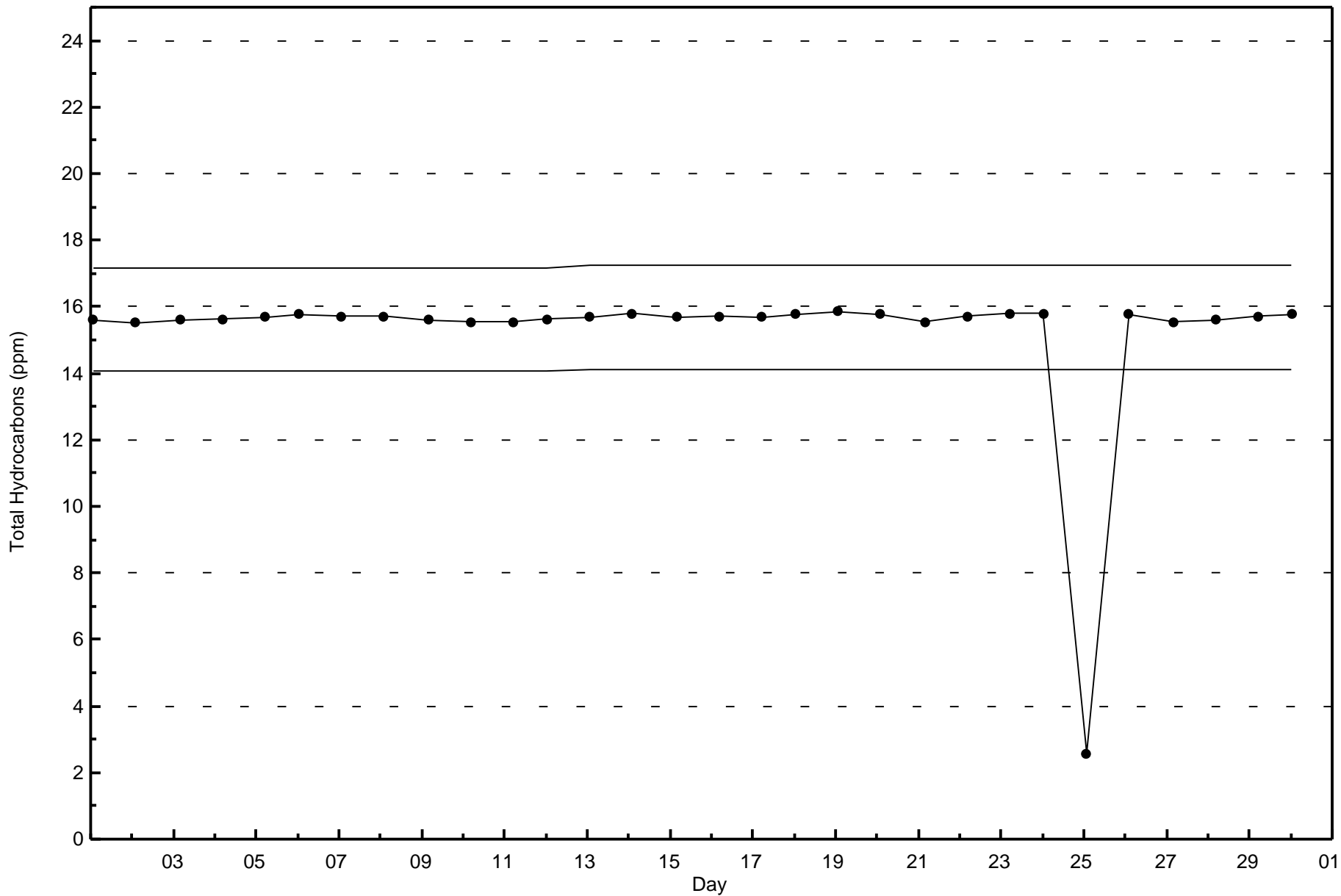


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)









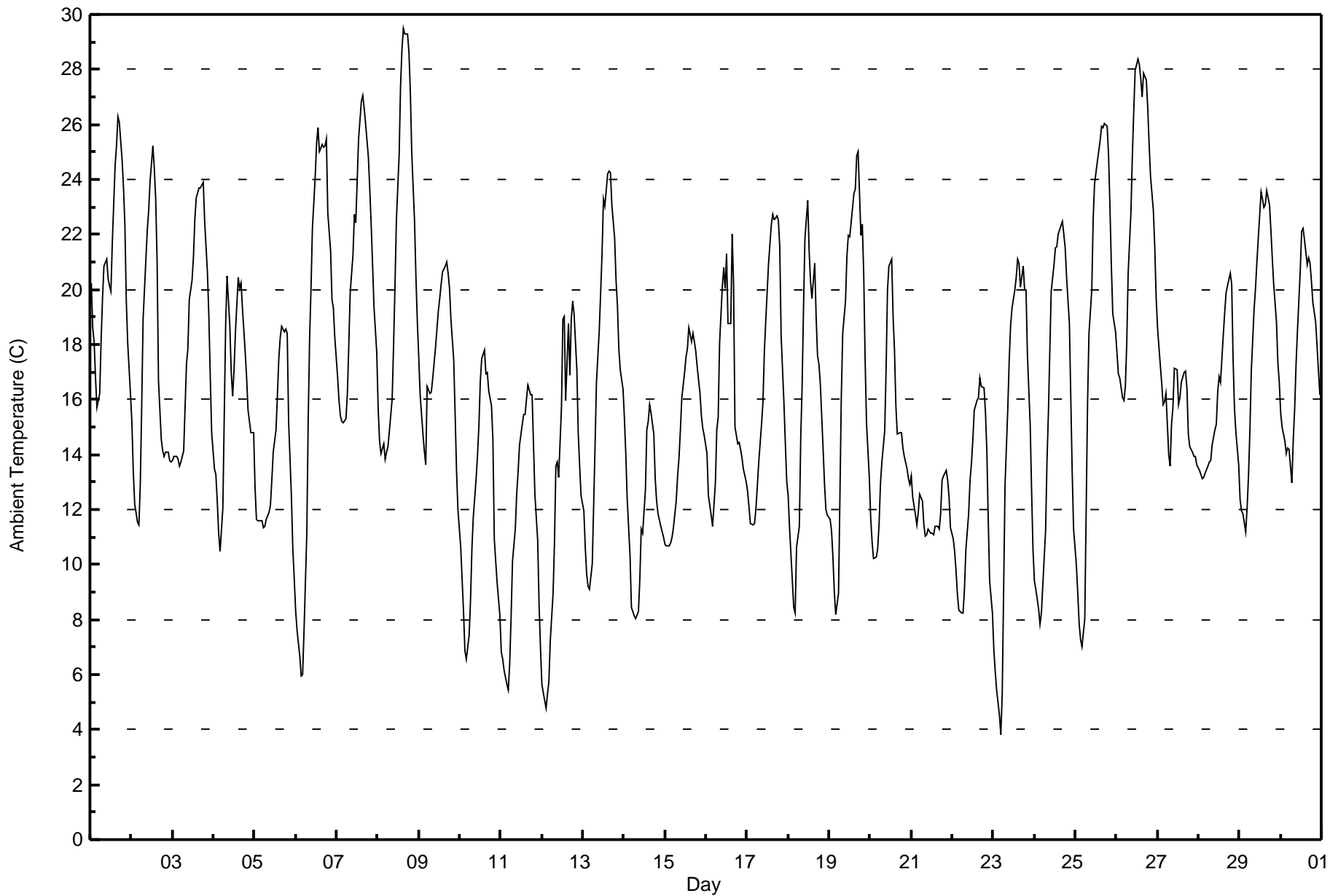
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Barge Landing - June 2017

Maximum Value: 29.5 C on Jun 8 16:00		Maximum Daily Average: 22.8 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 3.8 C on Jun 23 05:00		Minimum Daily Average: 11.3 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 21.0 C at hour 16		Minimum Diurnal Average: 10.6 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 16.28 C		Percentiles: P₁ = 5.4 P₁₀ = 10.0 Q₁ = 12.5 Median = 16.0 Q₃ = 20.1 P₉₀ = 23.3 P₉₉ = 28.0		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.2	18.6	18.1	16.8	15.7	16.2	18.1	19.7	20.9	21.1	20.4	20.1	19.9	21.7	24.5	25.2	26.3	26.1	24.7	23.7	22.3	19.6	18.0	16.2	20.6	26.3																						
2-Jun	15.1	13.4	12.2	11.5	11.4	12.9	15.8	18.9	21.1	22.2	22.9	23.9	25.2	24.4	23.3	21.1	16.7	14.6	14.2	13.9	14.1	14.1	13.8	13.7	17.1	25.2																						
3-Jun	13.8	13.9	13.9	13.8	13.6	13.7	14.2	15.7	17.3	17.8	19.6	20.3	21.2	22.6	23.4	23.7	23.8	23.9	22.5	20.6	19.0	16.8	14.8	18.5	23.9	23.9																						
4-Jun	13.5	13.3	12.3	11.1	10.5	12.0	15.4	18.7	20.5	18.6	17.0	16.1	17.1	18.5	20.5	20.0	20.3	19.3	17.7	16.8	15.6	15.2	14.8	14.8	16.2	20.5																						
5-Jun	12.8	11.7	11.6	11.6	11.6	11.3	11.4	11.6	11.9	12.1	13.1	14.1	14.9	16.2	17.5	18.2	18.6	18.4	18.5	18.4	15.2	12.5	10.6	9.5	13.9	18.6																						
6-Jun	8.4	7.6	6.7	6.0	6.0	7.6	11.1	15.3	18.2	20.1	22.2	24.1	25.3	25.9	25.0	25.3	25.2	25.2	25.5	22.8	21.4	19.6	19.3	18.3	18.0	25.9																						
7-Jun	16.8	16.0	15.4	15.2	15.1	15.3	16.2	18.0	19.9	21.2	22.7	22.4	23.9	25.5	26.9	27.0	26.6	26.0	24.8	23.7	22.4	20.9	19.4	17.7	20.8	27.0																						
8-Jun	15.7	14.5	14.0	14.4	13.8	14.1	14.3	14.9	16.0	18.0	20.1	22.5	24.9	27.4	28.7	29.5	29.3	29.3	28.6	27.1	25.0	22.5	20.4	18.8	21.0	29.5																						
9-Jun	17.5	16.1	14.7	14.2	13.6	16.5	16.2	16.3	16.8	17.4	17.9	19.2	19.7	20.2	20.7	20.8	21.0	20.6	20.0	18.9	17.5	15.5	13.4	12.0	17.4	21.0																						
10-Jun	10.6	9.4	8.3	6.9	6.6	7.4	8.7	10.6	11.8	13.1	14.0	15.0	16.7	17.5	17.8	16.9	17.0	16.3	15.7	14.5	11.0	10.1	9.4	8.1	12.2	17.8																						
11-Jun	6.8	6.6	6.1	5.7	5.5	6.4	8.1	10.1	11.3	12.6	13.4	14.3	15.1	15.5	15.4	16.0	16.5	16.2	16.2	14.4	12.6	10.9	8.6	6.9	11.3	16.5																						
12-Jun	5.6	5.3	4.8	5.3	5.7	7.2	9.0	10.8	13.6	13.7	13.2	15.7	18.9	19.0	16.0	18.8	16.9	18.9	19.6	19.1	17.1	14.8	13.6	12.5	13.1	19.6																						
13-Jun	12.0	10.6	9.7	9.2	9.1	10.0	12.1	14.3	16.6	18.5	19.9	21.3	23.3	23.1	24.2	24.3	24.3	23.1	21.9	20.4	19.4	17.8	17.1	16.4	17.4	24.3																						
14-Jun	15.3	14.0	12.4	10.3	8.4	8.3	8.1	8.0	8.3	9.4	11.3	11.2	12.7	14.9	15.2	15.8	15.5	14.7	13.1	12.3	11.8	11.4	11.2	11.0	11.9	15.8																						
15-Jun	10.7	10.7	10.7	10.8	11.0	11.3	12.3	13.2	13.9	14.9	16.1	17.0	17.6	17.9	18.6	18.1	18.4	18.1	17.7	17.2	16.2	15.4	14.9	14.7	14.9	18.6																						
16-Jun	14.0	12.5	12.2	11.8	11.4	13.0	14.9	15.4	18.1	20.2	20.8	20.0	21.3	18.8	18.8	22.0	20.2	15.0	14.4	14.4	14.2	13.9	13.5	13.0	16.0	22.0																						
17-Jun	12.6	12.1	11.5	11.4	11.5	12.0	12.9	13.7	15.1	15.9	17.8	18.9	20.9	21.7	22.4	22.7	22.5	22.7	22.5	21.6	18.3	15.8	14.4	13.0	16.8	22.7																						
18-Jun	12.5	11.3	9.4	8.4	8.2	10.6	11.4	14.6	16.5	19.4	21.9	23.2	21.4	20.3	19.7	20.9	19.0	17.6	17.3	16.6	14.2	12.9	12.0	11.8	15.5	23.2																						
19-Jun	11.7	11.2	10.3	9.0	8.2	9.0	12.4	16.1	18.4	19.6	21.2	22.0	21.9	22.4	23.5	23.7	24.9	25.0	22.0	22.4	20.6	17.5	15.1	13.2	17.5	25.0																						
20-Jun	11.7	10.8	10.2	10.3	10.6	11.5	13.0	13.7	14.8	17.1	20.0	20.8	21.1	19.0	17.8	15.8	14.8	14.8	14.8	14.3	13.9	13.5	13.1	12.9	14.6	21.1																						
21-Jun	13.2	12.5	11.8	11.4	11.9	12.6	12.3	11.4	11.0	11.1	11.3	11.2	11.1	11.1	11.4	11.4	11.3	11.9	13.1	13.2	13.4	13.1	12.4	11.3	11.9	13.4																						
22-Jun	10.9	10.5	9.7	8.9	8.4	8.2	8.3	9.1	10.5	11.9	13.1	13.7	14.5	15.6	16.0	16.0	16.8	16.5	16.4	15.5	14.1	11.6	9.4	8.2	12.3	16.8																						
23-Jun	6.9	6.1	5.4	4.5	3.8	5.3	9.0	12.9	15.7	17.5	18.7	19.3	20.0	20.4	21.1	20.9	20.1	20.8	20.0	20.0	17.7	15.1	12.7	10.5	14.3	21.1																						
24-Jun	9.4	9.1	8.4	7.8	8.3	9.3	11.2	13.8	15.5	17.8	19.9	20.9	21.5	21.5	22.0	22.3	22.5	22.0	21.5	20.4	18.8	16.1	13.4	11.3	16.0	22.5																						
25-Jun	10.0	8.9	7.8	7.3	7.0	8.0	12.0	15.9	18.4	20.0	22.6	23.9	24.2	24.7	25.4	25.9	25.9	26.1	25.9	24.9	23.0	20.9	19.1	18.5	18.6	26.1																						
26-Jun	17.7	16.9	16.8	16.1	16.0	16.5	18.0	20.6	22.9	24.9	26.5	28.0	28.4	28.2	27.7	27.0	27.9	27.6	26.6	25.3	24.1	22.9	21.6	19.7	22.8	28.4																						
27-Jun	18.6	17.9	16.6	15.8	15.9	16.2	14.0	13.6	15.1	15.7	17.1	17.1	15.8	16.1	16.6	17.0	17.1	16.4	14.8	14.3	14.1	13.9	14.0	13.6	15.7	18.6																						
28-Jun	13.4	13.3	13.1	13.2	13.3	13.6	13.8	13.8	14.3	14.9	15.1	16.3	16.8	16.6	18.4	19.2	19.9	20.1	20.6	20.2	17.4	15.6	14.8	13.6	15.9	20.6																						
29-Jun	12.4	12.0	11.8	11.2	12.0	13.2	14.8	17.0	19.3	20.0	21.0	21.9	23.5	23.3	23.0	23.1	23.6	23.1	22.2	21.2	20.2	18.8	17.4	16.6	18.4	23.6																						
30-Jun	15.5	15.0	14.5	14.0	14.2	14.2	12.9	14.5	15.6	17.3	18.5	20.7	22.1	22.2	21.8	20.9	21.2	20.9	20.3	19.5	18.8	18.0	17.0	16.2	17.7	22.2																						
																								12.9	12.1	11.3	10.8	10.6	11.4	12.7	14.4	16.0	17.1	18.3	19.2	20.0	20.4	20.8	21.0	20.8	20.4	19.8	19.0	17.5	16.0	14.7	13.6	Diurnal Average
																								20.2	18.6	18.1	16.8	16.0	16.5	18.1	20.6	22.9	24.9	26.5	28.0	28.4	28.2	28.7	29.5	29.3	29.3	28.6	27.1	25.0	22.9	21.6	19.7	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	74	10.28	10.28
10 - 20	460	63.89	74.17
> 20	186	25.83	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

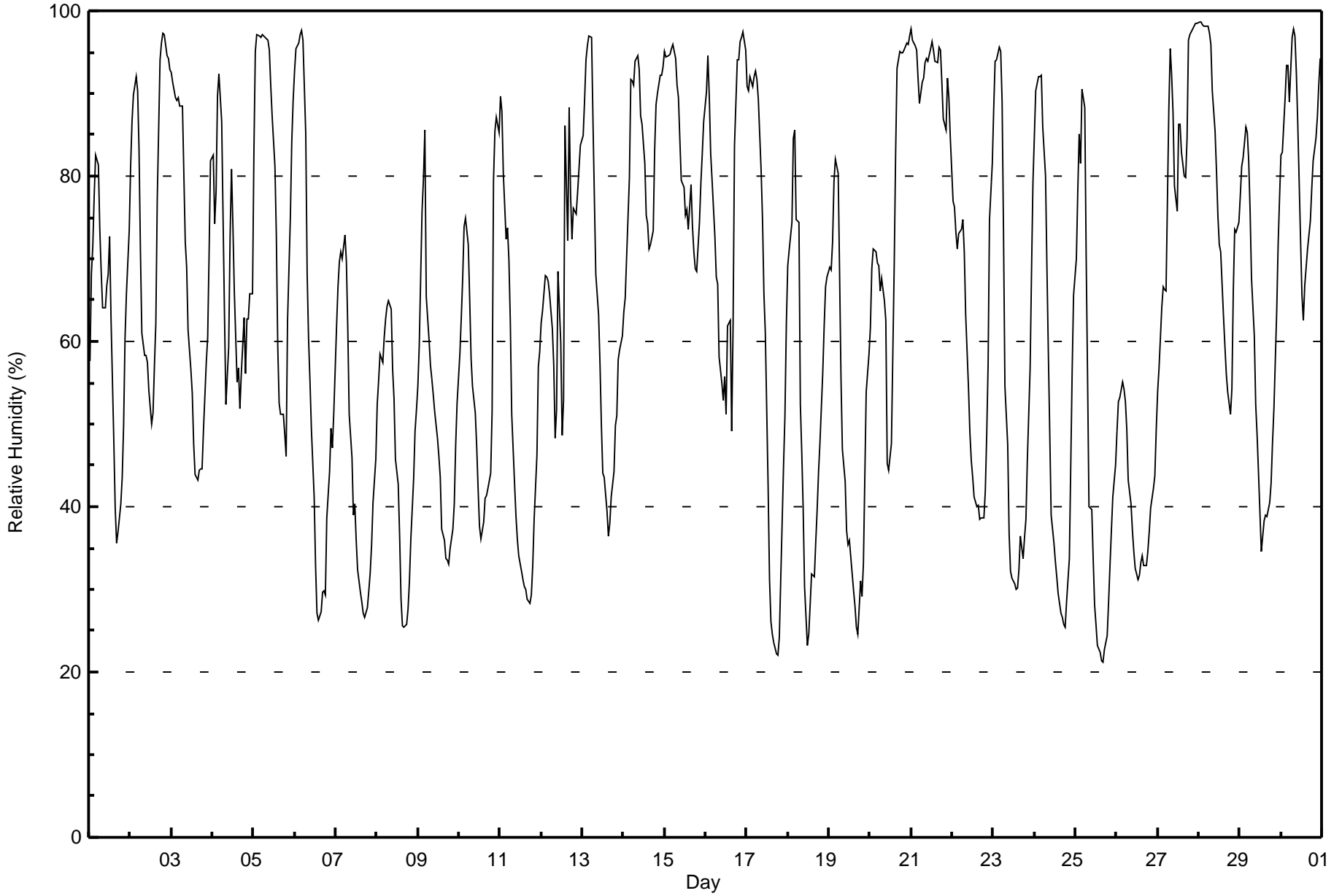
Relative Humidity (RH) - %
Barge Landing - June 2017

Maximum Value: 99 % on Jun 28 01:00														Maximum Daily Average: 92.8 % on Jun 21														Hours in Service: 720	
Minimum Value: 21 % on Jun 25 17:00														Minimum Daily Average: 41.5 % on Jun 26														Hours of Data: 720	
Maximum Diurnal Average: 83.8 % at hour 5														Minimum Diurnal Average: 47.2 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 64.1 %														Percentiles: P ₁ = 23 P ₁₀ = 33 Q ₁ = 45 Median = 66 Q ₃ = 84 P ₉₀ = 94 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	58	68	72	78	82	81	74	69	64	64	67	68	73	63	48	40	36	37	40	44	50	60	66	73	61.4	82			
2-Jun	81	87	90	92	90	83	71	61	58	58	58	54	50	51	57	62	77	94	96	97	97	95	94	93	77.0	97			
3-Jun	93	91	89	89	90	88	88	80	72	69	61	57	54	48	44	43	44	45	45	49	57	60	70	82	67.1	93			
4-Jun	82	74	78	90	92	87	75	63	52	59	73	81	74	66	55	57	52	56	63	56	63	63	66	66	68.5	92			
5-Jun	83	95	97	97	97	97	97	97	96	95	91	87	81	73	59	53	51	51	49	46	62	75	84	89	79.3	97			
6-Jun	93	95	96	97	98	96	85	68	60	55	50	41	33	27	26	27	30	30	29	39	44	50	47	51	57.0	98			
7-Jun	62	67	70	71	70	73	70	62	51	46	39	40	36	32	30	28	27	27	28	30	32	35	41	46	46.3	73			
8-Jun	52	55	58	57	61	63	64	65	64	57	53	46	43	37	29	26	25	26	28	31	36	43	49	52	46.6	65			
9-Jun	55	59	76	80	86	65	60	57	55	54	51	48	46	44	37	36	34	34	33	35	37	40	48	53	50.9	86			
10-Jun	58	63	68	74	75	72	65	58	55	51	47	42	38	36	38	41	41	42	44	52	80	85	87	85	58.2	87			
11-Jun	90	88	80	72	74	70	62	51	43	39	36	34	32	31	30	30	29	28	29	33	39	46	57	59	49.3	90			
12-Jun	62	64	68	68	67	66	62	57	48	52	69	60	49	53	86	72	88	78	72	76	75	78	81	84	68.1	88			
13-Jun	85	89	94	96	97	97	87	77	68	63	57	50	44	44	39	36	38	41	44	50	51	58	59	61	63.6	97			
14-Jun	63	65	70	80	92	91	91	94	95	93	87	86	81	75	74	71	72	73	83	89	90	92	92	93	83.1	95			
15-Jun	95	94	95	95	95	96	94	91	90	84	80	79	75	76	74	79	74	71	69	69	74	79	83	87	83.2	96			
16-Jun	90	95	90	83	80	73	68	67	58	55	53	56	51	62	63	49	62	84	94	94	96	97	97	95	75.4	97			
17-Jun	91	90	92	91	92	93	92	89	81	75	66	61	42	31	26	25	24	22	22	24	31	45	51	62	59.0	93			
18-Jun	69	71	74	85	86	75	74	52	47	40	30	23	25	28	32	32	36	40	44	48	56	62	67	68	52.6	86			
19-Jun	69	69	72	79	82	80	68	56	47	43	37	35	36	34	30	28	25	25	31	29	33	43	54	58	48.5	82			
20-Jun	62	69	71	71	70	69	66	68	65	63	45	44	48	59	69	83	93	95	95	95	95	96	96	97	74.3	97			
21-Jun	98	96	96	95	92	89	91	92	94	94	94	95	96	95	94	94	96	95	91	87	86	92	90	85	92.8	98			
22-Jun	77	76	73	71	73	74	75	71	63	54	49	46	44	41	40	40	38	39	39	42	49	57	75	81	57.8	81			
23-Jun	88	94	94	96	95	89	73	55	47	37	32	31	31	30	30	32	36	34	36	38	46	57	69	79	56.2	96			
24-Jun	85	90	92	92	92	86	80	69	59	49	39	36	33	31	30	27	26	26	25	29	34	45	56	66	54.0	92			
25-Jun	70	78	85	82	91	88	70	56	40	40	34	28	26	23	22	21	21	23	24	29	33	37	41	45	46.1	91			
26-Jun	49	53	53	55	54	53	49	43	40	37	35	32	31	32	33	34	33	33	35	37	40	42	44	49	41.5	55			
27-Jun	54	57	64	67	66	66	88	95	92	88	79	76	86	86	83	80	80	84	96	97	98	98	98	99	82.4	99			
28-Jun	99	99	98	98	98	98	97	96	90	85	81	75	72	71	63	59	56	54	51	54	66	74	73	74	78.5	99			
29-Jun	78	81	82	86	85	82	76	68	61	52	49	44	35	36	38	39	39	40	43	48	52	64	72	77	59.4	86			
30-Jun	83	83	90	93	93	89	97	98	97	93	86	72	66	63	67	71	73	75	78	82	85	87	91	94	83.5	98			
	75.7	78.5	80.9	82.6	83.8	81.0	77.0	70.8	65.1	61.5	57.6	54.3	51.0	49.3	48.2	47.2	48.6	50.0	51.9	54.2	59.6	65.2	69.9	73.4	Diurnal Average				
	99	99	98	98	98	98	97	98	97	95	94	95	96	95	94	94	96	95	96	97	98	98	98	99	Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Barge Landing - June 2017

Maximum Speed: 18 km/h on Jun 26 14:00	Maximum Daily Speed Average: 11.1 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 30 08:00	Minimum Daily Speed Average: 0.8 km/h on Jun 29	Hours of Data: 718
Maximum Diurnal Speed Average: 2.7 km/h at hour 21	Minimum Diurnal Speed Average: 0.3 km/h at hour 2	Hours of Missing Data: 2
Monthly Average Velocity: 1.2 km/h 13.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 O ₃ = 8 P ₉₀ = 11 P ₉₉ = 15	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SSW1	S5	SSW4	WSW1	NW4	WNW3	WSW6	SW5	SW4	SSW5	SW5	S5	SSE8	SSE7	SSW6	SSW4	SSW3	SSW3	ESE4	ESE4	ESE3	ESE3	SE3	N1	S2.8	SSE8	
2-Jun	SE2	SW2	W1	SSW3	SSW3	SW2	WNW1	NW2	NNW2	NNW5	N6	NNE6	NE7	NE10	N8	NW9	WNW11	W10	W6	W5	W4	WNW6	WSW8	W7	WNW3.1	WNW11	
3-Jun	W9	W8	W8	W7	WNW4	WNW5	NW3	NNW5	NNW5	WNW6	NW8	WNW7	WNW4	WNW7	NNW2	N2	ESE4	E5	E5	E3	NE4	NE6	N3	NNE2	NW2.6	W9	
4-Jun	ESE5	SE8	SSE6	SW2	SSE3	S3	SSW2	WNW3	WSW1	SE4	SSE2	SSW3	SW4	SW3	NNW4	N4	NNE7	NNW4	NNW7	NNW8	NNW7	N5	NNE5	NE6	NNE0.9	NNW8	
5-Jun	E6	E4	NE4	NNE5	N7	N7	N5	N5	N4	N4	N5	NNW4	NNW4	NNW5	E4	E4	ENE5	E5	SSE6	SSW4	ENE6	E3	WSW1	ESE1	NE2.6	N7	
6-Jun	SE2	ESE2	S1	SSW2	SSE3	SSE4	S5	S7	S6	SSW8	S7	SW7	SSW7	SW10	W8	W6	W4	NNW1	NNW1	NNE4	NNE6	N5	NE6	N3	SW1.9	SW10	
7-Jun	NNW5	N5	N4	N5	N4	N4	N5	N5	NNE7	NNE8	NNE10	NNE9	NE9	NE10	NE9	NE9	NE10	NE11	NE10	NE9	NE9	NE9	NE8	N6	NNE7.0	NE11	
8-Jun	N4	N3	NNW4	N4	N4	N4	NNW3	NNW4	NW3	NNE4	NNW4	NNE5	NNE7	N7	ESE1	SSW7	SE7	SSE7	SE6	SE7	ESE5	SE4	SE4	SSE4	ENE1.1	SSW7	
9-Jun	S3	SSW2	N4	N3	N4	NNE10	N13	NNE14	NNE14	NNE15	NE15	NNE16	NNE16	NNE16	NE15	NE15	NNE15	NNE15	NE13	NE14	NE12	ENE9	ENE7	NE7	NNE10.5	NNE16	
10-Jun	NE6	ENE6	ENE6	NNE3	NE3	ENE4	ESE5	ENE3	NNE3	N4	NE6	NE4	NNE2	NE3	E3	NE3	NNE2	NNE5	N6	NNW6	NNW7	N7	N6	N5	NNE3.7	NNW7	
11-Jun	NW4	WNW4	NW5	NNW7	NW6	NW7	NW8	NNW13	NNW13	NW13	NNW12	NNW10	NW11	NW10	NNW11	NNW9	NNW9	NNW9	NNW8	NNE6	ENE4	ENE5	ESE3	SE4	NNW6.7	NNW13	
12-Jun	SE3	ESE3	ESE4	SE4	SE5	SE6	SSE7	SSE6	SSE9	SSE6	SSE7	SSE11	SSE17	SSE12	SSE7	SE10	E4	ESE6	E5	E4	N8	N6	N5	NNE5	SE4.4	SSE17	
13-Jun	N5	N4	NNW3	NNW4	NNW3	NNW4	N4	E1	E3	NE4	NNE5	NE5	NNW5	NW5	NW5	NE5	NNE7	NNE12	N12	N10	NNE10	NNE9	NNE8	NNE10	N5.6	NNE12	
14-Jun	N11	NNE12	N11	N12	N13	NNE13	NNE12	NNE10	N7	N8	N11	N13	N13	N12	N12	N12	N10	N9	N9	N9	NNW8	NNW9	NNW8	N10.5	N13		
15-Jun	N9	NNW8	NNW8	NNW7	N6	N6	N6	NNE6	N5	NNE5	N5	NNW9	NNE7	N5	NE5	ENE4	ENE5	ENE6	E4	E4	ENE3	N1	N1	NNE1	NNE4.4	NNW9	
16-Jun	SSE1	E3	SE4	SE7	SE6	SE6	ESE1	SSE1	S1	NNW5	W5	WSW3	NE2	ENE6	NNE5	E3	ESE5	WSW2	W6	NNW5	ESE4	S2	SE4	SSE7	SE1.4	SSE7	
17-Jun	SSE7	SSE6	SE4	SSE5	SSE4	SSW2	SSW2	W5	W7	W7	NW4	NE3	NW11	NW12	NW12	NW10	NW11	WNW10	NNW8	NNW5	NE2	AF	SSE3	SSE1	WNW3.0	NW12	
18-Jun	NNW2	W1	S2	SW3	SSE3	S3	SSW4	SSW7	SSW9	SSW9	SW10	WSW10	WSW10	WSW12	W7	W13	W11	WNW8	NW8	NNW8	N10	NNW8	NW6	WNW5	W4.7	W13	
19-Jun	NW4	W6	W3	WSW4	SW4	WSW5	WSW5	WSW4	WSW4	WSW2	W3	NW2	WSW2	SSW5	WSW7	SW4	WSW5	WSW6	S4	SSW5	S4	SSE3	SE2	SE3	WSW3.1	WSW7	
20-Jun	ESE2	S1	ESE2	SE4	SE5	SE5	SSE7	SSE4	SSE5	SSE7	S8	SSW8	WSW8	SW10	SSW12	S10	S8	SSE7	SSE8	SSE8	SSE6	SE6	SE6	SSE7	S5.4	SSW12	
21-Jun	SSW8	SSW8	SSW5	SW4	W5	WNW7	W7	WNW9	W6	WNW7	W7	W6	WNW7	WNW8	WNW7	WNW8	W7	WNW5	N9	N10	N9	N9	N13	N14	WNW5.2	N14	
22-Jun	N15	N11	N13	N14	N12	N10	N8	N9	NNE11	NNE10	NNE12	N13	NNE11	N10	N10	N8	N8	NNE8	NNE7	NNE5	NNE3	W1	WSW3	W4	N8.5	N15	
23-Jun	NW3	NW2	NW4	NW2	WSW2	WSW3	W3	NW4	NNW4	N5	NW6	N4	NNE4	NE4	E2	SE1	SSW3	ESE2	NE2	W4	W1	NW2	WSW2	WSW1	NW1.5	NW6	
24-Jun	SSE2	WSW4	SSE4	WSW2	S1	NW2	NNW5	W5	NNE6	NNE7	NNW9	NNE8	NNE8	NNE7	N8	NNW6	NNE6	NE7	NE6	ENE5	ENE4	E1	N2	NNE0	NNE3.6	NNE9	
25-Jun	NNE2	N3	N3	NNW3	NW2	W2	W2	W3	NNW4	NNW3	NNW2	W8	WSW10	WSW10	SW10	SW9	SW9	SSE9	SSE9	SSE9	SE9	SE11	SE10	SE9	SSE9	S3.0	SE11
26-Jun	SSE9	SSE9	SSE9	SE8	SE10	SSE10	SSE10	S12	SSE12	SSE13	SSE15	SSE14	SSE17	SSE18	SSE15	SSE14	SSE13	SE12	SSE8	SE8	ESE9	SE11	SE10	SE6	SSE11.1	SSE18	
27-Jun	SE6	ESE3	NNE2	ESE4	SE3	SSE7	SW6	SE5	SSE9	S7	SSW7	WSW7	SW5	S3	SSE2	SSE1	ENE2	SE3	SSE3	ESE3	SE1	E3	ESE3	ENE3	SSE2.8	SSE9	
28-Jun	E4	ENE6	NE7	ENE6	E5	ENE6	NE7	NE8	ENE8	ENE8	ENE8	ENE8	ENE8	NE7	ENE7	E7	ENE5	E5	ENE4	NNE2	SSE2	S5	S5	S8	S7	E4.6	ENE8
29-Jun	SSE7	SSE6	SSE5	SSE3	SSE5	SSE4	S5	S4	WSW1	NE3	N4	WNW5	WNW4	NNW4	W3	WNW3	N2	N2	E4	SE3	WSW2	NW2	AF	WSW1	S0.8	SSE7	
30-Jun	S2	SSE3	W2	NW2	NW2	WSW3	E2	E0	ENE1	ESE4	S4	SSE7	SSW6	SW6	W6	WNW5	WNW3	NNW3	NNW1	SW2	SSW1	SSW2	SSE3	SE4	SSW1.4	SSE7	

ENE0.9 ENE0.3 NNE0.8 N1.1 NNE0.7 N0.7 NNW0.8 NNW1.3 NNW1.0 N1.4 N1.8 NNW1.7 NNW1.5 NNW1.6 NNW1.4 NNW1.4 NNE1.7 NNE2.0 NNE2.2 NE2.1 NE2.7 NE2.1 ENE1.5 NE0.9	Diurnal Average
N15 NNE12 N13 N14 NNE13 NNE13 N13 NNE14 NNE14 NNE15 NE15 NNE16 SSE17 SSE18 SSE15 NE15 NNE15 NNE15 NE13 NE14 NE12 SE11 N13 N14	Diurnal Maximum

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Barge Landing - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jun 18 15:00	Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7
Minimum Value: 1 km/h on Jun 12 00:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5	

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	2	1	1	1	2	2	2	1	2	2	2	3	2	3	2	2	2	1	1	1	1	1	1	3	
2-Jun	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	5	5	4	4	2	2	2	2	2	5	
3-Jun	2	2	3	2	2	2	2	2	2	3	3	3	2	3	2	2	2	2	2	1	2	2	2	1	3	
4-Jun	1	1	2	1	1	1	2	2	2	2	2	2	2	2	2	1	2	1	3	3	2	2	2	2	3	
5-Jun	2	1	2	2	2	2	2	2	1	2	2	1	1	2	2	2	2	2	2	2	3	1	2	1	3	
6-Jun	1	1	1	1	1	1	2	3	2	3	3	3	3	4	4	2	2	1	1	2	2	1	2	1	4	
7-Jun	1	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
8-Jun	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	4	4	3	3	2	1	1	1	1	4	
9-Jun	1	1	2	1	1	3	5	4	4	5	5	5	5	5	5	5	5	4	4	4	4	3	2	2	5	
10-Jun	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	3	4	2	2	2	4	
11-Jun	1	1	2	2	2	3	3	5	5	5	4	4	4	4	4	3	3	4	3	2	2	1	1	1	5	
12-Jun	2	2	1	1	1	2	2	2	3	3	3	3	5	6	6	4	4	2	2	1	2	2	2	1	6	
13-Jun	2	1	1	1	1	1	2	2	2	2	2	2	3	2	2	2	3	4	4	3	3	3	3	3	4	
14-Jun	4	4	3	4	4	4	4	4	3	3	4	4	4	4	4	4	4	3	3	2	3	2	3	3	4	
15-Jun	3	2	2	2	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2	1	1	1	1	1	3	
16-Jun	1	1	1	1	1	2	2	2	2	2	2	2	1	3	2	2	4	3	2	1	2	1	1	2	4	
17-Jun	2	1	1	1	1	1	1	2	2	2	2	2	4	5	4	3	4	4	3	2	1	AF	1	1	5	
18-Jun	2	2	1	1	1	1	1	3	3	3	4	4	4	6	7	5	4	3	3	3	3	3	2	3	7	
19-Jun	2	2	2	2	2	2	1	2	2	2	3	3	4	3	3	3	3	2	1	2	1	1	1	1	4	
20-Jun	1	2	1	1	1	2	1	1	2	2	3	3	2	4	4	4	3	2	3	3	2	1	1	2	4	
21-Jun	2	3	2	2	2	3	3	4	3	3	3	2	3	3	3	3	3	2	4	3	3	4	5	5	5	
22-Jun	5	4	4	4	4	3	2	3	3	3	4	4	4	4	3	3	3	3	2	2	1	1	1	1	5	
23-Jun	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	2	1	2	1	1	1	2	2	2	
24-Jun	2	2	2	1	1	1	2	2	2	2	3	3	3	3	3	3	3	3	2	2	2	1	1	1	3	
25-Jun	2	1	1	1	1	1	1	1	1	1	2	3	3	4	4	4	4	4	3	3	3	2	2	2	4	
26-Jun	2	3	3	2	3	3	4	4	5	5	5	5	6	6	5	5	5	4	3	2	3	3	3	2	6	
27-Jun	1	2	1	2	1	3	4	2	4	3	2	3	2	2	1	1	1	2	2	2	2	2	1	1	4	
28-Jun	1	2	2	3	2	2	2	3	3	3	3	3	3	3	2	2	2	1	1	2	2	2	3	2	3	
29-Jun	2	2	2	1	1	2	2	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	AF	2	2
30-Jun	1	1	1	1	1	2	1	1	1	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	3	
	5	4	4	4	4	4	5	5	5	5	5	5	6	6	7	5	5	4	4	4	4	4	5	5		

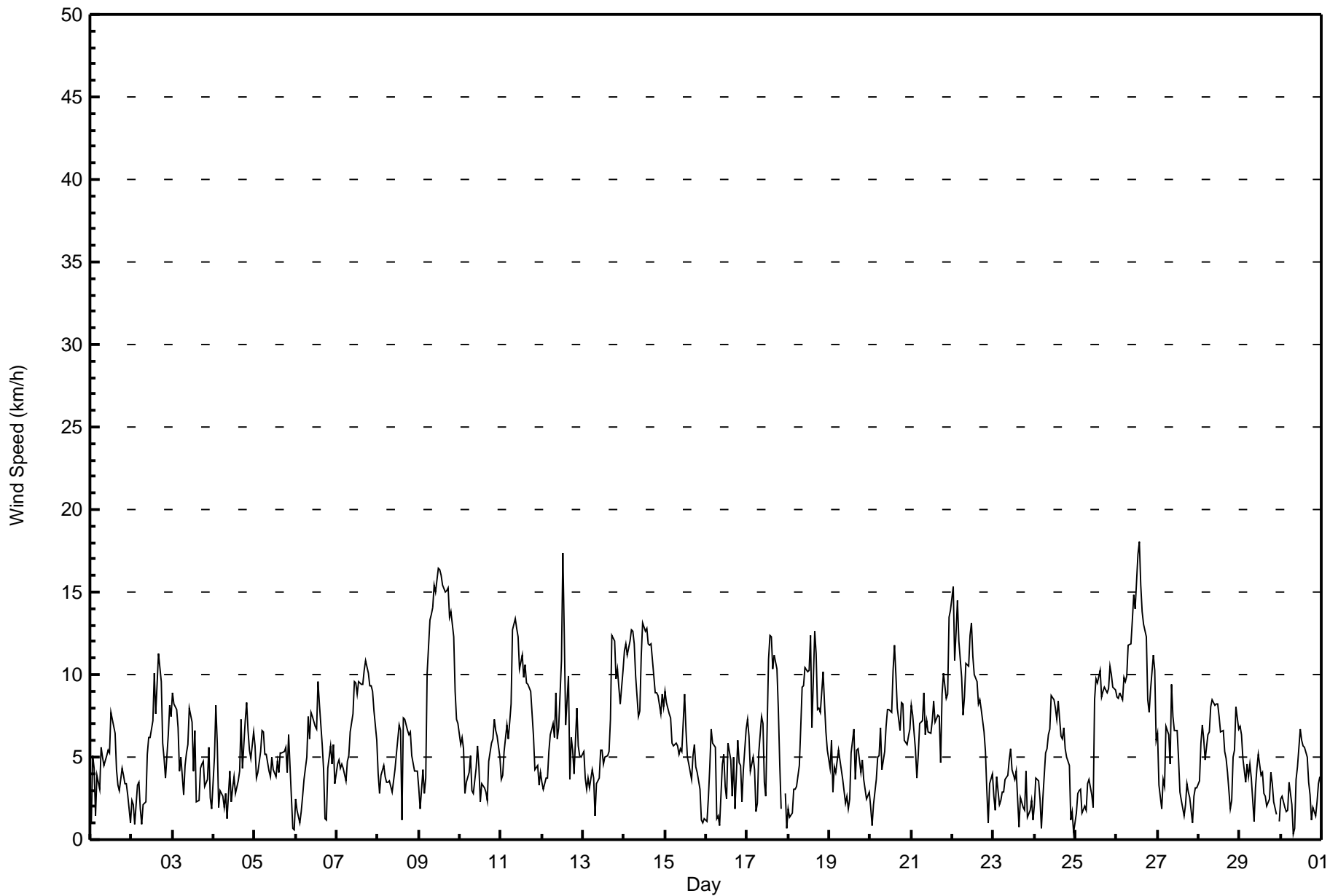
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	377	52.51	52.51
6 - 11	283	39.42	91.92
12 - 19	58	8.08	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	46	23	15	17	26	27	23	27	21	22	13	25	20	17	20	35	377
6 - 11	38	30	24	16	2	2	21	38	9	12	8	10	22	14	13	24	283
12 - 19	16	14	6	0	0	0	1	11	1	1	0	1	1	0	3	3	58
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	100	67	45	33	28	29	45	76	31	35	21	36	43	31	36	62	718

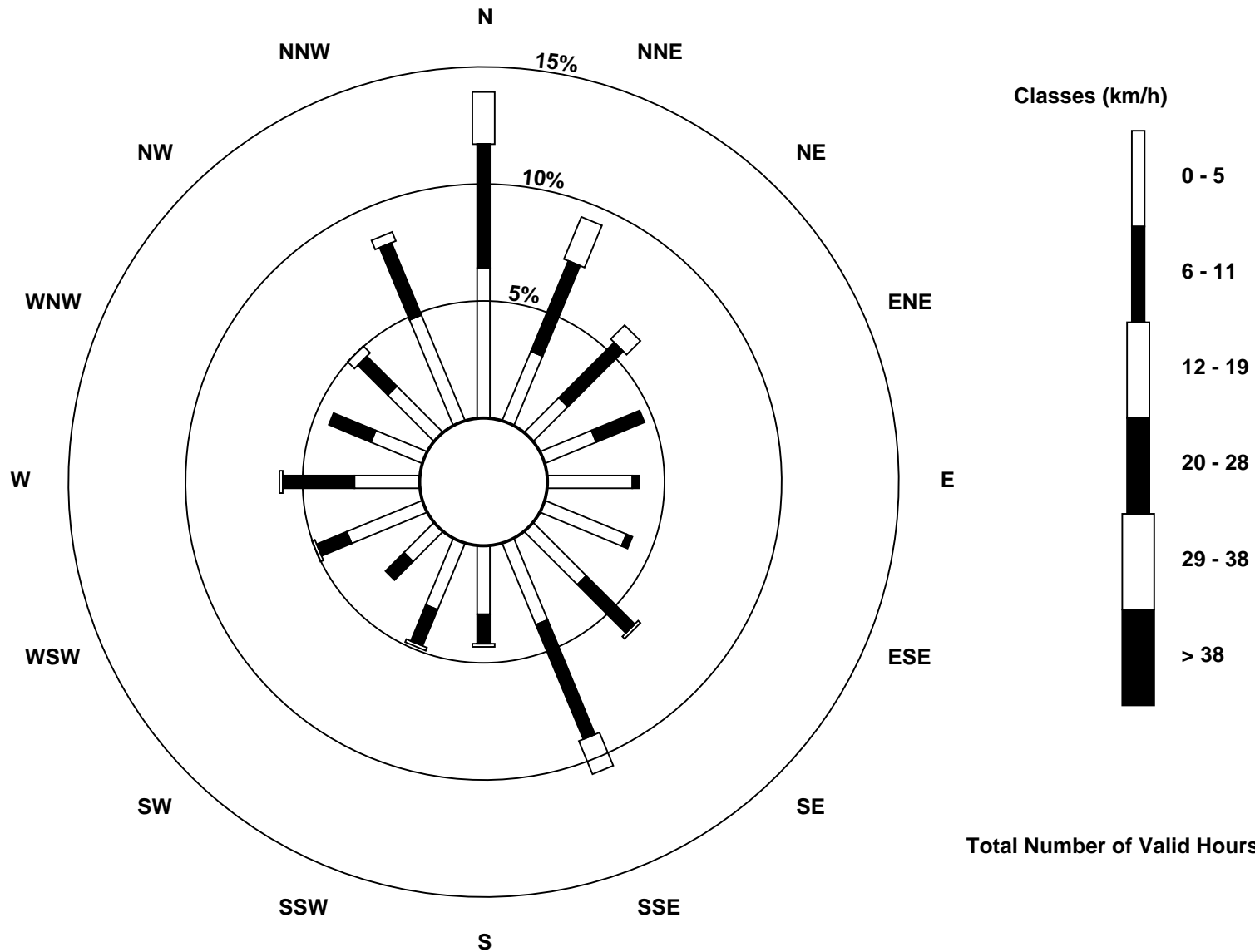
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Barge Landing (AMS 9)



Total Number of Valid Hours: 718



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - June 2017

Direction of Maximum Speed: 148 deg on Jun 26 14:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 149.9 deg on Jun 26	Hours of Data: 718
Direction of Minimum Speed: 99 deg on Jun 30 08:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 0.8 deg on Jun 29	Percent Operational Time: 99.7
Monthly Average Direction: 295.9 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	196	181	192	250	315	294	254	235	217	201	223	176	160	165	194	211	193	197	112	105	109	118	132	5	189.0
2-Jun	134	236	261	201	212	230	289	319	329	330	349	20	43	39	10	306	286	281	280	263	266	293	254	262	303.4
3-Jun	260	261	275	270	282	297	304	331	338	290	304	299	287	294	341	7	110	99	85	90	56	44	1	27	306.8
4-Jun	103	136	162	224	159	182	194	298	244	137	150	209	225	226	332	7	14	348	332	343	342	4	22	51	12.5
5-Jun	83	88	56	21	350	351	7	351	351	11	10	343	334	333	85	82	75	94	158	194	74	98	243	118	37.1
6-Jun	128	122	172	200	163	165	178	188	191	202	188	227	205	229	265	281	274	345	341	24	17	9	39	352	217.5
7-Jun	345	349	349	3	10	5	352	356	20	20	29	30	38	37	43	36	41	40	40	54	53	52	43	5	29.4
8-Jun	3	351	347	358	355	354	328	340	318	16	337	33	17	356	112	194	142	164	140	143	121	124	124	158	57.2
9-Jun	188	202	355	10	3	14	5	18	17	31	35	26	27	33	37	35	32	33	37	38	45	57	60	55	30.9
10-Jun	56	71	76	13	55	74	103	70	19	358	45	51	30	42	94	55	25	14	355	335	345	4	7	352	31.6
11-Jun	319	303	325	331	326	305	309	328	327	320	331	334	313	326	339	345	331	334	347	30	63	76	115	141	332.8
12-Jun	131	120	120	135	146	146	157	162	168	164	153	152	166	161	152	137	82	102	91	85	350	353	5	12	138.6
13-Jun	10	356	339	348	348	342	356	82	85	46	21	46	345	324	323	35	14	14	4	4	12	12	31	15	9.9
14-Jun	9	14	4	7	11	18	26	12	4	357	359	4	11	7	2	4	355	357	1	356	356	346	348	343	4.1
15-Jun	349	345	346	347	351	354	6	12	3	15	8	336	16	11	47	59	73	75	82	79	76	10	2	17	12.8
16-Jun	148	87	133	134	140	144	122	159	175	292	274	243	45	76	29	89	104	246	281	327	117	183	126	150	130.7
17-Jun	163	149	140	148	166	207	206	265	270	279	326	38	320	322	322	317	320	294	327	332	47	AF	163	149	300.0
18-Jun	340	278	170	228	156	188	205	192	207	213	228	242	248	243	262	269	272	299	316	327	3	347	315	296	262.3
19-Jun	314	272	268	248	233	250	247	252	250	243	259	311	248	201	237	218	257	256	181	198	187	159	137	131	236.3
20-Jun	116	170	109	124	130	141	154	163	167	150	172	211	244	224	195	191	169	167	151	152	153	135	141	164	169.3
21-Jun	202	201	202	218	274	292	276	294	279	284	281	270	283	282	290	295	276	302	350	354	352	355	2	357	300.7
22-Jun	2	356	2	359	357	3	0	356	19	15	13	7	15	354	9	355	4	17	17	29	14	271	251	266	3.5
23-Jun	314	313	320	307	246	238	266	323	336	350	325	7	25	48	86	133	193	123	47	263	280	304	258	250	320.8
24-Jun	152	250	166	247	175	312	345	4	26	29	30	32	29	20	0	346	25	44	47	61	69	99	349	24	23.2
25-Jun	22	350	357	346	319	277	270	261	293	335	333	260	240	252	215	214	157	155	152	145	136	139	143	155	188.5
26-Jun	158	162	166	144	146	149	153	169	162	152	150	164	153	148	150	152	150	145	157	133	121	127	130	139	149.9
27-Jun	128	121	27	107	144	156	226	144	155	187	202	241	221	177	148	151	64	124	148	115	134	93	108	78	156.9
28-Jun	80	57	52	59	91	64	50	56	75	67	74	75	47	69	85	74	98	61	30	149	181	173	177	174	80.7
29-Jun	154	159	167	150	154	152	171	170	252	44	354	302	294	328	268	299	1	0	93	124	248	306	AF	254	175.8
30-Jun	169	152	260	324	307	244	93	99	62	114	171	165	213	225	269	288	302	336	335	215	208	195	153	138	210.7

59.6	67.0	15.6	2.2	18.7	352.8	333.3	335.2	344.2	359.9	358.1	346.4	337.2	335.2	348.2	341.7	13.6	25.9	32.6	39.9	45.8	47.8	61.6	45.3
Diurnal Average																							

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Barge Landing - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 106 deg on Jun 19 12:00	Hours of Data: 718
Minimum Value: 9 deg on Jun 20 04:00	Hours of Missing Data: 2
Percentiles: P ₁ = 12 P ₁₀ = 19 Q ₁ = 23 Median = 30 Q ₃ = 41 P ₉₀ = 62 P ₉₉ = 92	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	93	28	29	57	25	40	24	25	37	26	31	36	27	33	47	48	73	61	15	12	14	15	46	53	93
2-Jun	41	59	62	39	26	53	80	42	59	25	29	35	30	24	28	31	37	37	59	41	51	31	18	21	80
3-Jun	21	23	31	29	65	34	50	31	26	39	35	41	62	48	85	75	45	29	25	28	24	22	37	48	85
4-Jun	14	15	34	72	49	44	66	66	93	28	78	46	41	61	45	25	23	35	23	19	24	31	23	93	
5-Jun	22	27	49	34	21	20	30	24	26	34	25	30	41	40	71	39	41	40	30	39	29	41	78	79	79
6-Jun	13	45	72	32	40	34	34	33	42	38	45	48	55	35	36	41	43	78	84	24	25	25	26	29	84
7-Jun	23	16	18	18	17	18	20	29	28	25	24	22	26	25	28	25	24	22	20	22	21	21	23	24	29
8-Jun	32	29	27	18	21	20	34	22	33	33	31	36	33	37	104	54	55	39	37	18	12	19	12	16	104
9-Jun	22	49	15	32	34	22	26	26	25	23	23	23	24	24	24	24	22	23	23	21	22	21	19	21	49
10-Jun	19	20	23	41	38	33	36	77	78	70	49	58	95	69	78	45	50	29	23	25	27	22	21	20	95
11-Jun	19	21	31	21	25	30	29	27	29	30	27	32	33	33	33	29	35	37	31	27	24	18	22	16	37
12-Jun	25	33	16	11	15	16	22	22	31	24	20	25	29	29	45	31	58	20	24	32	24	22	23	16	58
13-Jun	20	19	30	16	15	19	52	77	52	56	44	47	63	31	47	46	40	25	25	24	22	25	22	24	77
14-Jun	25	25	23	23	24	22	22	27	27	25	26	24	26	26	25	26	24	24	23	22	22	24	20	22	27
15-Jun	21	20	21	21	19	20	23	23	24	28	29	21	31	34	37	29	27	23	22	18	42	47	44	62	62
16-Jun	82	19	17	14	12	25	87	93	100	45	55	60	84	34	31	83	73	89	32	32	51	47	11	21	100
17-Jun	18	17	21	19	28	66	50	34	29	32	63	77	30	29	31	31	31	37	25	26	46	AF	48	89	89
18-Jun	72	80	50	30	25	40	29	34	32	36	36	38	28	25	78	35	31	32	25	26	25	21	38	45	80
19-Jun	38	28	77	23	29	18	28	43	59	88	85	106	98	52	43	79	54	46	32	27	20	27	34	39	106
20-Jun	20	78	21	9	12	12	17	26	34	29	32	39	28	28	30	28	25	26	21	20	19	12	15	27	78
21-Jun	23	25	28	37	36	36	34	36	34	36	35	26	32	35	35	34	36	38	29	22	22	23	24	24	38
22-Jun	24	23	24	25	25	24	25	24	25	26	28	28	30	32	30	32	31	28	29	27	21	55	10	19	55
23-Jun	21	31	16	17	19	13	38	35	50	46	41	65	67	63	87	95	62	78	67	30	54	44	77	71	95
24-Jun	45	22	38	39	78	35	24	28	31	30	32	29	37	38	36	39	45	31	30	26	17	42	31	73	78
25-Jun	57	39	33	20	45	41	45	30	43	73	85	32	34	37	38	40	36	33	29	17	13	12	13	17	85
26-Jun	17	20	23	15	17	19	24	28	28	25	24	32	27	23	24	24	23	22	22	13	15	15	16	22	32
27-Jun	11	54	48	15	34	25	54	34	24	34	35	28	27	61	53	68	56	53	32	43	82	32	27	19	82
28-Jun	21	23	23	28	25	23	22	22	25	27	26	26	30	30	34	39	41	47	65	54	21	20	31	25	65
29-Jun	15	20	22	19	24	30	42	53	91	67	50	43	64	62	71	53	71	53	22	12	48	43	AF	91	91
30-Jun	41	46	27	59	56	37	65	93	74	42	37	39	37	31	40	37	33	25	40	50	69	43	20	23	93

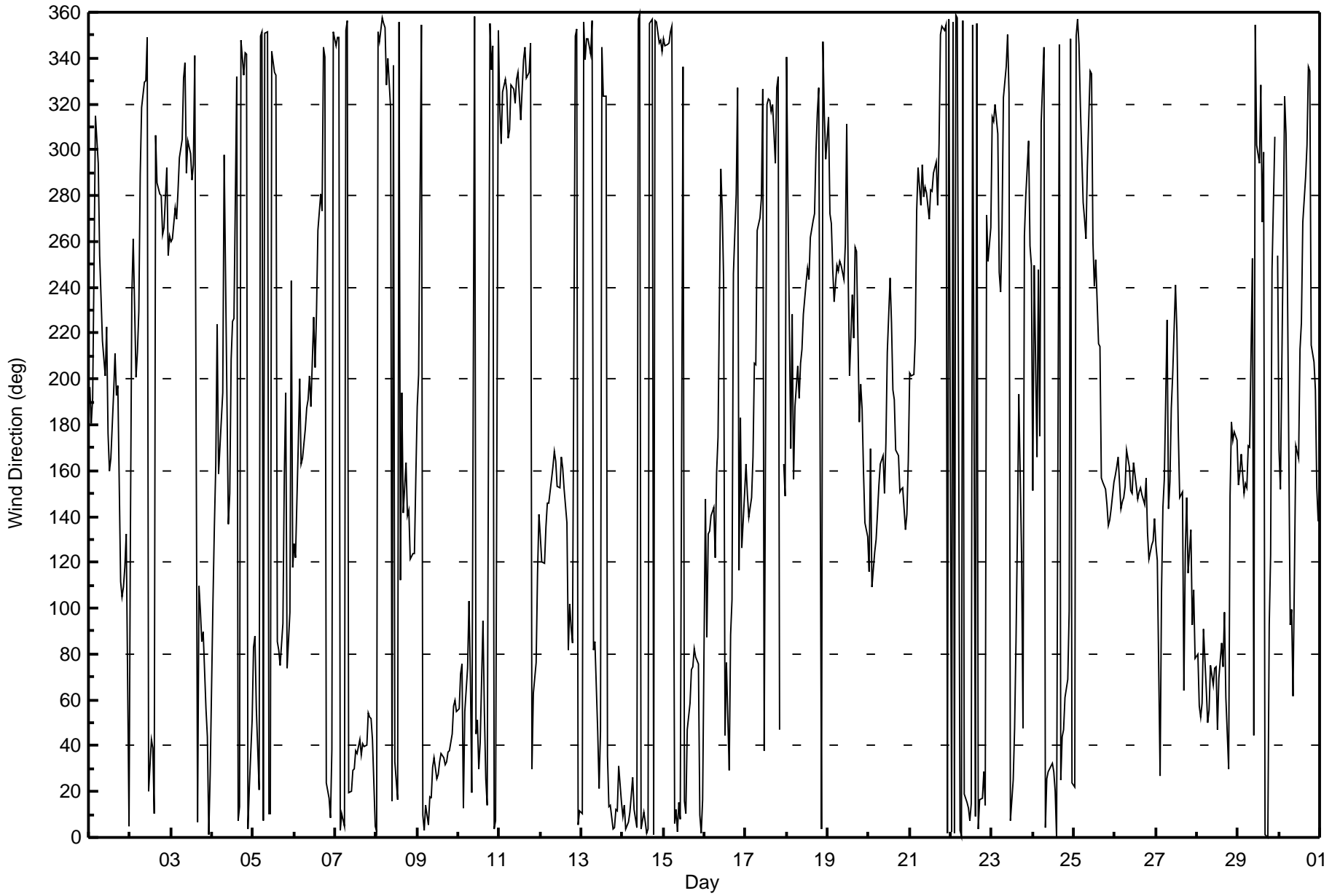
93	80	77	72	78	66	87	93	100	88	85	106	98	69	104	95	73	89	84	54	82	55	78	91	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Barge Landing - June 2017





Wood Buffalo Environmental Association

TRS Calibration Summary

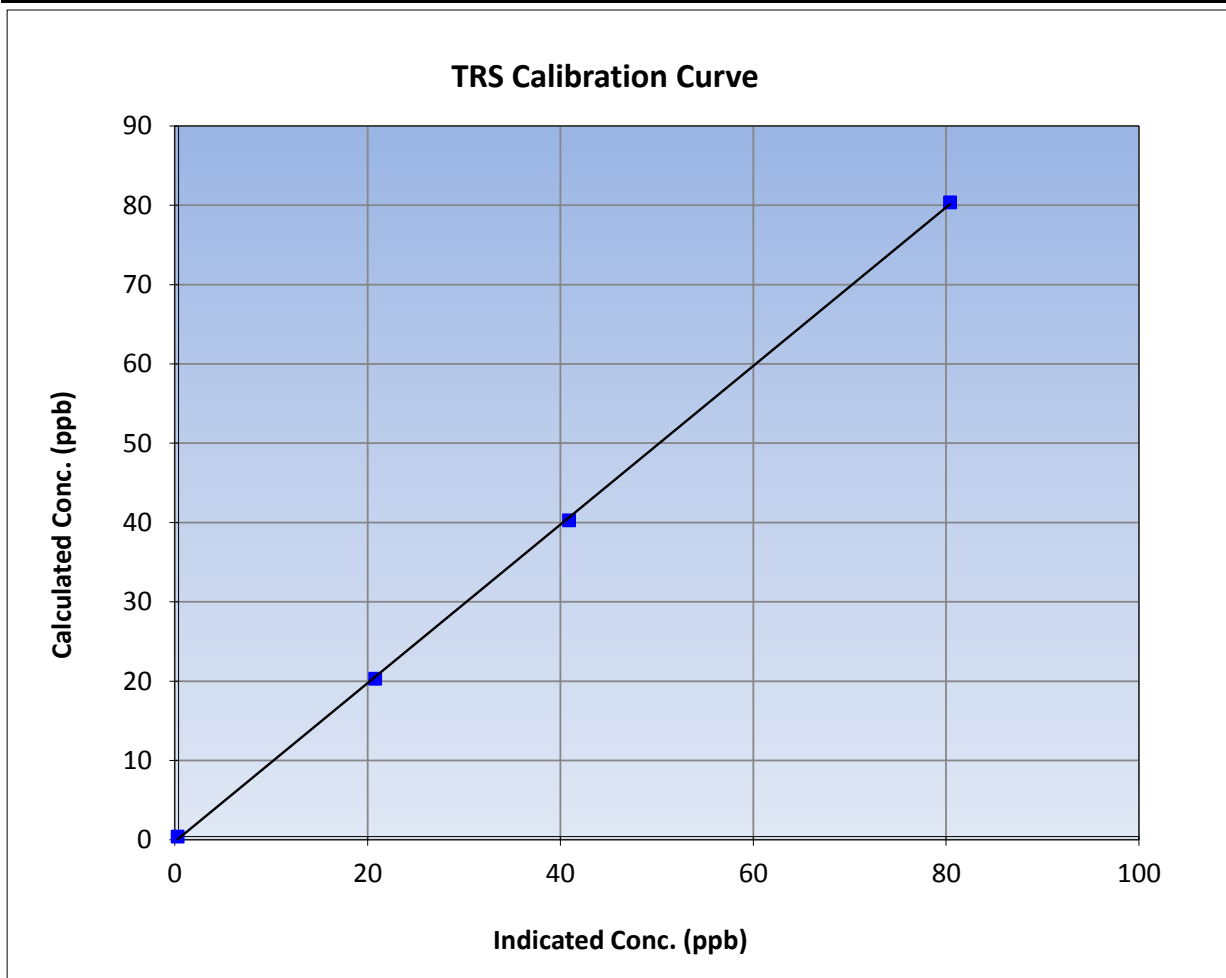
Version-03-2017

Station Information

Calibration Date	June 12, 2017	Previous Calibration	May 1, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	9:14	End Time (MST)	12:38
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1331259320

Calibration Data

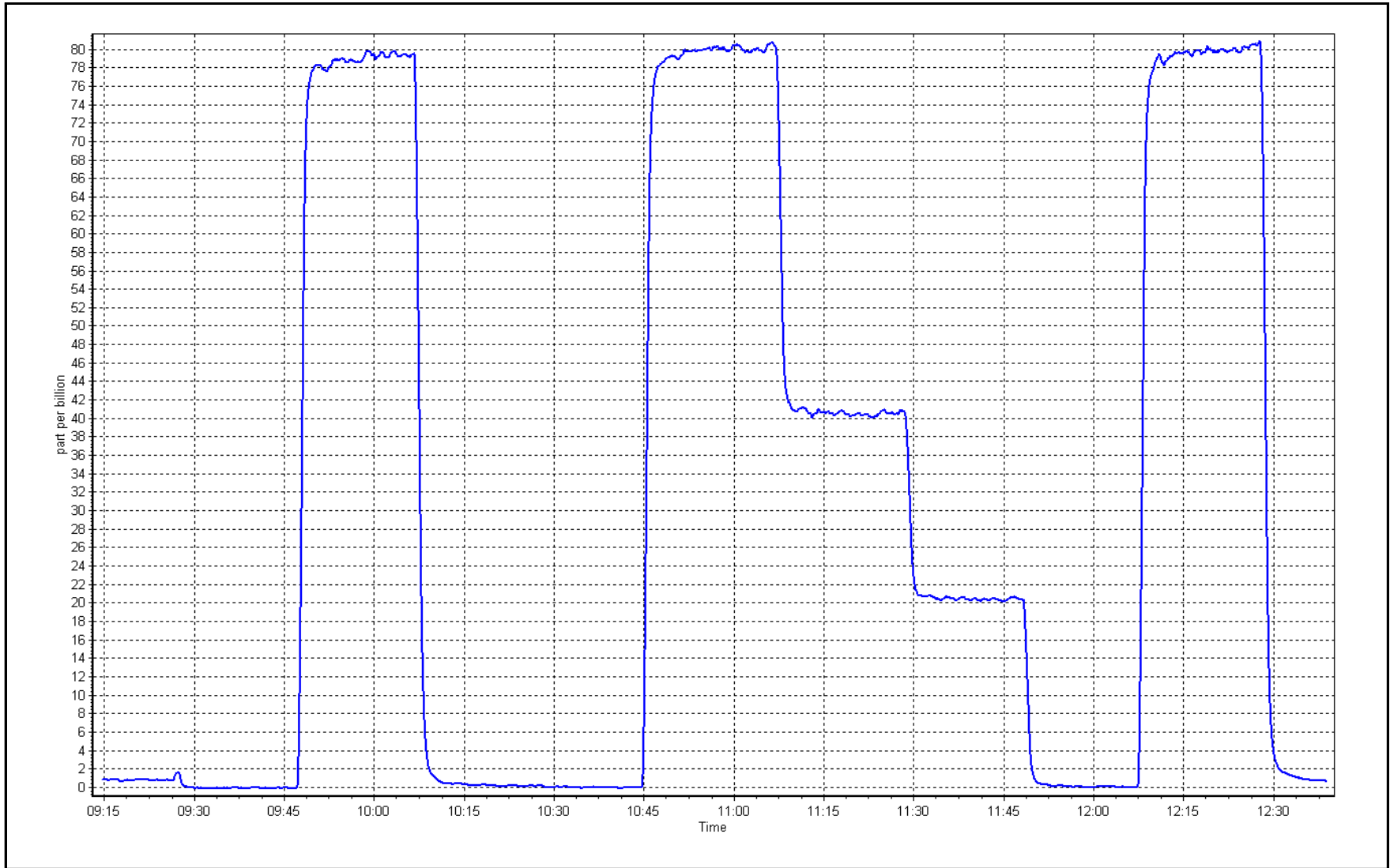
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999899	≥0.995
80.0	80.0	0.9997			
39.9	40.5	0.9851	Slope	0.999843	0.90 - 1.10
19.9	20.4	0.9760			
			Intercept	-0.248412	+/-3



TRS Calibration Plot

Date: June 12, 2017

Location: Barge Landing





Wood Buffalo Environmental Association

TRS Calibration Summary

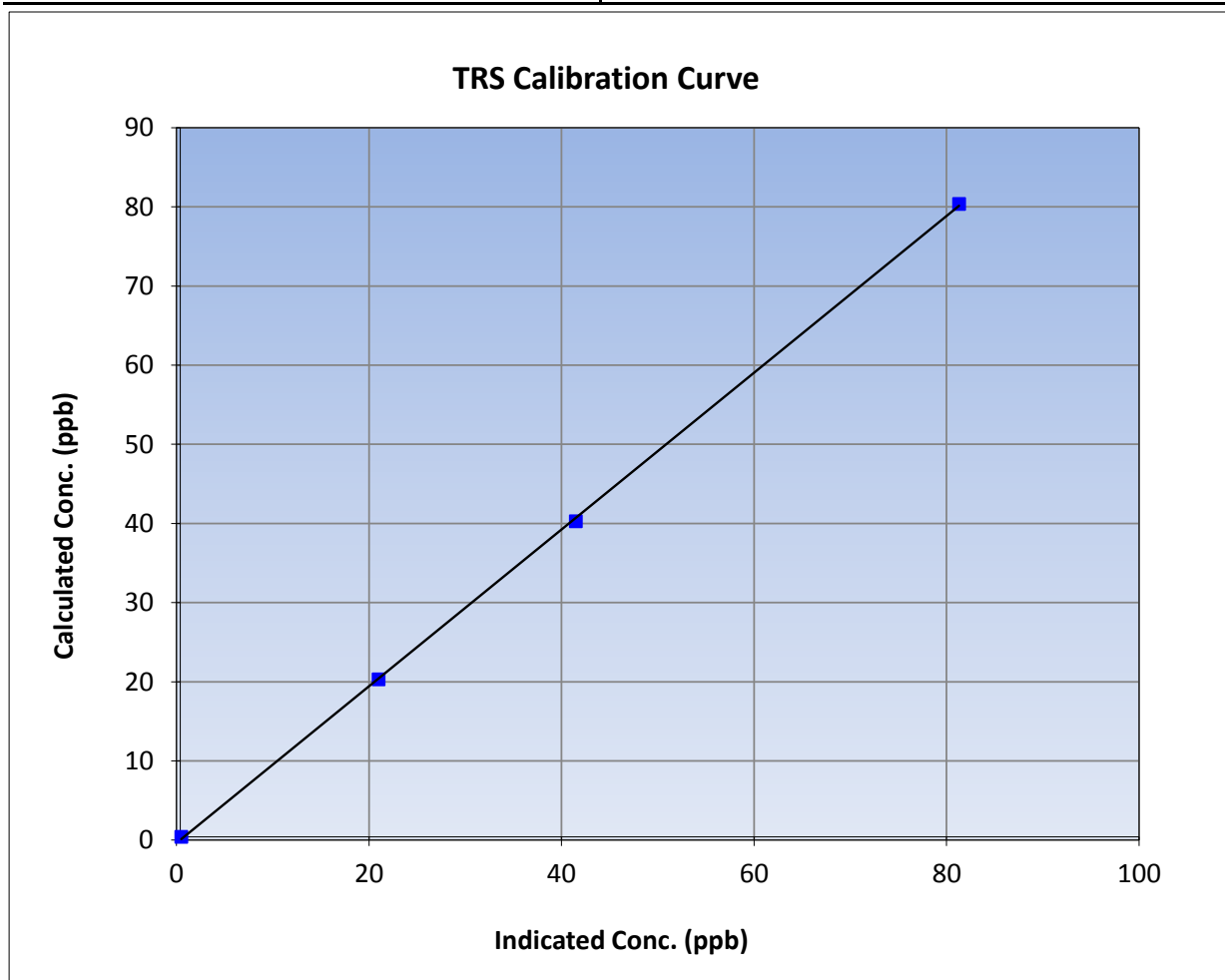
Version-03-2017

Station Information

Calibration Date	June 24, 2017	Previous Calibration	June 12, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	9:30	End Time (MST)	10:55
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1331259320

Calibration Data

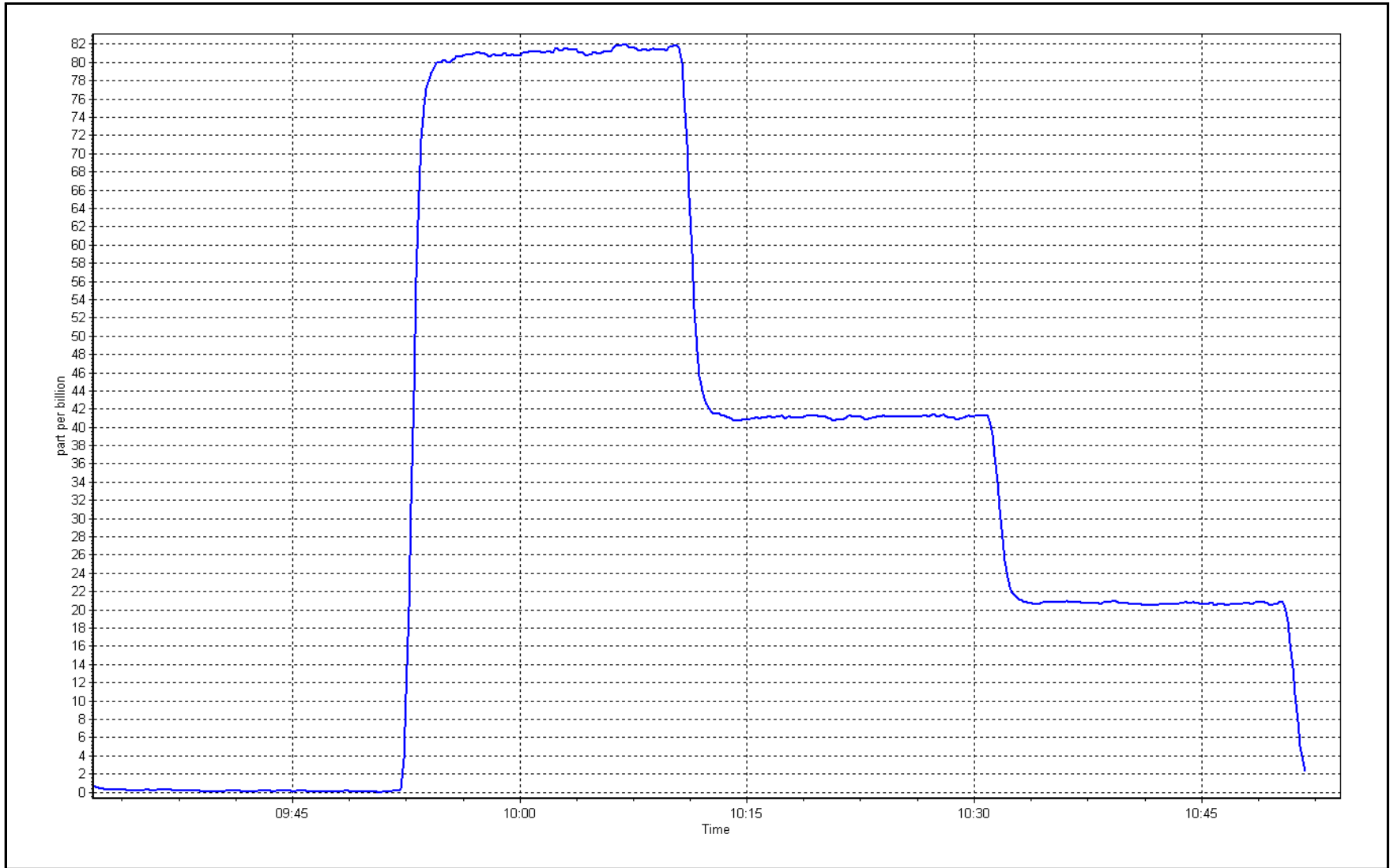
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999906	≥0.995
80.0	80.9	0.9886			
39.9	41.1	0.9708	Slope	0.990370	0.90 - 1.10
19.9	20.6	0.9665			
			Intercept	-0.385392	+/-3



TRS Calibration Plot

Date: June 24, 2017

Location: Barge Landing





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Barge Landing	Station number:	AMS 09
Calibration Date:	June 12, 2017	Last Cal Date:	May 1, 2017
Start time (MST):	12:27	End time (MST):	14:59
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000675	Cal Gas Expiry Date	November 4, 2019
CH4 Cal Gas Conc.	<u>511.0</u> ppm	CH4 Equiv Conc.	1055.5 ppm
C3H8 Cal Gas Conc.	<u>198.0</u> ppm	Station temp.	27 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11071107
ZAG Make/Model	API 701	Serial Number	4888

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1327059296
	<u>Start</u>	<u>Finish</u>	<u>Start</u> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-301 -301
Calculated slope	1.001947	Sample pressure	9.1 9.1
Calculated intercept	-0.022968	Fuel pressure	24.1 24.1
Analyzer Background	6.07	Air pressure	34.7 34.7
Analyzer Coefficient	4.593	Flame temperature	163.5 163.2

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.00	-0.08	----
as found span	4928	74.3	15.68	15.53	1.009
calibrator zero	5007	0.0	0.00	-0.02	----
high point	4928	74.4	15.70	15.70	1.000
second point	4958	39.8	8.41	8.39	1.001
third point	4977	14.9	3.15	3.16	0.996
as left zero	5007	0.0	0.00	-0.02	----
as left span	4928	74.3	15.68	15.59	1.006
Average Correction Factor					0.999
Corrected As found	15.61	Previous response	15.67	*% change	0.4%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

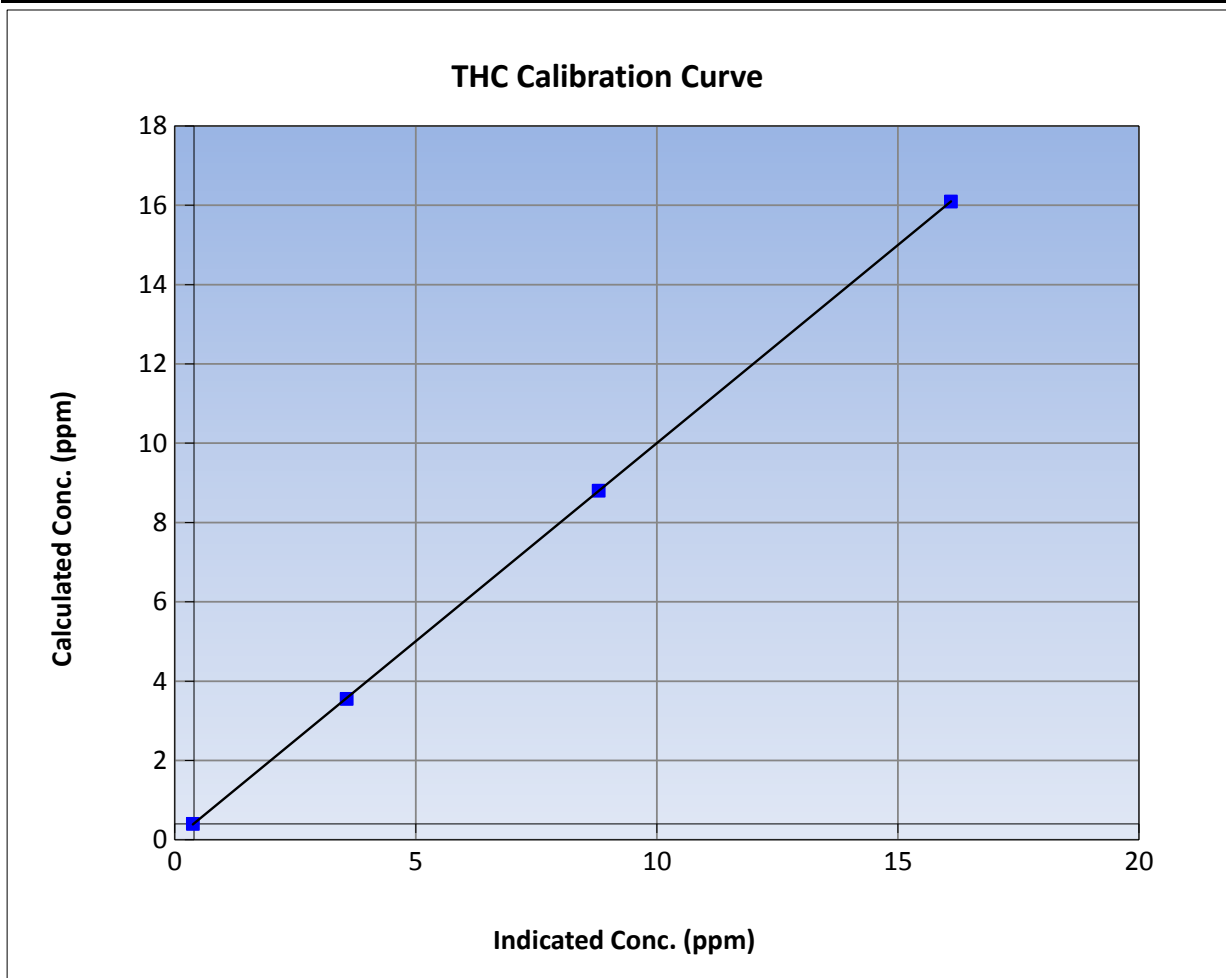
Version-03-2017

Station Information

Calibration Date	June 12, 2017	Previous Calibration	May 1, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	12:27	End Time (MST)	14:59
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

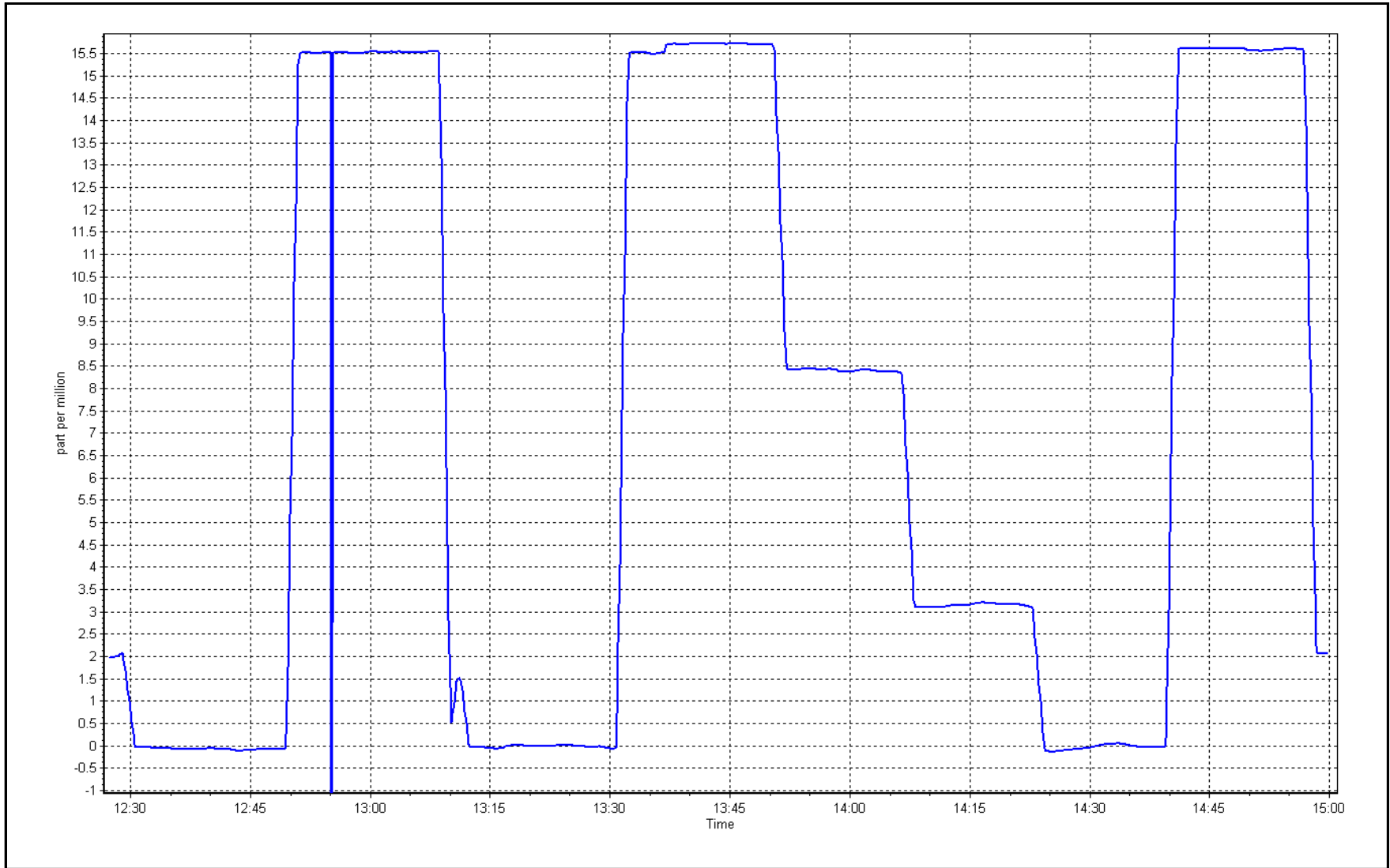
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999995	≥0.995
15.7	15.7	0.9998			
8.4	8.4	1.0015	Slope	0.999097	0.90 - 1.10
3.2	3.2	0.9957			
			Intercept	0.010968	+/-1.5



THC Calibration Plot

Date: June 12, 2017

Location: Barge Landing





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 11 LOWER CAMP JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	646	32	74	94.17	137	0	27	0
H2S (ppb) Average	647	31	73	94.17	6	0	1	0
THC (ppm) Average	646	32	74	94.17	3.6	-	2.6	-
Temperature (C) Average	720	0	0	100	27.7	-	22.4	-
Relative Humidity (%) Average	720	0	0	100	99	-	88	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	30	-	18	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	646	2.8	9	-	0	0	0	0	2	6	137
H2S (ppb) Average	647	0.4	1	-	0	0	0	0	0	1	6
THC (ppm) Average	646	2.25	0.2	-	2	2.1	2.1	2.2	2.3	2.5	3.6
Temperature 2 m (C) Average	720	16.55	4.6	-	5.4	10.7	13.3	16.1	19.9	22.8	27.7
Relative Humidity (%) Average	720	65.1	20	-	21	35	48	68	82	92	99
Wind Speed 10 m (km/h) Average	719	8.9	6	-	0	2	4	8	12	18	30
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	29 Jun 2017 07:00	01 Jul 2017 00:00	42	Unstable Operation - station temperature fluctuations
Wind Speed, Wind Direction	23 Jun 2017 00:00	23 Jun 2017 00:00	1	Flat line in sensor output signal

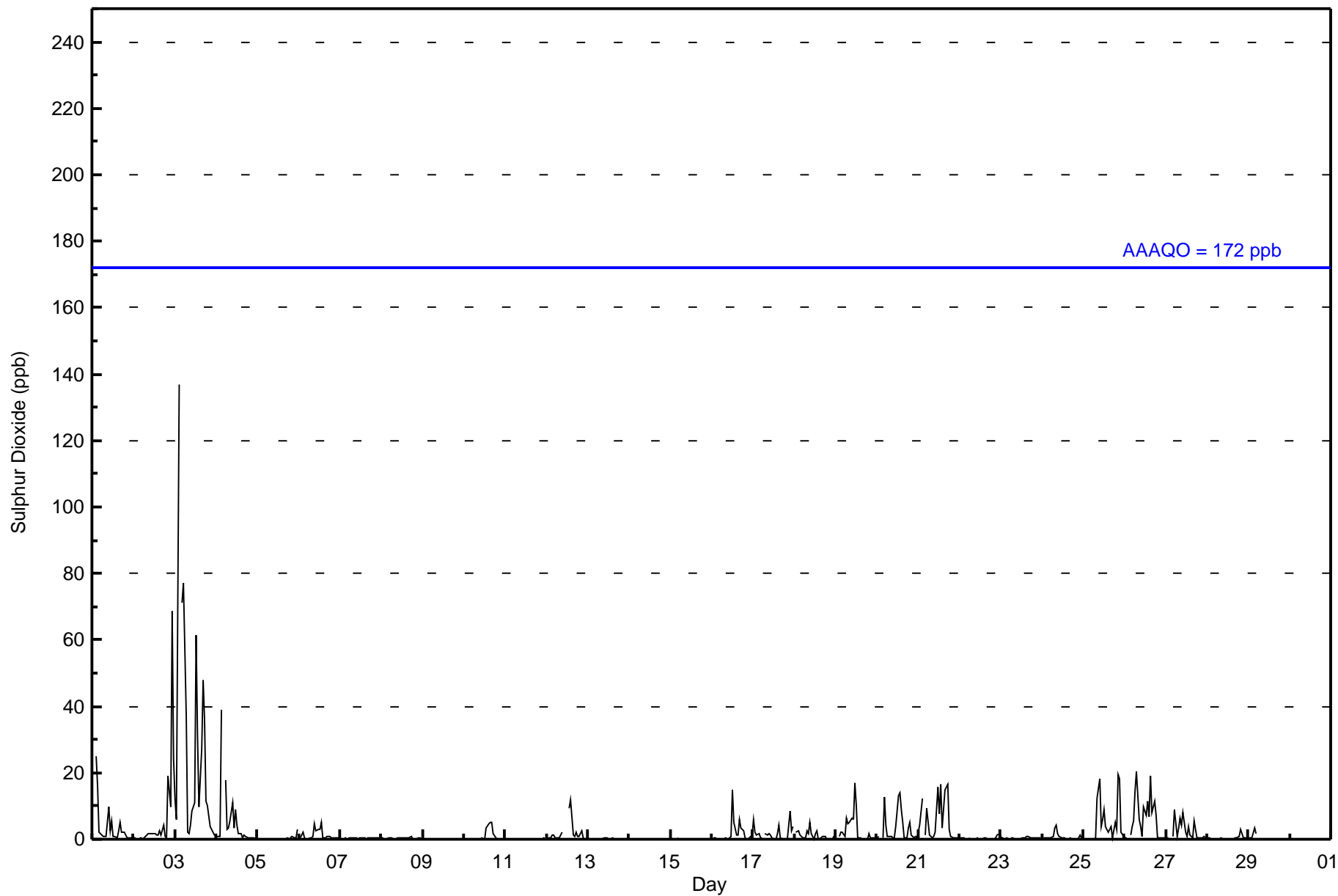


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 137 ppb on Jun 3 03:00	Maximum Daily Average: 26.7 ppb on Jun 3
Minimum Value: 0 ppb on Jun 11 04:00	Hours of Data: 646
Maximum Diurnal Average: 7.7 ppb at hour 3	Hours of Missing Data: 74
Monthly Average: 2.8 ppb	Hours of Calibration: 32
Minimum Daily Average: 0.1 ppb on Jun 14	Percent Operational Time: 94.2
Minimum Diurnal Average: 0.8 ppb at hour 2	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 35	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	9	Z	25	16	2	1	1	1	1	10	2	6	1	1	0	3	5	2	2	1	1	0	0	0	3.9	25	
2-Jun	0	0	Z	0	0	0	0	1	2	2	2	2	2	1	1	3	1	4	1	0	19	10	69	24	6.3	69	
3-Jun	12	6	137	Z	71	77	37	2	2	4	9	11	61	31	10	27	48	36	12	10	4	3	2	1	26.7	137	
4-Jun	1	1	1	39	Z	18	3	4	6	11	3	9	4	2	2	1	1	1	0	0	1	0	0	0	4.7	39	
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0.3	3	
6-Jun	Z	0	2	0	0	0	0	0	1	5	2	3	3	5	0	0	1	1	1	1	0	0	0	0	1.2	5	
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0.3	1	
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	3	4	5	5	2	0	0	0	0	0	0	0.9	5	
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
12-Jun	Z	0	0	1	1	1	0	0	1	2	C	C	C	9	12	1	1	2	1	1	2	0	0	0	1.9	12	
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	1	15	5	1	1	6	3	3	0	0	0	0	1	1.7	15	
17-Jun	6	2	1	2	0	0	Z	2	1	2	1	0	0	0	2	4	0	0	0	0	0	9	2	4	1.7	9	
18-Jun	Z	2	2	1	1	1	1	2	2	5	2	0	2	3	0	0	1	1	1	0	0	0	0	1	1.2	5	
19-Jun	1	Z	1	2	2	1	6	5	5	6	6	17	10	0	1	0	0	0	0	2	1	1	1	0	2.9	17	
20-Jun	0	1	Z	0	13	4	1	1	1	1	0	4	13	14	9	5	0	0	3	5	1	1	1	0	3.4	14	
21-Jun	2	4	12	Z	1	9	1	1	0	1	2	16	8	16	3	15	16	16	3	1	1	0	0	0	5.7	16	
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0.3	2	
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1	
24-Jun	Z	0	0	0	0	0	1	3	4	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.8	4	
25-Jun	0	Z	0	0	0	0	0	0	12	18	4	6	9	4	2	3	4	1	5	3	20	18	2	1	4.9	20	
26-Jun	0	0	Z	1	4	6	15	20	6	4	1	10	7	11	7	19	8	11	7	1	0	0	0	0	6.1	20	
27-Jun	0	0	0	Z	1	9	1	4	6	4	8	2	1	4	1	1	5	3	1	1	0	0	1	0	2.3	9	
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0	0.4	3	
29-Jun	0	0	0	3	2	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	3	
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--

1.4	0.8	7.7	2.9	4.2	5.2	2.6	1.7	1.9	2.8	1.7	3.3	5.1	4.0	2.1	3.3	3.8	3.1	1.5	1.1	1.9	1.7	3.0	1.5	Diurnal Average	
12	6	137	39	71	77	37	20	12	18	9	17	61	31	12	27	48	36	12	10	20	18	69	24	Diurnal Maximum	

Z - zerospan C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	605	93.65	93.65
11 - 20	28	4.33	97.99
21 - 60	8	1.24	99.23
61 - 110	4	0.62	99.85
111 - 172	1	0.15	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 646

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	58	28	17	32	26	57	81	31	9	6	7	18	43	36	77	78	604
11 - 20	0	2	0	1	0	0	10	1	1	1	1	1	7	2	0	1	28
21 - 60	0	0	1	1	1	0	0	0	1	0	0	1	1	0	2	0	8
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	4
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	30	18	34	27	57	91	32	11	7	8	20	53	41	79	79	645

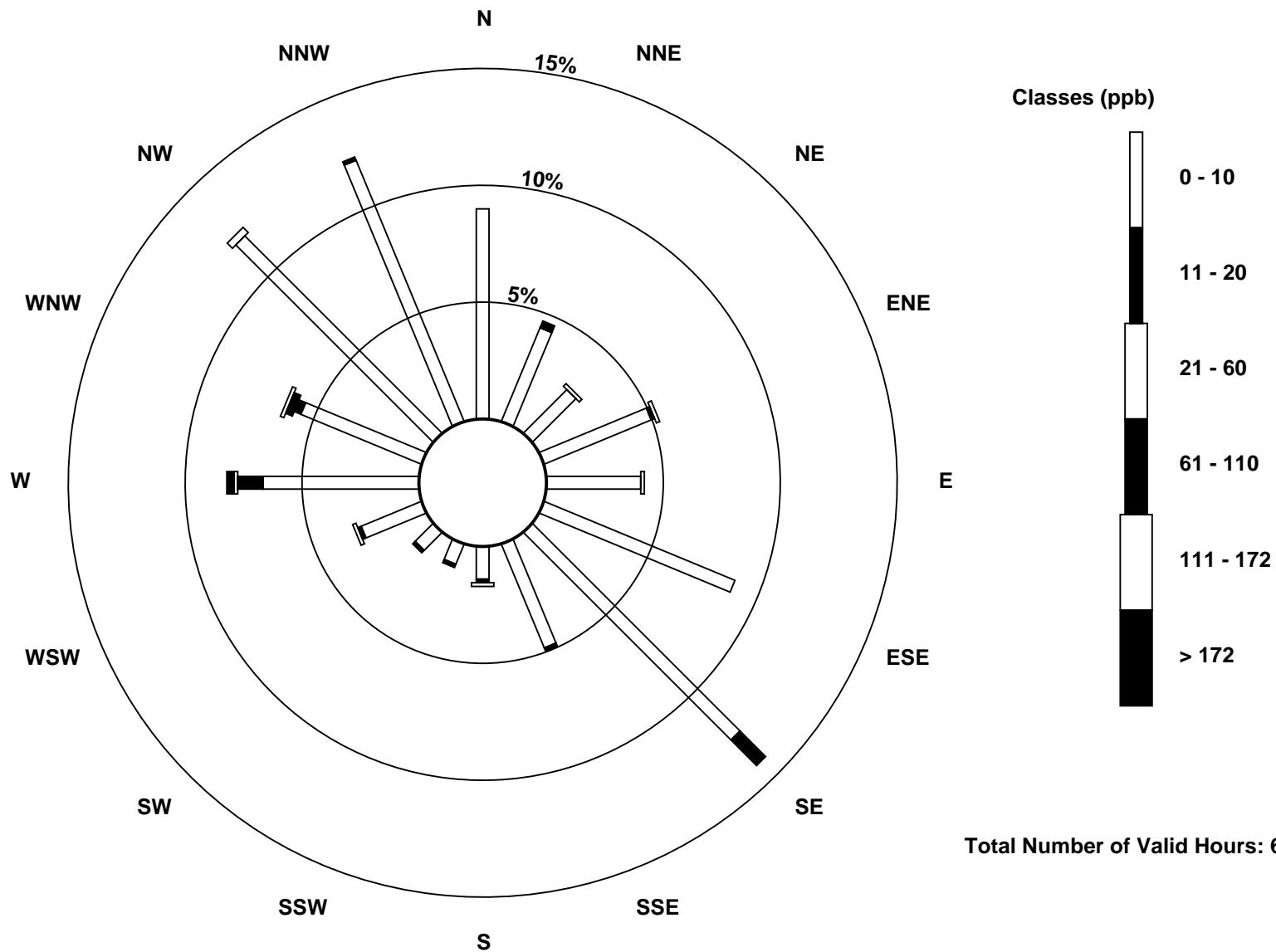
Total Number of Valid Hours: 645

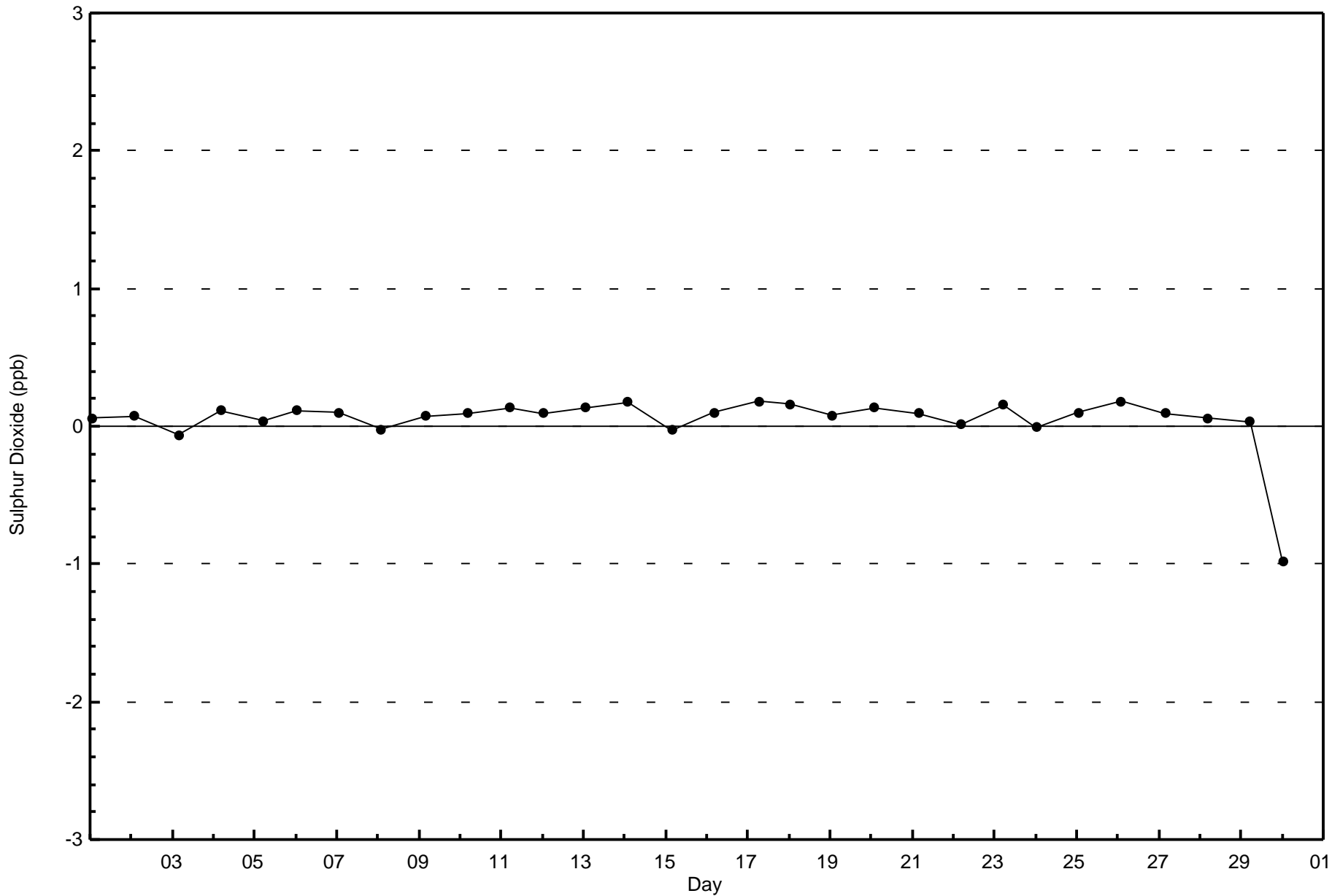
Total Number of Hours: 720

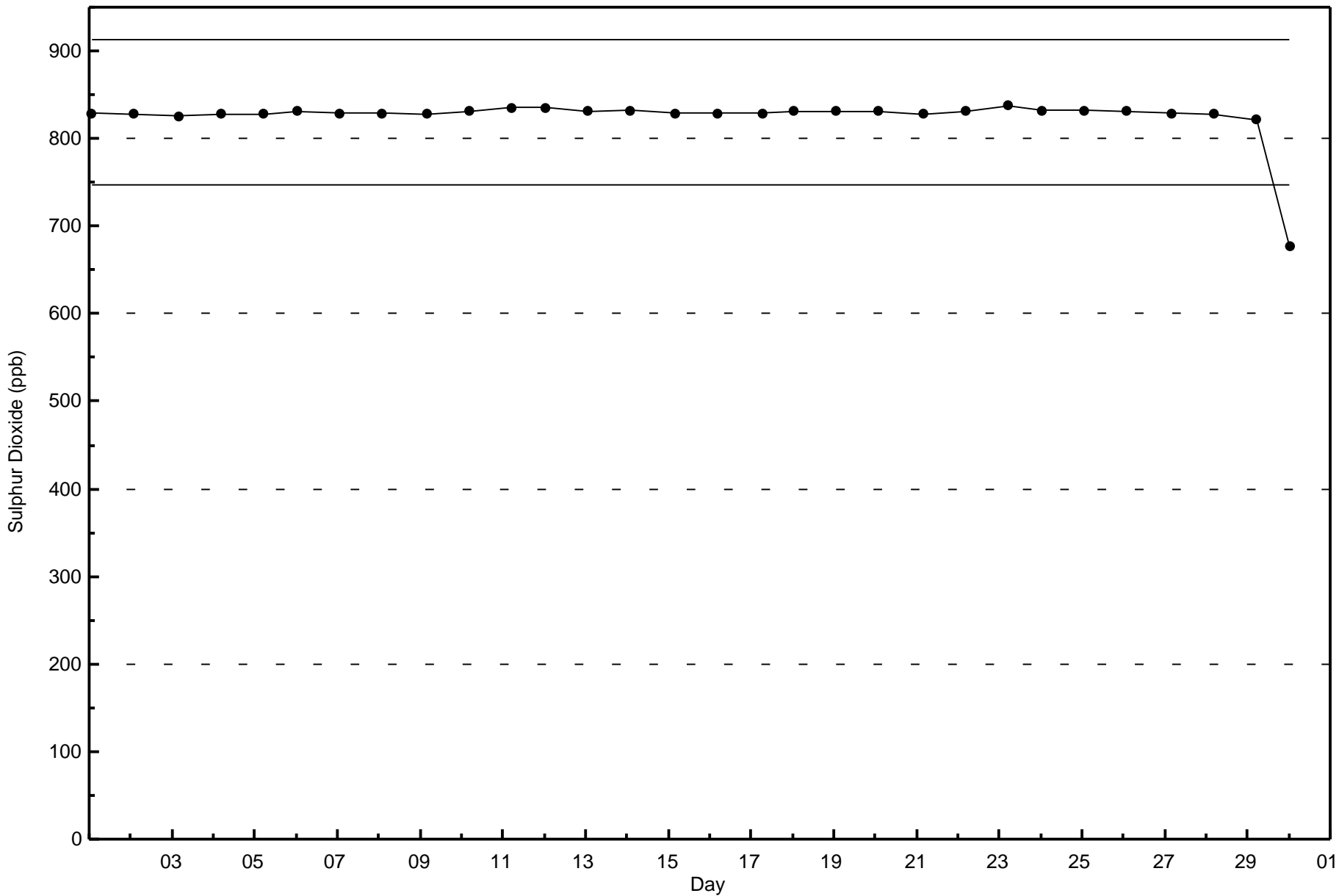


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 6 ppb on Jun 17 01:00	Maximum Daily Average: 1.2 ppb on Jun 20		Hours of Data:	647
Minimum Value: 0 ppb on Jun 3 12:00	Minimum Daily Average: 0.1 ppb on Jun 10		Hours of Missing Data:	73
Maximum Diurnal Average: 0.7 ppb at hour 3	Minimum Diurnal Average: 0.2 ppb at hour 16		Hours of Calibration:	31
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	94.2

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	1	Z	3	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
2-Jun	0	1	1	Z	1	1	1	0	1	1	1	1	0	0	0	0	0	1	2	1	0	0	0	0	0.6	2
3-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
4-Jun	0	0	0	3	3	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.3	3
6-Jun	1	Z	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jun	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
9-Jun	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	0	Z	0	0	1	1	0	0	0	1	0	1	1	1	1	1	0	0	0	0	1	0	1	0	0.6	1
13-Jun	0	0	Z	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1
17-Jun	6	4	1	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6
18-Jun	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
19-Jun	0	0	Z	0	0	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2
20-Jun	1	1	0	Z	1	3	1	1	1	1	1	1	1	1	1	1	0	1	3	2	1	2	2	2	1.2	3
21-Jun	2	1	3	0	Z	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0.5	3
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.2	2
23-Jun	1	1	0	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.4	1
24-Jun	1	Z	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
25-Jun	0	0	Z	1	0	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4	2	2	1	0.8	4
26-Jun	1	0	2	Z	1	0	1	1	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0.6	2
27-Jun	0	0	0	0	Z	1	0	1	1	1	1	0	0	1	0	0	2	1	0	0	0	0	1	0	0.6	2
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0.2	1
29-Jun	0	0	1	1	1	0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	1
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--

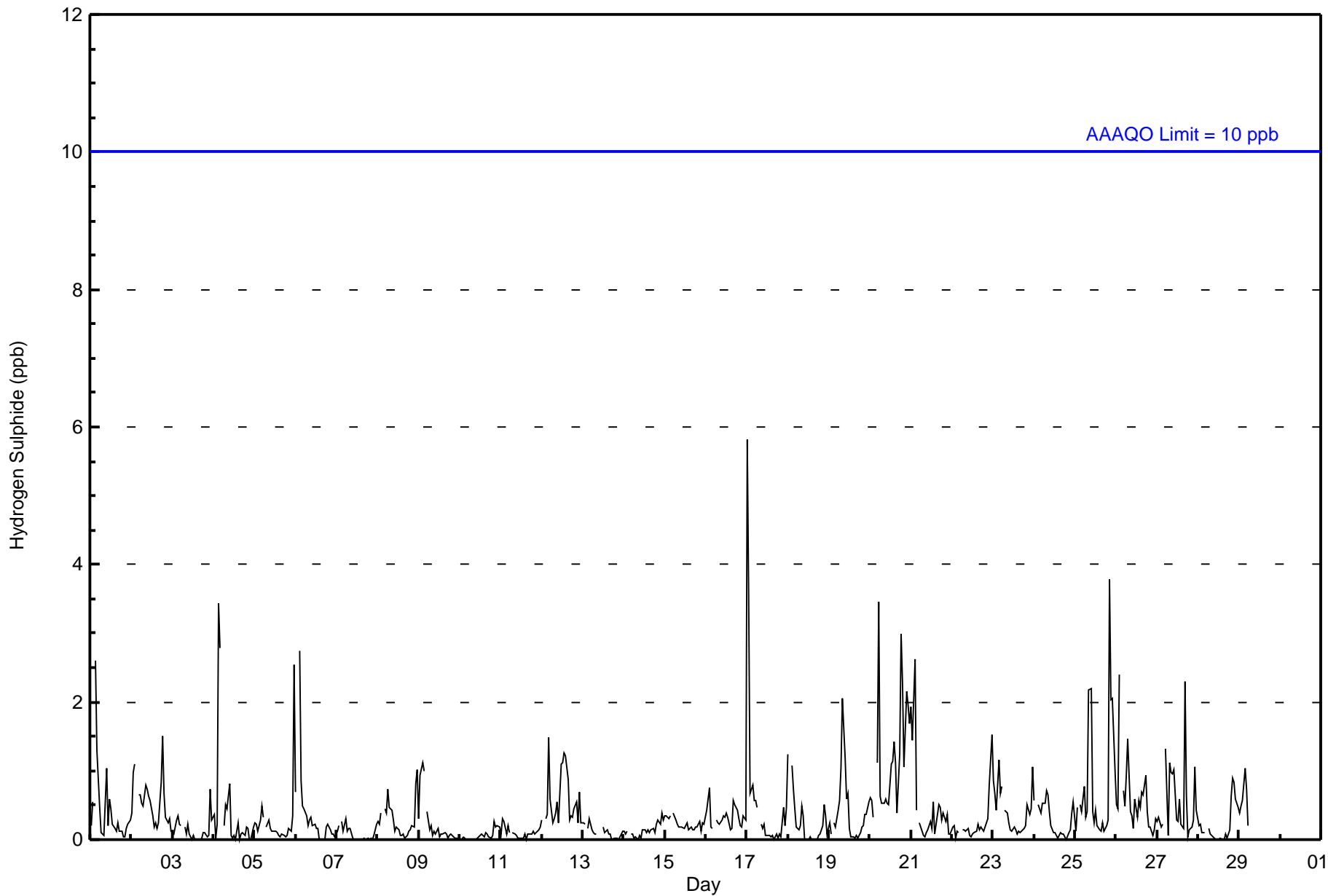
0.6	0.5	0.7	0.7	0.6	0.6	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	Diurnal Average
6	4	3	3	3	3	1	1	2	2	1	1	1	1	1	1	1	2	1	3	2	4	2	2	3	Diurnal Maximum

Z - zerospan C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	636	98.30	98.30
3 - 4	10	1.55	99.85
5 - 7	1	0.15	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 647

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	57	28	19	34	25	55	92	32	9	7	9	20	54	41	78	75	635
3 - 4	1	0	0	0	0	0	4	1	2	1	0	0	0	1	0	0	10
5 - 7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	28	19	34	25	55	96	34	11	8	9	20	54	42	78	75	646

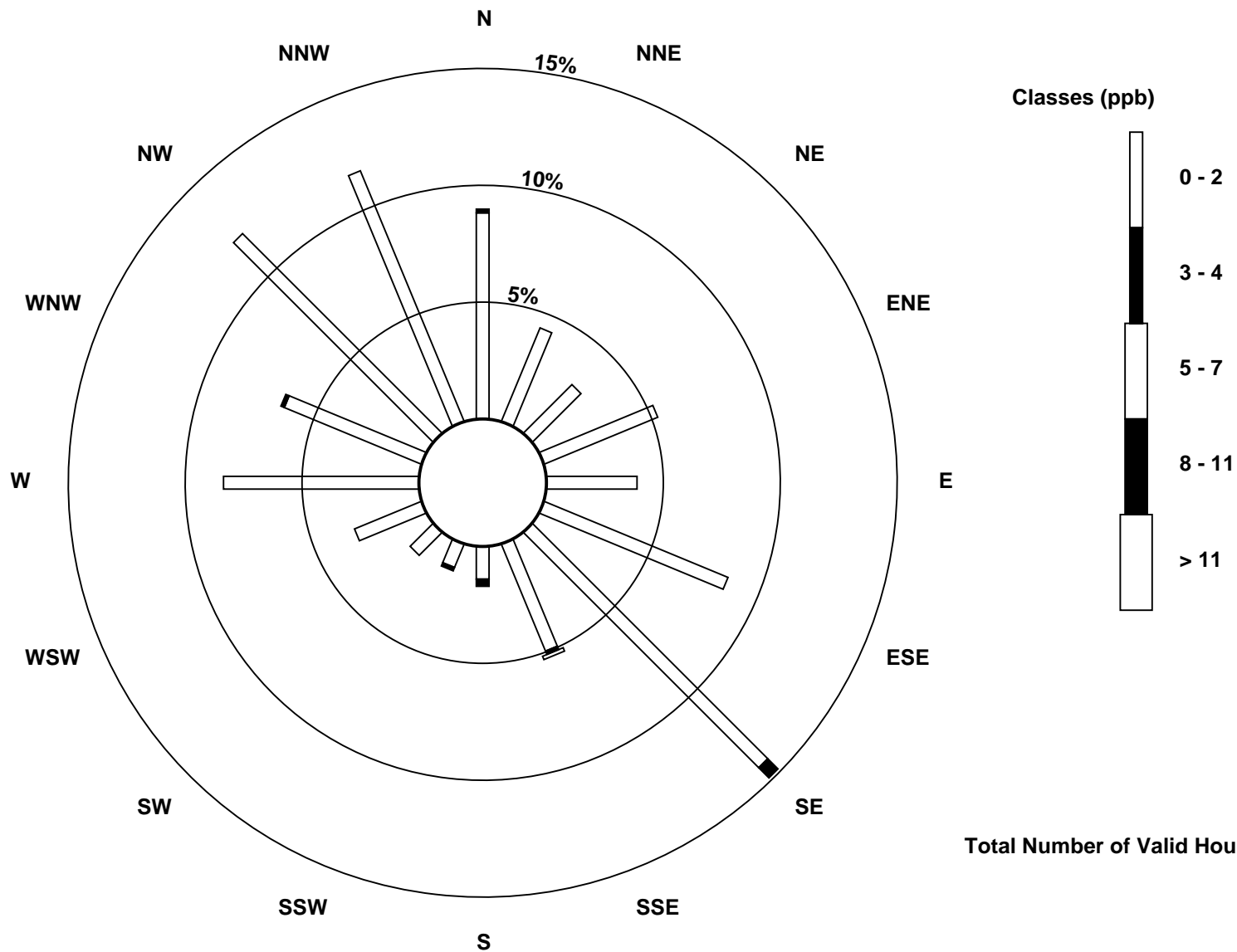
Total Number of Valid Hours: 646

Total Number of Hours: 720

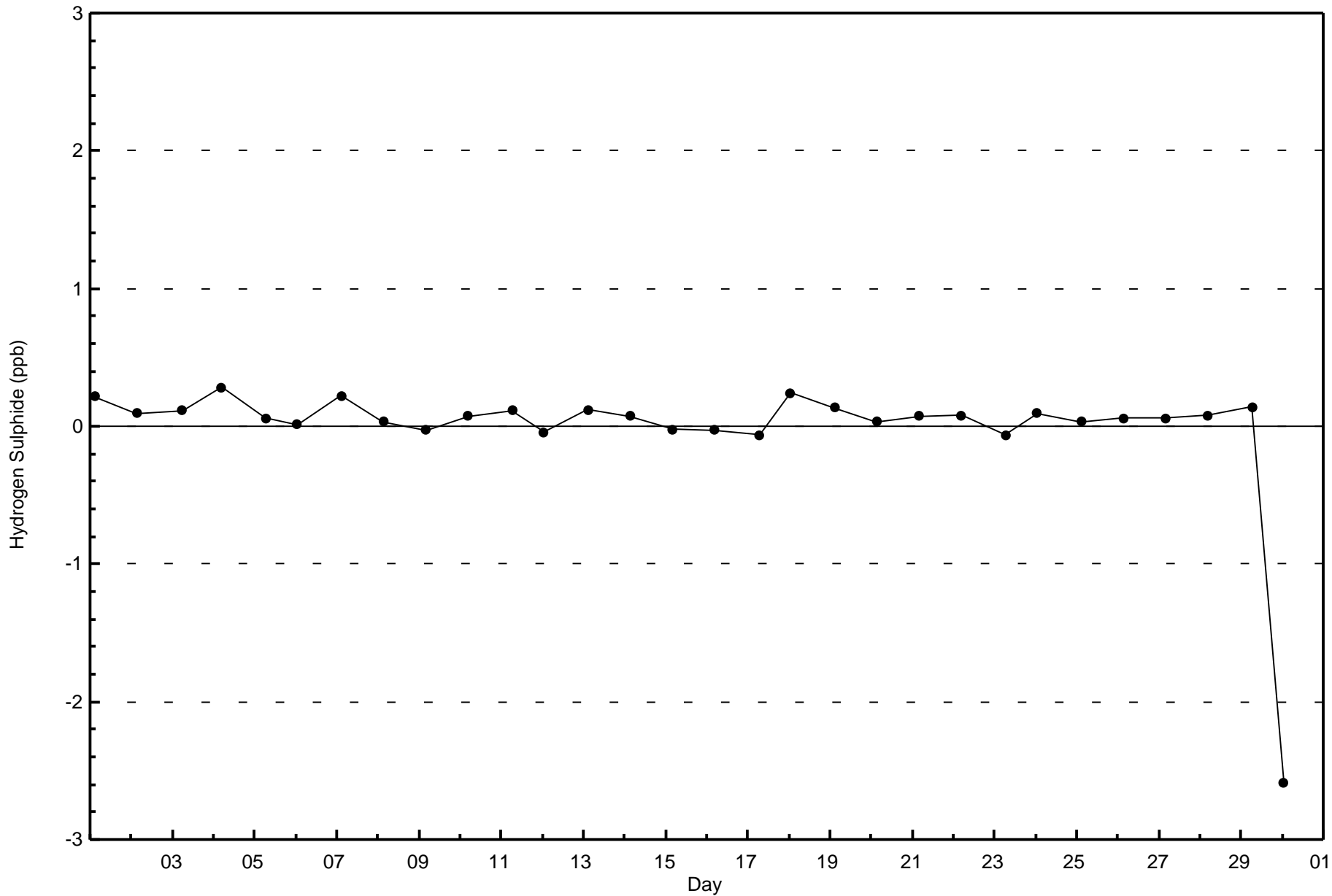


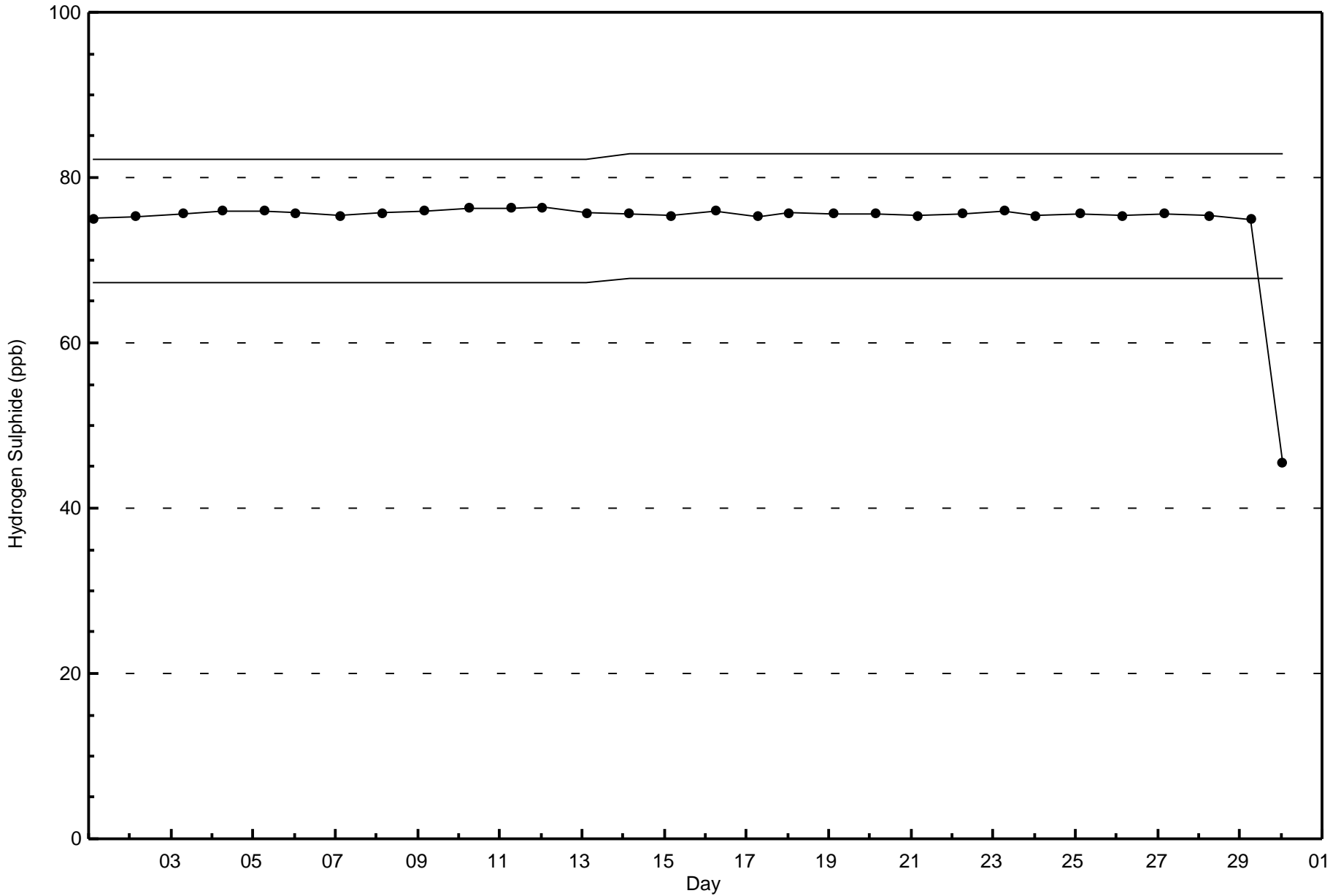
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)



Total Number of Valid Hours: 646







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

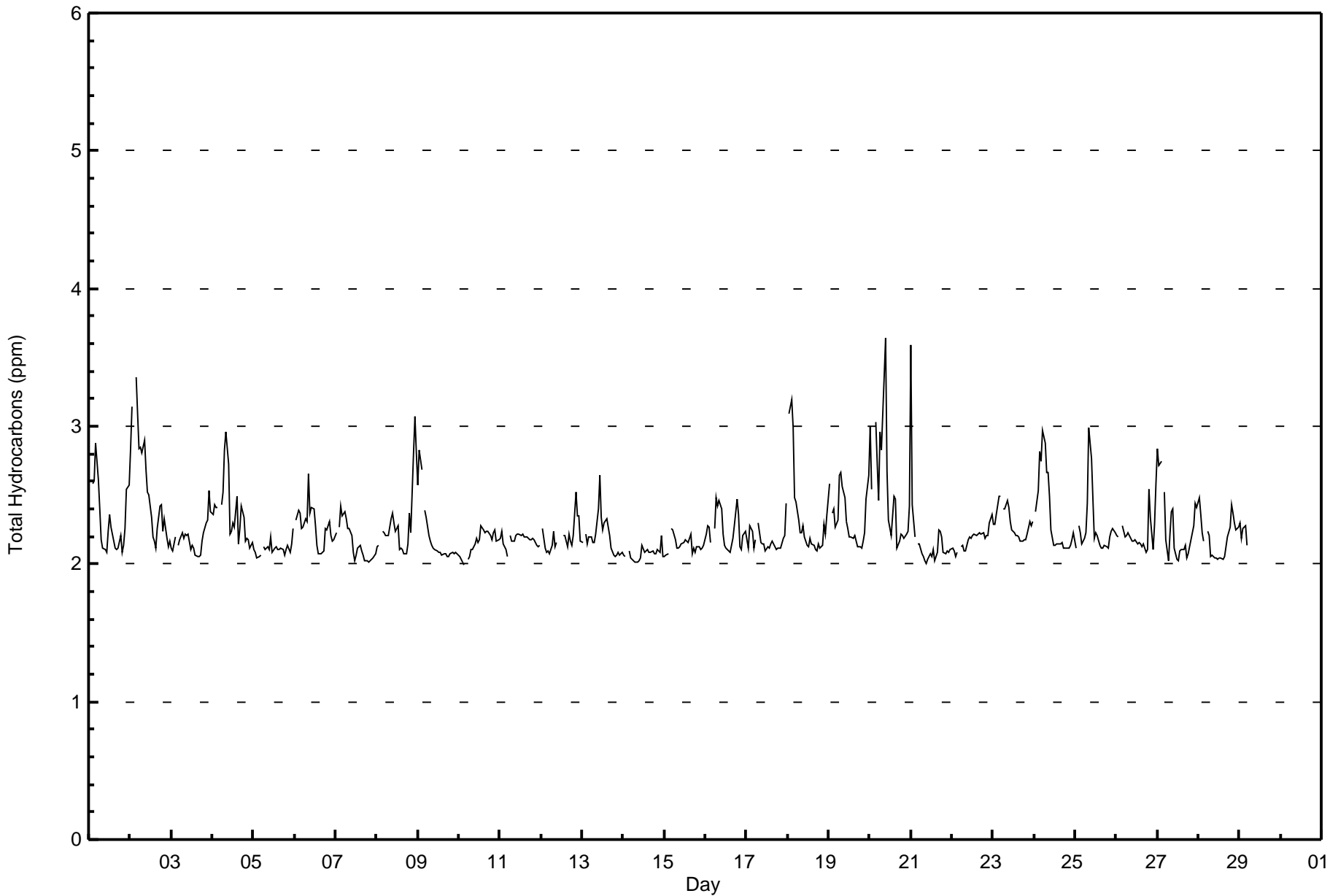
Lower Camp - June 2017

Maximum Value: 3.6 ppm on Jun 20 10:00																				Maximum Daily Average: 2.6 ppm on Jun 20					Hours in Service: 720		
Minimum Value: 2.0 ppm on Jun 10 04:00																				Minimum Daily Average: 2.1 ppm on Jun 14					Hours of Data: 646		
Maximum Diurnal Average: 2.4 ppm at hour 4																				Minimum Diurnal Average: 2.1 ppm at hour 17					Hours of Missing Data: 74		
Monthly Average: 2.25 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.1					Hours of Calibration: 32		
																									Percent Operational Time: 94.2		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.2	Z	2.6	2.6	2.9	2.6	2.4	2.2	2.1	2.1	2.1	2.2	2.4	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.5	2.6	2.3	2.9	
2-Jun	2.8	3.1	Z	3.4	3.1	2.8	2.8	2.8	2.9	2.7	2.5	2.5	2.3	2.2	2.2	2.1	2.3	2.4	2.4	2.2	2.3	2.2	2.1	2.2	2.5	3.4	
3-Jun	2.1	2.1	2.2	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.5	2.4	2.2	2.5	
4-Jun	2.4	2.4	2.4	2.4	Z	2.4	2.5	2.8	3.0	2.7	2.2	2.2	2.3	2.3	2.5	2.1	2.3	2.4	2.3	2.2	2.2	2.1	2.2	2.4	3.0		
5-Jun	2.1	2.1	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.3	
6-Jun	Z	2.3	2.4	2.4	2.3	2.3	2.3	2.7	2.4	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.7	
7-Jun	2.2	Z	2.3	2.4	2.3	2.4	2.3	2.3	2.3	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.4	
8-Jun	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.2	2.8	3.1	2.8	2.3	3.1	
9-Jun	2.6	2.8	2.7	Z	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.8	
10-Jun	2.1	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	
11-Jun	2.2	2.2	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	
12-Jun	Z	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	C	C	C	2.2	2.2	2.1	2.2	2.2	2.1	2.2	2.5	2.4	2.3	2.2	2.2	2.5	
13-Jun	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.6	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.2	2.6	
14-Jun	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	
15-Jun	2.1	2.1	2.1	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	
16-Jun	2.2	2.3	2.3	2.2	Z	2.3	2.5	2.4	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.4	2.1	2.1	2.2	2.2	2.2	2.5	
17-Jun	2.2	2.1	2.3	2.2	2.1	2.2	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.2	2.4	
18-Jun	Z	3.1	3.2	3.0	2.5	2.5	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.4	2.3	3.2	
19-Jun	2.6	Z	2.4	2.4	2.3	2.3	2.6	2.7	2.6	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.5	2.6	2.3	2.7	
20-Jun	3.0	2.5	Z	3.0	2.7	2.5	3.0	2.8	3.4	3.6	2.7	2.3	2.2	2.4	2.5	2.5	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.6	3.6	
21-Jun	3.6	2.4	2.2	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	3.6	
22-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.4	
23-Jun	2.3	2.3	2.4	2.5	2.5	Z	2.4	2.4	2.5	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.5	
24-Jun	Z	2.4	2.5	2.8	2.7	3.0	2.9	2.7	2.7	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	3.0	
25-Jun	2.1	Z	2.3	2.2	2.1	2.2	2.2	2.4	3.0	2.8	2.5	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	3.0	
26-Jun	2.2	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.5	2.3	2.1	2.3	2.6	2.2	2.6	
27-Jun	2.8	2.7	2.7	Z	2.5	2.2	2.0	2.2	2.4	2.4	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.8	
28-Jun	2.5	2.4	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.2	2.3	2.2	2.5	
29-Jun	2.3	2.2	2.3	2.3	2.1	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.3
30-Jun	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
																								Diurnal Average			
																								Diurnal Maximum			
2.4 2.3 2.3 2.4 2.3 2.3 2.3 2.3 2.4 2.3 2.2 2.2 2.2 2.2 2.2 2.1 2.1 2.2 2.2 2.2 2.2 2.2 2.3 2.3 2.3 2.3																											
3.6 3.1 3.2 3.4 3.1 3.0 3.0 2.8 3.4 3.6 2.7 2.5 2.4 2.4 2.5 2.5 2.3 2.4 2.5 2.5 2.5 2.8 3.1 2.8																											
Z - zerspan C - Calibration UO - Unstable Operation																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Lower Camp - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	34	5.26	5.26
2.1 - 3.0	603	93.34	98.61
3.1 - 10.0	9	1.39	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 646

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	7	5	1	8	3	0	1	0	0	0	2	2	4	0	1	0	34
2.1 - 3.0	51	25	17	26	22	55	88	31	11	7	6	18	49	40	77	79	602
3.1 - 10.0	0	0	0	0	2	2	2	1	0	0	0	0	0	1	1	0	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	30	18	34	27	57	91	32	11	7	8	20	53	41	79	79	645

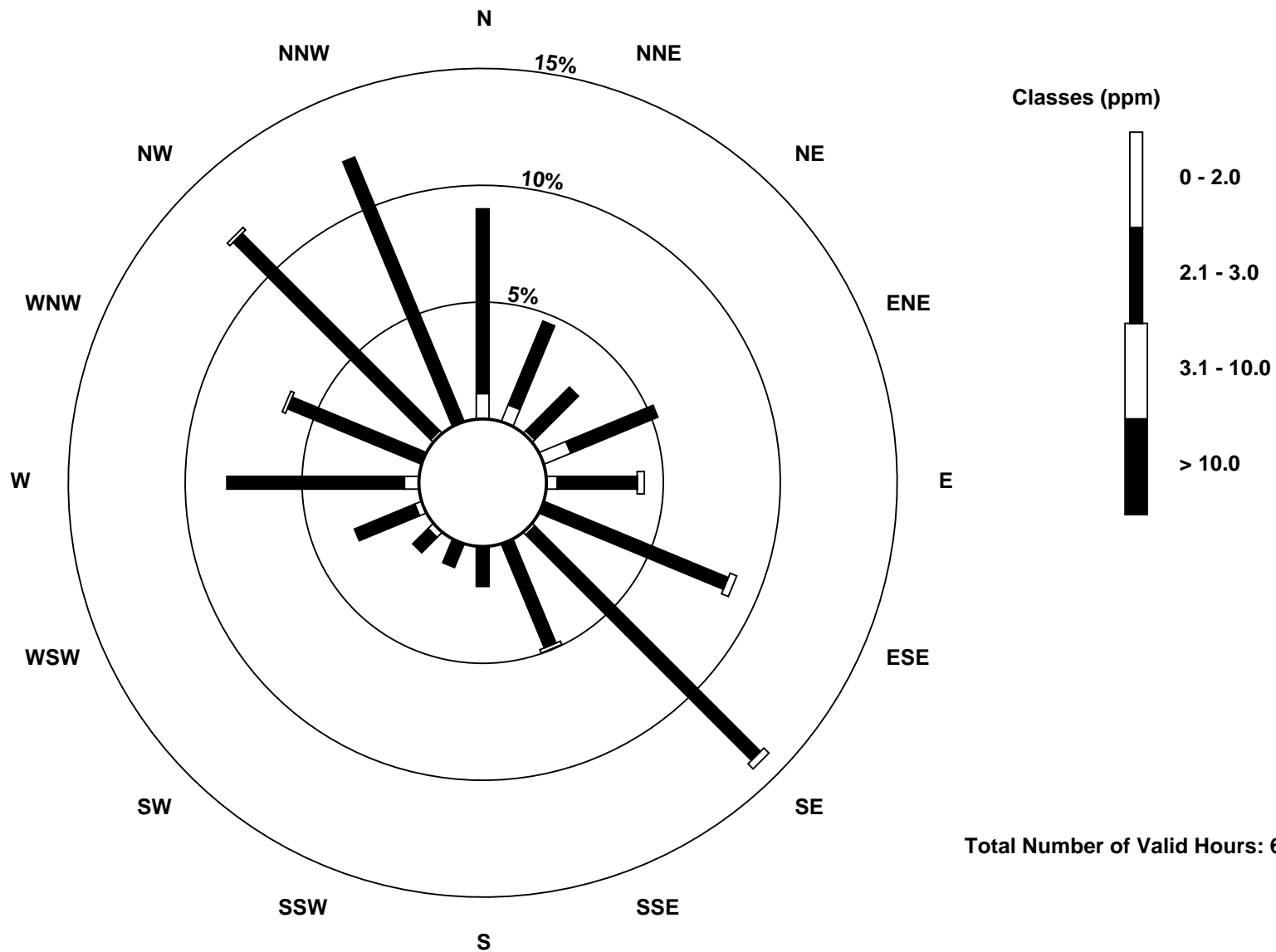
Total Number of Valid Hours: 645

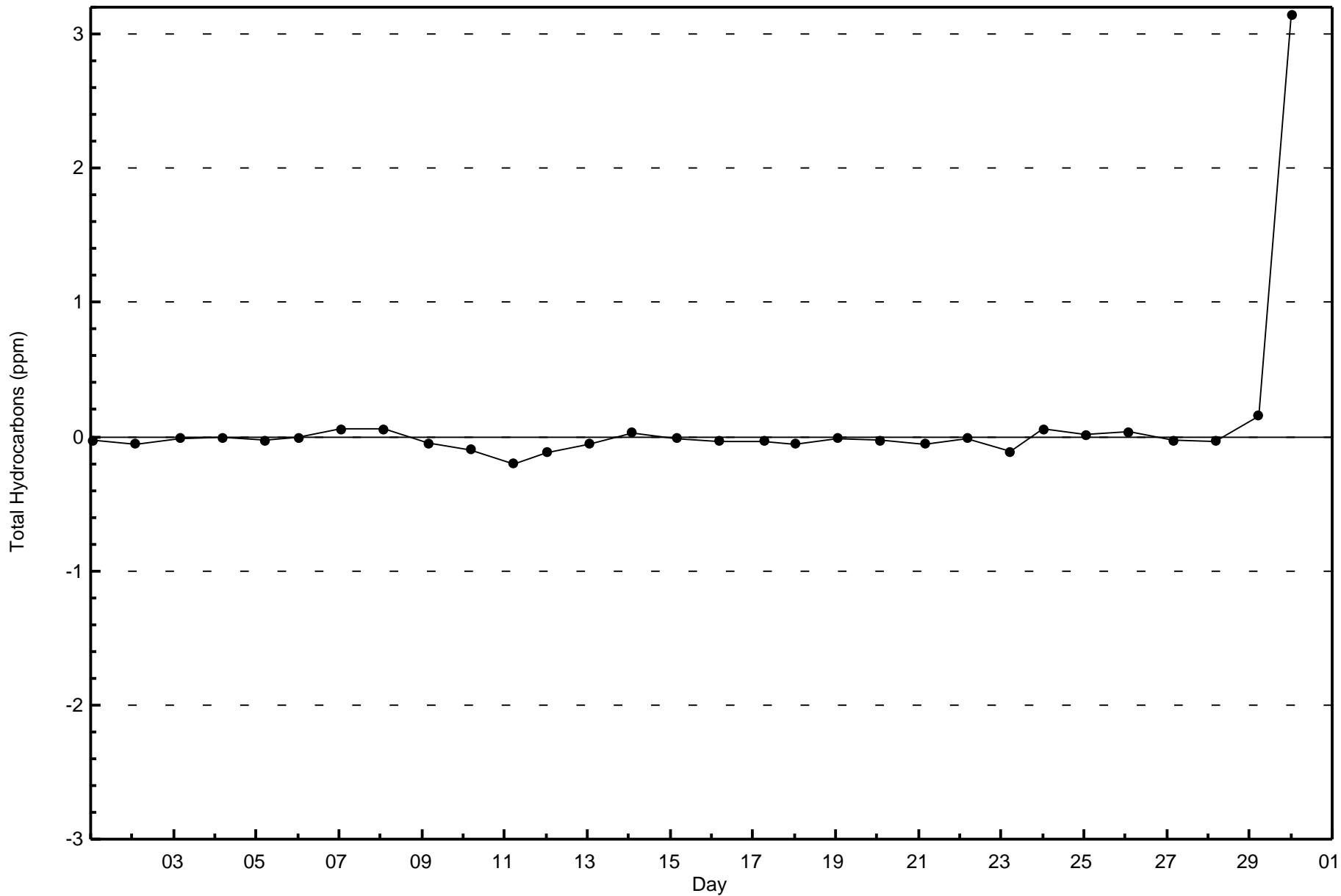
Total Number of Hours: 720

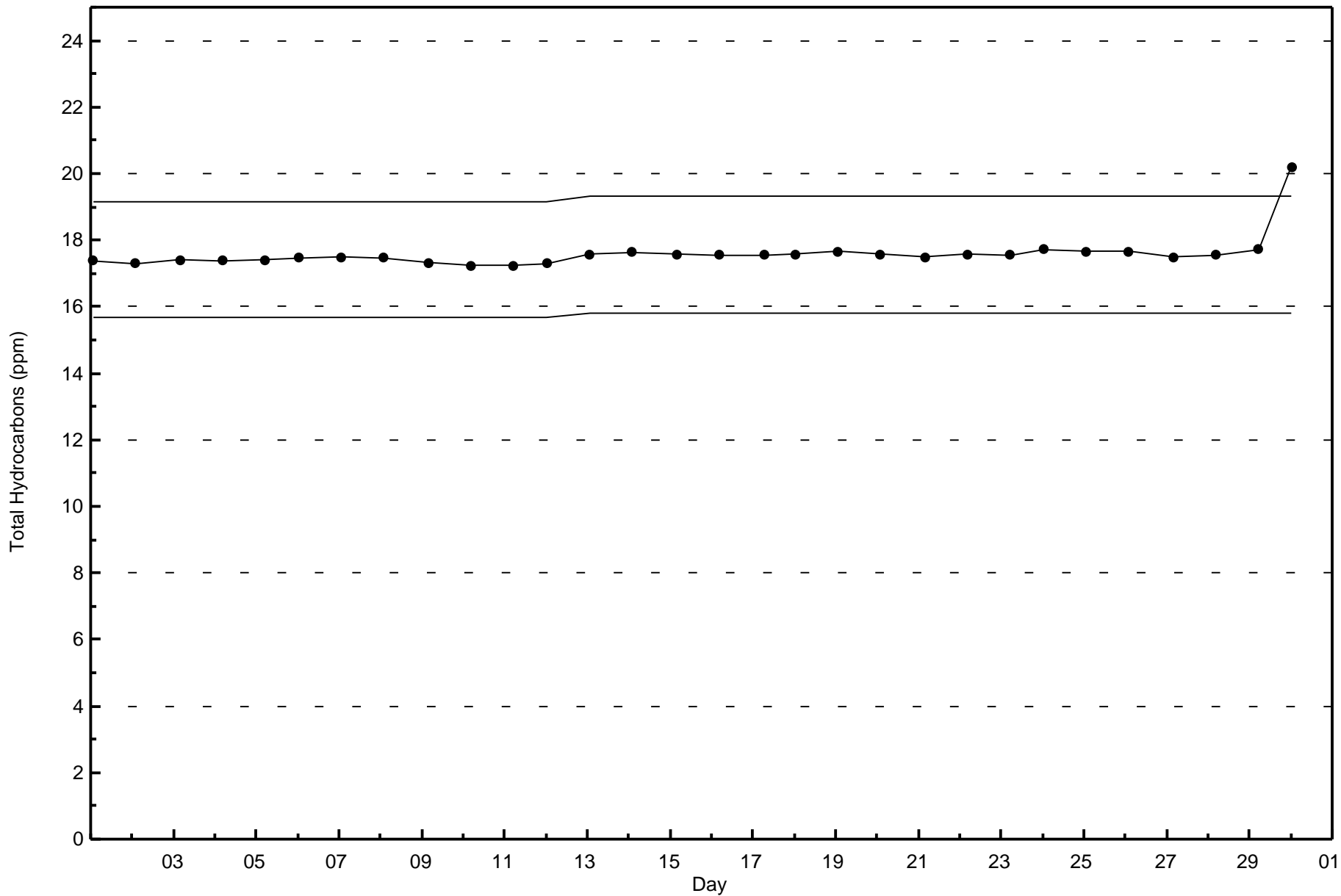


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

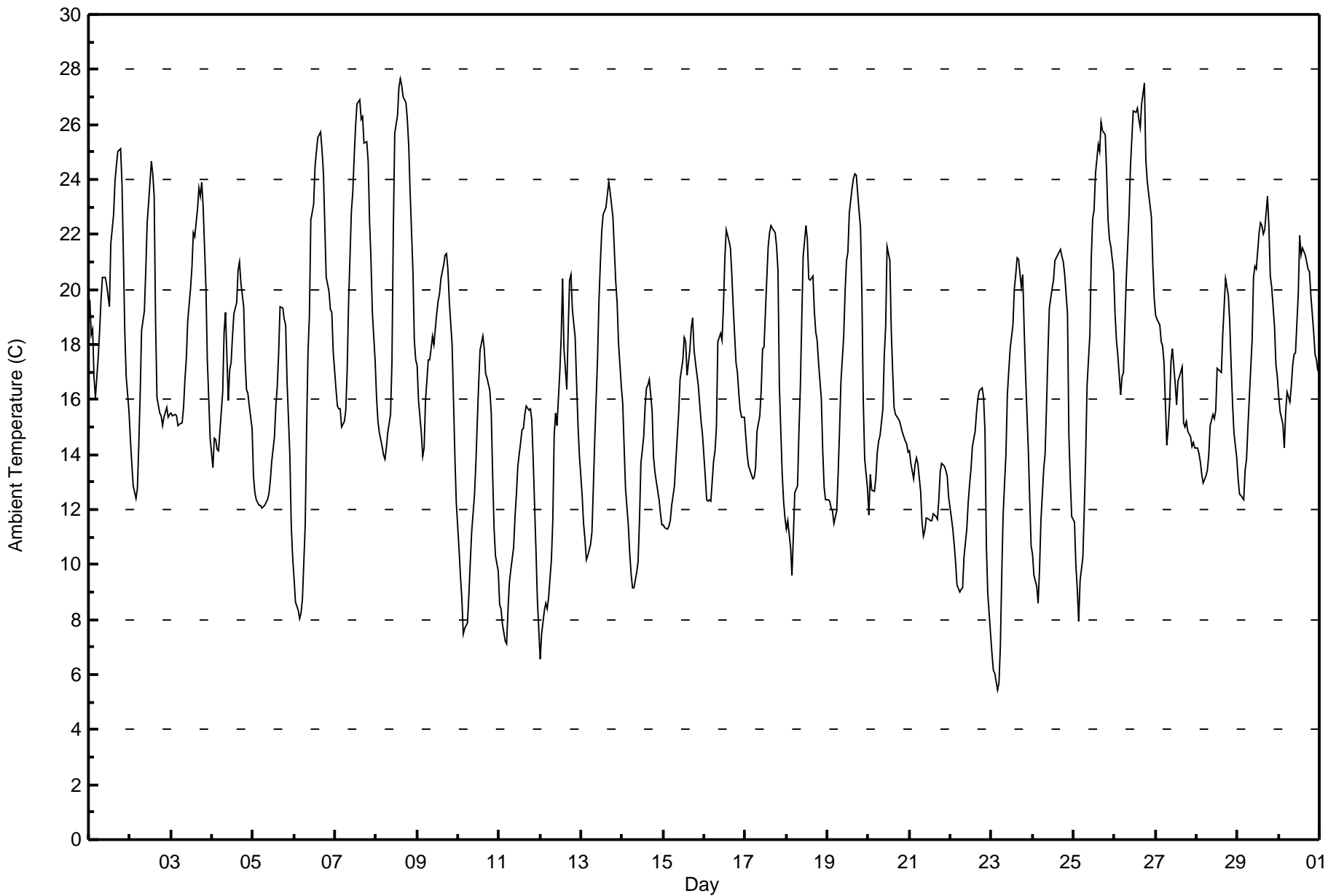
Lower Camp - June 2017

Maximum Value: 27.7 C on Jun 8 15:00		Maximum Daily Average: 22.4 C on Jun 26		Hours in Service: 720																						
Minimum Value: 5.4 C on Jun 23 04:00		Minimum Daily Average: 11.6 C on Jun 11		Hours of Data: 720																						
Maximum Diurnal Average: 20.6 C at hour 17		Minimum Diurnal Average: 12.0 C at hour 4		Hours of Missing Data: 0																						
Monthly Average: 16.55 C		Percentiles: P₁ = 7.1 P₁₀ = 10.7 Q₁ = 13.3 Median = 16.1 Q₃ = 19.9 P₉₀ = 22.8 P₉₉ = 26.7		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	19.6	18.4	18.6	16.8	16.1	17.6	18.5	19.6	20.4	20.4	20.2	19.8	19.4	21.7	22.8	23.9	24.5	25.0	25.1	23.8	21.3	18.5	16.8	15.6	20.2	25.1
2-Jun	14.5	13.7	12.8	12.4	12.8	14.3	16.2	18.5	19.2	20.7	22.4	23.2	24.6	24.2	23.4	18.9	16.1	15.5	15.4	15.1	15.3	15.7	15.4	15.5	17.3	24.6
3-Jun	15.5	15.4	15.5	15.4	15.0	15.1	15.1	15.7	16.7	17.5	18.8	20.1	20.8	22.1	21.9	22.9	23.7	23.4	23.9	23.0	20.1	17.4	16.1	14.6	18.6	23.9
4-Jun	13.5	14.6	14.5	14.2	14.1	15.6	16.2	18.4	19.2	16.0	17.1	17.4	18.3	19.1	19.5	20.7	21.0	20.2	19.4	17.4	16.4	16.2	15.8	14.9	17.1	21.0
5-Jun	13.2	12.6	12.4	12.2	12.2	12.1	12.1	12.1	12.4	12.6	13.0	13.7	14.6	15.8	16.5	17.7	19.4	19.3	18.9	18.7	16.7	14.0	11.4	10.3	14.3	19.4
6-Jun	9.5	8.7	8.4	8.0	8.2	8.8	11.4	14.9	17.7	19.0	22.5	23.1	24.5	25.0	25.5	25.7	25.1	24.3	22.3	20.5	19.9	19.3	19.2	17.8	17.9	25.7
7-Jun	16.4	15.8	15.7	15.6	15.0	15.2	15.6	17.1	19.5	22.8	23.5	24.8	25.9	26.7	26.9	26.2	26.3	25.3	25.4	24.7	22.5	21.1	19.2	17.4	21.0	26.9
8-Jun	16.1	15.2	14.8	14.3	14.0	13.9	14.3	14.8	15.4	17.4	22.2	25.7	26.3	27.4	27.7	27.4	27.0	26.8	26.2	25.2	23.5	20.7	18.2	17.4	20.5	27.7
9-Jun	17.3	16.0	14.8	13.9	14.2	15.9	17.4	17.4	17.9	18.3	18.0	19.1	19.6	19.8	20.4	20.9	21.2	21.3	20.7	19.6	18.0	16.0	13.9	12.3	17.7	21.3
10-Jun	10.5	9.6	8.7	7.5	7.7	7.9	8.9	10.1	11.2	12.5	13.7	15.2	16.6	17.8	18.3	17.8	16.9	16.8	16.3	15.5	13.3	11.3	10.3	9.7	12.7	18.3
11-Jun	8.6	8.4	7.8	7.2	7.1	8.4	9.3	9.8	10.6	11.7	12.5	13.6	14.4	14.9	14.9	15.5	15.7	15.6	15.7	15.3	13.8	10.5	8.7	7.6	11.6	15.7
12-Jun	6.6	7.5	8.3	8.6	8.4	8.8	10.2	11.6	14.7	15.5	15.1	17.0	18.3	20.4	17.9	16.4	18.5	20.4	20.6	19.3	18.3	16.6	15.1	14.0	14.5	20.6
13-Jun	12.5	11.5	11.0	10.2	10.3	10.7	11.2	12.8	14.6	17.5	19.6	20.9	22.1	22.7	23.0	23.5	23.9	23.5	22.6	21.5	20.3	19.5	18.1	16.5	17.5	23.9
14-Jun	15.9	14.3	12.8	11.5	10.4	9.7	9.1	9.2	9.7	10.1	11.7	13.7	14.7	15.7	16.4	16.5	16.7	15.6	13.9	13.4	13.0	12.3	11.9	11.5	12.9	16.7
15-Jun	11.4	11.3	11.3	11.4	11.6	12.2	12.9	13.8	14.6	15.5	16.7	17.4	18.2	18.1	16.9	17.8	18.6	19.0	17.8	17.3	16.5	15.9	15.2	14.8	15.3	19.0
16-Jun	13.2	12.4	12.3	12.3	12.3	13.8	14.2	15.0	18.1	18.4	18.2	19.4	21.1	22.2	21.8	21.5	20.5	19.4	17.3	17.0	16.2	15.6	15.4	15.3	16.8	22.2
17-Jun	14.6	14.0	13.6	13.3	13.1	13.2	13.5	14.8	15.4	16.3	17.9	17.9	20.4	21.6	22.1	22.3	22.2	22.1	21.6	20.7	16.5	13.3	12.3	11.7	16.8	22.3
18-Jun	11.3	11.6	10.6	9.6	11.0	12.6	12.9	14.9	16.5	18.9	21.2	22.3	21.8	20.4	20.4	20.5	19.2	18.5	18.2	17.3	16.0	14.1	12.8	12.4	16.0	22.3
19-Jun	12.4	12.3	12.0	11.9	11.5	11.9	13.3	14.9	16.6	18.3	19.9	21.0	21.3	22.8	23.7	24.0	24.2	24.1	22.8	22.3	19.8	15.9	13.8	12.7	17.7	24.2
20-Jun	11.8	13.3	12.7	12.7	13.2	14.1	14.5	14.7	15.7	17.6	18.7	21.6	21.0	18.5	17.1	15.7	15.5	15.3	15.2	15.0	14.8	14.5	14.4	14.1	15.5	21.6
21-Jun	14.1	13.7	13.1	13.6	13.9	13.7	12.6	11.5	11.0	11.2	11.7	11.7	11.6	11.6	11.9	11.7	11.7	12.4	13.4	13.7	13.6	13.4	13.2	12.5	12.6	14.1
22-Jun	11.7	11.3	10.7	10.0	9.3	9.0	9.1	9.2	10.3	11.3	12.2	12.9	13.5	14.3	14.8	15.6	16.1	16.3	16.4	16.1	14.9	10.7	9.0	7.5	12.2	16.4
23-Jun	6.7	6.2	6.1	5.4	5.7	7.0	9.6	11.9	14.0	16.1	17.1	17.9	18.7	20.0	20.6	21.2	21.1	20.1	20.5	18.6	16.9	14.1	12.4	10.7	14.1	21.2
24-Jun	10.4	9.6	9.2	8.6	9.8	11.6	13.5	14.0	15.7	17.7	19.3	20.0	20.3	21.0	21.2	21.4	21.4	21.2	21.0	20.5	19.1	14.7	13.1	11.7	16.1	21.4
25-Jun	11.6	10.0	9.1	7.9	9.4	10.3	12.0	14.0	16.5	18.3	21.2	22.6	22.9	24.2	25.3	25.0	26.1	25.8	25.6	24.2	22.5	21.8	21.6	20.7	18.7	26.1
26-Jun	19.1	18.2	17.6	16.2	16.8	17.0	18.7	20.3	22.7	24.4	25.5	26.5	26.4	26.6	26.2	25.9	26.8	27.5	24.7	23.9	23.5	22.6	20.9	19.7	22.4	27.5
27-Jun	19.1	18.9	18.7	18.1	17.9	17.3	14.3	15.0	15.9	17.4	17.8	16.6	15.8	16.7	16.8	17.2	15.1	15.0	15.2	14.9	14.6	14.3	14.5	14.2	16.3	19.1
28-Jun	14.2	14.0	13.7	13.3	13.0	13.2	13.4	14.0	15.1	15.5	15.3	15.6	17.2	17.1	17.0	18.3	19.4	20.4	19.8	18.8	17.2	15.9	14.8	13.9	15.8	20.4
29-Jun	13.1	12.5	12.5	12.4	13.4	13.8	15.0	16.1	18.2	20.4	20.9	20.8	22.1	22.4	22.3	22.0	22.2	23.4	22.3	20.5	20.1	18.6	17.3	16.8	18.3	23.4
30-Jun	16.1	15.5	15.1	14.2	15.5	16.3	15.9	16.4	17.2	17.6	17.7	19.8	22.0	21.3	21.5	21.3	21.0	20.7	20.6	19.8	18.4	17.6	17.4	17.0	18.2	22.0
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	55	7.64	7.64
10 - 20	487	67.64	75.28
> 20	178	24.72	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

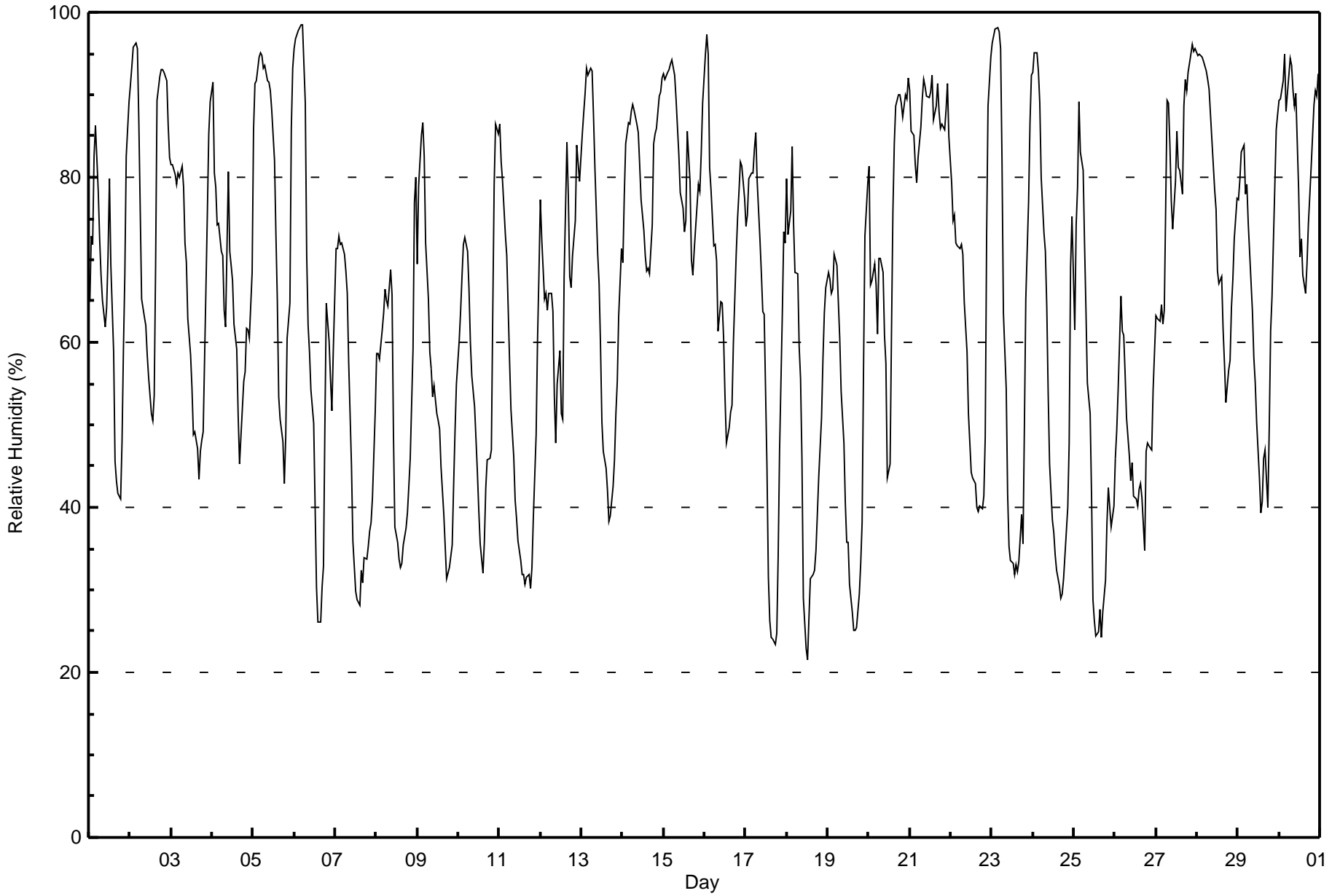
Lower Camp - June 2017

Maximum Value: 99 % on Jun 6 06:00																	Maximum Daily Average: 87.6 % on Jun 21																	Hours in Service: 720								
Minimum Value: 21 % on Jun 18 13:00																	Minimum Daily Average: 48.2 % on Jun 7																	Hours of Data: 720								
Maximum Diurnal Average: 81.6 % at hour 4																	Minimum Diurnal Average: 49.0 % at hour 16																	Hours of Missing Data: 0								
Monthly Average: 65.1 %																	Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 48 Median = 68 Q ₃ = 82 P ₉₀ = 92 P ₉₉ = 97																	Hours of Calibration: 0								
																																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																		
1-Jun	65	73	72	83	86	78	73	68	65	62	64	70	80	69	59	46	43	42	41	48	59	68	83	89	66.1	89																
2-Jun	91	93	96	96	96	87	76	65	63	62	59	56	51	50	54	69	89	92	93	93	93	92	86	82	78.5	96																
3-Jun	82	81	80	79	81	80	81	79	72	70	63	58	54	49	49	47	43	47	48	49	67	76	85	89	67.1	89																
4-Jun	92	81	79	74	74	71	71	64	62	81	71	69	67	62	59	51	45	49	55	56	62	62	61	69	66.1	92																
5-Jun	86	91	92	95	95	95	93	94	92	91	91	88	82	73	65	53	51	48	43	48	60	65	86	93	77.9	95																
6-Jun	96	97	98	98	98	99	89	70	62	59	54	50	40	30	26	26	30	33	50	65	60	56	52	59	62.4	99																
7-Jun	71	71	73	72	72	71	69	66	58	45	36	33	30	29	28	32	31	34	34	35	37	38	41	52	48.2	73																
8-Jun	59	59	58	61	64	66	65	64	69	66	49	38	36	34	33	33	35	37	39	43	46	59	77	80	52.9	80																
9-Jun	70	79	85	87	83	72	65	59	57	53	55	51	50	50	45	39	35	31	32	33	35	43	49	55	54.7	87																
10-Jun	60	64	68	72	73	71	66	60	56	52	48	44	40	36	32	36	42	46	46	47	64	79	86	85	57.2	86																
11-Jun	87	82	79	73	71	64	58	52	46	41	39	36	34	32	32	31	31	32	30	33	39	49	60	68	49.9	87																
12-Jun	77	72	65	66	64	66	66	64	54	48	55	59	51	51	68	84	78	68	67	70	75	84	82	80	67.2	84																
13-Jun	85	88	90	93	92	93	93	87	81	71	67	60	50	47	45	42	38	39	42	46	51	55	63	71	66.3	93																
14-Jun	70	78	84	87	87	88	89	88	86	85	81	77	74	70	69	69	68	74	84	85	86	90	90	92	81.3	92																
15-Jun	92	92	93	93	94	94	92	89	86	83	78	76	73	75	86	79	70	68	71	74	79	78	83	89	82.9	94																
16-Jun	95	97	95	81	78	72	72	70	61	65	65	61	53	48	50	52	52	60	71	75	78	82	81	78	70.5	97																
17-Jun	74	75	80	81	80	83	85	80	72	68	64	63	45	31	26	24	24	23	25	34	47	64	73	72	58.1	85																
18-Jun	80	73	76	84	74	68	68	59	56	46	29	23	21	27	31	32	32	35	39	44	51	58	64	67	51.5	84																
19-Jun	68	68	66	66	71	69	65	61	54	48	40	36	36	31	27	25	25	25	29	33	38	57	73	79	49.6	79																
20-Jun	81	67	68	69	67	61	70	70	69	61	58	44	45	61	76	84	89	90	90	89	87	90	89	92	73.6	92																
21-Jun	91	86	85	82	79	82	86	90	92	91	90	90	90	92	87	89	91	88	86	86	86	88	91	85	87.6	92																
22-Jun	79	75	75	72	72	71	72	71	65	59	51	48	44	44	43	40	40	40	40	41	49	73	89	95	60.3	95																
23-Jun	96	97	98	98	98	96	82	63	54	42	35	34	33	32	33	32	33	39	36	50	65	77	87	92	62.6	98																
24-Jun	93	95	95	93	89	80	73	71	64	54	45	38	37	34	32	30	29	29	31	34	40	48	69	75	57.5	95																
25-Jun	61	74	79	89	83	81	72	64	55	51	41	29	26	24	25	28	24	27	31	38	42	40	38	40	48.5	89																
26-Jun	46	49	54	66	61	61	56	51	46	43	45	41	41	40	42	43	41	35	47	48	47	47	54	59	48.5	66																
27-Jun	63	63	63	65	62	64	89	89	84	77	74	80	86	81	81	78	89	92	91	93	95	96	95	96	81.0	96																
28-Jun	95	95	95	95	94	93	92	91	88	82	78	76	69	67	68	62	57	53	57	58	64	68	73	77	76.8	95																
29-Jun	77	80	83	84	78	79	74	71	64	58	55	50	44	39	41	46	47	40	50	61	66	79	86	88	64.1	88																
30-Jun	89	90	92	95	88	90	94	94	90	89	90	79	70	73	68	66	69	74	78	81	89	90	90	93	84.2	95																
																	79.0	79.5	80.5	81.6	80.1	78.2	76.6	72.1	67.4	63.4	59.0	55.2	51.8	49.4	49.3	49.0	49.2	49.7	52.5	56.4	61.9	68.3	74.5	78.0	Diurnal Average	
																	96	97	98	98	98	99	94	94	92	91	91	90	90	92	87	89	91	92	93	93	95	96	95	96	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Lower Camp - June 2017

Maximum Speed: 30 km/h on Jun 2 16:00	Maximum Daily Speed Average: 15.5 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 02:00	Minimum Daily Speed Average: 1.2 km/h on Jun 6	Hours of Data: 719
Maximum Diurnal Speed Average: 3.7 km/h at hour 15	Minimum Diurnal Speed Average: 0.1 km/h at hour 2	Hours of Missing Data: 1
Monthly Average Velocity: 2.0 km/h 341.5 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 8 Q ₃ = 12 P ₉₀ = 18 P ₉₉ = 27	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SSE3	SE3	WSW3	SE0	WNW5	WNW3	W10WSW10	WSW10	WSW8	S4	SE5	SE11	SE11	ESE4	ESE7	SE5	ESE5	SE4	ESE3	ESE2	NE1	ENE1			S2.3	SE11
2-Jun	ENE1	WNW1	ESE3	E2	ESE3	SE6	SE6	SE5	NNW2	ESE2	NW10	NW7	NW6	NNE13	NW11	W30	W28	W15	NW6	NW12	WNW12	WNW10	WNW13	W17	WNW5.9	W30
3-Jun	W19	W19	WNW19	W23	W21	W20	NW14	NW11	NNW10	WNW11	WNW14	W13	WNW5	NW9	NNE6	NE3	E2	ENE3	SE6	SE5	E3	NNE0	NW4	W4	WNW7.9	W23
4-Jun	W3	SE6	SE6	S5	SSW1	NNE0	ENE4	SE4	WSW6	WNW7	NNW5	W9	W9	NW6	N9	N9	NNW13	NNW8	NW12	NW15	NNW5	NNE9	NNW8	NW10	NW4.0	NW15
5-Jun	WNW10	NNE2	E5	NW10	NW9	NW11	NNW10	NW10	NNW9	NNW9	NNW7	NW10	NW10	NNW9	N6	ENE9	SE6	ESE5	E4	SSE4	ENE6	ESE3	WNW1	N1	NNW4.0	NW11
6-Jun	W1	W1	WNW0	W2	WNW4	W4	ESE3	SE9	SE7	ESE8	SE8	SE10	ESE7	S2	W11	W12	NW5	WSW4	NW3	N0	WNW5	WNW5	NW5	WNW3	SW1.2	W12
7-Jun	NW2	NW1	NNW3	NW5	W5	NW4	NW6	NNW6	NNW6	WNW6	NE7	SE4	NW4	NNW2	ENE8	E5	E6	ENE8	ENE9	ENE8	NNE9	NE9	NW4	NNW4	NNE2.9	NE9
8-Jun	NNW5	W4	WNW6	NW4	WNW4	WNW4	NW4	NW4	NNW4	NNW6	SE6	SE5	ESE11	SE13	SE14	ESE15	ESE15	ESE14	ESE13	ESE12	ESE8	NW1	NW2	ENE1	ESE3.4	ESE15
9-Jun	ESE4	WNW2	NNW2	WNW5	WNW5	NNW8	N20	N19	N23	NNE27	NNE27	NNE27	NNE29	N29	NNE28	NNE28	NNE26	NE23	NE23	ENE20	ENE17	ENE12	ENE10	NE10	NNE15.5	NNE29
10-Jun	ENE11	E12	E8	ENE2	ENE7	NNE9	ENE8	E6	WNW7	NW9	NNW10	WNW9	W10	W9	WSW6	WNW3	NNE5	N8	NNE9	NNW9	NW15	N9	N10	NNW7	N4.3	NW15
11-Jun	WNW8	NW8	NW10	NW12	NW11	NW16	NNW18	NW23	NW21	NW20	NW19	NW16	NW17	NW17	NNW15	NNW14	NNW14	NNW15	NNW12	N11	NE7	ESE1	ENE1	NE0	NW12.0	NW23
12-Jun	ESE1	SE4	ESE11	ESE11	SE11	ESE13	ESE14	SE10	SE8	SSE8	SSE10	SE20	SE18	SE17	ENE6	SSE6	E4	ESE7	SE9	SSE8	SE7	N6	NW9	NW6	SE7.4	SE20
13-Jun	NW5	WNW5	NW5	NW4	NW5	NNE6	NE4	E7	E5	ESE4	SE3	E3	N5	NNW11	NNW10	NNW9	NNW8	N12	N18	N17	NNE9	N13	NNE11	NNW11	N6.1	N18
14-Jun	NNW11	N16	NNW14	N18	N18	N20	N18	NNE21	N18	N16	N13	NNW16	N20	N18	N18	N18	N17	N14	NNW10	NNW12	NNW11	NNW11	NNW13	NW13	N15.0	NNE21
15-Jun	NW10	NW10	NW9	NW8	NNW7	NNW6	N7	N8	N8	N6	N9	NW9	NNW7	SE8	SE6	ENE3	E2	ENE6	NW2	NE2	NNW2	N1	NE1		NNW4.1	NW10
16-Jun	SSW0	WSW0	SSE1	S4	SE4	ESE11	ESE10	E5	SE8	SE7	SE6	SE6	SE8	SSW9	WSW12	NE3	S8	W9	WNW11	NNW5	ESE5	S2	SE6	SE16	SE3.3	SE16
17-Jun	SSE10	SE10	SE12	SSE7	SSE7	SE5	SE5	WNW11	WNW17	WNW15	NW7	N7	WNW16	NW18	WNW21	WNW19	WNW18	NW15	NNW9	NNW2	SE2	ESE2	ESE3	SE2	WNW4.5	WNW21
18-Jun	SE3	ESE6	E1	ESE3	ESE9	SE10	SE6	SE6	SE11	ESE8	W12	W15	SW15	SW11	W18	W20	WSW20	WSW16	NW11	NNW12	NW12	NW10	NW9	W10	WSW5.1	WSW20
19-Jun	NW6	WSW9	NW7	WNW8	W11	W9	W10	WNW4	W4	W3	W6	WSW5	NW5	W8	WSW11	WSW9	WSW10	W10	NW7	SE2	SE4	ESE4	E3	NE2	W5.1	W11
20-Jun	ESE4	SE8	SE5	SE8	SE10	SE8	SE8	SE6	SE6	SE6	SE8	S7	SW16	SSW12	SSW10	S7	SSE8	S8	SSE11	SSE9	SSE9	SE9	SSE9	SSE8	SSE7.4	SW16
21-Jun	SSE6	SSW7	S5	W12	W16	W21	W26	W23	W21	W21	W18	W18	W20	W20	W25	W24	W23	W19	NW15	NW15	NW13	NNW8	NNW16	NNW19	W14.8	W26
22-Jun	NNW17	NNW18	N20	NNW19	N20	NNW16	N17	NNW14	NNW16	N20	N21	N21	N18	NNW17	N15	NNW14	NNW14	N12	N12	NNE11	N3	E1	ENE1	AF	N14.3	N21
23-Jun	E2	NW0	E1	SSE1	NW2	SW2	NNW3	NW6	NNW6	NNW10	NNW11	NNW11	NNW9	NW8	NNE4	W3	NNW7	N7	NNW5	NW3	W0	NE1	ENE1	SE2	NNW3.5	NNW11
24-Jun	NE2	E2	ESE3	E3	E4	ESE6	ESE4	N6	NW8	NNW9	NNW9	N11	N11	N14	NNW14	NNW11	NNW11	N11	NNE11	NNE9	NNE5	WSW2	NNW1	WNW2	N5.4	N14
25-Jun	ESE5	WNW4	W5	W4	NNW2	N3	N4	NE4	NNW2	NNE3	ESE6	ESE5	NNW5	SSE5	SSE7	SE10	SSE8	SE8	SE8	SE8	SE9	SSE9	SSE9	SSE10	SE3.2	SSE10
26-Jun	SSE9	SSE9	SSE9	SE11	SE13	SE15	SE17	SE15	SE12	SE14	SE20	SE18	SE23	SE23	SE22	SE17	SE15	SE12	SE12	ESE12	ESE12	ESE11	ESE10	ESE8	SE14.0	SE23
27-Jun	ESE12	ESE12	SE12	SE14	SE12	SSW10	WSW15	SW7	S7	S7	SSW6	SW12	SW8	SE3	E5	ENE0	SW10	WSW10	WSW9	NW2	ESE3	ESE2	E3	ESE3	S4.4	WSW15
28-Jun	E4	NE4	NNE4	ENE6	E7	ENE7	ENE6	NE4	ENE8	ENE14	ENE16	ENE11	ENE11	NNE15	NNE12	ENE9	ESE7	SSE5	SE6	SSE5	SSE6	SSE9	SE9	SE9	E6.0	ENE16
29-Jun	SSE6	SE6	SE6	SE7	SSE9	SE9	SE9	SE8	SE6	SE6	SE5	NNE1	WNW6	N7	NW5	N7	N5	NW5	NNW3	NW1	W7	N2	NNE1	N1	ESE1.6	SE9
30-Jun	ESE3	E3	ESE2	E1	E2	WSW4	E3	ESE8	SE8	ESE6	SE10	SE9	SE8	ESE7	WSW4	W10	WSW10	WSW8	WSW7	WSW7	SE4	SE5	SE4	ESE3	SSE2.8	WSW10
NNW0.5WNW0.1NNE0.7 NW1.3 NW1.1 NW1.4NNW1.9NNW2.2NNW2.8NNW3.1NNW3.0NNW2.3 NW3.0NNW3.4NNW3.7 NW3.4 NW2.8NNW2.5 N3.1NNE2.8 NE1.9 NE1.7 N1.8NNW1.3																								Diurnal Average		
W19 W19 N20 W23 W21 W21 W26 NW23 N23 NNE27 NNE27 NNE27 NNE29 N29 NNE28 W30 W28 NE23 NE23 ENE20 ENE17 N13 NNW16 NNW19																								Diurnal Maximum		

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Lower Camp - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 18 14:00	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 1 km/h on Jun 25 08:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	1	3	1	2	3	2	2	2	3	2	3	2	3	3	3	3	2	2	1	1	1	1	1	3
2-Jun	1	1	1	1	1	2	1	1	1	2	2	2	2	6	4	7	7	4	4	4	3	3	4	3	7
3-Jun	4	4	4	5	4	4	5	3	3	5	3	4	3	3	2	2	1	2	2	1	1	1	2	1	5
4-Jun	1	5	3	3	2	2	1	1	7	2	3	3	2	1	1	2	3	3	5	5	2	3	2	2	7
5-Jun	3	2	2	3	2	2	3	3	2	2	2	2	2	2	2	3	2	3	3	1	6	3	1	1	6
6-Jun	1	1	2	2	1	1	3	3	2	3	2	2	3	3	3	3	3	1	2	1	2	2	1	2	3
7-Jun	1	1	2	1	1	1	1	1	1	2	3	2	4	4	5	5	4	2	2	3	3	3	2	2	5
8-Jun	2	2	2	1	1	1	2	2	1	2	2	1	3	4	5	4	4	4	4	3	4	1	2	1	5
9-Jun	2	1	1	2	1	4	5	5	6	5	7	6	6	6	6	6	6	5	5	5	3	3	1	2	7
10-Jun	2	2	2	2	2	2	2	3	2	4	3	3	4	4	3	2	1	1	2	2	3	2	3	2	4
11-Jun	2	2	3	2	2	4	4	5	6	5	5	5	6	5	6	5	4	4	3	3	3	2	1	1	6
12-Jun	2	2	4	4	4	4	4	4	3	3	4	8	9	6	5	5	4	4	4	3	2	3	2	2	9
13-Jun	1	1	2	2	2	1	1	1	1	2	1	1	2	3	3	3	3	4	5	4	2	2	4	3	5
14-Jun	4	4	4	6	5	5	5	6	5	5	4	4	4	5	4	4	4	4	2	3	3	3	3	3	6
15-Jun	2	2	2	2	2	2	2	2	2	1	1	2	3	2	3	2	2	2	4	1	2	1	1	1	4
16-Jun	1	1	2	1	4	3	2	2	2	2	2	2	3	4	3	3	3	3	5	4	2	1	4	5	5
17-Jun	3	4	5	2	3	2	1	5	3	4	3	3	5	7	6	5	5	5	3	2	2	1	1	2	7
18-Jun	2	2	2	2	3	3	2	3	3	3	6	4	5	9	6	5	4	3	3	3	4	3	2	2	9
19-Jun	2	3	2	3	2	2	3	2	3	2	2	3	3	4	4	4	3	3	2	2	1	1	1	1	4
20-Jun	1	2	2	2	2	2	2	2	2	2	2	4	7	5	4	3	3	3	4	3	4	3	3	3	7
21-Jun	2	3	2	5	4	4	5	5	4	4	4	4	4	4	5	5	5	5	4	4	3	3	5	6	6
22-Jun	4	5	5	5	6	4	5	4	4	5	5	5	6	5	5	5	4	5	4	3	2	1	1	AF	6
23-Jun	1	1	1	1	1	1	1	2	1	4	4	3	3	3	3	3	5	4	1	1	2	2	2	2	5
24-Jun	2	2	2	2	1	1	1	3	2	2	3	4	4	4	4	4	4	3	3	2	3	1	1	1	4
25-Jun	4	2	1	2	1	1	1	1	1	1	4	2	3	3	3	4	3	4	3	3	4	3	3	3	4
26-Jun	3	3	3	4	3	4	4	4	4	5	5	6	6	6	5	4	5	4	3	2	4	4	3	3	6
27-Jun	3	4	4	4	5	5	4	4	3	3	3	4	3	2	2	4	3	2	2	2	1	2	2	2	5
28-Jun	2	2	1	2	1	1	1	2	6	3	4	4	4	3	5	3	3	3	2	1	2	3	3	4	6
29-Jun	2	2	2	2	3	3	2	2	1	1	1	3	2	2	3	2	2	2	2	1	2	1	1	2	3
30-Jun	1	1	1	2	2	2	2	2	3	3	3	2	2	4	4	2	2	2	2	1	1	1	1	1	4

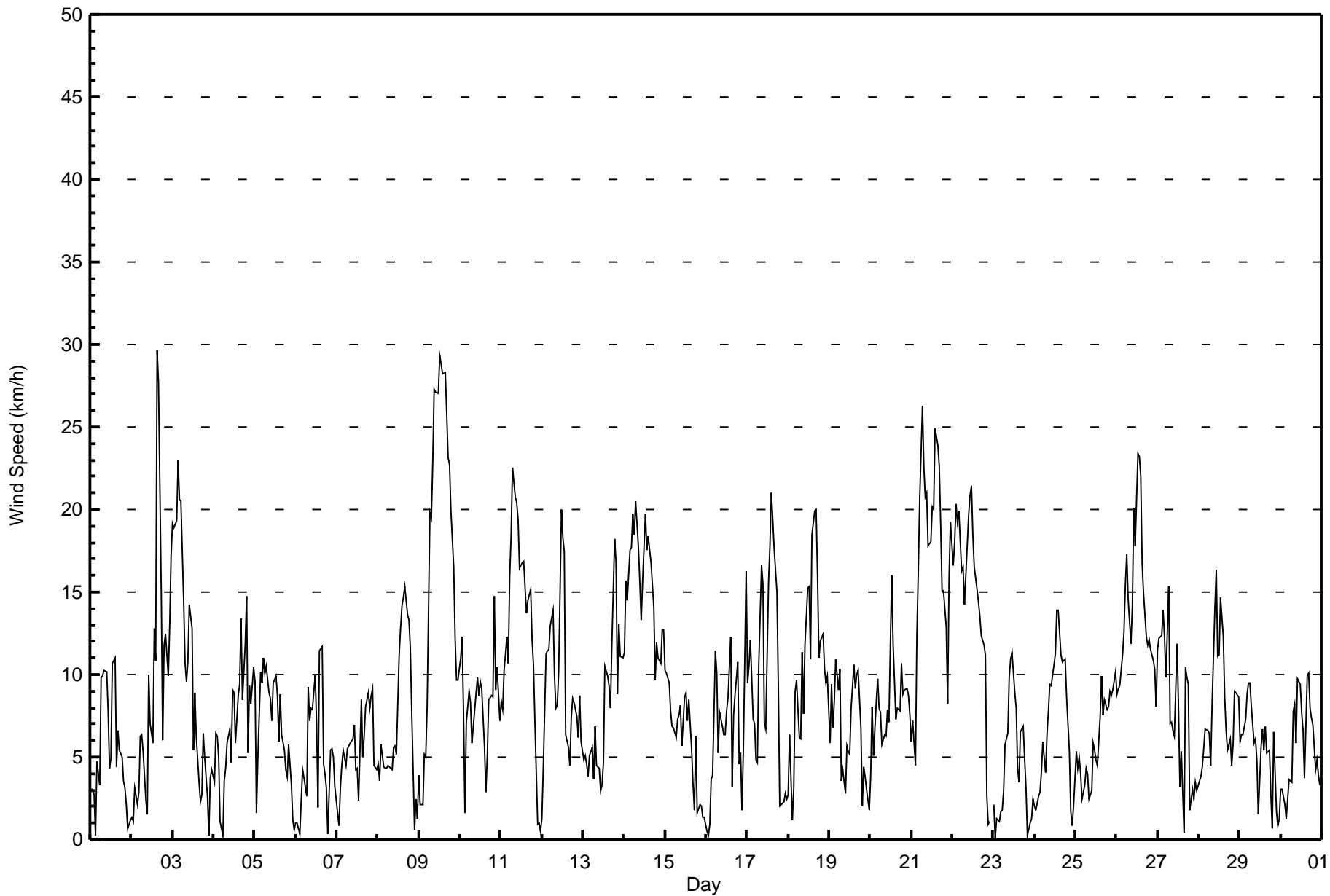
4	5	5	6	6	5	5	6	7	5	7	8	9	9	6	7	7	5	5	5	6	4	5	6	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	231	32.13	32.13
6 - 11	307	42.70	74.83
12 - 19	134	18.64	93.46
20 - 28	44	6.12	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	10	13	11	26	31	26	7	6	2	1	7	13	22	27	19	231
6 - 11	21	11	4	19	5	24	60	27	5	5	5	16	15	13	38	39	307
12 - 19	23	3	0	4	1	11	20	0	0	1	3	3	14	11	17	23	134
20 - 28	9	7	2	1	0	0	5	0	0	0	0	1	15	1	3	0	44
29 - 38	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	64	32	19	35	32	66	111	34	11	8	9	27	58	47	85	81	719

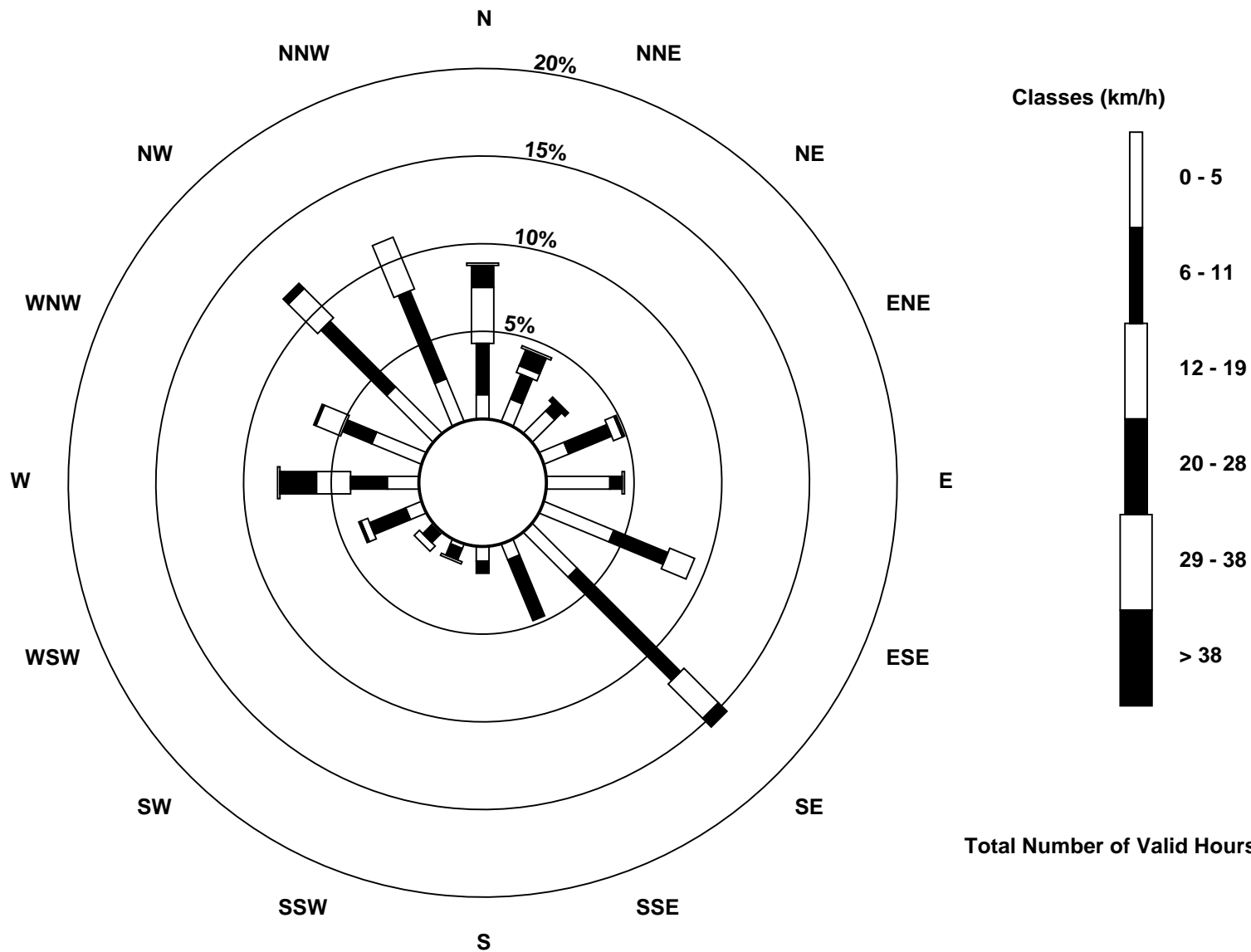
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - June 2017

Direction of Maximum Speed: 262 deg on Jun 2 16:00 Direction of Maximum Daily Speed Average: 21.7 deg on Jun 9	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1
Direction of Minimum Speed: 315 deg on Jun 23 02:00 Direction of Minimum Daily Speed Average: 1.2 deg on Jun 6	Percent Operational Time: 99.9
Monthly Average Direction: 314.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	148	143	238	131	299	291	263	257	247	232	242	170	125	130	126	114	116	132	120	137	123	119	49	69	181.0
2-Jun	66	286	109	79	116	126	133	134	331	103	309	313	318	13	321	262	267	281	321	309	282	284	286	272	288.0
3-Jun	271	276	286	280	274	279	311	315	338	301	293	270	285	306	13	53	92	57	137	137	86	21	310	281	290.2
4-Jun	271	138	141	171	202	17	69	124	238	302	329	263	260	304	358	349	339	333	323	326	342	17	343	319	323.3
5-Jun	302	21	81	310	319	325	340	321	328	337	340	310	312	331	351	73	138	121	89	150	59	123	292	10	339.9
6-Jun	274	281	294	266	282	259	116	128	131	123	132	124	123	173	259	271	319	243	312	355	298	289	304	295	221.8
7-Jun	304	321	336	324	280	312	311	334	330	282	48	128	306	348	68	95	87	74	77	65	33	36	310	339	18.6
8-Jun	330	277	303	313	300	299	315	326	334	348	124	132	119	125	124	119	121	123	120	114	104	311	305	58	111.4
9-Jun	115	293	336	288	284	328	3	350	6	12	13	18	15	10	12	14	26	49	50	65	65	66	63	52	21.7
10-Jun	73	97	92	77	68	25	57	99	288	315	340	288	278	262	252	286	12	10	15	334	321	349	353	336	354.2
11-Jun	293	317	308	307	309	304	300	313	322	311	310	314	316	321	341	329	346	348	337	355	43	120	67	37	321.3
12-Jun	113	137	121	122	130	117	122	128	137	155	168	135	143	136	75	148	91	118	136	150	137	353	321	323	129.8
13-Jun	314	302	321	322	320	19	42	95	98	116	124	79	5	331	336	346	348	3	351	0	28	10	29	340	0.9
14-Jun	342	1	341	349	355	4	7	12	10	6	1	331	360	2	10	360	359	5	348	340	338	340	328	324	355.1
15-Jun	317	315	314	316	329	345	331	2	352	359	350	352	311	328	126	127	76	81	74	316	38	340	357	35	344.8
16-Jun	208	243	162	173	133	112	111	94	132	133	132	126	136	193	251	48	172	276	295	347	106	174	135	129	144.1
17-Jun	149	145	135	148	161	142	133	292	289	298	323	3	303	311	301	294	300	314	334	327	133	113	118	128	295.9
18-Jun	137	123	95	121	122	130	137	142	127	120	265	262	231	228	265	262	252	253	308	330	317	321	308	265	253.8
19-Jun	305	258	304	290	273	275	268	298	266	280	279	254	321	278	258	257	258	264	313	130	126	109	85	43	274.3
20-Jun	119	137	132	138	136	146	132	137	129	139	126	184	218	195	197	172	167	169	148	152	164	137	148	147	156.7
21-Jun	168	208	187	263	263	270	267	268	270	272	273	275	274	276	272	277	277	280	309	324	318	327	347	346	280.9
22-Jun	333	337	358	347	349	333	351	341	341	1	355	351	349	346	353	339	346	359	4	30	353	94	64	AF	349.9
23-Jun	88	315	88	155	310	228	336	312	328	313	342	345	346	325	12	266	342	10	345	322	270	47	76	127	338.4
24-Jun	51	86	105	94	93	111	112	2	324	336	338	351	356	351	342	344	341	350	22	21	27	251	340	285	359.6
25-Jun	106	294	280	269	343	355	6	36	335	29	119	116	327	156	152	131	151	129	138	140	139	151	156	159	136.3
26-Jun	156	156	150	132	133	132	133	136	136	135	129	135	132	131	131	133	132	145	131	117	115	122	121	123	132.7
27-Jun	120	120	129	126	134	193	246	217	186	190	205	235	233	133	91	59	231	238	255	314	102	106	99	114	179.1
28-Jun	99	35	19	65	82	66	62	55	58	72	57	70	66	31	25	77	114	154	141	168	155	154	145	133	79.4
29-Jun	151	140	132	138	147	131	127	126	131	132	132	15	303	354	317	352	358	309	337	313	259	349	12	349	119.9
30-Jun	109	100	105	83	99	245	101	120	124	118	128	128	132	123	252	259	254	251	243	242	136	134	132	115	157.1

327.9	281.9	17.4	306.7	308.0	323.7	346.0	346.7	332.8	340.2	347.7	327.7	320.1	338.6	333.7	317.0	316.1	333.4	8.0	17.6	38.9	34.0	2.9	340.9
Diurnal Average																							

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

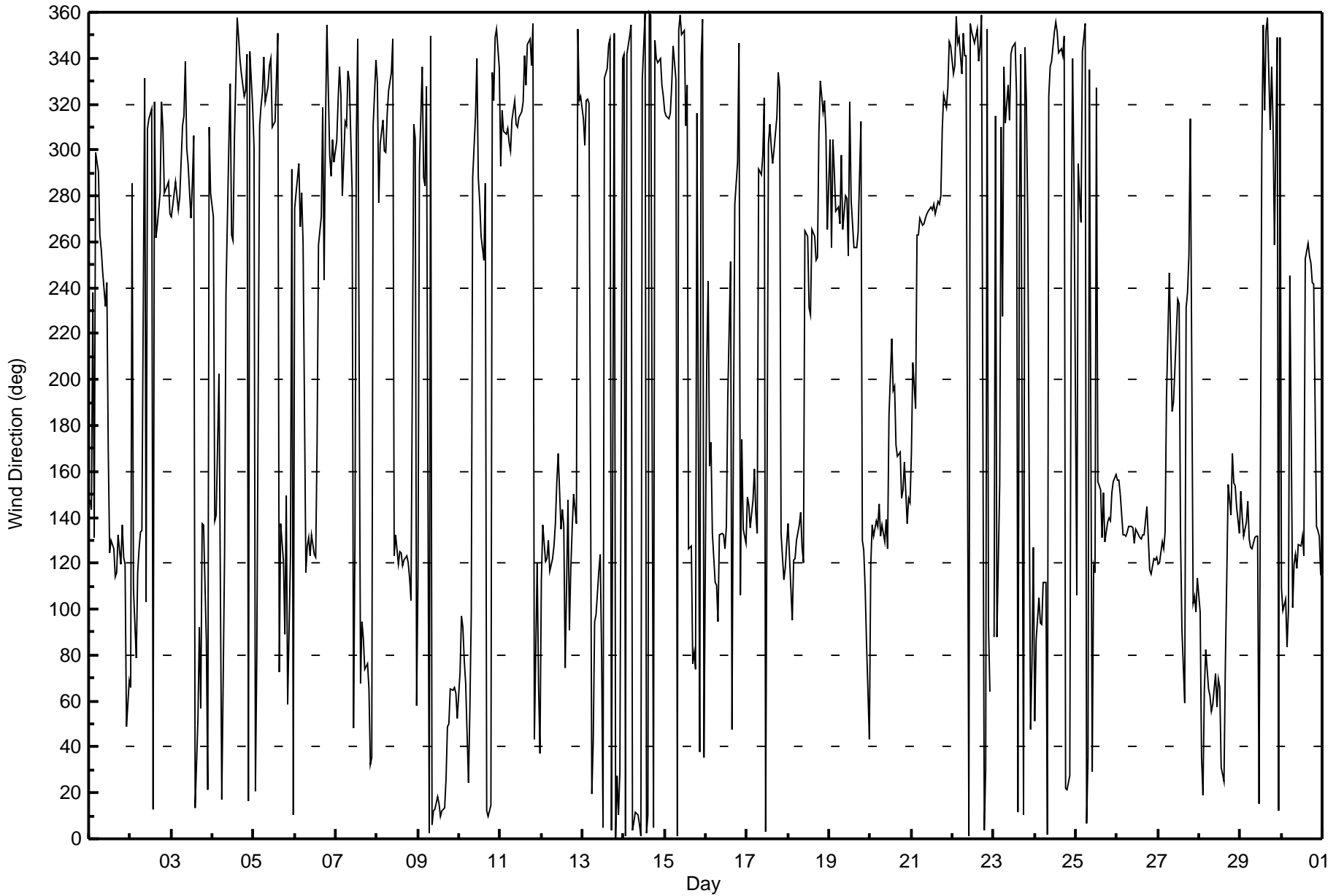
Wind Direction (WD) - deg
Lower Camp - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 99 deg on Jun 4 05:00	Hours of Data: 719
Minimum Value: 11 deg on Jun 16 07:00	Hours of Missing Data: 1
	Hours of Calibration: 0
	Percent Operational Time: 99.9
Percentiles: P ₁ = 12 P ₁₀ = 15 Q ₁ = 20 Median = 26 Q ₃ = 41 P ₉₀ = 65 P ₉₉ = 92	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	60	54	87	95	31	67	16	14	13	20	21	53	30	17	13	51	23	43	26	19	39	54	42	45	95
2-Jun	35	79	42	53	51	19	20	16	63	85	15	25	34	31	28	13	13	16	41	28	14	27	21	12	85
3-Jun	11	12	13	11	13	15	16	15	22	31	21	21	80	35	32	47	59	56	20	19	47	88	42	31	88
4-Jun	34	58	38	43	99	95	30	24	73	29	55	17	14	39	14	20	20	28	25	21	51	15	26	24	99
5-Jun	32	80	54	20	14	15	20	21	21	22	28	18	17	33	43	35	30	43	45	31	67	50	80	77	80
6-Jun	92	87	69	63	19	21	88	19	20	20	20	18	37	83	15	14	47	50	39	93	37	20	23	44	93
7-Jun	61	74	44	28	18	18	21	25	30	26	54	37	58	77	53	71	56	16	20	31	16	20	47	31	77
8-Jun	43	63	19	21	18	20	16	18	27	31	30	23	20	18	21	16	14	17	16	15	15	89	46	76	89
9-Jun	43	53	46	26	27	41	19	21	18	16	20	19	18	18	18	16	20	16	17	16	12	13	15	12	53
10-Jun	16	16	35	89	31	16	30	49	31	33	31	37	33	39	67	66	35	13	18	22	15	24	22	31	89
11-Jun	16	14	17	12	13	13	15	17	18	21	20	28	28	28	27	30	22	21	21	30	22	91	83	98	98
12-Jun	82	61	21	25	32	21	17	26	35	34	32	25	30	23	68	65	80	54	30	26	27	49	12	23	82
13-Jun	24	25	29	34	22	21	44	16	35	29	77	55	42	26	22	23	24	26	20	19	20	12	36	20	77
14-Jun	26	21	21	22	19	19	19	20	20	18	21	20	20	23	19	19	18	20	24	20	21	23	16	16	26
15-Jun	15	14	13	18	16	23	25	23	19	14	32	23	27	40	22	18	39	43	43	55	70	64	79	64	79
16-Jun	88	88	75	35	57	17	11	32	22	20	27	28	26	48	26	70	36	36	29	47	26	56	29	20	88
17-Jun	30	29	27	34	35	30	27	65	13	20	53	28	23	24	17	20	18	20	19	56	58	58	33	60	65
18-Jun	74	28	92	33	19	22	34	39	20	40	36	19	32	50	16	16	13	15	25	19	21	14	24	19	92
19-Jun	31	19	21	21	14	17	22	66	75	88	53	58	66	42	30	47	25	21	24	74	12	12	34	75	88
20-Jun	24	24	31	18	18	28	26	34	25	25	21	40	26	35	32	32	33	35	29	30	32	30	34	27	40
21-Jun	32	35	39	20	13	12	13	12	12	11	12	12	12	11	11	12	18	19	14	14	30	21	22	39	
22-Jun	18	19	20	22	21	21	22	22	23	20	22	21	25	24	24	25	24	29	23	16	57	86	29	AF	86
23-Jun	25	89	61	55	61	72	44	17	27	26	32	25	41	36	67	97	63	37	29	44	88	79	69	49	97
24-Jun	32	61	58	81	43	23	35	24	23	26	31	28	30	25	23	27	26	20	23	16	38	59	83	51	83
25-Jun	69	37	28	19	30	39	29	15	60	32	37	38	47	77	44	26	36	30	31	34	39	35	33	27	77
26-Jun	27	30	33	30	28	23	22	26	27	24	15	24	18	18	15	20	22	30	22	12	17	23	19	22	33
27-Jun	13	20	21	17	26	46	15	37	37	45	45	19	21	67	29	79	23	15	16	75	49	51	50	64	79
28-Jun	37	68	31	21	19	20	23	28	53	22	17	24	44	23	38	33	42	52	31	31	26	27	33	34	68
29-Jun	38	27	27	26	29	25	20	20	17	23	29	74	58	34	38	22	24	21	59	42	23	46	66	64	74
30-Jun	25	27	29	63	74	46	65	22	25	60	22	20	23	33	76	14	15	15	12	12	26	19	20	56	76
	92	89	92	95	99	95	88	66	75	88	77	74	80	83	76	97	80	56	59	93	88	91	83	98	

Diurnal Maximum

AF - Analyzer Failure





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Lower Camp	Station number:	AMS 11
Calibration Date:	June 12, 2017	Last Cal Date:	May 9, 2017
Start time (MST):	11:05	End time (MST):	12:27
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.5</u>	ppm	Cal Gas Exp Date	February 16, 2019
Cal Gas Cylinder #	<u>LL101792</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	11051107
ZAG Make/Model	API 701		Serial Number	3411

Analyzer Information

Analyzer make: TEI 43i

Analyzer serial #: 100841398

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-674.9	-674.9
Calculated slope	0.998778	0.999459	Lamp voltage	802	801
Calculated intercept	0.654985	-0.175695	Pressure	705.4	703.0
Analyzer Background	12.1	12.0	Flow	0.628	0.623
Analyzer Coefficient	1.044	1.044	Intensity	91	92

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5002	0.0	0.0	0.2	----
as found span	4916	83.8	829.7	830.0	1.000
calibrator zero	5005	0.0	0.0	0.2	----
high point	4916	83.8	829.7	830.0	1.000
second point	4961	42.4	419.5	420.6	0.997
third point	4980	21.2	209.8	209.7	1.001
as left zero	5004	0.0	0.0	0.3	----
as left span	4915	83.8	829.8	832.4	0.997

Average Correction Factor				0.999	
Corrected As found	829.87	Previous response	830.01	*% change	0.0%

* = > +/-5% change initiates investigation

Notes:

No adjustments required.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

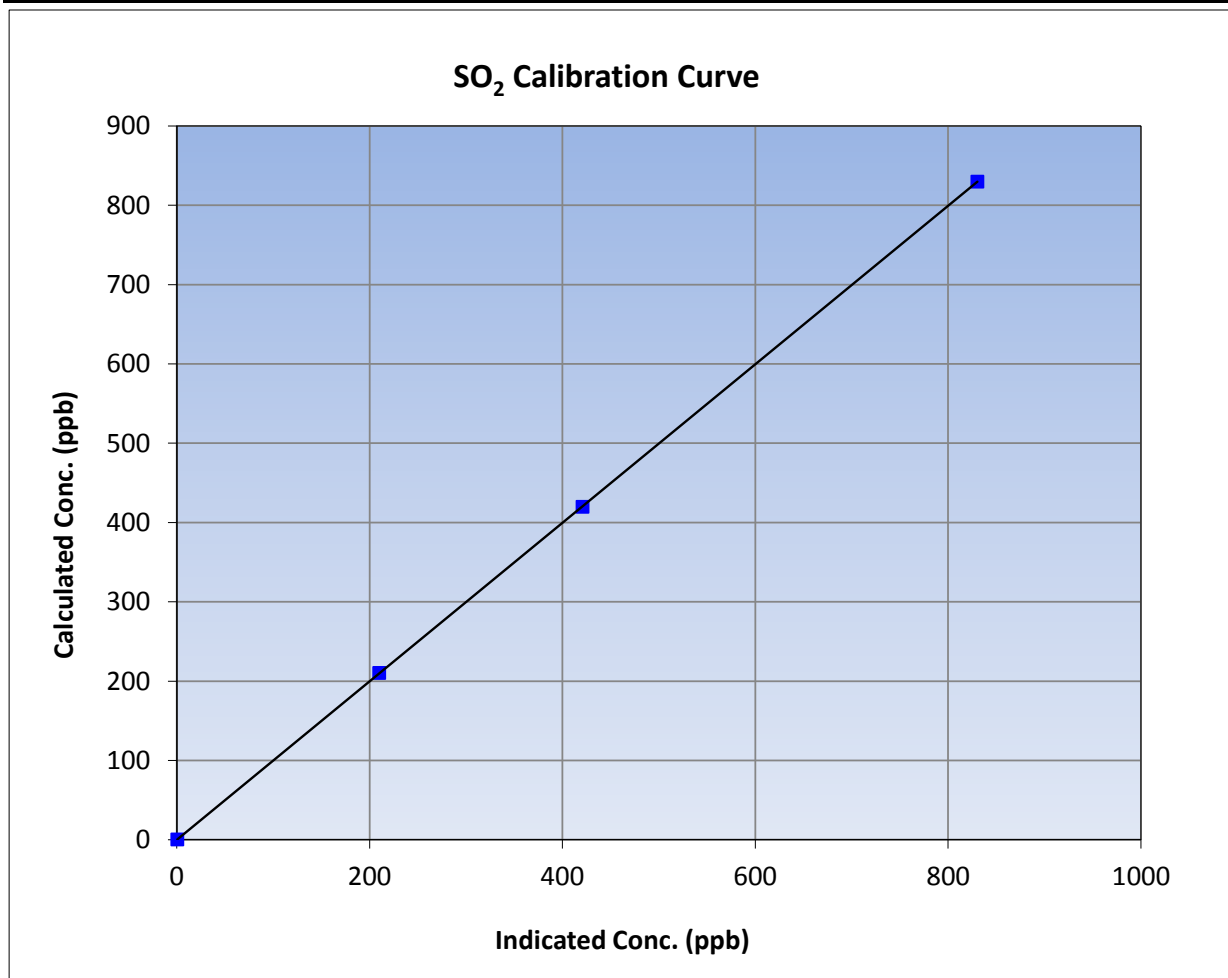
Version-03-2017

Station Information

Calibration Date	June 12, 2017	Previous Calibration	May 9, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	11:05	End Time (MST)	12:27
Analyzer make	TEI 43i	Analyzer serial #	100841398

Calibration Data

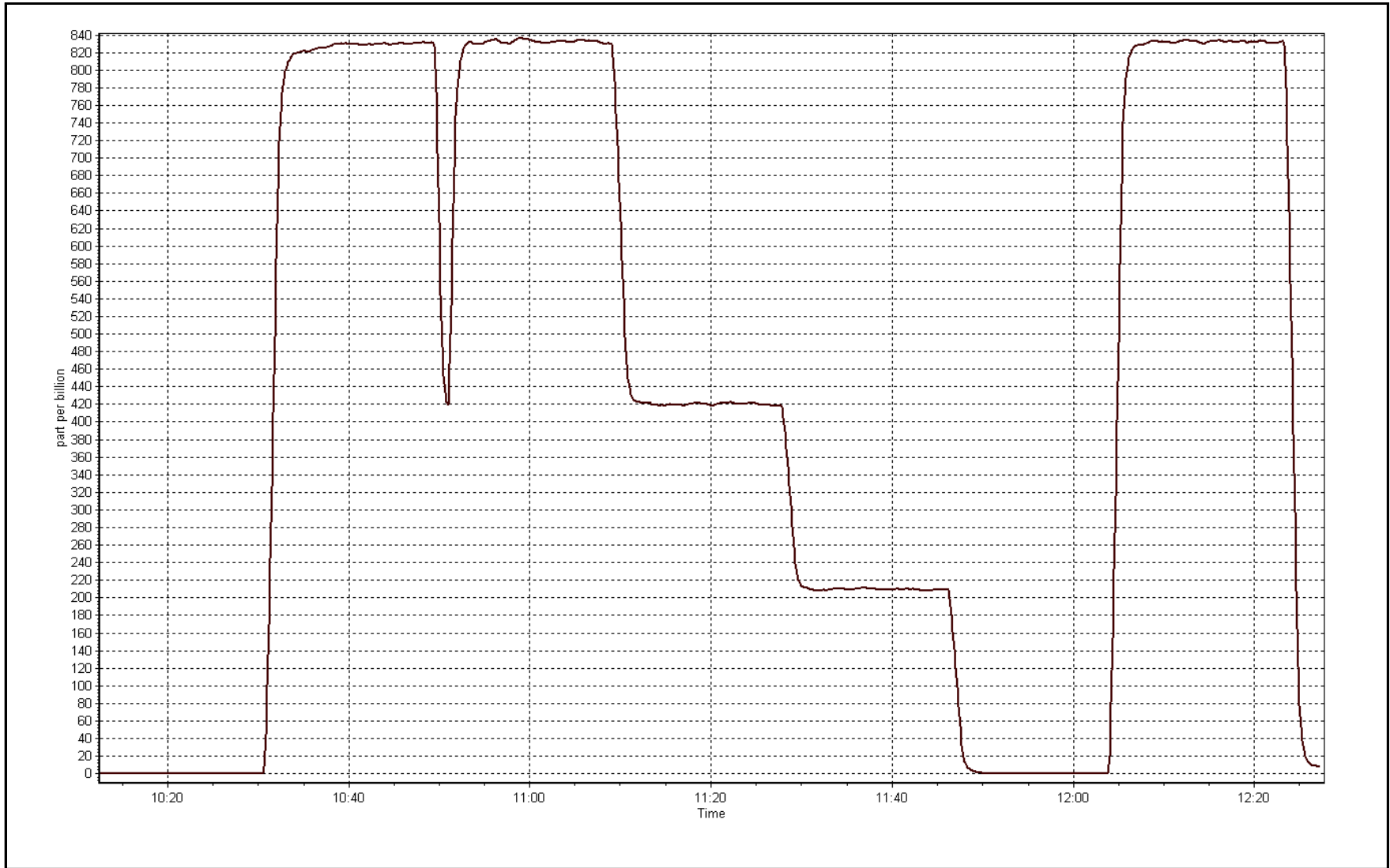
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	0.999998	≥0.995
829.7	830.0	0.9996	Slope	0.999459	0.90 - 1.10
419.5	420.6	0.9973	Intercept	-0.175695	+/-30
209.8	209.7	1.0008			



SO2 Calibration Plot

Date: June 12, 2017

Location: Lower Camp





Wood Buffalo Environmental Association

H₂S Calibration Summary

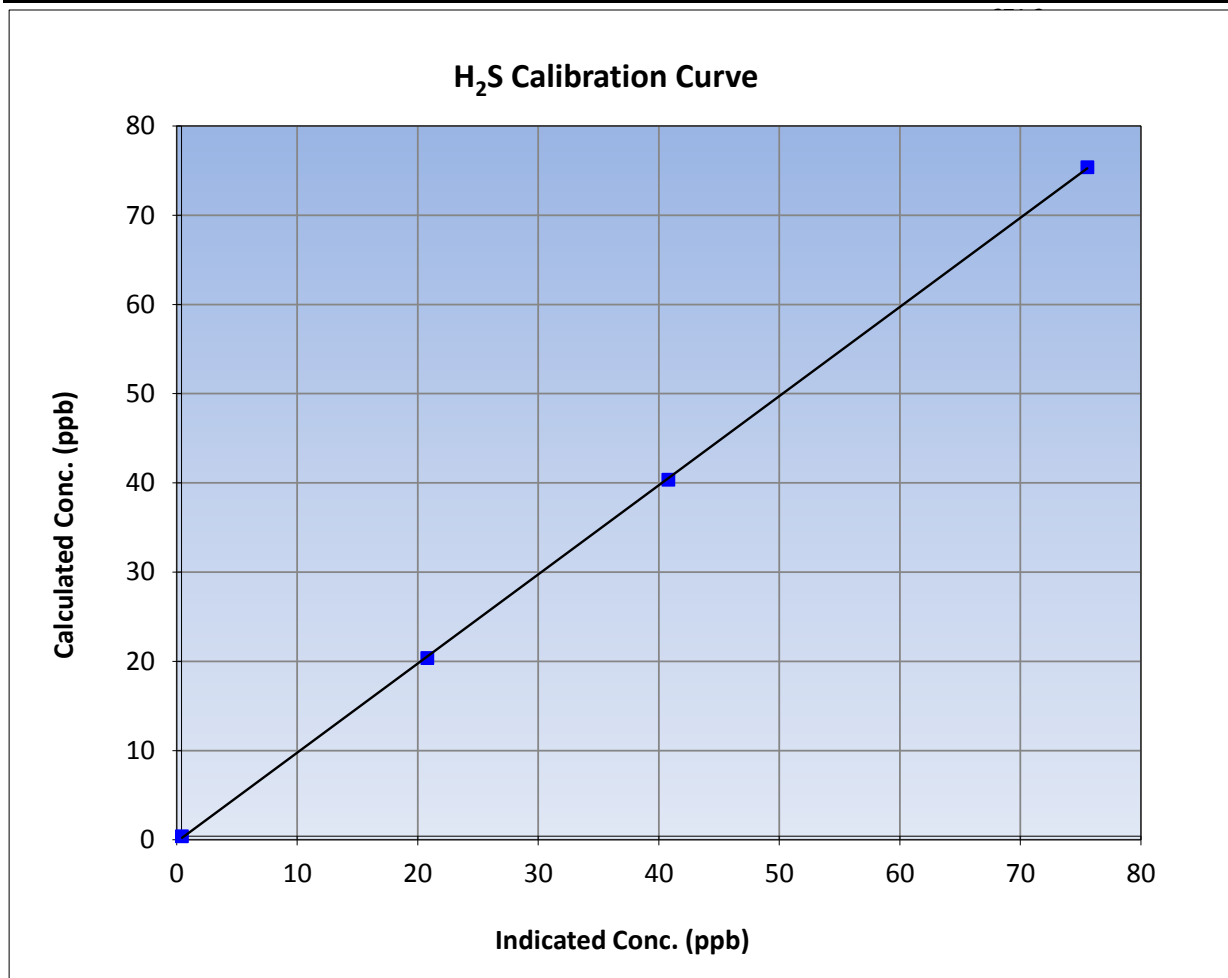
Version-03-2017

Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 5, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:45	End Time (MST)	12:02
Analyzer make	Thermo 450i	Analyzer serial #	1410661328

Calibration Data

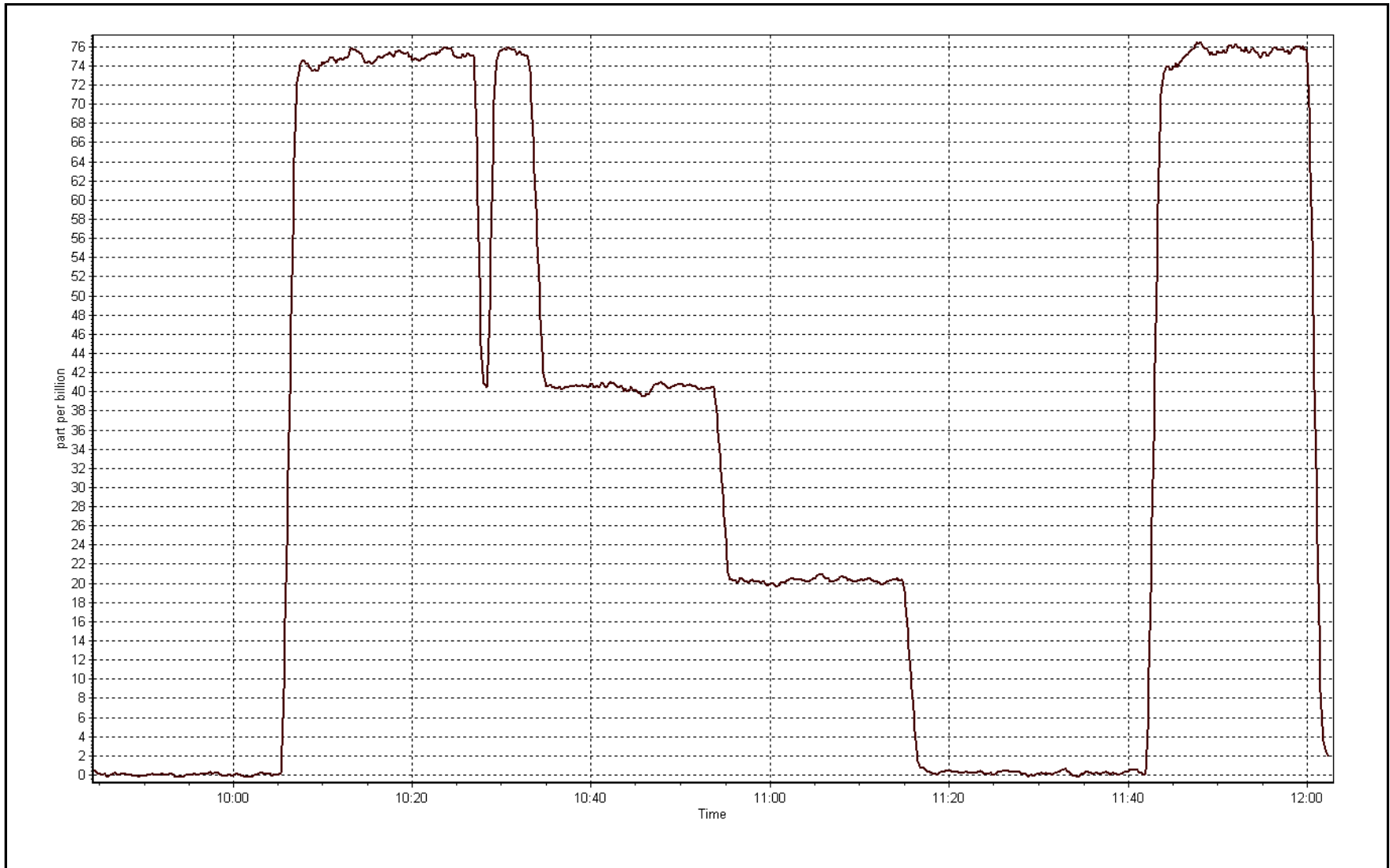
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.0	----	Correlation Coefficient	≥0.995
75.0	75.2	0.9978		
40.0	40.4	0.9892	Slope	0.90 - 1.10
20.0	20.4	0.9806		
			Intercept	+/-3



H₂S Calibration Plot

Date: June 13, 2017

Location: Lower Camp





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Lower Camp	Station number:	AMS 11
Calibration Date:	June 12, 2017	Last Cal Date:	May 9, 2017
Start time (MST):	11:03	End time (MST):	12:27
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL101792	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	<u>493.0</u> ppm	CH4 Equiv Conc.	1043.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11051107
ZAG Make/Model	API 701	Serial Number	3411

Analyzer Information

Analyzer make:	51-i-LT	Analyzer serial #:	1218153353
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-297.6
Calculated slope	1.006524	Sample pressure	7.8
Calculated intercept	-0.132860	Fuel pressure	25.2
Analyzer Background	3.670	Air pressure	40.2
Analyzer Coefficient	4.417	Flame temperature	166.7
			<u>Finish</u>
			-297.8
			7.8
			25.2
			40.2
			166.8

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5002	0.0	0.00	-0.04	----
as found span	4916	83.8	17.48	17.33	1.009
calibrator zero	5002	0.0	0.00	-0.04	----
high point	4916	83.8	17.48	17.48	1.000
second point	4961	42.4	8.84	8.86	0.998
third point	4980	21.2	4.42	4.47	0.989
as left zero	5004	0.0	0.00	0.05	----
as left span	4915	83.8	17.48	17.55	0.996
Average Correction Factor					0.996
Corrected As found	17.37	Previous response	17.50	*% change	0.8%

* = > +/-5% change initiates investigation

Notes: Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

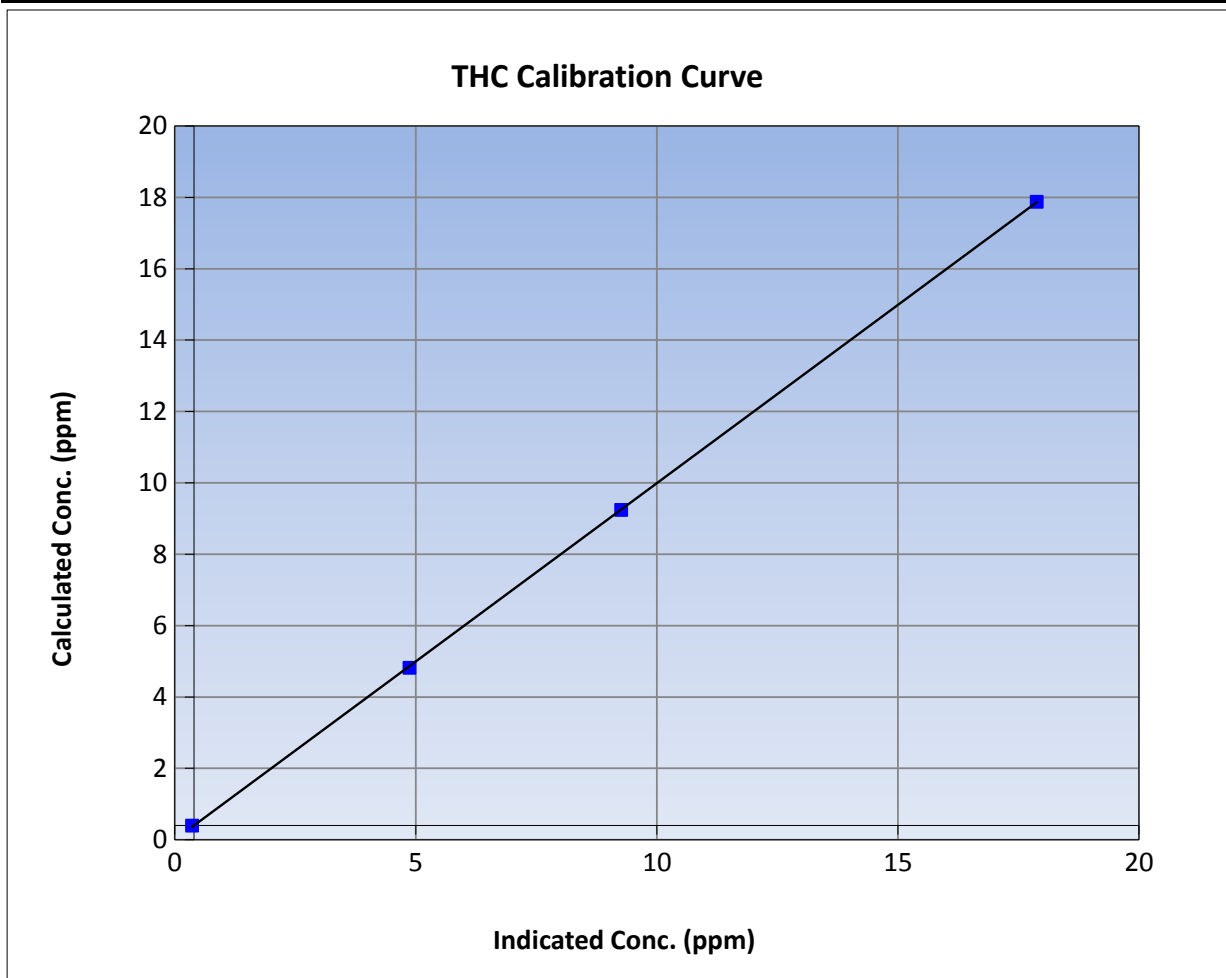
Version-03-2017

Station Information

Calibration Date	June 12, 2017	Previous Calibration	May 9, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	12:30	End Time (MST)	12:27
Analyzer make	51-i-LT	Analyzer serial #	1218153353

Calibration Data

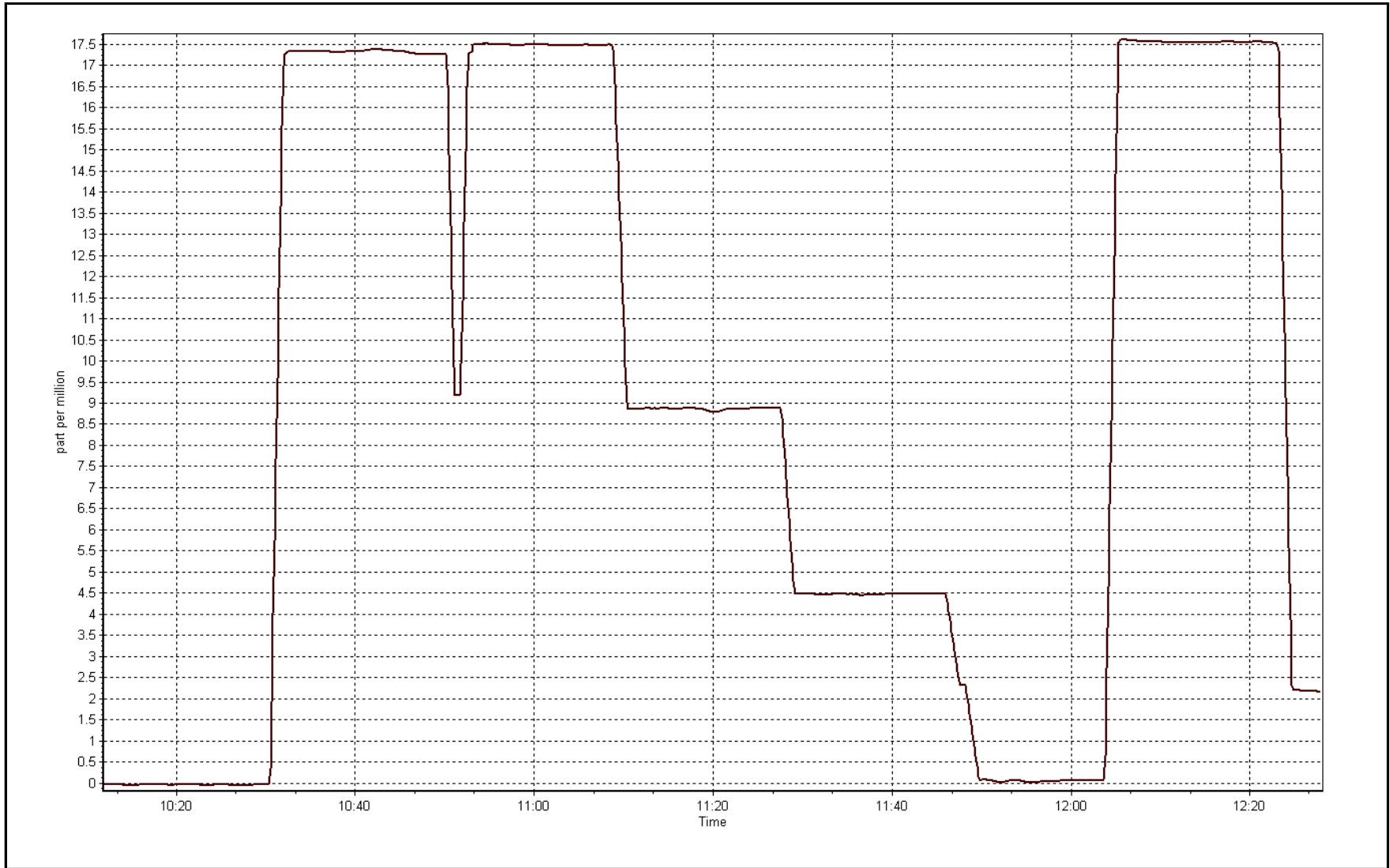
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999976	≥0.995
17.5	17.5	1.0001			
8.8	8.9	0.9976	Slope	0.999022	0.90 - 1.10
4.4	4.5	0.9891			
			Intercept	0.000342	+/-1.5



THC Calibration Plot

Date: June 12, 2017

Location: Lower Camp





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100	23	0	4	0
TRS(ppb) Average	686	33	34	99.86	1	0	0	0
THC(ppm) Average	686	34	34	100	3.3	-	2.3	-
O3(ppb) Average	686	33	34	99.86	63	0	38	-
NO2(ppb) Average	686	34	34	100	30	0	8	-
NO(ppb) Average	686	34	34	100	28	-	3	-
NOX(ppb) Average	686	34	34	100	45	-	10	-
PM2.5(ug/m3) Average	714	1	6	99.31	199.9	-	39.7	1
ET(C) Average	720	0	0	100	29.2	-	22.4	-
RH(%) Average	720	0	0	100	98	-	91	-
WS(km/h) Average	720	0	0	100	29	-	20	-
WD(deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	686	0.9	2	-	0	0	0	0	0	2	23
TRS(ppb) Average	686	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	686	2.18	0.2	-	2	2.1	2.1	2.1	2.2	2.4	3.3
O3(ppb) Average	686	23.8	13	-	1	6	14	23	33	39	63
NO2(ppb) Average	686	3.1	3	-	0	0	1	2	4	7	30
NO(ppb) Average	686	0.9	3	-	0	0	0	0	1	3	28
NOX(ppb) Average	686	4	6	-	0	0	1	2	5	10	45
PM2.5(ug/m3) Average	714	7.48	13	-	0.3	1.6	2.8	5.7	8.8	12.9	199.9
Temperature 2 m (C) Average	720	15.74	5.5	-	1.1	8.6	12	15.5	19.7	22.9	29.2
Relative Humidity (%) Average	720	64.9	23	-	20	32	46	68	87	93	98
Wind Speed 10 m (km/h) Average	720	8.3	6	-	0	2	4	7	11	16	29
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS, O3	07 Jun 2017 09:00	07 Jun 2017 09:00	1	Maintenance - cleaned glass manifold
PM2.5	17 Jun 2017 01:00	17 Jun 2017 02:00	2	Unstable operation - baseline drift
PM2.5	17 Jun 2017 13:00	17 Jun 2017 13:00	1	Unstable operation - baseline drift
PM2.5	17 Jun 2017 15:00	17 Jun 2017 16:00	2	Unstable operation - baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 23 ppb on Jun 16 10:00	Maximum Daily Average: 4.0 ppb on Jun 25		Hours of Data:	686
Minimum Value: 0 ppb on Jun 7 21:00	Minimum Daily Average: 0.1 ppb on Jun 5		Hours of Missing Data:	34
Maximum Diurnal Average: 3.2 ppb at hour 10	Minimum Diurnal Average: 0.2 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 13		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	1	Z	0	0	0	0	0	0	0	0	0	0	11	18	14	2	1	9	9	4	2	1	1	3.3	18	
2-Jun	0	0	0	Z	0	0	0	1	1	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0.8	2	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0.4	2	
4-Jun	0	0	0	0	0	Z	1	1	1	1	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0.5	1	
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
6-Jun	0	Z	0	0	0	0	1	1	15	22	8	3	1	0	0	0	0	0	0	0	1	1	0	0	2.4	22	
7-Jun	0	0	Z	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	4	3	1	0	0	0	0	0	0.6	4	
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
12-Jun	0	Z	0	0	0	2	4	3	1	3	2	2	2	2	2	2	2	1	1	1	0	0	0	0	1.3	4	
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
15-Jun	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
16-Jun	0	0	0	0	0	Z	1	2	12	23	12	4	1	4	1	4	11	1	0	0	0	0	0	0	3.4	23	
17-Jun	Z	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
18-Jun	0	Z	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
20-Jun	0	0	0	Z	0	0	2	1	1	5	4	13	1	0	0	1	6	2	1	1	0	0	1	3	1.8	13	
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
24-Jun	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
25-Jun	0	0	Z	0	0	0	0	0	0	15	23	11	5	4	5	11	2	1	1	3	2	2	4	2	1	4.0	23
26-Jun	1	3	1	Z	6	8	10	6	3	6	4	2	3	2	3	2	3	1	2	1	0	0	0	0	3.0	10	
27-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0.4	2	
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0.3	1	
29-Jun	Z	0	0	0	0	0	1	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0.8	2	
30-Jun	0	Z	0	0	0	0	0	0	0	1	2	2	3	2	0	0	0	0	0	0	0	0	0	0	0.6	3	

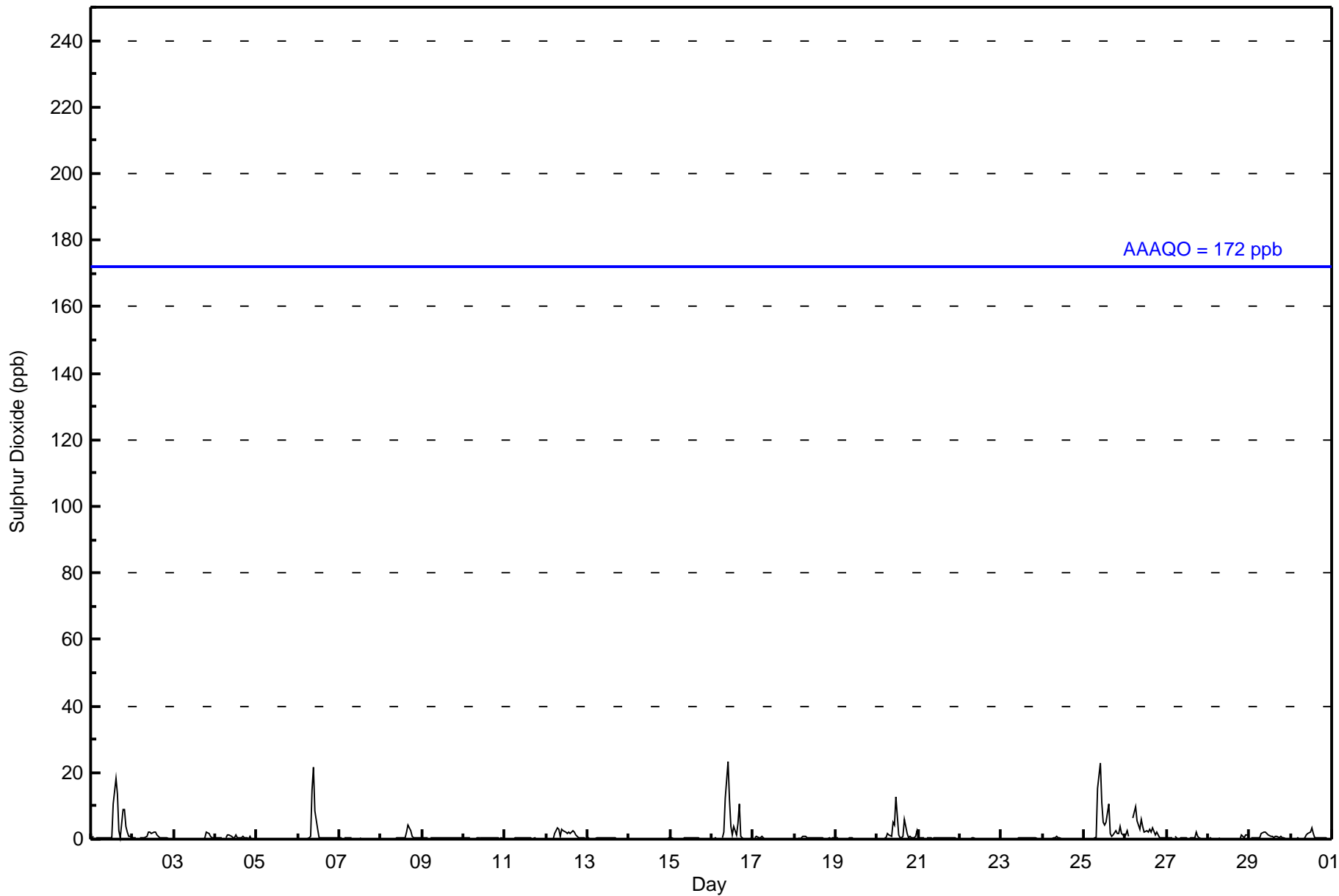
0.3	0.3	0.2	0.2	0.5	0.6	0.8	0.7	2.0	3.2	1.8	1.3	0.8	1.2	1.4	1.1	1.2	0.5	0.7	0.7	0.5	0.4	0.3	0.3	Diurnal Average	
1	3	1	0	6	8	10	6	15	23	12	13	4	11	18	14	11	3	9	9	4	4	2	3	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	672	97.96	97.96
11 - 20	11	1.60	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	116	70	30	6	11	9	32	50	54	31	37	50	46	33	30	67	672
11 - 20	0	0	0	1	0	1	1	4	4	0	0	0	0	0	0	0	11
21 - 60	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	70	30	7	12	10	33	55	59	31	37	50	46	33	30	67	686

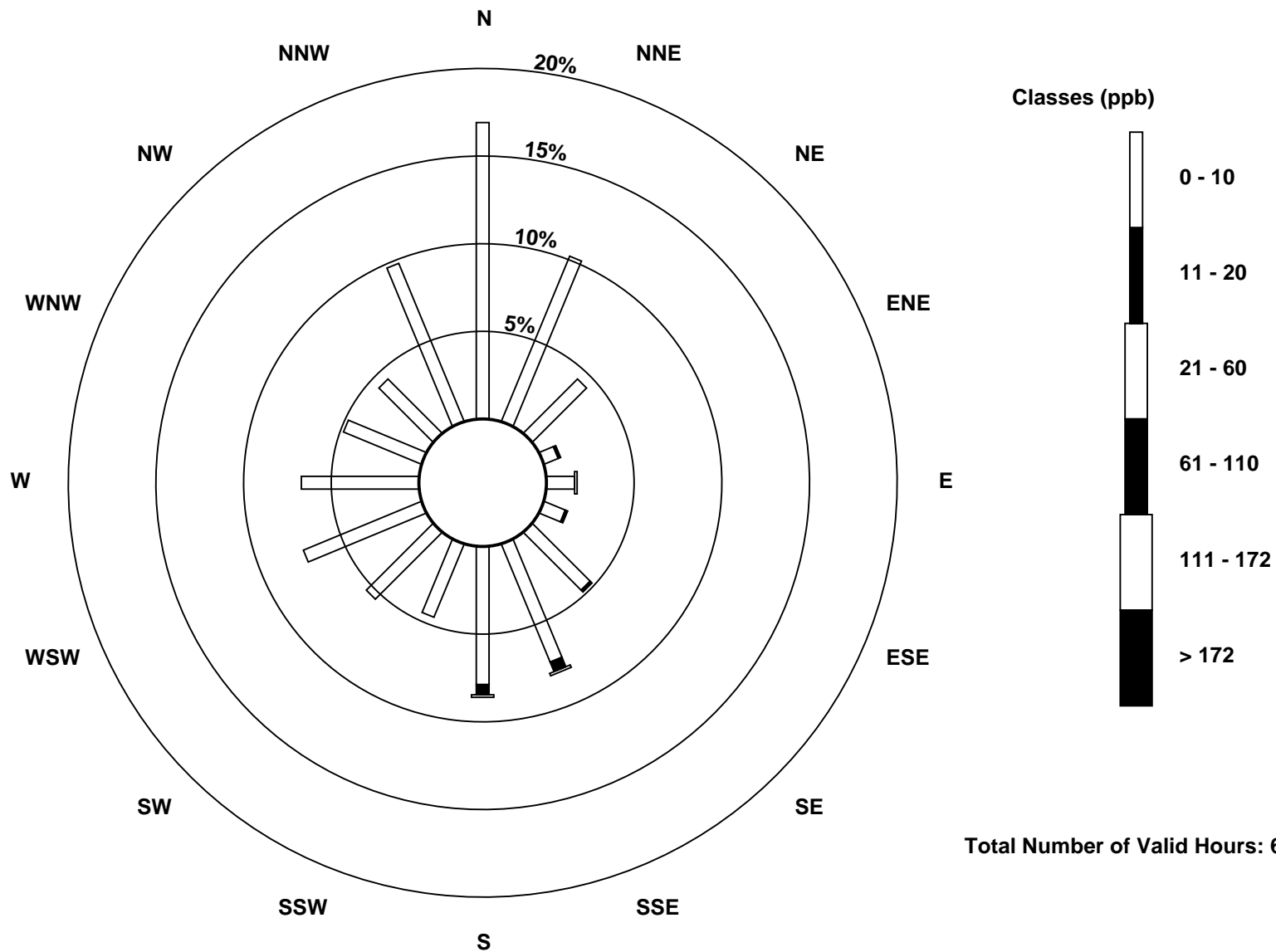
Total Number of Valid Hours: 686

Total Number of Hours: 720

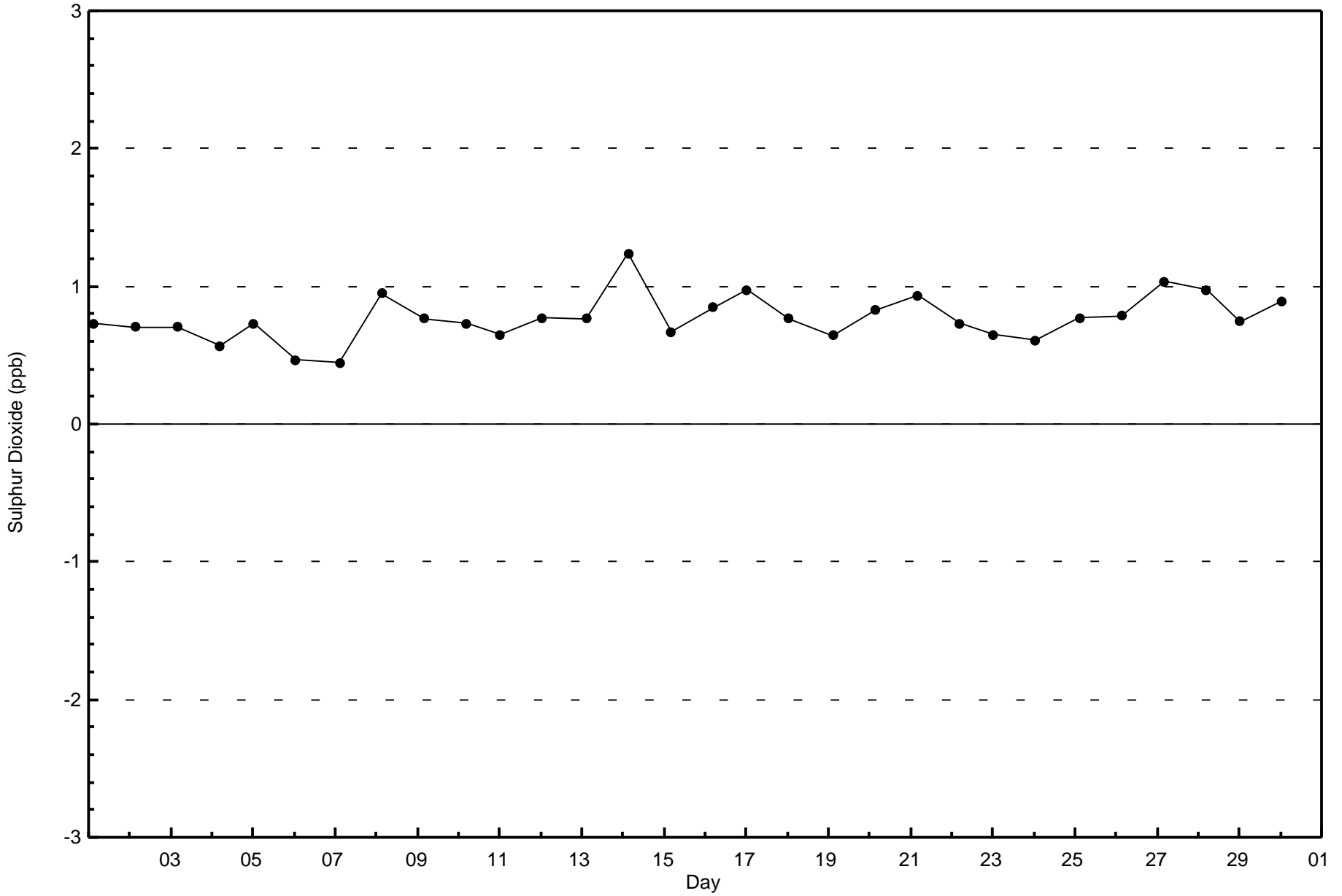


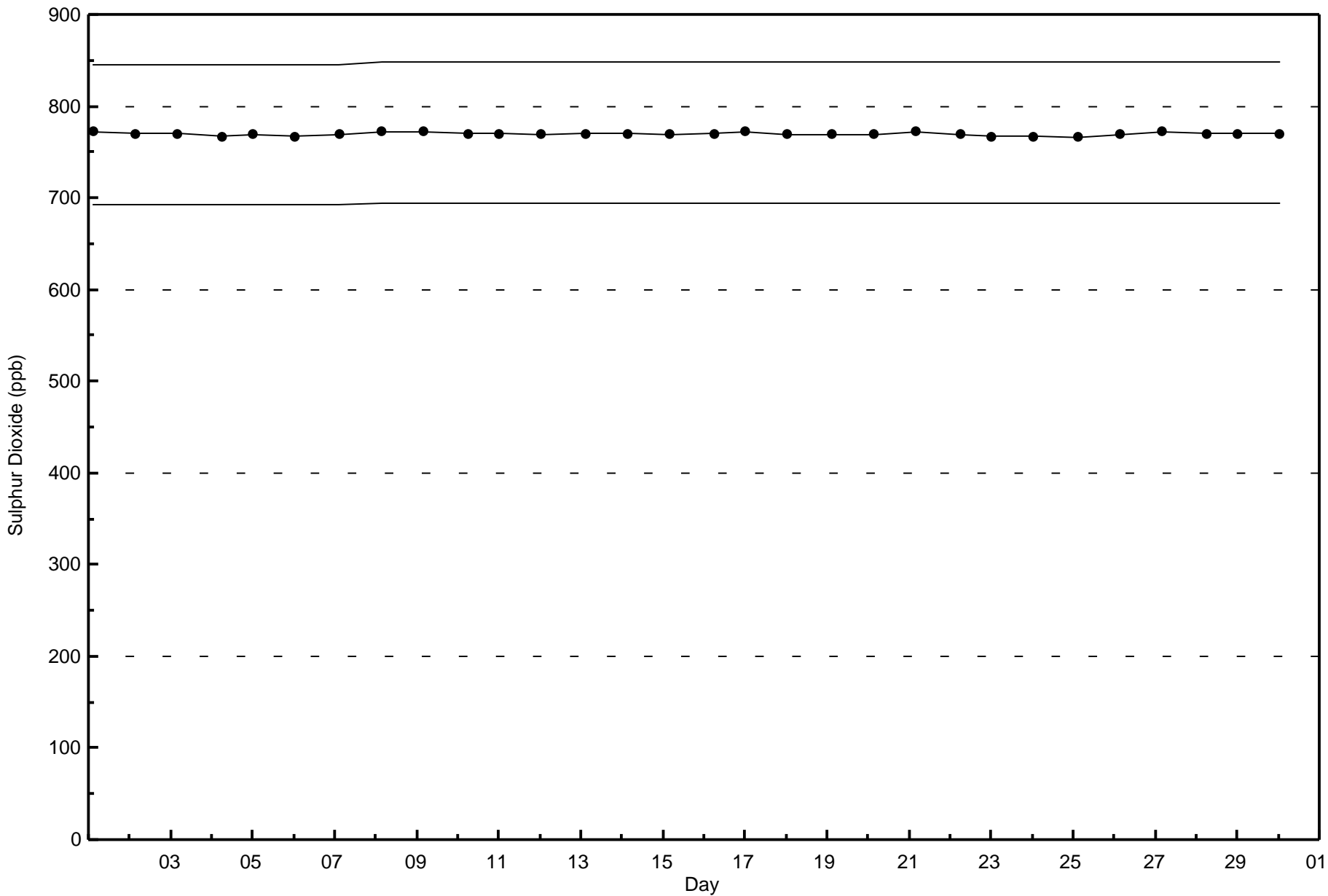
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 20 08:00	Maximum Daily Average: 0.5 ppb on Jun 20		Hours of Data:	686
Minimum Value: 0 ppb on Jun 10 09:00	Minimum Daily Average: 0.1 ppb on Jun 5		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 10	Minimum Diurnal Average: 0.1 ppb at hour 16		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Jun	0	0	0	Z	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	0	0	Z	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
17-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
20-Jun	1	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0.5	1
21-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Jun	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Jun	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
26-Jun	0	0	0	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jun	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1

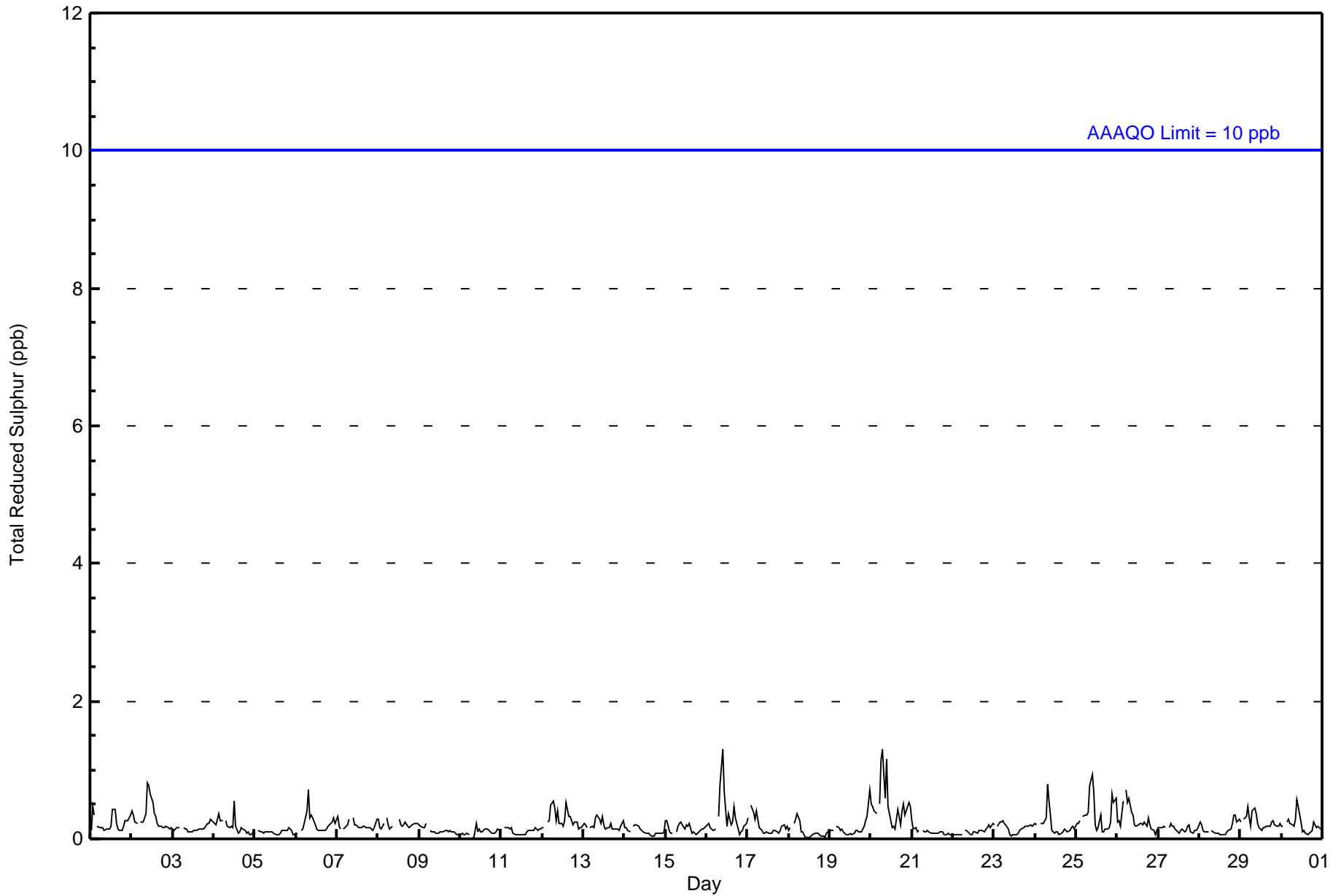
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1	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	0	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	116	69	29	7	12	9	33	56	59	31	37	50	47	32	30	69	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	69	29	7	12	9	33	56	59	31	37	50	47	32	30	69	686

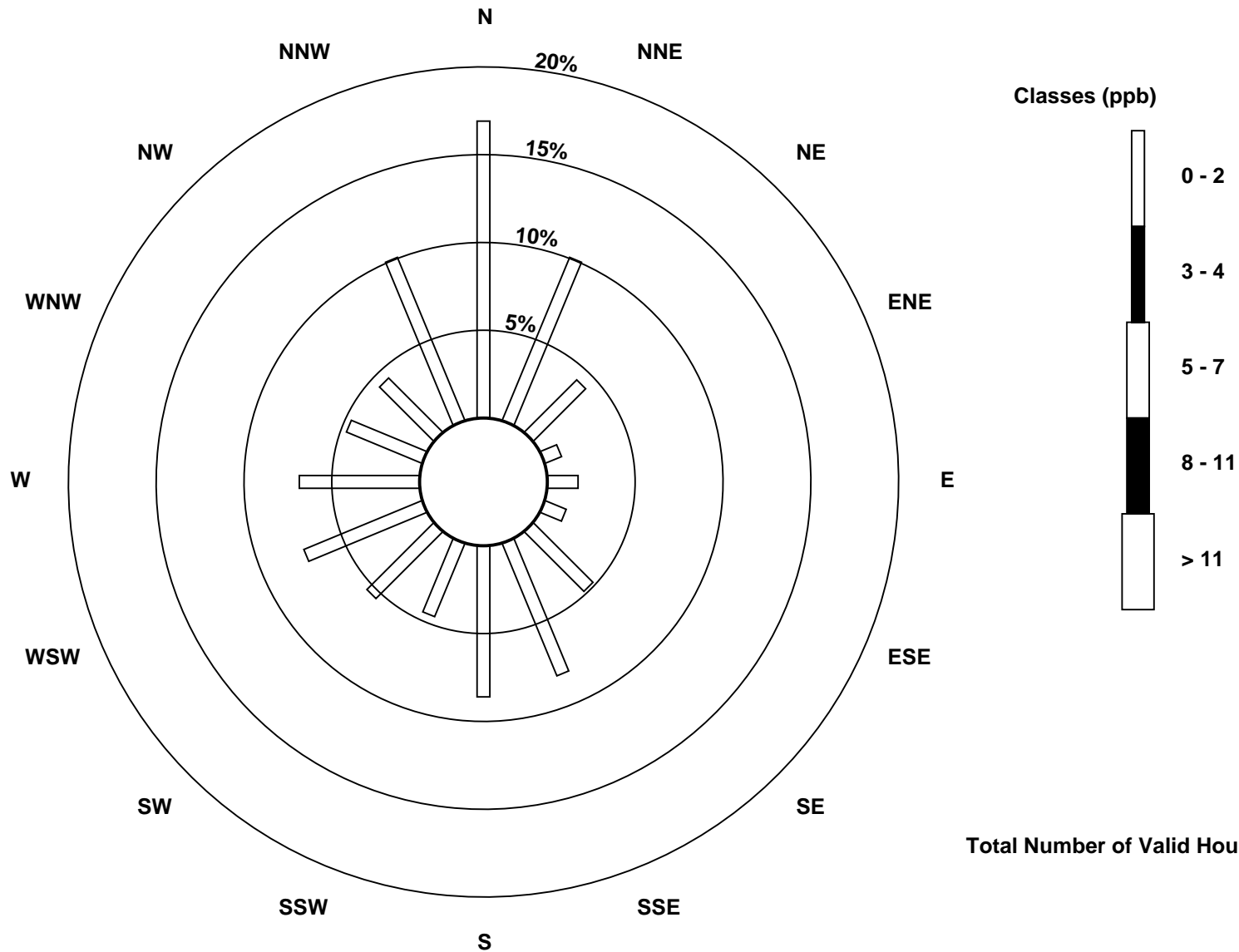
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)

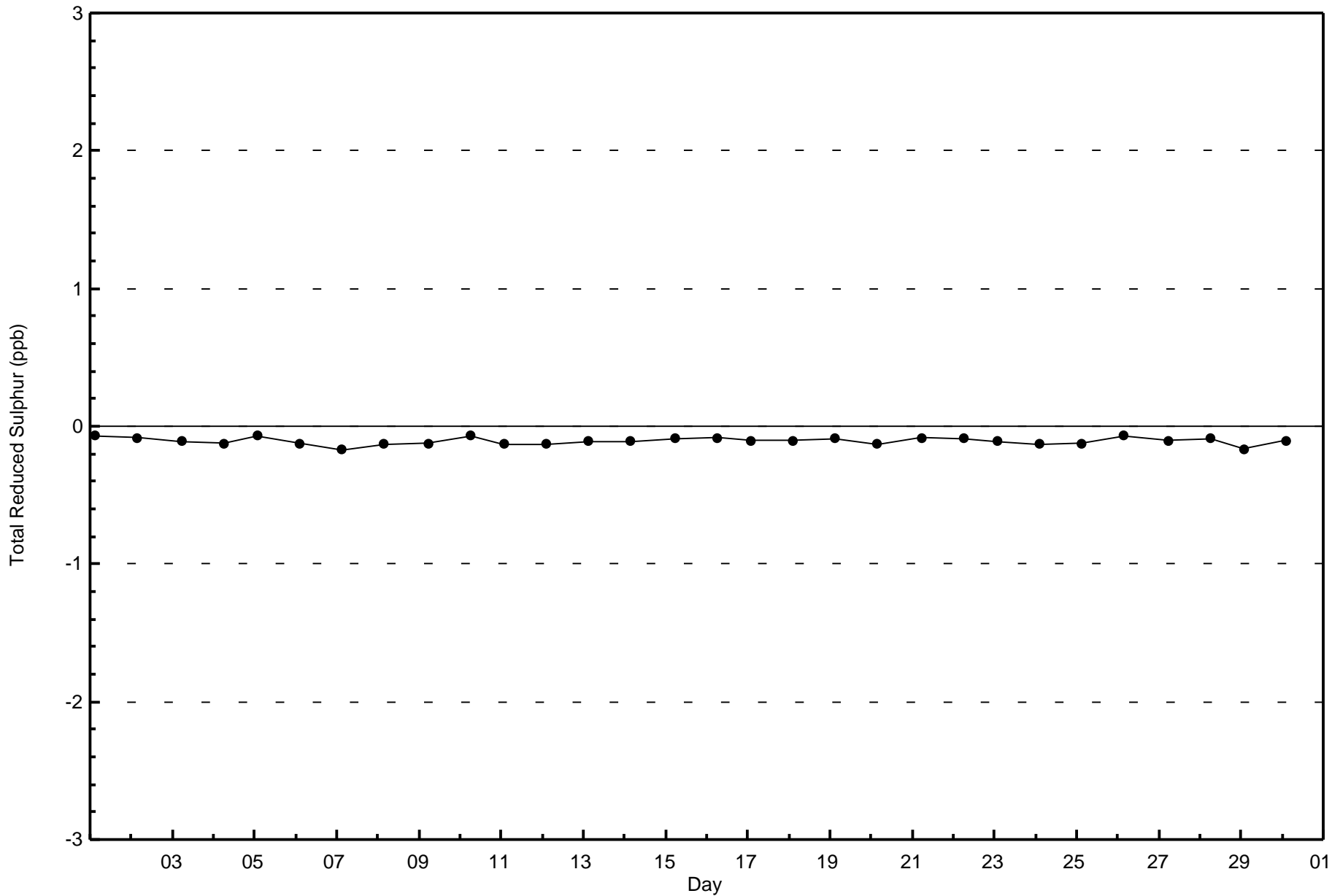


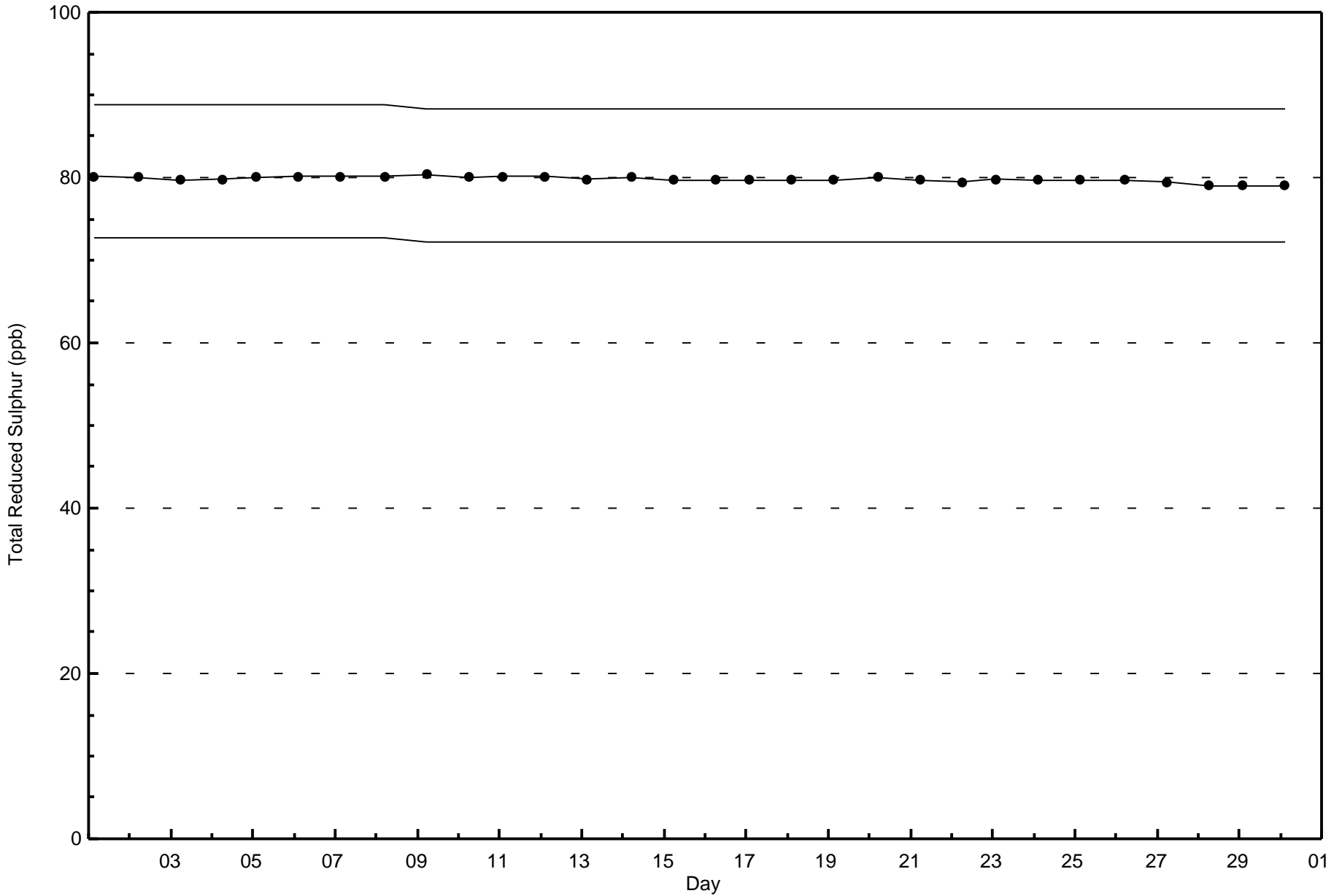
Total Number of Valid Hours: 686



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - June 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

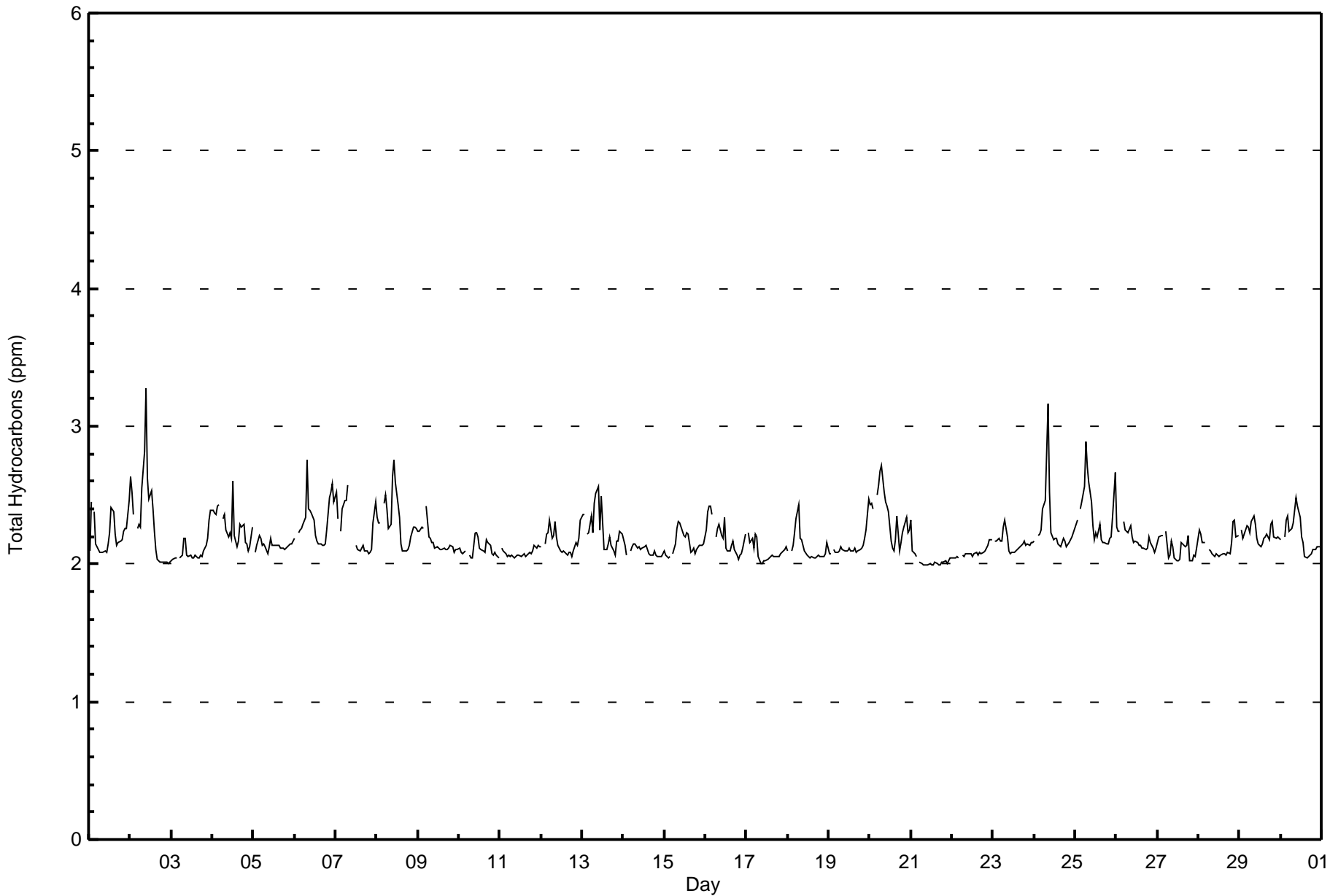
Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2017

Maximum Value: 3.3 ppm on Jun 2 10:00 Maximum Daily Average: 2.3 ppm on Jun 25		Hours in Service: 720 Hours of Data: 686 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0																									
Minimum Value: 2.0 ppm on Jun 21 10:00 Maximum Diurnal Average: 2.3 ppm at hour 8 Monthly Average: 2.18 ppm		Minimum Daily Average: 2.0 ppm on Jun 21 Minimum Diurnal Average: 2.1 ppm at hour 18 Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 2.8																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	2.5	Z	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.2	2.5	
2-Jun	2.6	2.5	2.4	Z	2.3	2.3	2.3	2.6	2.8	3.3	2.6	2.5	2.5	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	3.3	
3-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.1	2.4	
4-Jun	2.4	2.4	2.4	2.4	2.4	Z	2.3	2.4	2.2	2.2	2.2	2.2	2.6	2.2	2.1	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.3	2.3	2.6	
5-Jun	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	
6-Jun	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.8	2.4	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.5	2.6	2.5	2.3	2.8
7-Jun	2.5	2.3	Z	2.2	2.4	2.5	2.5	2.6	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.5	2.3	2.6	
8-Jun	2.3	2.3	2.3	Z	2.4	2.5	2.4	2.3	2.3	2.6	2.8	2.6	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.8	
9-Jun	2.2	2.2	2.3	2.3	Z	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	
10-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.2	
11-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
12-Jun	2.1	Z	2.1	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.3	2.2	2.3	
13-Jun	2.4	2.4	Z	2.2	2.2	2.3	2.2	2.4	2.5	2.6	2.2	2.5	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.6	
14-Jun	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
15-Jun	2.1	2.1	2.0	2.1	Z	2.1	2.1	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	
16-Jun	2.2	2.4	2.4	2.4	2.4	Z	2.2	2.3	2.3	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.2	2.4	
17-Jun	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
18-Jun	2.1	Z	2.1	2.1	2.2	2.3	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	
19-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.1	2.5	
20-Jun	2.4	2.4	2.4	Z	2.5	2.6	2.7	2.7	2.5	2.4	2.4	2.4	2.2	2.1	2.1	2.2	2.4	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.7	
21-Jun	2.3	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	
22-Jun	2.0	2.0	2.0	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	
23-Jun	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	
24-Jun	2.2	Z	2.2	2.2	2.2	2.4	2.5	2.8	3.2	2.5	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	3.2	
25-Jun	2.3	2.3	Z	2.4	2.5	2.6	2.9	2.7	2.6	2.5	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.9	
26-Jun	2.3	2.2	2.2	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.3	
27-Jun	2.2	2.2	2.2	2.2	Z	2.2	2.0	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.1	2.1	2.1	2.2	2.0	2.0	2.1	2.1	2.1	2.1	2.2	
28-Jun	2.3	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.3	
29-Jun	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	
30-Jun	2.2	Z	2.2	2.3	2.4	2.2	2.3	2.3	2.4	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	63	9.18	9.18
2.1 - 3.0	621	90.52	99.71
3.1 - 10.0	2	0.29	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	6	1	1	1	0	1	1	0	0	2	3	4	23	5	7	8	63
2.1 - 3.0	108	69	29	6	12	9	32	55	59	29	34	46	23	28	23	59	621
3.1 - 10.0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	70	30	7	12	10	33	55	59	31	37	50	46	33	30	67	686

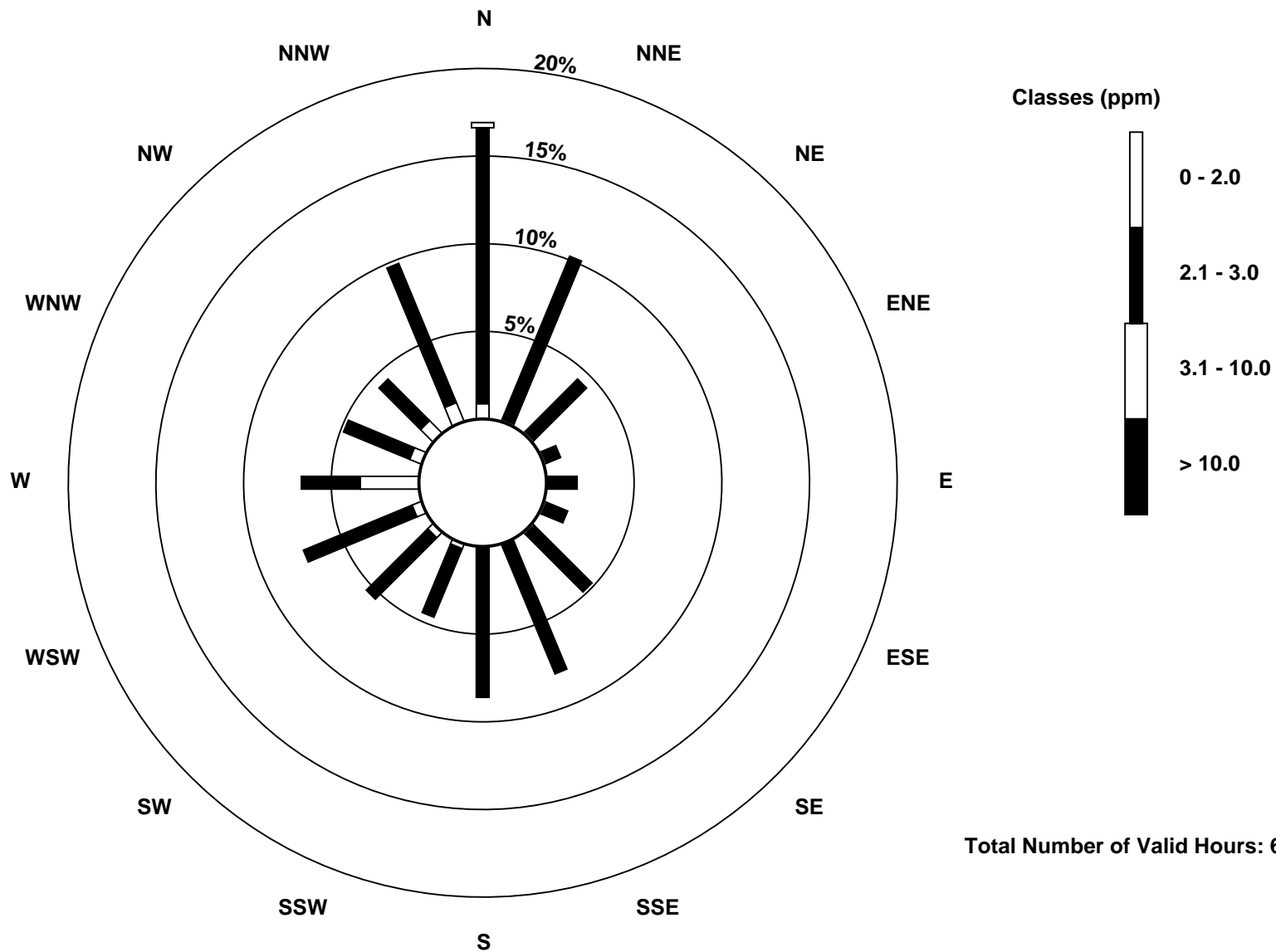
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

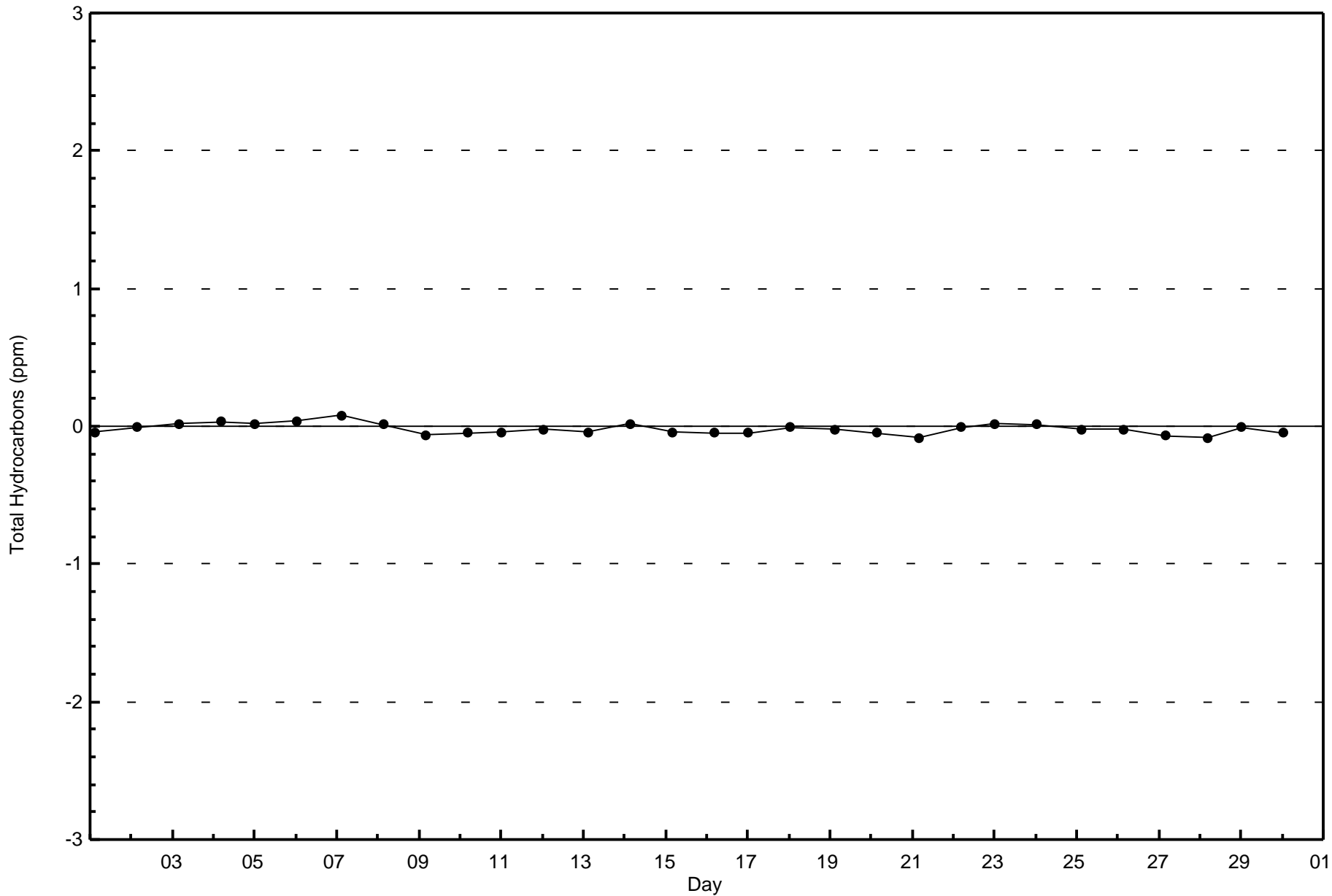
Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)

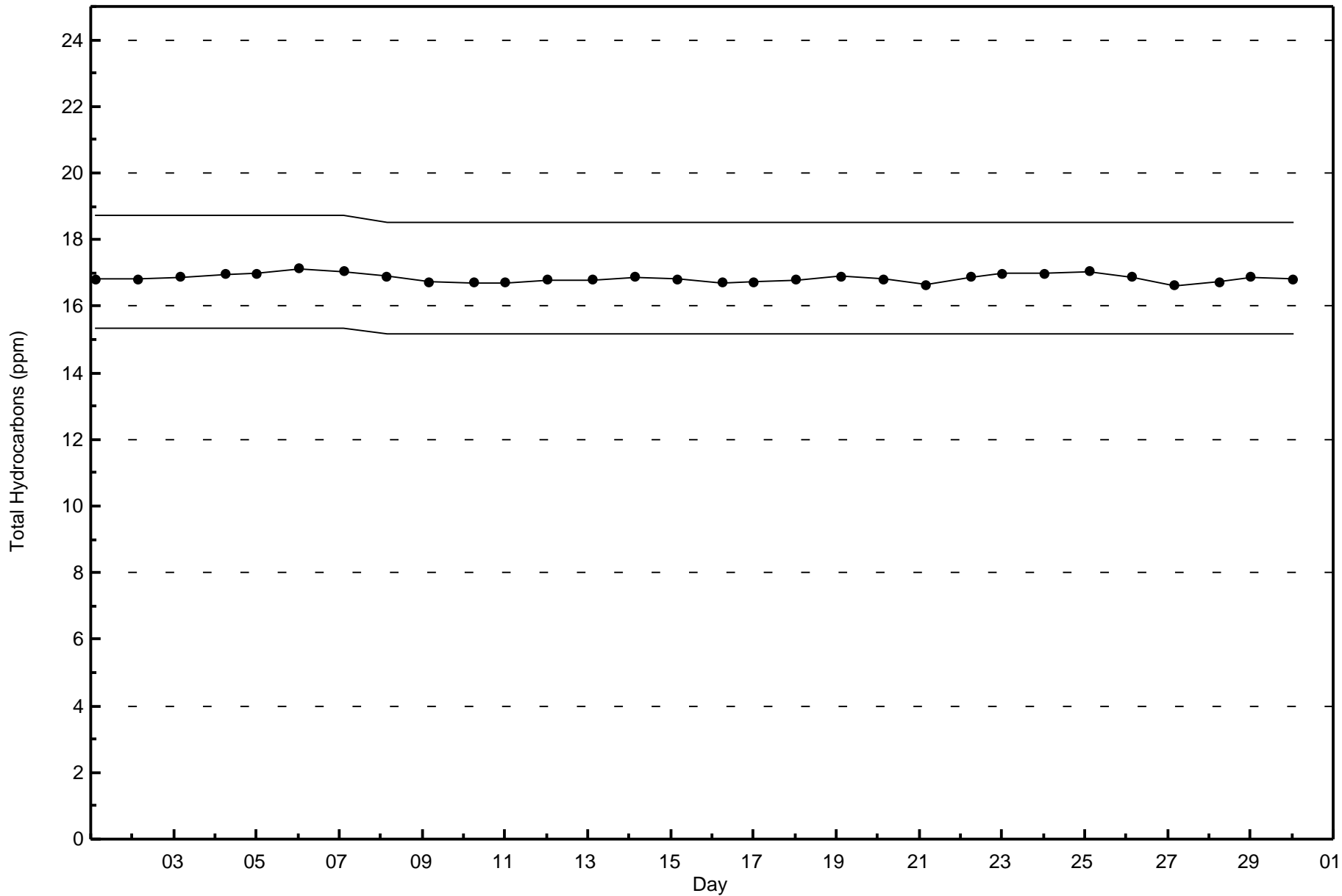




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay South - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 63 ppb on Jun 2 13:00	Maximum Daily Average: 38.4 ppb on Jun 26		Hours of Data:	686
Minimum Value: 1 ppb on Jun 30 04:00	Minimum Daily Average: 11.9 ppb on Jun 30		Hours of Missing Data:	34
Maximum Diurnal Average: 36.2 ppb at hour 16	Minimum Diurnal Average: 10.2 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 23.8 ppb	Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 14 Median = 23 Q ₃ = 33 P ₉₀ = 39 P ₉₉ = 52		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	50	32	16	13	33	Z	32	31	30	28	27	24	24	30	41	44	44	45	44	39	24	16	11	8	29.9	50
2-Jun	3	5	6	7	5	6	Z	15	23	46	62	60	63	53	47	45	45	44	41	33	31	31	28	25	31.4	63
3-Jun	21	19	17	15	15	17	14	Z	16	21	29	31	33	34	34	33	34	35	36	27	11	13	11	3	22.5	36
4-Jun	2	2	3	4	5	10	13	21	Z	32	28	27	21	29	38	38	37	36	40	50	49	47	43	31	26.3	50
5-Jun	34	39	28	Z	36	37	37	35	Z	34	35	35	36	38	42	44	45	44	43	42	35	32	25	10	34.5	45
6-Jun	4	4	2	2	Z	5	10	18	26	27	33	37	39	40	39	39	38	39	34	27	25	22	22	20	24.0	40
7-Jun	15	19	11	16	12	Z	13	16	M	22	32	29	33	36	37	38	37	35	33	32	30	28	24	14	25.6	38
8-Jun	13	14	13	10	8	6	Z	C	C	C	17	23	36	47	54	55	54	52	49	43	23	13	10	10	27.5	55
9-Jun	9	8	6	6	6	16	24	Z	26	28	30	30	31	33	37	38	39	39	39	38	36	35	30	28	26.5	39
10-Jun	23	29	20	15	13	27	31	32	Z	29	32	37	42	42	42	43	38	33	30	29	28	21	20	16	29.1	43
11-Jun	17	20	22	Z	22	22	24	30	33	34	35	36	37	38	38	38	37	38	37	35	25	15	11	9	28.4	38
12-Jun	9	7	5	3	Z	21	26	27	29	25	22	29	31	31	24	31	25	25	27	17	18	17	13	7	20.2	31
13-Jun	4	3	3	6	6	Z	12	11	13	19	28	32	34	35	38	42	37	31	32	29	28	21	16	14	21.4	42
14-Jun	18	20	22	22	20	19	Z	18	18	18	19	19	19	19	20	20	20	19	17	19	19	20	18	18	19.2	22
15-Jun	18	19	18	17	14	14	13	Z	10	11	13	15	16	15	17	22	21	23	24	21	11	10	3	2	15.1	24
16-Jun	1	1	1	1	1	3	12	16	Z	21	24	32	35	34	34	36	34	22	28	26	18	11	9	9	17.8	36
17-Jun	15	14	17	Z	14	7	7	11	18	20	22	23	28	35	37	38	38	38	37	31	19	8	7	11	21.5	38
18-Jun	21	16	11	5	Z	2	5	22	21	27	33	36	37	37	36	36	35	34	33	32	33	34	30	27	26.2	37
19-Jun	27	24	22	18	18	Z	18	21	27	31	31	31	32	30	30	32	33	33	30	26	18	8	4	1	23.7	33
20-Jun	1	1	1	1	1	2	Z	7	14	19	21	33	33	36	39	32	26	28	30	30	26	21	17	15	18.8	39
21-Jun	14	21	12	16	20	21	20	Z	25	23	23	23	22	22	20	19	17	15	19	31	29	26	22	22	21.1	31
22-Jun	22	21	21	23	23	23	23	26	Z	29	30	29	27	28	29	28	28	27	28	24	15	5	3	2	22.4	30
23-Jun	4	7	3	Z	2	6	12	18	23	30	32	33	33	35	35	36	34	34	28	28	16	9	6	5	20.4	36
24-Jun	5	6	4	2	Z	8	9	8	10	22	29	31	32	34	36	37	39	39	39	38	26	15	11	9	21.3	39
25-Jun	6	5	4	3	3	Z	7	15	16	20	30	39	41	46	46	47	45	45	44	42	37	28	29	29	27.3	47
26-Jun	26	25	30	28	18	19	Z	35	40	43	47	48	50	52	52	51	51	49	46	40	37	36	36	28	38.4	52
27-Jun	15	15	10	11	15	24	27	Z	21	22	28	26	20	20	18	25	22	21	19	19	14	5	7	8	18.0	28
28-Jun	7	9	13	13	13	12	13	13	Z	17	19	22	27	28	30	31	32	33	34	28	15	6	12	14	19.3	34
29-Jun	15	11	10	Z	5	6	8	14	21	26	32	37	40	42	44	45	45	42	38	23	20	10	4	3	23.5	45
30-Jun	3	2	1	1	Z	6	5	5	6	12	18	31	33	32	26	23	19	17	14	6	8	3	2	1	11.9	33

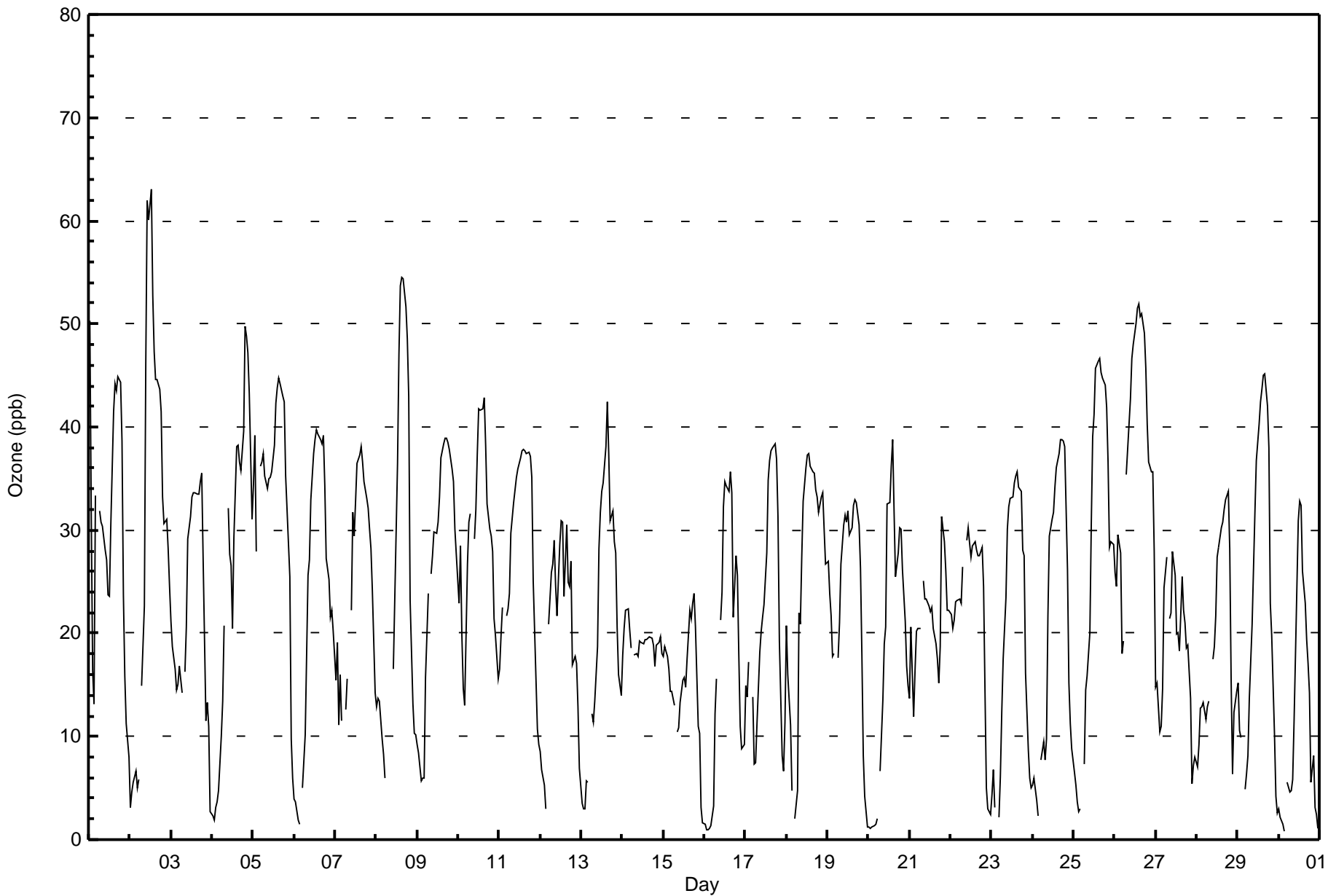
14.1	13.8	11.7	10.2	13.2	13.5	16.7	19.3	21.7	25.4	28.7	31.2	32.9	34.5	35.4	36.2	34.9	33.7	33.1	29.9	24.0	18.7	15.7	13.2	Diurnal Average	
50	39	30	28	36	37	37	35	40	46	62	60	63	53	54	55	54	52	49	50	49	47	43	31	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay South - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	285	41.55	41.55
21 - 50	389	56.71	98.25
51 - 82	12	1.75	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	45	12	7	3	3	3	5	11	28	19	25	35	30	13	14	32	285
21 - 50	70	53	22	5	8	5	22	43	32	11	13	15	18	21	18	33	389
51 - 82	2	2	0	0	1	0	5	2	0	0	0	0	0	0	0	0	12
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	117	67	29	8	12	8	32	56	60	30	38	50	48	34	32	65	686

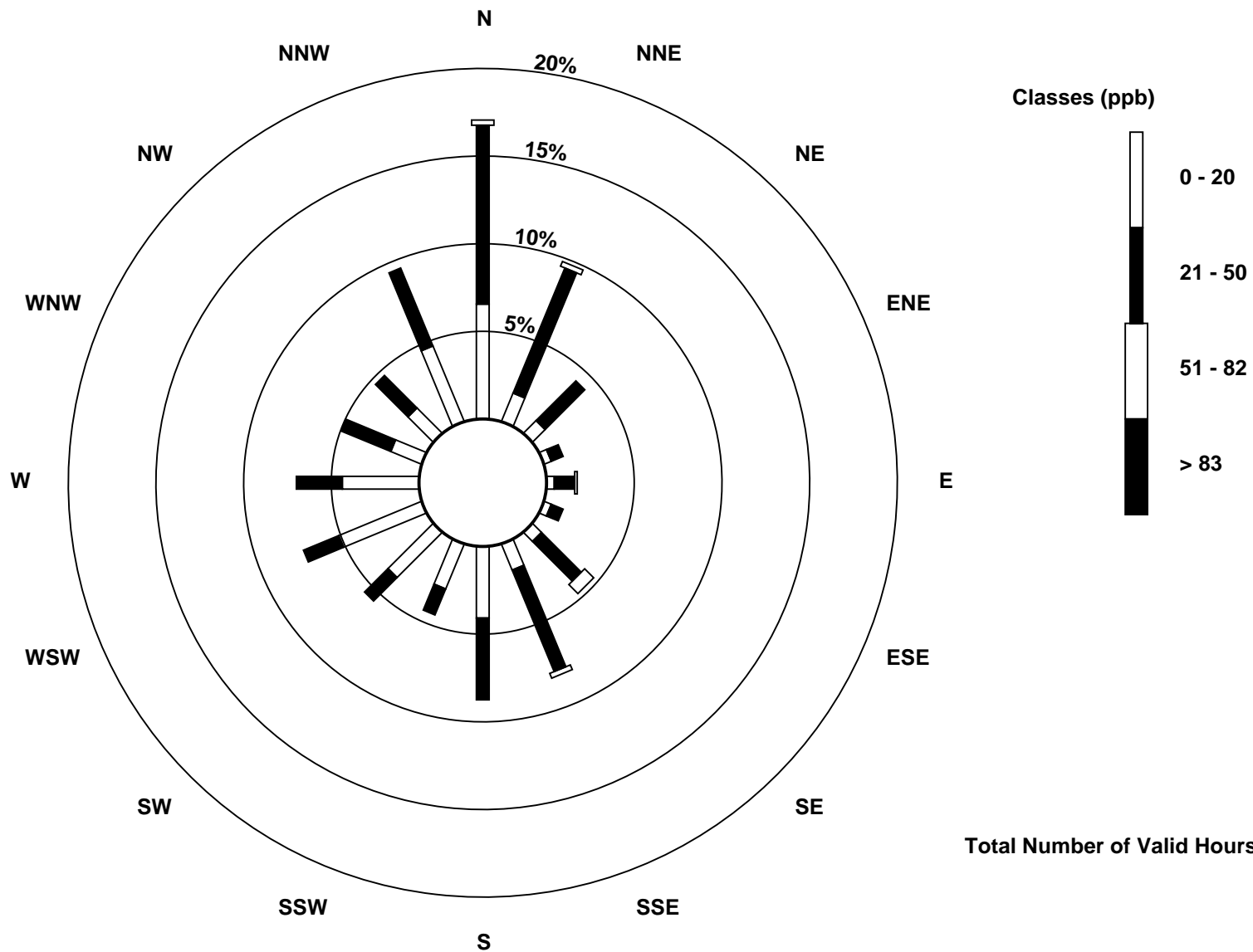
Total Number of Valid Hours: 686

Total Number of Hours: 720

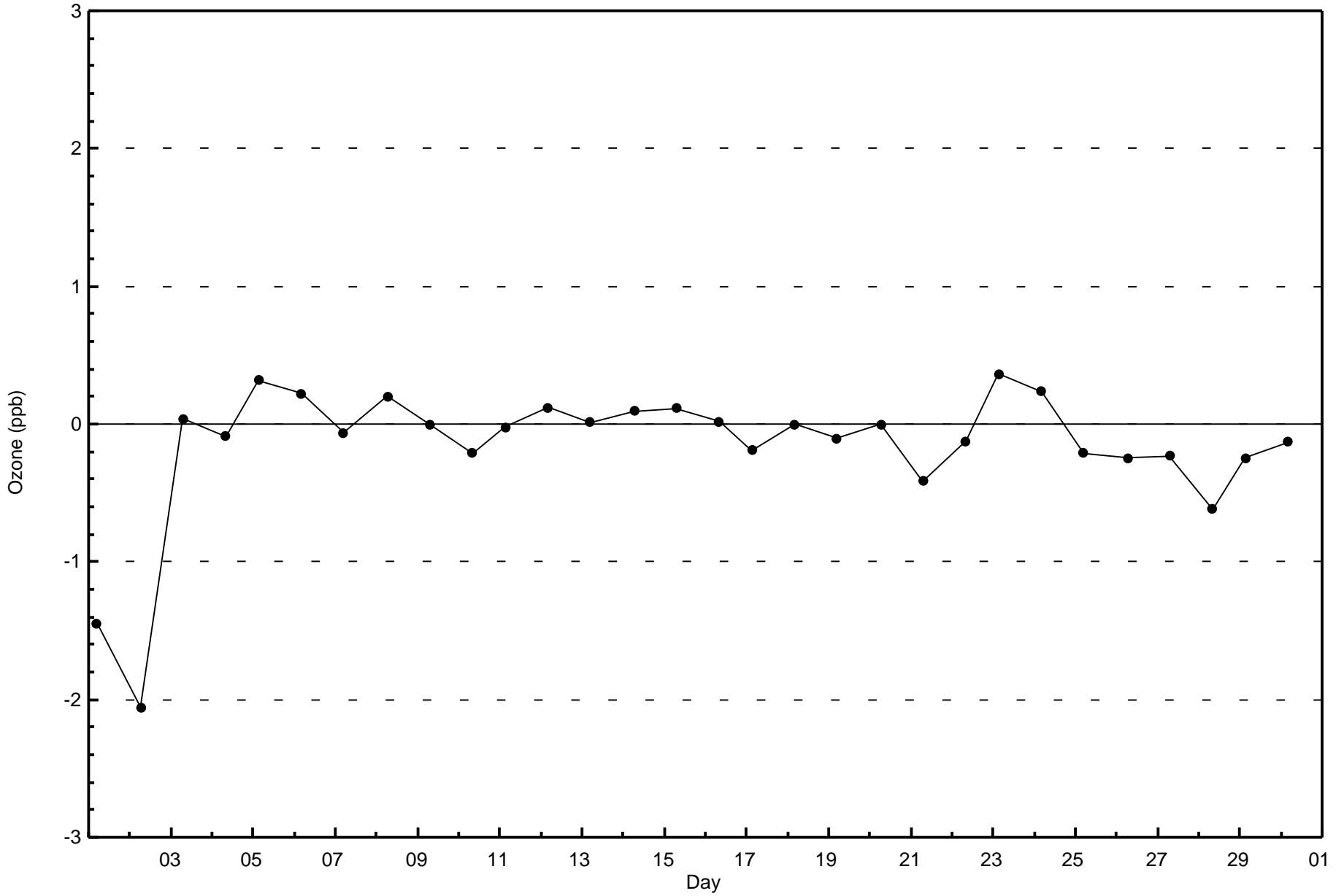


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Fort McKay South (AMS 13)



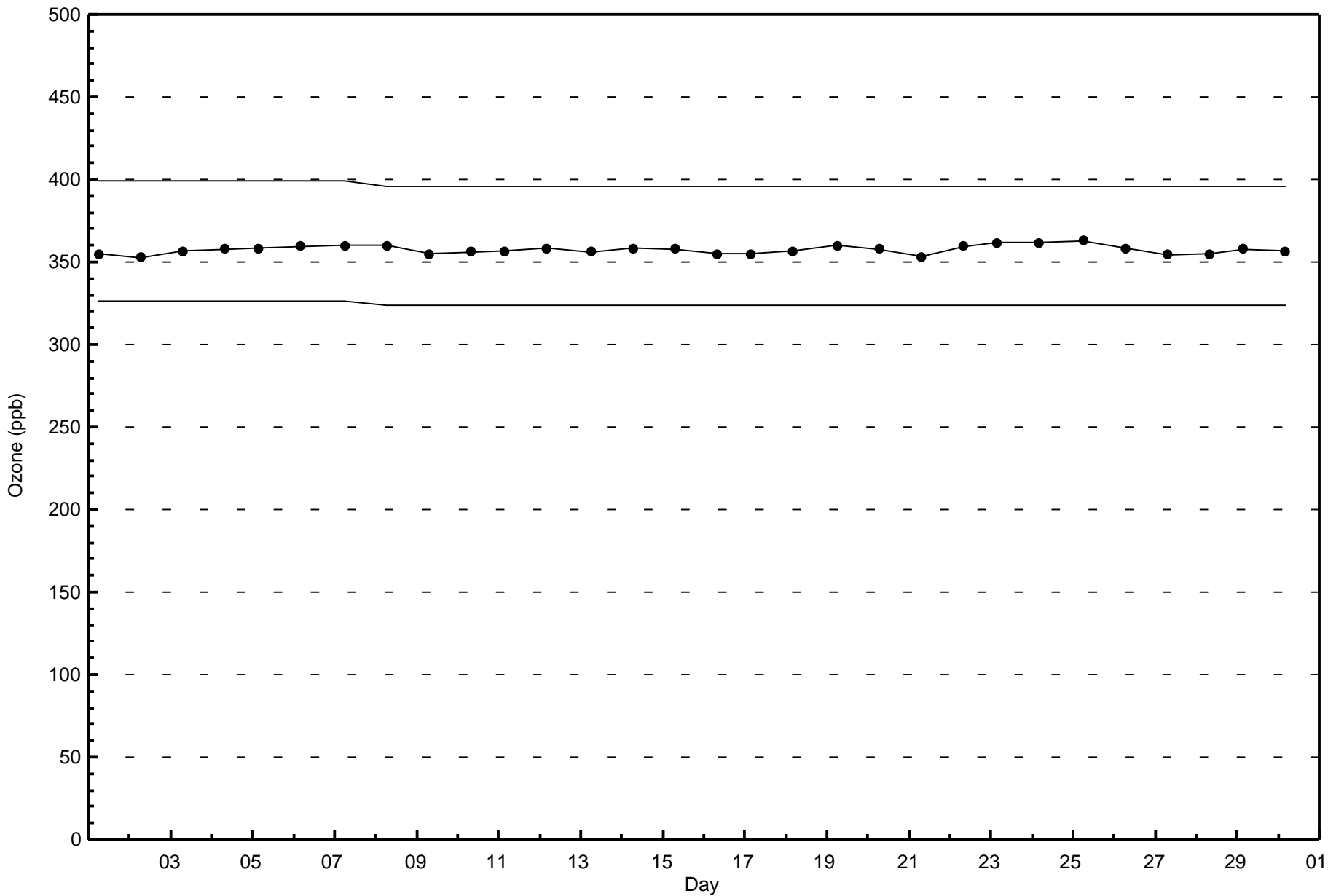
Total Number of Valid Hours: 686





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Fort McKay South - June 2017



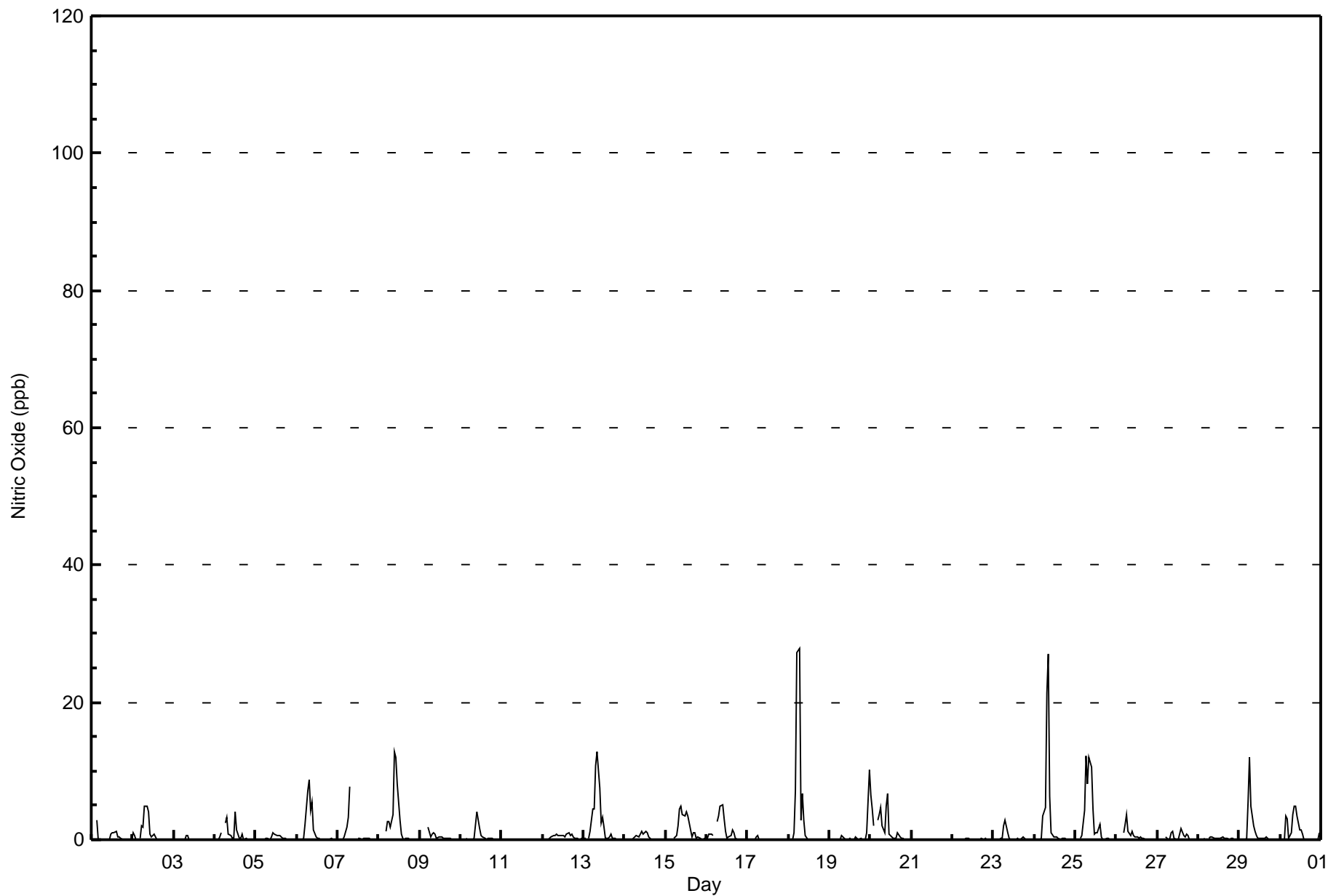


Maximum Value: 28 ppb on Jun 18 07:00																		Maximum Daily Average: 3.3 ppb on Jun 18																		Hours in Service: 720			
Minimum Value: 0 ppb on Jun 1 01:00																		Minimum Daily Average: 0.0 ppb on Jun 21																		Hours of Data: 686			
Maximum Diurnal Average: 3.3 ppb at hour 9																		Minimum Diurnal Average: 0.0 ppb at hour 22																		Hours of Missing Data: 34			
Monthly Average: 0.9 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12																		Hours of Calibration: 34			
																																				Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Jun	0	0	Z	3	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0.3	3													
2-Jun	1	1	0	Z	0	2	2	5	5	4	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1.0	5													
3-Jun	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1													
4-Jun	0	0	0	0	1	Z	2	3	1	1	0	0	4	1	0	0	1	0	0	0	0	0	0	0	0.7	4													
5-Jun	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.2	1													
6-Jun	0	Z	0	0	0	2	7	9	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	9													
7-Jun	0	0	Z	0	0	2	3	8	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.8	8													
8-Jun	0	0	0	Z	1	3	3	2	4	13	12	8	3	1	0	0	0	0	0	0	0	0	0	0	2.2	13													
9-Jun	0	0	0	0	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2													
10-Jun	0	0	0	0	0	Z	0	0	0	4	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.5	4													
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0													
12-Jun	0	Z	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0.4	1													
13-Jun	0	0	Z	0	1	5	4	11	13	7	2	3	2	0	0	0	1	0	0	0	0	0	0	0	2.2	13													
14-Jun	0	0	0	Z	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1													
15-Jun	0	0	0	0	Z	0	1	2	4	5	4	3	4	3	2	0	1	1	0	0	0	0	0	0	1.4	5													
16-Jun	0	1	1	1	1	Z	3	3	5	5	3	1	0	0	1	1	1	0	0	0	0	0	0	0	1.2	5													
17-Jun	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1													
18-Jun	0	Z	0	1	7	27	28	3	7	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3	28													
19-Jun	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	0.6	10													
20-Jun	7	5	2	Z	3	4	5	2	1	5	7	1	0	0	0	0	1	0	0	0	0	0	0	0	1.9	7													
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0													
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0													
23-Jun	Z	0	0	0	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3													
24-Jun	0	Z	0	0	0	4	5	21	27	6	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2.9	27													
25-Jun	0	0	Z	0	1	4	12	8	12	11	4	1	1	1	2	0	0	0	0	0	0	0	0	0	2.5	12													
26-Jun	0	0	0	Z	1	2	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	4													
27-Jun	0	0	0	0	Z	0	0	0	1	1	0	0	0	1	2	1	0	1	1	0	0	0	0	0	0.3	2													
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0													
29-Jun	Z	0	0	0	0	5	12	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	12													
30-Jun	0	Z	0	3	3	0	1	4	5	5	3	1	1	1	0	0	0	0	0	0	0	0	0	1	1.3	5													
																								Diurnal Average															
																								Diurnal Maximum															
Z - zerospan C - Calibration																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.42	99.42
21 - 40	4	0.58	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	115	69	30	7	12	10	33	55	57	31	37	50	46	33	30	67	682
21 - 40	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	70	30	7	12	10	33	55	59	31	37	50	46	33	30	67	686

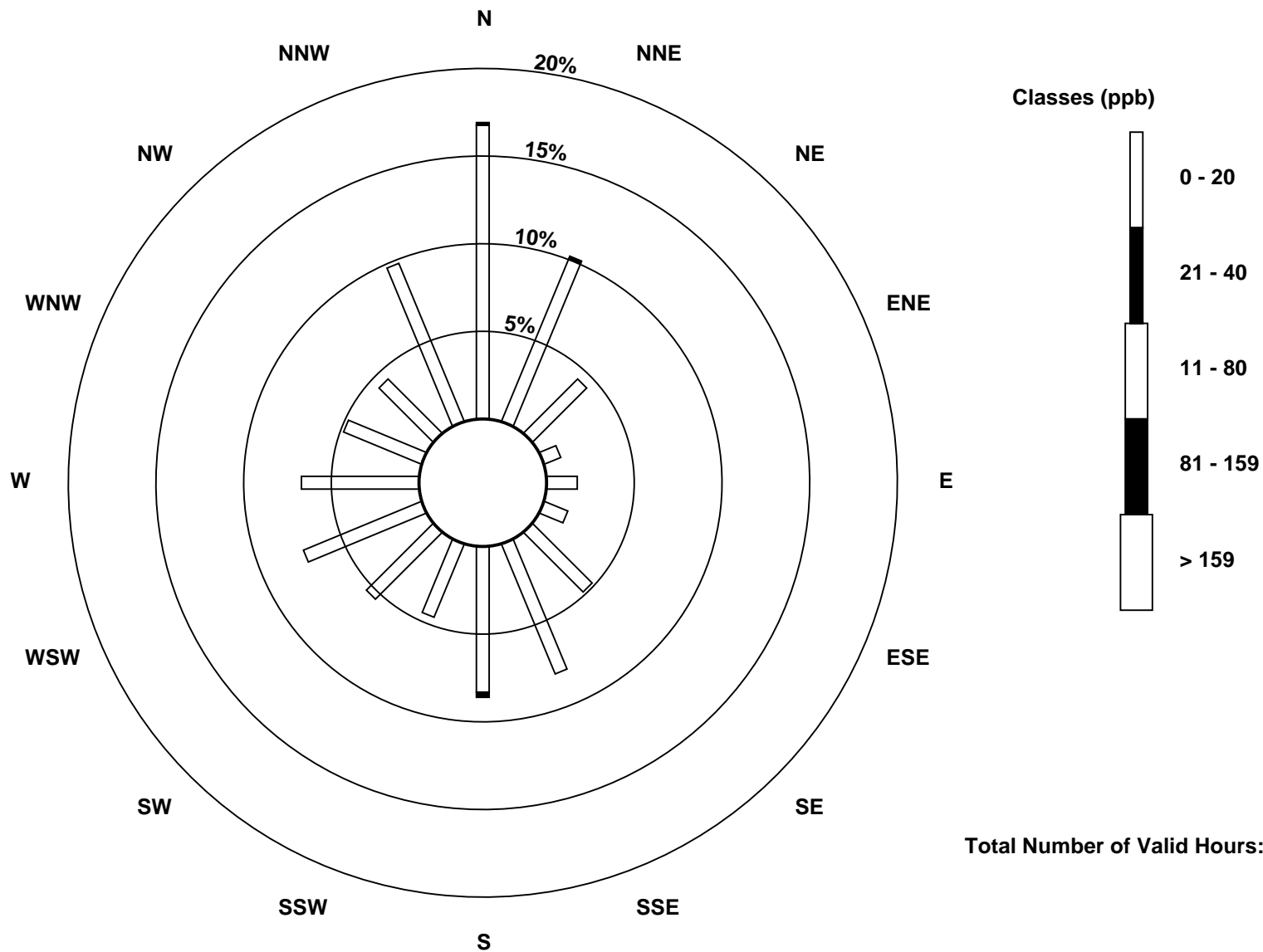
Total Number of Valid Hours: 686

Total Number of Hours: 720

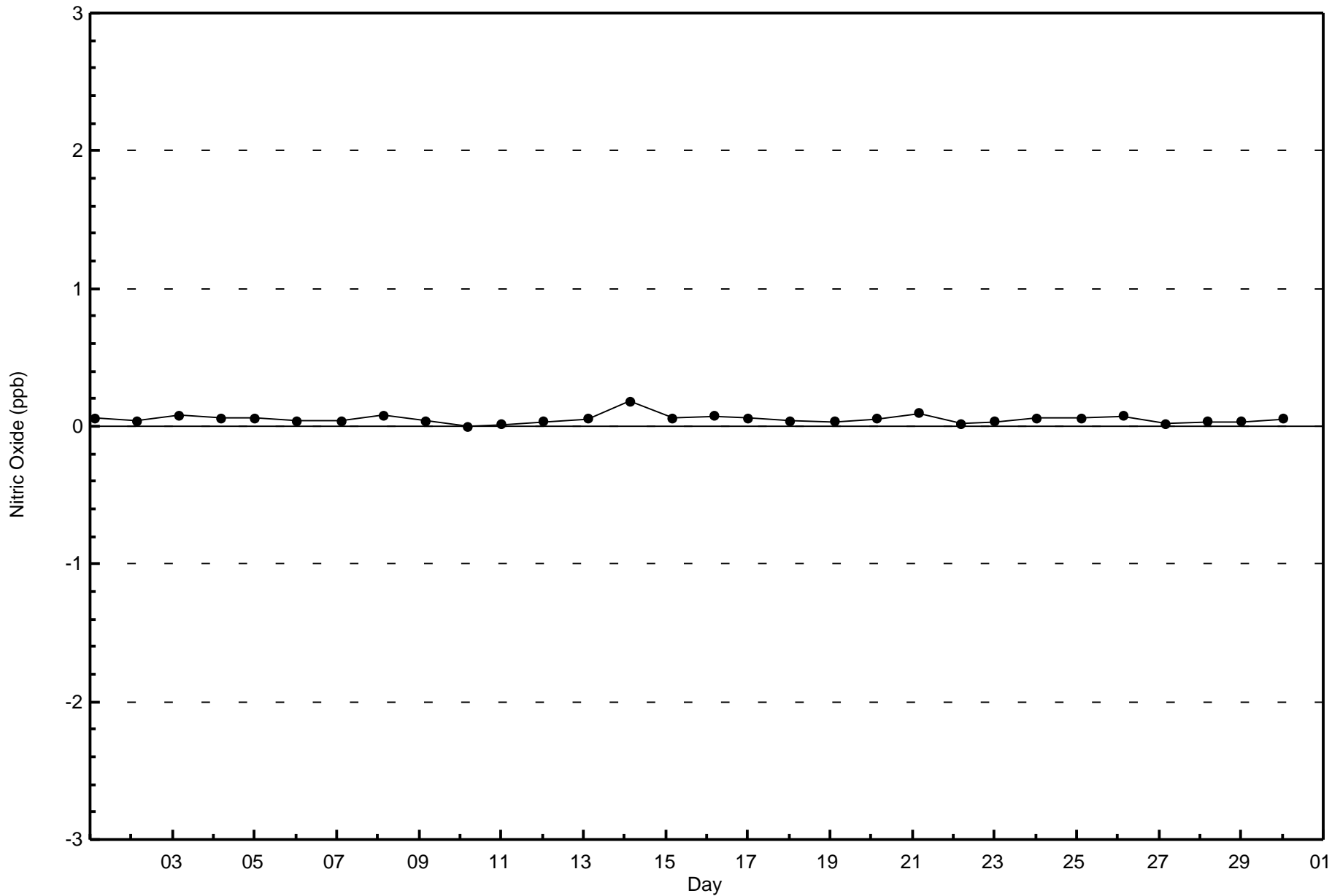


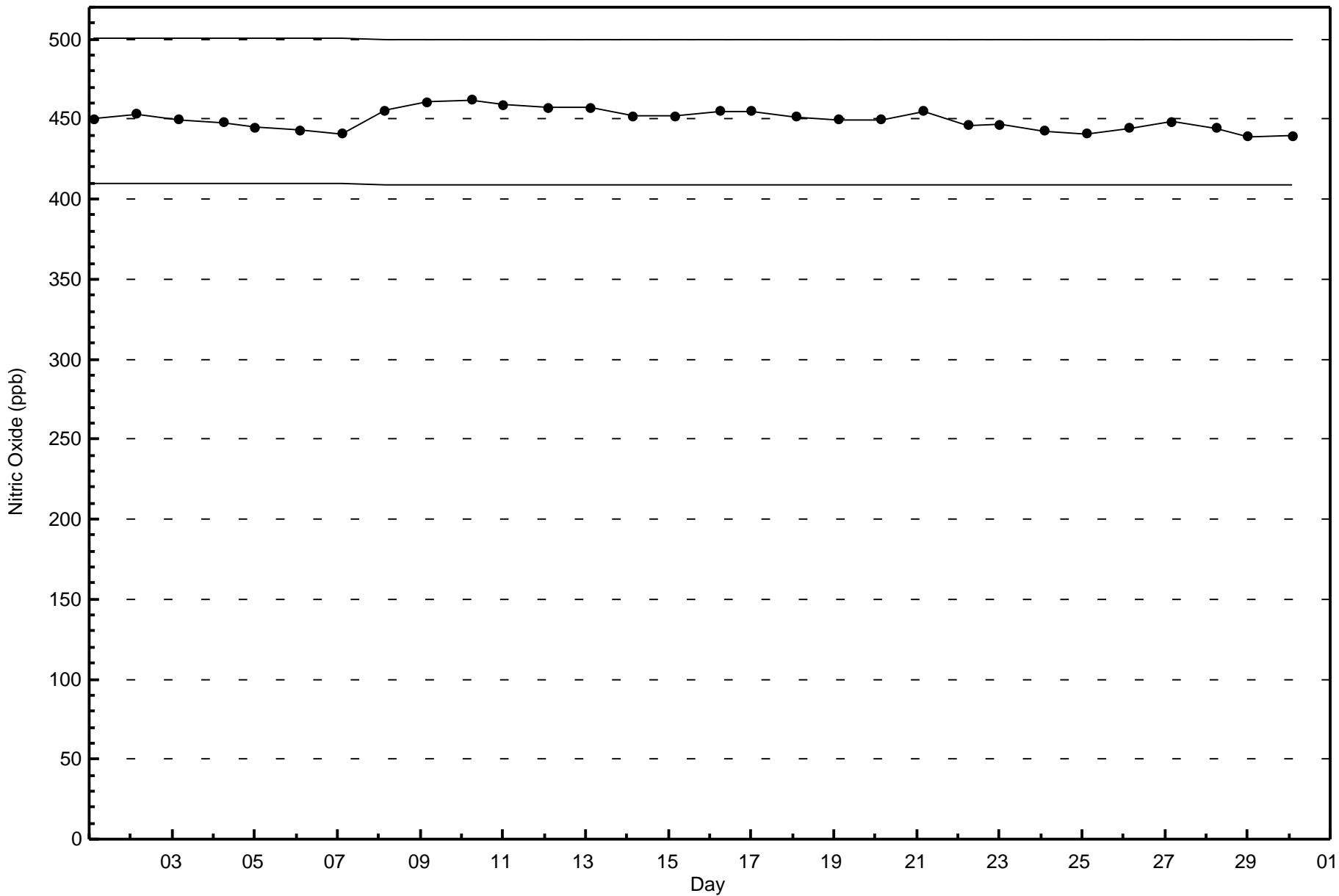
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay South - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Jun 2 10:00	Maximum Daily Average: 7.6 ppb on Jun 8		Hours of Data:	686
Minimum Value: 0 ppb on Jun 3 12:00	Minimum Daily Average: 0.4 ppb on Jun 22		Hours of Missing Data:	34
Maximum Diurnal Average: 5.6 ppb at hour 10	Minimum Diurnal Average: 1.7 ppb at hour 16		Hours of Calibration:	34
Monthly Average: 3.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 16		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	4	Z	24	2	1	1	1	1	1	1	4	4	4	5	3	3	2	2	3	2	2	2	3	3.3	24
2-Jun	11	11	3	Z	1	3	4	8	17	30	16	11	11	7	4	2	2	1	1	1	1	1	1	0	6.3	30
3-Jun	0	0	0	0	Z	0	0	1	2	0	0	0	0	0	0	0	0	0	1	1	1	2	5	6	0.9	6
4-Jun	4	3	3	5	4	Z	4	6	4	5	4	2	14	6	2	3	6	4	4	3	2	1	2	7	4.2	14
5-Jun	Z	2	4	4	5	3	4	3	1	4	6	5	3	3	3	2	1	2	1	1	2	1	1	1	2.6	6
6-Jun	1	Z	0	0	1	3	7	11	8	10	4	2	2	1	0	0	0	0	1	2	9	11	11	8	4.1	11
7-Jun	13	8	Z	5	9	10	10	12	C	C	C	C	2	1	1	1	2	2	2	1	1	1	5	13	5.1	13
8-Jun	13	10	10	Z	16	17	13	9	9	13	15	13	9	5	2	2	3	3	2	3	3	2	2	2	7.6	17
9-Jun	1	2	3	3	Z	7	2	2	2	2	1	1	1	1	1	1	1	1	2	1	2	2	2	2	1.9	7
10-Jun	4	1	2	1	1	Z	0	0	1	7	5	4	2	2	2	2	4	4	4	2	1	2	2	1	2.3	7
11-Jun	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	2	2	2	0.8	3
12-Jun	2	Z	1	1	2	4	4	4	3	6	4	2	2	3	3	4	4	3	2	2	4	3	6	9	3.3	9
13-Jun	9	7	Z	3	4	7	6	11	11	9	5	8	5	2	2	2	4	2	1	2	4	3	6	8	5.2	11
14-Jun	4	3	1	Z	2	3	5	4	4	3	2	2	2	1	1	1	1	1	1	1	1	1	0	2	2.0	5
15-Jun	3	1	0	0	Z	1	3	5	6	6	5	4	5	5	5	2	4	4	2	6	6	4	3	2	3.5	6
16-Jun	4	4	2	1	1	Z	6	7	7	7	6	3	2	2	3	5	6	4	2	1	1	1	2	4	3.5	7
17-Jun	Z	2	2	3	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.9	4
18-Jun	2	Z	0	3	6	10	14	5	9	6	2	0	0	0	0	0	0	0	0	0	1	1	2	3	2.8	14
19-Jun	0	0	Z	0	0	0	0	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	5	14	1.4	14
20-Jun	11	11	10	Z	5	4	7	7	5	10	13	5	3	2	2	2	8	5	2	3	3	4	4	5	5.7	13
21-Jun	7	4	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.8	7
22-Jun	0	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.4	1
23-Jun	Z	2	1	0	0	0	3	4	2	1	0	0	1	1	1	1	3	3	2	1	1	1	1	1	1.2	4
24-Jun	1	Z	1	1	1	4	5	12	18	9	3	1	1	2	1	1	1	2	1	1	1	1	1	1	2.9	18
25-Jun	2	2	Z	2	2	3	10	10	14	14	8	3	4	5	9	2	1	1	3	2	3	7	3	2	5.0	14
26-Jun	4	7	3	Z	16	15	12	5	3	5	4	2	3	2	3	3	3	2	3	6	3	1	1	1	4.6	16
27-Jun	2	4	3	2	Z	6	3	2	5	5	1	0	1	3	7	3	3	5	6	1	0	0	0	1	2.7	7
28-Jun	4	5	6	5	5	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	3	4	3	5	4	2.5	6
29-Jun	Z	3	2	1	2	9	10	6	4	3	3	2	2	2	3	3	3	2	3	3	1	1	1	1	3.0	10
30-Jun	1	Z	1	4	4	3	2	4	6	6	7	4	5	5	1	0	0	0	0	0	0	0	1	2	2.4	7

4.1	3.9	2.5	2.9	3.7	4.6	4.7	4.8	5.0	5.6	4.0	2.8	2.8	2.2	2.1	1.7	2.2	1.9	1.8	1.7	2.0	2.0	2.4	3.5	Diurnal Average	
13	11	10	24	16	17	14	12	18	30	16	13	14	7	9	5	8	5	6	6	9	11	11	14	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	99.71	99.71
21 - 40	2	0.29	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	115	70	30	7	12	10	33	55	59	31	37	50	46	32	30	67	684
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	70	30	7	12	10	33	55	59	31	37	50	46	33	30	67	686

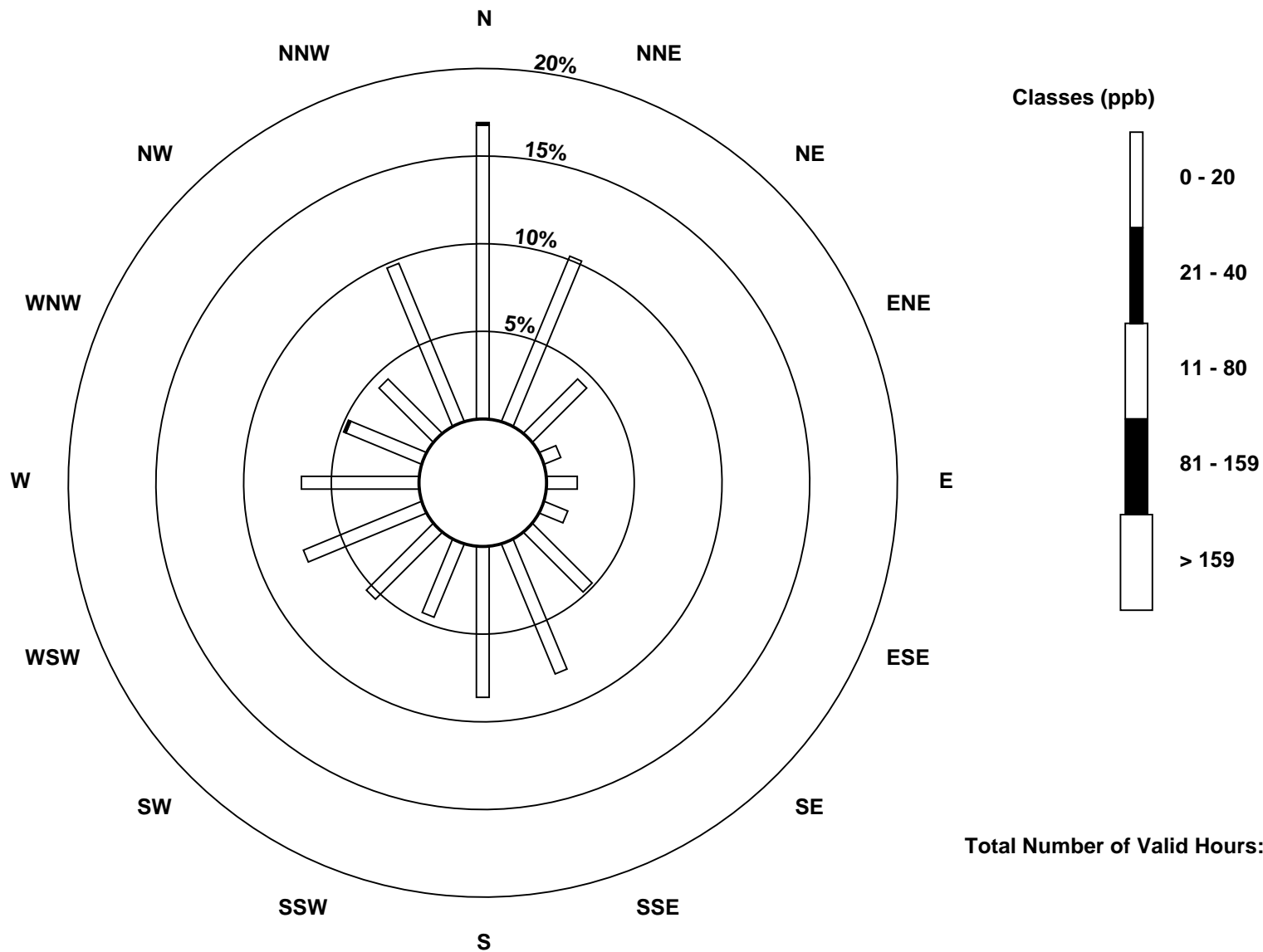
Total Number of Valid Hours: 686

Total Number of Hours: 720

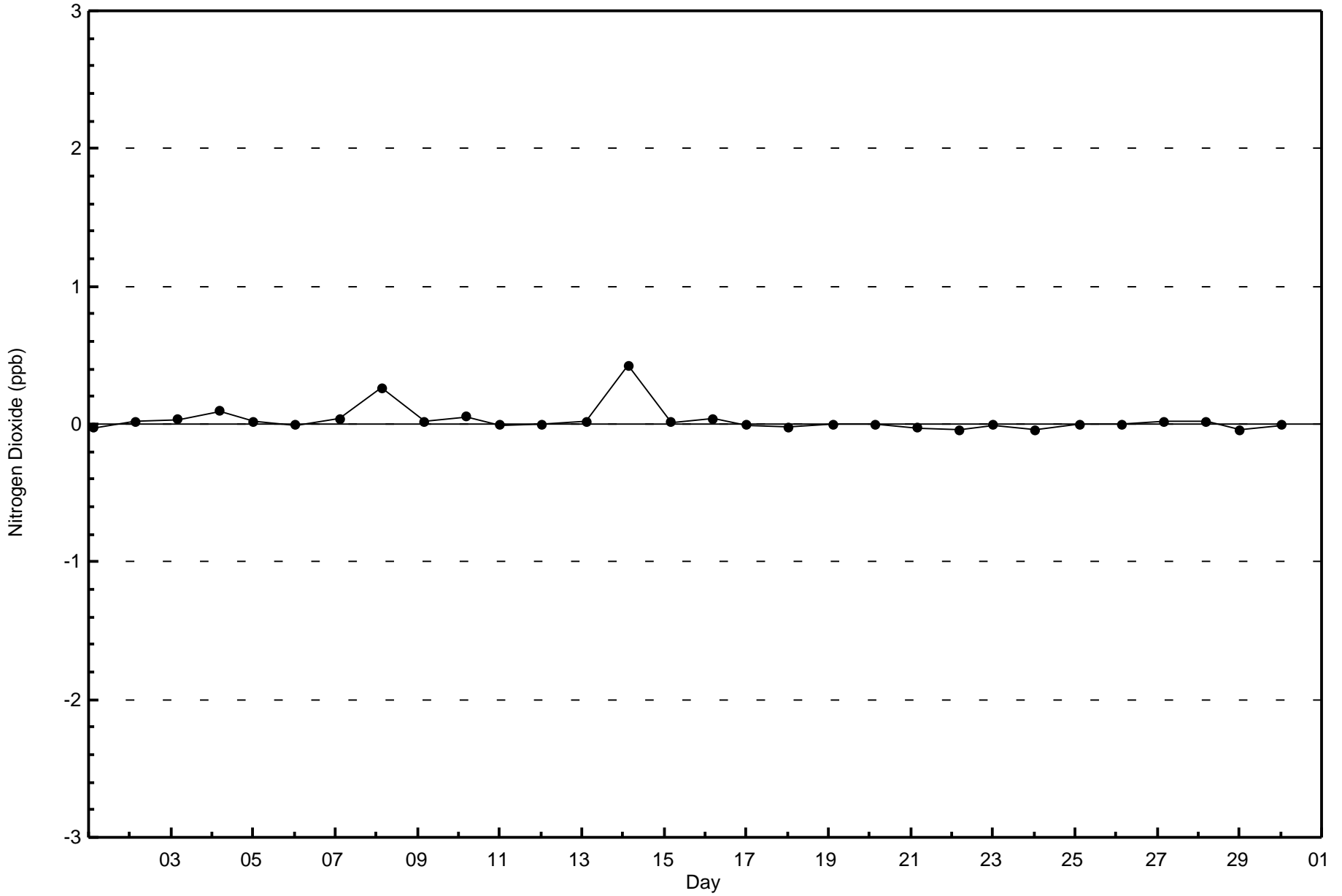


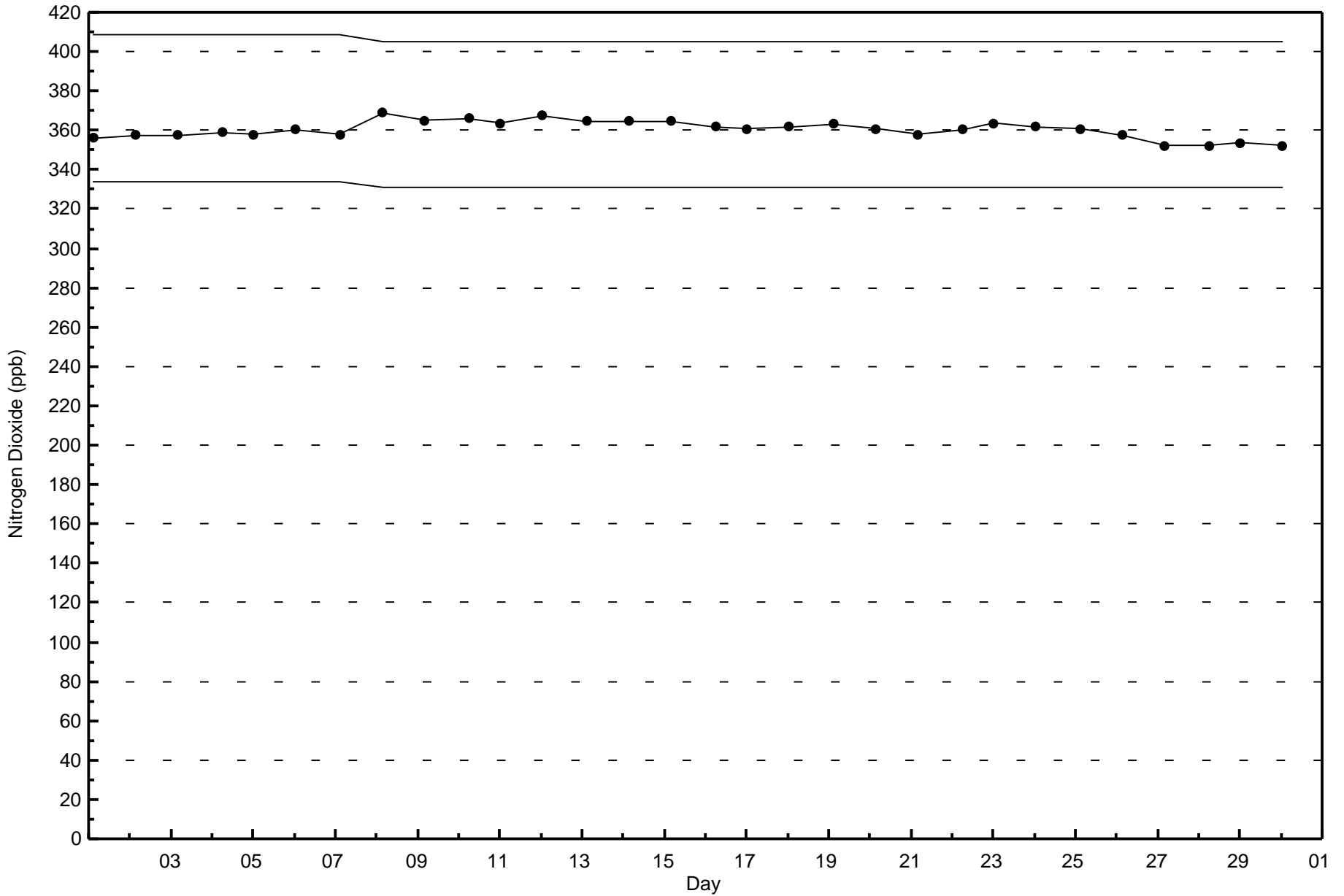
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association
Summary of Hour Averages

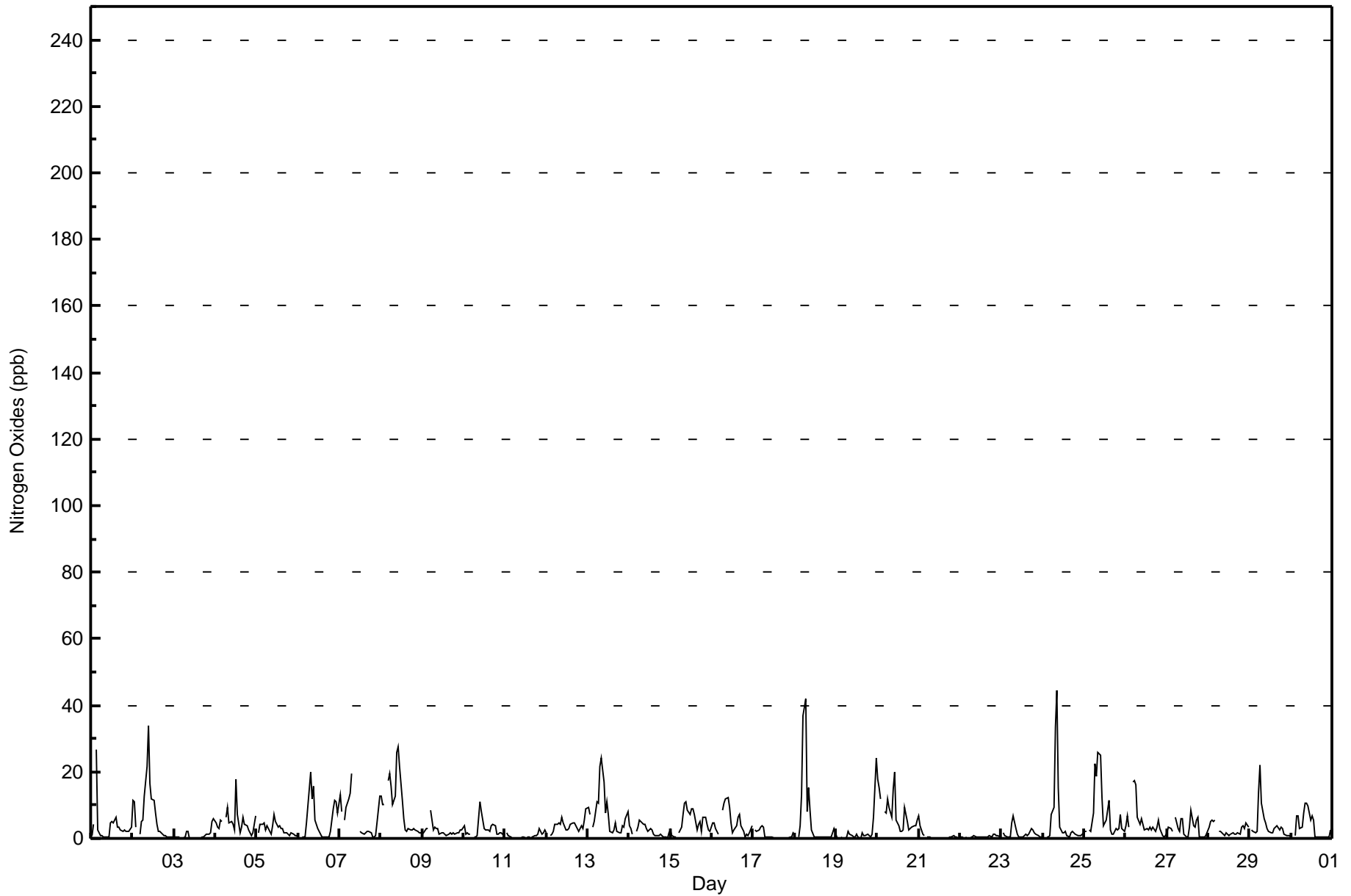
Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017

Maximum Value: 45 ppb on Jun 24 09:00 Maximum Daily Average: 9.8 ppb on Jun 8																		Hours in Service: 720 Hours of Data: 686 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0								
Minimum Value: 0 ppb on Jun 17 18:00 Minimum Daily Average: 0.5 ppb on Jun 22 Maximum Diurnal Average: 8.4 ppb at hour 10 Minimum Diurnal Average: 1.7 ppb at hour 20 Monthly Average: 4.0 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 10 P ₉₉ = 26																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	4	Z	27	2	1	1	1	1	1	1	5	5	5	6	3	3	3	2	3	2	2	2	3	3.6	27
2-Jun	12	11	3	Z	1	5	6	13	22	34	16	12	12	8	4	2	2	1	1	1	1	1	0	0	7.2	34
3-Jun	0	0	0	0	Z	0	0	2	2	0	0	0	0	0	0	0	0	0	1	1	1	2	5	6	1.0	6
4-Jun	4	3	3	6	5	Z	6	9	5	5	4	2	18	7	2	3	6	4	4	3	2	1	2	7	4.9	18
5-Jun	Z	2	4	4	5	3	4	3	1	4	7	5	3	4	3	3	2	2	1	1	2	1	1	1	2.8	7
6-Jun	1	Z	0	0	1	5	15	20	12	16	6	3	2	1	0	0	0	0	0	2	9	11	11	8	5.4	20
7-Jun	13	8	Z	5	10	12	14	19	C	C	C	C	2	2	1	2	2	2	2	1	1	1	5	13	5.9	19
8-Jun	13	10	10	Z	17	20	16	10	13	26	27	22	12	6	2	2	3	3	2	3	3	2	2	2	9.8	27
9-Jun	1	2	3	3	Z	8	3	3	3	3	1	2	2	1	1	1	2	1	2	1	2	2	2	2	2.2	8
10-Jun	4	1	1	1	1	Z	1	0	1	11	8	6	3	2	2	2	4	4	4	1	1	1	2	1	2.8	11
11-Jun	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	3	1	2	2	0.8	3
12-Jun	2	Z	1	1	2	4	4	4	4	6	5	3	2	3	4	5	5	4	3	2	4	3	6	9	3.7	9
13-Jun	9	7	Z	3	5	11	11	22	24	17	7	11	7	2	2	4	2	2	1	4	3	6	8	8	7.5	24
14-Jun	4	3	1	Z	2	3	6	5	4	4	3	2	3	3	1	1	1	1	1	1	0	0	2	2	2.3	6
15-Jun	3	1	0	0	Z	2	3	7	10	11	8	7	9	9	7	3	4	5	2	6	6	4	2	2	4.9	11
16-Jun	5	5	3	2	1	Z	8	11	12	12	9	5	2	3	4	6	7	4	2	1	1	1	2	4	4.7	12
17-Jun	Z	2	2	3	3	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.0	4
18-Jun	1	Z	0	4	13	37	42	8	15	8	3	0	0	0	0	0	0	0	0	0	1	1	2	3	6.1	42
19-Jun	0	0	Z	0	0	0	0	2	1	1	1	0	1	0	0	2	1	1	1	1	1	1	6	24	2.0	24
20-Jun	18	15	12	Z	8	8	12	9	6	15	20	6	4	2	2	3	9	5	3	3	3	4	4	5	7.6	20
21-Jun	7	4	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0.8	7
22-Jun	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1
23-Jun	Z	2	1	0	0	5	7	3	1	0	1	1	1	1	1	1	3	3	2	1	1	1	1	1	1.6	7
24-Jun	1	Z	1	1	1	7	9	34	45	15	4	2	2	2	1	1	2	2	2	1	1	1	1	1	5.8	45
25-Jun	2	2	Z	2	2	8	22	19	26	25	12	4	5	6	12	3	1	1	3	2	3	7	3	2	7.5	26
26-Jun	4	7	3	Z	17	17	16	6	4	6	4	3	3	2	3	3	3	2	3	6	3	1	1	1	5.2	17
27-Jun	2	4	3	2	Z	6	3	2	6	6	1	0	1	3	9	4	3	6	6	1	0	0	0	1	3.0	9
28-Jun	3	5	5	5	6	Z	2	2	2	1	2	1	1	1	2	1	1	2	1	3	4	3	4	4	2.7	6
29-Jun	Z	3	2	2	2	14	22	10	6	5	3	2	2	2	3	3	4	3	4	3	1	1	1	1	4.2	22
30-Jun	1	Z	1	7	7	3	3	8	11	11	10	6	7	5	1	0	0	0	0	0	0	0	1	3	3.7	11
																								Diurnal Average		
																								Diurnal Maximum		
4.4 4.1 2.6 3.3 4.5 7.1 7.9 7.9 8.3 8.4 5.7 3.7 3.6 2.7 2.5 1.9 2.5 2.1 1.9 1.7 2.1 2.0 2.5 3.9 18 15 12 27 17 37 42 34 45 34 27 22 18 9 12 6 9 6 6 6 9 11 11 24																										
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	669	97.52	97.52
21 - 40	15	2.19	99.71
41 - 80	2	0.29	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	112	66	28	6	11	10	33	54	57	30	37	50	46	32	30	67	669
21 - 40	3	4	2	1	1	0	0	1	1	1	0	0	0	1	0	0	15
11 - 80	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	116	70	30	7	12	10	33	55	59	31	37	50	46	33	30	67	686

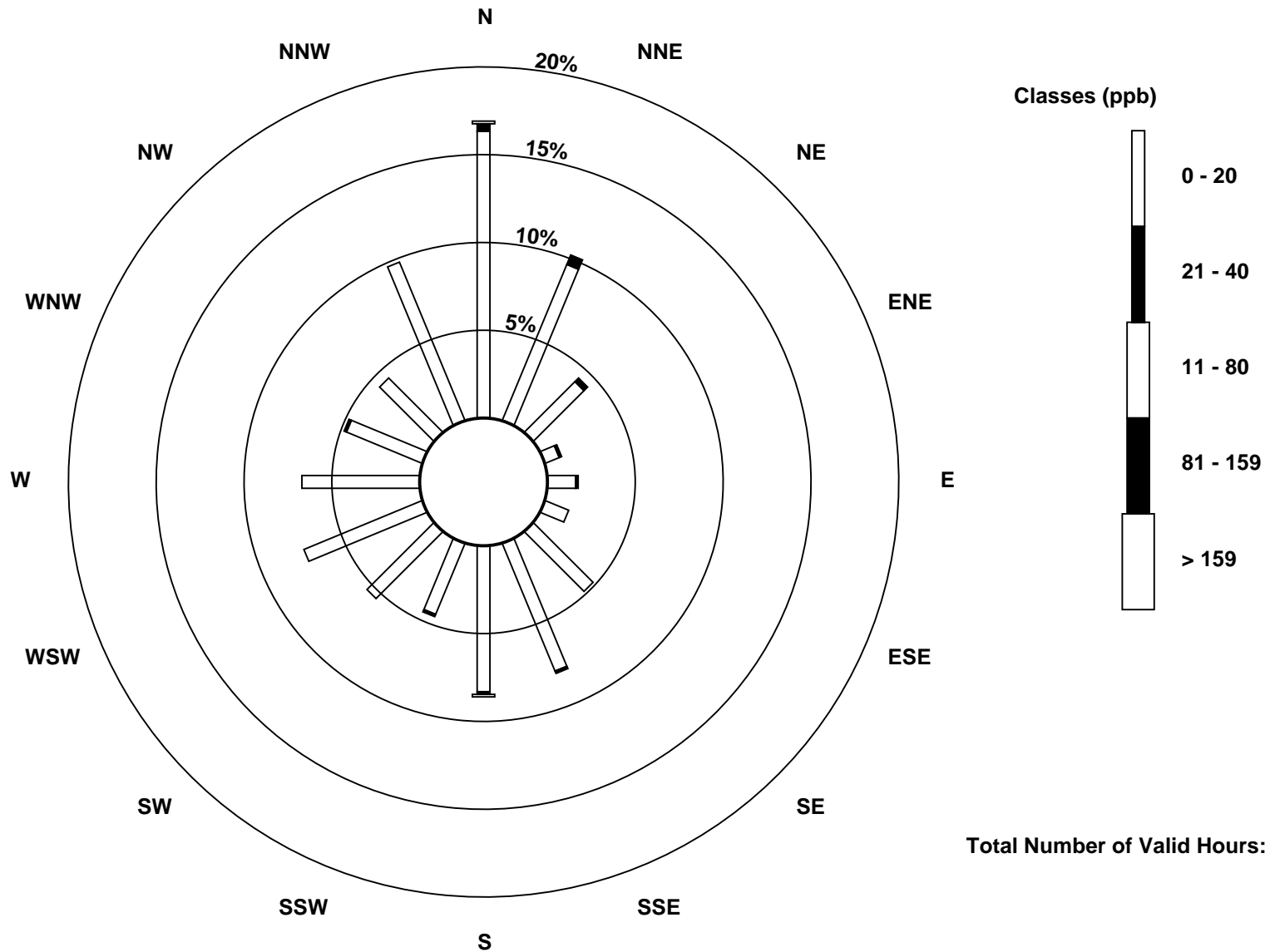
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

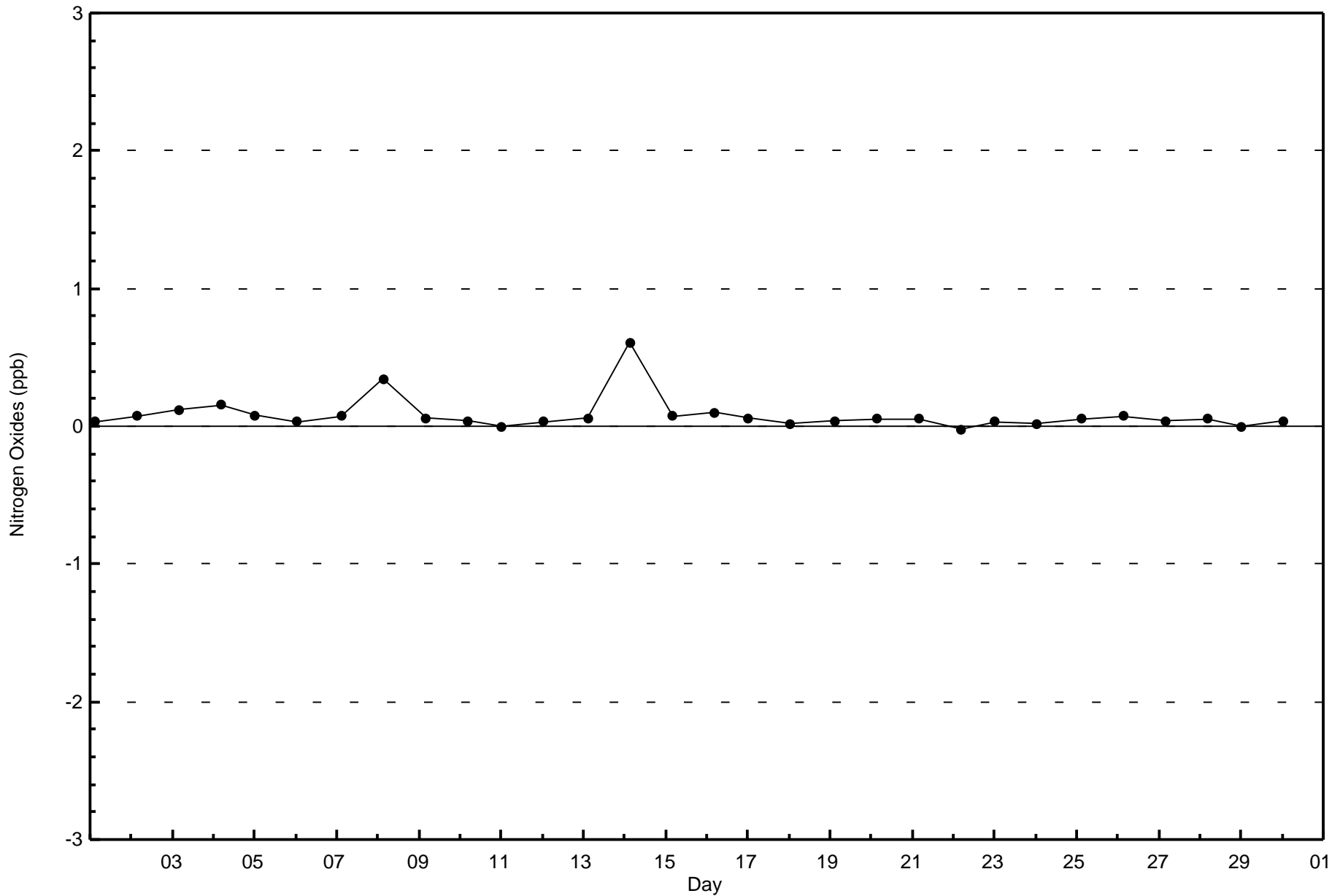
Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Zero Responses

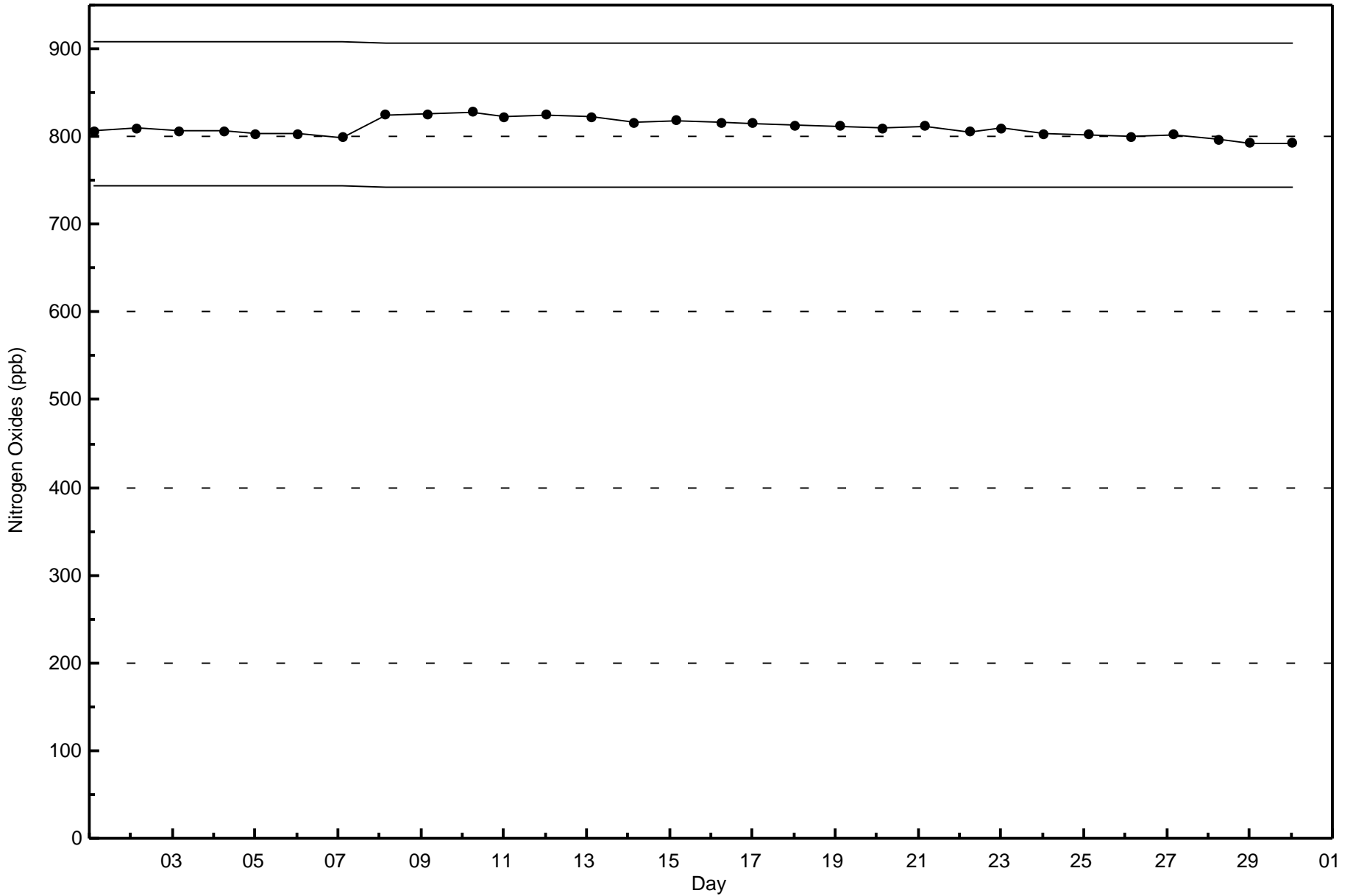
Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - June 2017



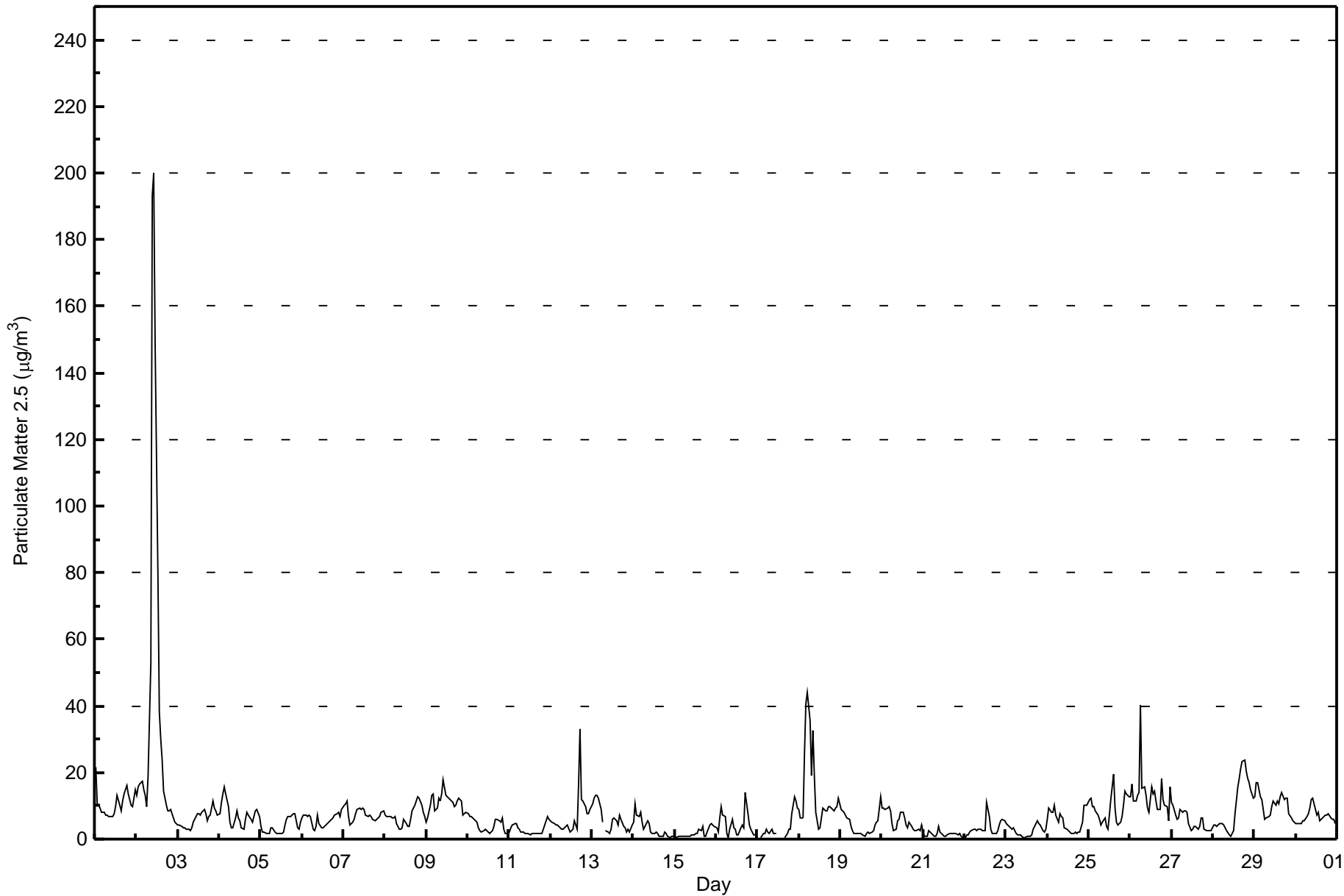


Number of Exceedences (AAAQO): 24-hr: 1	Hours in Service: 720
Maximum Value: 199.9 µg/m ³ on Jun 2 11:00	Maximum Daily Average: 39.7 µg/m ³ on Jun 2
Minimum Value: 0.3 µg/m ³ on Jun 16 08:00	Hours of Data: 714
Maximum Diurnal Average: 11.9 µg/m ³ at hour 10	Hours of Missing Data: 6
Monthly Average: 7.48 µg/m ³	Hours of Calibration: 1
Minimum Daily Average: 1.5 µg/m ³ on Jun 21	Percent Operational Time: 99.3
Minimum Diurnal Average: 5.4 µg/m ³ at hour 8	
Percentiles: P ₁ = 0.6 P ₁₀ = 1.6 Q ₁ = 2.8 Median = 5.7 Q ₃ = 8.8 P ₉₀ = 12.9 P ₉₉ = 38.4	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	21.5	10.8	10.2	9.2	7.9	7.9	7.3	7.1	7.0	6.8	6.9	7.5	9.9	12.9	10.3	8.5	11.3	13.6	15.9	13.8	11.9	10.4	9.7	14.9	10.5	21.5
2-Jun	13.3	15.6	16.4	17.2	14.8	13.0	9.8	18.4	52.8	193.0	199.9	149.6	79.1	38.2	30.0	23.8	14.3	10.4	8.6	8.7	8.8	6.2	5.1	4.7	39.7	199.9
3-Jun	4.3	4.0	3.7	3.4	3.2	3.1	3.1	2.7	3.5	5.0	5.8	7.5	7.7	7.3	8.2	8.9	7.6	5.4	6.6	7.3	11.2	9.4	8.3	7.1	6.0	11.2
4-Jun	7.8	11.1	13.4	15.5	13.6	9.9	5.2	3.4	3.5	6.4	8.5	6.5	5.6	3.4	2.9	5.8	8.0	7.1	6.0	5.1	6.8	8.6	8.8	6.6	7.5	15.5
5-Jun	4.0	2.3	2.0	1.8	1.6	1.7	3.3	3.5	2.3	1.8	1.7	1.8	1.7	2.3	4.3	5.8	6.9	6.8	7.0	7.6	7.6	3.2	3.0	5.0	3.7	7.6
6-Jun	6.6	7.0	7.0	6.9	7.3	6.7	3.0	2.4	3.8	7.3	4.8	3.6	3.5	3.7	4.4	5.2	5.7	5.7	6.2	7.4	7.5	7.9	7.0	8.7	5.8	8.7
7-Jun	10.0	10.5	11.5	6.8	4.1	5.1	6.1	7.4	8.7	9.5	9.0	9.3	8.9	7.2	6.6	7.0	6.6	5.8	5.7	5.8	6.2	6.6	8.0	8.4	7.5	11.5
8-Jun	7.1	6.8	6.7	6.7	6.5	6.4	6.7	4.6	3.0	2.8	3.6	6.1	4.6	3.8	3.8	5.7	8.3	10.1	11.5	12.6	12.3	10.2	8.1	6.7	6.9	12.6
9-Jun	5.2	6.2	10.3	13.2	13.7	8.5	9.3	12.2	11.6	13.6	17.8	13.0	12.9	12.3	12.1	10.9	9.8	10.1	11.3	12.2	11.4	7.4	7.7	7.9	10.9	17.8
10-Jun	7.8	6.9	6.7	6.6	5.9	5.0	3.5	2.5	2.3	2.5	3.1	2.6	2.0	1.9	2.5	3.8	5.9	5.7	5.3	5.3	6.4	3.1	1.9	1.5	4.2	7.8
11-Jun	2.2	3.6	4.4	4.7	4.6	3.6	2.8	2.2	2.0	1.8	1.7	1.6	1.5	1.5	1.6	1.5	1.6	1.7	1.6	1.8	3.1	5.3	6.6	6.0	2.9	6.6
12-Jun	5.4	5.0	4.7	4.4	4.4	4.0	2.9	3.0	3.4	3.7	4.3	2.2	2.7	3.0	5.4	3.1	16.7	33.1	11.8	11.5	9.7	7.8	7.7	8.8	7.0	33.1
13-Jun	10.4	12.4	13.3	13.0	12.2	9.0	5.0	C	2.3	2.3	1.5	3.0	6.0	6.3	5.6	4.1	7.2	6.0	3.6	3.2	2.2	3.0	2.1	4.1	6.0	13.3
14-Jun	4.9	10.4	7.1	6.8	8.0	4.9	2.9	3.7	5.3	4.6	2.2	1.5	1.7	1.9	1.5	1.0	0.7	0.8	2.0	1.7	1.0	0.4	0.7	1.0	3.2	10.4
15-Jun	0.9	0.6	0.8	1.0	0.9	0.8	0.8	0.9	0.9	1.0	1.2	1.4	1.7	1.8	2.8	2.6	3.6	0.9	1.0	2.0	4.3	4.7	4.2	3.8	1.9	4.7
16-Jun	3.3	2.0	6.4	9.8	7.4	6.7	1.7	0.3	2.8	6.0	3.2	3.0	1.2	1.3	3.5	4.2	3.5	13.9	7.8	4.2	3.1	2.0	1.4	1.4	4.2	13.9
17-Jun	UO	UO	0.4	1.5	1.8	3.1	2.1	1.6	3.1	1.7	1.6	1.8	UO	2.4	UO	UO	0.6	1.8	2.9	3.2	7.4	12.9	11.4	9.5	3.7	12.9
18-Jun	9.0	6.2	6.5	25.5	40.6	44.0	35.6	19.0	32.7	19.2	8.0	3.1	3.6	6.4	9.5	8.7	8.4	9.8	9.7	9.3	8.5	9.2	9.6	12.4	14.8	44.0
19-Jun	8.8	8.4	8.0	7.4	6.3	5.7	3.9	2.6	1.8	1.6	1.8	1.6	1.8	1.2	1.0	1.6	2.0	1.6	2.1	2.6	4.3	5.1	5.4	12.9	4.2	12.9
20-Jun	9.5	9.2	8.7	9.5	9.8	8.6	4.8	2.7	2.8	5.4	6.0	8.2	8.2	6.2	4.3	3.2	5.0	3.6	2.8	2.5	2.6	2.8	2.7	4.2	5.6	9.8
21-Jun	2.2	0.6	0.7	2.6	2.3	1.5	1.0	0.7	1.9	3.8	2.0	1.3	1.0	0.8	1.2	1.7	1.6	1.6	1.8	1.8	1.4	1.6	1.0	0.4	1.5	3.8
22-Jun	0.6	1.1	1.4	2.0	2.4	2.8	2.9	2.4	2.9	2.9	2.6	2.4	2.6	10.8	6.8	2.8	1.8	1.9	1.6	2.6	4.3	5.4	5.8	5.5	3.3	10.8
23-Jun	4.7	4.4	3.9	3.1	3.4	2.7	1.7	1.3	1.1	0.7	0.4	0.5	0.7	0.7	1.0	1.1	3.1	4.6	5.3	4.7	4.3	2.7	1.9	3.1	2.6	5.3
24-Jun	5.8	9.2	8.1	8.1	10.0	7.4	4.9	7.5	6.7	6.2	3.5	2.8	2.5	2.3	1.8	1.6	2.0	1.9	1.9	2.1	4.9	10.1	10.0	10.3	5.5	10.3
25-Jun	11.7	12.3	9.9	9.8	8.4	7.1	6.0	4.2	4.9	6.4	3.7	3.2	7.1	11.7	19.7	9.2	5.3	4.0	5.2	6.7	10.1	14.2	13.4	12.7	8.6	19.7
26-Jun	12.7	16.4	11.3	11.4	13.3	14.1	40.1	15.2	15.5	13.0	9.5	8.1	15.7	13.4	14.4	11.5	9.0	8.9	18.3	11.7	10.0	9.9	5.6	15.5	13.5	40.1
27-Jun	10.9	10.3	7.3	5.8	6.3	8.8	8.2	8.4	8.7	8.1	4.7	2.3	3.2	3.8	3.8	3.1	3.9	6.2	6.2	3.1	2.7	2.4	2.4	2.6	5.6	10.9
28-Jun	4.0	4.2	4.0	4.2	4.6	4.6	4.3	3.4	2.4	1.3	1.0	1.5	2.7	7.8	15.5	18.1	21.2	23.4	23.9	20.5	18.3	17.0	14.8	12.3	9.8	23.9
29-Jun	12.8	17.1	16.9	12.8	11.9	8.7	5.8	6.2	6.9	7.3	9.6	11.6	10.1	11.4	10.7	12.9	14.1	11.7	12.3	12.4	7.7	6.2	5.7	5.2	10.3	17.1
30-Jun	4.8	4.7	4.7	4.8	5.7	5.6	6.6	7.7	9.4	12.0	12.3	8.9	7.4	8.0	5.5	6.2	6.7	7.0	7.1	7.8	6.3	6.0	5.7	4.7	6.9	12.3

7.3	7.6	7.2	7.8	8.1	7.4	6.7	5.4	7.2	11.9	11.4	9.2	7.5	6.5	6.9	6.3	6.7	7.5	7.1	6.7	6.9	6.7	6.2	6.9	Diurnal Average
21.5	17.1	16.9	25.5	40.6	44.0	40.1	19.0	52.8	193.0	199.9	149.6	79.1	38.2	30.0	23.8	21.2	33.1	23.9	20.5	18.3	17.0	14.8	15.5	Diurnal Maximum

C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	319	44.68	44.68
6 - 15	324	45.38	90.06
16 - 25	27	3.78	93.84
26 - 80	10	1.40	95.24
> 81.0	3	0.42	95.66

Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay South - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	65	30	14	6	4	6	12	22	28	8	12	18	28	18	15	33	319
6 - 15	42	32	8	2	7	3	20	29	22	20	25	34	20	15	15	30	324
16 - 25	1	3	3	0	1	1	0	5	7	3	1	1	0	1	0	0	27
26 - 80	1	3	1	0	0	0	0	1	3	0	1	0	0	0	0	0	10
> 81.0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Totals	112	68	26	8	12	10	32	57	60	31	39	53	48	34	30	63	683

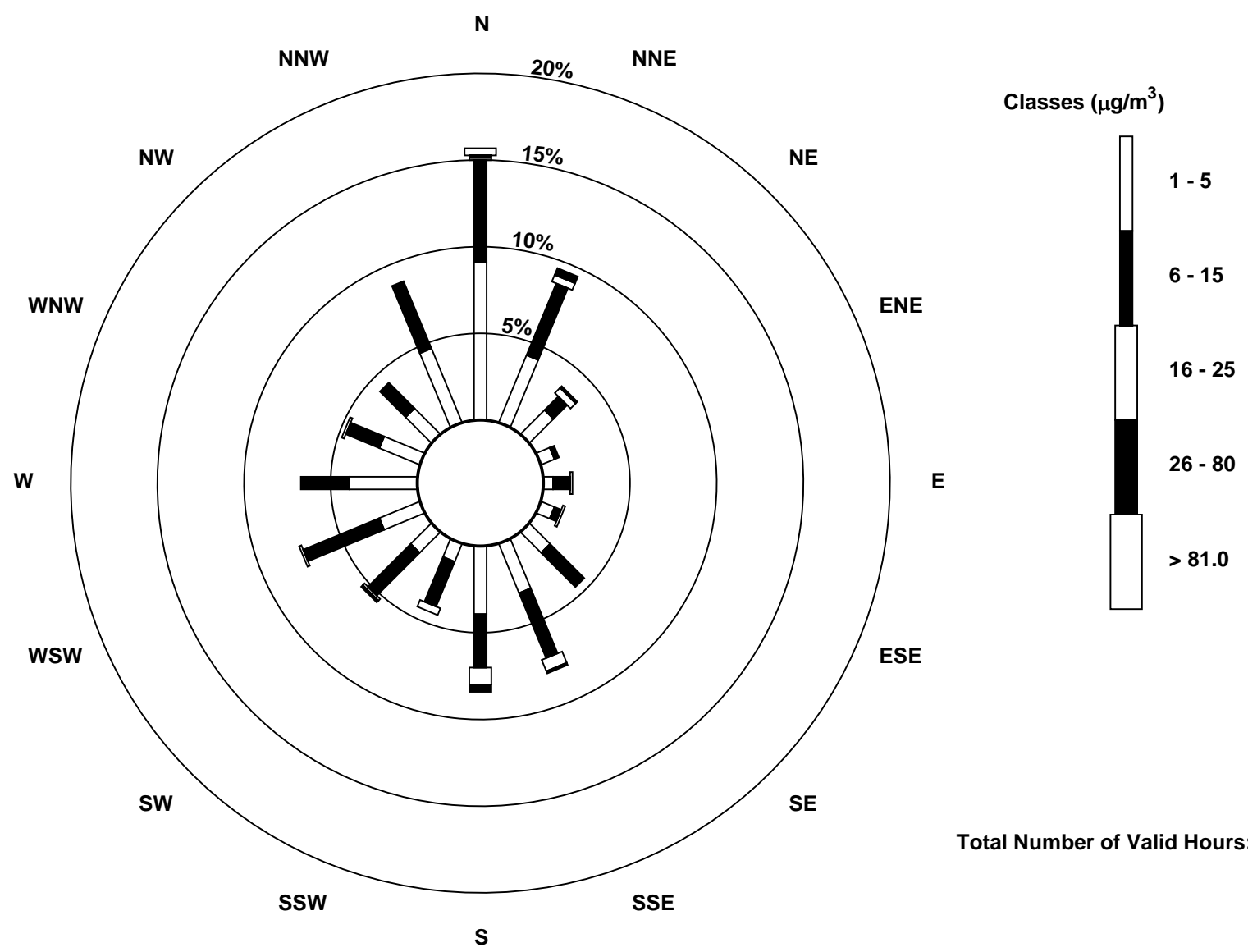
Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South (AMS 13)

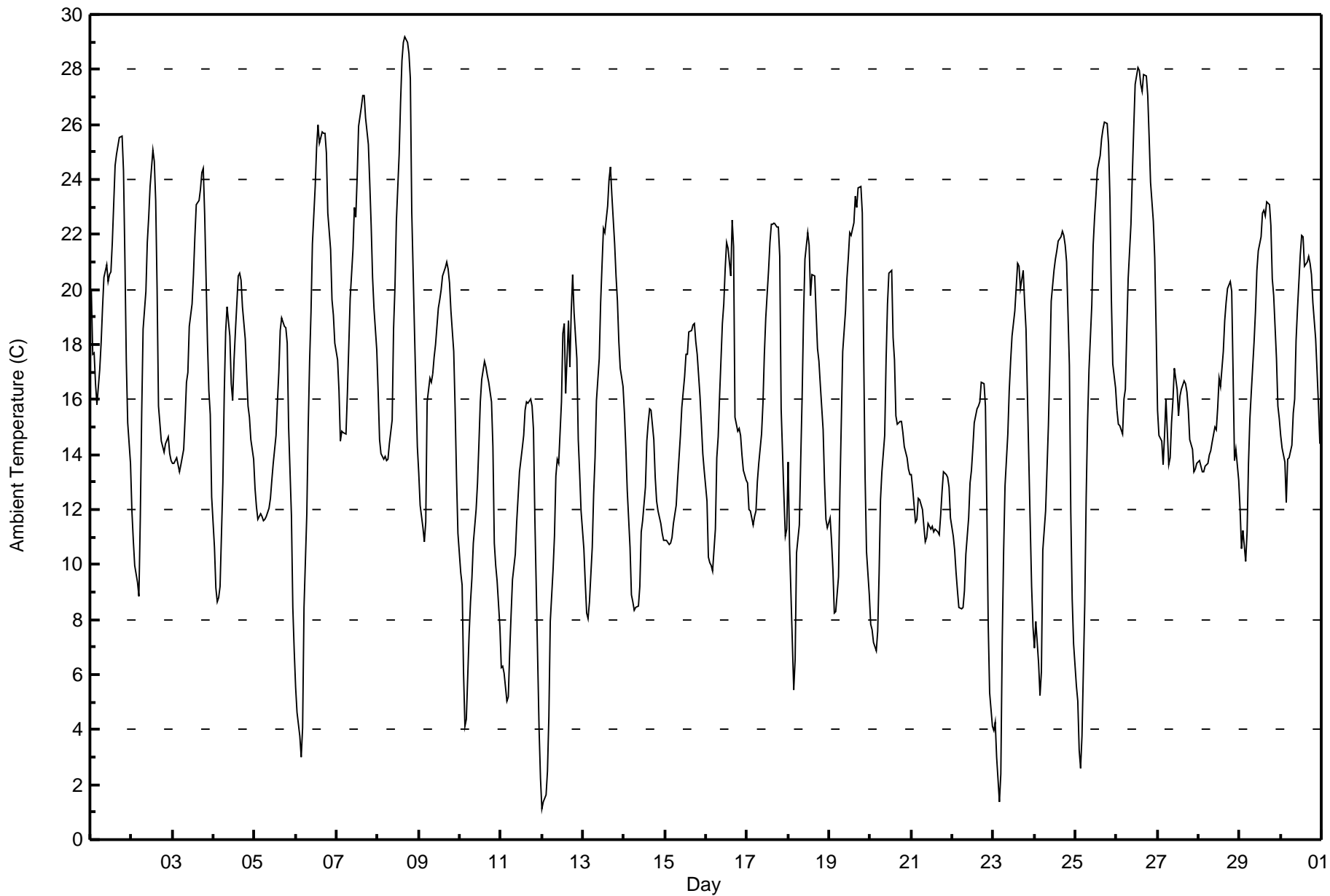




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Fort McKay South - June 2017

Maximum Value: 29.2 C on Jun 8 17:00		Maximum Daily Average: 22.4 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 1.1 C on Jun 12 01:00		Minimum Daily Average: 10.4 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 20.9 C at hour 16		Minimum Diurnal Average: 9.3 C at hour 4		Hours of Missing Data: 0																																												
Monthly Average: 15.74 C		Percentiles: P ₁ = 2.4 P ₁₀ = 8.6 Q ₁ = 12.0 Median = 15.5 Q ₃ = 19.7 P ₉₀ = 22.9 P ₉₉ = 27.9		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.0	17.6	17.7	16.6	15.8	17.1	18.1	19.3	20.4	20.9	20.3	20.6	20.7	21.7	24.5	24.9	25.2	25.5	25.6	24.3	21.1	17.4	15.1	13.7	20.2	25.6																						
2-Jun	12.0	10.9	10.0	9.3	8.8	11.7	15.5	18.6	19.9	21.7	22.6	23.7	25.1	24.6	23.2	20.0	15.8	14.5	14.3	14.1	14.4	14.6	14.0	13.8	16.4	25.1																						
3-Jun	13.7	13.7	13.9	13.6	13.4	13.6	14.2	15.3	16.6	17.0	18.7	19.5	20.5	21.9	23.1	23.2	23.6	24.2	24.4	22.8	18.1	16.3	15.5	12.5	17.9	24.4																						
4-Jun	10.6	9.1	8.6	8.8	9.2	13.0	16.2	18.5	19.4	18.3	16.6	16.0	17.4	18.5	20.5	20.6	20.3	19.4	18.2	17.0	15.8	15.4	14.6	13.8	15.6	20.6																						
5-Jun	12.7	12.1	11.6	11.8	11.7	11.6	11.6	11.8	12.0	12.4	13.1	13.7	14.7	15.9	17.0	18.5	18.9	18.7	18.6	18.0	15.0	11.8	8.4	6.9	13.7	18.9																						
6-Jun	5.5	4.6	3.8	3.0	4.1	8.4	11.8	15.0	17.4	19.2	21.7	23.7	25.2	26.0	25.3	25.7	25.7	25.7	25.0	22.8	21.5	19.7	19.1	18.1	17.4	26.0																						
7-Jun	17.4	16.3	14.5	14.9	14.8	14.7	16.2	17.9	19.7	21.5	23.0	22.6	24.1	26.0	26.7	27.1	27.0	26.3	25.3	23.8	22.3	20.4	19.3	17.8	20.8	27.1																						
8-Jun	16.3	14.5	14.0	13.8	13.9	13.8	13.8	14.4	15.2	18.5	20.1	22.5	24.9	26.8	28.3	29.0	29.2	29.0	28.6	27.7	22.8	18.4	16.3	14.3	20.3	29.2																						
9-Jun	13.3	12.1	11.4	10.8	11.5	15.9	16.8	16.6	16.9	17.6	18.0	19.3	19.6	20.0	20.5	20.8	21.0	20.7	20.3	19.2	17.8	15.7	13.2	11.2	16.7	21.0																						
10-Jun	9.7	9.2	6.1	4.1	4.4	7.5	8.6	9.5	10.8	12.0	13.0	14.4	15.9	16.8	17.4	17.2	16.9	16.6	15.9	14.3	10.8	10.0	9.4	7.7	11.6	17.4																						
11-Jun	6.3	6.3	6.1	5.0	5.2	6.8	8.2	9.5	10.4	11.5	12.5	13.4	14.2	14.7	15.6	15.9	15.9	16.0	15.8	14.9	11.6	6.6	4.0	2.2	10.4	16.0																						
12-Jun	1.1	1.4	1.6	2.5	4.5	7.9	9.8	11.0	13.2	13.8	13.7	15.9	18.4	18.8	16.2	18.9	17.2	19.2	20.5	19.2	17.5	14.5	13.3	12.0	12.6	20.5																						
13-Jun	10.6	9.4	8.3	8.0	8.6	10.6	12.6	13.9	16.0	17.5	19.5	20.9	22.2	22.1	23.0	24.0	24.5	23.4	21.6	20.5	19.6	18.1	17.1	16.5	17.0	24.5																						
14-Jun	15.5	14.3	12.7	10.6	8.9	8.6	8.3	8.5	8.5	9.2	11.2	11.6	12.8	14.5	15.2	15.6	14.6	13.1	12.3	11.9	11.5	11.1	10.9	12.0	15.6	15.6																						
15-Jun	10.9	10.9	10.7	10.8	11.0	11.5	12.2	13.0	13.9	14.7	15.7	16.8	17.6	17.7	18.5	18.5	18.7	18.8	18.1	17.6	16.1	15.1	14.0	13.4	14.8	18.8																						
16-Jun	12.3	10.3	10.0	10.0	9.8	11.3	13.9	14.7	16.1	18.7	19.5	20.8	21.7	21.5	20.5	22.5	21.5	15.3	14.8	14.9	14.7	14.0	13.4	13.1	15.6	22.5																						
17-Jun	13.0	12.0	12.0	11.4	11.8	11.9	13.0	13.7	14.7	15.9	17.7	19.0	20.7	21.7	22.4	22.4	22.4	22.3	22.3	21.2	15.7	12.4	11.0	11.3	16.3	22.4																						
18-Jun	13.7	10.7	7.2	5.4	6.5	10.4	11.4	13.8	16.1	19.0	21.1	22.1	21.6	19.8	20.5	20.5	19.1	17.9	17.4	16.5	14.9	13.0	11.6	11.3	15.1	22.1																						
19-Jun	11.7	10.9	9.8	8.2	8.3	9.6	12.7	15.2	17.8	19.2	20.4	21.2	22.1	22.0	22.4	23.4	23.0	23.7	23.8	22.8	17.6	13.2	10.5	8.9	16.6	23.8																						
20-Jun	7.8	7.6	7.1	6.9	7.6	9.7	12.4	13.4	14.7	17.4	19.5	20.6	20.7	18.3	17.5	15.4	15.1	15.2	15.2	14.8	14.3	13.9	13.5	13.3	13.8	20.7																						
21-Jun	13.3	12.8	11.5	11.6	12.4	12.4	12.0	11.4	10.9	11.0	11.5	11.3	11.4	11.2	11.3	11.2	11.1	11.8	12.7	13.4	13.3	13.2	12.8	11.7	12.0	13.4																						
22-Jun	11.0	10.5	9.7	9.0	8.5	8.4	8.5	9.0	10.4	11.7	13.0	13.4	14.2	15.2	15.7	15.8	15.9	16.6	16.6	15.8	12.1	7.8	5.3	4.1	11.6	16.6																						
23-Jun	4.0	4.3	3.0	1.4	2.4	7.2	10.5	12.9	14.7	16.3	17.4	18.3	19.2	20.1	21.0	20.8	20.0	20.7	19.5	18.6	16.2	11.5	9.2	7.8	13.2	21.0																						
24-Jun	7.0	8.0	6.4	5.2	6.1	10.5	12.0	13.5	15.0	17.2	19.6	20.7	21.1	21.4	21.8	21.9	22.1	21.9	21.6	21.0	17.3	11.9	8.7	7.1	15.0	22.1																						
25-Jun	5.6	5.0	3.2	2.6	3.7	8.6	12.4	15.2	17.1	19.4	21.6	22.6	23.5	24.4	24.9	25.5	25.8	26.1	26.0	25.3	23.3	19.7	17.3	16.4	17.3	26.1																						
26-Jun	15.6	15.1	15.0	14.7	16.0	16.4	18.4	20.4	22.4	24.2	25.9	27.4	28.1	28.0	27.4	27.2	27.8	27.7	27.1	25.5	23.9	22.5	21.2	18.5	22.4	28.1																						
27-Jun	15.6	14.7	14.5	13.6	14.7	16.0	13.6	13.9	15.1	16.0	17.1	16.4	15.4	16.1	16.4	16.7	16.6	16.3	15.6	14.6	14.2	13.4	13.5	13.7	15.1	17.1																						
28-Jun	13.8	13.6	13.4	13.4	13.6	13.7	14.0	14.1	14.5	15.0	14.9	15.7	16.8	16.5	17.8	18.9	19.5	20.0	20.3	19.9	16.9	13.8	14.2	13.1	15.7	20.3																						
29-Jun	12.0	10.6	11.2	10.1	11.2	13.7	15.3	16.3	18.1	19.2	20.7	21.4	21.9	22.8	22.9	22.7	23.2	23.1	22.3	20.4	19.8	17.5	15.8	15.3	17.8	23.2																						
30-Jun	14.7	14.3	13.7	12.2	13.8	13.9	14.3	15.5	16.0	18.2	19.2	21.2	21.9	21.9	20.8	21.0	21.2	21.0	20.5	19.5	18.2	17.0	15.8	14.4	17.5	21.9																						
																								11.6	10.8	10.0	9.3	9.7	11.5	12.9	14.2	15.5	16.8	18.0	18.9	19.8	20.2	20.6	20.9	20.7	20.4	20.0	19.1	17.0	14.7	13.3	12.2	Diurnal Average
																								20.0	17.6	17.7	16.6	16.0	17.1	18.4	20.4	22.4	24.2	25.9	27.4	28.1	28.0	28.3	29.0	29.2	29.0	28.6	27.7	23.9	22.5	21.2	18.5	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	100	13.89	13.89
10 - 20	446	61.94	75.83
> 20	174	24.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

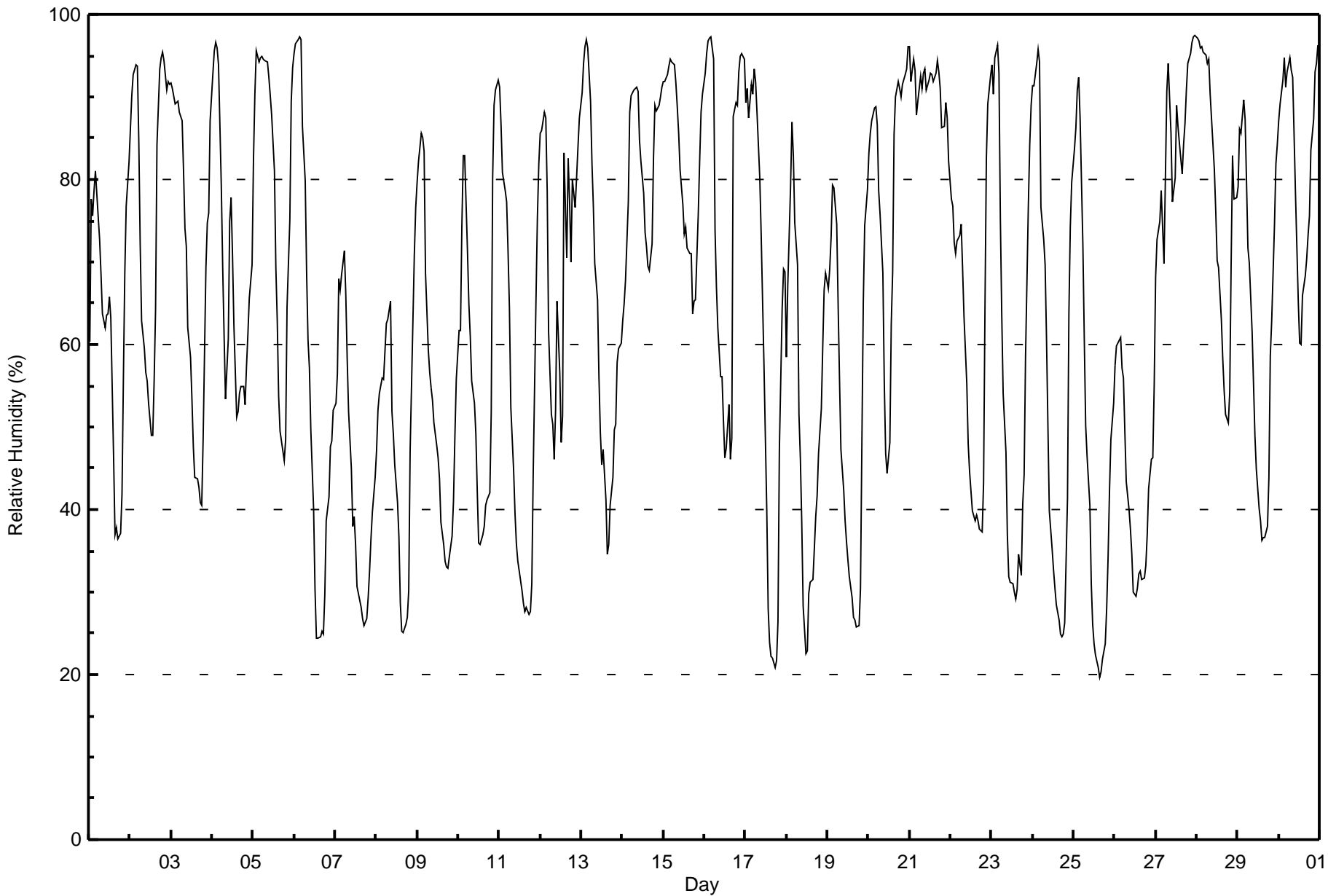


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Fort McKay South - June 2017**

Maximum Value: 98 % on Jun 28 00:00																			Maximum Daily Average: 91.1 % on Jun 21						Hours in Service: 720			
Minimum Value: 20 % on Jun 25 16:00																			Minimum Daily Average: 43.1 % on Jun 26						Hours of Data: 720			
Maximum Diurnal Average: 86.2 % at hour 4																			Minimum Diurnal Average: 45.8 % at hour 16						Hours of Missing Data: 0			
Monthly Average: 64.9 %																			Percentiles: P ₁ = 22 P ₁₀ = 32 Q ₁ = 46 Median = 68 Q ₃ = 87 P ₉₀ = 93 P ₉₉ = 97						Hours of Calibration: 0			
																			Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	60	78	76	79	81	75	73	69	64	62	63	64	66	63	46	37	38	36	37	42	56	69	77	82	62.2	82		
2-Jun	86	90	93	94	94	85	72	63	59	57	56	53	49	49	56	64	84	93	95	95	94	91	92	91	77.3	95		
3-Jun	92	91	89	89	90	88	87	81	74	72	62	58	53	48	44	44	43	41	40	49	69	75	76	87	68.4	92		
4-Jun	93	96	97	96	94	79	69	61	53	61	75	78	71	62	51	52	54	55	55	53	57	61	66	70	69.1	97		
5-Jun	82	90	96	94	95	95	95	94	94	92	90	88	81	69	63	54	49	47	46	49	65	75	89	94	78.6	96		
6-Jun	95	96	97	97	97	86	80	69	61	57	50	40	30	24	24	25	25	25	30	39	42	48	48	52	55.7	97		
7-Jun	53	56	68	67	68	71	66	58	52	45	38	39	36	31	29	28	27	26	27	29	33	36	40	44	44.4	71		
8-Jun	47	52	54	56	56	59	62	63	65	52	49	45	41	37	29	25	25	26	27	30	47	63	71	77	48.3	77		
9-Jun	80	82	86	85	83	69	59	57	55	53	51	48	46	44	38	36	34	33	33	34	37	41	49	56	53.6	86		
10-Jun	62	62	74	83	83	71	65	61	56	53	49	42	36	36	37	38	41	41	42	52	80	89	91	92	59.8	92		
11-Jun	91	87	81	79	77	71	64	52	45	39	36	34	31	30	29	28	28	27	28	31	44	66	75	82	52.3	91		
12-Jun	86	86	88	88	79	61	52	50	46	52	65	57	48	51	83	70	82	78	70	80	77	80	84	88	70.9	88		
13-Jun	91	94	96	97	96	89	82	77	70	65	56	49	45	47	41	35	36	41	44	50	50	58	59	60	63.7	97		
14-Jun	63	65	68	77	88	90	91	91	91	85	82	78	74	72	70	69	72	83	89	88	89	90	91	91	81.1	91		
15-Jun	92	92	93	94	95	94	94	92	89	86	81	77	73	74	72	71	71	64	65	65	76	82	88	90	82.1	95		
16-Jun	93	95	97	97	97	95	74	67	62	56	56	51	46	48	53	46	49	88	89	89	93	95	95	95	76.0	97		
17-Jun	89	91	87	91	90	93	92	88	80	73	65	57	40	28	24	22	22	21	22	26	47	64	69	69	60.6	93		
18-Jun	58	67	79	87	83	75	70	52	46	39	28	23	23	30	31	32	35	39	42	47	52	60	67	69	51.3	87		
19-Jun	67	69	73	79	79	75	65	56	47	42	39	36	34	32	29	27	27	26	26	30	48	65	74	79	51.0	79		
20-Jun	83	86	87	89	89	87	79	76	69	55	47	44	48	63	69	85	90	92	91	90	92	93	93	96	78.8	96		
21-Jun	96	92	95	93	88	90	93	91	93	93	91	92	93	93	92	93	94	93	91	86	86	89	87	82	91.1	96		
22-Jun	78	77	72	71	73	73	75	69	63	55	48	45	42	40	39	39	39	38	37	43	64	83	89	92	60.2	92		
23-Jun	94	90	95	96	93	75	64	54	47	37	32	31	31	30	29	30	35	32	41	44	58	77	84	89	57.8	96		
24-Jun	91	91	94	96	94	77	73	70	61	50	40	35	33	31	28	27	25	25	25	26	41	64	74	80	56.2	96		
25-Jun	84	86	91	92	87	72	61	50	46	41	31	26	24	22	21	20	20	22	24	28	34	42	48	53	46.9	92		
26-Jun	57	60	60	61	57	56	49	43	40	38	35	30	29	31	32	33	32	32	33	37	42	46	46	55	43.1	61		
27-Jun	68	73	75	79	74	70	91	94	90	86	77	80	89	86	84	81	84	87	91	94	95	97	97	98	85.0	98		
28-Jun	97	97	96	96	95	95	94	94	90	84	81	76	70	69	63	58	54	52	51	54	70	83	78	78	78.2	97		
29-Jun	79	86	86	90	87	80	72	70	62	55	49	45	40	39	36	37	37	38	44	59	63	75	82	84	62.2	90		
30-Jun	87	89	92	95	91	93	95	93	92	85	78	65	60	60	66	68	70	73	76	84	87	93	94	96	82.7	96		
	79.8	82.2	84.4	86.2	85.1	79.7	75.2	70.1	65.4	60.9	56.8	53.0	49.6	48.0	47.0	45.8	47.3	48.7	50.1	54.1	63.0	71.6	75.8	79.0	Diurnal Average			
	97	97	97	97	97	95	95	94	94	93	91	92	93	93	92	93	94	93	95	95	95	97	97	98	Diurnal Maximum			





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h
Fort McKay South - June 2017

Maximum Speed: 29 km/h on Jun 9 12:00	Maximum Daily Speed Average: 19.5 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 18 02:00	Minimum Daily Speed Average: 1.5 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 3.9 km/h at hour 15	Minimum Diurnal Speed Average: 1.9 km/h at hour 1	Hours of Missing Data: 0
Monthly Average Velocity: 2.6 km/h 353.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	S2	SSW7	S7	WNW1	WNW5	W3	WSW7	WSW6	WSW5	SW5	SW5	SSE8	S10	SSE10	SSE10	SSE5	SE7	SE8	ESE8	SE4	WSW3	WSW2	SW2	WNW1	S3.6	SSE10
2-Jun	SW3	SW2	WSW2	SSW4	S2	S1	NE1	NE3	NE5	N11	N11	N12	NNE12	NNE15	N12	WNW14	W12	W11	W8	W2	W8	NW6	SW4	W6	NW3.7	NNE15
3-Jun	WSW8	W9	W8	W8	W9	W8	NW6	NW7	NW6	WNW7	WNW10	WNW7	NW8	NW9	NNW4	ENE6	ESE6	SE5	E4	SSE2	WNW3	NNW7	NNW5	NW3	WNW4.0	WNW10
4-Jun	W2	SW3	SSW4	SSW3	SSW4	SW1	ESE2	N3	ESE2	SE4	S2	SSW3	SW4	SW4	N6	N9	NNE11	NNW6	NW12	NNW13	NNW10	N6	NNW7	N5	NNW2.4	NNW13
5-Jun	NE2	NE4	NNW6	N9	NNW11	N12	N9	NNW8	NNW7	N6	NNW7	NNW7	NNW7	N6	E3	SE3	E4	NE8	E5	S5	NNE6	WNW1	WSW3	W2	N4.0	N12
6-Jun	WSW3	WSW3	WSW3	SW2	SSW3	S3	SSE7	SSE10	S8	S10	S11	S9	SSE11	SW11	WSW10	WNW7	WNW4	NNE4	SSE1	N6	N8	N8	N7	NNW7	SW2.1	SSE11
7-Jun	NNW7	NNW6	NW5	NNW7	NNW6	NNW6	N7	NNE11	N12	N15	N17	N16	N14	NNE14	NNE14	NNE15	N17	NNE16	NNE15	NNE12	N11	N10	N13	N9	N11.1	N17
8-Jun	N8	NNW8	NNW9	NNW8	N8	NNW5	NNW5	NNW4	N4	NNE7	NNE9	N9	N12	N11	E5	SE12	SE13	SE12	SE11	SE8	SSW1	WSW3	W2	SW3	NNE2.5	SE13
9-Jun	SW4	WSW3	NNW4	NW2	NNW5	N15	N25	NNE23	N28	NNE25	NNE24	NNE29	N28	NNE25	NNE24	NNE26	NNE25	NNE24	NNE22	NNE23	NNE19	NNE9	NNE7	N8	NNE17.2	NNE29
10-Jun	N6	NNE6	NNW4	NNW5	N4	NNE7	ENE6	NE5	NNE5	NNE11	NNE9	NNE6	N6	NE10	ENE7	ESE4	NNE6	N10	N10	NW7	NNW9	NNW7	NNW5	WNW5	NNE5.5	NNE11
11-Jun	WNW5	WNW8	WNW8	WNW7	WNW6	WNW7	WNW8	NW15	NW17	NW17	NNW18	NNW17	NW15	NNW15	NNW14	NNW16	NNW15	NNW14	NNW13	N10	N3	W3	WSW3	WSW3	NW10.0	NNW18
12-Jun	WSW3	W2	W2	WSW2	SSE5	SSE10	SSE13	S13	SSE13	SE6	S10	SSE17	SSE25	SSE17	SSE6	SE13	N5	NNE4	N6	NW2	N11	NNW9	NNW8	NNW8	SSE4.0	SSE25
13-Jun	NNW5	NW4	NW4	NW4	NNW4	N5	N6	NNE1	N2	N6	N9	NNE9	NNE9	NW5	N8	NNE7	N13	N21	N21	N17	N16	N15	NNE15	N20	N9.0	N21
14-Jun	N23	N21	N21	N24	N25	N21	NNE21	N19	N17	N15	N23	N25	N25	N24	N22	N21	N23	N19	N15	NNW11	N14	N16	NNW13	NNW16	N19.5	N25
15-Jun	NNW14	NNW12	NNW11	NNW10	NNW9	N11	N11	N10	N11	N10	N8	N12	N13	N12	N10	E6	NE7	NE8	NE4	N3	NW2	N1	WNW2	N7.7	NNW14	
16-Jun	W1	SW1	WSW2	W1	WNW1	SW1	SSE5	SE6	ESE6	SSE5	S7	SSE10	SSE7	E7	NNE8	S4	SSE9	WSW1	W9	NW5	SE4	SW4	SSE3	S7	SSE2.4	SSE10
17-Jun	S10	S6	S8	S7	S7	SSW2	WSW3	W7	W7	NNW8	N8	N7	NNW15	NW16	NW15	NW14	WNW12	NW12	NW8	NNW5	WSW3	SW4	SSW2	SSW2	WNW4.2	NW16
18-Jun	WSW4	SSE0	SSW3	SSW3	SW2	S3	S5	S10	S13	S13	SW12	SW12	SW9	WSW8	WSW13	W13	W10	W7	NW10	NNW9	NNW12	NNW10	WNW7	W11	WSW5.6	WSW13
19-Jun	WNW4	W9	WNW2	WSW5	WSW9	WSW10	W6	WSW4	WNW1	S3	SE6	SE8	S6	WNW4	NNE4	S5	SE2	SSW4	S8	SW4	WSW3	SW3	WSW4	SSW2	SW3.0	WSW10
20-Jun	WSW2	SW2	W2	WSW2	SW2	SW2	S3	SSW3	S4	SSE10	SSE11	S11	SSW10	SSW12	S19	S12	S11	SSE8	SSE11	SSE14	S10	S7	SSE4	S9	S7.0	S19
21-Jun	S8	S8	SSE3	WSW6	W10	WNW8	W7	WNW9	W7	W7	W7	W6	WNW8	W10	W10	W11	W12	W10	NW10	NNW13	NNW12	NNW14	N25	N25	WNW7.4	N25
22-Jun	N22	NNW18	NNW23	N25	N20	N17	N13	NNW15	N14	NNE17	N19	N21	NNE20	N18	NNE16	NNE14	N15	N12	NNE11	N6	W2	WSW4	SW3	SW2	N13.6	N25
23-Jun	N1	NW2	NW1	S3	SW2	S1	NE2	NNE3	NE6	NE10	NE9	NNE11	NNE10	NE9	N7	N5	NNE8	ESE5	WSW4	WSW5	W2	W2	SSW4	WSW2	NNE2.6	NNE11
24-Jun	SSW3	WNW1	SW3	SW3	SSW2	N4	NNE8	NNE11	N13	N14	NNE12	NNE16	N14	N14	N14	N12	N13	NNE11	NE9	NNE8	NNW2	W3	WSW3	W2	N6.6	NNE16
25-Jun	WSW3	W2	WSW2	WSW3	SW3	WSW2	NE3	ENE4	ENE5	E5	SE8	SE10	S11	SSW7	S10	SSE14	SE12	SE12	SE11	SSE9	SSE7	S7	S8	SSE5.5	SSE14	
26-Jun	SSE10	S9	SSE11	SSE11	SSE14	S11	SSE13	SSE14	SSE16	SE16	SSE20	SSE27	SSE25	SSE24	SE21	SSE19	SE18	SSE15	SSE12	SE8	SSE5	SE8	SSE7	SSE4	SSE13.9	SSE27
27-Jun	WSW2	SSW2	NNW4	E1	SSE4	S12	SW6	SE7	S11	SSW9	SSW7	SW5	SSW5	SE4	ESE4	E3	WSW3	SW4	S2	WSW6	W2	S2	WNW1	NNE4	S2.9	S12
28-Jun	NNE4	NNE7	N7	N8	NNE5	ENE4	NE5	NNE10	NE10	NE11	NE11	NE10	NNE14	NE12	NE9	NNE9	NE7	E4	NNE5	SSE4	S5	S4	S8	S8	NE5.1	NNE14
29-Jun	S7	S5	SSW5	WSW4	S5	S5	SSE6	SE8	ESE3	NNE3	E3	SE5	ENE7	SSE7	NNE9	NE7	NE7	NNE6	NE2	W3	WSW5	NW2	SW1	SSW1	SE1.5	NNE9
30-Jun	S2	S2	WNW1	SSW2	NNW2	SW2	ESE1	NE2	N3	E5	SE8	SSE9	S8	SSW5	W8	WNW5	WSW6	WNW4	WNW2	WSW3	WSW4	SSW2	SW2	WSW2	SW1.7	SSE9

NW1.9	NW2.2	NW2.7	NW2.8	NW2.3	NNW2.1	N2.1	N2.6	N2.7	NNE3.6	NNE3.4	NNE3.0	N3.2	N3.7	N3.9	NNE2.8	NNE3.4	NNE3.6	N3.6	N2.7	NNW3.2	NNW2.8	NNW2.4	NW2.6		Diurnal Average
N23	N21	NNW23	N25	N25	N21	N25	NNE23	NNE28	NNE25	NNE24	NNE29	N28	NNE25	NNE24	NNE26	NNE25	NNE24	NNE22	NNE23	NNE19	N16	N25	N25		Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

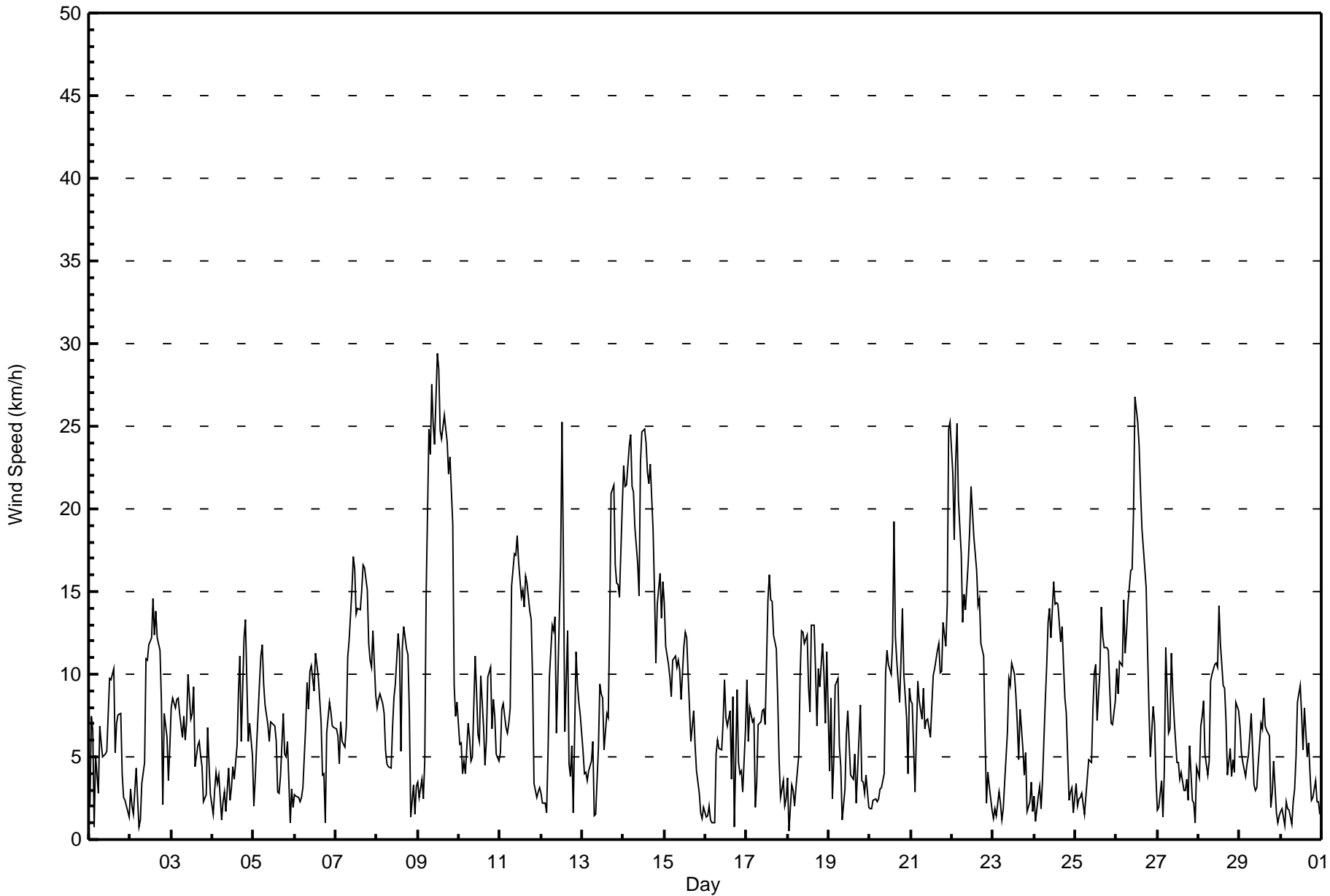
Wind Speed (WS) - km/h
Fort McKay South - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jun 12 14:00 Minimum Value: 0 km/h on Jun 23 05:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 6																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	2	1	2	2	3	2	3	2	3	3	2	3	3	3	4	3	2	3	2	2	1	1	4
2-Jun	2	1	2	1	1	1	1	1	2	3	2	3	3	4	3	5	4	4	5	2	2	2	2	2	5
3-Jun	3	3	2	3	3	3	2	3	4	3	3	3	4	3	2	2	2	2	1	1	2	2	1	4	
4-Jun	1	1	1	2	2	1	1	2	3	1	2	1	2	2	2	3	3	2	4	4	2	2	2	4	
5-Jun	2	2	2	3	2	2	2	2	2	2	2	1	4	3	2	3	3	3	2	3	4	1	1	4	
6-Jun	1	1	1	1	1	2	2	2	2	3	3	4	5	4	4	3	2	2	1	4	2	1	2	5	
7-Jun	2	1	1	1	1	1	1	2	2	3	4	3	3	3	4	4	4	4	4	3	2	2	2	4	
8-Jun	1	1	1	2	2	1	1	1	1	2	3	2	2	3	4	4	4	3	3	2	1	1	1	4	
9-Jun	1	1	2	1	2	7	6	5	6	6	7	7	6	6	6	6	6	6	5	6	5	3	2	7	
10-Jun	2	2	1	1	1	2	2	3	3	3	4	4	3	3	3	2	2	3	2	3	3	3	3	4	
11-Jun	1	2	2	2	2	2	3	6	5	5	6	5	6	5	6	5	5	4	4	3	2	1	1	6	
12-Jun	1	1	1	1	2	4	3	3	3	3	3	6	5	8	4	3	4	2	2	1	4	2	1	8	
13-Jun	2	1	2	1	1	2	2	1	2	2	3	3	3	2	3	3	5	4	5	4	3	4	3	5	
14-Jun	5	6	6	5	5	5	6	5	4	3	5	6	5	6	5	5	5	5	4	2	3	5	5	6	
15-Jun	3	2	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	2	1	2	2	1	3	
16-Jun	1	1	1	1	1	1	2	1	2	3	2	3	3	4	2	3	5	2	3	3	1	1	1	5	
17-Jun	2	2	2	2	2	1	2	2	3	3	3	5	5	6	6	4	5	4	3	2	1	0	1	6	
18-Jun	3	1	1	1	1	2	3	2	3	3	4	4	4	4	5	4	4	2	3	3	5	2	2	5	
19-Jun	2	3	2	4	3	2	2	2	2	2	3	4	4	3	3	4	2	2	3	2	1	1	1	4	
20-Jun	1	2	1	1	1	1	1	1	2	5	2	3	4	4	5	3	2	2	3	3	3	2	2	5	
21-Jun	2	3	2	4	4	3	3	4	3	3	3	3	3	3	4	4	4	3	5	3	3	5	6	6	
22-Jun	6	6	6	7	6	4	3	4	4	4	5	6	6	5	5	4	4	3	3	2	1	0	1	7	
23-Jun	1	1	1	1	0	1	1	2	3	3	3	3	3	3	2	3	2	1	2	1	1	1	1	3	
24-Jun	2	1	1	1	1	3	2	2	3	3	4	5	4	4	5	4	4	3	2	2	2	2	1	5	
25-Jun	1	1	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	3	3	3	2	2	2	4	
26-Jun	3	2	2	2	2	2	3	3	3	3	4	6	6	6	4	5	4	4	4	2	1	2	2	6	
27-Jun	1	1	1	1	2	4	3	3	2	3	3	2	1	1	1	1	2	2	1	2	1	1	1	4	
28-Jun	1	2	2	2	1	1	1	2	3	3	3	3	4	3	3	3	3	2	2	2	1	1	2	4	
29-Jun	2	2	1	1	1	1	2	2	2	2	2	2	3	3	2	2	2	2	2	2	1	1	1	3	
30-Jun	1	1	1	1	1	2	1	1	1	2	2	3	3	2	3	1	2	1	1	2	2	2	1	3	
																		Diurnal Maximum							



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Fort McKay South - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	272	37.78	37.78
6 - 11	280	38.89	76.67
12 - 19	123	17.08	93.75
20 - 28	44	6.11	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	11	12	3	11	7	8	14	24	25	34	41	19	20	13	16	272
6 - 11	45	30	18	5	1	3	16	25	33	6	3	11	27	14	10	33	280
12 - 19	40	16	1	0	0	0	8	14	6	1	2	1	3	2	9	20	123
20 - 28	24	13	0	0	0	0	1	5	0	0	0	0	0	0	0	1	44
29 - 38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	123	71	31	8	12	10	33	58	63	32	39	53	49	36	32	70	720

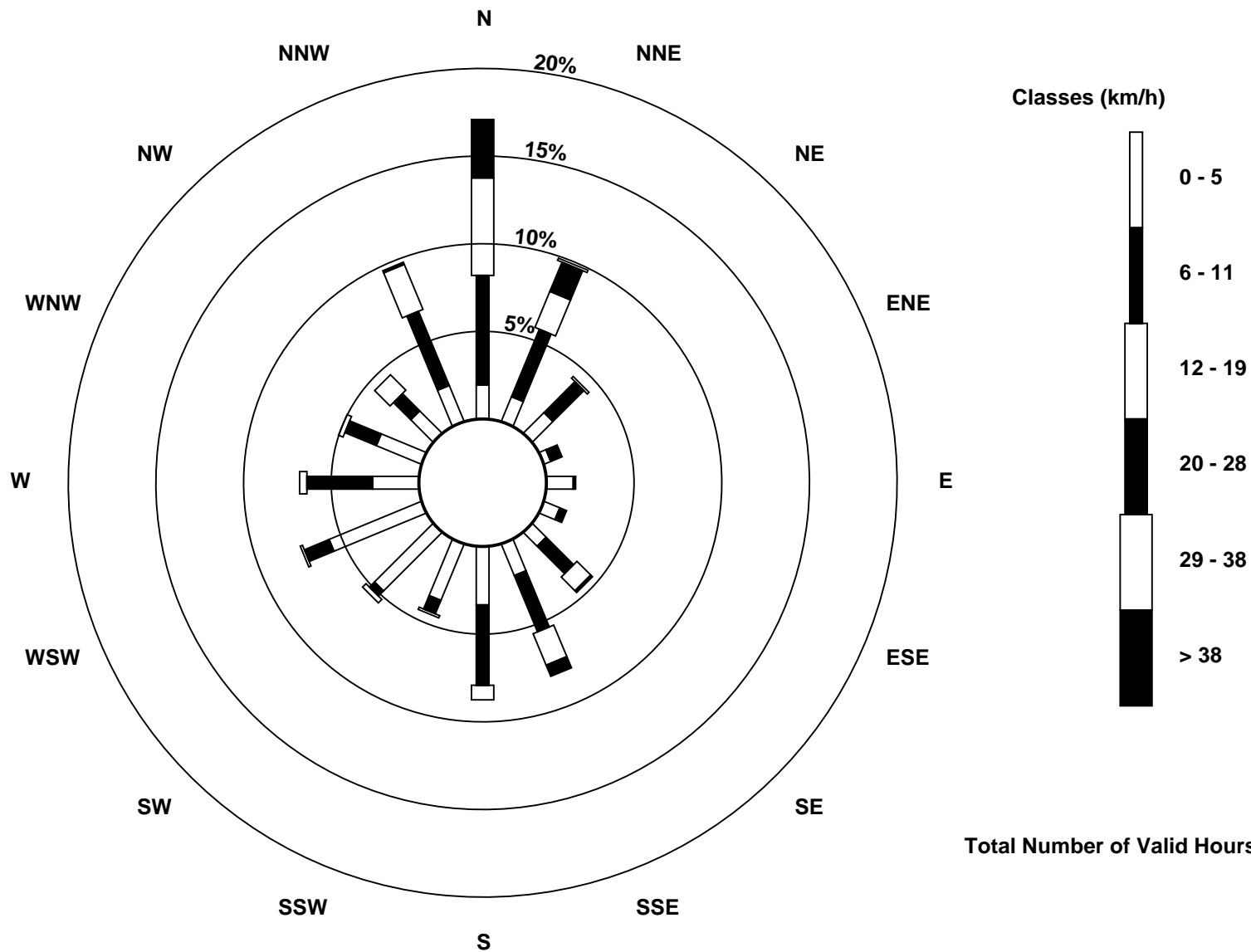
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Fort McKay South (AMS 13)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - June 2017

Direction of Maximum Speed: 12 deg on Jun 9 12:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 0.3 deg on Jun 14	Hours of Data: 720
Direction of Minimum Speed: 150 deg on Jun 18 02:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.5 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 283.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	178	202	187	286	285	264	257	250	254	220	236	167	182	148	158	163	140	142	115	128	252	250	235	292	188.9
2-Jun	233	234	244	193	175	169	38	54	35	9	9	6	15	28	2	285	274	275	271	268	267	311	233	259	323.7
3-Jun	254	262	275	267	262	281	308	326	324	298	291	287	309	313	344	67	118	129	82	158	300	341	346	314	298.1
4-Jun	266	216	196	209	195	222	108	3	121	131	177	202	215	218	354	359	14	333	322	340	334	11	347	4	335.2
5-Jun	45	47	334	352	341	351	351	333	332	6	348	334	328	2	86	143	82	48	100	175	27	289	258	259	357.2
6-Jun	250	250	250	229	196	174	148	159	179	179	175	186	166	223	257	299	284	17	165	351	358	351	359	341	216.4
7-Jun	348	336	324	342	338	345	352	12	7	5	3	4	9	29	30	19	11	22	20	19	8	2	3	353	7.4
8-Jun	349	333	335	340	349	345	329	333	6	30	14	3	6	3	87	142	144	138	145	144	205	248	264	233	19.9
9-Jun	230	249	336	313	348	8	6	12	11	14	18	12	11	18	18	12	13	15	15	18	25	31	18	5	12.8
10-Jun	11	29	332	336	357	25	63	45	19	28	27	28	8	46	66	105	30	359	349	310	330	343	335	301	11.9
11-Jun	285	300	302	289	296	295	298	322	315	318	334	332	325	337	342	347	345	339	344	356	10	275	254	254	325.3
12-Jun	242	277	275	251	161	160	166	172	162	140	169	157	162	150	161	144	1	30	7	322	351	344	343	341	157.4
13-Jun	341	321	312	308	332	349	352	18	0	8	3	16	18	310	5	27	7	2	5	2	9	8	13	3	1.7
14-Jun	2	4	358	2	4	11	15	6	356	356	4	2	6	6	2	1	357	356	358	343	350	352	343	345	0.3
15-Jun	348	346	342	343	346	349	353	359	1	5	350	6	1	5	359	79	44	46	55	42	3	323	360	297	1.7
16-Jun	260	230	258	279	288	233	153	124	113	151	191	159	148	92	28	189	159	246	274	304	132	221	150	190	166.1
17-Jun	180	175	184	190	181	205	237	259	273	327	10	359	332	321	317	318	299	306	324	329	252	231	206	203	294.3
18-Jun	240	150	210	213	236	184	179	188	187	190	224	233	235	251	253	261	261	271	325	319	340	333	300	268	250.9
19-Jun	286	264	292	258	256	255	268	252	283	171	126	142	177	282	25	181	142	199	188	218	248	221	253	192	227.6
20-Jun	241	231	278	243	224	229	175	193	174	149	153	191	210	200	187	182	169	167	153	165	173	169	165	179	179.5
21-Jun	191	191	165	247	268	285	273	282	276	278	281	273	284	275	274	280	267	277	323	344	334	339	355	354	299.1
22-Jun	355	347	346	356	356	351	357	345	7	23	11	11	15	9	17	16	11	10	14	356	275	250	230	223	1.3
23-Jun	1	317	321	186	230	176	52	26	51	41	43	33	30	40	9	11	33	117	247	255	270	269	192	242	28.9
24-Jun	205	288	216	226	205	355	20	20	5	7	25	13	10	358	352	10	3	20	36	31	345	261	247	269	6.7
25-Jun	244	272	239	256	231	243	54	67	66	94	126	130	190	201	179	155	145	147	146	143	151	167	184	179	157.7
26-Jun	159	169	168	165	164	170	152	158	148	143	149	163	153	148	145	149	142	147	156	145	151	143	151	160	153.3
27-Jun	237	206	342	88	157	175	223	143	176	196	213	225	206	127	108	80	237	232	179	245	274	178	283	18	191.2
28-Jun	13	14	9	10	33	70	42	20	42	44	45	48	17	34	36	22	42	92	21	163	184	188	178	191	39.0
29-Jun	170	191	198	243	179	175	147	140	118	18	93	131	68	159	12	38	45	28	34	260	254	304	225	207	127.0
30-Jun	172	183	292	202	332	222	115	40	352	86	145	165	174	206	264	293	249	295	300	243	248	207	234	237	216.3

312.1 306.5 312.0 314.5 311.2 329.1 359.3 1.9 8.8 21.9 19.5 22.2 10.2 9.8 4.9 12.0 12.2 12.1 7.2 354.3 342.5 333.4 331.9 318.4

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

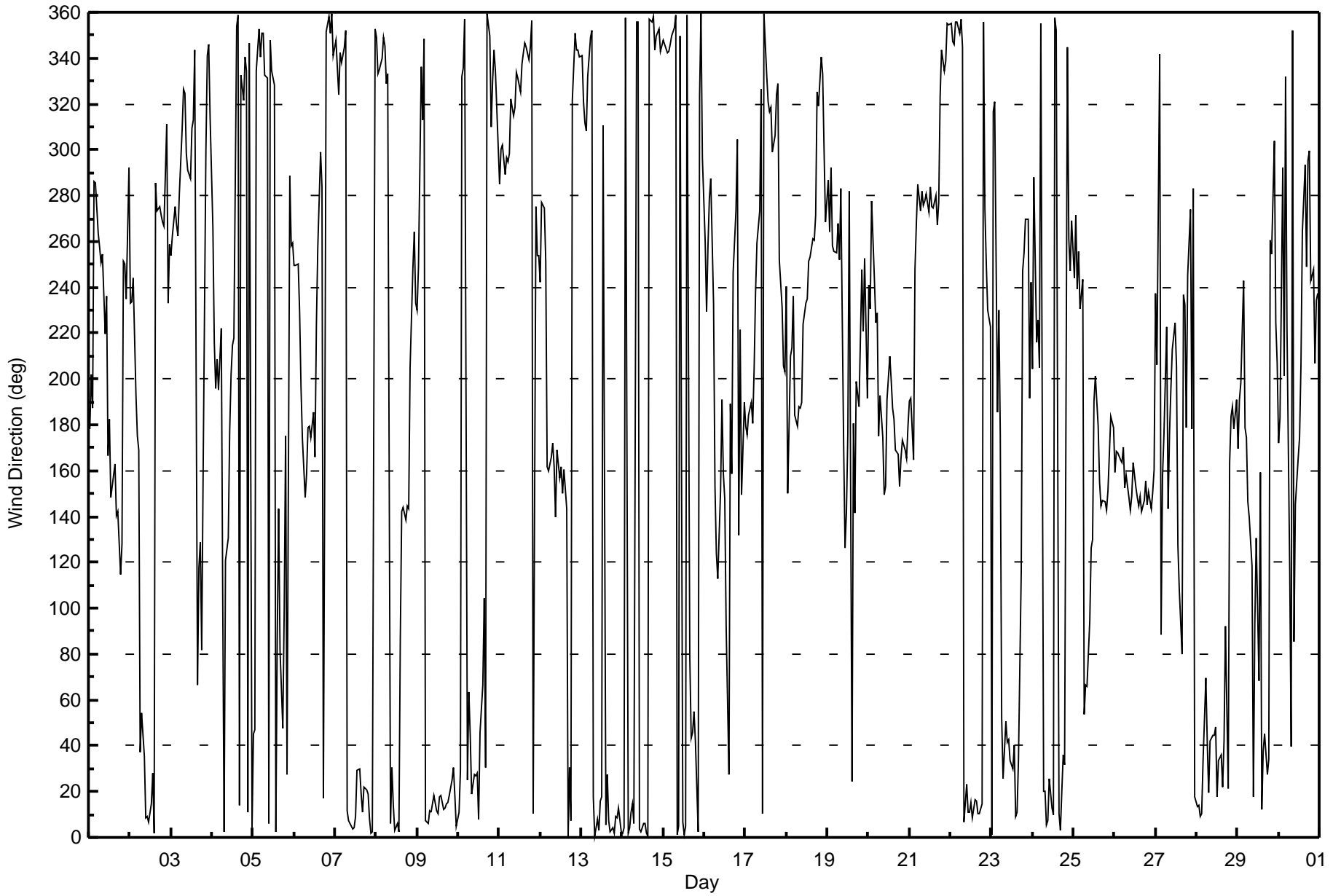
Wind Direction (WD) - deg
Fort McKay South - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Jun 19 09:00 Minimum Value: 6 deg on Jun 22 22:00 Percentiles: P ₁ = 9 P ₁₀ = 15 Q ₁ = 18 Median = 27 Q ₃ = 43 P ₉₀ = 64 P ₉₉ = 92		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	91	22	20	90	39	69	34	33	40	30	33	39	18	21	32	56	56	34	24	42	17	38	60	79	91
2-Jun	27	50	80	27	49	91	101	42	28	20	21	18	27	19	23	26	28	28	43	79	30	37	58	35	101
3-Jun	23	29	25	25	24	34	26	26	49	31	28	43	43	46	89	53	32	35	44	73	37	13	20	44	89
4-Jun	52	26	20	43	30	97	64	67	92	49	80	44	33	64	47	23	17	39	17	16	15	20	21	25	97
5-Jun	87	40	31	17	15	15	17	18	17	26	29	23	36	64	83	80	76	32	49	43	55	87	45	64	87
6-Jun	45	42	24	31	37	53	14	24	31	29	27	46	38	38	38	41	42	69	83	49	14	13	17	13	83
7-Jun	21	13	18	12	11	8	15	14	16	16	17	16	16	24	21	24	19	19	18	18	16	15	16	14	24
8-Jun	13	9	10	11	15	16	15	21	40	29	26	24	19	31	74	28	21	19	14	13	52	15	12	23	74
9-Jun	21	14	17	38	19	19	18	17	17	18	20	18	19	19	18	20	18	18	17	17	17	19	15	13	38
10-Jun	19	34	27	18	34	17	42	64	73	26	50	61	65	29	53	38	24	18	18	27	16	17	29	21	73
11-Jun	19	15	19	21	20	27	30	24	26	27	28	31	32	28	36	23	27	25	23	22	39	30	43	27	43
12-Jun	21	55	33	48	18	11	12	14	16	39	23	16	15	24	62	27	70	55	43	88	32	13	14	12	88
13-Jun	16	32	32	34	22	28	36	90	95	51	25	38	39	46	45	44	27	19	18	17	15	15	14	17	95
14-Jun	17	17	18	16	18	17	15	18	17	17	16	17	17	18	18	16	17	16	16	15	16	16	22	16	22
15-Jun	16	13	13	13	13	14	16	16	18	17	24	24	20	19	18	28	26	22	25	31	42	58	49	67	67
16-Jun	58	57	35	31	52	61	26	20	38	63	39	36	54	60	27	85	39	92	28	67	33	15	36	17	92
17-Jun	11	20	13	9	16	72	71	23	30	31	36	68	24	30	32	32	34	31	26	21	15	24	52	86	86
18-Jun	71	96	30	40	26	34	19	20	21	24	33	30	44	55	34	29	30	33	23	21	23	17	26	23	96
19-Jun	50	28	75	44	19	17	37	58	104	89	59	61	79	74	75	76	89	72	29	33	23	37	12	80	104
20-Jun	55	61	45	25	42	26	27	33	57	53	17	20	29	23	13	12	11	10	14	13	11	12	55	35	61
21-Jun	11	15	45	41	29	35	31	34	44	38	43	33	32	29	28	27	26	26	33	15	14	16	18	17	45
22-Jun	17	17	17	18	17	16	18	19	23	19	22	20	20	20	23	21	20	21	16	24	40	6	9	17	40
23-Jun	78	63	63	36	28	62	66	58	33	24	35	29	26	37	56	50	33	45	34	18	48	61	39	57	78
24-Jun	62	83	48	45	64	59	15	20	15	15	29	24	27	24	29	30	25	31	29	18	51	20	30	58	83
25-Jun	38	41	29	50	33	68	45	34	44	55	36	36	34	67	40	27	24	20	13	13	13	15	12	9	68
26-Jun	8	12	10	9	8	11	15	18	13	17	15	19	16	15	14	14	13	15	13	16	34	16	17	22	34
27-Jun	28	63	40	75	29	19	42	30	15	23	35	36	21	38	33	51	64	56	61	22	57	57	83	18	83
28-Jun	22	16	16	16	22	32	24	17	24	22	24	27	19	24	34	33	47	66	40	87	19	22	16	14	87
29-Jun	13	16	16	9	27	24	26	17	73	72	76	72	42	54	32	22	29	22	69	25	21	58	64	79	79
30-Jun	65	25	51	52	83	71	83	84	43	47	24	27	32	45	30	35	33	30	31	69	36	51	47	65	84
Diurnal Maximum																									
91 96 80 90 83 97 101 90 104 89 80 72 79 74 89 85 89 92 83 88 57 87 83 86																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort McKay South - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	June 7, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	8:10	End time (MST):	12:13
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.8</u>	ppm	Cal Gas Exp Date	September 8, 2018
Cal Gas Cylinder #	<u>LL110515</u>			
Calibrator Make/Model	Sabio 4010		Serial Number	11041107
ZAG Make/Model	API 701		Serial Number	5613

Analyzer Information

Analyzer make: API T100

Analyzer serial #: 599

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		HVPS voltage	524	524
Calculated slope	1.003916	1.000823	Lamp voltage	2270	2357
Calculated intercept	1.089808	0.993549	Pressure	26.3	26.3
Analyzer Background	32.9	32.9	Flow	693	691
Analyzer Coefficient	1.052	1.052	Lamp Ratio	77	80

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.4	----
as found span	4923	78.8	784.6	781.0	1.005
calibrator zero	5000	0.0	0.0	1.0	----
high point	4923	78.8	784.6	784.2	1.000
second point	4961	39.4	392.4	389.2	1.008
third point	4977	19.7	196.3	193.8	1.013
as left zero	5000	0.0	0.0	0.9	----
as left span	4923	78.8	784.6	779.0	1.007
Average Correction Factor					1.007
Corrected As found	780.60	Previous response	780.41	*% change	0.0%

* = > +/-5% change initiates investigation

Notes:

No adjustments or maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

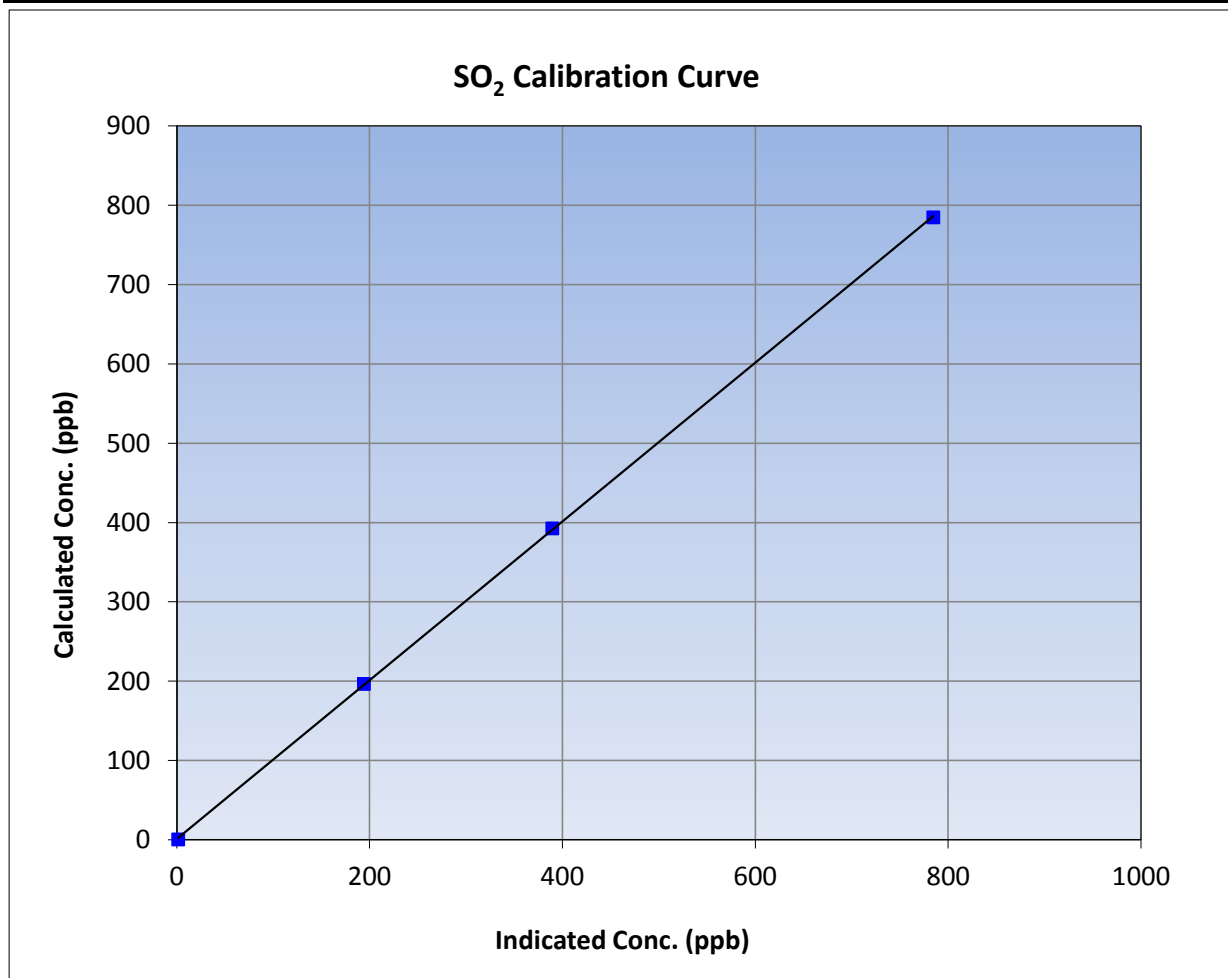
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	11:50
Analyzer make	API T100	Analyzer serial #	599

Calibration Data

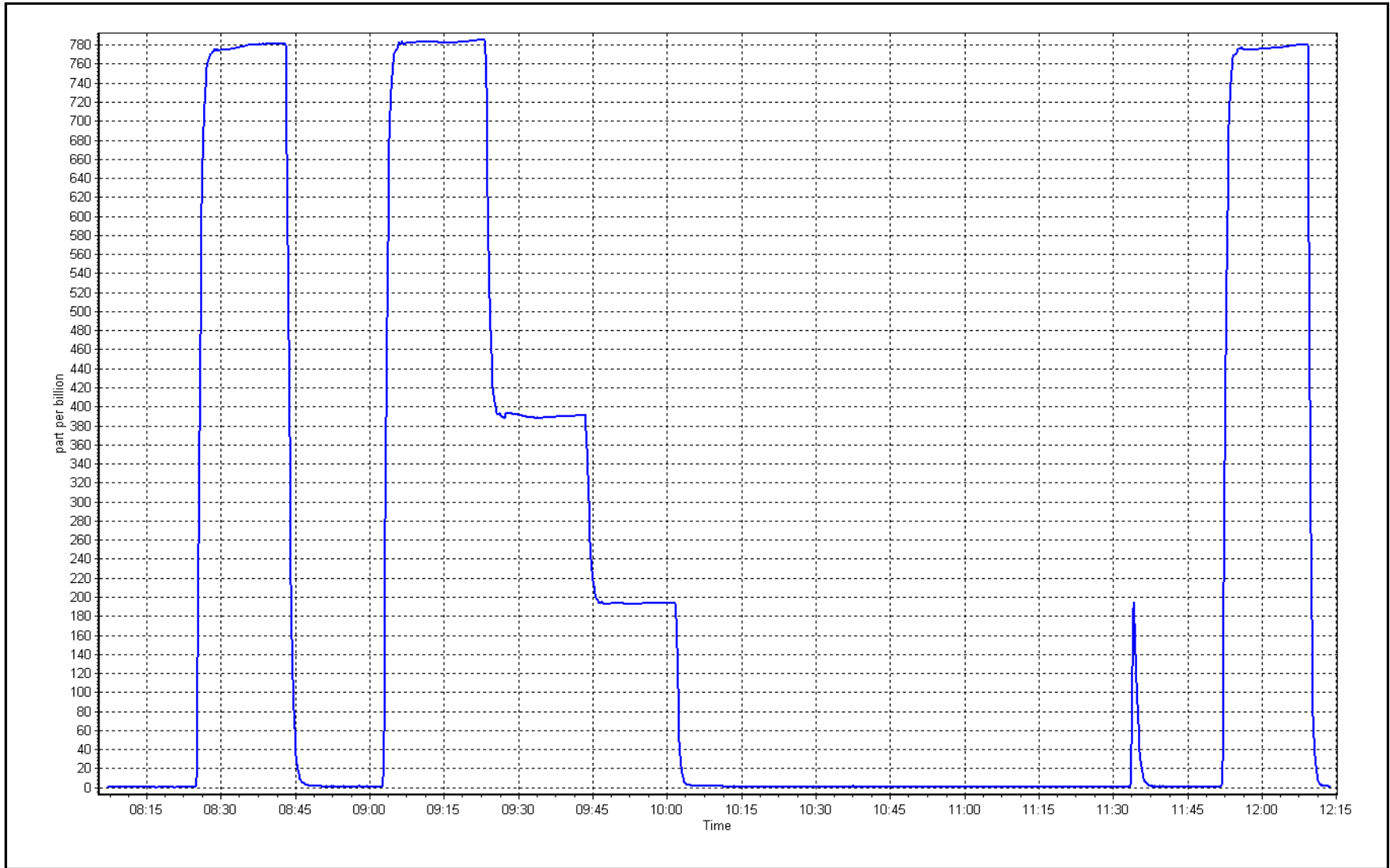
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	1.0	----	Correlation Coefficient	0.999967	≥ 0.995
784.6	784.2	1.0005	Slope	1.000823	0.90 - 1.10
392.4	389.2	1.0082			
196.3	193.8	1.0131	Intercept	0.993549	+/-30



SO2 Calibration Plot

Date: June 7, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

TRS Calibration Summary

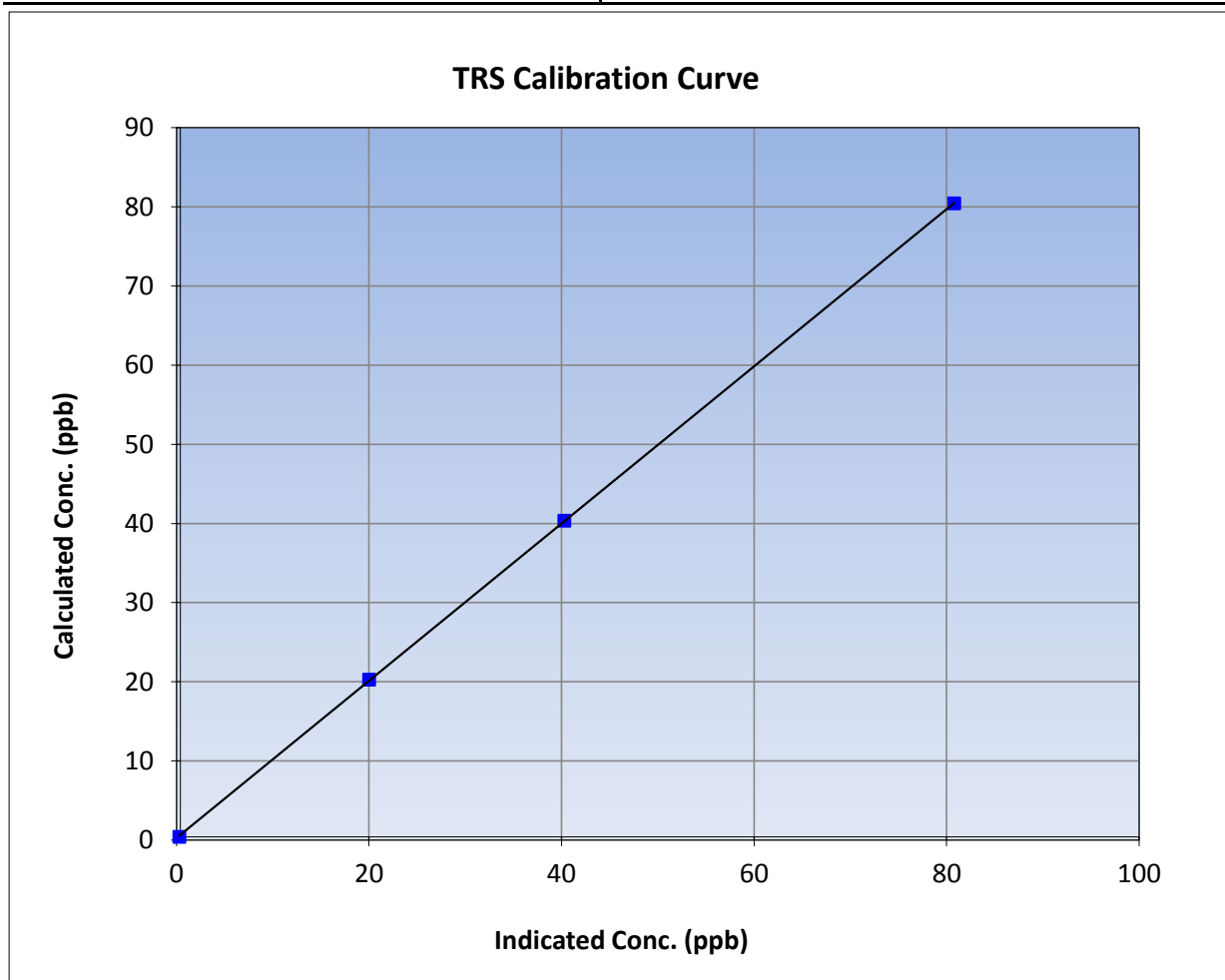
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 11, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	9:15	End Time (MST)	11:28
Analyzer make	Thermo 43i-LTE	Analyzer serial #	1218153359

Calibration Data

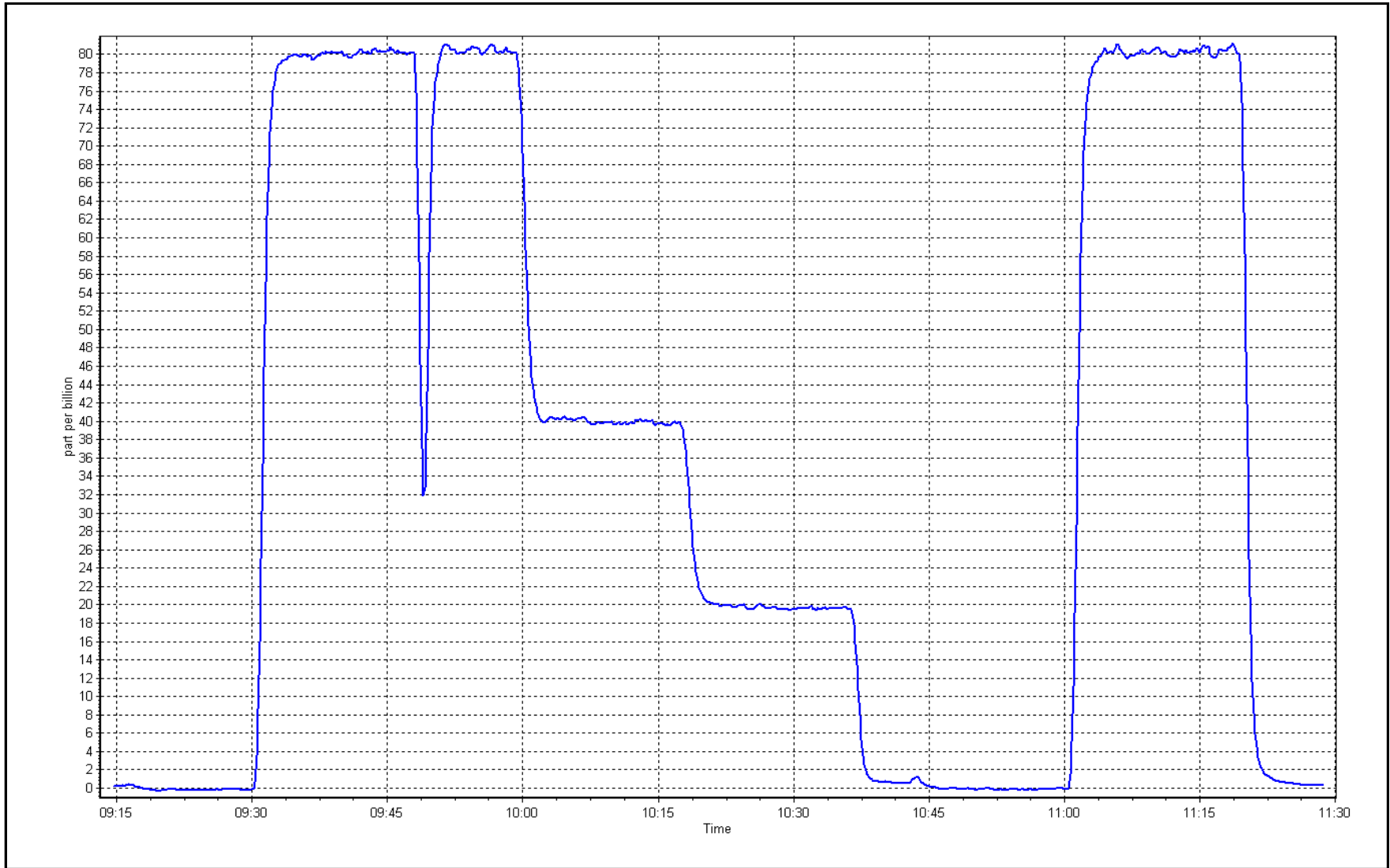
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999984	≥0.995
80.0	80.4	0.9955			
40.0	39.9	1.0014	Slope	0.993291	0.90 - 1.10
19.9	19.6	1.0139			
			Intercept	0.251120	+/-3



TRS Calibration Plot

Date: June 8, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	June 7, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	8:10	End time (MST):	12:11
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL110515	Cal Gas Expiry Date	September-08-18
CH4 Cal Gas Conc.	<u>517.0</u> ppm	CH4 Equiv Conc.	1067.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Sabio 4010	Serial Number	11041107
ZAG Make/Model	Teledyne API 701	Serial Number	5613

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1505164380
	<u>Start</u>	<u>Finish</u>	<u>Start</u> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-303.0 -303.2
Calculated slope	0.997714	Sample pressure	9.2 9.2
Calculated intercept	0.013262	Fuel pressure	23.1 23.1
Analyzer Background	3.061	Air pressure	34.2 34.2
Analyzer Coefficient	1.330	Flame temperature	152.4 152.4

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.00	0.08	----
as found span	4920	78.9	16.84	16.98	0.992
calibrator zero	5000	0.0	0.00	-0.01	----
high point	4920	78.9	16.84	16.73	1.007
second point	4969	39.3	8.37	8.31	1.008
third point	4981	19.6	4.18	4.11	1.018
as left zero	5000	0.0	0.00	-0.01	----
as left span	4920	78.9	16.84	16.83	1.001
Average Correction Factor					1.011
Corrected As found	16.90	Previous response	16.87	*% change	-0.2%

* = > +/-5% change initiates investigation

Notes: no maintenance done, zero adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

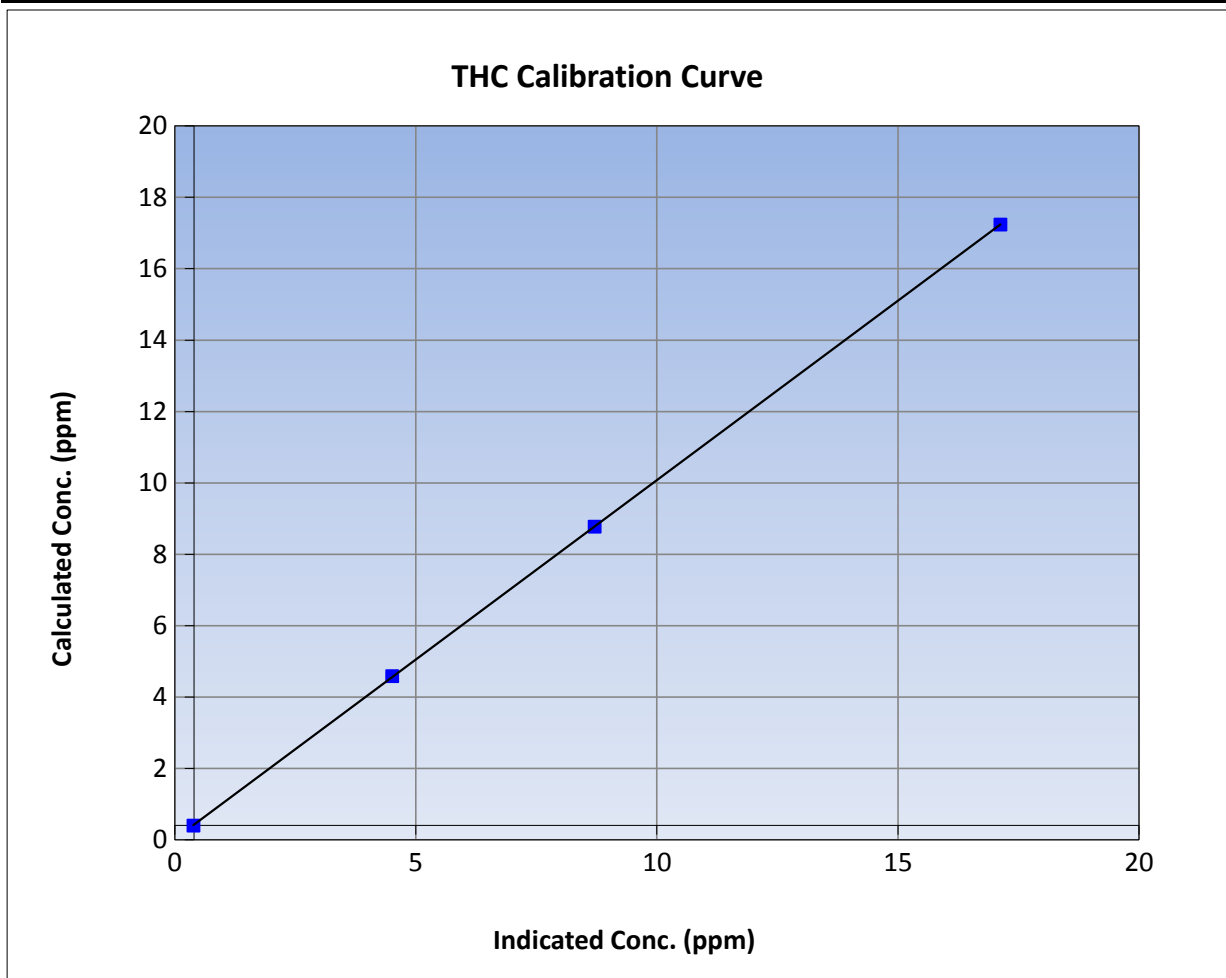
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	11:50
Analyzer make	Thermo 51i-LT	Analyzer serial #	1505164380

Calibration Data

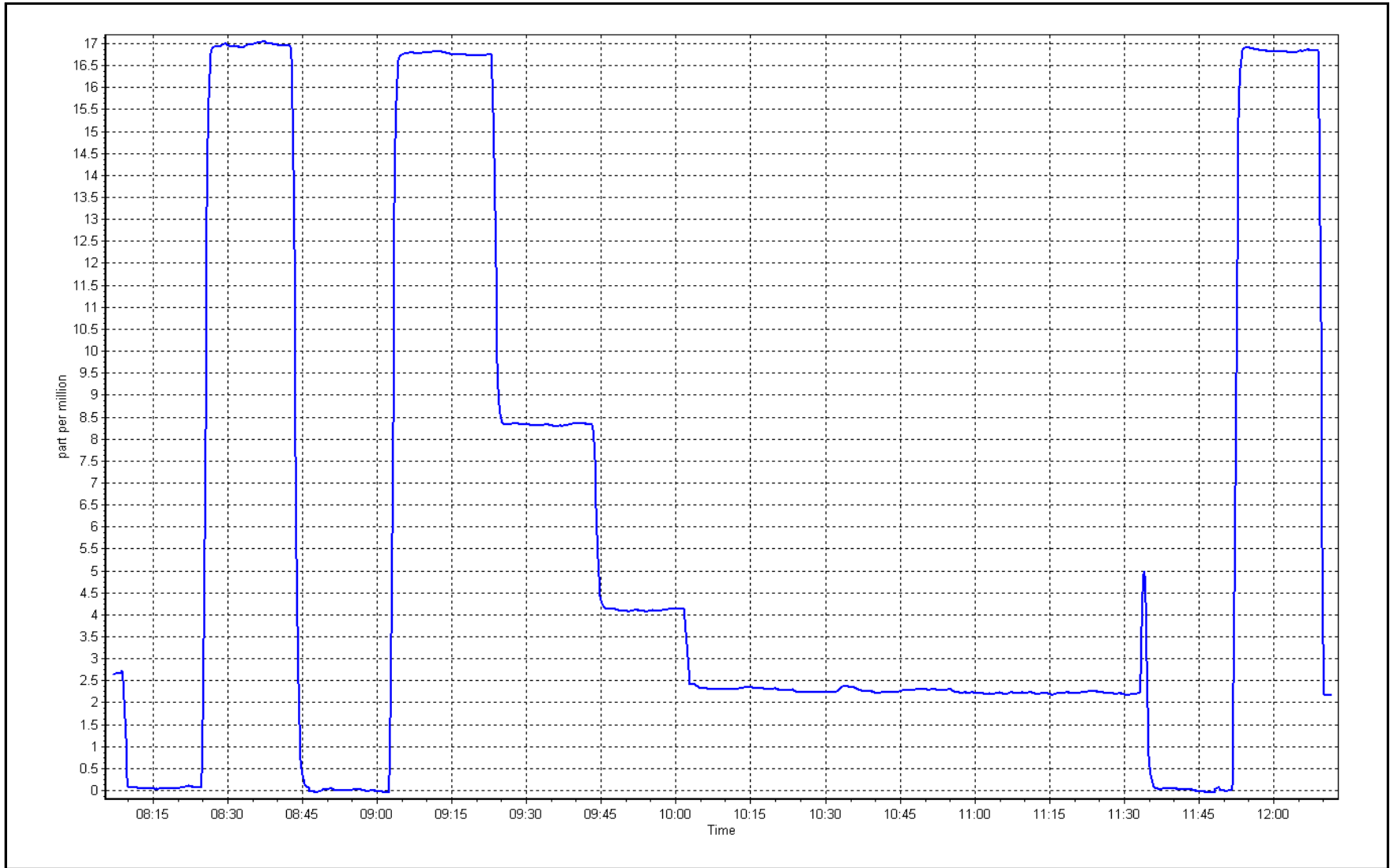
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
16.8	16.7	1.0066			
8.4	8.3	1.0075	Slope	1.005277	0.90 - 1.10
4.2	4.1	1.0176			
			Intercept	0.025511	+/-1.5



THC Calibration Plot

Date: June 7, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	June 8, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	6:50	End time (MST):	10:24
Reason:	Routine		

Calibration Standards

O3 generation mode:	Nox GPT	O3 reference Date:	June 7, 2017
Calibrator Make/Model:	Sabio 4010	Serial Number:	5613
ZAG Make/Model:	Teledyne API 701	Serial Number:	11038

Analyzer Information

Analyzer make: API T400

Analyzer serial #: 825

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	26.5	26.5
Calculated slope	1.000724	1.006029	Flow	757	757
Calculated intercept	-0.073052	-0.494757	Intensity	4366.9	4366.9
Analyzer Background	1.3	1.3			
Analyzer Coefficient	1.002	1.002			

O₃ Calibration Data

Set Point	Total air flow rate (scm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.6	----
as found span	5000	0.896	355.9	354.4	1.004
calibrator zero	5000	0.0	0.0	0.6	----
high point	5000	0.896	355.9	354.4	1.004
second point	5000	0.581	211.4	210.4	1.005
third point	5000	0.355	111.4	111.2	1.002
as left zero	5000	0.0	0.0	1.2	----
as left span	5000	0.896	355.9	361.5	0.985
Average Correction Factor					1.004

Corrected As found	353.80	Previous response	355.72	*% change	0.5%
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* = > +/-8% change initiates investigation

Notes:

no maintenance or adjustments done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

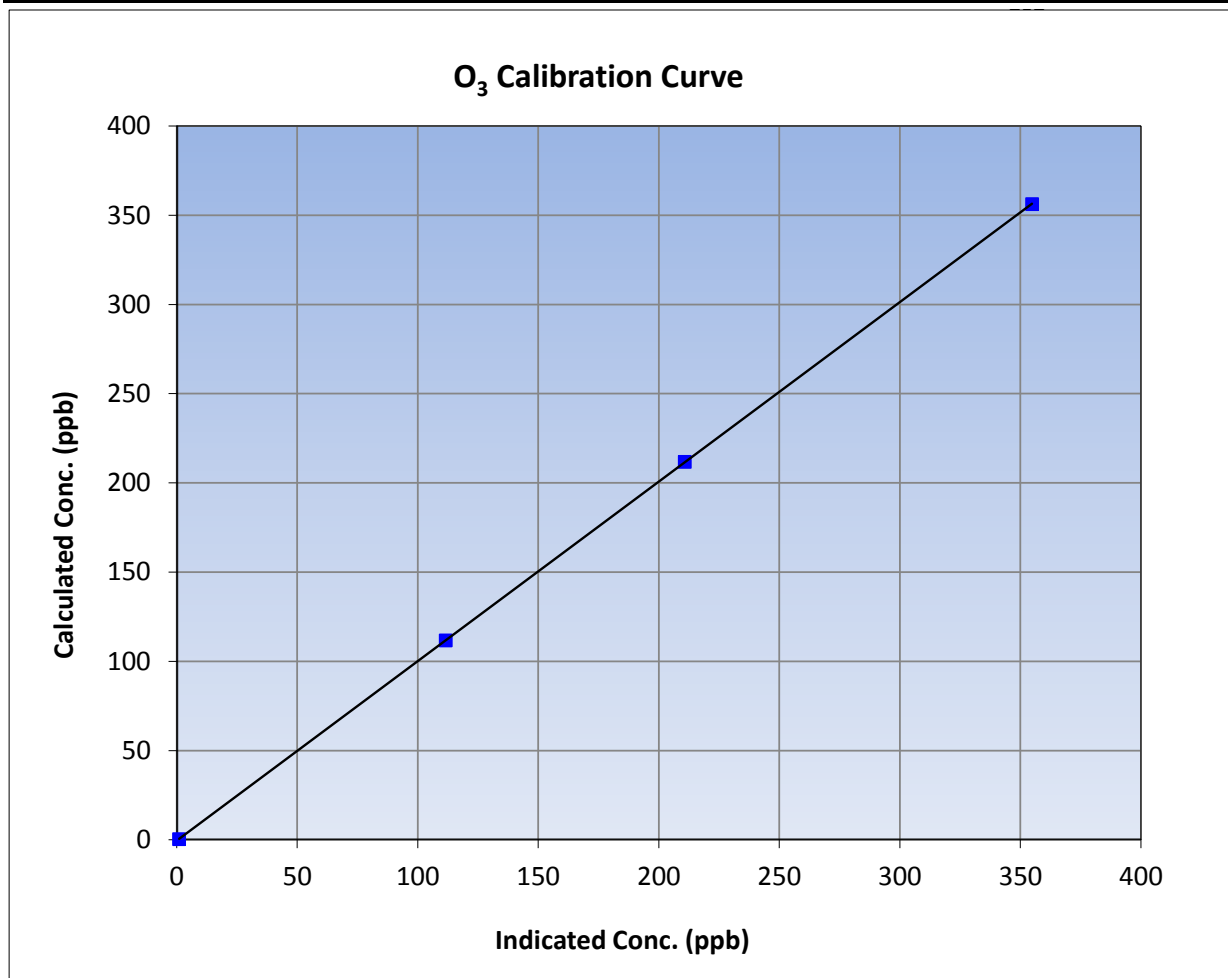
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 11, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	6:50	End Time (MST)	10:24
Analyzer make	API T400	Analyzer serial #	825

Calibration Data

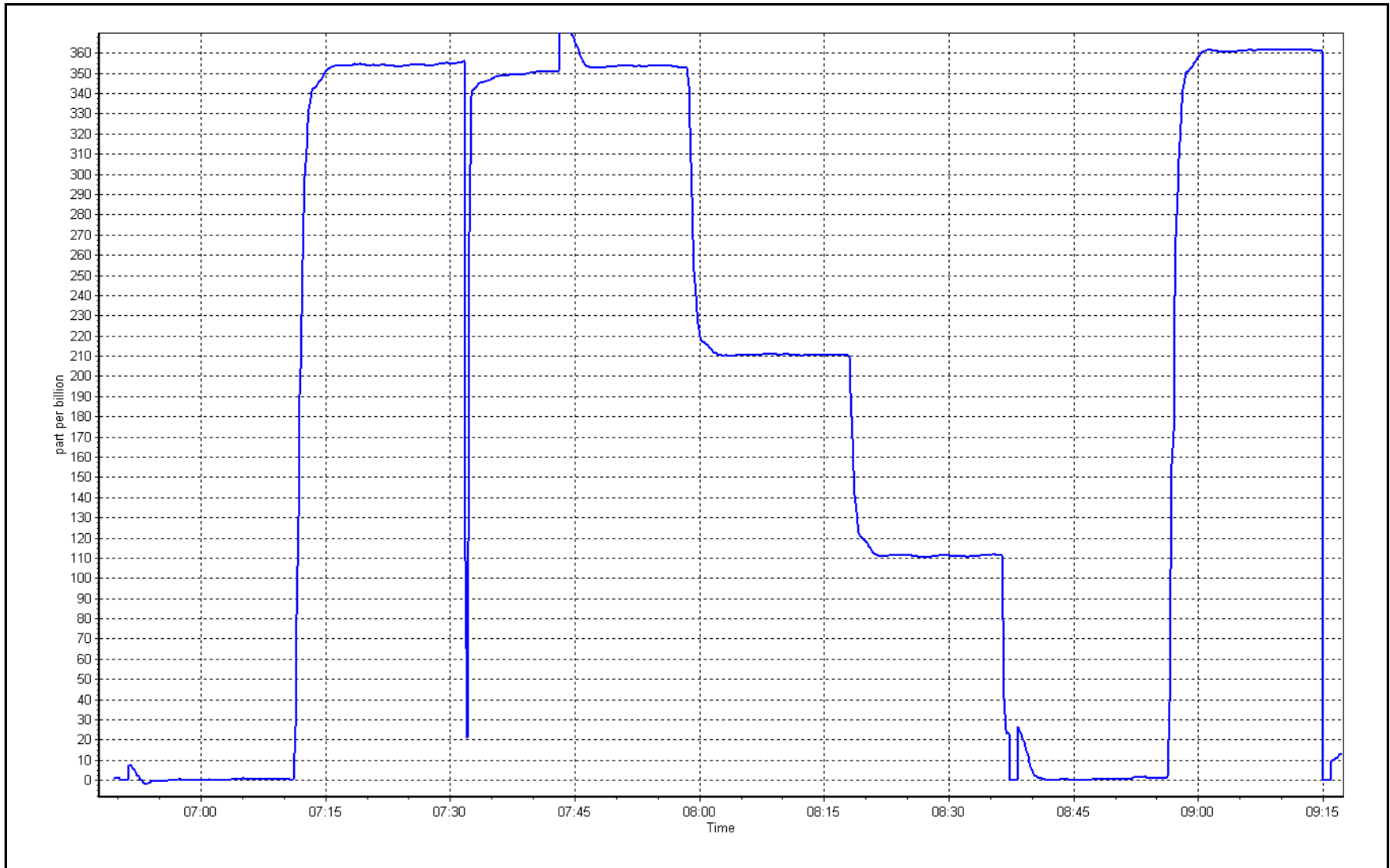
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.6	----	Correlation Coefficient	0.999999	≥ 0.995
355.9	354.4	1.0042	Slope	1.006029	0.90 - 1.10
211.4	210.4	1.0048	Intercept	-0.494757	+/- 10
111.4	111.2	1.0018			



O₃ Calibration Plot

Date: June 8, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	June 7, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	8:10	End time (MST):	12:11
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL110515	Cal Gas Expiry Date	September-08-18
NOX Cal Gas Conc.	<u>50.9</u> ppb	NO Cal Gas Conc.	<u>50.7</u> ppb
Calibrator Model	Sabio 4010	Serial Number	11041107
ZAG make/model	API T701	Serial Number	5613

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1410661329		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.102	1.140	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.002	1.002	PMT Temperature	-2.7	-2.7
NO2 coefficient	1.000	1.000	Reaction cell Press	193.8	193.8
NO bkgrnd	8.1	8.4	Sample Flow	0.770	0.770
NOX bkgrnd	8.2	8.5	PMT Voltage	-827.7	-827.7

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.997599	1.000841
NO _x Cal Offset	0.925899	0.689004
NO Cal Slope	0.997396	1.000634
NO Cal Offset	0.864931	0.708630
NO ₂ Cal Slope	1.009883	1.004965
NO ₂ Cal Offset	0.480292	0.189110



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
as found span	4923	78.8	801.9	798.7	3.2	784.3	780.4	4.0	1.0224	1.0235
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.2	0.1	----	----
high point	4923	78.8	801.9	798.7	3.2	801.4	798.4	3.0	1.0006	1.0004
second point	4961	39.4	401.1	399.5	1.6	398.4	396.8	1.6	1.0067	1.0068
third point	4977	19.7	200.7	199.9	0.8	199.6	199.0	0.5	1.0054	1.0045
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.1	----	----
as left span	4923	78.8	801.9	445.5	356.4	810.7	449.2	361.6	0.9891	0.9918
Average Correction Factor									1.0042	1.0039

Corrected As found	NO _x = 784.2 ppb	NO = 780.4 ppb		*Percent Change	NO _x = 2.4%
Previous Response	NO _x = 802.9 ppb	NO = 800.0 ppb		*Percent Change	NO = 2.5%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		3.2	803.8	801.4	2.4	0.9976	0.9967	----	----
1st NO2 (400 ppb O3)	445.5	359.1	802.5	445.5	357.1	0.9992	----	1.0055	99.5%
2nd NO2 (200 ppb O3)	590.0	214.6	803.5	590.0	213.6	0.9980	----	1.0045	99.6%
3rd NO2 (100 ppb O3)	690.0	114.6	803.0	690.0	113.2	0.9986	----	1.0119	98.8%
2nd NO ref point	----	3.2	800.3	798.0	2.2	1.0020	1.0009	----	----
Average Correction Factor						0.9995	0.9988	1.0073	99.3%

Notes:

Span adjusted, no maintenance done;

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

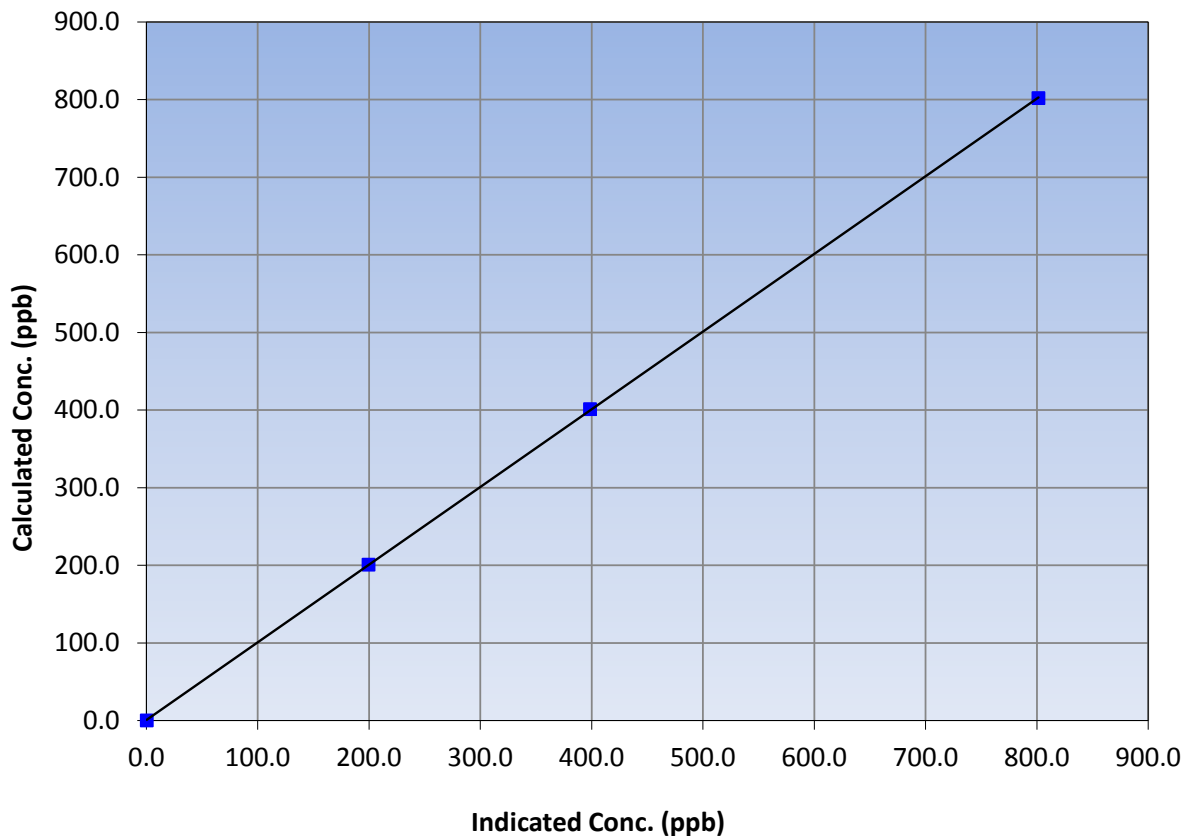
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	11:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
801.9	801.4	1.0006			
401.1	398.4	1.0067			
200.7	199.6	1.0054			
			Slope	1.000841	0.90 - 1.10
			Intercept	0.689004	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

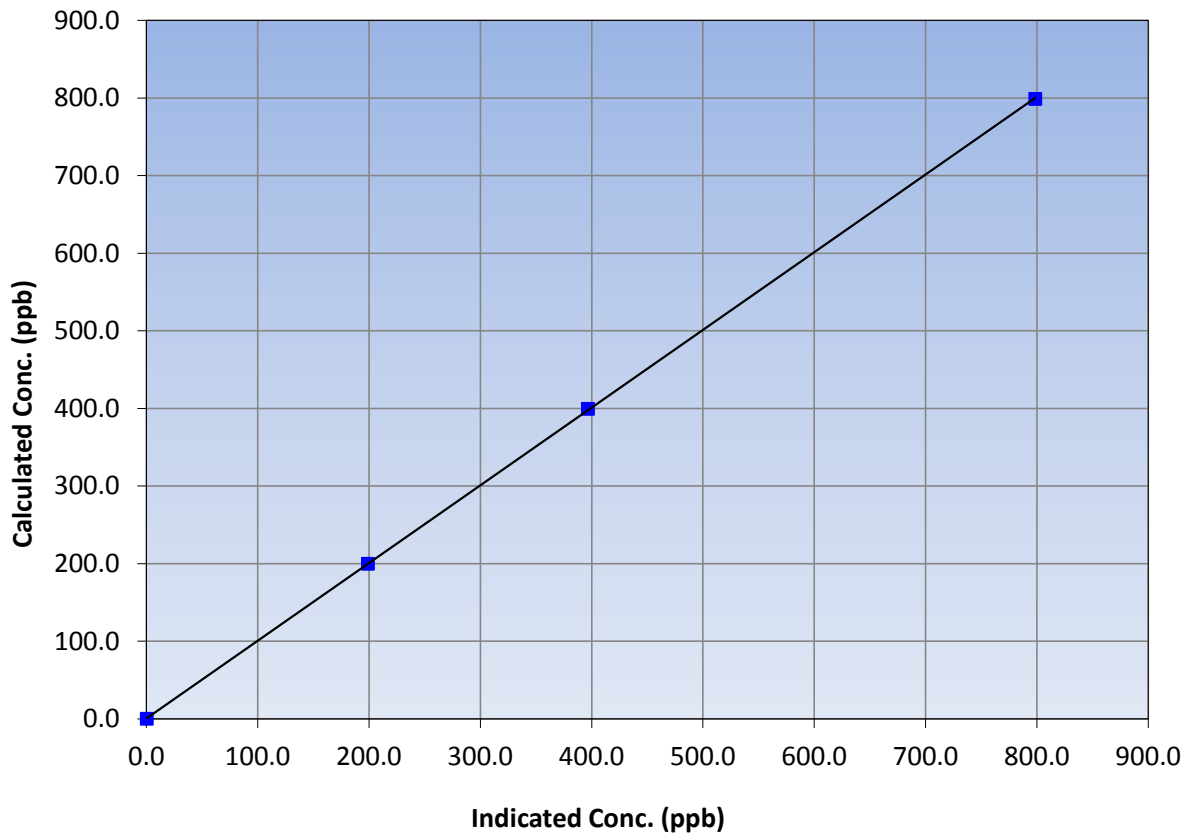
Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	11:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
798.7	798.4	1.0004			
399.5	396.8	1.0068			
199.9	199.0	1.0045			
			Slope	1.000634	0.90 - 1.10
			Intercept	0.708630	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

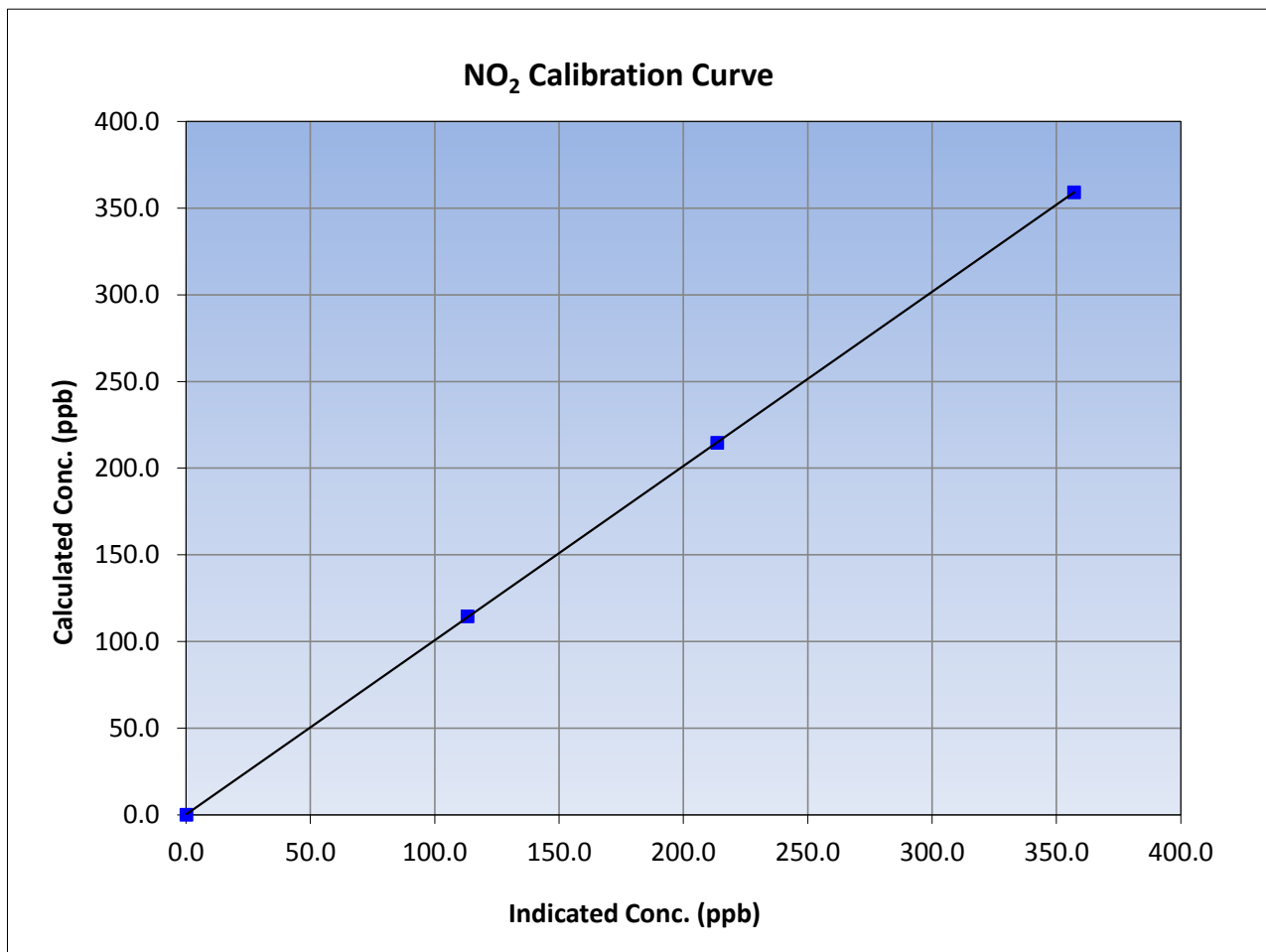
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	11:50
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Data

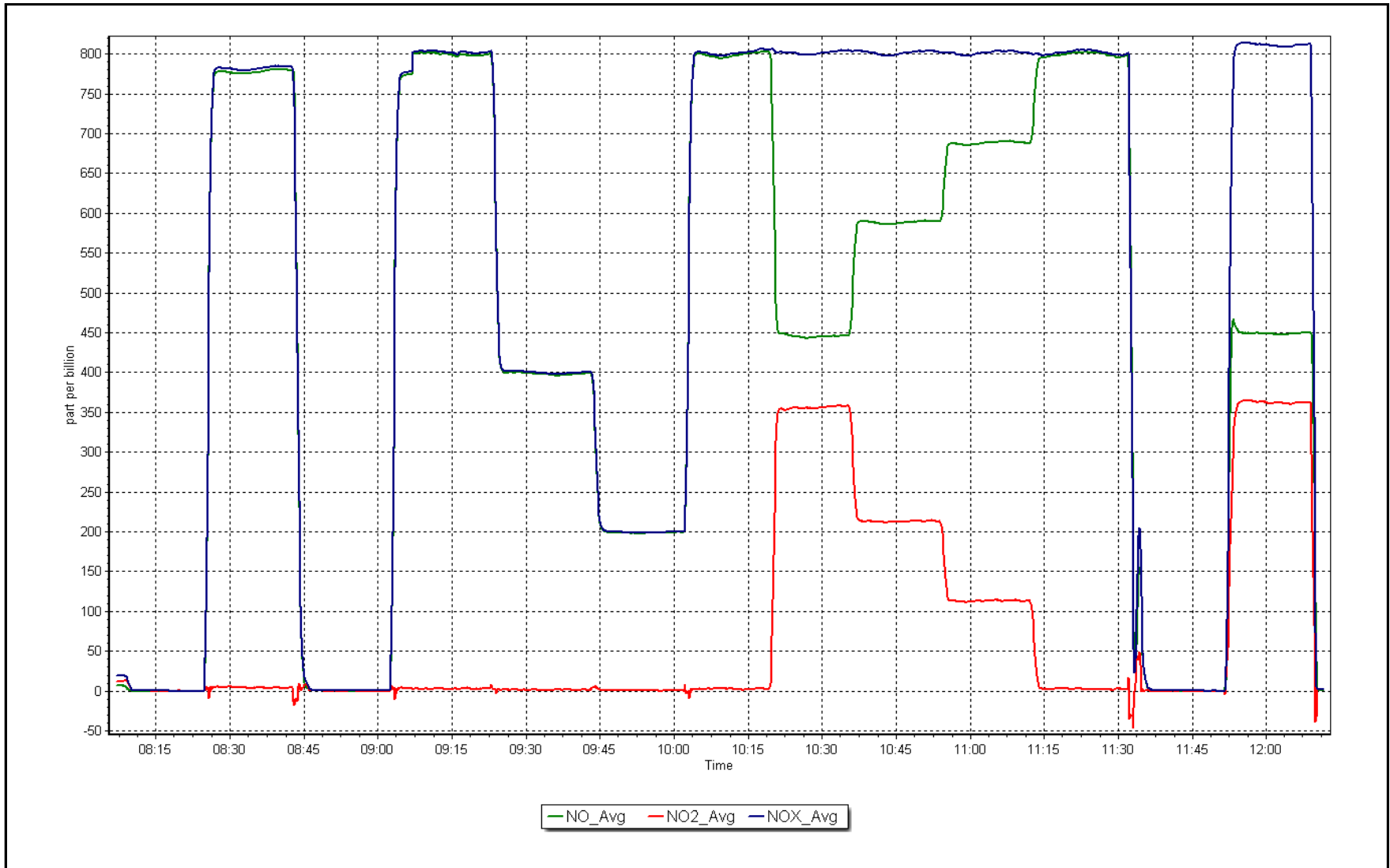
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
359.1	357.1	1.0055			
214.6	213.6	1.0045			
114.6	113.2	1.0119			
			Slope	1.004965	0.90 - 1.10
			Intercept	0.189110	+/-20



NO_x Calibration Plot

Date: June 7, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	June 13, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	7:01	End time (MST):	7:45
Sharp Model:	5030	S/N:	E-803
Particulate Fraction:	PM2.5	C14 Source S/N:	4066
Flow Meter Make/Model:	Delta Cal	S/N:	1450
Temp/RH standard:	Delta Cal	S/N:	1450

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	14	12.5	14	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	964	976	964	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	995	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	2.5	-----	-0.1	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: April 11, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>5872</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1337</u>	
	Calibration Date: _____	Calibration Date: <u>April 11, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: _____	Correction Factor: <u>7150</u>	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Nephelometer adjusted, Cyclone head cleaned

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 14
ANZAC
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100	6	0	1	0
TRS(ppb) Average	686	34	34	100	1	0	0	0
THC(ppm) Average	684	34	36	99.72	2.5	-	2.1	-
NMHC(ppm) Average	684	34	36	99.72	0.201	-	0.048	-
CH4(ppm) Average	684	34	36	99.72	2.3	-	2	-
NO2(ppb) Average	686	34	34	100	6	0	2	-
NO(ppb) Average	686	34	34	100	8	-	1	-
NOX(ppb) Average	686	34	34	100	14	-	3	-
O3(ppb) Average	687	33	33	100	58	0	43	-
PM2.5(ug/m3) Average	717	2	3	99.86	43.2	-	10	0
AT 2m(C) Average	720	0	0	100	27.6	-	21.9	-
RH(%) Average	720	0	0	100	99	-	90	-
Leaf Wetness (% of range) Average	720	0	0	100	62	-	17	-
WS(km/h) Average	718	0	2	99.72	23	-	19	-
WD(deg) Average	718	0	2	99.72	-	-	-	-
PC(mm) Total	720	0	0	100	7.9	-	9.7	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	686	0.3	1	-	0	0	0	0	0	1	6
TRS(ppb) Average	686	0.2	0	-	0	0	0	0	0	0	1
THC(ppm) Average	684	1.98	0.1	-	1.8	1.9	1.9	1.9	2	2.1	2.5
NMHC (ppm) Average	684	0.016	0.027	-	0	0	0	0	0	0.1	0.201
CH4(ppm) Average	684	1.96	0.1	-	1.8	1.9	1.9	1.9	2	2	2.3
NO2(ppb) Average	686	1	1	-	0	0	0	1	1	2	6
NO(ppb) Average	686	0.3	1	-	0	0	0	0	0	0	8
NOX(ppb) Average	686	1.3	1	-	0	0	0	1	2	3	14
O3(ppb) Average	687	29.3	11	-	4	12	22	30	37	42	58
PM2.5(ug/m3) Average	717	5.31	4.7	-	0.6	1.6	2.1	3.8	6.6	11.5	43.2
Temperature 2 m (C) Average	720	15.13	5.1	-	2.4	8.8	11.6	14.7	18.6	22.3	27.6
Relative Humidity (%) Average	720	64.9	22	-	24	34	45	67	86	93	99
Leaf Wetness (% of range) Average	720	4	9	-	-1	-1	0	0	2	17	62
Wind Speed 20 m (km/h) Average	718	9.1	5	-	0	3	5	8	12	16	23
Wind Direction 20 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	27.69	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	23 Jun 2017 10:00	23 Jun 2017 11:00	2	Maintenance - cleaned glass manifold
PM2.5	17 Jun 2017 22:00	17 Jun 2017 22:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	06 Jun 2017 22:00	06 Jun 2017 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jun 2017 02:00	30 Jun 2017 02:00	1	Flat line in sensor output signal



Summary of Hour Averages

Anzac - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 6 ppb on Jun 4 12:00	Maximum Daily Average: 1.4 ppb on Jun 4		Hours of Data:	686
Minimum Value: 0 ppb on Jun 7 01:00	Minimum Daily Average: 0.0 ppb on Jun 28		Hours of Missing Data:	34
Maximum Diurnal Average: 0.5 ppb at hour 11	Minimum Diurnal Average: 0.2 ppb at hour 1		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	2	0	1	0	0	0	0	0	0	0	0.4	2
3-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Jun	0	0	0	0	Z	0	0	2	4	3	4	6	2	2	1	1	6	1	0	0	0	0	0	0	0	1.4	6
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.2	1
8-Jun	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.3	1
11-Jun	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jun	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
19-Jun	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
20-Jun	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
22-Jun	0	0	0	0	Z	0	0	0	0	1	2	1	1	0	0	1	1	1	1	1	1	0	0	0	0	0.6	2
23-Jun	0	0	0	0	0	Z	1	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0.4	1
24-Jun	Z	0	0	0	0	0	0	1	1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3
25-Jun	0	Z	0	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0.4	1
26-Jun	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.6	1
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	2	4	3	1	1	1	1	0.7	4
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

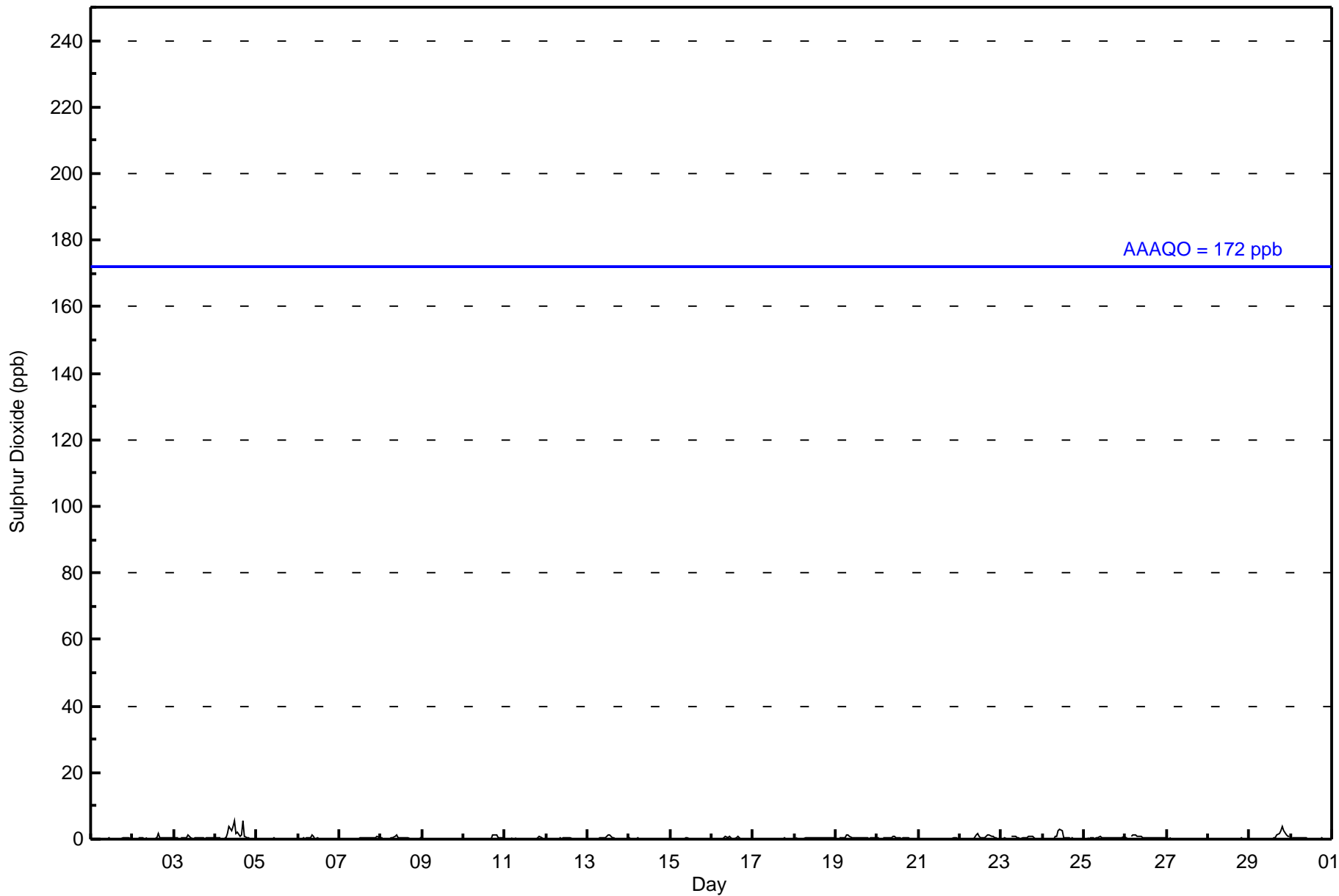
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1	1	0	1	1	1	1	1	2	4	3	4	6	2	2	1	2	6	2	2	4	3	1	1	1	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	686	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684

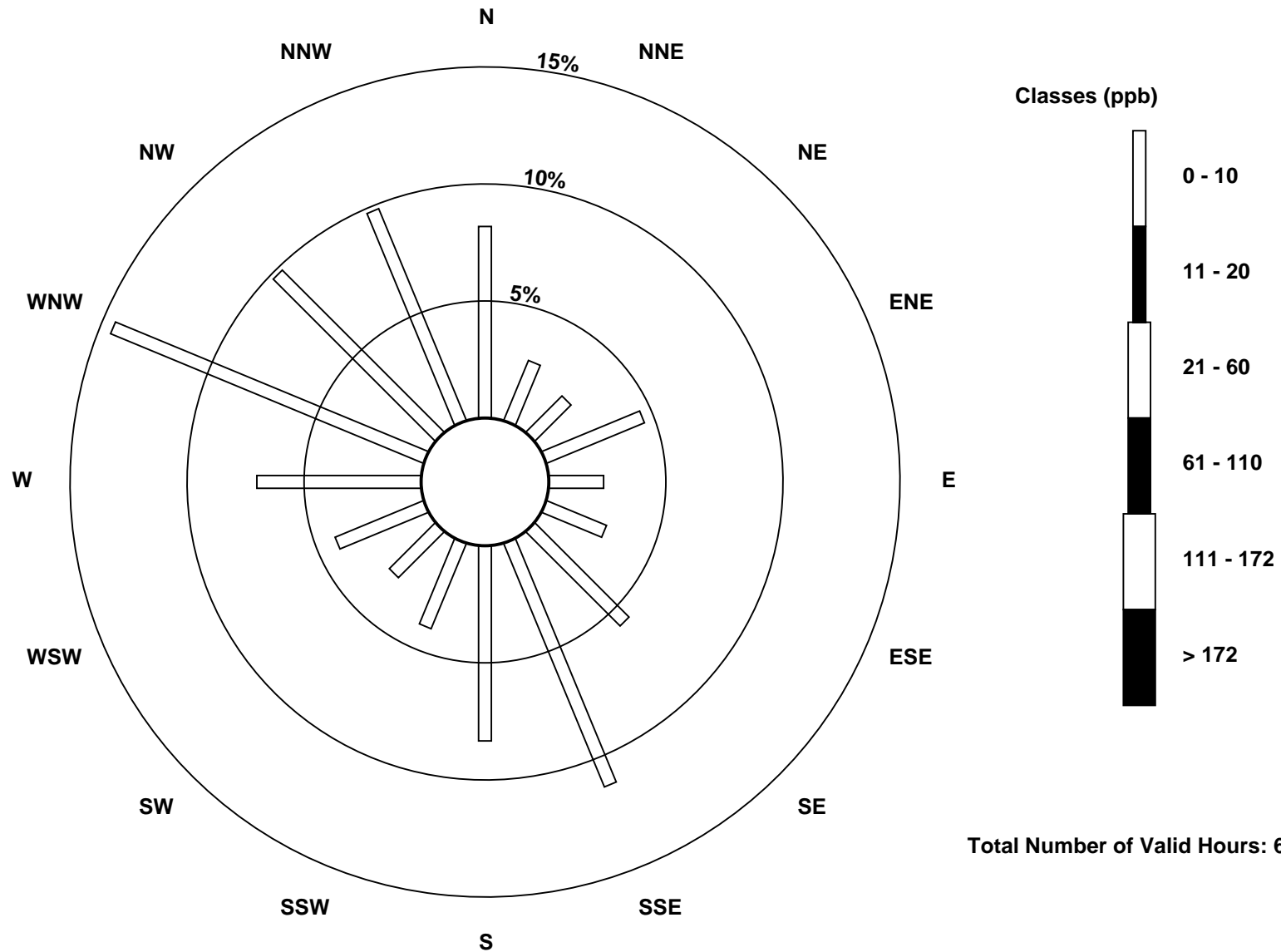
Total Number of Valid Hours: 684

Total Number of Hours: 720

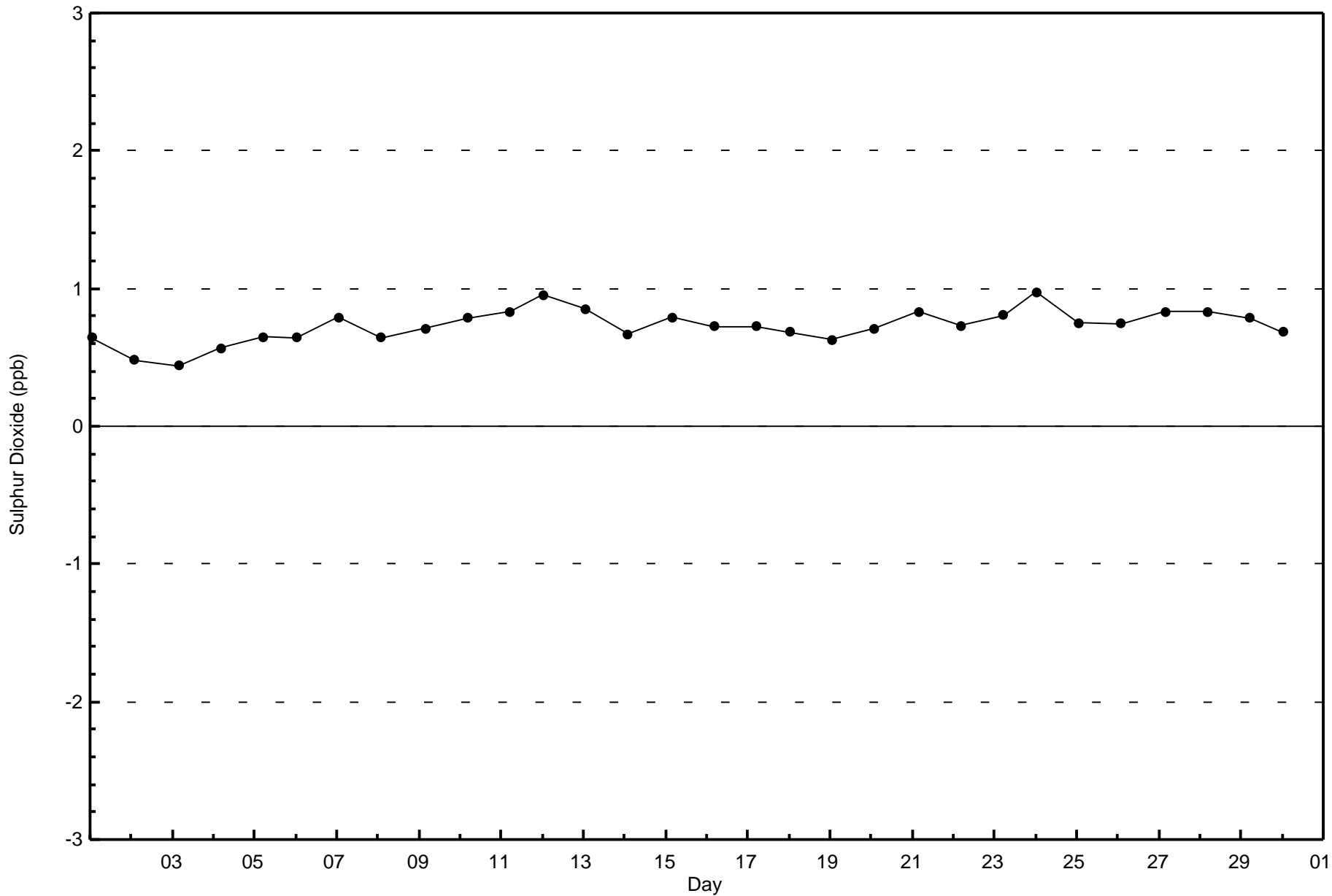


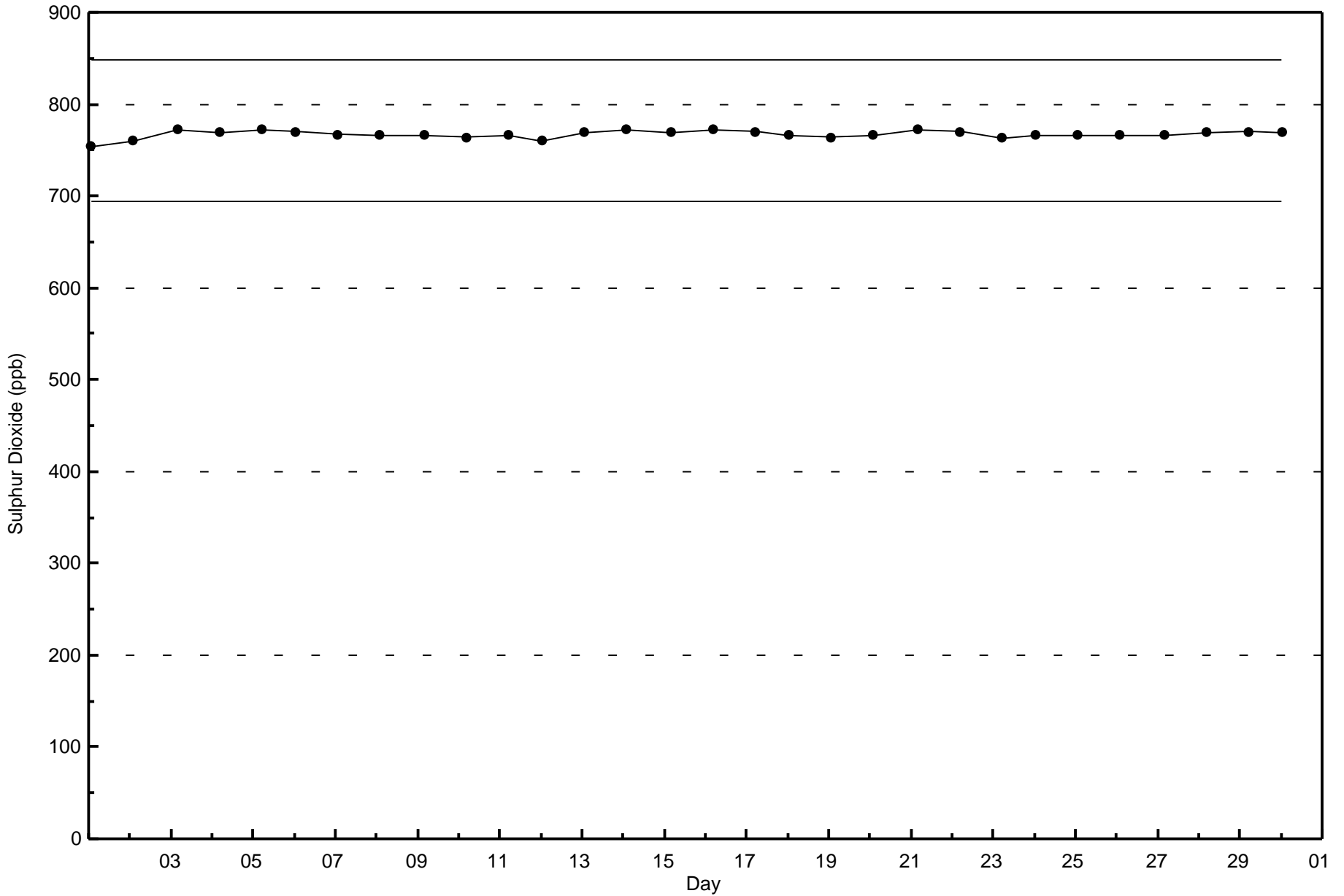
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 684







Summary of Hour Averages

Anzac - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 26 16:00	Maximum Daily Average: 0.3 ppb on Jun 7		Hours of Data:	686
Minimum Value: 0 ppb on Jun 10 11:00	Minimum Daily Average: 0.2 ppb on Jun 10		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 4	Minimum Diurnal Average: 0.2 ppb at hour 15		Hours of Calibration:	34
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0.2	0
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

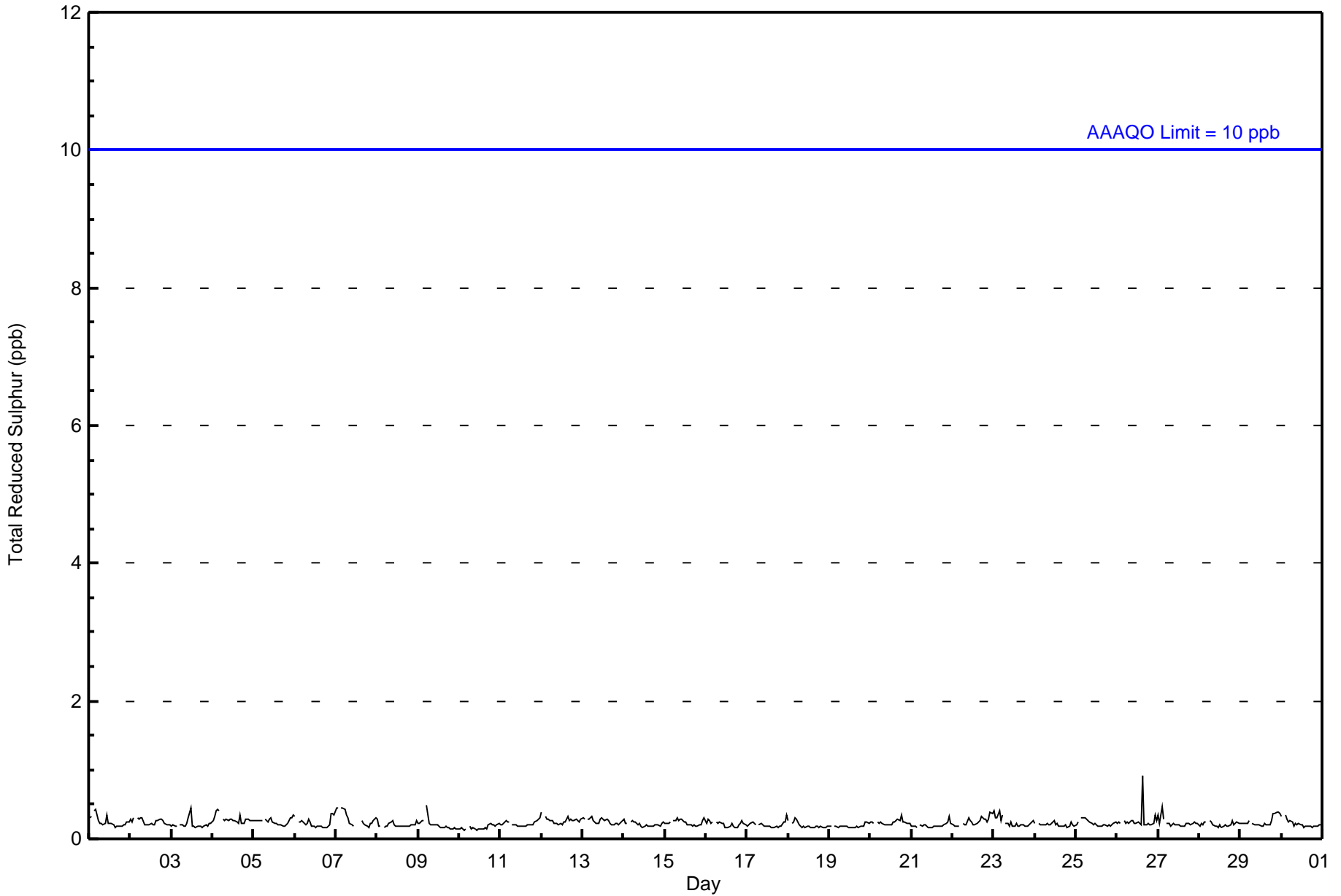
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	57	19	15	30	15	18	37	78	57	28	20	28	49	103	66	65	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	19	15	30	15	18	37	78	57	28	20	28	49	103	66	65	685

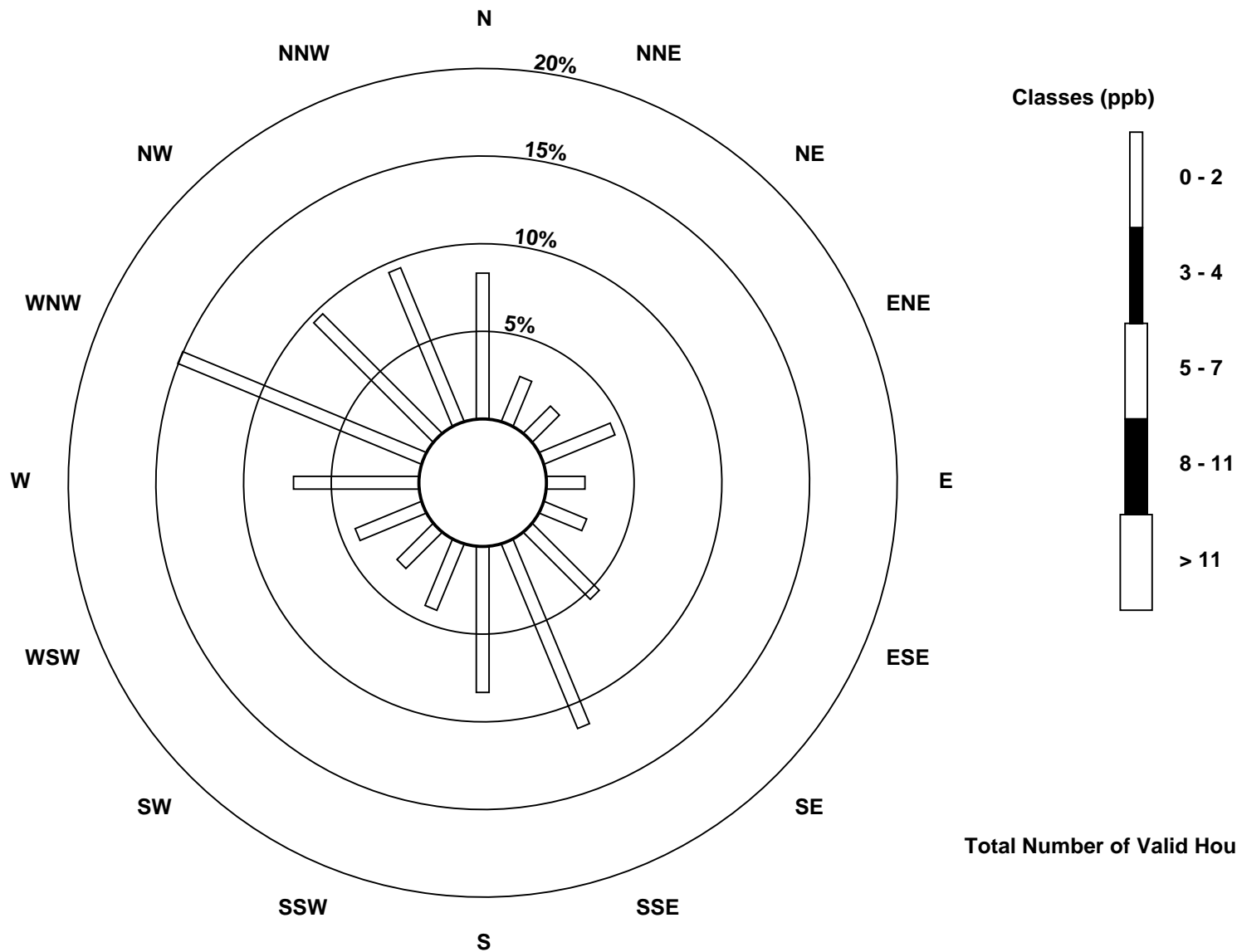
Total Number of Valid Hours: 685

Total Number of Hours: 720

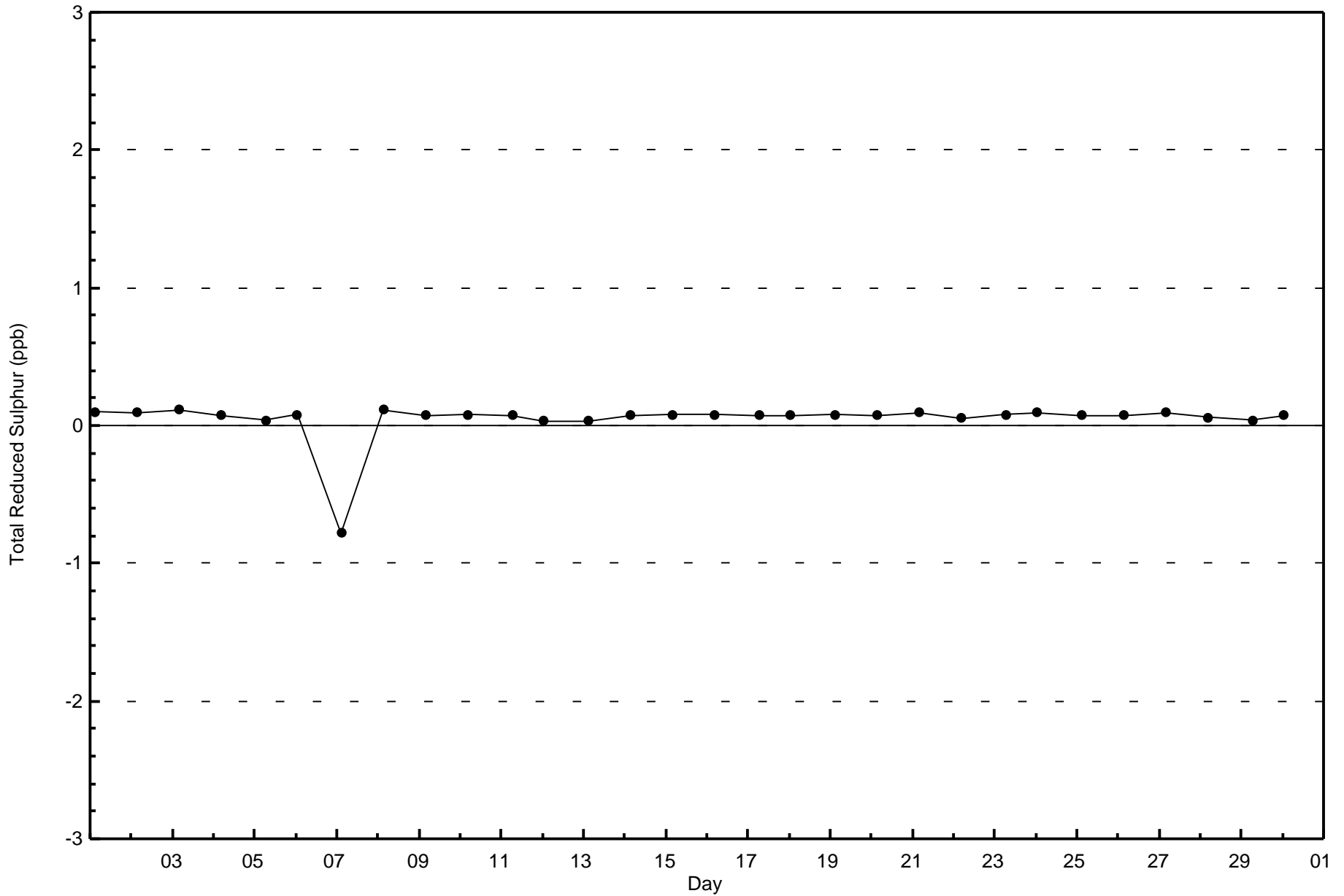


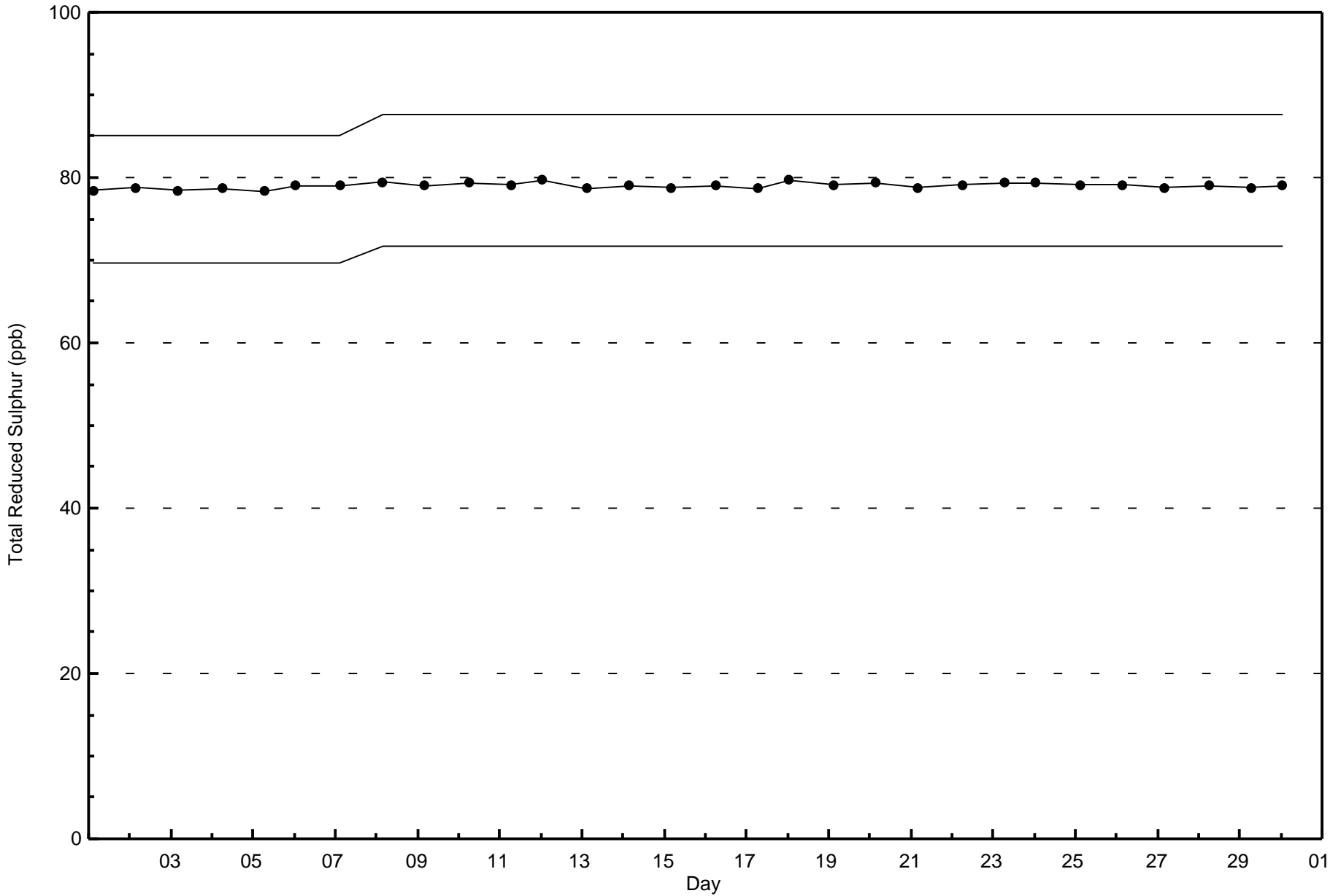
Wood Buffalo Environmental Association
Wind Rose Jun 2017

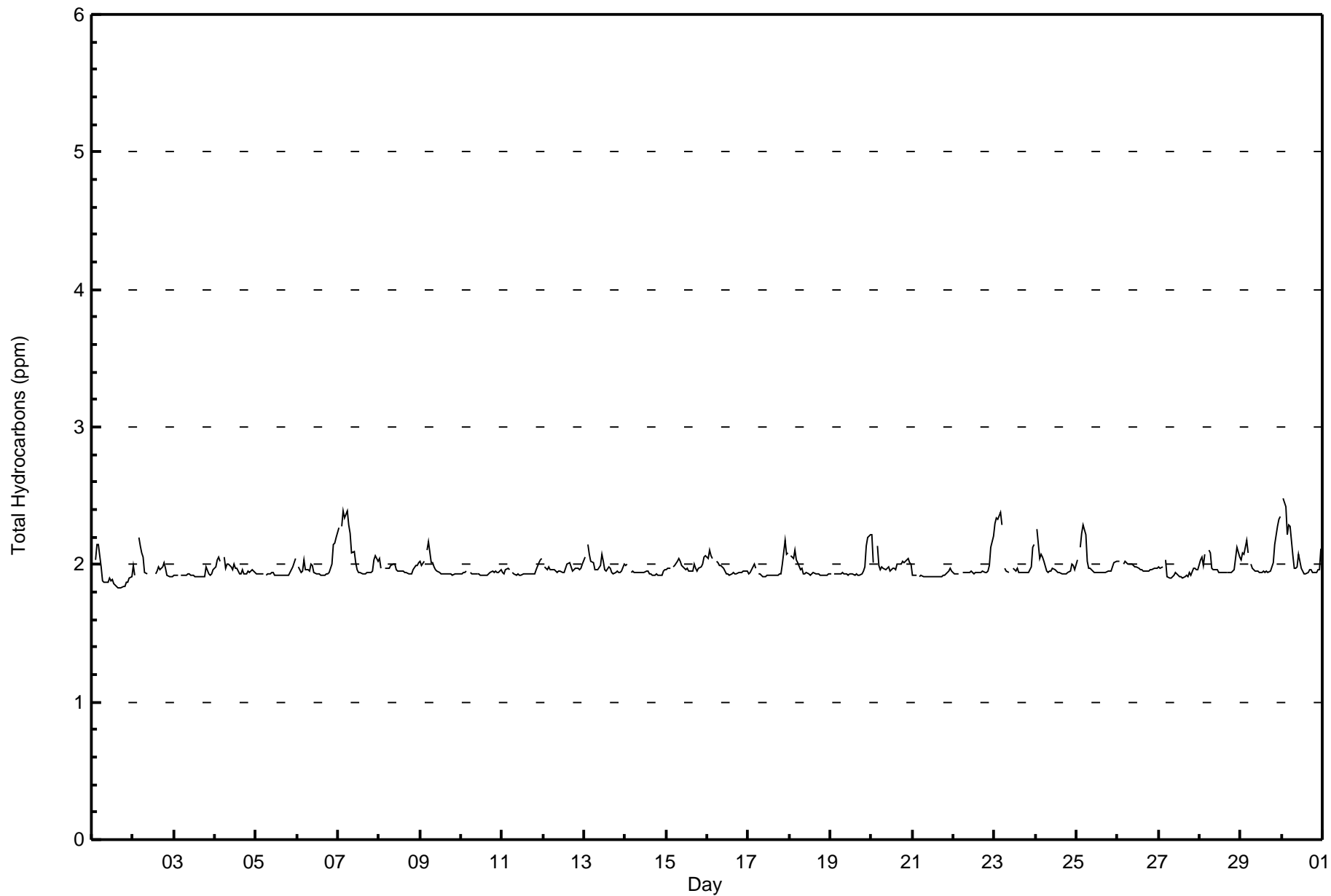
Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 685









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	605	88.45	88.45
2.1 - 3.0	79	11.55	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	53	19	15	27	15	13	36	73	50	17	14	18	39	91	62	63	605
2.1 - 3.0	1	0	0	4	1	6	3	4	7	10	5	10	9	8	5	4	77
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	682

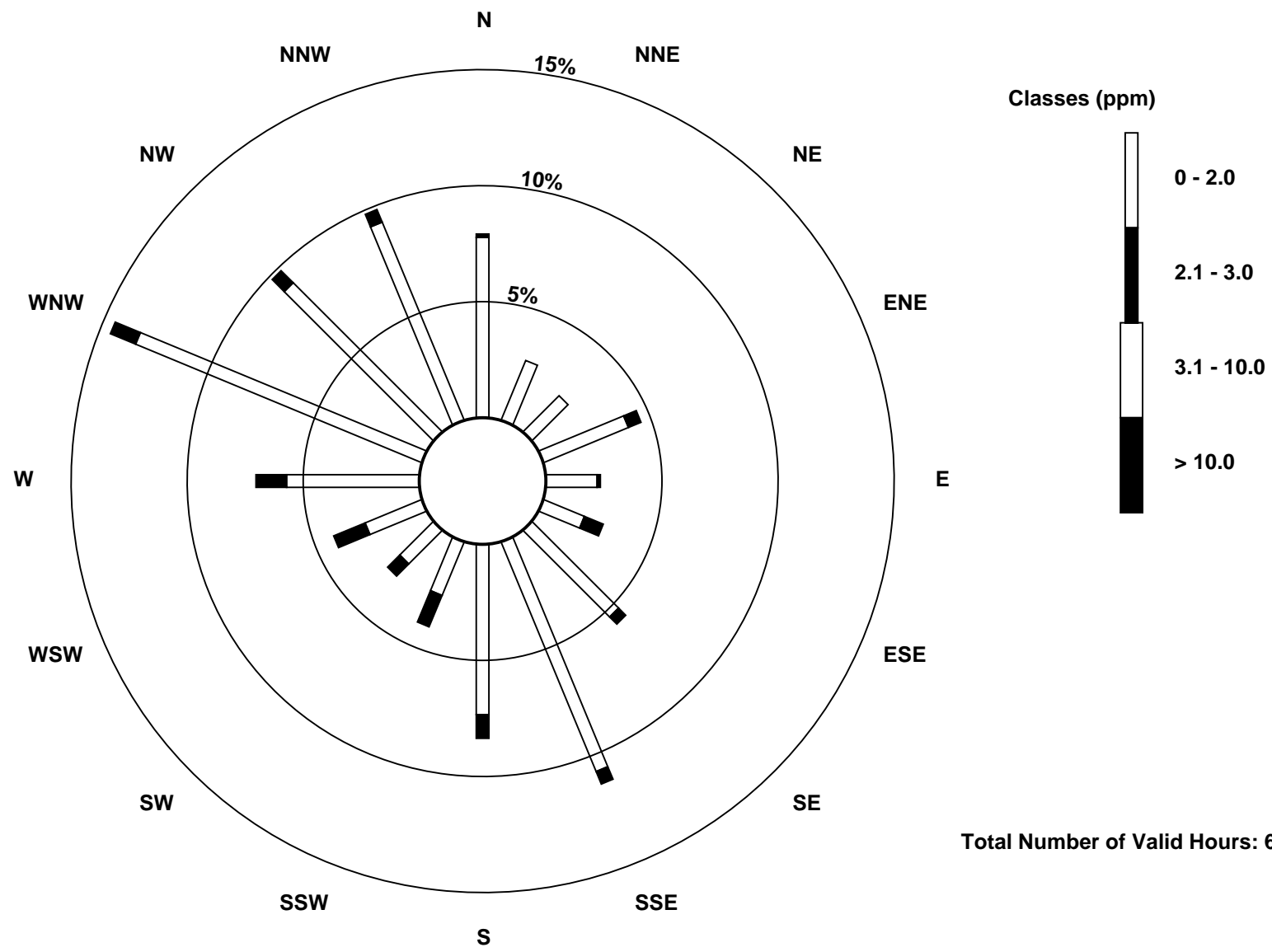
Total Number of Valid Hours: 682

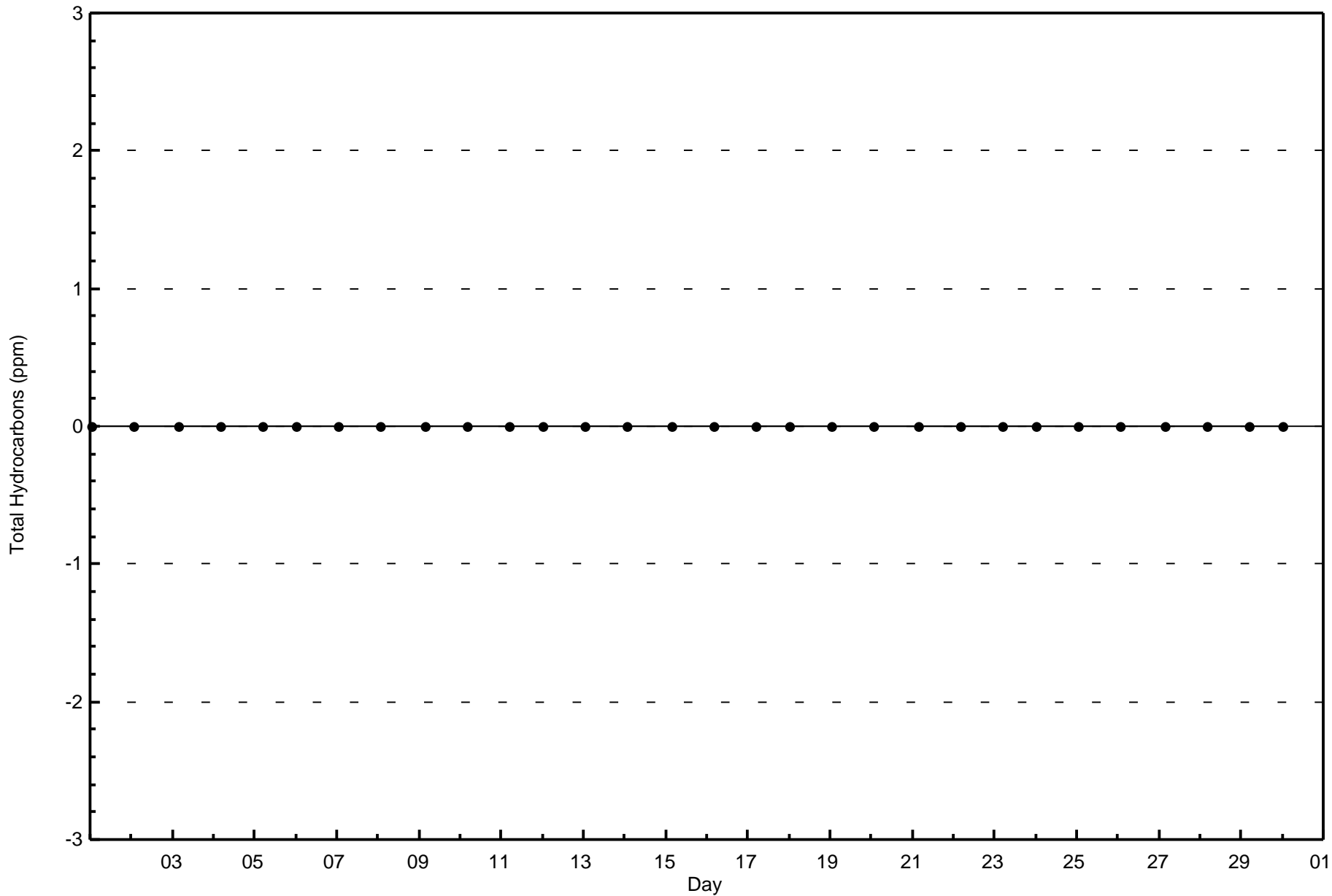
Total Number of Hours: 720

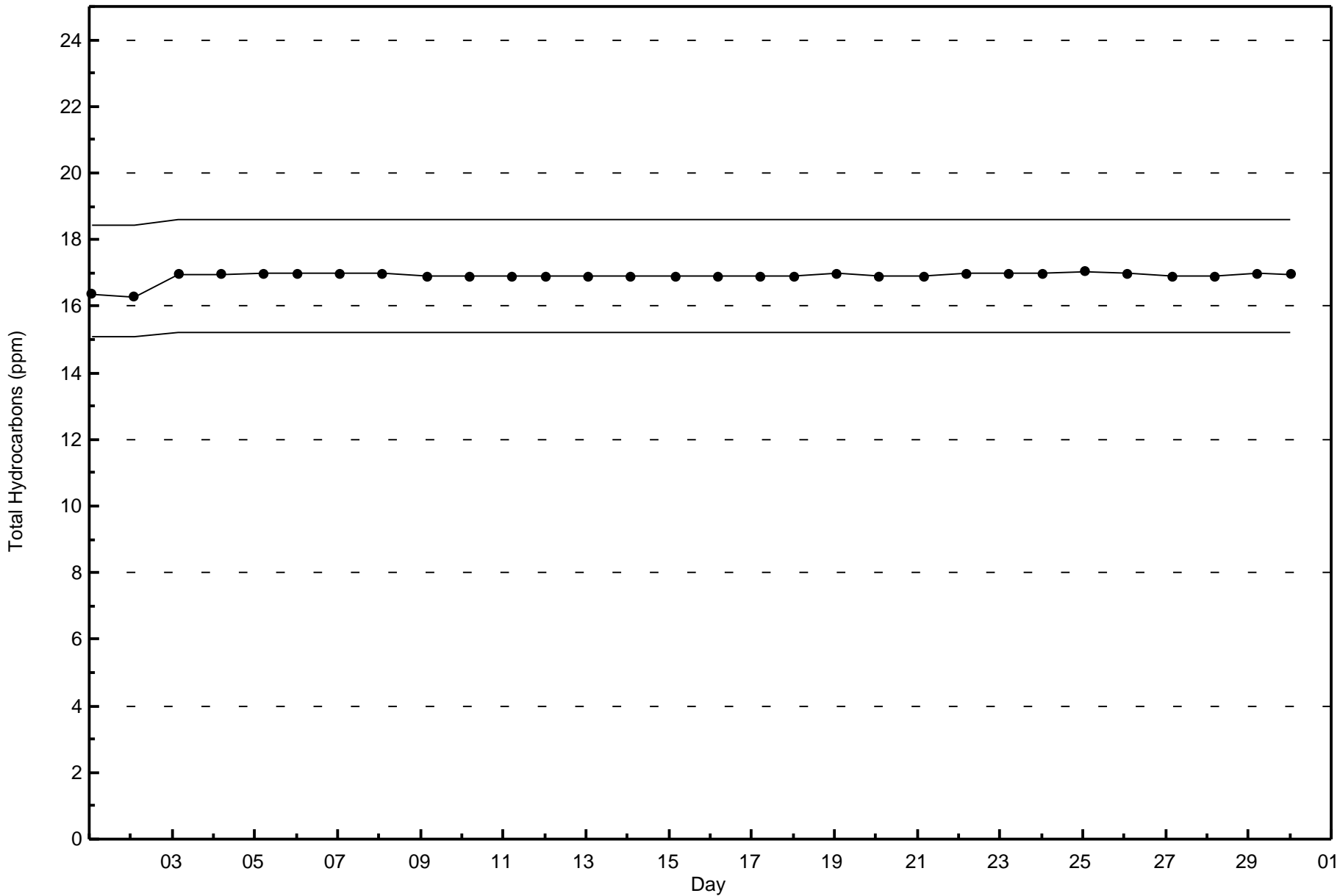


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)





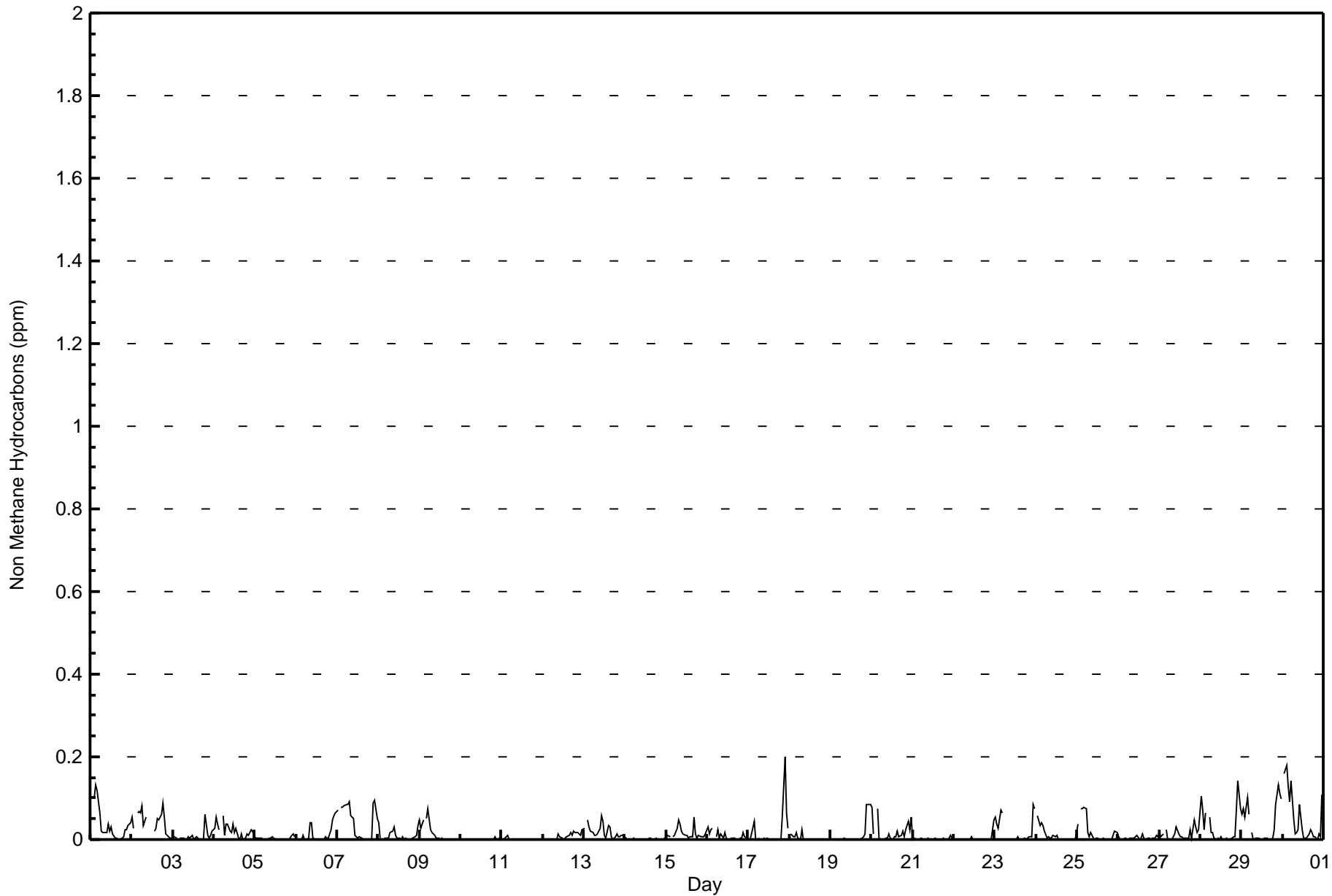




Summary of Hour Averages

Anzac - June 2017

Maximum Value: 0.201 ppm on Jun 17 22:00		Maximum Daily Average: 0.048 ppm on Jun 30		Hours in Service: 720																						
Minimum Value: 0.000 ppm on Jun 3 09:00		Minimum Daily Average: 0.001 ppm on Jun 11		Hours of Data: 684																						
Maximum Diurnal Average: 0.039 ppm at hour 4		Minimum Diurnal Average: 0.004 ppm at hour 13		Hours of Missing Data: 36																						
Monthly Average: 0.016 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.1		Hours of Calibration: 34																						
				Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.080	Z	0.100	0.132	0.119	0.064	0.019	0.016	0.016	0.018	0.037	0.021	0.031	0.013	0.004	0.002	0.001	0.002	0.004	0.007	0.023	0.024	0.033	0.041	0.035	0.132
2-Jun	0.053	0.028	Z	0.063	0.066	0.065	0.083	0.034	0.054	C	C	C	C	0.021	0.026	0.052	0.047	0.062	0.087	0.054	0.014	0.006	0.002	0.004	0.043	0.087
3-Jun	0.003	0.006	0.002	Z	0.004	0.003	0.004	0.002	0.000	0.006	0.003	0.009	0.000	0.002	0.006	0.000	0.001	0.002	0.003	0.062	0.011	0.004	0.010	0.021	0.007	0.062
4-Jun	0.027	0.053	0.036	0.022	Z	0.056	0.010	0.039	0.039	0.019	0.016	0.037	0.017	0.029	0.002	0.002	0.014	0.001	0.002	0.014	0.009	0.018	0.023	0.014	0.022	0.056
5-Jun	0.004	0.005	0.002	0.003	0.004	Z	0.001	0.000	0.002	0.004	0.006	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.009	0.012	0.006	0.003	0.012
6-Jun	Z	0.001	0.000	0.002	0.009	0.000	0.001	0.002	0.042	0.040	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.006	0.002	0.005	0.023	0.047	0.056	0.064	0.013	0.064
7-Jun	0.071	Z	0.079	0.080	0.080	0.086	0.085	0.090	0.058	0.051	0.010	0.008	0.004	0.006	0.003	0.001	0.000	0.002	0.000	0.000	0.003	0.088	0.094	0.052	0.041	0.094
8-Jun	0.040	0.003	Z	0.004	0.003	0.004	0.002	0.017	0.022	0.032	0.009	0.005	0.003	0.002	0.005	0.001	0.002	0.001	0.000	0.000	0.004	0.007	0.011	0.035	0.009	0.040
9-Jun	0.048	0.028	0.046	Z	0.051	0.074	0.022	0.017	0.013	0.010	0.003	0.003	0.001	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.074
10-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008	0.000	0.002	0.007	0.001	0.008
11-Jun	0.000	0.001	0.003	0.009	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.009
12-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.006	0.003	0.000	0.003	0.007	0.009	0.019	0.010	0.019	0.017	0.018	0.013	0.009	0.023	0.007	0.023
13-Jun	0.029	Z	0.046	0.031	0.022	0.015	0.011	0.010	0.012	0.026	0.058	0.043	0.010	0.003	0.036	0.031	0.007	0.000	0.008	0.015	0.007	0.007	0.011	0.011	0.019	0.058
14-Jun	0.005	0.003	Z	0.001	0.001	0.002	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.002	0.002	0.002	0.001	0.000	0.002	0.000	0.001	0.000	0.001	0.004	0.001	0.005
15-Jun	0.004	0.009	0.005	Z	0.008	0.011	0.027	0.046	0.036	0.020	0.015	0.009	0.010	0.003	0.006	0.008	0.054	0.014	0.003	0.009	0.008	0.007	0.005	0.013	0.014	0.054
16-Jun	0.031	0.012	0.023	0.027	Z	0.008	0.023	0.005	0.013	0.003	0.016	0.004	0.001	0.001	0.003	0.005	0.002	0.001	0.001	0.002	0.005	0.016	0.006	0.003	0.009	0.031
17-Jun	0.000	0.001	0.013	0.045	0.000	Z	0.003	0.002	0.000	0.004	0.001	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.058	0.201	0.065	0.027	0.018	0.201
18-Jun	Z	0.013	0.006	0.008	0.018	0.003	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.023
19-Jun	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.012	0.086	0.085	0.085	0.012	0.086
20-Jun	0.078	0.014	Z	0.073	0.005	0.001	0.000	0.001	0.002	0.003	0.014	0.003	0.001	0.005	0.006	0.020	0.007	0.009	0.019	0.006	0.024	0.043	0.024	0.053	0.018	0.078
21-Jun	0.001	0.002	0.000	Z	0.000	0.004	0.001	0.000	0.001	0.002	0.001	0.000	0.001	0.003	0.001	0.001	0.000	0.000	0.003	0.001	0.001	0.003	0.010	0.003	0.002	0.010
22-Jun	0.000	0.000	0.001	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.049	0.003	0.049
23-Jun	0.053	0.038	0.026	0.070	0.065	Z	0.000	0.000	0.000	0.000	M	M	0.001	0.000	0.008	0.000	0.000	0.002	0.001	0.002	0.006	0.008	0.084	0.073	0.021	0.084
24-Jun	Z	0.059	0.034	0.040	0.035	0.020	0.003	0.005	0.004	0.003	0.011	0.006	0.009	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.010	0.059
25-Jun	0.036	Z	0.074	0.073	0.076	0.075	0.017	0.005	0.017	0.003	0.000	0.004	0.002	0.000	0.000	0.002	0.001	0.000	0.000	0.001	0.001	0.011	0.021	0.016	0.019	0.076
26-Jun	0.008	0.001	Z	0.003	0.004	0.002	0.001	0.004	0.005	0.005	0.007	0.009	0.001	0.004	0.013	0.003	0.001	0.003	0.002	0.001	0.002	0.005	0.009	0.008	0.004	0.013
27-Jun	0.016	0.007	0.014	Z	0.024	0.001	0.000	0.001	0.006	0.013	0.032	0.012	0.007	0.005	0.003	0.003	0.005	0.004	0.025	0.004	0.048	0.029	0.017	0.024	0.013	0.048
28-Jun	0.104	0.071	0.023	0.064	Z	0.055	0.017	0.016	0.003	0.000	0.003	0.000	0.006	0.000	0.001	0.003	0.001	0.000	0.002	0.006	0.006	0.071	0.142	0.073	0.029	0.142
29-Jun	0.060	0.074	0.053	0.102	0.061	Z	0.017	0.001	0.003	0.005	0.002	0.000	0.001	0.004	0.002	0.004	0.002	0.000	0.003	0.023	0.086	0.134	0.111	0.100	0.037	0.134
30-Jun	Z	0.159	0.178	0.127	0.093	0.141	0.049	0.015	0.015	0.023	0.086	0.022	0.003	0.003	0.003	0.012	0.023	0.017	0.008	0.007	0.001	0.013	0.008	0.107	0.048	0.178
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	391	57.16	57.16
0.006 - 0.05	228	33.33	90.50
0.06 - 0.1	62	9.06	99.56
> 0.1	3	0.44	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	43	17	11	25	11	7	20	37	22	4	6	11	25	60	46	46	391
0.006 - 0.05	10	2	4	4	4	8	17	36	29	14	9	10	16	33	15	16	227
0.06 - 0.1	1	0	0	2	1	4	2	4	6	8	3	7	7	6	6	5	62
> 0.1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
Totals	54	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	682

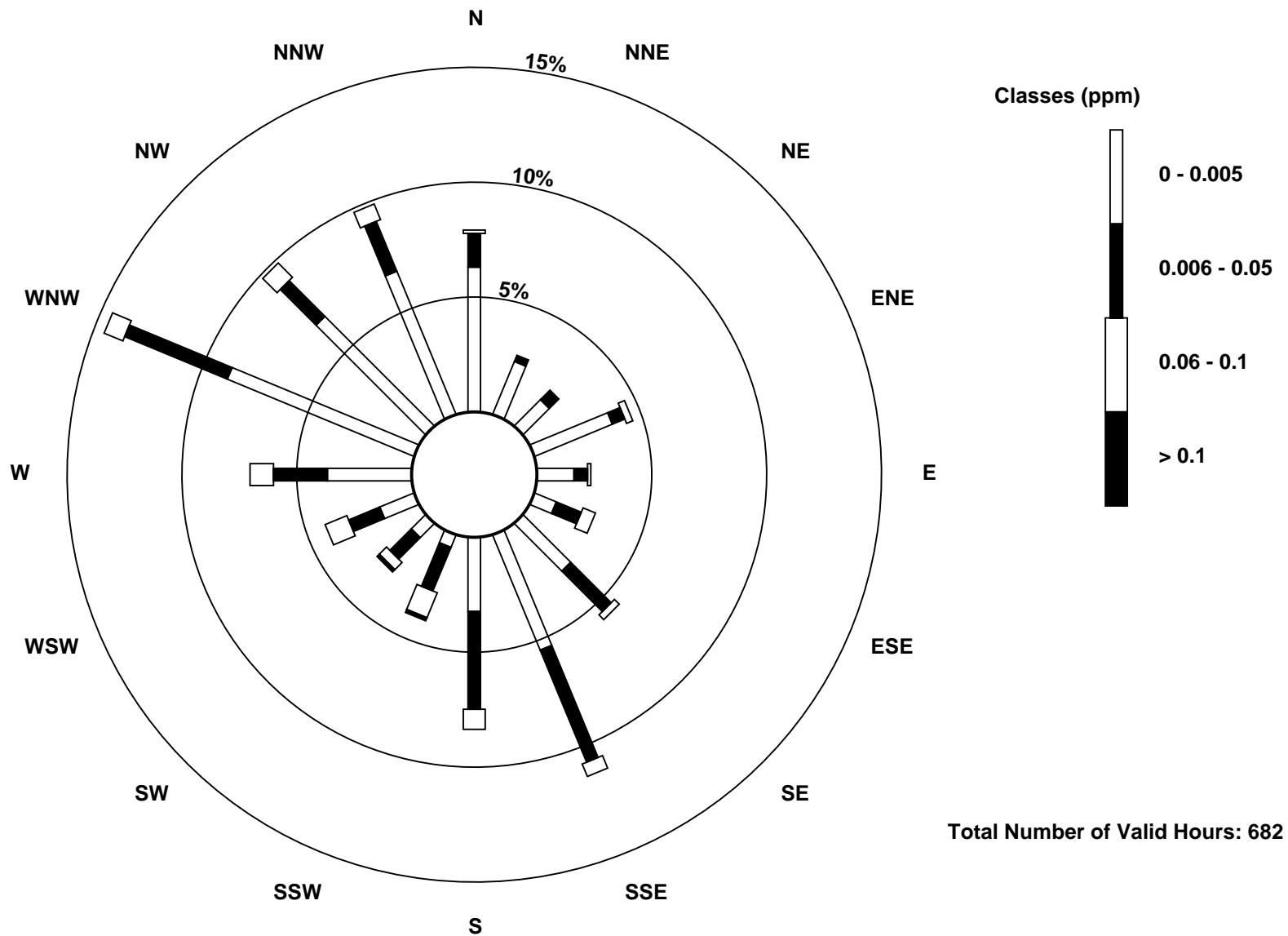
Total Number of Valid Hours: 682

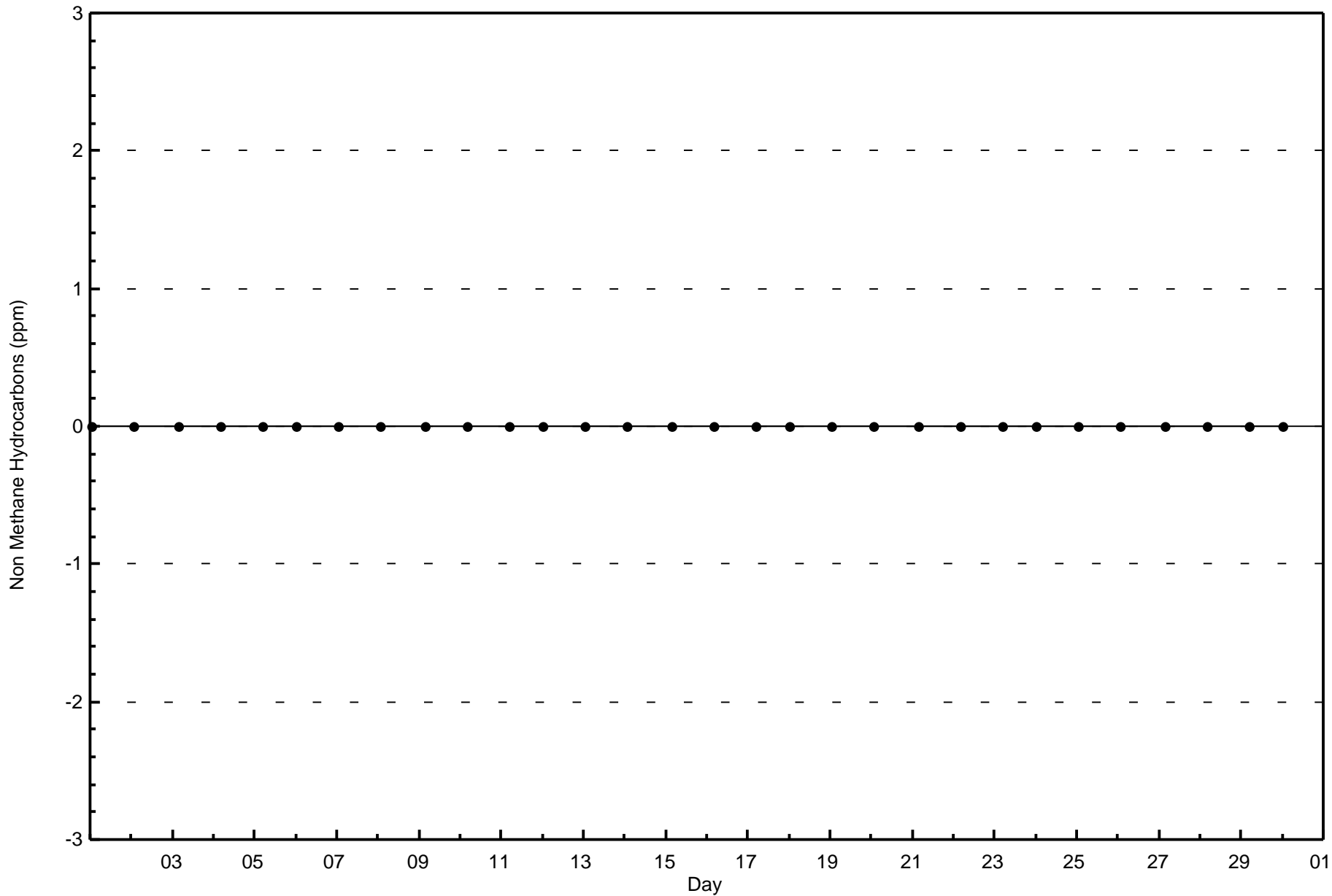
Total Number of Hours: 720

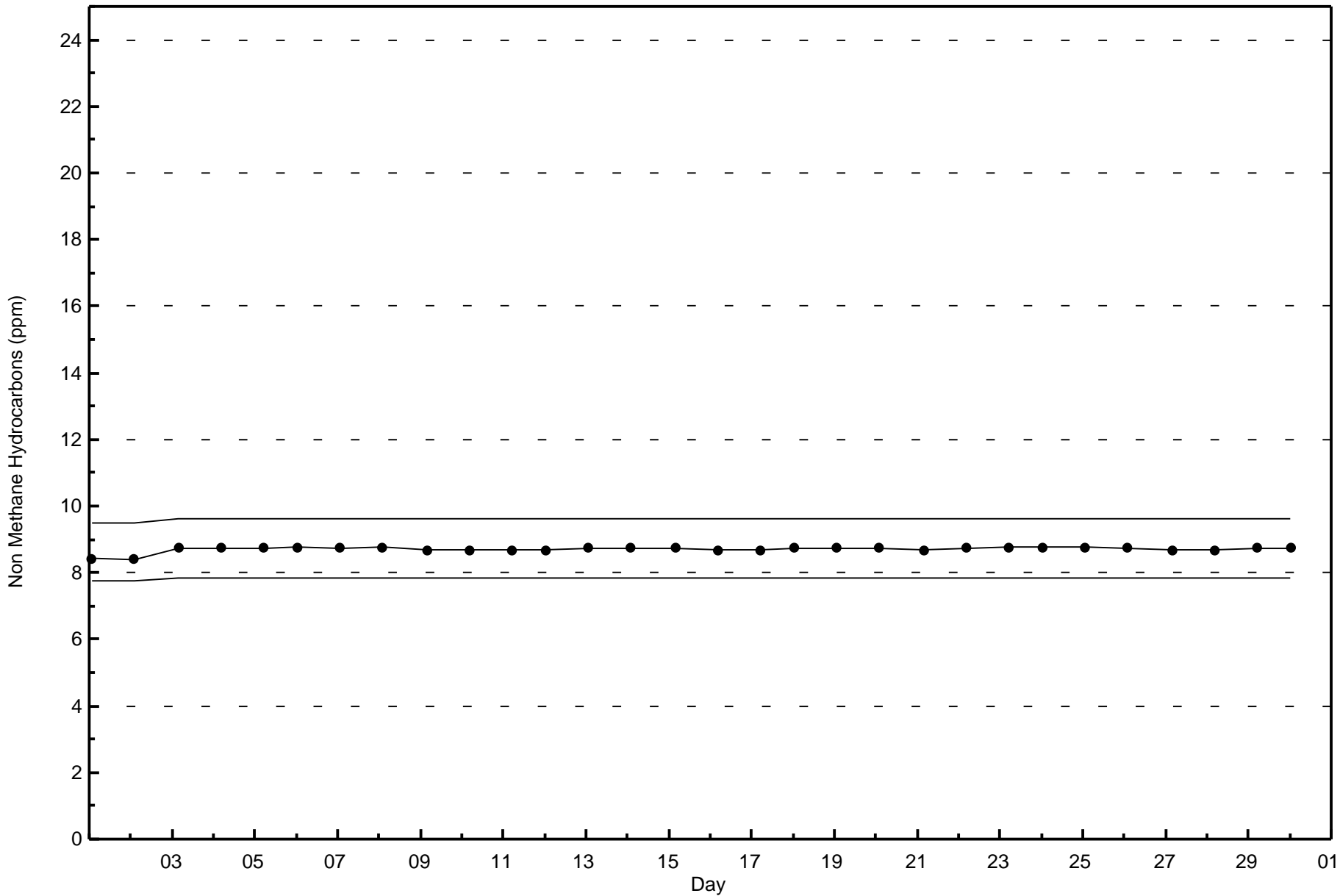


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)



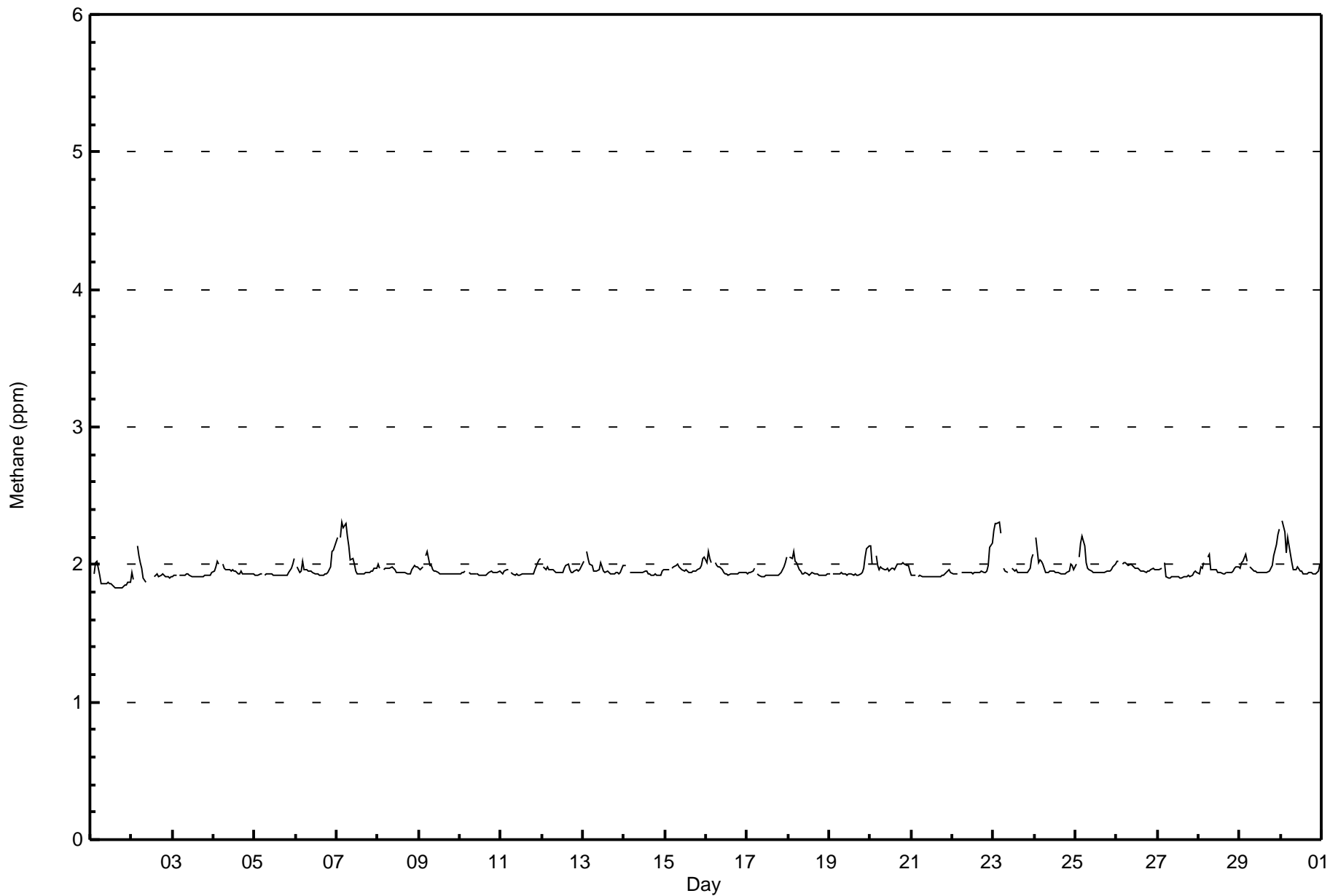






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	634	92.69	92.69
2.1 - 3.0	50	7.31	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	54	19	15	28	15	17	37	75	52	23	16	21	42	95	62	63	634
2.1 - 3.0	0	0	0	3	1	2	2	2	5	4	3	7	6	4	5	4	48
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	682

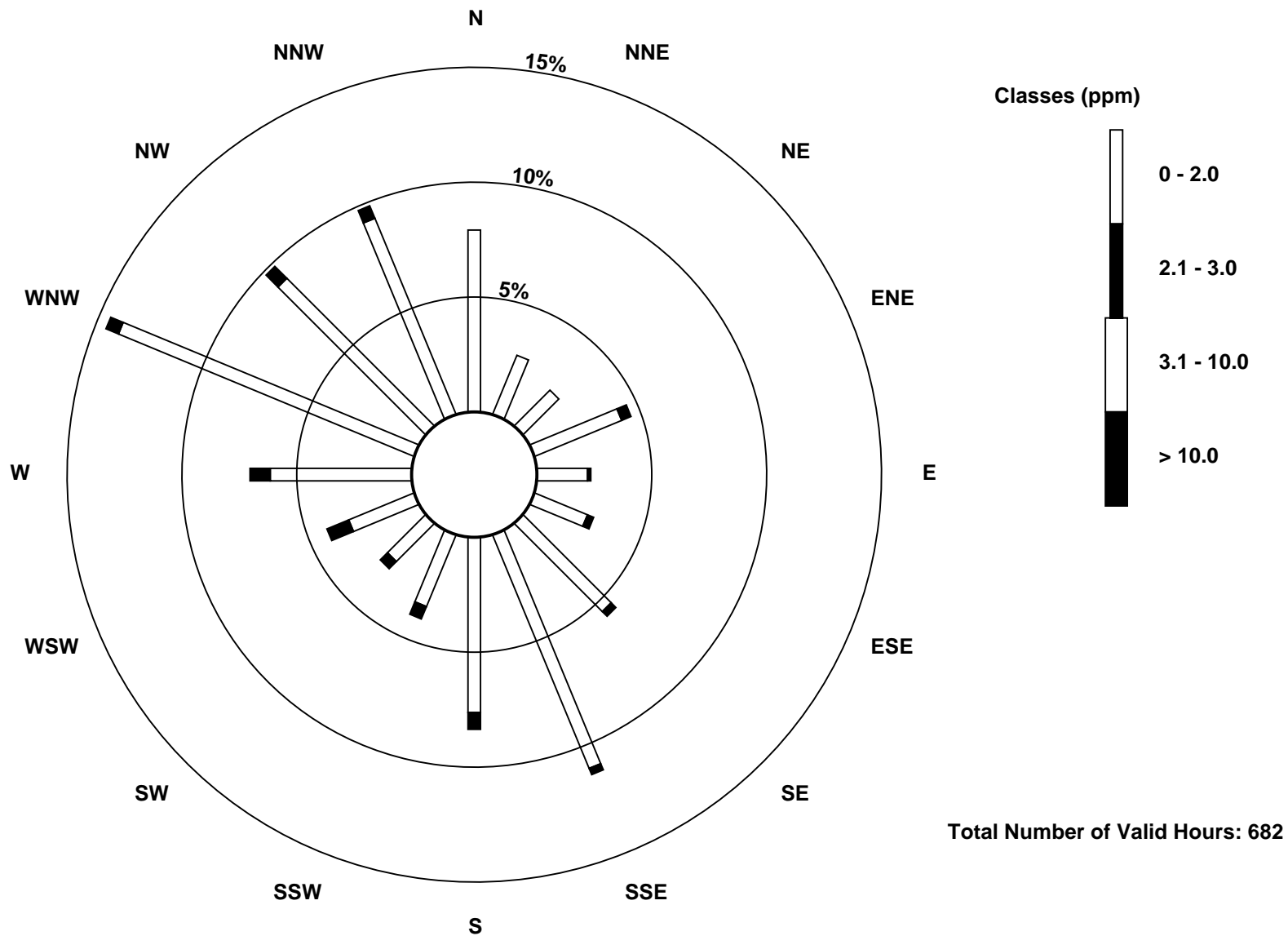
Total Number of Valid Hours: 682

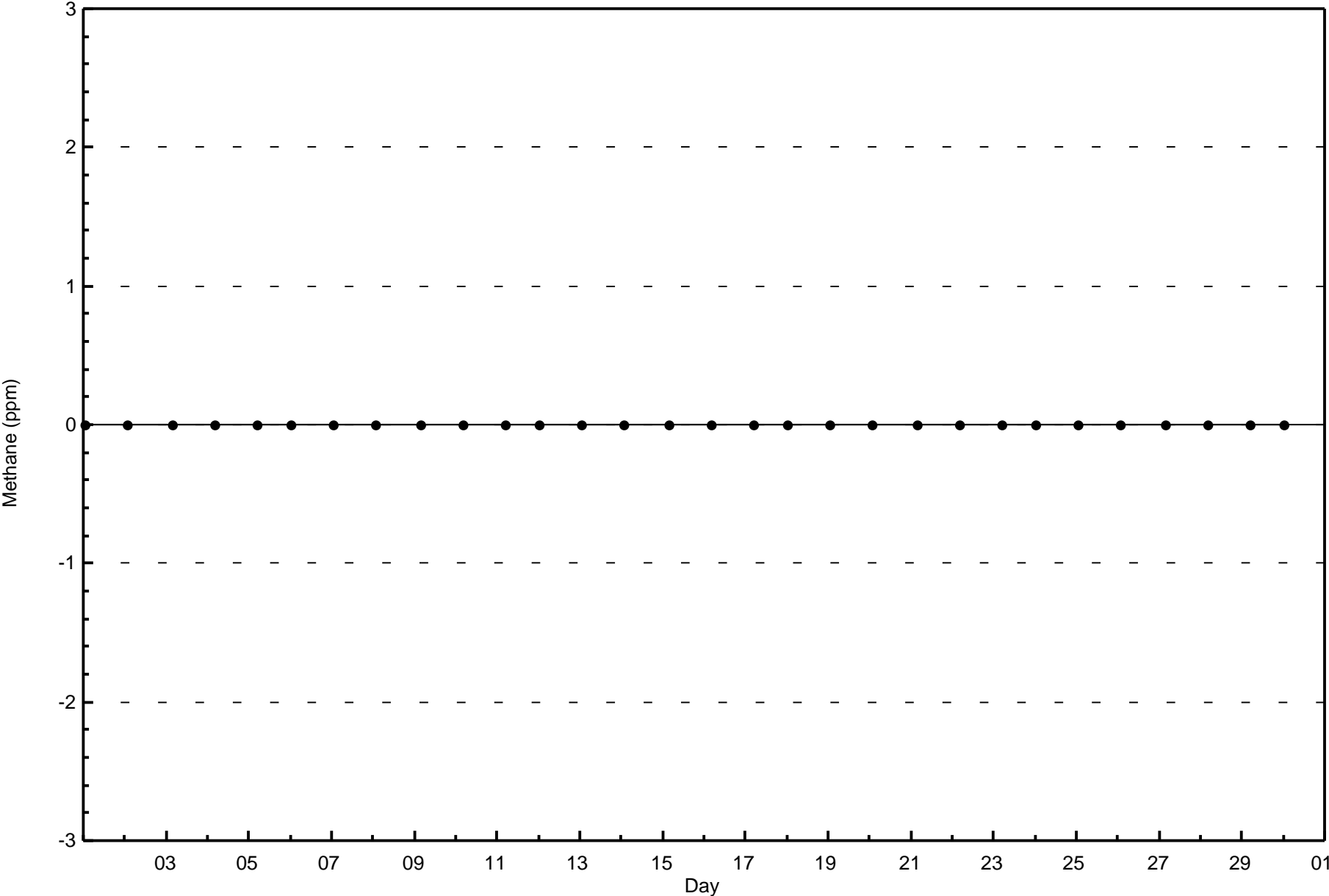
Total Number of Hours: 720

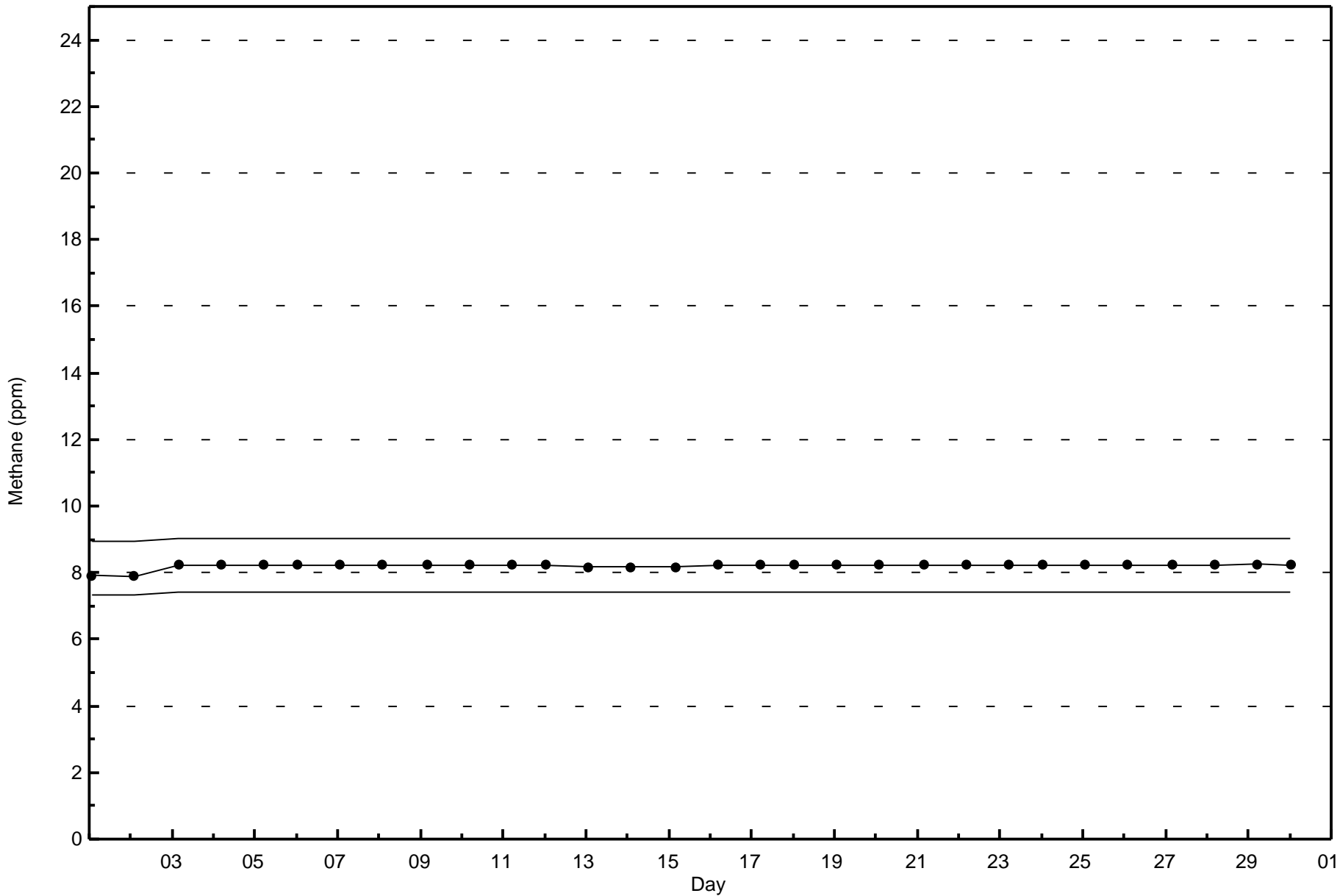


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Anzac (AMS 14)







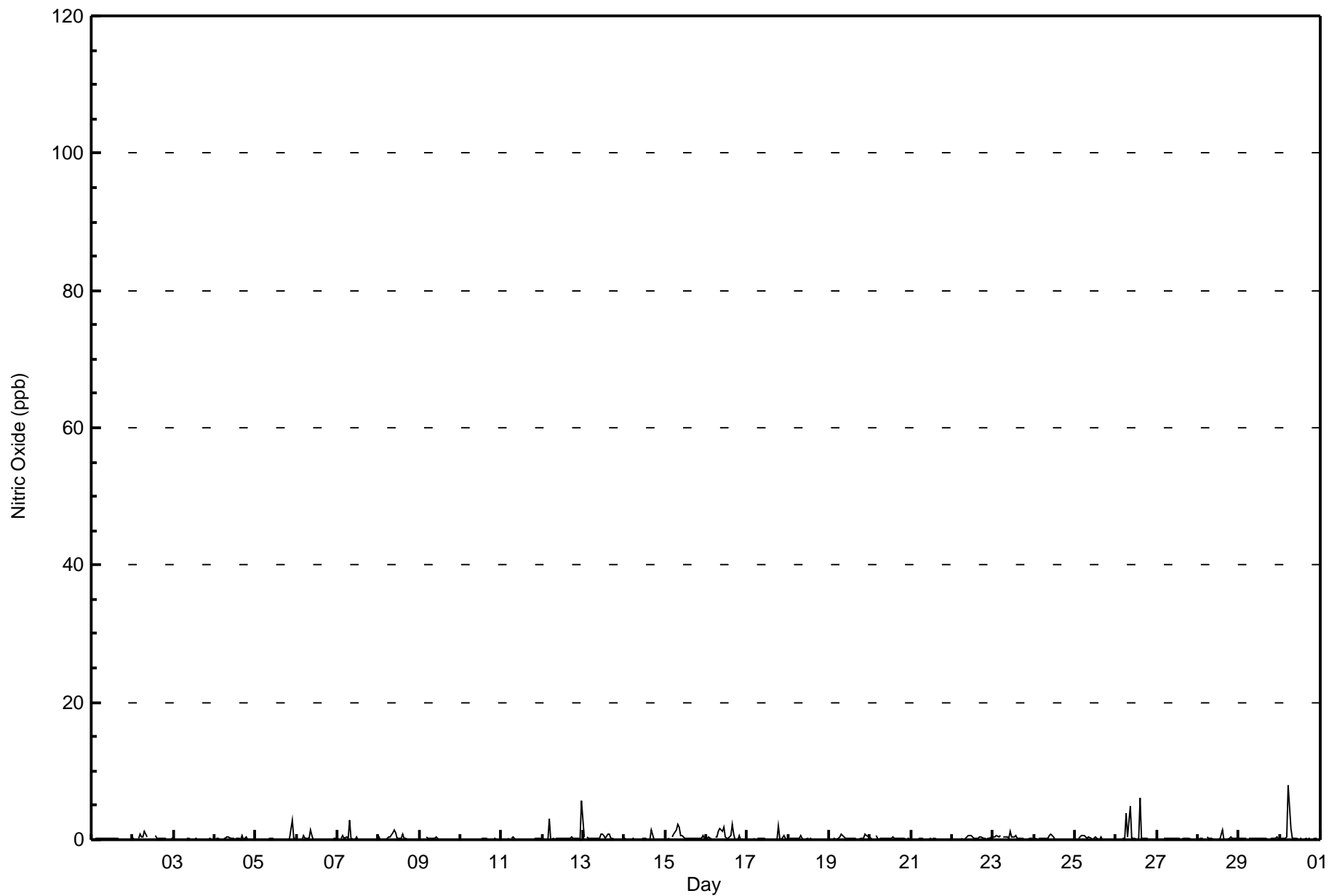


Maximum Value: 8 ppb on Jun 30 06:00																	Maximum Daily Average: 0.8 ppb on Jun 26																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 11 09:00																	Minimum Daily Average: 0.1 ppb on Jun 10																	Hours of Data: 686	
Maximum Diurnal Average: 0.5 ppb at hour 6																	Minimum Diurnal Average: 0.1 ppb at hour 21																	Hours of Missing Data: 34	
Monthly Average: 0.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 3																	Hours of Calibration: 34	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
2-Jun	0	0	Z	0	1	0	0	1	0	C	C	C	C	1	0	0	0	0	0	0	0	0	0	0	0.3	1									
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
4-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1									
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.2	3									
6-Jun	Z	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
7-Jun	0	Z	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3									
8-Jun	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1									
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
12-Jun	Z	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	6	0.5	6									
13-Jun	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0.3	1									
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1									
15-Jun	0	0	0	Z	0	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	2									
16-Jun	0	0	0	0	Z	0	0	1	2	1	2	0	0	0	1	2	1	0	0	1	0	0	0	0	0.6	2									
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0.2	2									
18-Jun	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1									
19-Jun	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1									
20-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
22-Jun	0	0	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
23-Jun	0	0	1	0	1	Z	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1									
24-Jun	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
25-Jun	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
26-Jun	0	0	Z	0	0	0	4	0	5	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0.8	6									
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1									
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1									
30-Jun	Z	0	0	0	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	8									
																	Diurnal Average		Diurnal Maximum																
																	0.1		0.3																
																	0		6																
Z - zerospan																	C - Calibration																		



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684

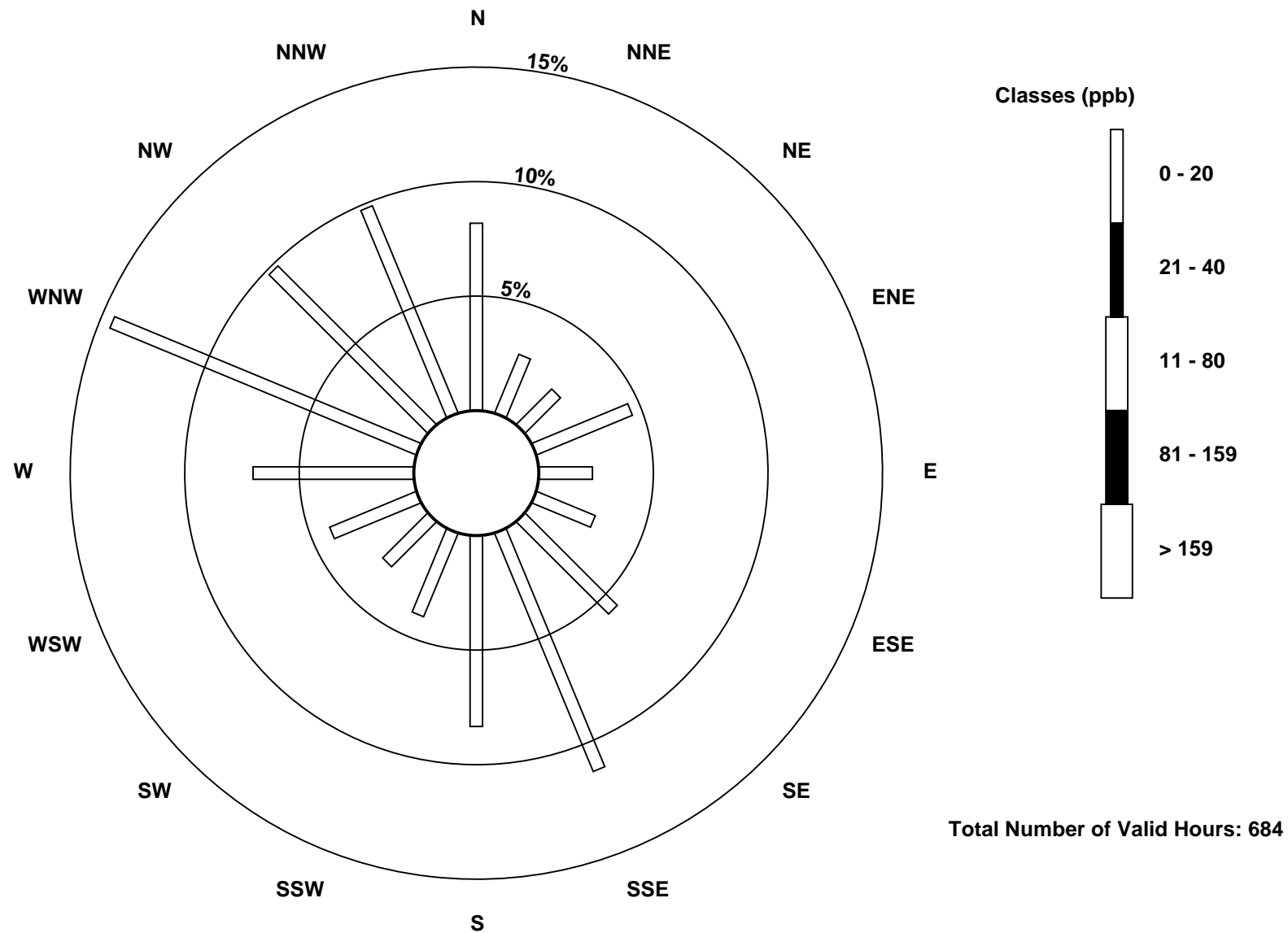
Total Number of Valid Hours: 684

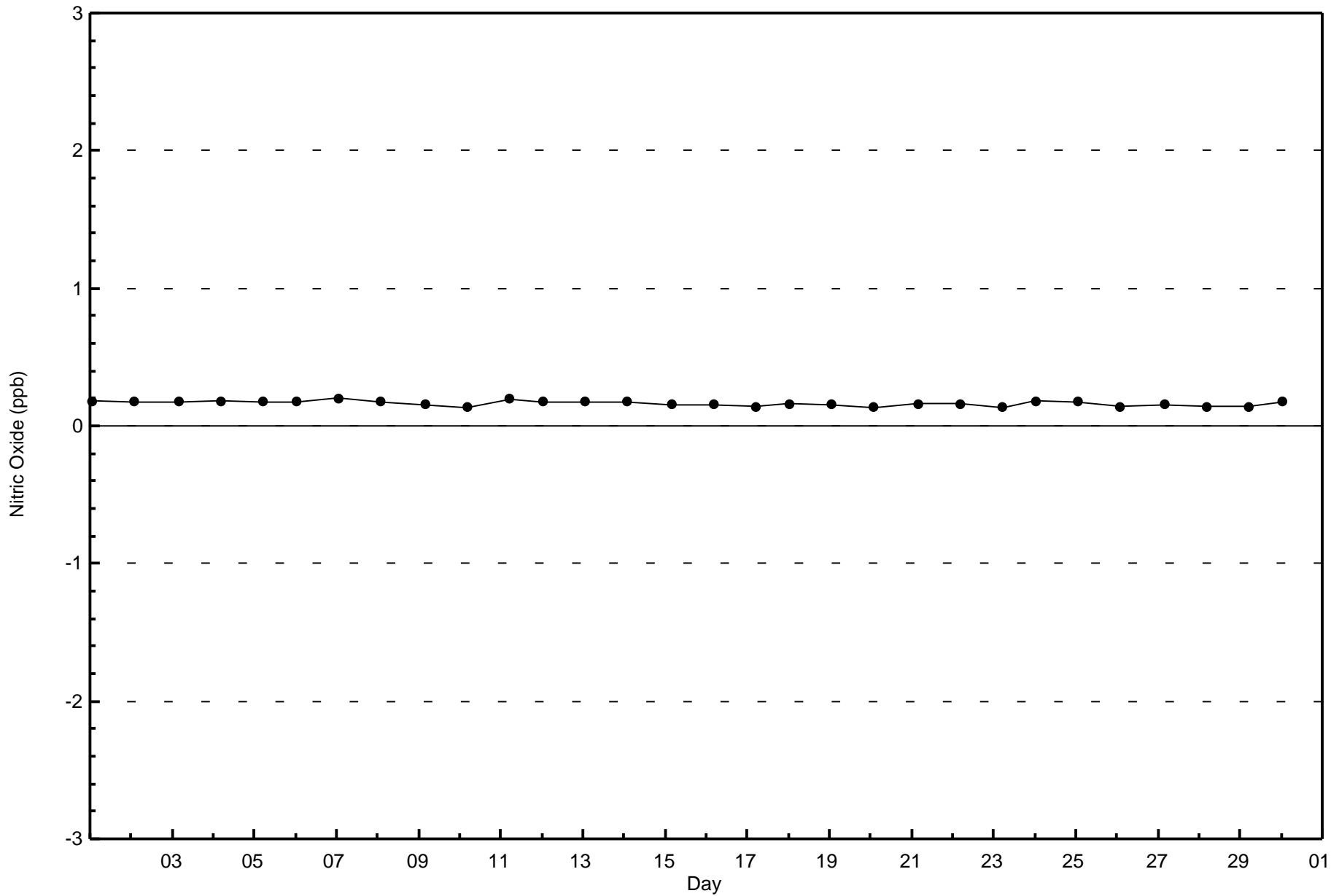
Total Number of Hours: 720

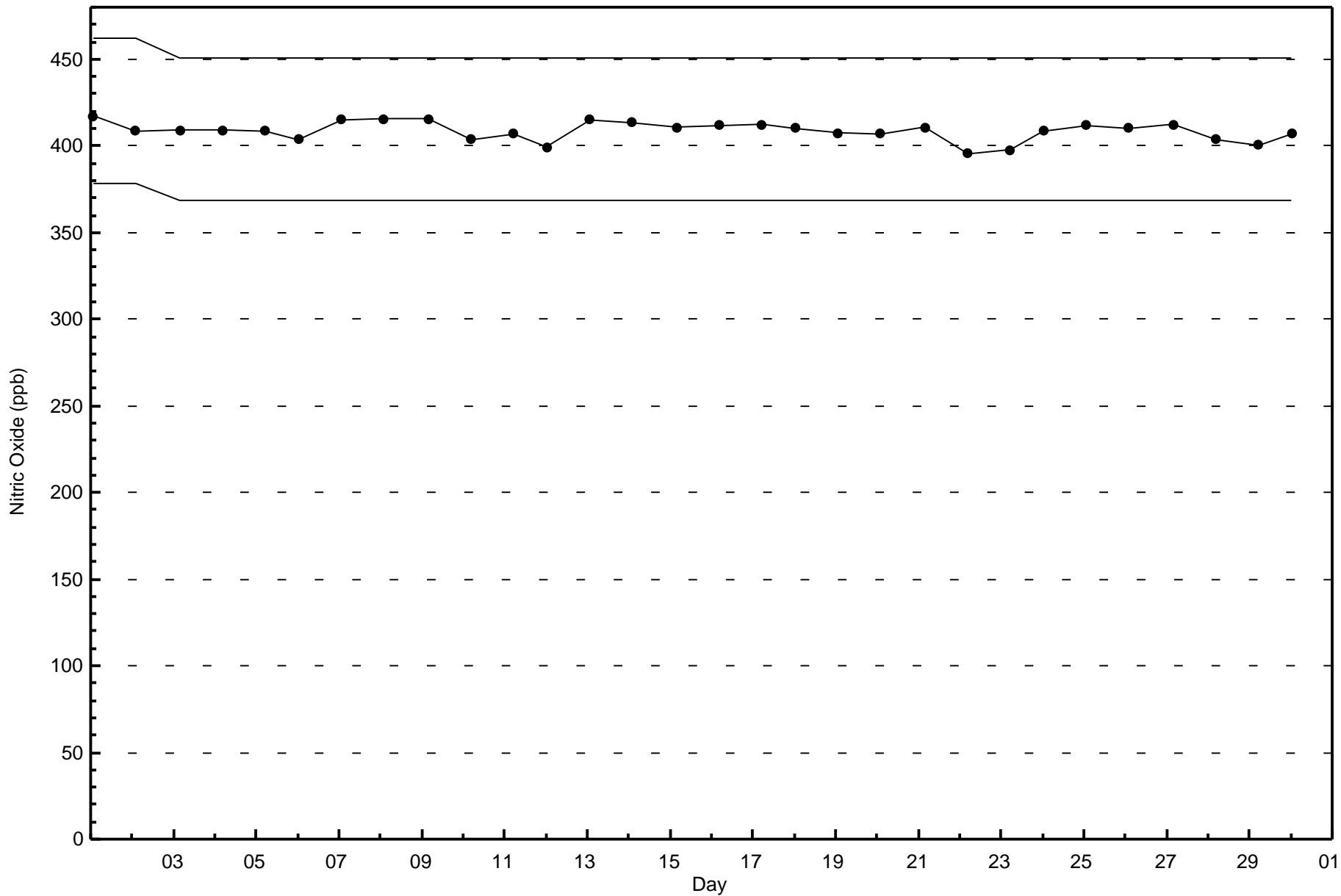


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Anzac (AMS 14)









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 6 ppb on Jun 20 04:00	Maximum Daily Average: 2.1 ppb on Jun 15		Hours of Data:	686
Minimum Value: 0 ppb on Jun 10 00:00	Minimum Daily Average: 0.4 ppb on Jun 9		Hours of Missing Data:	34
Maximum Diurnal Average: 1.5 ppb at hour 24	Minimum Diurnal Average: 0.7 ppb at hour 18		Hours of Calibration:	34
Monthly Average: 1.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	1	2	2	1	1	1	2	1	1	1	1	1	2	1	0	0	0	1	2	1	1	4	1.1	4
2-Jun	5	2	Z	1	2	2	1	3	2	C	C	C	C	2	1	2	1	2	2	1	1	0	0	0	1.6	5
3-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	2	3	0.6	3
4-Jun	1	1	1	1	Z	1	1	2	2	2	1	2	2	2	1	1	4	1	2	1	1	1	1	1	1.4	4
5-Jun	1	0	1	1	0	Z	0	1	1	2	2	0	0	0	0	0	0	0	0	0	1	6	5	5	1.2	6
6-Jun	Z	1	1	1	1	1	1	1	4	2	1	0	0	0	1	1	1	1	1	1	1	3	3	3	1.1	4
7-Jun	2	Z	1	1	1	1	1	5	1	1	0	1	0	1	1	1	0	1	1	1	1	2	3	1	1.1	5
8-Jun	2	0	Z	1	2	3	2	1	3	4	3	1	1	1	1	1	1	1	1	1	0	0	0	1	1.3	4
9-Jun	1	1	1	Z	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	3	0.6	3
11-Jun	1	1	2	2	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	1	2	0.8	3
12-Jun	Z	1	1	2	6	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	1.2	6
13-Jun	3	Z	1	1	1	1	1	1	1	1	2	3	3	2	3	2	1	1	1	1	1	0	1	1	1.2	3
14-Jun	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	3	0.5	3
15-Jun	4	3	4	Z	4	4	4	4	3	2	1	1	1	1	1	1	1	1	1	1	1	5	1	1	2.1	5
16-Jun	1	1	2	2	Z	1	1	2	3	2	3	1	1	1	1	5	2	1	1	1	1	1	1	1	1.5	5
17-Jun	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	2	1	1	0.6	3
18-Jun	Z	1	1	1	1	1	1	2	1	1	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0.6	2
19-Jun	1	Z	0	0	0	0	1	2	1	1	1	1	1	1	0	0	0	0	0	1	1	2	2	1	0.8	2
20-Jun	1	1	Z	6	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1.1	6
21-Jun	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	1	0.5	3
22-Jun	0	0	0	0	Z	1	1	0	0	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	0.9	2
23-Jun	1	1	1	1	1	Z	1	1	1	1	3	2	2	2	1	1	1	1	1	1	1	1	2	1	1.1	3
24-Jun	Z	1	1	1	1	1	0	1	1	2	2	2	1	1	1	1	0	0	1	1	2	2	1	1	1.0	2
25-Jun	1	Z	2	3	2	2	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1.3	3
26-Jun	1	1	Z	2	3	2	4	2	3	1	1	1	1	1	3	1	1	1	1	1	1	1	2	1	1.5	4
27-Jun	1	1	2	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0.7	2
28-Jun	1	1	0	1	Z	0	0	1	0	0	0	0	0	0	1	0	0	0	1	2	1	1	1	1	0.5	2
29-Jun	1	1	1	1	1	Z	0	0	0	0	0	0	0	1	1	1	1	1	3	4	4	3	3	2	1.3	4
30-Jun	Z	2	2	1	1	6	3	1	1	1	1	0	1	0	0	0	1	1	1	0	1	1	1	1	1.1	6

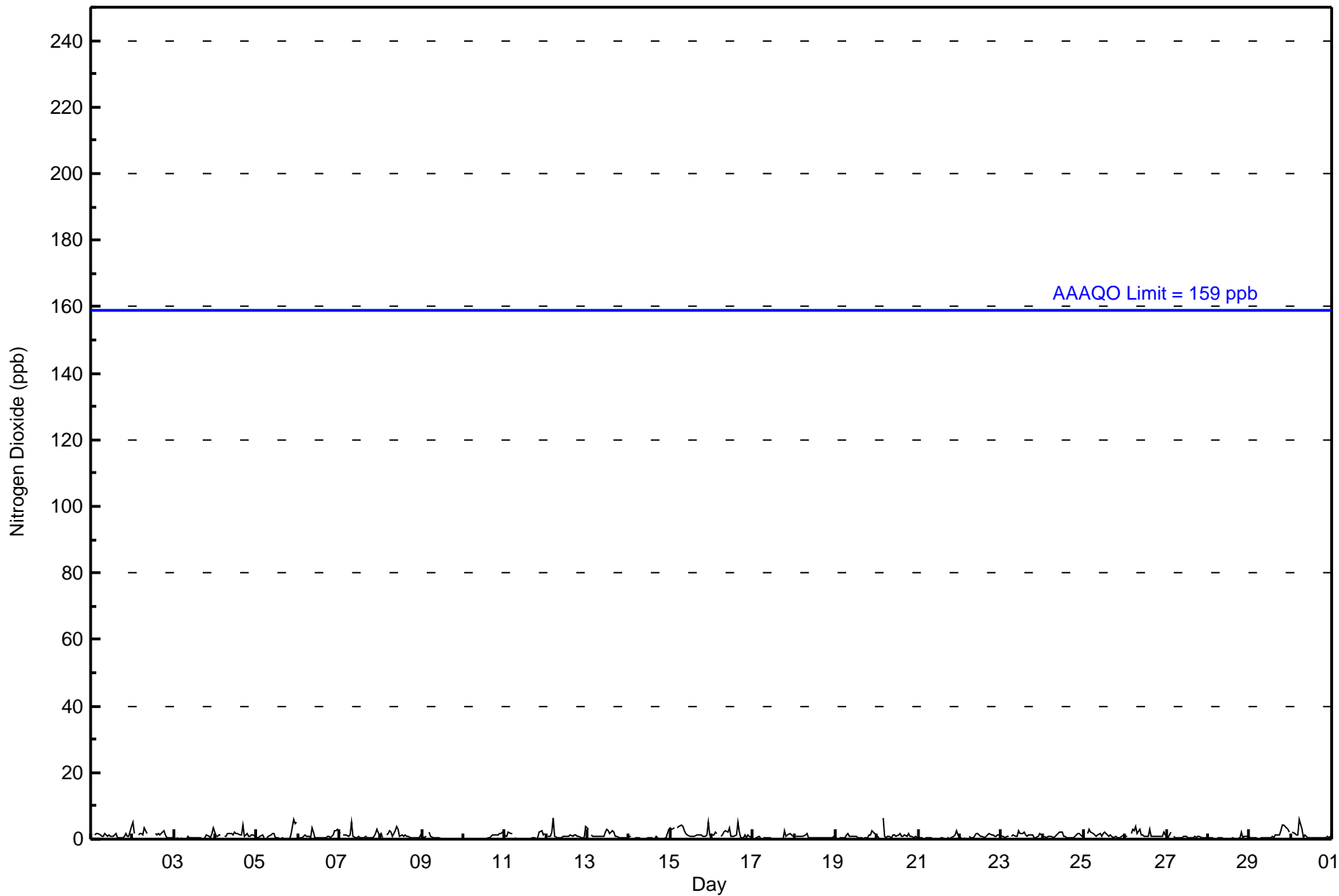
1.2	0.8	1.0	1.3	1.4	1.2	1.0	1.1	1.1	1.0	1.0	0.8	0.7	0.7	0.8	0.8	0.8	0.7	0.9	0.9	1.0	1.3	1.5	1.5	Diurnal Average
5	3	4	6	6	6	4	5	4	4	3	3	3	2	3	5	4	2	3	4	4	6	5	5	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684

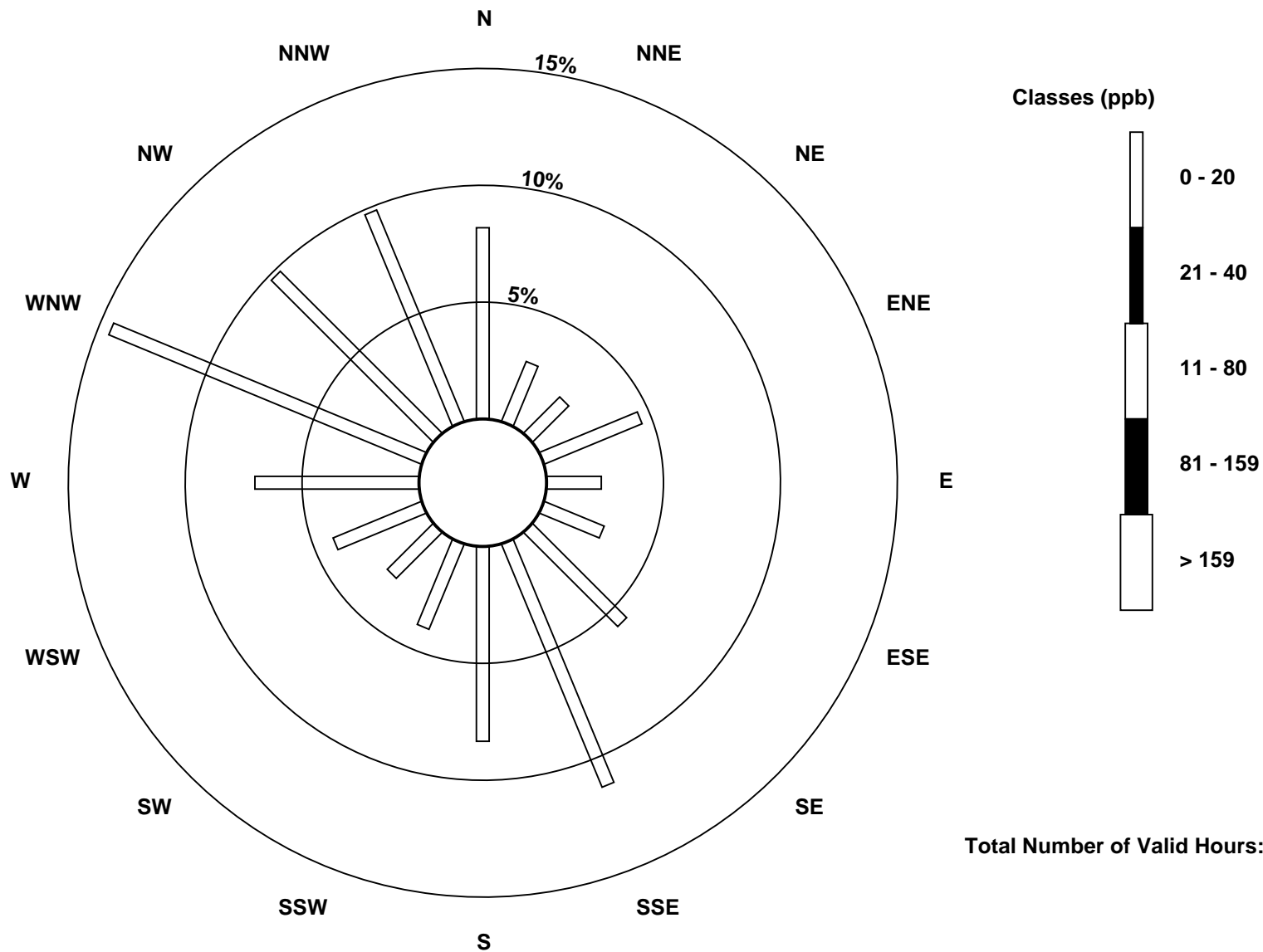
Total Number of Valid Hours: 684

Total Number of Hours: 720

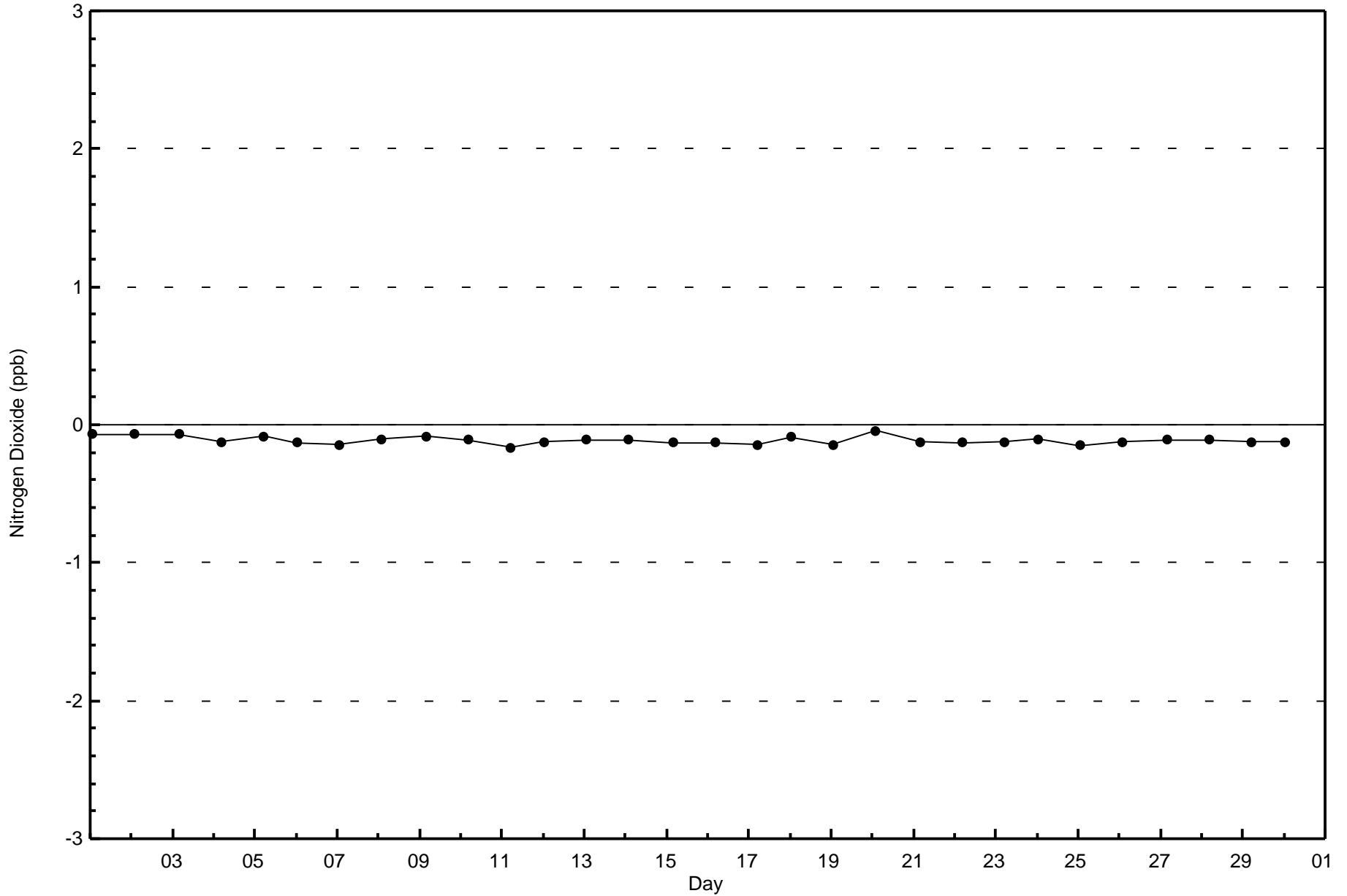


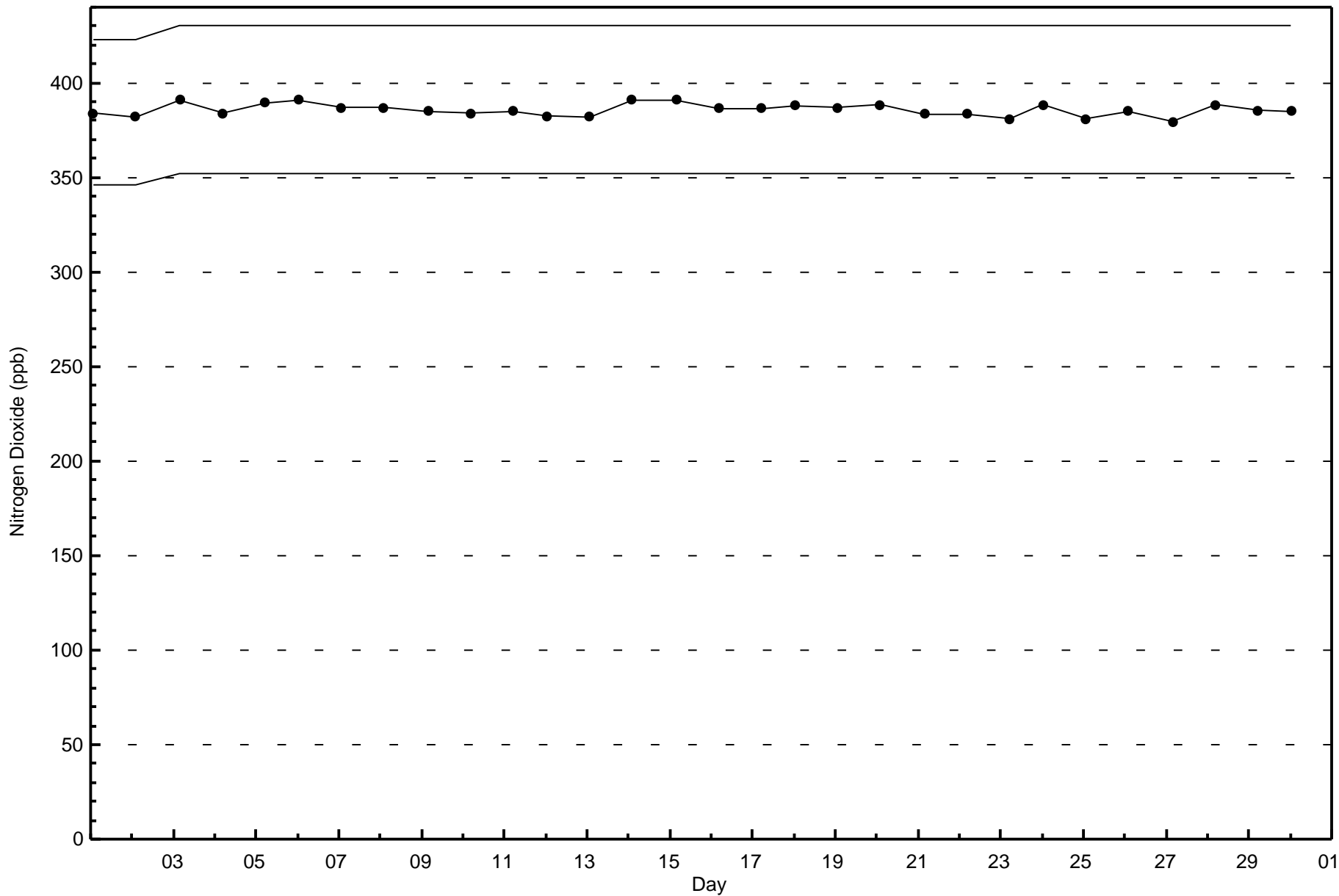
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 684







Wood Buffalo Environmental Association
Summary of Hour Averages

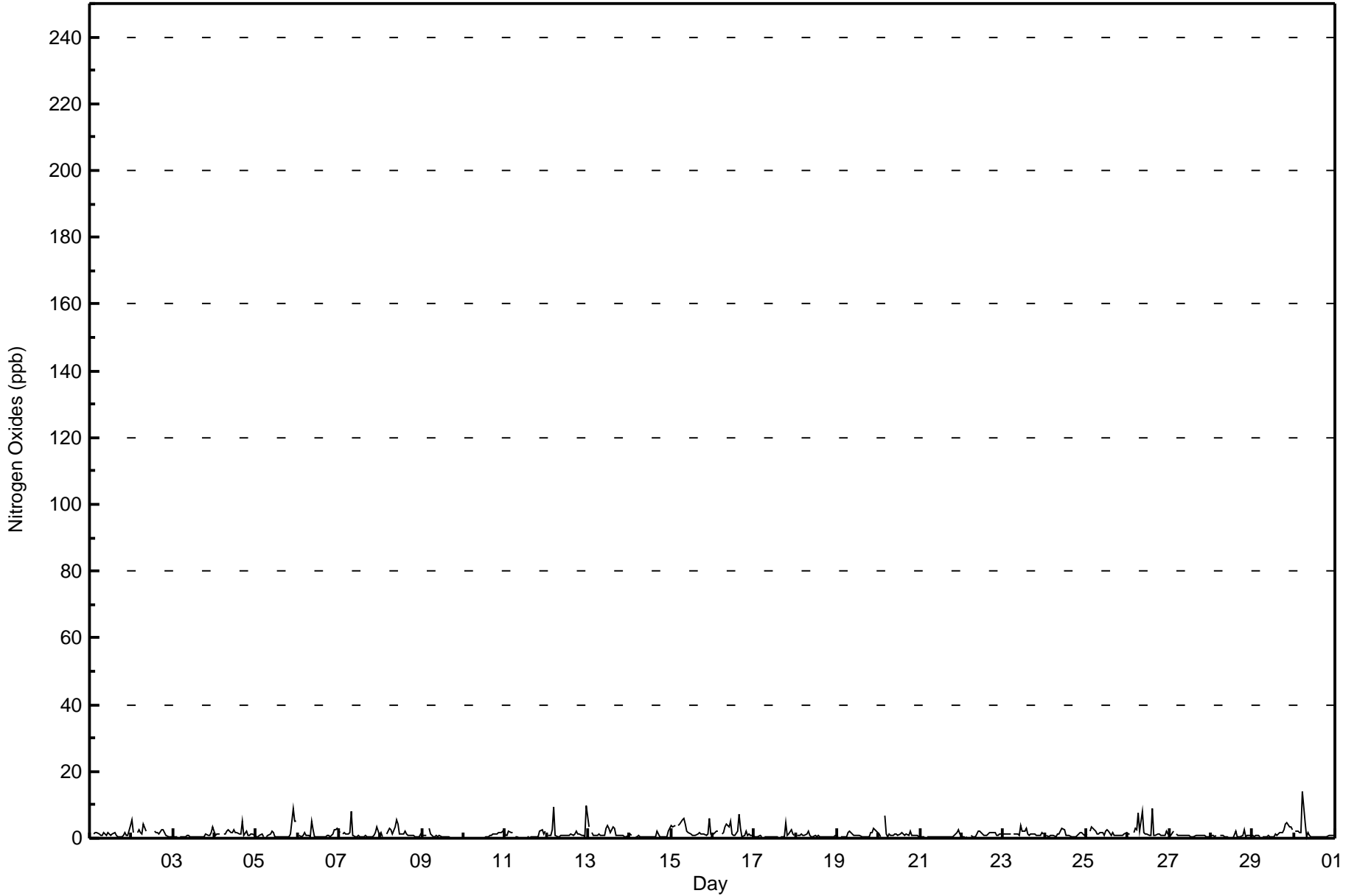
Nitrogen Oxides (NO_x) - ppb
Anzac - June 2017

Maximum Value: 14 ppb on Jun 30 06:00		Maximum Daily Average: 2.6 ppb on Jun 15		Hours in Service: 720																							
Minimum Value: 0 ppb on Jun 10 08:00		Minimum Daily Average: 0.5 ppb on Jun 9		Hours of Data: 686																							
Maximum Diurnal Average: 1.9 ppb at hour 24		Minimum Diurnal Average: 0.8 ppb at hour 18		Hours of Missing Data: 34																							
Monthly Average: 1.3 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 8		Hours of Calibration: 34																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	1	2	2	1	1	1	2	1	1	1	1	1	2	1	0	0	0	1	2	1	1	4	1.2	4	
2-Jun	5	2	Z	2	3	2	1	4	2	C	C	C	C	2	2	2	1	2	2	2	1	0	0	0	1.9	5	
3-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	2	3	0.7	3	
4-Jun	1	1	1	1	Z	1	1	2	2	2	2	2	2	2	1	1	5	1	2	1	1	1	1	1	1.6	5	
5-Jun	1	0	1	1	0	Z	0	1	1	2	2	1	0	0	0	0	0	0	0	0	1	9	5	5	1.4	9	
6-Jun	Z	1	1	1	2	1	1	1	5	3	1	1	1	1	0	0	1	1	1	1	1	3	3	3	1.3	5	
7-Jun	2	Z	1	2	1	1	2	8	1	1	0	1	0	1	1	1	0	1	1	1	1	2	3	1	1.4	8	
8-Jun	2	0	Z	1	2	3	2	1	4	5	4	1	1	1	2	1	1	1	1	1	0	0	0	1	1.6	5	
9-Jun	1	1	1	Z	3	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	3	0.7	3	
11-Jun	1	1	2	2	2	Z	1	1	0	0	0	0	0	0	0	0	1	0	0	1	2	3	1	2	0.9	3	
12-Jun	Z	1	1	2	9	1	1	0	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	10	1.7	10	
13-Jun	3	Z	2	1	1	1	1	1	1	1	3	4	3	2	3	3	1	1	1	1	1	0	1	1	1.6	4	
14-Jun	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	3	0.7	3	
15-Jun	4	3	4	Z	4	4	5	6	4	2	2	1	1	1	1	2	1	1	1	1	1	6	1	1	2.6	6	
16-Jun	1	2	2	2	Z	1	2	3	4	3	5	1	1	1	2	7	3	1	1	2	1	1	1	1	2.1	7	
17-Jun	0	0	0	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	5	1	1	3	1	1	0.8	5	
18-Jun	Z	1	1	1	1	1	1	2	1	1	0	1	1	1	0	0	1	0	1	0	0	0	0	1	0.7	2	
19-Jun	1	Z	0	1	0	0	1	2	2	1	1	1	1	1	0	0	0	0	0	2	2	3	3	2	1.1	3	
20-Jun	1	1	Z	7	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1.3	7	
21-Jun	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	1	0.6	3
22-Jun	0	0	0	0	Z	1	1	0	0	2	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	1.1	2
23-Jun	1	1	1	1	1	Z	1	1	1	1	4	2	2	3	1	1	1	1	1	1	1	1	2	1	1	1.4	4
24-Jun	Z	1	1	1	1	1	0	1	1	2	3	3	1	1	1	0	0	0	1	1	2	2	1	1	1	1.1	3
25-Jun	1	Z	2	3	3	2	1	1	2	2	1	2	3	2	1	2	1	1	1	1	1	1	1	2	1	1.5	3
26-Jun	1	1	Z	2	3	3	8	2	8	2	1	1	1	1	9	1	1	1	1	1	1	1	2	1	1	2.3	9
27-Jun	1	1	2	Z	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	0.8	2
28-Jun	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	2	0	0	0	0	1	3	1	1	1	1	0.7	3
29-Jun	1	1	1	1	1	Z	0	1	0	1	0	1	1	1	1	1	2	2	3	4	5	3	3	2	1	1.5	5
30-Jun	Z	2	2	2	2	14	5	1	2	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1.6	14
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	56	19	15	31	16	19	39	77	57	27	19	28	48	99	67	67	684

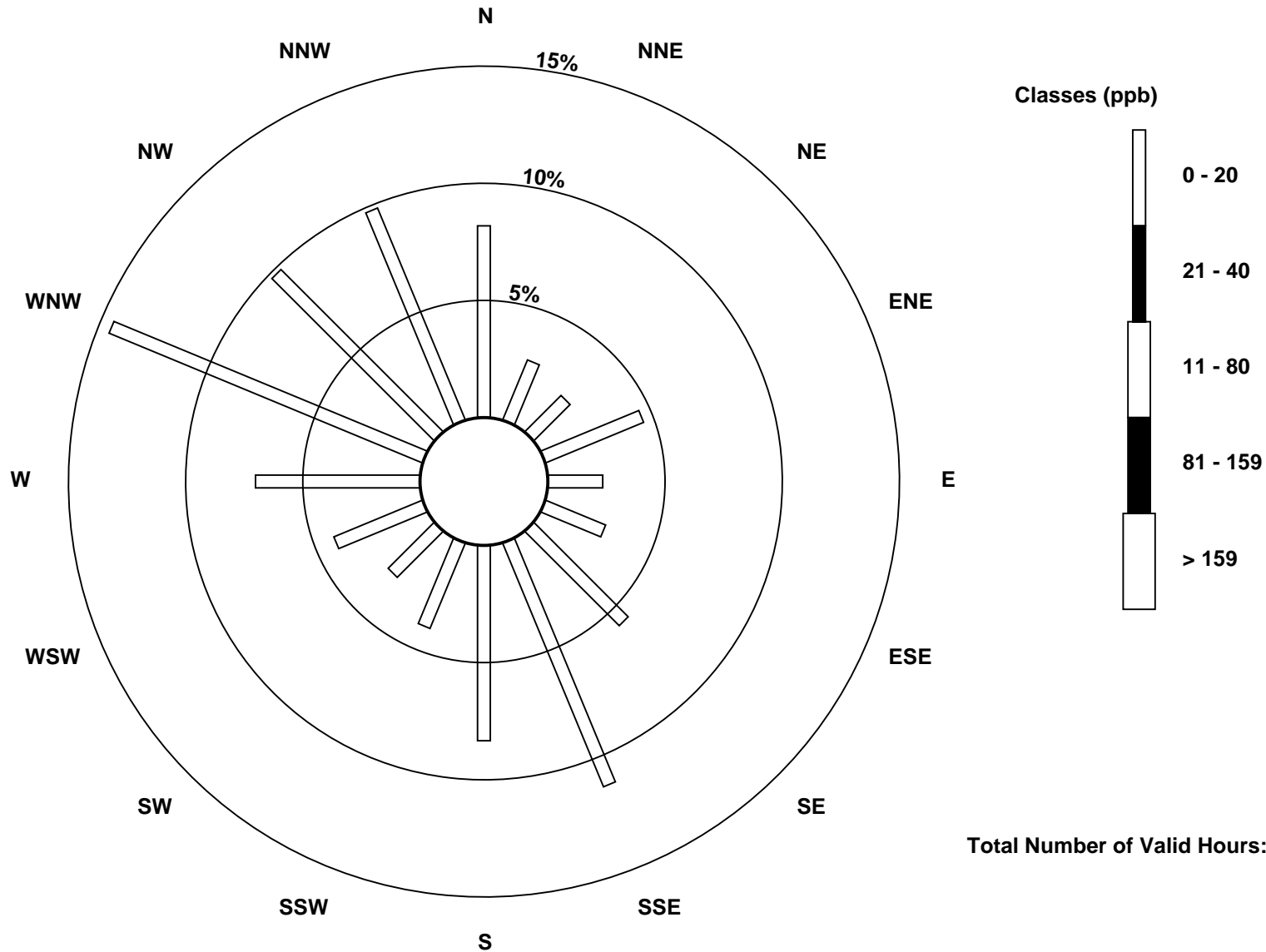
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

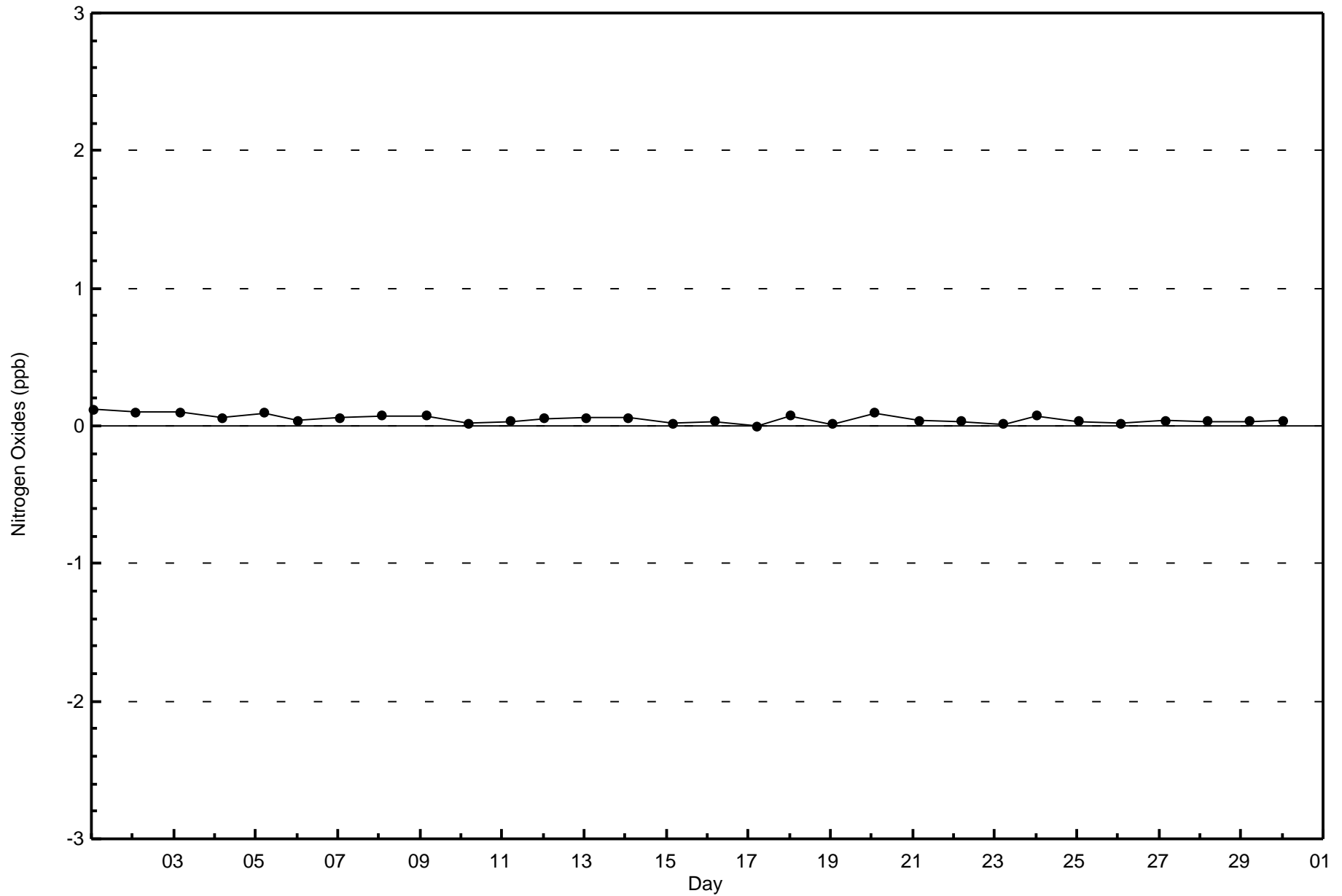
Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)

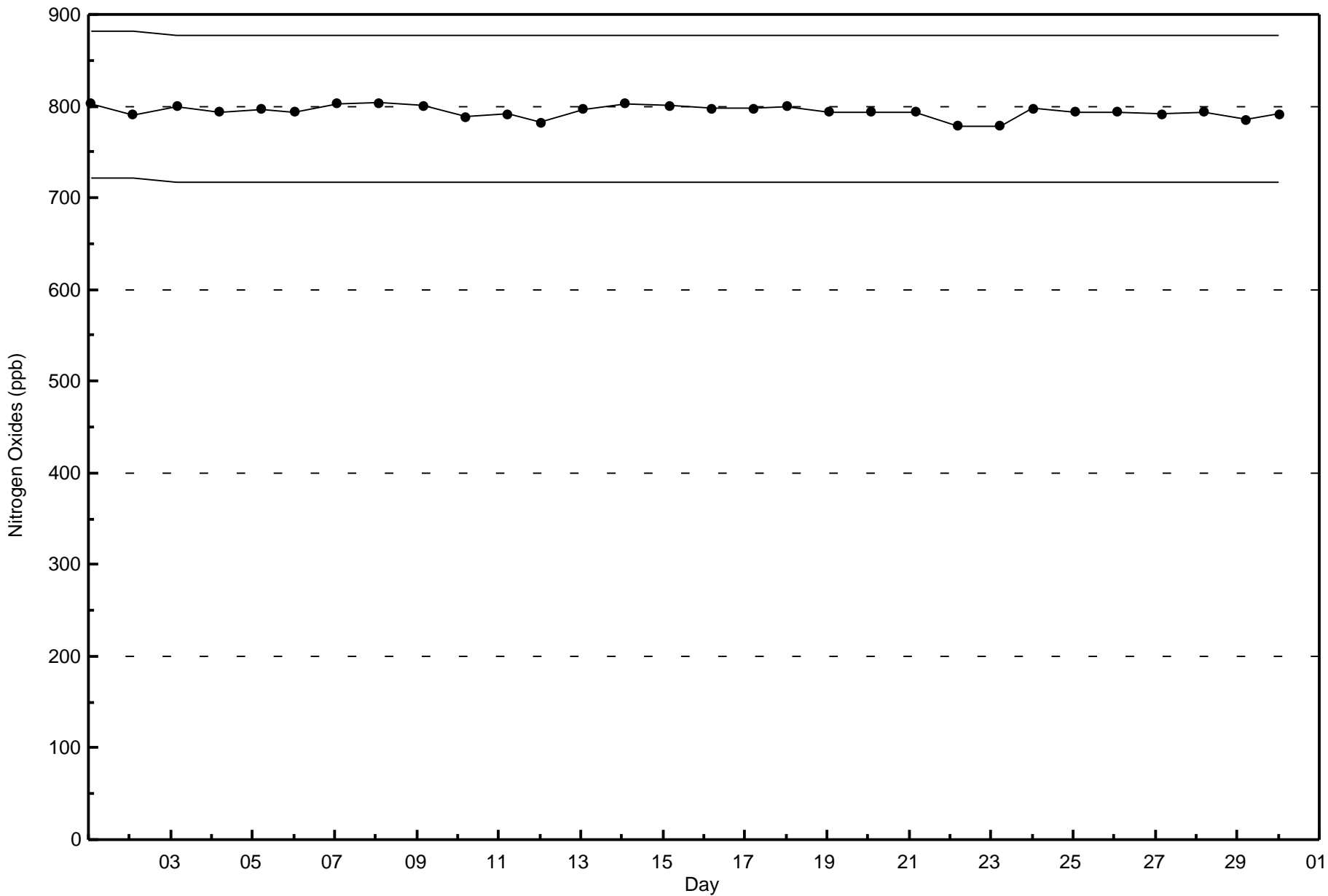




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - June 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

Ozone (O₃) - ppb
Anzac - June 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 58 ppb on Jun 4 15:00	Maximum Daily Average: 43.3 ppb on Jun 26		Hours of Data:	687
Minimum Value: 4 ppb on Jun 13 03:00	Minimum Daily Average: 17.1 ppb on Jun 15		Hours of Missing Data:	33
Maximum Diurnal Average: 37.6 ppb at hour 18	Minimum Diurnal Average: 17.6 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 29.3 ppb	Percentiles: P ₁ = 5 P ₁₀ = 12 Q ₁ = 22 Median = 30 Q ₃ = 37 P ₉₀ = 42 P ₉₉ = 53		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	36	34	28	Z	23	35	42	45	45	42	38	36	35	34	40	50	48	44	42	43	40	40	30	24	38.0	50
2-Jun	16	24	13	10	Z	14	17	23	26	28	27	27	30	35	35	42	37	43	39	38	33	32	30	26	28.1	43
3-Jun	26	25	23	23	24	Z	28	27	24	25	30	35	37	39	38	38	37	37	38	36	35	33	30	24	30.8	39
4-Jun	22	18	15	18	9	19	Z	34	37	39	45	49	48	54	58	56	53	53	46	47	46	42	36	34	38.2	58
5-Jun	34	35	36	38	38	37	39	Z	39	38	42	42	42	43	43	43	42	41	42	34	12	11	13	35.9	43	
6-Jun	11	15	Z	26	14	26	28	28	32	35	36	40	40	39	41	41	39	37	36	37	26	12	11	11	28.8	41
7-Jun	8	12	11	Z	7	6	11	8	21	C	C	C	37	40	42	45	42	44	44	42	38	36	29	29	27.6	45
8-Jun	26	28	30	27	Z	22	22	25	29	37	43	50	50	46	46	46	48	54	53	50	38	34	34	31	37.7	54
9-Jun	31	30	26	17	17	Z	24	24	35	33	36	34	32	31	31	29	30	36	40	41	39	37	36	33	31.4	41
10-Jun	32	32	32	30	31	32	Z	32	33	33	34	34	36	39	41	42	48	50	48	48	46	34	32	28	36.9	50
11-Jun	29	26	25	25	24	25	28	Z	33	32	33	35	36	37	38	38	39	39	40	39	33	20	15	16	30.7	40
12-Jun	17	19	Z	26	24	30	30	30	31	31	30	32	33	34	34	34	32	33	33	30	28	28	22	11	28.4	34
13-Jun	7	6	4	Z	13	22	29	32	33	29	28	37	43	47	39	34	38	44	39	34	34	30	29	22	29.3	47
14-Jun	25	22	23	18	Z	16	18	21	21	19	19	19	18	18	19	20	19	21	22	22	22	15	12	19.6	25	
15-Jun	12	12	11	10	10	Z	10	11	13	16	19	24	24	28	29	29	26	25	21	20	18	15	6	6	17.1	29
16-Jun	7	5	7	8	5	12	Z	19	18	20	28	34	36	35	33	30	37	36	34	30	28	26	26	23	23.5	37
17-Jun	24	22	20	17	15	16	19	Z	16	18	23	24	26	29	33	36	36	36	35	35	32	20	18	18	24.6	36
18-Jun	20	18	Z	11	18	23	29	29	33	34	35	38	41	41	37	36	36	37	38	35	34	33	33	32	31.3	41
19-Jun	30	31	29	Z	26	24	23	23	26	30	34	35	36	33	33	33	33	33	34	33	27	18	13	13	28.2	36
20-Jun	14	19	11	9	Z	25	28	29	32	34	37	40	39	38	37	35	34	35	30	28	27	27	25	30	28.9	40
21-Jun	37	38	41	42	37	Z	28	29	29	29	29	29	28	27	26	26	25	23	22	20	25	32	29	28	29.5	42
22-Jun	22	22	23	21	20	19	Z	25	27	27	29	32	34	33	31	31	32	31	30	28	25	15	8	7	24.9	34
23-Jun	6	5	4	5	5	12	21	Z	30	33	32	36	38	38	37	37	38	37	35	30	29	23	17	15	24.5	38
24-Jun	11	8	Z	17	18	21	26	29	28	31	37	38	36	35	35	33	32	34	35	38	35	27	32	29	29.0	38
25-Jun	21	14	11	Z	7	13	20	24	30	36	39	43	46	44	42	40	42	44	45	45	42	40	37	35	33.0	46
26-Jun	36	37	38	37	Z	34	36	40	40	46	49	49	49	49	47	49	49	48	48	47	46	44	40	38	43.3	49
27-Jun	36	38	35	34	30	Z	37	36	35	35	34	32	33	38	40	37	30	31	26	29	25	23	21	21	32.0	40
28-Jun	19	12	9	7	5	5	Z	22	22	24	21	21	24	29	28	27	24	23	23	21	20	15	12	9	18.3	29
29-Jun	9	10	10	8	13	16	21	Z	25	29	31	32	34	40	43	47	49	51	51	47	37	25	19	16	28.8	51
30-Jun	11	11	Z	10	8	6	18	23	21	21	17	24	24	30	30	28	29	28	27	26	27	22	20	15	20.7	30

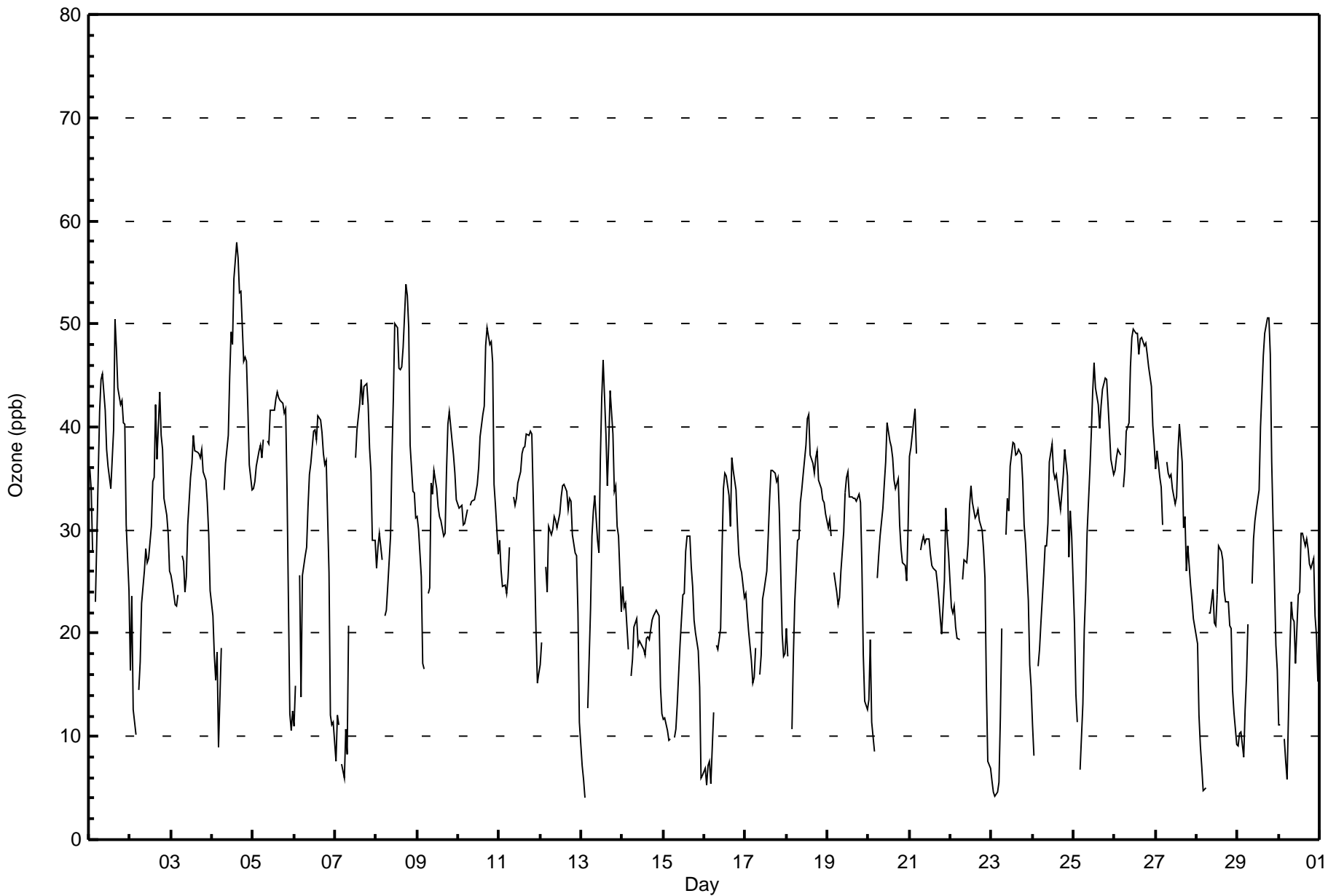
21.2	20.9	20.6	19.7	17.6	20.5	25.1	26.7	28.8	30.6	32.2	34.6	35.4	36.8	37.0	37.1	36.9	37.6	36.5	35.3	32.3	27.2	23.9	21.7	Diurnal Average	
37	38	41	42	38	37	42	45	45	46	49	50	50	54	58	56	53	54	53	50	46	44	40	38	Diurnal Maximum	

Z - zerspan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Anzac - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	146	21.25	21.25
21 - 50	532	77.44	98.69
51 - 82	9	1.31	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	6	3	1	2	1	7	11	9	17	17	11	12	10	13	9	15	144
21 - 50	48	15	14	27	16	9	29	68	39	10	10	15	40	87	57	48	532
51 - 82	3	1	0	0	0	0	0	0	2	0	0	0	0	0	0	3	9
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	19	15	29	17	16	40	77	58	27	21	27	50	100	66	66	685

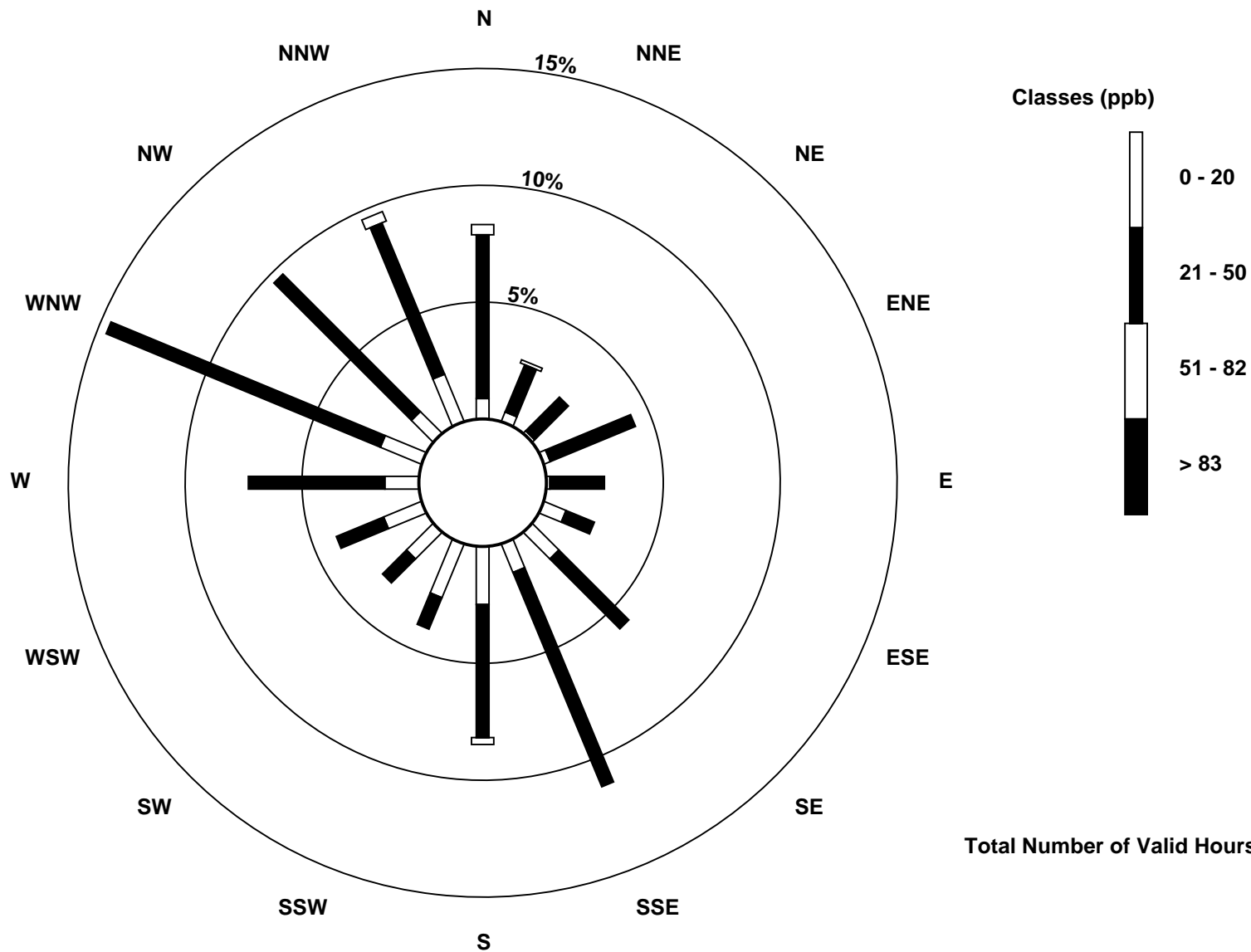
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

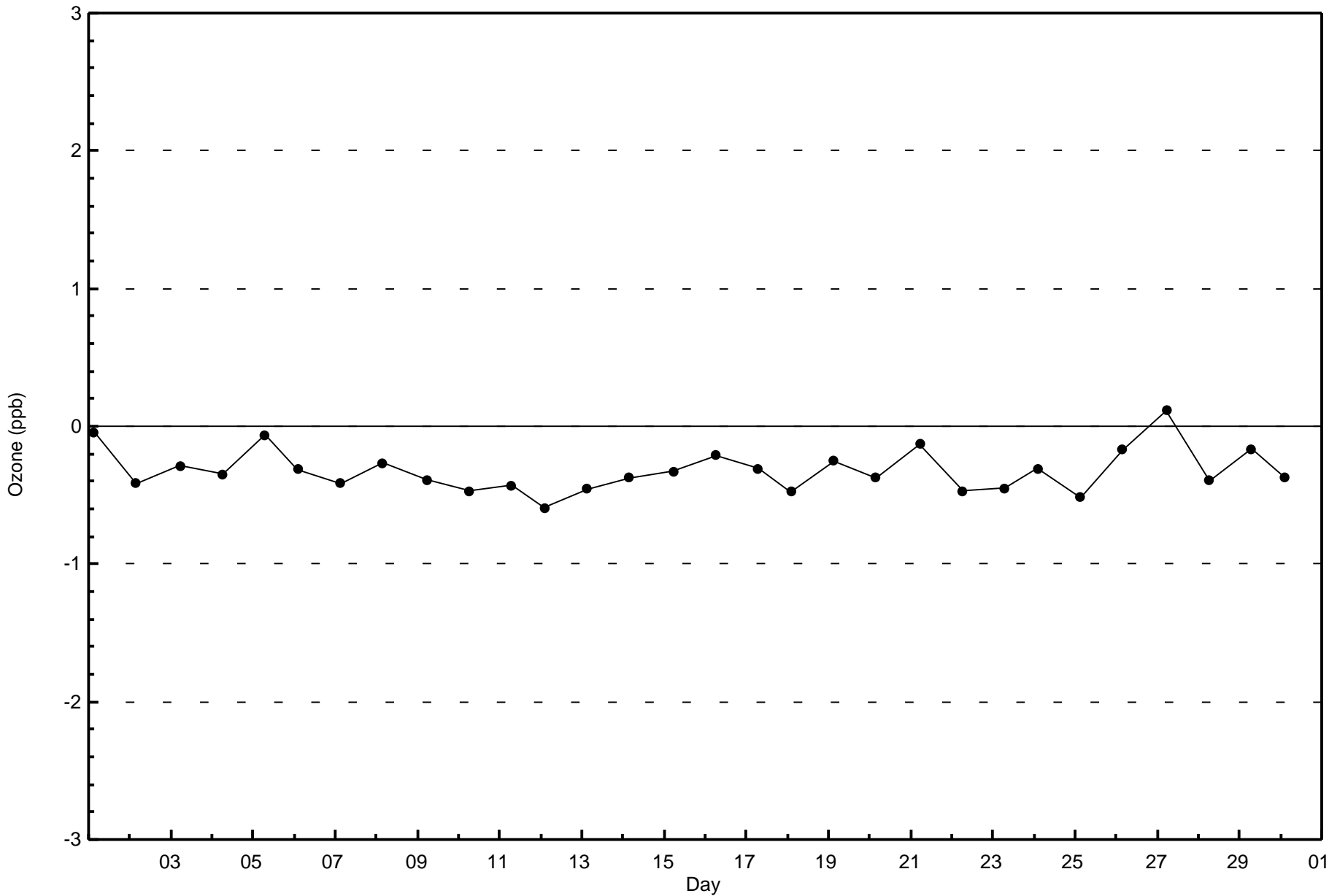
Ozone (O₃) - ppb
Anzac (AMS 14)





Wood Buffalo Environmental Association
Zero Responses

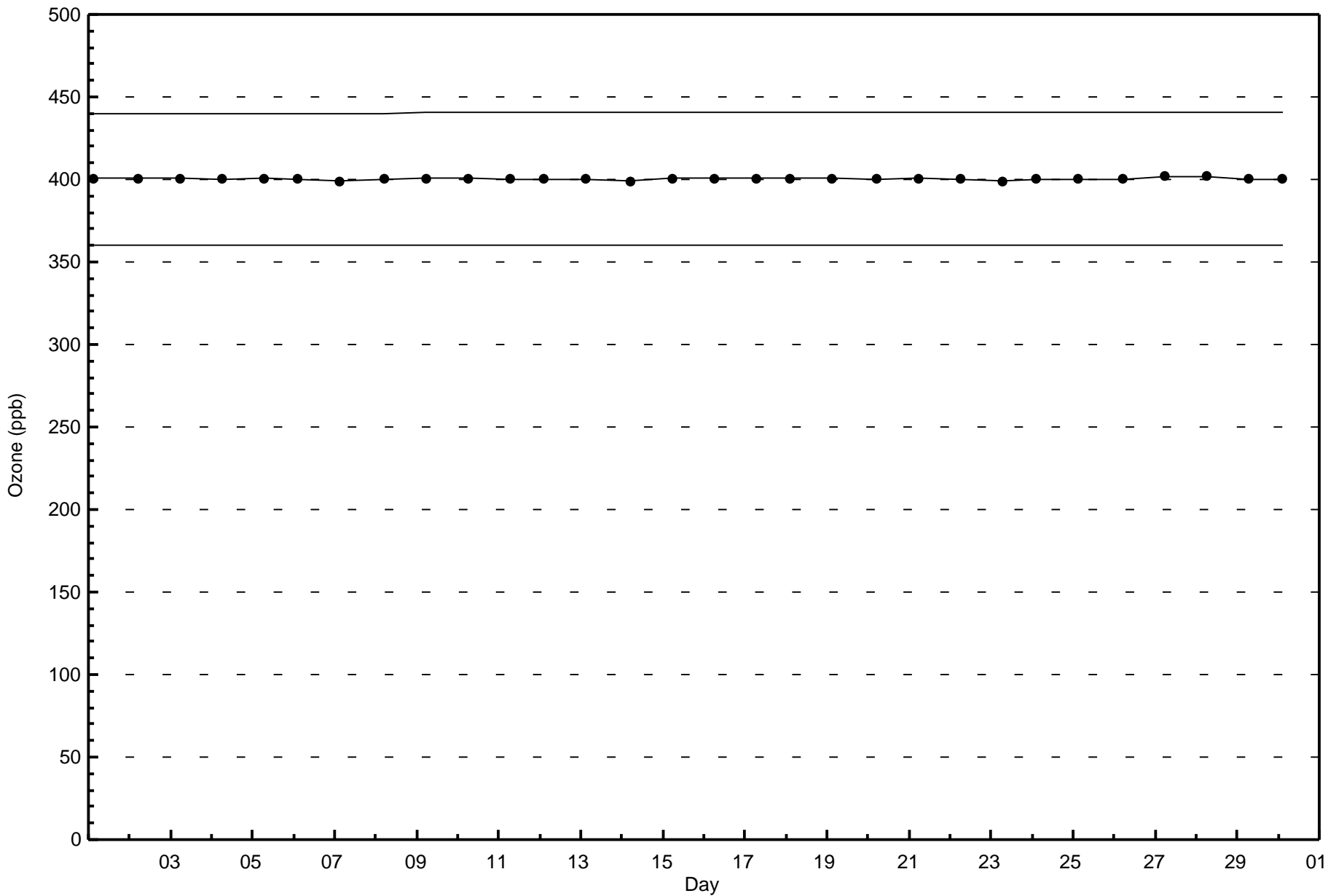
Ozone (O₃) - ppb
Anzac - June 2017





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Anzac - June 2017





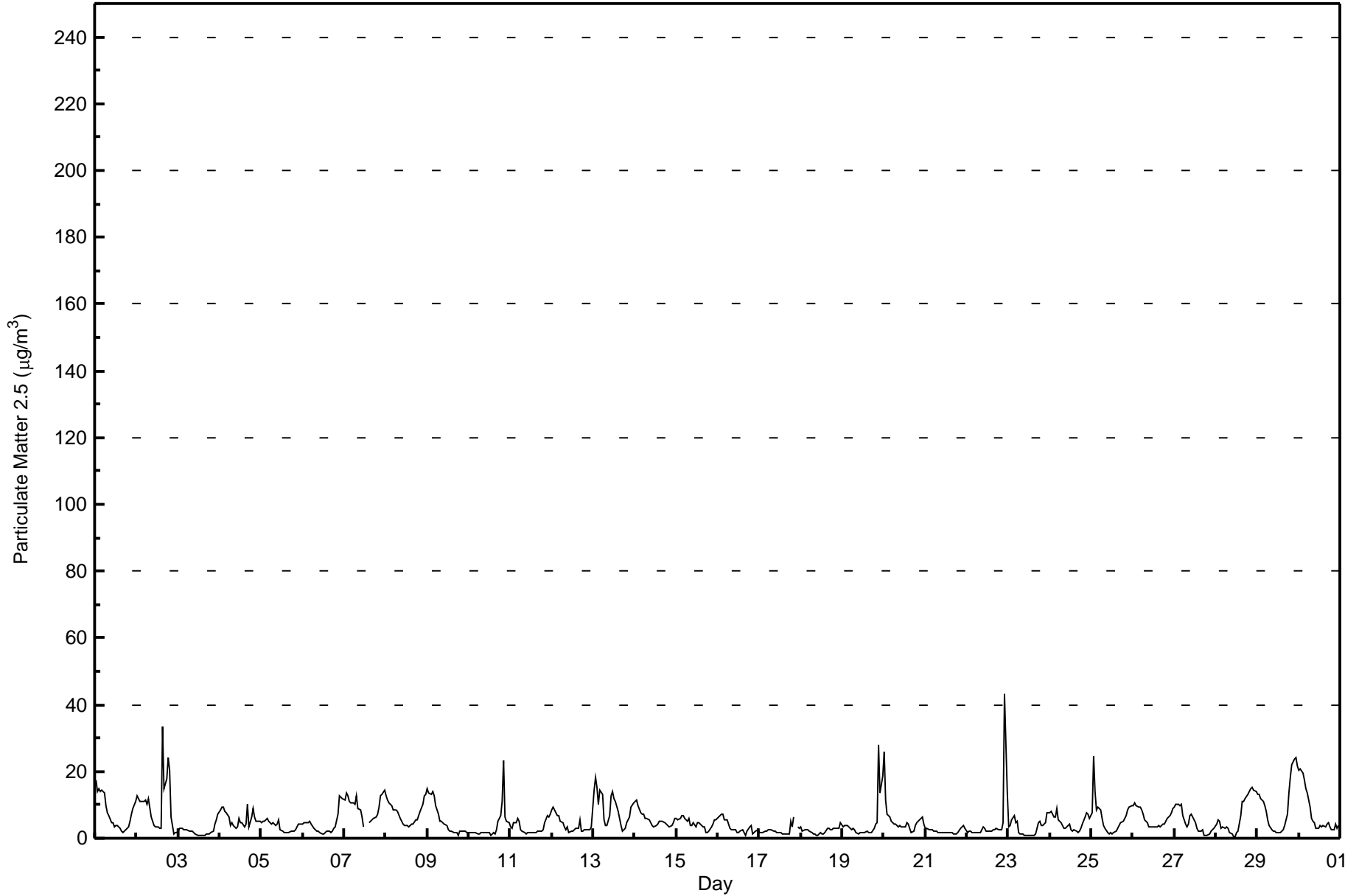
Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Anzac - June 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 43.2 µg/m ³ on Jun 22 23:00 Minimum Value: 0.6 µg/m ³ on Jun 28 11:00 Maximum Diurnal Average: 8.7 µg/m ³ at hour 2 Monthly Average: 5.31 µg/m ³		Maximum Daily Average: 10.0 µg/m ³ on Jun 2 Minimum Daily Average: 2.1 µg/m ³ on Jun 21 Minimum Diurnal Average: 2.8 µg/m ³ at hour 14 Percentiles: P ₁ = 0.9 P ₁₀ = 1.6 Q ₁ = 2.1 Median = 3.8 Q ₃ = 6.6 P ₉₀ = 11.5 P ₉₉ = 24.0		Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 2 Percent Operational Time: 99.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	17.5	14.1	14.8	14.2	14.4	13.4	9.9	7.7	6.9	4.8	4.7	3.4	3.7	3.9	3.0	2.0	1.9	2.2	2.8	3.3	5.3	7.2	9.1	10.9	7.5	17.5																						
2-Jun	12.8	12.0	11.1	11.1	11.0	11.4	10.4	11.8	6.4	5.0	4.0	3.3	3.3	2.9	2.8	33.6	14.8	17.8	24.0	20.5	6.6	1.2	1.6	1.8	10.0	33.6																						
3-Jun	2.0	2.8	2.8	2.5	2.4	2.5	2.2	2.0	2.0	1.6	1.2	1.0	0.9	0.8	1.0	1.1	1.1	1.2	1.2	1.5	2.3	4.0	5.4	7.2	2.2	7.2																						
4-Jun	8.3	9.1	9.3	8.2	7.4	6.3	3.9	4.7	3.6	2.9	3.2	6.1	4.5	4.7	3.3	4.2	10.3	3.3	6.3	9.0	6.2	5.1	5.2	4.9	5.8	10.3																						
5-Jun	4.8	4.9	5.2	5.8	5.1	4.7	4.3	4.7	3.9	4.4	5.4	2.5	2.0	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.4	4.1	4.3	4.4	3.6	5.8																						
6-Jun	4.4	4.6	4.7	4.7	5.2	4.4	2.8	2.5	2.0	2.1	1.5	1.2	1.2	1.6	1.9	2.0	1.9	2.3	3.1	3.4	7.3	12.8	12.5	12.1	4.3	12.8																						
7-Jun	11.5	13.4	12.6	11.2	10.7	10.5	10.2	12.5	8.7	8.4	6.5	3.6	C	C	4.6	5.2	5.4	6.1	6.5	7.2	9.4	12.9	13.3	14.6	9.3	14.6																						
8-Jun	12.9	11.3	10.5	9.7	8.6	8.4	8.5	8.1	6.1	4.9	4.1	3.7	3.6	3.5	3.7	4.1	4.4	5.6	5.5	6.7	8.1	10.1	12.7	13.3	7.4	13.3																						
9-Jun	14.8	13.4	12.9	13.9	12.7	9.7	7.1	5.0	5.2	4.7	4.3	3.7	2.4	2.3	2.3	1.9	1.8	1.5	1.0	1.9	2.3	2.0	1.9	1.7	5.4	14.8																						
10-Jun	1.7	1.7	1.7	1.6	1.5	1.4	1.5	1.5	1.6	1.7	1.8	1.8	1.8	1.1	1.5	1.2	2.4	5.2	6.7	11.2	23.4	6.3	5.1	4.8	3.8	23.4																						
11-Jun	3.5	2.9	4.8	4.8	6.1	5.0	2.7	2.0	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	2.1	2.0	1.9	2.5	4.5	6.9	6.2	7.1	3.2	7.1																						
12-Jun	8.5	9.4	7.8	6.9	6.6	5.1	4.8	3.2	2.5	3.4	1.9	1.9	2.1	2.5	3.0	3.1	5.5	2.2	2.2	2.4	2.4	2.6	2.7	3.3	4.0	9.4																						
13-Jun	14.5	18.3	15.0	10.0	14.4	13.2	5.5	4.0	3.9	6.7	12.5	14.2	11.7	10.9	8.2	5.9	3.7	2.0	3.1	4.8	5.4	6.3	9.3	10.4	8.9	18.3																						
14-Jun	11.0	11.5	9.8	7.8	7.2	7.0	5.8	5.7	5.4	4.5	3.8	3.2	3.8	4.4	5.1	5.0	5.0	4.5	4.3	3.8	3.5	3.7	4.5	5.9	5.7	11.5																						
15-Jun	5.7	5.4	5.7	6.7	6.8	5.8	5.2	6.0	3.8	3.7	4.6	3.6	4.5	4.5	4.3	3.6	3.6	1.8	1.6	2.2	3.3	4.3	5.7	5.7	4.5	6.8																						
16-Jun	6.4	6.9	7.1	7.1	5.4	5.6	4.4	2.8	2.5	2.4	2.4	1.5	1.6	2.1	2.5	1.6	1.0	2.0	3.4	3.7	1.3	1.7	2.0	2.5	3.3	7.1																						
17-Jun	1.7	1.7	1.7	2.0	2.0	2.6	2.4	2.5	2.1	1.9	1.6	1.5	1.6	1.2	1.2	1.1	1.1	1.4	4.9	3.4	6.3	UO	3.3	2.9	2.3	6.3																						
18-Jun	3.2	2.1	2.5	2.5	2.4	2.0	1.6	1.4	1.1	0.9	0.9	1.6	1.2	1.5	1.6	2.8	3.2	2.5	2.6	2.9	3.0	2.9	3.2	4.8	2.3	4.8																						
19-Jun	3.2	3.8	3.8	3.6	3.3	2.6	3.0	2.5	1.8	1.4	1.6	1.6	1.6	1.7	1.9	1.7	1.5	1.7	2.9	4.1	4.8	27.9	13.7	18.5	4.7	27.9																						
20-Jun	26.0	11.5	7.1	6.2	5.1	4.5	4.3	4.4	3.2	3.9	3.4	3.2	3.3	4.7	4.4	2.9	1.7	2.1	3.9	4.5	5.2	5.8	6.2	4.4	5.5	26.0																						
21-Jun	3.1	2.8	2.7	2.6	2.4	2.2	2.3	1.9	1.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.3	1.2	1.1	1.5	3.1	3.3	3.8	3.0	2.1	3.8																						
22-Jun	1.9	2.2	2.0	1.9	1.7	1.7	1.6	1.6	1.8	3.2	2.8	2.0	2.2	2.3	2.3	2.4	2.7	2.8	2.4	2.3	2.6	4.5	43.2	13.7	4.5	43.2																						
23-Jun	3.5	3.9	5.4	6.7	4.7	5.1	1.8	1.3	1.1	0.8	0.9	0.8	0.8	1.0	1.0	1.0	1.5	4.6	5.0	3.9	3.9	4.9	7.5	7.8	3.3	7.8																						
24-Jun	7.8	8.2	6.4	6.4	9.0	5.5	4.6	3.8	3.1	3.1	3.5	4.3	2.7	2.3	2.7	2.2	1.8	2.0	2.9	4.1	6.4	7.5	7.3	6.1	4.7	9.0																						
25-Jun	7.7	24.5	14.0	8.6	9.5	8.6	5.8	3.9	2.9	1.9	1.4	1.5	1.5	1.6	2.1	2.8	3.7	4.5	4.9	5.8	6.8	8.6	9.5	9.9	6.3	24.5																						
26-Jun	9.9	10.6	9.7	9.4	9.5	8.5	7.0	5.6	4.5	3.4	3.4	3.4	3.5	3.5	3.6	3.6	3.6	4.3	4.3	5.2	6.0	6.6	7.8	8.8	6.1	10.6																						
27-Jun	9.2	10.0	10.0	9.8	10.2	6.7	4.2	3.4	4.4	6.6	7.0	5.6	4.6	3.1	1.9	2.1	2.6	0.9	1.0	0.8	1.3	2.2	2.7	3.0	4.7	10.2																						
28-Jun	4.4	5.4	5.2	3.1	3.3	3.1	3.2	2.8	1.8	1.4	0.6	0.6	1.5	1.9	6.8	11.0	11.2	12.0	13.0	13.9	15.0	15.2	14.6	13.9	6.9	15.2																						
29-Jun	13.0	13.0	11.9	10.9	9.7	8.2	5.6	3.8	2.7	1.9	1.9	1.9	1.8	1.8	2.2	2.6	3.6	7.4	13.5	18.1	21.8	23.6	24.1	21.6	9.4	24.1																						
30-Jun	20.5	20.6	19.7	17.2	15.0	13.6	9.4	5.9	5.0	4.5	3.2	3.0	3.8	3.4	3.8	3.5	4.2	4.6	3.3	2.6	2.4	4.0	2.9	3.7	7.5	20.6																						
																								8.5	8.7	7.9	7.2	7.1	6.3	4.9	4.3	3.4	3.3	3.2	3.0	2.8	2.8	2.9	4.0	3.7	3.8	4.7	5.3	6.1	7.2	8.4	7.7	Diurnal Average
																								26.0	24.5	19.7	17.2	15.0	13.6	10.4	12.5	8.7	8.4	12.5	14.2	11.7	10.9	8.2	33.6	14.8	17.8	24.0	20.5	23.4	27.9	43.2	21.6	Diurnal Maximum
C - Calibration																								UO - Unstable Operation																								
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	476	66.39	66.39
6 - 15	205	28.59	94.98
16 - 25	17	2.37	97.35
26 - 80	4	0.56	97.91
> 81.0	0	0.00	97.91

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - June 2017

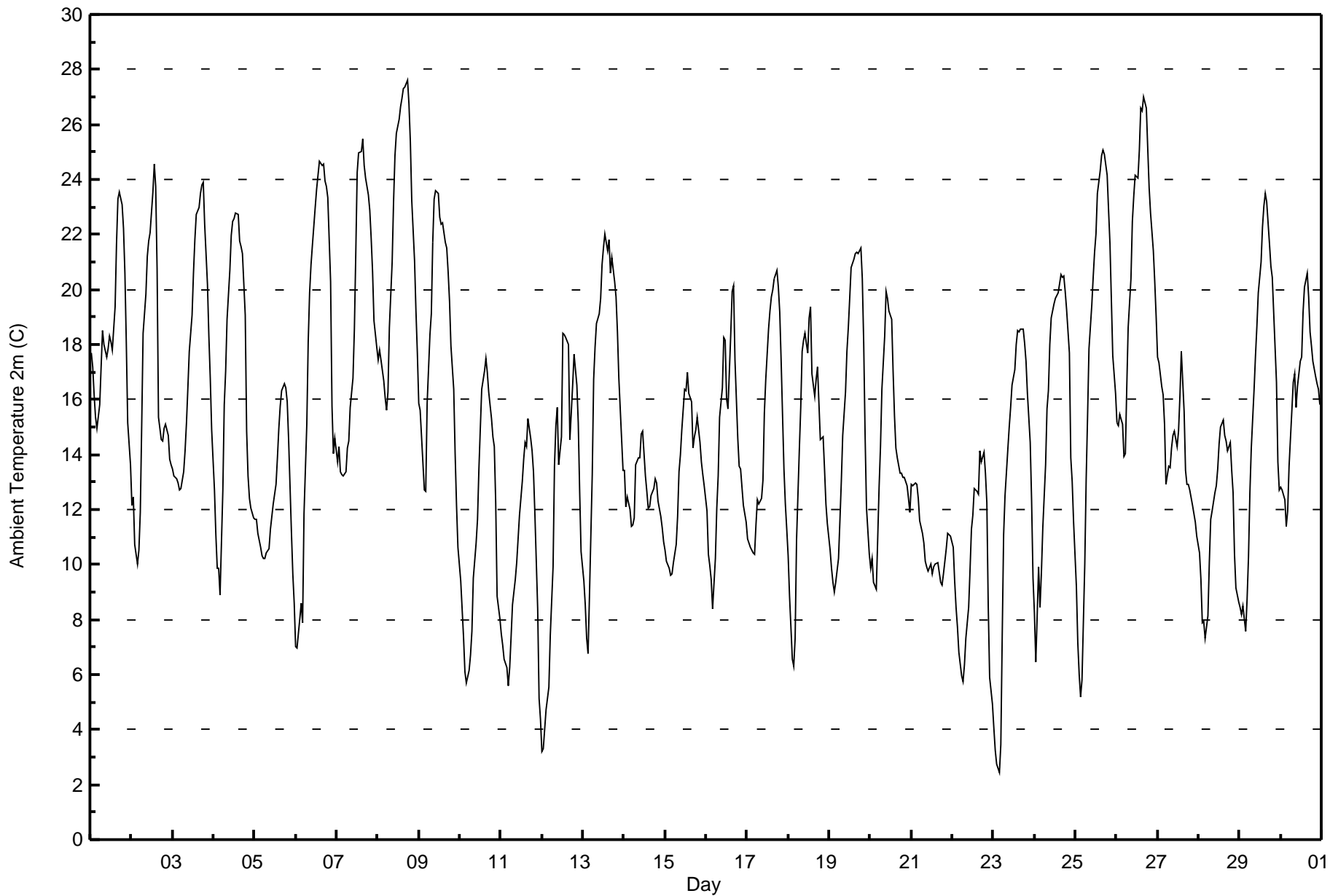
Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	43	15	14	23	7	6	23	48	32	14	10	22	37	86	49	47	476
6 - 15	9	4	1	7	9	13	16	29	29	14	8	7	10	17	11	20	204
16 - 25	0	0	0	0	0	1	1	1	1	1	1	1	1	1	4	3	16
26 - 80	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0	4
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	52	19	15	30	16	20	40	79	62	29	20	30	48	104	66	70	700

Total Number of Valid Hours: 715

Total Number of Hours: 720



Maximum Value: 27.6 C on Jun 8 18:00		Maximum Daily Average: 21.9 C on Jun 8		Hours in Service: 720																						
Minimum Value: 2.4 C on Jun 23 04:00		Minimum Daily Average: 9.8 C on Jun 22		Hours of Data: 720																						
Maximum Diurnal Average: 19.4 C at hour 15		Minimum Diurnal Average: 9.8 C at hour 4		Hours of Missing Data: 0																						
Monthly Average: 15.13 C		Percentiles: P ₁ = 4.2 P ₁₀ = 8.8 Q ₁ = 11.6 Median = 14.7 Q ₃ = 18.6 P ₉₀ = 22.3 P ₉₉ = 26.6		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	17.7	17.2	16.2	15.3	15.0	15.8	17.2	18.5	18.0	17.6	17.9	18.3	18.1	17.8	19.4	21.7	23.3	23.6	23.1	22.2	20.6	18.1	15.1	13.6	18.4	23.6
2-Jun	12.1	12.4	10.7	10.0	10.5	11.9	15.1	18.4	19.9	21.2	21.8	22.0	23.6	24.6	23.8	20.7	15.3	14.5	14.5	14.9	15.1	14.7	13.9	13.7	16.5	24.6
3-Jun	13.5	13.2	13.1	12.9	12.7	12.8	13.4	14.1	15.1	16.4	17.7	19.1	20.6	21.8	22.7	23.0	23.5	23.8	23.9	22.3	20.2	18.3	16.8	14.9	17.7	23.9
4-Jun	12.7	11.1	9.9	9.9	8.9	12.7	15.8	17.0	18.9	20.7	22.0	22.4	22.6	22.8	22.7	21.8	21.6	21.3	19.1	14.9	13.2	12.4	12.1	11.7	16.6	22.8
5-Jun	11.6	11.6	11.1	10.6	10.3	10.2	10.2	10.4	10.6	11.3	11.8	12.2	12.9	13.9	15.0	15.8	16.3	16.6	16.4	15.9	14.5	11.2	9.6	8.6	12.4	16.6
6-Jun	7.0	6.9	8.1	8.6	7.9	11.9	15.1	18.1	19.9	20.9	21.6	23.0	23.6	24.1	24.6	24.5	24.5	24.0	23.7	23.3	20.3	15.7	14.0	14.6	17.8	24.6
7-Jun	13.7	14.3	13.4	13.3	13.2	13.4	14.2	14.5	15.7	16.8	18.6	21.3	24.2	25.0	25.0	25.5	24.5	24.0	23.5	22.9	21.8	20.7	18.9	17.9	19.0	25.5
8-Jun	17.4	17.8	17.4	16.7	16.0	15.6	16.2	18.6	21.0	23.2	24.9	25.7	26.2	26.7	27.0	27.3	27.4	27.6	26.7	25.4	23.2	21.0	19.2	17.7	21.9	27.6
9-Jun	15.9	15.6	13.7	12.7	12.7	15.8	18.4	19.1	21.7	23.3	23.6	23.5	22.6	22.4	22.4	21.7	21.5	20.6	19.6	18.0	16.4	14.0	12.2	10.6	18.2	23.6
10-Jun	9.4	8.4	7.4	6.1	5.7	6.2	6.7	7.6	9.5	10.8	11.6	13.5	14.9	16.4	17.0	17.5	17.0	16.3	15.3	14.6	14.3	12.2	8.9	8.0	11.5	17.5
11-Jun	7.5	7.1	6.6	6.2	5.6	6.2	7.3	8.6	9.5	10.1	10.9	11.8	13.0	13.8	14.5	14.3	15.3	14.6	14.1	13.4	11.8	8.4	5.1	4.4	10.0	15.3
12-Jun	3.2	3.3	4.7	5.1	5.5	7.4	9.9	13.6	15.1	15.7	13.6	14.7	18.4	18.4	18.2	18.0	14.5	15.5	16.5	17.7	16.5	15.1	12.7	10.5	12.7	18.4
13-Jun	9.4	8.5	7.3	6.8	8.8	13.2	16.7	17.9	18.8	19.1	19.7	20.9	21.5	22.0	21.4	21.8	20.6	21.1	20.3	19.7	18.5	16.8	15.7	13.4	16.7	22.0
14-Jun	13.4	12.1	12.5	12.0	11.4	11.4	11.7	13.6	13.9	13.9	14.7	14.8	13.2	12.7	12.0	12.1	12.5	12.8	13.1	13.0	12.3	11.7	11.3	10.8	12.6	14.8
15-Jun	10.5	10.1	9.9	9.6	9.7	10.1	10.8	11.7	13.4	14.0	14.9	16.4	16.3	17.0	16.2	15.9	14.2	14.6	14.9	15.4	14.4	13.7	13.3	12.9	13.3	17.0
16-Jun	11.9	10.4	10.0	9.4	8.4	10.2	12.1	13.2	15.4	16.4	18.3	18.1	16.0	15.7	18.4	19.9	20.1	17.4	14.6	13.6	13.5	12.8	12.2	11.6	14.2	20.1
17-Jun	10.9	10.8	10.6	10.4	10.4	11.5	12.4	12.2	12.4	13.0	15.5	16.7	18.5	19.2	19.8	20.0	20.4	20.7	20.1	19.2	17.4	13.5	12.2	11.3	15.0	20.7
18-Jun	10.3	8.8	6.6	6.3	7.3	10.9	14.2	15.7	17.7	18.1	18.4	17.7	18.9	19.4	17.0	16.1	16.7	17.2	15.9	14.6	14.7	13.5	12.2	11.5	14.2	19.4
19-Jun	10.5	9.9	9.3	9.0	9.3	10.2	11.6	13.0	14.7	16.3	17.7	18.6	19.7	20.8	21.1	21.3	21.3	21.3	21.5	20.4	18.0	14.7	12.1	10.4	15.5	21.5
20-Jun	9.9	10.2	9.4	9.1	10.9	12.8	14.3	16.4	18.3	19.9	19.7	19.2	18.9	17.0	15.4	14.2	13.9	13.3	13.3	13.2	13.2	12.9	12.4	11.9	14.2	19.9
21-Jun	12.9	12.9	13.0	12.9	12.4	11.6	11.2	10.8	10.1	9.9	9.7	10.0	9.6	9.9	10.0	10.1	9.7	9.4	9.3	9.7	10.6	11.1	11.1	11.0	10.8	13.0
22-Jun	10.6	9.4	8.4	7.7	6.8	6.0	5.8	6.3	7.3	8.5	9.8	11.3	11.8	12.8	12.7	12.6	14.1	13.7	14.1	13.3	12.2	8.5	5.9	4.9	9.8	14.1
23-Jun	4.1	3.3	2.8	2.4	3.4	7.4	11.1	12.5	14.2	15.0	15.7	16.5	17.1	18.0	18.5	18.5	18.6	18.5	18.0	17.4	16.2	14.4	12.3	9.5	12.7	18.6
24-Jun	8.2	6.4	9.9	8.4	9.7	11.3	13.6	15.6	16.3	18.0	19.0	19.5	19.7	19.8	19.9	20.5	20.4	20.5	19.9	19.3	17.7	13.9	13.0	11.5	15.5	20.5
25-Jun	9.2	7.2	6.0	5.2	5.8	10.0	13.1	15.4	17.8	19.4	20.5	21.3	22.0	23.5	24.3	24.9	25.1	24.9	24.1	22.9	21.7	19.6	17.6	16.2	17.4	25.1
26-Jun	15.2	15.1	15.5	15.1	13.9	14.0	16.4	18.6	20.4	22.5	23.4	24.2	24.1	25.1	26.6	26.5	27.0	26.6	25.1	23.7	22.8	21.4	20.3	19.0	20.9	27.0
27-Jun	17.5	17.3	16.5	16.1	15.1	12.9	13.6	13.6	14.3	14.7	14.9	14.3	14.9	16.1	17.7	15.5	13.4	12.9	12.9	12.7	12.2	11.8	11.5	11.1	14.3	17.7
28-Jun	10.4	9.5	7.9	7.9	7.3	8.1	10.1	11.6	12.0	12.6	12.8	13.5	14.4	15.0	15.3	14.7	14.5	14.1	14.5	13.4	12.6	10.4	9.2	8.6	11.7	15.3
29-Jun	8.4	8.2	8.5	7.6	8.7	10.3	12.6	14.3	16.4	17.6	18.7	19.9	21.0	22.3	23.1	23.5	23.2	21.7	20.8	20.4	19.1	16.6	13.7	12.7	16.2	23.5
30-Jun	12.8	12.7	12.4	11.4	12.0	13.6	15.6	16.6	16.9	15.7	16.5	17.4	17.6	19.2	20.1	20.6	19.8	18.5	17.9	17.4	16.8	16.6	16.4	15.8	16.3	20.6
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	112	15.56	15.56
10 - 20	472	65.56	81.11
> 20	136	18.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



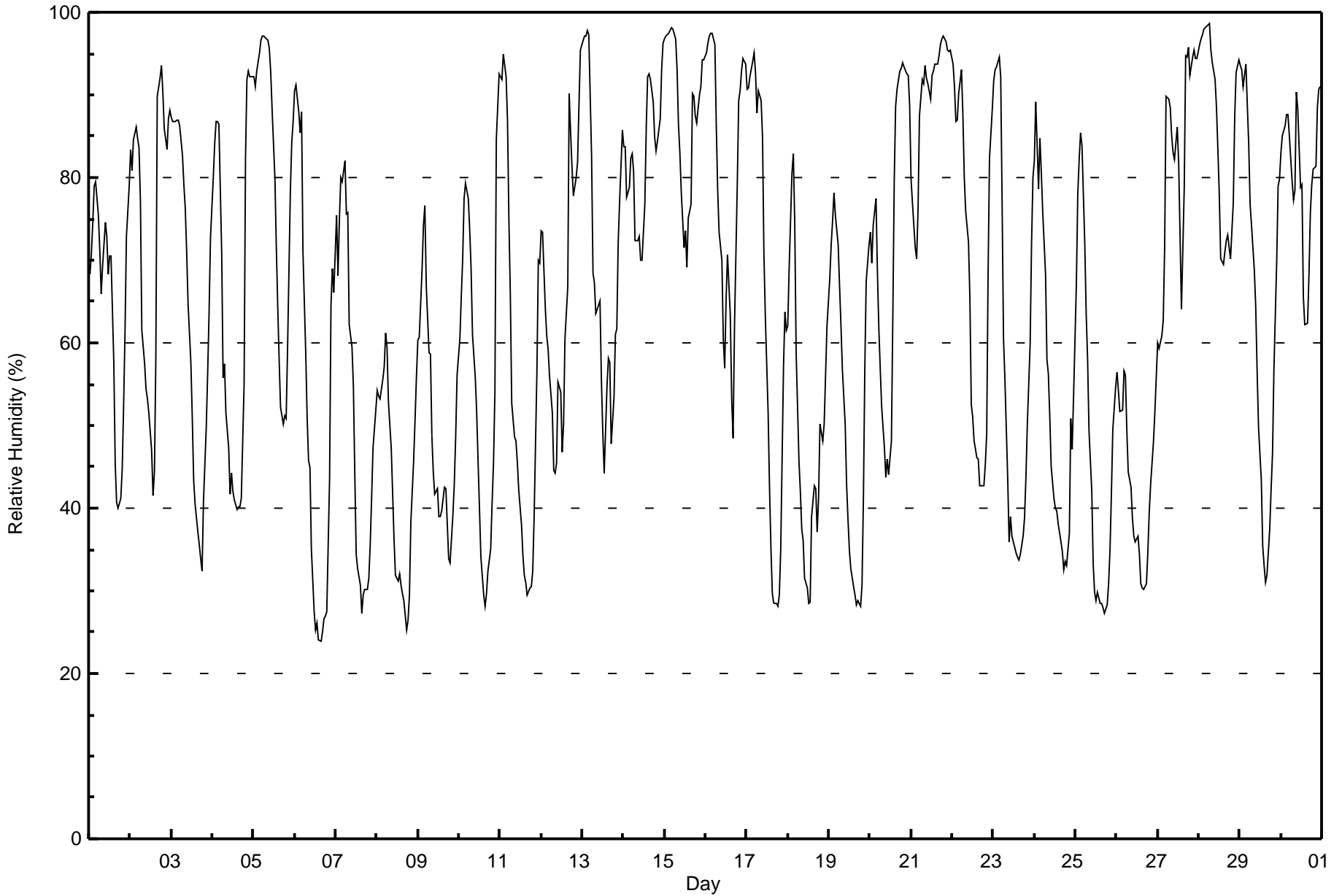
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Anzac - June 2017

Maximum Value: 99 % on Jun 28 07:00														Maximum Daily Average: 89.6 % on Jun 21														Hours in Service: 720	
Minimum Value: 24 % on Jun 6 16:00														Minimum Daily Average: 42.9 % on Jun 8														Hours of Data: 720	
Maximum Diurnal Average: 82.7 % at hour 4														Minimum Diurnal Average: 48.8 % at hour 15														Hours of Missing Data: 0	
Monthly Average: 64.9 %														Percentiles: P ₁ = 26 P ₁₀ = 34 Q ₁ = 45 Median = 67 Q ₃ = 86 P ₉₀ = 93 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	68	71	75	79	80	75	71	66	69	75	73	68	71	70	58	45	41	40	41	45	52	61	73	79	64.4	80			
2-Jun	83	81	85	86	85	84	77	62	57	54	53	52	47	42	44	58	90	92	94	90	86	83	87	88	73.3	94			
3-Jun	87	87	87	87	87	86	83	79	76	71	65	58	51	43	41	37	36	34	32	41	50	57	64	73	62.9	87			
4-Jun	80	84	87	87	86	71	56	57	52	47	42	44	42	41	40	40	40	41	55	82	92	93	92	92	64.3	93			
5-Jun	92	91	93	95	97	97	97	97	97	96	93	88	80	72	64	58	52	50	51	51	59	78	84	87	79.9	97			
6-Jun	91	91	88	85	88	71	59	51	46	45	35	27	25	26	24	24	25	27	27	27	43	64	69	66	51.1	91			
7-Jun	75	68	75	80	80	82	76	76	62	60	55	44	34	33	31	27	29	30	30	31	36	41	47	52	52.3	82			
8-Jun	54	54	53	56	57	61	60	53	47	42	36	32	31	32	31	30	29	25	26	29	38	46	51	56	42.9	61			
9-Jun	60	61	69	74	77	67	59	59	49	44	42	42	39	39	40	42	42	38	34	33	39	43	49	56	49.9	77			
10-Jun	61	66	70	77	79	77	74	69	61	56	52	46	40	34	30	28	30	32	35	41	46	54	85	92	55.6	92			
11-Jun	92	92	95	92	87	75	66	53	49	48	46	42	38	34	32	31	30	30	30	32	39	57	70	70	55.4	95			
12-Jun	74	73	64	61	59	56	52	45	44	45	55	54	47	50	61	67	90	86	81	78	80	82	89	95	66.1	95			
13-Jun	97	97	97	98	97	83	68	67	64	65	65	56	49	44	55	58	58	48	53	61	62	72	77	86	69.8	98			
14-Jun	84	84	78	79	82	83	81	72	72	73	70	70	77	86	92	93	92	89	85	83	84	87	93	96	82.7	96			
15-Jun	97	97	97	98	98	98	97	93	86	83	78	72	74	69	75	77	90	90	87	87	90	91	94	94	88.0	98			
16-Jun	95	96	97	97	97	96	86	79	73	70	61	57	65	71	63	53	48	62	79	89	91	93	94	94	79.5	97			
17-Jun	91	91	92	94	95	93	88	90	89	85	71	63	52	42	35	30	28	28	28	30	35	57	64	62	63.9	95			
18-Jun	62	69	81	83	74	59	46	42	37	36	31	30	28	29	39	43	42	37	41	50	48	50	56	62	49.0	83			
19-Jun	68	72	75	78	75	72	67	62	57	50	43	39	35	33	31	29	28	29	28	31	41	57	68	72	51.6	78			
20-Jun	73	70	74	77	69	62	57	52	47	44	46	44	48	63	79	89	91	93	93	94	93	93	92	89	72.2	94			
21-Jun	80	77	71	70	76	87	92	91	93	92	91	89	92	93	94	94	95	96	97	97	97	95	95	95	89.6	97			
22-Jun	94	91	87	87	90	93	88	80	76	72	65	53	51	48	46	46	43	43	43	45	49	69	82	88	67.8	94			
23-Jun	92	93	93	95	92	77	61	56	44	36	39	37	35	35	34	34	34	37	39	44	50	60	72	80	56.9	95			
24-Jun	82	89	79	85	81	76	68	58	56	51	45	41	40	40	38	36	35	33	34	33	37	51	47	54	53.6	89			
25-Jun	67	78	82	85	84	72	64	58	50	42	33	30	29	30	29	28	28	27	28	31	35	42	50	55	48.2	85			
26-Jun	56	54	52	52	57	56	49	44	43	39	37	36	37	34	31	30	30	31	35	39	43	48	52	56	43.3	57			
27-Jun	60	59	61	63	72	90	89	88	85	83	82	86	82	73	64	79	95	95	96	92	95	95	94	94	82.2	96			
28-Jun	96	97	97	98	98	98	99	95	94	92	88	83	78	70	70	71	72	73	70	74	77	87	93	94	86.1	99			
29-Jun	94	93	91	94	89	84	77	74	69	64	57	50	43	35	33	31	32	37	42	47	57	70	79	80	63.4	94			
30-Jun	83	85	86	88	88	85	79	77	79	90	88	79	79	66	62	62	68	76	79	81	81	88	91	91	80.5	91			
																												Diurnal Average	
																												Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	128	17.78	17.78
40 - 60	182	25.28	43.06
60 - 80	178	24.72	67.78
80 - 100	232	32.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



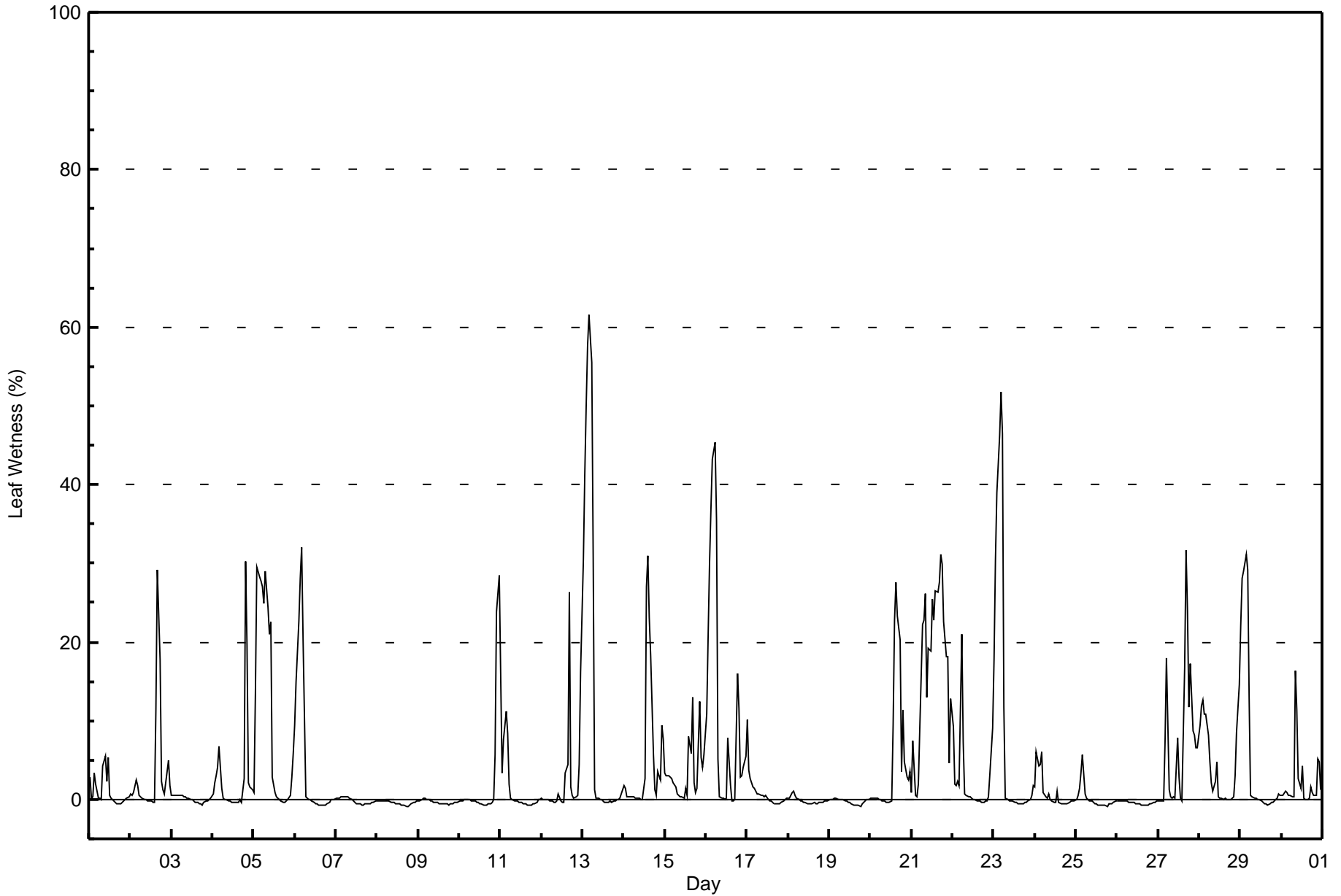
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

Anzac - June 2017

Maximum Value: 62 % on Jun 13 05:00		Maximum Daily Average: 17.0 % on Jun 21		Hours in Service: 720																						
Minimum Value: -1 % on Jun 8 18:00		Minimum Daily Average: -0.4 % on Jun 8		Hours of Data: 720																						
Maximum Diurnal Average: 10.1 % at hour 5		Minimum Diurnal Average: 1.0 % at hour 13		Hours of Missing Data: 0																						
Monthly Average: 4.0 %		Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = 0 Median = 0 O ₃ = 2 P ₉₀ = 17 P ₉₉ = 46		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	3	0	0	3	2	0	0	0	4	5	2	5	1	0	0	0	-1	-1	-1	0	0	0	0	0	1.0	5
2-Jun	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	11	29	18	2	1	1	4	5	2	3.3	29
3-Jun	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0.0	1
4-Jun	1	2	3	4	7	1	0	0	0	0	0	0	0	0	0	0	0	0	3	30	20	2	2	1	3.0	30
5-Jun	1	14	29	28	28	27	25	29	24	21	23	3	1	0	0	0	0	0	0	0	0	0	3	6	10.9	29
6-Jun	9	15	23	28	32	20	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	5.1	32
7-Jun	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.2	0
8-Jun	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.4	0
9-Jun	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.3	0
10-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	0	0	0	6	24	28	2.1	28
11-Jun	16	3	8	11	8	2	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	1.7	16
12-Jun	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	4	26	2	1	0	0	0	4	16	2.4	26
13-Jun	30	41	50	58	62	55	31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	13.7	62
14-Jun	2	1	0	0	0	0	0	0	0	0	0	0	3	27	31	23	18	6	1	1	4	3	10	8	5.8	31
15-Jun	3	3	3	3	3	2	2	1	0	0	0	0	1	0	8	6	13	2	1	1	12	5	4	6	3.4	13
16-Jun	11	21	30	37	43	45	35	5	0	0	0	0	8	2	0	0	0	0	16	12	3	3	4	6	11.7	45
17-Jun	10	4	3	2	1	1	1	1	1	1	0	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0.8	10
18-Jun	0	0	1	1	0	0	0	0	0	0	0	0	-1	-1	-1	0	0	-1	0	0	0	0	0	0	-0.2	1
19-Jun	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.3	0
20-Jun	0	0	0	0	0	0	0	0	0	0	0	0	9	23	27	23	20	4	11	5	3	3	4	4	5.5	27
21-Jun	1	7	1	0	2	9	22	23	26	13	19	19	25	23	26	26	27	31	30	23	18	18	5	13	17.0	31
22-Jun	9	2	2	2	2	21	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	9	2.4	21
23-Jun	18	30	39	46	52	46	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	10.1	52
24-Jun	2	6	4	4	6	1	0	0	1	0	0	0	0	1	0	0	-1	-1	-1	-1	0	0	0	0	0.8	6
25-Jun	0	0	1	3	6	1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0.1	6
26-Jun	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.4	0
27-Jun	0	0	0	0	7	18	1	0	0	0	0	8	3	0	0	17	32	24	12	17	9	8	7	7	7.0	32
28-Jun	9	12	13	11	11	8	5	2	1	2	5	0	0	0	0	0	0	0	0	0	0	3	9	15	4.4	15
29-Jun	22	28	29	31	29	13	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	1	0	6.3	31
30-Jun	1	1	1	1	1	0	0	0	16	11	3	1	4	0	0	0	0	2	1	0	1	5	5	1	2.3	16
		5.0	6.4	8.0	9.3	10.1	9.1	4.8	2.1	2.4	1.7	1.6	1.0	1.0	2.0	2.8	3.5	5.3	3.1	2.0	3.0	2.2	1.9	2.8	4.1	Diurnal Average
		30	41	50	58	62	55	35	29	26	21	23	19	25	27	31	27	32	31	30	30	20	18	24	28	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	108	27.07	27.07
0.4 - 0.5	40	10.03	37.09
0.6 - 0.7	16	4.01	41.10
0.8 - 1.4	28	7.02	48.12
1.5 - 10	109	27.32	75.44
> 10	98	24.56	100.00

Total Number of Valid Hours: 399

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Anzac - June 2017

Maximum Speed: 23 km/h on Jun 22 12:00	Maximum Daily Speed Average: 18.0 km/h on Jun 21	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 7 07:00	Minimum Daily Speed Average: 2.8 km/h on Jun 6	Hours of Data: 718
Maximum Diurnal Speed Average: 3.9 km/h at hour 12	Minimum Diurnal Speed Average: 0.4 km/h at hour 21	Hours of Missing Data: 2
Monthly Average Velocity: 2.1 km/h 307.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 O ₃ = 12 P ₉₀ = 16 P ₉₉ = 21	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SE3	N2	E3	WSW3	W4	WNW8	WNW10	WNW11	WNW9	WNW8	W7	WNW5	WNW10	WNW7	SW2	W1	W2	NW1	WNW1	S5	S7	S7	S5	S7	W3.1	WNW11
2-Jun	SW5	SW6	WSW6	WNW5	WNW5	WNW5	W3	W5	WNW5	WNW9	WNW14	WNW14	WNW11	WNW12	W15	NW15	NW14	NNW12	NW10	NW12	NW14	WNW17	NW18	WNW16	WNW9.6	NW18
3-Jun	WNW19	NW18	WNW18	WNW18	NW16	NW17	NW15	NW14	NNW12	NW12	NW13	NW12	NW10	WNW10	WNW8	W6	NNW5	NNW3	W2	SSE8	SE11	SE10	SSE9	SSE7	WNW7.6	WNW19
4-Jun	SSE7	S7	S6	SSW5	S3	SSW2	WSW6	W6	WSW2	WNW7	WNW7	NNW8	N8	NNW11	N15	N14	N14	NNE14	N12	NNW6	N10	N11	NNW8	NNW7	NNW4.8	N15
5-Jun	NNW9	NNW9	N9	NNE10	NNE8	NNW9	NNW11	NNW11	NNW11	NW12	N15	N12	N12	N13	N12	N12	NNE11	NE8	E6	ESE4	S3	SE3	S4	SSW6	N7.0	N15
6-Jun	S5	S6	S7	S7	SW5	SW5	SSW2	SE3	SSE6	W2	NW8	WNW11	WNW11	WNW9	NW8	WNW5	WNW8	WNW5	WSW2	ENE1	E1	AF	ESE2	SSW5	WSW2.8	WNW11
7-Jun	W2	WSW5	NNW3	NW3	W1	NNW2	NW0	S1	ESE5	ESE7	ESE7	SE9	SE9	SE9	ESE8	SSE7	E5	ENE7	E8	E6	SE7	SE7	ESE6	SE6	ESE3.8	SE9
8-Jun	ESE6	ESE8	SE9	SE9	ESE7	SE7	SE8	SSE10	SSE9	SSE12	SSE12	SSE12	SSE9	SE13	SE13	SE12	SE13	S11	S11	SSE8	E8	E7	ESE7	SSE7	SE8.9	SE13
9-Jun	SSE7	SSE8	SSE7	SSE6	SE6	ENE5	ESE4	NNE9	NE14	NE17	NE22	ENE21	NE21	NE21	ENE20	NE21	NE19	NE21	ENE19	ENE18	ENE15	ENE14	ENE14	ENE12	ENE12.3	NE22
10-Jun	ENE11	ENE11	E10	ENE10	E9	E11	ESE10	ENE9	E7	ENE6	NE5	NE5	SE2	SSE2	WNW7	WSW7	NW10	NNW7	N7	SW11	WSW12	NNW19	NNW12	N7	NE3.2	NNW19
11-Jun	N8	NW7	NW9	NW11	NW12	NNW12	NNW15	NNW18	NNW21	NNW19	NW17	NW16	NW15	NW16	NNW15	NNW16	NNW13	NNW11	NNW13	N10	NNE6	NE2	ESE3	SSE4	NNW11.2	NNW21
12-Jun	SSE6	S9	S10	S10	SSE10	SSE11	SSE9	SSE11	SSE14	S16	SSE12	SSE18	S21	S15	S12	S10	SSW6	SSE11	SSE10	S11	S12	SSW9	ESE2	SE5	S10.6	S21
13-Jun	S5	SW4	SW4	SSE2	SW9	SW6	S2	WNW1	WNW7	NNW8	N9	N7	N5	E4	SSE15	SSE16	S14	S10	S7	SE6	SSE8	S8	S5	NNE6	S2.8	SSE16
14-Jun	NW2	NNW6	NNW8	NNW7	NNW8	NNW8	N8	NNE11	NNE11	N13	N12	NNW12	N11	N9	NNE9	NNE11	NNE10	N9	N8	NNW8	NNW9	NW8	NNW10	N8.5	N13	
15-Jun	NNW9	NNW9	NW7	NW5	NW6	NNW5	WNW6	NW6	NNW6	NNW8	NW7	WNW3	WNW8	W5	SSW5	WSW7	W5	W4	W3	WSW2	SSW3	S1	SE1	E3	WNW3.8	NNW9
16-Jun	SE3	SE4	ESE5	SE5	SE5	SSE6	SE7	SE9	ESE7	ESE8	SE8	SW5	WSW10	WSW5	SE9	SE9	SE8	W11	W10	ENE3	SE5	SSE6	SSE7	SSE8	SSE4.2	W11
17-Jun	SSE7	SSE8	SSE8	SSE6	S5	WNW7	WNW12	WNW13	WNW13	WNW13	NW14	NW11	NNW16	NNW15	NNW14	NNW16	NW13	WNW15	NW13	NW8	NW4	SW4	WSW5	WSW6	NW6.8	NNW16
18-Jun	SW5	WSW4	S3	SSW5	SW5	SW5	WSW4	W6	W10	WNW10	W13	W16	W9	WNW17	WNW21	NW12	WNW7	WNW5	WSW10	SW13	WNW11	NW11	NW12	NW11	W8.3	WNW21
19-Jun	NW10	NW11	NW12	NW12	NW13	WNW13	WNW10	WNW9	WNW9	W10	W11	W11	W10	W9	WNW9	WNW9	WNW7	WNW6	NW6	WNW4	WSW1	SSE2	S5	S5	WNW7.7	WNW13
20-Jun	SW8	SW7	SSW5	S5	S6	S6	SSE8	SSE9	SSE10	SSE12	S11	SSW13	S11	SW7	SW7	SSE9	SSE9	SSE10	SSE10	SSE9	SSE9	SSE9	SSW10	W8	S7.7	SSW13
21-Jun	W11	WNW14	WNW17	WNW19	WNW21	WNW19	WNW19	NW21	NW21	NW22	WNW23	WNW22	WNW19	WNW20	WNW21	WNW22	WNW22	WNW20	WNW17	NW17	NNW17	NNW17	NNW15	N14	NW18.0	WNW23
22-Jun	N19	N21	N19	N17	NNW16	NNW16	NNW16	N19	N19	NNW17	NNW18	N23	N21	N20	N19	N16	N15	N15	N14	N11	N7	N3	NW3	WSW5	N15.1	N23
23-Jun	WSW6	W6	W6	W5	W6	W5	NNW5	WNW9	NNW11	N12	N11	NNW11	N14	NNW14	N13	N12	NW7	WNW8	WNW5	NW6	NW3	NW3	W5	SW3	NW6.1	NNW14
24-Jun	SSW5	WSW4	WNW8	WNW6	WNW7	WNW7	WNW9	WNW7	WNW6	NNE2	NE6	N7	N8	N11	NNE12	N10	NNE9	N10	N9	NNW11	NNW7	NNW6	NNE7	ENE6	NNW5.4	NNE12
25-Jun	E3	ESE3	ESE3	WSW2	WNW1	NNW1	WNW3	W4	NE3	NE5	WNW1	WNW3	NE4	SE7	SSE11	S13	SSE15	SSE14	SSE14	SSE11	S9	S9	S10	SSE4.9	SSE15	
26-Jun	S10	S12	S14	S14	SSE14	SSE16	SSE18	SSE19	SSE22	S19	SSE21	SSE21	SSE21	S19	S19	S18	SSE16	SSE15	SSE12	SSE11	SSE9	SSE10	SE9	SE7	SSE15.1	SSE22
27-Jun	SE8	SSE10	SE9	S5	W5	WNW14	WNW15	W10	W9	W11	WNW8	W7	WNW4	NW4	NNE4	W12	W6	NW4	SW5	W5	SW4	SSW4	SSW3	W4	W4.3	WNW15
28-Jun	WSW5	WSW1	SE3	SSE5	SE2	ENE2	ENE2	ENE4	ENE9	E10	E14	ENE15	ENE14	ENE14	ENE12	ENE13	ENE13	E11	SE9	SSE7	SSW5	SSW4	SSW4	SSW5	E5.4	ENE15
29-Jun	S5	SSW5	SSW4	SSW3	SSW5	S6	S7	SSW5	W5	WSW5	WSW6	WSW8	WNW10	WNW10	NW8	WNW10	NW9	NNW7	NNW6	NNW4	NW3	WNW3	NNW4	NW5	W3.6	WNW10
30-Jun	W4	AF	SSW2	SSE2	S2	WSW3	WNW6	NW6	WNW3	S2	ENE6	NNW4	W5	SSW6	WSW4	WNW8	WNW10	WNW9	NW9	NW8	WNW7	WNW6	WNW5	SW4	WNW3.6	WNW10

WSW1.5	WSW1.7	W1.4	W1.8	W2.5	WNW3.1	NNW3.3	NW3.4	NW3.0	NW3.4	NW3.8	NW3.9	NW3.9	NW3.9	NNW2.6	NW3.0	NNW2.9	NNW2.6	NW1.8	W0.6	WSW0.4	NW0.4	W0.5	WSW0.9	Diurnal Average
N19	N21	N19	WNW19	WNW21	WNW19	WNW19	NW21	SSE22	NNW22	WNW23	N23	N21	NE21	WNW21	WNW22	WNW22	NE21	ENE19	ENE18	NNW17	NNW19	NW18	WNW16	Diurnal Maximum

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Anzac - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Jun 21 16:00	Hours of Data: 718
Minimum Value: 0 km/h on Jun 16 01:00	Hours of Missing Data: 2
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	2	1	1	3	3	3	3	2	3	3	3	2	1	1	2	2	1	2	2	2	1	1	3
2-Jun	1	1	1	1	1	1	1	1	2	3	4	4	3	4	6	6	4	4	3	4	5	6	5	5	6
3-Jun	6	6	6	6	5	6	5	4	4	4	4	4	4	4	2	2	2	2	3	4	2	2	2	2	6
4-Jun	2	2	2	1	1	1	2	2	1	3	3	3	3	6	4	3	4	4	3	3	4	3	2	2	6
5-Jun	3	2	2	3	2	2	3	3	3	3	5	4	4	4	4	3	3	4	3	2	1	1	1	1	5
6-Jun	2	2	2	2	1	3	1	1	2	3	3	3	4	4	2	3	3	2	1	2	1	AF	1	2	4
7-Jun	2	1	1	1	1	1	1	2	1	2	2	3	3	3	3	3	2	2	2	2	2	2	1	1	3
8-Jun	2	2	2	2	2	2	2	3	2	3	4	4	4	4	5	4	5	3	3	3	2	2	2	2	5
9-Jun	1	1	1	2	1	2	2	3	4	5	6	6	6	6	6	6	6	6	6	5	5	4	4	3	6
10-Jun	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	4	2	3	4	4	6	5	2	6
11-Jun	3	2	2	3	3	4	5	6	7	6	6	5	5	5	5	5	5	4	4	3	3	1	1	1	7
12-Jun	2	1	2	2	2	2	2	3	5	5	4	6	6	5	4	4	3	3	2	3	3	3	2	2	6
13-Jun	2	1	1	1	4	3	1	2	2	3	3	3	3	2	4	4	4	3	3	2	2	2	2	2	4
14-Jun	2	2	2	2	2	2	2	3	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	3	4
15-Jun	2	2	2	2	1	1	2	2	2	2	2	1	2	3	3	3	1	1	1	2	3	2	1	1	3
16-Jun	0	1	1	1	1	2	2	2	2	2	3	3	3	2	2	3	3	6	3	3	1	1	2	2	6
17-Jun	2	2	3	2	1	4	5	4	4	4	5	4	6	5	5	5	5	5	5	3	2	1	1	1	6
18-Jun	1	2	1	2	2	1	1	2	3	3	6	7	4	7	7	5	3	2	6	4	5	4	4	4	7
19-Jun	3	3	4	4	5	4	4	3	3	3	4	3	3	3	3	3	2	2	2	2	1	2	1	1	5
20-Jun	2	2	1	1	1	1	2	2	2	3	4	4	4	3	2	3	3	2	2	3	2	2	3	4	4
21-Jun	3	6	6	6	7	6	6	8	7	8	7	7	6	7	7	8	7	7	6	5	6	5	4	4	8
22-Jun	5	6	5	5	5	5	5	6	5	5	6	7	6	6	5	5	5	5	4	3	3	1	1	1	7
23-Jun	1	1	1	1	1	1	2	3	4	4	4	5	5	4	5	4	3	3	2	2	2	1	1	1	5
24-Jun	1	2	2	2	2	3	3	2	2	2	2	3	3	5	4	4	3	3	4	3	2	1	2	1	5
25-Jun	3	1	1	2	1	1	2	1	2	2	3	3	3	4	5	5	4	5	4	4	3	2	2	2	5
26-Jun	2	3	3	4	4	4	5	6	6	6	6	7	6	6	7	5	5	5	4	3	3	3	2	2	7
27-Jun	2	2	2	3	5	5	5	4	3	3	2	2	1	2	2	6	3	2	1	2	2	1	2	1	6
28-Jun	1	2	1	1	2	1	1	2	3	3	4	4	4	4	4	4	5	3	2	2	1	1	1	1	5
29-Jun	1	1	1	1	2	1	2	2	2	2	2	2	3	4	3	4	3	2	2	2	1	1	1	1	4
30-Jun	1	AF	1	1	1	1	3	3	1	1	2	2	2	2	2	3	3	3	2	2	2	2	1	1	3
	6	6	6	6	7	6	6	8	7	8	7	7	6	7	7	8	7	7	6	5	6	6	5	5	

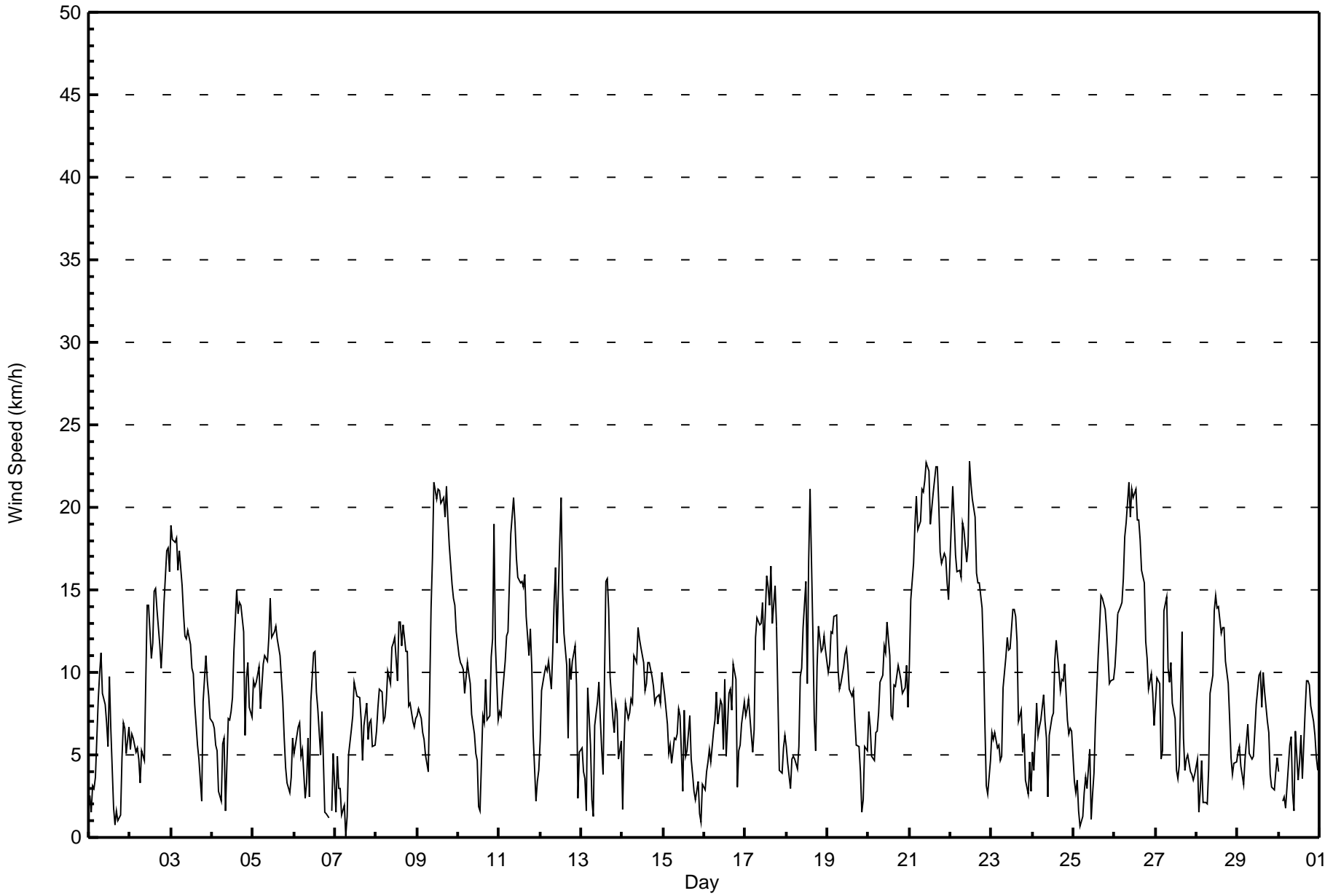
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	192	26.74	26.74
6 - 11	330	45.96	72.70
12 - 19	167	23.26	95.96
20 - 28	29	4.04	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	3	2	5	8	5	9	13	6	20	23	12	19	23	21	13	10	192
6 - 11	24	14	2	9	11	11	25	49	28	5	8	10	23	52	25	34	330
12 - 19	26	3	3	12	1	0	4	20	13	1	1	1	4	24	28	26	167
20 - 28	4	0	5	2	0	0	0	4	1	0	0	0	0	9	3	1	29
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	19	15	31	17	20	42	79	62	29	21	30	50	106	69	71	718

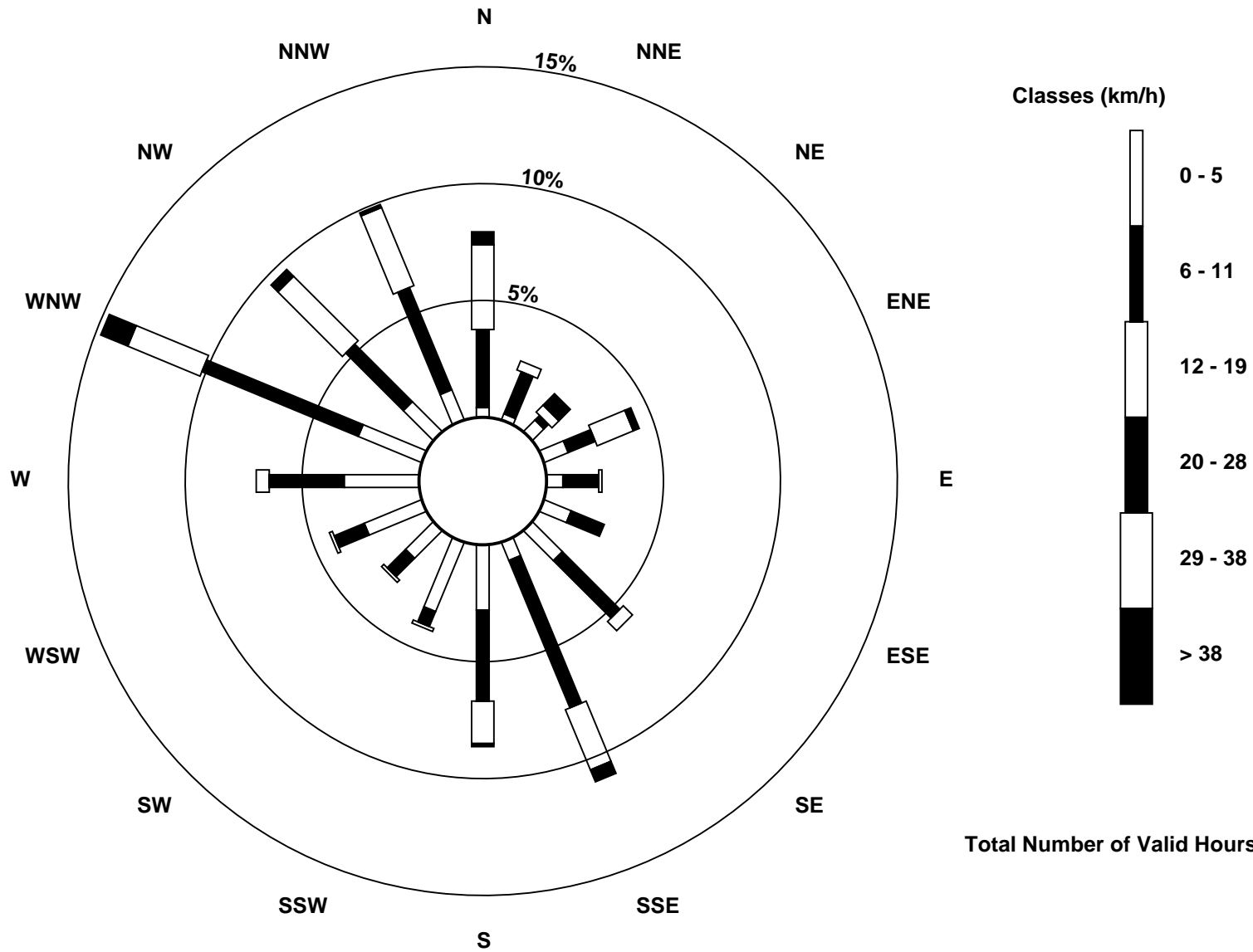
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Anzac (AMS 14)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - June 2017

Direction of Maximum Speed: 350 deg on Jun 22 12:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 304.6 deg on Jun 21	Hours of Data: 718
Direction of Minimum Speed: 305 deg on Jun 7 07:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 2.8 deg on Jun 6	Percent Operational Time: 99.7
Monthly Average Direction: 292.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	144	359	83	246	261	297	294	301	299	303	276	296	296	298	223	268	273	309	299	184	179	177	185	189	270.6
2-Jun	215	230	253	284	294	298	274	262	299	295	300	295	290	289	280	320	326	332	314	305	309	301	304	299	297.7
3-Jun	300	305	302	303	305	307	308	322	330	314	305	312	306	296	291	277	329	333	267	152	126	125	149	154	303.7
4-Jun	159	172	185	198	179	196	253	269	238	290	297	335	350	348	350	358	4	12	7	341	8	352	348	337	341.4
5-Jun	332	346	352	22	12	347	333	339	333	324	359	11	3	359	10	10	16	54	83	107	187	136	183	192	0.6
6-Jun	174	176	182	191	222	236	199	124	156	271	308	297	297	297	305	300	297	302	253	59	82	AF	108	209	258.4
7-Jun	271	243	344	310	278	338	305	181	103	115	102	124	124	140	116	155	82	66	80	98	126	141	123	125	116.5
8-Jun	105	105	134	127	123	127	138	149	152	148	148	159	149	130	140	143	138	178	175	155	100	93	114	155	139.6
9-Jun	167	164	162	156	146	70	111	22	46	47	52	59	53	50	59	55	48	54	59	71	65	68	67	71	63.4
10-Jun	78	78	79	72	85	96	108	75	89	76	34	46	129	155	285	254	315	328	355	227	247	345	346	352	38.9
11-Jun	354	323	320	320	324	328	328	328	332	332	323	320	321	321	331	329	335	340	344	360	14	51	116	148	331.6
12-Jun	165	170	175	173	168	162	161	162	167	170	168	165	175	179	177	180	202	165	165	180	186	192	112	137	171.3
13-Jun	177	228	226	159	227	224	172	287	302	341	3	357	355	79	150	153	175	189	184	142	157	169	174	13	176.9
14-Jun	323	339	347	330	328	336	349	14	18	352	352	342	349	2	24	29	26	15	5	352	334	329	324	331	353.8
15-Jun	330	328	322	318	312	327	291	326	336	330	318	299	302	280	192	254	263	268	275	247	200	184	137	87	302.9
16-Jun	133	145	123	129	141	147	135	130	117	114	135	226	245	246	130	145	145	281	268	67	126	159	151	147	153.1
17-Jun	152	151	149	168	186	284	292	300	295	294	307	320	336	342	334	336	323	298	310	312	314	219	239	240	304.0
18-Jun	235	240	177	207	214	232	241	266	277	293	281	260	260	292	290	306	287	284	258	236	288	311	312	312	276.5
19-Jun	305	307	304	305	304	303	301	288	282	269	275	272	274	281	289	292	294	302	304	301	251	167	184	184	288.3
20-Jun	224	216	203	187	188	185	165	158	158	161	174	211	175	226	214	167	160	152	149	158	161	165	193	263	180.1
21-Jun	276	284	289	292	296	295	296	304	309	304	300	299	299	299	303	302	300	298	301	310	333	345	341	352	304.6
22-Jun	359	354	351	352	343	339	345	352	350	347	340	350	350	352	357	353	350	354	1	1	4	4	314	251	350.3
23-Jun	246	259	265	261	261	276	342	294	336	357	351	347	359	341	358	360	325	289	297	304	326	309	261	234	322.2
24-Jun	213	254	294	294	292	300	293	293	290	17	55	11	355	8	32	11	31	355	349	346	343	347	17	61	345.3
25-Jun	98	113	119	256	288	335	294	272	56	54	299	283	56	125	161	170	161	161	168	164	164	172	174	176	160.4
26-Jun	179	177	170	175	161	160	166	163	161	169	166	165	157	169	170	178	165	162	153	150	157	149	146	143	164.2
27-Jun	146	148	133	176	259	298	293	276	271	275	283	274	284	324	23	275	263	309	223	263	214	193	213	262	261.9
28-Jun	258	239	128	167	143	77	77	67	77	80	81	73	65	71	75	69	76	92	136	153	192	204	200	200	92.6
29-Jun	188	193	212	196	196	184	191	202	281	246	258	258	282	287	309	298	325	346	343	344	306	298	337	310	273.3
30-Jun	271	AF	210	156	173	246	293	324	288	189	74	343	260	195	241	296	291	289	305	309	297	297	286	231	284.6

240.7 253.6 259.8 263.2 270.5 291.3 289.8 307.5 321.5 320.7 326.1 314.0 321.1 324.6 335.1 324.1 336.6 332.7 325.2 272.6 237.0 319.1 261.4 238.9

Diurnal Average

AF - Analyzer Failure

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

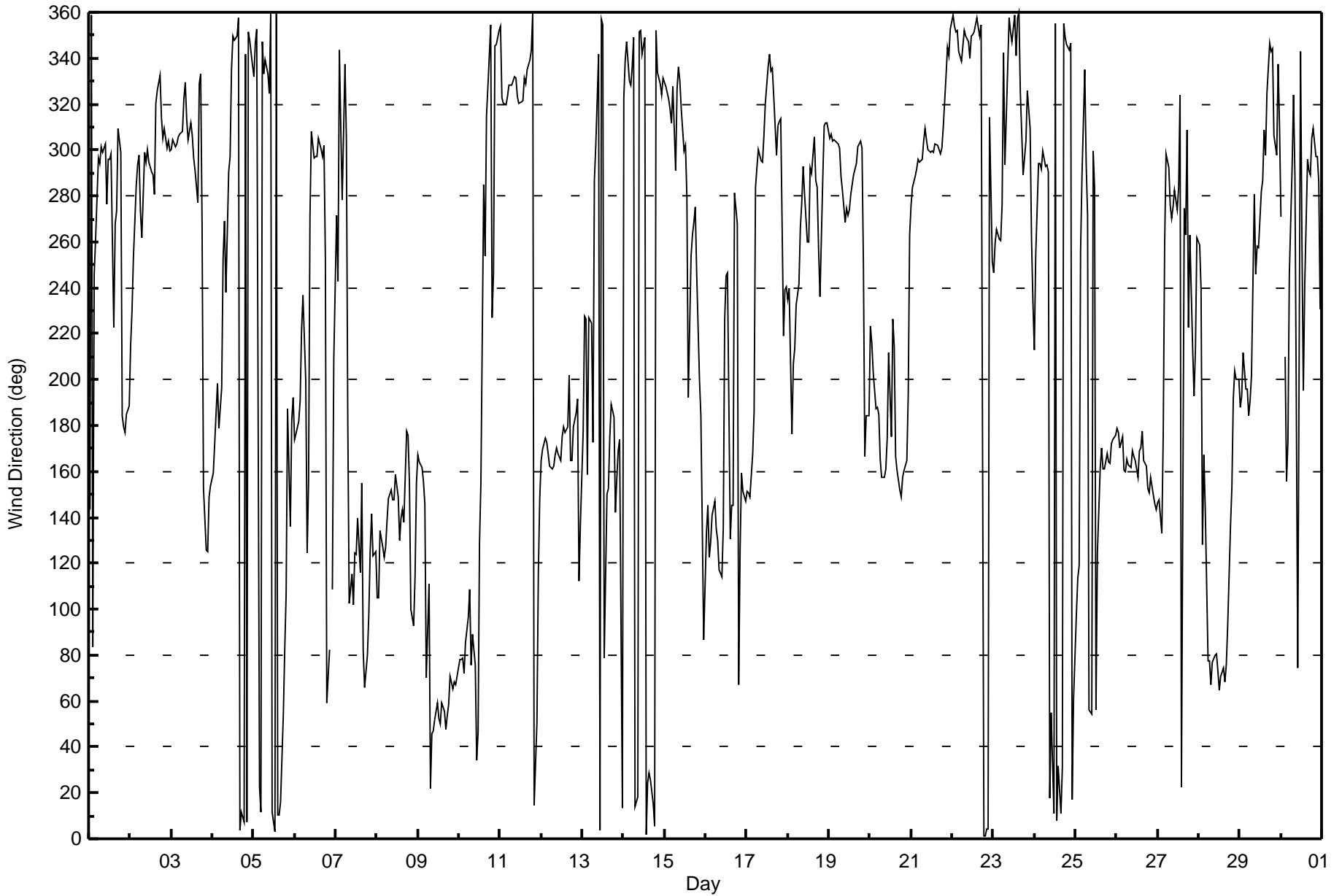
Wind Direction (WD) - deg
Anzac - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 102 deg on Jun 1 16:00	Hours of Data: 718
Minimum Value: 6 deg on Jun 23 02:00	Hours of Missing Data: 2
Percentiles: P ₁ = 9 P ₁₀ = 15 Q ₁ = 18 Median = 22 Q ₃ = 31 P ₉₀ = 48 P ₉₉ = 93	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	83	87	32	24	32	18	19	18	22	19	31	29	23	23	78	102	85	99	80	29	16	15	12	9	102
2-Jun	21	9	8	15	16	22	32	27	20	23	18	22	26	22	24	22	16	21	16	20	19	20	19	20	32
3-Jun	20	19	19	19	19	19	20	20	19	27	24	29	35	31	42	53	55	62	75	25	19	17	15	16	75
4-Jun	16	19	36	12	39	42	22	29	93	27	35	38	28	36	22	19	20	19	26	47	45	17	16	16	93
5-Jun	15	16	16	17	16	17	15	15	19	17	22	18	18	21	20	23	26	31	36	32	34	40	28	15	40
6-Jun	26	15	18	17	18	18	47	46	36	90	28	25	25	49	35	71	24	20	45	91	64	AF	47	15	91
7-Jun	86	17	25	19	55	27	92	68	23	20	25	20	41	37	33	39	39	20	14	20	25	15	15	17	92
8-Jun	24	21	17	20	19	12	17	20	22	23	26	32	44	35	30	31	27	26	24	35	21	18	22	19	44
9-Jun	13	13	11	15	10	30	65	23	20	22	20	20	18	18	19	19	19	16	18	18	15	16	15	15	65
10-Jun	16	16	15	15	19	22	26	25	50	50	63	83	98	94	43	51	39	24	33	25	31	18	16	15	98
11-Jun	21	14	14	15	15	14	17	19	17	19	21	24	26	26	24	22	27	31	22	19	17	21	23	18	31
12-Jun	12	10	12	12	14	14	16	21	27	22	33	22	21	24	22	30	59	18	16	20	20	23	71	36	71
13-Jun	24	25	33	77	18	25	50	89	24	31	26	62	57	60	20	24	23	22	23	30	17	17	61	16	89
14-Jun	74	41	16	16	13	14	14	19	24	18	21	19	17	19	18	18	17	19	17	21	13	14	13	13	74
15-Jun	13	13	15	18	17	31	28	33	26	21	26	94	18	35	44	29	34	27	24	47	72	74	72	21	94
16-Jun	19	15	18	13	15	16	21	20	30	25	38	68	20	37	24	25	32	37	26	72	19	23	17	17	72
17-Jun	19	21	20	20	21	40	23	21	22	23	23	27	27	23	20	18	27	20	24	20	29	14	15	12	40
18-Jun	14	66	19	15	21	13	26	29	26	24	27	26	40	26	25	21	32	40	26	18	37	19	16	17	66
19-Jun	20	18	19	19	20	18	21	21	25	25	31	27	31	34	34	27	30	29	32	27	52	51	14	14	52
20-Jun	14	17	13	16	17	17	16	16	18	20	28	25	25	24	25	21	20	18	17	17	17	17	27	29	29
21-Jun	23	23	22	23	23	22	21	20	19	20	19	21	20	21	19	20	21	22	22	18	18	16	15	17	23
22-Jun	18	17	17	17	16	15	18	17	17	20	21	20	20	20	20	20	22	20	21	18	15	11	27	17	27
23-Jun	7	6	6	7	8	30	34	20	26	24	34	32	25	24	23	23	40	27	41	25	40	37	11	51	51
24-Jun	28	22	16	16	17	19	21	23	36	80	45	43	36	26	34	33	32	25	20	17	13	13	24	15	80
25-Jun	78	34	17	63	72	54	38	48	74	46	98	87	81	62	48	37	23	23	21	19	20	17	16	15	98
26-Jun	16	16	16	19	17	17	18	20	18	21	21	23	21	22	24	25	24	22	19	19	19	17	20	18	25
27-Jun	21	18	15	45	80	30	22	26	26	25	29	26	38	61	63	27	44	47	23	31	26	33	50	32	80
28-Jun	12	66	21	22	57	29	39	46	23	18	18	21	23	21	21	23	27	23	29	25	24	19	14	13	66
29-Jun	18	16	29	37	42	23	22	28	54	57	41	42	32	36	46	33	37	28	17	25	26	31	35	23	57
30-Jun	18	AF	50	36	32	32	33	29	39	60	22	52	45	32	67	26	22	21	17	18	19	18	22	32	67

86	87	50	77	80	54	92	89	93	90	98	94	98	94	78	102	85	99	80	91	72	74	72	51	
Diurnal Maximum																								

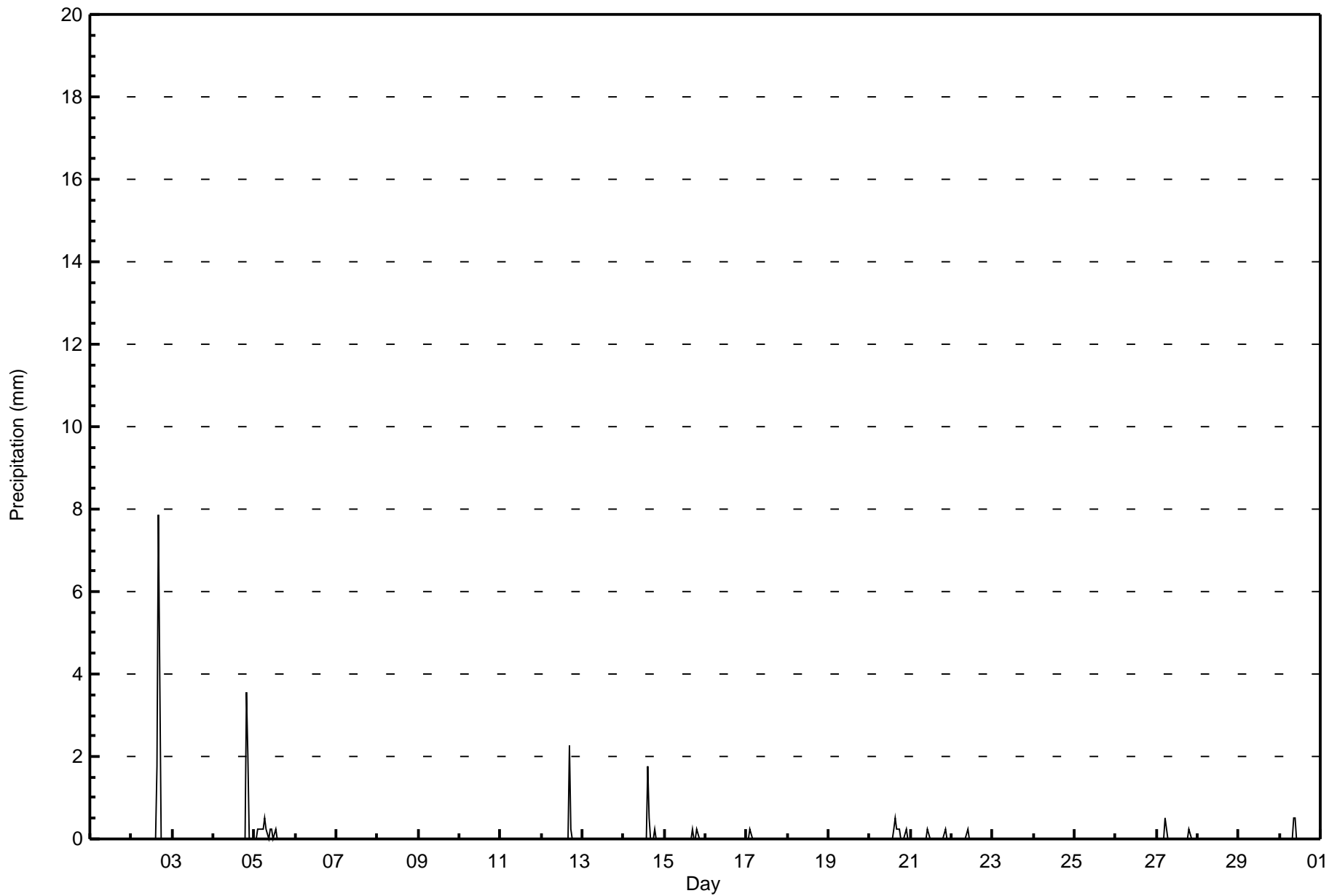
AF - Analyzer Failure





Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

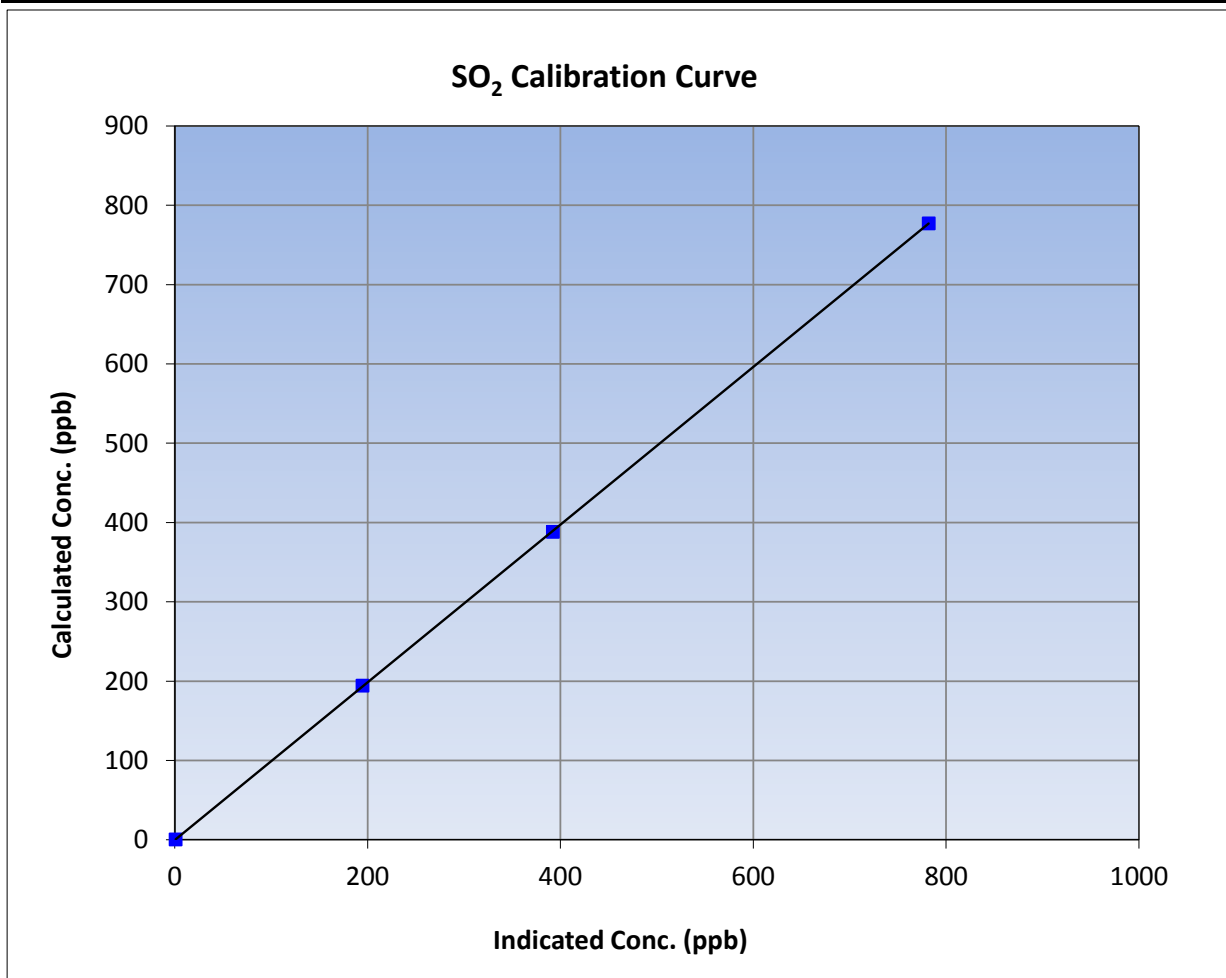
Version-03-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:07
Analyzer make	Thermo 42i	Analyzer serial #	1152430005

Calibration Data

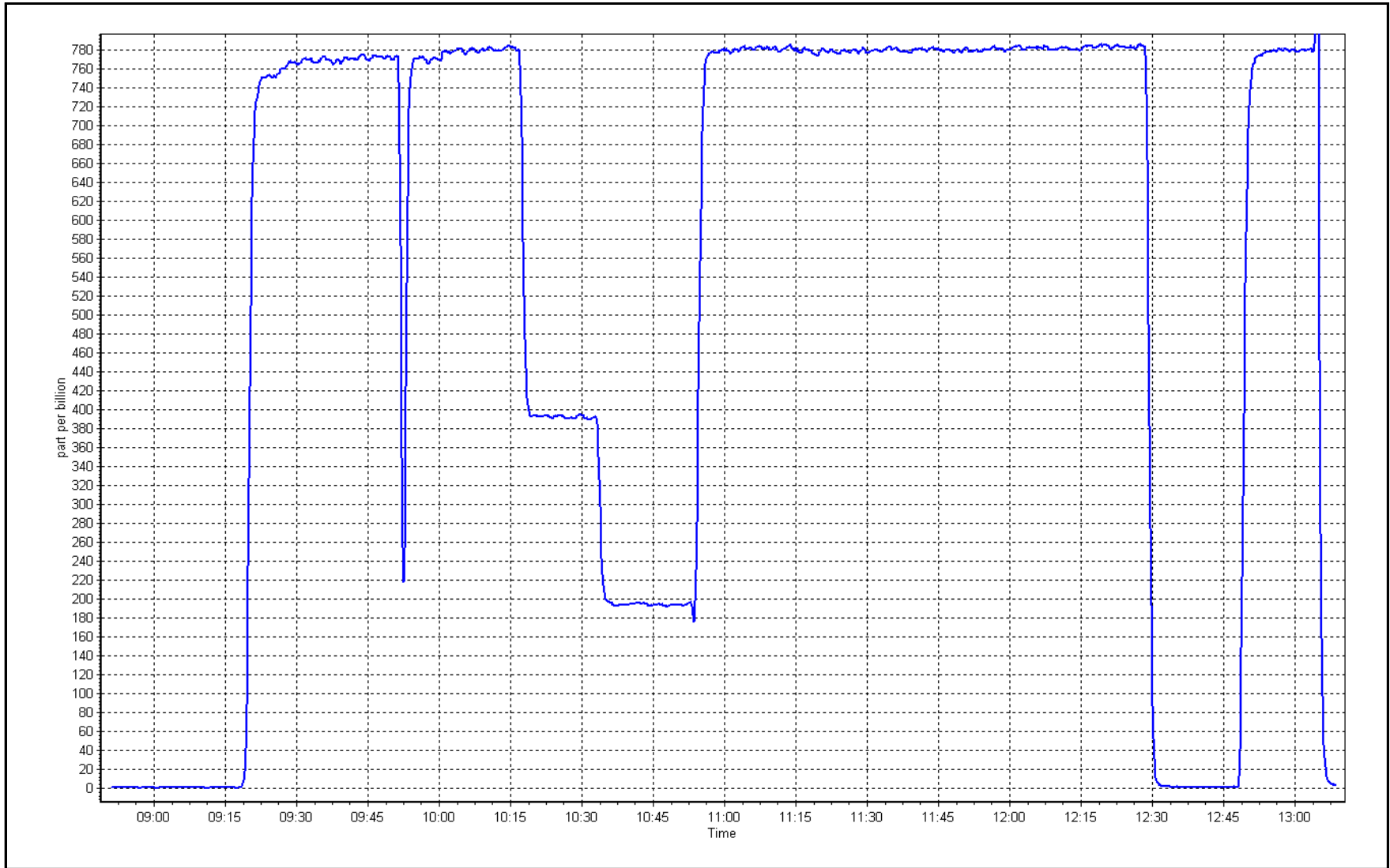
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.6	----	Correlation Coefficient	≥0.995
777.0	781.5	0.9942		
388.0	391.9	0.9900	Slope	0.90 - 1.10
194.0	194.4	0.9978		
			Intercept	+/-30



SO2 Calibration Plot

Date: June 2, 2017

Location: Anzac





Wood Buffalo Environmental Association

TRS Calibration Summary

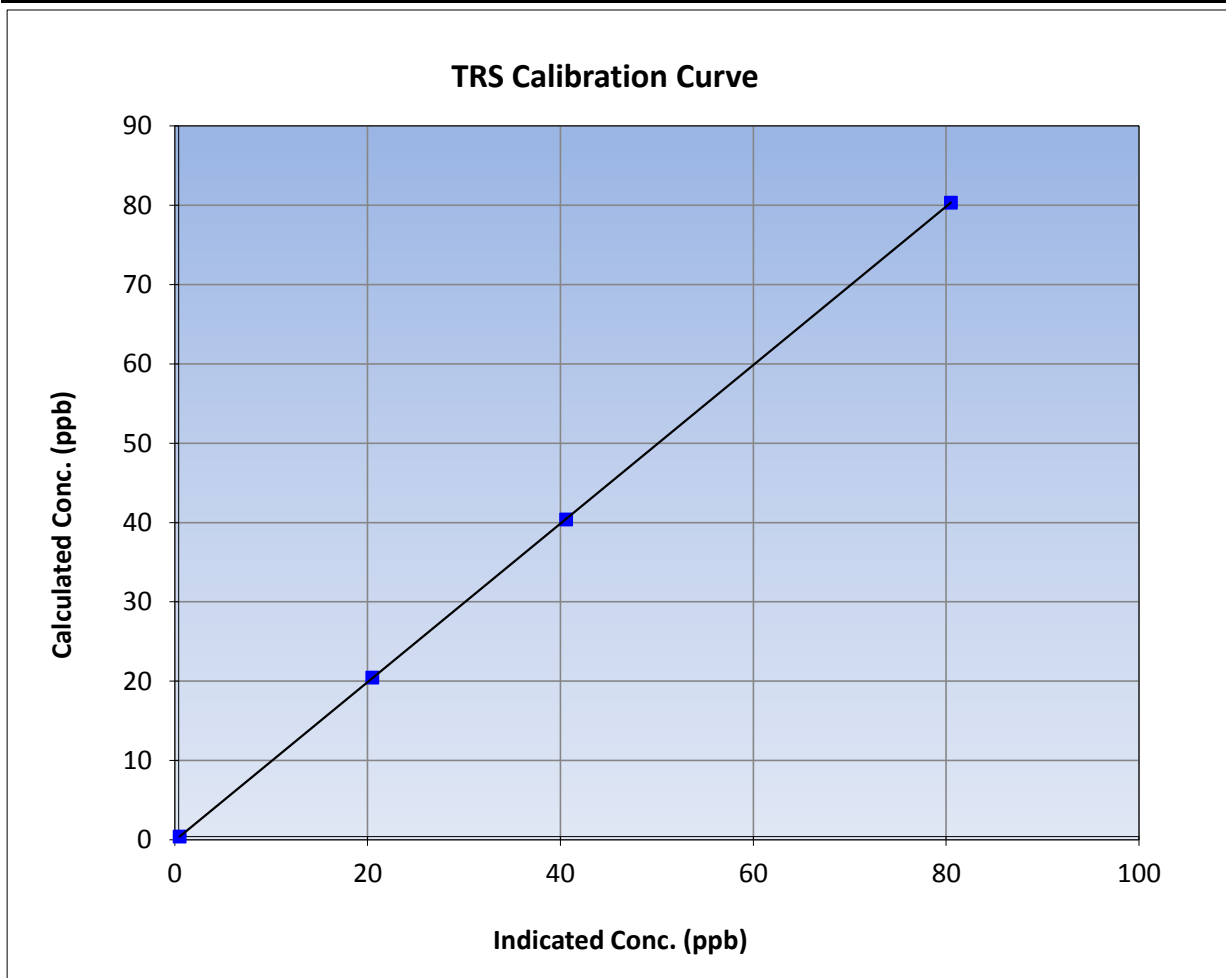
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 8, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	11:30	End Time (MST)	14:25
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

Calibration Data

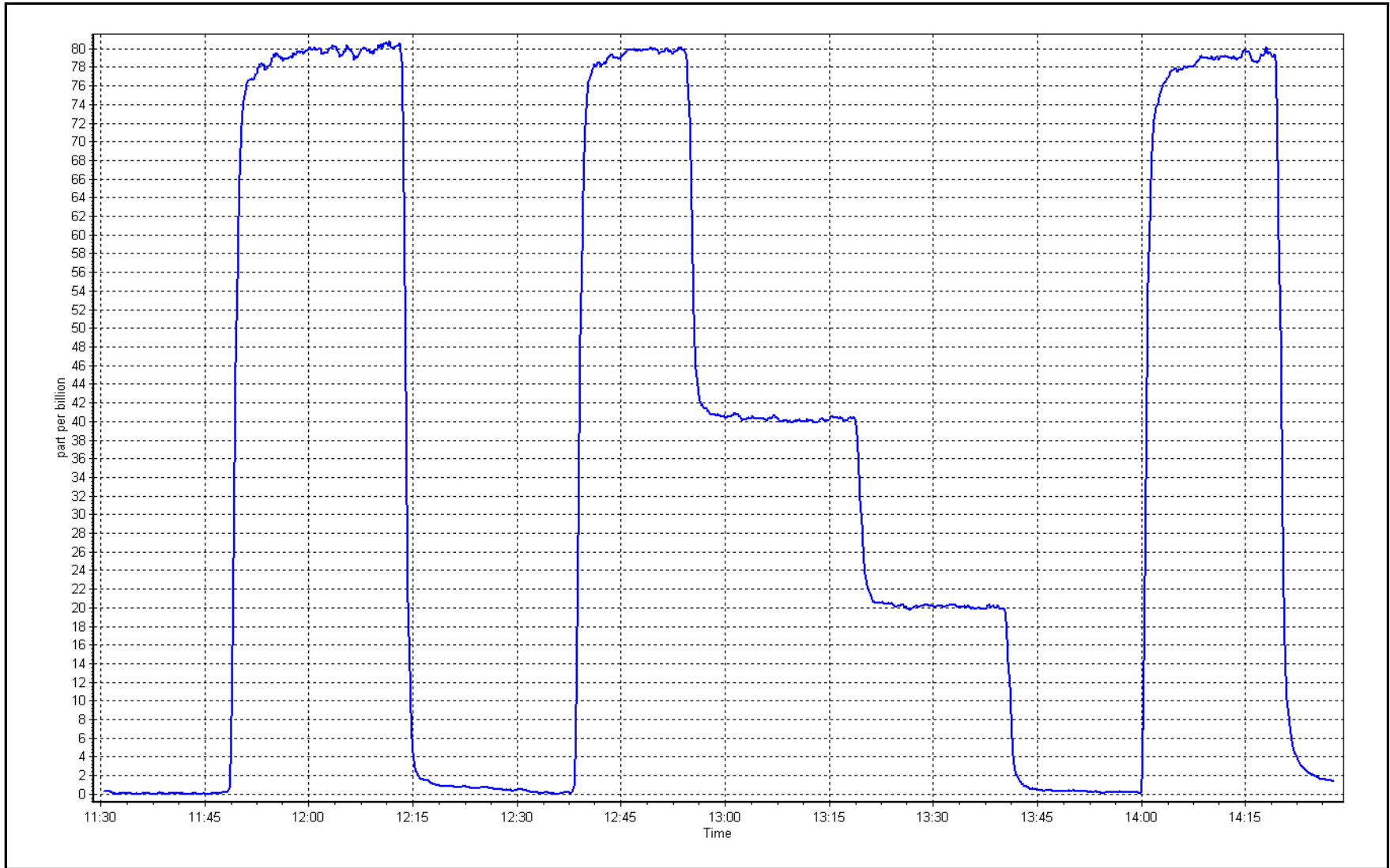
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999997	≥0.995
79.9	80.1	0.9981			
40.0	40.2	0.9949	Slope	0.998913	0.90 - 1.10
20.1	20.1	0.9976			
			Intercept	-0.089065	+/-3



TRS Calibration Plot

Date: June 7, 2017

Location: Anzac





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	June 2, 2017	Last Cal Date:	May 4, 2017
Start time (MST):	8:50	End time (MST):	13:05
Reason:			

Calibration Standards

Gas Cert Reference	EY0000647	Cal Gas Expiry Date	November-04-19
CH4 Cal Gas Conc.	<u>513.0</u> ppm	CH4 Equiv Conc.	1060.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	22 Deg C
Calibrator Model	Teledyne API T700	Serial Number	2659
ZAG make/model	Teledyne API 701	Serial Number	4764

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1218153355

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	0.000196	0.000203	Flame Temp	405.0	405.0
CH4 Retention time	11.6	11.4	Carrier Pressure	33.3	33.3
NMHC SP Ratio	3.80E-05	3.92E-05	Fuel Pressure	48.0	47.9
NMHC Peak Area	228420	220941	Air Pressure	36.6	36.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.998391	0.994376
THC Cal Offset	0.037783	0.010454
CH4 Cal Slope	0.996005	0.990210
CH4 Cal Offset	0.036112	0.024126
NMHC Cal Slope	1.000598	0.998427
NMHC Cal Offset	0.001740	-0.013262

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0.0	0.00	0.00	----
as found span	4931	79.3	16.78	16.29	1.030
calibrator zero	5005	0.0	0.00	0.00	----
high point	4932	79.3	16.78	16.86	0.995
second point	4972	39.6	8.38	8.43	0.994
third point	4992	19.8	4.19	4.18	1.002
as left zero	5005	0.0	0.00	0.00	----
as left span	4931	79.3	16.78	16.86	0.995
Average Correction Factor					0.997
Corrected As found	16.29	Prev response	16.77	*% change	2.9%

NMHC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0	0.00	0.00	----
as found span	4931	79.3	8.66	8.39	1.032
calibrator zero	5005	0	0.00	0.00	----
high point	4932	79.3	8.66	8.68	0.998
second point	4972	39.6	4.32	4.36	0.992
third point	4992	19.8	2.16	2.19	0.989
as left zero	5005	0	0.00	0.00	----
as left span	4931	79.3	8.66	8.66	1.000
Average Correction Factor					0.993
Corrected As found	8.39	Prev response	8.65	*% change	3.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0.0	0.00	0.00	----
as found span	4931	79.3	8.12	7.90	1.028
calibrator zero	5005	0.0	0.00	0.00	----
high point	4932	79.3	8.12	8.18	0.992
second point	4972	39.6	4.05	4.07	0.997
third point	4992	19.8	2.03	1.99	1.017
as left zero	5005	0.0	0.00	0.00	----
as left span	4931	79.3	8.12	8.20	0.990
Average Correction Factor					1.002
Corrected As found	7.90	Prev response	8.12	*% change	2.8%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

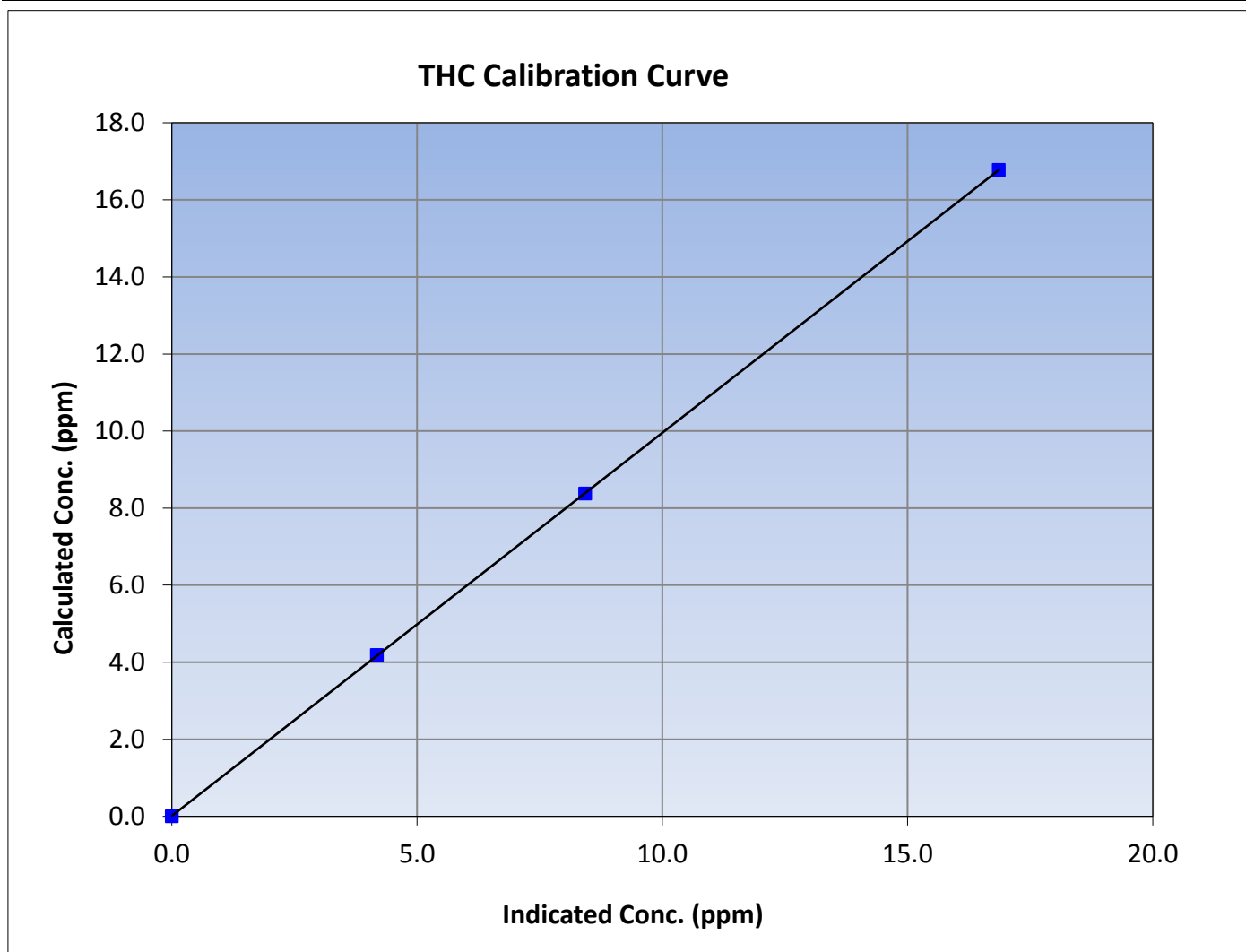
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999995	≥ 0.995			
16.78	16.86	0.9951						
8.38	8.43	0.9940				Slope	0.994376	0.90 - 1.10
4.19	4.18	1.0023						
			Intercept	0.010454	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

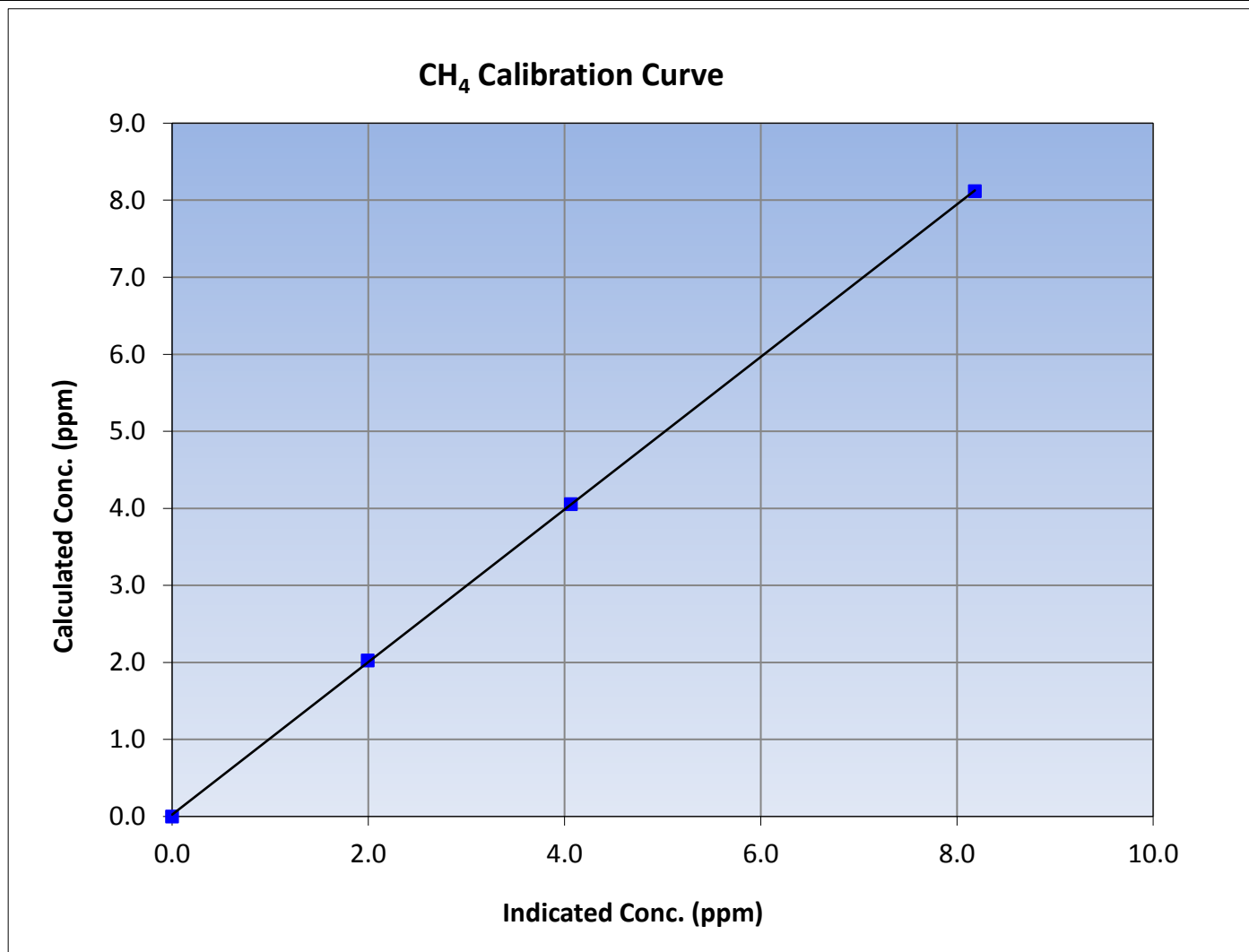
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999958	≥ 0.995			
8.12	8.18	0.9920						
4.05	4.07	0.9972				Slope	0.990210	0.90 - 1.10
2.03	1.99	1.0169						
			Intercept	0.024126	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

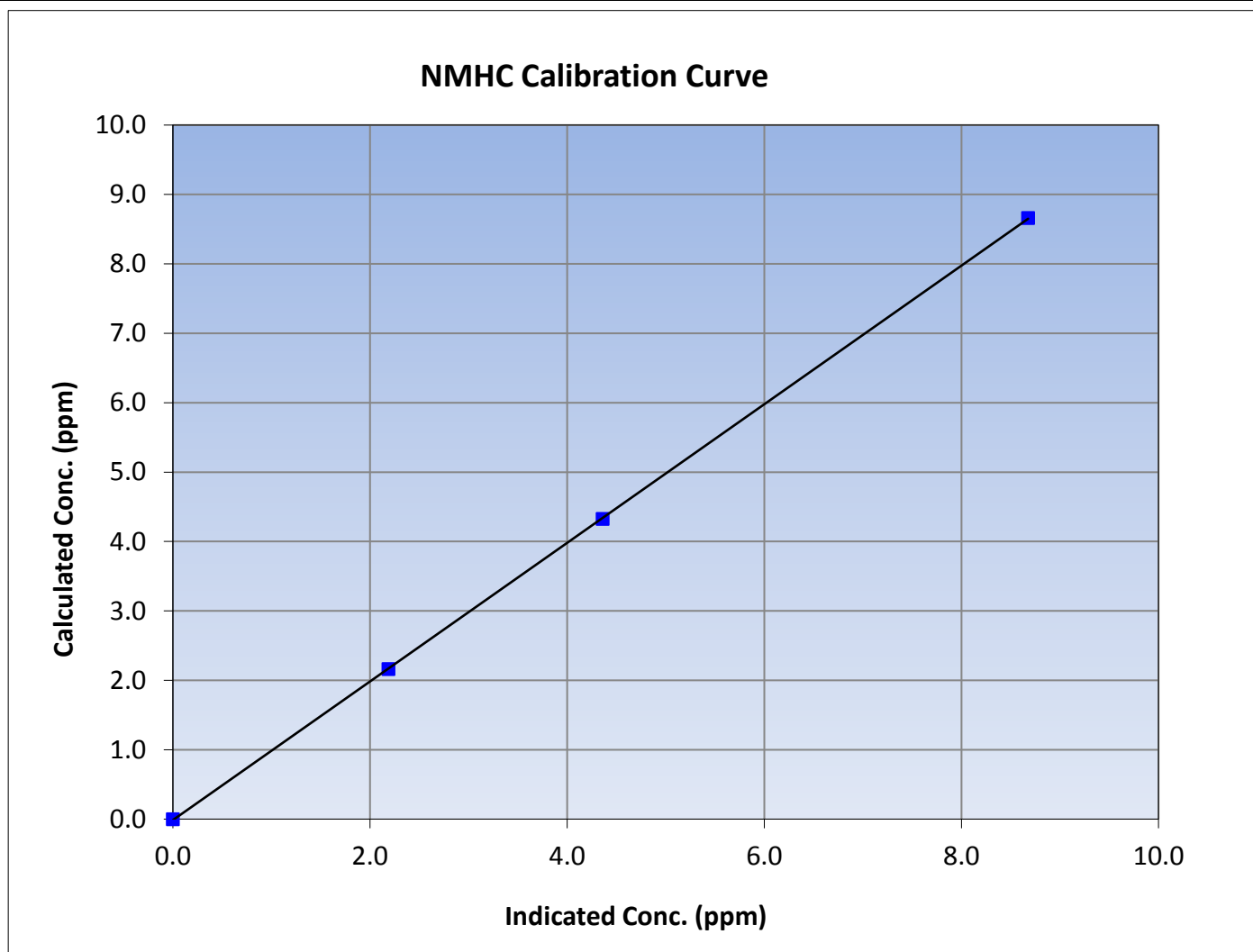
Version-02-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

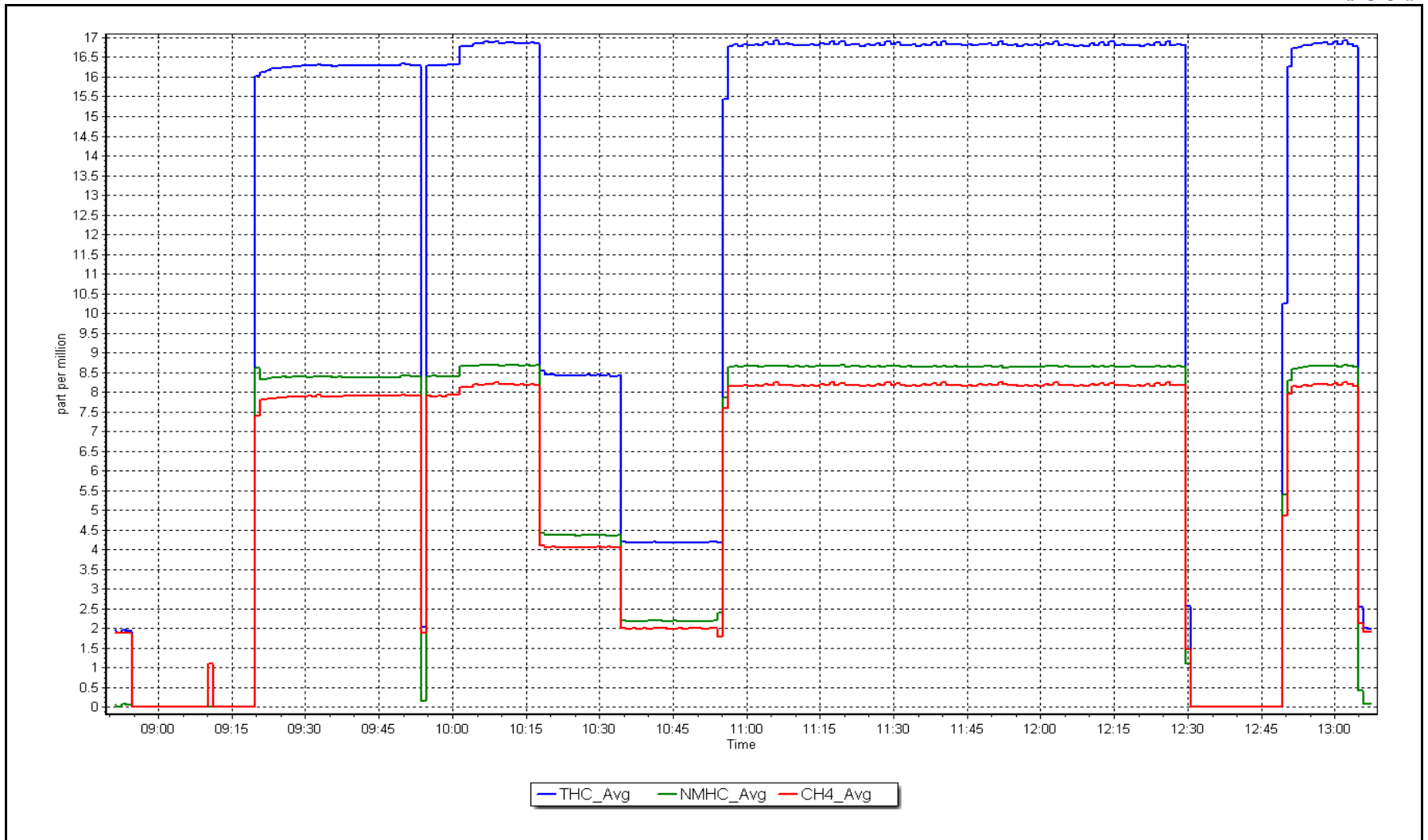
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999986	≥ 0.995			
8.66	8.68	0.9980						
4.32	4.36	0.9918				Slope	0.998427	0.90 - 1.10
2.16	2.19	0.9890						
			Intercept	-0.013262	± 0.5			



NMHC Calibration Plot

Date: June 2, 2017

Location: Anzac





Wood Buffalo Environmental Association

O₃ Calibration Summary

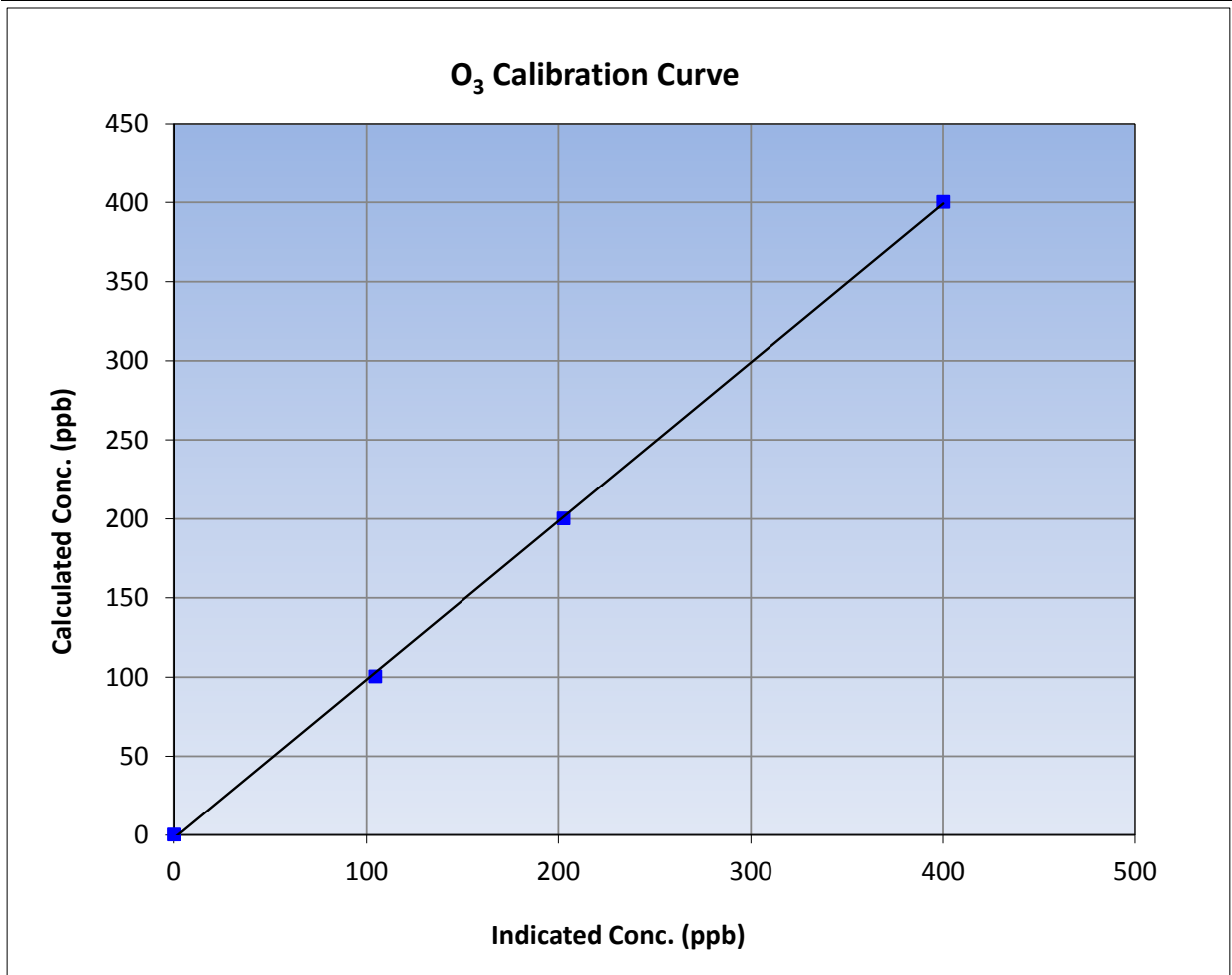
Version-03-2017

Station Information

Calibration Date	June 7, 2017	Previous Calibration	May 5, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:00	End Time (MST)	11:30
Analyzer make	Thermo 49i	Analyzer serial #	1426262595

Calibration Data

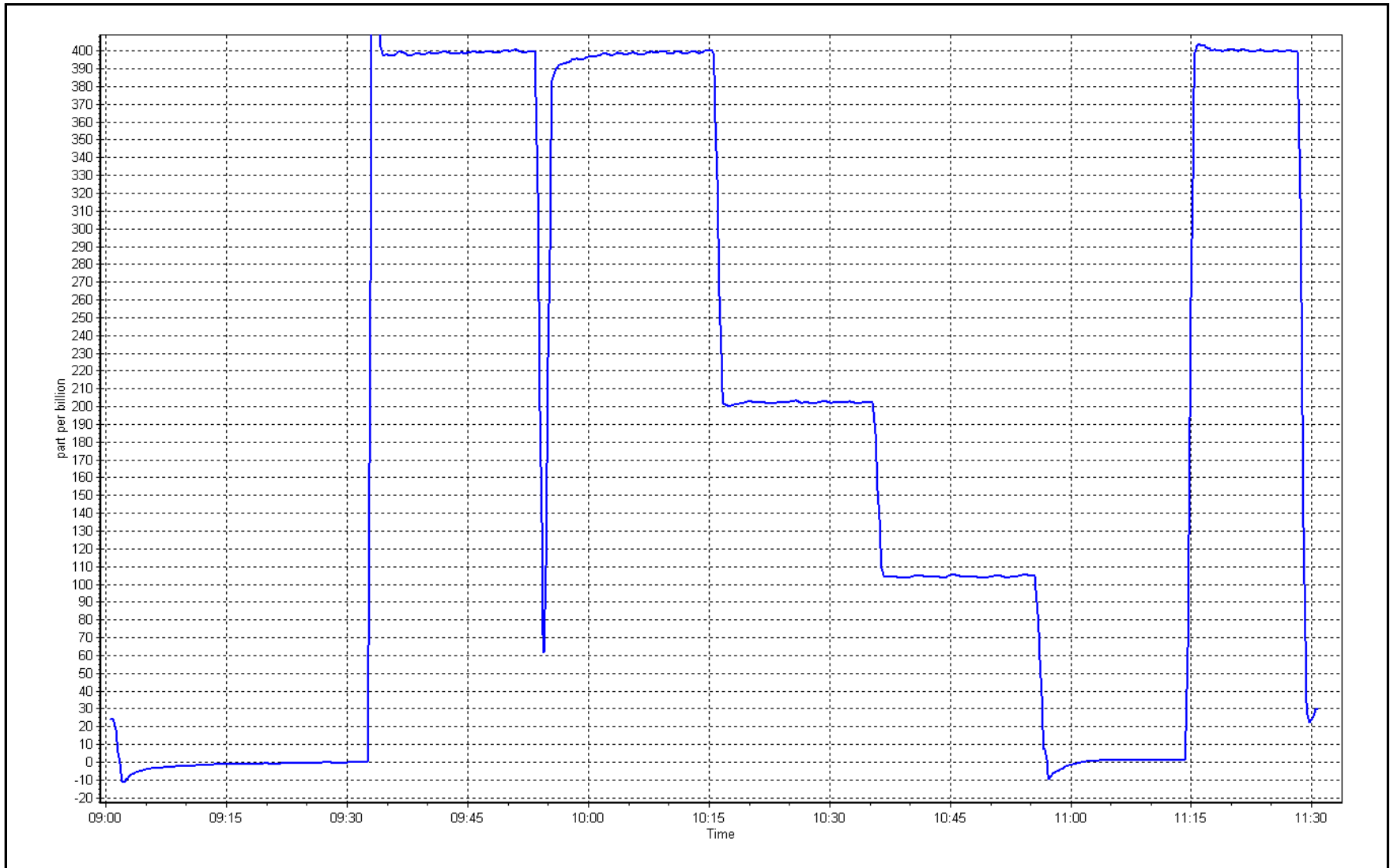
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999855	≥0.995
400.0	399.7	1.0008			
200.0	202.3	0.9886	Slope	1.003093	0.90 - 1.10
100.0	104.1	0.9606			
			Intercept	-2.020920	+/- 10



O₃ Calibration Plot

Date: June 7, 2017

Location: Anzac





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	June 2, 2017	Last Cal Date:	May 4, 2017
Start time (MST):	8:50	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000647	Cal Gas Expiry Date	November 4, 2019
NOX Cal Gas Conc.	<u>50.5</u> ppb	NO Cal Gas Conc.	<u>50.5</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	2659
ZAG make/model	Teledyne API 701	Serial Number	4764

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1426262592		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.117	1.126	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.002	1.001	PMT Temperature	322.4	322.1
NO2 coefficient	1.000	1.000	Reaction cell Press	174.9	176.7
NO bkgrnd	4.2	4.2	Sample Flow	0.689	0.723
NOX bkgrnd	4.4	4.4	PMT Voltage	-808.1	-808.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.989953	0.996492
NO _x Cal Offset	0.455987	-0.426698
NO Cal Slope	0.990711	0.996520
NO Cal Offset	0.357226	-0.287064
NO ₂ Cal Slope	1.010217	0.997293
NO ₂ Cal Offset	-1.858637	-1.291262



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.0	0.0	0.4	0.2	0.3	----	----
as found span	4932	79.3	799.1	799.1	0.0	793.3	792.6	0.7	1.0073	1.0082
calibrator zero	5005	0.0	0.0	0.0	0.0	0.4	0.2	0.3	----	----
high point	4932	79.3	799.1	799.1	0.0	801.6	801.4	0.1	0.9969	0.9972
second point	4972	39.6	399.0	399.0	0.0	403.1	403.0	0.1	0.9899	0.9902
third point	4992	19.8	199.5	199.5	0.0	199.2	199.1	0.1	1.0016	1.0021
as left zero	5005	0.0	0.0	0.0	0.0	0.2	0.3	-0.1	----	----
as left span	4931	79.3	799.3	411.5	387.8	814.4	422.5	391.9	0.9814	0.9740
Average Correction Factor									0.9961	0.9965

Corrected As found	NO _x = 792.9 ppb	NO = 792.4 ppb		*Percent Change	NO _x = 1.8%
Previous Response	NO _x = 806.8 ppb	NO = 806.3 ppb		*Percent Change	NO = 1.7%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	798.5	795.8	2.7	1.0008	1.0042	----	----
1st NO2 (400 ppb O3)	411.5	384.3	797.9	411.5	386.3	1.0015	----	0.9948	100.5%
2nd NO2 (200 ppb O3)	605.4	190.4	797.6	605.4	192.2	1.0019	----	0.9906	100.9%
3rd NO2 (100 ppb O3)	699.7	96.1	798.7	699.7	99.0	1.0005	----	0.9707	103.0%
2nd NO ref point	----	0.0	799.3	797.3	2.0	0.9998	1.0023	----	----
Average Correction Factor						1.0009	1.0032	0.9854	101.5%

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

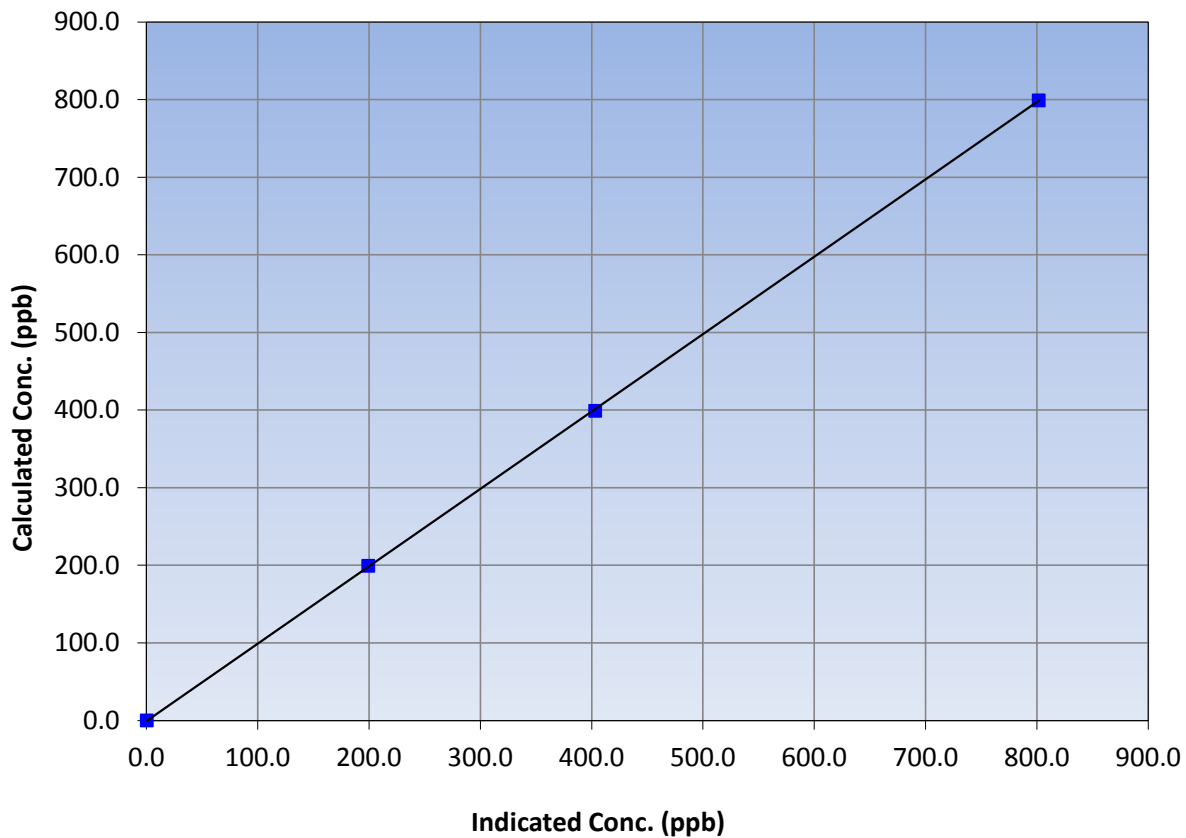
Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.4	----	Correlation Coefficient	≥0.995	
799.1	801.6	0.9969			
399.0	403.1	0.9899			
199.5	199.2	1.0016			
			Slope	0.996492	0.90 - 1.10
			Intercept	-0.426698	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

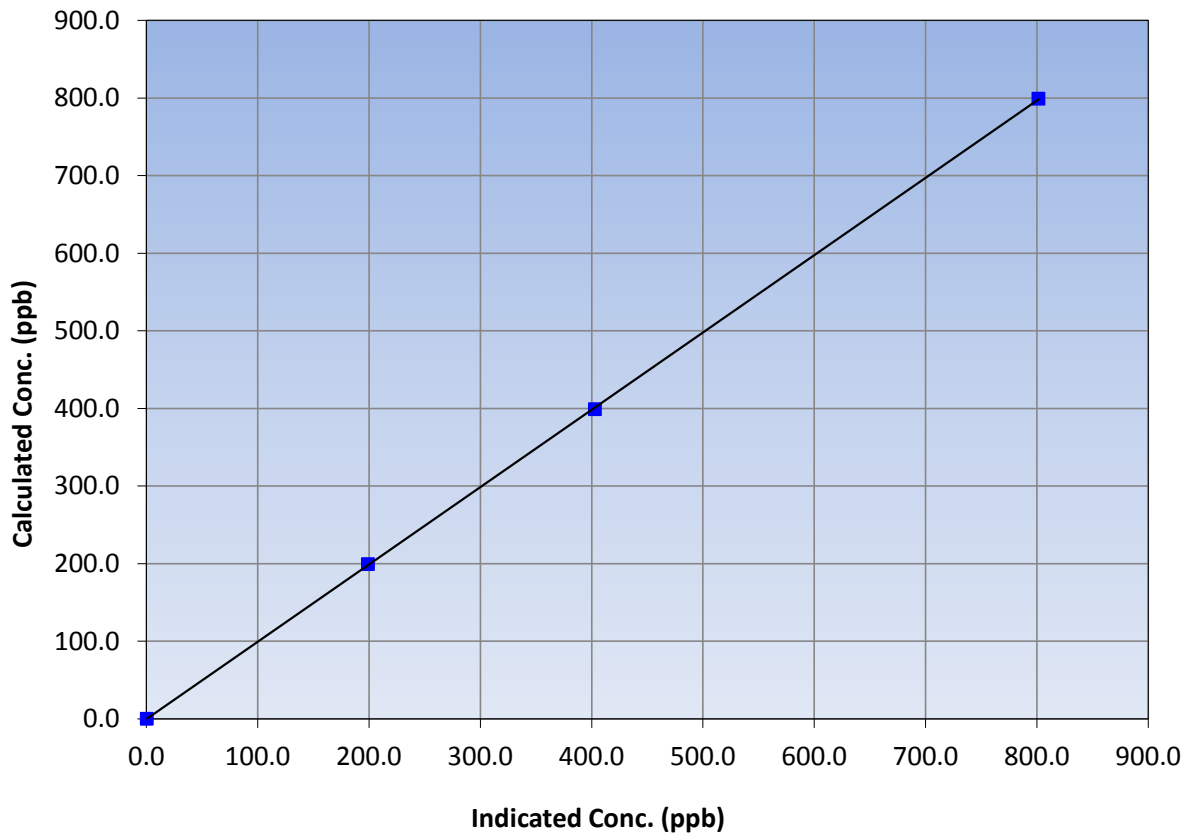
Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
799.1	801.4	0.9972			
399.0	403.0	0.9902			
199.5	199.1	1.0021			
			Slope	0.996520	0.90 - 1.10
			Intercept	-0.287064	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

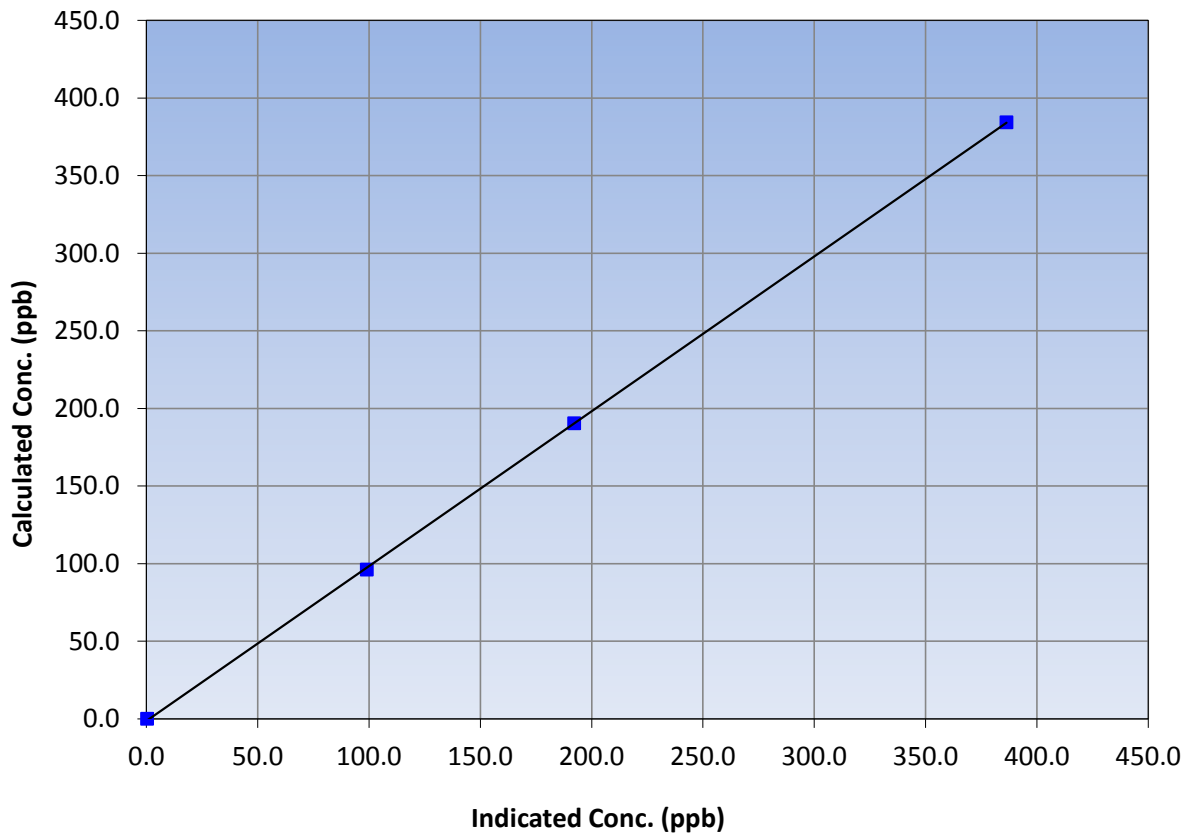
Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 4, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
384.3	386.3	0.9948			
190.4	192.2	0.9906			
96.1	99.0	0.9707			
			Slope	0.997293	0.90 - 1.10
			Intercept	-1.291262	+/-20

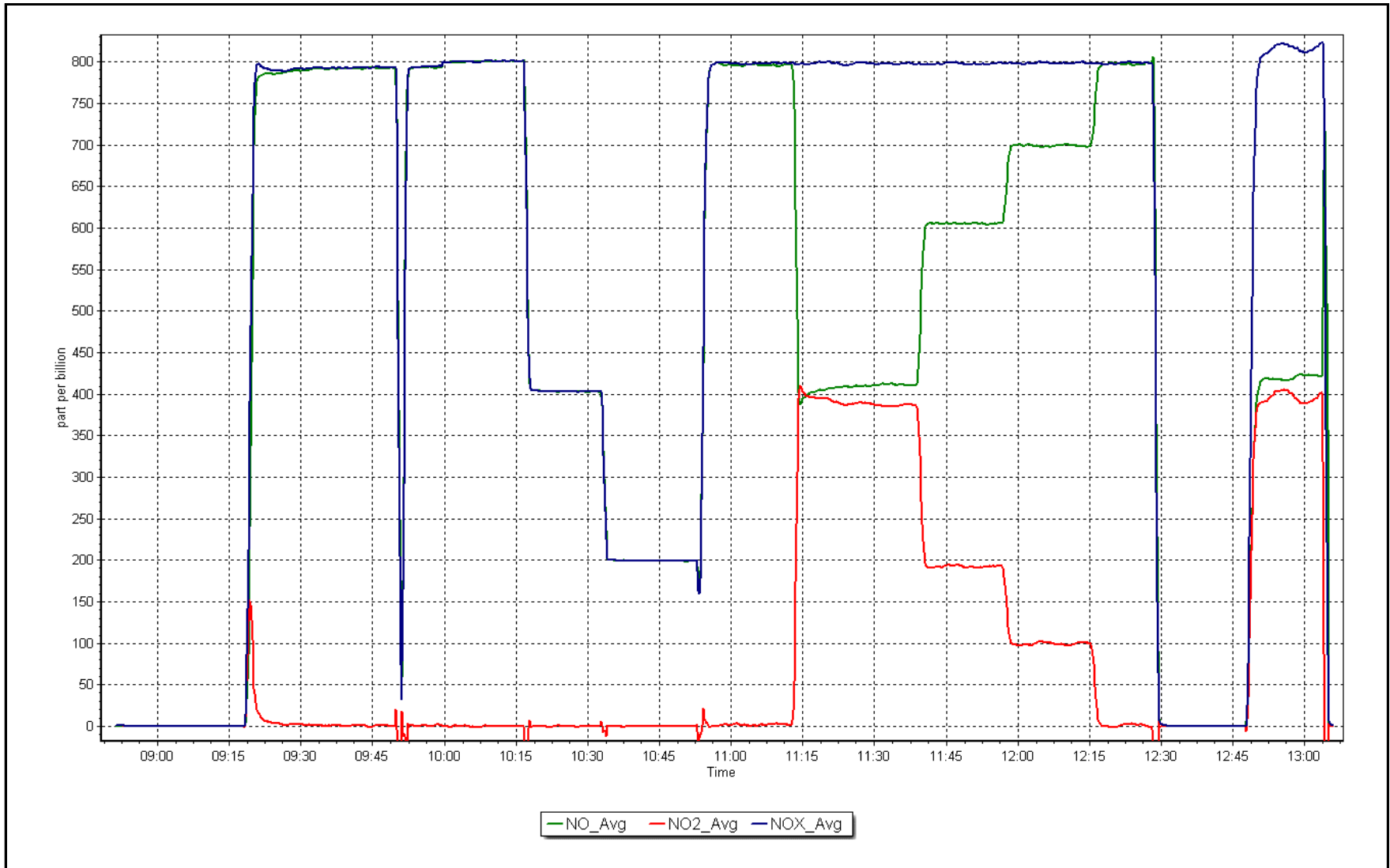
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 2, 2017

Location: Anzac





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 15 HORIZON JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	35	36	99.86	14	0	3	0
TRS (ppb) Average	686	34	34	100	1	0	1	0
THC (ppm) Average	684	35	36	99.86	4.7	-	2.6	-
NO2 (ppb) Average	684	35	36	99.86	24	0	8	-
NO (ppb) Average	684	35	36	99.86	61	-	9	-
NOX (ppb) Average	684	35	36	99.86	80	-	17	-
PM2.5 (ug/m3) Average	719	1	1	100	278.3	-	45.4	1
Temperature 2 m (C) Average	720	0	0	100	29.3	-	22.2	-
Wind Speed 10 m (km/h) Average	720	0	0	100	30	-	19	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Precipitation (mm) Total	720	0	0	100	4.3	-	8.1	-
Relative Humidity (%) Average	720	0	0	100	99	-	87	-
Global Solar Radiation (W/m2) Average	720	0	0	100	930	-	369	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.9	1	-	0	0	0	0	1	2	14
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	684	2.18	0.3	-	1.9	2	2	2.1	2.2	2.4	4.7
NO2 (ppb) Average	684	3.5	4	-	0	0	1	2	5	9	24
NO (ppb) Average	684	1.3	4	-	0	0	0	0	1	3	61
NOX (ppb) Average	684	4.8	7	-	0	1	1	2	5	11	80
PM2.5 (ug/m3) Average	719	9.4	16.7	-	1.4	2.6	3.7	6.4	10.6	16.4	278.3
Temperature 2 m (C) Average	720	15.94	5.3	-	2.2	8.9	12.4	15.5	19.9	22.7	29.3
Wind Speed 10 m (km/h) Average	720	9.3	6	-	1	3	5	8	13	18	30
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	37.34	-	-	-	-	-	-	-
Relative Humidity (%) Average	720	62.3	23	-	17	29	43	64	81	94	99
Global Solar Radiation (W/m2) Average	720	239.1	278	-	0	0	3	113	444	712	930

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -HORIZON (AMS 15)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NOX, SO2, THC	14 Jun 2017 10:00	14 Jun 2017 10:00	1	Maintenance - cleaned glass manifold



Summary of Hour Averages

Horizon - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Jun 20 12:00	Maximum Daily Average: 2.7 ppb on Jun 25		Hours of Data:	684
Minimum Value: 0 ppb on Jun 29 03:00	Minimum Daily Average: 0.3 ppb on Jun 28		Hours of Missing Data:	36
Maximum Diurnal Average: 1.8 ppb at hour 10	Minimum Diurnal Average: 0.4 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 7		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	3	4	2	0.9	4	
2-Jun	1	1	0	Z	0	0	1	1	1	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0.8	2	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0.3	1	
4-Jun	0	1	0	1	0	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	2	1	0	1	0	0.8	2	
5-Jun	Z	0	0	0	0	0	1	2	1	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0.6	2	
6-Jun	0	Z	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	0.6	1	
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	
8-Jun	0	0	1	Z	0	0	0	1	0	0	0	1	1	1	1	1	1	1	2	3	2	1	1	1	0.9	3	
9-Jun	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
10-Jun	1	1	0	0	0	Z	1	1	1	1	0	0	1	2	1	2	0	0	0	1	0	1	3	1	0.8	3	
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0.4	1	
12-Jun	0	Z	0	0	0	1	1	3	7	12	3	4	3	3	3	2	2	2	1	1	1	0	0	0	2.1	12	
13-Jun	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	2	1	0	1	1	0	0	0	0	0	0.5	2	
14-Jun	0	0	1	Z	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0.5	2	
15-Jun	1	3	1	1	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0.6	3	
16-Jun	0	1	1	1	0	Z	0	4	1	4	4	8	9	7	1	1	2	2	1	1	0	0	0	0	2.2	9	
17-Jun	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	6	1	0.6	6	
19-Jun	1	1	Z	1	1	1	1	2	4	6	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1.0	6	
20-Jun	0	0	0	Z	0	0	0	3	2	3	8	14	1	1	1	1	0	0	1	1	1	3	1	1	1.9	14	
21-Jun	2	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	7	5	1	2	1.3	7	
22-Jun	3	4	1	1	1	Z	4	2	1	1	2	3	2	2	2	2	1	0	0	0	0	0	0	0	1.4	4	
23-Jun	Z	0	0	0	0	0	0	1	1	1	2	0	1	1	2	1	1	0	0	1	1	1	1	1	0.7	2	
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1	
25-Jun	1	1	Z	1	1	1	1	1	1	14	7	3	3	5	4	2	6	3	2	2	2	1	1	2	3	2.7	14
26-Jun	2	1	1	Z	1	1	3	7	5	4	2	3	2	2	3	3	4	2	3	2	0	0	0	0	2.2	7	
27-Jun	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1	
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
29-Jun	Z	0	0	0	0	0	0	4	2	1	1	1	1	1	1	1	1	1	2	1	0	0	0	0	0.9	4	
30-Jun	0	Z	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1	

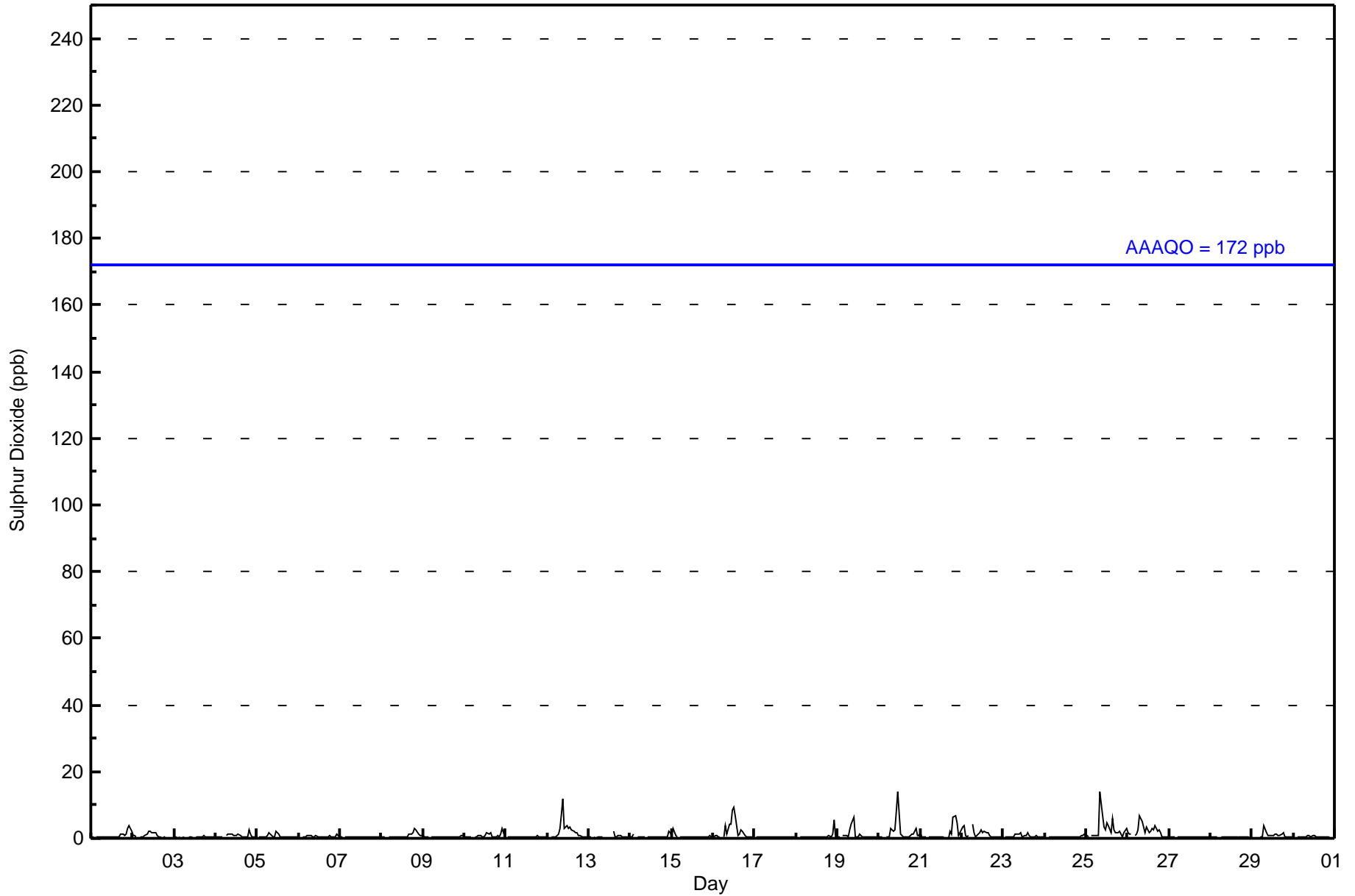
0.7	0.7	0.5	0.4	0.5	0.4	0.7	1.2	1.6	1.8	1.2	1.6	1.2	1.1	0.8	0.9	0.8	0.8	0.7	0.9	0.8	0.8	0.9	0.7	Diurnal Average
3	4	1	1	1	1	4	7	14	12	8	14	9	7	3	6	4	2	3	6	7	5	6	3	Diurnal Maximum

Z - zeronspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Horizon - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	99.56	99.56
11 - 20	3	0.44	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	49	134	72	30	19	19	25	37	52	55	37	28	40	28	37	19	681
11 - 20	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	134	72	30	19	19	27	37	53	55	37	28	40	28	37	19	684

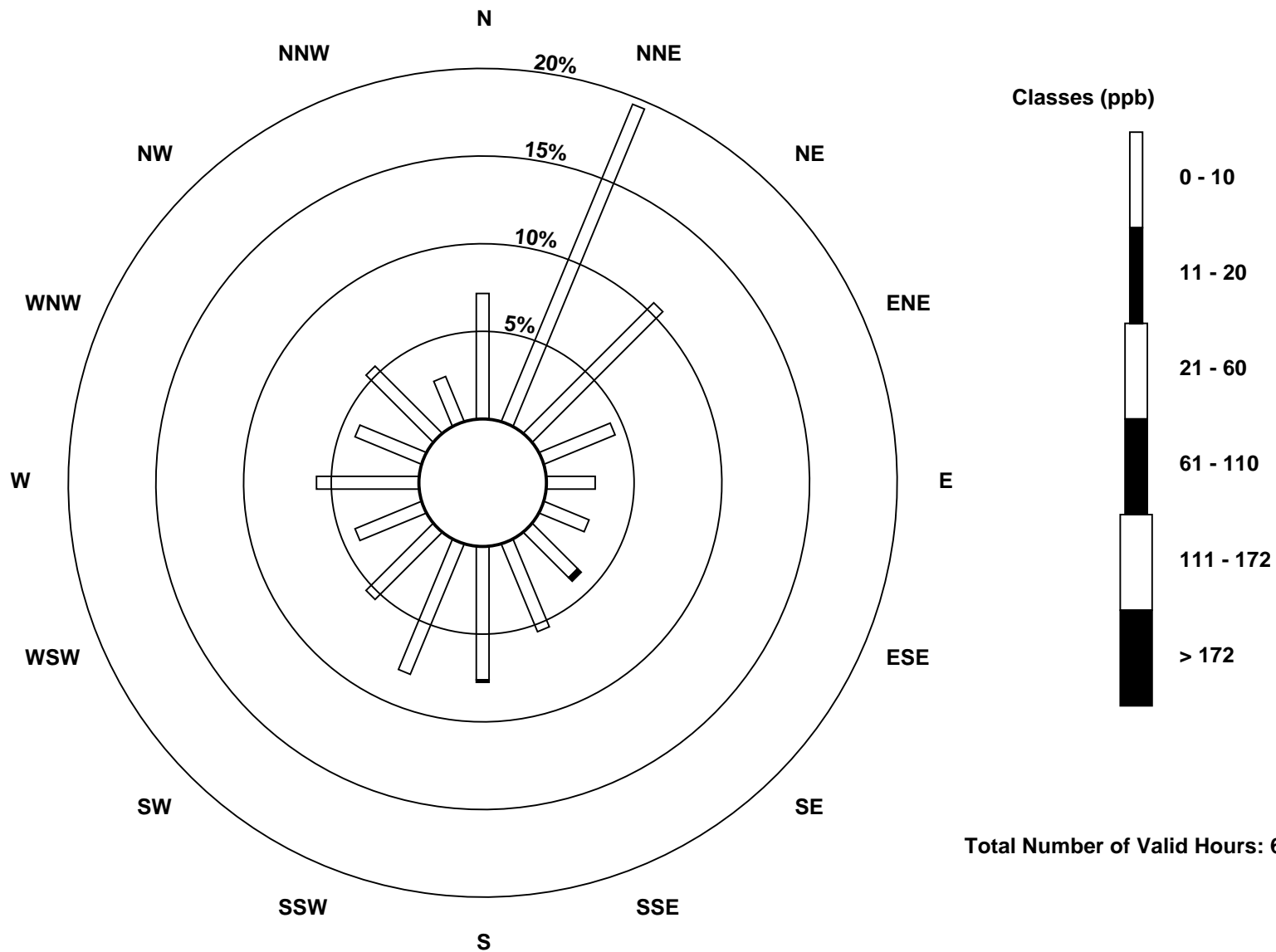
Total Number of Valid Hours: 684

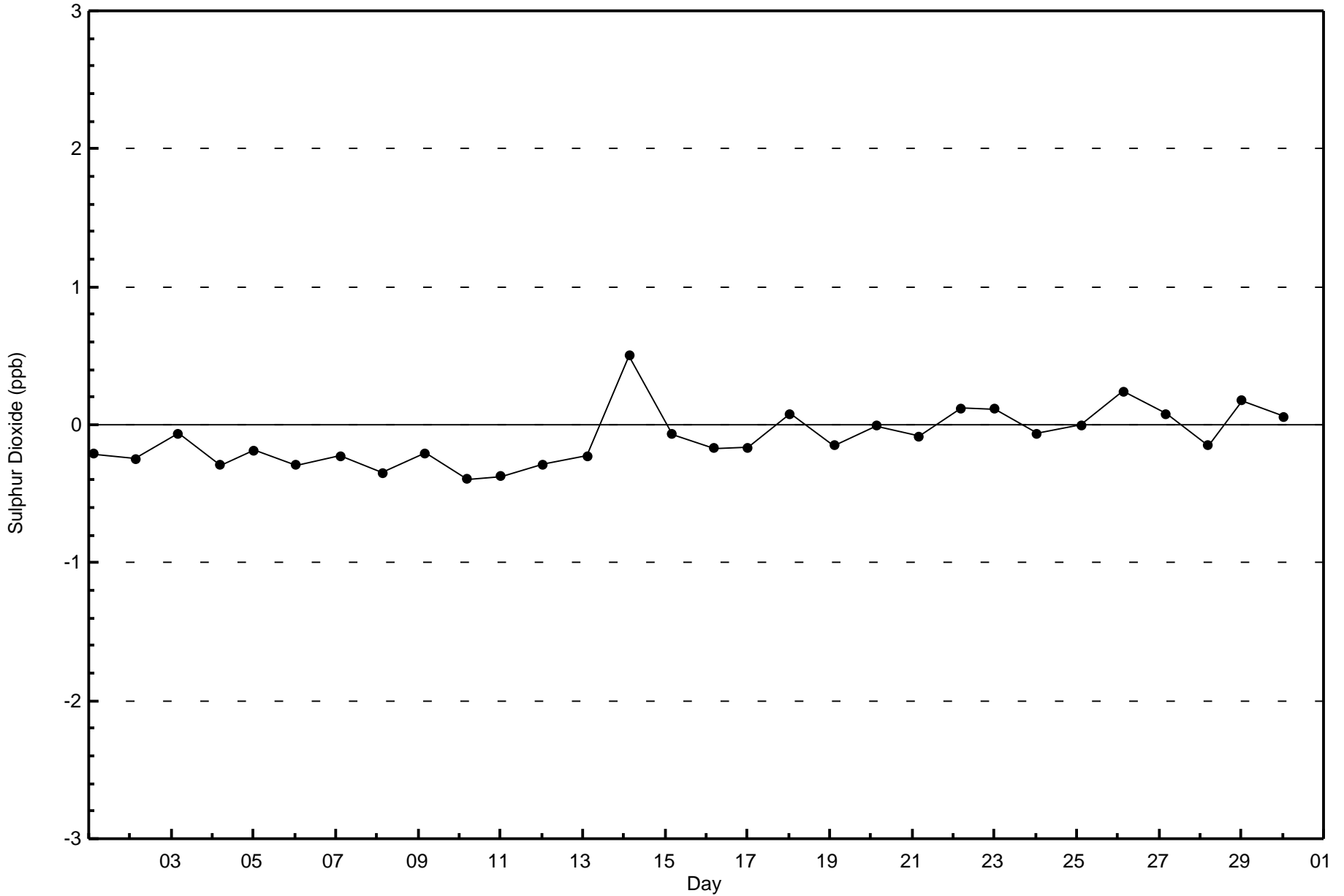
Total Number of Hours: 720

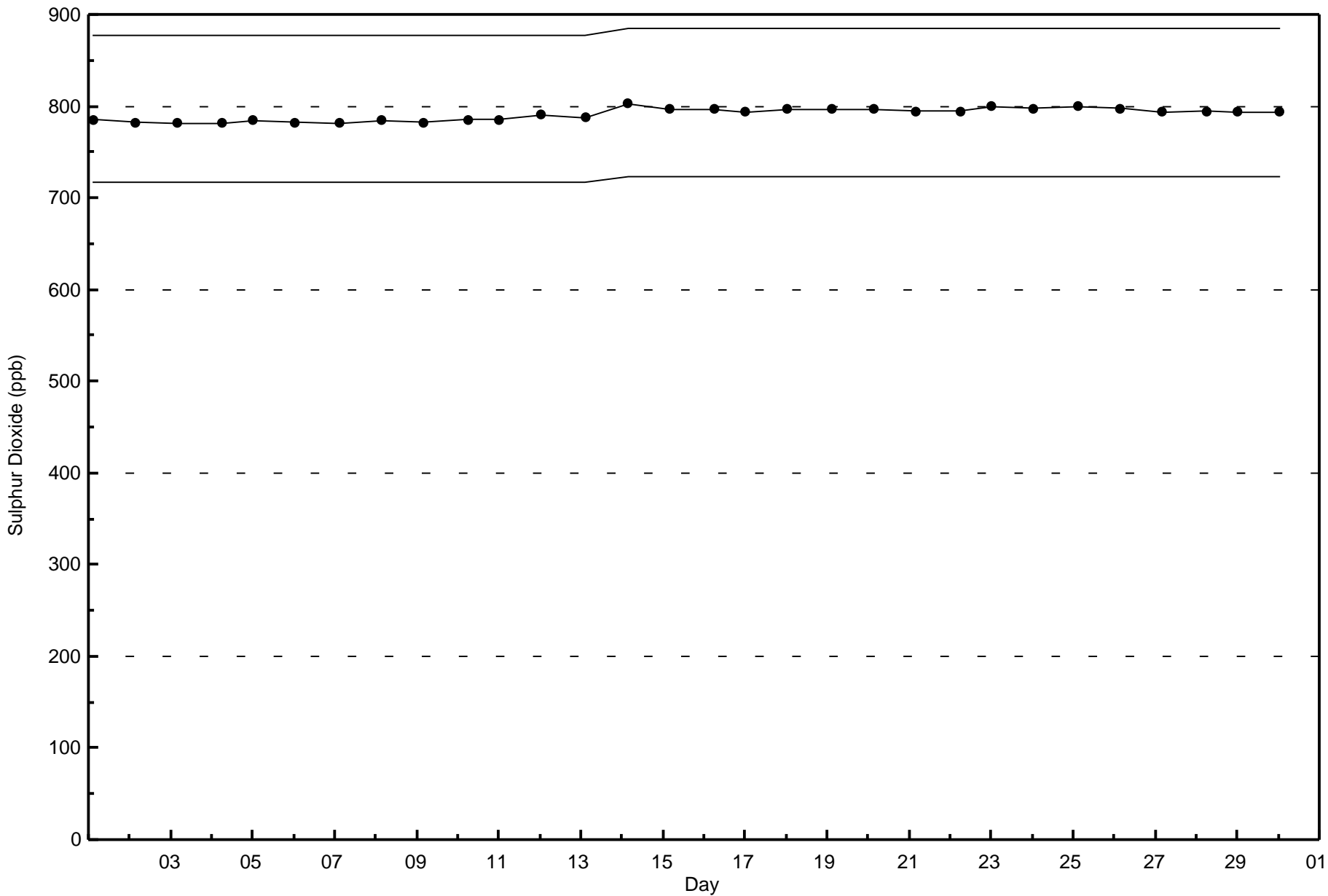


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Horizon (AMS 15)









Summary of Hour Averages

Horizon - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 19 10:00	Maximum Daily Average: 0.5 ppb on Jun 20		Hours of Data:	686
Minimum Value: 0 ppb on Jun 24 19:00	Minimum Daily Average: 0.2 ppb on Jun 3		Hours of Missing Data:	34
Maximum Diurnal Average: 0.4 ppb at hour 10	Minimum Diurnal Average: 0.2 ppb at hour 17		Hours of Calibration:	34
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
9-Jun	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0.4	1
13-Jun	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
14-Jun	0	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
16-Jun	0	1	1	1	1	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0.5	1
17-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Jun	0	0	0	0	Z	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	1	0.5	1
21-Jun	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
24-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
25-Jun	1	0	0	Z	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.4	1
26-Jun	1	1	1	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-Jun	0	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
30-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0

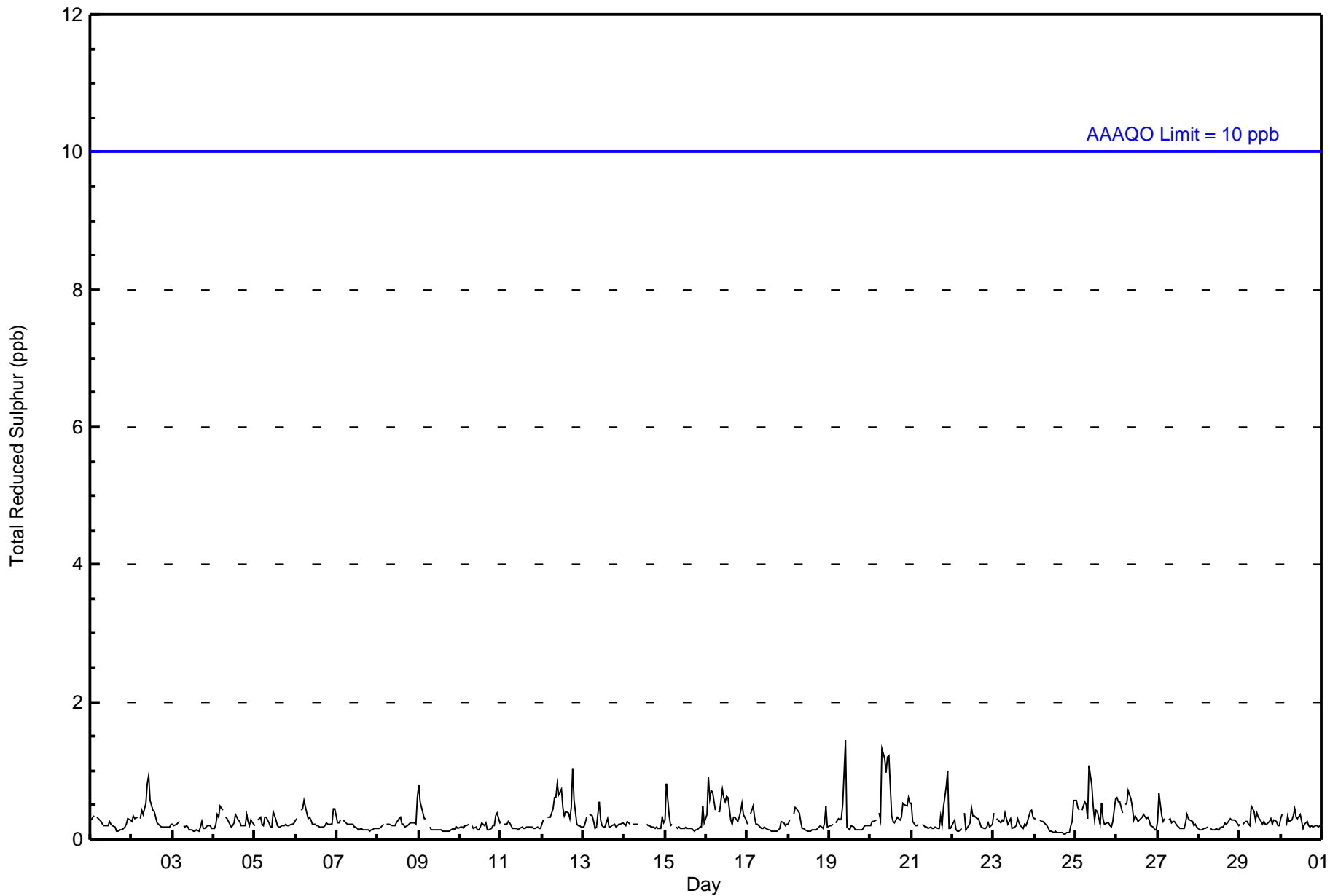
0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Horizon - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	47	133	74	33	20	18	26	37	52	57	38	27	41	28	39	16	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	47	133	74	33	20	18	26	37	52	57	38	27	41	28	39	16	686

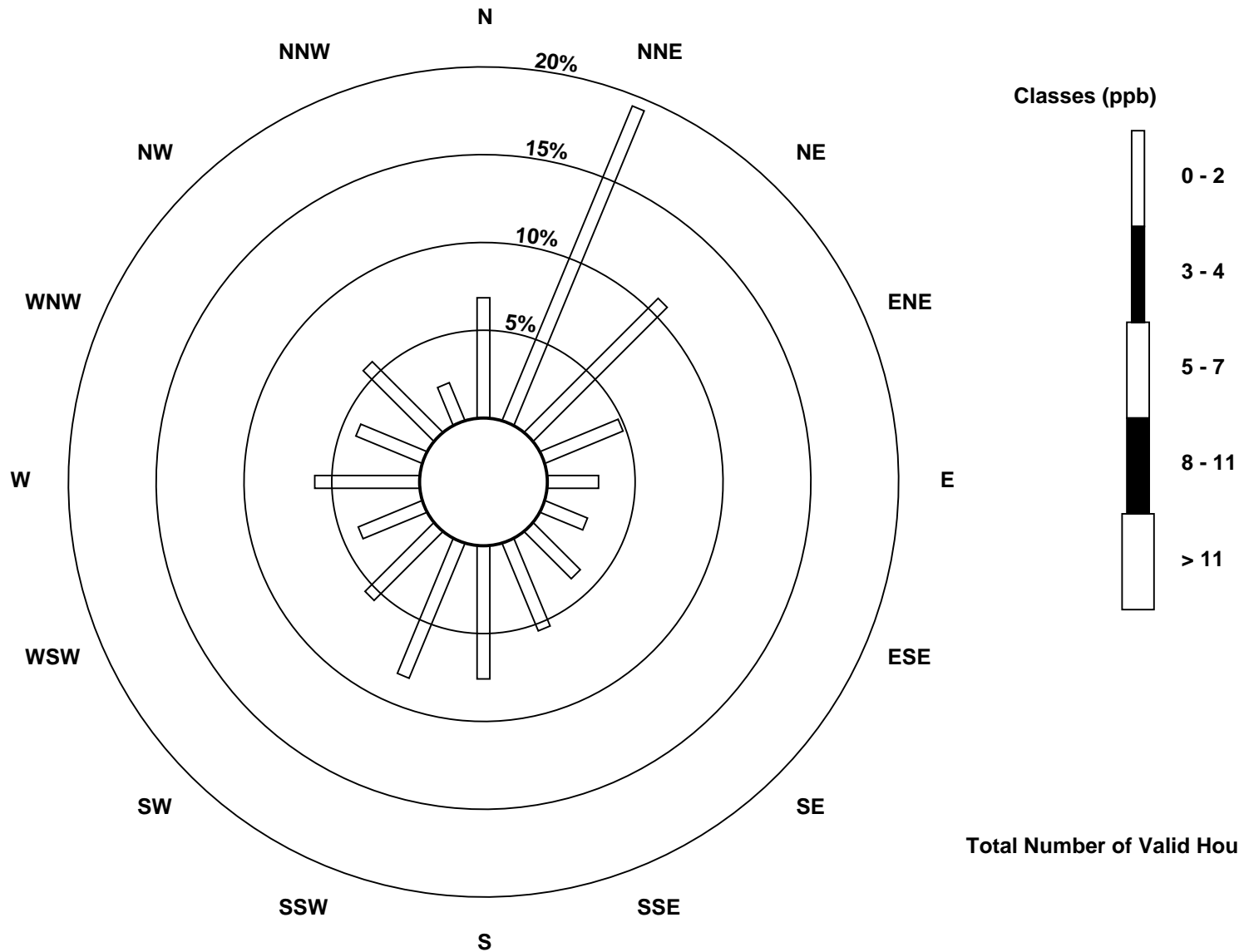
Total Number of Valid Hours: 686

Total Number of Hours: 720

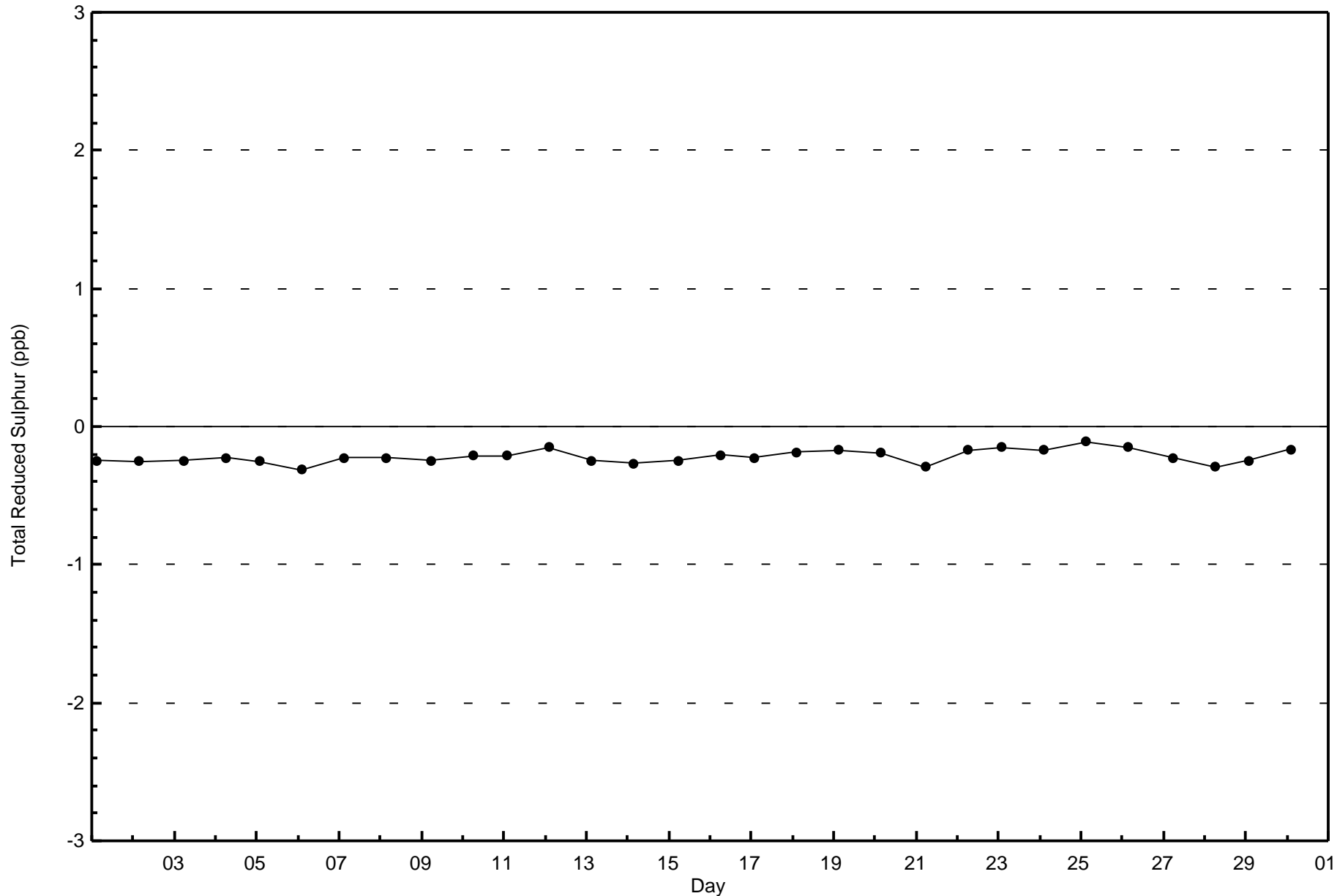


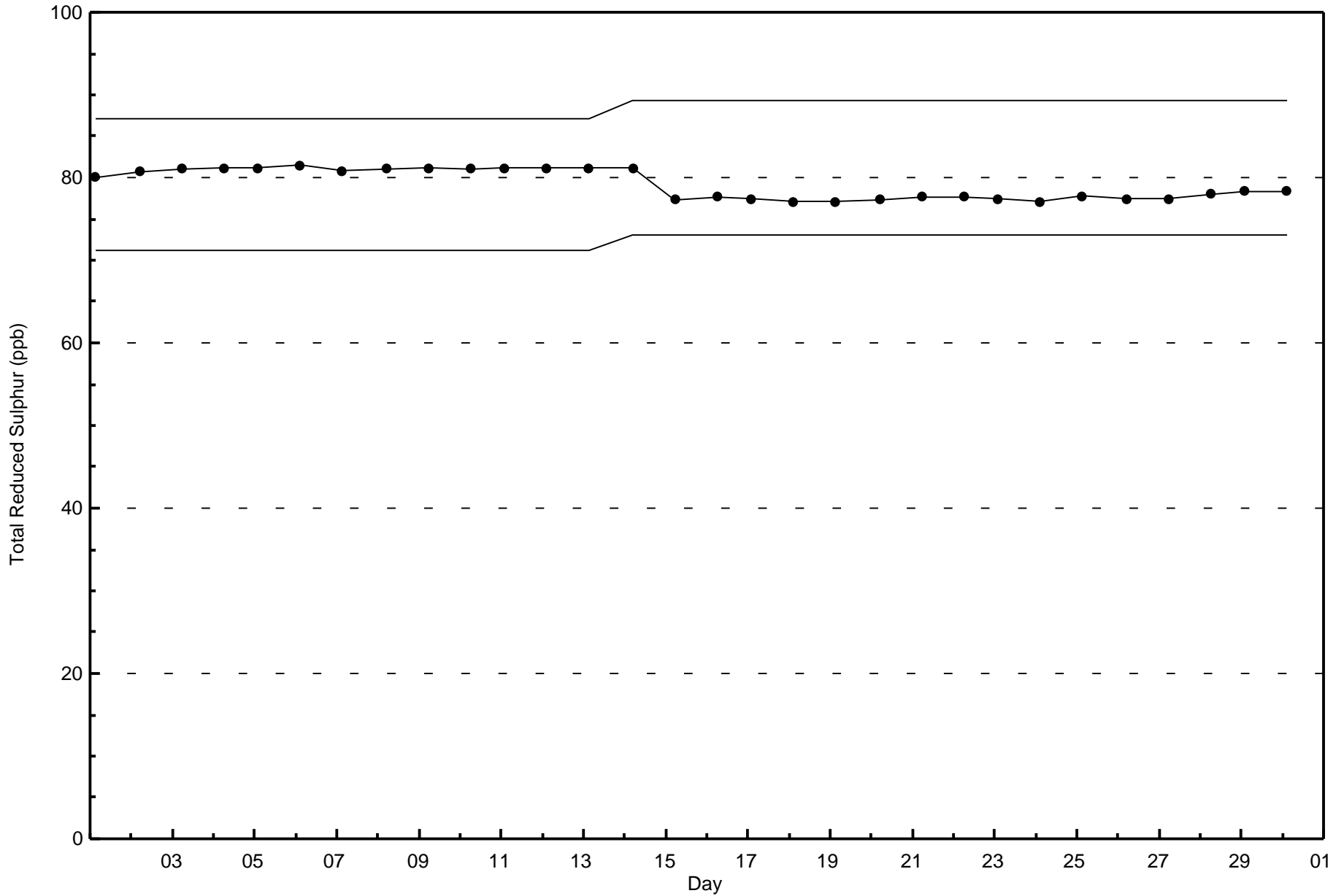
Wood Buffalo Environmental Association
Wind Rose Jun 2017

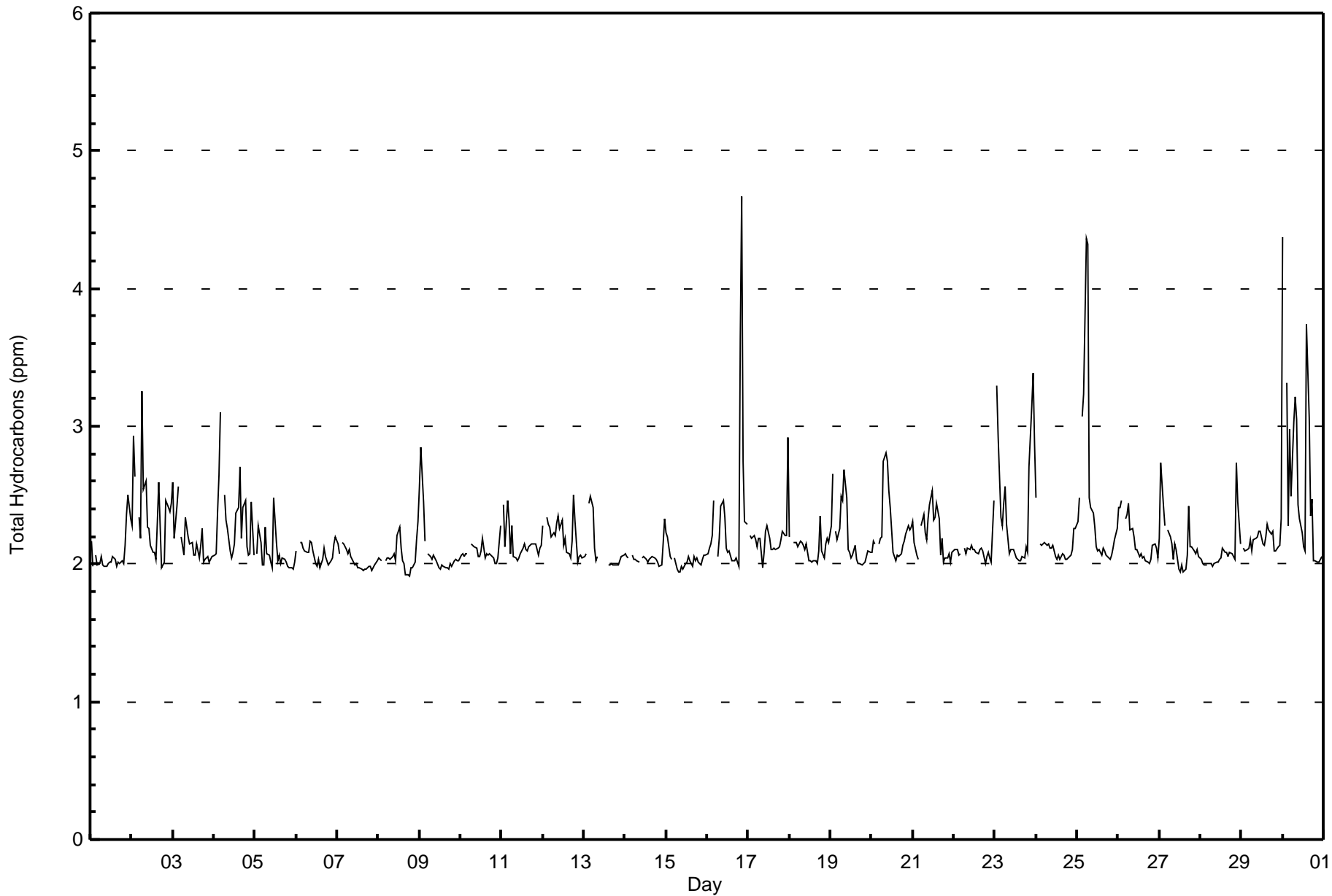
Total Reduced Sulphur (TRS) - ppb
Horizon (AMS 15)



Total Number of Valid Hours: 686









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	217	31.73	31.73
2.1 - 3.0	451	65.94	97.66
3.1 - 10.0	16	2.34	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	13	68	32	13	6	7	9	8	8	10	19	11	7	1	3	2	217
2.1 - 3.0	35	64	39	17	13	12	16	29	45	43	17	17	29	26	32	17	451
3.1 - 10.0	1	2	1	0	0	0	2	0	0	2	1	0	4	1	2	0	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	134	72	30	19	19	27	37	53	55	37	28	40	28	37	19	684

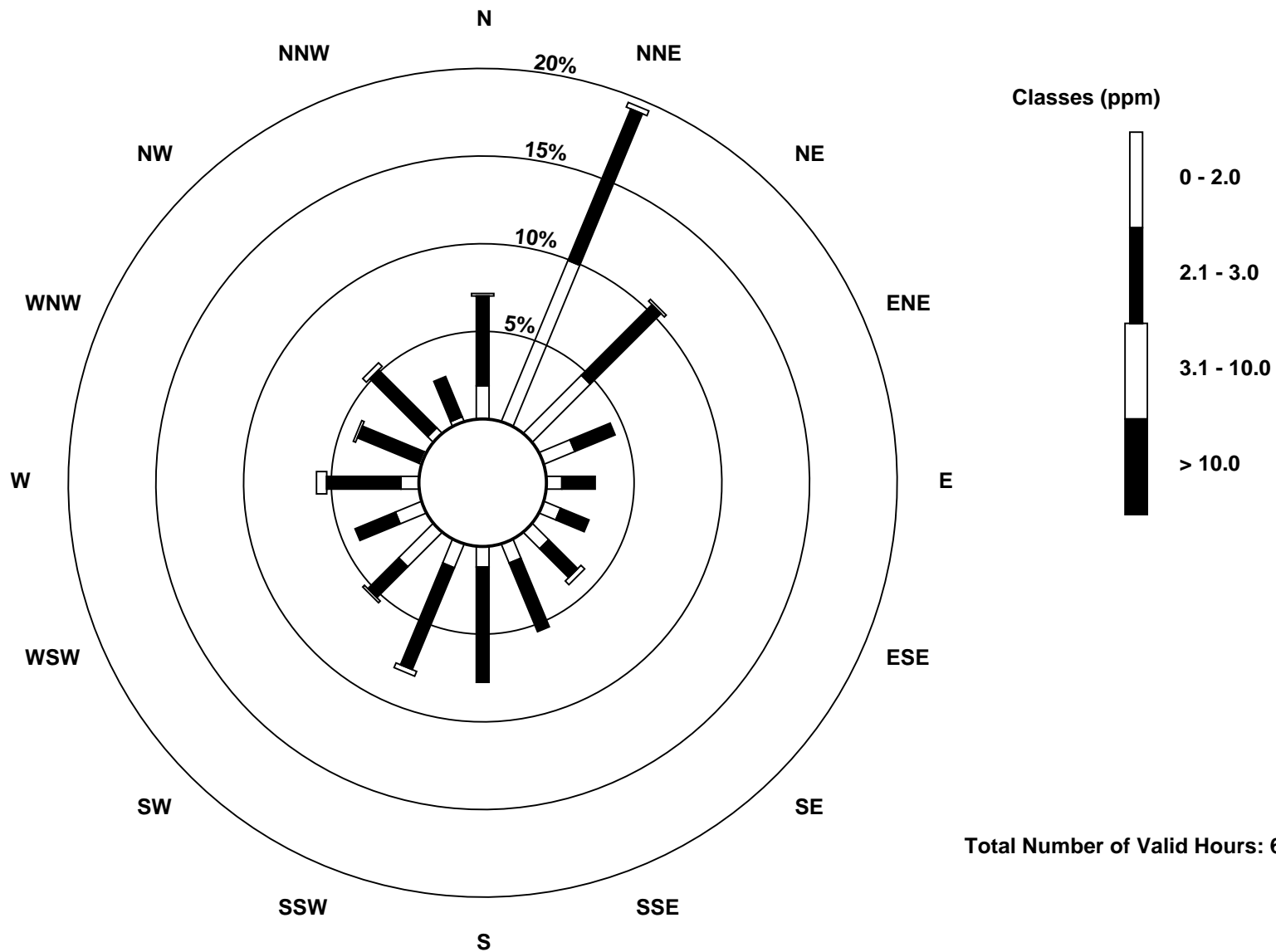
Total Number of Valid Hours: 684

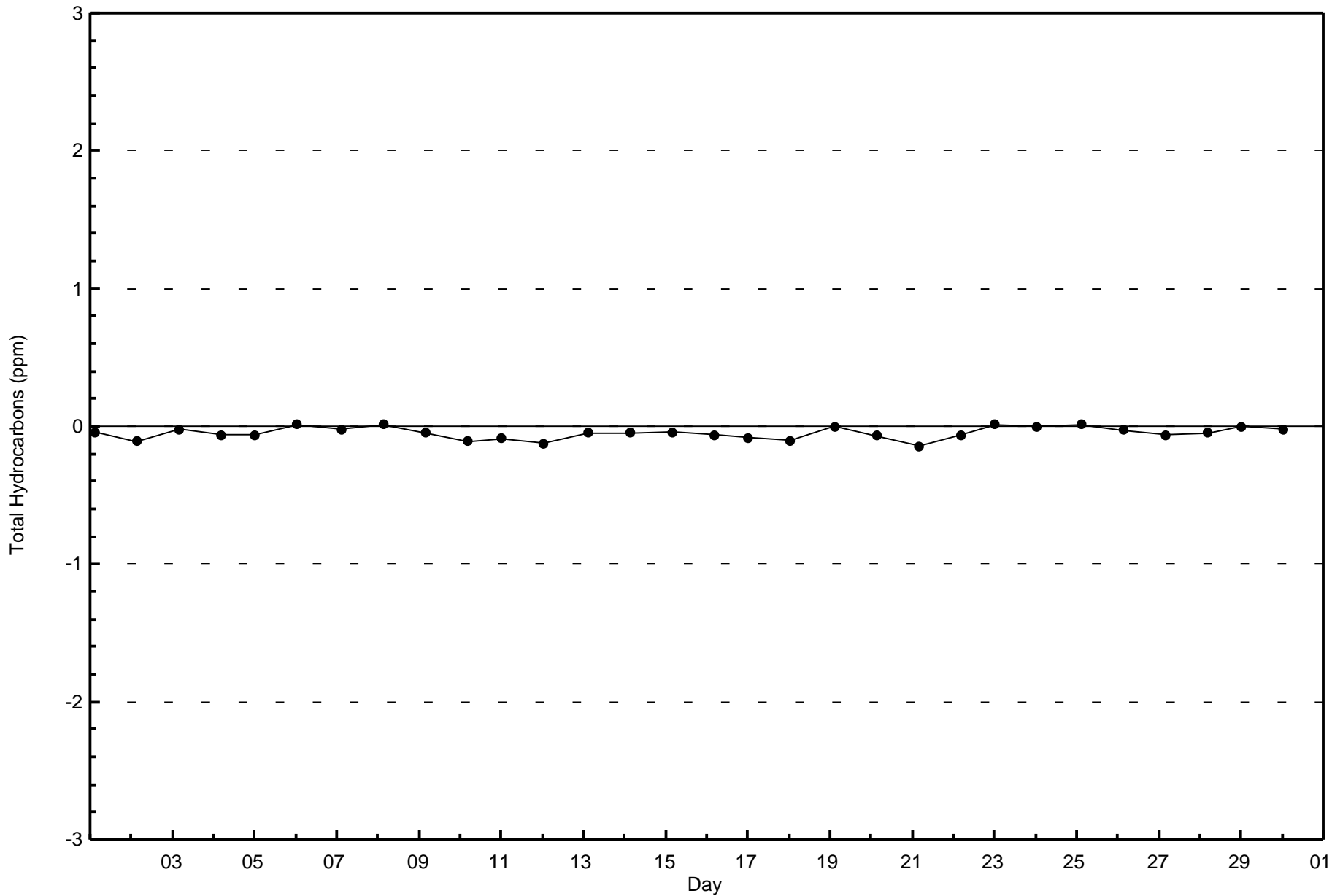
Total Number of Hours: 720

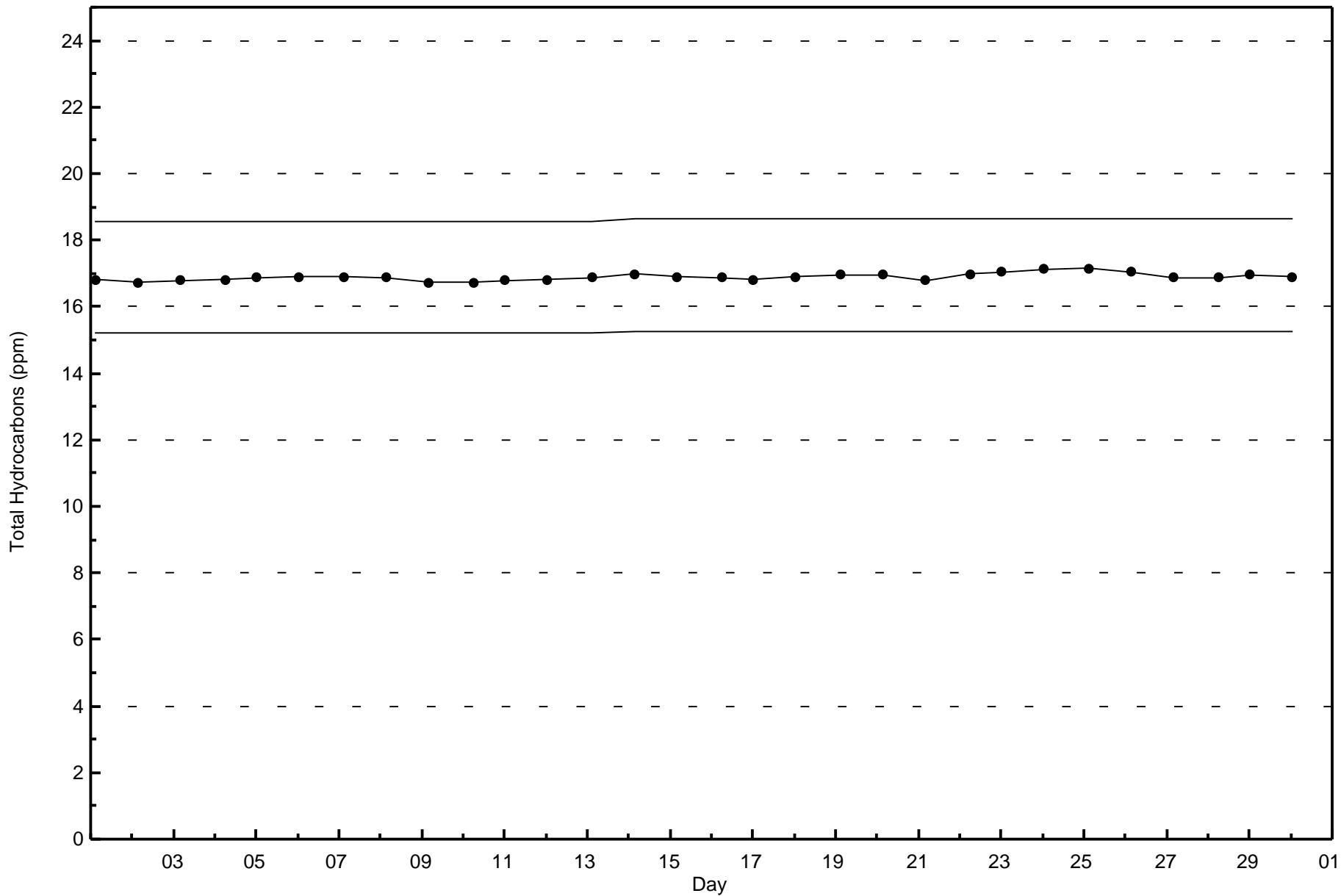


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Horizon (AMS 15)







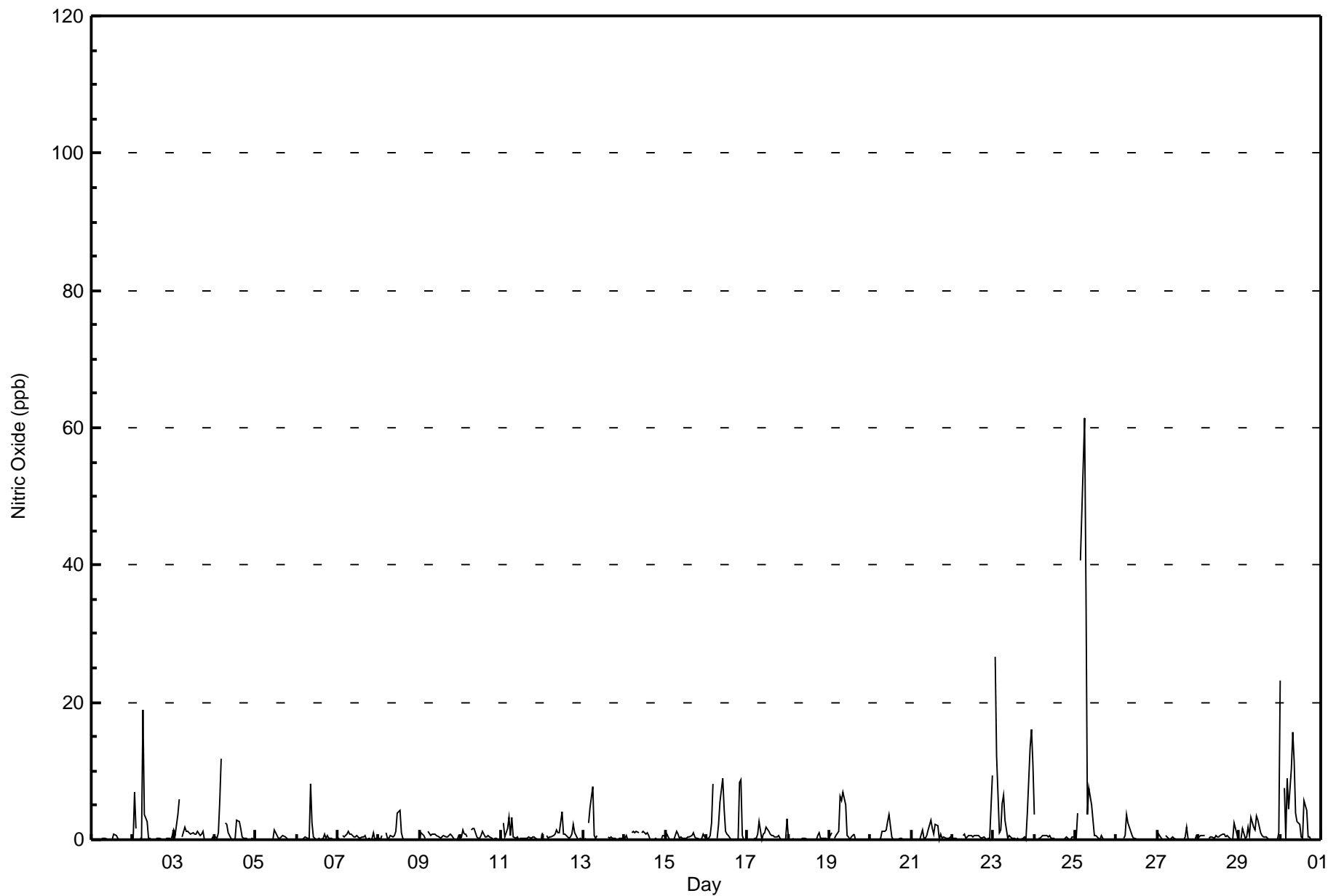


Maximum Value: 61 ppb on Jun 25 06:00														Maximum Daily Average: 9.2 ppb on Jun 25														Hours in Service: 720	
Minimum Value: 0 ppb on Jun 1 01:00														Minimum Daily Average: 0.1 ppb on Jun 1														Hours of Data: 684	
Maximum Diurnal Average: 3.7 ppb at hour 5														Minimum Diurnal Average: 0.3 ppb at hour 19														Hours of Missing Data: 36	
Monthly Average: 1.3 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 18														Hours of Calibration: 35	
																												Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.1	1			
2-Jun	0	7	2	Z	0	0	19	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	19			
3-Jun	1	1	4	6	Z	0	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1.1	6				
4-Jun	0	0	1	6	12	Z	2	2	1	0	0	0	3	3	2	0	0	0	0	0	0	0	0	1.4	12				
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0.2	1				
6-Jun	0	Z	0	0	0	0	0	0	8	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0.6	8				
7-Jun	0	0	Z	1	0	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0.4	1				
8-Jun	0	0	1	Z	1	0	0	1	0	1	1	4	4	1	0	0	0	0	0	0	0	0	0	0.6	4				
9-Jun	0	1	1	0	Z	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	0	0	1	0.5	1				
10-Jun	0	1	1	1	0	Z	1	2	2	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0.6	2				
11-Jun	Z	2	0	2	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3				
12-Jun	1	Z	1	0	0	0	1	1	1	1	1	4	1	1	1	0	0	1	2	1	0	0	0	0.8	4				
13-Jun	0	0	Z	2	5	8	1	0	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	1.0	8				
14-Jun	0	1	0	Z	1	1	1	1	1	M	1	1	1	1	1	0	0	0	0	0	0	1	1	0.6	1				
15-Jun	0	1	0	0	Z	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0.4	1				
16-Jun	0	0	1	3	8	Z	0	2	6	9	4	1	1	1	0	0	0	0	0	8	9	1	0	2.3	9				
17-Jun	Z	0	0	0	0	0	1	3	0	1	1	2	1	1	1	1	0	0	1	0	0	0	3	0.7	3				
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1				
19-Jun	1	1	Z	0	1	1	6	6	7	5	1	0	0	0	1	0	0	0	0	0	0	0	0	1.3	7				
20-Jun	0	0	0	Z	0	0	0	1	1	1	3	4	0	0	0	0	0	0	0	0	0	0	0	0.5	4				
21-Jun	0	0	0	0	Z	0	1	0	0	1	2	3	2	1	2	2	0	1	0	0	0	0	0	0.7	3				
22-Jun	0	0	0	0	0	Z	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0	0	9	0.7	9				
23-Jun	Z	27	12	1	1	5	6	3	0	1	0	0	0	0	0	0	0	0	0	0	4	13	16	11	4.5	27			
24-Jun	4	Z	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4				
25-Jun	0	4	Z	41	48	61	36	4	8	5	3	1	1	0	0	1	0	0	0	0	0	0	0	9.2	61				
26-Jun	0	0	0	Z	0	1	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4				
27-Jun	0	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	1	0.3	2				
28-Jun	0	1	1	1	1	Z	0	0	0	0	1	0	0	1	1	1	0	1	0	0	0	3	2	0	0.6	3			
29-Jun	Z	0	2	0	0	2	1	3	2	1	3	3	1	1	0	0	0	0	0	0	0	0	1	1.0	3				
30-Jun	23	Z	8	0	9	4	10	16	11	4	3	2	0	0	6	4	0	0	0	0	0	0	0	4.4	23				
1.3														1.9														Diurnal Average	
23														27														Diurnal Maximum	
Z - zerospan														C - Calibration														M - Maintenance	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Horizon - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	99.12	99.12
21 - 40	3	0.44	99.56
41 - 80	3	0.44	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Horizon - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	133	71	30	19	19	27	37	53	54	37	28	39	28	35	19	678
21 - 40	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	3
11 - 80	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	134	72	30	19	19	27	37	53	55	37	28	40	28	37	19	684

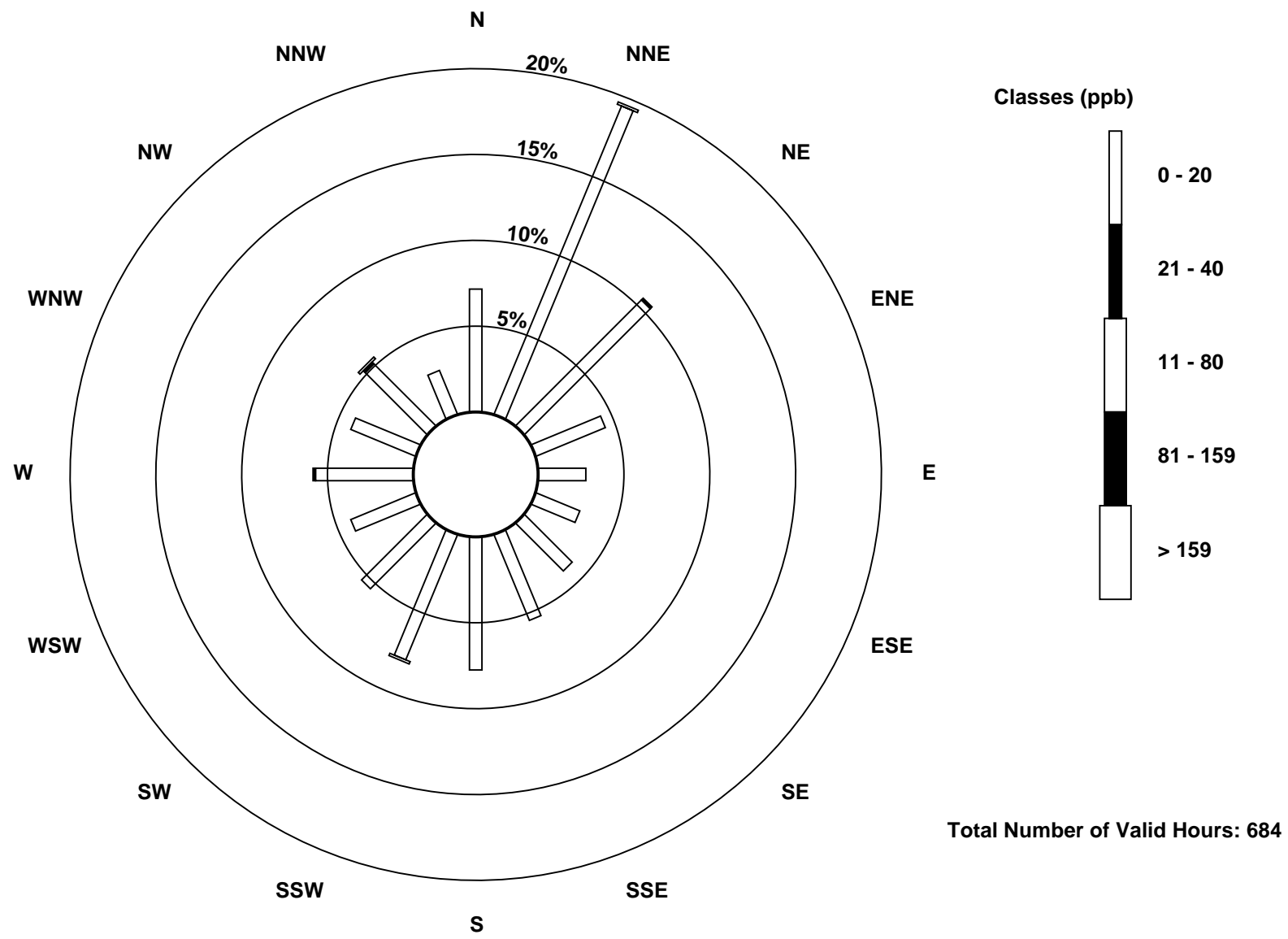
Total Number of Valid Hours: 684

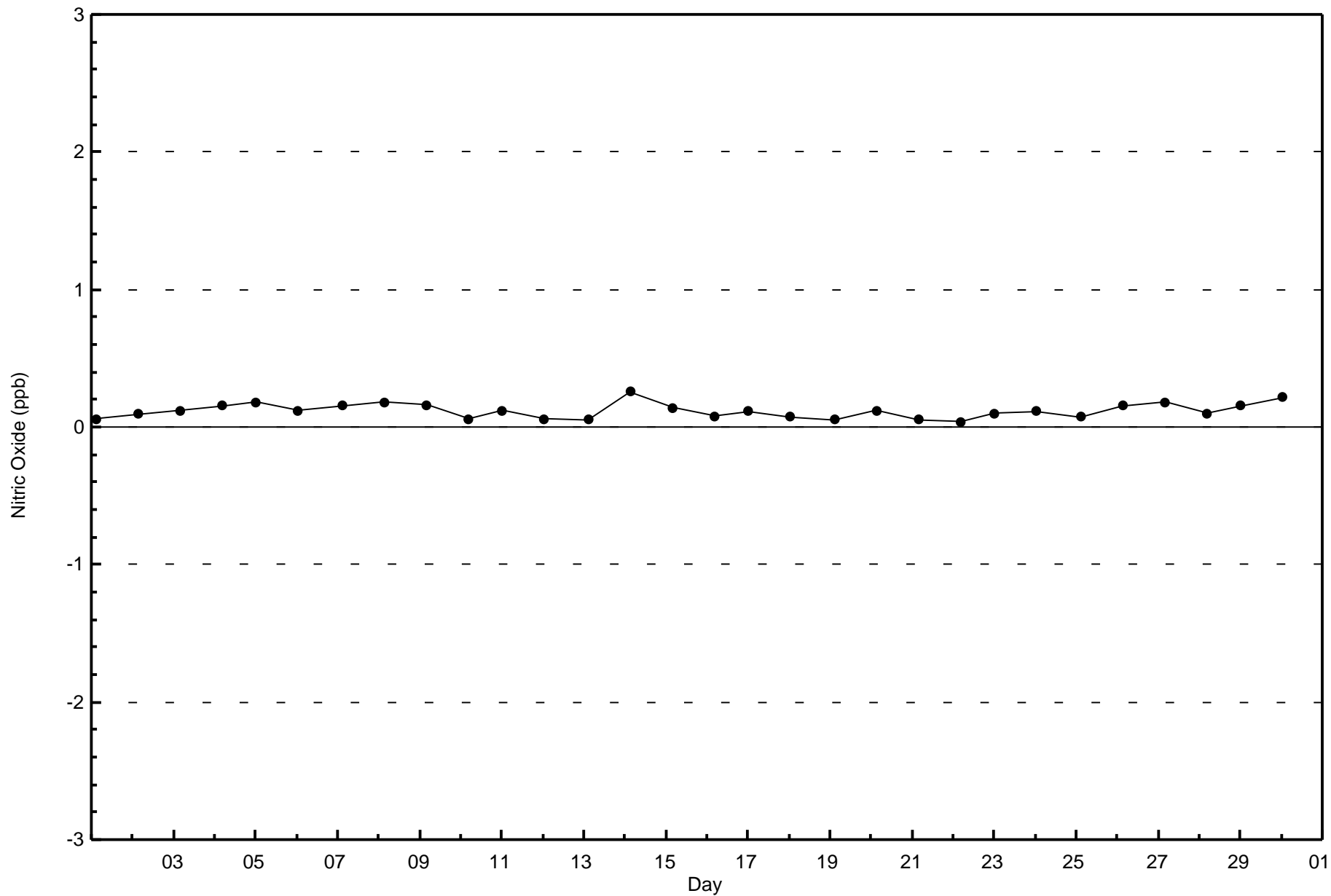
Total Number of Hours: 720

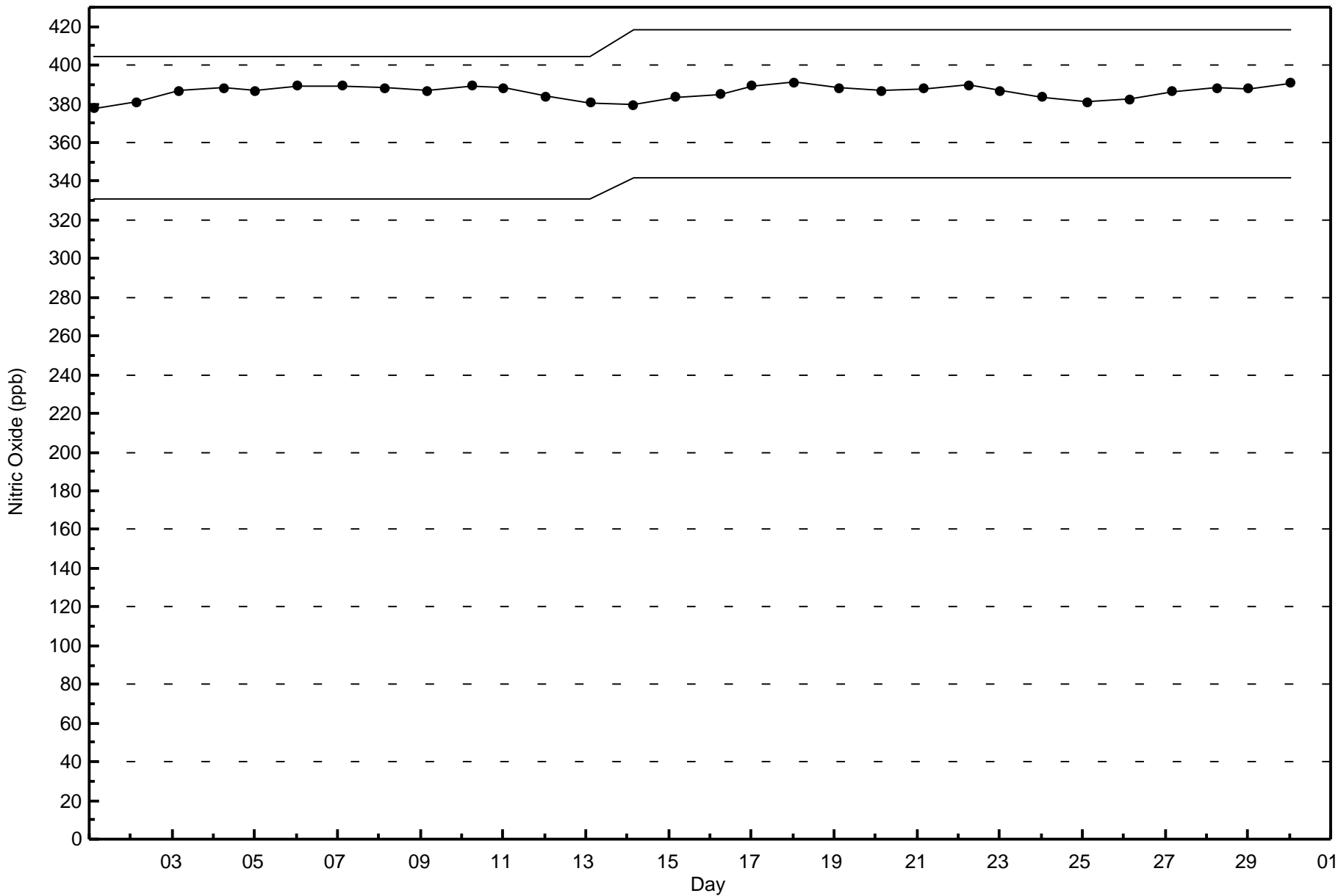


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Horizon (AMS 15)









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 24 ppb on Jun 16 21:00	Maximum Daily Average: 7.8 ppb on Jun 25		Hours of Data:	684
Minimum Value: 0 ppb on Jun 19 19:00	Minimum Daily Average: 1.3 ppb on Jun 14		Hours of Missing Data:	36
Maximum Diurnal Average: 6.9 ppb at hour 2	Minimum Diurnal Average: 2.1 ppb at hour 17		Hours of Calibration:	35
Monthly Average: 3.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 9 P ₉₉ = 18		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	5	1	Z	5	1	1	1	1	2	1	1	1	1	3	3	1	1	1	1	2	2	2	2	3	1.7	5	
2-Jun	2	10	6	Z	3	1	12	7	13	8	8	4	3	3	3	6	9	1	1	2	11	9	11	14	6.3	14	
3-Jun	13	4	11	14	Z	2	6	2	3	3	2	2	2	2	3	2	5	7	1	2	3	2	1	4	4.1	14	
4-Jun	3	4	10	9	10	Z	5	6	5	2	2	2	5	13	11	14	3	6	6	4	2	2	13	2	5.9	14	
5-Jun	Z	6	9	7	1	1	2	2	1	1	1	7	3	1	1	2	3	3	2	1	1	1	1	2	2.5	9	
6-Jun	2	Z	2	1	1	1	1	1	10	5	1	1	0	1	1	2	3	2	4	2	3	2	5	3	2.4	10	
7-Jun	2	4	Z	5	3	2	3	1	1	1	1	1	1	1	1	1	2	1	1	2	2	5	1	3	1.9	5	
8-Jun	1	1	3	Z	4	0	1	2	1	2	3	9	10	5	2	2	1	1	1	2	2	2	2	5	2.6	10	
9-Jun	10	18	8	2	Z	2	1	1	1	1	1	0	0	1	1	1	1	1	2	2	0	0	1	3	2.5	18	
10-Jun	3	5	3	4	3	Z	4	4	3	1	1	1	1	3	2	3	2	1	1	2	2	3	3	8	2.7	8	
11-Jun	Z	18	8	15	12	3	7	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3.3	18
12-Jun	10	Z	8	4	4	3	5	4	6	7	6	7	2	3	2	2	2	4	11	9	2	1	3	2	4.7	11	
13-Jun	2	2	Z	6	4	5	1	1	1	C	C	C	C	C	1	1	1	0	0	1	1	1	1	1	1.5	6	
14-Jun	0	1	0	Z	1	1	1	2	1	M	1	1	1	1	1	0	0	0	0	1	0	0	7	8	1.3	8	
15-Jun	5	9	1	1	Z	0	2	1	0	0	0	0	0	1	1	2	3	2	2	3	1	1	3	1	1.7	9	
16-Jun	1	2	4	7	9	Z	1	4	8	10	6	4	4	4	2	1	2	2	2	22	24	18	6	4	6.3	24	
17-Jun	Z	2	2	2	4	3	4	6	0	2	2	4	3	2	2	2	2	2	3	2	1	1	3	12	2.8	12	
18-Jun	3	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	7	2	0	4	9	5	1.6	9	
19-Jun	9	15	Z	6	3	3	8	8	10	8	2	1	0	2	2	0	0	0	0	0	0	0	1	1	3.4	15	
20-Jun	0	0	0	Z	0	1	1	8	6	5	7	11	4	2	1	1	2	2	2	3	3	3	3	4	3.0	11	
21-Jun	3	1	0	0	Z	3	12	3	2	3	7	10	7	4	8	7	0	4	1	4	5	5	2	2	4.0	12	
22-Jun	2	2	1	0	0	Z	3	2	0	1	1	1	1	1	1	1	1	0	1	1	0	1	11	1.4	11		
23-Jun	Z	14	12	7	4	6	8	4	1	1	1	0	1	1	1	1	1	3	2	16	21	16	11	5.8	21		
24-Jun	7	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	2	1	1	6	11	1.7	11	
25-Jun	10	15	Z	20	17	19	19	8	12	9	6	2	3	3	2	5	3	2	2	2	4	10	6	7.8	20		
26-Jun	5	4	4	Z	5	5	10	8	5	4	2	3	2	2	2	2	3	2	2	2	2	1	0	1	3.3	10	
27-Jun	2	22	12	10	Z	7	3	1	1	3	2	1	0	0	0	0	4	12	6	5	4	3	6	5	4.7	22	
28-Jun	3	3	2	2	2	Z	1	2	2	1	2	1	1	2	2	3	2	3	3	2	2	11	7	3	2.7	11	
29-Jun	Z	9	11	6	3	4	2	4	3	3	7	7	5	4	5	5	5	5	7	3	3	3	2	6	4.8	11	
30-Jun	11	Z	7	3	10	6	11	14	10	7	6	6	3	2	12	11	2	3	1	0	0	1	1	1	5.6	14	

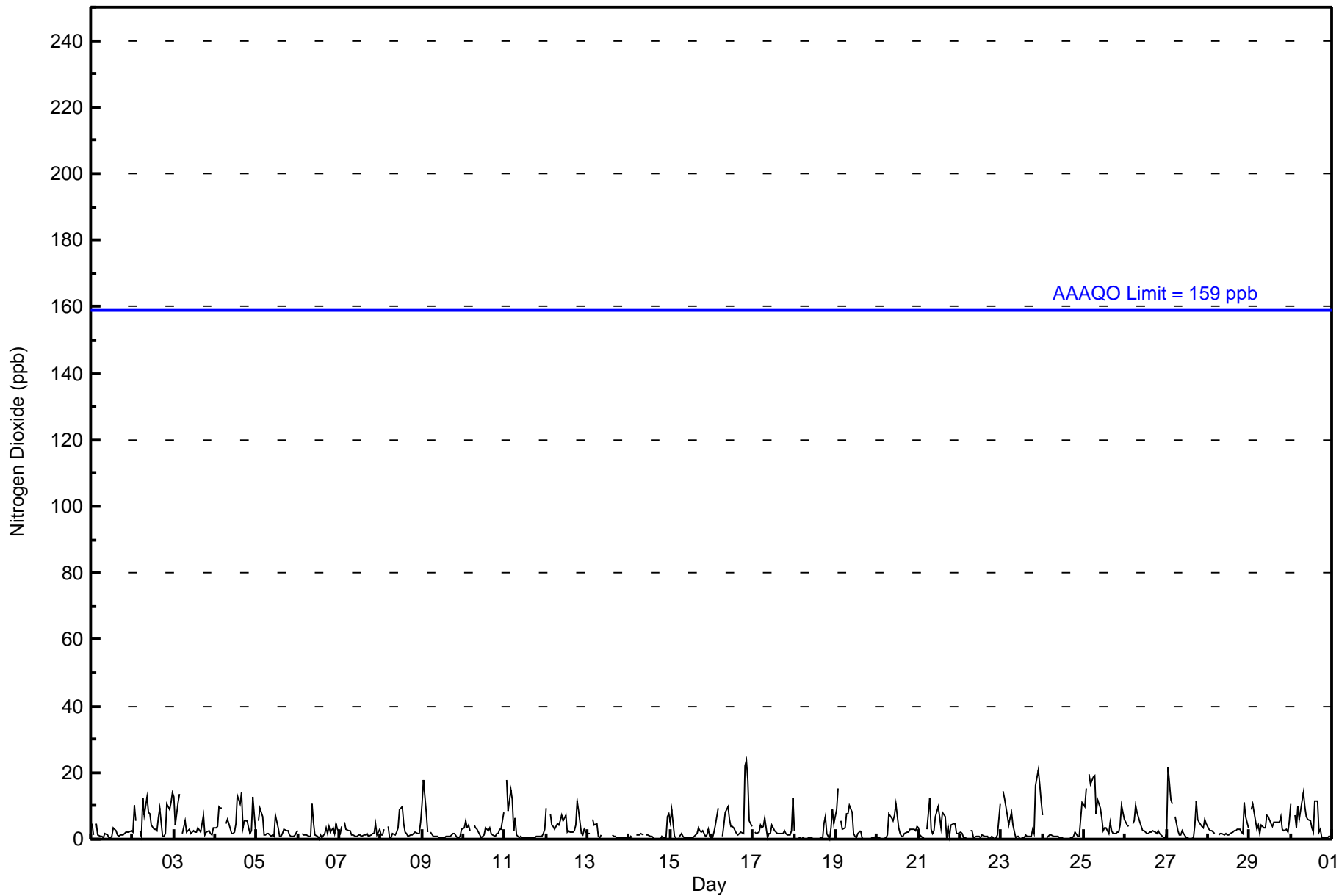
4.5	6.9	5.0	5.5	4.2	3.3	4.4	3.6	3.6	3.3	2.7	3.0	2.2	2.2	2.4	2.6	2.1	2.4	2.4	2.8	3.1	3.6	4.2	4.7	Diurnal Average	
13	22	12	20	17	19	19	14	13	10	8	11	10	13	12	14	9	12	11	22	24	21	16	14	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Horizon - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	680	99.42	99.42
21 - 40	4	0.58	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Horizon - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	133	72	30	19	19	26	37	53	55	37	28	39	27	37	19	680
21 - 40	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	134	72	30	19	19	27	37	53	55	37	28	40	28	37	19	684

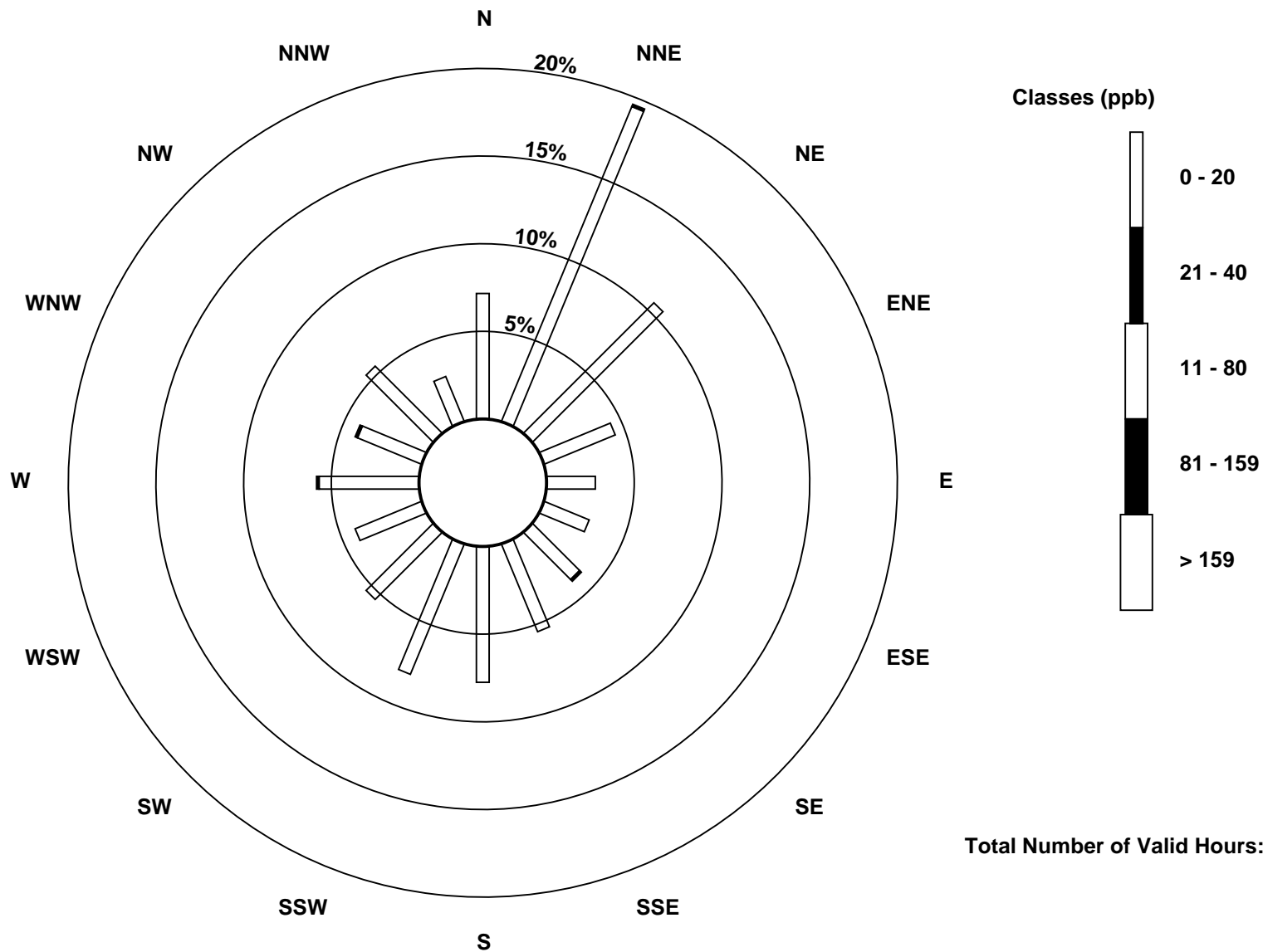
Total Number of Valid Hours: 684

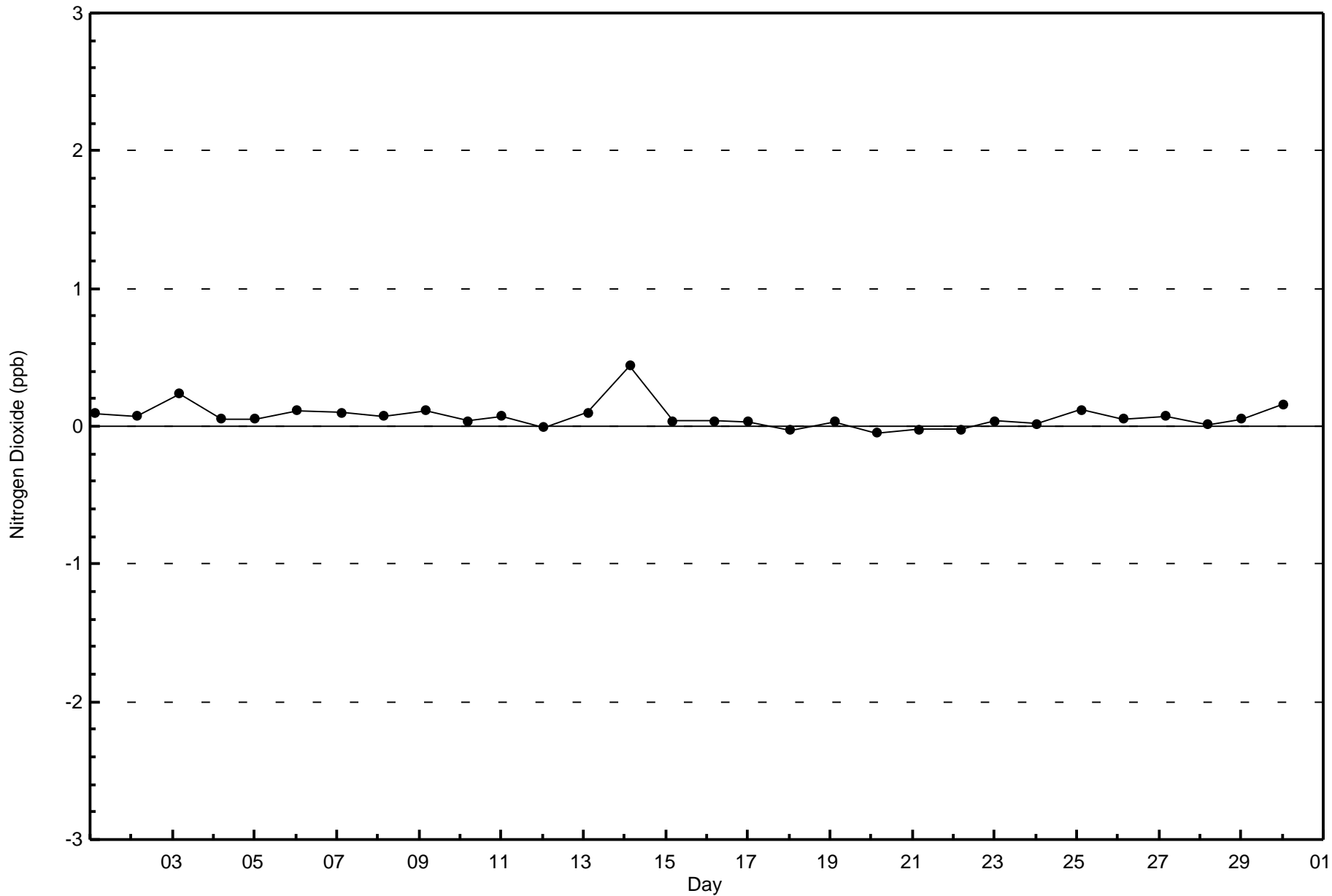
Total Number of Hours: 720

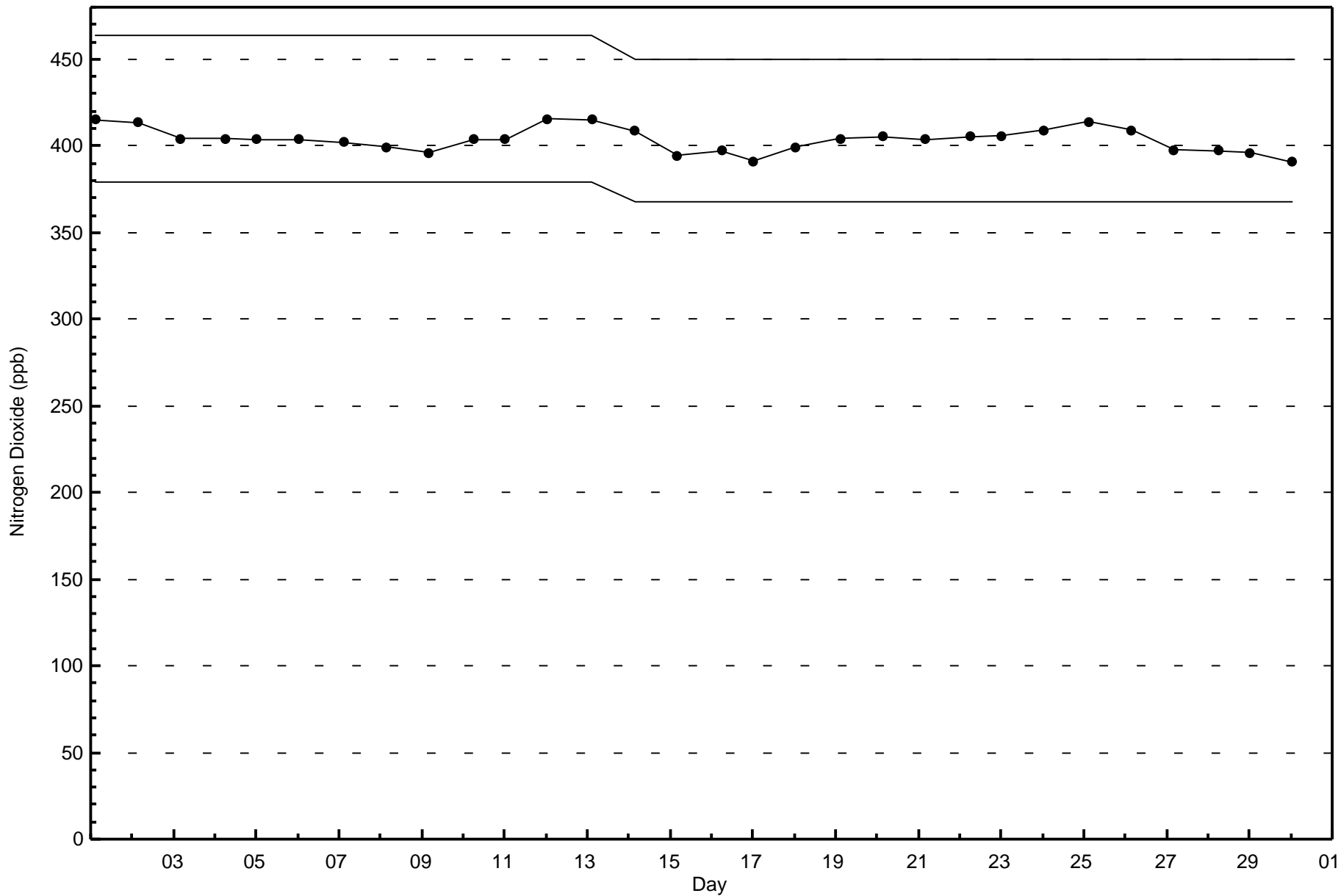


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Horizon (AMS 15)









Wood Buffalo Environmental Association
Summary of Hour Averages

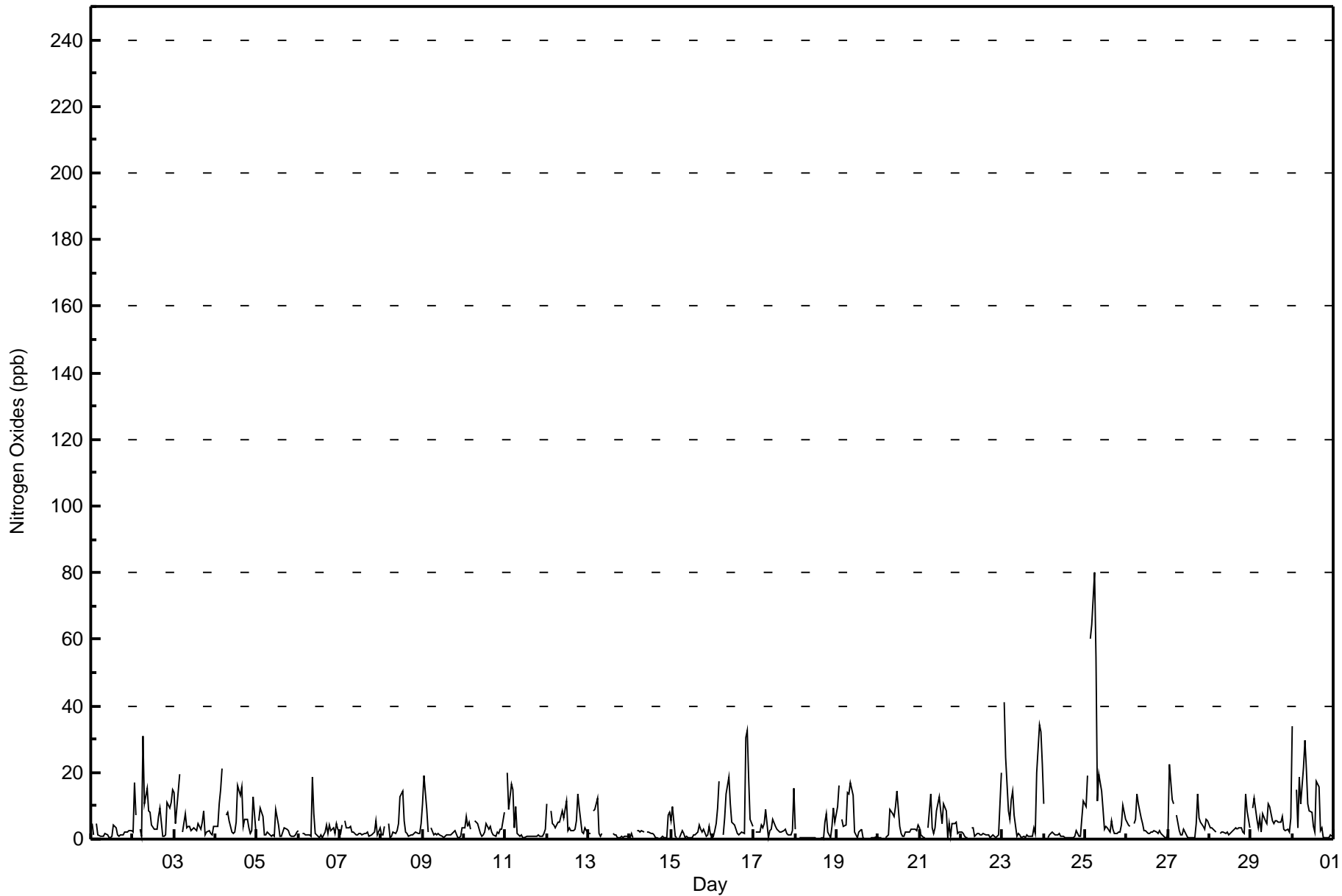
Nitrogen Oxides (NO_x) - ppb
Horizon - June 2017

Maximum Value: 80 ppb on Jun 25 06:00																		Maximum Daily Average: 17.0 ppb on Jun 25						Hours in Service: 720			
Minimum Value: 0 ppb on Jun 19 19:00																		Minimum Daily Average: 1.8 ppb on Jun 18						Hours of Data: 684			
Maximum Diurnal Average: 8.8 ppb at hour 2																		Minimum Diurnal Average: 2.4 ppb at hour 17						Hours of Missing Data: 36			
Monthly Average: 4.8 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 11 P ₉₉ = 34						Hours of Calibration: 35			
																		Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	5	1	Z	5	1	1	1	1	2	1	0	1	1	4	3	1	1	1	1	2	2	2	2	3	1.9	5	
2-Jun	2	17	7	Z	3	1	31	11	15	8	8	4	3	3	3	7	9	1	1	1	11	9	11	15	7.9	31	
3-Jun	14	5	15	20	Z	2	8	4	4	4	2	4	3	3	5	3	5	9	1	2	2	2	1	4	5.2	20	
4-Jun	4	4	11	15	21	Z	7	8	6	2	1	2	5	16	13	16	4	6	6	3	2	2	13	2	7.3	21	
5-Jun	Z	6	9	7	1	1	2	2	1	1	1	9	4	1	1	2	3	3	3	1	1	1	1	2	2.7	9	
6-Jun	2	Z	2	2	1	1	1	1	18	7	2	1	0	1	1	2	4	2	4	3	4	2	5	3	3.0	18	
7-Jun	2	4	Z	6	3	3	4	2	2	1	1	2	2	1	1	2	2	1	1	2	2	6	1	3	2.4	6	
8-Jun	1	1	4	Z	5	1	1	2	2	3	5	13	14	5	2	2	1	1	1	2	2	2	2	5	3.3	14	
9-Jun	11	19	9	2	Z	4	1	2	1	2	1	1	1	1	1	1	1	2	2	2	0	0	1	3	3.0	19	
10-Jun	4	7	4	5	3	Z	6	5	5	2	1	1	2	5	3	4	2	1	1	2	2	3	3	8	3.3	8	
11-Jun	Z	20	9	17	15	3	10	2	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	2	3	4.0	20
12-Jun	10	Z	8	5	4	4	5	5	7	8	7	12	3	3	3	3	3	3	5	14	10	2	2	3	2	5.5	14
13-Jun	2	2	Z	8	9	12	2	1	2	C	C	C	C	C	2	1	1	1	0	1	1	1	1	1	2.6	12	
14-Jun	0	2	0	Z	2	2	2	3	2	M	2	2	2	2	1	0	0	0	0	1	0	0	7	8	1.8	8	
15-Jun	5	10	1	0	Z	1	3	2	1	1	1	1	1	1	1	2	4	3	2	3	1	1	4	1	2.1	10	
16-Jun	1	3	5	9	17	Z	1	6	14	19	10	5	5	4	2	1	1	2	2	30	33	18	6	4	8.6	33	
17-Jun	Z	2	2	2	4	3	4	9	0	3	3	6	4	3	2	2	2	2	3	2	1	1	3	15	3.5	15	
18-Jun	3	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	8	2	0	4	9	5	1.8	9	
19-Jun	10	16	Z	6	4	4	14	13	17	13	2	1	0	2	3	0	0	0	0	0	0	0	0	1	1	4.7	17
20-Jun	0	0	0	Z	0	1	1	9	8	7	10	14	4	2	1	1	2	2	2	3	3	3	3	4	3.5	14	
21-Jun	4	1	0	0	Z	3	14	3	2	3	8	13	8	5	10	9	0	5	1	5	5	5	2	2	4.7	14	
22-Jun	2	2	1	0	0	Z	3	3	1	2	2	1	1	2	1	1	1	0	1	1	0	1	1	20	2.1	20	
23-Jun	Z	41	24	9	6	12	15	7	1	1	1	0	1	1	1	1	1	3	2	20	34	32	22	10.3	41		
24-Jun	11	Z	1	1	2	2	1	1	1	2	1	1	0	0	0	0	0	1	1	2	1	1	6	11	2.1	11	
25-Jun	10	19	Z	60	64	80	55	11	20	14	9	3	4	4	2	6	3	2	2	2	2	4	10	6	17.0	80	
26-Jun	5	4	4	Z	5	6	14	11	6	5	2	3	2	2	2	2	2	2	2	2	2	1	0	1	3.7	14	
27-Jun	2	23	12	10	Z	7	3	1	1	3	2	0	0	0	0	0	5	14	6	5	4	3	6	5	5.0	23	
28-Jun	4	3	3	3	2	Z	2	2	2	1	2	1	2	2	3	3	3	3	3	2	2	14	8	3	3.2	14	
29-Jun	Z	9	12	6	3	6	2	8	5	5	11	10	6	5	6	6	5	5	7	3	3	3	2	6	5.8	12	
30-Jun	34	Z	15	3	19	10	22	30	21	11	9	8	4	2	17	16	3	3	1	0	0	0	1	1	10.0	34	
																		Diurnal Average									
																		Diurnal Maximum									
Z - zerospan																		C - Calibration						M - Maintenance			



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Horizon - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Horizon - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	666	97.37	97.37
21 - 40	13	1.90	99.27
41 - 80	5	0.73	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Horizon - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	130	71	30	19	19	25	37	53	52	36	27	38	26	35	19	666
21 - 40	0	3	0	0	0	0	2	0	0	2	1	1	1	2	1	0	13
11 - 80	0	1	1	0	0	0	0	0	0	1	0	0	1	0	1	0	5
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	134	72	30	19	19	27	37	53	55	37	28	40	28	37	19	684

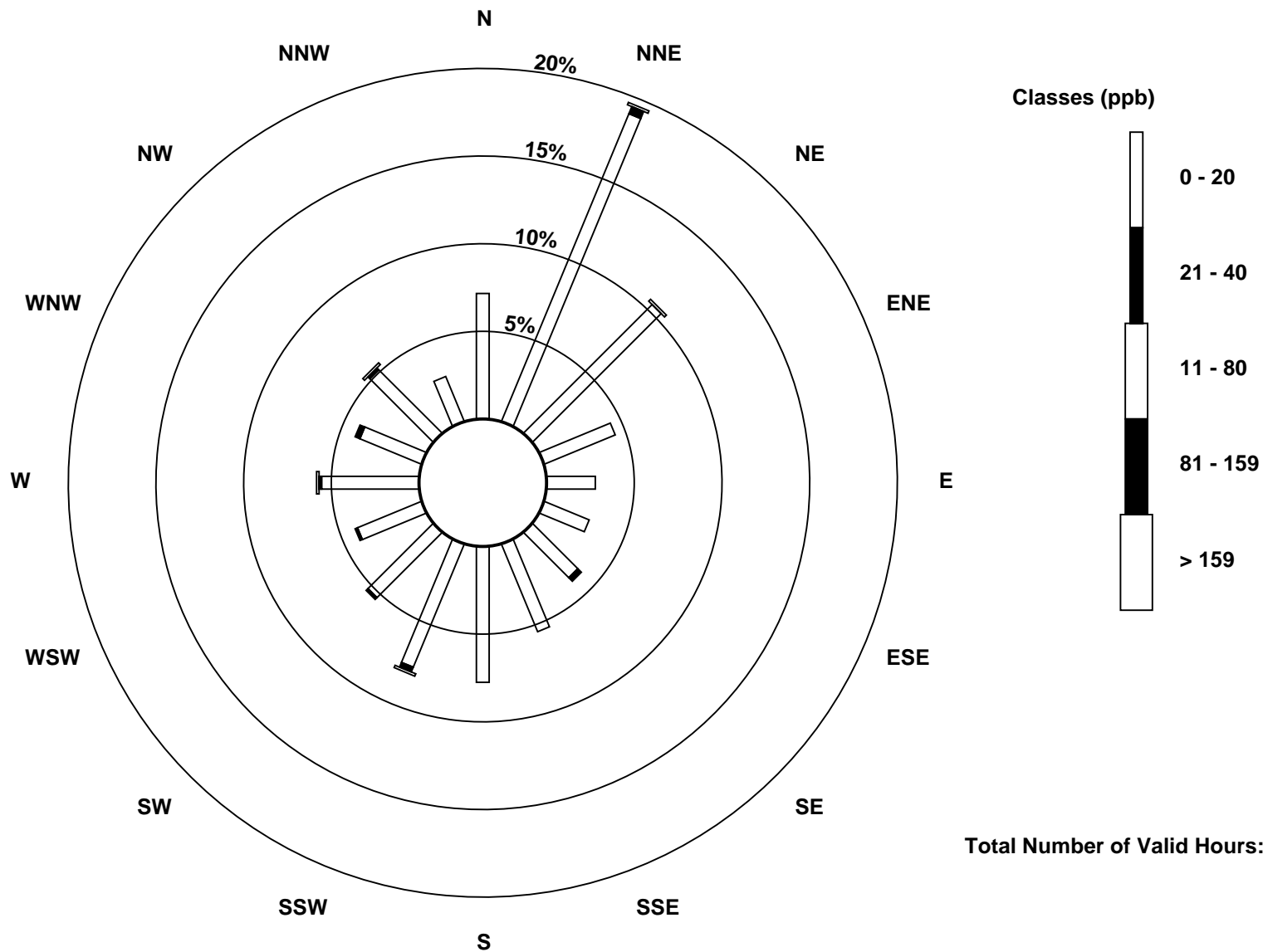
Total Number of Valid Hours: 684

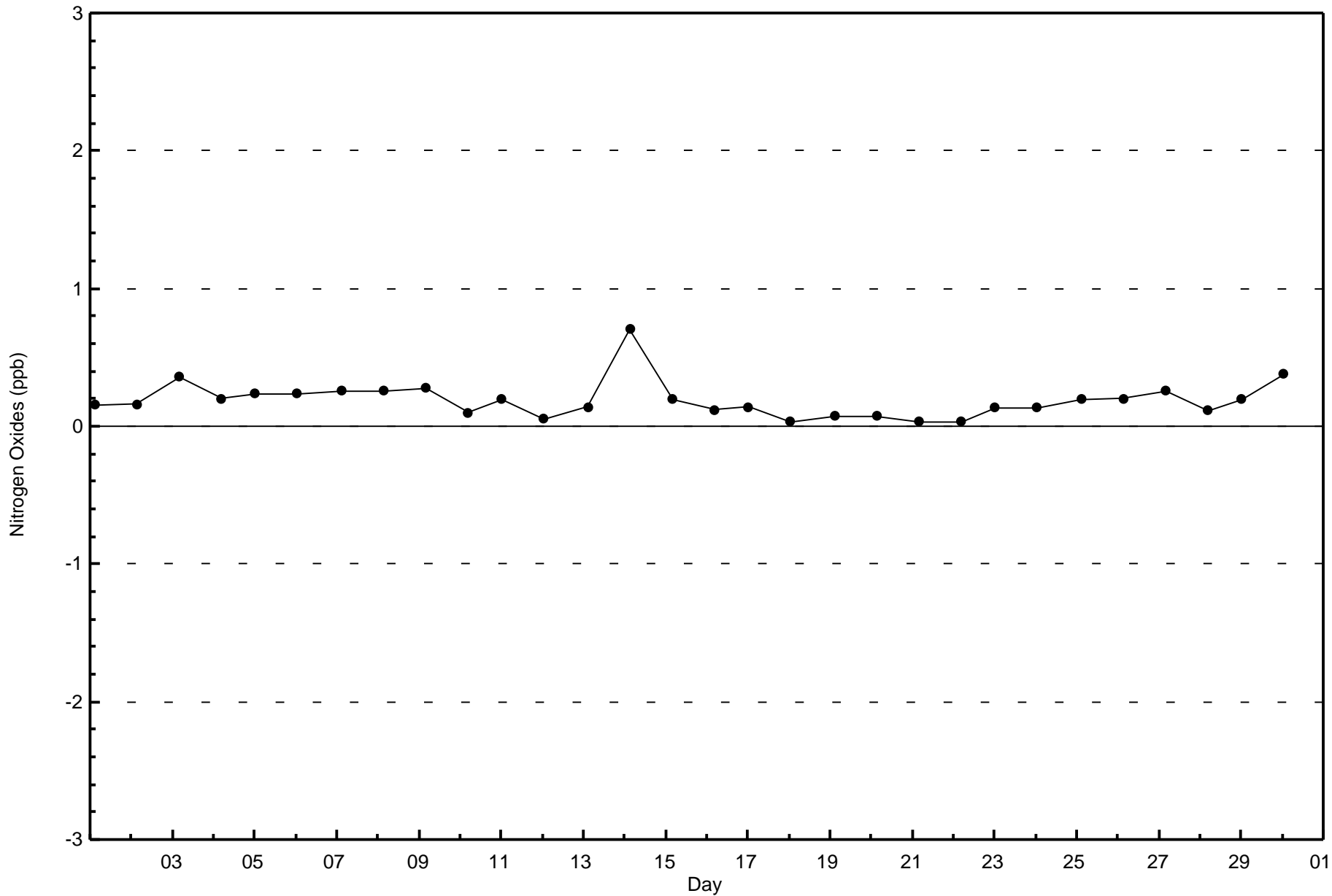
Total Number of Hours: 720

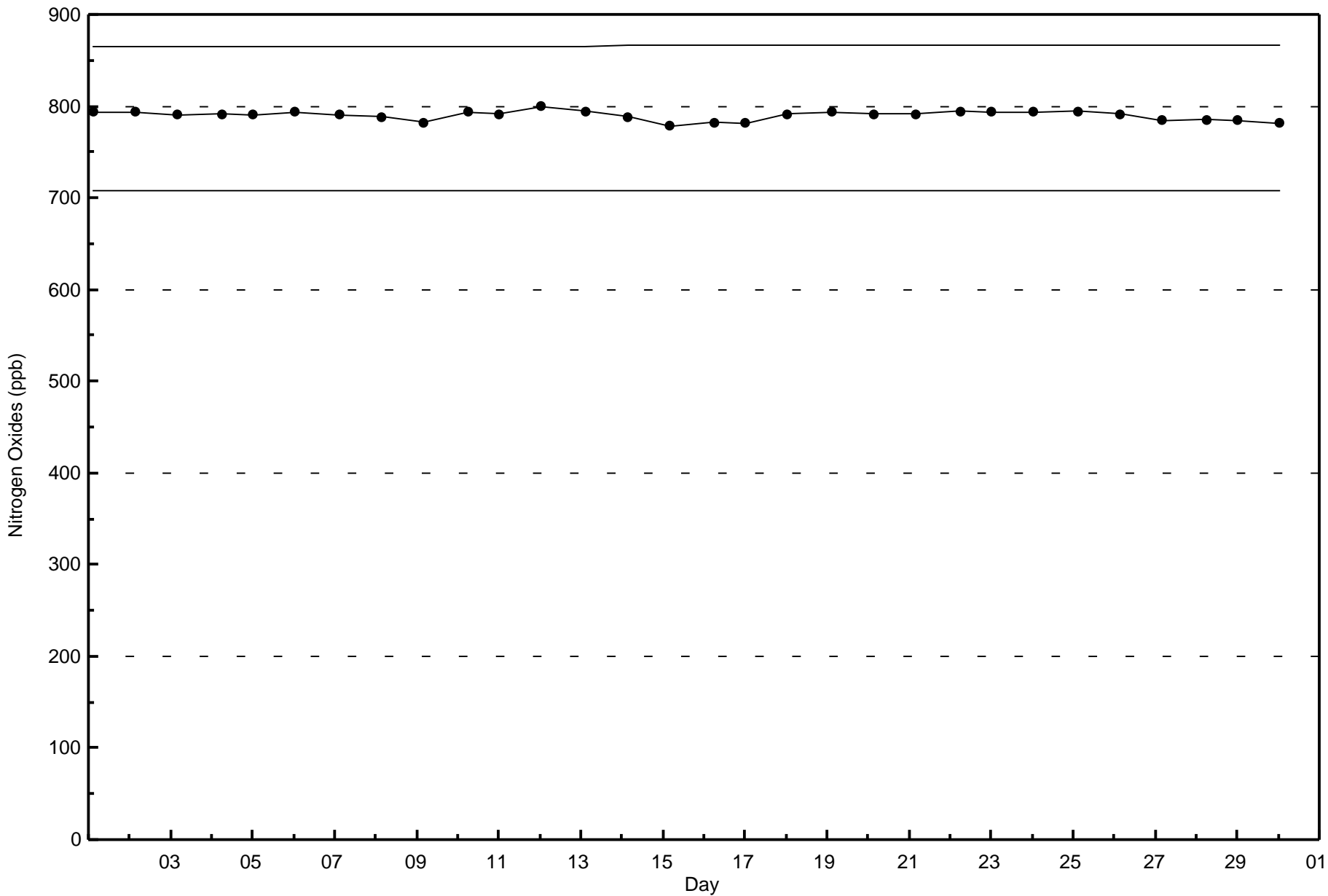


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Horizon (AMS 15)









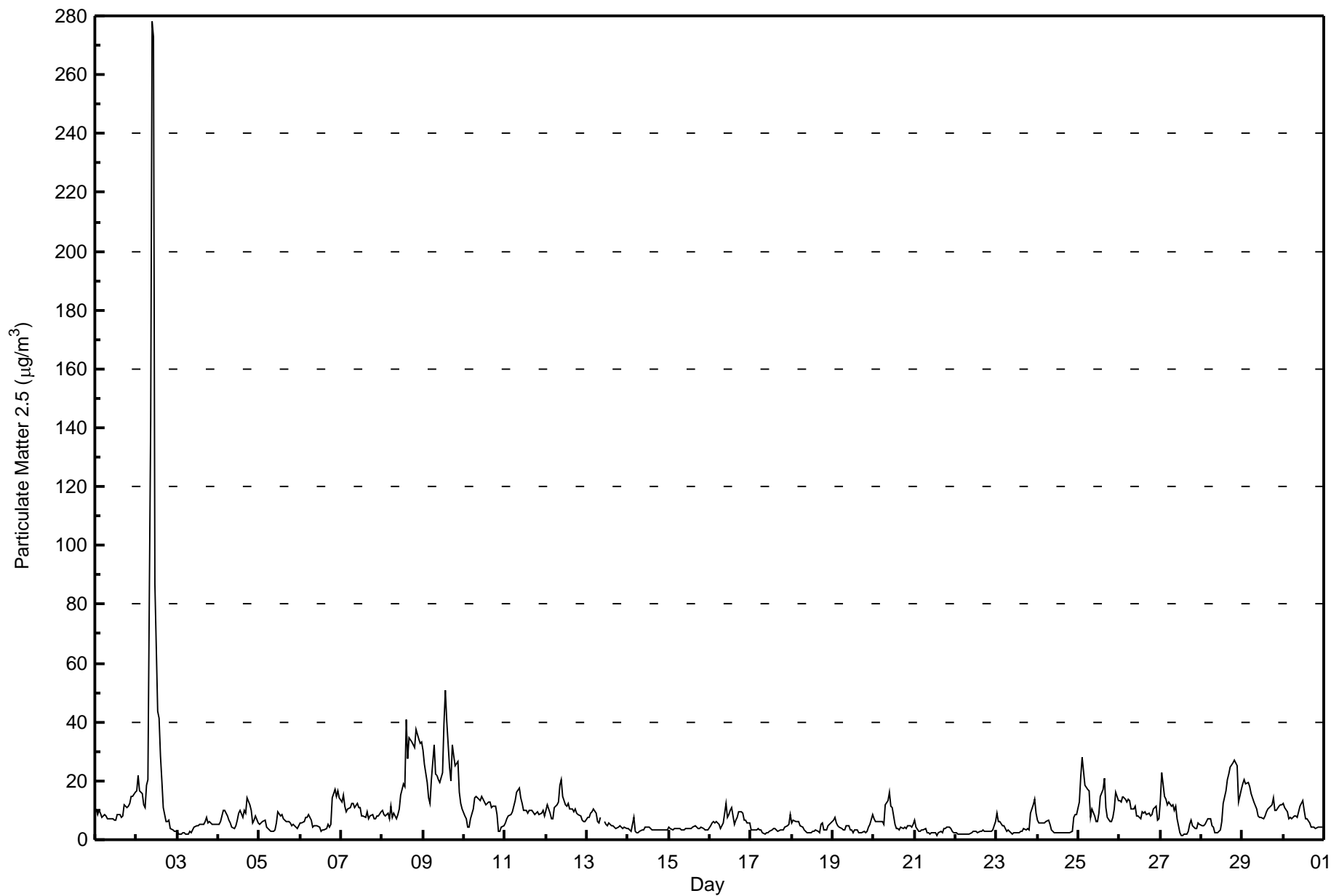
Summary of Hour Averages

Horizon - June 2017

Number of Exceedences (AAAQO): 24-hr: 1	Hours in Service: 720
Maximum Value: 278.3 µg/m ³ on Jun 2 10:00	Maximum Daily Average: 45.4 µg/m ³ on Jun 2
Minimum Value: 1.4 µg/m ³ on Jun 27 13:00	Hours of Data: 719
Maximum Diurnal Average: 17.0 µg/m ³ at hour 10	Hours of Missing Data: 1
Monthly Average: 9.40 µg/m ³	Hours of Calibration: 1
Minimum Daily Average: 2.6 µg/m ³ on Jun 22	Percent Operational Time: 100.0
Minimum Diurnal Average: 7.7 µg/m ³ at hour 5	
Percentiles: P ₁ = 1.9 P ₁₀ = 2.6 Q ₁ = 3.7 Median = 6.4 Q ₃ = 10.6 P ₉₀ = 16.4 P ₉₉ = 39.4	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	10.3	8.6	10.1	9.0	7.8	8.5	8.1	7.1	7.1	7.0	7.0	6.7	6.9	8.6	8.4	7.8	8.2	11.7	11.0	11.5	12.6	14.9	14.9	16.2	9.6	16.2																							
2-Jun	16.7	22.0	16.8	15.6	11.8	10.7	18.3	20.2	142.8	278.3	273.0	87.0	43.7	41.2	28.6	20.0	10.8	6.3	6.0	6.9	3.7	3.1	3.0	3.0	45.4	278.3																							
3-Jun	2.7	2.0	2.1	2.3	2.1	1.9	1.9	3.1	2.5	3.1	4.3	4.7	4.8	5.1	5.3	5.1	6.0	7.4	5.8	6.4	5.4	5.0	5.0	5.4	4.1	7.4																							
4-Jun	5.5	6.3	8.2	10.2	10.1	8.0	6.6	5.8	4.3	4.0	4.9	6.7	9.1	10.1	7.7	9.7	8.9	14.4	11.7	10.1	5.6	6.7	8.3	5.9	7.9	14.4																							
5-Jun	5.2	5.5	6.4	6.6	4.1	3.8	3.3	2.8	2.9	3.3	5.9	9.4	8.1	8.4	7.1	6.7	6.4	6.0	5.6	5.0	5.4	4.4	3.8	4.7	5.5	9.4																							
6-Jun	5.5	5.8	6.2	7.4	7.7	8.3	6.8	4.4	4.7	4.5	4.8	4.3	2.9	3.4	3.2	3.8	5.1	4.3	5.5	14.3	16.9	14.6	16.8	14.4	7.3	16.9																							
7-Jun	13.0	15.3	11.4	9.4	10.4	11.0	12.4	12.3	10.7	12.3	11.1	10.7	8.0	8.3	7.7	9.3	7.0	8.2	8.5	7.3	7.0	8.1	8.1	9.3	9.9	15.3																							
8-Jun	9.8	8.6	8.2	8.9	7.1	11.6	7.7	8.9	7.1	8.4	10.6	15.2	18.8	17.9	40.9	27.7	34.4	33.4	32.2	31.4	37.4	34.3	32.8	33.0	20.3	40.9																							
9-Jun	30.5	25.7	19.6	14.2	12.2	20.5	32.3	22.2	21.7	20.5	19.6	23.0	39.6	50.6	40.3	24.6	20.1	32.3	28.7	25.2	26.3	16.1	12.3	10.5	24.5	50.6																							
10-Jun	8.0	6.9	4.4	4.4	6.9	10.3	14.2	14.9	14.0	13.2	14.7	13.8	12.7	11.9	13.0	12.8	11.0	11.6	11.2	8.7	2.8	3.1	4.1	4.6	9.7	14.9																							
11-Jun	5.7	7.1	7.9	8.5	9.4	11.5	13.4	16.0	17.5	14.2	12.2	9.9	9.9	9.1	10.0	9.8	10.2	8.7	8.9	9.6	8.7	8.8	9.8	8.3	10.2	17.5																							
12-Jun	9.9	12.0	9.2	7.1	7.3	11.1	11.8	12.7	18.6	20.6	14.6	11.8	11.2	12.1	10.3	10.3	9.5	10.3	9.1	8.8	7.9	6.7	6.1	6.4	10.6	20.6																							
13-Jun	7.8	7.8	9.1	9.3	10.3	9.2	6.3	5.8	7.7	C	6.3	5.4	4.9	5.6	4.9	5.0	4.2	3.9	4.0	4.5	4.1	3.7	4.5	3.6	6.0	10.3																							
14-Jun	3.7	3.5	2.9	7.4	2.8	2.6	2.5	2.8	3.2	3.4	4.0	4.3	4.2	3.6	3.1	3.2	3.3	3.1	3.2	3.5	3.2	3.2	3.1	3.2	3.5	7.4																							
15-Jun	4.3	3.8	3.5	3.6	3.7	3.8	3.9	3.5	3.2	3.3	3.6	3.7	3.9	4.0	4.2	4.7	4.3	3.8	3.8	4.4	3.9	3.2	3.5	3.3	3.8	4.7																							
16-Jun	4.6	5.7	6.2	5.9	6.0	5.3	3.9	4.5	5.6	12.4	7.6	8.3	9.9	10.7	5.4	6.6	7.6	9.5	9.6	8.8	6.8	6.8	5.6	5.8	7.1	12.4																							
17-Jun	3.5	3.4	3.3	3.2	3.6	3.3	3.2	2.3	2.0	2.2	2.3	2.6	3.5	3.8	3.6	3.2	3.1	3.3	3.5	3.4	4.1	4.9	5.3	8.6	3.6	8.6																							
18-Jun	5.9	6.5	6.0	6.1	6.4	4.9	4.2	3.3	2.6	2.5	2.5	2.6	2.6	2.8	3.1	2.9	2.4	5.0	5.5	3.3	3.1	4.7	5.3	5.7	4.2	6.5																							
19-Jun	6.4	7.7	5.6	4.8	4.5	4.0	3.4	3.2	4.8	4.9	3.3	3.1	2.3	3.2	3.4	2.5	2.3	2.6	2.7	2.4	2.7	4.1	5.2	8.7	4.1	8.7																							
20-Jun	7.4	6.1	6.1	6.0	6.1	6.2	5.3	11.8	13.4	16.2	11.3	10.7	5.5	4.0	3.9	3.5	4.1	3.8	4.1	3.8	4.8	4.8	4.2	5.4	6.6	16.2																							
21-Jun	6.6	4.2	3.0	2.7	3.3	3.2	3.8	2.6	2.2	2.1	2.1	2.4	2.3	1.6	2.5	2.8	2.5	3.6	3.6	4.1	4.1	3.9	3.0	2.6	3.1	6.6																							
22-Jun	2.3	2.1	2.0	1.9	1.8	2.0	2.1	2.0	2.0	2.2	2.6	2.6	2.6	2.6	2.9	2.8	3.2	2.7	2.7	2.7	2.6	2.7	3.1	6.2	2.6	6.2																							
23-Jun	8.8	6.3	6.0	4.7	4.9	3.8	3.0	3.4	2.4	2.1	2.3	2.4	2.5	2.6	2.9	3.0	3.8	3.3	3.7	3.4	9.1	11.9	13.7	9.2	5.0	13.7																							
24-Jun	6.5	5.5	5.7	5.9	5.9	6.1	6.6	5.4	3.2	2.8	2.3	2.4	2.6	2.4	2.5	2.2	2.1	2.3	2.3	2.4	3.0	7.7	8.4	8.5	4.4	8.5																							
25-Jun	12.6	21.2	28.1	23.1	18.7	17.2	16.5	7.5	10.7	8.1	6.1	6.1	8.9	14.5	17.3	20.7	11.0	7.6	6.2	6.1	7.4	10.4	15.9	13.5	13.1	28.1																							
26-Jun	13.3	12.7	14.6	13.9	12.9	13.6	13.2	10.6	10.6	11.2	7.9	8.2	7.3	9.3	9.1	9.4	8.6	8.9	8.1	8.6	10.5	11.5	6.6	7.0	10.3	14.6																							
27-Jun	13.4	22.7	14.9	13.9	11.6	12.6	11.3	11.9	9.9	11.5	7.3	2.5	1.4	1.5	1.7	1.9	2.7	5.0	6.6	4.8	3.7	3.8	5.5	5.2	7.8	22.7																							
28-Jun	4.9	5.0	5.3	6.0	7.1	7.1	5.0	4.1	2.5	2.3	2.7	3.5	6.2	12.5	16.8	20.2	22.4	24.5	26.0	27.2	25.9	25.0	12.8	16.9	12.2	27.2																							
29-Jun	18.8	20.6	18.9	19.3	17.9	15.5	14.0	13.0	10.6	8.1	7.7	7.4	7.3	7.9	9.3	10.4	10.8	11.8	14.3	10.1	9.9	11.5	12.1	11.8	12.5	20.6																							
30-Jun	12.3	10.9	9.3	7.0	7.7	6.9	7.9	8.0	7.6	9.7	11.5	13.4	10.2	7.0	7.3	5.6	4.4	4.1	4.1	4.0	4.2	4.1	4.1	4.1	7.3	13.4																							
																								8.9	9.4	8.7	8.3	7.7	8.2	8.4	7.9	11.9	17.0	15.9	9.8	8.8	9.5	9.5	8.6	8.0	8.8	8.6	8.4	8.4	8.5	8.2	8.4	Diurnal Average	
																								30.5	25.7	28.1	23.1	18.7	20.5	32.3	22.2	142.8	278.3	273.0	87.0	43.7	50.6	40.9	27.7	34.4	33.4	32.2	31.4	37.4	34.3	32.8	33.0	Diurnal Maximum	

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	303	42.14	42.14
6 - 15	337	46.87	89.01
16 - 25	49	6.82	95.83
26 - 80	26	3.62	99.44
> 81.0	4	0.56	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	32	69	29	15	6	2	3	8	17	17	20	16	23	21	16	9	303
6 - 15	15	55	35	17	8	14	19	27	30	36	17	12	18	6	18	10	337
16 - 25	1	13	5	0	4	2	2	1	4	8	1	1	1	1	5	0	49
26 - 80	2	4	5	0	2	1	3	2	2	1	1	0	1	0	2	0	26
> 81.0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	4
Totals	50	141	77	33	20	19	27	38	53	62	39	29	43	28	41	19	719

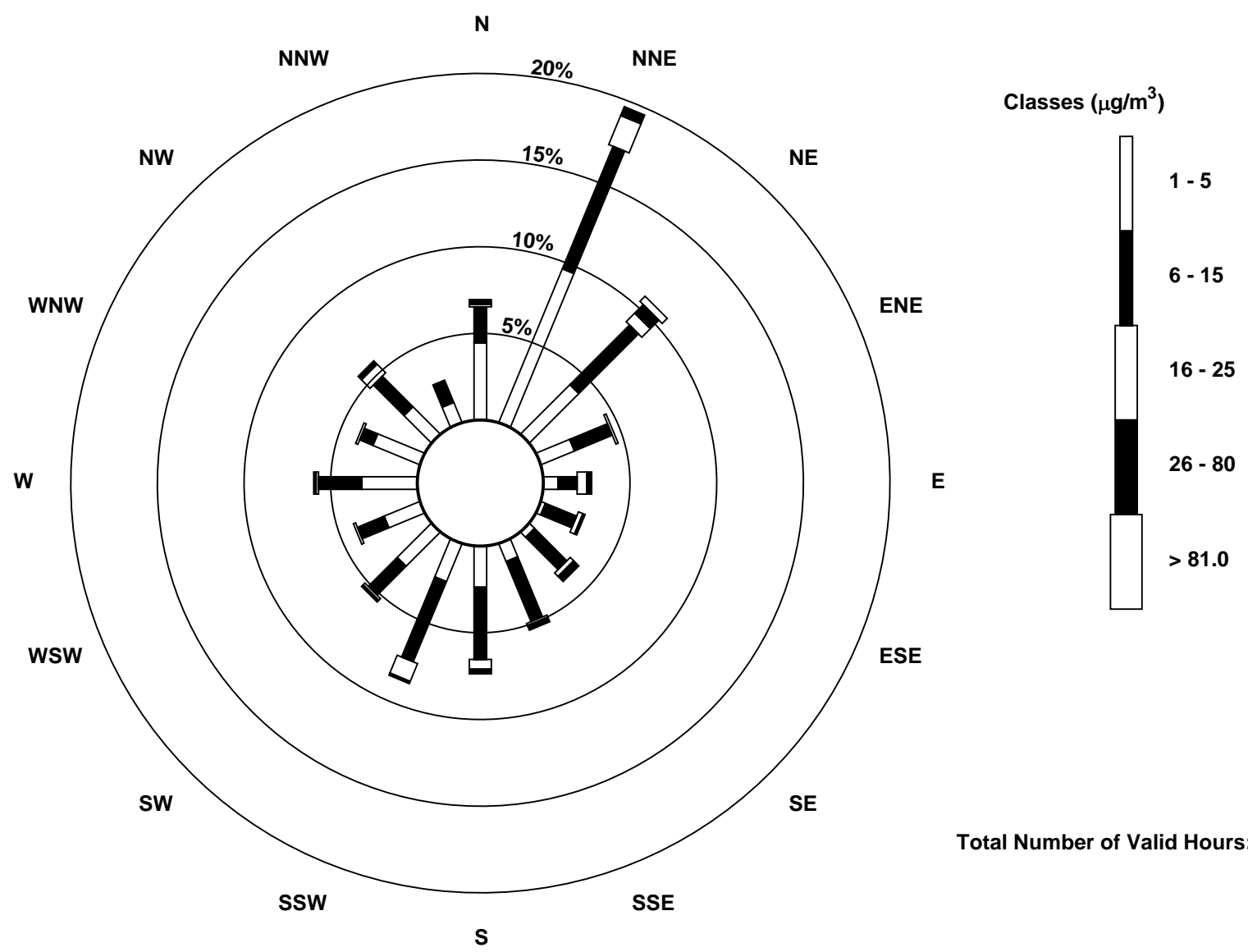
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon (AMS 15)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

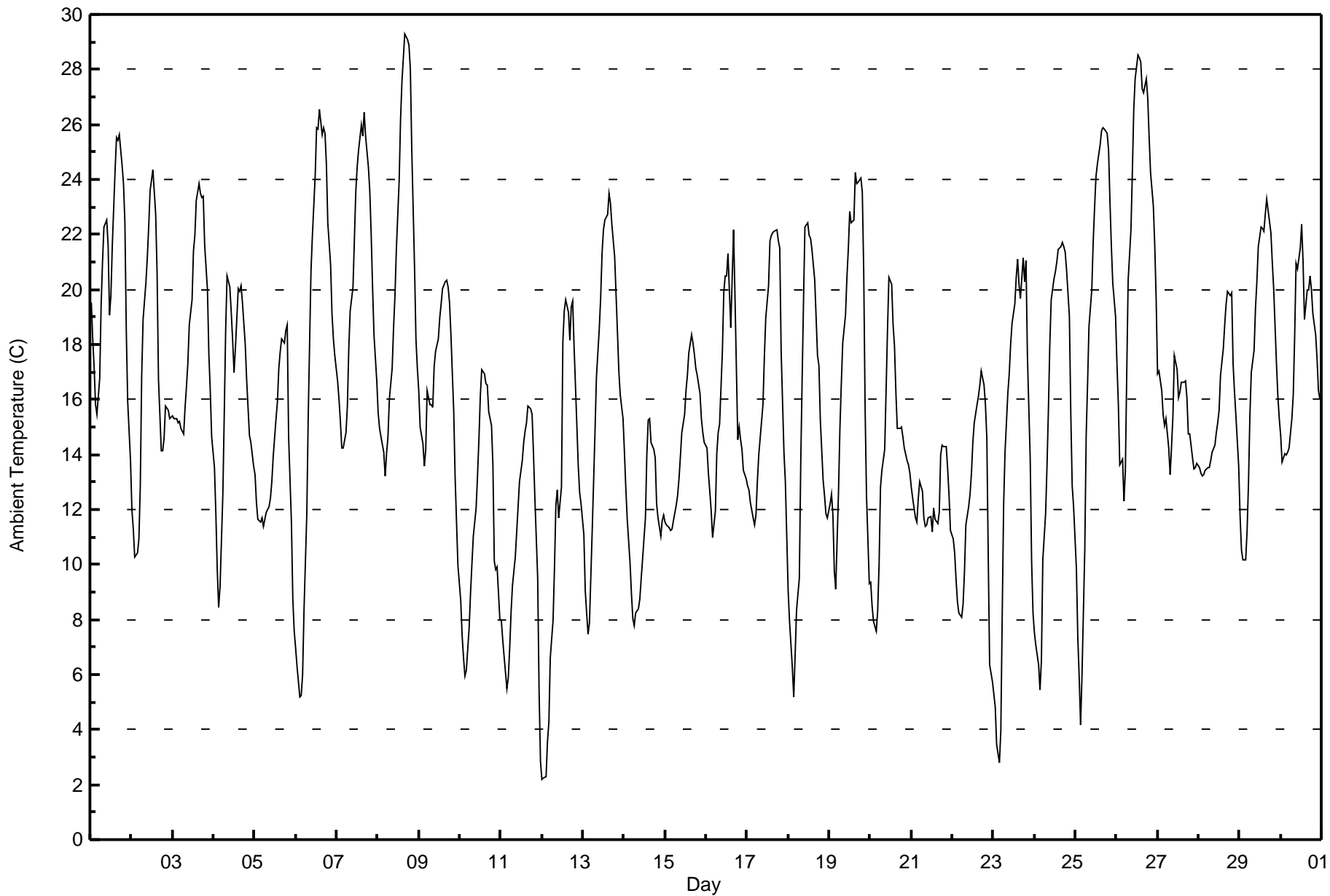
Horizon - June 2017

Maximum Value: 29.3 C on Jun 8 17:00		Maximum Daily Average: 22.2 C on Jun 26		Hours in Service: 720																						
Minimum Value: 2.2 C on Jun 12 01:00		Minimum Daily Average: 10.6 C on Jun 11		Hours of Data: 720																						
Maximum Diurnal Average: 20.6 C at hour 16		Minimum Diurnal Average: 9.9 C at hour 4		Hours of Missing Data: 0																						
Monthly Average: 15.94 C		Percentiles: P ₁ = 3.9 P ₁₀ = 8.9 Q ₁ = 12.4 Median = 15.5 Q ₃ = 19.9 P ₉₀ = 22.7 P ₉₉ = 28.1		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	19.5	18.2	17.2	15.8	15.5	16.8	19.4	21.0	22.3	22.5	21.6	19.1	19.8	21.6	24.3	25.5	25.4	25.6	24.5	23.8	22.4	18.5	15.9	13.8	20.4	25.6
2-Jun	12.0	11.3	10.3	10.4	11.0	12.8	16.9	18.9	20.2	21.1	22.3	23.6	24.4	23.5	22.7	20.6	16.8	14.1	14.1	14.6	15.8	15.6	15.3	15.4	16.8	24.4
3-Jun	15.4	15.3	15.3	15.2	15.2	15.0	14.7	15.7	16.5	17.4	18.7	19.6	21.4	22.0	23.2	23.9	23.5	23.3	23.4	21.6	20.0	17.6	16.3	14.7	18.5	23.9
4-Jun	13.5	11.9	9.8	8.4	9.2	12.6	15.5	18.5	20.5	20.1	19.2	18.2	17.0	17.9	20.1	19.9	20.1	19.5	18.0	16.7	15.7	14.7	14.4	13.6	16.0	20.5
5-Jun	13.3	12.2	11.7	11.5	11.7	11.4	11.6	11.9	12.1	12.4	13.0	13.9	15.3	15.9	17.1	17.7	18.2	18.0	18.5	18.7	14.6	11.5	8.8	7.6	13.7	18.7
6-Jun	6.9	6.3	5.2	5.2	6.0	8.3	11.8	15.3	18.1	20.7	22.0	24.1	25.9	25.9	26.5	25.6	25.9	25.7	24.5	22.4	20.9	19.1	18.2	17.6	17.8	26.5
7-Jun	16.7	16.0	15.2	14.2	14.2	14.8	15.7	17.8	19.2	20.1	21.8	23.6	24.5	25.1	26.0	25.6	26.4	25.6	24.5	23.6	22.0	20.1	18.3	16.7	20.3	26.4
8-Jun	15.5	15.0	14.7	14.1	13.2	14.1	14.7	16.0	17.2	18.6	19.8	21.4	24.0	26.2	27.6	28.4	29.3	29.1	28.9	28.0	25.1	20.8	18.2	17.2	20.7	29.3
9-Jun	16.3	15.0	14.4	13.6	14.2	16.3	15.8	15.8	15.7	17.2	17.8	18.2	18.9	19.5	20.0	20.3	20.3	20.1	19.5	18.3	15.6	13.2	11.5	10.0	16.6	20.3
10-Jun	8.7	7.4	6.6	6.0	6.1	7.7	8.9	10.0	11.1	12.1	13.2	14.5	16.1	17.1	16.9	16.6	16.5	15.6	15.0	13.6	10.1	9.8	9.9	8.0	11.6	17.1
11-Jun	8.0	7.3	6.7	5.5	5.9	6.9	8.3	9.2	10.3	11.2	12.1	13.0	13.8	14.5	14.9	15.2	15.8	15.7	15.4	14.0	12.4	9.5	5.4	2.8	10.6	15.8
12-Jun	2.2	2.2	2.3	3.6	4.3	6.6	8.0	9.9	12.2	12.7	11.7	12.8	18.1	19.2	19.6	19.2	18.2	19.4	19.6	17.9	15.0	13.6	12.6	12.2	12.2	19.6
13-Jun	11.1	9.1	8.2	7.5	7.9	11.3	13.1	14.9	16.9	18.6	19.7	21.3	22.2	22.5	22.7	23.5	23.1	22.4	21.2	19.8	18.5	17.0	16.2	15.3	16.8	23.5
14-Jun	14.1	12.8	11.6	10.0	8.9	8.0	7.8	8.2	8.4	8.7	9.5	10.2	11.7	14.0	15.3	15.3	14.4	14.2	13.9	12.2	11.7	11.0	11.6	11.8	11.5	15.3
15-Jun	11.5	11.5	11.3	11.3	11.3	11.6	12.2	12.5	13.1	13.9	14.8	15.5	16.3	16.9	17.7	18.4	18.1	17.6	17.1	16.9	16.2	15.3	14.8	14.4	14.6	18.4
16-Jun	14.2	13.3	12.7	12.0	11.0	12.0	14.0	14.8	15.1	17.7	19.9	20.5	21.3	18.6	20.4	22.2	19.8	14.5	15.0	14.6	14.2	13.4	13.1	16.0	22.2	22.2
17-Jun	12.9	12.7	12.3	11.7	11.4	11.8	13.0	14.0	15.2	15.8	17.5	19.0	20.1	21.7	22.0	22.0	22.1	22.2	21.8	21.5	17.8	14.1	13.0	11.0	16.5	22.2
18-Jun	9.1	7.9	6.2	5.2	6.7	8.4	9.5	13.7	16.7	19.6	22.2	22.4	22.0	21.8	21.5	20.3	18.9	17.6	17.2	15.2	13.1	12.5	11.8	11.7	14.6	22.4
19-Jun	12.2	12.6	11.8	9.8	9.1	12.7	14.9	16.6	18.1	19.1	20.4	21.5	22.8	22.4	22.5	24.3	23.9	23.9	24.1	23.5	20.7	15.7	12.5	9.3	17.7	24.3
20-Jun	9.4	8.5	8.0	7.6	8.4	10.0	12.8	13.4	14.2	16.3	18.5	20.5	20.2	18.7	18.0	16.3	14.9	14.9	15.0	14.7	14.2	13.8	13.6	13.3	14.0	20.5
21-Jun	12.8	12.4	11.7	11.5	12.4	13.0	12.6	11.7	11.4	11.4	11.7	11.7	11.2	12.1	11.7	11.5	11.9	14.0	14.3	14.3	14.3	13.5	12.5	11.3	12.4	14.3
22-Jun	10.9	10.4	9.4	8.7	8.3	8.1	8.5	9.7	11.4	12.1	12.6	13.3	14.4	15.1	15.8	16.1	16.5	17.0	16.5	15.8	14.6	10.3	6.4	5.8	12.0	17.0
23-Jun	5.3	4.8	3.5	2.8	4.0	8.2	12.2	14.1	16.2	16.9	18.0	18.8	19.5	20.4	21.1	20.2	19.7	21.1	20.3	21.1	17.6	13.9	10.1	8.3	14.1	21.1
24-Jun	7.5	7.1	6.3	5.4	6.5	10.2	11.8	13.6	15.6	18.0	19.6	20.4	20.6	21.0	21.4	21.6	21.7	21.6	21.4	20.7	19.0	15.5	12.9	12.1	15.5	21.7
25-Jun	9.9	7.4	5.9	4.2	6.0	10.5	14.7	16.6	18.7	20.0	21.7	23.0	24.1	24.5	25.3	25.8	25.9	25.8	25.7	25.0	23.2	21.5	20.2	19.0	18.5	25.9
26-Jun	17.3	15.8	13.6	13.8	12.3	13.4	17.0	20.3	22.2	24.3	26.5	27.6	28.5	28.4	28.3	27.3	27.2	27.7	26.9	25.5	24.3	23.0	21.6	19.7	22.2	28.5
27-Jun	16.9	17.0	16.3	15.5	15.0	15.3	14.2	13.3	14.3	15.4	17.6	17.1	16.1	16.2	16.6	16.6	16.7	16.1	14.7	14.7	13.9	13.5	13.5	13.7	15.4	17.6
28-Jun	13.5	13.3	13.2	13.3	13.4	13.5	13.5	13.8	14.1	14.3	14.8	15.2	15.6	16.9	17.9	18.7	19.5	19.9	19.8	19.9	17.3	16.3	15.4	13.6	15.7	19.9
29-Jun	11.8	10.5	10.2	10.2	11.2	13.0	15.4	17.0	17.8	19.3	20.3	21.6	22.3	22.2	22.1	22.7	23.3	22.5	22.1	21.0	20.0	17.3	16.1	15.3	17.7	23.3
30-Jun	14.7	13.7	14.0	14.0	14.1	14.2	15.3	16.2	18.3	21.0	20.7	21.5	22.4	21.0	18.9	20.0	20.0	20.5	20.0	19.1	18.4	17.5	16.3	16.0	17.8	22.4
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Horizon - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Horizon - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	92	12.78	12.78
10 - 20	453	62.92	75.69
> 20	175	24.31	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

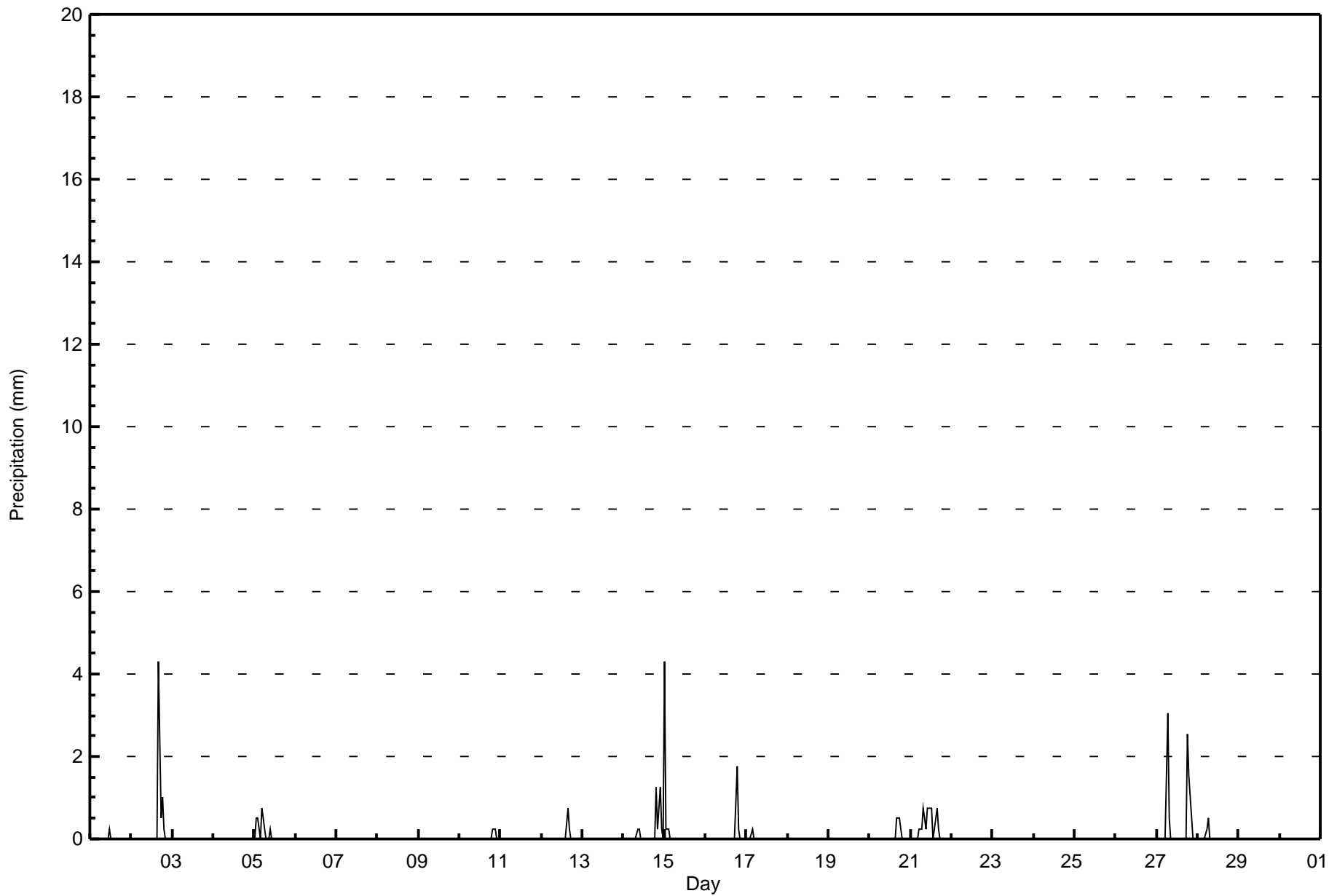
Horizon - June 2017

Maximum Value: 4.3 mm on Jun 2 17:00																			Maximum Daily Total: 8.1 mm on Jun 27						Hours in Service: 720																							
Minimum Value: 0.0 mm on Jun 1 01:00																			Minimum Daily Total: 0.0 mm on Jun 3						Hours of Data: 720																							
Maximum Diurnal Total: 5.6 mm at hour 19																			Minimum Diurnal Total: 0.0 mm at hour 14						Hours of Missing Data: 0																							
Monthly Total: 37.34 mm																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.1						Hours of Calibration: 0																							
																									Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3																						
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.5	1.0	0.3	0.0	0.0	0.0	0.0	6.1	4.3																						
3-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
5-Jun	0.0	0.5	0.5	0.0	0.8	0.5	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.8																						
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.8	0.3																						
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.8																						
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.3	1.3	0.3	0.0	3.6	1.3																						
15-Jun	4.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.3																							
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.3	0.0	0.0	0.0	0.0	2.0	1.8																							
17-Jun	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0																						
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
19-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	1.3	0.5	0.0																						
21-Jun	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.8	0.5	0.3	0.8	0.8	0.8	0.0	0.3	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.8	0.0																						
22-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
27-Jun	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5	0.5	0.0	0.0	0.0	8.1	3.0	0.0																						
28-Jun	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.5	0.0																						
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
30-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
																								4.3	0.8	0.8	0.3	0.8	1.0	4.1	1.3	0.8	0.8	0.8	1.0	0.8	0.0	0.3	1.5	5.3	1.0	5.6	3.6	1.0	1.5	0.3	0.0	Diurnal Average
																								4.3	0.5	0.5	0.3	0.8	0.5	3.0	0.8	0.5	0.3	0.8	0.8	0.8	0.0	0.3	0.8	4.3	0.5	2.5	1.5	0.5	1.3	0.3	0.0	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Horizon - June 2017





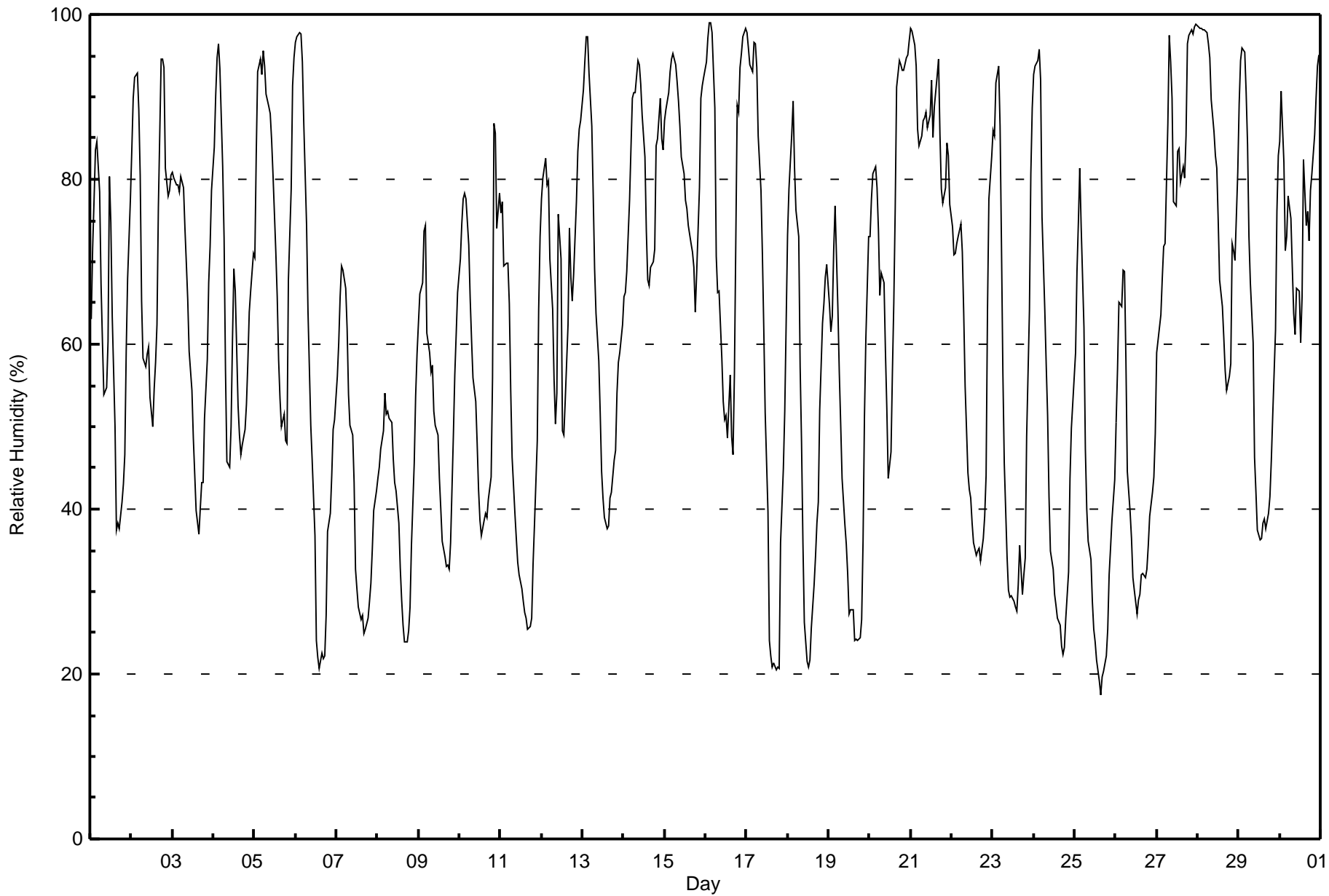
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Horizon - June 2017

Maximum Value: 99 % on Jun 16 04:00 Maximum Daily Average: 87.3 % on Jun 21																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 17 % on Jun 25 16:00 Minimum Daily Average: 39.6 % on Jun 25 Maximum Diurnal Average: 83.4 % at hour 4 Minimum Diurnal Average: 44.8 % at hour 16 Monthly Average: 62.3 % Percentiles: P ₁ = 21 P ₁₀ = 29 Q ₁ = 43 Median = 64 Q ₃ = 81 P ₉₀ = 94 P ₉₉ = 98																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	63	72	77	84	85	79	67	60	54	55	60	80	75	63	50	37	38	38	41	43	47	59	68	78	61.4	85
2-Jun	84	90	92	93	88	81	65	58	57	59	60	54	50	54	58	62	77	95	95	94	81	78	79	81	74.3	95
3-Jun	81	80	79	79	79	80	79	74	70	65	59	54	49	44	40	37	40	43	43	51	58	68	72	79	62.7	81
4-Jun	84	90	95	96	93	82	73	57	46	45	50	61	69	66	52	49	47	48	50	53	58	64	66	71	65.2	96
5-Jun	71	83	93	95	93	96	94	90	89	88	85	81	71	66	58	53	50	51	48	48	68	79	91	95	76.4	96
6-Jun	97	97	98	98	94	87	74	64	57	50	46	37	24	22	21	22	22	22	27	37	39	44	50	51	53.3	98
7-Jun	56	60	66	70	69	67	62	54	50	49	43	33	30	28	27	27	25	25	27	29	31	35	40	42	43.5	70
8-Jun	44	45	47	50	54	52	52	51	50	46	43	42	38	33	29	26	24	24	25	28	36	46	54	59	41.5	59
9-Jun	63	66	67	74	74	61	59	57	57	52	50	49	44	40	36	34	33	33	33	36	49	56	61	66	52.2	74
10-Jun	70	75	78	78	78	72	66	61	56	53	48	42	39	37	39	39	39	41	44	56	87	86	74	78	59.7	87
11-Jun	76	77	69	70	70	65	54	46	40	36	34	32	30	29	27	27	25	26	27	33	38	48	64	73	46.6	77
12-Jun	78	80	83	79	80	70	64	56	50	54	76	70	50	49	53	62	74	68	65	68	77	83	86	87	69.4	87
13-Jun	91	94	97	97	93	87	78	69	64	58	52	45	41	39	38	38	41	42	46	47	54	58	59	62	62.1	97
14-Jun	66	66	69	77	84	90	90	91	94	94	91	88	83	74	68	67	69	70	72	84	85	90	85	84	80.4	94
15-Jun	87	89	90	93	95	95	94	92	90	86	83	81	77	77	74	72	71	69	64	69	79	90	91	92	83.4	95
16-Jun	94	97	99	99	98	89	71	66	66	58	53	51	51	49	56	49	47	56	89	88	94	95	97	98	75.5	99
17-Jun	98	96	94	93	97	97	94	85	79	71	62	52	40	24	22	21	21	20	21	21	36	45	52	62	58.4	98
18-Jun	73	79	85	89	81	76	73	57	48	36	26	22	21	22	26	31	34	38	41	52	63	65	68	70	53.2	89
19-Jun	65	62	63	71	77	64	57	50	44	38	36	32	27	28	28	24	24	24	24	27	36	51	61	73	45.3	77
20-Jun	73	78	81	82	79	74	66	69	68	59	52	44	47	57	65	76	91	94	94	93	93	95	95	97	75.8	97
21-Jun	98	98	96	94	86	84	85	87	87	88	86	88	92	85	89	93	95	85	79	77	79	84	83	77	87.3	98
22-Jun	74	71	71	72	73	75	71	64	55	44	42	41	38	36	34	35	35	34	36	39	44	64	78	83	54.6	83
23-Jun	86	85	92	94	86	72	57	46	34	30	29	29	29	28	28	31	36	30	32	34	49	64	81	89	52.9	94
24-Jun	93	94	94	96	92	75	64	57	51	41	35	33	30	28	27	26	23	22	23	27	32	44	50	53	50.5	96
25-Jun	59	69	75	81	74	62	47	40	36	34	29	25	24	22	19	17	20	20	22	25	32	35	39	44	39.6	81
26-Jun	50	57	65	65	69	69	58	45	40	36	32	30	27	29	30	32	32	32	33	36	39	42	44	49	43.3	69
27-Jun	59	61	63	68	72	72	87	97	94	90	77	77	83	84	80	81	80	85	96	97	98	98	98	99	83.3	99
28-Jun	98	98	98	98	98	98	96	95	90	86	83	81	75	68	65	61	57	54	56	58	72	71	70	81	79.5	98
29-Jun	89	94	96	95	91	84	73	67	60	46	42	37	36	36	38	39	38	39	42	46	51	62	76	83	60.9	96
30-Jun	85	91	82	71	73	78	75	69	64	61	67	66	60	66	82	74	76	72	79	81	85	90	94	95	76.5	95
	76.8	79.8	81.9	83.4	82.4	77.7	71.5	65.8	61.3	57.0	54.4	51.9	48.4	46.1	45.3	44.8	46.2	46.8	49.1	52.6	59.7	66.3	70.9	75.0	Diurnal Average	
	98	98	99	99	98	98	96	97	94	94	91	88	92	85	89	93	95	95	96	97	98	98	98	99	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Horizon - June 2017

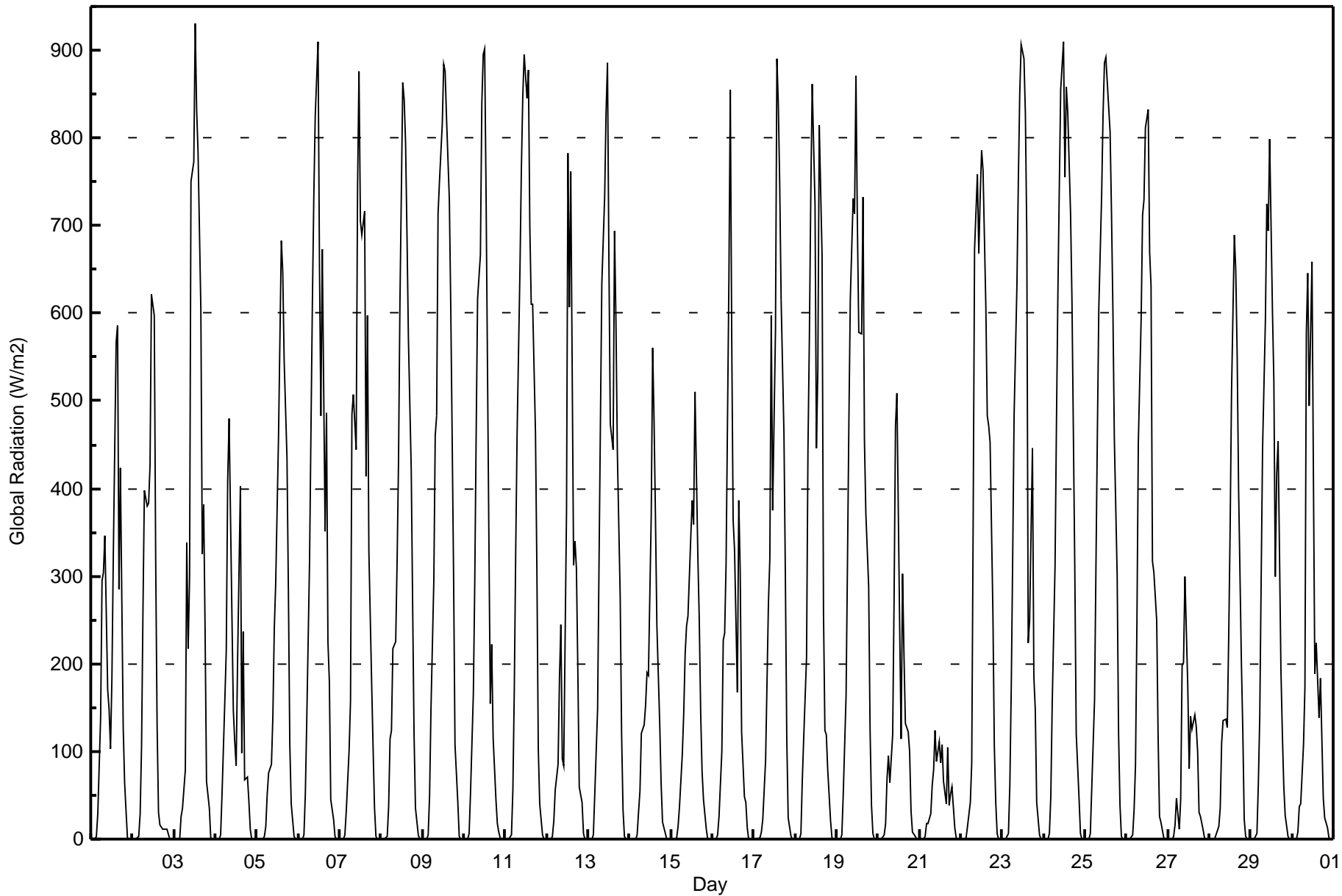
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	3	0.42	0.42
20 - 40	156	21.67	22.08
40 - 60	165	22.92	45.00
60 - 80	201	27.92	72.92
80 - 100	195	27.08	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 930 W/m2 on Jun 3 13:00 Maximum Daily Average: 369.0 W/m2 on Jun 25		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 0 W/m2 on Jun 1 02:00 Maximum Diurnal Average: 599.2 W/m2 at hour 12 Monthly Average: 239.1 W/m2		Minimum Daily Average: 45.8 W/m2 on Jun 21 Minimum Diurnal Average: 0.0 W/m2 at hour 2 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 3 Median = 113 Q ₃ = 444 P ₉₀ = 712 P ₉₉ = 896																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	3	29	138	295	304	346	170	148	103	184	325	567	586	285	424	126	65	32	2	0	0	172.2	586
2-Jun	0	0	0	3	29	106	263	397	380	383	427	621	597	319	130	31	15	12	11	11	12	0	0	0	156.1	621
3-Jun	0	0	0	0	25	36	79	339	217	297	750	774	930	832	784	604	326	382	237	66	36	2	0	0	279.9	930
4-Jun	0	0	0	4	51	160	215	409	480	256	147	111	84	202	402	98	236	68	71	43	11	1	0	0	127.1	480
5-Jun	0	0	0	0	4	14	51	75	85	140	241	291	458	571	682	647	547	436	283	108	40	4	0	0	194.8	682
6-Jun	0	0	0	5	51	136	318	468	614	733	825	910	659	482	672	351	486	226	181	45	23	3	0	0	299.5	910
7-Jun	0	0	0	5	32	102	157	485	507	444	745	877	705	689	716	414	597	329	176	103	36	3	0	0	296.7	877
8-Jun	0	0	0	4	37	114	124	217	226	317	431	612	864	844	794	689	572	421	267	119	35	4	0	0	278.7	864
9-Jun	0	0	0	5	51	149	294	461	483	713	750	817	883	877	822	730	608	458	300	108	42	3	0	0	356.4	883
10-Jun	0	0	0	6	53	166	293	464	617	667	839	896	902	738	345	155	222	116	44	18	8	1	0	0	272.9	902
11-Jun	0	0	0	6	57	171	329	464	648	764	847	896	846	878	698	610	610	464	307	103	40	4	0	0	364.2	896
12-Jun	0	0	0	3	21	56	85	183	245	93	84	376	783	607	762	312	340	309	193	59	42	6	0	0	190.0	783
13-Jun	0	0	0	5	52	148	312	475	635	733	829	886	664	474	444	694	592	442	277	120	34	4	0	0	325.7	886
14-Jun	0	0	0	0	6	31	55	121	130	152	190	186	371	561	476	365	242	133	63	20	12	0	0	0	129.7	561
15-Jun	0	0	0	2	15	37	96	144	211	244	254	344	387	360	511	324	251	144	77	44	12	1	0	0	144.0	511
16-Jun	0	0	0	5	26	100	227	235	313	638	855	572	364	330	168	387	306	122	49	42	13	1	0	0	198.0	855
17-Jun	0	0	0	1	9	23	57	90	268	320	597	376	581	891	838	746	616	462	300	115	24	3	0	0	263.1	891
18-Jun	0	0	0	6	68	115	207	445	571	735	862	725	446	536	815	664	259	124	118	79	21	2	0	0	283.3	862
19-Jun	0	0	0	5	52	164	318	478	617	731	714	872	702	579	577	733	455	373	289	124	39	6	0	0	326.1	872
20-Jun	0	0	0	6	18	69	94	64	120	273	472	509	237	114	302	212	133	122	99	32	8	3	0	0	120.2	509
21-Jun	0	0	0	3	18	17	29	62	79	124	89	111	86	107	66	40	104	38	51	60	13	1	0	0	45.8	124
22-Jun	0	0	0	2	15	42	87	359	673	759	668	734	787	763	606	483	472	452	258	106	42	6	0	0	304.8	787
23-Jun	0	0	0	6	63	173	321	482	631	750	850	906	890	828	688	223	249	446	186	147	41	5	0	0	328.6	906
24-Jun	0	0	0	6	48	154	311	473	620	740	856	910	755	858	829	713	613	463	307	121	46	7	0	0	367.9	910
25-Jun	0	0	0	6	57	160	313	465	605	734	826	886	893	863	806	714	603	458	302	121	38	4	0	0	369.0	893
26-Jun	0	0	0	5	34	85	247	453	595	711	729	812	833	670	631	317	305	249	117	26	19	2	0	0	285.0	833
27-Jun	0	0	0	3	16	47	12	46	199	202	299	176	80	140	125	142	129	99	31	26	10	1	0	0	74.3	299
28-Jun	0	0	0	1	6	14	35	110	135	137	128	231	352	508	690	649	553	402	201	122	22	4	0	0	179.1	690
29-Jun	0	0	0	6	62	140	296	446	593	724	693	798	602	522	300	417	453	193	120	61	27	3	0	0	269.1	798
30-Jun	0	0	0	8	37	40	108	174	578	645	494	659	415	189	224	139	184	114	47	24	13	2	0	0	170.6	659
																								Diurnal Average		
																								Diurnal Maximum		





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Horizon - June 2017

Maximum Speed: 30 km/h on Jun 9 13:00	Maximum Daily Speed Average: 18.4 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 1 km/h on Jun 23 05:00	Minimum Daily Speed Average: 1.0 km/h on Jun 23	Hours of Data: 720
Maximum Diurnal Speed Average: 4.5 km/h at hour 21	Minimum Diurnal Speed Average: 1.3 km/h at hour 13	Hours of Missing Data: 0
Monthly Average Velocity: 2.6 km/h 3.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 26	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	WSW6	SSW10	SSW9	WSW7	W10	WSW8	SW8	SW9	WSW8	SW9	SSW10	SSW8	S11	S8	SSW8	SSW5	S6	SE7	ESE8	ESE5	SE5	S4	W3	S1	SSW5.6	S11
2-Jun	WSW2	SW5	W4	SSW5	SSW6	S3	NNE1	NNE4	ENE7	NE9	NE11	NE14	NE14	NE17	NNE13	NW12	WSW19	SW17	SW11	SW9	WNW18	NW15	W9	NW14	NW3.5	WSW19
3-Jun	WNW17	W15	WNW15	WNW14	NW9	NNW6	NW17	NW13	NW15	WNW14	WNW17	WNW12	W11	WNW12	NW7	NW9	ENE2	ESE9	SE7	ENE5	NNE9	NNE8	NNE7	NNE7	NW7.6	WNW17
4-Jun	NNE7	N3	W3	SW3	SSW4	SSW6	WSW3	W1	SW4	SSW6	SSE5	SSE7	S7	S4	NNW3	NW11	NNE9	NW8	NW16	N11	N7	NNE6	N7	NNE6	NNW2.1	NW16
5-Jun	ENE6	ESE3	ENE5	NNE6	N9	NNE8	N8	N9	NNE7	NE5	N4	NNW4	N4	E5	E5	ESE6	E8	ESE8	S6	SSW3	ENE8	E2	SW3	SW6	NE2.9	NNE9
6-Jun	SW6	WSW5	SSW5	SSW7	SSW8	S9	SSW9	S7	S7	SSW8	SSE8	S9	SW12	W10	W16	WNW11	WNW15	WNW14	N11	NNE11	NNE11	NE6	N7	NNE5	WSW3.5	W16
7-Jun	NNE6	NNE5	NNE5	NE6	NNE6	NNE8	NNE10	NNE11	NE10	NNE11	NNE14	NE18	NE15	NE15	NE14	NE13	NE14	ENE14	NE14	NE13	NE12	NE9	NNE11	NNE10	NE10.8	NE18
8-Jun	NNE10	NNE10	NNE9	NNE8	NNE8	NNE8	N8	NNE7	NNE4	NE4	ENE5	E5	NE7	E8	E7	ESE7	SSE8	SSE7	S8	SE4	SE5	E4	SE2	N5	ENE4.1	NNE10
9-Jun	NW3	W1	NNE5	NNE7	NNE7	NNE18	NNE26	NE24	NNE26	NNE25	NNE25	NNE28	NNE30	NNE28	NE25	NE23	NE22	NE22	NE21	NNE20	N21	NNE18	NNE14	NNE11	NNE18.4	NNE30
10-Jun	NNE9	NE8	NNE7	NNE7	NNE7	NE8	NE6	NNE3	NNE5	NNE8	ENE9	E7	W3	NNE4	E7	NE8	NE12	NE10	NNE7	NNW9	NNE6	N9	N12	NW10	NNE6.4	N12
11-Jun	NW13	NW15	NW18	NW13	W9	W10	NNW15	NW26	NW29	NW26	NW23	NW20	NW20	NW19	NW16	NW19	NW19	NNW18	N13	NE10	NE7	ENE5	NNE2	W3	NW13.9	NW29
12-Jun	SSW4	SW2	SSE3	SW3	SE1	S3	SSE4	S6	S8	SE2	NE4	NE7	S18	S15	SSE14	ESE8	ESE8	ESE6	ESE7	NNE11	NNE12	NNE10	NNE7	NNE7	ESE2.9	SSE18
13-Jun	N6	NNW4	NW4	NNW3	WNW4	N7	NNE6	ENE3	NE2	NE2	ENE6	NE7	ENE7	NE5	N6	NNE12	NNE17	NNE20	NNE19	NNE16	NNE16	NNE17	NNE16	NNE18	NNE8.7	NNE20
14-Jun	NNE22	NNE20	N16	NNE22	NNE20	NNE21	NNE20	NNE17	NNE16	NNE17	NNE17	NNE17	NNE19	NNE19	NNE20	NNE21	N21	NNE19	NNE18	NNE15	NNE13	NNE14	N17	NNW18	NNE17.8	NNE22
15-Jun	NNW16	N15	N12	N10	NNE9	NNE10	NNE13	NNE12	NNE11	NNE11	NNE9	NNE9	NNE8	NE7	ENE9	ENE9	ENE5	NE3	NNE5	NNE5	NE5	NE5	NE5	NE5	NNE8.4	NNW16
16-Jun	NNE5	N4	NNE5	NE5	ENE3	E4	SE5	E4	ENE4	NNE4	S2	SSE4	SSE6	SSW6	SE10	SE3	SW7	S9	SW7	W8	SE4	SSE5	ESE5	S2	SE1.9	SE10
17-Jun	SSW5	S7	S7	S7	SW6	SSW5	WSW4	W7	WSW9	NW10	NNW6	NW15	NW18	NW28	WNW26	NW23	WNW20	WNW18	NW15	NNW8	NE2	SSW5	WSW4	SW3	WNW8.0	NW28
18-Jun	WSW5	SW6	SW9	SSW8	SSW9	SSW7	SSW10	S8	S9	S12	SW15	SW14	WSW16	WSW19	W21	W20	W15	WNW16	WNW17	N14	NNE14	N10	NW9	W13	WSW7.8	W21
19-Jun	W13	WNW17	W7	N2	SW1	SW5	WSW5	W5	NW4	NNW5	WNW4	W6	WSW9	NW3	W7	SW8	SW5	SW8	SSW8	SSW6	S5	SSW6	SSW6	WSW4	WSW4.7	WNW17
20-Jun	SSW7	SSW7	SSW7	SSW5	SSW5	S8	S8	S7	S7	E2	SSE4	S9	SSW10	SSW14	SSW20	SSW17	S10	S8	SSE8	SSE9	SSE8	SSE6	SSE7	S7	S7.9	SSW20
21-Jun	SSW7	SW9	SW8	WSW9	W12	W13	WNW15	W19	W14	W16	W14	WNW13	W14	W15	W14	W14	WSW11	N9	N23	N20	N15	N21	N23	N21	WNW9.5	N23
22-Jun	N17	N22	NNE19	NNE19	NNE16	N11	N14	NNW16	NNE14	N19	N21	N18	N17	NNW18	N17	N16	N15	NNE12	NE11	NE10	NE6	NE2	WSW5	W7	N13.0	N22
23-Jun	W7	W7	WNW2	WSW5	WNW1	SSE3	S2	NNE4	NNE7	NNE6	NNE4	ESE7	ENE8	ENE6	NNE3	NE6	E2	NE3	SE4	WSW8	WNW7	WNW5	SW5	WSW5	NNW1.0	WSW8
24-Jun	S4	SSW7	SW4	ENE1	SSW2	NNE8	NNE12	NNE13	NE11	ENE14	ENE14	NE13	NNE11	NE13	NNE12	NE13	NE12	NE11	NE9	NE8	NE7	NNE4	NNW5	N6	NE7.1	ENE14
25-Jun	N5	NW5	NW5	NW2	NNE2	SSW2	NE1	NE3	SE4	ESE5	SSE7	S6	SSW8	S9	S11	S12	S10	SSE10	SSE10	SE9	SE9	SSE10	SSE11	SSE11	SSE4.6	S12
26-Jun	S10	S8	S6	SSE5	NNW2	N3	ESE1	SSE9	SSE11	SSE12	S17	SSE16	S22	SSE16	SSE16	SSE14	SE13	SE10	SSE9	SSE7	SE8	SE9	SE10	ESE6	SSE9.2	S22
27-Jun	NNE3	NNE6	NE7	NE6	NE5	NE3	SSW7	SE4	SSE11	SSW10	SW8	SW10	SW9	SW8	S4	SSW1	E4	ENE8	ENE3	E2	ENE4	NE4	NE5	NE7	SE1.5	SSE11
28-Jun	NE8	NE9	NNE9	NE10	NNE12	NE12	NE13	NE14	ENE15	ENE12	NE11	ENE11	ENE13	ENE10	E7	E7	ESE5	ESE3	S6	SSW6	SW6	WNW7	N6	SE4	ENE6.6	ENE15
29-Jun	SSW7	SSW7	SSW6	SSW5	S1	SSW3	SSW3	SE3	ENE5	NNE4	NE3	SSW1	S5	SE6	SSE4	SSE6	SE5	ESE6	E5	ENE5	E2	S2	SW4	W3	SSE2.4	SSW7
30-Jun	NW3	N2	N5	NNE6	NW4	SW2	SSW1	SE2	NNE2	SSW7	SSW8	S7	S5	WSW9	W11	W7	W6	WSW5	WSW7	WSW7	SW6	SW5	W3	S5	WSW3.1	W11

NNW2.9	NW2.5	NNW2.4	NNW2.3	NNW2.4	NNE2.0	N2.9	N3.4	NNE3.0	NNE3.3	NNE2.7	NNE2.5	NNW1.3	NNW2.3	NNW2.0	NNW2.9	N2.4	NNE2.5	NNE3.0	NNE4.1	NNE4.5	NNE3.6	N3.2	NNW2.9	Diurnal Average
NNE22	N22	NNE19	NNE22	NNE20	NNE21	NNE26	NW26	NW29	NW26	NNE25	NNE28	NNE30	NW28	WNW26	NW23	NE22	NE22	N23	N20	N21	N21	N23	N21	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

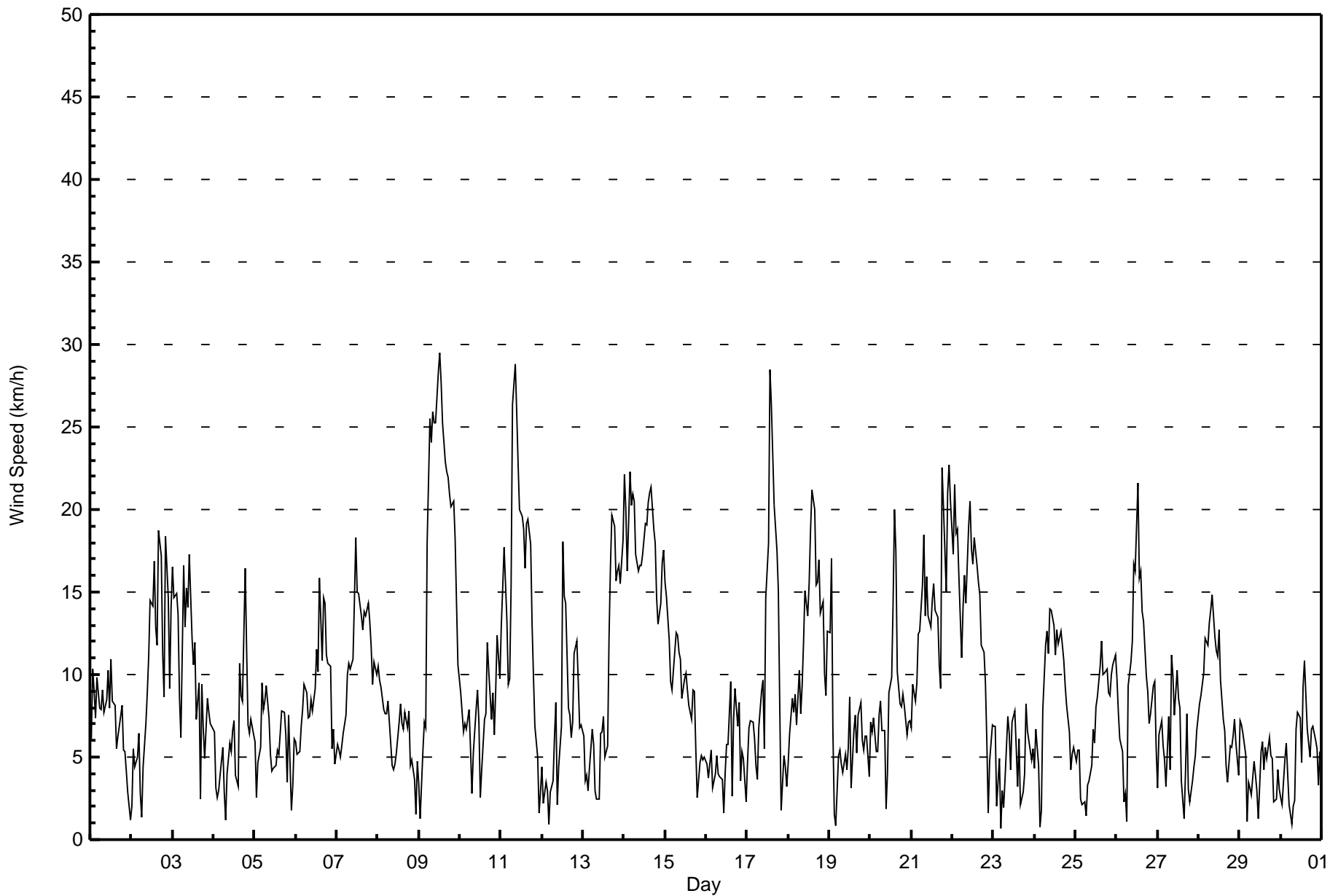
Wind Speed (WS) - km/h
Horizon - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jun 2 16:00 Minimum Value: 0 km/h on Jun 12 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	5	2	2	2	2	2	2	2	2	2	3	4	3	3	3	3	3	2	2	1	1	1	2	2	5
2-Jun	2	2	2	2	1	2	2	1	2	2	3	4	4	4	4	8	5	3	5	4	4	4	2	3	8
3-Jun	3	4	4	3	3	4	3	2	3	4	4	4	4	4	4	4	4	3	2	1	2	2	1	1	4
4-Jun	1	2	3	2	2	1	2	2	3	3	2	2	2	2	2	3	3	6	3	3	2	2	2	1	6
5-Jun	2	2	2	2	3	2	3	2	2	1	2	1	2	3	2	3	3	3	2	3	3	2	2	2	3
6-Jun	1	1	2	1	2	2	2	3	2	3	3	4	5	5	6	3	3	4	4	3	3	1	2	2	6
7-Jun	1	1	1	1	1	2	3	3	3	3	4	4	4	4	4	4	3	4	3	3	3	2	2	2	4
8-Jun	3	2	2	2	1	2	2	2	2	1	2	2	3	3	3	3	4	3	2	1	1	1	1	2	4
9-Jun	1	2	2	1	2	8	7	6	7	7	7	8	8	7	7	6	6	6	5	6	5	5	4	2	8
10-Jun	2	2	2	1	2	2	2	2	3	3	4	3	3	3	3	2	3	3	2	5	3	6	3	2	6
11-Jun	3	2	2	2	2	2	7	6	5	5	5	6	6	6	5	6	6	5	4	3	2	1	2	1	7
12-Jun	2	2	0	2	2	2	2	2	2	2	3	3	6	4	4	5	2	2	2	5	4	2	2	2	6
13-Jun	1	2	2	2	1	3	2	2	2	2	3	3	4	2	3	6	5	5	5	5	5	5	4	6	6
14-Jun	6	6	5	6	6	5	6	5	5	5	5	5	5	6	5	6	6	5	5	4	3	4	4	4	6
15-Jun	4	4	3	2	2	2	4	3	3	3	2	3	3	3	2	2	3	2	1	2	1	1	1	1	4
16-Jun	1	1	1	1	2	1	2	1	2	2	3	3	2	3	4	2	3	4	4	2	4	1	1	2	4
17-Jun	1	2	2	2	2	1	2	2	2	4	3	6	5	5	6	5	5	4	3	2	2	1	2	2	6
18-Jun	2	1	1	2	2	3	2	3	3	3	4	5	5	6	6	5	4	4	4	4	3	3	4	3	6
19-Jun	4	4	2	3	2	1	1	2	2	2	4	4	4	4	3	4	3	3	3	2	1	1	1	2	4
20-Jun	1	2	1	1	1	1	2	2	2	1	2	3	3	4	6	5	3	2	2	3	2	2	2	2	6
21-Jun	1	2	2	2	4	4	4	6	3	4	3	3	4	4	4	4	2	3	7	6	5	6	6	6	7
22-Jun	5	6	6	5	5	4	5	5	4	6	6	6	5	6	7	4	5	4	3	2	1	2	2	2	7
23-Jun	2	2	2	1	2	2	1	2	3	3	3	3	3	3	3	2	3	3	2	2	2	2	2	2	3
24-Jun	2	1	2	2	1	4	3	3	3	4	4	5	5	5	5	4	4	3	3	2	1	1	1	1	5
25-Jun	1	1	1	1	2	2	1	1	1	2	2	4	4	4	4	4	4	3	3	3	2	2	3	3	4
26-Jun	2	2	1	2	2	2	2	3	3	4	6	5	6	5	5	5	5	4	3	2	2	3	3	2	6
27-Jun	1	1	1	1	2	2	4	3	3	3	3	3	2	3	2	1	2	2	2	2	1	1	1	2	4
28-Jun	2	2	2	2	3	3	3	3	4	3	3	3	3	3	3	3	3	2	2	1	1	2	2	3	4
29-Jun	1	1	1	1	1	1	1	2	2	2	2	2	3	2	2	2	2	2	1	1	2	2	1	1	3
30-Jun	2	2	1	1	2	2	2	1	2	3	2	2	3	5	2	2	2	1	1	1	1	1	2	1	5
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Horizon - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	206	28.61	28.61
6 - 11	312	43.33	71.94
12 - 19	156	21.67	93.61
20 - 28	44	6.11	99.72
29 - 38	2	0.28	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	9	24	20	14	13	7	16	9	14	22	14	12	10	5	9	8	206
6 - 11	17	62	32	13	7	12	10	22	34	37	21	14	16	3	7	5	312
12 - 19	15	38	20	6	0	0	1	7	4	2	4	3	15	18	17	6	156
20 - 28	9	16	6	0	0	0	0	0	1	1	0	0	2	2	7	0	44
29 - 38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	141	78	33	20	19	27	38	53	62	39	29	43	28	41	19	720

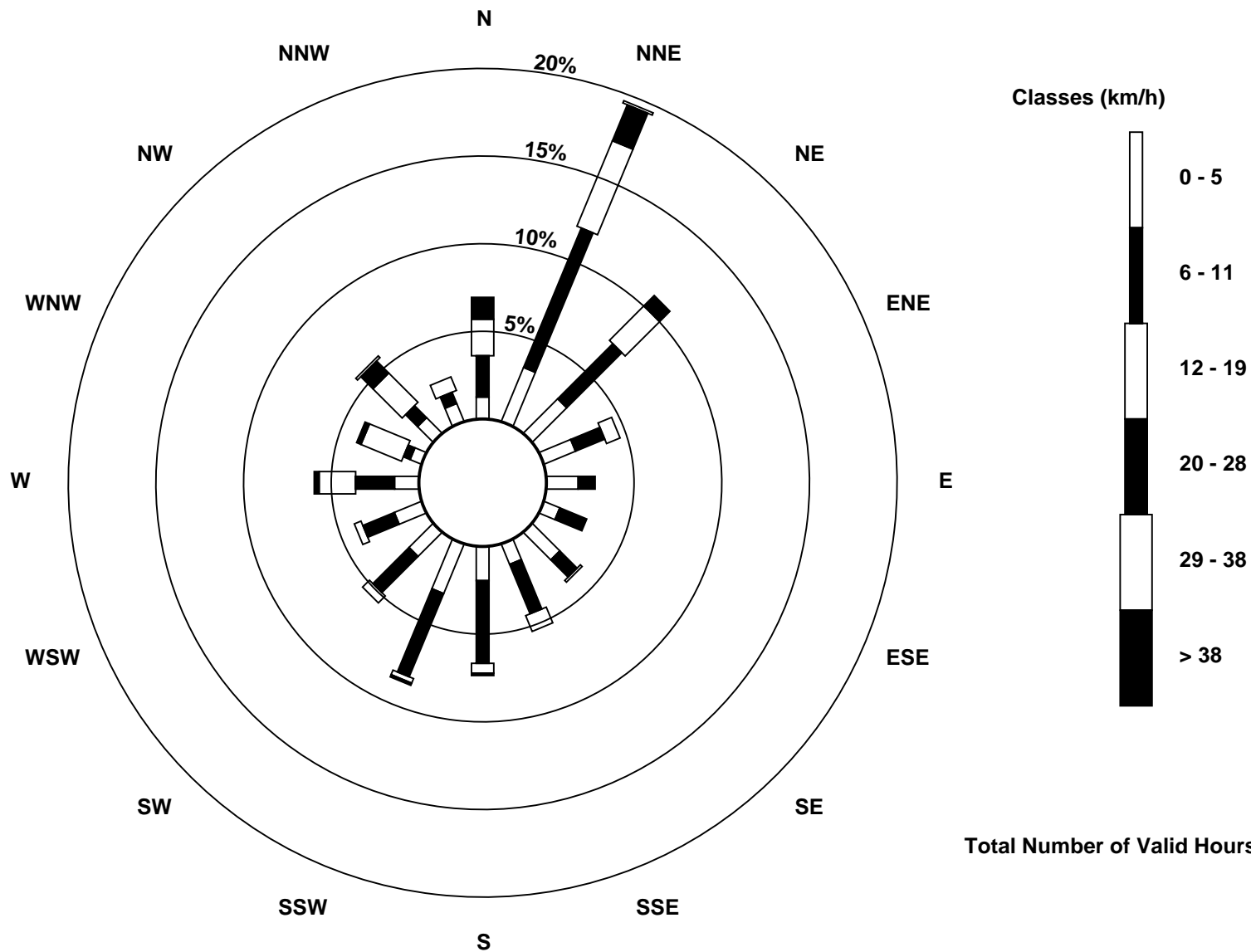
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Horizon (AMS 15)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Horizon - June 2017

Direction of Maximum Speed: 26 deg on Jun 9 13:00 Direction of Maximum Daily Speed Average: 30.0 deg on Jun 9	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 302 deg on Jun 23 05:00 Direction of Minimum Daily Speed Average: 1.0 deg on Jun 23	Percent Operational Time: 100.0
Monthly Average Direction: 259.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	243	193	194	246	267	237	220	227	249	220	207	209	178	190	198	192	183	128	121	116	125	170	268	191	202.4
2-Jun	244	214	278	206	206	191	21	17	63	48	38	42	42	38	29	307	256	231	236	231	285	311	275	304	310.3
3-Jun	292	278	293	296	323	334	317	326	306	295	290	294	274	298	322	326	60	121	126	64	23	18	16	25	312.5
4-Jun	32	4	272	223	196	199	242	274	229	198	161	159	187	177	336	323	17	312	323	358	3	23	352	15	327.2
5-Jun	65	109	71	21	11	25	356	357	13	42	358	327	354	91	95	119	82	120	171	192	58	91	228	230	47.8
6-Jun	227	239	202	206	201	191	199	184	175	193	162	178	218	276	268	284	295	282	352	28	31	43	4	26	245.4
7-Jun	17	22	24	35	26	28	32	29	35	26	32	46	47	48	45	49	48	58	55	52	47	34	25	25	39.8
8-Jun	21	21	28	23	28	19	11	22	31	52	75	80	52	83	93	121	156	152	170	141	134	101	125	3	60.5
9-Jun	321	265	21	20	23	30	28	34	29	33	31	27	26	30	39	39	46	42	41	31	9	18	21	29	30.0
10-Jun	28	38	33	33	27	35	51	33	29	24	72	84	276	29	88	45	38	41	24	344	33	10	358	304	29.3
11-Jun	314	315	318	305	271	266	303	324	325	322	324	315	314	326	324	320	320	329	349	47	44	63	25	259	321.7
12-Jun	204	225	161	225	127	183	161	175	181	136	51	39	169	172	156	121	102	105	102	27	15	21	15	16	120.5
13-Jun	11	329	326	340	300	10	26	74	43	51	64	37	57	42	359	18	20	16	12	23	22	26	24	24	20.7
14-Jun	24	29	8	22	31	33	31	32	31	30	33	33	32	31	29	15	11	16	22	21	18	15	349	337	21.9
15-Jun	336	357	4	9	14	22	32	33	24	25	21	19	18	28	12	52	61	60	59	37	26	33	39	46	22.8
16-Jun	17	349	20	53	65	93	130	86	75	23	169	152	160	203	124	132	220	180	236	277	125	157	118	185	140.0
17-Jun	207	182	182	184	223	202	253	259	247	309	335	310	317	304	302	305	303	296	307	344	45	206	251	233	290.1
18-Jun	239	230	224	201	205	193	192	188	183	185	216	232	243	246	259	273	261	291	288	9	31	354	310	267	250.5
19-Jun	281	288	276	354	222	228	238	263	305	342	290	276	250	307	275	235	231	219	203	192	179	201	209	241	252.4
20-Jun	200	203	204	211	206	187	190	183	190	87	167	176	200	212	199	201	185	171	167	160	164	162	165	174	187.5
21-Jun	201	216	225	237	271	278	282	280	266	269	280	283	280	281	279	273	252	350	7	2	4	1	7	8	302.5
22-Jun	10	6	12	14	12	11	0	348	25	1	355	4	359	348	355	359	9	17	37	53	55	43	246	269	5.6
23-Jun	278	272	292	252	302	164	180	18	19	16	25	102	67	73	33	44	86	45	127	242	297	285	232	256	342.2
24-Jun	189	195	214	77	201	24	26	30	39	57	59	45	14	36	28	45	39	50	40	36	52	14	339	2	38.1
25-Jun	349	312	307	308	24	203	36	41	131	105	152	179	206	174	184	188	172	151	150	138	135	152	159	168	163.6
26-Jun	174	170	174	161	333	356	107	167	168	161	179	160	177	163	151	157	145	140	157	150	128	131	138	121	157.9
27-Jun	19	31	53	41	34	46	197	138	168	192	221	226	219	221	179	209	85	78	67	94	69	49	52	40	128.9
28-Jun	44	36	33	34	32	44	50	51	59	60	52	71	61	73	93	95	104	118	171	204	234	285	7	124	56.8
29-Jun	193	192	211	213	186	198	213	138	64	28	40	208	176	136	147	150	143	105	97	74	83	183	217	278	157.8
30-Jun	307	352	7	16	324	226	210	137	32	197	192	169	191	258	276	265	264	247	245	243	233	217	268	179	242.7

332.1 317.1 330.8 345.8 344.8 11.7 359.4 5.8 16.2 12.5 17.4 23.2 344.8 346.5 345.6 341.7 3.8 31.1 24.3 29.6 30.4 21.0 0.2 346.2
 Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

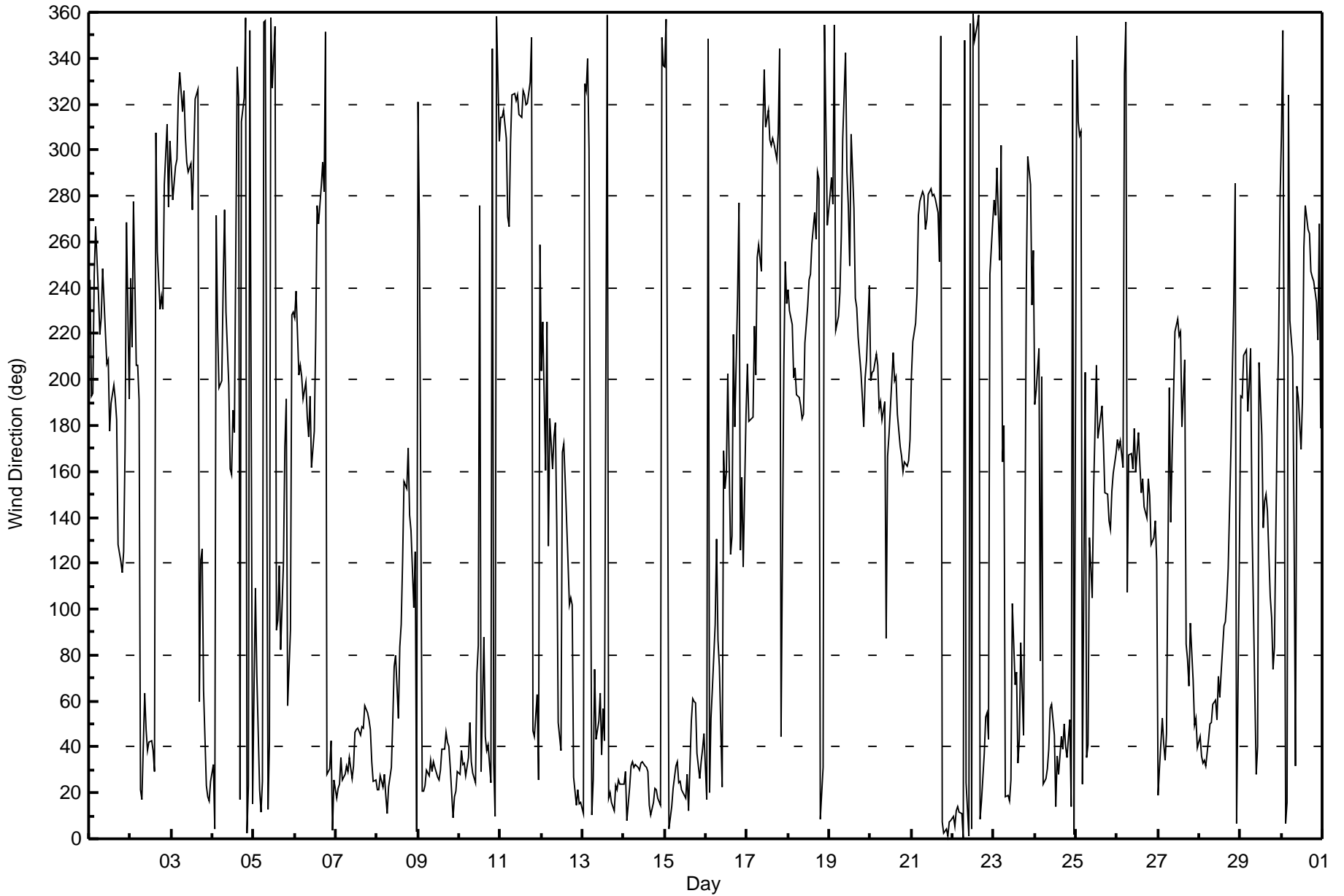
Wind Direction (WD) - deg
Horizon - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 111 deg on Jun 16 11:00 Minimum Value: 7 deg on Jun 11 02:00 Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 19 Median = 23 Q ₃ = 37 P ₉₀ = 59 P ₉₉ = 86																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	58	24	15	34	19	29	22	18	23	19	16	32	18	29	34	55	39	29	17	18	15	27	57	83	83
2-Jun	46	31	25	33	13	55	78	33	23	20	21	19	22	19	20	52	29	16	25	49	14	17	18	12	78
3-Jun	11	16	12	15	24	36	10	14	19	20	16	25	35	31	51	38	85	29	27	26	20	18	15	14	85
4-Jun	12	61	86	58	60	20	48	84	64	41	24	24	27	50	75	19	26	39	14	23	24	20	27	19	86
5-Jun	17	73	50	23	22	21	23	20	20	29	48	39	50	55	59	53	39	39	34	64	16	81	51	14	81
6-Jun	13	18	31	13	16	15	18	26	29	33	37	46	35	39	24	29	16	22	38	19	18	19	19	25	46
7-Jun	16	22	14	18	17	19	19	23	21	21	24	19	22	20	22	21	23	18	15	15	16	17	17	18	24
8-Jun	21	19	18	18	15	18	19	22	29	34	39	53	41	39	46	51	42	48	26	24	11	15	79	19	79
9-Jun	29	56	29	13	16	19	19	19	20	20	21	21	21	20	21	20	20	19	18	22	22	19	19	19	56
10-Jun	17	16	18	19	17	22	45	77	61	45	46	49	99	78	38	21	20	21	37	49	34	28	22	22	99
11-Jun	16	7	8	9	17	18	19	12	14	15	18	23	24	21	35	23	23	15	32	18	13	17	68	42	68
12-Jun	36	48	24	40	57	39	22	24	27	49	22	34	24	24	27	40	19	40	21	28	23	20	19	17	57
13-Jun	14	30	30	62	14	25	27	76	85	85	59	63	51	55	52	30	25	23	22	20	19	19	20	20	85
14-Jun	19	21	23	20	18	19	20	20	20	20	19	21	21	21	22	22	22	20	19	20	19	22	16	23	23
15-Jun	20	22	20	21	19	19	19	20	21	20	24	24	23	26	29	30	24	18	17	17	18	17	18	11	30
16-Jun	19	29	20	7	28	29	27	36	35	77	111	67	43	47	23	68	28	46	44	14	59	26	16	37	111
17-Jun	15	16	17	19	23	22	44	26	16	38	59	25	16	13	16	16	19	18	17	23	55	16	39	74	74
18-Jun	38	21	13	17	15	25	16	33	25	24	27	27	28	22	21	21	18	14	15	32	18	30	45	15	45
19-Jun	18	14	22	81	83	19	29	44	60	56	90	64	50	87	51	59	59	36	28	25	16	12	21	32	90
20-Jun	19	20	21	14	19	14	18	21	25	72	61	34	21	18	18	19	18	19	21	23	21	21	22	21	72
21-Jun	16	15	17	19	22	17	17	17	17	17	19	17	21	17	18	20	15	44	22	22	22	23	22	23	44
22-Jun	21	23	21	21	21	25	28	25	24	26	25	27	28	27	30	25	30	25	22	16	11	68	9	16	68
23-Jun	14	21	67	19	76	48	59	54	38	65	79	52	47	70	86	63	81	88	51	23	11	15	42	15	88
24-Jun	60	17	33	84	37	37	20	21	25	22	26	30	33	33	34	27	28	27	24	20	14	26	23	11	84
25-Jun	20	9	13	27	20	55	61	47	66	73	47	70	54	47	33	28	31	31	27	20	17	20	20	18	73
26-Jun	14	14	13	19	77	20	70	28	27	30	25	28	22	26	26	25	24	26	24	23	20	20	22	17	77
27-Jun	60	14	19	25	28	37	41	50	21	25	25	20	17	24	39	73	36	17	53	51	29	19	16	18	73
28-Jun	16	19	18	19	18	17	16	16	15	18	19	21	19	34	44	56	73	71	34	20	19	32	40	40	73
29-Jun	16	18	15	15	81	20	31	71	47	80	80	92	55	35	45	44	65	28	25	19	59	56	15	28	92
30-Jun	44	67	14	17	60	74	87	45	79	41	33	40	61	44	16	27	19	27	14	14	14	17	57	21	87
																			60 73 86 84 83 74 87 84 85 85 111 92 99 87 86 73 85 88 53 64 59 81 79 83						
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Horizon - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	June 13, 2017	Last Cal Date:	May 12, 2017
Start time (MST):	8:47	End time (MST):	13:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>50</u>	ppm	Cal Gas Exp Date	September 26, 2017
Cal Gas Cylinder #	<u>S0002488</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	1223
ZAG Make/Model	Teledyne API 701		Serial Number	1004

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 710321322

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-623	-623
Calculated slope	1.003966	0.990847	Lamp voltage	868	687
Calculated intercept	-0.227186	-0.270162	Pressure	706.0	706.9
Analyzer Background	19.8	19.8	Flow	0.556	0.555
Analyzer Coefficient	1.015	1.027	Intensity	90	91

SO₂ Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5070	0.0	0.0	-0.4	----
as found span	4995	81.6	803.7	790.5	1.017
calibrator zero	5070	0.0	0.0	0.1	----
high point	4995	81.6	803.7	811.5	0.990
second point	5040	40.6	399.6	403.0	0.991
third point	5060	20.2	198.8	201.5	0.987
as left zero	5070	0.0	0.0	0.4	----
as left span	4995	81.6	803.7	810.8	0.991

Average Correction Factor				0.989	
---------------------------	--	--	--	-------	--

Corrected As found	790.90	Previous response	800.74	*% change	1.2%
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* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

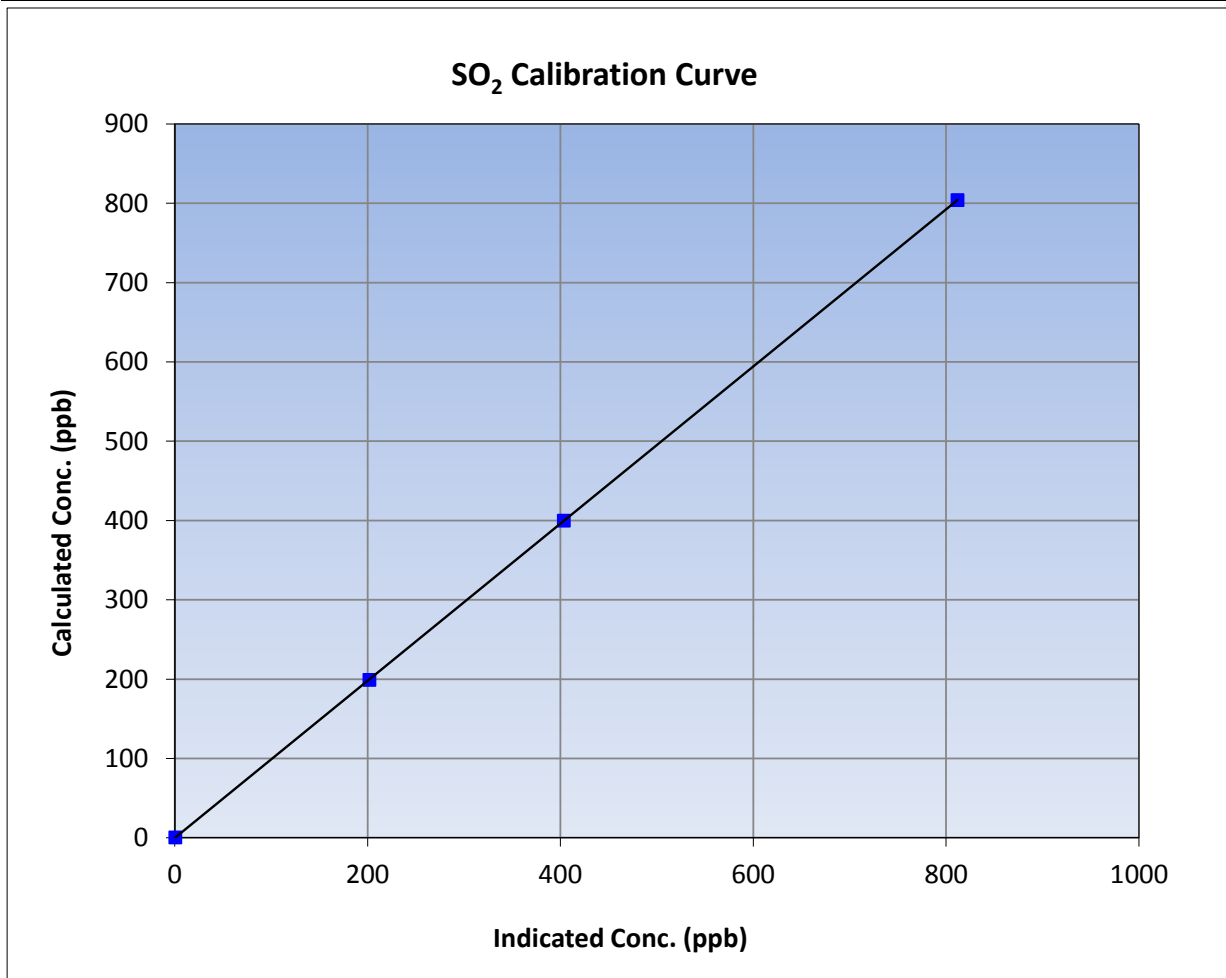
Version-03-2017

Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	13:30
Analyzer make	Thermo 43i	Analyzer serial #	710321322

Calibration Data

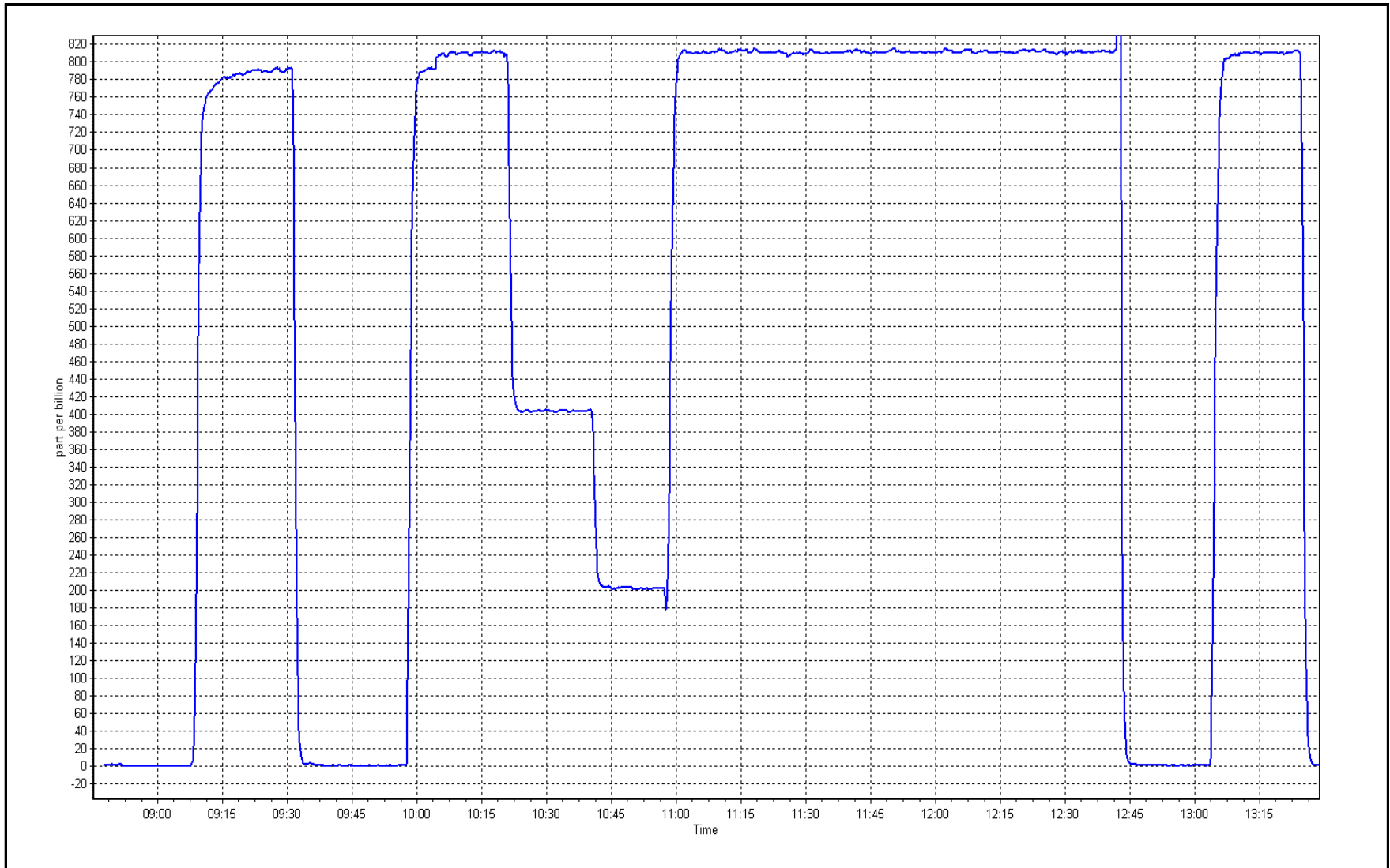
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient	≥0.995
803.7	811.5	0.9904		
399.6	403.0	0.9915	Slope	0.90 - 1.10
198.8	201.5	0.9867		
			Intercept	+/-30



SO2 Calibration Plot

Date: June 13, 2017

Location: Horizon





Wood Buffalo Environmental Association

TRS Calibration Summary

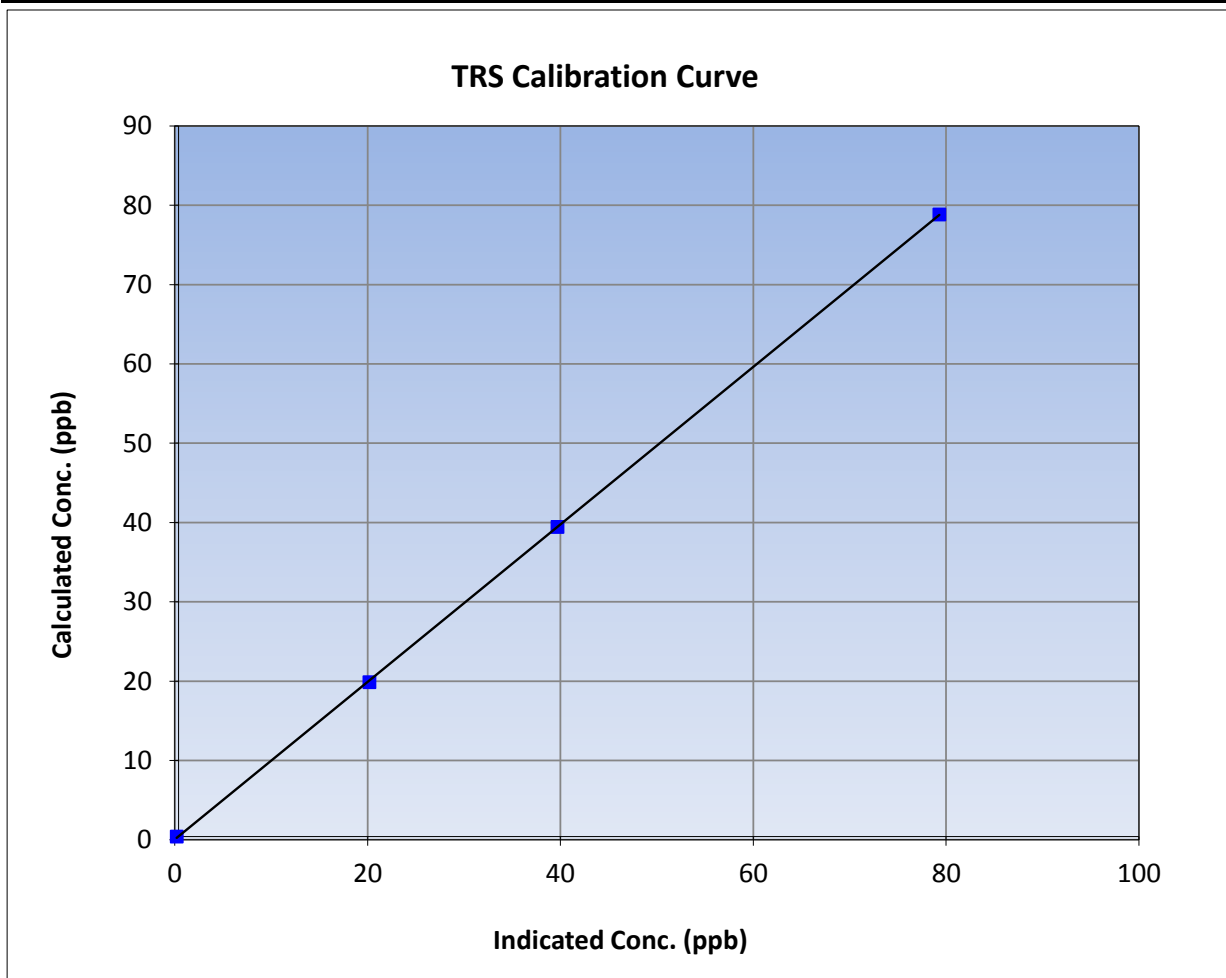
Version-03-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	May 11, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	9:19	End Time (MST)	12:31
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1151680032

Calibration Data

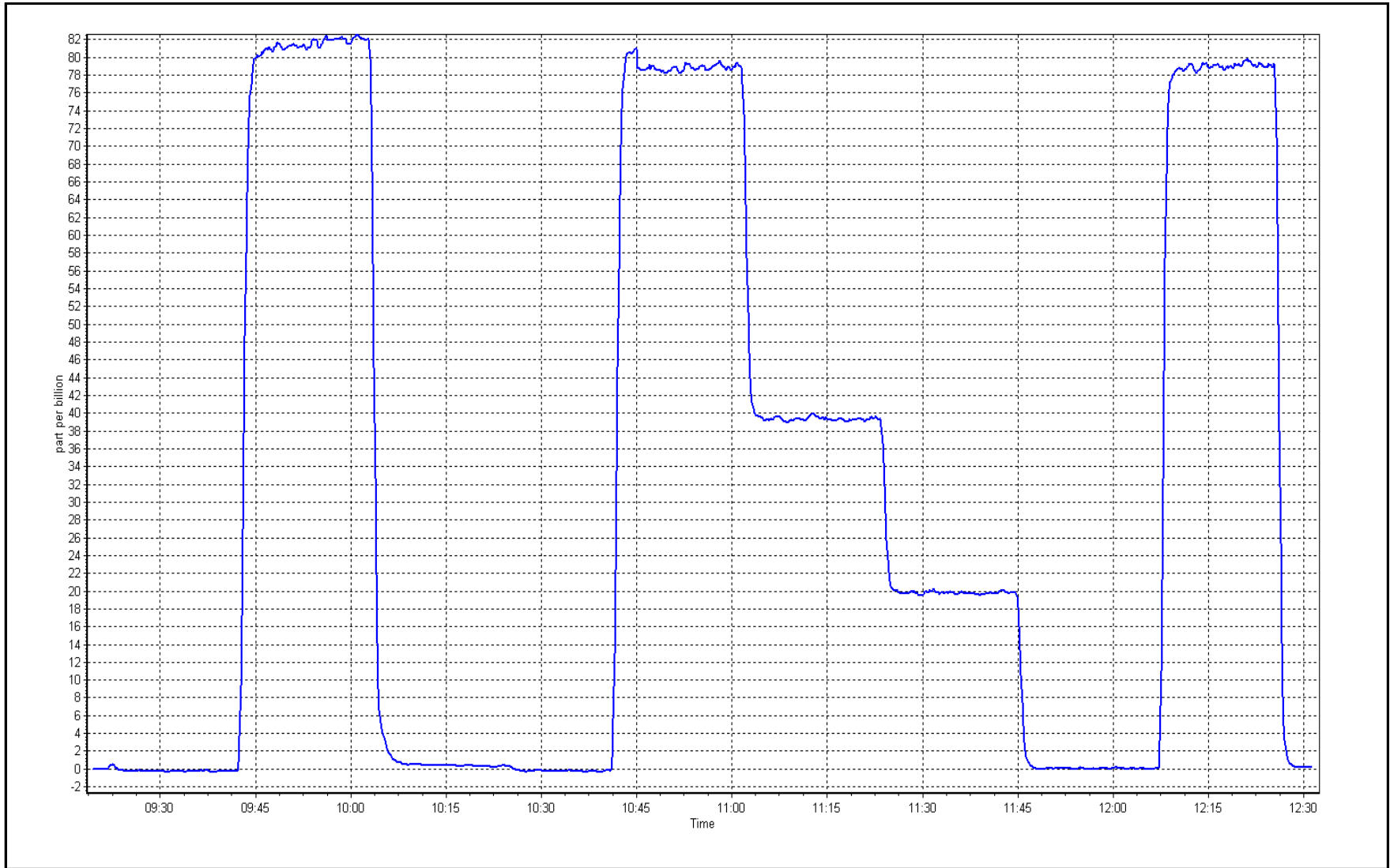
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999978	≥0.995
78.4	78.9	0.9943			
39.0	39.3	0.9936	Slope	0.993049	0.90 - 1.10
19.5	19.8	0.9844			
			Intercept	0.036902	+/-3



TRS Calibration Plot

Date: June 14, 2017

Location: Horizon





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	June 13, 2017	Last Cal Date:	May 12, 2017
Start time (MST):	8:47	End time (MST):	13:28
Reason:	Routine		

Calibration Standards

Gas Cert Reference	S0002488	Cal Gas Expiry Date	September 26, 2017
CH4 Cal Gas Conc.	<u>505.0</u> ppm	CH4 Equiv Conc.	1046.8 ppm
C3H8 Cal Gas Conc.	<u>197.0</u> ppm	Station temp.	Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1223
ZAG Make/Model	Teledyne API 701	Serial Number	1004

Analyzer Information

Analyzer make:	Thermo 51-LT	Analyzer serial #:	1327059295
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-301
Calculated slope	0.998578	Sample pressure	8.8
Calculated intercept	0.004145	Fuel pressure	26.3
Analyzer Background	2.400	Air pressure	38.0
Analyzer Coefficient	3.201	Flame temperature	155.4
			<u>Finish</u>

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5070	0.0	0.00	0.00	----
as found span	5004	81.6	16.80	16.83	0.998
calibrator zero	5070	0.0	0.00	0.00	----
high point	5004	81.6	16.80	16.81	0.999
second point	5040	40.6	8.36	8.35	1.002
third point	5060	20.2	4.16	4.09	1.018
as left zero	5070	0.0	0.00	-0.14	----
as left span	5004	81.6	16.80	16.87	0.995
Average Correction Factor					1.006
Corrected As found	16.83	Previous response	16.82	*% change	-0.1%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfinds Installed new hydrogen cylinder. Adjusted span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

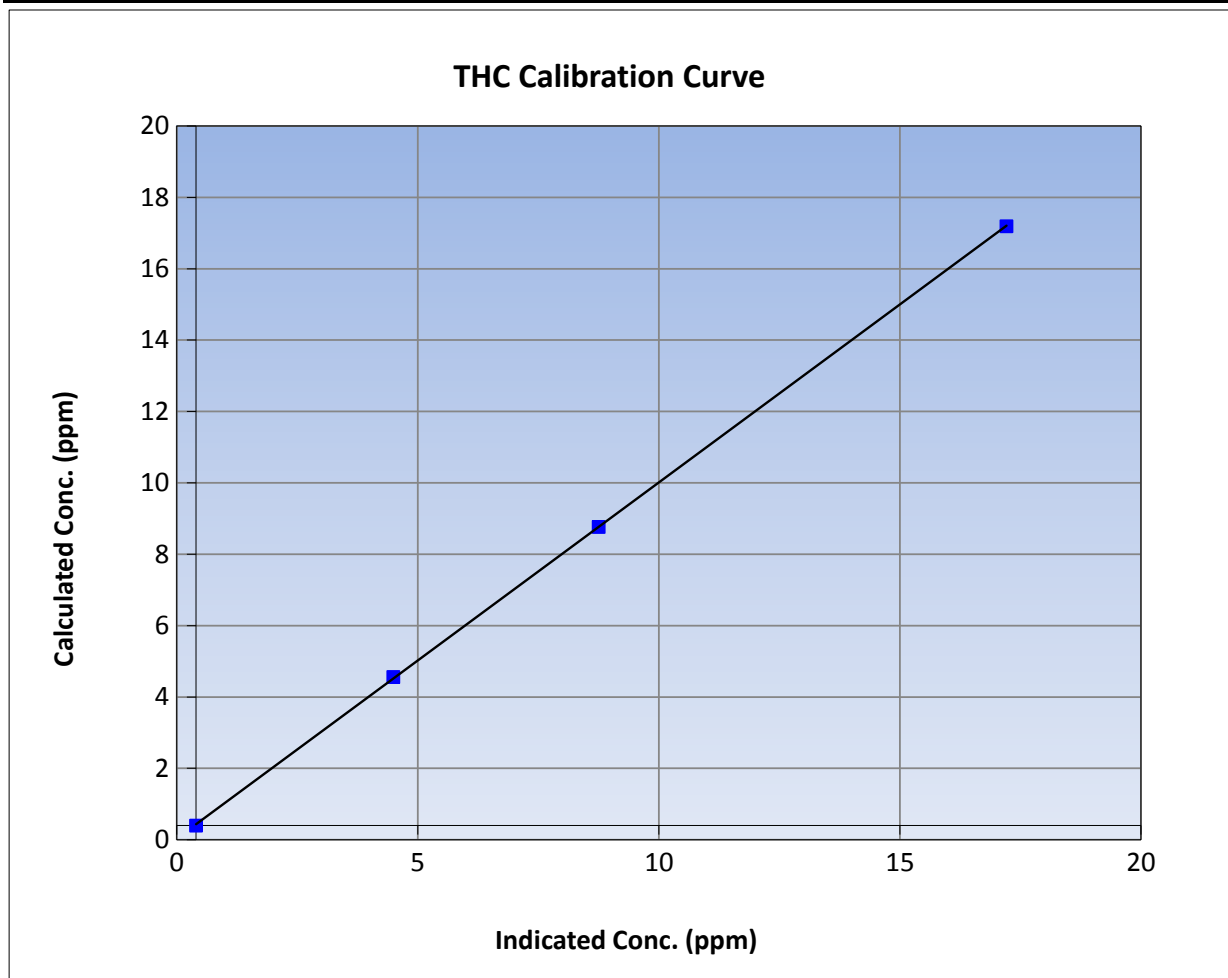
Version-03-2017

Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	13:28
Analyzer make	Thermo 51-LT	Analyzer serial #	1327059295

Calibration Data

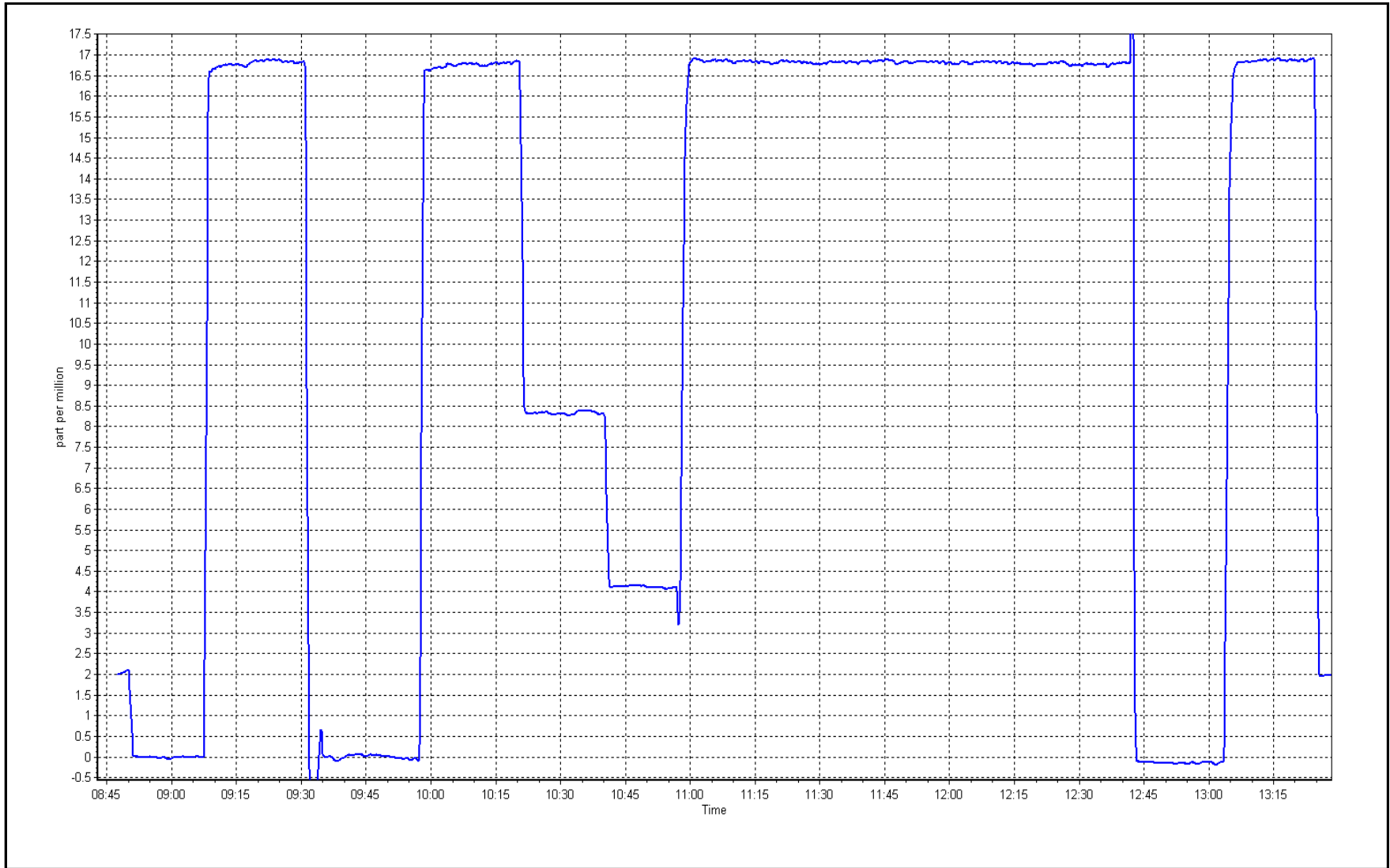
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999976	≥0.995
16.8	16.8	0.9990			
8.4	8.4	1.0016	Slope	0.997673	0.90 - 1.10
4.2	4.1	1.0176			
			Intercept	0.033844	+/-1.5



THC Calibration Plot

Date: June 13, 2017

Location: Horizon





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	June 13, 2017	Last Cal Date:	May 12, 2017
Start time (MST):	8:47	End time (MST):	13:27
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	S0002488	Cal Gas Expiry Date	September 26, 2017
NOX Cal Gas Conc.	<u>48.9</u> ppb	NO Cal Gas Conc.	<u>48.9</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	1223
ZAG make/model	Teledyne API 701	Serial Number	1004

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 710321429		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	0.901	0.900	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.003	0.999	PMT Temperature	-3.0	-3.0
NO ₂ coefficient	1.000	1.000	Reaction cell Press	161.1	159.6
NO bkgrnd	11.0	11.1	Sample Flow	0.725	0.715
NOX bkgrnd	11.2	11.1	PMT Voltage	-779.2	-779.2

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002221	1.001539
NO _x Cal Offset	0.110781	-1.584318
NO Cal Slope	1.001649	1.000909
NO Cal Offset	0.331524	-1.643585
NO ₂ Cal Slope	0.998506	0.999558
NO ₂ Cal Offset	-0.201426	-0.169841



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5070	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
as found span	5004	81.5	783.7	783.7	0.0	786.0	782.8	3.2	0.9970	1.0011
calibrator zero	5070	0.0	0.0	0.0	0.0	0.2	0.2	0.0	----	----
high point	5004	81.5	783.7	783.7	0.0	783.3	783.9	-0.6	1.0005	0.9997
second point	5040	40.6	390.8	390.8	0.0	392.6	392.7	-0.2	0.9953	0.9951
third point	5060	20.2	194.4	194.4	0.0	197.0	197.4	-0.4	0.9870	0.9850
as left zero	5070	0.0	0.0	0.0	0.0	0.4	0.3	0.1	----	----
as left span	5004	81.5	783.7	382.3	401.4	780.4	379.9	400.5	1.0042	1.0063
Average Correction Factor									0.9943	0.9933

Corrected As found	NO _x = 785.8 ppb	NO = 782.6 ppb		*Percent Change	NO _x = -0.5%
Previous Response	NO _x = 781.8 ppb	NO = 782.0 ppb		*Percent Change	NO = -0.1%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	787.3	785.6	1.7	0.9954	0.9975	----	----
1st NO2 (400 ppb O3)	382.3	403.3	785.7	382.3	403.4	0.9974	----	0.9998	100.0%
2nd NO2 (200 ppb O3)	575.4	210.2	786.4	575.4	211.0	0.9965	----	0.9962	100.4%
3rd NO2 (100 ppb O3)	675.2	110.4	785.7	675.2	110.5	0.9974	----	0.9991	100.1%
2nd NO ref point	----	0.0	785.8	784.3	1.5	0.9973	0.9992	----	----
Average Correction Factor						0.9972	0.9984	0.9984	100.2%

Notes: Changed inlet filter after as founds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

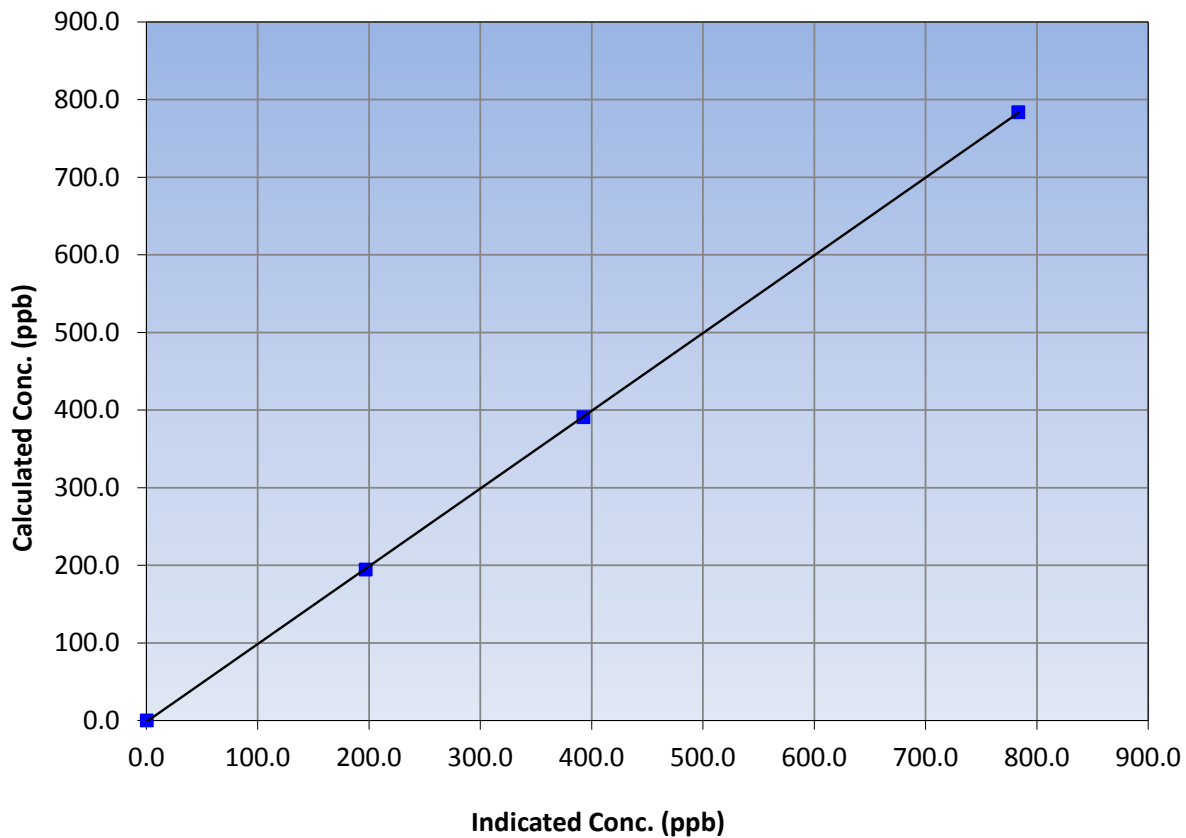
Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	13:27
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
783.7	783.3	1.0005			
390.8	392.6	0.9953			
194.4	197.0	0.9870			
			Slope	1.001539	0.90 - 1.10
			Intercept	-1.584318	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

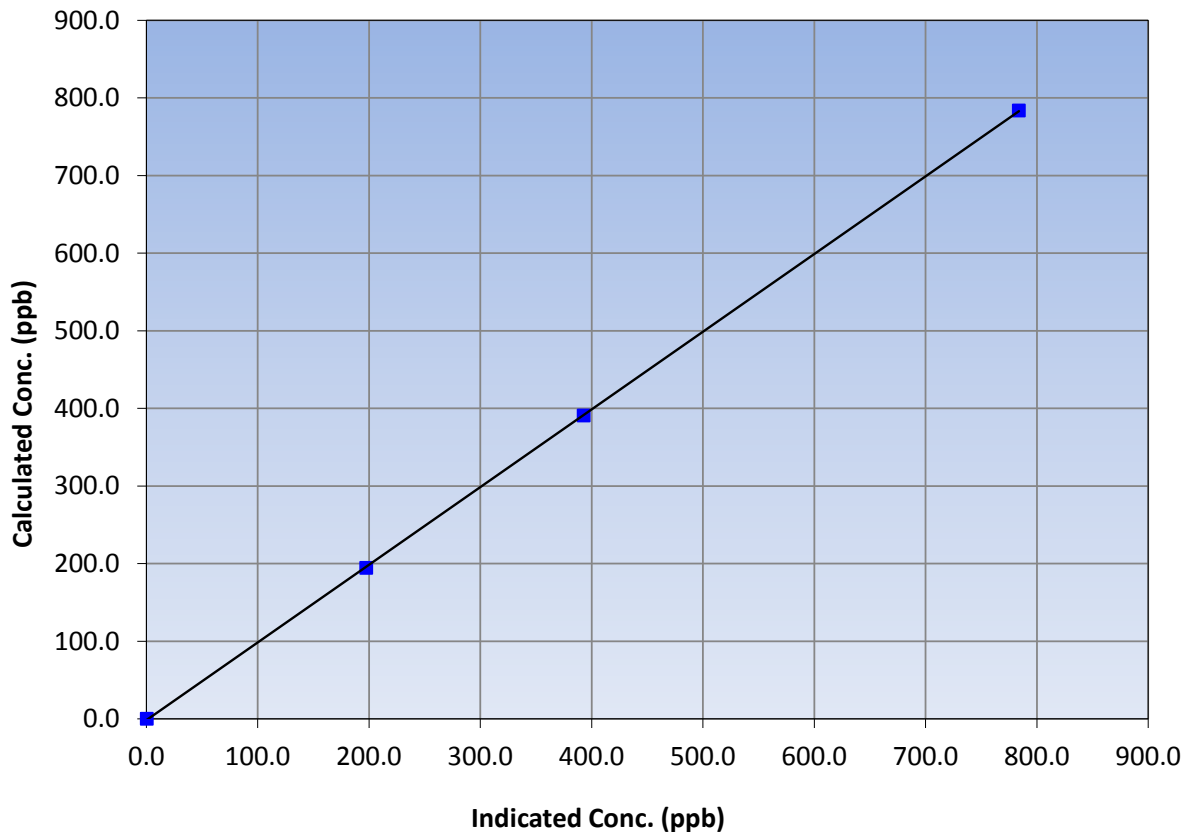
Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	13:27
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	0.999984	≥0.995
783.7	783.9	0.9997			
390.8	392.7	0.9951	Slope	1.000909	0.90 - 1.10
194.4	197.4	0.9850			
			Intercept	-1.643585	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

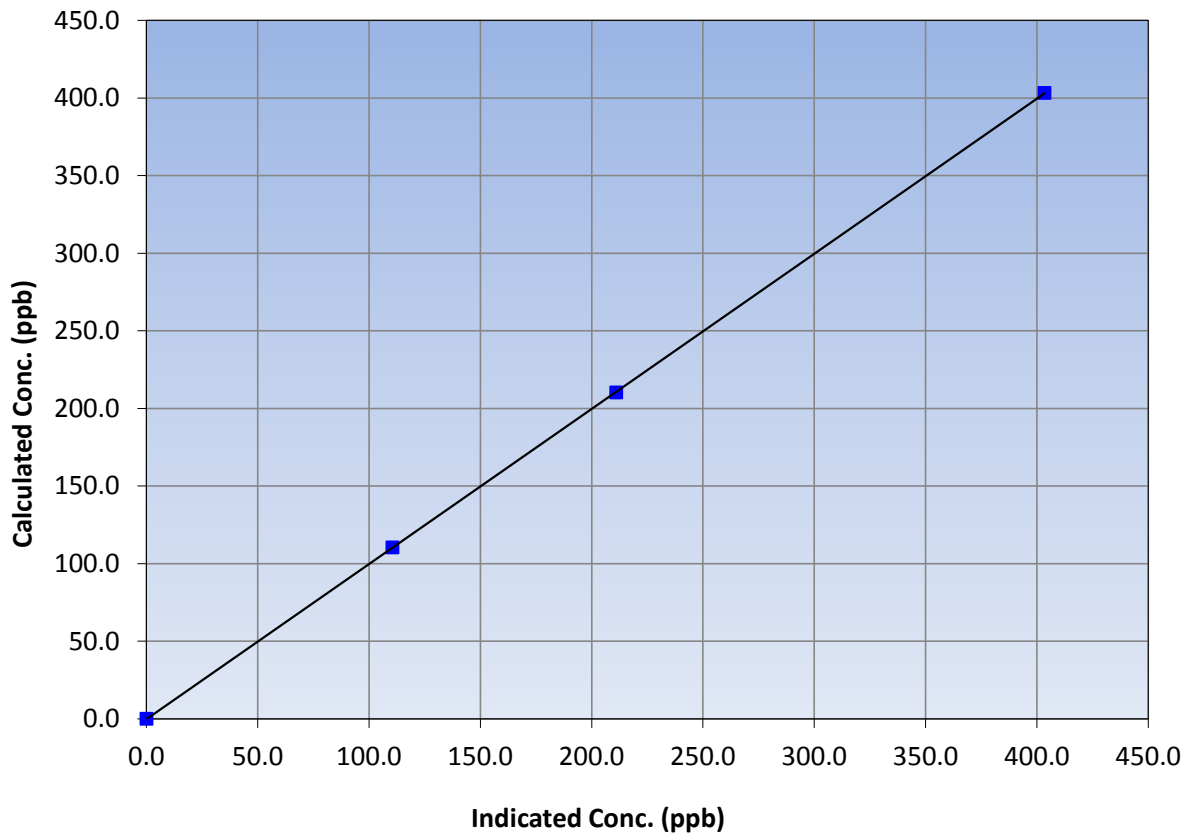
Station Information

Calibration Date	June 13, 2017	Previous Calibration	May 12, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	13:27
Analyzer make	Thermo 42i	Analyzer serial #	710321429

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
403.3	403.4	0.9998			
210.2	211.0	0.9962			
110.4	110.5	0.9991			
			Slope	0.999558	0.90 - 1.10
			Intercept	-0.169841	+/-20

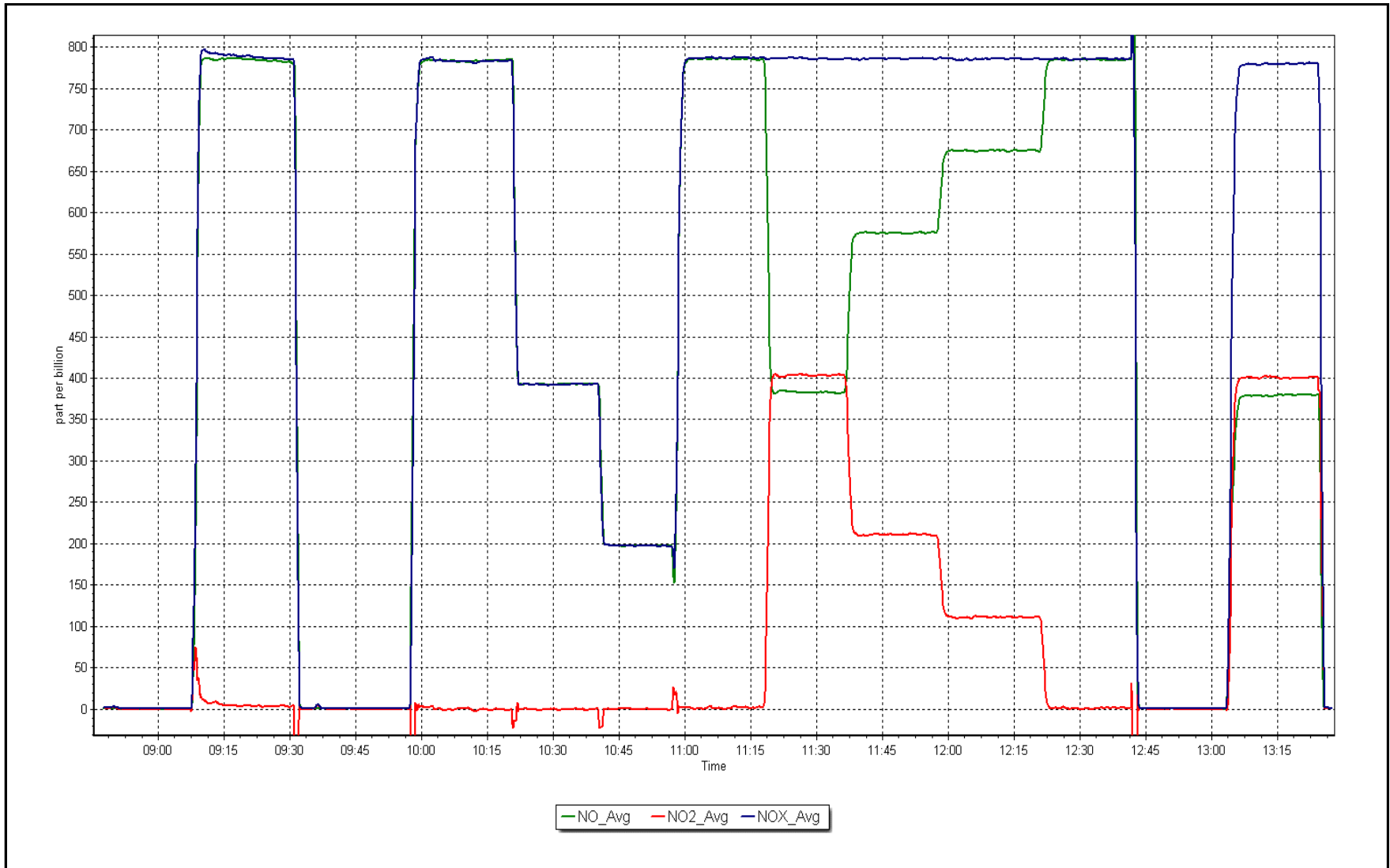
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 13, 2017

Location: Horizon





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 16
MUSKEG RIVER
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	681	36	39	99.58	29	0	4	0
THC (ppm) Average	639	36	81	93.75	4.9	-	3.1	-
NO2 (ppb) Average	681	36	39	99.58	39	0	15	-
NO (ppb) Average	681	36	39	99.58	91	-	24	-
NOX (ppb) Average	681	36	39	99.58	113	-	39	-
PM2.5 (ug/m3) Average	715	1	5	99.44	234.2	-	42.9	1
Temperature 2 m (C) Average	720	0	0	100	29	-	22.1	-
Relative Humidity (%) Average	720	0	0	100	99	-	91	-
Barometric Pressure (inHg) Average	720	0	0	100	29.2	-	29.1	-
Wind Speed 10 m (km/h) Average	720	0	0	100	34	-	24	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	681	0.5	2	-	0	0	0	0	0	1	29
THC (ppm) Average	639	2.45	0.4	-	1.7	2.1	2.2	2.3	2.6	3	4.9
NO2 (ppb) Average	681	6.9	6	-	0	1	2	5	10	16	39
NO (ppb) Average	681	5.1	9	-	0	0	0	1	6	14	91
NOX (ppb) Average	681	11.9	14	-	0	1	2	6	17	30	113
PM2.5 (ug/m3) Average	715	8.89	15.3	-	0	1.3	2.8	5.4	10.5	17.4	234.2
Temperature 2 m (C) Average	720	15.7	5	-	2.8	9.5	12.2	15.4	19.3	22.3	29
Relative Humidity (%) Average	720	64.6	21	-	22	33	46	67	84	92	99
Barometric Pressure (inHg) Average	720	28.75	0.2	-	28.4	28.5	28.6	28.7	28.9	29	29.2
Wind Speed 10 m (km/h) Average	720	11.3	7	-	0	4	6	10	15	21	34
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MUSKEG RIVER (AMS 16)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	25 Jun 2017 19:00	25 Jun 2017 21:00	3	Station power failure
THC	01 Jun 2017 19:00	01 Jun 2017 19:00	1	Unstable operation - excessive baseline drift
THC	02 Jun 2017 13:00	02 Jun 2017 14:00	2	Unstable operation - excessive baseline drift
THC	02 Jun 2017 17:00	02 Jun 2017 17:00	1	Unstable operation - excessive baseline drift
THC	03 Jun 2017 16:00	03 Jun 2017 20:00	5	Unstable operation - excessive baseline drift
THC	06 Jun 2017 12:00	07 Jun 2017 01:00	14	Unstable operation - excessive baseline drift
THC	07 Jun 2017 11:00	07 Jun 2017 22:00	12	Unstable operation - excessive baseline drift
THC	08 Jun 2017 16:00	08 Jun 2017 22:00	7	Unstable operation - excessive baseline drift
PM2.5	03 Jun 2017 03:00	03 Jun 2017 03:00	1	Unstable operation - excessive baseline drift



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 29 ppb on Jun 1 14:00	Maximum Daily Average: 4.3 ppb on Jun 1		Hours of Data:	681
Minimum Value: 0 ppb on Jun 3 15:00	Minimum Daily Average: 0.0 ppb on Jun 21		Hours of Missing Data:	39
Maximum Diurnal Average: 1.7 ppb at hour 14	Minimum Diurnal Average: 0.1 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 9		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	2	29	16	21	10	3	2	1	2	3	3	3	4.3	29
2-Jun	1	1	1	Z	0	0	0	1	1	2	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0.7	2
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Jun	0	0	0	0	0	Z	0	1	1	1	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0.4	2
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	0	Z	0	0	0	0	0	2	10	16	11	6	2	0	0	0	0	0	0	0	0	0	0	0	2.2	16
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
9-Jun	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	0	1	1	1	0	0	1	0	0	0	0.3	1
10-Jun	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
11-Jun	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Jun	0	Z	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	2	5	1	0	1	2	1	0	0	0	0	0	0	0.5	5
17-Jun	Z	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	0	Z	0	0	1	2	1	0	9	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	9
19-Jun	0	0	Z	0	0	0	2	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0.4	2
20-Jun	0	0	0	Z	0	1	1	1	0	2	2	5	5	1	4	3	1	2	1	0	0	0	0	0	1.3	5
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Jun	0	0	Z	0	0	0	0	0	1	0	0	0	1	3	3	2	3	2	PF	PF	PF	0	0	0	0.9	3
26-Jun	0	1	1	Z	0	0	0	1	2	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0.6	3
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	1
29-Jun	Z	1	1	1	1	2	2	2	2	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0.7	2
30-Jun	0	Z	0	0	0	0	0	0	0	2	1	4	8	7	1	0	0	0	0	0	0	0	0	0	1.0	8

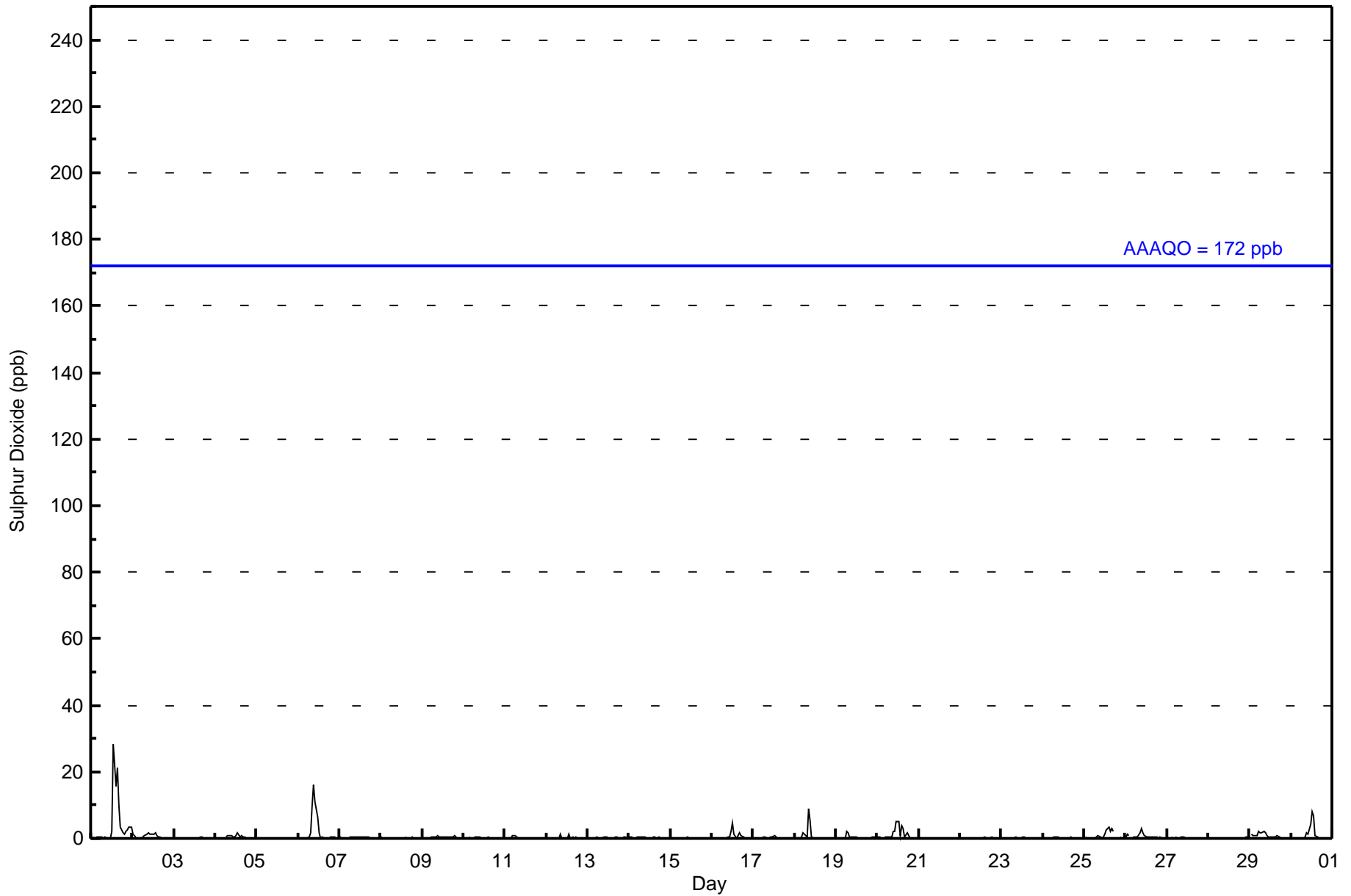
0.1	0.2	0.1	0.1	0.2	0.3	0.4	0.4	1.1	1.3	0.8	0.8	1.0	1.7	1.0	1.1	0.7	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.2	Diurnal Average
1	1	1	1	1	2	2	2	10	16	11	6	8	29	16	21	10	3	2	1	2	3	3	3	Diurnal Maximum	

Z - zerspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Muskeg River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Muskeg River - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	676	99.27	99.27
11 - 20	3	0.44	99.71
21 - 60	2	0.29	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	67	80	67	36	32	21	27	71	82	39	18	29	42	24	22	19	676
11 - 20	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	80	67	36	32	21	27	71	84	41	19	29	42	24	22	19	681

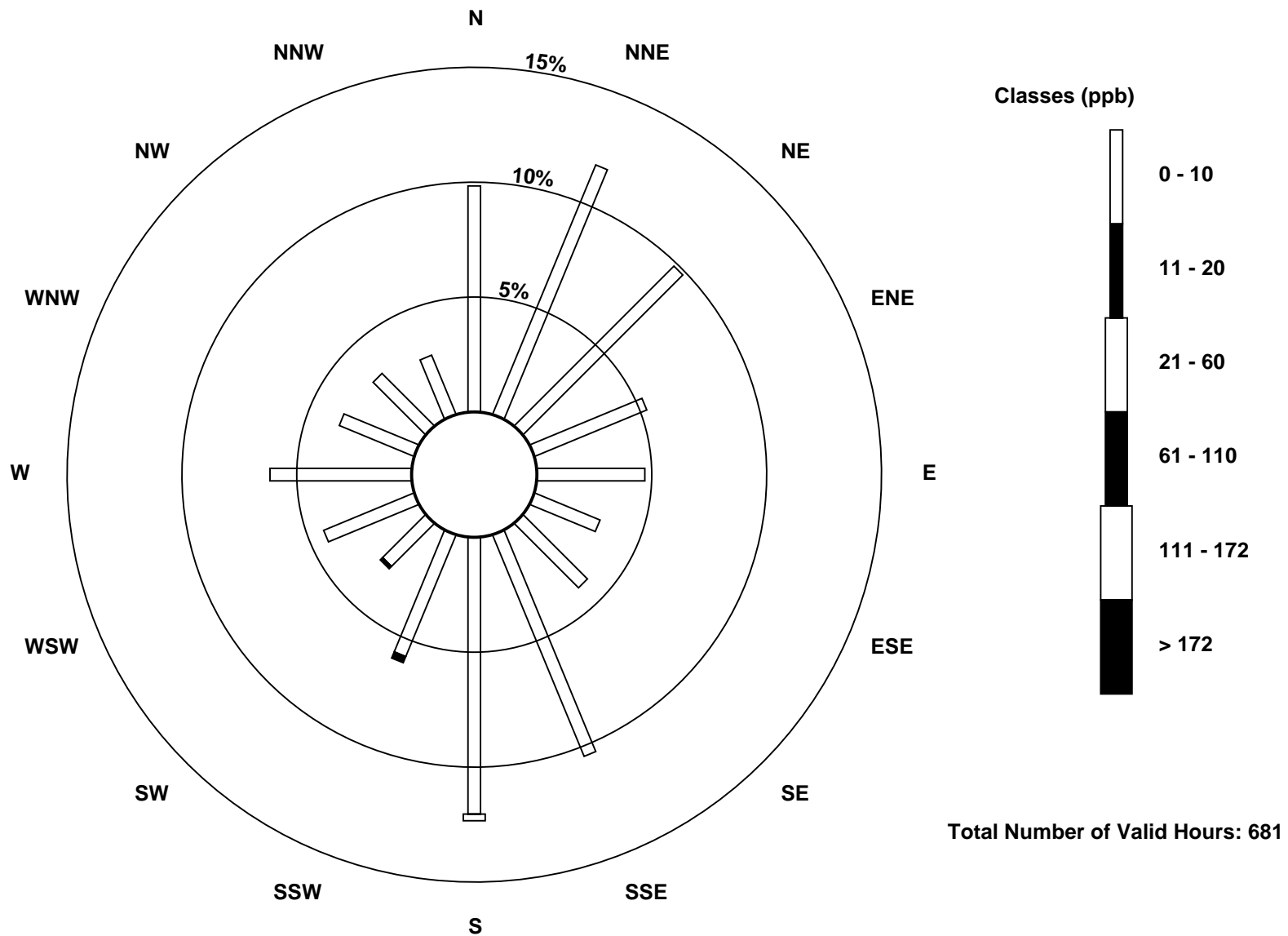
Total Number of Valid Hours: 681

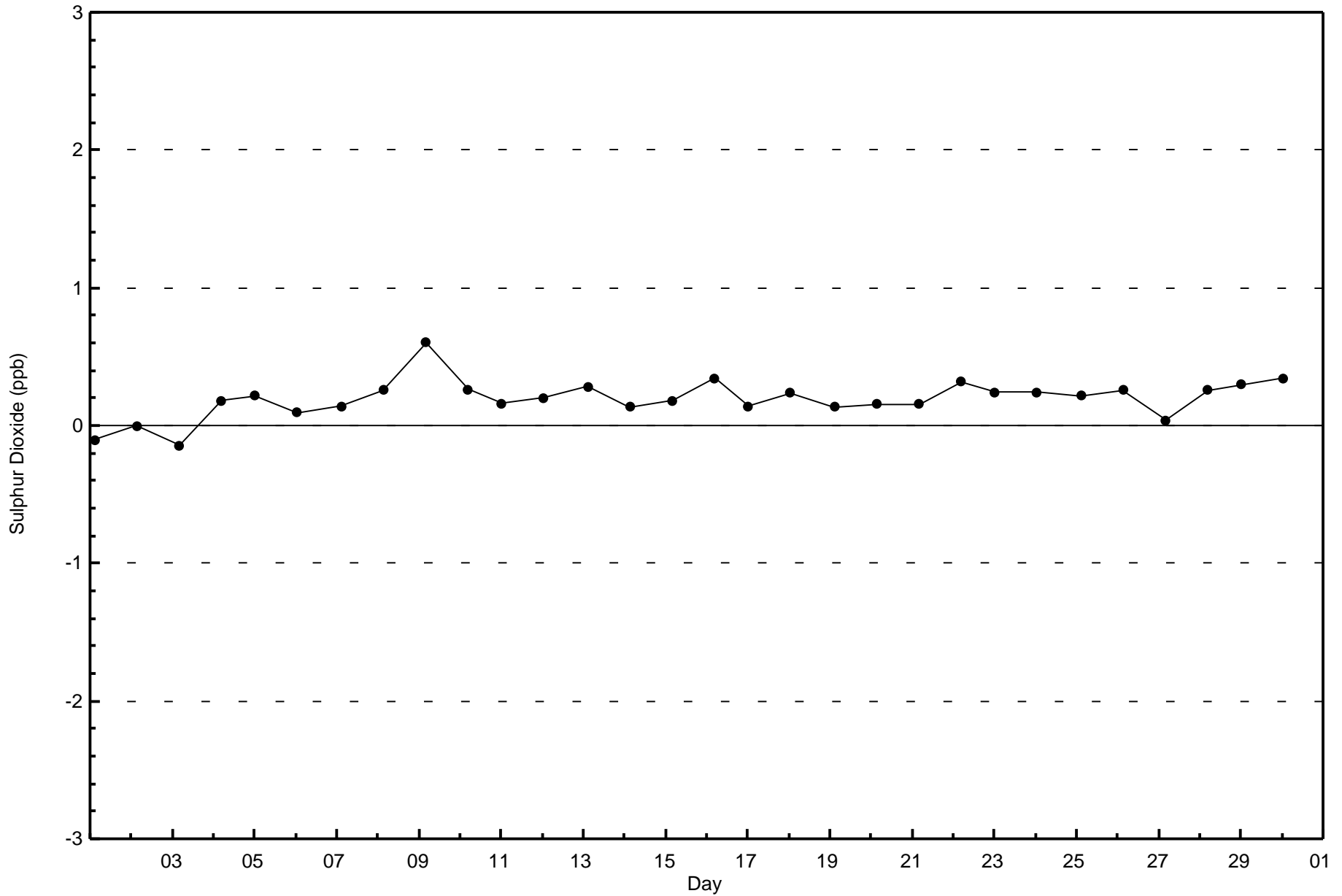
Total Number of Hours: 720

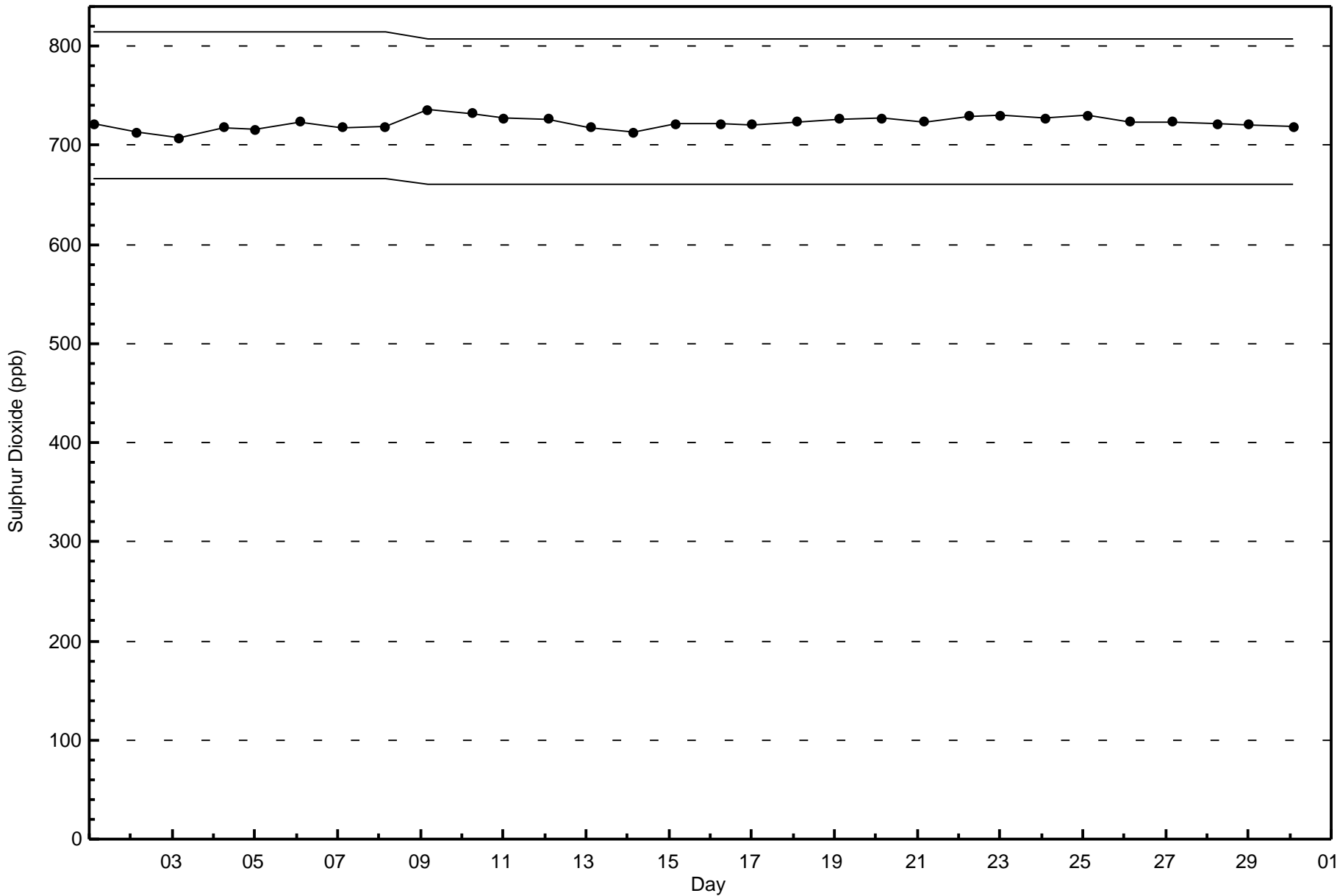


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Muskeg River (AMS 16)









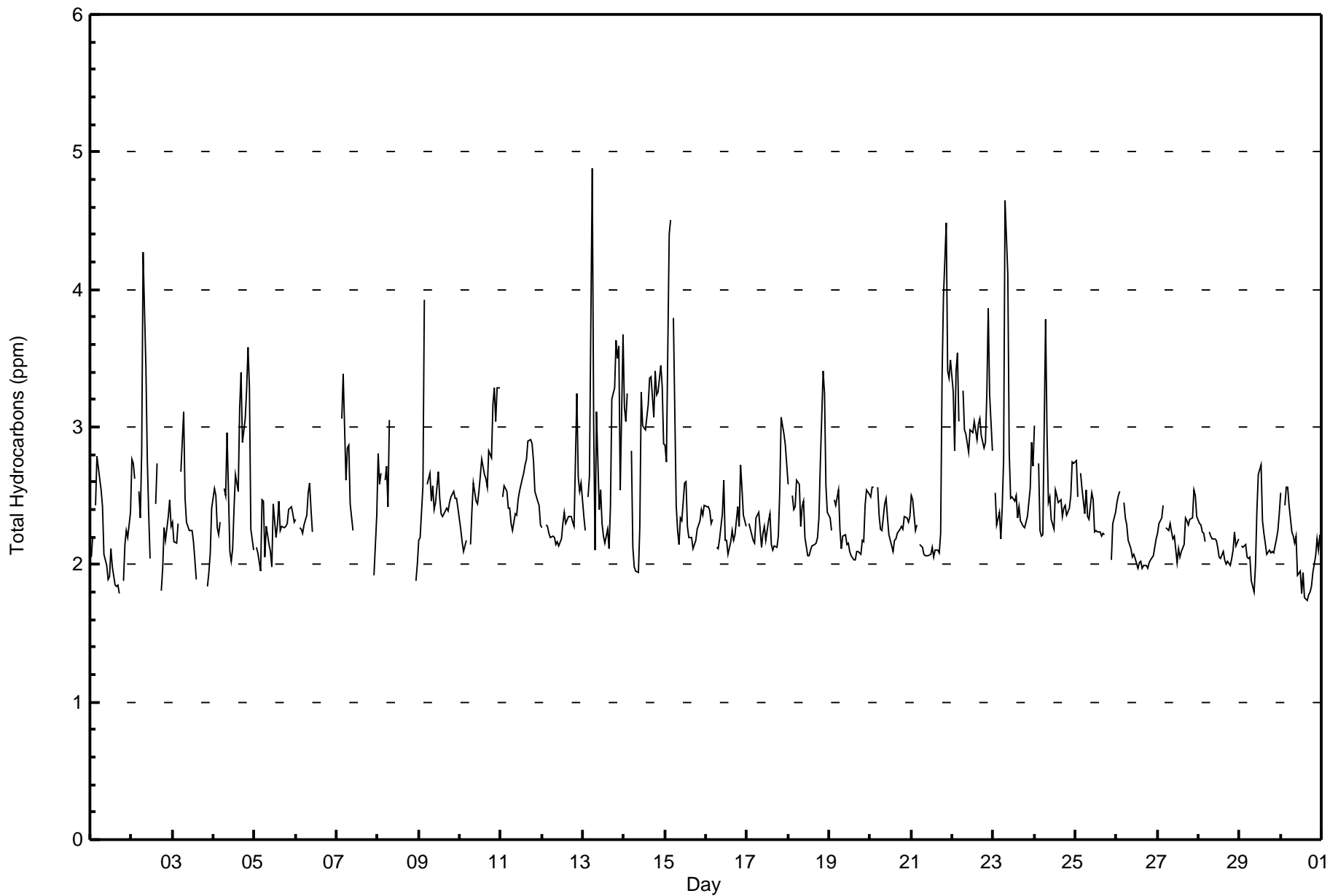
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Muskeg River - June 2017

Maximum Value: 4.9 ppm on Jun 13 06:00		Maximum Daily Average: 3.1 ppm on Jun 22		Hours in Service: 720																							
Minimum Value: 1.7 ppm on Jun 30 16:00		Minimum Daily Average: 2.1 ppm on Jun 30		Hours of Data: 639																							
Maximum Diurnal Average: 2.7 ppm at hour 21		Minimum Diurnal Average: 2.3 ppm at hour 15		Hours of Missing Data: 81																							
Monthly Average: 2.45 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.6 P ₉₀ = 3.0 P ₉₉ = 4.2		Hours of Calibration: 36																							
				Percent Operational Time: 93.8																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	2.2	Z	2.4	2.8	2.6	2.5	2.4	2.1	2.0	1.9	1.9	2.1	2.0	1.9	1.8	1.9	1.8	UO	1.9	2.1	2.2	2.2	2.4	2.1	2.8	
2-Jun	2.8	2.7	2.6	Z	2.5	2.3	2.8	4.3	3.4	2.8	2.4	2.0	UO	UO	2.4	2.7	UO	1.8	2.0	2.3	2.2	2.3	2.5	2.3	2.6	4.3	
3-Jun	2.3	2.2	2.2	2.3	Z	2.7	3.1	2.5	2.3	2.3	2.2	2.2	2.2	2.0	1.9	UO	UO	UO	UO	UO	1.8	1.9	2.1	2.4	2.3	3.1	
4-Jun	2.6	2.5	2.3	2.2	2.3	Z	2.6	2.5	3.0	2.1	2.0	2.1	2.4	2.7	2.5	3.1	3.4	2.9	3.1	3.3	3.6	3.3	2.3	2.1	2.6	3.6	
5-Jun	Z	2.1	2.1	1.9	2.5	2.5	2.1	2.3	2.1	2.1	2.0	2.4	2.2	2.3	2.5	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.5	
6-Jun	2.3	Z	2.3	2.3	2.2	2.3	2.4	2.5	2.6	2.4	2.2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.6
7-Jun	UO	4.1	Z	3.1	3.4	2.6	2.8	2.9	2.4	2.2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.9	2.4	--	4.1
8-Jun	2.8	2.6	2.7	Z	2.6	2.7	2.4	3.1	C	C	C	C	C	C	1.9	UO	UO	UO	UO	UO	UO	UO	UO	1.9	2.0	--	3.1
9-Jun	2.2	2.2	2.6	3.9	Z	2.6	2.7	2.5	2.6	2.4	2.5	2.7	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.5	3.9	3.9
10-Jun	2.3	2.2	2.1	2.1	2.2	Z	2.1	2.4	2.6	2.5	2.4	2.5	2.6	2.8	2.7	2.6	2.6	2.8	2.8	3.2	3.3	3.0	3.3	3.3	2.6	3.3	3.3
11-Jun	Z	2.5	2.6	2.5	2.4	2.4	2.3	2.2	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9	2.9	2.9	2.9	2.8	2.5	2.5	2.4	2.3	2.5	2.9
12-Jun	2.3	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.3	2.4	2.3	2.3	2.3	2.4	2.3	2.3	3.2	2.6	2.5	2.6	2.3	3.2	3.2
13-Jun	2.3	2.2	Z	2.5	2.6	4.9	3.0	2.1	3.1	2.4	2.5	2.3	2.2	2.2	2.3	2.1	2.4	3.2	3.3	3.6	3.5	3.6	2.5	3.7	2.8	4.9	
14-Jun	3.1	3.0	3.2	Z	2.8	2.1	2.0	2.0	1.9	2.3	3.3	3.0	3.0	3.1	3.2	3.4	3.4	3.1	3.4	3.2	3.3	3.4	3.3	2.9	2.9	3.4	3.4
15-Jun	2.9	2.7	4.4	4.5	Z	3.8	2.4	2.2	2.2	2.3	2.3	2.6	2.6	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.6	4.5	4.5
16-Jun	2.4	2.4	2.4	2.3	2.3	Z	2.1	2.1	2.2	2.4	2.6	2.2	2.2	2.1	2.2	2.3	2.2	2.2	2.4	2.3	2.7	2.6	2.4	2.3	2.3	2.7	2.7
17-Jun	Z	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.1	2.2	2.3	2.2	2.3	2.4	2.1	2.1	2.1	2.1	2.2	2.5	3.1	3.0	2.9	2.7	2.4	3.1	3.1
18-Jun	2.6	Z	2.5	2.4	2.4	2.6	2.6	2.3	2.4	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.7	3.4	3.2	2.6	2.4	2.4	3.4	3.4
19-Jun	2.3	2.2	Z	2.5	2.4	2.5	2.3	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.4	2.5	2.5	2.2	2.5	2.5
20-Jun	2.5	2.6	2.6	Z	2.6	2.4	2.3	2.3	2.4	2.5	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.6
21-Jun	2.5	2.5	2.2	2.3	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	3.4	4.0	4.5	3.4	3.4	3.5	2.6	4.5	4.5
22-Jun	3.3	2.8	3.4	3.5	3.0	Z	3.3	3.0	2.9	2.8	3.0	3.0	3.0	3.0	2.9	3.0	3.1	2.9	2.8	2.9	3.2	3.9	3.2	2.8	3.1	3.9	3.9
23-Jun	Z	2.5	2.3	2.4	2.2	2.4	2.8	4.6	4.1	2.8	2.5	2.5	2.5	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.6	2.9	2.7	2.6	4.6	4.6	
24-Jun	3.0	Z	2.7	2.2	2.2	2.2	3.8	3.0	2.5	2.3	2.3	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.7	2.7	2.5	3.8	3.8
25-Jun	2.8	2.5	Z	2.7	2.6	2.4	2.5	2.3	2.3	2.5	2.5	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.0	2.3	2.4	2.4	2.8	2.8
26-Jun	2.5	2.5	2.5	Z	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.5	2.5
27-Jun	2.2	2.3	2.3	2.4	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.0	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.3	2.5	2.5	2.4	2.3	2.5	2.5
28-Jun	2.3	2.3	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.1	2.3	2.3
29-Jun	Z	2.1	2.1	2.1	2.1	2.0	2.1	1.9	1.8	2.0	2.4	2.6	2.7	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.2	2.7	2.7
30-Jun	2.5	Z	2.4	2.6	2.6	2.4	2.2	2.2	2.2	2.2	1.9	1.9	1.8	1.9	1.8	1.7	1.8	1.8	1.8	1.9	2.1	2.2	2.1	2.2	2.1	2.6	2.6
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerspan			
																								C - Calibration			
																								UO - Unstable Operation			
																								PF - Power Failure			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Muskeg River - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	60	9.39	9.39
2.1 - 3.0	516	80.75	90.14
3.1 - 10.0	63	9.86	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 639

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Muskeg River - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	3	6	2	2	2	7	11	6	7	4	4	6	0	0	0	60
2.1 - 3.0	28	61	46	32	29	17	15	57	77	32	15	22	33	23	19	10	516
3.1 - 10.0	39	9	1	1	0	0	0	0	0	0	0	1	0	1	3	8	63
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	73	53	35	31	19	22	68	83	39	19	27	39	24	22	18	639

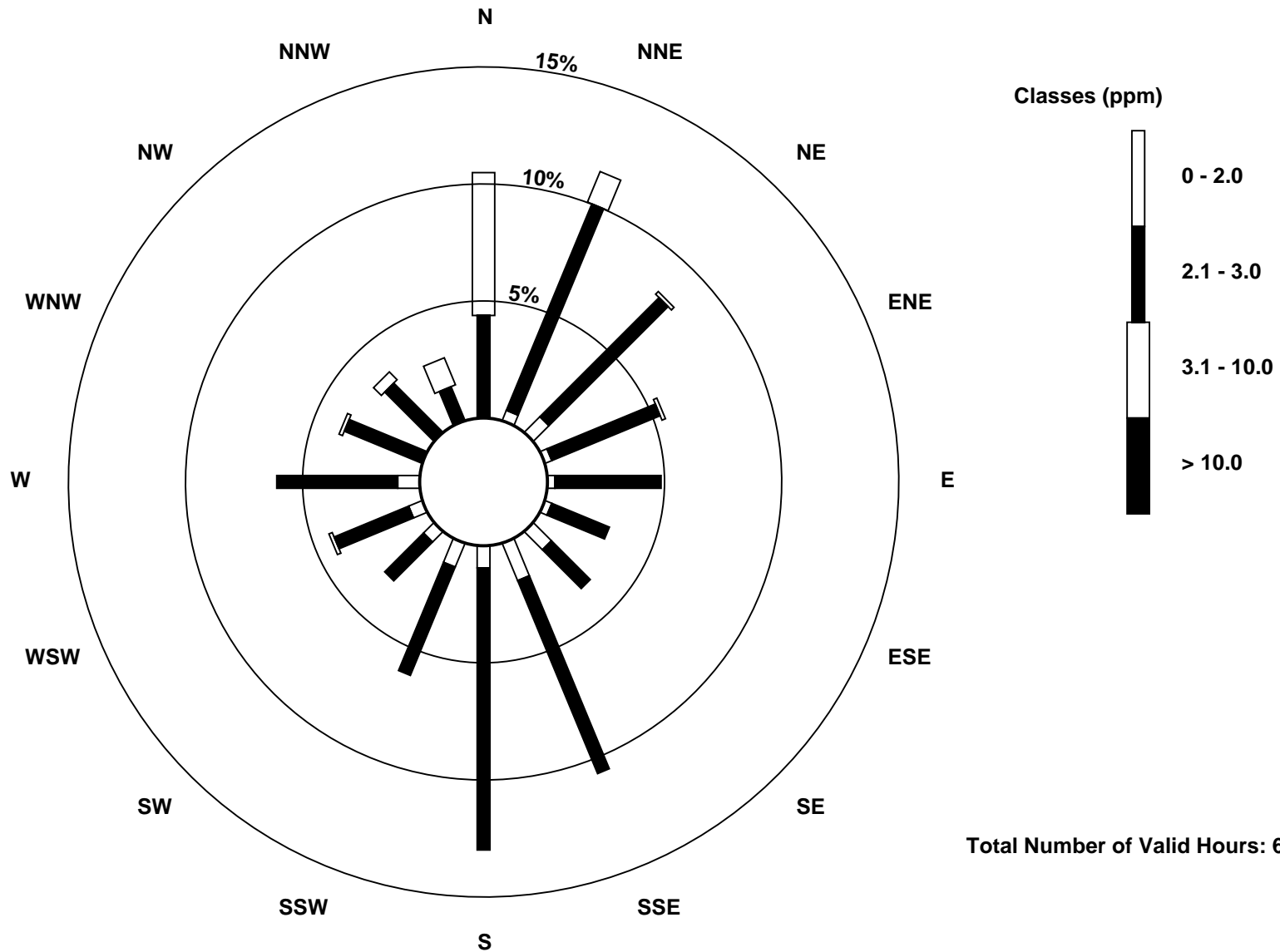
Total Number of Valid Hours: 639

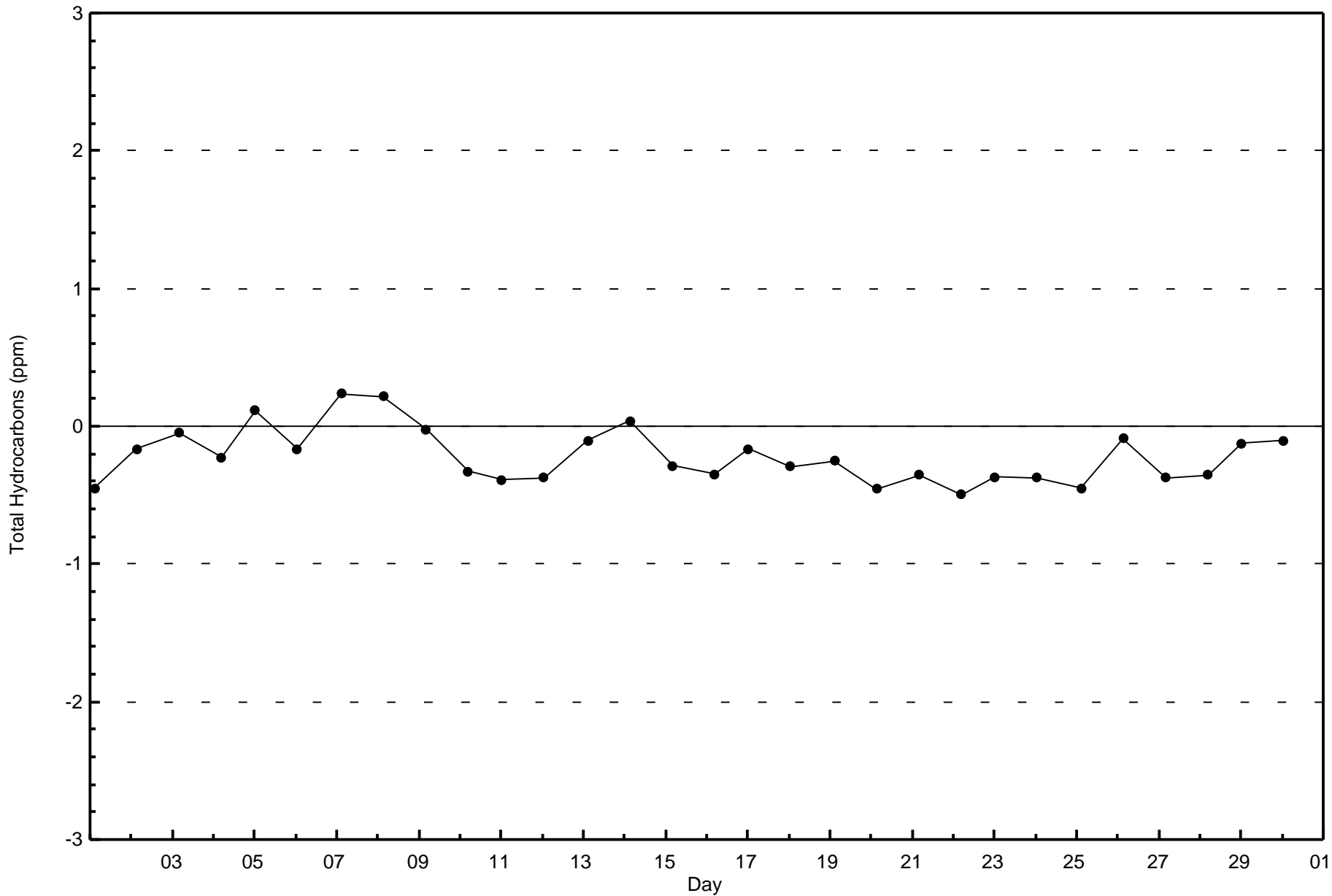
Total Number of Hours: 720

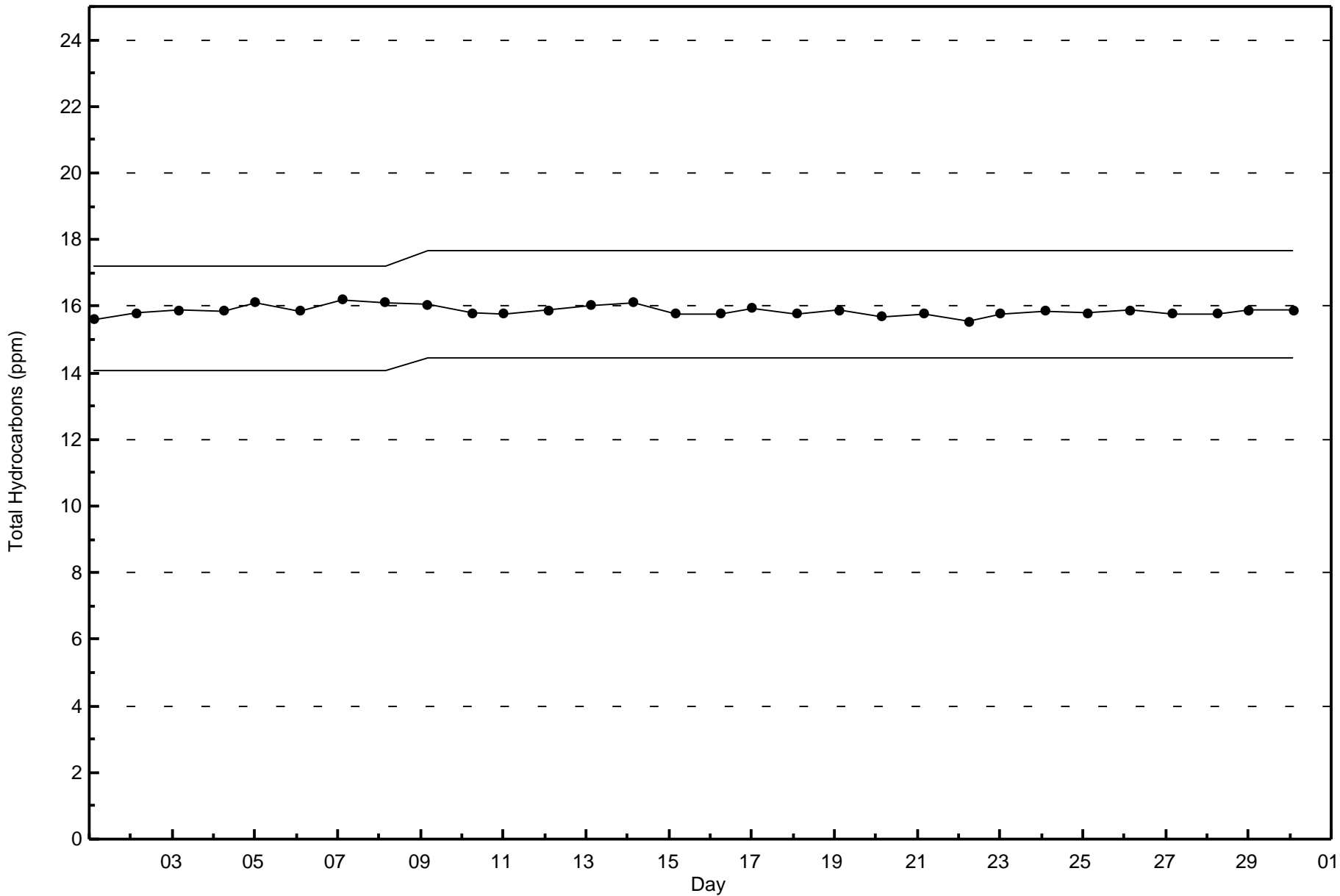


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

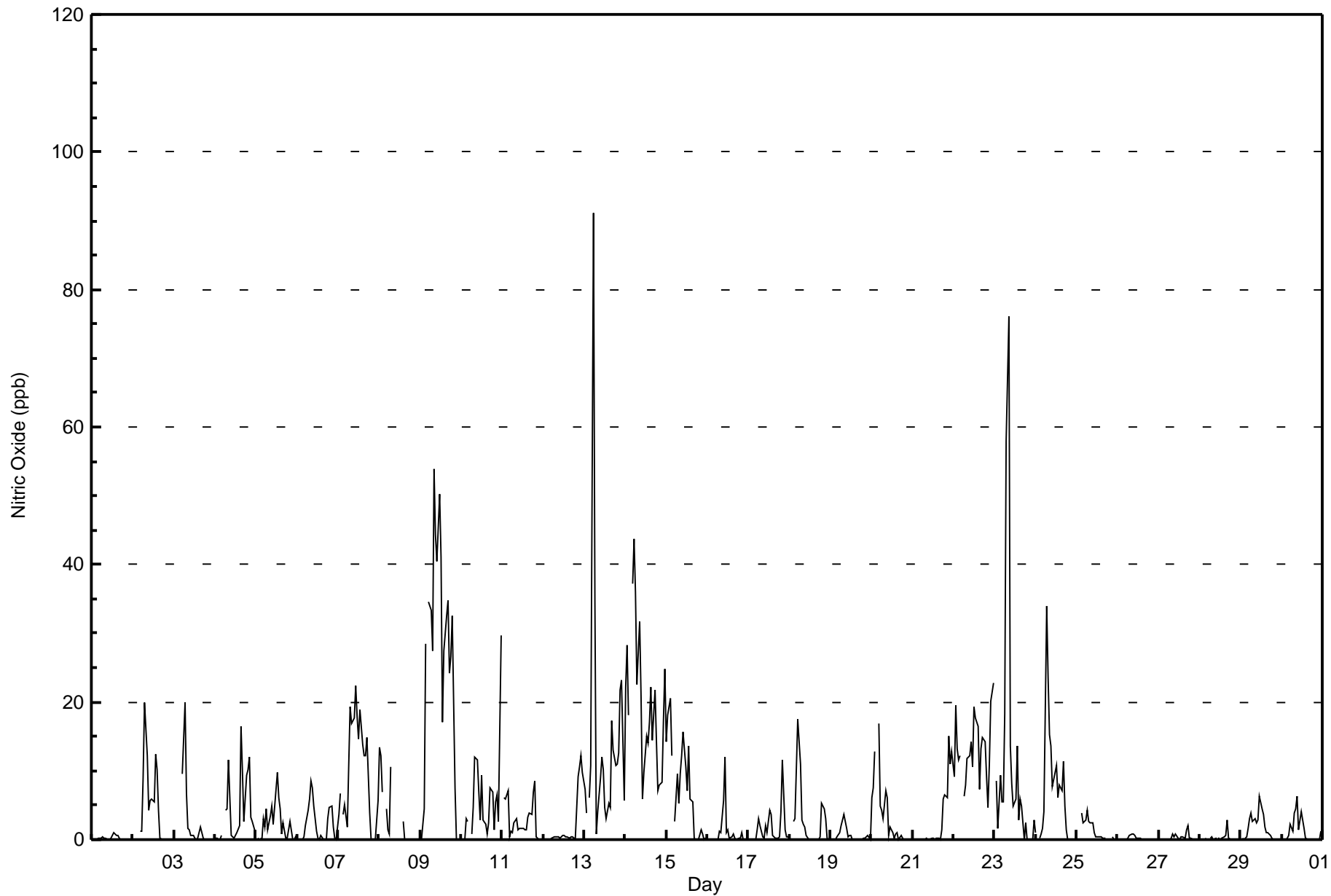
Nitric Oxide (NO) - ppb
Muskeg River - June 2017

Maximum Value: 91 ppb on Jun 13 06:00																		Maximum Daily Average: 24.4 ppb on Jun 9						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 1 19:00																		Minimum Daily Average: 0.2 ppb on Jun 26						Hours of Data: 681		
Maximum Diurnal Average: 10.3 ppb at hour 9																		Minimum Diurnal Average: 2.8 ppb at hour 22						Hours of Missing Data: 39		
Monthly Average: 5.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 6 P ₉₀ = 14 P ₉₉ = 43						Hours of Calibration: 36		
																								Percent Operational Time: 99.6		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.2	1
2-Jun	0	0	0	Z	1	1	9	20	12	4	6	6	6	12	10	4	0	0	0	0	0	0	0	0	4.0	20
3-Jun	0	0	0	0	Z	10	20	7	2	1	1	1	0	0	2	1	0	0	0	0	0	0	0	0	1.9	20
4-Jun	0	0	0	0	1	Z	4	4	12	1	0	0	1	1	2	16	10	3	9	10	12	3	3	1	4.1	16
5-Jun	Z	0	0	0	3	2	4	1	4	5	2	5	10	6	4	1	2	0	0	1	3	0	0	0	2.4	10
6-Jun	0	Z	0	0	0	2	4	6	8	8	5	1	0	0	1	0	0	0	3	5	5	2	0	0	2.2	8
7-Jun	4	7	Z	4	5	2	11	19	17	18	22	18	15	19	14	12	12	15	4	0	0	0	0	6	9.7	22
8-Jun	13	12	7	Z	5	1	1	11	C	C	C	C	C	C	3	0	0	0	0	0	0	0	0	0	--	13
9-Jun	0	0	4	28	Z	35	33	27	54	44	40	50	41	17	27	33	35	24	27	33	8	0	0	0	24.4	54
10-Jun	0	0	0	3	3	Z	1	5	12	12	7	3	9	3	2	1	2	7	7	1	6	7	3	30	5.3	30
11-Jun	Z	6	6	7	0	1	1	2	3	1	2	2	1	2	3	4	4	4	7	9	0	0	0	0	2.7	9
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	9	11	12	10	2.0	12
13-Jun	7	4	Z	6	11	91	34	1	4	9	12	10	5	3	5	5	17	13	11	11	13	22	23	6	14.0	91
14-Jun	22	28	18	Z	37	44	36	23	32	21	6	10	15	14	17	22	14	22	14	7	8	8	17	25	20.0	44
15-Jun	14	18	20	12	Z	3	9	5	9	12	16	11	7	14	6	6	0	0	0	0	1	1	0	0	7.2	20
16-Jun	0	0	0	0	0	Z	0	1	1	6	12	1	1	0	0	1	0	0	0	0	1	0	0	0	1.1	12
17-Jun	Z	0	0	0	0	1	3	2	0	0	2	1	4	4	1	0	0	0	0	0	4	12	1	0	1.6	12
18-Jun	0	Z	3	3	10	18	11	3	2	2	1	0	0	0	0	0	0	0	0	5	4	3	0	0	2.9	18
19-Jun	0	0	Z	0	0	1	2	3	4	2	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0.7	4
20-Jun	6	8	13	Z	17	5	4	3	7	6	1	2	1	0	1	1	0	1	0	0	0	0	0	0	3.3	17
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	6	6	6	15	11	13	2.6	15
22-Jun	9	19	13	12	12	Z	6	8	12	12	14	11	19	18	16	7	13	15	14	9	5	11	20	23	13.0	23
23-Jun	Z	9	2	9	6	6	18	58	76	14	8	5	6	14	3	6	5	0	2	0	0	0	0	3	10.8	76
24-Jun	1	Z	0	1	2	4	34	24	15	14	8	10	11	6	8	7	11	5	2	0	0	0	0	0	7.0	34
25-Jun	0	0	Z	4	2	3	4	3	2	2	1	0	0	0	0	0	0	0	0	0	PF	PF	PF	0	1.2	4
26-Jun	0	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jun	0	0	0	0	Z	0	0	0	1	0	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0.3	2
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0.3	3
29-Jun	Z	0	0	0	2	3	4	3	3	2	3	6	5	4	2	1	1	1	0	0	0	0	0	0	1.7	6
30-Jun	0	Z	0	0	1	2	1	4	4	6	1	4	3	2	0	0	0	0	0	0	0	0	0	1	1.3	6
																		Diurnal Average								
																		Diurnal Maximum								
Z - zerspan																		C - Calibration						PF - Power Failure		



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Muskeg River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	644	94.57	94.57
21 - 40	29	4.26	98.83
41 - 80	7	1.03	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



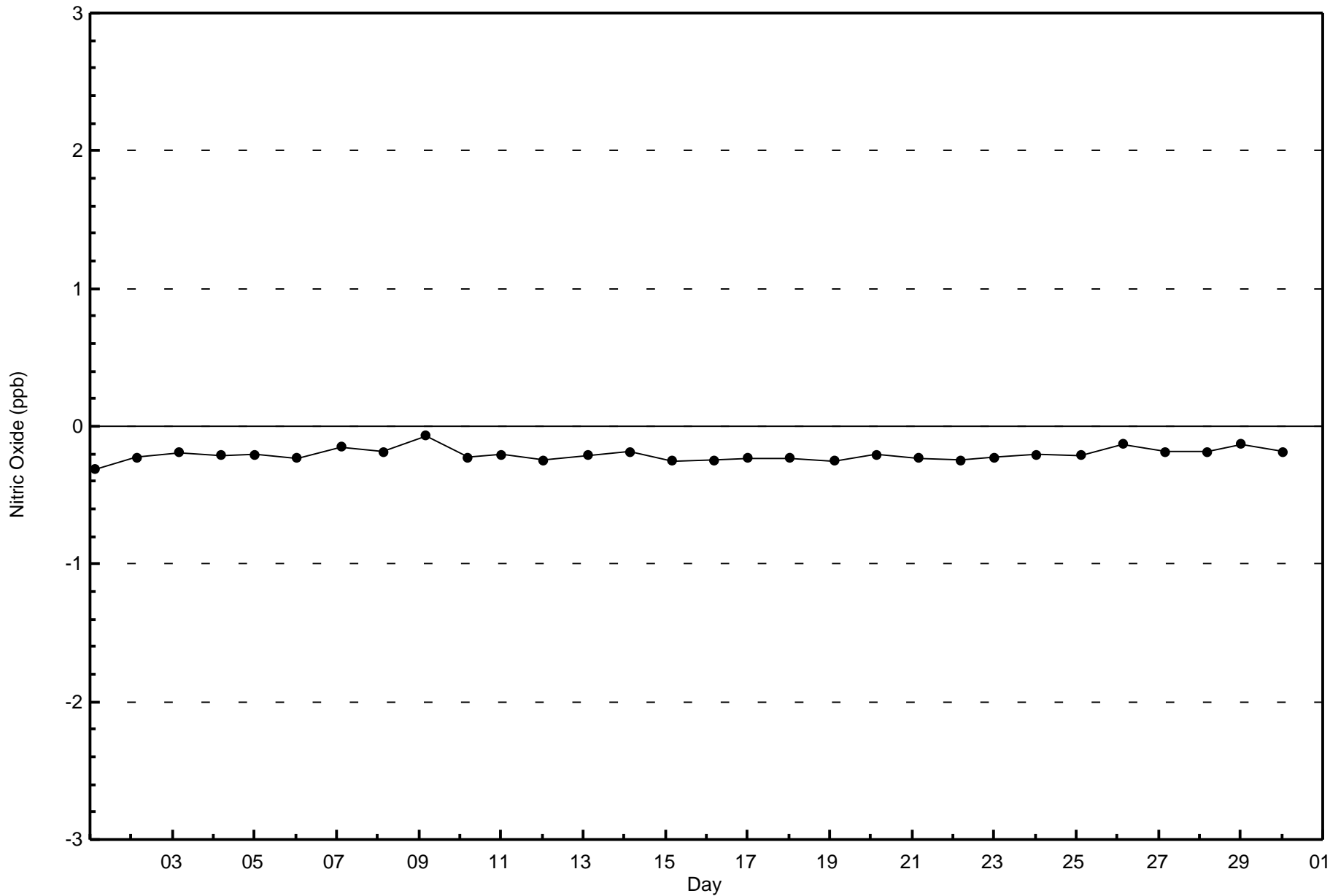
**Wood Buffalo Environmental Association
Frequency Distribution**

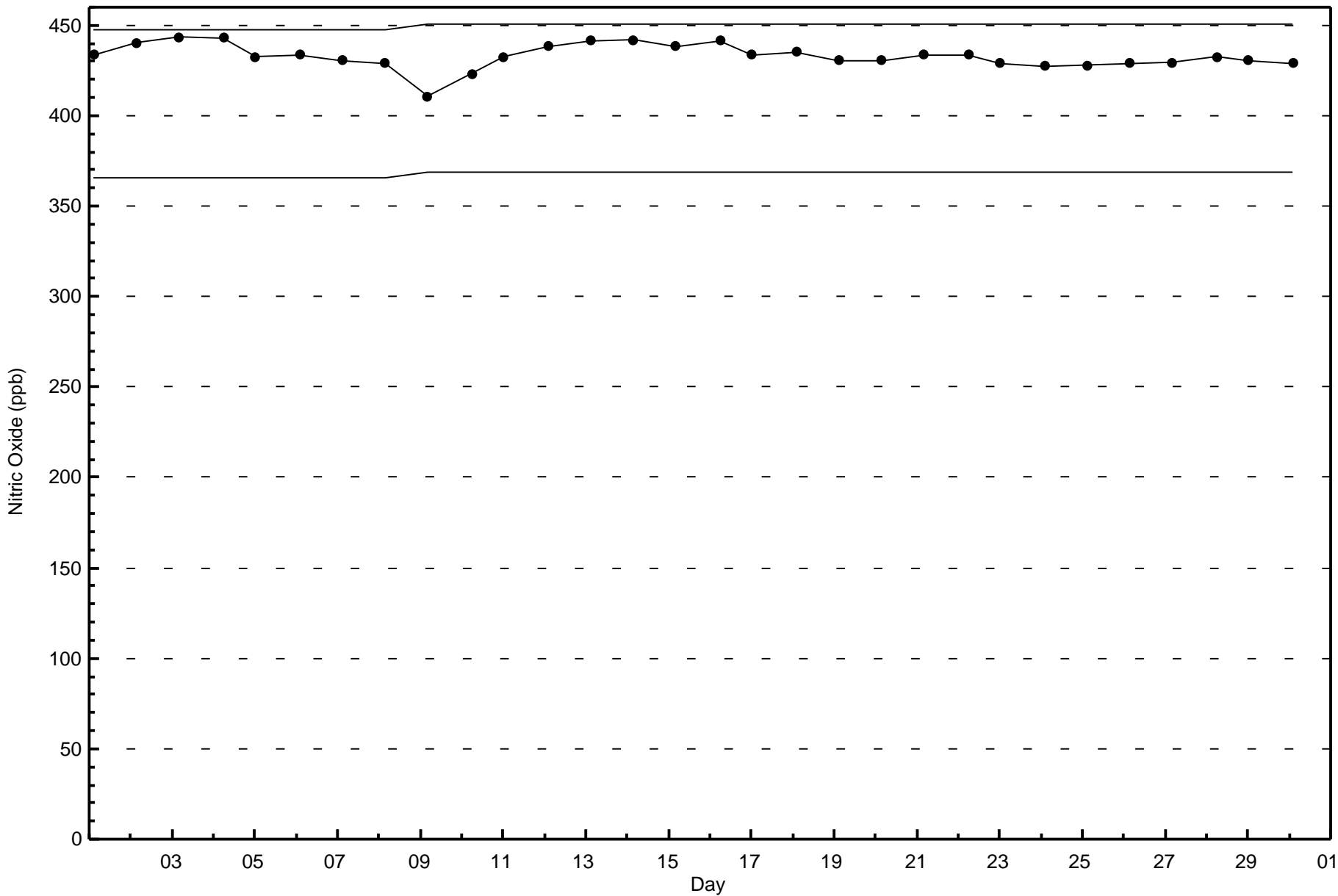
**Nitric Oxide (NO) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	54	66	36	32	21	27	71	84	41	19	28	41	24	21	16	644
21 - 40	4	21	1	0	0	0	0	0	0	0	0	0	1	0	0	2	29
11 - 80	0	5	0	0	0	0	0	0	0	0	0	1	0	0	1	0	7
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	80	67	36	32	21	27	71	84	41	19	29	42	24	22	19	681

Total Number of Valid Hours: 681

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Muskeg River - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 39 ppb on Jun 4 21:00	Maximum Daily Average: 14.7 ppb on Jun 9		Hours of Data:	681
Minimum Value: 0 ppb on Jun 11 22:00	Minimum Daily Average: 2.0 ppb on Jun 28		Hours of Missing Data:	39
Maximum Diurnal Average: 9.1 ppb at hour 9	Minimum Diurnal Average: 5.0 ppb at hour 18		Hours of Calibration:	36
Monthly Average: 6.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 10 P ₉₀ = 16 P ₉₉ = 31		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	1	Z	2	5	2	2	0	1	0	0	1	3	3	2	4	2	1	1	1	6	5	3	8	2.3	8	
2-Jun	4	6	10	Z	8	4	8	22	31	20	18	15	12	19	18	20	3	1	2	2	1	6	6	2	10.3	31	
3-Jun	5	2	1	5	Z	15	15	8	3	3	2	2	1	1	1	6	5	3	1	2	2	4	6	6	4.3	15	
4-Jun	7	5	2	5	6	Z	8	8	22	7	5	4	5	6	9	31	22	12	32	31	39	22	8	3	13.0	39	
5-Jun	Z	1	3	2	12	10	13	7	10	11	4	12	17	10	9	2	4	1	2	3	5	2	3	4	6.3	17	
6-Jun	4	Z	3	3	3	5	8	10	14	14	12	5	2	1	3	1	1	2	7	10	13	6	5	6	5.9	14	
7-Jun	13	18	Z	7	9	5	11	13	14	13	14	13	10	14	11	12	11	15	7	1	0	0	1	9	9.5	18	
8-Jun	16	15	12	Z	8	8	5	13	C	C	C	C	C	C	6	1	1	1	1	2	1	2	2	1	--	16	
9-Jun	1	1	10	23	Z	20	15	13	22	19	19	21	20	10	16	22	24	18	22	25	9	2	4	3	14.7	25	
10-Jun	1	1	1	7	7	Z	3	7	12	12	8	3	10	7	8	8	5	9	8	10	19	15	19	32	9.1	32	
11-Jun	Z	15	20	15	5	5	3	4	5	2	3	3	3	3	3	5	7	7	10	10	0	0	3	6	5.8	20	
12-Jun	1	Z	1	1	1	1	3	2	1	3	2	1	1	1	1	0	1	1	1	0	10	8	8	6	2.4	10	
13-Jun	4	3	Z	6	9	22	11	0	6	8	9	8	6	4	6	6	11	11	10	11	11	14	13	5	8.4	22	
14-Jun	12	13	12	Z	18	18	15	11	14	9	3	4	5	5	8	9	10	11	7	6	10	13	20	21	11.0	21	
15-Jun	20	21	20	15	Z	3	6	3	5	7	8	7	5	8	4	4	1	0	0	1	17	12	3	6	7.5	21	
16-Jun	5	6	2	1	1	Z	1	3	2	6	12	3	5	3	2	3	2	2	4	2	16	6	2	1	3.9	16	
17-Jun	Z	4	1	2	1	10	10	5	1	0	3	2	6	5	2	1	1	1	2	16	31	20	12	13	6.4	31	
18-Jun	7	Z	11	13	15	17	14	6	6	5	2	1	1	1	1	1	1	1	3	16	21	20	8	4	7.5	21	
19-Jun	3	2	Z	3	4	3	4	5	6	4	2	2	2	1	1	1	1	1	1	3	4	8	13	13	3.7	13	
20-Jun	19	19	20	Z	19	13	12	11	15	11	3	7	5	3	6	8	2	6	4	2	2	2	1	2	8.3	20	
21-Jun	5	5	3	2	Z	1	2	1	2	1	1	1	3	1	1	2	1	6	18	24	25	25	9	18	6.9	25	
22-Jun	17	13	15	16	14	Z	15	15	10	10	10	9	10	10	10	7	10	10	12	10	7	18	20	19	12.4	20	
23-Jun	Z	11	11	11	7	4	11	25	30	13	8	6	7	12	5	10	7	1	6	1	2	4	12	14	9.3	30	
24-Jun	8	Z	5	9	8	7	18	15	12	10	6	6	7	6	8	8	11	5	3	0	0	1	4	5	6.9	18	
25-Jun	11	18	Z	11	6	6	9	6	6	6	4	2	3	3	4	2	3	2	1	PF	PF	PF	2	1	3	5.3	18
26-Jun	7	11	9	Z	2	2	2	3	4	4	3	2	2	2	2	2	2	2	1	1	1	1	0	1	2.7	11	
27-Jun	1	1	2	5	Z	1	3	3	4	3	3	1	1	2	3	3	7	12	5	4	2	5	9	3	3.5	12	
28-Jun	3	4	2	2	1	Z	1	1	0	0	0	0	0	1	1	1	4	2	2	2	3	4	6	7	2.0	7	
29-Jun	Z	10	8	11	8	7	6	4	5	5	7	12	12	12	9	8	8	7	6	3	3	2	3	5	6.9	12	
30-Jun	5	Z	7	3	2	5	4	6	6	9	4	7	8	8	2	1	1	1	1	1	1	1	1	5	3.7	9	

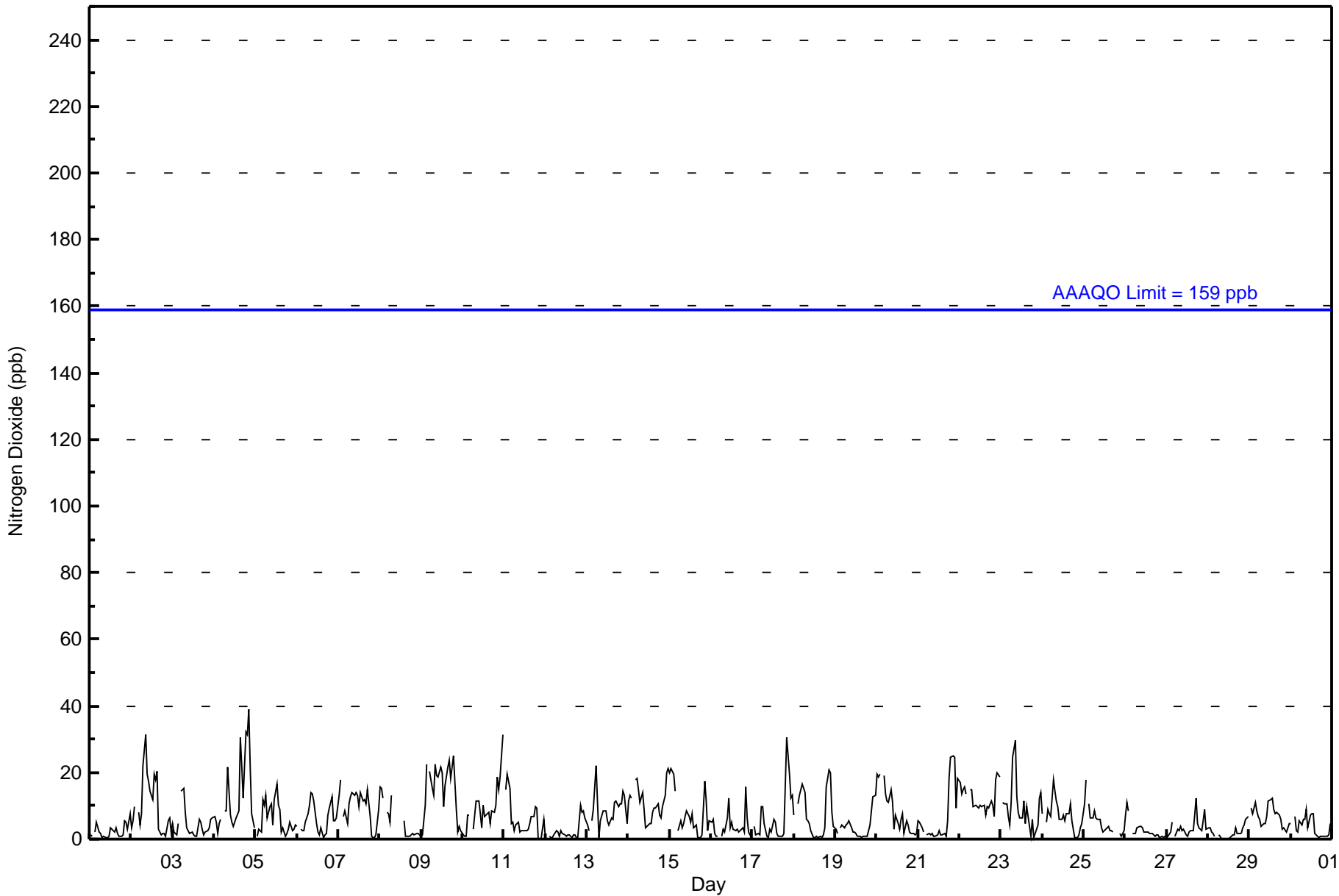
7.2	8.1	7.5	7.0	7.1	7.8	7.8	7.7	9.1	7.3	6.0	5.6	5.8	5.5	5.3	6.1	5.4	5.0	6.1	6.8	8.9	7.6	6.9	7.6	Diurnal Average
20	21	20	23	19	22	18	25	31	20	19	21	20	19	18	31	24	18	32	31	39	25	20	32	Diurnal Maximum

Z - zeronspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Muskeg River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Muskeg River - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	654	96.04	96.04
21 - 40	27	3.96	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	62	72	66	35	32	21	27	71	84	41	19	28	42	24	19	11	654
21 - 40	5	8	1	1	0	0	0	0	0	0	0	1	0	0	3	8	27
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	80	67	36	32	21	27	71	84	41	19	29	42	24	22	19	681

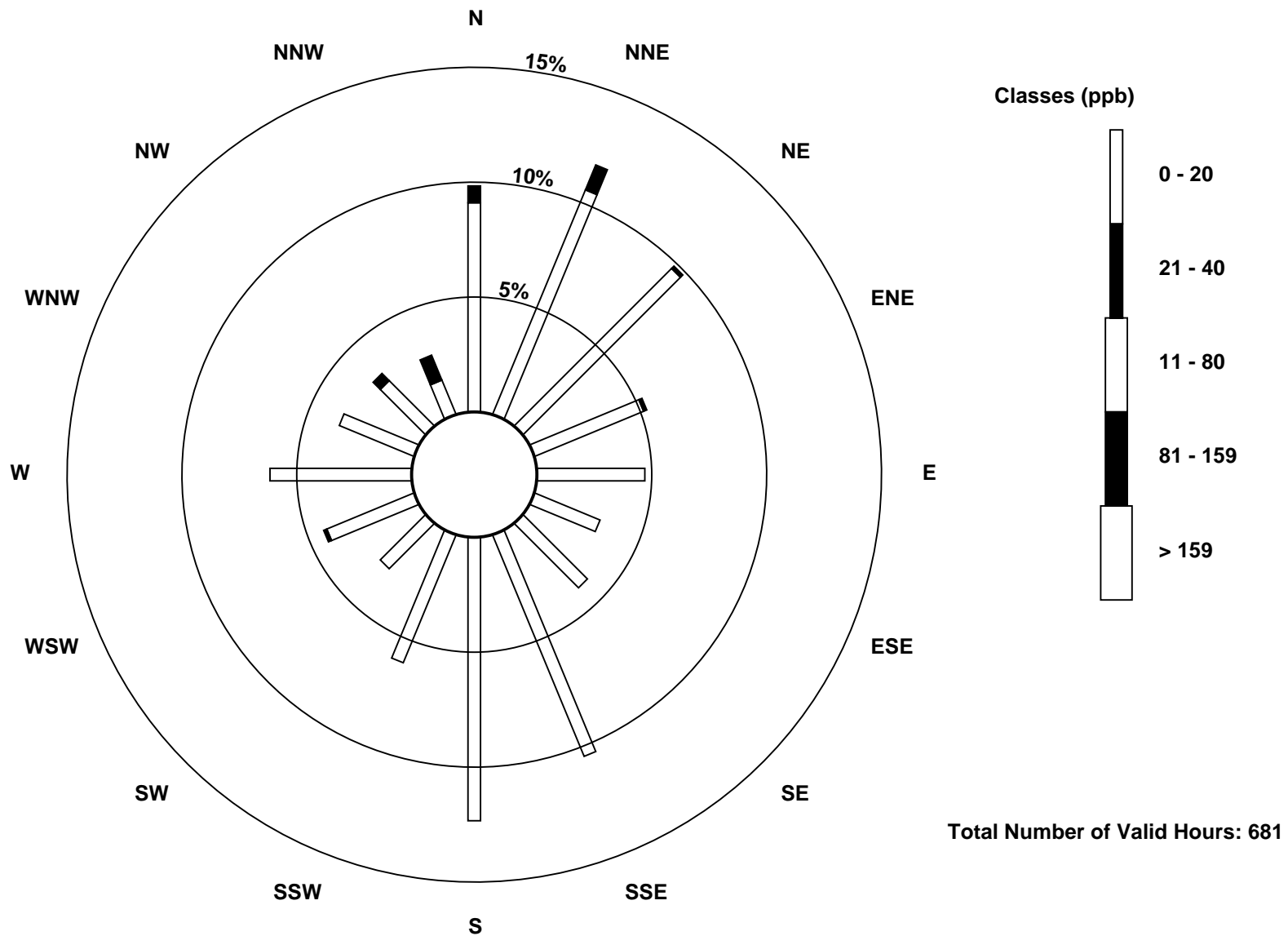
Total Number of Valid Hours: 681

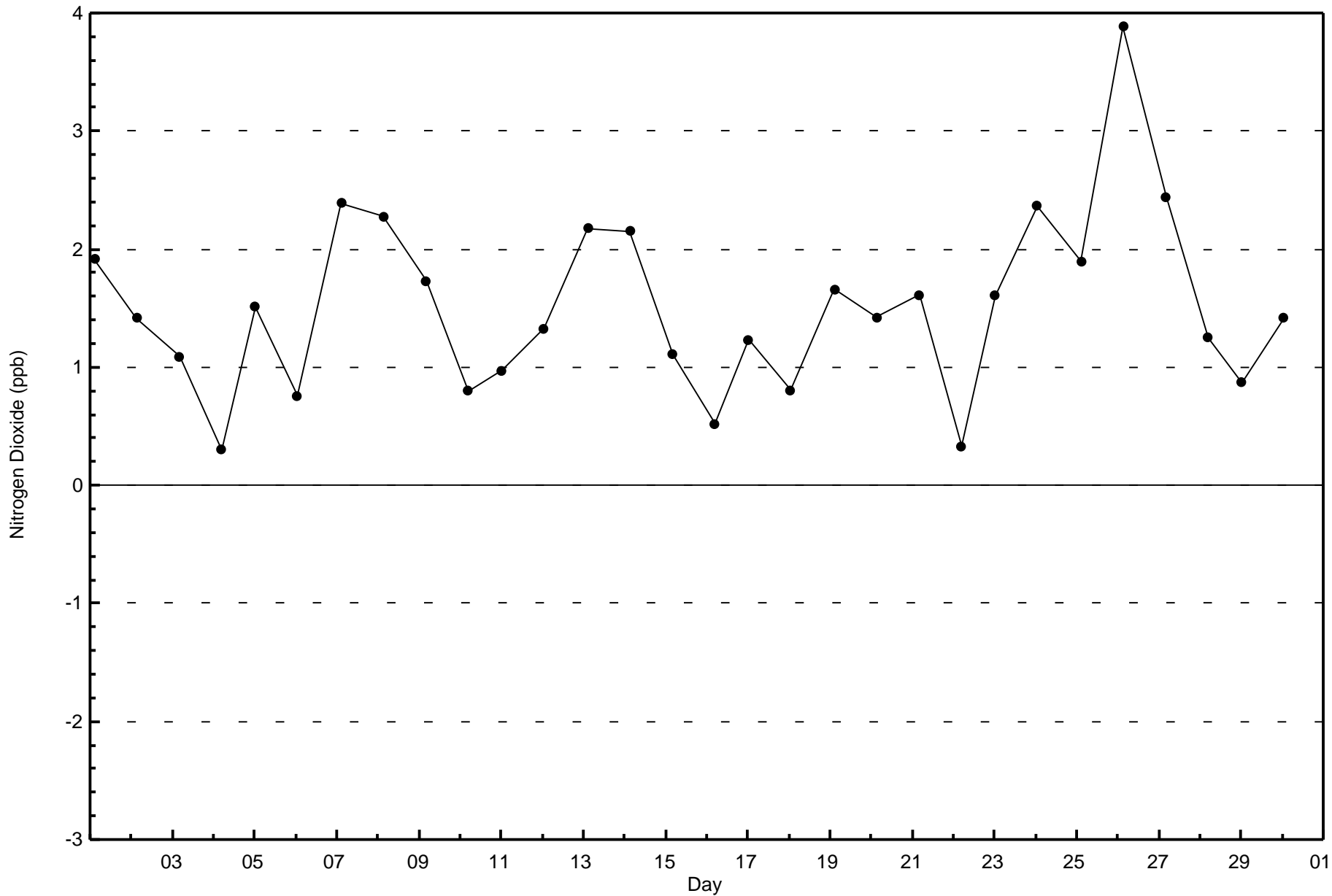
Total Number of Hours: 720

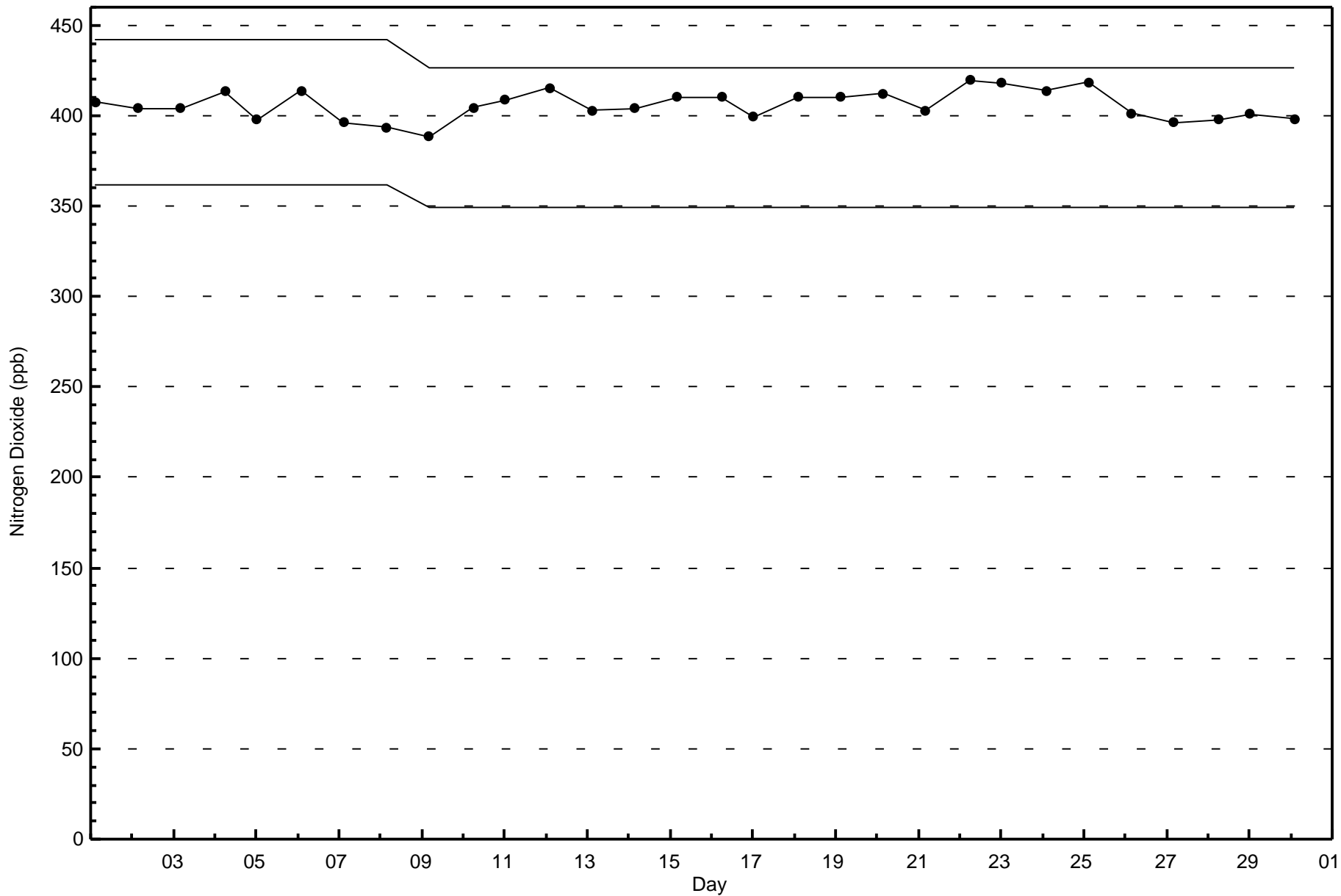


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

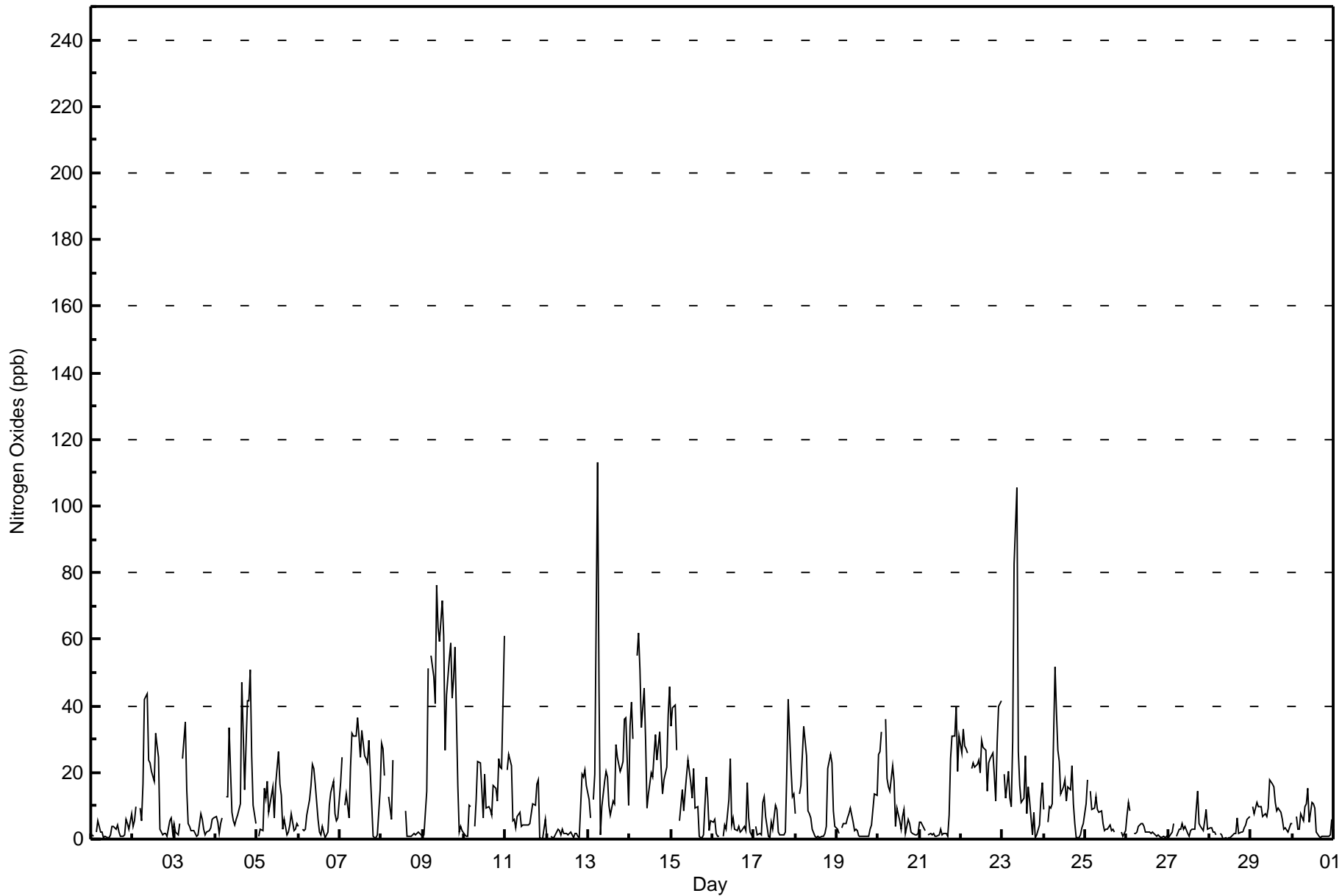
Nitrogen Oxides (NO_x) - ppb
Muskeg River - June 2017

Maximum Value: 113 ppb on Jun 13 06:00 Maximum Daily Average: 39.1 ppb on Jun 9																		Hours in Service: 720 Hours of Data: 681 Hours of Missing Data: 39 Hours of Calibration: 36 Percent Operational Time: 99.6									
Minimum Value: 0 ppb on Jun 11 22:00 Minimum Daily Average: 2.3 ppb on Jun 28 Maximum Diurnal Average: 19.4 ppb at hour 9 Minimum Diurnal Average: 8.8 ppb at hour 18 Monthly Average: 11.9 ppb Percentiles: P ₁ = 0 P ₁₀ = 1 O ₁ = 2 Median = 6 O ₃ = 17 P ₉₀ = 30 P ₉₉ = 61																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	1	Z	2	5	2	2	1	1	0	0	1	4	4	3	4	2	1	1	1	6	5	3	8	2.6	8	
2-Jun	4	6	10	Z	9	5	17	42	43	24	23	20	17	32	28	24	3	1	2	2	1	6	6	2	14.3	43	
3-Jun	5	2	1	5	Z	24	35	15	5	4	3	3	2	1	1	8	6	3	1	2	2	4	6	6	6.2	35	
4-Jun	7	5	2	4	6	Z	13	13	33	8	6	4	6	7	11	47	32	15	42	41	51	25	10	4	17.0	51	
5-Jun	Z	1	3	2	15	12	17	8	13	16	6	16	26	16	13	3	6	1	2	4	8	2	3	5	8.7	26	
6-Jun	4	Z	3	3	3	7	12	16	22	21	16	6	2	1	4	1	1	2	10	14	17	7	6	7	8.1	22	
7-Jun	17	24	Z	10	14	7	21	32	31	31	36	31	24	33	25	24	23	30	11	1	0	0	1	15	19.2	36	
8-Jun	29	27	19	Z	13	9	6	24	C	C	C	C	C	C	8	1	1	1	1	2	1	2	2	1	--	29	
9-Jun	1	1	14	51	Z	55	49	41	76	63	59	72	61	27	43	54	59	42	48	58	16	2	4	3	39.1	76	
10-Jun	1	1	1	10	10	Z	4	12	23	23	15	6	19	9	10	9	7	16	15	12	24	22	21	61	14.4	61	
11-Jun	Z	21	25	22	5	6	3	7	8	4	4	4	4	4	5	8	10	10	17	18	0	0	3	6	8.5	25	
12-Jun	1	Z	1	1	0	1	3	2	1	3	2	2	1	2	2	1	2	2	1	0	19	19	21	16	4.4	21	
13-Jun	12	6	Z	12	20	113	45	1	10	17	21	19	10	7	11	10	28	24	20	21	23	36	36	10	22.4	113	
14-Jun	34	41	30	Z	55	62	51	34	45	30	9	14	20	19	25	32	24	32	21	14	18	22	37	46	31.0	62	
15-Jun	34	39	40	27	Z	5	15	9	14	19	24	17	12	21	9	10	1	0	0	1	19	12	3	6	14.7	40	
16-Jun	5	6	2	1	1	Z	1	4	3	12	24	4	6	3	3	4	2	3	4	2	17	6	2	1	5.0	24	
17-Jun	Z	4	1	2	1	11	13	7	1	1	5	3	10	9	2	1	1	1	2	20	42	21	13	14	8.0	42	
18-Jun	8	Z	13	16	25	34	25	9	8	7	3	1	1	1	1	1	1	2	4	21	25	23	8	4	10.4	34	
19-Jun	3	2	Z	3	5	5	6	8	9	5	2	3	2	1	1	1	1	1	1	3	4	9	13	13	4.4	13	
20-Jun	25	26	32	Z	36	18	16	14	22	17	4	9	6	3	7	9	2	6	4	2	2	1	1	2	11.6	36	
21-Jun	5	5	3	2	Z	1	2	1	2	1	1	1	3	1	1	2	1	7	24	31	31	40	20	31	9.5	40	
22-Jun	26	33	28	27	26	Z	21	23	22	23	24	20	30	27	27	14	23	24	26	19	12	29	40	41	25.4	41	
23-Jun	Z	20	12	20	12	10	29	83	105	26	16	11	12	25	7	15	12	1	8	1	1	4	12	17	20.1	105	
24-Jun	9	Z	5	10	9	11	52	38	27	23	14	16	18	12	16	15	22	10	5	0	0	1	4	5	13.9	52	
25-Jun	11	18	Z	15	9	9	13	9	8	8	5	2	3	3	4	3	3	2	2	PF	PF	PF	2	1	2	6.5	18
26-Jun	7	11	9	Z	2	2	2	4	5	5	4	2	2	2	1	2	2	1	1	1	0	1	0	1	2.9	11	
27-Jun	1	1	2	5	Z	1	3	3	5	3	4	2	1	2	3	3	9	14	5	4	2	5	9	3	3.9	14	
28-Jun	3	4	2	2	1	Z	2	1	0	0	0	0	0	1	2	2	6	2	2	2	3	4	6	7	2.3	7	
29-Jun	Z	10	8	11	10	10	10	7	8	7	9	18	16	16	11	9	9	8	6	3	3	2	3	5	8.6	18	
30-Jun	5	Z	7	3	3	8	6	10	10	15	5	11	10	9	2	1	1	1	1	1	1	1	1	6	5.1	15	
10.3 12.6 11.0 10.6 11.8 17.1 16.4 15.8 19.4 14.4 11.9 11.0 11.4 10.3 9.5 10.5 9.9 8.8 9.8 10.4 12.1 10.5 9.9 11.5																								Diurnal Average			
34 41 40 51 55 113 52 83 105 63 59 72 61 33 43 54 59 42 48 58 51 40 40 61																								Diurnal Maximum			
Z - zerospan			C - Calibration			PF - Power Failure																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Muskeg River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	540	79.30	79.30
21 - 40	106	15.57	94.86
41 - 80	32	4.70	99.56
81 - 159	3	0.44	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Muskeg River - June 2017**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 20	20	36	52	35	32	21	27	67	79	39	18	28	41	23	14	8	540
21 - 40	46	23	14	0	0	0	0	4	5	2	1	0	0	1	6	4	106
11 - 80	1	21	1	1	0	0	0	0	0	0	0	0	1	0	1	6	32
81 - 159	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	80	67	36	32	21	27	71	84	41	19	29	42	24	22	19	681

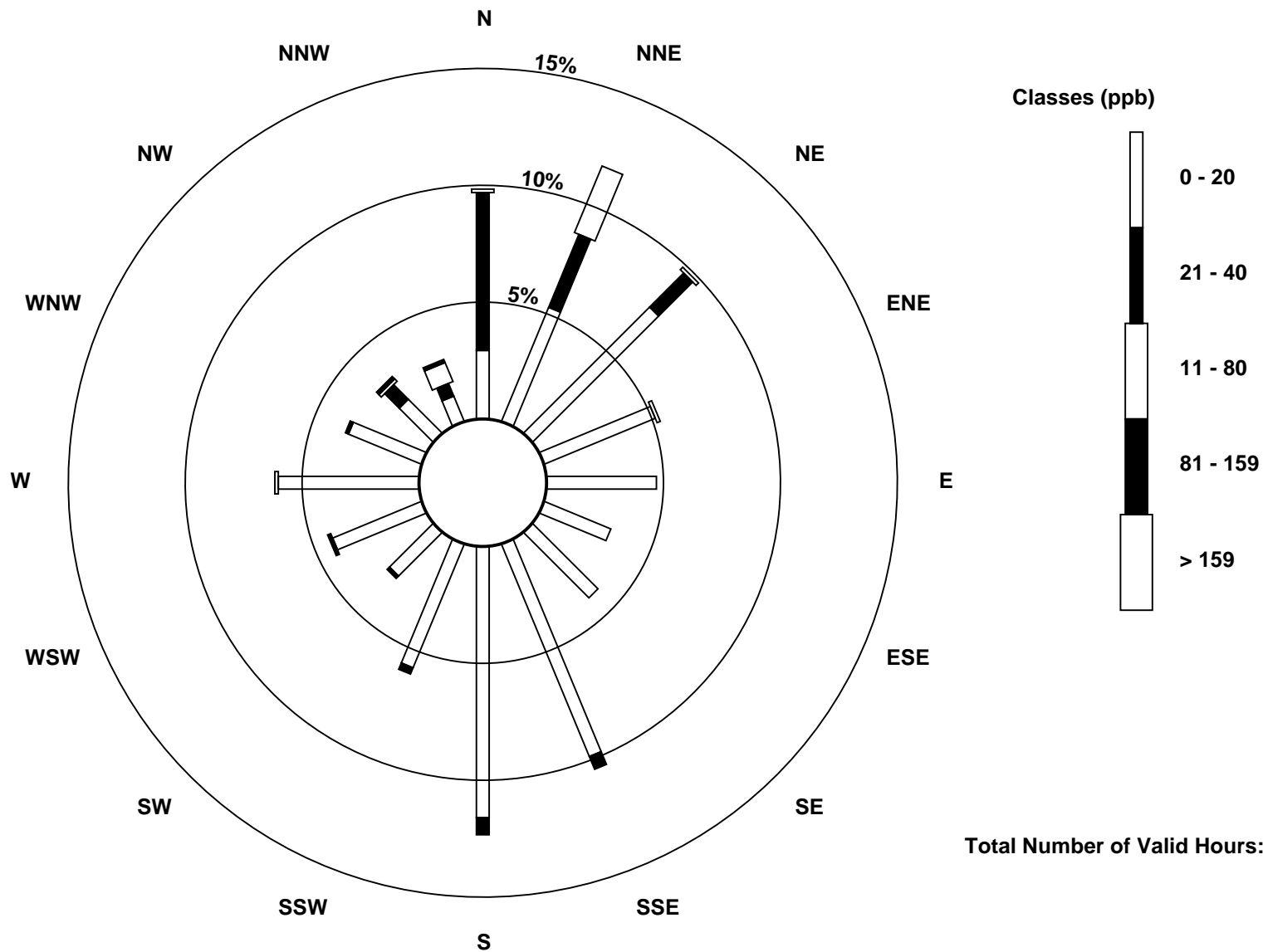
Total Number of Valid Hours: 681

Total Number of Hours: 720

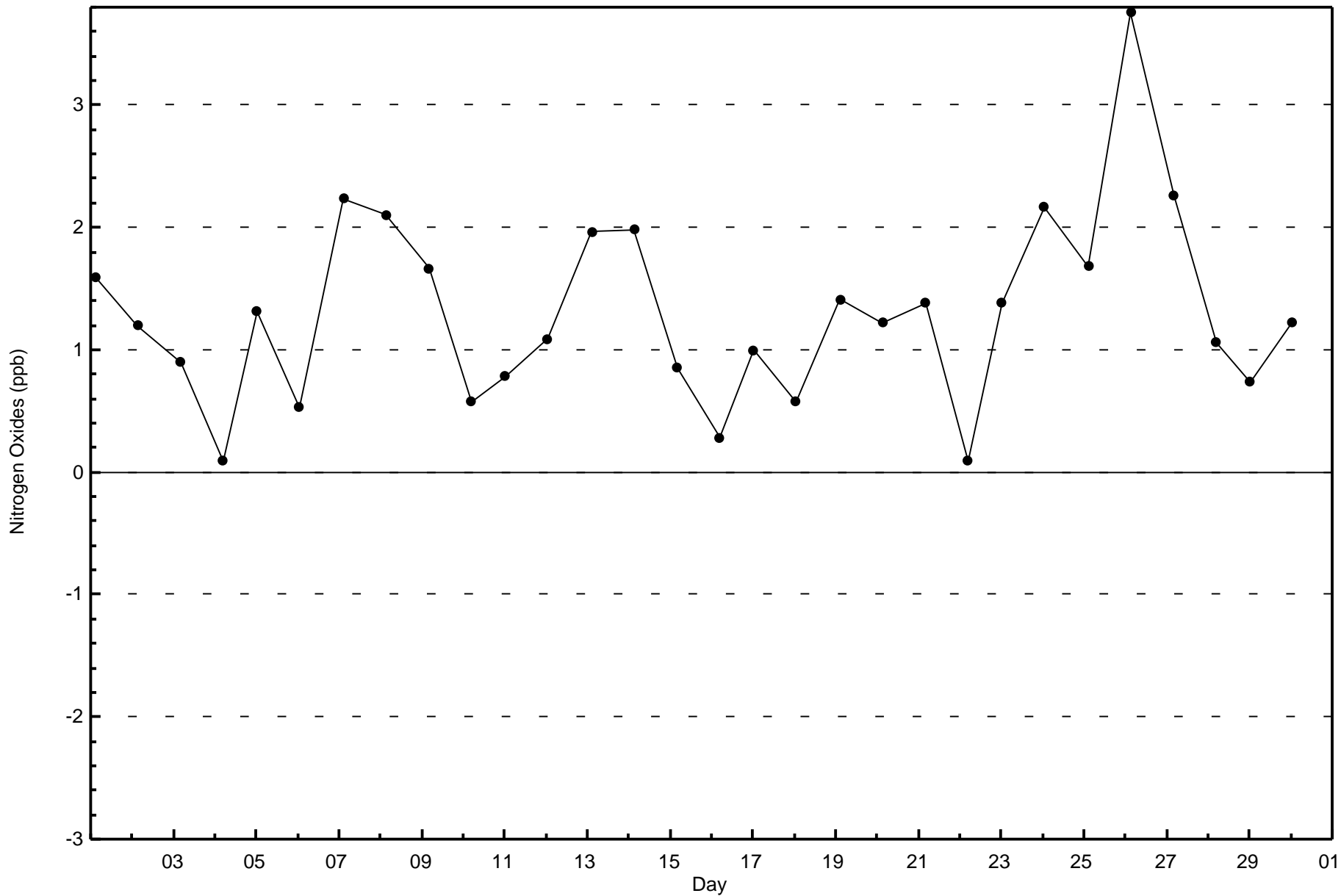


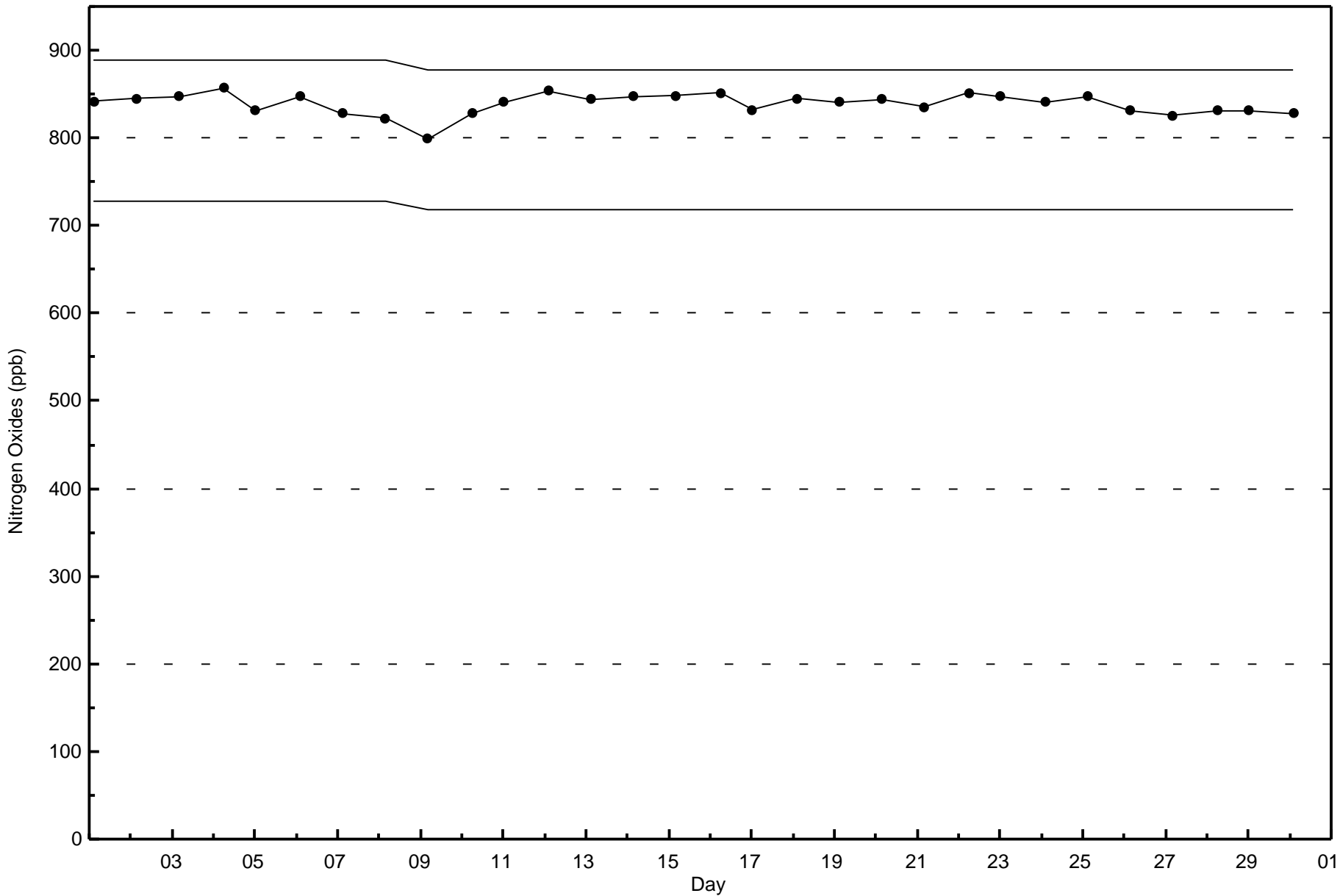
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Muskeg River (AMS 16)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

Muskeg River - June 2017

Number of Exceedences (AAAQO):	24-hr: 1	Hours in Service:	720
Maximum Value: 234.2 µg/m ³ on Jun 2 09:00	Maximum Daily Average: 42.9 µg/m ³ on Jun 2	Hours of Data:	715
Minimum Value: 0.0 µg/m ³ on Jun 3 04:00	Minimum Daily Average: 0.8 µg/m ³ on Jun 21	Hours of Missing Data:	5
Maximum Diurnal Average: 14.1 µg/m ³ at hour 9	Minimum Diurnal Average: 5.9 µg/m ³ at hour 18	Hours of Calibration:	1
Monthly Average: 8.89 µg/m ³	Percentiles: P ₁ = 0.2 P ₁₀ = 1.3 Q ₁ = 2.8 Median = 5.4 Q ₃ = 10.5 P ₉₀ = 17.4 P ₉₉ = 55.8	Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	3.8	4.0	3.7	7.4	11.4	10.5	16.4	9.2	5.3	4.6	2.9	3.0	9.1	13.1	8.9	20.0	14.7	10.9	8.7	5.3	4.7	6.1	7.7	17.1	8.7	20.0
2-Jun	25.7	28.2	28.2	21.9	19.1	17.4	14.0	38.8	234.2	222.3	130.0	95.6	45.7	34.2	27.2	11.2	12.0	6.5	5.7	4.4	3.1	1.8	1.8	1.3	42.9	234.2
3-Jun	1.4	0.8	UO	0.0	0.5	0.2	0.9	0.4	0.5	0.5	0.9	0.9	1.1	0.8	1.0	2.6	2.3	0.5	0.9	2.2	2.1	1.2	0.9	2.6	1.1	2.6
4-Jun	4.2	7.4	11.9	15.6	9.1	7.0	4.2	4.7	4.6	5.0	5.4	3.6	1.9	2.5	4.4	15.2	16.7	10.5	17.2	6.8	7.5	5.4	3.6	3.5	7.4	17.2
5-Jun	3.4	1.3	1.2	2.1	2.7	1.6	1.8	0.9	0.6	0.8	0.7	0.9	0.6	1.4	1.6	1.3	2.3	2.2	2.4	3.2	4.6	3.3	4.0	3.0	2.0	4.6
6-Jun	2.1	2.8	4.0	2.9	2.5	3.1	3.9	4.2	16.3	12.0	4.2	9.8	7.1	5.0	7.7	4.9	7.7	4.1	4.9	4.2	2.4	1.7	4.6	7.9	5.4	16.3
7-Jun	12.3	14.5	12.5	12.1	15.4	11.3	17.1	10.8	11.6	10.4	10.1	9.5	5.0	4.8	6.0	6.4	6.2	7.4	5.8	6.1	2.0	1.1	2.0	3.6	8.5	17.1
8-Jun	4.0	5.5	9.1	6.9	9.0	13.7	8.7	12.1	11.6	C	19.6	18.3	7.6	3.0	23.9	24.8	8.4	7.8	9.4	9.4	6.5	6.4	36.1	7.3	11.7	36.1
9-Jun	55.8	29.5	33.4	26.5	11.7	12.0	36.5	19.6	13.1	10.8	15.0	15.1	17.3	20.0	12.7	9.3	9.2	7.5	8.9	10.9	4.3	3.2	3.2	2.2	16.2	55.8
10-Jun	1.6	10.0	9.2	6.3	4.1	3.4	1.3	4.9	2.9	2.1	1.2	1.1	1.3	10.5	10.8	11.0	9.6	2.9	2.3	10.2	7.4	4.7	3.0	4.4	5.3	11.0
11-Jun	4.1	4.5	4.6	4.7	4.6	4.4	2.9	2.8	3.5	1.7	2.0	2.3	4.9	6.9	3.7	4.1	6.4	5.9	4.0	2.1	1.5	1.8	8.2	7.7	4.1	8.2
12-Jun	7.9	5.2	5.7	5.3	3.8	2.9	2.5	2.2	3.0	3.1	3.8	2.0	3.1	5.3	5.5	1.6	0.9	1.9	5.1	6.3	4.6	5.3	7.0	8.6	4.3	8.6
13-Jun	9.6	12.1	13.8	7.3	5.2	14.2	6.3	1.9	4.9	3.5	2.8	7.1	11.2	10.4	12.2	7.4	5.3	9.7	5.1	7.1	6.6	4.9	3.6	4.3	7.4	14.2
14-Jun	5.2	4.8	5.4	4.0	4.3	2.1	0.9	1.1	0.9	1.5	2.2	2.6	3.2	3.5	3.8	7.9	12.3	7.0	4.3	1.4	1.4	3.0	4.7	2.4	3.7	12.3
15-Jun	1.5	3.6	4.3	1.6	1.2	2.4	1.4	1.7	10.8	4.9	2.7	7.2	5.1	1.9	1.5	1.4	2.3	2.8	3.7	10.1	10.3	3.0	1.5	2.8	3.7	10.8
16-Jun	6.1	8.3	7.0	6.0	6.3	3.4	1.8	2.8	2.8	4.5	5.1	4.5	5.0	2.1	1.3	1.7	5.0	9.3	7.9	3.0	4.8	6.4	3.2	2.3	4.6	9.3
17-Jun	1.5	1.5	1.1	2.1	1.6	5.0	5.4	4.4	1.6	4.0	11.1	9.3	7.5	8.5	10.2	3.9	7.0	4.3	4.1	9.3	16.1	20.7	24.9	26.8	8.0	26.8
18-Jun	9.9	6.6	12.1	8.0	7.9	7.7	6.1	2.5	10.5	10.5	22.1	12.7	5.0	77.4	21.2	8.0	5.5	6.2	8.1	27.7	37.0	9.7	6.6	8.8	14.1	77.4
19-Jun	6.8	4.3	5.4	22.4	12.9	27.5	16.1	19.2	19.0	13.1	4.6	4.3	3.7	2.8	3.0	2.5	7.5	5.1	15.6	33.0	24.9	50.2	40.0	18.4	15.1	50.2
20-Jun	24.8	26.4	22.3	24.4	19.6	10.3	10.3	8.1	13.2	11.2	8.7	15.0	20.1	8.2	5.3	4.2	1.1	1.2	2.3	1.9	2.1	2.3	2.9	2.8	10.4	26.4
21-Jun	4.0	1.0	0.4	0.5	0.6	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.6	0.9	1.1	2.1	2.1	0.8	0.8	0.8	4.0
22-Jun	0.8	0.7	1.2	1.5	1.6	1.8	2.3	2.6	2.6	2.6	2.9	3.1	2.8	2.3	2.2	2.5	2.1	1.5	1.6	2.5	2.7	10.5	52.1	55.8	6.8	55.8
23-Jun	17.1	8.5	5.5	7.7	9.3	9.8	0.8	2.9	5.7	6.7	4.7	3.0	13.3	6.6	3.1	4.6	5.0	3.2	3.0	2.9	5.7	11.2	13.5	32.2	7.8	32.2
24-Jun	8.9	21.1	8.1	7.6	9.1	8.7	3.5	2.6	4.1	3.4	3.3	3.4	4.3	3.8	4.3	3.2	3.9	3.3	3.1	2.3	3.1	6.6	34.4	16.8	7.2	34.4
25-Jun	13.9	13.2	11.4	14.7	6.5	6.2	7.4	10.6	15.2	11.4	8.3	8.8	13.0	23.6	30.1	21.9	15.3	9.6	PF	PF	PF	19.4	21.7	22.4	14.5	30.1
26-Jun	21.3	19.0	16.8	16.4	14.3	10.6	9.7	11.0	5.9	4.5	9.6	11.3	10.5	12.0	13.3	12.3	10.6	10.7	11.9	10.9	8.3	7.1	7.7	13.1	11.6	21.3
27-Jun	8.9	5.9	7.9	9.8	7.5	5.9	6.9	3.4	5.5	4.7	12.1	3.7	1.0	1.2	0.7	1.0	2.0	1.9	2.6	6.0	6.1	4.2	5.8	6.1	5.0	12.1
28-Jun	4.5	5.3	6.6	5.2	6.4	6.5	2.3	2.7	1.0	0.9	1.2	7.0	7.6	7.0	13.5	20.9	22.3	19.4	18.9	20.3	16.6	14.3	16.0	18.3	10.2	22.3
29-Jun	17.0	15.3	9.9	9.5	9.7	4.6	3.9	6.4	3.7	3.0	5.8	8.3	9.9	11.8	14.5	14.3	9.2	9.3	12.7	8.6	6.5	7.8	17.1	13.9	9.7	17.1
30-Jun	12.5	18.0	16.8	17.5	17.6	11.9	4.6	3.4	8.5	14.7	6.5	7.0	13.5	16.3	5.6	3.9	3.7	3.9	6.3	5.4	3.9	3.6	4.9	8.1	9.1	18.0

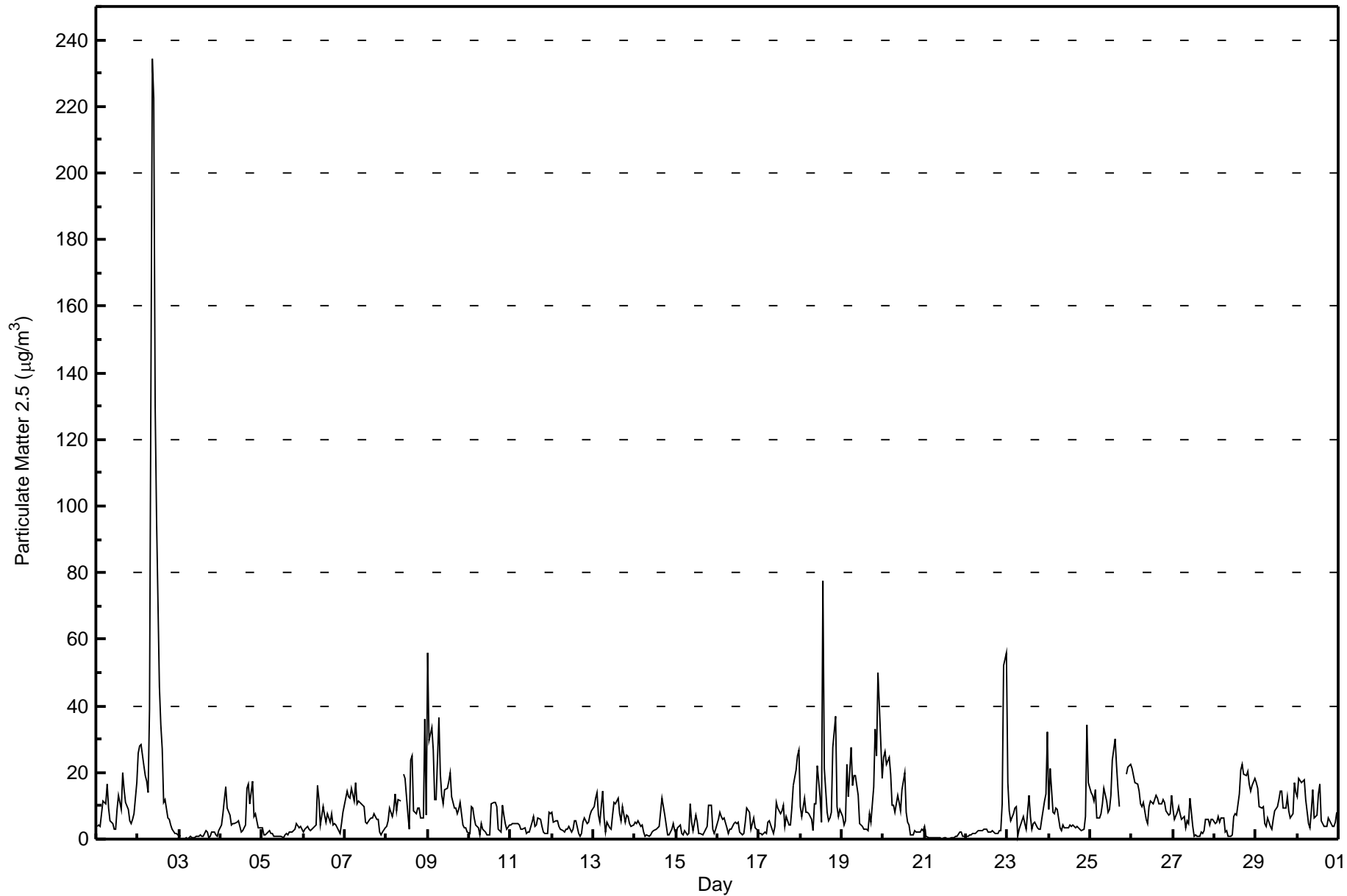
10.0	9.6	9.6	9.3	7.9	7.6	6.7	6.6	14.1	13.1	10.3	9.4	8.1	10.2	8.6	7.8	7.2	5.9	6.5	7.8	7.2	7.6	11.5	10.8	Diurnal Average	
55.8	29.5	33.4	26.5	19.6	27.5	36.5	38.8	234.2	222.3	130.0	95.6	45.7	77.4	30.1	24.8	22.3	19.4	18.9	33.0	37.0	50.2	52.1	55.8	Diurnal Maximum	

C - Calibration UO - Unstable Operation PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	311	43.50	43.50
6 - 15	261	36.50	80.00
16 - 25	62	8.67	88.67
26 - 80	27	3.78	92.45
> 81.0	4	0.56	93.01

Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Muskeg River - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	45	43	42	19	12	9	8	22	33	17	6	12	12	10	13	8	311
6 - 15	13	28	26	13	18	10	13	36	36	13	9	12	9	10	5	10	261
16 - 25	1	4	2	1	2	2	3	11	17	7	2	6	1	1	1	1	62
26 - 80	3	2	1	2	0	0	1	4	6	2	1	1	2	1	1	0	27
> 81.0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Totals	64	78	72	35	32	21	25	73	92	39	18	31	24	22	20	19	665

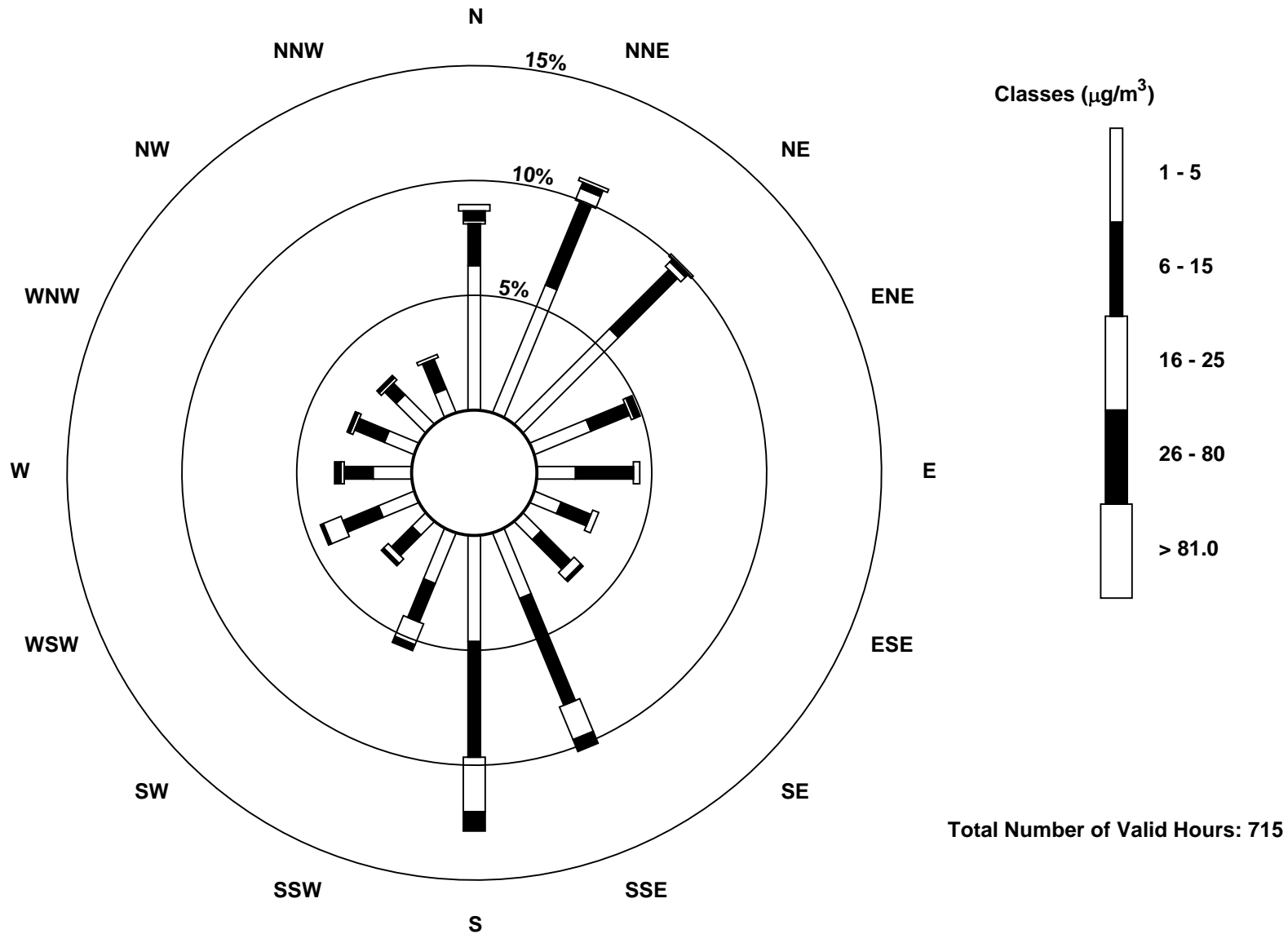
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River (AMS 16)





Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

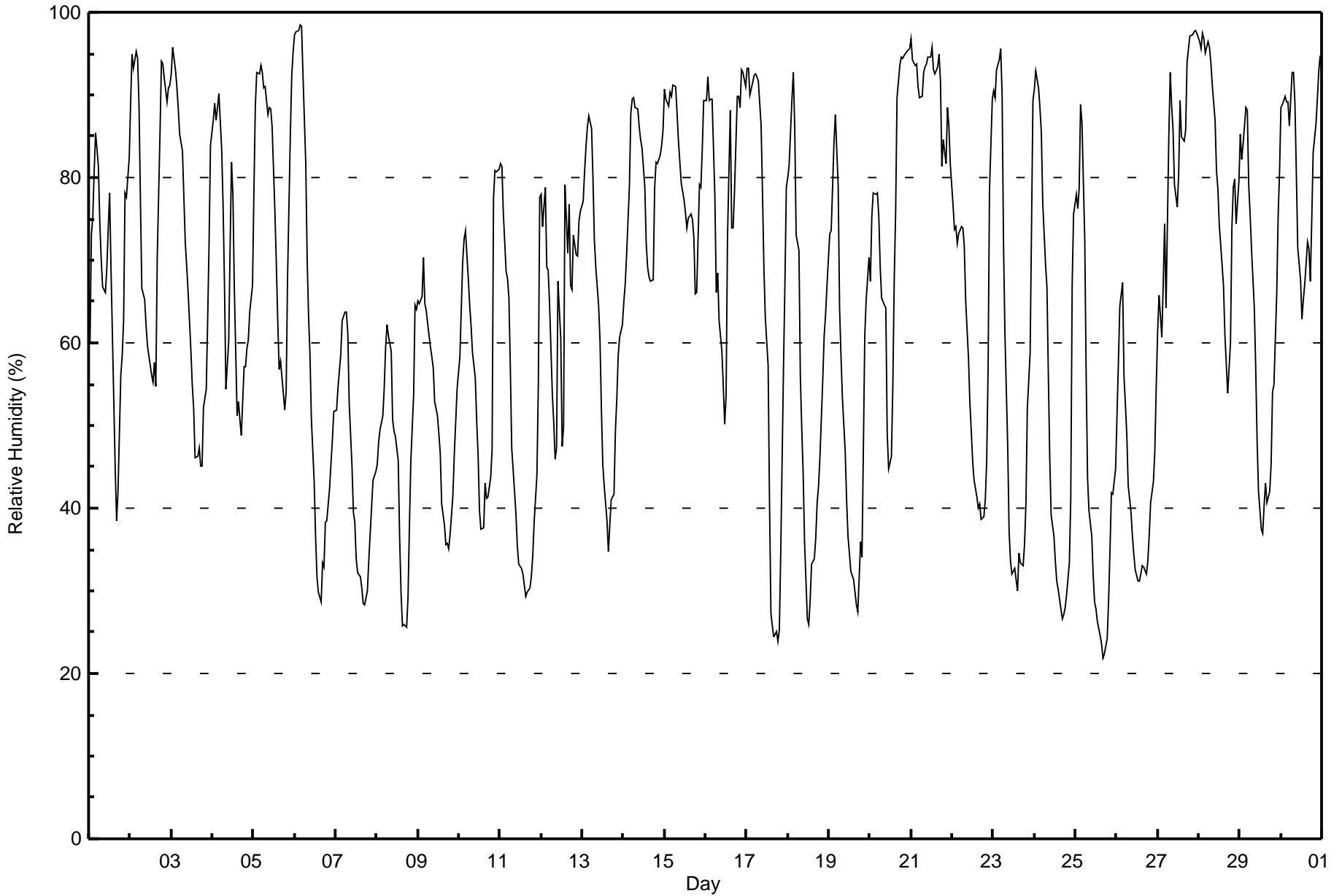
Muskeg River - June 2017

Maximum Value: 99 % on Jun 6 04:00																		Maximum Daily Average: 91.0 % on Jun 21																		Hours in Service: 720	
Minimum Value: 22 % on Jun 25 17:00																		Minimum Daily Average: 43.0 % on Jun 26																		Hours of Data: 720	
Maximum Diurnal Average: 82.5 % at hour 5																		Minimum Diurnal Average: 48.4 % at hour 16																		Hours of Missing Data: 0	
Monthly Average: 64.6 %																		Percentiles: P ₁ = 25 P ₁₀ = 33 Q ₁ = 46 Median = 67 Q ₃ = 84 P ₉₀ = 92 P ₉₉ = 97																		Hours of Calibration: 0	
																																				Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jun	60	73	75	81	85	81	75	70	67	66	69	74	78	69	53	45	39	42	56	58	63	78	78	82	67.4	85											
2-Jun	89	95	93	95	94	89	77	67	65	62	60	58	56	55	58	55	70	86	94	94	92	89	91	91	78.1	95											
3-Jun	93	96	93	91	88	85	83	78	72	69	66	59	55	52	46	46	47	45	45	52	54	63	72	84	68.2	96											
4-Jun	87	89	87	89	90	83	77	67	54	60	72	82	78	67	51	53	51	49	57	57	59	60	64	67	68.7	90											
5-Jun	78	89	93	93	94	93	91	91	88	88	88	86	76	69	63	57	58	54	52	54	68	85	92	95	78.9	95											
6-Jun	97	98	98	99	98	92	82	70	63	59	51	43	37	32	30	29	33	33	38	39	42	45	48	52	58.7	99											
7-Jun	52	55	57	59	63	64	64	61	53	45	40	38	34	32	32	30	28	28	30	34	37	40	43	44	44.3	64											
8-Jun	45	48	50	51	55	60	62	61	59	51	49	49	46	36	30	26	26	26	29	38	46	54	65	64	46.8	65											
9-Jun	65	65	66	70	65	64	61	60	58	57	53	51	49	47	41	38	36	36	35	37	42	47	50	54	51.9	70											
10-Jun	58	64	70	73	73	68	65	62	59	56	51	46	40	38	38	43	41	41	44	47	77	81	81	81	58.1	81											
11-Jun	82	81	76	69	68	65	57	47	42	39	35	33	33	32	31	29	30	30	32	34	38	44	55	78	48.4	82											
12-Jun	78	74	79	69	69	65	54	50	46	47	67	60	47	50	79	71	77	67	67	73	71	70	75	76	65.9	79											
13-Jun	77	81	84	86	87	86	80	72	69	65	60	52	45	43	38	35	38	41	42	49	53	58	61	62	61.1	87											
14-Jun	65	67	71	79	88	89	90	89	88	86	85	84	79	72	69	68	67	68	79	82	82	83	84	86	79.1	90											
15-Jun	91	89	89	90	90	91	91	88	84	82	79	77	76	74	75	76	75	73	66	66	79	79	83	89	81.4	91											
16-Jun	89	92	89	89	89	78	66	69	63	59	55	50	54	73	88	74	74	78	90	90	88	93	93	91	78.1	93											
17-Jun	93	93	90	91	92	93	92	92	86	78	69	63	57	41	27	26	24	25	24	25	35	57	67	79	63.3	93											
18-Jun	80	82	90	93	86	73	71	56	50	44	36	27	26	29	33	34	36	41	43	46	56	61	63	67	55.0	93											
19-Jun	73	74	79	84	88	79	64	58	53	47	41	37	35	32	31	30	28	27	36	34	47	61	65	70	53.1	88											
20-Jun	67	75	78	78	78	75	69	65	65	64	49	45	46	55	68	76	90	94	95	94	95	95	95	96	75.3	96											
21-Jun	97	94	94	94	91	90	90	93	93	94	95	95	96	93	93	93	95	92	81	85	82	88	86	82	91.0	97											
22-Jun	77	74	74	72	73	74	74	72	65	58	53	49	46	43	41	40	40	39	39	41	46	57	78	90	58.9	90											
23-Jun	91	90	93	94	96	90	72	61	47	37	33	32	33	31	30	35	33	33	36	41	52	59	74	89	57.6	96											
24-Jun	91	93	91	89	85	77	70	67	56	46	39	37	34	31	30	28	27	27	28	30	33	41	67	76	53.8	93											
25-Jun	78	76	79	89	87	72	56	44	40	37	32	29	28	26	25	23	22	22	24	29	35	42	42	45	45.0	89											
26-Jun	51	58	64	67	56	52	49	43	39	37	34	33	31	31	32	33	33	32	34	37	41	43	47	55	43.0	67											
27-Jun	61	66	61	67	74	64	85	93	89	86	79	76	80	89	85	84	86	94	96	97	97	98	98	97	83.5	98											
28-Jun	97	96	97	97	95	96	96	94	91	87	81	79	74	72	67	61	57	54	60	74	79	80	74	80	80.7	97											
29-Jun	85	82	84	88	88	79	76	71	64	57	48	42	37	37	40	43	41	42	45	54	55	66	75	81	61.8	88											
30-Jun	88	89	90	89	89	86	93	93	89	81	72	68	63	65	67	72	71	67	75	83	86	89	93	95	81.4	95											
																		77.9 79.9 81.0 82.5 82.5 78.5 74.3 70.1 65.3 61.4 58.0 55.1 52.2 50.6 49.7 48.4 49.1 49.5 52.3 55.8 61.0 66.9 72.0 76.6																		Diurnal Average	
																		97 98 98 99 98 96 96 94 93 94 95 95 96 93 93 93 95 94 96 97 97 98 98 97																		Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Muskeg River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Muskeg River - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	124	17.22	17.22
40 - 60	173	24.03	41.25
60 - 80	213	29.58	70.83
80 - 100	210	29.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

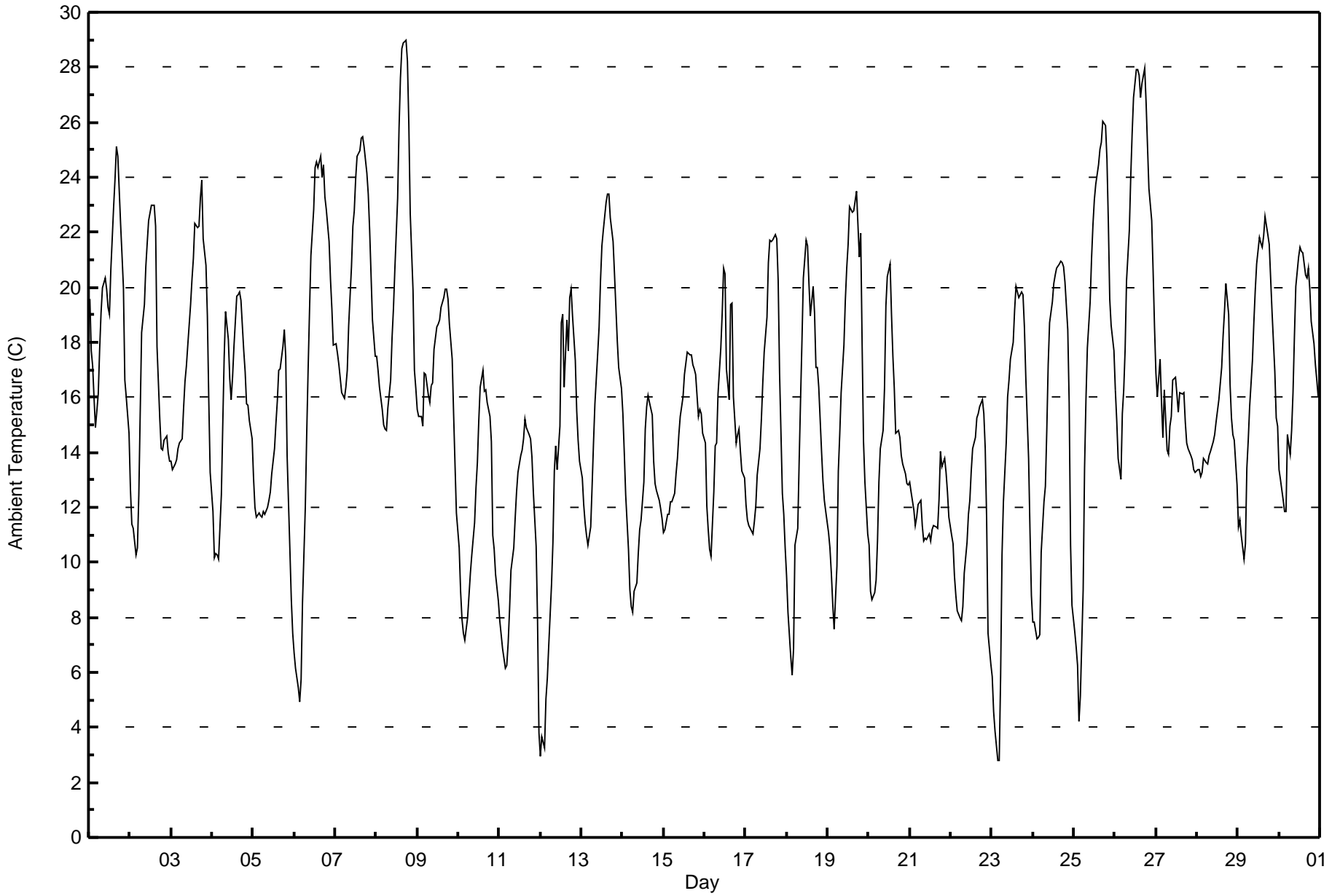


Maximum Value: 29.0 C on Jun 8 18:00		Maximum Daily Average: 22.1 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 2.8 C on Jun 23 04:00		Minimum Daily Average: 10.7 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 20.2 C at hour 16		Minimum Diurnal Average: 10.3 C at hour 4		Hours of Missing Data: 0																																												
Monthly Average: 15.70 C		Percentiles: P ₁ = 4.1 P ₁₀ = 9.5 Q ₁ = 12.2 Median = 15.4 Q ₃ = 19.3 P ₉₀ = 22.3 P ₉₉ = 27.9		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	19.6	17.7	17.2	16.0	14.9	16.1	17.8	19.1	20.0	20.3	19.9	19.3	19.0	20.6	22.9	24.0	25.1	24.8	22.3	21.2	20.0	16.6	16.0	14.7	19.4	25.1																						
2-Jun	12.7	11.4	11.3	10.3	10.5	12.5	15.4	18.4	19.4	20.7	21.6	22.4	23.0	23.0	23.0	22.2	17.9	15.2	14.1	14.1	14.5	14.6	14.0	13.7	16.5	23.0																						
3-Jun	13.7	13.4	13.6	13.7	14.1	14.3	14.5	15.6	16.6	17.1	17.9	19.4	20.3	21.0	22.3	22.2	22.2	23.2	23.9	21.8	20.8	18.9	15.9	13.3	17.9	23.9																						
4-Jun	11.9	10.2	10.3	10.3	10.1	12.5	15.0	17.4	19.1	18.1	16.7	15.9	16.8	17.8	19.7	19.7	19.8	19.5	17.7	16.9	15.8	15.7	15.2	14.5	15.7	19.8																						
5-Jun	13.1	12.0	11.7	11.8	11.7	11.7	11.9	11.7	12.0	12.3	12.6	13.2	14.1	15.0	15.8	17.0	17.0	17.8	18.5	17.5	13.9	10.4	8.6	7.4	13.3	18.5																						
6-Jun	6.7	6.2	5.5	4.9	5.8	8.6	12.0	14.6	17.0	19.1	21.1	22.8	24.4	24.6	24.4	24.7	24.0	24.5	23.3	22.8	21.7	20.3	19.2	17.9	17.3	24.7																						
7-Jun	17.9	17.6	17.2	16.7	16.2	15.9	16.4	17.0	18.6	20.7	22.2	22.8	23.9	24.8	25.0	25.4	25.5	25.1	24.1	23.4	22.1	20.5	18.8	17.5	20.6	25.5																						
8-Jun	17.5	17.0	16.4	15.6	15.0	14.8	14.8	15.6	16.6	18.1	19.2	20.7	23.3	25.8	27.6	28.7	28.9	29.0	28.2	25.9	22.7	19.9	17.0	16.3	20.6	29.0																						
9-Jun	15.6	15.3	15.3	14.9	16.9	16.8	16.1	15.8	16.4	16.5	17.7	18.5	18.7	18.8	19.3	19.6	20.0	19.9	19.6	18.7	17.4	15.4	13.6	11.8	17.0	20.0																						
10-Jun	10.5	8.9	7.9	7.4	7.2	8.0	8.8	9.6	10.3	11.4	12.7	13.6	15.2	16.4	17.0	16.2	16.3	15.8	15.3	14.4	11.0	10.5	9.5	8.6	11.8	17.0																						
11-Jun	7.9	7.4	6.9	6.2	6.2	7.1	8.3	9.7	10.5	11.6	12.6	13.3	13.9	14.1	14.5	15.2	14.9	14.7	14.5	13.8	12.6	10.6	7.9	3.8	10.7	15.2																						
12-Jun	2.9	3.7	3.2	5.0	5.8	7.0	9.2	10.7	13.3	14.2	13.4	14.9	18.7	19.0	16.4	18.8	17.7	19.6	19.9	19.0	17.3	15.5	14.4	13.7	13.1	19.9																						
13-Jun	13.1	12.1	11.4	11.0	10.6	11.3	12.8	14.4	15.8	17.6	18.5	20.2	21.5	22.1	23.1	23.4	23.4	22.5	21.7	20.5	19.3	18.1	17.1	16.3	17.4	23.4																						
14-Jun	15.4	14.0	12.5	10.5	9.0	8.4	8.2	8.9	9.2	10.3	11.2	11.5	12.9	14.9	15.6	16.1	15.8	15.3	13.7	12.9	12.6	12.3	11.9	11.6	12.3	16.1																						
15-Jun	11.1	11.2	11.7	11.7	12.2	12.2	12.5	13.2	13.8	14.7	15.3	16.0	16.8	17.3	17.6	17.6	17.5	17.2	17.0	16.8	15.3	15.6	15.4	14.7	14.8	17.6																						
16-Jun	14.3	12.1	11.2	10.5	10.2	12.6	14.2	14.4	16.1	17.8	19.1	20.7	20.5	17.1	15.9	19.4	19.4	16.0	14.3	14.7	14.9	14.0	13.3	13.1	15.2	20.7																						
17-Jun	12.1	11.5	11.3	11.1	11.1	11.5	12.1	13.2	14.1	15.2	16.5	17.6	18.9	20.9	21.7	21.7	21.7	21.9	21.7	20.2	16.9	12.5	11.7	10.5	15.7	21.9																						
18-Jun	9.5	8.2	6.6	5.9	6.9	10.6	11.2	13.7	15.9	18.0	20.3	21.7	21.5	20.1	18.9	20.1	19.1	17.1	17.1	16.4	14.0	12.9	12.2	11.9	14.6	21.7																						
19-Jun	11.1	10.5	9.6	8.5	7.6	9.9	13.3	14.7	16.2	17.9	19.5	20.7	21.5	22.9	22.7	22.8	23.1	23.5	21.1	22.0	17.9	14.4	12.9	11.0	16.5	23.5																						
20-Jun	10.6	8.9	8.6	8.9	9.4	10.8	12.9	14.2	14.8	16.3	19.3	20.4	20.9	19.0	17.5	16.3	14.7	14.8	14.5	13.9	13.6	13.2	12.8	12.8	14.1	20.9																						
21-Jun	12.9	12.6	11.9	11.3	11.6	12.1	12.2	11.3	10.8	10.9	10.9	11.1	10.8	11.2	11.4	11.3	11.2	12.3	14.0	13.5	13.8	13.3	12.6	11.6	11.9	14.0																						
22-Jun	11.0	10.7	9.5	8.8	8.2	8.0	7.9	8.4	9.6	10.7	11.7	12.2	13.3	14.2	14.5	15.2	15.4	15.7	15.9	15.4	14.2	11.6	7.4	6.3	11.5	15.9																						
23-Jun	5.9	4.6	3.9	2.8	2.8	5.8	10.3	12.2	14.3	16.0	16.6	17.4	18.0	19.2	20.0	19.8	19.6	19.9	19.7	18.6	16.8	13.8	11.1	8.8	13.2	20.0																						
24-Jun	7.8	7.8	7.2	7.3	7.4	10.4	12.2	12.8	14.8	17.2	18.7	19.5	20.1	20.5	20.7	20.9	21.0	20.9	20.7	20.2	18.5	15.8	10.7	8.5	15.1	21.0																						
25-Jun	7.5	6.9	6.2	4.2	5.1	9.0	13.4	15.9	17.8	19.5	21.0	22.3	23.2	23.7	24.4	25.0	25.3	26.0	25.9	24.7	22.3	19.6	18.6	17.7	17.7	26.0																						
26-Jun	16.3	15.1	13.8	13.0	15.4	16.3	17.7	20.2	22.1	24.0	25.6	26.9	27.9	27.9	27.7	26.9	27.4	28.0	26.7	25.1	23.6	22.4	20.6	18.6	22.1	28.0																						
27-Jun	16.9	16.0	17.4	15.8	14.6	16.3	14.1	13.9	14.9	15.3	16.6	16.8	16.1	15.5	16.2	16.1	16.2	15.1	14.4	14.1	13.9	13.7	13.4	13.3	15.3	17.4																						
28-Jun	13.4	13.4	13.1	13.3	13.8	13.6	13.6	13.9	14.0	14.4	14.6	15.1	15.5	15.9	17.1	18.2	19.1	20.1	19.0	16.5	15.2	14.6	14.4	12.8	15.2	20.1																						
29-Jun	11.3	11.5	11.0	10.1	10.7	13.4	14.4	15.6	17.3	18.7	19.9	20.9	21.8	21.6	21.5	21.9	22.6	21.9	21.6	20.3	19.1	16.9	15.3	14.9	17.3	22.6																						
30-Jun	13.4	13.0	12.2	11.8	11.9	14.6	13.9	14.8	16.2	18.2	20.1	21.1	21.4	21.3	21.2	20.5	20.4	20.7	19.9	18.8	17.9	17.2	16.6	16.0	17.2	21.4																						
																								12.1	11.4	10.9	10.3	10.4	11.7	12.9	14.0	15.3	16.4	17.4	18.3	19.1	19.5	19.9	20.2	20.1	19.9	19.3	18.5	17.0	15.4	13.9	12.8	Diurnal Average
																								19.6	17.7	17.4	16.7	16.9	16.8	17.8	20.2	22.1	24.0	25.6	26.9	27.9	27.9	27.7	28.7	28.9	29.0	28.2	25.9	23.6	22.4	20.6	18.6	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Muskeg River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Muskeg River - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	80	11.11	11.11
10 - 20	492	68.33	79.44
> 20	148	20.56	100.00

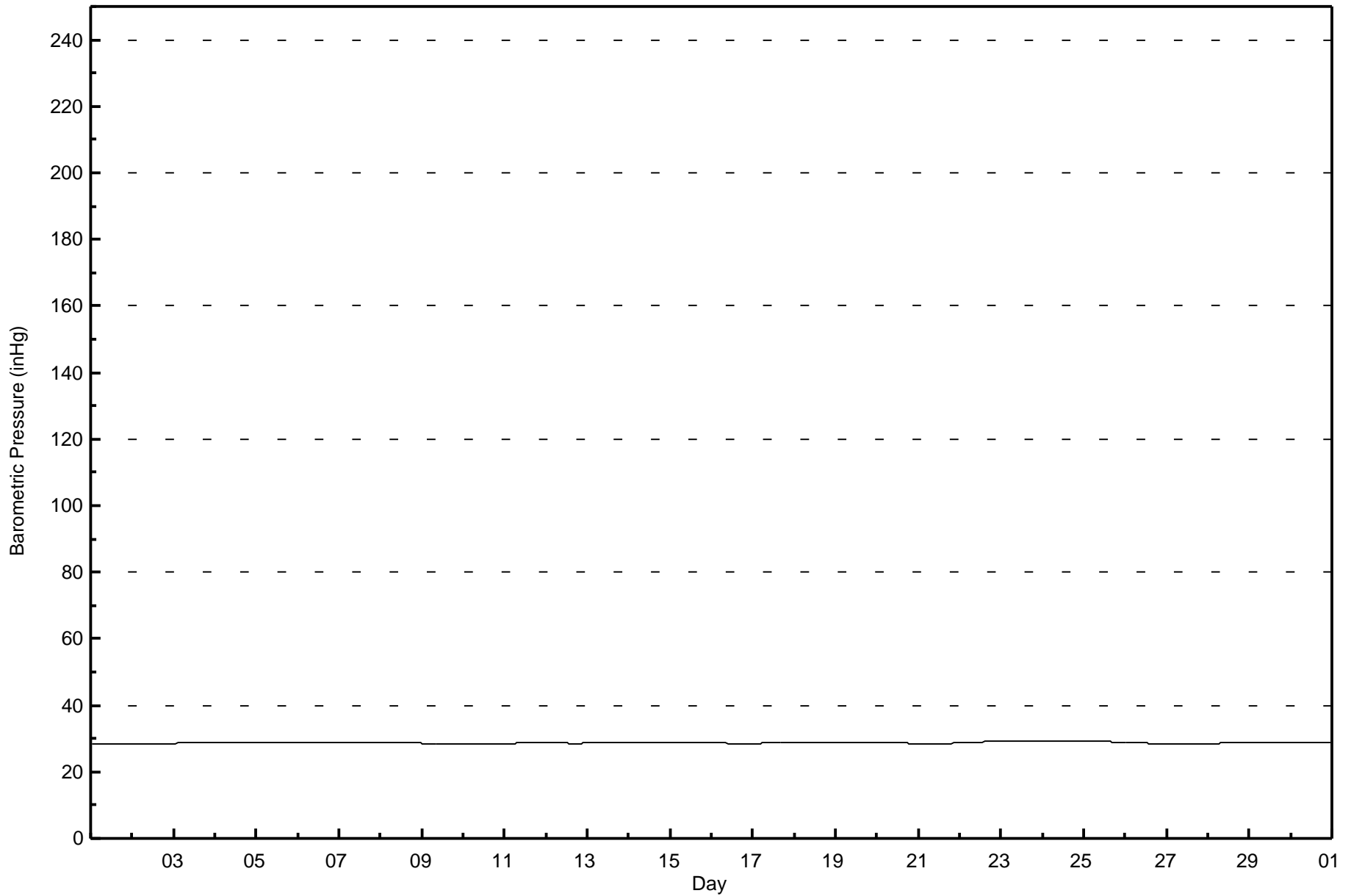
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Muskeg River - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Muskeg River - June 2017

Maximum Speed: 34 km/h on Jun 9 10:00	Maximum Daily Speed Average: 24.0 km/h on Jun 14	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 18 02:00	Minimum Daily Speed Average: 2.0 km/h on Jun 16	Hours of Data: 720
Maximum Diurnal Speed Average: 6.8 km/h at hour 21	Minimum Diurnal Speed Average: 1.7 km/h at hour 6	Hours of Missing Data: 0
Monthly Average Velocity: 3.1 km/h 24.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 21 P ₉₉ = 32	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	W5	S7	S8	S4	WNW5	WSW6	WSW10	SSW5	SSW7	SSW8	S8	S8	S11	S9	SSW8	S8	SSW7	SW4	SSE4	SE5	ESE6	SSE5	SSE5	S2	S5.2	S11
2-Jun	SSE5	S6	S5	S7	SSW8	S5	SSW2	ENE3	NE10	N9	N14	NNE15	NE17	NNE21	N16	NNW16	W26	WSW25	WSW19	WSW14	W14	WNW12	WSW11	W10	WNW4.3	W26
3-Jun	WSW10	W9	W11	W12	NNW8	NW8	N8	NW8	NW11	WNW11	WNW10	W12	WNW10	W7	W8	NNE8	ENE8	ESE7	SE5	E6	NE14	NE15	ENE8	NE5	NW3.9	NE15
4-Jun	E7	SSE9	S8	SSW7	SE6	S6	S6	W2	NW1	SE6	SE4	SSW5	SW6	WSW7	WNW5	NNW8	N14	N12	NW13	NNW15	NNW14	NNE15	NE16	NE19	N2.5	NE19
5-Jun	NE13	ENE9	ENE11	NE15	NNE14	N15	NNE13	N14	NNE12	NNE12	NE13	NNE7	NNE13	NNE8	NNE6	E4	NE11	ESE6	SSW8	NE1	ENE11	SSW3	SW4	S6	NE7.2	NE15
6-Jun	S6	S6	S5	S6	SSE7	S6	S6	S8	SSW7	SW11	SSW11	SSW10	S11	SSW10	W12	W14	WSW7	WSW7	NNW4	NE15	NE16	NE17	NE15	NE9	SSW2.1	NE17
7-Jun	NNE11	NNE12	NNE14	NNE18	NNE14	NE6	NNE12	NNE12	NE12	NNE16	NNE21	NE19	NNE20	NNE19	NE19	NE18	NE21	NE20	NE21	NE21	NE20	NE21	NE20	NE17	NE16.7	NE21
8-Jun	NNE16	NNE16	NNE17	NE17	NE10	NE4	E3	N4	E3	NNW2	NNE3	NE6	NE10	NE13	E5	SE12	SE12	SE8	SSE5	SSE7	SE8	ESE6	SE7	SSE8	ENE5.4	NE17
9-Jun	SSE8	S6	W3	NNE9	NNE17	NNE25	N28	NNE26	NNE31	NNE34	NNE30	NNE31	NNE32	NE33	NNE32	NNE32	NNE31	NNE29	NNE28	NNE28	NE25	NE18	NE18	ENE18	NNE22.2	NNE34
10-Jun	ENE18	ENE15	ENE15	NE10	NE7	ENE6	SE4	NE2	N7	NNE9	N9	N7	NNE5	WNW6	SSE2	S5	ENE9	NNE15	NNE15	NNW15	N17	N15	N15	NNW11	NNE7.7	ENE18
11-Jun	NW9	NW11	NW12	NW12	WNW15	WNW17	NW18	NW21	NW20	NW19	NW18	NNW17	NW16	NNW15	NNW16	NNW14	NNW14	N13	N15	NNE15	ENE14	ENE13	E8	SSE6	NNW11.4	NW21
12-Jun	SSE6	S6	SE8	S8	S7	SSE9	SSE14	SSE12	SSE12	SSE9	SSE8	SSE15	SSE25	S20	SSE8	SE14	E6	ESE10	ESE8	E6	NNE19	NNE19	NNE18	NNE18	SE6.7	SSE25
13-Jun	NE17	NE15	NNE11	NE11	NNE7	NNW6	NNE7	ESE4	NW4	NNE3	NE9	NE11	NE11	ENE8	NNE7	NNE8	NNE18	N24	N25	N21	N21	NNE19	NNE18	N18	NNE11.9	N25
14-Jun	N21	NNE25	N23	N28	NNE29	NNE33	NNE32	NE28	NNE27	NNE21	N26	N25	N27	N27	N26	N24	N24	N23	N22	N25	N21	N23	N16	NNW12	N24.0	NNE33
15-Jun	NNW15	NNW16	N15	N16	N15	N16	NNE19	NE16	NE14	NE12	NE12	NNE11	NNE12	NE13	NE14	NE11	NE14	ENE12	E8	E8	E9	NE8	ENE7	ENE5	NNE10.9	NNE19
16-Jun	ENE9	ESE5	E4	E4	E4	ENE3	E4	ENE4	W2	NW5	NNE5	SE4	SSW6	SSE11	WNW4	S3	S5	SW12	WSW15	WNW10	E7	SSE6	SE8	SSE11	SSE2.0	WSW15
17-Jun	SSE9	S9	S8	SSE7	S8	SSW6	S5	WSW7	W12	W12	NW7	WNW4	NW5	NW14	WNW23	WNW19	WNW19	WNW14	WNW13	NNW10	NNW7	SSE5	S5	S6	W5.2	WNW23
18-Jun	SSE2	WSW0	S6	S7	S7	S7	SSW7	S9	SSW12	S13	SW14	WSW16	WSW16	SW21	WSW21	WSW22	W19	W18	WNW14	NW17	N21	N18	WNW11	W5	WSW8.1	WSW22
19-Jun	SW5	W8	WSW5	WSW6	WSW7	WSW7	W7	WSW5	WSW5	WSW5	SSW6	WSW4	SW6	S11	SSW10	WSW11	WSW6	WSW8	SSW7	SSW6	S6	S6	SSE4	S7	SW5.6	S11
20-Jun	S5	SSE4	SSE6	S4	S5	S6	S7	S7	S7	SE7	SSE10	SSW10	SSW13	SW20	SSW16	SSW14	S11	S9	S8	S10	SSE9	SSE10	SSE9	SSE8	S8.5	SW20
21-Jun	SSW9	SSW10	SSW9	SW8	WSW14	W16	W17	W16	W15	W15	W11	W10	W14	W16	W15	W14	W15	WNW12	N26	N19	N18	N19	N31	N25	WNW10.2	N31
22-Jun	N26	N27	N25	N28	N25	N21	N18	N18	N24	N25	N25	N21	N24	N22	N20	N17	N19	NNE17	NNE17	NNE15	NNE12	NNW8	WNW6	W4	N18.6	N28
23-Jun	WNW7	WNW4	SW1	WNW2	SSE4	S4	SSE4	WSW3	NW7	N8	NNE10	N10	NE12	NE11	E5	E5	NE9	E7	ENE5	E6	ESE4	W3	W4	S3	NE2.3	NE12
24-Jun	S7	S5	SSE6	S5	S6	S2	NNE3	NNE10	NNE12	NE14	NE17	NNE17	NNE15	NNE15	NNE14	NNE14	NE16	NE15	NE13	ENE11	ENE11	E9	ENE5	E7	NE7.9	NE17
25-Jun	E5	NE4	N2	SSW2	ESE4	SE3	SE2	SW2	SSE3	ESE2	S4	S2	SSW5	WSW8	SSW9	S13	S13	SSE11	SSE13	SE13	SE12	SE12	SSE14	SSE16	SSE5.8	SSE16
26-Jun	SSE13	S10	SSE9	SSE10	SSE14	SSE16	SSE18	SSE18	S19	SSE20	SSE21	SSE23	SSE22	SSE23	SSE21	SSE19	SSE17	SE16	SSE14	SE11	SE12	SE15	ESE12	SE7	SSE15.5	SSE23
27-Jun	SE9	SE7	ENE7	E6	ESE6	SSE11	SSW11	SSE7	SSE15	S15	S10	SSW10	SW10	S6	SE4	ESE4	ESE5	ESE4	E2	SSE4	ESE3	ESE5	E8	ENE10	SSE5.2	SSE15
28-Jun	ENE13	NE18	ENE14	NE17	NE19	NE15	NE18	NE18	ENE16	ENE16	ENE16	ENE16	ENE14	ENE11	E9	ENE9	ESE6	SSE5	SSE5	SSW6	SSW6	S9	S11	S10	ENE8.8	NE19
29-Jun	SSE11	S9	S8	S7	SSE5	SSE6	S6	S6	E1	SE2	W4	WNW4	NW3	ENE6	ENE3	S5	SSW3	E7	E6	E5	E6	S3	S3	SW2	SSE3.0	SSE11
30-Jun	S6	S6	SE4	ESE4	SSE4	S5	SSW6	SSE2	E3	SSE5	S8	SSW10	SW10	SW10	W11	W11	W8	W6	WSW4	SW5	SW6	SSW6	S5	SSE5	SSW4.4	W11

ENE2.7	NE2.1	NE2.2	NNE3.0	NNE2.8	NNE1.7	NNE1.9	NNE2.6	N3.0	NNE3.0	NNE3.8	N3.2	NNE2.9	NNE2.2	NNW3.1	NNW2.4	N3.7	NNE3.4	NNE4.1	NNE5.2	NE6.8	NE5.6	NE4.2	ENE2.9	Diurnal Average
N26	N27	N25	N28	NNE29	NNE33	NNE32	NE28	NNE31	NNE34	NNE30	NNE31	NNE32	NE33	NNE32	NNE32	NNE31	NNE29	NNE28	NNE28	NE25	N23	N31	N25	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

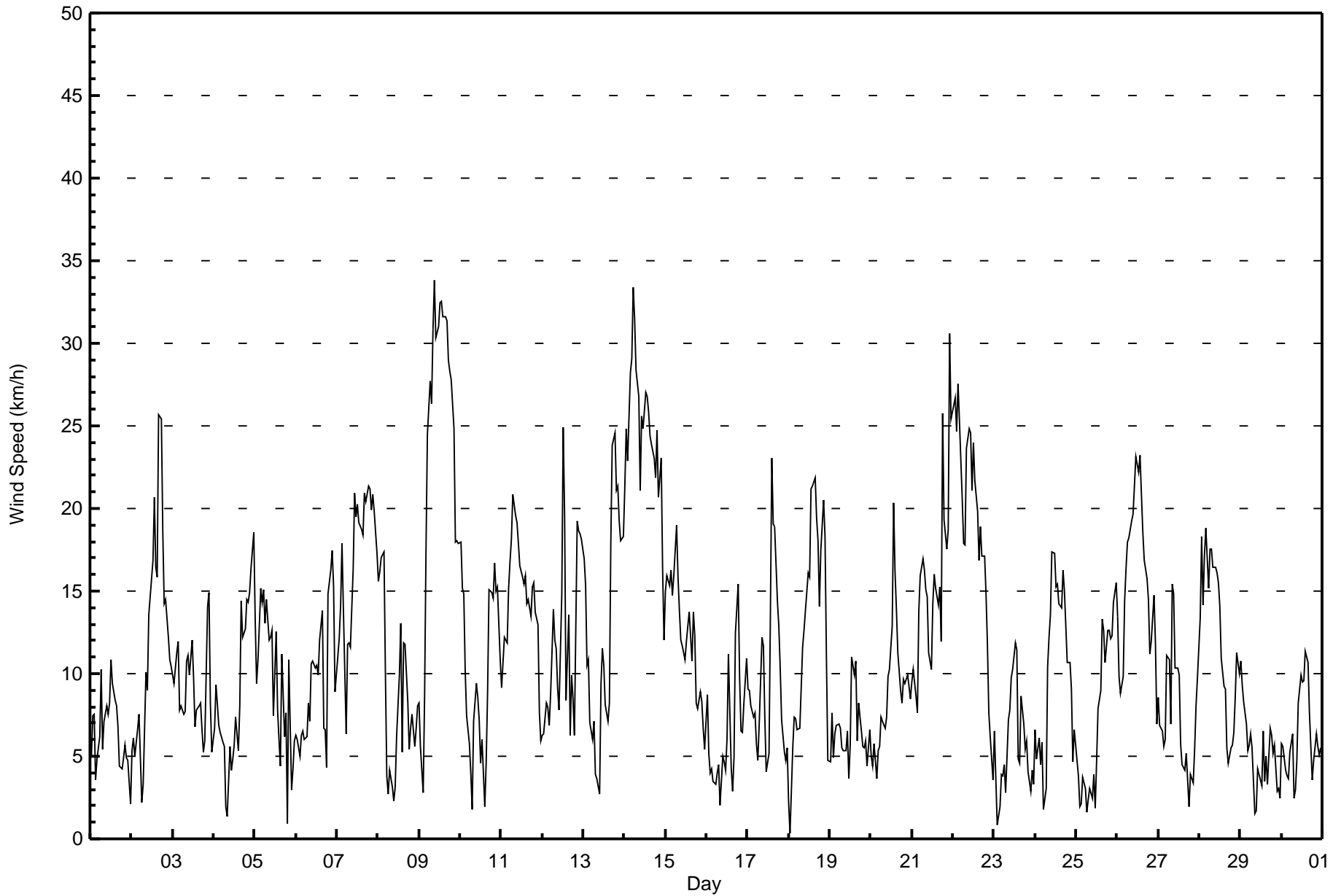
Wind Speed (WS) - km/h
Muskeg River - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 18 14:00 Minimum Value: 1 km/h on Jun 20 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	3	1	2	3	4	2	2	2	2	3	3	3	3	3	2	1	1	1	1	1	1	1	4
2-Jun	1	1	1	2	2	1	1	3	2	3	3	3	4	4	4	7	5	5	3	4	4	2	2	7	
3-Jun	2	2	3	3	3	3	3	3	3	3	4	3	4	3	4	2	2	1	2	3	3	4	1	4	
4-Jun	1	2	2	2	3	2	1	2	3	3	3	2	2	2	3	3	3	5	4	3	4	3	3	5	
5-Jun	4	5	3	4	4	3	3	4	3	2	3	3	4	3	2	3	2	2	8	7	1	2	2	8	
6-Jun	1	1	1	1	1	1	2	2	2	4	3	4	4	4	4	2	2	6	3	3	3	4	3	6	
7-Jun	3	3	3	3	3	4	3	3	2	3	4	3	4	4	3	3	4	3	3	3	3	3	3	4	
8-Jun	3	2	3	2	3	2	1	3	1	2	1	2	3	3	4	4	4	4	2	2	1	1	1	2	4
9-Jun	3	4	3	7	4	5	6	6	6	6	6	7	6	6	5	6	6	5	6	5	5	3	3	3	7
10-Jun	3	4	3	3	3	3	2	2	4	4	4	3	3	2	2	2	5	4	3	5	5	5	4	3	5
11-Jun	3	3	4	4	3	3	6	6	7	7	6	6	6	6	5	5	5	5	4	3	3	3	2	1	7
12-Jun	1	2	1	2	2	3	3	2	3	3	3	4	6	6	5	6	2	3	3	3	4	4	4	3	6
13-Jun	3	2	4	2	3	2	3	2	2	2	3	3	4	4	3	4	4	6	6	4	5	5	4	5	6
14-Jun	5	5	5	6	6	6	5	6	5	4	5	5	6	5	5	5	6	5	5	5	5	4	4	4	6
15-Jun	4	4	4	3	3	3	3	2	2	2	2	3	3	2	3	3	3	3	3	2	2	2	2	2	4
16-Jun	3	1	2	1	1	1	1	1	2	2	2	2	3	5	2	1	3	3	3	3	3	2	2	2	5
17-Jun	1	2	2	1	2	2	1	3	3	3	3	2	3	8	8	6	6	5	4	3	2	2	2	1	8
18-Jun	2	1	1	2	2	1	2	2	4	4	4	5	5	9	8	5	5	4	4	6	5	7	5	3	9
19-Jun	2	2	2	2	4	1	1	2	2	2	2	3	5	4	5	4	3	3	2	2	1	1	1	1	5
20-Jun	2	2	1	1	1	1	2	2	2	2	2	3	4	6	6	5	3	3	3	3	2	2	2	3	6
21-Jun	4	3	3	2	3	3	3	4	3	3	3	2	4	4	4	4	3	4	7	5	5	8	8	7	8
22-Jun	7	7	6	7	7	6	5	5	6	7	7	6	6	6	5	6	6	4	3	4	3	3	1	1	7
23-Jun	2	4	1	2	1	1	1	1	2	3	4	5	4	3	3	3	3	2	2	1	2	2	1	5	5
24-Jun	2	2	2	2	1	1	3	2	3	5	4	4	4	5	5	5	4	3	3	3	2	1	2	2	5
25-Jun	1	2	2	1	1	1	1	1	1	1	2	2	3	4	4	4	4	4	4	3	2	3	2	3	4
26-Jun	2	2	2	2	3	3	4	4	5	5	5	6	7	6	6	5	4	5	4	3	4	5	3	3	7
27-Jun	2	2	2	2	2	4	4	3	4	5	3	3	4	2	1	1	2	2	2	3	2	2	2	2	5
28-Jun	4	3	3	4	5	4	4	4	3	4	4	4	4	4	3	3	3	3	2	1	2	3	3	3	5
29-Jun	2	2	2	1	1	2	2	2	2	2	2	2	3	3	3	1	2	2	2	1	1	1	1	1	3
30-Jun	1	1	1	1	1	2	3	1	2	2	2	3	3	3	3	2	2	1	2	1	2	1	1	2	3
																		Diurnal Maximum							



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Muskeg River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	146	20.28	20.28
6 - 11	274	38.06	58.33
12 - 19	214	29.72	88.06
20 - 28	72	10.00	98.06
29 - 38	14	1.94	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	2	5	5	7	14	12	10	21	25	7	7	8	9	7	5	2	146
6 - 11	7	15	17	17	19	8	11	31	61	30	8	15	13	8	7	7	274
12 - 19	25	42	41	14	0	2	8	16	5	4	2	6	19	9	9	12	214
20 - 28	36	10	9	0	0	0	0	7	1	0	2	3	1	1	2	0	72
29 - 38	1	12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	14
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	71	84	73	38	33	22	29	75	92	41	19	32	42	25	23	21	720

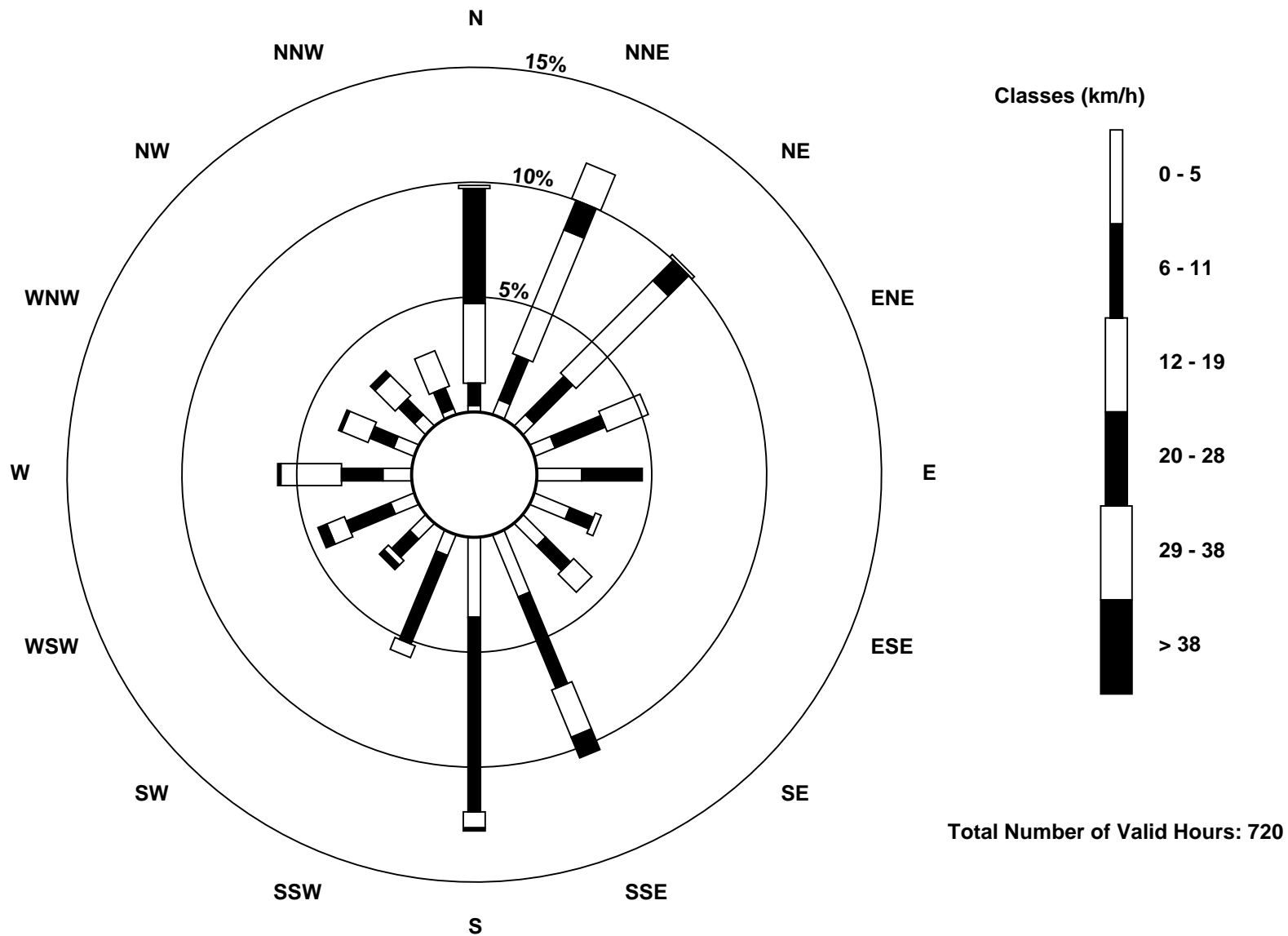
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Muskeg River (AMS 16)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Muskeg River - June 2017

Direction of Maximum Speed: 28 deg on Jun 9 10:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 10.0 deg on Jun 14	Hours of Data: 720
Direction of Minimum Speed: 242 deg on Jun 18 02:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.0 deg on Jun 16	Percent Operational Time: 100.0
Monthly Average Direction: 234.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	274	174	184	178	292	244	239	206	208	208	183	180	169	169	199	190	204	231	157	124	106	155	153	171	191.2
2-Jun	147	180	182	184	198	186	207	78	43	10	7	17	40	31	10	348	268	257	258	246	266	289	248	262	299.5
3-Jun	258	261	273	280	327	316	354	319	309	286	286	274	287	276	281	25	66	118	132	85	55	49	74	54	319.7
4-Jun	88	160	189	209	135	187	171	272	318	145	125	207	221	242	298	339	3	8	321	342	347	20	40	41	8.0
5-Jun	53	73	66	39	12	7	24	6	19	30	41	18	31	26	18	81	48	108	192	55	60	196	214	189	37.7
6-Jun	170	187	178	189	167	170	186	186	205	220	202	213	185	202	276	264	258	248	337	40	34	41	44	54	197.4
7-Jun	30	19	22	25	17	45	24	19	34	25	28	34	33	32	34	37	36	38	40	47	46	45	43	34	33.8
8-Jun	25	31	26	42	42	51	88	11	87	347	30	51	39	47	96	140	136	133	154	148	136	114	145	155	71.5
9-Jun	158	181	274	14	25	22	8	18	20	28	28	18	26	37	33	26	26	32	31	30	42	47	48	65	29.6
10-Jun	65	67	64	42	52	71	127	46	6	27	360	357	23	299	168	190	60	19	18	343	351	4	357	346	23.9
11-Jun	317	316	318	321	300	288	306	319	325	313	322	329	324	327	327	327	340	350	8	24	61	76	96	164	331.5
12-Jun	163	185	146	181	175	160	163	160	164	148	153	155	167	169	163	136	93	111	109	100	17	25	31	30	132.6
13-Jun	39	41	24	35	23	339	21	111	317	27	39	42	43	70	15	20	19	5	4	4	7	19	30	6	20.8
14-Jun	10	14	7	9	13	23	24	34	29	18	2	3	5	4	6	6	359	11	7	3	3	3	353	336	10.0
15-Jun	344	347	356	356	7	9	26	35	38	37	36	15	13	38	46	39	51	69	80	85	82	53	58	74	29.4
16-Jun	73	105	88	101	89	69	91	61	263	319	17	140	200	149	288	176	177	223	257	293	91	162	141	153	154.7
17-Jun	162	170	172	158	174	192	169	238	259	260	313	293	319	313	299	292	295	299	302	337	339	152	186	172	271.3
18-Jun	158	242	187	191	179	176	200	189	211	188	223	250	240	230	245	256	266	277	285	325	352	356	298	266	253.4
19-Jun	231	276	241	251	255	249	265	250	237	248	213	252	227	188	209	252	241	240	201	192	190	173	162	187	227.0
20-Jun	177	156	162	181	174	188	178	169	180	133	165	203	206	214	195	193	184	175	174	172	167	158	162	161	180.3
21-Jun	202	201	211	216	255	268	269	274	263	268	267	270	272	266	275	275	265	295	359	354	354	353	5	355	295.2
22-Jun	352	6	3	1	4	351	354	351	1	0	1	354	6	4	7	358	6	19	24	25	12	345	290	268	1.4
23-Jun	299	285	224	300	165	171	158	244	310	358	24	11	44	41	91	82	48	86	71	94	118	268	278	189	38.7
24-Jun	174	181	153	176	170	180	17	24	31	38	35	32	15	31	25	23	38	41	41	69	75	82	68	80	45.9
25-Jun	83	37	349	211	113	143	137	215	164	123	183	191	212	241	208	185	188	168	154	146	141	143	152	155	163.4
26-Jun	158	174	166	157	157	159	163	168	172	168	165	164	160	155	155	158	152	142	163	143	124	132	120	139	156.4
27-Jun	133	129	58	81	107	151	202	154	166	183	188	209	221	190	141	119	102	121	91	154	110	105	81	72	148.3
28-Jun	59	39	59	42	43	48	45	53	58	57	65	59	69	75	97	75	103	159	153	206	204	183	186	182	68.2
29-Jun	161	188	185	184	153	162	185	176	87	136	278	284	326	71	75	178	193	86	92	95	91	171	187	215	156.6
30-Jun	171	177	136	123	167	185	206	150	88	159	183	211	221	232	272	264	265	275	251	220	234	199	172	148	210.4

61.2	51.4	43.9	25.8	28.2	17.5	14.0	18.0	9.4	13.6	17.2	0.8	14.5	21.8	343.1	346.6	5.5	15.6	14.3	25.3	35.4	44.1	51.0	63.4
Diurnal Average																							

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

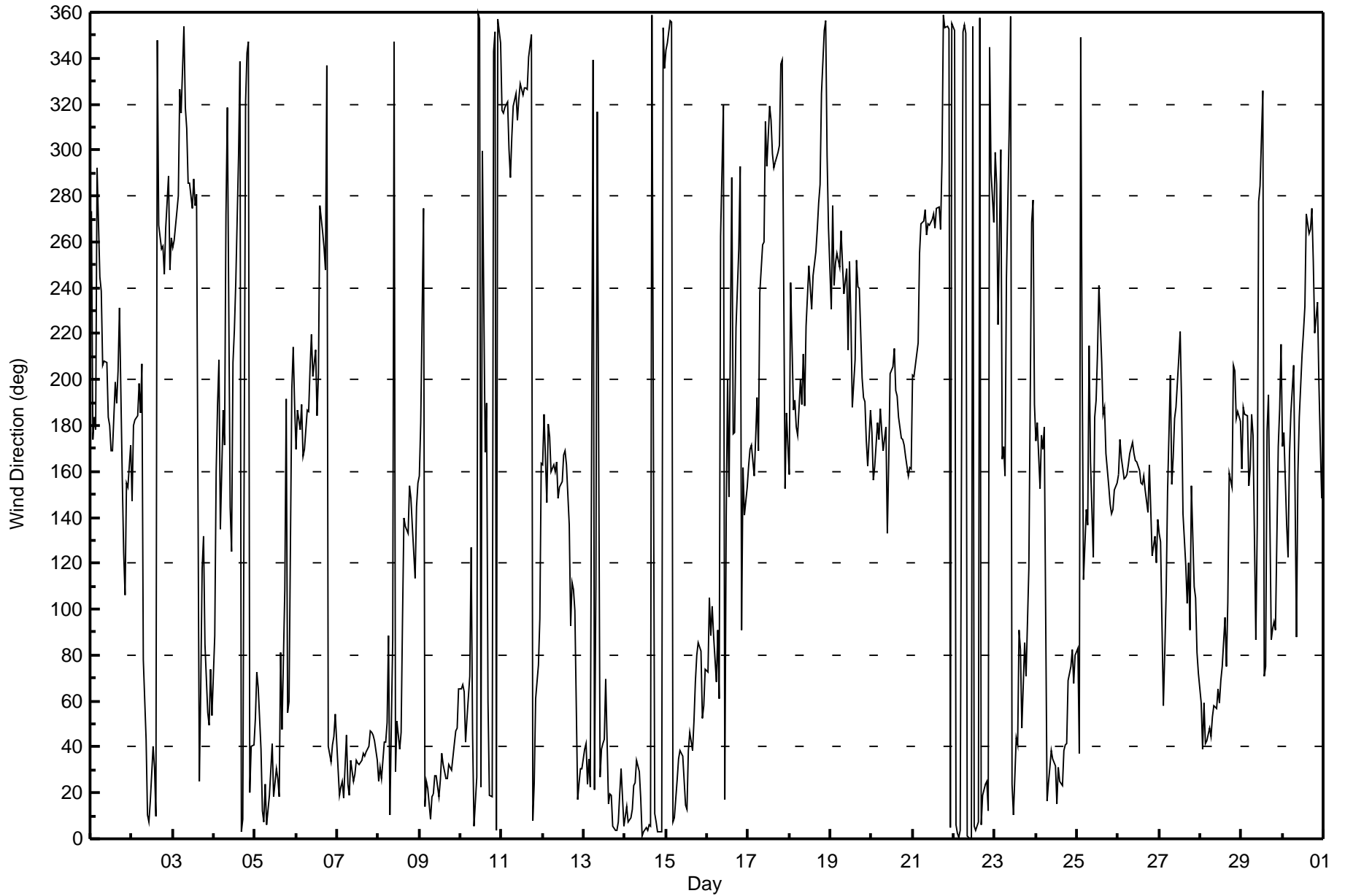
Wind Direction (WD) - deg
Muskeg River - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jun 18 02:00 Minimum Value: 7 deg on Jun 8 04:00 Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 15 Median = 20 Q ₃ = 30 P ₉₀ = 49 P ₉₉ = 88																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	63	32	24	40	39	19	15	30	28	25	21	23	16	24	28	28	36	43	17	21	17	13	12	50	63
2-Jun	12	15	26	20	19	23	55	56	18	28	19	22	12	11	21	21	17	14	16	16	16	15	10	13	56
3-Jun	11	11	13	11	25	33	30	27	27	23	28	23	35	49	50	52	33	34	24	28	14	12	24	18	52
4-Jun	18	22	22	23	26	24	28	79	81	28	61	39	34	15	34	23	18	24	22	28	17	25	10	8	81
5-Jun	27	18	13	15	19	18	18	18	23	17	17	32	21	47	45	64	21	39	29	85	42	47	12	22	85
6-Jun	13	14	15	11	13	16	23	27	29	21	28	37	30	33	32	21	28	25	71	12	13	8	14	18	71
7-Jun	17	13	13	8	11	40	9	13	15	10	13	13	14	16	14	14	12	11	9	9	9	9	9	12	40
8-Jun	11	11	11	7	11	40	41	79	39	65	55	24	19	17	74	25	22	28	40	18	8	17	15	14	79
9-Jun	15	32	69	48	15	13	17	16	12	12	15	15	14	12	12	11	11	12	12	12	12	10	14	11	69
10-Jun	10	10	11	18	32	34	55	92	51	43	45	45	81	52	96	38	38	20	18	24	17	23	18	18	96
11-Jun	23	21	22	22	14	11	17	24	25	25	26	28	31	30	27	34	30	28	24	16	18	10	30	12	34
12-Jun	8	26	11	18	15	16	12	12	18	18	18	15	18	22	36	24	49	25	24	31	16	11	11	11	49
13-Jun	10	9	37	14	35	30	41	67	56	88	29	22	31	37	59	51	21	18	18	17	17	16	12	17	88
14-Jun	17	15	17	15	15	10	10	12	11	18	15	17	15	17	16	19	16	17	17	17	14	13	18	24	24
15-Jun	16	15	16	15	15	17	10	12	14	17	15	24	28	16	14	15	18	15	18	16	12	22	21	22	28
16-Jun	14	27	28	16	17	20	39	25	82	46	59	79	63	34	43	42	55	15	13	27	46	26	11	11	82
17-Jun	9	14	18	14	19	37	20	32	13	17	32	48	59	33	23	23	18	22	23	27	18	25	21	25	59
18-Jun	74	99	20	16	15	19	24	24	25	26	27	20	18	18	20	19	16	20	20	29	20	22	45	67	99
19-Jun	35	17	26	33	30	14	18	35	40	55	48	84	71	32	36	34	48	28	25	23	22	18	22	19	84
20-Jun	17	40	17	15	16	15	17	16	19	26	26	25	24	22	24	24	20	18	21	20	13	10	10	18	40
21-Jun	23	21	23	21	16	13	12	14	15	13	15	15	14	14	15	16	14	33	18	19	18	23	18	20	33
22-Jun	19	16	18	19	17	19	18	20	18	20	21	23	19	23	21	32	21	20	19	21	18	22	12	36	36
23-Jun	14	89	89	78	44	23	18	53	29	52	40	41	17	28	81	57	24	32	36	27	40	75	44	37	89
24-Jun	29	49	19	48	12	64	91	21	23	18	18	16	27	32	36	29	14	12	24	19	11	9	28	15	91
25-Jun	18	32	64	59	34	35	23	41	53	71	68	97	78	61	56	26	31	26	17	13	12	11	11	10	97
26-Jun	11	18	12	10	13	12	13	17	18	19	17	20	22	19	19	18	16	18	16	13	17	18	17	24	24
27-Jun	14	20	24	18	18	15	30	40	17	21	23	25	26	28	27	37	28	35	77	62	34	20	13	14	77
28-Jun	20	9	19	16	14	15	13	16	15	17	16	18	21	30	32	34	56	59	31	11	15	20	21	20	59
29-Jun	11	20	18	17	25	17	26	31	78	98	62	73	75	38	68	40	54	18	19	17	15	35	33	55	98
30-Jun	24	13	28	26	18	30	35	27	40	44	27	27	23	23	18	16	17	23	37	16	20	19	19	14	44
	74	99	89	78	44	64	91	92	82	98	68	97	81	61	96	64	56	59	77	85	46	75	45	67	
	Diurnal Maximum																								



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Muskeg River - June 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

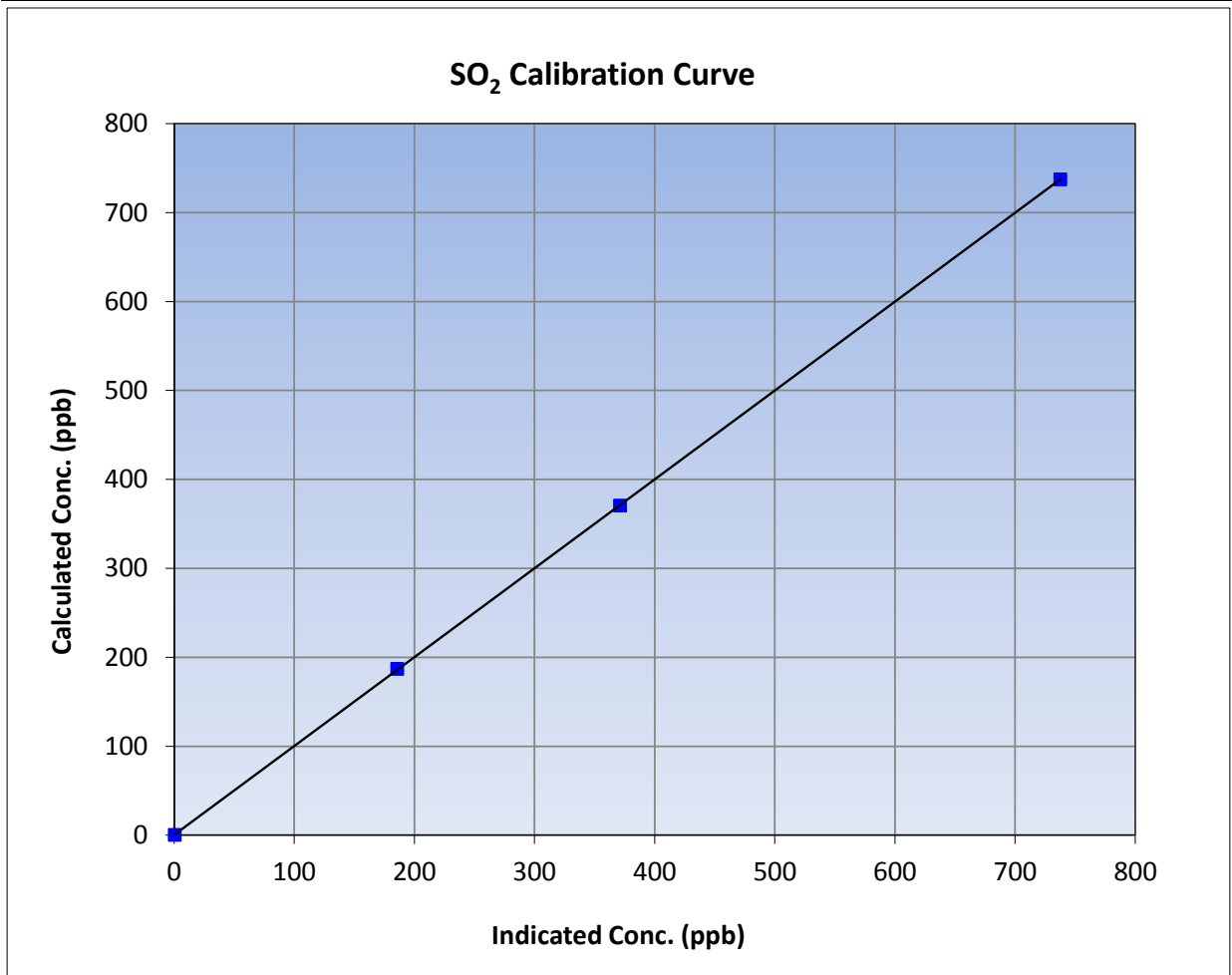
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 10, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:34
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

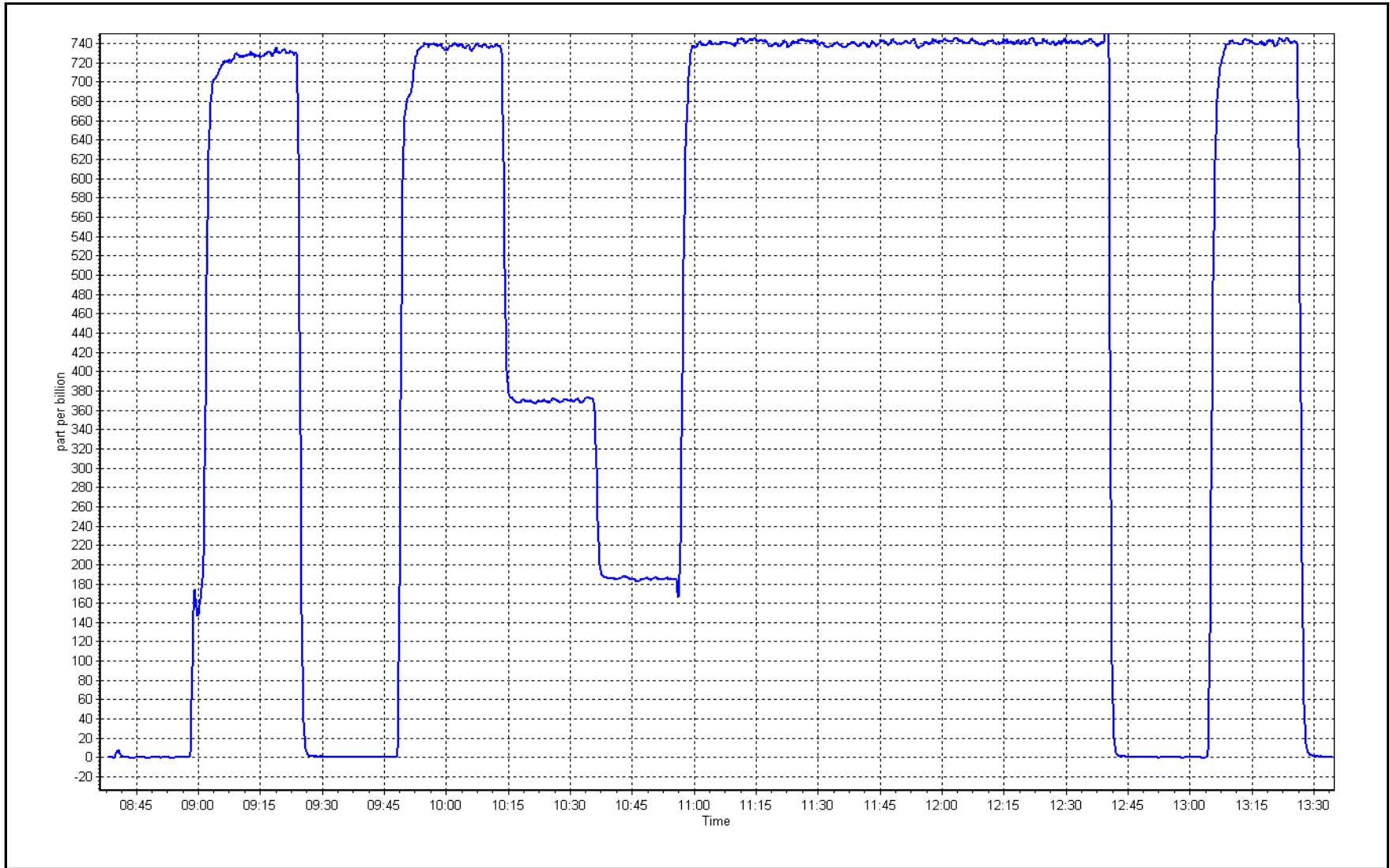
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999995	≥0.995
737.0	737.3	0.9996			
370.4	370.7	0.9991	Slope	0.999222	0.90 - 1.10
186.6	185.4	1.0062			
			Intercept	0.332585	+/-30



SO2 Calibration Plot

Date: June 8, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Muskeg River	Station number:	AMS 16
Calibration Date:	June 8, 2017	Last Cal Date:	May 18, 2017
Start time (MST):	8:37	End time (MST):	13:28
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference	EY0000638	Cal Gas Expiry Date	November 4, 2017
CH4 Cal Gas Conc.	<u>502.0</u> ppm	CH4 Equiv Conc.	1035.5 ppm
C3H8 Cal Gas Conc.	<u>194.0</u> ppm	Station temp.	23 Deg C
Calibrator Make/Model	API T700	Serial Number	493
ZAG Make/Model	API 701	Serial Number	2155

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153458
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-287
Calculated slope	0.987067	Sample pressure	8.2
Calculated intercept	0.105793	Fuel pressure	24.2
Analyzer Background	2.37	Air pressure	34.9
Analyzer Coefficient	4.770	Flame temperature	157.3
			<u>Finish</u>

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4998	0.0	0.00	0.20	----
as found span	4932	76.5	15.82	15.93	0.993
calibrator zero	4998	0.0	0.00	-0.08	----
high point	4933	76.5	15.81	15.81	1.000
second point	4970	38.5	7.96	7.95	1.001
third point	4992	19.4	4.01	3.99	1.005
as left zero	4998	0.0	0.00	-2.98	----
as left span	4932	76.5	15.82	15.85	0.998
Average Correction Factor					1.002
Corrected As found	15.73	Previous response	15.92	*% change	1.2%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

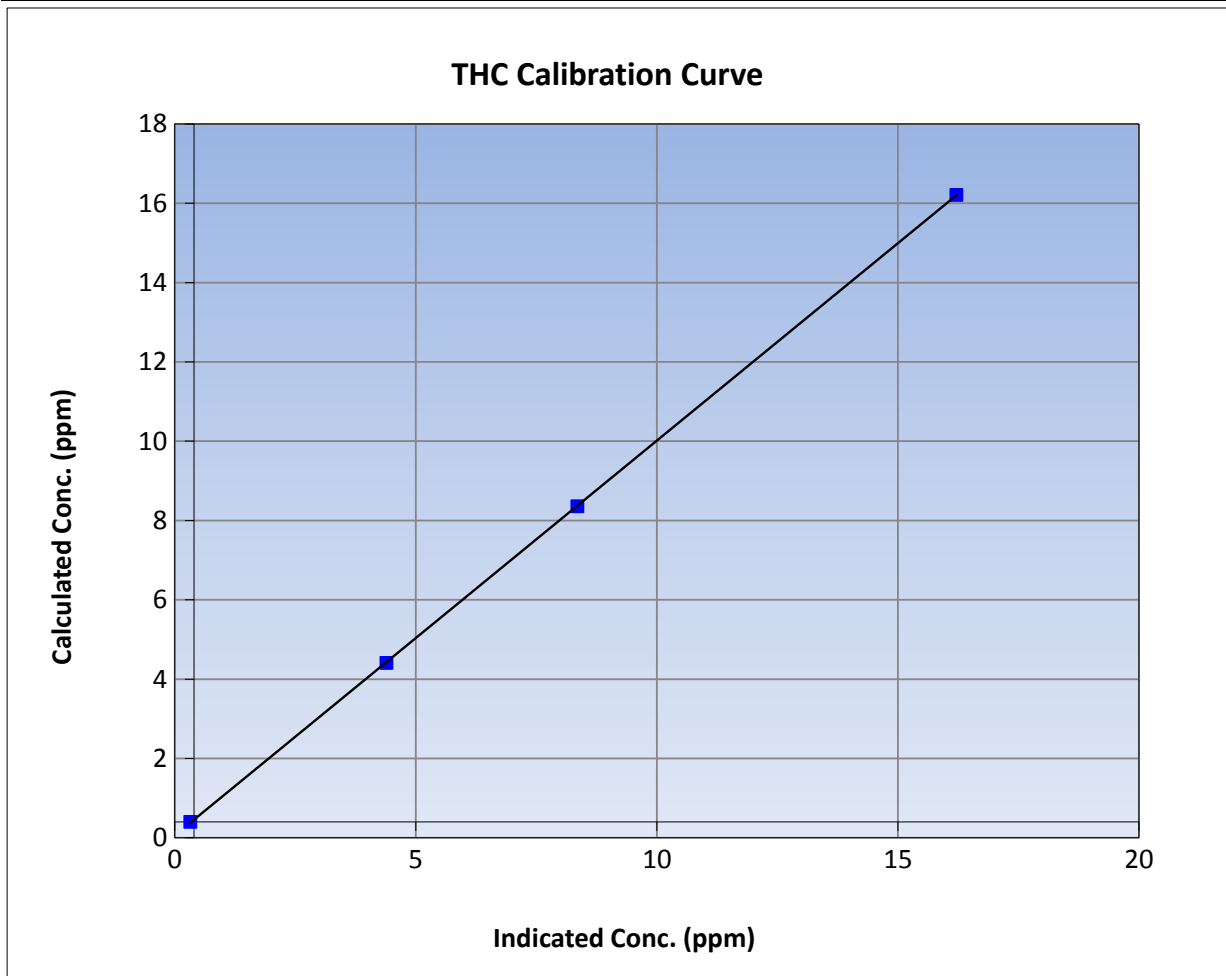
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 18, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:28
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

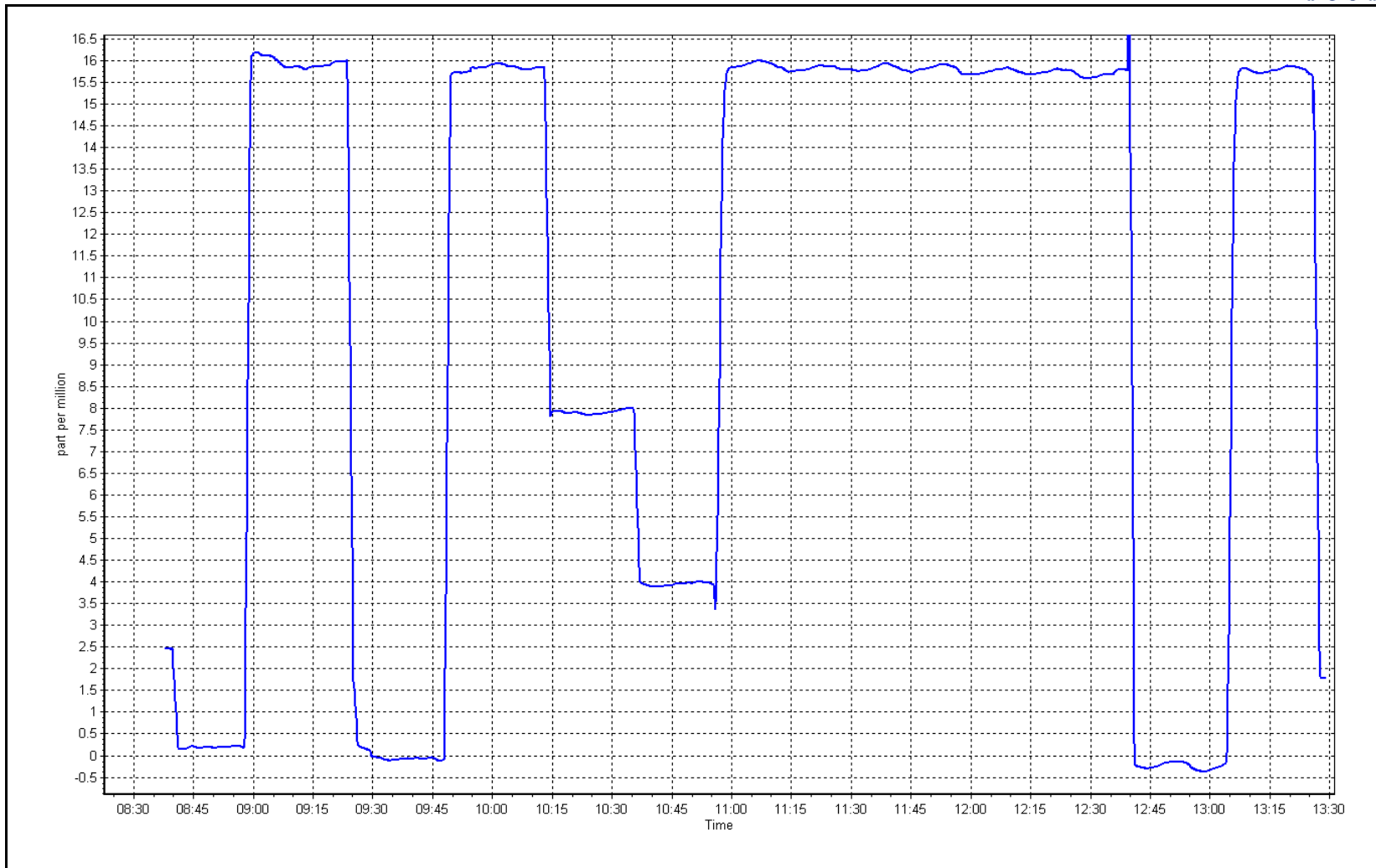
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999991	≥0.995
15.8	15.8	1.0000			
8.0	8.0	1.0009	Slope	0.995678	0.90 - 1.10
4.0	4.0	1.0049			
			Intercept	0.056037	+/-1.5



THC Calibration Plot

Date: June 8, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Muskeg River	Station number:	AMS 16
Calibration Date:	June 8, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	8:37	End time (MST):	13:30
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000638	Cal Gas Expiry Date	November-04-19
NOX Cal Gas Conc.	<u>52.4</u> ppb	NO Cal Gas Conc.	<u>52.4</u> ppb
Calibrator Model	API T700	Serial Number	493
ZAG make/model	API T701	Serial Number	2155

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1426262593		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.079	1.082	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.997	0.997	PMT Temperature	-2.7	-3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	163.7	162.2
NO bkgrnd	9.2	9.1	Sample Flow	0.967	0.953
NOX bkgrnd	9.9	9.8	PMT Voltage	-744.8	-744.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002920	1.002355
NO _x Cal Offset	1.017298	0.934247
NO Cal Slope	1.002449	1.000436
NO Cal Offset	1.354947	1.255612
NO ₂ Cal Slope	0.997707	1.002004
NO ₂ Cal Offset	1.718570	0.862356



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4998	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
as found span	4930	76.6	801.7	801.7	0.0	803.4	802.1	1.3	0.9979	0.9995
calibrator zero	4998	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4933	76.6	801.2	801.2	0.0	798.8	800.2	-1.3	1.0030	1.0013
second point	4970	38.5	402.8	402.8	0.0	400.5	400.7	-0.2	1.0057	1.0052
third point	4993	19.4	202.8	202.8	0.0	200.7	200.5	0.3	1.0105	1.0115
as left zero	4998	0.0	0.0	0.0	0.0	1.7	-0.1	1.9	----	----
as left span	4930	76.6	801.7	424.9	376.8	799.6	409.9	389.7	1.0026	1.0366
Average Correction Factor									1.0064	1.0060

Corrected As found	NO _x = 803.6 ppb	NO = 802.3 ppb		*Percent Change	NO _x = -0.7%
Previous Response	NO _x = 798.4 ppb	NO = 798.4 ppb		*Percent Change	NO = -0.5%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	801.3	801.1	0.2	0.9999	1.0002	----	----
1st NO2 (400 ppb O3)	424.9	376.2	800.2	424.9	375.2	1.0013	----	1.0027	99.7%
2nd NO2 (200 ppb O3)	602.6	198.5	799.0	602.6	196.4	1.0028	----	1.0107	98.9%
3rd NO2 (100 ppb O3)	697.1	104.0	799.4	697.1	102.3	1.0023	----	1.0166	98.4%
2nd NO ref point	----	0.0	791.0	790.6	0.4	1.0129	1.0134	----	----
Average Correction Factor						1.0048	1.0068	1.0100	99.0%

Notes: Changed out inlet filter after asfinds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

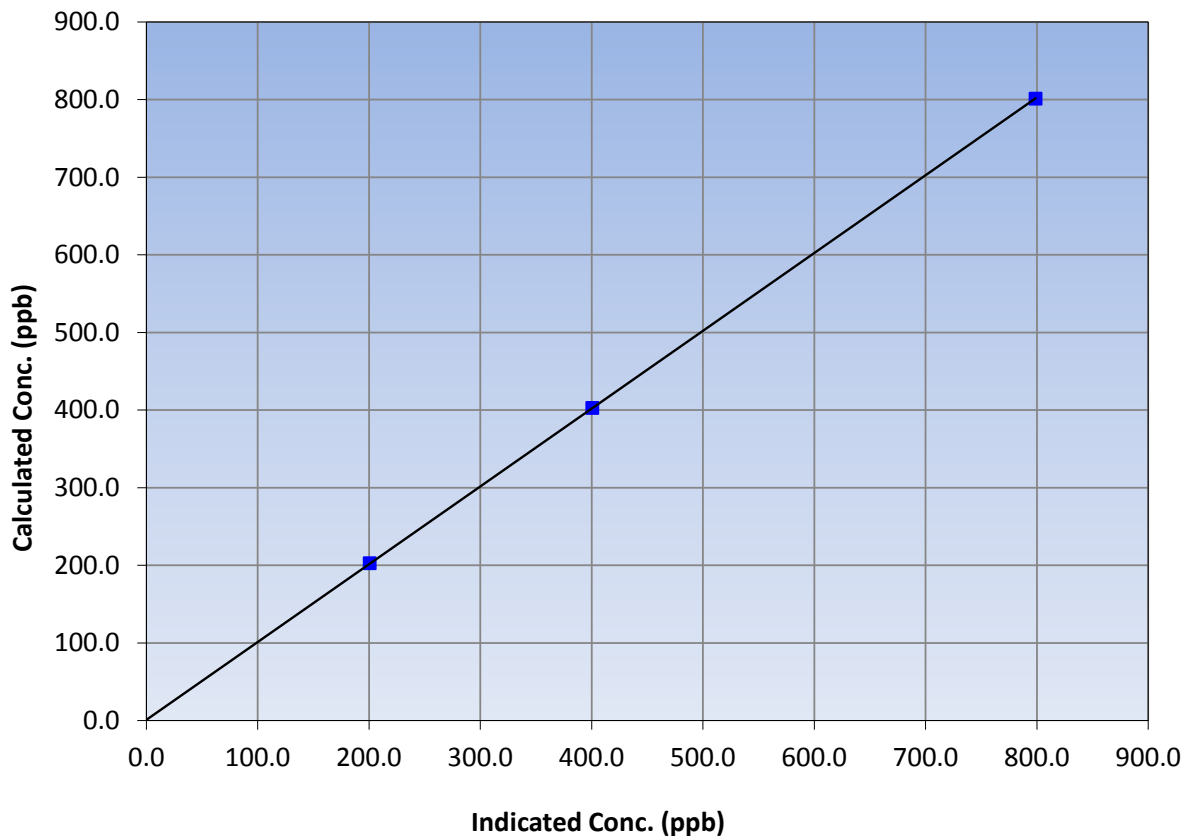
Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 10, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	≥0.995	
801.2	798.8	1.0030			
402.8	400.5	1.0057			
202.8	200.7	1.0105			
			Slope	0.999996	0.90 - 1.10
			Intercept	1.002355	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

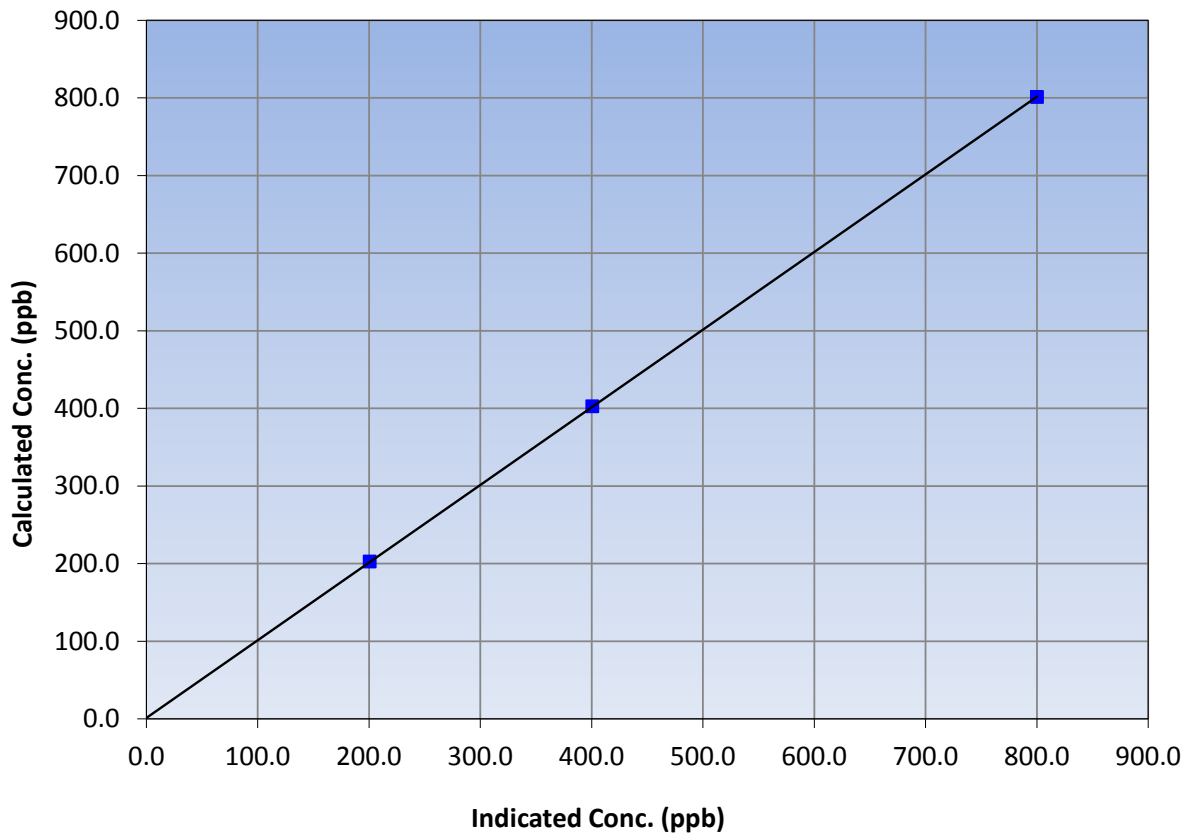
Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 10, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	≥0.995	
801.2	800.2	1.0013			
402.8	400.7	1.0052			
202.8	200.5	1.0115			
			Slope	1.000436	0.90 - 1.10
			Intercept	1.255612	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

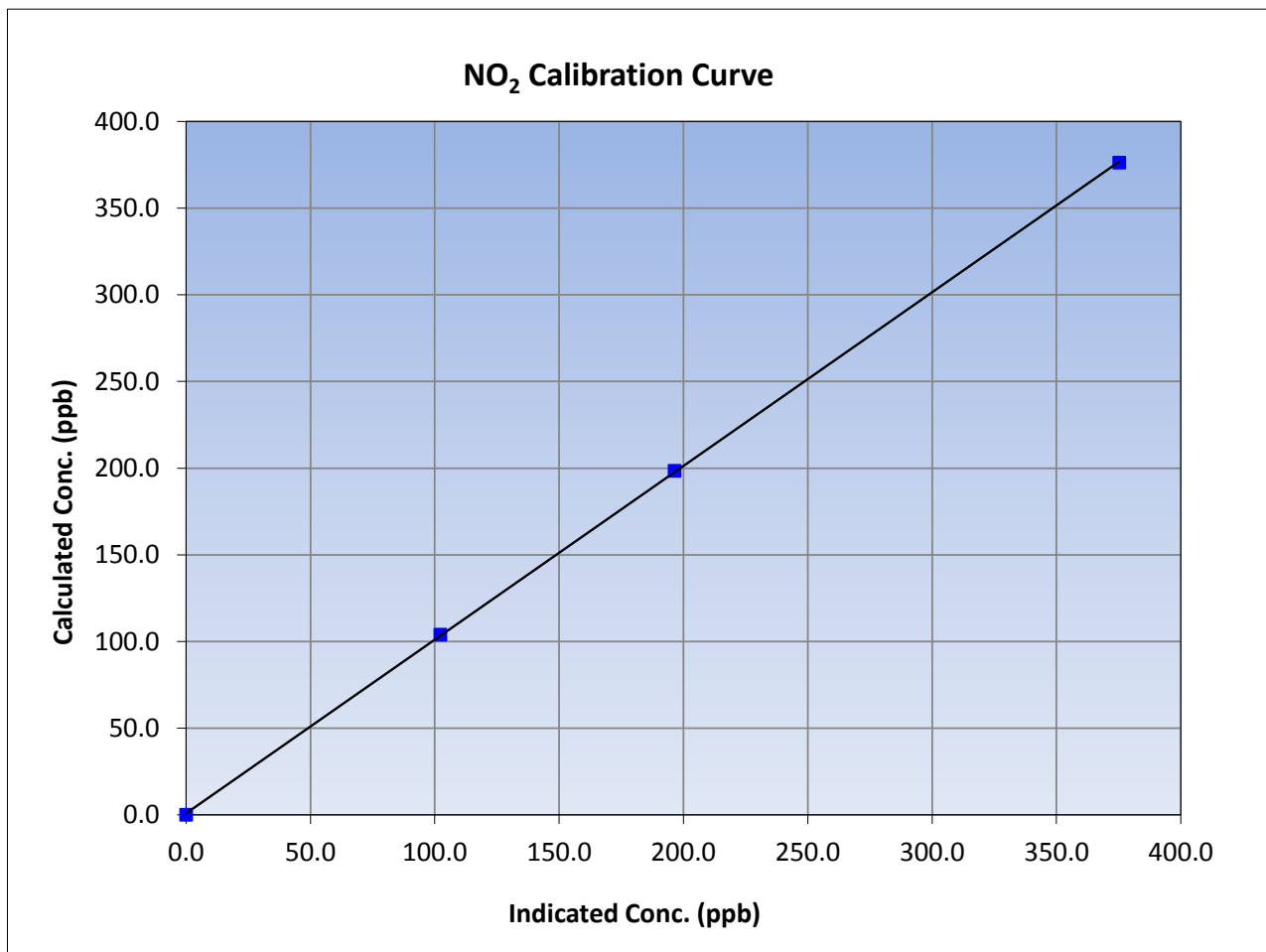
Version-03-2017

Station Information

Calibration Date	June 8, 2017	Previous Calibration	May 10, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:30
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

Calibration Data

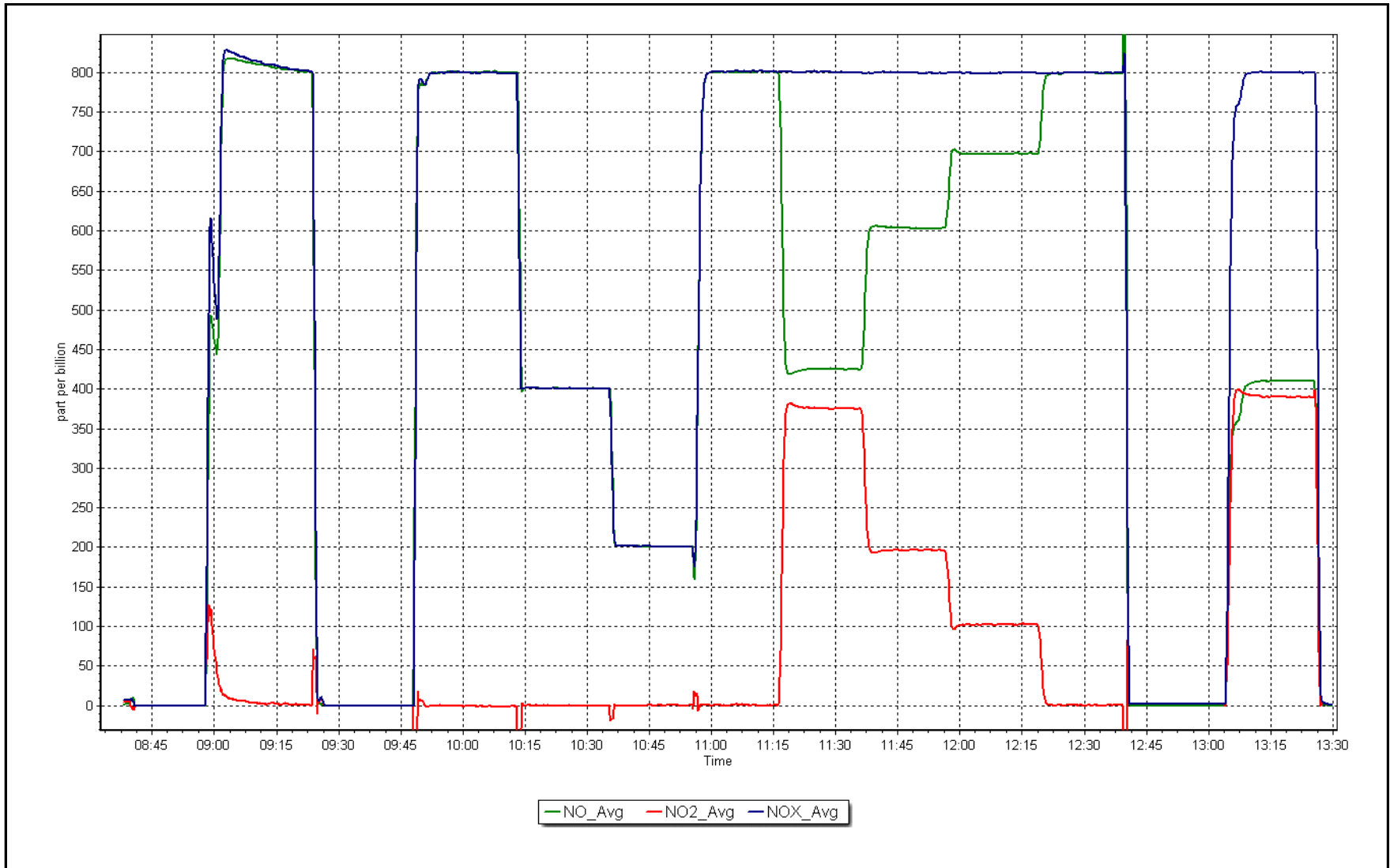
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
376.2	375.2	1.0027			
198.5	196.4	1.0107			
104.0	102.3	1.0166			
			Slope	1.002004	0.90 - 1.10
			Intercept	0.862356	+/-20



NO_x Calibration Plot

Date: June 8, 2017

Location: Muskeg River





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 17
WAPASU
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	34	36	99.72	30	0	6	0
H2S (ppb) Average	684	33	36	99.58	2	0	0	0
THC (ppm) Average	685	34	35	99.86	2.6	-	2.2	-
O3 (ppb) Average	685	32	35	99.58	57	0	44	-
NO2 (ppb) Average	683	34	37	99.58	19	0	4	-
NO (ppb) Average	683	34	37	99.58	5	-	1	-
NOX (ppb) Average	683	34	37	99.58	23	-	5	-
PM2.5 (ug/m3) Average	720	0	0	100	74.7	-	20.1	0
Temperature 2 m (C) Average	720	0	0	100	26.7	-	20.9	-
Relative Humidity (%) Average	720	0	0	100	99	-	96	-
Precipitation (mm) Total	720	0	0	100	14.2	-	27.1	-
Wind Speed 10 m (km/h) Average	720	0	0	100	23	-	16	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.5	2	-	0	0	0	0	0	1	30
H2S (ppb) Average	684	0.1	0	-	0	0	0	0	0	0	2
THC (ppm) Average	685	2.07	0.1	-	1.9	2	2	2.1	2.1	2.1	2.6
O3 (ppb) Average	685	30.5	10	-	2	18	23	31	38	43	57
NO2 (ppb) Average	683	1.3	2	-	0	0	0	1	2	3	19
NO (ppb) Average	683	0.3	0	-	0	0	0	0	0	1	5
NOX (ppb) Average	683	1.7	2	-	0	0	0	1	2	4	23
PM2.5 (ug/m3) Average	720	5.63	5.6	-	1.2	2.1	3	4	6.5	10.1	74.7
Temperature 2 m (C) Average	720	14.78	5.1	-	-1.3	8.5	11.2	14.7	18.7	21.3	26.7
Relative Humidity (%) Average	720	62.4	23	-	21	32	44	61	84	95	99
Precipitation (mm) Total	720	-	-	89.9	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	720	8.9	4	-	0	4	6	8	12	15	23
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	30 Jun 2017 10:00	30 Jun 2017 12:00	3	Maintenance - WBEA internal audit
O3, H2S	20 Jun 2017 08:00	20 Jun 2017 08:00	1	Maintenance - manifold cleaning
O3	27 Jun 2017 15:00	27 Jun 2017 16:00	2	Maintenance - WBEA internal audit
SO2	27 Jun 2017 12:00	27 Jun 2017 13:00	2	Maintenance - WBEA internal audit
H2S	27 Jun 2017 11:00	27 Jun 2017 12:00	2	Maintenance - WBEA internal audit
THC	27 Jun 2017 14:00	27 Jun 2017 14:00	1	Maintenance - WBEA internal audit



Summary of Hour Averages

Wapasu - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30 ppb on Jun 1 13:00	Maximum Daily Average: 5.7 ppb on Jun 1		Hours of Data:	684
Minimum Value: 0 ppb on Jun 2 19:00	Minimum Daily Average: 0.0 ppb on Jun 28		Hours of Missing Data:	36
Maximum Diurnal Average: 1.7 ppb at hour 13	Minimum Diurnal Average: 0.1 ppb at hour 24		Hours of Calibration:	34
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 8		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	13	Z	8	3	1	1	4	1	6	1	8	26	30	4	1	1	3	5	4	3	2	2	2	1	5.7	30
2-Jun	2	1	Z	1	1	1	1	1	1	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0.8	2
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Jun	0	1	1	0	Z	1	2	2	1	0	0	6	10	11	1	0	0	0	0	0	0	0	0	0	1.6	11
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.0	1	
6-Jun	Z	0	0	0	0	0	3	6	7	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	1.1	7
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jun	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
9-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0.2	1
17-Jun	0	0	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	Z	0	0	0	0	1	1	9	6	2	3	1	2	1	2	1	0	0	0	0	0	0	0	0	1.4	9
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	4	3	1	0	0.6	4
20-Jun	0	0	Z	0	0	1	1	C	C	C	C	0	1	0	1	1	0	0	0	0	0	0	0	0	0.2	1
21-Jun	0	2	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
25-Jun	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
26-Jun	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jun	0	0	0	Z	0	0	0	1	2	0	0	M	M	0	0	0	0	0	0	0	1	1	0	0	0.3	2
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jun	0	0	0	0	0	Z	2	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
30-Jun	Z	0	0	0	0	0	0	1	4	4	3	2	2	1	1	5	2	0	0	0	1	0	0	0	1.2	5

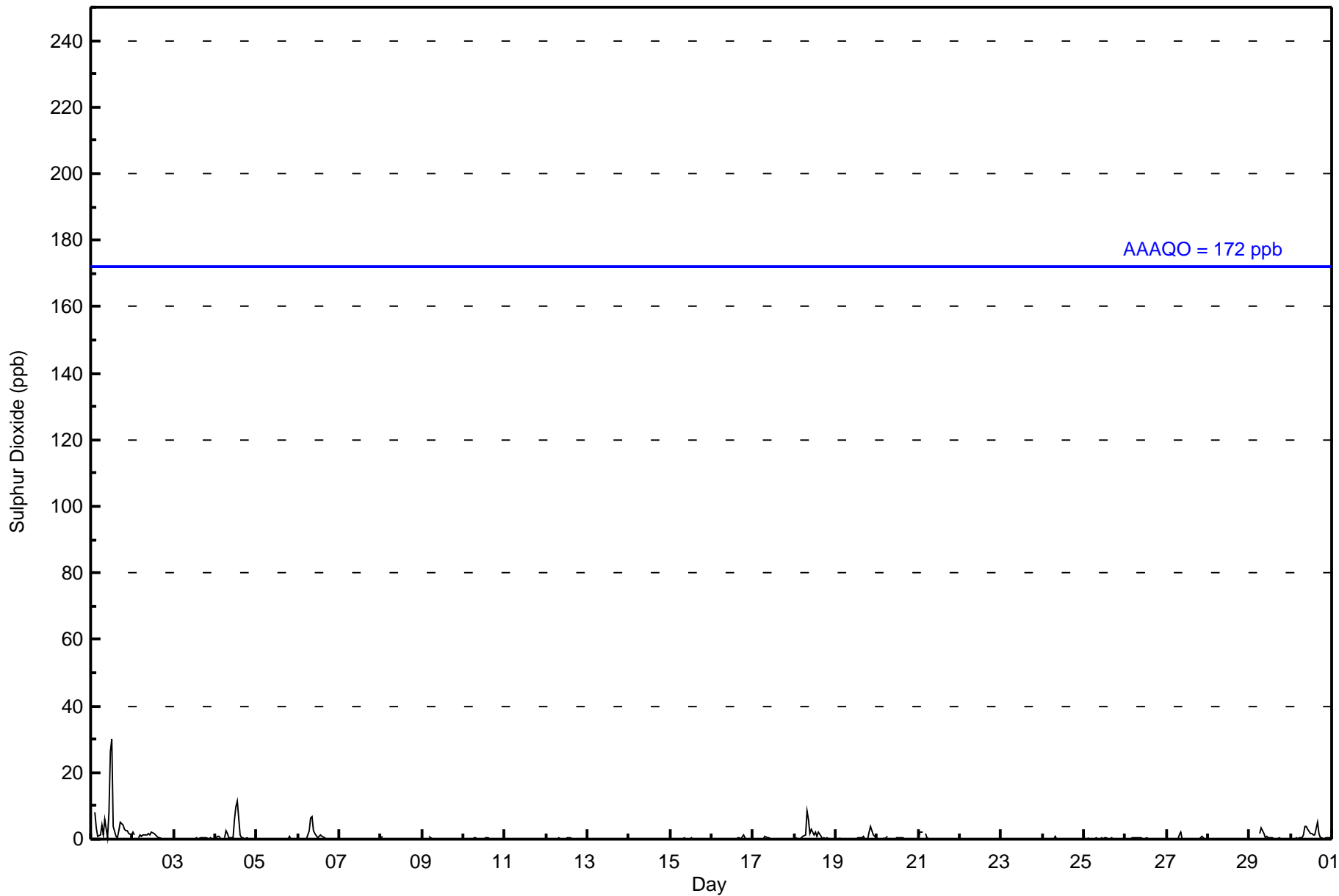
0.7	0.3	0.5	0.3	0.3	0.3	0.6	1.0	1.1	0.5	0.7	1.4	1.7	0.8	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	Diurnal Average	
13	2	8	3	1	1	4	9	7	4	8	26	30	11	2	5	3	5	4	3	4	3	2	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	680	99.42	99.42
11 - 20	2	0.29	99.71
21 - 60	2	0.29	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	63	57	36	40	32	37	79	95	36	17	17	23	35	21	35	57	680
11 - 20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2
21 - 60	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	57	36	40	32	37	79	95	37	19	17	23	35	22	35	57	684

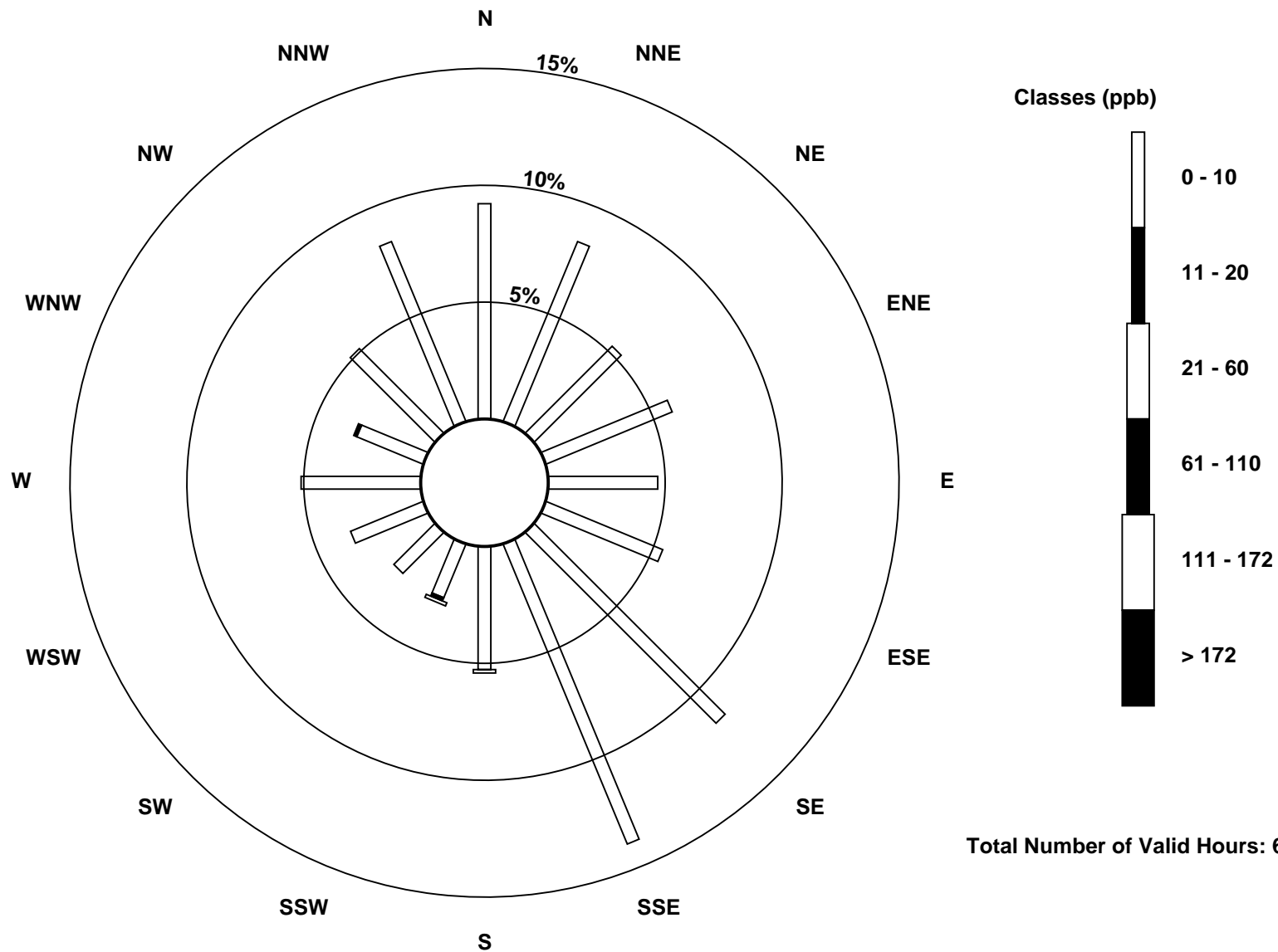
Total Number of Valid Hours: 684

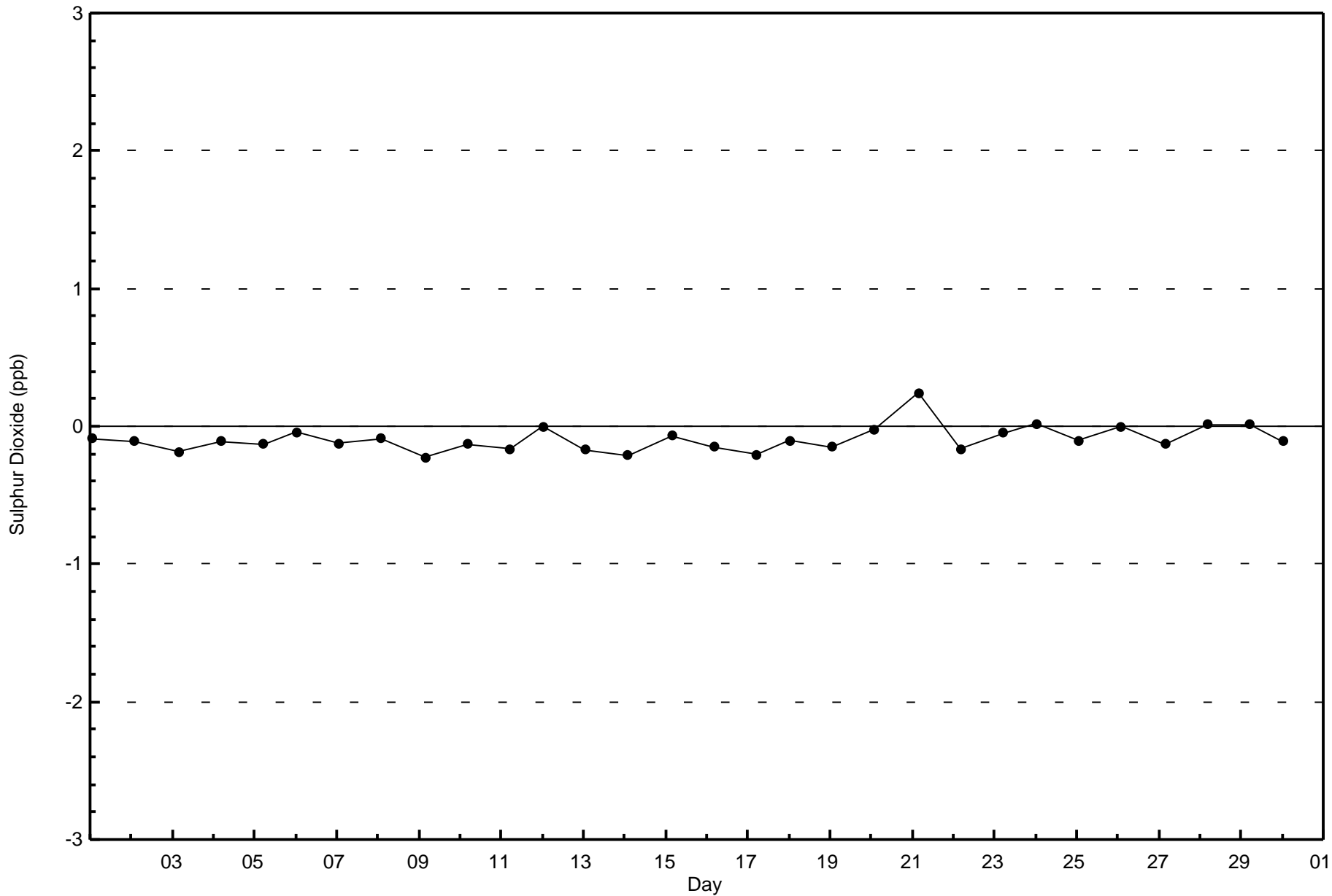
Total Number of Hours: 720

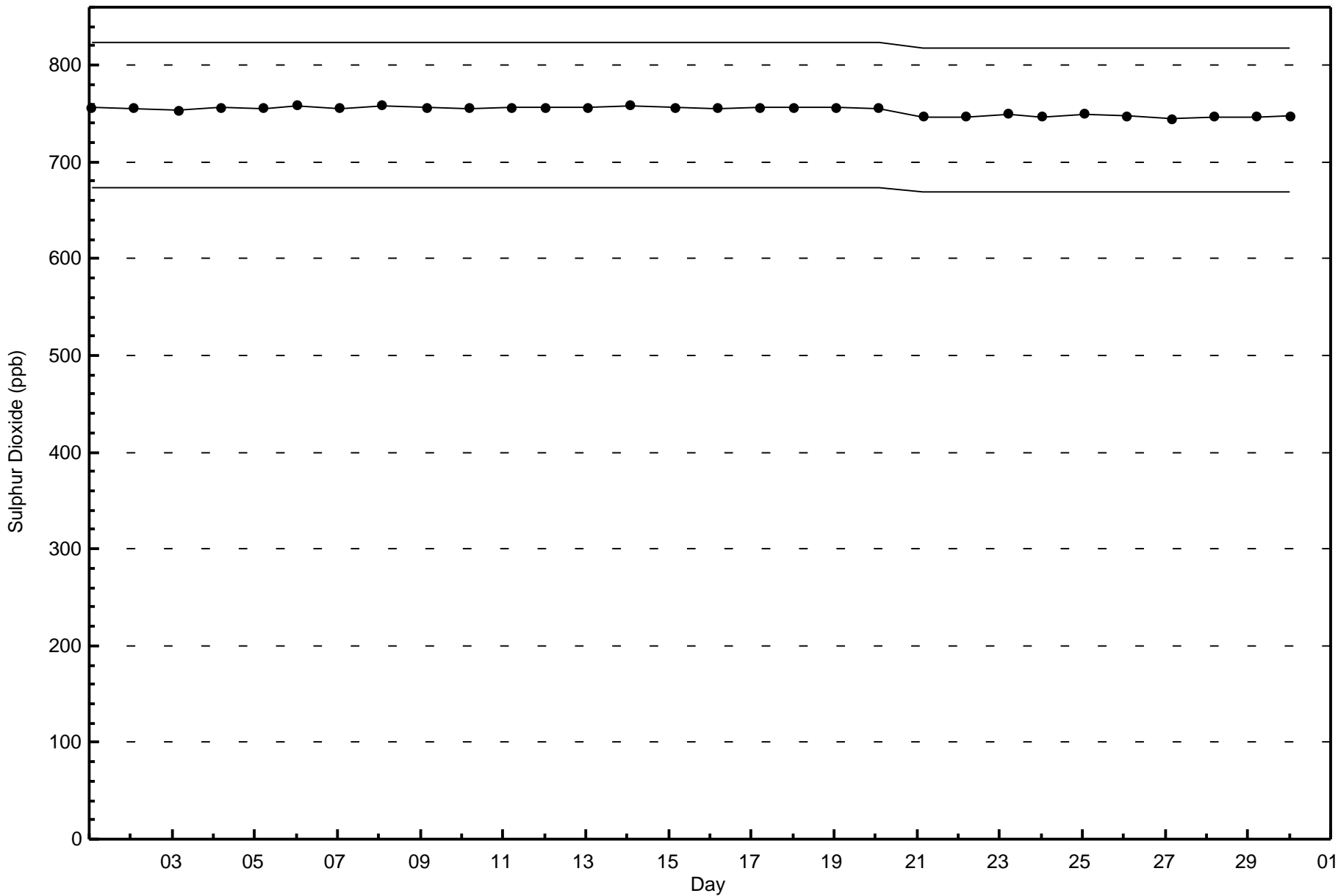


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)







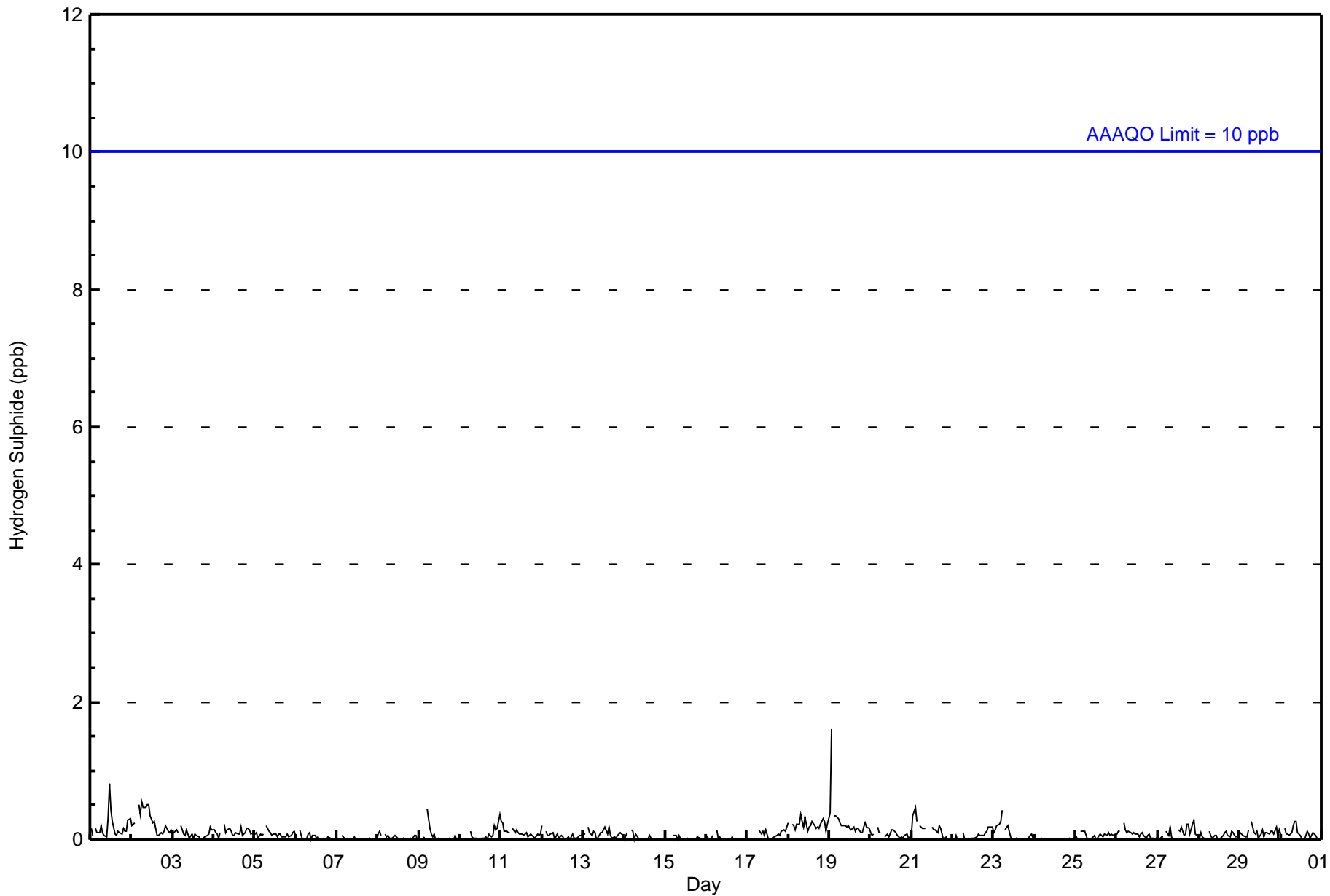


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 2 ppb on Jun 19 02:00	Maximum Daily Average: 0.3 ppb on Jun 19
Minimum Value: 0 ppb on Jun 3 18:00	Hours of Data: 684
Maximum Diurnal Average: 0.1 ppb at hour 2	Hours of Missing Data: 36
Monthly Average: 0.1 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.0 ppb on Jun 24	Percent Operational Time: 99.6
Minimum Diurnal Average: 0.1 ppb at hour 18	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
2-Jun	0	0	0	Z	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
20-Jun	0	0	0	Z	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Jun	0	0	0	0	Z	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Jun	0	0	0	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0

0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
0	2	0	0	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	62	56	38	42	31	37	77	100	36	19	18	22	32	22	35	57	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	62	56	38	42	31	37	77	100	36	19	18	22	32	22	35	57	684

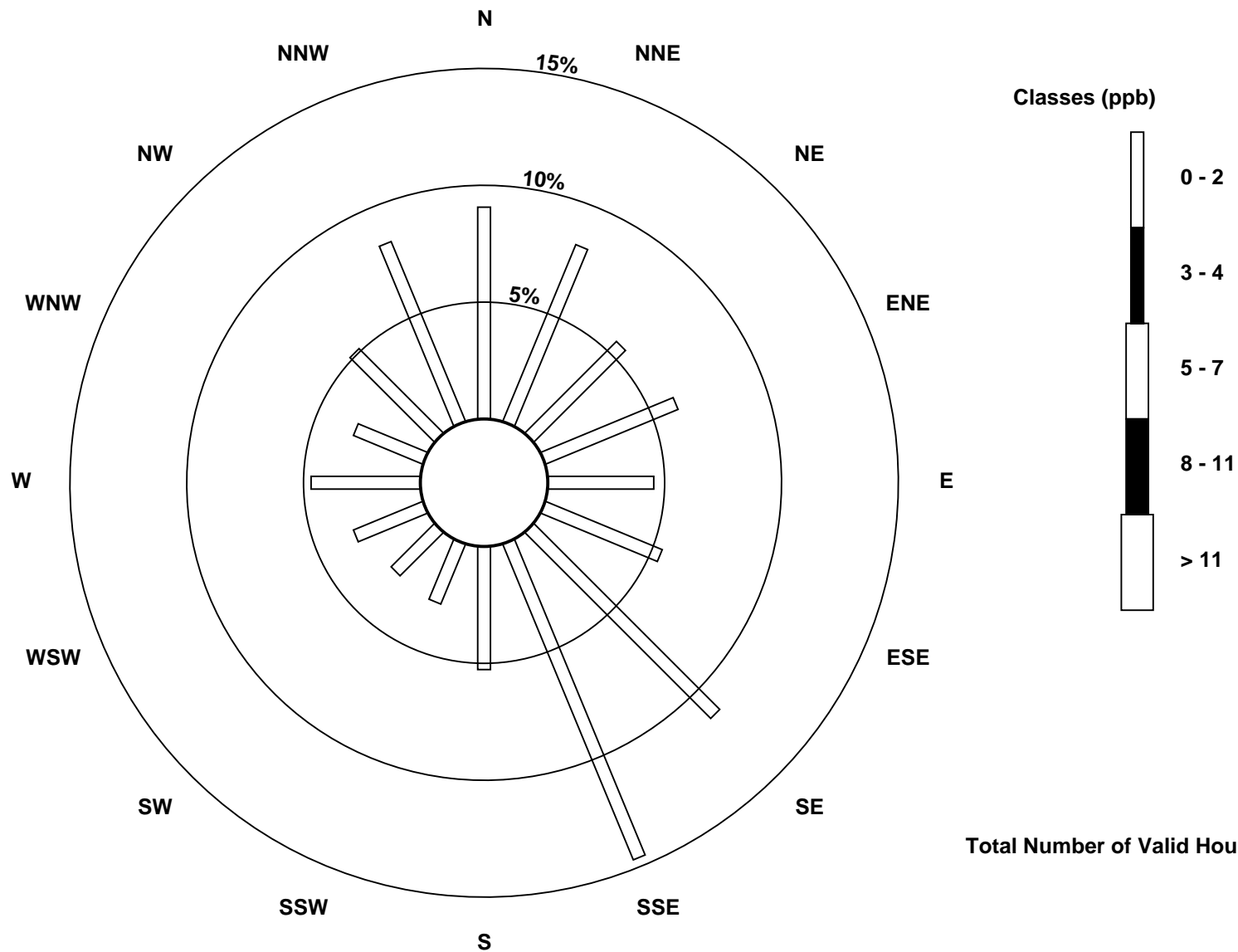
Total Number of Valid Hours: 684

Total Number of Hours: 720

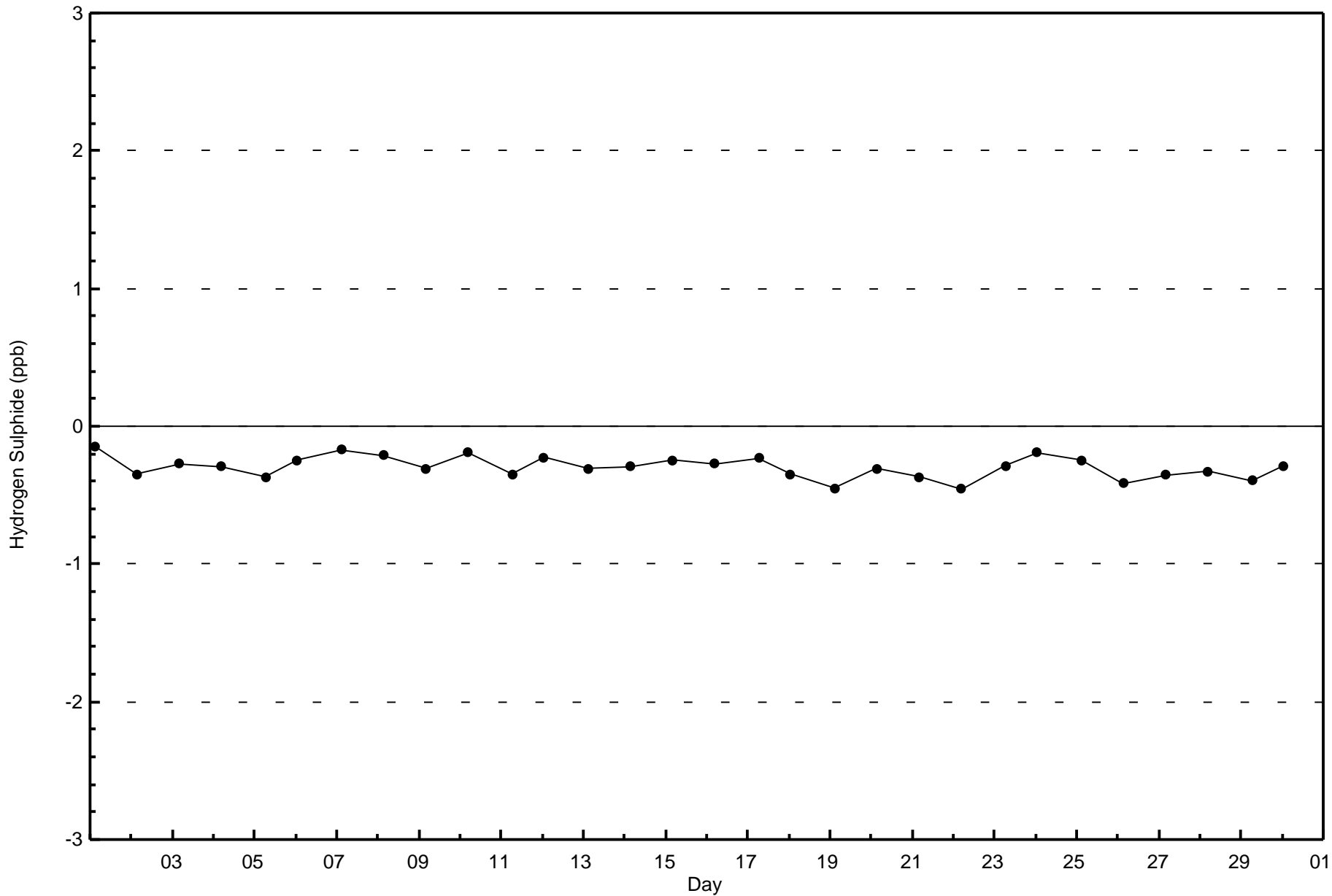


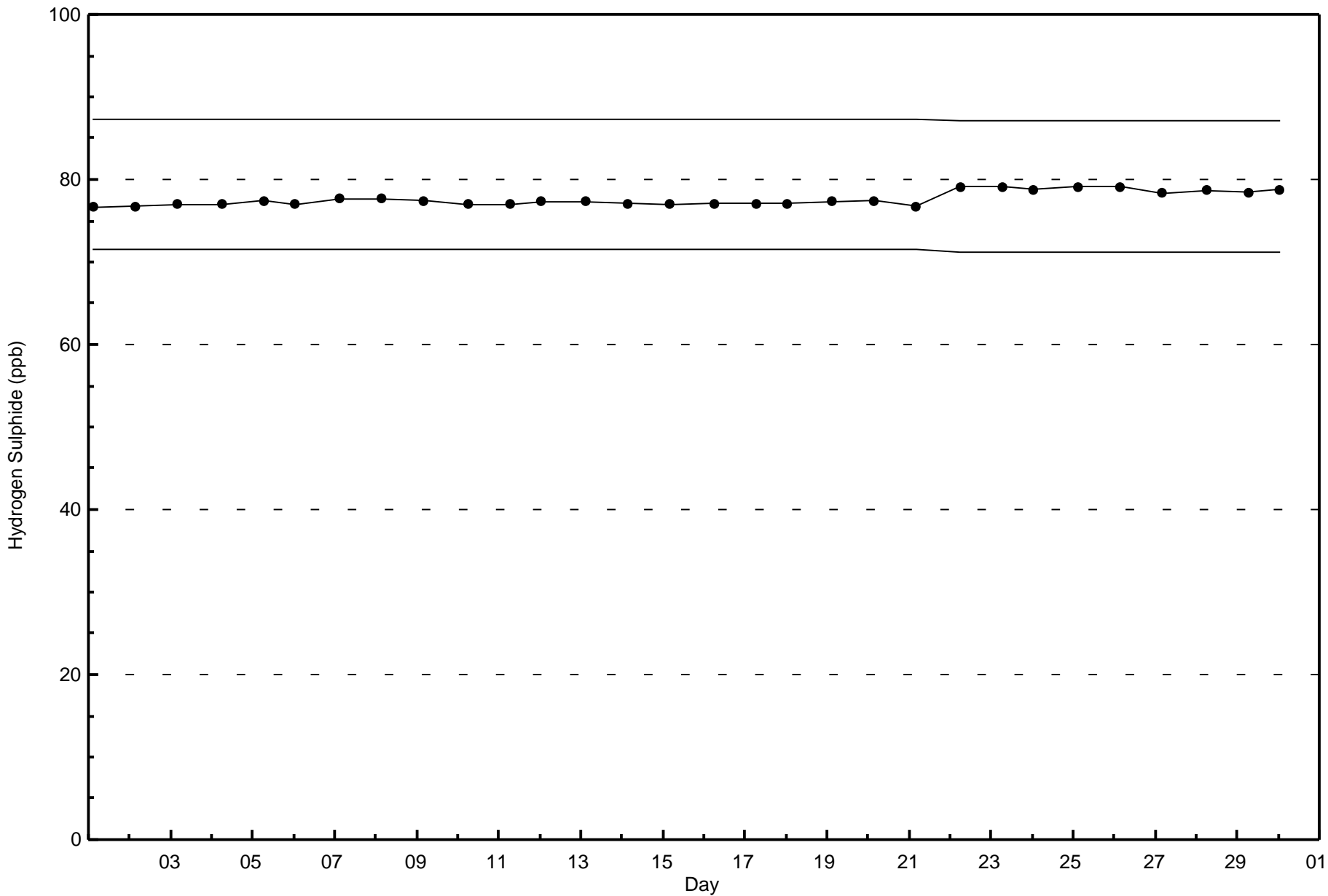
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 684







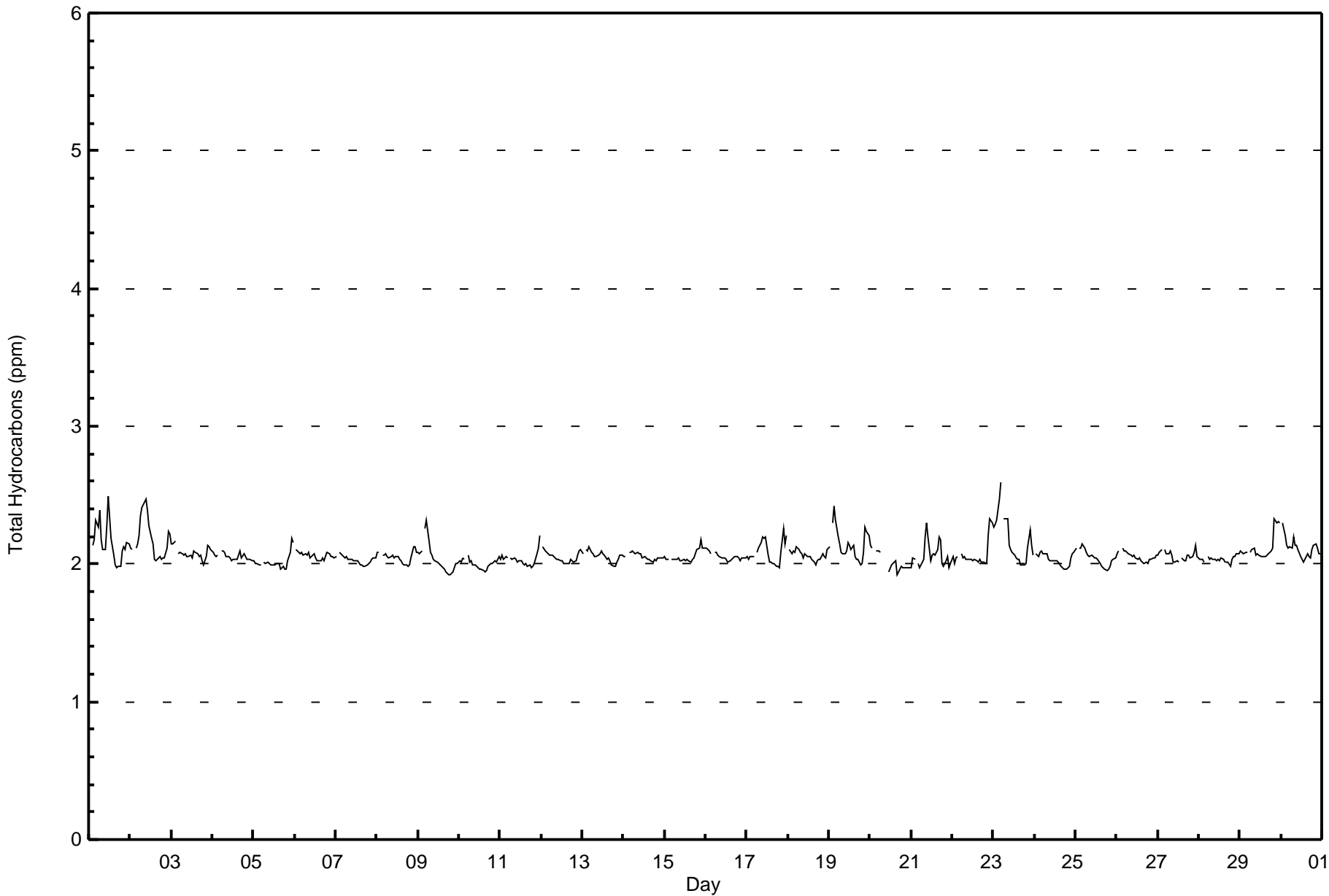
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Wapasu - June 2017

Maximum Value: 2.6 ppm on Jun 23 05:00																				Maximum Daily Average: 2.2 ppm on Jun 2					Hours in Service: 720	
Minimum Value: 1.9 ppm on Jun 9 20:00																				Minimum Daily Average: 2.0 ppm on Jun 10					Hours of Data: 685	
Maximum Diurnal Average: 2.1 ppm at hour 5																				Minimum Diurnal Average: 2.0 ppm at hour 19					Hours of Missing Data: 35	
Monthly Average: 2.07 ppm																				Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.1 P ₉₉ = 2.4					Hours of Calibration: 34	
																									Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2.1	Z	2.1	2.2	2.3	2.3	2.4	2.2	2.1	2.1	2.3	2.5	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2	2.5
2-Jun	2.1	2.1	Z	2.1	2.2	2.2	2.3	2.4	2.5	2.5	2.4	2.3	2.2	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.5
3-Jun	2.1	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2
4-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1
5-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2
6-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1
7-Jun	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
8-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
9-Jun	2.1	2.1	2.1	Z	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.3	2.3
10-Jun	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
11-Jun	2.0	2.1	2.0	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2
12-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
13-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
14-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
15-Jun	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.1	2.2
16-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1
17-Jun	2.1	2.0	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.1	2.2	2.3
18-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1
19-Jun	2.1	Z	2.3	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.2	2.1	2.4
20-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	C	C	C	C	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
21-Jun	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.2	2.3	2.2	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.3
22-Jun	2.1	2.0	2.0	2.1	Z	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.3
23-Jun	2.3	2.3	2.3	2.5	2.6	Z	2.3	2.3	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.2	2.6
24-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
25-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
26-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
27-Jun	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	M	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1
28-Jun	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1
29-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.3	2.3
30-Jun	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	338	49.34	49.34
2.1 - 3.0	347	50.66	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	38	37	26	34	22	11	18	38	12	9	10	7	15	10	25	26	338
2.1 - 3.0	25	20	10	6	10	26	61	58	25	10	7	16	20	12	10	31	347
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	57	36	40	32	37	79	96	37	19	17	23	35	22	35	57	685

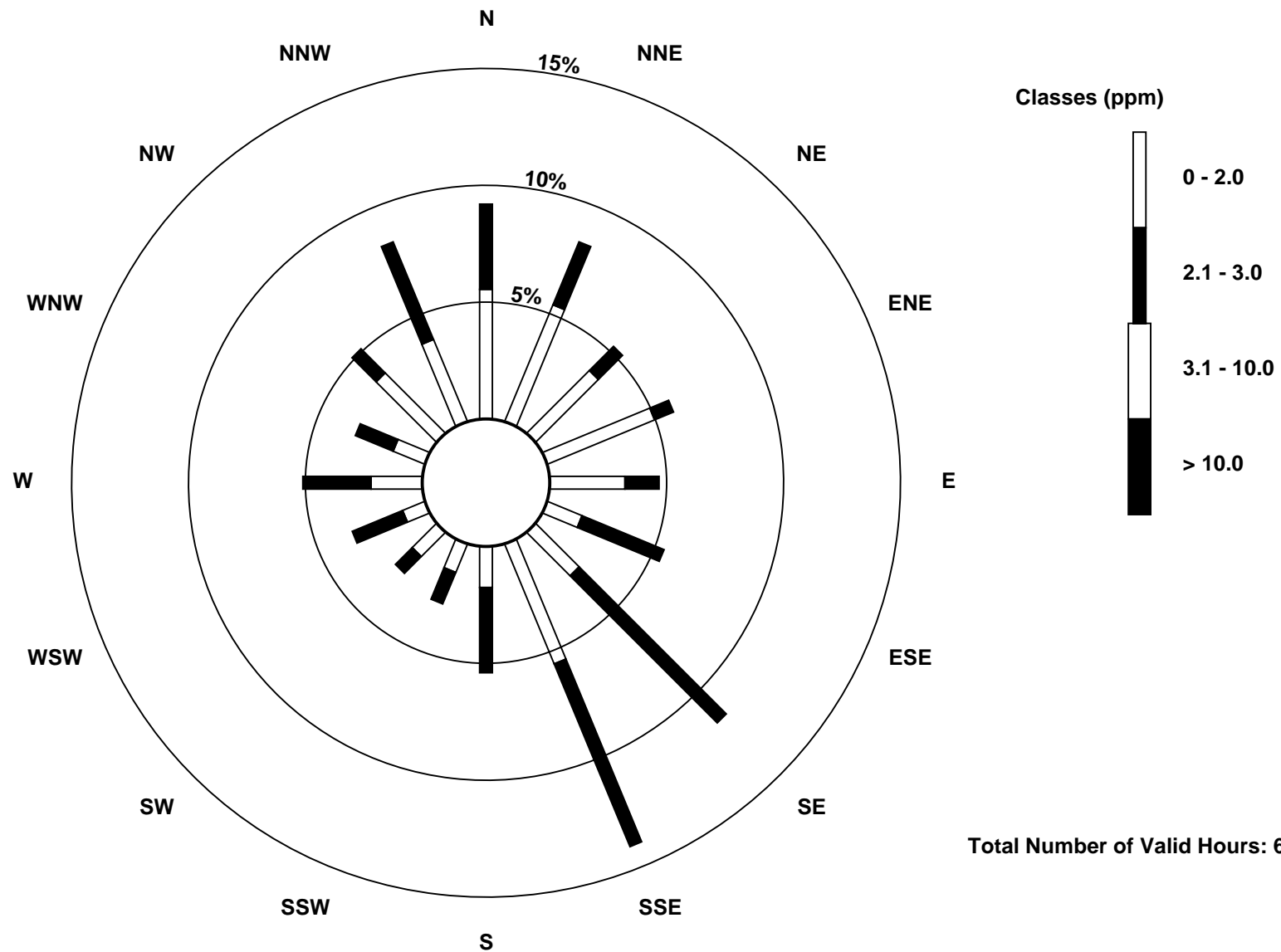
Total Number of Valid Hours: 685

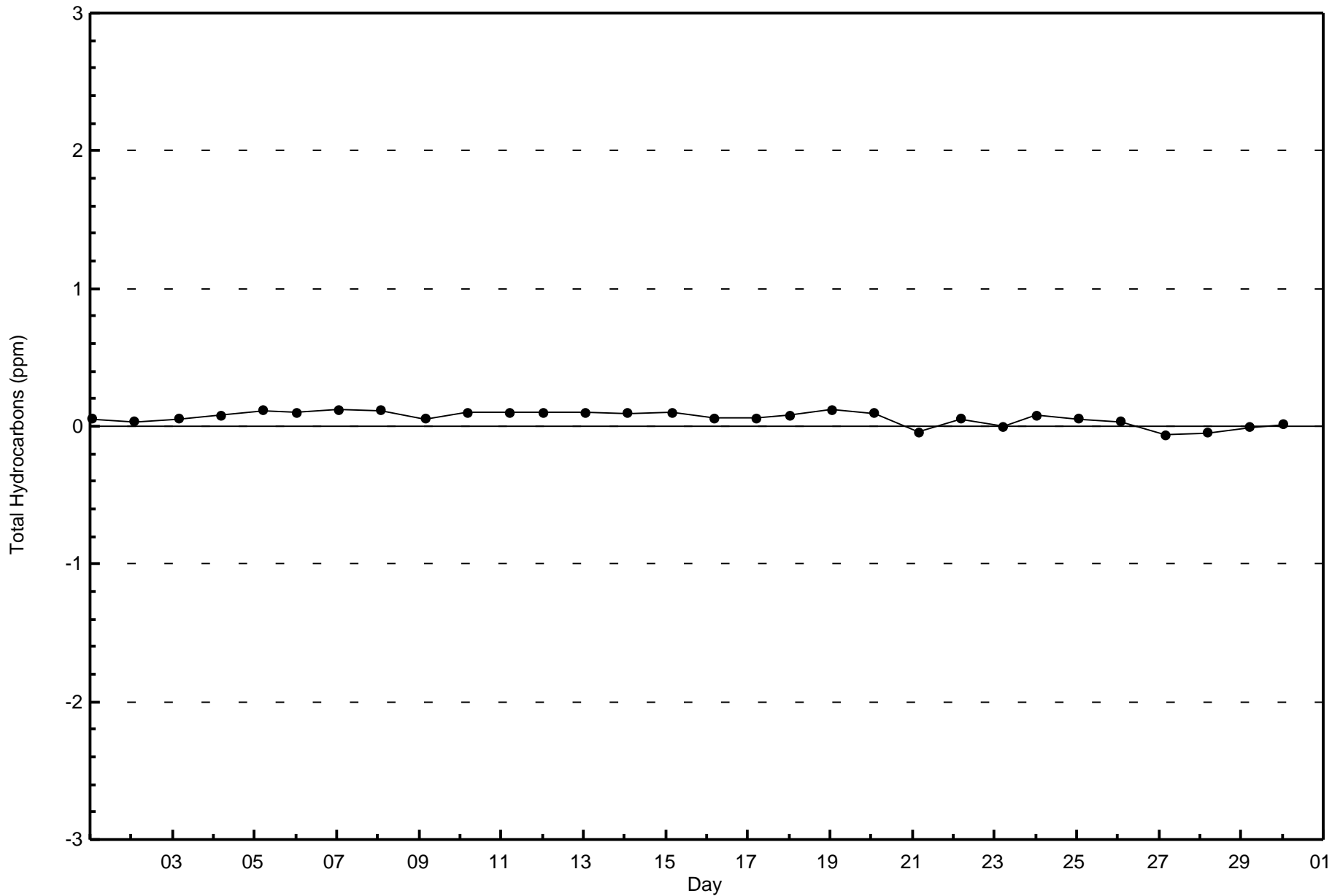
Total Number of Hours: 720

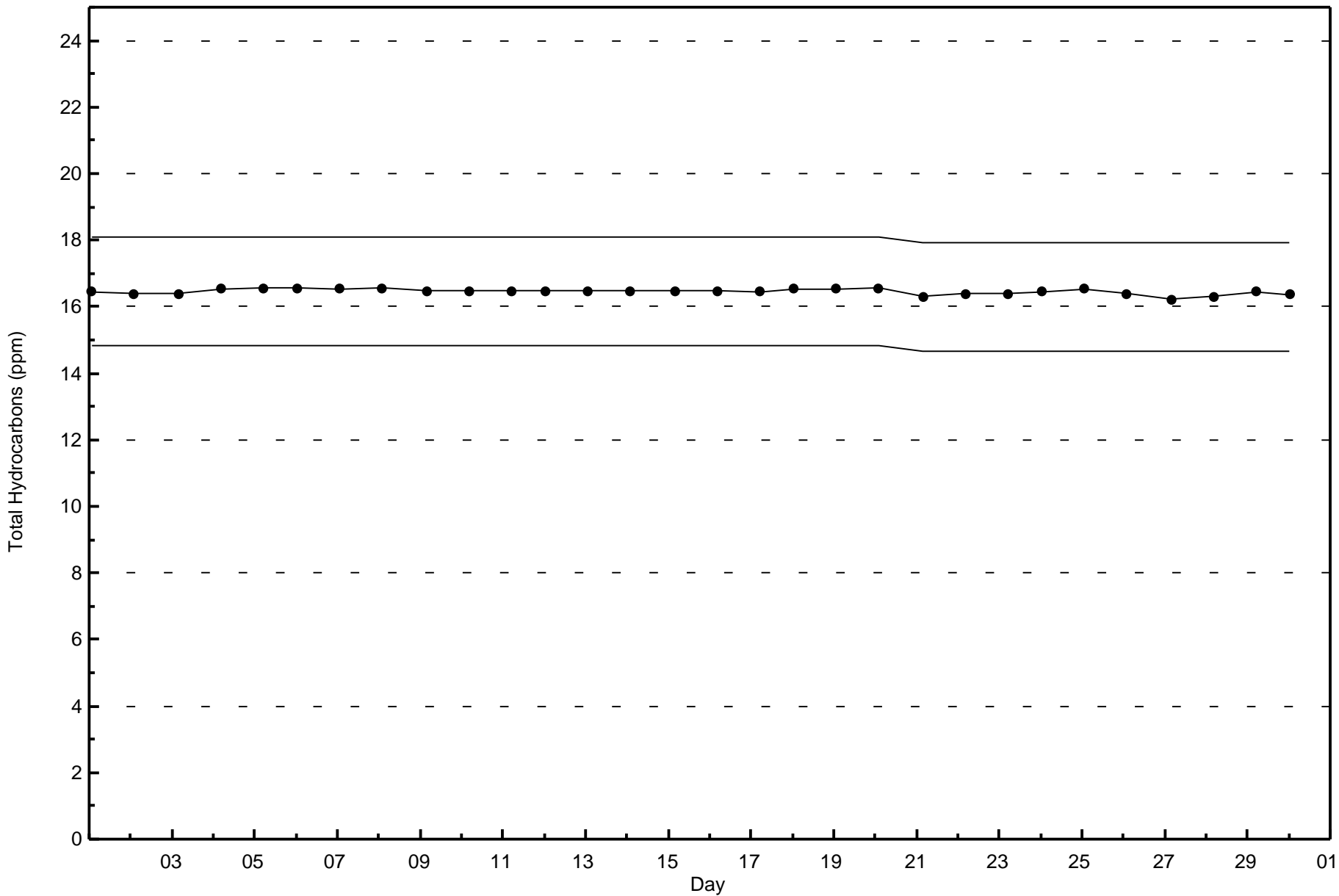


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Wapasu - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 57 ppb on Jun 4 12:00	Maximum Daily Average: 43.6 ppb on Jun 26		Hours of Data:	685
Minimum Value: 2 ppb on Jun 23 04:00	Minimum Daily Average: 17.4 ppb on Jun 15		Hours of Missing Data:	35
Maximum Diurnal Average: 38.1 ppb at hour 16	Minimum Diurnal Average: 23.4 ppb at hour 23		Hours of Calibration:	32
Monthly Average: 30.5 ppb	Percentiles: P ₁ = 3 P ₁₀ = 18 Q ₁ = 23 Median = 31 Q ₃ = 38 P ₉₀ = 43 P ₉₉ = 53		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	51	47	43	37	Z	22	36	49	55	49	42	27	20	26	43	49	53	54	47	34	33	33	28	28	39.4	55
2-Jun	32	29	22	24	22	Z	19	26	30	34	40	48	51	50	49	54	49	42	39	38	39	28	22	22	35.2	54
3-Jun	21	18	19	20	22	Z	25	24	24	24	23	29	36	42	43	41	43	41	35	24	25	31	33	28.8	43	
4-Jun	29	32	32	29	26	25	26	Z	52	47	50	57	53	54	54	53	52	53	48	47	45	42	40	42	43.0	57
5-Jun	49	45	47	46	45	42	41	40	Z	42	44	43	41	39	39	41	40	42	44	37	37	22	9	14	38.7	49
6-Jun	22	24	30	Z	29	29	28	32	40	41	40	41	43	44	43	42	41	41	38	33	34	34	33	34	35.5	44
7-Jun	34	35	34	34	Z	30	33	33	33	37	36	35	34	34	35	35	35	35	34	33	31	30	31	31	33.6	37
8-Jun	25	26	29	29	Z	27	27	28	28	30	29	42	53	50	47	44	45	46	44	39	35	35	36	35.8	53	
9-Jun	34	31	28	27	20	18	Z	25	26	28	29	30	30	32	38	42	43	41	40	40	38	35	32	31	32.0	43
10-Jun	32	31	30	27	28	27	34	Z	37	37	38	40	39	43	44	39	37	35	35	37	32	27	25	19	33.7	44
11-Jun	22	15	25	23	25	27	30	33	Z	34	34	34	34	35	36	37	37	36	36	35	32	21	18	14	29.3	37
12-Jun	22	27	31	Z	33	33	33	33	32	32	31	31	32	32	32	30	32	31	26	23	21	20	8	9	27.6	33
13-Jun	11	11	6	4	Z	12	16	21	23	27	32	36	36	36	38	40	38	34	32	31	30	28	21	18	25.3	40
14-Jun	20	21	23	22	Z	21	21	22	21	20	21	22	22	23	25	23	20	18	19	18	18	17	17	17	20.7	25
15-Jun	16	15	14	13	12	11	Z	16	18	20	19	20	22	22	28	23	25	21	21	17	13	9	10	17	17.4	28
16-Jun	20	24	25	25	25	25	24	Z	27	30	30	31	31	30	30	30	31	31	33	33	28	28	27	24	28.0	33
17-Jun	25	24	24	22	20	19	15	12	Z	16	17	20	26	27	31	36	39	39	39	38	28	14	10	10	23.9	39
18-Jun	18	26	26	Z	23	22	25	30	34	38	38	39	39	38	39	40	37	35	34	35	29	32	33	25	31.9	40
19-Jun	19	18	16	9	Z	16	20	27	30	33	36	37	40	43	43	37	36	35	36	35	27	17	15	19	28.1	43
20-Jun	26	27	27	27	28	Z	28	M	27	30	37	40	40	38	43	39	37	35	34	34	34	34	31	28	32.9	43
21-Jun	24	19	20	22	20	19	Z	C	C	23	24	22	21	20	18	16	12	12	32	37	33	31	23	22	22.4	37
22-Jun	22	22	21	21	21	21	24	Z	28	31	32	31	27	27	29	30	29	31	32	31	27	13	4	3	24.1	32
23-Jun	3	3	3	2	2	6	21	26	Z	28	32	34	35	34	33	33	32	32	32	29	21	11	12	22	21.2	35
24-Jun	23	24	24	Z	23	24	25	21	26	31	30	31	33	36	37	38	39	40	40	38	36	25	27	33	30.6	40
25-Jun	33	34	34	35	Z	34	34	34	35	38	41	41	41	42	43	44	42	47	50	44	40	43	42	37	39.5	50
26-Jun	37	37	37	36	38	Z	39	41	44	47	48	50	51	49	48	47	48	48	48	44	42	42	41	40	43.6	51
27-Jun	39	38	37	38	39	38	Z	35	37	38	32	29	25	23	M	M	20	22	27	29	19	11	17	24	29.4	39
28-Jun	24	18	15	14	21	24	19	Z	21	22	22	25	27	26	28	28	29	31	30	21	19	20	19	19	22.7	31
29-Jun	19	18	17	18	19	20	18	21	Z	33	35	38	41	48	47	43	43	43	38	32	20	15	18	15	28.7	48
30-Jun	16	16	23	Z	27	27	27	24	35	35	34	40	44	42	42	45	41	33	35	31	29	27	21	18	30.9	45

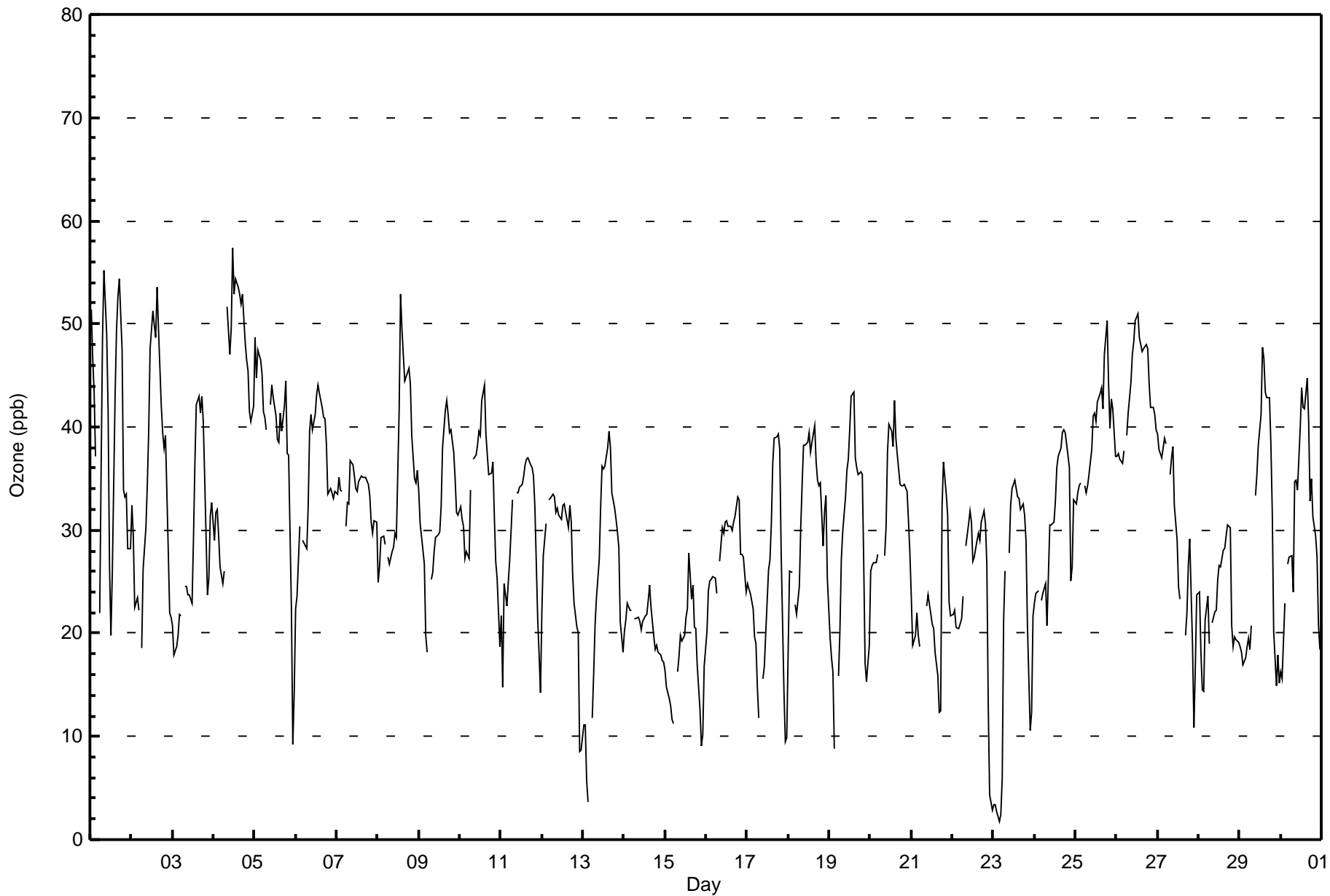
25.6	25.2	25.4	24.1	24.7	23.7	26.5	28.4	32.0	32.5	33.2	34.1	34.9	36.2	38.1	38.1	36.8	36.2	36.2	36.2	33.8	29.9	25.7	23.4	23.4	Diurnal Average	
51	47	47	46	45	42	41	49	55	49	50	57	53	54	54	54	53	54	50	47	45	43	42	42	Diurnal Maximum		

Z - zerspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Wapasu - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	115	16.79	16.79
21 - 50	554	80.88	97.66
51 - 82	16	2.34	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	3	10	13	8	4	14	17	8	14	2	5	4	5	5	0	3	115
21 - 50	57	44	24	33	27	23	62	89	25	15	12	16	27	15	34	51	554
51 - 82	3	1	0	0	0	0	0	1	1	2	1	1	1	2	1	2	16
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	55	37	41	31	37	79	98	40	19	18	21	33	22	35	56	685

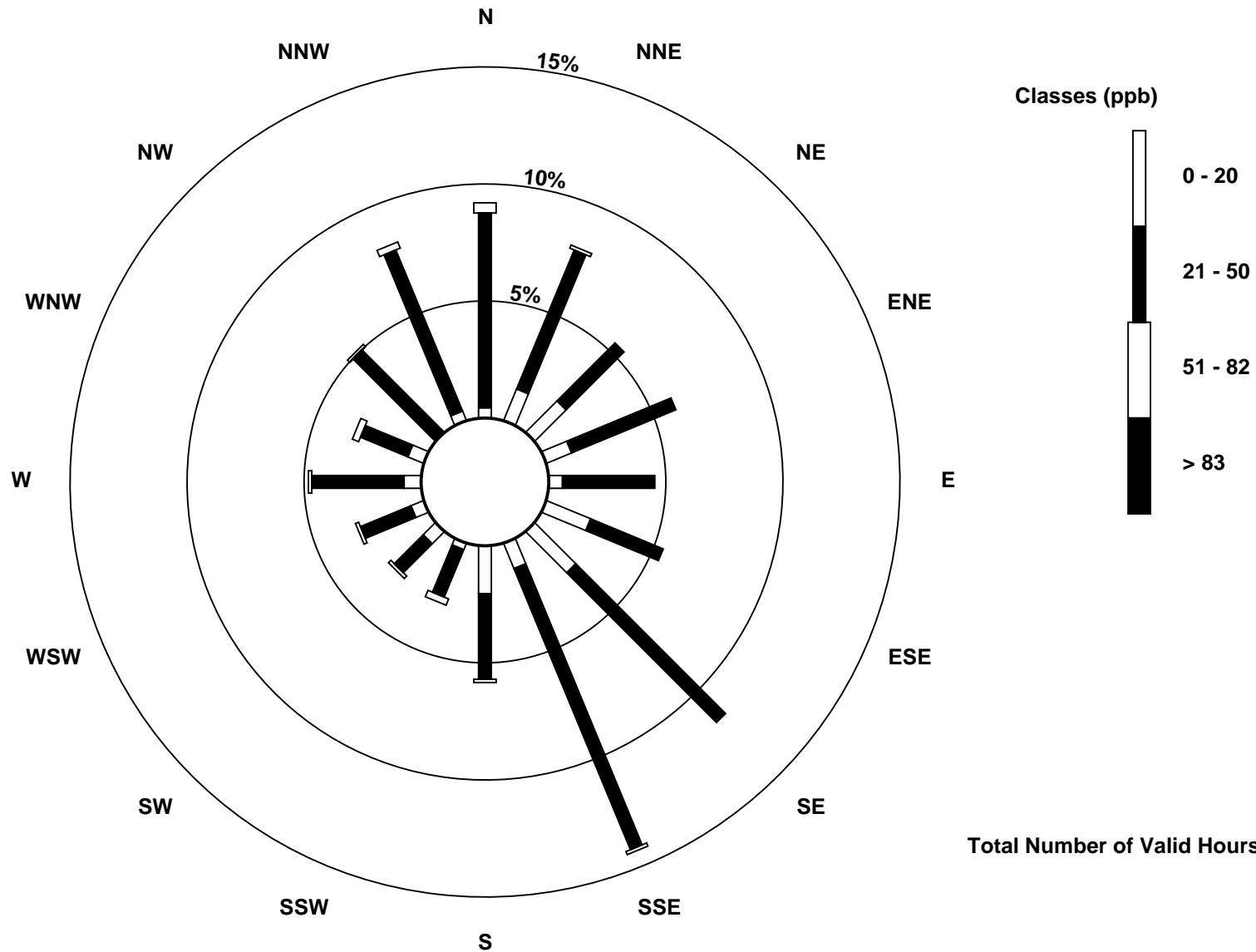
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

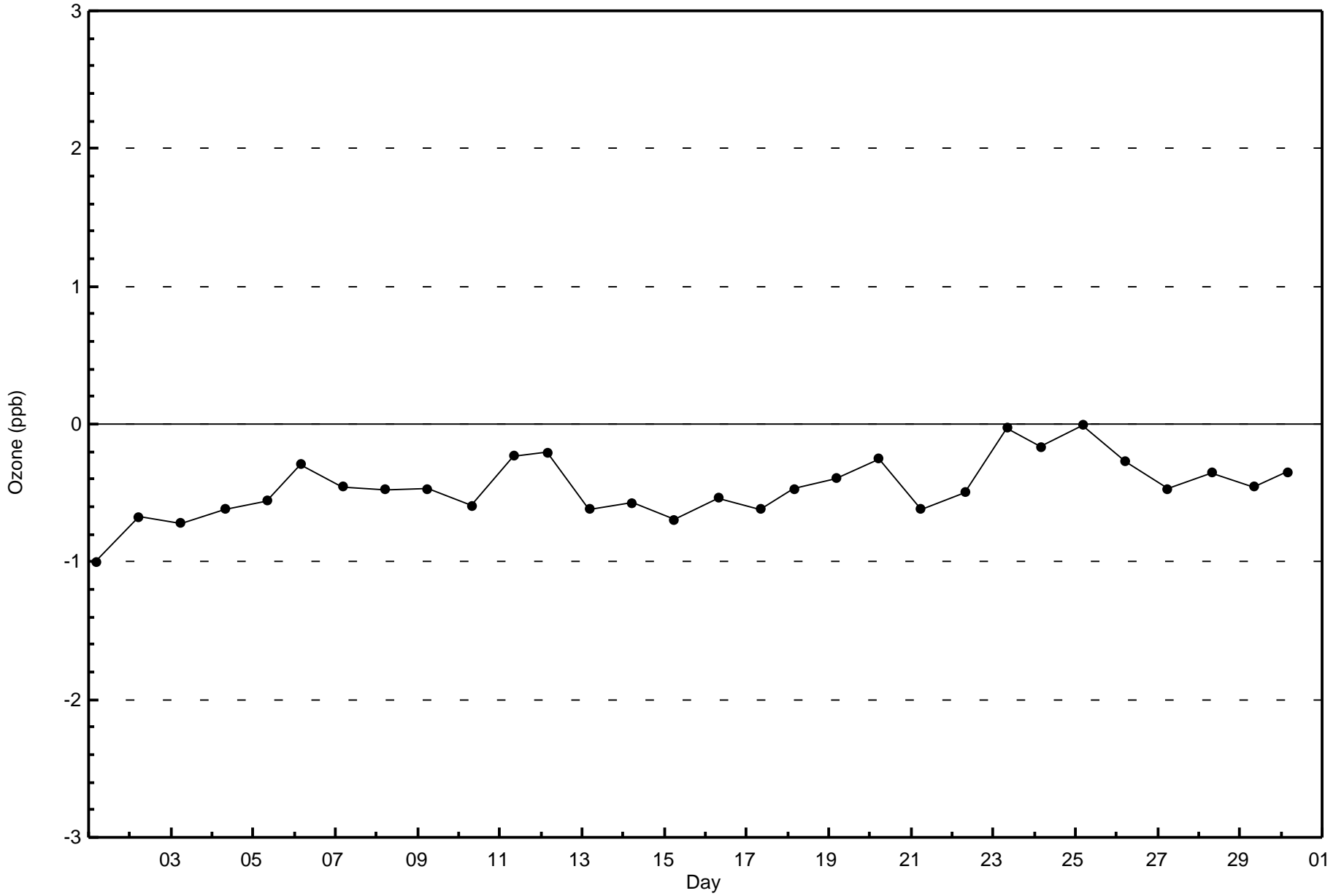
Ozone (O₃) - ppb
Wapasu (AMS 17)

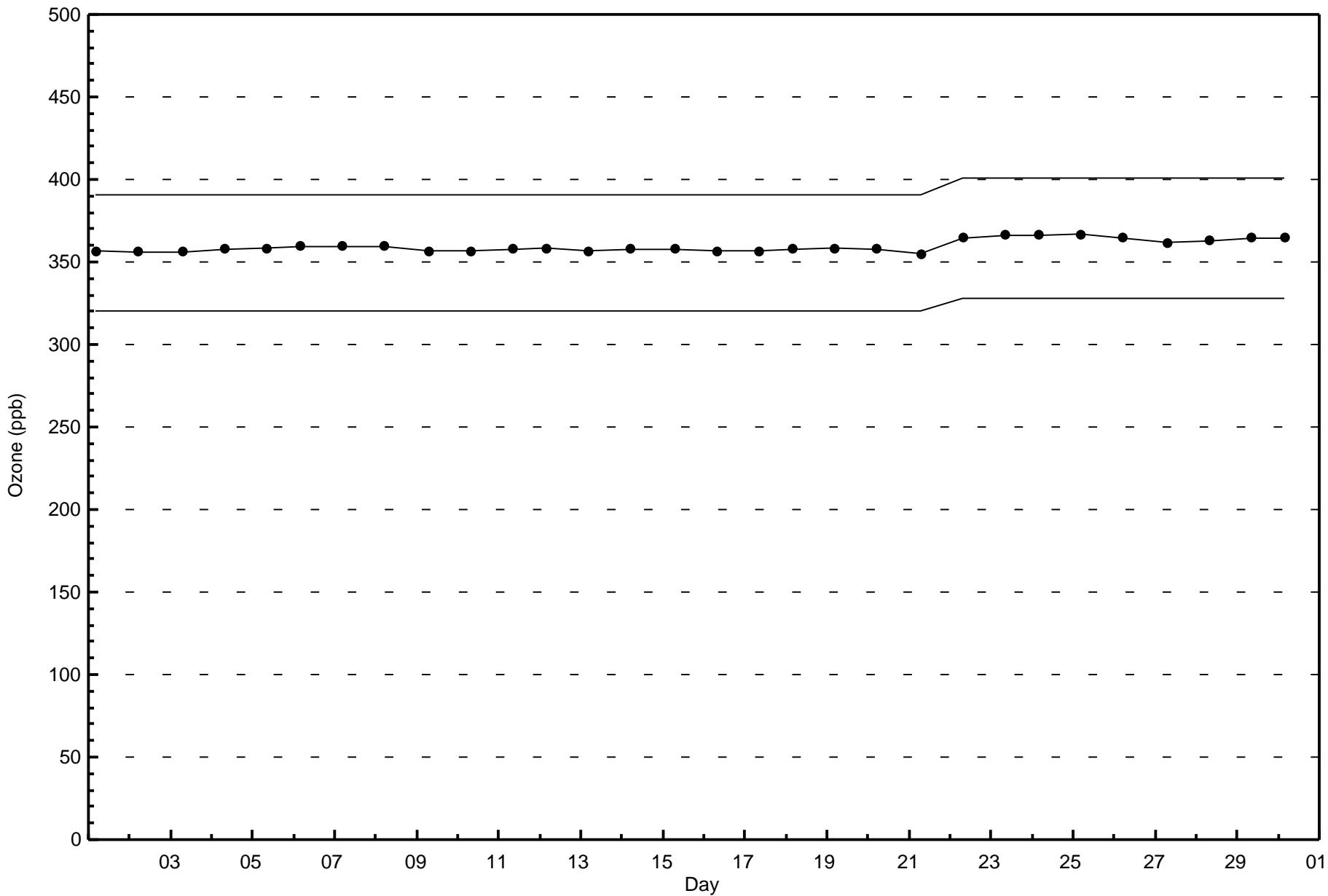




Wood Buffalo Environmental Association
Zero Responses

Ozone (O₃) - ppb
Wapasu - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

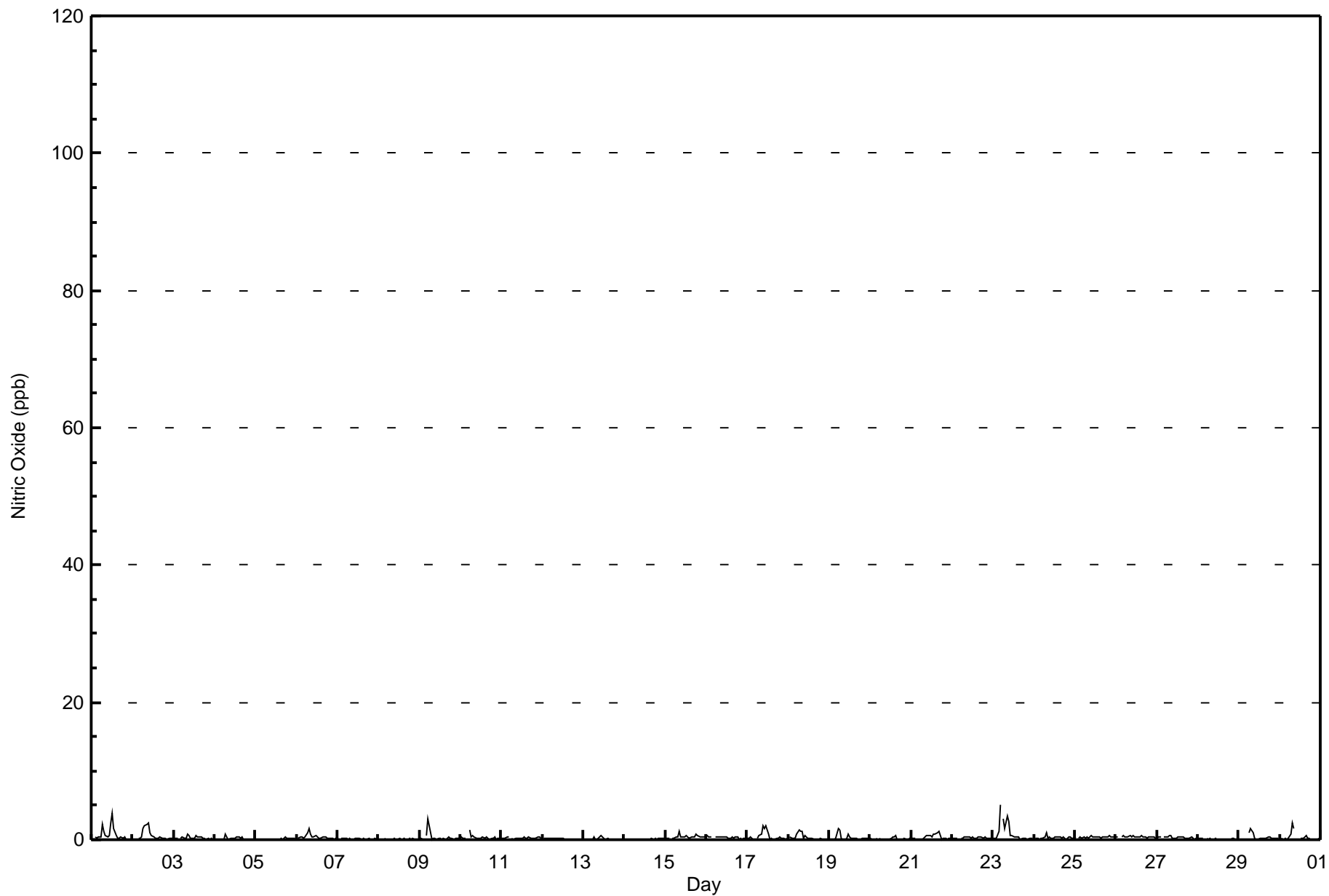
Wapasu - June 2017

Maximum Value: 5 ppb on Jun 23 05:00																	Maximum Daily Average: 0.9 ppb on Jun 23																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 4 03:00																	Minimum Daily Average: 0.1 ppb on Jun 8																	Hours of Data: 683	
Maximum Diurnal Average: 0.6 ppb at hour 8																	Minimum Diurnal Average: 0.1 ppb at hour 22																	Hours of Missing Data: 37	
Monthly Average: 0.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2																	Hours of Calibration: 34	
																																		Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	Z	0	0	0	0	2	1	1	0	1	3	4	2	1	0	0	0	0	0	0	0	0	0	0	0.7	4								
2-Jun	0	0	Z	0	0	0	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2								
3-Jun	0	0	0	Z	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0.3	1								
4-Jun	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1								
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
6-Jun	Z	0	0	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2								
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
9-Jun	0	0	0	Z	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3								
10-Jun	0	0	0	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0								
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
13-Jun	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1								
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
15-Jun	0	0	0	Z	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1								
16-Jun	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
17-Jun	0	0	0	0	0	Z	0	1	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2								
18-Jun	Z	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
19-Jun	0	Z	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2								
20-Jun	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1								
21-Jun	0	0	0	Z	0	0	0	0	0	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0.4	1								
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0								
23-Jun	0	0	0	1	5	Z	3	2	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5								
24-Jun	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
25-Jun	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1								
26-Jun	0	0	Z	0	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.5	1								
27-Jun	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1								
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0								
29-Jun	0	0	0	0	0	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2								
30-Jun	Z	0	0	0	0	0	1	3	2	M	M	M	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	3								
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration M - Maintenance																																			



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	57	36	40	32	37	79	97	37	19	16	21	35	22	35	57	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	57	36	40	32	37	79	97	37	19	16	21	35	22	35	57	683

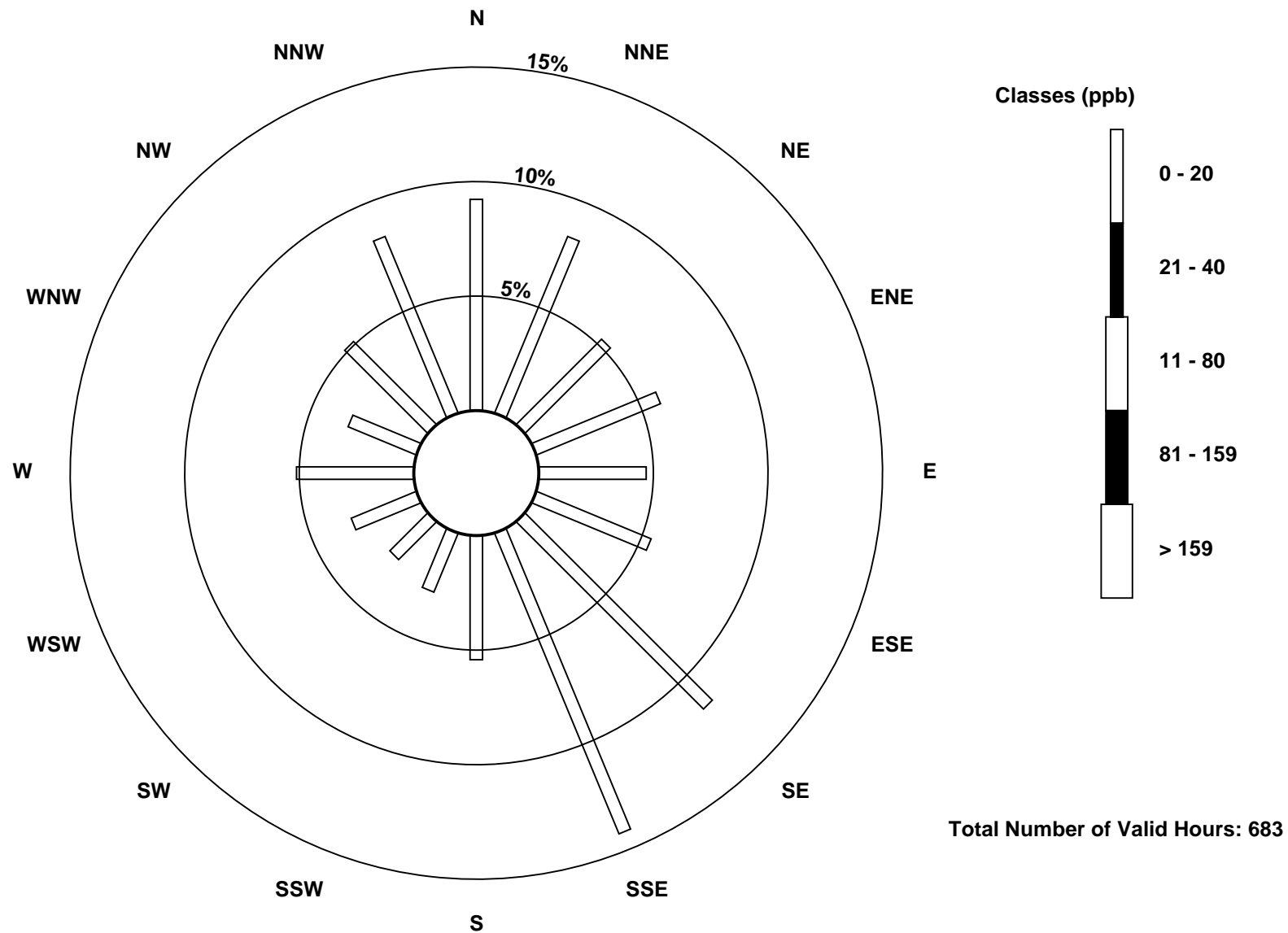
Total Number of Valid Hours: 683

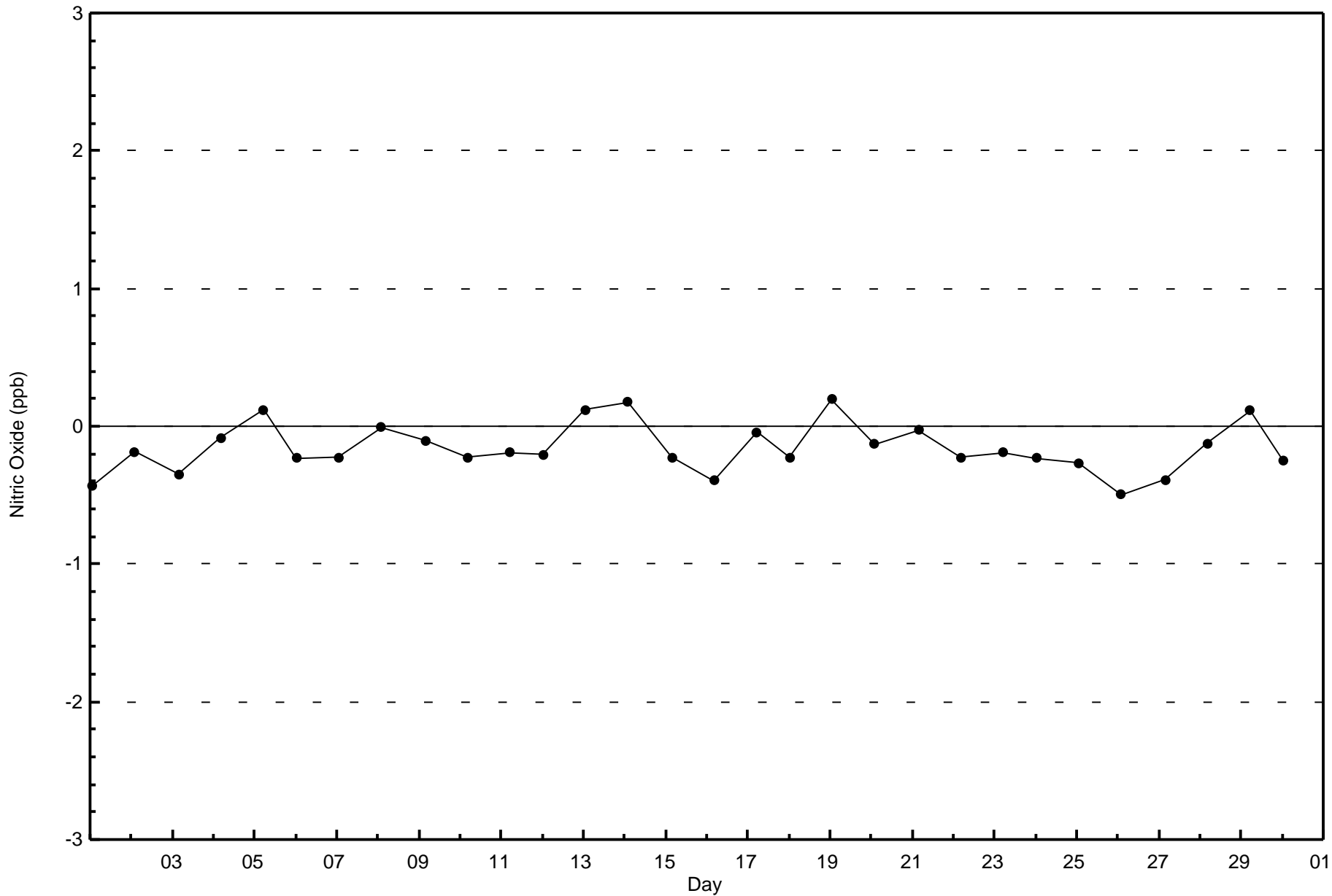
Total Number of Hours: 720

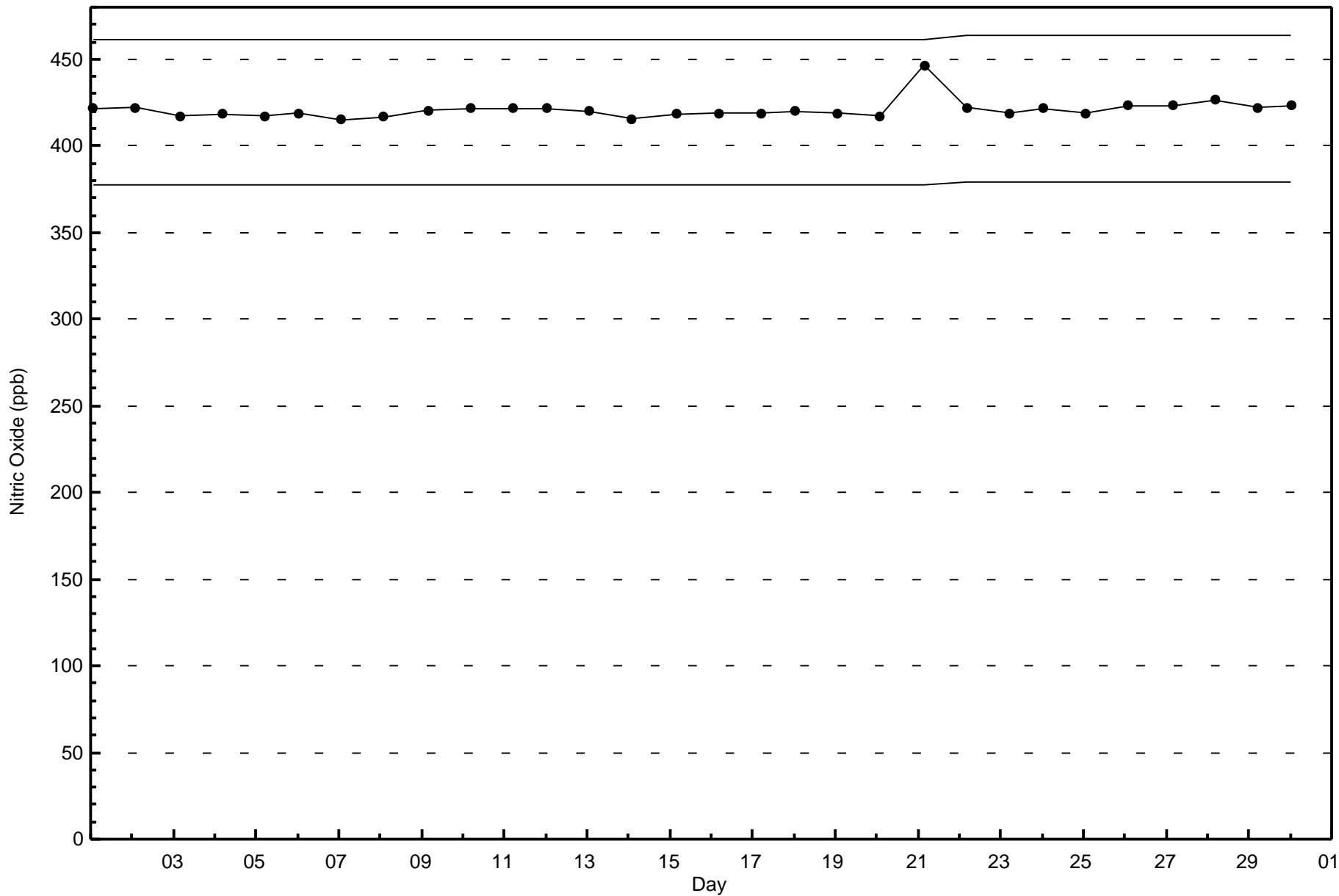


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Wapasu - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19 ppb on Jun 1 13:00	Maximum Daily Average: 4.3 ppb on Jun 2		Hours of Data:	683
Minimum Value: 0 ppb on Jun 3 07:00	Minimum Daily Average: 0.3 ppb on Jun 14		Hours of Missing Data:	37
Maximum Diurnal Average: 2.1 ppb at hour 8	Minimum Diurnal Average: 0.8 ppb at hour 4		Hours of Calibration:	34
Monthly Average: 1.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 9		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	3	Z	2	2	1	2	13	9	4	1	6	16	19	8	2	1	1	2	1	1	1	1	1	1	4.2	19
2-Jun	1	1	Z	1	3	2	7	9	12	13	11	6	4	3	1	1	2	3	1	3	1	3	6	5	4.3	13
3-Jun	4	4	4	Z	0	1	0	0	1	0	0	0	0	1	2	2	1	2	2	1	1	1	2	1	1.2	4
4-Jun	1	1	1	1	Z	1	3	2	1	2	2	2	3	3	4	2	4	2	3	3	4	1	1	1	2.0	4
5-Jun	1	1	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0.5	1
6-Jun	Z	0	0	1	1	1	3	4	3	1	1	2	1	1	1	1	2	2	2	2	1	1	0	0	1.3	4
7-Jun	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.3	1
8-Jun	7	4	Z	0	0	0	0	0	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	0.9	7
9-Jun	0	0	0	Z	7	8	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.0	8
10-Jun	0	0	0	0	Z	5	1	1	0	0	0	0	0	1	1	0	0	1	1	1	3	4	3	4	1.1	5
11-Jun	5	6	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.7	6
12-Jun	Z	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1
13-Jun	1	Z	0	0	1	1	2	1	1	2	3	3	2	2	2	2	2	1	0	0	1	0	2	1	1.3	3
14-Jun	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Jun	0	0	0	Z	0	0	0	1	2	0	0	0	1	1	0	0	1	1	3	3	1	0	0	0	0.7	3
16-Jun	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	1	1	2	2	1	0	0	0	0	0.4	2
17-Jun	0	0	0	0	0	Z	2	4	3	4	4	5	1	1	0	0	0	0	0	0	0	0	0	0	1.2	5
18-Jun	Z	1	1	1	1	3	4	4	4	1	3	1	1	1	2	1	1	1	2	2	6	4	0	1	2.0	6
19-Jun	2	Z	7	4	3	5	3	1	1	1	2	3	3	2	3	1	1	1	1	1	2	3	2	1	2.2	7
20-Jun	1	0	Z	1	1	1	1	C	C	C	C	1	2	3	3	5	1	1	1	0	0	0	0	0	1.1	5
21-Jun	1	8	7	Z	3	1	3	3	4	4	3	3	4	4	5	6	8	6	2	0	1	1	0	0	3.3	8
22-Jun	1	0	0	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	2	3	1	1	0.8	3
23-Jun	2	1	1	3	4	Z	6	4	6	5	1	1	1	1	1	0	1	0	0	1	0	0	0	0	1.8	6
24-Jun	Z	0	0	0	0	0	0	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	2
25-Jun	2	Z	1	1	1	1	1	1	1	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0.6	2
26-Jun	0	1	Z	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0.6	1
27-Jun	1	1	1	Z	1	1	1	3	2	1	1	1	1	1	2	2	1	1	1	2	5	3	1	1	1.4	5
28-Jun	1	1	1	1	Z	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
29-Jun	1	1	3	2	2	Z	3	4	3	1	1	1	1	2	2	1	2	2	4	3	2	1	1	1	1.8	4
30-Jun	Z	1	1	0	0	0	3	6	5	M	M	M	2	1	2	4	3	2	3	2	3	1	1	1	2.0	6

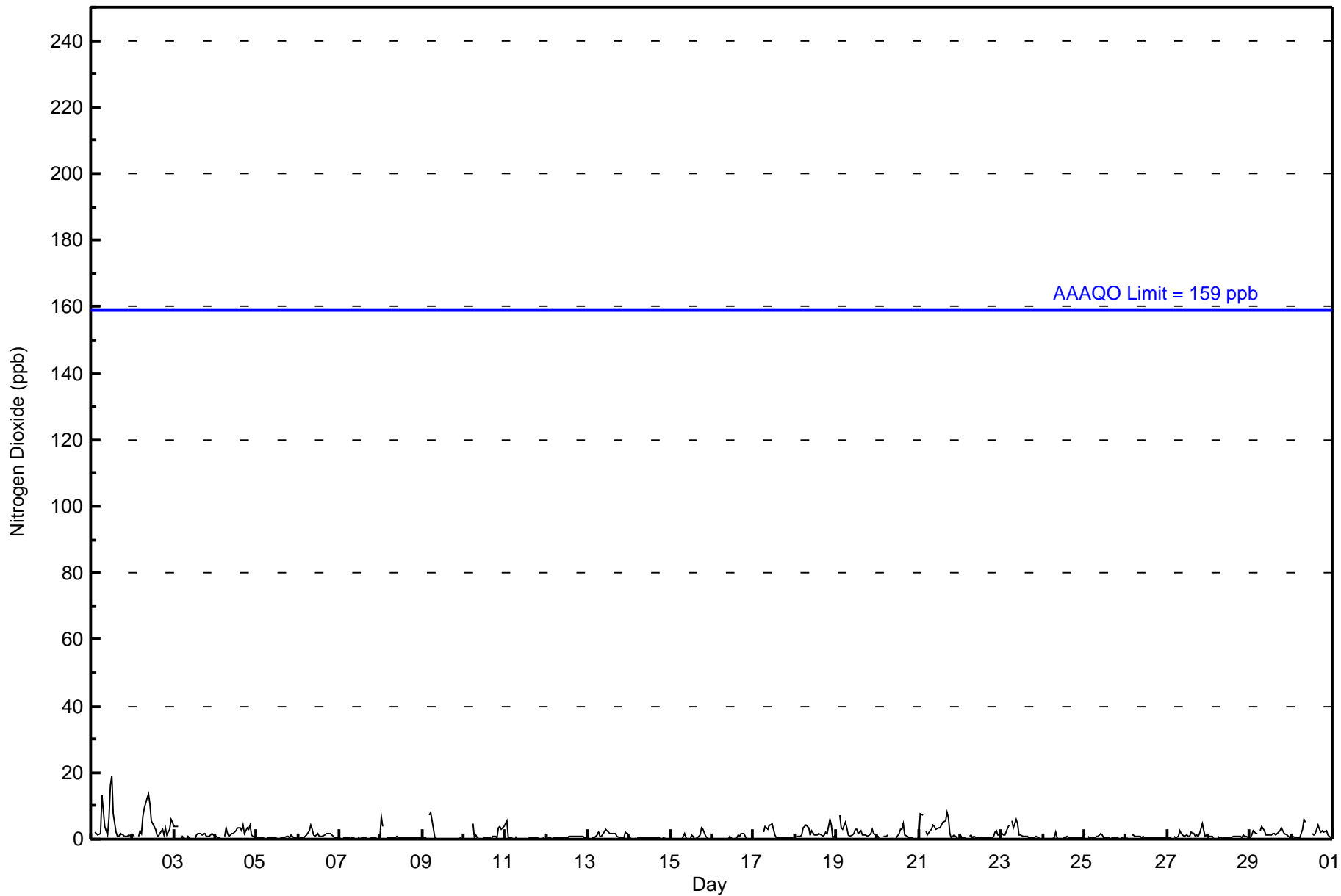
1.3	1.2	1.3	0.8	1.2	1.5	2.1	2.1	1.9	1.6	1.6	1.7	1.7	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.0	1.3	1.1	0.9	0.8	Diurnal Average	
7	8	7	4	7	8	13	9	12	13	11	16	19	8	5	6	8	6	4	3	6	4	6	5	Diurnal Maximum		

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	57	36	40	32	37	79	97	37	19	16	21	35	22	35	57	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	57	36	40	32	37	79	97	37	19	16	21	35	22	35	57	683

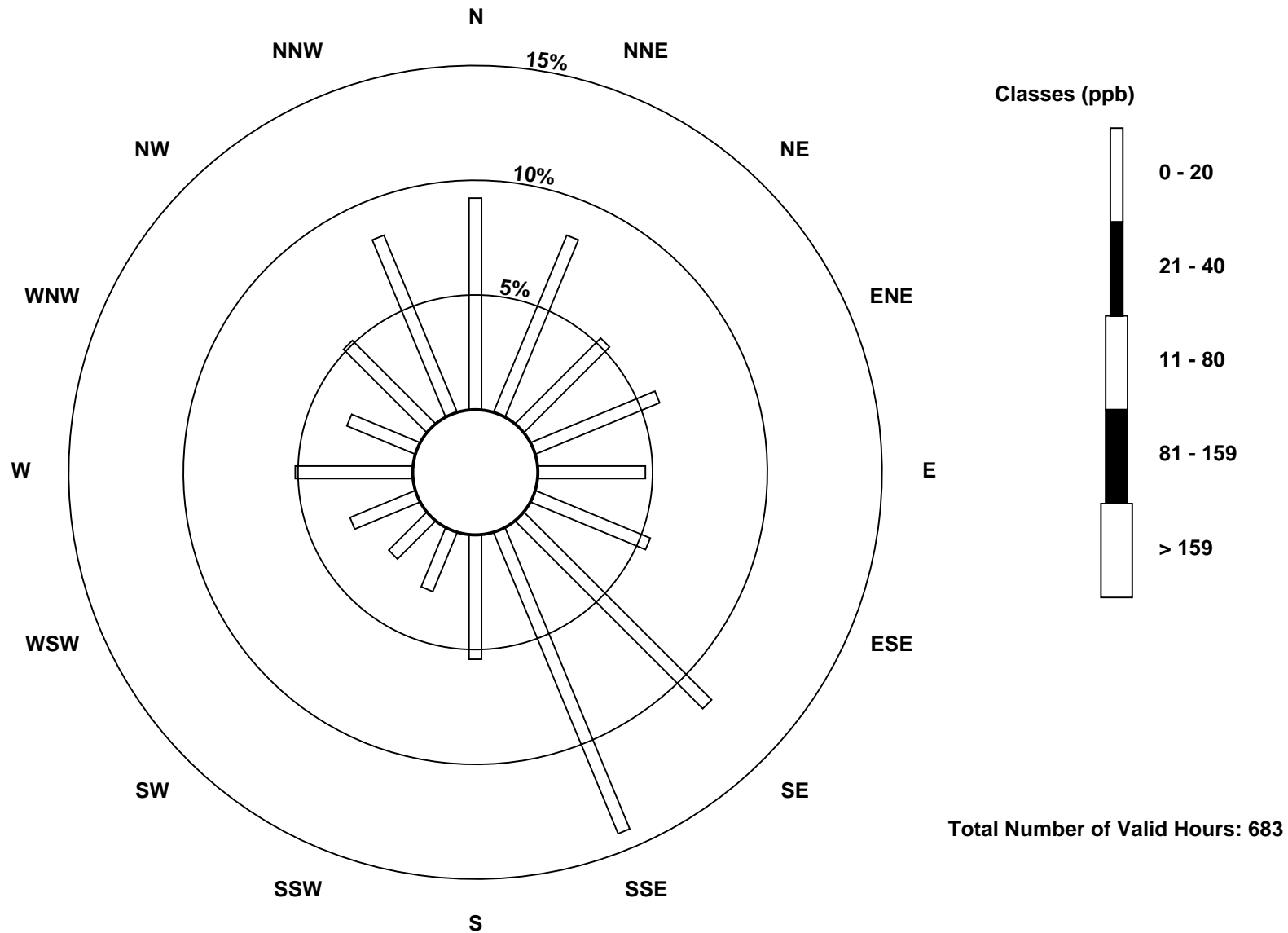
Total Number of Valid Hours: 683

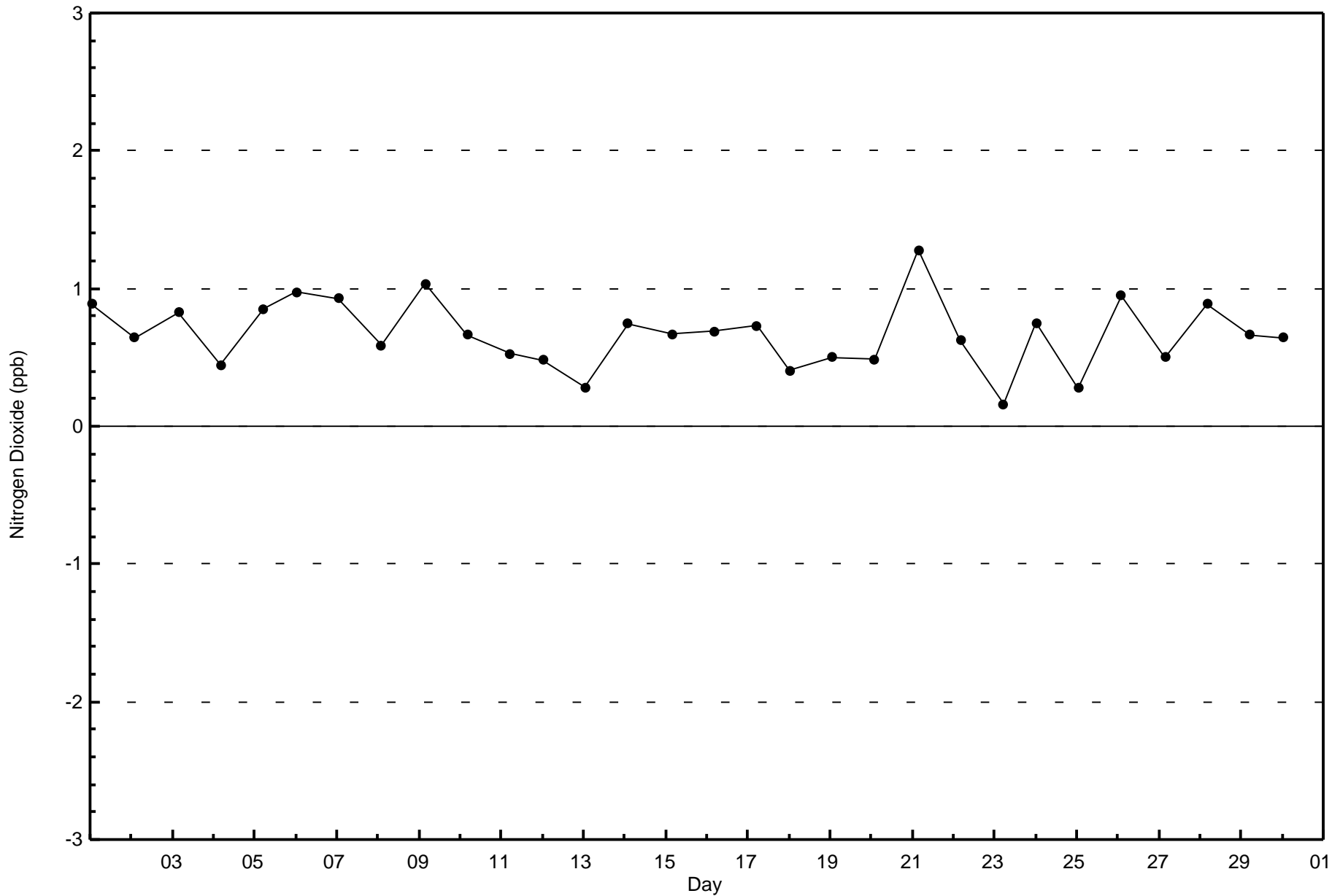
Total Number of Hours: 720

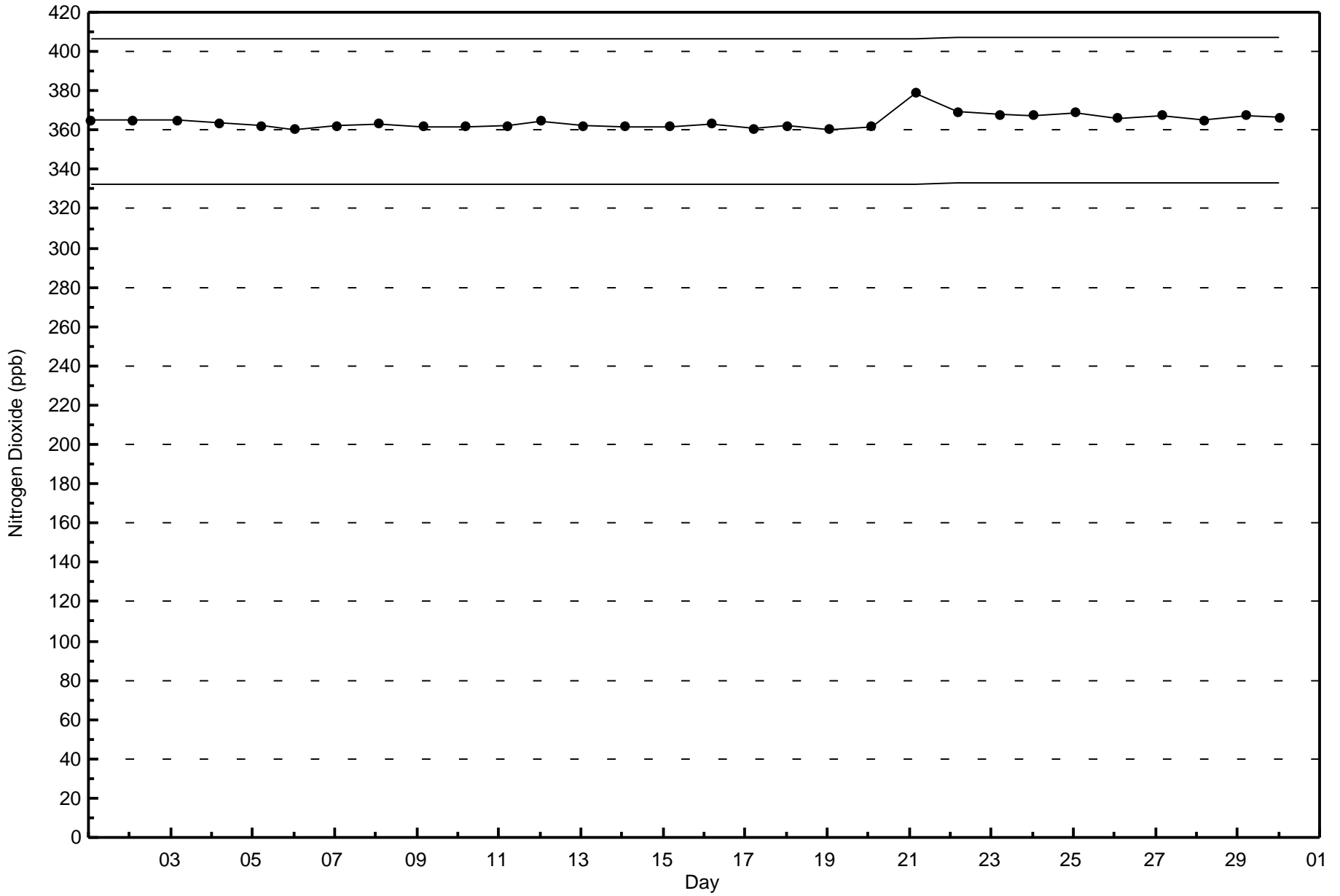


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association

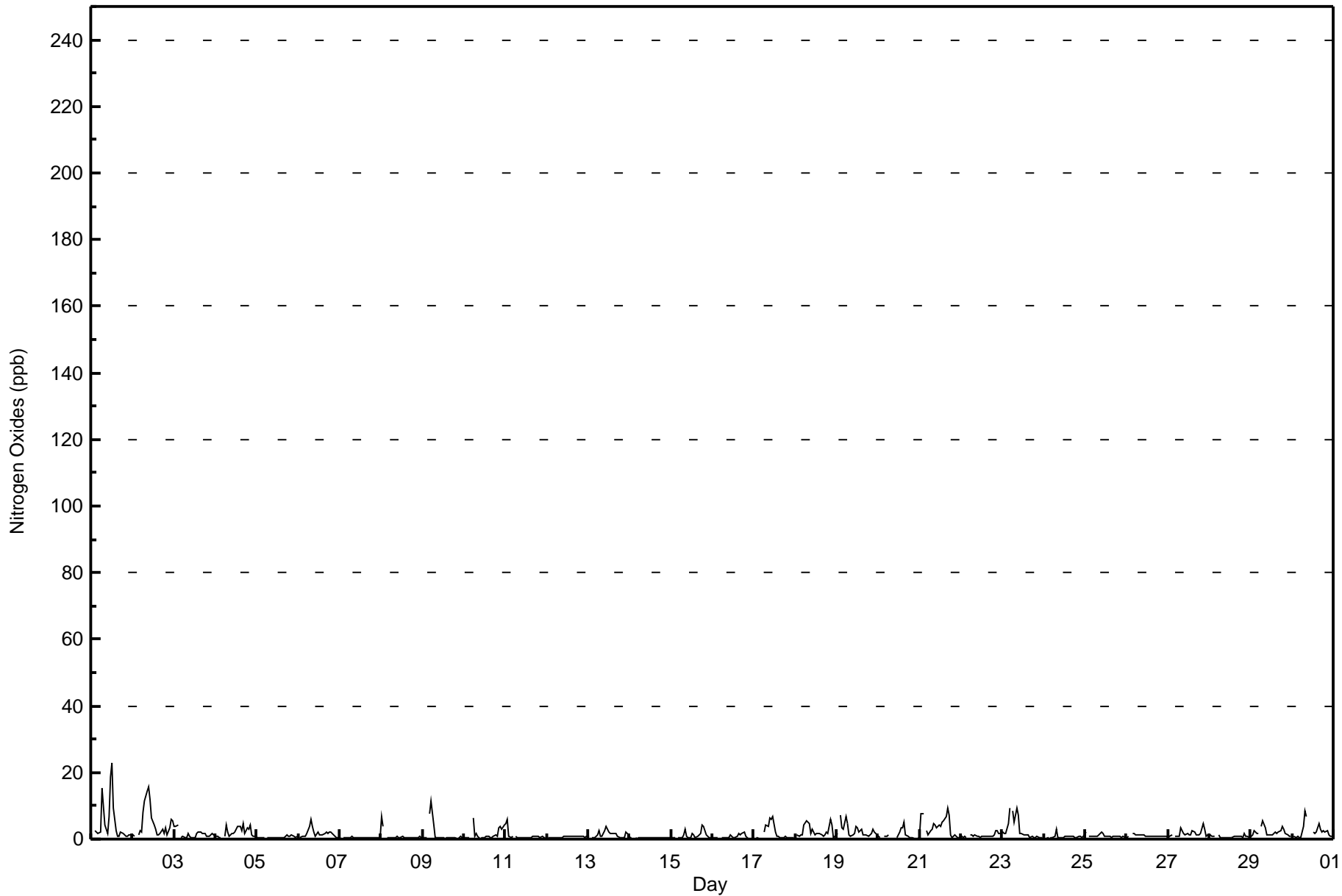
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Wapasu - June 2017

Maximum Value: 23 ppb on Jun 1 13:00																	Maximum Daily Average: 5.0 ppb on Jun 1																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 20 22:00																	Minimum Daily Average: 0.4 ppb on Jun 14																	Hours of Data: 683	
Maximum Diurnal Average: 2.8 ppb at hour 8																	Minimum Diurnal Average: 1.0 ppb at hour 24																	Hours of Missing Data: 37	
Monthly Average: 1.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 11																	Hours of Calibration: 34	
																																		Percent Operational Time: 99.6	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	4	Z	2	2	2	2	15	10	4	2	7	19	23	10	3	1	1	2	2	1	1	1	1	1	5.0	23									
2-Jun	1	1	Z	1	3	2	8	11	14	16	12	6	4	3	1	1	2	3	2	3	1	3	6	5	4.8	16									
3-Jun	4	4	4	Z	0	1	0	0	2	1	0	0	0	2	2	2	2	2	2	1	1	1	2	1	1.5	4									
4-Jun	1	1	1	0	Z	1	4	2	1	2	2	3	4	4	3	5	2	3	3	4	1	1	1	1	2.1	5									
5-Jun	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.5	1									
6-Jun	Z	1	1	1	1	2	4	6	4	2	1	2	1	1	1	1	2	2	2	2	1	1	1	0	1.7	6									
7-Jun	1	Z	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1									
8-Jun	7	4	Z	1	0	0	0	0	0	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	0.9	7									
9-Jun	0	1	0	Z	7	11	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.3	11									
10-Jun	0	0	0	0	Z	6	1	2	1	0	0	0	1	1	1	1	1	1	1	1	4	4	3	4	1.4	6									
11-Jun	5	6	1	1	1	Z	1	0	0	0	0	0	0	1	0	0	1	1	1	1	0	1	1	0	1.0	6									
12-Jun	Z	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1									
13-Jun	1	Z	0	0	1	1	3	1	1	2	4	3	2	2	2	1	2	1	0	0	0	0	2	1	1.4	4									
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1									
15-Jun	0	0	0	Z	0	0	0	1	3	1	0	0	2	1	1	1	1	2	4	4	1	1	1	0	1.1	4									
16-Jun	1	1	0	1	Z	1	0	0	0	0	1	1	1	0	1	2	1	2	2	1	0	0	0	0	0.7	2									
17-Jun	0	0	0	0	0	Z	2	4	4	6	6	7	2	1	1	0	0	1	1	1	0	1	0	1	1.7	7									
18-Jun	Z	1	1	1	1	4	6	5	5	2	3	1	2	2	2	1	1	1	2	2	6	4	0	1	2.3	6									
19-Jun	2	Z	7	4	3	7	5	1	1	1	2	4	3	2	3	1	1	1	1	1	2	3	2	1	2.5	7									
20-Jun	1	0	Z	1	1	1	1	C	C	C	C	1	2	3	3	5	1	1	0	1	0	0	0	0	1.2	5									
21-Jun	1	8	8	Z	2	1	3	3	5	4	3	4	4	5	6	7	9	7	1	0	1	1	0	0	3.7	9									
22-Jun	1	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	2	2	1.1	3									
23-Jun	2	2	2	5	9	Z	9	5	10	7	2	2	1	1	1	1	0	1	1	0	1	1	0	0	2.7	10									
24-Jun	Z	0	0	0	0	1	1	3	0	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	0.7	3									
25-Jun	2	Z	1	1	1	1	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1	1	1	0	1.0	2									
26-Jun	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2									
27-Jun	1	1	1	Z	1	1	1	3	2	2	1	2	1	1	3	2	1	1	1	2	5	3	1	1	1.7	5									
28-Jun	1	1	1	1	Z	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0.8	1									
29-Jun	1	1	3	2	2	Z	4	6	4	1	1	1	1	2	2	2	2	3	4	3	2	1	1	1	2.1	6									
30-Jun	Z	1	1	1	0	1	4	9	7	M	M	M	2	2	2	5	3	2	3	2	3	1	1	1	2.4	9									
																	Diurnal Average																	Diurnal Maximum	
1.5																	7																	5	
1.4																	8																	6	
1.5																	8																	6	
1.0																	5																	6	
1.6																	9																	4	
1.9																	11																	4	
2.7																	15																	6	
2.8																	11																	7	
2.5																	14																	9	
2.1																	16																	7	
1.9																	12																	9	
2.1																	19																	7	
2.1																	23																	4	
1.6																	10																	4	
1.5																	6																	4	
1.5																	7																	4	
1.4																	9																	4	
1.4																	7																	4	
1.3																	4																	4	
1.2																	4																	6	
1.5																	6																	4	
1.2																	4																	6	
1.0																	6																	4	
1.0																	5																	6	

Z - zerospan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	63	57	36	40	32	37	79	97	36	19	16	21	35	22	35	57	682
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	63	57	36	40	32	37	79	97	37	19	16	21	35	22	35	57	683

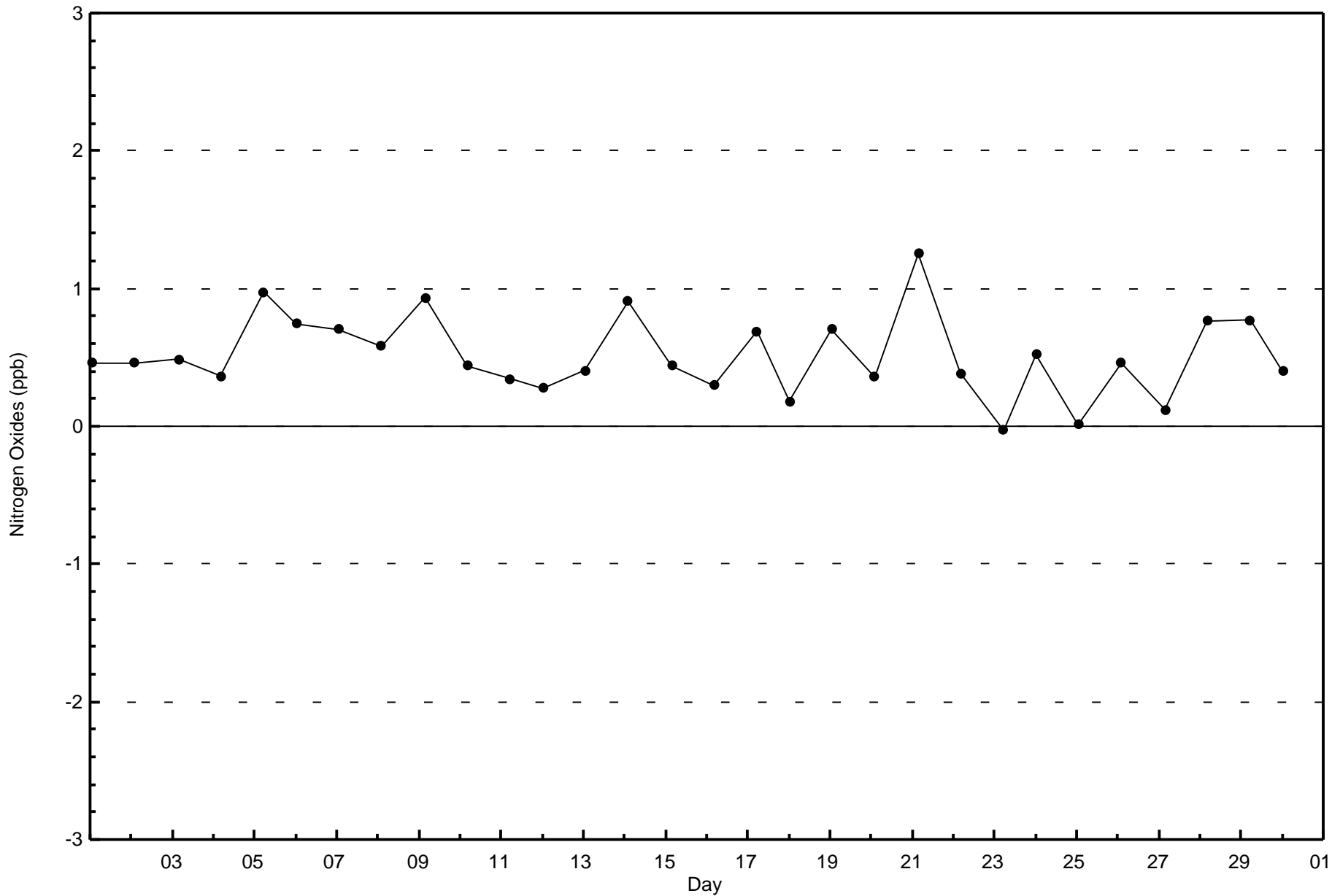
Total Number of Valid Hours: 683

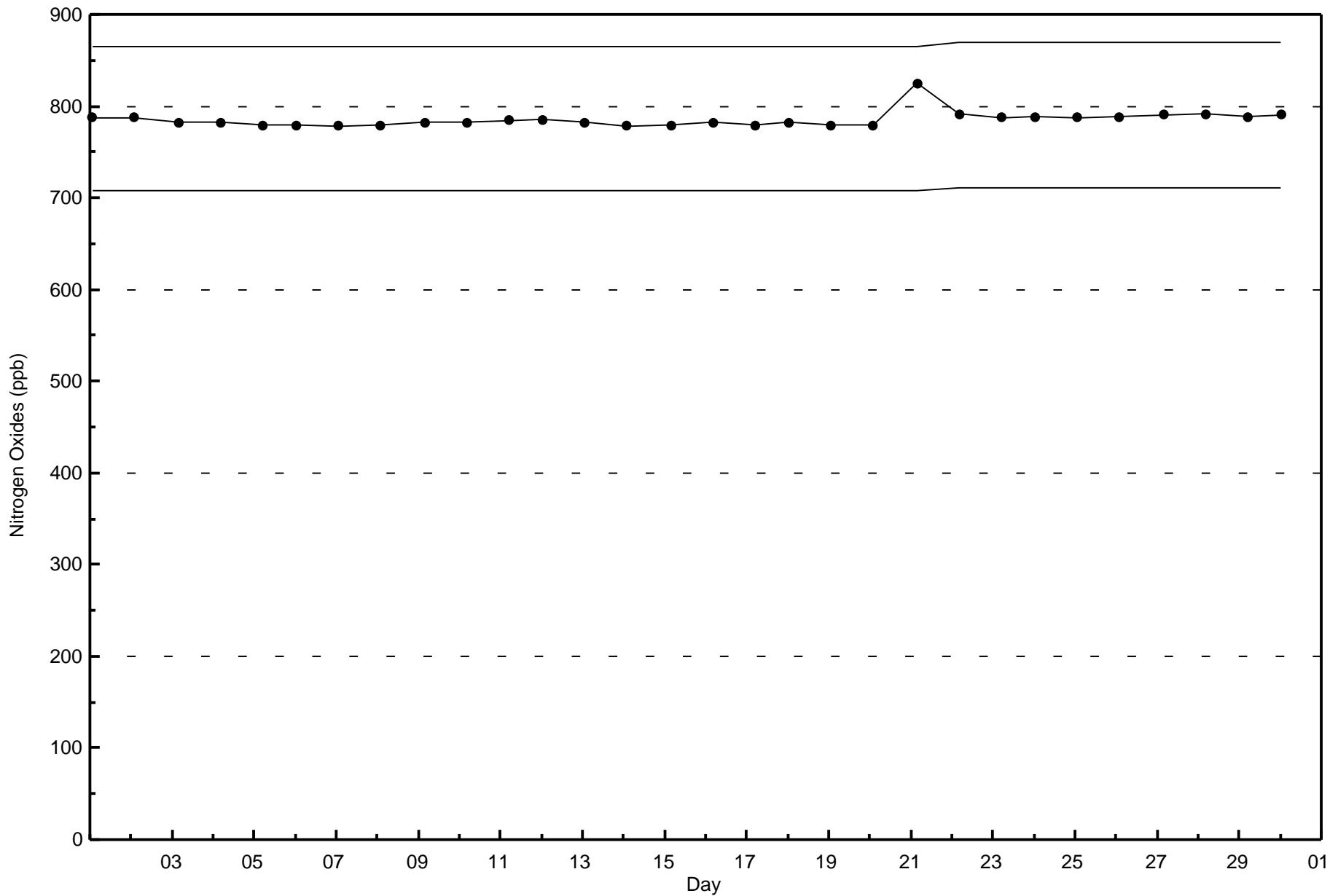
Total Number of Hours: 720



Wood Buffalo Environmental Association
Zero Responses

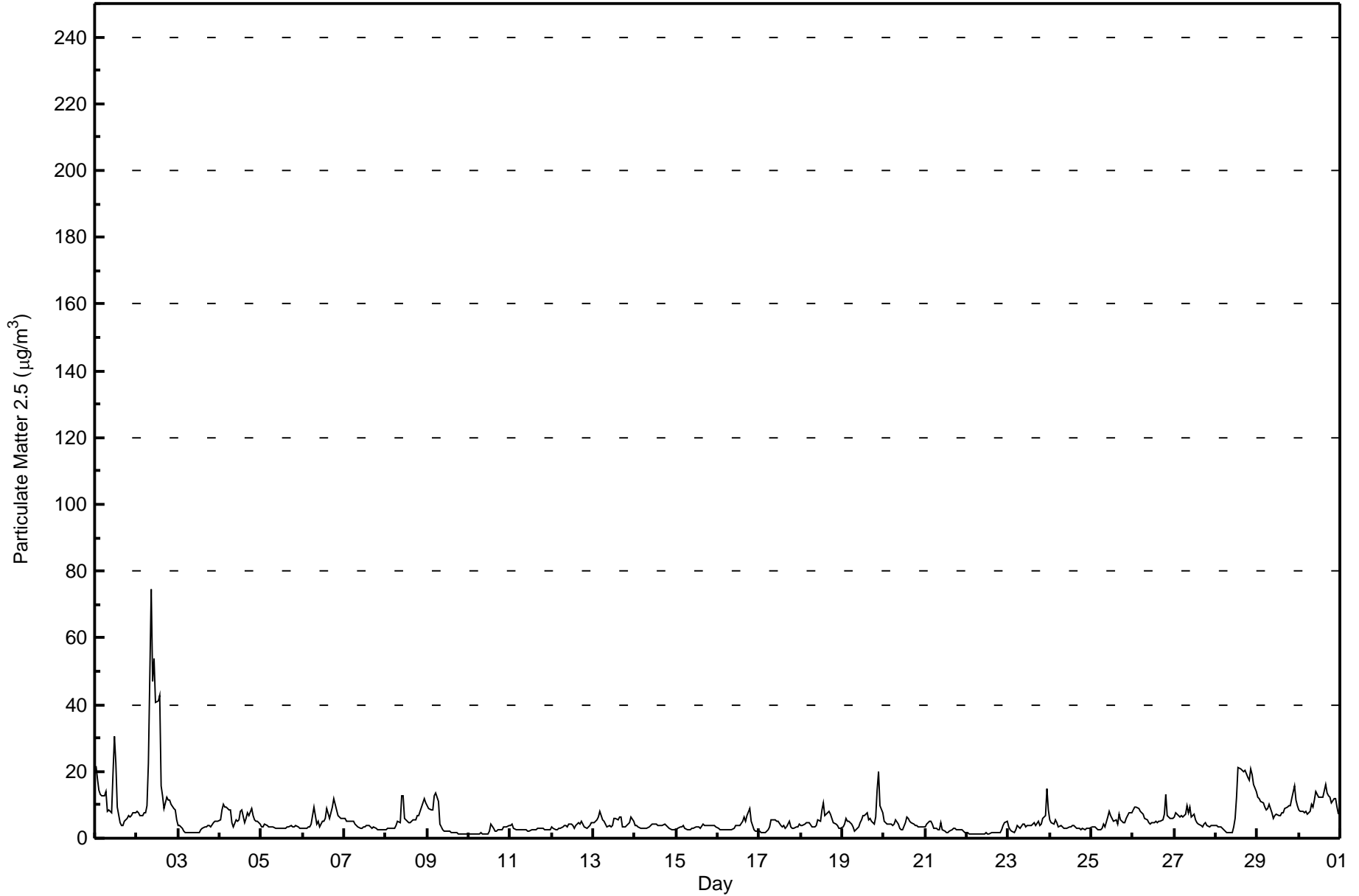
Nitrogen Oxides (NO_x) - ppb
Wapasu - June 2017







Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 74.7 µg/m ³ on Jun 2 09:00 Minimum Value: 1.2 µg/m ³ on Jun 22 08:00 Maximum Diurnal Average: 6.7 µg/m ³ at hour 14 Monthly Average: 5.63 µg/m ³		Maximum Daily Average: 20.1 µg/m ³ on Jun 2 Minimum Daily Average: 1.9 µg/m ³ on Jun 22 Minimum Diurnal Average: 4.7 µg/m ³ at hour 6 Percentiles: P ₁ = 1.3 P ₁₀ = 2.1 Q ₁ = 3.0 Median = 4.0 Q ₃ = 6.5 P ₉₀ = 10.1 P ₉₉ = 23.3		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	21.8	17.7	14.5	13.0	12.7	12.6	13.9	8.0	8.6	7.8	19.3	30.4	22.5	9.2	4.8	3.7	3.6	5.0	5.8	6.6	6.6	6.9	7.8	7.7	11.3	30.4																						
2-Jun	8.0	7.6	6.8	6.7	7.7	7.8	9.9	22.4	74.7	46.9	53.9	40.5	41.1	42.9	15.8	12.8	8.9	12.2	11.4	11.3	10.4	8.8	8.7	5.7	20.1	74.7																						
3-Jun	4.0	3.8	3.0	2.2	1.5	1.6	1.6	1.6	1.7	1.9	1.8	1.8	1.8	2.7	3.1	3.4	3.3	3.9	4.0	3.6	4.6	5.1	5.1	5.2	3.0	5.2																						
4-Jun	5.5	8.4	10.2	9.3	9.4	8.6	8.3	4.9	3.3	5.5	5.1	5.6	8.0	8.6	4.8	5.8	7.6	6.8	9.0	6.8	5.7	5.0	5.1	4.3	6.7	10.2																						
5-Jun	3.4	3.6	4.2	3.8	3.6	3.6	3.5	3.5	3.0	3.0	3.1	3.1	2.9	2.8	2.9	3.2	3.3	3.8	3.3	3.3	3.9	3.3	3.0	2.9	3.3	4.2																						
6-Jun	2.9	2.9	2.9	3.3	3.6	4.3	9.2	6.7	4.0	5.2	3.3	4.9	5.2	5.9	8.9	6.0	7.6	9.4	11.9	10.2	6.7	6.2	6.0	5.8	6.0	11.9																						
7-Jun	5.9	5.2	5.1	5.0	5.2	5.1	4.1	4.0	3.3	2.8	3.2	3.3	3.5	3.7	3.7	3.3	3.0	3.3	3.0	2.6	2.4	2.4	2.5	2.4	3.7	5.9																						
8-Jun	2.5	2.9	2.9	2.9	2.9	3.1	3.8	5.2	4.7	12.9	12.8	6.0	5.2	4.5	4.8	5.3	5.5	5.6	6.9	6.7	8.1	10.7	12.0	10.5	6.2	12.9																						
9-Jun	10.0	8.9	8.4	8.7	12.9	13.6	11.0	4.2	3.3	2.5	2.2	2.3	2.1	2.0	1.8	1.8	1.8	1.6	1.5	1.4	1.4	1.4	1.4	1.4	4.5	13.6																						
10-Jun	1.4	1.4	1.3	1.3	1.3	1.4	1.5	1.7	1.3	1.3	1.3	1.4	2.1	4.4	3.0	2.2	2.1	2.6	2.5	2.4	3.4	3.5	3.4	3.9	2.2	4.4																						
11-Jun	3.9	4.1	2.8	2.7	2.5	2.5	2.7	2.7	2.5	2.4	2.3	2.2	2.5	2.5	2.5	2.7	2.9	3.0	3.0	2.8	2.6	2.6	2.6	2.6	2.7	4.1																						
12-Jun	3.4	3.0	2.6	2.7	2.8	3.0	3.3	3.9	3.6	3.6	4.0	4.3	3.6	3.1	3.6	4.8	4.2	4.9	4.1	3.2	2.9	3.2	3.8	4.7	3.6	4.9																						
13-Jun	4.8	5.1	5.4	6.4	8.1	5.7	4.9	4.2	3.5	3.9	3.4	4.0	5.7	5.9	5.7	6.2	6.2	3.6	3.3	3.7	4.4	4.6	6.5	4.9	5.0	8.1																						
14-Jun	3.7	3.7	3.3	3.0	2.9	3.0	3.0	3.2	3.4	3.9	4.4	4.3	4.1	4.0	4.0	3.9	4.0	4.2	4.0	3.5	2.9	2.7	2.6	2.6	3.5	4.4																						
15-Jun	2.6	2.8	3.3	3.4	3.6	2.9	2.5	2.5	2.7	2.9	3.0	3.4	3.4	3.5	3.1	4.2	4.0	3.7	3.9	4.0	3.8	3.9	3.6	3.3	3.3	4.2																						
16-Jun	3.0	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5	3.1	3.9	3.8	3.8	3.7	5.1	6.4	5.1	6.8	8.8	5.0	3.6	2.6	2.2	2.0	3.7	8.8																						
17-Jun	1.9	1.9	1.9	1.9	2.1	2.4	3.4	5.4	5.7	5.4	5.0	4.9	3.9	3.3	3.6	3.2	3.6	5.1	3.4	3.0	3.1	3.5	3.4	4.1	3.5	5.7																						
18-Jun	3.6	4.0	4.1	4.5	4.8	4.6	3.5	3.3	3.4	4.0	5.7	5.1	8.6	10.5	6.9	7.5	7.9	7.2	5.9	4.5	4.2	3.7	3.0	3.1	5.2	10.5																						
19-Jun	3.3	4.3	6.0	5.3	5.1	4.3	3.2	2.3	2.6	3.5	4.5	5.4	6.9	6.7	7.6	5.5	5.7	5.2	4.4	6.3	14.3	19.9	9.7	7.6	6.2	19.9																						
20-Jun	5.0	4.5	4.3	4.3	4.2	4.0	4.3	5.4	4.4	2.8	2.5	2.5	4.5	6.4	5.9	5.1	4.6	4.4	4.0	3.6	3.4	3.5	3.6	3.4	4.2	6.4																						
21-Jun	3.6	4.3	4.9	5.2	4.2	2.9	2.8	2.5	2.6	4.8	2.7	1.9	1.7	1.8	2.0	2.5	3.1	3.0	2.7	2.6	2.4	2.6	2.2	1.9	3.0	5.2																						
22-Jun	1.7	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.3	1.5	1.4	1.5	1.5	1.5	1.7	1.5	1.7	1.7	1.8	1.8	2.6	3.7	4.7	5.0	1.9	5.0																						
23-Jun	3.3	2.5	1.9	1.9	2.7	4.0	3.3	3.1	4.4	4.1	3.6	3.7	3.7	3.9	4.2	4.5	3.9	5.0	3.8	4.2	6.0	6.6	15.0	8.4	4.5	15.0																						
24-Jun	5.5	4.5	4.2	5.4	4.7	3.5	3.6	3.5	3.0	2.9	3.0	3.2	3.5	3.9	3.6	3.1	3.0	3.1	2.7	2.8	2.7	2.8	3.0	3.0	3.5	5.5																						
25-Jun	3.3	3.2	3.4	3.1	2.5	2.4	3.0	4.0	3.3	6.5	8.0	6.8	5.8	5.2	5.6	4.3	7.3	5.7	4.8	4.9	6.0	6.8	7.5	7.6	5.0	8.0																						
26-Jun	8.7	9.4	9.3	9.1	8.1	7.5	7.3	5.9	5.3	4.8	4.2	4.5	4.8	5.0	4.6	5.0	5.3	5.6	7.2	13.1	6.8	5.8	5.8	5.8	6.6	13.1																						
27-Jun	6.4	7.5	7.0	6.6	6.7	6.4	7.1	9.9	7.6	9.2	6.3	7.0	5.7	4.5	4.1	3.8	3.3	4.4	4.5	3.7	3.5	3.6	3.8	4.0	5.7	9.9																						
28-Jun	3.7	3.3	3.4	3.4	3.0	2.0	1.8	1.6	1.8	1.8	3.2	6.0	12.5	21.0	20.7	20.5	20.0	20.1	18.1	17.5	20.6	19.0	16.2	14.0	10.6	21.0																						
29-Jun	12.4	12.0	11.0	10.4	9.3	8.5	8.7	10.2	7.6	6.1	6.9	7.0	6.7	6.7	7.7	7.8	8.7	9.3	9.8	9.8	11.9	15.6	11.3	9.8	9.4	15.6																						
30-Jun	8.6	8.2	8.0	7.7	7.9	7.3	8.2	10.2	9.4	11.6	13.9	12.2	12.4	12.2	12.3	16.0	13.4	12.5	12.2	10.6	12.0	11.9	9.3	7.4	10.6	16.0																						
																								5.3	5.2	5.0	4.9	5.0	4.7	4.9	5.0	6.3	5.9	6.6	6.4	6.7	6.7	5.6	5.5	5.5	5.8	5.7	5.5	5.8	6.1	5.8	5.2	Diurnal Average
																								21.8	17.7	14.5	13.0	12.9	13.6	13.9	22.4	74.7	46.9	53.9	40.5	41.1	42.9	20.7	20.5	20.0	20.1	18.1	17.5	20.6	19.9	16.2	14.0	Diurnal Maximum
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	490	68.06	68.06
6 - 15	204	28.33	96.39
16 - 25	19	2.64	99.03
26 - 80	7	0.97	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Wapasu - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	53	52	34	34	28	36	45	59	21	9	11	8	16	13	27	44	490
6 - 15	7	5	5	5	4	2	38	47	14	8	7	15	19	8	9	11	204
16 - 25	2	0	1	3	2	1	1	1	5	1	1	0	0	1	0	0	19
26 - 80	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	3	7
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	64	58	40	42	34	39	84	107	40	19	19	23	35	22	36	58	720

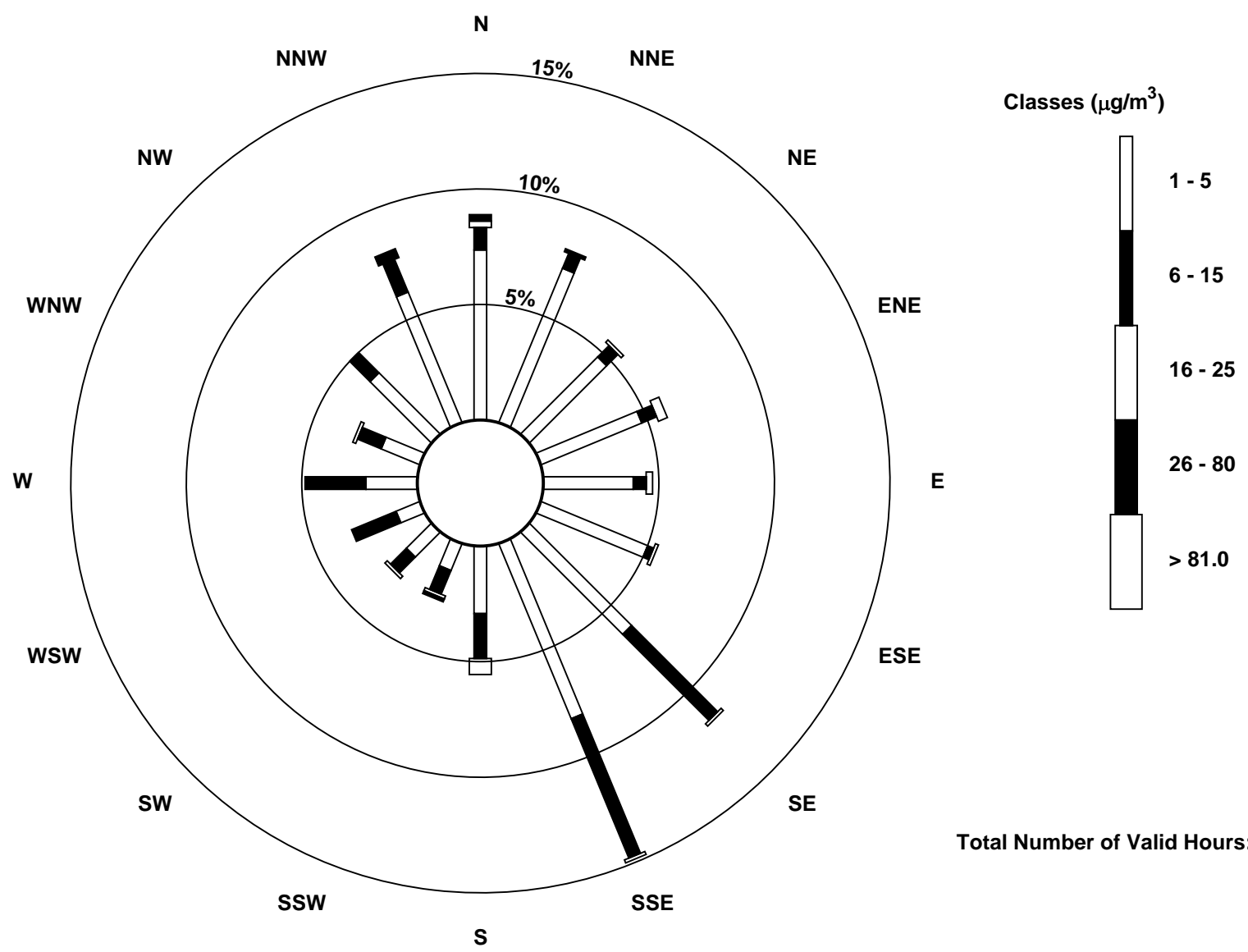
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)

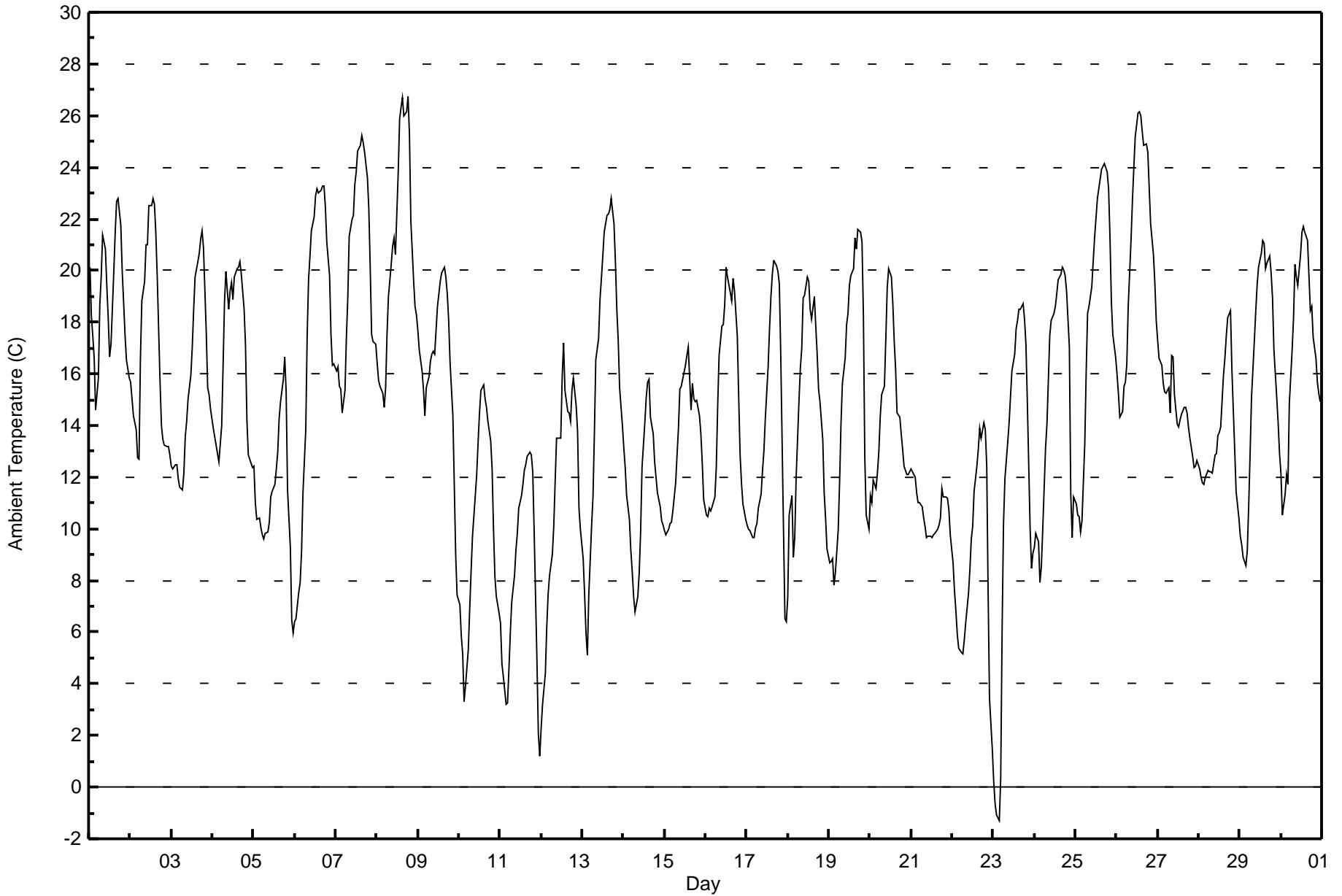




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Wapasu - June 2017

Maximum Value: 26.7 C on Jun 8 19:00		Maximum Daily Average: 20.9 C on Jun 26		Hours in Service: 720																																												
Minimum Value: -1.3 C on Jun 23 04:00		Minimum Daily Average: 8.1 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 18.9 C at hour 16		Minimum Diurnal Average: 10.1 C at hour 4		Hours of Missing Data: 0																																												
Monthly Average: 14.78 C		Percentiles: P ₁ = 2.0 P ₁₀ = 8.5 Q ₁ = 11.2 Median = 14.7 Q ₃ = 18.7 P ₉₀ = 21.3 P ₉₉ = 25.9		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.1	18.3	17.5	16.6	14.6	15.8	18.7	19.8	21.4	20.8	19.4	18.2	16.6	17.2	20.0	21.5	22.7	22.8	21.8	20.0	18.8	17.5	16.6	15.8	18.8	22.8																						
2-Jun	15.7	15.0	14.4	13.9	12.7	12.7	16.6	18.8	19.6	21.0	21.0	22.5	22.5	22.8	22.6	21.4	19.7	15.7	14.0	13.5	13.2	13.2	13.2	12.9	17.0	22.8																						
3-Jun	12.5	12.3	12.5	12.5	12.0	11.6	11.5	12.2	13.6	14.2	15.1	15.9	17.0	18.5	19.7	20.4	20.7	21.2	21.5	20.9	17.6	15.4	15.2	14.6	15.8	21.5																						
4-Jun	13.9	13.6	13.2	12.9	12.6	14.0	16.3	18.8	20.0	18.5	19.2	19.5	18.9	19.8	20.1	20.1	20.4	19.8	18.5	17.1	14.2	12.8	12.7	12.4	16.6	20.4																						
5-Jun	12.4	11.0	10.4	10.4	10.0	9.7	9.6	9.8	9.9	10.3	11.2	11.5	11.7	12.3	12.9	14.2	14.9	15.8	16.6	15.3	11.5	9.3	6.5	6.0	11.4	16.6																						
6-Jun	6.4	6.5	7.5	7.9	9.1	11.4	13.8	17.4	19.6	20.6	21.5	22.1	22.9	23.1	23.0	23.1	23.3	23.3	22.5	21.1	19.8	17.5	16.4	16.4	17.3	23.3																						
7-Jun	16.1	16.3	15.5	15.4	14.5	15.4	17.4	18.9	21.3	22.0	22.2	23.3	23.8	24.6	24.9	25.2	25.0	24.6	23.6	22.4	20.1	17.5	17.2	17.2	20.2	25.2																						
8-Jun	16.4	15.8	15.5	15.2	14.7	15.4	17.5	19.0	20.2	20.9	21.3	20.6	23.8	25.9	26.3	26.7	26.0	26.2	26.7	25.3	21.9	19.6	18.6	18.3	20.7	26.7																						
9-Jun	17.7	16.9	16.1	15.4	14.4	15.5	15.9	16.5	16.7	16.9	16.8	18.6	19.1	19.6	19.9	20.1	19.8	19.1	18.0	16.4	14.4	11.7	9.0	7.4	16.3	20.1																						
10-Jun	7.1	5.9	5.2	3.3	3.9	5.3	6.9	8.4	9.7	11.3	12.1	13.4	14.5	15.3	15.6	15.0	14.7	14.2	13.4	12.3	10.0	8.1	7.4	6.7	10.0	15.6																						
11-Jun	6.4	4.8	4.3	3.2	3.3	4.6	6.0	7.1	8.2	9.2	9.8	10.8	11.3	11.7	12.3	12.5	12.8	13.0	12.9	12.2	9.9	4.9	2.1	1.2	8.1	13.0																						
12-Jun	2.3	3.2	4.4	6.2	7.5	8.2	9.0	10.1	11.8	13.5	13.5	13.5	15.9	17.2	15.4	14.5	14.5	14.2	15.4	15.9	14.8	13.8	10.8	10.0	11.5	17.2																						
13-Jun	8.8	7.5	6.0	5.1	7.4	10.1	11.2	13.7	16.6	17.4	18.9	19.7	20.6	21.5	22.1	22.2	22.3	22.8	21.8	20.4	18.5	17.3	15.4	14.0	15.9	22.8																						
14-Jun	13.2	12.4	11.3	10.4	9.2	8.4	7.4	6.8	7.4	8.3	9.9	12.4	14.1	15.1	15.7	15.8	14.3	13.7	12.6	12.0	11.4	10.8	10.3	10.1	11.4	15.8																						
15-Jun	9.9	9.8	10.0	10.2	10.3	10.7	11.8	12.8	13.9	15.4	15.5	16.1	16.3	16.7	17.0	14.6	15.6	15.0	14.9	15.0	14.4	13.7	12.6	11.2	13.5	17.0																						
16-Jun	10.5	10.5	10.8	10.7	10.9	11.2	12.4	14.7	16.7	17.8	17.9	18.7	20.1	19.7	19.2	18.8	19.7	19.2	17.5	15.1	12.8	11.8	11.0	10.4	14.9	20.1																						
17-Jun	10.2	10.0	9.9	9.7	9.6	10.0	10.2	10.8	11.3	12.3	13.0	14.3	16.3	17.8	19.0	19.9	20.4	20.2	20.0	19.5	16.8	9.9	6.5	6.4	13.5	20.4																						
18-Jun	7.4	10.5	11.3	8.9	9.6	12.0	14.9	16.2	17.0	19.0	19.0	19.8	19.6	18.5	18.1	19.0	17.9	16.8	15.4	14.9	13.5	11.4	10.4	9.2	14.6	19.8																						
19-Jun	8.7	8.7	8.8	7.8	8.3	9.9	11.8	14.1	15.6	16.6	17.9	18.4	19.4	19.8	20.1	21.3	20.8	21.6	21.5	21.1	18.3	12.8	10.5	10.0	15.2	21.6																						
20-Jun	11.3	11.0	11.9	11.6	12.2	12.9	14.3	15.2	15.5	17.3	19.3	20.1	19.7	18.7	17.2	16.2	14.5	14.3	13.7	13.1	12.4	12.1	12.1	12.2	14.5	20.1																						
21-Jun	12.3	12.2	12.0	11.4	11.0	11.0	10.8	10.4	10.1	9.7	9.7	9.7	9.6	9.8	9.9	10.0	10.2	10.4	11.5	11.3	11.2	11.2	10.8	9.8	10.7	12.3																						
22-Jun	8.7	7.6	6.8	5.9	5.4	5.2	5.2	5.7	6.3	7.5	8.4	9.6	10.1	11.5	12.4	13.1	13.9	13.5	14.1	13.8	12.5	7.6	3.4	1.5	8.7	14.1																						
23-Jun	0.2	-0.6	-1.1	-1.3	0.3	6.1	10.2	11.9	13.3	14.1	15.1	16.1	16.7	17.8	18.1	18.5	18.7	18.1	17.2	14.9	10.0	8.5	9.1	11.3	18.7																							
24-Jun	9.3	9.8	9.5	7.9	8.5	10.0	13.1	14.0	15.7	17.5	18.1	18.4	18.6	19.1	19.6	19.9	20.1	20.0	19.8	19.2	17.0	11.3	9.7	11.2	14.9	20.1																						
25-Jun	11.0	10.5	10.5	9.9	10.3	13.3	16.1	18.3	18.6	19.4	20.3	21.2	22.0	22.8	23.6	23.9	24.1	24.2	23.8	23.2	21.3	18.8	17.5	16.7	18.4	24.2																						
26-Jun	16.0	15.3	14.3	14.5	15.5	15.7	16.4	18.6	21.2	22.7	24.0	25.2	26.1	26.1	26.0	25.4	24.9	24.9	24.6	23.2	21.8	20.6	19.5	18.1	20.9	26.1																						
27-Jun	17.3	16.6	16.3	15.6	15.3	15.2	15.5	14.5	16.7	16.7	15.2	14.0	13.9	14.2	14.4	14.7	14.7	14.5	13.9	13.5	12.8	12.4	12.4	12.6	14.7	17.3																						
28-Jun	12.3	12.0	11.8	11.7	12.0	12.3	12.2	12.2	12.2	12.8	12.9	13.6	13.7	14.0	16.0	16.6	17.5	18.2	18.4	16.1	14.6	13.1	11.5	10.4	13.7	18.4																						
29-Jun	9.7	9.4	8.9	8.6	9.2	10.9	12.9	15.1	17.2	18.4	19.4	20.1	20.7	21.2	21.1	20.1	20.3	20.6	19.9	18.9	16.9	15.1	14.1	12.9	15.9	21.2																						
30-Jun	12.2	10.5	11.3	12.1	11.7	14.9	16.9	18.2	20.2	19.7	19.4	20.6	21.5	21.7	21.5	21.2	19.8	18.4	18.6	17.4	16.6	15.7	15.2	14.9	17.1	21.7																						
																								11.2	10.8	10.6	10.1	10.2	11.3	12.8	14.0	15.3	16.1	16.6	17.3	17.9	18.5	18.8	18.9	18.8	18.6	18.2	17.2	15.5	13.2	11.9	11.3	Diurnal Average
																								20.1	18.3	17.5	16.6	15.5	15.8	18.7	19.8	21.4	22.7	24.0	25.2	26.1	26.1	26.3	26.7	26.0	26.2	26.7	25.3	21.9	20.6	19.5	18.3	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Wapasu - June 2017

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	3	0.42	0.42
0 - 10	123	17.08	17.50
10 - 20	476	66.11	83.61
> 20	118	16.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



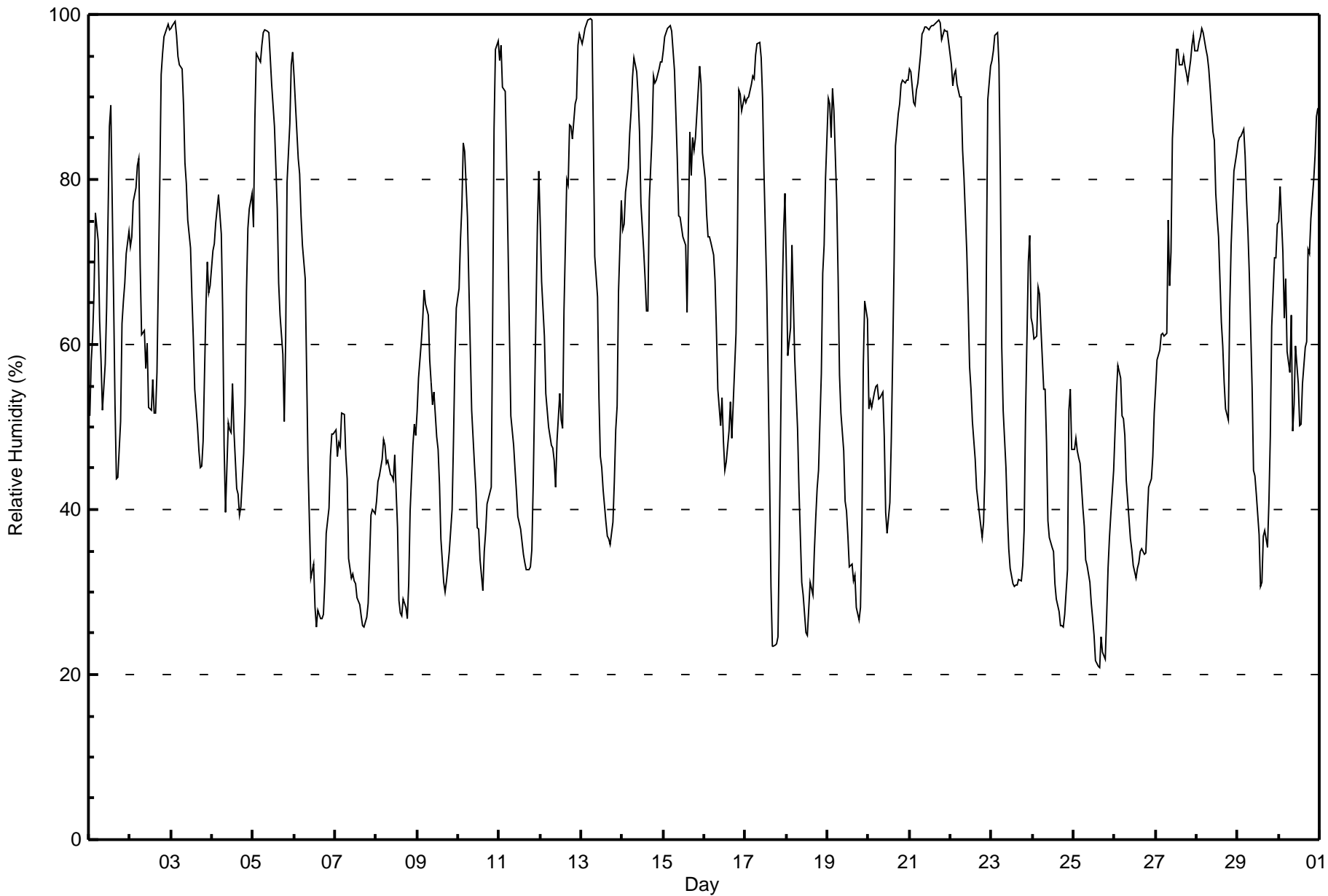
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Wapasu - June 2017

Maximum Value: 99 % on Jun 13 06:00																		Maximum Daily Average: 96.4 % on Jun 21																		Hours in Service: 720	
Minimum Value: 21 % on Jun 25 16:00																		Minimum Daily Average: 33.5 % on Jun 25																		Hours of Data: 720	
Maximum Diurnal Average: 76.6 % at hour 4																		Minimum Diurnal Average: 47.5 % at hour 15																		Hours of Missing Data: 0	
Monthly Average: 62.4 %																		Percentiles: P ₁ = 24 P ₁₀ = 32 Q ₁ = 44 Median = 61 Q ₃ = 84 P ₉₀ = 95 P ₉₉ = 99																		Hours of Calibration: 0	
																																				Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jun	51	58	61	66	76	73	63	58	52	58	64	75	86	89	66	53	44	44	51	63	65	67	71	74	63.6	89											
2-Jun	72	73	77	79	82	82	70	61	62	57	60	52	52	56	52	52	57	80	93	95	97	98	99	98	73.1	99											
3-Jun	98	99	99	97	95	94	93	89	82	79	75	72	66	61	54	50	47	45	45	48	65	70	66	67	73.2	99											
4-Jun	71	72	75	76	78	73	64	48	40	51	50	49	55	50	43	42	39	40	47	53	66	74	76	78	58.8	78											
5-Jun	74	87	95	95	94	96	98	98	98	98	95	92	86	82	76	68	64	59	51	60	80	87	94	95	84.2	98											
6-Jun	93	89	83	81	76	72	68	57	46	38	32	33	28	26	28	27	27	27	31	37	40	47	49	49	49.3	93											
7-Jun	50	46	48	48	52	52	47	44	34	32	32	31	31	29	28	27	26	26	27	29	34	39	40	39	37.1	52											
8-Jun	41	43	44	46	48	48	46	46	44	44	44	47	38	29	27	27	29	28	27	31	40	48	50	49	40.2	50											
9-Jun	52	56	60	63	67	65	64	58	55	53	54	49	47	43	36	31	30	31	33	35	40	48	58	64	49.7	67											
10-Jun	67	73	77	84	83	75	67	60	52	45	42	38	38	34	30	35	37	41	42	43	63	86	96	97	58.5	97											
11-Jun	94	96	91	91	82	72	62	51	48	45	42	39	38	36	35	34	33	33	33	35	43	64	74	81	56.3	96											
12-Jun	75	68	61	54	52	50	48	47	46	43	48	54	51	50	64	80	79	87	86	85	89	90	96	98	66.7	98											
13-Jun	96	97	98	99	99	99	99	85	71	66	54	46	45	42	38	37	36	36	38	43	50	53	66	77	65.6	99											
14-Jun	74	75	78	81	86	88	92	95	93	90	86	77	71	68	64	64	77	86	93	92	92	93	94	94	83.5	95											
15-Jun	96	97	98	98	99	98	93	88	83	76	75	73	72	72	64	86	81	85	84	85	91	94	91	83	85.9	99											
16-Jun	80	76	73	73	72	71	68	62	55	50	53	48	45	46	49	53	49	53	61	73	91	90	88	90	65.4	91											
17-Jun	89	90	90	92	93	92	95	96	97	95	90	81	67	56	44	31	23	24	24	25	37	65	74	78	68.5	97											
18-Jun	69	59	62	72	65	58	50	42	37	31	30	25	25	28	31	30	35	39	43	45	56	69	72	80	48.0	80											
19-Jun	90	89	85	91	88	77	68	56	52	47	41	40	37	33	33	31	32	28	27	28	38	57	65	63	54.1	91											
20-Jun	52	53	52	54	55	55	53	54	54	49	40	37	41	48	59	70	84	88	89	92	92	92	92	92	64.4	92											
21-Jun	93	93	89	89	91	92	95	98	98	98	99	98	99	99	99	99	99	99	99	97	98	98	98	97	96.4	99											
22-Jun	94	91	93	93	91	90	90	84	80	71	65	57	55	51	46	43	41	40	37	39	45	69	90	94	68.6	94											
23-Jun	94	96	97	98	94	80	60	52	45	40	35	33	31	31	31	31	32	31	33	37	51	70	73	63	55.8	98											
24-Jun	62	61	61	67	66	62	55	55	48	39	37	35	35	31	29	28	26	26	26	27	33	52	55	47	44.2	67											
25-Jun	47	49	47	46	46	40	38	34	33	31	29	27	25	22	21	21	25	23	22	27	33	37	39	45	33.5	49											
26-Jun	50	54	57	56	51	51	49	44	39	36	35	33	32	33	34	35	35	35	35	39	43	44	46	52	42.4	57											
27-Jun	55	58	59	61	61	61	61	75	67	71	85	93	96	96	94	94	95	94	93	92	94	96	97	96	81.0	97											
28-Jun	96	97	97	98	98	96	95	93	91	86	85	78	75	73	63	60	55	52	51	64	72	77	81	83	79.9	98											
29-Jun	85	85	85	86	83	78	74	68	55	45	44	42	37	31	31	37	38	35	41	49	62	71	70	75	58.6	86											
30-Jun	75	79	71	63	68	59	57	64	49	53	60	55	50	50	55	60	60	72	71	75	80	83	88	89	66.1	89											
	74.5	75.3	75.6	76.6	76.3	73.4	69.3	65.4	60.1	57.2	56.0	53.7	51.8	49.7	47.5	47.7	47.8	49.5	51.0	54.7	62.7	70.9	75.0	76.3	Diurnal Average												
	98	99	99	99	99	99	99	98	98	98	99	98	99	99	99	99	99	99	99	99	97	98	98	99	98	Diurnal Maximum											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	153	21.25	21.25
40 - 60	202	28.06	49.31
60 - 80	161	22.36	71.67
80 - 100	204	28.33	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

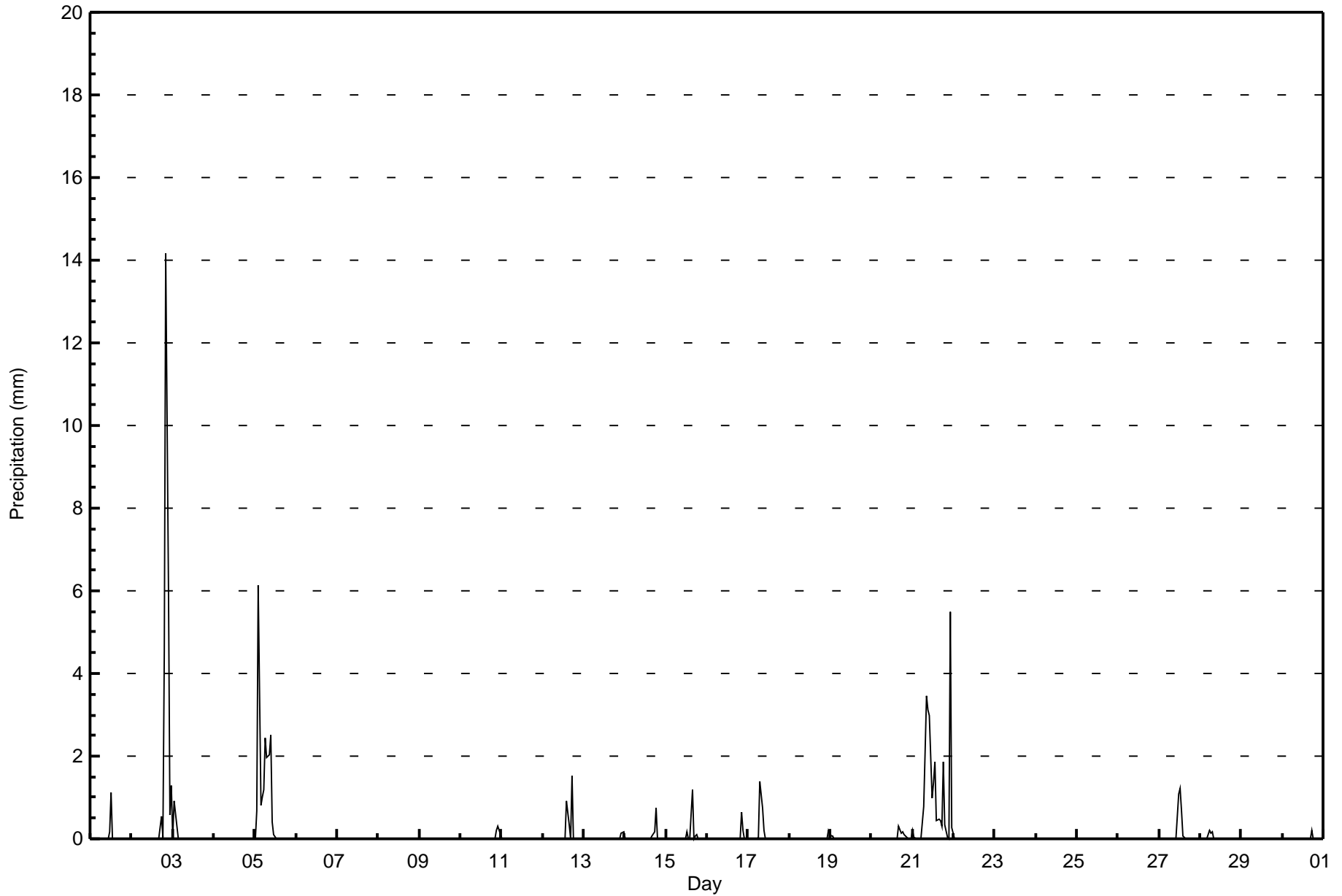
Wapasu - June 2017

Maximum Value: 14.2 mm on Jun 2 21:00		Maximum Daily Total: 27.1 mm on Jun 2		Hours in Service: 720																							
Minimum Value: 0.0 mm on Jun 1 01:00		Minimum Daily Total: 0.0 mm on Jun 4		Hours of Data: 720																							
Maximum Diurnal Total: 14.9 mm at hour 21		Minimum Diurnal Total: 0.3 mm at hour 1		Hours of Missing Data: 0																							
Monthly Total: 89.90 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 2.9		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.1	
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	4.5	14.2	6.0	0.6	1.3	27.1	14.2	
3-Jun	0.1	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.9	
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Jun	0.0	0.7	6.2	0.8	1.0	1.2	2.4	2.0	2.1	2.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.3	6.2	
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.6	0.3	
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.4	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	1.5	
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.2	
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.7	
15-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	1.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.2	
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.0	0.0	0.8	0.6	
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	1.4	
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	
19-Jun	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.8	0.3		
21-Jun	0.2	0.1	0.0	0.0	0.0	0.0	0.8	2.1	3.5	3.1	3.0	1.0	1.4	1.9	0.4	0.5	0.5	0.3	1.9	0.4	0.0	0.0	5.5	0.3	26.6	5.5	
22-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
27-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	1.2	
28-Jun	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2		
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	
		0.3	1.7	6.5	0.8	1.0	1.4	3.4	5.6	6.3	5.9	3.4	2.3	3.9	2.6	1.4	2.0	0.8	3.0	2.9	5.0	14.9	6.4	6.5	2.0	Diurnal Average	
		0.2	0.9	6.2	0.8	1.0	1.2	2.4	2.1	3.5	3.1	3.0	1.1	1.4	1.9	0.9	1.2	0.5	1.5	1.9	4.5	14.2	6.0	5.5	1.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - June 2017





Maximum Speed: 23 km/h on Jun 12 13:00	Maximum Daily Speed Average: 15.4 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 23 06:00	Minimum Daily Speed Average: 1.0 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 4.8 km/h at hour 3	Minimum Diurnal Speed Average: 1.5 km/h at hour 8	Hours of Missing Data: 0
Monthly Average Velocity: 1.3 km/h 78.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 8 O ₃ = 12 P ₉₀ = 15 P ₉₉ = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SSW5	SSE5	SE5	SE2	SE2	S1	WSW4	W5	WSW7	WSW9	SW8	SSW7	S7	SSE6	S7	S6	SSW6	SW3	NNW6	E3	ESE4	SE4	SSE5	SSE4	SSW3.3	WSW9
2-Jun	SSE5	SSE5	SSE5	SSE5	SSE5	SSE4	SSW2	N6	N6	NNE4	NNW9	NNW10	NNW11	N13	N14	N14	NW8	WSW12	WSW11	W11	WSW9	W7	WSW6	W7	NW3.2	N14
3-Jun	WSW8	W8	NNW8	NNW11	NNW10	NNW14	NNW14	NNW13	NNW13	NNW10	NNW6	NNW7	NW4	NW6	NW8	W6	WNW5	ESE1	ESE3	ESE4	E5	ESE8	ESE10	ESE11	NNW4.0	NNW14
4-Jun	SE13	SE13	SSE13	SSE10	S6	SSE6	S4	NNE6	NNE8	NW10	NW8	W6	WNW8	WNW9	NW12	NNW13	N13	N11	NNW8	NNW14	NNE7	NE6	NE8	NE12	N2.9	NNW14
5-Jun	NE10	NE9	E13	ENE13	ENE11	NE9	NE8	NNE7	NE7	NNE7	NE8	NE11	NE12	NNE8	N6	NNE3	N6	NW2	W3	NW6	NNE6	WNW2	SE3	SSE7	NE5.8	E13
6-Jun	SSE6	SSE7	SSE7	SSE7	S6	S7	S7	SSE5	WSW6	WSW7	SW10	SW12	WSW12	WSW11	W8	W10	W9	WNW7	W4	N4	NNE6	ENE7	ENE7	E7	SW3.3	WSW12
7-Jun	E8	E7	E5	ESE6	ENE5	E7	E8	E8	ENE12	ENE11	ENE11	ENE8	NE11	ENE11	ENE8	NE10	NE10	ENE10	NE10	ENE11	NE8	ENE8	E11	ESE15	ENE8.7	ESE15
8-Jun	ESE14	ESE15	ESE15	SE15	SE15	SE14	SE12	SE7	S4	SSE5	SSE5	SE8	SE9	SSE9	SSE10	S10	SSE8	SSE8	SSE7	SSE7	SE6	SE7	SE9	SE10	SE9.2	ESE15
9-Jun	SE11	SE11	SE9	NE3	NE5	N6	NNE12	NNE14	NNE16	NNE15	NNE15	NNE18	NNE19	NNE18	NE17	ENE17	ENE18	ENE17	ENE16	ENE16	ENE13	ENE9	ENE7	ENE7	NE10.9	NNE19
10-Jun	E9	E10	ESE10	E7	E9	ESE12	ESE11	ESE4	NE5	N8	NNE6	E3	NW5	NW9	WNW8	NW8	NW6	N8	N8	N7	NNW13	N10	N7	NNW5	NNE3.8	NNW13
11-Jun	NNW8	NNW5	NNW9	NW8	NW10	NW12	NW16	NW20	NW20	NW17	NW17	NNW18	NNW16	NNW15	NNW16	NNW15	NNW16	NNW14	NNW12	N8	NE5	E4	ESE5	SE5	NNW10.7	NW20
12-Jun	SE7	SE8	SSE10	SSE12	SSE13	SSE14	SSE14	SSE13	SSE14	SSE13	SSE12	SSE16	SSE23	SSE21	SSE13	SE15	SSE7	SE12	SE10	SE9	SE6	NE3	ENE3	NE5	SSE10.7	SSE23
13-Jun	ENE5	ENE5	E4	NE2	NE2	ENE4	NNE3	N4	N4	NNW7	N8	NNW8	NNW8	NNW7	NNW8	NNW7	N7	NNE12	NNE12	NNE10	NNE9	NE6	W5	N8	N5.3	NNE12
14-Jun	N10	NNE11	NNE12	N12	NNE13	NNE14	NNE14	NNE14	NNE15	NNE14	NNE13	NNE15	N15	NNE14	NNE14	NE13	NE9	NE7	NE7	NNE10	NNE9	NNE8	NNE8	NNE8	NNE11.4	N15
15-Jun	NE8	NNE6	NE6	NE6	NE5	NE5	NE6	E6	ESE6	ESE6	ESE8	ESE6	ESE5	ESE5	WNW3	N4	N7	N6	NNE4	NE3	NE4	E3	ESE5	ESE6	ENE3.9	NE8
16-Jun	SE9	SE11	SE11	SE11	SE12	SE11	SE11	SE10	ESE6	NNE2	NNW7	NNE3	SE6	SE5	W3	NW5	S0	W8	WSW9	SE9	SE13	SE13	SE13	SSE13	SE5.7	SE13
17-Jun	SSE13	SSE12	SSE12	SSE11	SSE10	S8	S6	SSW4	WSW6	WNW7	WNW6	WSW4	NW9	NW11	NW10	NW14	NW14	WNW13	NW11	NW8	NNW1	SE4	ESE4	SSE6	WSW2.5	NW14
18-Jun	SSE6	S7	SSE6	SSE7	SSE7	SSE7	S8	SSW9	SSW10	SSW12	WSW15	W14	WSW10	SW12	SSW13	SW14	W11	W13	W9	NW7	N12	NNW11	N5	SSE1	SW5.7	WSW15
19-Jun	SW3	SW3	WSW4	S2	SW4	WSW4	WNW4	N6	NNW5	NNW6	NW7	WNW7	NNW7	WNW7	NW6	W6	WNW7	WNW8	WNW7	W6	SSW3	SE5	SE6	SE7	WNW3.1	WNW8
20-Jun	SSE7	SSE6	SSE8	SSE6	SSE8	SSE7	S8	SSE7	SSE8	SSE10	SSE11	S13	SSW10	SW12	SW17	SSW12	SSW8	S9	SSE11	SSE13	SSE13	SSE12	SSE12	SSE12	S9.2	SW17
21-Jun	S10	SW12	SW14	SW13	SW12	WSW11	WSW8	W11	W9	W9	W10	W9	W9	W10	W10	W10	W9	WNW8	N17	N15	N15	N15	N17	N19	WNW7.0	N19
22-Jun	N18	N17	N15	N16	N15	N15	NNW17	N15	NNW16	N18	N19	N19	NNW20	NNW19	N19	NNW18	N17	N17	NNW17	NNW13	NNW8	NE1	SE3	SE5	N14.2	NNW20
23-Jun	SE3	SE4	SE4	SE4	ESE3	NE0	N5	N7	NNW10	NNW12	N11	N10	NNW11	N10	N10	NNE9	NNE7	N8	NNE5	ENE4	SE2	SE3	SSE6	SE6	NNE3.8	NNW12
24-Jun	SE7	SE6	SE6	SE7	SE8	SE6	E4	N8	ENE6	ENE10	NE9	NNE9	N10	N11	N12	N10	NNW13	N12	NNE8	NNE7	NNE5	E4	E7	ESE9	NE4.5	NNW13
25-Jun	ESE9	ESE10	ESE10	ESE9	ESE6	SE6	SE6	NNW4	NNW7	NW2	W4	W2	SW5	SW9	SSW9	SSW10	SSW11	S10	S10	SSE10	SSE9	SE12	SSE12	SSE13	SSE5.5	SSE13
26-Jun	SSE13	SSE12	SSE14	SSE16	SSE19	SSE20	SSE20	SSE19	S17	S18	S18	S18	S19	SSE18	SSE18	SSE17	SSE16	SSE13	SSE14	SE11	SE14	SE13	SE11	SE10	SSE15.4	SSE20
27-Jun	SE11	SE11	SE13	SE14	SE14	SE14	SSE11	SSW9	SSE12	S11	S10	SSE8	SSE5	SSE5	SSE4	E4	ENE5	ESE6	SE10	S5	ESE2	ENE2	ESE5	E5	SE7.2	SE14
28-Jun	E5	E4	ENE3	ENE5	ENE8	E10	E12	E13	E13	E14	ENE13	ENE11	ENE12	ENE9	E7	ENE6	NE6	ENE7	E5	S2	S5	S8	S9	S7	E6.5	E14
29-Jun	S7	S7	S8	S8	SSE7	S8	S7	SE4	E3	N5	W3	NW4	WNW5	NW9	NNW10	NW6	WNW6	NNW7	NNE4	NE1	SE3	ESE4	ESE4	SSE4	SSW1.0	NNW10
30-Jun	SE4	SE5	SSE5	SE6	SSE6	SSE4	SSW6	SSW6	SSE4	SW7	WSW8	WSW6	NW4	WNW6	W8	WNW10	SSE4	SW2	NNE4	SE5	SE5	SE6	SSE8	SSE5	SSW3.0	WNW10

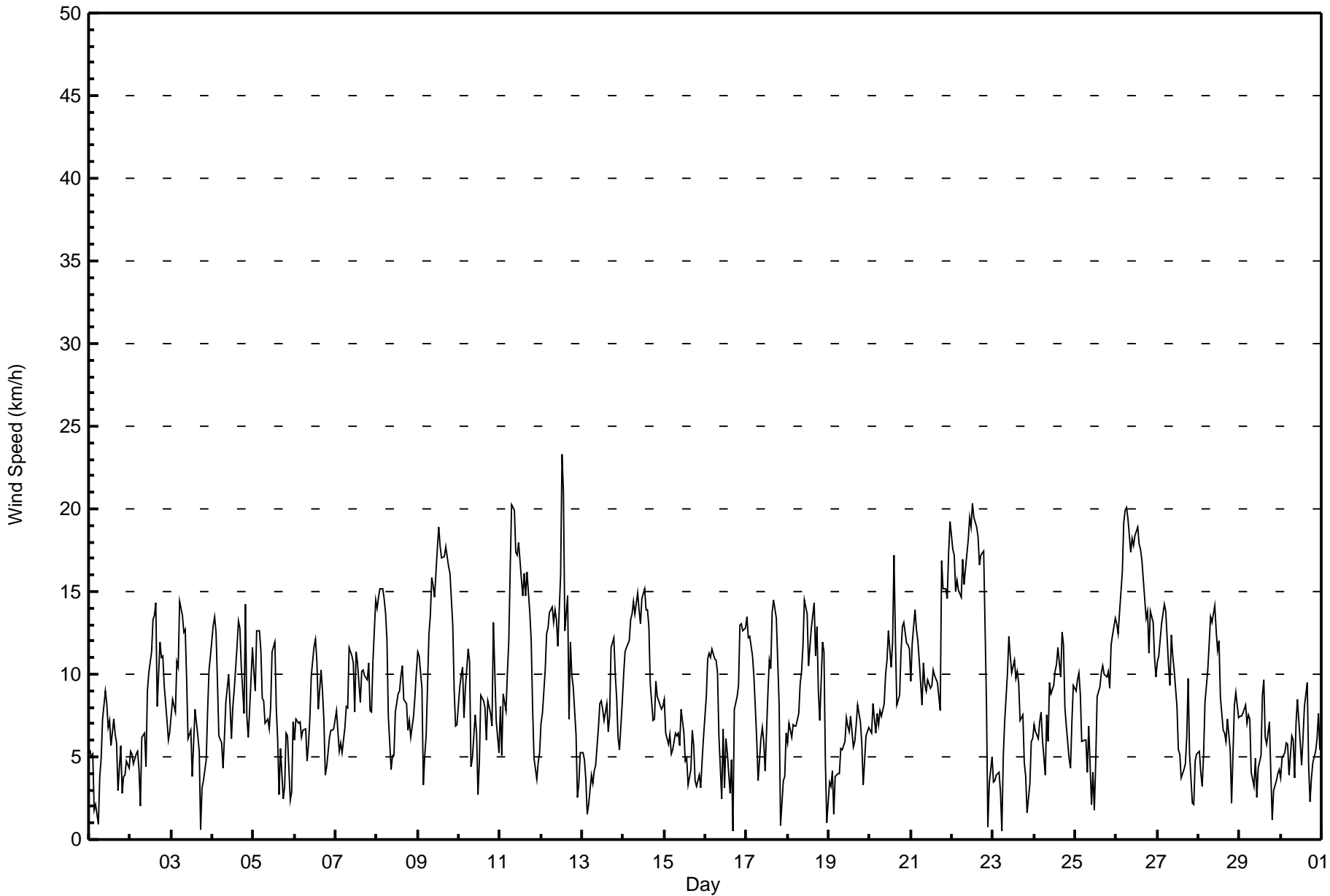
ESE4.6 SE4.6 SE4.8 SE4.2 SE3.9 SE3.3 ESE2.1 NE1.5 NNE1.9 N1.8 NNW1.9 N1.7 NNW2.1 NW2.7 NW2.8 NNW2.5 NNW2.9 NNW2.4 NNE2.4 NE2.3 ENE2.8 E3.1 ESE4.0 ESE4.5	Diurnal Average
N18 N17 ESE15 SSE16 SSE19 SSE20 SSE20 NW20 NW20 S18 N19 N19 SSE23 SSE21 N19 NNW18 ENE18 N17 NNW17 ENE16 N15 N15 N17 N19	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Wapasu - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	164	22.78	22.78
6 - 11	368	51.11	73.89
12 - 19	181	25.14	99.03
20 - 28	7	0.97	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	12	14	10	14	15	22	24	7	4	6	4	8	5	7	5	164
6 - 11	30	24	22	22	15	19	43	44	27	12	4	16	25	16	20	29	368
12 - 19	27	22	4	10	5	5	19	35	6	3	9	3	2	1	7	23	181
20 - 28	0	0	0	0	0	0	0	4	0	0	0	0	0	0	2	1	7
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	64	58	40	42	34	39	84	107	40	19	19	23	35	22	36	58	720

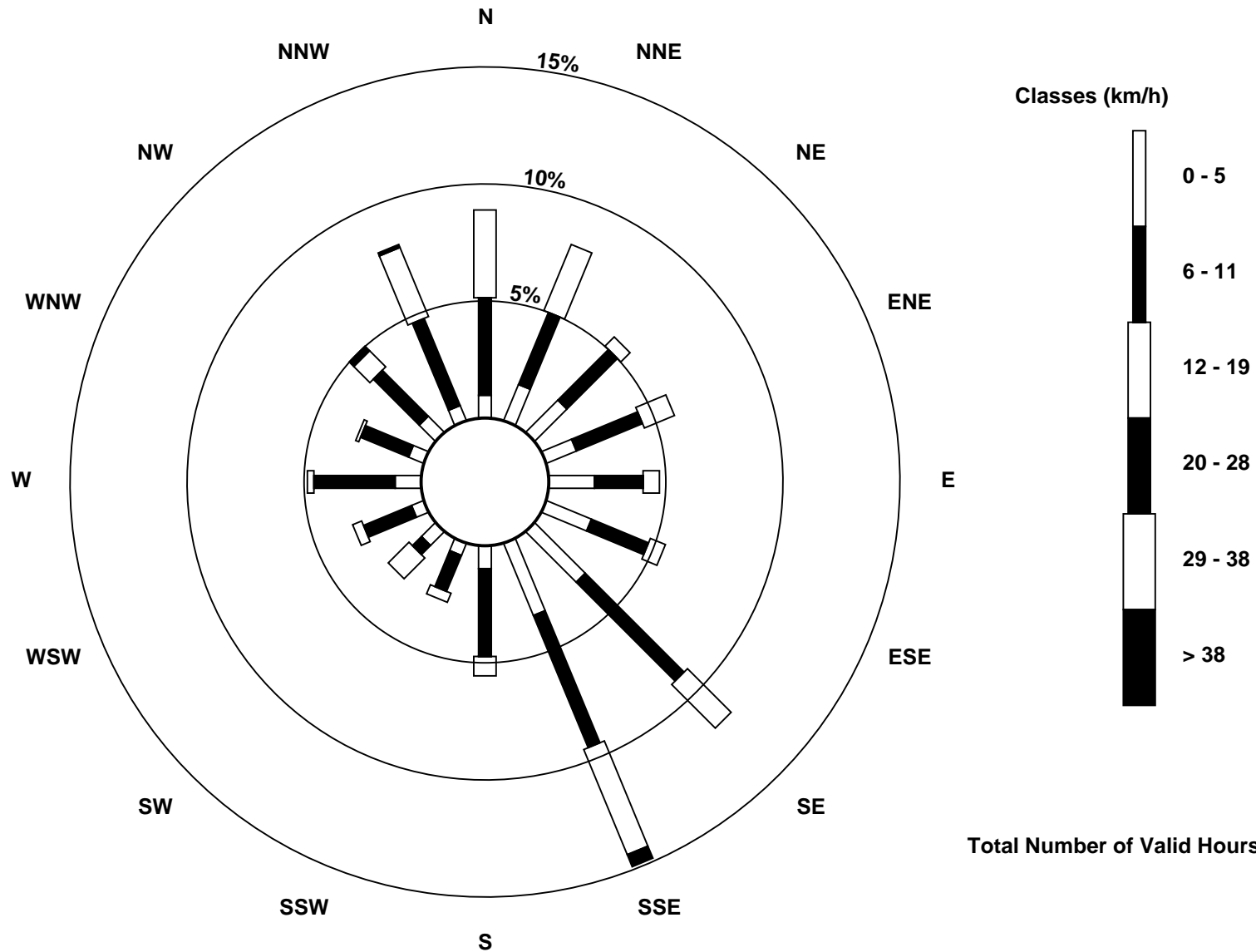
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jun 12 13:00 Minimum Value: 0 km/h on Jun 19 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	3	1	2	3	1	1	2	2	2	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	3	
2-Jun	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4	3	4	3	4	3	2	2	2	4	
3-Jun	2	3	3	4	4	4	4	3	4	2	2	3	2	3	3	3	2	2	1	1	1	2	2	3	4	
4-Jun	3	3	3	3	3	1	2	3	2	4	2	2	2	3	3	3	4	3	2	6	3	2	2	4	6	
5-Jun	3	5	4	4	3	3	2	2	3	2	3	4	4	3	2	2	2	2	2	5	6	1	1	1	6	
6-Jun	2	1	1	1	1	2	2	2	2	3	4	4	4	4	4	4	3	3	2	1	2	2	2	2	4	
7-Jun	2	2	1	1	1	2	2	4	4	4	4	4	4	4	4	4	4	3	3	3	2	2	3	4	4	
8-Jun	4	4	4	4	4	3	3	4	2	3	2	2	3	4	5	5	4	4	3	2	1	1	2	2	5	
9-Jun	2	2	2	3	2	3	4	5	5	6	5	6	6	6	6	6	6	6	5	5	4	3	1	2	6	
10-Jun	3	3	3	1	2	4	4	2	3	3	3	3	4	4	3	2	2	2	2	2	5	3	2	1	5	
11-Jun	3	2	2	2	3	4	5	6	6	5	5	5	5	5	6	5	4	4	4	3	1	1	1	1	6	
12-Jun	1	1	2	3	3	4	4	4	4	4	4	3	5	7	7	6	4	4	4	3	3	2	3	1	2	7
13-Jun	1	1	1	1	1	1	2	2	2	3	3	4	4	3	3	3	3	4	5	4	3	2	3	2	5	
14-Jun	3	3	4	4	4	5	5	5	5	5	5	5	5	5	5	4	3	2	2	3	3	3	3	3	5	
15-Jun	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	3	
16-Jun	2	3	3	3	3	3	3	3	3	2	3	2	4	2	2	1	2	2	3	4	3	3	3	3	4	
17-Jun	3	3	3	3	2	3	2	2	2	2	2	2	4	4	4	5	4	5	3	3	2	0	1	1	5	
18-Jun	1	5	2	1	1	2	3	3	3	4	4	5	4	5	5	5	4	4	4	3	4	3	2	2	5	
19-Jun	3	3	1	1	1	1	2	2	3	3	3	3	4	4	3	4	4	3	3	2	2	1	0	1	4	
20-Jun	1	1	2	1	2	2	2	2	2	3	4	4	4	5	5	4	3	4	4	4	4	3	4	4	5	
21-Jun	3	4	3	3	3	3	2	4	3	3	3	3	3	3	3	3	3	2	6	5	4	4	6	6	6	
22-Jun	6	5	5	5	5	5	5	6	6	5	6	6	6	6	6	5	5	5	5	4	4	1	0	1	6	
23-Jun	1	1	1	1	0	1	2	2	3	4	4	4	4	4	4	4	3	3	2	2	1	1	1	1	4	
24-Jun	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	4	4	3	2	1	1	1	2	4	
25-Jun	2	2	2	2	1	1	1	3	2	2	3	3	3	4	4	4	4	3	3	3	2	2	3	3	4	
26-Jun	3	3	3	4	5	6	6	6	6	6	6	6	7	6	6	5	5	4	4	3	4	3	3	2	7	
27-Jun	2	2	3	3	4	4	4	3	4	4	4	4	2	2	2	2	2	3	3	3	2	2	1	1	4	
28-Jun	1	1	1	1	3	3	4	5	4	5	4	4	3	3	3	2	3	3	2	1	2	3	2	2	5	
29-Jun	2	2	2	2	2	2	2	2	2	2	2	3	4	5	3	2	2	2	1	1	1	1	1	1	5	
30-Jun	1	1	1	1	1	1	2	2	2	2	2	3	3	3	2	3	2	1	2	2	2	1	2	1	3	
																	Diurnal Maximum									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - June 2017

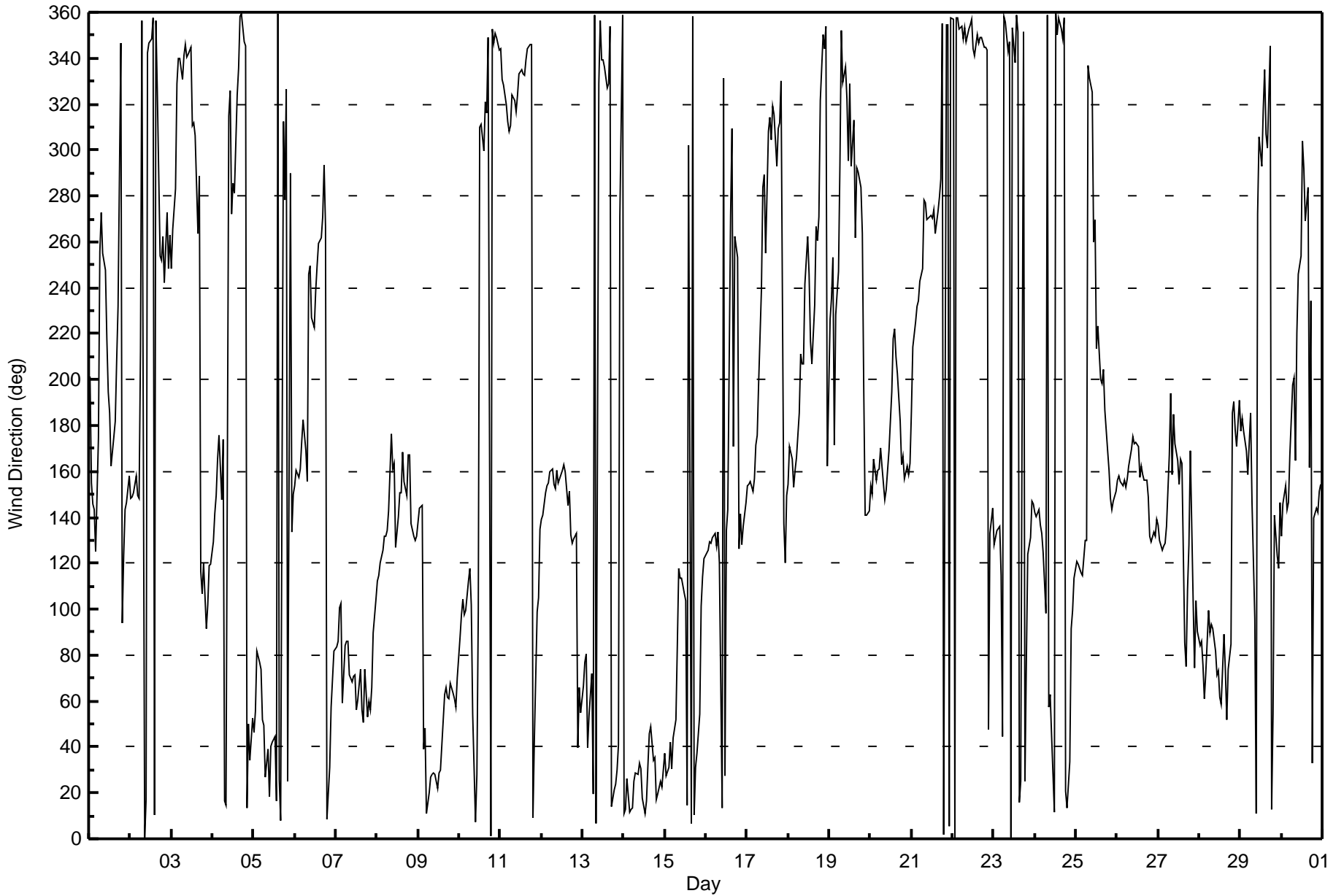
Direction of Maximum Speed: 161 deg on Jun 12 13:00 Direction of Maximum Daily Speed Average: 156.8 deg on Jun 26	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 45 deg on Jun 23 06:00 Direction of Minimum Daily Speed Average: 1.0 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 296.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	202	155	146	144	125	174	256	273	255	248	218	195	186	162	175	182	208	232	347	94	123	143	147	158	192.7
2-Jun	148	149	151	158	150	148	212	357	0	17	342	346	348	357	10	357	326	254	252	262	242	273	248	263	311.9
3-Jun	249	266	283	329	340	340	331	341	346	341	342	345	310	312	306	264	289	117	107	120	92	102	119	120	332.0
4-Jun	129	142	149	165	176	148	174	17	15	315	326	272	285	282	324	335	358	359	347	346	13	50	34	52	2.1
5-Jun	46	56	82	77	74	52	50	27	39	19	40	42	44	16	359	26	8	312	278	326	25	290	133	150	44.1
6-Jun	154	161	158	161	173	182	169	156	246	249	227	223	239	250	259	262	271	294	267	8	31	57	69	82	217.9
7-Jun	84	86	101	103	59	84	86	86	72	69	71	71	56	60	74	56	51	74	53	60	56	66	90	105	72.9
8-Jun	112	115	120	126	132	132	135	143	176	161	163	127	140	151	151	169	155	150	167	167	137	132	130	132	138.0
9-Jun	138	144	145	39	48	11	20	27	28	29	28	22	29	30	41	63	66	62	61	67	63	61	57	70	50.6
10-Jun	88	98	105	98	99	112	118	102	54	7	28	99	310	311	299	321	316	349	1	353	347	351	349	344	28.7
11-Jun	344	331	328	320	312	308	311	324	321	317	324	333	335	333	333	339	344	346	346	9	43	99	105	135	332.5
12-Jun	139	141	151	154	155	160	161	154	152	160	155	159	161	163	160	145	151	132	129	130	133	40	66	55	149.8
13-Jun	67	77	80	39	54	72	20	359	7	329	356	339	339	336	327	329	354	14	21	24	30	41	271	359	6.1
14-Jun	11	13	26	11	13	13	25	29	28	33	30	18	11	17	32	46	49	34	35	17	20	25	22	30	23.9
15-Jun	37	28	31	42	31	44	52	84	118	114	114	107	104	14	302	7	358	10	31	37	54	101	114	122	59.1
16-Jun	124	126	129	129	131	133	128	134	120	13	331	27	134	143	271	309	171	262	253	126	142	128	136	147	135.6
17-Jun	154	154	156	152	157	171	175	198	239	284	289	255	308	314	305	319	315	293	309	312	330	137	120	149	247.4
18-Jun	155	171	165	153	160	166	185	211	207	207	242	263	246	217	207	232	266	261	271	321	350	344	354	162	231.0
19-Jun	226	236	253	172	228	247	293	352	330	336	322	295	329	293	313	262	292	290	284	264	196	141	141	143	282.2
20-Jun	154	150	166	156	161	161	170	162	148	152	161	169	195	218	222	210	202	182	163	167	157	162	159	164	173.3
21-Jun	186	214	225	232	234	243	248	278	277	269	270	272	270	274	264	273	279	287	355	2	355	355	6	358	288.4
22-Jun	357	1	358	358	353	354	348	354	347	353	355	357	344	341	350	347	349	349	345	345	344	48	133	144	351.8
23-Jun	128	131	134	136	114	45	358	356	343	347	1	353	338	359	352	16	25	351	25	77	124	131	147	146	13.7
24-Jun	142	140	143	137	133	124	98	359	57	63	45	12	360	350	358	353	348	358	21	13	33	92	100	113	42.5
25-Jun	121	120	118	116	115	130	130	337	331	325	260	270	214	224	200	199	204	186	169	161	148	143	147	151	159.8
26-Jun	156	158	156	154	156	153	157	162	170	175	172	172	171	158	162	159	156	156	149	132	129	134	132	139	156.8
27-Jun	137	130	126	128	129	136	167	194	158	185	172	165	155	165	164	85	75	109	128	169	104	75	104	90	141.8
28-Jun	84	86	76	61	72	99	89	93	91	82	71	73	62	59	89	73	52	74	85	185	190	178	171	191	90.0
29-Jun	178	183	177	169	158	172	186	146	96	11	272	306	293	317	335	307	301	345	13	54	141	123	118	147	201.4
30-Jun	132	146	154	143	147	167	198	201	165	220	246	254	304	291	269	284	162	234	33	140	144	142	151	154	191.9

122.8 129.4 133.1 125.8 124.5 126.1 122.0 46.0 31.2 354.9 347.3 350.0 339.8 323.5 318.9 327.2 342.0 343.0 13.0 38.6 67.7 93.4 110.9 117.2

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 109 deg on Jun 25 12:00 Minimum Value: 4 deg on Jun 23 00:00 Percentiles: P ₁ = 8 P ₁₀ = 16 Q ₁ = 21 Median = 27 Q ₃ = 35 P ₉₀ = 52 P ₉₉ = 90																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	30	23	17	84	29	73	32	37	30	25	29	26	30	23	30	36	47	68	28	20	14	15	14	9	84
2-Jun	9	13	11	9	8	9	53	29	34	52	26	31	27	29	30	25	42	26	23	27	32	29	24	26	53
3-Jun	23	27	28	25	17	20	19	18	23	18	31	35	76	54	49	48	50	92	51	28	11	18	17	19	92
4-Jun	18	17	17	33	31	23	36	39	34	31	30	42	30	33	26	22	29	30	21	22	35	20	28	25	42
5-Jun	27	39	24	25	24	28	25	32	28	29	27	29	27	35	37	79	57	78	62	45	72	51	46	8	79
6-Jun	24	8	10	11	21	25	24	32	49	44	34	31	36	36	37	32	33	32	31	27	22	24	19	19	49
7-Jun	21	19	22	14	25	20	23	26	32	32	35	57	34	48	54	41	35	33	31	23	18	18	23	21	57
8-Jun	20	20	18	19	19	18	19	35	48	51	49	22	31	46	38	40	28	26	35	26	9	11	14	15	51
9-Jun	16	16	16	81	23	52	34	32	33	31	32	32	33	33	32	29	25	27	25	24	22	19	17	17	81
10-Jun	22	20	19	15	22	24	26	71	78	47	66	90	91	43	41	28	35	25	26	26	18	20	20	22	91
11-Jun	16	17	17	22	25	24	25	22	24	27	28	27	30	31	29	32	24	26	23	33	22	15	18	14	33
12-Jun	11	10	15	17	20	20	22	21	23	24	25	23	25	25	29	21	68	31	20	20	37	69	20	21	69
13-Jun	17	15	20	69	52	23	39	62	66	50	41	44	59	51	40	65	47	35	32	34	28	25	52	26	69
14-Jun	32	32	31	31	30	32	29	32	31	29	31	31	30	33	31	28	26	28	28	29	30	29	31	29	33
15-Jun	27	28	31	25	28	24	22	30	29	42	26	31	36	36	76	37	31	28	31	25	21	14	18	12	76
16-Jun	15	17	17	17	17	18	20	23	42	88	46	78	52	43	72	26	99	26	28	48	18	18	18	17	99
17-Jun	18	19	19	17	20	26	25	44	21	29	30	46	38	34	34	27	30	29	27	26	83	8	18	6	83
18-Jun	20	55	26	14	16	22	28	27	27	33	27	32	36	28	36	28	29	24	31	41	22	18	56	98	98
19-Jun	47	62	29	77	41	32	50	45	53	65	45	58	73	59	55	71	46	47	41	41	35	10	5	6	77
20-Jun	12	12	18	14	18	19	24	24	18	22	28	30	31	28	21	25	27	30	24	25	20	23	23	25	31
21-Jun	30	25	16	16	17	19	21	31	32	27	27	28	25	30	26	26	33	31	30	28	22	22	30	25	33
22-Jun	24	27	25	24	22	23	20	24	22	23	25	26	21	23	25	25	30	25	23	21	18	75	6	4	75
23-Jun	9	11	11	7	9	77	26	26	26	29	41	45	37	39	45	39	46	46	39	37	49	13	7	11	77
24-Jun	10	13	15	14	19	21	51	26	51	37	45	41	38	37	37	54	33	30	38	32	24	13	11	15	54
25-Jun	14	14	15	14	14	15	17	69	39	98	76	109	83	49	46	39	35	32	31	23	16	16	16	18	109
26-Jun	19	20	17	19	20	19	22	26	29	29	29	30	31	29	29	26	24	24	21	20	19	19	16	16	31
27-Jun	16	17	18	18	19	19	29	33	30	32	29	27	30	28	48	29	23	34	19	36	32	61	16	21	61
28-Jun	26	19	25	23	28	24	24	26	26	26	26	30	26	30	50	42	50	33	51	44	23	28	23	34	51
29-Jun	25	25	25	24	21	25	30	52	81	55	87	75	83	50	32	29	37	24	33	83	29	16	11	10	87
30-Jun	10	8	10	8	8	22	34	33	68	31	27	72	67	51	35	30	60	66	53	25	27	15	15	19	72
																			47 62 31 84 52 77 53 71 81 98 87 109 91 59 76 79 99 92 62 83 83 75 56 98						
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

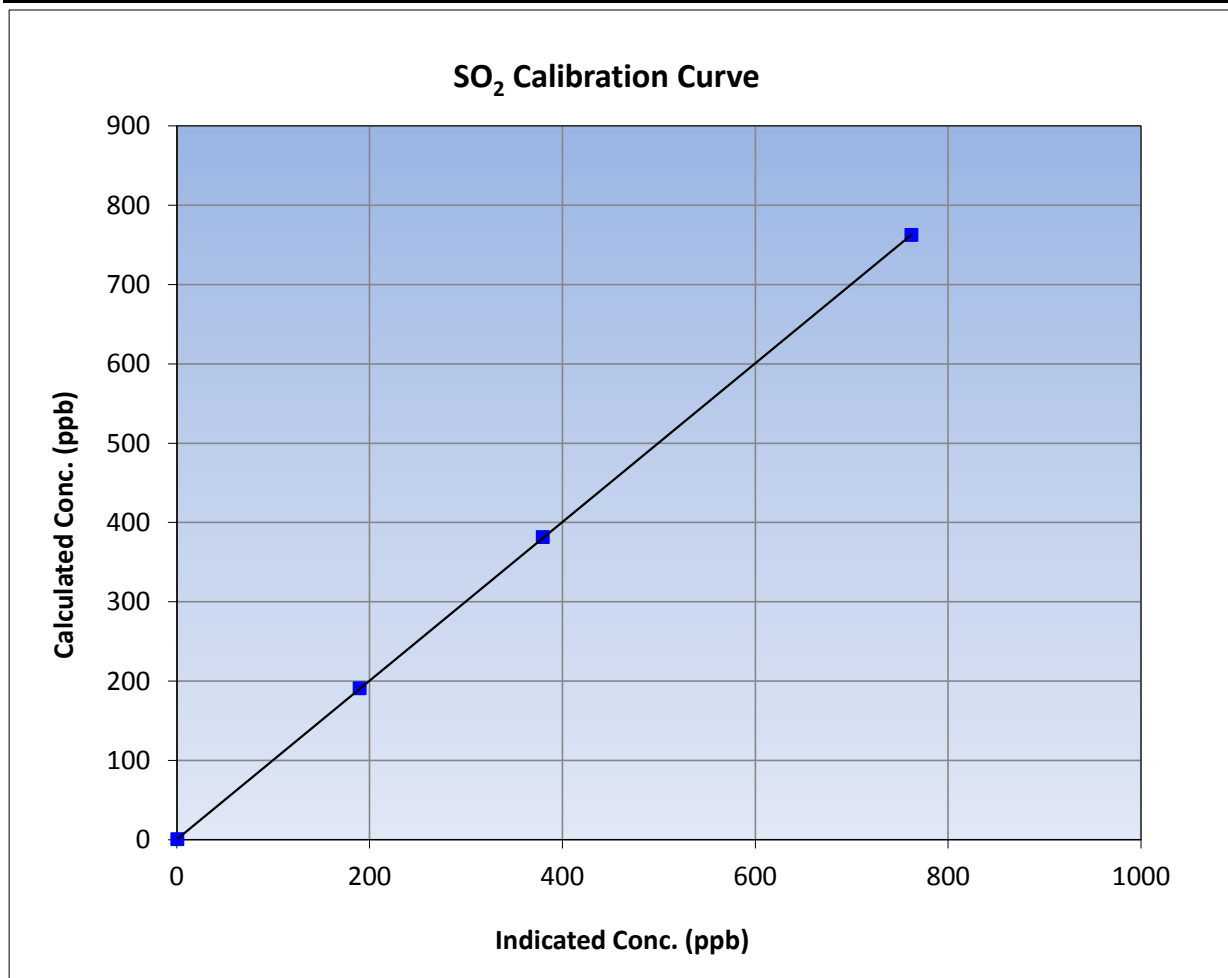
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:10
Analyzer make	Routine	Analyzer serial #	1218153459

Calibration Data

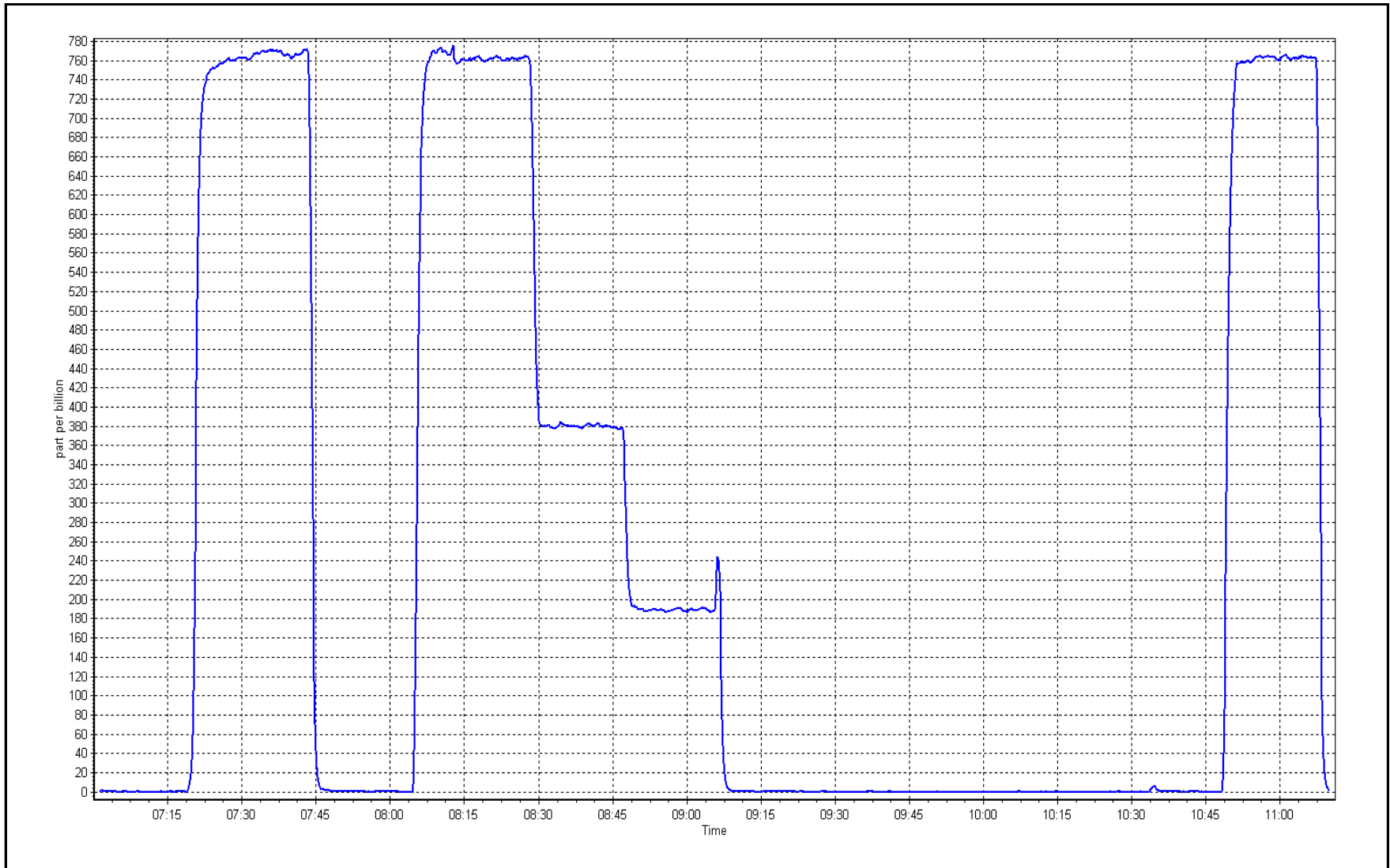
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999994	≥0.995
762.0	761.6	1.0005			
381.1	379.5	1.0041	Slope	1.000541	0.90 - 1.10
190.5	189.4	1.0059			
			Intercept	0.512088	+/-30



SO2 Calibration Plot

Date: June 20, 2017

Location: Wapasu





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	June 21, 2017	Last Cal Date:	May 17, 2017
Start time (MST):	9:00	End time (MST):	11:30
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.10</u>	ppm	Cal Gas Exp Date	September 9, 2017
Cal Gas Cylinder #	<u>CC107167</u>			
Calibrator Make/Model	API T700		Serial Number	997
ZAG Make/Model	API T701		Serial Number	4427

Analyzer Information

Analyzer make: Thermo 450i

Analyzer serial #: 1218153583

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-627.2	-627.2
Calculated slope	1.001524	0.992386	Lamp voltage	826	826
Calculated intercept	-0.423697	0.340634	Pressure	544.1	544.1
Analyzer Background	10.9	11.4	Flow	0.963	0.963
Analyzer Coefficient	0.993	1.016	Intensity	91	91

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5095	0.0	0.0	-0.3	----
as found span	5025	78.4	78.3	76.5	1.024
calibrator zero	5095	0.0	0.0	-0.3	----
high point	5025	78.4	78.3	78.6	0.997
second point	5063	39.2	39.2	39.2	1.000
third point	5083	19.6	19.6	19.3	1.015
as left zero	5095	0.0	0.0	-0.1	----
as left span	5025	78.4	78.3	79.7	0.983

SO₂ Scrubber Check

			Average Correction Factor	1.004
Corrected As found	76.80	Previous response	78.65	*% change 2.4%

* = > +/-5% change initiates investigation

Notes:

Span adjusted, No Maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

H₂S Calibration Summary

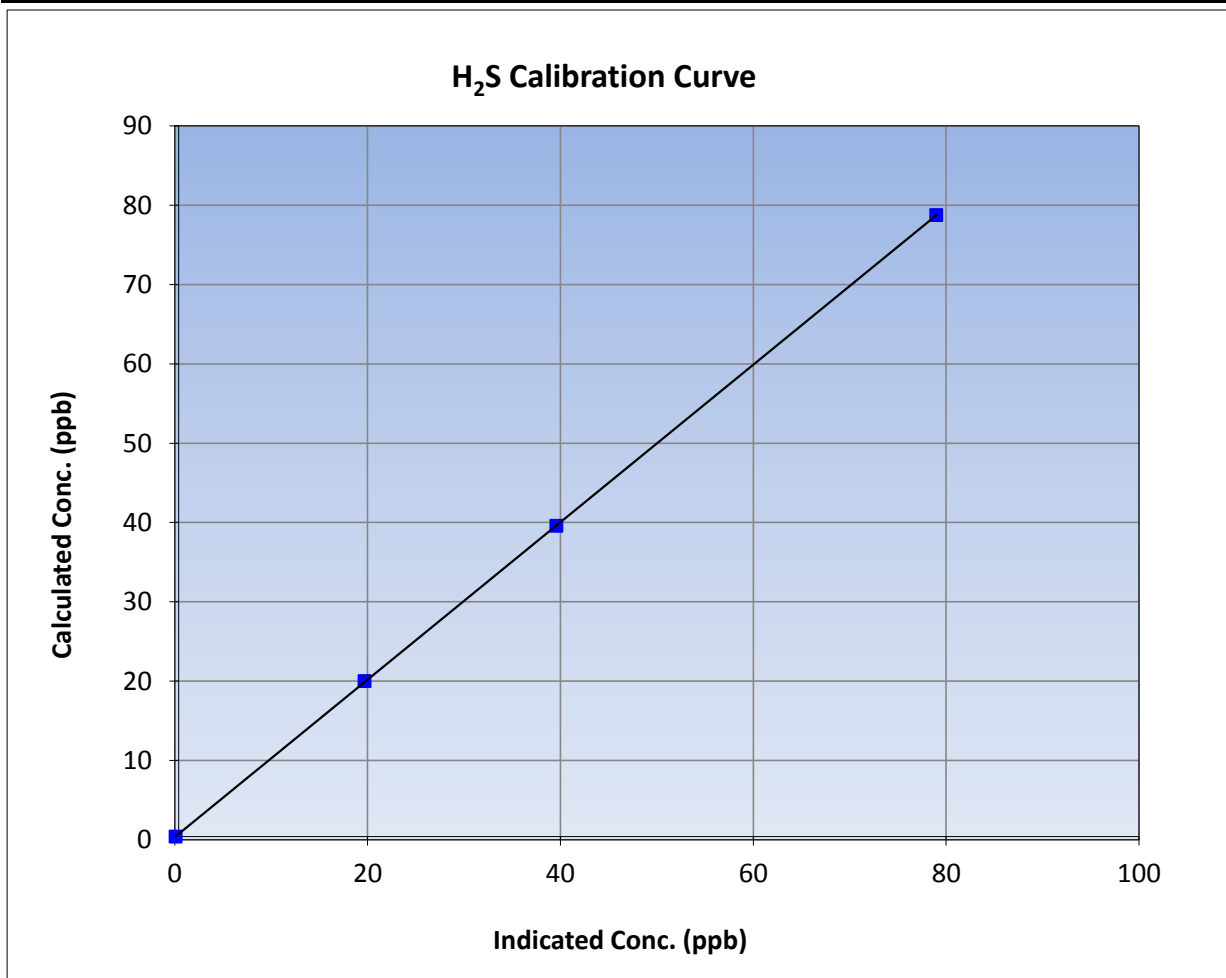
Version-03-2017

Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	9:00	End Time (MST)	11:30
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

Calibration Data

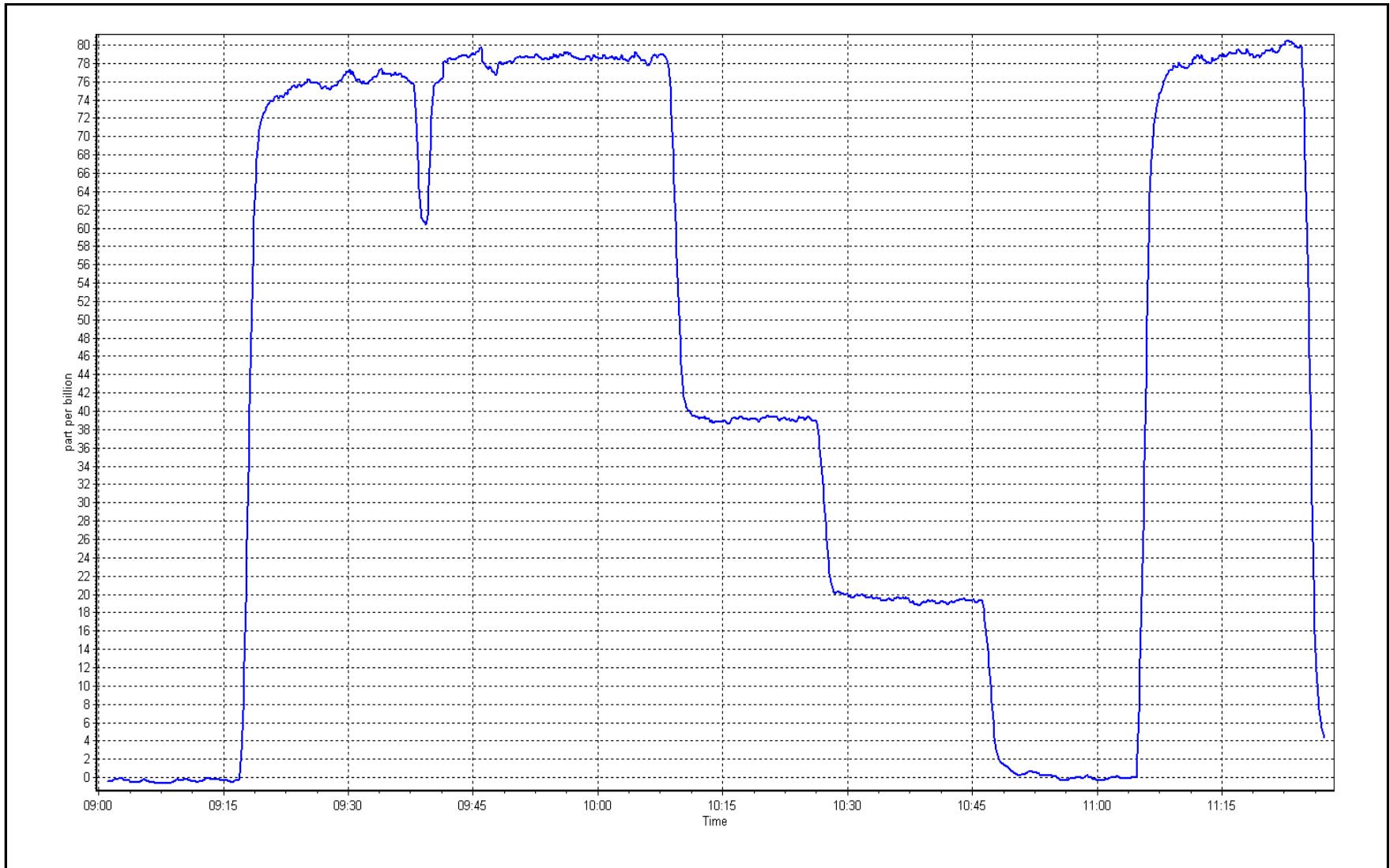
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999996	≥0.995
78.3	78.6	0.9968			
39.2	39.2	0.9996	Slope	0.992386	0.90 - 1.10
19.6	19.3	1.0150			
			Intercept	0.340634	+/-3



H₂S Calibration Plot

Date: June 21, 2017

Location: Wapasu





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	June 20, 2017	Last Cal Date:	May 24, 2017
Start time (MST):	7:00	End time (MST):	11:09
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000753	Cal Gas Expiry Date	2/22/2020
CH4 Cal Gas Conc.	<u>505.0</u> ppm	CH4 Equiv Conc.	1055.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	997
ZAG Make/Model	API T701	Serial Number	4427

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153352
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-296.5
Calculated slope	1.001586	Sample pressure	8.5
Calculated intercept	-0.018591	Fuel pressure	24.8
Analyzer Background	4.362	Air pressure	40.3
Analyzer Coefficient	3.040	Flame temperature	160.0

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5097	0.0	0.00	0.09	----
as found span	5025	78.4	16.21	16.46	0.985
calibrator zero	5097	0.0	0.00	-0.01	----
high point	5025	78.4	16.21	16.27	0.996
second point	5063	39.2	8.11	8.12	0.999
third point	5083	19.6	4.05	4.07	0.996
as left zero	5097	0.0	0.00	0.01	----
as left span	5025	78.4	16.21	16.28	0.996
Average Correction Factor					0.997
Corrected As found	16.37	Previous response	16.20	*% change	-1.0%

* = > +/-5% change initiates investigation

Notes: zero and span adjusted, no maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

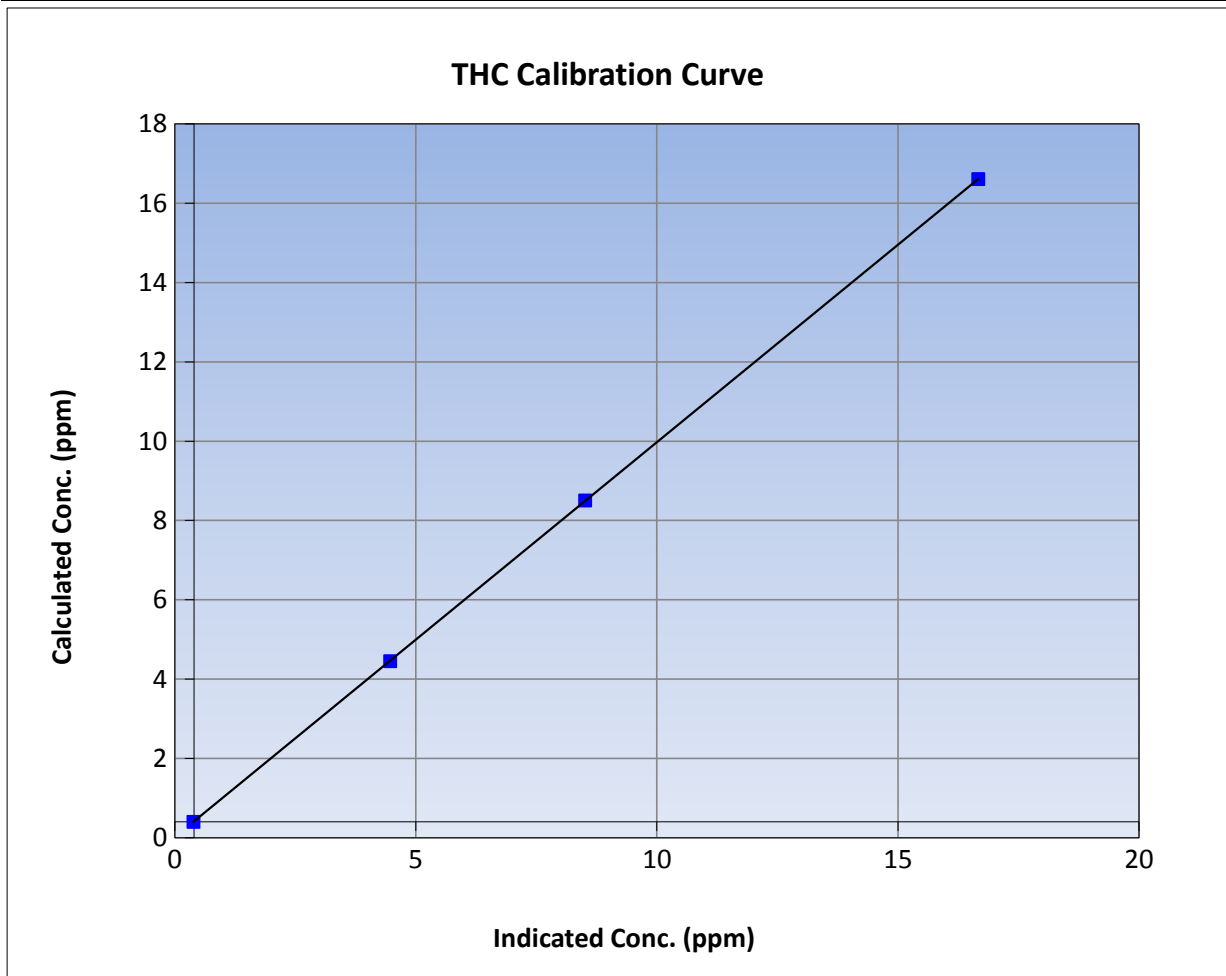
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:09
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

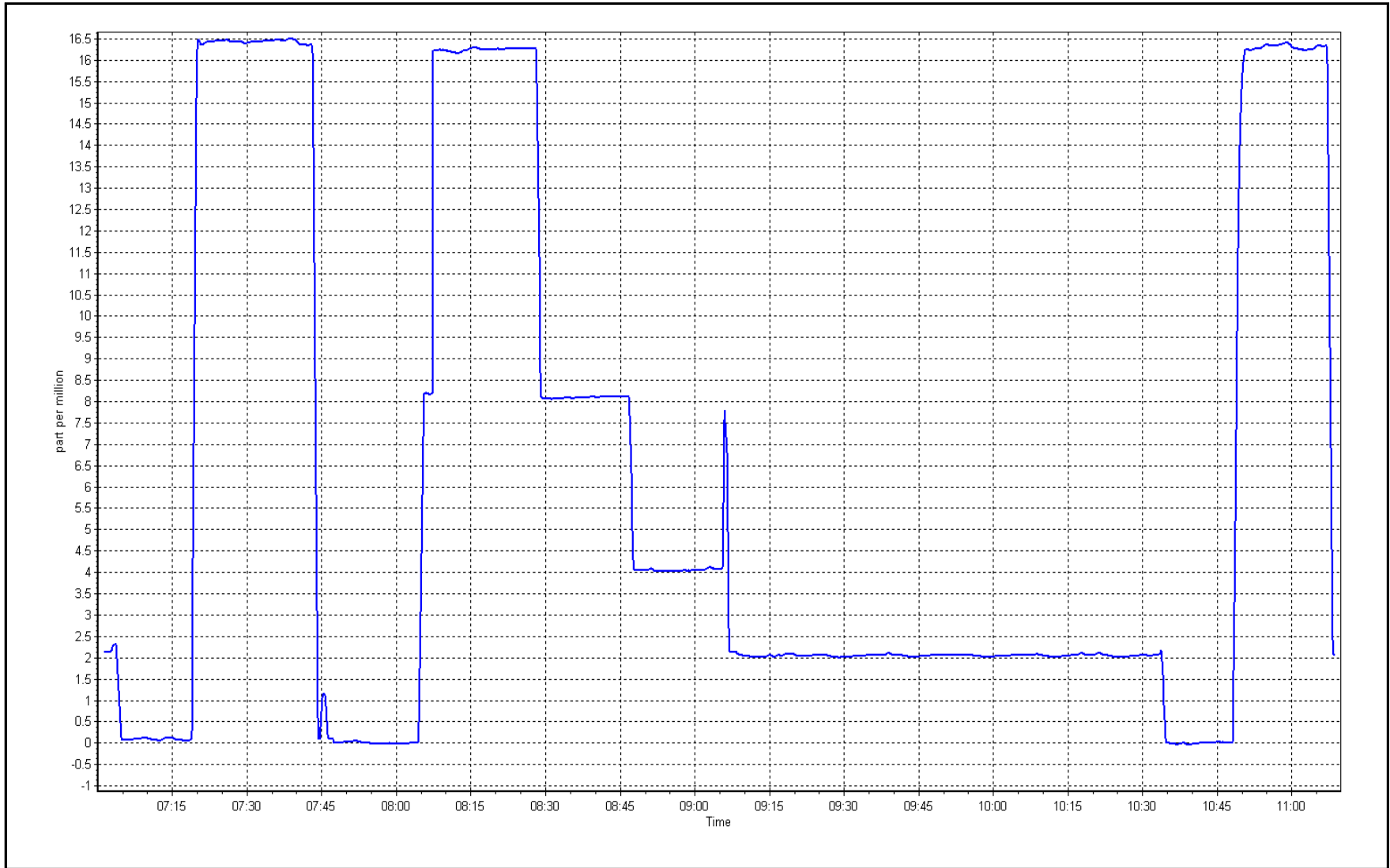
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
16.2	16.3	0.9961			
8.1	8.1	0.9988	Slope	0.995843	0.90 - 1.10
4.1	4.1	0.9957			
			Intercept	0.009614	+/-1.5



THC Calibration Plot

Date: June 20, 2017

Location: Wapasu





Wood Buffalo Environmental Association

O₃ Calibration Summary

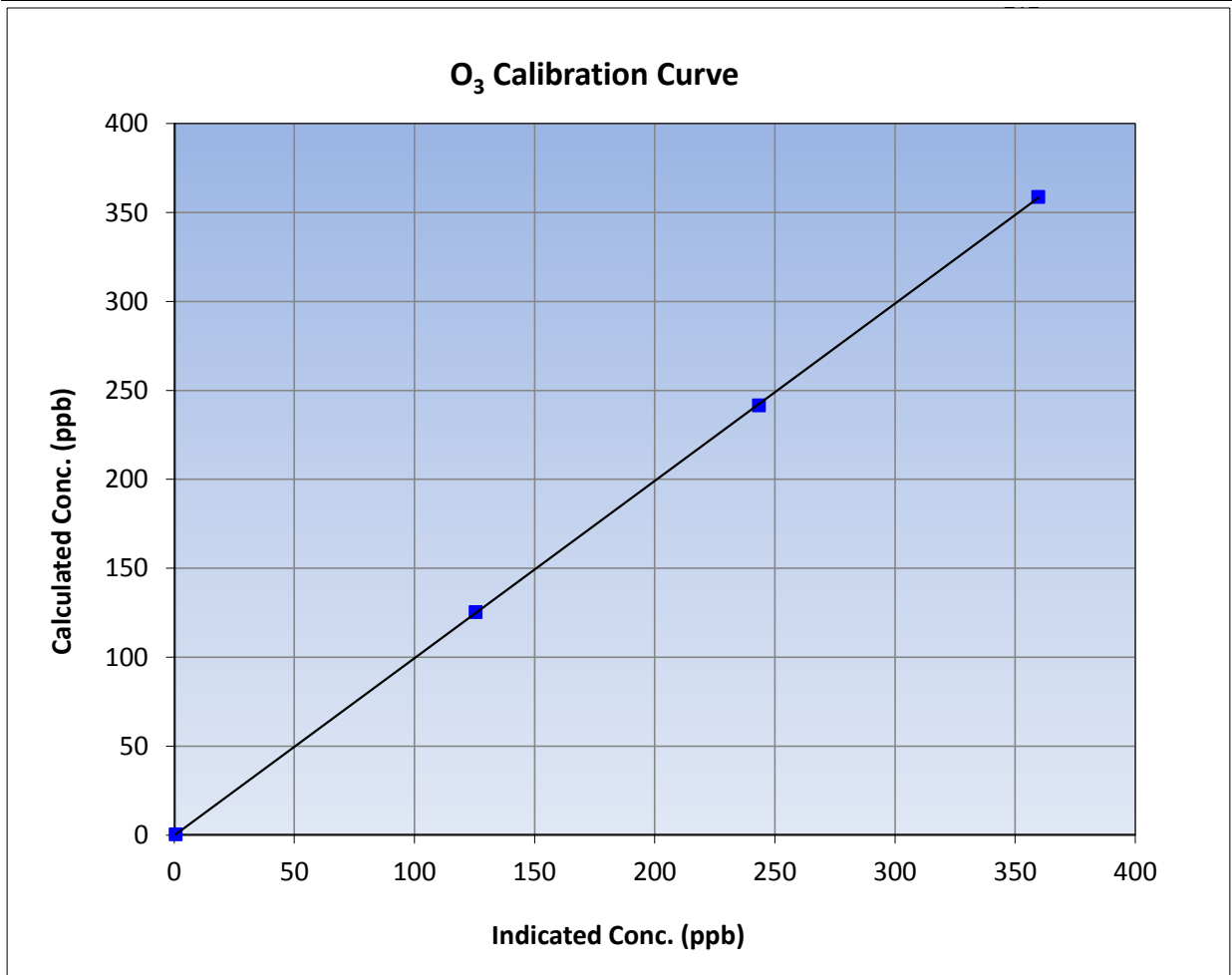
Version-03-2017

Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 25, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:30	End Time (MST)	10:02
Analyzer make	Teledyne T400	Analyzer serial #	824

Calibration Data

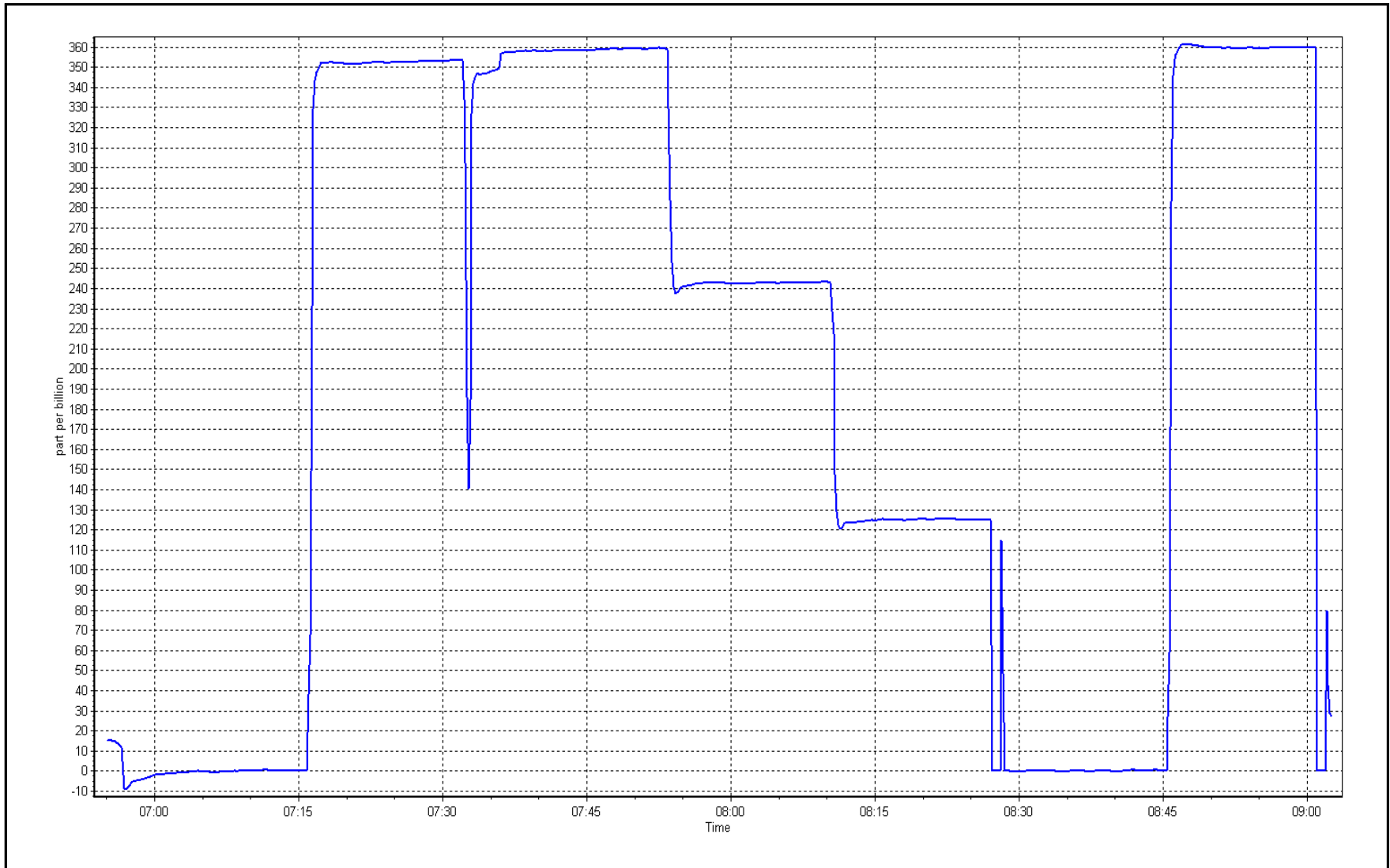
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	0.999984	≥0.995
358.3	359.3	0.9972	Slope	0.996813	0.90 - 1.10
241.1	243.0	0.9922	Intercept	-0.270243	+/- 10
124.9	125.1	0.9984			



O₃ Calibration Plot

Date: June 21, 2017

Location: Wapasu





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	June 20, 2017	Last Cal Date:	May 24, 2017
Start time (MST):	7:00	End time (MST):	11:09
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000753	Cal Gas Expiry Date	2/22/2020
NOX Cal Gas Conc.	<u>51.0</u> ppb	NO Cal Gas Conc.	<u>51.0</u> ppb
Calibrator Model	API T700	Serial Number	997
ZAG make/model	API T701	Serial Number	4427

Analyzer Information

Analyzer make: API T200		Analyzer serial #: 722	
	<u>Start</u>	<u>Finish</u>	
NO coefficient	0.933	0.946	NOX Range (ppb) 0 - 1000 ppb
NOX coefficient	0.933	0.946	PMT Temperature 7.0 7.0
NO ₂ coefficient	1.000	1.000	Reaction cell Press 3.2 3.2
NO bkgrnd	0.0	0.0	Sample Flow 440 440
NOX bkgrnd	0.1	0.1	HVPS Voltage 781 781

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.998992	0.989952
NO _x Cal Offset	0.568091	1.763802
NO Cal Slope	0.999424	0.993897
NO Cal Offset	0.868731	1.249369
NO ₂ Cal Slope	1.000372	1.000835
NO ₂ Cal Offset	-0.641766	-0.051066



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5097	0.0	0.0	0.0	0.0	0.4	0.0	0.4	----	----
as found span	5025	78.4	783.5	783.5	0.0	780.0	777.8	2.1	1.0045	1.0073
calibrator zero	5097	0.0	0.0	0.0	0.0	0.3	0.3	0.0	----	----
high point	5025	78.4	783.5	783.5	0.0	790.7	787.7	3.1	0.9909	0.9946
second point	5063	39.2	391.8	391.8	0.0	392.9	392.5	0.4	0.9973	0.9983
third point	5083	19.6	195.9	195.9	0.0	194.1	194.1	0.0	1.0093	1.0093
as left zero	5097	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	----	----
as left span	5025	78.4	783.5	429.1	354.4	784.1	429.0	355.1	0.9992	1.0002
Average Correction Factor									0.9991	1.0007

Corrected As found	NO _x = 779.6 ppb	NO = 777.8 ppb		*Percent Change	NO _x = 0.5%
Previous Response	NO _x = 783.7 ppb	NO = 783.1 ppb		*Percent Change	NO = 0.7%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	789.8	787.4	2.4	0.9920	0.9950	----	----
1st NO2 (400 ppb O3)	429.1	358.3	787.0	429.1	357.9	0.9955	----	1.0011	99.9%
2nd NO2 (200 ppb O3)	546.3	241.1	787.4	546.3	241.2	0.9950	----	0.9996	100.0%
3rd NO2 (100 ppb O3)	662.5	124.9	787.4	662.5	124.8	0.9950	----	1.0008	99.9%
2nd NO ref point	----	0.0	787.2	785.6	1.6	0.9953	0.9973	----	----
Average Correction Factor						0.9952	0.9962	1.0005	99.9%

Notes: span adjusted, no maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

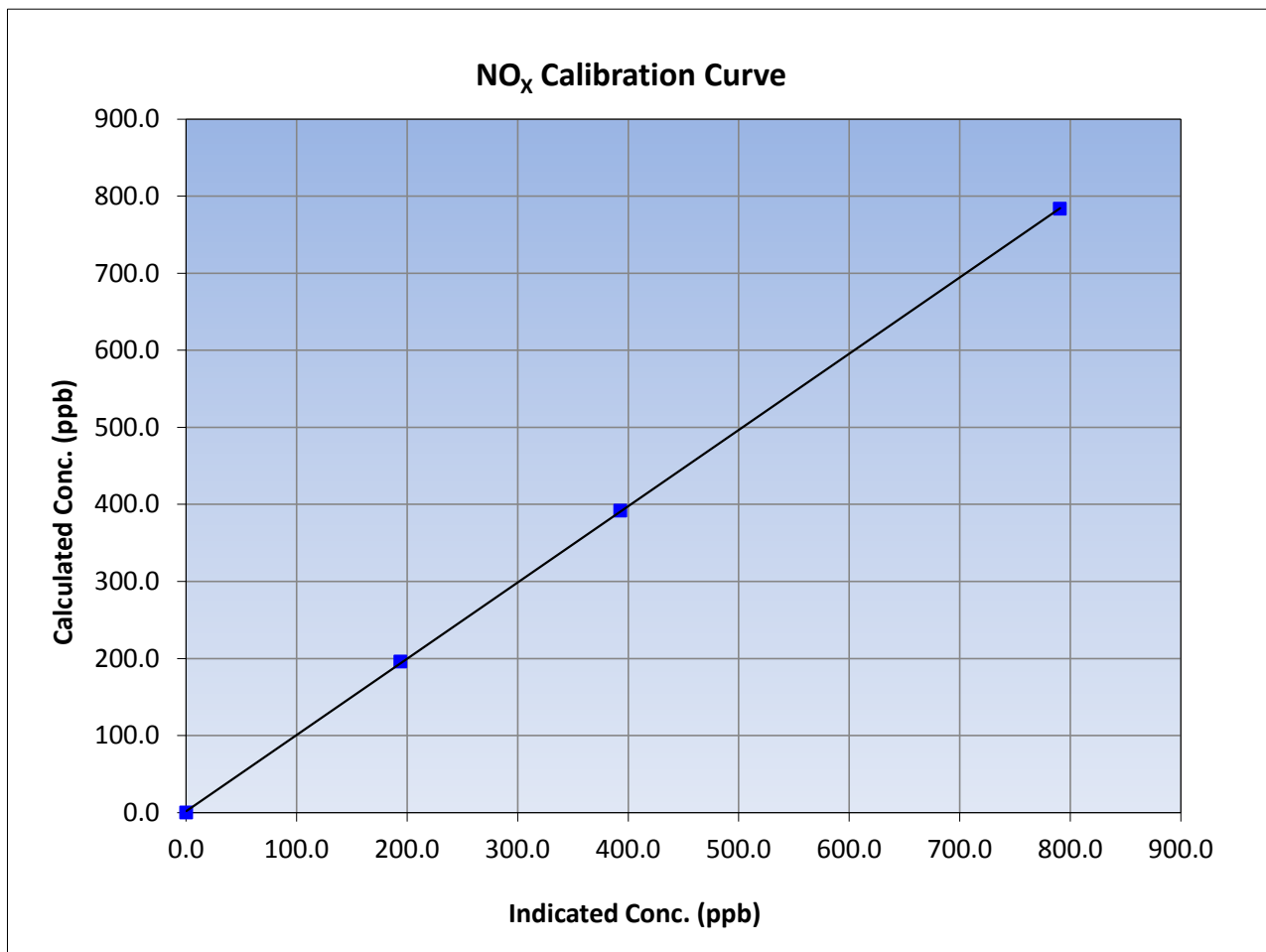
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:09
Analyzer make	API T200	Analyzer serial #	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
783.5	790.7	0.9909			
391.8	392.9	0.9973			
195.9	194.1	1.0093			
			Slope	0.989952	0.90 - 1.10
			Intercept	1.763802	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

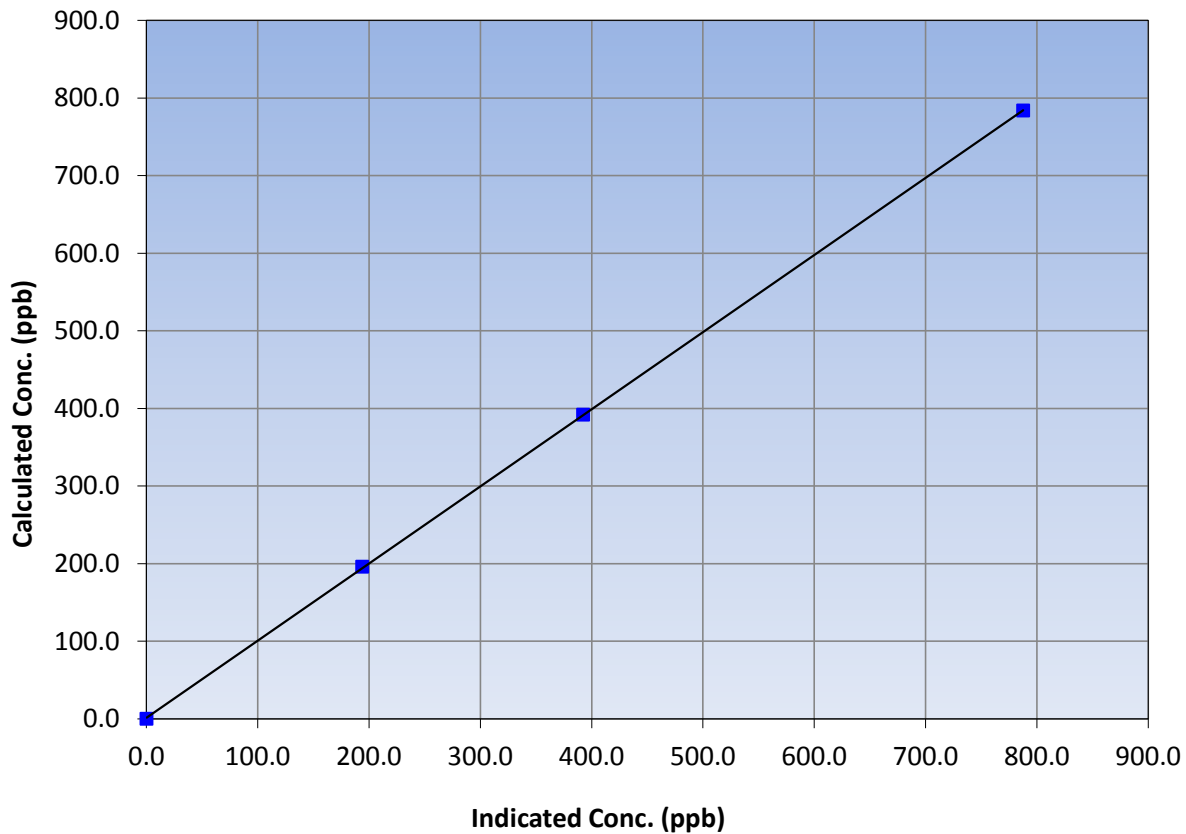
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:09
Analyzer make	API T200	Analyzer serial #	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
783.5	787.7	0.9946			
391.8	392.5	0.9983			
195.9	194.1	1.0093			
			Slope	0.993897	0.90 - 1.10
			Intercept	1.249369	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

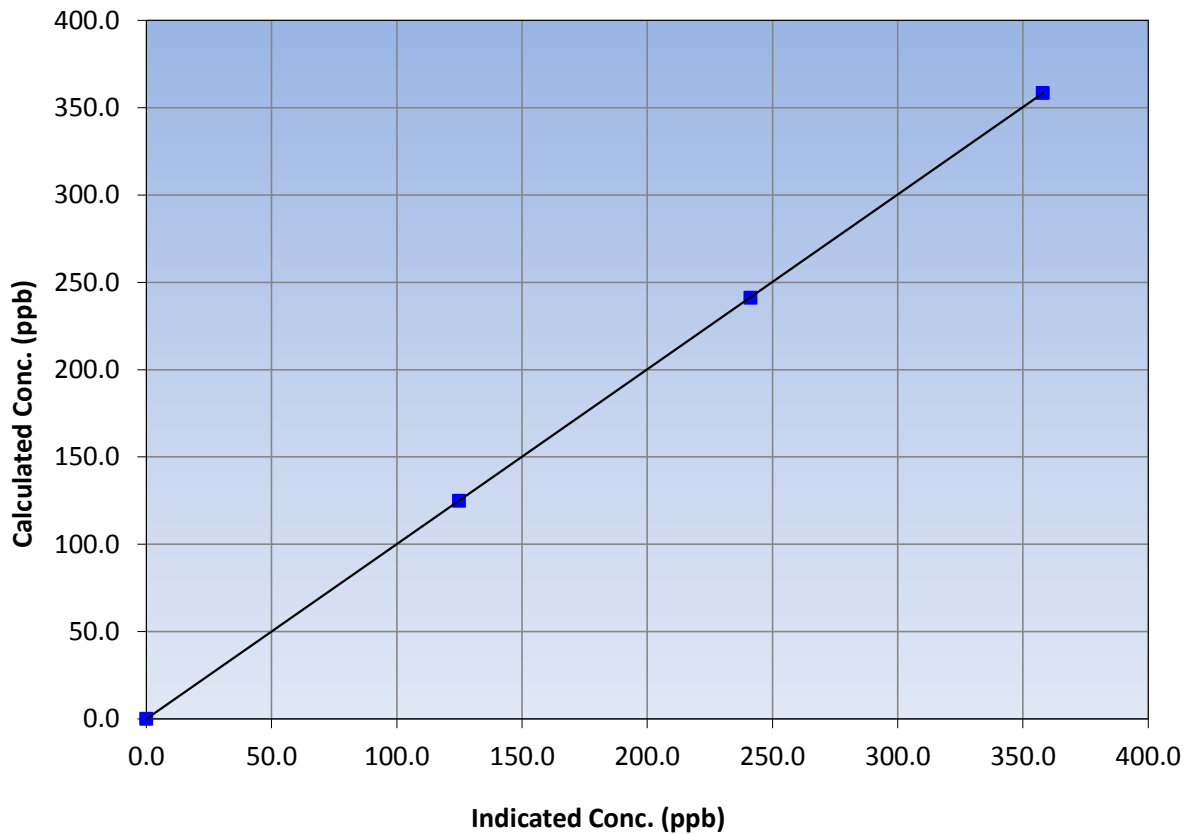
Station Information

Calibration Date	June 20, 2017	Previous Calibration	May 24, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:09
Analyzer make	API T200	Analyzer serial #	722

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
358.3	357.9	1.0011			
241.1	241.2	0.9996			
124.9	124.8	1.0008			
			Slope	1.000835	0.90 - 1.10
			Intercept	-0.051066	+/-20

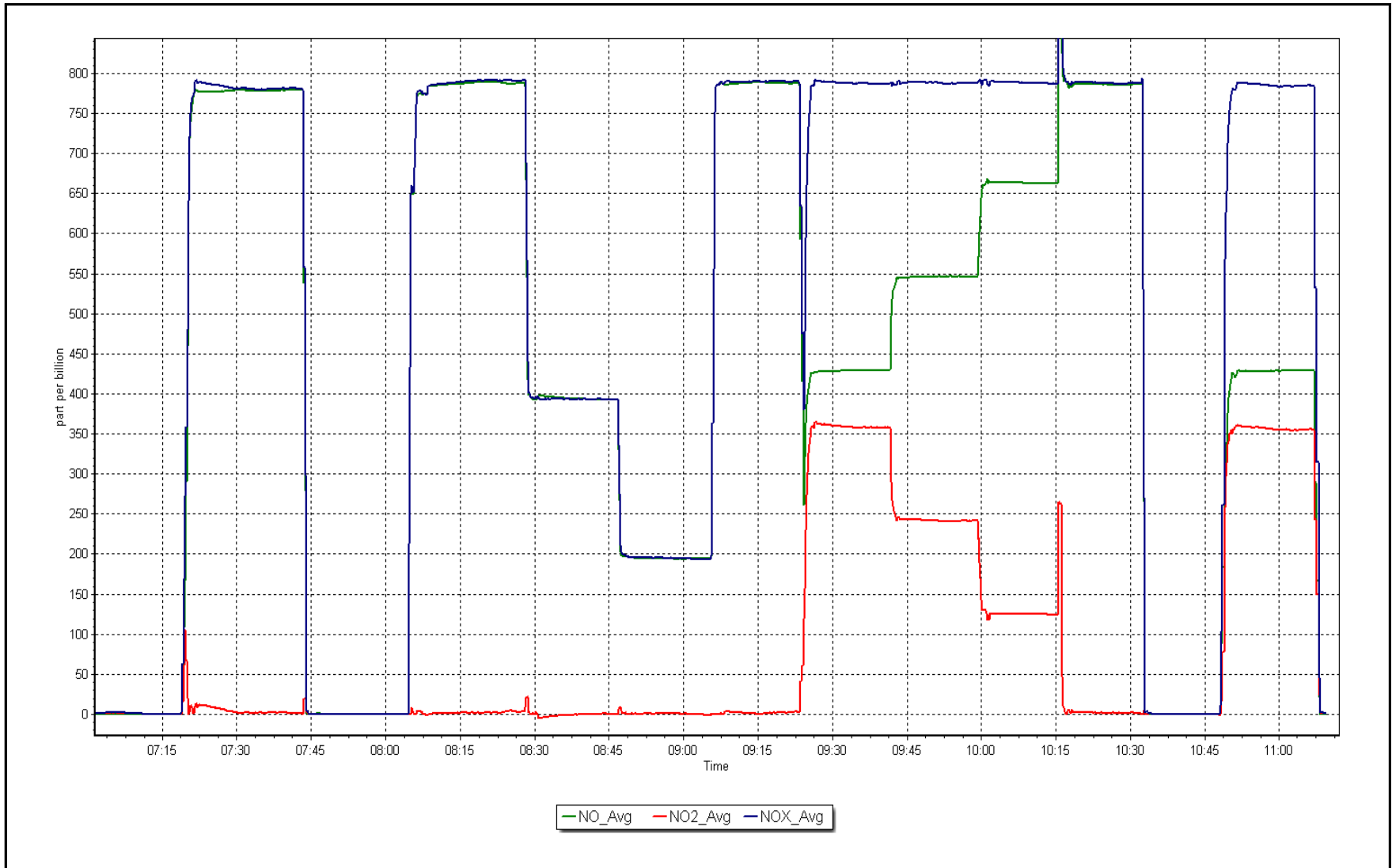
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 20, 2017

Location: Wapasu





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
STONY MOUNTAIN
JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	33	35	99.72	2	0	1	0
TRS(ppb) Average	684	34	36	99.72	0	0	0	0
THC(ppm) Average	683	33	37	99.44	2.2	-	2	-
NMHC(ppm) Average	683	33	37	99.44	0.235	-	0.103	-
CH4(ppm) Average	683	33	37	99.44	2	-	1.9	-
O3 (ppb) Average	685	33	35	99.72	64	0	53	-
NO2 (ppb) Average	681	36	39	99.58	3	0	1	-
NO (ppb) Average	681	36	39	99.58	1	-	0	-
NOX (ppb) Average	681	36	39	99.58	3	-	1	-
PM2.5 (ug/m3) Average	717	3	3	100	11.7	-	8.3	0
Wind Speed 10 m (km/h) Average	719	0	1	99.86	18	-	12	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	0	-	-
Temperature 2 m (C) Average	720	0	0	100	26	-	19.7	-
Relative Humidity (%) Average	720	0	0	100	100	-	96.0	-
Precipitation (mm) Total	719	0	1	99.86	18.2	-	31.5	-
Leaf Wetness (% of range) Average	720	0	0	100	47	-	16.0	-
Global Solar Radiation (W/m2) Average	720	0	0	100	989	-	340.0	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	685	0.2	0	-	0	0	0	0	0	0	0	2
TRS (ppb) Average	684	0.3	0	-	0	0	0	0	0	0	0	0
THC (ppm) Average	683	1.92	0	-	1.8	1.9	1.9	1.9	1.9	1.9	2	2.2
NMHC(ppm) Average	683	0.032	0.034	-	0	0	0	0	0.1	0.1	0.1	0.235
CH4(ppm) Average	683	1.89	0	-	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2
O3 (ppb) Average	685	37.8	9	-	14	26	31	37	44	50	64	64
NO2 (ppb) Average	681	0.6	0	-	0	0	0	1	1	1	1	3
NO (ppb) Average	681	0.1	0	-	0	0	0	0	0	0	0	1
NOX (ppb) Average	681	0.7	0	-	0	0	0	1	1	1	1	3
PM2.5 (ug/m3) Average	717	4.64	2.1	-	1.6	2.3	2.9	4.1	6.1	7.4	11.7	11.7
Wind Speed 10 m (km/h) Average	719	6.6	3	-	0	3	4	6	9	11	18	18
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	14.24	4.6	-	4.1	8.9	11.2	13.6	17.2	20.9	26	26
Relative Humidity (%) Average	720	69.4	21	-	24	39	52	70	90	97	100	100
Precipitation (mm) Total	719	-	-	111.81	-	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	720	5.5	8	-	0	1	1	1	7	17	47	47
Global Solar Radiation (W/m2) Average	720	222.1	274	-	0	0	2	92	376	703	989	989

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Jun 2017 18:00	07 Jun 2017 19:00	2	Maintenance - WBEA internal audit
TRS	08 Jun 2017 08:00	08 Jun 2017 09:00	2	Maintenance - WBEA internal audit
O3	07 Jun 2017 17:00	07 Jun 2017 18:00	2	Maintenance - WBEA internal audit
NO2, NO, NOX	07 Jun 2017 14:00	07 Jun 2017 16:00	3	Maintenance - WBEA internal audit
NMHC, CH4, THC	08 Jun 2017 09:00	08 Jun 2017 10:00	2	Maintenance - WBEA internal audit
NMHC, CH4, THC	27 Jun 2017 10:00	27 Jun 2017 11:00	2	Maintenance - replaced carrier gas
Precipitation Collector	26 Jun 2017 13:00	26 Jun 2017 13:00	1	Maintenance to complete drip test
Wind Speed, Wind Direction	29 Jun 2017 00:00	29 Jun 2017 00:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association
Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 4 20:00	Maximum Daily Average: 0.5 ppb on Jun 4		Hours of Data:	685
Minimum Value: 0 ppb on Jun 16 22:00	Minimum Daily Average: 0.1 ppb on Jun 10		Hours of Missing Data:	35
Maximum Diurnal Average: 0.3 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 19		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	1	Z	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	2	1	0	0	0	0.5	2
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Jun	0	0	Z	0	0	0	0	1	0	0	0	0	0	1	1	1	1	M	M	0	0	0	0	1	0.4	1
8-Jun	1	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.5	1
9-Jun	1	1	1	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0.3	1
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jun	0	0	0	0	0	Z	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Jun	0	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
23-Jun	Z	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0.5	1
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
26-Jun	1	0	0	Z	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	2	1	0	0.5	2
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0

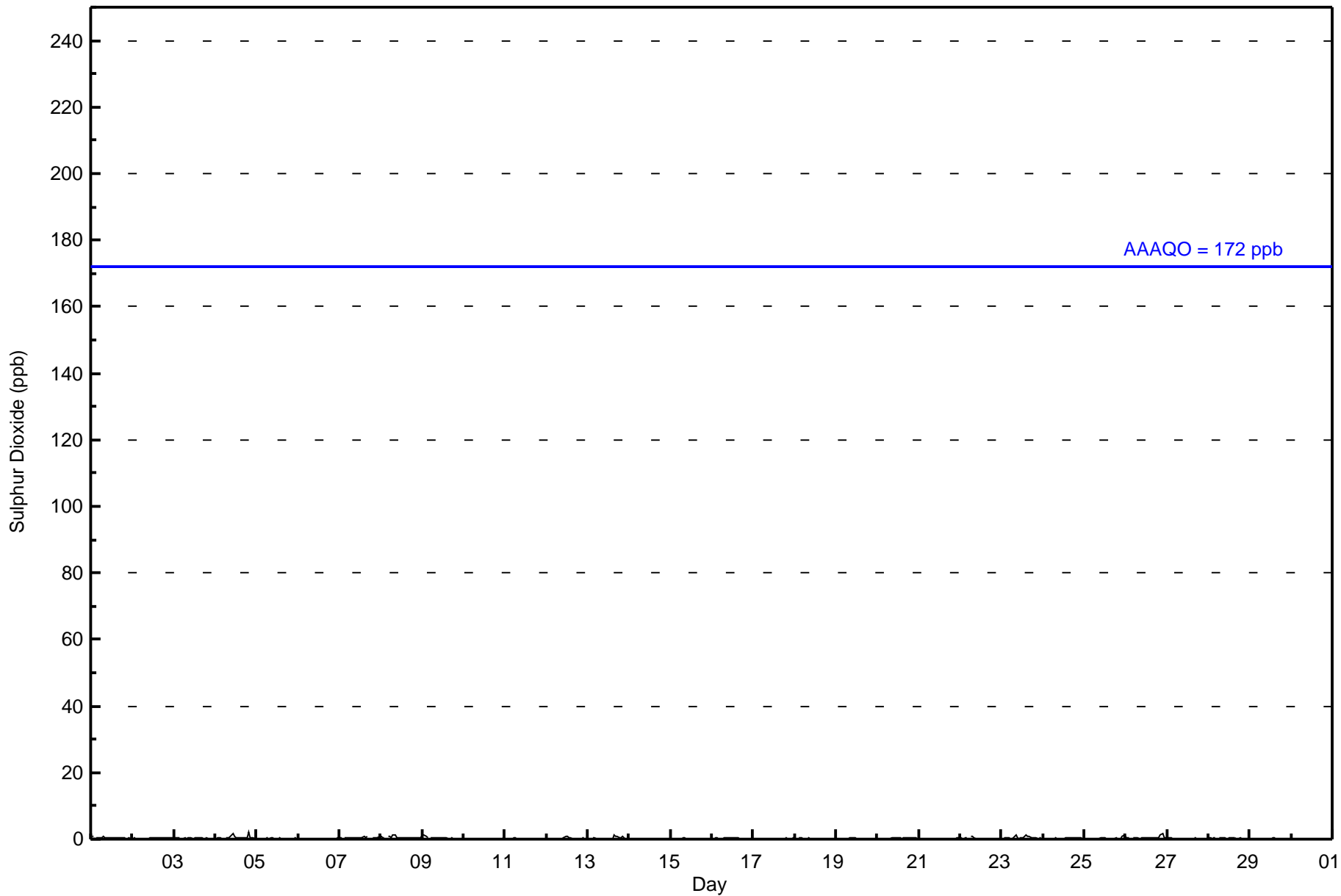
0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	2	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	19	32	48	14	24	34	27	45	46	75	50	40	70	105	34	21	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	32	48	14	24	34	27	45	46	75	50	40	70	105	34	21	684

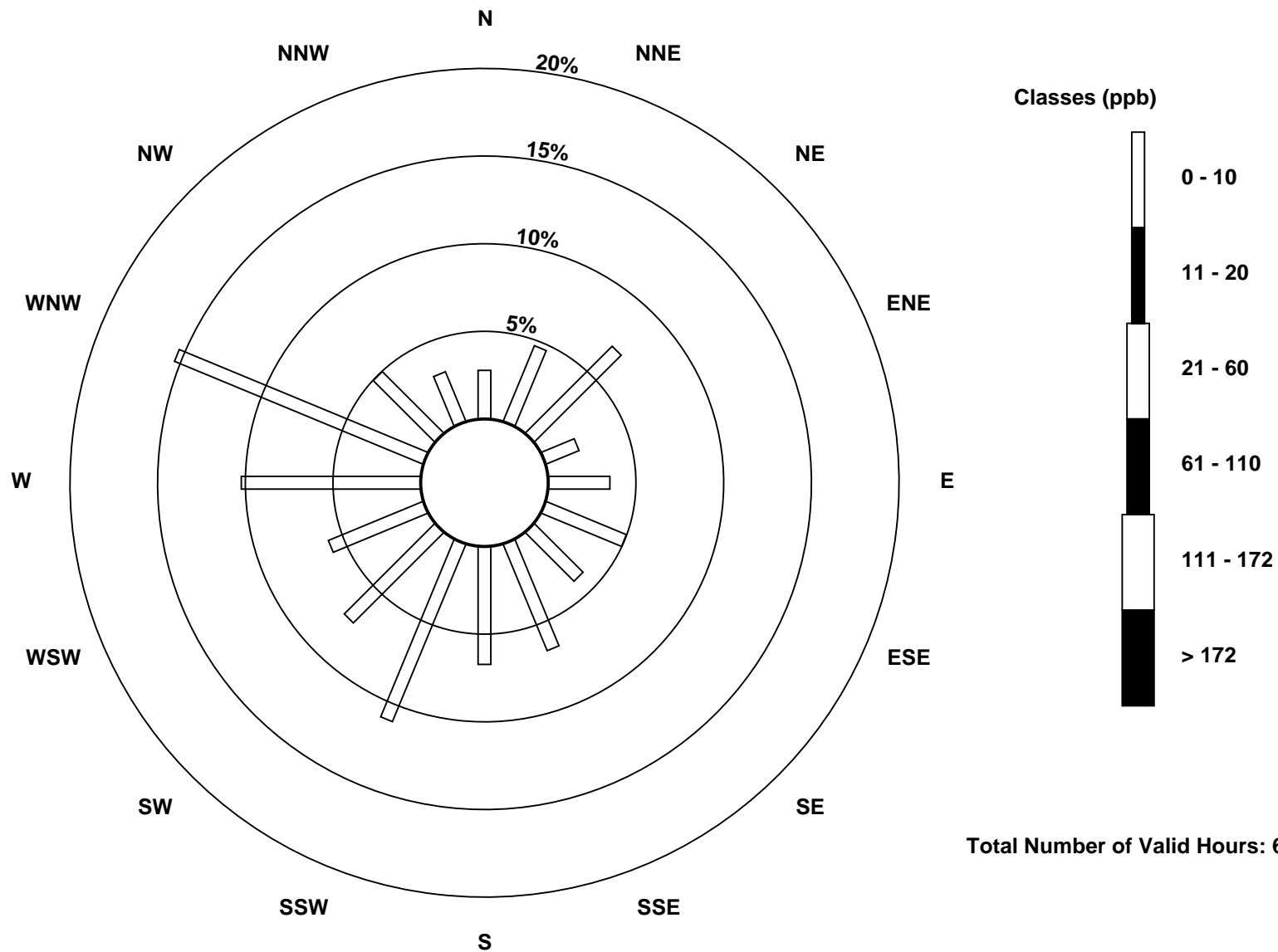
Total Number of Valid Hours: 684

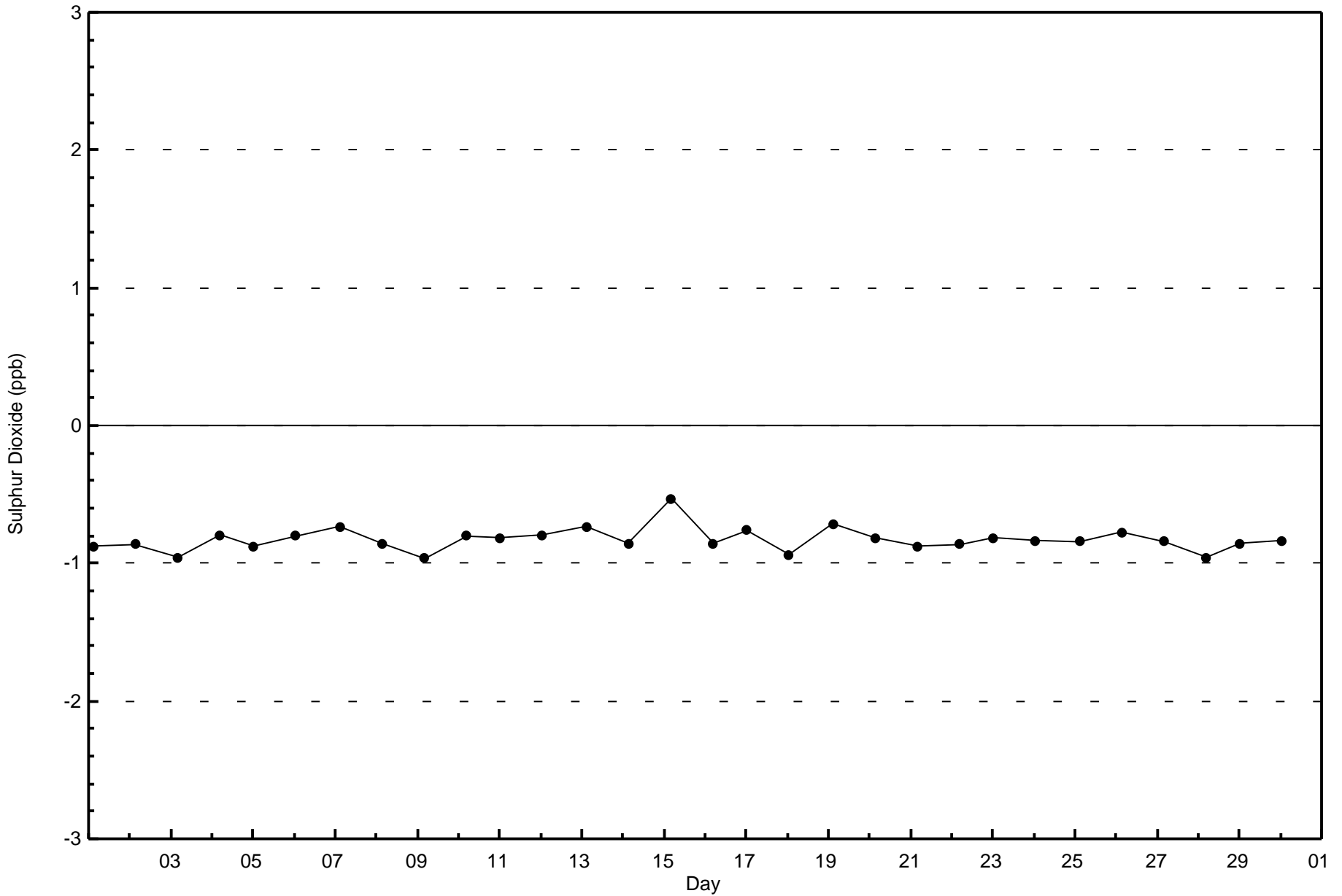
Total Number of Hours: 720

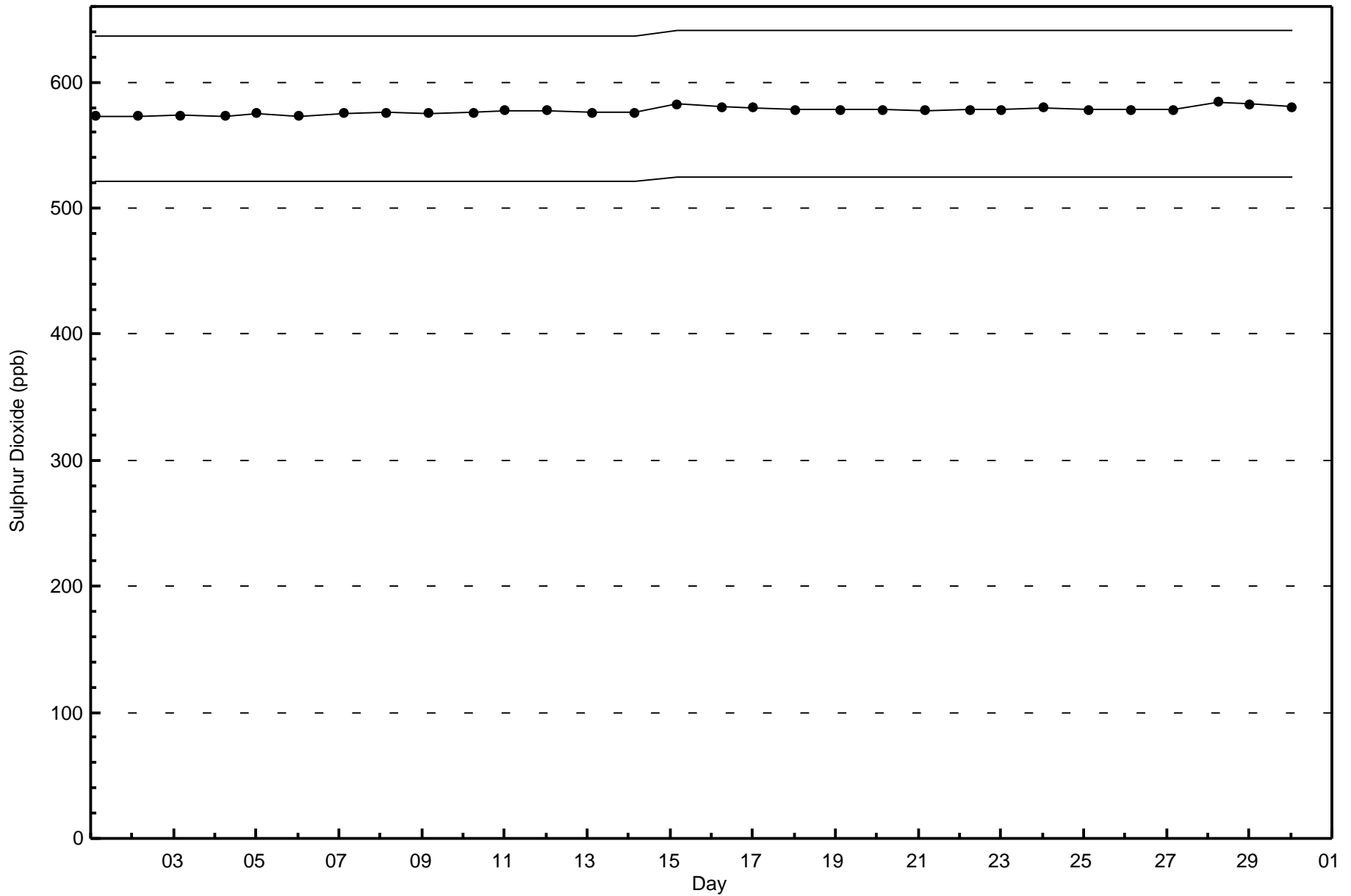


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)







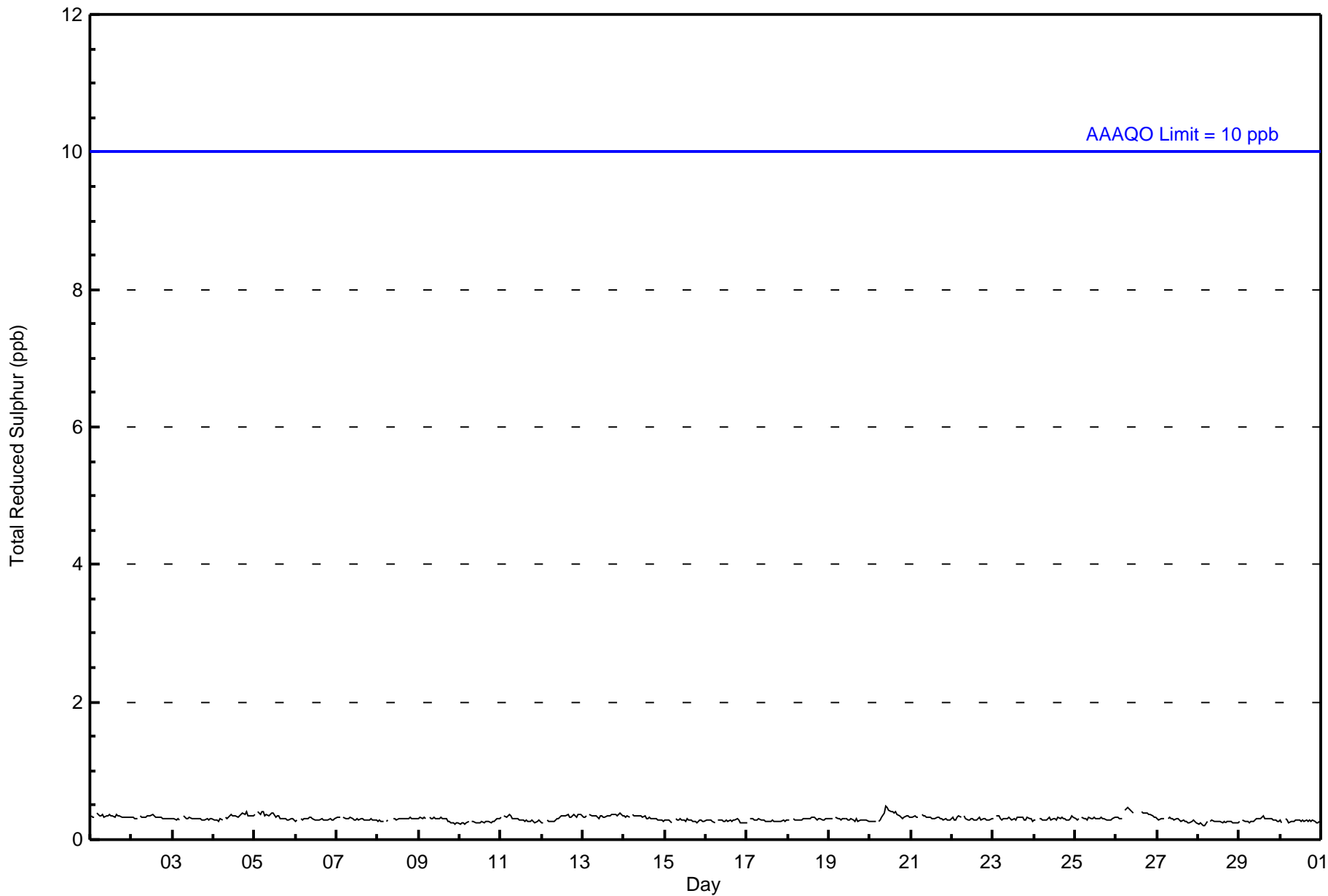


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0 ppb on Jun 20 10:00 Maximum Daily Average: 0.4 ppb on Jun 26																	Hours in Service: 720 Hours of Data: 684 Hours of Missing Data: 36 Hours of Calibration: 34 Percent Operational Time: 99.7									
Minimum Value: 0 ppb on Jun 28 04:00 Minimum Daily Average: 0.3 ppb on Jun 28 Maximum Diurnal Average: 0.3 ppb at hour 10 Minimum Diurnal Average: 0.3 ppb at hour 2 Monthly Average: 0.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
2-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
4-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
6-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Jun	0	0	0	0	Z	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
9-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
10-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
12-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
13-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
15-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
16-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
18-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
20-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
21-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
23-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
24-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Jun	0	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.4	0
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
28-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
30-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	19	32	49	16	24	31	27	43	47	72	53	41	67	108	32	22	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	32	49	16	24	31	27	43	47	72	53	41	67	108	32	22	683

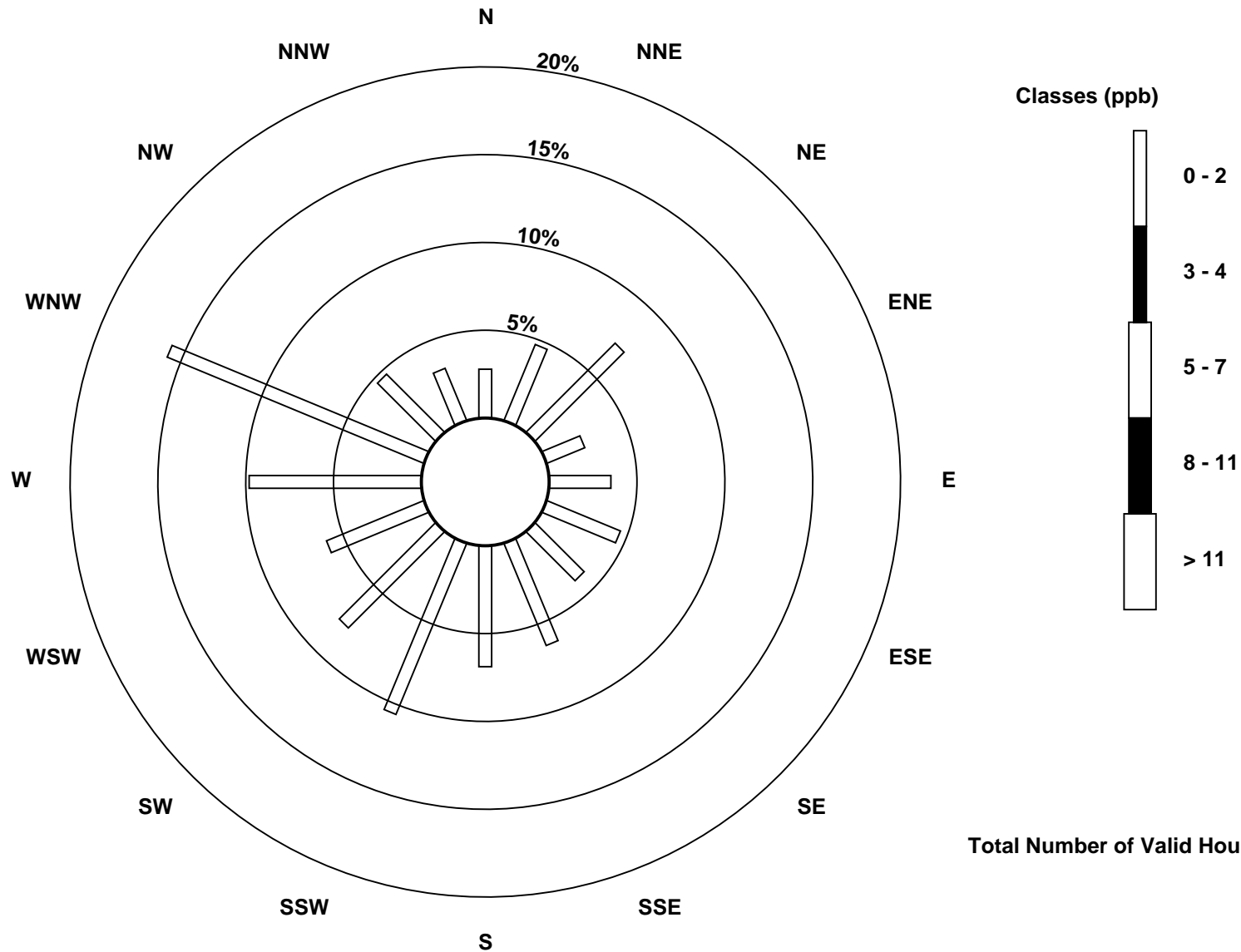
Total Number of Valid Hours: 683

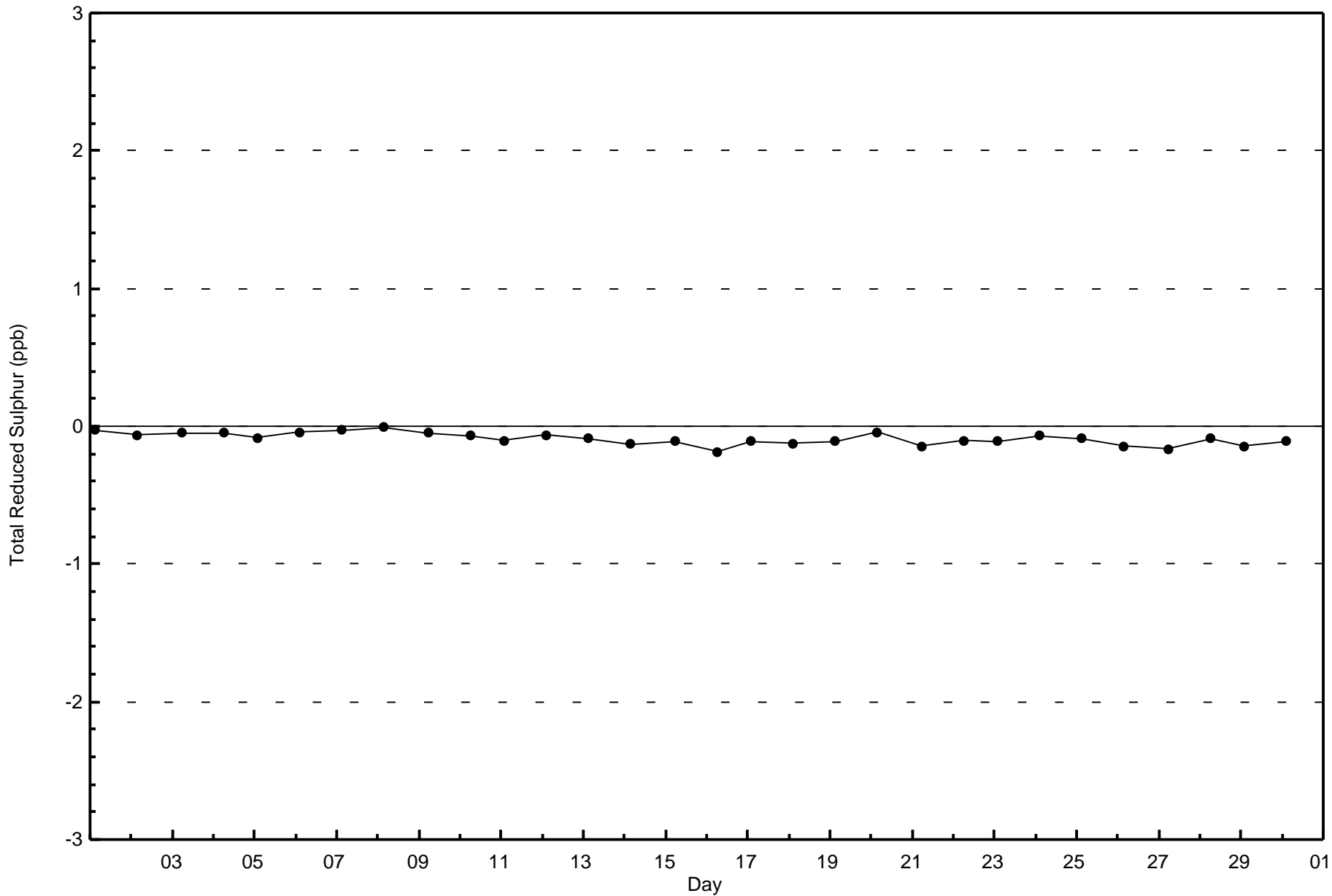
Total Number of Hours: 720

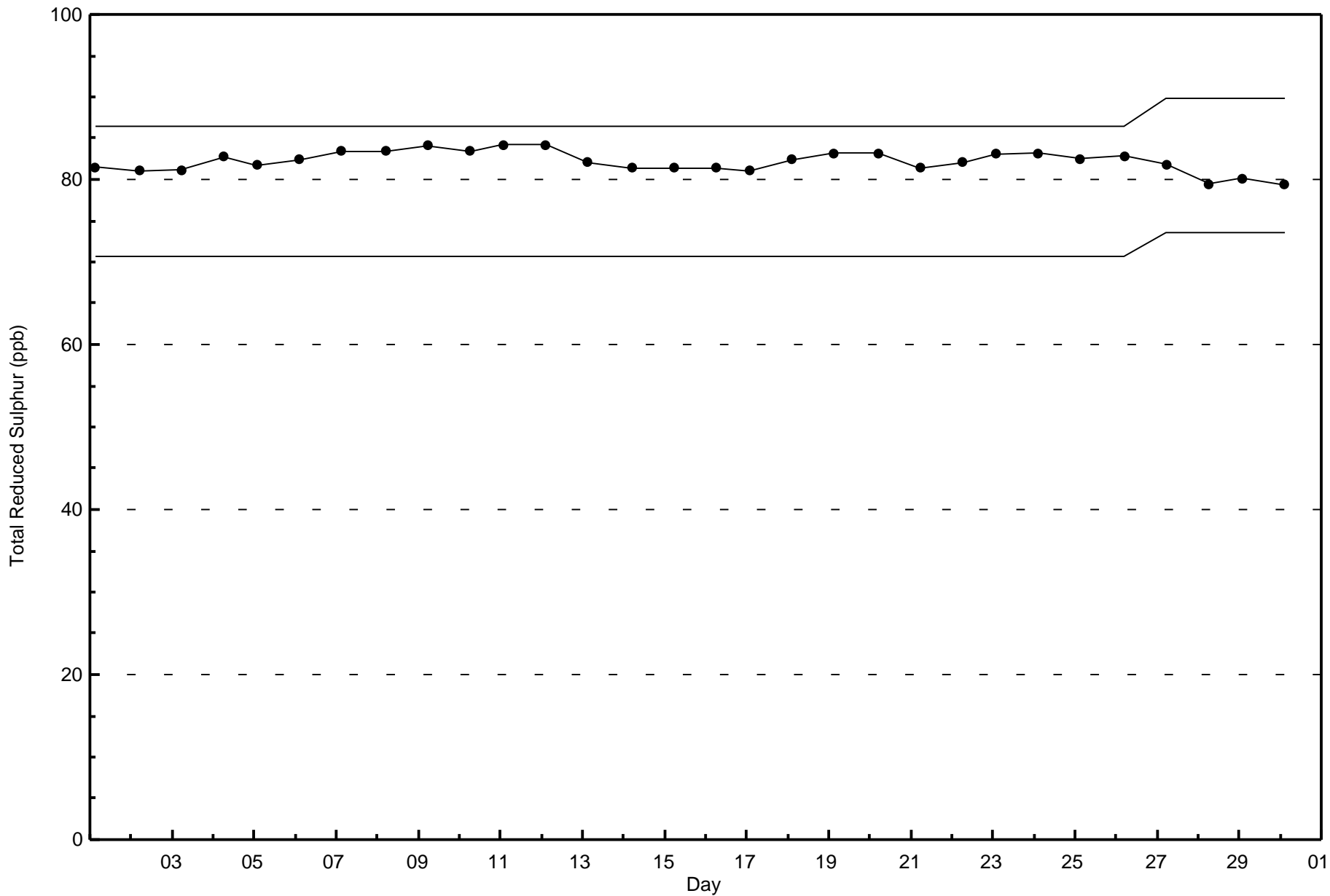


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

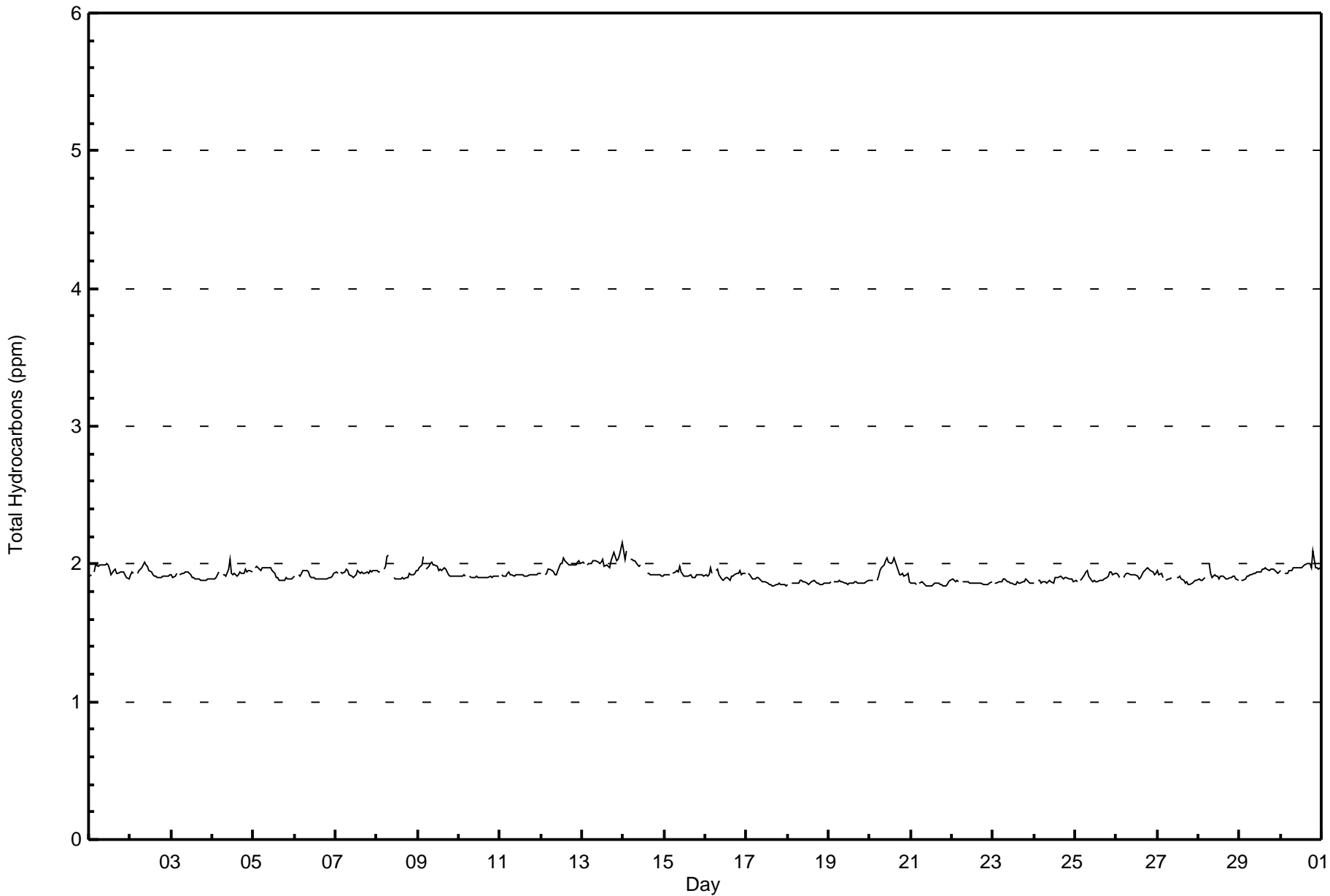
Stony Mountain - June 2017

Maximum Value: 2.2 ppm on Jun 14 00:00		Maximum Daily Average: 2.0 ppm on Jun 13		Hours in Service: 720																							
Minimum Value: 1.8 ppm on Jun 21 10:00		Minimum Daily Average: 1.9 ppm on Jun 21		Hours of Data: 683																							
Maximum Diurnal Average: 1.9 ppm at hour 8		Minimum Diurnal Average: 1.9 ppm at hour 18		Hours of Missing Data: 37																							
Monthly Average: 1.92 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.1		Hours of Calibration: 33																							
				Percent Operational Time: 99.4																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	
2-Jun	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
3-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.0	1.9	1.9	1.9	2.0
5-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
6-Jun	1.9	Z	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
7-Jun	1.9	1.9	Z	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	1.9	2.0	2.0
8-Jun	2.0	1.9	1.9	Z	2.0	2.0	2.1	2.1	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
9-Jun	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
10-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
11-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
12-Jun	1.9	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
13-Jun	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.0	2.2
14-Jun	2.1	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
15-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
16-Jun	1.9	1.9	1.9	2.0	1.9	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9
18-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
19-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
20-Jun	1.9	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0
21-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9
22-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
23-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
24-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
25-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
26-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	M	M	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
28-Jun	1.9	1.9	1.9	1.9	1.9	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
29-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0
30-Jun	2.0	Z	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	674	98.68	98.68
2.1 - 3.0	9	1.32	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	31	46	16	23	32	25	45	46	75	50	40	68	104	33	21	673
2.1 - 3.0	1	1	2	0	1	1	1	0	0	0	0	0	0	1	1	0	9
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	32	48	16	24	33	26	45	46	75	50	40	68	105	34	21	682

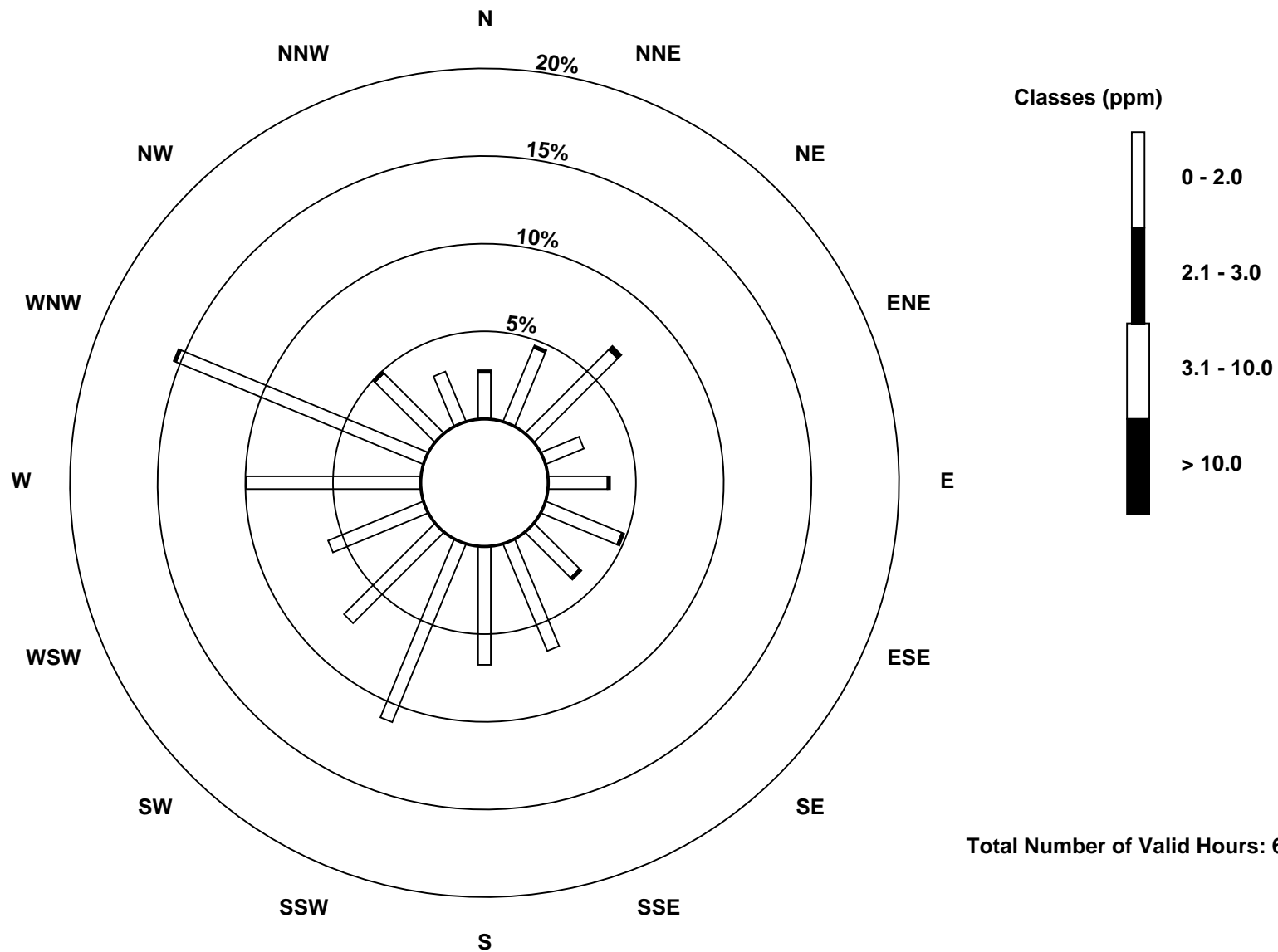
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)

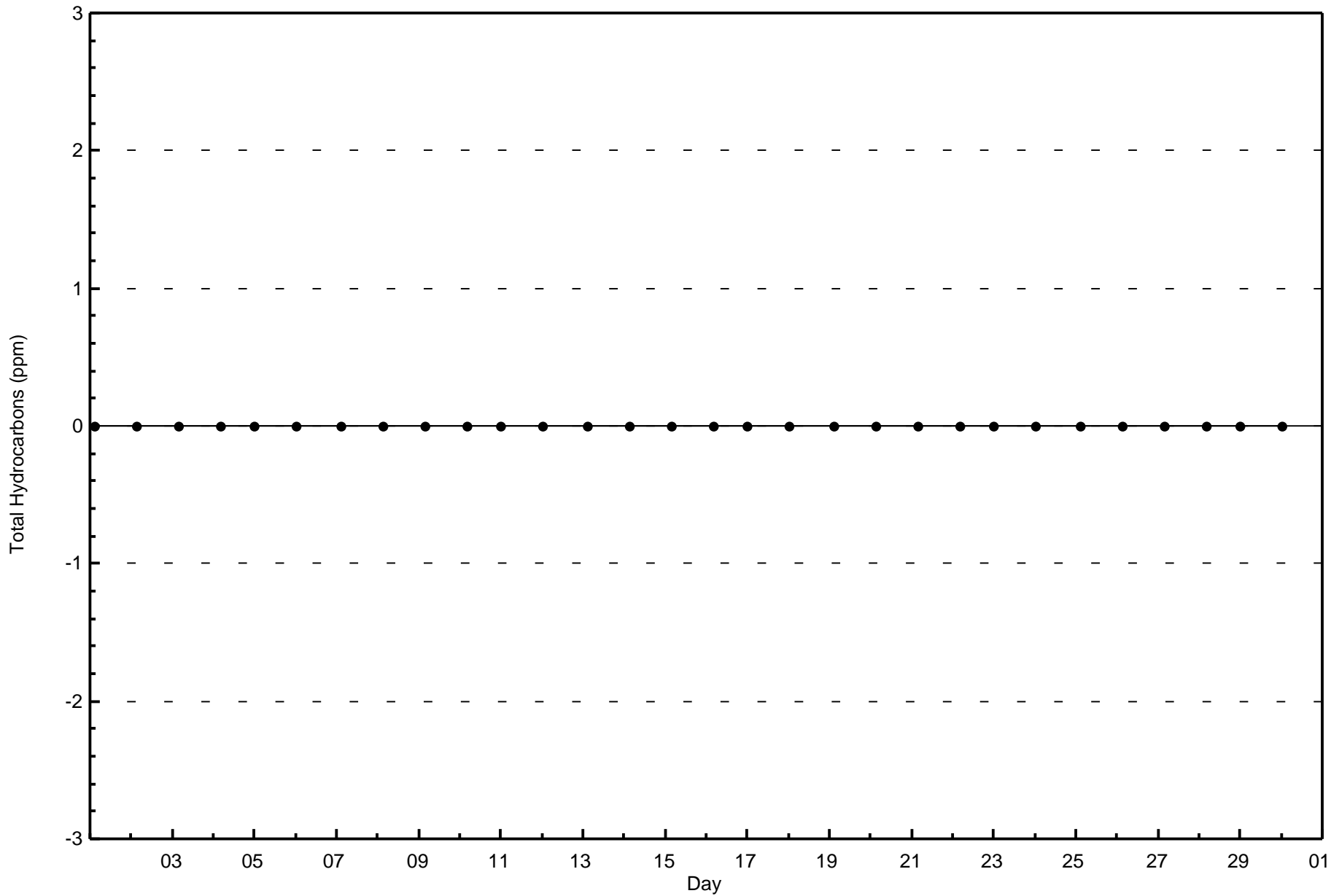


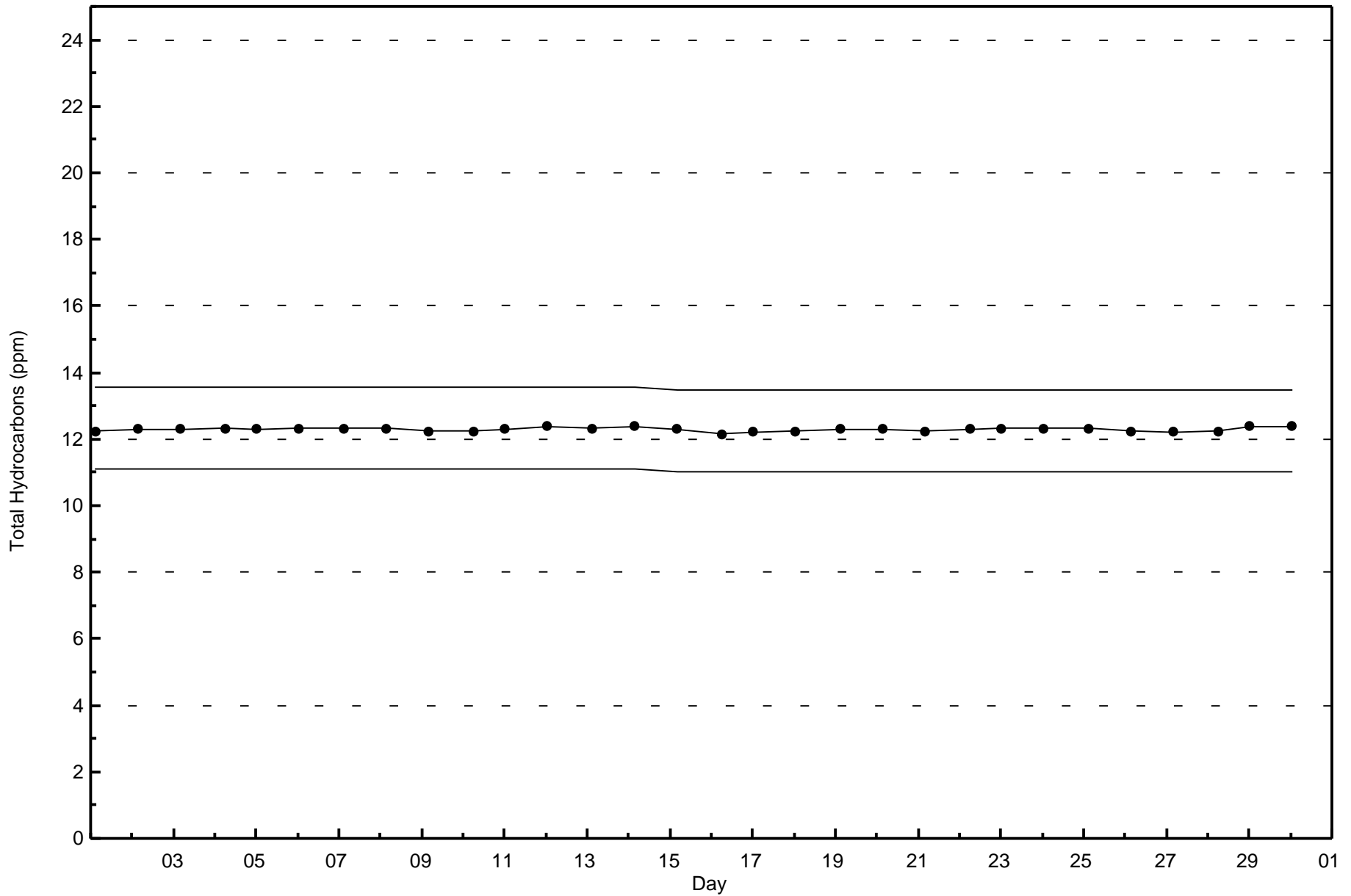
Total Number of Valid Hours: 682



Wood Buffalo Environmental Association
Zero Responses

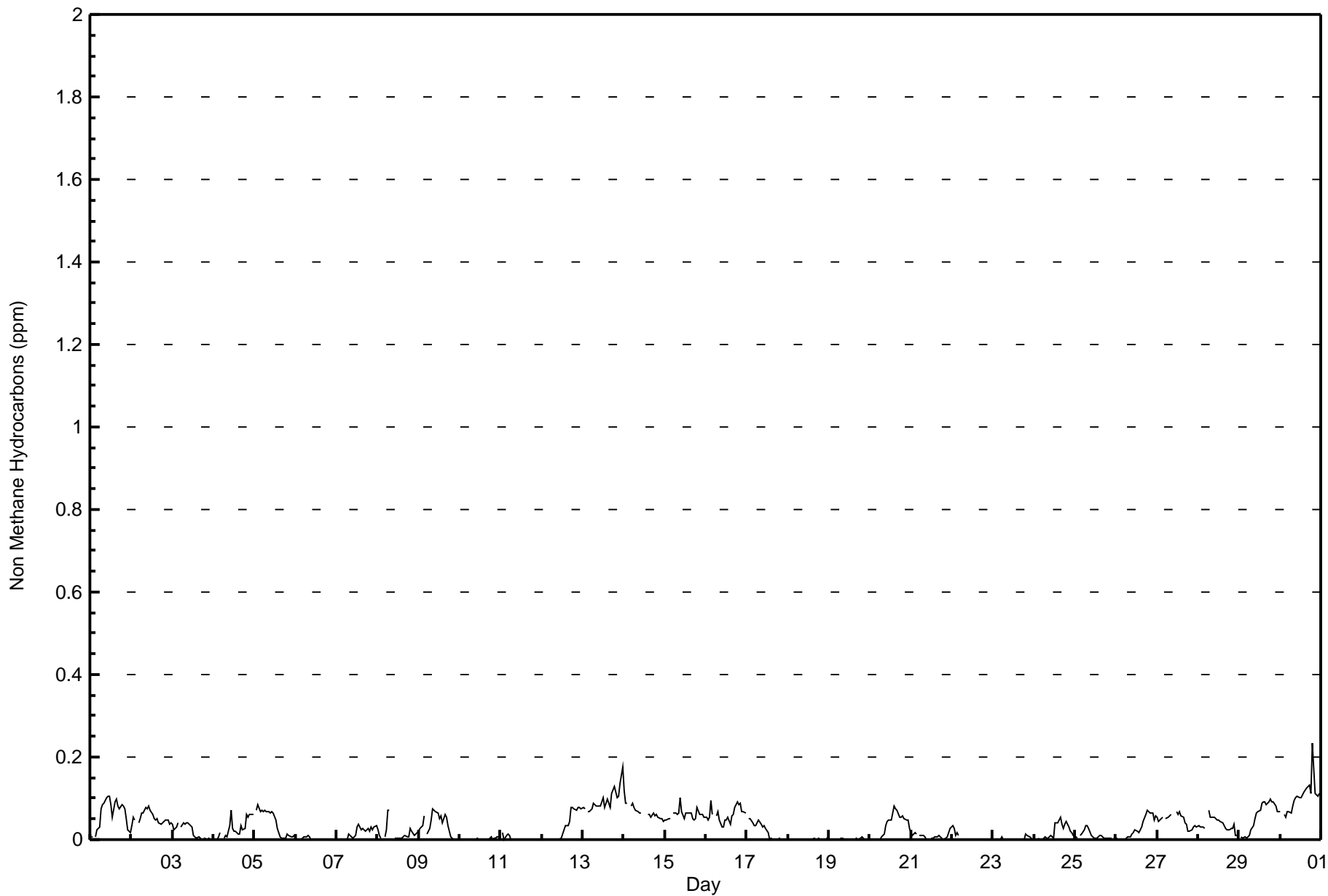
Total Hydrocarbons (THC) - ppm
Stony Mountain - June 2017







Maximum Value: 0.235 ppm on Jun 30 20:00		Maximum Daily Average: 0.103 ppm on Jun 30		Hours in Service:	720																																												
Minimum Value: 0.000 ppm on Jun 4 03:00		Minimum Daily Average: 0.001 ppm on Jun 18		Hours of Data:	683																																												
Maximum Diurnal Average: 0.042 ppm at hour 20		Minimum Diurnal Average: 0.022 ppm at hour 5		Hours of Missing Data:	37																																												
Monthly Average: 0.032 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.1		Hours of Calibration:	33																																												
				Percent Operational Time:	99.4																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	0.008	0.007	Z	0.007	0.025	0.031	0.075	0.086	0.087	0.101	0.106	0.104	0.084	0.055	0.091	0.100	0.082	0.074	0.084	0.083	0.075	0.051	0.025	0.015	0.063	0.106																							
2-Jun	0.036	0.053	0.047	Z	0.041	0.051	0.064	0.066	0.078	0.076	0.082	0.070	0.060	0.052	0.046	0.050	0.040	0.038	0.040	0.045	0.047	0.046	0.039	0.040	0.052	0.082																							
3-Jun	0.036	0.024	0.031	0.041	Z	0.032	0.041	0.036	0.040	0.042	0.036	0.029	0.011	0.005	0.004	0.007	0.002	0.002	0.000	0.002	0.001	0.004	0.002	0.001	0.019	0.042																							
4-Jun	0.001	0.001	0.000	0.008	0.017	Z	0.004	0.009	0.007	0.033	0.072	0.028	0.022	0.021	0.012	0.015	0.032	0.025	0.027	0.059	0.053	0.062	0.063	0.062	0.028	0.072																							
5-Jun	Z	0.071	0.084	0.068	0.073	0.068	0.070	0.068	0.068	0.065	0.067	0.064	0.046	0.029	0.018	0.007	0.002	0.003	0.003	0.015	0.011	0.006	0.007	0.009	0.040	0.084																							
6-Jun	0.004	Z	0.002	0.001	0.003	0.007	0.007	0.009	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.009																							
7-Jun	0.000	0.001	Z	0.000	0.000	0.001	0.002	0.013	0.011	0.005	0.008	0.011	0.029	0.038	0.025	0.027	0.025	0.019	0.028	0.021	0.032	0.023	0.032	0.032	0.017	0.038																							
8-Jun	0.025	0.010	0.002	Z	0.007	0.025	0.070	0.070	M	M	0.002	0.003	0.003	0.002	0.004	0.008	0.009	0.007	0.006	0.028	0.022	0.009	0.014	0.018	0.016	0.070																							
9-Jun	0.022	0.026	0.032	0.058	Z	0.015	0.027	0.047	0.073	0.072	0.066	0.065	0.049	0.057	0.040	0.061	0.054	0.035	0.020	0.007	0.000	0.000	0.000	0.000	0.036	0.073																							
10-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.003	0.003	0.008	0.008	0.001	0.008																							
11-Jun	Z	0.018	0.002	0.011	0.012	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.018																							
12-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.015	0.023	0.033	0.035	0.045	0.077	0.076	0.075	0.070	0.079	0.080	0.074	0.030	0.080																							
13-Jun	0.079	0.074	Z	0.066	0.069	0.073	0.089	0.084	0.080	0.081	0.082	0.091	0.102	0.079	0.098	0.088	0.079	0.111	0.129	0.117	0.103	0.106	0.135	0.178	0.095	0.178																							
14-Jun	0.120	0.089	0.089	Z	0.083	0.087	0.078	0.071	0.068	0.064	0.064	0.064	C	C	C	0.063	0.060	0.056	0.063	0.058	0.060	0.054	0.052	0.050	0.043	0.120																							
15-Jun	0.047	0.049	0.050	0.051	Z	0.065	0.064	0.062	0.065	0.100	0.067	0.050	0.064	0.066	0.064	0.065	0.049	0.049	0.051	0.078	0.059	0.062	0.060	0.055	0.060	0.100																							
16-Jun	0.054	0.048	0.056	0.096	0.061	Z	0.058	0.067	0.047	0.031	0.030	0.046	0.047	0.053	0.039	0.058	0.062	0.079	0.092	0.086	0.089	0.067	0.067	0.063	0.061	0.096																							
17-Jun	Z	0.052	0.050	0.040	0.035	0.033	0.040	0.048	0.037	0.032	0.033	0.026	0.016	0.002	0.003	0.001	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.020	0.052																							
18-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.001	0.001	0.002	0.001	0.000	0.000	0.000	0.003	0.001	0.003																							
19-Jun	0.000	0.000	Z	0.001	0.000	0.001	0.002	0.002	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.004	0.001	0.005	0.006	0.002	0.001	0.001	0.000	0.001	0.006																							
20-Jun	0.000	0.000	0.000	Z	0.001	0.001	0.001	0.006	0.013	0.035	0.045	0.046	0.049	0.065	0.083	0.075	0.070	0.054	0.056	0.057	0.050	0.047	0.048	0.027	0.036	0.083																							
21-Jun	0.017	0.012	0.016	0.015	Z	0.009	0.010	0.010	0.005	0.001	0.001	0.000	0.004	0.003	0.008	0.007	0.010	0.007	0.004	0.001	0.003	0.007	0.016	0.028	0.008	0.028																							
22-Jun	0.034	0.027	0.009	0.017	0.011	Z	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.034																							
23-Jun	Z	0.000	0.000	0.000	0.000	0.006	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.014	0.011	0.011	0.006	0.004	0.001	0.002	0.014																							
24-Jun	0.001	Z	0.002	0.001	0.000	0.001	0.005	0.002	0.003	0.007	0.010	0.004	0.040	0.042	0.041	0.054	0.036	0.027	0.036	0.043	0.030	0.021	0.019	0.010	0.019	0.054																							
25-Jun	0.006	0.004	Z	0.012	0.013	0.023	0.034	0.033	0.026	0.009	0.006	0.002	0.002	0.003	0.009	0.012	0.008	0.004	0.002	0.004	0.005	0.004	0.002	0.004	0.010	0.034																							
26-Jun	0.002	0.001	0.001	Z	0.000	0.001	0.003	0.006	0.007	0.013	0.017	0.023	0.020	0.016	0.023	0.032	0.045	0.061	0.072	0.069	0.065	0.064	0.049	0.057	0.028	0.072																							
27-Jun	0.056	0.043	0.051	0.055	Z	0.050	0.054	0.057	0.060	M	M	0.066	0.060	0.069	0.056	0.053	0.040	0.039	0.019	0.019	0.023	0.031	0.034	0.031	0.046	0.069																							
28-Jun	0.034	0.029	0.030	0.032	0.029	Z	0.072	0.054	0.053	0.056	0.050	0.047	0.047	0.044	0.042	0.032	0.027	0.022	0.024	0.027	0.028	0.036	0.011	0.009	0.036	0.072																							
29-Jun	Z	0.007	0.003	0.006	0.003	0.005	0.012	0.023	0.033	0.051	0.063	0.066	0.071	0.088	0.092	0.092	0.083	0.092	0.099	0.093	0.092	0.081	0.068	0.067	0.056	0.099																							
30-Jun	0.068	Z	0.060	0.055	0.068	0.069	0.066	0.083	0.094	0.101	0.104	0.101	0.101	0.110	0.115	0.127	0.128	0.133	0.113	0.235	0.113	0.110	0.105	0.111	0.103	0.235																							
																								0.026	0.026	0.025	0.026	0.022	0.026	0.032	0.034	0.033	0.035	0.035	0.033	0.032	0.032	0.034	0.036	0.033	0.034	0.035	0.042	0.035	0.033	0.031	0.032	Diurnal Average	
																								0.120	0.089	0.089	0.096	0.083	0.087	0.089	0.086	0.094	0.101	0.106	0.104	0.102	0.110	0.115	0.127	0.128	0.133	0.129	0.235	0.113	0.110	0.135	0.178	Diurnal Maximum	
Z - zerspan		C - Calibration				M - Maintenance																																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	240	35.14	35.14
0.006 - 0.05	264	38.65	73.79
0.06 - 0.1	177	25.92	99.71
> 0.1	2	0.29	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	5	10	16	2	1	2	4	8	18	33	24	22	25	46	17	7	240
0.006 - 0.05	9	6	20	9	18	22	10	23	18	27	12	9	30	38	6	6	263
0.06 - 0.1	5	15	12	5	5	9	12	14	10	15	14	9	13	20	11	8	177
> 0.1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
Totals	19	32	48	16	24	33	26	45	46	75	50	40	68	105	34	21	682

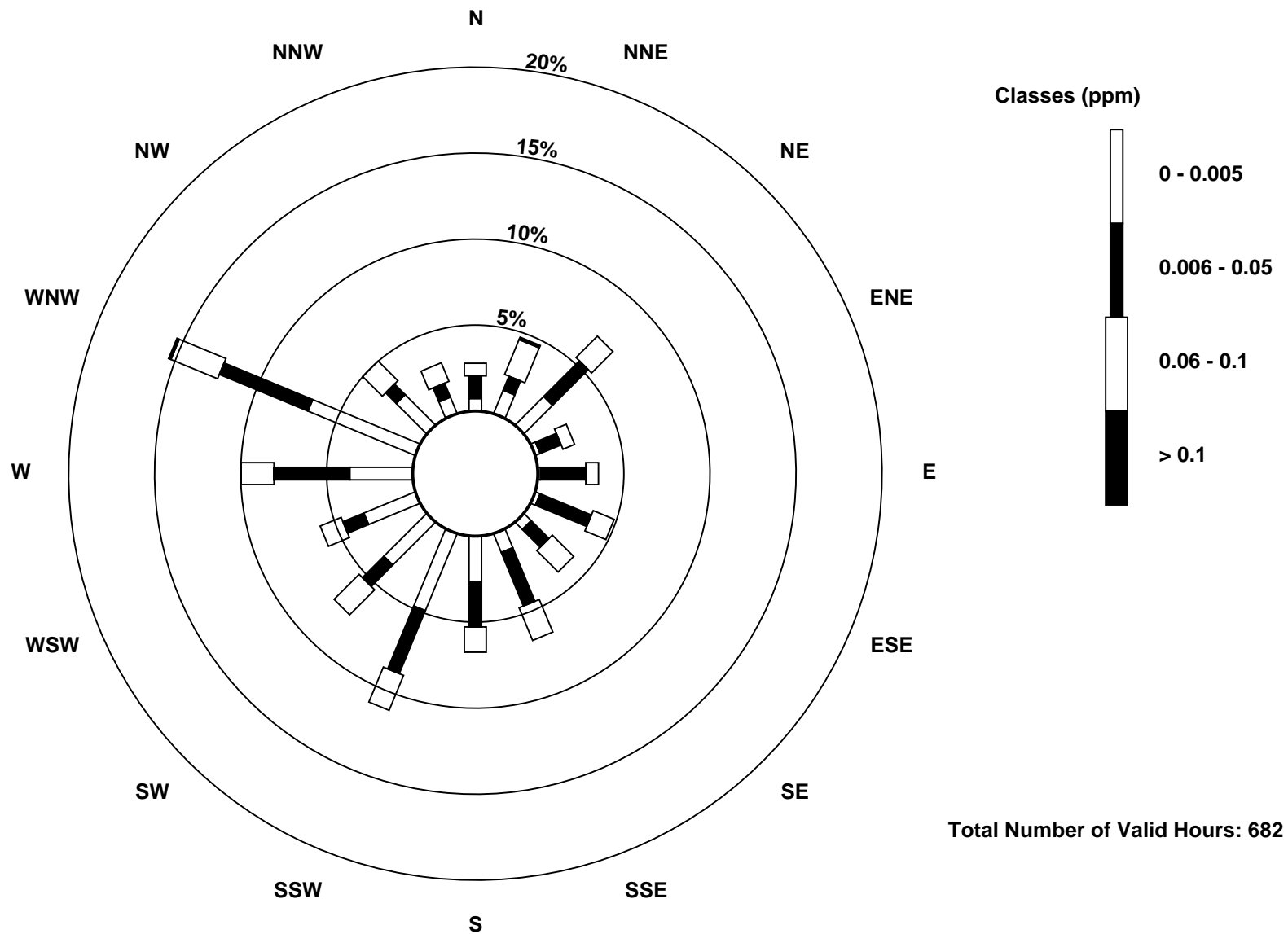
Total Number of Valid Hours: 682

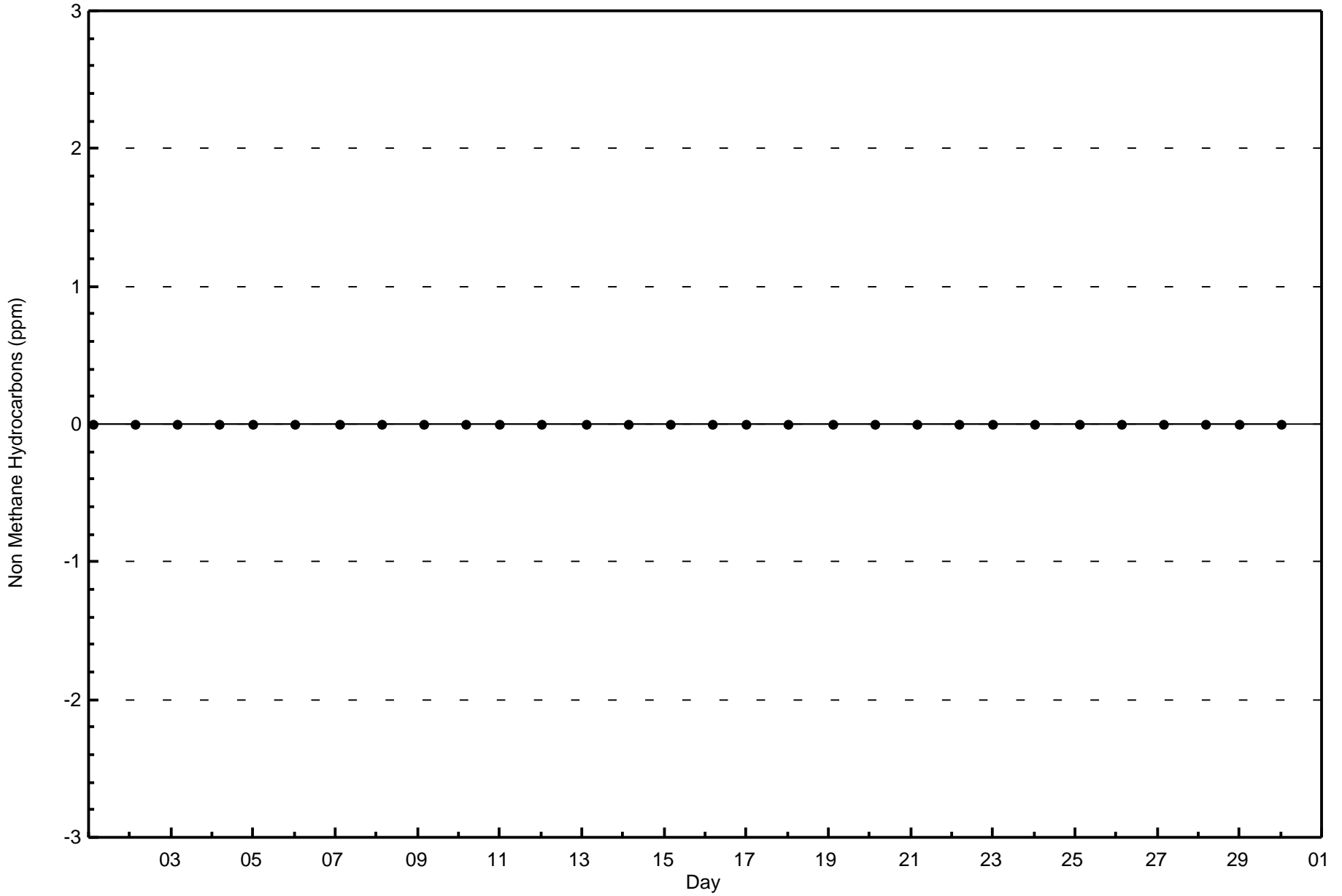
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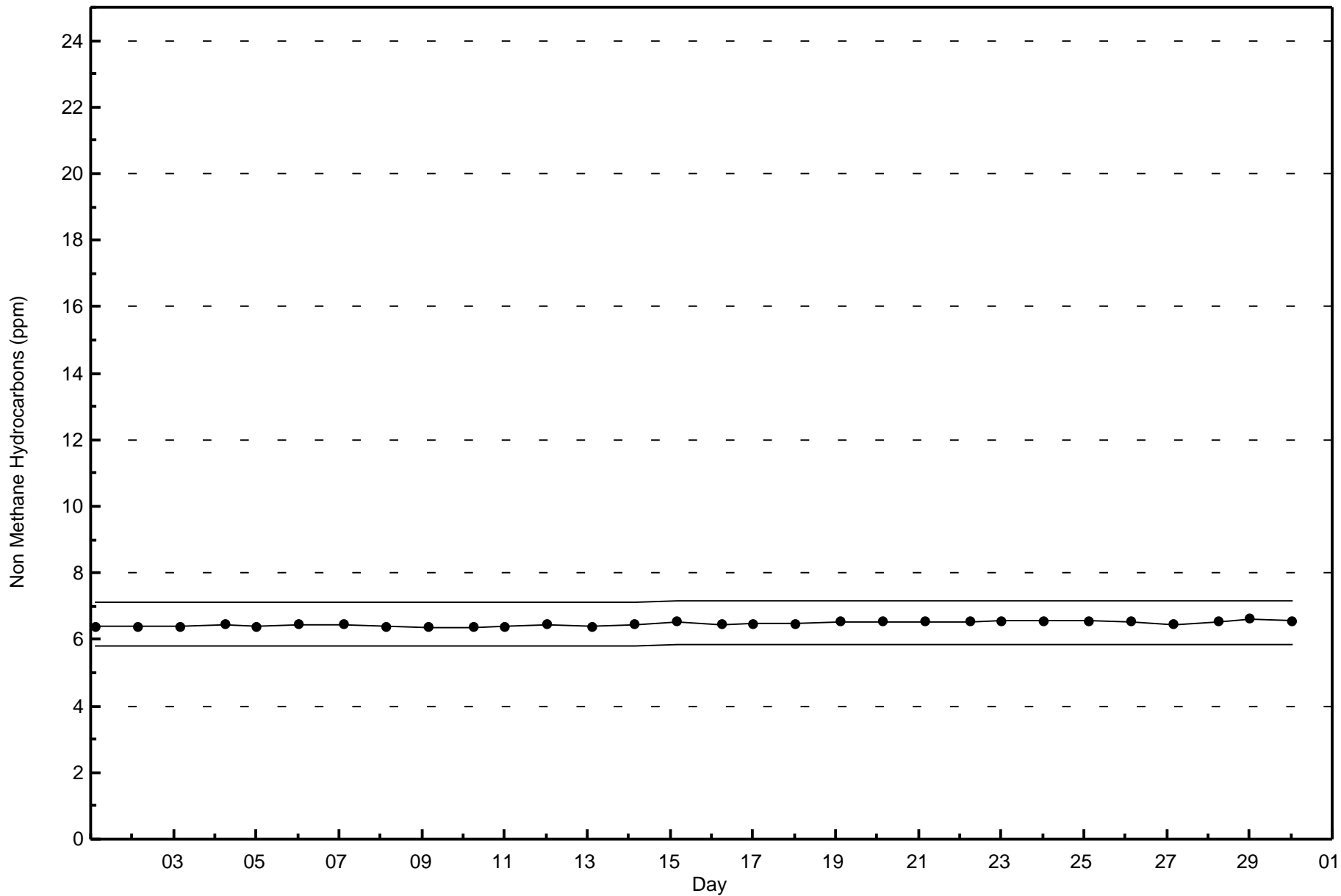


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain (AMS 18)



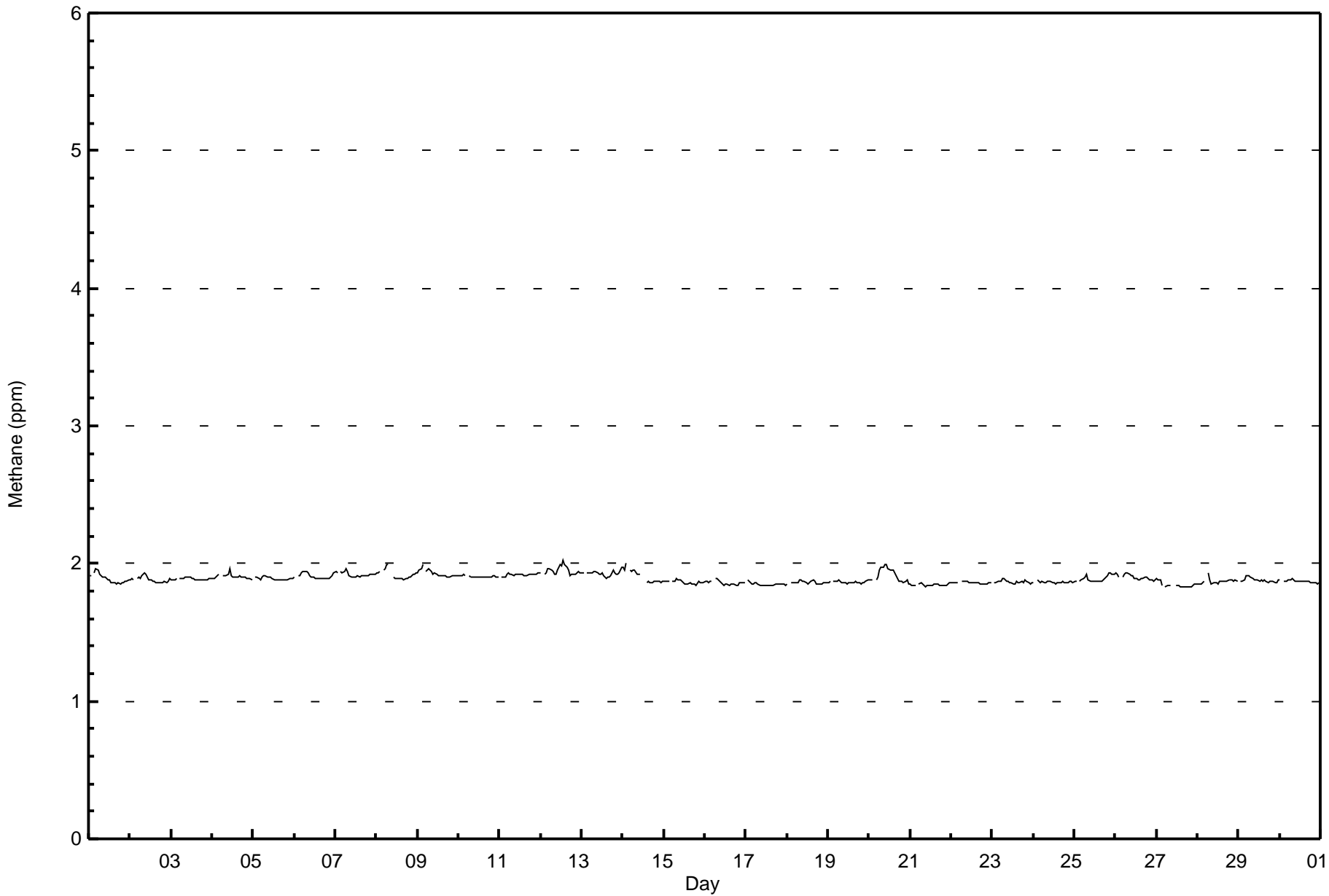






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	683	100.00	100.00
2.1 - 3.0	0	0.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	32	48	16	24	33	26	45	46	75	50	40	68	105	34	21	682
2.1 - 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	32	48	16	24	33	26	45	46	75	50	40	68	105	34	21	682

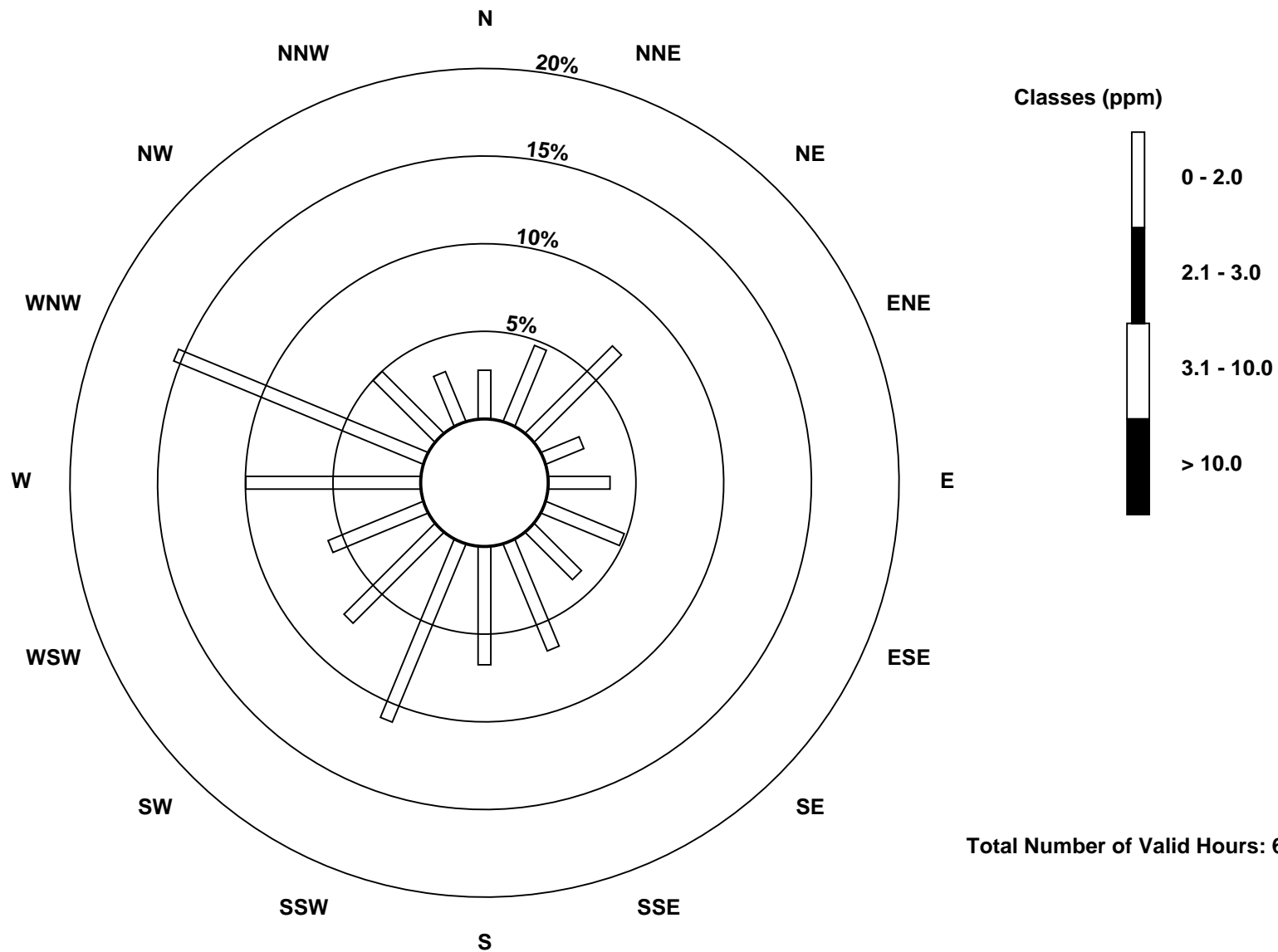
Total Number of Valid Hours: 682

Total Number of Hours: 720

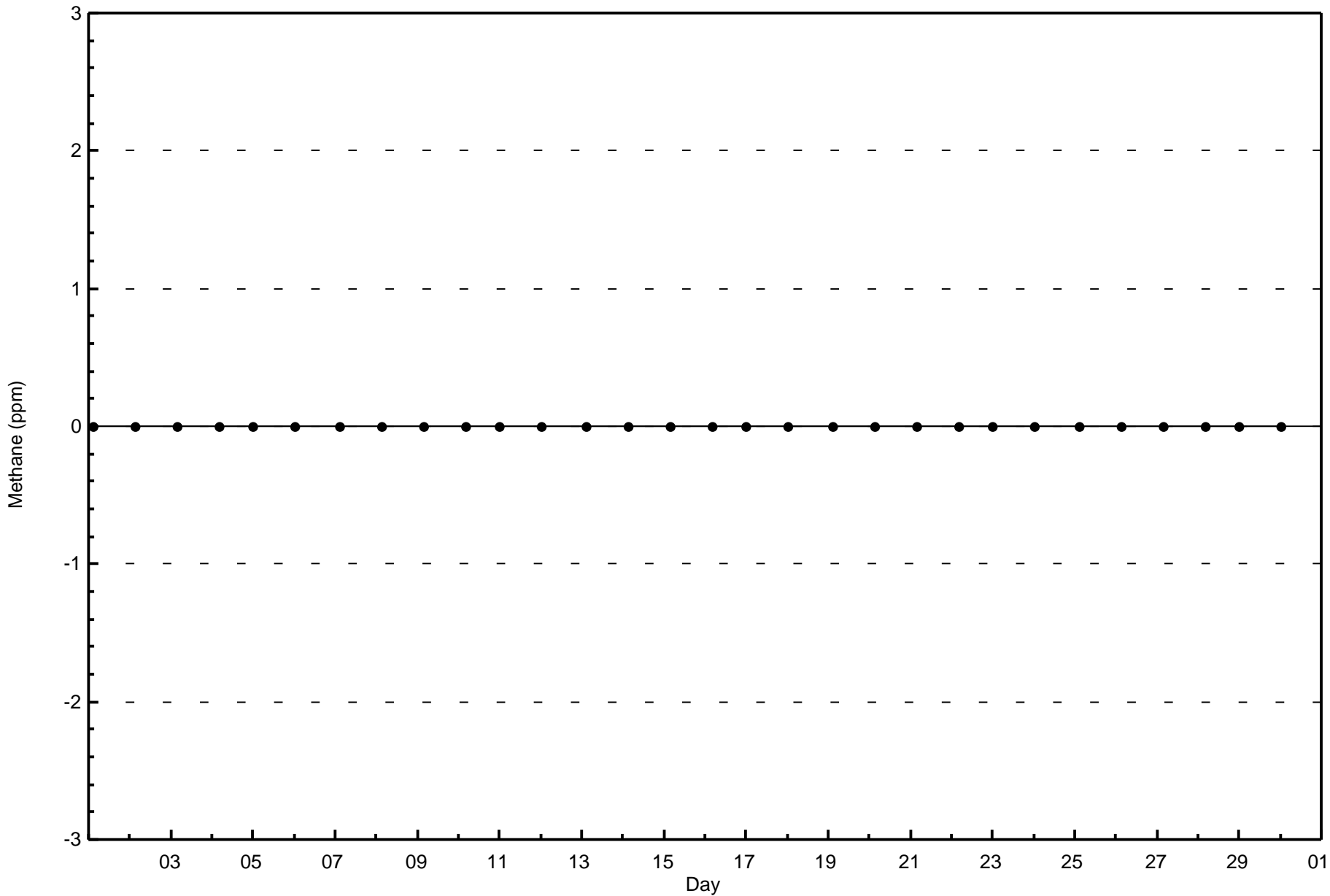


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Stony Mountain (AMS 18)



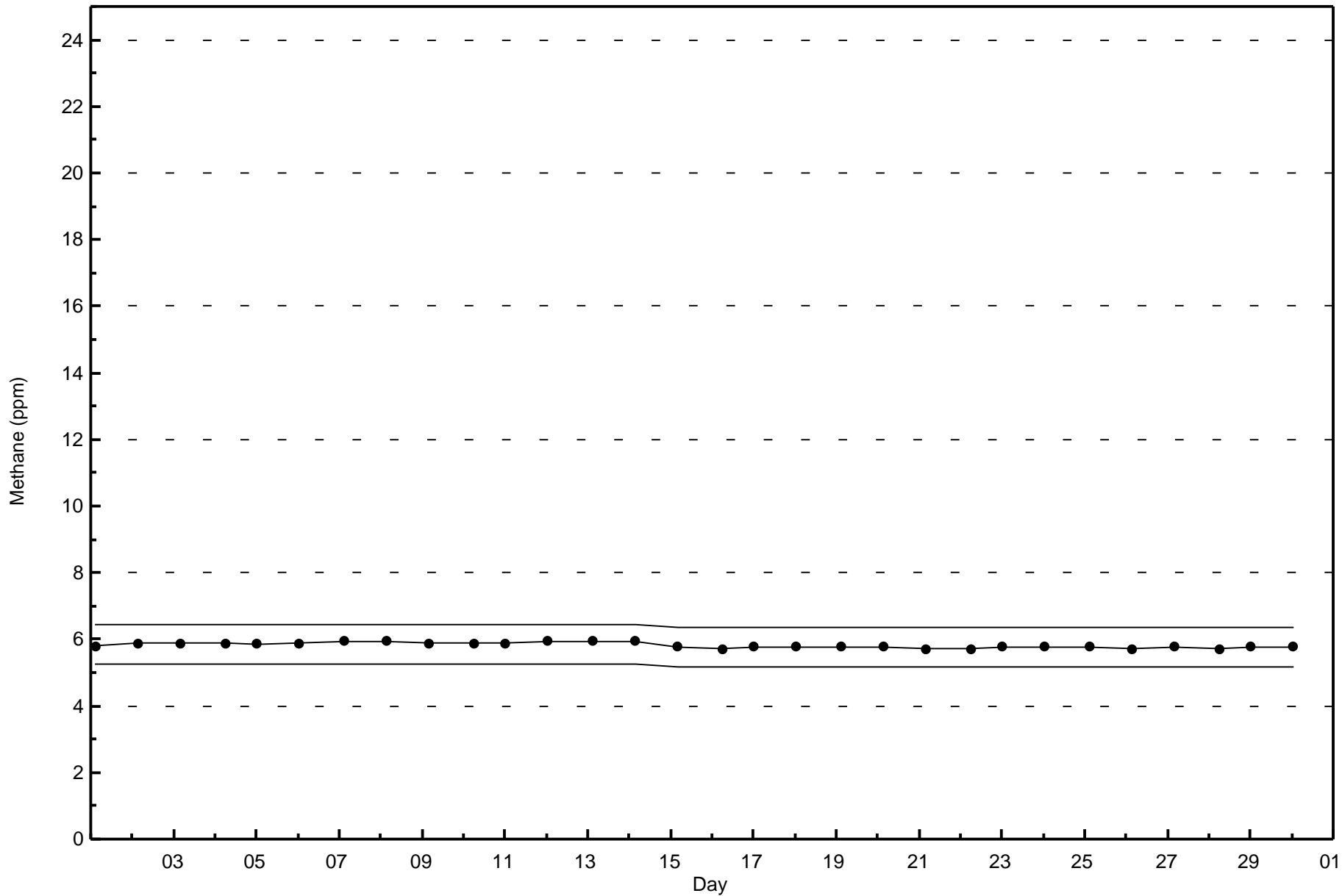
Total Number of Valid Hours: 682





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

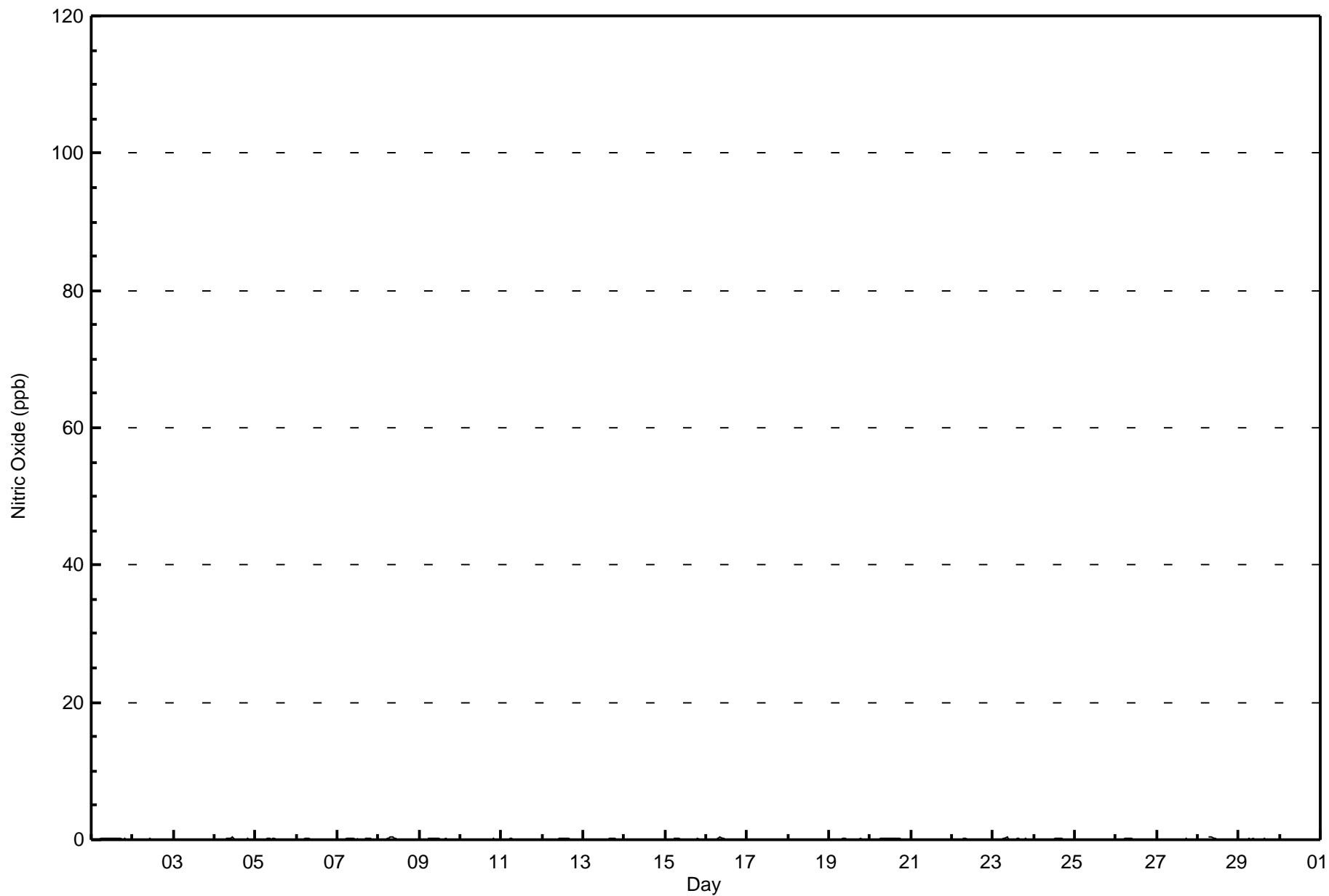
Nitric Oxide (NO) - ppb
Stony Mountain - June 2017

Maximum Value: 1 ppb on Jun 28 07:00		Maximum Daily Average: 0.1 ppb on Jun 20		Hours in Service: 720																																												
Minimum Value: 0 ppb on Jun 14 21:00		Minimum Daily Average: 0.0 ppb on Jun 3		Hours of Data: 681																																												
Maximum Diurnal Average: 0.1 ppb at hour 9		Minimum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 39																																												
Monthly Average: 0.1 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0		Hours of Calibration: 36																																												
				Percent Operational Time: 99.6																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0.1	0																						
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
17-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																						
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
27-Jun	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0																						
28-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
29-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																						
																								0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	Diurnal Average
																								0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Stony Mountain - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



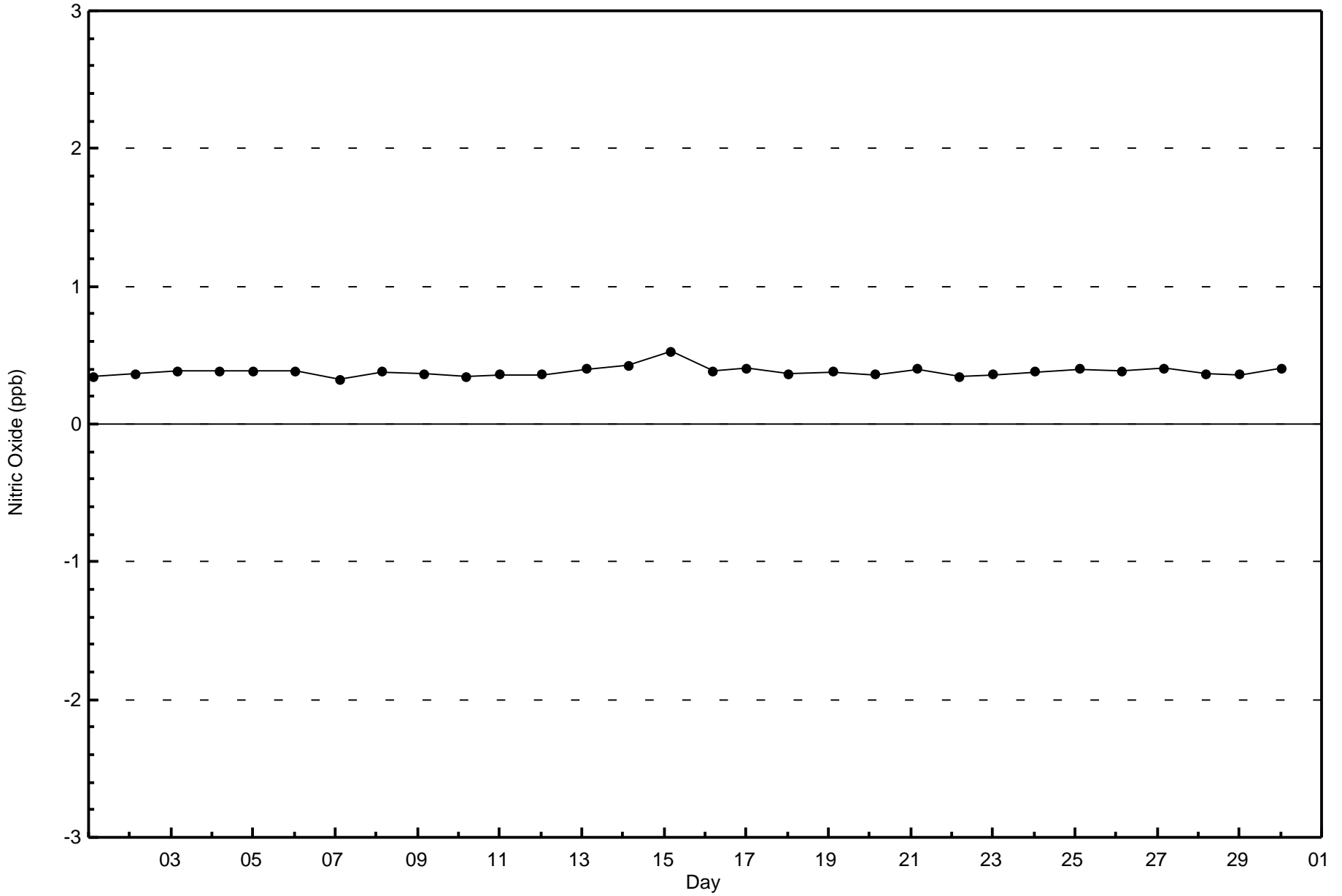
**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680

Total Number of Valid Hours: 680

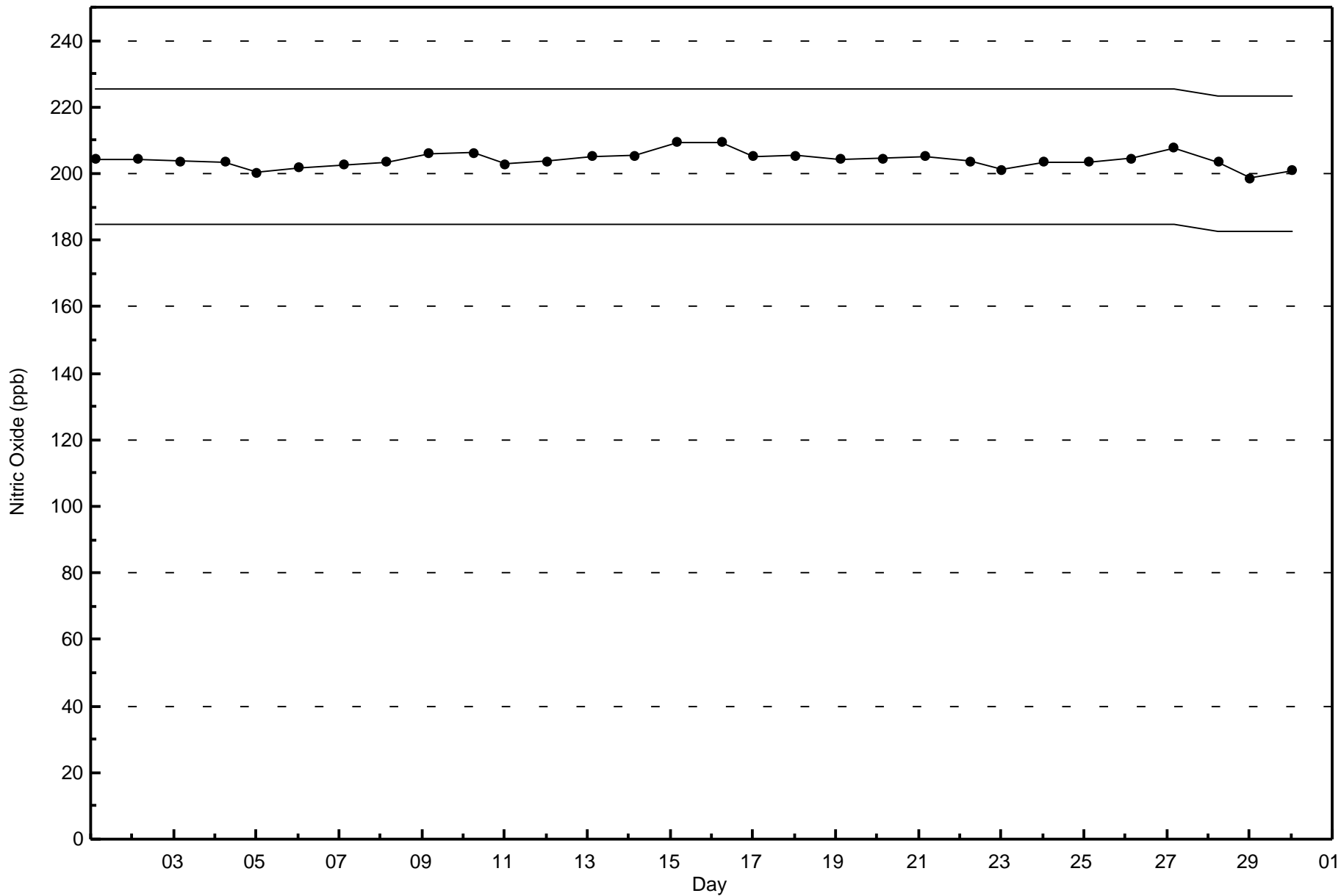
Total Number of Hours: 720





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Jun 13 00:00	Maximum Daily Average: 1.2 ppb on Jun 8		Hours of Data:	681
Minimum Value: 0 ppb on Jun 10 09:00	Minimum Daily Average: 0.2 ppb on Jun 10		Hours of Missing Data:	39
Maximum Diurnal Average: 0.9 ppb at hour 1	Minimum Diurnal Average: 0.5 ppb at hour 14		Hours of Calibration:	36
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2	2	Z	2	2	1	1	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0.9	2	
2-Jun	0	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1	
4-Jun	1	1	2	1	1	Z	1	1	1	2	3	1	1	1	1	1	1	1	1	1	3	1	1	1	1.1	3	
5-Jun	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	0.8	2	
6-Jun	1	Z	1	1	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1	
7-Jun	1	1	Z	2	2	1	2	1	1	1	1	1	1	M	M	M	1	1	1	1	1	1	1	1	1.1	2	
8-Jun	1	1	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.2	2	
9-Jun	3	2	2	2	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.9	3	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
11-Jun	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
12-Jun	1	Z	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	3	0.9	3	
13-Jun	2	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1.1	2	
14-Jun	2	1	2	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.6	2	
15-Jun	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0.5	1	
16-Jun	0	1	1	1	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0.6	1	
17-Jun	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
18-Jun	0	Z	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1	
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0.4	1	
20-Jun	1	1	1	Z	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2	
21-Jun	1	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1	
22-Jun	1	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
23-Jun	Z	0	1	1	1	0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0.6	1	
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.4	1	
25-Jun	1	1	Z	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1	1	1	1	2	0.7	2	
26-Jun	2	1	1	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1.2	2
27-Jun	2	2	1	1	Z	1	1	1	0	C	C	C	C	C	C	0	0	1	0	0	0	0	0	0	--	2	
28-Jun	0	0	0	0	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
29-Jun	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
30-Jun	0	Z	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1	

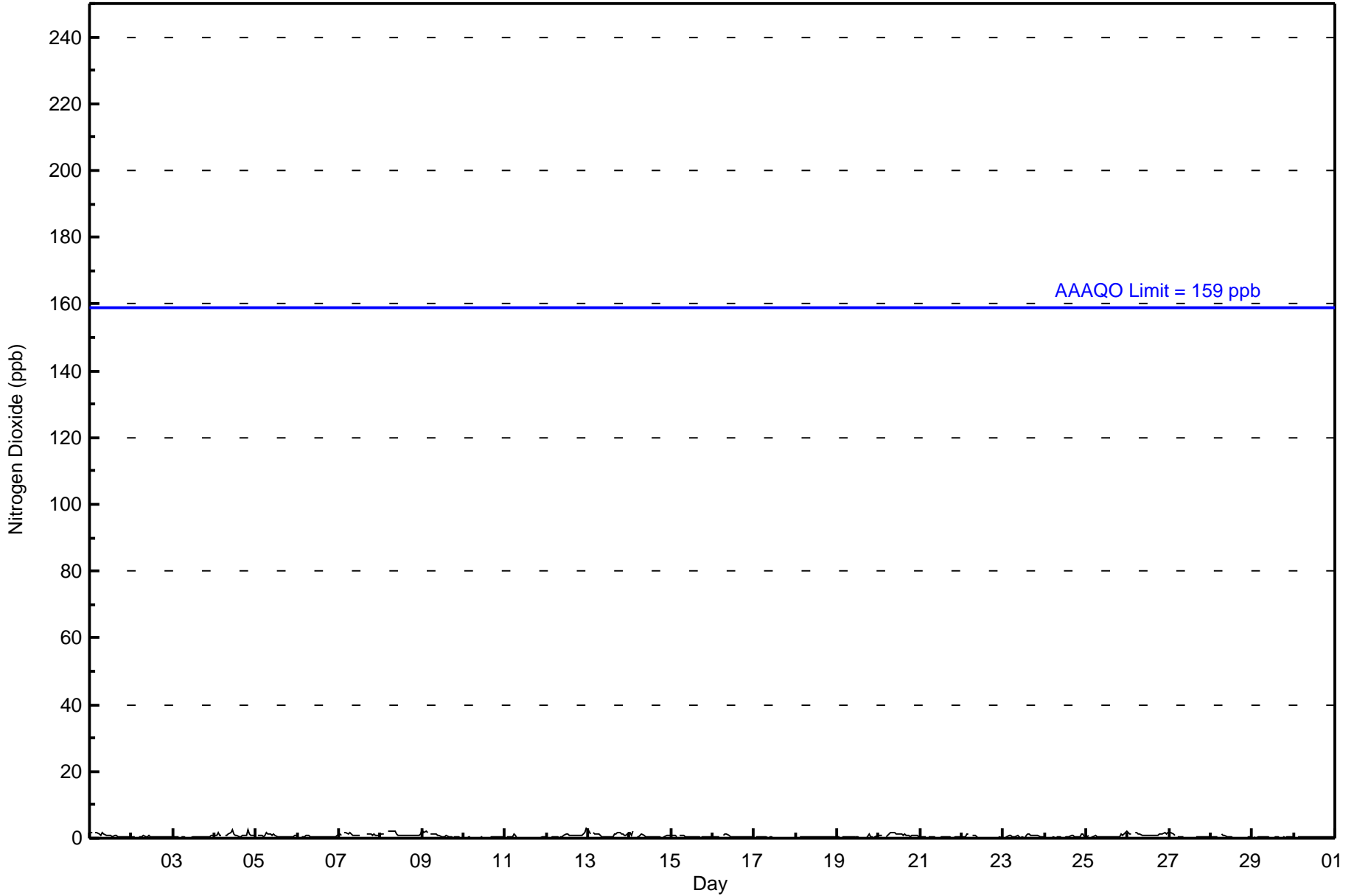
0.9	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	Diurnal Average	
3	2	2	2	2	2	2	2	2	2	2	3	1	1	1	1	1	1	1	1	2	2	3	1	2	2	3	Diurnal Maximum

Z - zeronspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681
Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680

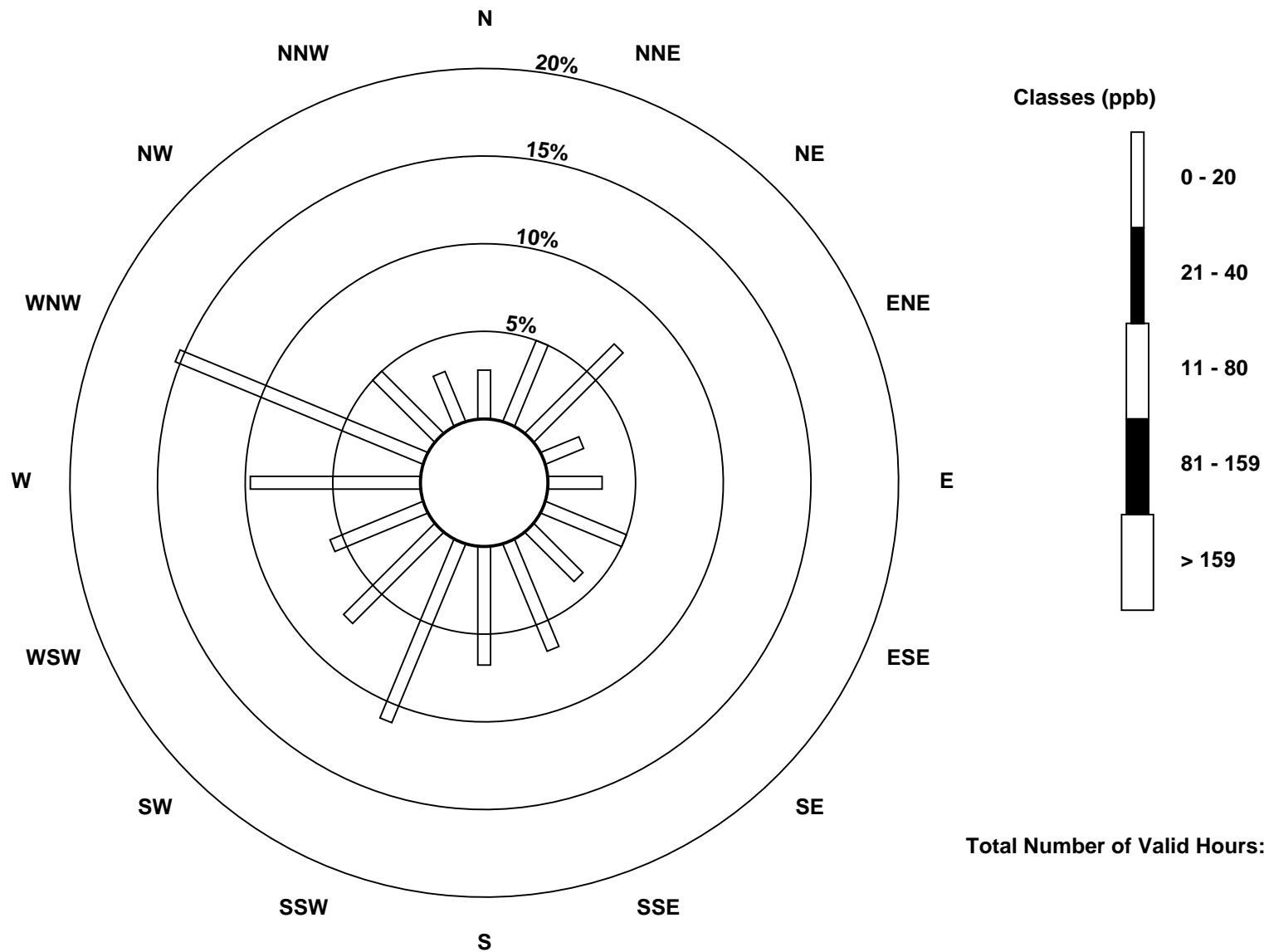
Total Number of Valid Hours: 680

Total Number of Hours: 720

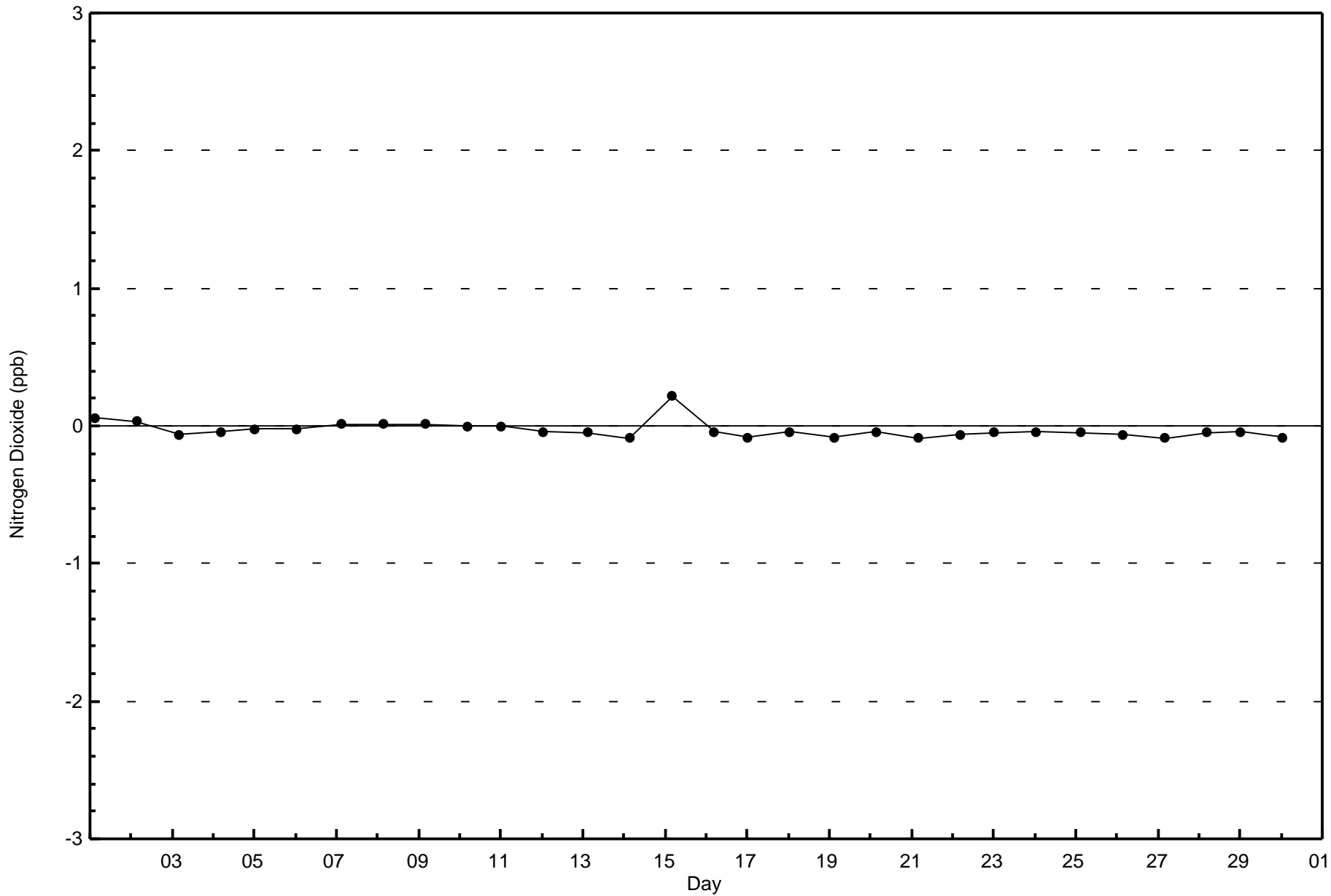


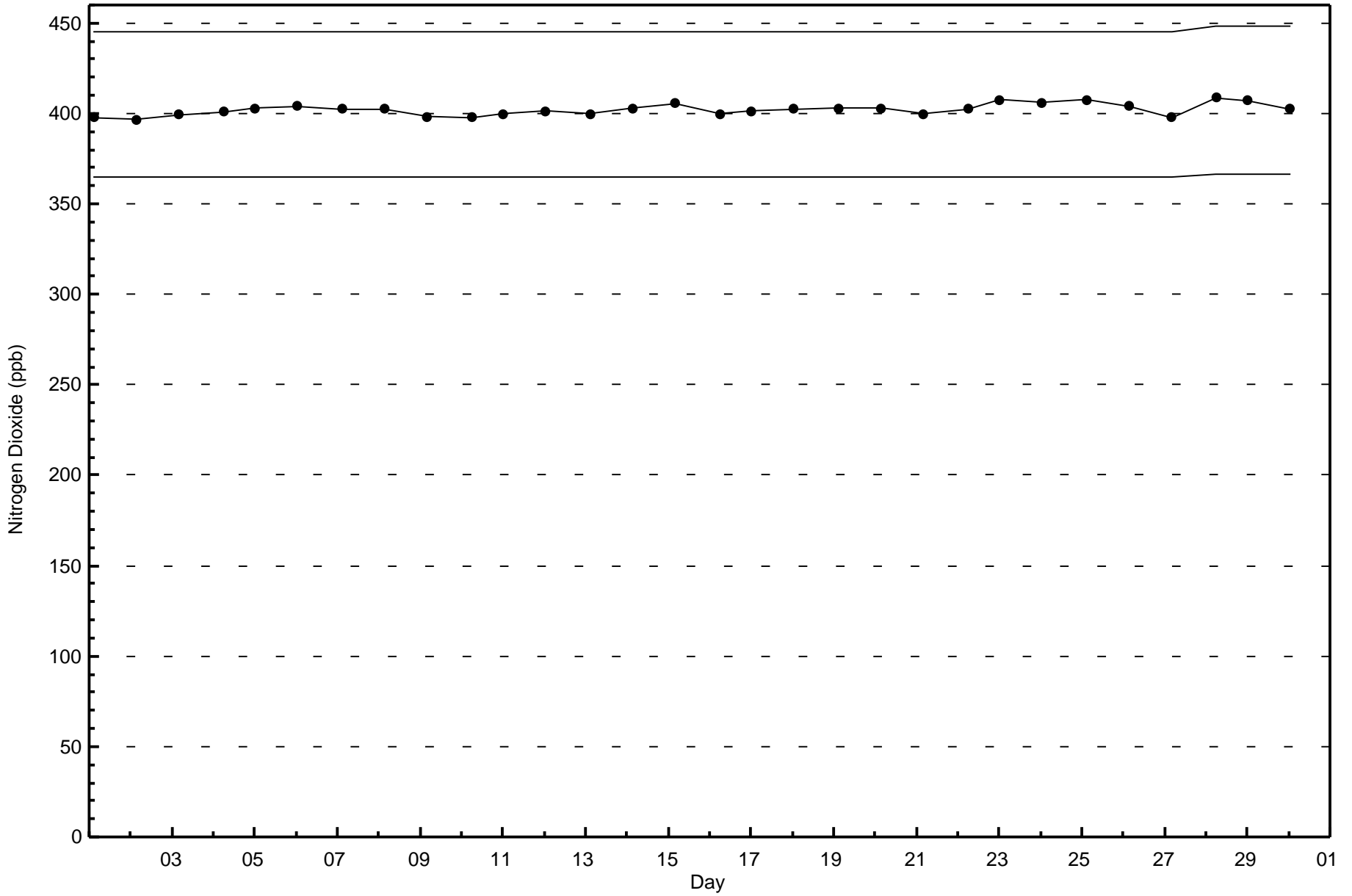
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 680







Wood Buffalo Environmental Association
Summary of Hour Averages

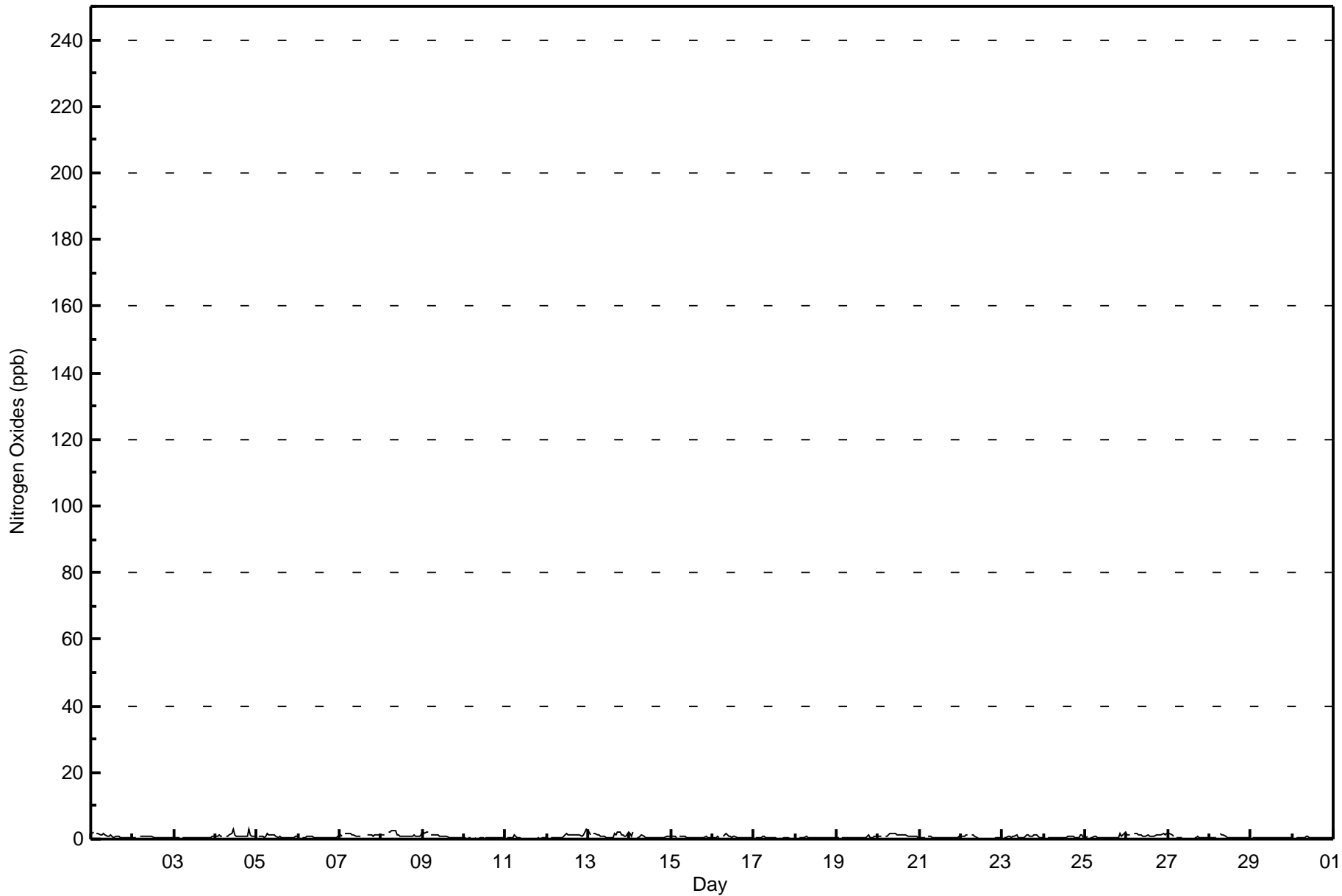
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017

Maximum Value: 3 ppb on Jun 13 00:00		Maximum Daily Average: 1.3 ppb on Jun 8		Hours in Service: 720																																												
Minimum Value: 0 ppb on Jun 11 10:00		Minimum Daily Average: 0.3 ppb on Jun 10		Hours of Data: 681																																												
Maximum Diurnal Average: 1.0 ppb at hour 7		Minimum Diurnal Average: 0.6 ppb at hour 14		Hours of Missing Data: 39																																												
Monthly Average: 0.7 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Hours of Calibration: 36																																												
				Percent Operational Time: 99.6																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	2	2	Z	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1.0	2																						
2-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1																						
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																						
4-Jun	1	1	1	1	1	Z	1	1	1	2	3	1	1	1	1	1	1	1	1	1	3	1	1	1	1.2	3																						
5-Jun	Z	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0.8	2																						
6-Jun	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	1																						
7-Jun	1	1	Z	2	2	2	2	1	1	1	1	1	1	M	M	M	1	1	1	1	1	1	1	1	1.2	2																						
8-Jun	1	1	1	Z	2	2	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	3																						
9-Jun	3	2	2	2	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.9	3																						
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																						
11-Jun	Z	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1																						
12-Jun	1	Z	0	0	0	1	0	0	0	0	1	2	1	1	1	1	1	1	1	1	1	1	2	3	1.0	3																						
13-Jun	2	1	Z	2	2	1	1	1	1	1	1	1	1	1	2	1	2	2	2	1	1	1	2	1	1.2	2																						
14-Jun	2	1	2	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.7	2																						
15-Jun	1	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0.6	1																						
16-Jun	0	0	1	1	0	Z	1	1	2	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0.7	2																						
17-Jun	Z	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
18-Jun	0	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1																						
19-Jun	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0.5	1																						
20-Jun	1	1	1	Z	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	2																						
21-Jun	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																						
22-Jun	1	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1																						
23-Jun	Z	0	0	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0.7	1																						
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.5	1																						
25-Jun	1	1	Z	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	2	1	2	0.7	2																						
26-Jun	1	1	1	Z	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1.3	2																						
27-Jun	2	2	1	1	Z	1	0	1	0	C	C	C	C	C	C	0	0	1	0	0	0	0	0	0	--	2																						
28-Jun	0	0	0	0	1	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
29-Jun	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																						
30-Jun	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0.5	1																						
																								0.9	0.8	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	Diurnal Average	
																								3	2	2	2	2	2	3	3	3	2	3	2	1	1	1	2	1	2	2	3	2	2	3	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	34	49	16	21	34	27	45	46	75	50	39	66	104	34	21	680

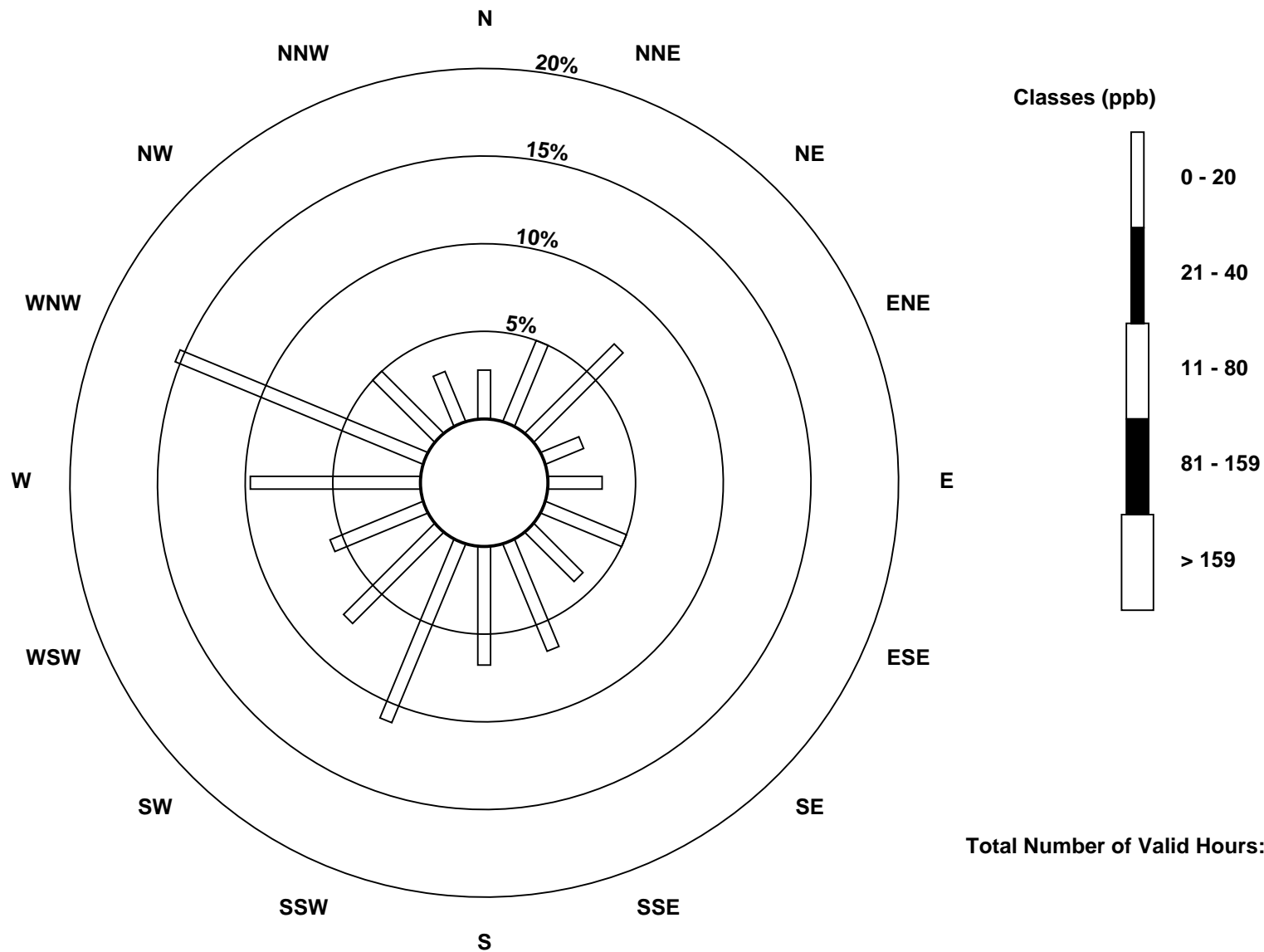
Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

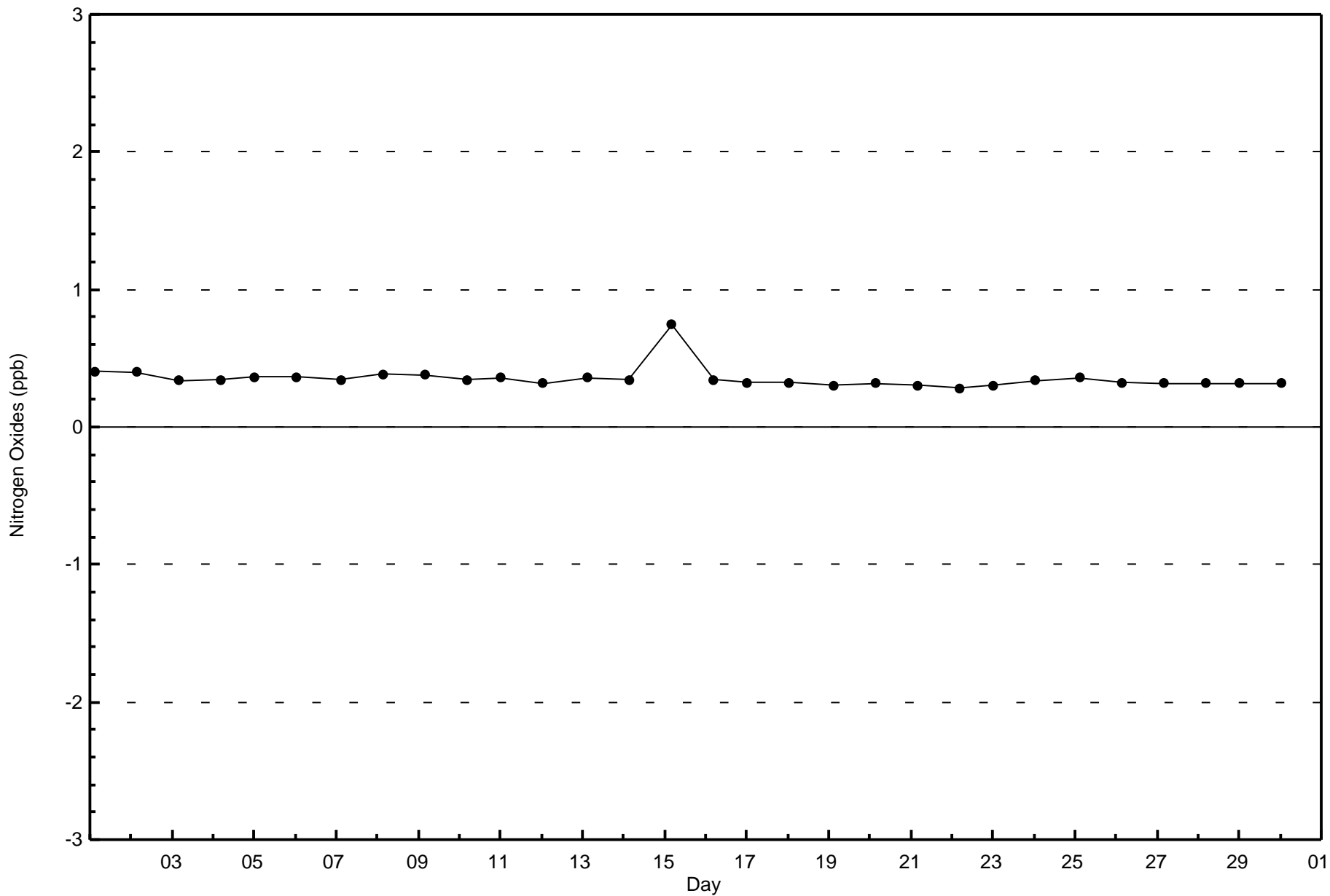
Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Zero Responses

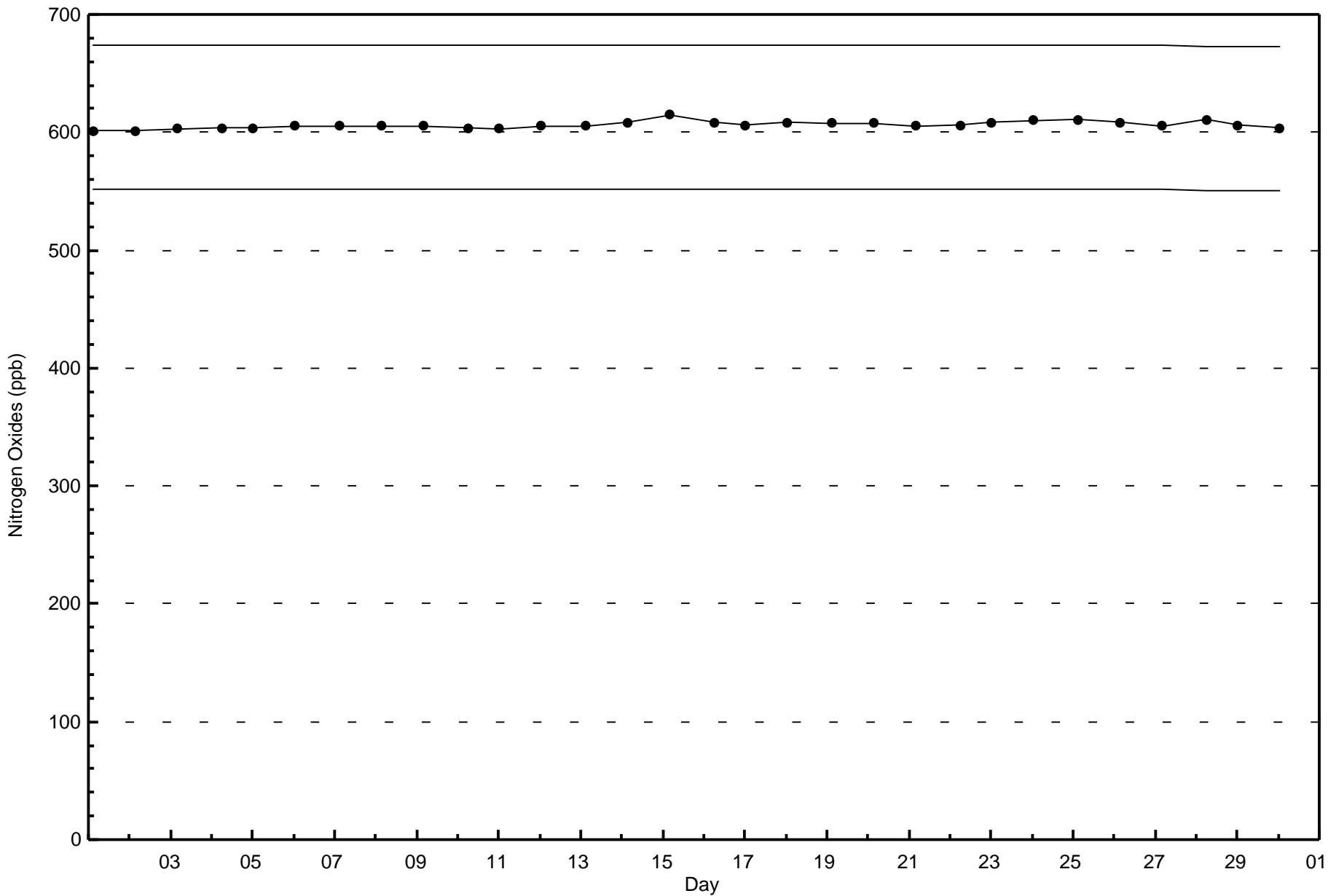
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Stony Mountain - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 64 ppb on Jun 7 10:00	Maximum Daily Average: 53.4 ppb on Jun 8		Hours of Data:	685
Minimum Value: 14 ppb on Jun 15 05:00	Minimum Daily Average: 23.9 ppb on Jun 14		Hours of Missing Data:	35
Maximum Diurnal Average: 42.2 ppb at hour 15	Minimum Diurnal Average: 31.6 ppb at hour 7		Hours of Calibration:	33
Monthly Average: 37.8 ppb	Percentiles: P ₁ = 18 P ₁₀ = 26 Q ₁ = 31 Median = 37 Q ₃ = 44 P ₉₀ = 50 P ₉₉ = 62		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	57	53	51	50	Z	49	48	46	49	48	45	44	45	51	46	43	50	49	46	43	41	48	50	49	47.8	57
2-Jun	44	45	45	46	46	Z	38	36	36	36	37	39	40	40	43	45	46	46	46	43	41	40	41	42	41.7	46
3-Jun	43	43	39	35	31	29	Z	28	30	30	33	38	42	43	44	42	41	42	46	43	41	41	43	46	38.9	46
4-Jun	48	46	44	45	44	41	39	Z	43	46	51	53	52	52	54	52	54	60	60	55	51	44	45	48	49.0	60
5-Jun	42	40	Z	31	34	34	35	36	39	40	41	45	50	50	50	50	48	48	46	40	38	39	37	36	41.4	50
6-Jun	33	35	34	Z	32	34	33	33	36	43	50	48	49	49	49	49	47	46	45	44	46	48	47	47	42.5	50
7-Jun	47	49	49	50	Z	52	50	51	58	64	63	60	57	57	62	59	M	M	54	47	45	43	41	43	52.4	64
8-Jun	44	47	48	50	46	Z	35	37	41	56	63	63	63	63	60	59	58	59	59	56	56	57	56	54	53.4	63
9-Jun	53	53	50	47	45	40	Z	34	36	45	44	48	51	51	55	42	37	36	34	39	45	42	40	38	43.8	55
10-Jun	36	36	35	35	34	34	34	Z	34	34	36	37	39	43	46	46	45	44	37	36	38	48	47	46	39.1	48
11-Jun	41	38	Z	34	32	31	31	35	38	38	40	41	41	42	43	44	42	42	40	38	37	37	38	38	38.2	44
12-Jun	36	31	34	Z	30	28	27	28	34	35	38	38	40	41	42	43	45	43	38	36	35	33	33	31	35.6	45
13-Jun	33	30	32	34	Z	32	26	29	30	30	31	28	25	38	36	37	40	38	32	32	32	30	24	21	31.2	40
14-Jun	22	22	20	20	22	Z	23	25	26	26	26	28	30	30	28	26	24	23	22	22	24	21	20	19	23.9	30
15-Jun	21	22	20	17	14	19	Z	20	23	27	29	37	34	33	36	39	36	35	35	24	31	27	24	26	27.3	39
16-Jun	29	30	26	24	20	18	21	Z	32	40	43	42	42	41	43	41	42	36	30	27	23	21	20	22	30.9	43
17-Jun	27	28	Z	29	31	28	23	26	29	31	31	31	33	39	41	42	42	42	40	35	35	38	39	40	33.9	42
18-Jun	40	41	41	Z	41	39	37	36	36	40	41	43	43	46	40	39	41	41	42	41	39	40	40	37	40.1	46
19-Jun	35	34	33	32	Z	31	27	27	31	34	38	40	40	40	38	38	37	37	31	32	34	35	36	37	34.7	40
20-Jun	37	36	36	35	34	Z	33	34	36	36	37	40	40	36	30	34	40	41	41	35	34	32	36	43	36.4	43
21-Jun	47	50	47	44	38	31	Z	36	38	39	40	39	39	38	36	35	33	34	37	35	29	26	26	30	36.8	50
22-Jun	30	28	29	27	26	26	27	Z	27	27	31	34	35	37	37	38	37	37	37	35	30	27	28	31	31.5	38
23-Jun	31	31	Z	30	30	29	29	30	34	36	40	42	45	50	50	47	45	43	39	33	36	32	32	33	36.8	50
24-Jun	36	31	32	Z	35	34	33	34	35	35	36	37	34	34	35	34	40	40	34	33	32	34	32	35	34.5	40
25-Jun	36	35	35	34	Z	30	28	28	37	42	43	45	46	46	44	44	44	48	50	50	49	48	45	42	41.2	50
26-Jun	42	43	44	44	45	Z	45	47	48	49	52	54	56	56	55	53	53	54	54	53	52	48	47	44	49.6	56
27-Jun	40	39	42	43	44	43	Z	41	40	40	42	43	45	38	C	C	C	48	50	46	39	36	35	32	41.3	50
28-Jun	28	27	25	20	16	17	17	Z	27	28	34	37	39	24	24	29	31	32	30	27	24	18	19	20	25.7	39
29-Jun	19	20	Z	24	20	22	23	25	27	29	30	31	30	29	30	29	32	31	27	26	31	27	34	31	27.3	34
30-Jun	27	24	30	Z	36	23	28	26	30	33	37	37	33	30	28	28	27	28	29	28	22	18	18	21	27.8	37

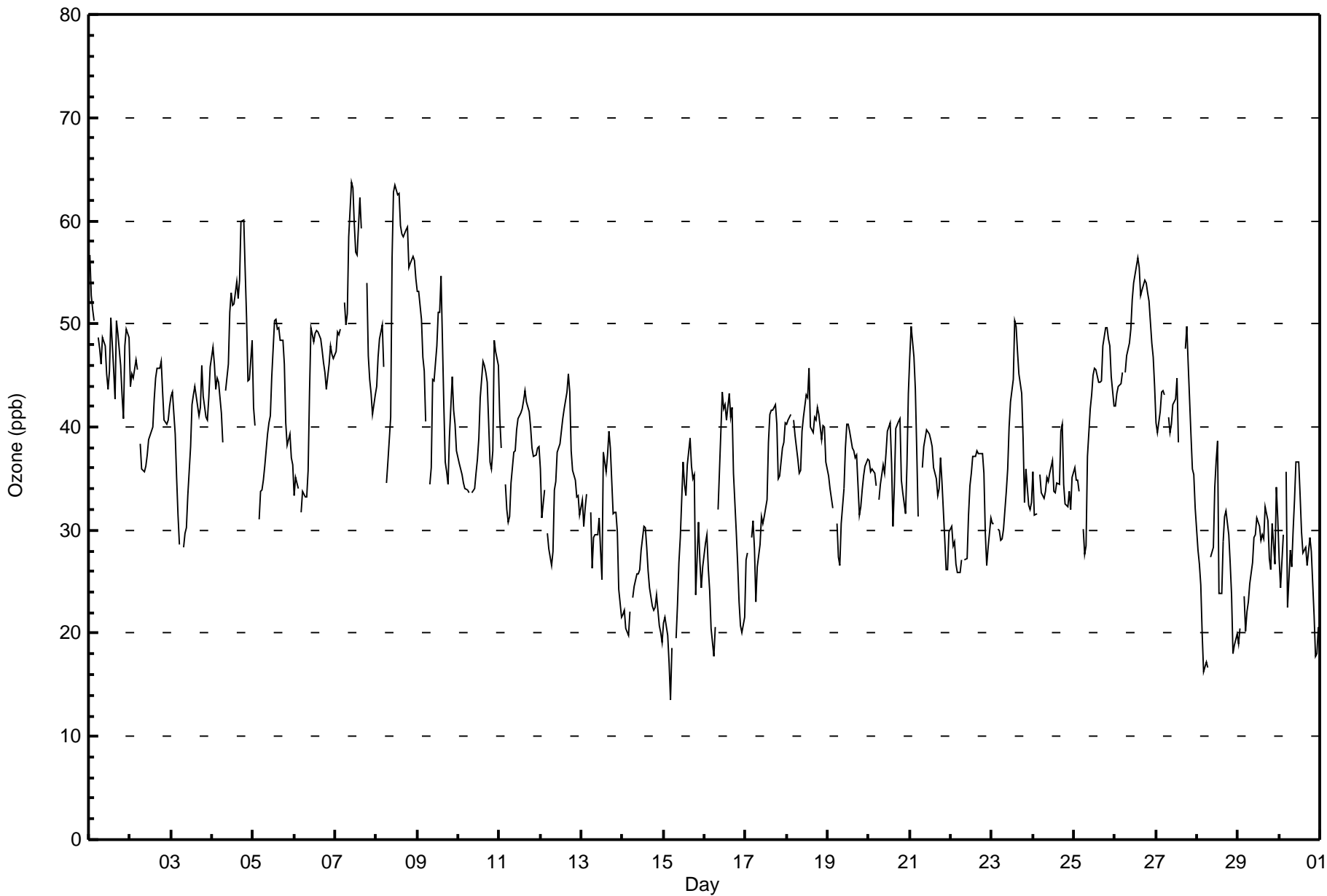
36.8	36.3	36.8	35.2	33.0	31.7	31.6	33.1	35.3	37.9	40.1	41.4	41.9	42.2	42.2	41.6	41.4	41.5	40.4	37.8	36.9	35.9	35.8	36.1	Diurnal Average	
57	53	51	50	46	52	50	51	58	64	63	63	63	63	62	59	58	60	60	56	56	57	56	54	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	24	3.50	3.50
21 - 50	604	88.18	91.68
51 - 82	57	8.32	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Stony Mountain - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	2	1	2	1	1	2	2	1	1	2	0	1	1	2	1	3	23
21 - 50	15	33	46	9	12	20	16	37	41	66	54	38	67	102	31	17	604
51 - 82	1	0	0	5	8	11	11	9	4	4	1	1	0	0	1	1	57
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	34	48	15	21	33	29	47	46	72	55	40	68	104	33	21	684

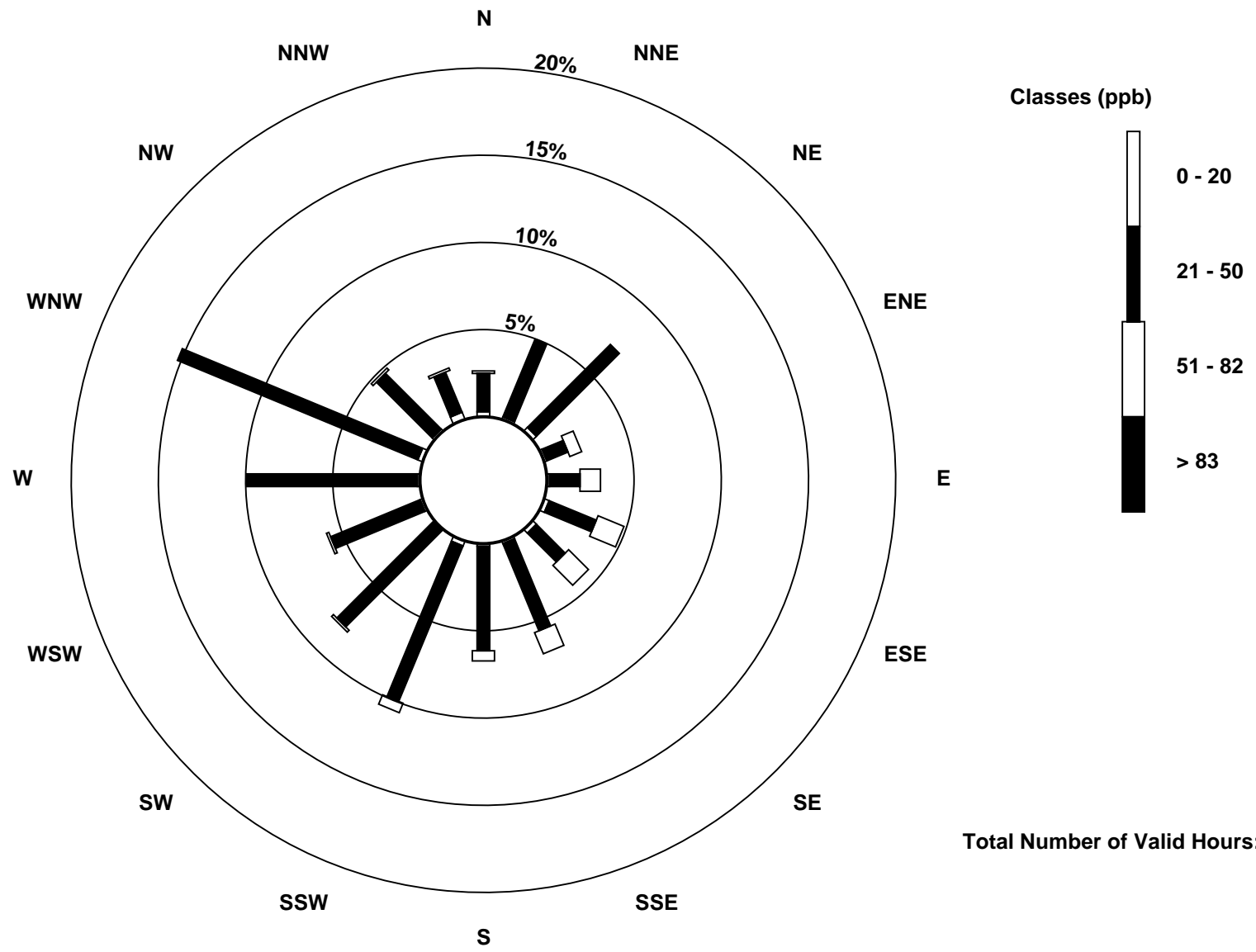
Total Number of Valid Hours: 684

Total Number of Hours: 720

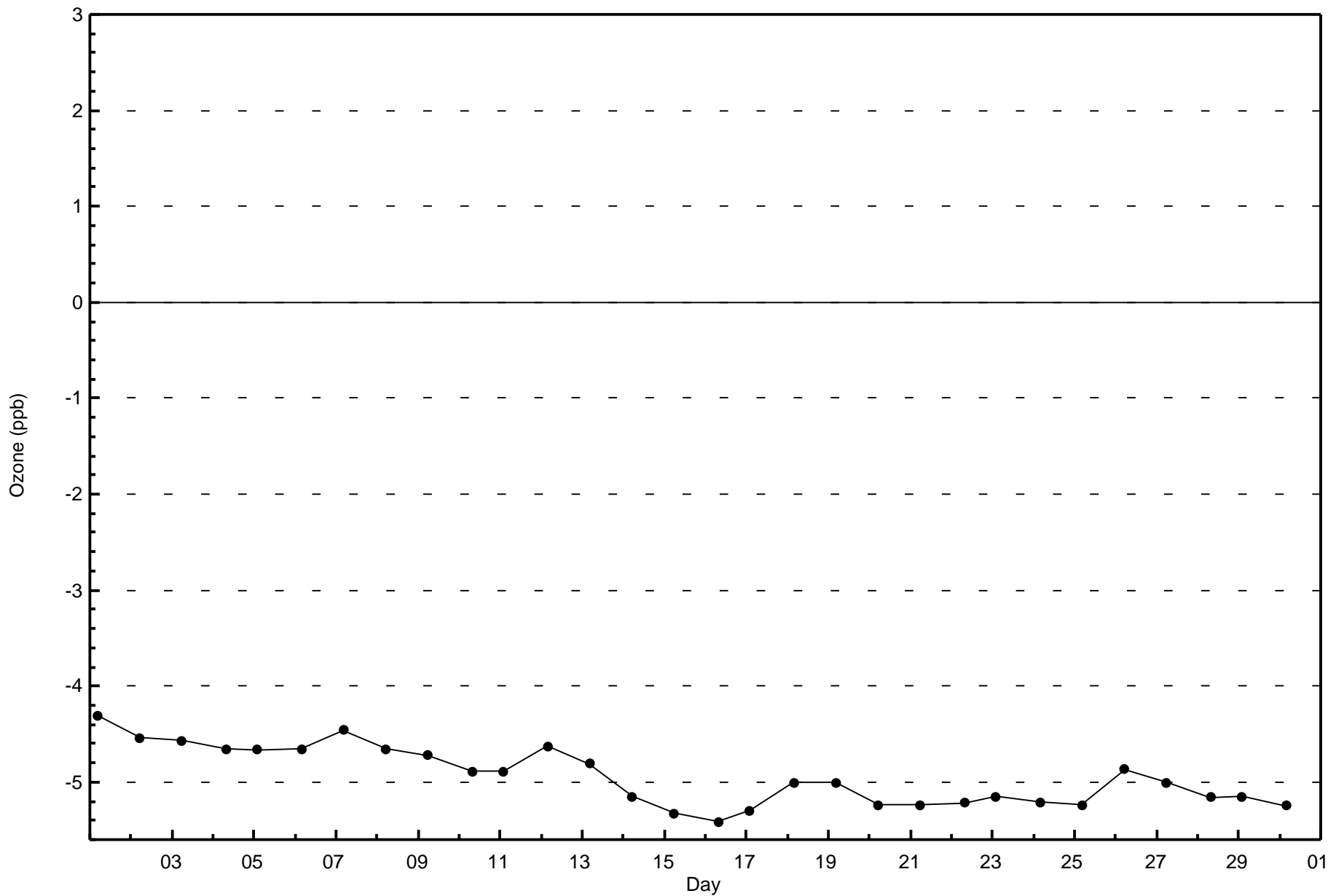


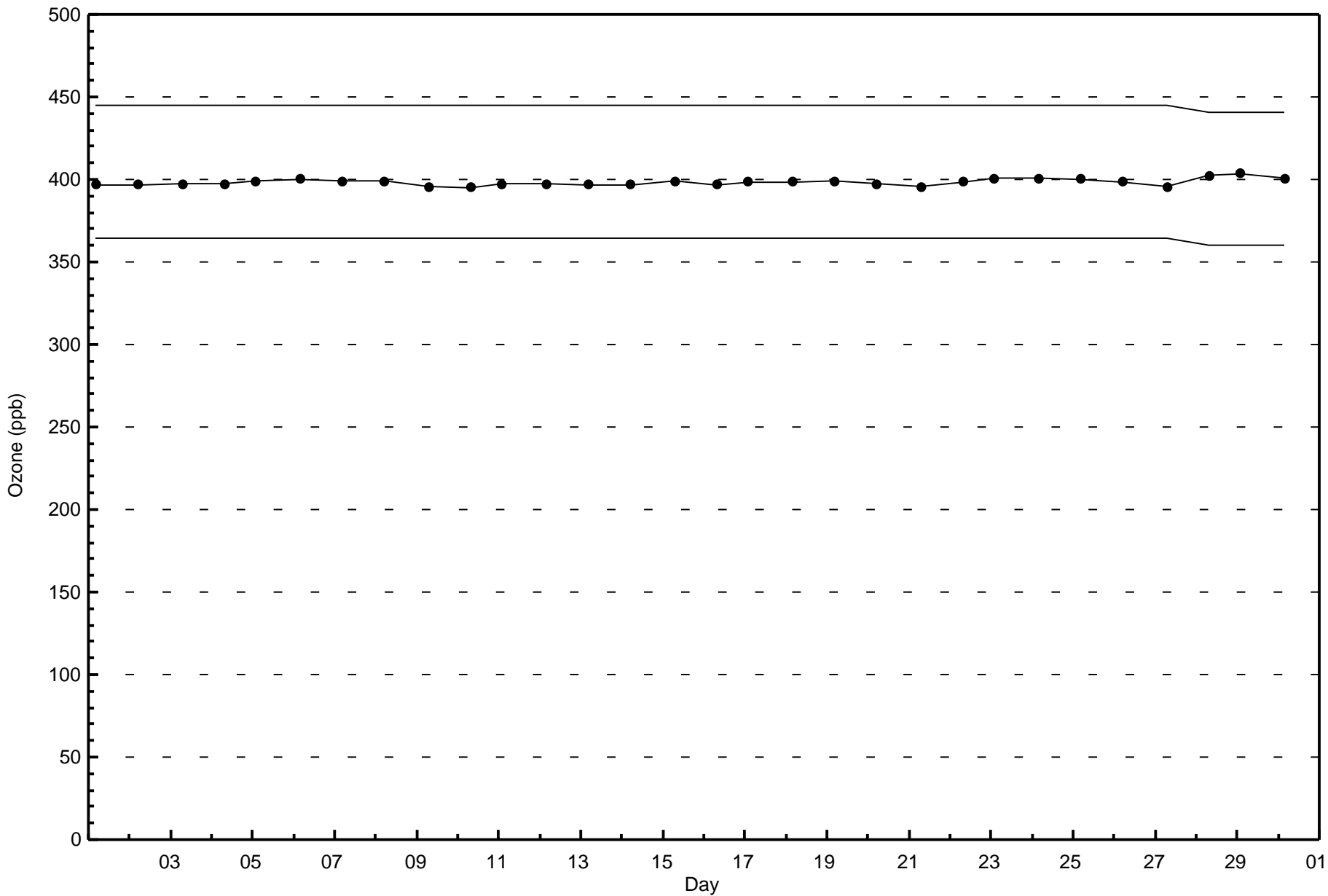
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 684





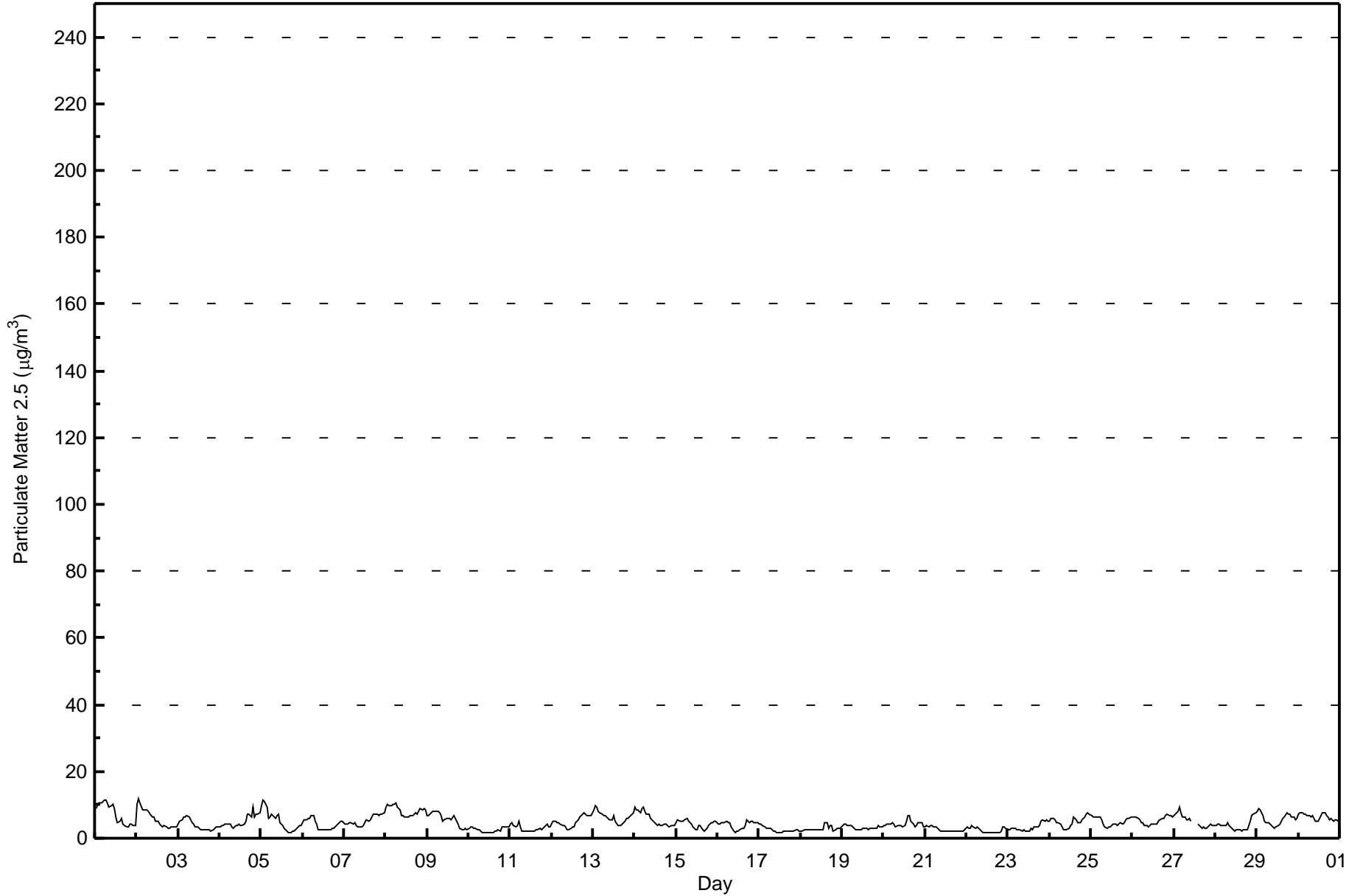


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 11.7 µg/m ³ on Jun 2 02:00 Minimum Value: 1.6 µg/m ³ on Jun 10 14:00 Maximum Diurnal Average: 6.0 µg/m ³ at hour 2 Monthly Average: 4.64 µg/m ³		Maximum Daily Average: 8.3 µg/m ³ on Jun 8 Minimum Daily Average: 2.5 µg/m ³ on Jun 22 Minimum Diurnal Average: 3.6 µg/m ³ at hour 12 Percentiles: P ₁ = 1.7 P ₁₀ = 2.3 Q ₁ = 2.9 Median = 4.1 Q ₃ = 6.1 P ₉₀ = 7.4 P ₉₉ = 10.5		Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 3 Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	8.9	9.8	10.7	10.4	10.5	11.4	11.5	10.5	9.2	9.7	10.4	8.7	6.3	4.6	5.0	6.0	4.4	4.0	3.5	3.6	4.3	4.2	3.9	3.6	7.3	11.5
2-Jun	10.2	11.7	10.4	8.6	8.4	8.5	8.4	8.0	6.7	6.3	6.2	5.2	5.1	4.3	3.7	3.5	3.7	3.3	3.1	3.1	3.3	3.5	3.4	3.4	5.9	11.7
3-Jun	4.4	5.3	5.7	6.2	6.4	6.7	6.5	5.4	4.8	4.3	3.5	3.3	3.0	2.6	2.6	2.5	2.4	2.4	2.5	2.2	2.6	3.0	3.3	3.3	4.0	6.7
4-Jun	3.5	3.7	4.0	4.1	4.3	4.4	4.2	3.3	3.0	3.6	3.8	4.1	3.7	3.8	4.2	5.0	7.4	7.0	6.4	9.1	6.4	7.3	7.3	7.7	5.1	9.1
5-Jun	9.7	11.5	11.1	9.3	6.1	6.3	7.2	6.7	5.9	6.7	7.3	4.8	3.7	3.2	2.6	2.0	1.8	1.7	2.0	2.2	2.7	3.5	3.8	4.0	5.2	11.5
6-Jun	4.9	5.7	5.7	5.9	5.9	6.6	6.6	5.2	4.1	2.6	2.4	2.6	2.4	2.4	2.4	2.4	2.7	3.1	3.0	3.6	4.4	4.6	5.0	5.1	4.1	6.6
7-Jun	4.4	4.2	4.2	4.5	4.5	4.4	4.8	3.9	3.5	3.3	3.4	3.8	4.8	5.5	5.2	5.7	6.2	7.1	7.3	7.1	6.7	7.1	7.4	7.6	5.3	7.6
8-Jun	9.4	10.3	10.0	9.9	10.3	10.3	10.5	9.5	8.4	7.0	6.6	6.5	6.4	6.2	6.6	6.6	6.9	7.5	7.4	8.0	8.7	8.3	8.7	8.5	8.3	10.5
9-Jun	6.8	6.6	7.6	8.0	8.0	7.9	8.2	7.7	6.6	5.3	5.4	6.0	6.0	6.1	5.7	7.0	6.0	5.0	4.1	3.1	2.7	2.6	2.8	2.5	5.7	8.2
10-Jun	2.8	3.3	3.3	3.1	2.9	2.7	2.6	2.0	1.9	1.8	1.8	1.7	1.6	1.6	1.8	2.2	2.3	2.4	2.3	3.4	3.2	3.4	3.4	3.6	2.5	3.6
11-Jun	4.1	4.5	3.7	3.3	3.9	5.3	3.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.4	2.5	2.8	2.7	2.9	3.5	4.4	3.5	3.2	3.1	5.3
12-Jun	4.2	5.0	5.3	4.8	4.7	4.4	3.9	3.8	3.2	2.7	2.6	3.0	3.3	3.5	4.7	5.6	6.3	6.9	7.4	7.8	6.8	6.9	6.7	6.9	5.0	7.8
13-Jun	8.4	9.6	9.5	8.1	7.6	7.0	6.6	6.7	6.4	5.6	5.3	5.4	6.7	5.0	3.8	3.6	4.0	4.2	5.3	6.1	6.0	6.5	6.7	7.4	6.3	9.6
14-Jun	9.2	8.5	8.5	7.5	9.0	9.3	8.1	7.2	7.2	6.1	5.5	5.0	4.1	4.0	4.1	3.7	3.9	4.1	4.0	3.8	3.6	3.8	3.7	3.7	5.7	9.3
15-Jun	4.7	5.3	5.2	5.0	5.0	5.4	5.8	4.9	4.8	4.1	3.5	2.3	2.7	3.8	3.7	2.4	2.2	2.6	2.9	3.8	4.6	4.8	4.9	4.9	4.1	5.8
16-Jun	4.2	4.3	4.5	4.6	4.7	5.1	4.7	4.5	3.5	2.3	1.9	1.9	2.3	2.5	2.8	3.0	3.9	5.4	4.8	5.2	5.1	4.7	4.8	4.5	4.0	5.4
17-Jun	4.2	4.3	3.8	3.3	3.0	3.0	3.0	2.8	2.1	2.0	1.9	1.9	1.8	1.8	2.1	2.0	2.0	2.0	2.1	2.1	2.3	2.6	2.4	2.3	2.5	4.3
18-Jun	2.3	2.3	2.6	2.4	2.4	2.4	2.4	2.4	2.4	2.6	2.6	2.5	2.6	2.7	4.8	4.6	2.8	3.6	3.7	2.3	2.6	3.0	2.9	2.8	2.8	4.8
19-Jun	3.7	4.4	4.3	4.0	4.0	3.6	3.3	2.9	2.4	2.4	2.4	2.6	2.9	2.8	2.8	2.7	2.9	3.0	3.1	2.9	3.2	3.7	3.5	3.4	3.2	4.4
20-Jun	3.9	4.0	4.1	4.0	4.2	4.5	4.1	3.6	3.7	3.9	3.7	3.5	3.8	5.1	6.6	6.7	5.2	4.0	3.4	3.9	4.6	4.9	4.7	3.5	4.3	6.7
21-Jun	3.4	3.7	3.4	3.6	3.7	3.5	3.2	2.9	2.4	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.7	2.6	3.7
22-Jun	3.5	2.8	2.8	3.7	3.4	2.8	3.3	3.1	2.6	1.9	1.8	1.9	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	2.3	3.3	3.2	2.7	2.5	3.7
23-Jun	2.6	2.7	2.8	2.9	2.9	2.4	2.5	2.4	2.3	2.4	2.2	2.1	2.2	2.9	2.7	3.2	3.2	3.5	3.9	5.0	5.7	5.3	5.7	5.2	3.3	5.7
24-Jun	5.3	6.1	6.0	5.4	4.7	4.5	4.3	3.5	2.7	2.5	2.5	2.9	3.9	4.0	6.3	5.4	4.5	4.7	4.6	5.5	6.4	7.4	7.7	7.0	4.9	7.7
25-Jun	6.7	6.3	6.2	6.3	6.4	6.2	5.6	4.4	3.6	2.9	3.2	3.6	4.0	4.3	4.0	3.9	4.3	4.5	4.3	4.8	5.5	5.8	6.1	6.2	5.0	6.7
26-Jun	6.5	6.4	6.3	5.8	5.3	4.8	4.5	4.0	3.9	3.5	3.9	4.2	4.4	4.2	4.3	4.9	5.6	5.8	6.1	6.6	7.1	7.0	6.7	6.3	5.3	7.1
27-Jun	7.0	7.3	8.2	9.2	7.5	6.5	6.2	5.7	5.7	5.8	5.1	C	C	C	4.4	3.4	3.1	3.3	3.1	3.0	3.8	4.1	3.9	3.6	5.2	9.2
28-Jun	4.0	4.1	4.1	4.0	3.7	3.6	3.9	4.6	3.8	3.1	2.6	2.3	2.4	2.6	2.6	2.3	2.4	2.4	2.6	3.9	5.2	6.6	7.3	7.5	3.8	7.5
29-Jun	8.1	8.9	8.6	6.7	5.2	4.7	4.5	4.5	3.7	3.2	2.9	3.4	3.9	4.3	4.9	5.8	6.6	7.6	7.3	7.1	6.4	6.5	5.6	6.0	5.7	8.9
30-Jun	7.3	7.8	7.4	7.0	7.0	6.8	6.6	6.2	6.6	6.1	5.3	5.0	5.8	6.8	7.5	7.6	6.8	6.3	5.6	5.9	5.3	5.5	5.4	5.1	6.4	7.8
																								Diurnal Average		
																								Diurnal Maximum		
																								5.6 6.0 6.0 5.7 5.5 5.5 5.3 4.8 4.3 3.9 3.8 3.6 3.7 3.7 3.9 4.0 4.0 4.1 4.1 4.4 4.6 4.9 4.9 4.8		
																								10.2 11.7 11.1 10.4 10.5 11.4 11.5 10.5 10.5 9.2 9.7 10.4 8.7 6.7 6.8 7.5 7.6 7.4 7.6 7.4 9.1 8.7 8.3 8.7 8.5		
C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																										



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	499	69.60	69.60
6 - 15	218	30.40	100.00
16 - 25	0	0.00	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Stony Mountain - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	11	23	39	10	16	16	14	26	35	56	36	31	54	91	24	17	499
6 - 15	9	12	12	6	8	18	15	21	14	21	19	10	18	19	10	5	217
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	35	51	16	24	34	29	47	49	77	55	41	72	110	34	22	716

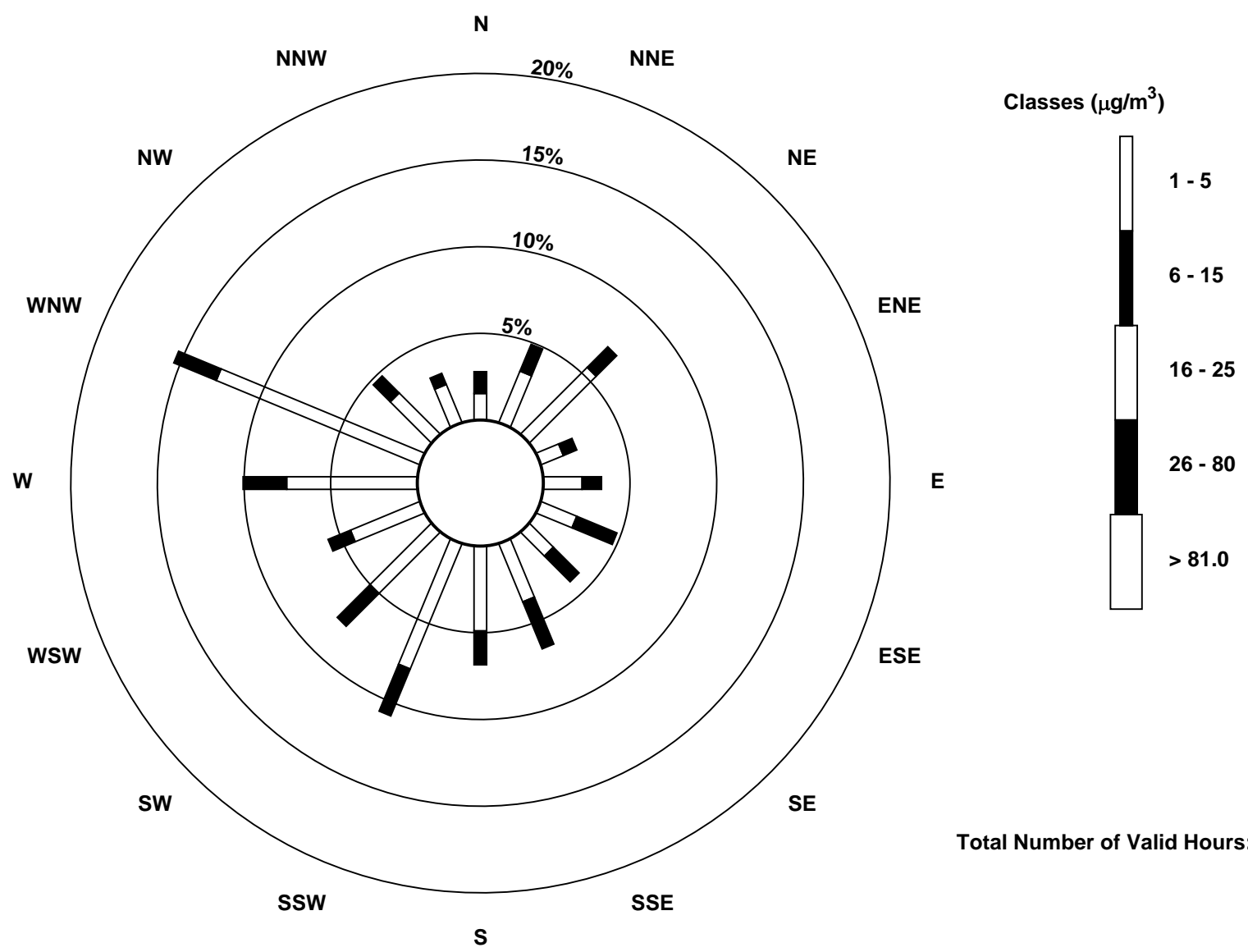
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain (AMS 18)



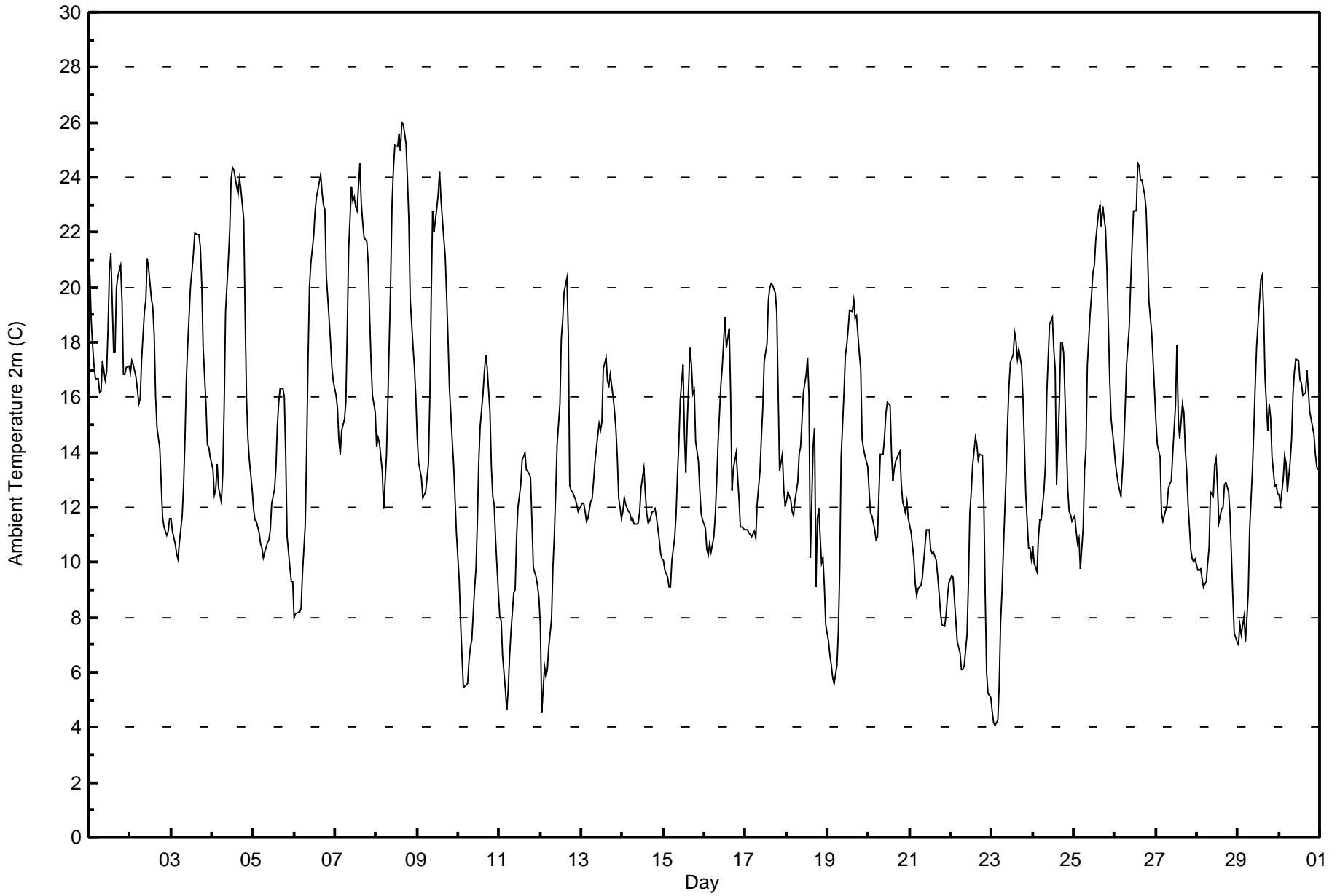


Maximum Value: 26.0 C on Jun 8 16:00		Maximum Daily Average: 19.7 C on Jun 8		Hours in Service: 720																																												
Minimum Value: 4.1 C on Jun 23 03:00		Minimum Daily Average: 9.6 C on Jun 22		Hours of Data: 720																																												
Maximum Diurnal Average: 18.0 C at hour 14		Minimum Diurnal Average: 10.3 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 14.24 C		Percentiles: P ₁ = 5.2 P ₁₀ = 8.9 Q ₁ = 11.2 Median = 13.6 Q ₃ = 17.2 P ₉₀ = 20.9 P ₉₉ = 24.8		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	20.5	18.8	17.8	17.2	16.7	16.7	16.2	16.2	17.4	16.6	16.9	18.5	20.6	21.3	17.6	17.7	20.0	20.4	20.8	19.5	16.8	16.9	17.1	17.1	18.1	21.3																						
2-Jun	16.9	17.4	17.2	16.7	16.2	15.8	15.9	17.4	19.1	19.5	21.1	20.7	19.6	19.3	18.2	16.0	14.9	14.1	12.8	11.7	11.3	11.0	11.1	11.6	16.1	21.1																						
3-Jun	11.6	11.1	10.7	10.3	10.1	10.7	11.7	12.8	14.5	16.7	17.9	20.1	20.6	21.2	21.9	21.9	21.4	20.1	17.8	15.8	14.3	14.2	13.8	18.1	21.9																							
4-Jun	13.4	12.5	12.7	13.6	12.7	12.2	13.2	15.6	19.1	21.0	22.0	24.0	24.4	24.2	23.7	23.4	24.0	23.5	22.5	19.0	16.0	14.5	13.7	12.7	18.1	24.4																						
5-Jun	12.0	11.5	11.5	11.1	10.7	10.5	10.2	10.4	10.7	10.8	11.2	12.2	12.7	13.4	14.9	15.8	16.3	16.3	16.0	13.9	10.9	9.8	9.3	9.3	12.1	16.3																						
6-Jun	8.0	8.1	8.2	8.2	8.3	9.6	11.4	14.2	17.5	20.0	20.9	21.9	22.8	23.3	23.6	24.1	23.4	23.0	22.9	20.4	18.9	18.0	17.1	16.6	17.1	24.1																						
7-Jun	16.0	15.6	14.5	13.9	14.8	15.2	15.8	18.5	21.4	23.6	23.2	23.3	22.9	22.8	24.5	23.1	22.4	21.8	21.6	20.9	18.9	17.3	16.1	15.5	19.3	24.5																						
8-Jun	14.2	14.6	14.3	13.3	12.0	12.9	13.9	15.9	20.2	23.0	24.3	25.2	25.1	25.6	24.9	26.0	25.9	25.2	23.9	22.5	19.6	17.9	17.1	16.0	19.7	26.0																						
9-Jun	14.5	13.6	13.1	12.4	12.5	12.6	13.6	16.0	19.6	22.8	22.0	22.9	23.4	24.2	23.2	21.8	21.2	19.8	18.1	16.4	14.5	13.6	12.4	11.1	17.3	24.2																						
10-Jun	9.3	7.8	6.6	5.4	5.5	5.6	6.4	6.9	7.1	9.1	9.7	11.5	13.7	14.9	16.1	16.9	17.5	17.1	15.4	13.5	12.4	12.1	10.8	8.9	10.9	17.5																						
11-Jun	8.0	7.9	6.6	5.4	4.6	5.3	6.5	7.5	8.9	9.0	10.9	12.0	12.8	13.8	13.8	14.0	13.4	13.2	13.1	11.5	9.8	9.5	9.2	8.7	9.8	14.0																						
12-Jun	7.7	4.5	6.2	5.8	6.1	6.9	7.9	9.8	11.0	12.6	14.3	15.8	18.2	18.8	19.8	20.3	18.3	12.8	12.6	12.6	12.3	12.1	11.8	11.9	12.1	20.3																						
13-Jun	12.1	12.1	11.8	11.5	11.6	12.2	12.3	12.9	13.6	14.6	15.1	14.8	15.1	17.0	17.4	16.6	16.4	16.8	16.0	15.5	14.9	13.9	12.4	11.6	14.1	17.4																						
14-Jun	11.9	12.4	12.1	11.9	11.8	11.5	11.6	11.4	11.4	11.5	11.8	12.7	13.4	12.6	11.8	11.4	11.5	11.8	11.8	12.0	11.7	10.8	10.3	10.1	11.7	13.4																						
15-Jun	10.1	9.7	9.5	9.1	9.1	10.1	10.9	11.7	13.2	14.4	15.9	17.2	14.6	13.2	15.1	17.8	17.2	16.1	16.3	14.4	13.7	12.6	11.7	11.6	13.1	17.8																						
16-Jun	11.2	10.5	10.3	10.7	10.4	10.9	11.7	12.9	14.3	16.4	17.1	18.0	18.9	17.8	18.5	16.2	12.6	13.4	14.0	13.1	12.3	11.3	11.3	11.2	13.5	18.9																						
17-Jun	11.2	11.2	11.1	10.9	11.1	11.1	10.9	12.2	13.3	14.5	15.6	17.3	18.0	19.5	20.0	20.1	19.8	19.1	16.2	13.3	13.9	12.6	12.0	14.8	20.1																							
18-Jun	12.3	12.6	12.3	11.8	11.7	12.2	12.9	13.9	14.2	15.1	16.2	16.8	17.4	16.0	10.2	14.2	14.9	9.1	11.6	11.9	10.0	10.2	9.2	7.7	12.7	17.4																						
19-Jun	7.1	6.6	6.2	5.8	5.6	6.2	7.5	9.8	13.8	16.1	17.5	17.9	18.5	19.2	19.1	19.5	18.9	18.9	17.6	17.0	14.5	14.2	13.9	13.5	13.5	19.5																						
20-Jun	12.6	11.8	11.7	11.2	10.8	10.9	12.4	13.9	14.0	14.5	15.4	15.8	15.7	14.0	12.9	13.4	13.7	13.9	14.1	12.9	12.2	11.8	12.2	11.6	13.1	15.8																						
21-Jun	11.3	11.1	10.1	9.2	8.8	9.1	9.1	9.4	10.0	10.6	11.2	11.2	10.5	10.3	10.4	10.1	9.5	8.9	8.2	7.7	7.7	8.1	8.7	9.3	9.6	11.3																						
22-Jun	9.5	9.4	8.6	7.9	7.1	6.7	6.1	6.1	6.2	7.4	9.3	11.8	12.6	13.5	14.5	14.3	13.7	13.9	13.9	12.2	8.8	6.0	5.2	5.1	9.6	14.5																						
23-Jun	4.6	4.2	4.1	4.3	5.5	7.8	9.0	10.5	13.3	15.1	16.4	17.3	17.6	18.4	18.0	17.4	17.7	17.1	15.9	14.3	12.5	10.5	10.5	10.1	12.2	18.4																						
24-Jun	10.6	9.9	9.6	10.9	11.6	11.6	12.6	13.5	16.1	17.4	18.7	18.9	17.8	17.0	12.8	15.8	18.0	18.0	17.6	16.0	12.6	11.8	11.7	11.5	14.3	18.9																						
25-Jun	11.7	11.1	10.7	10.9	9.8	11.2	13.4	14.1	17.2	19.1	19.8	20.5	20.8	21.7	22.7	23.0	22.2	22.9	22.1	20.6	18.6	16.6	15.2	14.2	17.1	23.0																						
26-Jun	13.6	13.2	12.9	12.4	13.3	14.2	15.6	17.2	18.6	20.2	21.5	22.8	22.8	24.5	24.4	23.9	23.9	23.3	22.8	21.3	19.5	18.4	17.3	16.3	18.9	24.5																						
27-Jun	15.1	14.3	13.8	11.8	11.5	11.7	12.1	12.7	12.9	13.0	13.9	15.7	17.9	15.2	14.5	15.8	15.5	14.1	13.3	12.1	10.4	10.1	10.0	10.1	13.2	17.9																						
28-Jun	9.7	9.7	9.8	9.4	9.1	9.3	10.0	10.5	12.5	12.4	13.5	13.8	12.8	11.4	12.0	12.0	12.8	12.9	12.6	11.7	10.2	8.8	7.4	7.1	10.9	13.8																						
29-Jun	7.0	7.7	7.4	8.0	7.1	8.0	8.9	11.2	13.4	14.9	16.4	17.8	19.5	20.3	20.5	19.1	16.7	14.8	15.8	15.3	13.8	12.8	12.8	12.5	13.4	20.5																						
30-Jun	12.5	12.1	13.0	13.9	13.6	12.5	13.7	14.5	16.1	16.9	17.4	17.3	16.6	16.5	16.1	16.2	17.0	16.2	15.5	15.2	14.6	13.9	13.5	13.4	14.9	17.4																						
																								11.5	11.1	10.8	10.5	10.3	10.7	11.4	12.7	14.4	15.6	16.6	17.5	17.9	18.0	17.8	17.9	17.7	17.0	16.6	15.3	13.6	12.7	12.2	11.7	Diurnal Average
																								20.5	18.8	17.8	17.2	16.7	16.7	16.2	18.5	21.4	23.6	24.3	25.2	25.1	25.6	24.9	26.0	25.9	25.2	23.9	22.5	19.6	18.4	17.3	17.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	114	15.83	15.83
10 - 20	513	71.25	87.08
> 20	93	12.92	100.00

Total Number of Valid Hours: 720

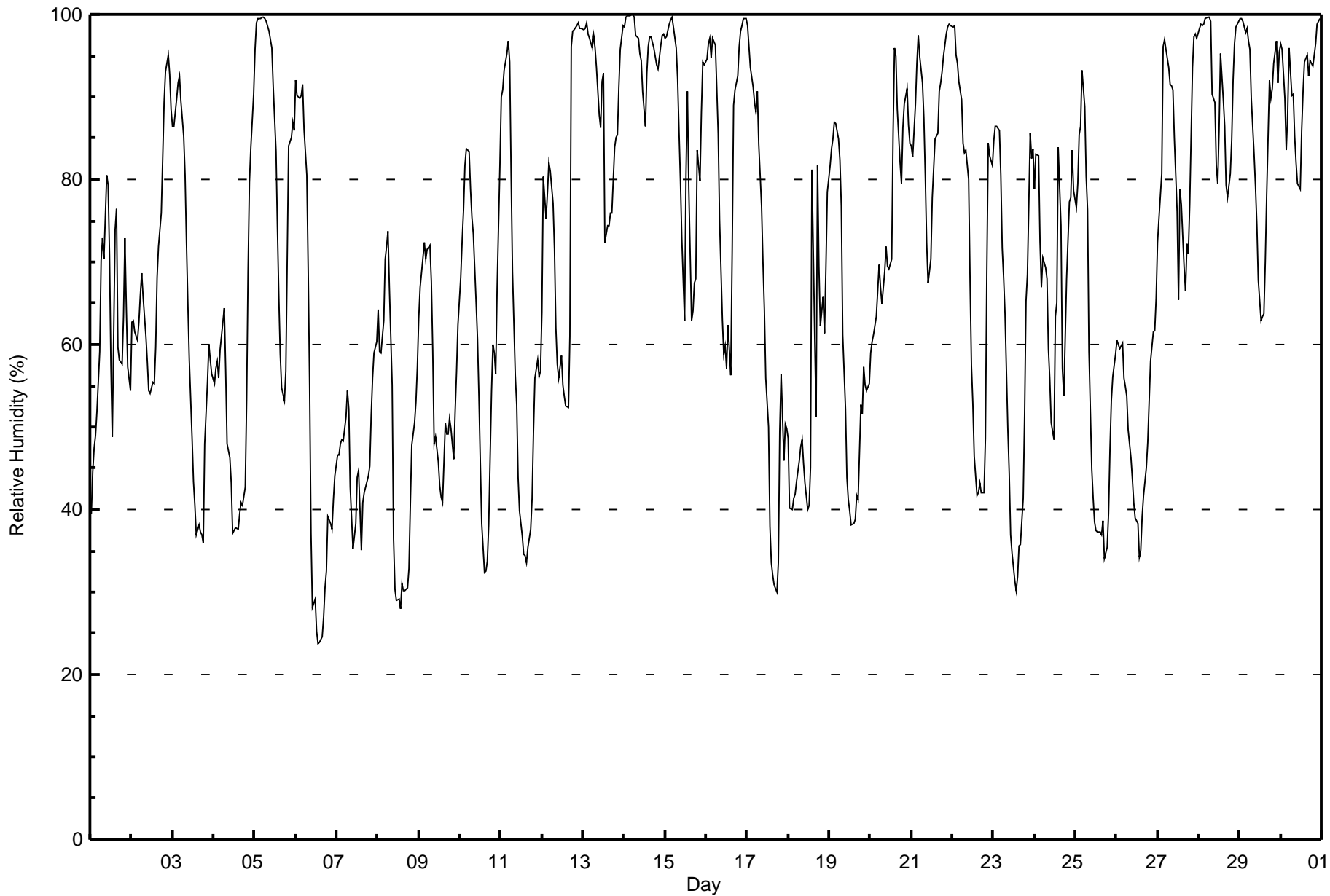
Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Stony Mountain - June 2017

Maximum Value: 100 % on Jun 14 05:00																	Maximum Daily Average: 96.3 % on Jun 14																	Hours in Service: 720															
Minimum Value: 24 % on Jun 6 14:00																	Minimum Daily Average: 46.4 % on Jun 7																	Hours of Data: 720															
Maximum Diurnal Average: 81.9 % at hour 5																	Minimum Diurnal Average: 55.6 % at hour 14																	Hours of Missing Data: 0															
Monthly Average: 69.4 %																	Percentiles: P ₁ = 29 P ₁₀ = 39 Q ₁ = 52 Median = 70 Q ₃ = 90 P ₉₀ = 97 P ₉₉ = 100																	Hours of Calibration: 0															
																																		Percent Operational Time: 100.0															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	39	45	48	49	52	59	70	73	70	80	79	71	57	49	74	76	60	58	58	63	73	65	57	54	61.7	80																							
2-Jun	63	63	62	60	63	66	69	66	61	58	54	54	55	55	60	68	72	76	82	89	93	95	93	88	69.4	95																							
3-Jun	86	87	90	92	93	90	85	81	72	65	58	49	43	41	37	38	37	37	36	48	55	60	58	56	62.2	93																							
4-Jun	55	57	58	56	59	63	64	57	48	46	43	37	38	38	39	41	41	43	53	69	80	84	90	54.0	90																								
5-Jun	96	99	99	100	100	100	99	99	98	97	96	91	83	74	66	59	55	53	57	70	84	85	87	86	84.7	100																							
6-Jun	92	90	90	90	92	86	81	69	55	37	28	29	25	24	24	25	27	30	33	39	38	38	41	44	51.1	92																							
7-Jun	47	47	48	48	48	51	54	52	43	35	37	38	44	45	35	41	42	43	44	45	51	56	59	60	46.4	60																							
8-Jun	64	59	59	63	70	72	74	67	55	36	30	29	29	28	31	30	30	31	33	41	48	50	53	57	47.5	74																							
9-Jun	63	67	71	72	70	72	72	68	59	48	49	46	43	42	41	50	49	49	51	50	46	52	57	62	56.2	72																							
10-Jun	68	73	76	82	84	83	79	75	73	65	61	54	46	38	32	32	34	38	54	60	59	56	67	82	61.3	84																							
11-Jun	90	91	93	95	97	94	81	69	56	53	44	40	37	34	34	34	35	38	41	50	56	58	56	57	59.7	97																							
12-Jun	64	80	75	78	82	81	77	71	62	58	56	59	55	54	53	52	61	96	98	98	99	99	98	98	75.2	99																							
13-Jun	98	98	99	98	97	96	97	96	94	88	86	92	93	72	74	74	76	76	84	85	85	91	96	99	89.4	99																							
14-Jun	99	100	100	100	100	100	100	100	97	97	95	94	91	86	93	96	97	96	95	94	93	96	98	98	96.3	100																							
15-Jun	97	97	99	99	100	98	96	92	86	80	73	63	81	91	79	63	64	68	68	84	80	88	94	94	84.7	100																							
16-Jun	95	96	97	95	97	96	91	86	75	63	59	60	57	62	56	71	89	91	93	96	98	99	100	100	84.2	100																							
17-Jun	99	96	94	91	89	88	91	84	77	70	64	56	50	38	34	32	31	30	34	49	56	46	50	50	62.5	99																							
18-Jun	49	40	40	41	42	43	46	48	48	46	43	40	40	45	81	61	51	82	70	62	66	61	69	78	53.9	82																							
19-Jun	82	84	85	87	87	85	82	77	61	52	44	41	40	38	38	39	42	41	53	52	57	55	54	55	59.6	87																							
20-Jun	59	60	61	63	66	70	67	65	69	72	70	69	70	86	96	95	89	82	80	86	89	91	87	84	76.1	96																							
21-Jun	84	83	89	94	97	95	92	87	80	72	67	70	78	81	85	86	91	92	93	95	98	98	99	99	87.7	99																							
22-Jun	99	99	95	94	92	90	84	83	84	80	68	57	53	46	42	42	43	42	42	49	69	84	83	82	70.9	99																							
23-Jun	85	86	86	86	80	72	68	64	50	44	37	35	31	30	32	36	36	41	52	65	68	86	83	84	59.9	86																							
24-Jun	79	83	83	73	67	70	69	68	59	56	51	48	63	65	84	74	57	54	61	68	77	78	84	79	68.8	84																							
25-Jun	77	80	85	86	93	89	80	76	59	45	41	38	37	37	37	37	39	34	35	40	47	53	56	59	56.8	93																							
26-Jun	60	60	60	60	56	55	54	50	46	44	41	39	38	34	35	39	42	45	48	53	58	61	62	66	50.2	66																							
27-Jun	72	75	81	96	97	96	94	92	91	91	85	76	65	79	77	69	67	72	71	77	94	97	98	97	83.7	98																							
28-Jun	98	99	99	99	99	100	100	99	90	89	82	79	86	95	90	87	79	78	81	85	92	96	98	99	91.7	100																							
29-Jun	100	100	99	98	98	97	96	90	83	79	74	68	63	63	64	70	78	92	90	91	94	97	92	95	86.3	100																							
30-Jun	96	96	90	84	88	96	90	90	85	82	79	79	86	91	94	95	93	94	94	94	97	99	99	100	91.3	100																							
																								78.5	79.6	80.3	81.0	81.9	81.7	80.1	76.4	69.6	64.2	59.8	56.6	55.8	55.6	57.3	57.1	56.8	60.0	62.4	67.7	73.0	75.7	77.0	78.4	Diurnal Average	
																								100	100	100	100	100	100	100	99	98	97	96	92	93	95	96	97	97	96	98	98	99	99	100	100	Diurnal Maximum	





Wood Buffalo Environmental Association
Summary of Hour Averages

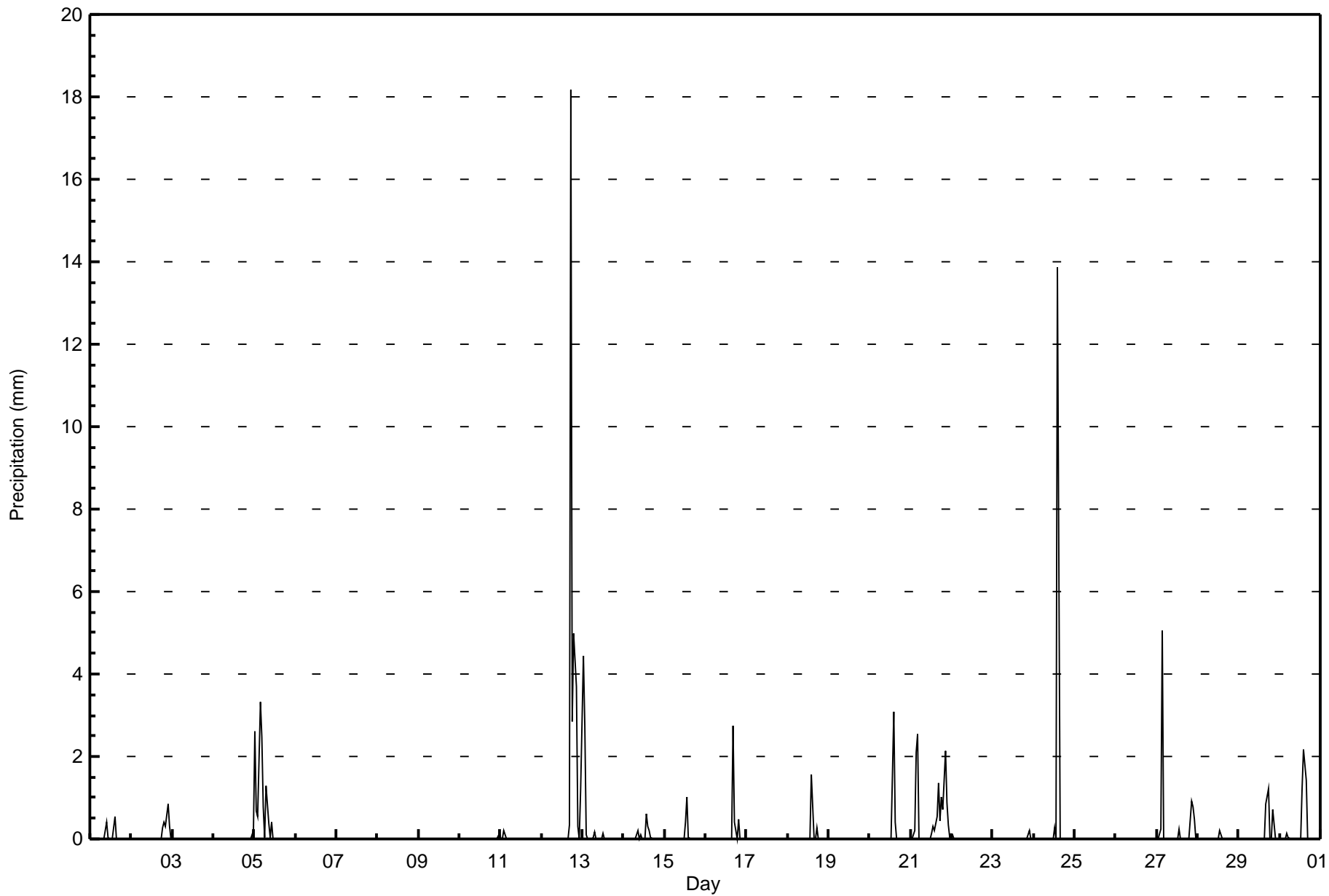
Precipitation (PC) - mm
Stony Mountain - June 2017

Maximum Value: 18.2 mm on Jun 12 18:00 Maximum Daily Total: 31.5 mm on Jun 12																				Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Minimum Value: 0.0 mm on Jun 1 01:00 Minimum Daily Total: 0.0 mm on Jun 3 Maximum Diurnal Total: 21.7 mm at hour 15 Minimum Diurnal Total: 0.0 mm at hour 12 Monthly Total: 111.81 mm Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 3.1																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	0.9	0.3	0.0	2.2	0.9
3-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
5-Jun	2.6	0.7	0.5	3.3	2.5	0.8	0.1	1.3	0.4	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	3.3
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
11-Jun	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	18.2	2.9	5.0	3.7	0.3	0.0	1.2	31.5	18.2	
13-Jun	4.5	2.7	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	4.5	
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.6	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.6	
15-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.4	0.0	0.5	0.0	0.0	0.0	0.0	3.6	2.8	
17-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.6	
19-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	3.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.1	
21-Jun	0.0	0.0	0.2	2.1	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.5	1.4	0.4	1.0	0.7	2.1	0.9	0.3	0.0	12.9	2.5	
22-Jun	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.2	
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.1	13.9	
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Jun	0.0	0.0	0.2	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.8	0.5	0.0	7.7	5.1
28-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.2	0.0	0.0	0.7	0.0	0.0	0.0	2.8	1.2	
30-Jun	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.2	2.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	2.2	
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - June 2017

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	669	93.05	93.05
0.4 - 0.5	13	1.81	94.85
0.6 - 0.7	4	0.56	95.41
0.8 - 1.4	14	1.95	97.36
1.5 - 10	17	2.36	99.72
> 10	2	0.28	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

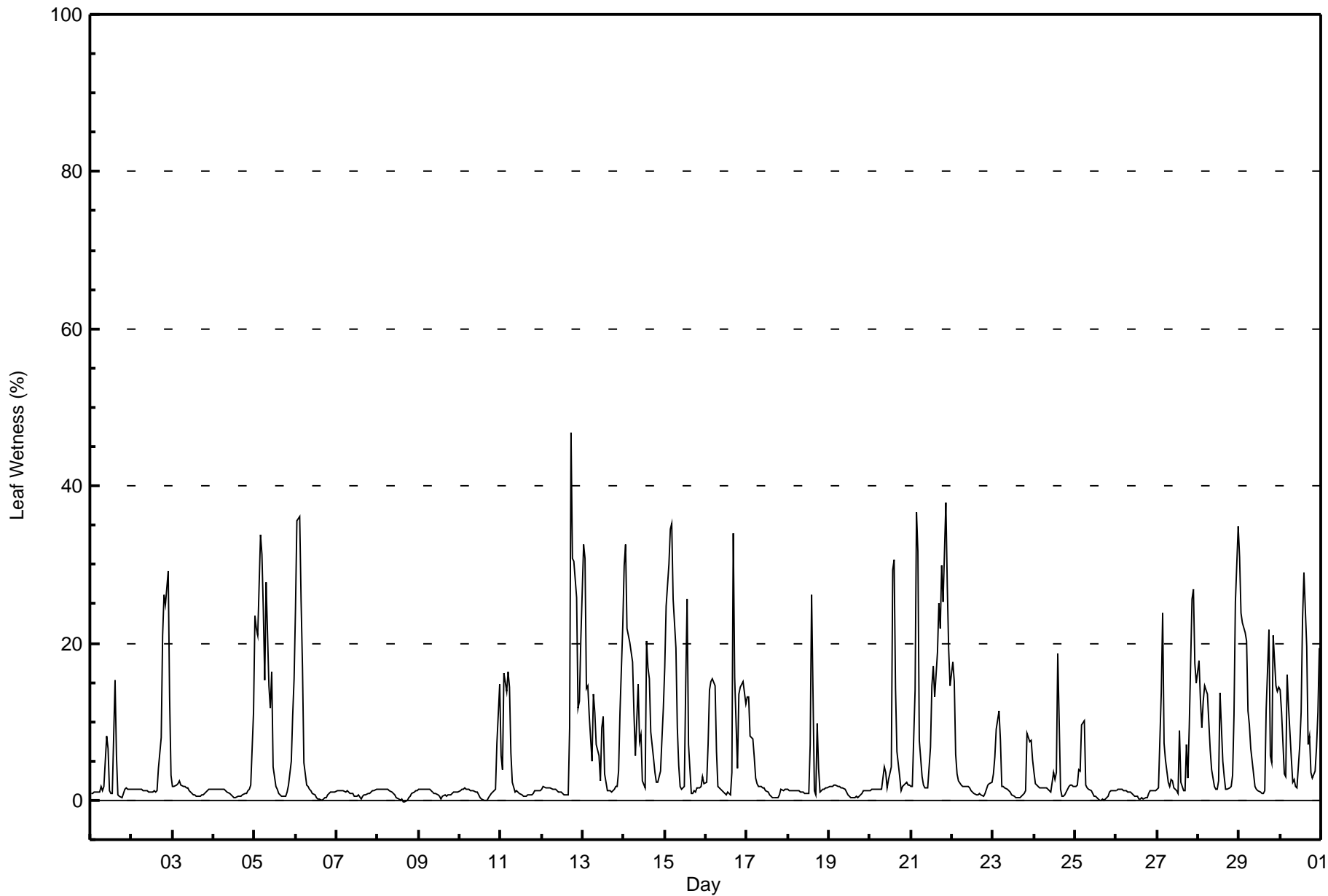
Stony Mountain - June 2017

Maximum Value: 47 % on Jun 12 18:00																	Maximum Daily Average: 15.6 % on Jun 21										Hours in Service: 720																					
Minimum Value: 0 % on Jun 8 17:00																	Minimum Daily Average: 0.8 % on Jun 8										Hours of Data: 720																					
Maximum Diurnal Average: 10.1 % at hour 4																	Minimum Diurnal Average: 1.9 % at hour 12										Hours of Missing Data: 0																					
Monthly Average: 5.5 %																	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 1 Q ₃ = 7 P ₉₀ = 17 P ₉₉ = 35										Hours of Calibration: 0																					
																											Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	1	1	1	1	1	1	2	1	2	8	7	1	1	1	15	6	1	1	0	1	1	2	1	1	2.4	15																						
2-Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	8	21	26	25	29	13	3	6.2	29																						
3-Jun	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	2																						
4-Jun	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	2	11	1.5	11																						
5-Jun	24	22	21	34	31	24	15	28	15	12	16	4	2	1	1	1	1	1	1	2	5	11	15	11.9	34																							
6-Jun	24	35	36	25	17	5	2	2	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	6.6	36																						
7-Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	0.9	1																						
8-Jun	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.8	1																						
9-Jun	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1.0	1																						
10-Jun	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	7	15	1.8	15																						
11-Jun	6	4	16	14	16	14	6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3.9	16																						
12-Jun	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	9	47	31	30	26	12	13	20	8.6	47																						
13-Jun	33	31	14	15	11	5	13	11	7	6	2	9	11	3	1	1	1	1	1	2	2	4	11	22	9.1	33																						
14-Jun	30	33	22	20	19	18	11	6	15	7	8	2	2	20	17	16	9	5	3	2	2	4	8	12	12.1	33																						
15-Jun	17	25	30	35	35	26	19	9	4	2	1	2	15	26	7	1	1	1	2	2	2	3	2	2	11.1	35																						
16-Jun	2	7	14	15	16	14	6	2	2	1	1	1	1	1	4	34	16	4	14	14	15	15	12	8.8	34																							
17-Jun	13	13	8	8	5	3	2	2	2	2	2	1	1	1	0	0	0	0	0	1	1	1	1	1	2.9	13																						
18-Jun	1	1	1	1	1	1	1	1	1	1	1	1	7	26	1	1	10	4	1	1	1	2	2	2	2.9	26																						
19-Jun	2	2	2	2	2	2	2	2	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1.2	2																						
20-Jun	1	1	1	1	1	1	1	1	4	4	2	3	4	29	31	14	6	3	1	2	2	2	2	2	5.1	31																						
21-Jun	2	2	14	37	32	8	3	2	2	2	2	7	15	17	13	19	25	22	30	25	38	27	19	15	15.6	38																						
22-Jun	18	15	6	3	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2.9	18																						
23-Jun	3	5	9	11	8	2	2	2	1	1	1	1	0	0	0	0	0	1	1	1	8	7	8	5	3.3	11																						
24-Jun	4	2	2	2	2	2	2	2	1	1	1	4	3	4	19	1	1	0	1	1	2	2	2	2	2.5	19																						
25-Jun	2	2	4	4	10	10	2	2	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1.9	10																						
26-Jun	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0.9	1																						
27-Jun	1	2	14	24	7	5	2	2	3	2	2	1	1	9	2	1	1	7	3	9	26	27	17	15	7.6	27																						
28-Jun	18	13	9	13	15	14	10	6	4	2	1	1	2	14	5	3	1	1	2	2	3	11	25	35	8.7	35																						
29-Jun	31	24	23	21	20	11	10	7	3	2	1	1	1	1	1	1	12	22	6	5	21	15	14	14	11.1	31																						
30-Jun	14	11	3	3	16	12	5	2	3	2	2	7	11	23	29	20	7	8	3	3	4	7	11	19	9.4	29																						
																								8.6	8.8	8.8	10.1	9.4	6.4	4.4	3.5	2.9	2.3	2.1	1.9	2.6	5.4	5.8	3.1	3.9	5.3	4.0	4.6	6.5	6.2	6.6	7.9	Diurnal Average
																								33	35	36	37	35	26	19	28	15	12	16	9	15	29	31	20	34	47	31	30	38	29	25	35	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (LW) - %
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - June 2017

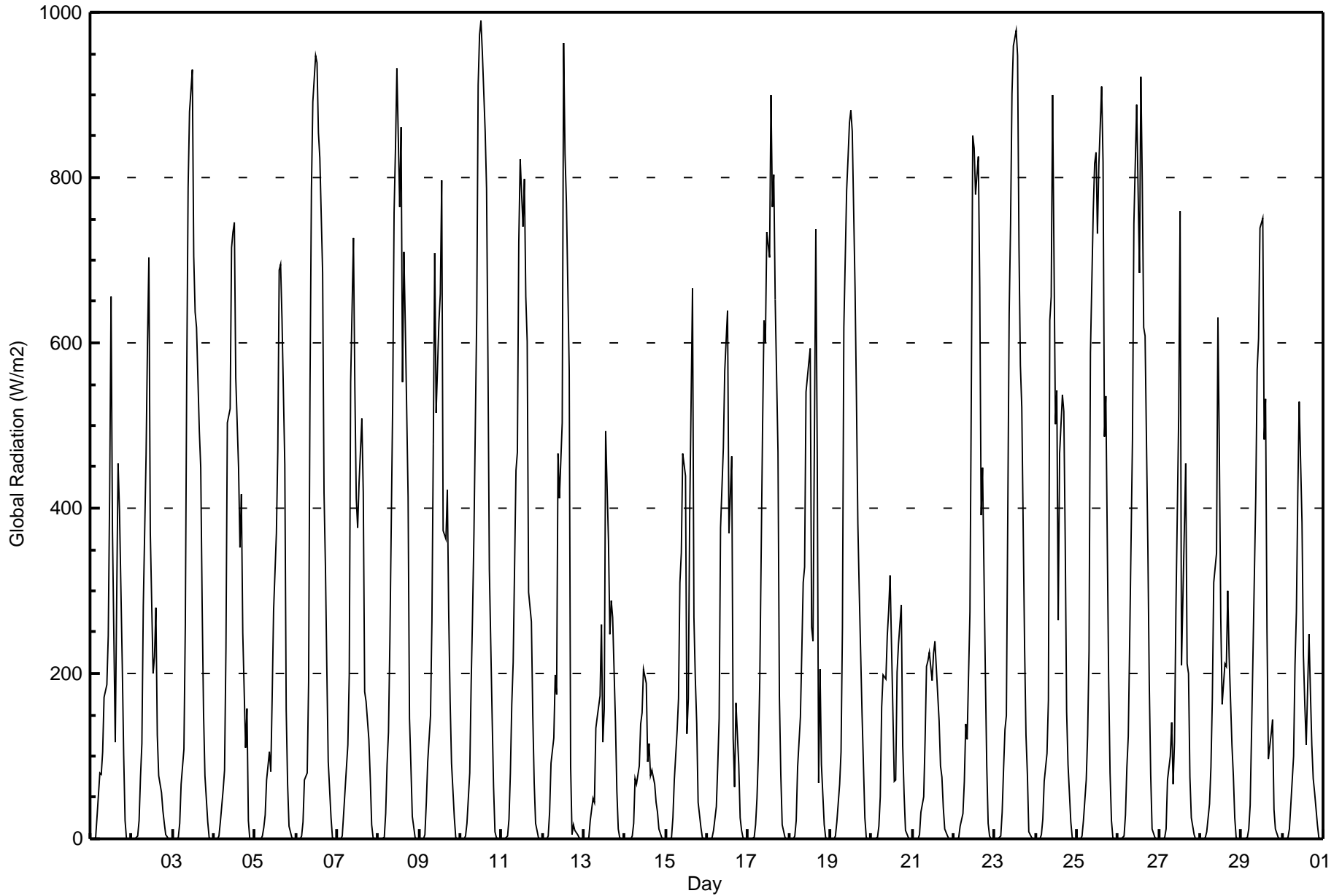
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	31	4.34	4.34
0.4 - 0.5	35	4.90	9.24
0.6 - 0.7	46	6.44	15.69
0.8 - 1.4	232	32.49	48.18
1.5 - 10	209	29.27	77.45
> 10	142	19.89	97.34

Total Number of Valid Hours: 714

Total Number of Hours: 720



Maximum Value: 989 W/m2 on Jun 10 13:00														Maximum Daily Average: 339.8 W/m2 on Jun 10														Hours in Service: 720	
Minimum Value: 0 W/m2 on Jun 1 01:00														Minimum Daily Average: 60.7 W/m2 on Jun 14														Hours of Data: 720	
Maximum Diurnal Average: 604.6 W/m2 at hour 12														Minimum Diurnal Average: 0.1 W/m2 at hour 2														Hours of Missing Data: 0	
Monthly Average: 222.1 W/m2														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 2 Median = 92 Q ₃ = 376 P ₉₀ = 703 P ₉₉ = 945														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	0	0	0	1	28	80	78	104	172	187	246	418	656	373	116	289	454	398	210	102	22	1	0	0	163.9	656			
2-Jun	0	0	0	3	22	75	115	281	465	601	703	372	201	220	280	125	76	56	34	19	5	0	0	0	152.2	703			
3-Jun	0	1	0	2	18	66	109	259	559	789	880	931	706	638	618	494	449	284	153	76	21	1	0	0	293.9	931			
4-Jun	0	0	0	3	21	59	83	231	504	520	715	734	746	558	449	352	416	250	110	158	22	1	0	0	247.2	746			
5-Jun	0	0	0	0	3	14	29	71	105	81	172	276	369	470	688	695	628	453	157	67	16	1	0	0	179.0	695			
6-Jun	0	0	0	3	21	70	80	190	550	784	891	948	939	855	824	684	419	329	206	94	26	2	0	0	329.8	948			
7-Jun	0	0	0	3	31	86	114	198	553	727	546	412	377	431	508	419	179	166	120	72	17	1	0	0	206.6	727			
8-Jun	0	0	0	2	31	89	130	239	527	758	836	932	764	860	552	711	622	414	146	88	26	2	0	0	322.1	932			
9-Jun	0	0	0	6	45	93	149	262	478	708	516	626	660	796	374	362	423	271	166	92	26	2	0	0	252.3	796			
10-Jun	0	0	0	3	19	80	186	271	370	636	912	973	989	951	856	786	577	326	145	63	8	1	0	0	339.8	989			
11-Jun	0	0	0	3	23	79	163	214	446	468	723	821	740	798	656	602	298	263	149	67	18	2	0	0	272.3	821			
12-Jun	0	0	0	3	32	91	121	198	175	467	412	504	963	829	770	566	88	5	16	10	6	1	0	0	219.0	963			
13-Jun	0	0	0	2	22	50	44	134	147	173	260	117	158	494	360	248	288	268	141	58	11	1	1	0	124.0	494			
14-Jun	0	0	0	1	4	19	73	66	88	139	153	205	188	92	115	76	82	67	45	31	12	1	0	0	60.7	205			
15-Jun	0	0	0	2	25	71	130	169	311	346	466	440	128	170	394	667	267	192	140	43	14	1	0	0	165.7	667			
16-Jun	0	0	0	1	11	39	89	146	376	473	566	604	640	370	463	123	63	165	89	25	10	1	0	0	177.1	640			
17-Jun	0	0	0	1	17	49	102	191	498	626	600	733	704	900	765	803	653	467	173	78	18	2	1	0	307.5	900			
18-Jun	0	0	0	3	22	87	148	227	310	329	541	576	593	256	239	737	466	67	206	90	17	2	0	0	204.9	737			
19-Jun	0	0	0	3	20	66	105	256	618	784	824	867	882	855	665	533	381	299	151	88	26	2	0	0	309.4	882			
20-Jun	0	0	0	2	16	51	158	199	193	245	276	318	154	69	71	202	236	283	114	55	11	1	0	0	110.6	318			
21-Jun	0	0	0	0	5	31	51	120	208	215	225	192	224	239	206	143	87	75	37	12	3	0	0	0	86.4	239			
22-Jun	0	0	0	1	15	30	70	139	120	274	547	851	836	780	826	668	391	449	200	88	18	3	1	1	262.9	851			
23-Jun	0	1	1	4	33	85	133	149	635	744	901	960	979	948	717	573	522	232	125	78	9	1	0	0	326.2	979			
24-Jun	0	0	0	4	24	70	103	168	626	656	901	503	543	264	467	537	516	359	154	89	20	3	0	0	250.2	901			
25-Jun	0	0	0	3	22	70	125	227	589	759	817	830	733	815	911	818	486	535	194	80	22	2	0	0	335.0	911			
26-Jun	0	0	0	3	29	86	124	237	483	744	817	888	684	923	794	619	609	352	186	78	13	1	0	0	319.6	923			
27-Jun	0	0	0	1	13	72	100	141	67	117	276	513	759	209	292	454	212	200	75	26	5	1	0	0	147.2	759			
28-Jun	0	0	0	2	9	42	86	169	310	345	631	470	270	162	211	209	299	221	114	76	25	2	1	1	152.3	631			
29-Jun	0	0	0	2	12	41	129	222	415	567	605	740	751	483	532	252	97	127	144	36	11	2	0	0	215.3	751			
30-Jun	0	0	0	1	12	41	100	210	274	417	529	384	222	162	114	247	178	113	73	57	17	1	0	0	131.3	529			
														0.1 0.1 0.1 2.4 20.0 62.7 107.5 189.6 372.3 489.3 582.8 604.6 585.2 532.4 494.5 466.5 348.7 256.2 132.4 66.6 15.7 1.4 0.1 0.1														Diurnal Average	
														0 1 1 6 45 93 186 281 635 789 912 973 989 951 911 818 653 535 210 158 26 3 1 1														Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Stony Mountain - June 2017

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	252	35.00	35.00
21 - 100	115	15.97	50.97
101 - 300	153	21.25	72.22
301 - 600	97	13.47	85.69
601 - 900	87	12.08	97.78
> 900	16	2.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Stony Mountain - June 2017

Maximum Speed: 18 km/h on Jun 9 17:00	Maximum Daily Speed Average: 12.1 km/h on Jun 21	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 1 17:00	Minimum Daily Speed Average: 0.7 km/h on Jun 15	Hours of Data: 719
Maximum Diurnal Speed Average: 3.4 km/h at hour 6	Minimum Diurnal Speed Average: 0.2 km/h at hour 19	Hours of Missing Data: 1
Monthly Average Velocity: 1.7 km/h 255.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 11 P ₉₉ = 16	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SSE8	S6	S7	SSW8	WSW5	WSW5	WNW5	WNW4	WNW3	W6	WNW6	NW5	NW5	NW6	WNW3	NE2	W0	S3	SE3	SSE3	SSW5	SW7	SW8	SW9	WSW2.9	SW9	
2-Jun	SW10	WSW8	W11	W11	W9	WNW8	W5	W6	W9WNW10	WNW8	WNW8	W9WNW10	W16	W17	W14	W12	W14	W12	W11	W11	W13WNW15	W10.5	W17				
3-Jun	WNW13WNW12	W12	W11	W10	W11	WNW9	WNW9WNW10	WNW8	W9	WNW8	W9	W7	WNW6	WNW5	WSW6	WSW5	SW5	SSW4	SSW5	SSW5	SSW6	SSW6	W6.9	WNW13			
4-Jun	SSW6	SSW6	SSW7	W7	WNW7	WNW5	SE2	E3	E3	E3	ENE6	E7	E8	E9	ESE9	E8	SSE9	SSE8	SSW4	NNW6	N6	N4	NNE6	NNE7	E1.7	E9	
5-Jun	N5	NNE7	NNW4	N4	N4	WNW7	NW6	NW6	WNW9	NW8	NNW6	NNW6	N8	N9	N9	NNE10	NNE9	NNE8	ENE4	ESE3	SE3	S3	S4	S4	N3.8	NNE10	
6-Jun	SSE4	S5	SSW9	SSW11	SSW12	SSW13	SSW11	SSW8	SW6	WSW7	SW10	SW9	WSW7	W5	SW6	WNW3	SW3	SW3	SW4	SSW4	SW6	SW6	SW7	SW8	SW6.5	SSW13	
7-Jun	SW8	SSW8	SSW8	SSW8	SSW8	SSW8	SSW9	SW6	WSW6	SSW2	ESE2	SE3	E4	E4	E3	E5	E5	ENE4	ENE4	E6	E4	ESE5	ESE6	SE6	SSE2.9	SSW9	
8-Jun	SSE4	SSE4	S4	SSE3	SE3	E2	E3	ESE4	ESE5	SE8	SE9	SE10	SE9	SE11	ESE9	ESE9	ESE9	ESE8	ESE8	SE4	ESE4	ESE4	ESE5	SE5	SE5.8	SE11	
9-Jun	SE4	ESE3	E3	NE4	NE5	NNE7	NE7	NE8	NE7	ENE10	NE14	NE14	ENE14	ENE16	ENE13	NE15	NE18	NE17	NE16	NE16	NE13	NE13	NE14	NE14	NE10.7	NE18	
10-Jun	NE12	NE10	NE11	NE10	NE11	NE11	NE10	NE10	NE9	NE8	NNE8	NNE7	NE6	E5	NE3	NNE1	SW2	NNE3	WNW2	W0	NW4	WNW5	WNW6	WNW4	NE5.3	NE12	
11-Jun	WNW4	NW4	NNE8	NW3	WNW4	WNW5	NW5	NW7	NW8	WNW9WNW10WNW11WNW10	NW9	WNW9	W10	WNW8	WNW8	WNW7	W5	WSW5	WSW8	WSW8	WSW7	WNW6.6	WNW11				
12-Jun	WSW5	SW4	SW5	SSW7	SSW7	SSW7	S7	S6	SSE10	SSE12	S13	S12	SSW16	SSW16	S15	S16	SSW9	W8	SSE2	W3	E4	SSE6	SSE7	SSE4	S7.2	SSW16	
13-Jun	SSW6	S5	SSE6	SSE5	S8	S6	SW2	SSW4	SSW5	SW3	SSW6	SSW6	SSE4	S5	SSE5	SE5	ESE4	ESE6	SE6	SE5	SE5	SSE3	NW1	NNE3	SSE3.7	S8	
14-Jun	N3	NE6	NE5	NNE5	NNE6	N3	NNE5	NNE8	NNE9	NNE8	NNE8	NNE9	NNE10	NE10	NNE11	NNE10	NNE9	NNE9	NNE8	NNE7	NNE7	N3	N3	NNW3	NNE6.8	NNE11	
15-Jun	NNE4	NE4	E3	ENE2	WNW1	NW2	NW3	NNW3	WNW5	W6	NNW2	SE2	ESE2	SSE2	E1	E4	E3	NE4	ENE4	NE2	E2	SSW3	SSW2	S2	NE0.7	W6	
16-Jun	SSE1	S1	S2	ESE1	ESE3	SE3	SE3	ESE3	S4	S2	WNW2	ESE4	ESE4	ESE4	ESE3	SW6	SW5	ENE0	NNW2	NNW1	SSW1	S1	SSE2	SSW3	SSE1.5	SW6	
17-Jun	WSW3	W5	W6	WSW6	WSW8	W9	W10WNW11WNW10WNW10WNW11	NW9	WNW9WNW11	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW9	WNW7.1	WNW11
18-Jun	SW6	WSW7	W8	W7	W8	W7	W6	WSW6	SW7	SW10	SW9	SSW5	S5WSW10	WSW9	WSW6	W8	WNW6	WNW5	W5	W5	W8	W12	WNW7	WSW6.6	W12		
19-Jun	WNW9WNW10WNW10	WNW9	WNW9	WNW9	WNW9	WNW6	WNW6	NW5	NW5	WNW5	W4	WSW5	WSW6	W2	WNW3	W2	WSW2	S2	SSW3	SW5	SW7	SSW7	SW7	W4.9	WNW10		
20-Jun	SSW7	SSW6	SSW7	SSW7	SSW7	S6	S7	S8	SSW8	SSE6	SSE5	SSE6	S5	WSW3	ESE1	SE7	SE8	SE8	SE8	SE8	SE5	SSE5	S5	W8WNW10	S4.7	WNW10	
21-Jun	W10WNW13	W14	W7	SW4	W8	W12WNW14WNW14WNW15WNW16WNW14WNW13WNW14	W13WNW13WNW12WNW14WNW14WNW16WNW13WNW12WNW10	NW8	WNW12.1	WNW16																	
22-Jun	NW7	NNW7	N9	NNW7	NNW7	NNW7	N10	N10	NNW7	NNW6	NW9	N9	NNW10	NW10	NW8	NW8	NNW7	NNW7	N7	NW4	SSW1	WNW0	NW2	WNW3	NNW6.4	N10	
23-Jun	WNW3	WNW3	WNW2	W2	WSW4	WNW4	WNW5	NW4	NNW4	N4	NNW6	NW7	NW7	NW7	NNE11	NNE10	NNE9	NE4	ENE3	SE2	NNW1	SSW4	WSW5	SW5	NNW3.0	NNE11	
24-Jun	SW7	SW7	W6	W7	WSW6	W6	WNW6	W4	WNW5	WNW5	W7	WNW6	NE5	ESE2	ESE5	SSE4	S1	NE5	NE2	NNE1	N1	S4	SSW7	SW7	WSW2.6	SW7	
25-Jun	SW7	SW6	SW6	SW6	SSW7	SW6	SSW4	S5	S5	SSE4	SSE5	S4	SSW3	S5	S6	SSE7	SSE6	S7	S8	SSW7	S6	SSE4	SSE7	SSE7	S5.4	S8	
26-Jun	S7	SSE8	S7	S7	S10	S11	SSE12	SSE15	SSE15	SSE14	SSE15	SSE14	SSE13	SSE13	S12	S11	SSE10	SSW8	SSE7	SE5	SE5	ESE6	ESE9	ENE3	SSE9.4	SSE15	
27-Jun	NE2	ESE2	WSW9	NW6WNW12WNW11	WNW8	NW3	WNW3	W6	W5	WSW5	W4	W9	W10WNW10WNW10	WNW9	W6	WSW6	SSW7	SSW6	SW6	SW6	SW6	SW6	SW6	SW6	W5.6	WNW12	
28-Jun	SSW5	SSW6	SSW5	S3	ESE3	SE3	NE4	NE6	NE6	NE9	NE9	NNE9	NE11	NE10	ENE10	NE11	NE12	ENE7	NE8	ENE4	NE3	N2	NNW1	AF	NE4.5	NE12	
29-Jun	W1	SSW4	SSW7	SSW6	SSW8	SSW5	SSW8	SSW9	SSW9	SW7	SW6	WSW6	WSW3	S1	SSE3	SSE6	WSW9	W3	SSW4	WSW7	WNW5	SW6	SW6	SW6	SW5.0	SSW9	
30-Jun	SW5	SW4	WSW6	WSW6	SW5	SSW4	SW7	SW7	WSW4	SW6	SSW8	SSW8	SW5	S1	NW1	WNW1	W2	WNW4	WNW4	WNW2	WNW0	WSW1	WNW2	WNW2	SW3.5	SSW8	

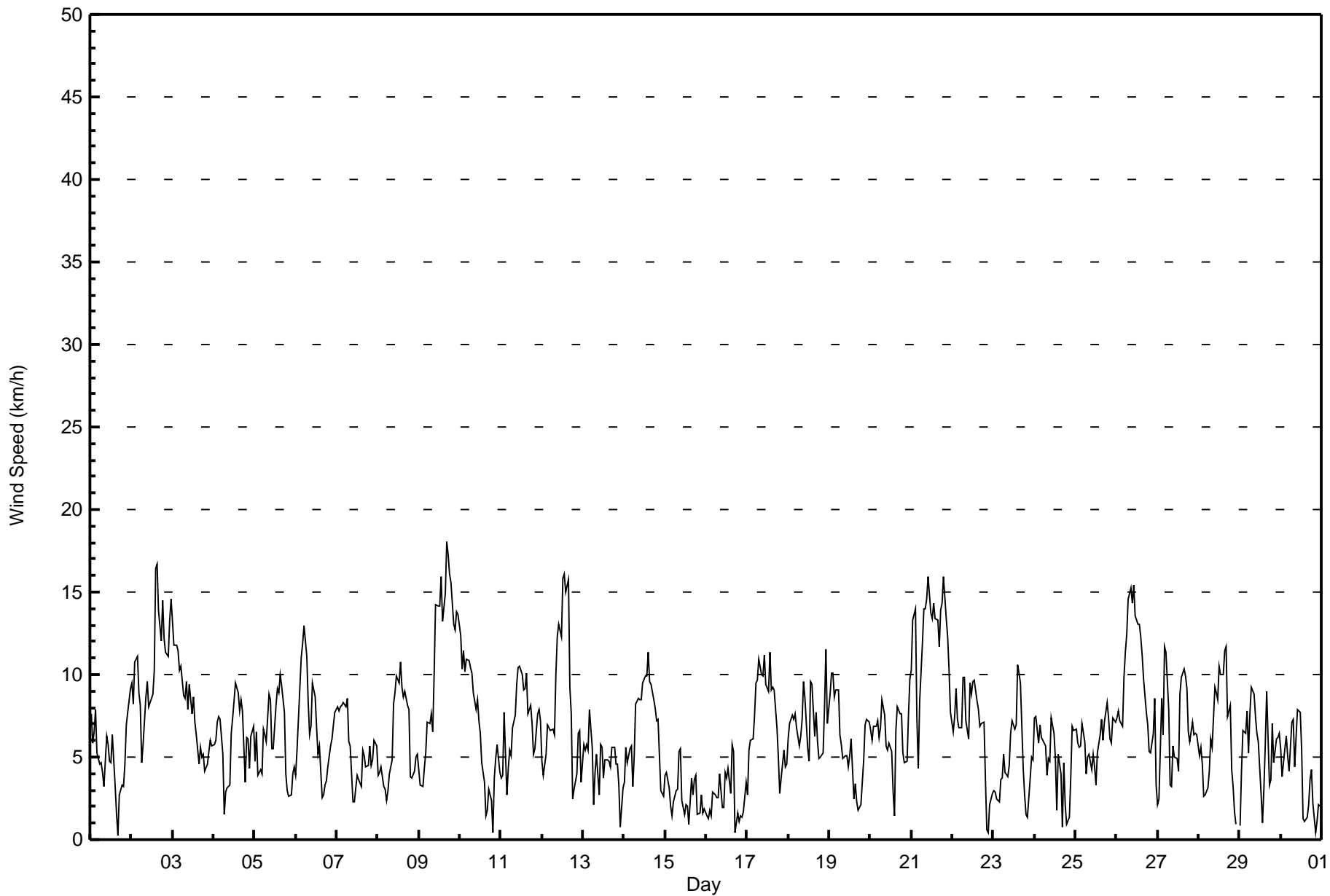
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WNW13WNW13	W14	W11	SSW12	SSW13	SSE12	SSE15	SSE15WNW15WNW16	NE14	SSW16	SSW16	W16	W17	NE18	NE17	NE16WNW16WNW13	NE13	NE14WNW15	Diurnal Maximum

AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Stony Mountain - June 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	294	40.89	40.89
6 - 11	360	50.07	90.96
12 - 19	65	9.04	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	11	7	15	9	19	24	18	20	26	26	17	17	21	39	16	9	294
6 - 11	9	28	23	4	5	10	11	18	18	47	38	25	40	53	18	13	360
12 - 19	0	0	13	3	0	0	0	9	5	4	0	0	12	19	0	0	65
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	35	51	16	24	34	29	47	49	77	55	42	73	111	34	22	719

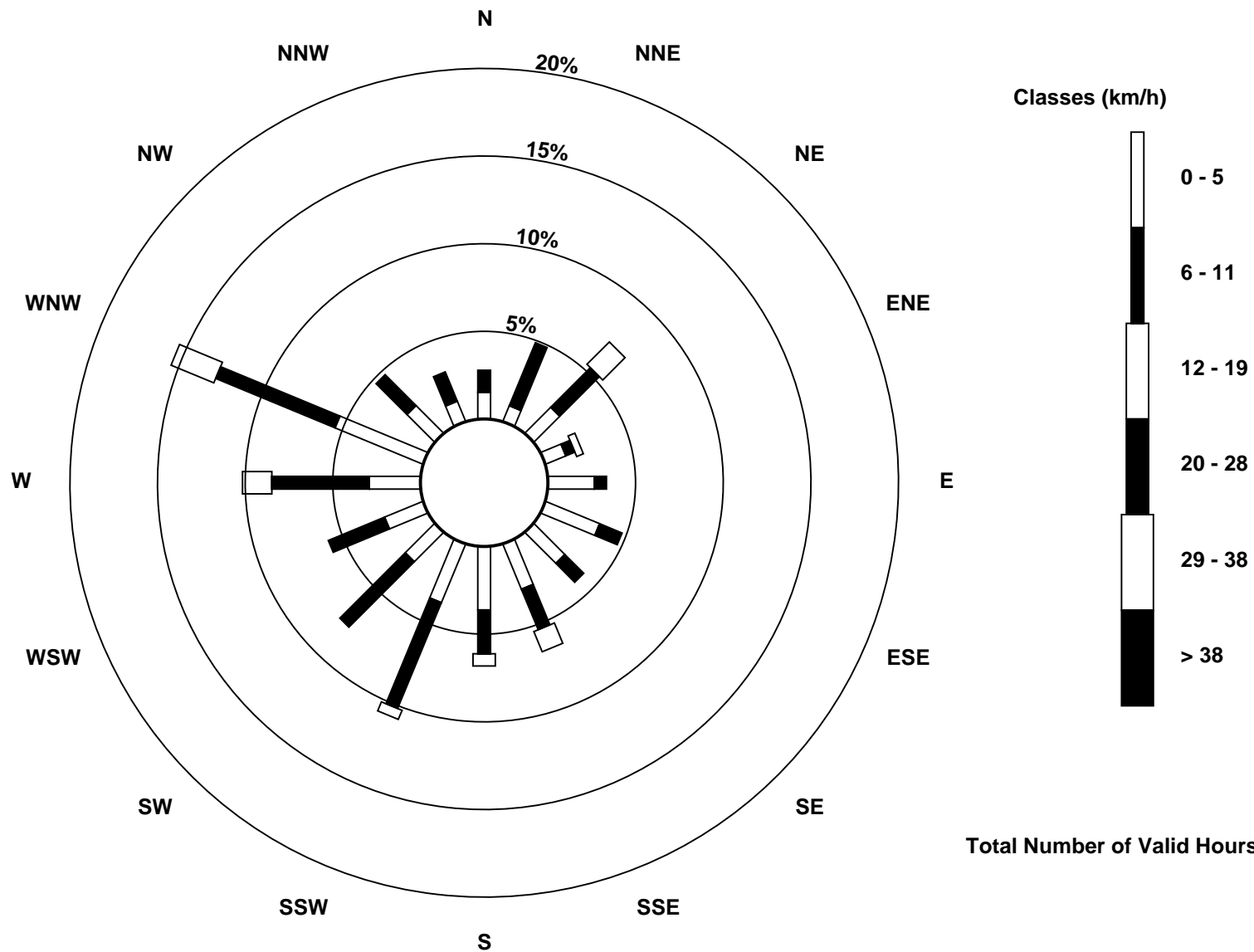
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 km/h on Jun 9 16:00	Hours of Data: 719
Minimum Value: 0 km/h on Jun 23 02:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 6	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	2	2	2	1	2	2	1	2	2	2	2	3	2	1	1	1	1	1	1	2	2	3	3
2-Jun	3	3	4	4	3	3	2	2	3	3	3	4	3	4	6	7	6	5	5	5	4	4	5	5	7
3-Jun	5	4	5	4	4	4	4	4	4	3	4	3	4	3	3	2	2	2	1	1	1	1	1	1	5
4-Jun	1	1	2	2	2	2	1	1	1	1	2	3	3	4	4	4	4	3	3	3	3	2	3	3	4
5-Jun	3	3	1	2	2	3	3	2	3	3	3	2	4	4	4	4	4	3	2	1	1	1	1	2	4
6-Jun	1	2	2	3	3	3	3	2	2	3	4	4	4	3	3	3	2	2	2	1	1	1	2	2	4
7-Jun	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	3	2	2	2	2	2	2	2	3
8-Jun	1	1	1	1	1	1	1	2	2	3	4	4	4	5	5	4	4	3	3	1	1	1	1	1	5
9-Jun	1	1	1	2	2	2	2	2	2	5	6	6	6	7	5	7	7	7	6	6	5	4	5	5	7
10-Jun	4	4	3	3	4	4	4	4	4	3	4	4	3	2	2	2	1	1	2	1	2	2	4	2	4
11-Jun	1	2	5	1	2	2	2	3	3	4	5	5	4	4	4	4	3	3	3	2	2	2	3	2	5
12-Jun	2	1	1	2	2	2	2	3	4	5	5	5	6	6	6	6	5	4	2	6	2	2	2	2	6
13-Jun	5	3	2	2	4	3	1	2	2	1	2	2	1	2	2	2	2	2	2	2	2	1	1	1	5
14-Jun	2	2	1	2	1	1	2	3	3	3	3	4	3	3	4	3	3	3	3	3	3	1	1	1	4
15-Jun	2	1	1	1	1	1	1	1	2	2	1	1	2	1	1	2	1	1	2	1	1	1	1	1	2
16-Jun	1	1	1	1	1	1	1	1	2	1	2	2	2	2	1	5	3	1	1	1	1	1	1	1	5
17-Jun	1	2	2	2	3	3	3	5	4	4	5	4	4	5	4	4	4	3	3	1	1	2	1	1	5
18-Jun	2	2	3	2	3	3	2	3	3	3	3	3	3	5	4	2	5	5	2	2	2	3	4	3	5
19-Jun	3	3	3	3	3	3	2	2	2	2	2	2	3	3	2	2	2	2	1	2	1	1	1	2	3
20-Jun	1	1	1	1	2	2	2	3	3	2	2	3	3	1	2	3	3	3	3	3	1	2	3	3	3
21-Jun	4	5	5	3	2	3	5	5	5	6	6	5	5	5	6	5	5	6	6	6	5	4	4	3	6
22-Jun	3	4	5	3	3	3	5	5	4	3	4	4	5	4	4	4	3	4	3	2	1	1	1	1	5
23-Jun	0	0	1	0	1	1	2	1	1	2	4	3	3	3	5	5	4	2	2	1	3	2	3	2	5
24-Jun	2	2	2	2	2	2	3	2	2	2	3	3	3	2	3	2	1	2	2	1	1	2	1	1	3
25-Jun	1	1	1	1	1	1	1	1	2	2	2	2	2	3	4	3	3	3	4	3	3	3	3	3	4
26-Jun	3	3	3	3	4	4	5	6	6	6	6	6	6	5	5	4	4	3	3	2	2	2	3	2	6
27-Jun	2	1	4	4	4	4	4	2	3	2	2	2	3	4	4	4	4	4	2	2	2	2	2	2	4
28-Jun	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4	5	4	3	3	2	1	2	1	AF	5
29-Jun	1	1	1	2	2	3	3	3	3	2	3	2	2	2	3	3	4	3	2	5	4	2	1	2	5
30-Jun	2	2	2	2	2	1	2	2	2	2	3	3	3	1	1	1	1	2	2	2	1	1	1	1	3

5	5	5	4	4	4	5	6	6	6	6	6	6	7	6	7	7	7	7	6	6	5	4	5	5	
Diurnal Maximum																									

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Stony Mountain - June 2017

Direction of Maximum Speed: 48 deg on Jun 9 17:00 Direction of Maximum Daily Speed Average: 284.8 deg on Jun 21	Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1
Direction of Minimum Speed: 263 deg on Jun 1 17:00 Direction of Minimum Daily Speed Average: 0.7 deg on Jun 15	Percent Operational Time: 99.9
Monthly Average Direction: 259.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	159	184	184	192	241	243	294	301	295	281	296	322	326	309	296	47	263	190	129	159	207	220	227	231	238.1
2-Jun	235	255	268	274	278	282	278	266	279	291	293	288	278	284	276	277	271	273	273	271	275	274	275	282	275.1
3-Jun	289	286	280	278	279	279	297	286	296	295	278	288	269	278	282	289	240	250	217	205	204	197	209	202	271.2
4-Jun	201	194	200	270	295	303	124	100	88	81	58	95	81	84	102	101	150	161	198	343	356	351	18	24	91.1
5-Jun	5	13	339	352	352	302	307	312	303	306	344	345	9	11	10	21	32	32	71	104	136	176	172	187	355.5
6-Jun	166	180	203	209	211	211	212	213	219	242	235	234	258	267	232	301	235	223	218	211	219	222	217	218	220.1
7-Jun	215	213	206	209	209	211	213	215	237	204	114	125	91	87	99	88	87	75	77	86	87	102	116	130	162.5
8-Jun	152	148	187	161	126	99	88	115	111	140	143	128	128	135	123	112	111	122	120	128	114	118	121	127	127.3
9-Jun	133	103	87	41	40	26	36	37	56	66	51	56	59	63	67	53	48	54	50	48	46	42	43	46	52.5
10-Jun	47	46	49	43	48	50	45	51	53	56	30	26	39	88	44	22	222	22	286	263	305	285	297	297	37.1
11-Jun	300	313	13	315	294	301	309	309	304	293	292	297	291	305	290	280	282	287	284	270	256	255	257	257	290.4
12-Jun	257	227	236	209	206	202	190	175	159	160	177	177	195	194	190	189	201	280	152	266	83	153	158	164	189.2
13-Jun	200	169	160	147	185	184	230	212	205	229	196	198	168	182	149	132	118	113	124	138	133	149	325	20	166.4
14-Jun	11	49	49	27	26	357	12	24	27	25	25	28	31	36	31	30	33	33	24	21	21	356	352	341	26.1
15-Jun	13	55	85	63	285	305	317	341	298	280	327	145	117	151	97	100	93	44	68	40	81	196	193	189	35.4
16-Jun	156	172	177	121	122	137	137	105	178	190	301	107	118	109	113	234	225	63	332	342	205	191	153	208	160.7
17-Jun	249	260	271	257	251	264	280	290	286	294	295	305	303	299	301	297	295	291	293	260	257	276	270	256	284.0
18-Jun	233	256	262	260	265	273	261	237	231	222	218	213	186	247	242	238	273	288	283	271	271	271	259	283	252.0
19-Jun	282	284	282	285	284	283	290	296	305	306	284	273	255	238	270	296	279	255	172	208	216	214	213	216	267.7
20-Jun	210	206	206	203	197	191	187	191	195	158	153	168	183	238	115	124	138	143	145	141	149	186	279	288	183.5
21-Jun	279	283	280	279	226	260	277	284	284	290	292	290	287	283	279	282	283	291	287	282	285	294	303	313	284.8
22-Jun	314	334	352	329	339	328	9	7	340	332	316	349	329	326	325	324	332	337	3	314	201	297	313	294	335.8
23-Jun	293	289	290	279	254	297	301	313	334	360	334	310	320	325	22	17	27	35	61	125	348	211	237	219	330.8
24-Jun	220	219	259	263	258	259	283	275	284	287	265	284	56	111	116	163	182	44	41	25	352	177	212	219	248.3
25-Jun	224	223	232	228	212	214	192	190	191	154	161	176	200	174	170	156	165	182	177	192	173	159	152	159	184.7
26-Jun	171	166	177	173	175	171	167	167	168	165	164	157	150	153	170	177	168	200	159	142	130	114	117	66	161.9
27-Jun	36	108	254	315	295	288	296	313	284	274	262	253	281	259	268	284	282	285	277	237	201	198	214	218	268.5
28-Jun	208	209	203	184	102	143	39	49	56	43	40	25	35	52	58	52	48	57	56	71	40	11	327	AF	53.3
29-Jun	262	204	207	213	208	194	194	204	212	221	234	252	246	174	157	150	241	274	194	245	284	215	225	218	217.4
30-Jun	225	222	243	253	236	204	217	220	258	227	204	209	220	170	323	292	276	301	285	299	290	238	288	295	236.1

238.5 238.4 246.3 251.6 248.0 254.3 266.2 264.6 263.2 268.1 271.9 274.9 300.8 280.8 281.3 311.7 281.7 320.3 288.8 253.1 241.9 222.9 235.9 243.6

Diurnal Average

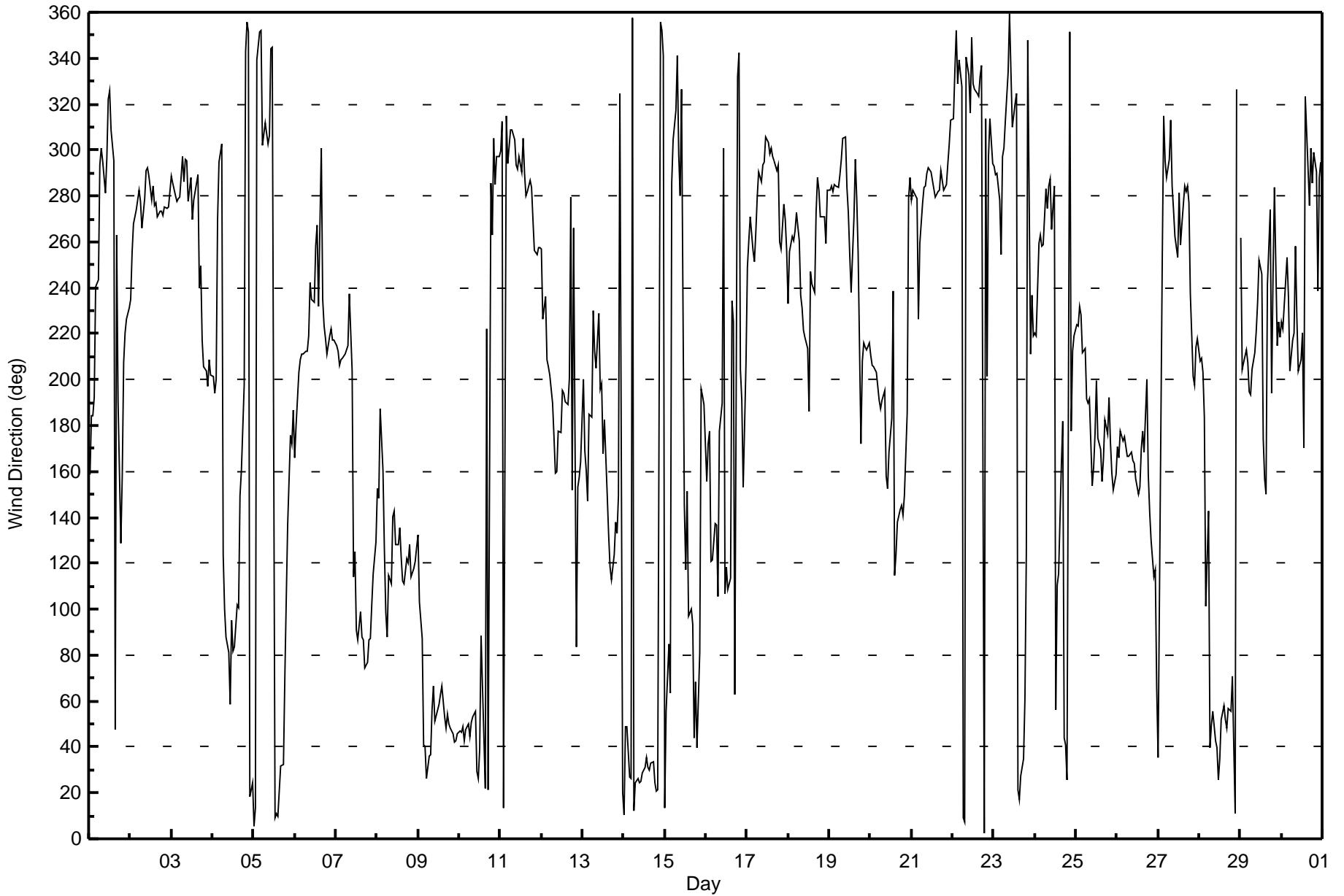
AF - Analyzer Failure

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Stony Mountain - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Stony Mountain - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 106 deg on Jun 10 16:00	Hours of Data: 719
Minimum Value: 10 deg on Jun 23 01:00	Hours of Missing Data: 1
Percentiles: P ₁ = 13 P ₁₀ = 21 Q ₁ = 27 Median = 35 Q ₃ = 45 P ₉₀ = 61 P ₉₉ = 93	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	39	32	31	23	44	31	33	37	47	37	40	55	66	54	57	67	101	45	41	36	12	16	19	25	101
2-Jun	27	34	31	31	30	25	36	31	35	32	41	34	32	32	31	32	35	37	32	31	34	33	34	30	41
3-Jun	31	33	33	34	34	31	35	44	40	48	45	54	36	45	48	57	36	40	17	15	12	14	14	13	57
4-Jun	12	16	28	33	22	19	77	44	55	45	33	43	38	37	34	40	42	45	78	48	42	48	42	26	78
5-Jun	37	33	45	49	43	39	46	44	39	44	60	62	58	49	50	42	38	36	46	18	27	25	33	28	62
6-Jun	32	27	20	20	21	21	22	22	34	40	38	41	62	59	58	78	78	49	31	15	16	18	17	17	78
7-Jun	19	19	18	17	20	20	20	24	38	82	69	53	32	33	73	36	34	30	30	31	27	21	20	22	82
8-Jun	31	37	28	28	21	29	27	35	36	39	43	42	38	41	40	39	35	36	30	23	15	16	19	18	43
9-Jun	19	19	22	24	21	19	21	27	28	31	30	30	30	31	31	30	25	27	26	23	23	23	23	24	31
10-Jun	22	21	21	21	25	25	27	30	31	37	44	53	60	62	81	106	89	46	62	93	52	34	50	38	106
11-Jun	37	51	48	42	37	49	56	53	58	43	43	50	47	53	46	40	36	39	37	32	27	32	34	32	58
12-Jun	33	34	24	18	17	19	25	35	39	38	39	37	31	32	38	35	56	47	79	106	58	29	32	67	106
13-Jun	60	40	34	29	30	33	55	41	35	45	23	25	31	29	35	27	34	29	26	27	21	39	84	28	84
14-Jun	27	23	21	28	23	34	29	22	25	23	24	29	27	25	25	26	24	29	27	27	33	27	22	22	34
15-Jun	28	33	28	56	44	42	37	56	42	40	84	79	72	47	74	58	41	26	29	29	66	28	19	61	84
16-Jun	35	24	26	39	12	28	30	26	46	78	78	56	52	34	61	78	36	104	43	70	75	36	29	20	104
17-Jun	27	30	34	35	36	34	31	32	37	42	44	57	49	45	53	50	46	52	49	37	19	28	24	22	57
18-Jun	22	29	30	30	30	31	34	35	30	29	34	53	60	38	34	42	40	61	53	36	26	30	35	33	61
19-Jun	31	29	31	32	30	31	33	38	55	67	63	63	61	50	83	70	75	87	49	23	14	17	17	17	87
20-Jun	17	15	16	17	16	21	24	26	27	37	40	44	37	43	88	30	31	35	31	30	31	33	35	30	88
21-Jun	35	30	32	36	35	34	35	33	35	36	34	35	34	34	34	35	37	36	35	33	35	35	43	53	53
22-Jun	52	59	64	61	60	58	54	53	61	73	53	66	59	59	62	68	64	60	61	73	94	44	19	20	94
23-Jun	10	10	13	22	15	25	29	40	58	72	64	58	70	61	47	45	31	49	33	35	87	68	35	26	87
24-Jun	21	22	34	29	30	29	26	40	51	54	48	49	44	90	49	45	89	26	63	54	45	45	15	15	90
25-Jun	19	23	26	25	15	18	31	32	43	60	50	61	80	57	55	44	48	46	42	32	45	49	41	43	80
26-Jun	41	42	40	43	41	39	40	39	38	41	39	41	39	41	41	39	45	36	42	36	25	22	22	49	49
27-Jun	49	43	38	54	27	27	46	59	47	33	38	46	79	34	37	35	36	36	34	36	23	23	23	23	79
28-Jun	17	19	19	28	22	41	33	27	33	25	29	32	27	30	30	27	28	30	29	32	21	39	23	AF	41
29-Jun	33	18	17	23	19	47	27	24	27	31	47	47	91	93	83	44	43	73	52	36	70	21	18	17	93
30-Jun	28	34	32	32	32	17	23	27	42	37	37	30	35	67	73	83	59	42	24	20	57	68	43	21	83

60	59	64	61	60	58	77	59	61	82	84	79	91	93	88	106	101	104	79	106	94	68	84	67	
Diurnal Maximum																								

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

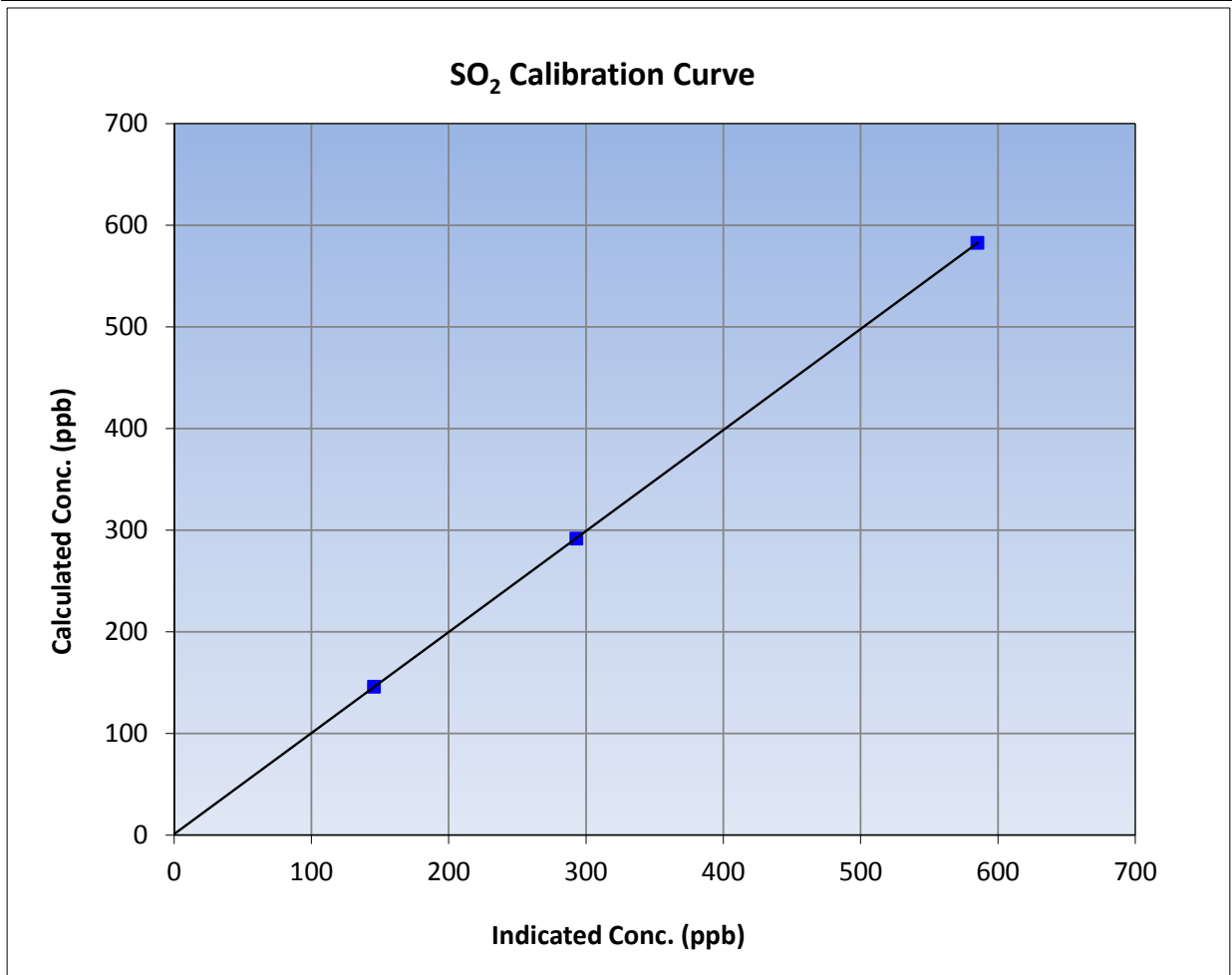
Version-03-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:55	End Time (MST)	13:47
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

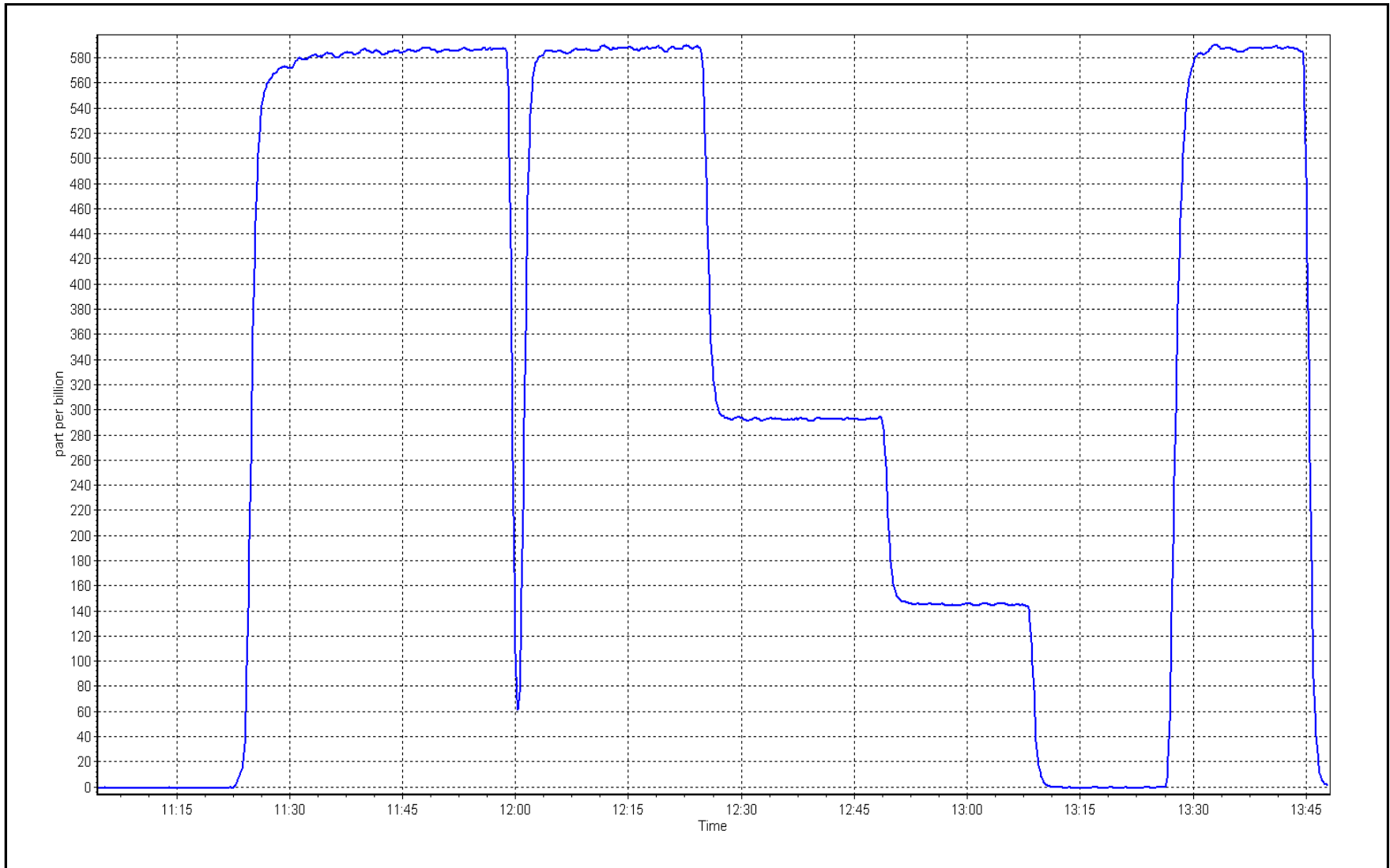
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-1.0	----	Correlation Coefficient	≥0.995
582.3	584.7	0.9958		
291.4	292.6	0.9960	Slope	0.90 - 1.10
145.8	145.2	1.0041		
			Intercept	+/-30



SO2 Calibration Plot

Date: June 14, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

TRS Calibration Summary

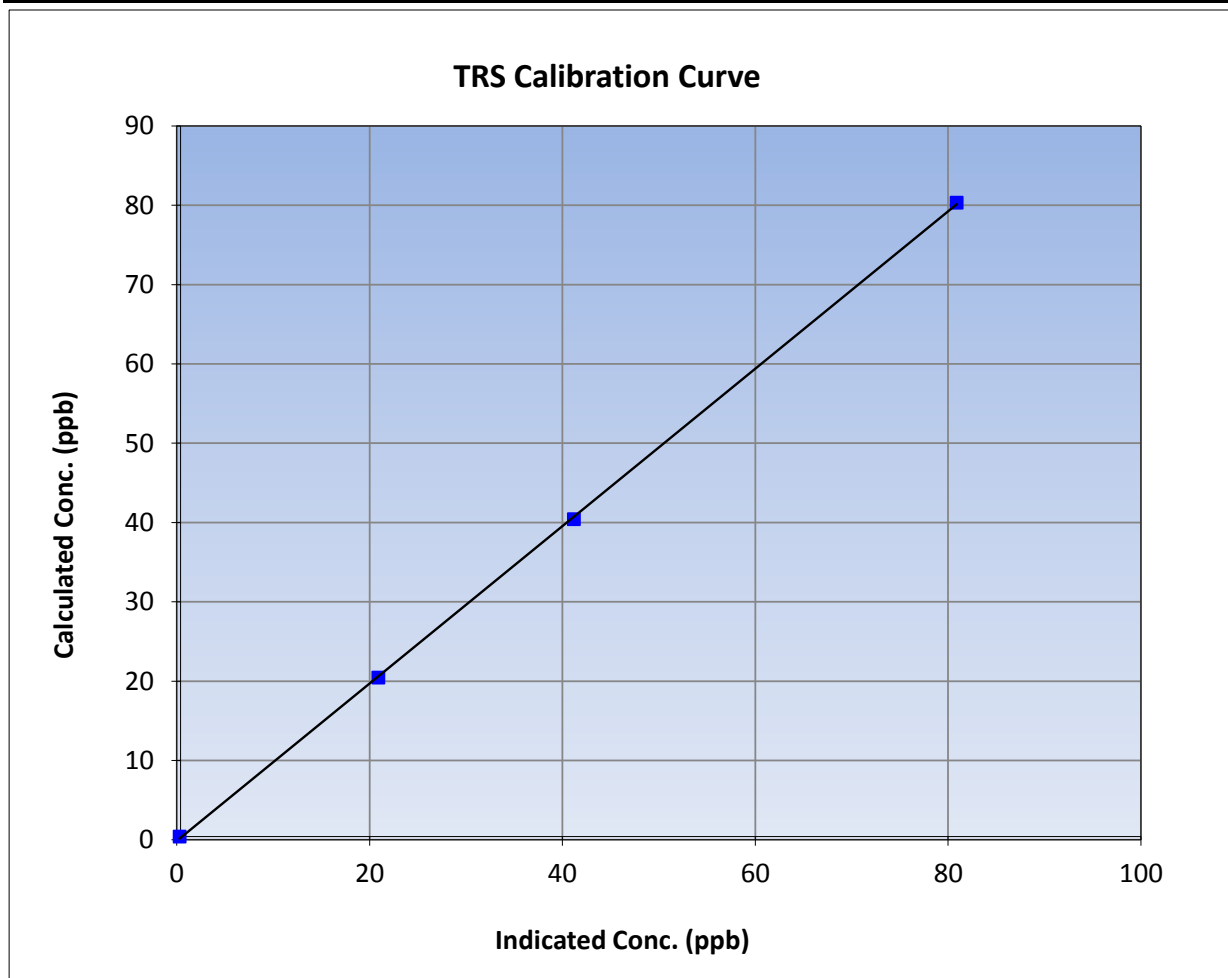
Version-03-2017

Station Information

Calibration Date	June 26, 2017	Previous Calibration	May 19, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	11:37	End Time (MST)	14:29
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

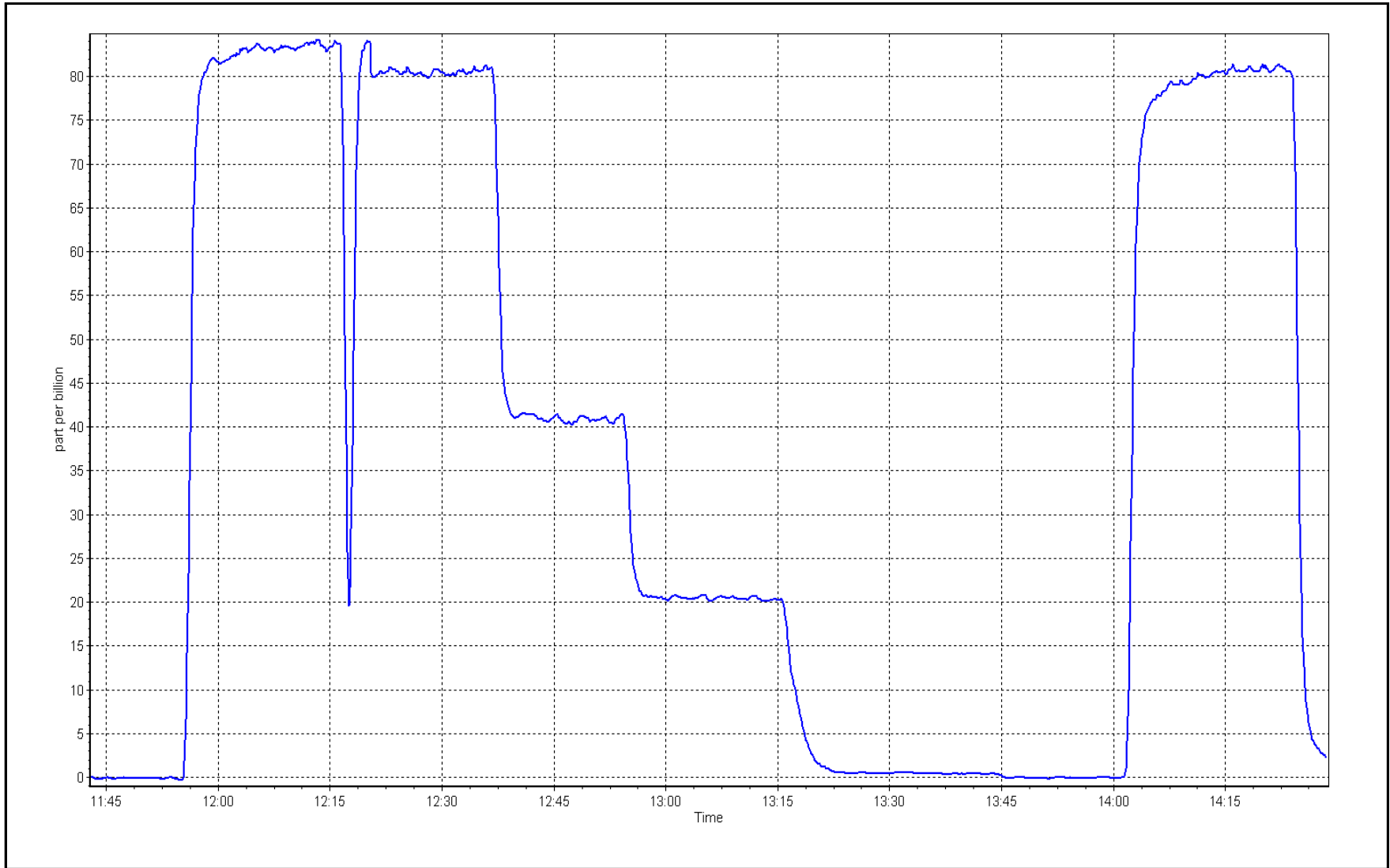
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
79.9	80.5	0.9928		
40.0	40.8	0.9810	Slope	0.90 - 1.10
20.1	20.5	0.9784		
			Intercept	+/-3



TRS Calibration Plot

Date: June 26, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 14, 2017	Last Cal Date:	May 16, 2017
Start time (MST):	10:55	End time (MST):	13:47
Reason:	Cylinder Change		

Calibration Standards

Gas Cert Reference	LL110090	Cal Gas Expiry Date	February 16, 2019
CH4 Cal Gas Conc.	<u>491.0</u> ppm	CH4 Equiv Conc.	1041.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	23 Deg C
Calibrator Model	API 700	Serial Number	1222
ZAG make/model	Teledyne API 701	Serial Number	5610

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1505164831

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.3	75.2
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.1
CH4 SP Ratio	0.000205	0.000199	Flame Temp	405.0	405.0
CH4 Retention time	11.8	12.0	Carrier Pressure	31.5	31.5
NMHC SP Ratio	4.49E-05	4.55E-05	Fuel Pressure	44.3	44.3
NMHC Peak Area	144305	142471	Air Pressure	34.4	34.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.002633	1.000284
THC Cal Offset	0.040572	0.018830
CH4 Cal Slope	0.993325	1.005300
CH4 Cal Offset	0.028139	0.015450
NMHC Cal Slope	1.011065	0.995838
NMHC Cal Offset	0.012345	0.003469

Notes: Hydrogen Cylinder swapped out. No significant change after cylinder change, span adjusted.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5009	0.0	0.00	0.00	----
as found span	4955	59.1	12.27	12.31	0.997
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	12.27	12.27	1.000
second point	4988	29.6	6.14	6.09	1.009
third point	5000	14.8	3.07	3.05	1.007
as left zero	5010	0.0	0.00	0.00	----
as left span	4833	59.0	12.55	12.31	1.020
Average Correction Factor					1.006
Corrected As found	12.31	Prev response	12.20	*% change	-0.9%

NMHC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5009	0	0.00	0.00	----
as found span	4955	59.1	6.48	6.42	1.009
calibrator zero	5009	0	0.00	0.00	----
high point	4955	59.1	6.48	6.51	0.996
second point	4988	29.6	3.24	3.24	1.001
third point	5000	14.8	1.62	1.63	0.995
as left zero	5010	0	0.00	0.00	----
as left span	4833	59	6.63	6.54	1.015
Average Correction Factor					0.997
Corrected As found	6.42	Prev response	6.40	*% change	-0.4%

CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5009	0.0	0.00	0.00	----
as found span	4955	59.1	5.79	5.89	0.983
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	5.79	5.75	1.006
second point	4988	29.6	2.90	2.85	1.018
third point	5000	14.8	1.45	1.42	1.021
as left zero	5010	0.0	0.00	0.00	----
as left span	4833	59.0	5.92	5.77	1.026
Average Correction Factor					1.015
Corrected As found	5.89	Prev response	5.80	*% change	-1.5%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

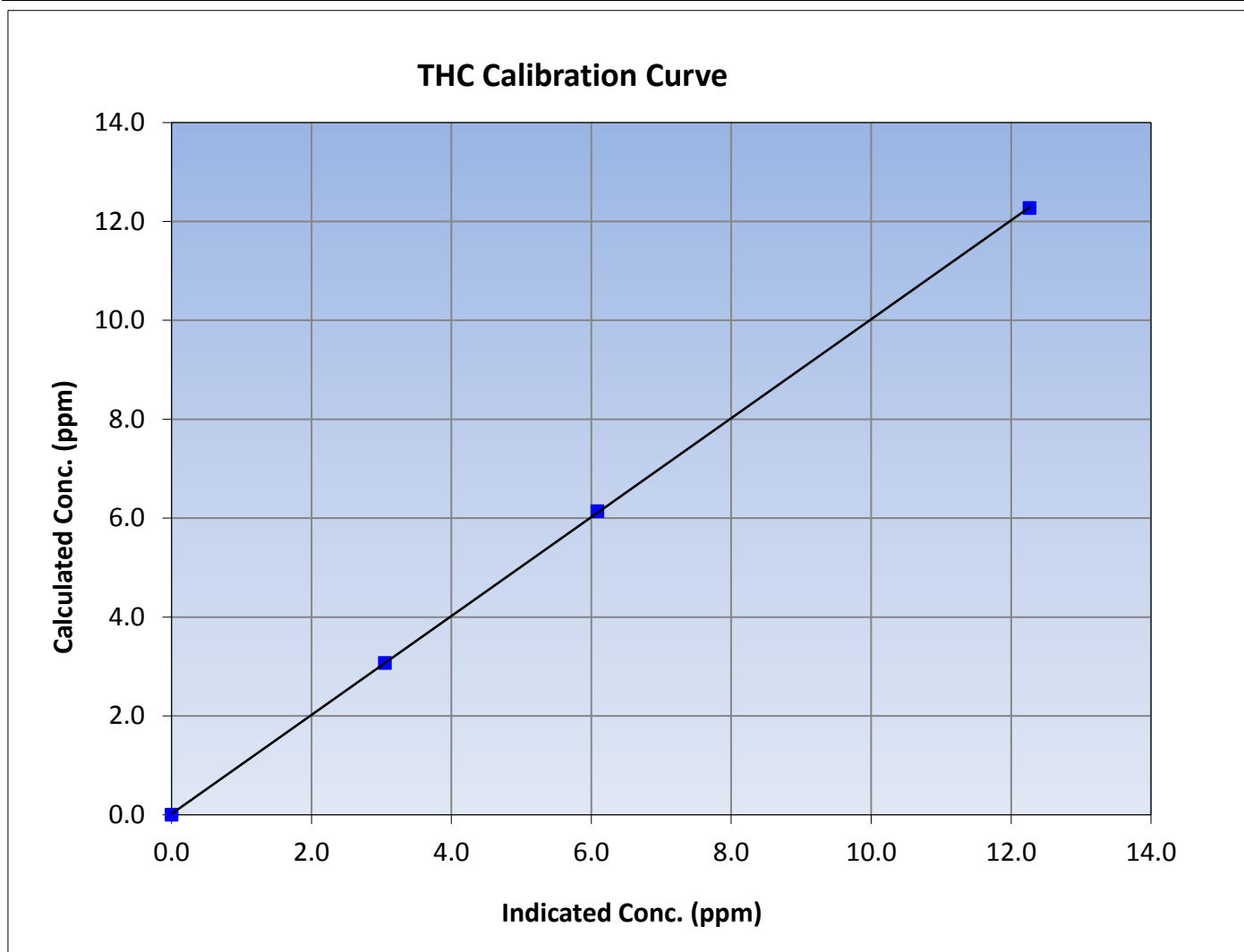
Version-02-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:55	End Time (MST)	13:47
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999978	≥ 0.995			
12.27	12.27	1.0004						
6.14	6.09	1.0089				Slope	1.000284	0.90 - 1.10
3.07	3.05	1.0073						
			Intercept	0.018830	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

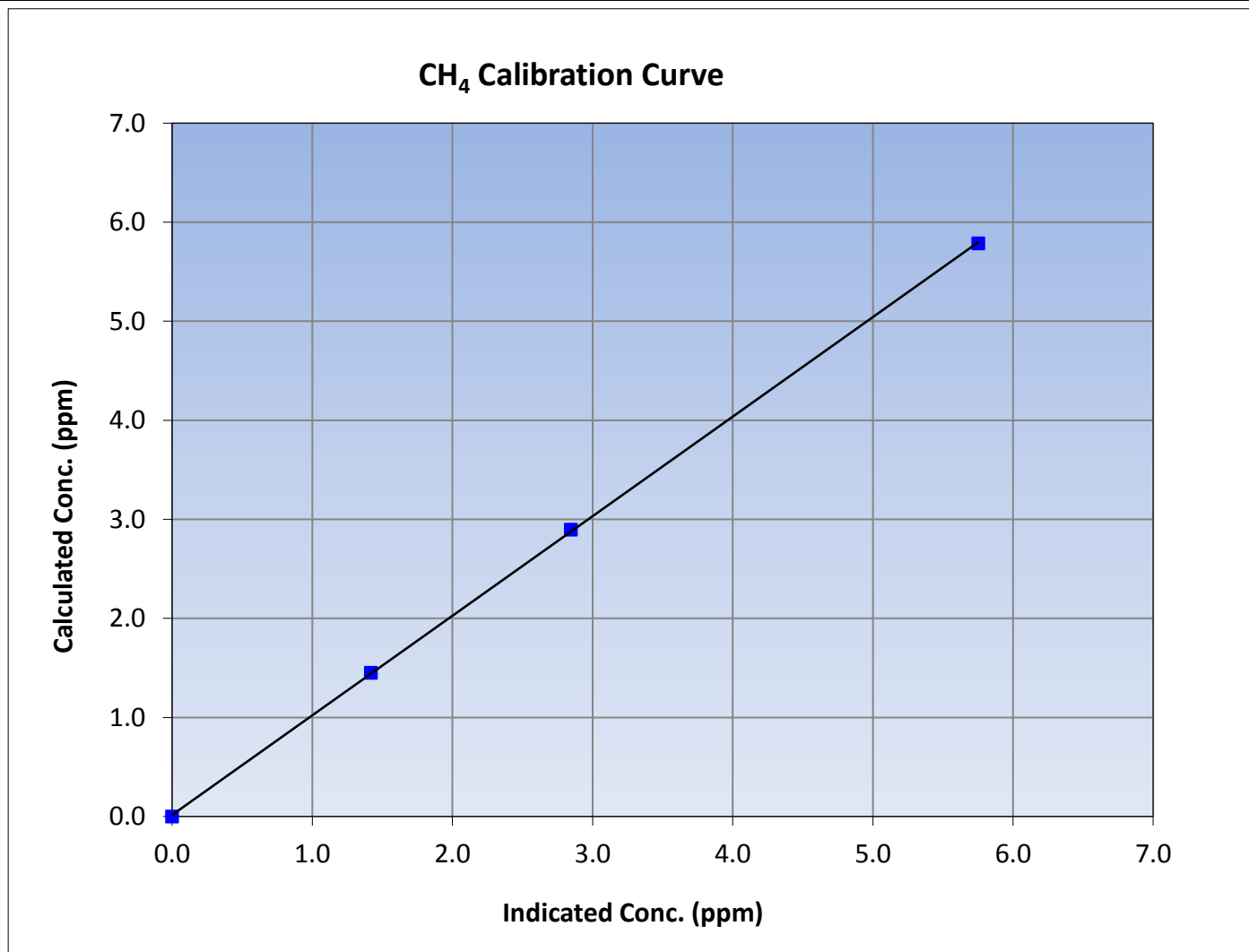
Version-02-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:55	End Time (MST)	13:47
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999955	≥ 0.995			
5.79	5.75	1.0060						
2.90	2.85	1.0178				Slope	1.005300	0.90 - 1.10
1.45	1.42	1.0212						
			Intercept	0.015450	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

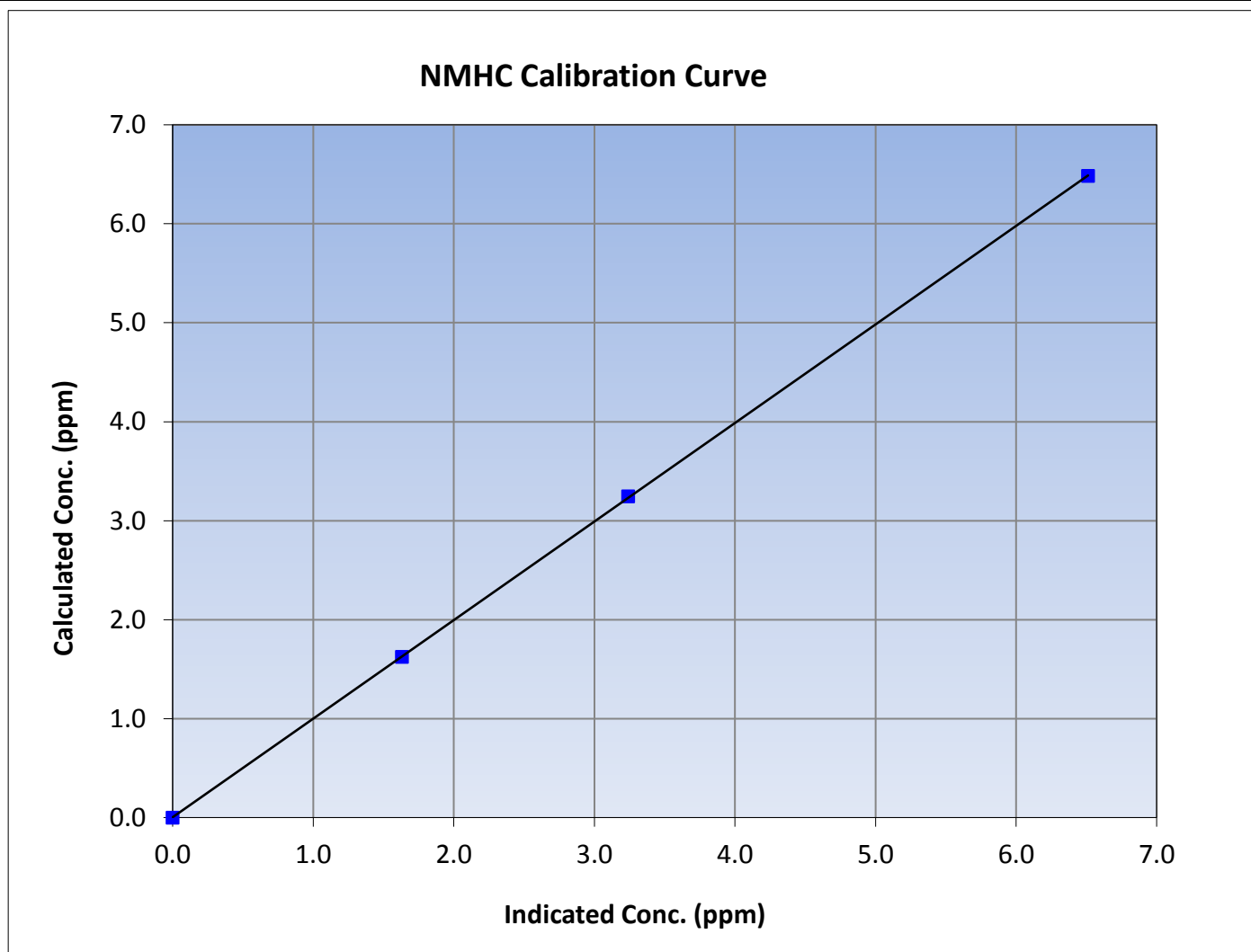
Version-02-2017

Station Information

Calibration Date	June 14, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:55	End Time (MST)	13:47
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

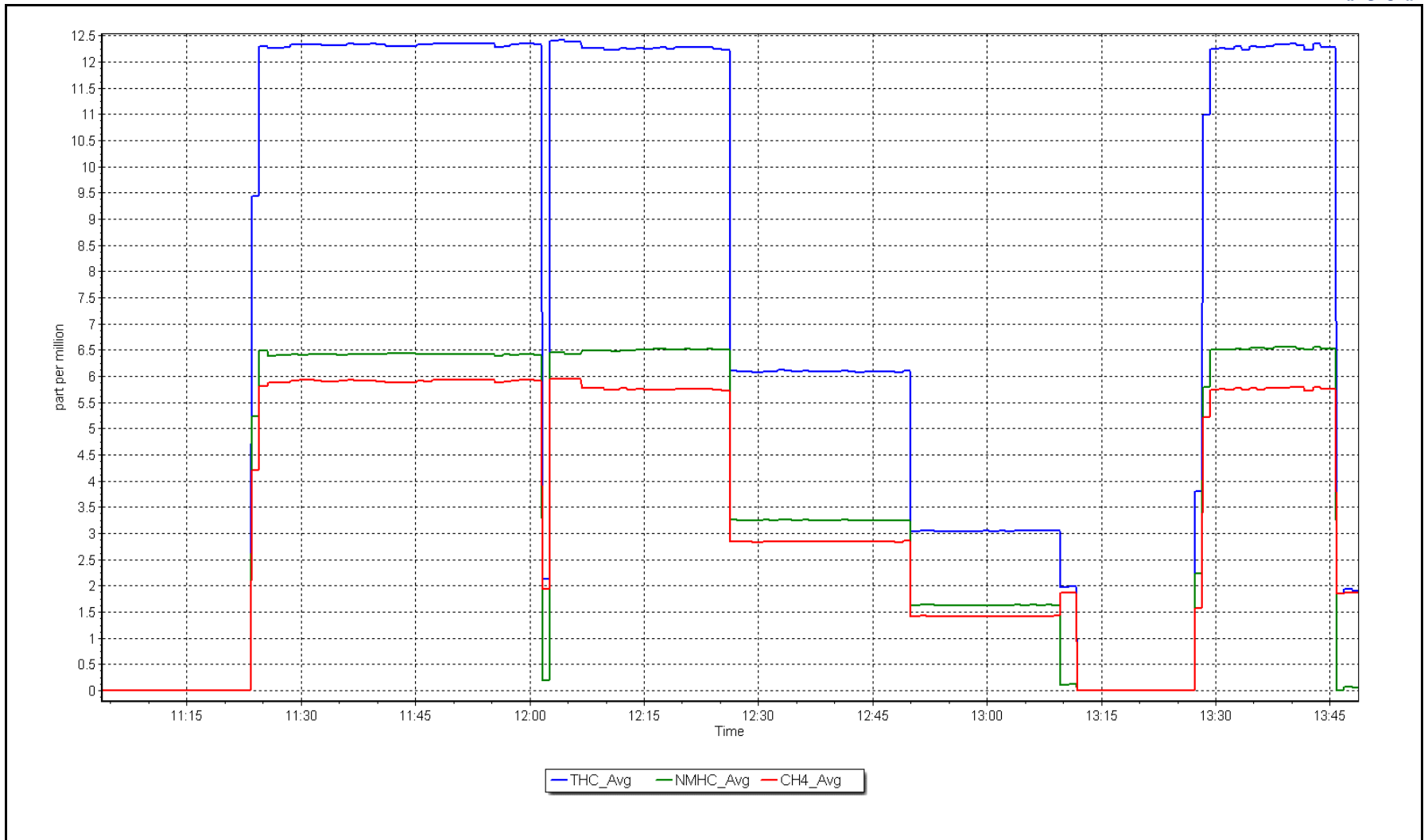
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999989	≥ 0.995			
6.48	6.51	0.9955						
3.24	3.24	1.0011				Slope	0.995838	0.90 - 1.10
1.62	1.63	0.9952						
			Intercept	0.003469	± 0.5			



NMHC Calibration Plot

Date: June 14, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 27, 2017	Last Cal Date:	May 16, 2017
Start time (MST):	9:25	End time (MST):	14:08
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL110090	Cal Gas Expiry Date	February 16, 2019
NOX Cal Gas Conc.	<u>50.9</u> ppb	NO Cal Gas Conc.	<u>50.9</u> ppb
Calibrator Model	API T700	Serial Number	1222
ZAG make/model	Teledyne API T701	Serial Number	5610

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1336160088		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	0.986	0.973	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.996	0.998	PMT Temperature	-2.9	-2.9
NO ₂ coefficient	0.999	0.999	Reaction cell Press	195.2	195.2
NO bkgrnd	1.8	1.7	Sample Flow	0.714	0.707
NOX bkgrnd	1.9	1.8	PMT Voltage	-850.3	-850.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.994849	0.995818
NO _x Cal Offset	-0.297103	0.403014
NO Cal Slope	0.992048	0.994422
NO Cal Offset	-0.323029	0.464729
NO ₂ Cal Slope	0.996957	1.001357
NO ₂ Cal Offset	-0.814020	0.382501



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5010	0.0	0.0	0.0	0.0	0.3	0.3	0.0	----	----
as found span	4955	59.1	599.9	599.9	0.0	604.4	605.0	-1.7	0.9926	0.9916
calibrator zero	5009	0.0	0.0	0.0	0.0	0.3	0.3	0.0	----	----
high point	4955	59.1	599.9	599.9	0.0	602.4	603.3	-0.9	0.9959	0.9944
second point	4985	29.6	300.5	300.5	0.0	301.0	301.1	-0.2	0.9982	0.9978
third point	5000	14.8	150.2	150.2	0.0	149.7	149.9	-0.2	1.0035	1.0021
as left zero	5010	0.0	0.0	0.0	0.0	0.5	0.5	0.0	----	----
as left span	4846	59.1	613.3	205.5	407.8	605.5	199.9	405.6	1.0128	1.0280
Average Correction Factor									0.9992	0.9981

Corrected As found NO_x = 604.1 ppb
 Previous Response NO_x = 603.3 ppb

NO = 604.7 ppb
 NO = 605.1 ppb

*Percent Change NO_x = -0.1%
 *Percent Change NO = 0.1%
 * = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	605.1	605.1	0.0	0.9915	0.9915	----	----
1st NO2 (400 ppb O3)	205.5	399.6	604.9	205.5	399.4	0.9918	----	1.0005	99.9%
2nd NO2 (200 ppb O3)	331.1	274.0	604.5	331.1	272.2	0.9925	----	1.0066	99.3%
3rd NO2 (100 ppb O3)	465.3	139.8	604.6	465.3	139.2	0.9923	----	1.0043	99.6%
2nd NO ref point	----	0.0	604.6	604.3	0.3	0.9923	0.9928	----	----
Average Correction Factor						0.9922	0.9921	1.0038	99.6%

Notes:

Span adjusted slightly.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

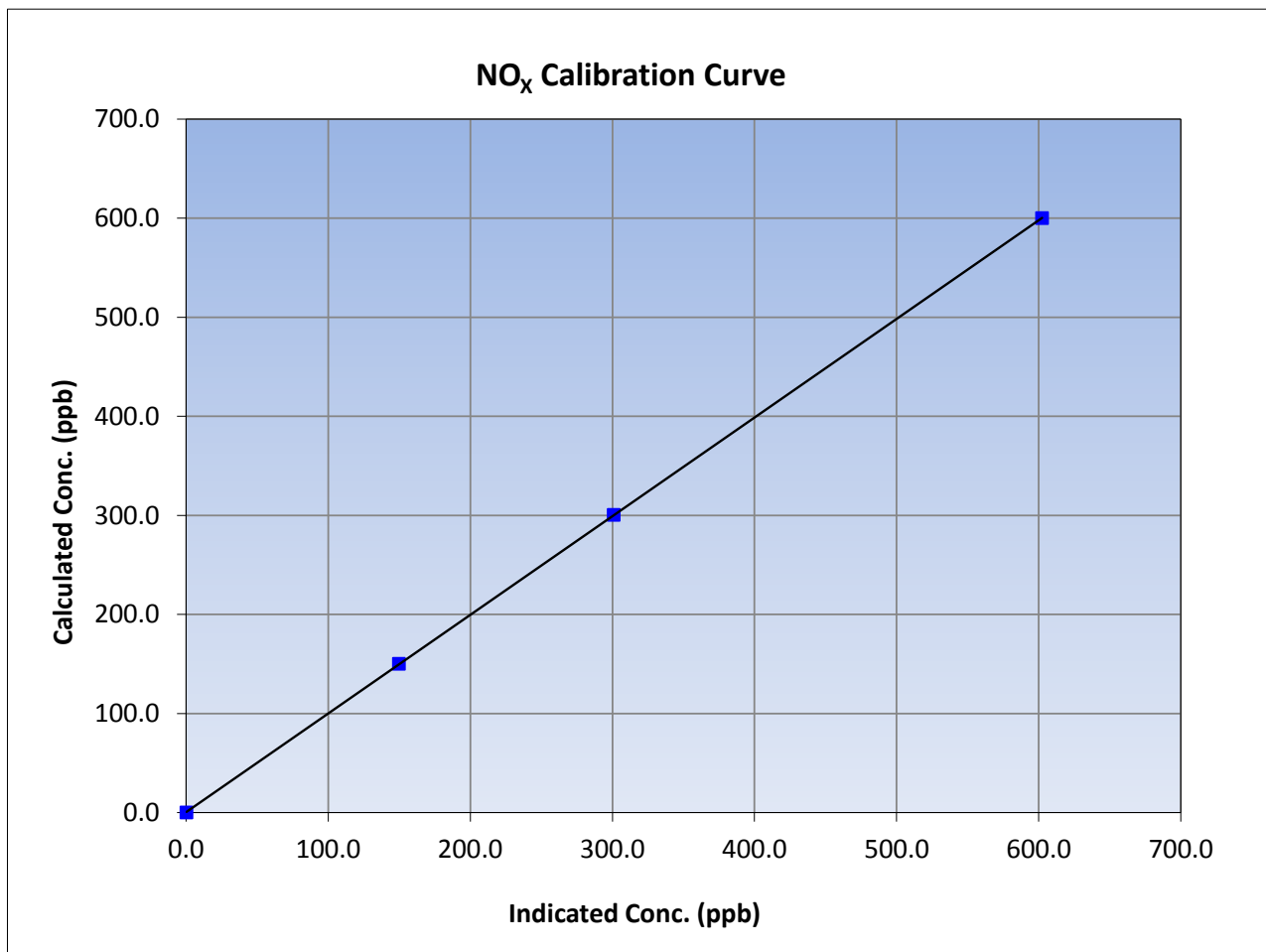
Version-03-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	9:25	End Time (MST)	14:08
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
599.9	602.4	0.9959			
300.5	301.0	0.9982			
150.2	149.7	1.0035			
			Slope	0.995818	0.90 - 1.10
			Intercept	0.403014	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

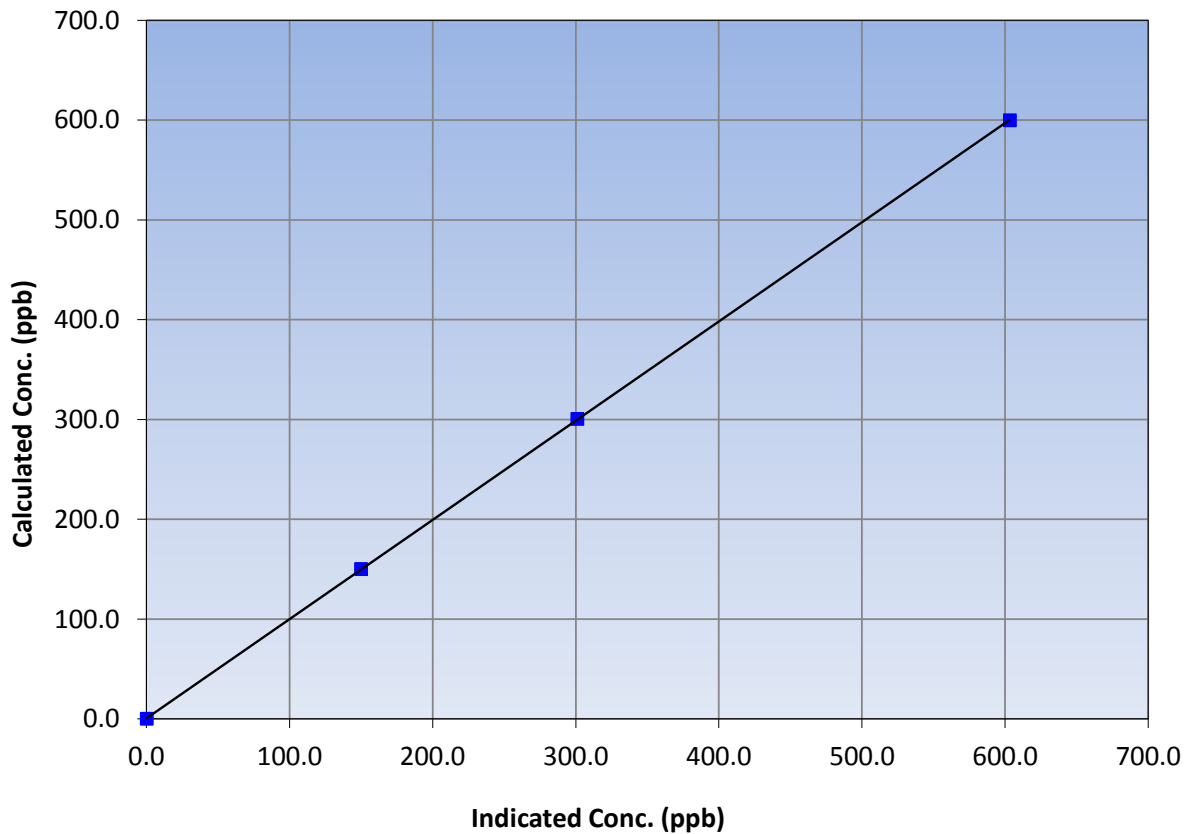
Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	9:25	End Time (MST)	14:08
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	≥0.995	
599.9	603.3	0.9944			
300.5	301.1	0.9978			
150.2	149.9	1.0021			
			Slope	0.994422	0.90 - 1.10
			Intercept	0.464729	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

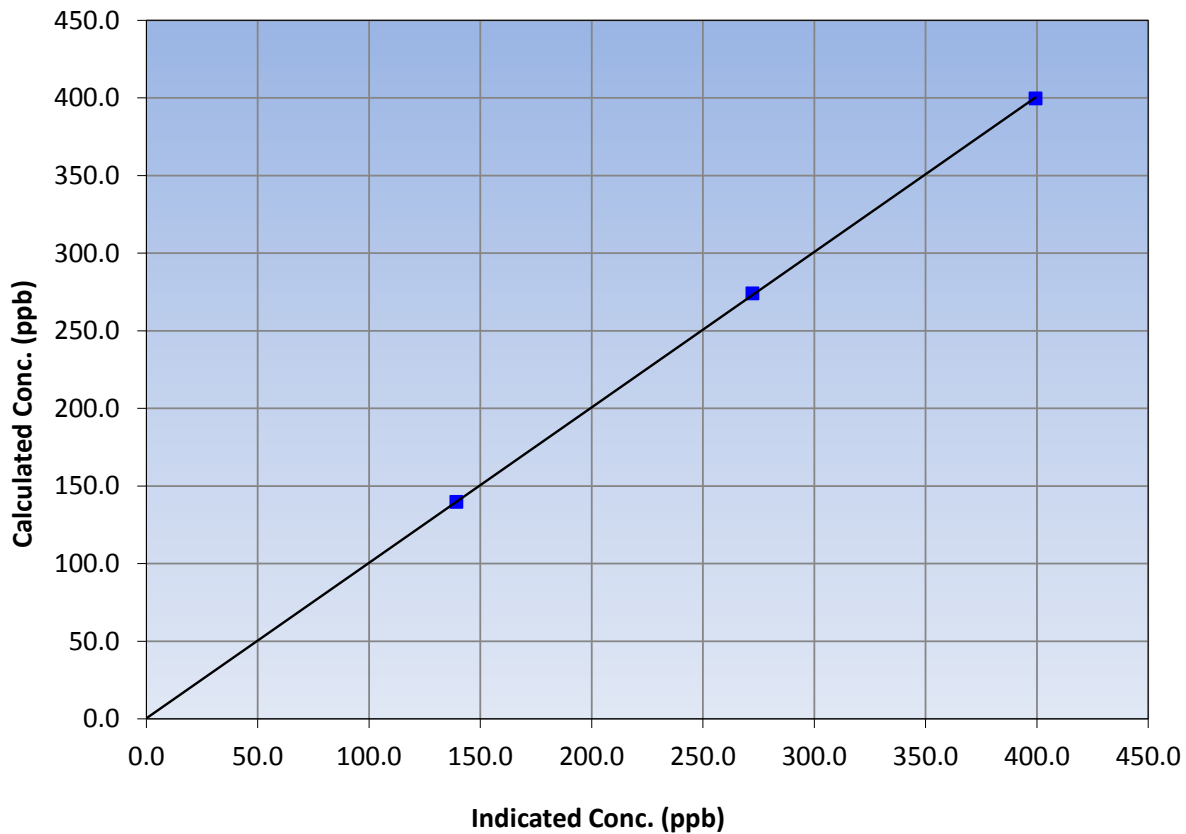
Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 16, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	9:25	End Time (MST)	14:08
Analyzer make	Thermo 42i	Analyzer serial #	1336160088

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
399.6	399.4	1.0005			
274.0	272.2	1.0066			
139.8	139.2	1.0043			
			Slope	1.001357	0.90 - 1.10
			Intercept	0.382501	+/-20

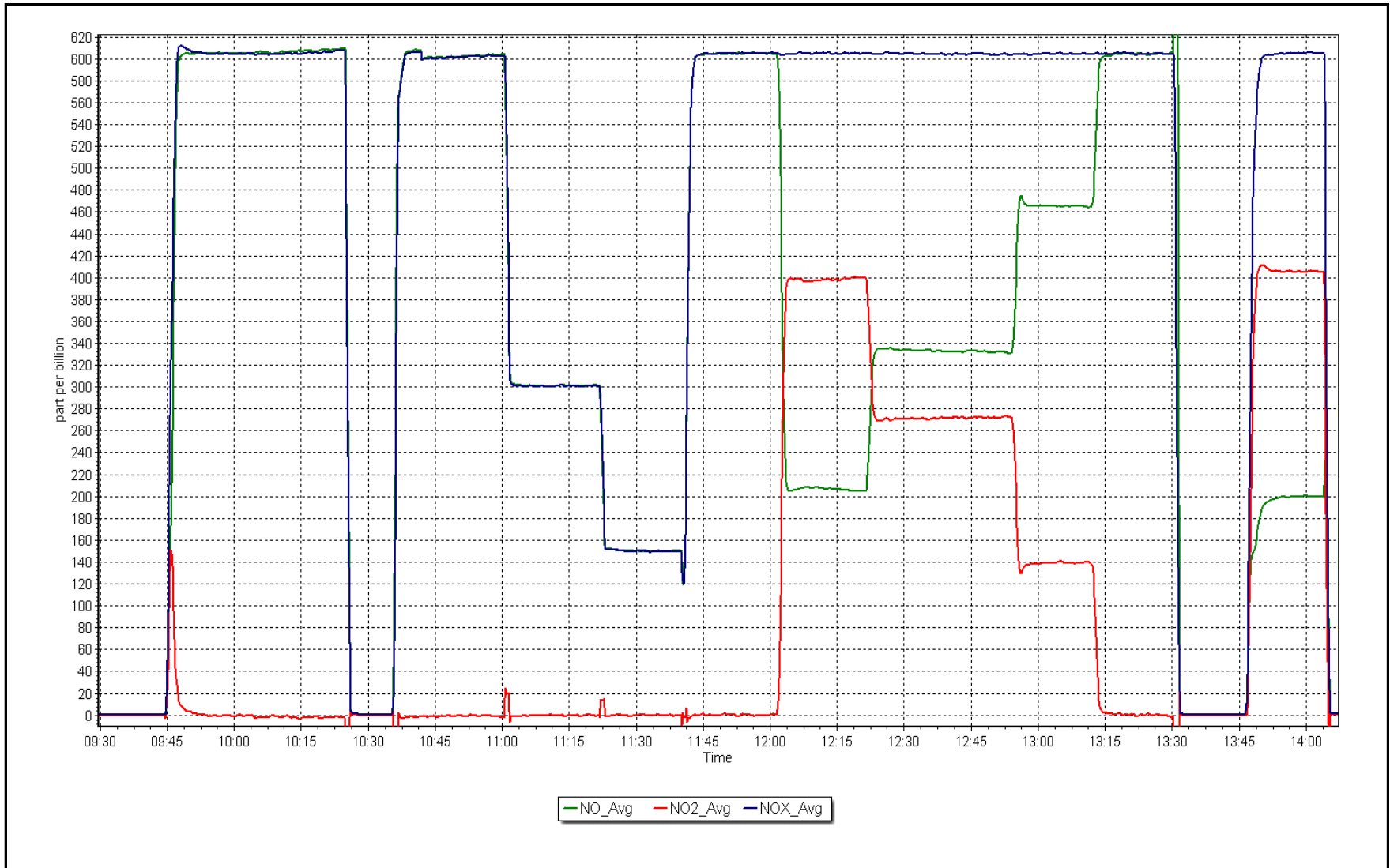
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 27, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

O₃ Calibration Summary

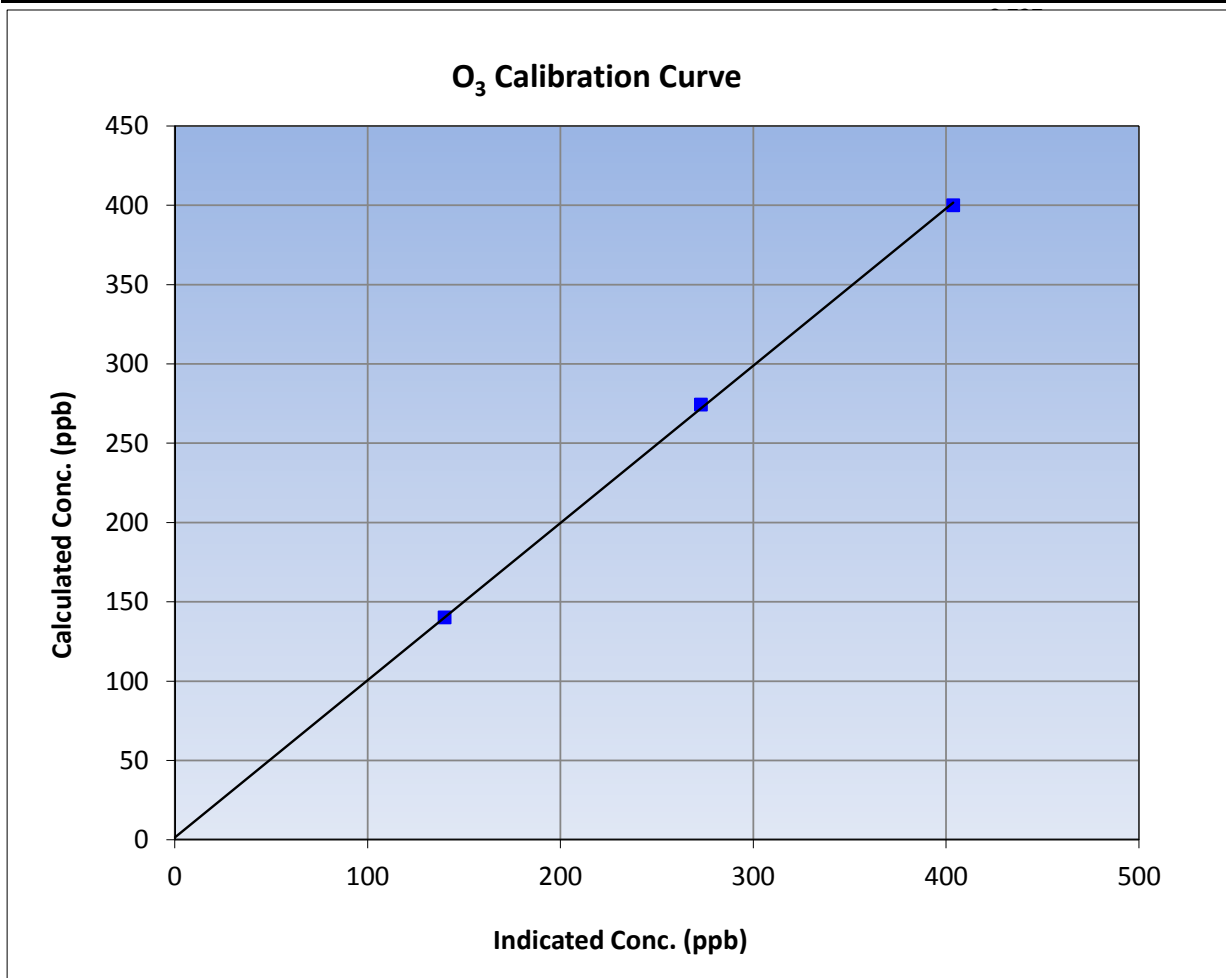
Version-03-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 17, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	14:04	End Time (MST)	16:35
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

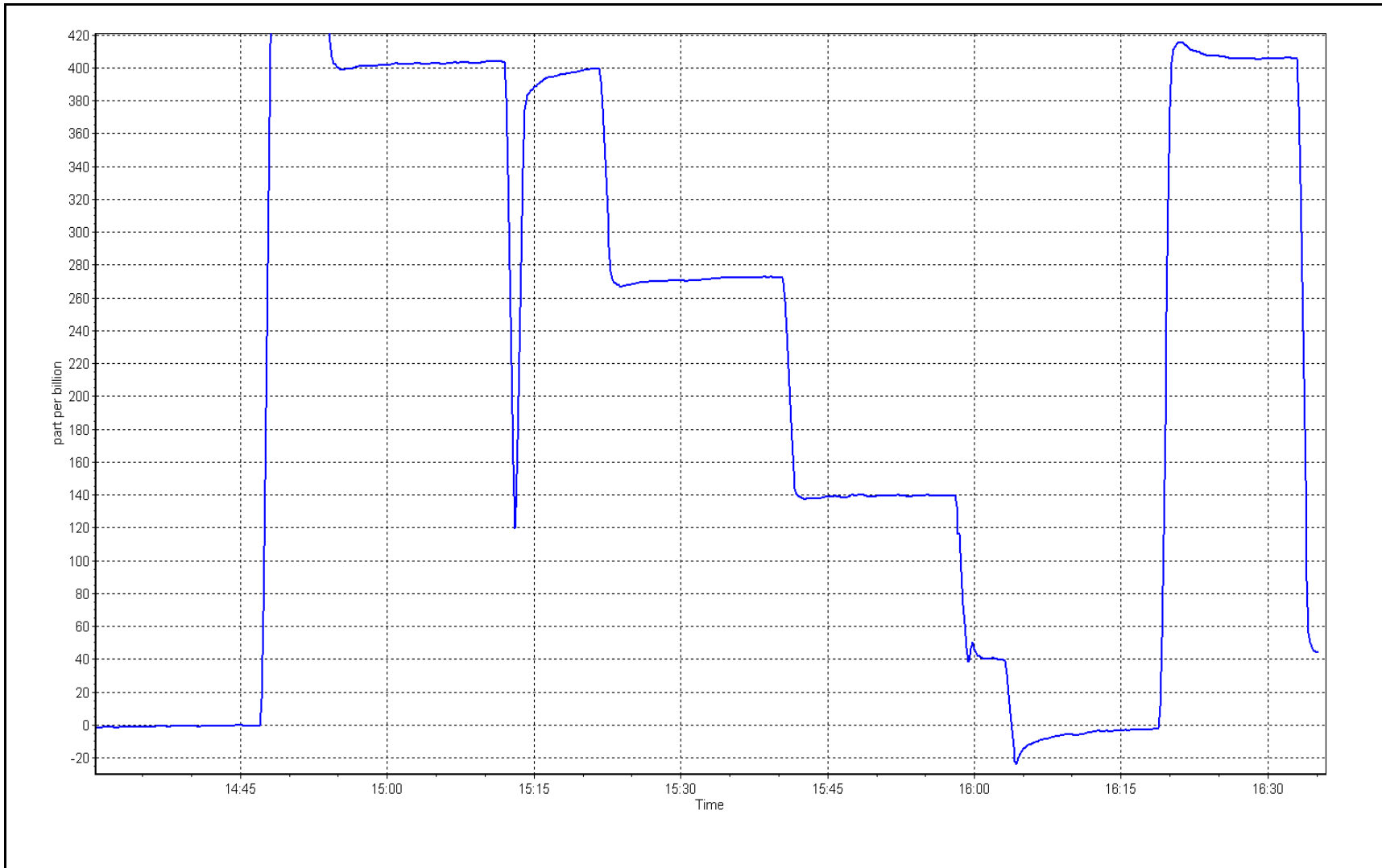
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.5	----	Correlation Coefficient	0.999894	≥0.995
399.6	403.3	0.9908	Slope	0.991629	0.90 - 1.10
274.0	272.5	1.0055	Intercept	1.355175	+/- 10
139.8	139.5	1.0022			



O₃ Calibration Plot

Date: June 27, 2017

Location: Stony Mountain



Aswin Sasi Kumar



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Stony Mountain	Station number:	AMS 18
Calibration Date:	June 27, 2017	Last Cal Date:	May 15, 2017
Start time (MST):	11:16	End time (MST):	14:41
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1107
Particulate Fraction:	PM2.5	C14 Source S/N:	4965
Flow Meter Make/Model:	Delta-Cal	S/N:	954
Temp/RH standard:	Delta-Cal	S/N:	954

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	21.3	17.3	17	<input checked="" type="checkbox"/>	+/- 2 °C
P3 (hPa)	921.3	922	931	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	997.8	1001	999	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero		-----		<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: June 27, 2017 Last Cal Date: January 10, 2017
 Flow w/o adaptor: 16.63 Flow w/ adaptor: 16.58

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: _____	Foil S/N: _____	
Foil Calibration	Foil Mass: _____	Foil Mass: _____	
	Calibration Date: _____	Calibration Date: _____	
(Limit) +/- 5% of previous	Correction Factor: _____	Correction Factor: _____	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: T1 Adjusted. Leak check performed. Leak check passed. No other adjustments required. Neph zero cal not performed due to rain.

Calibration by: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 19 FIREBAG JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	36	36	100	15	0	4	0
H2S (ppb) Average	686	34	34	100	3	0	0	0
THC (ppm) Average	685	35	35	100	3	-	2.3	-
NO2 (ppb) Average	685	35	35	100	16	0	5	-
NO (ppb) Average	685	35	35	100	9	-	1	-
NOX (ppb) Average	685	35	35	100	21	-	6	-
Temperature 2 m (C) Average	720	0	0	100	25.3	-	19.9	-
Relative Humidity (%) Average	720	0	0	100	99	-	97	-
Wind Speed 10 m (km/h) Average	720	0	0	100	35	-	24	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.5	1	-	0	0	0	0	0	1	15
H2S (ppb) Average	686	0.2	0	-	0	0	0	0	0	0	3
THC (ppm) Average	685	2.15	0.1	-	2	2.1	2.1	2.1	2.2	2.2	3
NO2 (ppb) Average	685	1.5	2	-	0	0	0	1	2	4	16
NO (ppb) Average	685	0.4	1	-	0	0	0	0	0	1	9
NOX (ppb) Average	685	1.9	3	-	0	0	0	1	2	4	21
Temperature 2 m (C) Average	720	14.27	4.7	-	2.7	8.6	10.8	14.1	17.8	20.4	25.3
Relative Humidity (%) Average	720	62.6	23	-	21	33	43	60	85	95	99
Wind Speed 10 m (km/h) Average	720	13	7	-	0	5	8	12	17	22	35
	6	720	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
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No operational issues to report



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 15 ppb on Jun 1 13:00	Maximum Daily Average: 4.3 ppb on Jun 1		Hours of Data:	684
Minimum Value: 0 ppb on Jun 8 06:00	Minimum Daily Average: 0.0 ppb on Jun 22		Hours of Missing Data:	36
Maximum Diurnal Average: 0.9 ppb at hour 13	Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Calibration:	36
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 6		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	5	7	Z	1	1	1	2	12	9	8	3	15	15	4	1	1	0	2	3	3	3	2	1	1	4.3	15
2-Jun	3	1	0	Z	4	2	2	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	1.2	4
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0.3	2	
4-Jun	0	0	0	0	0	Z	2	1	1	1	1	2	1	6	2	1	0	0	0	0	0	0	0	0	0.9	6
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.4	1
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	2	1	6	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0.3	1
13-Jun	0	0	Z	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	Z	0	0	0	2	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0.3	2
16-Jun	0	0	0	0	0	Z	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
17-Jun	Z	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	0	Z	0	0	0	1	2	2	0	0	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0.6	2
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	3	3	1	1	0.6	3
20-Jun	0	0	0	Z	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
21-Jun	0	1	1	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	0	Z	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	1	1	2	0.5	3	
28-Jun	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jun	Z	0	0	0	0	0	1	2	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	2
30-Jun	0	Z	0	0	0	0	0	0	0	1	2	2	1	1	1	1	0	0	0	2	0	0	0	0	0.7	2

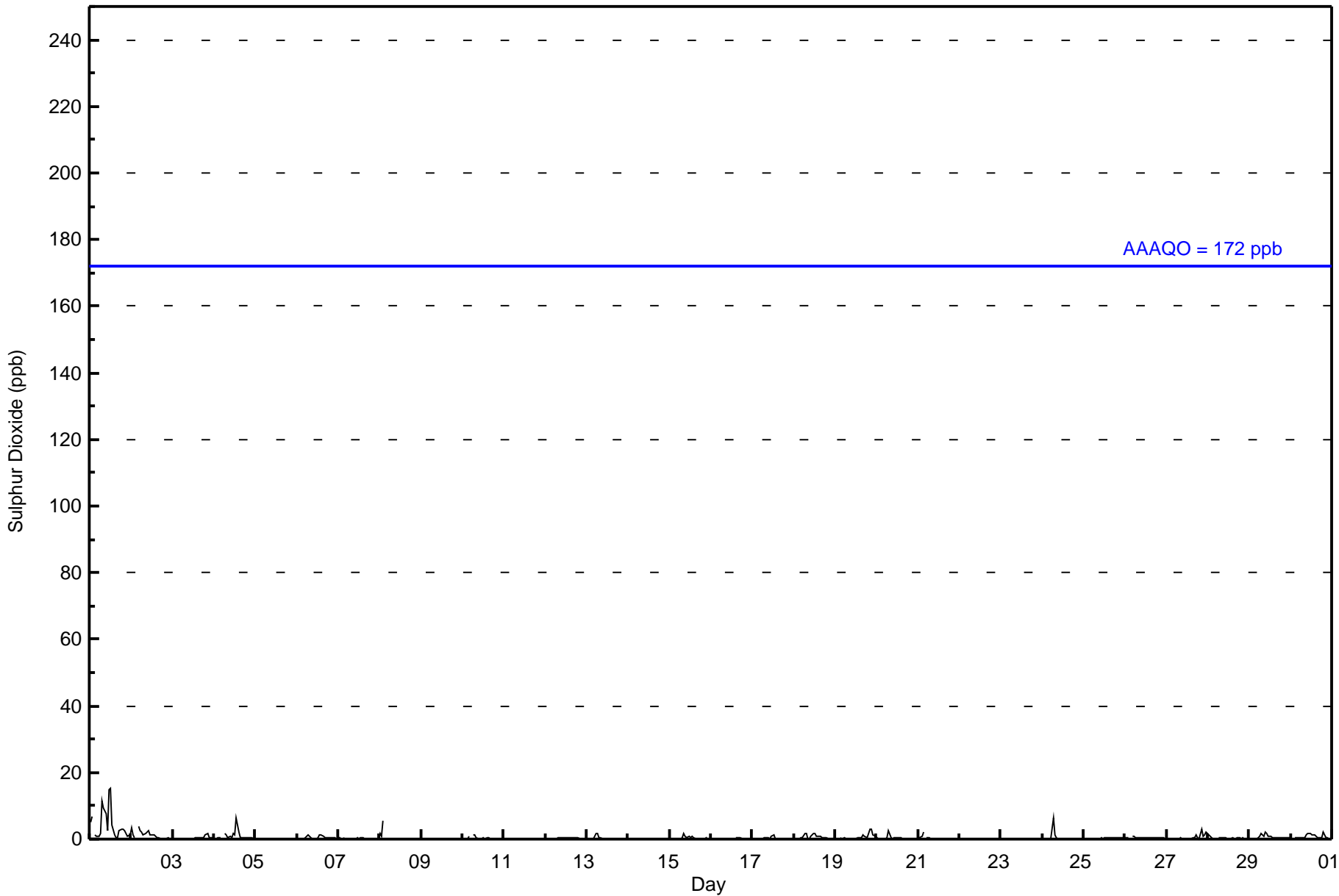
0.6	0.5	0.4	0.3	0.4	0.4	0.7	0.9	0.7	0.6	0.5	0.9	0.9	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.3	0.2	0.3	Diurnal Average
5	7	6	2	4	2	6	12	9	8	3	15	15	6	2	1	1	2	3	3	3	3	3	1	2	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	99.56	99.56
11 - 20	3	0.44	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	49	56	39	38	28	51	43	59	65	38	25	14	35	49	36	56	681
11 - 20	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	56	39	38	28	51	43	59	65	39	26	14	35	50	36	56	684

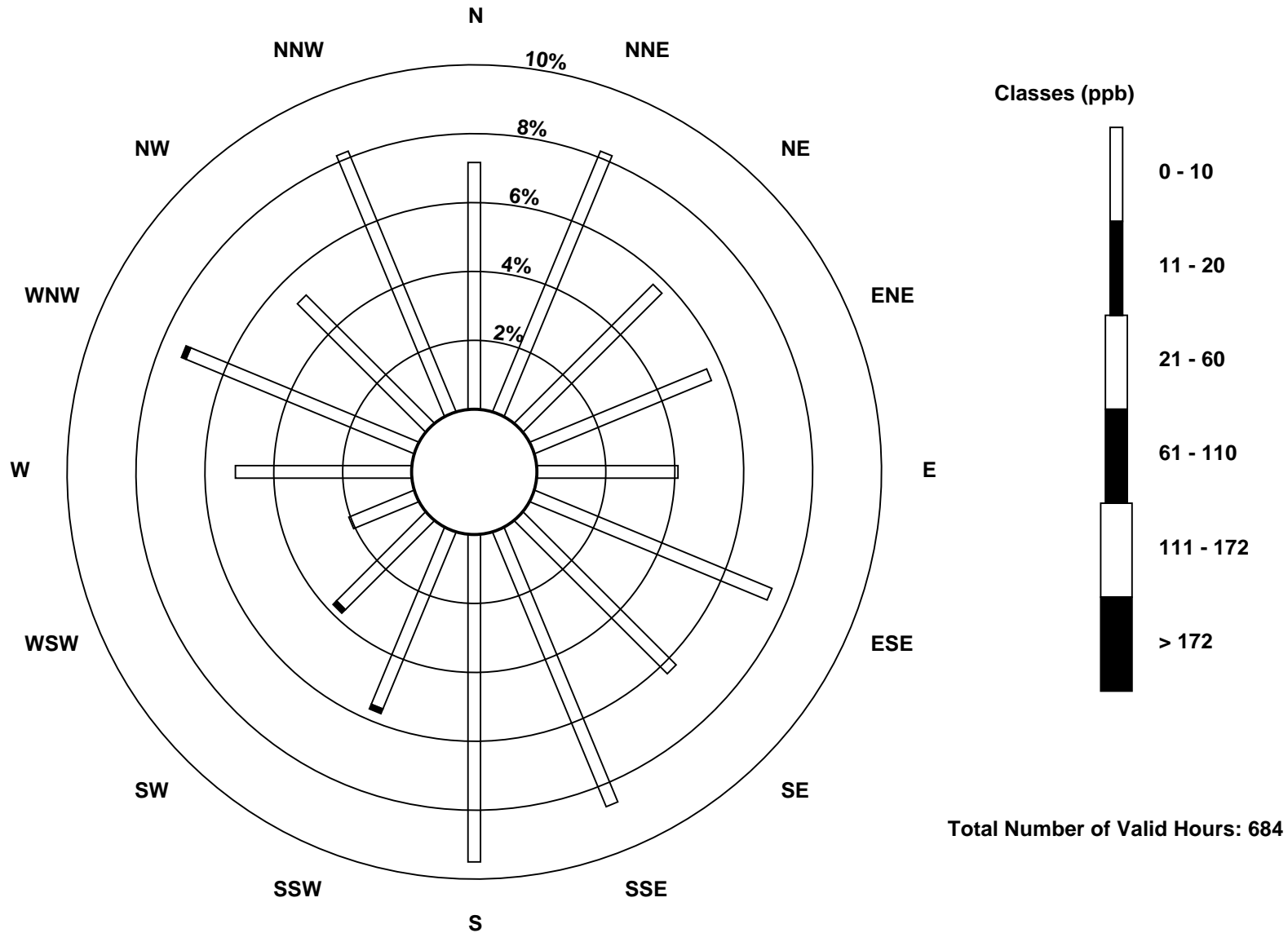
Total Number of Valid Hours: 684

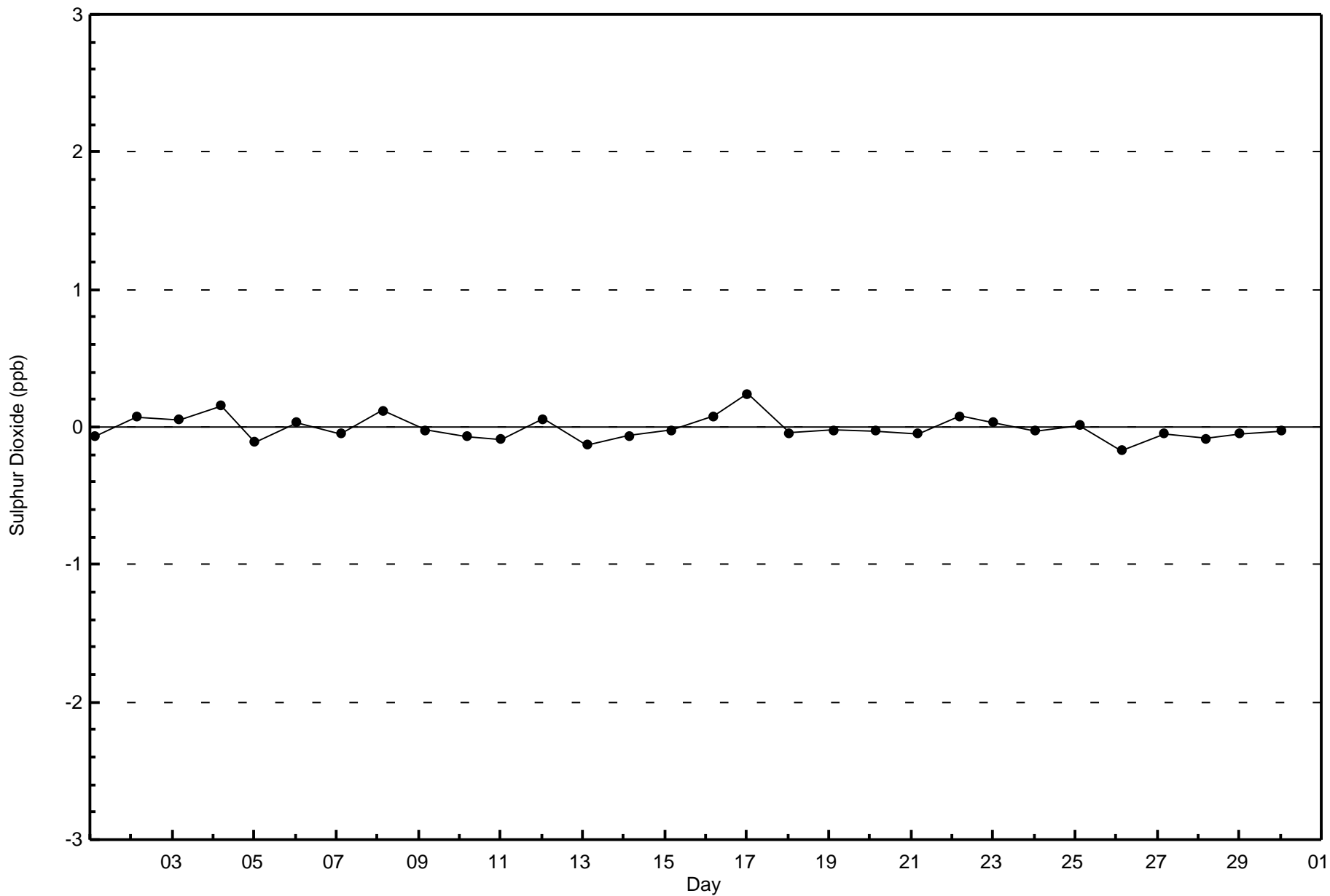
Total Number of Hours: 720

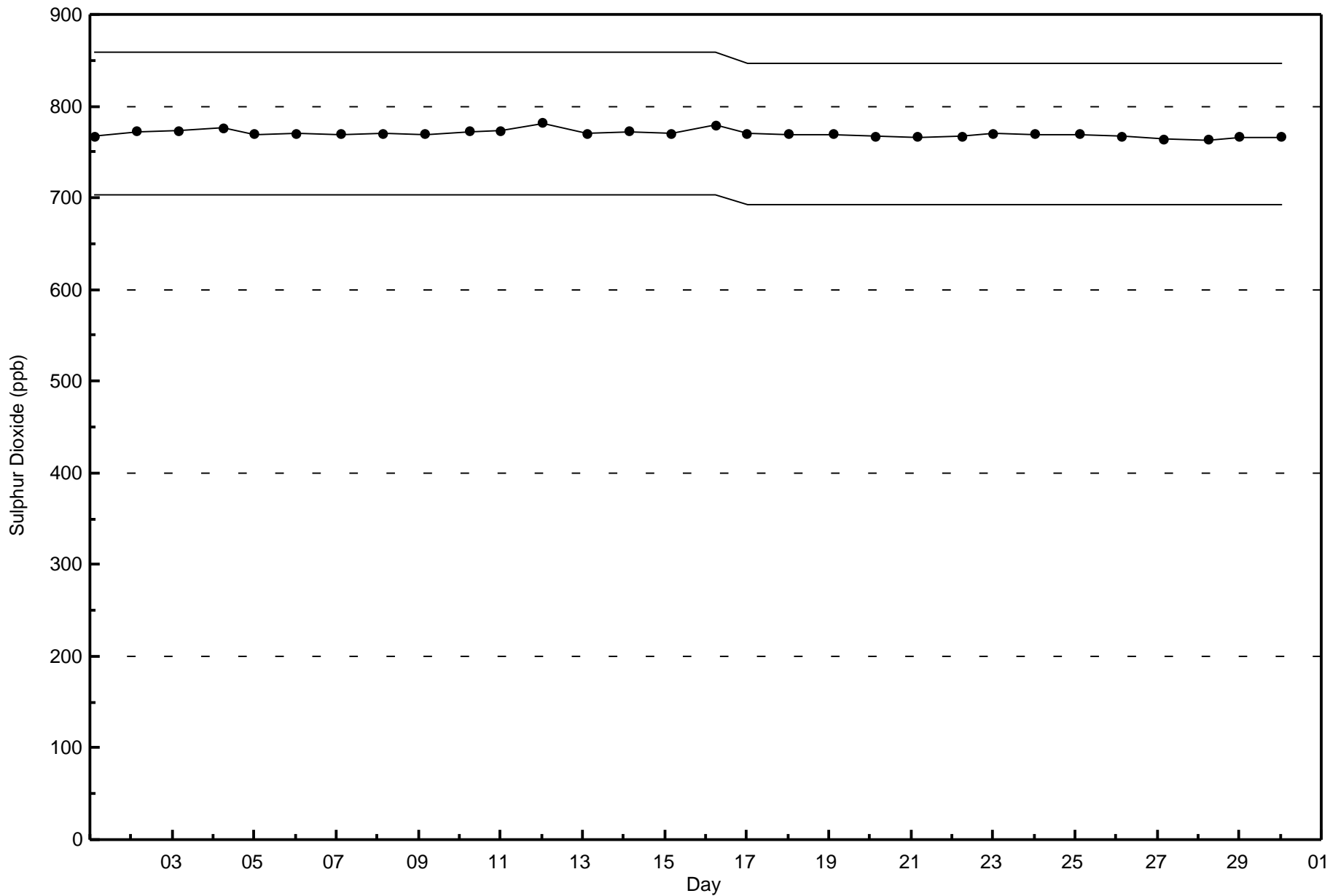


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)







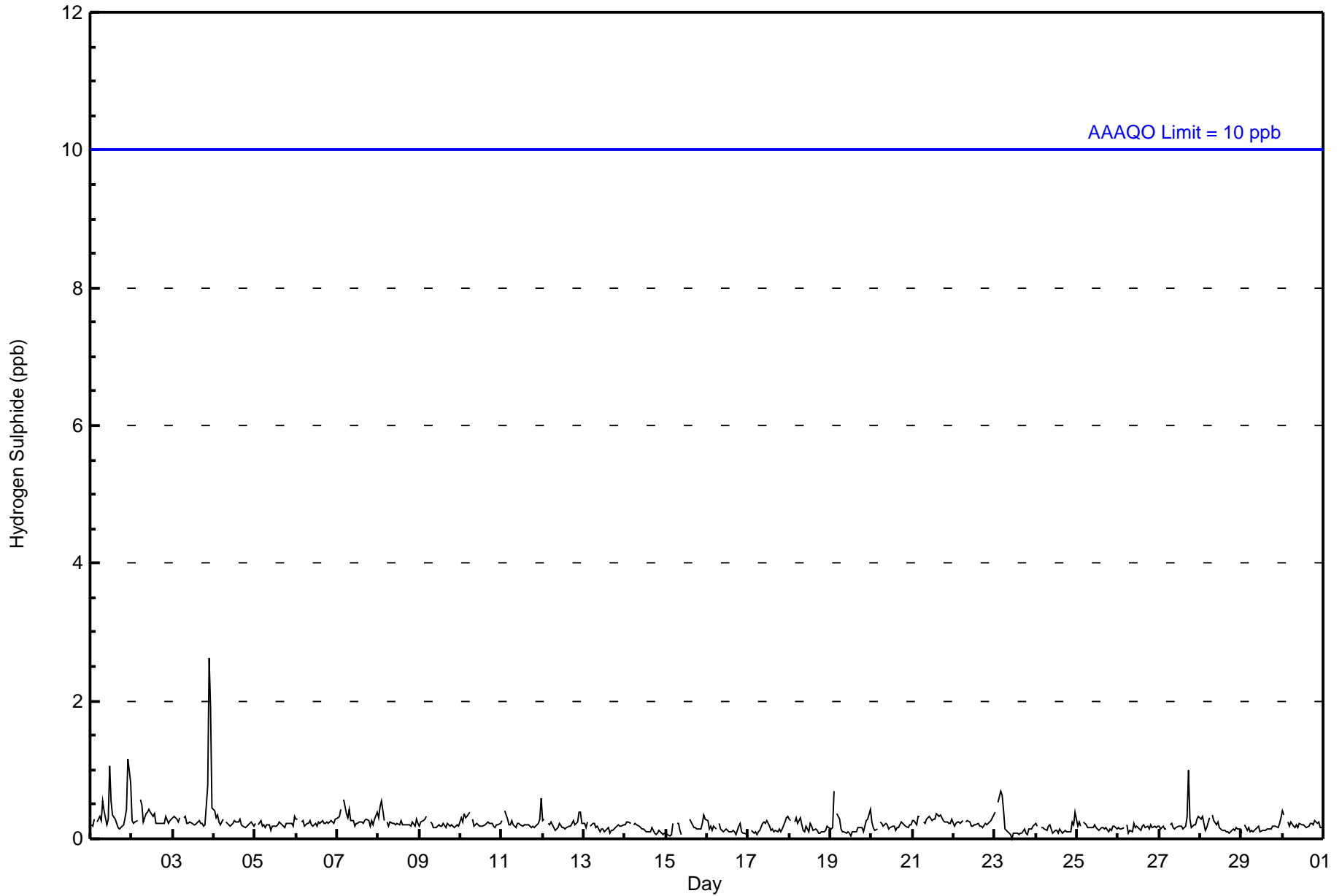


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 3 ppb on Jun 3 22:00	Maximum Daily Average: 0.5 ppb on Jun 3
Minimum Value: 0 ppb on Jun 23 11:00	Hours of Data: 686
Maximum Diurnal Average: 0.3 ppb at hour 23	Hours of Missing Data: 34
Monthly Average: 0.2 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Jun 16	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.2 ppb at hour 20	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0.4	1
2-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
3-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	0.5	3
4-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Jun	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
12-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
24-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.2	1
28-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
30-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average
0	0	1	1	1	1	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0	1	3	2	1	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	685	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	49	57	38	38	29	51	42	60	65	38	27	16	33	50	37	55	685
3 - 4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	57	38	38	29	52	42	60	65	38	27	16	33	50	37	55	686

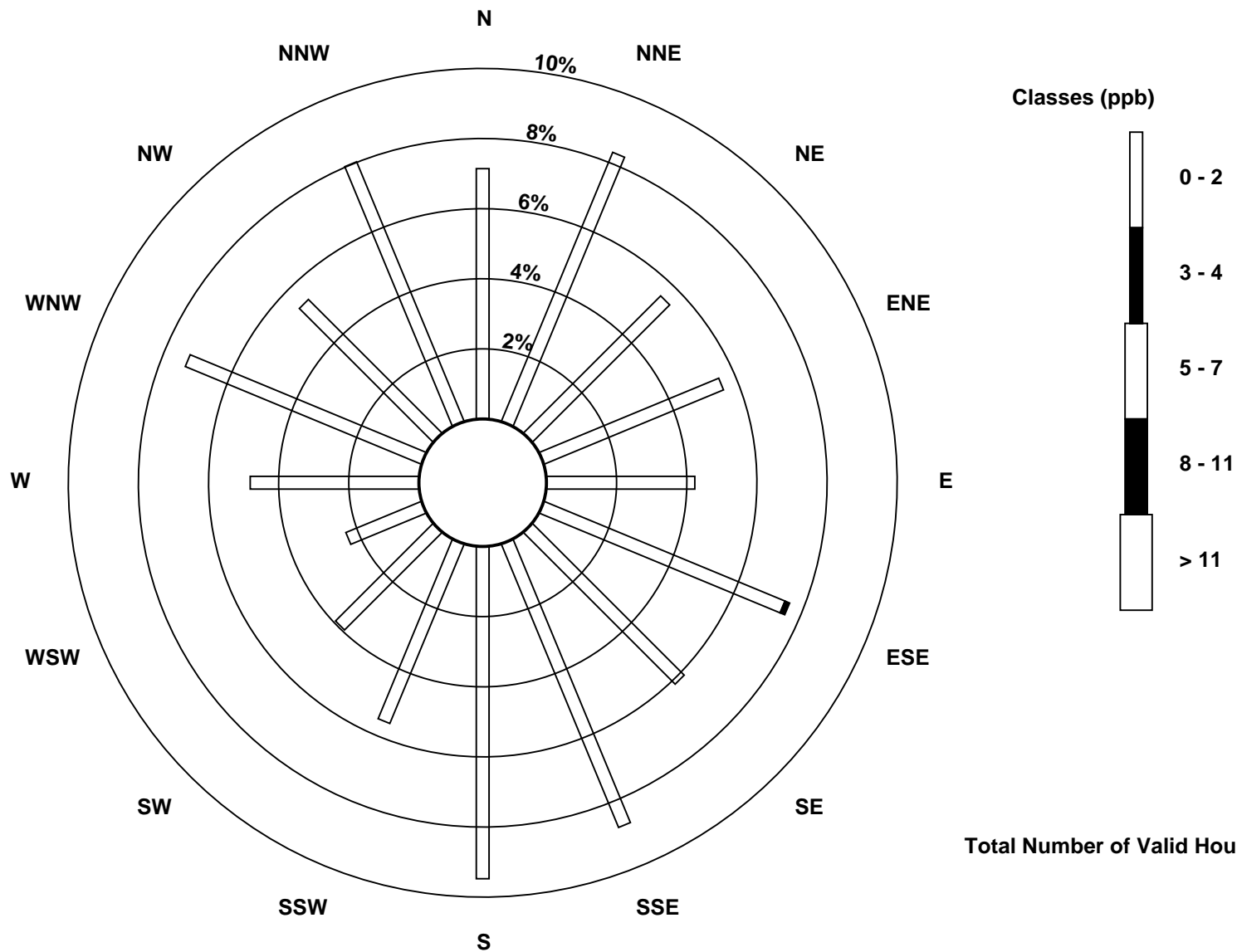
Total Number of Valid Hours: 686

Total Number of Hours: 720

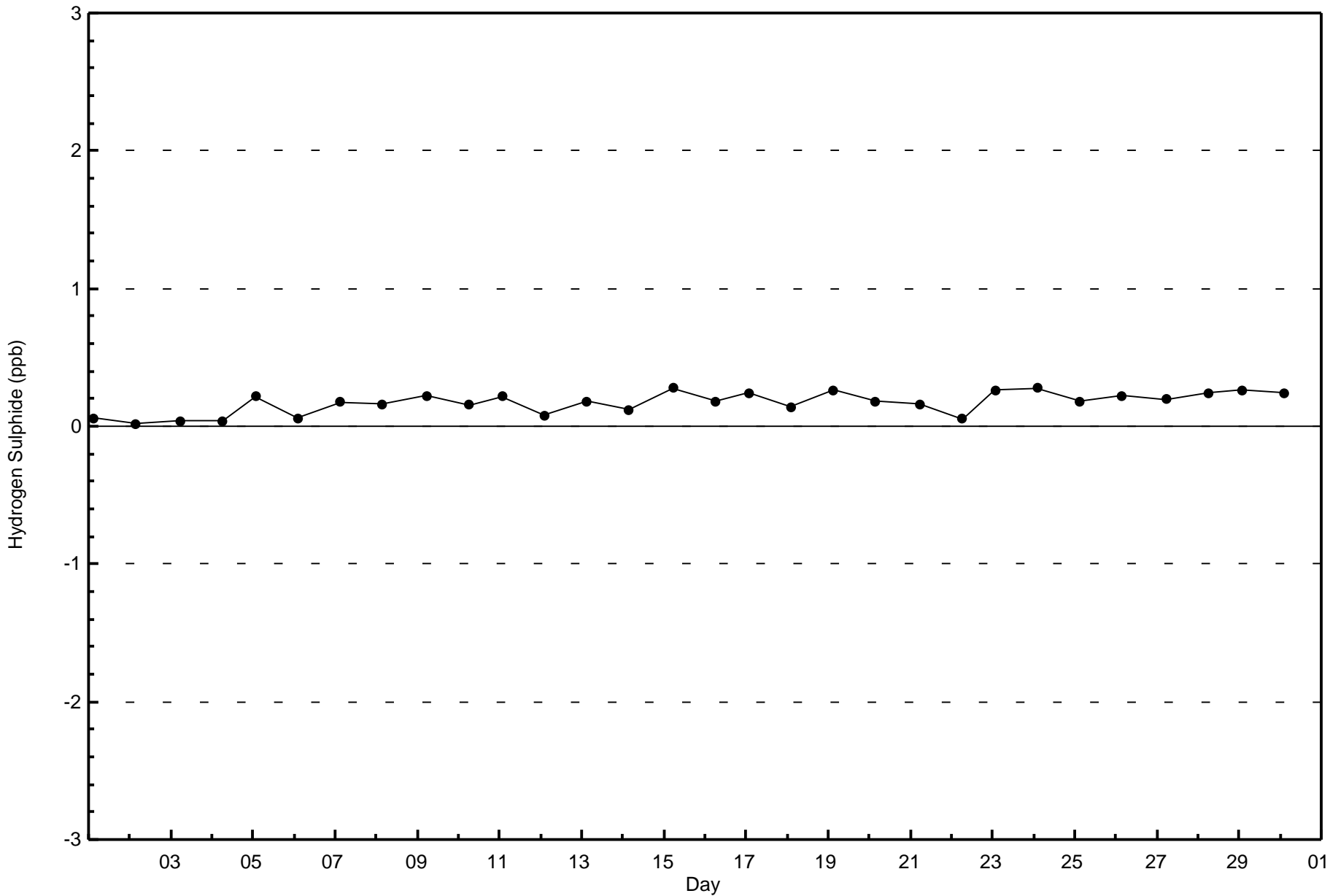


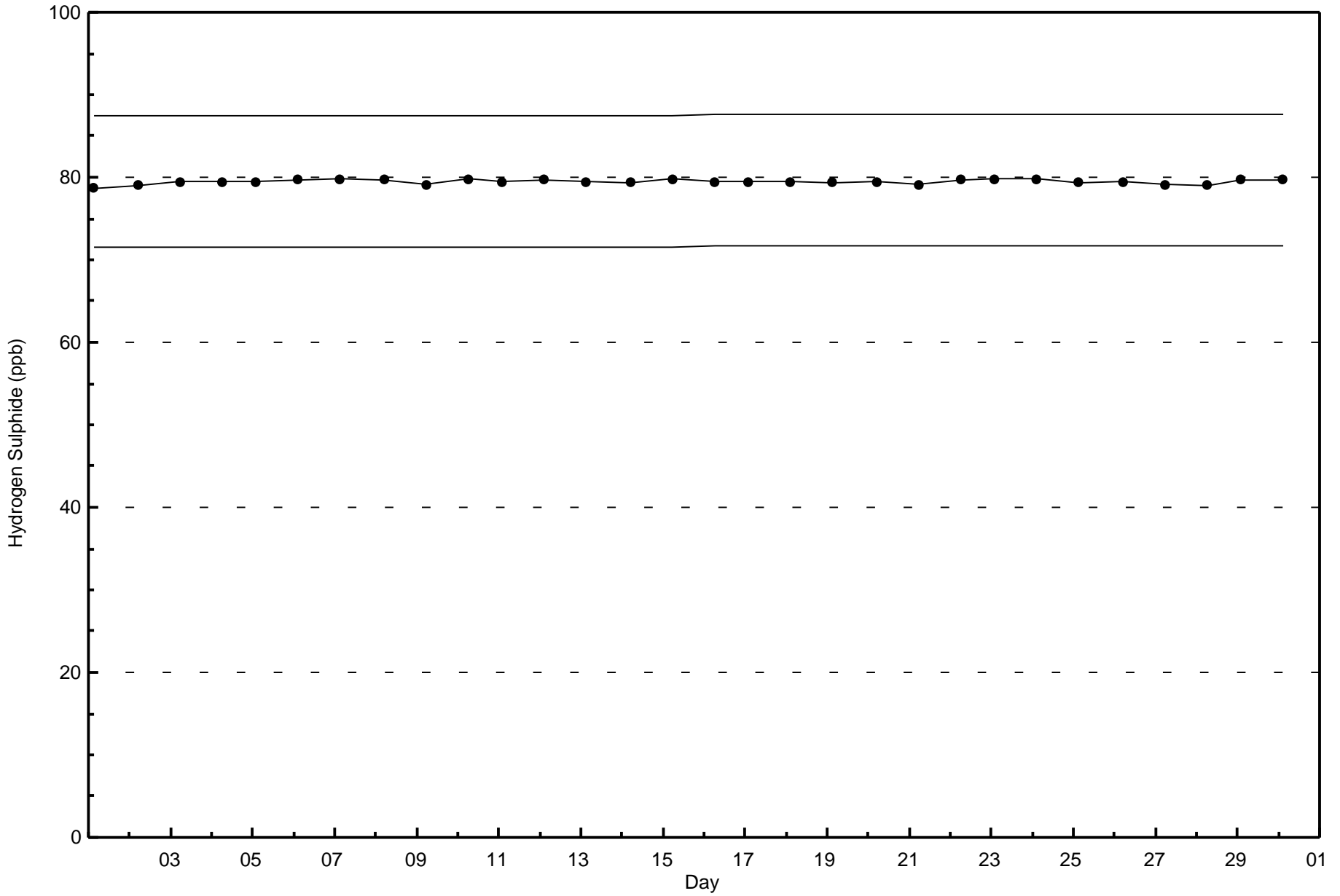
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)



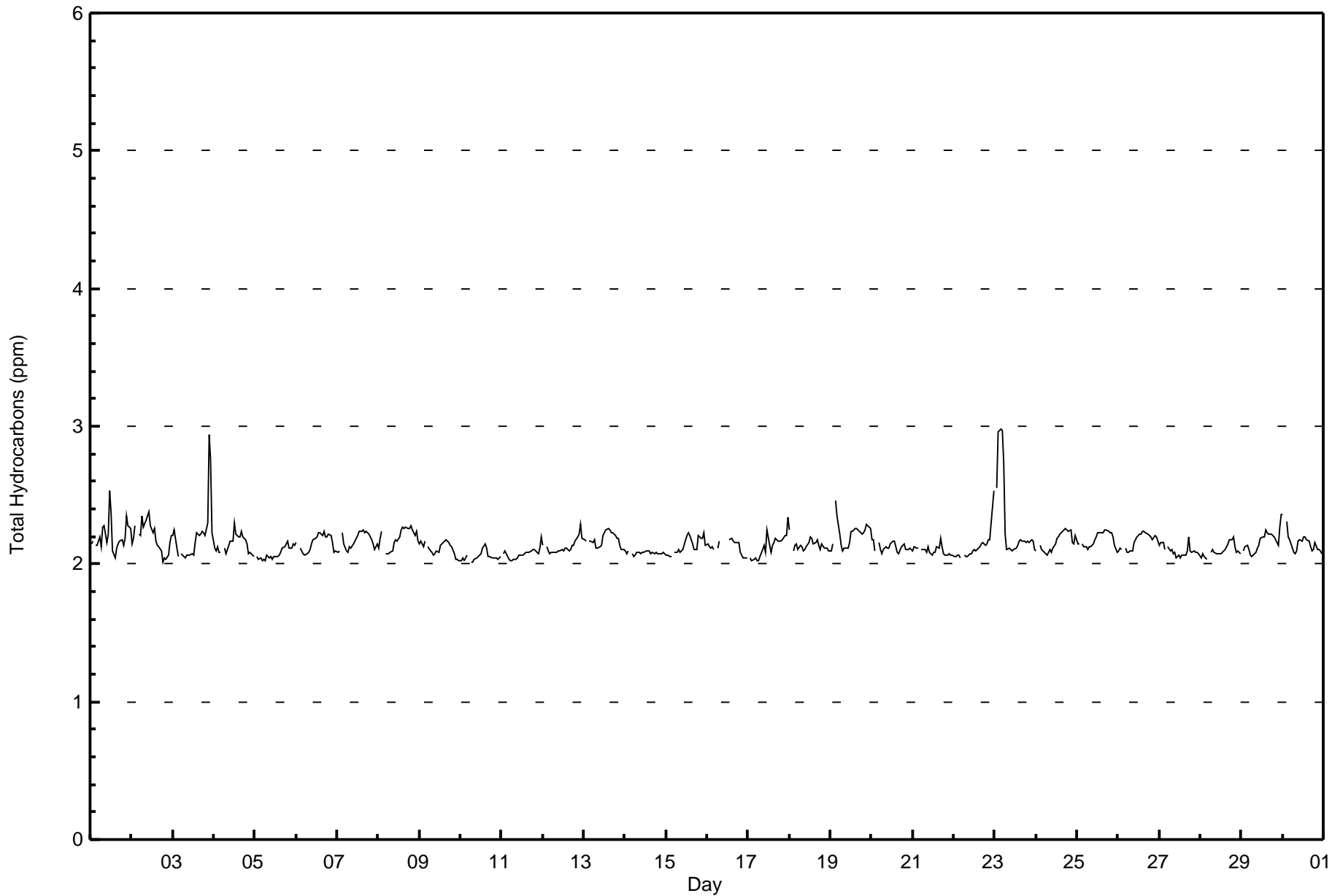
Total Number of Valid Hours: 686







Maximum Value: 3.0 ppm on Jun 23 04:00		Maximum Daily Average: 2.3 ppm on Jun 23		Hours in Service: 720																						
Minimum Value: 2.0 ppm on Jun 10 07:00		Minimum Daily Average: 2.1 ppm on Jun 10		Hours of Data: 685																						
Maximum Diurnal Average: 2.2 ppm at hour 17		Minimum Diurnal Average: 2.1 ppm at hour 7		Hours of Missing Data: 35																						
Monthly Average: 2.15 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.2 P ₉₉ = 2.5		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2.1	2.2	Z	2.1	2.1	2.2	2.1	2.3	2.3	2.2	2.2	2.5	2.4	2.1	2.0	2.1	2.2	2.2	2.2	2.1	2.2	2.4	2.3	2.3	2.2	2.5
2-Jun	2.1	2.2	2.3	Z	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.4
3-Jun	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.9	2.8	2.2	2.9	
4-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	
5-Jun	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	
6-Jun	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	
7-Jun	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	
8-Jun	2.1	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	
9-Jun	2.1	2.2	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.2	
10-Jun	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	
11-Jun	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	
12-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.3	
13-Jun	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.3	
14-Jun	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
15-Jun	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	
16-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.2	C	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.2	
17-Jun	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	
18-Jun	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
19-Jun	2.1	2.1	Z	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	
20-Jun	2.2	2.2	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
21-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
22-Jun	2.1	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.5	2.5	
23-Jun	Z	2.5	3.0	3.0	3.0	2.7	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	3.0	
24-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.3	
25-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	
26-Jun	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
27-Jun	2.1	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	
28-Jun	2.0	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	
29-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.4	2.4	
30-Jun	2.4	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.4	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	51	7.45	7.45
2.1 - 3.0	634	92.55	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	3	4	5	9	2	3	2	5	4	1	0	0	3	3	4	3	51
2.1 - 3.0	46	52	34	29	26	49	41	54	61	38	26	14	32	47	32	53	634
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685

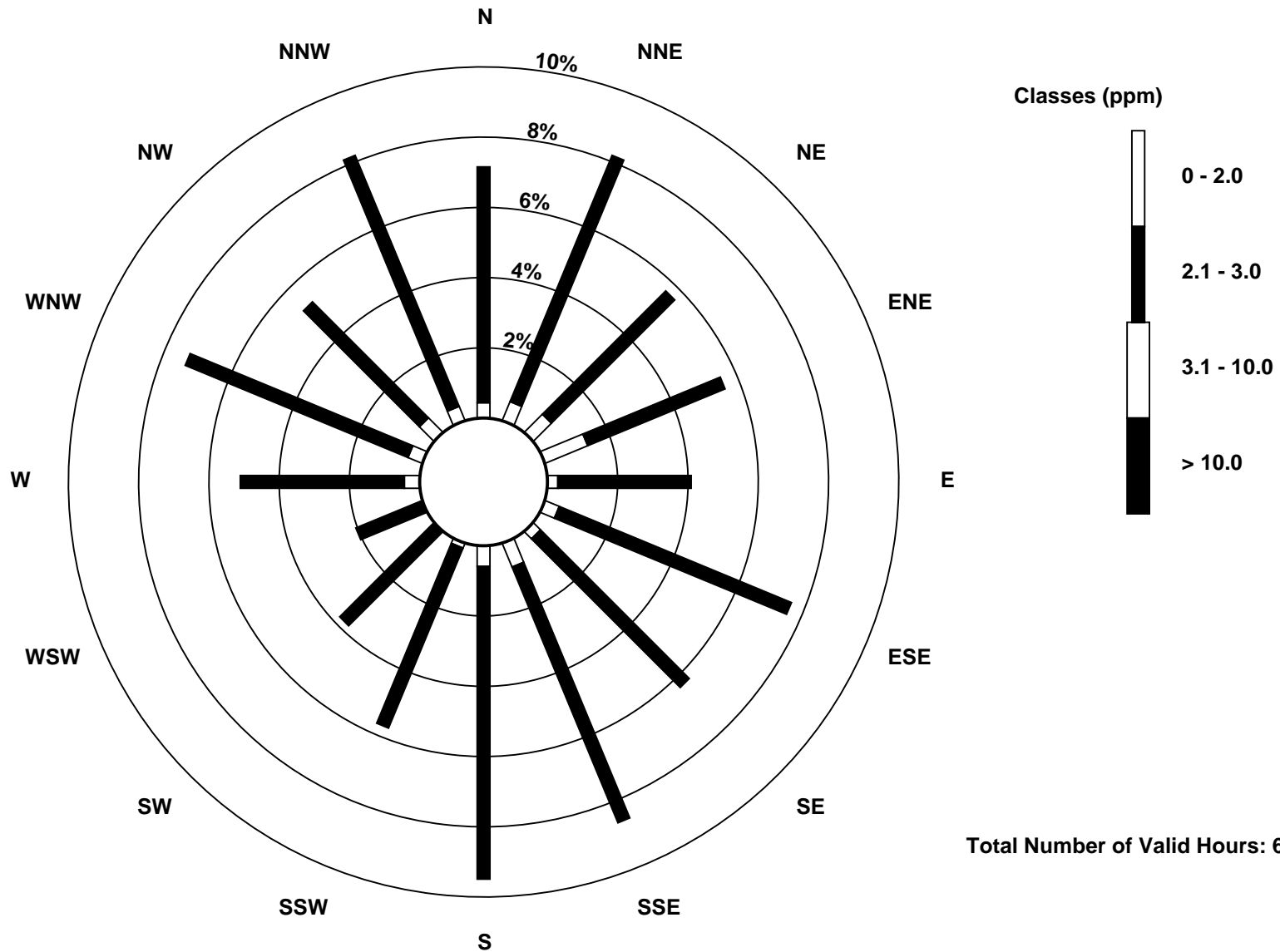
Total Number of Valid Hours: 685

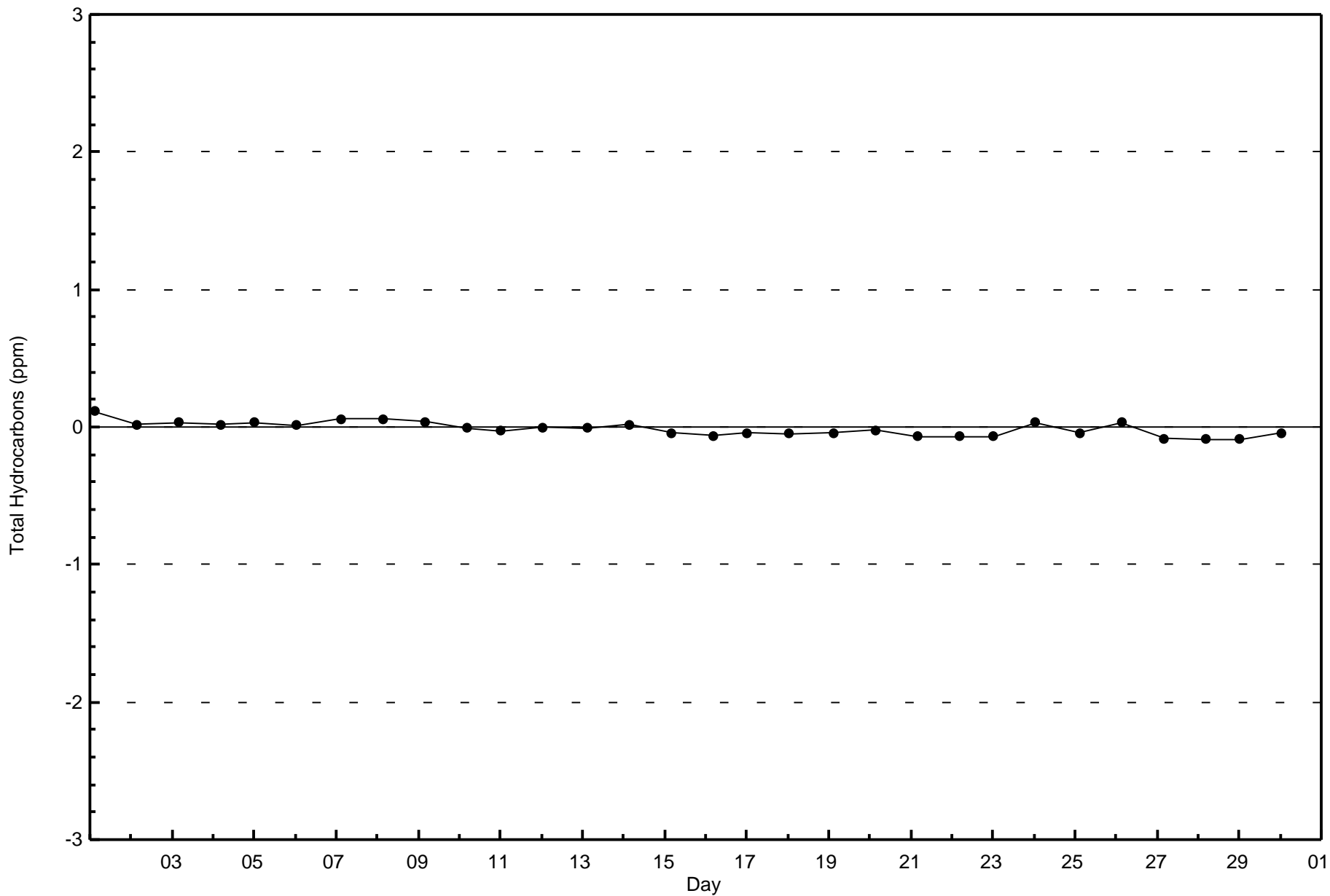
Total Number of Hours: 720

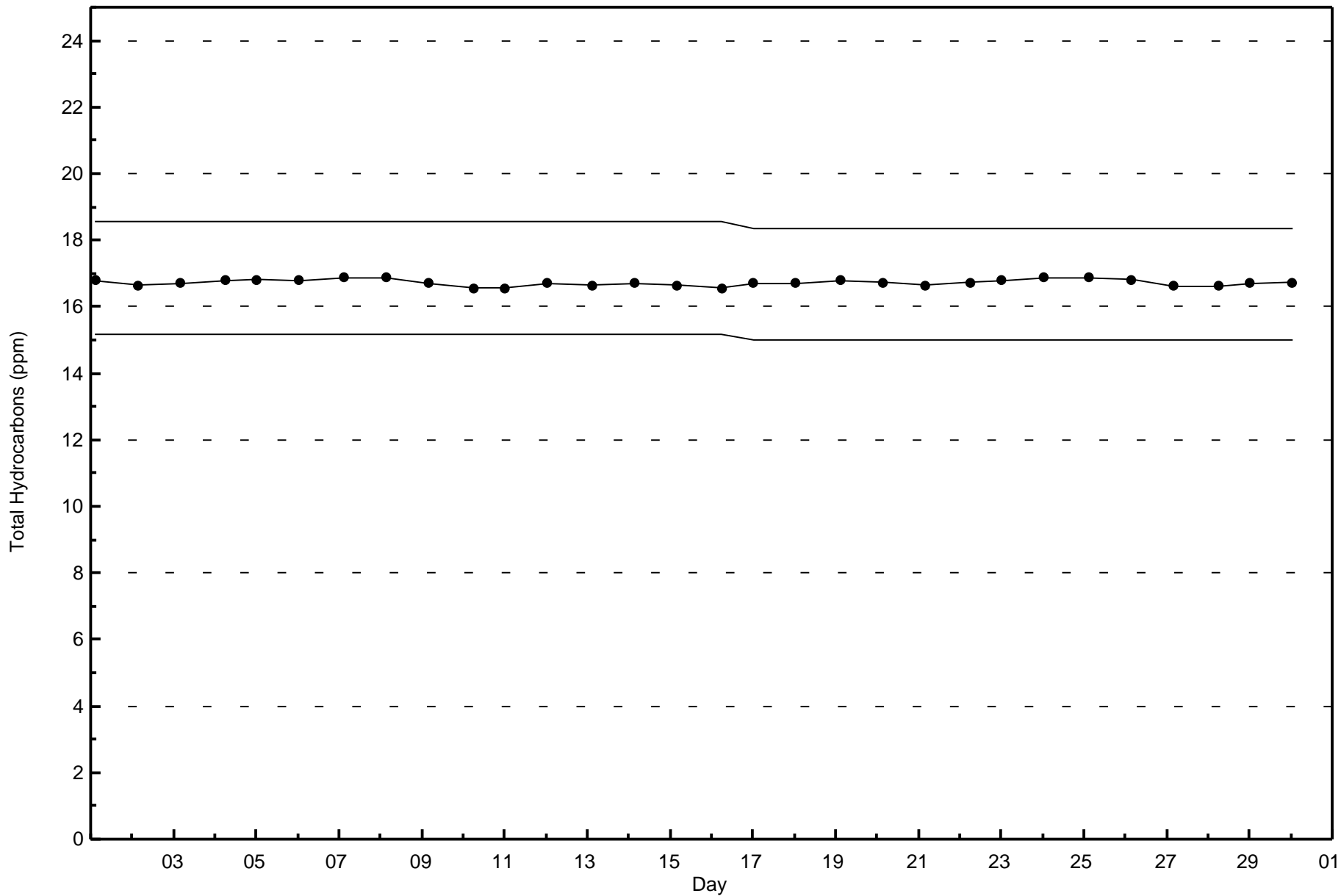


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)







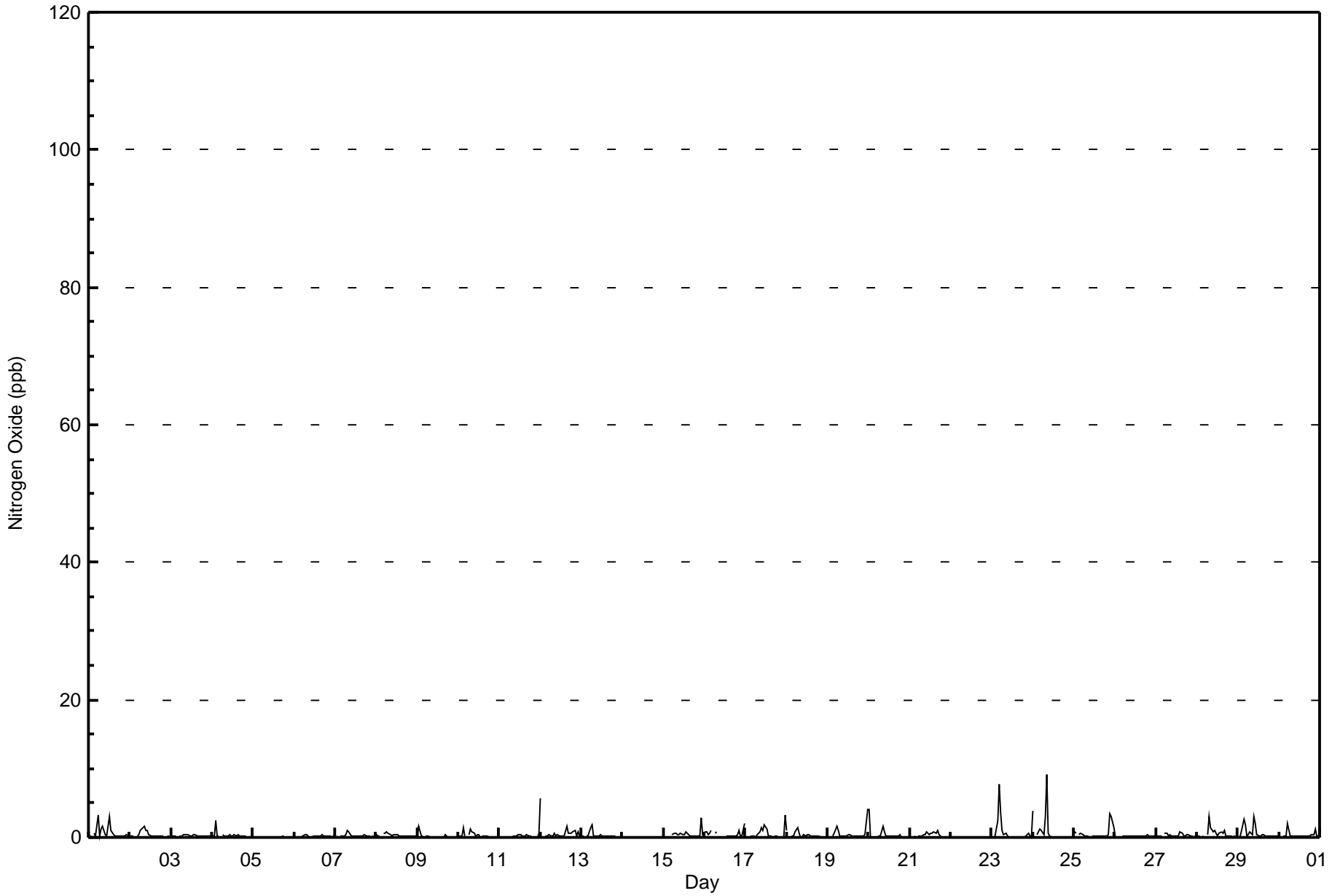


Maximum Value: 9 ppb on Jun 24 09:00																	Maximum Daily Average: 0.9 ppb on Jun 24																	Hours in Service: 720			
Minimum Value: 0 ppb on Jun 22 21:00																	Minimum Daily Average: 0.1 ppb on Jun 22																	Hours of Data: 685			
Maximum Diurnal Average: 0.8 ppb at hour 9																	Minimum Diurnal Average: 0.2 ppb at hour 20																	Hours of Missing Data: 35			
Monthly Average: 0.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4																	Hours of Calibration: 35			
																																		Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Jun	0	0	Z	1	0	3	0	1	2	0	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0.7	3										
2-Jun	0	0	0	Z	0	0	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2										
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0										
4-Jun	0	0	3	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3										
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0										
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0										
7-Jun	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
8-Jun	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1										
9-Jun	0	2	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2										
10-Jun	0	0	0	1	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1										
11-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1										
12-Jun	6	Z	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1	1	1	1	1	0	1	0	0.6	6											
13-Jun	0	0	Z	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2										
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0										
15-Jun	0	0	0	0	Z	0	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	3	0	0.4	3										
16-Jun	1	1	0	1	1	Z	1	1	C	C	C	C	C	0	0	0	0	0	0	0	1	0	0	2	0.6	2											
17-Jun	Z	0	0	0	0	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	3	0.5	3											
18-Jun	1	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1										
19-Jun	0	0	Z	0	1	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4	0.5	4											
20-Jun	4	0	0	Z	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4											
21-Jun	0	0	0	0	Z	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0.3	1											
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0											
23-Jun	Z	0	0	3	8	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.8	8											
24-Jun	4	Z	0	1	1	1	0	3	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	9											
25-Jun	1	1	Z	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0.6	3										
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0											
27-Jun	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1											
28-Jun	0	0	0	0	0	Z	0	3	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0.5	3											
29-Jun	Z	0	1	3	2	0	0	1	0	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0.7	3											
30-Jun	0	Z	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	2											
																	0.7 0.2 0.3 0.4 0.7 0.7 0.5 0.6 0.8 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.5																	Diurnal Average			
																	6 2 3 3 8 4 2 3 9 3 2 2 3 1 1 2 1 1 1 1 1 1 3 3 4																	Diurnal Maximum			
Z - zerospan																	C - Calibration																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685

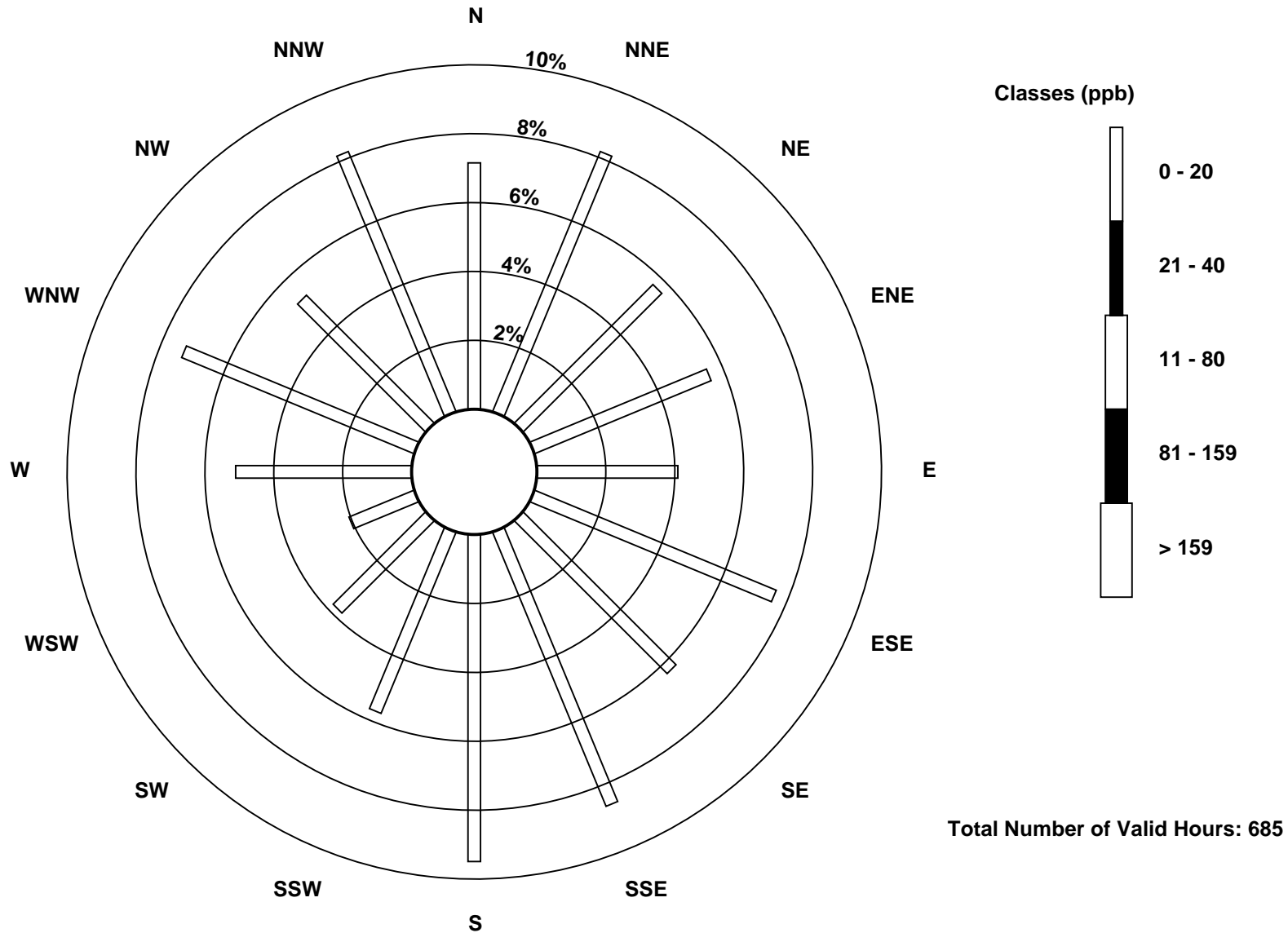
Total Number of Valid Hours: 685

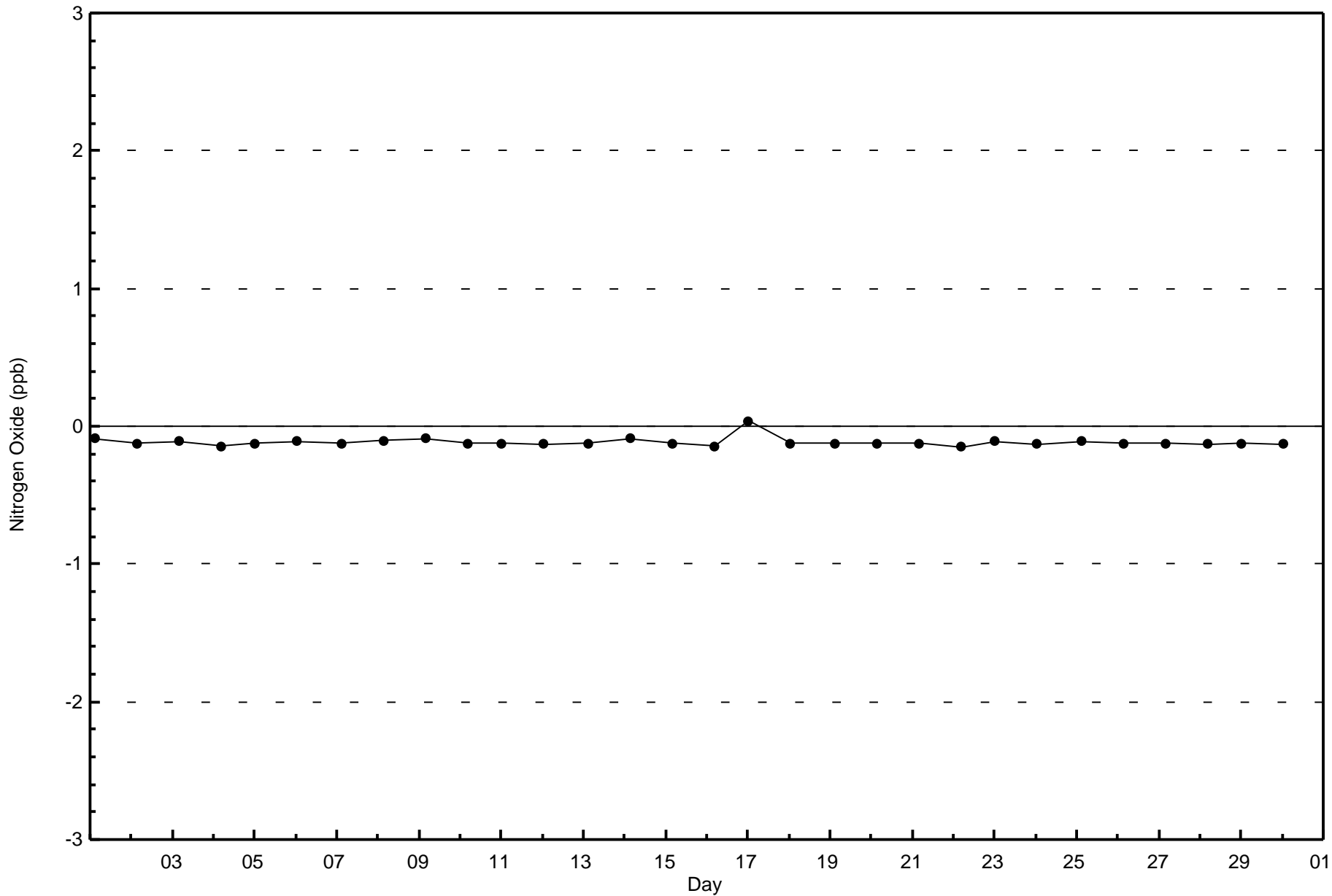
Total Number of Hours: 720

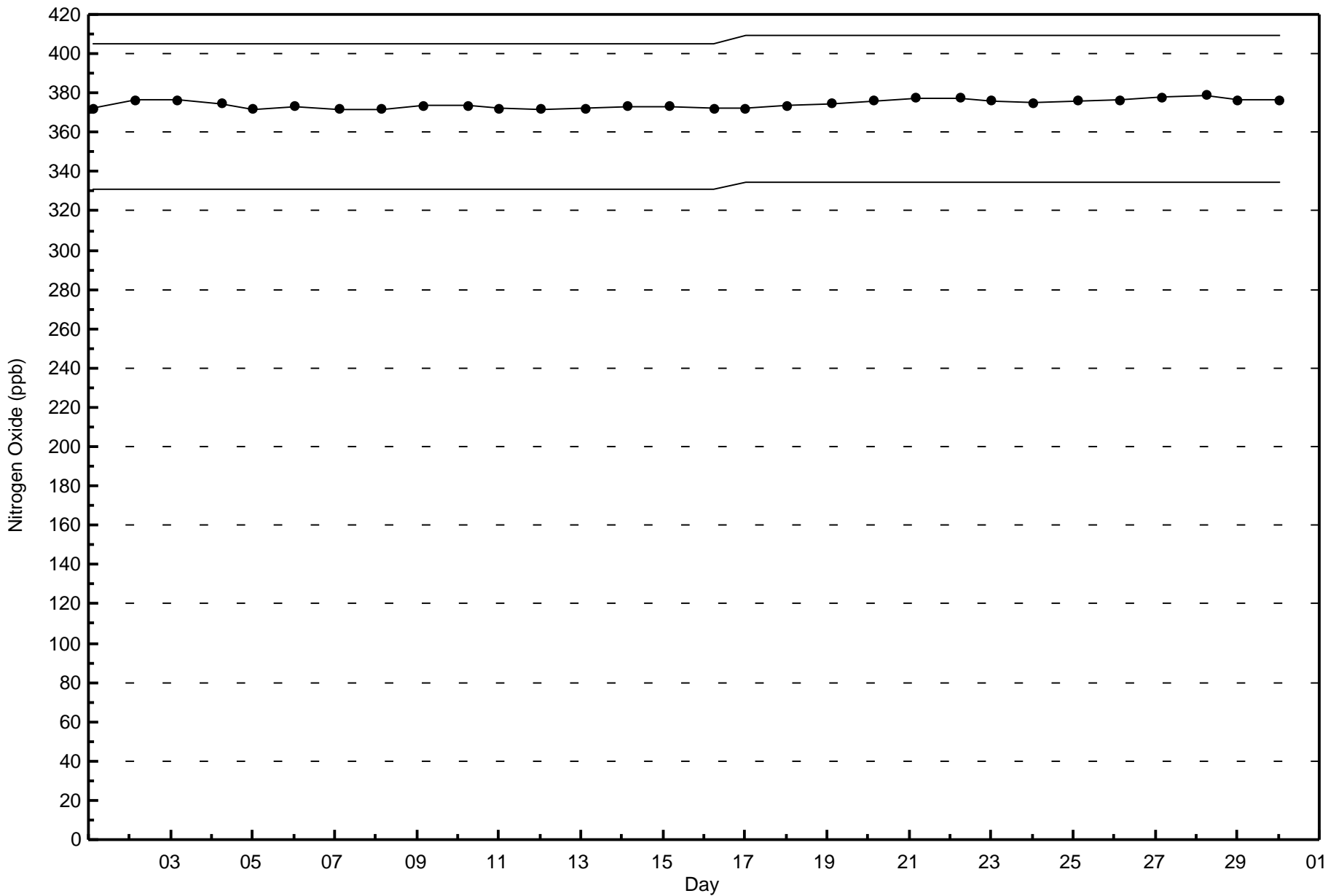


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)







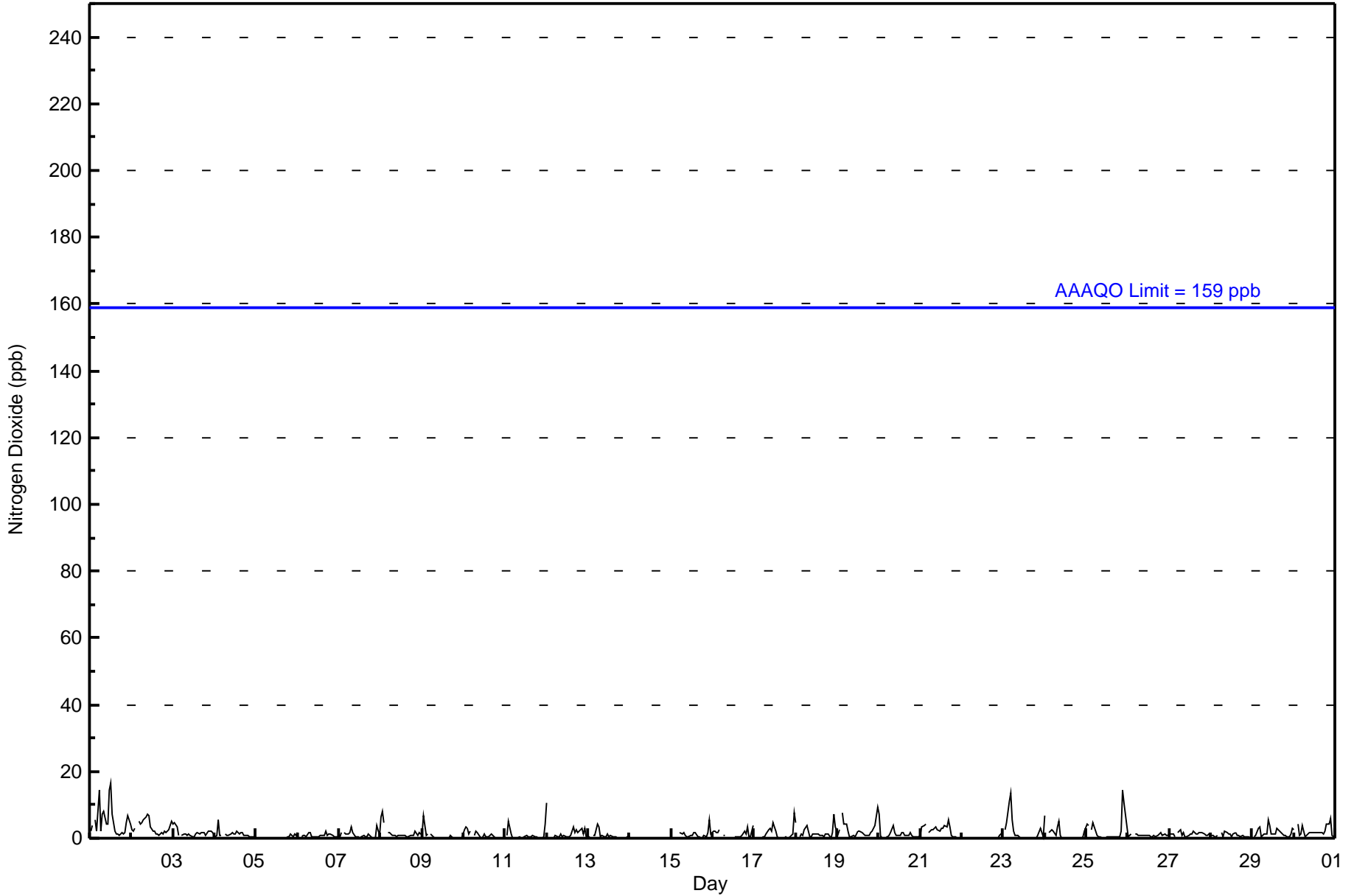


Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16 ppb on Jun 1 13:00	Maximum Daily Average: 5.1 ppb on Jun 1		Hours of Data:	685
Minimum Value: 0 ppb on Jun 9 20:00	Minimum Daily Average: 0.1 ppb on Jun 14		Hours of Missing Data:	35
Maximum Diurnal Average: 2.6 ppb at hour 1	Minimum Diurnal Average: 0.9 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 1.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 10		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	4	Z	6	2	14	2	7	8	4	4	14	16	7	2	1	1	1	2	1	2	5	7	4	5.1	16
2-Jun	3	2	3	Z	5	4	5	6	6	7	7	4	2	2	1	1	1	2	1	2	2	3	4	5	3.3	7
3-Jun	4	5	4	1	Z	1	1	1	1	1	1	0	0	1	2	1	2	2	2	1	2	2	2	2	1.7	5
4-Jun	1	1	6	1	1	Z	1	1	1	1	2	1	1	2	1	2	2	1	1	1	1	0	0	0	1.3	6
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0.3	1
6-Jun	2	Z	1	1	1	1	2	2	1	0	0	1	1	1	1	1	2	1	1	1	1	1	1	1	0.9	2
7-Jun	0	2	Z	2	1	1	2	3	2	0	0	1	0	1	1	0	0	1	0	0	0	0	4	1	1.0	4
8-Jun	6	8	5	Z	2	2	1	1	1	0	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1.7	8
9-Jun	1	7	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.6	7
10-Jun	2	4	3	1	2	Z	1	2	2	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	1.0	4
11-Jun	Z	1	5	1	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0	0	1	4	0.7	5
12-Jun	11	Z	0	0	0	1	0	0	1	0	1	0	1	1	1	3	2	3	2	2	3	1	3	1	1.6	11
13-Jun	0	0	Z	1	1	4	4	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	1	0.8	4	
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	0	Z	2	1	2	1	0	1	1	1	2	2	0	0	0	0	1	1	2	6	1	0.9	6
16-Jun	2	2	2	2	3	Z	1	1	C	C	C	C	C	0	0	0	1	1	2	1	3	1	1	4	1.4	4
17-Jun	Z	0	0	0	0	0	0	1	3	3	2	5	2	1	0	0	0	0	0	0	0	1	1	8	1.2	8
18-Jun	5	Z	0	1	1	2	4	2	0	1	1	1	1	1	1	1	1	1	1	1	0	2	7	3	1.7	7
19-Jun	1	2	Z	8	4	4	2	1	0	1	1	1	2	2	2	1	1	1	1	2	2	3	4	10	2.4	10
20-Jun	7	0	0	Z	1	1	1	2	4	2	1	1	1	2	2	1	1	1	2	1	1	1	1	0	1.3	7
21-Jun	1	3	4	4	Z	2	3	2	3	4	2	2	3	3	4	4	6	3	1	0	0	0	0	0	2.3	6
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.1	2
23-Jun	Z	3	5	11	14	5	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	2.1	14
24-Jun	7	Z	2	2	3	2	1	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1.3	7
25-Jun	4	4	Z	3	5	2	1	0	0	0	0	0	0	1	0	0	0	1	1	1	2	15	11	4	2.3	15
26-Jun	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	0.9	2
27-Jun	1	1	1	1	Z	2	3	1	2	1	1	1	1	2	1	1	2	2	2	2	1	1	1	1	1.3	3
28-Jun	1	1	1	0	1	Z	2	0	2	2	1	1	0	1	2	1	1	1	1	1	1	0	0	0	0.9	2
29-Jun	Z	1	1	3	3	0	1	1	1	6	4	1	1	1	3	2	2	1	1	1	1	1	1	3	1.8	6
30-Jun	3	Z	4	1	1	4	1	1	1	2	2	2	2	2	2	2	2	1	2	4	4	6	1	1	2.1	6

2.6	2.0	1.9	2.0	2.0	2.3	1.4	1.4	1.6	1.3	1.1	1.4	1.4	1.2	1.0	0.9	1.0	0.9	0.9	0.9	0.9	1.0	1.6	2.0	2.0	Diurnal Average
11	8	6	11	14	14	5	7	8	7	7	14	16	7	4	4	6	3	2	4	4	4	15	11	10	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 159 ppb





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685

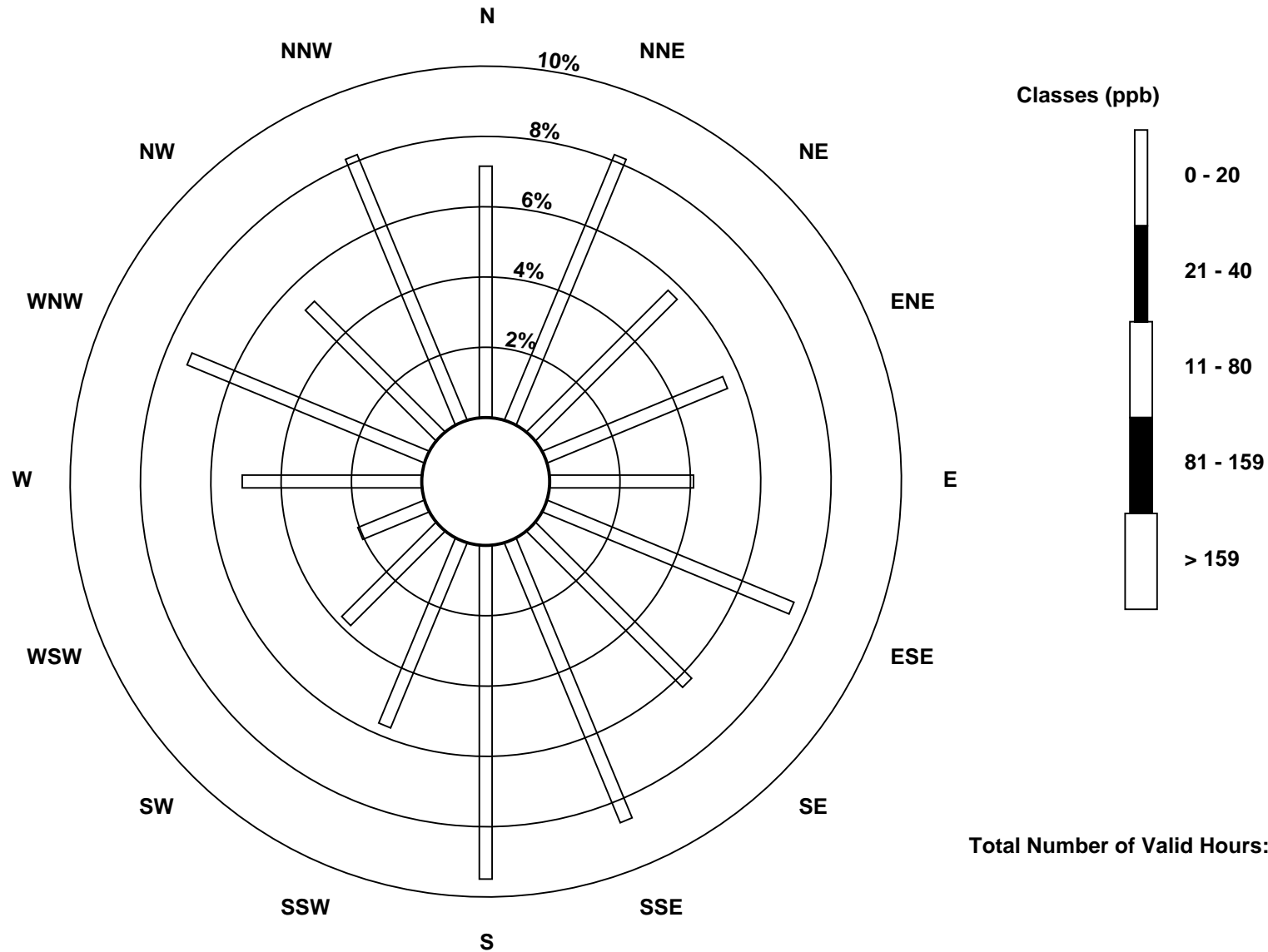
Total Number of Valid Hours: 685

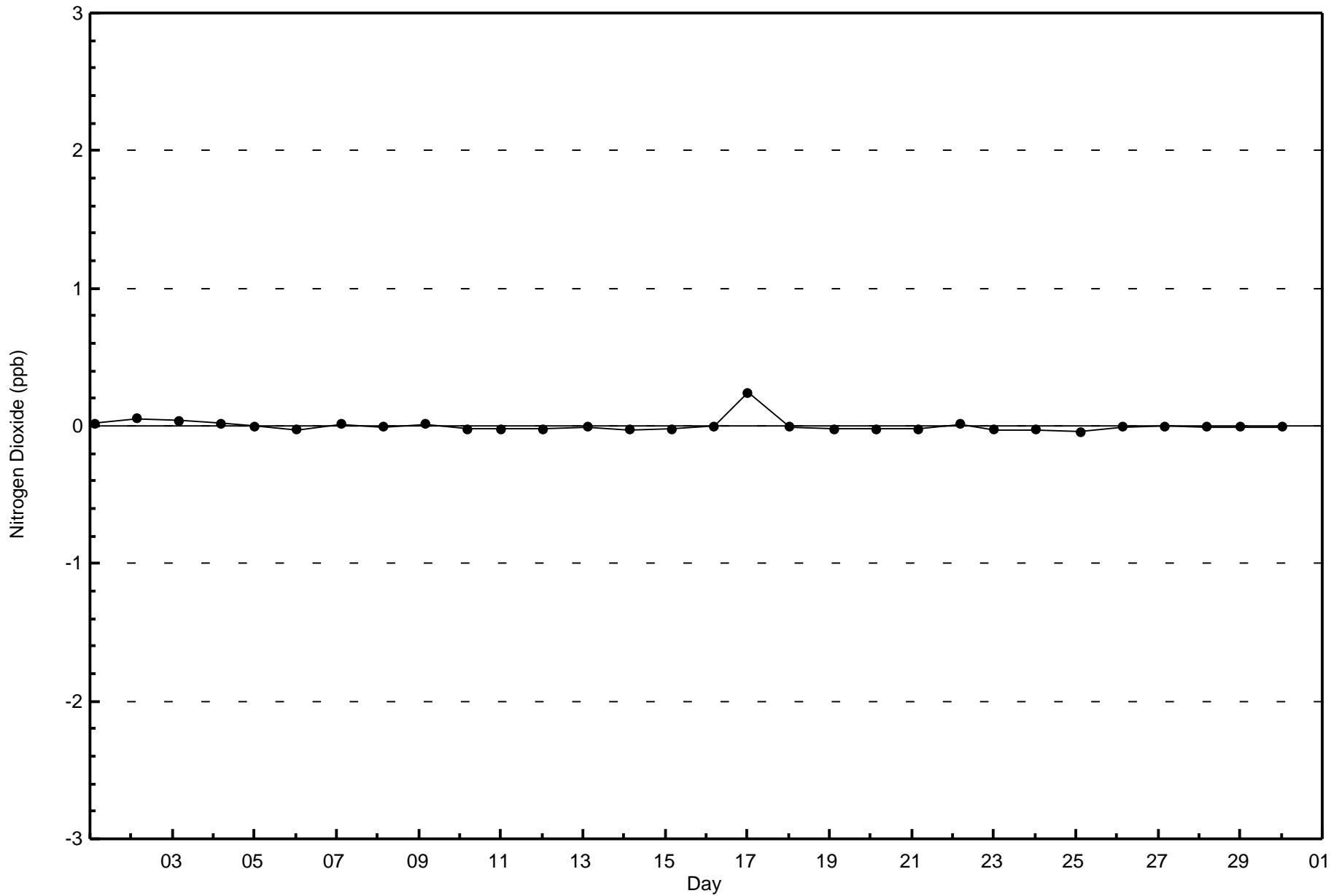
Total Number of Hours: 720

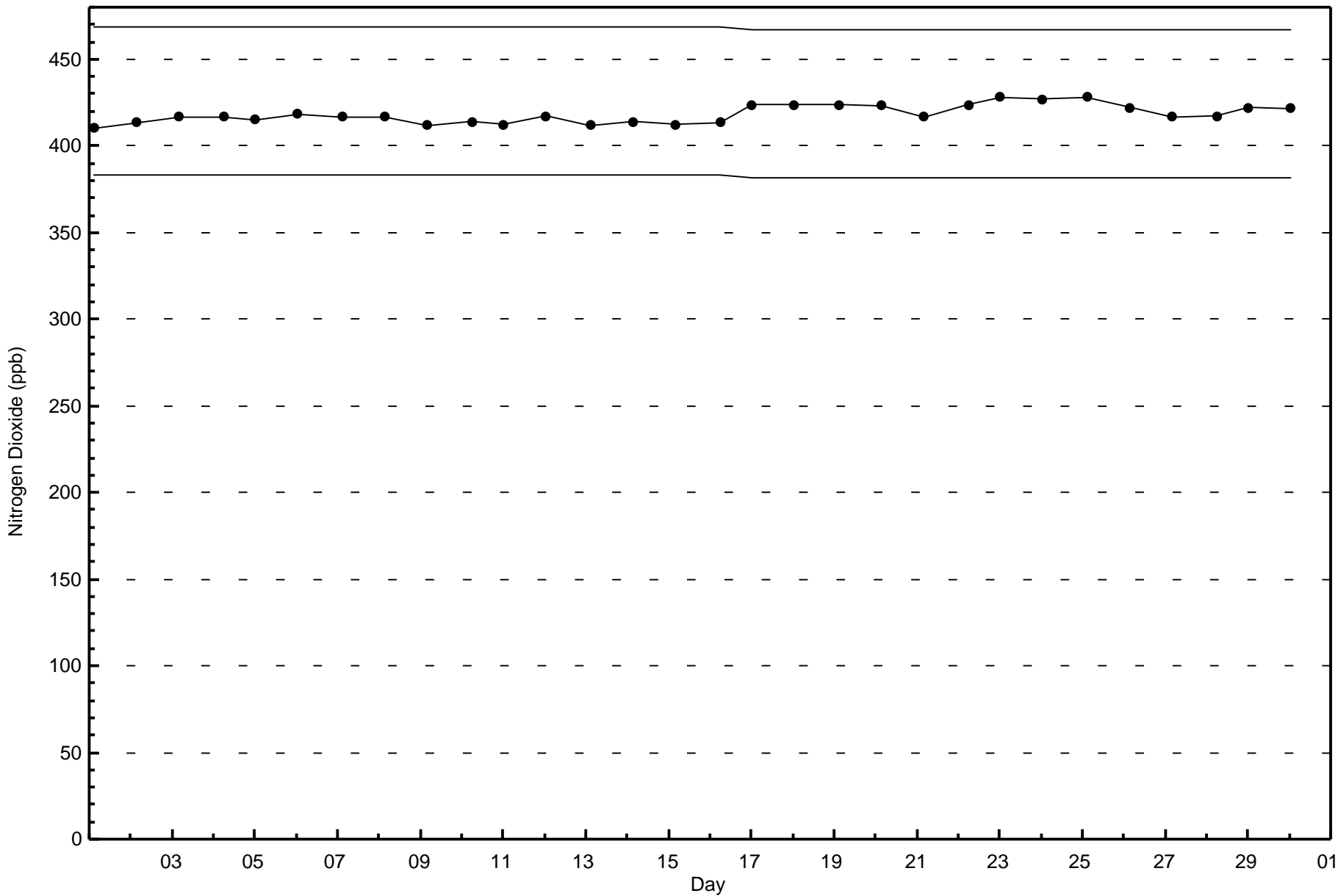


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)

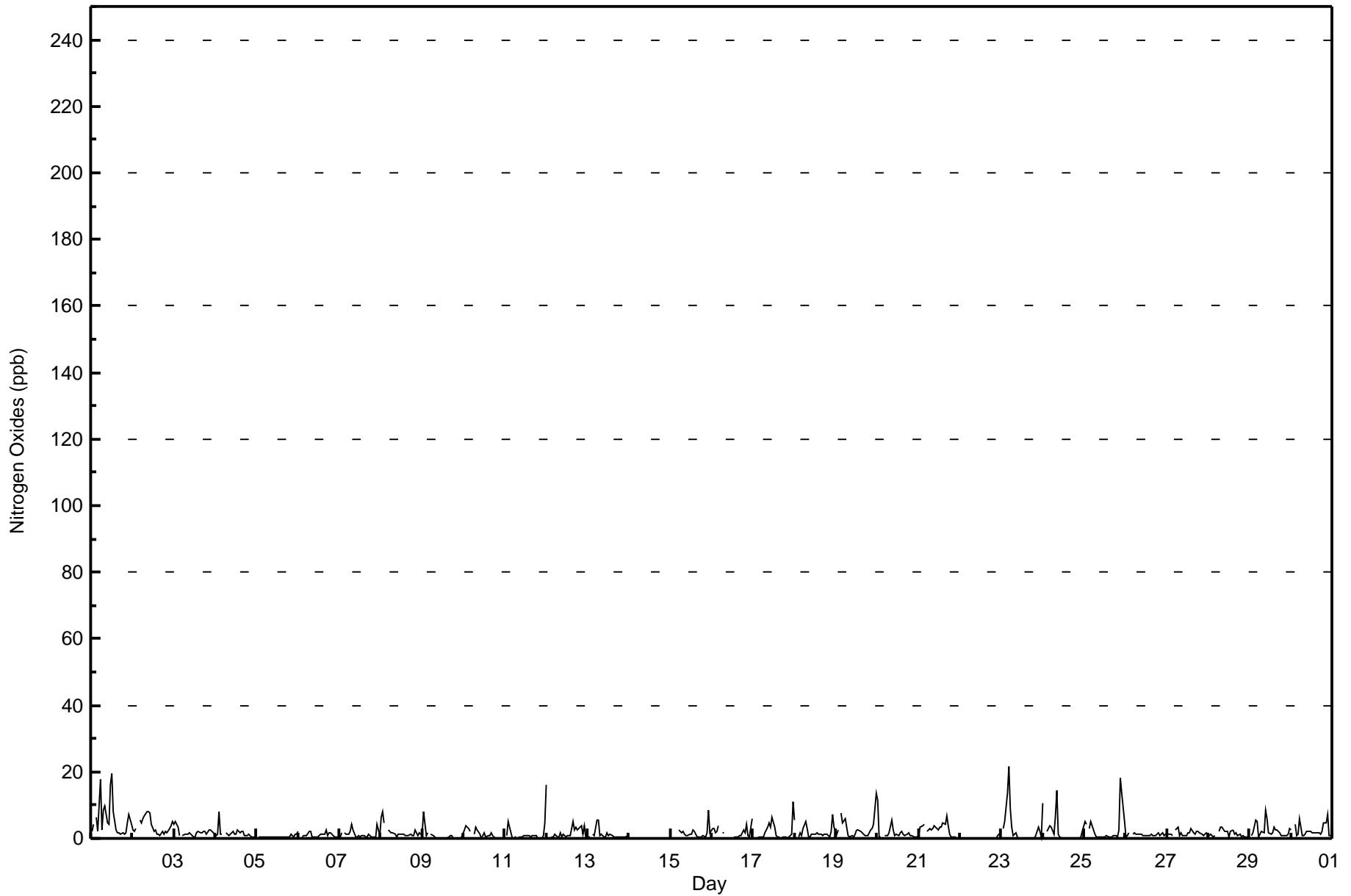








Maximum Value: 21 ppb on Jun 23 05:00														Maximum Daily Average: 5.8 ppb on Jun 1														Hours in Service: 720			
Minimum Value: 0 ppb on Jun 22 16:00														Minimum Daily Average: 0.1 ppb on Jun 14														Hours of Data: 685			
Maximum Diurnal Average: 3.3 ppb at hour 1														Minimum Diurnal Average: 1.0 ppb at hour 20														Hours of Missing Data: 35			
Monthly Average: 1.9 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 14														Hours of Calibration: 35			
																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Jun	2	4	Z	6	2	18	2	9	10	5	4	16	20	8	3	2	2	1	2	1	2	5	7	4	5.8	20					
2-Jun	3	2	3	Z	5	5	6	7	8	8	8	4	2	2	1	1	1	2	1	2	2	3	4	5	3.7	8					
3-Jun	4	5	4	1	Z	1	1	1	1	2	1	1	0	2	2	2	2	2	2	1	2	3	2	2	1.9	5					
4-Jun	1	1	8	1	1	Z	2	1	1	2	2	1	1	2	2	2	2	1	1	1	1	1	0	0	1.6	8					
5-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1					
6-Jun	2	Z	1	1	1	1	2	2	1	0	0	1	1	1	1	1	3	1	2	2	1	1	1	1	1.1	3					
7-Jun	1	2	Z	2	1	1	2	4	3	1	0	1	0	1	1	1	0	1	0	0	0	0	4	1	1.2	4					
8-Jun	7	8	5	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	1	2	1	2.0	8					
9-Jun	1	8	1	2	Z	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.8	8					
10-Jun	3	4	3	3	2	Z	1	3	2	1	0	1	1	0	1	1	2	1	0	0	0	0	0	0	1.3	4					
11-Jun	Z	1	5	2	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	1	5	0.9	5					
12-Jun	16	Z	0	0	0	1	0	0	2	0	1	1	1	1	1	5	2	3	3	3	4	1	4	1	2.2	16					
13-Jun	0	0	Z	1	1	6	5	1	1	1	1	2	1	1	1	1	0	0	0	0	0	0	1	1	1.1	6					
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0					
15-Jun	0	0	0	0	Z	2	2	2	1	1	1	1	1	3	2	1	1	0	0	1	1	2	8	2	1.4	8					
16-Jun	3	3	2	2	4	Z	2	2	C	C	C	C	C	1	1	1	1	1	2	2	4	1	1	6	2.0	6					
17-Jun	Z	0	0	0	0	1	0	1	3	5	3	7	3	1	0	0	0	0	0	0	0	1	1	11	1.7	11					
18-Jun	6	Z	0	2	1	3	5	3	0	1	1	1	1	2	1	1	1	1	1	1	0	2	7	3	2.0	7					
19-Jun	1	3	Z	8	5	6	3	1	1	1	1	1	3	2	2	2	1	1	1	2	2	3	4	14	2.9	14					
20-Jun	11	1	0	Z	1	1	1	2	6	3	1	1	1	2	2	1	1	1	2	1	1	1	1	1	1.7	11					
21-Jun	1	3	4	4	Z	2	3	3	3	4	3	3	3	3	5	4	7	4	1	0	0	0	0	0	2.7	7					
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0.2	2					
23-Jun	Z	3	5	14	21	9	3	1	2	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	2.9	21					
24-Jun	11	Z	2	3	4	3	1	7	14	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2.2	14					
25-Jun	5	4	Z	3	5	3	1	0	0	0	0	0	1	1	1	1	1	1	1	1	3	18	13	5	2.9	18					
26-Jun	1	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1.1	2					
27-Jun	1	1	1	1	Z	2	3	1	2	1	1	1	2	1	3	2	1	2	2	2	1	1	1	2	1.6	3					
28-Jun	1	1	1	1	1	Z	2	3	4	2	2	2	1	2	3	1	2	1	1	1	1	0	0	0	1.4	4					
29-Jun	Z	1	2	5	5	1	1	2	2	8	6	2	1	2	3	3	2	1	1	1	1	1	1	3	2.4	8					
30-Jun	3	Z	4	1	1	6	1	1	1	2	2	2	2	2	2	2	2	1	2	5	5	7	1	1	2.4	7					
																												Diurnal Average			
																												Diurnal Maximum			
Z - zerospan														C - Calibration																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	56	39	38	28	52	43	59	65	39	26	14	34	50	36	56	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	56	39	38	28	52	43	59	65	39	26	14	35	50	36	56	685

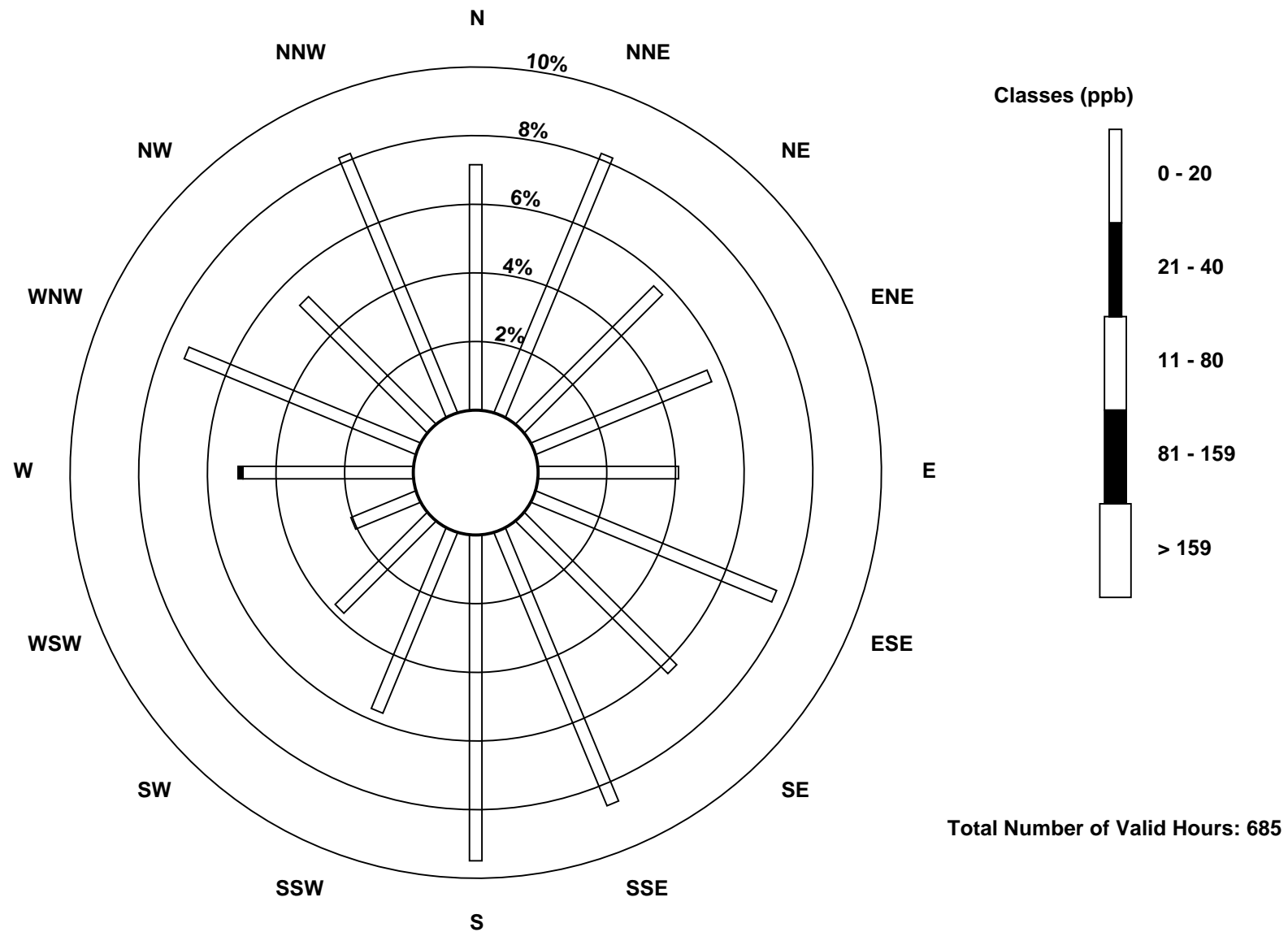
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

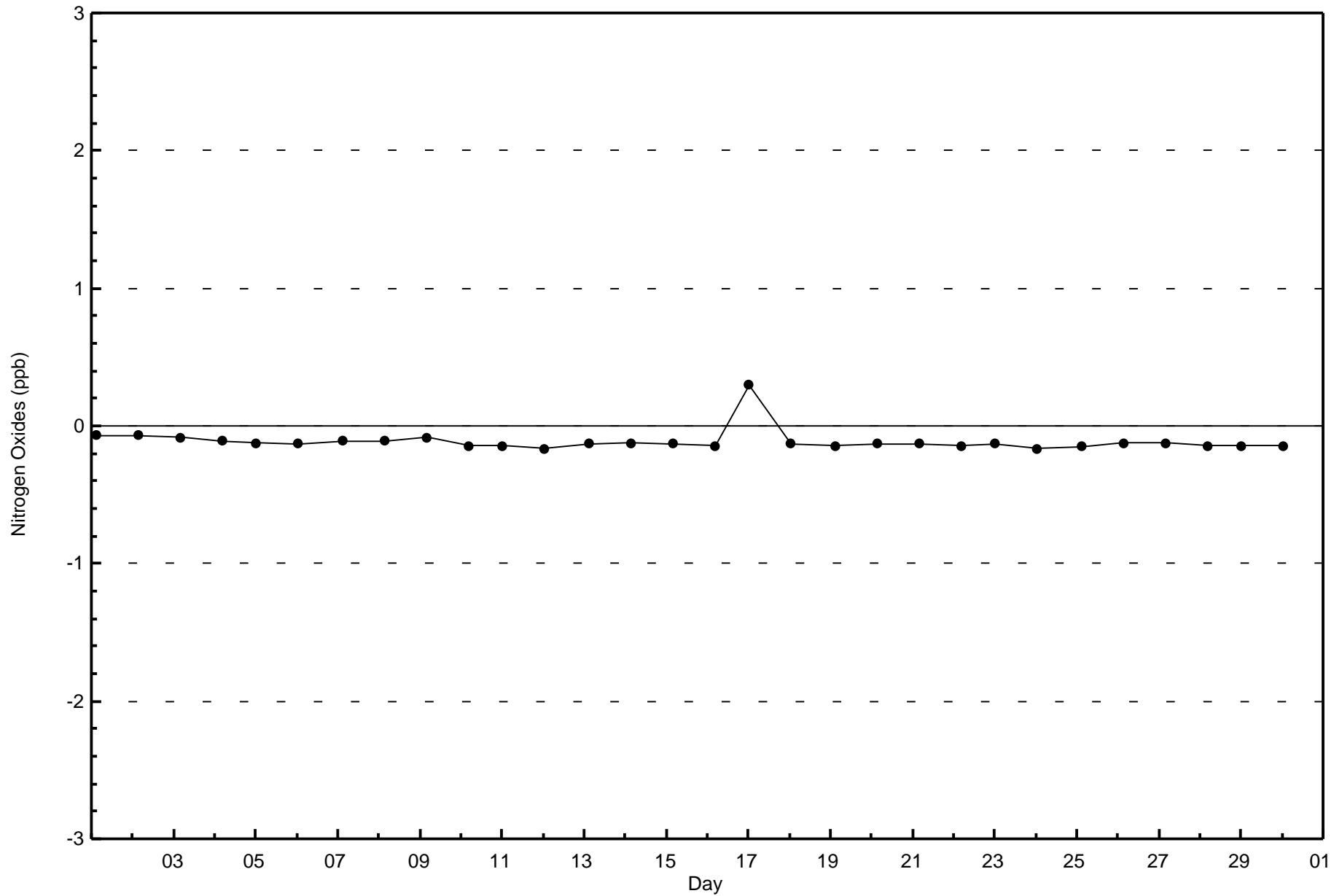
Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)

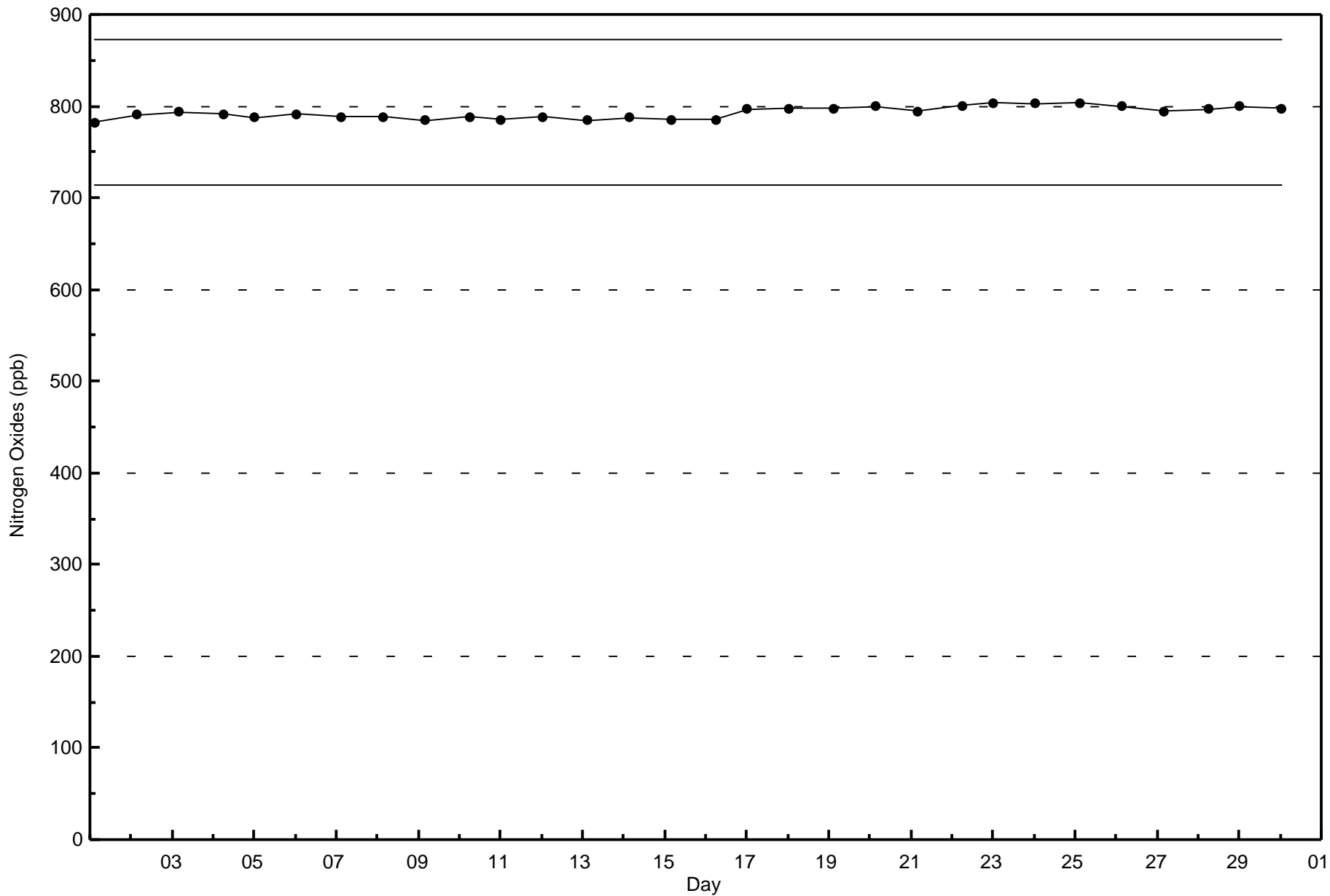




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - June 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

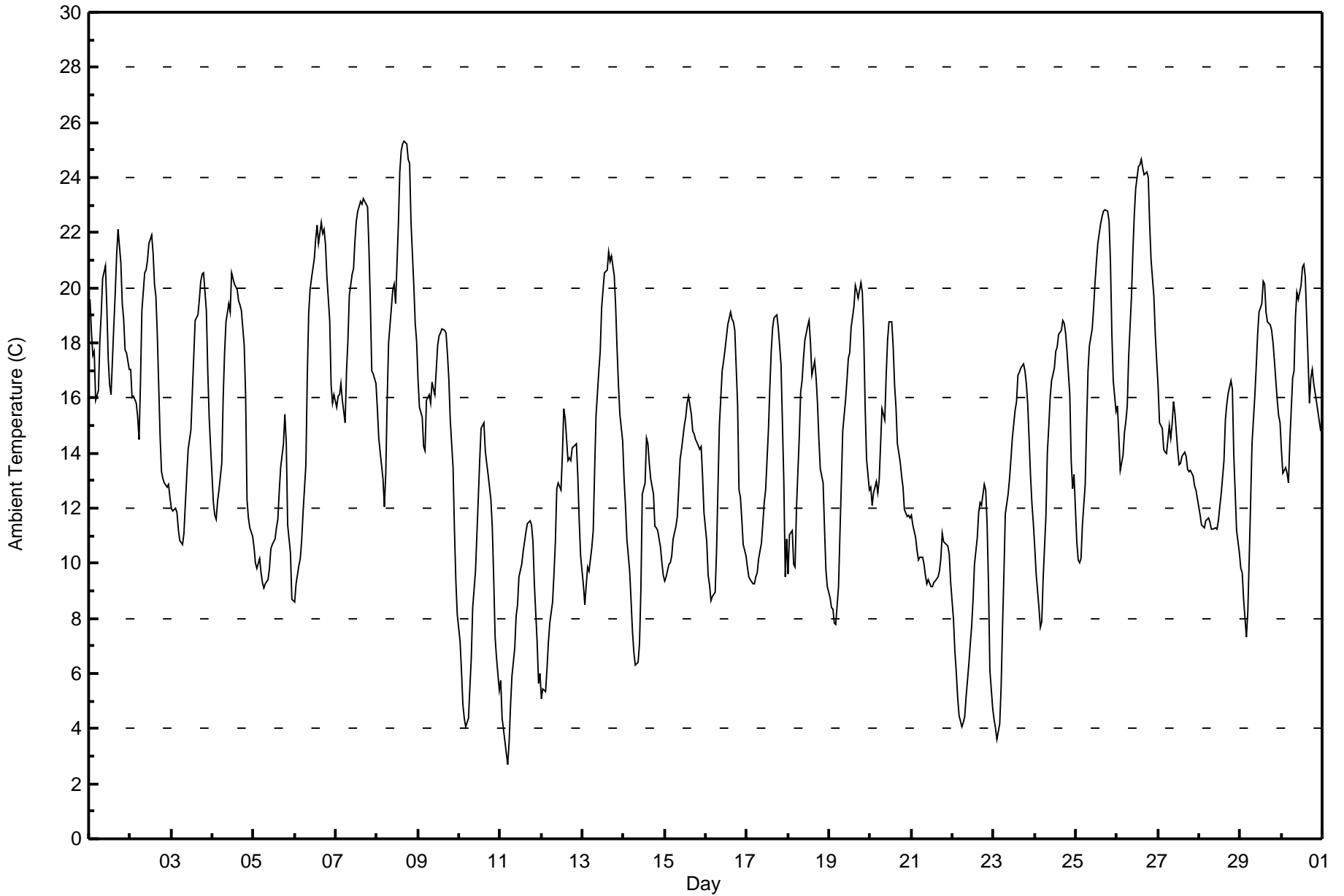
Ambient Temperature (AT) - C
Firebag - June 2017

Maximum Value: 25.3 C on Jun 8 17:00		Maximum Daily Average: 19.9 C on Jun 26		Hours in Service: 720																																												
Minimum Value: 2.7 C on Jun 11 05:00		Minimum Daily Average: 7.6 C on Jun 11		Hours of Data: 720																																												
Maximum Diurnal Average: 17.7 C at hour 15		Minimum Diurnal Average: 10.3 C at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 14.27 C		Percentiles: P ₁ = 4.0 P ₁₀ = 8.6 Q ₁ = 10.8 Median = 14.1 Q ₃ = 17.8 P ₉₀ = 20.4 P ₉₉ = 24.4		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	19.6	18.4	17.5	17.7	15.9	16.3	18.0	19.1	20.3	20.8	19.3	17.4	16.5	16.1	18.7	19.8	21.2	22.1	20.9	19.4	18.9	17.8	17.6	17.0	18.6	22.1																						
2-Jun	17.0	16.0	16.1	15.8	15.3	14.5	16.6	19.2	20.5	20.6	21.0	21.6	21.9	21.3	20.1	19.7	18.3	14.6	13.3	13.1	12.9	12.8	12.8	12.4	17.0	21.9																						
3-Jun	12.0	11.9	12.0	11.9	11.2	10.8	10.7	11.1	12.1	13.2	14.1	14.8	16.2	17.5	18.8	19.0	19.6	20.2	20.5	20.6	19.1	17.0	15.3	14.2	15.2	20.6																						
4-Jun	12.2	11.8	11.6	12.2	12.6	13.6	16.0	17.7	18.8	19.4	19.1	20.6	20.3	20.1	19.9	19.5	19.4	19.2	17.9	16.1	12.3	11.7	11.3	11.0	16.0	20.6																						
5-Jun	10.6	10.0	9.8	10.2	9.7	9.3	9.1	9.3	9.4	9.8	10.5	10.7	10.9	11.3	11.6	12.6	13.5	14.3	15.4	14.4	11.4	10.4	8.7	8.6	10.9	15.4																						
6-Jun	8.6	9.2	9.9	10.2	10.9	11.8	13.6	16.8	19.1	19.9	20.3	21.0	21.7	22.3	21.6	22.4	22.0	22.1	21.6	20.4	18.8	16.5	15.8	16.1	17.2	22.4																						
7-Jun	15.7	16.1	16.1	16.5	15.9	15.1	17.0	18.1	19.7	20.5	20.7	21.7	22.4	22.8	23.2	23.0	23.2	23.1	22.9	21.4	19.4	17.0	16.9	16.5	19.4	23.2																						
8-Jun	15.6	14.6	14.0	13.1	12.1	13.3	15.9	18.0	19.3	19.9	20.1	19.4	22.3	24.2	25.0	25.2	25.3	25.2	24.7	24.5	22.4	20.1	18.7	18.1	19.6	25.3																						
9-Jun	16.7	15.7	15.3	14.2	14.1	15.9	16.1	15.8	16.6	16.3	16.1	17.9	18.2	18.3	18.5	18.5	18.4	17.6	16.7	15.2	13.5	11.2	9.3	8.1	15.6	18.5																						
10-Jun	7.1	6.1	4.9	4.4	4.1	4.4	5.5	6.6	8.4	9.7	11.0	12.3	13.7	14.9	15.1	14.1	13.6	13.2	12.3	11.3	9.5	7.3	6.5	5.4	9.2	15.1																						
11-Jun	5.8	4.4	3.9	3.1	2.7	3.5	4.8	5.9	6.9	8.1	8.5	9.5	10.0	10.4	10.8	11.1	11.4	11.5	11.4	10.8	9.3	7.1	5.6	6.0	7.6	11.5																						
12-Jun	5.1	5.4	5.4	6.1	7.1	7.8	8.6	9.6	10.8	12.7	12.9	12.7	13.9	15.6	15.3	13.7	13.8	13.7	14.2	14.3	14.3	13.2	11.6	10.2	11.2	15.6																						
13-Jun	9.2	8.5	9.2	9.8	9.7	10.6	11.2	13.4	15.4	17.0	17.7	19.3	19.9	20.5	20.6	21.3	20.9	21.2	20.5	19.3	17.8	16.5	15.4	14.4	15.8	21.3																						
14-Jun	13.1	12.1	10.9	9.7	8.7	7.5	6.8	6.3	6.4	7.1	9.0	12.5	12.9	14.6	14.3	13.7	13.0	12.5	11.3	11.3	11.2	10.6	10.0	9.5	10.6	14.6																						
15-Jun	9.3	9.5	9.9	10.0	10.3	10.9	11.3	11.7	12.7	13.8	14.1	15.0	15.3	15.8	16.0	15.4	14.8	14.7	14.5	14.4	14.1	14.2	13.2	11.8	13.0	16.0																						
16-Jun	10.8	9.6	9.2	8.7	8.8	9.0	10.5	12.8	15.0	17.0	17.3	17.8	18.2	18.7	19.1	18.9	18.8	18.4	15.7	12.7	12.4	11.6	10.7	10.2	13.8	19.1																						
17-Jun	9.8	9.5	9.4	9.2	9.3	9.5	9.6	10.2	10.7	11.4	12.2	12.7	14.8	16.4	17.7	18.6	18.9	19.0	18.6	17.9	17.2	12.9	9.5	10.9	13.2	19.0																						
18-Jun	9.6	11.0	11.2	10.0	9.9	12.0	14.6	16.2	16.6	17.4	18.1	18.6	18.8	18.0	16.8	17.3	16.7	15.8	14.5	13.4	12.9	11.3	9.8	9.1	14.2	18.8																						
19-Jun	8.8	8.4	8.3	7.8	7.8	9.2	11.0	12.9	14.8	15.9	16.6	17.4	17.6	18.6	19.3	20.1	19.9	19.6	20.2	19.8	18.2	15.7	13.8	12.7	14.8	20.2																						
20-Jun	12.8	12.1	12.6	13.0	12.5	13.0	14.3	15.6	15.2	16.9	18.1	18.7	18.8	17.8	16.5	15.6	14.4	13.7	13.2	12.7	11.9	11.7	11.7	11.6	14.4	18.8																						
21-Jun	11.8	11.4	11.0	10.5	10.1	10.2	10.2	9.9	9.6	9.2	9.4	9.2	9.2	9.3	9.3	9.5	9.7	10.2	11.1	10.8	10.7	10.6	10.3	9.3	10.1	11.8																						
22-Jun	8.0	6.8	6.0	5.1	4.5	4.1	4.2	4.4	5.1	6.3	7.0	7.7	8.7	10.0	11.0	11.8	12.2	12.1	12.9	12.6	11.4	9.2	6.1	4.7	8.0	12.9																						
23-Jun	4.3	4.0	3.6	4.2	5.5	7.7	9.6	11.8	12.5	13.1	13.8	14.5	15.5	15.9	16.9	16.9	17.1	17.2	17.0	16.5	15.8	13.2	12.1	11.4	12.1	17.2																						
24-Jun	10.6	9.6	8.4	7.7	7.9	9.5	11.8	14.0	15.0	16.0	16.6	17.1	17.7	17.9	18.3	18.4	18.8	18.7	18.4	18.7	16.1	13.7	12.7	13.2	14.4	18.8																						
25-Jun	10.8	10.1	10.0	10.2	11.4	12.8	15.0	17.0	17.9	18.5	19.3	20.2	20.9	21.6	22.3	22.6	22.8	22.8	22.8	22.4	21.0	18.4	16.6	15.5	17.6	22.8																						
26-Jun	15.7	14.6	13.3	13.9	14.7	15.2	15.7	17.5	19.7	21.3	22.6	23.6	24.4	24.5	24.7	24.4	24.1	24.2	24.0	22.3	21.0	19.7	18.3	17.3	19.9	24.7																						
27-Jun	16.4	15.1	14.9	14.2	14.0	14.0	15.0	14.5	15.1	15.8	15.5	14.1	13.6	13.6	13.9	14.0	13.9	13.4	13.3	13.4	13.2	12.8	12.7	12.3	14.1	16.4																						
28-Jun	11.7	11.4	11.3	11.3	11.6	11.7	11.5	11.2	11.3	11.3	11.2	11.5	12.0	12.5	13.7	15.2	15.8	16.2	16.6	16.3	13.9	12.6	11.2	10.4	12.6	16.6																						
29-Jun	9.8	9.7	8.7	7.3	8.2	10.2	12.2	14.3	16.1	17.1	18.3	19.1	19.4	20.2	20.1	19.1	18.8	18.7	18.5	18.0	17.3	15.9	15.3	15.1	15.3	20.2																						
30-Jun	14.1	13.3	13.5	13.3	12.9	14.5	16.7	17.0	18.9	19.8	19.6	20.1	20.7	20.9	20.4	17.4	15.8	16.7	17.0	16.5	15.9	15.5	15.1	14.8	16.7	20.9																						
																								11.4	10.9	10.6	10.4	10.3	10.9	12.1	13.3	14.3	15.2	15.7	16.3	16.9	17.4	17.7	17.6	17.5	17.4	17.1	16.3	15.1	13.6	12.5	11.9	Diurnal Average
																								19.6	18.4	17.5	17.7	15.9	16.3	18.0	19.2	20.5	21.3	22.6	23.6	24.4	24.5	25.0	25.2	25.3	25.2	24.7	24.5	22.4	20.1	18.7	18.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	140	19.44	19.44
10 - 20	494	68.61	88.06
> 20	86	11.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



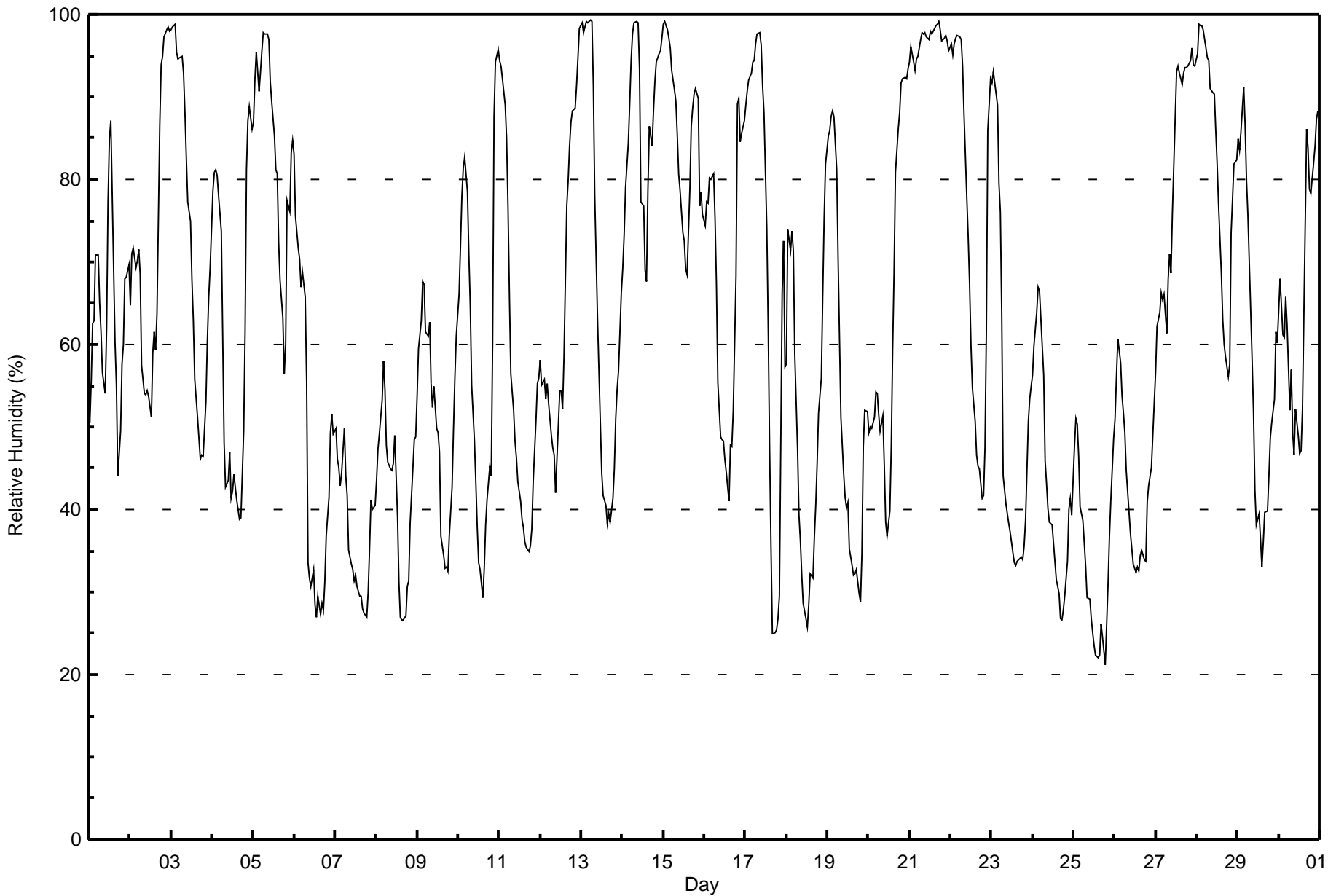
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Firebag - June 2017

Maximum Value: 99 % on Jun 13 06:00																	Maximum Daily Average: 96.8 % on Jun 21																	Hours in Service: 720	
Minimum Value: 21 % on Jun 25 19:00																	Minimum Daily Average: 33.3 % on Jun 25																	Hours of Data: 720	
Maximum Diurnal Average: 76.4 % at hour 4																	Minimum Diurnal Average: 48.7 % at hour 15																	Hours of Missing Data: 0	
Monthly Average: 62.6 %																	Percentiles: P ₁ = 25 P ₁₀ = 33 Q ₁ = 43 Median = 60 Q ₃ = 85 P ₉₀ = 95 P ₉₉ = 99																	Hours of Calibration: 0	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	50	56	62	63	71	71	65	61	57	54	62	77	85	87	69	60	55	44	50	58	60	68	68	70	63.5	87									
2-Jun	65	71	72	69	70	71	68	57	54	54	54	54	51	59	62	59	64	87	94	95	97	98	98	98	71.8	98									
3-Jun	98	98	99	95	95	95	95	93	88	83	77	75	68	63	56	51	49	46	47	46	53	60	66	69	73.5	99									
4-Jun	79	81	81	81	78	74	61	48	43	43	47	41	42	44	41	40	39	39	50	62	81	87	89	86	60.7	89									
5-Jun	87	92	95	91	93	96	98	98	98	97	92	89	85	81	81	72	68	63	56	60	77	76	83	85	83.9	98									
6-Jun	83	76	72	70	67	69	66	55	34	32	31	33	28	27	29	27	29	28	31	37	42	49	52	49	46.4	83									
7-Jun	50	46	45	43	44	50	44	42	35	33	33	31	32	31	30	30	28	27	27	30	35	41	40	40	37.0	50									
8-Jun	44	47	49	53	58	55	48	46	45	45	46	49	39	31	27	27	27	27	31	31	38	45	49	49	41.9	58									
9-Jun	54	59	63	68	67	61	61	63	55	52	55	50	49	47	37	34	33	33	33	37	43	50	56	61	50.9	68									
10-Jun	66	72	78	81	83	78	71	65	55	48	43	38	33	33	29	33	38	41	45	44	60	88	94	96	58.9	96									
11-Jun	94	94	92	89	85	77	66	56	52	48	46	43	41	39	38	36	35	35	36	38	43	51	55	56	56.1	94									
12-Jun	58	55	56	53	55	53	49	47	47	42	46	54	54	52	58	77	80	84	87	88	89	91	95	98	65.4	98									
13-Jun	99	98	99	99	99	99	99	91	78	63	57	51	44	42	40	38	40	38	41	45	51	55	57	66	66.2	99									
14-Jun	69	73	79	84	89	94	98	99	99	99	93	77	77	69	68	79	86	84	88	92	94	95	96	97	86.6	99									
15-Jun	99	99	98	97	96	93	91	90	85	81	79	74	73	69	68	79	86	89	90	91	90	77	78	76	85.3	99									
16-Jun	74	77	77	80	80	81	75	67	55	49	48	48	46	45	41	48	48	52	68	89	90	85	86	87	66.5	90									
17-Jun	89	91	92	93	94	94	96	98	98	96	91	88	74	62	48	36	25	25	25	27	29	66	73	57	69.5	98									
18-Jun	58	74	71	74	71	59	47	39	36	32	29	27	26	28	32	32	37	41	46	52	56	66	75	82	49.5	82									
19-Jun	85	86	88	88	88	81	70	61	51	44	41	40	41	35	33	32	32	33	30	29	35	48	52	52	53.1	88									
20-Jun	49	50	50	51	54	54	52	49	51	45	38	37	40	48	59	69	81	86	88	92	92	92	92	93	63.1	93									
21-Jun	94	96	94	93	95	95	97	98	98	98	97	97	98	98	98	99	99	99	98	97	97	97	97	96	96.8	99									
22-Jun	97	95	96	97	98	97	97	94	88	78	73	67	60	55	51	47	45	45	41	42	47	62	86	92	72.9	98									
23-Jun	92	93	92	89	80	76	63	44	41	40	38	37	35	34	33	34	34	34	34	36	39	51	53	55	52.3	93									
24-Jun	56	60	64	67	66	63	56	46	43	40	38	38	36	34	31	30	27	27	28	30	34	40	41	39	43.1	67									
25-Jun	48	51	50	46	40	39	36	33	29	29	27	25	24	22	22	22	26	25	21	26	31	37	41	49	33.3	51									
26-Jun	51	56	61	58	54	52	49	45	40	37	35	33	32	33	33	34	35	34	34	41	43	45	49	53	43.2	61									
27-Jun	57	62	64	66	65	66	61	68	71	69	76	87	93	94	93	92	93	94	94	94	94	96	94	94	80.7	96									
28-Jun	95	99	99	99	98	96	95	94	91	91	90	86	82	77	69	63	60	58	56	58	74	78	82	82	82.1	99									
29-Jun	85	84	86	91	87	80	76	70	58	52	42	38	39	36	33	36	40	40	44	49	50	53	62	60	57.9	91									
30-Jun	64	68	61	61	66	62	52	57	49	47	52	49	47	47	52	75	86	84	79	78	82	84	87	88	65.7	88									
72.9																	75.3																	Diurnal Average	
99																	99																	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	146	20.28	20.28
40 - 60	216	30.00	50.28
60 - 80	145	20.14	70.42
80 - 100	213	29.58	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Firebag - June 2017

Maximum Speed: 35 km/h on Jun 12 13:00	Maximum Daily Speed Average: 23.0 km/h on Jun 26	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 3 20:00	Minimum Daily Speed Average: 1.6 km/h on Jun 29	Hours of Data: 720
Maximum Diurnal Speed Average: 4.2 km/h at hour 23	Minimum Diurnal Speed Average: 1.5 km/h at hour 12	Hours of Missing Data: 0
Monthly Average Velocity: 1.2 km/h 54.8 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 17 P ₉₀ = 22 P ₉₉ = 32	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SW8	S7	SSE8	SE8	W4	SE3	WNW5	WNW7	WNW8	WSW10	SW12	SSW9	SW12	SSW7	S8	SSE9	SSE8	W8	WNW4	NNE5	E6	SE3	SSE4	S4	SSW3.9	SW12	
2-Jun	SSW6	SSW4	SW5	SW5	SW5	SW3	WNW4	N8	N8	N6	NNW9	NNW13	NNW15	N18	N18	N16	WNW9	W18	W18	W19	W18	WNW14	WNW10	W14	WNW7.7	W19	
3-Jun	W13	W16	WNW18	NW23	NW22	NNW23	NW21	NW18	NW18	NW17	NW13	NW11	WNW11	WNW9	WNW10	WNW10	WNW8	W3	NE2	W0	ESE7	ESE11	ESE13	ESE15	NW8.6	NNW23	
4-Jun	ESE13	ESE13	SSE14	S15	SSW12	S6	SSW2	N11	NNE11	NW14	NW13	W12	WNW12	WNW14	NW17	NNW19	N19	NNE18	NNE12	N14	N11	NNE9	NNE14	NE20	N5.3	NE20	
5-Jun	NNE17	NNE14	NE15	ENE25	ENE17	NE15	NNE13	NNE13	NNE13	N13	NNE17	NNE19	NE24	NNE17	NNW9	NNW9	NNE8	N7	N4	SSW3	WNW7	N14	WNW9	WSW6	SW7	NNE10.0	ENE25
6-Jun	SSW11	SW11	SSW11	SSW11	SSW12	SW13	SW10	SSW6	S6	SSW8	SSW13	SW15	SW17	WSW17	WSW11	W16	WNW10	WNW11	WNW8	NNW6	NNE10	NNE10	NE10	ENE10	SW6.2	WSW17	
7-Jun	ENE10	ENE9	E9	E10	ENE9	ENE9	ENE13	E12	ENE16	ENE15	ENE15	ESE11	NE15	ENE11	ENE8	NE12	ENE14	ENE14	ENE13	NE14	NE12	NE11	ENE14	E19	ENE11.9	E19	
8-Jun	E18	E15	ESE16	ESE15	ESE15	ESE15	SE15	SE12	ESE11	SE14	SE12	ESE9	SE11	SE12	S16	S15	S15	SSE13	SSE13	SSE11	SE8	ESE11	SE11	SE11	SE11.9	E18	
9-Jun	SE11	SSE11	SSE9	SE2	NNE7	NE7	NNE18	NNE21	NNE25	NE28	NNE26	NNE28	NNE29	NNE29	NE27	NE26	ENE24	ENE26	ENE25	NE25	NE20	NE15	ENE13	ENE15	NE17.1	NNE29	
10-Jun	ENE16	ENE16	ENE15	E15	E15	E17	ESE16	ESE9	E7	NNE9	NE7	SE3	S5	WNW5	NW10	NW11	NW7	NNW10	N13	N12	NNW17	NNW14	NNW13	NNW10	NE5.9	E17	
11-Jun	NNW14	NNW11	NW14	NW12	WNW14	WNW19	NNW24	NW27	NW28	NW27	NW23	NNW24	NNW22	NW20	NW22	NNW20	NNW20	NNW18	NNW15	N12	NNE8	NE6	ENE7	SE7	NW15.5	NW28	
12-Jun	SSE10	SSE11	SSE14	S17	S17	S19	S21	SSE21	SSE20	S22	SSE20	SSE23	SSE35	S34	SSE27	SE18	SSE15	ESE9	ESE13	SE11	SE9	ESE7	ENE4	NE5	SSE15.7	SSE35	
13-Jun	NE6	NE5	S5	S7	WSW5	WNW3	N6	NE5	NE5	NNW9	N8	NW7	W10	WNW8	NNE8	NNW9	N12	N15	NNE22	NNE18	NNE14	NNE11	NNW6	NNW14	N6.5	NNE22	
14-Jun	N20	NNE20	NNE20	N21	N22	NNE26	NNE25	NNE24	NNE24	NNE21	NNE23	NNE21	NNE21	NE23	NNE19	NE15	NE15	NNE16	NNE15	NNE20	NNE18	NNE18	NNE18	NNE16	NNE20.0	NNE26	
15-Jun	NNE14	NE13	NE12	NE11	ENE10	ENE12	E15	E14	ESE12	ESE13	ESE10	E11	ESE5	SE4	SE2	WNW6	NNW7	NNW9	NW6	NNW6	NE5	SE5	SE7	ESE10	ENE6.1	E15	
16-Jun	ESE11	ESE11	ESE11	ESE11	ESE13	ESE12	ESE14	SE13	SE10	SE5	ESE6	ESE7	E10	ESE11	SE8	W4	NW2	SSW7	ESE9	SSE10	SE11	SE16	SE14	SSE16	SE9.2	SSE16	
17-Jun	SSE15	SSE15	SSE16	SSE14	SSE13	S13	SSW9	SW6	W10	W10	WNW12	W8	WNW12	WNW15	NW17	WNW19	WNW20	WNW18	WNW16	WNW12	NW4	S2	SE3	SSE4	WSW5.7	WNW20	
18-Jun	SSE6	S14	S12	S7	S9	SSW10	SSW14	SSW15	SSW16	SSW17	WSW22	WSW19	SW19	SSW22	SSW17	WSW17	W16	WSW19	W14	WNW8	N15	NNW16	NNW12	WNW7	SW9.8	WSW22	
19-Jun	WNW10	W10	WNW7	W6	WNW8	W9	NW9	NNW9	N9	NW10	NW10	W9	NNW10	NW8	NW9	W9	WSW6	NW7	SW9	SW8	SW7	S5	SSE5	SE8	WNW5.6	NW10	
20-Jun	SSE10	S10	S12	S10	S11	SSW11	S13	S11	SSE12	SSE13	SSE18	S20	S20	SSW18	SW20	SSW20	SSW15	S20	S19	S21	S20	S20	S19	S19	S15.3	S21	
21-Jun	SSW19	SW18	SW16	WSW16	WSW17	W16	W15	W20	WNW18	WNW19	W19	WNW19	W16	WNW19	W19	WNW18	WNW16	WNW15	N27	N28	N25	N23	N29	N32	WNW13.3	N32	
22-Jun	N30	N29	N26	N23	N21	NNW23	NNW20	NNW20	NNW21	NNW25	N25	N23	NNW24	NNW27	NNW26	NNW27	NNW23	NNW20	NNW17	N16	NNW8	WNW2	SSE0	WSW2	NNW19.6	N30	
23-Jun	WSW3	WNW3	WSW4	SW4	W3	NW4	NNW9	N14	NNW16	NNW15	N14	NNW12	NNW13	NNW13	N13	NNE12	N11	N11	NNE10	NNE6	E4	SSE5	SSE7	S8	NNW6.0	NNW16	
24-Jun	SSE10	SE8	SE9	ESE10	ESE14	ESE11	ESE11	E13	E15	ENE13	NE12	N12	N15	N14	N13	N13	N13	N13	NNE12	N11	NNE9	NE7	ENE10	E12	NE7.6	E15	
25-Jun	ESE10	ESE10	ESE10	ESE11	ESE10	SE8	ESE8	ESE2	SSW1	NW2	SSE0	SSW3	SE11	SSE12	SSE10	SSE11	S17	S16	S18	S16	SSE15	SSE13	SSE15	SSE16	SSE9.0	S18	
26-Jun	S19	S17	SSE17	SSE21	SSE25	SSE25	SSE28	S31	S33	S32	S33	S33	S32	S32	S30	S28	S23	SSE21	SSE21	ESE17	SE16	SE13	ESE11	SE11	SSE23.0	S33	
27-Jun	SE11	ESE11	ESE13	ESE15	ESE16	SE14	SSE16	S19	S17	S19	S18	SSW14	S9	S7	SE6	E6	E9	E15	ESE12	SE9	ESE10	E8	E13	E12	SE10.0	S19	
28-Jun	ESE10	E6	NE6	ENE6	ENE16	E20	E20	E22	E22	E19	E19	ENE17	ENE17	ENE13	ENE9	NE9	NE8	NNE5	SW1	WSW4	SSW11	S16	S11	SSW14	E9.0	E22	
29-Jun	SSW13	S13	SSE12	SSE9	S7	SSW12	SSW12	SSW4	S1	S3	ENE3	SW2	NNW8	NW6	WNW13	NW9	NW9	NNW8	N6	NE5	NE5	NE5	ESE3	SE3	SW1.6	SSW13	
30-Jun	SE3	SSE4	SSE6	SSE7	SSE6	S5	SW8	S9	SSW4	SSW2	SW11	SSW3	W3	SW4	W6	NNW7	SW10	W3	N7	ESE9	SE9	SE9	S11	S9	S3.9	SW11	

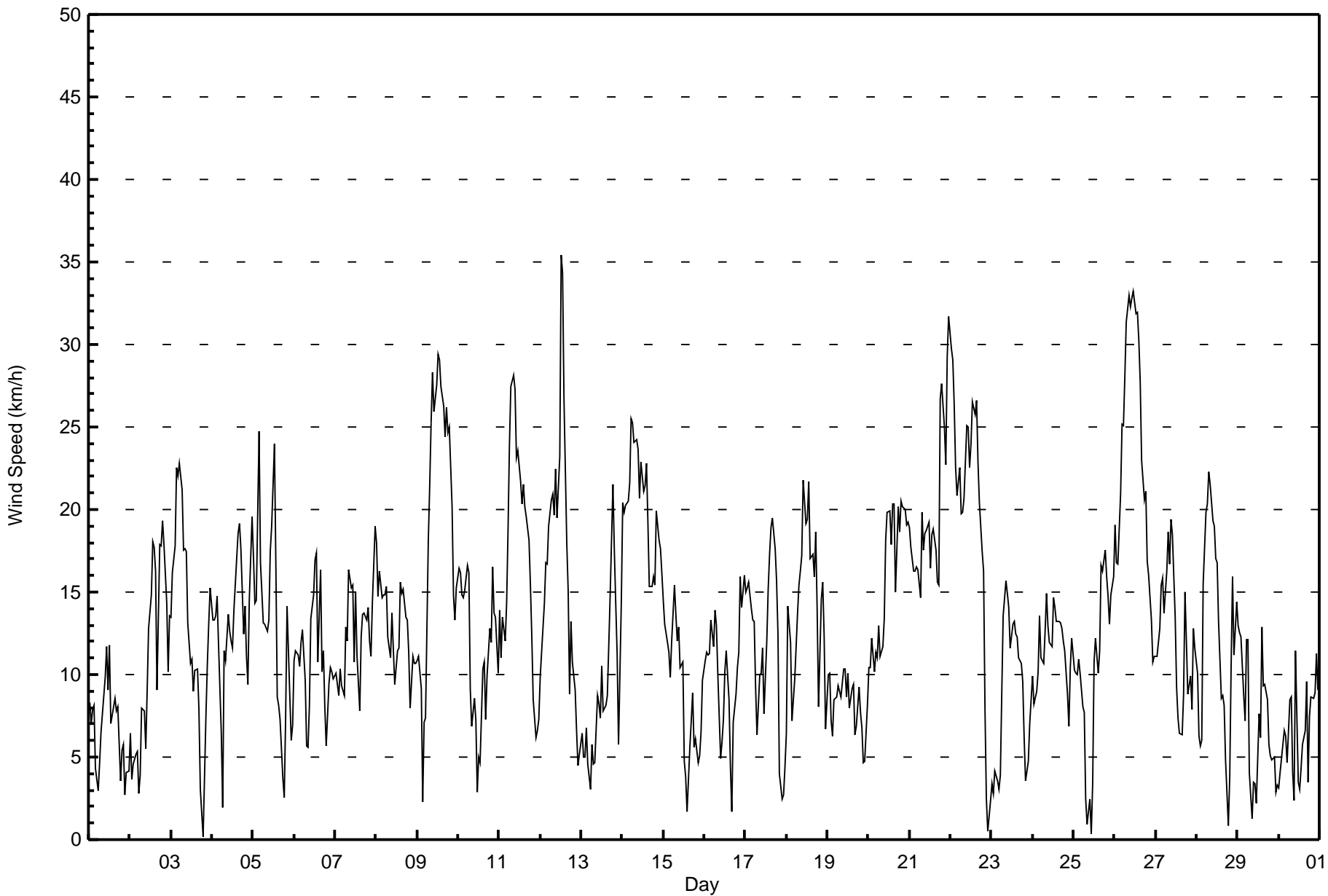
ESE3.5	SE3.3	SE3.5	SE3.9	SE2.8	ESE2.6	ESE1.6	ENE1.6	NE2.6	N1.8	NNW1.9	NW1.5	NW1.8	NW2.1	NW2.7	NW4.2	NW3.3	NNW2.9	N3.0	NNE3.5	NE3.9	ENE3.3	E4.2	ESE4.1	Diurnal Average
N30	N29	N26	ENE25	SSE25	NNE26	SSE28	S31	S33	S32	S33	S33	SSE35	SSE34	S30	S28	ENE24	ENE26	N27	N28	N25	N23	N29	N32	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Firebag - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	84	11.67	11.67
6 - 11	249	34.58	46.25
12 - 19	273	37.92	84.17
20 - 28	98	13.61	97.78
29 - 38	16	2.22	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	2	9	2	1	3	11	7	8	9	8	5	7	7	4	0	84
6 - 11	13	13	10	13	10	34	23	21	17	13	11	4	11	21	15	20	249
12 - 19	22	24	12	20	17	21	12	22	27	16	8	6	16	21	9	20	273
20 - 28	10	17	8	4	4	0	0	12	9	2	1	1	1	2	9	18	98
29 - 38	4	2	0	0	0	0	0	2	8	0	0	0	0	0	0	0	16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	58	39	39	32	58	46	64	69	40	28	16	35	51	37	58	720

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jun 21 19:00 Minimum Value: 1 km/h on Jun 24 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	2	3	3	2	2	2	2	3	3	2	3	3	2	3	3	3	2	1	1	1	1	2	3
2-Jun	2	2	1	1	1	2	2	2	2	2	3	3	3	6	4	4	3	4	4	4	4	3	2	3	6
3-Jun	2	4	4	6	5	5	5	4	4	4	3	3	3	3	4	4	3	3	2	2	2	2	2	3	6
4-Jun	2	2	2	2	3	2	2	3	3	8	4	5	3	4	4	4	4	4	2	3	4	3	3	3	8
5-Jun	3	4	5	4	4	2	2	3	3	3	3	4	4	5	5	3	3	3	2	4	7	1	2	1	7
6-Jun	2	2	1	1	2	2	2	1	2	4	4	5	5	4	4	5	3	3	2	1	2	1	2	1	5
7-Jun	1	2	1	2	2	2	2	3	3	3	4	4	5	4	5	4	4	5	4	2	2	1	3	3	5
8-Jun	4	3	3	2	2	2	3	3	2	3	2	3	3	5	6	5	4	3	4	3	2	2	2	2	6
9-Jun	2	2	2	3	3	2	5	4	5	5	5	6	6	6	6	5	5	5	5	5	5	2	2	3	6
10-Jun	3	4	3	3	3	3	4	3	3	4	4	3	3	4	5	3	3	3	3	2	4	3	4	2	5
11-Jun	3	2	3	2	3	4	5	6	6	6	6	6	7	6	5	6	6	5	4	3	2	1	1	2	7
12-Jun	1	2	2	2	2	3	3	3	4	4	3	4	7	5	8	6	6	4	2	2	2	2	2	2	8
13-Jun	1	1	2	2	1	1	2	2	2	4	4	4	4	4	3	4	3	4	5	4	3	2	2	4	5
14-Jun	4	4	4	4	5	5	5	5	5	4	5	4	5	4	4	4	3	3	3	3	4	3	3	3	5
15-Jun	2	2	2	2	2	4	3	3	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	2	4
16-Jun	2	2	2	2	2	2	2	3	3	3	3	3	4	5	4	3	2	3	7	3	2	3	2	3	7
17-Jun	3	2	2	3	2	2	1	2	2	3	3	3	3	4	4	5	5	5	4	4	2	1	1	1	5
18-Jun	3	4	2	3	1	1	3	2	3	4	5	5	5	6	6	5	4	5	4	2	3	3	2	4	6
19-Jun	2	3	2	1	2	2	2	3	2	4	4	5	3	4	4	4	4	4	4	2	2	1	1	2	5
20-Jun	2	1	1	2	2	1	1	2	2	3	3	4	4	3	4	3	3	5	3	3	4	3	3	3	5
21-Jun	3	3	2	3	2	3	3	6	4	4	4	4	4	4	4	4	3	3	8	7	6	5	8	8	8
22-Jun	7	6	5	6	5	5	4	4	5	6	6	5	5	5	5	5	6	6	4	5	3	2	1	1	7
23-Jun	1	1	1	1	1	1	2	3	3	4	5	5	5	5	5	4	4	4	3	2	1	1	2	2	5
24-Jun	1	2	2	2	2	2	2	3	3	4	5	5	5	5	6	5	5	4	3	3	2	1	2	2	6
25-Jun	2	1	2	2	2	2	1	2	2	3	3	4	4	5	4	5	5	4	4	3	3	2	2	2	5
26-Jun	3	2	2	5	4	4	5	5	6	5	6	5	6	5	6	6	4	4	4	4	3	2	2	2	6
27-Jun	2	2	3	2	3	3	3	3	3	3	3	3	3	2	2	1	2	3	3	2	2	2	3	2	3
28-Jun	2	1	1	3	4	4	5	4	4	4	4	3	3	3	3	3	3	2	1	2	4	2	3	2	5
29-Jun	2	2	2	1	1	2	3	2	1	2	3	2	3	4	3	2	2	2	2	1	1	2	1	1	4
30-Jun	1	1	1	1	1	2	3	2	2	4	2	3	2	2	2	4	3	2	3	2	2	2	2	2	4
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Firebag - June 2017

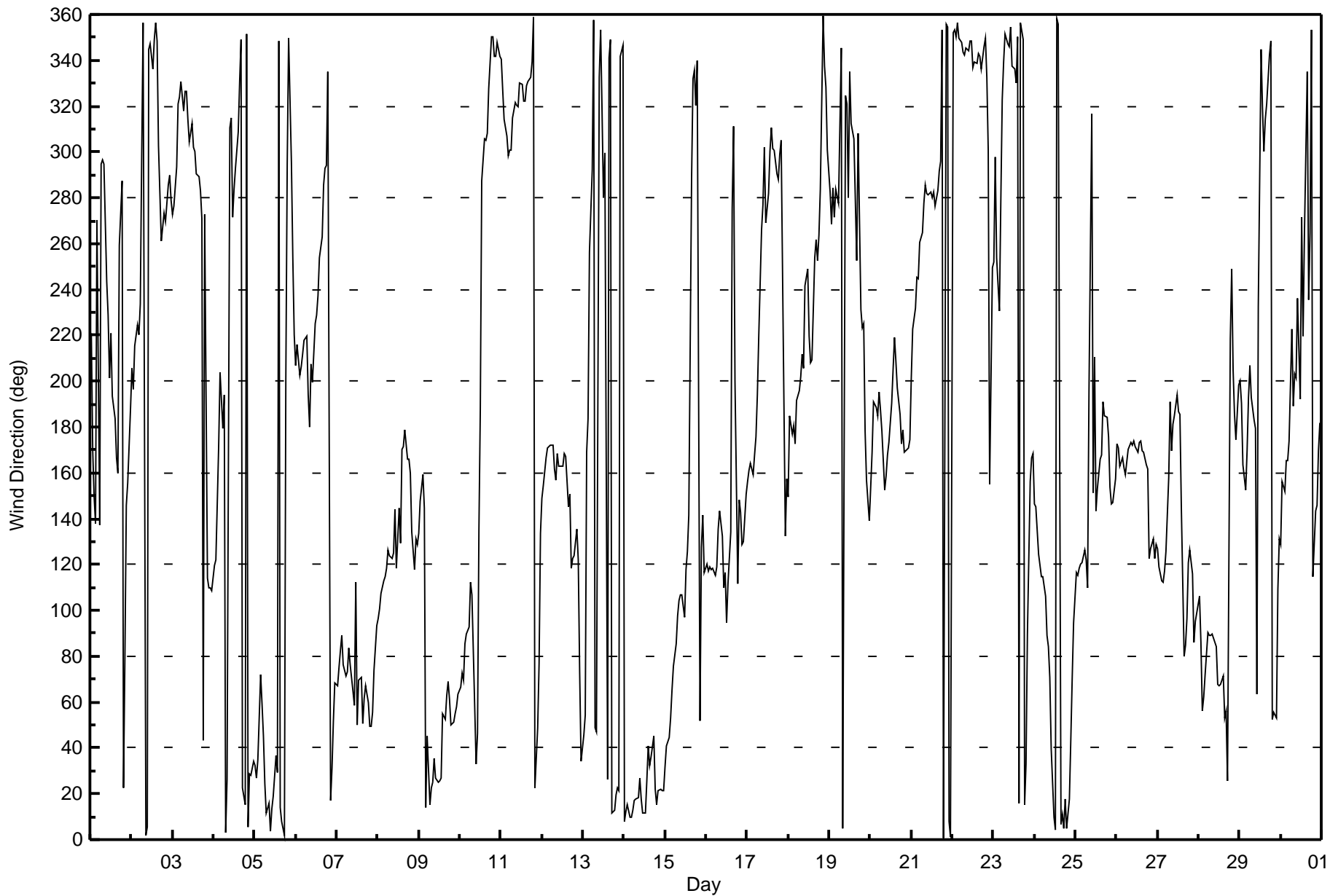
Direction of Maximum Speed: 163 deg on Jun 12 13:00 Direction of Maximum Daily Speed Average: 164.1 deg on Jun 26	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 273 deg on Jun 3 20:00 Direction of Minimum Daily Speed Average: 1.6 deg on Jun 29	Percent Operational Time: 100.0
Monthly Average Direction: 278.3 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	221	170	149	138	270	137	295	297	295	243	229	201	221	194	184	167	160	259	287	23	80	146	155	188	205.8
2-Jun	206	197	215	225	220	234	298	356	2	5	345	347	336	349	356	349	302	261	267	273	270	285	290	279	302.5
3-Jun	273	276	293	321	324	330	318	326	326	314	304	312	302	300	291	289	283	271	43	273	114	110	110	109	312.8
4-Jun	120	122	147	171	204	179	194	3	27	310	315	272	283	293	309	331	349	23	15	351	5	29	28	34	352.2
5-Jun	32	27	35	72	59	45	25	12	16	4	14	19	37	29	348	14	8	2	200	295	350	295	254	221	22.1
6-Jun	207	216	203	206	212	218	219	194	180	208	199	225	229	238	254	263	286	293	294	335	17	31	52	68	233.2
7-Jun	67	75	83	89	76	71	73	84	76	65	59	112	50	69	71	50	62	67	60	49	49	55	74	94	69.4
8-Jun	96	101	107	113	115	119	126	124	123	125	144	118	145	130	170	172	179	166	166	160	134	118	131	129	133.1
9-Jun	133	148	159	145	14	45	15	22	25	35	27	25	25	27	55	52	63	69	61	50	51	55	58	63	46.3
10-Jun	67	72	70	85	90	93	112	107	82	33	46	135	188	287	306	305	308	328	350	350	342	342	348	342	34.5
11-Jun	340	327	314	307	299	301	301	315	322	321	320	330	329	322	322	329	330	332	339	359	23	49	77	134	325.3
12-Jun	149	154	167	171	171	172	172	162	157	169	163	163	163	169	167	145	150	119	122	124	136	122	73	34	157.7
13-Jun	46	54	169	184	257	292	358	49	47	333	353	318	280	299	26	341	349	11	13	20	23	21	342	347	359.2
14-Jun	8	12	15	10	10	13	17	18	18	27	18	12	12	26	41	33	36	45	22	15	21	22	22	21	20.0
15-Jun	32	41	45	53	65	76	86	98	104	107	107	97	118	126	141	288	332	336	321	340	52	127	142	116	72.4
16-Jun	120	117	119	118	118	115	119	135	144	132	110	117	95	112	134	275	311	200	112	148	143	129	130	151	127.8
17-Jun	156	161	164	159	168	176	194	220	266	277	302	269	282	300	311	301	301	291	288	299	305	190	132	158	254.3
18-Jun	150	185	177	181	172	192	196	202	212	205	241	249	220	208	209	254	261	253	264	284	359	338	328	301	230.6
19-Jun	283	268	284	272	284	278	312	345	5	324	321	280	335	312	306	279	253	308	232	223	225	178	157	139	287.7
20-Jun	154	169	191	189	185	195	187	178	153	158	168	173	190	205	219	208	197	185	173	179	169	170	171	174	181.7
21-Jun	201	223	232	245	245	260	265	278	286	282	281	282	280	283	276	283	292	296	354	1	356	354	8	1	297.5
22-Jun	352	353	350	356	349	348	344	342	345	344	349	349	337	340	339	343	342	336	346	350	333	301	155	250	345.0
23-Jun	252	298	254	231	279	323	339	352	347	346	354	338	336	330	350	16	356	349	15	33	90	156	167	169	346.2
24-Jun	147	145	124	120	114	115	106	89	84	70	40	10	4	358	356	7	11	5	17	5	18	44	70	94	53.8
25-Jun	116	115	119	120	121	126	122	110	195	317	151	211	143	153	166	168	191	185	184	176	154	147	147	157	153.4
26-Jun	172	171	163	167	162	159	164	170	174	172	174	172	169	173	174	169	169	164	162	123	127	131	122	129	164.1
27-Jun	127	119	113	112	117	126	158	191	170	181	185	194	187	185	145	80	85	96	121	126	116	86	95	99	138.1
28-Jun	106	86	56	62	72	90	89	89	90	86	84	68	67	68	71	53	56	26	218	249	205	186	174	198	91.3
29-Jun	200	191	164	152	170	193	207	193	183	179	64	233	345	319	300	315	321	342	349	52	56	53	109	131	216.0
30-Jun	129	156	152	165	165	174	223	189	203	201	236	192	271	219	265	335	235	265	353	115	143	146	170	182	189.8

116.9 129.2 135.1 129.3 129.9 123.3 121.4 63.3 46.8 8.7 342.3 315.4 320.0 306.5 305.8 323.9 325.2 332.9 5.4 18.8 45.9 73.1 86.1 102.5

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 108 deg on Jun 25 11:00 Minimum Value: 6 deg on Jun 6 03:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 11 Median = 15 Q ₃ = 23 P ₉₀ = 40 P ₉₉ = 88		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	10	35	16	41	28	30	32	19	23	20	13	24	21	28	21	23	43	38	40	22	13	32	15	25	43	
2-Jun	14	17	12	10	8	21	43	20	21	26	19	18	17	19	13	13	46	14	11	13	14	15	15	12	46	
3-Jun	12	12	13	14	12	12	12	12	14	14	16	20	23	36	37	29	35	72	74	91	27	12	10	10	91	
4-Jun	11	11	14	8	14	16	89	16	24	42	21	27	24	18	20	16	25	11	14	21	25	25	11	10	89	
5-Jun	10	26	25	10	12	11	11	13	12	14	15	12	11	18	29	34	36	88	82	33	39	13	22	12	88	
6-Jun	7	18	6	7	8	8	11	23	35	43	25	22	24	22	21	21	17	18	12	33	8	7	8	11	43	
7-Jun	11	12	16	8	18	13	10	14	17	21	20	33	24	35	68	25	20	18	16	9	7	7	12	10	68	
8-Jun	9	10	9	10	10	10	12	14	14	18	20	22	20	38	25	26	19	22	11	11	20	9	11	12	38	
9-Jun	11	10	8	78	12	22	13	14	13	14	12	14	15	15	17	17	16	14	15	11	10	9	9	10	78	
10-Jun	11	14	12	14	10	12	15	28	43	47	64	89	66	88	41	19	41	26	15	10	12	11	13	11	89	
11-Jun	14	14	12	18	12	12	13	15	14	17	18	18	22	23	21	19	16	23	19	19	11	14	23	12	23	
12-Jun	7	9	8	8	8	9	9	9	11	12	14	11	11	11	15	25	68	13	14	12	39	46	20	68		
13-Jun	13	22	34	16	29	47	22	37	53	40	35	63	34	58	38	37	21	19	16	11	9	10	51	28	63	
14-Jun	12	14	12	14	13	12	11	11	12	11	13	16	13	17	12	12	10	11	10	10	10	10	10	10	17	
15-Jun	10	8	8	8	12	19	12	13	15	15	17	17	35	58	85	45	29	12	12	15	23	30	16	11	85	
16-Jun	12	11	10	11	11	11	11	14	23	56	57	43	26	35	47	67	85	65	81	28	16	12	12	11	85	
17-Jun	10	9	9	10	10	10	8	28	13	13	15	25	22	20	21	17	18	21	14	15	16	27	31	15	31	
18-Jun	20	25	16	20	6	8	7	11	13	17	17	26	25	24	19	23	17	16	14	34	15	16	12	61	61	
19-Jun	14	20	11	10	11	12	20	23	28	30	34	49	28	47	39	49	58	42	50	18	9	14	13	12	58	
20-Jun	10	8	9	8	9	7	8	15	11	15	12	17	14	14	13	13	9	9	9	9	10	9	9	10	17	
21-Jun	14	9	9	11	11	12	12	14	13	11	11	12	13	12	12	11	15	14	24	17	16	15	17	17	24	
22-Jun	16	15	14	16	14	13	13	13	14	15	14	16	15	15	17	16	18	16	17	13	11	26	81	22	81	
23-Jun	7	15	11	16	23	19	13	15	17	24	34	35	33	26	35	21	30	27	25	16	46	13	15	13	46	
24-Jun	12	17	13	11	10	10	13	13	18	26	37	37	26	30	37	28	34	25	22	16	9	12	12	13	37	
25-Jun	9	9	10	9	11	12	14	82	96	85	108	88	37	36	36	42	23	23	17	13	10	9	9	11	108	
26-Jun	8	9	8	9	9	9	9	10	10	10	12	12	14	12	14	15	14	12	13	14	12	17	14	11	17	
27-Jun	11	11	11	10	12	15	13	13	32	12	13	12	15	35	31	19	21	13	17	15	13	22	13	15	35	
28-Jun	11	22	16	20	17	11	11	11	12	14	15	14	12	14	29	43	38	36	88	65	21	9	11	8	88	
29-Jun	9	17	12	13	19	8	15	49	72	45	79	84	44	71	23	15	17	13	18	30	20	10	39	27	84	
30-Jun	22	15	11	11	11	15	18	16	59	88	22	85	86	53	34	38	17	61	37	20	17	11	10	11	88	
		22	35	34	78	29	47	89	82	96	88	108	89	86	88	85	67	85	88	88	91	46	39	81	61	
		Diurnal Maximum																								



Wood Buffalo Environmental Association

SO₂ Calibration Summary

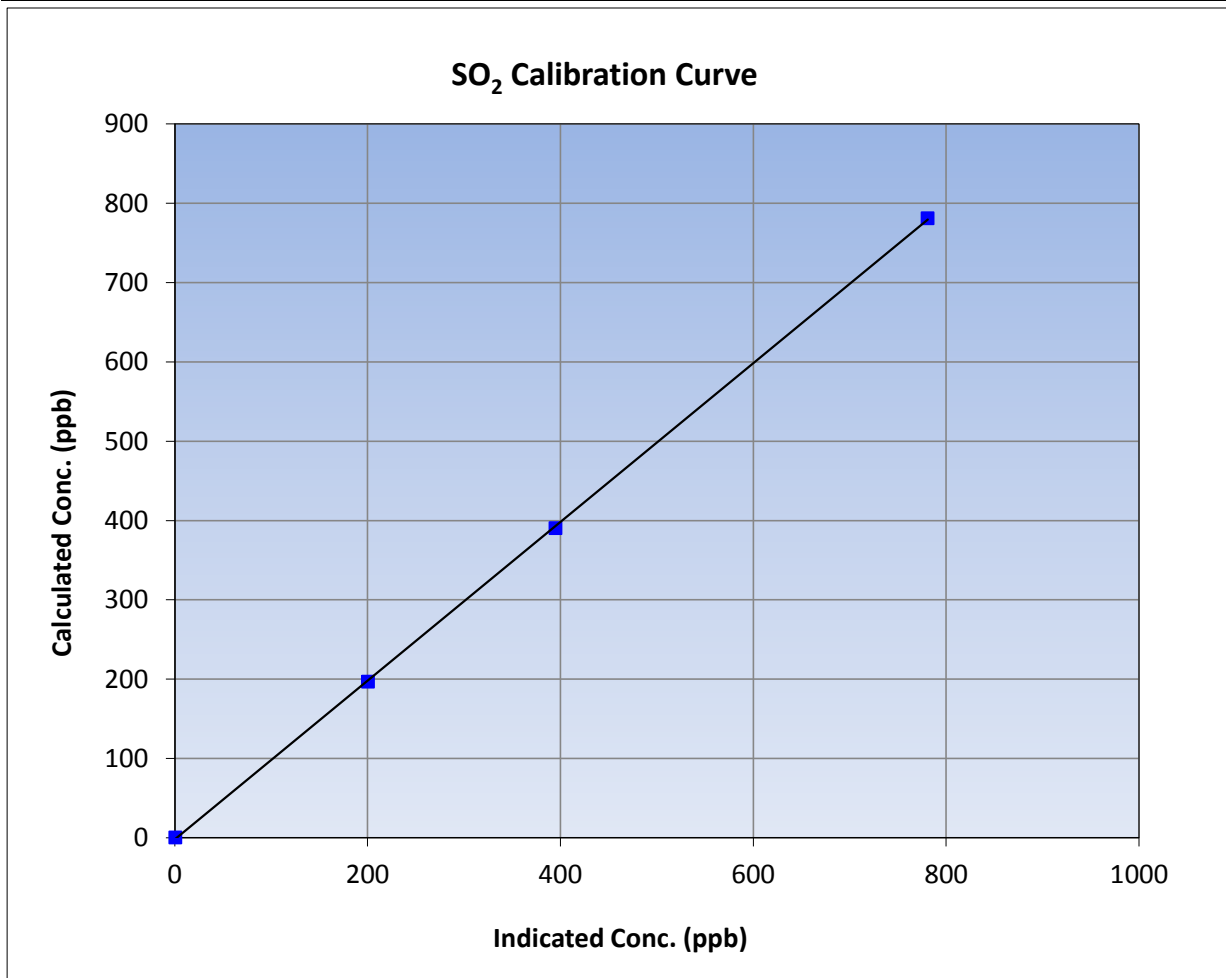
Version-03-2017

Station Information

Calibration Date	June 16, 2017	Previous Calibration	May 12, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:34	End Time (MST)	13:04
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

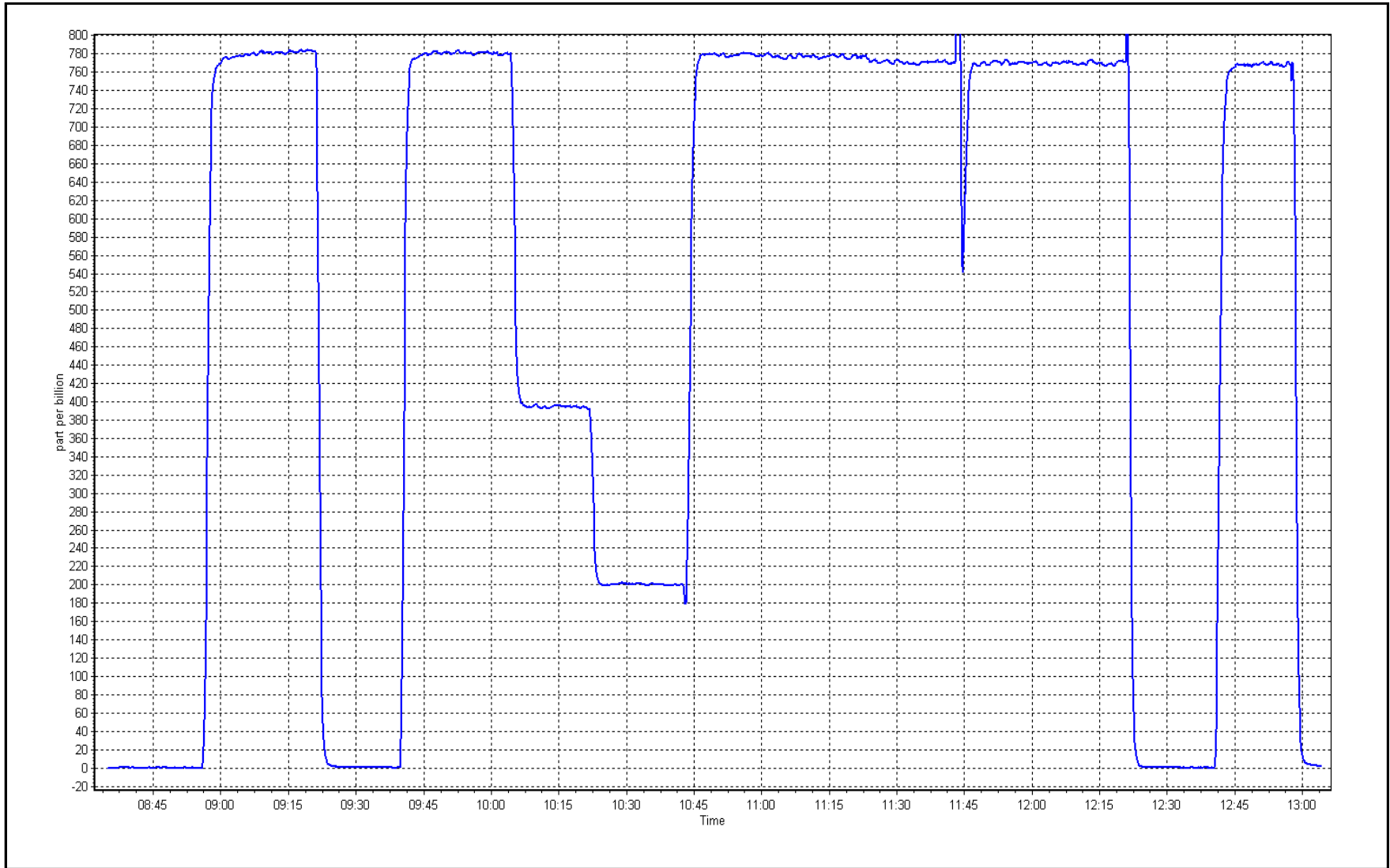
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999951	
780.7	780.5	1.0002			≥0.995
390.1	394.6	0.9886	Slope	1.001129	
196.5	200.0	0.9827			0.90 - 1.10
			Intercept	-2.362758	+/-30



SO2 Calibration Plot

Date: June 16, 2017

Location: Firebag





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	June 15, 2017	Last Cal Date:	May 17, 2017
Start time (MST):	10:18	End time (MST):	13:31
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.30</u>	ppm	Cal Gas Exp Date	February 13, 2018
Cal Gas Cylinder #	<u>LL77486</u>			
Calibrator Make/Model	API T700		Serial Number	996
ZAG Make/Model	API 701		Serial Number	201

Analyzer Information

Analyzer make:	Thermo 450i	Analyzer serial #:	815129098		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
Analyzer Range	0 - 100 ppb	PMT voltage	-574	-574	
Calculated slope	0.998831	1.001827	Lamp voltage	931	932
Calculated intercept	-0.376612	-0.337154	Pressure	539.2	540.7
Analyzer Background	13.8	13.8	Flow	0.951	0.953
Analyzer Coefficient	1.150	1.144	Intensity	85	84

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.1	----
as found span	4936	75.6	80.0	80.2	0.997
calibrator zero	5000	0.0	0.0	0.1	----
high point	4936	75.6	80.0	79.9	1.001
second point	4975	37.8	40.0	40.7	0.982
third point	4994	19.1	20.2	20.5	0.985
as left zero	5000	0.0	0.0	0.2	----
as left span	4936	75.6	80.0	79.7	1.003
SO2 Scrubber Check	4991	20.1	200.6	1.5	----
Average Correction Factor					0.989
Corrected As found	80.10	Previous response	80.42	*% change	0.4%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Completed SO2 scrubber check with mix gas cylinder at the station. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

H₂S Calibration Summary

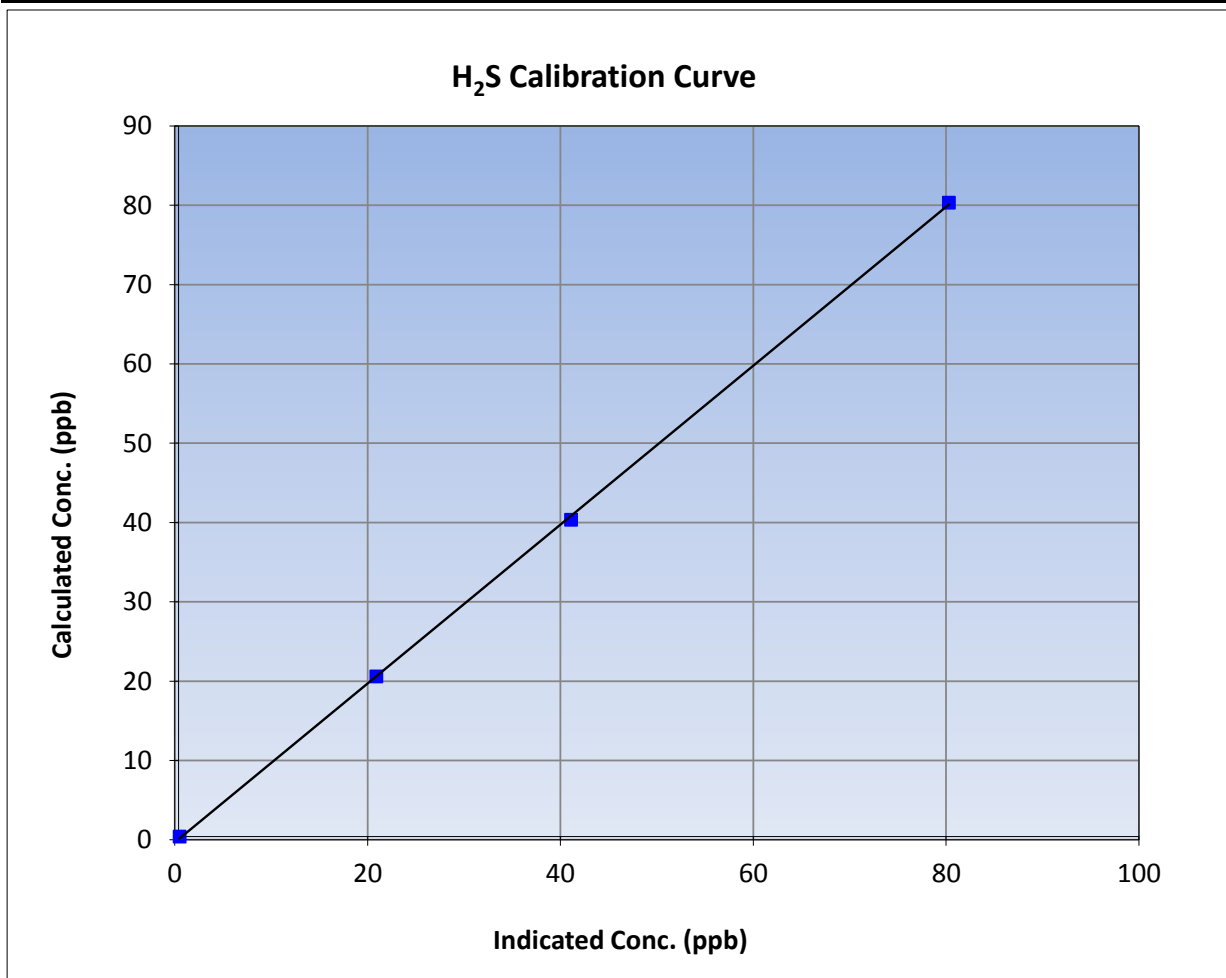
Version-03-2017

Station Information

Calibration Date	June 15, 2017	Previous Calibration	May 17, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	10:18	End Time (MST)	13:31
Analyzer make	Thermo 450i	Analyzer serial #	815129098

Calibration Data

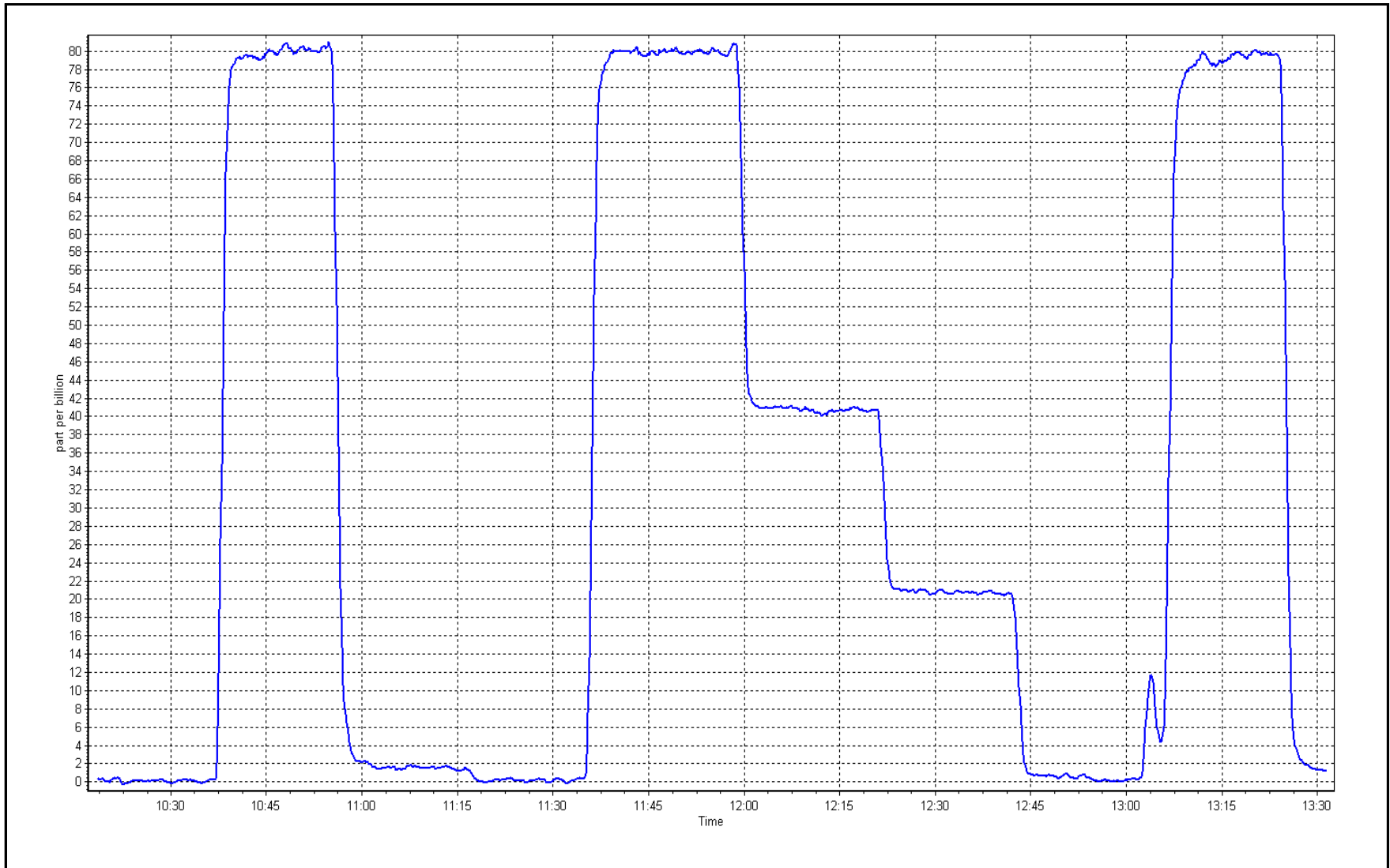
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999903	
80.0	79.9	1.0006			≥0.995
40.0	40.7	0.9820	Slope	1.001827	
20.2	20.5	0.9850			0.90 - 1.10
			Intercept	-0.337154	+/-3



H₂S Calibration Plot

Date: June 15, 2017

Location: Firebag





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	June 16, 2017	Last Cal Date:	May 16, 2017
Start time (MST):	8:34	End time (MST):	12:59
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000652	Cal Gas Expiry Date	November-04-17
CH4 Cal Gas Conc.	<u>513.0</u> ppm	CH4 Equiv Conc.	1057.5 ppm
C3H8 Cal Gas Conc.	<u>198.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	API T700	Serial Number	996
ZAG Make/Model	API 701	Serial Number	201

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1336160089
	<u>Start</u>	<u>Finish</u>	<u>Start</u> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-306 -307
Calculated slope	1.002859	Sample pressure	8.6 8.6
Calculated intercept	-0.057799	Fuel pressure	23.0 23.0
Analyzer Background	1.70	Air pressure	34.9 34.9
Analyzer Coefficient	3.574	Flame temperature	155.9 156.2

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.00	-0.01	----
as found span	4930	79.8	16.84	16.66	1.011
calibrator zero	4999	0.0	0.00	-0.01	----
high point	4929	79.8	16.85	16.84	1.001
second point	4972	39.9	8.42	8.53	0.987
third point	4991	20.1	4.24	4.39	0.967
as left zero	4999	0.0	0.00	0.10	----
as left span	4930	79.8	16.84	16.78	1.004
Average Correction Factor					0.985
Corrected As found	16.67	Previous response	16.85	*% change	1.1%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

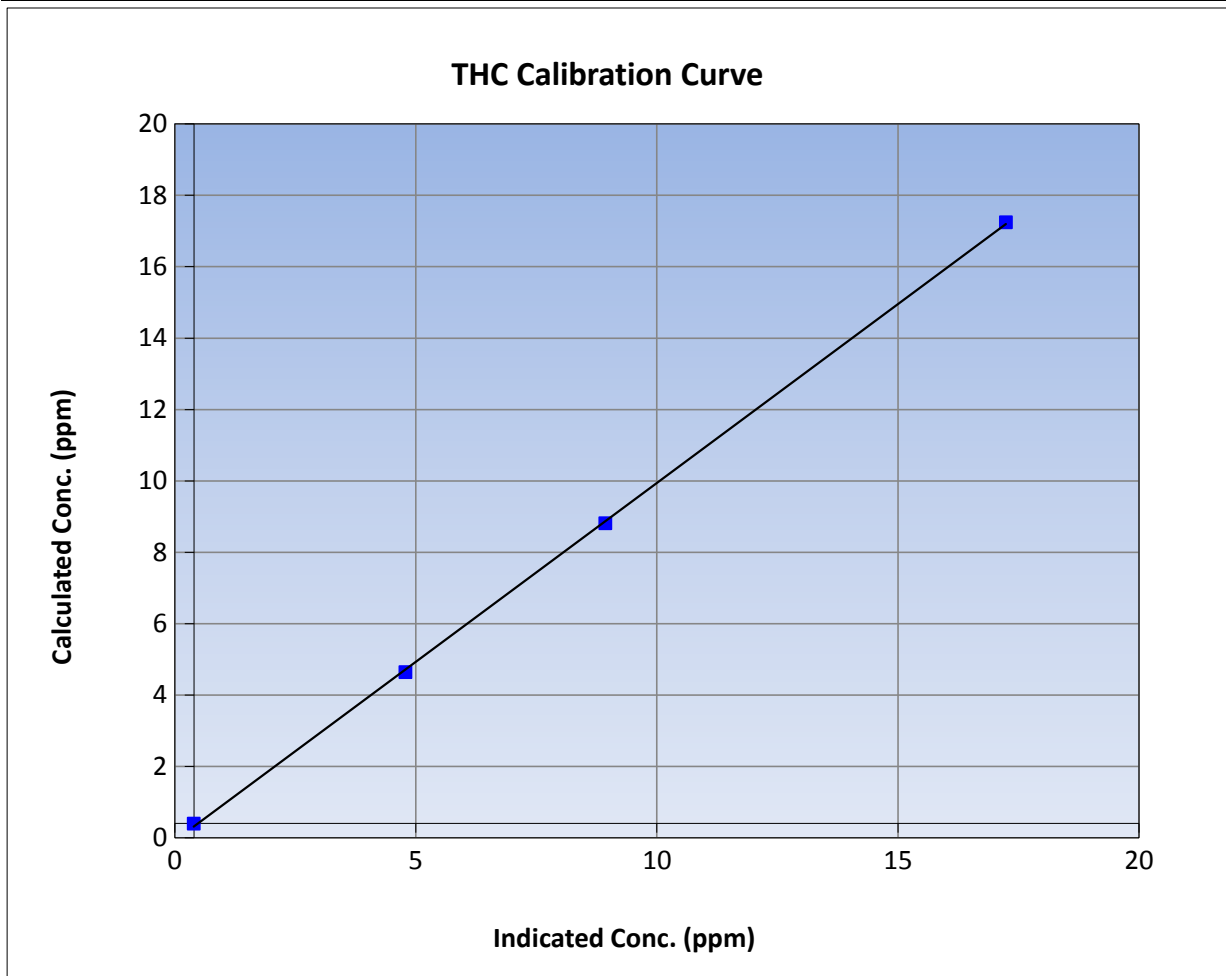
Version-03-2017

Station Information

Calibration Date	June 16, 2017	Previous Calibration	May 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:34	End Time (MST)	12:59
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

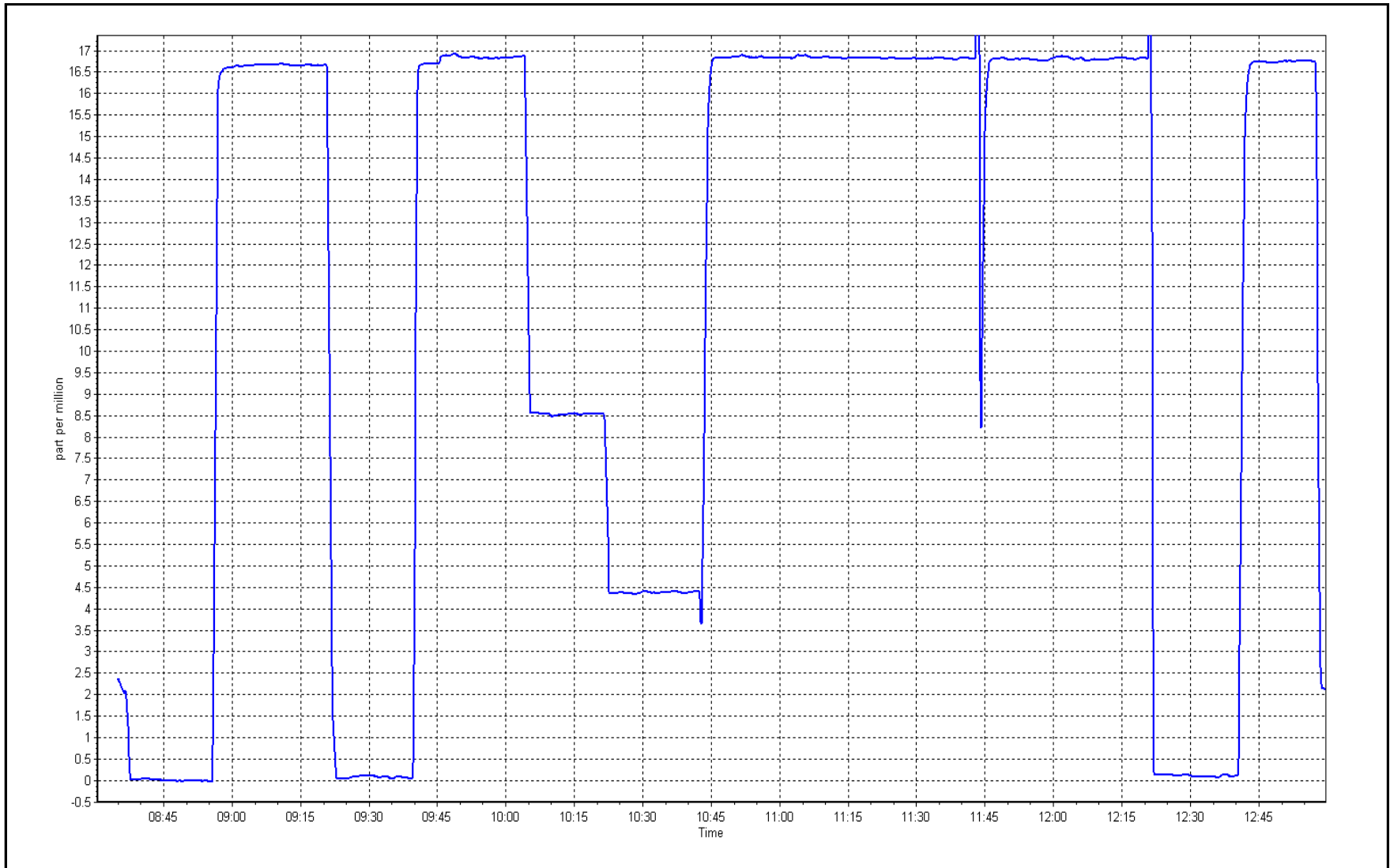
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999880	
16.8	16.8	1.0006			≥0.995
8.4	8.5	0.9866	Slope	1.002249	
4.2	4.4	0.9673			0.90 - 1.10
			Intercept	-0.076574	+/-1.5



THC Calibration Plot

Date: June 16, 2017

Location: Firebag





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	June 16, 2017	Last Cal Date:	May 16, 2017
Start time (MST):	8:34	End time (MST):	13:01
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000652	Cal Gas Expiry Date	November 4, 2019
NOX Cal Gas Conc.	<u>50.2</u> ppb	NO Cal Gas Conc.	<u>50.2</u> ppb
Calibrator Model	API T700	Serial Number	996
ZAG make/model	API T701H	Serial Number	201

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1410661309	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	0.934	0.934	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	1.000	1.000	PMT Temperature	-3.1 -2.9
NO2 coefficient	1.000	1.000	Reaction cell Press	162.3 161.2
NO bkgrnd	4.1	4.2	Sample Flow	0.623 0.612
NOX bkgrnd	4.1	4.2	PMT Voltage	-780.3 -780.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.001335	1.002315
NO _x Cal Offset	-2.253323	-2.473207
NO Cal Slope	1.000919	1.001873
NO Cal Offset	-2.332343	-2.492975
NO ₂ Cal Slope	0.996518	0.998509
NO ₂ Cal Offset	-0.428088	0.300809



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
as found span	4930	79.8	799.6	799.6	0.0	789.6	788.9	0.7	1.0127	1.0136
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	----	----
high point	4929	79.8	799.8	799.8	0.0	798.6	799.0	-0.5	1.0015	1.0010
second point	4971	39.9	399.7	399.7	0.0	403.9	404.1	-0.3	0.9897	0.9892
third point	4991	20.1	201.4	201.4	0.0	205.2	205.2	0.0	0.9813	0.9813
as left zero	4999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
as left span	4929	79.8	799.8	378.0	421.8	791.0	368.8	422.2	1.0111	1.0249
Average Correction Factor									0.9908	0.9905

Corrected As found	NO _x = 789.8 ppb	NO = 789.0 ppb	*Percent Change	NO _x = 1.4%
Previous Response	NO _x = 800.8 ppb	NO = 801.2 ppb	*Percent Change	NO = 1.5%
<i>* = > +/-5% change initiates investigation</i>				

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	797.8	797.0	0.8	1.0025	1.0035	----	----
1st NO2 (400 ppb O3)	378.0	419.0	797.3	378.0	419.3	1.0031	----	0.9993	100.1%
2nd NO2 (200 ppb O3)	585.3	211.7	797.3	585.3	212.0	1.0031	----	0.9986	100.1%
3rd NO2 (100 ppb O3)	687.9	109.1	796.3	687.9	108.5	1.0044	----	1.0055	99.5%
2nd NO ref point	----	0.0	797.0	796.5	0.6	1.0035	1.0041	----	----
Average Correction Factor						1.0035	1.0038	1.0011	99.9%

Notes: Changed inlet filter after asfinds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

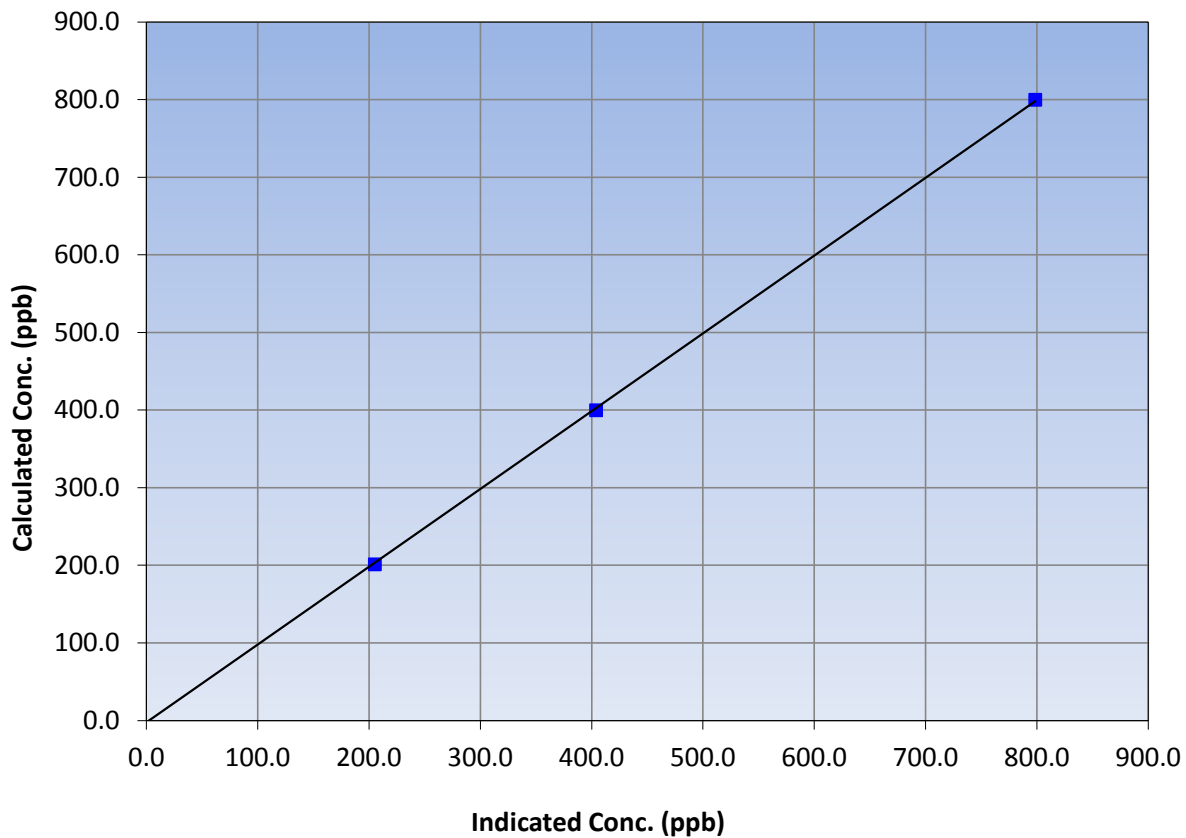
Station Information

Calibration Date	June 16, 2017	Previous Calibration	May 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:34	End Time (MST)	13:01
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.2	----	Correlation Coefficient	≥0.995	
799.8	798.6	1.0015			
399.7	403.9	0.9897			
201.4	205.2	0.9813			
			Slope	1.002315	0.90 - 1.10
			Intercept	-2.473207	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

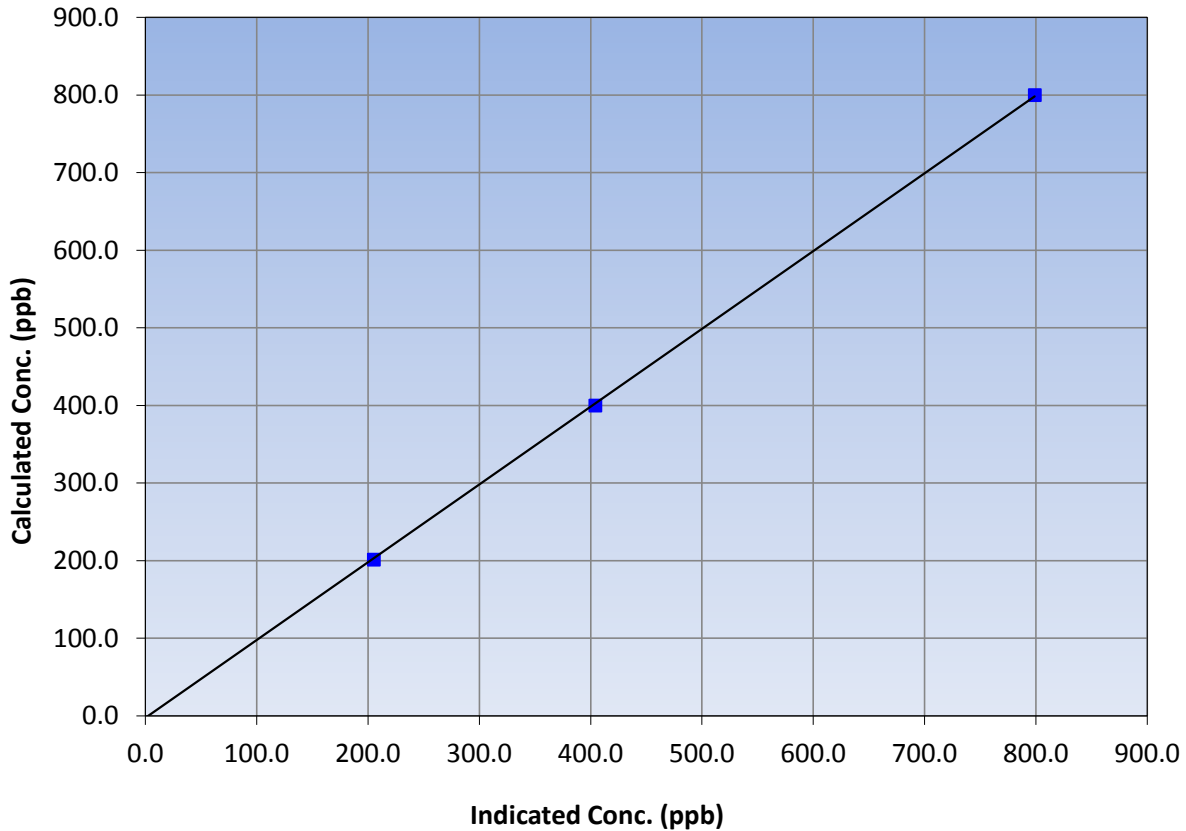
Station Information

Calibration Date	June 16, 2017	Previous Calibration	May 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:34	End Time (MST)	13:01
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
799.8	799.0	1.0010			
399.7	404.1	0.9892	Slope	0.90 - 1.10	
201.4	205.2	0.9813			
			Intercept	-2.492975	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

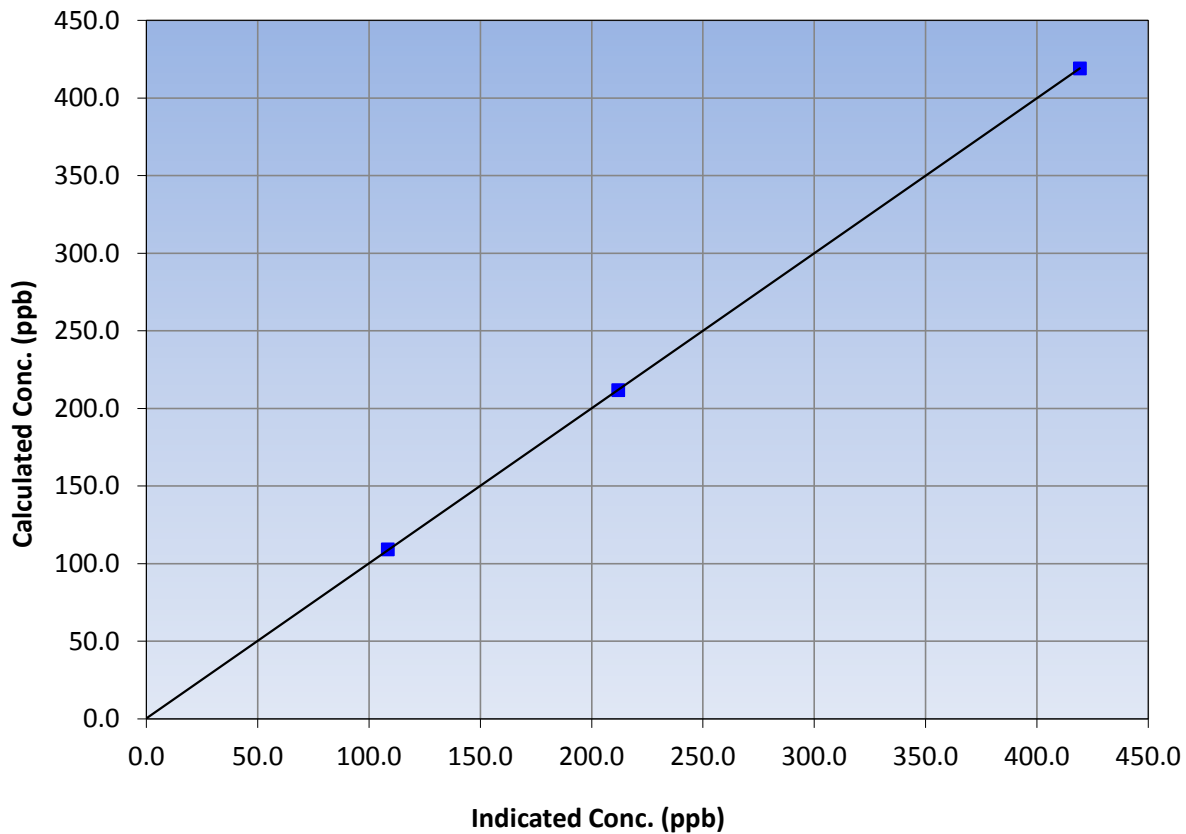
Station Information

Calibration Date	June 16, 2017	Previous Calibration	May 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:34	End Time (MST)	13:01
Analyzer make	Thermo 42i	Analyzer serial #	1410661309

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
419.0	419.3	0.9993			
211.7	212.0	0.9986			
109.1	108.5	1.0055			
			Slope	0.998509	0.90 - 1.10
			Intercept	0.300809	+/-20

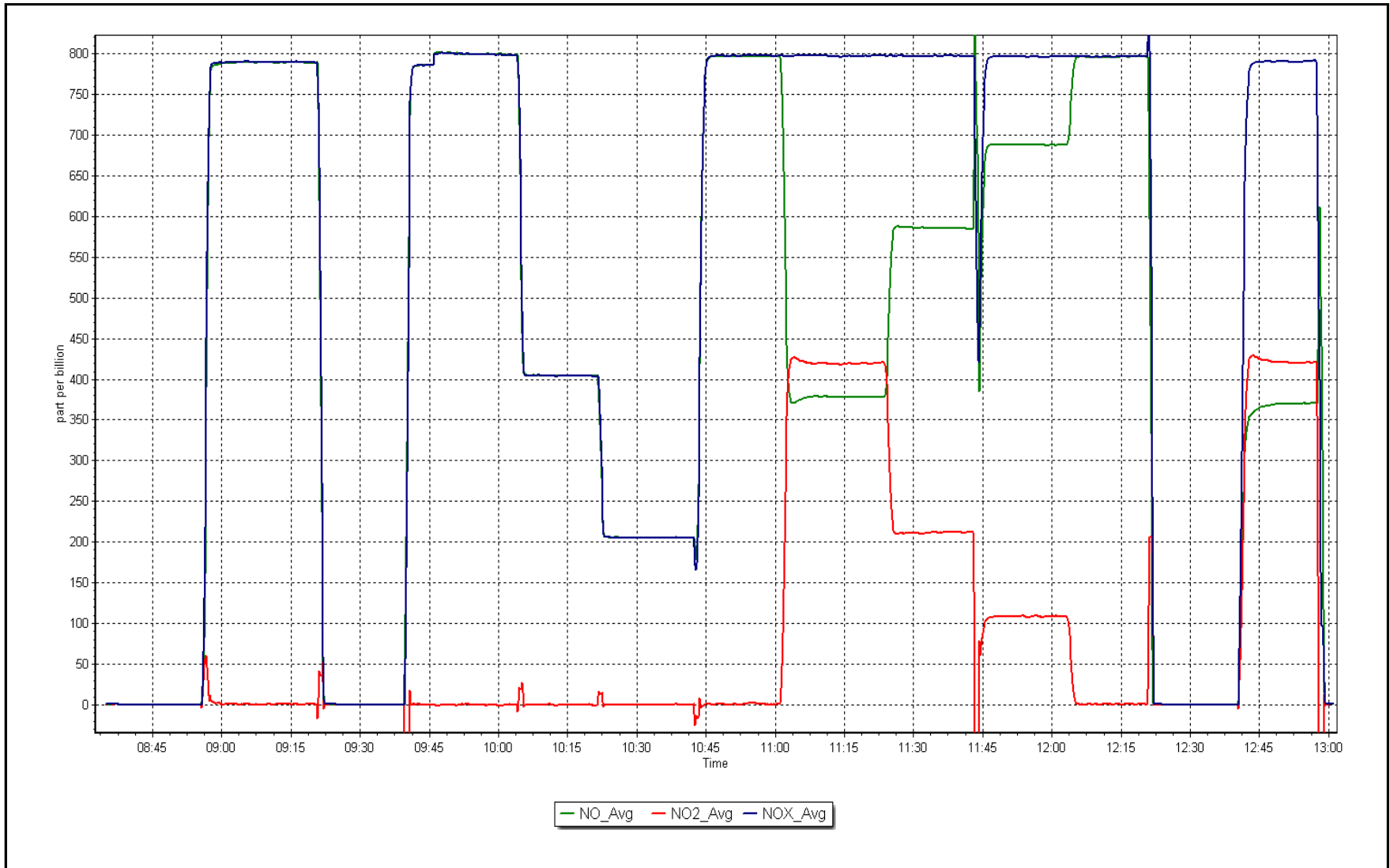
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 16, 2017

Location: Firebag





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 20
MACKAY RIVER
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	35	35	100	16	0	3	0
H2S (ppb) Average	678	34	42	98.89	4	0	1	0
THC (ppm) Average	685	35	35	100	2.6	-	2.2	-
NO2 (ppb) Average	685	35	35	100	20	0	6	-
NO (ppb) Average	685	35	35	100	5	-	1	-
NOX (ppb) Average	685	35	35	100	23	-	6	-
Temperature 2 m (C) Average	719	0	1	99.86	27.6	-	21.2	-
Relative Humidity (%) Average	719	0	1	99.86	98	-	93	-
Precipitation (mm) Total	719	0	1	99.86	6.1	-	22.9	-
Wind Speed 10 m (km/h) Average	719	0	1	99.86	23	-	14	-
Wind Direction 10 m (deg) Average	719	0	1	99.86	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.3	1	-	0	0	0	0	0	1	16
H2S (ppb) Average	678	0.3	0	-	0	0	0	0	0	0	4
THC (ppm) Average	685	2.09	0.1	-	1.9	2	2	2.1	2.1	2.3	2.6
NO2 (ppb) Average	685	1.2	2	-	0	0	0	1	1	3	20
NO (ppb) Average	685	0.2	0	-	0	0	0	0	0	0	5
NOX (ppb) Average	685	1.3	2	-	0	0	0	1	1	3	23
Temperature 2 m (C) Average	719	14.63	5.5	-	-0.4	7.9	10.7	14.4	18.4	22.1	27.6
Relative Humidity (%) Average	719	65.3	24	-	22	31	44	68	88	95	98
Precipitation (mm) Total	719	-	-	62.94	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	719	7.3	4	-	0	3	4	7	10	13	23
Wind Direction 10 m (deg) Average	719	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS 20)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	07 Jun 2017 20:00	07 Jun 2017 21:00	2	Unstable operation - excessive baseline drift
H2S	11 Jun 2017 21:00	11 Jun 2017 22:00	2	Unstable operation - excessive baseline drift
H2S	14 Jun 2017 05:00	14 Jun 2017 05:00	1	Unstable operation - excessive baseline drift
H2S	24 Jun 2017 06:00	24 Jun 2017 06:00	1	Unstable operation - excessive baseline drift
H2S	29 Jun 2017 18:00	29 Jun 2017 18:00	1	Unstable operation - excessive baseline drift
ALL PARAMETERS	28 Jun 2017 10:00	28 Jun 2017 10:00	1	Maintenance - replaced power distribution card



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Mackay River - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16 ppb on Jun 7 23:00	Maximum Daily Average: 3.3 ppb on Jun 7		Hours of Data:	685
Minimum Value: 0 ppb on Jun 2 18:00	Minimum Daily Average: 0.0 ppb on Jun 22		Hours of Missing Data:	35
Maximum Diurnal Average: 0.7 ppb at hour 23	Minimum Diurnal Average: 0.1 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 6		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
5-Jun	1	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0.2	1
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Jun	1	Z	1	1	1	3	12	8	2	1	0	0	1	1	0	0	0	0	0	0	3	11	16	11	3.3	16
8-Jun	7	4	Z	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7
9-Jun	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	0	0	0	0	Z	0	0	0	0	0	2	6	4	2	1	1	1	0	1	0	0	0	0	0	0.9	6
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	0	0.3	1
13-Jun	0	Z	0	0	0	0	1	1	2	1	1	1	1	0	1	2	1	1	1	0	0	0	0	0	0.7	2
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jun	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
20-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	Z	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	Z	0	1	4	0	C	C	C	C	C	2	0	1	3	4	4	2	0	0	0	1.2	4
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0.2	2
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

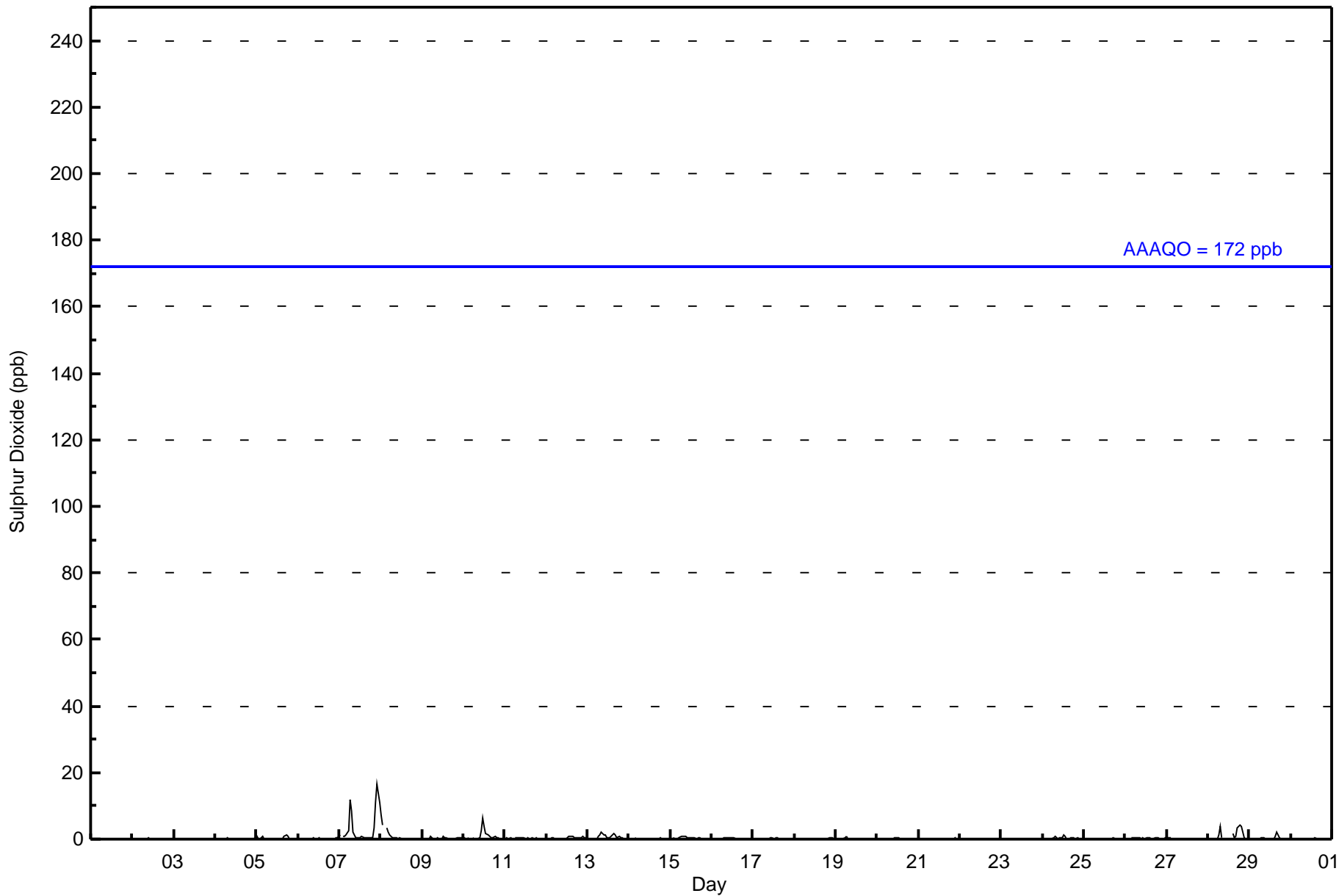
0.4	0.3	0.1	0.3	0.2	0.3	0.6	0.6	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.5	0.7	0.5	Diurnal Average		
7	4	1	3	2	3	12	8	2	1	2	6	4	2	2	2	2	2	3	4	4	3	11	16	11	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mackay River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mackay River - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	99.42	99.42
11 - 20	4	0.58	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	27	82	36	13	18	40	58	74	36	39	36	31	60	46	32	53	681
11 - 20	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685

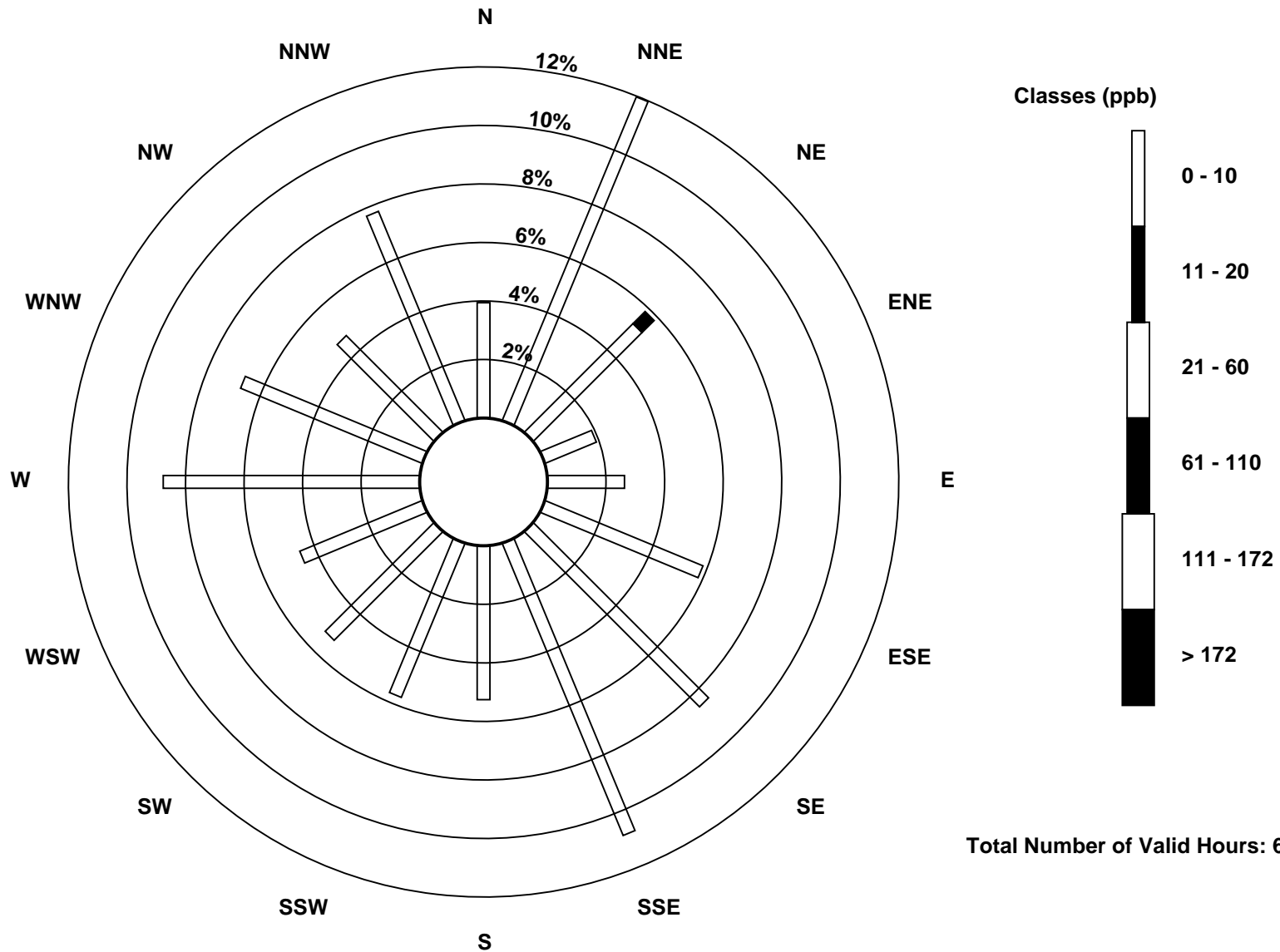
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Mackay River (AMS 20)

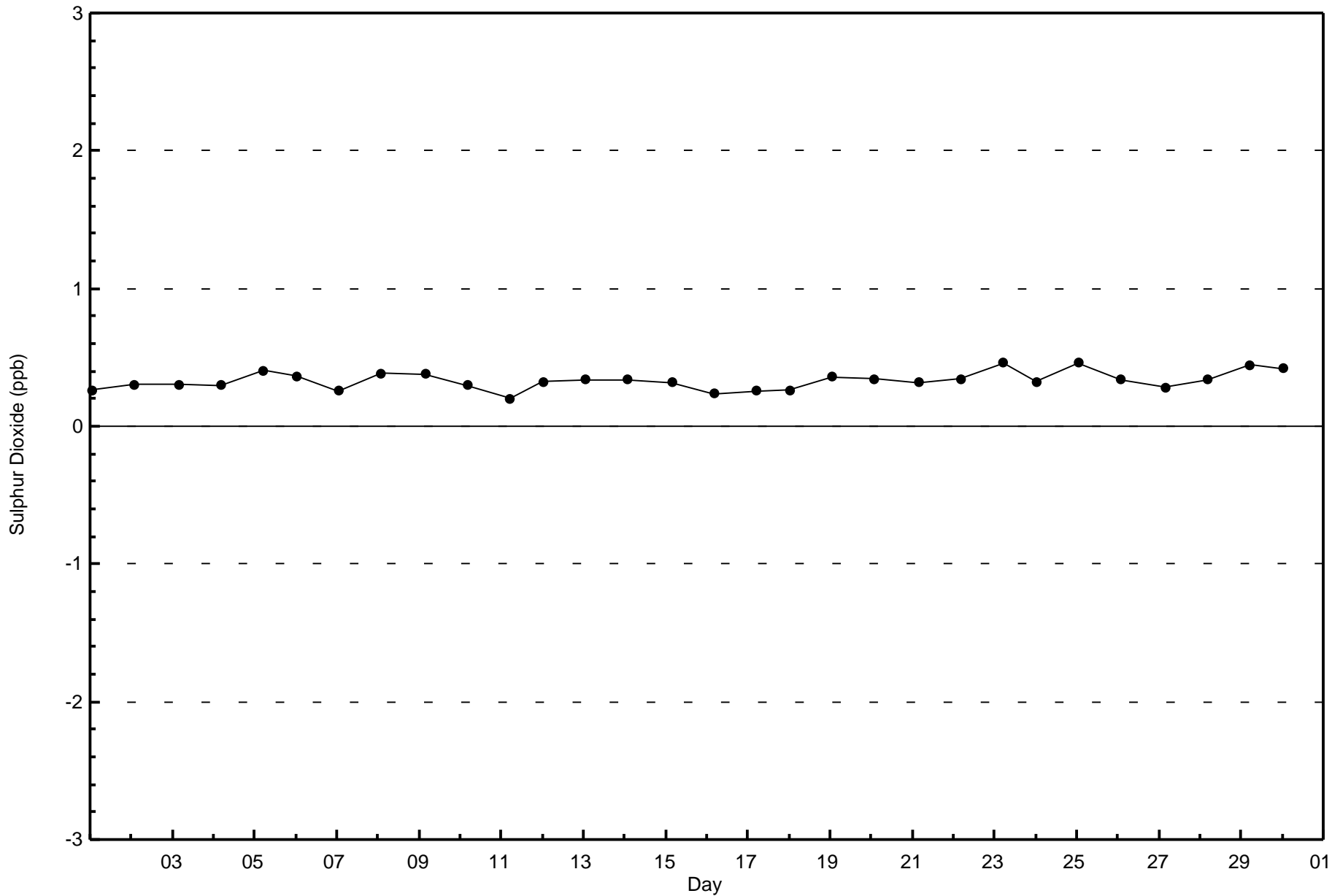


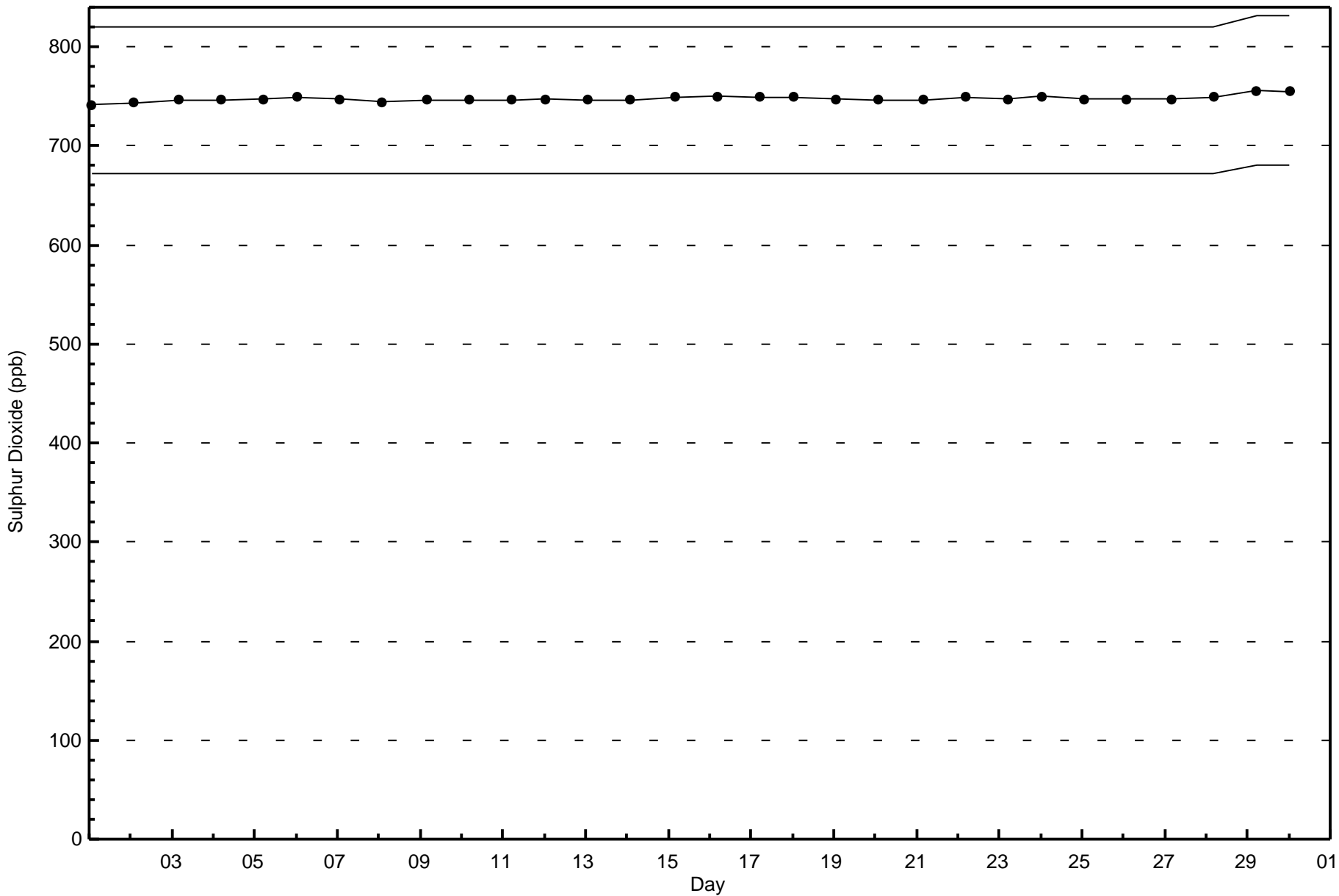
Total Number of Valid Hours: 685



Wood Buffalo Environmental Association
Zero Responses

Sulphur Dioxide (SO₂) - ppb
Mackay River - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Mackay River - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 4 ppb on Jun 21 22:00	Maximum Daily Average: 0.6 ppb on Jun 11
Minimum Value: 0 ppb on Jun 17 16:00	Hours of Data: 678
Maximum Diurnal Average: 0.5 ppb at hour 22	Hours of Missing Data: 42
Monthly Average: 0.3 ppb	Hours of Calibration: 34
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2	Percent Operational Time: 98.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
2-Jun	0	0	0	Z	0	0	1	3	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.5	3	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
4-Jun	0	0	0	0	0	Z	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1	
5-Jun	0	0	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
7-Jun	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	UO	UO	0	1	1	0.3	1	
8-Jun	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
11-Jun	0	3	1	3	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0.6	3	
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
14-Jun	0	0	0	Z	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1	
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
17-Jun	0	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	2	1	0.5	4
19-Jun	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	1	
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0.5	4	
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
23-Jun	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.3	1	
24-Jun	0	Z	0	0	0	UO	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
28-Jun	0	0	0	0	0	Z	0	1	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
29-Jun	0	0	0	0	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	UO	0	0	0	0	0	0.2	0	
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	

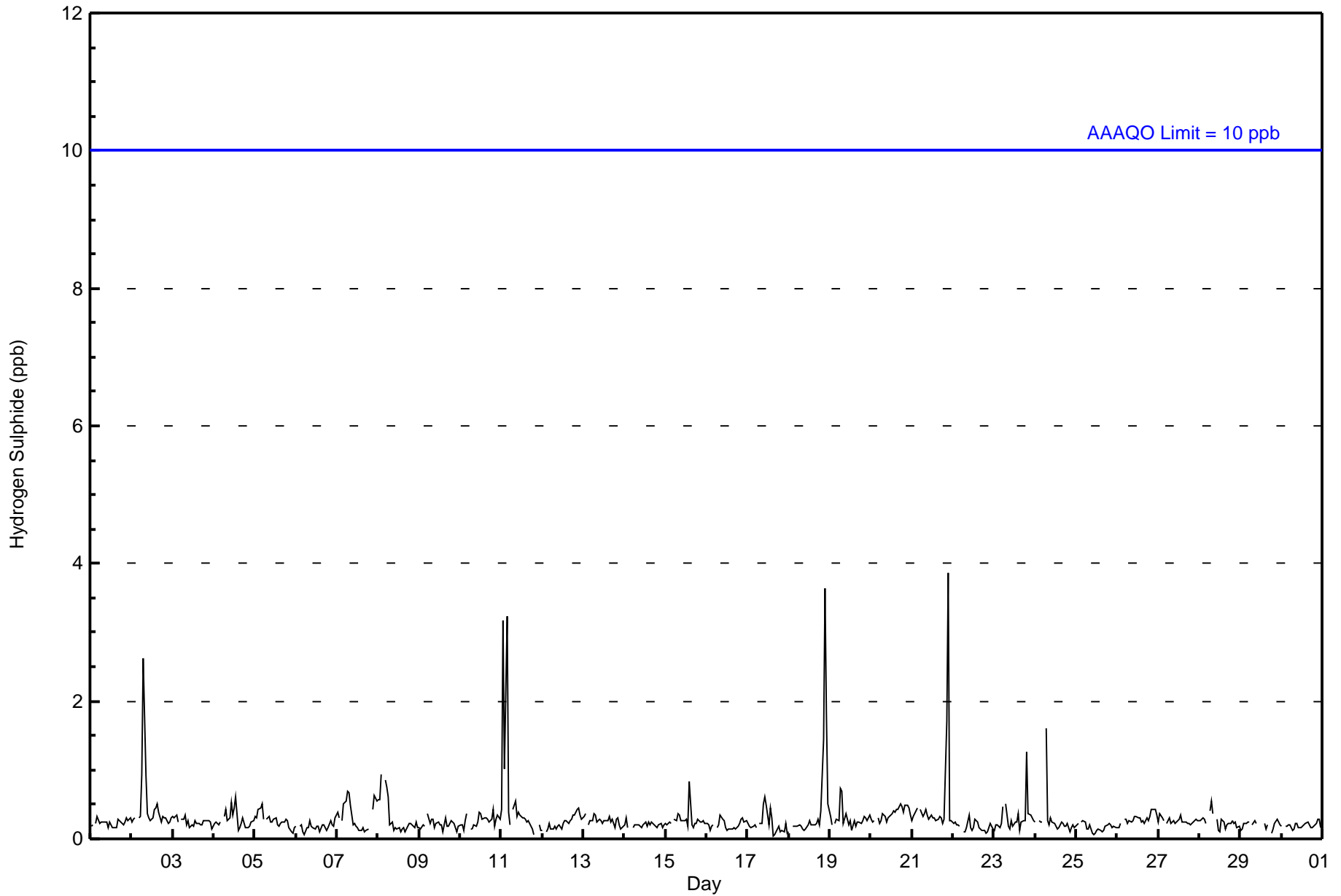
0.2	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.3	0.2	Diurnal Average
1	3	1	3	1	1	2	3	1	1	1	0	0	1	1	1	0	1	0	1	2	4	2	1	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mackay River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	673	99.26	99.26
3 - 4	5	0.74	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	24	80	42	13	17	38	62	71	36	40	34	32	62	43	28	51	673
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	5
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	80	42	13	17	38	62	71	36	40	34	32	62	45	31	51	678

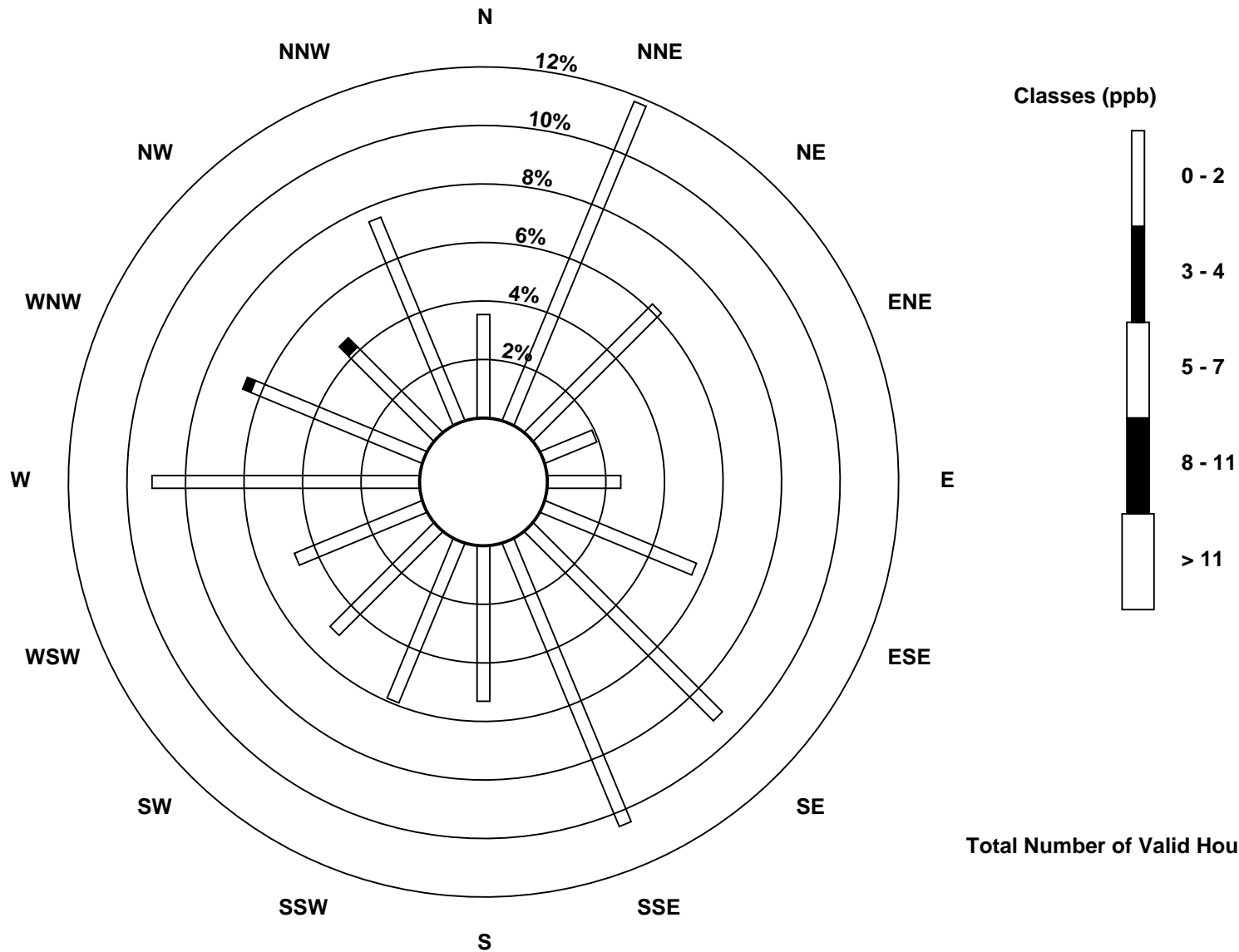
Total Number of Valid Hours: 678

Total Number of Hours: 720

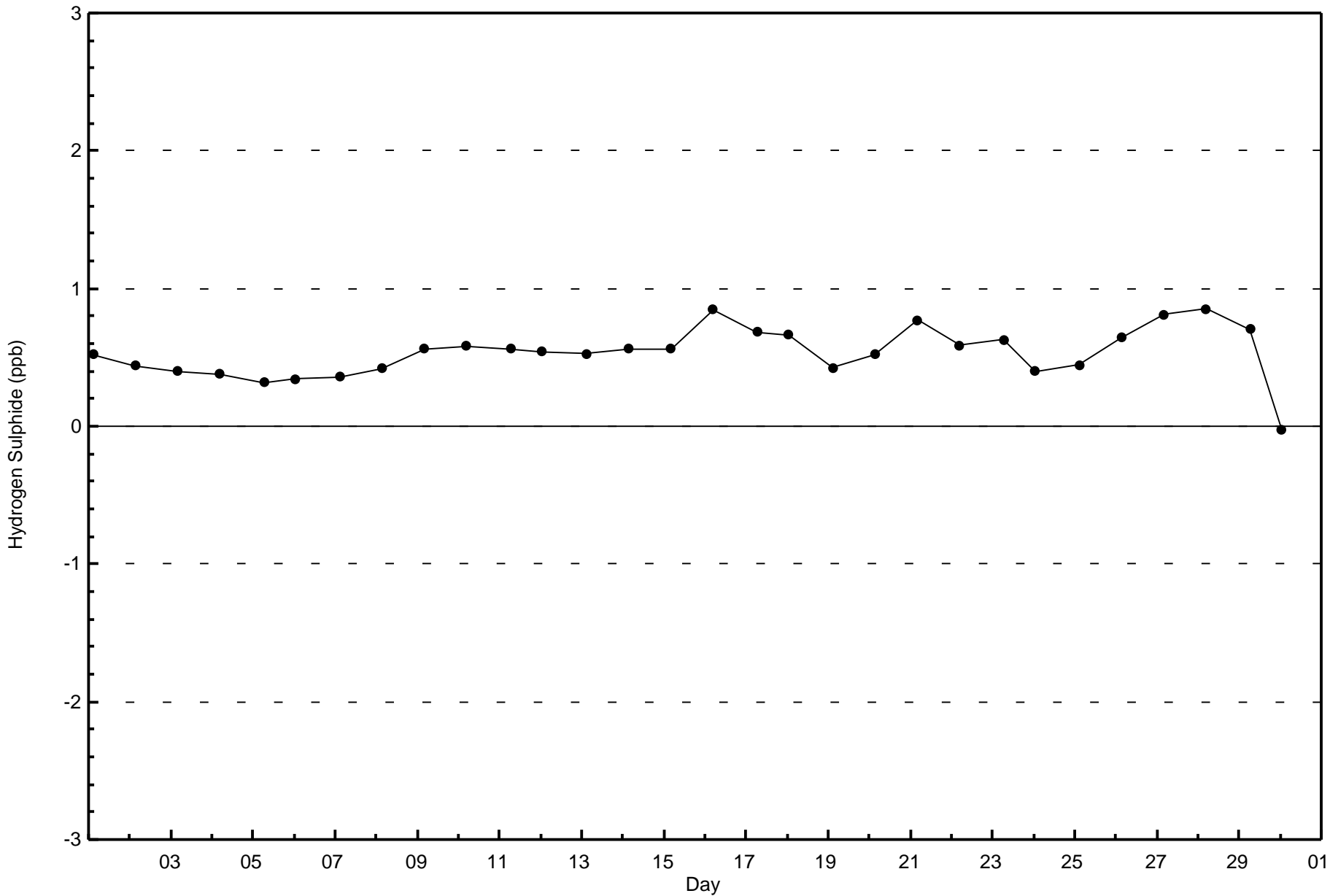


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Mackay River (AMS 20)



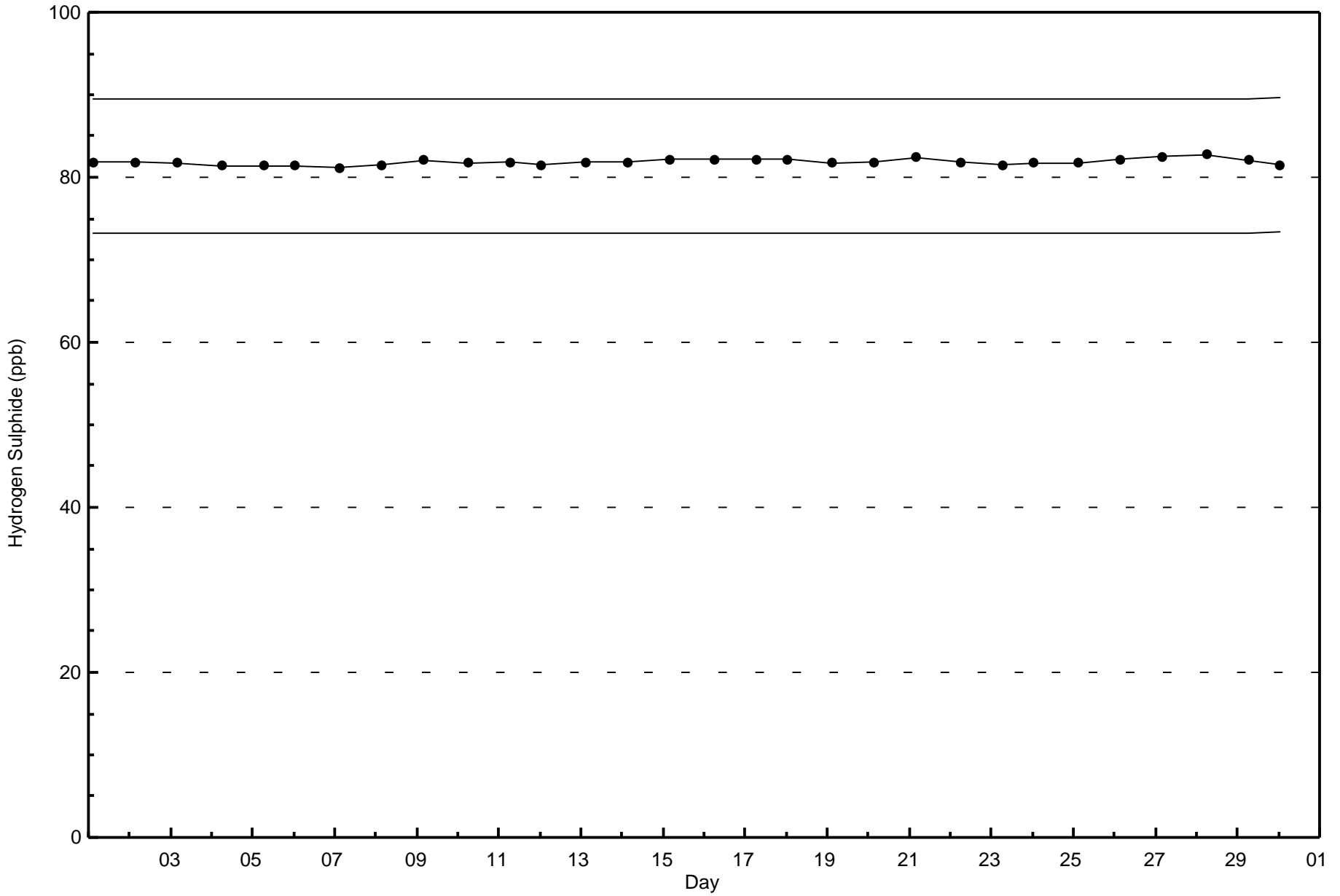
Total Number of Valid Hours: 678





Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Mackay River - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

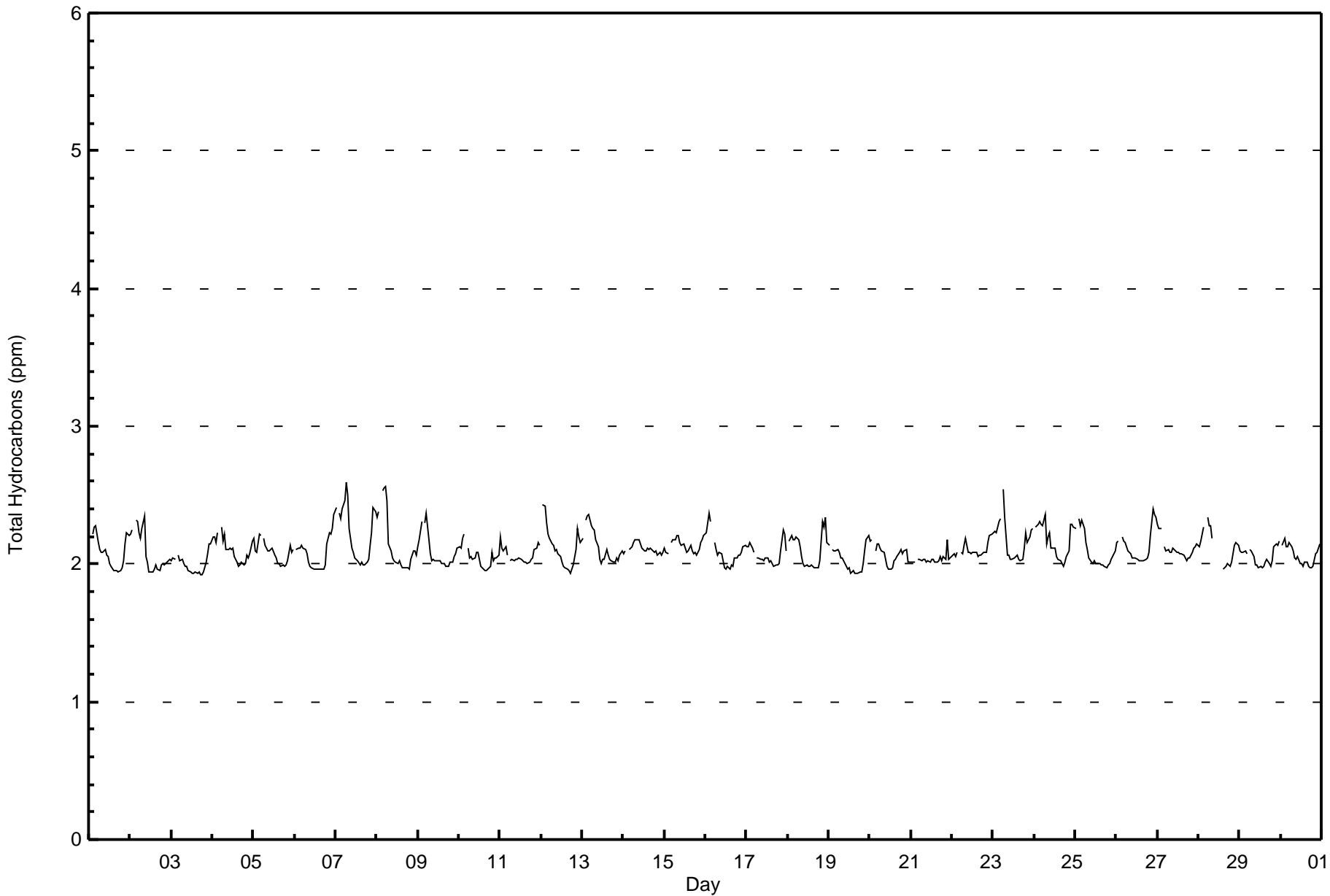
Mackay River - June 2017

Maximum Value: 2.6 ppm on Jun 7 07:00		Maximum Daily Average: 2.2 ppm on Jun 7		Hours in Service: 720																							
Minimum Value: 1.9 ppm on Jun 3 18:00		Minimum Daily Average: 2.0 ppm on Jun 3		Hours of Data: 685																							
Maximum Diurnal Average: 2.2 ppm at hour 4		Minimum Diurnal Average: 2.0 ppm at hour 17		Hours of Missing Data: 35																							
Monthly Average: 2.09 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.3 P ₉₉ = 2.4		Hours of Calibration: 35																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2.1	Z	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.1	2.3	
2-Jun	2.2	2.3	Z	2.3	2.3	2.2	2.2	2.3	2.3	2.1	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	
3-Jun	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.1	
4-Jun	2.2	2.2	2.2	2.2	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.3	
5-Jun	2.2	2.1	2.1	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	
6-Jun	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.4	2.1	2.4
7-Jun	2.4	Z	2.4	2.3	2.4	2.5	2.6	2.5	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.4	2.2	2.6
8-Jun	2.3	2.4	Z	2.5	2.6	2.6	2.5	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.6
9-Jun	2.1	2.2	2.3	Z	2.3	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.4
10-Jun	2.1	2.1	2.2	2.2	Z	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.2	
11-Jun	2.2	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.2
12-Jun	Z	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.1	2.3	2.2	2.2	2.1	2.4	
13-Jun	2.2	Z	2.3	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.4
14-Jun	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
15-Jun	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2
16-Jun	2.2	2.3	2.4	2.3	Z	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.4
17-Jun	2.1	2.1	2.2	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.2
18-Jun	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.3	2.2	2.1	2.3
19-Jun	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.2	2.0	2.2
20-Jun	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2
21-Jun	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.2	2.0	2.0	2.0	2.0	2.2
22-Jun	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2
23-Jun	2.2	2.2	2.2	2.3	2.3	Z	2.5	2.3	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.5
24-Jun	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.3	2.3	2.2	2.4
25-Jun	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.3
26-Jun	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.4	2.3	2.1	2.4
27-Jun	2.3	2.3	2.3	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.3
28-Jun	2.1	2.2	2.2	2.3	Z	2.3	2.3	2.3	2.2	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.3
29-Jun	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2
30-Jun	Z	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan C - Calibration			



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mackay River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	291	42.48	42.48
2.1 - 3.0	394	57.52	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	12	25	9	7	7	21	12	21	15	13	16	17	43	36	19	18	291
2.1 - 3.0	15	57	31	6	11	19	46	53	21	26	20	14	17	10	13	35	394
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685

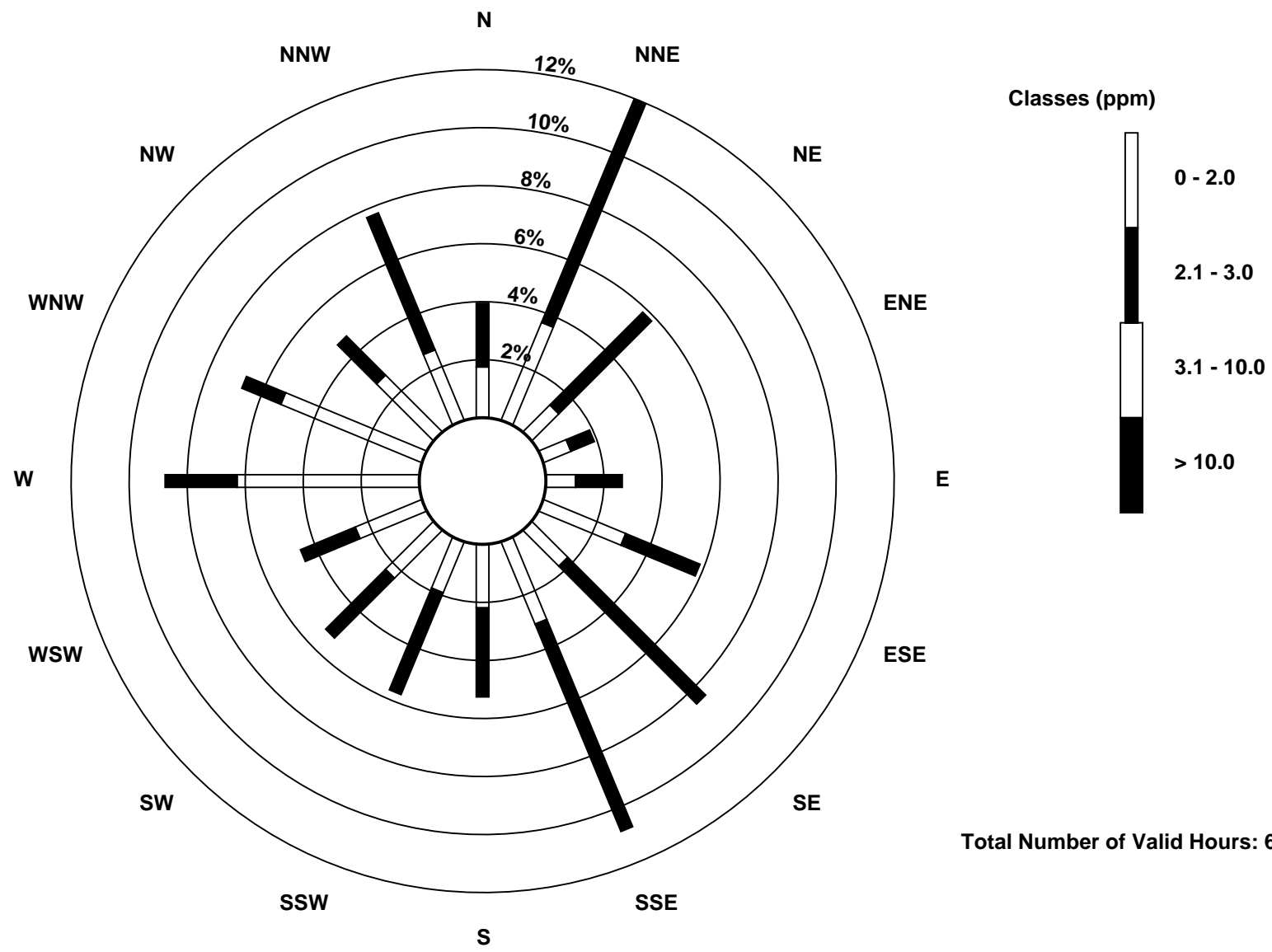
Total Number of Valid Hours: 685

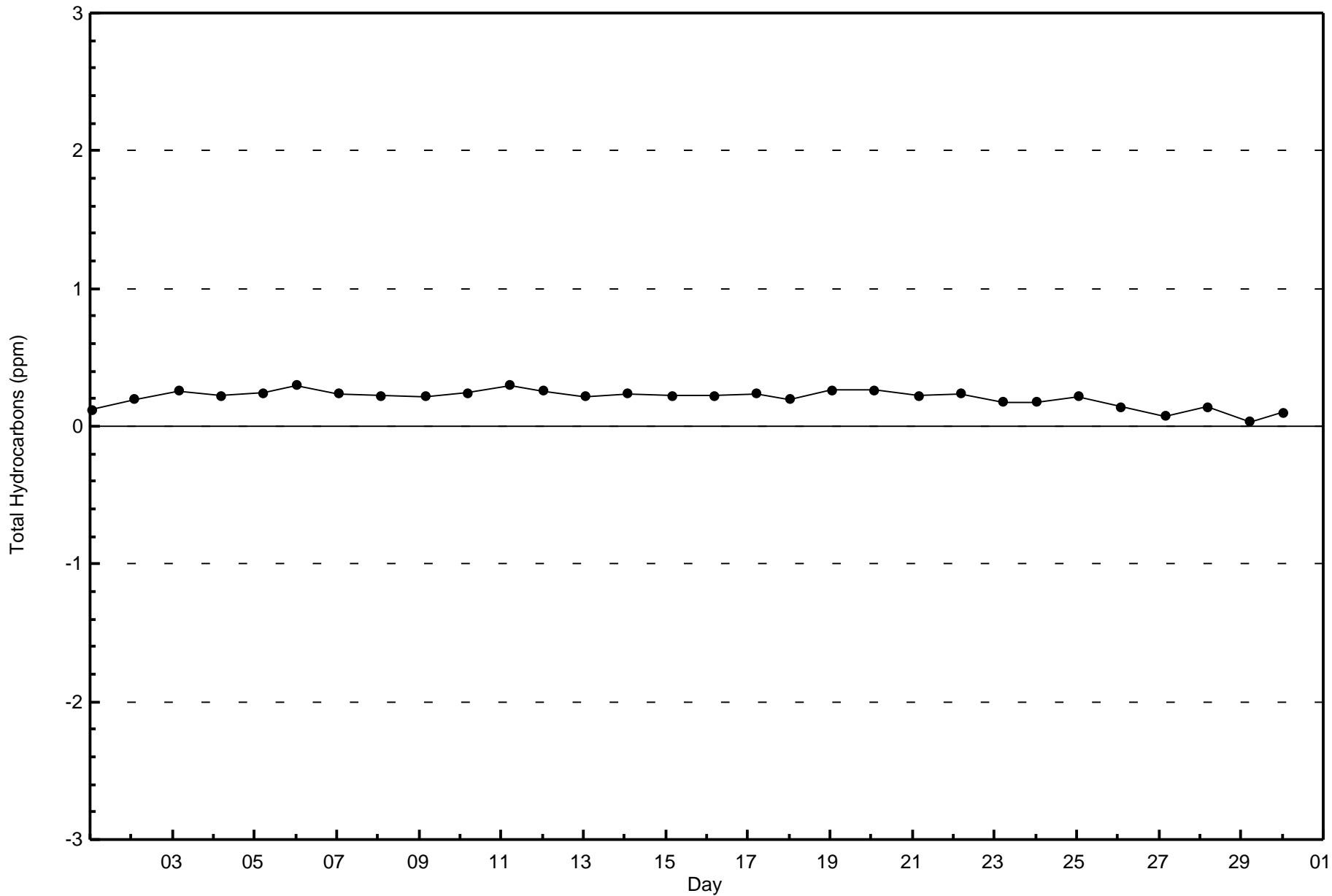
Total Number of Hours: 720

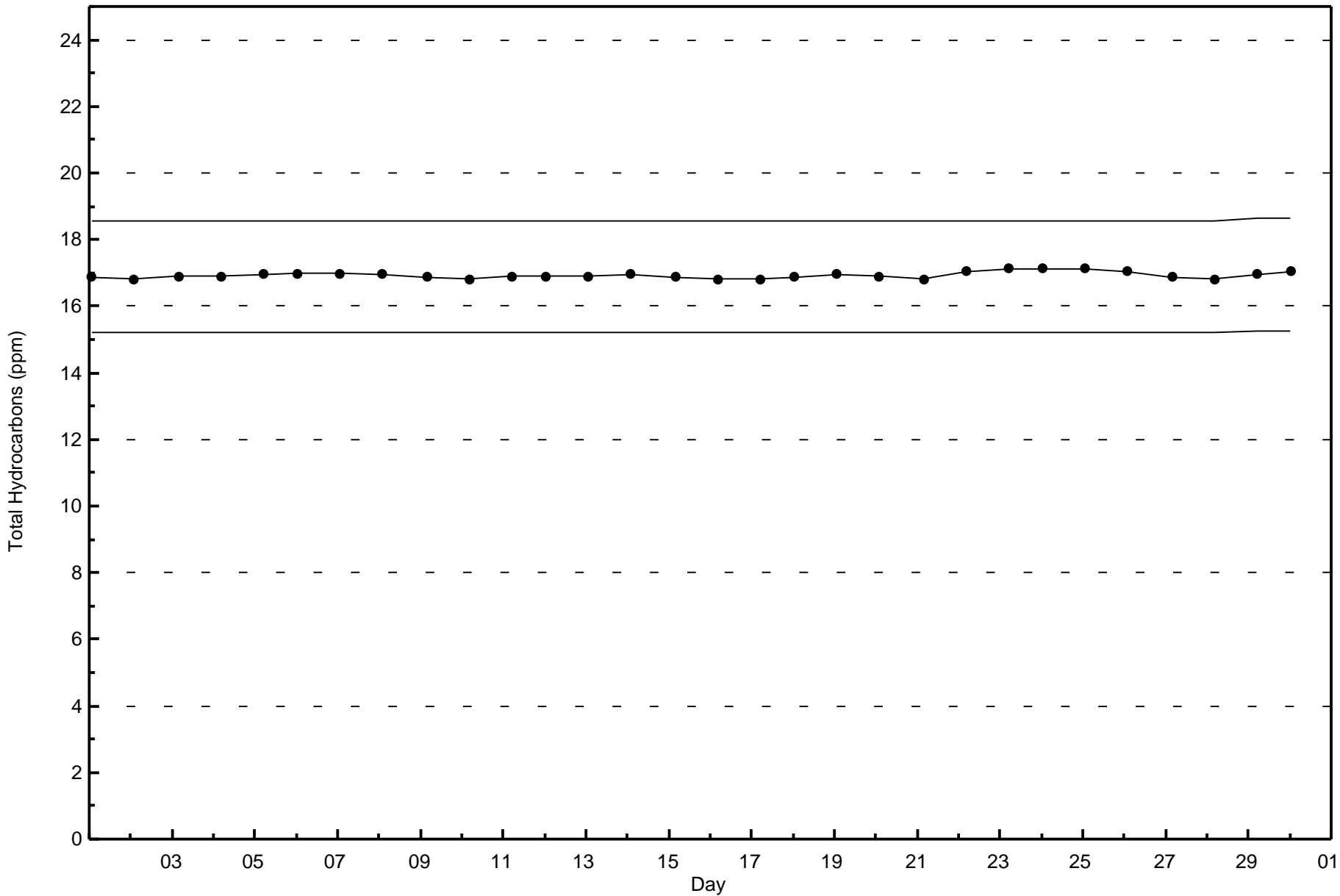


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Mackay River (AMS 20)









Maximum Value: 5 ppb on Jun 8 06:00	Maximum Daily Average: 0.6 ppb on Jun 7	Hours in Service: 720
Minimum Value: 0 ppb on Jun 2 19:00	Minimum Daily Average: 0.0 ppb on Jun 27	Hours of Data: 685
Maximum Diurnal Average: 0.6 ppb at hour 7	Minimum Diurnal Average: 0.0 ppb at hour 24	Hours of Missing Data: 35
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2	Hours of Calibration: 35
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2-Jun	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jun	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	Z	0	0	0	2	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5
8-Jun	0	0	Z	1	3	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
9-Jun	0	0	0	Z	0	1	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Jun	0	0	0	0	Z	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0.3	2
11-Jun	0	1	0	1	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
13-Jun	0	Z	0	0	0	1	3	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.5	3
14-Jun	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Jun	0	0	0	Z	0	0	1	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	2
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
17-Jun	0	0	0	0	0	Z	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Jun	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
20-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Jun	Z	0	0	0	0	0	0	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	Z	0	1	1	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

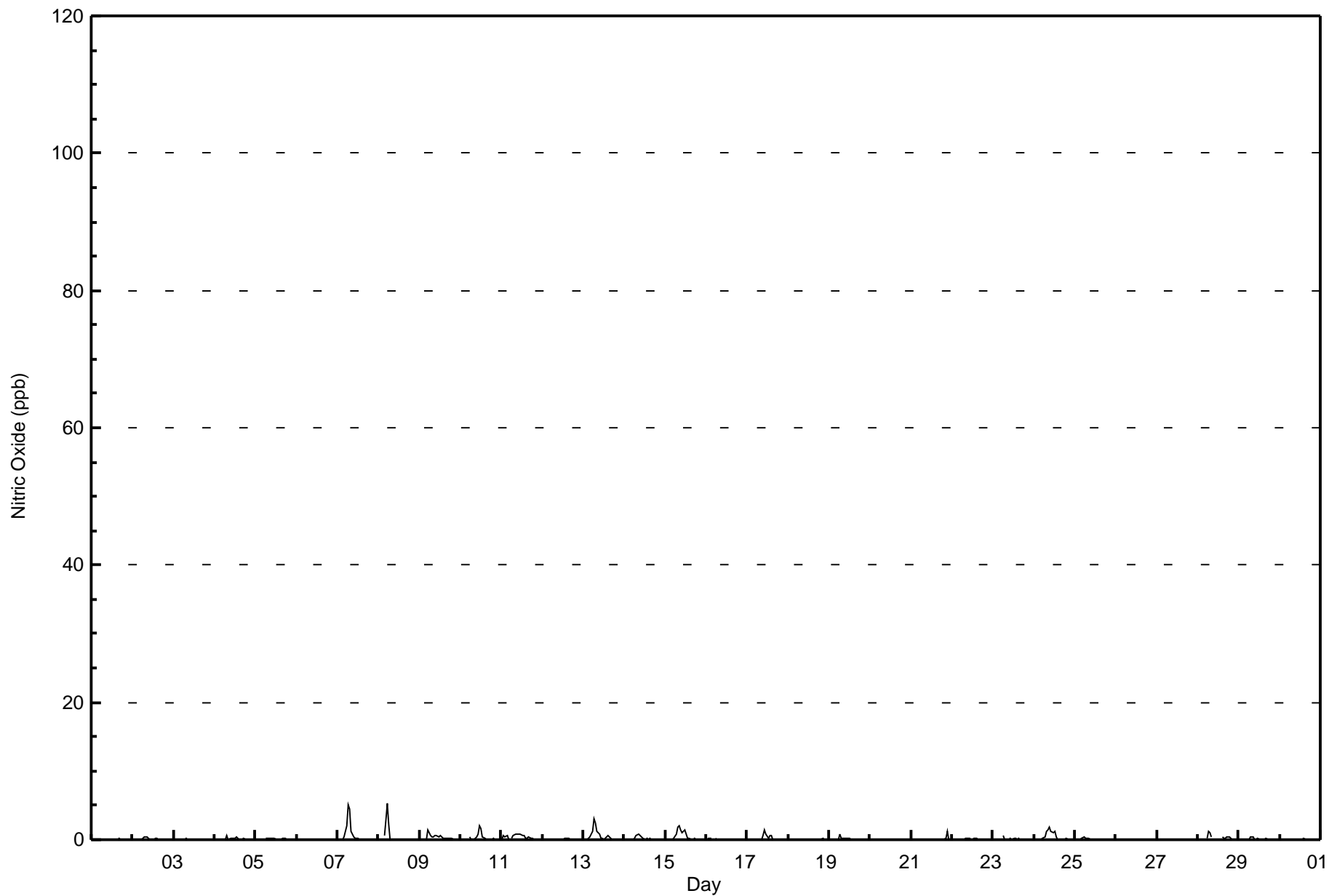
0.0	0.0	0.0	0.1	0.2	0.5	0.6	0.5	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	Diurnal Average
0	1	0	1	3	5	5	4	2	2	1	2	2	1	1	0	0	0	0	0	0	0	0	1	0	0	Diurnal Maximum

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Mackay River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Mackay River - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685

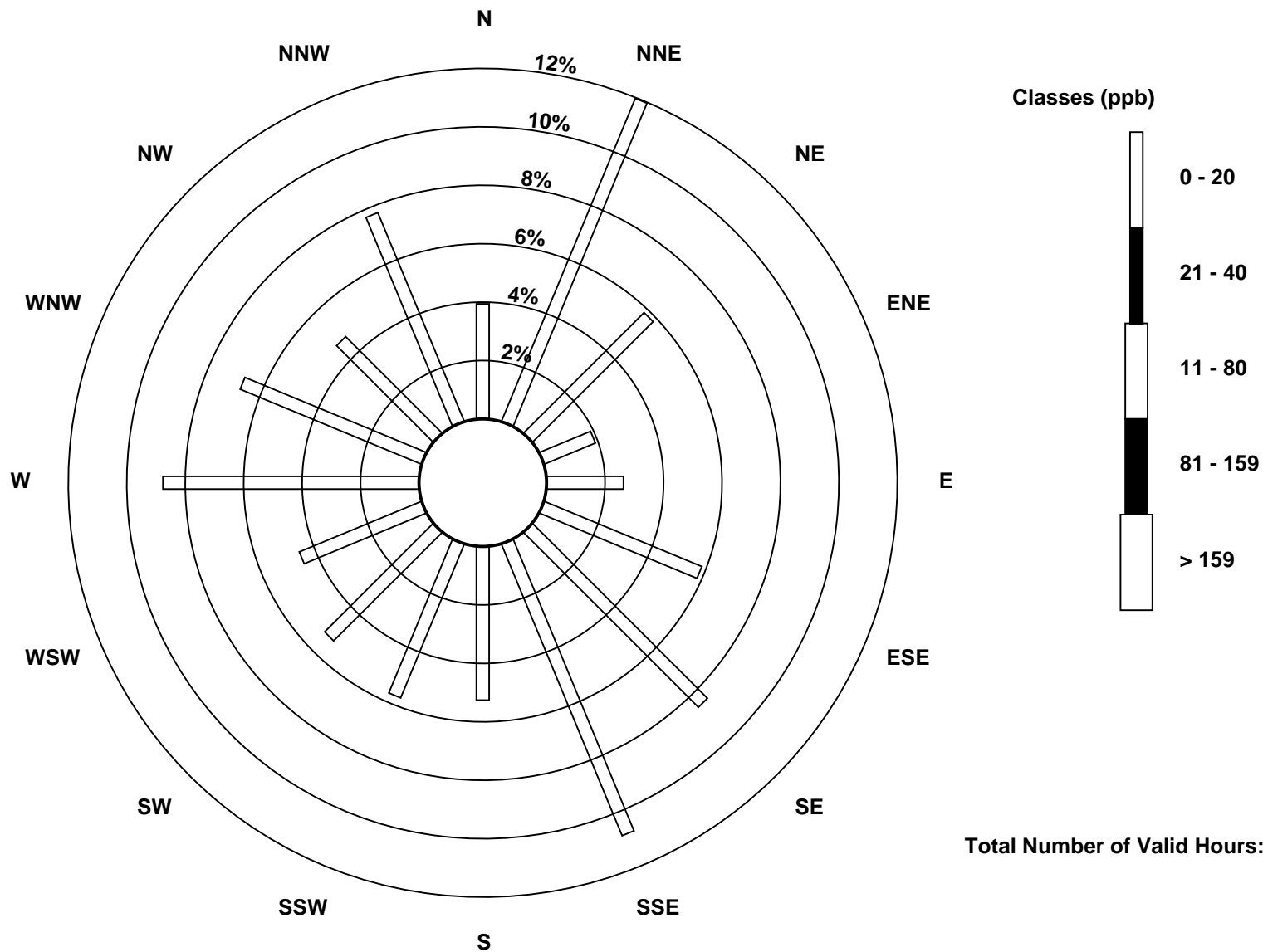
Total Number of Valid Hours: 685

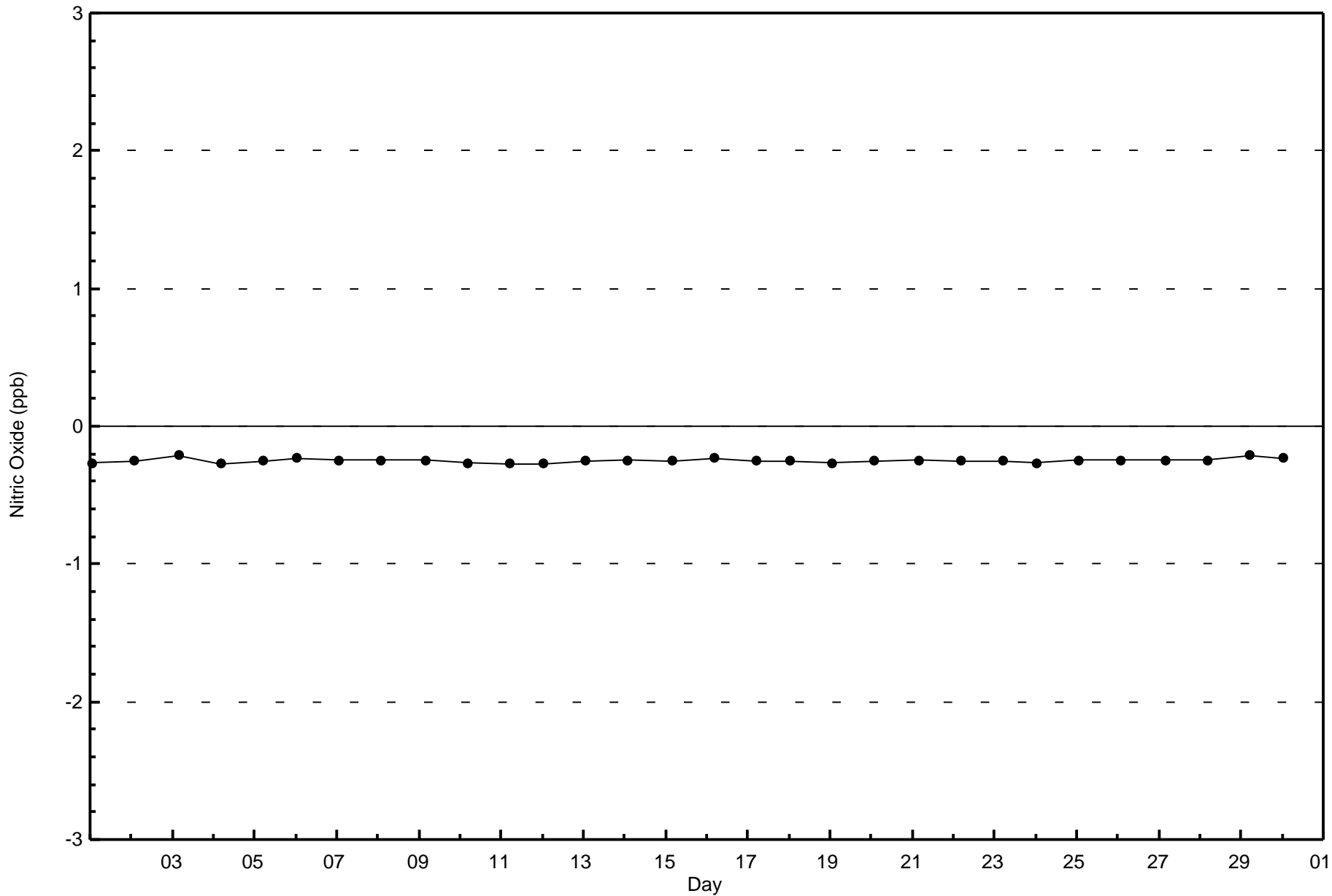
Total Number of Hours: 720

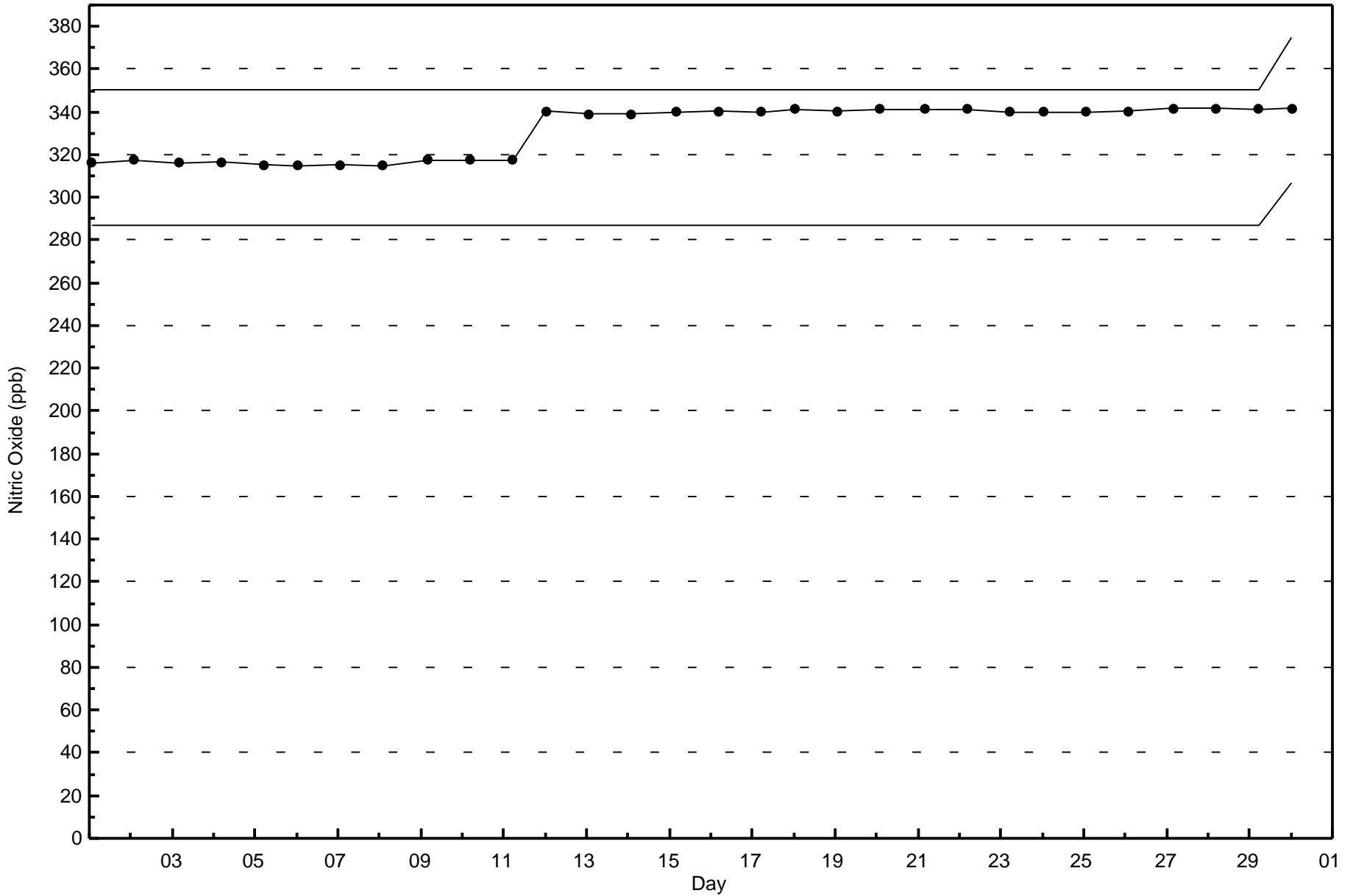


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Mackay River (AMS 20)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Mackay River - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 20 ppb on Jun 8 05:00	Maximum Daily Average: 5.7 ppb on Jun 7		Hours of Data:	685
Minimum Value: 0 ppb on Jun 23 23:00	Minimum Daily Average: 0.2 ppb on Jun 22		Hours of Missing Data:	35
Maximum Diurnal Average: 2.2 ppb at hour 6	Minimum Diurnal Average: 0.7 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 13		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	1	0	0	0	0	0.6	1
2-Jun	0	0	Z	0	0	0	1	2	2	1	1	0	1	1	2	2	2	1	1	0	0	0	0	0	0.8	2
3-Jun	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
4-Jun	0	0	0	1	Z	0	1	2	1	1	2	1	1	2	0	0	0	1	1	0	0	0	0	3	0.8	3
5-Jun	6	2	1	4	3	Z	3	3	2	2	2	2	1	1	1	2	1	1	1	1	1	1	0	0	1.7	6
6-Jun	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	9	13	1.4	13
7-Jun	13	Z	14	9	12	15	18	13	5	2	2	2	2	1	1	1	1	1	1	1	2	4	6	6	5.7	18
8-Jun	7	12	Z	19	20	15	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4.2	20
9-Jun	1	1	1	Z	1	8	3	2	1	2	2	2	2	2	1	1	1	1	1	2	1	1	1	1	1.6	8
10-Jun	1	3	4	3	Z	2	1	0	0	1	2	5	4	2	2	1	1	1	2	4	0	0	1	0	1.7	5
11-Jun	2	5	3	5	0	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1.2	5
12-Jun	Z	0	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	3	4	3	1.0	4
13-Jun	3	Z	2	2	2	2	4	5	4	3	2	1	1	2	4	4	3	2	2	2	3	2	2	1	2.4	5
14-Jun	1	1	Z	1	1	1	3	3	3	2	1	1	0	1	1	1	1	1	1	1	1	1	0	0	1.1	3
15-Jun	2	2	2	Z	2	3	4	6	5	3	2	2	2	2	2	1	1	1	1	1	1	0	1	2	2.0	6
16-Jun	4	2	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4
17-Jun	0	0	0	0	0	Z	0	0	0	1	2	2	1	1	2	0	0	0	0	0	0	0	0	0	0.5	2
18-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	3	4	2	0.7	4
19-Jun	0	Z	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
20-Jun	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
21-Jun	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0.4	3
22-Jun	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
23-Jun	0	0	0	0	0	Z	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0.3	1
24-Jun	Z	0	0	0	0	0	1	2	2	3	3	4	4	2	1	1	1	1	1	2	2	1	1	1	1.4	4
25-Jun	1	Z	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.6	2
26-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
27-Jun	1	1	1	Z	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jun	0	0	0	0	Z	1	4	5	2	C	C	C	C	C	2	1	1	2	3	3	2	1	0	0	1.6	5
29-Jun	0	0	0	0	0	Z	0	1	1	0	1	1	0	1	0	1	3	1	0	0	0	0	0	0	0.6	3
30-Jun	Z	0	0	0	0	1	1	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0.4	1

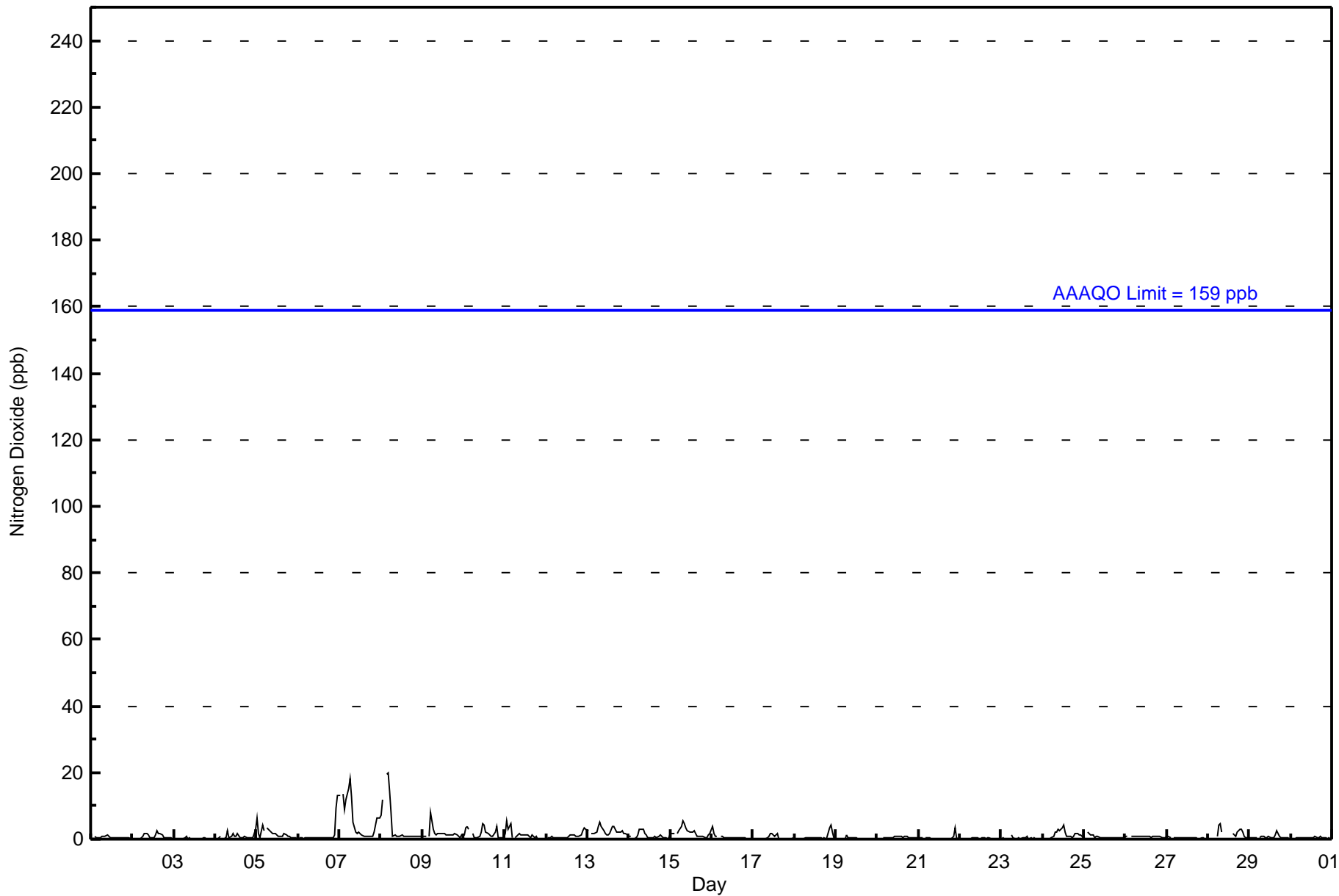
1.8	1.3	1.3	2.0	1.8	2.2	2.0	1.8	1.3	1.0	1.0	1.0	0.9	0.9	0.9	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.9	1.1	1.2	Diurnal Average		
13	12	14	19	20	15	18	13	5	3	3	5	4	2	4	4	3	2	3	4	3	4	3	4	9	13	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Mackay River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685

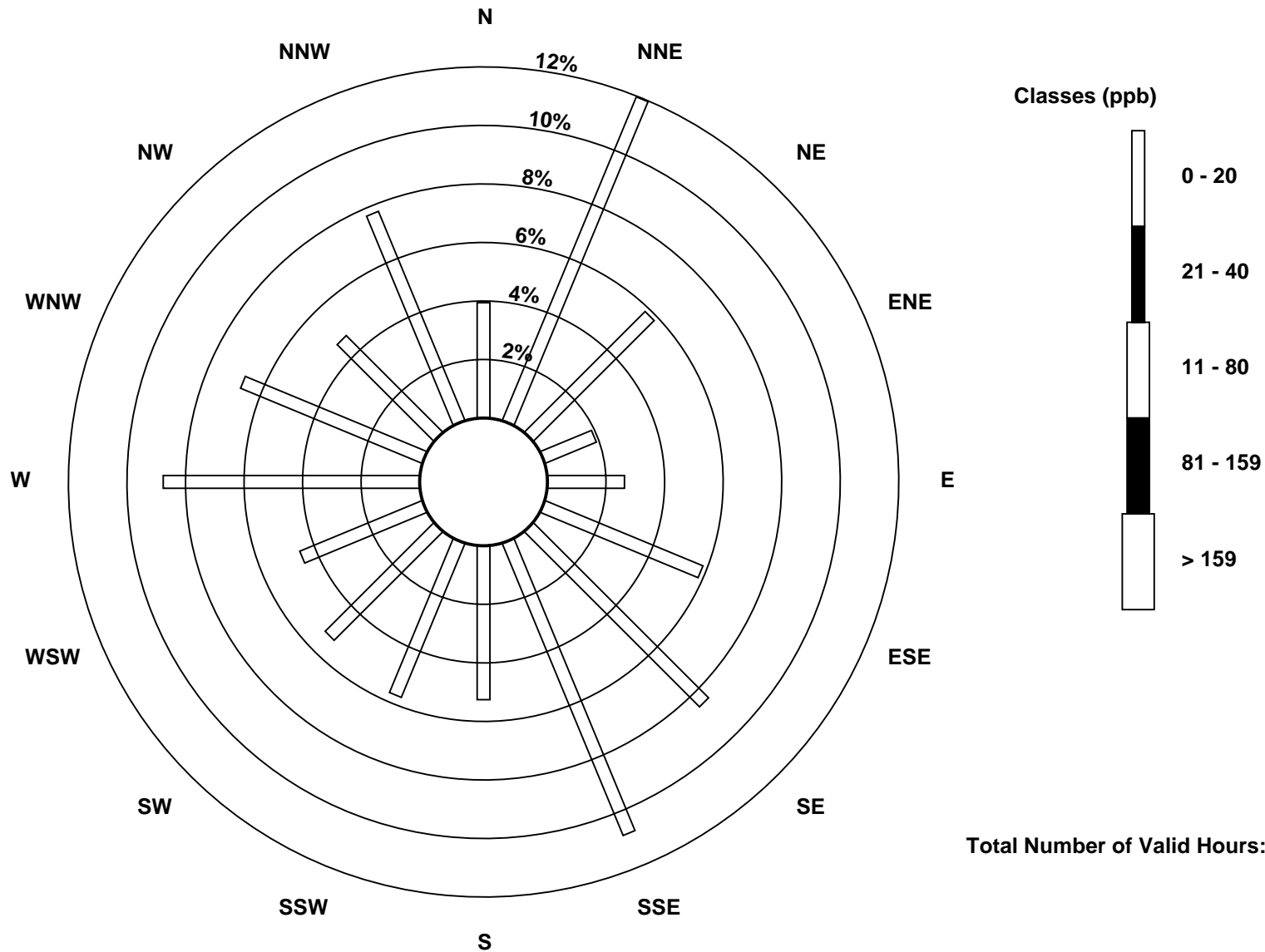
Total Number of Valid Hours: 685

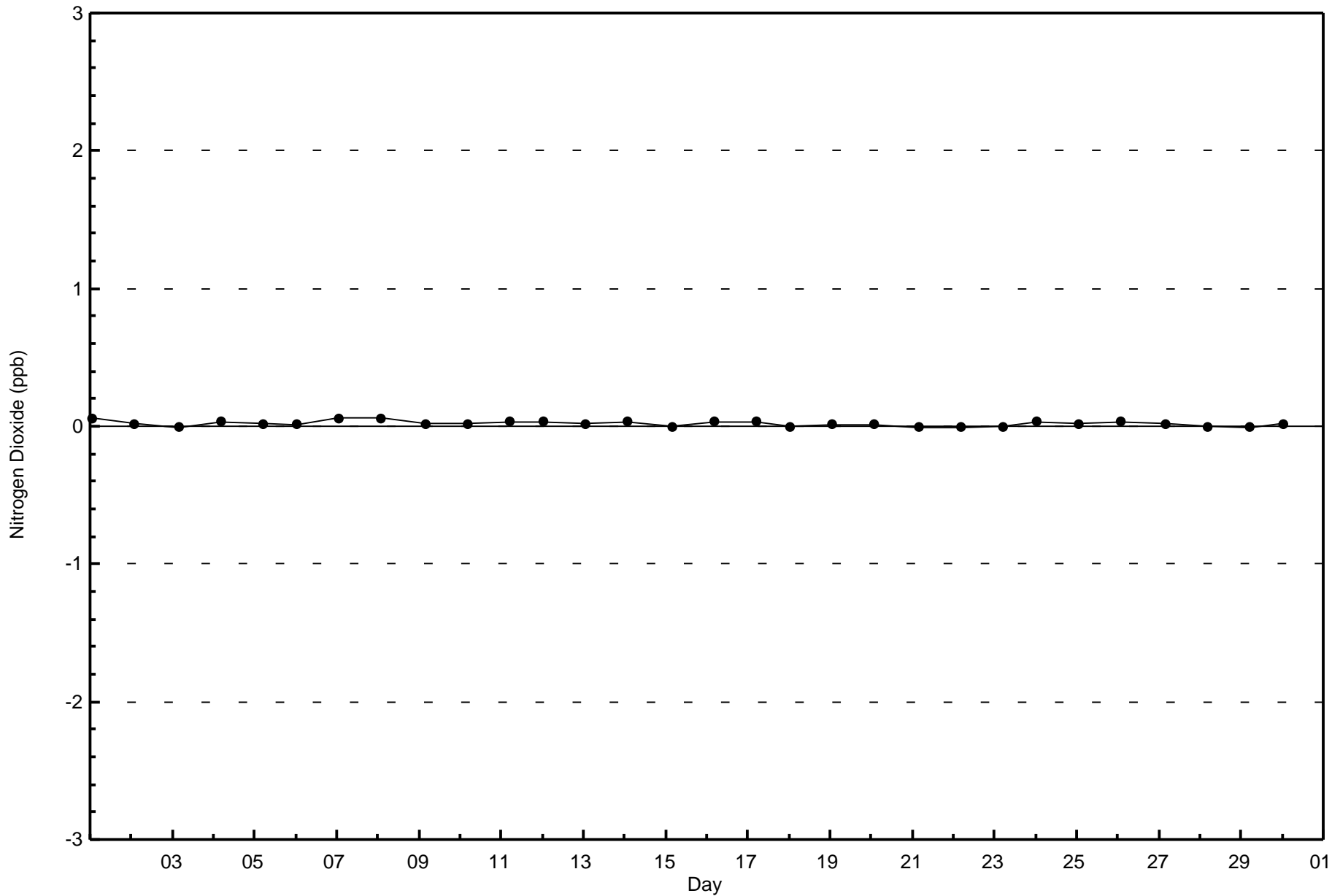
Total Number of Hours: 720

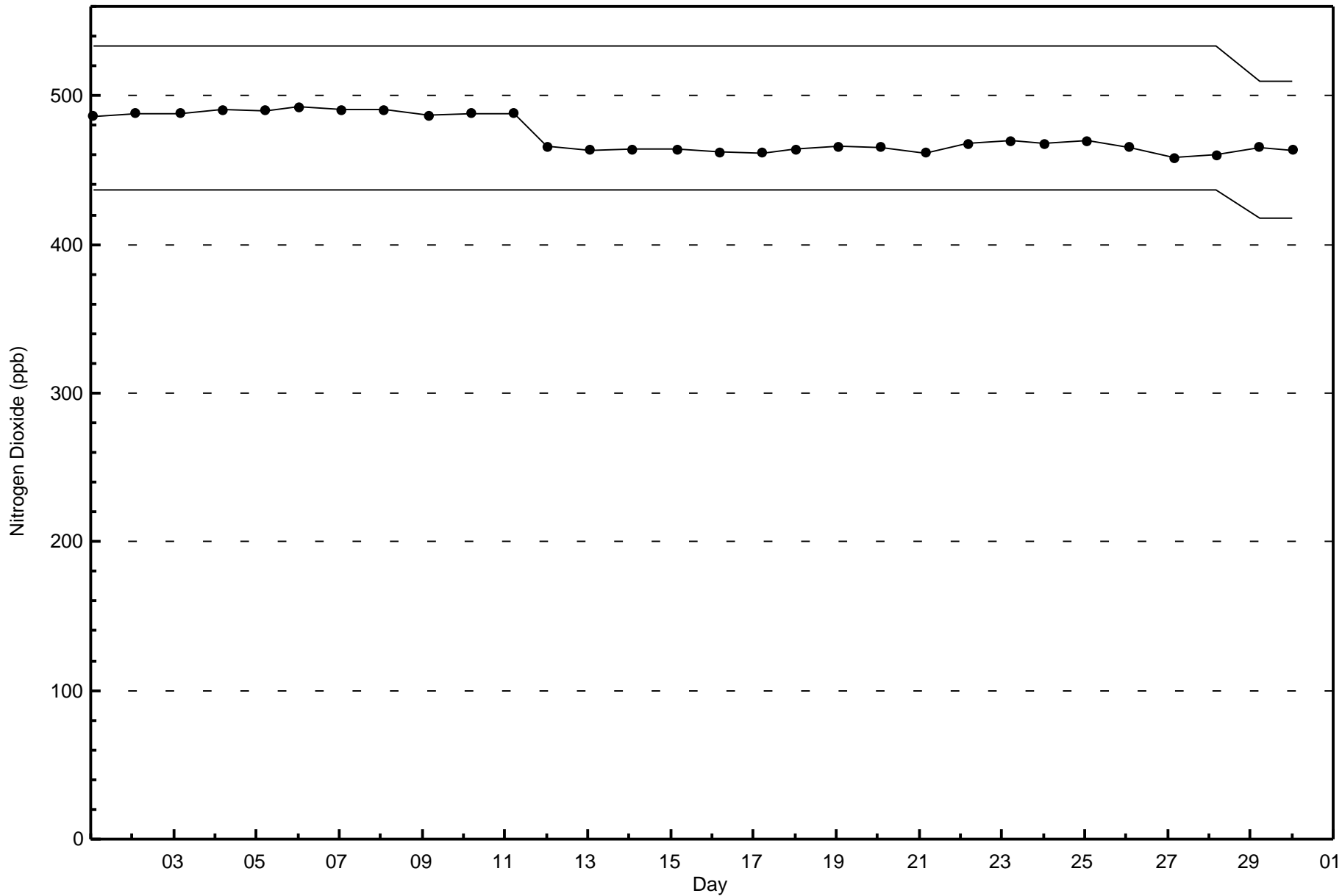


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Mackay River (AMS 20)







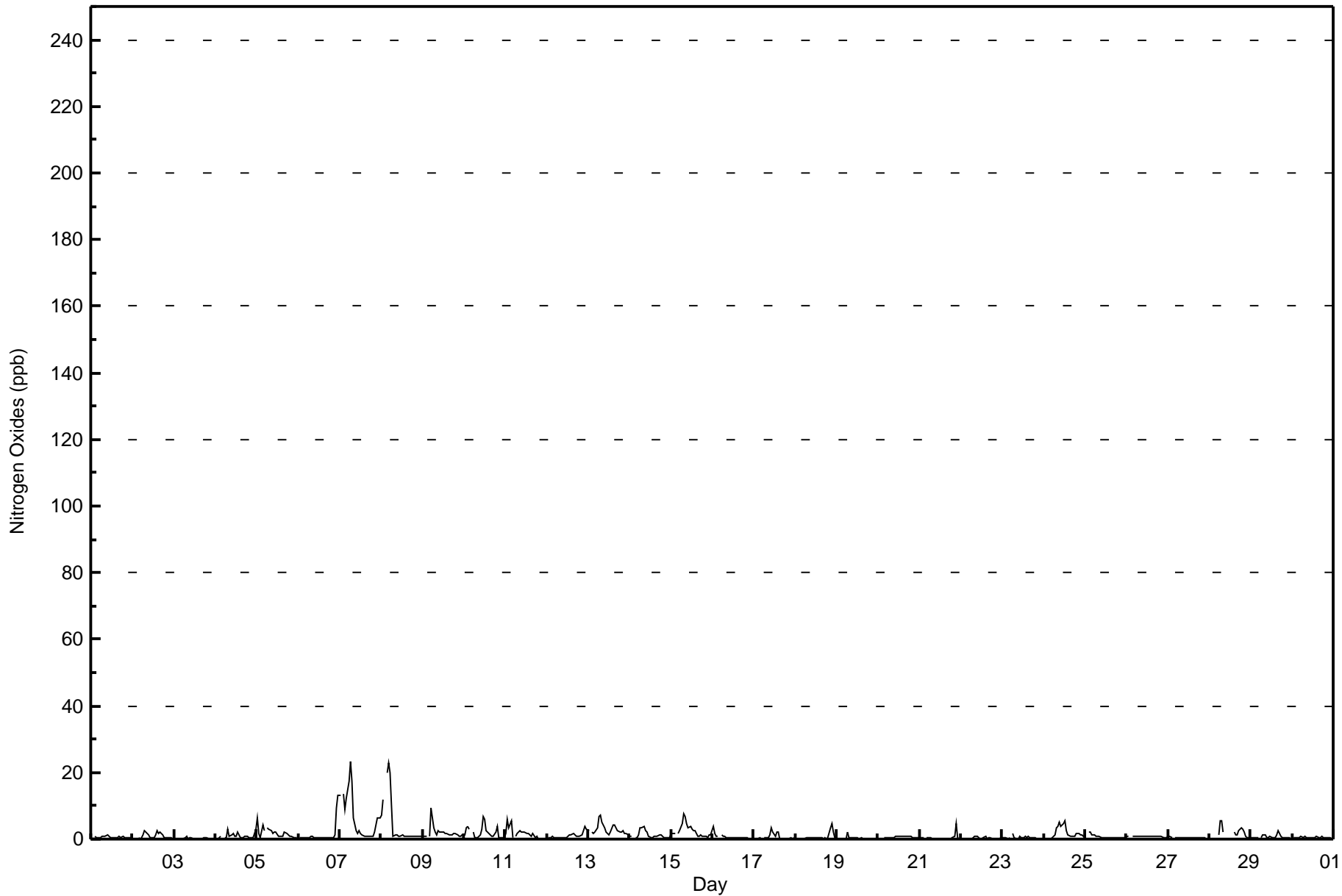


Maximum Value: 23 ppb on Jun 7 07:00																		Maximum Daily Average: 6.3 ppb on Jun 7						Hours in Service: 720		
Minimum Value: 0 ppb on Jun 22 20:00																		Minimum Daily Average: 0.2 ppb on Jun 3						Hours of Data: 685		
Maximum Diurnal Average: 2.6 ppb at hour 6																		Minimum Diurnal Average: 0.8 ppb at hour 19						Hours of Missing Data: 35		
Monthly Average: 1.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12						Hours of Calibration: 35		
																		Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	1	1	0	1	1	1	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0.6	1
2-Jun	0	0	Z	0	0	0	1	2	2	1	1	0	1	1	3	2	2	1	1	0	0	0	0	0.9	3	
3-Jun	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
4-Jun	0	0	0	1	Z	1	1	3	1	1	2	1	1	2	0	0	0	1	1	0	0	0	3	0.9	3	
5-Jun	6	2	1	4	3	Z	4	3	3	2	2	2	1	1	1	2	2	1	1	1	1	0	0	1.8	6	
6-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	1	9	13	1.4	13	
7-Jun	13	Z	14	9	12	17	23	17	6	3	2	3	2	1	1	1	1	1	1	1	2	4	6	6.3	23	
8-Jun	7	12	Z	20	23	20	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4.7	23	
9-Jun	1	1	1	Z	1	9	3	2	1	3	2	2	2	2	2	1	1	1	2	2	1	1	1	1.9	9	
10-Jun	1	3	4	3	Z	2	1	0	0	1	3	7	6	3	2	1	1	1	2	4	0	0	1	2.0	7	
11-Jun	2	6	3	5	0	Z	1	2	2	2	2	2	2	2	1	1	2	1	1	0	0	0	0	1.6	6	
12-Jun	Z	0	0	1	0	0	0	0	0	0	0	0	1	1	1	2	1	1	1	1	1	3	4	1.0	4	
13-Jun	3	Z	2	2	2	3	7	7	5	3	2	2	1	2	4	4	3	2	2	2	3	2	2	2.9	7	
14-Jun	1	1	Z	0	1	1	3	4	4	2	2	1	0	1	1	1	1	1	1	1	0	0	0	1.2	4	
15-Jun	2	2	2	Z	2	3	5	7	7	5	3	4	3	3	3	1	1	1	1	1	1	0	1	2.5	7	
16-Jun	4	2	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4	
17-Jun	0	0	0	0	0	Z	0	0	0	1	3	2	1	2	2	0	0	0	0	0	0	0	0	0.7	3	
18-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	3	5	2	0.7	5	
19-Jun	0	Z	0	0	0	0	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	2	
20-Jun	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.6	1	
21-Jun	0	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0.5	5	
22-Jun	0	0	0	0	Z	0	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.3	1	
23-Jun	0	0	0	0	0	Z	2	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0.4	2	
24-Jun	Z	0	0	0	0	0	1	3	4	5	4	5	6	3	1	1	1	1	1	2	2	1	1	1.8	6	
25-Jun	1	Z	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	2	
26-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1	
27-Jun	1	1	1	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1	
28-Jun	0	0	0	0	Z	1	6	6	2	C	C	C	C	C	2	1	1	3	3	3	2	1	0	1.8	6	
29-Jun	0	0	0	0	0	Z	0	1	1	0	1	1	0	0	0	1	3	1	0	0	0	0	0	0.6	3	
30-Jun	Z	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0.4	1	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Mackay River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	99.71	99.71
21 - 40	2	0.29	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	27	81	39	13	18	40	58	74	36	39	36	31	60	46	32	53	683
21 - 40	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	82	40	13	18	40	58	74	36	39	36	31	60	46	32	53	685

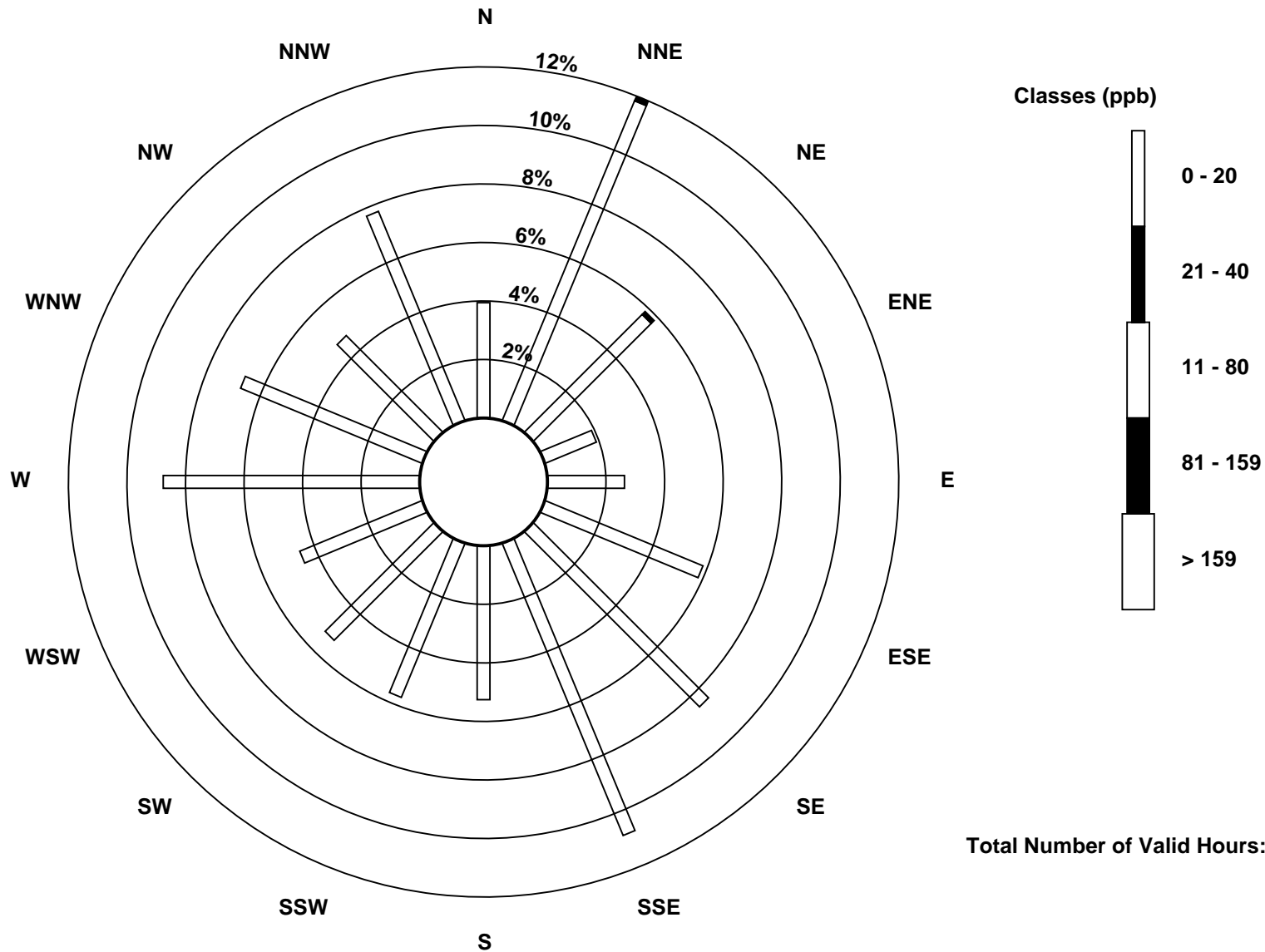
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

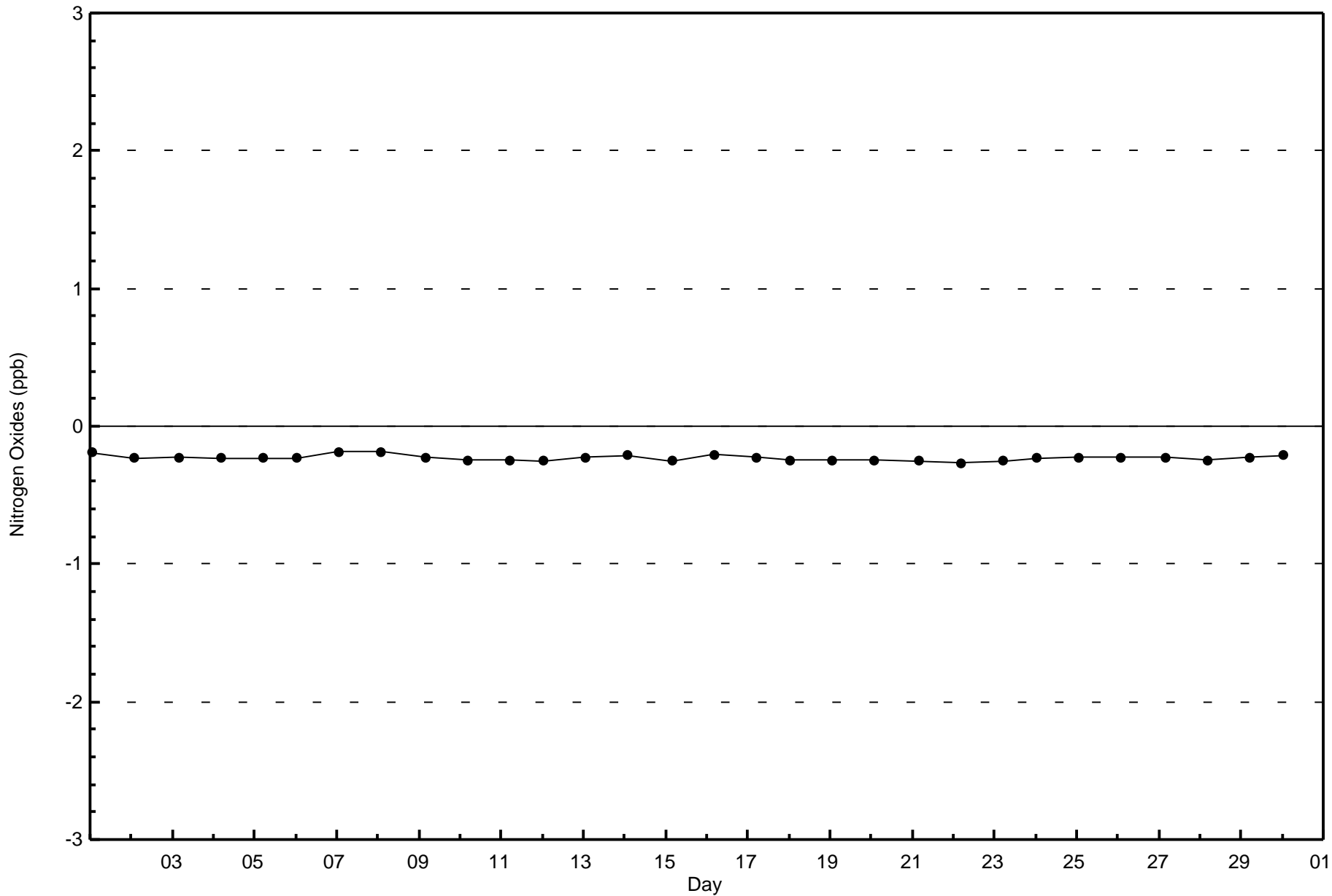
Nitrogen Oxides (NO_x) - ppb
Mackay River (AMS 20)

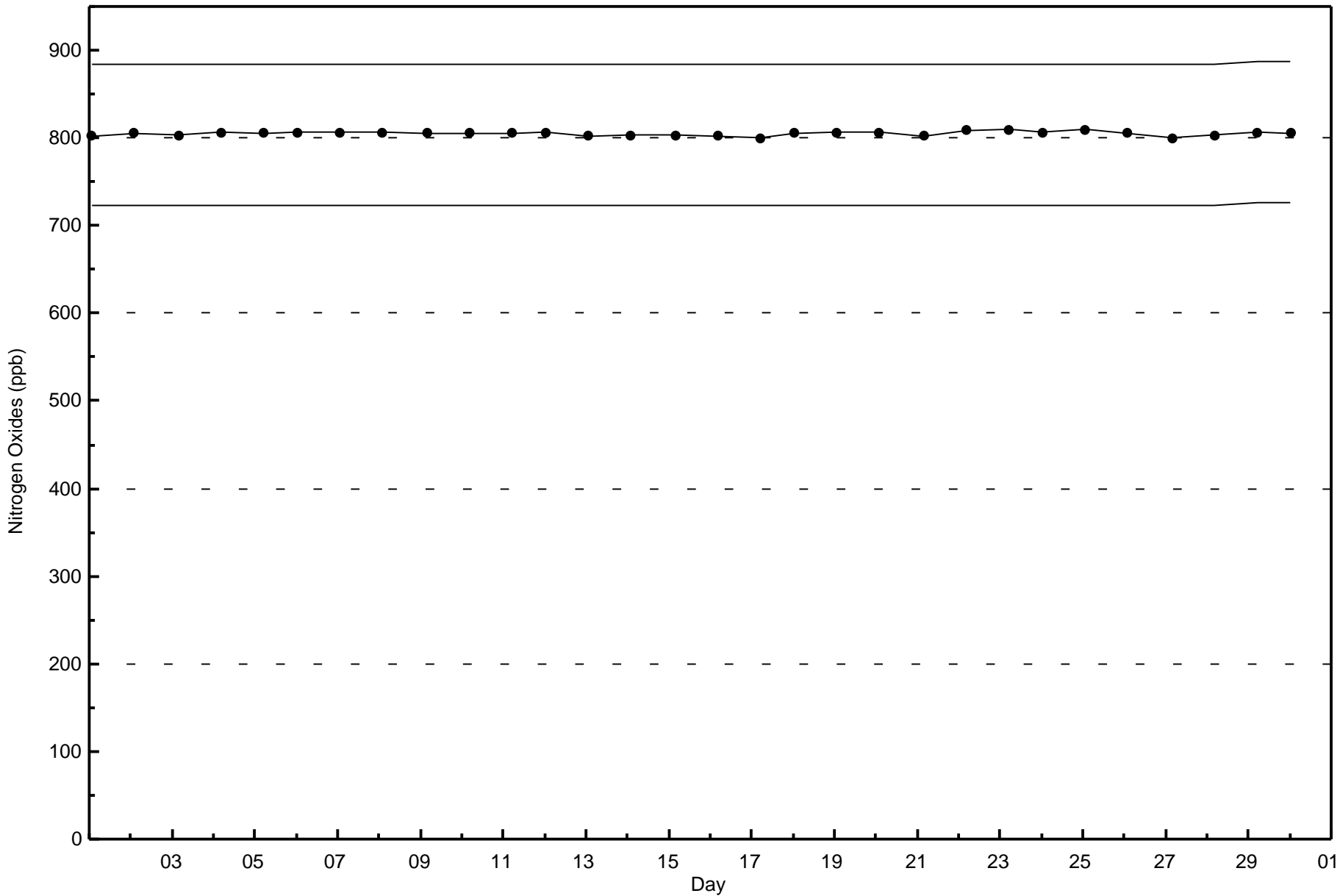




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Mackay River - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Mackay River - June 2017

Maximum Value: 27.6 C on Jun 8 17:00	Maximum Daily Average: 21.2 C on Jun 8	Hours in Service: 720
Minimum Value: -0.4 C on Jun 23 04:00	Minimum Daily Average: 9.5 C on Jun 11	Hours of Data: 719
Maximum Diurnal Average: 19.2 C at hour 16	Minimum Diurnal Average: 8.5 C at hour 5	Hours of Missing Data: 1
Monthly Average: 14.63 C	Percentiles: P ₁ = 1.9 P ₁₀ = 7.9 Q ₁ = 10.7 Median = 14.4 Q ₃ = 18.4 P ₉₀ = 22.1 P ₉₉ = 26.3	Hours of Calibration: 0
		Percent Operational Time: 99.9

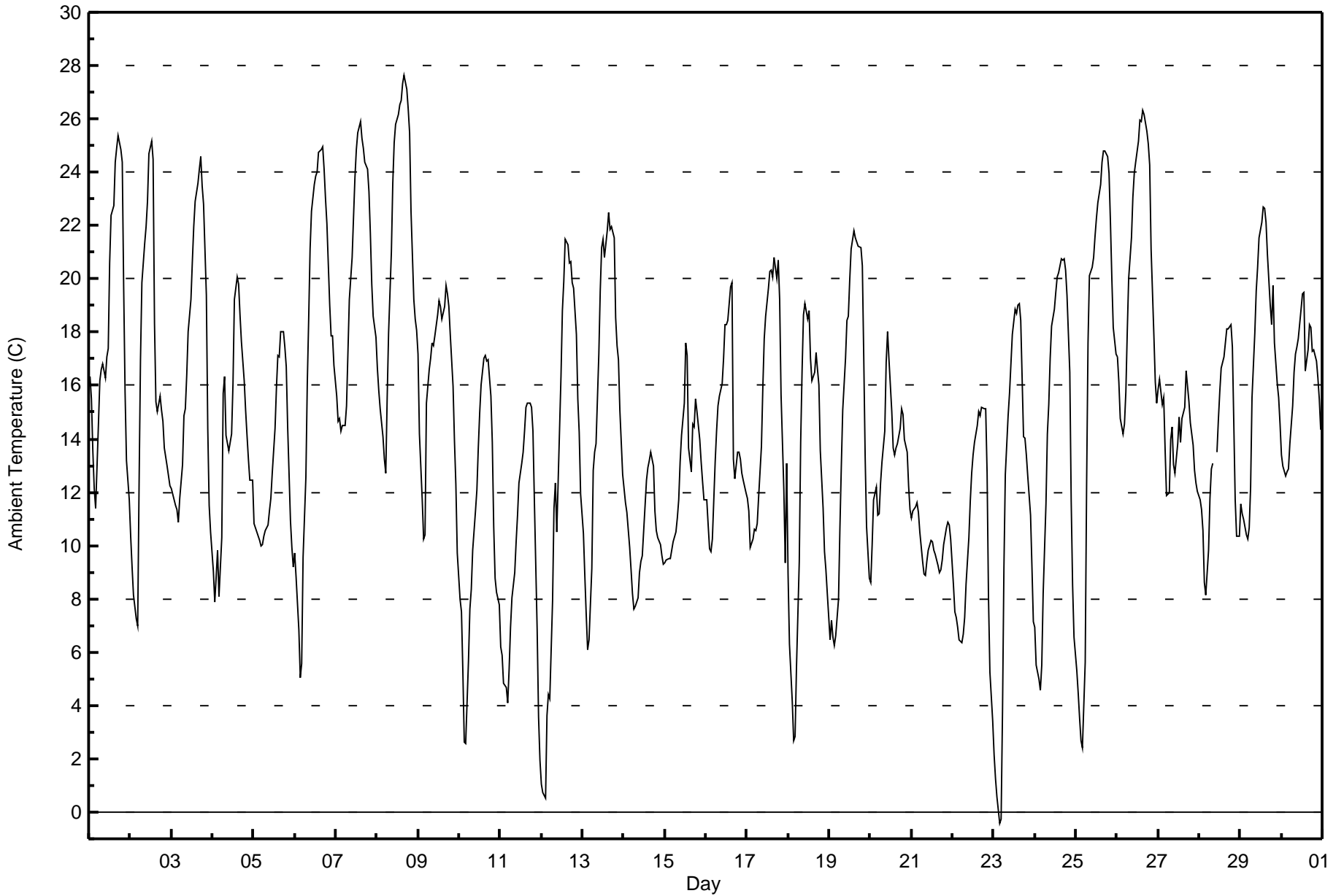
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	16.3	15.5	13.6	12.1	11.4	14.6	16.2	16.6	16.8	16.3	17.1	17.4	20.6	22.4	22.7	24.4	24.9	25.4	24.9	24.4	19.7	15.8	13.2	11.7	18.1	25.4																						
2-Jun	10.3	9.2	8.2	7.2	7.0	12.3	17.0	19.9	21.3	22.0	22.9	24.7	25.2	24.5	18.3	15.4	15.0	15.6	15.1	14.6	13.6	13.0	12.6	12.2	15.7	25.2																						
3-Jun	12.2	11.9	11.5	11.3	10.9	11.7	13.0	14.9	15.1	16.4	18.0	19.2	20.7	22.0	22.9	23.6	24.1	24.6	23.5	22.8	19.4	14.4	11.5	10.5	16.9	24.6																						
4-Jun	9.0	7.9	8.8	9.8	8.1	10.3	15.7	16.4	14.1	13.6	13.9	14.2	16.1	19.2	20.0	19.8	18.7	17.7	16.2	15.1	14.1	13.2	12.5	12.4	14.0	20.0																						
5-Jun	10.8	10.7	10.5	10.2	10.0	10.0	10.4	10.6	10.7	11.3	11.8	12.7	14.4	15.9	17.1	17.1	18.0	18.0	17.5	16.7	14.4	10.9	9.9	9.2	12.9	18.0																						
6-Jun	9.7	8.8	6.8	5.0	5.6	9.6	12.6	16.1	18.5	21.1	22.5	23.5	23.9	24.0	24.7	24.8	25.0	24.1	23.0	22.0	19.0	17.8	17.9	16.7	17.6	25.0																						
7-Jun	15.6	14.7	14.8	14.3	14.5	14.5	15.2	17.2	19.2	20.8	22.3	23.8	24.9	25.5	25.9	25.3	24.9	24.4	24.1	23.3	21.7	19.8	18.6	17.8	20.1	25.9																						
8-Jun	16.7	15.8	15.1	14.1	13.2	12.7	15.6	18.0	21.0	23.6	25.1	25.8	26.2	26.5	26.7	27.3	27.6	27.1	26.4	25.5	22.6	19.2	18.5	18.1	21.2	27.6																						
9-Jun	17.2	14.2	11.7	10.3	10.4	15.4	16.6	17.0	17.6	17.5	17.9	18.6	19.2	19.0	18.5	18.9	19.7	19.5	19.0	17.9	16.0	13.9	12.3	9.7	16.2	19.7																						
10-Jun	8.0	7.5	5.2	2.6	2.6	5.7	7.6	8.4	9.8	11.3	12.1	13.7	15.0	16.0	17.0	17.1	16.9	17.0	15.6	13.9	10.7	8.8	8.3	7.8	10.8	17.1																						
11-Jun	6.2	5.9	4.8	4.7	4.1	5.4	6.9	8.0	9.0	10.1	11.1	12.3	13.1	13.5	14.3	15.2	15.4	15.4	15.2	14.3	11.7	6.8	3.6	1.9	9.5	15.4																						
12-Jun	1.0	0.7	0.5	3.6	4.4	4.3	7.9	11.4	12.3	10.5	12.5	16.3	18.8	19.9	21.5	21.3	20.6	20.7	19.9	19.6	17.9	15.5	14.3	11.9	12.8	21.5																						
13-Jun	10.5	8.9	7.4	6.1	6.5	9.1	12.8	13.5	13.8	17.2	19.5	21.2	21.5	20.8	21.8	22.5	21.9	22.0	21.5	18.5	17.5	17.0	15.1	12.6	15.8	22.5																						
14-Jun	12.2	11.6	11.2	9.9	9.1	8.2	7.6	7.7	8.0	9.0	9.4	9.6	11.5	12.5	12.9	13.2	13.5	13.0	11.3	10.6	10.3	10.0	9.6	9.3	10.5	13.5																						
15-Jun	9.3	9.5	9.5	9.5	9.8	10.1	10.5	11.1	11.7	13.1	14.1	15.4	17.6	17.1	13.6	12.8	14.6	14.5	15.5	15.0	14.0	13.1	12.4	11.7	12.7	17.6																						
16-Jun	11.7	10.8	9.9	9.8	10.3	13.1	14.3	15.2	15.6	16.1	17.0	18.3	18.3	18.4	19.7	19.9	13.2	12.5	13.5	13.5	13.2	12.7	12.5	12.0	14.2	19.9																						
17-Jun	11.8	11.3	9.9	10.2	10.6	10.6	10.8	11.8	13.7	15.9	17.7	18.6	19.7	20.3	20.3	20.0	20.8	20.0	20.7	19.2	15.7	12.1	9.4	13.1	15.2	20.8																						
18-Jun	8.9	6.3	4.1	2.7	2.8	5.4	9.4	13.9	16.5	18.7	19.1	18.5	18.8	17.0	16.2	16.5	17.2	16.6	16.0	13.6	11.4	9.8	9.1	8.2	12.4	19.1																						
19-Jun	6.5	7.2	6.6	6.2	6.6	8.0	10.7	13.0	15.1	17.0	18.4	18.6	20.0	21.1	21.8	21.6	21.4	21.3	21.2	20.5	17.1	13.4	10.7	8.8	14.7	21.8																						
20-Jun	8.6	10.1	11.7	12.2	11.1	11.2	12.3	13.1	14.3	16.8	18.0	17.0	15.0	13.7	13.4	13.7	13.8	14.4	15.1	14.9	14.0	13.5	12.2	11.3	13.4	18.0																						
21-Jun	11.0	11.3	11.4	11.6	11.3	10.5	9.4	9.0	8.9	9.4	9.8	10.2	10.1	9.8	9.7	9.2	9.0	9.1	9.5	10.1	10.6	10.9	10.8	10.3	10.1	11.6																						
22-Jun	8.5	7.5	7.3	6.9	6.4	6.4	6.7	7.3	8.5	10.3	11.7	12.7	13.4	13.9	14.5	15.0	14.9	15.2	15.1	15.1	12.7	8.0	5.3	3.4	10.3	15.2																						
23-Jun	2.1	1.3	0.6	-0.4	-0.3	3.8	9.2	12.7	14.9	15.7	16.8	17.9	18.9	18.7	19.0	19.0	18.5	14.1	14.0	13.4	12.6	11.1	9.2	7.1	11.2	19.0																						
24-Jun	7.0	5.5	5.0	4.5	5.5	8.2	11.6	14.2	15.3	17.0	18.2	18.9	19.5	20.1	20.2	20.7	20.7	20.8	20.3	19.4	16.5	11.7	8.5	6.6	14.0	20.8																						
25-Jun	5.3	4.5	3.5	2.7	2.4	5.6	12.3	17.6	20.1	20.4	20.8	21.6	22.3	22.9	23.5	24.4	24.8	24.8	24.6	23.9	22.1	20.0	18.2	17.2	16.9	24.8																						
26-Jun	17.1	16.1	14.7	14.2	14.5	15.7	18.0	20.0	21.5	23.1	24.0	24.4	25.2	25.9	25.9	26.3	26.2	25.6	25.1	24.3	21.1	17.9	16.1	15.3	20.8	26.3																						
27-Jun	15.9	16.2	15.3	15.5	13.6	11.9	12.0	14.0	14.4	13.1	12.7	13.8	14.8	13.9	14.8	15.2	16.6	16.0	15.4	14.6	13.8	12.8	12.4	12.0	14.2	16.6																						
28-Jun	11.7	11.3	10.6	8.6	8.2	9.8	11.8	12.9	13.1	M	13.5	14.7	15.8	16.7	17.1	17.6	18.1	18.1	18.3	17.4	14.6	11.7	10.3	10.4	13.6	18.3																						
29-Jun	11.5	11.2	11.0	10.4	10.2	10.7	12.2	15.6	18.0	19.5	20.4	21.5	22.1	22.7	22.7	22.1	20.9	19.0	18.3	19.8	17.6	16.1	15.5	14.5	16.8	22.7																						
30-Jun	13.4	13.0	12.6	12.8	12.9	13.8	15.2	16.5	17.2	17.5	17.7	18.8	19.4	19.5	16.6	17.3	18.3	18.2	17.3	17.3	16.9	16.3	15.5	14.4	16.2	19.5																						
																								10.5	9.9	9.1	8.6	8.5	9.9	12.1	13.8	14.9	16.0	16.9	17.8	18.7	19.1	19.1	19.2	19.2	18.8	18.4	17.7	15.8	13.6	12.2	11.3	Diurnal Average
																								17.2	16.2	15.3	15.5	14.5	15.7	18.0	20.0	21.5	23.6	25.1	25.8	26.2	26.5	26.7	27.3	27.6	27.1	26.4	25.5	22.6	20.0	18.6	18.1	Diurnal Maximum

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mackay River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Mackay River - June 2017

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	2	0.28	0.28
0 - 10	140	19.47	19.75
10 - 20	452	62.87	82.61
> 20	125	17.39	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

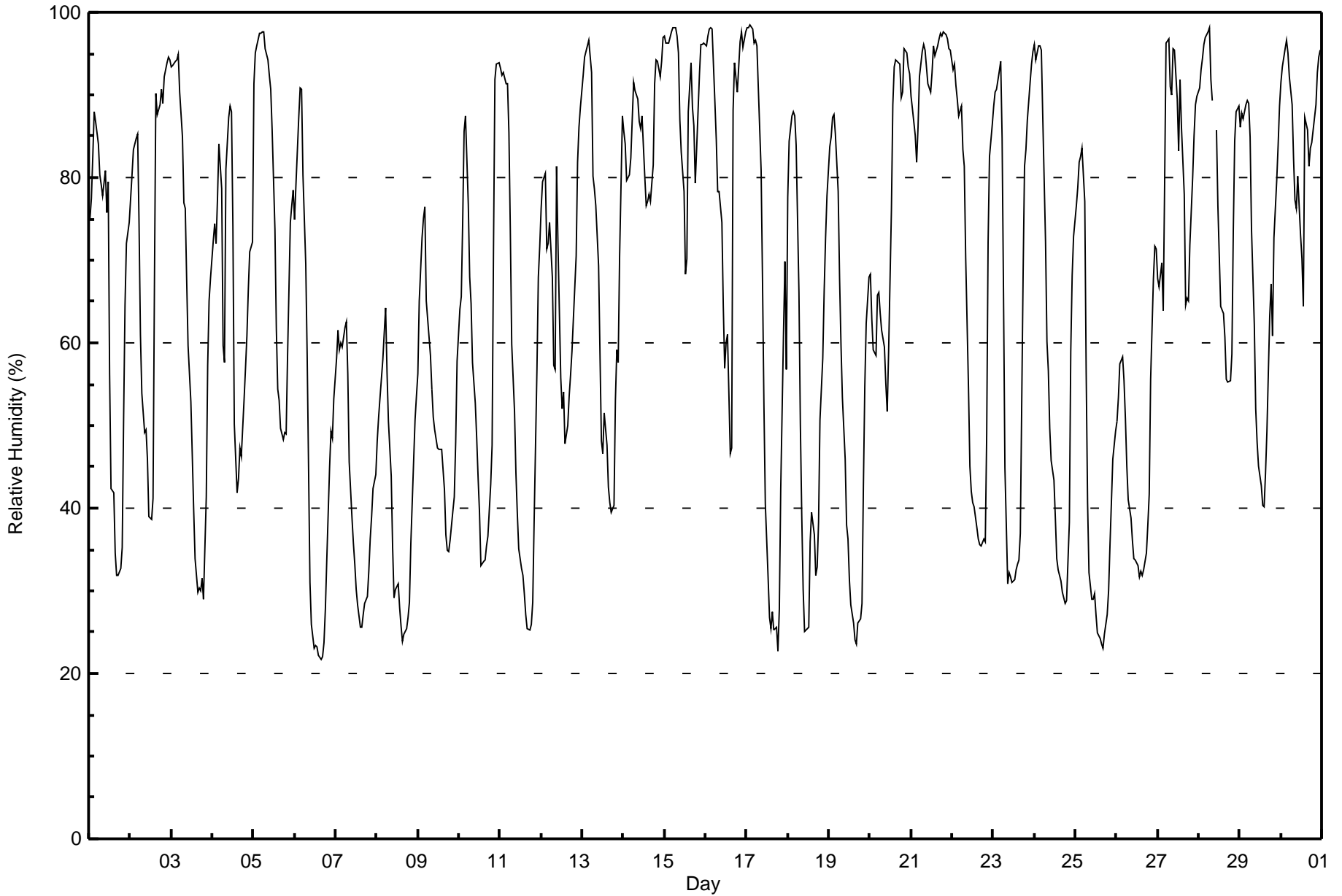
Relative Humidity (RH) - %
Mackay River - June 2017

Maximum Value: 98 % on Jun 17 03:00														Maximum Daily Average: 93.3 % on Jun 21														Hours in Service: 720																					
Minimum Value: 22 % on Jun 6 16:00														Minimum Daily Average: 40.9 % on Jun 8														Hours of Data: 719																					
Maximum Diurnal Average: 85.3 % at hour 5														Minimum Diurnal Average: 48.0 % at hour 14														Hours of Missing Data: 1																					
Monthly Average: 65.3 %														Percentiles: P ₁ = 23 P ₁₀ = 31 Q ₁ = 44 Median = 68 Q ₃ = 88 P ₉₀ = 95 P ₉₉ = 98														Hours of Calibration: 0																					
																												Percent Operational Time: 99.9																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	75	77	82	88	87	84	80	79	78	81	76	79	56	42	42	35	32	32	33	35	51	65	72	75	64.0	88																							
2-Jun	77	80	83	85	85	75	61	54	49	49	46	39	39	41	67	90	88	89	91	89	92	94	95	94	73.0	95																							
3-Jun	93	94	94	94	95	90	85	77	76	68	60	53	46	40	34	30	30	30	32	29	41	57	65	68	61.7	95																							
4-Jun	72	74	72	77	84	79	60	58	81	87	89	88	74	50	42	44	47	46	53	57	61	66	71	72	66.9	89																							
5-Jun	91	95	96	97	97	98	98	96	94	92	91	86	74	62	54	53	50	48	49	49	58	75	77	78	77.4	98																							
6-Jun	75	79	87	91	91	80	70	58	45	31	26	23	23	23	22	22	22	24	28	34	45	49	48	53	47.9	91																							
7-Jun	58	62	59	60	60	62	63	56	46	39	36	33	30	28	26	26	27	29	29	32	36	39	42	44	42.5	63																							
8-Jun	48	51	53	58	61	64	56	51	44	35	29	30	31	28	26	24	25	25	27	29	36	46	51	54	40.9	64																							
9-Jun	56	65	73	75	77	65	61	58	54	51	50	47	47	47	47	42	37	35	35	36	40	41	48	58	51.9	77																							
10-Jun	64	66	75	86	87	77	68	65	58	53	48	44	40	33	34	34	35	37	43	48	72	92	94	94	60.1	94																							
11-Jun	93	92	93	91	91	85	73	60	52	44	39	35	33	32	30	27	25	25	26	29	39	57	68	72	54.6	93																							
12-Jun	76	80	80	71	72	75	68	57	57	81	72	56	52	54	48	50	53	56	59	63	70	82	86	88	67.0	88																							
13-Jun	92	95	95	96	97	93	80	79	77	69	59	48	47	51	48	43	41	40	40	53	59	58	71	87	67.3	97																							
14-Jun	86	84	80	80	82	87	91	91	89	87	86	87	80	77	77	78	77	81	91	94	94	92	94	97	86.0	97																							
15-Jun	97	96	96	97	98	98	98	97	95	87	83	78	68	70	88	94	89	86	79	84	92	96	96	96	90.0	98																							
16-Jun	96	97	98	98	98	89	85	78	78	75	64	57	60	61	47	47	88	94	90	93	96	98	96	98	82.6	98																							
17-Jun	98	98	98	98	96	97	96	91	81	67	53	40	32	27	25	27	25	26	23	28	42	61	70	57	60.7	98																							
18-Jun	78	84	87	88	87	84	66	50	39	30	25	25	26	36	40	37	32	33	38	51	58	66	73	78	54.7	88																							
19-Jun	84	85	87	88	85	78	68	60	53	46	38	36	31	28	26	24	24	26	27	28	43	55	62	68	52.1	88																							
20-Jun	68	63	59	58	66	66	64	62	59	55	52	59	76	89	93	94	94	94	90	90	96	95	93	93	76.2	96																							
21-Jun	90	88	85	82	86	92	95	96	95	93	91	90	93	96	95	96	97	98	97	98	97	97	96	95	93.3	98																							
22-Jun	93	94	91	90	88	89	83	81	70	55	45	42	41	40	38	36	36	35	36	36	49	72	83	86	62.9	94																							
23-Jun	89	90	91	93	94	85	66	45	31	32	32	31	31	33	33	34	37	68	81	83	87	92	94	95	64.4	95																							
24-Jun	96	94	96	96	96	87	72	60	57	50	46	43	39	34	32	31	30	29	28	29	38	59	68	73	57.7	96																							
25-Jun	77	79	82	83	83	77	56	41	32	29	29	30	27	25	24	23	23	25	27	30	36	41	46	49	44.7	83																							
26-Jun	51	53	57	58	55	51	45	41	39	36	34	34	33	32	32	32	33	35	38	42	56	68	72	71	45.7	72																							
27-Jun	68	67	70	64	79	96	97	91	90	96	95	90	83	92	86	78	65	65	65	72	80	85	89	90	81.3	97																							
28-Jun	91	93	94	96	97	98	98	92	89	M	86	77	70	64	64	61	56	55	55	59	74	84	88	89	79.5	98																							
29-Jun	86	88	87	89	89	89	85	74	62	52	48	45	43	40	40	44	49	63	67	61	73	80	84	89	67.8	89																							
30-Jun	92	93	96	97	95	92	89	82	77	76	80	73	70	64	87	86	81	84	84	86	89	93	95	96	85.7	97																							
																								80.3	81.9	83.3	84.1	85.3	82.7	75.9	69.3	65.0	60.2	56.9	53.3	49.8	48.0	48.2	48.0	48.2	50.4	52.1	54.8	63.3	71.8	76.2	78.5	Diurnal Average	
																								98	98	98	98	98	98	98	97	95	96	95	90	93	96	95	96	97	98	97	98	97	98	96	98	Diurnal Maximum	
M - Maintenance																																																	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mackay River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Mackay River - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	150	20.86	20.86
40 - 60	158	21.97	42.84
60 - 80	146	20.31	63.14
80 - 100	265	36.86	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

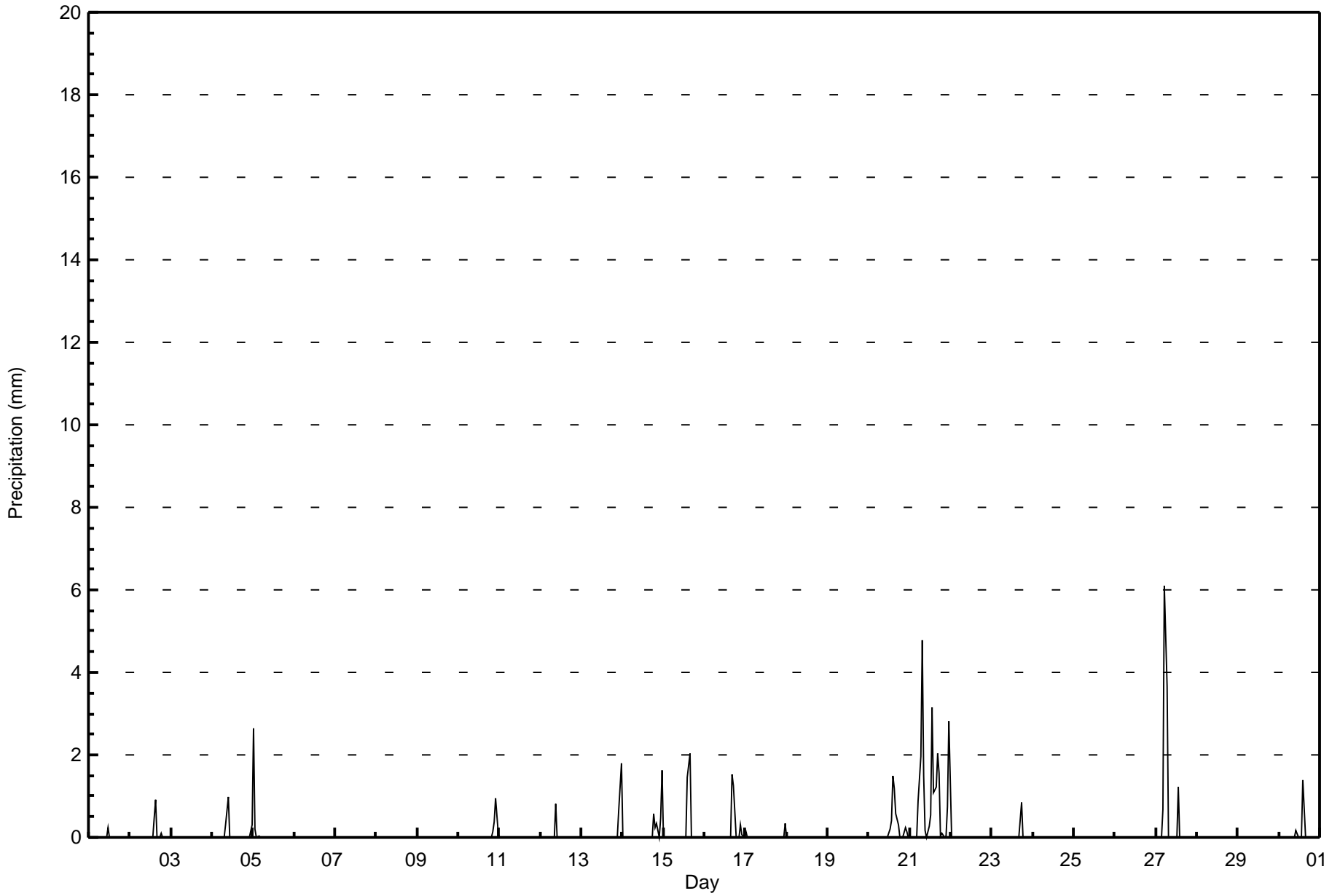
Mackay River - June 2017

Maximum Value: 6.1 mm on Jun 27 06:00 Maximum Daily Total: 22.9 mm on Jun 21 Minimum Value: 0.0 mm on Jun 1 01:00 Minimum Daily Total: 0.0 mm on Jun 3 Maximum Diurnal Total: 7.0 mm at hour 6 Minimum Diurnal Total: 0.0 mm at hour 3 Monthly Total: 62.94 mm Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.6																								Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
2-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.5	0.9
3-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.0
5-Jun	2.7	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.7
6-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	1.0	0.1	1.5	1.0
11-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
13-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.8	2.4	1.8
14-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.3	0.0	0.5	1.6	3.3	1.6
15-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.0
16-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.3	0.0	0.0	0.0	0.3	0.1	0.0	3.2	1.5
17-Jun	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.4
18-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	1.5	1.2	0.6	0.3	0.0	0.0	0.0	0.3	0.1	0.0	0.0	4.6	1.5
21-Jun	0.0	0.0	0.0	0.0	0.0	0.9	2.0	4.8	1.5	0.2	0.0	0.3	0.6	3.2	1.1	1.2	2.1	1.6	0.1	0.1	0.0	0.1	0.8	2.8	22.9	4.8
22-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9
24-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Jun	0.0	0.0	0.0	0.0	0.7	6.1	3.7	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	6.1
28-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.4
																								Diurnal Average		
																								Diurnal Maximum		
2.8 0.2 0.0 0.1 0.7 7.0 5.6 4.8 1.8 2.0 0.2 0.5 0.8 4.8 5.9 5.4 4.2 4.0 0.7 0.3 0.5 1.0 3.0 7.0 2.7 0.2 0.0 0.1 0.7 6.1 3.7 4.8 1.5 1.0 0.2 0.3 0.6 3.2 1.5 2.0 2.1 1.6 0.6 0.2 0.3 0.4 1.0 2.8																										
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Mackay River - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Mackay River - June 2017

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	681	94.71	94.71
0.4 - 0.5	4	0.56	95.27
0.6 - 0.7	5	0.70	95.97
0.8 - 1.4	13	1.81	97.77
1.5 - 10	13	1.81	99.58
> 10	0	0.00	99.58

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Mackay River - June 2017

Maximum Speed: 23 km/h on Jun 9 11:00	Maximum Daily Speed Average: 13.3 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 15 22:00	Minimum Daily Speed Average: 1.0 km/h on Jun 29	Hours of Data: 719
Maximum Diurnal Speed Average: 3.0 km/h at hour 14	Minimum Diurnal Speed Average: 0.3 km/h at hour 3	Hours of Missing Data: 1
Monthly Average Velocity: 1.1 km/h 337.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 20	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SE3	SSE2	SSE3	WSW3	SW3	W6	W6	W5	WSW5	SW3	SW6	S4	SSW5	SW6	WSW7	WSW4	WNNW6	W5	NW3	NNE2	SE1	SE3	SSE4	SSE4	SW2.7	WSW7	
2-Jun	SE3	SE2	SSE1	SSE2	SW2	W3	W2	WNNW4	NNW3	WSW5	SW3	SW8	WSW11	WNNW12	NNW13	NW8	WNNW9	WNNW7	WNNW9	W9	W9	W9	W8	W11	W5.1	NNW13	
3-Jun	W10	W10	W8	W10	W7	W8	WNNW8	WNNW9	W7	WNNW7	W6	WNNW7	W8	W8	W8	WNNW8	WSW3	W6	SSW5	SSW7	SSE3	SSE3	SSE4	S5	W5.5	W10	
4-Jun	SE3	S5	WSW4	W3	W2	S1	NNE3	NW6	S1	WSW2	SSE4	SSE3	SW3	NW7	NNW9	NNW11	NNW11	NNW11	NNW13	N9	NNE8	N7	NNE5	NE6	NNW3.4	NNW13	
5-Jun	NE6	NE5	N7	NNW6	NNW6	N7	NNW8	N8	NNW6	N6	N6	NNW6	NNE5	NNE8	NE7	ESE7	SE9	ESE10	ESE10	SE9	SE5	E3	SE5	SE6	NE3.5	ESE10	
6-Jun	SE6	SE6	SSE4	SSE4	S4	SSW3	SSW4	WSW5	SW5	WSW9	W9	W10	W9	WSW8	W10	W10	WNNW9	W7	WNNW3	NNW3	NE1	NE4	NE5	NNE4	WSW3.3	W10	
7-Jun	NE3	NNE3	NNE4	NE4	NE5	NE5	NE7	NE6	ENE8	E11	ESE12	E11	ENE10	E8	SE9	SE9	ESE8	ESE7	E5	ENE4	NNE7	NE6	NE7	NE6	ENE5.6	ESE12	
8-Jun	NNE6	NE6	NNE6	NNE4	NNE4	NNE3	E4	ESE8	ESE6	ESE9	ESE11	E10	ESE11	ESE11	ESE12	SE11	ESE12	ESE13	ESE10	ESE9	ESE5	ESE4	ESE6	SE6	ESE6.8	ESE13	
9-Jun	SE6	SE5	SE3	SSE3	NNE4	NNE12	NNE16	NNE19	NNE17	NNE23	NNE23	NNE21	NNE21	NNE21	NNE19	NNE19	NNE20	NNE21	NNE18	NNE15	NE9	NE9	NE9	NNE7	NNE13.3	NNE23	
10-Jun	NE6	NE5	NNE3	N5	NE3	NNE6	ENE7	ENE5	NE7	N9	NNE8	NE4	NNW4	NNW5	N1	S3	SSW3	WSW5	N10	NW13	NNW11	NW4	NNW9	NW8	N4.2	NW13	
11-Jun	NW7	WNNW7	WNNW7	NW7	WNNW6	WNNW7	WNNW10	NW14	NW18	NW19	NW19	NW18	NW17	NW15	NW14	NW15	NW13	NW10	NNW11	N9	N4	SSE2	SSE2	SE4	NW9.7	NW19	
12-Jun	SE5	SE4	SE5	SE6	SE6	SE6	SSE7	SSE10	SSE10	SSE9	SE15	SSE16	S13	S17	SSW17	S14	S13	S11	S10	W2	NE3	NNE5	NNE8	NNE6	SSE6.8	SSW17	
13-Jun	NNE3	NNE2	E1	W0	NNW2	NNW3	ESE3	NNW8	N5	ESE4	SW1	ESE5	NNE7	NNE16	NNE13	NNE11	NE9	NE8	ENE7	E7	NE9	NNE11	NNE8	NNE11	NNE5.3	NNE16	
14-Jun	N10	N10	NNE15	NNE16	NNE16	NNE18	NNE14	NE13	NNE15	NNE13	NNE14	NNE12	NNE17	NNE15	NNE12	NNE12	NNE13	NNE12	NNE10	NNE11	NNE12	NNE13	NNE11	NNE10	NNE12.9	NNE18	
15-Jun	NNE10	NNE9	NNE9	NNE8	NE9	NE6	NE6	NE6	NE6	ENE3	ENE3	NNE6	NNE6	N7	WNNW4	N5	NE8	ENE6	E6	E4	E2	E0	ESE3	SE2	NE4.7	NNE10	
16-Jun	ESE3	SE3	ESE4	ESE2	SE4	ESE6	SE6	SE6	ESE5	ESE5	SSE4	SSE5	ESE8	E9	ESE8	SSE4	WSW11	W6	WNNW3	SSW2	SE1	SE3	SSE3	SSW2	SE3.2	WSW11	
17-Jun	S4	SSW4	SSW3	WSW5	WSW6	W7	W8	WNNW9	WNNW11	WNNW12	NW16	NW16	NW17	NW16	WNNW14	WNNW11	WNNW11	WNNW9	WNNW8	W5	SW3	S2	SSW4	S8	WNNW7.0	NW17	
18-Jun	S3	SSE3	SSE3	SSE4	SSE3	SSE4	SSW5	SW7	SW7	SW9	WSW10	SW10	WSW11	W17	WSW10	WSW10	W9	WNNW6	WNNW11	WNNW8	NW8	NW5	NW5	WNNW3	WSW5.5	W17	
19-Jun	WSW3	W6	WSW6	W6	W5	W5	WNNW5	WNNW6	W5	W6	W5	W6	NW7	W6	WSW7	WSW4	SW6	SW5	SSW5	SSW4	S3	S3	SSE4	SSE4	WSW4.1	NW7	
20-Jun	SSE4	SSE5	S5	S6	SE3	SE5	SE6	SE5	SSE7	S8	SSW11	SSW14	S12	S11	SSE9	SSE8	SSE6	SE5	SSE7	SSE5	SE4	SSW5	SW5	SSW8	S6.2	SSW14	
21-Jun	SW8	SW7	SW7	WSW9	W9	WNNW11	WNNW12	W11	W10	W10	W10	W10	W10	WNNW8	WNNW14	WNNW14	W12	WNNW12	WNNW11	WNNW12	WNNW10	NW10	NNW14	N13	WNNW9.4	WNNW14	
22-Jun	N12	NNW11	NNW10	NNW12	NNW11	NNW9	NNW12	NW12	NNW14	NNW17	NNW16	NNW16	NNW16	NW16	NNW15	NNW15	NNW14	NNW12	NNW11	NNW10	NNW3	SSE2	SSE2	SE2	NNW10.6	NNW17	
23-Jun	SSE3	SSE4	SSE3	SE1	SW1	W1	NW4	NNW8	NNW11	NNW12	NNW9	NNW11	NNW11	NNW8	NNW8	NNW8	W4	N5	SE1	SSW2	SSW2	ESE1	SSE2	SW2	NNW3.2	NNW12	
24-Jun	WSW3	SSE2	SW2	WSW2	W3	W4	NNW5	N8	NNW10	N9	NNE9	N10	N9	NNE10	NNE10	NNE10	NNE9	NNE10	NE8	ENE7	E3	SE2	SE2	SE2	N4.4	NNE10	
25-Jun	SE3	SE3	ESE2	SSE1	S1	S0	ESE4	ESE2	ENE3	SE5	ESE7	ESE9	ESE8	ESE6	SE9	SE10	NNE10	SSE10	SSE11	SSE10	SSE10	SSE9	SSE7	SSE6	SSE8	SE5.6	SSE11
26-Jun	SSE11	SSE11	SE9	SE8	SE11	SSE13	SSE14	S15	S14	S16	SSE18	SSE18	SSE17	SSE16	SSE14	SSE12	S10	S7	SSE3	SSW3	SE1	SE3	SE4	SE5	SSE10.3	SSE18	
27-Jun	SE6	SSE5	SW4	W6	SW11	WSW11	W8	W8	WSW7	SSW8	SW7	SW6	SW4	WSW4	W5	W10	WNNW9	WSW7	SW7	SW7	SW4	SSW3	S1	SSW3	WSW5.3	WSW11	
28-Jun	S4	E2	E1	SE1	SE1	NE3	ENE5	NE6	NE8	M	NE8	ENE12	NE13	NE11	NNE11	NNE12	NE9	NNE9	ENE6	E3	SE3	S4	SSE4	SSE4	NE4.6	NE13	
29-Jun	S7	SSW8	SSW10	SSW9	SSW7	SSW6	SW5	WNNW4	NNW5	N5	N6	NNW8	N7	N7	NNW7	NNE11	NE6	WNNW7	SSE3	ENE1	ESE0	SSW3	SSW4	S3	W1.0	NNE11	
30-Jun	SE4	SSE4	SSE4	SSW6	SW5	SSW2	SE2	SSW3	SSW4	SE5	SSE7	S6	SSW3	W5	WNNW3	SE4	WSW4	WSW5	SSW5	SW3	SW3	SSW3	SSW4	S2	SSW3.0	SSE7	

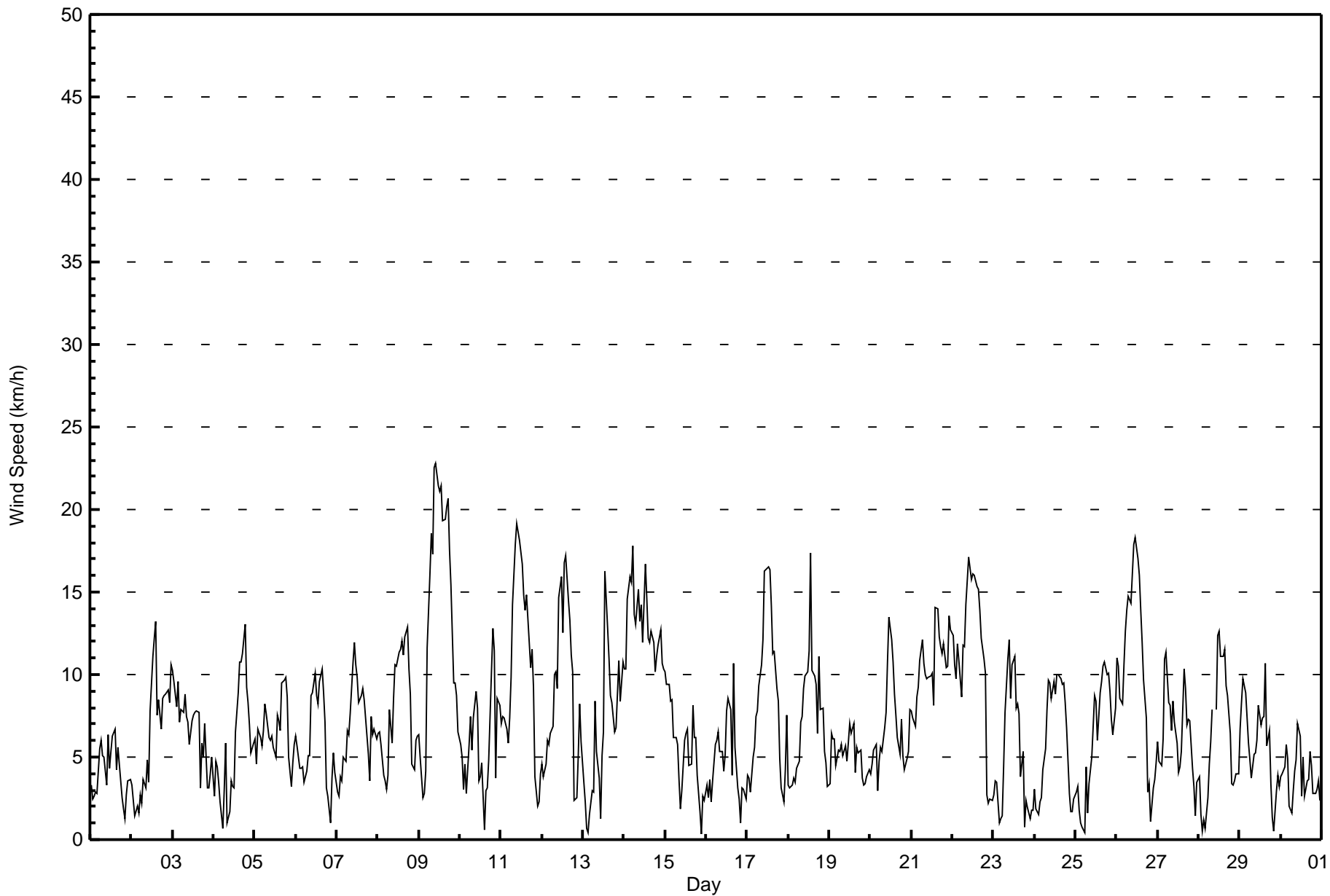
ESE1.0 SE0.8 S0.3 W0.8 W0.7 NW1.3NNW1.5NNW2.3NNW2.3NNW1.9NNW1.3NNW1.0NNW2.3NNW3.0 NW2.6 NW2.2 NW1.9NNW1.9 N1.2 N1.2NNE1.2 NE0.9 NE0.9 ESE0.8	Diurnal Average
N12 NNW11 NNE15 NNE16 NNE16 NNE18 NNE16 NNE19 NW18 NNE23 NNE23 NNE21 NNE21 NNE21 NNE19 NNE19 NNE20 NNE21 NNE18 NNE15 NNE12 NNE13 NNW14 N13	Diurnal Maximum

M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Mackay River - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	285	39.64	39.64
6 - 11	328	45.62	85.26
12 - 19	99	13.77	99.03
20 - 28	7	0.97	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	16	14	6	11	16	42	47	20	28	20	17	19	8	5	9	285
6 - 11	19	35	29	7	7	20	22	21	10	10	16	16	45	31	10	30	328
12 - 19	2	29	1	1	0	4	1	9	8	2	0	0	2	8	17	15	99
20 - 28	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	87	44	14	18	40	65	77	38	40	36	33	66	47	32	54	719

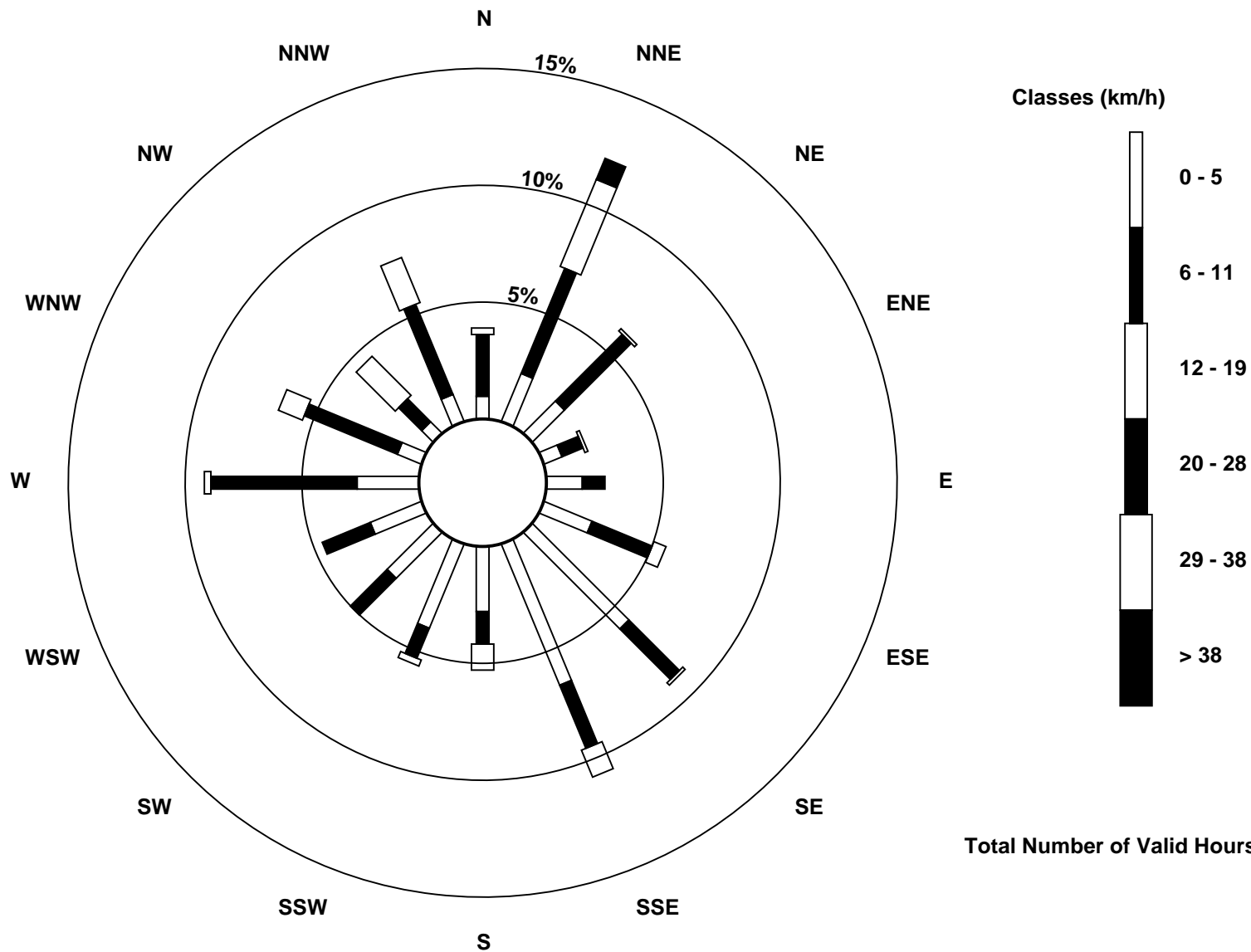
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Mackay River (AMS 20)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Mackay River - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Jun 9 11:00	Hours of Data: 719
Minimum Value: 0 km/h on Jun 11 22:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	1	1	1	1	2	2	2	2	1	2	2	2	2	3	3	3	2	2	1	1	1	1	1	3
2-Jun	1	1	1	1	1	1	1	1	1	2	2	3	5	6	6	3	3	3	3	4	4	3	3	4	6
3-Jun	4	4	3	4	3	3	3	3	3	3	3	3	3	3	3	3	2	3	2	2	1	1	1	4	
4-Jun	1	1	2	2	1	1	2	3	1	1	1	2	2	2	3	3	3	4	5	3	3	2	1	2	5
5-Jun	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	4	3	3	3	2	1	1	1	1	4
6-Jun	1	1	1	1	2	1	1	3	2	4	4	5	4	4	4	4	4	3	1	1	1	3	2	1	5
7-Jun	2	2	1	1	2	2	2	3	3	4	4	4	4	3	4	4	3	2	2	2	2	2	2	2	4
8-Jun	2	2	2	1	1	1	2	2	2	3	4	4	4	5	4	4	4	4	3	3	1	1	1	1	5
9-Jun	1	1	1	0	3	5	6	6	6	7	8	8	8	7	7	7	7	7	6	5	4	3	3	2	8
10-Jun	2	2	1	1	1	2	3	2	3	4	3	3	3	3	3	2	2	3	3	4	3	2	4	2	4
11-Jun	2	2	2	2	2	2	4	5	6	6	6	6	5	5	6	5	5	4	4	3	3	0	1	1	6
12-Jun	1	1	1	1	1	1	2	3	4	3	5	6	5	6	6	5	4	4	4	1	1	3	2	2	6
13-Jun	1	1	1	1	2	1	1	3	2	2	3	2	6	4	4	4	4	3	3	3	3	3	4	3	6
14-Jun	3	3	5	6	6	6	5	5	5	4	5	4	5	4	4	4	5	4	3	4	4	4	3	4	6
15-Jun	3	3	3	3	3	2	2	2	1	1	2	2	3	3	3	2	3	2	2	1	1	1	1	1	3
16-Jun	1	1	1	1	1	2	2	2	1	1	2	3	3	3	3	5	5	2	1	1	1	2	2	1	5
17-Jun	1	1	1	2	2	3	3	4	4	4	6	5	6	5	5	5	5	3	4	3	1	1	1	7	7
18-Jun	1	1	1	1	1	1	2	3	3	4	4	4	6	7	5	4	4	3	5	4	4	2	1	2	7
19-Jun	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	3	3	3	1	1	1	1	1	4
20-Jun	1	1	1	1	2	1	2	2	2	3	4	5	4	4	3	3	2	1	2	2	1	2	2	2	5
21-Jun	3	2	3	4	4	5	5	4	4	4	4	4	4	4	6	6	5	4	4	4	3	3	4	6	6
22-Jun	5	3	3	4	3	3	4	4	5	5	5	5	5	5	5	5	5	4	3	3	2	0	1	0	5
23-Jun	0	1	1	1	1	1	2	3	3	4	4	4	4	4	3	3	2	8	1	1	1	1	1	1	8
24-Jun	1	1	1	1	1	1	2	2	3	3	3	4	4	4	4	5	4	3	3	3	1	0	1	1	5
25-Jun	1	1	2	1	1	1	1	1	2	3	3	4	4	4	3	4	4	4	3	3	3	2	2	3	4
26-Jun	3	3	2	2	3	4	5	5	6	6	6	6	6	6	5	4	4	3	2	1	1	1	1	1	6
27-Jun	1	2	2	3	6	5	3	4	3	3	3	2	2	3	2	5	3	3	3	2	1	1	1	1	6
28-Jun	1	1	1	1	1	2	2	2	3	M	3	5	4	4	3	4	4	3	3	1	1	1	1	1	5
29-Jun	2	2	3	2	2	2	2	2	2	3	3	3	3	3	3	4	2	4	1	1	1	2	1	1	4
30-Jun	1	1	1	2	1	1	1	1	2	2	2	2	2	3	3	2	1	2	2	1	1	1	1	1	3

5	4	5	6	6	6	6	6	6	6	7	8	8	8	7	7	7	7	8	6	5	4	4	4	4	7
Diurnal Maximum																									

M - Maintenance



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mackay River - June 2017

Direction of Maximum Speed: 31 deg on Jun 9 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 31.8 deg on Jun 9	Hours of Data: 719
Direction of Minimum Speed: 88 deg on Jun 15 22:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 1.0 deg on Jun 29	Percent Operational Time: 99.9
Monthly Average Direction: 263.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	129	158	152	237	217	265	268	262	249	229	228	184	198	216	238	238	288	263	319	14	134	141	155	147	226.9
2-Jun	145	138	148	149	225	262	277	290	328	241	229	232	257	282	330	305	285	285	292	272	266	279	271	270	274.5
3-Jun	280	279	274	276	272	276	291	290	266	282	275	282	263	262	271	282	244	264	204	194	162	152	148	174	264.4
4-Jun	144	182	239	276	265	179	17	306	184	258	164	161	229	319	345	341	337	333	343	357	14	9	12	52	339.2
5-Jun	35	37	6	338	342	355	342	6	344	357	351	341	29	32	40	110	124	113	121	128	125	91	125	128	46.6
6-Jun	136	144	159	155	179	209	200	239	236	257	264	269	266	252	259	278	284	280	282	344	54	39	38	33	253.0
7-Jun	41	24	33	43	47	35	34	46	72	99	102	99	78	96	127	142	123	107	94	63	33	37	39	41	77.7
8-Jun	31	34	31	27	32	18	91	112	107	103	122	99	110	102	119	134	113	108	113	110	111	113	117	125	102.0
9-Jun	125	131	145	153	13	28	30	27	28	30	31	31	33	26	26	25	25	26	27	27	40	43	39	23	31.8
10-Jun	40	35	22	356	41	29	71	58	41	3	14	35	334	339	10	188	195	241	359	319	330	326	329	324	359.1
11-Jun	319	302	300	307	289	294	299	306	308	315	311	311	315	318	304	317	316	324	332	357	360	149	147	146	313.1
12-Jun	141	139	138	137	144	144	149	152	160	149	136	154	172	191	194	189	181	177	184	270	35	22	15	32	161.9
13-Jun	28	27	98	264	335	328	122	330	0	110	222	106	29	13	27	28	38	36	66	85	39	26	29	12	30.1
14-Jun	1	5	18	26	32	30	31	34	26	23	23	21	19	26	23	22	21	20	18	22	23	23	15		22.5
15-Jun	22	24	27	32	36	35	39	37	33	47	59	28	25	353	285	359	42	60	92	88	98	88	113	129	35.8
16-Jun	121	134	112	119	132	120	128	125	122	115	152	149	110	88	111	158	238	261	294	206	140	136	168	195	138.1
17-Jun	183	194	196	255	249	273	278	294	295	303	314	313	316	311	299	288	284	288	286	274	215	171	198	179	287.3
18-Jun	171	160	165	151	152	152	202	227	233	233	251	215	247	265	254	247	280	296	282	292	310	307	307	294	251.9
19-Jun	258	273	257	263	261	280	290	284	272	273	266	272	309	262	250	257	219	225	213	201	184	185	154	148	253.3
20-Jun	165	164	177	186	144	137	136	137	148	169	193	198	189	170	168	165	149	146	158	161	131	197	227	209	171.8
21-Jun	223	222	235	256	277	282	287	274	280	280	274	275	280	286	283	283	281	282	286	298	303	317	333	359	284.8
22-Jun	2	348	336	341	342	334	339	326	329	327	331	335	342	325	329	328	333	336	337	337	346	149	151	138	335.5
23-Jun	149	149	147	142	234	262	310	330	342	338	335	327	335	342	333	334	262	8	124	209	206	116	152	220	329.6
24-Jun	250	168	230	248	266	280	336	352	334	353	13	11	356	22	26	18	18	27	40	59	80	127	133	134	10.2
25-Jun	134	129	116	166	183	191	111	106	77	140	114	116	108	155	143	142	154	161	157	148	151	157	160	166	142.2
26-Jun	164	152	136	137	145	149	159	170	173	170	167	162	158	163	165	164	178	177	150	192	139	143	144	135	160.7
27-Jun	128	155	224	262	220	253	272	271	239	210	226	231	221	239	274	276	286	249	234	221	220	200	177	195	238.2
28-Jun	187	86	98	129	133	46	61	54	52	M	52	57	40	35	25	31	37	23	72	88	138	180	149	161	54.0
29-Jun	181	192	192	192	193	210	223	283	343	353	1	333	6	1	344	12	39	290	156	58	120	204	209	187	275.2
30-Jun	145	152	165	200	231	211	138	192	207	125	155	169	202	267	293	132	246	242	212	222	215	193	206	183	193.8

112.2 137.9 185.3 274.0 271.2 315.2 343.8 328.4 333.6 328.5 336.5 332.8 342.8 330.6 323.2 324.4 319.2 328.5 352.9 354.6 22.3 50.0 56.2 102.0

Diurnal Average

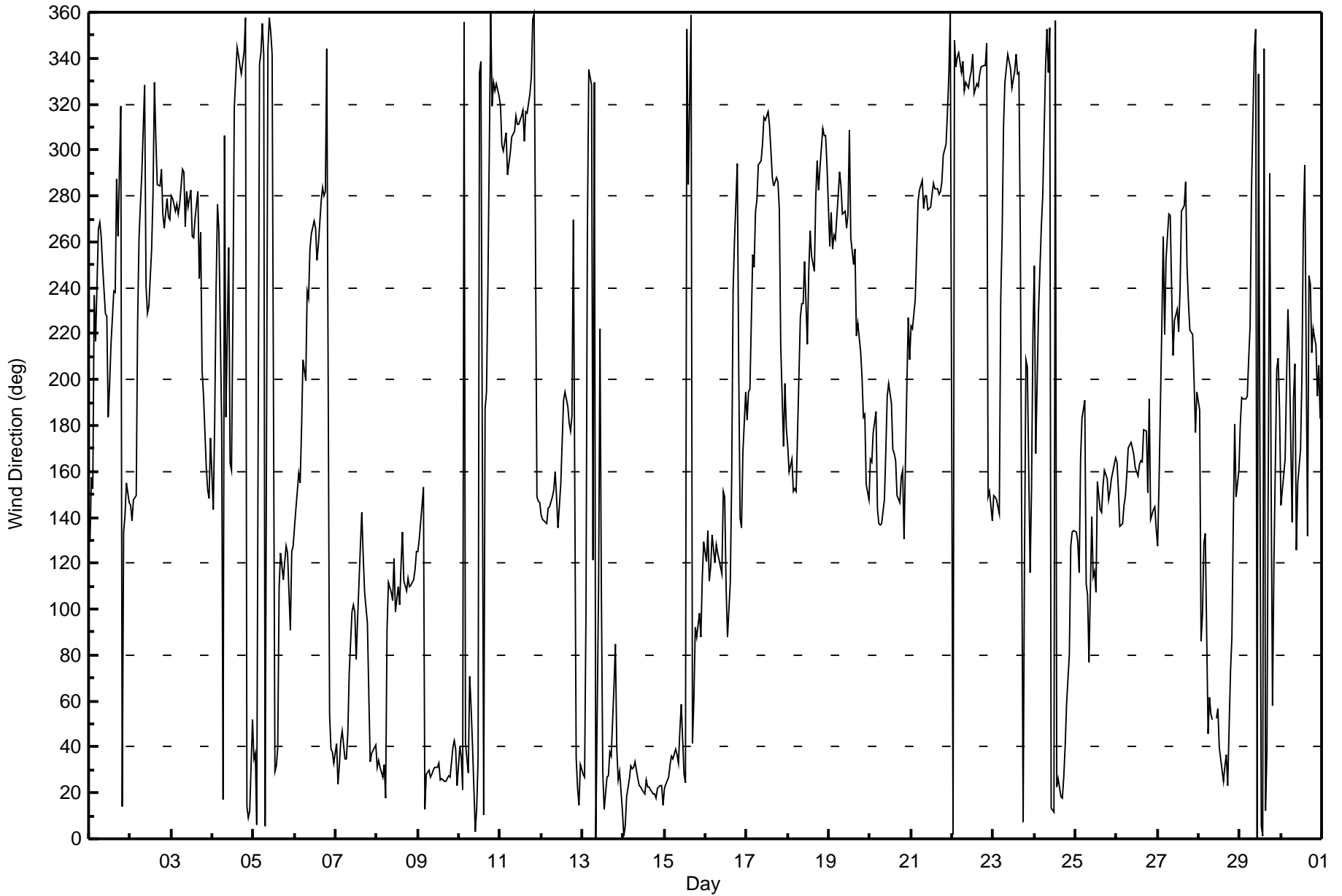
M - Maintenance

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Mackay River - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mackay River - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 106 deg on Jun 10 15:00	Hours of Data: 719
Minimum Value: 6 deg on Jun 24 22:00	Hours of Missing Data: 1
Percentiles: P ₁ = 12 P ₁₀ = 19 Q ₁ = 25 Median = 31 Q ₃ = 44 P ₉₀ = 56 P ₉₉ = 90	Hours of Calibration: 0
	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	53	21	29	37	31	42	41	47	42	46	33	45	39	42	49	85	56	64	97	67	36	22	10	12	97
2-Jun	19	29	53	21	46	41	57	51	61	46	73	59	44	50	26	40	36	41	29	45	45	38	46	46	73
3-Jun	36	36	41	35	46	37	37	38	49	46	62	50	54	48	53	51	82	57	51	22	19	11	15	13	82
4-Jun	50	31	41	49	28	69	59	62	92	79	37	39	61	44	29	25	24	25	28	26	29	33	38	44	92
5-Jun	41	41	28	22	23	30	24	27	27	28	26	36	52	47	52	50	34	28	25	23	21	33	19	17	52
6-Jun	17	19	15	17	36	30	30	57	58	44	50	45	48	48	47	43	41	42	32	29	53	48	27	21	58
7-Jun	19	40	28	38	30	25	25	30	33	29	29	35	49	48	47	36	30	23	29	34	22	24	24	29	49
8-Jun	23	23	26	18	23	29	38	21	29	29	36	38	34	34	32	33	31	22	21	18	17	15	18	16	38
9-Jun	14	13	16	13	28	25	25	25	29	27	26	29	28	27	28	26	28	26	27	25	28	27	26	22	29
10-Jun	24	27	45	21	40	23	36	46	42	45	48	82	94	78	106	78	57	55	28	25	21	42	25	18	106
11-Jun	17	21	23	22	28	25	26	24	26	27	25	27	27	29	32	30	28	34	26	28	29	9	16	13	34
12-Jun	14	14	14	20	19	17	30	26	26	27	25	31	30	27	28	28	25	26	27	62	39	30	25	27	62
13-Jun	31	51	80	79	63	28	52	29	48	64	95	62	40	27	29	33	30	28	53	35	29	23	31	23	95
14-Jun	25	27	26	26	26	26	29	27	27	27	26	26	27	27	26	24	27	25	25	25	23	25	26	26	29
15-Jun	22	26	27	27	28	26	26	24	46	73	71	42	49	58	64	49	24	37	28	26	16	42	21	21	73
16-Jun	20	14	12	28	15	18	20	20	26	24	45	71	39	36	36	72	41	41	34	47	54	28	48	34	72
17-Jun	21	19	25	48	46	42	38	30	31	34	27	27	27	27	35	36	39	34	36	45	42	26	21	51	51
18-Jun	28	18	18	20	18	17	36	36	41	41	46	37	51	45	48	46	45	48	38	32	21	18	25	43	51
19-Jun	45	43	49	48	56	40	41	46	58	55	72	49	49	71	61	89	64	55	48	35	17	18	19	8	89
20-Jun	15	18	19	18	43	23	24	25	28	33	27	25	27	27	27	27	28	31	27	28	22	49	36	21	49
21-Jun	32	28	39	45	40	36	35	41	38	40	42	43	35	37	35	35	37	37	34	23	22	21	23	27	45
22-Jun	25	23	21	22	21	21	23	21	25	27	25	30	28	27	28	28	27	25	23	23	73	30	19	17	73
23-Jun	13	12	18	59	46	42	35	29	28	32	49	41	36	48	40	33	63	91	98	49	49	59	35	40	98
24-Jun	25	32	69	43	45	29	33	29	27	32	42	40	49	40	40	47	42	35	35	36	29	6	18	18	69
25-Jun	15	15	53	60	72	87	13	73	62	61	54	53	55	78	43	47	36	31	35	26	25	26	28	30	87
26-Jun	28	24	22	22	23	24	27	28	31	30	30	29	30	30	31	30	33	29	56	35	37	16	17	20	56
27-Jun	16	43	45	55	38	46	43	45	43	28	33	43	51	54	48	43	48	47	38	27	25	31	52	21	55
28-Jun	21	41	87	75	87	43	35	29	29	M	33	31	32	32	28	29	42	34	39	47	21	11	20	23	87
29-Jun	25	19	19	19	21	24	41	69	43	59	64	43	63	54	32	31	31	54	44	60	73	47	22	18	73
30-Jun	15	13	23	24	29	58	32	28	45	29	30	39	82	48	84	50	42	39	29	26	20	19	22	21	84

53	51	87	79	87	87	59	73	92	79	95	82	94	78	106	89	82	91	98	67	73	59	52	51	
Diurnal Maximum																								

M - Maintenance



Wood Buffalo Environmental Association

SO₂ Calibration Summary

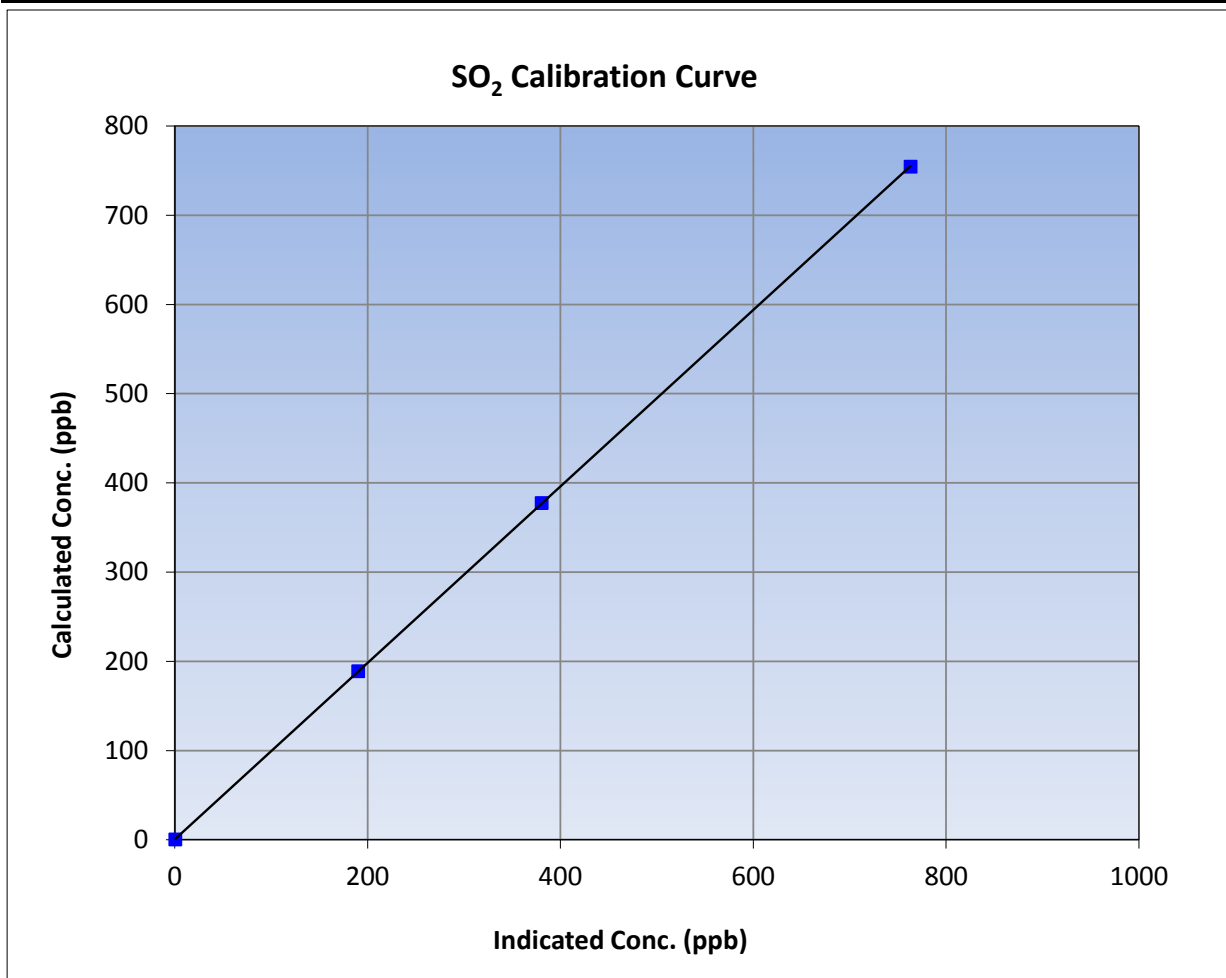
Version-03-2017

Station Information

Calibration Date	June 28, 2017	Previous Calibration	May 23, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	9:54	End Time (MST)	13:50
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

Calibration Data

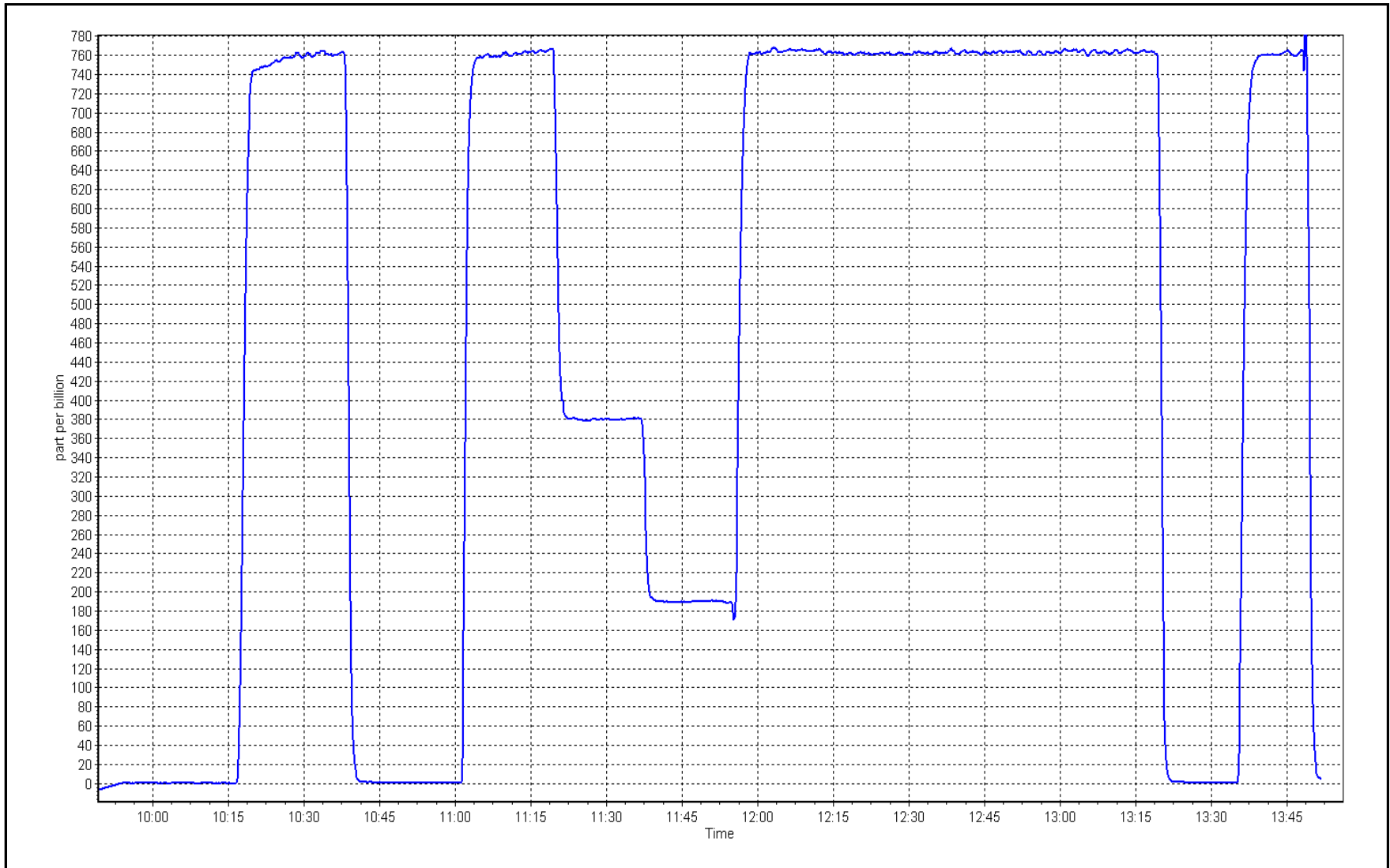
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999995	≥0.995
754.2	762.7	0.9889	Slope	0.989000	0.90 - 1.10
377.2	380.2	0.9920	Intercept	0.372952	+/-30
188.6	189.9	0.9930			



SO2 Calibration Plot

Date: June 28, 2017

Location: MacKay River





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	MacKay River	Station number:	AMS 20
Calibration Date:	June 29, 2017	Last Cal Date:	May 18, 2017
Start time (MST):	10:30	End time (MST):	13:35
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.35</u>	ppm	Cal Gas Exp Date	February 13, 2018
Cal Gas Cylinder #	<u>LL119508</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	1220
ZAG Make/Model	Teledyne API 701		Serial Number	4766

Analyzer Information

Analyzer make: Teledyne API T101

Analyzer serial #: 196

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	505	505
Calculated slope	1.003054	0.995907	Lamp voltage	2357	2356
Calculated intercept	-0.035992	0.153778	Pressure	21.4	21.4
Analyzer Background	25.4	27.0	Flow	0.554	0.555
Analyzer Coefficient	0.977	0.974	Intensity	58	58

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.6	----
as found span	4935	75.6	80.7	82.4	0.980
calibrator zero	5005	0.0	0.0	0.0	----
high point	4935	75.6	80.7	81.0	0.997
second point	4975	37.8	40.3	40.2	1.004
third point	4995	19.0	20.3	20.1	1.009
as left zero	5005	0.0	0.0	0.1	----
as left span	4935	75.6	80.7	80.5	1.003
SO2 Scrubber Check	4990	20.0	199.6	0.8	----
Average Correction Factor					1.003
Corrected As found	81.80	Previous response	80.51	*% change	-1.6%

* = > +/-5% change initiates investigation

Notes: sample inlet filter replaced after as founds. Used an SO₂ cylinder (LL104186) for the Sox scrubber test after as founds. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

H₂S Calibration Summary

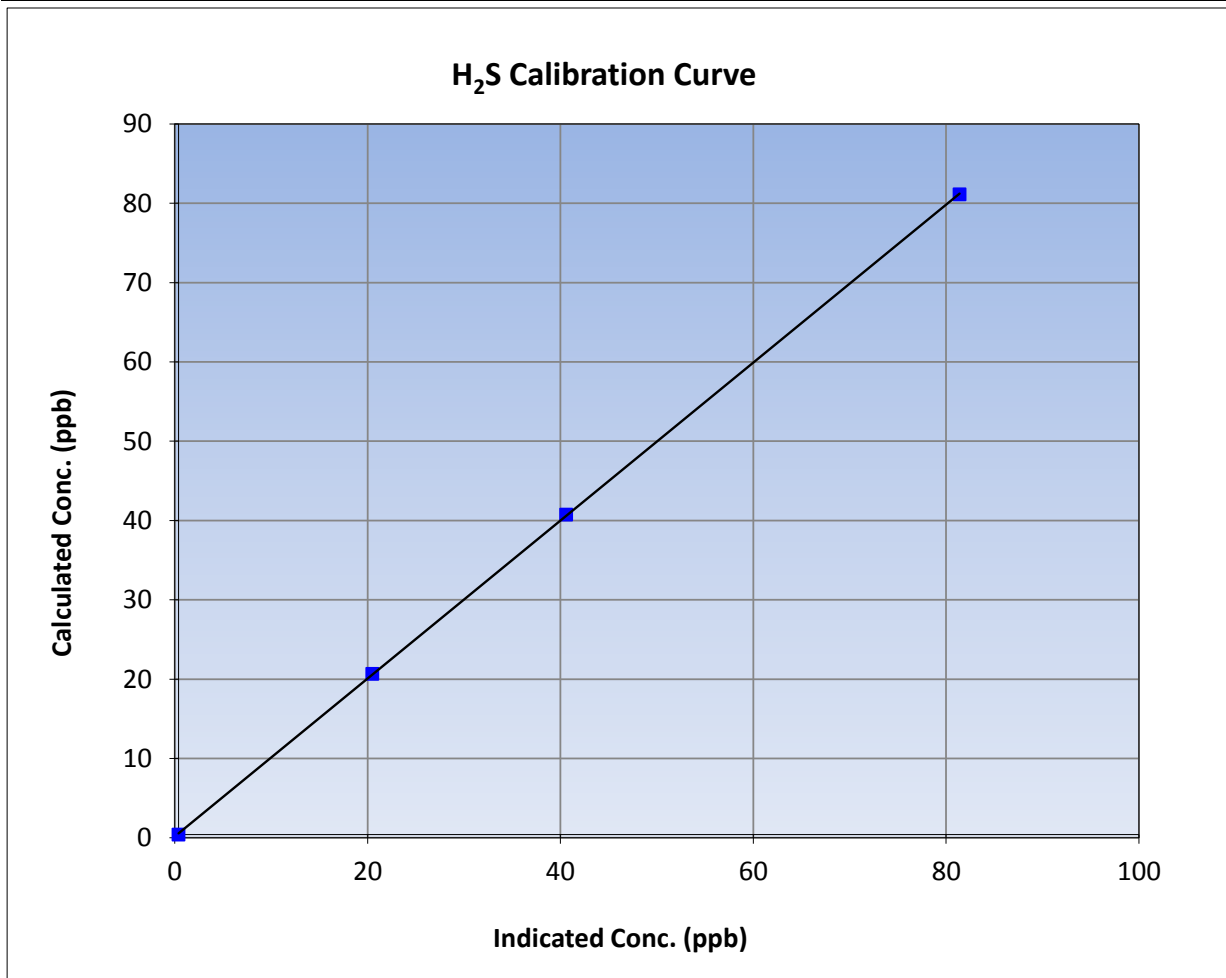
Version-03-2017

Station Information

Calibration Date	June 29, 2017	Previous Calibration	May 18, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	10:30	End Time (MST)	13:35
Analyzer make	Teledyne API T101	Analyzer serial #	196

Calibration Data

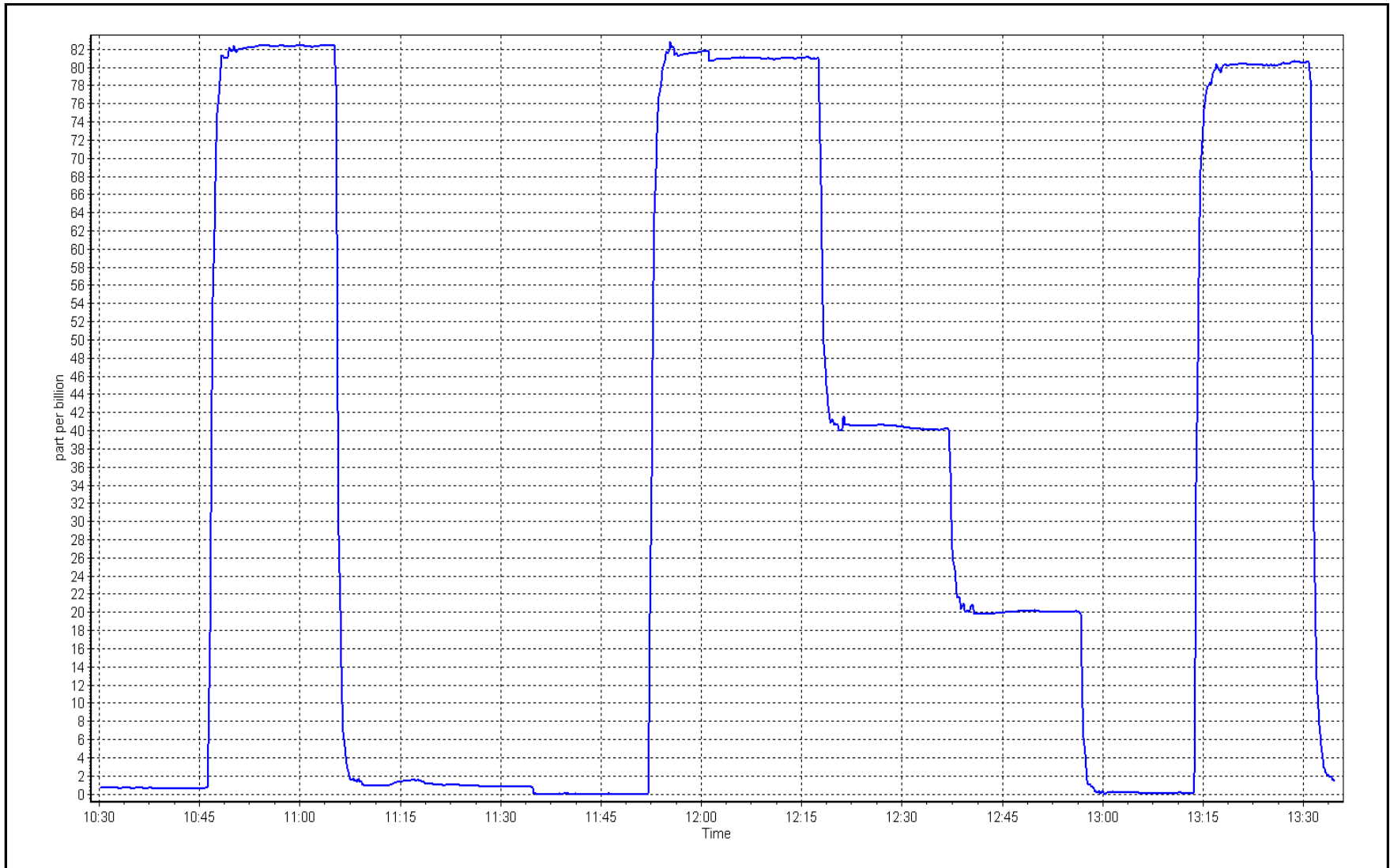
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999981	≥0.995
80.7	81.0	0.9966			
40.3	40.2	1.0036	Slope	0.995907	0.90 - 1.10
20.3	20.1	1.0086			
			Intercept	0.153778	+/-3



H₂S Calibration Plot

Date: June 29, 2017

Location: MacKay River





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	MacKay River	Station number:	AMS 20
Calibration Date:	June 28, 2017	Last Cal Date:	May 23, 2017
Start time (MST):	9:54	End time (MST):	13:50
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000657	Cal Gas Expiry Date	November 4, 2019
CH4 Cal Gas Conc.	<u>513.0</u> ppm	CH4 Equiv Conc.	1060.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	1220
ZAG Make/Model	Teledyne API 701	Serial Number	4766

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1501663727
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-299
Calculated slope	1.000399	Sample pressure	8.6
Calculated intercept	-0.011595	Fuel pressure	23.9
Analyzer Background	2.090	Air pressure	34.3
Analyzer Coefficient	4.402	Flame temperature	148.0
			<u>Finish</u>

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.00	0.19	----
as found span	4930	78.7	16.66	16.83	0.990
calibrator zero	5005	0.0	0.00	-0.01	----
high point	4930	78.7	16.66	16.83	0.990
second point	4975	39.4	8.33	8.37	0.995
third point	4995	19.7	4.17	4.19	0.995
as left zero	5005	0.0	0.00	0.01	----
as left span	4930	78.7	16.66	16.83	0.990
Average Correction Factor					0.993
Corrected As found	16.65	Previous response	16.66	*% change	0.1%

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Adjusted zero only.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

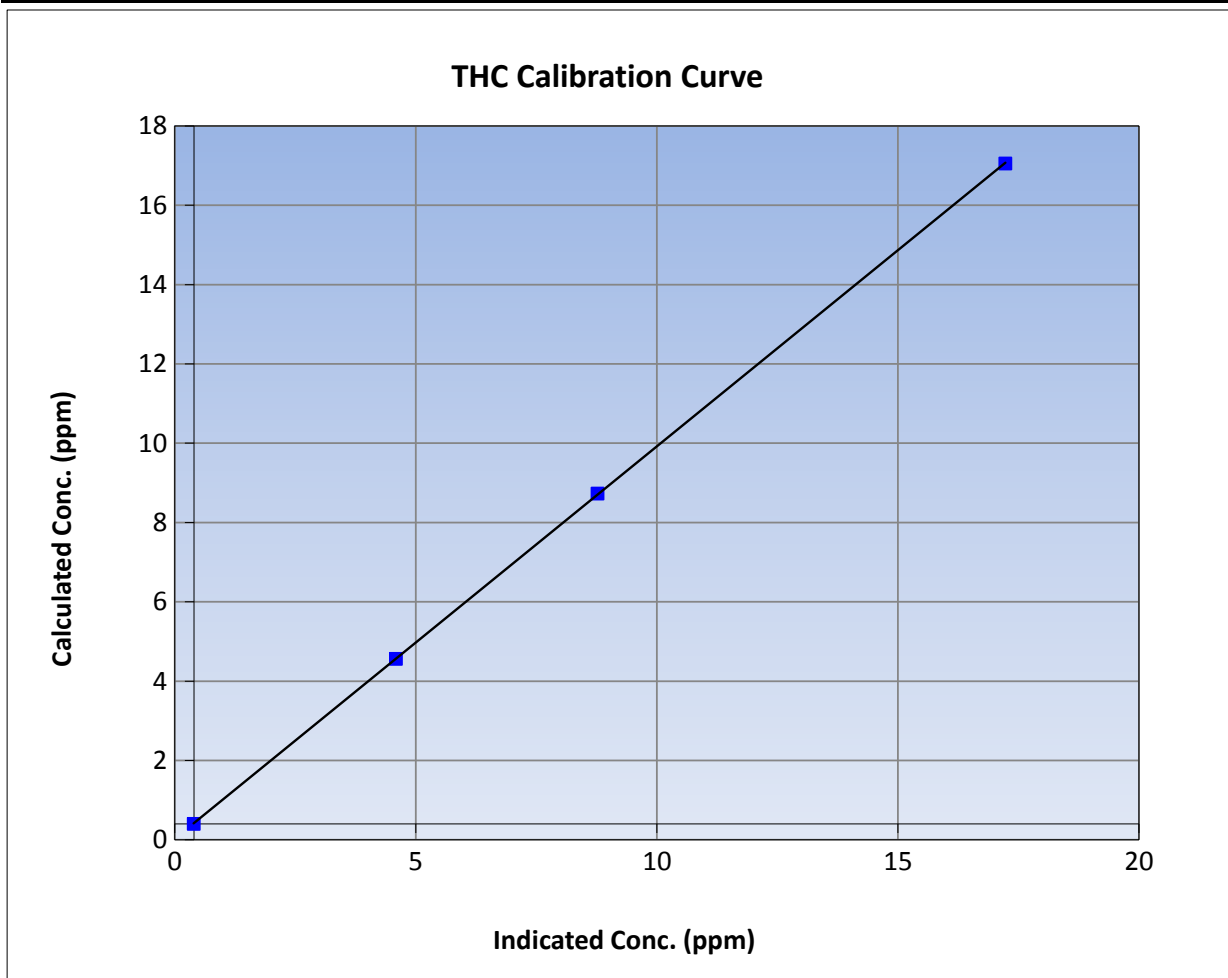
Version-03-2017

Station Information

Calibration Date	June 28, 2017	Previous Calibration	May 23, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	9:54	End Time (MST)	13:50
Analyzer make	Thermo 51i-LT	Analyzer serial #	1501663727

Calibration Data

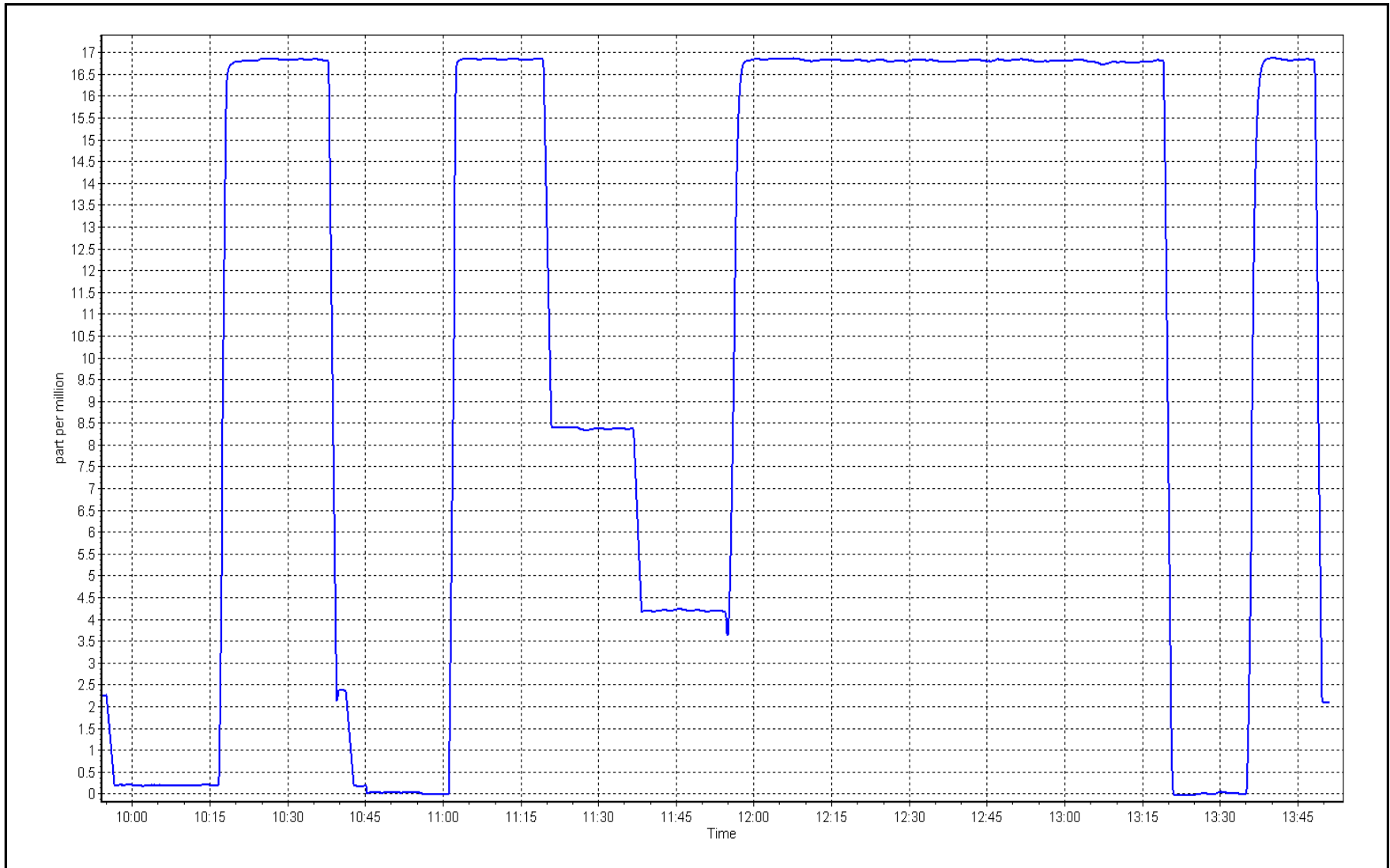
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999992	
16.7	16.8	0.9899			≥0.995
8.3	8.4	0.9954	Slope	0.989394	
4.2	4.2	0.9945			0.90 - 1.10
			Intercept	0.021967	+/-1.5



THC Calibration Plot

Date: June 28, 2017

Location: MacKay River





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Mackay River	Station number:	AMS 20
Calibration Date:	June 28, 2017	Last Cal Date:	May 23, 2017
Start time (MST):	9:54	End time (MST):	13:50
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000657	Cal Gas Expiry Date	November 4, 2019
NOX Cal Gas Conc.	<u>50.9</u> ppb	NO Cal Gas Conc.	<u>50.9</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	1220
ZAG make/model	Teledyne API 701	Serial Number	4766

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1505164379		
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>	
NO coefficient	1.070	1.070	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.999	PMT Temperature	325.6	326.6
NO2 coefficient	0.995	0.995	Reaction cell Press	166.3	167.2
NO bkgrnd	3.1	3.1	Sample Flow	0.823	0.824
NOX bkgrnd	3.1	3.1	PMT Voltage	-767.4	-767.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.998788	0.995521
NO _x Cal Offset	0.716827	0.714375
NO Cal Slope	0.999068	0.996239
NO Cal Offset	1.318237	1.334285
NO ₂ Cal Slope	0.993359	0.991050
NO ₂ Cal Offset	-0.545463	-0.672732



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.0	0.0	-0.2	-0.3	0.0	----	----
as found span	4930	78.7	799.8	799.8	0.0	802.5	800.7	1.9	0.9966	0.9988
calibrator zero	5005	0.0	0.0	0.0	0.0	-0.2	-0.3	0.0	----	----
high point	4930	78.7	799.8	799.8	0.0	803.1	802.1	0.8	0.9959	0.9971
second point	4975	39.4	399.9	399.9	0.0	400.2	399.2	1.0	0.9994	1.0019
third point	4995	19.7	200.0	200.0	0.0	200.0	198.6	1.4	0.9998	1.0068
as left zero	5005	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	----	----
as left span	4930	78.7	799.8	345.0	454.8	803.8	343.4	460.4	0.9950	1.0047
Average Correction Factor									0.9983	1.0019

Corrected As found	NO _x = 802.7 ppb	NO = 801.0 ppb		*Percent Change	NO _x = -0.3%
Previous Response	NO _x = 800.0 ppb	NO = 799.2 ppb		*Percent Change	NO = -0.2%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	802.1	799.9	2.2	0.9971	0.9998	----	----
1st NO2 (400 ppb O3)	345.0	454.9	804.3	345.0	459.3	0.9944	----	0.9904	101.0%
2nd NO2 (200 ppb O3)	567.3	232.6	803.1	567.3	235.8	0.9959	----	0.9864	101.4%
3rd NO2 (100 ppb O3)	680.7	119.2	802.3	680.7	121.6	0.9969	----	0.9803	102.0%
2nd NO ref point	----	0.0	801.6	799.6	2.0	0.9977	1.0002	----	----
Average Correction Factor						0.9962	1.0000	0.9857	101.5%

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

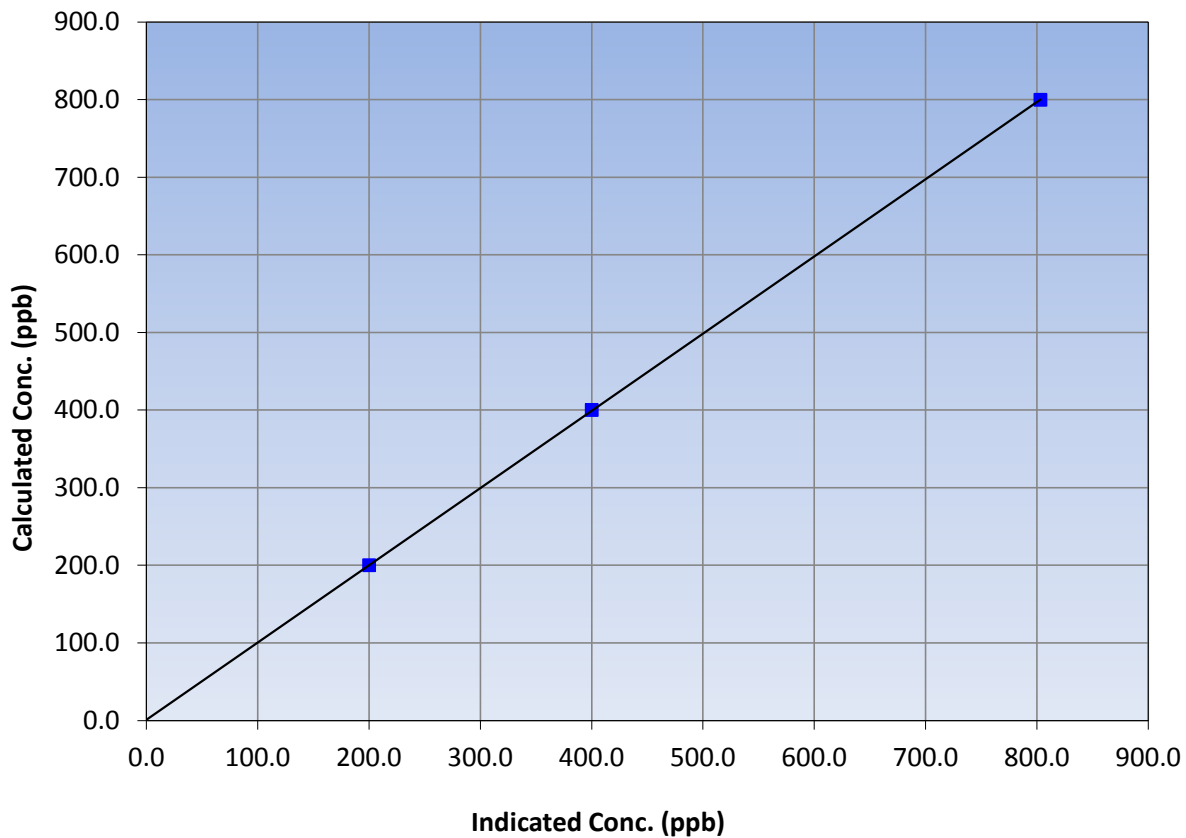
Station Information

Calibration Date	June 28, 2017	Previous Calibration	May 23, 2017
Station Name	MackKay River	Station Number	AMS 20
Start Time (MST)	9:54	End Time (MST)	13:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	≥0.995	
799.8	803.1	0.9959			
399.9	400.2	0.9994			
200.0	200.0	0.9998			
			Slope	0.995521	0.90 - 1.10
			Intercept	0.714375	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

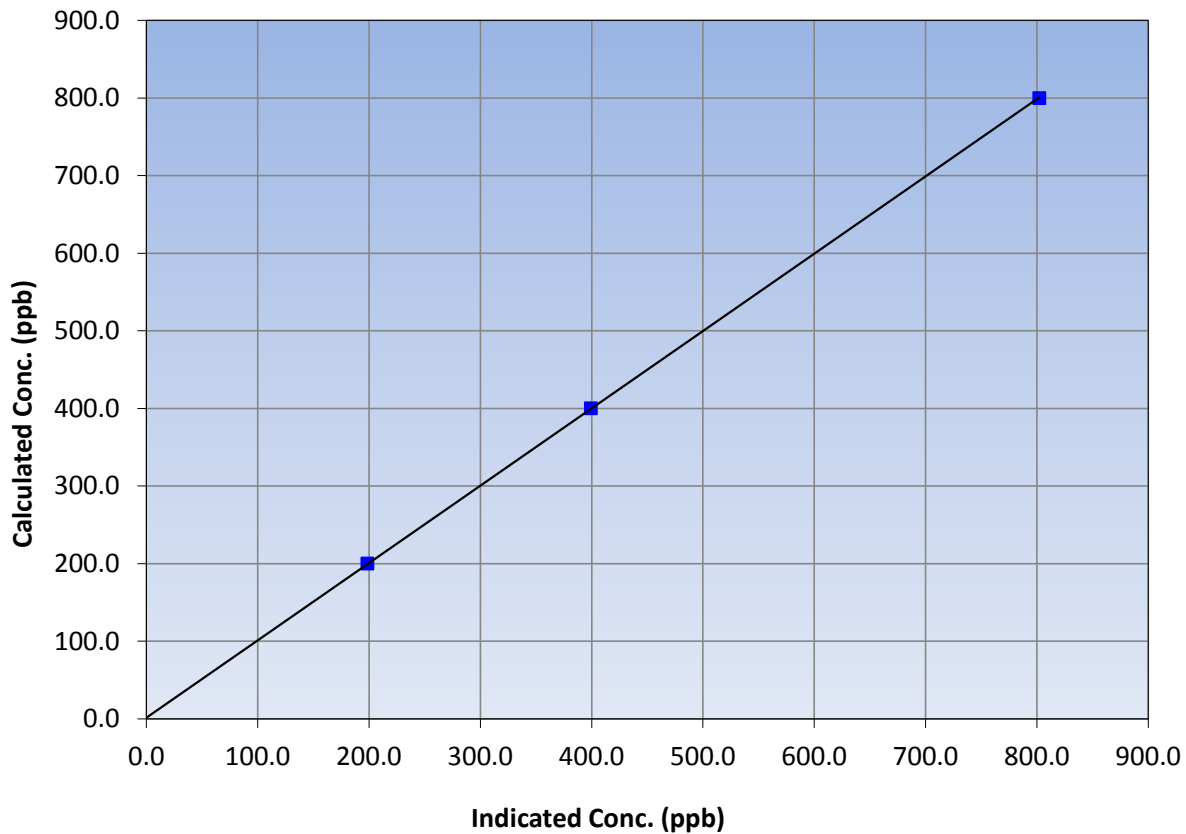
Station Information

Calibration Date	June 28, 2017	Previous Calibration	May 23, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	9:54	End Time (MST)	13:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.3	----	Correlation Coefficient	0.999992	≥0.995
799.8	802.1	0.9971			
399.9	399.2	1.0019	Slope	0.996239	0.90 - 1.10
200.0	198.6	1.0068			
			Intercept	1.334285	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

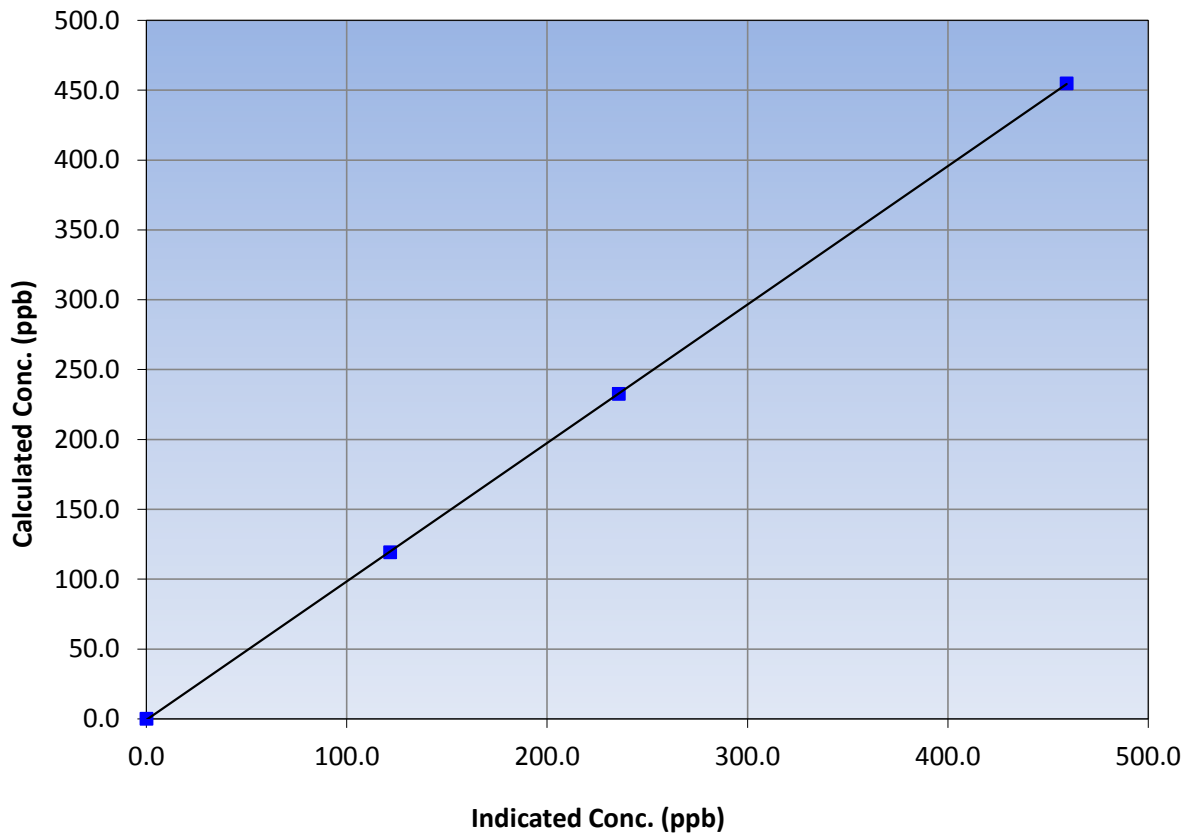
Station Information

Calibration Date	June 28, 2017	Previous Calibration	May 23, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	9:54	End Time (MST)	13:50
Analyzer make	Thermo 42i	Analyzer serial #	1505164379

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
454.9	459.3	0.9904			
232.6	235.8	0.9864			
119.2	121.6	0.9803			
			Slope	0.991050	0.90 - 1.10
			Intercept	-0.672732	+/-20

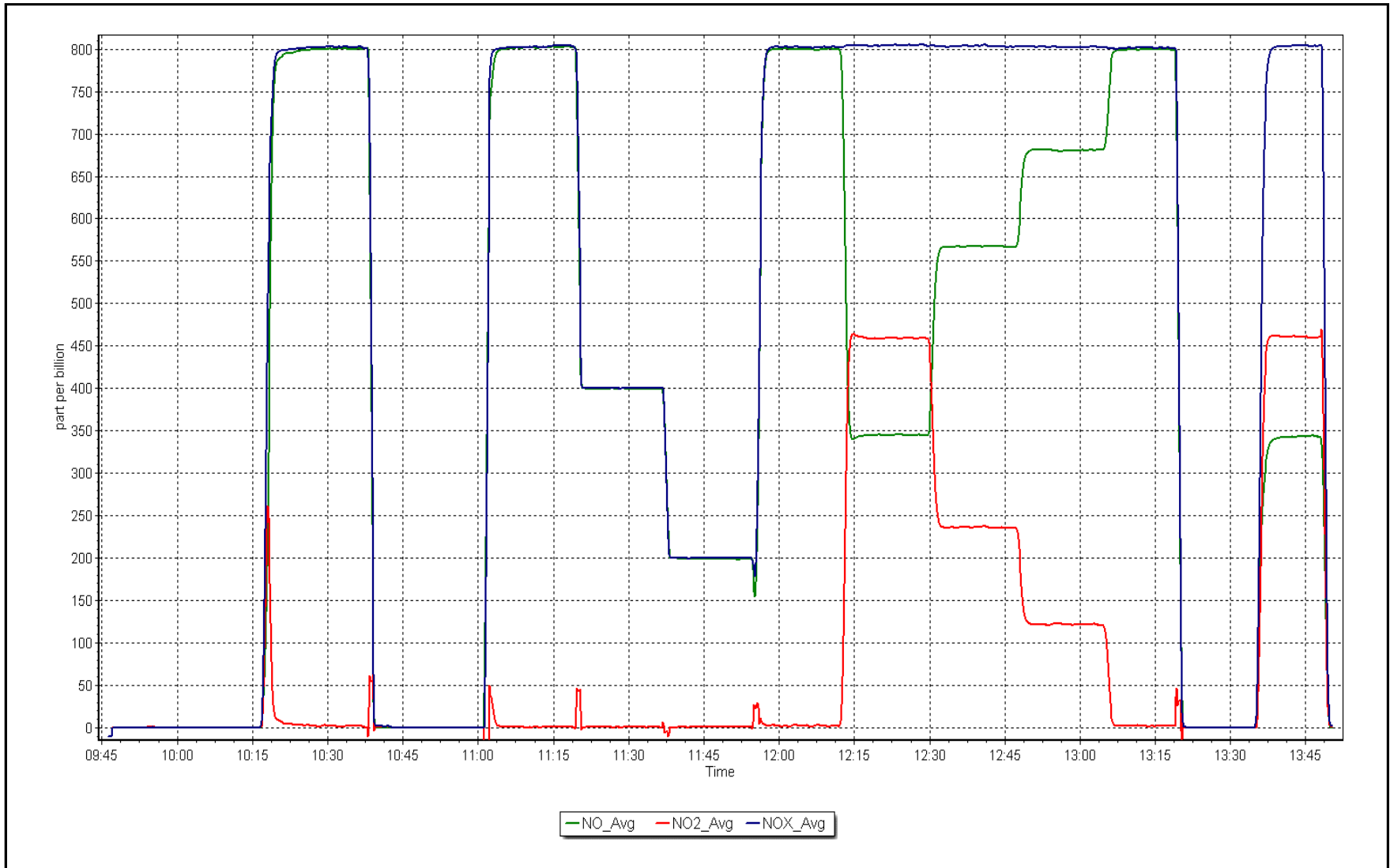
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 28, 2017

Location: MacKay River





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 21
CONKLIN COMMUNITY
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	682	35	38	99.58	3	0	1	0
TRS(ppb) Average	683	33	37	99.44	1	0	0	0
THC(ppm) Average	683	35	37	99.72	2.5	-	2.1	-
NMHC(ppm) Average	683	35	37	99.72	0.099	-	0.011	-
CH4(ppm) Average	683	35	37	99.72	2.5	-	2.1	-
O3 (ppb) Average	684	33	36	99.58	66	0	49	-
NO2 (ppb) Average	658	35	62	96.25	19	0	5	-
NO (ppb) Average	658	35	62	96.25	32	-	4	-
NOX (ppb) Average	658	35	62	96.25	41	-	8	-
PM2.5 (ug/m3) Average	717	1	3	99.72	57	-	11.8	0
Wind Speed 10 m (km/h) Average	716	0	4	99.44	22	-	14	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	26.5	-	20.2	-
Relative Humidity (%) Average	720	0	0	100	99	-	93.0	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	682	0.2	0	-	0	0	0	0	0	0	0	3
TRS (ppb) Average	683	0.3	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	683	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2.1	2.1	2.5
NMHC(ppm) Average	683	0.001	0.007	-	0	0	0	0	0	0	0	0.099
CH4(ppm) Average	683	1.94	0.1	-	1.8	1.9	1.9	1.9	2	2.1	2.1	2.5
O3 (ppb) Average	684	31.5	14	-	6	10	22	33	41	48	48	66
NO2 (ppb) Average	658	2.1	3	-	0	0	1	1	2	6	6	19
NO (ppb) Average	658	1.1	3	-	0	0	0	0	1	3	3	32
NOX (ppb) Average	658	3.3	5	-	0	0	1	1	4	10	10	41
PM2.5 (ug/m3) Average	717	5.49	5.8	-	0.2	1.3	2.5	4.2	6.3	9.9	9.9	57
Wind Speed 10 m (km/h) Average	716	6.7	5	-	0	2	3	6	9	13	13	22
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	14.17	5.3	-	0.5	7.4	10.4	13.7	17.8	21.9	21.9	26.5
Relative Humidity (%) Average	720	69.4	23	-	22	35	49	74	90	97	97	99

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC, O3, NOX	19 Jun 2017 16:00	19 Jun 2017 16:00	1	Maintenance - sample manifold cleaned
SO2	09 Jun 2017 09:00	09 Jun 2017 10:00	2	Maintenance - WBEA internal audit
TRS	09 Jun 2017 10:00	09 Jun 2017 11:00	2	Maintenance - WBEA internal audit
TRS	22 Jun 2017 12:00	22 Jun 2017 13:00	2	Maintenance - replaced calibration gas
THC	09 Jun 2017 12:00	09 Jun 2017 12:00	1	Maintenance - WBEA internal audit
O3	09 Jun 2017 13:00	09 Jun 2017 14:00	2	Maintenance - WBEA internal audit
NOX	08 Jun 2017 13:00	08 Jun 2017 15:00	3	Maintenance - WBEA internal audit
NOX	30 Jun 2017 02:00	01 Jul 2017 00:00	23	Analyzer Failure - pump failure
PM2.5	28 Jun 2017 14:00	28 Jun 2017 15:00	2	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	08 Jun 2017 00:00	08 Jun 2017 00:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Jun 2017 23:00	08 Jun 2017 23:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	17 Jun 2017 21:00	17 Jun 2017 21:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jun 2017 23:00	30 Jun 2017 23:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 3 ppb on Jun 4 10:00	Maximum Daily Average: 0.6 ppb on Jun 26		Hours of Data:	682
Minimum Value: 0 ppb on Jun 1 17:00	Minimum Daily Average: 0.1 ppb on Jun 29		Hours of Missing Data:	38
Maximum Diurnal Average: 0.4 ppb at hour 9	Minimum Diurnal Average: 0.1 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
2-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	Z	0	0	0	1	3	1	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0.5	3
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
7-Jun	0	Z	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	0	1	0	0	0	0.4	1
8-Jun	0	0	Z	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
9-Jun	0	0	0	Z	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
12-Jun	Z	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0.3	1
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jun	0	0	0	0	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Jun	0	0	0	0	0	Z	0	0	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0.4	1
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	1	0	Z	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	0	1	1	1	2	0	0	0.6	2
27-Jun	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0

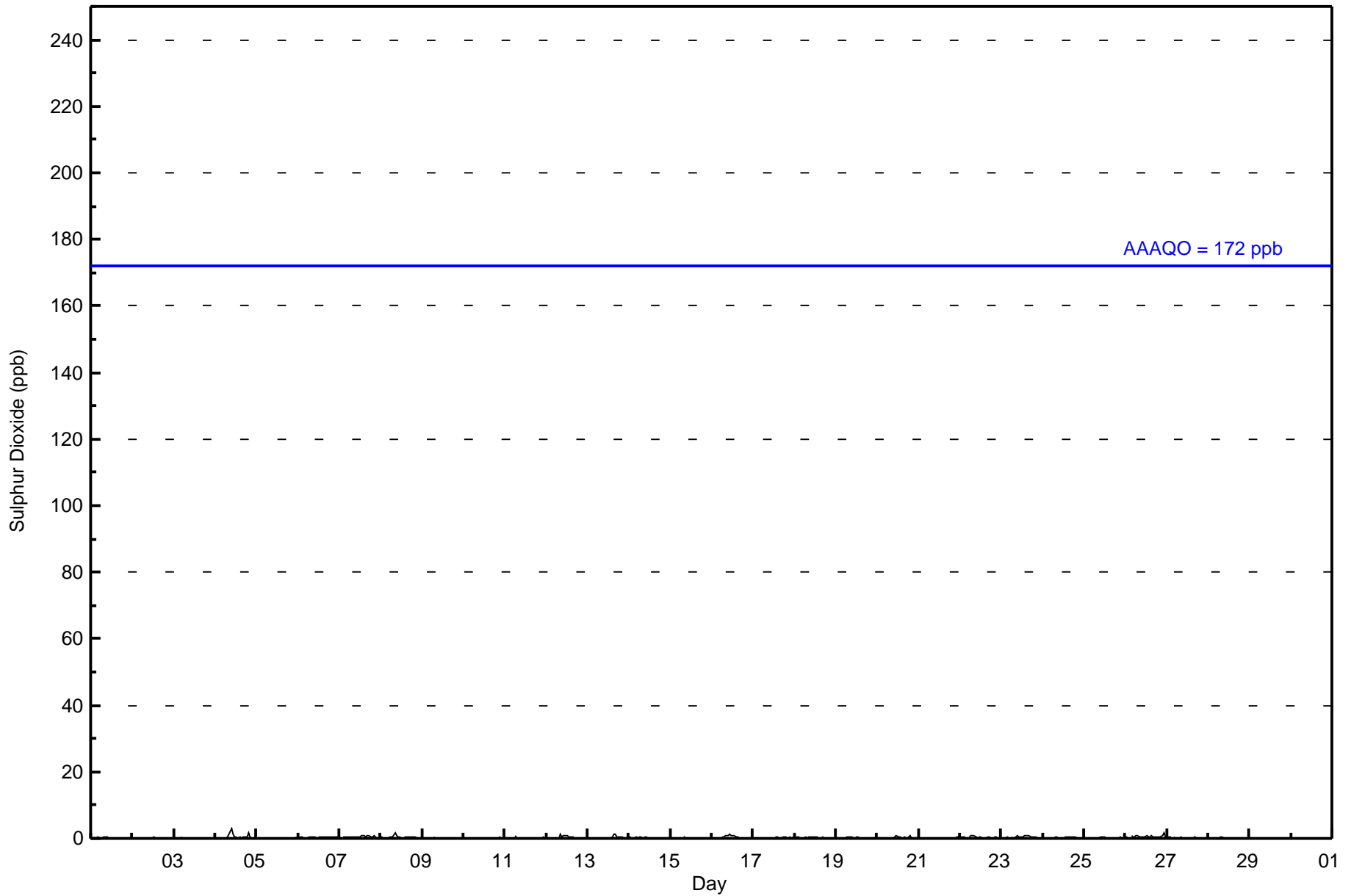
0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
1	0	0	1	1	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1	2	1	1	2	0	0	Diurnal Maximum	

Z - zeronspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	682	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



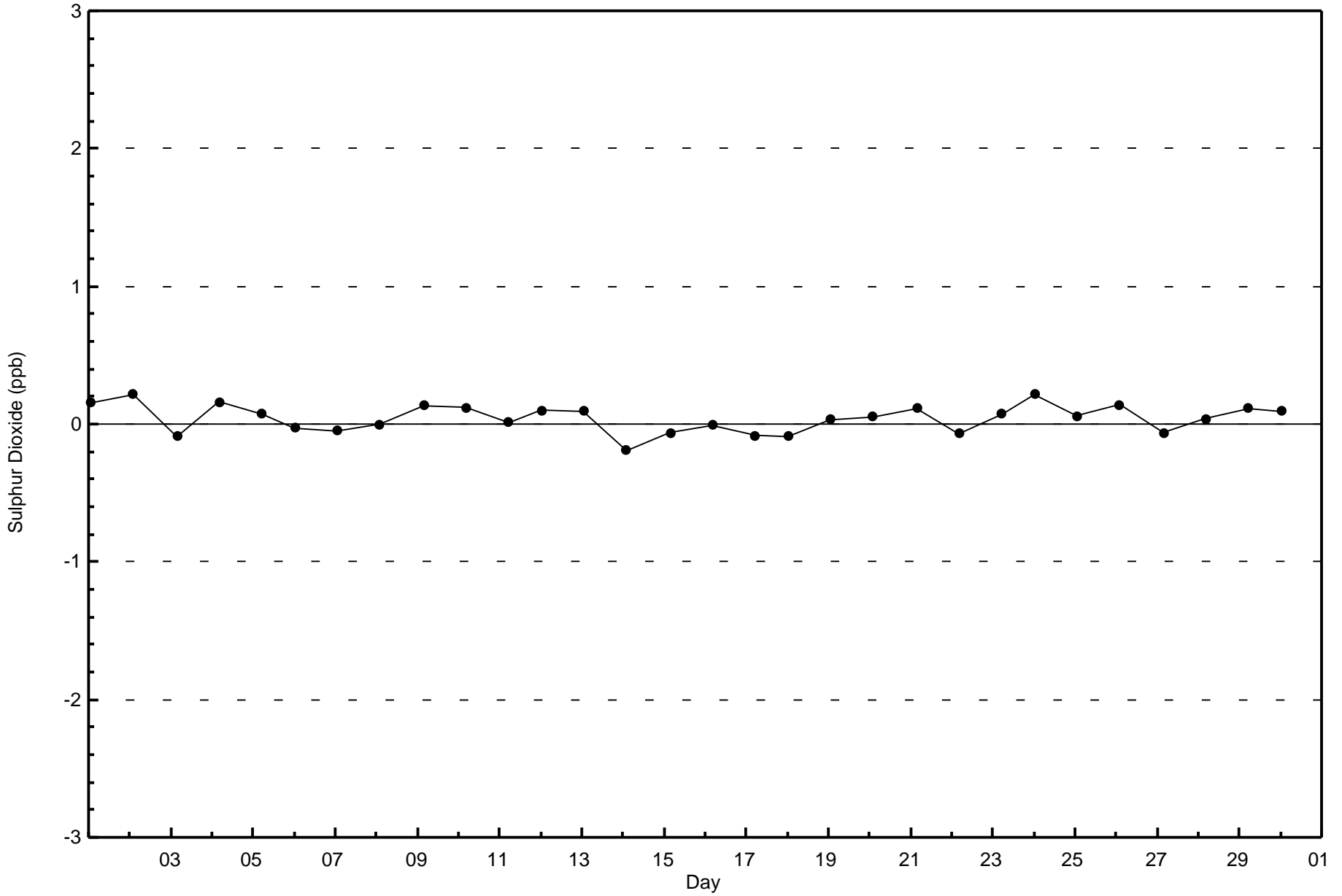
**Wood Buffalo Environmental Association
Frequency Distribution**

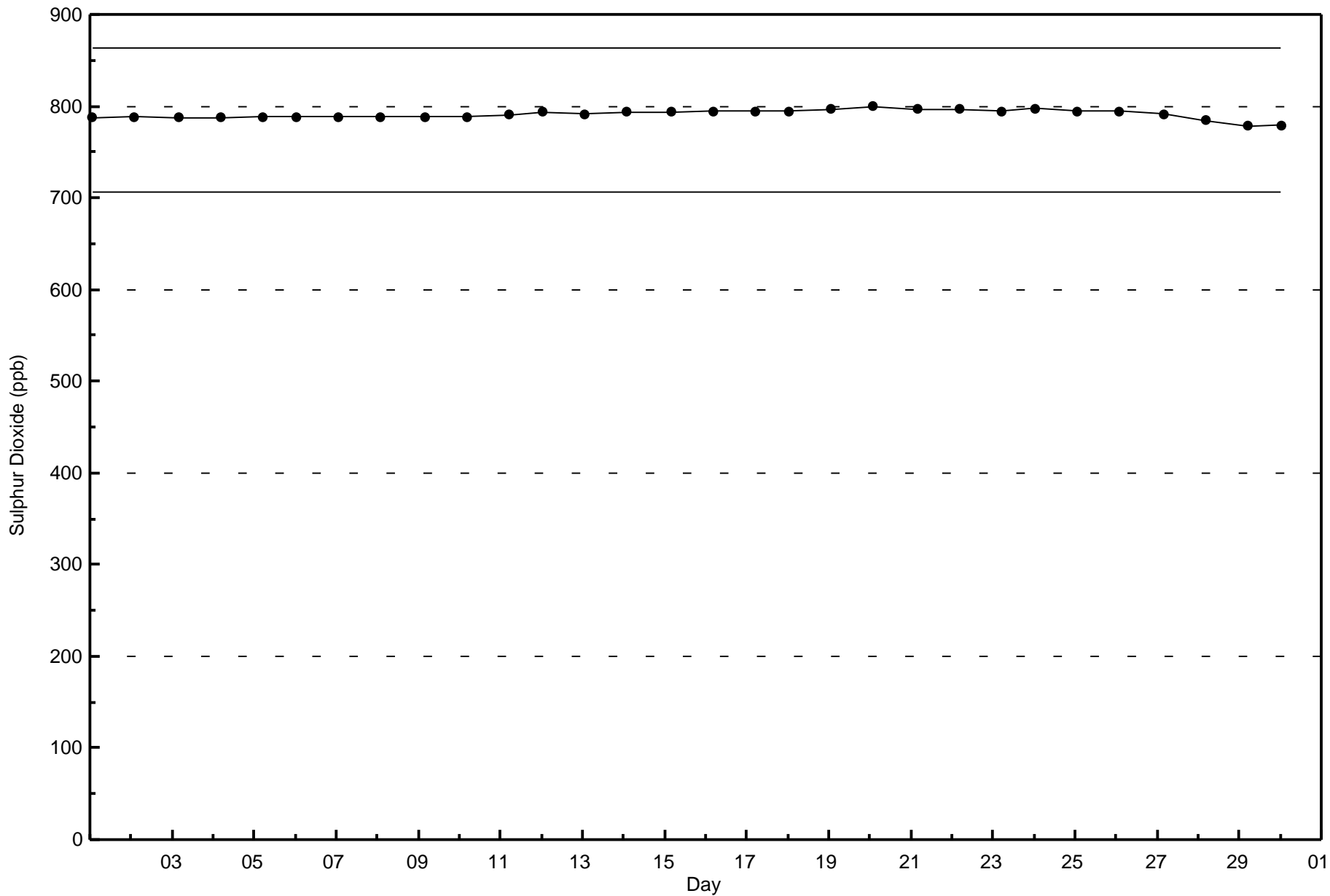
**Sulphur Dioxide (SO₂) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	36	18	11	12	30	32	65	59	56	37	28	36	58	83	78	678
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	36	18	11	12	30	32	65	59	56	37	28	36	58	83	78	678

Total Number of Valid Hours: 678

Total Number of Hours: 720







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 20 10:00	Maximum Daily Average: 0.4 ppb on Jun 26		Hours of Data:	683
Minimum Value: 0 ppb on Jun 29 03:00	Minimum Daily Average: 0.3 ppb on Jun 10		Hours of Missing Data:	37
Maximum Diurnal Average: 0.4 ppb at hour 22	Minimum Diurnal Average: 0.3 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
9-Jun	0	0	0	0	Z	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0.3	0
20-Jun	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0.4	0
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0

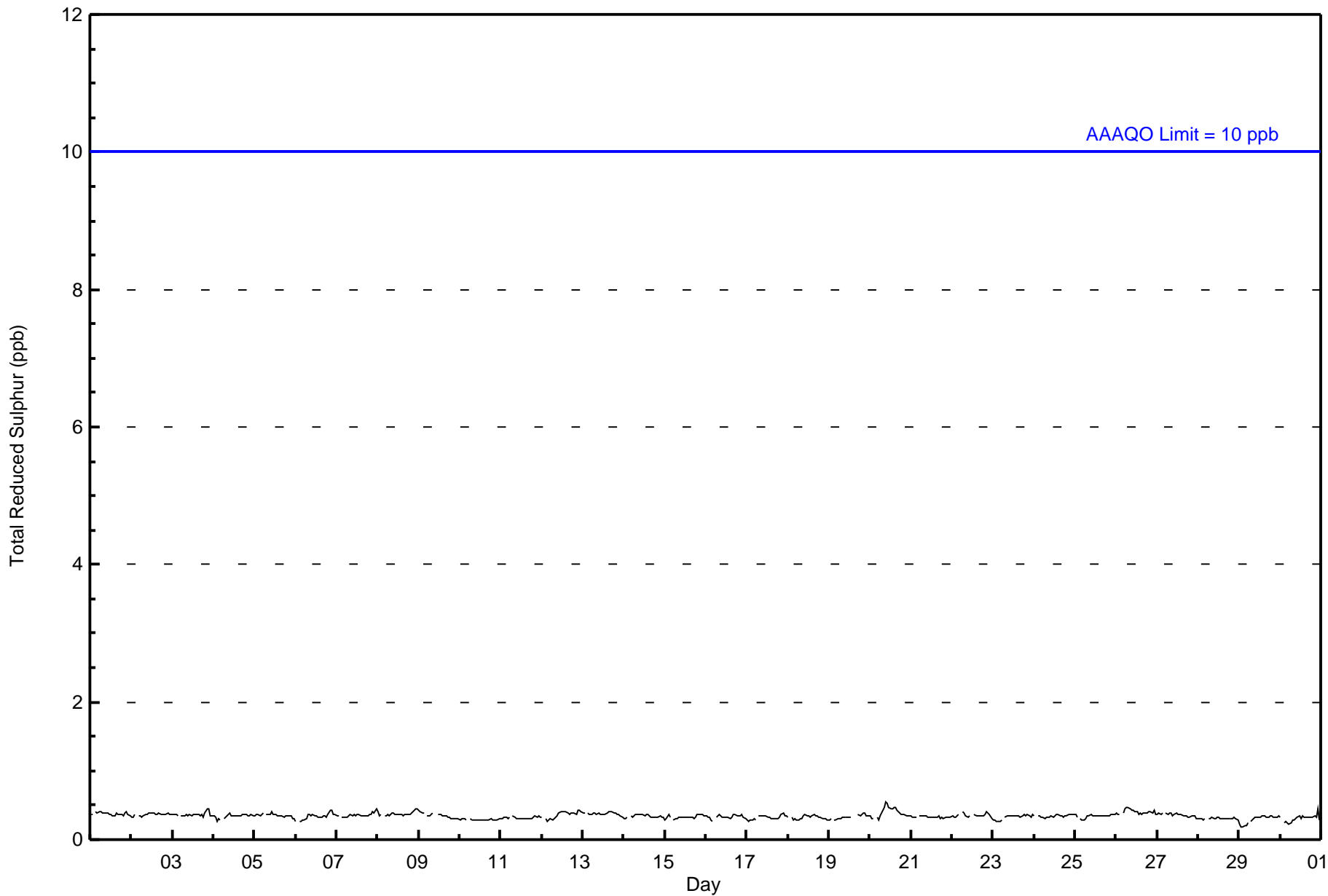
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	Diurnal Average
0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	683	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



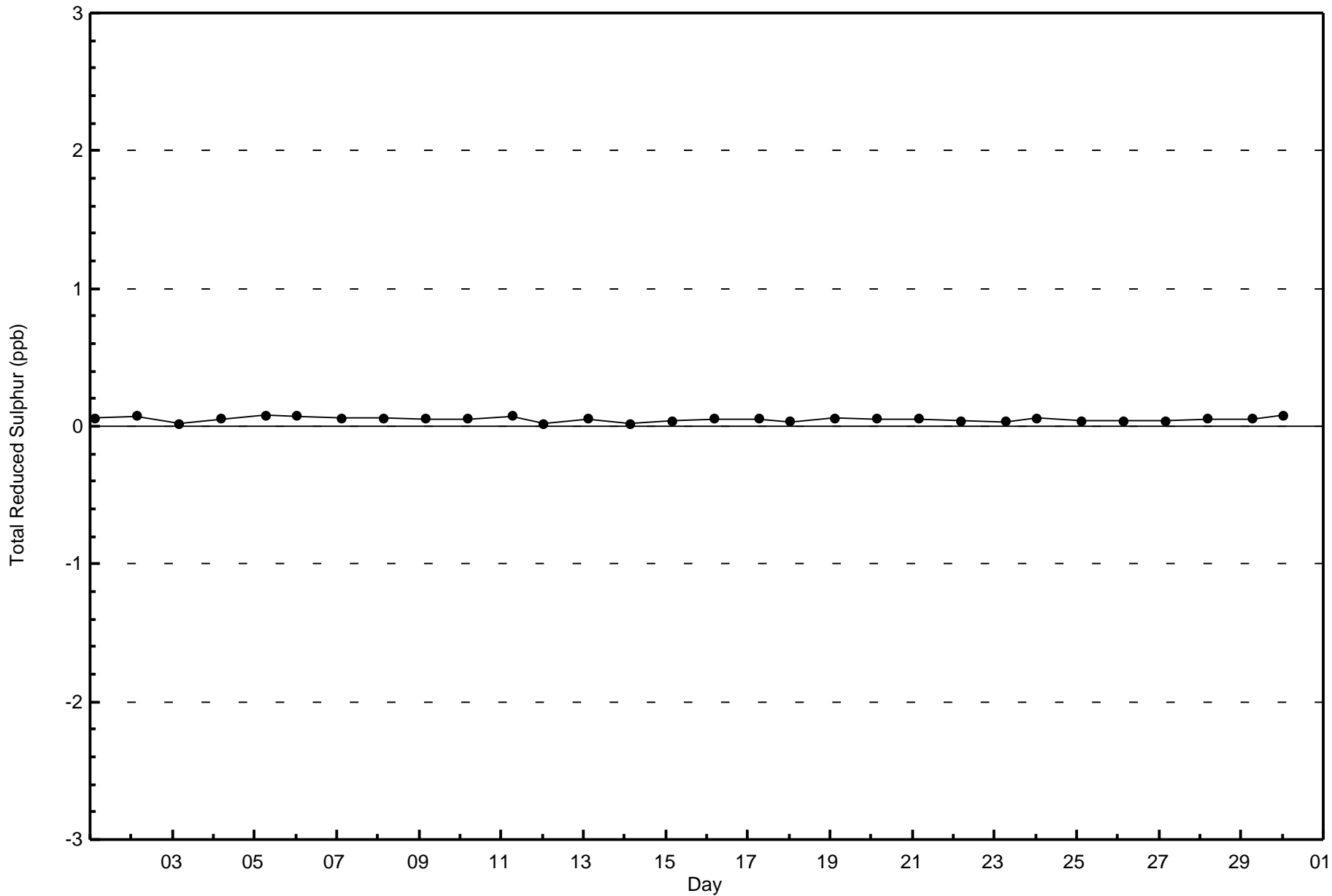
Wood Buffalo Environmental Association
Frequency Distribution

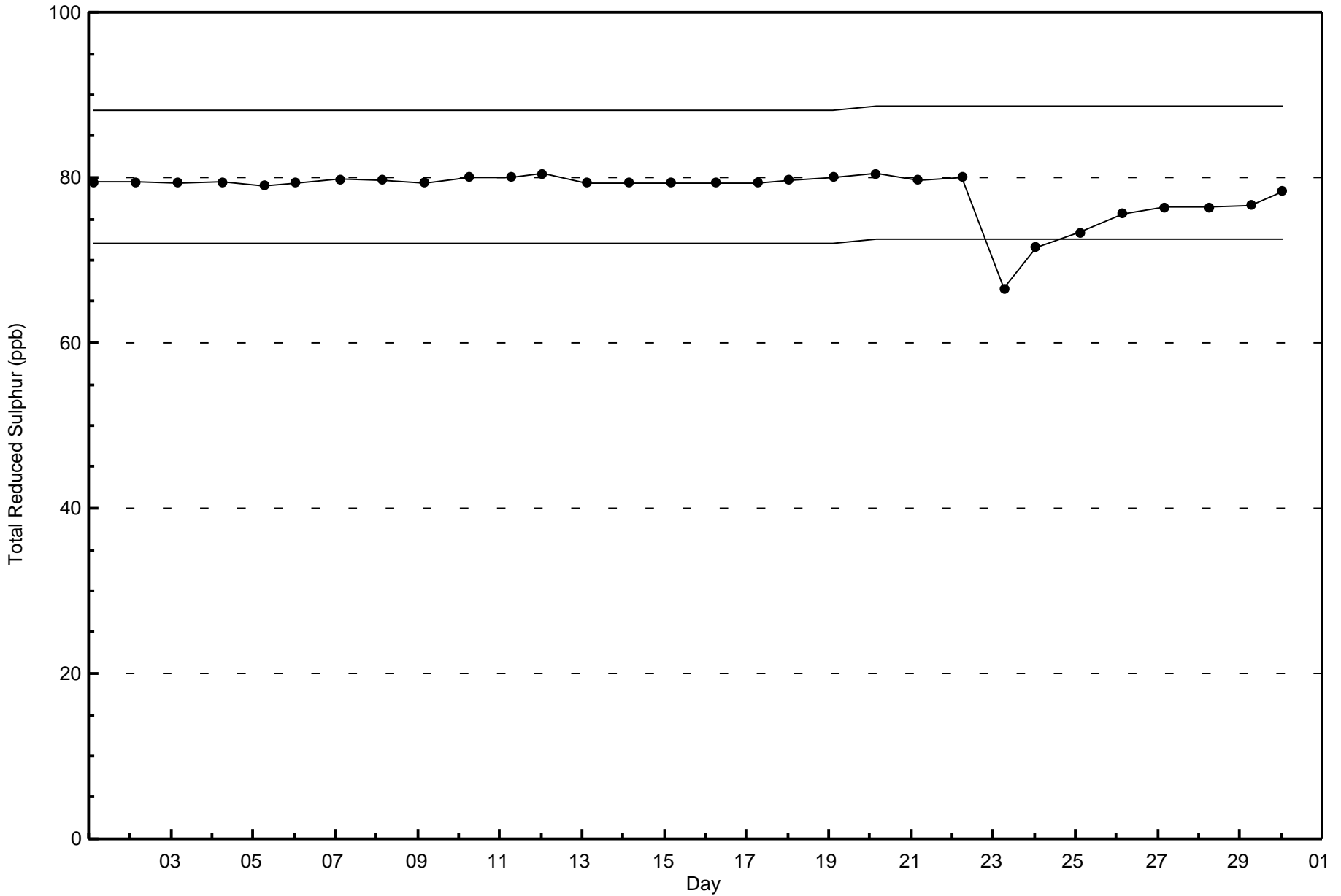
Total Reduced Sulphur (TRS) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	39	34	19	10	13	29	33	63	63	57	37	27	37	59	83	76	679
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	34	19	10	13	29	33	63	63	57	37	27	37	59	83	76	679

Total Number of Valid Hours: 679

Total Number of Hours: 720





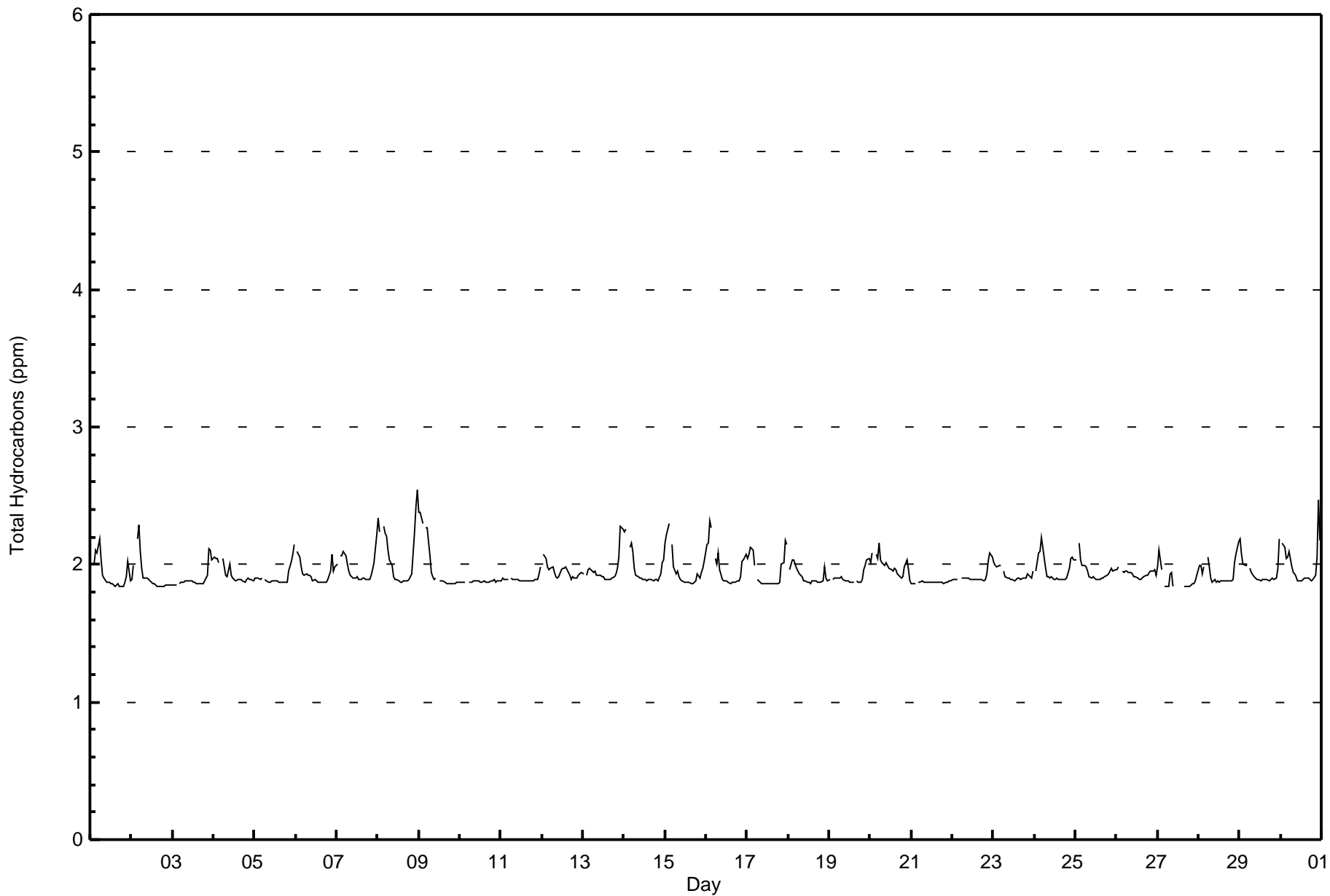


Maximum Value: 2.5 ppm on Jun 9 00:00	Maximum Daily Average: 2.1 ppm on Jun 8	Hours in Service: 720
Minimum Value: 1.8 ppm on Jun 2 19:00	Minimum Daily Average: 1.9 ppm on Jun 21	Hours of Data: 683
Maximum Diurnal Average: 2.0 ppm at hour 2	Minimum Diurnal Average: 1.9 ppm at hour 18	Hours of Missing Data: 37
Monthly Average: 1.94 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.3	Hours of Calibration: 35
		Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1.9	Z	2.0	2.1	2.1	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	2.2	
2-Jun	1.9	2.0	Z	2.2	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.3	
3-Jun	1.8	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.0	1.9	2.1	
4-Jun	2.1	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
5-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	1.9	2.1
6-Jun	Z	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	1.9	2.1
7-Jun	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.0	2.2	
8-Jun	2.3	2.2	Z	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.4	2.5	2.1	2.5	
9-Jun	2.4	2.4	2.3	Z	2.3	2.3	2.1	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4	
10-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
11-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
12-Jun	Z	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	
13-Jun	1.9	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.3	2.3	2.0	2.3	
14-Jun	2.2	2.3	Z	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.3
15-Jun	2.2	2.2	2.3	Z	2.1	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.3
16-Jun	2.1	2.2	2.3	2.3	Z	2.0	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.3	
17-Jun	2.0	2.1	2.1	2.1	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.1	1.9	2.2
18-Jun	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0
19-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	
20-Jun	2.0	2.1	Z	2.1	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.2
21-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	1.9	2.1	
23-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
24-Jun	Z	2.0	2.1	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.2
25-Jun	2.0	Z	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.2
26-Jun	2.0	2.0	Z	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.9	2.0
27-Jun	2.0	2.1	2.0	Z	1.8	1.8	1.8	1.9	1.9	1.8	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.1
28-Jun	2.0	2.0	1.9	2.0	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	1.9	2.2	
29-Jun	2.2	2.1	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	1.9	2.2
30-Jun	Z	2.2	2.1	2.0	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.5	2.2	2.0	2.5	

2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	Diurnal Average		
2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.2	2.5	2.5	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	600	87.85	87.85
2.1 - 3.0	83	12.15	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Conklin - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	35	36	18	11	13	28	25	58	52	41	34	22	35	54	71	66	599
2.1 - 3.0	4	0	0	0	0	2	7	7	7	15	3	6	1	4	12	12	80
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	36	18	11	13	30	32	65	59	56	37	28	36	58	83	78	679

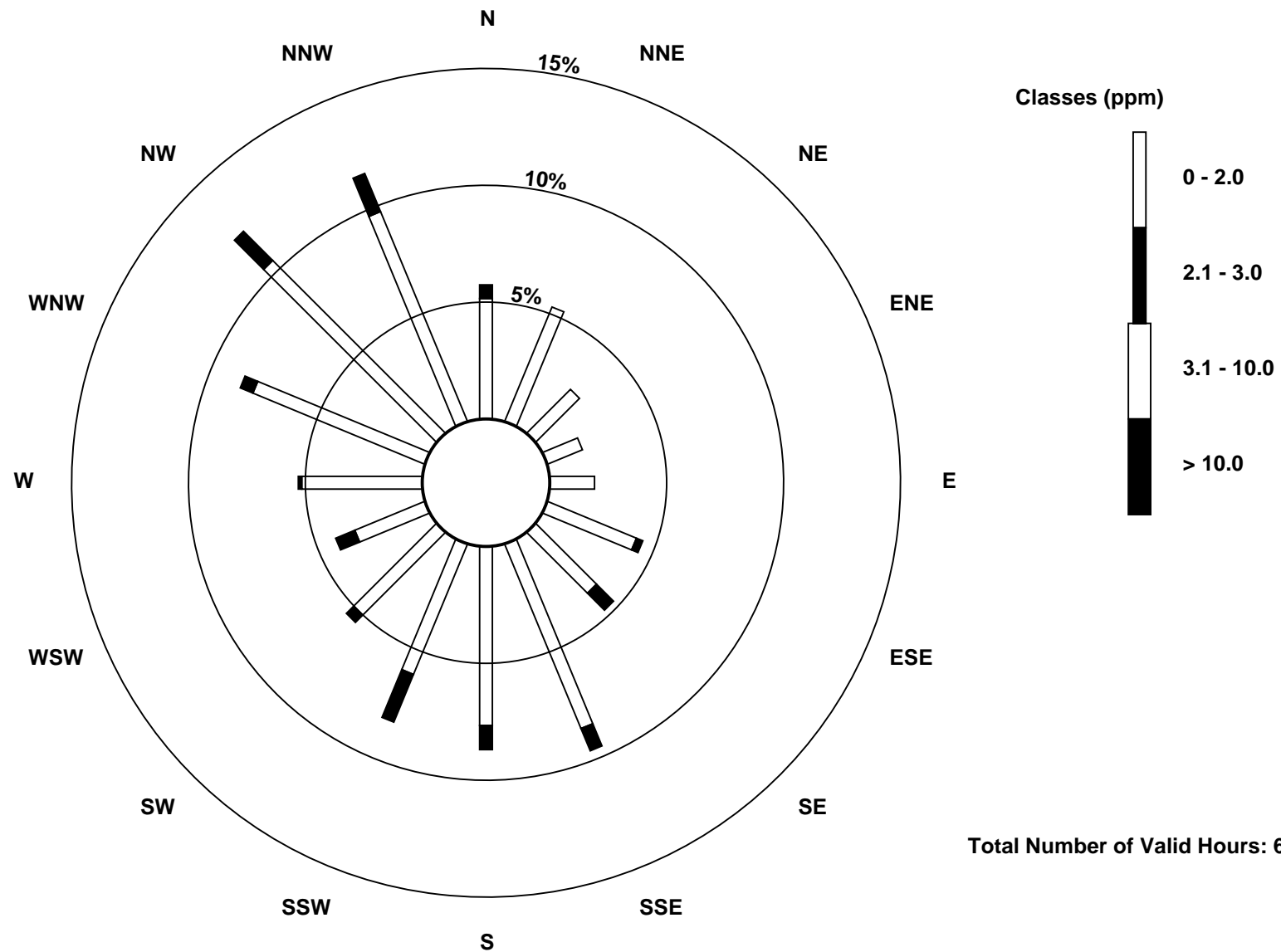
Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Conklin (AMS 21)



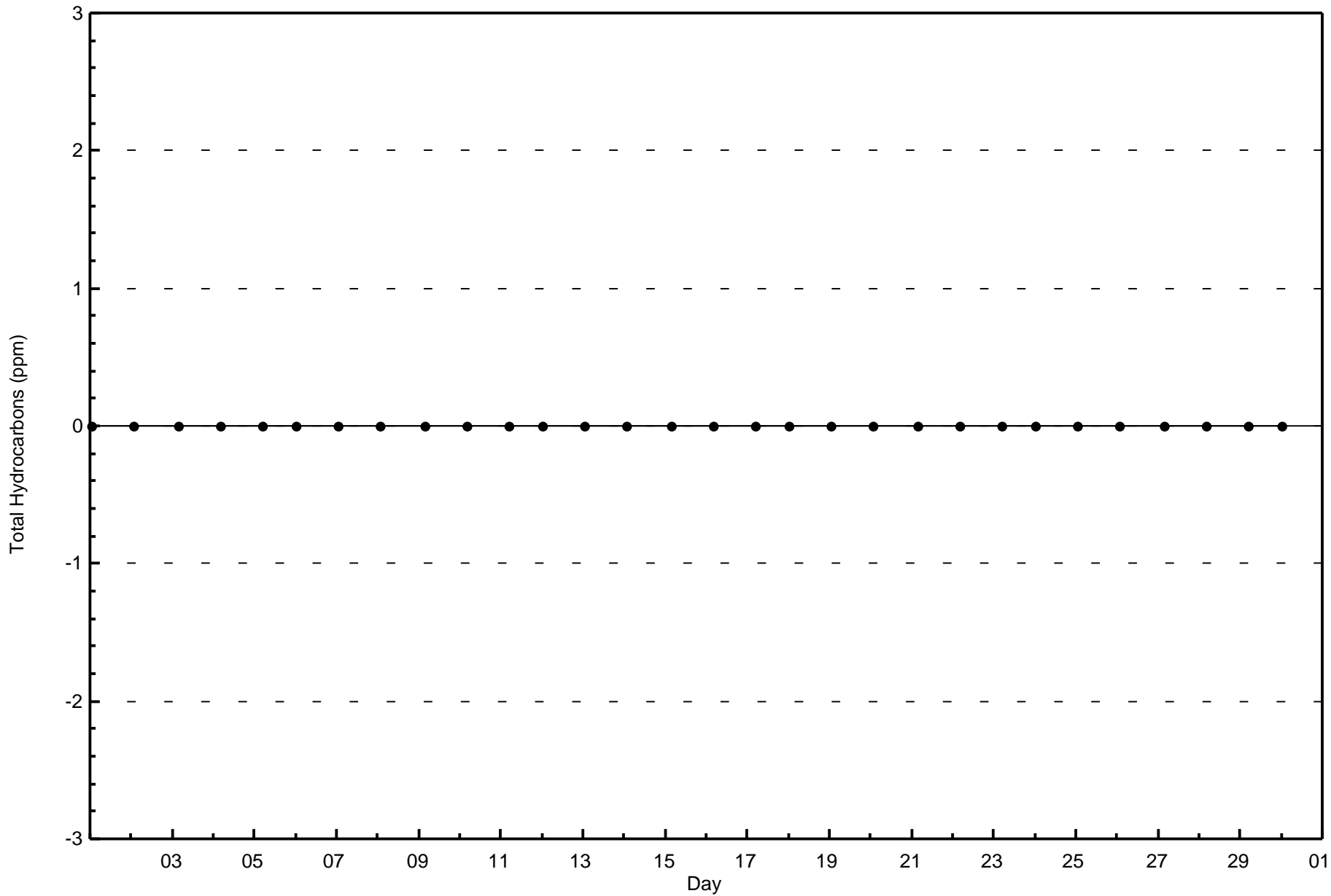


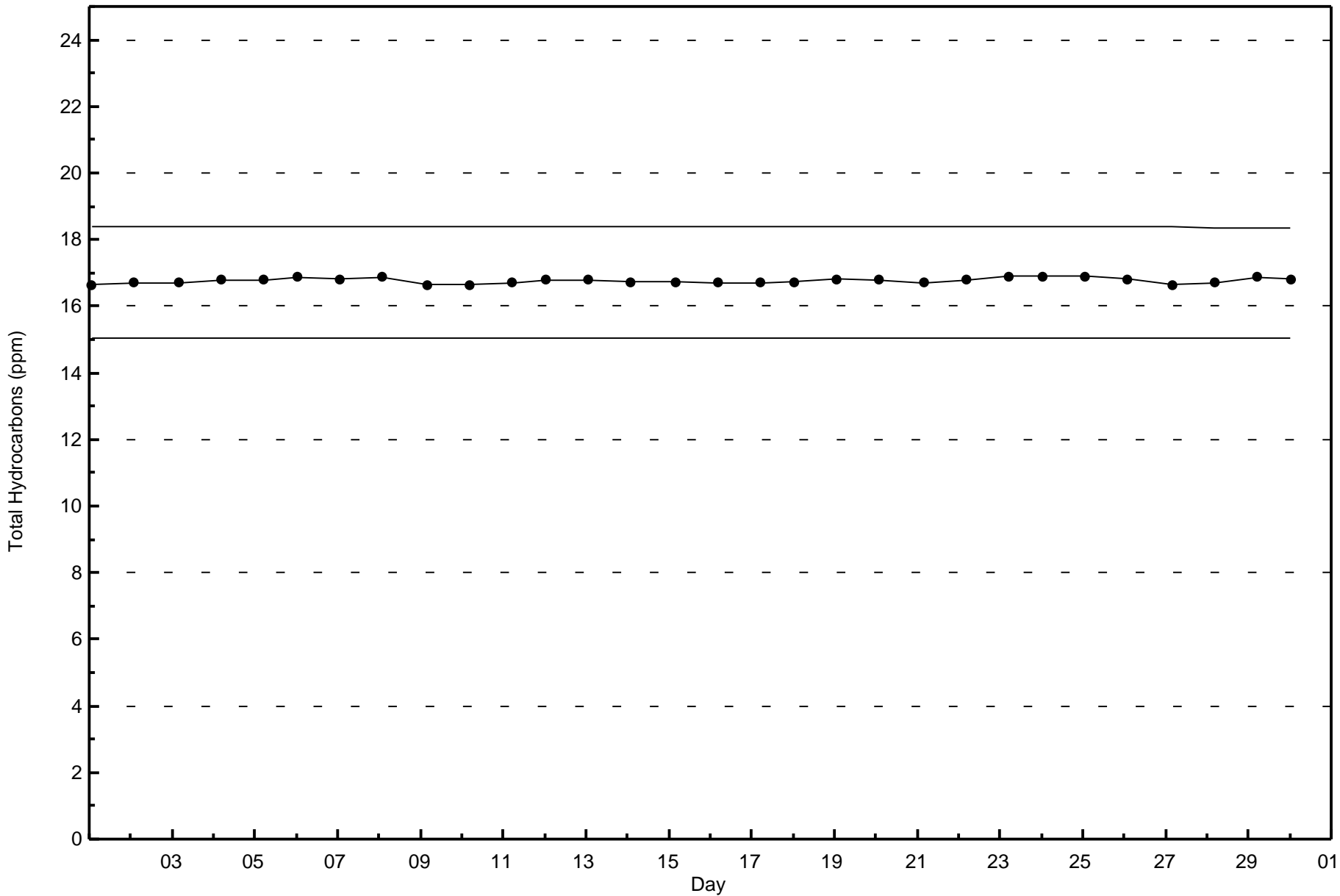
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Conklin - June 2017





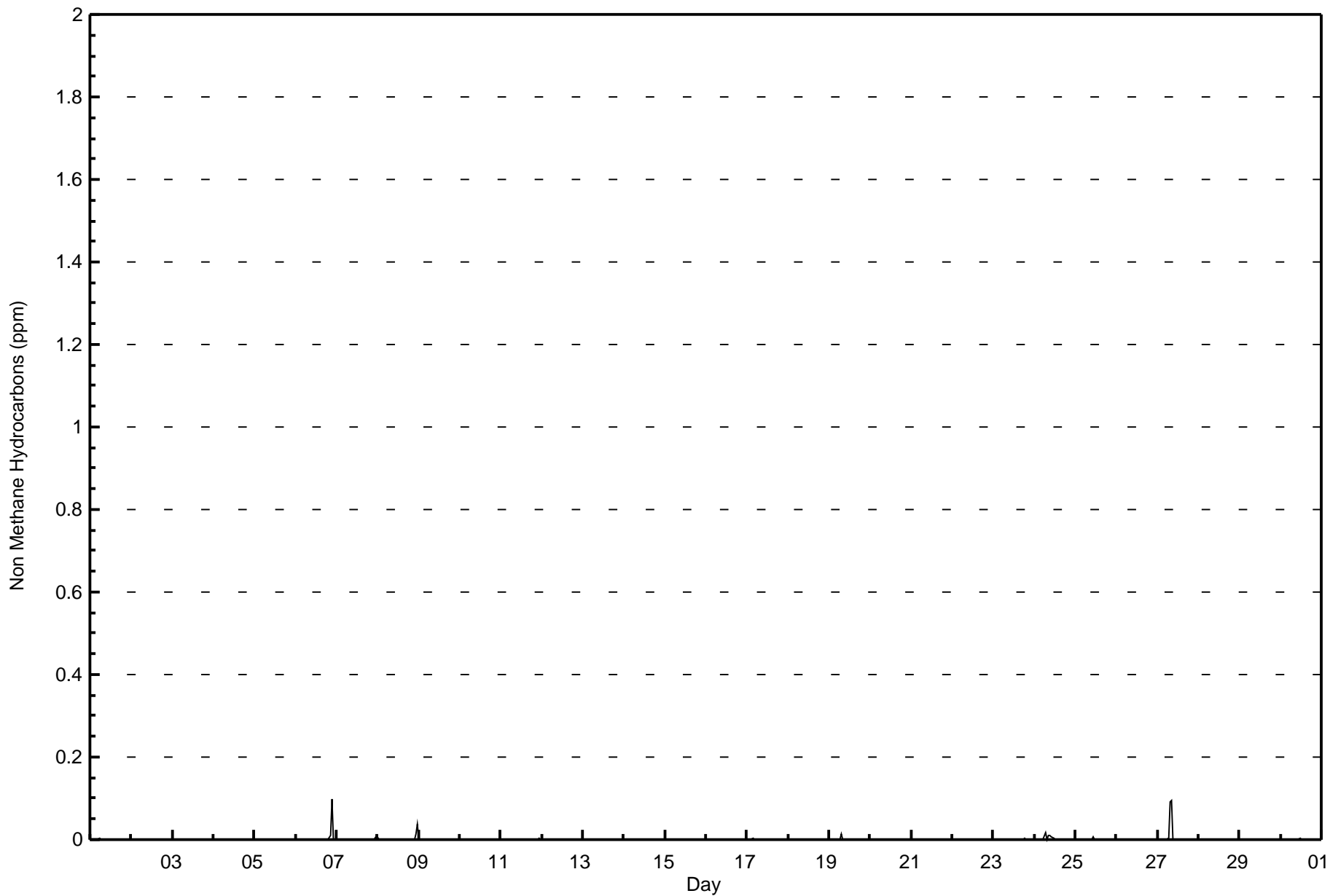


Maximum Value: 0.099 ppm on Jun 6 22:00	Maximum Daily Average: 0.011 ppm on Jun 27	Hours in Service: 720
Minimum Value: 0.000 ppm on Jun 1 01:00	Minimum Daily Average: 0.000 ppm on Jun 2	Hours of Data: 683
Maximum Diurnal Average: 0.004 ppm at hour 9	Minimum Diurnal Average: 0.000 ppm at hour 2	Hours of Missing Data: 37
Monthly Average: 0.001 ppm	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0	Hours of Calibration: 35
		Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	0.000	Z	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005
2-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
6-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.099	0.002	0.000	0.000	0.000	0.005	0.099
7-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.001	0.012
8-Jun	0.003	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.037	0.002	0.003	0.037
9-Jun	0.003	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
10-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.004
12-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
17-Jun	0.000	0.000	0.000	0.003	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
18-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.001	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013
20-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
24-Jun	Z	0.000	0.000	0.000	0.001	0.000	0.017	0.000	0.011	0.009	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.017
25-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
26-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.004	0.092	0.096	0.000	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.096
28-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002

0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.002	Diurnal Average			
0.003	0.000	0.000	0.003	0.001	0.005	0.017	0.092	0.096	0.009	0.007	0.003	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.011	0.099	0.014	0.037	Diurnal Maximum		

Z - zerospan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Conklin - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	670	98.10	98.10
0.006 - 0.05	10	1.46	99.56
0.06 - 0.1	3	0.44	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



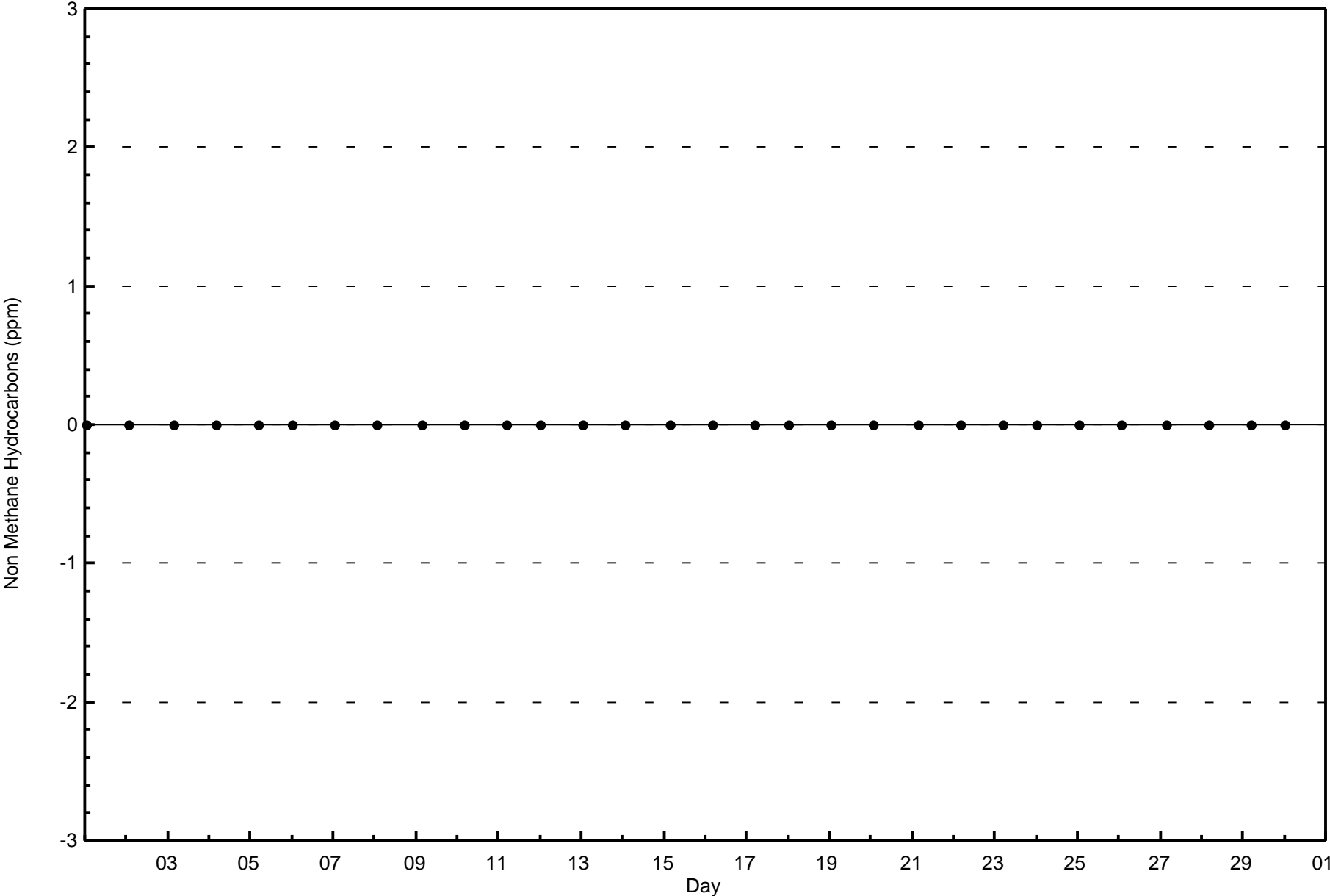
**Wood Buffalo Environmental Association
Frequency Distribution**

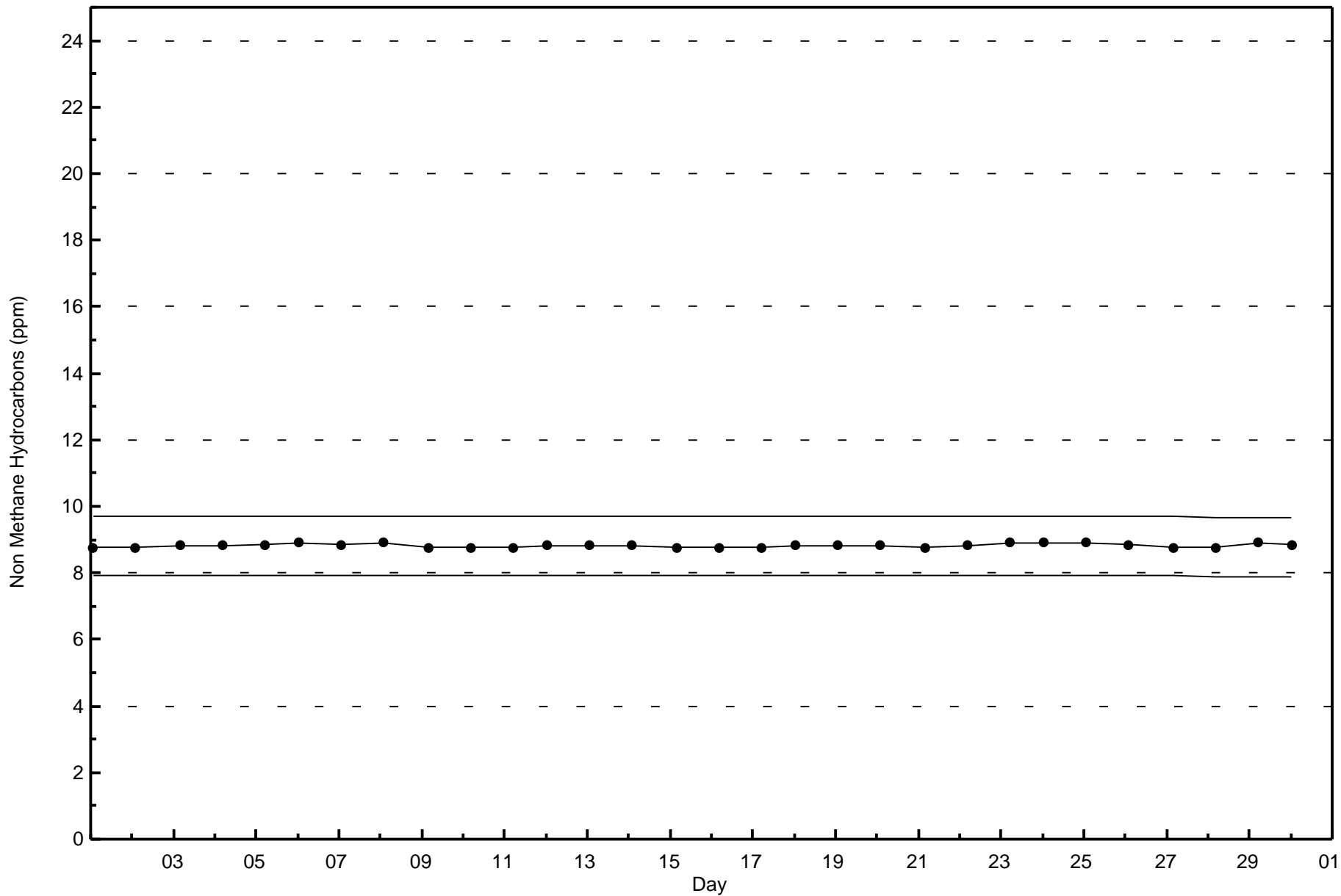
**Non Methane Hydrocarbons (NMHC) - ppm
Conklin - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	39	36	18	11	13	30	32	65	59	54	37	27	35	54	81	77	668
0.006 - 0.05	0	0	0	0	0	0	0	0	0	1	0	1	1	3	1	1	8
0.06 - 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	3
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	36	18	11	13	30	32	65	59	56	37	28	36	58	83	78	679

Total Number of Valid Hours: 679

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Conklin - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.5 ppm on Jun 9 00:00	Maximum Daily Average: 2.1 ppm on Jun 8		Hours of Data:	683
Minimum Value: 1.8 ppm on Jun 27 07:00	Minimum Daily Average: 1.9 ppm on Jun 21		Hours of Missing Data:	37
Maximum Diurnal Average: 2.0 ppm at hour 2	Minimum Diurnal Average: 1.9 ppm at hour 18		Hours of Calibration:	35
Monthly Average: 1.94 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.3		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1.9	Z	2.0	2.1	2.1	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.8	1.8	1.8	1.9	1.9	2.0	1.9	1.9	2.2	
2-Jun	1.9	2.0	Z	2.2	2.3	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.3	
3-Jun	1.8	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.0	1.9	2.1	
4-Jun	2.1	2.0	2.0	2.0	Z	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	
5-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	1.9	2.1
6-Jun	Z	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.1	
7-Jun	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.0	2.2	
8-Jun	2.3	2.2	Z	2.3	2.2	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	2.4	2.5	2.1	2.5	
9-Jun	2.4	2.4	2.3	Z	2.3	2.3	2.1	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.4	
10-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
11-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	
12-Jun	Z	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	
13-Jun	1.9	Z	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.3	2.3	2.0	2.3	
14-Jun	2.2	2.3	Z	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.3
15-Jun	2.2	2.2	2.3	Z	2.1	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.3
16-Jun	2.1	2.2	2.3	2.3	Z	2.0	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.3	
17-Jun	2.0	2.1	2.1	2.1	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.1	1.9	2.2
18-Jun	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0
19-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.0	
20-Jun	2.0	2.1	Z	2.1	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.2
21-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	1.9	2.1	
23-Jun	2.0	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
24-Jun	Z	2.0	2.1	2.1	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.0	2.0	2.2
25-Jun	2.0	Z	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.2
26-Jun	2.0	2.0	Z	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.9	2.0
27-Jun	2.0	2.1	2.0	Z	1.8	1.8	1.8	1.8	1.8	1.8	1.8	C	C	C	C	C	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.1
28-Jun	2.0	2.0	1.9	2.0	Z	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	1.9	2.2	
29-Jun	2.2	2.1	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	1.9	2.2	
30-Jun	Z	2.2	2.1	2.0	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.5	2.2	2.0	2.5	

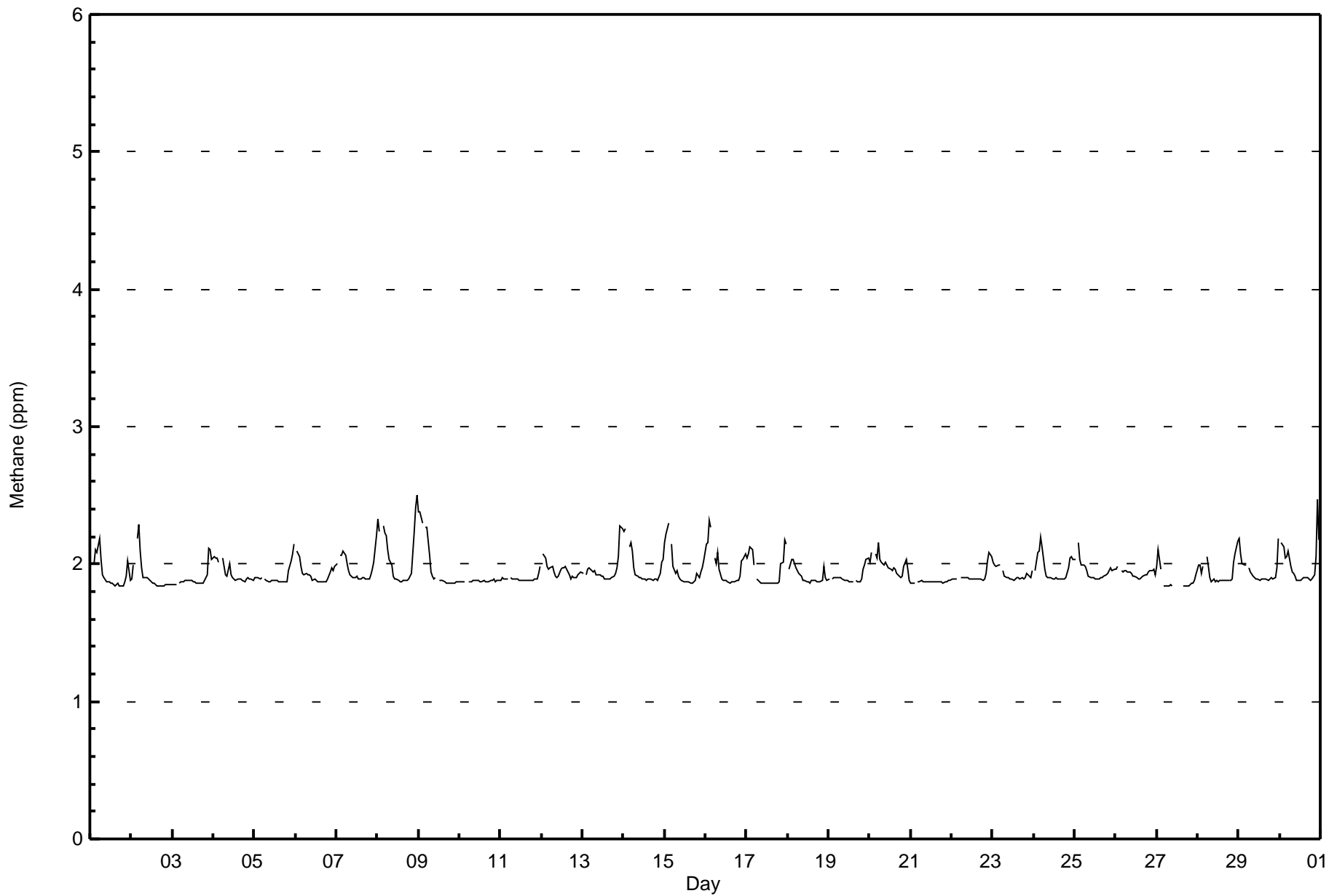
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	Diurnal Average		
2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.2	2.5	2.5	Diurnal Maximum	

Z - zerspan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Conklin - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	601	87.99	87.99
2.1 - 3.0	82	12.01	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	35	36	18	11	13	28	25	58	52	42	34	22	35	54	71	66	600
2.1 - 3.0	4	0	0	0	0	2	7	7	7	14	3	6	1	4	12	12	79
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	36	18	11	13	30	32	65	59	56	37	28	36	58	83	78	679

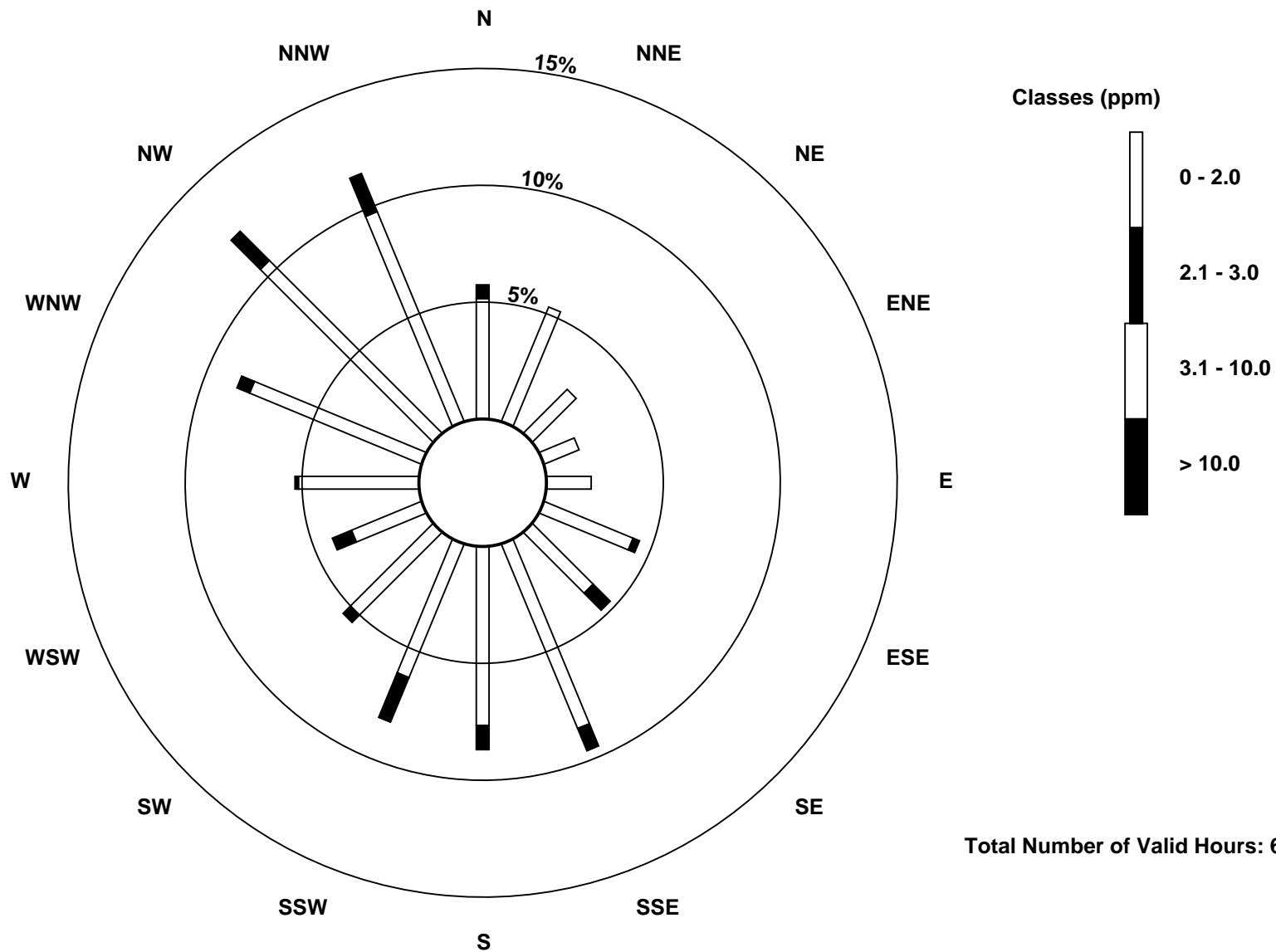
Total Number of Valid Hours: 679

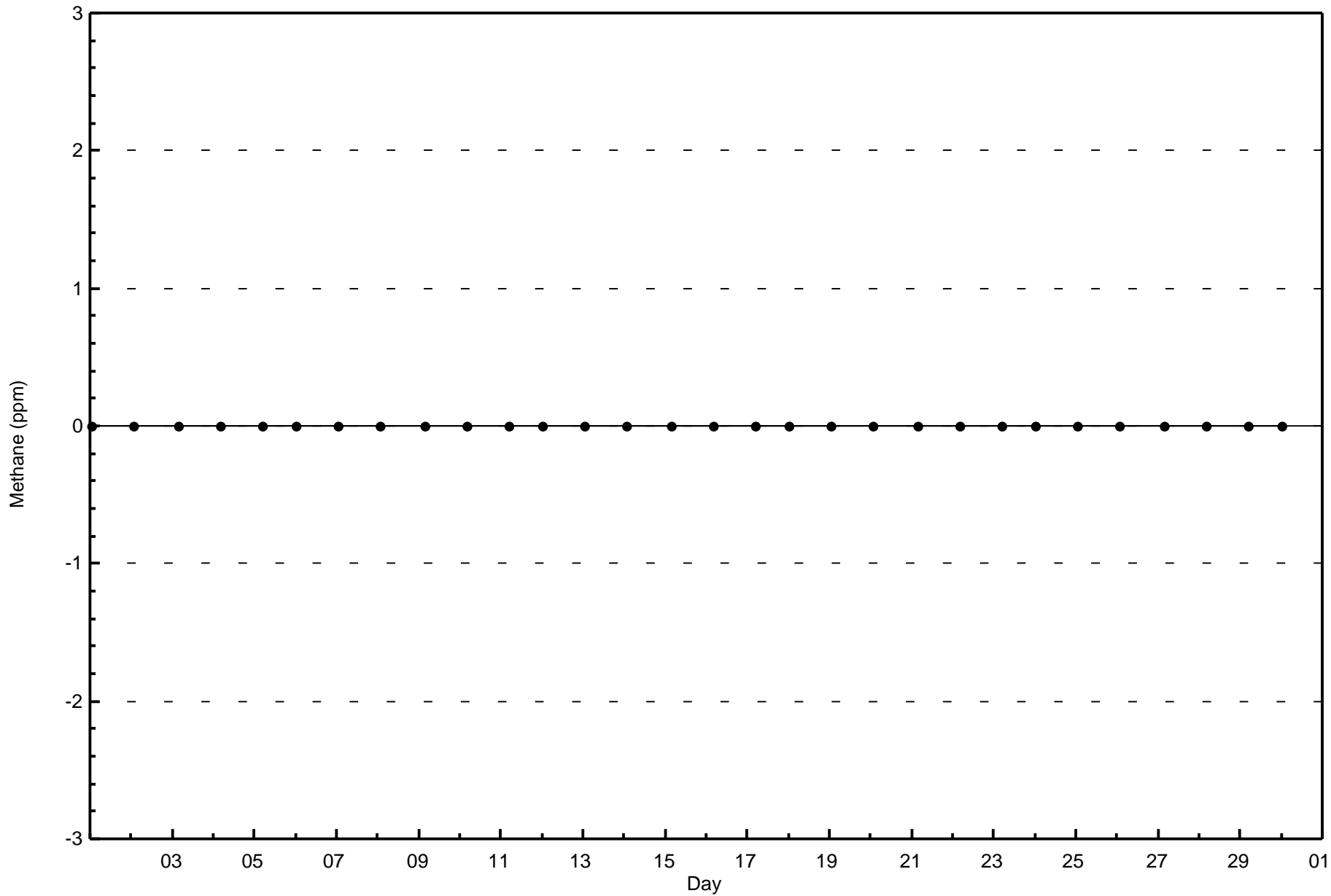
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Conklin (AMS 21)

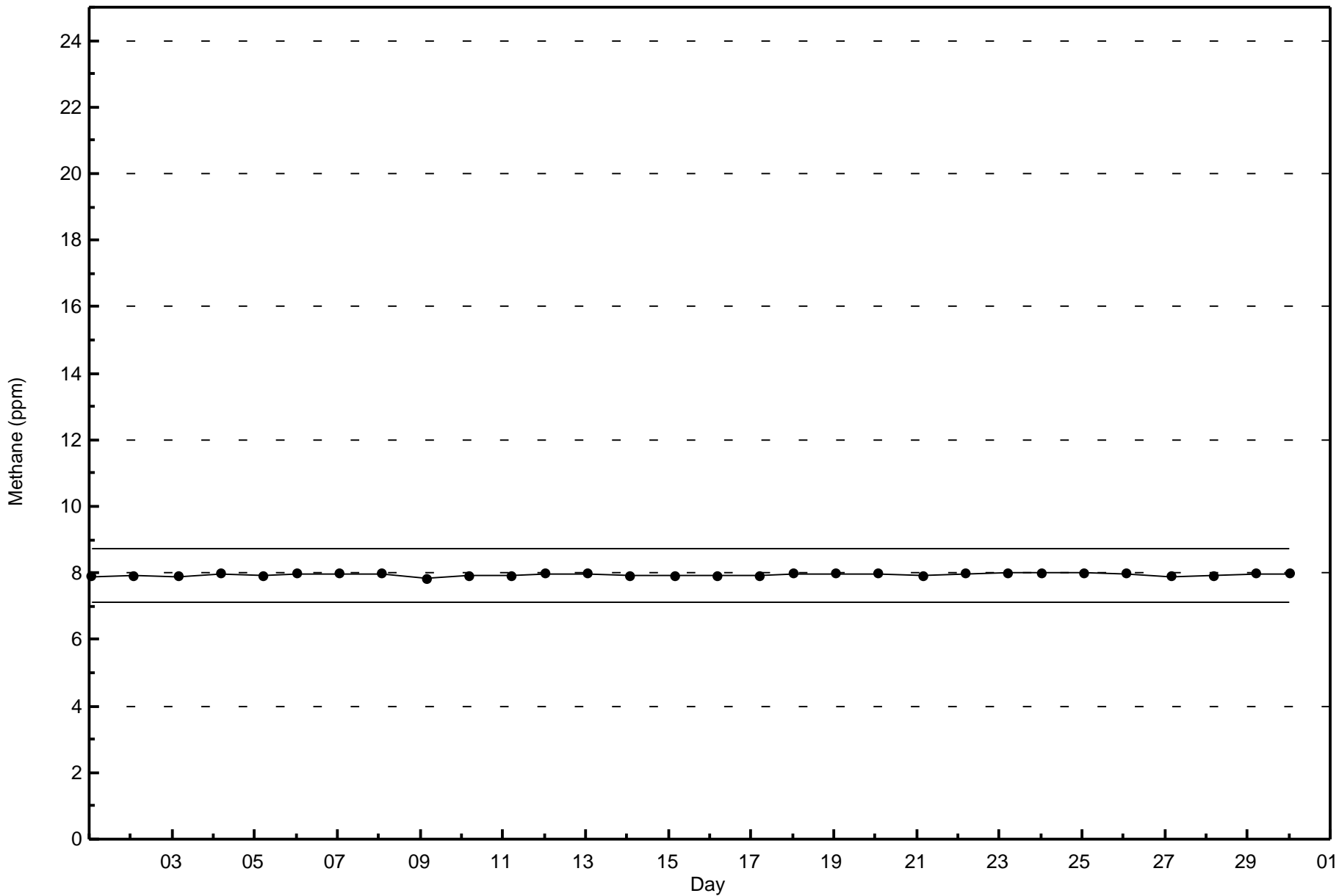






Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Conklin - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

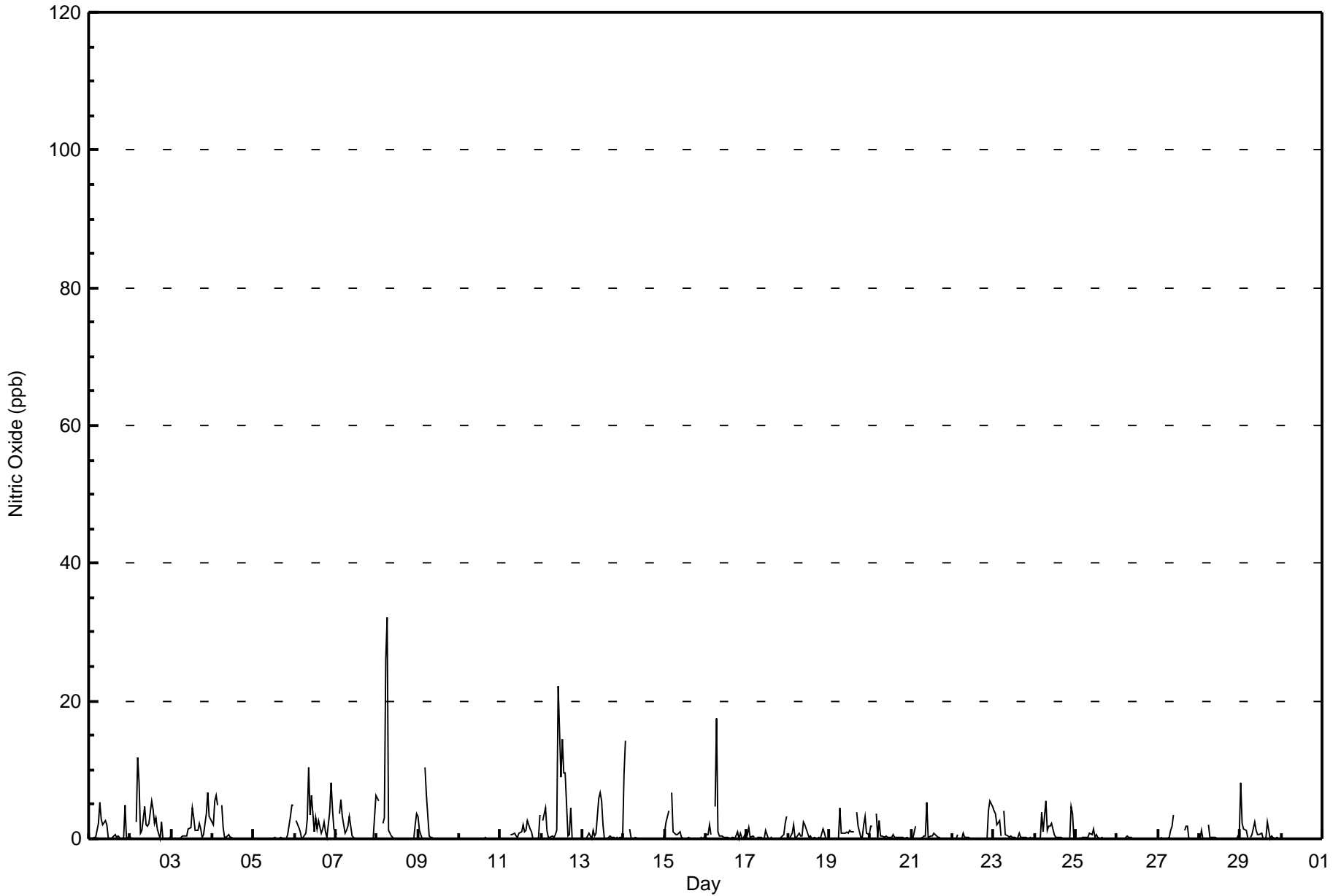
Conklin - June 2017

Maximum Value: 32 ppb on Jun 8 07:00																	Maximum Daily Average: 4.1 ppb on Jun 8																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 2 02:00																	Minimum Daily Average: 0.0 ppb on Jun 10																	Hours of Data: 658	
Maximum Diurnal Average: 2.8 ppb at hour 7																	Minimum Diurnal Average: 0.1 ppb at hour 20																	Hours of Missing Data: 62	
Monthly Average: 1.1 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12																	Hours of Calibration: 35	
																																		Percent Operational Time: 96.3	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	Z	0	0	0	2	5	3	2	3	2	0	0	0	1	1	0	0	0	0	5	0	0	1.1	5										
2-Jun	0	0	Z	2	12	8	1	1	5	2	2	2	5	4	2	3	1	0	2	0	0	0	0	2.4	12										
3-Jun	0	0	0	Z	0	0	0	0	0	0	2	2	5	3	1	1	2	1	0	1	4	7	3	1.6	7										
4-Jun	2	6	6	5	Z	5	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	6										
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	5	0.6	5										
6-Jun	Z	3	2	1	0	0	1	3	10	3	6	1	3	1	3	1	2	2	1	0	4	8	4	2.7	10										
7-Jun	1	Z	4	6	3	1	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	6										
8-Jun	6	6	Z	2	3	26	32	1	0	0	0	0	M	M	M	0	0	0	0	0	0	0	2	4	4.1	32									
9-Jun	3	1	0	Z	10	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	10										
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0										
11-Jun	0	0	0	0	0	Z	1	1	1	1	0	1	1	2	1	1	3	1	1	0	0	0	0	0.8	3										
12-Jun	Z	3	4	1	0	0	0	0	1	1	22	9	14	10	10	0	1	4	0	0	0	0	0	3.5	22										
13-Jun	0	Z	0	1	1	0	1	0	1	6	7	5	2	0	0	0	0	0	0	0	0	0	0	1.1	7										
14-Jun	9	14	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	14										
15-Jun	1	2	4	Z	7	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	7										
16-Jun	1	1	2	1	Z	5	17	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1.4	17										
17-Jun	1	2	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2	3	0.5	3									
18-Jun	Z	0	1	2	0	0	1	0	0	2	2	1	0	0	0	0	0	0	0	0	1	1	0	0.6	2										
19-Jun	0	Z	0	0	0	0	5	1	1	1	1	1	1	1	1	M	4	2	0	0	2	3	1	1.1	5										
20-Jun	2	2	Z	4	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.6	4										
21-Jun	0	0	2	Z	0	0	0	0	0	5	0	0	0	1	1	0	0	0	0	0	0	0	0	0.5	5										
22-Jun	0	0	0	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	5	0.7	5										
23-Jun	4	4	2	3	0	Z	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.9	4										
24-Jun	Z	0	0	0	4	1	5	1	2	2	2	1	0	0	0	0	0	0	0	0	5	4	0	1.2	5										
25-Jun	0	Z	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0.2	1										
26-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0										
27-Jun	0	0	0	Z	0	0	0	1	2	3	C	C	C	C	C	1	2	2	0	0	0	0	0	0.7	3										
28-Jun	0	1	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	2										
29-Jun	8	2	1	1	0	Z	0	1	2	1	1	1	1	0	0	0	3	0	0	0	0	0	0	1.0	8										
30-Jun	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--										
																	1.5 1.9 1.2 1.3 1.7 2.5 2.8 0.7 1.2 1.2 1.8 0.9 1.3 0.9 0.8 0.4 0.6 0.5 0.3 0.1 0.5 1.3 1.0 1.2																	Diurnal Average	
																	9 14 6 6 12 26 32 3 10 6 22 9 14 10 10 3 4 4 4 2 1 4 8 5 6																	Diurnal Maximum	
Z - zerospan																	C - Calibration					M - Maintenance					AF - Analyzer Failure								



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	655	99.54	99.54
21 - 40	3	0.46	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 658

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	37	36	19	11	13	29	30	64	58	50	33	27	36	55	77	77	652
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	3
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	36	19	11	13	29	30	64	59	50	33	27	36	55	79	77	655

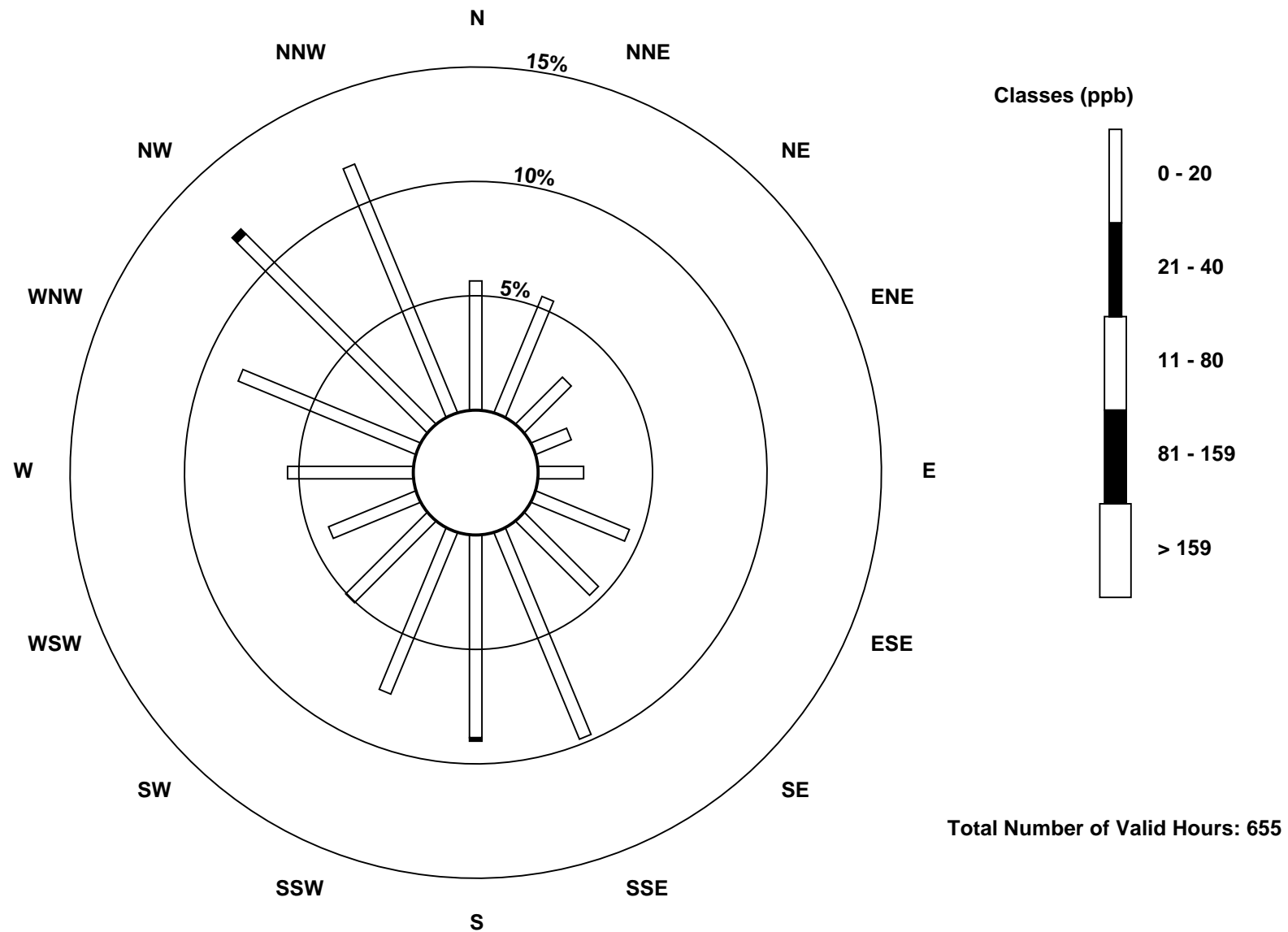
Total Number of Valid Hours: 655

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Conklin (AMS 21)



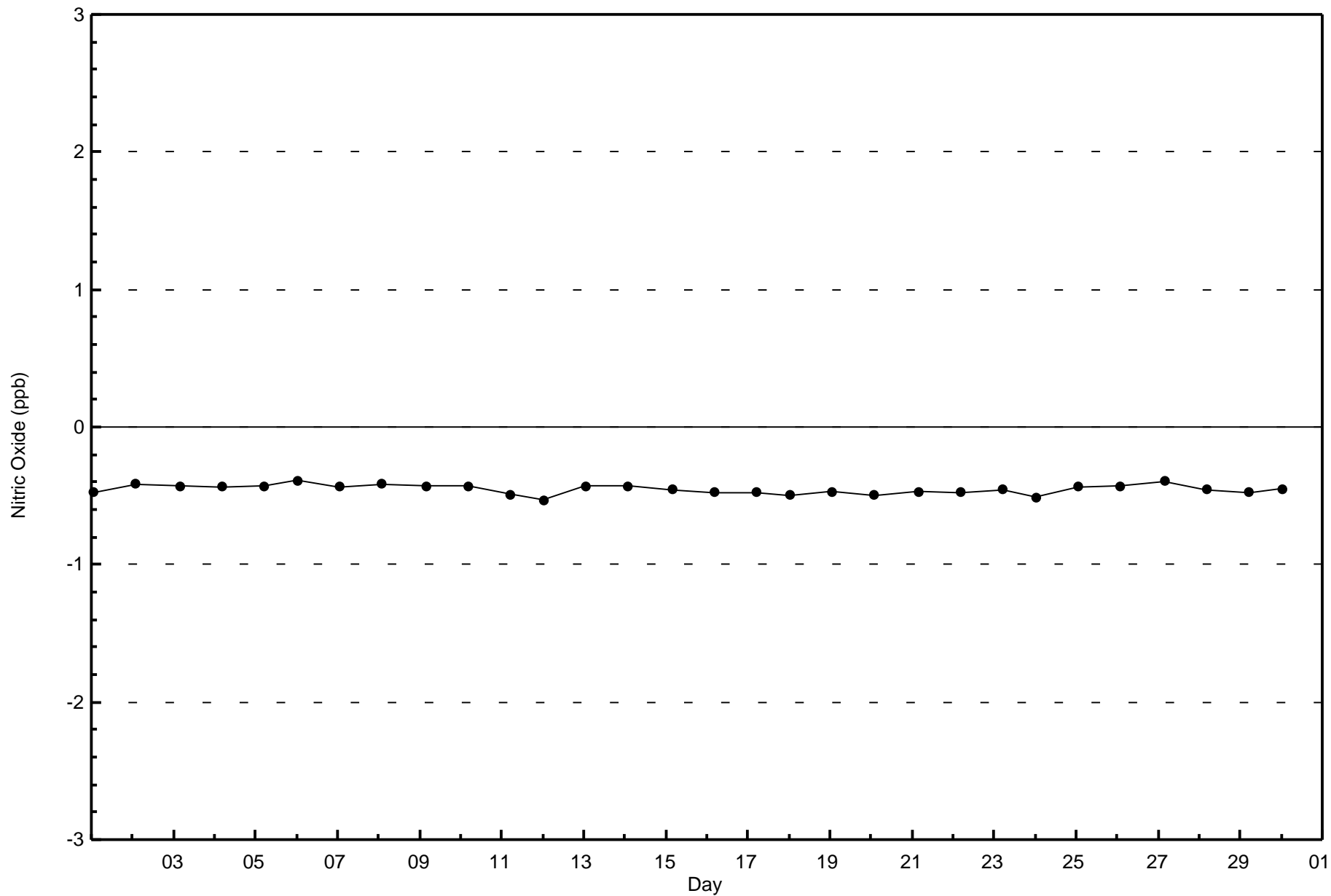


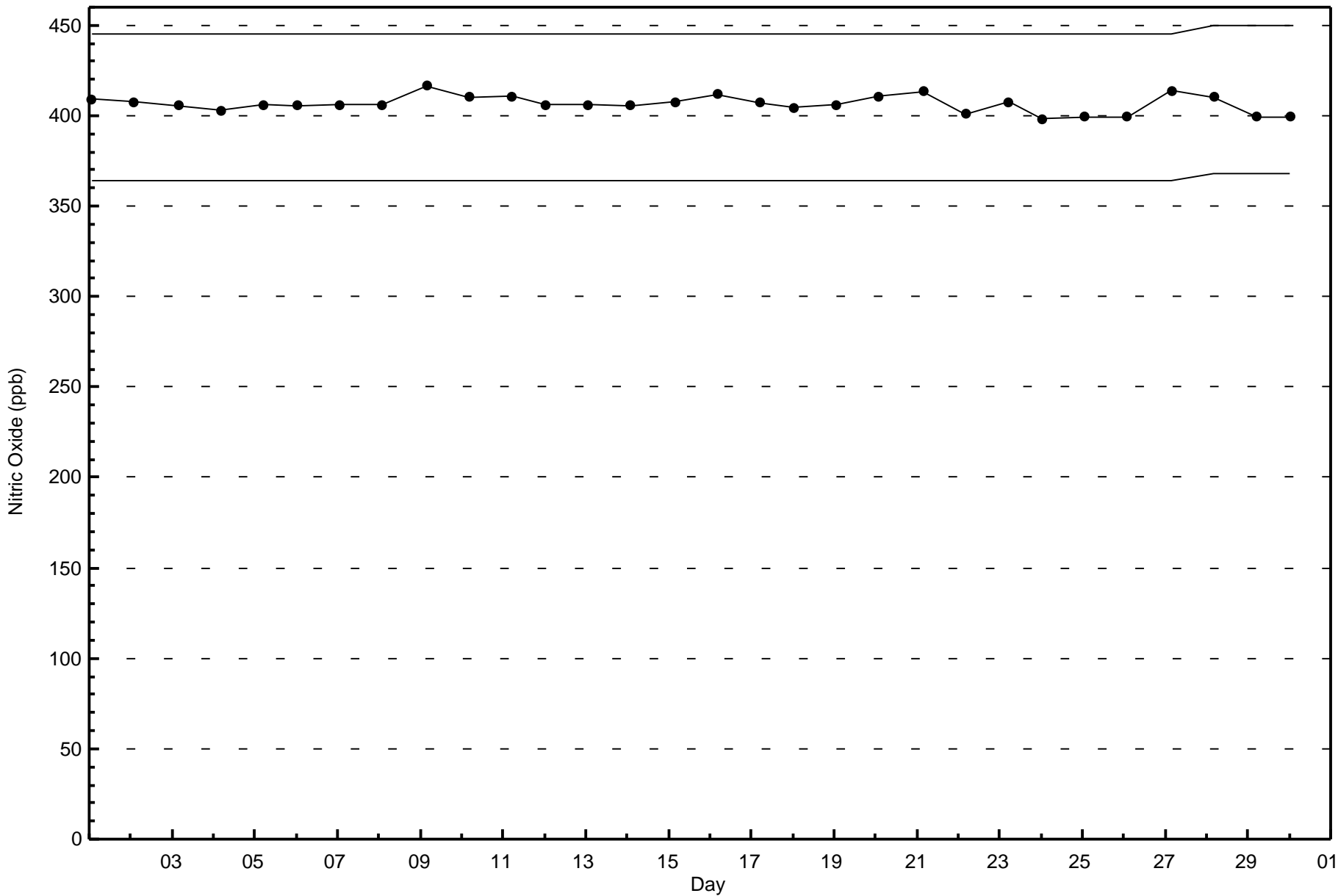
Wood Buffalo Environmental Association

Zero Responses

Nitric Oxide (NO) - ppb

Conklin - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Conklin - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19 ppb on Jun 6 22:00	Maximum Daily Average: 4.9 ppb on Jun 1		Hours of Data:	658
Minimum Value: 0 ppb on Jun 9 18:00	Minimum Daily Average: 0.3 ppb on Jun 10		Hours of Missing Data:	62
Maximum Diurnal Average: 4.2 ppb at hour 22	Minimum Diurnal Average: 1.0 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 2.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 13		Percent Operational Time:	96.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Jun	2	Z	2	8	2	8	11	12	10	9	7	1	1	1	2	4	1	2	1	1	7	15	3	7	4.9	15		
2-Jun	10	4	Z	8	9	7	2	3	6	4	3	5	9	7	4	5	3	0	1	0	0	0	0	0	3.9	10		
3-Jun	0	0	0	Z	0	0	1	1	1	1	2	2	5	4	3	2	4	3	1	7	11	15	10	10	3.6	15		
4-Jun	4	6	7	6	Z	5	2	1	1	3	2	1	1	1	1	1	1	1	1	2	2	1	1	1	2.3	7		
5-Jun	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	1	6	12	8	6	1.9	12		
6-Jun	Z	4	2	1	1	1	2	3	7	4	6	2	3	3	4	2	1	5	4	2	13	19	14	8	4.8	19		
7-Jun	6	Z	5	12	7	3	2	4	8	3	2	1	1	1	1	1	1	1	1	1	3	5	3	13	3.6	13		
8-Jun	8	8	Z	4	4	7	8	2	2	1	1	1	M	M	M	1	1	1	1	1	1	1	5	15	3.6	15		
9-Jun	10	5	2	Z	5	4	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.5	10		
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0.3	1		
11-Jun	0	0	0	0	1	Z	1	1	1	1	0	1	2	3	2	2	4	3	2	0	1	1	3	4	1.5	4		
12-Jun	Z	8	9	4	1	1	1	1	2	2	9	4	6	5	5	1	2	5	2	1	1	1	2	2	3.1	9		
13-Jun	2	Z	1	4	3	1	5	3	2	5	4	5	2	1	1	2	2	1	2	1	1	1	0	0	2.2	5		
14-Jun	2	3	Z	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.7	3		
15-Jun	1	2	2	Z	2	1	1	2	1	2	1	0	0	0	1	0	0	0	0	1	1	1	1	2	1.0	2		
16-Jun	4	3	2	1	Z	2	7	2	2	1	1	1	1	1	1	1	1	1	2	1	4	2	1	2	1.8	7		
17-Jun	1	3	1	1	1	Z	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	5	6	7	1.3	7		
18-Jun	Z	1	4	7	1	1	2	1	1	2	2	2	1	2	1	1	0	1	1	0	2	3	0	0	1.5	7		
19-Jun	0	Z	0	0	0	0	6	2	1	1	2	1	2	2	2	M	6	3	1	2	7	9	5	6	2.7	9		
20-Jun	7	5	Z	7	1	3	1	2	2	2	2	1	1	5	2	1	1	1	1	1	1	1	1	1	2.1	7		
21-Jun	0	0	2	Z	2	1	1	1	1	2	1	1	1	2	1	1	1	0	0	0	0	0	1	1	0.9	2		
22-Jun	1	1	1	1	Z	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	7	8	9	1.5	9		
23-Jun	8	7	4	5	1	Z	3	1	1	1	1	0	1	1	1	1	1	1	2	2	1	2	2	2	2.1	8		
24-Jun	Z	1	1	0	3	1	4	2	3	2	3	2	1	1	1	1	1	1	1	1	1	10	8	2	2.2	10		
25-Jun	1	Z	1	1	1	1	1	1	1	2	2	3	1	2	1	1	0	1	1	1	1	1	1	1	0.9	3		
26-Jun	2	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	1	1.3	3		
27-Jun	1	4	4	Z	1	1	2	5	8	8	C	C	C	C	C	3	7	5	0	1	1	3	3	1	3.1	8		
28-Jun	1	5	1	0	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.7	5		
29-Jun	4	2	1	2	1	Z	1	1	2	1	1	1	2	0	0	0	2	0	2	1	1	3	1	1	1.3	4		
30-Jun	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--	--	--

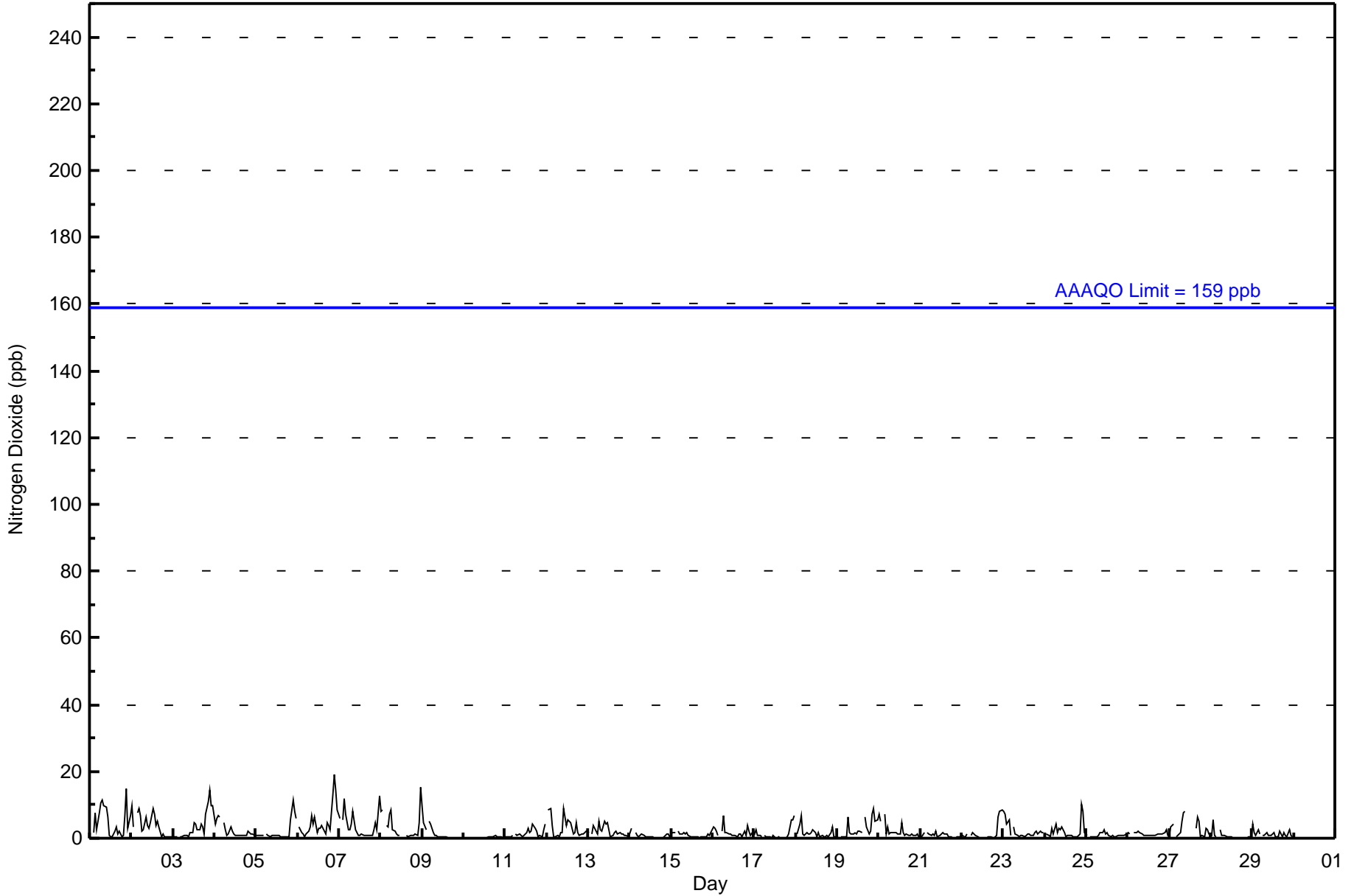
3.0	3.1	2.2	3.2	2.1	2.2	2.5	1.9	2.4	2.1	2.0	1.3	1.5	1.6	1.2	1.2	1.5	1.3	1.0	1.1	2.4	4.2	3.1	3.5	Diurnal Average	
10	8	9	12	9	8	11	12	10	9	9	5	9	7	5	5	7	5	4	7	13	19	14	15	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	658	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 658

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 20	37	36	19	11	13	29	30	64	59	50	33	27	36	55	79	77	655
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	36	19	11	13	29	30	64	59	50	33	27	36	55	79	77	655

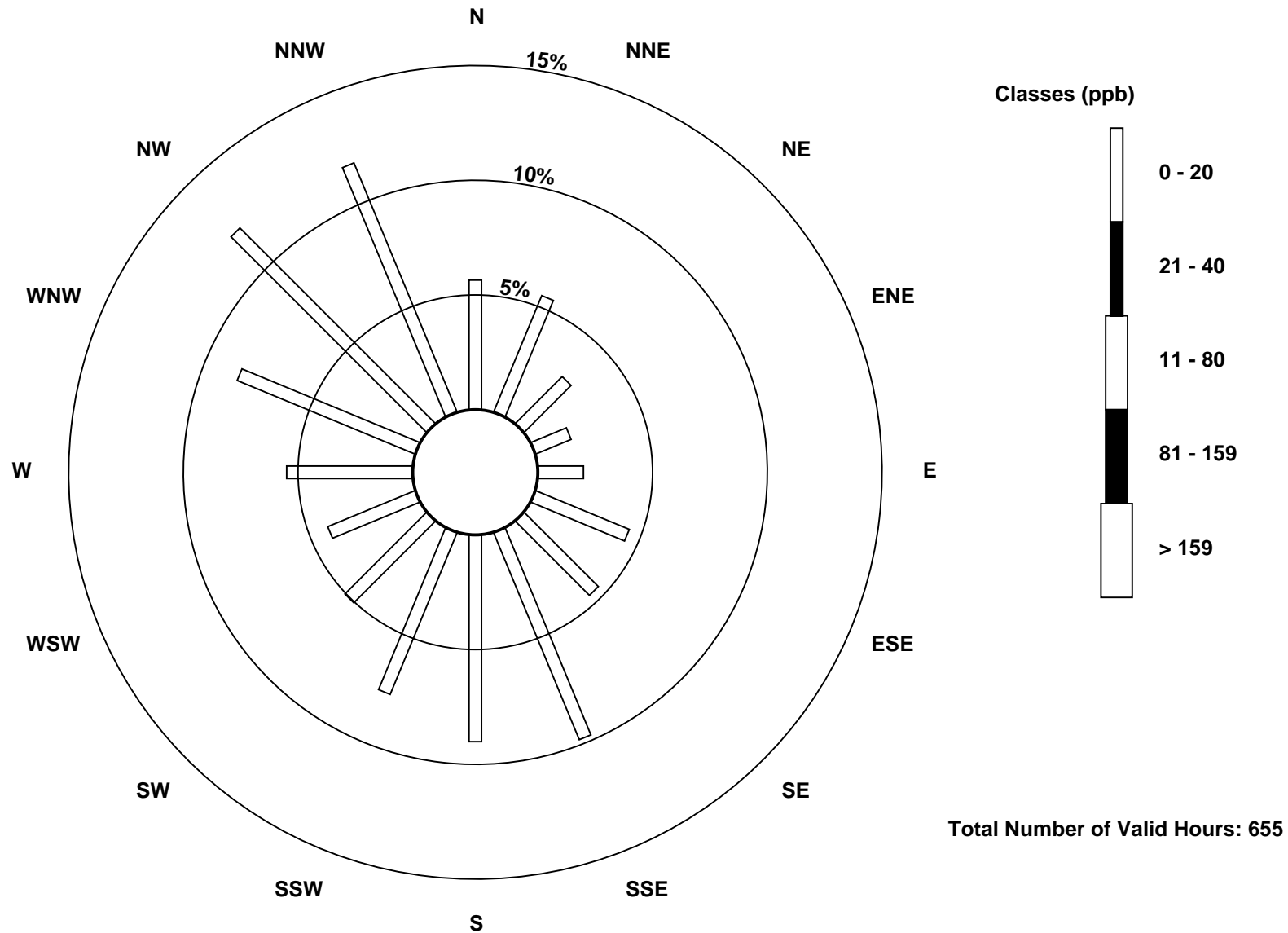
Total Number of Valid Hours: 655

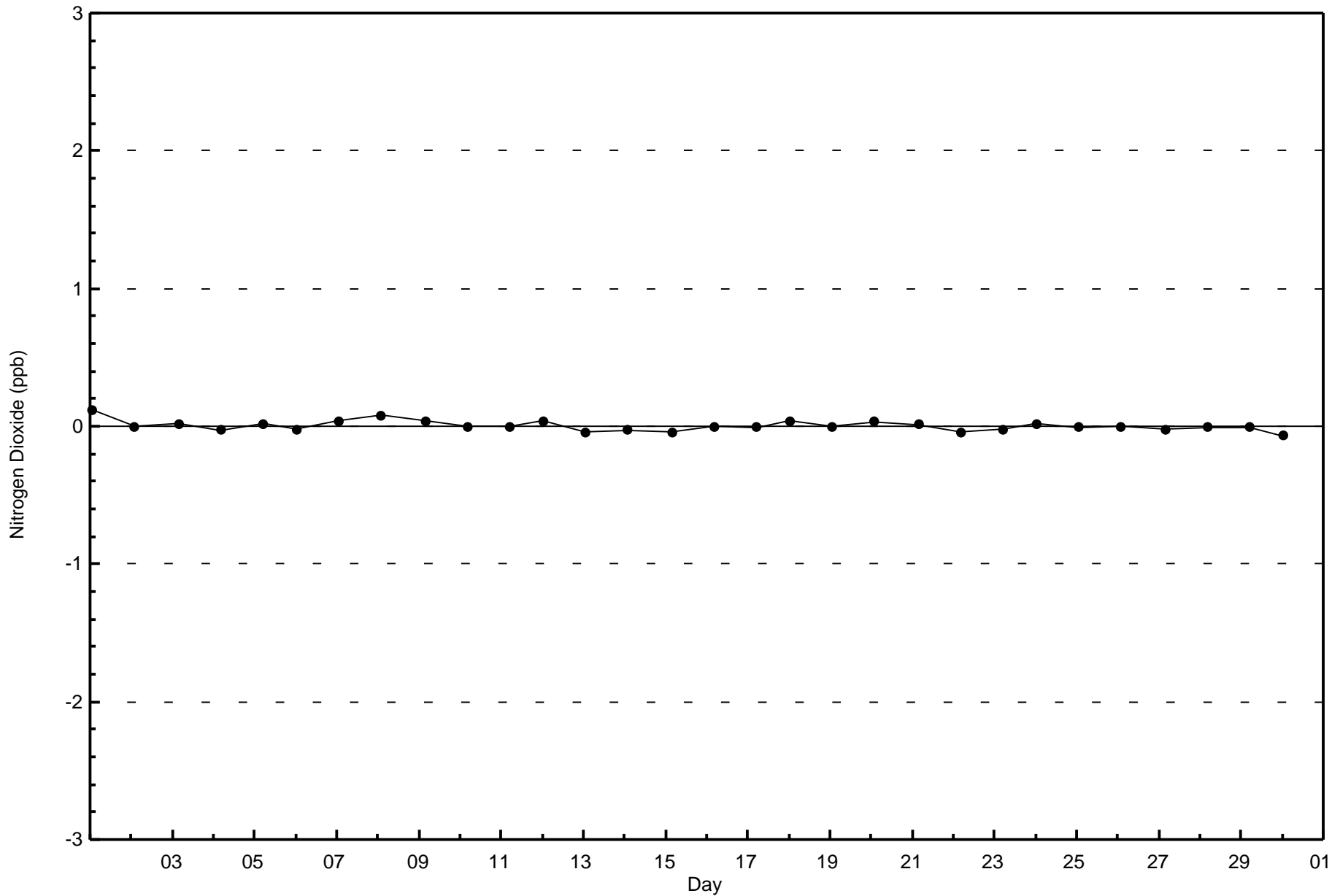
Total Number of Hours: 720

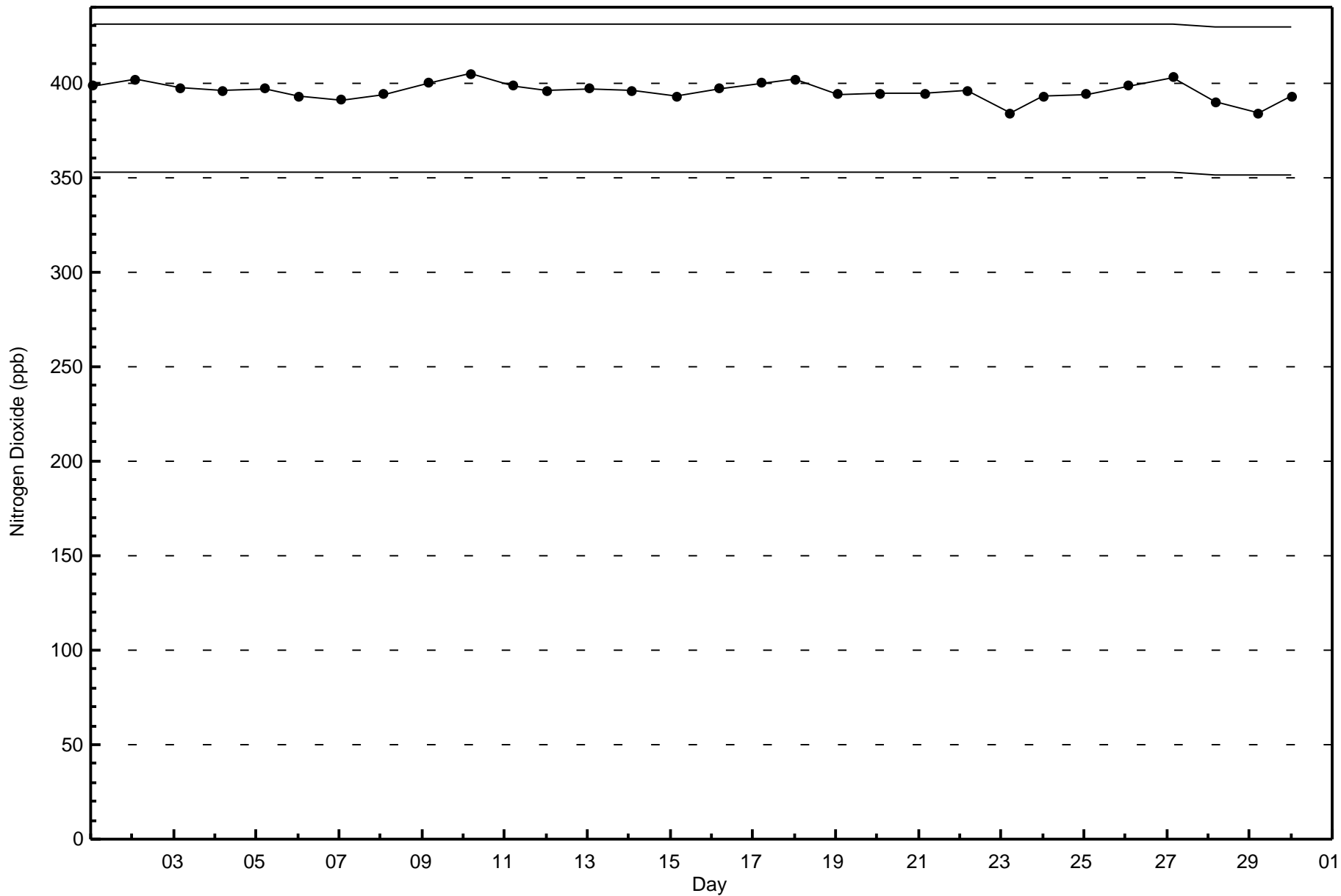


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Conklin (AMS 21)







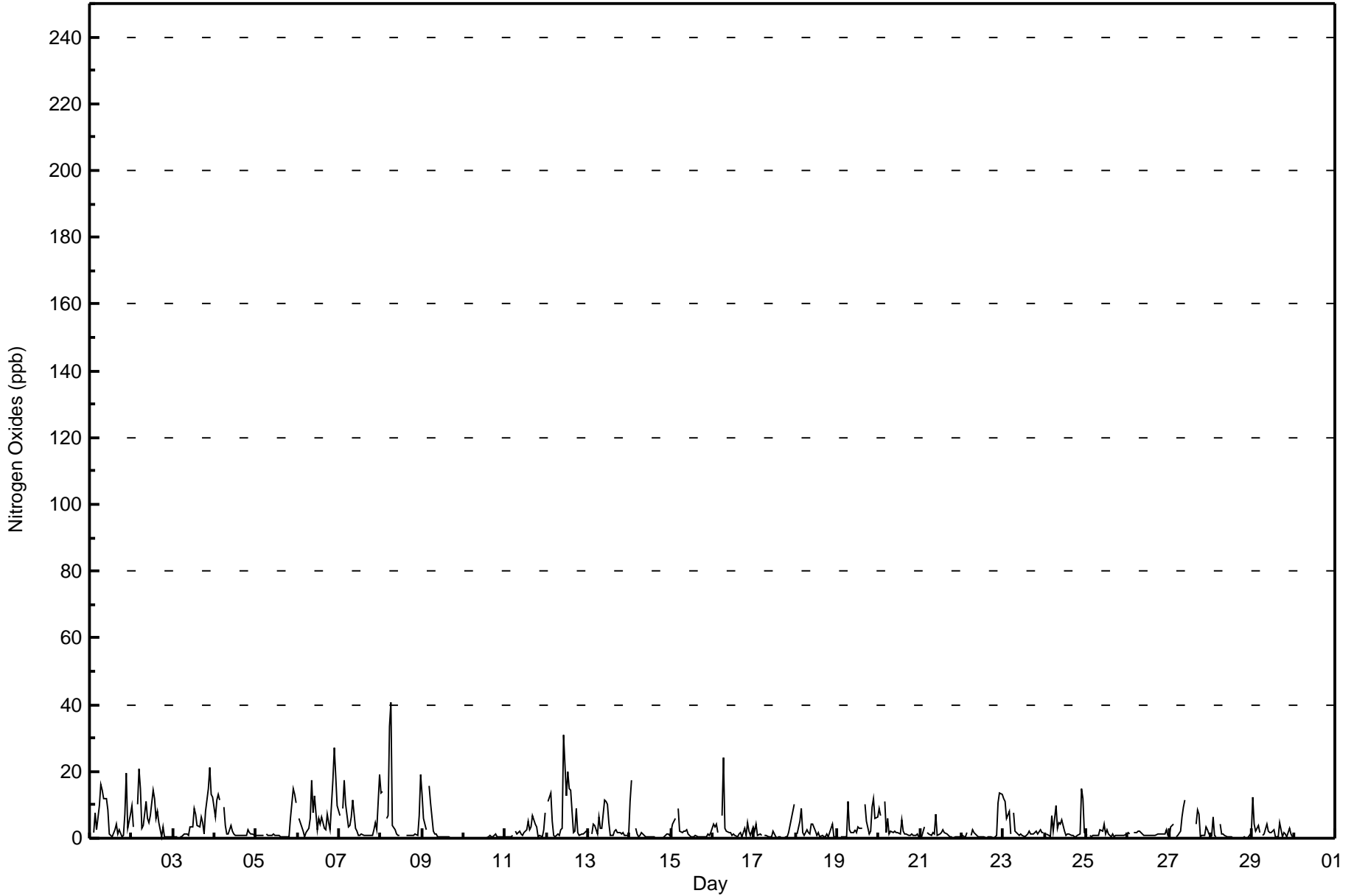


Maximum Value: 41 ppb on Jun 8 07:00																		Maximum Daily Average: 7.8 ppb on Jun 8						Hours in Service: 720			
Minimum Value: 0 ppb on Jun 10 04:00																		Minimum Daily Average: 0.3 ppb on Jun 10						Hours of Data: 658			
Maximum Diurnal Average: 5.4 ppb at hour 22																		Minimum Diurnal Average: 1.1 ppb at hour 20						Hours of Missing Data: 62			
Monthly Average: 3.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 4 P ₉₀ = 10 P ₉₉ = 21						Hours of Calibration: 35			
																								Percent Operational Time: 96.3			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	2	Z	2	8	2	10	16	14	12	12	8	1	1	1	3	4	1	3	1	1	7	20	3	7	6.0	20	
2-Jun	10	4	Z	10	21	15	3	4	11	6	5	7	14	12	6	8	5	0	4	0	0	0	0	1	6.3	21	
3-Jun	0	0	0	Z	0	0	1	1	1	1	3	3	9	7	4	4	6	5	1	8	15	21	13	12	5.1	21	
4-Jun	7	11	13	11	Z	9	4	1	1	4	2	1	1	1	1	1	1	1	1	2	2	1	1	1	3.4	13	
5-Jun	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	0	0	0	6	15	13	11	2.6	15	
6-Jun	Z	6	3	2	1	1	3	6	17	8	13	3	6	4	6	3	3	7	5	3	17	27	19	10	7.5	27	
7-Jun	7	Z	9	17	10	3	4	6	11	3	2	1	1	1	1	1	1	1	1	1	3	5	2	19	4.8	19	
8-Jun	14	14	Z	6	7	33	41	4	2	1	1	1	M	M	M	1	1	1	1	1	1	7	19	7.8	41		
9-Jun	13	6	2	Z	16	10	2	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2.4	16	
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0.3	1	
11-Jun	0	0	0	0	1	Z	2	1	2	1	1	2	2	5	3	3	7	4	3	0	1	0	3	8	2.2	8	
12-Jun	Z	11	13	5	1	1	1	1	2	3	31	13	20	15	14	2	2	9	2	1	1	1	2	2	6.6	31	
13-Jun	2	Z	1	4	4	1	6	3	3	11	11	10	4	1	1	2	3	2	2	1	2	1	1	1	3.3	11	
14-Jun	11	17	Z	3	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1.8	17	
15-Jun	2	4	6	Z	9	2	2	2	2	3	1	1	0	0	1	0	0	0	0	0	0	1	1	2	1.8	9	
16-Jun	4	4	4	1	Z	7	24	3	2	2	2	1	1	1	1	1	2	1	3	1	5	2	1	3	3.2	24	
17-Jun	2	4	1	1	1	Z	1	1	1	0	0	2	0	0	1	0	0	0	0	0	2	6	8	10	1.8	10	
18-Jun	Z	1	5	9	2	1	3	2	1	4	4	2	1	2	1	1	0	1	1	0	3	4	0	0	2.1	9	
19-Jun	0	Z	0	0	0	0	11	2	2	2	3	2	3	3	3	M	10	5	1	2	9	12	6	6	3.8	12	
20-Jun	9	7	Z	11	1	6	1	2	2	2	2	2	1	5	2	1	1	1	1	1	1	1	1	1	2.7	11	
21-Jun	0	0	3	Z	2	1	1	2	1	7	1	1	2	3	2	1	1	0	0	0	0	0	1	1	1.3	7	
22-Jun	1	1	1	2	Z	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	11	13	13	2.2	13	
23-Jun	12	11	6	8	1	Z	8	2	1	1	1	1	0	1	1	2	1	1	2	2	1	2	2	2	3.1	12	
24-Jun	Z	1	1	1	7	2	10	3	5	4	5	2	1	1	1	1	1	1	1	1	1	15	12	2	3.4	15	
25-Jun	1	Z	1	1	1	1	1	1	1	2	2	4	1	2	1	1	1	1	1	1	1	1	1	1	1.2	4	
26-Jun	1	1	Z	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1.3	3	
27-Jun	1	4	4	Z	1	1	2	6	9	12	C	C	C	C	C	4	8	7	0	1	1	3	3	1	3.7	12	
28-Jun	1	6	1	0	Z	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.9	6	
29-Jun	12	4	2	4	2	Z	1	1	4	2	2	2	2	0	0	1	4	0	2	1	1	3	1	0	2.3	12	
30-Jun	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--	
																		Diurnal Average									
																		Diurnal Maximum									
																		4.5 5.0 3.4 4.5 3.8 4.7 5.3 2.7 3.6 3.3 3.8 2.2 2.8 2.5 2.0 1.6 2.1 1.8 1.2 1.1 2.9 5.4 4.0 4.7									
																		14 17 13 17 21 33 41 14 17 12 31 13 20 15 14 8 10 9 5 8 17 27 19 19									
Z - zerspan																		C - Calibration						M - Maintenance		AF - Analyzer Failure	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Conklin - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	651	98.94	98.94
21 - 40	6	0.91	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 658

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	37	36	19	11	13	29	30	64	58	47	32	27	36	55	77	77	648
21 - 40	0	0	0	0	0	0	0	0	1	3	1	0	0	0	1	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	36	19	11	13	29	30	64	59	50	33	27	36	55	79	77	655

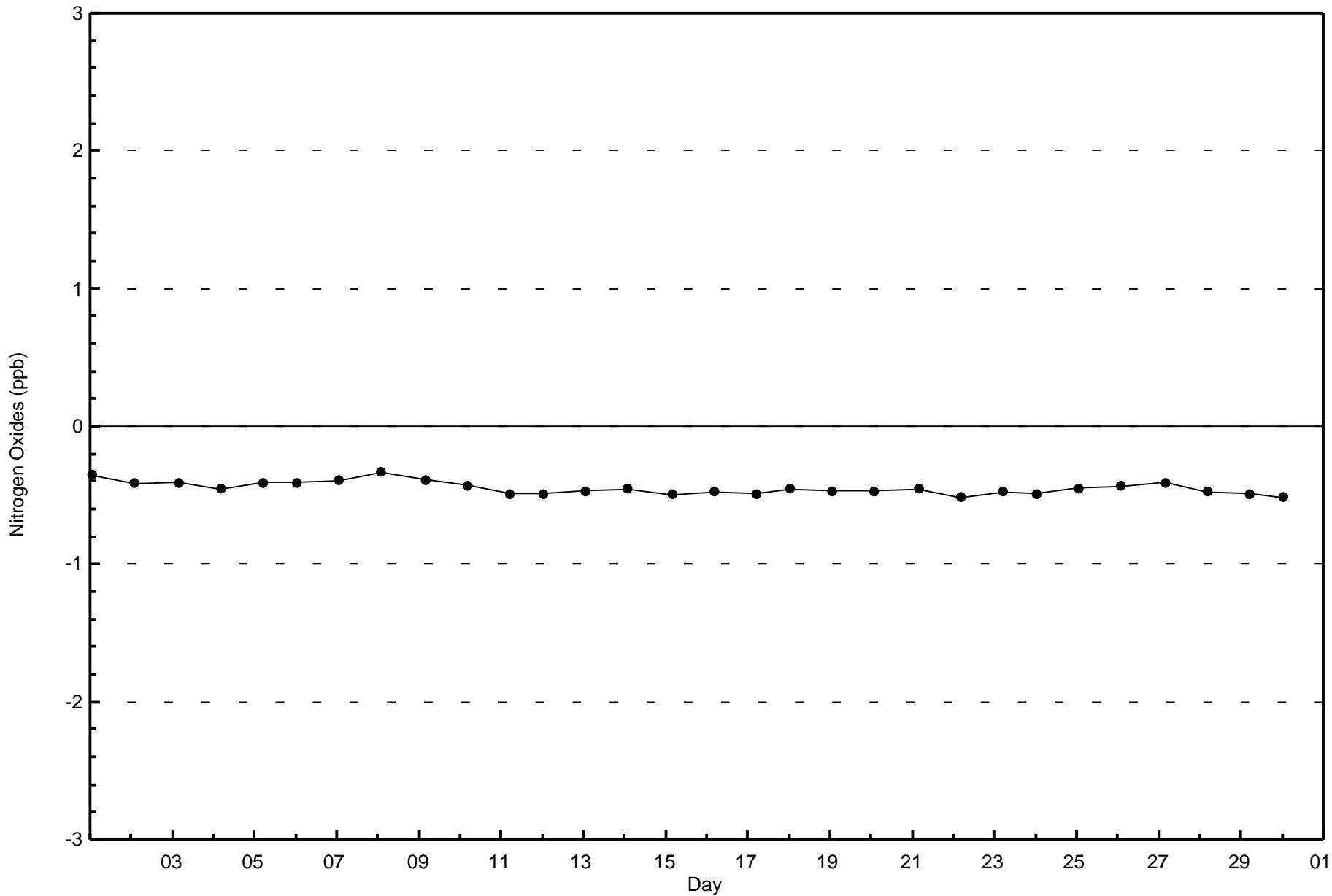
Total Number of Valid Hours: 655

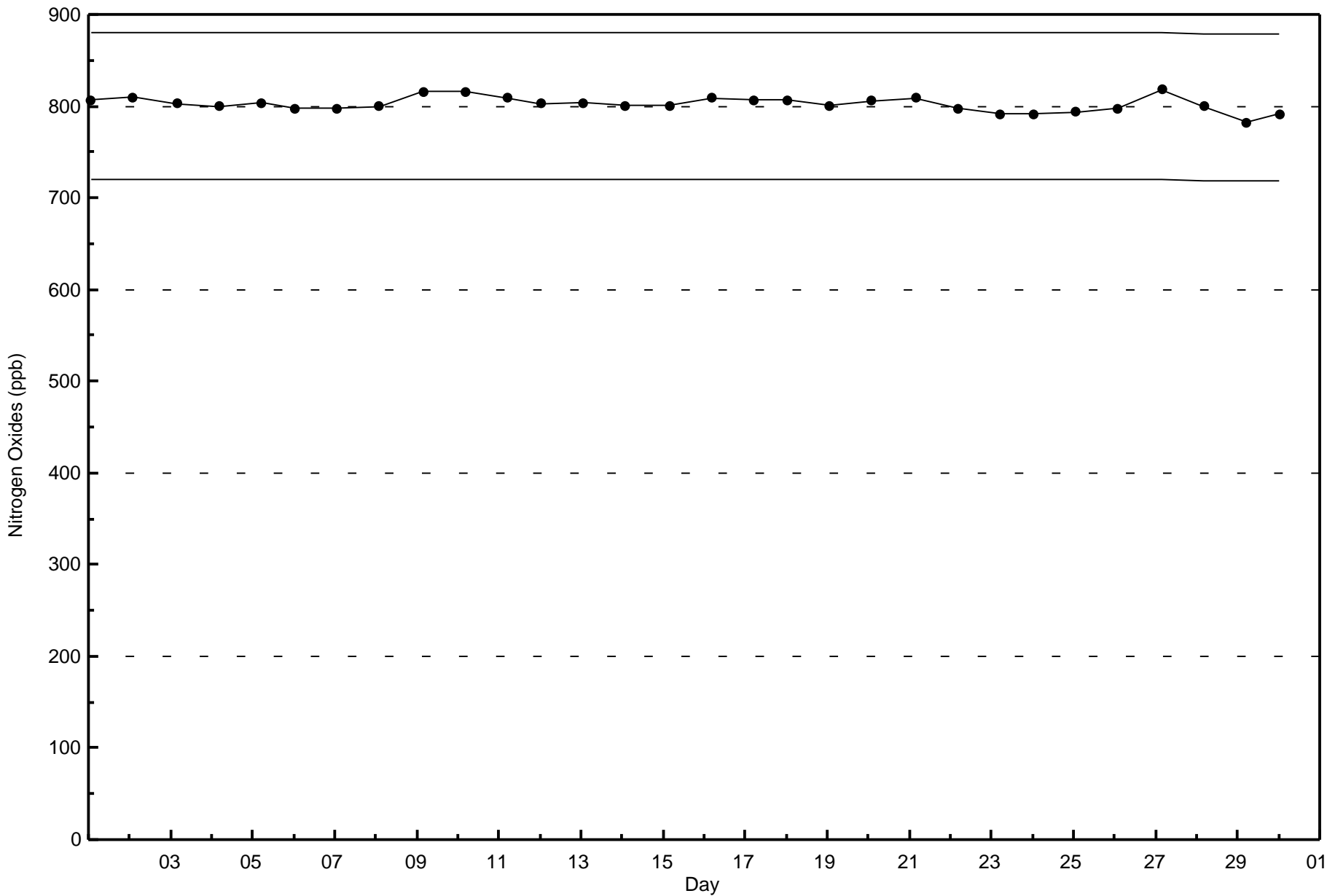
Total Number of Hours: 720



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Conklin - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Conklin - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 66 ppb on Jun 7 15:00	Maximum Daily Average: 48.7 ppb on Jun 26		Hours of Data:	684
Minimum Value: 6 ppb on Jul 1 00:00	Minimum Daily Average: 18.2 ppb on Jun 14		Hours of Missing Data:	36
Maximum Diurnal Average: 41.8 ppb at hour 16	Minimum Diurnal Average: 18.4 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 31.5 ppb	Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 22 Median = 33 Q ₃ = 41 P ₉₀ = 48 P ₉₉ = 61		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	54	49	35	Z	33	19	22	32	38	41	40	46	44	48	50	42	53	53	52	50	35	18	27	35	39.9	54
2-Jun	27	24	14	8	Z	13	21	27	30	33	35	35	32	33	38	39	41	43	44	42	39	37	38	39	31.7	44
3-Jun	40	40	38	34	30	Z	26	28	30	30	30	35	37	39	41	41	39	39	44	36	20	9	11	13	31.7	44
4-Jun	12	10	9	14	7	10	Z	36	44	49	50	51	53	52	55	53	52	60	60	55	49	45	45	46	39.7	60
5-Jun	43	35	33	29	30	31	30	Z	38	39	40	45	50	49	51	50	49	49	49	46	25	10	9	10	36.6	51
6-Jun	9	9	Z	19	25	27	29	31	30	37	44	46	46	47	46	47	47	42	44	40	18	11	16	20	31.8	47
7-Jun	20	18	10	Z	10	16	27	40	48	61	63	62	59	62	66	62	61	59	52	46	40	29	27	12	41.4	66
8-Jun	9	8	7	6	Z	6	12	28	41	57	61	62	62	61	59	59	58	58	58	55	51	35	18	7	38.2	62
9-Jun	8	8	8	7	7	Z	24	31	38	46	43	49	M	M	54	40	36	34	33	38	42	40	38	36	31.4	54
10-Jun	35	34	34	33	33	33	Z	34	34	34	34	36	39	40	43	46	46	45	42	43	39	47	46	46	38.9	47
11-Jun	40	36	38	34	30	29	30	Z	37	37	39	40	40	39	41	41	39	39	38	39	35	36	31	22	36.1	41
12-Jun	15	11	Z	17	22	22	20	26	31	34	33	36	36	37	38	42	43	37	34	34	34	32	31	27	30.2	43
13-Jun	28	28	30	Z	23	25	19	22	23	22	21	22	22	31	33	37	36	38	27	25	13	8	6	6	23.7	38
14-Jun	6	6	6	7	Z	10	15	21	22	23	23	26	29	29	26	24	23	21	21	20	22	19	12	10	18.2	29
15-Jun	7	6	6	6	6	Z	14	18	21	26	31	40	41	40	39	41	40	39	36	27	28	25	20	15	24.8	41
16-Jun	9	8	7	6	7	7	Z	15	29	39	43	44	44	44	46	45	38	33	29	32	21	13	14	9	25.2	46
17-Jun	9	8	10	10	14	15	21	Z	28	31	30	30	32	36	40	41	42	42	41	38	23	14	9	11	25.1	42
18-Jun	18	21	Z	14	19	22	27	29	33	36	39	42	44	44	39	37	39	40	39	42	34	19	37	36	32.6	44
19-Jun	34	32	31	Z	30	29	22	25	29	32	35	39	40	39	39	M	33	37	36	31	15	15	18	17	29.9	40
20-Jun	15	13	13	11	Z	13	22	31	36	37	39	41	43	37	29	34	38	39	42	36	29	21	26	37	29.6	43
21-Jun	43	47	45	42	36	Z	29	33	36	37	38	37	37	35	35	33	32	34	36	33	28	24	24	29	34.9	47
22-Jun	30	28	28	27	28	27	Z	27	27	28	31	34	36	C	C	C	38	37	37	36	29	13	7	7	27.7	38
23-Jun	8	9	10	10	13	15	17	Z	34	37	39	41	44	51	50	47	45	45	43	39	32	33	32	24	31.2	51
24-Jun	19	22	Z	10	7	11	18	30	33	33	32	35	36	38	38	42	44	42	42	39	26	12	13	16	27.7	44
25-Jun	16	11	9	Z	15	16	20	27	36	41	42	44	45	46	46	45	45	47	48	49	48	45	42	40	35.8	49
26-Jun	40	41	43	43	Z	45	44	46	48	49	53	55	55	55	55	54	53	54	53	52	50	47	43	43	48.7	55
27-Jun	36	28	34	42	40	Z	40	37	34	34	37	40	42	37	34	39	39	42	49	47	39	33	29	23	37.2	49
28-Jun	16	15	18	12	13	12	Z	21	27	26	34	36	36	22	24	29	31	33	30	28	26	15	9	6	22.6	36
29-Jun	6	8	9	9	12	14	20	Z	25	27	29	29	30	28	30	31	30	31	28	23	28	22	17	9	21.5	31
30-Jun	7	8	Z	12	9	10	16	21	21	26	36	35	34	28	27	28	28	27	25	25	17	9	6	6	20.1	36

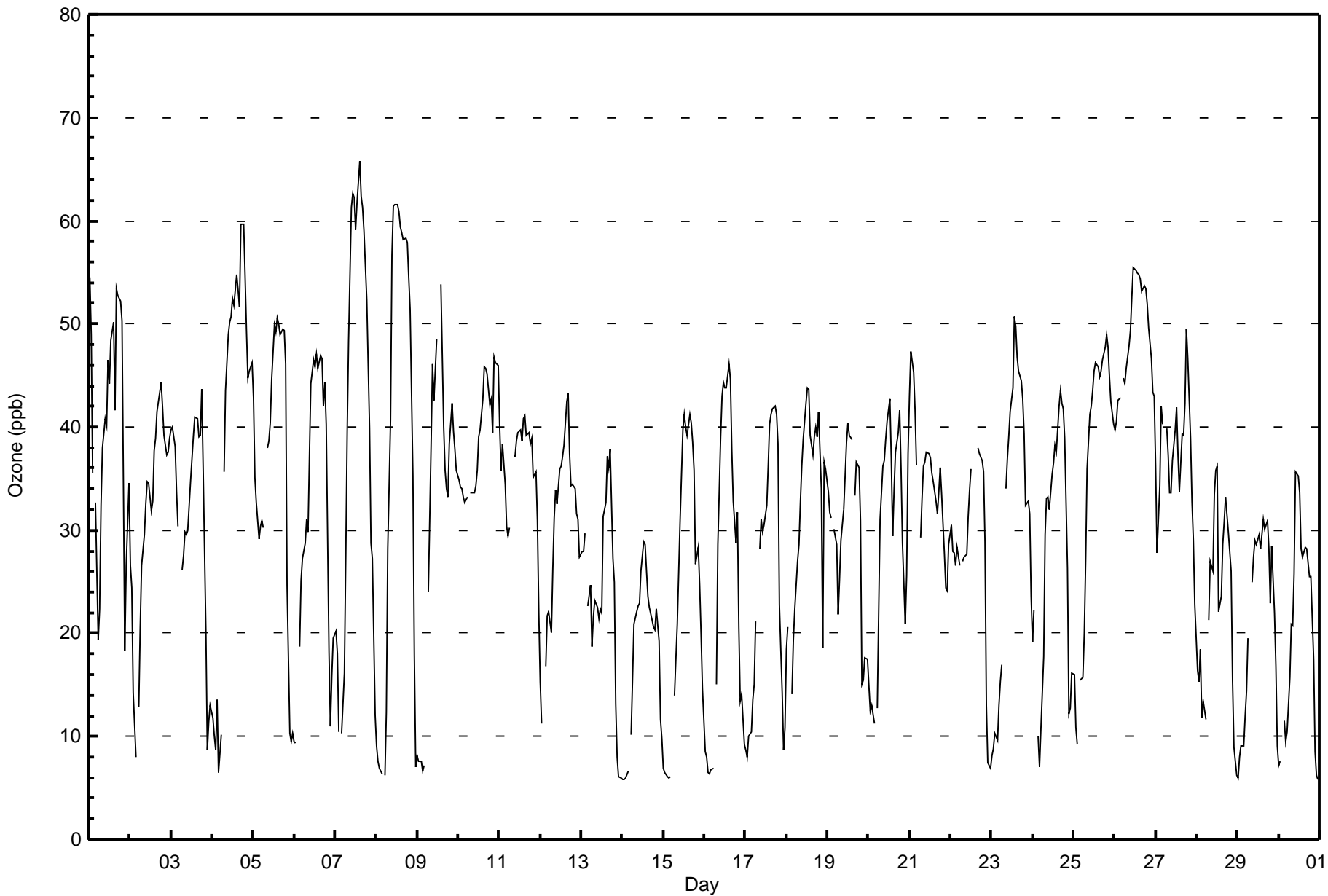
22.0	20.7	21.0	18.4	20.1	19.1	23.4	28.5	32.7	36.0	38.1	40.4	40.9	41.0	41.7	41.8	41.3	41.3	40.5	38.2	31.2	24.5	23.4	21.9	Diurnal Average		
54	49	45	43	40	45	44	46	48	61	63	62	62	62	66	62	61	60	60	60	55	51	47	46	46	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	156	22.81	22.81
21 - 50	480	70.18	92.98
51 - 82	48	7.02	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Conklin - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	6	2	2	0	0	2	10	17	31	28	7	8	2	8	11	19	153
21 - 50	31	35	15	7	8	15	16	39	28	25	29	20	37	51	73	50	479
51 - 82	1	0	0	4	5	13	8	7	5	0	1	0	0	1	0	3	48
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	37	17	11	13	30	34	63	64	53	37	28	39	60	84	72	680

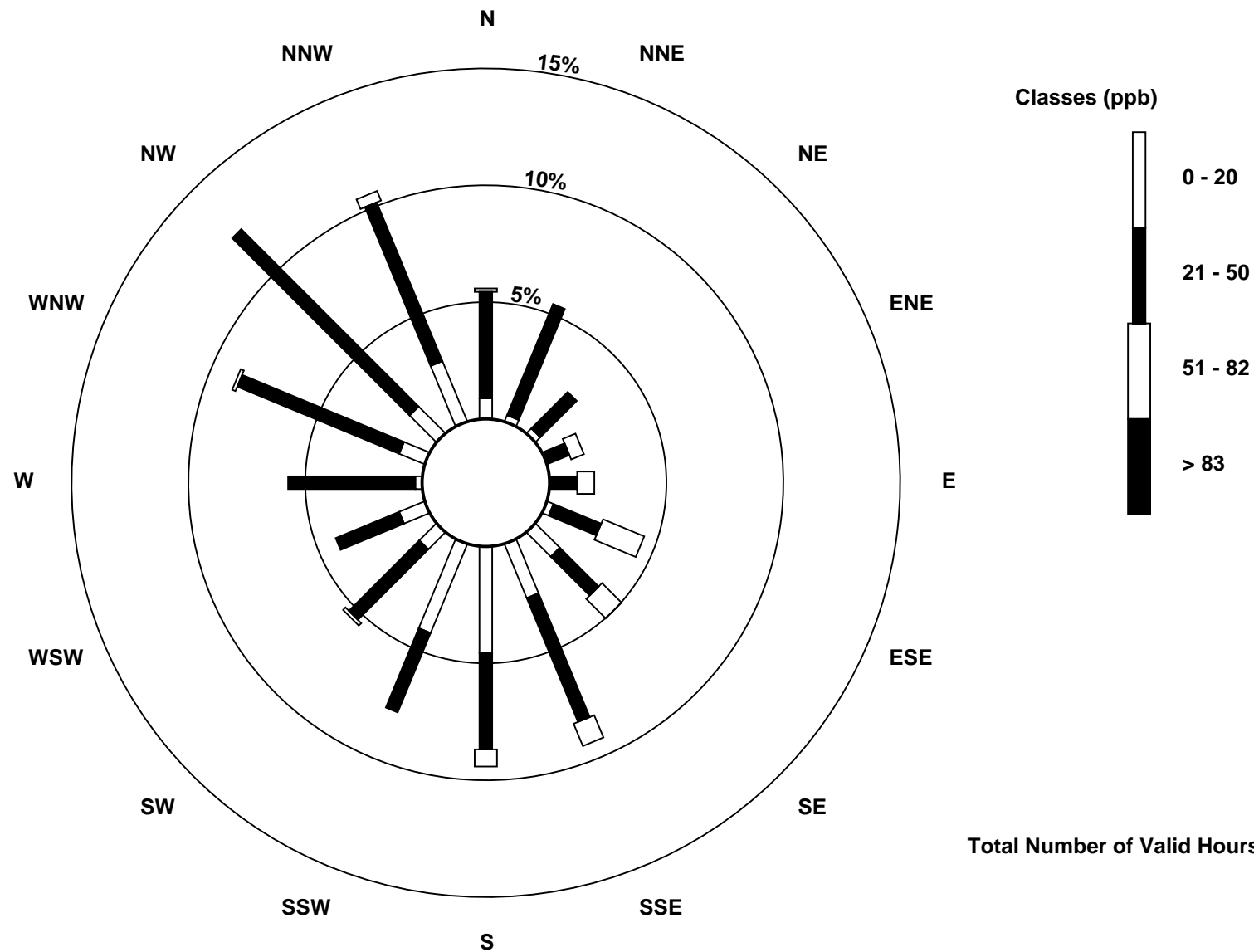
Total Number of Valid Hours: 680

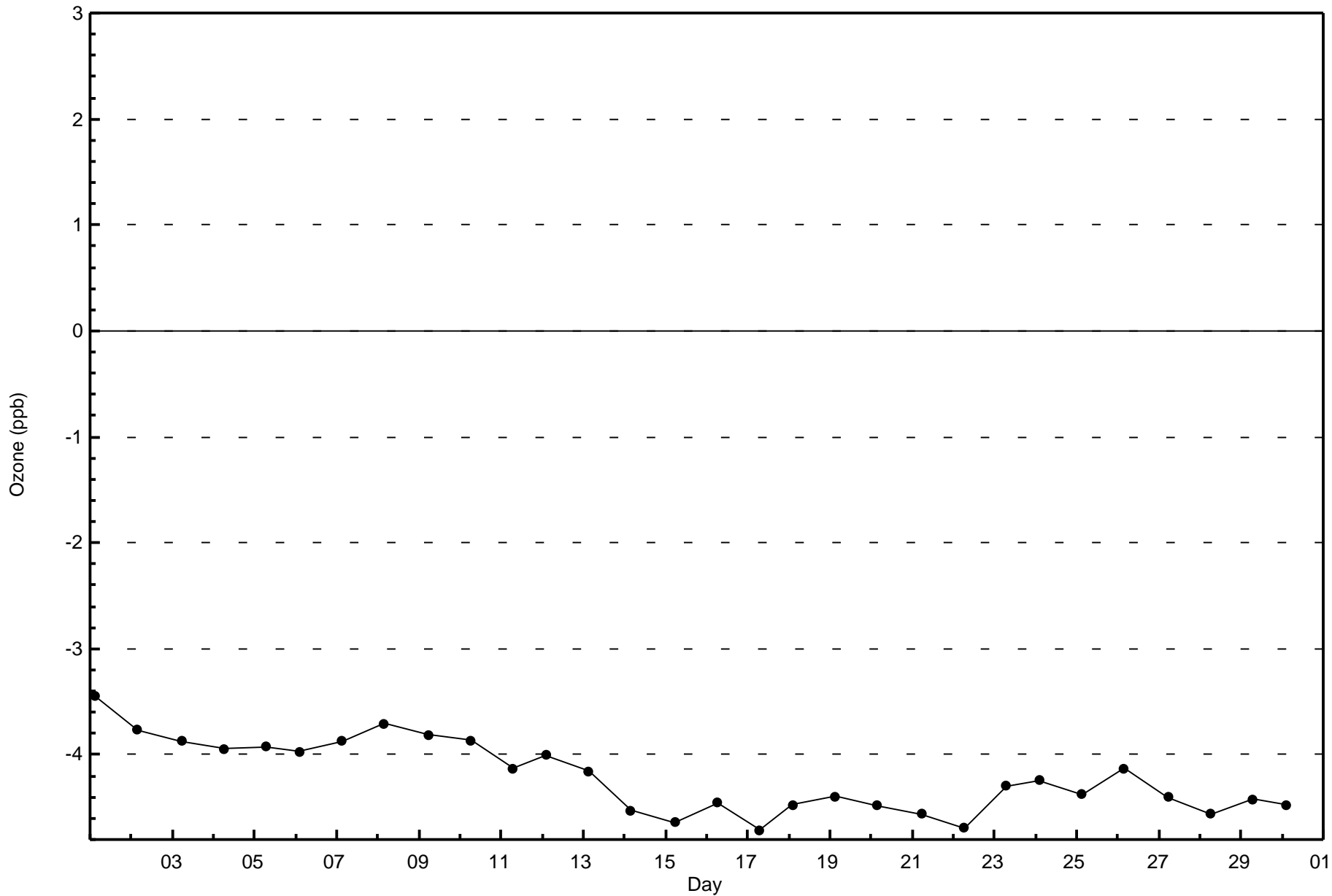
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Ozone (O₃) - ppb
Conklin (AMS 21)

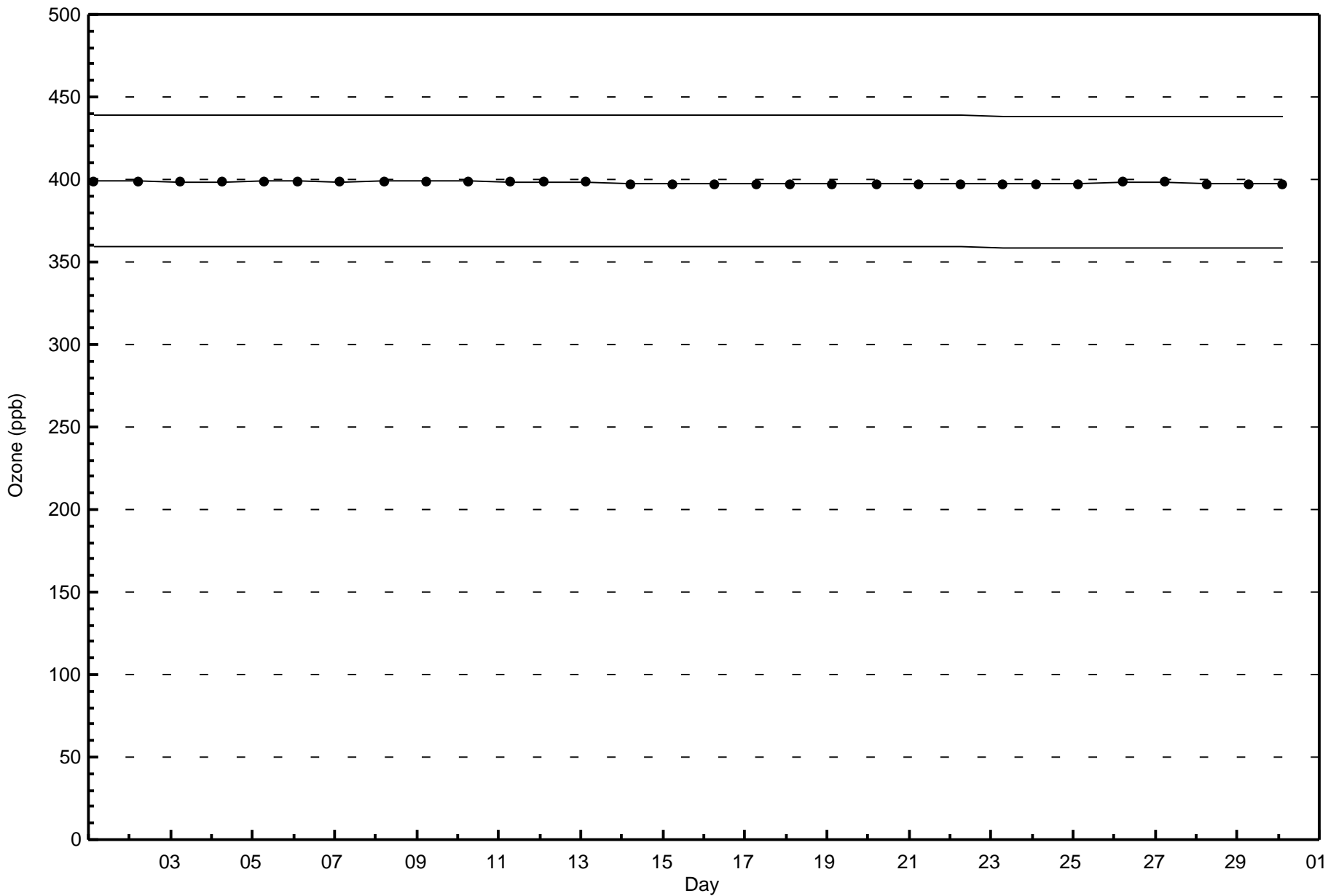






Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Conklin - June 2017





Summary of Hour Averages

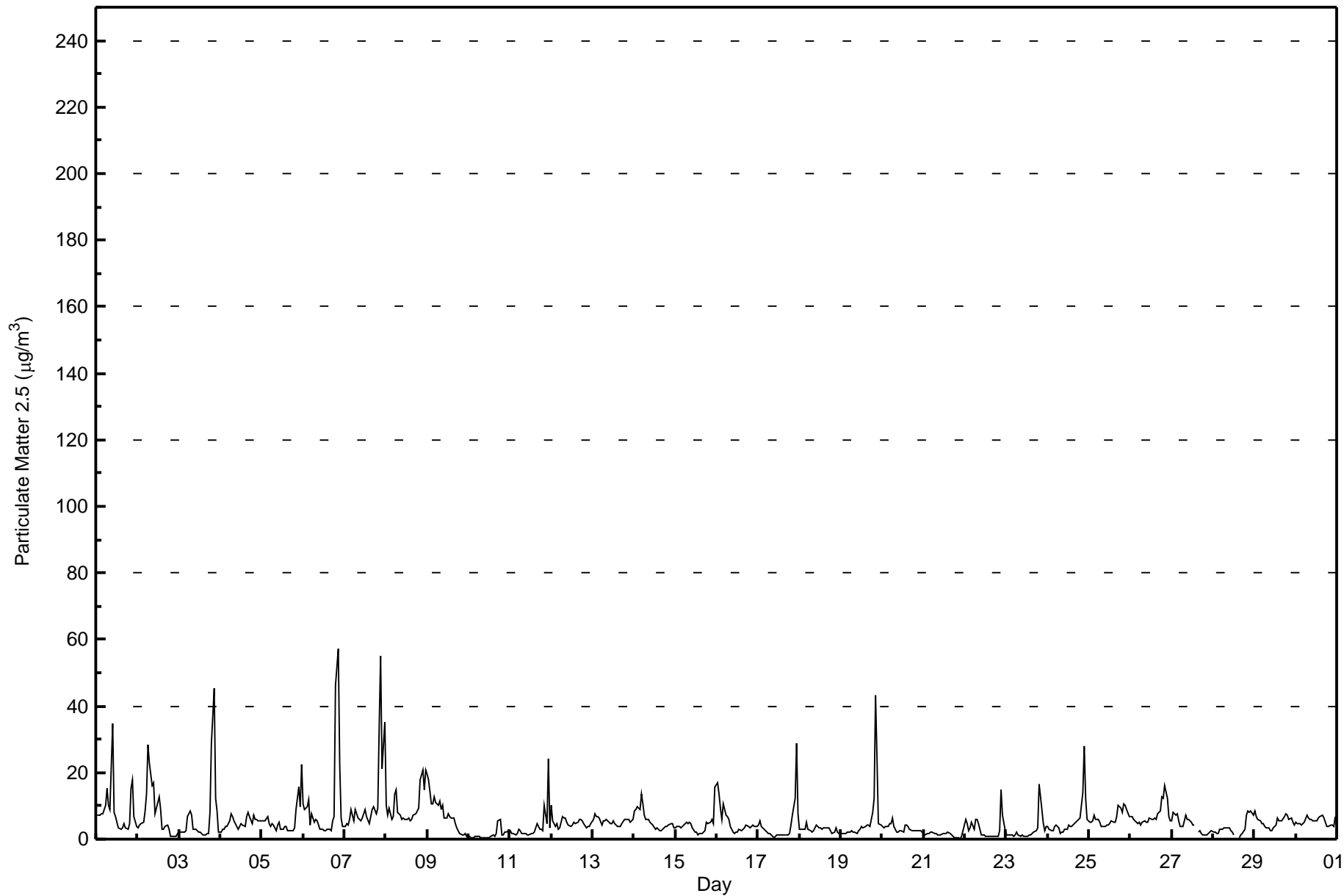
Conklin - June 2017

Number of Exceedences (AAAQO):	24-hr: 0	Hours in Service:	720
Maximum Value: 57.0 µg/m ³ on Jun 6 21:00	Maximum Daily Average: 11.8 µg/m ³ on Jun 7	Hours of Data:	717
Minimum Value: 0.2 µg/m ³ on Jun 21 22:00	Minimum Daily Average: 1.4 µg/m ³ on Jun 21	Hours of Missing Data:	3
Maximum Diurnal Average: 11.8 µg/m ³ at hour 21	Minimum Diurnal Average: 3.5 µg/m ³ at hour 15	Hours of Calibration:	1
Monthly Average: 5.49 µg/m ³	Percentiles: P ₁ = 0.4 P ₁₀ = 1.3 Q ₁ = 2.5 Median = 4.2 Q ₃ = 6.3 P ₉₀ = 9.9 P ₉₉ = 34.7	Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	7.0	7.1	7.0	7.7	7.7	10.1	15.1	10.2	9.0	34.9	8.2	6.7	5.2	3.2	2.9	3.5	4.9	3.6	2.9	4.7	15.4	17.6	6.7	4.0	8.6	34.9
2-Jun	3.5	4.3	4.7	5.0	8.5	13.4	28.3	22.8	16.3	16.8	7.6	9.5	12.6	9.0	3.0	2.8	3.7	4.2	2.9	0.8	0.7	0.9	0.9	1.8	7.7	28.3
3-Jun	2.1	2.2	2.0	2.2	2.6	6.7	8.5	7.3	3.2	2.9	3.1	2.3	1.9	1.5	1.3	1.2	1.7	1.9	7.9	29.0	45.5	12.3	8.4	2.3	6.7	45.5
4-Jun	2.2	2.9	3.2	3.7	3.9	5.7	7.5	6.8	5.6	3.8	2.8	3.8	4.7	4.2	3.8	6.6	8.1	6.6	4.9	7.4	5.7	6.0	5.6	5.4	5.0	8.1
5-Jun	5.6	5.6	5.7	7.0	4.6	3.8	4.8	4.2	2.6	4.1	5.2	3.0	3.0	3.6	3.7	2.7	2.7	2.7	2.6	3.4	8.9	15.7	9.9	22.4	5.7	22.4
6-Jun	10.6	8.8	9.8	11.9	4.4	7.6	5.0	6.0	5.5	4.2	3.1	2.8	2.6	2.7	3.1	3.1	2.6	5.3	6.7	46.3	57.0	22.5	6.4	3.7	10.1	57.0
7-Jun	3.9	4.8	4.3	6.0	9.0	5.7	8.8	7.5	6.4	5.4	6.3	7.5	8.8	6.7	4.7	6.8	8.7	9.9	7.5	9.1	34.1	55.3	21.3	35.3	11.8	55.3
8-Jun	10.4	7.1	9.2	6.0	6.7	13.5	15.0	7.9	7.3	5.8	6.3	6.1	5.8	6.3	5.5	5.8	7.1	7.5	8.5	9.2	17.6	20.9	14.6	20.9	9.6	20.9
9-Jun	19.3	17.7	10.5	10.7	12.8	11.1	10.3	11.4	8.9	10.3	6.4	6.3	7.6	6.9	6.3	6.4	4.8	3.4	2.6	1.8	1.3	1.1	1.7	1.0	7.5	19.3
10-Jun	0.7	0.3	0.3	0.5	0.9	1.0	0.9	0.5	0.4	0.4	0.4	0.4	0.6	0.8	1.3	1.1	1.9	5.4	5.9	1.5	1.4	2.0	2.1	2.4	1.4	5.9
11-Jun	2.5	1.9	1.5	1.3	1.6	3.0	2.7	1.6	1.8	1.7	1.2	1.4	1.9	1.8	2.1	3.2	4.8	2.8	3.0	2.5	10.3	4.7	24.2	3.6	3.6	24.2
12-Jun	10.1	5.5	3.7	4.6	3.1	3.4	6.9	6.4	6.2	4.9	4.1	3.9	4.2	4.9	4.7	5.0	6.1	5.9	5.5	4.6	3.6	4.0	3.7	4.6	5.0	10.1
13-Jun	5.9	7.5	7.0	6.7	6.3	4.4	5.4	5.3	5.8	5.1	4.6	4.6	5.3	4.8	3.8	3.6	4.0	4.5	6.0	5.8	6.1	6.1	4.9	5.9	5.4	7.5
14-Jun	8.4	8.8	9.9	9.0	13.4	10.6	7.1	6.0	5.8	5.3	4.6	4.3	3.0	3.5	2.8	2.4	2.7	3.6	3.9	3.9	4.3	4.8	4.6	3.2	5.7	13.4
15-Jun	3.4	3.8	3.8	3.5	3.8	4.3	4.9	4.8	5.1	4.5	3.5	2.3	1.9	1.2	1.6	1.9	2.2	2.7	5.0	4.8	5.2	5.9	4.8	15.6	4.2	15.6
16-Jun	17.0	13.6	9.1	5.8	10.4	7.1	6.6	5.7	3.6	2.0	1.8	2.0	2.1	2.8	2.4	3.0	3.5	4.1	4.0	3.3	3.9	4.1	3.9	3.9	5.2	17.0
17-Jun	4.4	5.4	3.9	3.1	2.3	2.1	1.7	1.7	0.7	0.6	0.7	1.1	1.2	1.3	1.3	1.3	1.4	1.5	1.5	4.1	7.3	12.2	28.8	7.7	4.1	28.8
18-Jun	3.1	2.9	2.9	2.9	5.0	2.9	2.6	2.1	2.6	3.5	4.1	3.5	3.3	2.9	3.6	3.3	3.3	3.3	2.4	1.7	2.3	3.5	2.1	1.9	3.0	5.0
19-Jun	1.5	1.5	1.8	1.9	2.0	2.0	2.6	2.1	2.1	1.7	2.4	2.9	3.7	3.6	3.6	4.3	4.2	4.0	8.1	12.2	43.1	24.5	4.5	4.2	6.0	43.1
20-Jun	3.6	3.6	3.6	3.8	4.8	4.5	6.3	3.7	2.3	2.1	2.4	2.4	2.1	4.1	4.3	3.7	2.9	2.6	2.6	2.7	2.6	2.5	2.7	2.1	3.3	6.3
21-Jun	1.5	1.3	1.6	1.6	2.0	1.9	1.9	1.7	1.1	1.1	1.4	1.5	1.7	1.5	2.0	1.5	1.4	0.7	0.6	0.4	0.4	0.2	0.7	2.6	1.4	2.6
22-Jun	5.9	4.6	2.7	3.4	5.0	3.2	6.0	5.7	4.5	1.1	1.1	1.5	0.7	0.7	0.6	0.8	0.8	0.7	0.8	0.9	2.5	14.9	7.0	2.7	3.2	14.9
23-Jun	1.3	1.1	1.1	1.2	1.0	1.2	2.1	1.2	0.8	1.2	1.0	0.9	0.8	1.3	1.2	1.7	2.0	2.5	3.6	16.3	12.7	4.6	2.7	3.7	2.8	16.3
24-Jun	3.8	2.8	2.5	2.3	3.8	4.2	3.5	1.9	2.1	2.2	2.8	2.8	4.3	3.8	3.8	4.5	5.3	5.4	5.9	6.5	14.0	27.8	12.1	6.0	5.6	27.8
25-Jun	5.2	5.3	5.6	7.3	5.8	5.9	5.1	3.9	3.8	3.7	4.3	4.2	4.8	5.4	4.9	5.1	6.9	10.1	9.4	8.1	10.8	10.3	8.9	6.9	6.3	10.8
26-Jun	6.9	6.8	6.0	5.2	4.6	5.0	4.4	5.0	5.3	5.3	5.3	6.3	6.0	5.8	6.5	5.8	7.6	8.6	12.6	12.5	16.0	12.1	6.6	5.4	7.1	16.0
27-Jun	5.5	7.9	7.3	7.6	5.5	4.0	4.0	5.5	7.2	5.8	6.0	5.0	4.4	4.4	C	1.9	2.7	1.9	1.3	1.2	1.4	1.5	2.2	2.4	4.2	7.9
28-Jun	2.1	2.0	1.7	1.7	2.8	2.9	3.2	3.6	3.2	3.3	2.5	2.2	1.4	UO	UO	0.6	1.1	1.5	3.1	7.0	8.5	8.0	8.5	7.3	3.6	8.5
29-Jun	8.7	6.9	5.8	5.4	4.9	4.7	3.7	3.5	3.3	2.5	2.7	3.3	4.2	6.6	5.4	5.4	5.6	6.9	7.5	7.3	6.1	6.4	5.0	4.0	5.2	8.7
30-Jun	5.1	4.8	4.6	4.2	4.8	5.2	7.1	6.5	5.9	5.8	5.5	5.7	5.4	6.3	6.9	7.3	6.5	5.1	3.9	4.0	4.4	4.4	3.9	6.7	5.4	7.3

5.7	5.3	4.8	4.8	5.1	5.4	6.4	5.4	4.6	5.1	3.7	3.7	3.8	3.9	3.5	3.5	4.0	4.3	4.8	7.4	11.8	10.6	7.3	6.7	Diurnal Average	
19.3	17.7	10.5	11.9	13.4	13.5	28.3	22.8	16.3	34.9	8.2	9.5	12.6	9.0	6.9	7.3	8.7	10.1	12.6	46.3	57.0	55.3	28.8	35.3	Diurnal Maximum	

C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin - June 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	434	60.53	60.53
6 - 15	213	29.71	90.24
16 - 25	19	2.65	92.89
26 - 80	12	1.67	94.56
> 81.0	0	0.00	94.56

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Conklin - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	30	22	9	3	4	12	20	38	46	34	24	14	30	40	63	44	433
6 - 15	8	2	7	6	9	17	13	28	19	16	9	15	6	13	17	26	211
16 - 25	0	0	1	0	0	1	1	1	1	5	2	0	1	3	2	1	19
26 - 80	0	0	0	2	0	0	0	1	1	3	3	0	0	1	0	0	11
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	24	17	11	13	30	34	68	67	58	38	29	37	57	82	71	674

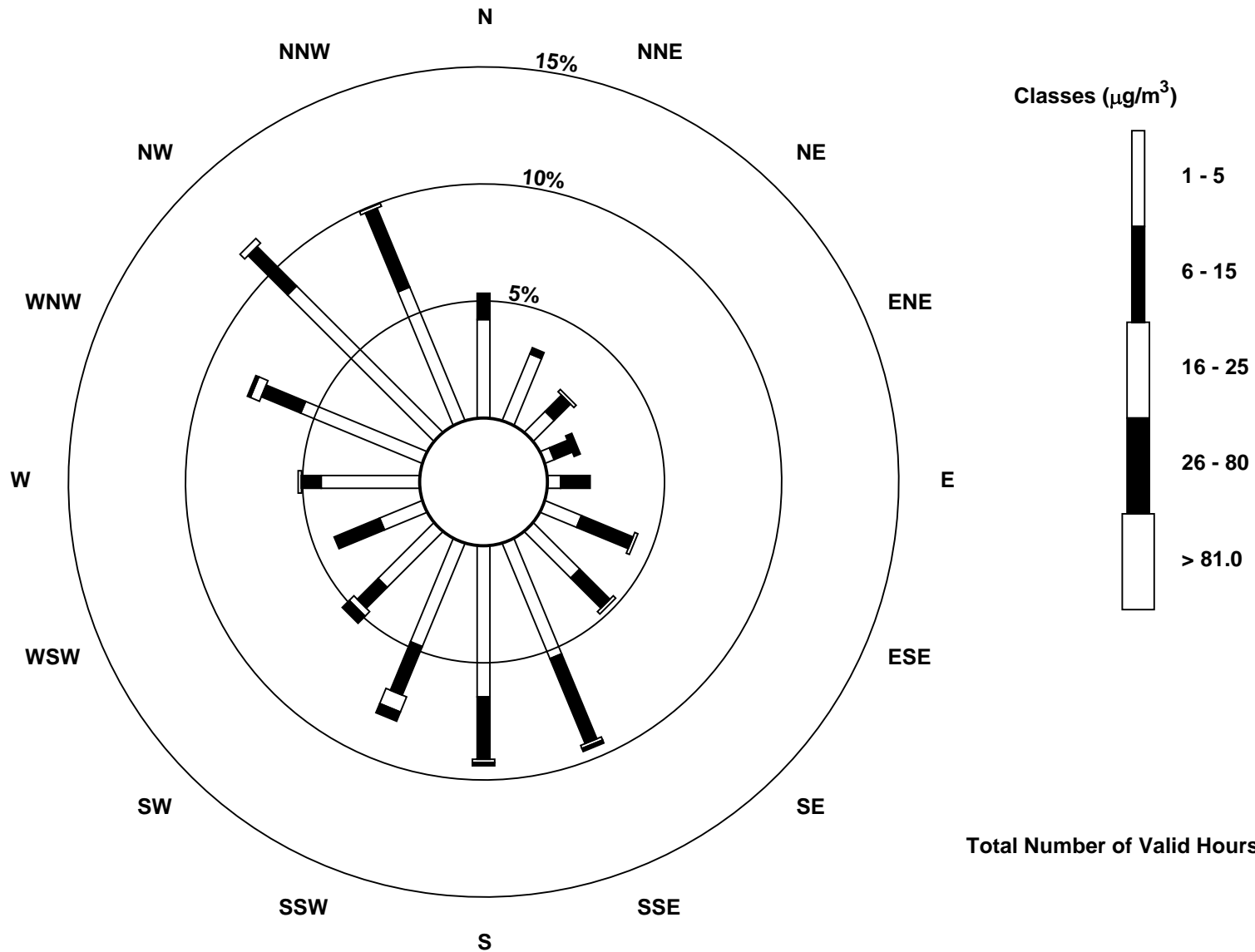
Total Number of Valid Hours: 713

Total Number of Hours: 720



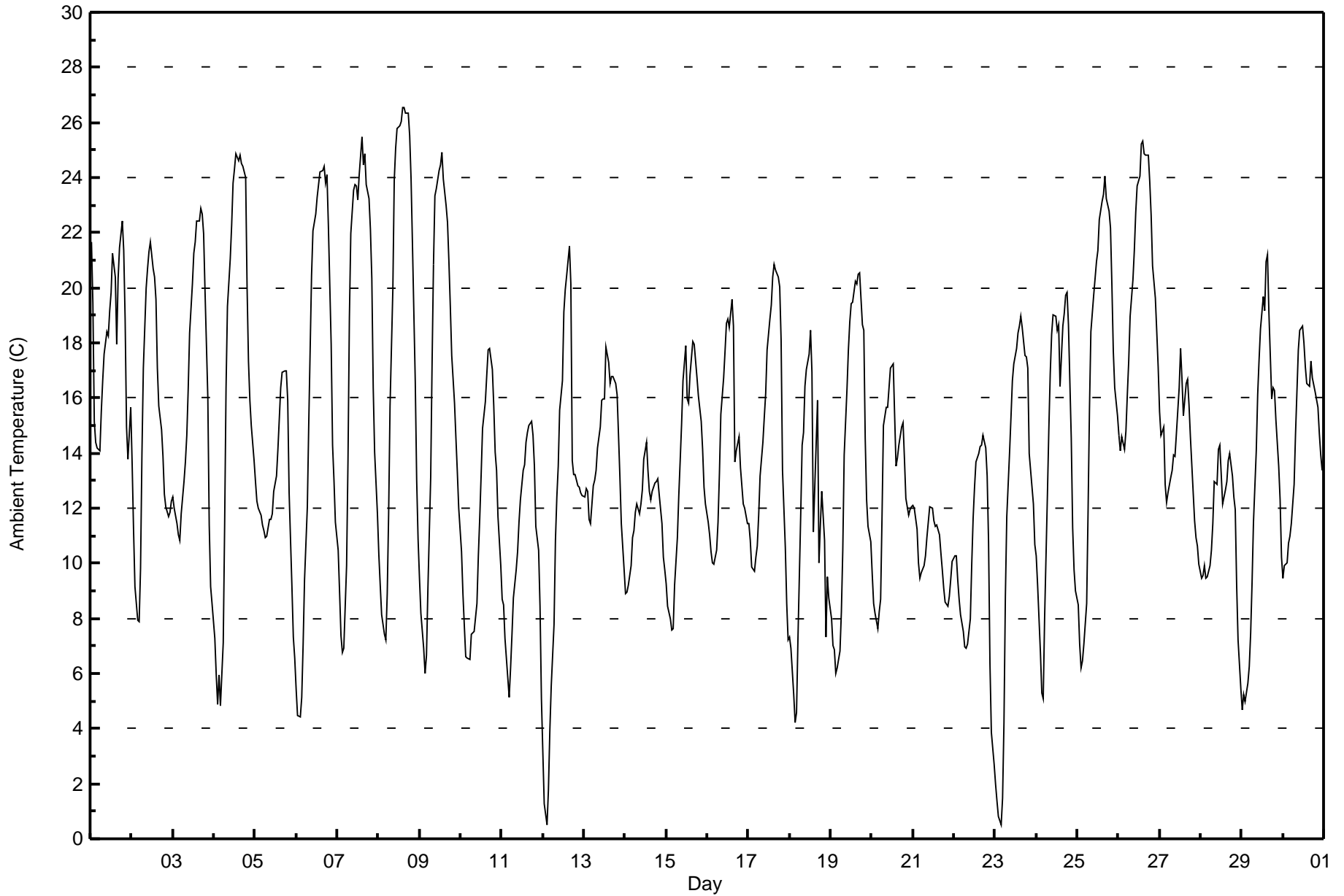
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin (AMS 21)





Maximum Value: 26.5 C on Jun 8 16:00		Maximum Daily Average: 20.2 C on Jun 26		Hours in Service: 720																							
Minimum Value: 0.5 C on Jun 23 04:00		Minimum Daily Average: 10.0 C on Jun 22		Hours of Data: 720																							
Maximum Diurnal Average: 18.8 C at hour 16		Minimum Diurnal Average: 8.0 C at hour 4		Hours of Missing Data: 0																							
Monthly Average: 14.17 C		Percentiles: P ₁ = 1.8 P ₁₀ = 7.4 Q ₁ = 10.4 Median = 13.7 Q ₃ = 17.8 P ₉₀ = 21.9 P ₉₉ = 25.7		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	21.7	19.4	15.2	14.4	14.2	14.1	15.5	16.6	17.6	18.4	18.3	19.2	19.8	21.2	20.4	18.0	20.3	21.5	22.4	21.4	18.8	14.9	13.8	15.7	18.0	22.4	
2-Jun	13.6	11.2	9.2	7.9	7.9	9.8	14.0	17.1	20.0	20.7	21.3	21.7	20.7	20.4	19.6	17.1	15.7	14.9	13.9	12.5	12.0	11.7	11.9	12.3	14.9	21.7	
3-Jun	12.4	12.0	11.5	11.0	10.8	11.8	12.9	13.7	14.7	16.3	18.4	20.1	21.2	21.7	22.4	22.4	22.9	22.7	22.0	19.9	16.0	11.4	9.2	8.5	16.1	22.9	
4-Jun	7.3	6.0	4.9	5.9	4.8	7.1	11.4	16.4	19.3	21.0	22.3	23.8	24.3	24.9	24.6	24.8	24.5	24.4	24.0	20.1	17.3	15.9	15.0	13.7	16.8	24.9	
5-Jun	12.9	12.3	12.0	11.7	11.4	11.2	10.9	11.0	11.6	11.6	11.8	12.6	13.2	14.1	15.3	16.4	16.9	17.0	17.0	15.9	12.6	9.1	7.3	6.6	12.6	17.0	
6-Jun	5.4	4.5	4.4	5.1	7.1	9.4	12.0	15.1	17.8	20.4	22.1	22.7	23.3	23.8	24.2	24.3	24.4	23.8	24.1	22.3	17.9	14.3	13.0	11.5	16.4	24.4	
7-Jun	10.5	9.0	7.4	6.8	6.9	9.9	13.7	18.9	22.0	23.5	23.8	23.7	23.2	24.1	25.5	24.5	24.9	23.8	23.2	22.1	20.3	16.4	14.0	11.8	17.9	25.5	
8-Jun	10.3	9.2	8.1	7.4	7.2	8.9	11.8	15.7	19.9	23.9	25.1	25.8	25.9	26.0	26.5	26.5	26.3	26.3	25.5	23.9	21.6	16.6	13.0	10.9	18.4	26.5	
9-Jun	9.4	8.2	6.9	6.0	6.6	9.0	13.1	17.3	20.8	23.3	23.6	24.2	24.4	24.9	24.0	23.0	22.4	21.0	19.3	17.5	15.8	14.5	13.3	12.0	16.7	24.9	
10-Jun	10.4	8.9	7.7	6.6	6.5	6.5	7.4	7.5	7.5	8.6	10.3	11.6	13.2	14.9	15.9	16.8	17.7	17.8	17.0	15.7	14.0	13.4	11.7	9.9	11.6	17.8	
11-Jun	8.7	8.5	7.3	5.8	5.2	6.2	7.4	8.7	9.7	10.4	11.5	12.3	13.4	13.6	14.4	14.7	15.0	15.1	14.6	13.5	11.3	10.5	8.4	5.1	10.5	15.1	
12-Jun	3.1	1.3	0.5	1.8	3.9	5.6	7.8	10.8	12.4	13.5	15.6	16.6	19.1	19.9	20.4	21.5	20.1	13.7	13.2	13.2	12.8	12.7	12.5	12.5	11.9	21.5	
13-Jun	12.4	12.7	12.6	11.6	11.4	12.8	13.0	13.4	14.2	15.0	15.9	16.0	15.9	17.9	17.3	16.5	16.8	16.8	16.5	16.1	14.7	13.1	11.4	9.8	14.3	17.9	
14-Jun	8.9	8.9	9.2	9.9	10.9	11.2	11.9	12.2	11.8	12.2	12.7	13.8	14.4	13.4	12.6	12.3	12.6	12.9	13.0	13.1	12.5	11.4	10.2	9.7	11.7	14.4	
15-Jun	9.2	8.4	8.0	7.6	7.6	9.2	10.9	12.4	13.7	15.0	16.6	17.9	16.0	15.8	16.9	18.1	17.9	17.4	16.7	16.1	15.2	14.1	12.8	12.1	13.6	18.1	
16-Jun	11.5	11.0	10.4	10.0	10.0	10.4	11.5	13.3	15.4	16.7	17.7	18.7	18.9	18.6	19.6	18.6	13.7	14.1	14.6	13.5	12.8	12.2	12.0	11.5	14.0	19.6	
17-Jun	11.4	10.8	9.9	9.7	10.2	10.6	11.8	13.2	14.4	15.3	16.2	17.7	18.9	19.4	20.4	20.9	20.7	20.4	20.0	18.1	13.4	10.6	8.6	7.2	14.6	20.9	
18-Jun	7.3	6.9	5.2	4.2	4.6	7.2	11.8	14.3	14.8	16.4	17.0	17.6	18.4	16.9	11.1	14.4	15.9	10.0	11.4	12.6	10.8	7.3	9.5	8.7	11.4	18.4	
19-Jun	8.0	7.0	6.9	6.0	6.2	6.8	8.2	10.5	13.9	16.3	17.8	18.7	19.4	19.5	20.2	20.2	20.5	20.5	18.7	18.4	14.5	12.3	11.4	10.8	13.9	20.5	
20-Jun	9.6	8.5	8.2	7.6	8.2	8.7	11.7	15.0	15.7	15.7	16.4	17.1	17.2	15.3	13.6	13.8	14.3	15.0	15.1	13.8	12.4	11.7	12.0	12.1	12.9	17.2	
21-Jun	12.1	12.0	11.2	10.0	9.5	9.6	9.9	10.3	10.9	11.5	12.0	12.0	11.6	11.3	11.4	11.0	10.4	9.8	9.1	8.6	8.4	8.8	9.4	10.1	10.5	12.1	
22-Jun	10.3	10.3	9.4	8.7	8.1	7.5	7.0	6.9	7.0	8.0	10.0	11.7	12.8	13.7	14.0	14.2	14.3	14.7	14.2	13.2	10.8	6.3	3.9	2.7	10.0	14.7	
23-Jun	2.0	1.3	0.8	0.5	1.5	4.2	8.8	11.7	14.0	15.3	16.6	17.2	17.8	18.4	18.6	19.0	18.6	17.5	17.5	17.1	14.0	12.8	12.1	10.7	12.0	19.0	
24-Jun	10.3	9.2	6.7	5.3	5.1	8.0	12.5	14.8	16.9	18.3	19.0	19.0	18.4	18.7	16.4	18.6	19.1	19.8	19.8	18.7	14.6	11.3	9.8	9.0	14.1	19.8	
25-Jun	8.5	7.1	6.2	6.4	7.1	8.5	11.9	15.6	18.4	19.7	20.3	21.0	21.4	22.5	23.1	23.4	24.0	23.2	22.8	22.2	20.1	17.7	16.4	15.3	16.8	24.0	
26-Jun	14.6	14.1	14.6	14.1	14.8	16.1	17.3	19.0	20.3	21.3	22.7	23.7	24.0	25.2	25.3	24.8	24.8	24.8	23.9	22.6	20.8	19.6	18.4	17.1	20.2	25.3	
27-Jun	15.5	14.6	15.0	12.9	12.2	12.6	13.1	13.4	13.9	13.9	14.7	16.4	17.8	16.7	15.4	16.5	16.7	15.8	14.6	13.6	11.5	10.9	10.6	10.0	14.1	17.8	
28-Jun	9.4	9.6	9.9	9.4	9.5	9.9	10.5	11.4	13.0	12.9	14.2	14.3	13.2	12.2	12.7	12.9	13.7	14.0	13.2	12.4	12.0	9.2	7.2	5.4	11.3	14.3	
29-Jun	4.7	5.2	5.0	5.6	6.2	7.5	9.3	11.5	14.1	16.1	17.4	18.5	19.7	19.2	20.9	21.2	19.1	16.0	16.4	16.3	15.2	13.5	12.3	10.2	13.4	21.2	
30-Jun	9.5	9.9	10.0	10.7	11.0	11.4	12.8	14.7	16.2	17.8	18.5	18.6	18.0	17.1	16.5	16.4	17.4	16.7	16.5	16.2	15.6	14.7	13.9	13.4	14.7	18.6	
		10.0	9.3	8.5	8.0	8.2	9.4	11.4	13.4	15.1	16.3	17.3	18.1	18.5	18.7	18.6	18.8	18.7	18.0	17.7	16.7	14.7	12.6	11.5	10.5	Diurnal Average	
		21.7	19.4	15.2	14.4	14.8	16.1	17.3	19.0	22.0	23.9	25.1	25.8	25.9	26.0	26.5	26.5	26.3	26.3	25.5	23.9	21.6	19.6	18.4	17.1	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	165	22.92	22.92
10 - 20	440	61.11	84.03
> 20	115	15.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



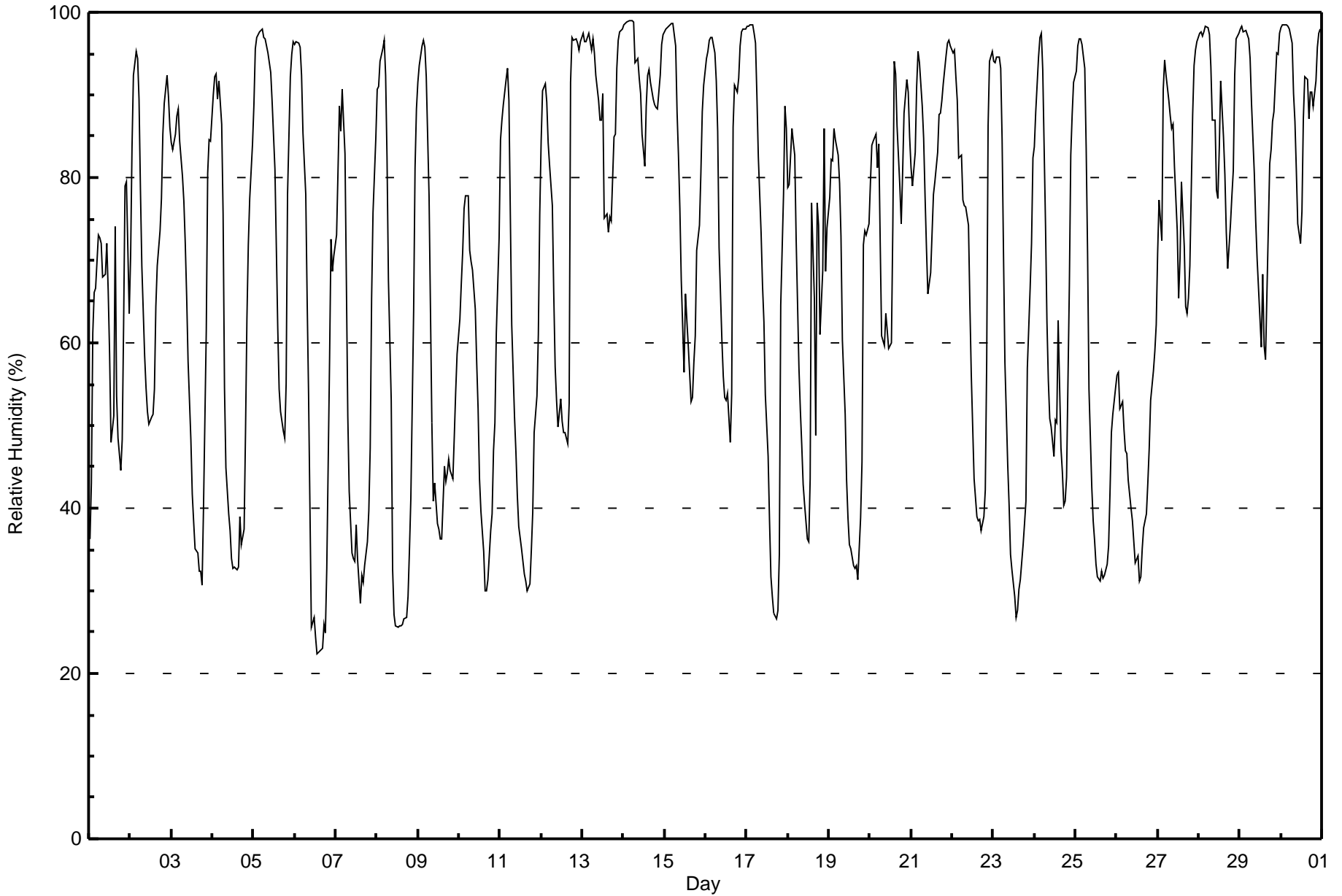
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Conklin - June 2017

Maximum Value: 99 % on Jun 14 05:00														Maximum Daily Average: 93.1 % on Jun 14														Hours in Service: 720	
Minimum Value: 22 % on Jun 6 14:00														Minimum Daily Average: 45.1 % on Jun 26														Hours of Data: 720	
Maximum Diurnal Average: 90.6 % at hour 4														Minimum Diurnal Average: 51.1 % at hour 14														Hours of Missing Data: 0	
Monthly Average: 69.4 %														Percentiles: P ₁ = 26 P ₁₀ = 35 Q ₁ = 49 Median = 74 Q ₃ = 90 P ₉₀ = 97 P ₉₉ = 99														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	36	43	61	66	67	73	73	72	68	68	72	66	59	48	51	74	54	48	45	48	62	79	79	64	61.5	79			
2-Jun	70	84	92	95	94	90	79	69	58	55	52	50	51	51	54	64	69	74	77	85	89	92	90	86	73.9	95			
3-Jun	84	83	85	87	88	84	80	77	72	66	58	48	42	38	35	35	32	32	31	40	62	80	85	84	62.9	88			
4-Jun	90	92	92	89	92	86	76	55	45	39	37	34	33	33	32	33	39	36	38	49	63	72	77	84	59.0	92			
5-Jun	89	96	97	98	98	98	97	97	95	94	93	89	81	72	62	54	52	49	49	55	78	92	95	96	82.3	98			
6-Jun	96	96	96	96	92	86	78	65	54	40	26	27	24	22	23	23	23	26	25	33	58	73	69	70	55.0	96			
7-Jun	73	81	89	86	91	83	67	51	42	35	34	34	38	34	28	32	31	33	36	40	47	65	76	85	54.5	91			
8-Jun	91	91	94	96	97	92	82	68	53	33	27	26	26	26	26	26	27	27	29	35	41	64	81	88	56.0	97			
9-Jun	92	94	96	97	96	92	78	64	50	41	43	38	37	36	36	45	43	44	46	45	44	49	54	59	59.1	97			
10-Jun	63	67	71	76	78	78	71	70	69	64	58	52	43	40	35	30	30	31	37	39	47	50	61	73	55.6	78			
11-Jun	85	87	89	92	93	89	76	62	51	47	42	38	35	34	32	31	30	31	35	39	49	54	61	76	56.5	93			
12-Jun	84	91	91	89	84	82	77	66	57	53	50	53	51	49	49	48	53	92	97	97	97	96	95	96	74.8	97			
13-Jun	97	97	97	97	97	95	97	95	92	89	87	87	90	75	76	73	75	75	85	85	93	97	98	98	89.5	98			
14-Jun	98	99	99	99	99	99	99	94	94	92	90	85	81	89	92	93	92	89	89	88	88	92	96	97	93.1	99			
15-Jun	98	98	98	98	99	99	96	88	83	76	68	56	66	63	60	53	53	58	61	71	74	80	88	91	78.1	99			
16-Jun	94	95	97	97	97	95	92	86	71	60	56	53	53	54	48	54	86	91	90	92	96	98	98	98	81.3	98			
17-Jun	98	98	98	99	98	96	90	83	73	67	62	54	46	39	32	29	27	27	28	34	65	78	89	86	66.5	99			
18-Jun	79	79	86	84	83	73	57	52	48	43	41	36	36	44	77	65	49	77	74	61	69	86	69	74	64.2	86			
19-Jun	78	82	82	86	84	83	79	73	60	51	43	39	36	35	33	33	33	31	39	46	72	74	73	74	59.1	86			
20-Jun	79	84	84	85	81	84	72	61	60	64	62	59	60	74	94	93	86	79	74	81	88	92	90	85	78.0	94			
21-Jun	81	79	83	91	95	94	89	85	78	72	66	68	73	78	80	83	88	88	89	91	95	96	97	96	84.7	97			
22-Jun	95	95	92	89	82	83	77	77	76	74	65	56	50	44	39	39	39	37	39	42	58	86	94	95	67.7	95			
23-Jun	94	94	95	95	93	85	71	58	45	40	34	33	29	27	28	30	31	36	38	41	57	67	72	82	57.2	95			
24-Jun	84	88	95	97	97	93	74	62	55	51	50	46	51	50	63	47	44	40	41	44	67	83	88	92	66.7	97			
25-Jun	93	96	97	97	96	93	84	71	54	43	39	36	33	32	31	32	32	32	33	35	42	49	51	54	56.5	97			
26-Jun	56	57	52	53	50	47	47	43	40	38	36	33	34	31	32	35	38	39	43	47	53	57	59	62	45.1	62			
27-Jun	71	77	72	91	94	92	89	87	86	87	81	74	65	70	79	72	64	64	65	69	88	94	95	96	80.2	96			
28-Jun	98	98	97	98	98	98	97	93	87	87	79	77	83	92	85	80	73	69	74	78	81	92	97	97	87.9	98			
29-Jun	98	98	98	98	97	97	94	89	80	75	70	67	60	68	60	58	66	82	83	87	88	95	95	97	83.3	98			
30-Jun	98	99	99	99	98	98	96	90	87	81	74	72	76	87	92	92	87	90	90	89	92	96	97	98	90.7	99			
	84.8	87.2	89.1	90.6	90.3	87.9	81.1	73.4	66.2	60.8	56.4	52.9	51.4	51.1	52.1	51.9	51.6	54.2	56.0	59.6	70.0	79.3	82.3	84.5	Diurnal Average				
	98	99	99	99	99	99	99	97	95	94	93	89	90	92	94	93	92	92	97	97	97	98	98	98	Diurnal Maximum				





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Conklin - June 2017

Maximum Speed: 22 km/h on Jun 26 12:00	Maximum Daily Speed Average: 14.1 km/h on Jun 22	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 30 01:00	Minimum Daily Speed Average: 0.4 km/h on Jun 24	Hours of Data: 716
Maximum Diurnal Speed Average: 3.0 km/h at hour 11	Minimum Diurnal Speed Average: 0.6 km/h at hour 19	Hours of Missing Data: 4
Monthly Average Velocity: 1.4 km/h 297.9 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 O ₃ = 9 P ₉₀ = 13 P ₉₉ = 19	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SSE10	S4	ENE1	SSE5	NW1	S3	W1	WNW3	WNW2	WNW6	NW7	NNW9	NNW10	NNW10	NW11	NNW2	N1	SW3	SSE5	S5	SW3	SSW4	S5	SW7	W1.6	NW11	
2-Jun	SSW6	SE4	SE2	SE2	SSW1	SSW2	S3	SSW6	WNW7	WNW8	NW10	NW9	W9	WNW9	W12	W15	W13	W12	W11	W10	WNW9	W8	W10	NNW10	W6.5	W15	
3-Jun	NW9	WNW8	W9	WNW8	W7	WNW7	NW10	NW9	NW9	NW10	NW9	WNW9	WNW9	WNW9	WNW8	NW7	W7	SW6	WSW5	SW3	SW3	SSW4	SSW5	S5	WNW6.0	NW10	
4-Jun	SE5	SSE4	S4	N1	S2	SSE3	SSE2	E3	E4	E6	ENE6	ESE11	ESE10	E10	ESE11	ESE11	ESE10	SE13	S8	NNW14	NNW9	NNW8	N9	N8	E3.5	NNW14	
5-Jun	NNW7	NNW5	NNW7	NNW8	NNW7	NW7	NNW8	NNW8	NW12	NW11	NNW10	NNW10	NNW15	NNW15	NNW18	N15	N11	N9	NE5	ESE4	ESE2	SSW1	S2	S2	NNW7.2	NNW18	
6-Jun	S4	S4	SSE6	SSE6	SSE6	SSW7	SSW10	SW8	WSW8	SW8	WSW9	WSW9	WSW7	W5	W7	W5	NW4	W3	WSW4	SSW3	SSW3	SSW5	SSW7	SSW6	SW4.8	SSW10	
7-Jun	SSW5	S5	SSE5	SSW5	SE2	SE2	SSE2	S1	WSW6	WNW3	E2	ESE4	ESE4	E5	ENE4	E7	E8	ENE5	ENE6	ENE6	ENE3	ENE2	SSE1	AF	ESE2.4	E8	
8-Jun	WSW0	S2	NW1	NW1	NW0	NW0	NW1	ESE4	E5	SE12	SE13	SE13	SE14	SE13	ESE14	ESE13	ESE12	ESE12	SE10	ESE7	ESE5	NW1	AF	WNW1	SE6.1	ESE14	
9-Jun	SW0	NNW1	NNW1	NNW3	NW1	NNW4	NNW4	N7	E6	NE12	NNE15	NE15	NE15	NE15	ENE12	NE18	NNE19	NNE18	NNE14	NE13	NNE10	N9	NNE12	NNE12	NNE9.1	NNE19	
10-Jun	NNE9	NNE7	NNE7	NNE8	NNE10	NNE11	NE10	NE10	NE9	NNE8	NNE9	N11	NNE9	NNE5	ESE1	NE4	S3	SE4	W0	N7	NW5	NW5	NW9	NW7	NNE5.7	N11	
11-Jun	NW5	NNW5	N11	NNW5	NW5	NW7	NNW9	NNW12	NW15	NW13	NW12	NW12	NW12	NW11	NW11	NW11	NW10	NW9	W8	W7	WSW5	WSW9	SW6	SSE4	NW7.9	NW15	
12-Jun	S2	SSW2	S4	S4	S5	SSE6	SSE4	SSE6	SSE12	SSE15	S16	S15	S16	SSW18	SSW18	SSW19	SSW14	WNW7	SE4	W2	ESE4	SSE8	SSE6	SSE4	S8.0	SSW19	
13-Jun	S2	SSE6	SSE6	SSW3	SSW6	SSE1	SW1	S1	W3	SW3	SSW3	S4	SE3	SSE4	SE6	SE6	E5	ESE8	SE6	SE2	NW1	NNW1	NW3	NNW2	SSE2.4	ESE8	
14-Jun	NNW1	W1	NNW2	NNW3	NNW2	NNW4	NNW6	N8	N8	N10	N9	N10	N10	NNE9	N13	NNE10	NNE10	NNE9	N8	N8	N8	NNW4	NNW2	NNW2	N6.3	N13	
15-Jun	WNW0	N1	NNW2	NNW3	NW1	NNW4	NNW4	NNW4	NW8	NW5	NW5	NW2	SE5	ENE7	SE2	NNE1	ESE2	NNE5	NNE3	NE2	N2	NE1	SSW3	NW1	W0	N1.4	ENE7
16-Jun	NW0	WSW1	WNW0	WSW1	WSW1	WNW1	SW1	ESE2	SSE3	WSW1	SW0	SE5	ESE4	SSE5	SSE4	SW6	SW8	N3	NNW3	NNW3	NW1	SE1	S2	WSW1	S0.9	SW8	
17-Jun	SSW1	SSE1	SE1	SSW3	S3	SSW2	NW5	NW8	NW10	NW12	NW13	NW14	NW13	NNW15	NW15	NW13	NNW14	NW13	NW9	NW5	AF	NE0	SSE3	S3	NW6.3	NNW15	
18-Jun	S4	S4	S4	S4	S4	S4	SSW7	SW7	SW8	SW10	SW8	SW6	S6	W9	WSW10	S5	WNW7	NW7	WNW4	W3	WSW4	WNW3	W9	W7	SW4.5	WSW10	
19-Jun	WNW6	NW6	NW6	NW6	NW5	NW5	WNW4	NW6	NW6	WNW5	NW6	WNW6	W6	W6	W5	W5	WNW6	W4	WSW4	WSW2	SSW3	SSW5	S5	SSW5	WNW4.1	NW6	
20-Jun	SSW5	SSW4	S5	S5	S4	SSW3	SE3	S6	SSW8	SSE8	S8	S9	S9	SW3	NNE2	ESE8	SE8	SE9	SSE11	SSE6	SE6	SSE3	WNW4	WNW5	SSE4.6	SSE11	
21-Jun	W6	WNW8	W11	W9	WSW6	WSW7	W9	NNW10	NNW11	NW11	NW14	NW12	NNW12	NNW10	NNW12	WNW9	WNW10	NW11	WNW10	NNW12	WNW9	NW10	NW11	NNW12	WNW9.6	NW14	
22-Jun	NNW12	NNW12	NNW17	NNW16	NNW17	NNW15	NNW21	NNW21	NNW18	NNW16	NNW18	NNW19	NNW19	NNW20	NNW19	NNW18	NNW17	NNW17	NNW13	NNW11	NNW3	WNW1	SW1	S2	NNW14.1	NNW21	
23-Jun	SSW2	SSW3	SSE2	S3	S3	SE2	NNE1	NW4	NNW6	NNW7	NNW9	NNW12	NNW13	NNW15	N19	N18	N14	N7	N2	NE2	WNW3	SW4	SW6	SSE2	NNW4.4	N19	
24-Jun	SW3	SSE2	NNW1	NW1	SE1	SE2	WSW1	WNW3	WNW6	WNW6	W7	NW7	ESE8	ESE9	SSE8	E5	NNE4	NNE7	ESE4	E2	ENE1	SW2	SSW5	SSE2	SE0.4	ESE9	
25-Jun	S3	S2	ESE3	SSE5	S4	SSE4	S5	S5	SSW4	WSW2	NNW3	WNW3	SW6	SSW8	S5	SSE10	S10	S10	SSW9	S12	SSE10	SSE9	SSE10	SSE9	S5.5	S12	
26-Jun	S8	SSE8	SSE10	SSE11	SSE13	SSE15	SSE15	SSE17	SSE19	SSE21	S21	SSE22	SSE18	SSE18	SSE18	SSE16	S13	S11	S9	SE9	SE6	ESE8	ESE7	NNE3	SSE12.6	SSE22	
27-Jun	NNW3	SSW2	WSW8	NW10	NW8	NW7	NW7	NW5	NW4	W7	W6	WNW7	WNW5	W5	NW7	NW8	NW7	WNW8	NW6	WSW7	S6	SSW5	SSW4	SSW4	WNW4.7	NW10	
28-Jun	SSE2	SSW5	SSE3	NNE1	NE2	WSW1	N5	NNE6	NNE7	N10	N12	N13	N12	NNE9	NNE9	NNE10	NE9	NE9	NE7	NE5	NNE4	NNW3	N1	N1	NNE4.9	N13	
29-Jun	WSW1	SSE4	S6	SSE2	S6	SSW5	S6	SSW7	SSW8	SW9	SW8	SW7	WNW4	ESE3	SSE9	S10	WSW13	WNW3	SW7	SW5	WNW4	SW5	S2	N1	SSW4.5	WSW13	
30-Jun	SSE0	SW3	SSW3	SSE2	SSW3	SSW3	SSW4	WSW4	SSW2	SW1	SSW9	SW10	SW7	NW2	NNW5	N4	N2	NW6	WNW3	NW2	WNW1	WNW0	AF	NW1	WSW1.9	SW10	

WSW1.3 SW1.3WSW1.0 W1.2WSW1.0WSW1.1WNW1.7 NW2.0WNW2.0WNW2.8WNW3.0 NW2.5NNW2.1NNW1.9 NW2.2 N1.4NNW2.1NNW2.0WNW0.6 NW1.0WNW0.8WSW1.3WSW1.6 W1.2	Diurnal Average
NNW12 NNW12 NNW17 NNW16 NNW17 NNW15 NNW21 NNW21 NNW18 NNW16 NNW18 NNW19 NNW19 NNW20 NNW19 NNW18 NNW17 NNW17 NNW13 NNW11 NNW3 WNW1 SW1 S2	Diurnal Maximum

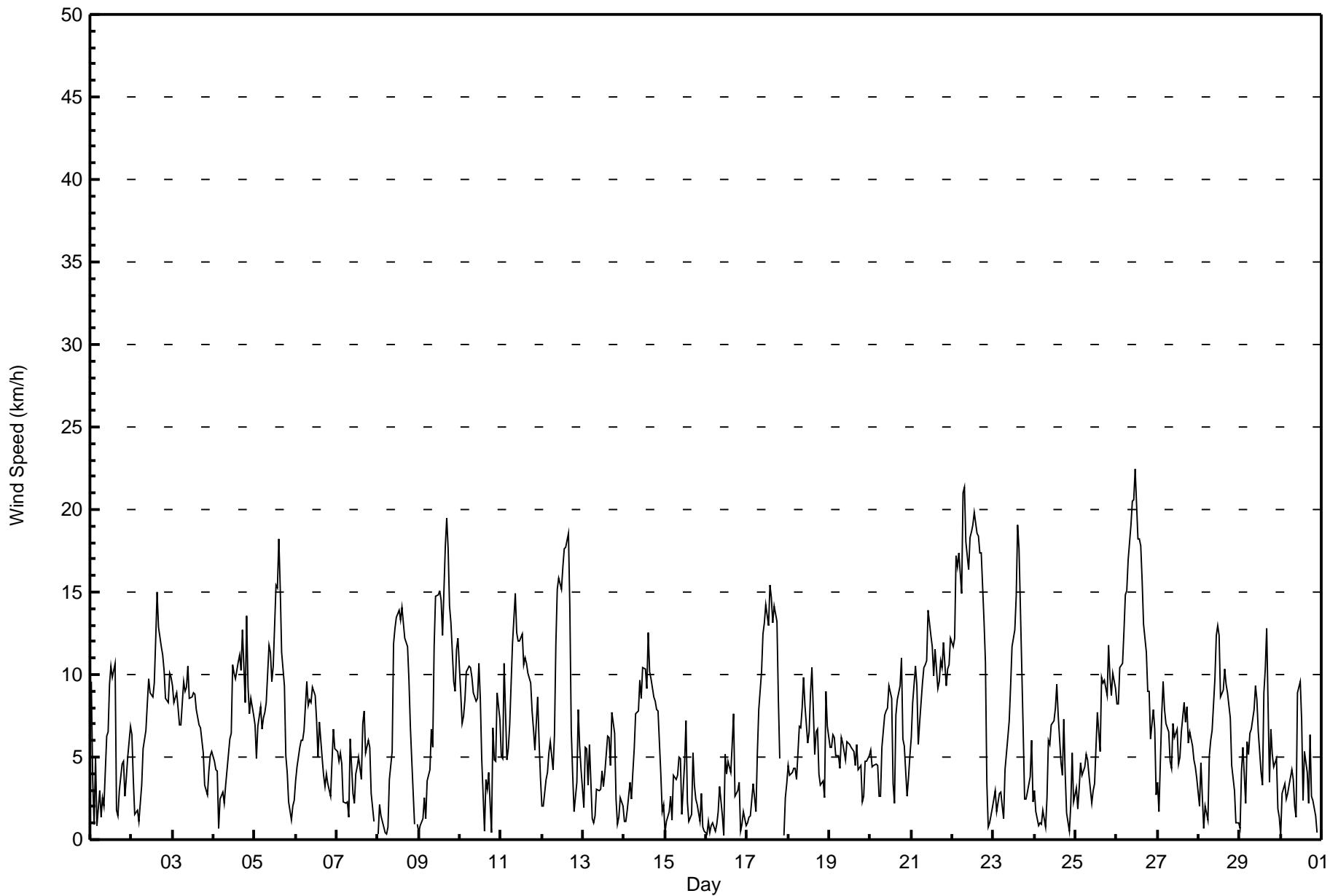
AF - Analyzer Failure

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Conklin - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	332	46.37	46.37
6 - 11	277	38.69	85.06
12 - 19	101	14.11	99.16
20 - 28	6	0.84	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	12	10	8	6	8	14	19	32	45	40	18	17	14	25	31	33	332
6 - 11	19	21	6	4	5	12	9	23	16	14	20	11	22	33	43	19	277
12 - 19	8	6	6	1	0	4	6	11	5	4	0	1	4	3	15	27	101
20 - 28	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	3	6
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	37	20	11	13	30	34	68	67	58	38	29	40	61	89	82	716

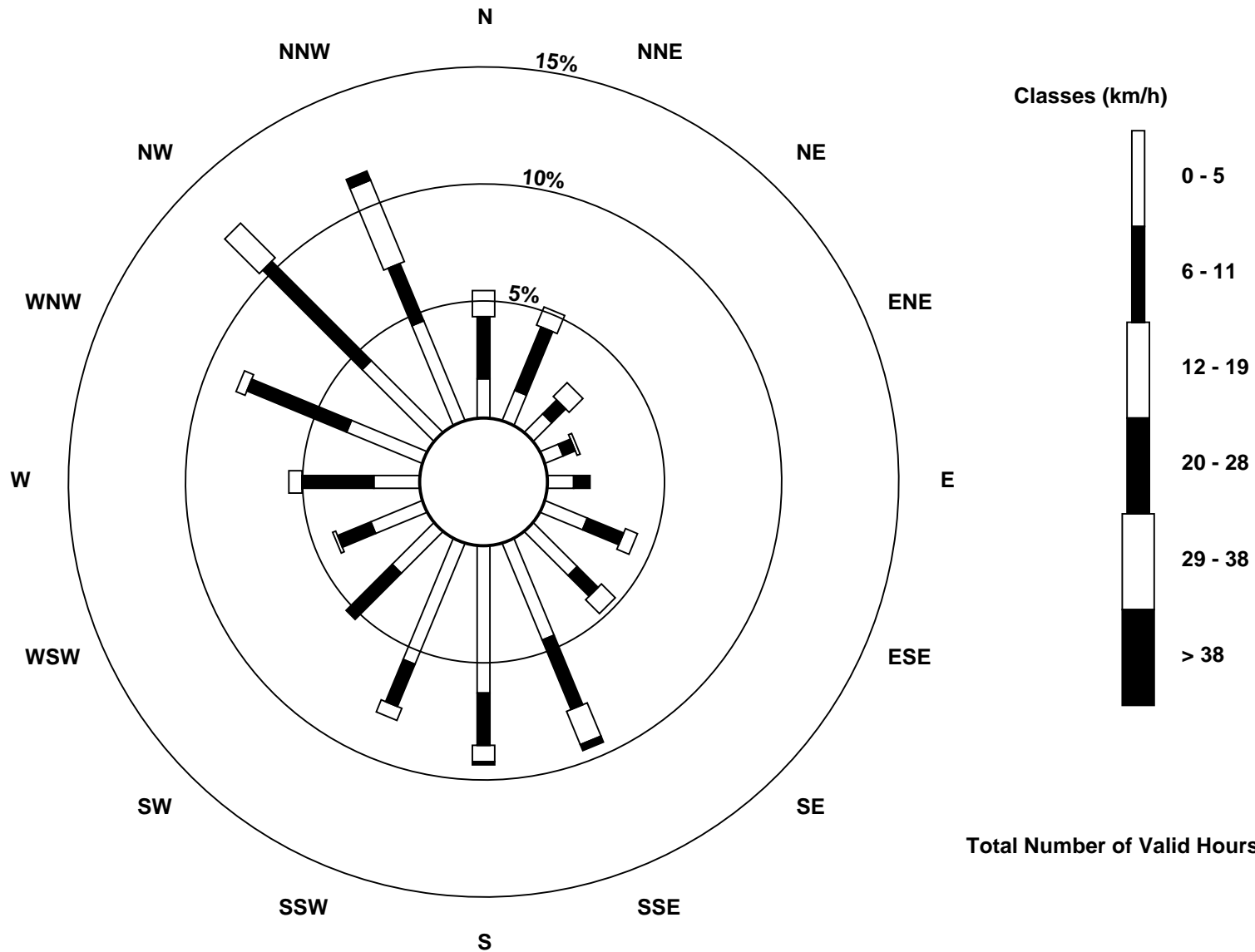
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Conklin (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 7 km/h on Jun 9 16:00	Hours of Data: 716
Minimum Value: 0 km/h on Jun 17 23:00	Hours of Missing Data: 4
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6	Hours of Calibration: 0
	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	3	1	1	2	2	2	2	1	3	2	3	3	3	4	1	1	2	2	2	1	1	1	2	4
2-Jun	2	1	1	1	1	1	1	2	3	3	4	3	4	4	6	6	5	5	5	4	3	3	5	4	6
3-Jun	4	3	3	3	3	3	4	4	4	4	4	4	4	4	3	3	3	2	2	1	1	1	1	1	4
4-Jun	1	1	1	3	1	1	1	1	2	2	3	3	3	3	4	4	3	5	4	5	3	2	3	2	5
5-Jun	2	2	2	2	2	3	2	2	4	3	3	4	5	4	5	4	4	3	2	1	1	1	1	1	5
6-Jun	1	1	1	1	1	2	3	2	3	3	4	4	4	3	4	3	2	2	1	1	1	1	1	1	4
7-Jun	1	1	1	2	2	1	1	1	2	2	1	2	1	2	3	2	3	2	3	3	1	1	1	AF	3
8-Jun	1	1	1	1	1	1	1	2	2	4	4	5	5	4	5	4	4	4	4	2	2	1	AF	1	5
9-Jun	1	1	1	1	1	1	2	2	2	4	5	6	6	6	5	7	6	6	5	5	4	3	4	4	7
10-Jun	3	2	3	3	3	4	4	4	3	4	4	4	4	3	3	3	2	2	3	3	3	3	5	3	5
11-Jun	1	1	5	1	1	3	3	4	6	5	5	5	5	5	4	4	4	4	4	2	1	2	2	2	6
12-Jun	1	2	2	2	1	1	1	5	3	4	5	5	5	6	5	6	5	5	2	5	3	2	3	2	6
13-Jun	2	2	2	2	2	2	1	1	2	1	1	1	1	1	2	2	2	2	2	2	1	1	1	2	2
14-Jun	1	1	2	1	1	1	2	2	2	3	2	3	3	3	4	4	4	3	3	2	3	1	1	1	4
15-Jun	1	1	1	1	1	1	1	1	2	2	1	2	3	1	2	2	4	2	2	1	1	1	1	1	4
16-Jun	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	4	4	1	1	2	1	1	1	1	4
17-Jun	1	1	1	1	1	1	2	3	4	5	5	6	6	6	6	6	5	5	3	3	AF	1	0	1	6
18-Jun	1	1	1	1	1	2	2	2	3	4	3	3	4	6	6	3	4	4	2	2	1	1	4	3	6
19-Jun	2	2	2	3	2	2	2	3	2	2	3	3	3	3	3	2	3	2	2	1	1	1	1	1	3
20-Jun	1	1	1	1	1	1	1	2	2	2	2	3	3	2	1	2	2	3	3	3	1	1	2	2	3
21-Jun	3	4	4	3	3	3	4	4	5	5	6	5	5	4	5	4	4	4	5	5	4	4	3	3	6
22-Jun	4	4	5	5	6	5	6	6	5	5	6	6	5	6	6	6	5	5	4	3	3	1	1	1	6
23-Jun	1	1	1	1	1	1	1	1	2	4	4	5	4	5	6	5	6	3	2	2	3	2	3	1	6
24-Jun	3	2	1	1	1	1	1	2	2	3	3	4	4	3	3	3	2	3	3	2	2	2	1	1	4
25-Jun	2	2	1	1	2	1	1	1	2	2	2	3	4	4	4	4	3	4	3	4	3	2	2	2	4
26-Jun	2	2	3	3	3	4	4	5	6	6	6	6	5	6	5	5	4	4	3	3	2	3	2	1	6
27-Jun	2	2	4	6	3	3	3	2	2	3	3	3	2	4	3	3	3	4	3	3	1	1	1	1	6
28-Jun	1	1	1	1	1	2	2	2	2	3	3	4	4	3	3	4	4	3	3	2	1	1	1	1	4
29-Jun	1	1	2	2	1	2	1	2	2	3	3	3	3	2	3	4	4	3	2	3	3	2	1	1	4
30-Jun	1	2	1	1	1	1	2	2	1	3	2	3	2	2	1	2	1	2	1	1	1	1	AF	1	3
	4	4	5	6	6	5	6	6	6	6	6	6	6	6	6	7	6	6	6	5	5	4	4	5	4

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin - June 2017

Direction of Maximum Speed: 163 deg on Jun 26 12:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 336.3 deg on Jun 22	Hours of Data: 716
Direction of Minimum Speed: 156 deg on Jun 30 01:00	Hours of Missing Data: 4
Direction of Minimum Daily Speed Average: 0.4 deg on Jun 24	Percent Operational Time: 99.4
Monthly Average Direction: 284.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	162	183	73	164	304	187	264	303	291	288	308	334	338	343	320	344	351	220	155	176	214	203	191	216	270.3
2-Jun	205	130	137	134	199	197	184	209	283	298	307	312	281	283	276	270	267	274	281	276	285	281	278	288	274.4
3-Jun	305	293	276	283	281	290	316	311	312	316	304	298	294	293	303	312	269	232	238	219	215	194	197	185	286.4
4-Jun	144	149	174	360	186	162	156	85	97	98	58	109	105	96	109	105	112	130	174	338	338	342	354	352	93.7
5-Jun	342	336	327	335	334	321	329	328	322	323	338	337	346	346	347	359	6	11	47	115	122	208	182	172	343.5
6-Jun	170	186	148	162	162	194	206	232	238	233	243	249	257	271	265	265	312	259	250	195	213	200	200	196	222.6
7-Jun	194	175	152	202	129	139	160	190	253	295	92	114	110	84	76	95	84	77	70	76	74	72	150	AF	114.5
8-Jun	247	178	320	321	319	315	314	117	98	127	146	136	129	130	115	120	121	120	125	119	118	324	AF	294	125.5
9-Jun	230	333	332	335	311	335	338	1	87	52	28	38	43	51	59	36	29	33	33	37	24	11	16	23	31.9
10-Jun	22	21	28	14	19	32	48	56	39	14	15	4	13	22	103	44	171	136	261	349	320	318	325	323	16.7
11-Jun	324	330	351	328	325	321	327	330	324	317	316	309	311	312	308	305	305	308	281	278	255	258	233	160	309.7
12-Jun	183	203	191	179	169	167	167	167	164	161	172	174	188	193	193	192	194	282	126	270	123	156	161	158	179.2
13-Jun	186	166	163	195	193	157	235	170	261	229	193	181	132	157	145	127	100	120	131	136	311	333	323	341	158.5
14-Jun	331	275	337	331	327	341	346	2	355	355	6	1	9	18	6	12	14	22	2	353	355	340	343	348	0.6
15-Jun	292	356	336	327	314	339	340	327	313	306	313	124	68	130	20	113	13	15	50	353	49	196	326	274	359.8
16-Jun	320	250	293	255	237	294	233	107	158	252	226	124	115	149	147	226	219	351	339	338	310	135	177	241	187.7
17-Jun	195	159	142	192	173	194	311	309	305	318	321	323	321	332	321	319	331	326	321	313	AF	45	157	169	317.6
18-Jun	184	177	169	175	171	185	209	214	230	233	230	230	172	264	258	191	295	318	284	275	255	292	276	279	236.0
19-Jun	286	308	313	319	312	310	295	318	308	297	321	300	275	267	278	273	287	269	257	241	208	193	191	198	284.7
20-Jun	202	194	186	185	180	197	144	169	192	165	174	172	177	214	23	115	139	145	151	147	142	158	298	301	168.0
21-Jun	280	290	276	263	240	251	280	292	298	305	314	308	302	295	284	289	301	308	294	284	294	312	322	327	294.8
22-Jun	327	331	339	337	338	339	334	341	341	335	333	338	337	337	333	336	342	339	333	341	341	293	218	187	336.3
23-Jun	200	198	167	176	171	143	16	321	347	348	333	339	341	344	350	356	350	7	8	52	295	218	220	166	341.6
24-Jun	234	166	337	326	144	132	246	285	303	292	266	304	109	104	150	86	33	33	119	83	67	215	193	166	133.3
25-Jun	185	181	118	168	184	160	187	191	198	238	338	283	231	196	171	166	172	185	200	175	165	160	161	167	179.1
26-Jun	170	163	163	167	163	163	164	161	166	167	169	163	148	153	151	156	191	174	180	144	145	117	121	13	160.5
27-Jun	328	211	250	325	314	310	324	314	304	275	261	285	296	281	309	316	305	298	304	251	189	210	204	199	287.5
28-Jun	168	199	164	20	39	241	1	21	18	5	355	358	6	24	31	33	38	43	54	52	17	335	358	349	19.8
29-Jun	240	167	187	167	185	197	171	194	209	219	217	232	285	115	161	185	242	283	216	217	301	214	185	357	207.2
30-Jun	156	218	192	165	202	193	196	253	208	221	211	223	233	325	335	355	351	325	298	312	303	283	AF	312	245.9

240.8 224.8 253.3 270.4 247.5 256.3 292.0 304.8 294.0 298.8 301.9 311.4 335.8 336.7 325.3 353.8 329.2 346.4 284.3 310.3 288.8 241.3 241.5 266.8

Diurnal Average

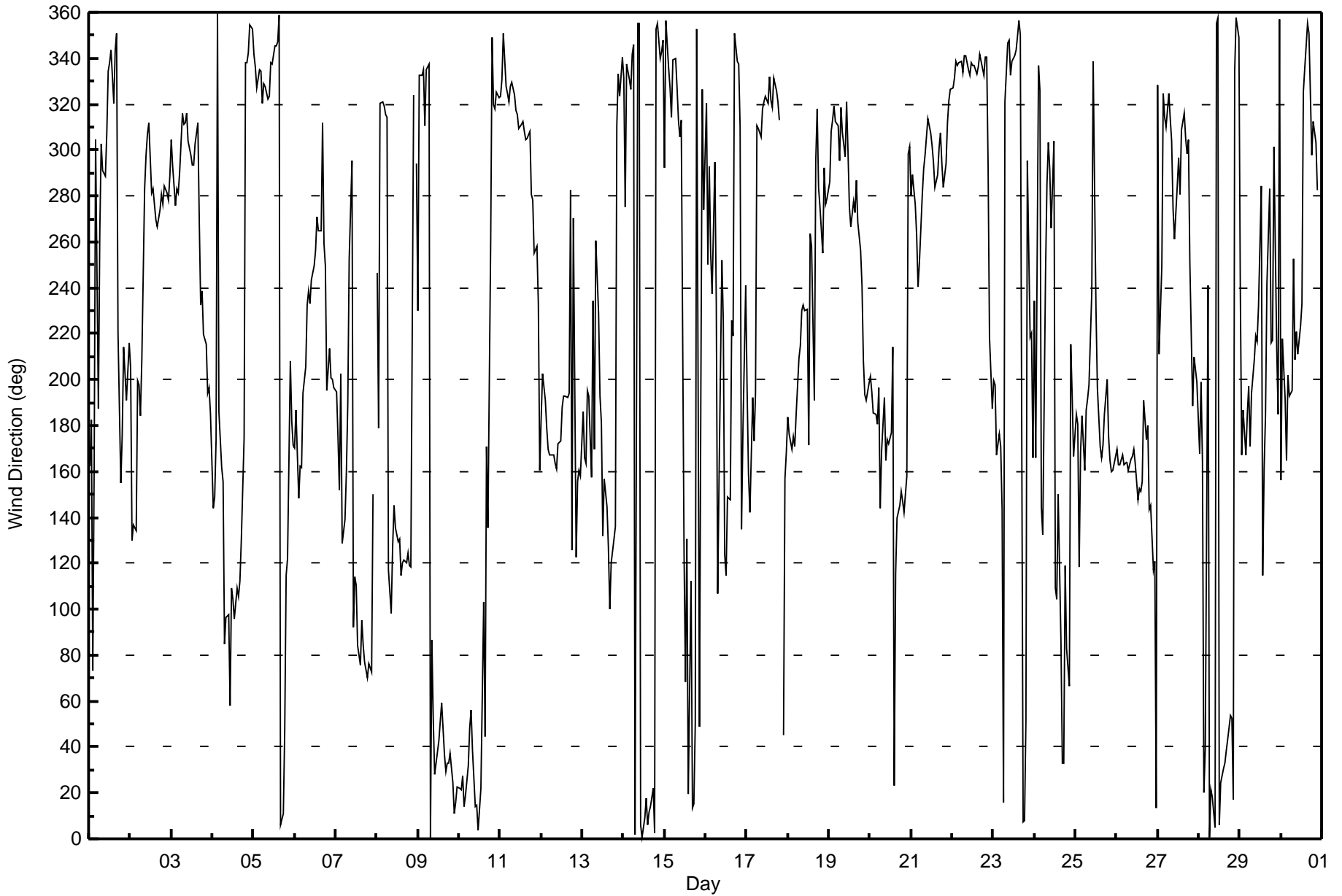
AF - Analyzer Failure

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Conklin - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Conklin - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 108 deg on Jun 10 15:00	Hours of Data: 716
Minimum Value: 7 deg on Jun 6 23:00	Hours of Missing Data: 4
Percentiles: P ₁ = 10 P ₁₀ = 19 Q ₁ = 24 Median = 36 Q ₃ = 51 P ₉₀ = 72 P ₉₉ = 96	Hours of Calibration: 0
	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	17	71	75	17	77	60	73	42	54	41	38	26	24	24	25	67	70	72	49	34	37	33	24	26	77
2-Jun	21	26	86	65	61	61	43	26	42	43	40	34	37	38	39	35	31	34	36	35	38	36	39	43	86
3-Jun	39	40	35	36	39	44	31	37	37	34	45	45	41	40	39	38	38	35	18	22	26	10	14	14	45
4-Jun	14	14	17	94	48	32	56	47	55	38	43	29	29	33	32	30	20	19	53	21	19	21	24	28	94
5-Jun	19	21	18	19	20	24	25	20	24	23	23	21	21	21	23	25	29	33	54	43	50	82	64	62	82
6-Jun	27	20	24	17	27	27	25	25	24	33	39	46	61	70	64	57	56	45	33	36	38	7	7	10	70
7-Jun	10	23	12	57	66	75	58	87	29	79	81	51	19	43	76	33	43	42	44	46	49	50	90	AF	90
8-Jun	73	44	64	53	29	48	43	57	42	31	32	26	26	28	29	24	23	24	20	18	33	58	AF	39	73
9-Jun	81	62	30	15	32	18	29	24	52	39	30	33	36	40	41	30	29	31	29	31	29	25	27	26	81
10-Jun	27	26	29	24	25	29	35	44	42	46	49	35	47	82	108	83	83	61	95	26	30	29	20	18	108
11-Jun	18	15	22	16	19	28	23	28	31	40	39	39	39	39	40	40	38	41	40	34	18	18	34	59	59
12-Jun	69	83	38	38	17	17	31	65	21	21	23	25	25	26	24	26	43	52	75	107	80	21	29	60	107
13-Jun	93	39	34	79	20	91	90	94	45	46	57	39	63	49	24	31	44	20	20	78	71	29	24	25	94
14-Jun	79	64	23	14	18	11	16	21	21	21	24	22	23	27	23	26	26	29	22	19	20	13	25	12	79
15-Jun	58	76	22	16	37	28	26	38	35	38	91	62	42	68	94	91	51	57	46	17	73	51	40	67	94
16-Jun	69	68	77	41	59	52	80	96	48	93	95	58	79	55	61	49	33	54	48	35	84	93	66	52	96
17-Jun	96	86	79	30	44	83	46	41	43	35	36	35	35	27	31	40	29	29	31	37	AF	94	29	28	96
18-Jun	18	24	14	14	17	33	17	25	24	24	38	56	63	46	24	59	39	53	55	46	35	51	35	36	63
19-Jun	43	43	38	36	40	47	46	36	45	62	56	56	60	53	62	59	42	52	18	26	44	15	12	13	62
20-Jun	8	13	19	9	19	24	38	35	23	23	24	26	25	49	58	21	19	20	19	18	14	74	38	38	74
21-Jun	38	45	38	21	29	28	39	43	47	43	37	38	42	43	41	42	40	40	46	39	43	38	26	20	47
22-Jun	19	20	19	20	21	19	20	19	21	22	21	23	25	24	24	23	23	23	23	20	31	46	80	67	80
23-Jun	43	33	77	44	32	68	78	39	42	57	39	34	31	29	23	27	28	23	47	59	47	57	36	66	78
24-Jun	59	85	57	47	88	64	82	69	45	48	50	46	60	35	35	76	62	38	67	80	86	62	14	76	88
25-Jun	62	98	46	23	44	26	22	34	67	87	87	69	56	61	81	47	32	28	23	23	16	13	14	17	98
26-Jun	16	15	17	18	18	20	22	21	22	21	21	21	20	26	23	26	26	28	24	18	17	22	23	60	60
27-Jun	14	65	35	49	40	45	32	39	36	36	34	45	54	59	37	34	41	42	39	38	22	24	27	25	65
28-Jun	60	18	50	68	53	66	20	27	30	24	25	23	25	32	30	36	36	33	37	42	23	20	60	62	68
29-Jun	84	22	32	82	18	52	23	27	27	28	43	49	58	73	34	31	32	87	17	33	72	36	77	47	87
30-Jun	103	51	30	56	44	37	38	69	73	97	27	26	28	26	18	48	54	21	32	40	57	62	AF	46	103
	103	98	86	94	88	91	90	96	73	97	95	69	79	82	108	91	83	87	95	107	86	94	90	76	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

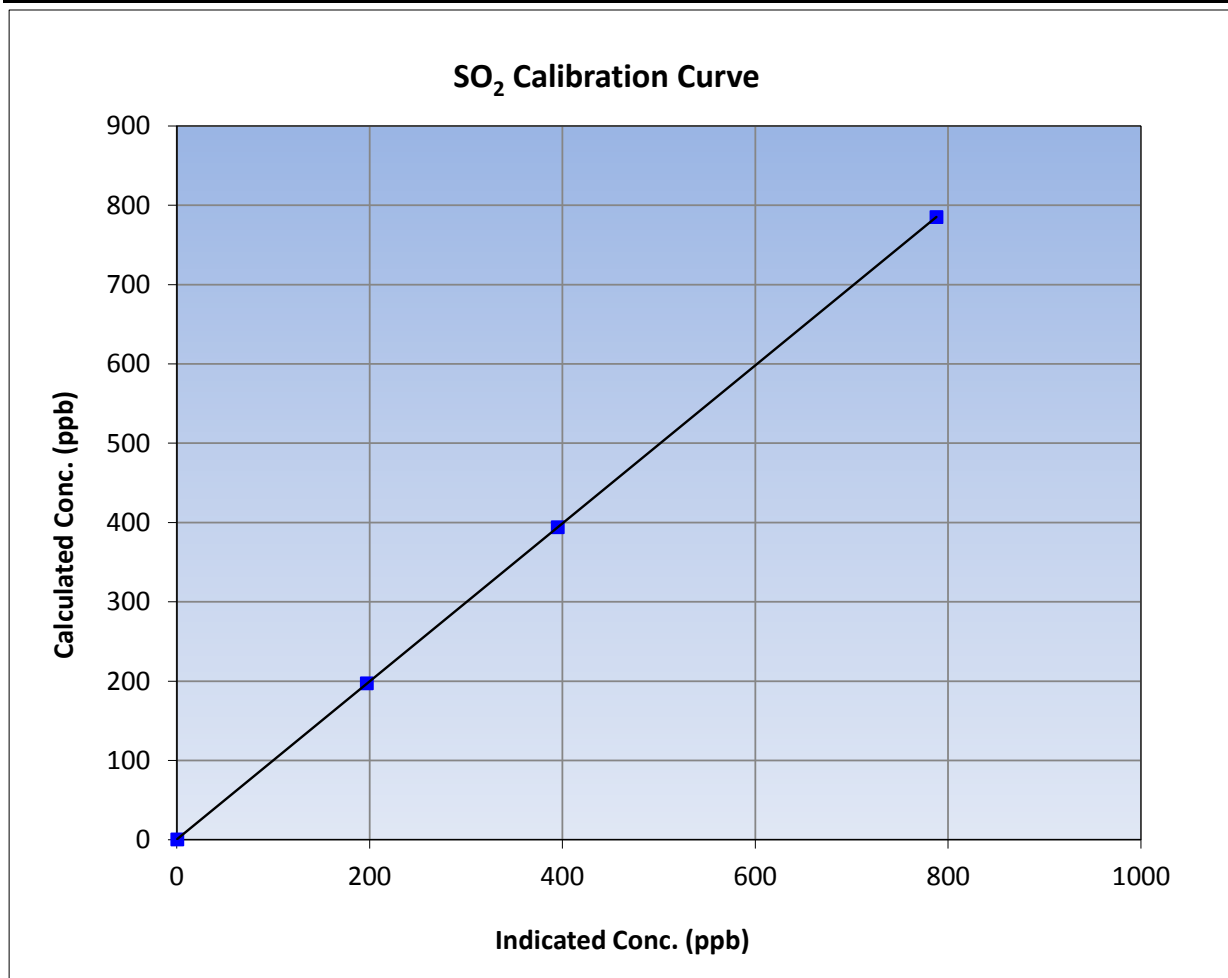
Version-03-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 43i	Analyzer serial #	1428701363

Calibration Data

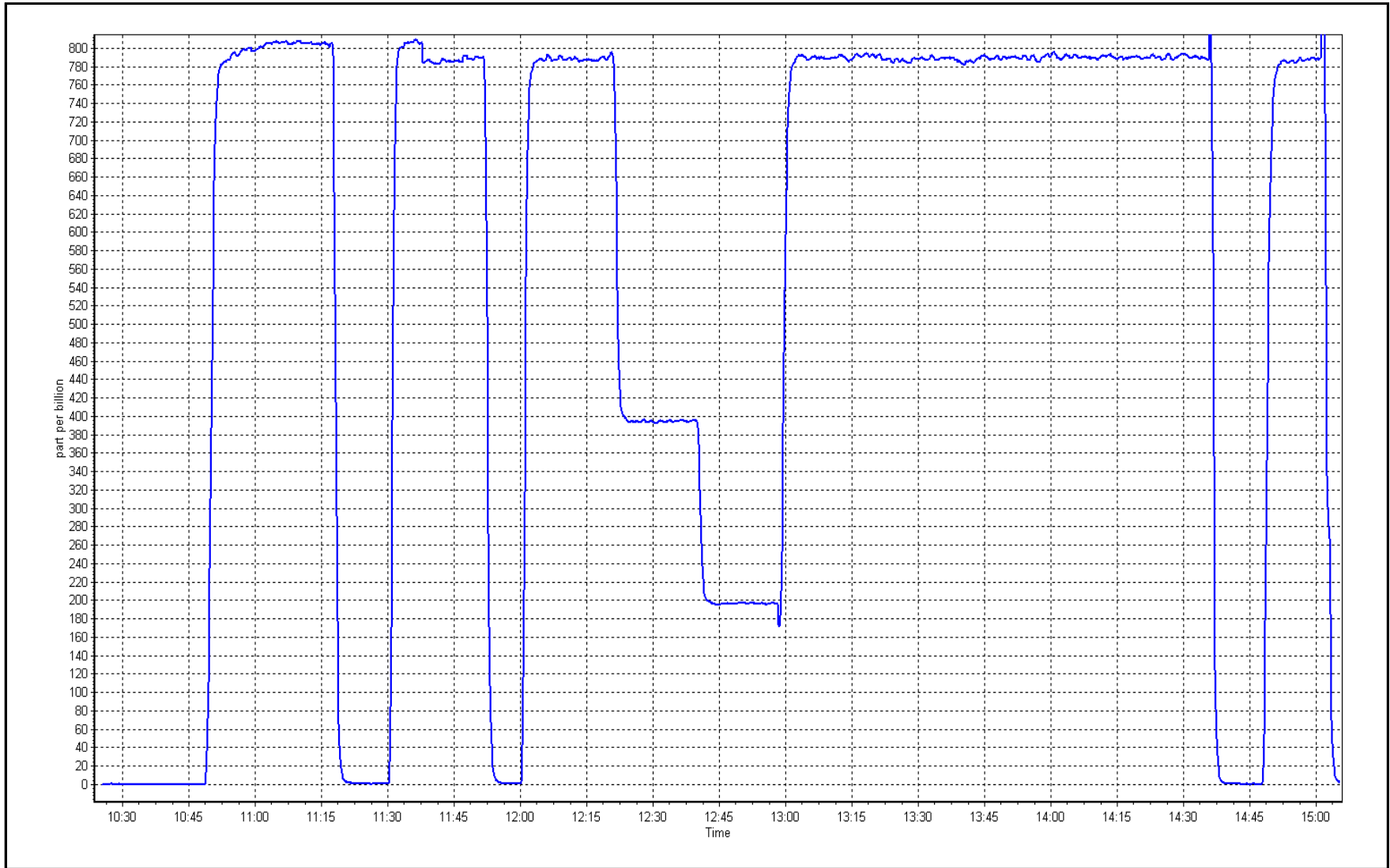
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
784.8	787.5	0.9965	Slope	0.996227	0.90 - 1.10
393.7	394.9	0.9970	Intercept	0.371479	+/-30
197.0	196.7	1.0016			



SO2 Calibration Plot

Date: June 27, 2017

Location: Conklin





Wood Buffalo Environmental Association

TRS Calibration Summary

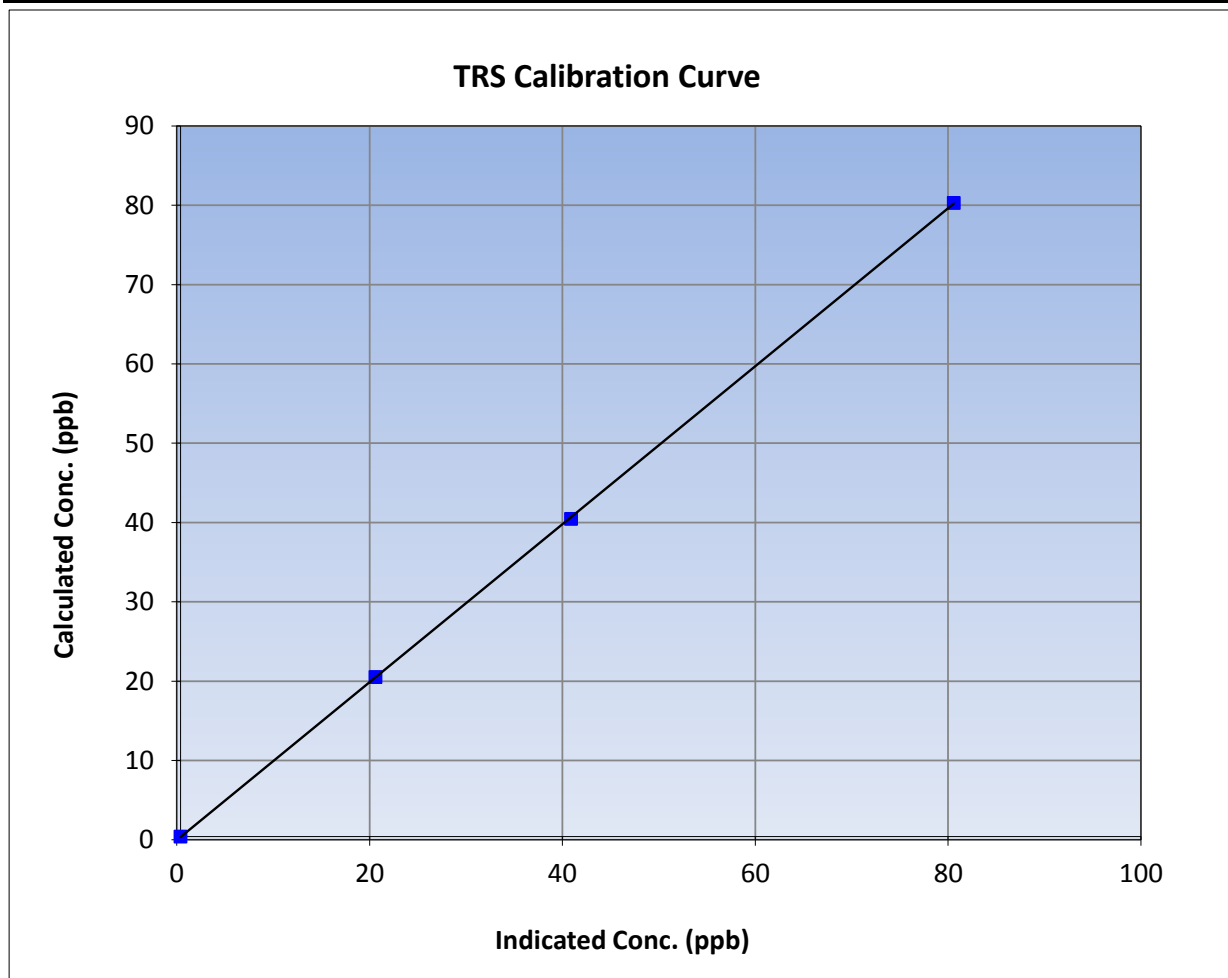
Version-03-2017

Station Information

Calibration Date	June 19, 2017	Previous Calibration	May 16, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	14:12	End Time (MST)	16:35
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1236656116

Calibration Data

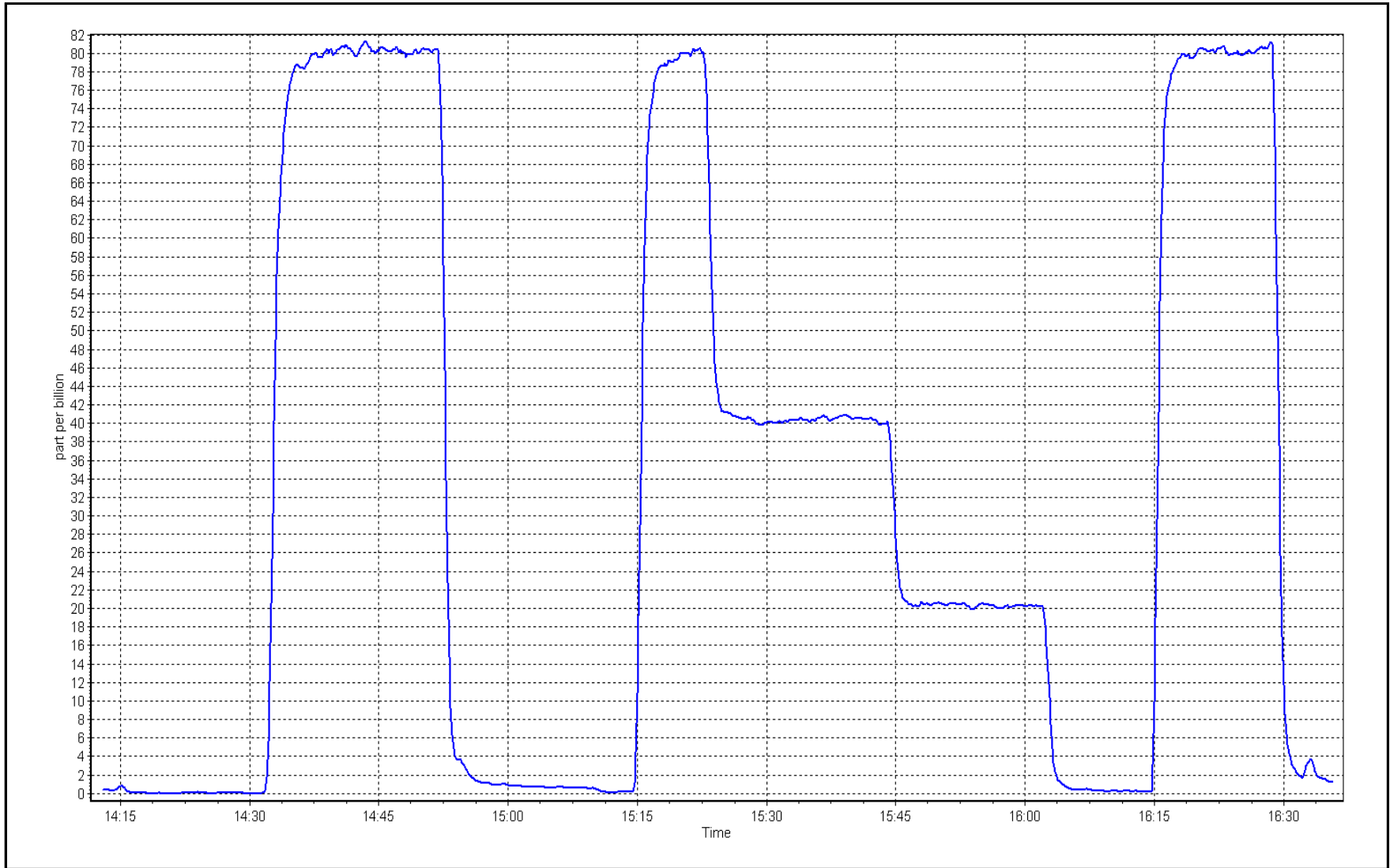
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999982	≥0.995
79.9	80.2	0.9964			
40.1	40.5	0.9893	Slope	0.996010	0.90 - 1.10
20.1	20.2	0.9965			
			Intercept	-0.056962	+/-3



TRS Calibration Plot

Date: June 19, 2017

Location: Conklin





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	June 27, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	10:25	End time (MST):	15:05
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000359	Cal Gas Expiry Date	February 9, 2018
CH4 Cal Gas Conc.	<u>512.0</u> ppm	CH4 Equiv Conc.	1084.0 ppm
C3H8 Cal Gas Conc.	<u>208.0</u> ppm	Station temp.	22 Deg C
Calibrator Model	Teledyne API T700	Serial Number	2658
ZAG make/model	Teledyne API 701	Serial Number	5611

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1152430011

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	75.1	75.1
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	1.72E-04	1.72E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.0	Carrier Pressure	37.0	37.0
NMHC SP Ratio	4.16E-05	4.16E-05	Fuel Pressure	49.7	49.7
NMHC Peak Area	210163	210163	Air Pressure	34.3	34.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.994497	0.994498
THC Cal Offset	0.076783	0.041472
CH4 Cal Slope	0.995829	0.990088
CH4 Cal Offset	0.032190	0.025748
NMHC Cal Slope	0.993299	0.998466
NMHC Cal Offset	0.044616	0.015718

Notes: Sample inlet filter replaced after as founds. H2 generator installed after as founds. No adjustments made.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0.0	0.00	0.00	----
as found span	4934	76.5	16.55	16.62	0.996
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	16.55	16.62	0.996
second point	4974	38.3	8.28	8.27	1.002
third point	4990	19.2	4.15	4.09	1.015
as left zero	5005	0.0	0.00	0.00	----
as left span	4934	76.5	16.55	16.68	0.992
Average Correction Factor					1.004
Corrected As found	16.62	Prev response	16.57	*% change	-0.3%

NMHC Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0	0.00	0.00	----
as found span	4934	76.5	8.73	8.74	1.000
calibrator zero	5005	0	0.00	0.00	----
high point	4934	76.5	8.73	8.74	1.000
second point	4974	38.3	4.37	4.37	1.001
third point	4990	19.2	2.19	2.16	1.016
as left zero	5005	0	0.00	0.00	----
as left span	4934	76.5	8.73	8.79	0.994
Average Correction Factor					1.006
Corrected As found	8.74	Prev response	8.75	*% change	0.1%

CH4 Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i>
as found zero	5005	0.0	0.00	0.00	----
as found span	4934	76.5	7.82	7.89	0.991
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	7.82	7.89	0.991
second point	4974	38.3	3.91	3.90	1.002
third point	4990	19.2	1.96	1.94	1.014
as left zero	5005	0.0	0.00	0.00	----
as left span	4934	76.5	7.82	7.90	0.990
Average Correction Factor					1.002
Corrected As found	7.89	Prev response	7.82	*% change	-0.9%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

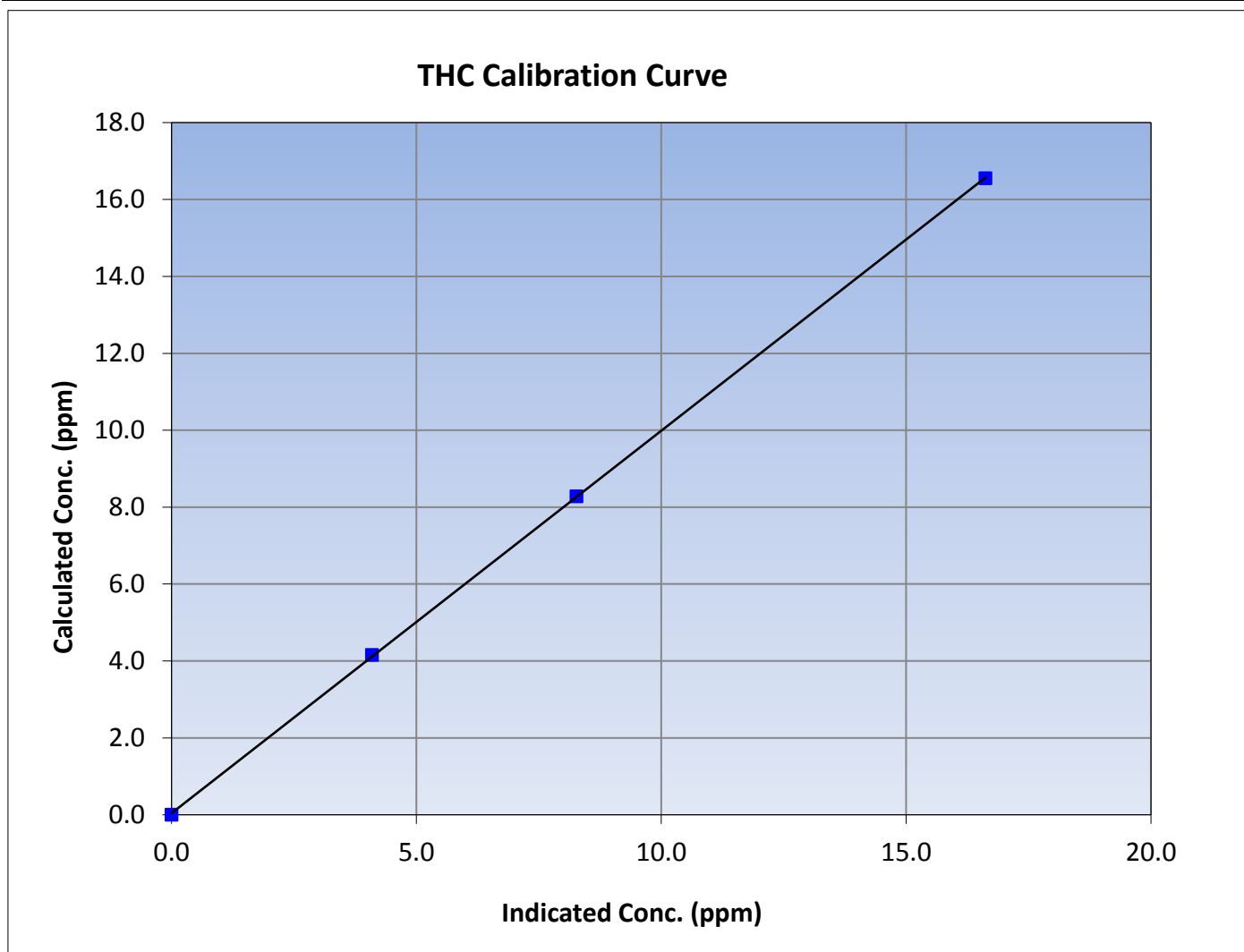
Version-02-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999971	≥ 0.995			
16.55	16.62	0.9958						
8.28	8.27	1.0017				Slope	0.994498	0.90 - 1.10
4.15	4.09	1.0151						
			Intercept	0.041472	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

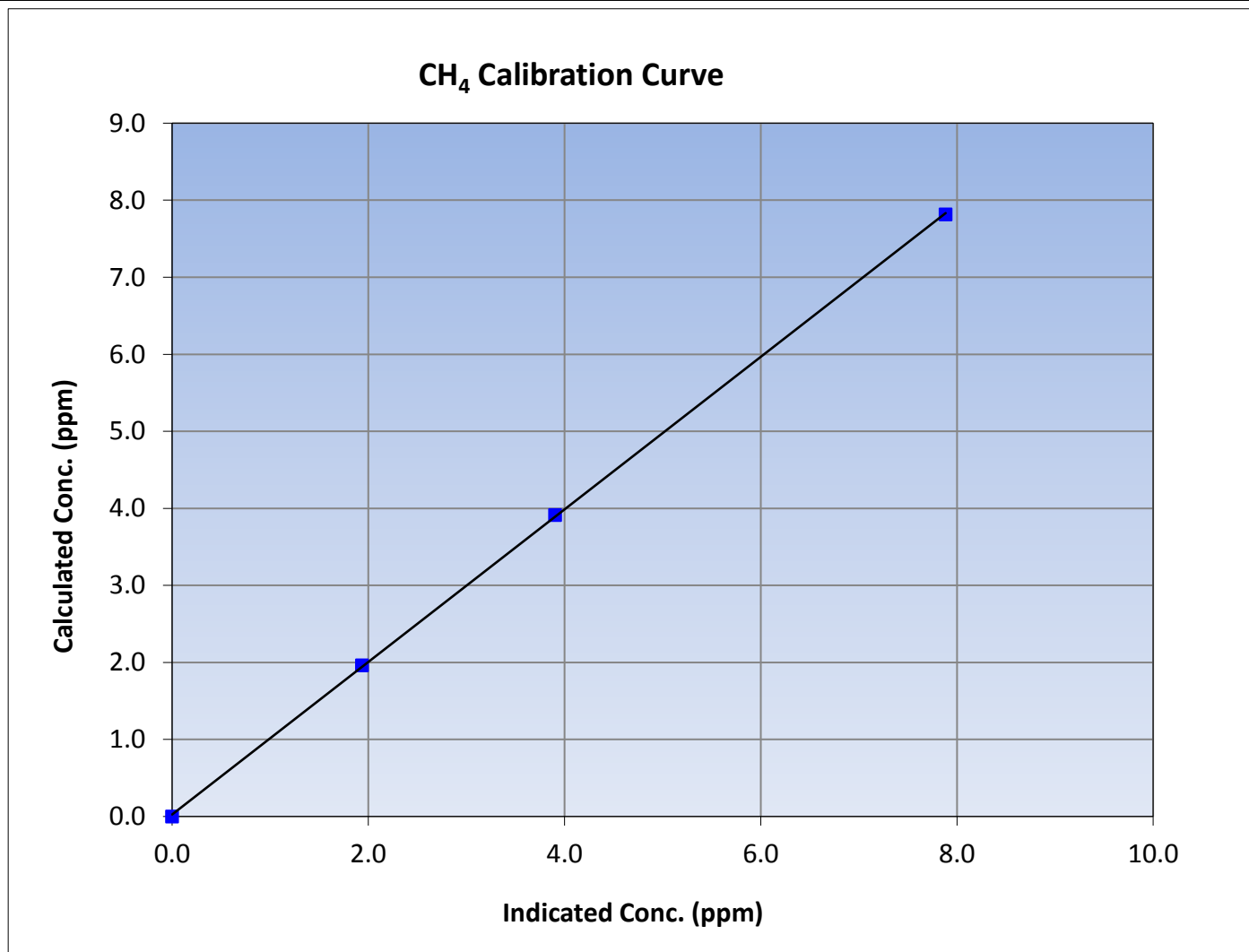
Version-02-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999948	≥ 0.995			
7.82	7.89	0.9914						
3.91	3.90	1.0021				Slope	0.990088	0.90 - 1.10
1.96	1.94	1.0137						
			Intercept	0.025748	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

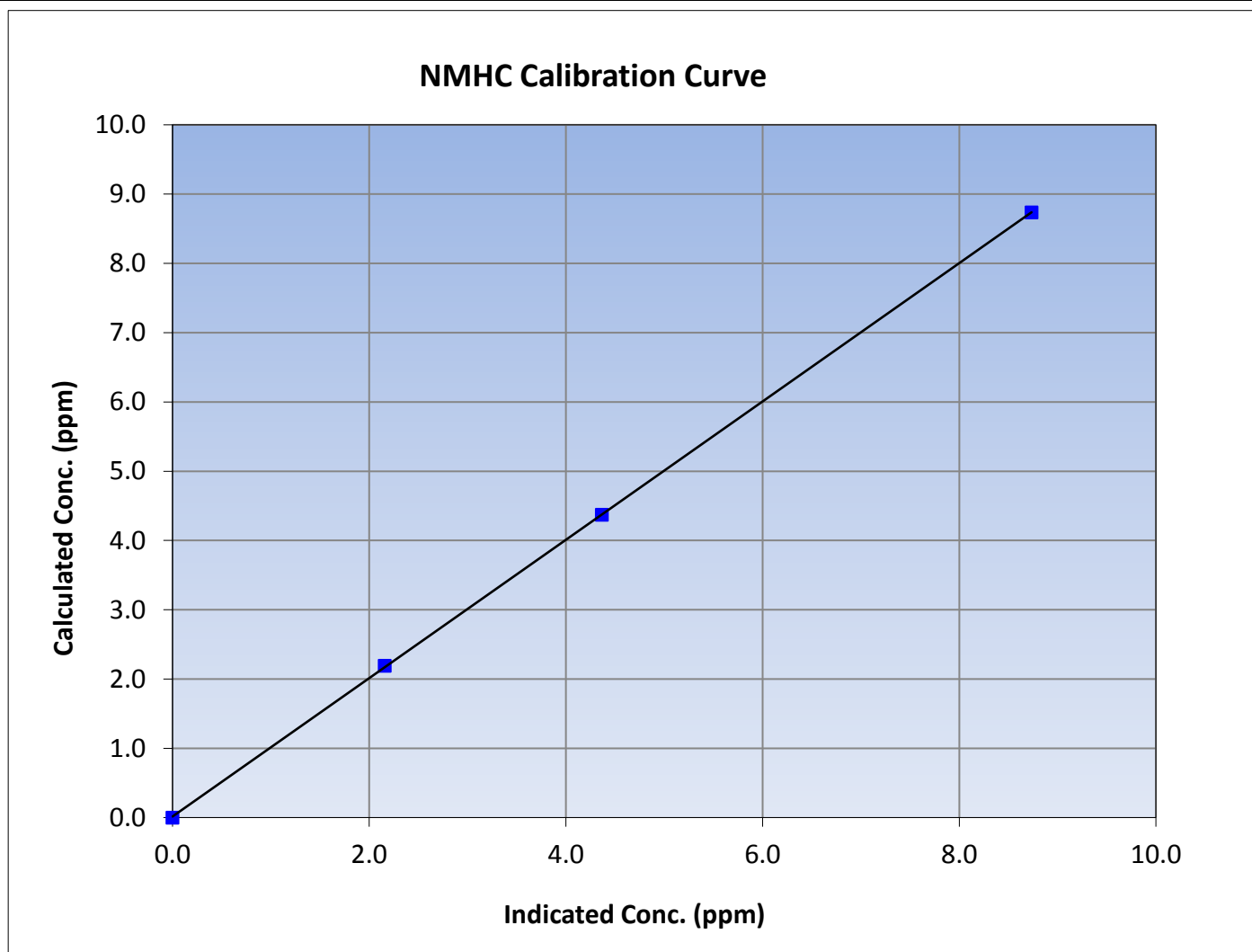
Version-02-2017

Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

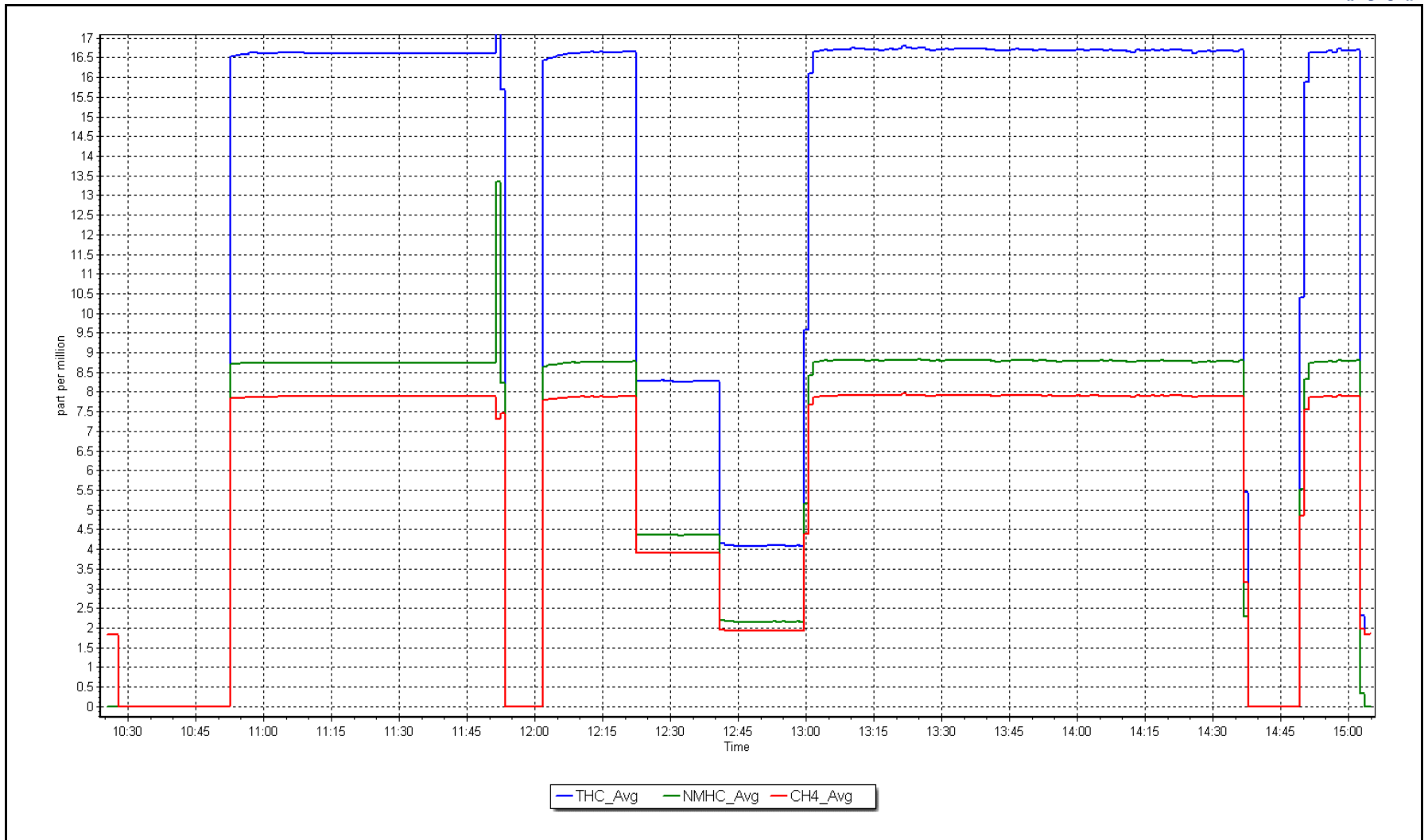
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999981	≥ 0.995			
8.73	8.74	0.9998						
4.37	4.37	1.0013				Slope	0.998466	0.90 - 1.10
2.19	2.16	1.0164						
			Intercept	0.015718	± 0.5			



NMHC Calibration Plot

Date: June 27, 2017

Location: Conklin





Wood Buffalo Environmental Association

O₃ Calibration Summary

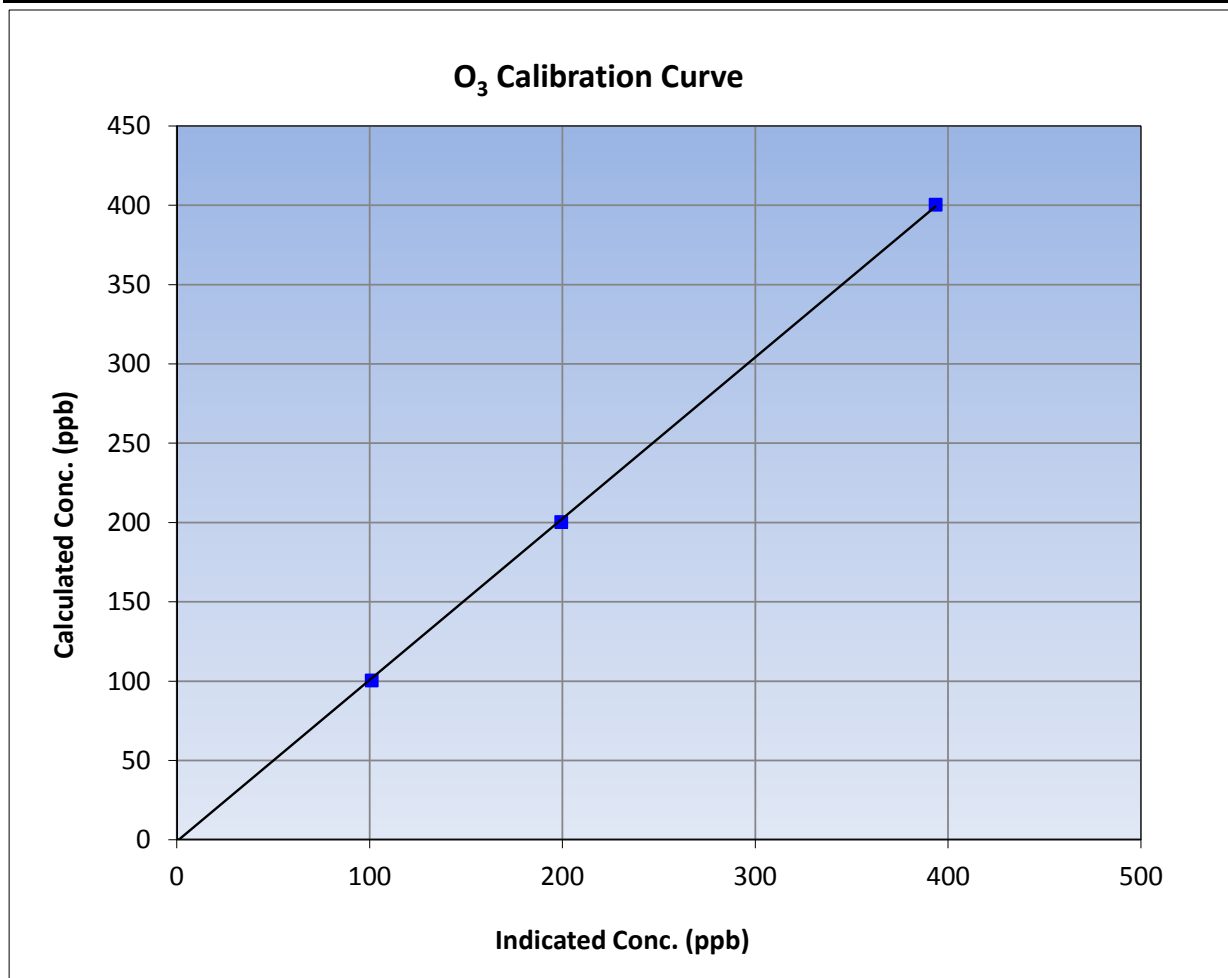
Version-03-2017

Station Information

Calibration Date	June 22, 2017	Previous Calibration	May 16, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	13:00	End Time (MST)	15:16
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

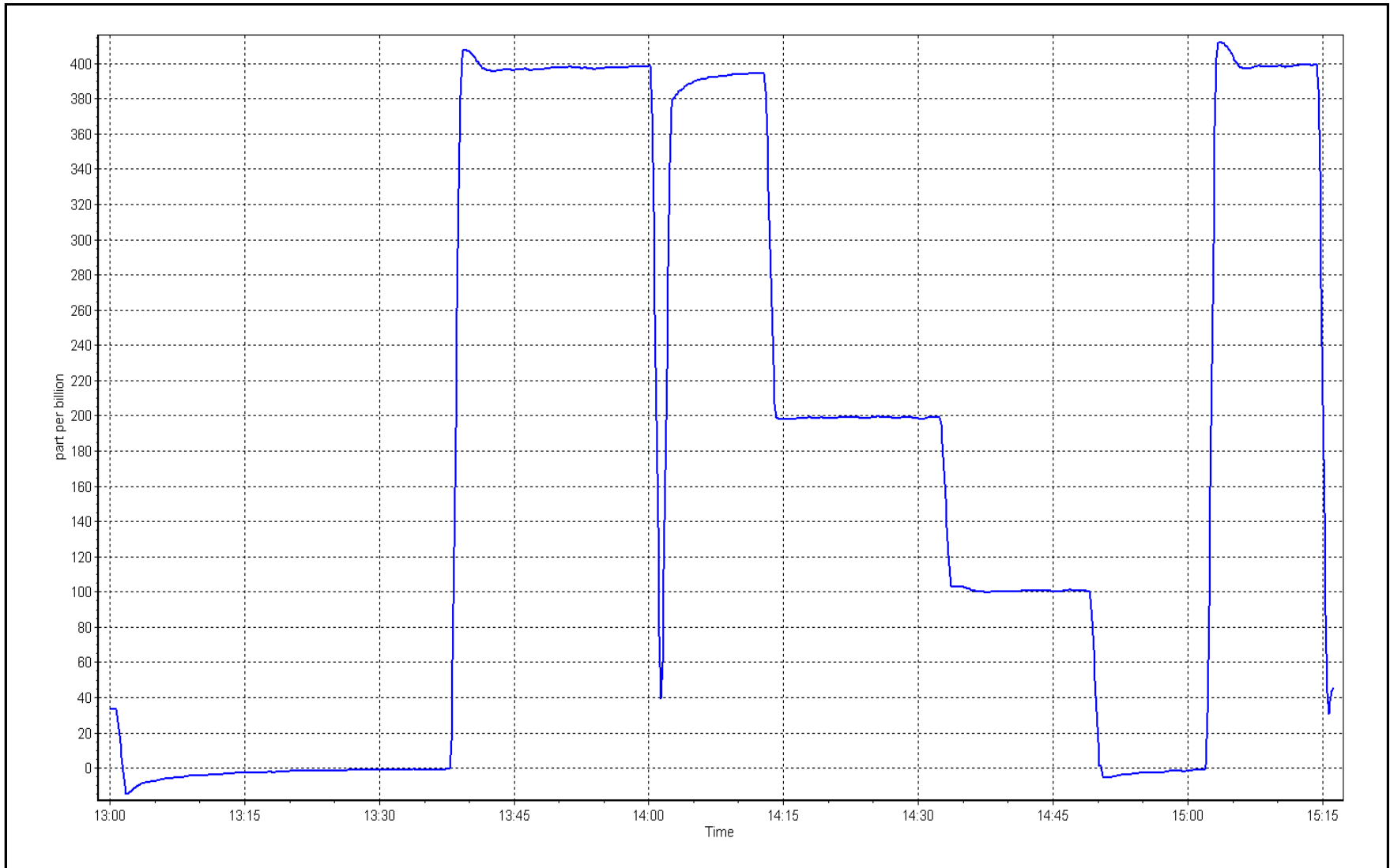
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.7	----	Correlation Coefficient	0.999905	≥0.995
400.0	393.1	1.0176			
200.0	199.0	1.0050	Slope	1.017434	0.90 - 1.10
100.0	100.7	0.9930			
			Intercept	-1.041535	+/- 10



O₃ Calibration Plot

Date: June 22, 2017

Location: Conklin





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	June 27, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	10:25	End time (MST):	15:05
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000359	Cal Gas Expiry Date	February 9, 2018
NOX Cal Gas Conc.	<u>52.4</u> ppb	NO Cal Gas Conc.	<u>52.4</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	2658
ZAG make/model	Teledyne API 701	Serial Number	5611

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1501663731	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	1.015	0.999	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	0.999	0.999	PMT Temperature	326.8 326.0
NO2 coefficient	1.000	1.000	Reaction cell Press	130.0 130.0
NO bkgrnd	10.4	10.2	Sample Flow	0.860 0.856
NOX bkgrnd	10.4	10.2	PMT Voltage	-892.4 -892.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.997087	0.999132
NO _x Cal Offset	0.348768	-0.618759
NO Cal Slope	0.997469	0.999519
NO Cal Offset	0.695997	-0.279751
NO ₂ Cal Slope	0.991318	0.998246
NO ₂ Cal Offset	0.938446	-1.569747



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5005	0.0	0.0	0.0	0.0	-0.4	-0.5	0.0	----	----
as found span	4934	76.5	800.0	800.0	0.0	812.4	811.1	1.3	0.9848	0.9864
calibrator zero	5005	0.0	0.0	0.0	0.0	-0.4	-0.5	0.0	----	----
high point	4934	76.5	800.0	800.0	0.0	800.4	799.8	0.6	0.9996	1.0003
second point	4975	38.3	400.3	400.3	0.0	403.1	402.7	0.4	0.9931	0.9941
third point	4990	19.2	200.8	200.8	0.0	201.8	201.0	0.8	0.9953	0.9992
as left zero	5005	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	----	----
as left span	4934	76.5	800.0	403.1	396.9	805.3	397.5	407.8	0.9935	1.0141
Average Correction Factor									0.9960	0.9979

Corrected As found	NO _x = 812.8 ppb	NO = 811.6 ppb		*Percent Change	NO _x = -1.3%
Previous Response	NO _x = 802.0 ppb	NO = 801.4 ppb		*Percent Change	NO = -1.3%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	803.8	801.4	2.3	0.9953	0.9983	----	----
1st NO2 (400 ppb O3)	403.1	398.3	802.6	403.1	399.6	0.9968	----	0.9967	100.3%
2nd NO2 (200 ppb O3)	605.7	195.7	804.6	605.7	199.0	0.9943	----	0.9834	101.7%
3rd NO2 (100 ppb O3)	706.8	94.6	804.3	706.8	97.5	0.9947	----	0.9703	103.1%
2nd NO ref point	----	0.0	804.5	803.8	0.7	0.9945	0.9953	----	----
Average Correction Factor						0.9951	0.9968	0.9835	101.7%

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

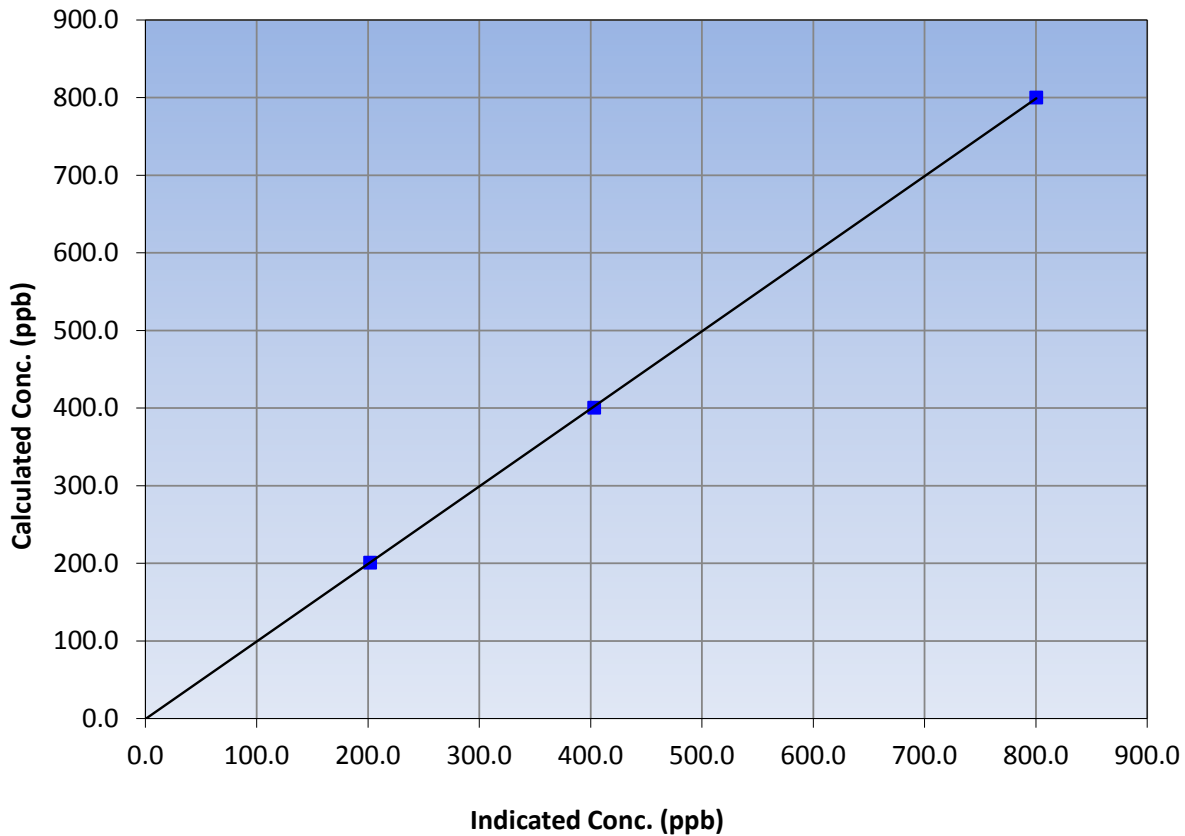
Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.4	----	Correlation Coefficient	≥0.995	
800.0	800.4	0.9996			
400.3	403.1	0.9931			
200.8	201.8	0.9953			
			Slope	0.999132	0.90 - 1.10
			Intercept	-0.618759	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

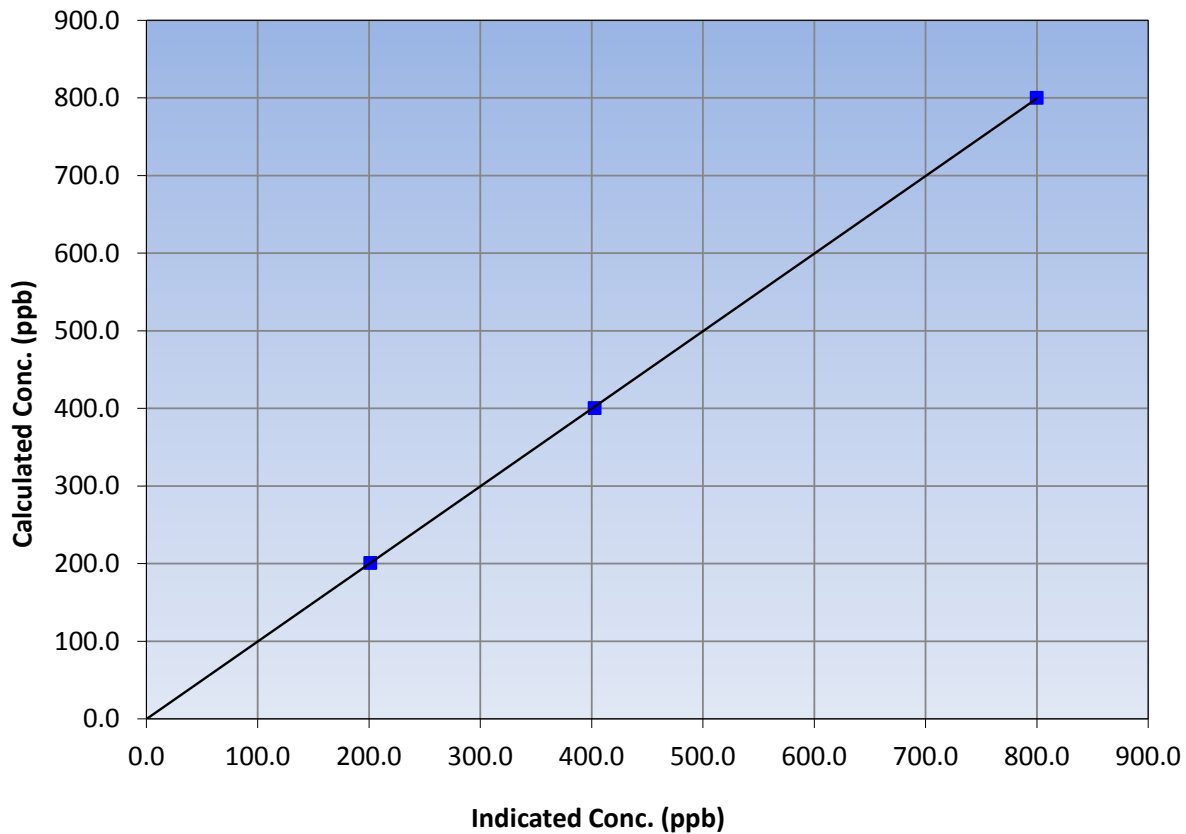
Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.5	----	Correlation Coefficient	≥0.995	
800.0	799.8	1.0003			
400.3	402.7	0.9941	Slope	0.90 - 1.10	
200.8	201.0	0.9992			
			Intercept	-0.279751	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

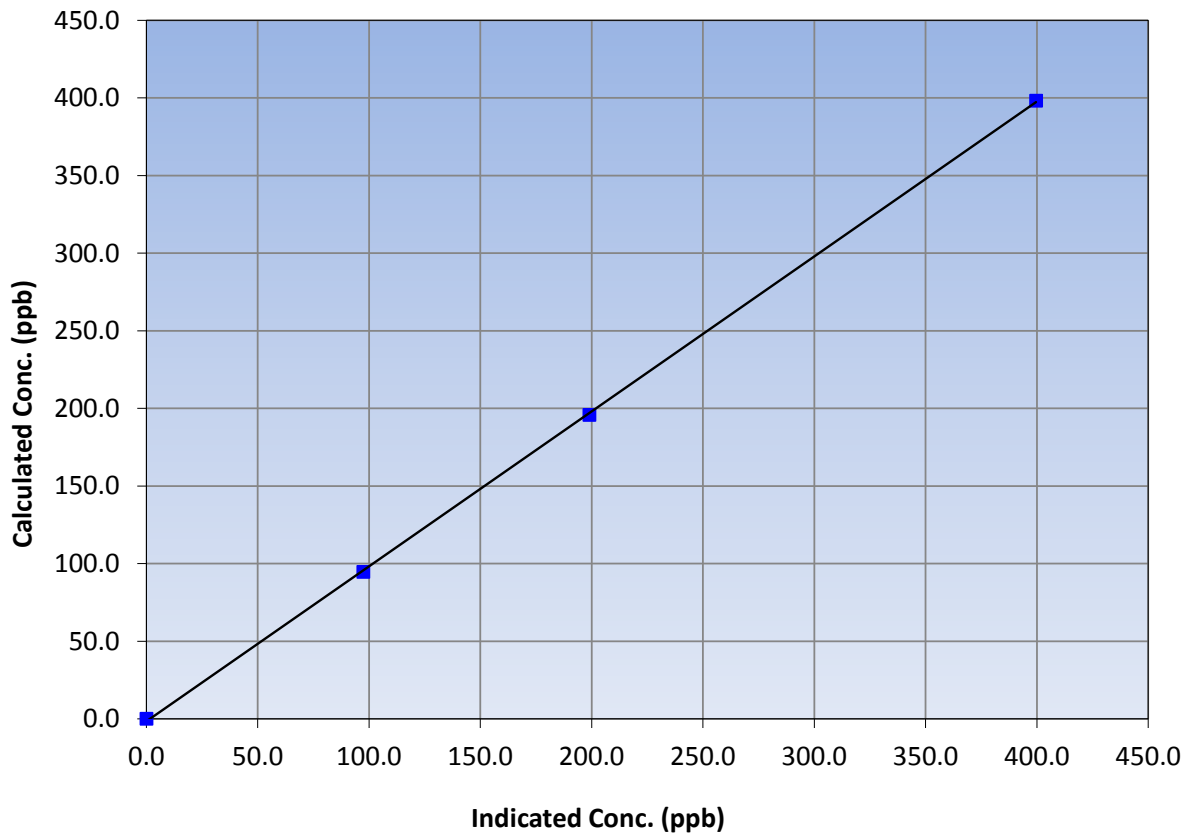
Station Information

Calibration Date	June 27, 2017	Previous Calibration	May 11, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:25	End Time (MST)	15:05
Analyzer make	Thermo 42i	Analyzer serial #	1501663731

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
398.3	399.6	0.9967			
195.7	199.0	0.9834			
94.6	97.5	0.9703			
			Slope	0.998246	0.90 - 1.10
			Intercept	-1.569747	+/-20

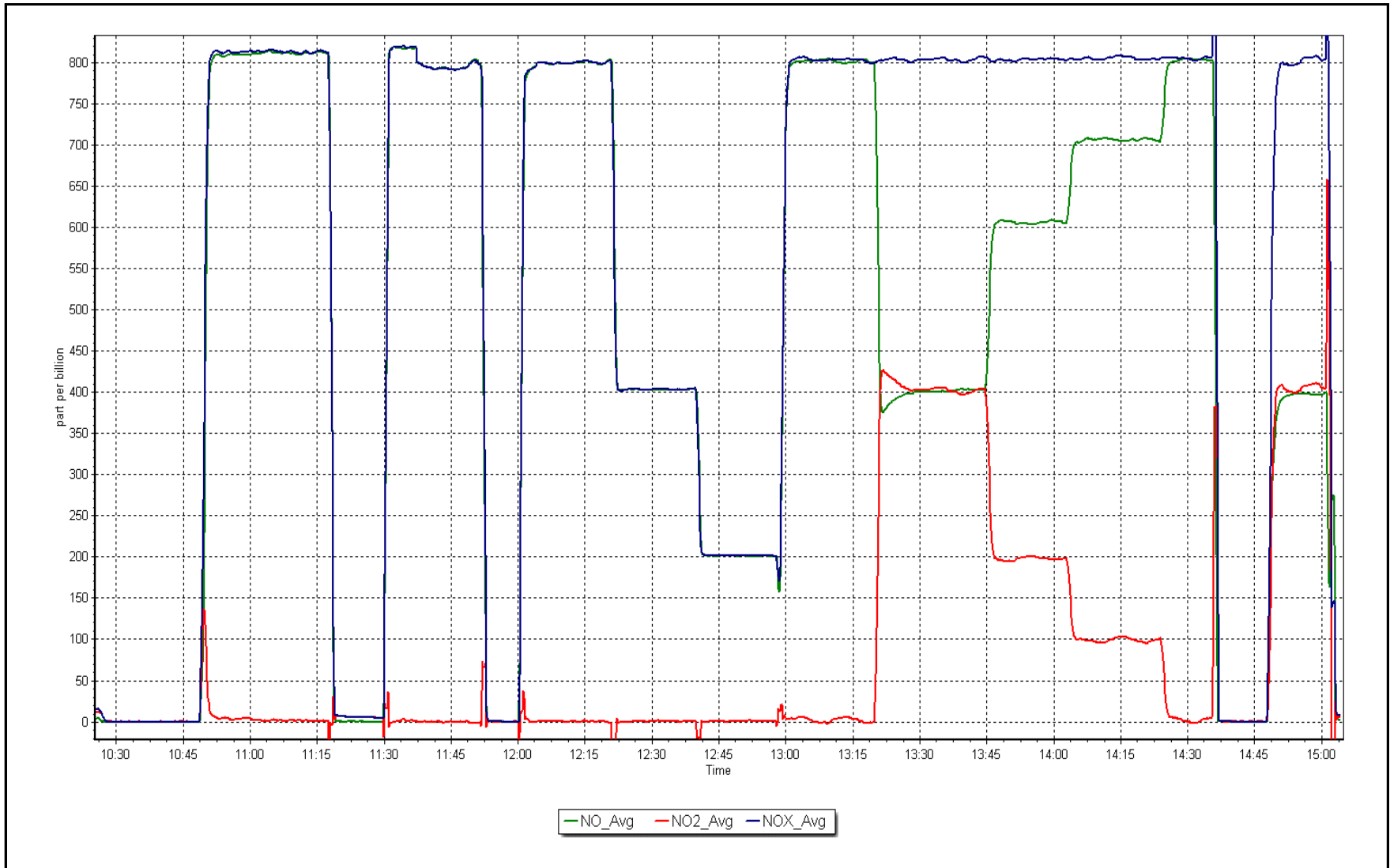
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 27, 2017

Location: Conklin





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	June 27, 2017	Last Cal Date:	May 16, 2017
Start time (MST):	14:00	End time (MST):	14:30
Sharp Model:	5030	S/N:	7494
Particulate Fraction:	PM2.5	C14 Source S/N:	CM-0404
Flow Meter Make/Model:	Delta Cal	S/N:	954
Temp/RH standard:	NA	S/N:	NA

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	17	17.6	17	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	934	933.9	934	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1002	1019	1002	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-0.6	-----	-0.6	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: May 16, 2017 Last Cal Date: February 16, 2017
 Flow w/o adaptor: 16.85 Flow w/ adaptor: 16.84

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input type="checkbox"/>	Foil S/N: <u>2598</u>	Foil S/N: <u>2598</u>	
Foil Calibration	Foil Mass: <u>1265</u>	Foil Mass: <u>1265</u>	
	Calibration Date: <u>October 12, 2016</u>	Calibration Date: <u>June 14, 2016</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>7119</u>	Correction Factor: <u>5603</u>	27.06%

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Cyclone head cleaned. No adjustments made.

Calibration by: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 22
JANVIER
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	684	36	36	100	4	0	1	0
TRS(ppb) Average	687	33	33	100	0	0	0	0
THC(ppm) Average	681	36	39	99.58	2.1	-	1.9	-
NMHC(ppm) Average	681	36	39	99.58	0.017	-	0.001	-
CH4(ppm) Average	681	36	39	99.58	2.1	-	1.9	-
O3 (ppb) Average	687	33	33	100	65	0	50	-
NO2 (ppb) Average	684	36	36	100	2	0	1	-
NO (ppb) Average	684	36	36	100	2	-	0	-
NOX (ppb) Average	684	36	36	100	4	-	1	-
PM2.5 (ug/m3) Average	682	3	38	95.14	23.5	-	7.1	0
Wind Speed 10 m (km/h) Average	720	0	0	100	22	-	12	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	26.8	-	19.8	-
Relative Humidity (%) Average	720	0	0	100	99	-	91.0	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	684	0.1	0	-	0	0	0	0	0	0	0	4
TRS (ppb) Average	687	0.2	0	-	0	0	0	0	0	0	0	0
THC (ppm) Average	681	1.88	0	-	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.1
NMHC(ppm) Average	681	0	0.001	-	0	0	0	0	0	0	0	0.017
CH4(ppm) Average	681	1.88	0	-	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.1
O3 (ppb) Average	687	35	11	-	11	21	27	36	43	50	65	
NO2 (ppb) Average	684	0.5	0	-	0	0	0	0	1	1	2	
NO (ppb) Average	684	0.1	0	-	0	0	0	0	0	0	2	
NOX (ppb) Average	684	0.7	1	-	0	0	0	1	1	1	4	
PM2.5 (ug/m3) Average	682	3.67	2.9	-	0	0.8	1.7	2.9	4.8	7.7	23.5	
Wind Speed 10 m (km/h) Average	720	5.7	4	-	0	2	3	5	8	11	22	
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	720	14.57	5	-	1.1	8.3	11.1	13.9	18.1	22	26.8	
Relative Humidity (%) Average	720	69.9	22	-	21	37	51	74	89	96	99	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NMHC, CH4, THC	02 Jun 2017 10:00	02 Jun 2017 12:00	3	Maintenance - replaced fuel gas
PM 2.5	03 Jun 2017 17:00	03 Jun 2017 18:00	2	Unstable operation - excessive baseline drift
PM 2.5	06 Jun 2017 12:00	06 Jun 2017 14:00	3	Unstable operation - excessive baseline drift
PM 2.5	10 Jun 2017 10:00	10 Jun 2017 18:00	9	Unstable operation - excessive baseline drift
PM 2.5	11 Jun 2017 11:00	11 Jun 2017 11:00	1	Unstable operation - excessive baseline drift
PM 2.5	11 Jun 2017 13:00	11 Jun 2017 14:00	2	Unstable operation - excessive baseline drift
PM 2.5	18 Jun 2017 18:00	19 Jun 2017 11:00	18	Analyzer Failure - sample pump failure



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4 ppb on Jun 23 09:00	Maximum Daily Average: 0.6 ppb on Jun 23		Hours of Data:	684
Minimum Value: 0 ppb on Jun 1 03:00	Minimum Daily Average: 0.0 ppb on Jun 30		Hours of Missing Data:	36
Maximum Diurnal Average: 0.2 ppb at hour 9	Minimum Diurnal Average: 0.0 ppb at hour 3		Hours of Calibration:	36
Monthly Average: 0.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0
2-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Jun	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1
12-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.2	1
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
16-Jun	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Jun	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
22-Jun	0	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.5	1
23-Jun	0	0	0	0	0	Z	0	1	4	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	4
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	1	Z	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

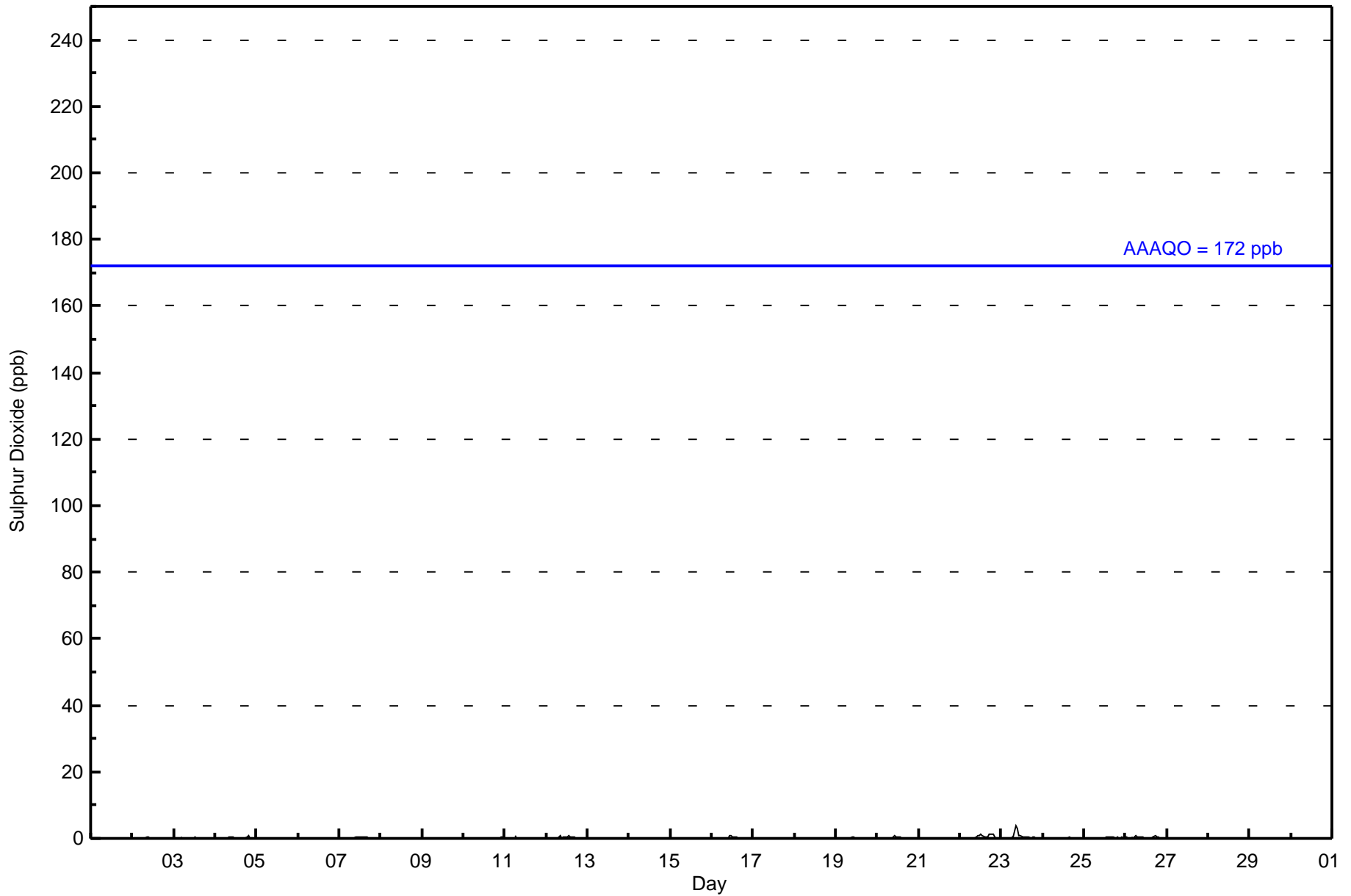
0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
0	1	0	0	0	0	1	1	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	684	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684

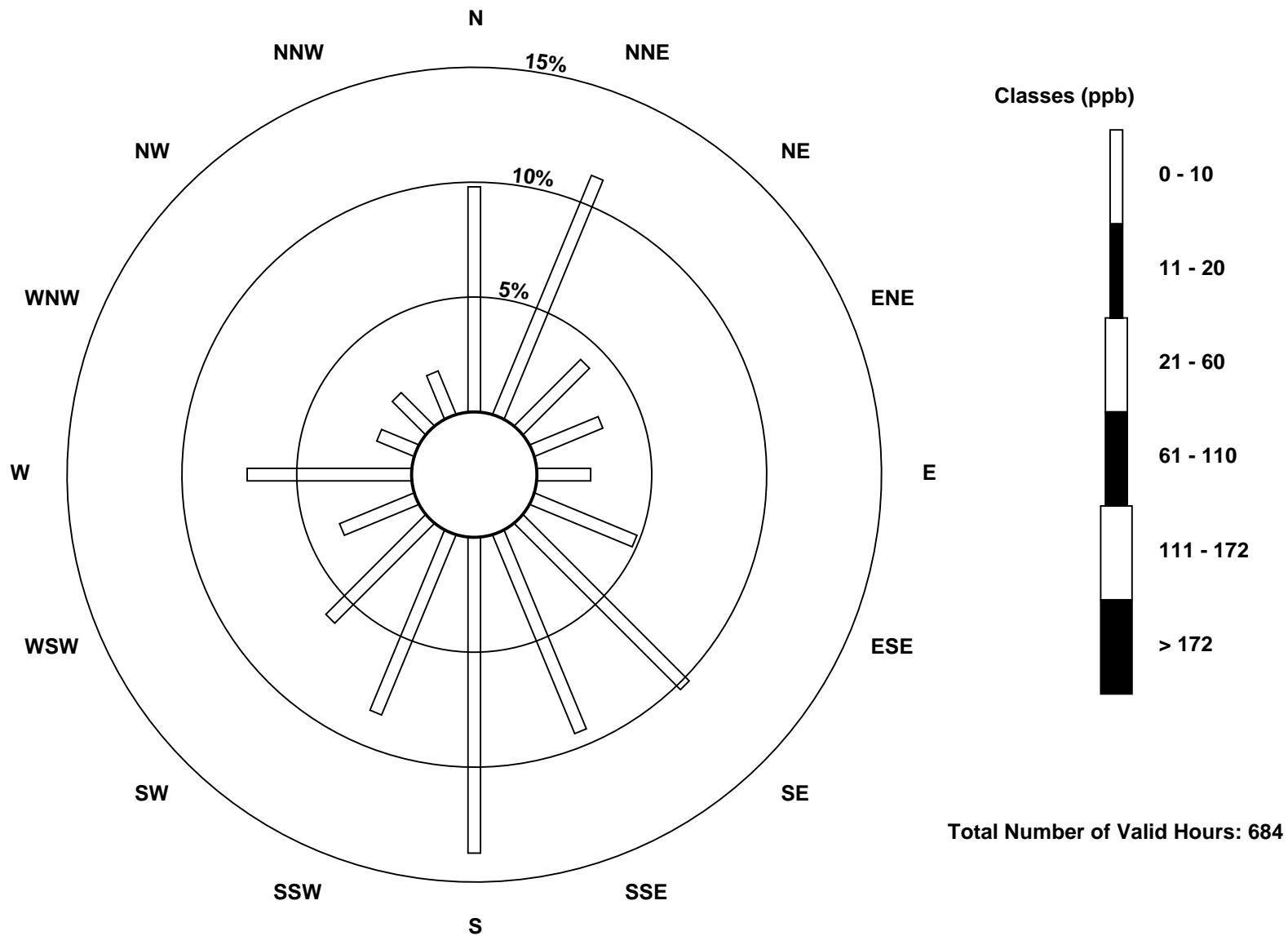
Total Number of Valid Hours: 684

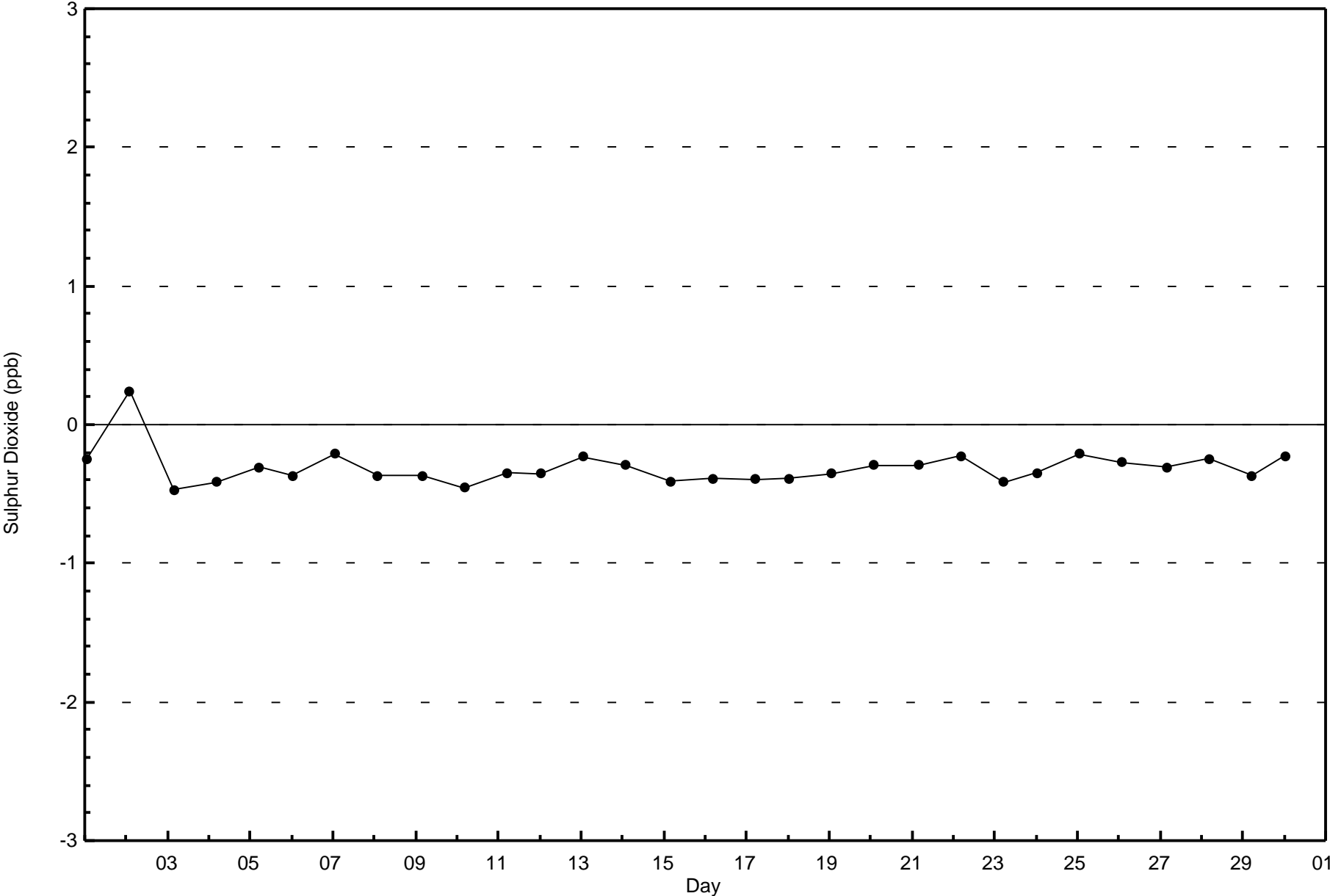
Total Number of Hours: 720

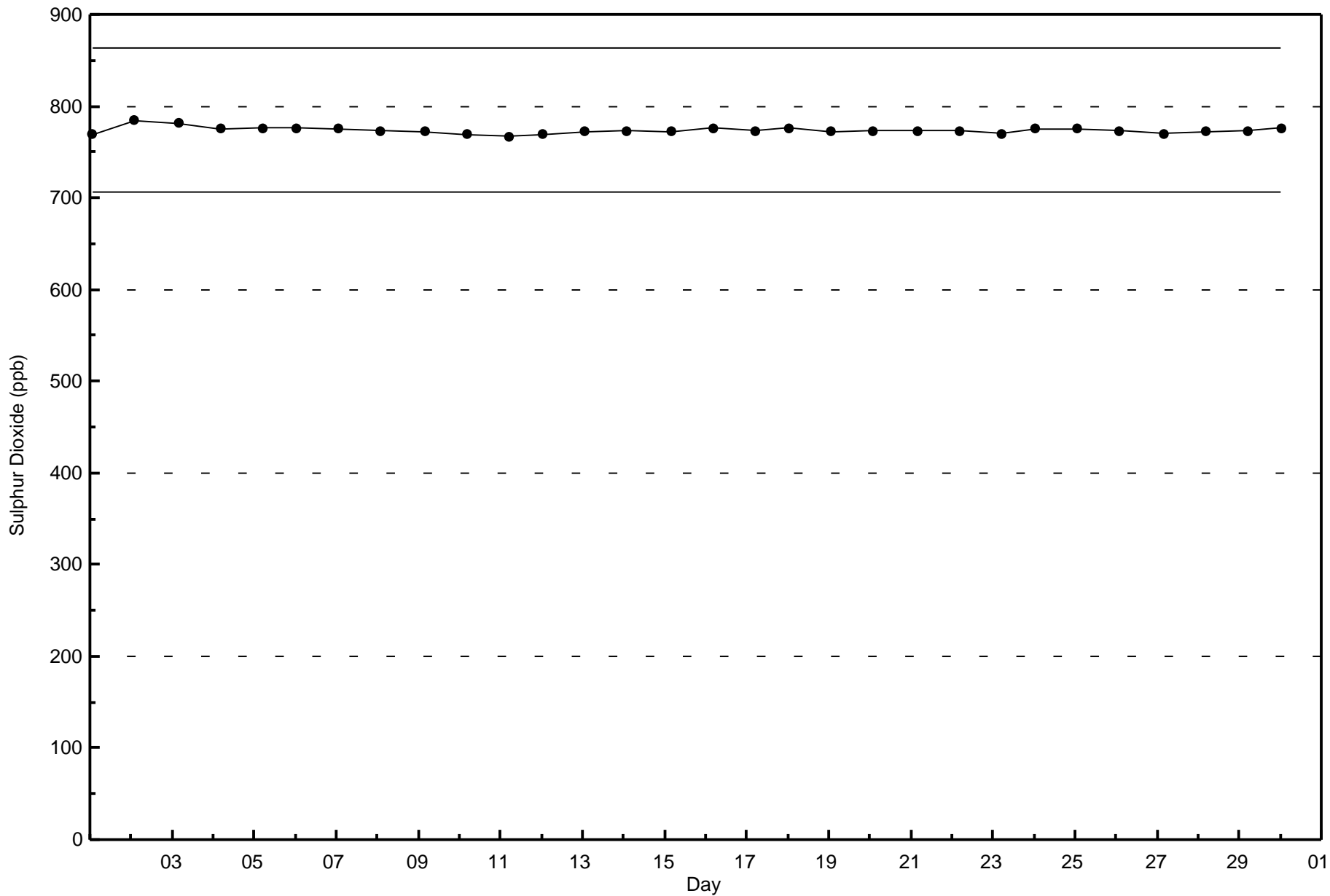


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Janvier (AMS 22)









Summary of Hour Averages

Janvier - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 0 ppb on Jun 9 06:00	Maximum Daily Average: 0.2 ppb on Jun 12		Hours of Data:	687
Minimum Value: 0 ppb on Jun 18 18:00	Minimum Daily Average: 0.1 ppb on Jun 17		Hours of Missing Data:	33
Maximum Diurnal Average: 0.2 ppb at hour 7	Minimum Diurnal Average: 0.2 ppb at hour 18		Hours of Calibration:	33
Monthly Average: 0.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
2-Jun	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
5-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
30-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0

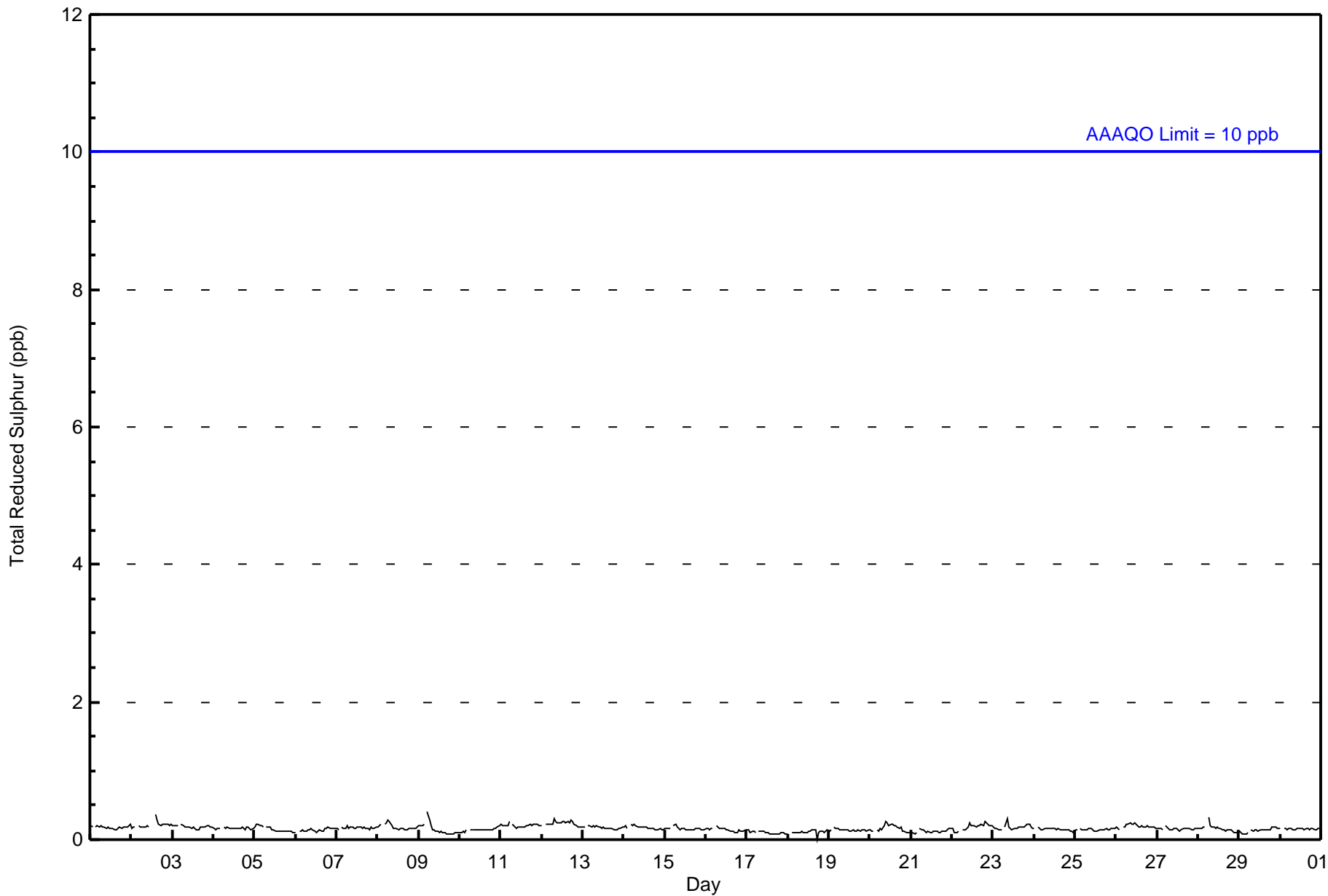
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	687	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	72	76	30	22	16	31	70	63	96	59	43	25	45	13	15	11	687
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	76	30	22	16	31	70	63	96	59	43	25	45	13	15	11	687

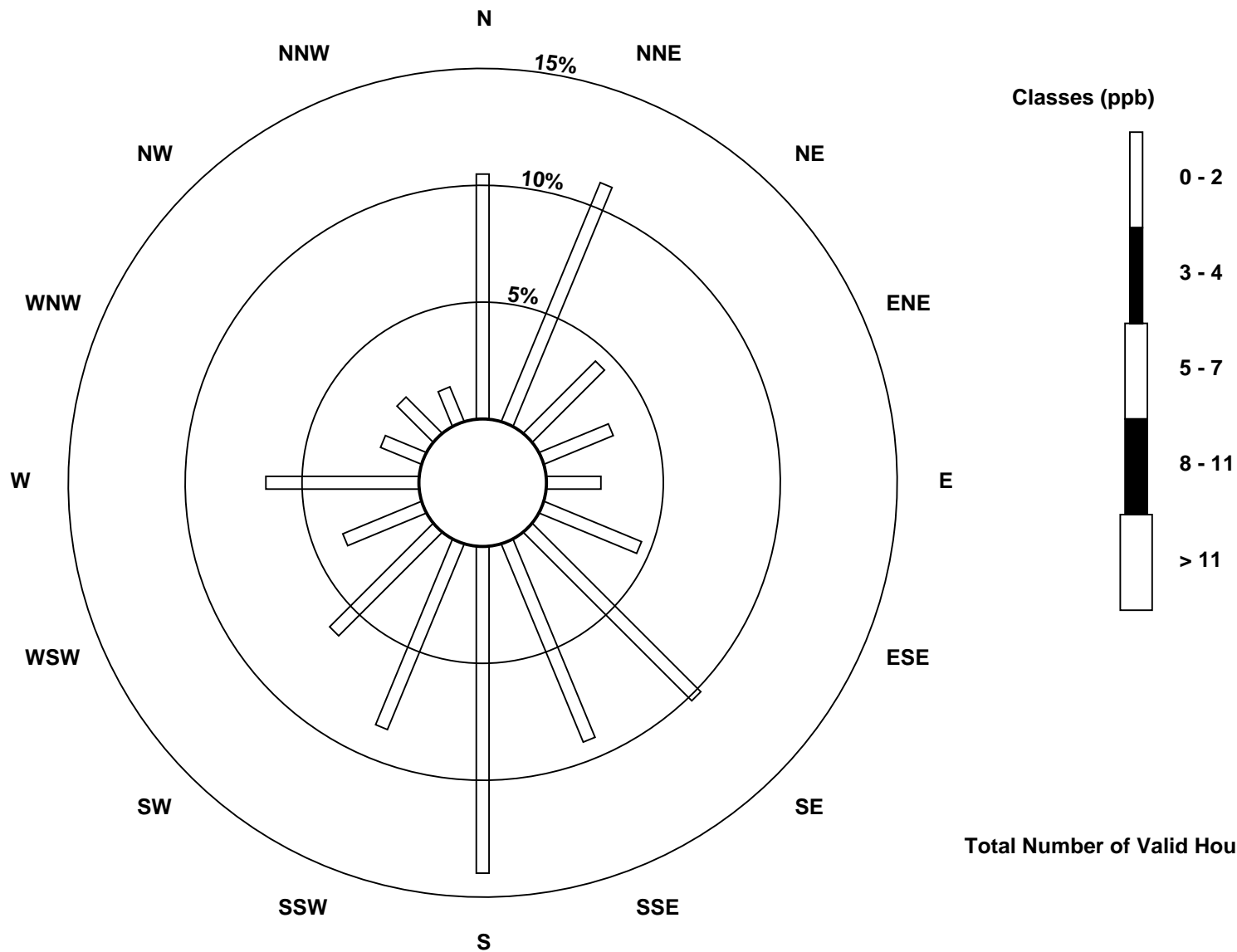
Total Number of Valid Hours: 687

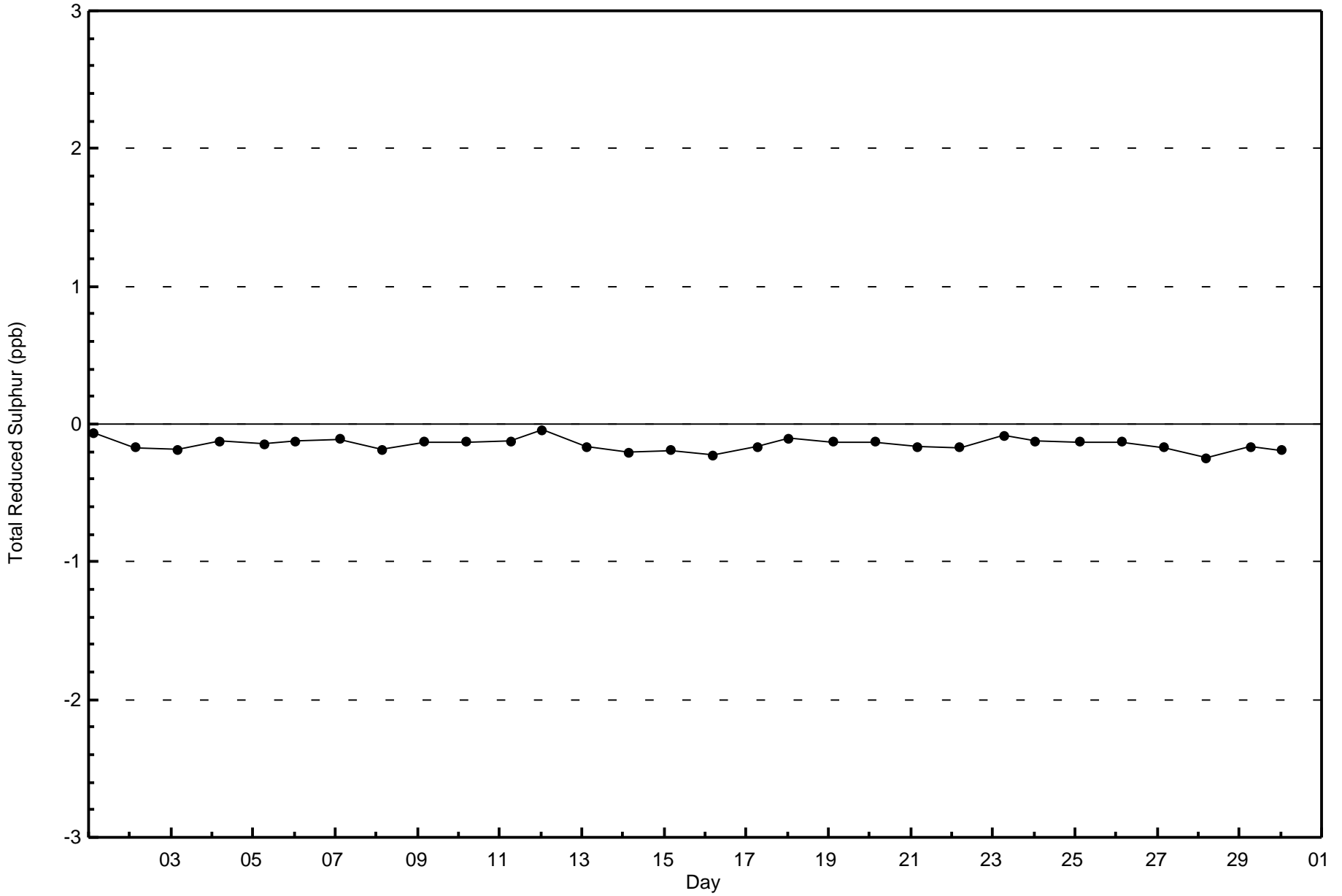
Total Number of Hours: 720

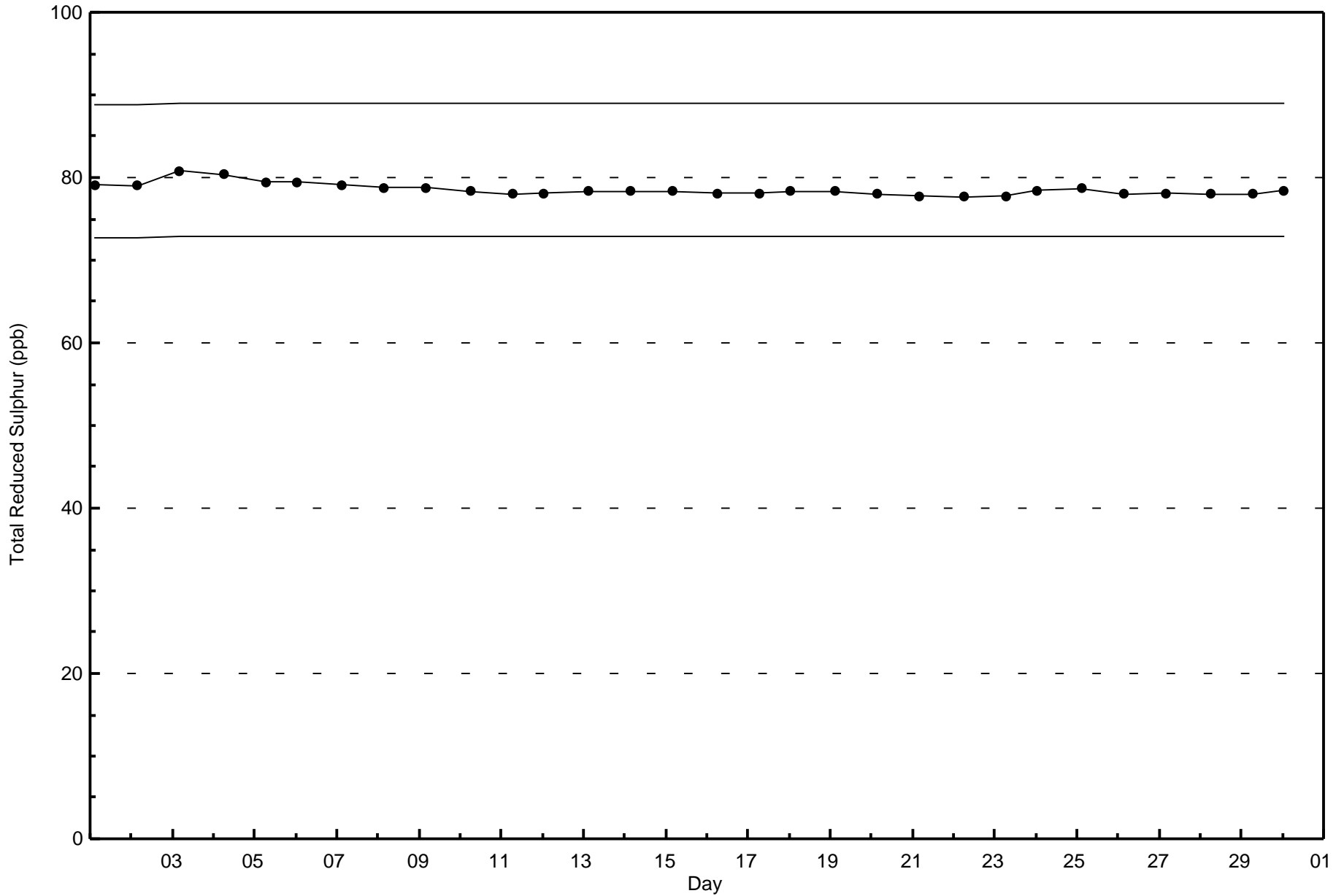


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Janvier (AMS 22)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

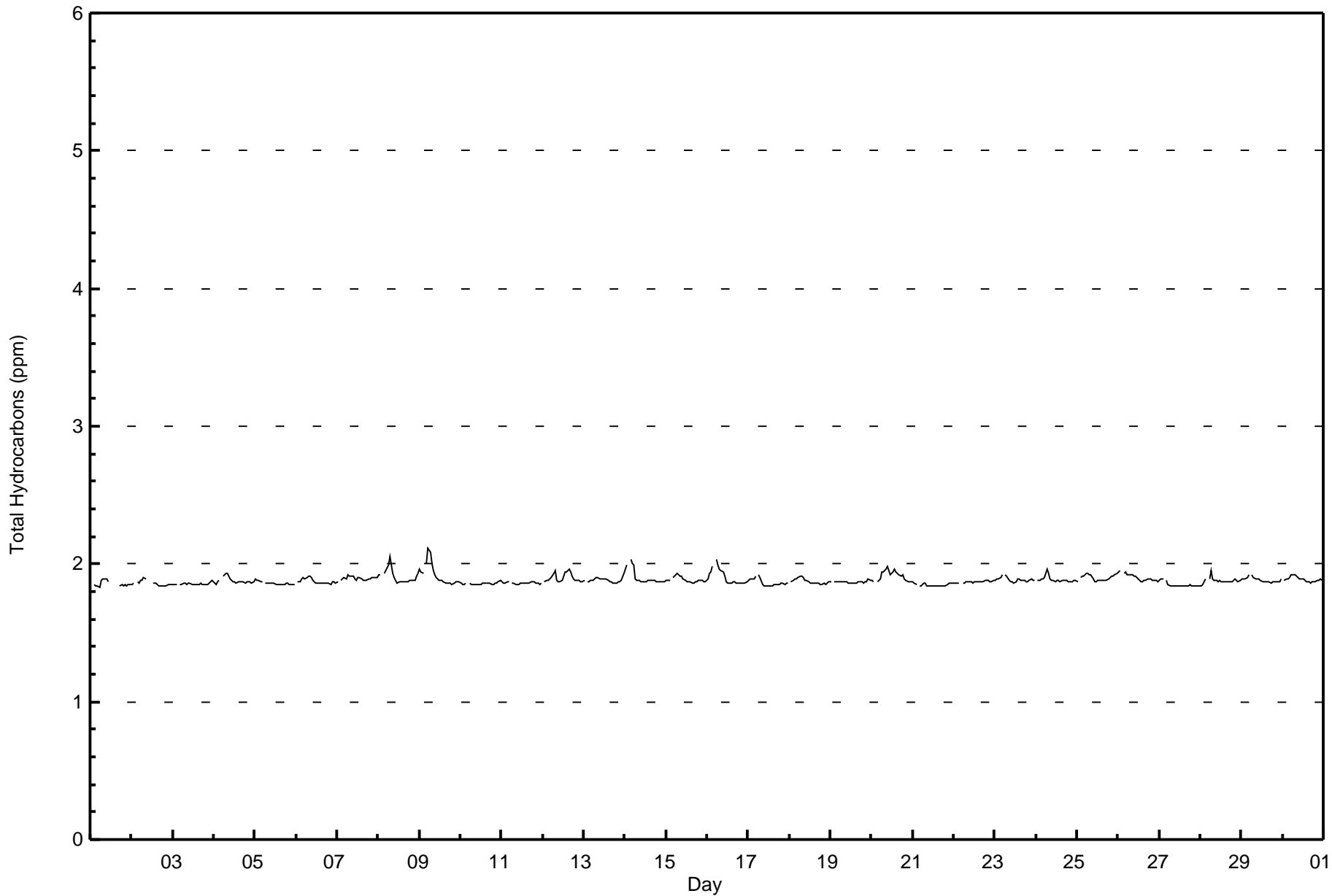
Janvier - June 2017

Maximum Value: 2.1 ppm on Jun 9 06:00		Maximum Daily Average: 1.9 ppm on Jun 9		Hours in Service: 720																						
Minimum Value: 1.8 ppm on Jun 1 06:00		Minimum Daily Average: 1.8 ppm on Jun 21		Hours of Data: 681																						
Maximum Diurnal Average: 1.9 ppm at hour 7		Minimum Diurnal Average: 1.9 ppm at hour 20		Hours of Missing Data: 39																						
Monthly Average: 1.88 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 1.9 P ₉₉ = 2.0		Hours of Calibration: 36																						
				Percent Operational Time: 99.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1.9	Z	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	1.8	1.9	1.8	1.8	1.8	1.8	1.9	--	1.9
2-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	M	M	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
3-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
5-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9
6-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Jun	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
9-Jun	2.0	1.9	1.9	Z	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
10-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
11-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
12-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
13-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
14-Jun	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
15-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Jun	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
18-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
19-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
20-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
21-Jun	1.9	1.9	1.8	Z	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9
22-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
23-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
24-Jun	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
26-Jun	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.9
28-Jun	1.8	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
29-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
30-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	678	99.56	99.56
2.1 - 3.0	3	0.44	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	66	76	28	22	16	33	70	64	94	58	40	24	48	12	14	13	678
2.1 - 3.0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	40	24	48	12	14	14	681

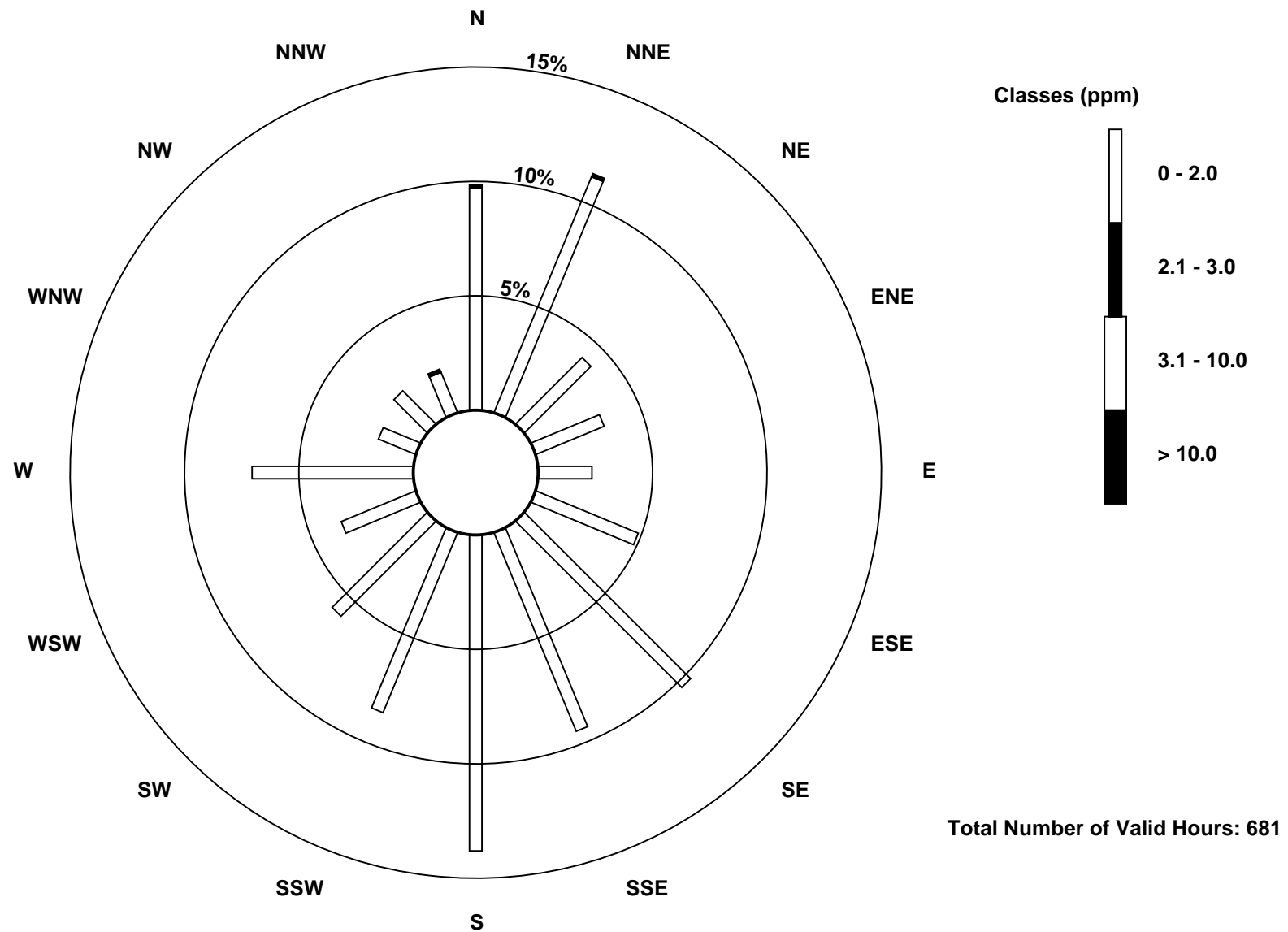
Total Number of Valid Hours: 681

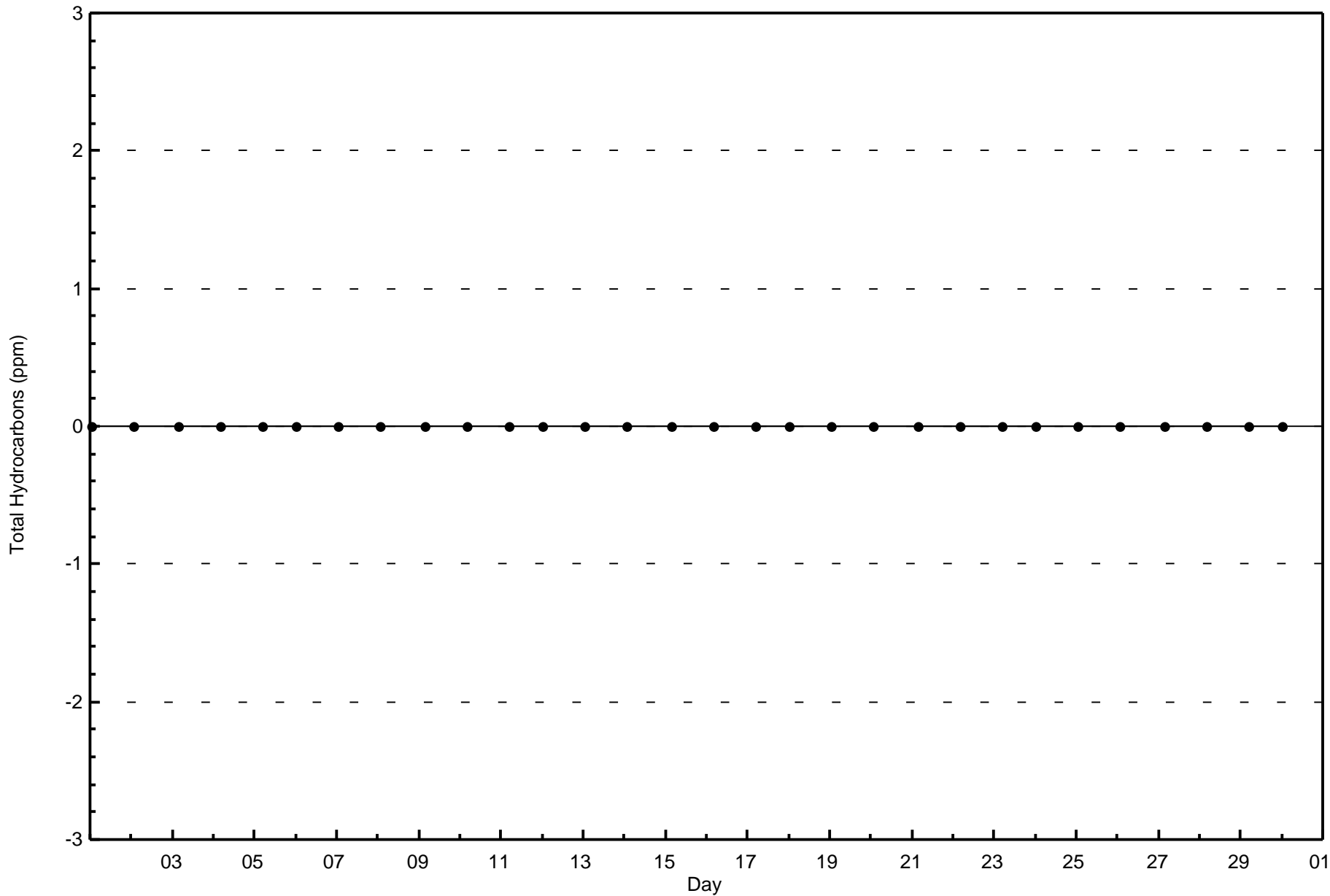
Total Number of Hours: 720

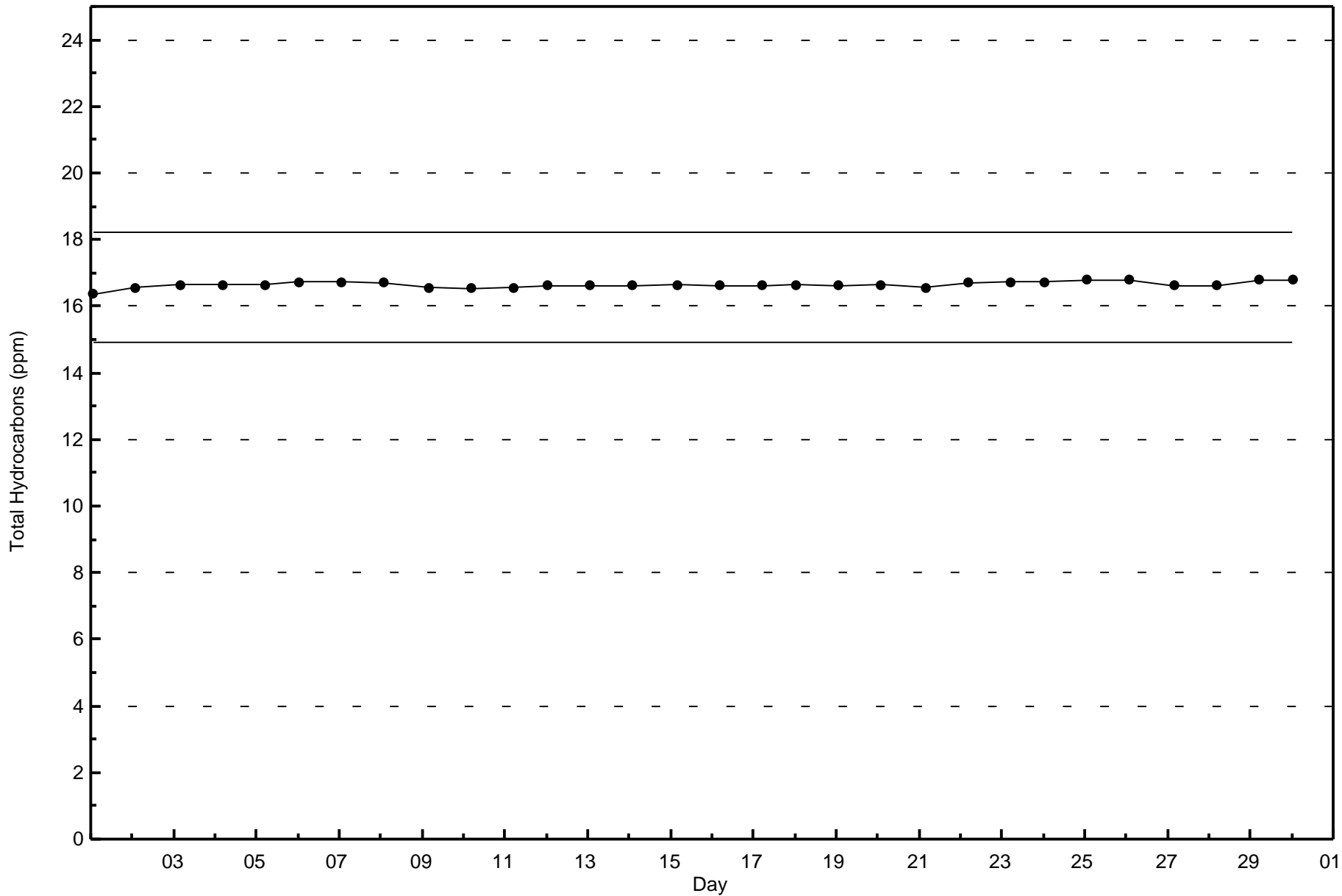


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Janvier (AMS 22)





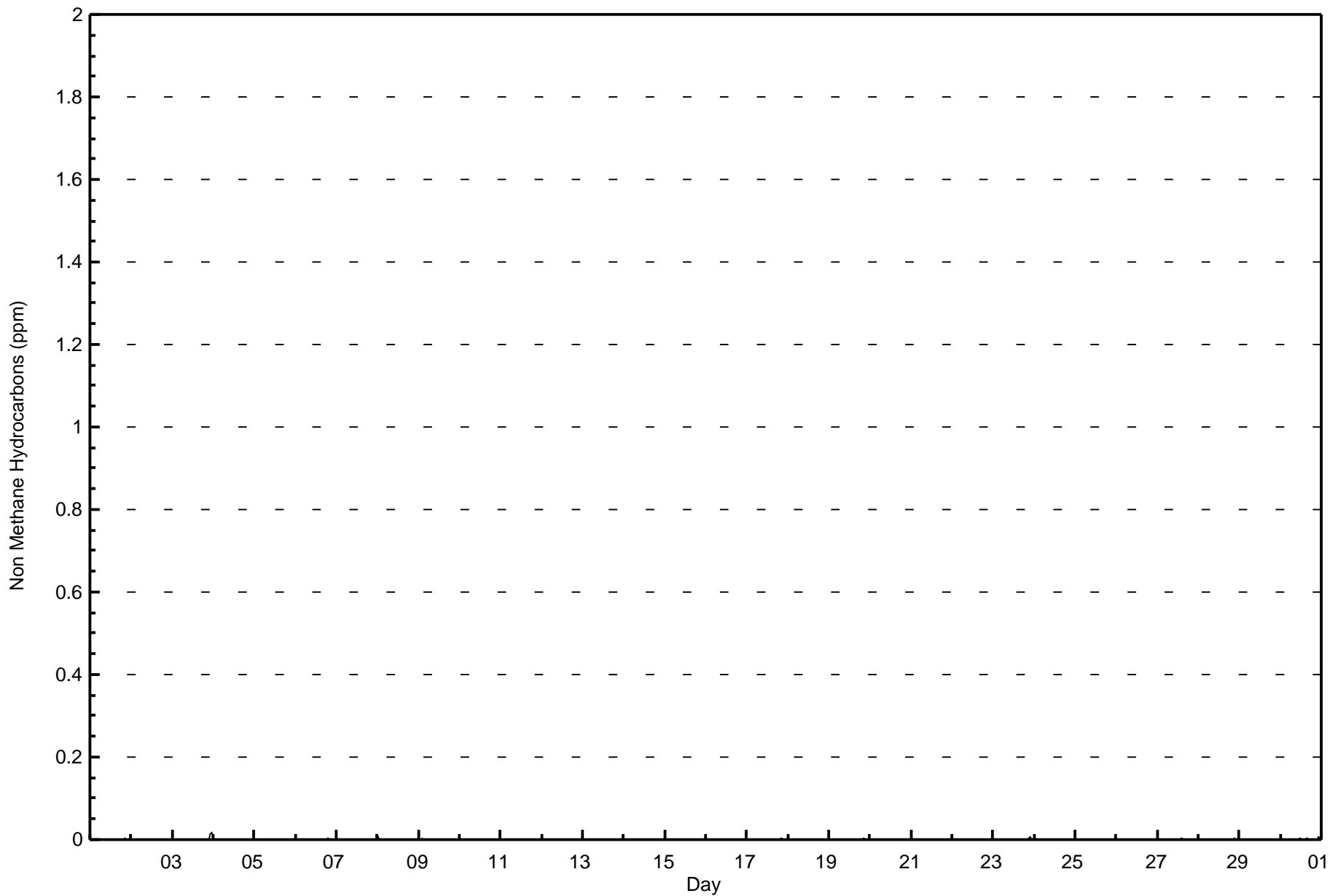




Summary of Hour Averages

Janvier - June 2017

Maximum Value: 0.017 ppm on Jun 4 00:00		Maximum Daily Average: 0.001 ppm on Jun 3		Hours in Service: 720																						
Minimum Value: 0.000 ppm on Jun 1 01:00		Minimum Daily Average: 0.000 ppm on Jun 2		Hours of Data: 681																						
Maximum Diurnal Average: 0.001 ppm at hour 23		Minimum Diurnal Average: 0.000 ppm at hour 7		Hours of Missing Data: 39																						
Monthly Average: 0.000 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0		Hours of Calibration: 36																						
				Percent Operational Time: 99.6																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	C	0.000	0.000	0.002	0.005	0.000	0.000	0.000	--	0.005
2-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.017	0.001	0.017
4-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.005
7-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
8-Jun	0.006	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.006
9-Jun	0.002	0.000	0.002	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
10-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
11-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
14-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Jun	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
16-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
17-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003
18-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.003
20-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.008
24-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001
25-Jun	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26-Jun	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
27-Jun	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
28-Jun	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002
29-Jun	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30-Jun	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005	0.002	0.001	0.005
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Janvier - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	677	99.41	99.41
0.006 - 0.05	4	0.59	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Janvier - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	67	77	28	21	16	33	68	63	94	58	40	24	48	12	14	14	677
0.006 - 0.05	0	0	0	1	0	0	2	1	0	0	0	0	0	0	0	0	4
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	40	24	48	12	14	14	681

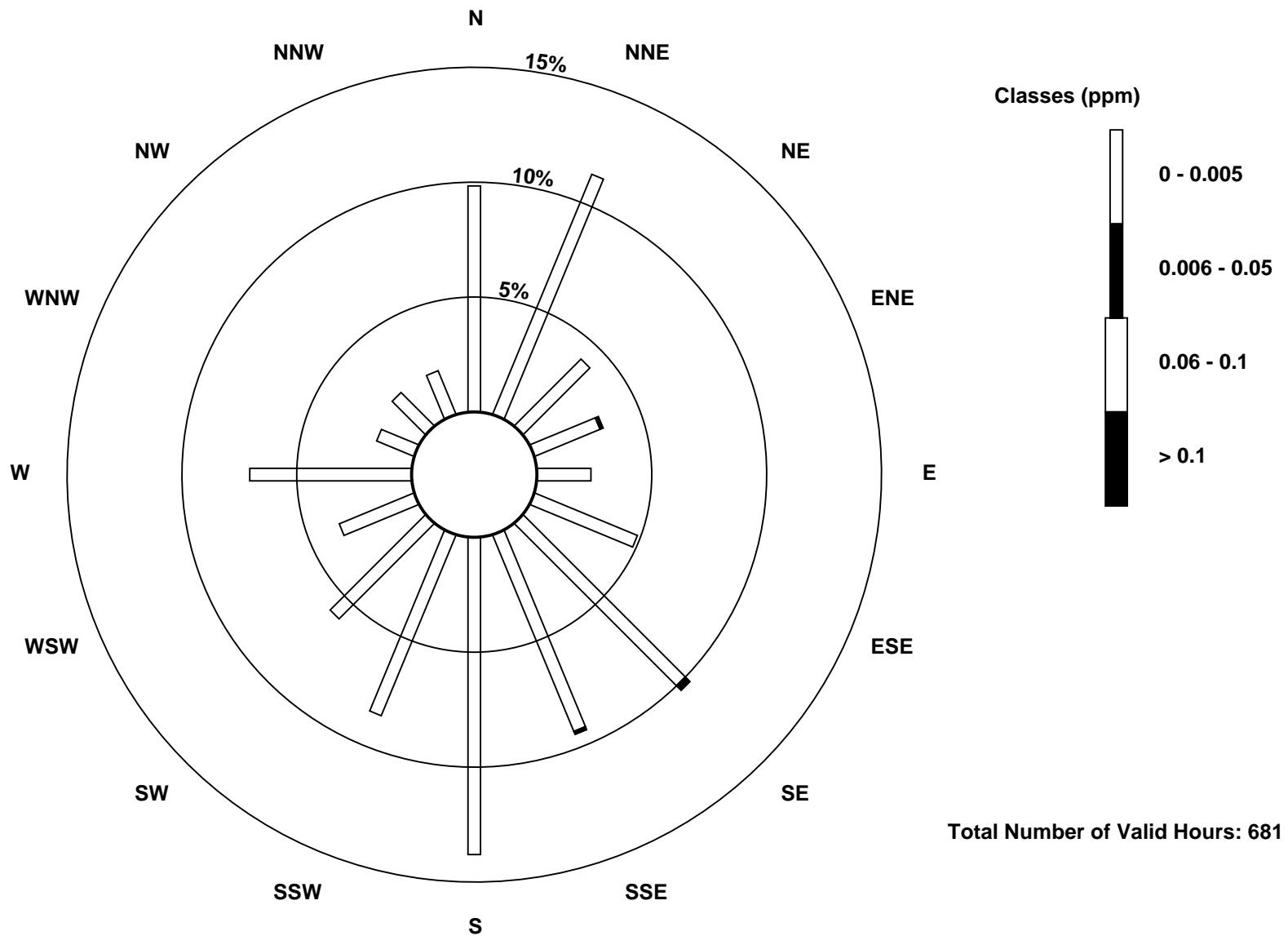
Total Number of Valid Hours: 681

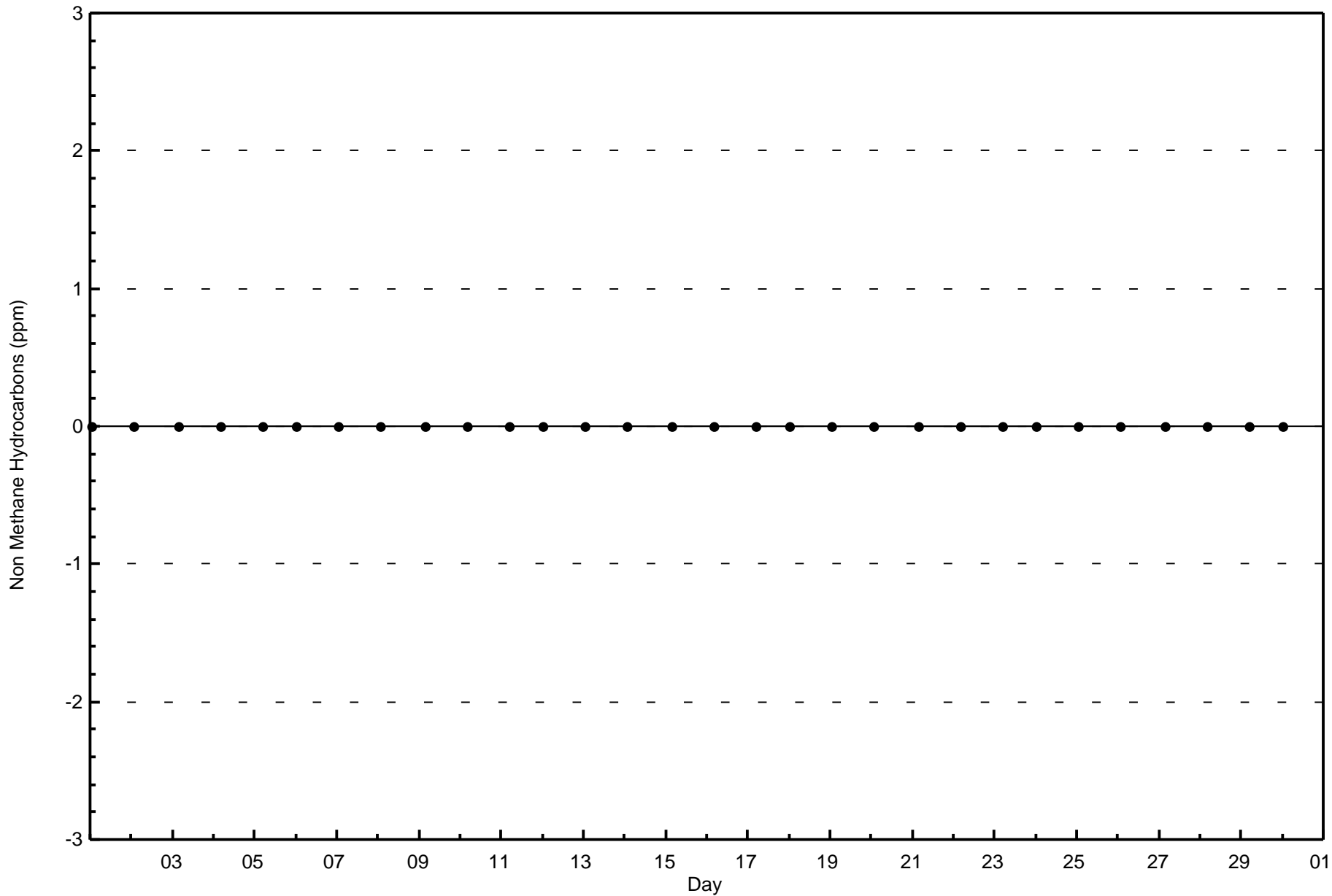
Total Number of Hours: 720

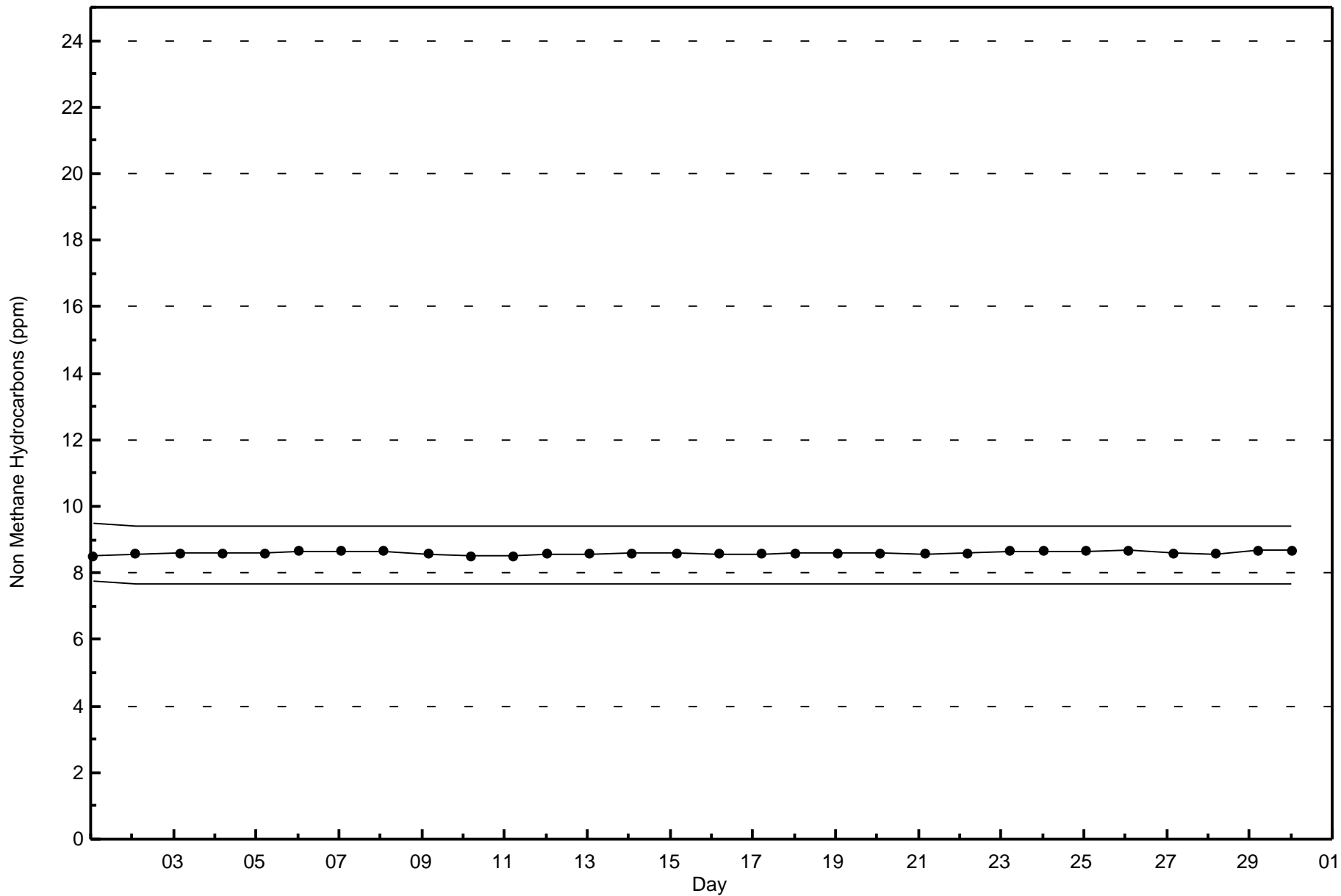


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Non Methane Hydrocarbons (NMHC) - ppm
Janvier (AMS 22)









Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Janvier - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.1 ppm on Jun 9 06:00	Maximum Daily Average: 1.9 ppm on Jun 9		Hours of Data:	681
Minimum Value: 1.8 ppm on Jun 1 06:00	Minimum Daily Average: 1.8 ppm on Jun 21		Hours of Missing Data:	39
Maximum Diurnal Average: 1.9 ppm at hour 7	Minimum Diurnal Average: 1.9 ppm at hour 20		Hours of Calibration:	36
Monthly Average: 1.88 ppm	Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 1.9 P ₉₉ = 2.0		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1.9	Z	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	C	C	C	C	C	C	1.8	1.9	1.8	1.8	1.8	1.8	1.9	--	1.9
2-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	M	M	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9
3-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9
4-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
5-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.9	1.9
6-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
7-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
8-Jun	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
9-Jun	2.0	1.9	1.9	Z	2.0	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
10-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
11-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
12-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
13-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
14-Jun	2.0	2.0	Z	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
15-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
16-Jun	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
18-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
19-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
20-Jun	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
21-Jun	1.9	1.9	1.8	Z	1.8	1.8	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9
22-Jun	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
23-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
24-Jun	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Jun	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
26-Jun	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
27-Jun	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9
28-Jun	1.8	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
29-Jun	1.9	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
30-Jun	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9

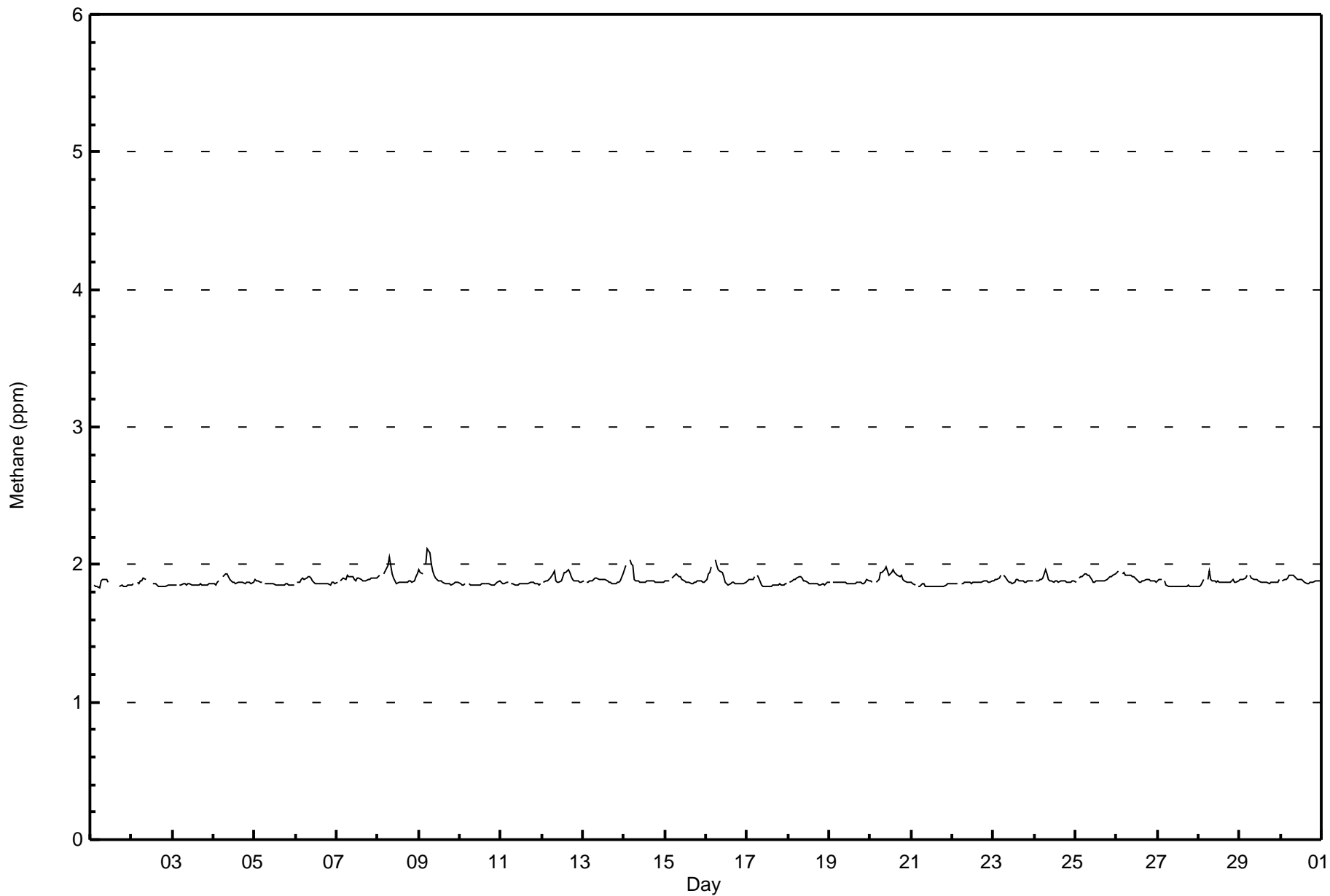
1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Average
2.0	2.0	1.9	2.0	2.0	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	Diurnal Maximum

Z - zerspan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Janvier - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Janvier - June 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	678	99.56	99.56
2.1 - 3.0	3	0.44	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Janvier - June 2017**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	66	76	28	22	16	33	70	64	94	58	40	24	48	12	14	13	678
2.1 - 3.0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	40	24	48	12	14	14	681

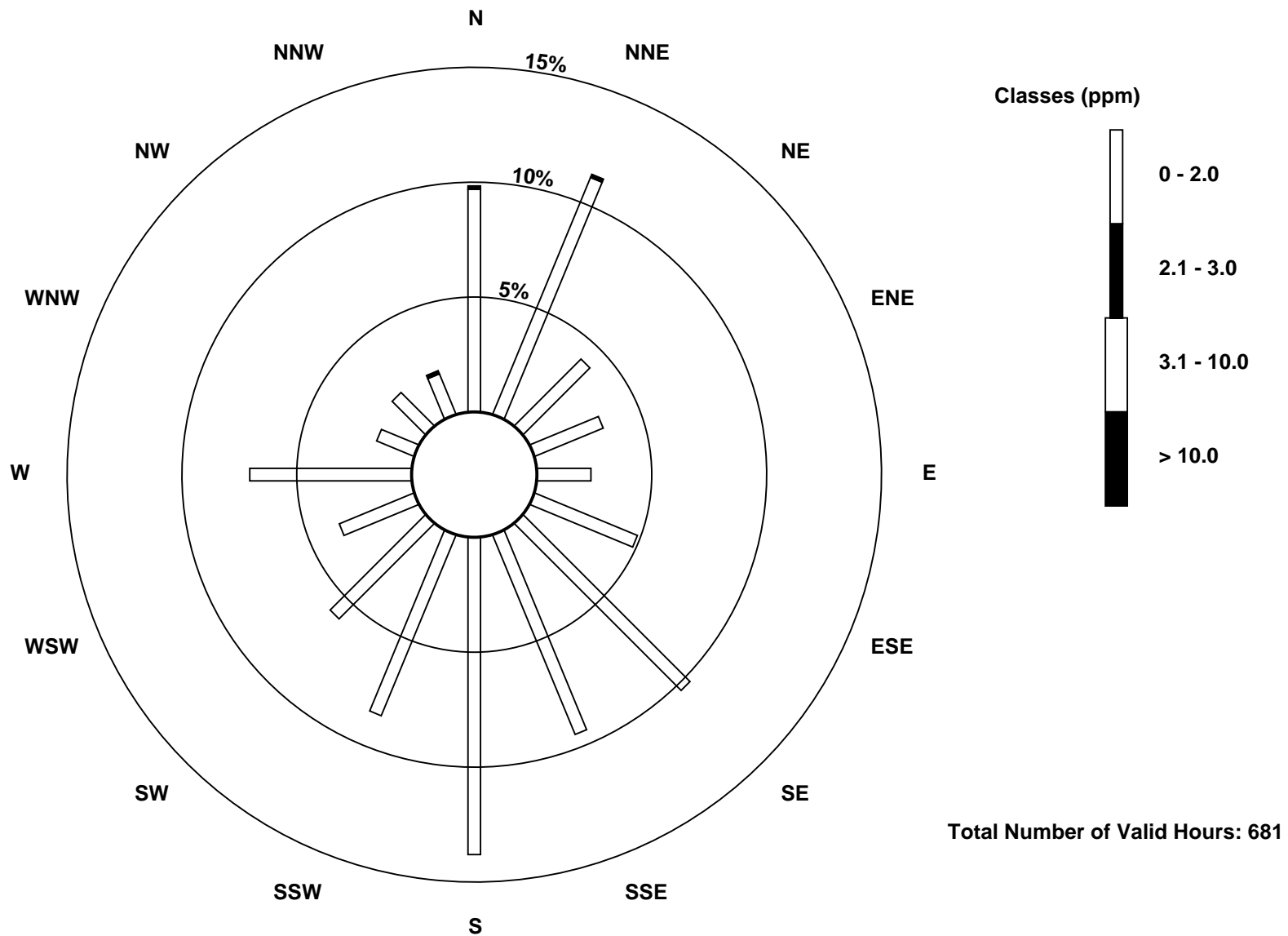
Total Number of Valid Hours: 681

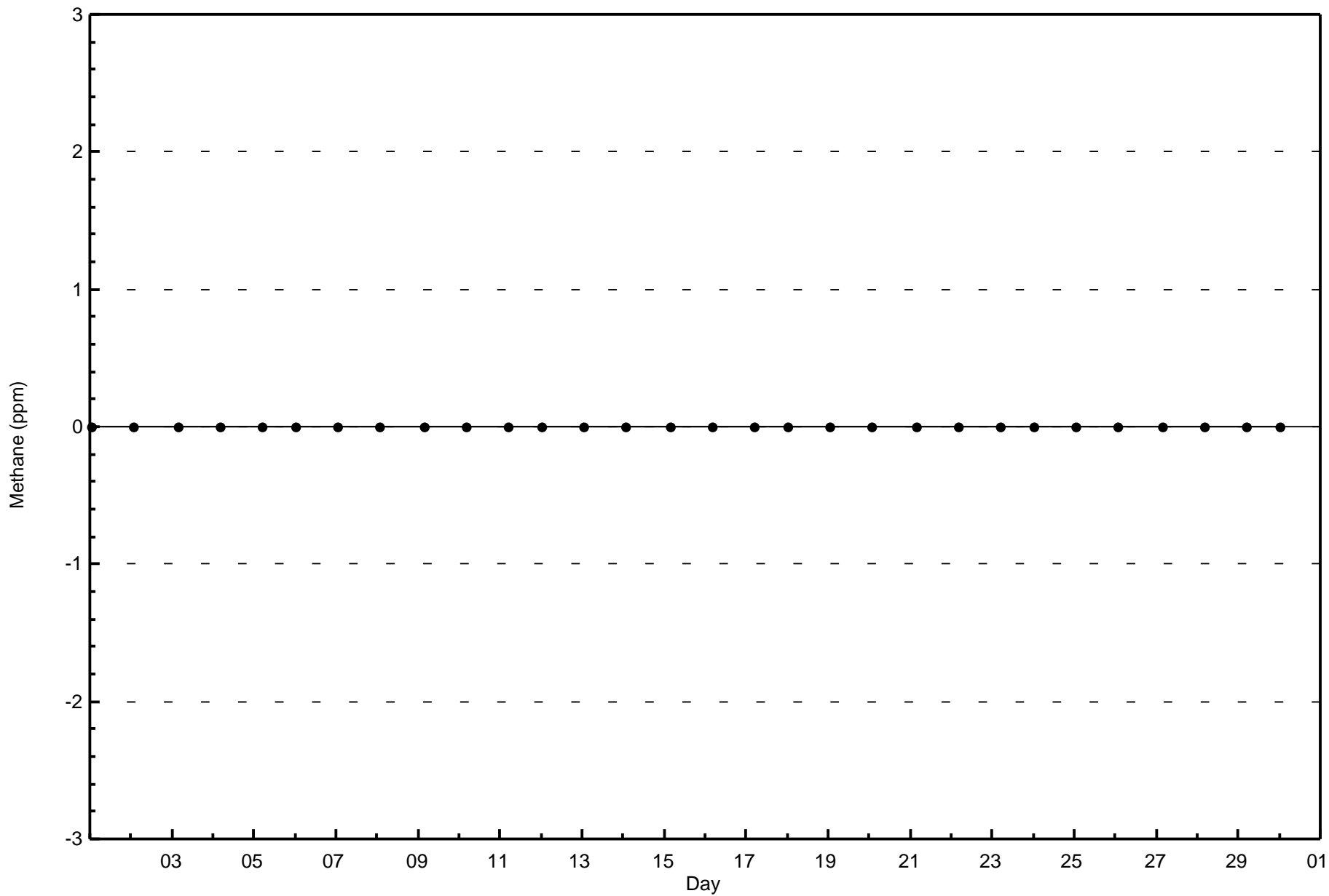
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Methane (CH₄) - ppm
Janvier (AMS 22)

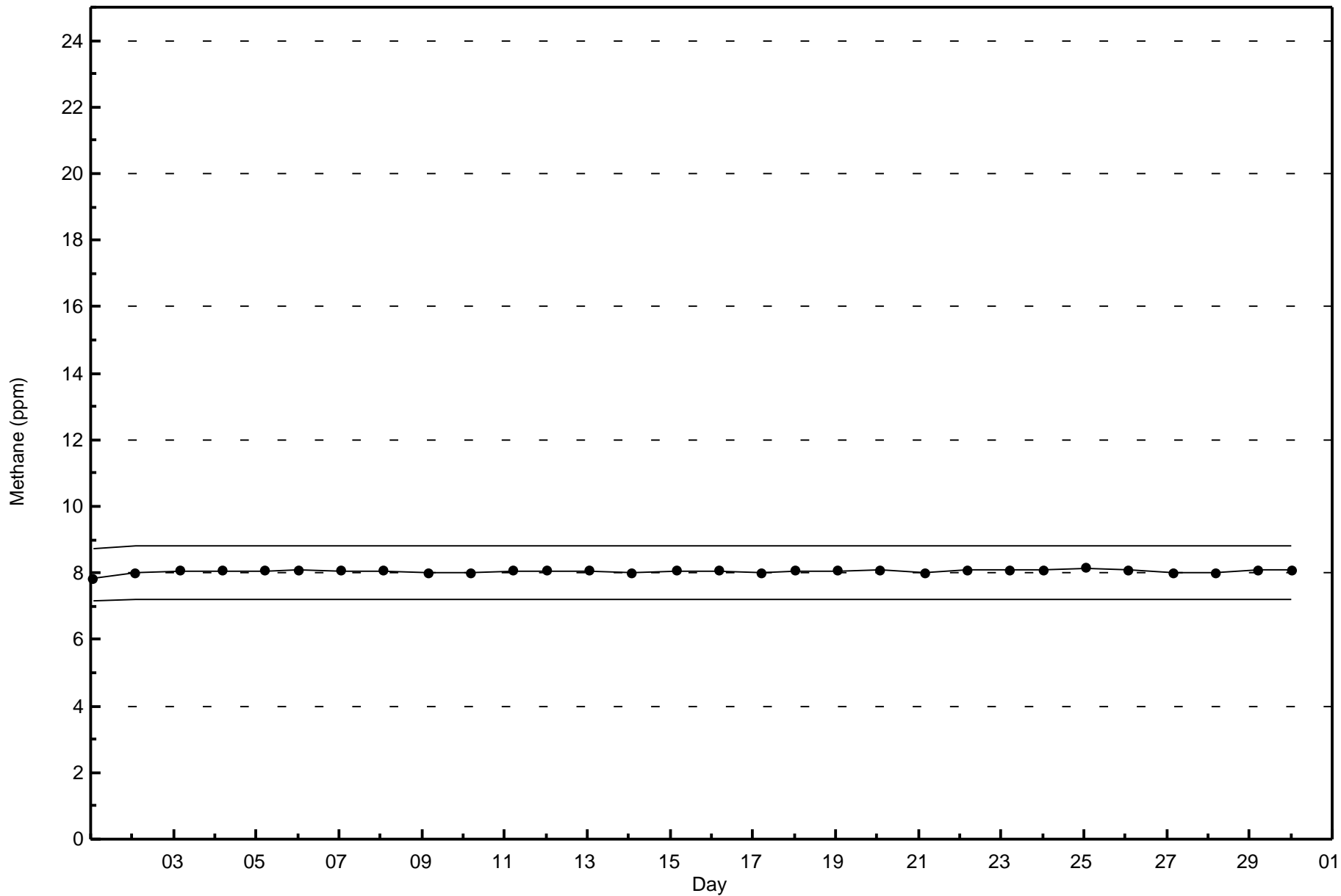






Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Janvier - June 2017





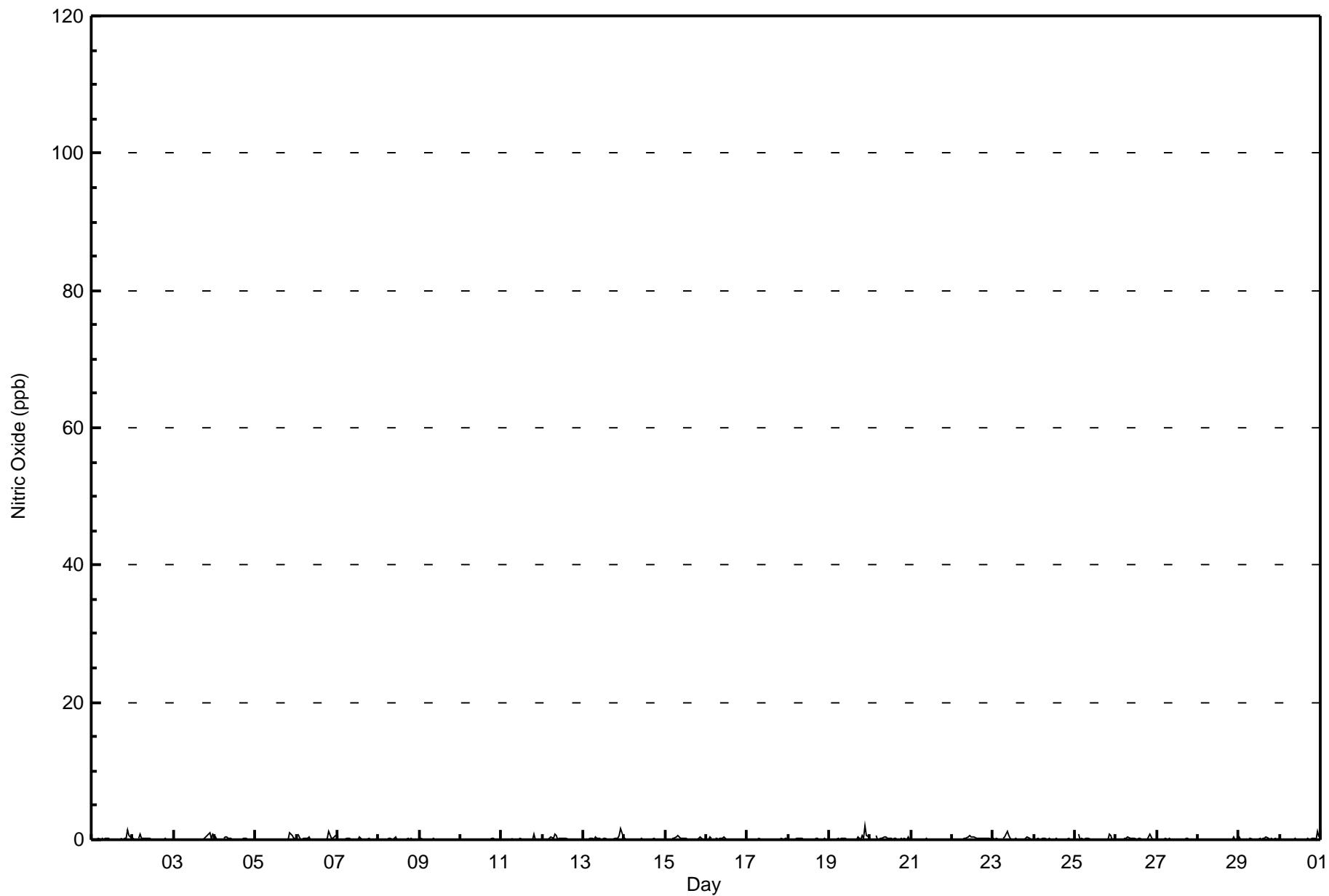
Maximum Value: 2 ppb on Jun 19 22:00																	Maximum Daily Average: 0.2 ppb on Jun 19																	Hours in Service: 720	
Minimum Value: 0 ppb on Jun 4 03:00																	Minimum Daily Average: 0.0 ppb on Jun 10																	Hours of Data: 684	
Maximum Diurnal Average: 0.3 ppb at hour 22																	Minimum Diurnal Average: 0.0 ppb at hour 4																	Hours of Missing Data: 36	
Monthly Average: 0.1 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																	Hours of Calibration: 36	
																																		Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Jun	0	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	1	1	0	--	1									
2-Jun	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1									
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.2	1									
4-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.1	1									
6-Jun	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.2	1									
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1									
12-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1									
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0.2	2									
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
15-Jun	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
17-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
19-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0.2	2									
20-Jun	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
21-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0									
22-Jun	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
23-Jun	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
25-Jun	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1									
26-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1									
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
29-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0									
30-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1									
																	Diurnal Average		Diurnal Maximum																
																	0.1		0																
																	0.1		1																
																	0.1		1																
																	0.0		1																
																	0.1		1																
																	0.1		0																
																	0.1		1																
																	0.2		1																
																	0.2		1																
																	0.1		1																
																	0.2		1																
																	0.2		2																
																	0.3		2																
																	0.2		2																
																	0.1		1																

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684

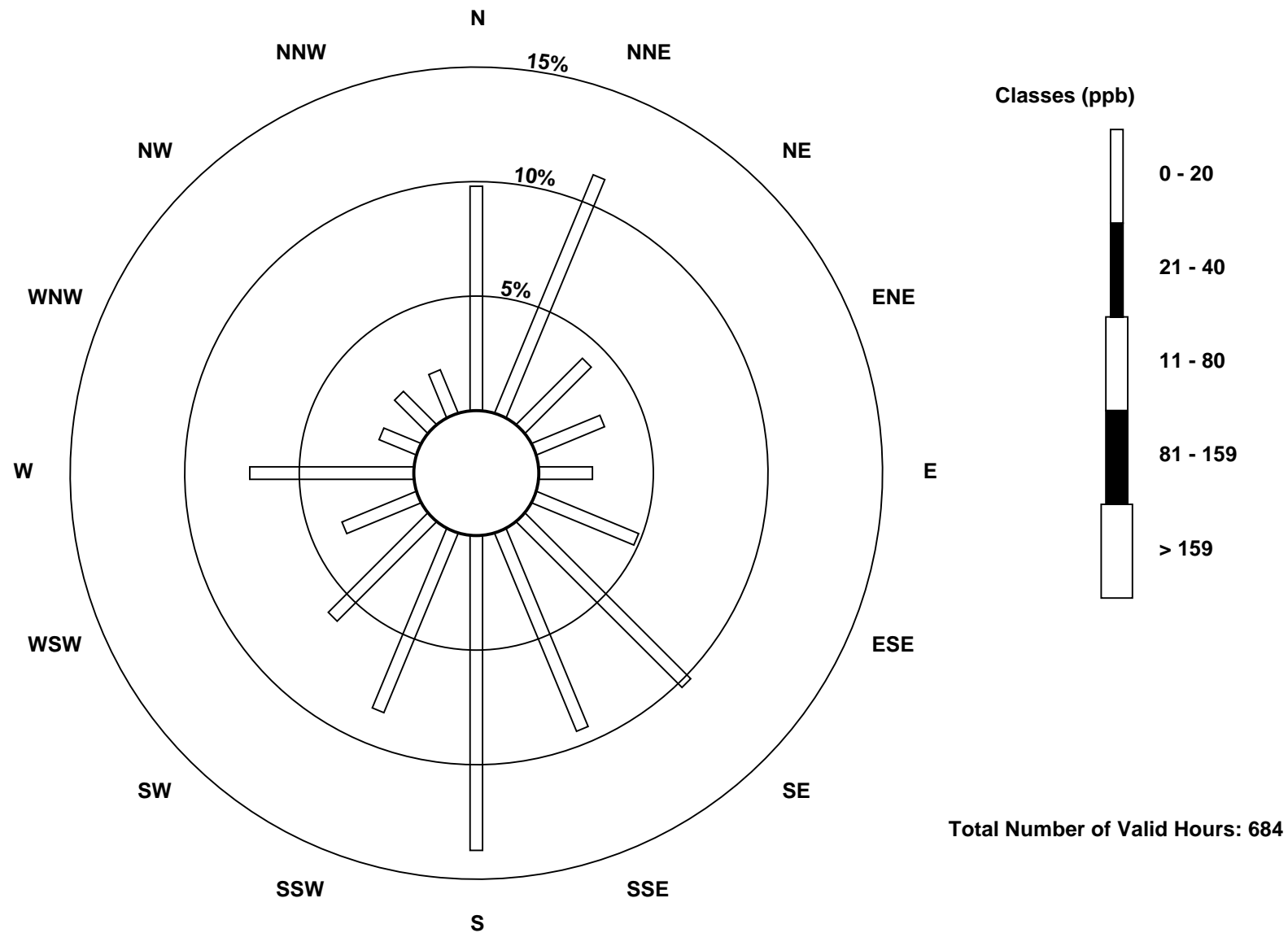
Total Number of Valid Hours: 684

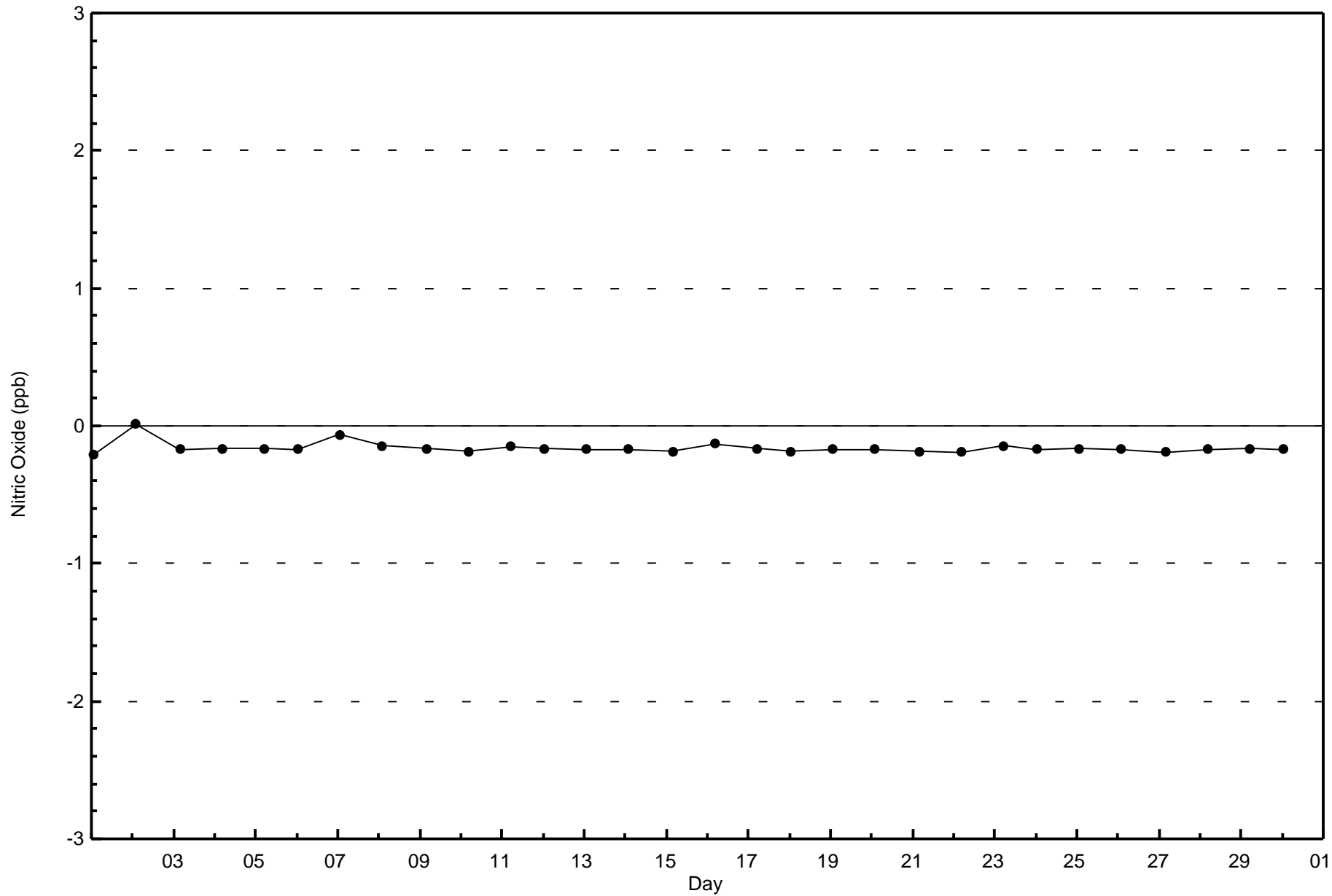
Total Number of Hours: 720

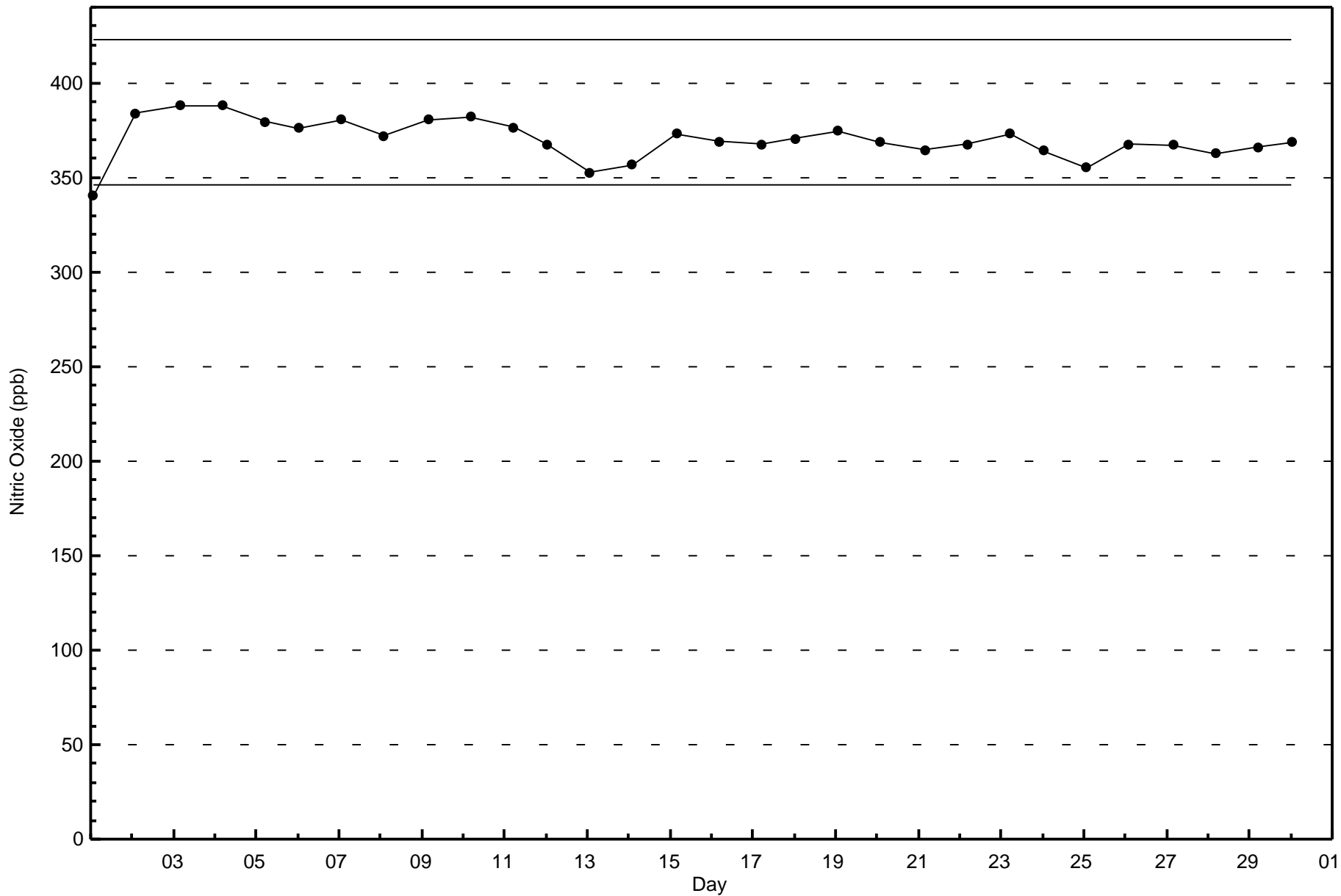


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Janvier (AMS 22)









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2 ppb on Jun 7 14:00	Maximum Daily Average: 0.9 ppb on Jun 7		Hours of Data:	684
Minimum Value: 0 ppb on Jun 9 18:00	Minimum Daily Average: 0.2 ppb on Jun 10		Hours of Missing Data:	36
Maximum Diurnal Average: 0.7 ppb at hour 22	Minimum Diurnal Average: 0.3 ppb at hour 16		Hours of Calibration:	36
Monthly Average: 0.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	1	1	1	1	1	1	1	1	1	C	C	C	C	C	C	1	0	1	1	2	2	1	--	2	
2-Jun	1	1	Z	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.5	1
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	1	1	0.4	2	
4-Jun	1	0	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	1	2	1	1	1	0	0.7	2	
5-Jun	0	1	1	1	0	Z	2	1	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0.6	2	
6-Jun	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	2	1	2	0.7	2	
7-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	0	1	0.9	2	
8-Jun	1	1	Z	1	1	0	0	0	0	0	0	1	1	1	1	0	1	1	0	1	0	0	1	1	0.5	1	
9-Jun	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.2	2	
11-Jun	1	1	0	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
12-Jun	Z	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0.7	1	
13-Jun	1	Z	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	1	1	1	1	2	1	0.7	2	
14-Jun	1	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
15-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0.6	1	
16-Jun	1	1	0	0	Z	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0.5	1	
17-Jun	1	1	1	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.3	1	
18-Jun	Z	1	0	0	0	1	1	0	1	1	0	0	0	0	1	0	1	0	1	0	0	1	0	1	0.4	1	
19-Jun	1	Z	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	1	2	1	0.5	2	
20-Jun	1	1	Z	1	1	0	1	1	1	2	2	1	1	1	1	1	1	1	1	1	0	1	1	1	0.8	2	
21-Jun	1	1	0	Z	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1	
22-Jun	1	0	0	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	0.9	2	
23-Jun	1	1	1	1	1	Z	1	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0.9	2	
24-Jun	Z	2	1	1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0.5	2	
25-Jun	0	Z	1	1	1	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	0.5	1	
26-Jun	1	1	Z	1	1	1	1	2	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0.8	2	
27-Jun	0	0	0	Z	1	1	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0.4	1	
28-Jun	0	1	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
29-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	2	1	1	0.4	2	
30-Jun	Z	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1	

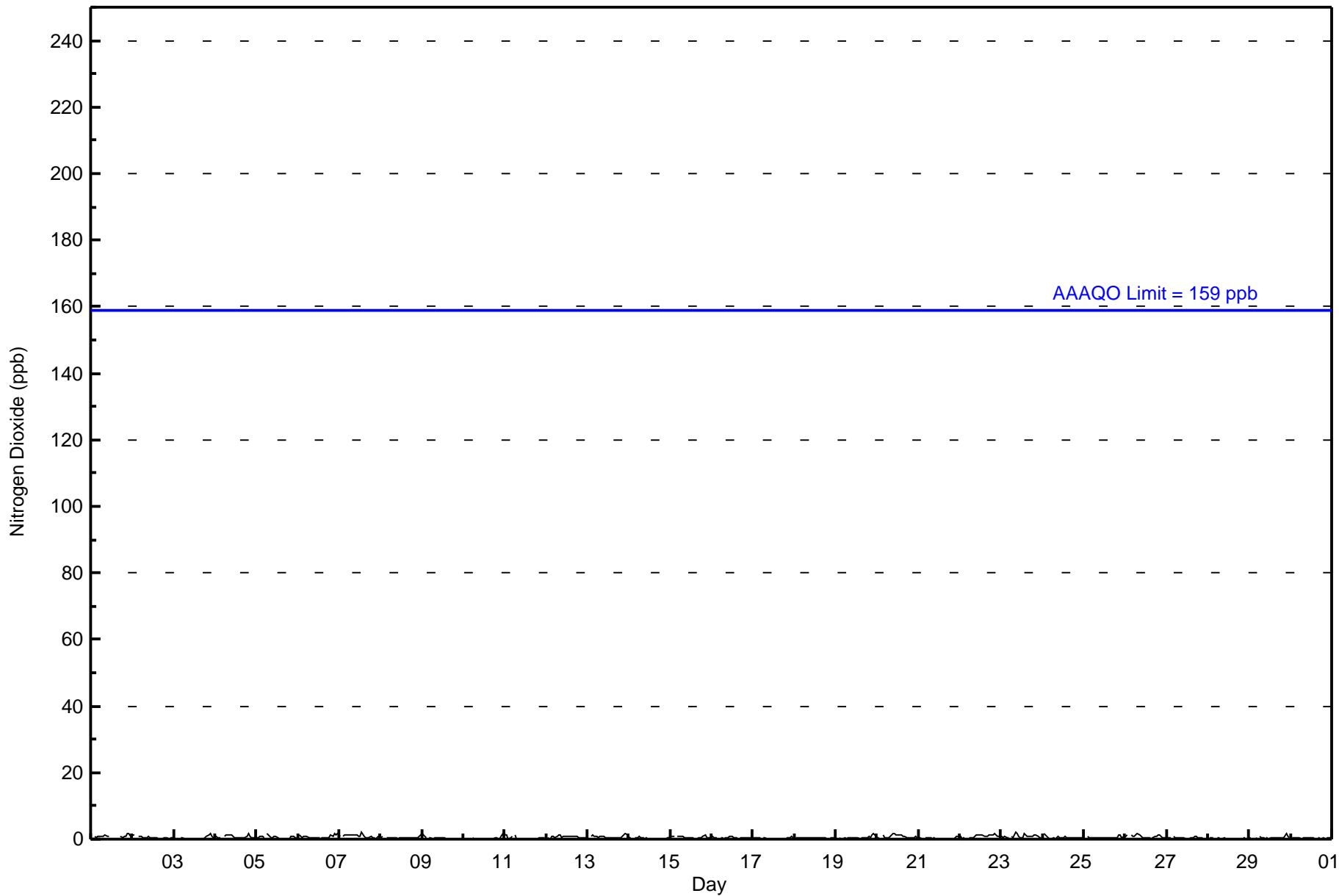
0.7	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.5	0.4	0.3	0.4	0.4	0.4	0.6	0.6	0.7	0.7	0.6	Diurnal Average	
2	2	1	1	1	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1	2	2	2	2	2	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684

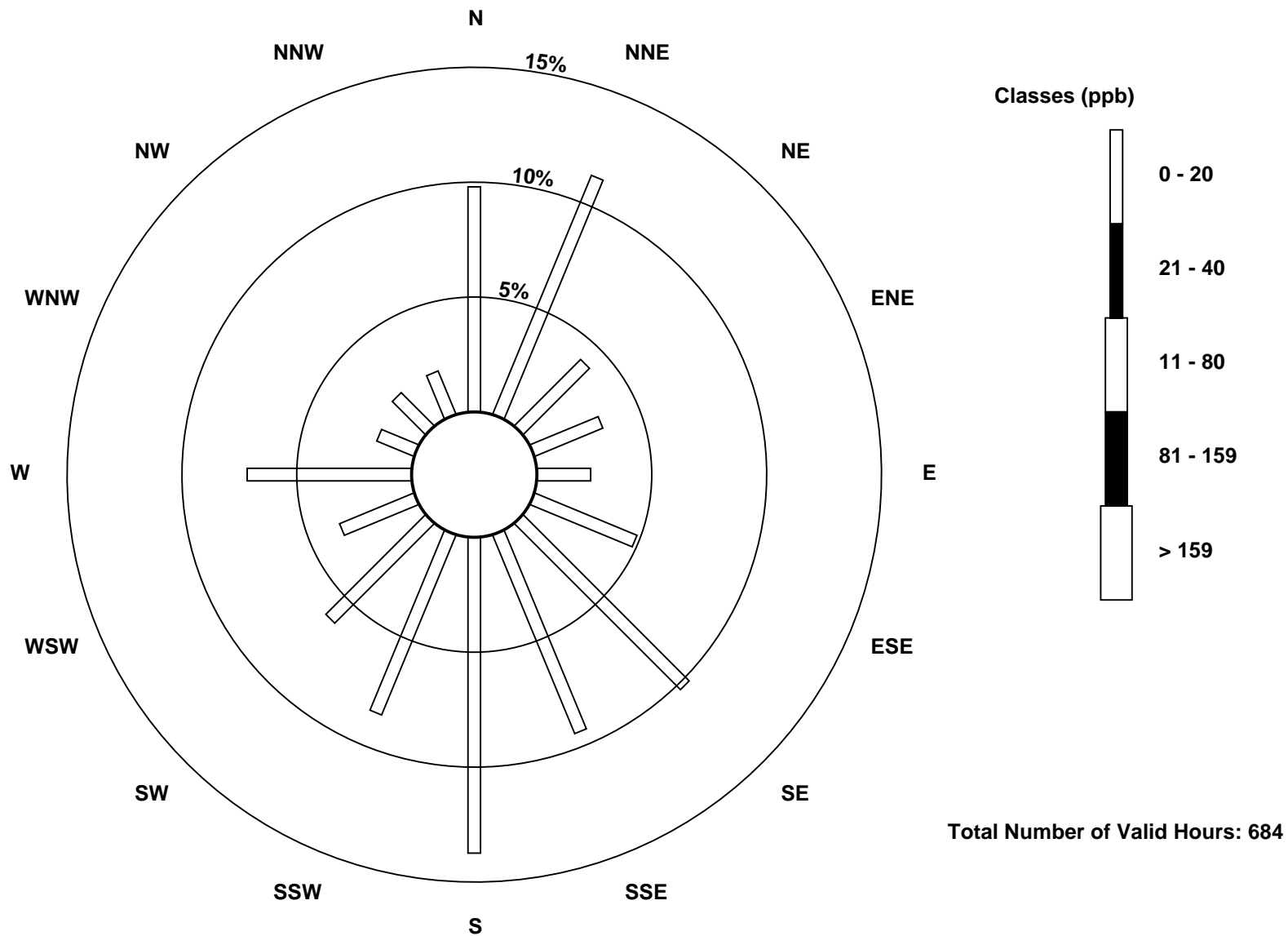
Total Number of Valid Hours: 684

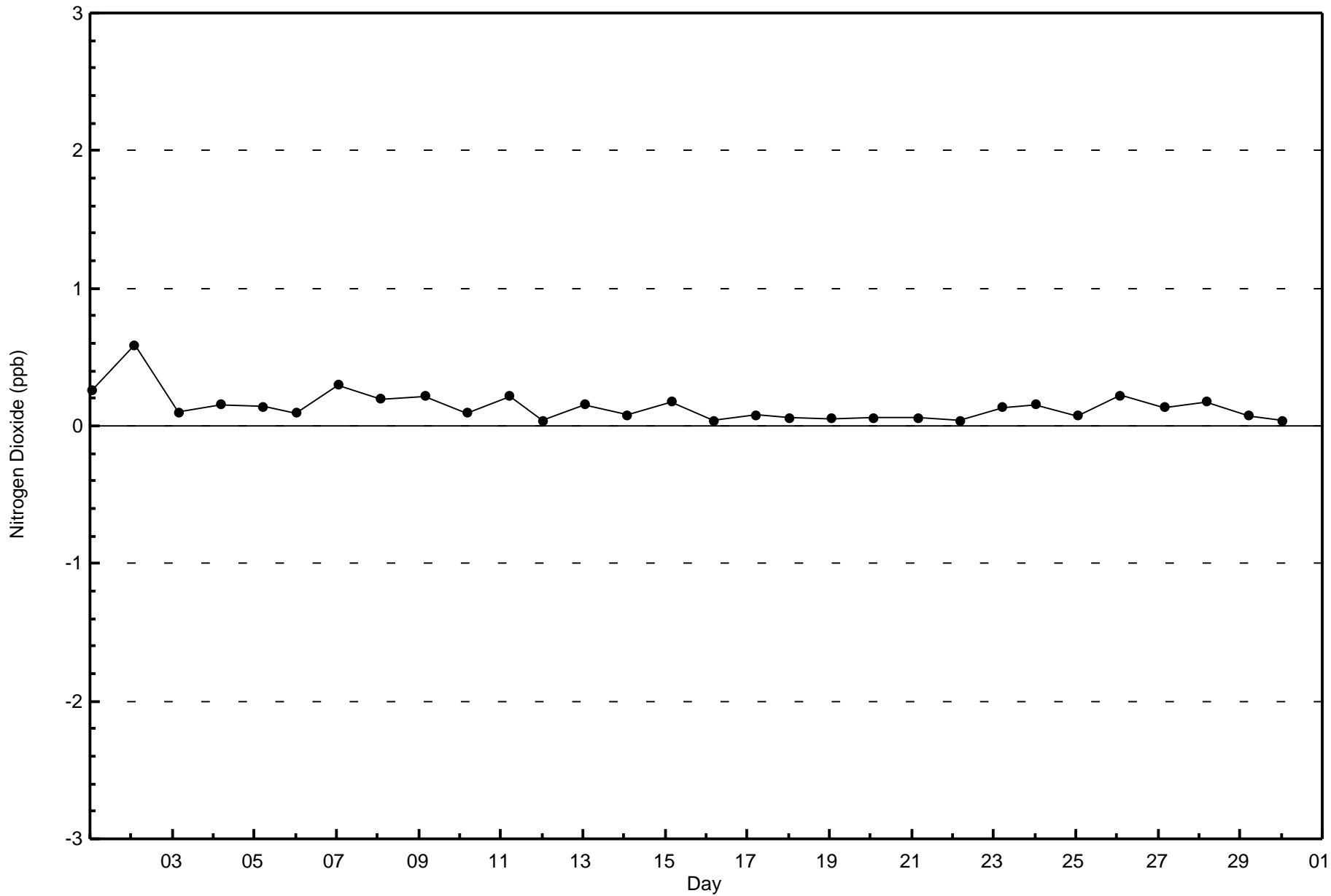
Total Number of Hours: 720

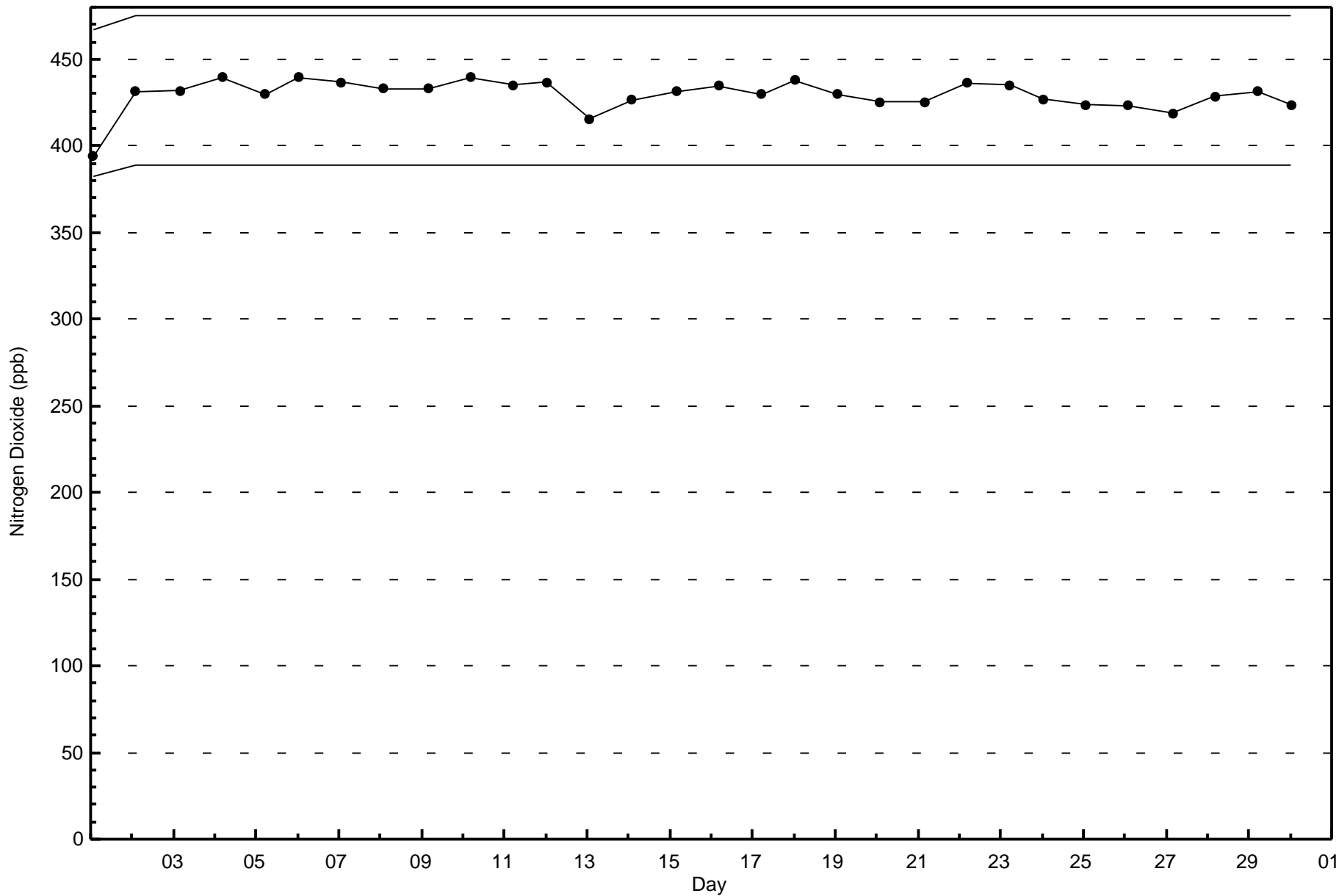


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Janvier (AMS 22)









Wood Buffalo Environmental Association
Summary of Hour Averages

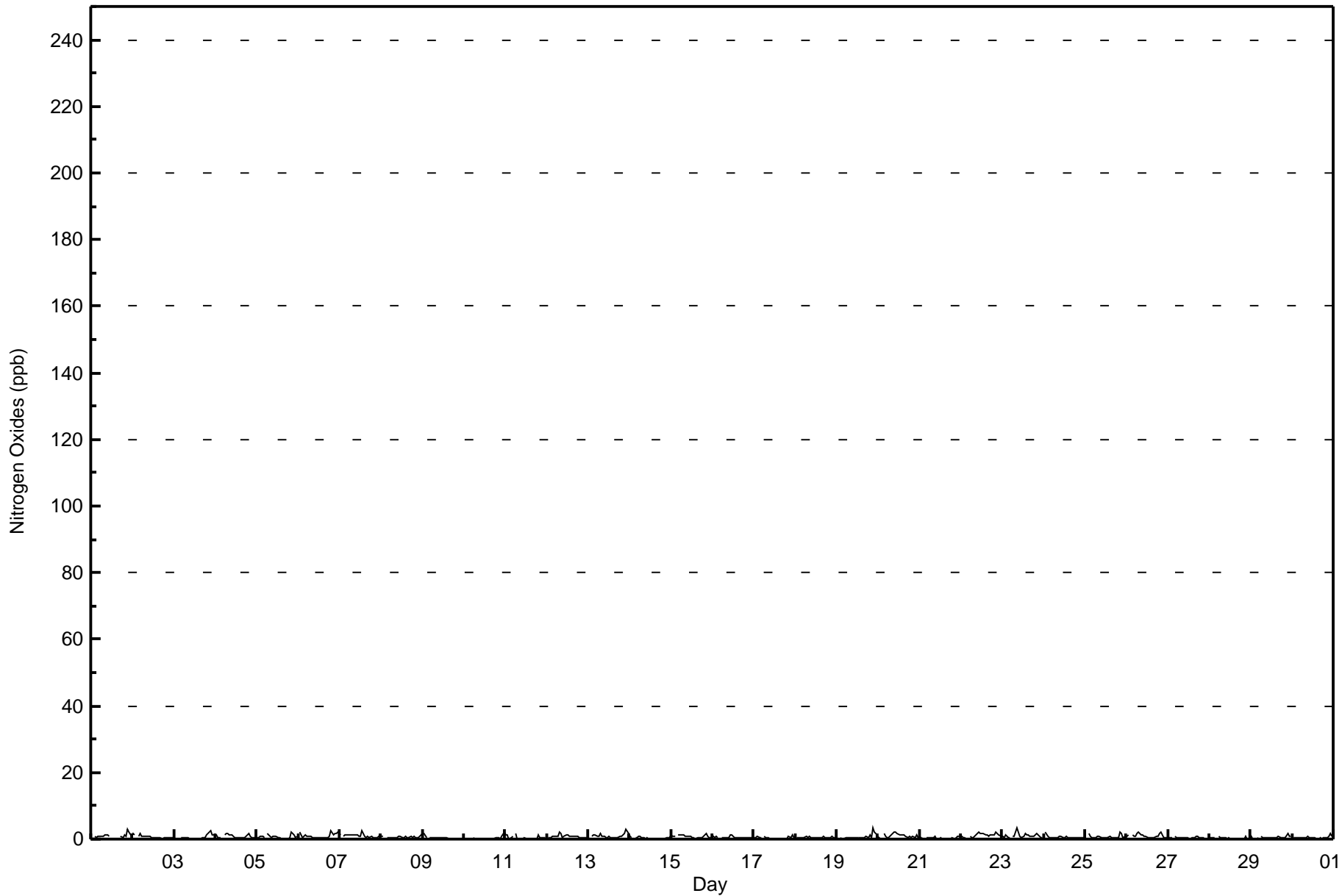
Nitrogen Oxides (NO_x) - ppb
Janvier - June 2017

Maximum Value: 4 ppb on Jun 23 09:00 Maximum Daily Average: 1.1 ppb on Jun 22																		Hours in Service: 720 Hours of Data: 684								
Minimum Value: 0 ppb on Jun 10 03:00 Minimum Daily Average: 0.2 ppb on Jun 10 Maximum Diurnal Average: 1.0 ppb at hour 22 Minimum Diurnal Average: 0.4 ppb at hour 16 Monthly Average: 0.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2																		Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	1	1	1	1	1	1	1	1	1	C	C	C	C	C	C	1	0	1	1	3	2	1	--	3
2-Jun	2	1	Z	1	2	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.6	2
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	3	1	1	0.5	3
4-Jun	1	0	1	1	Z	1	2	2	1	1	1	1	0	0	0	0	0	1	1	2	1	1	0	0	0.8	2
5-Jun	0	1	1	1	0	Z	2	1	0	1	1	1	0	0	0	0	0	0	0	0	2	1	1	1	0.7	2
6-Jun	Z	2	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	2	1	2	2	2	0.9	2
7-Jun	1	Z	1	1	1	1	1	1	1	1	1	1	1	2	1	0	1	1	1	0	1	0	0	1	1.0	2
8-Jun	1	1	Z	1	1	0	0	0	0	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1	0.6	1
9-Jun	1	2	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0.2	2
11-Jun	1	1	0	0	1	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.4	2
12-Jun	Z	0	0	1	1	1	1	2	2	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0.9	2
13-Jun	1	Z	1	1	1	1	1	2	1	1	0	1	1	1	0	0	0	0	1	1	1	2	3	2	1.0	3
14-Jun	1	0	Z	1	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
15-Jun	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	1	2	1	0	0	0.7	2
16-Jun	1	0	1	1	Z	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	1
17-Jun	0	0	1	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0.3	1
18-Jun	Z	1	0	0	0	1	1	1	1	1	0	0	0	0	1	0	1	0	0	0	0	1	1	1	0.5	1
19-Jun	1	Z	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	1	0	1	1	4	2	1	0.7	4
20-Jun	0	0	Z	2	1	0	1	1	2	2	2	2	1	1	1	1	1	1	1	0	1	0	1	0	1.0	2
21-Jun	1	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
22-Jun	1	0	0	0	Z	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	2	2	1	1	1.1	2
23-Jun	1	1	1	1	1	Z	1	1	4	2	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1.1	4
24-Jun	Z	2	1	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	1	1	1	0	0.6	2
25-Jun	1	Z	2	1	1	0	1	1	1	0	0	0	0	0	1	1	1	1	0	1	2	2	1	1	0.7	2
26-Jun	1	1	Z	1	1	1	2	2	1	1	1	1	0	0	1	0	1	1	1	2	2	1	0	0	1.0	2
27-Jun	0	1	0	Z	1	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0.4	1
28-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
29-Jun	1	0	0	0	0	Z	1	1	0	0	0	0	1	0	1	0	1	1	1	1	0	2	1	1	0.6	2
30-Jun	Z	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0.5	2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Janvier - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	67	77	28	22	16	33	70	64	94	58	42	24	49	12	14	14	684

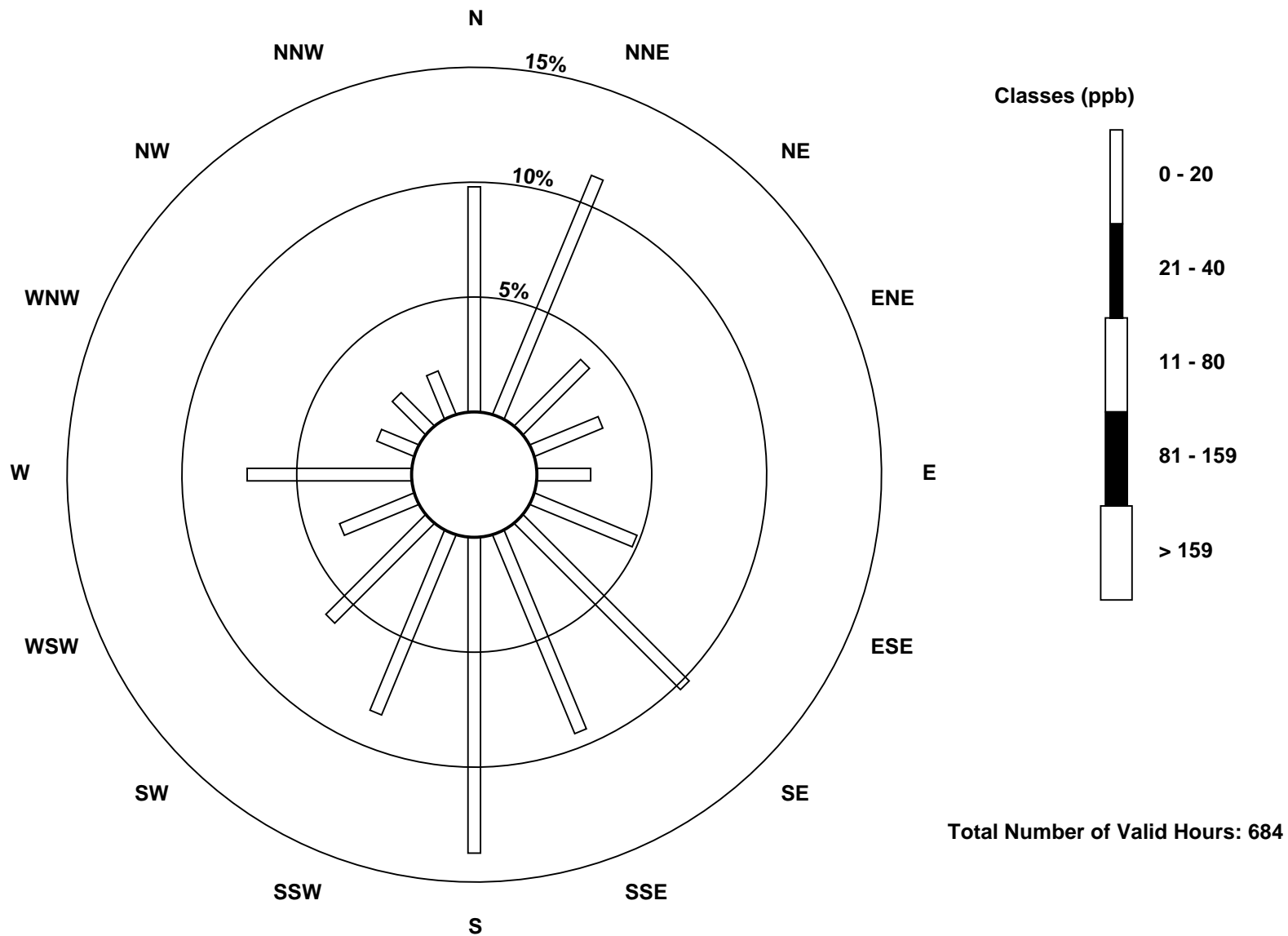
Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

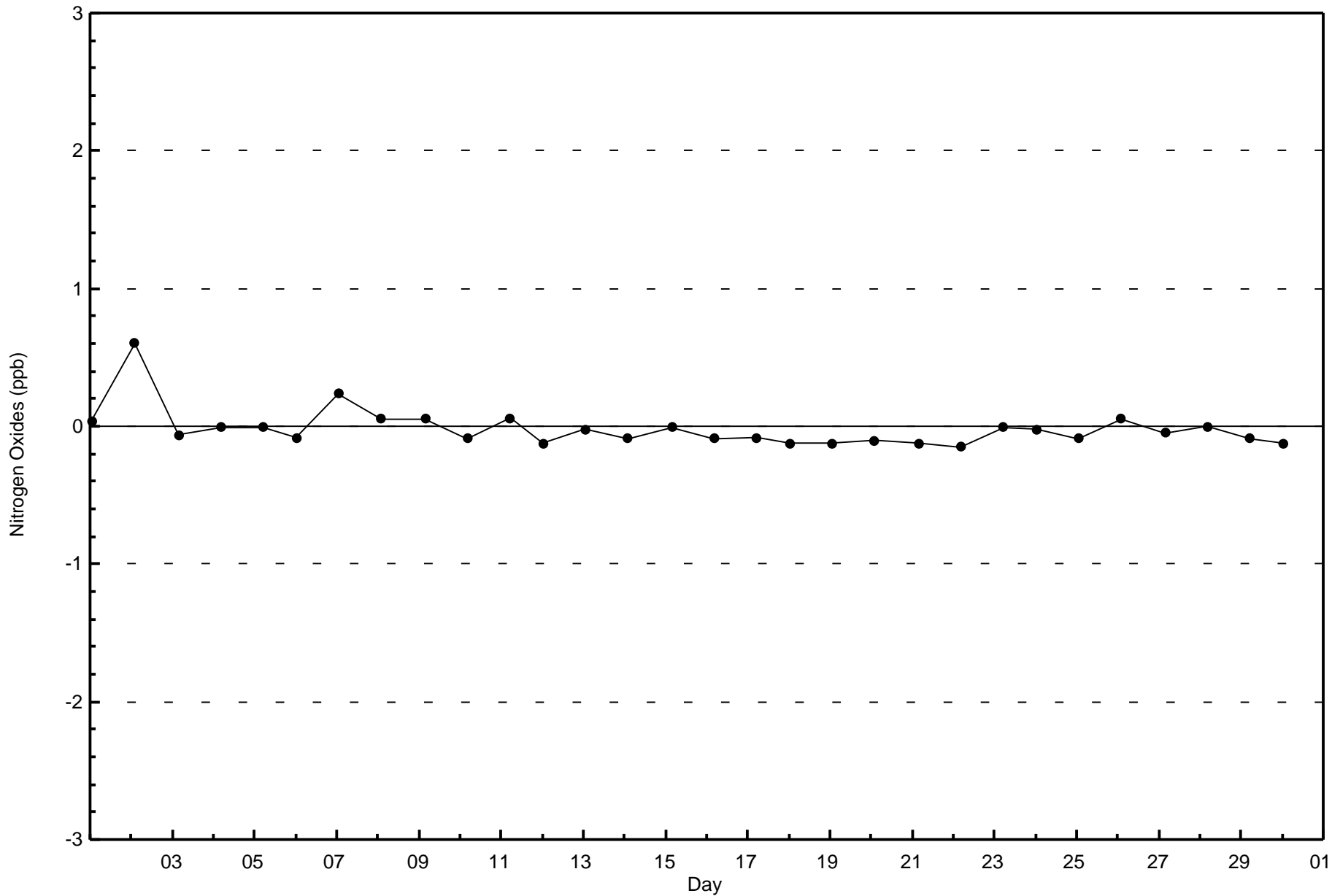
Nitrogen Oxides (NO_x) - ppb
Janvier (AMS 22)

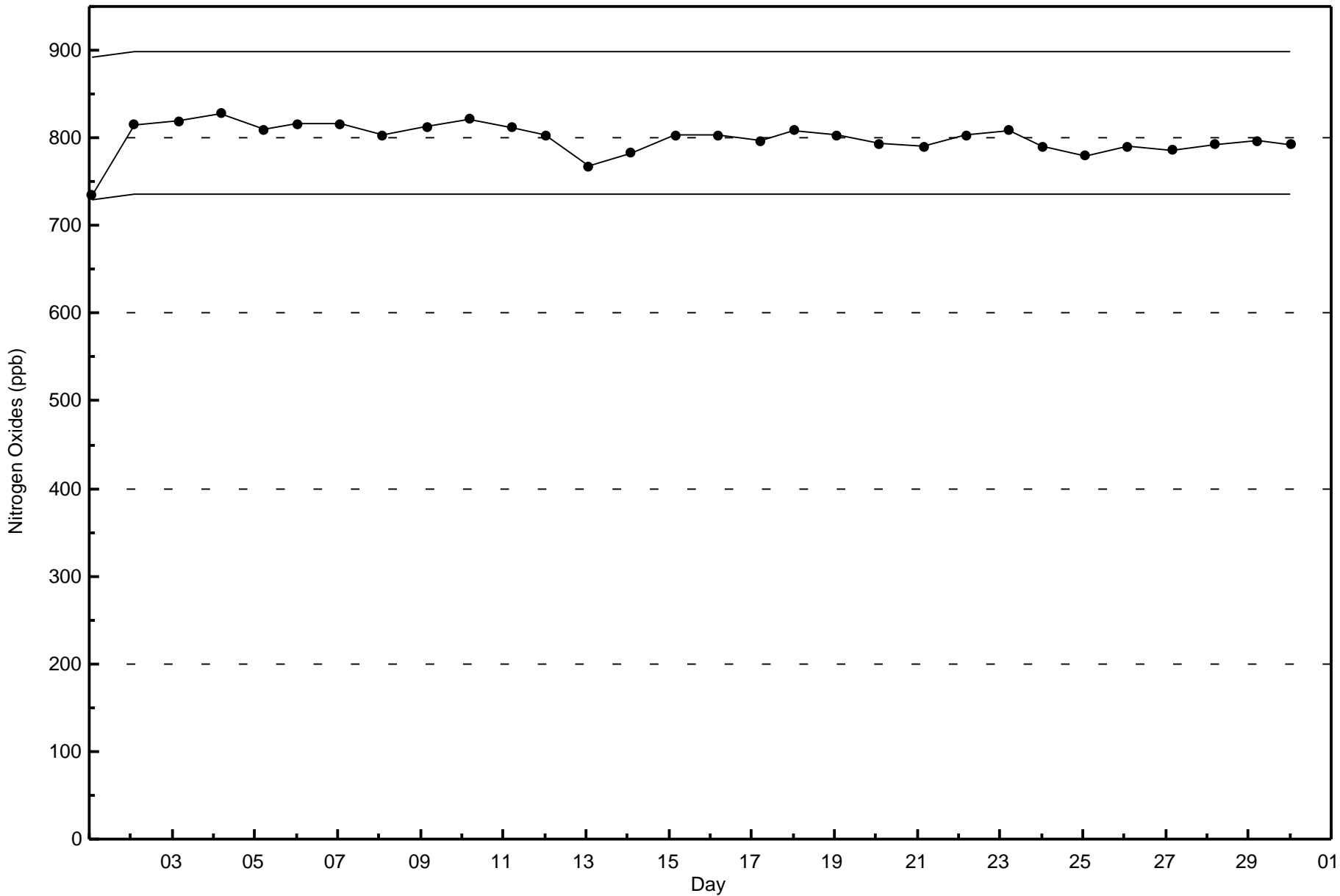




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Janvier - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Janvier - June 2017

Number of Exceedences (AAAO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 65 ppb on Jun 7 12:00	Maximum Daily Average: 50.3 ppb on Jun 26		Hours of Data:	687
Minimum Value: 11 ppb on Jun 16 05:00	Minimum Daily Average: 23.0 ppb on Jun 14		Hours of Missing Data:	33
Maximum Diurnal Average: 43.2 ppb at hour 15	Minimum Diurnal Average: 24.6 ppb at hour 6		Hours of Calibration:	33
Monthly Average: 35.0 ppb	Percentiles: P ₁ = 14 P ₁₀ = 21 Q ₁ = 27 Median = 36 Q ₃ = 43 P ₉₀ = 50 P ₉₉ = 58		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	51	49	47	Z	34	33	29	33	33	36	43	49	53	49	50	55	53	52	54	44	36	34	30	27	42.4	55
2-Jun	30	33	31	30	Z	29	30	28	30	36	38	38	38	40	41	43	46	47	44	42	41	39	39	38	37.0	47
3-Jun	37	38	37	37	37	Z	37	39	41	41	43	43	44	45	44	44	44	45	40	36	31	27	27	27	38.4	45
4-Jun	30	29	27	21	19	17	Z	30	37	43	46	46	47	45	49	45	44	47	58	54	49	50	50	48	40.5	58
5-Jun	43	38	34	35	40	40	39	Z	41	42	51	50	47	48	49	50	50	50	49	42	31	31	26	23	41.3	51
6-Jun	22	19	Z	19	21	27	28	32	34	42	49	50	50	50	50	50	48	46	38	34	30	27	30	29	35.0	50
7-Jun	30	27	26	Z	27	24	25	38	47	51	60	65	55	48	49	53	52	48	46	44	44	42	39	30	42.2	65
8-Jun	31	24	26	23	Z	18	19	19	35	39	50	62	62	62	60	57	57	58	58	54	50	51	38	34	42.9	62
9-Jun	28	31	32	27	22	Z	21	26	30	36	44	51	51	50	43	38	37	36	40	46	44	42	39	38	37.1	51
10-Jun	38	38	37	36	35	36	Z	37	37	38	38	39	41	42	43	45	46	45	35	32	44	48	46	40	39.7	48
11-Jun	40	39	38	34	29	30	36	Z	39	41	41	43	44	43	43	44	45	44	45	39	34	31	31	29	38.3	45
12-Jun	27	23	Z	19	18	20	25	27	35	37	39	40	42	44	43	44	44	38	38	40	37	37	34	32	34.1	44
13-Jun	28	31	40	Z	25	28	30	29	30	29	28	28	30	36	39	40	39	37	30	24	20	16	15	15	29.6	40
14-Jun	14	16	16	14	Z	17	21	22	22	25	28	32	32	27	26	24	23	23	25	24	24	24	24	24	23.0	32
15-Jun	22	21	18	15	14	Z	15	17	20	23	27	31	32	36	36	39	39	38	35	30	23	24	22	21	26.0	39
16-Jun	16	13	12	11	11	12	Z	16	17	19	31	38	38	43	43	35	38	42	43	37	33	30	24	20	27.0	43
17-Jun	20	19	15	17	16	16	18	Z	27	30	32	33	33	37	36	36	40	41	41	39	30	28	26	25	28.6	41
18-Jun	25	29	Z	30	29	28	28	29	32	35	37	41	44	45	44	42	39	42	45	38	34	25	30	29	34.7	45
19-Jun	30	23	26	Z	31	27	22	23	28	35	40	C	C	C	43	43	40	40	41	34	31	27	27	24	31.8	43
20-Jun	24	25	23	21	Z	20	18	19	28	39	44	44	45	42	37	38	40	42	42	43	40	38	32	26	33.6	45
21-Jun	29	37	46	45	47	Z	33	29	35	36	36	37	36	36	36	35	36	37	35	31	28	31	39	39	36.0	47
22-Jun	36	31	29	30	29	29	Z	29	31	32	35	40	43	45	46	43	42	43	42	39	32	25	24	23	34.7	46
23-Jun	21	21	20	20	20	21	22	Z	33	41	44	48	52	53	52	51	48	44	40	33	29	26	24	26	34.3	53
24-Jun	25	27	Z	23	19	21	24	27	35	38	37	39	38	40	41	42	42	42	41	33	31	26	28	24	32.3	42
25-Jun	23	19	20	Z	18	20	23	28	31	41	47	48	48	50	52	54	53	52	51	52	49	47	46	45	39.8	54
26-Jun	43	41	36	34	Z	36	45	49	52	54	54	55	56	57	56	56	57	59	58	55	51	51	51	50	50.3	59
27-Jun	50	47	45	42	43	Z	41	40	36	40	41	42	47	46	48	43	43	37	32	35	35	37	37	30	40.8	50
28-Jun	28	23	19	18	16	24	Z	26	27	30	30	30	28	30	31	31	33	30	29	29	22	17	17	14	25.3	33
29-Jun	13	15	15	17	18	18	20	Z	28	29	31	34	32	33	35	36	40	47	38	32	33	39	31	25	28.7	47
30-Jun	25	22	Z	22	22	22	21	23	27	29	33	29	29	32	35	35	32	32	29	25	21	18	15	14	25.7	35

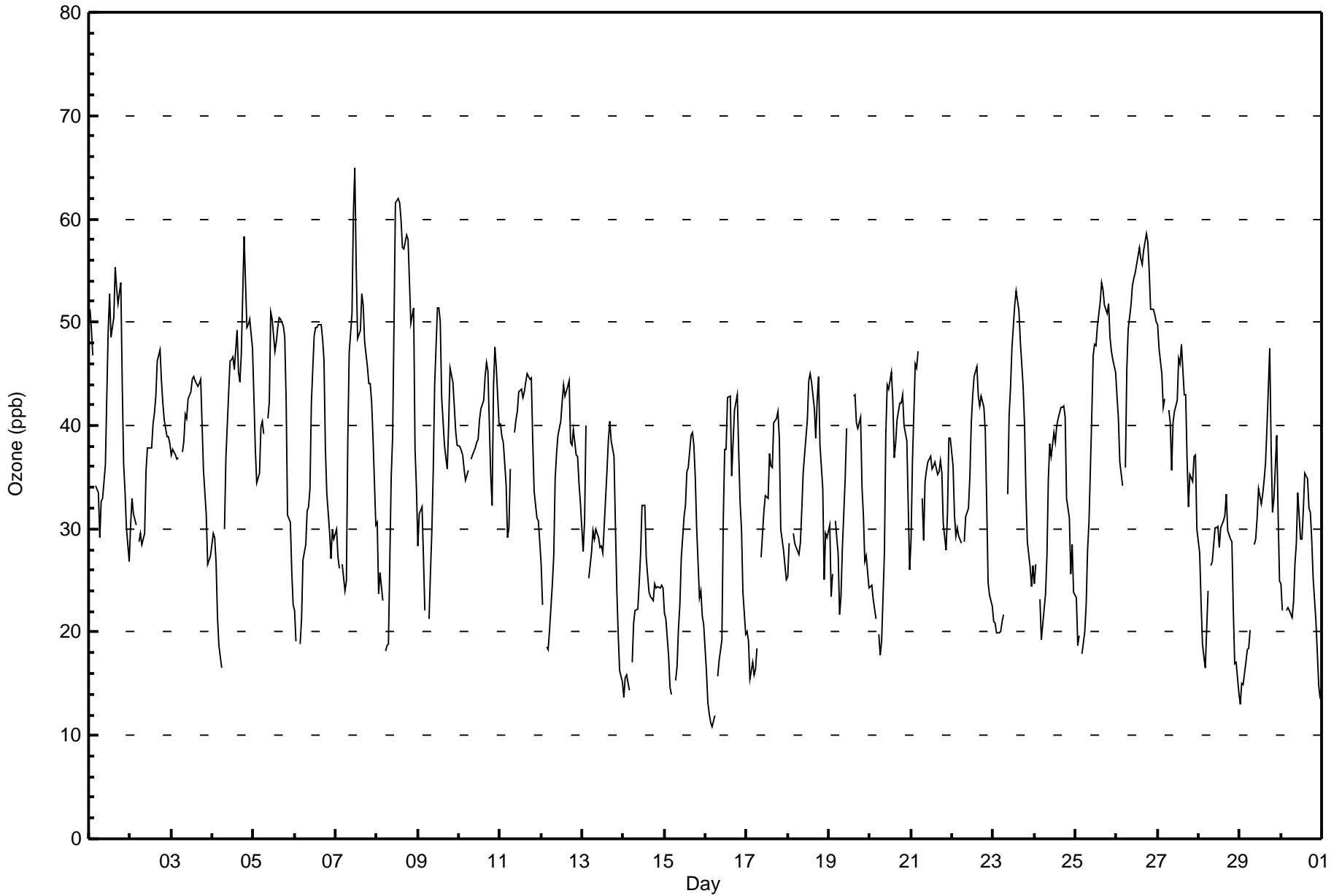
29.3	28.2	28.6	25.7	25.6	24.6	26.8	28.6	32.5	35.9	39.7	42.2	42.6	43.0	43.2	43.0	43.2	42.8	41.6	38.2	34.7	33.0	31.5	29.0	Diurnal Average	
51	49	47	45	47	40	45	49	52	54	60	65	62	62	60	57	57	59	58	55	51	51	51	50	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Janvier - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	68	9.90	9.90
21 - 50	567	82.53	92.43
51 - 82	52	7.57	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Janvier - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	5	9	1	2	1	0	7	10	12	9	4	1	1	1	1	4	68
21 - 50	61	65	25	14	13	25	54	43	80	48	38	23	46	11	12	9	567
51 - 82	6	2	4	4	2	7	8	12	4	0	0	1	0	1	1	0	52
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	72	76	30	20	16	32	69	65	96	57	42	25	47	13	14	13	687

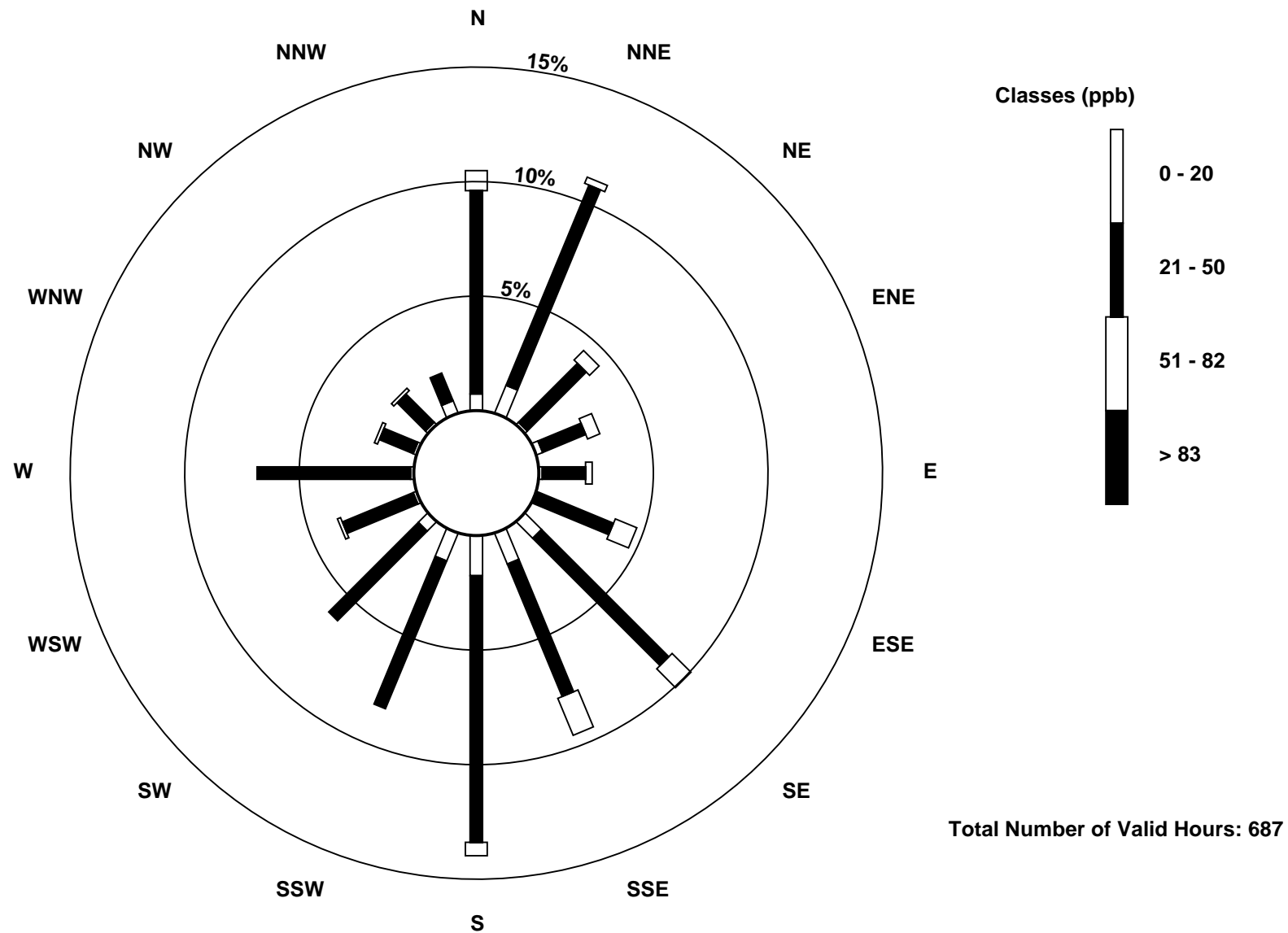
Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

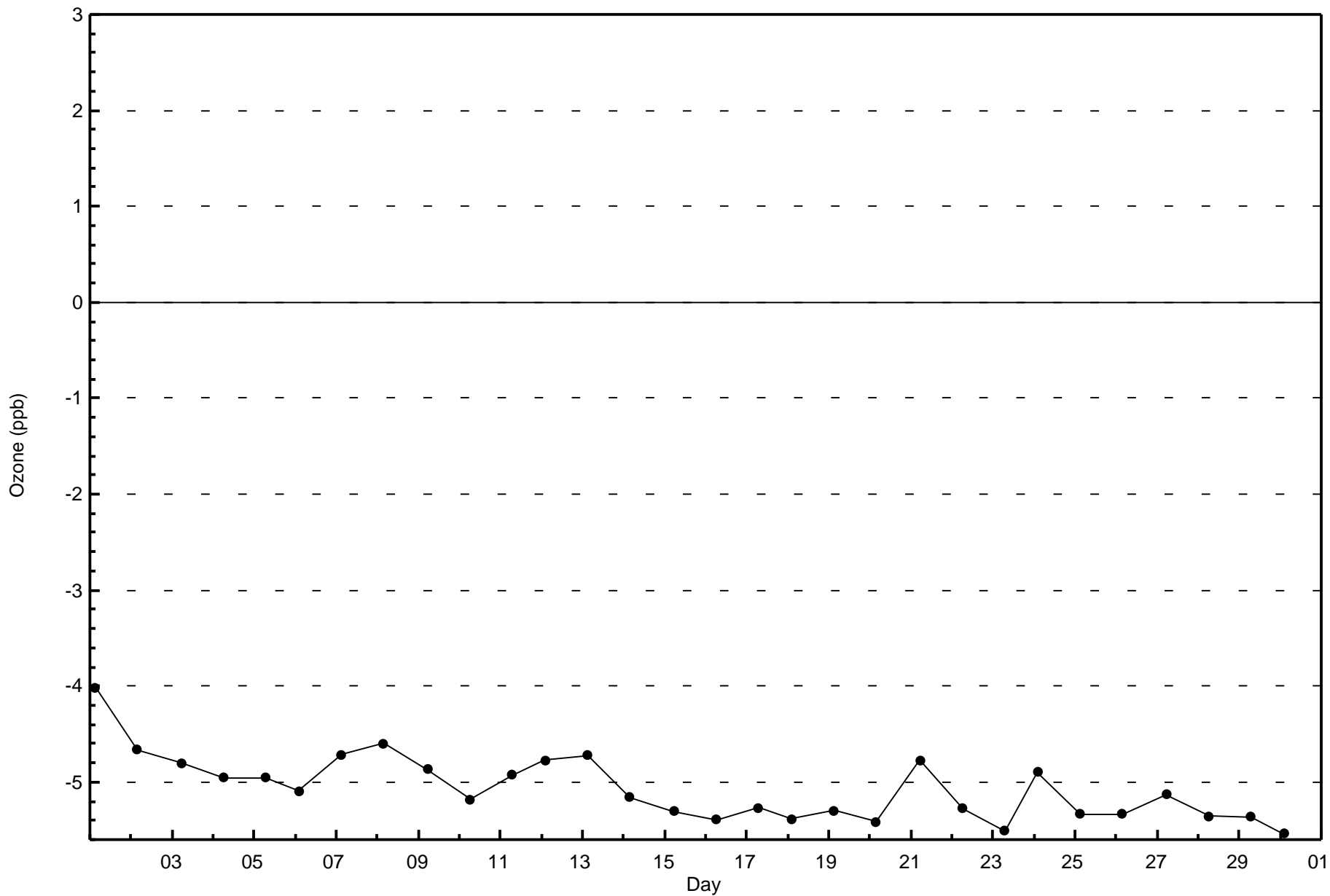
Ozone (O₃) - ppb
Janvier (AMS 22)





Wood Buffalo Environmental Association
Zero Responses

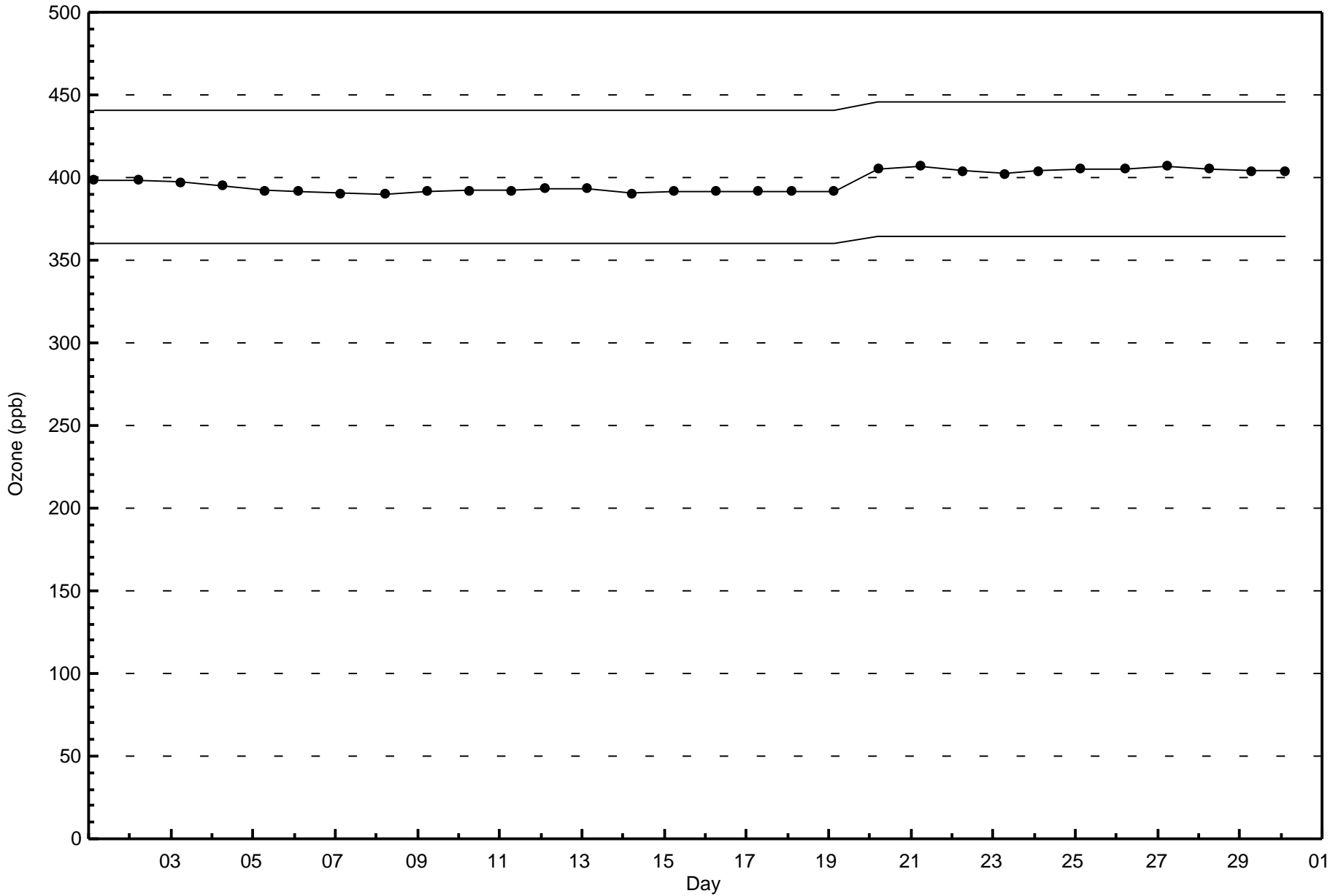
Ozone (O₃) - ppb
Janvier - June 2017





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Janvier - June 2017



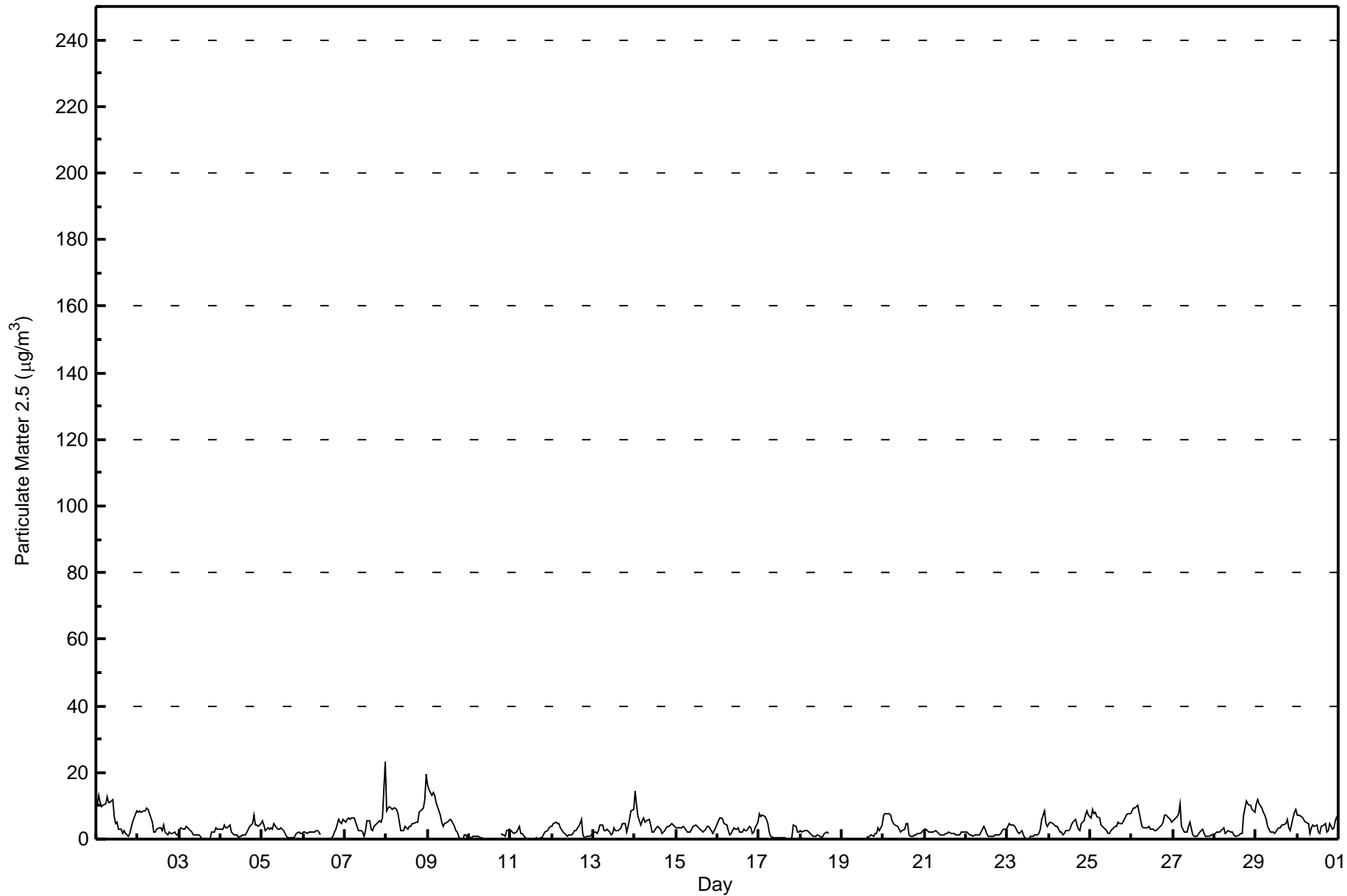


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 23.5 µg/m ³ on Jun 8 00:00 Minimum Value: 0.0 µg/m ³ on Jun 3 15:00 Maximum Diurnal Average: 5.9 µg/m ³ at hour 2 Monthly Average: 3.67 µg/m ³		Maximum Daily Average: 7.1 µg/m ³ on Jun 8 Minimum Daily Average: 1.7 µg/m ³ on Jun 11 Minimum Diurnal Average: 2.2 µg/m ³ at hour 12 Percentiles: P ₁ = 0.1 P ₁₀ = 0.8 Q ₁ = 1.7 Median = 2.9 Q ₃ = 4.8 P ₉₀ = 7.7 P ₉₉ = 13.2		Hours in Service: 720 Hours of Data: 682 Hours of Missing Data: 38 Hours of Calibration: 3 Percent Operational Time: 95.1																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	10.1	13.2	10.9	9.7	10.0	10.5	12.6	10.9	11.2	11.9	6.8	4.5	5.0	2.8	3.0	1.6	2.5	1.8	0.8	1.5	3.4	5.0	6.2	8.5	6.9	13.2	
2-Jun	8.0	8.4	8.2	8.6	8.5	9.1	9.1	7.7	5.3	1.9	2.2	3.0	3.2	3.6	2.6	4.4	2.2	1.1	1.9	1.9	1.7	2.2	1.4	1.5	4.5	9.1	
3-Jun	2.4	3.2	2.8	3.0	3.7	3.4	2.4	1.9	1.4	1.4	1.2	1.2	0.9	0.1	0.0	0.0	UO	UO	0.3	2.0	2.0	3.5	2.8	3.1	1.9	3.7	
4-Jun	3.1	3.1	4.2	3.5	3.4	4.3	2.3	1.7	1.2	1.1	0.5	0.8	0.7	1.2	1.3	2.2	3.0	3.9	4.8	7.2	4.3	4.3	3.9	4.5	2.9	7.2	
5-Jun	5.5	4.1	2.7	3.5	3.0	3.2	2.9	4.5	3.5	2.8	2.9	3.2	2.4	1.6	0.8	0.6	0.5	0.3	0.3	0.8	1.7	2.2	1.9	1.8	2.4	5.5	
6-Jun	2.1	2.0	1.9	2.1	2.2	2.3	2.2	2.7	2.5	2.2	1.1	UO	UO	UO	0.2	0.2	0.4	0.7	2.2	3.2	5.9	5.2	4.5	5.8	2.4	5.9	
7-Jun	5.1	6.1	6.4	6.0	6.3	6.4	5.1	4.0	2.6	2.4	2.0	0.9	2.3	5.7	5.4	2.8	2.5	3.8	4.7	4.9	5.4	5.3	6.4	23.5	5.3	23.5	
8-Jun	8.5	9.5	9.6	8.7	9.2	9.1	9.0	7.4	2.7	2.7	2.7	3.8	3.1	3.8	4.0	4.5	4.5	5.3	5.2	8.0	8.4	9.3	12.0	19.5	7.1	19.5	
9-Jun	16.2	14.6	13.3	13.8	13.3	11.1	8.5	7.0	5.1	3.9	4.7	5.1	5.7	6.0	5.7	3.8	2.6	2.0	1.0	0.2	0.1	1.1	1.1	0.6	6.1	16.2	
10-Jun	0.4	0.2	0.7	0.7	1.0	0.6	0.6	0.5	0.5	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.6	1.1	1.2	0.9	2.6	3.0	--	3.0
11-Jun	2.4	2.3	1.8	2.3	2.8	3.9	1.9	1.5	0.6	0.6	UO	0.8	UO	UO	0.0	0.2	0.2	0.4	0.5	1.1	2.1	2.4	3.2	3.9	1.7	3.9	
12-Jun	3.7	4.9	5.1	4.8	4.8	3.2	2.1	1.6	1.3	0.9	1.2	1.1	1.9	2.3	2.7	3.7	4.8	5.8	1.3	0.5	0.7	0.8	1.0	1.3	2.6	5.8	
13-Jun	2.2	2.3	1.7	2.5	4.1	4.3	2.4	2.4	3.1	2.2	1.1	1.8	3.4	2.6	2.7	3.1	3.2	4.6	4.5	1.9	3.7	5.8	8.6	9.1	3.5	9.1	
14-Jun	14.3	10.3	6.9	4.2	5.7	6.4	5.2	5.6	6.1	4.4	2.0	2.0	3.4	3.8	3.2	3.2	1.8	2.4	3.4	3.9	3.8	4.5	4.1	3.6	4.8	14.3	
15-Jun	3.4	3.6	3.6	3.5	3.6	3.3	2.2	2.3	2.3	3.1	4.0	4.1	3.9	3.4	2.9	2.3	2.7	3.1	3.9	4.0	2.6	1.6	2.7	3.2	3.1	4.1	
16-Jun	5.4	6.4	6.3	5.7	4.7	4.0	2.6	1.4	1.9	3.5	2.8	2.9	3.3	2.3	2.1	2.9	2.5	2.6	3.8	3.4	1.7	2.0	3.5	4.9	3.4	6.4	
17-Jun	7.5	6.7	7.0	6.7	6.0	4.6	2.3	1.0	0.3	0.3	0.5	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.1	0.4	4.2	3.8	2.1	2.2	2.4	7.5	
18-Jun	2.4	2.3	2.6	2.7	2.5	2.0	1.1	1.1	0.7	0.7	1.1	0.8	0.6	0.7	1.6	2.0	1.7	AF	AF	AF	AF	AF	AF	AF	--	2.7	
19-Jun	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	0.9	0.4	0.8	1.1	0.8	1.8	1.5	3.2	2.6	4.4	--	4.4	
20-Jun	7.4	7.6	7.6	7.7	7.1	5.6	4.6	4.3	3.8	2.9	2.3	2.6	2.9	4.6	4.5	1.1	0.8	0.8	1.2	1.2	1.5	1.6	2.2	2.3	3.7	7.7	
21-Jun	3.1	2.9	2.0	1.9	2.1	2.3	2.3	2.1	1.7	1.4	1.2	1.3	1.7	1.8	2.0	1.8	1.7	1.5	1.4	1.3	1.3	2.3	2.0	1.9	1.9	3.1	
22-Jun	2.2	1.6	1.4	1.2	1.1	1.3	1.1	1.1	1.3	3.0	3.9	3.2	1.8	1.1	0.8	0.8	0.9	1.2	1.1	1.2	1.9	2.4	3.1	3.1	1.7	3.9	
23-Jun	4.0	4.6	4.1	4.2	3.7	2.9	2.2	1.7	2.4	1.4	0.4	0.1	0.1	0.6	0.9	1.0	1.1	1.3	1.6	2.8	6.1	8.5	4.6	3.7	2.7	8.5	
24-Jun	4.5	5.2	4.6	4.1	3.9	3.7	2.3	2.0	1.5	1.6	2.7	2.7	3.1	4.0	5.1	5.8	4.1	3.1	2.6	4.5	5.4	7.2	8.3	7.3	4.1	8.3	
25-Jun	6.5	8.8	7.5	7.9	6.8	6.4	4.4	3.9	3.2	2.6	1.7	1.7	2.5	3.2	3.8	3.9	4.9	4.7	4.5	5.4	6.6	7.2	7.5	7.5	5.1	8.8	
26-Jun	8.6	9.3	9.2	10.2	7.8	5.9	3.7	3.2	3.3	3.4	4.0	2.9	2.8	2.5	2.7	2.8	3.6	4.3	4.9	7.1	7.4	6.5	6.0	5.0	5.3	10.2	
27-Jun	5.4	6.1	6.9	7.8	10.5	4.0	2.2	2.0	2.1	4.0	5.1	1.3	0.8	0.9	1.0	2.2	2.4	2.8	1.5	0.9	0.8	1.0	1.2	1.2	3.1	10.5	
28-Jun	1.7	1.9	2.0	2.1	2.4	3.2	1.6	2.1	2.7	2.1	2.1	1.4	0.8	0.9	1.2	1.6	1.6	7.2	11.3	10.4	10.0	10.1	8.8	7.8	4.0	11.3	
29-Jun	10.8	11.9	10.5	9.3	8.2	7.2	6.0	3.8	2.3	2.2	2.2	1.7	2.8	3.3	3.3	4.2	4.4	4.7	5.9	3.2	2.4	6.2	8.1	8.9	5.6	11.9	
30-Jun	7.2	7.2	6.9	6.4	5.5	5.0	4.8	1.8	3.3	4.1	3.6	4.4	2.2	1.7	3.9	4.4	4.8	2.2	2.7	4.6	3.1	3.6	5.4	6.6	4.4	7.2	
																								Diurnal Average			
																								Diurnal Maximum			
5.7 5.9 5.5 5.3 5.3 4.8 3.8 3.2 2.8 2.7 2.4 2.2 2.4 2.5 2.4 2.3 2.4 2.7 2.7 3.1 3.5 4.1 4.4 5.5																								Diurnal Average			
16.2 14.6 13.3 13.8 13.3 11.1 12.6 10.9 11.2 11.9 6.8 5.1 5.7 6.0 5.7 5.8 4.9 7.2 11.3 10.4 10.0 10.1 12.0 23.5																								Diurnal Maximum			
C - Calibration AF - Analyzer Failure UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³																											



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	462	67.74	67.74
6 - 15	133	19.50	87.24
16 - 25	3	0.44	87.68
26 - 80	0	0.00	87.68
> 81.0	0	0.00	87.68

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Janvier - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	56	40	20	18	12	15	49	43	69	35	24	23	38	2	9	9	462
6 - 15	8	16	5	3	3	13	18	20	24	10	8	1	1	0	0	3	133
16 - 25	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	3
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	64	56	25	21	15	29	67	63	94	46	32	24	39	2	9	12	598

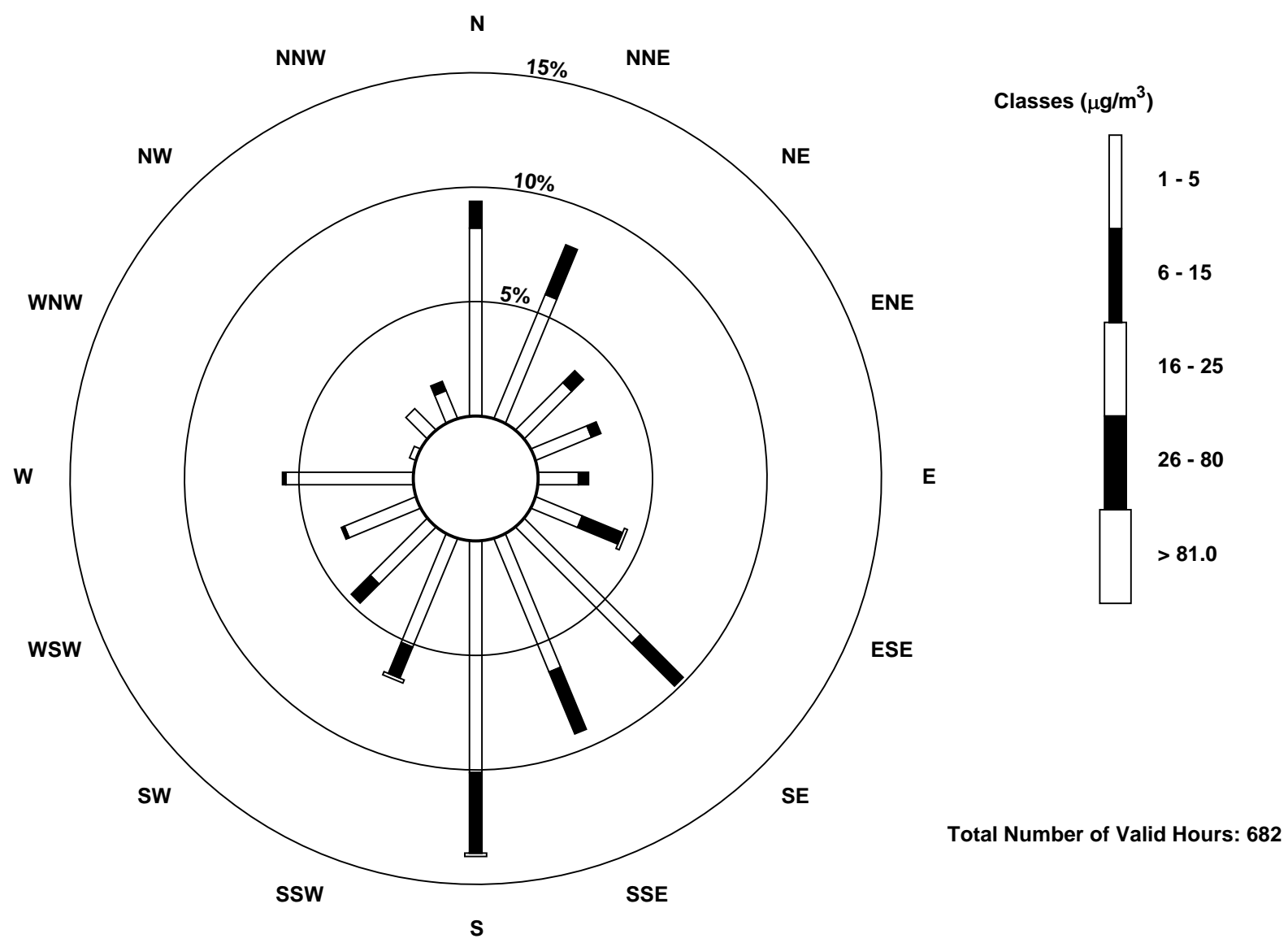
Total Number of Valid Hours: 682

Total Number of Hours: 720



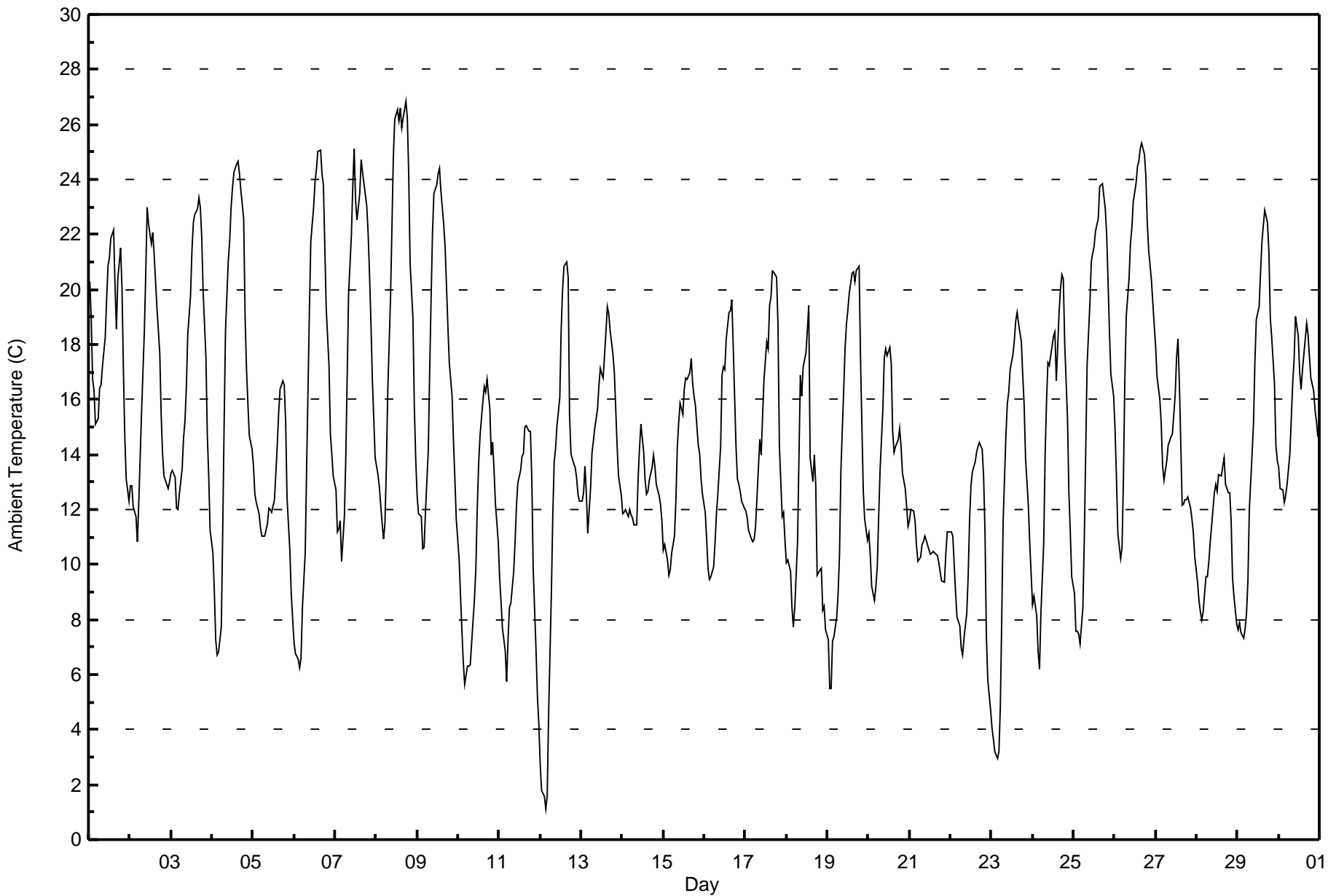
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier (AMS 22)





Maximum Value: 26.8 C on Jun 8 18:00		Maximum Daily Average: 19.8 C on Jun 8		Hours in Service: 720																							
Minimum Value: 1.1 C on Jun 12 04:00		Minimum Daily Average: 10.3 C on Jun 22		Hours of Data: 720																							
Maximum Diurnal Average: 19.0 C at hour 17		Minimum Diurnal Average: 9.1 C at hour 5		Hours of Missing Data: 0																							
Monthly Average: 14.57 C		Percentiles: P ₁ = 3.1 P ₁₀ = 8.3 Q ₁ = 11.1 Median = 13.9 Q ₃ = 18.1 P ₉₀ = 22.0 P ₉₉ = 26.1		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	20.3	18.9	16.8	16.3	15.1	15.3	16.4	16.5	17.2	18.3	19.6	20.8	21.1	21.9	22.2	20.1	18.5	20.4	21.5	20.0	17.1	14.6	13.1	12.3	18.1	22.2	
2-Jun	12.8	12.9	12.1	11.7	10.9	12.3	13.9	15.6	18.5	20.6	23.0	22.4	21.7	22.1	21.3	20.3	19.3	17.7	15.5	14.1	13.2	12.9	12.8	13.0	16.3	23.0	
3-Jun	13.3	13.4	13.2	12.1	12.0	12.6	13.5	14.6	15.2	16.4	18.4	19.8	21.4	22.4	22.7	22.9	23.3	23.0	21.9	19.9	17.5	14.7	13.2	11.2	17.0	23.3	
4-Jun	10.4	9.1	7.3	6.7	6.8	7.7	11.2	15.1	18.5	21.0	21.7	23.0	23.7	24.2	24.6	24.7	24.2	23.6	22.6	19.0	17.1	15.9	14.7	14.2	17.0	24.7	
5-Jun	13.6	12.6	12.2	11.8	11.3	11.0	11.0	11.1	11.5	12.0	12.0	11.9	12.4	13.3	14.3	15.5	16.4	16.7	16.5	15.2	12.4	10.5	9.0	8.0	12.6	16.7	
6-Jun	7.2	6.8	6.6	6.2	6.6	8.4	10.4	13.5	16.4	19.3	21.8	23.0	23.9	24.3	25.0	25.1	24.2	23.8	21.6	19.3	17.3	14.8	14.0	13.2	16.4	25.1	
7-Jun	12.7	11.2	11.3	11.6	10.1	11.8	13.9	16.8	19.9	22.0	23.8	25.1	23.3	22.5	23.5	24.7	24.2	23.9	23.0	22.0	20.5	18.8	16.7	13.9	18.6	25.1	
8-Jun	13.6	13.3	12.8	11.5	10.9	11.5	13.5	16.3	19.7	22.3	24.8	26.2	26.5	26.1	26.6	25.9	26.2	26.8	26.3	24.1	21.0	19.0	15.8	13.8	19.8	26.8	
9-Jun	12.5	11.9	11.7	10.6	10.6	11.9	14.2	17.1	19.7	22.1	23.5	23.8	24.2	24.4	23.6	22.4	21.6	20.1	18.7	17.3	16.1	14.5	13.1	11.7	17.4	24.4	
10-Jun	10.2	8.9	7.6	6.4	5.7	6.3	6.3	6.4	7.2	8.7	9.8	12.1	13.7	14.7	15.9	16.5	16.3	16.7	15.6	14.0	14.4	13.4	12.2	10.8	11.2	16.7	
11-Jun	9.5	8.6	7.7	6.9	5.8	7.3	8.4	8.6	9.7	10.8	12.1	13.0	13.4	13.9	14.0	15.0	15.1	14.9	14.8	13.1	9.8	6.9	5.2	4.2	10.4	15.1	
12-Jun	2.8	1.8	1.6	1.1	1.6	4.5	9.0	11.8	13.7	14.2	15.0	16.1	18.6	20.0	20.9	21.0	20.4	15.4	14.0	13.9	13.5	13.2	12.6	12.3	12.0	21.0	
13-Jun	12.3	12.6	13.6	12.6	11.1	12.8	14.0	14.5	15.0	15.7	16.5	17.1	16.9	16.8	18.5	19.4	19.1	18.5	17.6	17.0	15.6	14.3	13.2	12.5	15.3	19.4	
14-Jun	11.8	11.9	12.0	11.8	12.0	11.8	11.7	11.4	11.4	13.1	14.3	15.1	14.1	13.1	12.6	12.7	13.0	13.5	14.0	13.6	12.9	12.5	12.2	11.6	12.7	15.1	
15-Jun	10.5	10.7	10.2	9.6	9.8	10.4	11.0	12.3	14.2	15.2	15.9	15.5	16.4	16.8	16.7	17.0	17.5	16.6	16.1	15.8	14.3	14.0	13.1	12.5	13.8	17.5	
16-Jun	11.9	10.9	9.9	9.5	9.6	9.9	10.8	11.8	12.5	14.3	16.9	17.2	17.1	18.2	19.2	19.2	19.6	17.9	14.3	13.1	12.9	12.7	12.3	12.1	13.9	19.6	
17-Jun	11.9	11.7	11.2	10.9	10.8	10.9	11.4	12.4	14.6	14.0	15.4	16.7	18.1	17.8	19.4	19.7	20.7	20.6	20.4	18.8	14.3	11.8	11.9	10.9	14.8	20.7	
18-Jun	10.1	10.2	9.8	8.5	7.7	8.5	10.8	13.9	16.9	16.1	17.2	17.7	18.5	19.4	13.9	13.0	14.0	12.9	9.6	9.7	9.8	8.3	8.5	7.6	12.2	19.4	
19-Jun	7.3	5.5	5.5	7.2	7.4	8.1	9.0	10.4	13.4	16.4	17.9	18.7	19.3	19.9	20.6	20.7	20.3	20.7	20.8	17.6	15.1	12.7	11.7	10.9	14.0	20.8	
20-Jun	11.1	10.3	9.2	8.7	9.2	9.9	11.7	13.4	15.7	17.5	17.8	17.6	17.9	17.3	14.9	14.1	14.3	14.5	14.9	14.3	13.3	12.7	12.1	11.4	13.5	17.9	
21-Jun	11.6	12.0	11.9	11.6	10.7	10.1	10.3	10.7	10.8	11.0	10.9	10.5	10.4	10.4	10.5	10.4	10.3	10.1	9.7	9.4	9.4	10.4	11.2	11.2	10.6	12.0	
22-Jun	11.2	11.0	10.0	9.0	8.1	7.8	7.0	6.7	7.3	8.2	9.6	11.6	12.9	13.4	13.7	14.1	14.3	14.4	14.2	13.2	11.2	7.4	5.8	4.7	10.3	14.4	
23-Jun	4.1	3.7	3.2	3.0	3.2	4.9	8.1	11.6	14.8	15.9	16.3	17.1	17.6	18.2	18.9	19.2	18.8	18.1	16.9	15.8	13.9	12.2	10.8	9.6	12.3	19.2	
24-Jun	8.6	8.8	8.1	6.8	6.2	8.2	10.8	14.0	15.9	17.4	17.3	18.0	18.3	18.5	16.7	19.2	20.1	20.6	20.4	18.1	15.3	12.6	11.2	9.6	14.2	20.6	
25-Jun	9.0	7.6	7.6	7.5	7.1	8.4	10.9	14.0	17.2	19.5	21.0	21.3	21.5	22.1	22.6	23.7	23.8	23.9	22.9	22.0	20.3	18.4	16.9	16.1	16.9	23.9	
26-Jun	14.9	13.2	11.1	10.2	10.6	13.2	16.7	19.0	20.4	21.7	22.2	23.2	23.8	24.5	24.7	25.1	25.3	24.9	24.1	22.5	21.5	20.3	19.5	18.7	19.6	25.3	
27-Jun	18.0	16.8	16.0	15.2	13.6	13.1	13.8	14.3	14.5	14.7	14.8	16.2	17.5	18.2	16.6	12.2	12.2	12.4	12.4	12.5	12.1	11.6	11.1	10.3	14.2	18.2	
28-Jun	9.4	8.7	8.3	8.0	8.3	9.6	9.6	10.0	10.8	12.0	12.6	12.9	12.7	13.3	13.2	13.6	13.9	12.9	12.6	12.6	11.6	9.5	8.8	7.8	10.9	13.9	
29-Jun	7.6	7.9	7.5	7.3	7.7	8.3	9.4	12.0	14.0	15.2	17.4	18.9	19.4	20.6	21.7	22.3	22.9	22.4	21.4	19.0	18.3	16.6	14.3	13.8	15.2	22.9	
30-Jun	13.5	12.8	12.7	12.3	12.5	12.9	14.0	15.3	16.6	17.5	19.0	18.3	17.0	16.4	17.1	18.2	18.7	18.4	17.6	16.8	16.3	15.6	15.2	14.7	15.8	19.0	
		11.1	10.5	10.0	9.4	9.1	10.0	11.4	13.0	14.8	16.1	17.3	18.0	18.4	18.8	18.9	18.9	19.0	18.5	17.7	16.5	14.9	13.4	12.4	11.5	Diurnal Average	
		20.3	18.9	16.8	16.3	15.1	15.3	16.7	19.0	20.4	22.3	24.8	26.2	26.5	26.1	26.6	25.9	26.2	26.8	26.3	24.1	21.5	20.3	19.5	18.7	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Janvier - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	122	16.94	16.94
10 - 20	478	66.39	83.33
> 20	120	16.67	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

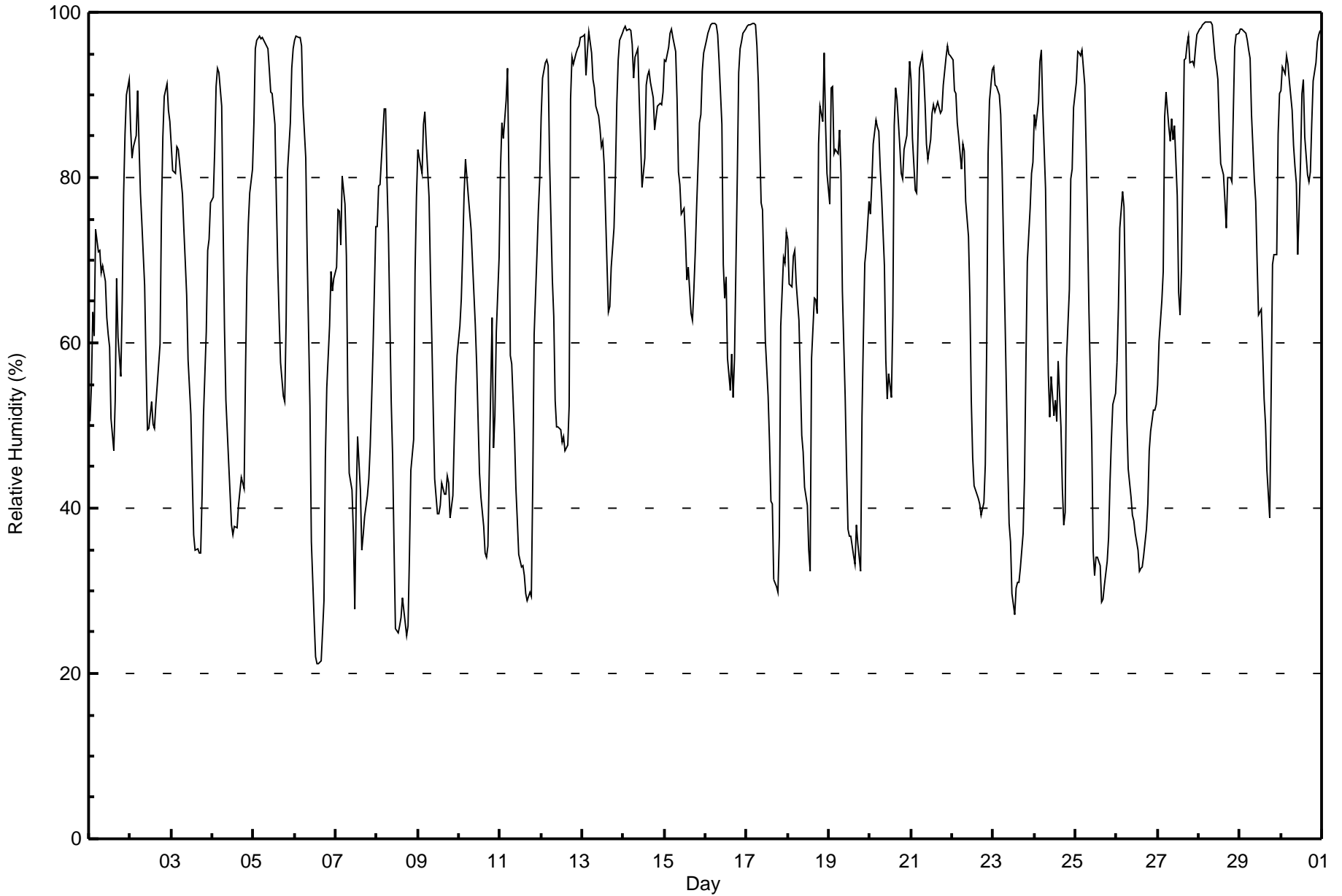
Janvier - June 2017

Maximum Value: 99 % on Jun 28 07:00														Maximum Daily Average: 91.3 % on Jun 14														Hours in Service: 720																					
Minimum Value: 21 % on Jun 6 14:00														Minimum Daily Average: 48.6 % on Jun 26														Hours of Data: 720																					
Maximum Diurnal Average: 89.7 % at hour 5														Minimum Diurnal Average: 52.0 % at hour 17														Hours of Missing Data: 0																					
Monthly Average: 69.9 %														Percentiles: P ₁ = 25 P ₁₀ = 37 Q ₁ = 51 Median = 74 Q ₃ = 89 P ₉₀ = 96 P ₉₉ = 99														Hours of Calibration: 0																					
																												Percent Operational Time: 100.0																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	51	55	64	61	74	71	71	68	69	68	63	61	60	51	47	53	68	61	56	65	78	85	90	92	65.8	92																							
2-Jun	86	82	84	85	91	84	78	75	67	58	50	50	53	50	50	53	55	60	76	85	90	91	88	87	71.9	91																							
3-Jun	84	81	81	84	83	82	78	74	70	66	58	51	44	37	35	35	34	42	51	61	71	73	77	61.9	84																								
4-Jun	78	83	91	93	93	89	74	62	53	45	42	38	37	38	38	40	42	44	42	57	68	74	78	81	61.7	93																							
5-Jun	87	96	97	97	97	97	97	96	96	93	90	90	86	77	69	63	58	54	53	63	81	87	93	96	83.8	97																							
6-Jun	97	97	97	97	96	89	82	71	62	52	36	26	22	21	21	22	25	29	46	55	62	69	66	68	58.6	97																							
7-Jun	69	76	76	72	80	77	71	54	44	42	37	28	41	49	42	35	37	39	42	44	47	53	59	74	53.6	80																							
8-Jun	74	79	79	85	88	88	79	73	53	46	35	25	25	26	27	29	28	25	26	34	45	48	68	78	52.7	88																							
9-Jun	83	82	81	87	88	84	78	68	60	52	44	39	39	40	43	42	42	44	43	39	42	49	55	59	57.6	88																							
10-Jun	62	65	71	78	82	78	76	74	70	62	57	51	44	41	38	35	34	35	54	63	47	51	61	70	58.4	82																							
11-Jun	81	87	85	89	93	80	59	57	49	42	38	34	33	33	32	30	29	30	29	43	61	71	76	80	55.9	93																							
12-Jun	87	92	94	94	93	82	68	63	53	50	50	50	48	49	47	48	52	49	95	94	95	96	96	97	74.2	97																							
13-Jun	97	97	92	95	98	95	92	91	89	87	86	84	84	82	69	64	64	69	74	80	89	94	97	98	86.1	98																							
14-Jun	98	98	98	98	98	96	92	95	96	90	84	79	82	91	92	93	92	90	86	87	89	89	89	90	91.3	98																							
15-Jun	94	94	96	97	98	97	95	89	81	79	76	76	73	68	69	64	63	66	71	77	87	88	93	95	82.7	98																							
16-Jun	97	98	98	98	99	99	98	97	94	86	70	65	68	58	54	59	53	58	80	93	96	96	98	98	83.7	99																							
17-Jun	98	99	98	99	99	98	96	91	77	76	68	60	53	48	41	41	31	31	30	37	62	70	70	73	68.6	99																							
18-Jun	73	67	67	71	71	67	63	56	49	47	43	40	35	32	58	65	65	64	84	89	87	95	87	80	64.7	95																							
19-Jun	77	91	91	83	83	83	86	80	66	53	45	38	37	37	34	33	38	36	32	51	61	70	71	77	60.5	91																							
20-Jun	76	79	84	87	86	86	81	78	69	58	53	56	53	63	86	91	90	84	80	80	83	85	90	94	78.1	94																							
21-Jun	92	85	78	78	85	93	95	93	89	84	82	85	88	89	88	89	89	88	88	91	95	96	95	95	88.7	96																							
22-Jun	94	90	90	87	85	81	84	83	77	73	65	53	46	43	42	41	41	39	41	45	60	83	89	93	67.7	94																							
23-Jun	93	91	91	90	88	81	72	64	46	38	36	30	27	30	31	31	33	37	44	58	70	76	80	82	59.1	93																							
24-Jun	88	86	89	94	95	88	79	66	56	51	56	51	53	51	58	50	42	38	40	58	66	80	81	88	66.9	95																							
25-Jun	92	95	95	95	95	91	83	74	64	48	35	32	34	34	33	29	29	31	34	36	43	48	53	54	56.5	95																							
26-Jun	58	64	74	78	76	66	51	45	41	39	39	37	35	32	33	33	34	37	41	47	49	52	52	53	48.6	78																							
27-Jun	55	60	65	69	87	90	86	84	87	85	86	78	66	63	69	94	94	96	97	94	94	94	96	97	82.8	97																							
28-Jun	98	98	98	99	99	99	99	99	99	94	93	92	86	82	80	77	74	80	80	80	88	96	97	98	91.0	99																							
29-Jun	98	98	98	97	97	95	94	88	80	77	70	63	64	59	53	50	45	39	54	69	71	71	85	90	75.2	98																							
30-Jun	90	93	93	95	94	92	88	84	81	79	71	82	90	92	85	80	79	81	87	92	94	96	97	98	88.1	98																							
																								83.5	85.3	86.5	87.7	89.7	86.6	81.5	76.4	69.5	64.1	58.6	54.8	53.6	52.2	52.1	52.2	52.0	53.5	58.1	65.2	72.0	77.5	80.8	83.7	Diurnal Average	
																								98	99	98	99	99	99	99	99	99	94	93	92	90	92	92	94	94	96	97	94	96	96	98	98	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Janvier - June 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Janvier - June 2017

Maximum Speed: 22 km/h on Jun 9 16:00	Maximum Daily Speed Average: 11.5 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 16 00:00	Minimum Daily Speed Average: 0.7 km/h on Jun 16	Hours of Data: 720
Maximum Diurnal Speed Average: 1.7 km/h at hour 15	Minimum Diurnal Speed Average: 0.6 km/h at hour 19	Hours of Missing Data: 0
Monthly Average Velocity: 0.2 km/h 200.6 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 16	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	SE6	ESE3	ESE3	ESE4	SE3	SSE3	SW2	S3	S4	SW5	W2	N2	NW5	N7	N6	WNW5	WSW2	SSE2	SE4	SE3	SE3	SE3	SSE2	SSE3	SSE0.9	N7	
2-Jun	S6	S6	S5	S7	SSE3	S6	SSW6	SW4	SW4	SW6	SW7	W9	W6	W8	W12	WSW13	WSW14	WSW12	W10	W10	WSW10	WSW8	WSW7	W9	WSW6.7	WSW14	
3-Jun	W11	W11	W11	WSW8	W8	W8	W10	W9	W11	W10	W9	W9	W9	W9	W8	W7	SW6	SSW6	SSE4	SE3	SE4	SE3	SE3	SE3	WSW6.1	W11	
4-Jun	ESE4	SE2	SSW1	SSE3	S1	S1	SSW3	SW1	ENE3	NE4	NNE6	NE7	NE9	NNE10	ENE8	NE10	NE9	E7	ENE2	N7	N8	N10	NNE7	NNE5	NE3.9	NE10	
5-Jun	N3	N4	N5	N6	N6	N5	NW4	NNW4	NW6	NNW7	N7	N10	N7	N9	N11	N9	NNE11	NNE10	NE7	ESE3	SE4	SE4	SSE1	S2	N4.8	N11	
6-Jun	S2	SSE3	SSE3	SSE3	S5	SSW6	SSW7	SW9	SSW7	SSW7	SW8	SSW10	SW6	WSW6	SSW5	SSW7	SSW6	SSW4	SE3	SE3	SE3	SSE2	S4	S4	SSW4.6	SSW10	
7-Jun	S4	SSE3	SSE3	S5	SE2	SSE2	SW2	S4	SE2	ENE4	ENE5	NE6	NNE6	NNE3	NNE5	NNE10	NE8	ENE6	NE6	ENE5	NE4	NE3	NE2	ESE1	ENE2.6	NNE10	
8-Jun	ENE1	NNE1	NE2	SE1	ESE1	SW0	NNE2	NNW2	NE5	NE6	ESE3	SE7	ESE8	ESE7	E7	ESE8	SE7	SE9	SSE7	SE4	ESE3	E3	E1	S2	ESE3.2	SE9	
9-Jun	SSW1	ENE1	NNE2	NE1	NNE4	N2	NNE5	NNE6	NNE9	NNE13	NNE16	NE15	NE16	NE17	NNE22	NNE22	NNE20	NE20	NNE19	NNE16	NNE13	NNE13	NNE14	NNE13	NNE11.5	NNE22	
10-Jun	NNE11	NNE10	NNE10	NNE8	NNE9	NNE11	NNE12	NNE11	NNE9	NE10	NNE9	NNE6	N6	SSE3	W1	ESE4	ESE6	SE2	SE2	SE2	WSW5	W5	W6	NNW6	NNE4.8	NNE12	
11-Jun	N5	N7	N4	NNW2	WSW3	NW4	NNW7	NW6	NW8	WNW11	WNW10	W11	WNW10	NW7	NW7	W9	WNW6	WNW6	WNW6	N0	SE3	SSE2	SE2	E1	NW4.4	W11	
12-Jun	SSE2	SE1	S2	SSE2	SE1	SSE2	SE2	S6	S12	S13	S12	S13	S15	S14	S16	S15	S11	ESE1	S9	S7	S8	ESE3	S3	S3	S6.9	S16	
13-Jun	SW1	SSW6	SSE11	S3	SE2	SSW2	S0	SSW4	SSW5	SSW4	S7	S7	S6	SE3	SSE4	ENE6	ENE6	ESE7	SSE6	SE2	NE2	E2	N1	NNE1	SSE2.8	SSE11	
14-Jun	NNE2	NNE3	N3	NNE3	NNE3	N3	N5	N7	N5	N7	NNE10	NNE11	NNE12	N10	N10	N9	N8	N8	N8	N8	N4	N4	N4	N4	NNE4	N6.0	NNE12
15-Jun	NNE3	NNE4	NE1	SSW1	SW1	ENE2	WNW1	ENE3	N1	NE6	NE8	ENE6	SE4	E1	WSW3	NW2	NNE6	NNE7	NNE3	NNE3	E2	ENE1	SE1	SE0	NE2.1	NE8	
16-Jun	ENE0	S0	SE1	NNW0	N1	NNW1	NW1	NNW2	NNE5	NNE4	NNE5	S3	S6	ESE4	ESE5	E8	ENE6	WSW6	SW5	SW3	ESE2	SSE1	WSW1	SSE1	ESE0.7	E8	
17-Jun	SSW2	WSW1	SW1	S2	SW3	SSW4	SSW5	SSW6	WNW7	W9	NW6	WNW8	WNW6	WNW9	NW7	NNW5	NW6	NW6	NNW4	NNE0	SE3	SE3	S3	SSE3	W2.6	WNW9	
18-Jun	S5	S8	SSW8	S9	S10	S8	S7	SSW6	SSW8	SSW9	SW8	SW9	SW1	ESE5	W8	S6	ESE6	SW4	SSE5	SSW4	SSW4	S3	SSW4	SSW5	SSW5.4	S10	
19-Jun	SW5	S3	SSW3	W2	WSW4	SSW3	S4	SSW5	SSE3	NNE3	E1	ENE6	SE2	SW3	SW5	SW6	SW1	SSW4	SW6	SSE3	SE3	SE3	SSE4	S3	SSW2.3	SW6	
20-Jun	S5	SSE3	SE3	ESE2	SE2	S2	W1	NW2	S3	S6	S7	S8	S9	SSW4	SSW2	SE4	SE5	SE6	SSE7	SSE6	SSE3	SE2	S2	SSE3	SSE3.5	S9	
21-Jun	S4	SW5	WSW6	SW7	WSW14	WSW9	WSW8	WSW8	W10	W11	W11	W11	W11	WSW11	W12	W12	W13	W14	W13	W11	W9	NW6	N9	N8	W8.4	WSW14	
22-Jun	N8	N12	N12	N12	N9	N11	N9	N10	N10	N9	N11	N13	N13	N15	N11	N12	NNE14	N11	N9	N5	NE2	SE2	SE2	SSE3	N8.7	N15	
23-Jun	S5	S5	S5	S6	S7	S6	S4	SSW2	NE5	NNE9	NNE11	N10	N9	N9	N8	N8	N4	W2	SSE2	SE3	SSE3	SSE3	SSE3	SSE3	NNE1.2	NNE11	
24-Jun	S3	S6	S4	SSE3	SSE3	S5	SSW6	S3	E1	SE1	NE6	NE8	ESE2	W1	SW6	S1	E4	ESE3	SE2	ESE3	SE4	SSE2	ESE3	SE3	SSE1.9	NE8	
25-Jun	S3	SSE1	SSE4	S3	SE2	S4	S6	SSW4	SSW3	E3	SW5	W2	NE4	ENE2	S6	S5	SSE7	SSE7	SE8	SSE6	SSE6	SSE8	SSE10	SSE10	SSE4.1	SSE10	
26-Jun	SSE8	SE5	SE3	ESE3	SE4	SSE5	S9	S12	S15	S15	SSE14	SSE16	SSE14	S15	SSE12	SE12	SSE12	SSE10	ESE9	ESE6	ESE7	SE7	SE10	E8	SSE8.9	SSE16	
27-Jun	ENE4	ENE3	ESE5	SW6	NNW5	SW5	S2	ESE2	WSW3	W5	WSW4	WSW5	W4	NNE3	S2	SSW1	NNE0	S3	SSW3	S3	S4	SW6	SSW3	SE2	SW1.6	SW6	
28-Jun	SE3	SE1	NNE0	SE1	NNE2	N2	NNE6	NNE6	N5	N4	NNW3	NNE12	NNE16	NNE14	NNE14	NNE11	NNE11	NNE12	NNE7	NNE4	NNE1	SE2	SE2	SSE1	NNE5.2	NNE16	
29-Jun	S3	S3	SSW4	SSW5	SSW6	SSW7	SSW6	SSW8	SSW8	SW7	S4	SSE5	SE3	SSE5	E3	SE4	E4	NNE5	SW5	SSW6	SW7	SSW5	SSW4	S4	S3.9	SSW8	
30-Jun	S5	S3	S4	S4	SSW6	SSW6	SSW6	SSW5	SW3	SW3	ENE1	NNW2	SW5	SW6	W4	SSW6	SW4	WSW5	SSW3	SSW3	SSE3	S2	SSE2	SE1	SSW3.1	SSW6	

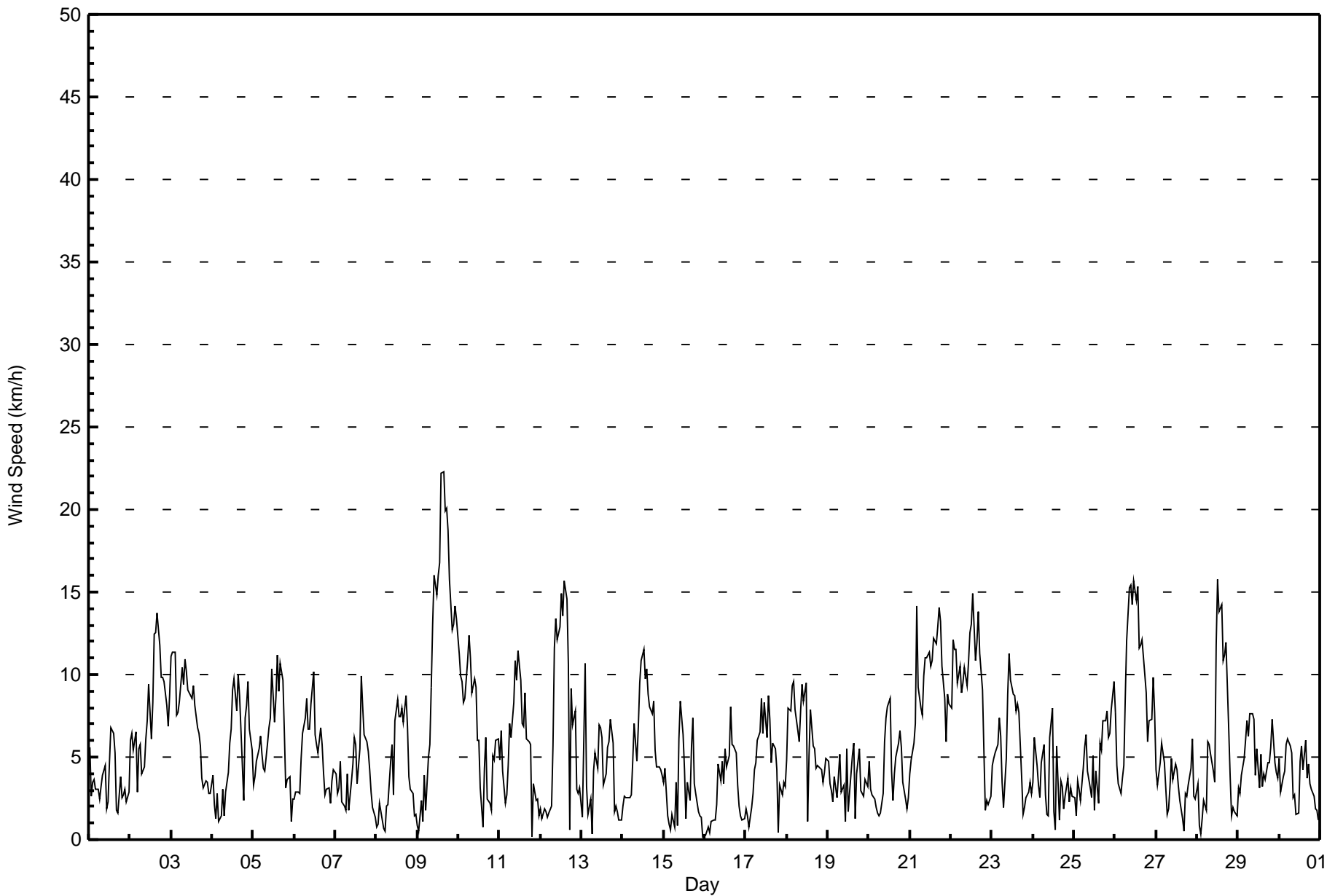
S1.3 SSE0.8	S1.1	S1.3	SW0.9	SW1.6	SW1.4	SW1.5	WSW1.2	W1.4	NNW1.0	NNW0.7	NNW0.9	N1.4	NNW1.7	NNE0.9	NE1.6	NE0.8	SE0.6	SE0.8	SE1.3	SE1.0	SE0.9	SE0.9	Diurnal Average	
NNE11	N12	N12	N12	WSW14	NNE11	NNE12	S12	S15	S15	NNE16	SSE16	NE16	NE17	NNE22	NNE22	NNE20	NE20	NNE19	NNE16	NNE13	NNE13	NNE14	NNE13	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Janvier - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	394	54.72	54.72
6 - 11	268	37.22	91.94
12 - 19	54	7.50	99.44
20 - 28	4	0.56	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	25	30	12	15	12	24	65	48	59	36	27	11	11	2	6	11	394
6 - 11	42	30	14	7	4	10	6	14	31	26	17	11	32	11	10	3	268
12 - 19	7	16	3	0	0	0	1	5	12	0	0	4	6	0	0	0	54
20 - 28	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	74	79	30	22	16	34	72	67	102	62	44	26	49	13	16	14	720

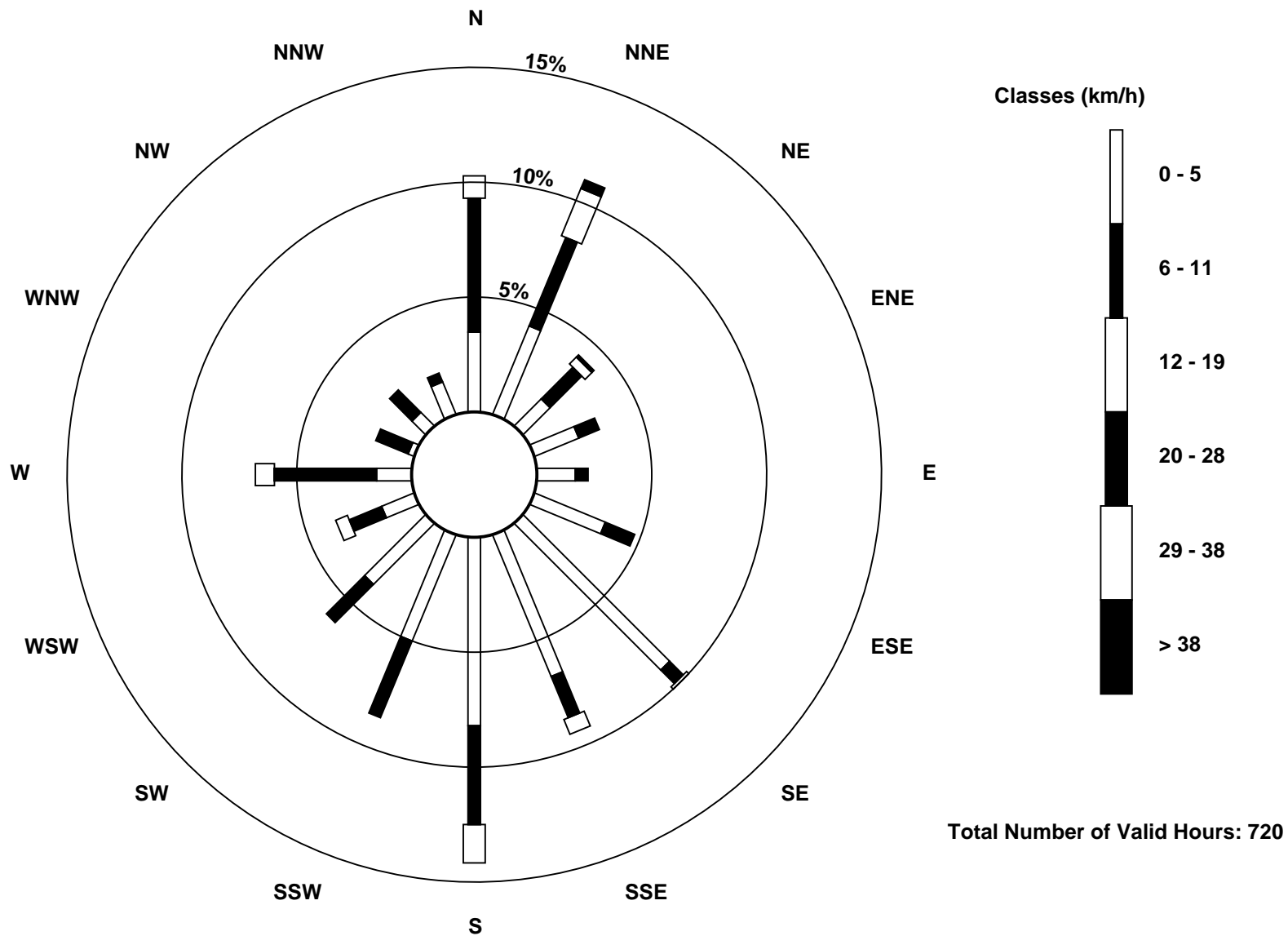
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Janvier (AMS 22)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Janvier - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jun 9 14:00 Minimum Value: 0 km/h on Jun 22 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	2	2	1	1	1	2	1	1	1	2	2	2	3	3	3	1	1	1	1	1	1	1	1	1	3
2-Jun	2	2	2	2	1	1	2	1	1	2	3	4	2	4	5	5	5	4	4	3	3	3	3	4	5
3-Jun	4	4	5	3	3	3	4	4	4	4	4	4	4	3	3	2	2	1	1	1	1	1	1	5	
4-Jun	1	1	1	2	1	1	1	1	1	2	1	2	3	3	3	4	3	2	4	3	3	4	3	4	
5-Jun	1	2	2	2	2	2	3	2	3	3	3	5	3	4	4	3	4	3	2	1	1	1	2	5	
6-Jun	1	1	1	1	1	2	2	2	2	2	3	3	4	3	3	3	2	2	1	1	0	1	1	4	
7-Jun	1	1	1	1	1	1	1	1	1	2	2	2	3	1	2	3	3	2	2	2	1	1	1	3	
8-Jun	1	1	1	1	1	1	1	1	2	2	3	4	4	4	3	3	2	3	3	2	1	1	1	4	
9-Jun	1	1	1	1	1	1	2	2	3	4	5	5	5	7	6	6	6	6	5	5	4	4	4	7	
10-Jun	3	3	3	3	3	3	3	3	3	4	4	3	4	3	2	2	2	1	1	1	4	2	3	4	
11-Jun	2	4	2	1	1	3	3	4	4	5	5	5	4	3	4	4	3	3	3	1	1	1	1	5	
12-Jun	1	1	1	1	1	1	2	2	5	4	5	4	5	5	5	5	4	3	3	3	3	3	2	5	
13-Jun	2	3	4	2	1	2	1	1	2	2	2	2	1	2	2	2	2	2	3	1	2	1	1	4	
14-Jun	1	1	1	1	1	2	2	2	2	2	4	4	5	4	4	3	3	3	3	3	2	2	2	5	
15-Jun	1	2	1	1	1	2	1	2	1	3	2	2	2	1	1	1	2	2	1	1	2	1	1	3	
16-Jun	1	1	1	1	1	1	1	1	1	1	2	3	2	1	3	3	2	5	3	1	1	1	1	5	
17-Jun	1	1	1	1	1	1	1	2	3	4	4	3	4	5	4	3	3	3	3	1	1	1	1	5	
18-Jun	2	2	2	2	2	1	1	2	3	4	2	3	3	3	5	3	2	4	3	1	1	1	2	5	
19-Jun	2	1	1	2	1	1	1	2	2	2	2	3	2	2	2	2	1	2	2	1	0	1	1	3	
20-Jun	1	1	1	1	1	1	1	1	2	2	3	3	3	2	1	1	2	2	2	2	1	1	1	3	
21-Jun	2	2	3	3	5	3	2	3	4	4	4	5	4	4	4	4	5	6	5	4	3	3	4	6	
22-Jun	3	5	5	5	4	5	4	5	5	5	4	5	5	6	5	5	5	4	3	2	2	0	0	6	
23-Jun	1	1	2	1	2	1	1	1	3	3	4	4	4	4	4	4	2	2	1	1	1	1	1	4	
24-Jun	1	1	1	1	1	2	2	1	1	2	2	2	3	2	1	2	2	2	1	1	1	1	1	3	
25-Jun	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	3	3	
26-Jun	3	1	1	1	1	2	3	4	5	5	5	5	5	5	4	4	4	4	3	2	2	3	3	5	
27-Jun	2	1	2	4	7	2	2	1	2	2	2	2	2	3	4	2	1	1	1	2	2	2	2	7	
28-Jun	1	1	1	1	2	2	2	2	1	2	1	5	4	4	4	3	4	3	3	1	1	1	1	5	
29-Jun	1	1	2	2	1	2	2	3	3	2	2	3	2	2	2	2	2	3	3	2	2	1	1	3	
30-Jun	1	1	1	1	2	1	2	2	1	2	1	1	3	2	2	2	1	2	1	1	1	1	1	3	
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Janvier - June 2017

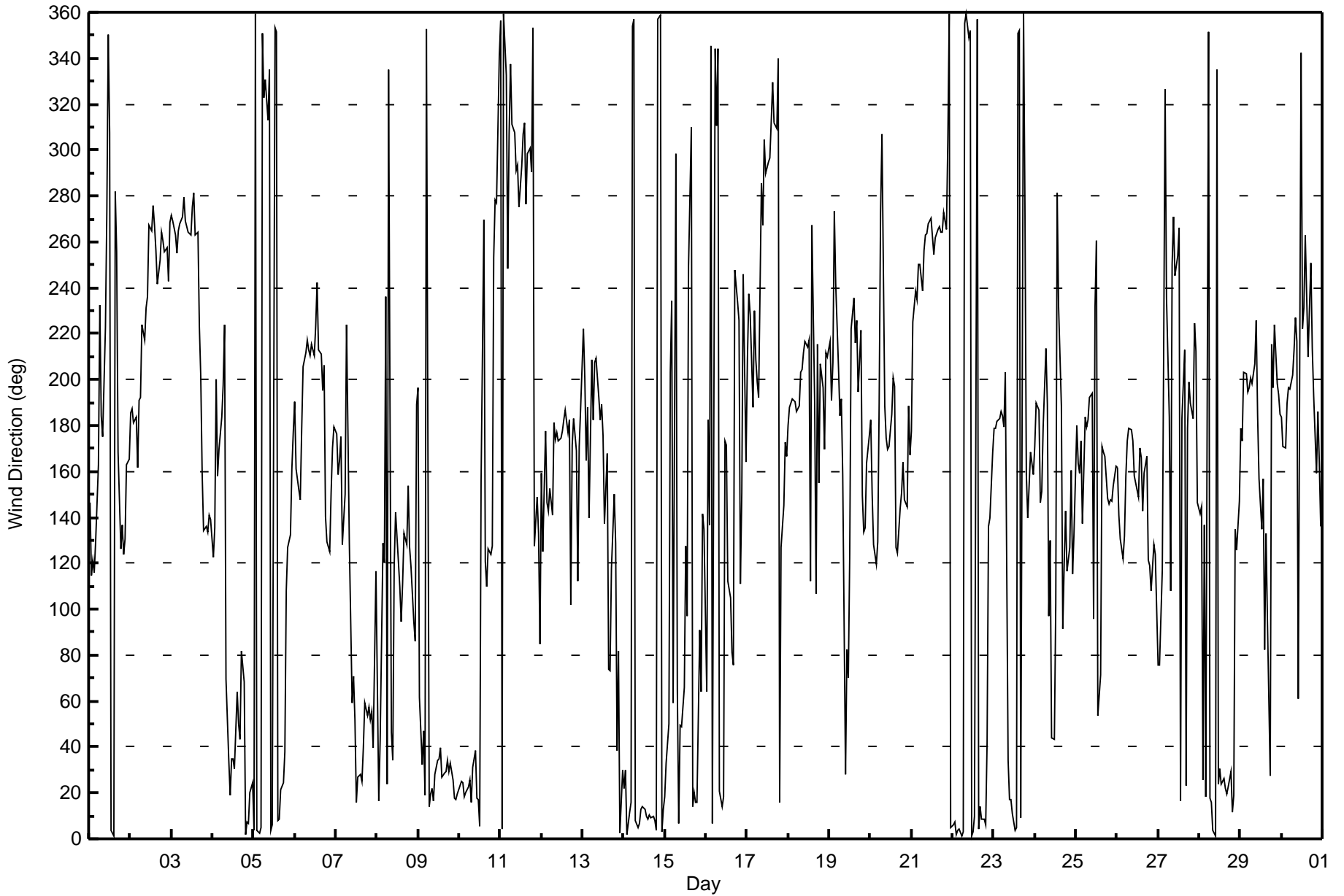
Direction of Maximum Speed: 29 deg on Jun 9 16:00 Direction of Maximum Daily Speed Average: 27.5 deg on Jun 9	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 135 deg on Jun 16 00:00 Direction of Minimum Daily Speed Average: 0.7 deg on Jun 16	Percent Operational Time: 100.0
Monthly Average Direction: 211.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	146	115	121	116	129	163	232	184	175	223	273	350	307	3	1	282	256	168	126	137	124	131	163	166	157.3
2-Jun	185	187	181	184	162	191	192	224	217	231	236	267	265	276	267	257	242	252	264	261	256	258	243	268	241.9
3-Jun	271	269	263	255	265	268	271	279	269	267	264	263	275	281	263	264	223	201	160	134	136	133	141	139	258.4
4-Jun	123	135	200	158	170	184	197	224	70	34	19	34	35	31	64	50	43	82	68	2	8	7	20	24	40.3
5-Jun	4	359	4	3	5	351	323	331	313	335	4	6	353	351	8	9	21	24	38	108	127	133	161	177	6.1
6-Jun	190	161	152	148	178	205	212	218	213	210	215	210	224	242	213	211	195	206	140	130	125	151	170	180	199.3
7-Jun	177	159	165	175	128	150	224	177	129	59	71	52	16	27	28	25	40	59	54	57	52	55	40	117	64.4
8-Jun	67	16	43	129	121	236	24	335	47	34	119	142	121	110	95	111	133	128	154	127	118	95	86	189	110.0
9-Jun	196	61	33	47	19	353	14	20	22	17	28	34	35	39	27	29	29	34	29	33	26	18	17	19	27.5
10-Jun	23	25	25	18	20	23	26	16	31	39	17	17	6	156	270	121	110	126	124	128	253	278	277	341	22.6
11-Jun	357	4	360	333	248	307	337	311	308	291	294	275	293	307	312	276	298	301	291	353	128	149	133	85	304.1
12-Jun	159	125	178	147	143	153	141	181	174	177	173	174	178	183	186	177	183	102	172	183	169	112	171	187	175.0
13-Jun	222	201	165	188	139	209	183	208	209	192	182	189	176	137	168	74	73	118	150	129	38	82	3	30	161.8
14-Jun	22	30	2	12	16	354	357	8	5	7	13	14	13	10	9	10	9	10	8	4	357	359	3	13	8.7
15-Jun	18	33	50	203	234	59	298	65	7	50	49	66	127	97	250	310	14	20	16	16	91	64	141	135	41.8
16-Jun	64	182	137	345	7	344	310	344	21	14	18	173	172	113	105	81	76	248	234	226	111	151	246	164	102.3
17-Jun	209	238	228	188	230	209	199	192	286	267	305	290	295	297	312	330	312	309	340	16	127	145	173	167	273.3
18-Jun	180	188	192	191	190	186	189	203	204	212	217	214	217	112	267	189	107	216	155	207	197	170	212	210	196.0
19-Jun	217	191	208	273	242	205	184	192	159	28	83	70	124	222	235	216	226	195	222	149	133	136	163	176	191.9
20-Jun	182	150	128	119	130	190	273	307	188	175	169	171	185	201	197	127	124	144	151	164	148	145	189	167	164.1
21-Jun	178	225	239	235	250	250	239	256	263	264	268	270	263	254	262	265	267	264	264	273	266	304	360	5	263.9
22-Jun	6	8	2	3	4	1	3	355	360	349	352	1	3	10	357	4	14	9	9	6	42	136	140	168	4.4
23-Jun	179	179	182	183	186	184	179	203	34	17	17	11	4	5	351	352	9	360	276	159	140	168	163	158	24.6
24-Jun	171	189	187	147	152	179	213	189	97	130	44	43	103	281	232	188	92	119	143	116	127	160	115	133	146.6
25-Jun	180	163	159	173	137	184	179	182	192	194	96	232	260	54	71	171	169	166	148	146	148	147	154	162	162.9
26-Jun	162	141	130	122	132	158	173	178	178	173	158	155	149	170	166	143	159	167	122	119	108	128	124	99	152.7
27-Jun	76	76	117	214	327	235	184	108	250	271	246	254	266	16	183	213	23	179	199	190	183	224	212	146	215.7
28-Jun	141	145	26	137	18	352	17	16	4	1	335	24	30	24	26	22	20	23	29	12	19	135	126	147	24.7
29-Jun	179	173	203	202	194	196	201	198	207	226	184	157	135	157	82	133	95	28	215	196	224	198	193	185	188.5
30-Jun	183	171	170	190	196	196	202	213	227	217	61	342	222	231	263	210	231	251	213	193	159	186	164	136	206.2

168.9 166.8 170.2 188.0 214.8 218.4 233.2 233.3 249.9 278.5 343.2 340.2 348.4 1.3 330.9 18.2 43.7 39.0 128.4 130.8 137.2 133.0 140.0 136.6

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Janvier - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 116 deg on Jun 17 20:00 Minimum Value: 6 deg on Jun 15 23:00 Percentiles: P ₁ = 10 P ₁₀ = 18 Q ₁ = 24 Median = 34 Q ₃ = 54 P ₉₀ = 71 P ₉₉ = 96																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	28	71	27	16	26	62	48	64	31	38	75	79	64	54	54	48	67	71	43	29	9	25	17	17	79
2-Jun	15	12	16	17	23	14	21	35	36	33	36	30	31	45	35	33	27	27	36	28	29	33	31	38	45
3-Jun	34	31	29	27	35	33	35	40	36	34	40	45	53	44	43	40	38	28	24	14	11	10	16	15	53
4-Jun	16	49	40	47	88	45	43	72	64	53	16	27	30	26	32	30	24	35	79	62	30	31	28	40	88
5-Jun	32	51	37	41	33	53	70	63	58	61	53	38	57	54	34	40	27	19	30	30	16	25	74	24	74
6-Jun	23	20	19	18	15	26	25	26	37	36	32	32	65	60	68	44	39	30	18	9	7	24	18	15	68
7-Jun	15	17	18	17	18	29	45	28	79	51	52	40	42	18	16	20	26	27	27	27	19	26	65	62	79
8-Jun	62	74	33	49	62	65	42	58	33	25	96	54	44	39	35	28	35	35	29	20	16	25	59	23	96
9-Jun	74	83	25	47	15	52	33	28	21	22	19	20	20	26	20	20	21	21	18	19	18	18	22	20	83
10-Jun	19	20	19	20	19	19	19	22	27	38	42	77	75	82	106	67	26	52	30	22	64	41	56	67	106
11-Jun	56	41	49	77	46	63	63	71	65	57	59	51	54	66	65	51	56	61	55	108	12	19	36	66	108
12-Jun	61	32	19	30	56	29	56	24	24	24	25	24	25	31	24	23	29	105	26	40	45	83	67	55	105
13-Jun	74	40	27	36	44	67	96	34	29	34	21	24	31	35	56	41	39	26	30	35	39	52	46	21	96
14-Jun	9	24	39	27	42	41	44	27	37	35	29	27	23	26	30	30	31	28	29	48	43	46	39	29	48
15-Jun	11	31	35	84	89	82	99	37	88	49	29	30	54	85	39	66	38	18	23	14	43	70	6	90	99
16-Jun	97	96	60	73	18	48	64	60	17	23	48	74	28	37	59	36	44	85	57	37	68	61	21	47	97
17-Jun	29	35	77	56	29	20	21	26	53	39	71	53	70	63	64	72	69	71	65	116	19	25	23	27	116
18-Jun	17	12	13	12	14	13	20	28	27	27	28	28	108	62	61	36	38	74	64	43	31	22	35	47	108
19-Jun	40	41	58	97	32	54	20	24	69	69	99	56	99	73	58	48	90	57	34	20	10	12	18	11	99
20-Jun	13	24	17	12	19	27	34	33	56	29	26	25	25	48	45	40	36	30	30	34	50	29	55	52	56
21-Jun	37	31	43	32	26	25	25	32	30	29	32	36	30	29	28	31	32	32	32	37	30	70	55	49	70
22-Jun	47	37	47	47	43	50	56	58	54	61	57	48	49	38	59	51	30	38	40	41	67	15	16	16	67
23-Jun	10	10	11	10	9	11	29	58	70	35	32	46	56	54	59	54	47	45	85	30	17	33	20	20	85
24-Jun	19	13	26	26	25	18	29	67	75	79	25	27	74	88	32	93	54	57	73	36	34	24	25	17	93
25-Jun	39	70	25	25	15	22	15	23	43	77	77	45	95	52	80	63	54	34	32	27	22	22	23	23	95
26-Jun	23	22	21	30	25	25	24	23	22	25	29	32	33	28	31	33	34	32	29	23	25	29	26	21	34
27-Jun	32	34	31	42	75	42	84	82	66	51	46	47	65	82	81	76	102	65	74	43	24	27	51	22	102
28-Jun	16	76	94	61	53	62	23	29	31	38	44	20	20	19	20	24	19	18	26	35	64	22	11	44	94
29-Jun	26	38	35	34	23	19	27	27	35	35	66	53	86	56	81	75	62	51	73	18	27	18	23	23	86
30-Jun	17	20	27	24	19	14	20	26	51	65	90	70	43	34	37	30	38	23	23	23	20	40	23	32	90
																			97 96 94 97 89 82 99 82 88 79 99 79 108 88 106 93 102 105 85 116 68 83 74 90						
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

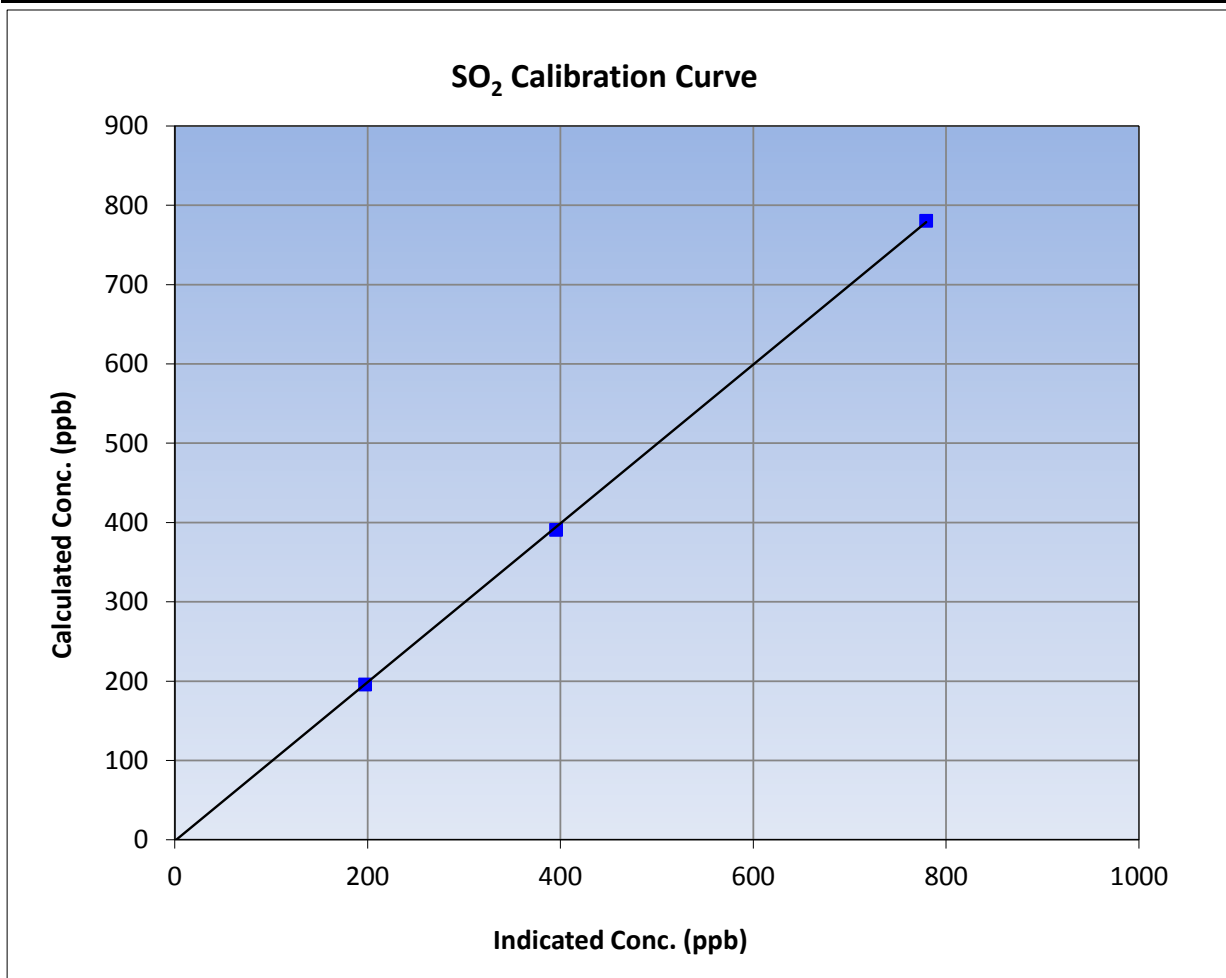
Version-03-2017

Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:15
Analyzer make	Thermo 43i	Analyzer serial #	1152430006

Calibration Data

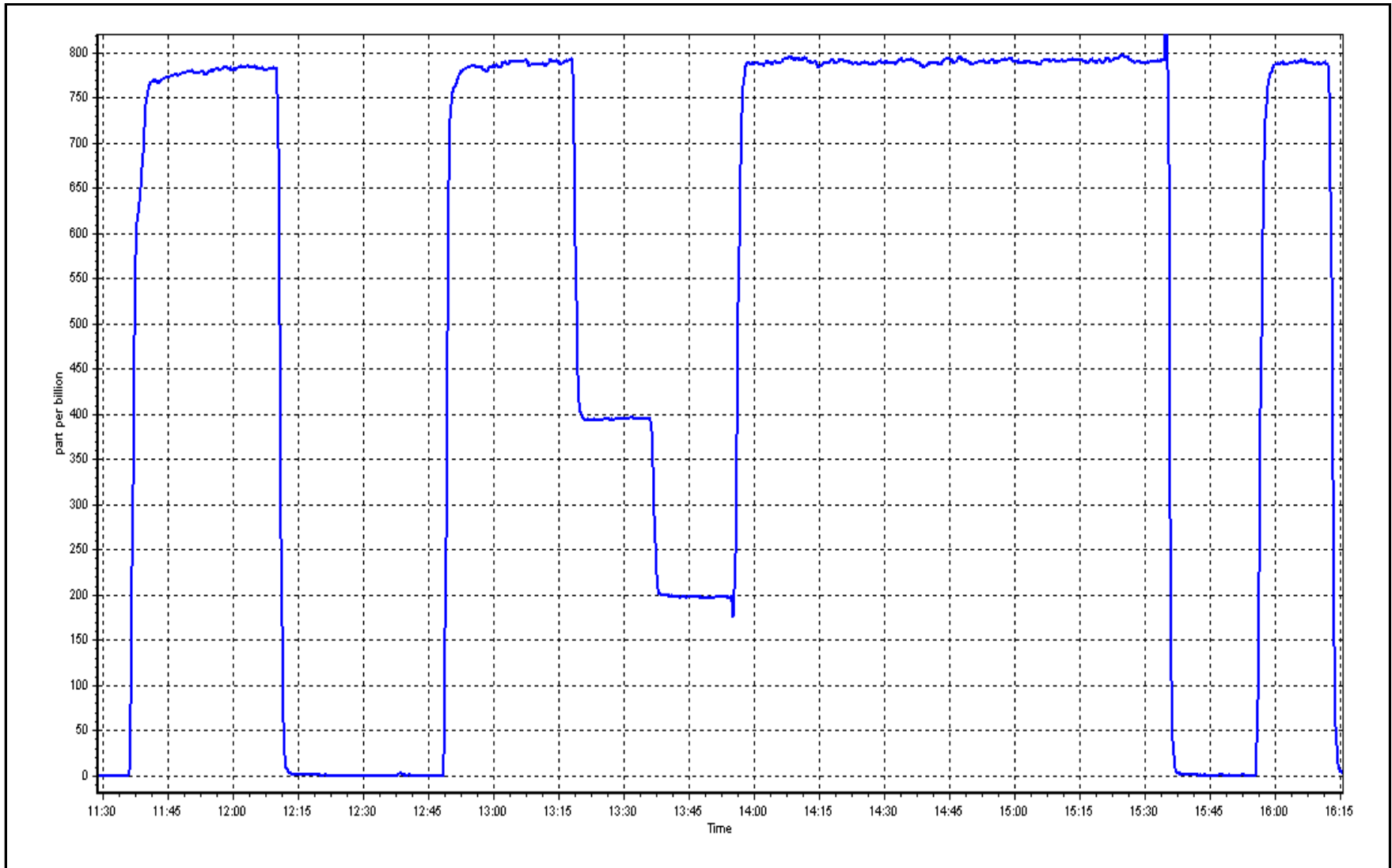
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.4	----	Correlation Coefficient	0.999936	≥0.995
780.3	779.0	1.0017			
390.4	395.1	0.9880	Slope	1.001235	0.90 - 1.10
195.3	197.0	0.9915			
			Intercept	-1.594906	+/-30



SO2 Calibration Plot

Date: June 1, 2017

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Summary

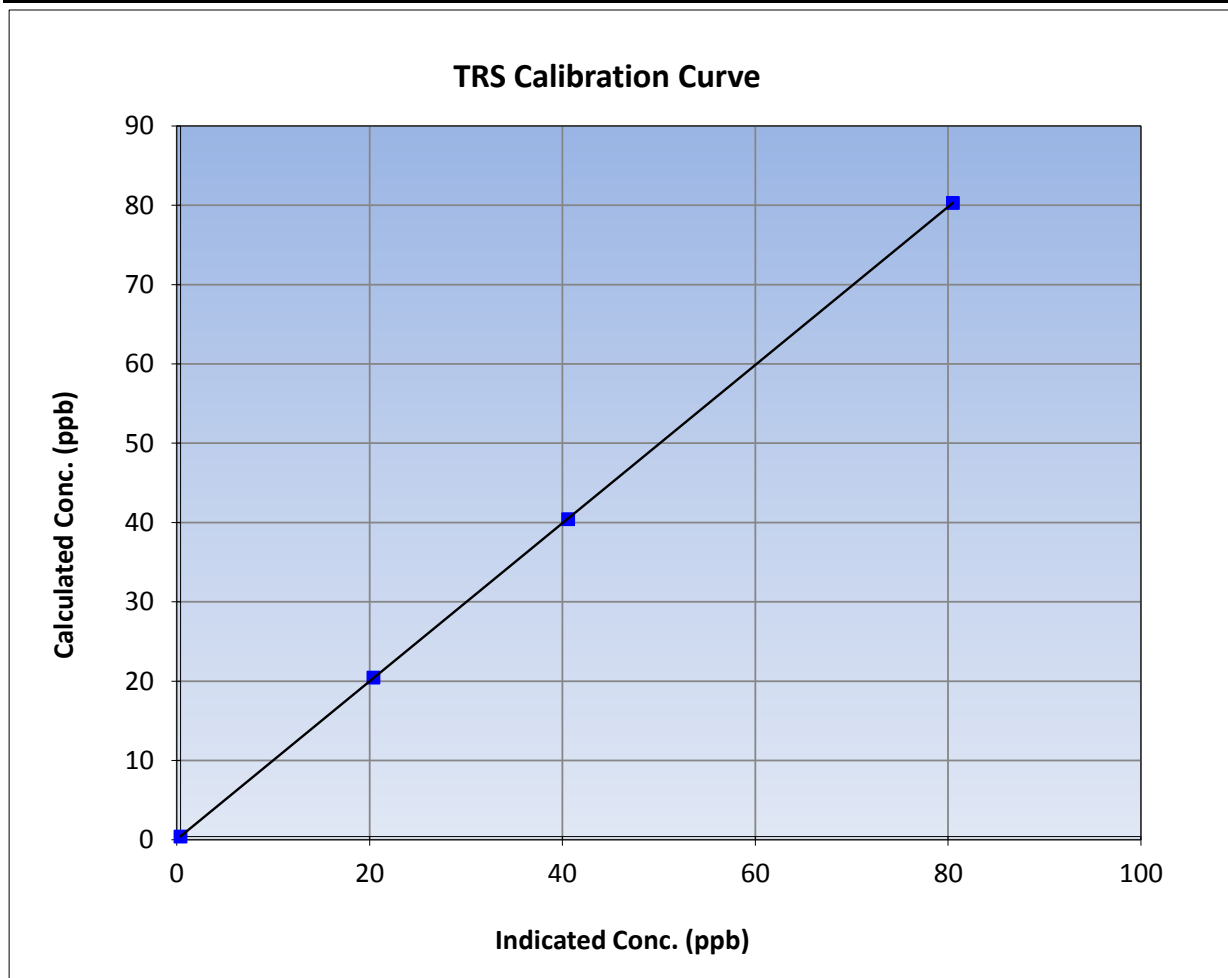
Version-03-2017

Station Information

Calibration Date	June 2, 2017	Previous Calibration	May 11, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:25	End Time (MST)	13:55
Analyzer make	Thermo 43i- TLE	Analyzer serial #	1151680031

Calibration Data

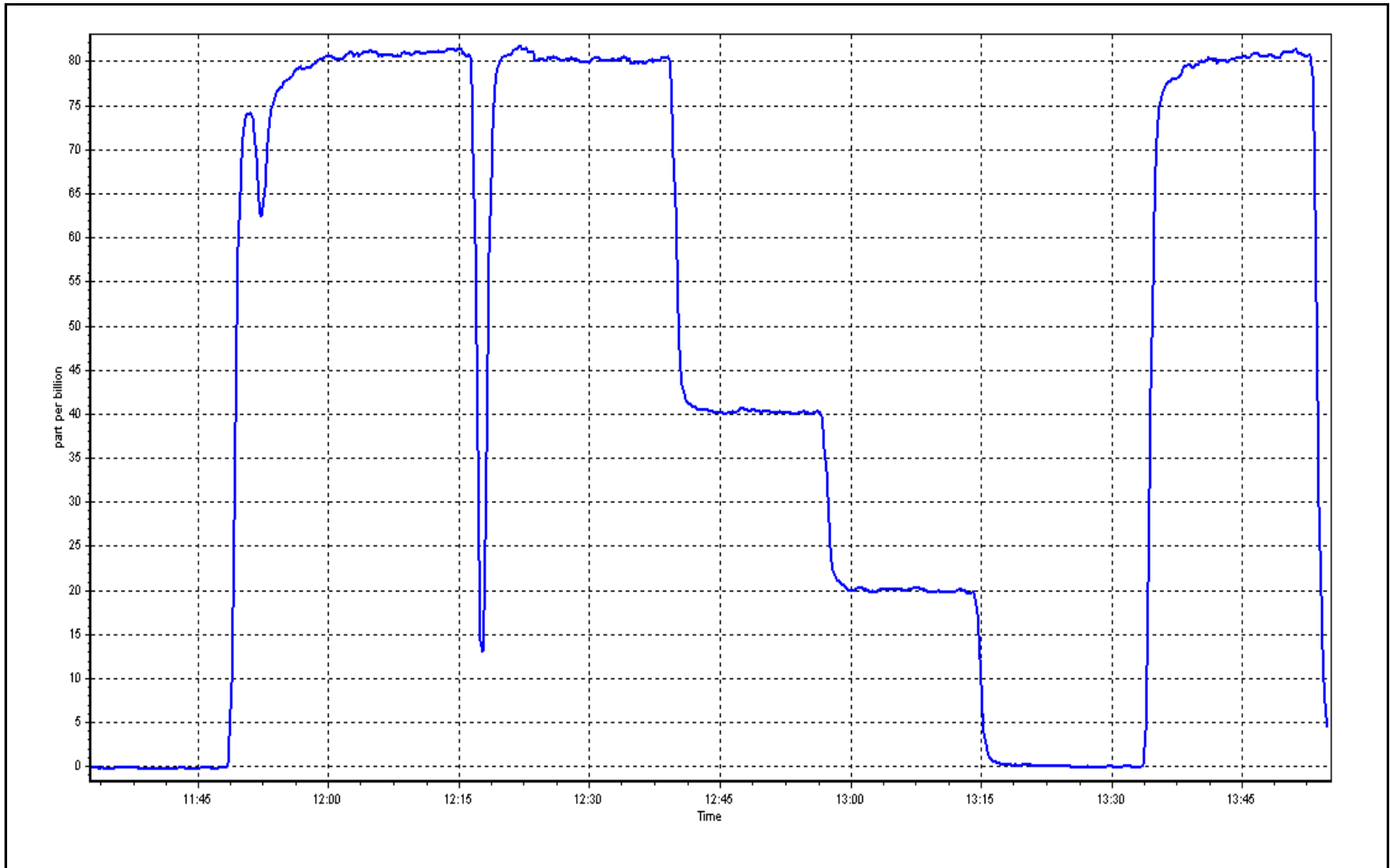
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
79.9	80.1	0.9978			
40.0	40.2	0.9956	Slope	0.997135	0.90 - 1.10
20.1	20.0	1.0036			
			Intercept	0.030098	+/-3



TRS Calibration Plot

Date: June 2, 2017

Location: Janvier





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-03-2017

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	June 19, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	10:47	End time (MST):	13:41
Reason:	Routine		

Calibration Standards

O3 generation mode:	Photometer	O3 reference Date:	June 19, 2017
Calibrator Make/Model:	Teledyne API T700	Serial Number:	2657
ZAG Make/Model:	Teledyne API T701	Serial Number:	135

Analyzer Information

Analyzer make: Thermo 49i

Analyzer serial #: 1227254861

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	698.2	695.2
Calculated slope	1.002749	0.994125	Flow cell A	0.770	0.768
Calculated intercept	-2.912686	-1.680951	Flow cell B	0.745	0.745
Analyzer Background	-3.9	-4.1	Cell A Intensity	90235	90156
Analyzer Coefficient	1.033	1.068	Cell B Intensity	83622	83555

O₃ Calibration Data

Set Point	Total air flow rate (sccm)	Calibrator Lamp Voltage Drive	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5009	800.0	0.0	-0.7	----
as found span	4900	1068.7	400.0	390.2	1.025
calibrator zero	5008	800.0	0.0	-0.7	----
high point	4902	1052.9	400.0	402.8	0.993
second point	4902	845.8	200.0	204.1	0.980
third point	4900	731.8	100.0	104.7	0.955
as left zero	5010	800.0	0.0	-0.6	----
as left span	4829	1071.0	400.0	407.0	0.983
Average Correction Factor					0.976

Corrected As found	390.90	Previous response	401.82	*% change	2.8%
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* = > +/-8% change initiates investigation

Notes:

Adjusted span.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

O₃ Calibration Summary

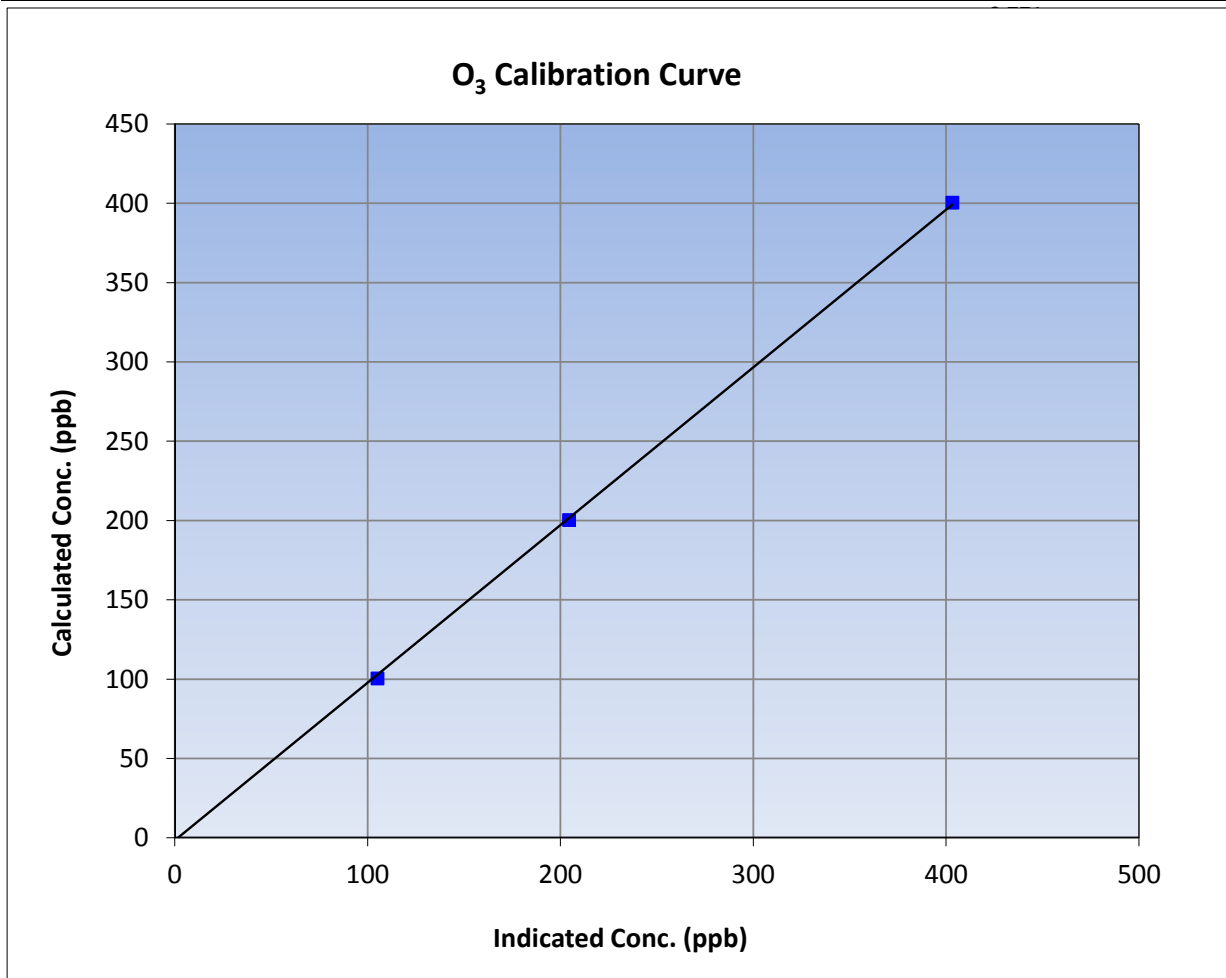
Version-03-2017

Station Information

Calibration Date	June 19, 2017	Previous Calibration	May 11, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	10:47	End Time (MST)	13:41
Analyzer make	Thermo 49i	Analyzer serial #	1227254861

Calibration Data

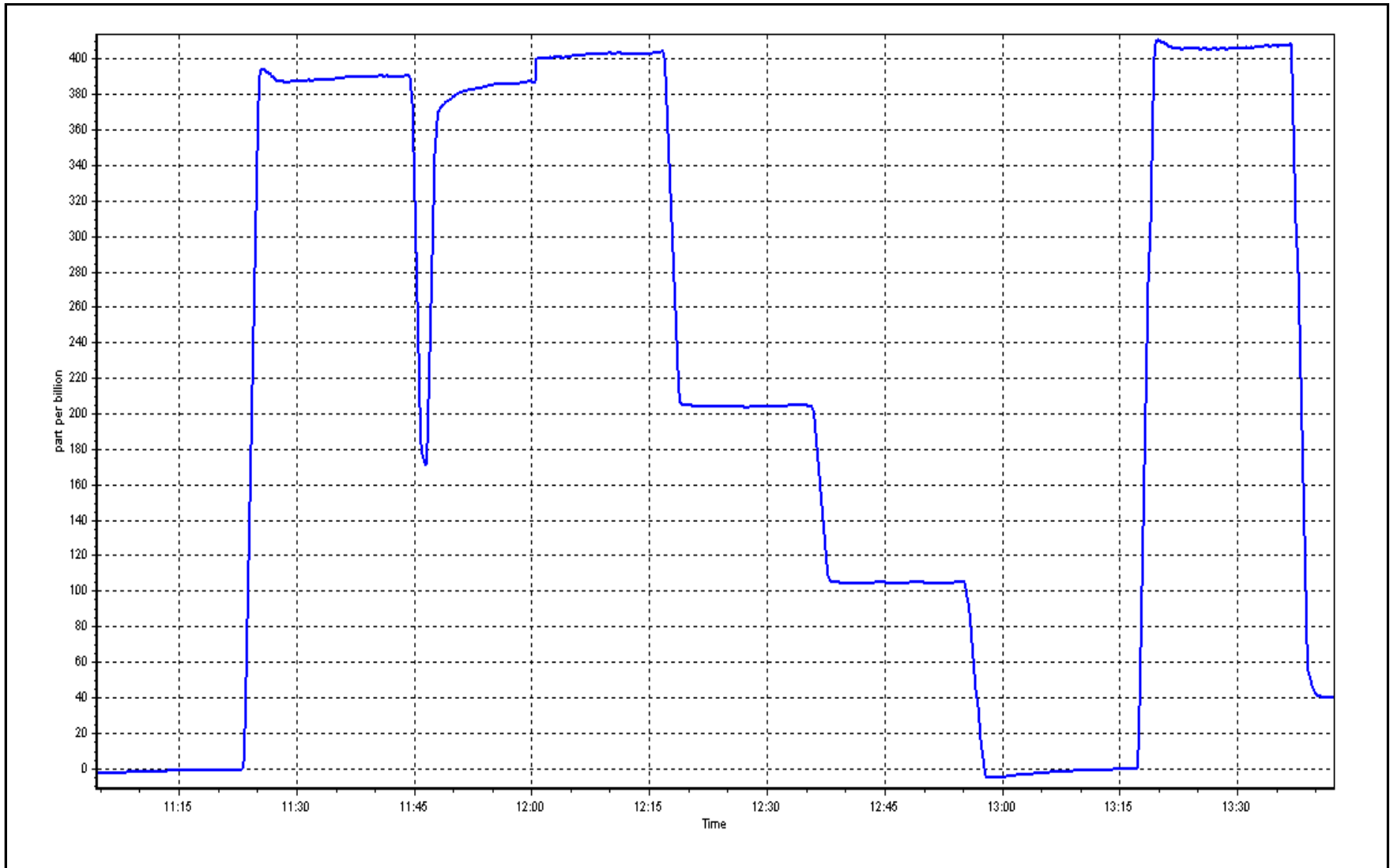
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.7	----	Correlation Coefficient	0.999835	≥0.995
400.0	402.8	0.9930			
200.0	204.1	0.9799	Slope	0.994125	0.90 - 1.10
100.0	104.7	0.9551			
			Intercept	-1.680951	+/- 10



O₃ Calibration Plot

Date: June 19, 2017

Location: Janvier





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	June 1, 2017	Last Cal Date:	May 10, 2017
Start time (MST):	11:06	End time (MST):	16:15
Reason:	Maintenance		

Calibration Standards

NO Gas Cylinder #	LL107937	Cal Gas Expiry Date	September 8, 2018
NOX Cal Gas Conc.	<u>50.9</u> ppb	NO Cal Gas Conc.	<u>50.9</u> ppb
Calibrator Model	API T700	Serial Number	2447
ZAG make/model	Teledyne API T701	Serial Number	135

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	1229254994	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	0.968	0.680	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	0.994	0.995	PMT Temperature	-3.0 -3.0
NO2 coefficient	0.995	0.995	Reaction cell Press	193.2 152.9
NO bkgrnd	2.7	2.1	Sample Flow	0.786 1.066
NOX bkgrnd	2.8	2.1	PMT Voltage	-762.2 -762.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.996863	0.993273
NO _x Cal Offset	3.690160	6.267433
NO Cal Slope	0.992266	0.989031
NO Cal Offset	5.085550	7.341076
NO ₂ Cal Slope	0.999884	1.008880
NO ₂ Cal Offset	1.650769	-0.181429



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5009	0.0	0.0	0.0	0.0	0.2	-0.2	0.4	----	----
as found span	4934	78.7	799.1	799.1	0.0	735.1	734.4	0.7	1.0871	1.0881
calibrator zero	5006	0.0	0.0	0.0	0.0	0.2	-0.2	0.7	----	----
high point	4935	78.7	799.0	799.0	0.0	802.4	805.2	-2.8	0.9957	0.9923
second point	4976	39.4	399.9	399.9	0.0	389.2	389.0	0.3	1.0274	1.0279
third point	4993	19.7	200.0	200.0	0.0	191.3	190.7	1.4	1.0456	1.0490
as left zero	5011	0.0	0.0	0.0	0.0	0.3	0.0	0.4	----	----
as left span	4828	78.7	816.4	383.8	432.6	814.3	385.5	428.8	1.0026	0.9956
Average Correction Factor									1.0229	1.0231

Corrected As found	NO _x = 734.9 ppb	NO = 734.6 ppb	*Percent Change	NO _x = 8.6%
Previous Response	NO _x = 798.0 ppb	NO = 800.3 ppb	*Percent Change	NO = 8.9%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	810.0	807.9	2.6	0.9864	0.9890	----	----
1st NO2 (400 ppb O3)	383.8	424.1	806.1	383.8	422.3	0.9912	----	1.0043	99.6%
2nd NO2 (200 ppb O3)	595.4	212.5	801.1	595.4	205.8	0.9973	----	1.0326	96.8%
3rd NO2 (100 ppb O3)	703.8	104.1	810.2	703.8	106.1	0.9861	----	0.9811	101.9%
2nd NO ref point	----	0.0	810.0	807.9	2.6	0.9864	0.9890	----	----
Average Correction Factor						0.9903	0.9890	1.0060	99.4%

Notes: Pump replaced and span adjusted after as founds.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

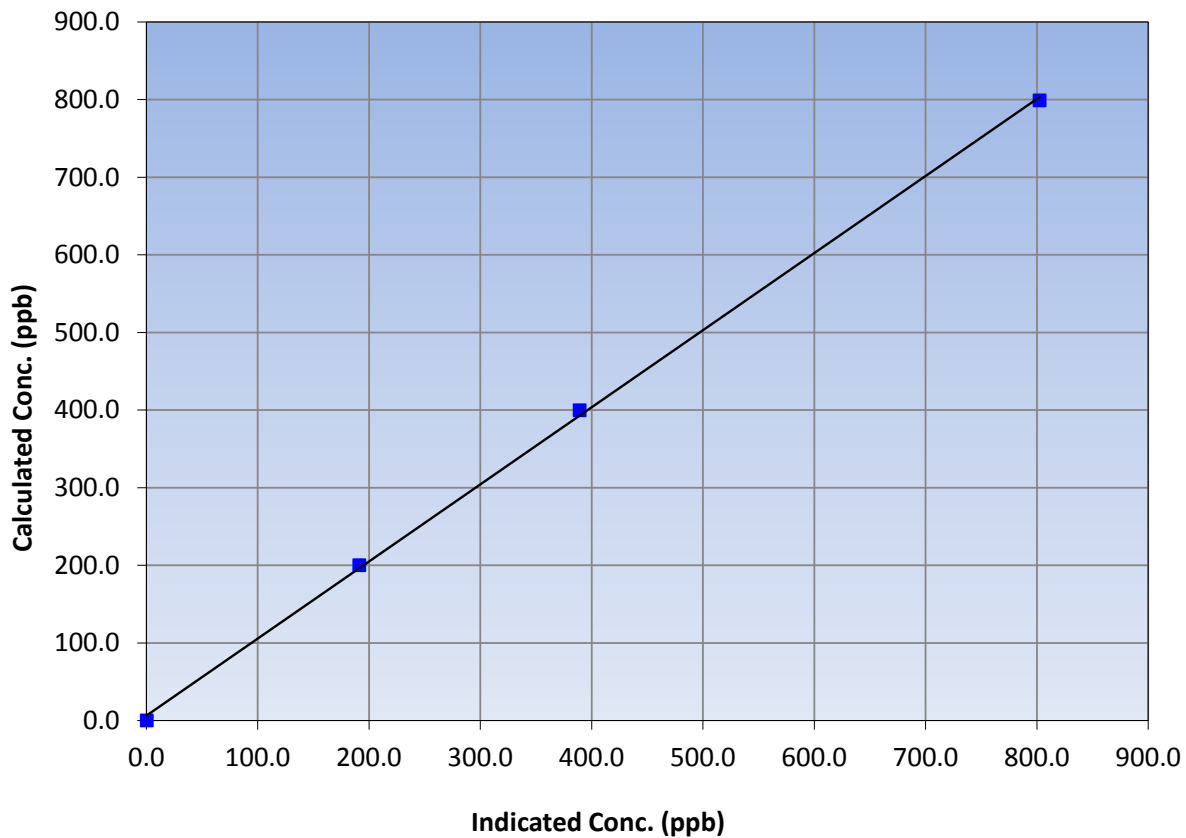
Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1229254994

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
799.0	802.4	0.9957			
399.9	389.2	1.0274			
200.0	191.3	1.0456			
			Slope	0.993273	0.90 - 1.10
			Intercept	6.267433	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

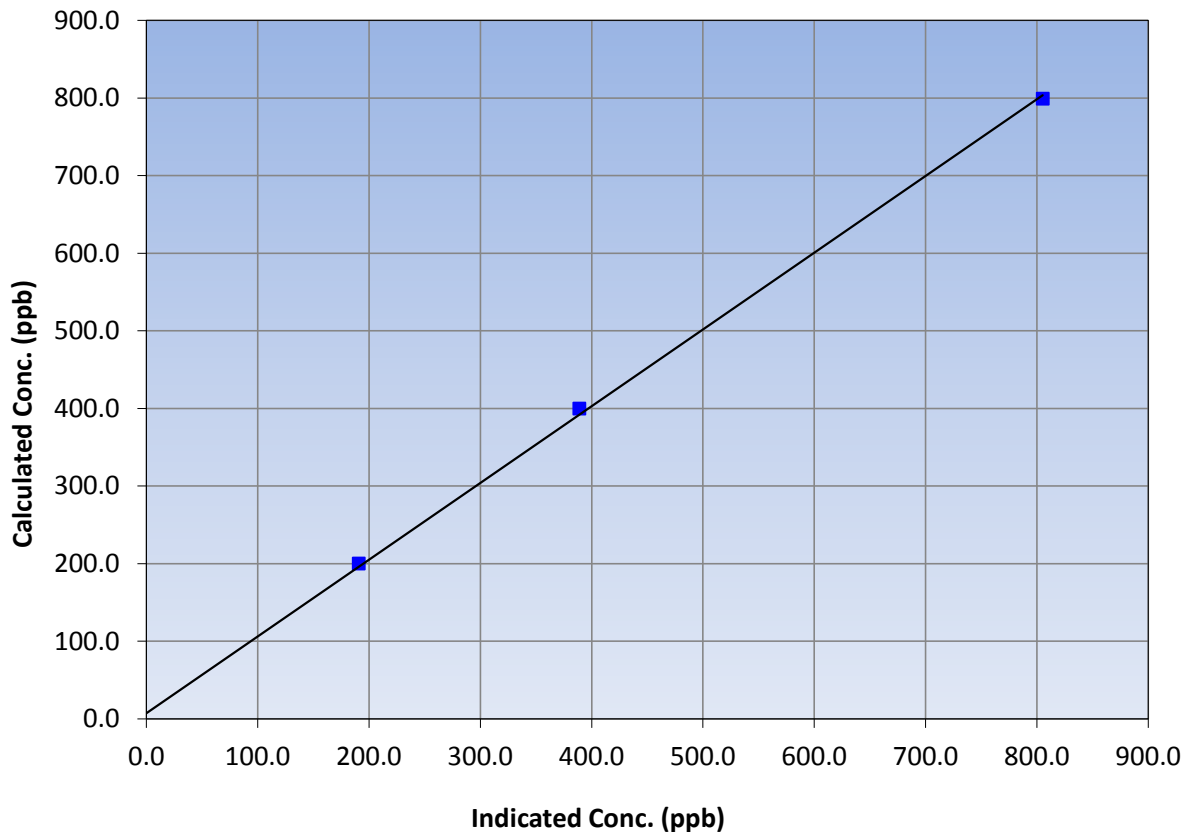
Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1229254994

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.2	----	Correlation Coefficient	0.999568	≥0.995
799.0	805.2	0.9923			
399.9	389.0	1.0279	Slope	0.989031	0.90 - 1.10
200.0	190.7	1.0490			
			Intercept	7.341076	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

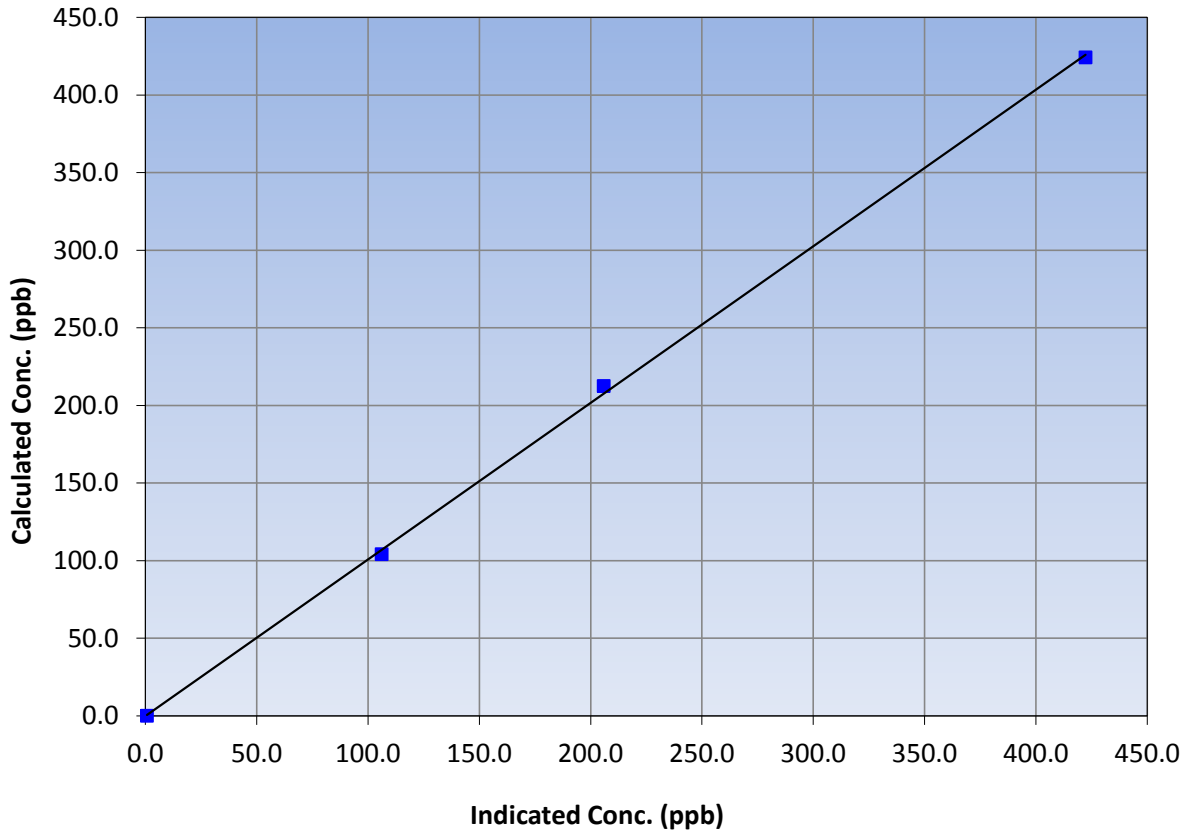
Station Information

Calibration Date	June 1, 2017	Previous Calibration	May 10, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:06	End Time (MST)	16:15
Analyzer make	Thermo 42i	Analyzer serial #	1229254994

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.7	----	Correlation Coefficient	≥0.995	
424.1	422.3	1.0043			
212.5	205.8	1.0326			
104.1	106.1	0.9811			
			Slope	1.008880	0.90 - 1.10
			Intercept	-0.181429	+/-20

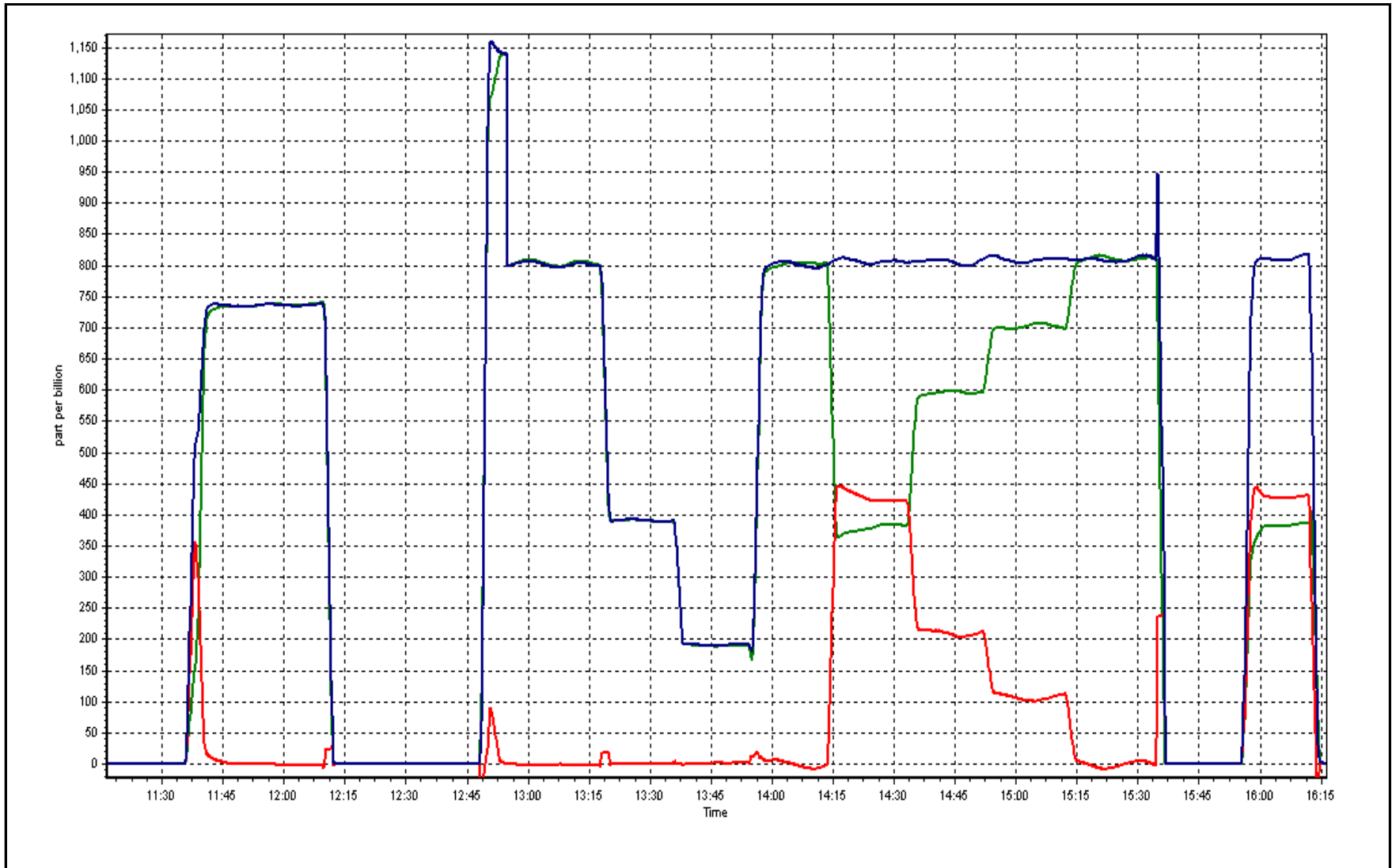
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 1, 2017

Location: Janvier





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	June 19, 2017	Last Cal Date:	May 11, 2017
Start time (MST):	10:35	End time (MST):	13:31
Sharp Model:	Thermo 5030 SHARP	S/N:	E-803
Particulate Fraction:	PM2.5	C14 Source S/N:	4173
Flow Standard Model:	Delta-Cal	S/N:	954
Temp/RH standard:	Delta-Cal	S/N:	954

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T1 (°C)	21	20.1	21	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	960	958.8	960	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1018.2	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0	0	0	<input type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input checked="" type="checkbox"/>				
Cyclone cleaning:	PM10 Cyclone <input checked="" type="checkbox"/>		PM2.5 Cyclone <input checked="" type="checkbox"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

				<u>Tolerance</u>
Leak Test:	Date of check: <u>Nov 17 2016</u>	Last Cal Date: <u>NA</u>		
	Flow w/o adaptor: <u>16.53</u>	Flow w/ adaptor: <u>16.4</u>		0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: <u>1202</u>	S/N: <u>5332</u>
	Date of check: <u>Nov 17 2016</u>	Last Cal Date: <u>NA</u>
	New Correction Factor: <u>7065</u>	<u>7036</u>

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
T2 (°C)	16	NA	16	<input type="checkbox"/>	+/- 2 °C
T3 (°C)	18	NA	18	<input type="checkbox"/>	+/- 2 °C
T4 (°C)	12	NA	12	<input type="checkbox"/>	+/- 2 °C
RH (%)	10	NA	10	<input type="checkbox"/>	+/- 10%

Notes: Pump was off after power outage. Recycled power and calibrated. No adjustments required.

Calibration by: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 23 FORT HILLS JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	35	35	100	14	0	2	0
TRS(ppb) Average	686	33	34	99.86	1	0	0	0
THC(ppm) Average	681	35	39	99.44	5	-	2	-
NO2 (ppb) Average	685	35	35	100	31	0	10	-
NO (ppb) Average	685	35	35	100	32	-	6	-
NOX (ppb) Average	685	35	35	100	56	-	16	-
PM2.5 (ug/m3) Average	706	2	14	98.33	285	-	58	2
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	25	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
Temperature 2 m (C) Average	720	0	0	100	29	-	22	-
Relative Humidity (%) Average	720	0	0	100	96	-	84	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	0.4	1	-	0	0	0	0	0	1	14
TRS (ppb) Average	686	0.3	0	-	0	0	0	0	0	0	1
THC (ppm) Average	681	2.1	0	-	2	2	2	2	2	2	5
NO2 (ppb) Average	685	4.7	5	-	0	1	1	3	6	12	31
NO (ppb) Average	685	1.6	4	-	0	0	0	0	1	4	32
NOX (ppb) Average	685	6.3	8	-	0	1	1	3	7	16	56
PM2.5 (ug/m3) Average	706	13.2	19	-	0	3	6	9	15	25	285
Wind Speed 10 m (km/h) Average	720	11.2	7	-	0	3	5	10	15	22	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	720	16.4	5	-	6	10	13	16	20	23	29
Relative Humidity (%) Average	720	60.1	21	-	20	30	42	61	78	87	96

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	06 Jun 2017 12:00	06 Jun 2017 12:00	1	Maintenance - manifold cleaning
THC	19 Jun 2017 11:00	19 Jun 2017 14:00	4	Maintenance - baseline adjustment and calibration
PM2.5	09 Jun 2017 19:00	09 Jun 2017 20:00	2	Unstable operation - excessive baseline drift
PM2.5	10 Jun 2017 03:00	10 Jun 2017 06:00	4	Unstable operation - excessive baseline drift
PM2.5	11 Jun 2017 07:00	11 Jun 2017 08:00	2	Unstable operation - excessive baseline drift
PM2.5	11 Jun 2017 11:00	11 Jun 2017 12:00	2	Unstable operation - excessive baseline drift
PM2.5	11 Jun 2017 14:00	11 Jun 2017 14:00	1	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort Hills - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 14 ppb on Jun 30 12:00	Maximum Daily Average: 1.5 ppb on Jun 30		Hours of Data:	685
Minimum Value: 0 ppb on Jun 5 08:00	Minimum Daily Average: 0.0 ppb on Jun 10		Hours of Missing Data:	35
Maximum Diurnal Average: 1.0 ppb at hour 12	Minimum Diurnal Average: 0.1 ppb at hour 5		Hours of Calibration:	35
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	Z	1	0	0	0	0	0	1	1	0	1	0	3	3	4	2	1	1	2	4	3	2	2	1.4	4
2-Jun	1	0	Z	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	1
3-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0.2	1
4-Jun	0	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
5-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
6-Jun	Z	0	0	0	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.2	0
7-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
12-Jun	Z	0	0	0	0	2	0	2	4	5	3	1	1	1	2	1	1	1	1	0	0	0	0	0	1.1	5
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
15-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
16-Jun	0	0	0	0	Z	0	0	0	0	1	1	0	0	1	0	1	3	2	1	0	0	0	0	0	0.5	3
17-Jun	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
18-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
19-Jun	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
20-Jun	0	0	Z	0	0	0	1	2	2	4	6	6	4	0	0	0	1	2	1	1	0	1	0	0	1.4	6
21-Jun	2	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
23-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
24-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
25-Jun	0	Z	0	0	0	0	0	0	0	0	0	1	2	2	4	1	1	1	1	1	0	0	0	1	0.7	4
26-Jun	2	2	Z	1	0	0	0	3	4	4	3	2	1	1	1	0	1	1	1	0	0	0	0	0	1.3	4
27-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jun	1	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0.3	1
30-Jun	Z	0	0	0	0	0	0	0	0	7	6	14	3	1	2	0	0	0	0	0	0	0	0	0	1.5	14

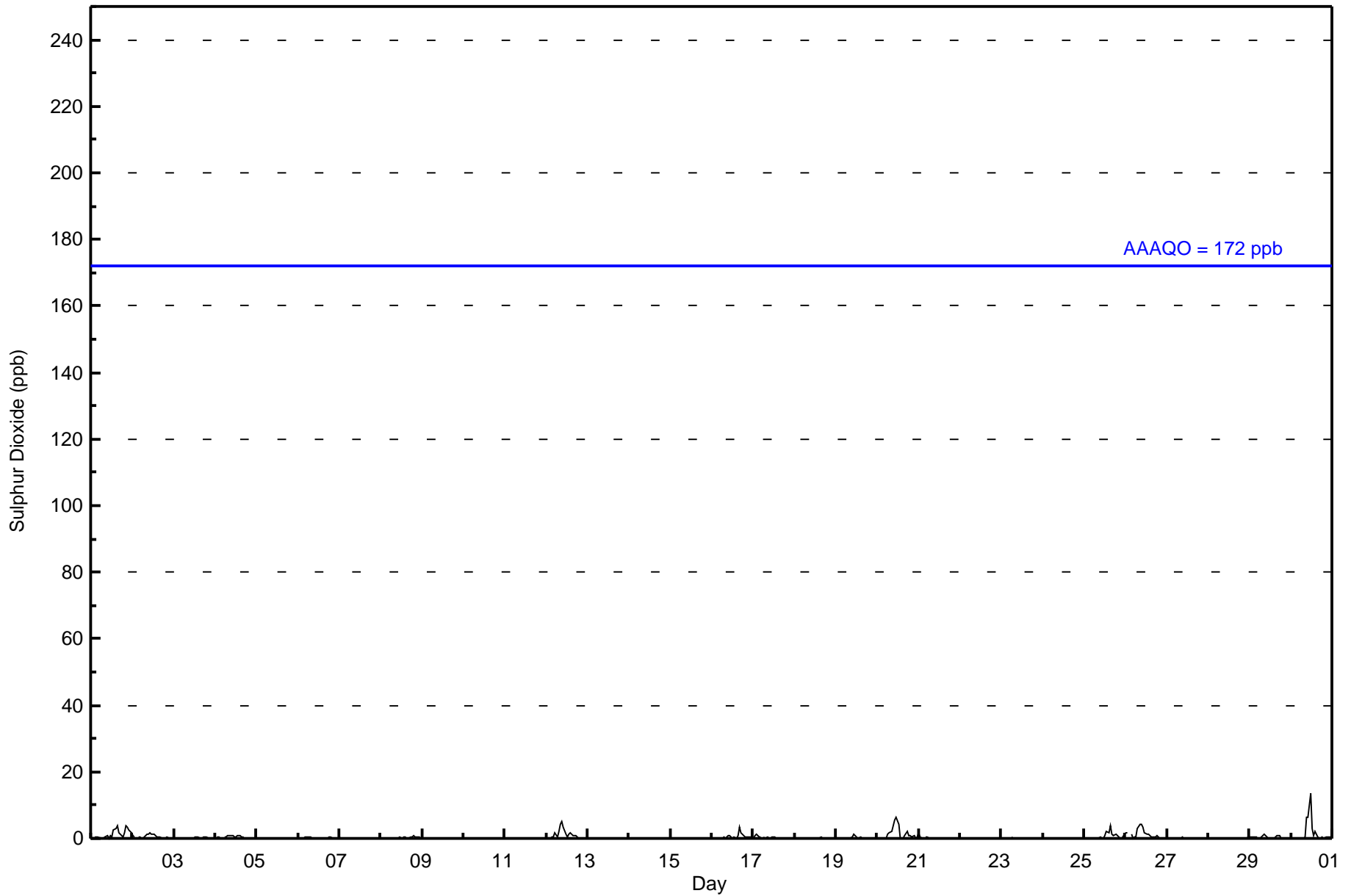
0.3	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.5	0.9	0.8	1.0	0.5	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.2	Diurnal Average	
2	2	1	1	0	2	1	3	4	7	6	14	4	3	3	4	3	2	1	2	4	3	2	2	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Hills - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	684	99.85	99.85
11 - 20	1	0.15	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	73	125	55	24	10	17	31	77	66	36	31	20	22	33	25	39	684
11 - 20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	125	55	24	10	17	31	78	66	36	31	20	22	33	25	39	685

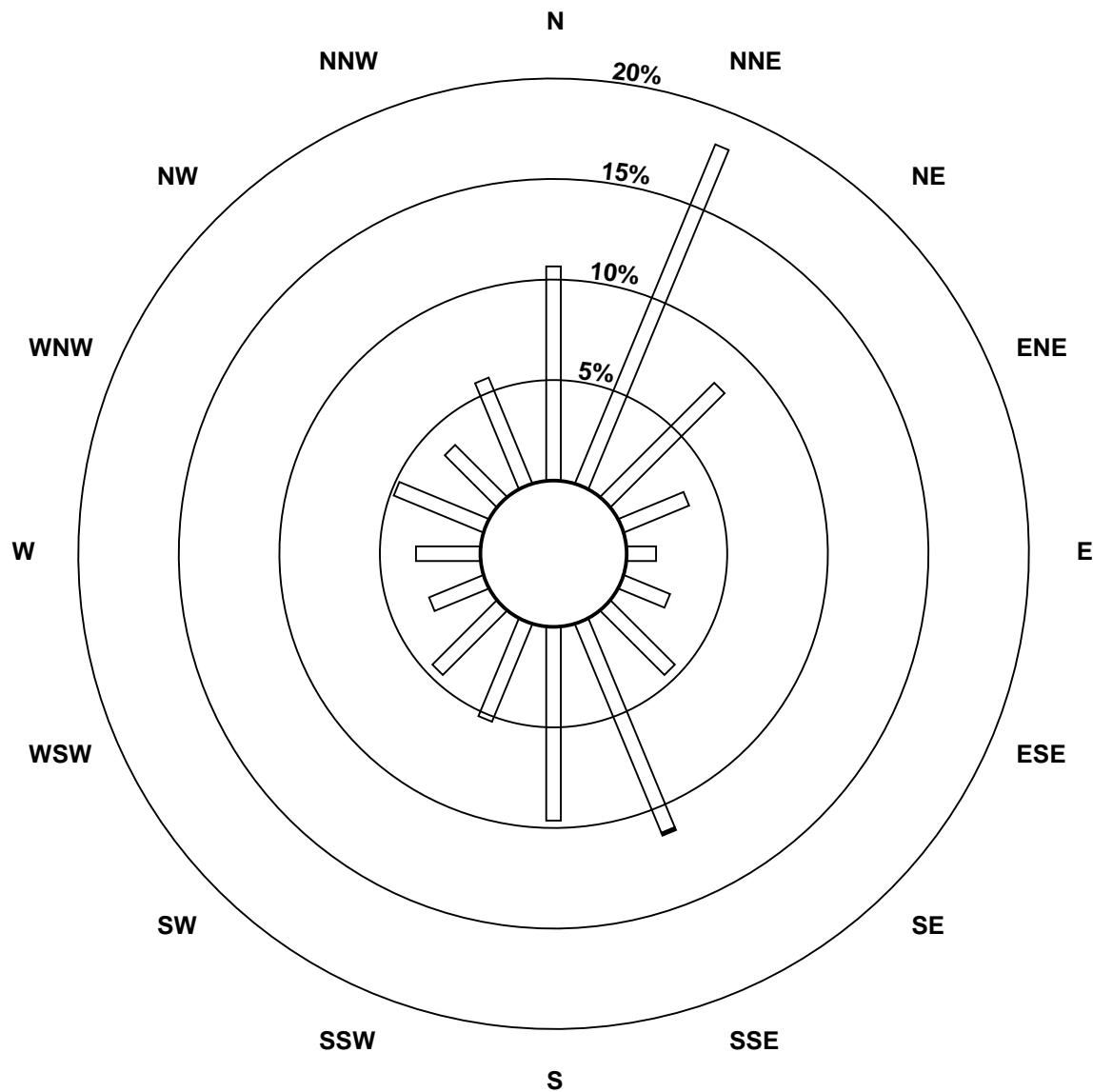
Total Number of Valid Hours: 685

Total Number of Hours: 720

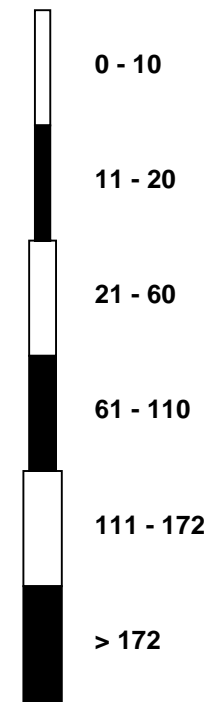


Wood Buffalo Environmental Association
Wind Rose Jun 2017

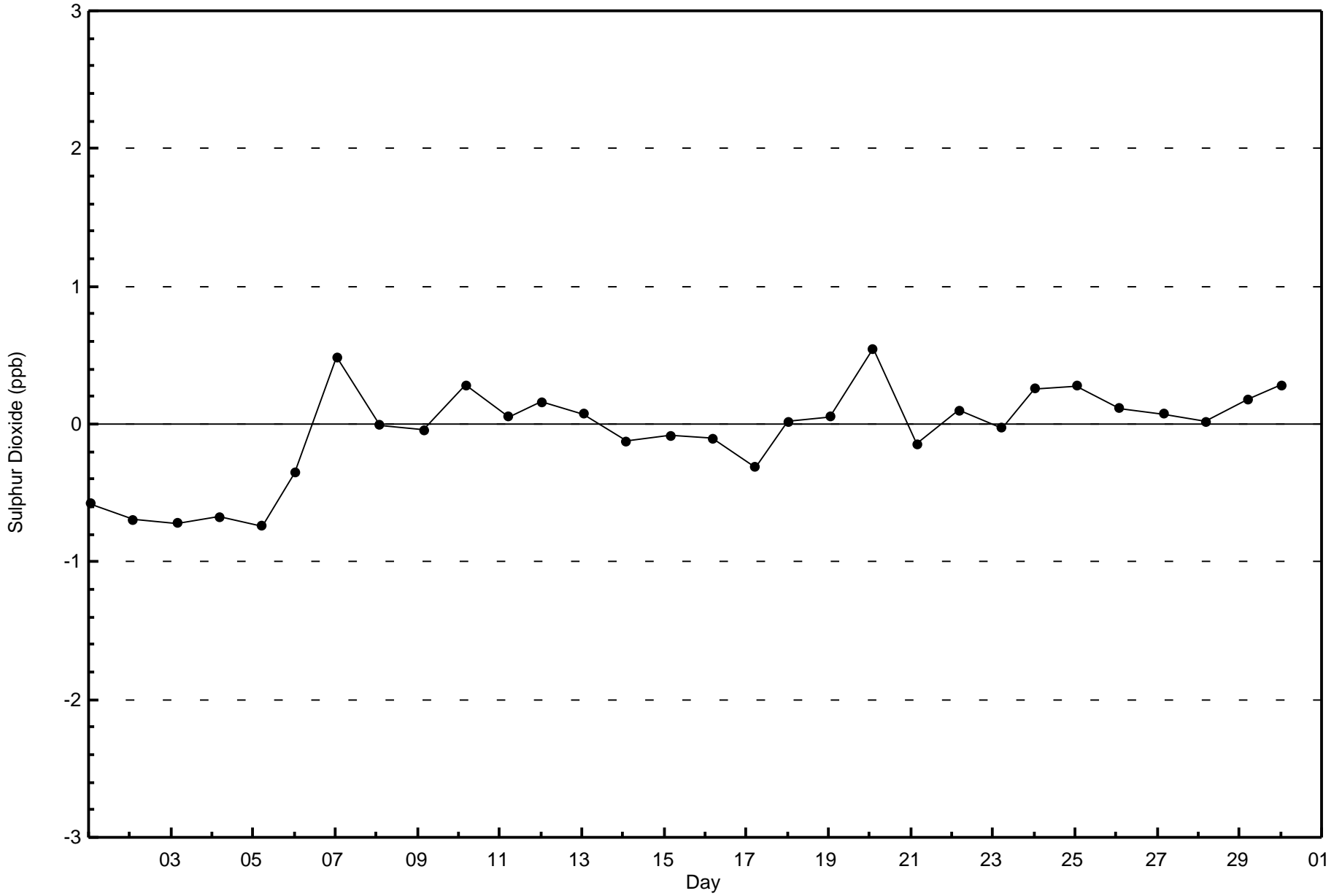
Sulphur Dioxide (SO₂) - ppb
Fort Hills (AMS 23)

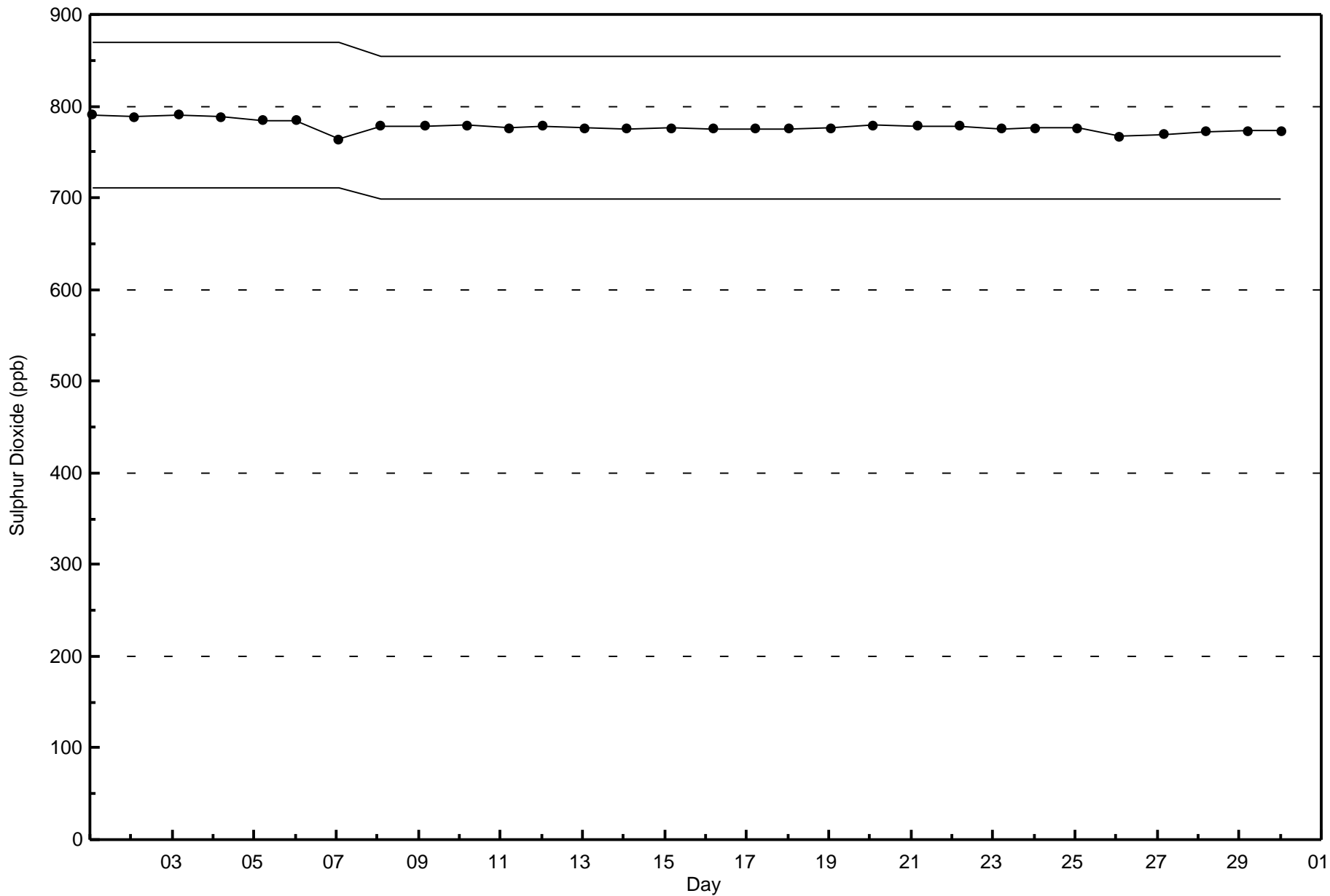


Classes (ppb)



Total Number of Valid Hours: 685







Summary of Hour Averages

Fort Hills - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 1 ppb on Jun 20 08:00	Maximum Daily Average: 0.5 ppb on Jun 20		Hours of Data:	686
Minimum Value: 0 ppb on Jun 24 17:00	Minimum Daily Average: 0.2 ppb on Jun 9		Hours of Missing Data:	34
Maximum Diurnal Average: 0.3 ppb at hour 5	Minimum Diurnal Average: 0.2 ppb at hour 15		Hours of Calibration:	33
Monthly Average: 0.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
2-Jun	1	1	1	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
4-Jun	0	1	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Jun	0	0	0	0	0	0	Z	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
6-Jun	0	Z	0	0	0	1	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
9-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
12-Jun	0	Z	0	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
14-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
16-Jun	0	0	0	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
17-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
19-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jun	0	0	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
21-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.2	1
22-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
26-Jun	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
27-Jun	1	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
29-Jun	0	0	0	0	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
30-Jun	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1

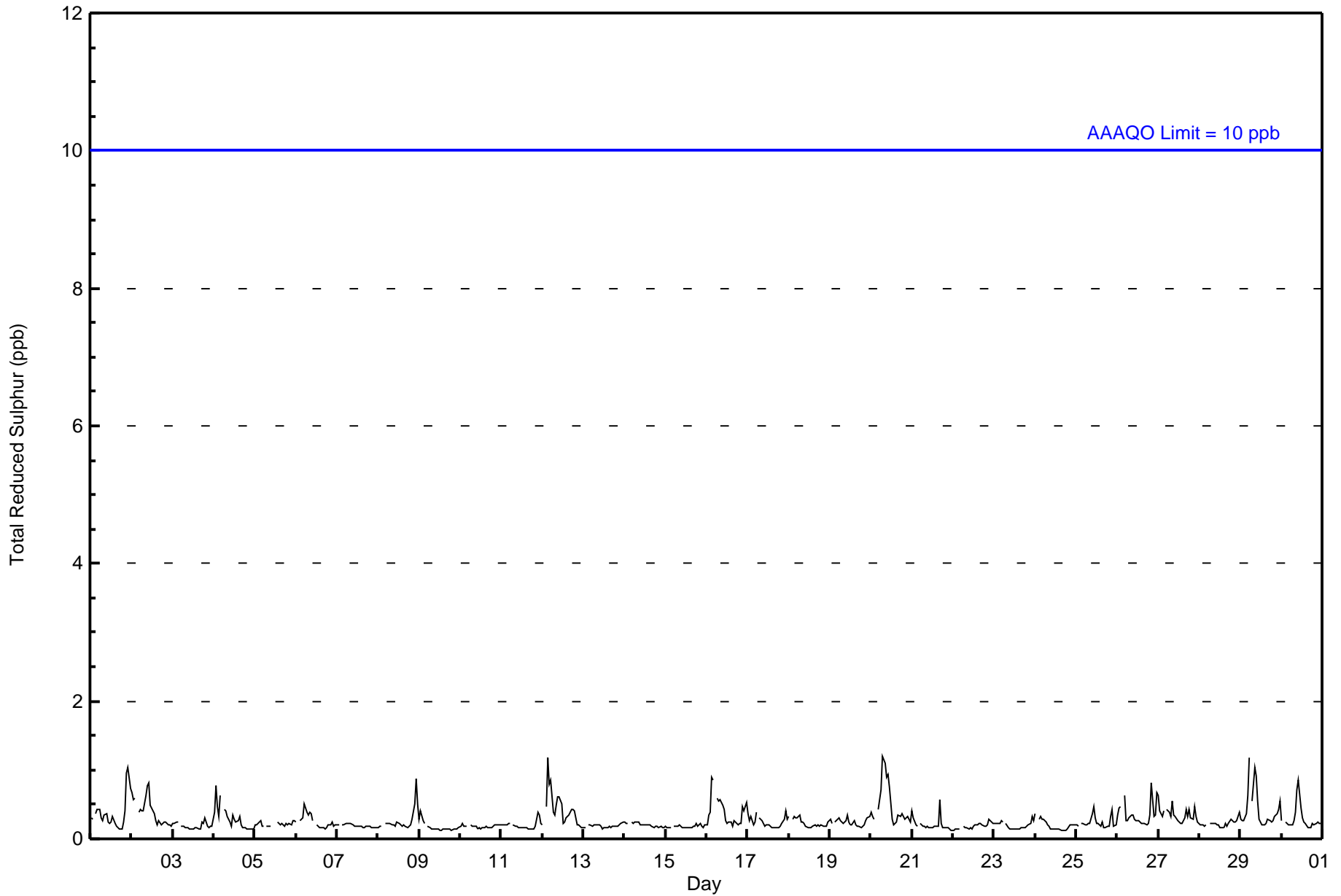
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average
1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort Hills - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	75	125	54	24	10	17	32	80	64	35	32	21	24	32	24	37	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	75	125	54	24	10	17	32	80	64	35	32	21	24	32	24	37	686

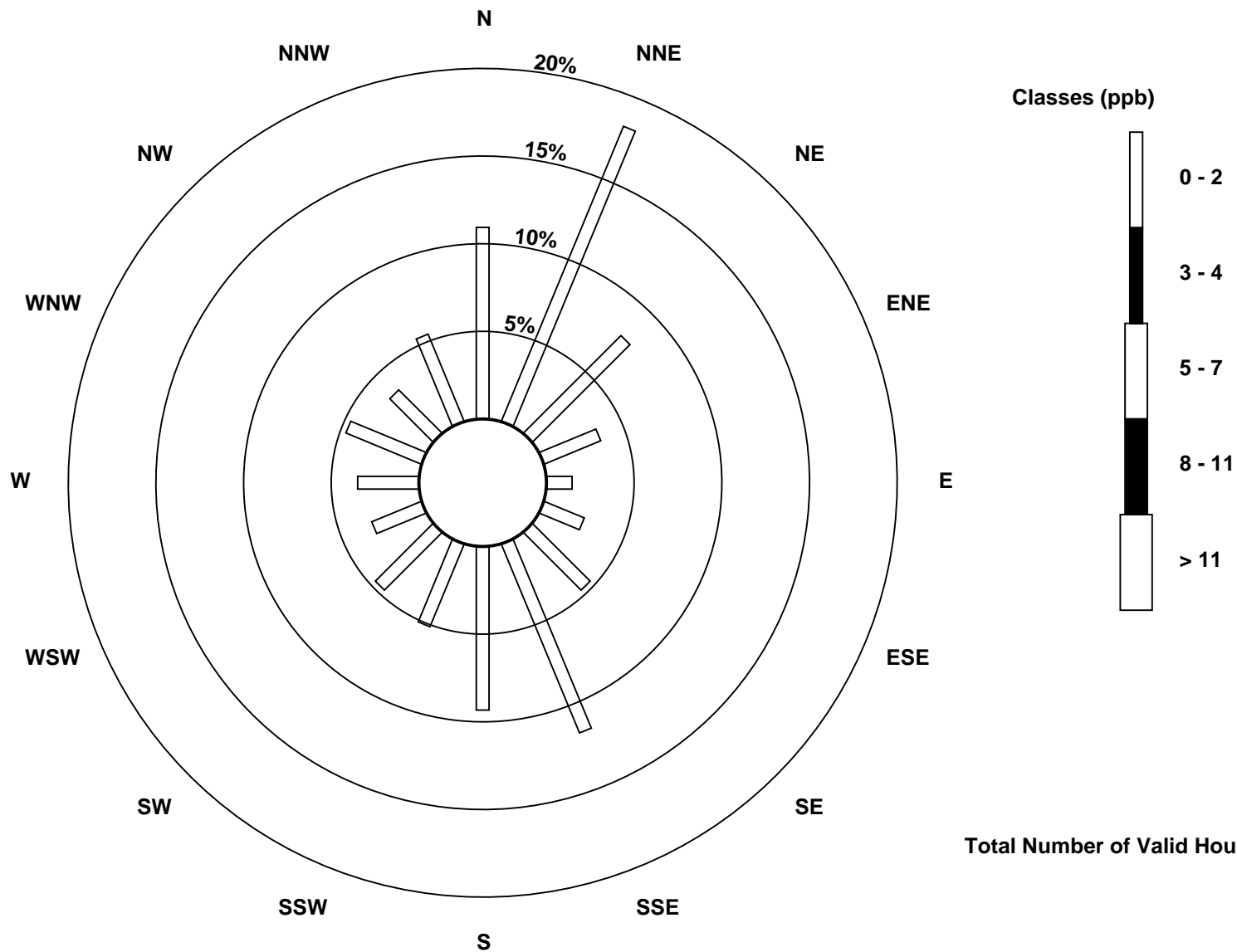
Total Number of Valid Hours: 686

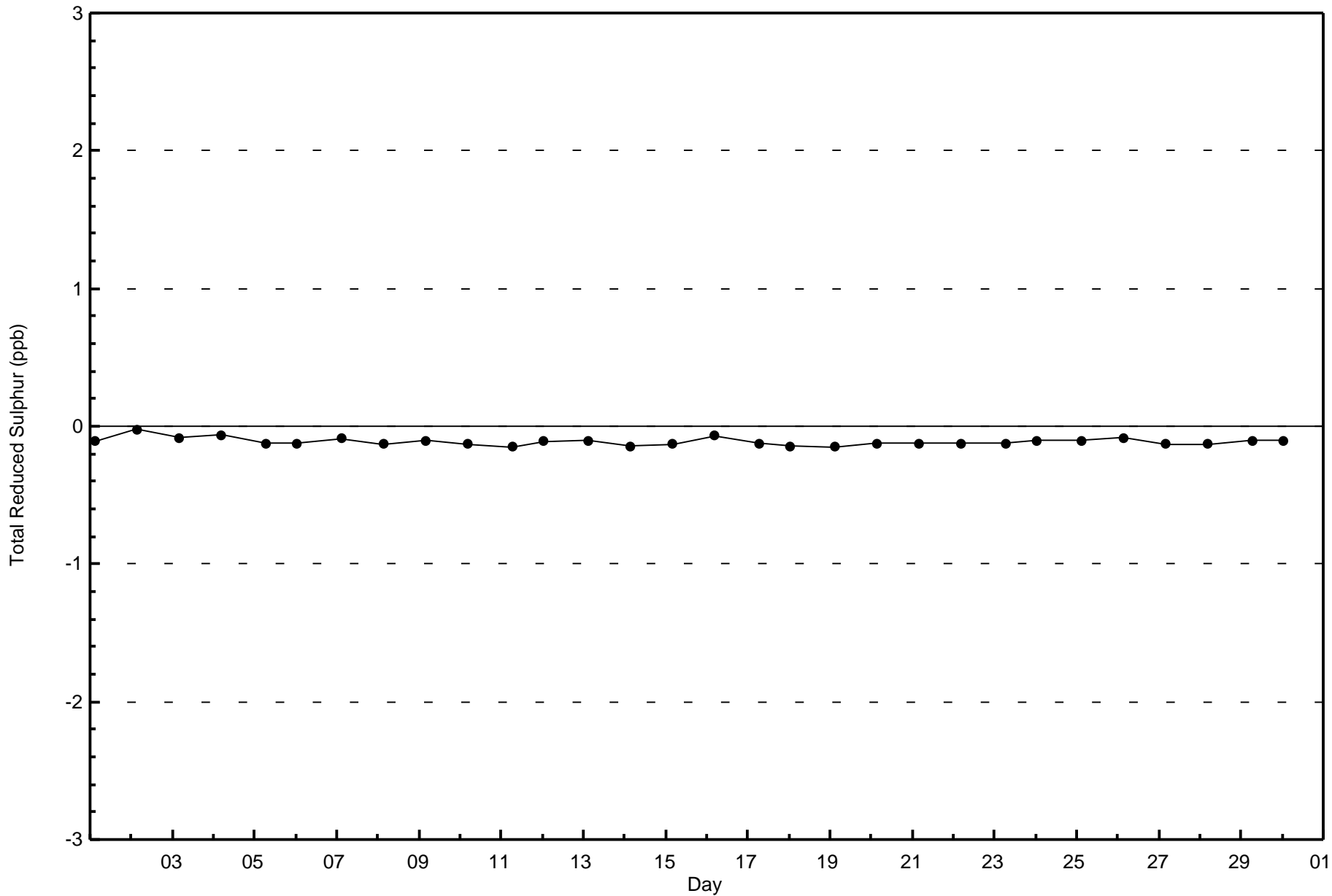
Total Number of Hours: 720

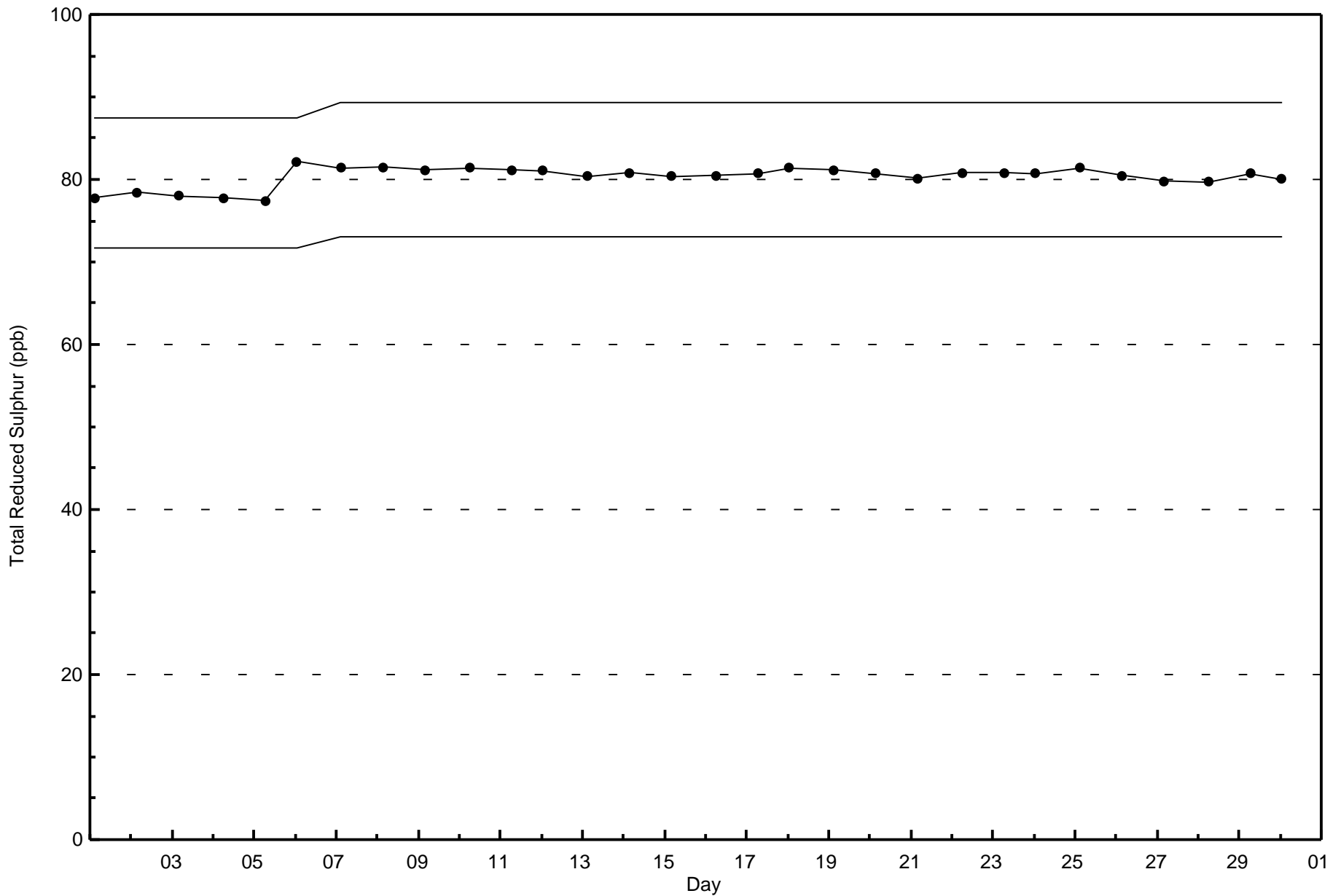


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Reduced Sulphur (TRS) - ppb
Fort Hills (AMS 23)







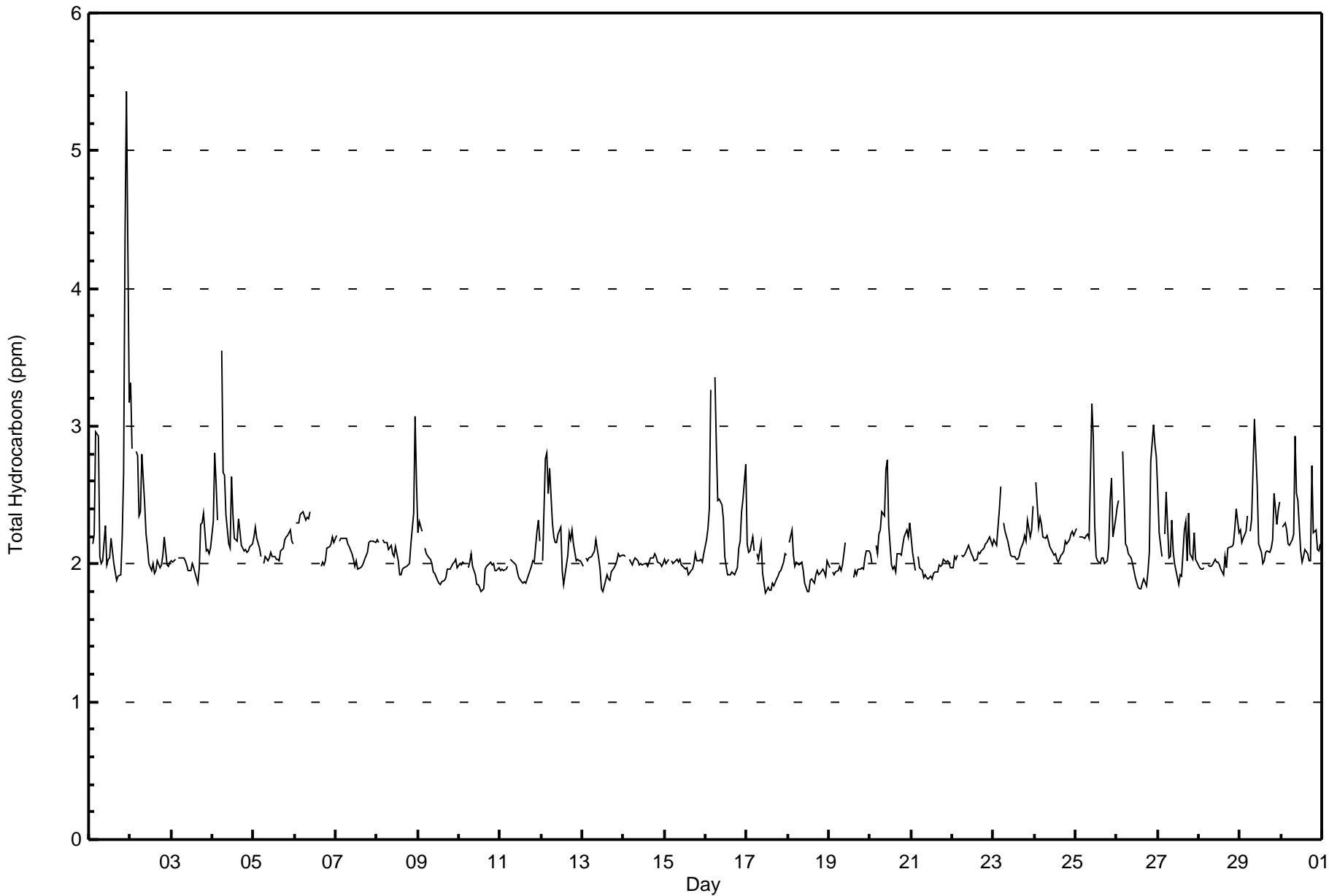


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5 ppm on Jun 1 23:00	Maximum Daily Average: 2.5 ppm on Jun 1		Hours of Data:	681
Minimum Value: 2 ppm on Jun 17 12:00	Minimum Daily Average: 2.0 ppm on Jun 10		Hours of Missing Data:	39
Maximum Diurnal Average: 2.3 ppm at hour 23	Minimum Diurnal Average: 2.0 ppm at hour 15		Hours of Calibration:	35
Monthly Average: 2.1 ppm	Percentiles: P ₁ = 2 P ₁₀ = 2 Q ₁ = 2 Median = 2 Q ₃ = 2 P ₉₀ = 2 P ₉₉ = 3		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	Z	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	4	5	3	2.5	5
2-Jun	3	3	Z	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.3	3
3-Jun	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
4-Jun	2	3	3	2	Z	4	3	3	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2.4	4
5-Jun	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
6-Jun	Z	2	2	2	2	2	2	2	2	2	C	C	C	C	C	2	2	2	2	2	2	2	2	2	2.2	2
7-Jun	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
8-Jun	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2.1	3
9-Jun	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
10-Jun	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
11-Jun	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
12-Jun	Z	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
13-Jun	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
14-Jun	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
15-Jun	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
16-Jun	2	2	2	3	Z	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2.3	3
17-Jun	2	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
18-Jun	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
19-Jun	2	Z	2	2	2	2	2	2	2	2	M	M	M	M	2	2	2	2	2	2	2	2	2	2	2.0	2
20-Jun	2	2	Z	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
21-Jun	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	2
22-Jun	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
23-Jun	2	2	2	2	3	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
24-Jun	Z	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
25-Jun	2	Z	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	3	2	2	2.3	3
26-Jun	2	2	Z	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2.2	3
27-Jun	3	2	2	Z	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	3
28-Jun	2	2	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	2
29-Jun	2	2	2	2	2	Z	2	2	3	3	3	2	2	2	2	2	2	2	2	2	2	3	2	2	2.3	3
30-Jun	Z	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2.2	3

2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.2	Diurnal Average
3	3	3	3	3	4	3	3	3	3	3	3	3	2	2	2	2	2	2	3	2	3	4	5	3	Diurnal Maximum

Z - zerspan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - June 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	325	47.72	47.72
2.1 - 3.0	347	50.95	98.68
3.1 - 10.0	9	1.32	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - June 2017

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	35	65	35	8	1	5	6	22	24	17	19	9	17	18	20	24	325
2.1 - 3.0	38	60	20	15	8	11	23	55	40	19	11	10	5	14	4	14	347
3.1 - 10.0	0	0	0	1	1	1	2	0	2	0	0	0	0	1	0	1	9
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	125	55	24	10	17	31	77	66	36	30	19	22	33	24	39	681

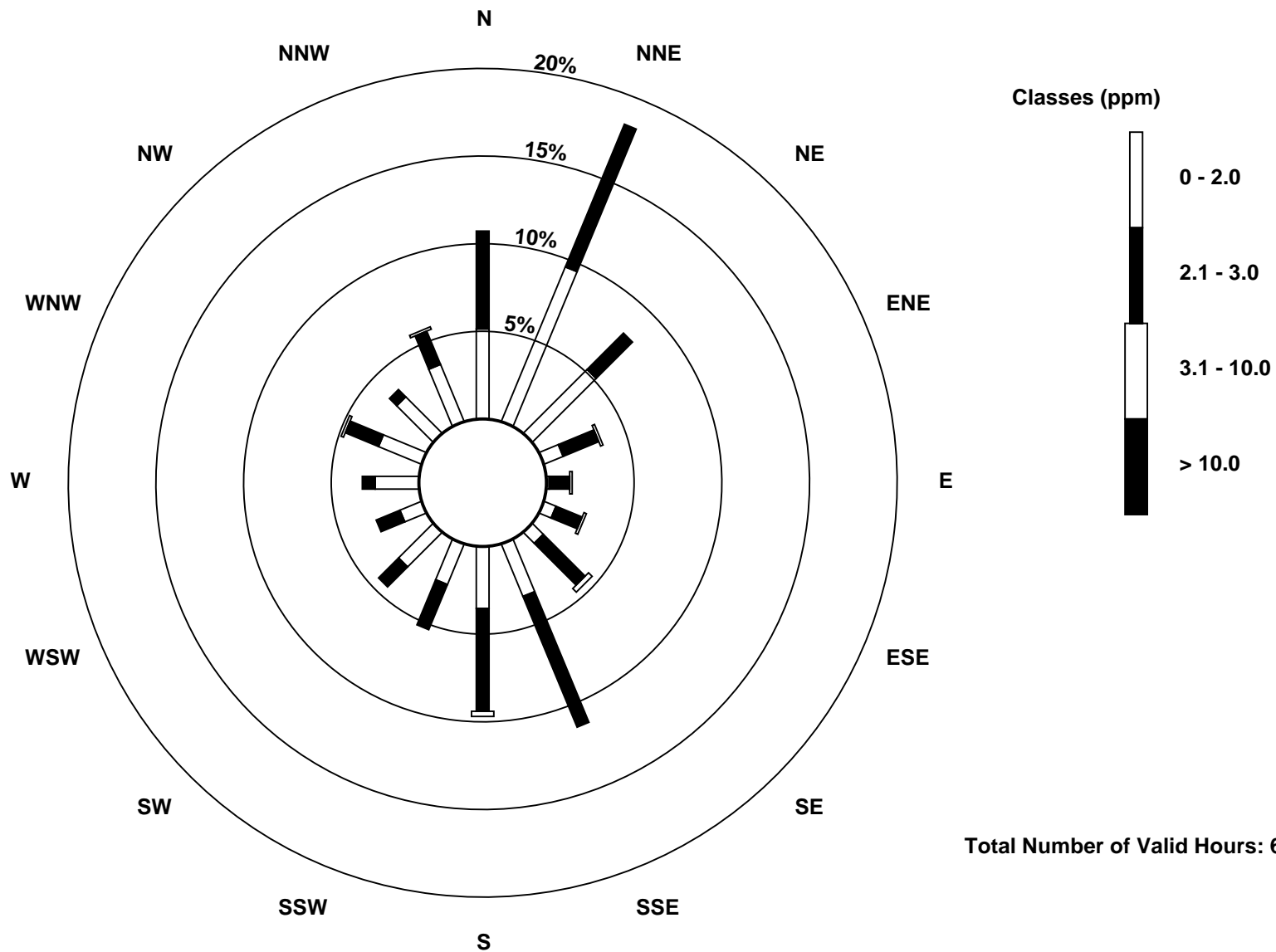
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Total Hydrocarbons (THC) - ppm
Fort Hills (AMS 23)



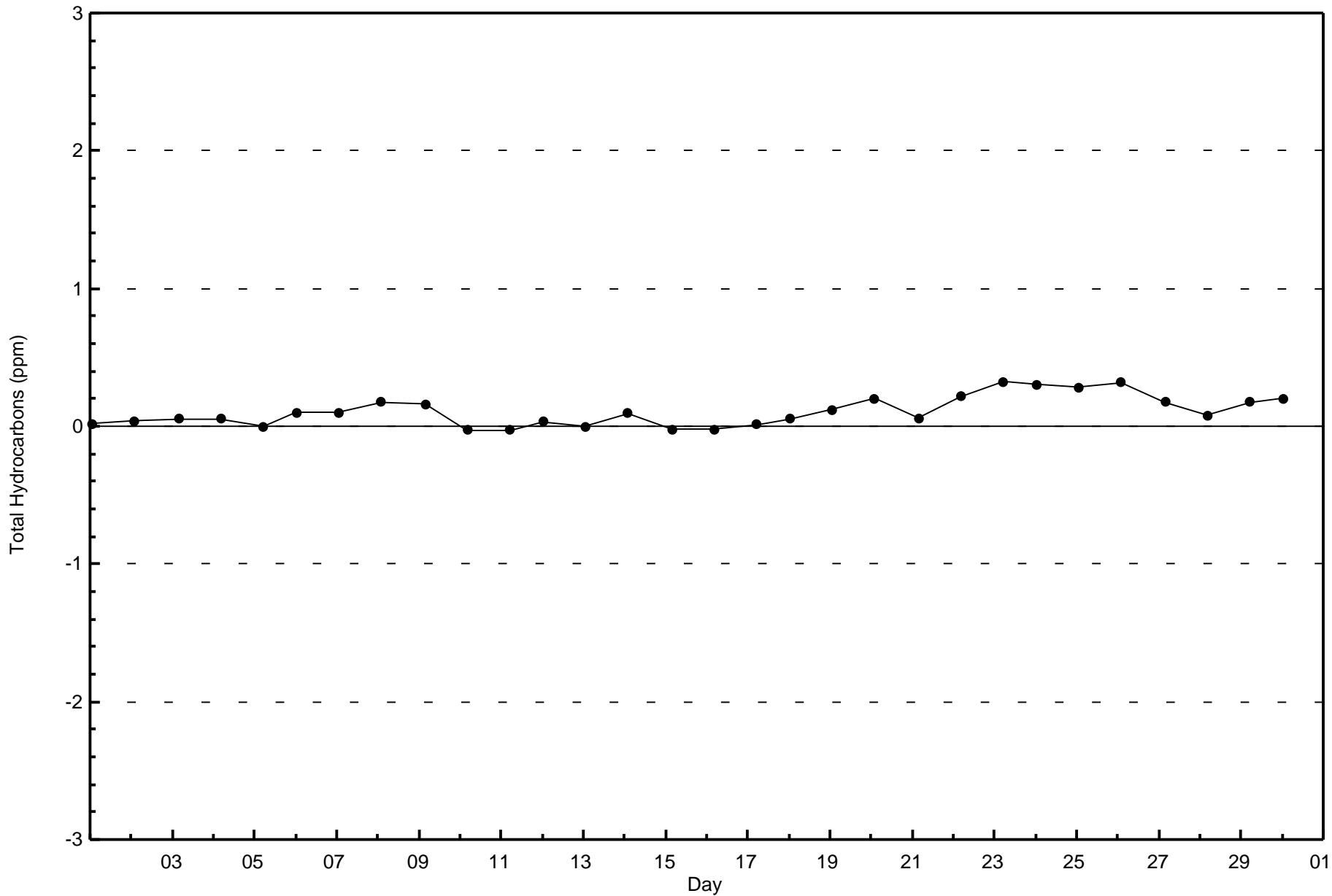


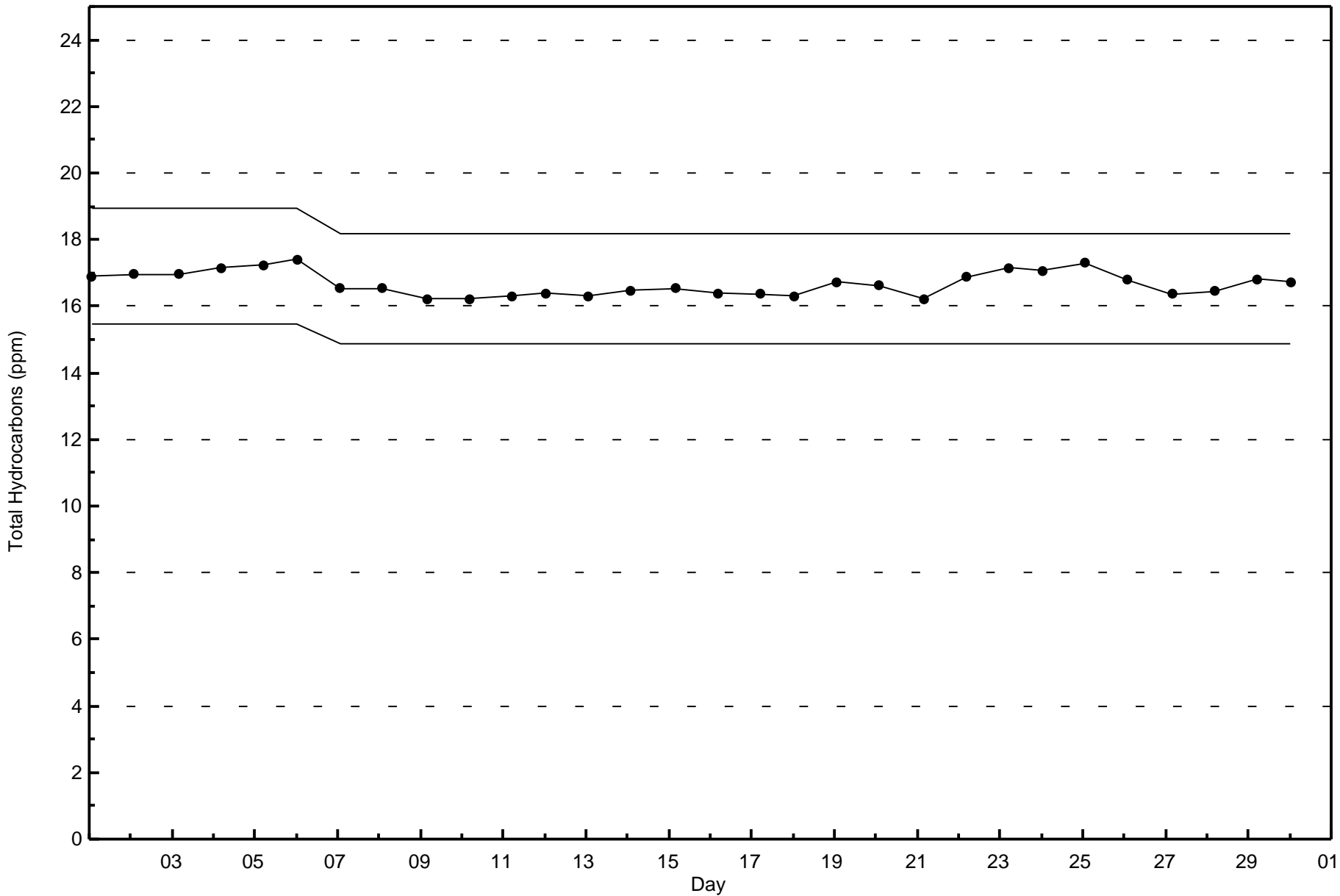
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Fort Hills - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort Hills - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 32 ppb on Jun 4 06:00	Maximum Daily Average: 6.2 ppb on Jun 16		Hours of Data:	685
Minimum Value: 0 ppb on Jun 21 03:00	Minimum Daily Average: 0.2 ppb on Jun 22		Hours of Missing Data:	35
Maximum Diurnal Average: 4.0 ppb at hour 6	Minimum Diurnal Average: 0.2 ppb at hour 20		Hours of Calibration:	35
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 19		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	Z	0	1	5	10	0	0	1	2	0	0	1	2	0	0	0	0	0	0	0	9	23	2	2.5	23
2-Jun	4	1	Z	1	4	1	3	9	3	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1.3	9
3-Jun	5	3	2	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1	0	0	0	0	0.8	5
4-Jun	7	6	9	1	Z	32	9	9	3	1	0	4	1	1	2	1	1	1	0	0	0	0	0	0	3.7	32
5-Jun	2	1	0	0	0	Z	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0.4	2
6-Jun	Z	0	0	0	0	4	3	2	3	4	C	C	C	C	C	1	2	1	0	0	0	0	0	0	1.2	4
7-Jun	0	Z	0	2	0	1	1	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0.5	2
8-Jun	0	0	Z	1	0	2	1	2	3	1	1	2	1	0	0	0	0	0	0	0	0	0	27	5	2.1	27
9-Jun	0	0	0	Z	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
10-Jun	0	0	0	2	Z	2	2	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
11-Jun	1	0	0	3	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	2	0.8	5
12-Jun	Z	1	17	30	15	12	6	6	7	3	10	13	1	0	1	3	3	4	3	1	0	0	0	0	5.9	30
13-Jun	0	Z	1	0	4	2	3	5	5	4	3	0	0	0	1	1	0	0	0	0	0	0	0	0	1.3	5
14-Jun	0	0	Z	1	0	1	1	1	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
15-Jun	0	0	0	Z	0	0	1	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0.5	1
16-Jun	3	10	11	25	Z	18	15	15	9	11	11	3	1	1	0	0	0	0	0	2	0	0	0	5	6.2	25
17-Jun	0	0	0	0	1	Z	1	1	3	2	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0.6	3
18-Jun	Z	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	1	2	1	0	0	0	1	2	0.6	2
19-Jun	4	Z	0	0	0	2	3	1	1	4	2	1	1	1	1	1	0	1	0	0	0	0	0	1	1.1	4
20-Jun	0	0	Z	2	2	3	3	6	6	15	19	7	1	0	0	0	0	1	0	0	0	0	0	0	2.9	19
21-Jun	0	0	0	Z	2	2	1	2	1	2	2	2	0	1	2	2	1	1	0	0	0	0	0	0	0.9	2
22-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
23-Jun	0	0	0	4	15	Z	3	2	0	0	0	0	0	0	0	0	0	1	1	1	2	0	0	2	1.4	15
24-Jun	Z	2	0	0	9	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	9
25-Jun	2	Z	1	1	5	3	5	8	4	19	14	2	0	0	0	0	0	0	0	0	0	1	4	0	3.0	19
26-Jun	0	0	Z	16	4	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	2	1	1	1	1.4	16
27-Jun	0	0	0	Z	5	2	0	0	6	1	1	0	0	0	0	1	2	0	1	0	0	0	0	0	1.0	6
28-Jun	0	0	0	0	Z	0	1	1	1	1	0	1	1	0	1	2	0	2	1	0	0	0	0	0	0.5	2
29-Jun	0	0	0	0	1	Z	3	5	17	18	7	2	1	0	0	0	1	0	0	0	0	0	0	0	2.6	18
30-Jun	Z	0	0	2	2	1	3	6	16	16	6	6	1	1	1	2	0	0	2	0	0	0	0	0	3.0	16

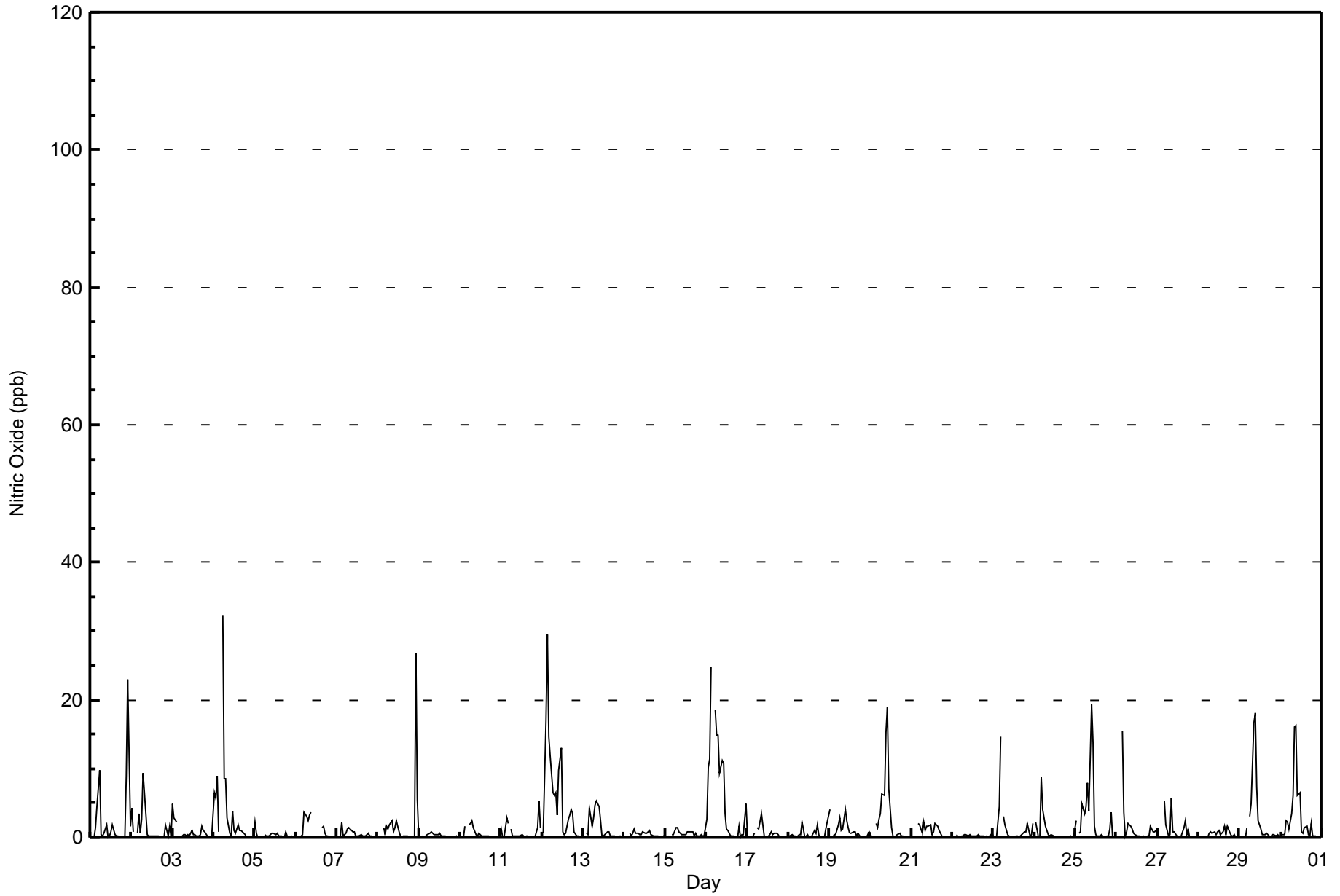
1.2	1.0	1.7	3.7	3.1	4.0	2.5	3.1	3.3	3.7	2.8	1.7	0.5	0.4	0.5	0.7	0.6	0.5	0.5	0.2	0.3	0.6	2.1	0.7	Diurnal Average	
7	10	17	30	15	32	15	15	17	19	19	13	1	2	2	3	3	4	3	2	2	9	27	5	Diurnal Maximum	

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Hills - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	680	99.27	99.27
21 - 40	5	0.73	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	73	125	55	24	9	17	30	77	65	36	31	20	22	33	25	38	680
21 - 40	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	125	55	24	10	17	31	78	66	36	31	20	22	33	25	39	685

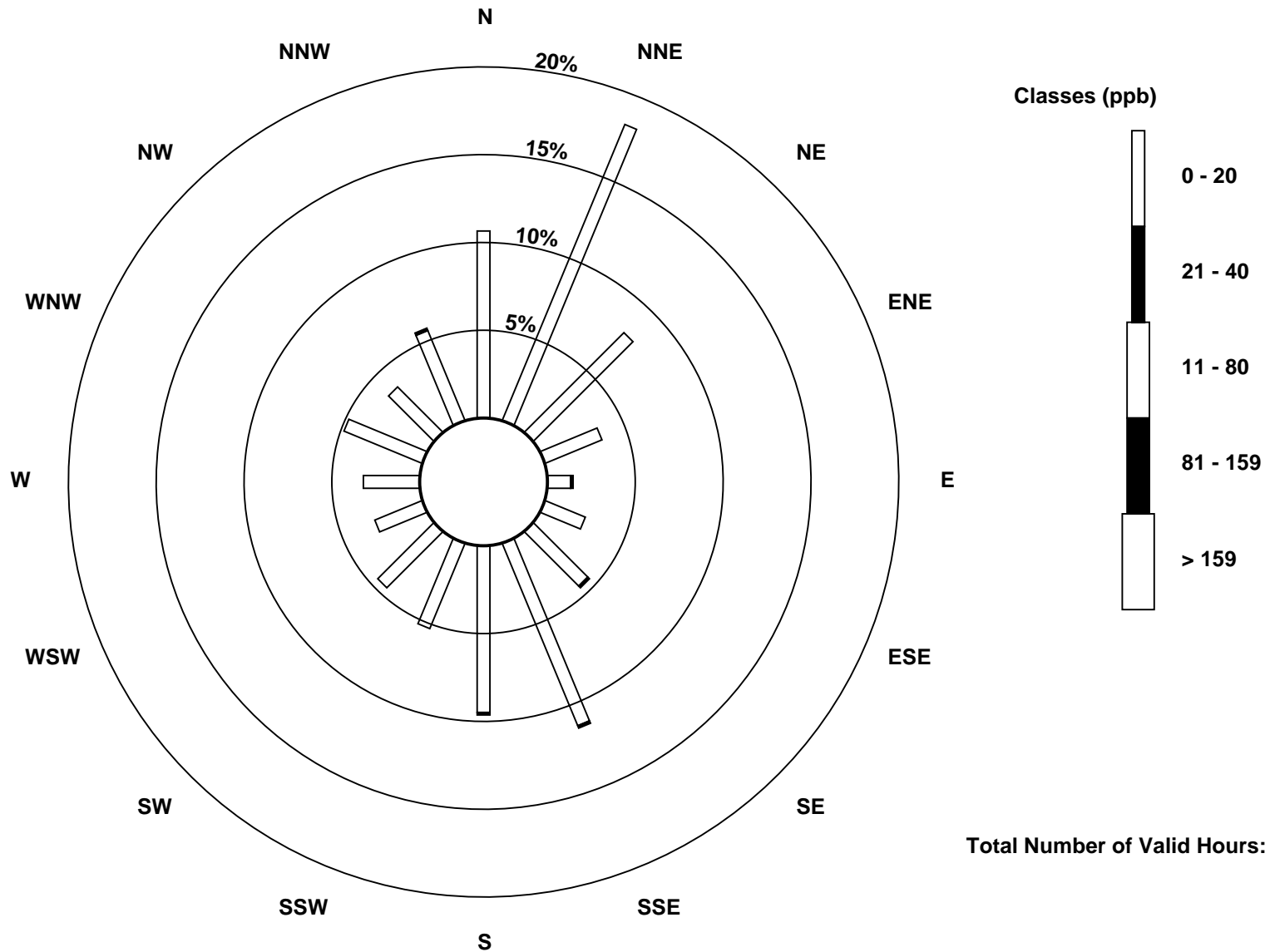
Total Number of Valid Hours: 685

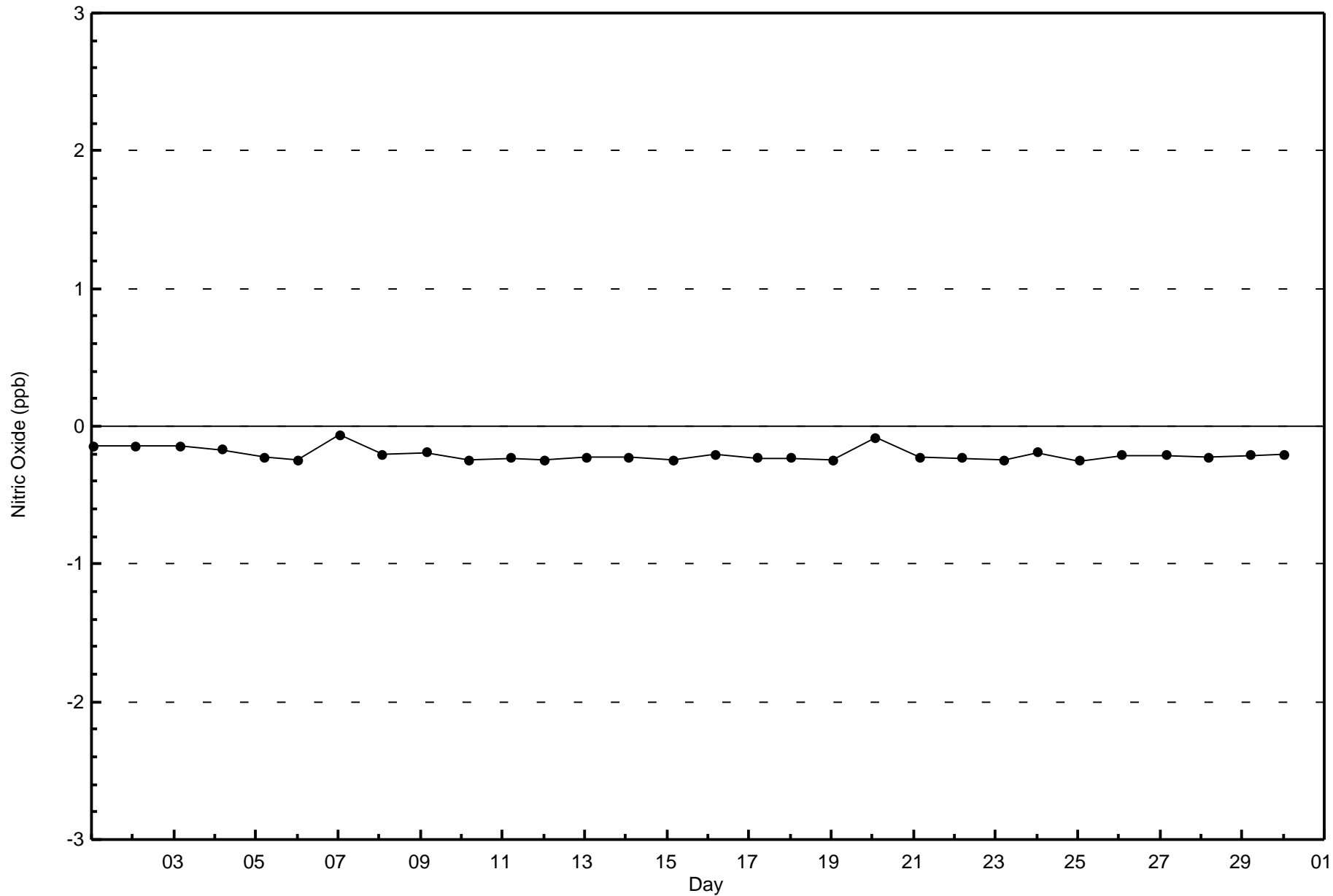
Total Number of Hours: 720

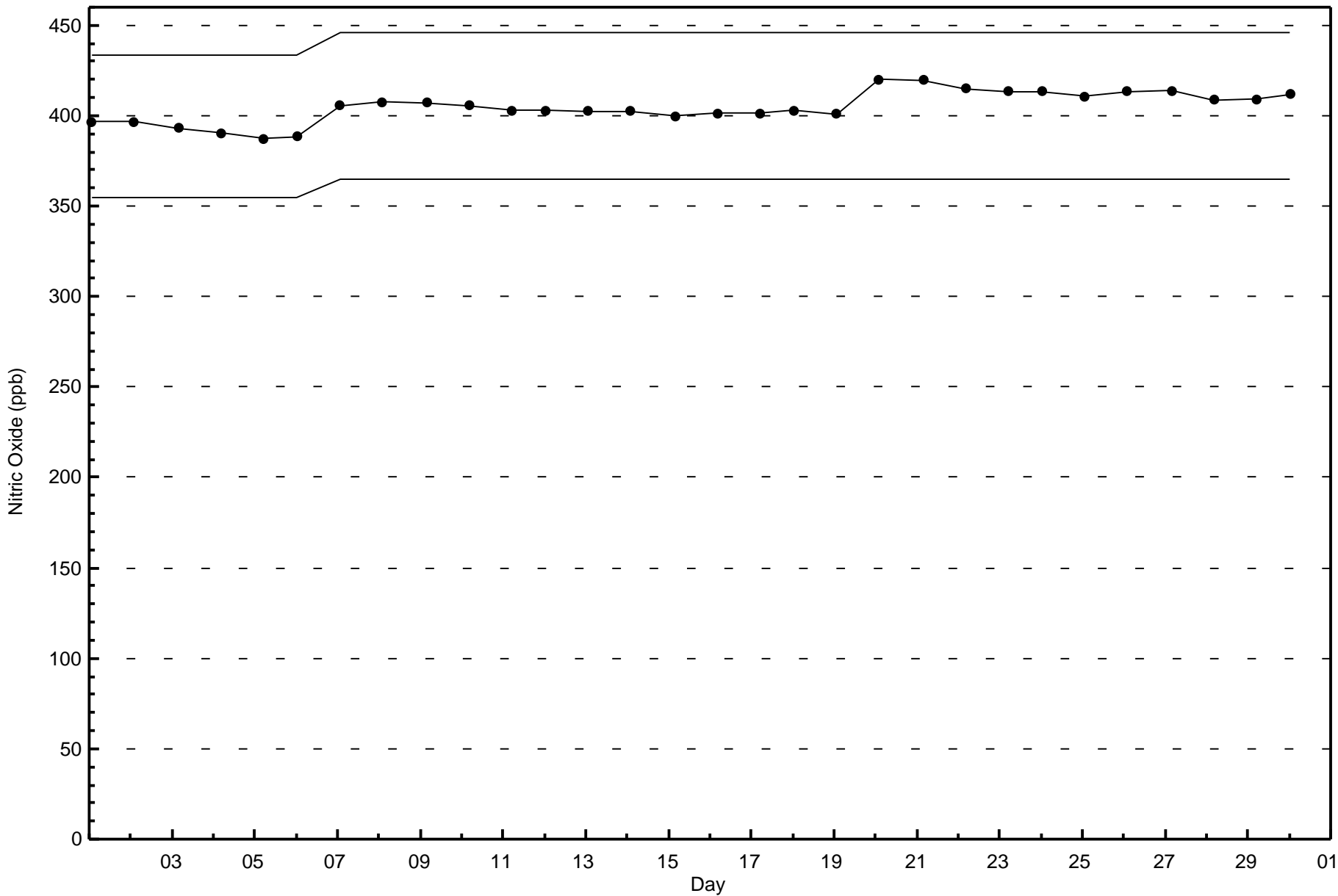


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitric Oxide (NO) - ppb
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Hills - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 31 ppb on Jun 1 23:00	Maximum Daily Average: 10.1 ppb on Jun 12
Minimum Value: 0 ppb on Jun 11 14:00	Hours of Data: 685
Maximum Diurnal Average: 8.5 ppb at hour 5	Hours of Missing Data: 35
Monthly Average: 4.7 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.8 ppb on Jun 22	Percent Operational Time: 100.0
Minimum Diurnal Average: 1.7 ppb at hour 14	
Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 12 P ₉₉ = 25	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	8	Z	4	8	28	24	2	2	3	10	1	1	3	6	2	2	2	1	2	3	6	26	31	22	8.5	31
2-Jun	18	14	Z	9	11	4	5	14	13	9	8	5	4	3	3	4	3	2	2	4	7	1	4	1	6.4	18
3-Jun	4	4	2	Z	2	1	1	0	0	1	1	1	1	1	1	1	3	7	7	10	4	3	2	3	2.6	10
4-Jun	17	17	17	9	Z	14	11	11	8	4	3	18	9	5	7	8	6	5	2	1	1	1	2	3	7.7	18
5-Jun	15	6	2	4	3	Z	4	2	2	4	3	2	1	2	1	1	1	1	4	2	2	2	3	2	3.0	15
6-Jun	Z	4	4	5	4	5	6	5	6	8	C	C	C	C	C	2	3	1	2	2	2	4	5	2	3.8	8
7-Jun	4	Z	7	12	3	5	5	4	3	2	2	1	1	1	1	1	1	1	3	2	3	2	2	2	2.9	12
8-Jun	3	2	Z	11	6	8	5	5	6	3	5	6	3	1	1	2	2	2	2	2	4	13	26	19	5.9	26
9-Jun	5	4	9	Z	2	2	2	2	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1.6	9
10-Jun	2	3	4	12	Z	6	5	5	3	1	1	2	1	1	1	2	2	1	1	0	1	1	1	0	2.3	12
11-Jun	2	0	0	3	3	Z	1	0	1	0	1	0	1	0	0	0	1	0	0	0	1	18	23	14	3.0	23
12-Jun	Z	3	12	26	22	19	17	15	14	13	19	16	2	2	2	8	9	11	12	6	2	2	1	1	10.1	26
13-Jun	1	Z	2	4	7	3	4	6	6	6	4	1	1	1	1	2	1	1	1	1	1	1	1	0	2.3	7
14-Jun	0	0	Z	3	1	2	3	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	0	0	1.2	3
15-Jun	0	0	2	Z	3	3	4	3	2	1	1	1	1	1	1	2	2	2	4	3	3	4	3	2	2.0	4
16-Jun	6	15	17	17	Z	17	17	16	14	12	12	6	4	4	2	1	3	2	3	5	5	15	15	22	10.0	22
17-Jun	7	8	8	10	10	Z	6	4	5	2	0	1	1	1	1	1	1	1	1	0	2	2	3	3	3.3	10
18-Jun	Z	5	10	3	2	1	1	1	4	3	1	1	0	0	1	2	3	3	1	1	1	1	2	5	2.2	10
19-Jun	6	Z	0	2	3	4	2	1	2	7	5	3	2	2	2	2	1	1	1	0	1	3	2	3	2.4	7
20-Jun	3	3	Z	10	6	9	11	16	15	16	23	14	5	2	1	2	4	5	3	5	5	6	7	5	7.6	23
21-Jun	5	2	1	Z	6	4	1	2	2	2	2	2	1	1	2	2	3	2	1	1	1	1	0	0	1.9	6
22-Jun	0	0	0	2	Z	1	1	1	1	0	1	1	0	0	0	1	0	0	0	0	2	2	3	1	0.8	3
23-Jun	1	1	1	7	13	Z	5	3	1	0	0	0	0	1	1	0	1	2	4	4	6	2	3	10	2.9	13
24-Jun	Z	11	3	5	7	6	3	2	1	1	1	0	0	0	0	0	0	0	0	0	2	6	8	3	2.7	11
25-Jun	7	Z	2	7	11	6	6	12	8	20	19	5	2	2	2	4	2	1	2	4	19	28	5	11	8.0	28
26-Jun	11	9	Z	20	22	3	4	7	5	5	3	3	2	2	2	2	2	2	3	9	25	24	25	28	9.4	28
27-Jun	23	15	15	Z	24	17	6	3	11	5	3	1	1	1	2	9	14	6	12	4	6	9	7	6	8.6	24
28-Jun	4	4	2	3	Z	1	3	3	2	3	2	2	2	1	2	4	2	5	4	4	4	5	8	4	3.1	8
29-Jun	6	6	4	4	8	Z	5	6	15	19	14	6	4	3	4	3	5	4	2	7	13	8	12	11	7.3	19
30-Jun	Z	7	5	11	9	7	7	8	14	18	12	11	4	4	3	3	2	2	11	3	5	1	1	2	6.5	18

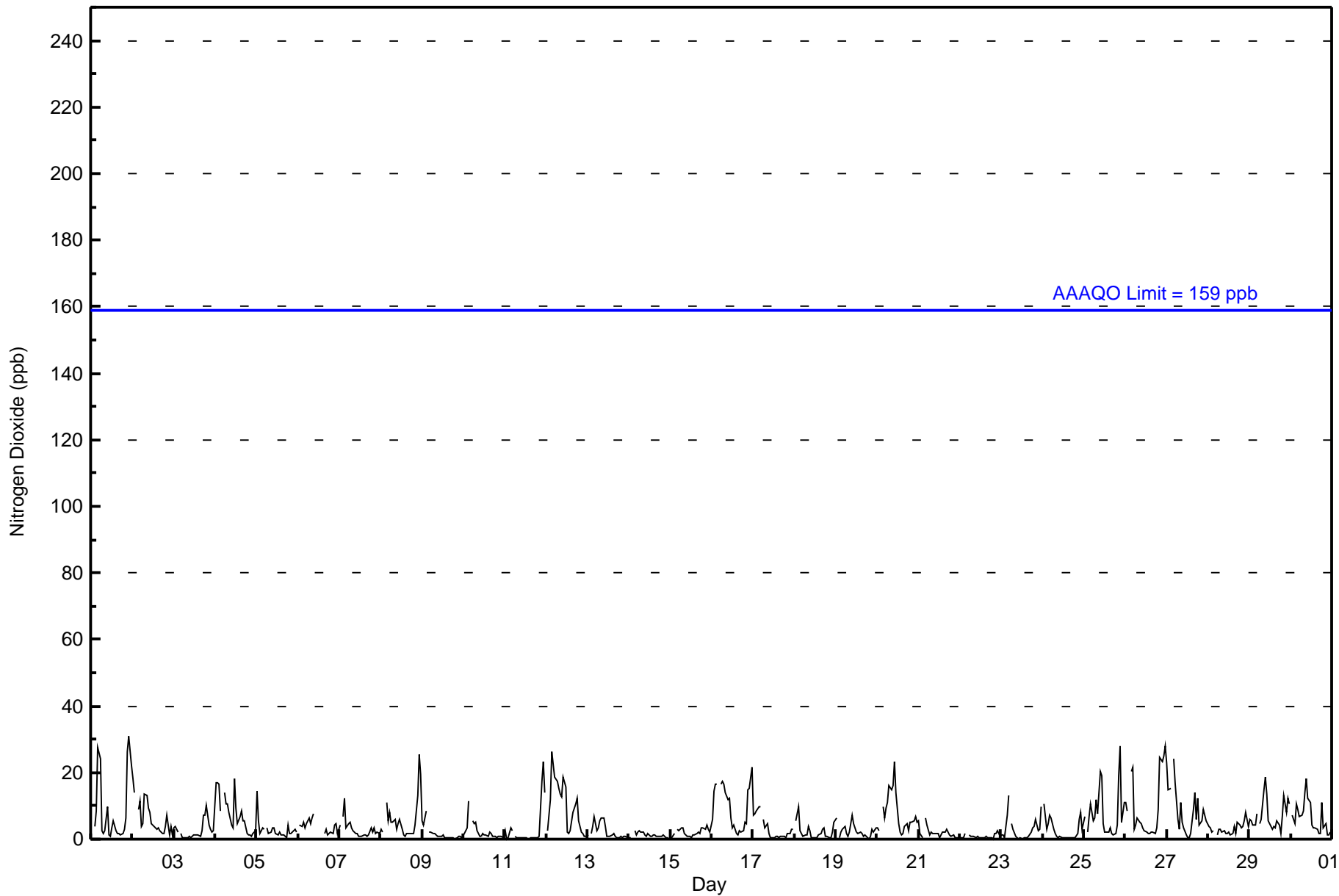
6.4	5.7	5.3	8.2	8.5	6.8	5.0	5.3	5.6	5.9	5.1	3.8	2.0	1.7	1.7	2.4	2.5	2.5	3.0	2.9	4.4	6.3	6.9	6.1	Diurnal Average	
23	17	17	26	28	24	17	16	15	20	23	18	9	6	7	9	14	11	12	10	25	28	31	28	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	666	97.23	97.23
21 - 40	19	2.77	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	73	125	54	22	10	16	25	74	65	34	31	19	22	33	25	38	666
21 - 40	0	0	1	2	0	1	6	4	1	2	0	1	0	0	0	1	19
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	125	55	24	10	17	31	78	66	36	31	20	22	33	25	39	685

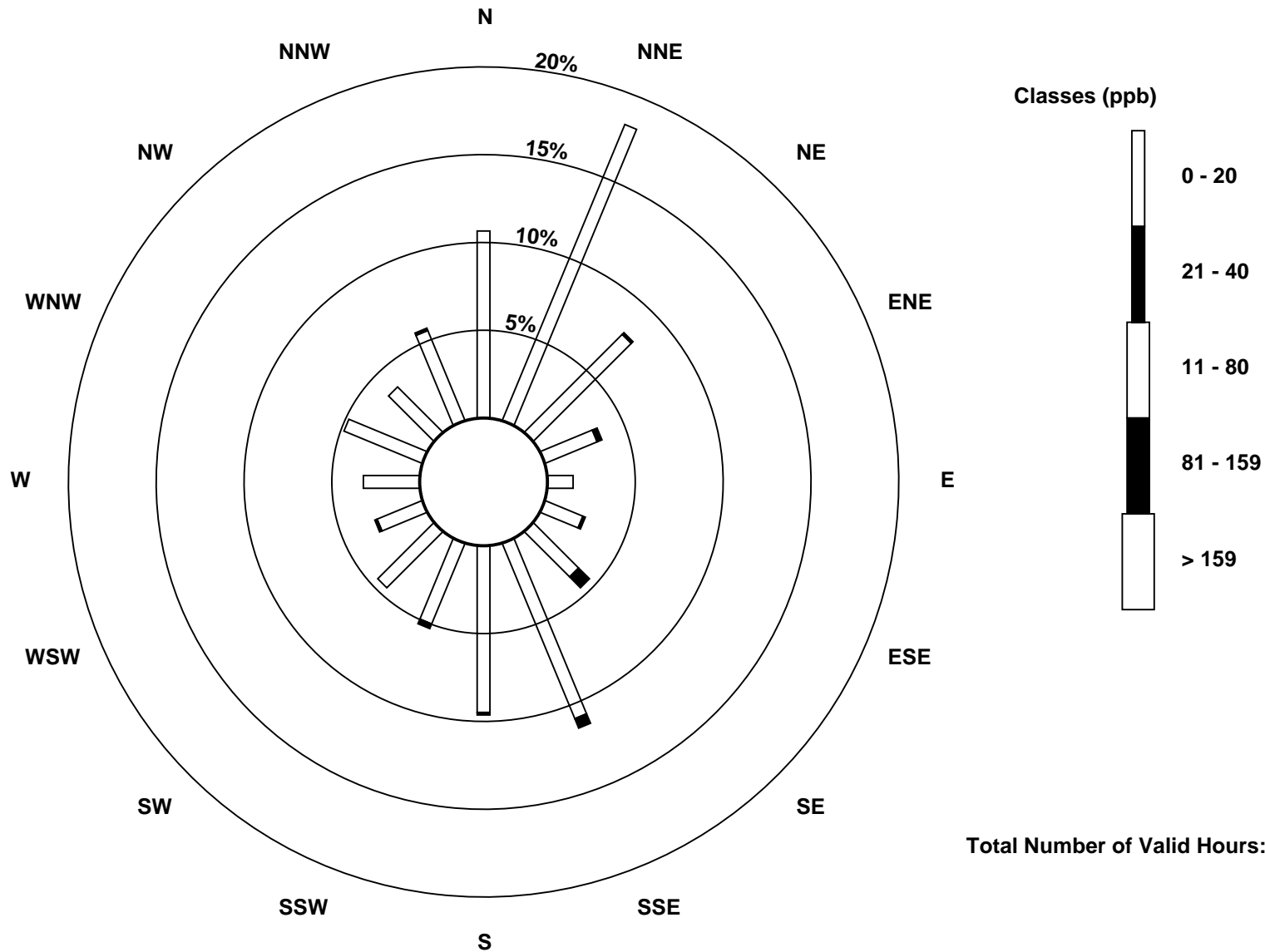
Total Number of Valid Hours: 685

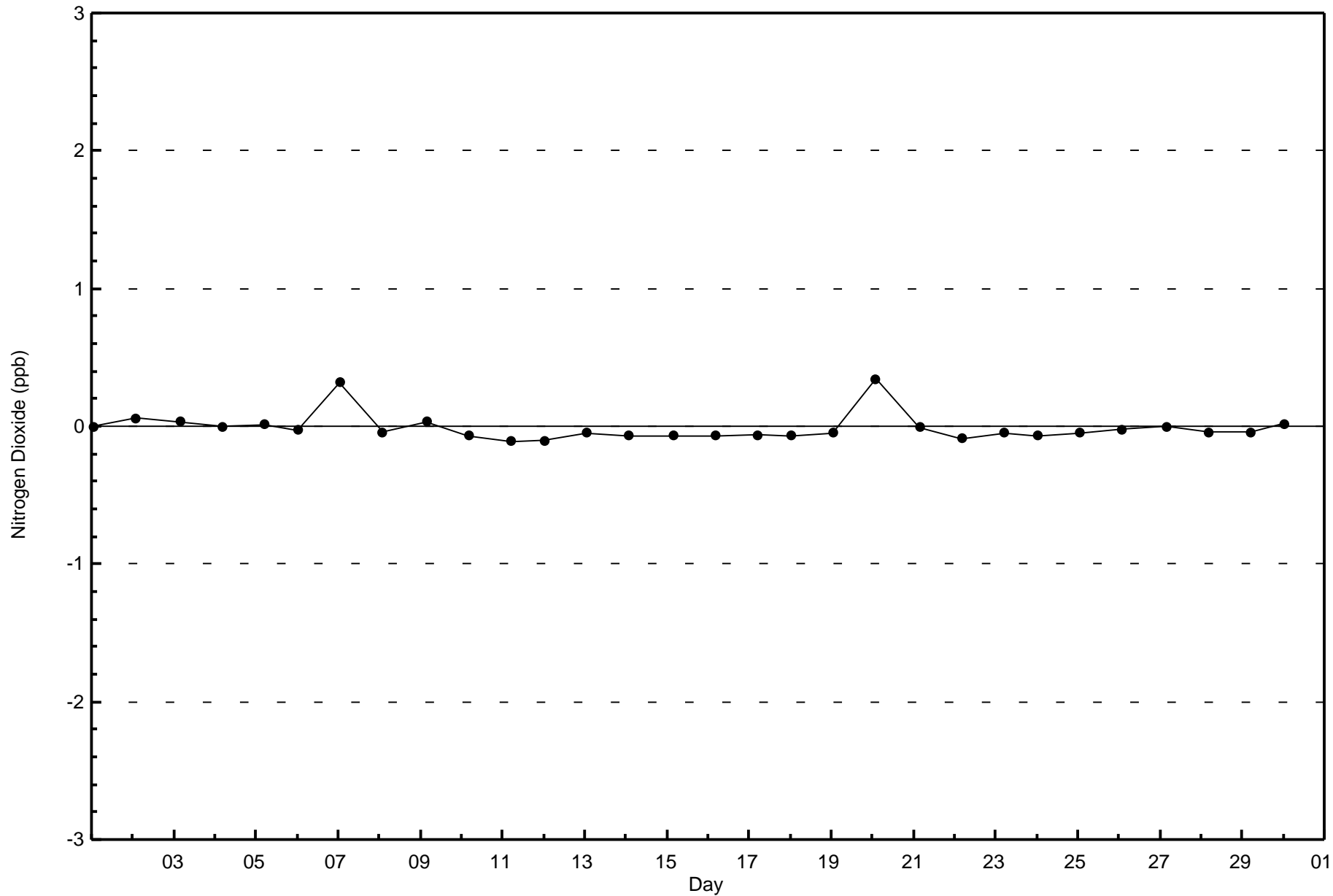
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Hills (AMS 23)

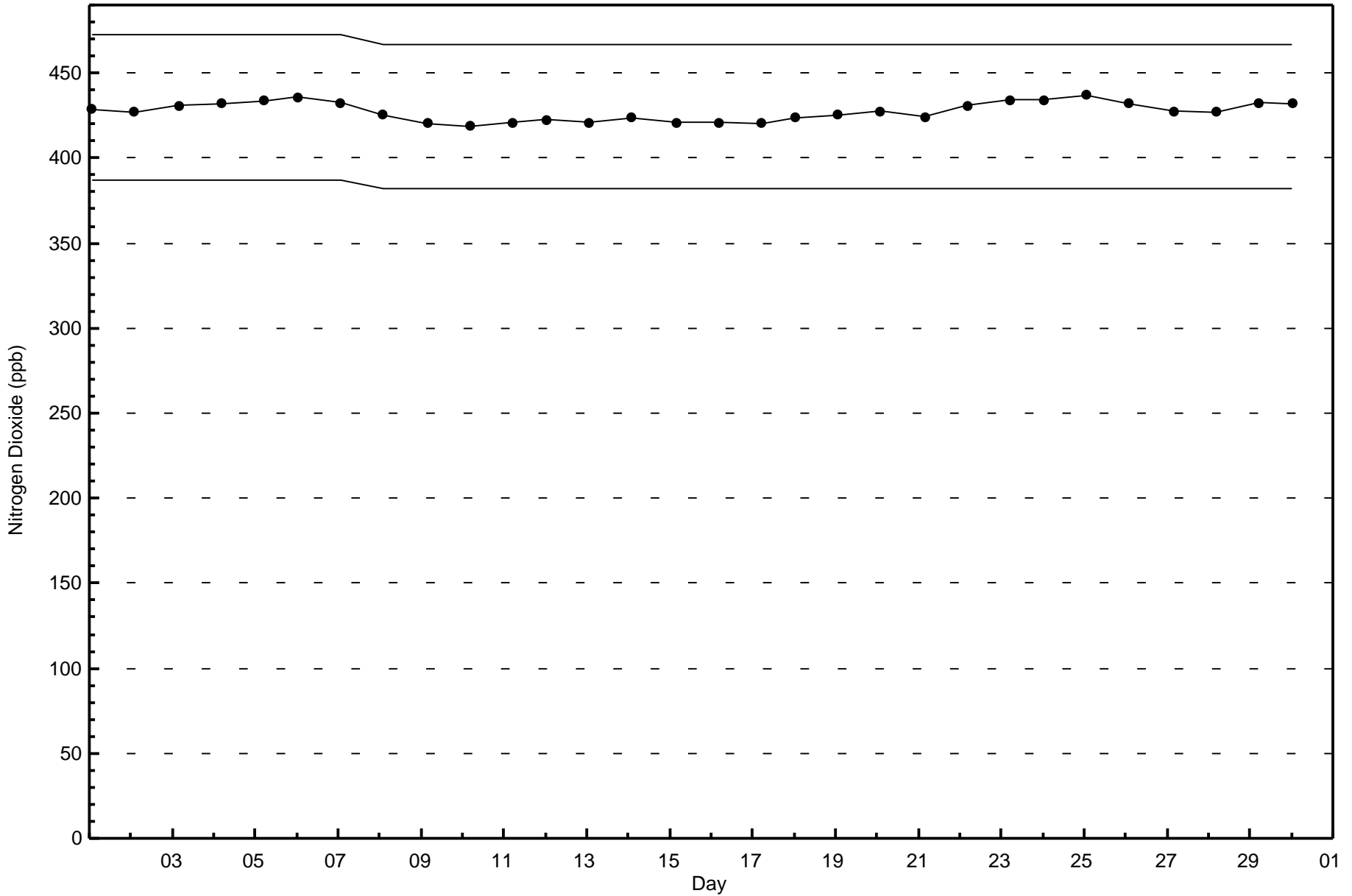






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Fort Hills - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 56 ppb on Jun 12 04:00	Maximum Daily Average: 16.2 ppb on Jun 16		Hours of Data:	685
Minimum Value: 0 ppb on Jun 15 01:00	Minimum Daily Average: 1.0 ppb on Jun 22		Hours of Missing Data:	35
Maximum Diurnal Average: 11.9 ppb at hour 4	Minimum Diurnal Average: 2.1 ppb at hour 14		Hours of Calibration:	35
Monthly Average: 6.3 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 7 P ₉₀ = 16 P ₉₉ = 39		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	8	Z	4	10	32	34	3	2	3	12	1	1	4	7	3	2	2	1	2	3	6	35	54	24	11.0	54
2-Jun	22	15	Z	9	15	4	8	23	17	10	8	5	4	3	3	4	3	2	2	4	9	1	5	1	7.7	23
3-Jun	8	7	5	Z	2	1	1	1	1	1	1	2	1	2	1	1	3	9	8	11	4	3	2	3	3.4	11
4-Jun	23	23	26	10	Z	46	19	19	11	5	4	22	10	5	9	9	7	6	2	1	1	1	2	3	11.5	46
5-Jun	17	6	2	4	3	Z	4	2	2	4	4	3	2	3	1	2	2	1	5	2	2	3	3	2	3.4	17
6-Jun	Z	4	4	5	4	8	9	7	10	11	C	C	C	C	C	3	4	2	2	3	2	4	5	2	5.0	11
7-Jun	5	Z	7	14	4	6	6	5	4	3	2	1	1	1	2	1	1	2	4	2	4	2	2	2	3.4	14
8-Jun	3	2	Z	12	6	9	6	7	8	4	6	8	4	1	1	2	2	2	2	2	4	13	52	25	8.0	52
9-Jun	6	4	9	Z	2	3	2	3	2	1	1	1	2	1	1	1	0	0	0	0	1	1	1	1	1.8	9
10-Jun	2	2	4	13	Z	7	7	8	4	1	1	2	2	1	1	2	2	1	1	0	1	1	1	0	2.8	13
11-Jun	4	0	0	6	5	Z	2	0	1	0	1	1	1	0	0	1	1	0	0	1	1	19	28	15	3.8	28
12-Jun	Z	3	29	56	37	31	24	22	20	16	28	29	3	2	3	11	13	15	16	6	2	2	1	1	16.0	56
13-Jun	1	Z	2	4	11	4	6	10	12	11	6	1	1	1	2	2	1	1	1	1	1	1	1	0	3.6	12
14-Jun	0	1	Z	3	1	3	4	3	3	2	1	2	1	1	2	2	1	1	1	1	1	1	0	0	1.6	4
15-Jun	0	0	2	Z	3	3	5	5	3	2	1	1	1	2	2	3	3	2	4	4	3	5	3	2	2.5	5
16-Jun	9	25	28	42	Z	35	32	31	23	23	23	10	5	5	2	1	3	2	3	7	5	15	16	27	16.2	42
17-Jun	8	8	8	10	10	Z	7	5	8	4	1	1	1	1	2	1	2	2	1	0	2	2	3	3	3.8	10
18-Jun	Z	6	10	3	2	1	2	1	6	4	1	1	1	0	1	3	4	5	1	1	1	0	3	7	2.8	10
19-Jun	10	Z	0	3	3	6	5	2	3	11	7	5	3	2	3	3	1	2	0	0	1	3	2	4	3.5	11
20-Jun	4	3	Z	12	8	12	14	22	21	31	42	21	6	2	1	2	4	5	3	5	5	6	7	5	10.5	42
21-Jun	5	2	0	Z	9	6	2	4	3	3	3	4	1	2	4	4	4	3	1	1	1	0	0	0	2.8	9
22-Jun	0	0	0	2	Z	1	1	1	1	0	1	1	1	0	1	1	1	1	0	0	2	2	3	2	1.0	3
23-Jun	1	1	1	12	28	Z	8	5	1	0	0	0	0	1	1	0	1	3	4	5	8	3	3	12	4.3	28
24-Jun	Z	13	3	5	16	10	4	3	1	1	1	0	0	0	0	1	0	0	0	1	2	6	8	3	3.5	16
25-Jun	9	Z	3	8	16	9	11	20	12	40	33	6	2	3	2	4	2	1	2	5	20	32	5	11	11.1	40
26-Jun	11	8	Z	36	25	3	5	8	7	6	4	3	2	2	2	2	2	2	4	9	26	24	26	29	10.8	36
27-Jun	23	15	15	Z	29	19	6	4	17	6	4	1	1	1	2	10	16	6	13	4	6	9	7	6	9.6	29
28-Jun	4	4	2	3	Z	1	4	4	3	3	2	3	3	2	3	5	2	7	5	4	4	6	8	4	3.6	8
29-Jun	6	6	4	4	9	Z	8	11	32	37	21	8	5	3	4	4	6	5	2	7	14	8	13	11	9.8	37
30-Jun	Z	8	5	13	11	8	11	14	30	34	18	17	5	4	5	5	2	2	13	4	5	1	1	2	9.5	34

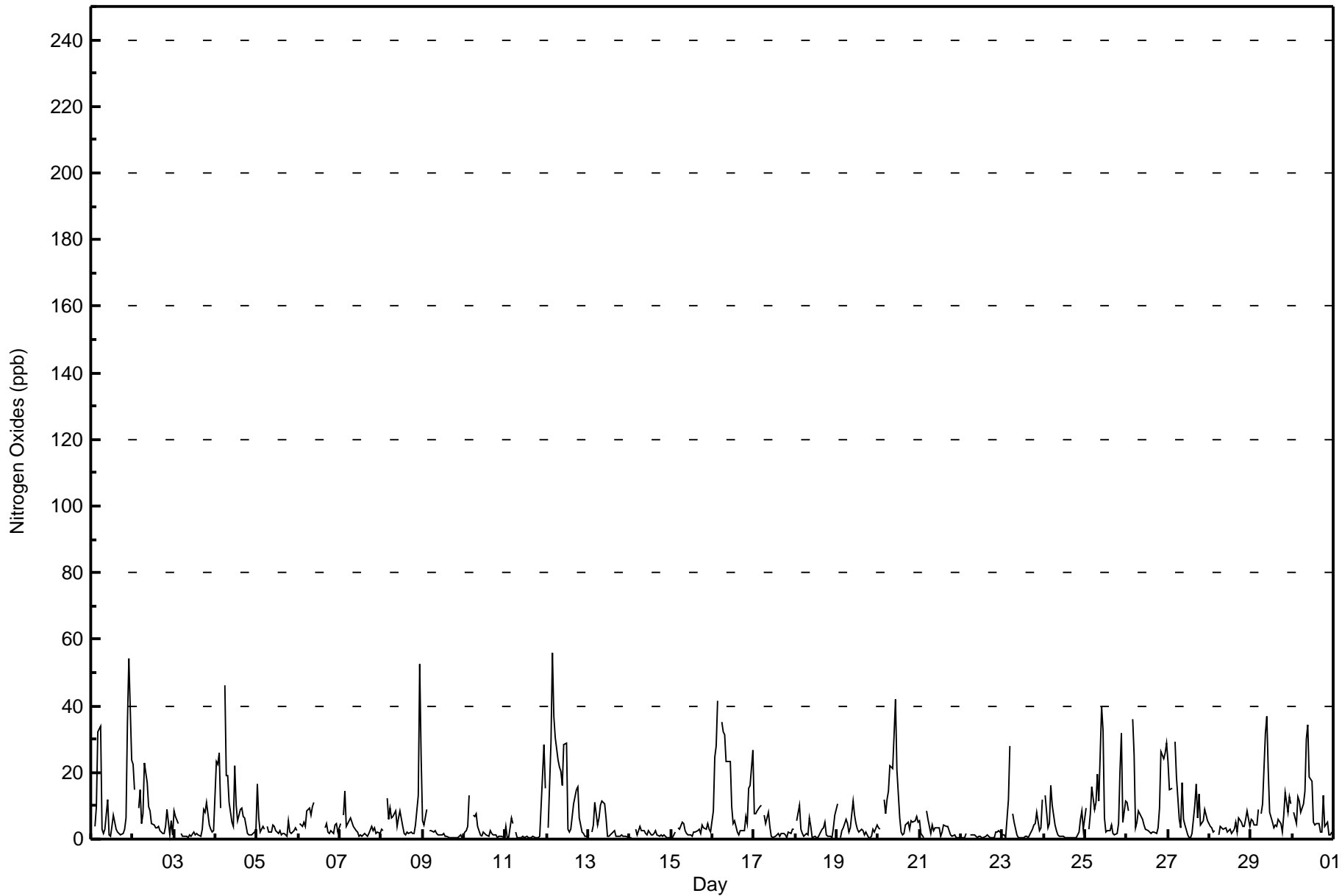
7.6	6.7	7.0	11.9	11.6	10.8	7.5	8.4	8.9	9.6	7.9	5.5	2.5	2.1	2.2	3.0	3.1	3.0	3.4	3.1	4.8	6.9	8.9	6.9	Diurnal Average
23	25	29	56	37	46	32	31	32	40	42	29	10	7	9	11	16	15	16	11	26	35	54	29	Diurnal Maximum

Z - zerspan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Hills - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Hills - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	630	91.97	91.97
21 - 40	49	7.15	99.12
41 - 80	6	0.88	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	73	124	50	22	9	12	19	65	60	34	30	18	22	30	25	37	630
21 - 40	0	1	5	2	0	5	11	12	4	2	1	2	0	3	0	1	49
11 - 80	0	0	0	0	1	0	1	1	2	0	0	0	0	0	0	1	6
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	73	125	55	24	10	17	31	78	66	36	31	20	22	33	25	39	685

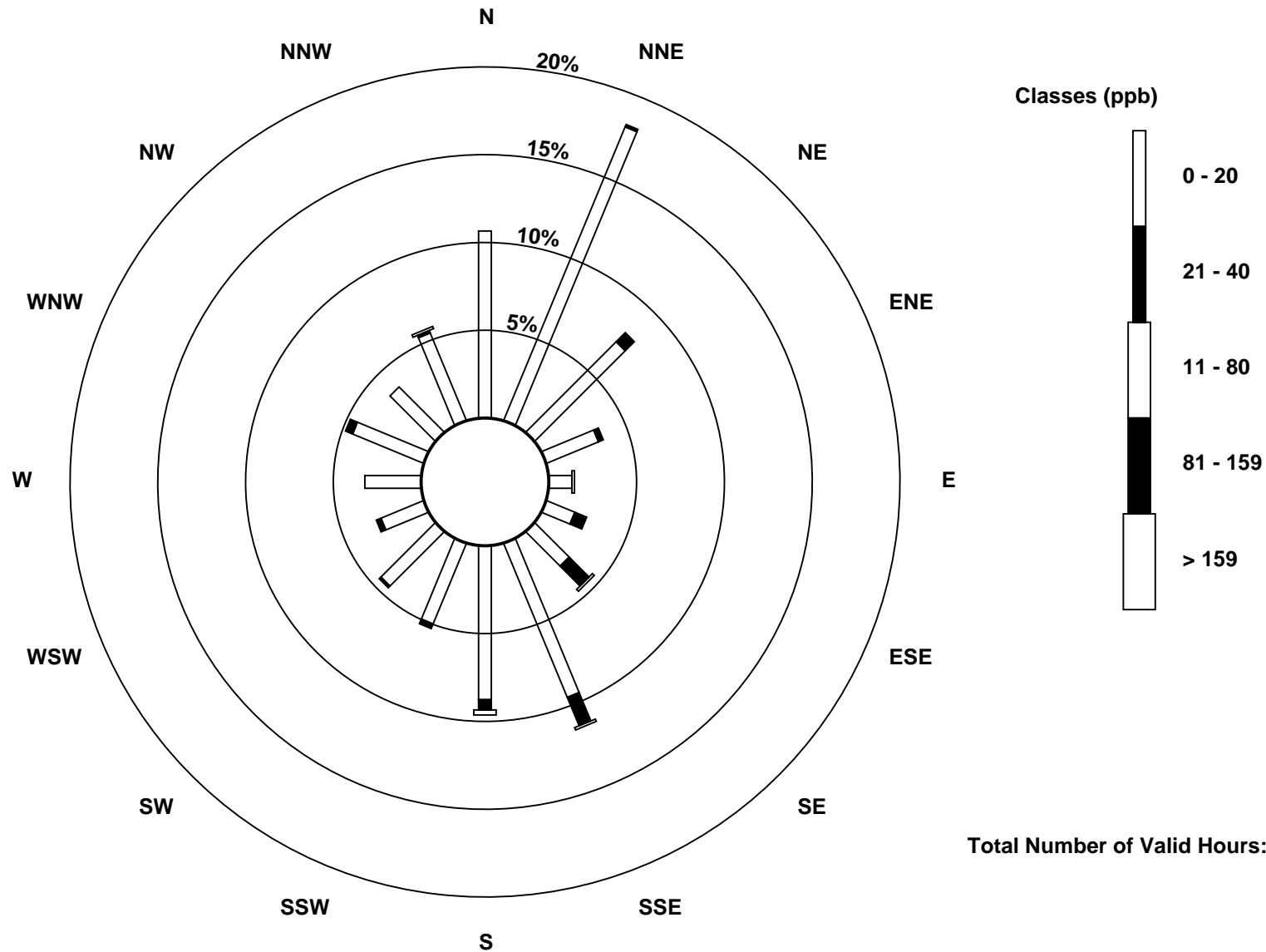
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

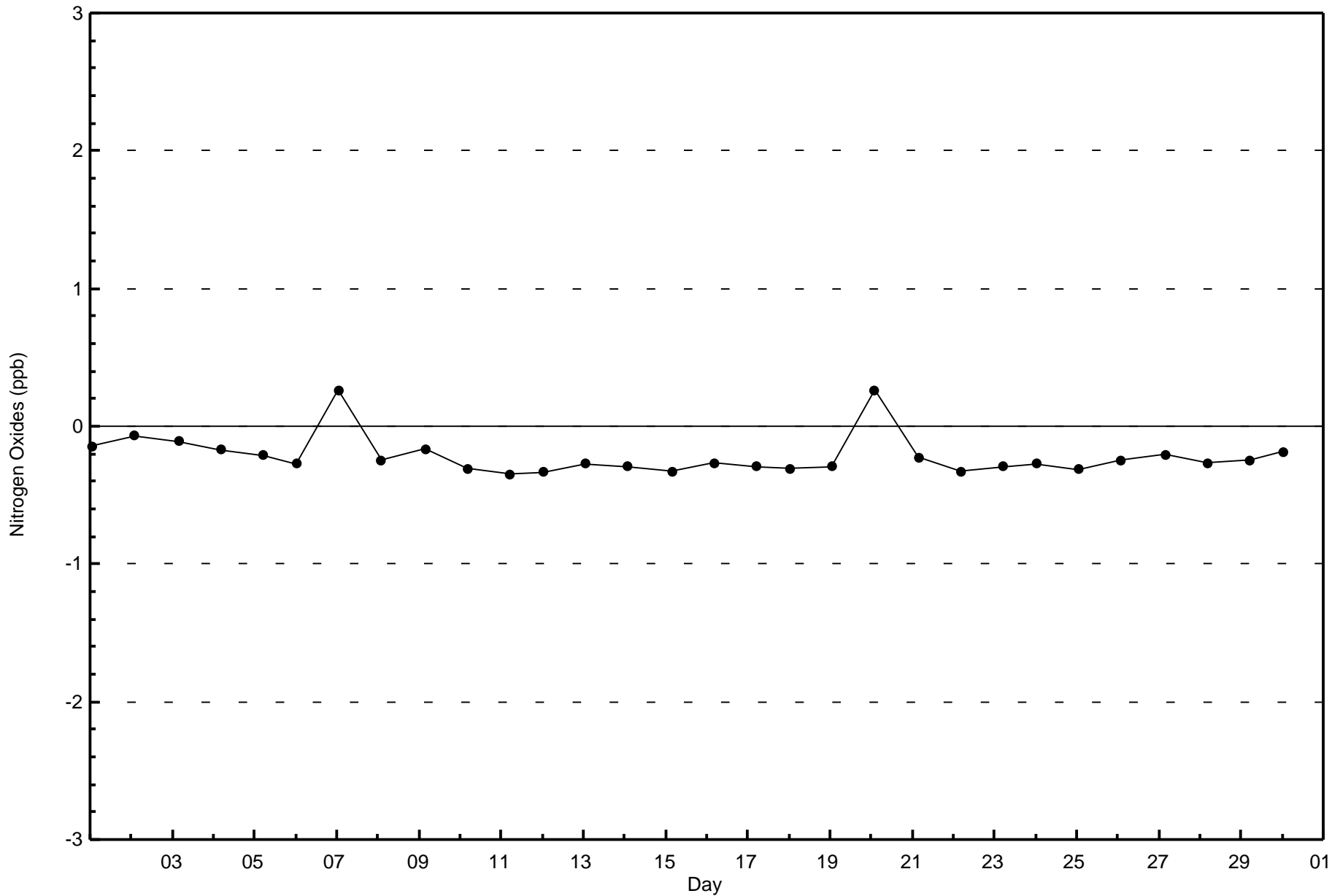
Nitrogen Oxides (NO_x) - ppb
Fort Hills (AMS 23)

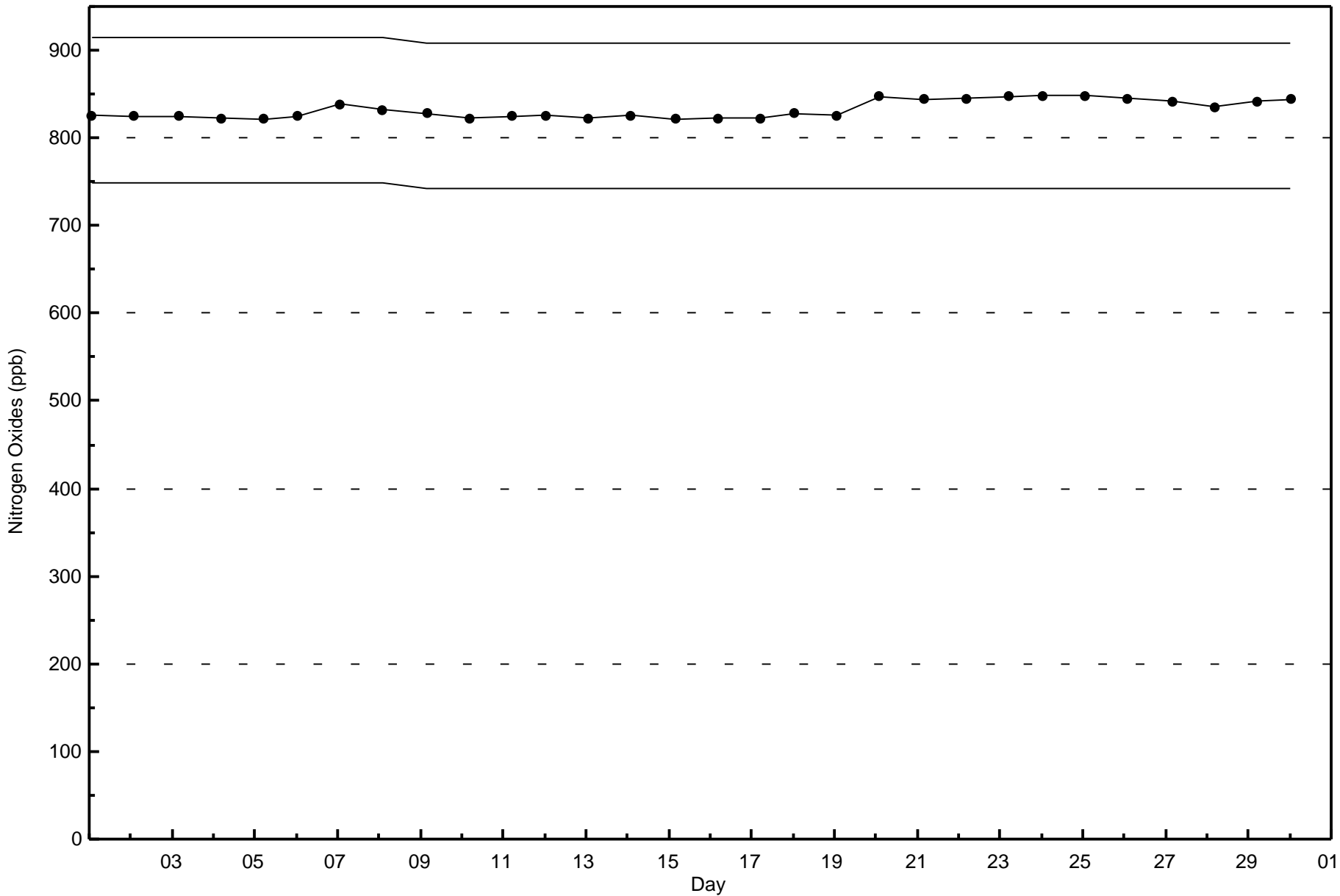




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Fort Hills - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM_{2.5}) - µg/m³

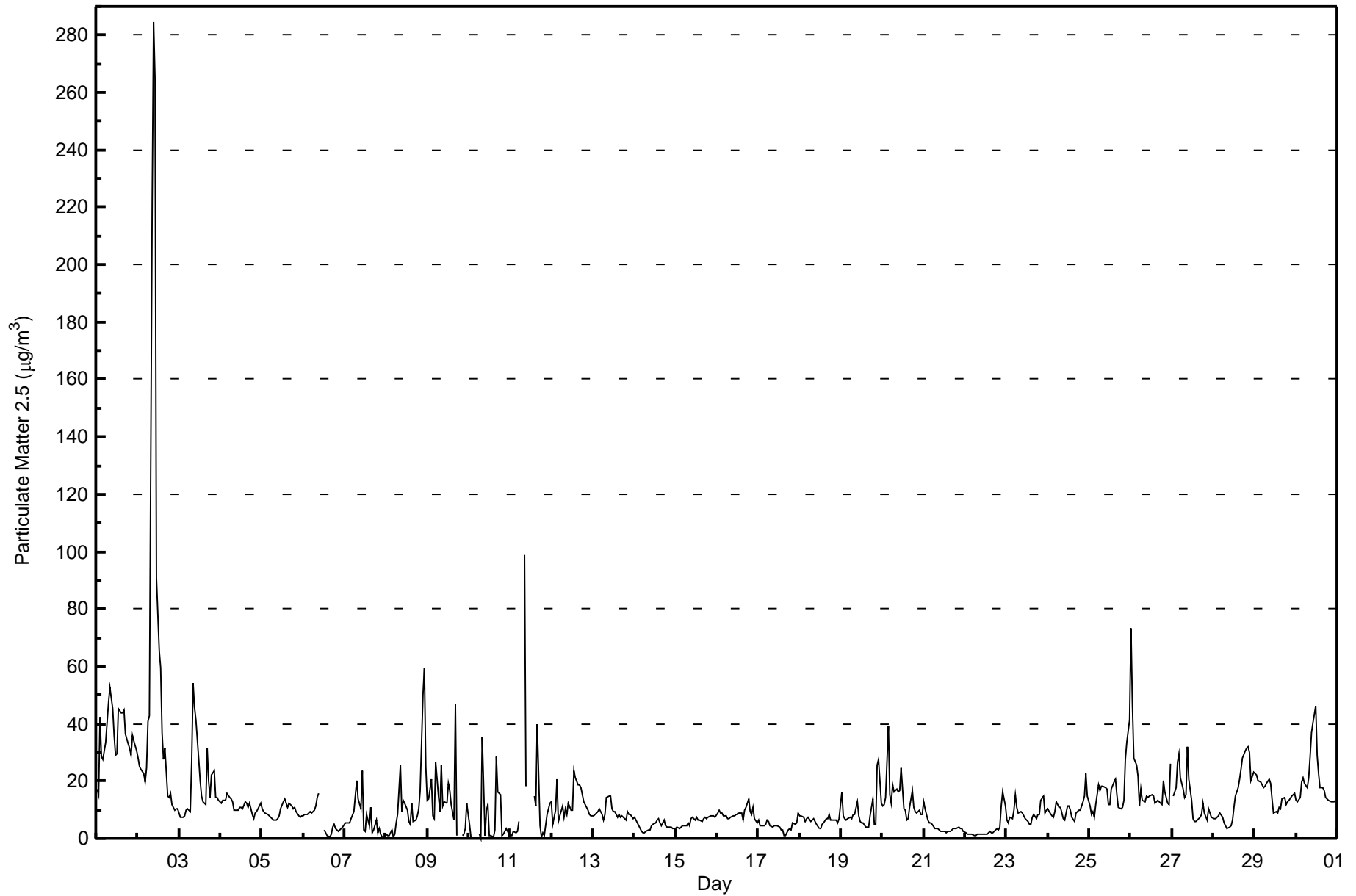
Fort Hills - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 2	Hours in Service:	720
Maximum Value: 285 µg/m ³ on Jun 2 10:00	Maximum Daily Average: 58.3 µg/m ³ on Jun 2		Hours of Data:	706
Minimum Value: 0 µg/m ³ on Jun 10 08:00	Minimum Daily Average: 3.3 µg/m ³ on Jun 22		Hours of Missing Data:	14
Maximum Diurnal Average: 25.1 µg/m ³ at hour 9	Minimum Diurnal Average: 10.0 µg/m ³ at hour 20		Hours of Calibration:	2
Monthly Average: 13.2 µg/m ³	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 15 P ₉₀ = 25 P ₉₉ = 61		Percent Operational Time:	98.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	17	15	42	28	28	33	40	47	53	45	36	29	30	45	44	44	45	36	33	31	29	36	34	30	35.4	53	
2-Jun	28	25	24	23	20	25	41	43	222	285	265	91	65	60	37	28	32	15	14	16	12	10	10	10	58.3	285	
3-Jun	9	8	7	8	10	10	10	27	54	46	41	28	20	15	13	12	31	20	14	22	23	14	14	13	19.5	54	
4-Jun	12	14	13	13	16	14	14	13	10	10	10	11	11	10	13	12	11	12	9	7	9	10	10	13	11.5	16	
5-Jun	10	9	9	9	8	8	7	6	6	7	8	10	13	14	12	11	12	11	10	11	10	8	8	8	9.3	14	
6-Jun	8	8	9	9	9	9	10	11	14	16	C	C	3	2	1	0	2	4	5	3	3	3	4	4	6.2	16	
7-Jun	5	5	5	6	7	9	15	20	14	10	24	3	3	8	4	11	2	3	6	2	4	1	1	0	7.0	24	
8-Jun	1	1	1	3	1	2	6	8	25	9	13	12	10	6	5	12	6	6	8	10	17	50	59	25	12.3	59	
9-Jun	13	14	21	8	7	26	15	9	26	11	13	12	19	17	12	7	47	1	UO	UO	1	1	4	12	13.4	47	
10-Jun	5	0	UO	UO	UO	UO	2	0	35	1	10	12	1	1	1	3	28	16	15	1	2	3	3	1	7.0	35	
11-Jun	1	1	3	2	2	6	UO	UO	99	18	UO	UO	6	UO	15	11	40	4	1	2	1	8	10	12	12.8	99	
12-Jun	13	5	10	21	6	8	11	7	10	8	13	10	10	24	21	19	19	18	15	13	11	10	9	8	12.3	24	
13-Jun	8	8	9	9	10	9	6	8	14	15	15	10	9	9	7	8	7	8	7	6	9	8	9	7	9.0	15	
14-Jun	7	6	5	4	2	2	2	2	3	3	4	5	5	6	7	5	5	6	4	4	4	4	3	3	4.3	7	
15-Jun	4	4	4	4	4	5	4	5	4	7	7	6	7	7	6	7	8	7	8	7	8	8	8	7	6.0	8	
16-Jun	9	10	9	9	8	8	7	7	7	8	8	8	9	9	9	6	10	11	14	9	8	11	7	5	8.5	14	
17-Jun	6	5	5	4	5	6	6	4	4	5	4	4	4	3	3	1	1	3	3	3	5	5	5	9	4.3	9	
18-Jun	8	8	7	6	7	7	6	6	7	6	5	3	3	5	5	7	7	8	7	6	7	6	6	7	6.3	8	
19-Jun	16	8	7	6	7	7	7	9	8	13	8	6	6	6	4	4	4	8	14	5	5	26	27	12	9.2	27	
20-Jun	11	12	14	39	15	12	19	16	17	16	16	25	10	10	7	7	11	17	11	9	9	10	8	8	13.7	39	
21-Jun	13	11	6	5	5	5	4	3	3	3	3	2	2	2	2	2	3	3	3	3	4	4	3	3	4.1	13	
22-Jun	2	2	1	1	1	1	1	1	1	1	1	2	2	1	3	2	2	3	4	3	4	11	16	11	3.3	16	
23-Jun	7	5	7	7	10	15	11	9	9	9	8	7	6	5	5	8	8	7	8	8	13	15	9	10	8.5	15	
24-Jun	10	9	8	7	9	13	11	11	9	7	6	11	11	10	8	6	9	10	10	10	13	15	23	15	10.4	23	
25-Jun	11	9	9	7	12	19	17	18	18	18	17	12	12	17	19	21	15	11	11	11	13	28	33	41	16.6	41	
26-Jun	73	47	28	25	22	11	17	13	13	15	14	15	15	15	13	13	14	12	12	20	16	12	12	26	19.7	73	
27-Jun	UO	15	18	27	30	21	17	14	15	32	21	13	7	6	6	7	7	9	12	9	6	10	9	7	13.8	32	
28-Jun	7	7	7	8	9	8	6	4	3	4	4	4	6	11	15	18	21	24	28	30	31	32	30	20	23	14.8	32
29-Jun	23	22	20	20	19	18	18	19	20	19	14	9	9	9	11	10	14	14	12	13	13	15	15	16	15.5	23	
30-Jun	13	13	14	20	21	19	18	21	28	37	40	46	29	23	18	18	17	14	14	13	13	13	13	13	20.3	46	

12.1	10.1	11.1	11.7	10.7	11.6	11.9	12.6	25.1	22.7	22.4	14.6	11.6	12.3	10.9	10.7	14.6	10.8	10.8	10.0	10.0	12.8	13.1	12.1	Diurnal Average	
73	47	42	39	30	33	41	47	222	285	265	91	65	60	44	44	47	36	33	31	32	50	59	41	Diurnal Maximum	

C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - June 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	151	21.39	21.39
6 - 15	384	54.39	75.78
16 - 25	82	11.61	87.39
26 - 80	67	9.49	96.88
> 81.0	5	0.71	97.59

Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Hills - June 2017

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
1 - 5	33	43	16	3	0	1	1	5	2	3	6	7	10	7	7	7	151
6 - 15	35	63	32	17	9	13	13	50	41	22	16	9	10	18	12	24	384
16 - 25	5	6	3	1	1	2	10	16	16	6	4	3	2	4	0	3	82
26 - 80	2	6	3	1	0	1	8	11	10	6	6	3	1	3	1	5	67
> 81.0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
Totals	76	121	54	22	10	17	32	82	69	37	32	22	23	32	20	40	689

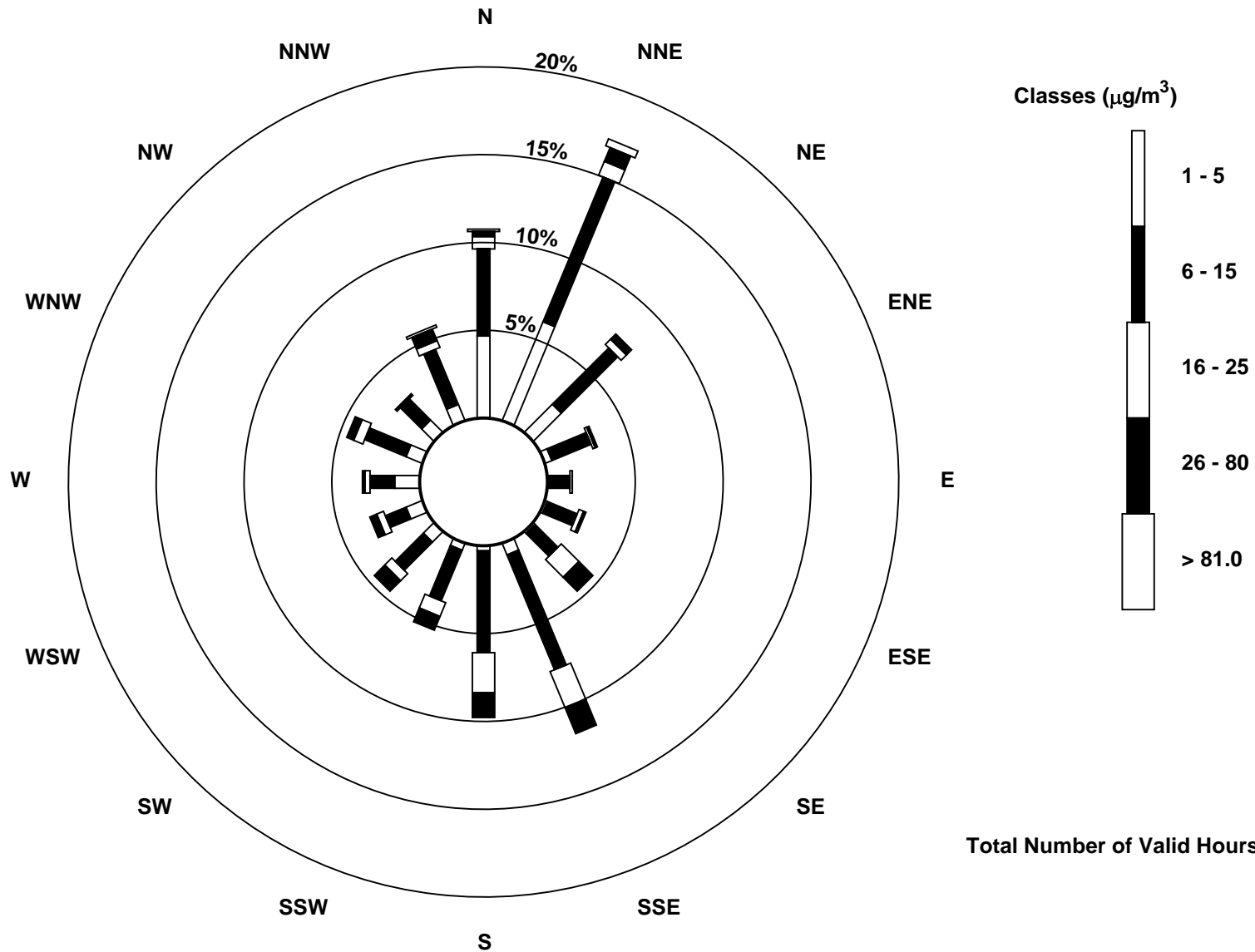
Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills (AMS 23)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

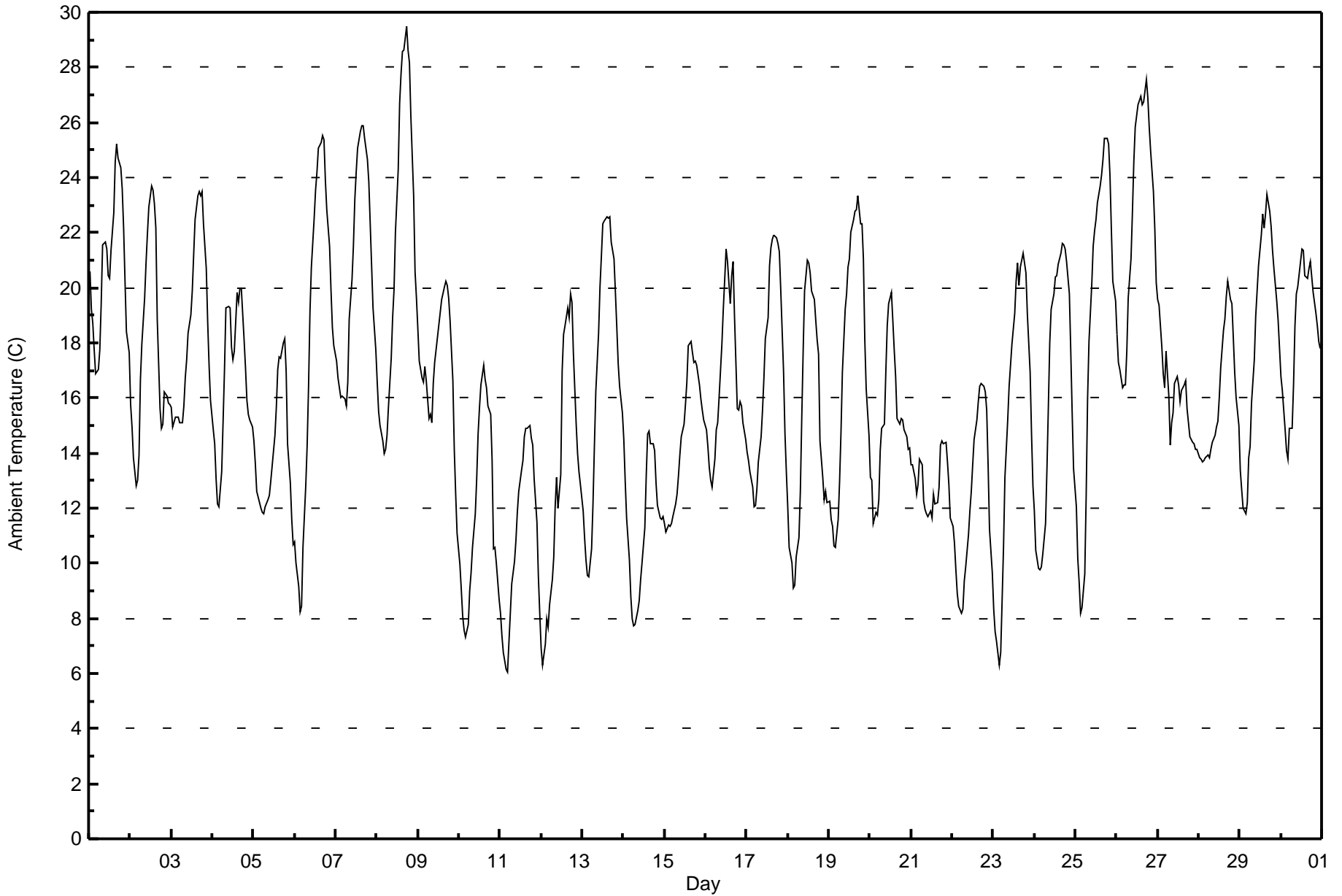
Fort Hills - June 2017

Maximum Value: 29 C on Jun 8 18:00										Maximum Daily Average: 22.4 C on Jun 26										Hours in Service: 720							
Minimum Value: 6 C on Jun 11 05:00										Minimum Daily Average: 10.9 C on Jun 11										Hours of Data: 720							
Maximum Diurnal Average: 20.4 C at hour 17										Minimum Diurnal Average: 11.7 C at hour 5										Hours of Missing Data: 0							
Monthly Average: 16.4 C										Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 16 Q ₃ = 20 P ₉₀ = 23 P ₉₉ = 27										Hours of Calibration: 0							
																				Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	21	19	19	18	17	17	18	19	22	22	21	20	20	21	23	25	25	25	24	24	22	20	18	18	20.7	25	
2-Jun	16	15	14	13	13	14	17	18	20	21	22	23	24	24	23	22	19	16	15	15	16	16	16	16	17.7	24	
3-Jun	16	15	15	15	15	15	15	16	17	17	18	19	20	21	22	23	23	23	24	22	21	19	17	16	18.6	24	
4-Jun	15	14	13	12	12	13	15	17	19	19	19	18	17	18	20	19	20	20	18	17	16	15	15	15	16.6	20	
5-Jun	14	14	13	12	12	12	12	12	12	12	13	14	15	16	17	17	17	18	18	17	14	13	12	11	14.0	18	
6-Jun	11	10	9	8	8	11	13	14	16	19	21	23	24	24	25	25	26	25	24	23	22	20	19	18	18.2	26	
7-Jun	17	17	16	16	16	16	16	17	19	20	22	23	24	25	26	26	26	25	25	24	22	21	19	18	20.6	26	
8-Jun	17	16	15	14	14	14	15	16	17	19	20	22	24	27	28	29	29	29	29	28	26	23	21	20	21.3	29	
9-Jun	18	17	17	17	17	17	15	15	15	17	17	18	19	19	20	20	20	20	20	19	17	14	13	11	17.1	20	
10-Jun	10	9	8	8	7	8	9	10	11	12	13	15	16	16	17	17	16	16	15	14	11	11	10	9	11.9	17	
11-Jun	8	7	7	6	6	7	8	9	10	11	12	13	13	14	15	15	15	15	15	14	13	11	10	8	10.9	15	
12-Jun	7	6	7	8	8	8	9	10	12	13	12	13	17	18	19	19	19	20	19	18	15	14	13	13	13.3	20	
13-Jun	12	11	10	10	10	11	12	14	16	18	20	21	22	22	23	23	23	22	21	20	19	17	16	15	17.0	23	
14-Jun	15	13	12	10	9	8	8	8	8	9	9	10	11	13	15	15	14	14	14	13	12	12	12	12	11.4	15	
15-Jun	11	11	11	11	11	12	12	13	13	14	15	15	16	17	18	18	18	17	17	17	16	16	16	15	14.6	18	
16-Jun	15	14	13	13	13	14	15	15	16	18	19	20	21	21	19	20	21	19	16	16	16	16	15	14	16.7	21	
17-Jun	14	14	13	13	12	12	13	14	15	16	17	18	19	21	21	22	22	22	22	21	20	17	15	13	16.8	22	
18-Jun	12	11	10	9	9	10	11	13	15	18	20	21	21	21	20	20	19	18	18	14	13	12	13	12	14.9	21	
19-Jun	12	12	11	11	11	12	13	15	17	19	20	21	21	22	22	23	23	23	22	22	21	18	16	15	17.6	23	
20-Jun	13	13	11	12	12	12	14	15	15	17	19	19	20	19	18	17	15	15	15	15	15	15	14	14	15.2	20	
21-Jun	14	14	13	13	13	14	14	12	12	12	12	12	13	12	12	13	14	14	14	14	14	14	13	12	12.9	14	
22-Jun	11	11	10	9	8	8	8	9	10	11	12	13	14	14	15	16	16	17	16	16	16	14	11	10	12.3	17	
23-Jun	8	8	7	6	7	9	11	13	15	16	17	18	19	20	21	20	21	21	21	21	19	17	15	13	15.1	21	
24-Jun	12	10	10	10	10	10	11	13	16	18	19	20	20	20	21	21	22	22	21	21	20	18	15	13	16.4	22	
25-Jun	12	10	9	8	8	10	12	16	18	20	22	22	22	23	24	24	25	25	25	25	24	22	20	20	18.7	25	
26-Jun	18	17	17	16	16	16	18	20	21	23	25	26	27	27	27	27	27	28	27	26	25	24	22	20	22.4	28	
27-Jun	20	19	18	17	16	18	16	14	15	15	17	17	16	16	16	16	17	16	15	15	14	14	14	14	16.1	20	
28-Jun	14	14	14	14	14	14	14	14	14	15	15	15	16	17	18	19	20	20	20	19	18	17	16	15	16.1	20	
29-Jun	13	13	12	12	12	14	14	16	17	19	20	21	22	23	22	23	23	23	22	21	21	20	19	18	18.3	23	
30-Jun	17	16	15	14	14	15	15	16	19	20	20	21	21	21	20	20	21	21	20	20	19	19	18	18	18.3	21	
	13.8	13.0	12.3	11.8	11.7	12.3	13.1	14.1	15.4	16.7	17.5	18.3	19.1	19.8	20.2	20.4	20.4	20.3	19.8	19.0	17.9	16.6	15.4	14.5	Diurnal Average		
	21	19	19	18	17	18	18	20	22	23	25	26	27	27	28	29	29	29	29	29	28	26	24	22	20	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Fort Hills - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort Hills - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	61	8.47	8.47
10 - 20	491	68.19	76.67
> 20	168	23.33	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

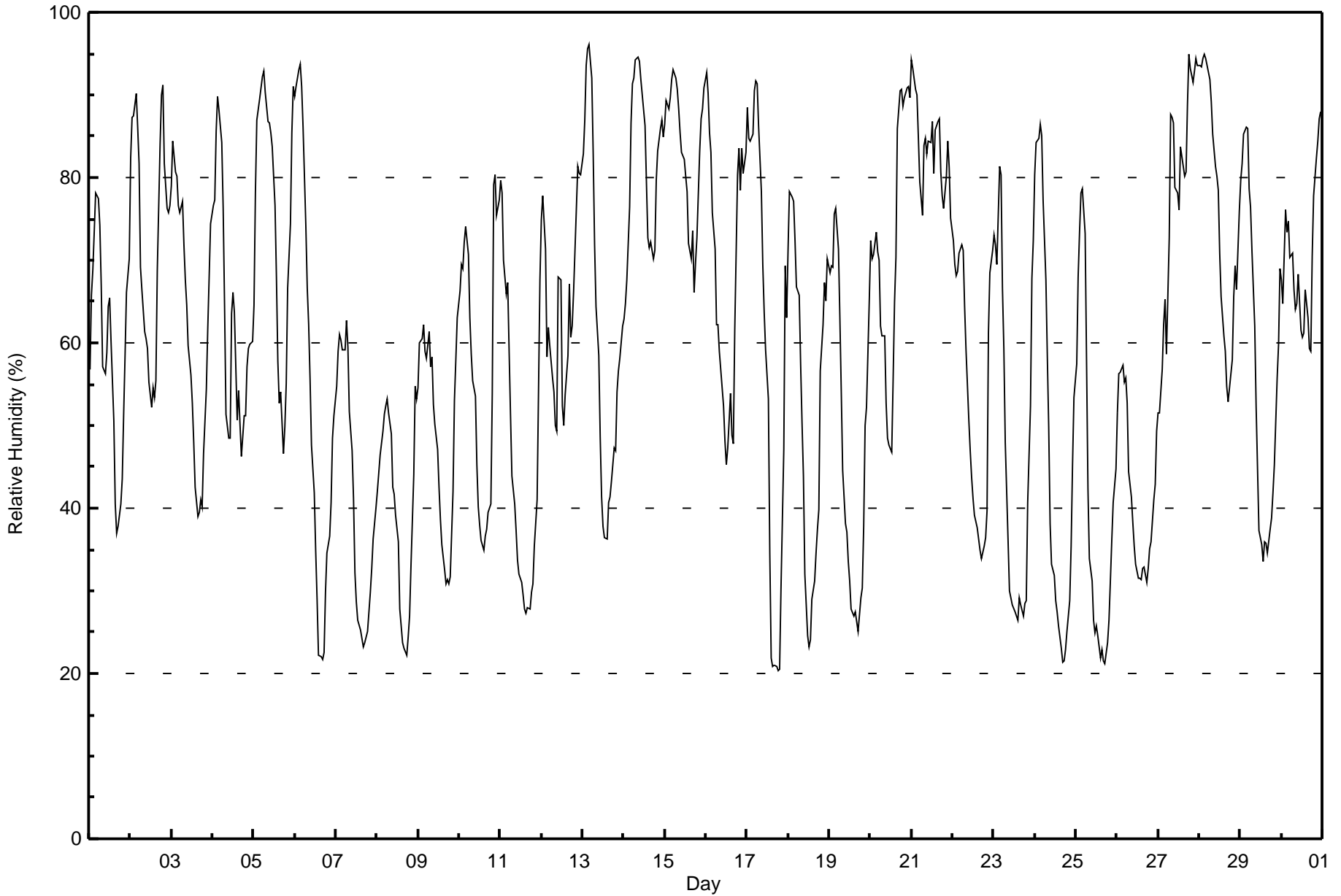
Fort Hills - June 2017

Maximum Value: 96 % on Jun 13 05:00														Maximum Daily Average: 83.8 % on Jun 21														Hours in Service: 720	
Minimum Value: 20 % on Jun 17 19:00														Minimum Daily Average: 39.9 % on Jun 8														Hours of Data: 720	
Maximum Diurnal Average: 77.3 % at hour 4														Minimum Diurnal Average: 43.9 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 60.1 %														Percentiles: P ₁ = 22 P ₁₀ = 30 Q ₁ = 42 Median = 61 Q ₃ = 78 P ₉₀ = 87 P ₉₉ = 94														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	57	66	69	73	78	78	74	67	57	56	59	64	65	60	50	41	37	38	40	44	51	59	66	70	59.2	78			
2-Jun	82	87	88	90	86	82	69	66	61	61	59	55	52	55	53	55	69	84	90	91	82	76	76	77	72.8	91			
3-Jun	79	84	81	80	77	76	77	72	68	65	60	56	53	48	42	39	39	41	40	47	54	62	68	74	61.7	84			
4-Jun	77	77	86	90	88	84	76	64	51	49	49	64	66	64	51	54	50	46	51	51	57	59	60	60	63.5	90			
5-Jun	65	78	87	90	91	92	93	90	87	87	85	84	77	68	58	53	54	47	50	55	67	74	85	91	75.3	93			
6-Jun	90	91	93	94	91	86	74	67	62	56	48	42	35	29	22	22	22	23	30	35	37	41	49	51	53.6	94			
7-Jun	55	59	61	60	59	59	63	59	52	47	41	32	29	26	25	24	23	24	25	27	30	33	36	40	41.3	63			
8-Jun	42	44	46	49	51	52	53	51	49	43	42	39	36	28	26	24	23	22	24	27	33	44	55	53	39.9	55			
9-Jun	55	60	61	62	59	58	61	57	58	52	50	47	43	39	36	33	31	31	31	32	42	53	58	63	48.8	63			
10-Jun	66	69	69	72	74	71	63	59	55	53	45	40	38	36	35	37	37	39	41	54	79	80	75	77	56.9	80			
11-Jun	80	78	70	66	67	59	51	44	41	37	34	32	31	30	28	27	28	28	30	31	35	41	54	68	45.4	80			
12-Jun	75	78	71	58	62	60	56	54	50	49	68	68	52	50	54	59	67	61	62	66	76	81	80	80	64.1	81			
13-Jun	83	87	94	96	96	92	83	72	64	58	49	41	38	37	36	41	41	43	47	47	54	57	58	62	61.5	96			
14-Jun	63	65	68	76	87	91	92	94	95	94	92	90	86	79	73	71	72	70	71	80	83	86	87	85	81.3	95			
15-Jun	86	89	88	90	92	93	92	91	88	86	83	82	80	78	72	70	74	66	70	73	83	87	88	91	83.0	93			
16-Jun	93	90	85	83	76	71	62	62	59	55	52	48	45	47	54	49	48	61	80	84	79	84	80	83	68.0	93			
17-Jun	88	85	84	85	91	92	91	86	78	70	64	59	53	35	22	21	21	21	20	20	30	47	69	63	58.2	92			
18-Jun	71	78	78	77	72	67	66	57	50	44	32	25	23	24	29	31	35	37	40	57	62	67	65	70	52.4	78			
19-Jun	69	69	69	76	76	71	63	54	45	38	37	34	31	28	27	27	26	25	29	30	38	50	52	65	47.1	76			
20-Jun	72	70	71	73	71	70	62	61	61	53	49	48	47	56	65	70	86	90	91	89	90	91	91	90	71.4	91			
21-Jun	94	93	91	90	85	80	75	84	85	83	84	84	87	81	86	87	87	81	78	76	80	84	81	75	83.8	94			
22-Jun	72	70	68	69	71	72	71	64	59	51	47	44	41	39	38	36	35	34	35	37	40	61	68	71	53.9	72			
23-Jun	73	72	70	81	80	67	59	48	36	30	29	28	27	27	26	29	28	27	28	29	41	52	68	72	47.0	81			
24-Jun	80	84	85	86	85	77	68	58	50	38	33	32	29	28	26	23	21	22	23	25	29	35	45	53	47.4	86			
25-Jun	57	68	73	78	79	73	58	42	34	31	26	25	26	25	22	23	22	21	24	26	31	36	41	45	41.1	79			
26-Jun	51	56	56	57	55	56	53	44	41	38	35	33	32	31	31	33	33	31	33	35	36	41	43	49	41.9	57			
27-Jun	52	51	57	62	65	59	73	88	87	87	79	78	76	84	82	80	81	89	95	93	92	93	94	94	78.7	95			
28-Jun	94	93	94	95	94	93	92	89	85	81	80	78	71	66	61	59	55	53	56	58	66	69	66	76	76.0	95			
29-Jun	80	82	85	86	86	79	76	71	62	52	45	37	36	34	36	36	35	37	39	42	45	56	60	69	56.9	86			
30-Jun	68	65	76	73	75	70	71	66	64	65	68	61	61	61	66	63	59	59	70	78	82	84	87	88	70.1	88			
72.3														74.7														Diurnal Average	
94														93														Diurnal Maximum	
75.8														77.3															
77.3														74.3															
70.6														66.2															
61.2														56.9															
54.1														51.7															
48.8														46.3															
44.4														43.9															
44.6														45.1															
48.1														51.2															
56.8														62.8															
66.9														70.2															



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Hills - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Hills - June 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	159	22.08	22.08
40 - 60	191	26.53	48.61
60 - 80	210	29.17	77.78
80 - 100	160	22.22	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

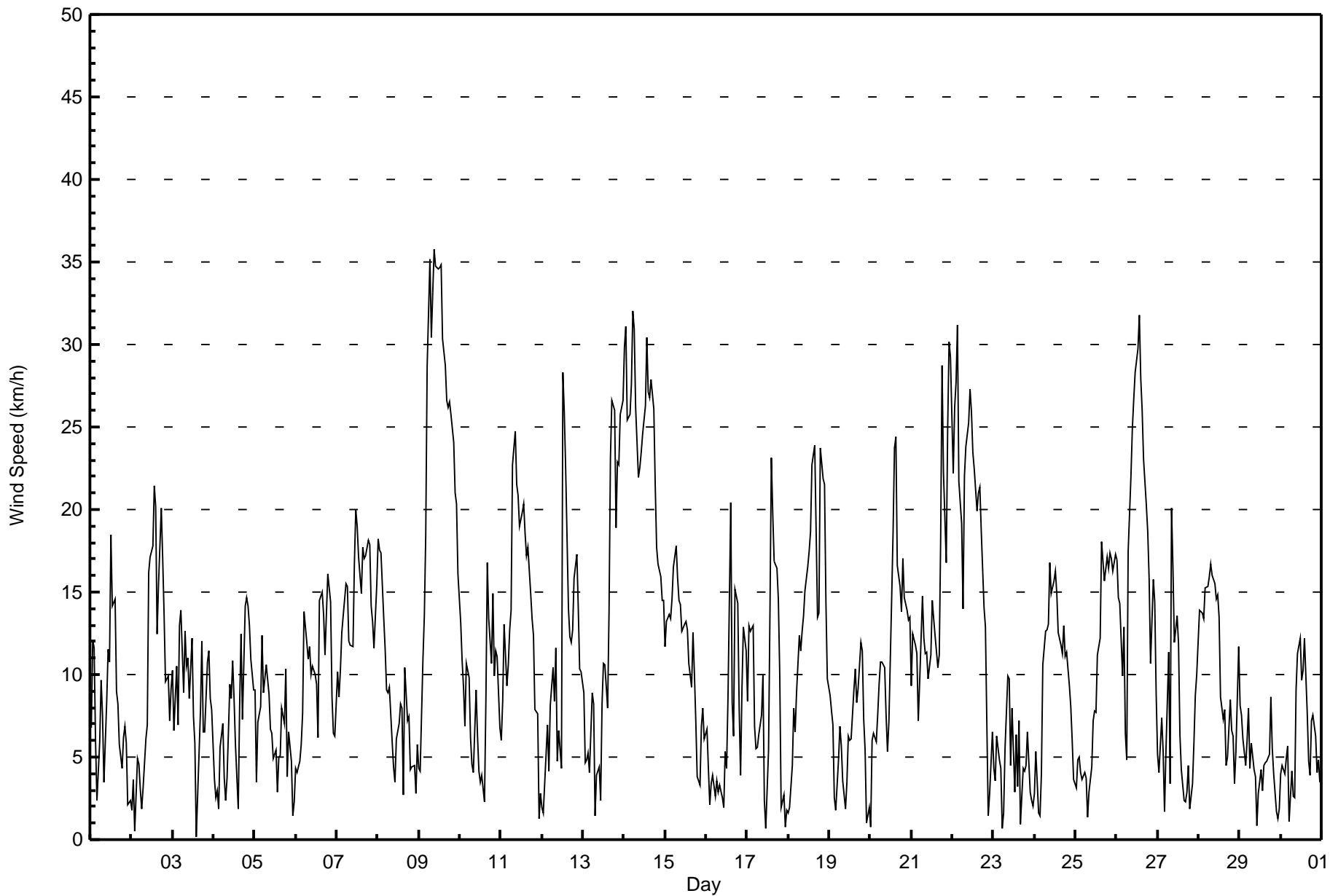
Wind Speed (WS) - km/h
Fort Hills - June 2017

Maximum Speed: 36 km/h on Jun 9 10:00	Maximum Daily Speed Average: 24.5 km/h on Jun 9	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 3 15:00	Minimum Daily Speed Average: 1.6 km/h on Jun 4	Hours of Data: 720
Maximum Diurnal Speed Average: 5.7 km/h at hour 21	Minimum Diurnal Speed Average: 0.5 km/h at hour 15	Hours of Missing Data: 0
Monthly Average Velocity: 3.1 km/h 20.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 10 Q ₃ = 15 P ₉₀ = 22 P ₉₉ = 32	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SW7	S12	S12	WSW6	WSW2	SSW6	SSW10	SW8	S3	SSW8	SSW12	SW11	S18	SSE14	S15	SSW9	SSW8	SW6	SSE4	SE6	SE7	SE6	NNW2	ENE2	S6.8	SSE18
2-Jun	WNW2	SSW4	NNE1	SSE5	SSE5	S3	S2	WNW3	NNE6	N7	NNE16	NNE17	NNE18	NNE21	NNE20	N12	SW15	SW20	SSW17	SW14	W10	NW10	WNW7	NW9	NNW3.1	NNE21
3-Jun	WNW10	WNW7	WNW11	WNW7	N13	NNW14	NNW9	NNW13	NNW11	NW11	WNW9	W12	WSW7	WSW6	NNW0	NE5	SE8	SSE12	SE7	ENE7	NNE11	NNE11	N9	NNE8	NNW4.7	NNW14
4-Jun	NE4	SSE3	WSW3	ESE2	SE6	S7	S4	WSW2	SSW4	SSE9	SSE9	SSE11	SSW9	SW6	WNW2	NNW8	NNE12	NNW7	NNW14	N15	N14	N13	NNE11	NNE9	N1.6	N15
5-Jun	ENE9	E3	E7	NNE8	N12	NNE9	NNW10	N11	N9	NNE7	NNE6	NW5	NNW5	NW3	SE5	ESE5	ENE8	ESE7	SSW10	N4	NNE7	NNW5	SSW1	SSE2	NNE3.7	N12
6-Jun	S4	S4	S5	SSE6	SSE8	SSE14	S12	S11	SSE12	S10	S11	SSE10	SSE9	NNW6	W14	W15	W14	NW11	N14	NNE16	NE14	NE9	NNE6	N6	SSW1.7	NNE16
7-Jun	NNE10	NNE9	NNE10	NNE13	NNE14	NNE15	NNE15	N12	N12	NNE12	NE17	NE20	NE19	NE17	NE15	NE18	NE17	NE17	NE18	NE18	NE14	NNE13	NNE12	NNE15	NNE14.1	NE20
8-Jun	N18	NNE18	NNE17	NNE13	NNE12	NNE9	N9	N9	N6	NNW4	W3	ESE6	ESE7	ESE8	ESE8	S3	SSE10	SSE7	SSE7	S4	ESE4	ESE4	SE3	NNW6	NE4.1	N18
9-Jun	NNW4	N4	NNE11	NNE14	NNE19	NNE29	NNE35	NNE30	NNE33	NNE36	NNE35	NNE35	NNE35	NE35	NE30	NE29	NE27	NE26	NE27	NNE26	NNE24	NNE21	NNE20	NNE16	NNE24.5	NNE36
10-Jun	NNE13	NNE11	NNE9	NNE7	NNE11	NNE10	NE6	ENE5	N4	NNE9	NE6	SSE4	S4	WSW4	ENE2	NNE9	NNE17	NNE13	NNE11	N15	NNE10	N11	N11	NNW7	NNE7.5	NNE17
11-Jun	WNW6	NW8	NW13	WNW9	W11	W13	WNW14	NW23	NNW25	NNW22	NW21	NW19	NNW20	NNW20	N19	NNW17	NNW18	N15	NNE13	NE12	NE8	ENE8	ENE1	WNW3	NNW12.1	NNW25
12-Jun	WSW2	WNW2	SE5	SSE7	SSW4	SSE8	SSE10	S8	S12	SSW5	NNE7	SE4	SSE28	S26	SSE22	SE14	SE12	SE12	SE13	NNE16	NNE17	NNE14	NNE10	NNE10	SE5.3	SSE28
13-Jun	NNE9	N5	NW5	NNW5	NW4	N9	N8	SW1	S4	S4	NE2	NNW8	NNW11	NW11	WNW8	NNW14	NNE23	NNE27	NNE26	NNE19	NNE23	NNE23	NNE26	NNE27	N11.0	NNE27
14-Jun	NNE30	NNE31	N25	NNE26	NNE28	NNE32	NNE31	NNE26	NNE22	NNE23	NNE24	NNE25	NNE26	NNE30	NNE27	NNE27	NNE28	NNE26	NNE21	NNE18	N17	N16	N14	NNW14	NNE24.2	NNE32
15-Jun	NNW12	N13	N14	N13	N15	NNE17	NNE18	NNE16	NNE14	N14	N13	N13	N13	N13	NE11	NE9	NE13	ENE10	NE7	NNE4	NNE3	N7	NNE8	NNE6	NNE10.8	NNE18
16-Jun	NE7	NE4	ESE2	E3	ESE4	ESE3	ESE4	NE3	SSE3	ESE3	SSE2	SE5	SE4	S9	SSE20	SSE8	SSW6	SSW15	SW14	WNW8	E4	SSE9	SSE13	SSE11	SSE4.3	SSE20
17-Jun	S8	SSE13	SSE13	SSE13	SSW7	SSE5	S6	WSW6	W8	W10	NW2	SW1	NNW5	NW14	NW23	WSW20	NW17	NW16	NNW15	NNW10	NE2	SE3	WSW1	ESE2	W4.0	NW23
18-Jun	WSW2	SSW2	S5	S8	S7	S9	S12	S11	S13	S14	SSW15	SW17	WSW17	WSW19	SW23	W24	WSW19	W13	WNW14	N24	NNE22	N22	NNW14	WNW10	WSW6.7	W24
19-Jun	W9	NW8	NNW7	S3	S2	SW5	W7	W6	SW4	S2	SW4	SSE6	WSW6	NW6	WSW9	SW10	SW8	SW9	SSW12	SSW11	S7	S5	SE1	NNW2	SW4.4	SSW12
20-Jun	S1	SSW6	SSE6	S6	SSW8	S9	S11	S11	S10	SSE8	S5	SW7	SSW15	SW19	SSW24	SSW24	S17	S15	S14	SSE17	S15	SSE14	SSE13	SSE13	S11.3	SSW24
21-Jun	SSW9	SSW12	SW12	SW11	WSW7	WNW10	NW15	W12	W11	WNW11	W10	WNW11	W15	WNW13	WNW12	W10	W11	N18	N29	N22	N17	N25	N30	N29	NW9.3	N30
22-Jun	N22	N26	N28	N31	N22	N19	N14	NNE22	NNE24	N25	NNE27	NNE26	N24	N22	N20	N21	NNE21	NNE19	NNE14	NNE13	NNE7	WSW1	WNW3	WNW7	N18.6	N31
23-Jun	NW4	N4	NW6	WNW5	WNW4	W1	W2	N5	N10	NNE10	NNE4	NNE8	E3	ENE6	NE3	N7	ENE1	E4	SE4	ENE4	W7	NW3	WNW2	WNW2	N2.7	N10
24-Jun	SSW3	S5	SSW2	ENE1	N4	N11	NNE13	NNE13	NNE13	NE17	ENE15	NE16	N16	NNE15	NNE13	N12	NNE11	NNE13	NNE11	NE11	NE9	NE8	NNE6	N4	NNE8.8	NE17
25-Jun	NNW3	NNW5	NNW5	NNW4	NNW4	WNW4	WNW4	SSW1	S3	S4	SE7	SSE8	S8	SSW11	SSW12	SSW18	S17	SSE16	SSE17	SSE16	SSE17	SSE17	SSE16	SSE17	S7.1	SSW18
26-Jun	SSE17	SSE15	SSE14	SSE10	SSE13	SSE6	S5	S17	S22	S25	SSE27	SSE28	SSE30	SSE32	SSE28	SSE26	SSE23	SSE20	SSE19	SSE16	SE11	SE16	SE14	SE9	SSE18.0	SSE32
27-Jun	ESE5	NE4	NE7	NE5	NE2	SSE5	S11	SSE3	SSE20	S17	S12	SSW14	SW12	SW6	SE4	E2	E2	SE3	NE5	S2	NE3	ENE6	NE9	NE10	SSE3.4	SSE20
28-Jun	NE14	NE14	NE14	NNE13	NNE15	NE15	NE16	NE17	ENE16	ENE15	NE15	ENE15	ENE13	E9	ESE7	SSE8	SSE5	S5	SW8	SW7	WSW6	NNW3	E5	SSE12	ENE7.3	NE17
29-Jun	SE8	SSE8	S6	S5	SE6	S8	SSW4	SSE6	SE4	SE4	NE1	WNW3	S4	ENE3	SW5	SW5	ESE5	ENE5	NE9	ENE6	ENE4	SE2	SSE1	N2	SE2.7	NE9
30-Jun	N4	NNE5	N4	N5	N6	WSW1	SW4	SSE3	SE3	SSE9	S11	SSE12	S10	WSW10	W12	WNW8	WNW5	WSW4	SW7	SW8	SW6	S4	SSE5	SSE3	SW2.8	SSE12

NNE3.3 NNE2.6	N3.1 NNE3.1 NNE3.8 NNE3.5	N3.3	N3.4 NNE2.8 NNE2.7 NNE3.0	NE2.5	NE1.0	N2.0 NNW0.5 NNW2.2 NNE2.1	NE2.5 NNE3.0 NNE5.5 NNE5.7 NNE5.5 NNE4.7 NNE4.0																Diurnal Average
NNE30 NNE31	N28	N31 NNE28 NNE32 NNE35 NNE30 NNE33 NNE36 NNE35 NNE35 NNE35	NE35	NE30	NE29 NNE28 NNE27	N29 NNE26 NNE24	N25 N30 N29																Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	186	25.83	25.83
6 - 11	235	32.64	58.47
12 - 19	201	27.92	86.39
20 - 28	76	10.56	96.94
29 - 38	22	3.06	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	12	5	12	11	8	12	15	16	28	10	8	10	3	14	7	15	186
6 - 11	17	38	15	8	2	6	11	26	24	15	15	9	12	16	9	12	235
12 - 19	31	44	22	5	0	0	6	29	15	10	7	3	9	4	6	10	201
20 - 28	14	32	4	0	0	0	0	10	3	2	2	0	1	0	4	4	76
29 - 38	4	13	3	0	0	0	0	2	0	0	0	0	0	0	0	0	22
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	78	132	56	24	10	18	32	83	70	37	32	22	25	34	26	41	720

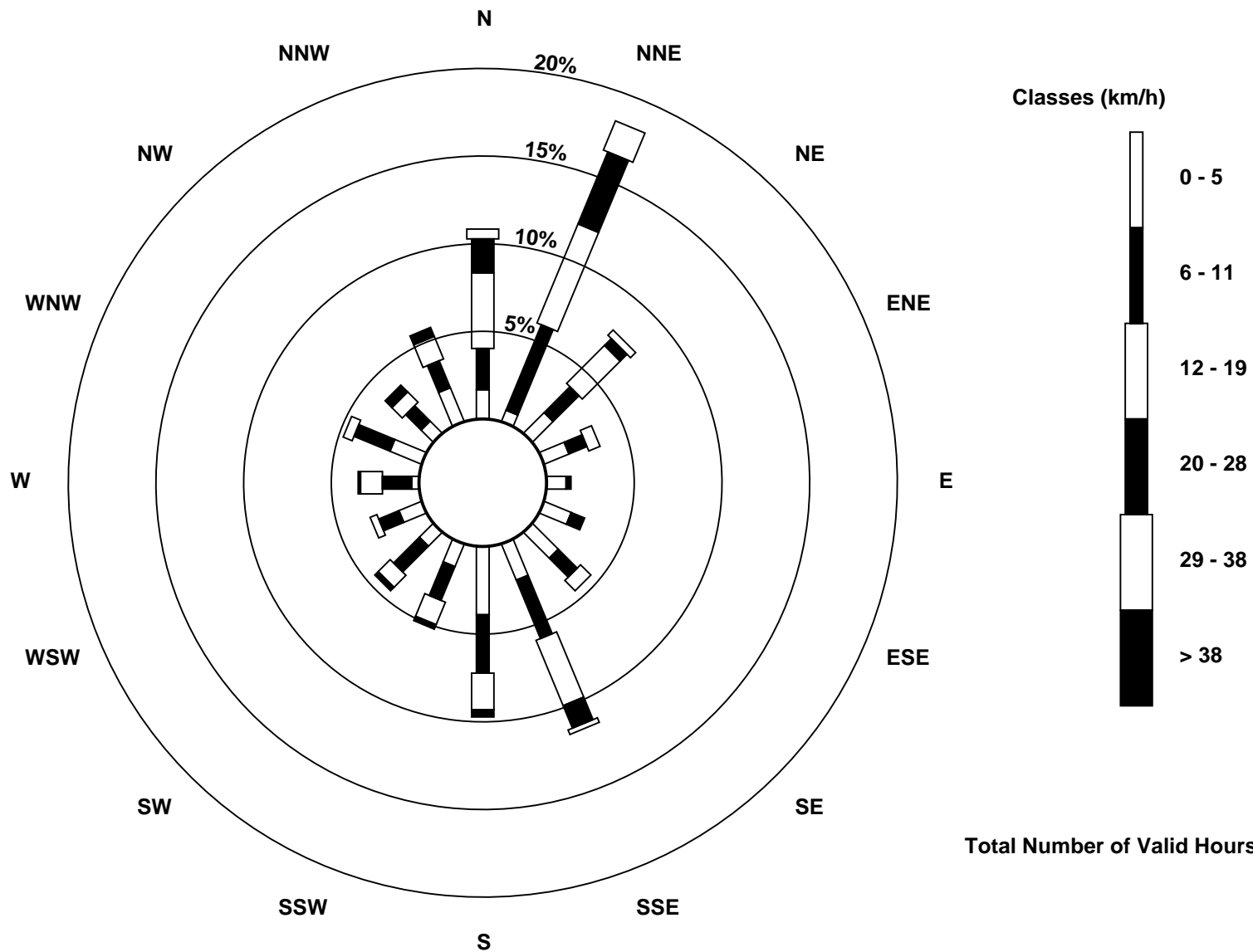
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Fort Hills (AMS 23)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Hills - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jun 21 18:00 Minimum Value: 1 km/h on Jun 23 05:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	3	2	2	2	2	1	2	1	3	2	3	3	2	4	4	4	3	2	1	1	2	2	1	4
2-Jun	1	1	2	2	2	1	1	1	4	2	3	3	3	4	4	5	6	5	3	2	2	3	2	2	6
3-Jun	3	2	3	1	4	3	2	3	3	3	3	3	3	3	2	3	3	3	3	2	2	2	2	1	4
4-Jun	2	1	3	2	1	2	2	2	3	4	2	4	1	3	2	2	2	2	3	3	3	3	2	2	4
5-Jun	2	2	3	3	3	2	2	2	2	2	2	2	2	2	3	2	2	3	2	7	3	2	3	7	
6-Jun	2	2	1	2	2	2	1	2	2	3	3	4	4	3	6	5	3	3	3	3	3	3	1	2	6
7-Jun	2	1	2	2	2	3	2	2	2	3	4	4	4	4	3	3	3	3	3	3	3	2	2	3	4
8-Jun	2	3	3	2	2	1	1	2	2	1	1	2	2	3	3	4	4	4	2	2	1	2	2	2	4
9-Jun	1	2	2	2	7	8	7	6	6	6	6	6	7	7	7	5	5	5	5	4	5	3	3	3	8
10-Jun	2	1	1	1	2	2	2	2	3	3	3	3	2	2	2	4	3	3	2	4	4	3	3	1	4
11-Jun	2	2	3	2	2	2	4	6	5	5	5	5	6	5	5	5	4	4	4	2	2	1	1	1	6
12-Jun	1	1	2	2	1	3	2	2	2	2	2	6	5	5	4	6	3	3	3	6	4	2	2	2	6
13-Jun	2	1	1	2	2	2	2	2	1	2	3	3	4	3	2	7	4	4	5	4	5	4	5	5	7
14-Jun	6	6	6	5	6	6	5	5	5	4	5	4	5	5	5	5	5	5	4	3	3	3	3	3	6
15-Jun	2	3	2	2	2	2	3	3	2	2	2	2	2	2	3	3	2	2	2	1	1	1	1	1	3
16-Jun	2	1	1	1	1	1	1	1	1	2	2	3	2	6	5	1	2	6	3	2	2	2	3	2	6
17-Jun	3	1	2	3	2	1	1	1	3	2	3	1	2	9	5	5	4	4	3	4	2	1	2	3	9
18-Jun	3	2	1	1	1	2	2	3	3	3	4	6	5	9	5	6	3	3	4	5	4	6	7	4	9
19-Jun	2	2	2	1	1	1	1	1	2	2	2	4	4	3	4	5	5	4	4	3	2	2	2	2	5
20-Jun	2	4	2	1	1	2	1	2	3	3	3	5	3	5	4	5	3	2	2	3	2	2	1	2	5
21-Jun	2	2	2	1	2	5	5	3	3	3	2	3	3	3	3	2	3	10	6	5	4	7	7	7	10
22-Jun	5	6	6	6	5	4	3	5	5	6	6	6	5	5	6	5	5	4	3	3	3	1	2	1	6
23-Jun	2	1	1	1	1	1	1	2	3	3	4	3	3	3	3	2	1	2	2	2	2	2	2	2	4
24-Jun	2	2	1	1	4	3	3	2	3	3	4	5	4	5	5	5	4	4	3	3	2	1	1	1	5
25-Jun	1	1	1	1	2	1	1	1	2	2	3	4	4	4	5	5	4	4	3	2	2	2	2	2	5
26-Jun	2	1	1	2	2	2	3	4	3	4	5	4	4	5	5	5	4	4	3	2	3	4	5	1	5
27-Jun	3	3	1	2	2	6	5	4	4	4	3	3	3	5	1	2	2	1	2	2	2	3	2	2	6
28-Jun	2	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	2	2	3	3
29-Jun	1	1	1	1	2	1	2	2	1	2	1	1	3	2	2	2	2	1	3	2	1	1	2	1	3
30-Jun	1	1	1	2	2	2	2	1	1	2	3	3	2	4	2	2	1	2	2	2	1	1	1	1	4
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Hills - June 2017

Direction of Maximum Speed: 20 deg on Jun 9 10:00 Direction of Maximum Daily Speed Average: 27.6 deg on Jun 9	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 328 deg on Jun 3 15:00 Direction of Minimum Daily Speed Average: 1.6 deg on Jun 4	Percent Operational Time: 100.0
Monthly Average Direction: 252.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	232	173	182	247	241	192	211	221	184	207	199	214	169	164	177	204	193	226	158	135	127	133	341	68	187.4
2-Jun	293	210	29	165	167	182	173	283	14	3	14	18	21	22	18	7	232	216	210	219	269	317	290	315	326.5
3-Jun	285	286	302	302	356	338	328	338	348	315	292	278	257	243	328	43	126	148	134	60	24	33	6	17	334.0
4-Jun	49	165	254	104	131	190	178	246	207	168	164	155	193	215	286	343	16	344	331	351	0	11	31	31	9.1
5-Jun	62	88	100	27	3	16	347	1	8	22	20	306	333	311	127	106	71	116	193	4	30	348	198	161	29.5
6-Jun	188	188	178	168	166	164	181	172	159	177	180	165	167	334	276	276	276	306	7	25	35	48	14	359	199.6
7-Jun	13	16	14	19	19	21	13	11	7	19	38	46	43	48	42	46	51	52	50	47	40	29	16	12	32.3
8-Jun	10	16	15	15	14	14	1	5	0	347	262	114	103	117	105	177	147	158	166	169	114	108	142	345	41.4
9-Jun	339	354	18	26	21	22	21	23	21	20	22	25	30	34	39	52	50	41	40	33	19	12	14	21	27.6
10-Jun	27	23	27	13	20	24	41	75	3	14	34	147	173	252	58	17	21	24	19	354	26	9	0	336	18.8
11-Jun	303	317	320	287	278	277	299	320	334	327	320	322	330	337	352	341	347	352	23	39	40	59	74	301	332.4
12-Jun	253	298	139	166	208	160	168	191	184	200	24	129	168	176	168	144	140	127	128	20	16	18	26	28	142.2
13-Jun	32	9	320	346	326	354	8	233	190	184	50	348	348	318	290	346	13	15	12	17	12	17	19	18	6.2
14-Jun	16	18	9	16	24	23	25	27	26	18	23	20	20	17	20	13	15	16	16	12	6	3	352	348	16.7
15-Jun	333	352	5	6	7	13	16	18	15	9	10	4	3	6	43	50	52	61	48	31	32	10	16	27	15.7
16-Jun	40	51	107	87	114	107	117	41	150	122	167	140	145	174	158	160	212	203	235	301	84	159	147	148	158.2
17-Jun	174	168	168	162	205	160	170	248	262	278	305	217	330	313	307	310	312	306	328	346	53	140	237	105	280.9
18-Jun	247	202	173	179	186	188	185	187	178	180	212	235	242	240	234	262	251	275	282	11	19	1	331	293	249.1
19-Jun	280	310	331	188	176	236	270	264	223	190	235	153	249	314	249	221	234	236	208	194	187	171	145	288	235.1
20-Jun	184	204	165	186	192	179	182	182	182	152	176	225	213	221	203	199	190	178	175	168	169	162	151	166	184.8
21-Jun	196	213	219	226	252	302	308	279	273	282	276	291	276	286	283	277	263	353	7	7	358	6	7	8	316.8
22-Jun	9	360	8	9	6	7	6	12	18	8	14	15	11	7	6	4	16	14	16	31	30	248	294	301	9.4
23-Jun	319	355	316	298	294	269	273	4	0	22	19	22	80	64	50	350	64	101	146	65	277	305	292	282	359.0
24-Jun	195	179	207	66	353	4	22	16	30	54	59	34	1	16	32	7	15	22	12	39	53	41	12	358	26.5
25-Jun	339	331	342	342	343	301	346	207	181	171	143	159	176	196	203	196	189	164	165	155	147	152	153	160	170.8
26-Jun	164	164	164	151	151	158	187	177	178	169	165	162	164	164	161	168	164	160	160	155	130	131	130	131	160.5
27-Jun	117	47	50	43	50	153	185	152	161	183	188	202	221	215	133	91	99	128	56	188	40	63	50	49	147.8
28-Jun	47	45	36	32	29	49	49	54	62	57	55	67	73	90	113	157	151	182	224	226	245	332	92	164	63.3
29-Jun	145	167	185	180	140	172	211	158	141	140	48	292	183	73	222	220	119	67	55	69	73	132	156	359	145.3
30-Jun	10	21	2	11	356	246	226	148	144	168	172	161	189	248	272	289	289	238	233	222	214	176	156	158	216.1

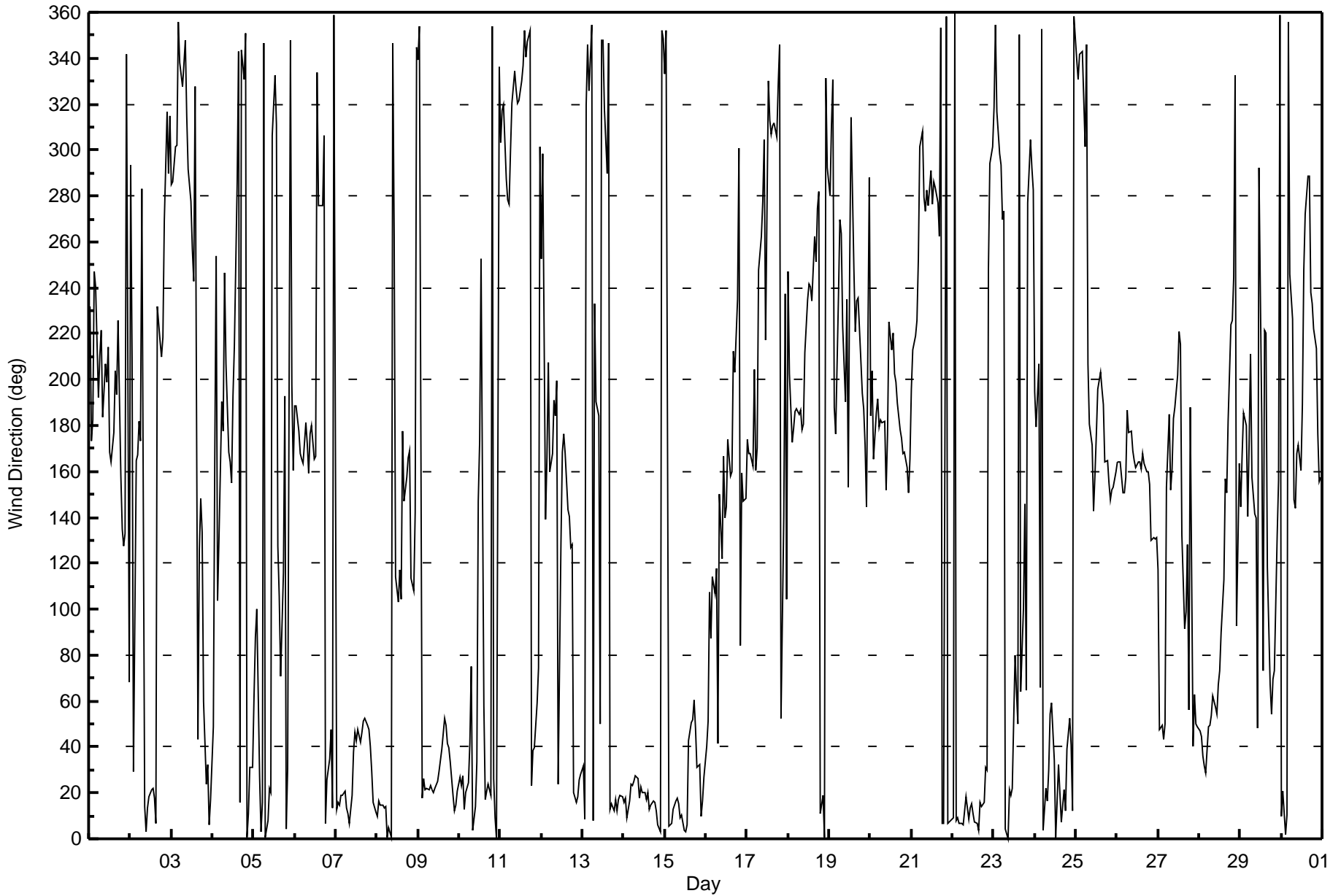
11.6	12.6	11.1	17.3	14.1	18.2	6.6	5.7	27.3	24.9	30.6	35.4	34.2	353.5	344.6	339.2	22.2	33.8	29.1	30.1	31.1	32.3	27.0	19.4
Diurnal Average																							

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Hills - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Hills - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 107 deg on Jun 3 15:00 Minimum Value: 5 deg on Jun 26 01:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 18 Q ₃ = 33 P ₉₀ = 60 P ₉₉ = 95		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	45	27	15	39	52	22	11	22	26	19	10	23	10	12	17	27	33	19	29	16	11	15	77	51	77	
2-Jun	41	39	86	14	25	40	61	48	70	24	14	11	15	13	13	26	29	9	19	14	22	13	16	15	86	
3-Jun	12	15	12	17	15	14	14	14	22	22	48	21	34	46	107	67	48	15	36	20	15	14	21	11	107	
4-Jun	46	56	77	79	27	36	51	57	40	29	17	45	18	33	76	16	13	34	22	23	15	11	16	11	79	
5-Jun	14	46	32	29	14	14	14	17	18	20	31	30	43	77	58	52	27	43	20	78	50	35	81	75	81	
6-Jun	34	30	16	26	19	9	12	15	11	24	32	37	33	63	20	16	16	24	23	9	12	17	24	14	63	
7-Jun	11	14	11	8	7	8	11	12	15	24	15	13	16	17	18	15	15	11	9	9	11	10	13	10	24	
8-Jun	10	8	9	12	9	12	15	12	34	25	33	45	36	34	42	95	23	37	25	21	24	22	57	19	95	
9-Jun	34	23	12	8	9	11	11	12	11	11	13	14	12	14	13	13	13	13	13	11	15	11	9	9	34	
10-Jun	7	8	9	12	8	13	39	48	87	32	55	71	81	80	86	39	12	14	18	19	13	16	17	14	87	
11-Jun	27	17	13	12	10	11	19	16	16	20	20	21	19	20	22	26	24	25	22	13	10	8	82	43	82	
12-Jun	60	73	27	16	34	19	16	13	13	39	21	75	13	11	13	18	17	20	20	19	13	14	11	11	75	
13-Jun	10	29	20	37	17	16	17	75	35	37	87	42	34	26	29	36	14	11	14	11	11	11	10	10	87	
14-Jun	11	10	15	10	11	11	9	10	10	11	11	12	13	13	13	13	10	10	11	14	14	15	14	15	15	
15-Jun	16	18	14	12	12	11	10	9	12	14	14	15	16	17	23	23	13	12	21	23	31	16	11	18	31	
16-Jun	12	16	68	26	21	31	33	55	35	66	78	60	56	49	16	21	26	11	23	14	63	15	14	16	78	
17-Jun	19	7	7	7	30	24	12	30	32	21	77	91	50	47	15	18	24	19	20	15	64	37	95	87	95	
18-Jun	82	66	25	16	16	14	9	15	20	17	22	26	19	20	16	14	14	16	31	15	12	17	35	13	82	
19-Jun	12	21	17	65	48	20	14	18	43	77	72	70	61	51	45	39	47	35	21	10	12	16	82	76	82	
20-Jun	95	24	20	32	12	15	9	18	15	27	45	40	17	8	13	11	11	10	10	8	7	9	8	11	95	
21-Jun	21	10	7	10	28	14	17	13	15	16	15	15	20	17	11	17	10	33	15	14	16	14	16	15	33	
22-Jun	14	17	15	15	14	15	16	16	13	15	15	16	20	17	23	19	19	16	19	13	13	45	30	22	45	
23-Jun	21	22	14	24	12	84	65	27	21	32	87	40	80	54	73	21	98	60	55	61	25	59	51	61	98	
24-Jun	51	33	77	55	73	17	12	15	23	15	23	21	28	34	27	29	27	18	17	10	12	14	18	18	77	
25-Jun	38	20	31	22	31	21	24	85	68	44	35	45	50	39	32	17	22	13	12	11	6	6	6	6	85	
26-Jun	5	6	5	12	9	9	24	12	11	10	10	12	13	9	13	10	10	10	12	9	19	15	14	9	24	
27-Jun	67	23	21	25	26	32	31	67	12	14	14	15	16	45	36	49	50	46	24	91	25	28	10	9	91	
28-Jun	9	10	10	9	9	11	9	10	12	10	14	16	17	27	40	34	69	52	17	11	11	57	53	11	69	
29-Jun	16	12	19	32	23	16	22	26	39	70	102	75	67	85	39	51	47	36	12	22	20	60	81	58	102	
30-Jun	28	40	23	19	27	97	34	53	58	22	21	20	29	23	11	14	36	64	12	7	16	22	13	39	97	
		95	73	86	79	73	97	65	85	87	77	102	91	81	85	107	95	98	64	55	91	64	60	95	87	
		Diurnal Maximum																								



Wood Buffalo Environmental Association

SO₂ Calibration Summary

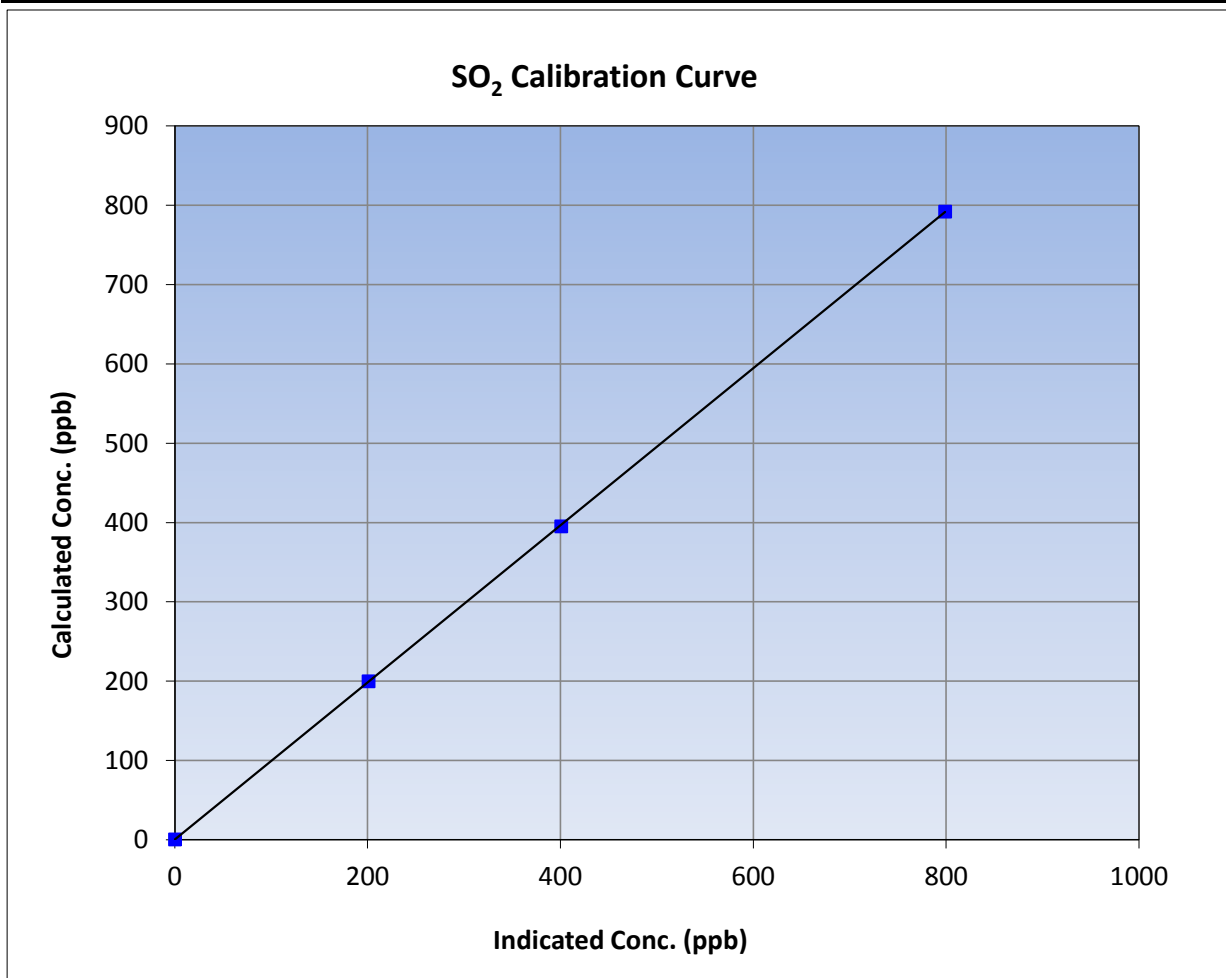
Version-03-2017

Station Information

Calibration Date	April 20, 2017	Previous Calibration	April 4, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	8:05	End Time (MST)	13:22
Analyzer make	Thermo 43i	Analyzer serial #	1160290012

Calibration Data

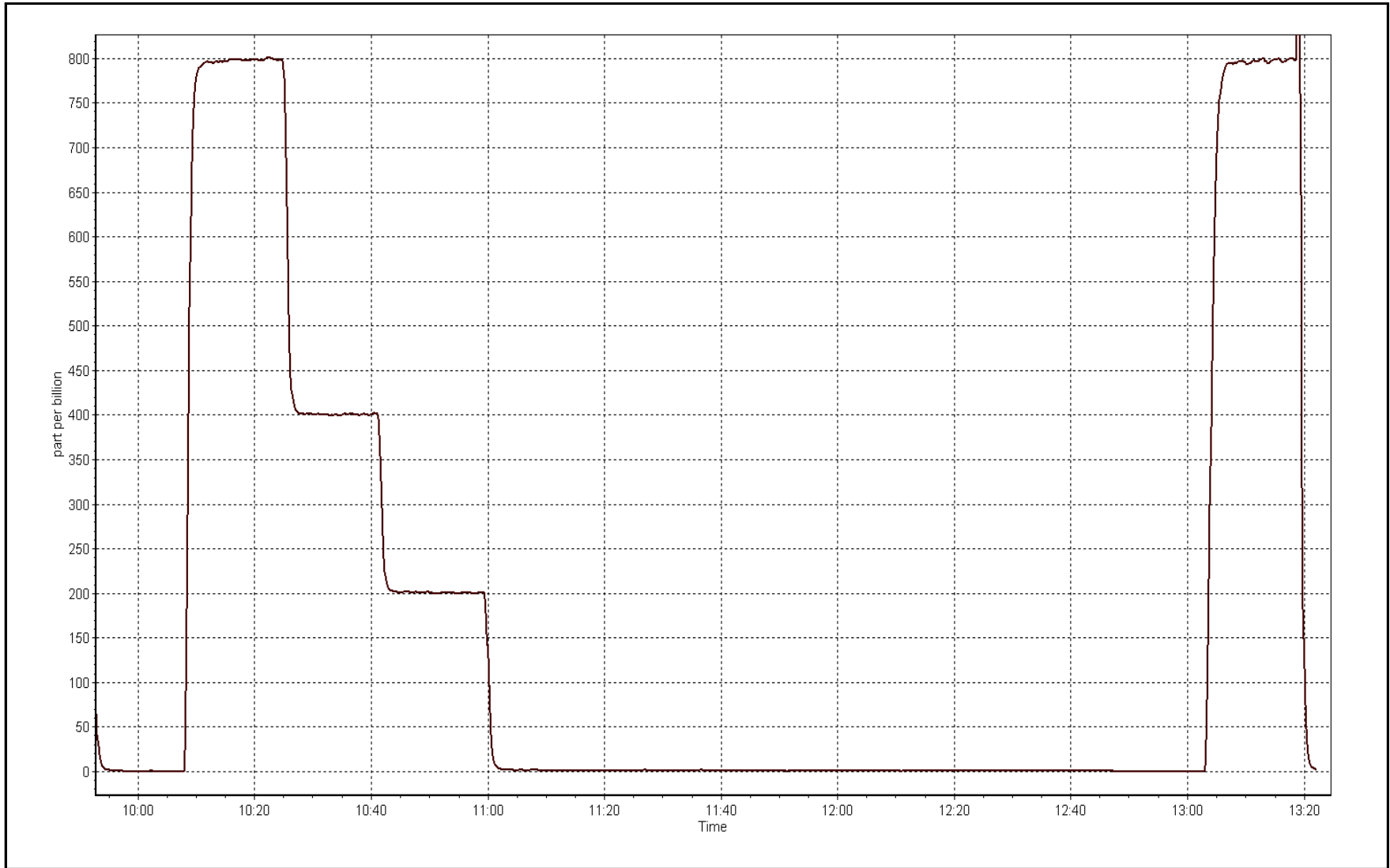
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999985	≥0.995
791.8	798.6	0.9914			
394.9	400.6	0.9858	Slope	0.990549	0.90 - 1.10
199.6	200.5	0.9956			
			Intercept	0.001637	+/-30



SO2 Calibration Plot

Date: April 20, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

SO₂ Calibration Summary

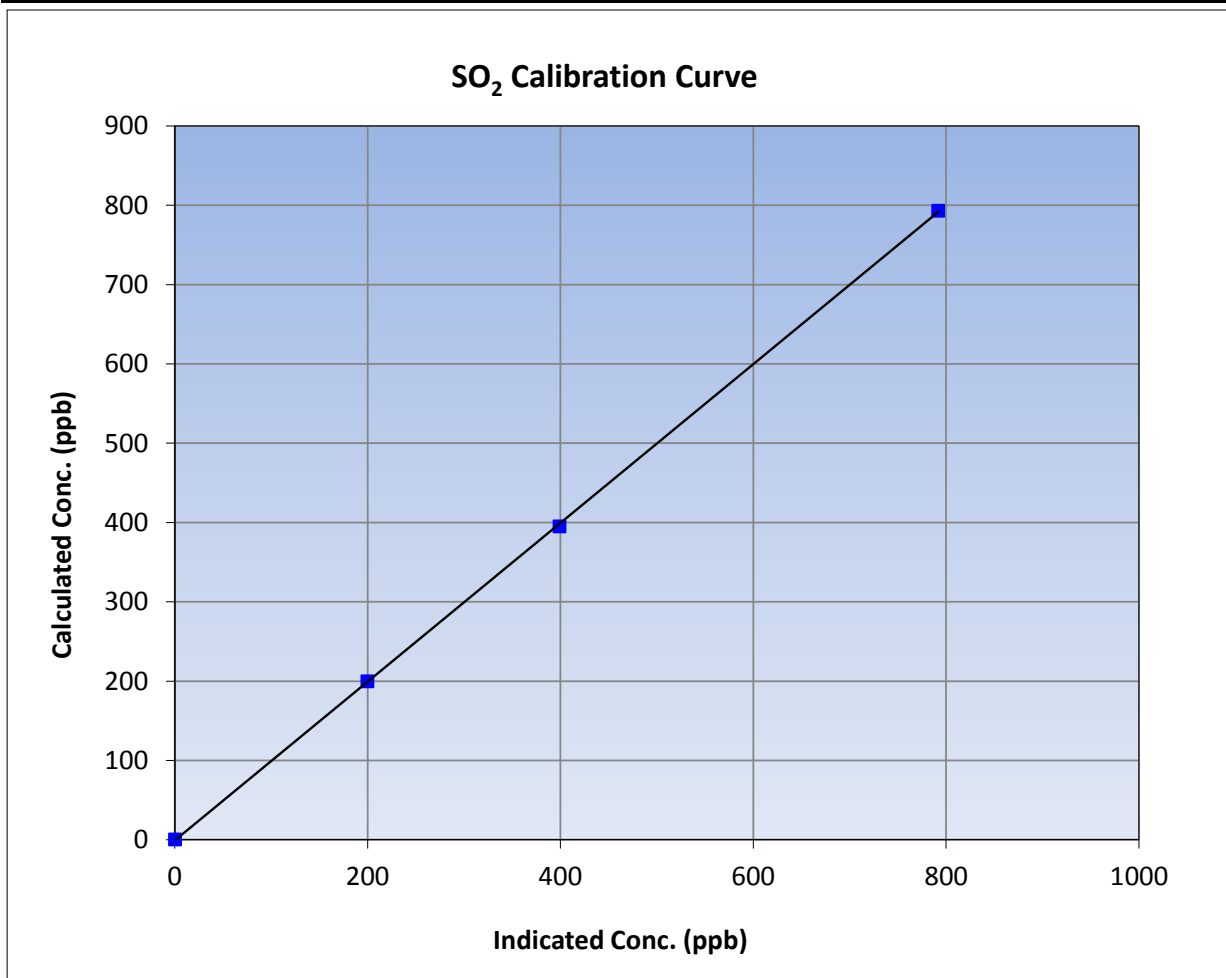
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:22	End Time (MST)	15:02
Analyzer make	Thermo 43i	Analyzer serial #	1160290012

Calibration Data

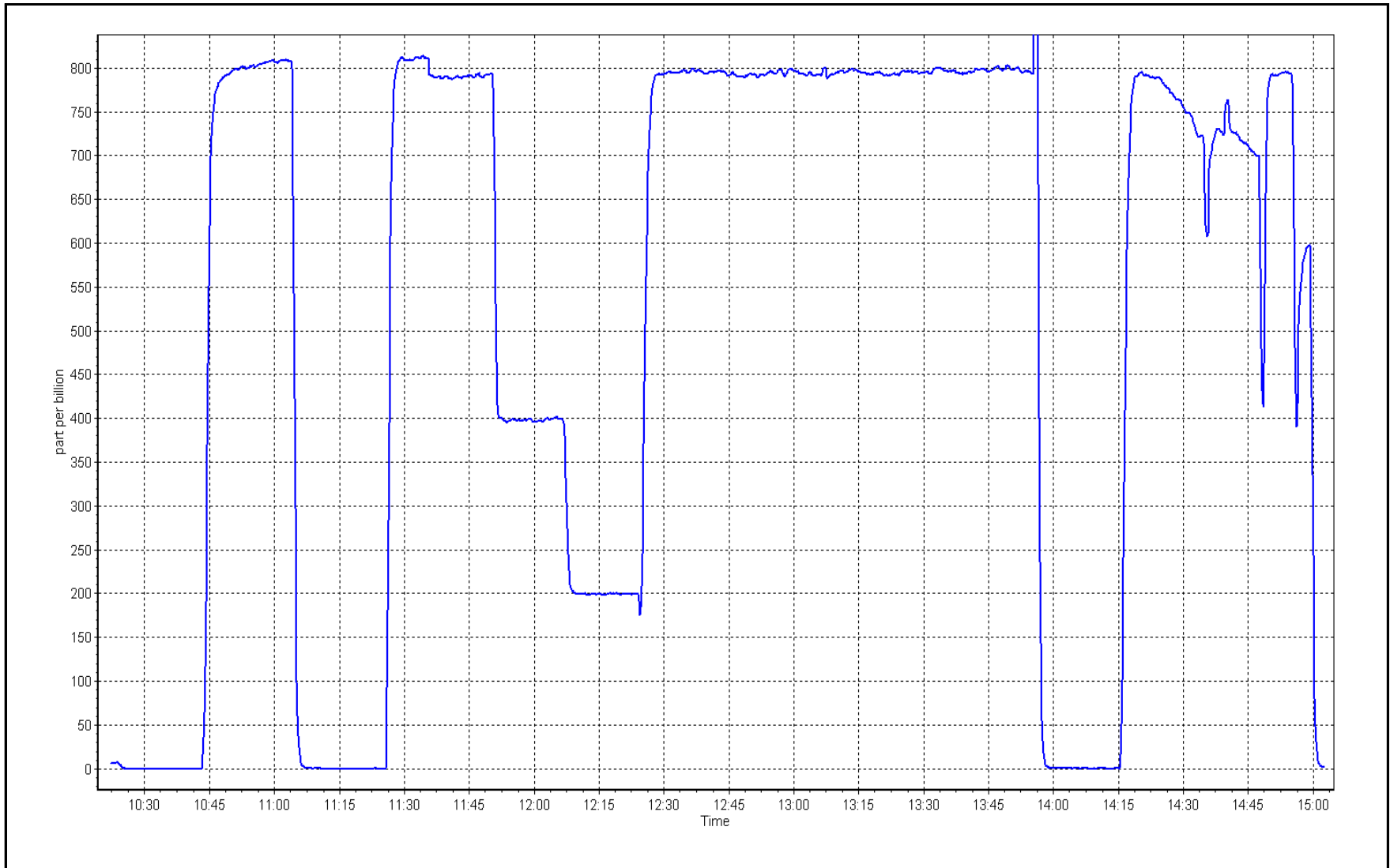
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999956	≥0.995
792.7	791.4	1.0017			
394.9	398.8	0.9903	Slope	1.000986	0.90 - 1.10
199.6	199.5	1.0005			
			Intercept	-0.930369	+/-30



SO2 Calibration Plot

Date: June 6, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

TRS Calibration Summary

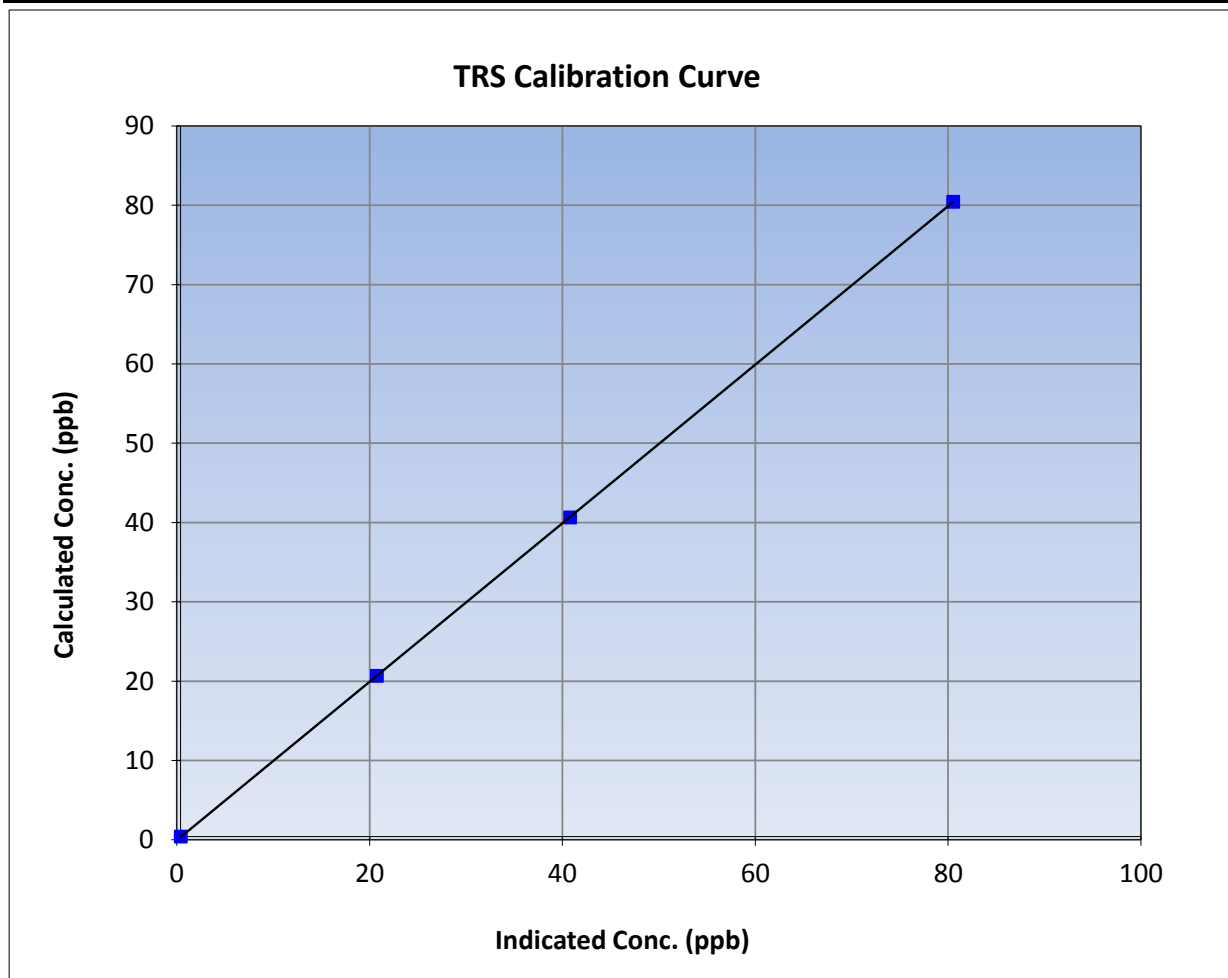
Version-03-2017

Station Information

Calibration Date	April 21, 2017	Previous Calibration	April 10, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:00	End Time (MST)	13:00
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1150840012

Calibration Data

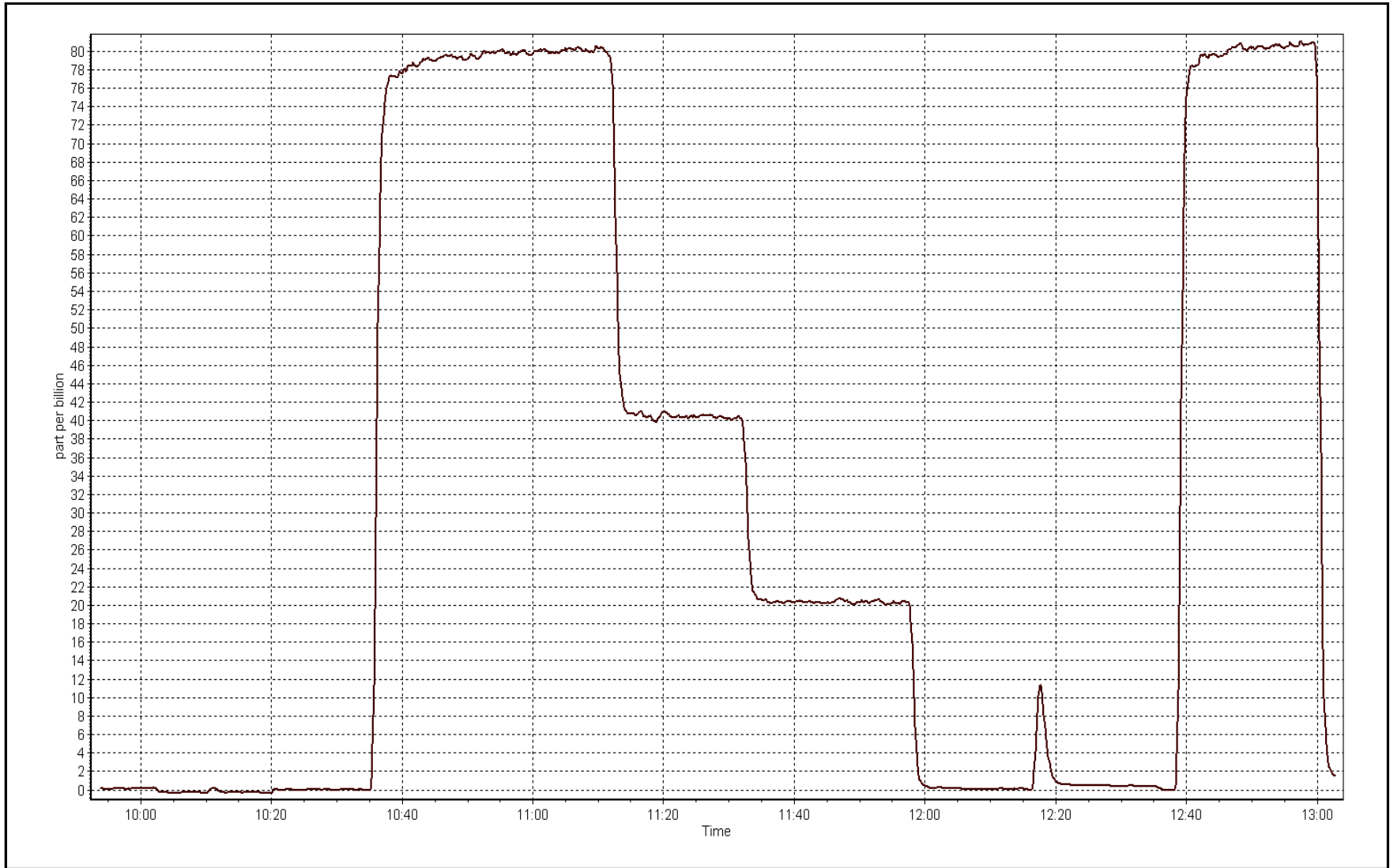
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
80.1	80.1	0.9992			
40.2	40.4	0.9961	Slope	0.999628	0.90 - 1.10
20.3	20.4	0.9953			
			Intercept	-0.074155	+/-3



TRS Calibration Plot

Date: April 21, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

TRS Calibration Summary

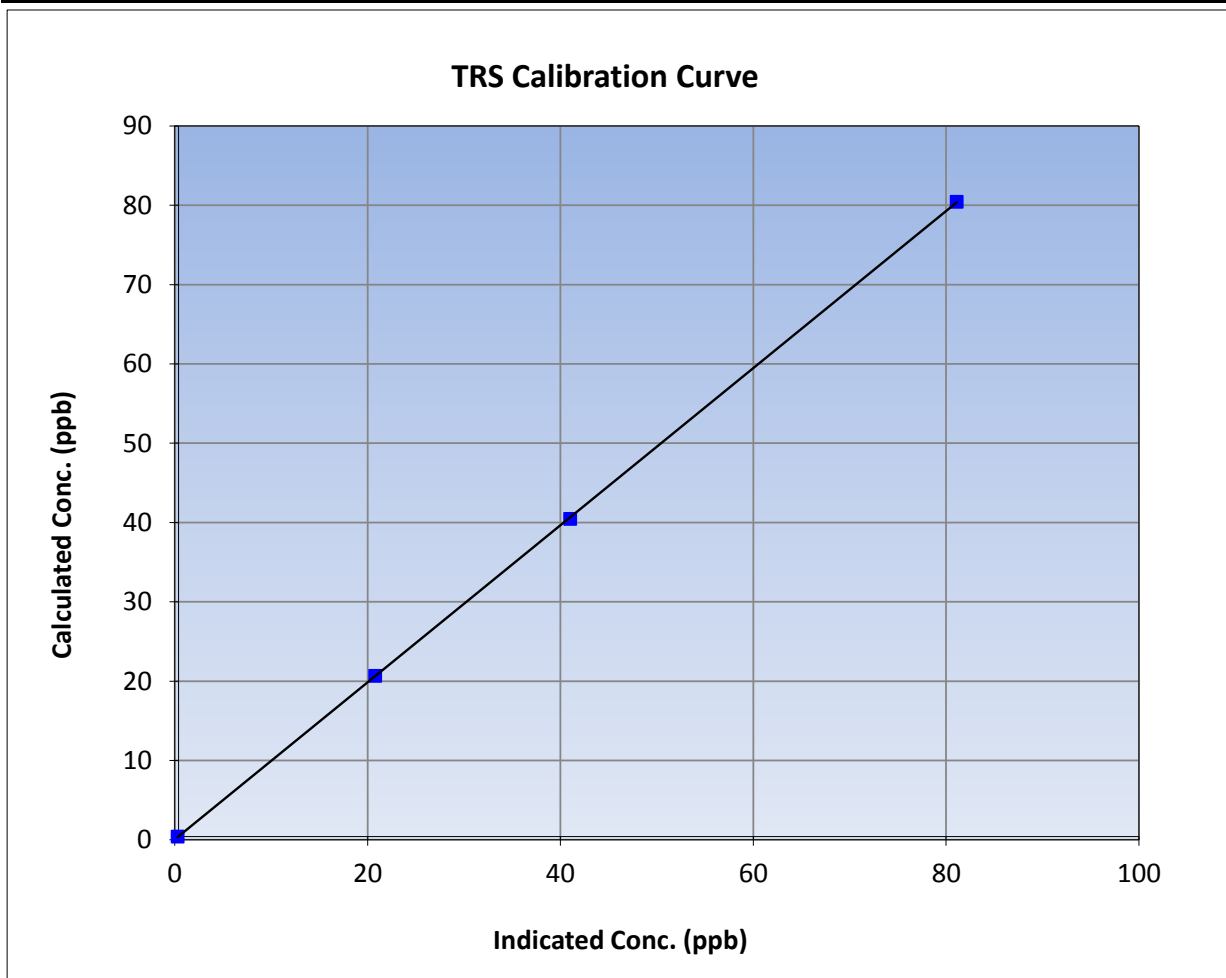
Version-03-2017

Station Information

Calibration Date	June 5, 2017	Previous Calibration	April 21, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:09	End Time (MST)	12:58
Analyzer make	Thermo 43iTLE	Analyzer serial #	1150840012

Calibration Data

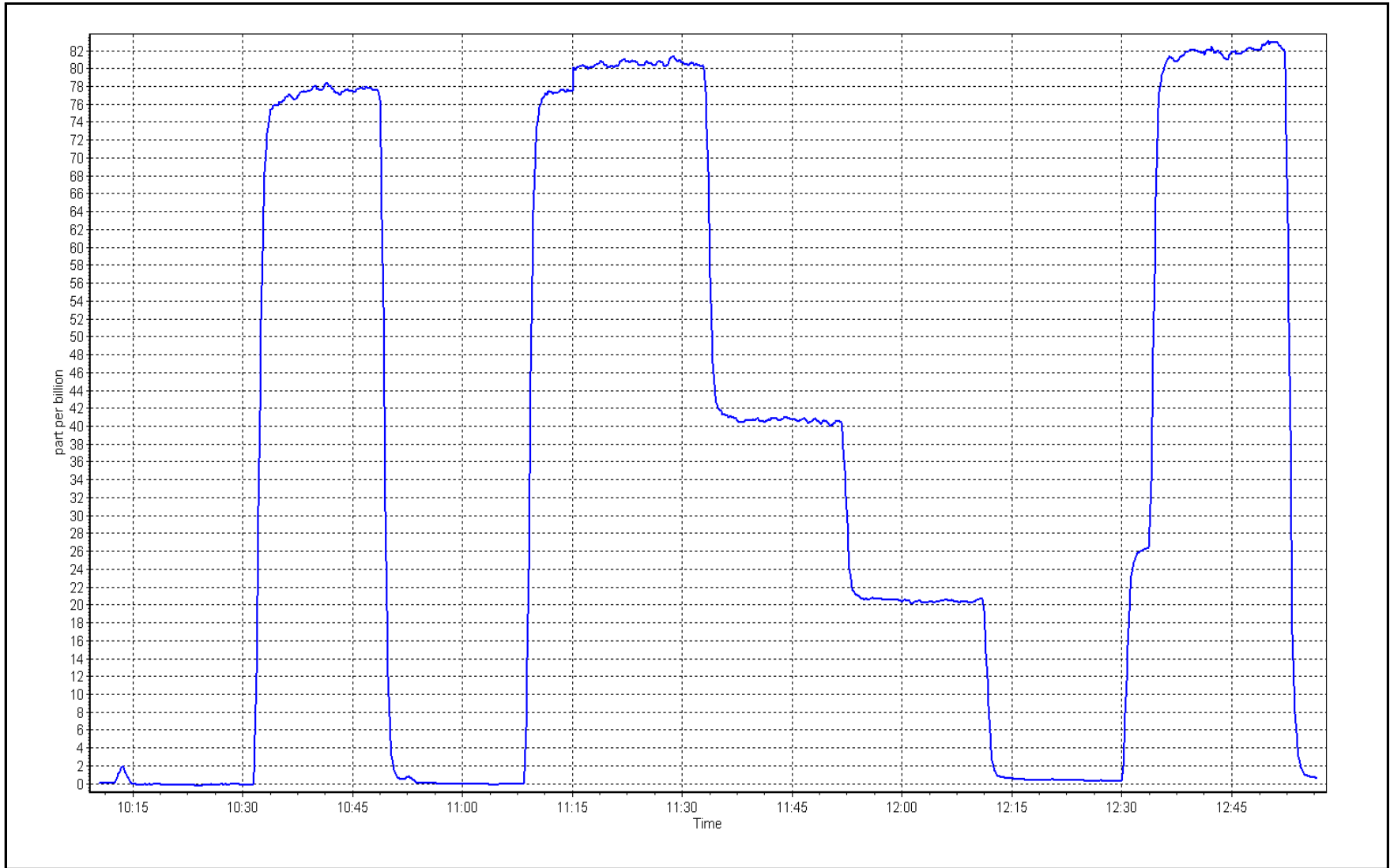
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999988	≥0.995
80.0	80.7	0.9919			
40.1	40.6	0.9871	Slope	0.990497	0.90 - 1.10
20.3	20.4	0.9936			
			Intercept	0.034706	+/-3



TRS Calibration Plot

Date: June 5, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	May 9, 2017	Last Cal Date:	April 20, 2017
Start time (MST):	10:02	End time (MST):	13:19
Reason:	Install		

Calibration Standards

Gas Cert Reference	EY0000688	Cal Gas Expiry Date	November 4, 2017
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	24 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	451
ZAG Make/Model	Teledyne API 701	Serial Number	4522

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153580
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-299
Calculated slope	1.001227	Sample pressure	7.5
Calculated intercept	0.022563	Fuel pressure	24.2
Analyzer Background	2.750	Air pressure	37.8
Analyzer Coefficient	5.528	Flame temperature	156.4
			<u>Finish</u>
			-298
			8.2
			24.2
			37.8
			158.3

THC Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.00	-0.27	----
as found span	4935	80.5	17.03	13.95	1.221
calibrator zero	5011	0.0	0.00	0.06	----
high point	4936	80.5	17.03	17.08	0.997
second point	4977	40.4	8.55	8.60	0.994
third point	4996	20.4	4.32	4.33	0.997
as left zero	5009	0.0	0.00	-0.12	----
as left span	4928	80.5	17.06	17.64	0.967
Average Correction Factor					0.996
Corrected As found	14.22	Previous response	16.99	*% change	19.5%
<i>* = > +/-5% change initiates investigation</i>					

Notes: Low sample pressure. Pump replaced and inlet filter changed after asfinds. Adjusted the zero and span

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

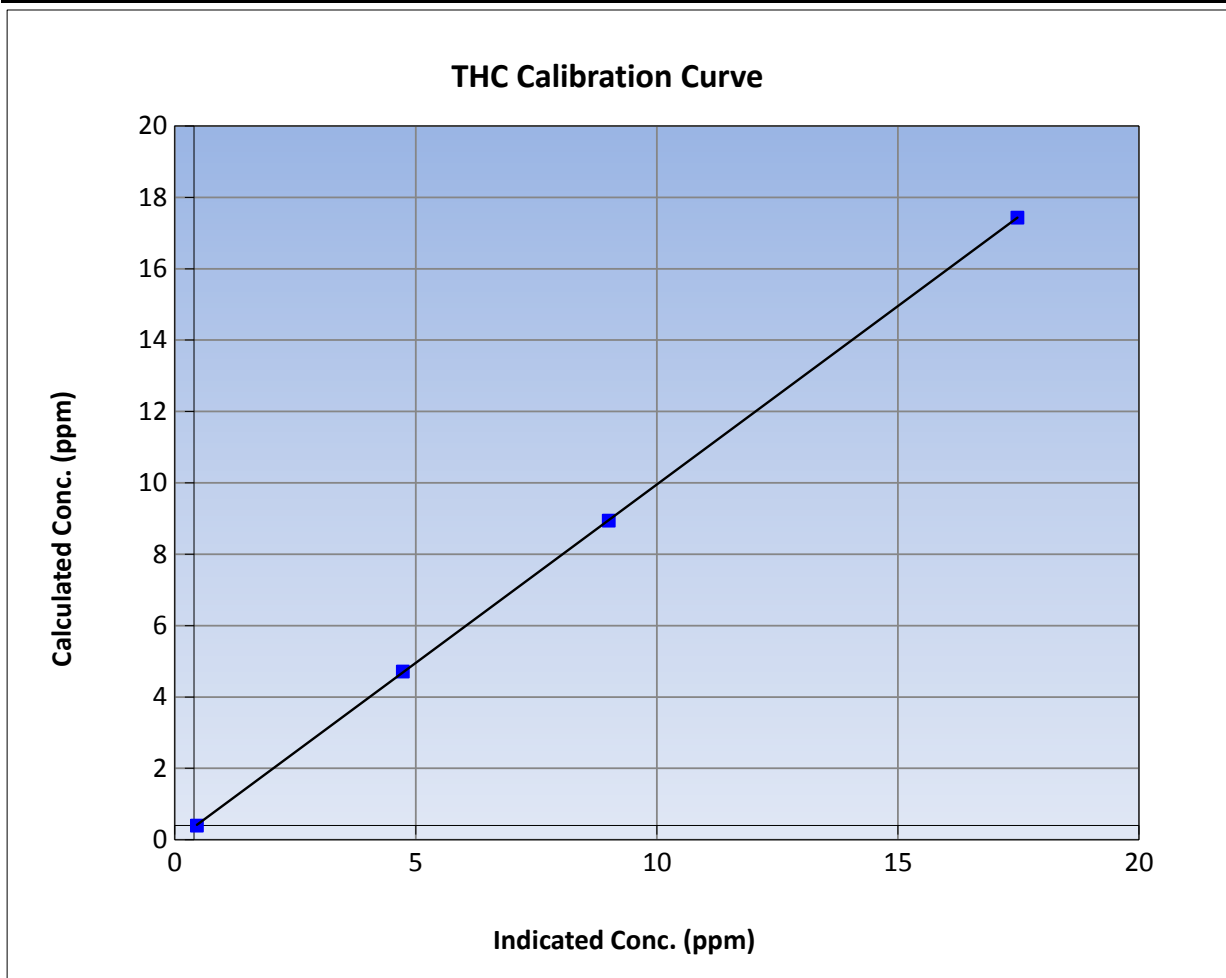
Version-03-2017

Station Information

Calibration Date	May 9, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:02	End Time (MST)	13:19
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153580

Calibration Data

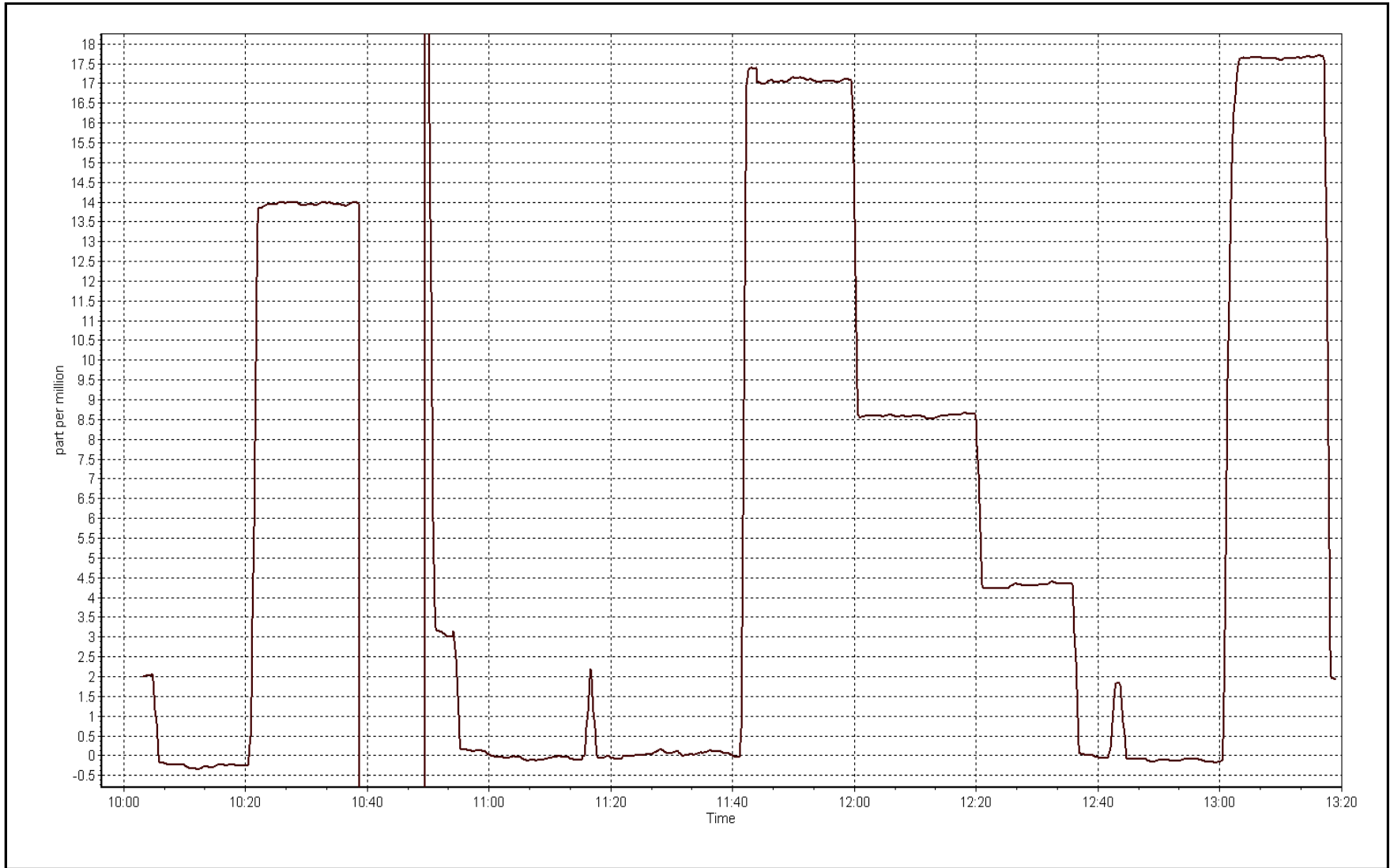
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999992	≥0.995
17.0	17.1	0.9971			
8.5	8.6	0.9936	Slope	0.999714	0.90 - 1.10
4.3	4.3	0.9967			
			Intercept	-0.042642	+/-1.5



THC Calibration Plot

Date: May 9, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	June 6, 2017	Last Cal Date:	May 9, 2017
Start time (MST):	10:22	End time (MST):	14:40
Reason:	Install		

Calibration Standards

Gas Cert Reference	EY0000688	Cal Gas Expiry Date	November 4, 2017
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	24 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	451
ZAG Make/Model	Teledyne API 701	Serial Number	4522

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153580
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-299
Calculated slope	0.999714	Sample pressure	8.2
Calculated intercept	-0.042642	Fuel pressure	24.2
Analyzer Background	2.530	Air pressure	37.8
Analyzer Coefficient	5.338	Flame temperature	158.9

THC Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.00	0.04	----
as found span	4935	80.5	17.03	17.78	0.958
calibrator zero	5011	0.0	0.00	0.04	----
high point	4936	80.5	17.03	17.02	1.000
second point	4977	40.4	8.55	8.54	1.000
third point	4997	20.4	4.31	4.23	1.021
as left zero	5009	0.0	0.00	-0.03	----
as left span	4928	80.5	17.06	16.60	1.028
Average Correction Factor					1.007
Corrected As found	17.74	Previous response	17.08	*% change	-3.7%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after asfinds. Adjusted the span

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

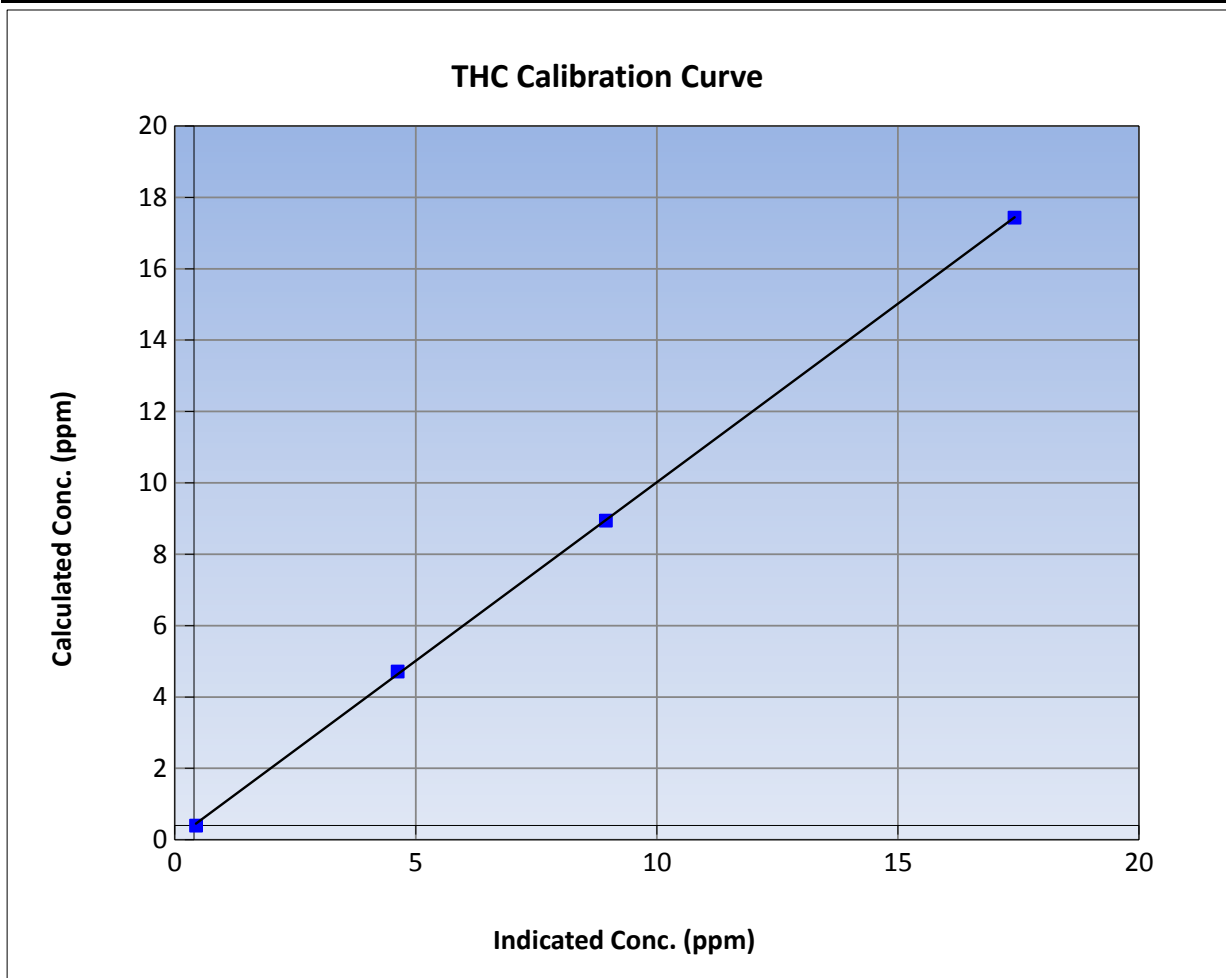
Version-03-2017

Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 9, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:22	End Time (MST)	14:40
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153580

Calibration Data

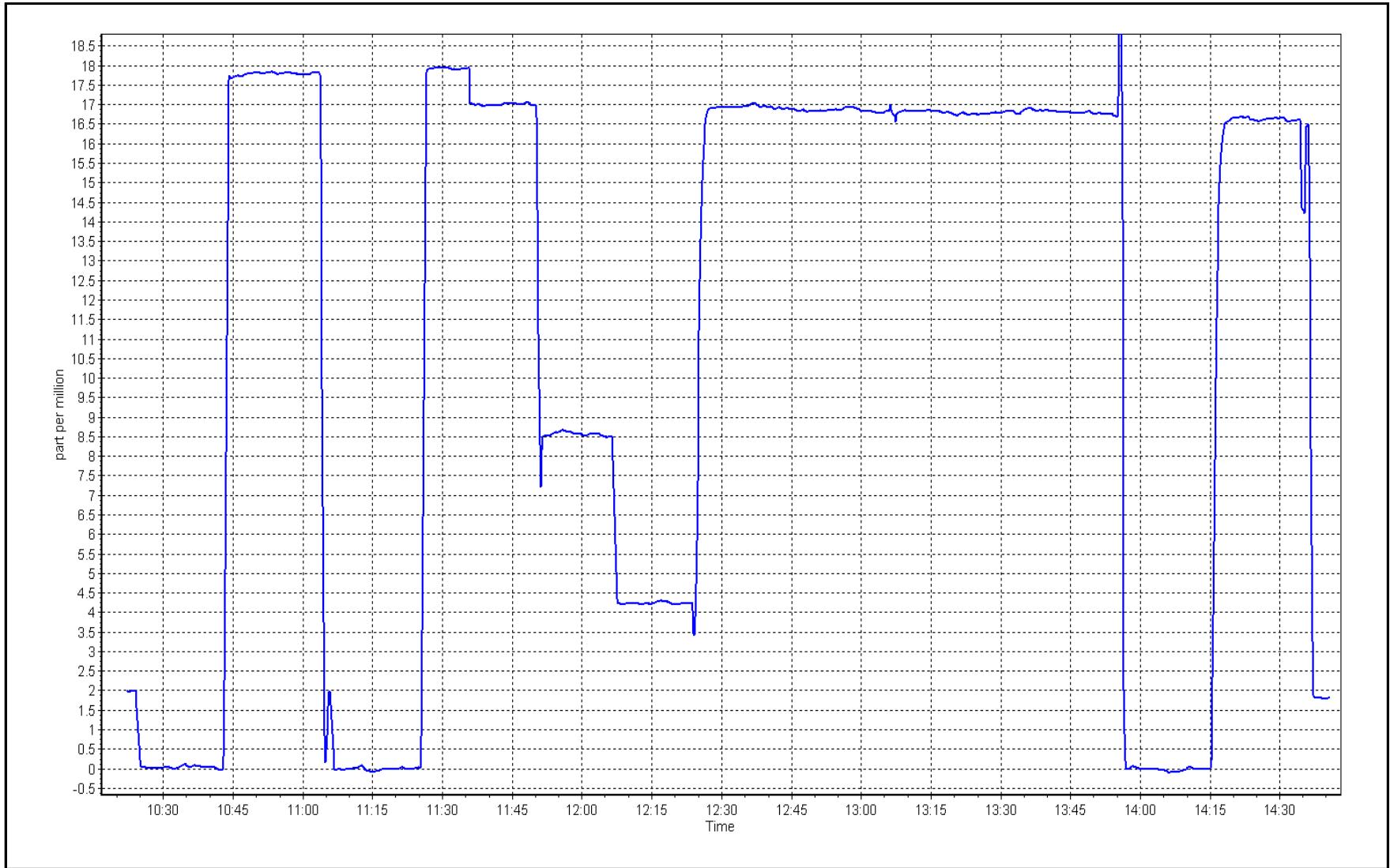
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999945	
17.0	17.0	1.0005			≥0.995
8.5	8.5	1.0005	Slope	1.000547	
4.3	4.2	1.0213			0.90 - 1.10
			Intercept	0.011414	+/-1.5



THC Calibration Plot

Date: June 6, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	June 19, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	10:22	End time (MST):	13:19
Reason:	Maintenance		

Calibration Standards

Gas Cert Reference	EY0000688	Cal Gas Expiry Date	November 4, 2017
CH4 Cal Gas Conc.	<u>514.0</u> ppm	CH4 Equiv Conc.	1061.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	24 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	451
ZAG Make/Model	Teledyne API 701	Serial Number	4522

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1218153580
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-299
Calculated slope	1.000547	Sample pressure	8.2
Calculated intercept	0.011414	Fuel pressure	24.2
Analyzer Background	2.40	Air pressure	37.8
Analyzer Coefficient	5.068	Flame temperature	158.9

THC Calibration Data

Set Point	Total air flow rate (sccm)	Source gas flow rate (sccm)	Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.00	-0.06	----
as found span	4935	80.5	17.03	17.12	0.995
calibrator zero	5011	0.0	0.00	0.04	----
high point	4936	80.5	17.03	17.14	0.994
second point	4977	40.5	8.57	8.60	0.996
third point	4997	20.4	4.31	4.40	0.982
as left zero	5009	0.0	0.00	0.09	----
as left span	4928	80.5	17.06	17.36	0.983
Average Correction Factor					0.990
Corrected As found	17.18	Previous response	17.01	*% change	-1.0%

* = > +/-5% change initiates investigation

Notes: Adjustments due to baseline dropping below 1.8ppm. Did not change out the inlet filter as it was done earlier this month. Adjusted zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

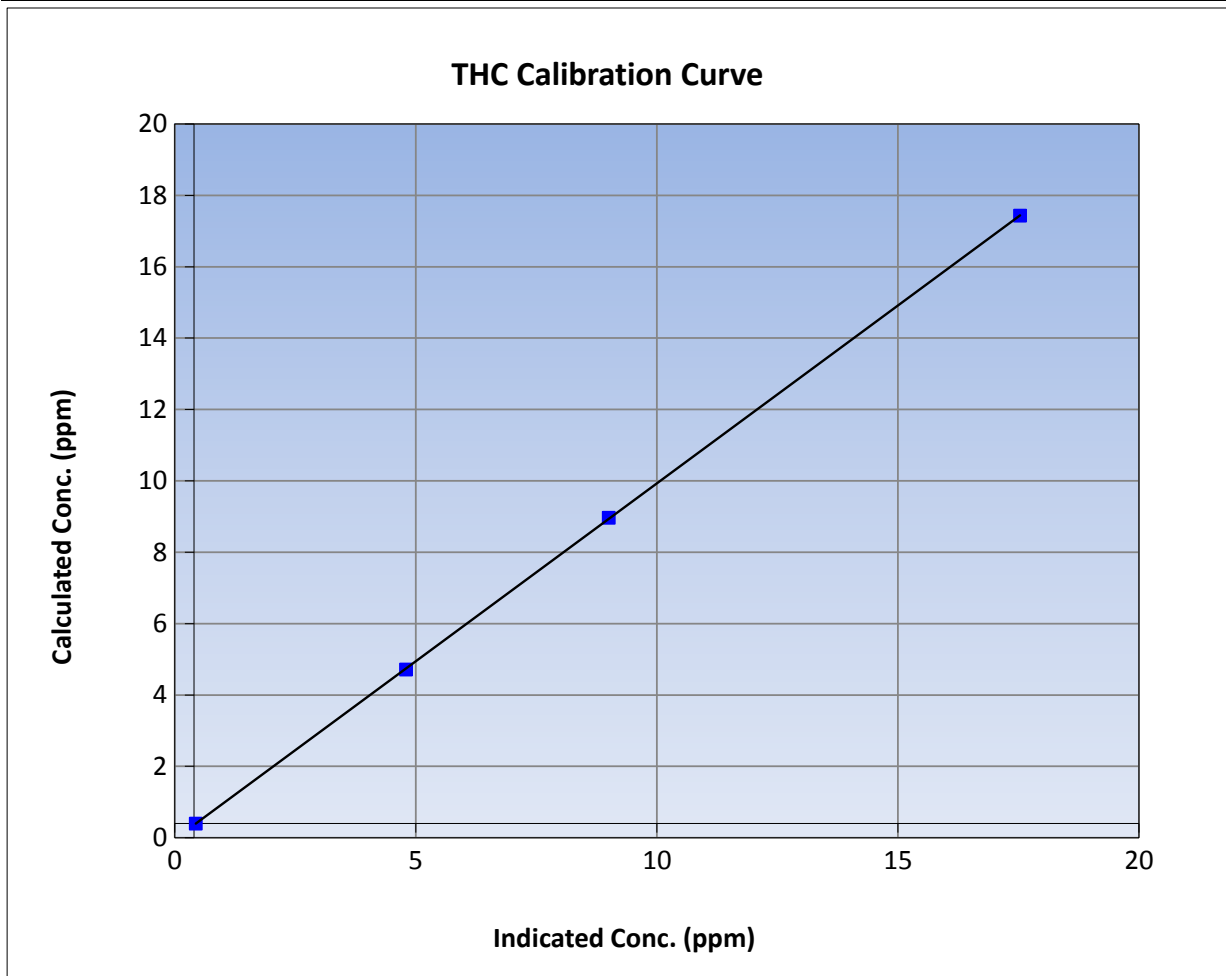
Version-03-2017

Station Information

Calibration Date	June 19, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:22	End Time (MST)	13:19
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153580

Calibration Data

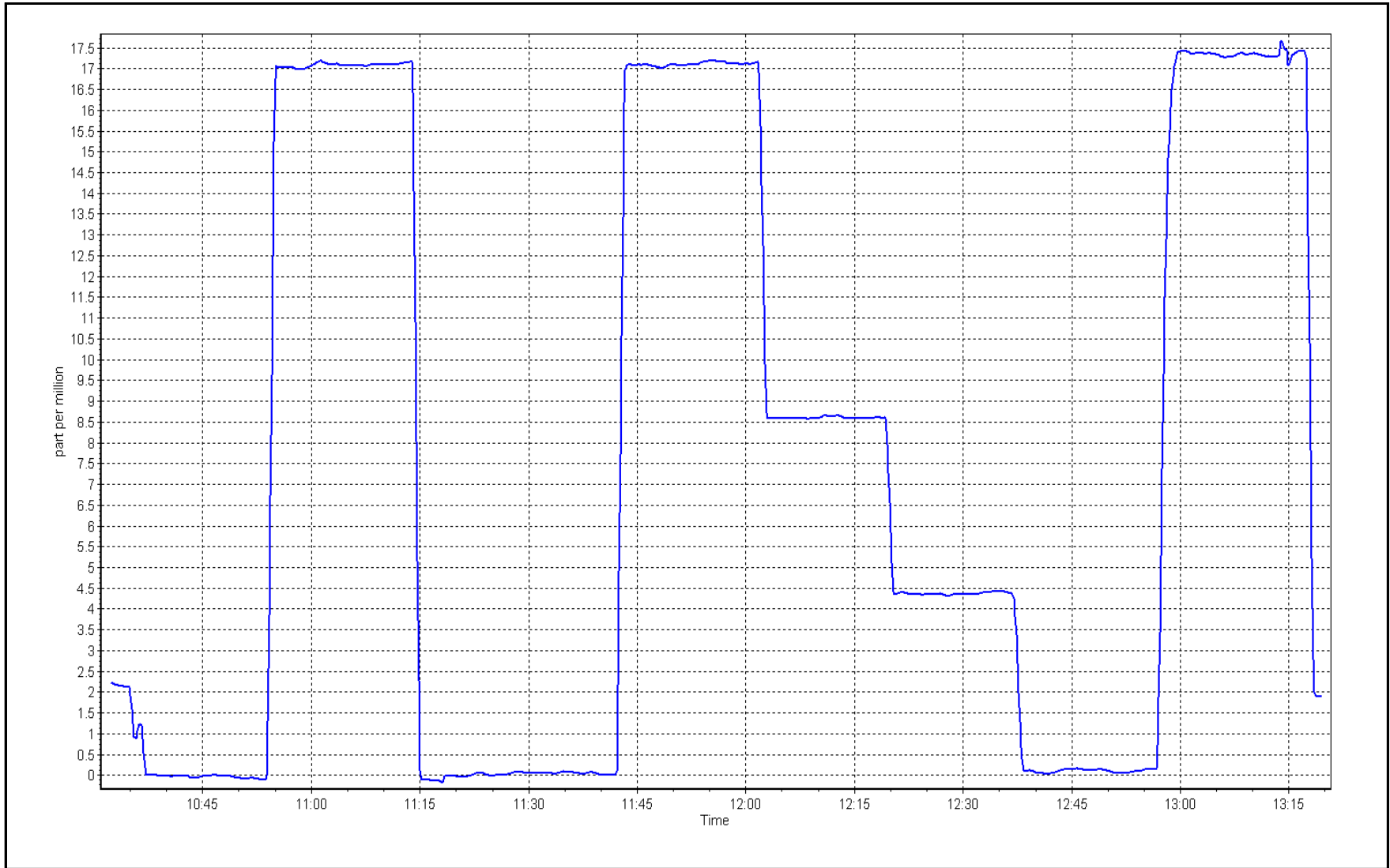
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999987	≥0.995
17.0	17.1	0.9939			
8.6	8.6	0.9961	Slope	0.996794	0.90 - 1.10
4.3	4.4	0.9815			
			Intercept	-0.040083	+/-1.5



THC Calibration Plot

Date: June 19, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	May 26, 2017	Last Cal Date:	April 20, 2017
Start time (MST):	10:50	End time (MST):	14:19
Reason:	Install		

Calibration Standards

NO Gas Cylinder #	EY0000688	Cal Gas Expiry Date	November-04-19
NOX Cal Gas Conc.	<u>49.9</u> ppb	NO Cal Gas Conc.	<u>49.9</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	451
ZAG make/model	Teledyne API 701	Serial Number	4522

Analyzer Information

Analyzer make:	Thermo 42i	Analyzer serial #:	115243007	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
NO coefficient	0.965	1.096	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	0.997	0.997	PMT Temperature	-3.1 -3.2
NO2 coefficient	1.000	1.000	Reaction cell Press	171.8 171.2
NO bkgrnd	1.5	1.7	Sample Flow	0.728 0.723
NOX bkgrnd	1.6	1.8	PMT Voltage	-802.9 -802.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope		1.001318
NO _x Cal Offset		-1.371224
NO Cal Slope		0.999434
NO Cal Offset		-1.248955
NO ₂ Cal Slope		1.001603
NO ₂ Cal Offset		0.001433



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Total flow rate (sccm)	Total flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero										
as found span										
calibrator zero	5008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	----	----
high point	4937	80.5	813.6	813.6	0.0	812.9	814.3	-1.4	1.0009	0.9992
second point	4976	40.5	406.1	406.1	0.0	408.7	409.5	-0.7	0.9937	0.9918
third point	4997	20.4	203.7	203.7	0.0	205.5	205.5	0.0	0.9913	0.9913
as left zero	5008	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4936	80.4	812.8	399.1	413.7	828.6	402.2	426.4	0.9809	0.9923
Average Correction Factor									0.9953	0.9941

Corrected As found	NO _x = NA	ppb	NO = NA	ppb		*Percent Change	NO _x = NA
Previous Response	NO _x = NA	ppb	NO = NA	ppb		*Percent Change	NO = NA

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	826.2	824.7	1.4	0.9848	0.9866	----	----
1st NO2 (400 ppb O3)	399.1	425.6	824.3	399.1	425.2	0.9871	----	1.0009	99.9%
2nd NO2 (200 ppb O3)	611.3	213.4	823.6	611.3	212.2	0.9879	----	1.0057	99.4%
3rd NO2 (100 ppb O3)	717.3	107.4	825.1	717.3	107.8	0.9861	----	0.9963	100.4%
2nd NO ref point	----	0.0	826.2	824.7	1.4	0.9848	0.9866	----	----
Average Correction Factor						0.9865	0.9866	1.0010	99.9%

Notes: Install calibration. Adjusted the span. Used second GPT point.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

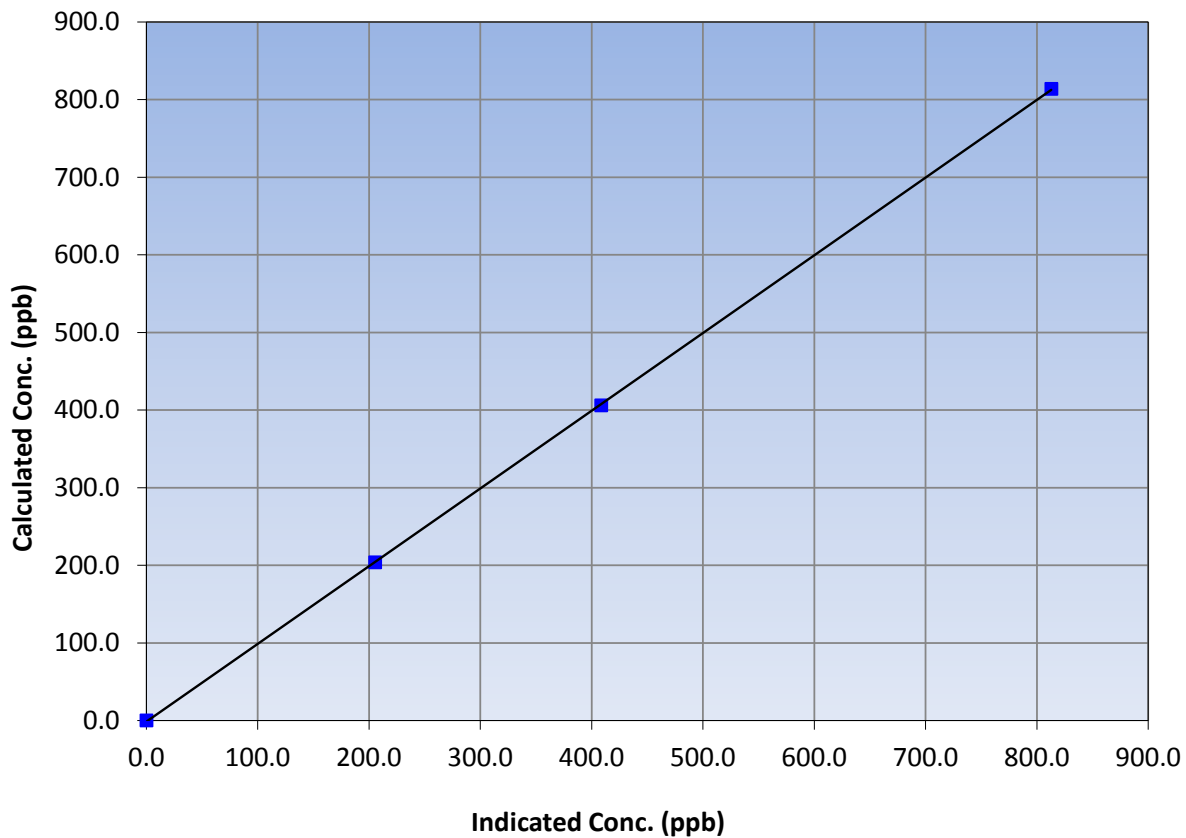
Station Information

Calibration Date	May 26, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:19
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
813.6	812.9	1.0009			
406.1	408.7	0.9937			
203.7	205.5	0.9913			
			Slope	1.001318	0.90 - 1.10
			Intercept	-1.371224	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

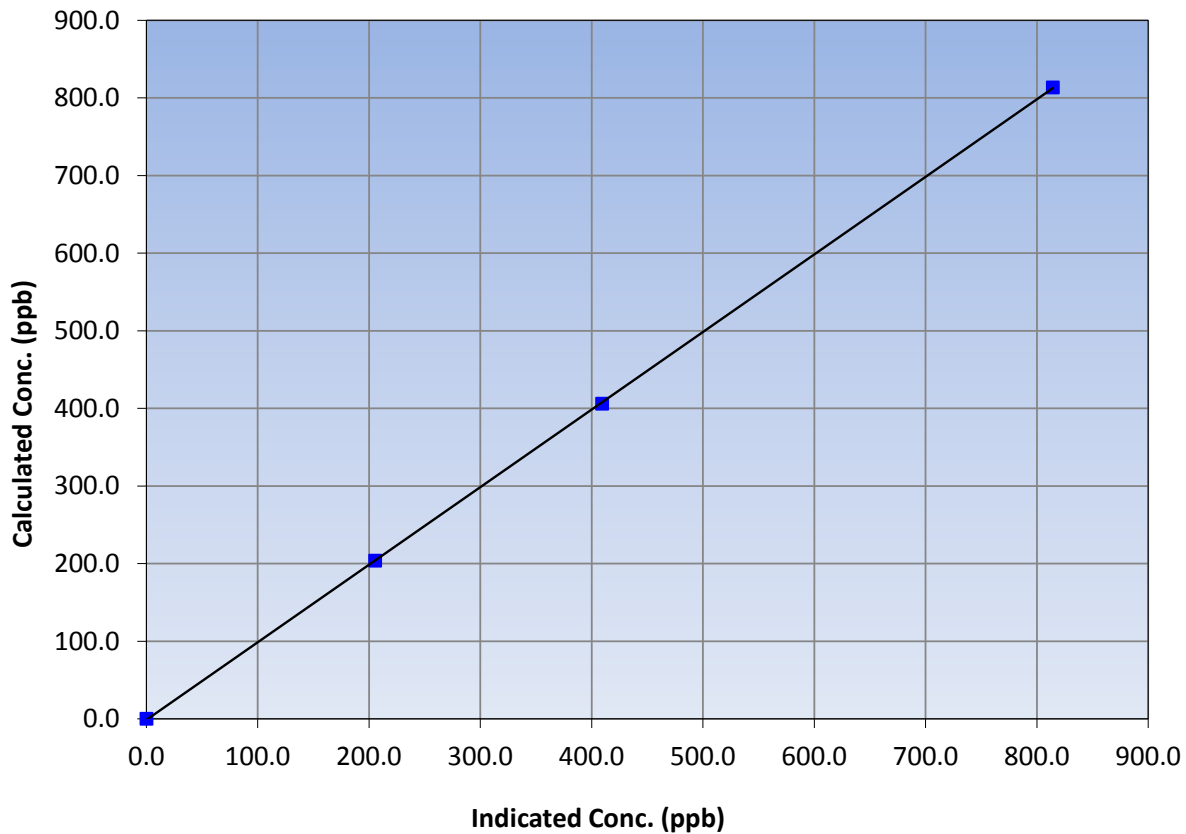
Station Information

Calibration Date	May 26, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:19
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
813.6	814.3	0.9992			
406.1	409.5	0.9918			
203.7	205.5	0.9913			
			Slope	0.999434	0.90 - 1.10
			Intercept	-1.248955	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

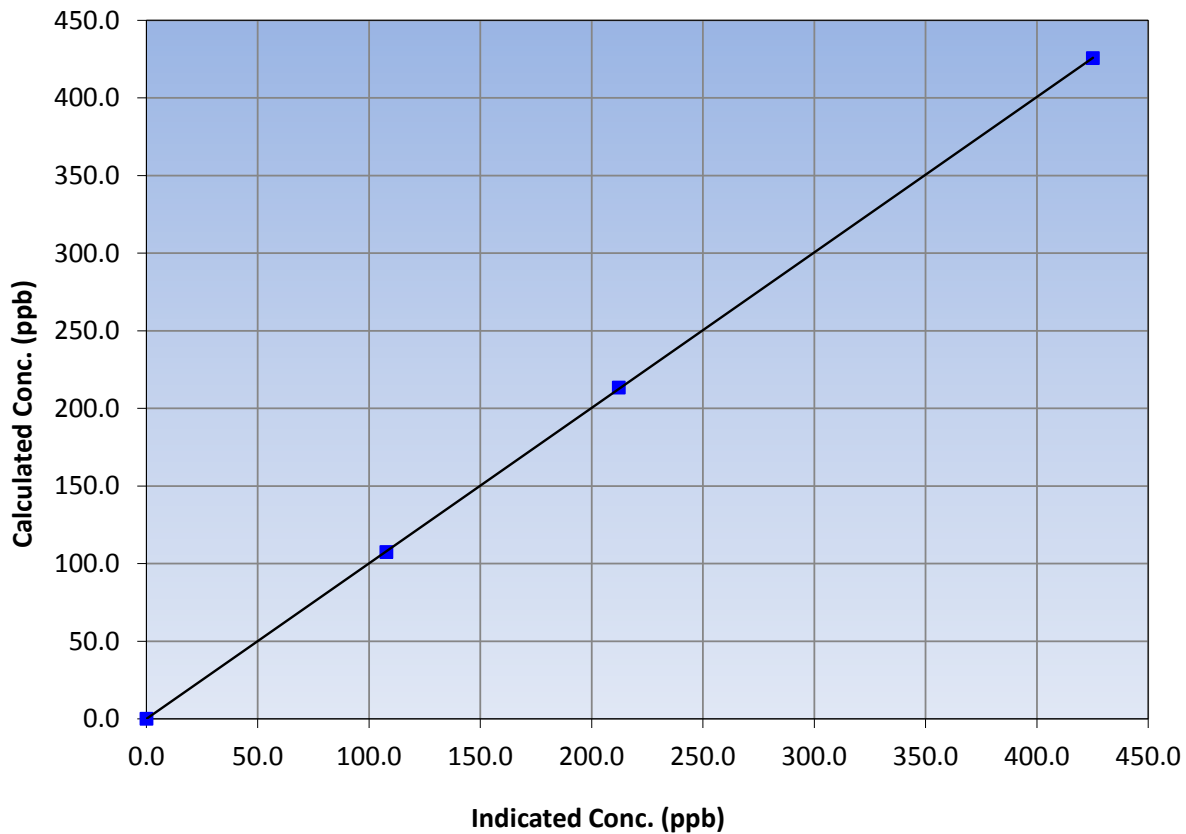
Station Information

Calibration Date	May 26, 2017	Previous Calibration	April 20, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:19
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
425.6	425.2	1.0009			
213.4	212.2	1.0057			
107.4	107.8	0.9963			
			Slope	1.001603	0.90 - 1.10
			Intercept	0.001433	+/-20

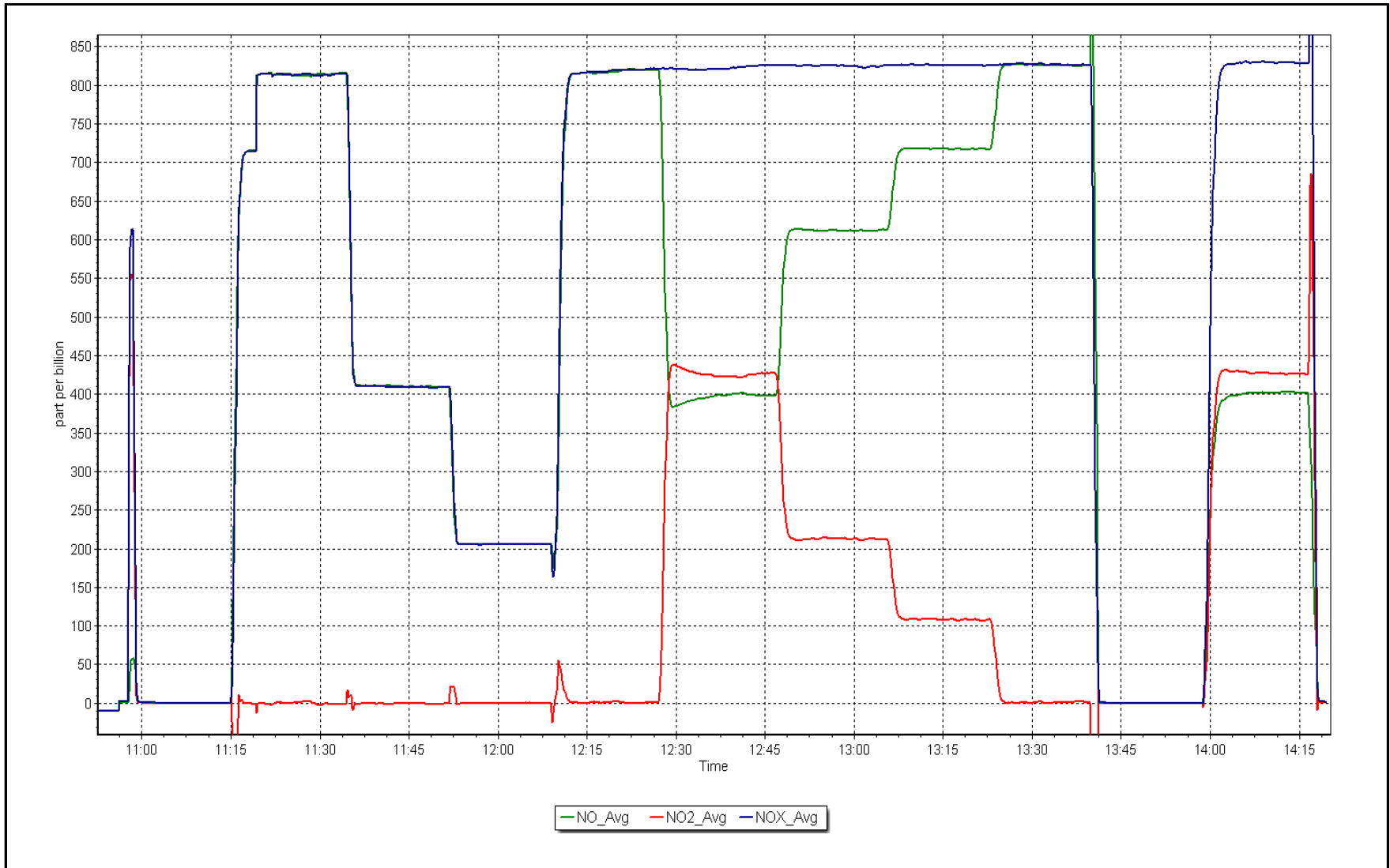
NO₂ Calibration Curve



NO_x Calibration Plot

Date: May 26, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	June 6, 2017	Last Cal Date:	May 26, 2017
Start time (MST):	10:22	End time (MST):	14:39
Reason:	Install		

Calibration Standards

NO Gas Cylinder #	EY0000688	Cal Gas Expiry Date	November-04-19
NOX Cal Gas Conc.	<u>49.9</u> ppb	NO Cal Gas Conc.	<u>49.9</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	451
ZAG make/model	Teledyne API 701	Serial Number	4522

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 115243007		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.096	1.071	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.997	0.999	PMT Temperature	-3.1	-2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	171.5	169.7
NO bkgrnd	1.7	1.7	Sample Flow	0.750	0.740
NOX bkgrnd	1.8	1.8	PMT Voltage	-802.5	-802.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.001318	0.996537
NO _x Cal Offset	-1.371224	-1.185475
NO Cal Slope	0.999434	0.995660
NO Cal Offset	-1.248955	-1.045303
NO ₂ Cal Slope	1.001603	1.019384
NO ₂ Cal Offset	0.001433	-1.439422



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Total flow rate (sccm)	Total flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5008	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
as found span	4937	80.5	813.6	813.6	0.0	827.4	828.8	-1.4	0.9834	0.9817
calibrator zero	5008	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	----	----
high point	4937	80.5	813.6	813.6	0.0	816.6	817.2	-0.5	0.9964	0.9956
second point	4976	40.5	406.1	406.1	0.0	410.6	410.8	-0.1	0.9891	0.9887
third point	4997	20.4	203.7	203.7	0.0	206.1	206.1	0.0	0.9884	0.9884
as left zero	5008	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
as left span	4936	80.4	812.8	401.0	411.8	833.9	406.9	426.6	0.9747	0.9855
Average Correction Factor									0.9913	0.9909

Corrected As found	NO _x = 827.5 ppb	NO = 829.0 ppb		*Percent Change	NO _x = -1.6%
Previous Response	NO _x = 813.9 ppb	NO = 815.4 ppb		*Percent Change	NO = -1.6%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	837.1	835.0	2.1	0.9720	0.9744	----	----
1st NO2 (400 ppb O3)	401.0	434.0	827.8	401.0	426.7	0.9829	----	1.0171	98.3%
2nd NO2 (200 ppb O3)	618.4	216.6	832.2	618.4	213.9	0.9777	----	1.0126	98.8%
3rd NO2 (100 ppb O3)	725.8	109.2	836.0	725.8	110.3	0.9733	----	0.9900	101.0%
2nd NO ref point	----	0.0	837.1	835.0	2.1	0.9720	0.9744	----	----
Average Correction Factor						0.9765	0.9744	1.0066	99.4%

Notes: Install calibration. Adjusted the span. Used second GPT point due to drift.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

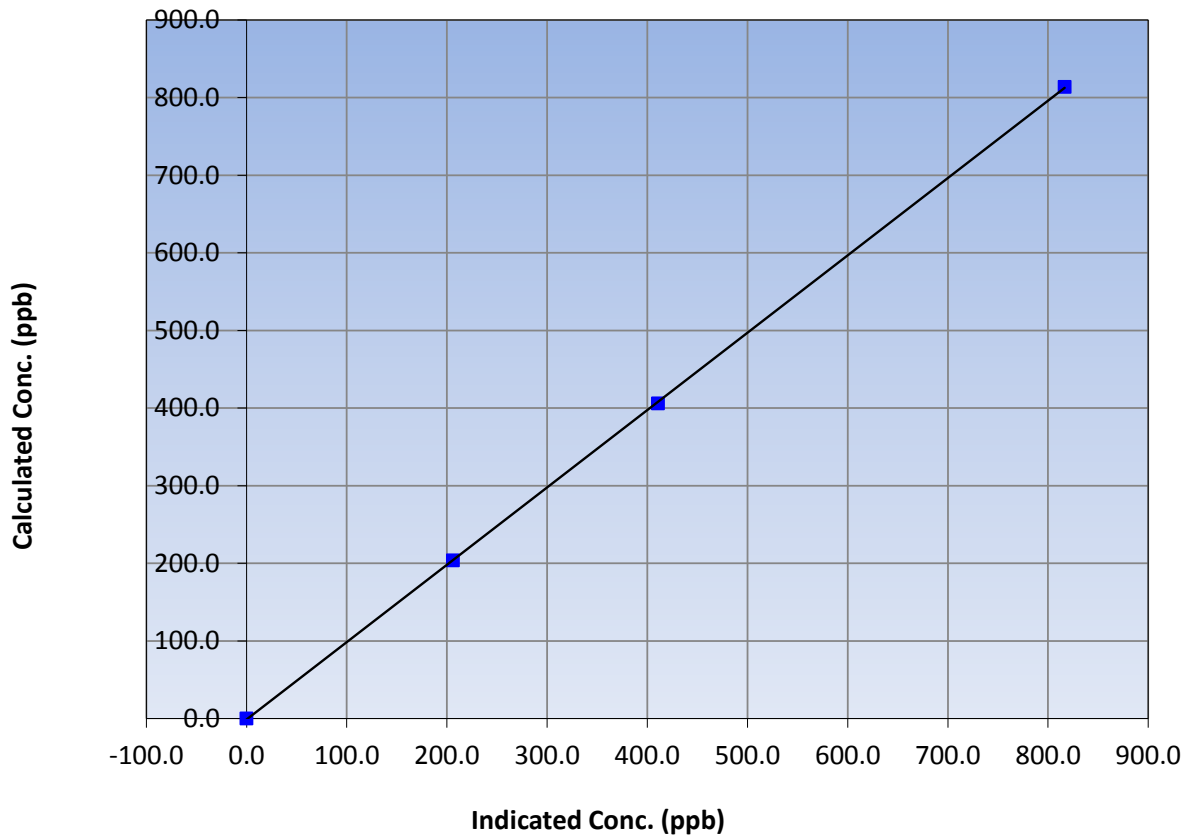
Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 26, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:39
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	≥0.995	
813.6	816.6	0.9964			
406.1	410.6	0.9891			
203.7	206.1	0.9884			
			Slope	0.996537	0.90 - 1.10
			Intercept	-1.185475	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

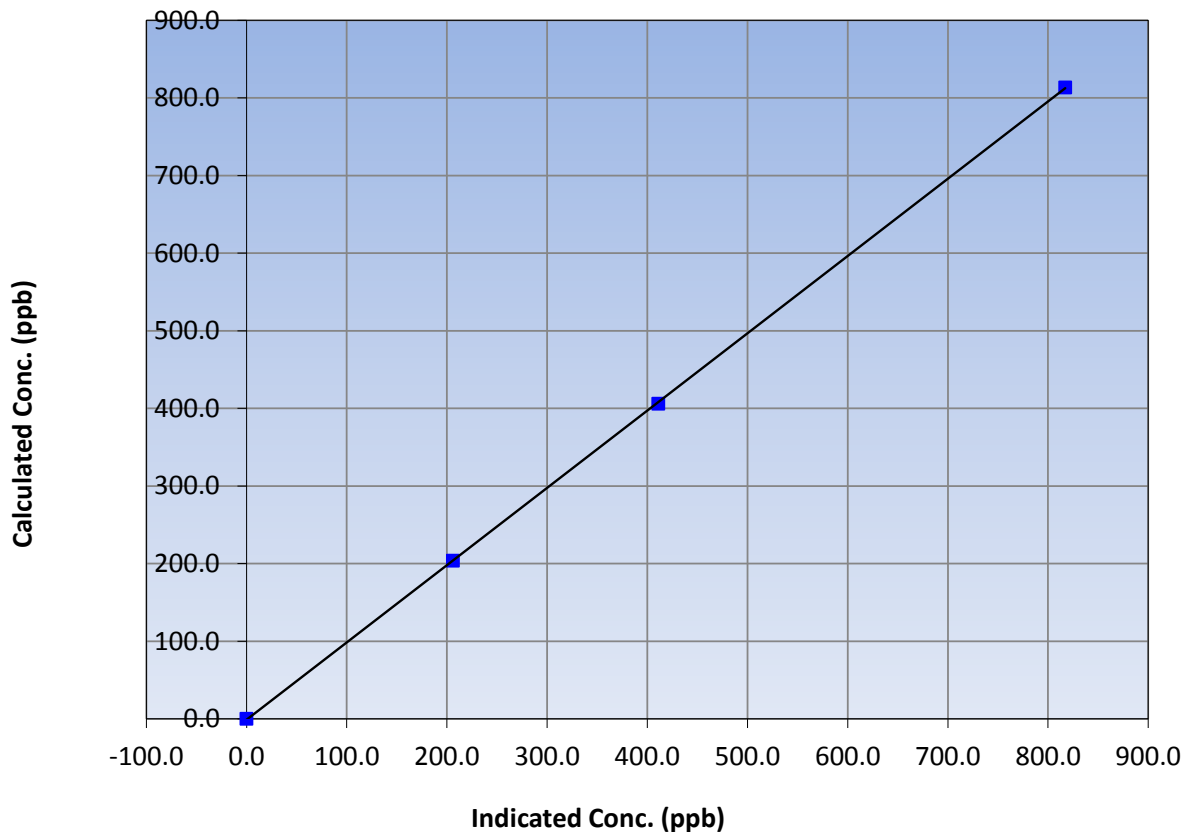
Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 26, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:39
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>
0.0	-0.2	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
813.6	817.2	0.9956		
406.1	410.8	0.9887		
203.7	206.1	0.9884		

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

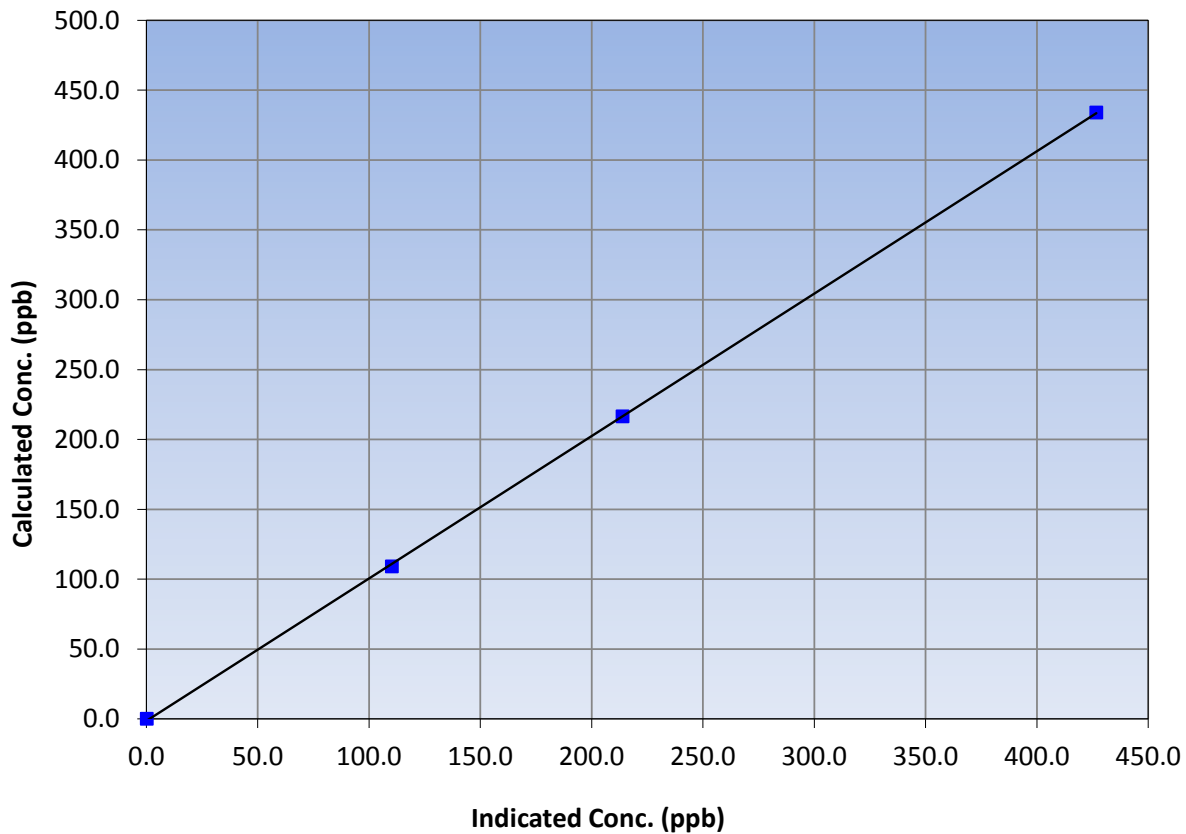
Station Information

Calibration Date	June 6, 2017	Previous Calibration	May 26, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:39
Analyzer make	Thermo 42i	Analyzer serial #	115243007

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
434.0	426.7	1.0171			
216.6	213.9	1.0126			
109.2	110.3	0.9900			
			Slope	1.019384	0.90 - 1.10
			Intercept	-1.439422	+/-20

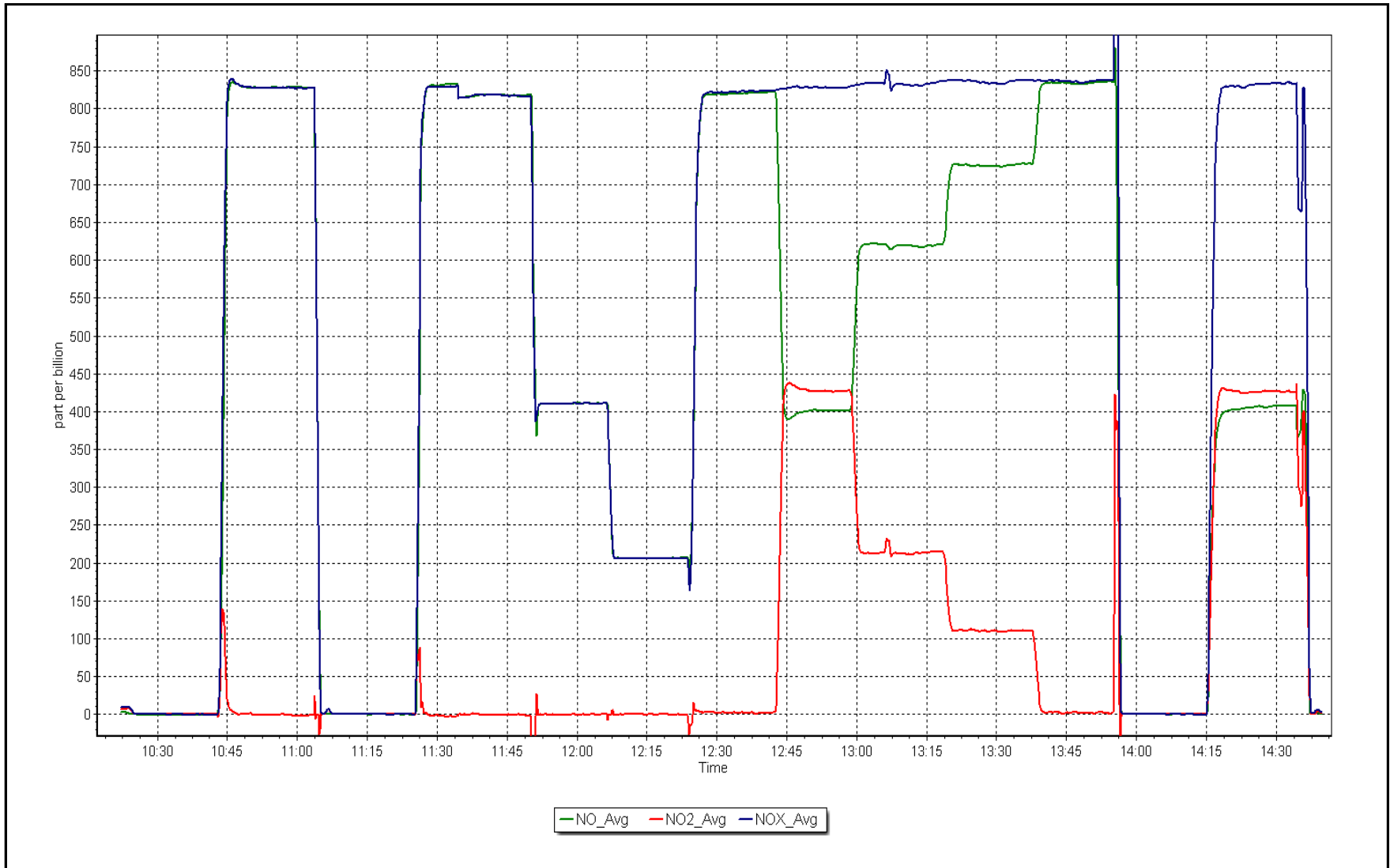
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 6, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	May 5, 2017	Last Cal Date:	NA
Start time (MST):	10:53	End time (MST):	12:55
Sharp Model:	5030	S/N:	E-802
Particulate Fraction:	PM2.5	C14 Source S/N:	4153
Flow Meter Make/Model:	DeltaCAL	S/N:	628
Temp/RH standard:		S/N:	

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	21	22	21	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	959	961	959	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1080	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.9	-----	-0.7	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: Date of check: May 5, 2017 Last Cal Date: _____
 Flow w/o adaptor: 18.01 Flow w/ adaptor: 18.01

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input checked="" type="checkbox"/>	Foil S/N: <u>2198</u>	Foil S/N: _____	
Foil Calibration	Foil Mass: <u>1463</u>	Foil Mass: _____	
	Calibration Date: <u>May 5, 2017</u>	Calibration Date: _____	
(Limit) +/- 5% of previous	Correction Factor: <u>6969</u>	Correction Factor: <u>6981</u>	-0.17%

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Adjusted the flow and nephelometer. Completed leak check before adjusting the flow. Completed foil test and adjusted the value.

Calibration by: Jayme Marcoux



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Fort Hills	Station number:	AMS 23
Calibration Date:	June 6, 2017	Last Cal Date:	May 5, 2017
Start time (MST):	10:30	End time (MST):	11:50
Sharp Model:	5030	S/N:	E-802
Particulate Fraction:	PM2.5	C14 Source S/N:	4153
Flow Meter Make/Model:	DeltaCAL	S/N:	628
Temp/RH standard:		S/N:	

Monthly Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T1 (°C)	20.5	20.2	20.5	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	969	982	982	<input checked="" type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1002	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	5.5	-----	0	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified	<input type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input checked="" type="checkbox"/>	PM2.5 Cyclone	<input checked="" type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test: _____ Date of check: _____ Last Cal Date: May 5, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

<u>Adjusted</u>	<u>Current Test</u>	<u>Previous Test</u>	<u>% Change</u>
<input checked="" type="checkbox"/>	Foil S/N: _____	Foil S/N: <u>2198</u>	
Foil Calibration	Foil Mass: _____	Foil Mass: <u>1463</u>	
	Calibration Date: _____	Calibration Date: <u>May 5, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: _____	Correction Factor: <u>6969</u>	---

Annual Calibration Test

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	(Limits)
T2 (°C)				<input type="checkbox"/>	+/- 2 °C
T3 (°C)				<input type="checkbox"/>	+/- 2 °C
T4 (°C)				<input type="checkbox"/>	+/- 2 °C
RH (%)				<input type="checkbox"/>	+/- 10%
Date Sample Tube Cleaned:					
Date Pump Rebuilt/Replaced:					

Notes: Adjusted the pressure and nephelometer.

Calibration by: Jayme Marcoux



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Hills	Station Number:	AMS 23
Calibration Date:	Thursday, May 04, 2017	Prev Cal Date:	NA
Start Time (MST):	11:20	End Time (MST):	13:33
Barometric Press:		Station Temp:	23 Deg C
Reason:	Install		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P22395
WS Calibrator:	MetOne 053	Serial Number:	K13090

Shaft RPM	Actual Speed (K/hr) (Cv)	Indicated Speed (K/hr) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.0	0.0	n/a
200	20.2	20.1	1.0031
400	39.4	39.4	0.9990
600	58.6	58.5	1.0009
800	77.8	77.7	1.0007
Average Correction Factor			1.0009

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999999	≥0.995
Calculated slope		1.000500	0.90 - 1.10
Calculated intercept		0.006023	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	R14656
As Found Declination (deg west of North)	<u>NA</u>	As Left Declination (deg west of North)	<u>14</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	-0.6	n/a
90	90.5	0.9945
180	181.1	0.9939
270	270.7	0.9974
357	356.3	1.0020
Average Correction Factor		0.9969

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999984	≥0.995
Calculated slope		0.999888	0.90 - 1.10
Calculated intercept		-0.175960	+/- 7

Notes: Adjusted the potentiometer in the Wind direction sensor

Calibration Performed By: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
JUNE 2017**

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	19	0	5	0
H2S (ppb) Average	686	33	34	99.86	2	0	0	0
NO2 (ppb) Average	685	35	35	100	13	0	4	-
NO (ppb) Average	685	35	35	100	12	-	3	-
NOX (ppb) Average	685	35	35	100	23	-	7	-
Temperature 2 m (C) Average	720	0	0	100	26.1	-	19.8	-
Relative Humidity (%) Average	720	0	0	100	98	-	92	-
Wind Speed 10 m (km/h) Average	720	0	0	100	32	-	19	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	1	2	-	0	0	0	0	1	3	19
H2S (ppb) Average	686	0.1	0	-	0	0	0	0	0	0	2
NO2 (ppb) Average	685	1.5	2	-	0	0	0	1	2	4	13
NO (ppb) Average	685	0.8	2	-	0	0	0	0	1	2	12
NOX (ppb) Average	685	2.3	3	-	0	0	1	1	3	6	23
Temperature 2 m (C) Average	720	14.7	4.8	-	1.6	8.8	11.4	14	17.8	22	26.1
Relative Humidity (%) Average	720	66.5	21	-	23	35	49	69	86	93	98
Wind Speed 10 m (km/h) Average	720	10.1	6	-	0	3	5	8	15	20	32
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	21 Jun 2017 10:00	21 Jun 2017 10:00		1 Maintenance - sample manifold cleaned



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Christina Lake - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19 ppb on Jun 11 13:00	Maximum Daily Average: 5.1 ppb on Jun 11		Hours of Data:	686
Minimum Value: 0 ppb on Jun 1 20:00	Minimum Daily Average: 0.0 ppb on Jun 14		Hours of Missing Data:	34
Maximum Diurnal Average: 2.3 ppb at hour 18	Minimum Diurnal Average: 0.1 ppb at hour 1		Hours of Calibration:	34
Monthly Average: 1.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	4	1	0	0	0	1	3	1	1	0	3	7	1	1	0	0	0	0	0	0	1.1	7
2-Jun	0	0	0	0	Z	0	0	0	0	3	8	5	8	1	1	0	0	0	0	0	0	0	0	0	1.2	8
3-Jun	1	4	0	0	0	Z	5	6	17	7	8	9	11	7	9	3	1	0	0	0	0	0	0	3.9	17	
4-Jun	Z	0	0	1	0	1	1	8	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.6	8
5-Jun	0	Z	0	0	0	0	1	0	2	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	4
6-Jun	0	1	Z	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
7-Jun	0	0	0	Z	0	0	0	1	5	2	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0.6	5
8-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	17	3	2	1.1	17
11-Jun	0	Z	0	0	0	1	1	2	6	7	9	9	19	14	2	8	9	12	18	1	0	0	0	0	5.1	19
12-Jun	0	0	Z	0	0	0	7	3	0	0	1	1	1	1	1	0	0	5	1	0	0	0	0	0	0.9	7
13-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
14-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
15-Jun	0	0	0	0	0	Z	0	1	2	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0.2	2
16-Jun	Z	0	0	0	0	0	0	0	1	0	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3
17-Jun	0	Z	0	0	0	0	0	1	3	11	9	10	3	2	1	4	9	10	7	3	0	0	0	0	3.2	11
18-Jun	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	0	4	3	13	5	1	0	0	0	0	1.3	13
19-Jun	0	2	12	Z	11	1	1	7	2	4	1	3	0	0	3	1	0	3	0	0	0	0	0	0	2.2	12
20-Jun	0	0	0	0	Z	0	1	3	0	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	3
21-Jun	0	0	0	0	0	Z	0	1	C	C	C	C	6	2	1	1	5	14	2	1	1	10	9	1	2.8	14
22-Jun	Z	1	0	0	1	0	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	0	0	0.9	2
23-Jun	0	Z	0	0	0	0	1	2	2	2	3	1	1	1	2	0	0	0	0	0	0	0	1	0.8	3	
24-Jun	0	1	Z	0	0	0	0	2	6	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.8	6
25-Jun	0	0	0	Z	0	0	3	1	0	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	0.5	3
26-Jun	1	1	0	1	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0.5	1
27-Jun	0	0	0	2	2	Z	5	4	1	1	0	1	1	0	2	2	2	6	2	0	0	0	0	0	1.3	6
28-Jun	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.2	1
30-Jun	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0.2	1

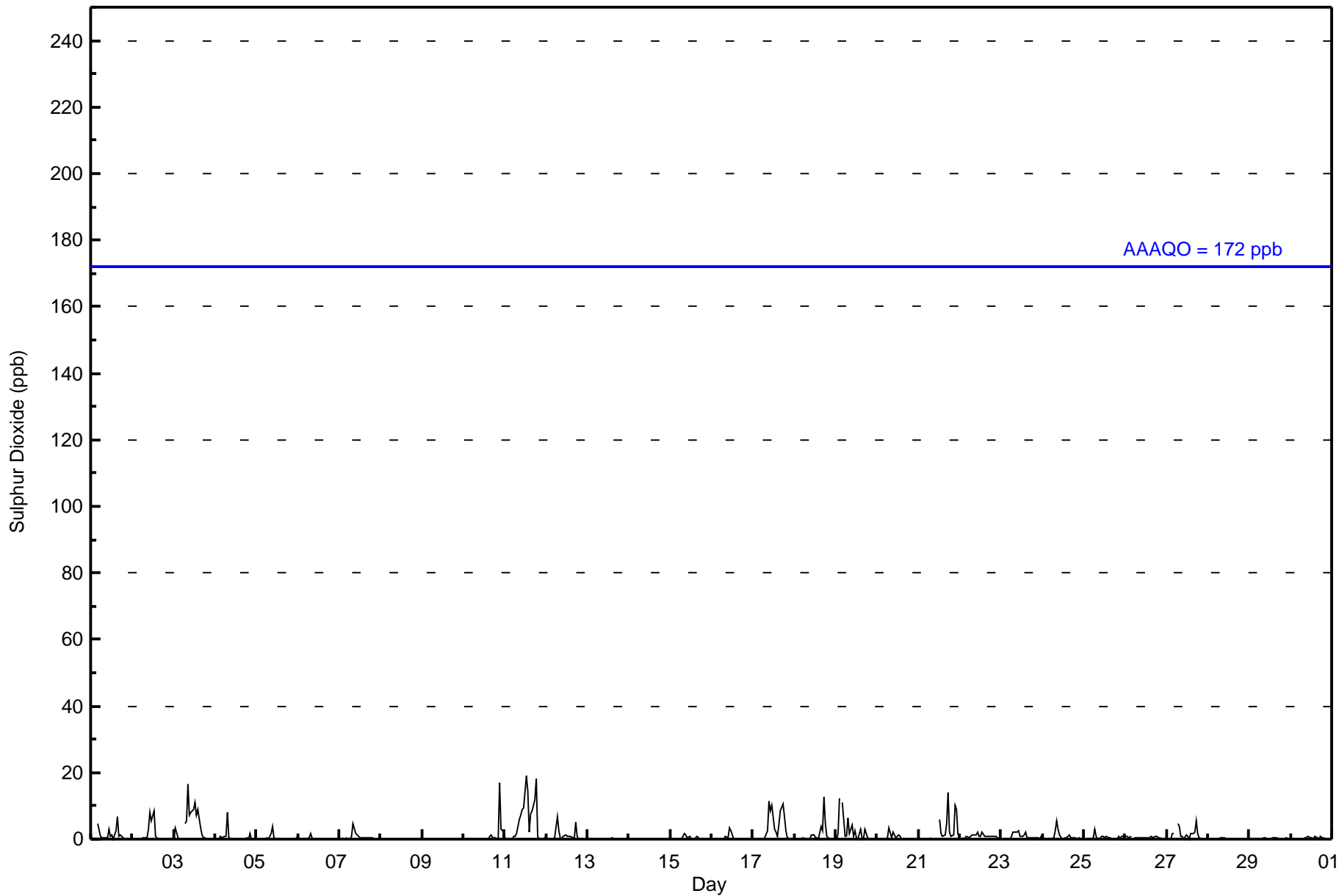
0.1	0.4	0.6	0.2	0.8	0.2	0.9	1.5	1.7	1.8	1.9	1.7	2.0	1.2	0.9	1.2	1.1	2.3	1.3	0.3	0.2	1.0	0.5	0.2	Diurnal Average	
1	4	12	2	11	1	7	8	17	11	9	10	19	14	9	8	9	14	18	3	2	17	9	2	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Christina Lake - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	674	98.25	98.25
11 - 20	12	1.75	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	33	41	43	20	27	28	65	70	71	56	33	44	35	36	38	34	674
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1	0	12
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	41	43	20	27	28	65	70	71	56	33	44	35	47	39	34	686

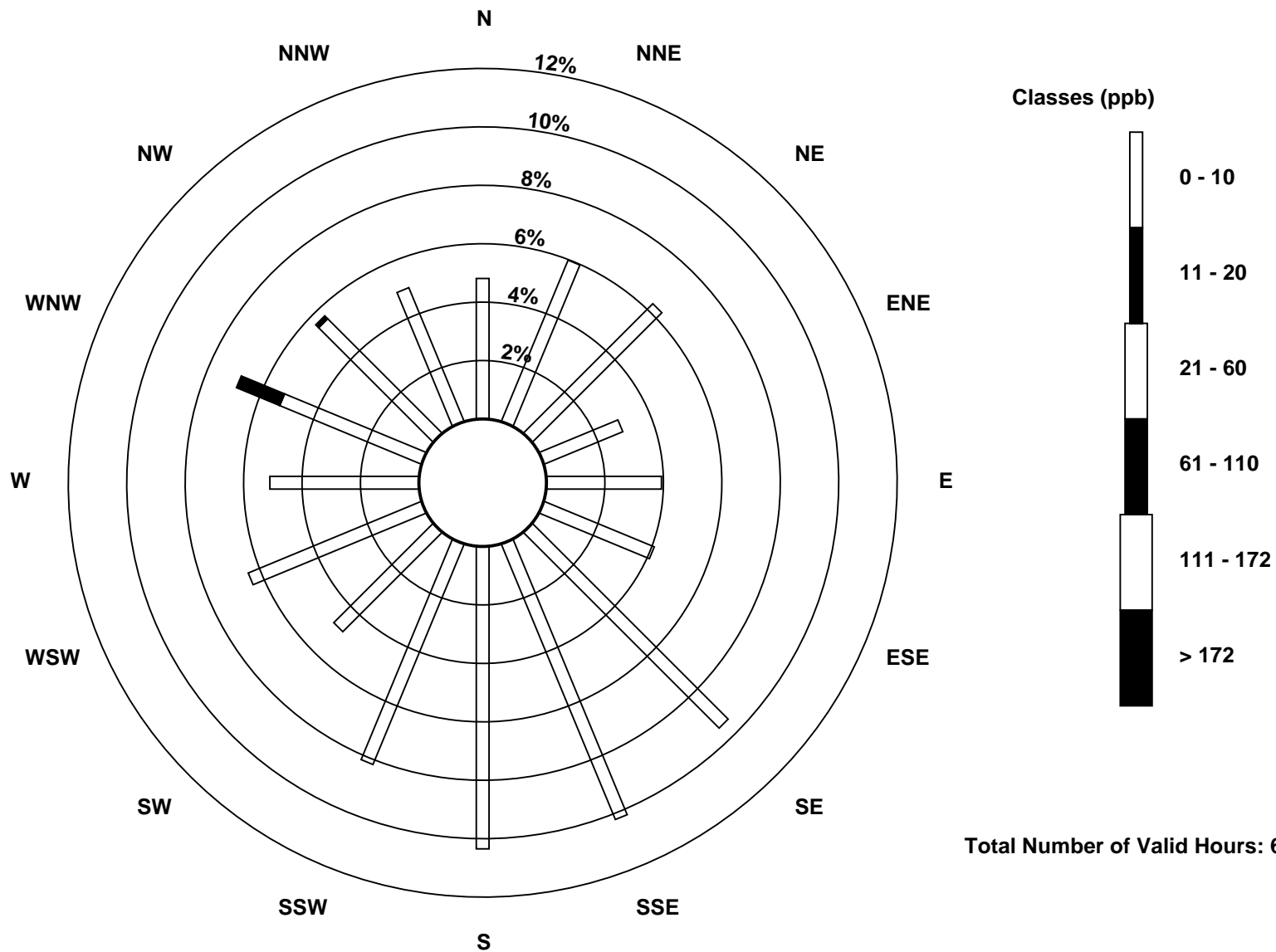
Total Number of Valid Hours: 686

Total Number of Hours: 720

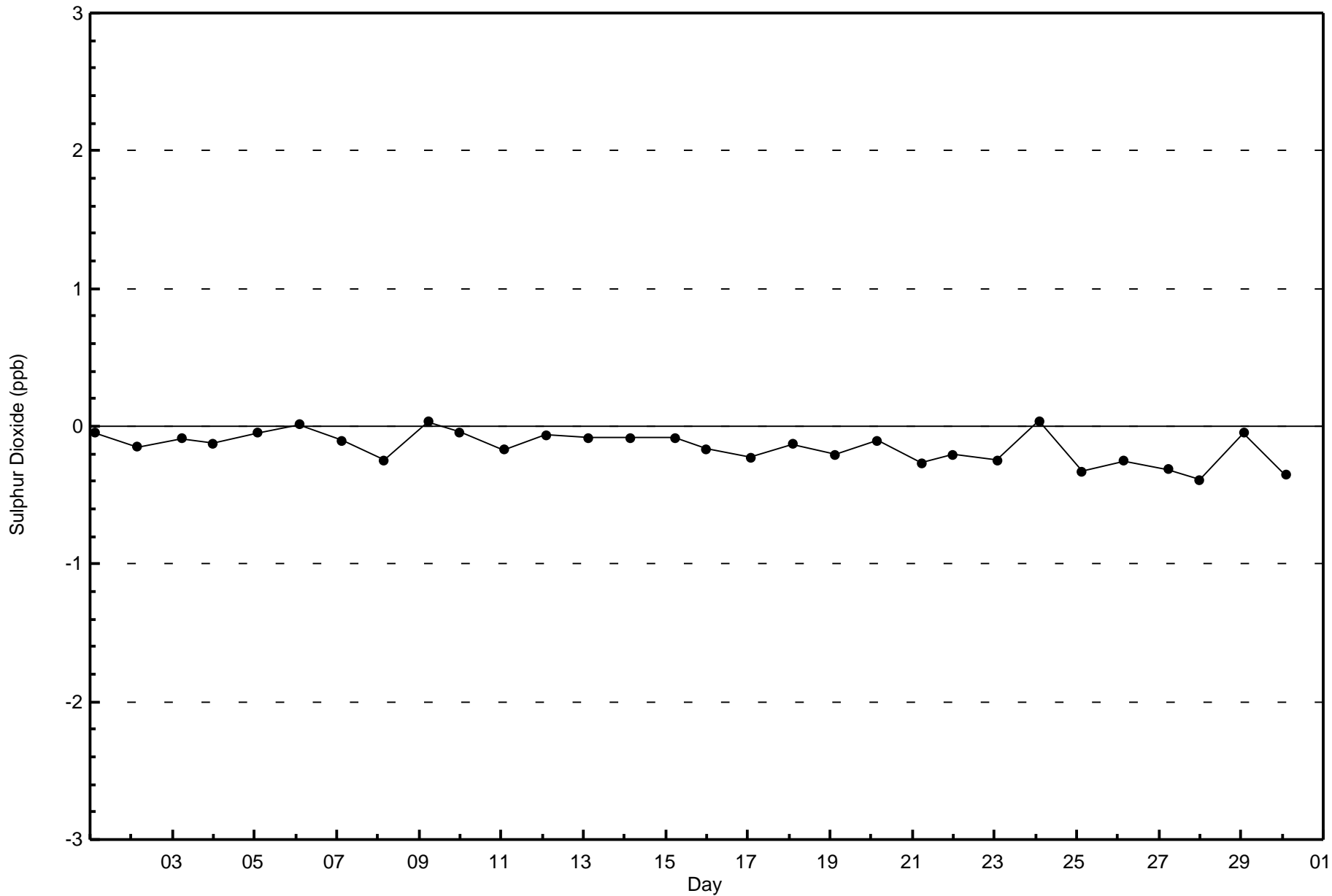


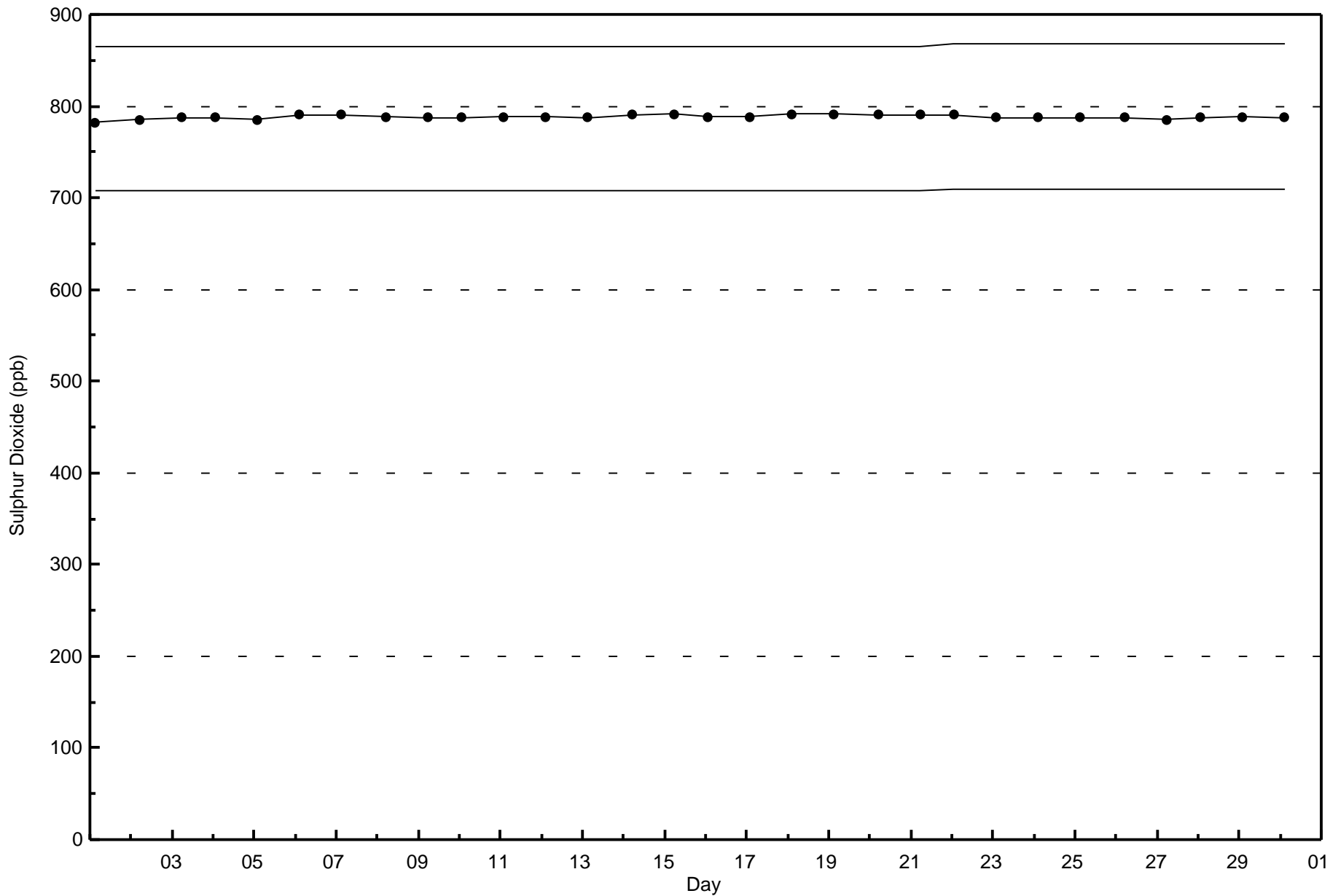
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Christina Lake (AMS 500)



Total Number of Valid Hours: 686

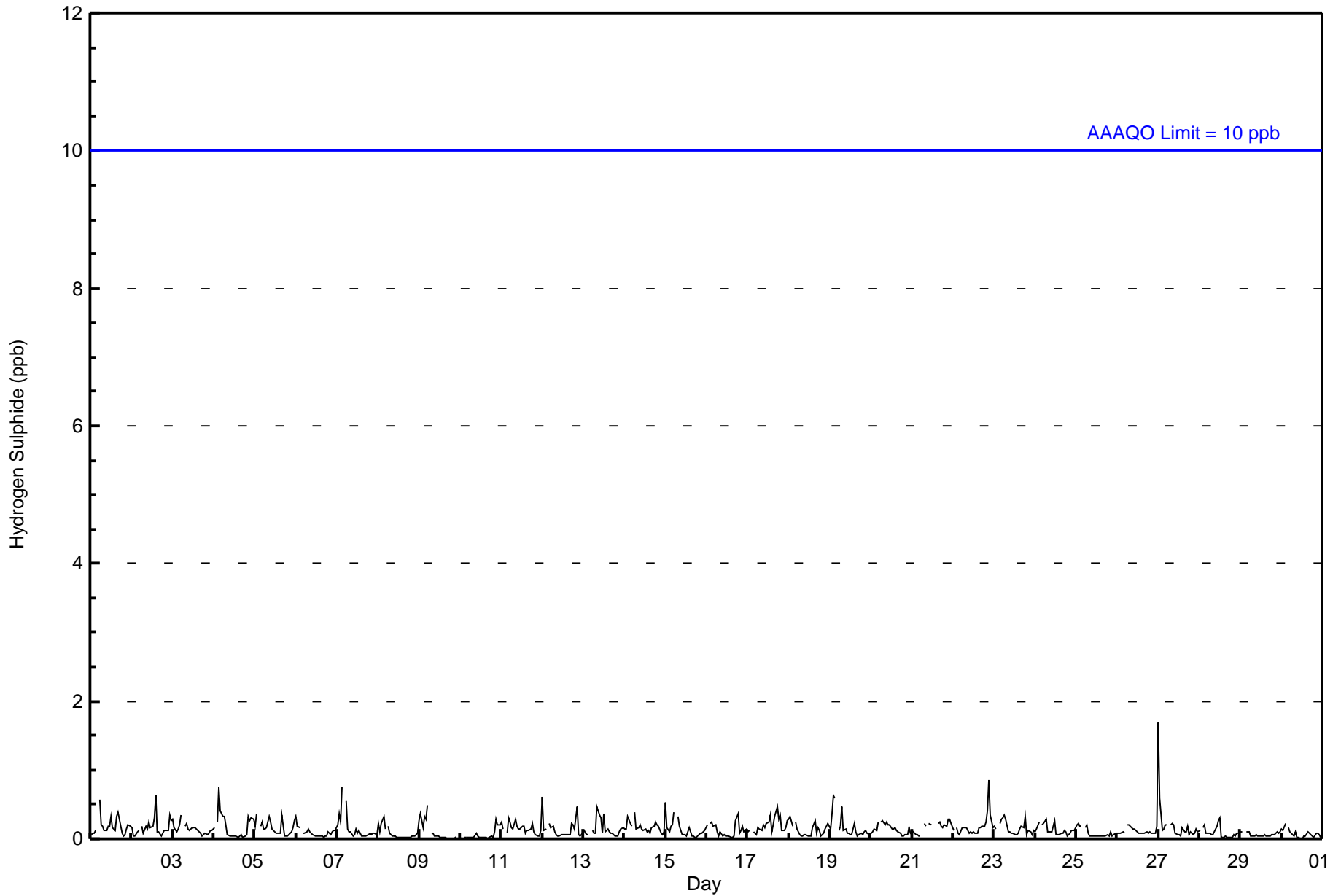






Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Christina Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	32	40	43	19	26	27	66	72	71	58	32	45	33	46	42	34	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	40	43	19	26	27	66	72	71	58	32	45	33	46	42	34	686

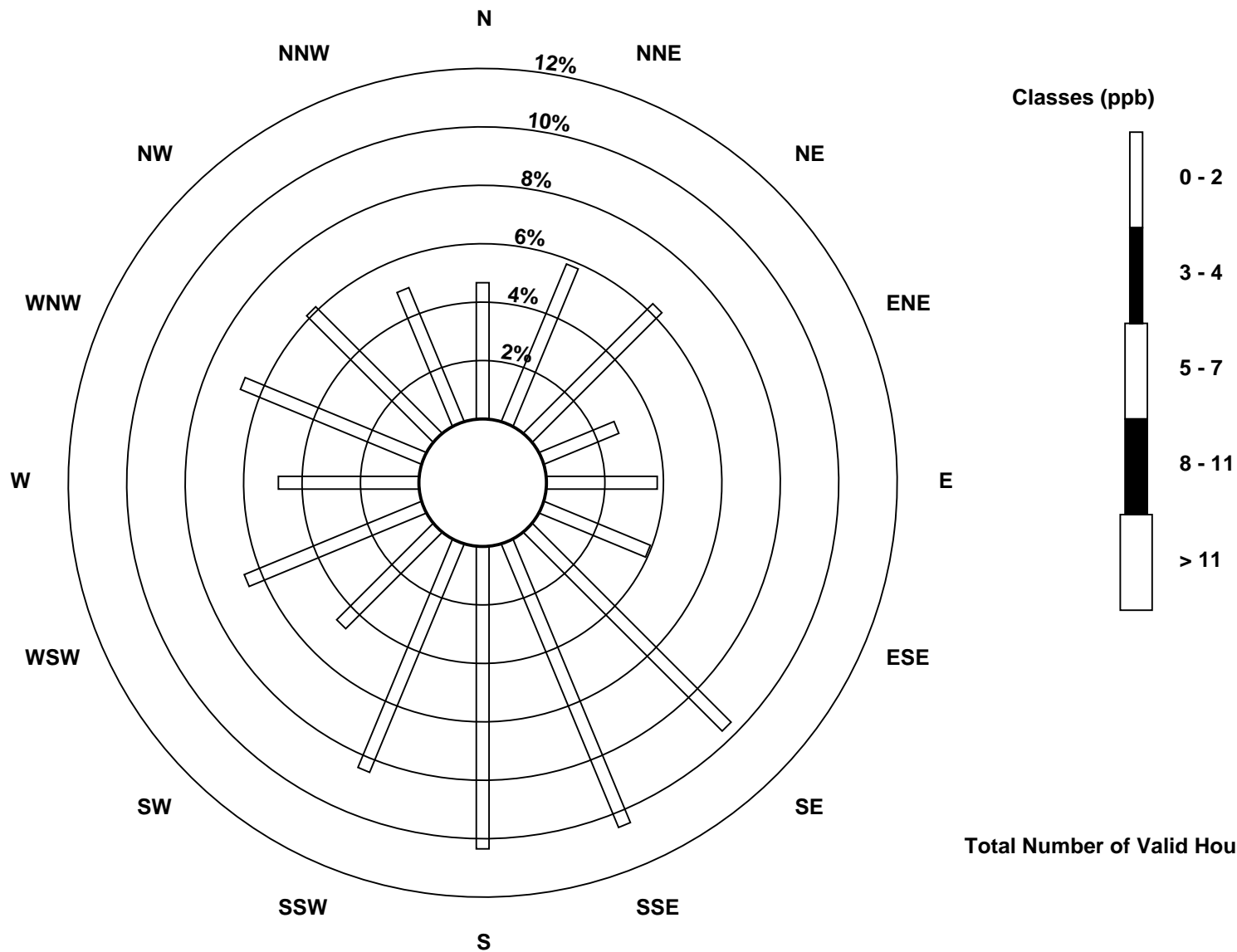
Total Number of Valid Hours: 686

Total Number of Hours: 720

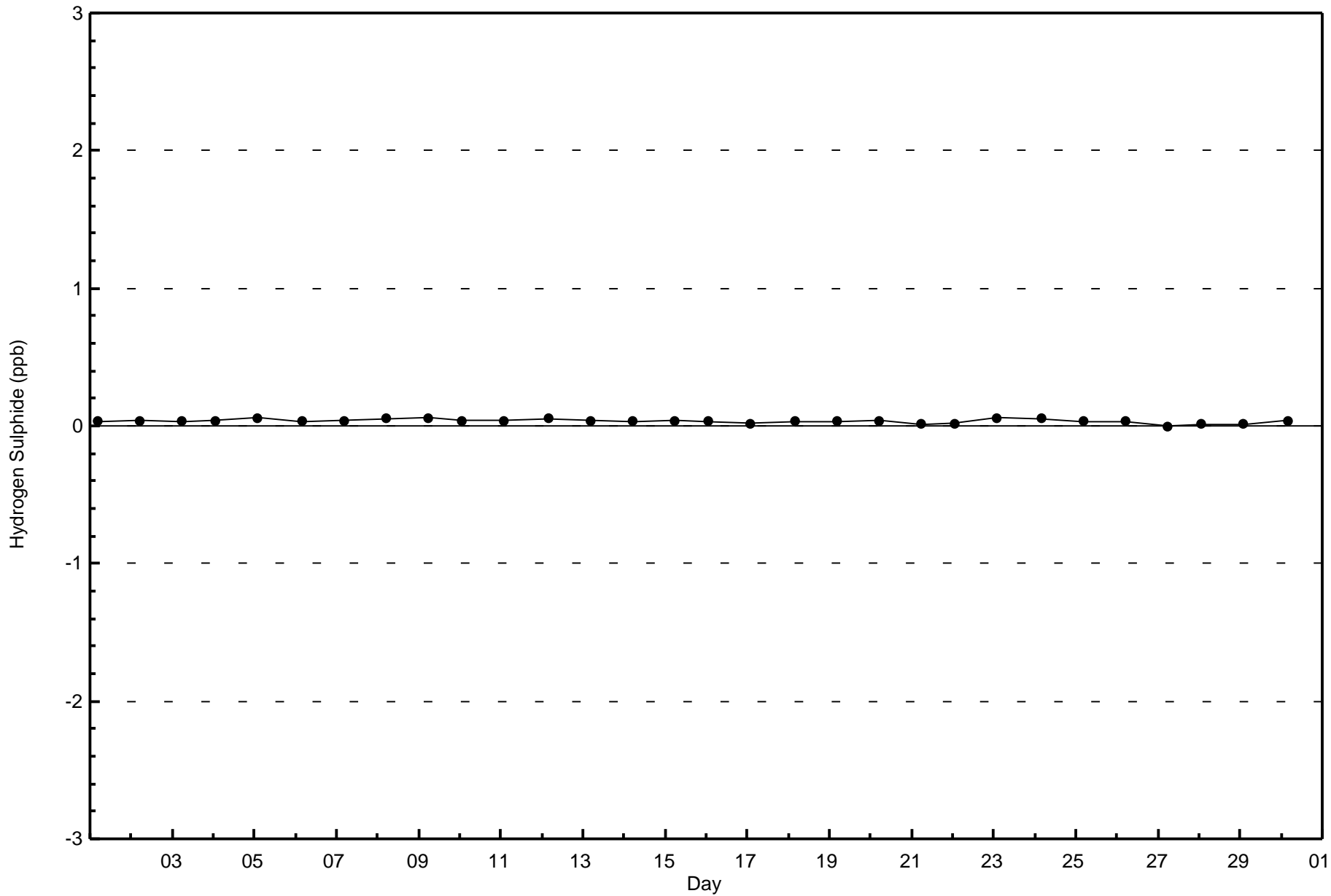


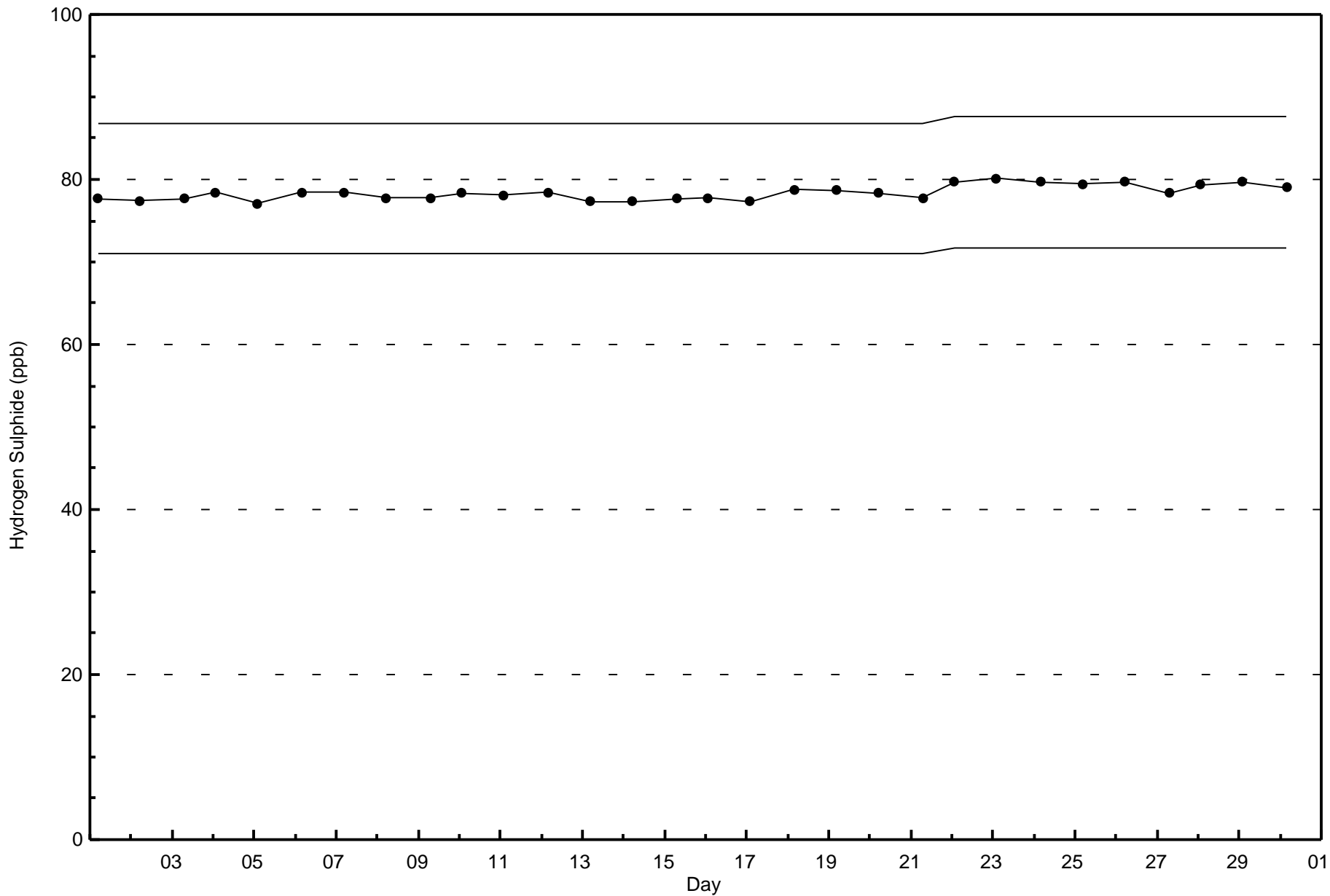
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Christina Lake (AMS 500)



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association
Summary of Hour Averages

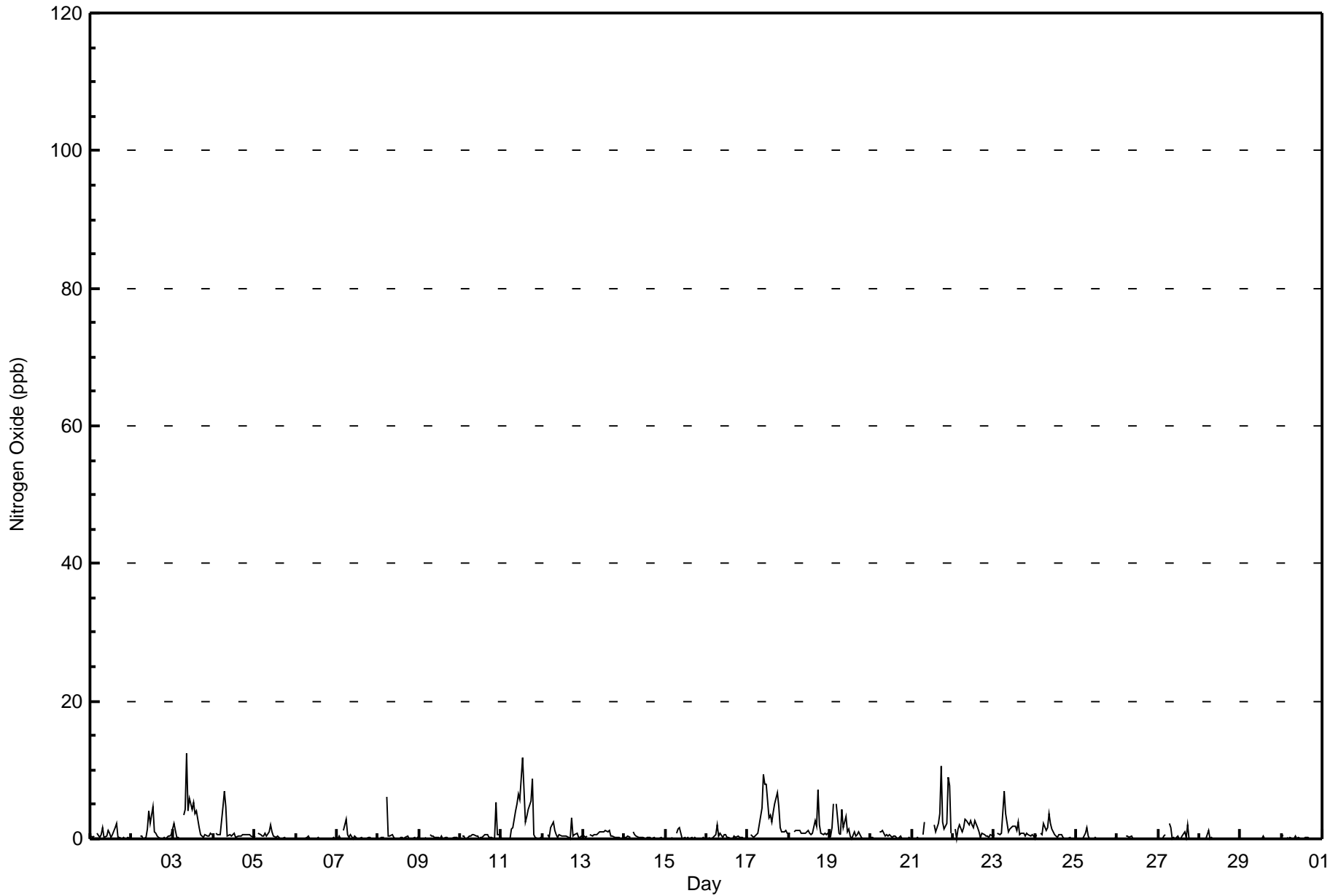
Nitrogen Oxide (NO) - ppb
Christina Lake - June 2017

Maximum Value: 12 ppb on Jun 3 09:00		Maximum Daily Average: 3.0 ppb on Jun 17		Hours in Service: 720																						
Minimum Value: 0 ppb on Jun 2 01:00		Minimum Daily Average: 0.0 ppb on Jun 29		Hours of Data: 685																						
Maximum Diurnal Average: 1.4 ppb at hour 9		Minimum Diurnal Average: 0.2 ppb at hour 1		Hours of Missing Data: 35																						
Monthly Average: 0.8 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 8		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	0	0	0	Z	1	0	1	2	0	0	1	1	0	1	2	2	0	0	0	0	0	0	0	0	0.5	2
2-Jun	0	0	0	0	Z	0	0	0	0	1	4	2	5	1	1	0	0	0	0	0	0	0	0	0	0.8	5
3-Jun	1	2	0	0	0	Z	4	4	12	4	6	4	5	4	4	2	1	0	0	1	0	0	1	2.5	12	
4-Jun	Z	1	1	1	1	5	7	5	0	1	0	1	1	0	0	0	0	0	1	1	1	1	0	0	1.2	7
5-Jun	0	Z	1	1	0	0	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
6-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
7-Jun	0	0	0	Z	1	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3
8-Jun	0	0	0	0	Z	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6
9-Jun	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jun	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	5	1	1	0.6	5
11-Jun	0	Z	0	0	0	0	1	2	4	5	6	6	12	7	2	3	4	6	9	1	0	0	0	0	3.0	12
12-Jun	0	0	Z	1	0	2	2	1	1	0	1	0	0	0	0	0	0	3	1	1	1	0	0	0	0.7	3
13-Jun	0	0	1	Z	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.6	1
14-Jun	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Jun	0	0	0	0	0	Z	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
16-Jun	Z	0	0	0	0	1	2	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
17-Jun	0	Z	1	0	0	1	1	2	4	9	8	8	3	3	2	4	5	7	5	2	1	1	1	1	3.0	9
18-Jun	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	3	2	7	2	1	1	1	1	1	1	1.3	7
19-Jun	0	2	5	Z	5	1	1	4	2	3	1	1	0	0	1	0	1	1	0	0	0	0	0	0	1.3	5
20-Jun	0	0	0	0	Z	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Jun	0	0	0	0	0	Z	1	2	C	C	C	C	C	2	1	2	4	11	3	1	2	9	8	1	2.6	11
22-Jun	Z	1	0	1	2	1	2	3	3	2	3	2	2	3	2	1	0	1	1	0	0	0	1	0	1.3	3
23-Jun	1	Z	1	1	1	4	7	4	1	2	2	2	2	1	2	1	1	1	1	1	1	1	1	0	1.5	7
24-Jun	0	1	Z	1	1	2	1	2	4	2	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0.7	4
25-Jun	0	0	0	Z	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
26-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
27-Jun	0	0	0	0	1	Z	2	2	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0.4	2
28-Jun	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
29-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.0	1
30-Jun	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerospan C - Calibration		



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Christina Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	41	43	20	27	28	65	70	71	56	33	44	34	47	39	34	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	41	43	20	27	28	65	70	71	56	33	44	34	47	39	34	685

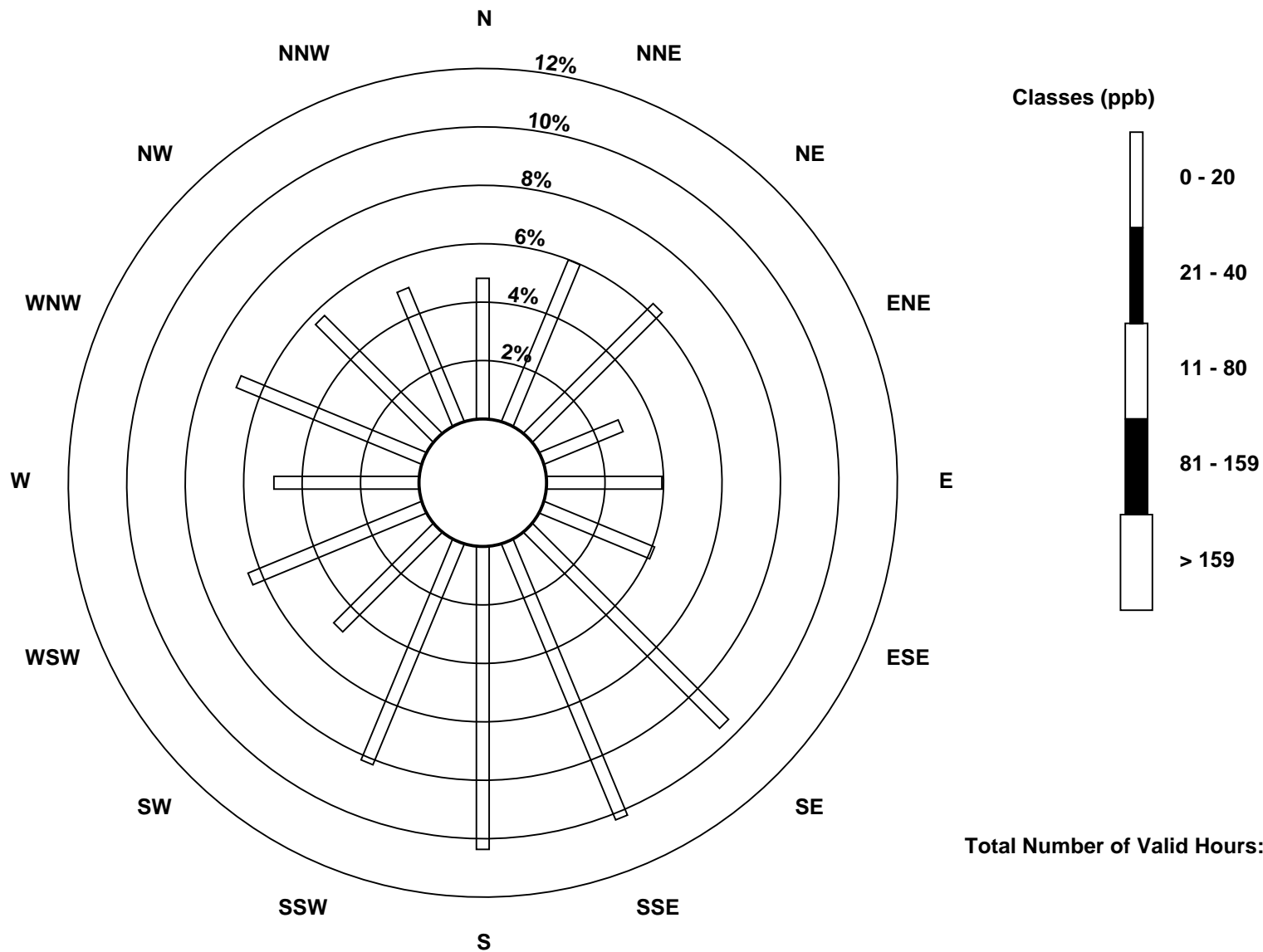
Total Number of Valid Hours: 685

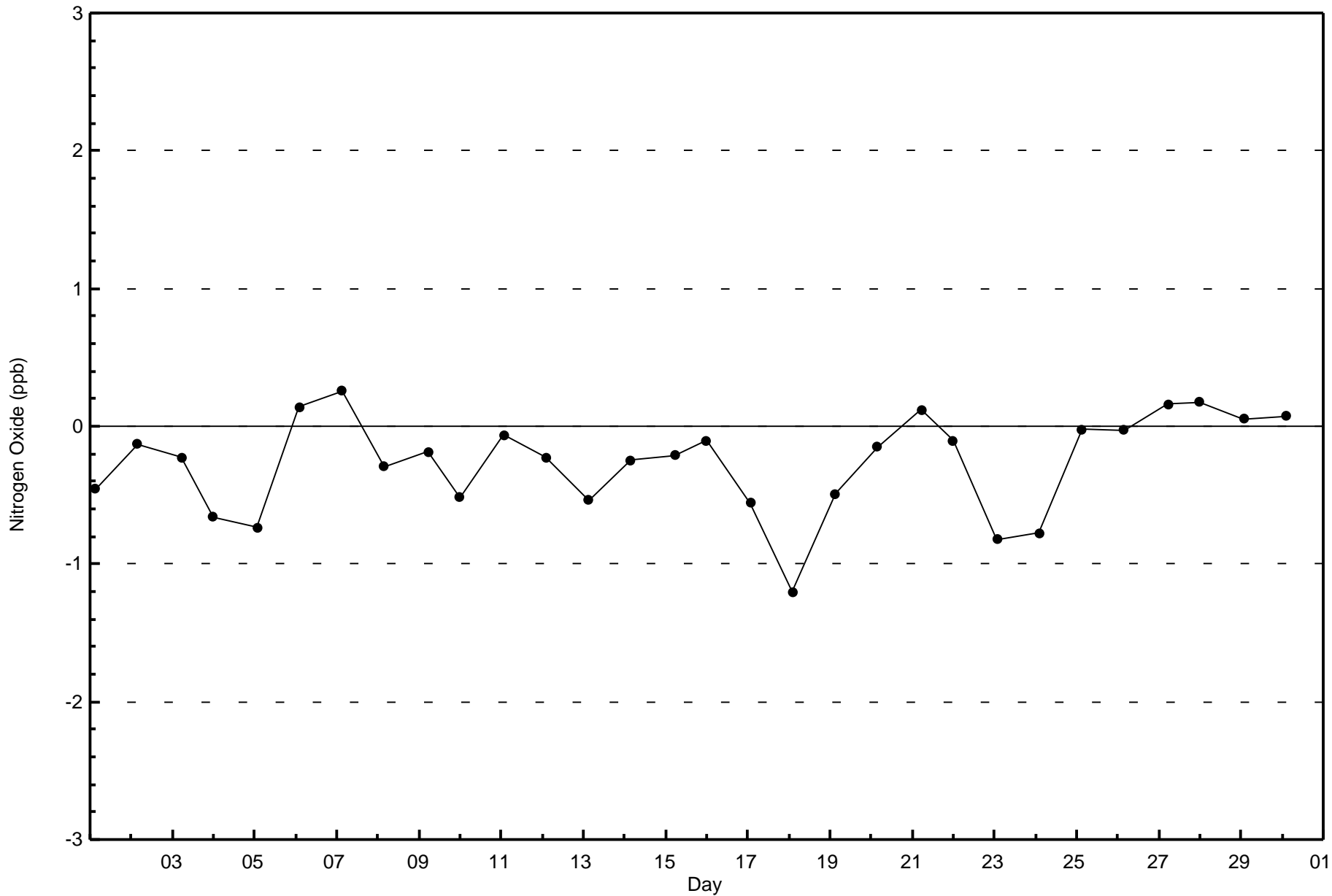
Total Number of Hours: 720

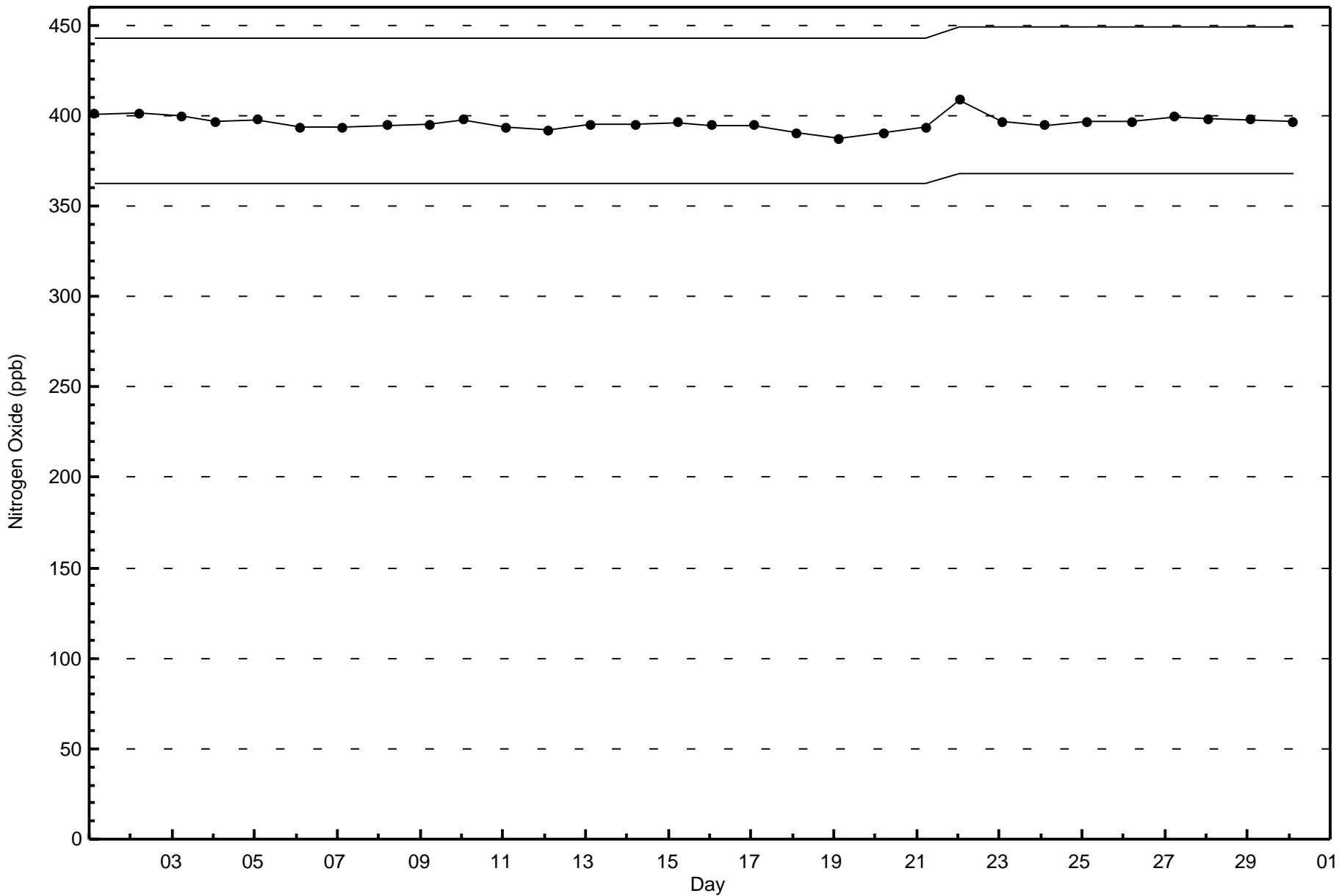


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxide (NO) - ppb
Christina Lake (AMS 500)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Christina Lake - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 13 ppb on Jun 10 22:00	Maximum Daily Average: 3.8 ppb on Jun 11		Hours of Data:	685
Minimum Value: 0 ppb on Jun 1 21:00	Minimum Daily Average: 0.4 ppb on Jun 29		Hours of Missing Data:	35
Maximum Diurnal Average: 2.4 ppb at hour 7	Minimum Diurnal Average: 0.7 ppb at hour 20		Hours of Calibration:	35
Monthly Average: 1.5 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 9		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	2	1	2	Z	6	2	2	4	2	1	3	2	1	0	2	5	2	2	1	1	0	0	0	0	1.9	6
2-Jun	0	0	0	1	Z	2	2	1	1	3	6	4	7	2	3	1	1	1	1	1	1	2	0	2	1.8	7
3-Jun	5	5	0	0	0	Z	4	4	10	4	5	4	6	5	6	3	1	0	0	0	0	1	0	2.7	10	
4-Jun	Z	3	2	3	2	7	8	8	1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1.7	8	
5-Jun	0	Z	0	0	0	0	1	1	2	4	2	1	1	1	0	0	0	0	0	0	1	0	6	0.9	6	
6-Jun	5	3	Z	1	1	1	2	2	1	1	0	0	0	0	1	0	0	0	0	0	0	1	2	0	1.0	5
7-Jun	1	4	1	Z	4	7	2	2	4	1	1	1	1	1	2	1	1	1	0	0	0	0	0	1	1.5	7
8-Jun	7	7	6	1	Z	5	1	1	1	1	0	0	1	0	0	1	0	0	0	1	0	0	3	1.5	7	
9-Jun	1	0	1	1	1	Z	2	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0.5	2
10-Jun	Z	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	2	0	1	0	0	13	3	2	1.1	13
11-Jun	1	Z	0	1	1	1	3	2	5	6	6	6	11	8	4	5	7	8	11	2	1	0	0	1	3.8	11
12-Jun	1	0	Z	3	2	4	6	3	1	1	1	1	1	1	1	1	1	7	2	1	2	1	1	1	1.9	7
13-Jun	1	2	2	Z	2	3	2	1	3	2	2	2	3	4	4	4	1	1	0	0	1	2	1	3	2.0	4
14-Jun	2	4	2	1	Z	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	4
15-Jun	0	1	1	1	1	Z	1	2	2	2	1	1	0	1	0	2	1	0	0	0	1	1	1	1	0.9	2
16-Jun	Z	1	1	1	1	2	3	1	2	1	2	2	1	0	0	0	0	1	2	1	1	0	1	3	1.2	3
17-Jun	1	Z	0	0	0	0	1	1	3	6	6	5	2	2	2	4	5	8	5	2	1	0	0	0	2.3	8
18-Jun	0	1	Z	0	0	0	0	0	0	0	0	1	0	0	0	3	2	10	4	0	0	0	1	1.0	10	
19-Jun	0	2	9	Z	7	1	2	3	1	3	1	1	0	0	2	0	0	2	1	0	0	0	0	1	1.6	9
20-Jun	0	0	0	0	Z	4	4	4	1	3	2	2	1	2	2	1	0	1	0	1	1	1	3	1	1.5	4
21-Jun	2	1	0	2	1	Z	1	4	C	C	C	C	C	4	3	4	5	11	5	3	4	7	6	1	3.4	11
22-Jun	Z	2	1	2	3	1	3	4	3	2	2	2	2	3	2	1	1	1	1	0	0	1	1	0	1.5	4
23-Jun	0	Z	0	0	1	3	5	4	1	1	2	2	2	2	3	1	1	1	1	1	1	1	0	1	1.4	5
24-Jun	1	1	Z	2	1	2	2	2	5	3	2	1	1	1	2	2	1	1	1	1	1	4	1	1	1.6	5
25-Jun	1	4	1	Z	1	2	4	2	1	1	1	1	1	1	1	0	1	1	0	1	4	1	1	2	1.4	4
26-Jun	2	2	2	4	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0	0	0	1.1	4
27-Jun	0	1	3	3	5	Z	5	6	2	2	1	2	2	1	3	3	4	5	2	1	0	0	1	2	2.3	6
28-Jun	Z	1	1	1	0	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
29-Jun	1	Z	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	0	0	0.4	1
30-Jun	0	1	Z	2	1	1	1	1	2	1	1	0	0	0	2	1	0	1	1	1	0	0	1	1	0.8	2

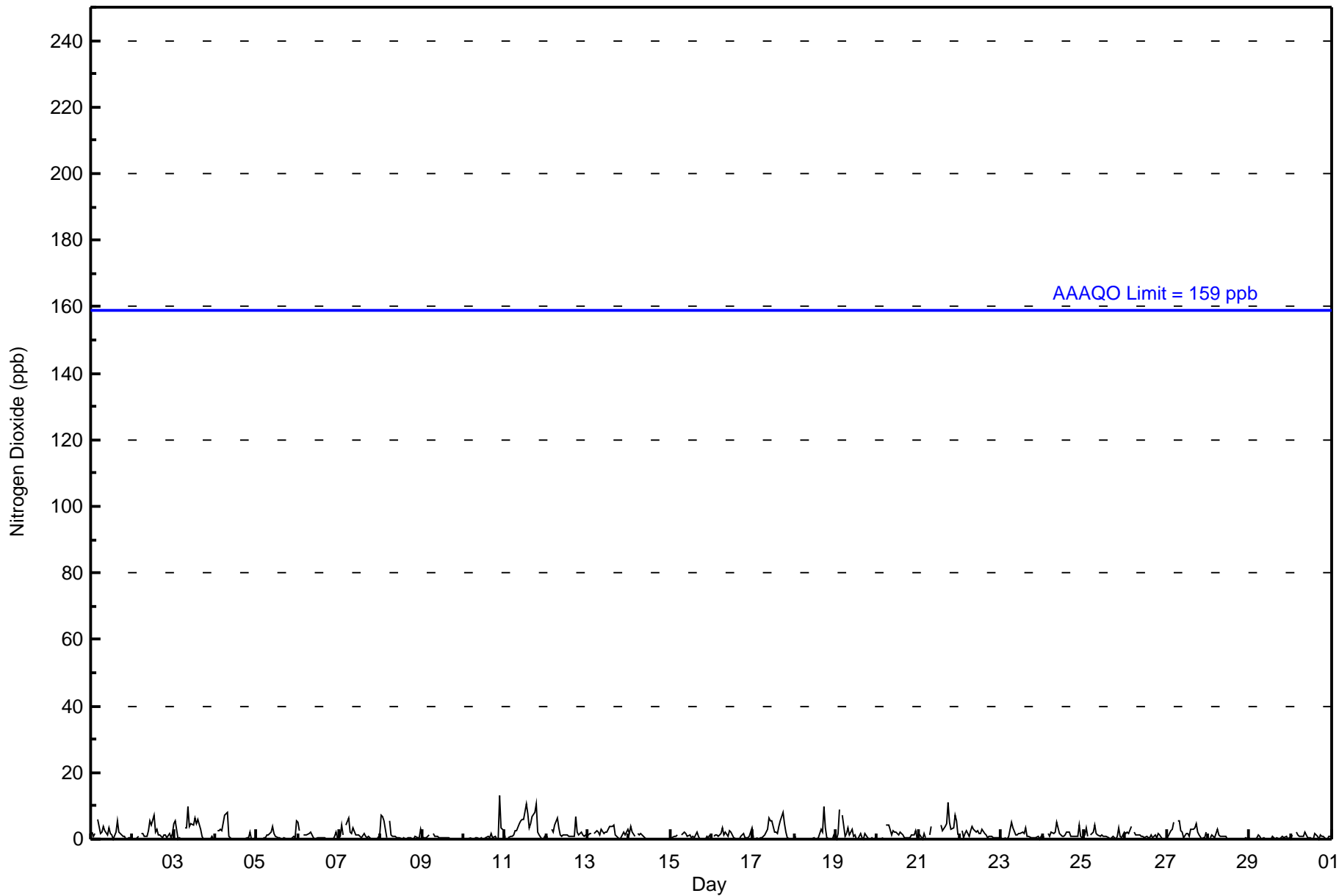
1.3	1.8	1.4	1.2	1.7	2.3	2.4	2.3	2.1	1.7	1.7	1.5	1.6	1.3	1.5	1.5	1.2	2.1	1.3	0.7	0.7	1.3	0.8	1.2	Diurnal Average	
7	7	9	4	7	7	8	8	10	6	6	6	11	8	6	5	7	11	11	3	4	13	6	6	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Christina Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	41	43	20	27	28	65	70	71	56	33	44	34	47	39	34	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	41	43	20	27	28	65	70	71	56	33	44	34	47	39	34	685

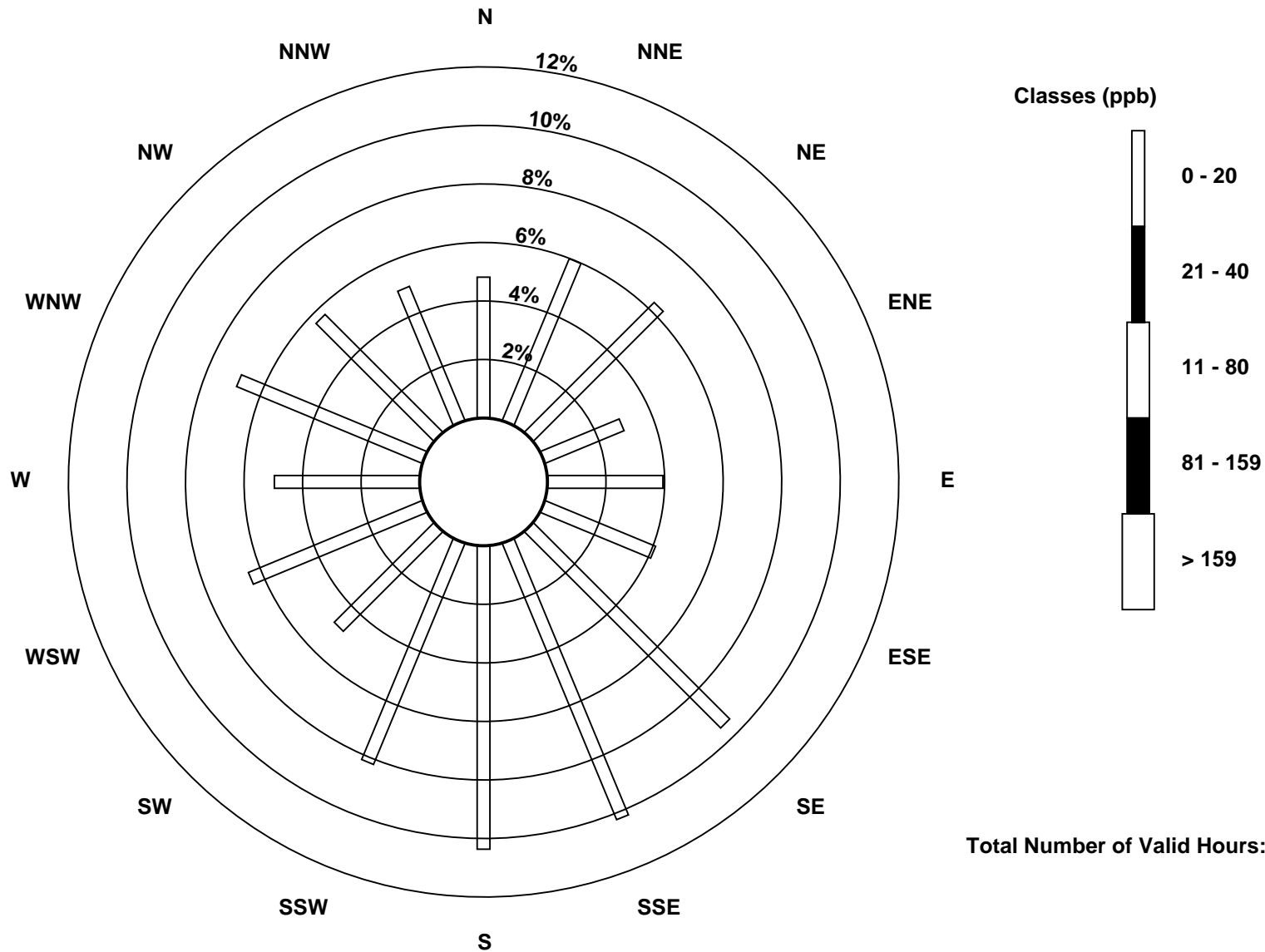
Total Number of Valid Hours: 685

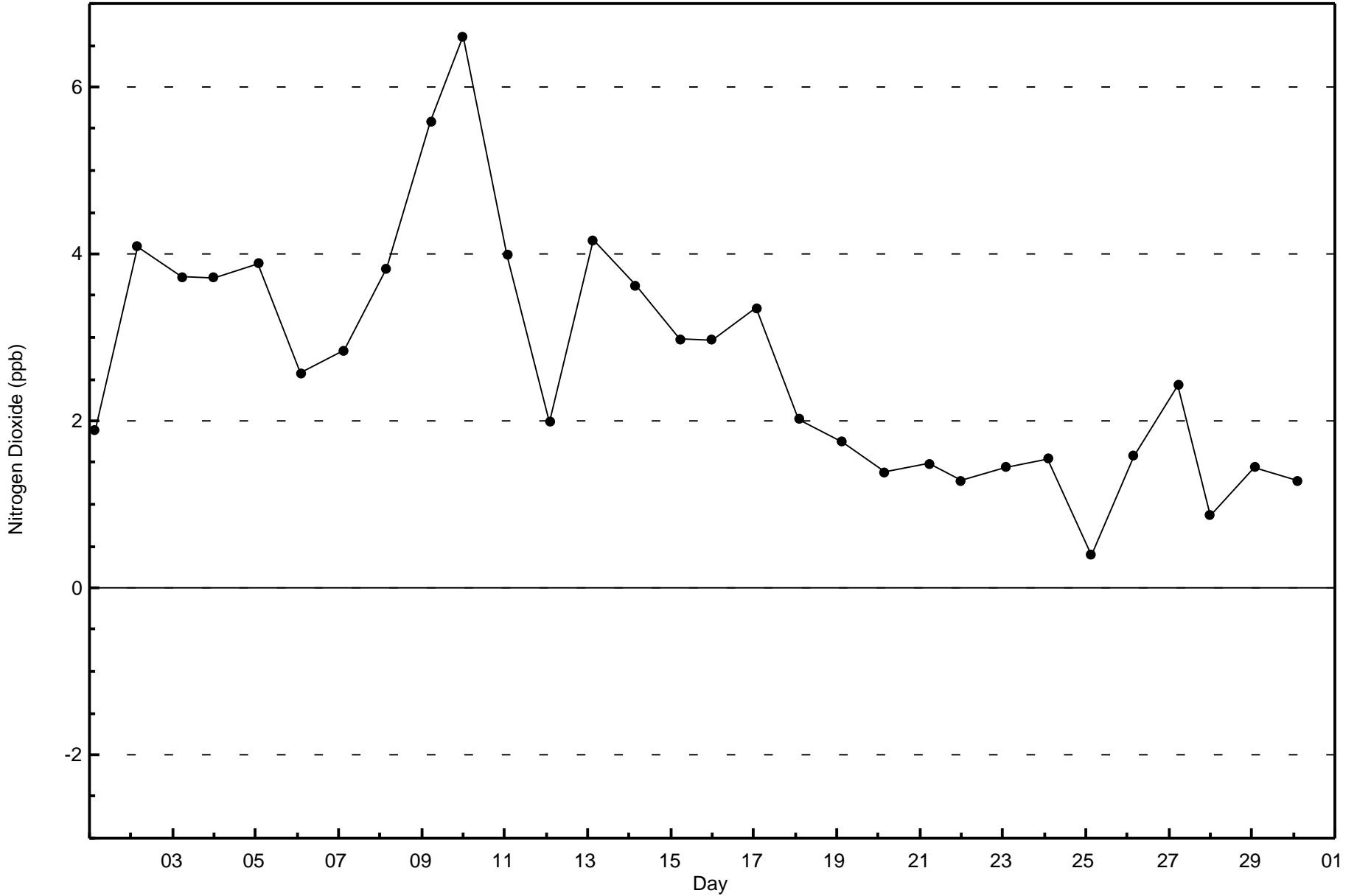
Total Number of Hours: 720

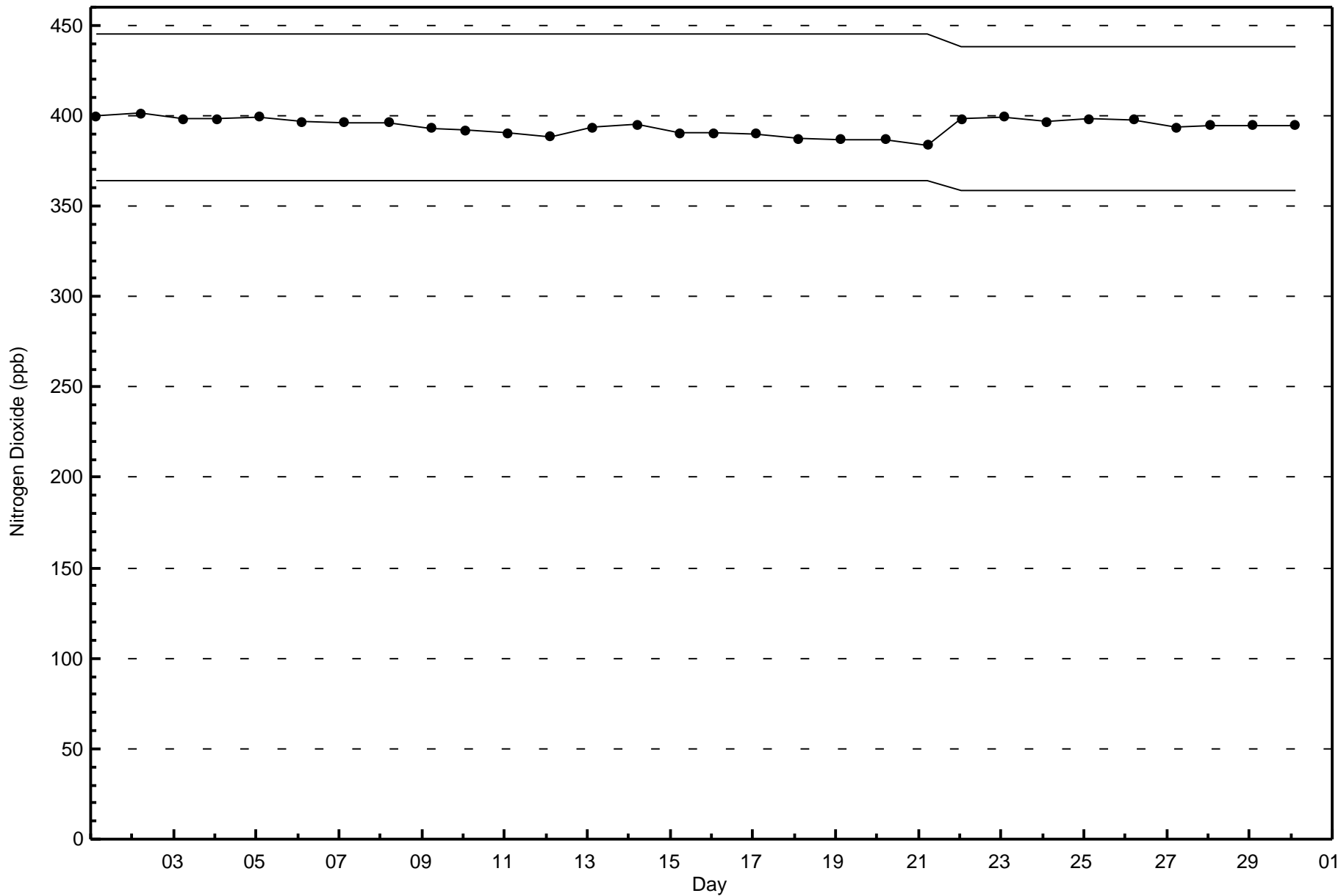


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Christina Lake (AMS 500)









Wood Buffalo Environmental Association
Summary of Hour Averages

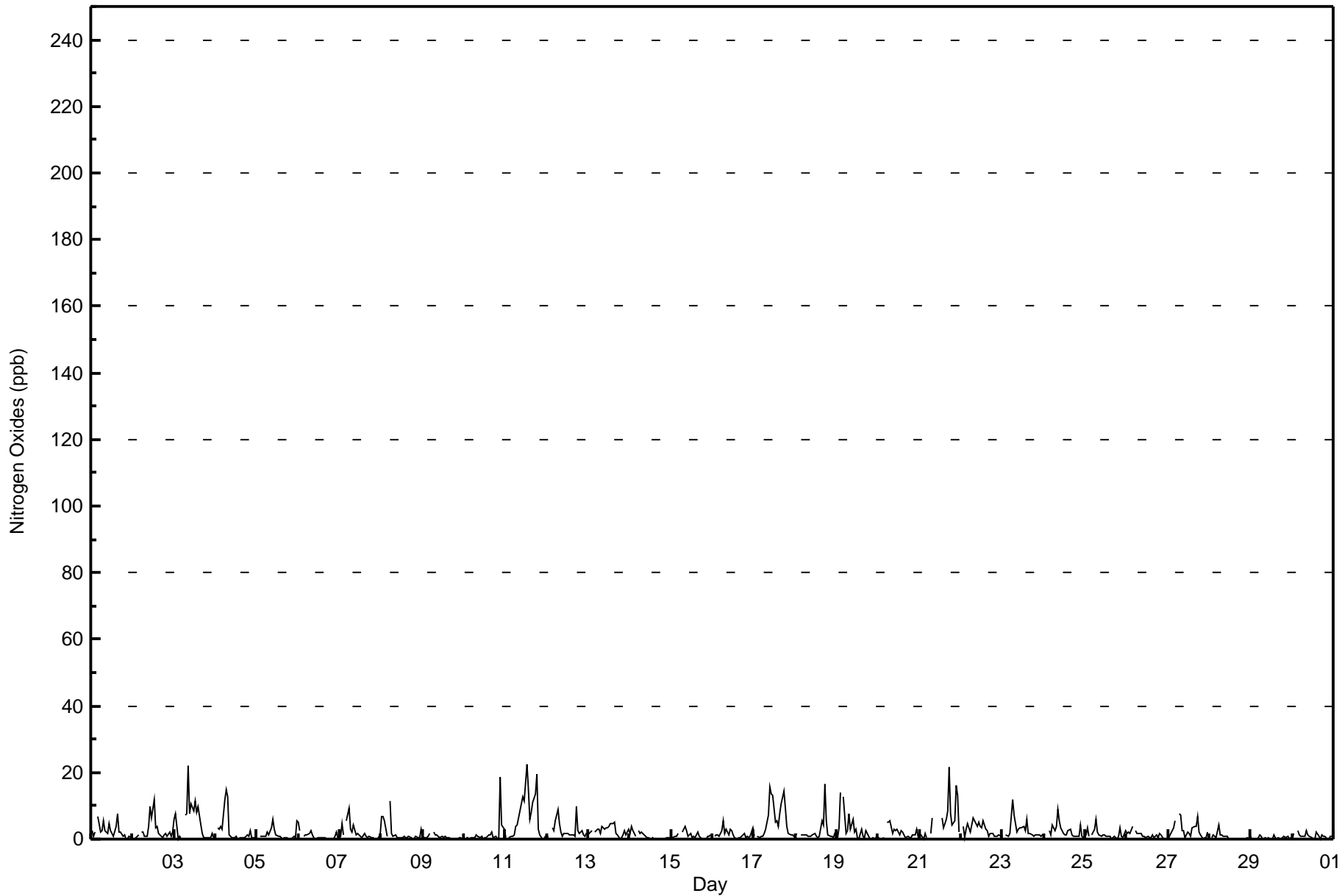
Nitrogen Oxides (NO_x) - ppb
Christina Lake - June 2017

Maximum Value: 23 ppb on Jun 11 13:00		Maximum Daily Average: 6.8 ppb on Jun 11		Hours in Service: 720																																												
Minimum Value: 0 ppb on Jun 2 01:00		Minimum Daily Average: 0.4 ppb on Jun 29		Hours of Data: 685																																												
Maximum Diurnal Average: 3.7 ppb at hour 7		Minimum Diurnal Average: 0.9 ppb at hour 20		Hours of Missing Data: 35																																												
Monthly Average: 2.3 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 16		Hours of Calibration: 35																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	2	1	2	Z	7	2	3	5	3	2	5	3	2	1	4	7	2	2	1	1	0	0	1	0	2.4	7																						
2-Jun	0	0	0	1	Z	2	2	1	1	4	10	6	12	3	4	2	1	1	1	2	1	2	1	2	2.6	12																						
3-Jun	6	7	0	1	0	Z	7	8	22	8	11	8	11	8	10	4	2	0	0	1	0	0	2	1	5.1	22																						
4-Jun	Z	4	3	4	3	12	15	13	1	1	0	1	1	0	0	0	1	1	1	3	1	0	1	1	2.8	15																						
5-Jun	0	Z	1	1	1	1	2	1	3	6	3	1	1	1	0	0	0	0	0	0	0	1	0	6	1.3	6																						
6-Jun	5	3	Z	1	1	1	2	3	1	0	0	0	0	1	1	0	0	0	0	0	0	1	2	0	1.0	5																						
7-Jun	1	5	1	Z	6	9	3	2	4	1	2	1	1	0	2	1	1	1	0	0	0	0	0	1	1.8	9																						
8-Jun	7	7	6	1	Z	12	2	1	1	1	0	0	0	1	0	0	1	1	0	0	1	0	0	3	2.0	12																						
9-Jun	1	0	0	1	2	Z	2	1	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0.7	2																						
10-Jun	Z	0	0	0	0	0	0	1	1	0	1	0	0	1	1	1	2	0	1	0	0	19	4	3	1.7	19																						
11-Jun	1	Z	1	1	1	1	4	4	9	11	13	12	23	15	6	8	11	14	20	3	1	0	0	1	6.8	23																						
12-Jun	1	0	Z	4	2	6	9	4	2	1	2	2	2	1	1	1	1	10	2	2	3	1	1	2	2.6	10																						
13-Jun	1	2	2	Z	2	3	3	2	4	3	3	3	4	5	5	5	2	1	0	1	1	3	1	3	2.6	5																						
14-Jun	2	4	2	1	Z	3	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4																						
15-Jun	0	1	1	1	2	Z	2	3	4	3	1	2	1	1	0	2	1	0	0	0	1	1	1	1	1.1	4																						
16-Jun	Z	1	1	1	1	2	5	1	3	1	3	3	1	0	0	0	1	1	2	1	1	1	1	3	1.5	5																						
17-Jun	1	Z	1	0	1	1	2	3	7	16	13	13	5	6	4	8	11	15	9	4	1	1	1	1	5.4	16																						
18-Jun	1	2	Z	1	1	1	1	1	1	1	1	2	1	1	1	6	4	17	6	1	1	1	1	2	2.3	17																						
19-Jun	0	4	14	Z	13	2	2	8	3	6	2	3	0	0	3	1	1	2	1	0	0	0	0	1	2.8	14																						
20-Jun	0	0	0	0	Z	5	5	6	2	3	3	3	1	3	2	1	0	1	0	1	1	1	3	1	1.9	6																						
21-Jun	2	1	0	2	0	Z	2	6	C	C	C	C	C	6	4	6	8	22	8	4	6	16	13	2	6.0	22																						
22-Jun	Z	4	1	3	5	2	4	6	5	4	5	4	3	6	3	2	1	2	2	1	1	1	1	1	2.8	6																						
23-Jun	1	Z	1	1	2	7	12	7	2	3	3	4	4	3	6	2	2	1	1	1	1	1	1	1	2.8	12																						
24-Jun	1	1	Z	3	1	4	3	4	9	6	3	2	1	1	2	3	1	1	1	1	1	4	1	1	2.4	9																						
25-Jun	1	4	1	Z	1	3	6	2	1	1	1	1	1	1	0	1	1	0	1	1	4	1	0	3	1.5	6																						
26-Jun	2	2	2	4	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	0	0	0	1.2	4																						
27-Jun	0	1	3	3	6	Z	8	7	2	2	1	2	2	1	3	4	4	7	2	1	0	0	0	2	2.7	8																						
28-Jun	Z	0	1	1	0	4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4																						
29-Jun	1	Z	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	0	0	0.4	1																						
30-Jun	0	2	Z	3	1	1	1	1	3	1	1	0	0	0	2	1	0	1	1	1	0	0	1	1	0.9	3																						
																								1.5	2.2	1.8	1.5	2.4	3.5	3.7	3.6	3.5	3.0	3.1	2.7	2.7	2.3	2.3	2.3	1.9	3.4	2.0	0.9	1.0	1.9	1.3	1.4	Diurnal Average
																								7	7	14	4	13	12	15	13	22	16	13	13	23	15	10	8	11	22	20	4	6	19	13	6	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Christina Lake - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Christina Lake - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	99.56	99.56
21 - 40	3	0.44	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Christina Lake - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	33	41	43	20	27	28	65	70	71	56	33	44	34	44	39	34	682
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	41	43	20	27	28	65	70	71	56	33	44	34	47	39	34	685

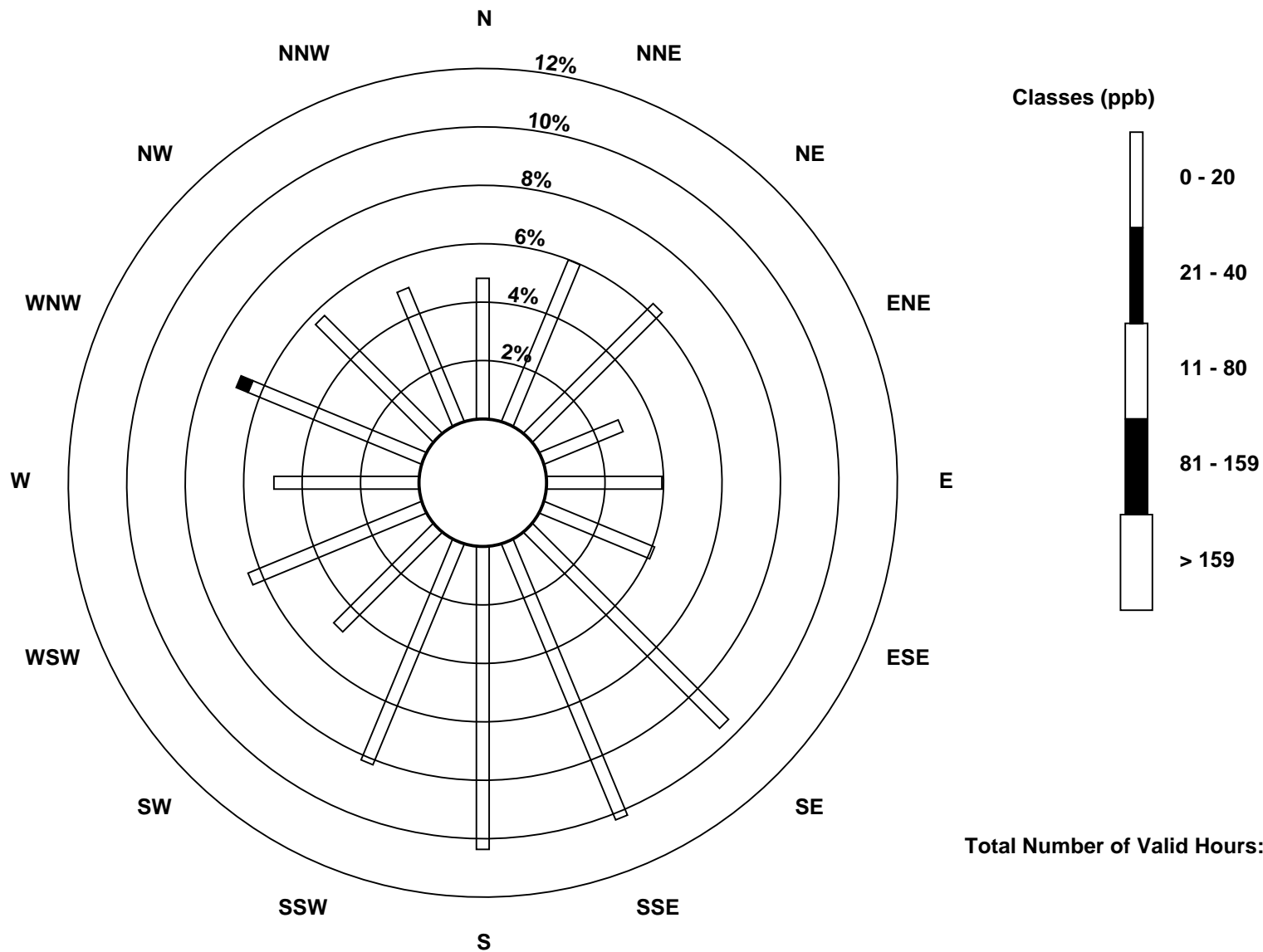
Total Number of Valid Hours: 685

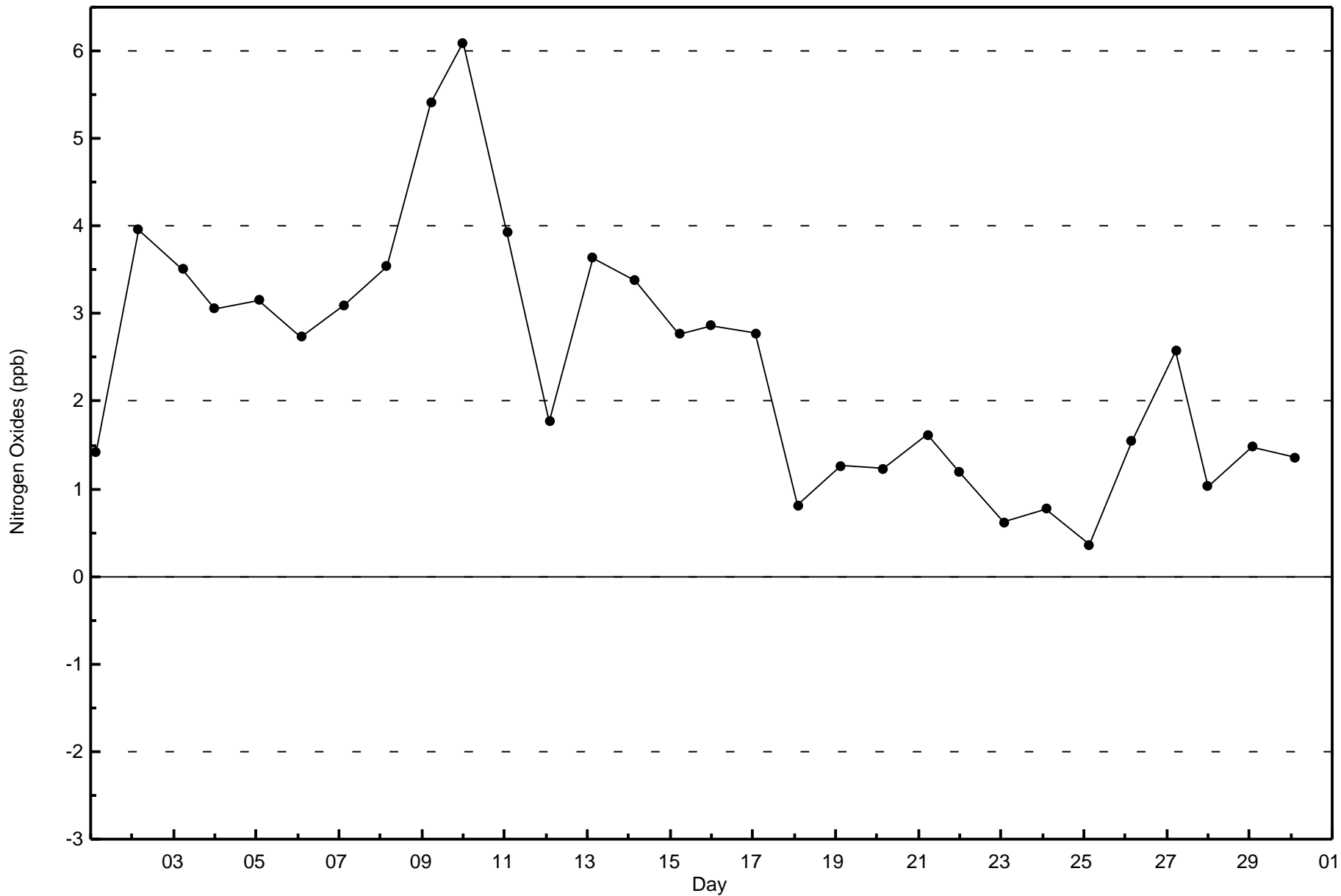
Total Number of Hours: 720

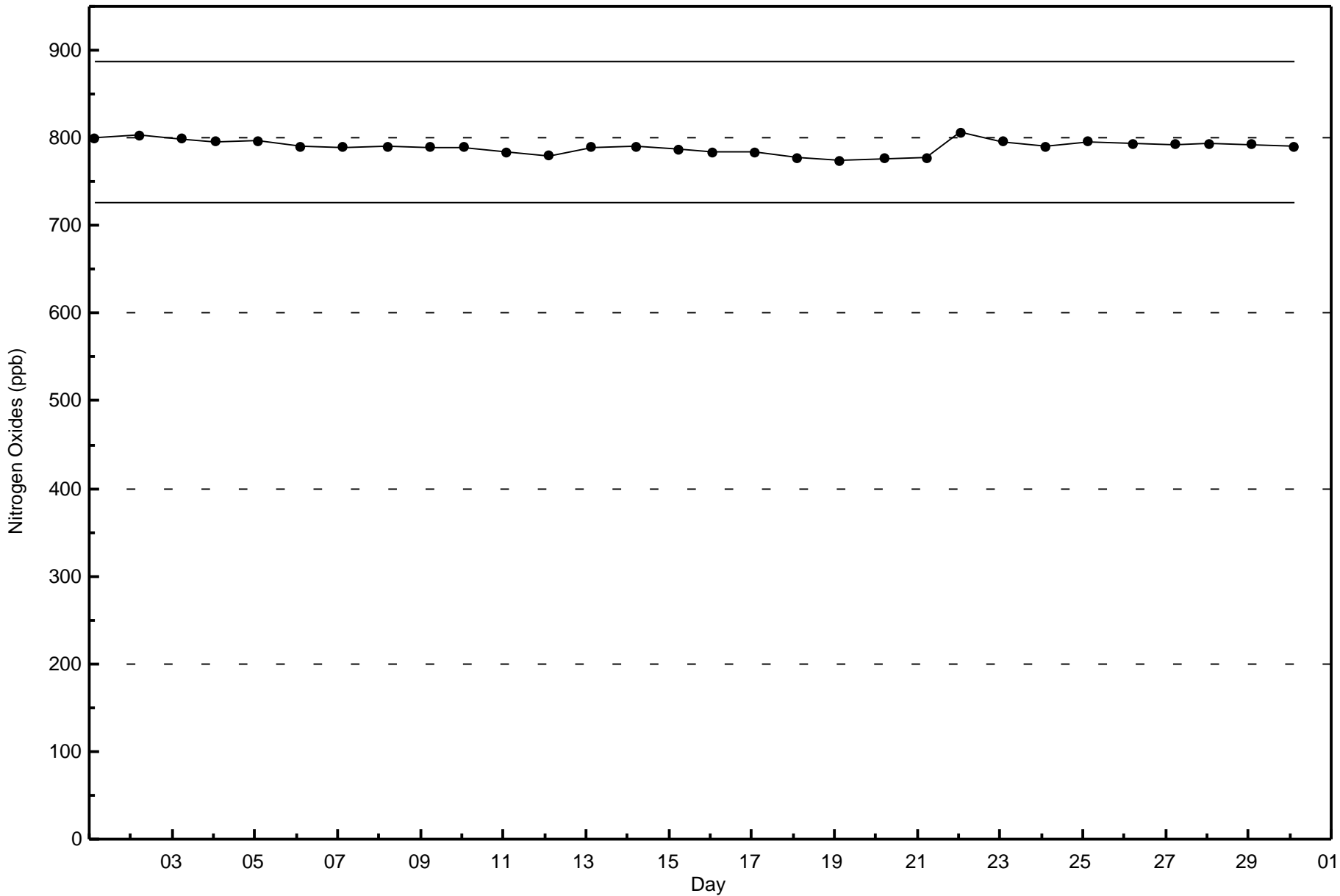


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Oxides (NO_x) - ppb
Christina Lake (AMS 500)









Wood Buffalo Environmental Association
Summary of Hour Averages

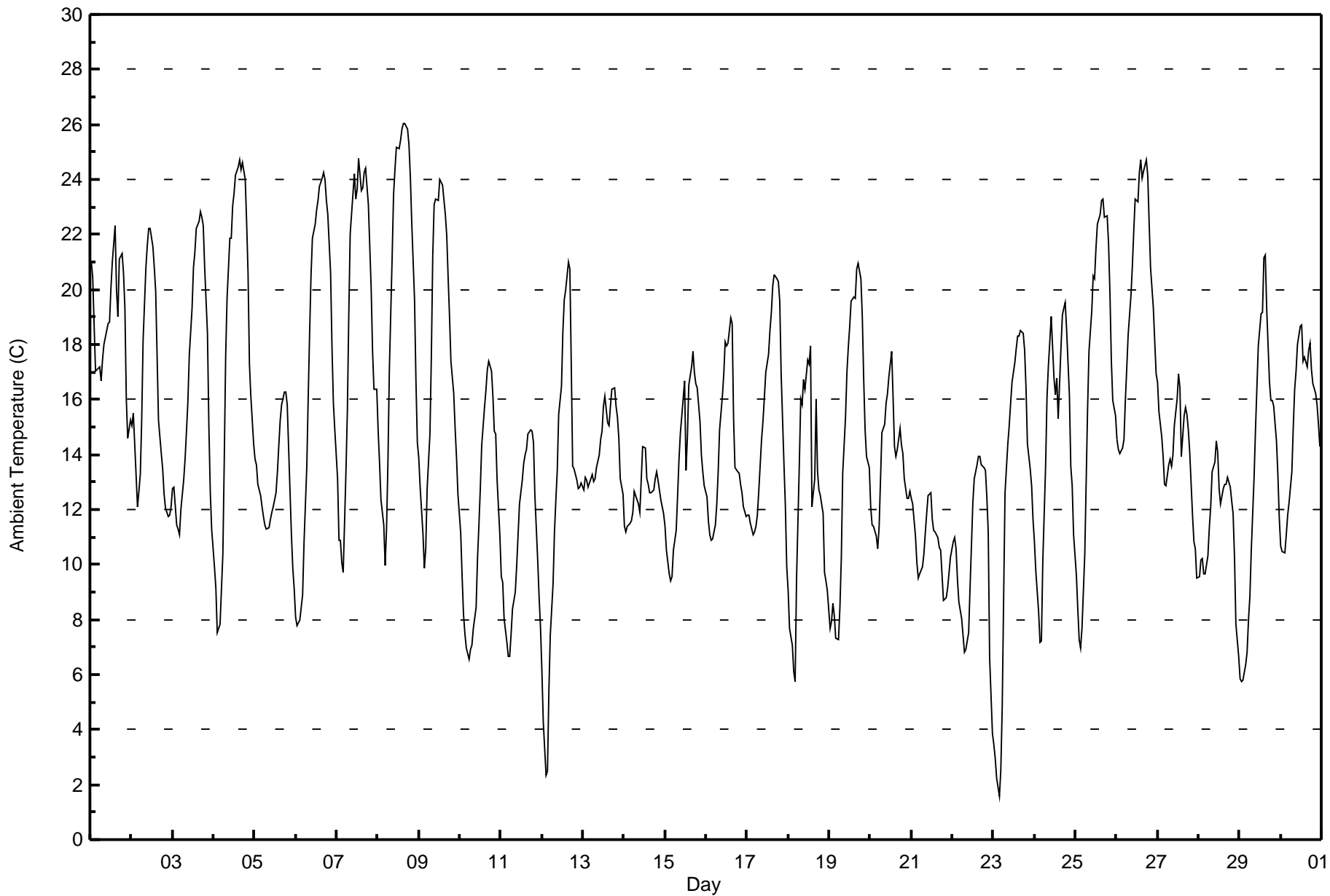
Ambient Temperature (AT) - C
Christina Lake - June 2017

Maximum Value: 26.1 C on Jun 8 16:00		Maximum Daily Average: 19.8 C on Jun 26		Hours in Service: 720																						
Minimum Value: 1.6 C on Jun 23 04:00		Minimum Daily Average: 10.4 C on Jun 22		Hours of Data: 720																						
Maximum Diurnal Average: 18.5 C at hour 17		Minimum Diurnal Average: 9.6 C at hour 4		Hours of Missing Data: 0																						
Monthly Average: 14.70 C		Percentiles: P ₁ = 3.8 P ₁₀ = 8.8 Q ₁ = 11.4 Median = 14.0 Q ₃ = 17.8 P ₉₀ = 22.0 P ₉₉ = 25.1		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	21.0	20.4	18.7	17.1	17.1	17.2	16.7	17.4	18.0	18.5	18.8	18.8	20.1	21.0	22.3	20.0	19.0	21.1	21.3	20.6	19.3	16.0	14.6	15.3	18.8	22.3
2-Jun	15.1	15.5	14.4	12.1	12.6	13.3	15.3	18.1	20.8	21.6	22.2	22.2	21.5	20.8	19.9	17.6	15.2	14.0	13.5	12.6	12.1	11.7	11.8	12.1	16.1	22.2
3-Jun	12.8	12.8	11.5	11.3	11.1	12.0	13.1	13.8	14.9	15.9	17.6	19.3	20.8	21.4	22.2	22.5	22.8	22.6	22.3	20.8	18.4	15.0	12.7	11.3	16.6	22.8
4-Jun	9.9	9.2	7.5	7.7	7.8	10.4	13.8	17.6	19.7	21.9	23.0	23.5	24.2	24.5	24.7	24.4	24.6	24.0	22.4	20.6	17.3	16.1	14.4	18.0	24.7	
5-Jun	13.8	13.7	12.9	12.5	12.1	11.8	11.4	11.3	11.3	11.6	11.9	12.1	12.6	13.4	14.4	15.2	15.8	16.3	16.3	15.8	14.3	11.1	9.9	9.1	12.9	16.3
6-Jun	8.1	7.8	8.0	8.5	8.9	10.8	13.6	16.1	18.4	20.5	21.9	22.4	22.9	23.2	23.7	24.1	24.3	24.0	23.2	22.8	20.6	17.9	15.8	14.9	17.6	24.3
7-Jun	13.1	10.9	10.9	10.1	9.7	13.4	15.6	19.1	22.0	23.5	24.2	23.3	23.6	24.8	23.6	23.7	24.3	24.4	23.1	21.6	20.0	17.8	16.4	16.4	19.0	24.8
8-Jun	14.8	13.7	12.4	11.4	10.0	11.4	13.8	17.1	21.2	23.5	24.4	25.2	25.1	25.4	25.8	26.1	26.0	25.8	25.3	24.1	22.4	19.6	16.7	14.4	19.8	26.1
9-Jun	13.9	12.8	11.2	9.9	10.6	12.8	14.7	17.6	21.2	23.1	23.3	23.2	24.0	23.9	23.8	22.7	21.9	20.5	19.0	17.4	16.2	15.0	13.9	12.5	17.7	24.0
10-Jun	11.2	9.5	8.2	7.5	7.0	6.5	6.9	7.1	7.7	8.4	10.2	11.5	12.8	14.4	15.7	16.3	17.1	17.4	17.0	16.1	14.8	14.8	13.1	11.0	11.8	17.4
11-Jun	9.5	9.3	8.0	7.2	6.7	6.7	7.5	8.4	9.0	10.0	11.1	12.2	13.1	13.7	14.0	14.2	14.8	14.9	14.9	14.4	12.5	10.2	8.9	7.7	10.8	14.9
12-Jun	6.1	4.2	2.4	2.5	5.4	7.4	9.3	11.2	12.4	13.4	15.5	16.5	18.5	19.6	20.0	21.0	20.7	17.3	13.6	13.5	13.1	12.8	12.8	13.0	12.6	21.0
13-Jun	12.7	13.2	13.1	12.8	13.0	13.3	13.0	13.1	13.5	14.0	14.5	14.9	15.7	16.1	15.1	15.1	15.7	16.4	16.4	15.8	15.4	14.6	13.1	12.5	14.3	16.4
14-Jun	11.4	11.2	11.4	11.5	11.6	11.9	12.7	12.5	12.2	11.9	13.0	14.3	14.2	13.1	12.9	12.6	12.6	12.7	13.1	13.4	13.0	12.4	12.1	11.9	12.5	14.3
15-Jun	11.4	10.5	9.7	9.4	9.5	10.5	11.2	12.5	13.8	14.8	15.4	16.7	13.4	14.6	16.5	17.2	17.8	17.0	16.6	16.4	15.2	14.0	13.4	12.8	13.8	17.8
16-Jun	12.4	11.6	11.1	10.9	10.9	11.4	12.2	13.4	14.9	16.1	17.0	18.1	18.0	18.1	19.0	18.8	15.3	13.5	13.4	13.3	12.9	12.6	12.1	11.7	14.1	19.0
17-Jun	11.8	11.8	11.5	11.1	11.2	11.4	11.8	12.7	14.6	15.2	16.1	17.0	17.6	18.5	19.2	20.2	20.6	20.4	20.3	19.6	16.9	13.7	12.1	9.9	15.2	20.6
18-Jun	9.1	7.7	7.1	6.1	5.7	9.5	13.7	16.0	15.8	16.7	16.4	17.4	17.3	17.9	12.1	13.1	16.0	13.4	12.7	12.5	11.9	9.7	9.4	9.0	12.3	17.9
19-Jun	7.7	7.9	8.6	8.1	7.3	7.3	8.4	10.2	13.3	15.4	17.0	17.9	18.7	19.6	19.7	19.7	20.7	20.9	20.4	19.0	16.7	14.9	13.9	13.5	14.5	20.9
20-Jun	12.1	11.4	11.4	11.1	10.6	11.4	13.1	14.8	15.1	15.9	16.2	16.8	17.7	16.1	14.3	13.9	14.2	15.0	14.3	14.0	13.1	12.4	12.4	12.6	13.7	17.7
21-Jun	12.4	12.2	11.0	10.1	9.5	9.6	9.9	10.4	11.1	11.9	12.5	12.6	11.6	11.2	11.2	11.0	10.6	10.5	9.6	8.7	8.8	9.2	9.7	10.3	10.7	12.6
22-Jun	10.8	11.0	10.6	9.4	8.6	8.1	7.4	6.8	6.9	7.5	9.1	10.7	12.2	13.1	13.6	13.9	13.9	13.6	13.5	13.4	12.5	11.2	6.6	3.9	10.4	13.9
23-Jun	3.5	2.9	2.2	1.6	2.6	4.8	8.7	12.6	14.4	15.0	15.9	16.6	17.3	17.9	18.3	18.3	18.5	18.4	17.8	16.4	14.4	13.5	12.8	11.6	12.3	18.5
24-Jun	10.8	9.8	8.3	7.2	7.2	10.1	13.6	16.1	17.2	18.1	19.0	16.8	16.2	16.8	15.3	17.9	19.1	19.3	19.5	18.6	16.2	13.6	12.9	11.1	14.6	19.5
25-Jun	9.6	8.4	7.3	7.0	7.7	10.4	13.0	15.6	17.7	19.2	20.5	20.4	21.5	22.4	22.7	23.2	23.3	22.6	22.7	21.6	19.8	17.4	16.0	15.4	16.9	23.3
26-Jun	14.6	14.2	14.1	14.2	14.5	16.0	17.1	18.3	19.8	20.8	22.1	23.3	23.2	24.3	24.7	24.0	24.3	24.7	24.2	22.4	20.8	19.3	18.1	16.9	19.8	24.7
27-Jun	16.6	15.5	14.7	14.0	12.9	12.9	13.7	13.8	13.6	14.0	15.1	16.0	16.9	16.4	13.9	15.4	15.7	15.5	14.9	14.1	11.8	10.8	10.6	9.5	14.1	16.9
28-Jun	9.6	10.2	10.2	9.7	9.7	10.3	11.3	12.1	13.4	13.7	14.5	14.1	12.8	12.2	12.8	12.9	12.9	13.1	12.8	12.3	11.9	10.3	7.8	6.7	11.6	14.5
29-Jun	5.8	5.8	5.8	6.4	6.8	8.0	8.8	10.5	13.2	14.9	16.4	18.0	19.1	19.2	21.1	21.2	19.3	16.6	16.0	15.9	15.8	14.5	13.3	11.7	13.5	21.2
30-Jun	10.7	10.5	10.4	11.1	11.8	12.3	13.4	15.0	16.4	17.1	18.0	18.7	18.7	17.4	17.5	17.2	17.8	18.1	17.1	16.6	16.2	15.8	15.1	14.3	15.3	18.7
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Christina Lake - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Christina Lake - June 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	110	15.28	15.28
10 - 20	494	68.61	83.89
> 20	116	16.11	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

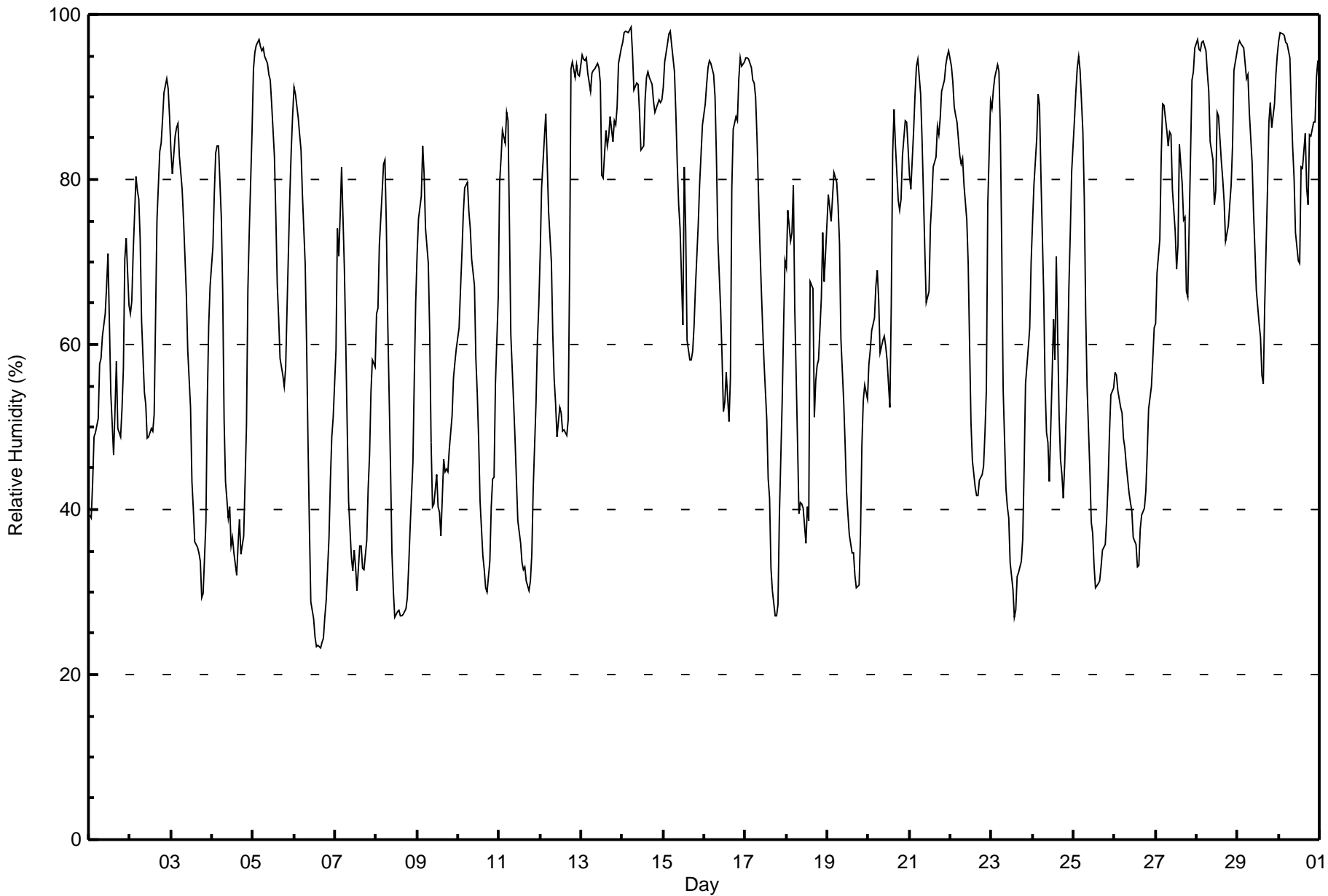
Relative Humidity (RH) - %
Christina Lake - June 2017

Maximum Value: 98 % on Jun 14 06:00														Maximum Daily Average: 91.9 % on Jun 14														Hours in Service: 720	
Minimum Value: 23 % on Jun 6 16:00														Minimum Daily Average: 46.1 % on Jun 26														Hours of Data: 720	
Maximum Diurnal Average: 85.3 % at hour 5														Minimum Diurnal Average: 51.9 % at hour 14														Hours of Missing Data: 0	
Monthly Average: 66.5 %														Percentiles: P ₁ = 27 P ₁₀ = 35 Q ₁ = 49 Median = 69 Q ₃ = 86 P ₉₀ = 93 P ₉₉ = 98														Hours of Calibration: 0	
																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Jun	39	39	43	49	49	51	58	58	61	64	67	71	63	54	47	52	58	50	49	52	57	70	73	65	55.8	73			
2-Jun	64	65	71	80	79	78	73	63	54	53	49	49	50	50	51	63	75	83	84	87	90	92	91	88	70.1	92			
3-Jun	83	81	85	86	87	83	79	75	71	66	59	52	43	40	36	35	35	34	29	30	38	53	62	67	58.8	87			
4-Jun	72	78	83	84	84	75	67	51	43	39	40	36	37	35	32	36	39	35	37	43	50	67	74	86	55.1	86			
5-Jun	93	95	96	97	96	96	96	95	94	93	92	89	83	75	67	63	58	56	55	57	64	78	84	88	81.7	97			
6-Jun	91	90	87	86	84	78	70	60	48	38	29	27	25	23	24	23	24	24	27	29	37	44	49	51	48.6	91			
7-Jun	59	74	71	76	82	69	60	50	41	34	33	35	33	30	36	36	33	33	36	43	47	54	58	57	49.1	82			
8-Jun	64	64	72	79	82	82	74	63	45	35	30	27	28	28	27	27	27	28	29	33	38	46	56	65	47.9	82			
9-Jun	71	75	78	84	81	74	70	61	48	40	41	44	40	40	37	46	45	45	45	47	51	56	58	59	55.7	84			
10-Jun	62	67	71	76	79	80	76	74	70	67	58	54	48	41	34	33	30	30	34	40	44	44	55	66	55.6	80			
11-Jun	80	83	86	84	88	87	75	61	53	49	44	39	36	34	33	33	31	30	31	35	43	53	60	65	54.6	88			
12-Jun	71	79	85	88	82	76	70	61	56	53	49	52	52	49	50	49	51	68	93	94	92	94	93	92	70.8	94			
13-Jun	95	94	94	95	93	91	93	93	93	94	94	92	81	80	86	84	85	88	85	87	87	89	94	96	90.1	96			
14-Jun	97	98	98	98	98	98	95	91	92	92	88	84	84	90	92	93	92	91	89	88	89	90	89	90	91.9	98			
15-Jun	91	94	97	98	98	96	93	88	82	77	74	62	81	74	61	58	58	59	62	67	75	80	83	87	78.9	98			
16-Jun	89	92	94	94	94	93	90	83	73	64	59	52	53	57	51	56	79	86	88	87	92	95	94	94	79.5	95			
17-Jun	95	95	95	94	92	92	90	85	73	67	62	58	51	44	41	33	30	27	27	28	39	53	62	70	62.6	95			
18-Jun	69	76	72	73	79	64	48	40	41	41	40	36	40	39	68	67	51	56	57	58	66	74	68	71	58.1	79			
19-Jun	78	77	75	78	81	80	77	72	61	53	48	42	40	37	35	35	32	30	31	37	48	53	55	53	54.4	81			
20-Jun	58	59	62	63	67	69	65	59	61	61	60	58	52	65	83	89	84	77	76	78	83	87	87	84	70.3	89			
21-Jun	81	79	86	90	94	95	90	85	78	71	65	66	74	78	82	83	86	85	87	91	92	94	95	96	84.3	96			
22-Jun	94	92	89	88	87	83	82	82	79	75	70	60	51	46	43	42	42	44	44	45	49	55	77	90	67.0	94			
23-Jun	89	91	92	94	93	86	72	55	43	40	39	34	30	27	28	32	32	34	37	45	55	60	62	70	55.7	94			
24-Jun	75	79	85	90	89	81	66	55	49	48	43	56	63	58	71	51	46	44	41	46	57	67	73	81	63.1	90			
25-Jun	87	91	93	95	93	86	78	64	55	45	38	37	33	31	31	31	33	35	36	39	43	49	54	55	55.5	95			
26-Jun	57	56	54	52	52	49	47	45	42	41	40	37	36	33	33	38	39	40	42	47	52	55	58	62	46.1	62			
27-Jun	63	69	73	83	89	89	86	84	86	85	79	74	69	72	84	80	75	75	66	66	83	92	93	96	79.6	96			
28-Jun	97	96	96	97	97	96	93	91	85	82	77	79	88	88	82	80	77	73	74	77	79	84	93	95	86.4	97			
29-Jun	96	97	96	96	94	92	93	88	82	76	71	67	63	61	56	55	65	79	87	89	86	89	93	95	82.0	97			
30-Jun	97	98	98	98	97	96	95	89	84	80	74	70	70	81	81	86	79	77	85	85	87	87	92	94	86.6	98			
																												Diurnal Average	
78.5														80.8														97	
82.6														84.8														98	
85.3														82.1														98	
77.3														70.7														96	
64.7														60.8														94	
57.0														54.6														94	
53.2														51.9														92	
52.7														52.9														93	
53.1														53.9														92	
55.6														58.4														93	
63.8														70.0														94	
74.5														77.6														95	
77.6														77.6														95	
																												Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Christina Lake - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Christina Lake - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	111	15.42	15.42
40 - 60	175	24.31	39.72
60 - 80	181	25.14	64.86
80 - 100	253	35.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

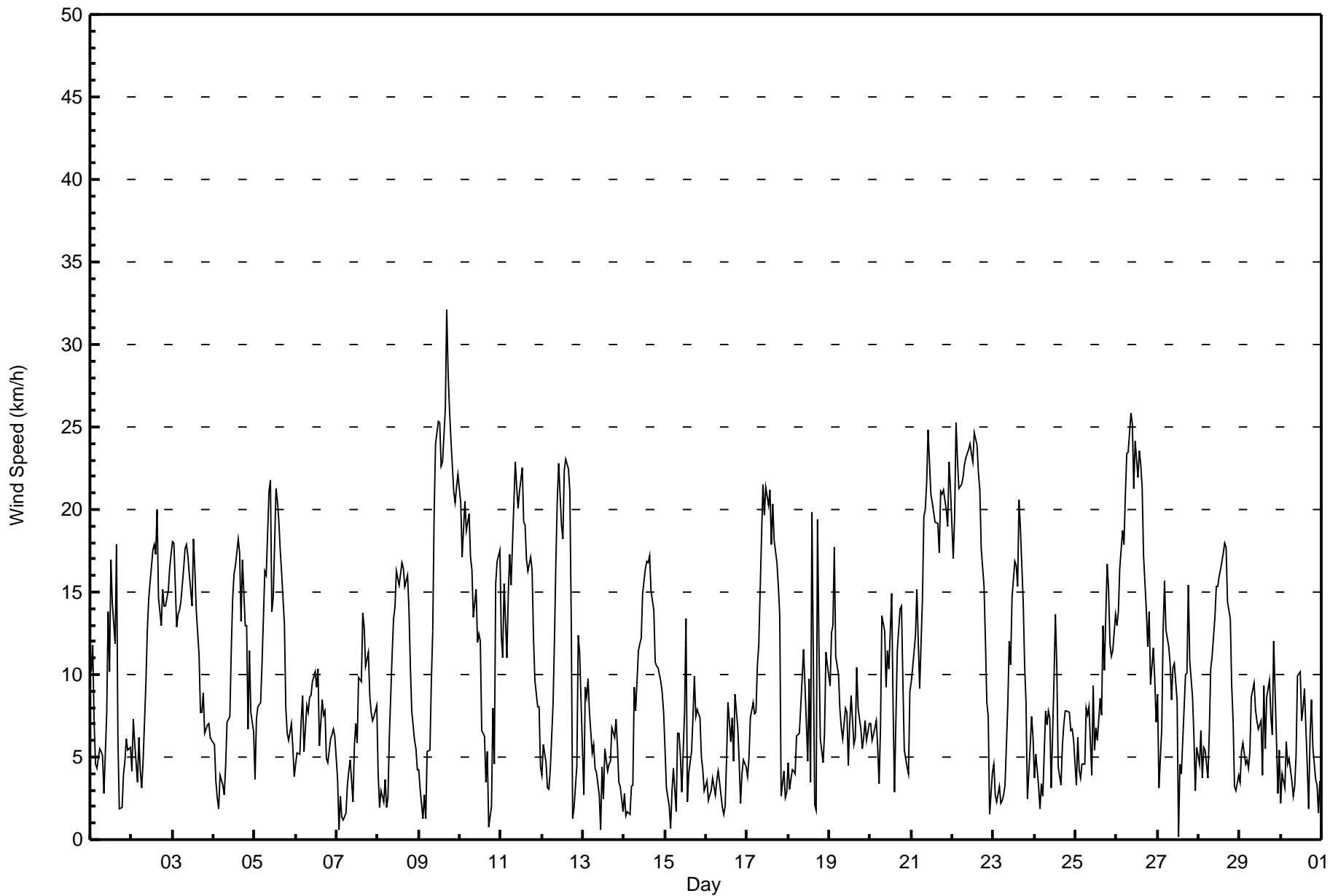
Wind Speed (WS) - km/h
Christina Lake - June 2017

Maximum Speed: 32 km/h on Jun 9 17:00	Maximum Daily Speed Average: 17.6 km/h on Jun 22	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 27 13:00	Minimum Daily Speed Average: 1.5 km/h on Jun 24	Hours of Data: 720
Maximum Diurnal Speed Average: 4.0 km/h at hour 10	Minimum Diurnal Speed Average: 0.8 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 1.3 km/h 285.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 15 P ₉₀ = 20 P ₉₉ = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SSE10	SSE12	SSE7	SSE5	SSE4	WSW5	SSW5	S5	SSW3	WSW8	W14	NW10	NW17	NNW14	NNW12	NW18	WNW6	E2	SW2	S4	S5	SSW6	SSW5	SSW6	WSW2.9	NW18
2-Jun	SSW4	WSW7	SW6	SSE3	S6	S4	SE3	SW5	WSW9	NNW13	W15	NNW16	W18	W18	W17	W20	WSW15	WSW13	W15	W14	WSW14	WSW15	W16	W17	W10.8	W20
3-Jun	W18	W18	WSW13	WSW14	WSW14	WSW14	NNW16	W18	NNW18	NNW17	NNW16	NNW14	NW18	NNW16	NNW14	NNW11	WNW8	SW8	SSW9	SSW6	S7	S7	S6	S6	W10.3	NW18
4-Jun	S6	E4	ESE3	NNW2	SE4	SE3	SSE3	E4	ESE7	E7	E11	E15	E16	E17	ESE18	ESE17	SE13	SE17	SSE13	SE13	NNW7	N11	NNE8	NNE7	ESE6.9	ESE18
5-Jun	ENE4	NNW7	N8	NNW8	NNW11	NNW13	NW16	NNW16	NNW21	NNW22	NW14	NNW15	NNW21	NNW21	NNW19	N18	N16	NNE13	NE8	ENE6	ESE6	S7	S6	SE4	NNW9.3	NW22
6-Jun	SE5	SSE5	SSE5	S7	SSW9	S5	SSW8	SSW8	SSW9	SW9	SW10	SW10	SW9	SSW10	SSW6	SSW9	SSW8	SW8	SSW5	SSW5	S6	SSW6	SSW7	S6	SSW6.8	SSW10
7-Jun	S4	SE1	SSW3	SE1	E1	SE2	SSE3	S4	S5	S2	N6	NNE7	NNE6	NNE10	NE10	NE14	NE13	ENE11	ENE11	ENE9	E8	E7	ESE7	SE8	ENE4.1	NE14
8-Jun	SE4	SE2	SE3	E2	SSE4	ENE2	E3	ESE6	SE11	SE13	SE14	SE16	SE15	SE16	ESE17	SE16	ESE15	ESE16	ESE14	ESE11	ESE8	ESE6	ESE5	ESE4	ESE9.1	ESE17
9-Jun	ENE4	E3	ESE1	ENE3	E1	NNE5	NNE5	NE10	ENE13	NE20	NE24	NE25	NE25	ENE23	ENE23	NE26	NE32	NE28	NE26	NE24	NE21	NNE20	NNE21	NNE22	NE16.5	NE32
10-Jun	NE20	NE17	NE19	NE20	NNE19	NE20	NE17	NE16	NE13	N15	NNE12	NNE12	N12	ENE7	NNE6	NNE4	SSW5	ESE1	SSE2	NE8	N5	WNW15	WNW17	NW18	NNE9.7	NE20
11-Jun	NW12	NNW11	NNW16	NNW11	NW15	WNW17	NW15	NW18	NW23	NW21	WNW20	WNW21	WNW23	WNW19	NW19	WNW17	WNW16	WNW17	WNW16	W12	WSW10	SW8	WSW8	WSW4	WNW14.2	NW23
12-Jun	SSW4	SSW6	SSE5	SSE3	SE3	SE4	SSE8	SSE12	SSE17	SSE21	SSE23	S19	S18	S22	S23	SSE22	S21	W13	NE1	E2	ENE4	SE12	SE11	SE8	SSE10.4	S23
13-Jun	S3	S9	SE9	ESE10	SSE8	SE5	SSW6	SSW4	W4	W3	SSW1	S4	E2	SE6	SSE4	SE5	ENE5	ENE7	ESE6	SE7	SE6	E3	E3	ESE2	SE3.6	ESE10
14-Jun	SSE3	SE1	NNE2	N2	SSW3	WNW3	N9	N8	N11	N12	NNE12	N15	N16	NNE17	NNE17	NNE15	NNE14	N11	N10	N10	N10	NNW9	N8	N8	N9.0	NNE17
15-Jun	N5	E3	SSE2	SSW1	WSW3	NW4	NNE2	WNW6	WNW6	WSW5	SE3	NE8	NE13	SSE2	NNE4	NNE5	NNE7	NNE10	NNE7	NE8	E7	SE5	SE4	SE3	NE2.5	NE13
16-Jun	E4	ESE2	SE3	SE3	SE4	ESE3	SE4	SE4	SSW3	SW2	SSW2	ENE2	NE5	ENE8	ENE6	E7	SSW5	WN9	NNW7	NNE5	SSE2	ESE4	SE5	SSW4	E1.7	NW9
17-Jun	SSW4	SSW5	SW7	SW8	SW8	WSW8	WSW11	WSW12	W18	WNW21	WNW20	NW21	NW20	NW21	NNW18	NW20	NW18	WNW17	WNW15	WNW14	WSW3	SE4	S3	SE3	WNW9.8	WNW21
18-Jun	S5	SE3	SSE4	SSE4	S4	S6	SW6	WSW8	SW10	SW12	SSW9	WNW5	NE10	E3	WSW20	WSW2	NNW2	WNW19	WNW12	SW6	SSE5	SSW6	WSW11	WSW11	WSW4.7	WSW20
19-Jun	SW9	W13	WNW13	NW18	WNW11	WSW10	WSW8	WNW7	NNW6	NW8	N8	WSW5	SW7	SW9	WNW6	SW6	WSW10	W8	WSW7	SW5	S6	SSW7	SSW6	SSW7	W6.1	NW18
20-Jun	S7	S6	S6	S7	SSE6	ESE3	SE7	S14	S13	S9	SSE11	SSE10	SSE15	S8	S3	SE7	SE11	SE14	SE14	SE10	SE5	SE4	SSW4	SW9	SSE7.8	SSE15
21-Jun	WSW10	WSW10	WSW12	WSW15	WSW12	WSW9	W15	W20	W20	NNW22	NNW25	NNW21	W20	W20	W19	W19	W17	WNW21	W21	W21	W20	WNW19	NW23	NW21	W17.3	WNW25
22-Jun	NW17	NNW20	NNW25	NW23	NW21	NNW21	NW22	NW23	NNW23	NNW24	NW24	NNW23	NNW23	NW25	NNW24	NNW22	N21	N18	N15	N12	NNE8	N7	SSW1	SSW4	NNW17.6	NNW25
23-Jun	S5	S3	S2	S3	S2	SSE2	SW3	NW3	NNE8	N12	NNW11	NNW15	NW17	NNW17	NNW15	N21	N19	N14	N11	NE8	SSE2	SW6	SW7	S6	NNW5.3	N21
24-Jun	SW4	S5	SSE3	SE2	SSE3	SSE3	WSW8	W7	NW8	WNW7	N3	NNE10	ESE14	E10	SSE4	NE3	NNE6	NNE7	NNE8	E8	SE8	S7	SSW7	S6	ESE1.5	ESE14
25-Jun	SE3	SSE6	S4	S4	SSE5	SSE5	S8	S8	S8	S4	SSE9	S5	S7	S6	SE9	SSE8	SSE13	S10	SSE17	SSE15	SSE12	SSE11	SSE11	SSE14	SSE8.2	SSE17
26-Jun	SSE13	SSE14	SSE16	SSE19	SSE18	SSE21	SSE23	SSE23	SSE26	SSE25	SSE21	SSE24	SE22	SE24	SSE23	SSE21	SSE17	SSE14	S12	SE14	SE9	ESE12	E10	ENE7	SSE17.0	SSE26
27-Jun	N9	ESE3	SSW7	WNW13	W16	W13	W12	W11	W8	W10	WSW11	WSW8	NE0	ENE5	NW4	W8	NW10	NNW10	NW15	WSW11	SW9	SSW6	SSE3	SSE6	W6.1	W16
28-Jun	SSE5	S7	SE4	E6	ESE5	SSE4	NE7	NNE10	NE11	NNE14	NNE15	NNE15	NNE16	NE16	NE17	NE18	NE18	NE14	NE13	NE9	NE7	SE3	S3	S4	NE7.8	NE18
29-Jun	S4	S5	S6	S5	S5	SSW4	SSE5	S9	SSW10	SSW8	SSW7	SW7	SW7	SSW4	SW9	SSW5	SSW9	WSW10	S7	SSW6	WSW12	SSW6	S3	S5	SSW6.0	WSW12
30-Jun	SSE2	SSE4	SE3	SSE6	S5	SSE5	SE4	SE3	NNW3	SW5	SSW10	SSW10	SW7	WNW8	WNW9	N4	NE2	WNW6	WNW8	NW6	NW4	WSW3	SSE2	S4	SW2.3	SSW10

SSW1.4	SSW1.9	SSW1.3	WSW1.2	SW2.3	WSW1.9	WSW2.4	W3.0	W3.3	NNW4.0	NNW3.0	NNW3.5	NNW3.7	NNW2.1	NNW2.6	N2.8	N2.2	NNW2.8	N1.5	ESE0.8	SSE1.1	S1.6	SSW1.7	SSW2.0	Diurnal Average
NE20	NNW20	NNW25	NW23	NW21	NNW21	SSE23	SSE23	SSE26	SSE25	WNW25	NE25	NE25	NW25	NNW24	NE26	NE32	NE28	NE26	NE24	NE21	NNE20	WNW23	NNE22	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	212	29.44	29.44
6 - 11	249	34.58	64.03
12 - 19	177	24.58	88.61
20 - 28	81	11.25	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	8	5	8	15	12	38	35	35	25	7	8	2	2	4	3	212
6 - 11	13	17	12	9	10	9	15	14	33	33	25	22	6	13	6	12	249
12 - 19	13	14	14	1	3	8	12	18	5	0	1	15	21	25	17	10	177
20 - 28	2	3	12	2	0	0	2	12	3	0	0	1	8	10	15	11	81
29 - 38	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	42	44	20	28	29	67	79	76	58	33	46	37	50	42	36	720

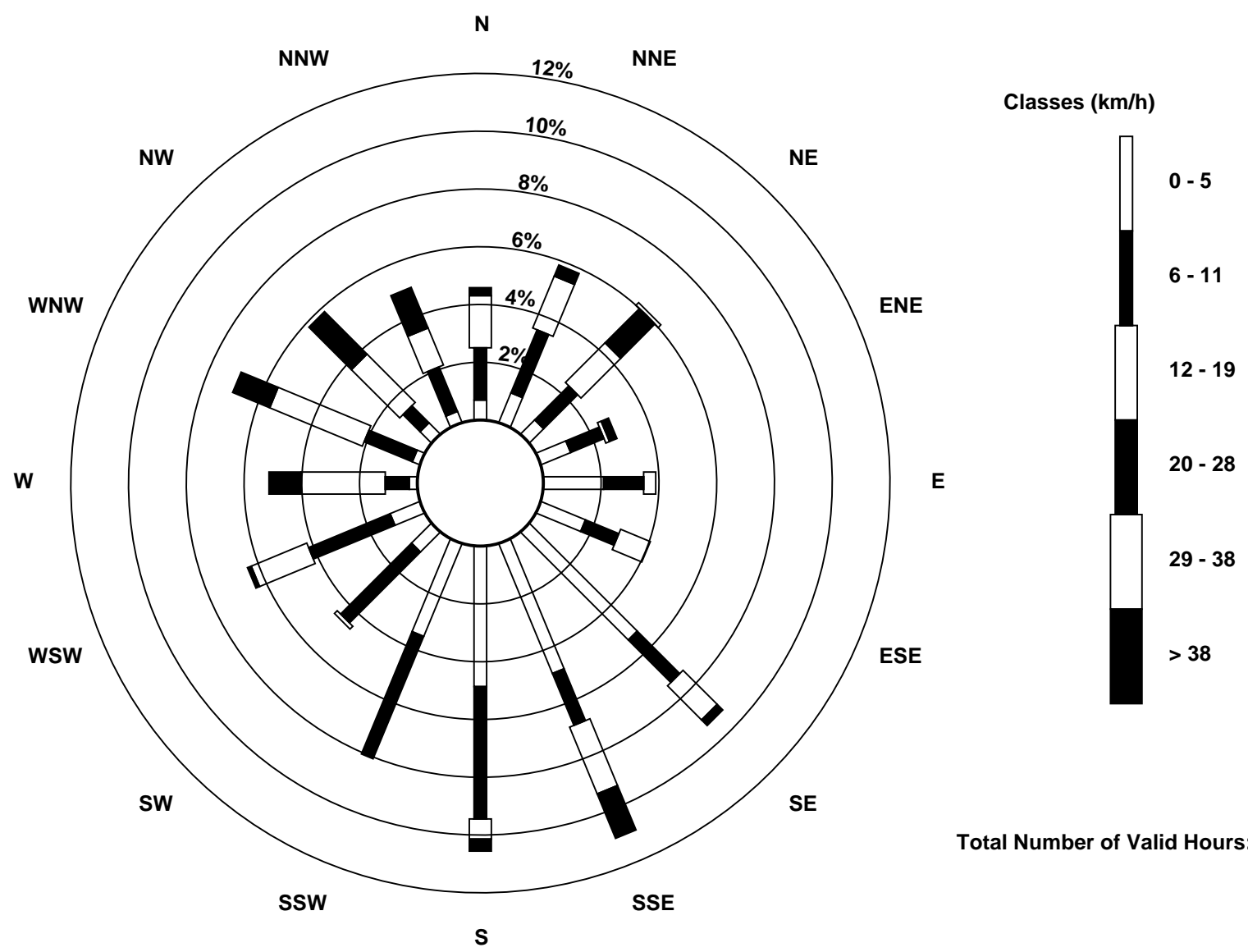
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Christina Lake (AMS 500)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Christina Lake - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 18 15:00 Minimum Value: 0 km/h on Jun 18 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	2	2	1	3	1	1	2	2	3	4	3	4	4	6	5	4	1	2	1	1	1	1	1	6
2-Jun	2	2	2	2	2	2	1	2	3	5	4	5	5	5	5	6	5	4	5	4	4	4	5	5	6
3-Jun	5	5	3	4	4	3	4	5	5	5	5	5	5	5	4	4	3	3	1	1	1	1	1	5	
4-Jun	1	1	1	4	2	1	1	1	3	4	3	4	4	4	5	4	5	3	4	3	3	2	2	5	
5-Jun	2	2	3	4	3	3	3	4	4	4	4	5	5	4	4	4	4	3	2	1	1	2	1	5	
6-Jun	1	1	2	2	3	2	3	2	2	3	4	4	4	4	4	4	3	3	2	1	1	1	1	4	
7-Jun	2	1	1	1	1	1	1	2	2	2	3	2	2	3	3	3	3	4	3	2	1	1	1	4	
8-Jun	2	2	1	2	1	2	1	2	3	3	5	5	5	5	5	5	4	5	3	2	1	1	1	5	
9-Jun	1	1	1	1	1	2	2	3	4	5	5	5	5	6	5	7	6	7	7	6	5	4	5	7	
10-Jun	4	3	4	4	4	5	3	4	4	3	4	5	4	4	4	3	3	2	2	3	3	4	5	5	
11-Jun	3	3	4	3	3	3	4	4	5	5	6	6	6	6	5	5	5	4	5	4	2	2	2	6	
12-Jun	2	1	1	1	1	1	2	3	4	4	6	5	6	6	6	6	6	6	3	6	3	5	3	6	
13-Jun	4	4	3	2	2	1	3	2	2	3	2	2	1	1	2	2	2	2	1	1	3	1	1	4	
14-Jun	2	1	2	2	1	2	2	3	3	3	3	4	4	4	4	4	3	3	3	2	2	2	2	4	
15-Jun	1	1	2	1	2	2	1	3	2	2	2	7	5	1	2	2	3	2	1	2	2	1	1	7	
16-Jun	1	2	1	1	1	2	1	1	1	2	1	2	2	2	3	4	3	5	3	2	1	2	1	5	
17-Jun	1	1	2	2	2	2	3	3	5	5	5	5	5	5	5	6	5	5	5	4	2	1	3	6	
18-Jun	2	1	1	0	1	1	1	2	3	4	4	5	4	3	9	2	4	8	4	2	1	3	4	9	
19-Jun	2	4	4	4	3	3	3	3	2	3	4	3	3	3	4	3	3	3	3	1	1	1	1	4	
20-Jun	1	1	1	2	1	1	3	4	3	2	3	3	4	4	1	3	2	4	5	3	1	1	3	5	
21-Jun	2	3	4	4	4	2	4	6	6	7	7	7	6	5	5	6	6	5	6	6	5	4	5	7	
22-Jun	4	5	6	4	4	7	5	5	7	5	5	5	5	6	5	5	5	4	4	3	1	2	1	7	
23-Jun	1	1	1	1	1	1	1	1	3	4	5	5	5	5	6	6	5	5	3	2	2	3	2	6	
24-Jun	2	1	1	1	1	1	3	3	3	3	3	7	4	7	2	2	2	3	2	4	2	1	2	7	
25-Jun	2	2	2	1	1	1	2	2	3	3	4	4	4	4	4	3	4	3	4	4	2	2	2	4	
26-Jun	2	2	3	4	4	5	5	5	6	6	5	6	6	5	6	6	6	4	4	3	2	3	2	6	
27-Jun	2	2	2	8	4	4	4	4	3	4	4	3	3	3	4	3	4	6	4	3	3	2	2	8	
28-Jun	1	2	1	1	1	1	2	2	3	3	3	3	3	4	4	5	4	3	3	2	1	1	1	5	
29-Jun	2	2	1	2	1	1	2	2	3	2	2	3	3	3	4	3	5	4	2	1	4	2	2	5	
30-Jun	2	2	1	2	2	1	1	1	2	3	3	3	2	2	3	2	1	3	2	2	2	1	1	3	
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Christina Lake - June 2017

Direction of Maximum Speed: 41 deg on Jun 9 17:00 Direction of Maximum Daily Speed Average: 333.7 deg on Jun 22	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 43 deg on Jun 27 13:00 Direction of Minimum Daily Speed Average: 1.5 deg on Jun 24	Percent Operational Time: 100.0
Monthly Average Direction: 245.4 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	150	150	161	147	164	256	192	186	207	248	279	314	307	341	335	305	300	82	221	184	183	197	193	204	253.8
2-Jun	213	244	234	163	189	190	145	227	256	295	281	293	281	265	262	262	257	250	259	259	257	256	260	262	259.7
3-Jun	267	272	253	255	254	256	293	278	296	300	297	302	308	293	294	303	290	216	207	198	184	174	177	181	272.5
4-Jun	170	91	106	331	131	146	150	94	107	88	101	95	90	89	108	109	129	134	151	146	330	351	22	28	104.5
5-Jun	61	346	2	331	344	327	309	308	304	304	324	340	332	335	340	8	6	23	39	62	117	176	170	145	338.1
6-Jun	145	167	166	186	196	184	206	208	213	216	233	219	227	194	212	203	195	221	212	198	191	193	192	187	201.9
7-Jun	181	128	210	146	82	131	164	184	190	171	3	20	21	28	55	42	37	74	77	70	83	88	111	140	71.9
8-Jun	128	134	125	83	167	77	85	113	132	140	128	126	132	126	109	124	120	105	113	118	119	102	107	111	120.7
9-Jun	66	81	109	57	88	12	21	42	59	56	40	38	51	57	72	39	41	49	48	46	38	29	28	31	44.7
10-Jun	41	37	38	38	32	39	43	34	46	3	24	12	350	60	15	28	197	117	147	40	8	295	302	305	20.0
11-Jun	312	329	348	332	305	302	312	313	308	310	294	289	294	295	309	296	293	298	297	261	241	228	239	244	299.1
12-Jun	195	195	168	150	141	143	164	163	160	157	165	172	176	178	173	166	182	276	34	93	69	131	141	138	166.6
13-Jun	177	189	132	122	168	141	194	210	266	262	200	183	92	128	148	140	67	75	112	141	129	89	82	117	142.0
14-Jun	158	146	12	349	192	287	353	352	356	3	14	354	359	17	13	18	17	13	4	358	357	351	348	349	3.6
15-Jun	3	98	151	198	247	314	16	296	289	245	132	50	52	155	19	22	26	32	32	49	87	145	134	129	41.4
16-Jun	94	110	144	141	141	102	146	124	210	214	202	58	35	70	59	86	211	314	340	31	158	111	136	195	101.0
17-Jun	192	194	217	224	223	244	247	256	277	295	290	308	314	313	331	320	308	291	303	303	242	140	179	140	289.3
18-Jun	183	137	154	153	176	176	214	237	232	233	197	297	36	97	255	239	342	294	295	222	158	200	249	245	236.7
19-Jun	235	259	287	307	286	246	256	291	347	326	9	241	232	225	294	226	251	259	256	222	188	193	194	194	260.4
20-Jun	185	179	180	178	156	117	145	176	178	169	160	155	168	178	172	131	126	137	145	133	132	136	213	229	160.7
21-Jun	240	248	251	250	247	240	259	269	274	283	290	285	277	270	266	270	277	283	274	267	271	290	304	304	274.1
22-Jun	319	330	334	326	325	331	326	325	329	328	321	329	328	320	331	344	353	6	10	1	14	10	201	202	333.7
23-Jun	183	188	177	174	186	163	225	319	18	7	346	329	326	329	345	359	354	355	11	42	163	220	221	188	343.2
24-Jun	218	172	148	128	153	159	242	265	317	302	357	21	104	93	157	54	18	27	33	97	124	171	196	176	110.1
25-Jun	139	167	177	172	168	149	170	177	176	178	152	174	176	181	143	165	154	170	150	159	163	156	158	158	162.0
26-Jun	153	155	156	162	159	160	163	161	161	156	159	147	139	143	157	152	152	163	178	145	127	105	94	62	151.7
27-Jun	359	109	197	298	267	262	271	279	262	259	250	257	43	62	318	274	304	330	314	250	236	212	164	148	273.0
28-Jun	164	190	127	97	103	156	46	29	34	22	18	15	14	46	43	38	41	42	45	48	55	131	184	174	43.8
29-Jun	175	171	190	191	170	194	156	183	197	196	199	215	231	192	219	193	208	238	179	202	253	211	187	175	201.5
30-Jun	149	166	145	158	179	168	139	141	336	227	211	208	223	290	294	359	35	299	298	323	312	253	155	182	235.5

198.5 203.5 206.8 245.4 226.0 245.7 252.4 262.3 276.6 292.7 295.3 322.2 332.8 342.7 332.1 357.9 356.3 341.3 350.8 111.0 162.6 187.3 209.3 206.6

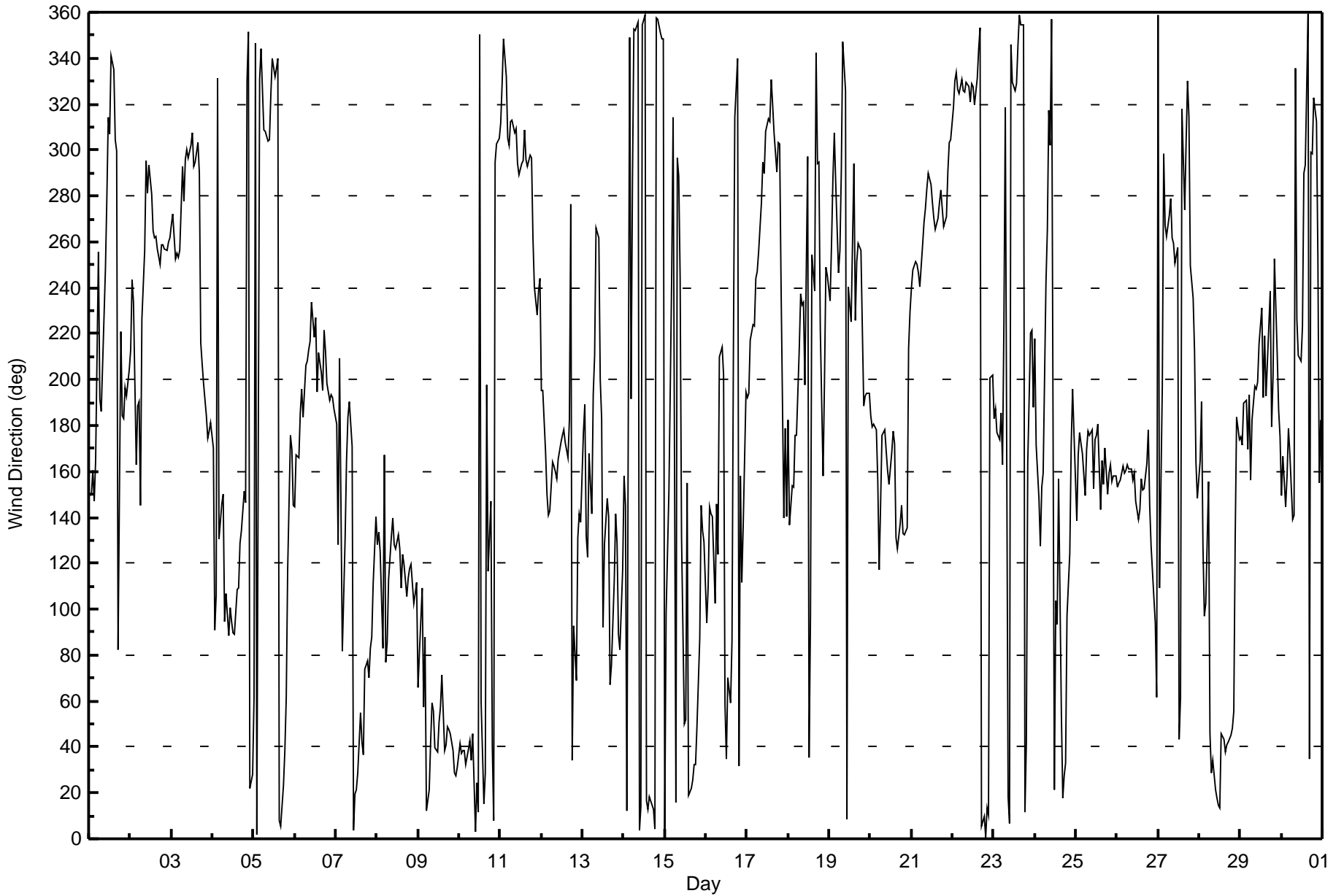
Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Christina Lake - June 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Christina Lake - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Jun 27 13:00 Minimum Value: 7 deg on Jun 25 00:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 17 Median = 22 Q ₃ = 35 P ₉₀ = 54 P ₉₉ = 92																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	18	18	15	18	47	27	19	28	57	32	17	27	17	27	44	15	44	76	90	18	9	8	15	14	90
2-Jun	30	17	41	43	34	51	36	35	23	32	22	24	23	19	19	18	19	19	18	18	18	18	17	18	51
3-Jun	18	18	19	18	17	19	23	20	19	20	24	28	17	25	27	32	51	32	18	12	8	12	17	11	51
4-Jun	19	35	21	83	42	39	37	27	25	43	21	21	15	18	19	29	17	19	15	51	18	22	35	83	
5-Jun	45	19	20	21	22	23	13	14	10	11	26	27	16	19	21	20	20	21	30	20	12	11	25	25	45
6-Jun	31	22	28	21	18	20	22	24	25	28	34	33	46	36	68	55	41	25	22	11	9	9	10	22	68
7-Jun	36	67	37	65	57	66	16	33	37	84	42	25	29	28	14	14	19	21	17	17	9	11	13	14	84
8-Jun	37	27	46	36	14	58	46	21	18	21	27	23	23	24	22	25	23	21	15	13	10	10	9	9	58
9-Jun	22	34	39	33	64	16	22	19	18	13	14	12	15	15	13	18	13	16	13	12	12	12	13	12	64
10-Jun	12	11	11	11	14	13	16	20	25	25	28	32	32	60	61	88	59	102	80	24	49	18	16	11	102
11-Jun	15	19	21	20	15	10	17	16	16	18	23	22	18	20	22	24	23	23	20	21	19	15	18	75	75
12-Jun	42	13	17	28	21	20	16	13	13	14	17	18	22	19	17	21	18	53	92	81	82	19	31	22	92
13-Jun	68	38	22	20	24	17	27	42	43	61	95	31	74	25	43	34	26	30	25	11	23	20	17	82	95
14-Jun	49	57	73	92	52	43	18	17	18	19	18	18	16	17	14	16	16	18	17	16	16	15	14	92	92
15-Jun	16	27	42	83	42	47	82	37	35	46	56	54	16	59	38	42	38	17	8	12	21	23	31	33	83
16-Jun	33	38	27	33	33	50	26	38	39	77	74	93	36	27	40	53	61	35	34	46	62	16	22	14	93
17-Jun	28	27	17	19	17	22	18	25	19	20	21	19	16	16	25	23	28	23	25	17	78	31	70	47	78
18-Jun	21	37	21	20	12	9	25	25	26	24	28	77	34	67	20	97	105	23	32	31	38	34	19	18	105
19-Jun	15	22	23	14	28	21	27	41	48	43	47	76	46	35	73	48	27	36	42	15	10	11	9	9	76
20-Jun	11	9	11	11	13	15	28	14	14	20	14	17	17	18	43	24	17	17	16	15	20	16	59	20	59
21-Jun	18	21	19	19	19	20	19	17	18	19	16	17	18	17	17	17	24	16	17	17	17	21	13	10	24
22-Jun	14	17	16	12	12	17	12	12	16	12	17	17	21	17	18	23	21	18	17	21	12	17	87	17	87
23-Jun	19	45	25	14	29	68	63	43	27	30	38	32	22	27	35	23	22	29	18	18	54	59	17	22	68
24-Jun	52	20	34	66	37	42	27	36	38	47	85	53	35	41	54	76	42	32	26	41	10	13	14	7	85
25-Jun	33	16	20	18	24	15	17	20	27	76	41	63	57	72	47	47	28	24	16	15	11	8	9	10	76
26-Jun	10	11	10	11	11	12	12	14	14	16	17	16	17	18	17	19	24	25	20	12	12	13	11	34	34
27-Jun	15	58	17	54	18	22	26	32	36	26	23	37	105	83	92	37	29	47	15	19	26	19	51	12	105
28-Jun	22	16	41	16	17	38	23	15	21	17	20	18	18	13	16	17	14	14	14	13	17	30	35	19	41
29-Jun	31	23	21	40	24	29	27	16	20	23	30	38	39	64	44	63	58	29	25	15	20	41	50	25	64
30-Jun	64	50	28	18	19	19	22	48	70	76	26	23	33	28	21	44	64	62	17	26	33	23	54	22	76
																			68 67 73 92 64 68 82 48 70 84 95 93 105 83 92 97 105 102 92 81 82 59 87 82						
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

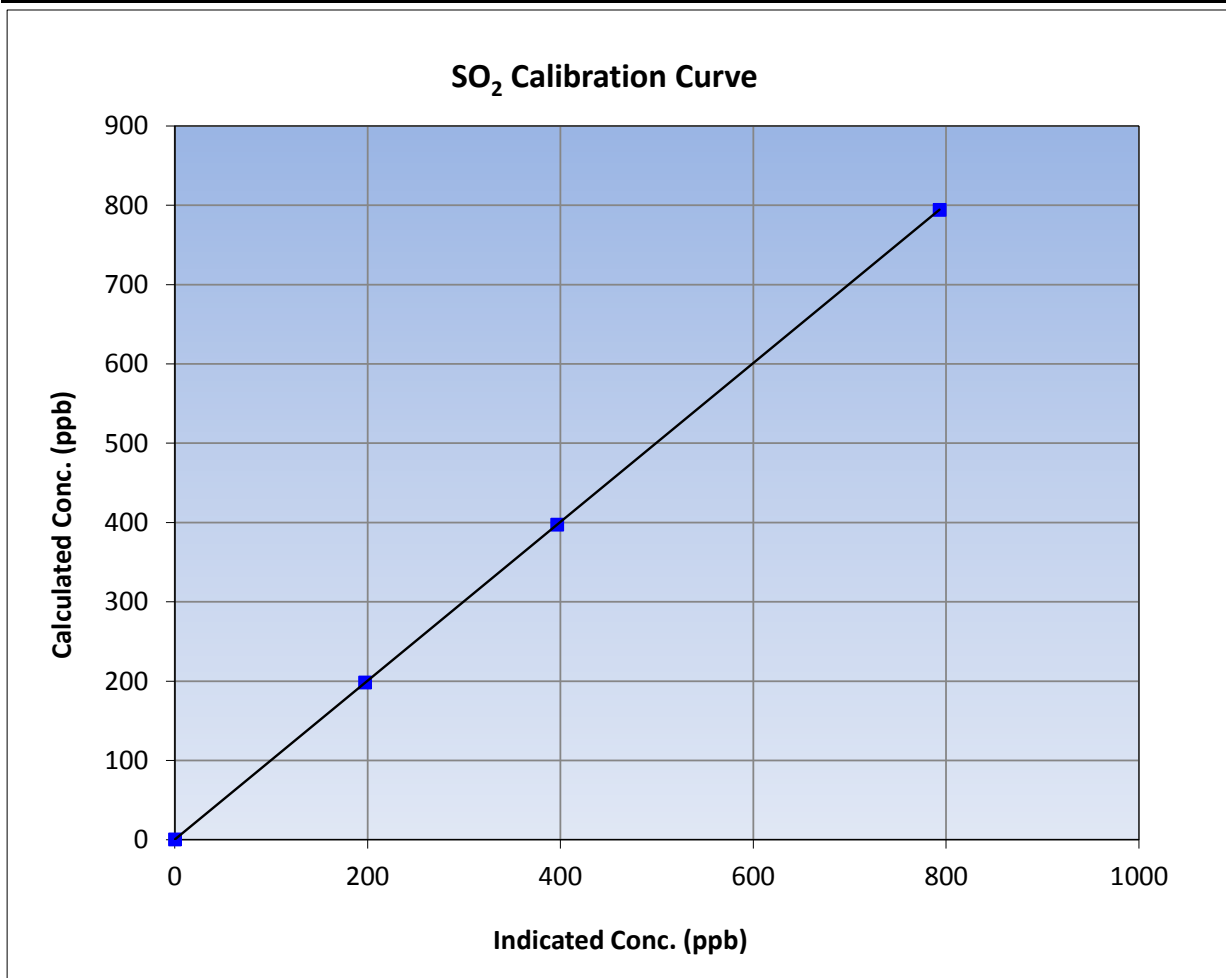
Version-03-2017

Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	8:11	End Time (MST)	12:05
Analyzer make	Thermo 43i	Analyzer serial #	1118148497

Calibration Data

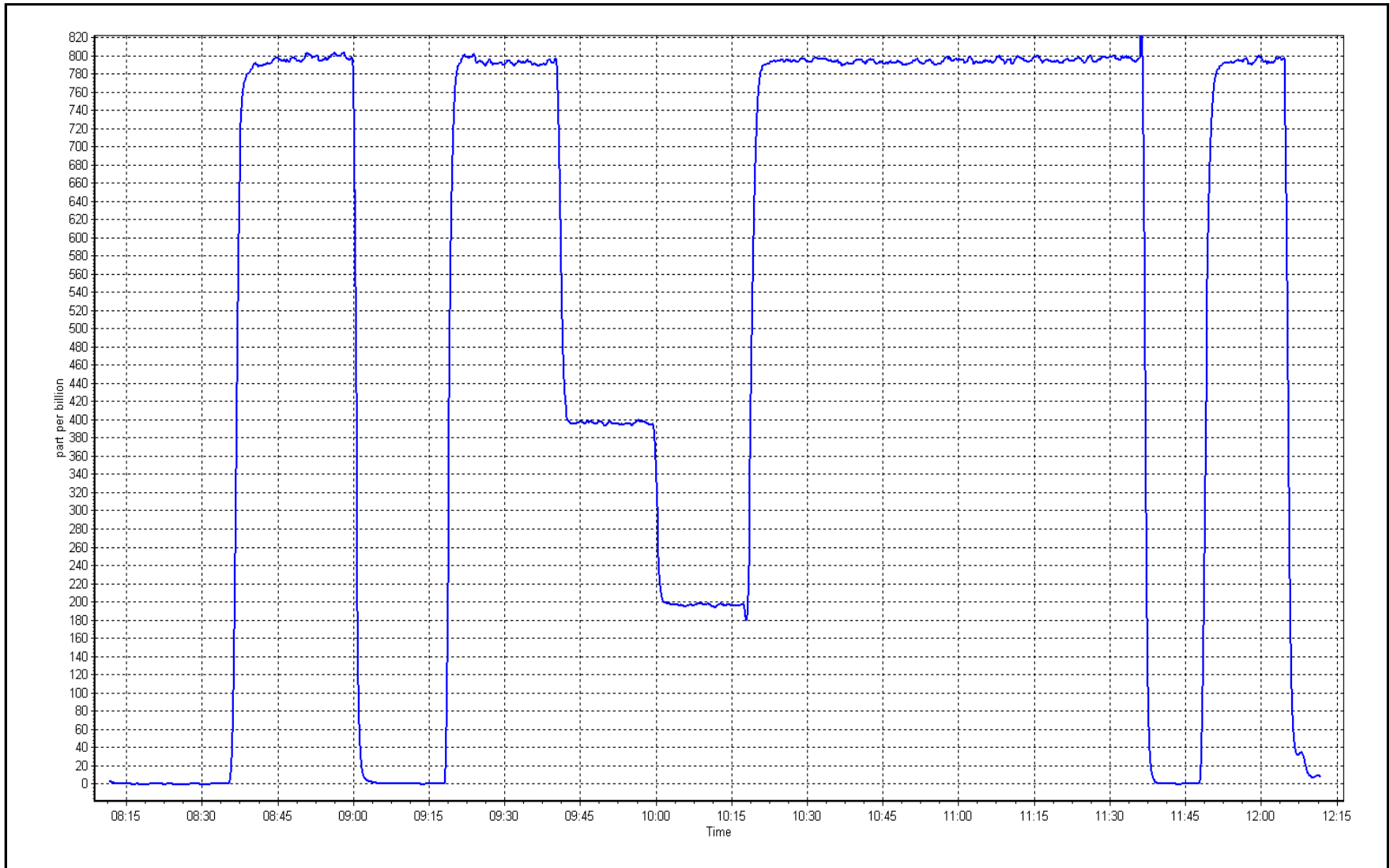
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	1.000000	≥0.995
794.1	792.8	1.0016			
397.0	396.4	1.0016	Slope	1.001319	0.90 - 1.10
198.0	197.2	1.0041			
			Intercept	0.249766	+/-30



SO2 Calibration Plot

Date: June 21, 2017

Location: Christina Lake





Wood Buffalo Environmental Association

H₂S Calibration Summary

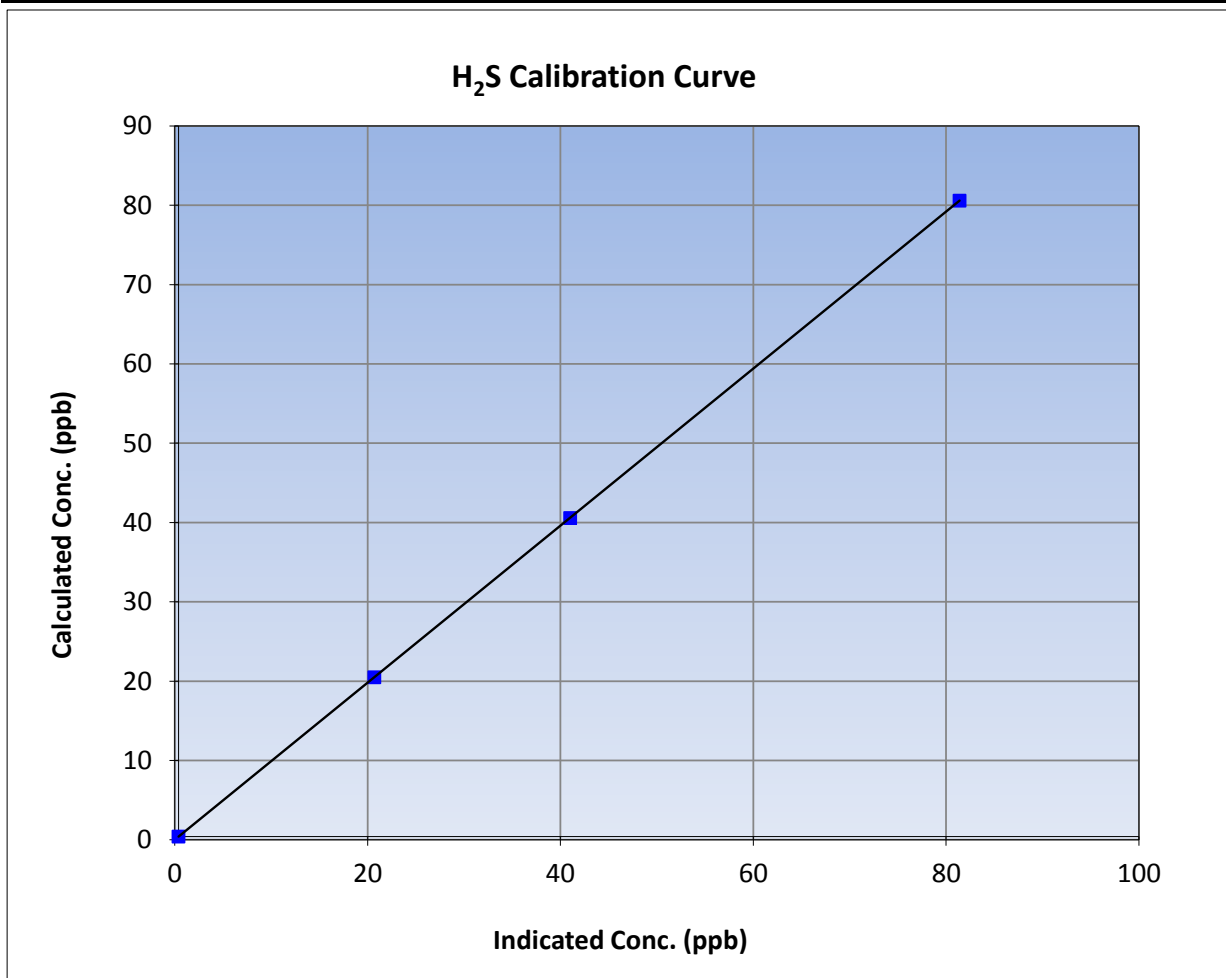
Version-03-2017

Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:05	End Time (MST)	14:05
Analyzer make	Thermo 43i- TLE	Analyzer serial #	1008841400

Calibration Data

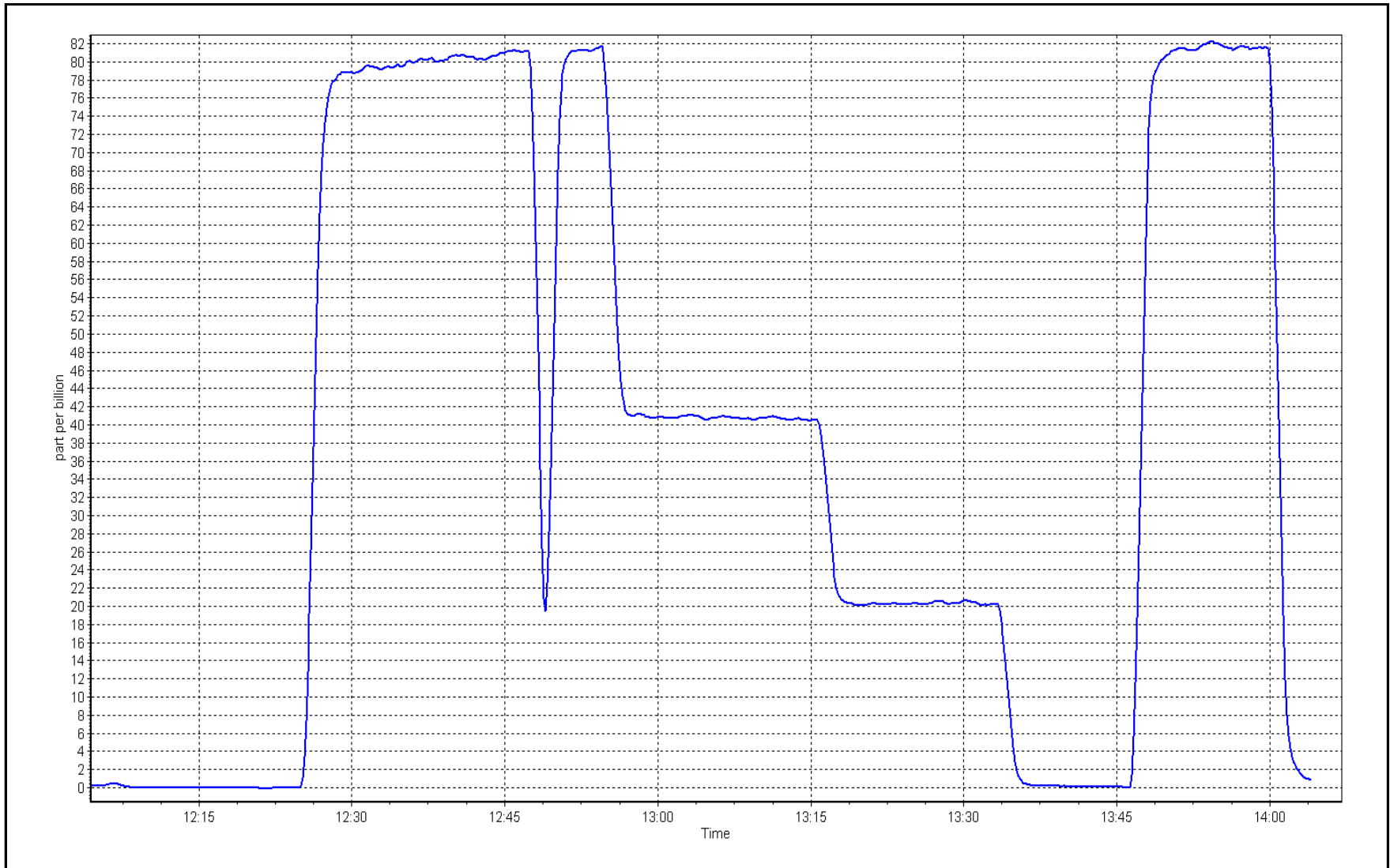
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	1.000000	
80.2	81.0	0.9901			≥0.995
40.2	40.6	0.9900	Slope	0.990062	
20.1	20.3	0.9899			0.90 - 1.10
			Intercept	-0.001844	+/-3



H₂S Calibration Plot

Date: June 21, 2017

Location: Christina Lake





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Christina Lake	Station number:	AMS 500
Calibration Date:	June 21, 2017	Last Cal Date:	May 17, 2017
Start time (MST):	8:11	End time (MST):	12:05
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL107928	Cal Gas Expiry Date	September 8, 2018
NOX Cal Gas Conc.	<u>50.8</u> ppb	NO Cal Gas Conc.	<u>50.5</u> ppb
Calibrator Model	Teledyne API T700	Serial Number	1221
ZAG make/model	Teledyne API 701	Serial Number	4604

Analyzer Information

Analyzer make: Teledyne API T200			Analyzer serial #: 723		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.200	1.238	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.206	1.247	PMT Temperature	6.9	6.9
NO ₂ coefficient	1.000	1.000	Reaction cell Press	6.7	6.6
NO bkgrnd	0.4	0.4	Sample Flow	0.487	0.488
NOX bkgrnd	1.4	1.4	PMT Voltage	827.0	826.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.998075	0.996195
NO _x Cal Offset	0.505424	0.982161
NO Cal Slope	0.997478	0.996846
NO Cal Offset	0.572410	1.584333
NO ₂ Cal Slope	1.006952	0.993211
NO ₂ Cal Offset	0.951799	0.257455



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.8	0.2	----	----
as found span	4920	79.4	806.8	802.0	4.8	779.9	777.7	2.2	1.0345	1.0313
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.6	-0.8	0.2	----	----
high point	4920	79.4	806.8	802.0	4.8	808.9	803.1	5.8	0.9974	0.9987
second point	4960	39.7	403.4	401.0	2.4	404.3	401.1	3.1	0.9977	0.9997
third point	4980	19.8	201.2	200.0	1.2	200.2	197.7	2.6	1.0049	1.0116
as left zero	6000	0.0	0.0	0.0	0.0	-0.3	0.5	-0.8	----	----
as left span	4927	79.4	805.7	410.6	395.1	803.8	408.4	395.5	1.0023	1.0054
Average Correction Factor									1.0000	1.0033

Corrected As found	NO _x = 780.5 ppb	NO = 778.5 ppb		*Percent Change	NO _x = 3.5%
Previous Response	NO _x = 807.9 ppb	NO = 803.5 ppb		*Percent Change	NO = 3.2%
<i>* = > +/-5% change initiates investigation</i>					

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		4.8	806.3	798.4	7.8	1.0006	1.0046	----	----
1st NO2 (400 ppb O3)	410.6	392.6	805.3	410.6	394.8	1.0019	----	0.9943	100.6%
2nd NO2 (200 ppb O3)	604.9	198.3	805.2	604.9	200.4	1.0020	----	0.9893	101.1%
3rd NO2 (100 ppb O3)	700.1	103.1	802.3	700.1	102.2	1.0056	----	1.0085	99.2%
2nd NO ref point	----	4.8	802.7	796.9	5.8	1.0051	1.0064	----	----
Average Correction Factor						1.0036	1.0055	0.9974	100.3%

Notes: Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

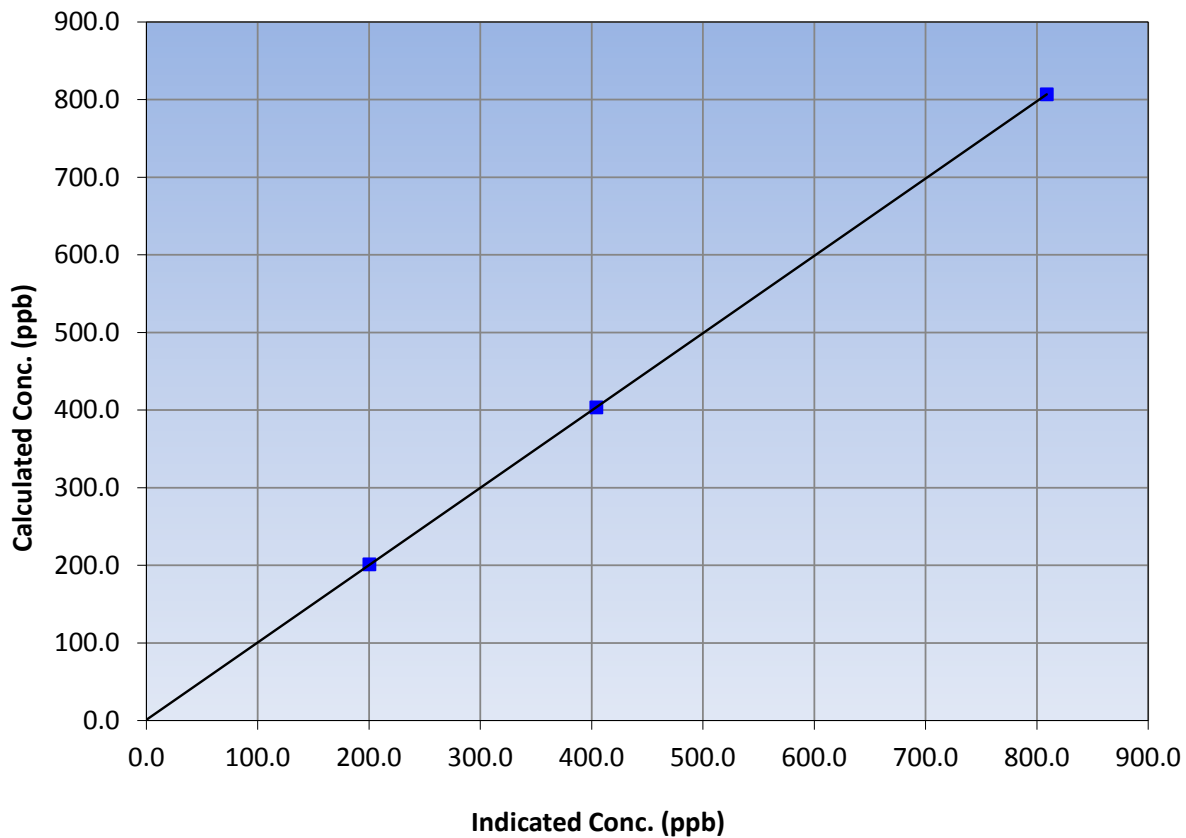
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	8:11	End Time (MST)	12:05
Analyzer make	Teledyne API T200	Analyzer serial #	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.6	----	Correlation Coefficient	≥0.995	
806.8	808.9	0.9974			
403.4	404.3	0.9977			
201.2	200.2	1.0049			
			Slope	0.996195	0.90 - 1.10
			Intercept	0.982161	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

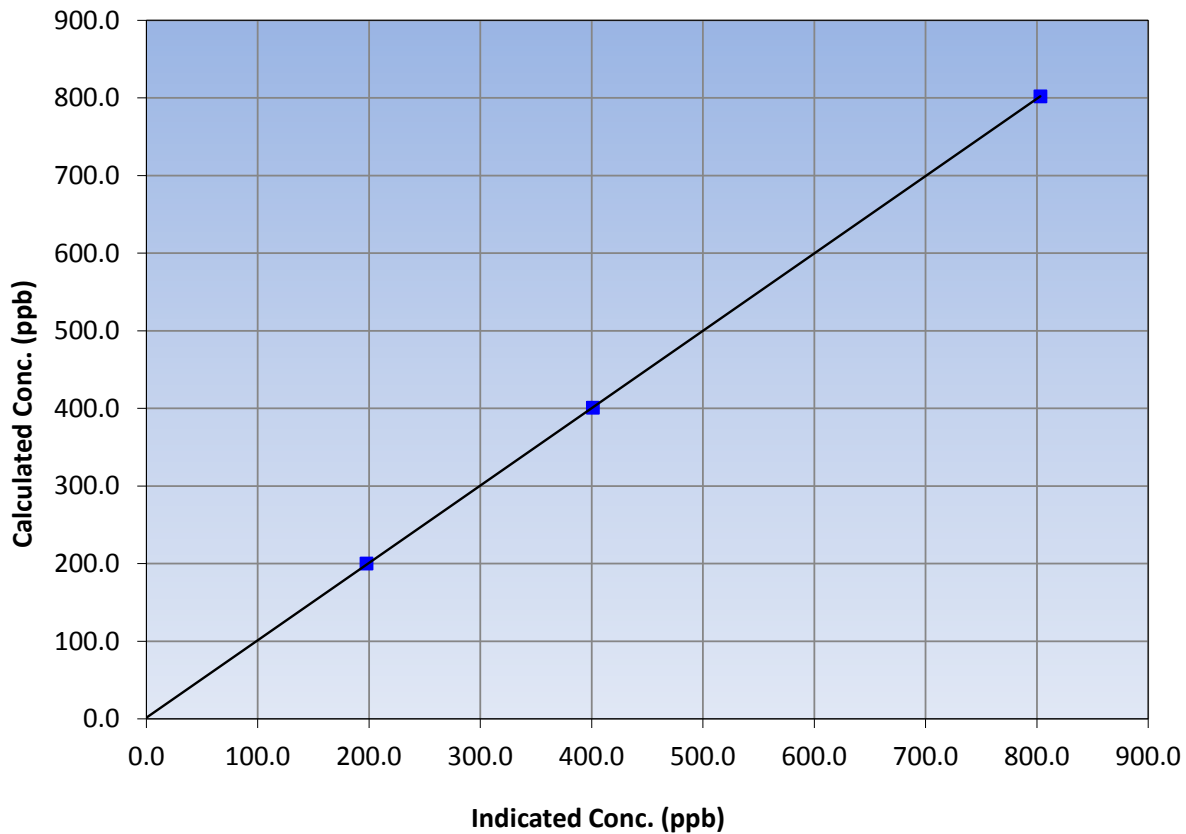
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	8:11	End Time (MST)	12:05
Analyzer make	Teledyne API T200	Analyzer serial #	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.8	----	Correlation Coefficient	0.999993	≥0.995
802.0	803.1	0.9987			
401.0	401.1	0.9997	Slope	0.996846	0.90 - 1.10
200.0	197.7	1.0116			
			Intercept	1.584333	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

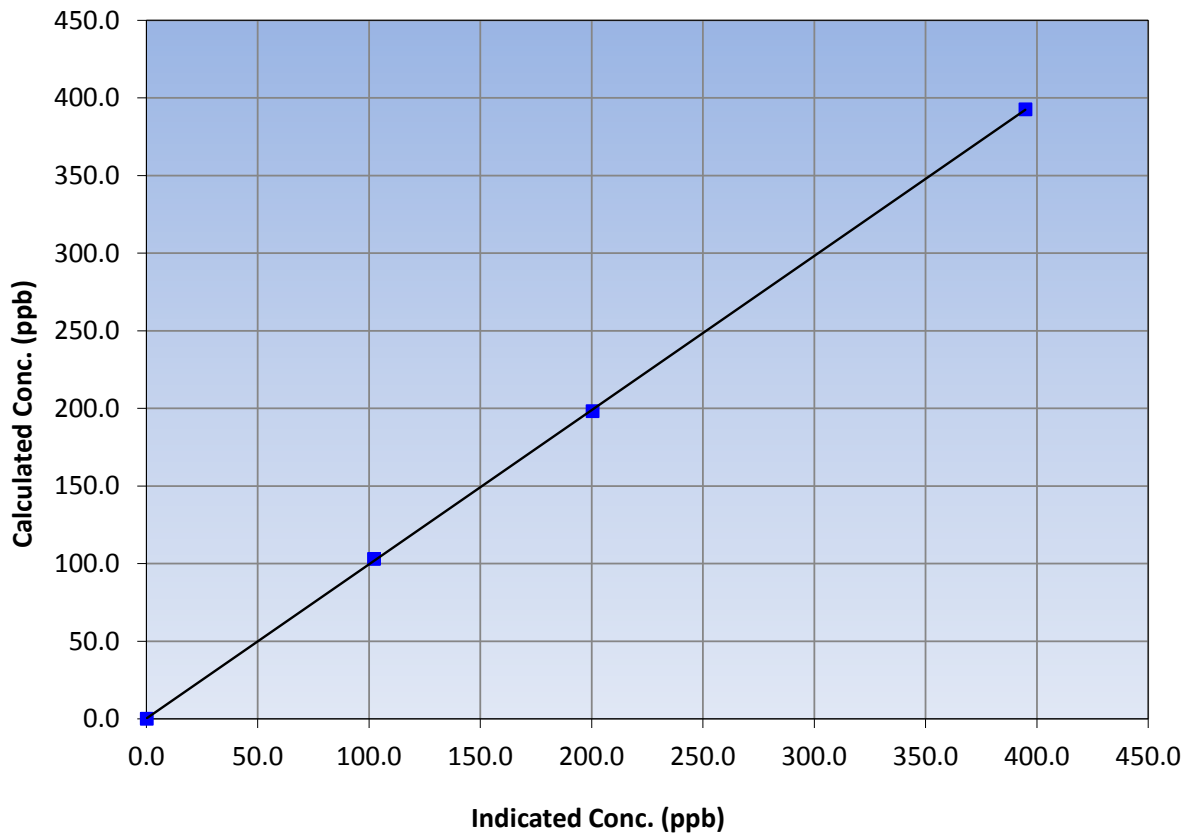
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 17, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	8:11	End Time (MST)	12:05
Analyzer make	Teledyne API T200	Analyzer serial #	723

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.2	----	Correlation Coefficient	≥0.995	
392.6	394.8	0.9943			
198.3	200.4	0.9893			
103.1	102.2	1.0085			
			Slope	0.993211	0.90 - 1.10
			Intercept	0.257455	+/-20

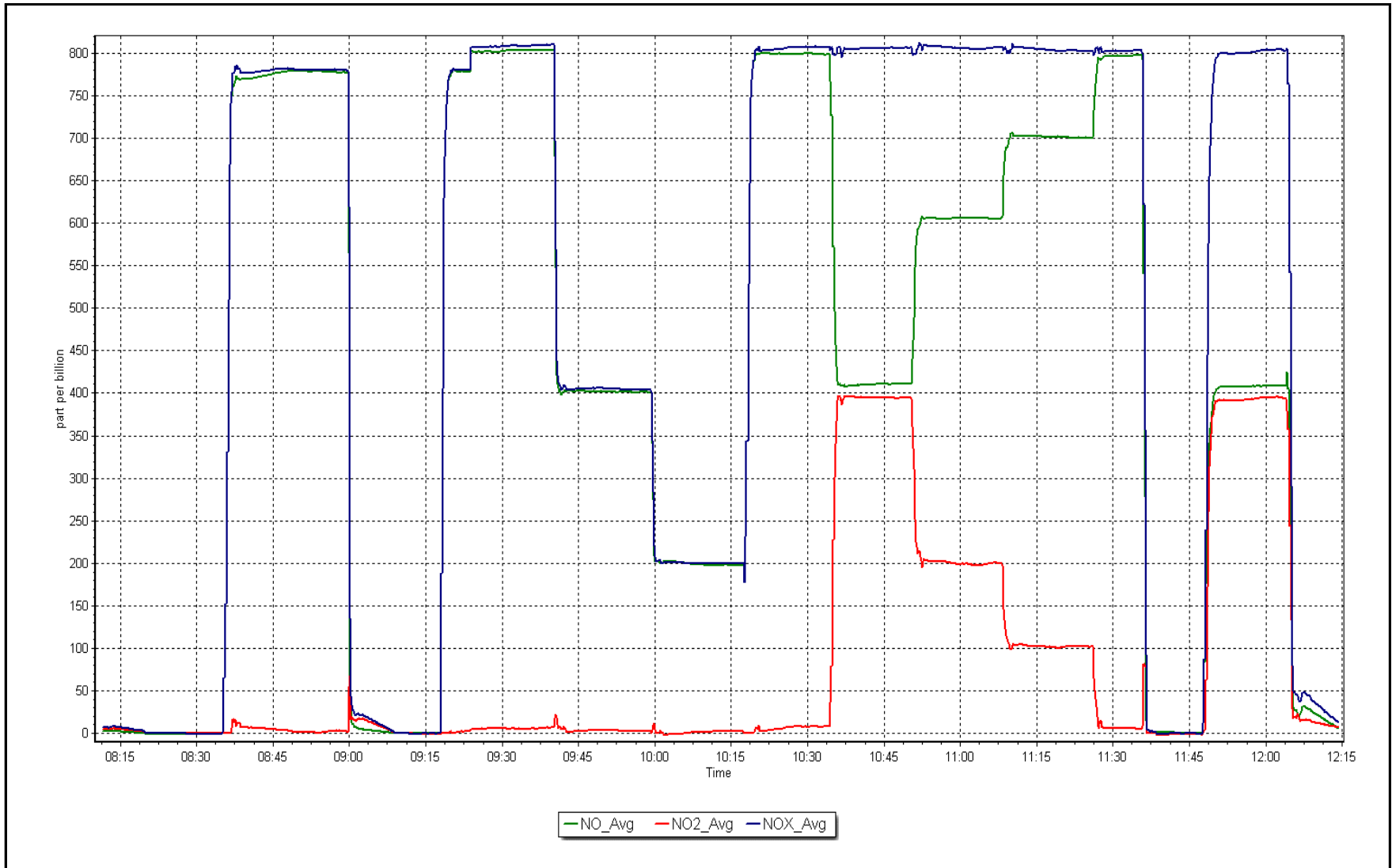
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 21, 2017

Location: Christina Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 502 SURMONT JUNE 2017

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association
Fort McMurray, Alberta

July 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 JUNE 2017

MONTHLY SUMMARY for
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	19	0	5	0
H2S (ppb) Average	686	33	34	99.86	2	0	0	0
NO2 (ppb) Average	685	35	35	100	13	0	4	-
NO (ppb) Average	685	35	35	100	12	-	3	-
NOX (ppb) Average	685	35	35	100	23	-	7	-
Temperature 2 m (C) Average	720	0	0	100	26.1	-	19.8	-
Relative Humidity (%) Average	720	0	0	100	98	-	92	-
Wind Speed 10 m (km/h) Average	720	0	0	100	32	-	19	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
JUNE 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	21 Jun 2017 10:00	21 Jun 2017 10:00	1	Maintenance - sample manifold cleaned

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 JUNE 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	1	2	-	0	0	0	0	1	3	19
H2S (ppb) Average	686	0.1	0	-	0	0	0	0	0	0	2
NO2 (ppb) Average	685	1.5	2	-	0	0	0	1	2	4	13
NO (ppb) Average	685	0.8	2	-	0	0	0	0	1	2	12
NOX (ppb) Average	685	2.3	3	-	0	0	1	1	3	6	23
Temperature 2 m (C) Average	720	14.7	4.8	-	1.6	8.8	11.4	14	17.8	22	26.1
Relative Humidity (%) Average	720	66.5	21	-	23	35	49	69	86	93	98
Wind Speed 10 m (km/h) Average	720	10.1	6	-	0	3	5	8	15	20	32
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Surmont - June 2017

Number of Exceedences (AAAQO):		1-hr: 0 24-hr: 0		Hours in Service:		720																																										
Maximum Value: 16 ppb on Jun 11 09:00		Maximum Daily Average: 5.6 ppb on Jun 11		Hours of Data:		685																																										
Minimum Value: 0 ppb on Jun 21 02:00		Minimum Daily Average: 0.1 ppb on Jun 13		Hours of Missing Data:		35																																										
Maximum Diurnal Average: 1.6 ppb at hour 10		Minimum Diurnal Average: 0.3 ppb at hour 2		Hours of Calibration:		35																																										
Monthly Average: 1.0 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 9		Percent Operational Time:		100.0																																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Jun	0	Z	1	1	0	1	2	1	0	1	0	0	4	3	1	0	1	1	0	0	0	0	0	0	0.8	4																						
2-Jun	0	0	Z	1	1	1	1	0	0	1	1	0	0	0	0	0	0	5	9	3	1	0	1	1	1.2	9																						
3-Jun	0	0	0	Z	2	1	2	6	5	4	5	3	3	1	1	2	1	0	0	0	0	0	0	1.7	6																							
4-Jun	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	1	2	1	2	0	0	0	0.5	2																							
5-Jun	0	0	0	0	0	Z	1	1	2	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0.6	3																							
6-Jun	Z	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1																							
7-Jun	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0.5	1																							
8-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
9-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	4	1	1	1	1	3	1	5	9	1	1.3	9																						
11-Jun	1	0	1	2	5	Z	11	9	16	13	10	14	7	7	6	7	5	7	5	0	0	1	1	1	5.6	16																						
12-Jun	Z	0	0	1	0	0	0	1	1	3	2	3	3	3	1	2	0	0	0	0	0	0	0	1.0	3																							
13-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
14-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0.3	1																						
15-Jun	0	1	0	Z	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0.6	2																							
16-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
17-Jun	0	0	0	0	0	Z	0	1	1	2	3	5	1	1	5	5	4	5	2	1	1	0	0	1.7	5																							
18-Jun	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
19-Jun	1	Z	0	0	0	2	6	3	1	0	5	2	4	3	1	0	0	1	0	0	0	0	0	1.3	6																							
20-Jun	0	0	Z	0	0	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	2																							
21-Jun	0	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	4	1	0	0.4	4																							
22-Jun	0	0	0	0	Z	0	0	0	1	5	5	2	2	2	3	3	10	5	6	1	1	1	1	2.1	10																							
23-Jun	0	0	0	1	1	Z	4	4	3	4	3	4	3	8	5	1	1	3	4	0	0	0	0	2.2	8																							
24-Jun	Z	0	0	0	1	0	1	1	1	0	1	1	2	1	0	0	0	1	0	0	1	1	1	0.7	2																							
25-Jun	1	Z	0	0	1	0	0	1	0	0	1	1	1	1	0	0	0	1	1	0	0	0	1	0.6	1																							
26-Jun	1	1	Z	2	1	1	3	2	4	4	3	2	1	1	2	1	1	1	1	1	1	1	1	1.4	4																							
27-Jun	0	0	0	Z	1	1	1	0	0	0	1	0	2	2	0	0	0	1	1	0	0	0	0	0.6	2																							
28-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1																							
29-Jun	0	0	0	0	0	Z	0	0	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	0.8	2																							
30-Jun	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
																								0.4	0.3	0.3	0.6	0.7	0.5	1.3	1.1	1.5	1.6	1.6	1.5	1.4	1.4	1.3	1.1	1.1	1.3	1.2	0.6	0.5	0.5	0.6	0.4	Diurnal Average
																								1	1	1	2	5	2	11	9	16	13	10	14	7	8	6	7	10	7	9	3	4	5	9	1	Diurnal Maximum

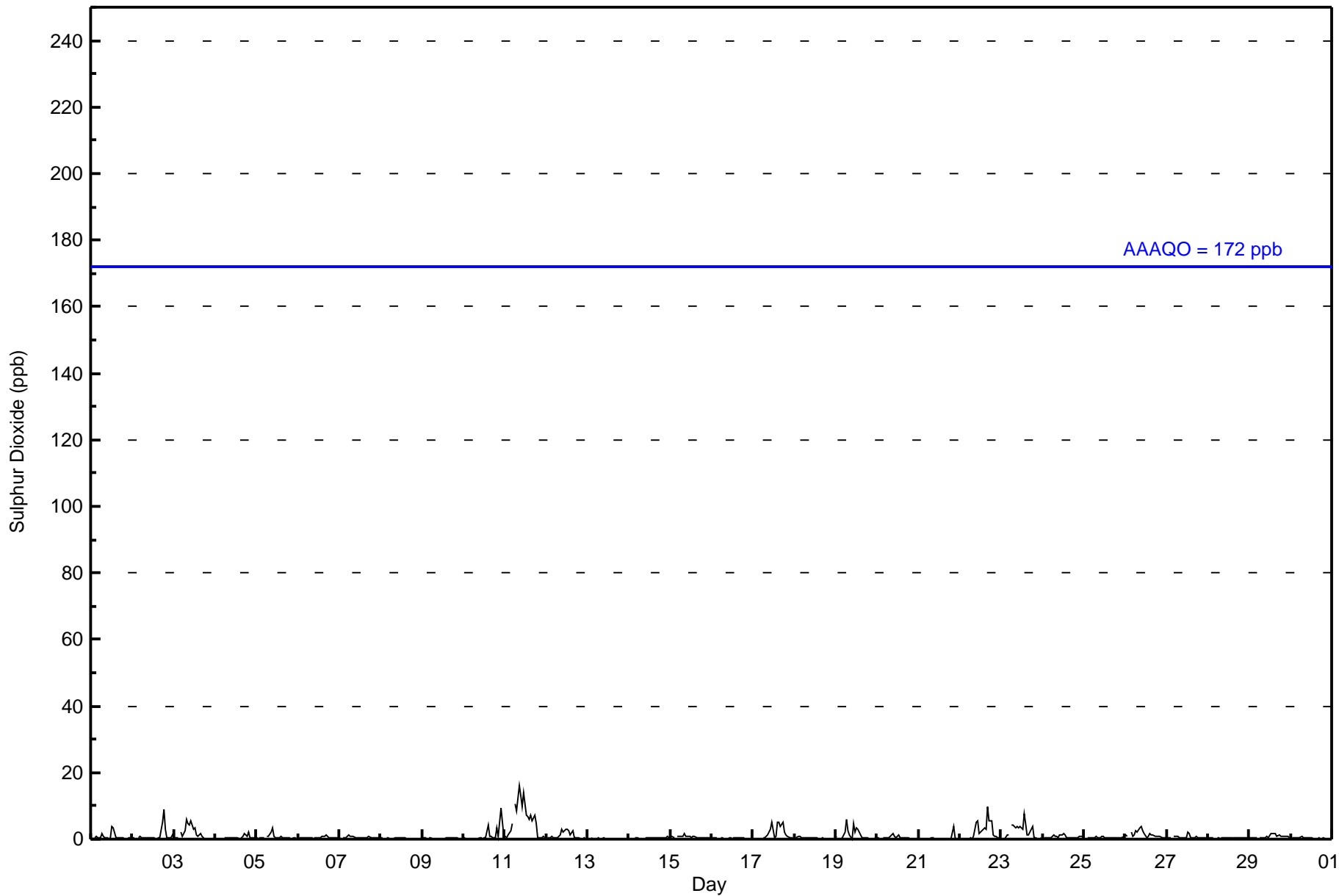
Z - zerospan C - Calibration

Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	99.42	99.42
11 - 20	4	0.58	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	50	25	24	30	7	29	66	42	25	35	34	72	62	77	31	72	681
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	25	24	30	7	29	66	42	25	35	34	72	62	77	35	72	685

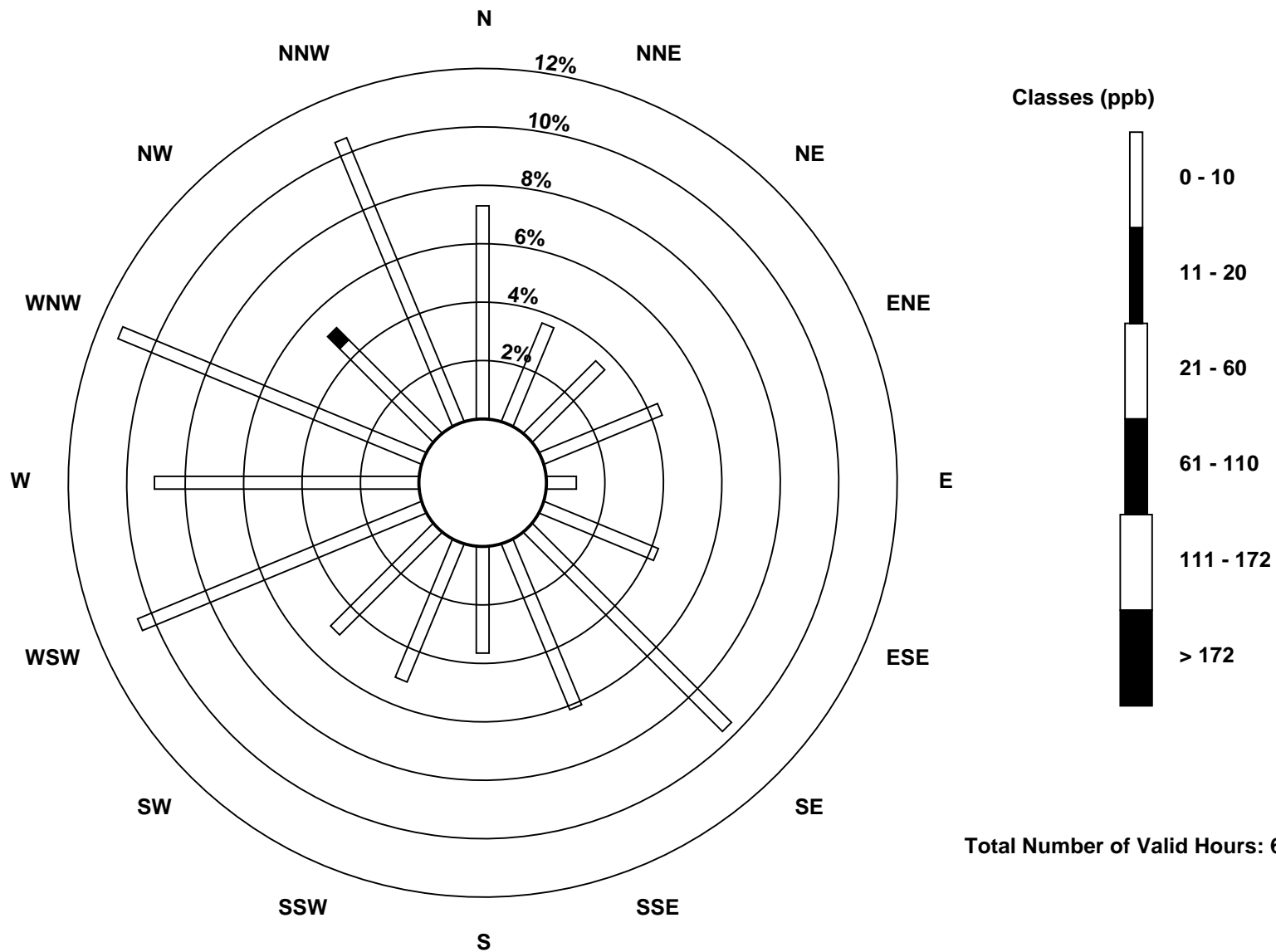
Total Number of Valid Hours: 685

Total Number of Hours: 720

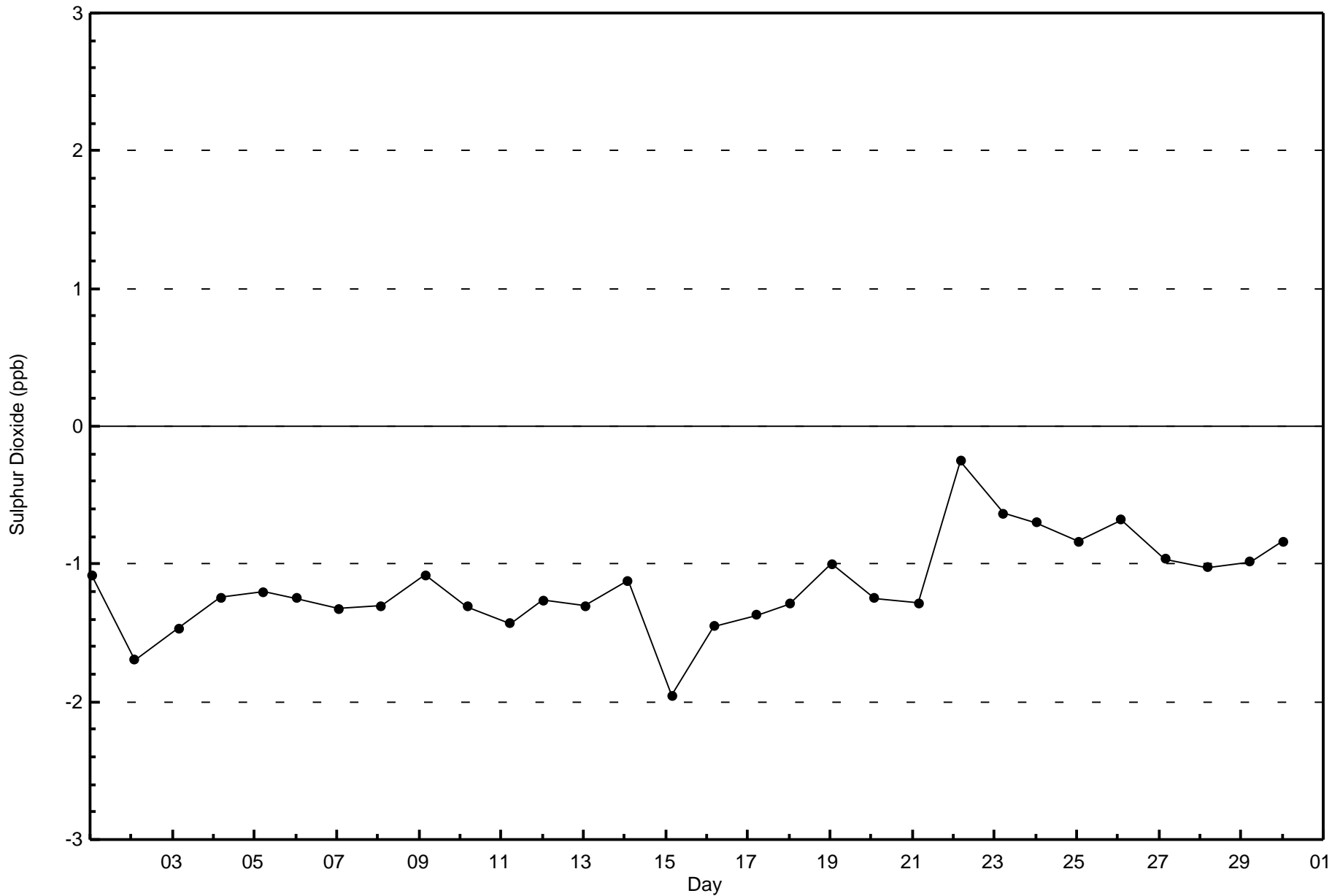


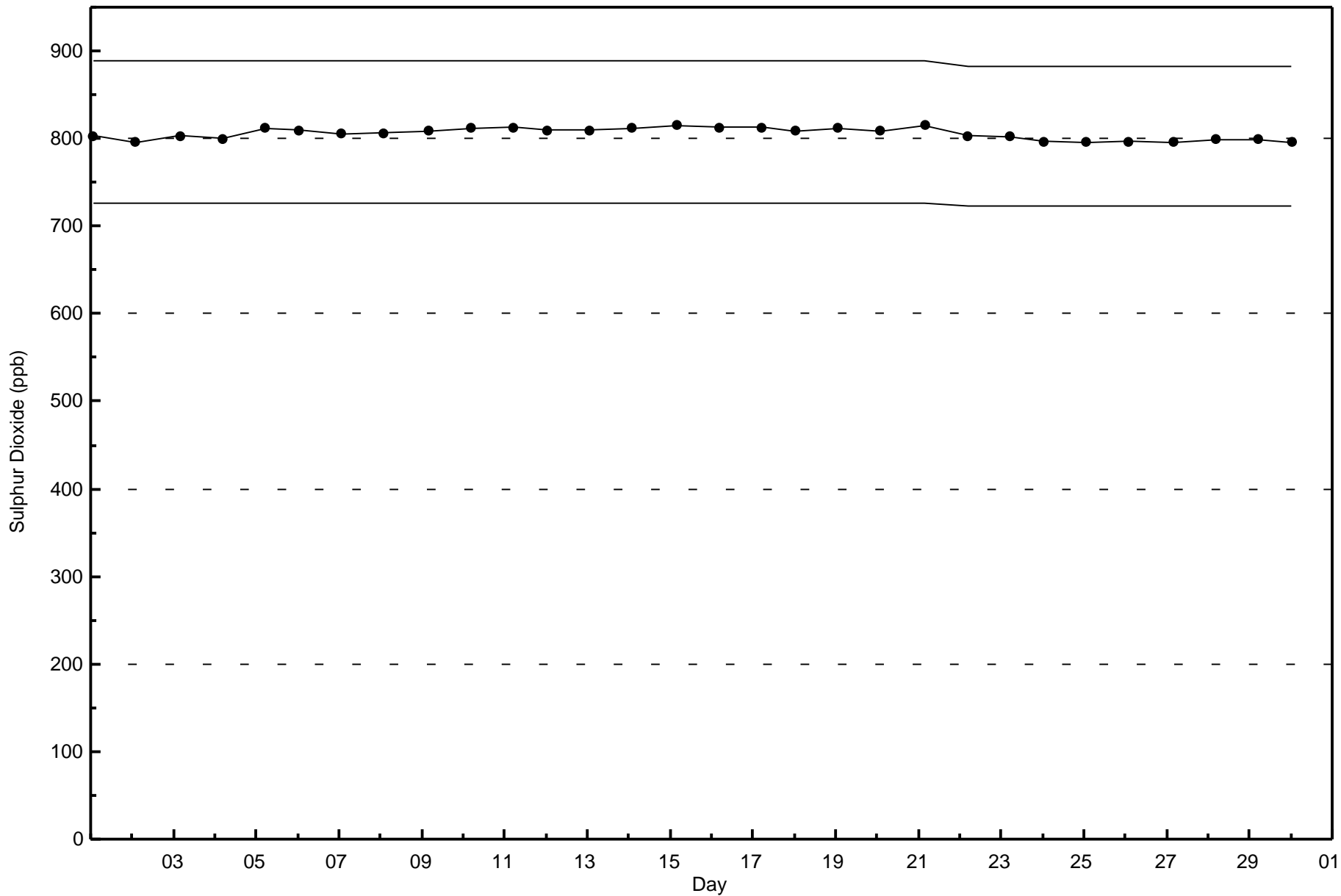
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Sulphur Dioxide (SO₂) - ppb
Surmont (AMS 502)



Total Number of Valid Hours: 685







Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 3 ppb on Jun 28 07:00	Maximum Daily Average: 1.1 ppb on Jun 14
Minimum Value: 0 ppb on Jun 10 01:00	Hours of Data: 679
Maximum Diurnal Average: 0.5 ppb at hour 22	Hours of Missing Data: 41
Monthly Average: 0.3 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.2 ppb on Jun 20	Percent Operational Time: 98.9
Minimum Diurnal Average: 0.2 ppb at hour 11	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	0	0	Z	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0.4	1	
2-Jun	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.4	1	
3-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
4-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0.5	2	
5-Jun	1	2	2	2	2	1	Z	1	1	1	UO	UO	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2	
6-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
7-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
8-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
9-Jun	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0.3	2	
11-Jun	1	1	1	1	1	1	Z	1	1	1	1	1	0	0	0	1	1	1	1	1	0	1	2	1	0	0.8	2
12-Jun	0	Z	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
13-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1	
14-Jun	2	1	1	Z	2	2	1	2	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1.1	2
15-Jun	1	1	1	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
16-Jun	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
17-Jun	0	0	0	0	0	1	Z	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.4	1	
18-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
19-Jun	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
20-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
21-Jun	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1	
22-Jun	1	1	1	1	1	Z	1	1	1	1	1	C	C	C	1	1	1	1	1	1	1	0	0	0	0.6	1	
23-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	0.3	1	
24-Jun	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1	
25-Jun	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0.2	0
26-Jun	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
27-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.3	1	
28-Jun	0	0	0	0	0	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
29-Jun	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0.3	1	
30-Jun	1	Z	1	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0.3	1	

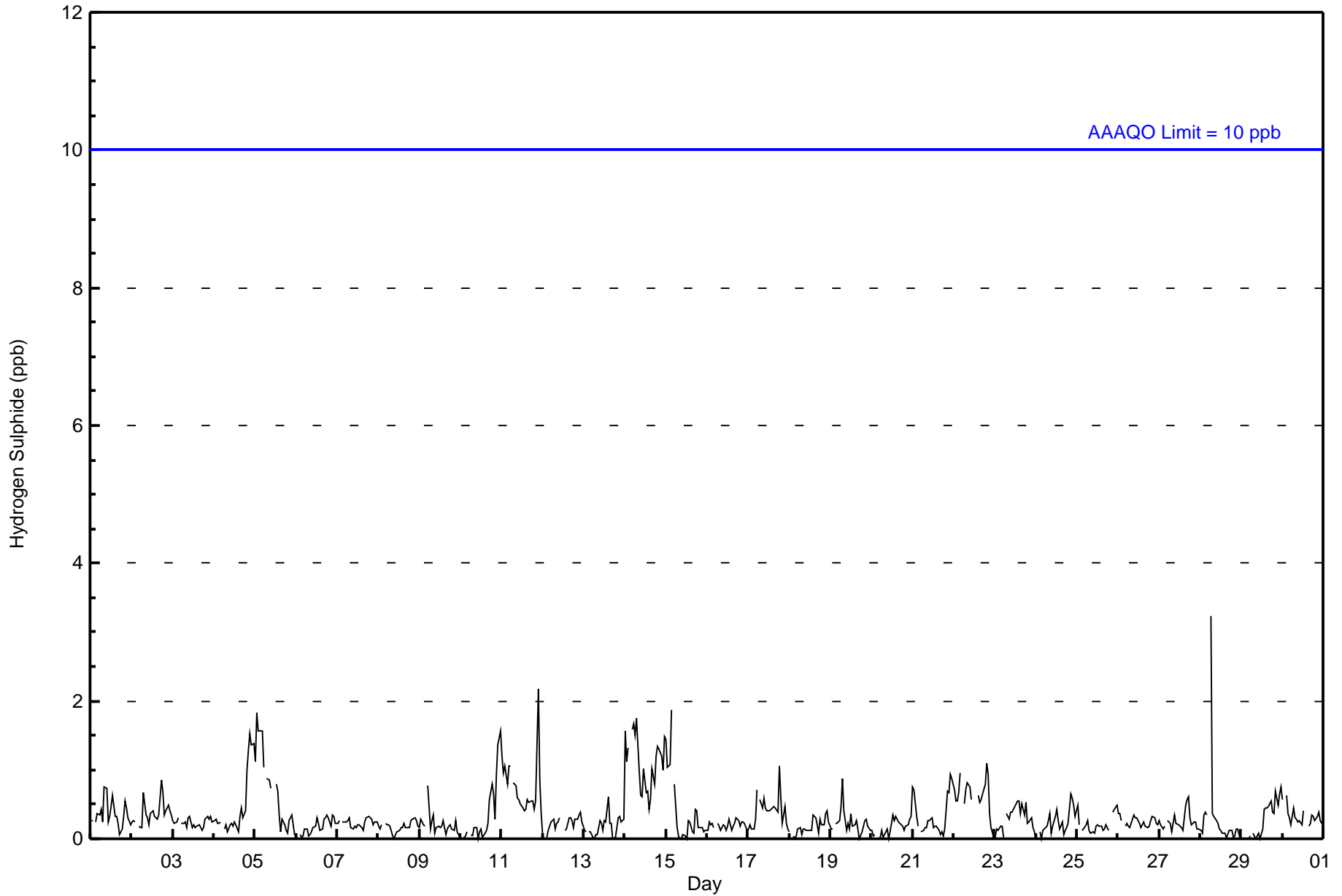
0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.4	Diurnal Average
2	2	2	2	2	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	Diurnal Maximum

Z - zerospan C - Calibration UO - Unstable Operation
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	678	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 679

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Surmont - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	47	25	25	30	7	28	65	40	25	33	36	70	64	79	35	69	678
3 - 4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	48	25	25	30	7	28	65	40	25	33	36	70	64	79	35	69	679

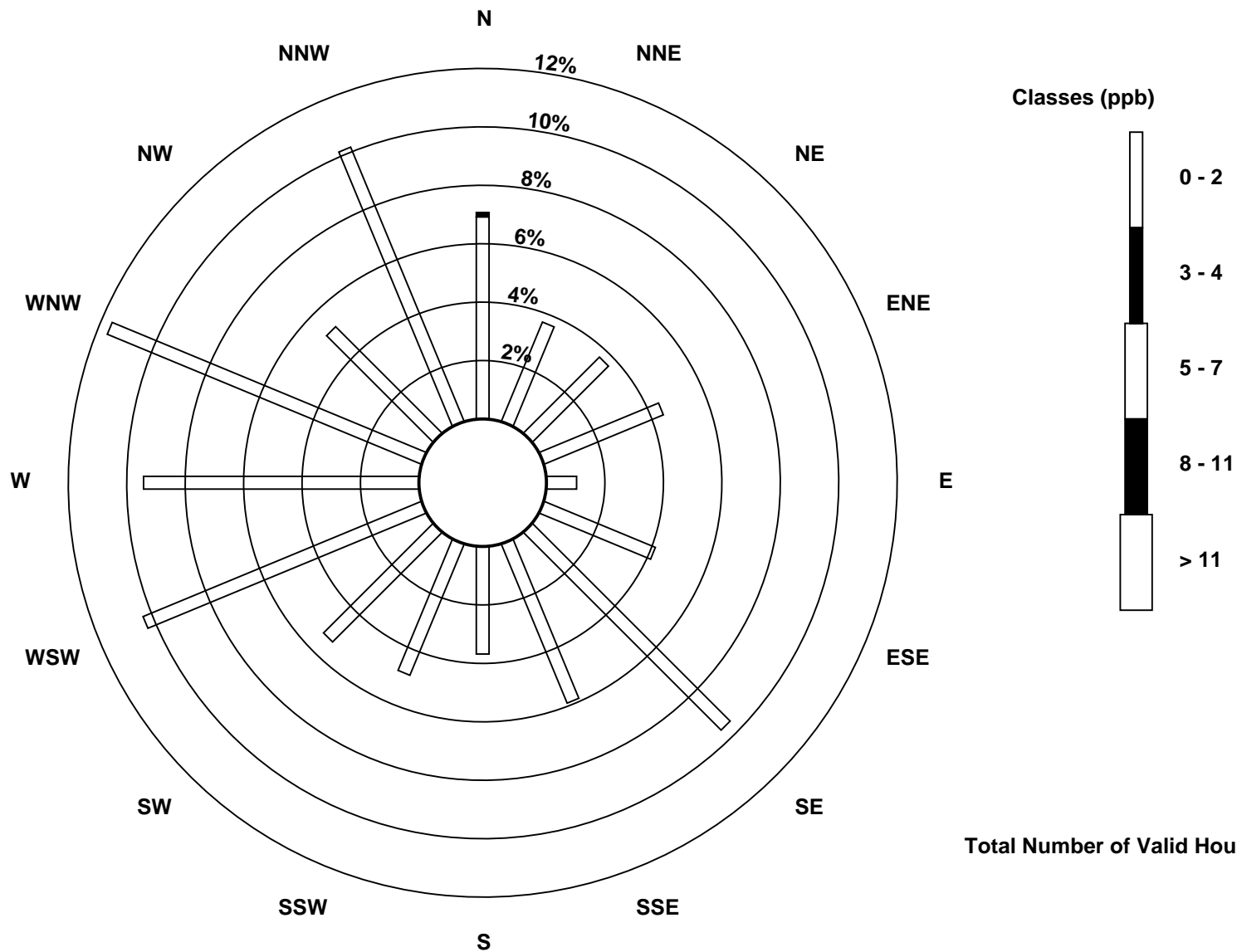
Total Number of Valid Hours: 679

Total Number of Hours: 720

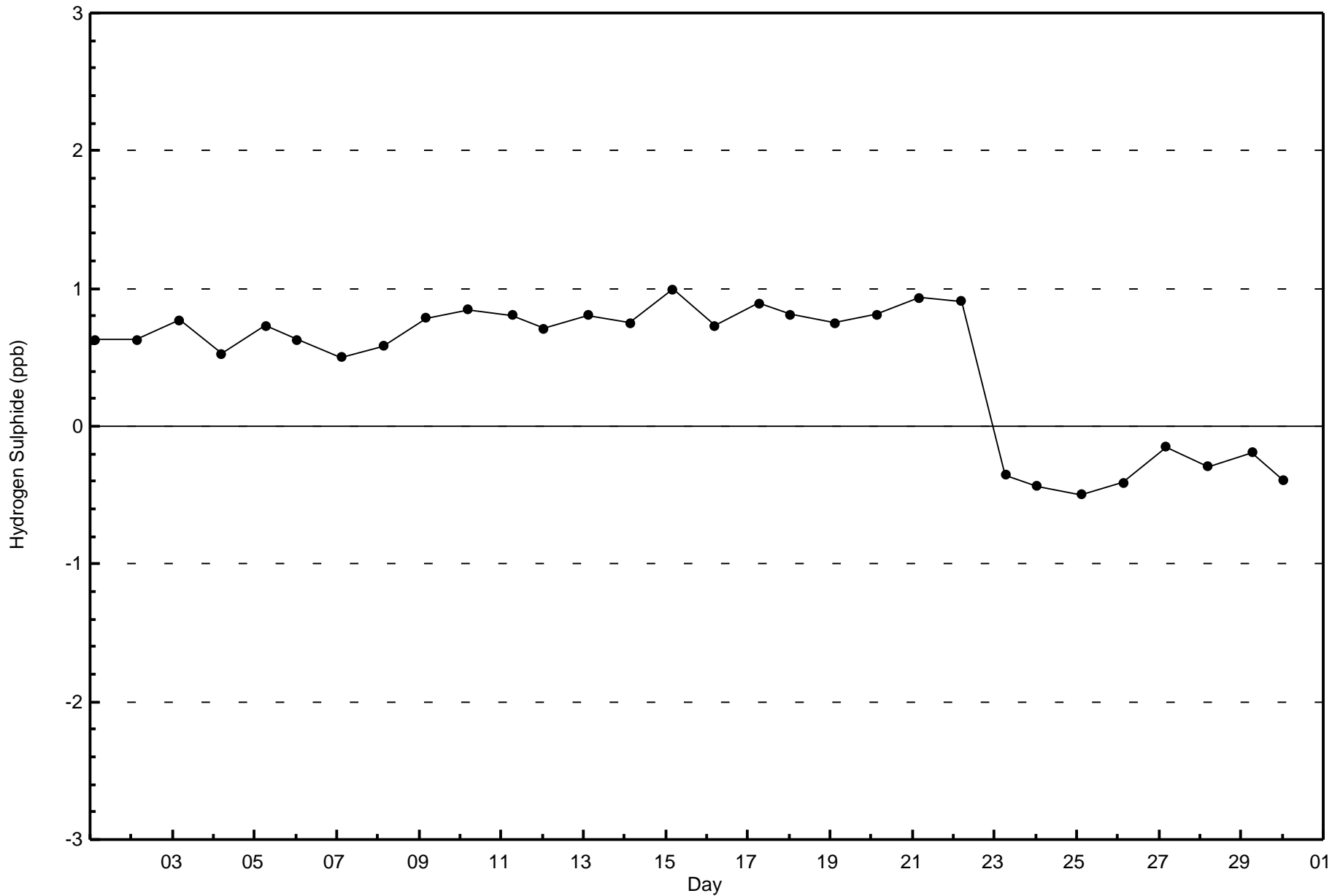


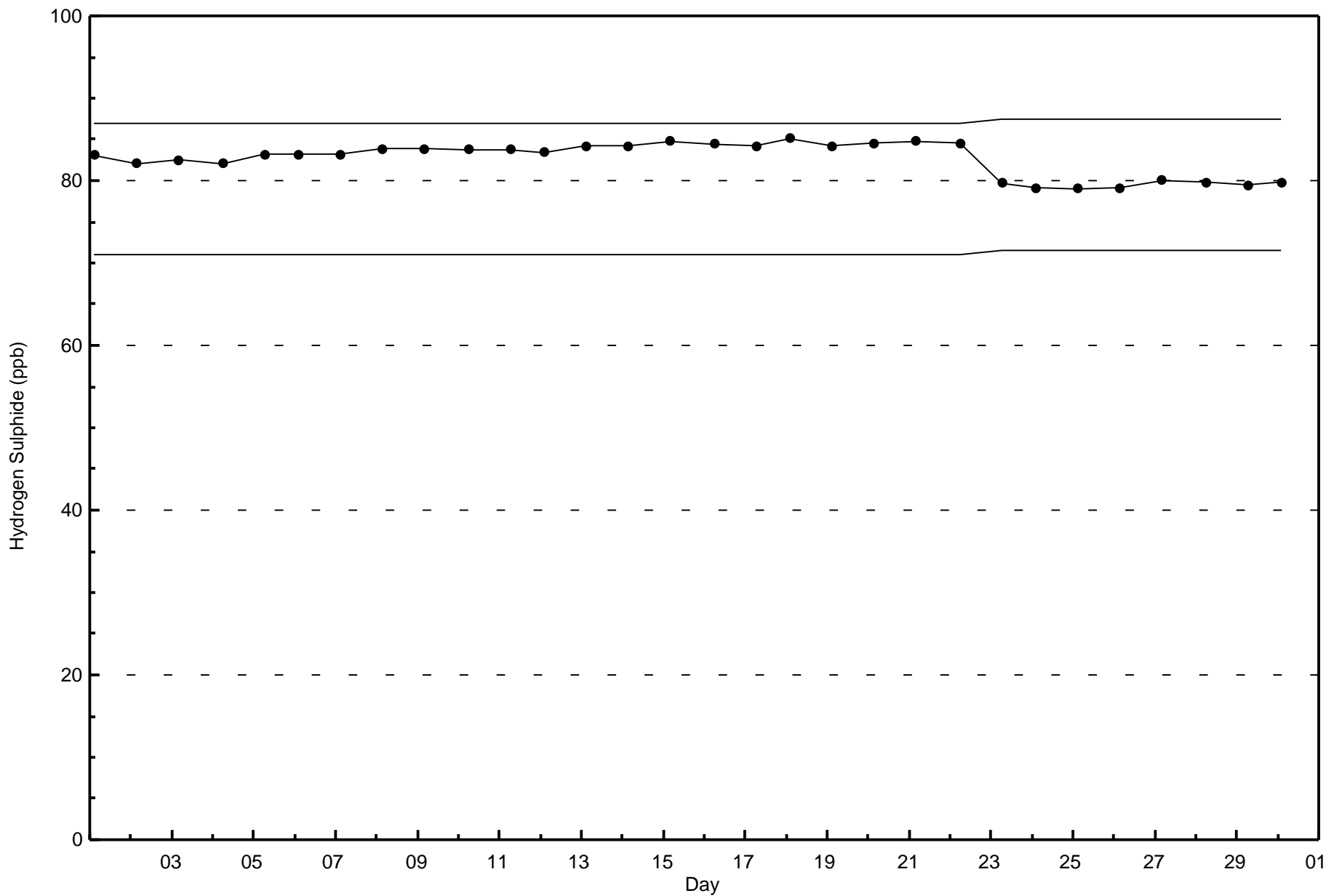
Wood Buffalo Environmental Association
Wind Rose Jun 2017

Hydrogen Sulphide (H₂S) - ppb
Surmont (AMS 502)



Total Number of Valid Hours: 679







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

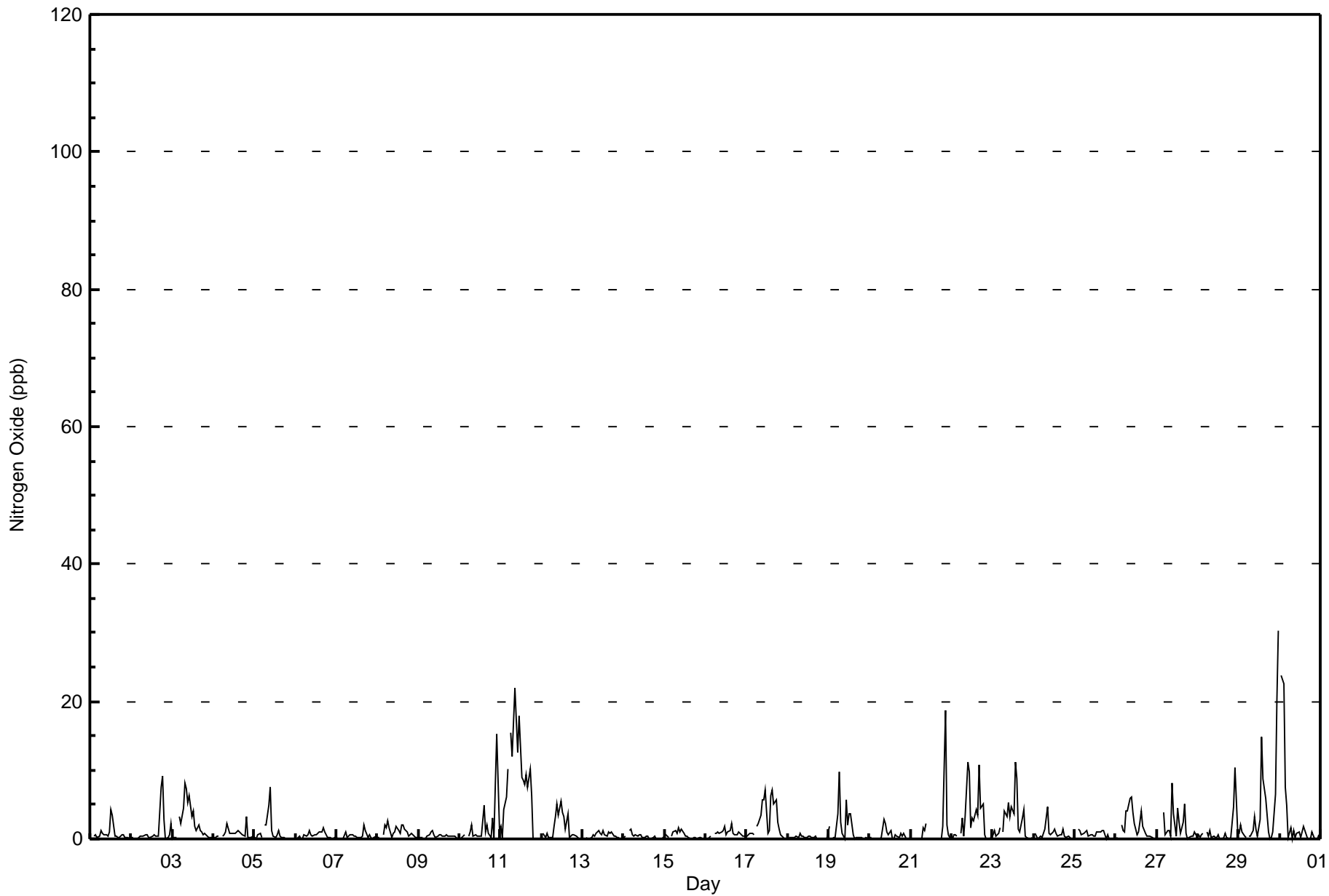
Surmont - June 2017

Maximum Value: 30 ppb on Jun 30 00:00		Maximum Daily Average: 7.8 ppb on Jun 11		Hours in Service: 720																																														
Minimum Value: 0 ppb on Jun 5 19:00		Minimum Daily Average: 0.2 ppb on Jun 18		Hours of Data: 685																																														
Maximum Diurnal Average: 3.0 ppb at hour 10		Minimum Diurnal Average: 0.3 ppb at hour 1		Hours of Missing Data: 35																																														
Monthly Average: 1.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 18		Hours of Calibration: 35																																														
				Percent Operational Time: 100.0																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Jun	0	Z	0	1	0	1	1	1	1	1	0	1	4	3	0	0	0	0	1	1	0	0	0	0	0.8	4																								
2-Jun	0	0	Z	0	0	0	0	0	1	1	0	0	0	1	0	0	0	8	9	3	0	0	1	2	1.3	9																								
3-Jun	0	0	0	Z	3	2	4	8	7	5	6	3	4	2	1	2	1	1	1	1	0	0	0	0	2.4	8																								
4-Jun	0	0	0	0	Z	0	1	1	2	1	1	1	1	1	1	1	1	1	0	3	0	0	0	0	0.8	3																								
5-Jun	0	0	1	1	0	Z	2	2	5	7	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1.0	7																								
6-Jun	Z	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	2	1	1	0	0	0	0	0	0.5	2																								
7-Jun	0	Z	0	0	0	1	0	0	1	1	0	0	0	0	0	0	2	1	0	1	0	0	0	1	0.4	2																								
8-Jun	0	0	Z	1	2	2	3	2	0	1	1	2	1	1	2	2	1	1	0	1	1	0	0	0	1.0	3																								
9-Jun	0	0	0	Z	0	0	1	1	1	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0.4	1																								
10-Jun	0	0	0	1	Z	0	1	2	0	1	0	0	0	0	5	1	2	1	0	3	0	8	15	1	1.9	15																								
11-Jun	2	0	4	6	10	Z	15	12	22	17	13	18	9	9	8	9	7	10	6	0	0	0	0	0	7.8	22																								
12-Jun	Z	1	0	1	0	0	0	2	3	5	3	6	4	3	1	4	0	0	1	1	0	0	0	0	1.6	6																								
13-Jun	0	Z	0	0	0	0	1	0	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0.5	1																								
14-Jun	0	0	Z	1	2	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																								
15-Jun	0	1	0	Z	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																								
16-Jun	0	0	0	0	Z	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	0	0	0.8	2																								
17-Jun	1	1	1	1	1	Z	2	2	4	6	6	7	1	1	6	7	5	6	3	1	1	0	0	0	2.6	7																								
18-Jun	Z	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																								
19-Jun	2	Z	0	0	0	4	10	2	1	0	6	2	4	4	1	0	0	0	0	0	0	0	0	0	1.5	10																								
20-Jun	0	0	Z	0	0	0	0	0	3	2	1	1	1	0	0	1	0	0	1	0	1	0	0	0	0.5	3																								
21-Jun	0	0	0	Z	0	0	0	2	1	2	C	C	C	C	C	0	0	0	0	2	19	2	1	0	1.6	19																								
22-Jun	0	1	1	0	Z	1	3	0	3	11	10	2	3	3	4	3	11	5	5	1	0	0	0	0	2.9	11																								
23-Jun	1	1	0	1	2	Z	1	4	3	5	3	5	4	11	9	2	1	3	4	0	0	0	0	0	2.6	11																								
24-Jun	Z	1	0	0	0	0	1	3	5	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0.8	5																								
25-Jun	0	Z	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1	0	0	0	0	0.7	1																								
26-Jun	0	0	Z	2	1	1	4	4	6	6	4	2	1	1	2	4	2	1	0	0	0	0	0	0	1.9	6																								
27-Jun	0	0	0	Z	4	1	1	1	0	8	4	0	4	3	1	2	5	1	0	0	0	0	1	1	1.6	8																								
28-Jun	1	0	1	1	Z	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	2	5	10	1	1.1	10																								
29-Jun	1	2	1	0	0	Z	0	0	1	3	1	0	3	15	9	7	6	1	0	0	1	7	20	30	4.8	30																								
30-Jun	Z	24	23	8	5	0	2	0	1	0	1	1	0	1	2	1	0	0	0	1	0	0	0	1	3.0	24																								
																								0.3	1.3	1.4	1.0	1.3	0.8	1.9	1.9	2.6	3.0	2.3	2.0	1.8	2.2	2.1	1.8	1.8	1.5	1.2	0.7	1.0	0.8	1.7	1.3	Diurnal Average		
																								2	24	23	8	10	4	15	12	22	17	13	18	9	15	9	9	9	11	10	9	3	19	8	20	30	Diurnal Maximum	
Z - zerospan		C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	681	99.42	99.42
21 - 40	4	0.58	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	25	24	30	7	29	66	42	25	35	34	69	62	77	34	72	681
21 - 40	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	25	24	30	7	29	66	42	25	35	34	72	62	77	35	72	685

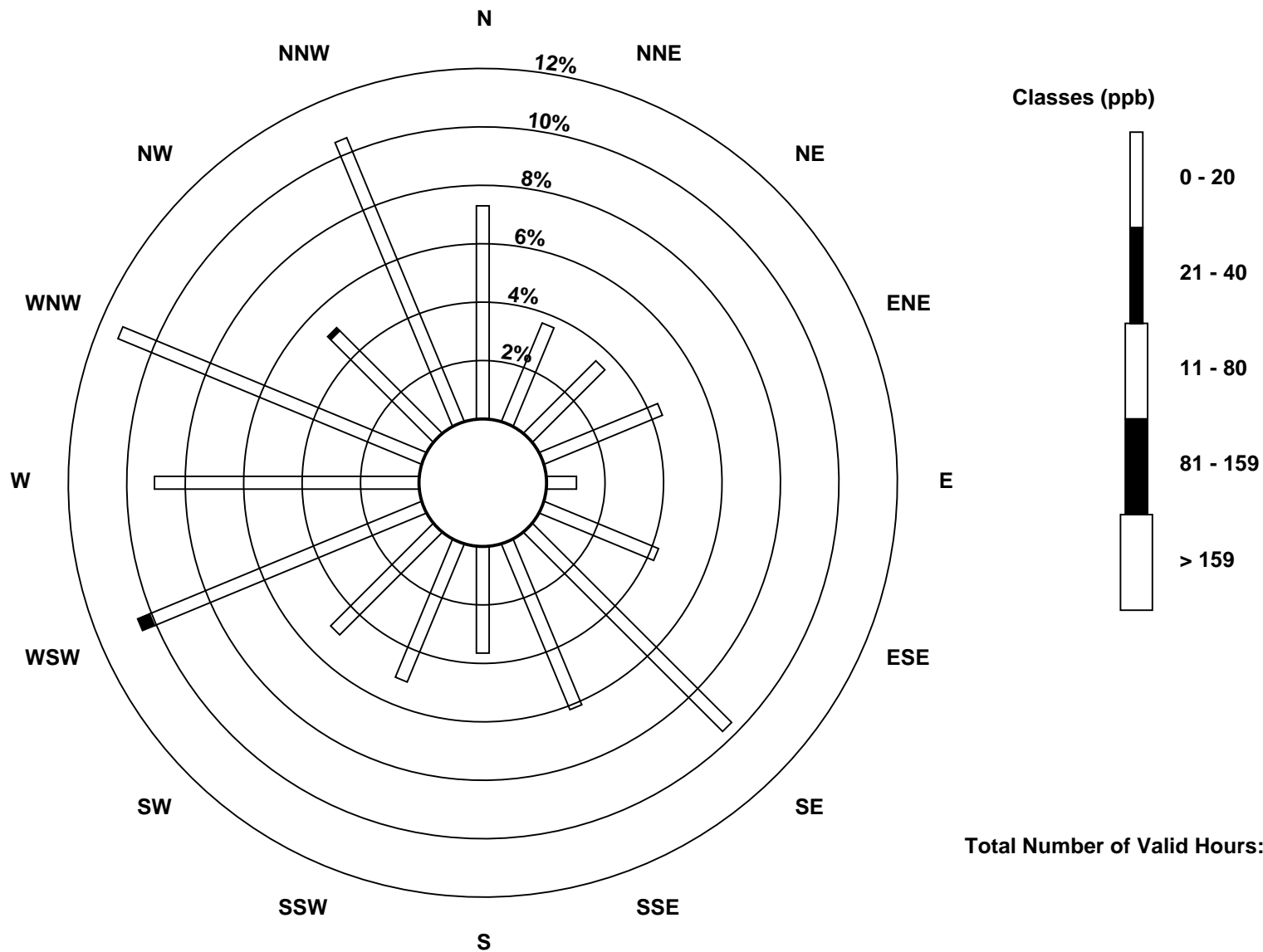
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

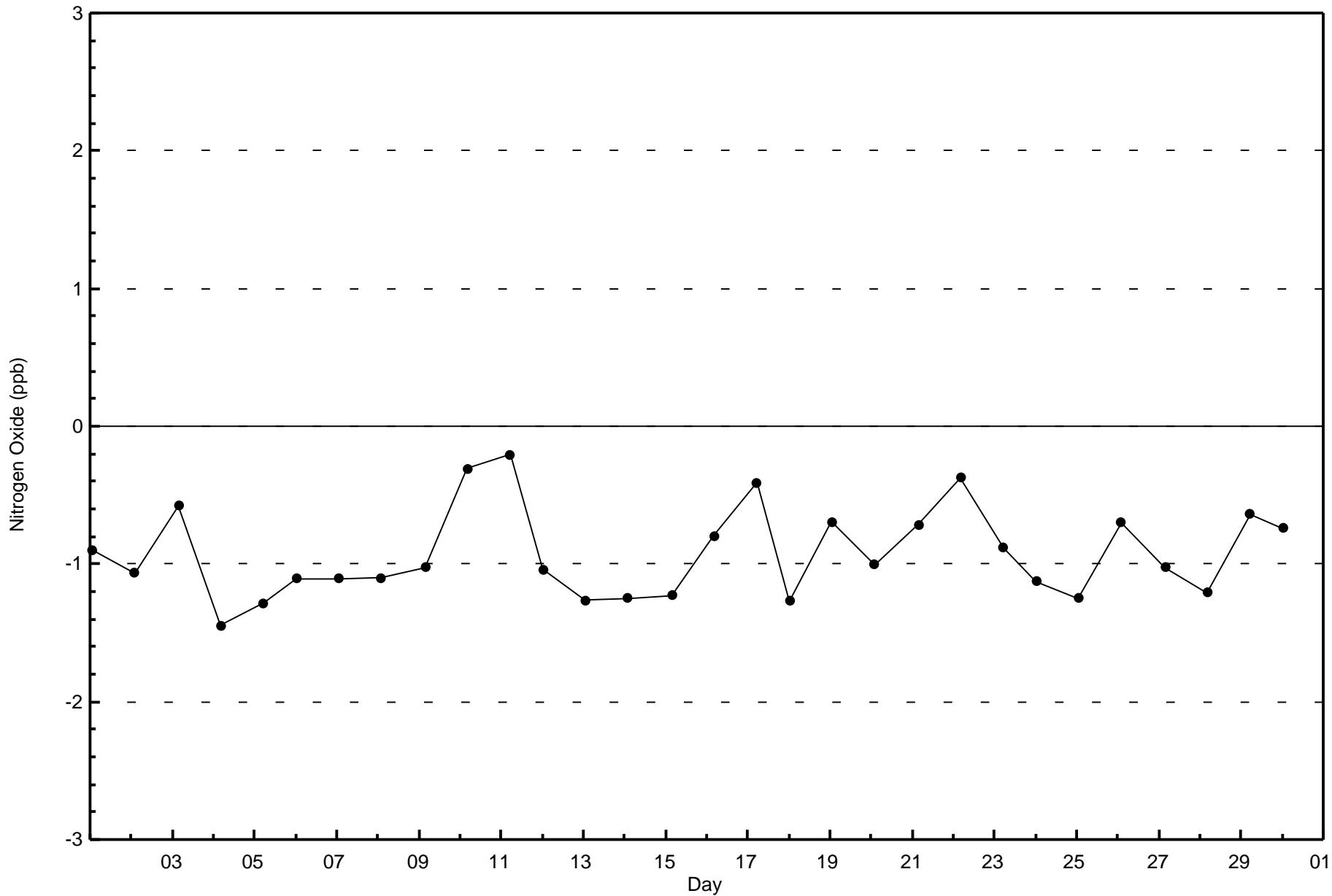
Nitrogen Oxide (NO) - ppb
Surmont (AMS 502)





Wood Buffalo Environmental Association
Zero Responses

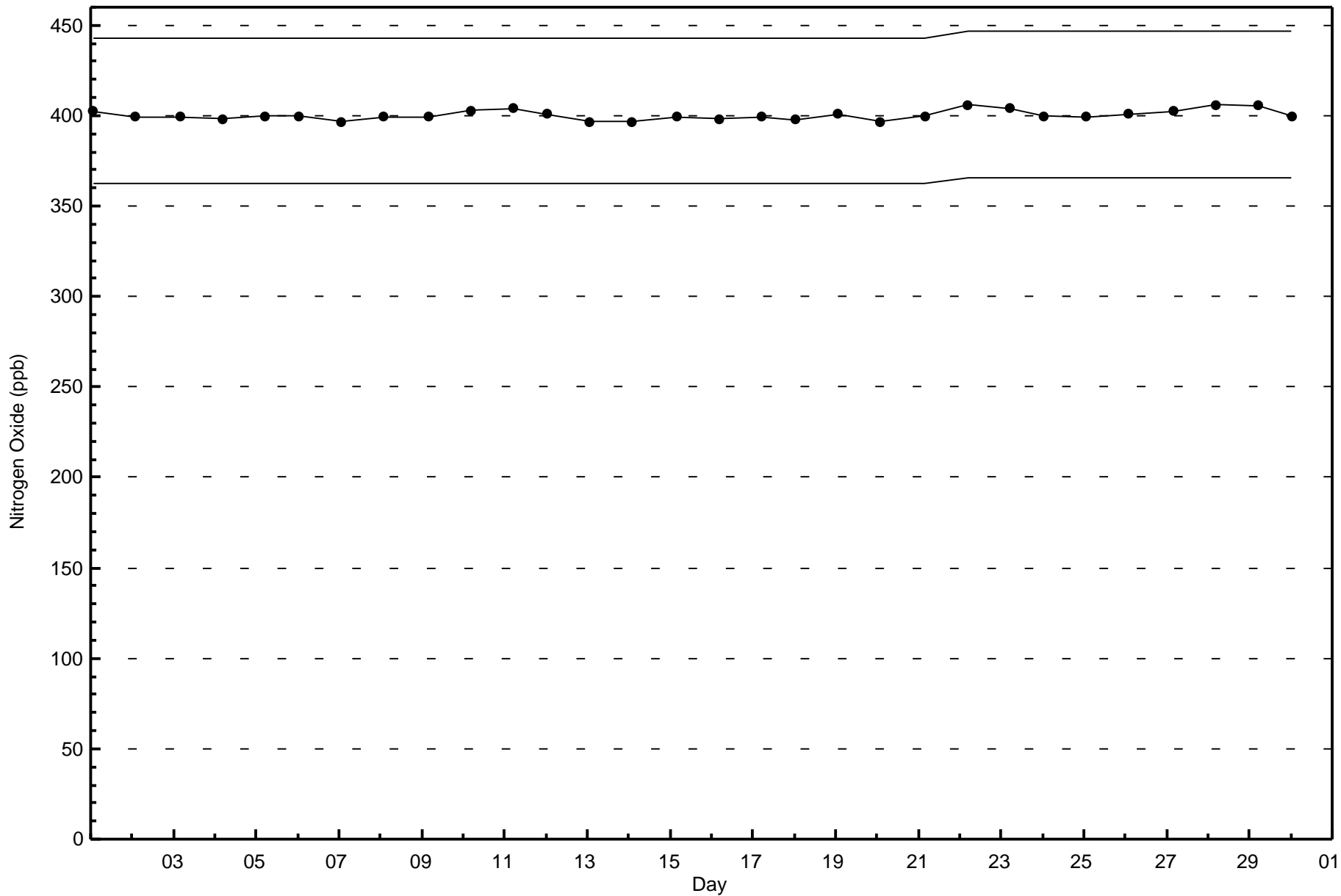
Nitrogen Oxide (NO) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxide (NO) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Surmont - June 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19 ppb on Jun 30 00:00	Maximum Daily Average: 4.3 ppb on Jun 29		Hours of Data:	685
Minimum Value: 0 ppb on Jun 2 17:00	Minimum Daily Average: 0.2 ppb on Jun 16		Hours of Missing Data:	35
Maximum Diurnal Average: 2.2 ppb at hour 10	Minimum Diurnal Average: 0.8 ppb at hour 20		Hours of Calibration:	35
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 9		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Jun	1	Z	2	3	2	2	3	2	2	2	1	2	4	3	1	1	1	1	1	1	1	0	0	1	1.5	4	
2-Jun	1	1	Z	1	1	0	0	0	1	1	1	0	0	1	0	0	0	6	11	3	0	0	0	0	1.2	11	
3-Jun	0	0	0	Z	1	1	1	4	3	3	3	2	2	0	1	1	0	0	0	0	0	0	0	0	0.9	4	
4-Jun	0	0	0	1	Z	1	1	1	1	1	1	1	1	1	1	1	2	2	1	4	1	1	1	2	1.1	4	
5-Jun	1	1	1	1	2	Z	2	2	4	7	2	1	1	1	1	1	1	1	0	0	0	0	1	0	1.4	7	
6-Jun	Z	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0.9	3	
7-Jun	1	Z	1	1	1	4	3	2	1	2	1	1	1	1	1	1	3	2	1	1	1	1	0	0	1.3	4	
8-Jun	1	0	Z	1	1	1	3	2	1	1	1	1	2	1	3	2	1	1	1	1	2	1	1	0	1.2	3	
9-Jun	1	1	0	Z	1	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2	
10-Jun	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	3	0	1	0	0	3	0	4	9	1	0.9	9	
11-Jun	2	0	2	5	6	Z	5	4	8	6	4	8	5	5	5	5	4	6	5	0	0	1	1	1	3.7	8	
12-Jun	Z	1	1	4	1	1	0	2	3	5	4	5	5	5	3	6	1	1	1	1	0	1	1	1	2.2	6	
13-Jun	1	Z	1	1	0	1	1	1	1	2	1	1	1	1	2	2	3	2	0	0	0	1	1	0	1.0	3	
14-Jun	1	1	Z	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	1	1	0.7	2	
15-Jun	2	3	2	Z	2	2	1	1	2	1	2	1	1	1	1	0	0	0	0	1	0	1	1	1	1.1	3	
16-Jun	0	0	0	0	Z	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
17-Jun	0	0	0	0	0	Z	0	0	1	1	1	3	0	0	2	2	2	3	1	1	0	0	0	0	0.8	3	
18-Jun	Z	0	1	1	1	1	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0.3	1	
19-Jun	2	Z	0	1	1	2	3	2	1	0	3	2	3	3	1	1	1	1	1	0	0	0	0	1	1.1	3	
20-Jun	1	1	Z	1	1	0	1	1	4	4	3	2	3	1	1	2	1	2	1	1	2	1	0	0	1.4	4	
21-Jun	0	0	0	Z	0	0	0	1	1	2	C	C	C	C	C	0	0	0	0	0	0	7	2	2	1	1.0	7
22-Jun	0	0	0	0	Z	0	1	0	2	5	4	1	2	2	2	2	7	5	4	1	1	2	2	4	2.1	7	
23-Jun	2	2	1	3	4	Z	2	3	3	4	2	4	4	6	7	3	2	3	4	1	0	0	1	1	2.6	7	
24-Jun	Z	2	0	0	1	0	0	3	3	1	2	2	3	2	1	1	1	2	0	0	1	1	2	2	1.3	3	
25-Jun	3	Z	7	6	3	3	2	2	1	1	1	1	1	2	1	1	1	3	1	1	1	1	1	1	2.0	7	
26-Jun	2	2	Z	6	5	3	8	6	9	9	7	5	2	2	4	1	3	2	1	1	1	1	1	1	3.5	9	
27-Jun	1	1	1	Z	3	1	2	3	1	5	4	1	3	2	1	3	7	2	0	0	1	1	3	1	1.9	7	
28-Jun	2	1	2	2	Z	4	1	1	1	1	1	0	0	0	0	0	0	0	0	0	4	5	7	2	1.4	7	
29-Jun	3	6	4	2	1	Z	0	1	2	4	2	1	2	6	3	3	5	1	1	2	7	9	17	19	4.3	19	
30-Jun	Z	14	17	8	5	1	2	1	1	1	1	1	1	2	2	1	0	0	0	1	0	1	2	3	2.8	17	

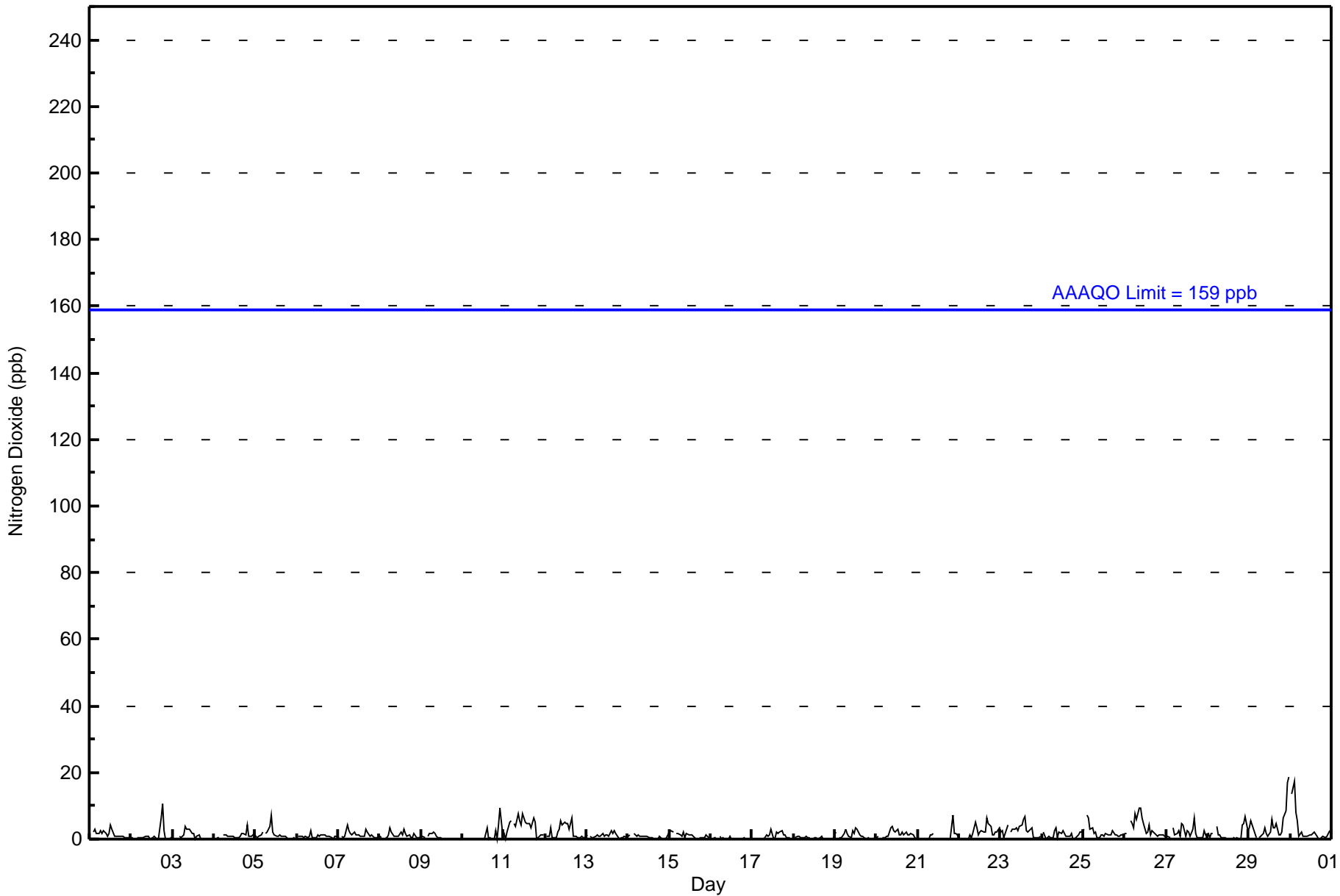
1.1	1.4	1.8	1.9	1.6	1.3	1.6	1.7	2.0	2.2	1.8	1.7	1.7	1.7	1.7	1.4	1.6	1.5	1.2	0.8	1.0	1.1	1.8	1.5	Diurnal Average	
3	14	17	8	6	4	8	6	9	9	7	8	5	6	7	6	7	6	11	4	7	9	17	19	Diurnal Maximum	

Z - zerospan C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	50	25	24	30	7	29	66	42	25	35	34	72	62	77	35	72	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	25	24	30	7	29	66	42	25	35	34	72	62	77	35	72	685

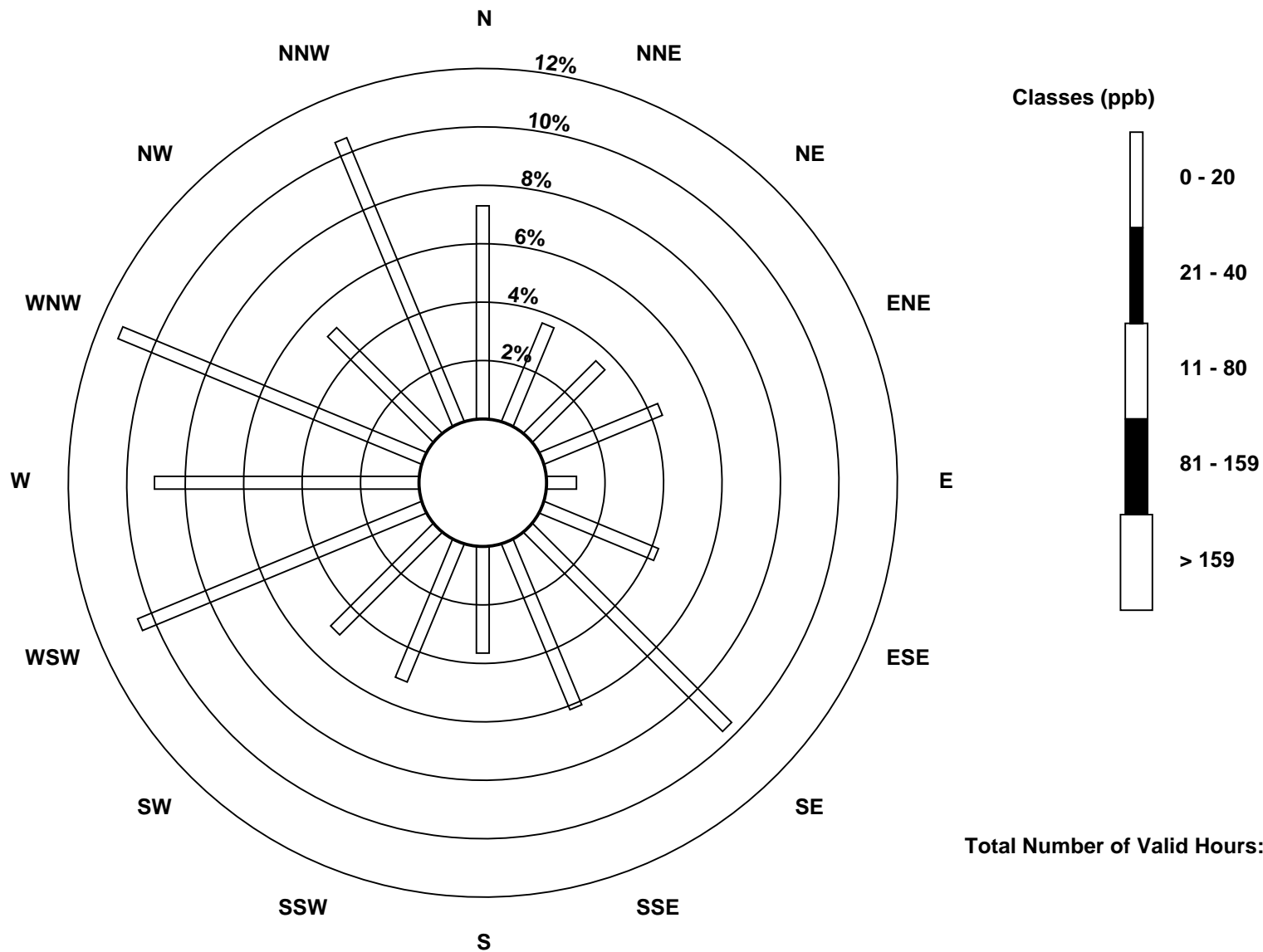
Total Number of Valid Hours: 685

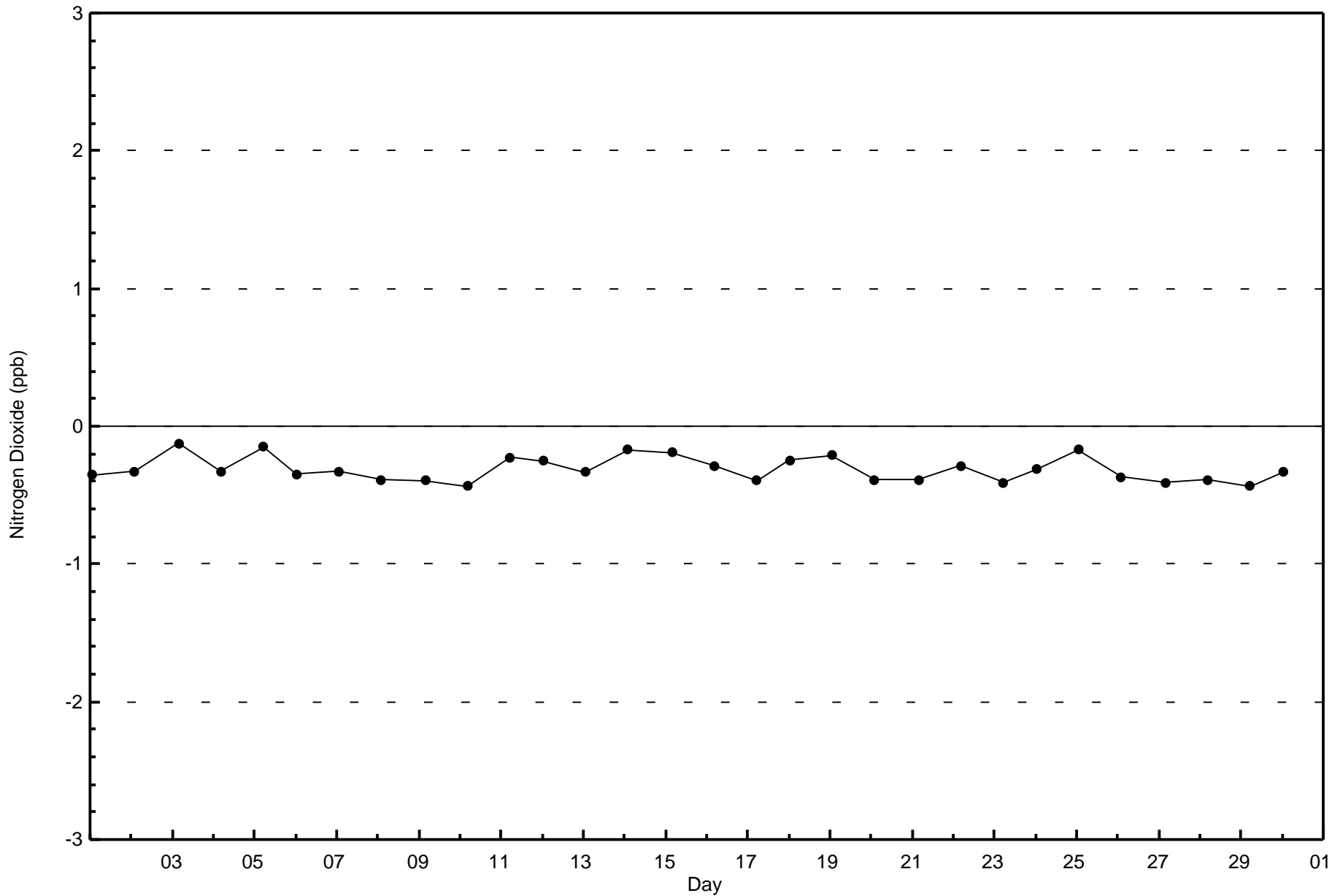
Total Number of Hours: 720

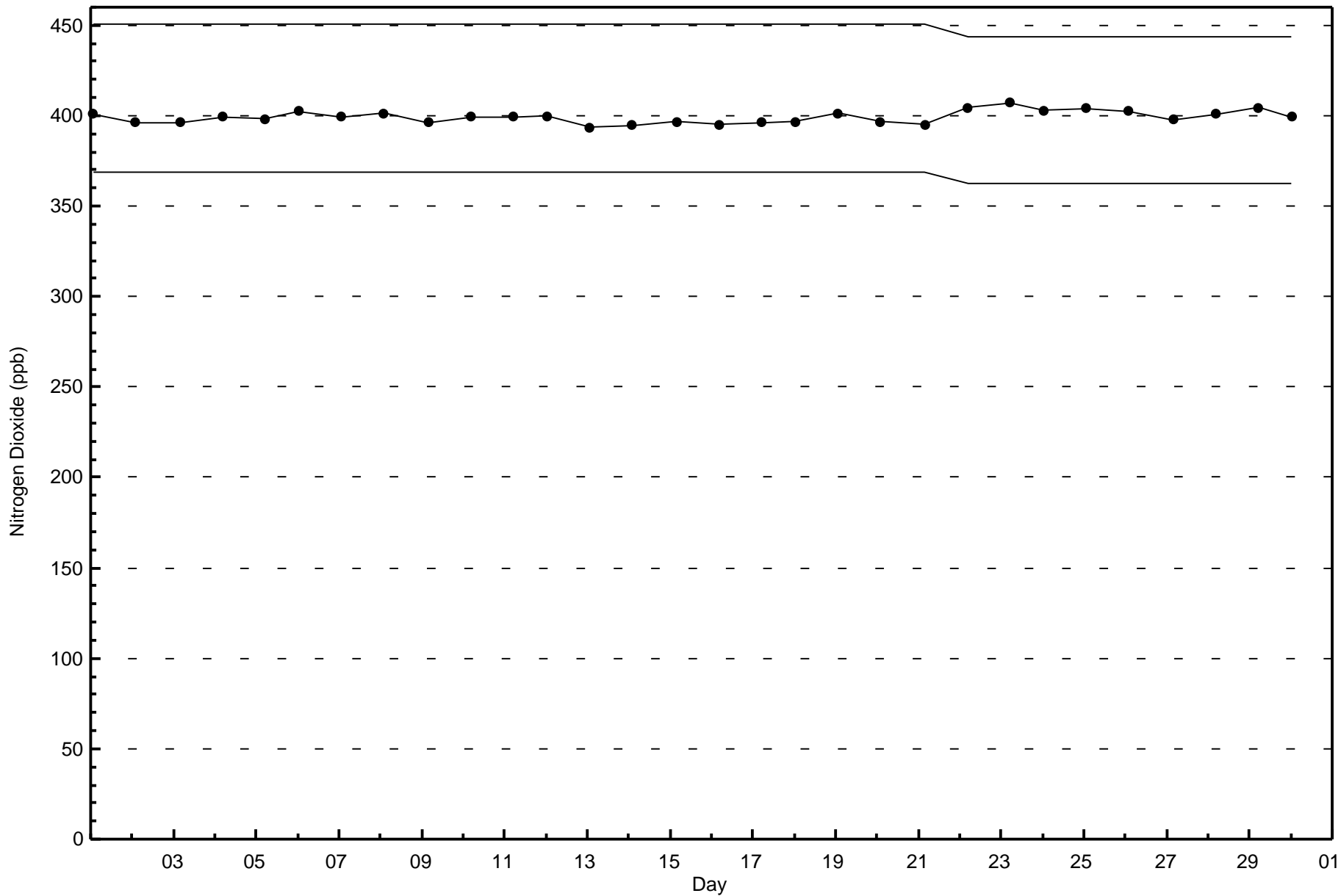


Wood Buffalo Environmental Association
Wind Rose Jun 2017

Nitrogen Dioxide (NO₂) - ppb
Surmont (AMS 502)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Surmont - June 2017

Maximum Value: 49 ppb on Jun 30 00:00	Maximum Daily Average: 11.5 ppb on Jun 11	Hours in Service: 720
Minimum Value: 0 ppb on Jun 14 21:00	Minimum Daily Average: 0.5 ppb on Jun 18	Hours of Data: 685
Maximum Diurnal Average: 5.3 ppb at hour 10	Minimum Diurnal Average: 1.4 ppb at hour 1	Hours of Missing Data: 35
Monthly Average: 3.1 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 8 P ₉₉ = 25	Hours of Calibration: 35
		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	1	Z	3	4	2	2	4	2	3	2	1	3	8	7	1	1	1	1	1	1	1	1	0	1	2.2	8
2-Jun	1	1	Z	1	1	1	1	1	2	2	1	0	1	1	1	1	0	14	20	6	0	0	1	3	2.5	20
3-Jun	0	0	0	Z	4	3	6	12	10	8	9	5	6	2	2	3	1	1	1	1	0	0	0	0	3.3	12
4-Jun	0	0	1	1	Z	1	2	2	3	2	2	2	2	1	2	2	2	3	2	8	1	1	1	2	1.9	8
5-Jun	1	1	2	2	2	Z	4	4	9	14	3	2	1	1	2	1	1	1	0	0	0	1	0	2.4	14	
6-Jun	Z	1	1	1	1	1	1	2	4	1	1	1	2	2	2	2	3	2	1	1	1	0	1	1	1.4	4
7-Jun	1	Z	1	1	1	5	3	2	2	3	2	2	1	1	1	1	5	3	1	2	1	1	1	1	1.7	5
8-Jun	1	1	Z	1	2	3	6	4	1	2	2	3	4	2	5	4	2	2	1	1	2	1	1	1	2.2	6
9-Jun	1	1	1	Z	1	2	2	3	3	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1.0	3
10-Jun	0	0	0	1	Z	0	1	2	0	1	0	0	0	0	8	1	3	1	0	5	0	12	25	2	2.9	25
11-Jun	4	0	7	11	16	Z	20	16	30	23	17	25	14	13	12	14	11	17	11	0	0	1	1	1	11.5	30
12-Jun	Z	2	1	4	1	1	1	4	6	10	8	11	8	8	4	10	1	1	1	1	1	1	1	1	3.8	11
13-Jun	1	Z	1	0	0	1	2	1	1	3	2	2	3	1	3	3	3	3	1	1	0	1	1	0	1.5	3
14-Jun	1	2	Z	3	3	2	2	1	1	1	2	1	1	1	1	0	0	0	1	0	0	0	1	1	1.1	3
15-Jun	2	3	2	Z	2	3	2	2	4	2	3	2	2	2	1	0	0	0	1	0	1	1	1	1	1.6	4
16-Jun	0	0	1	1	Z	1	1	1	1	1	1	3	1	1	1	2	1	1	1	1	1	1	0	0	1.0	3
17-Jun	1	1	1	1	1	Z	2	2	5	7	7	10	1	2	9	9	7	9	4	3	1	1	0	0	3.4	10
18-Jun	Z	1	1	1	1	1	1	2	1	1	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0.5	2
19-Jun	4	Z	0	1	1	5	13	4	2	0	8	4	7	6	2	1	1	1	0	1	0	0	0	1	2.7	13
20-Jun	1	1	Z	1	0	0	1	1	7	6	4	3	4	1	1	3	2	2	2	2	2	1	0	0	1.9	7
21-Jun	0	0	0	Z	0	0	0	3	2	4	C	C	C	C	C	0	0	0	0	2	26	4	2	2	2.5	26
22-Jun	0	1	1	0	Z	1	4	1	5	16	13	3	5	5	7	6	17	9	9	2	1	2	2	4	5.0	17
23-Jun	3	3	1	4	6	Z	3	7	6	9	6	9	8	17	16	4	3	6	8	1	1	0	0	1	5.2	17
24-Jun	Z	3	0	0	1	1	2	6	8	1	3	3	4	2	1	1	1	3	1	0	1	1	2	2	2.1	8
25-Jun	3	Z	9	7	3	4	3	4	1	1	2	2	1	3	2	3	3	4	1	2	1	1	1	1	2.6	9
26-Jun	2	2	Z	8	6	4	12	10	15	15	10	7	2	3	7	5	4	3	2	1	2	2	1	1	5.4	15
27-Jun	1	1	0	Z	7	2	3	4	1	13	8	1	7	5	2	5	11	2	0	1	1	1	4	2	3.5	13
28-Jun	2	1	2	2	Z	5	1	2	1	1	1	0	1	0	0	0	1	0	0	1	6	9	17	3	2.5	17
29-Jun	4	8	5	2	1	Z	1	1	3	7	3	1	5	21	12	11	11	2	1	3	8	15	37	49	9.1	49
30-Jun	Z	37	40	15	10	1	4	1	2	1	2	2	2	3	4	1	0	0	0	2	0	1	2	3	5.8	40

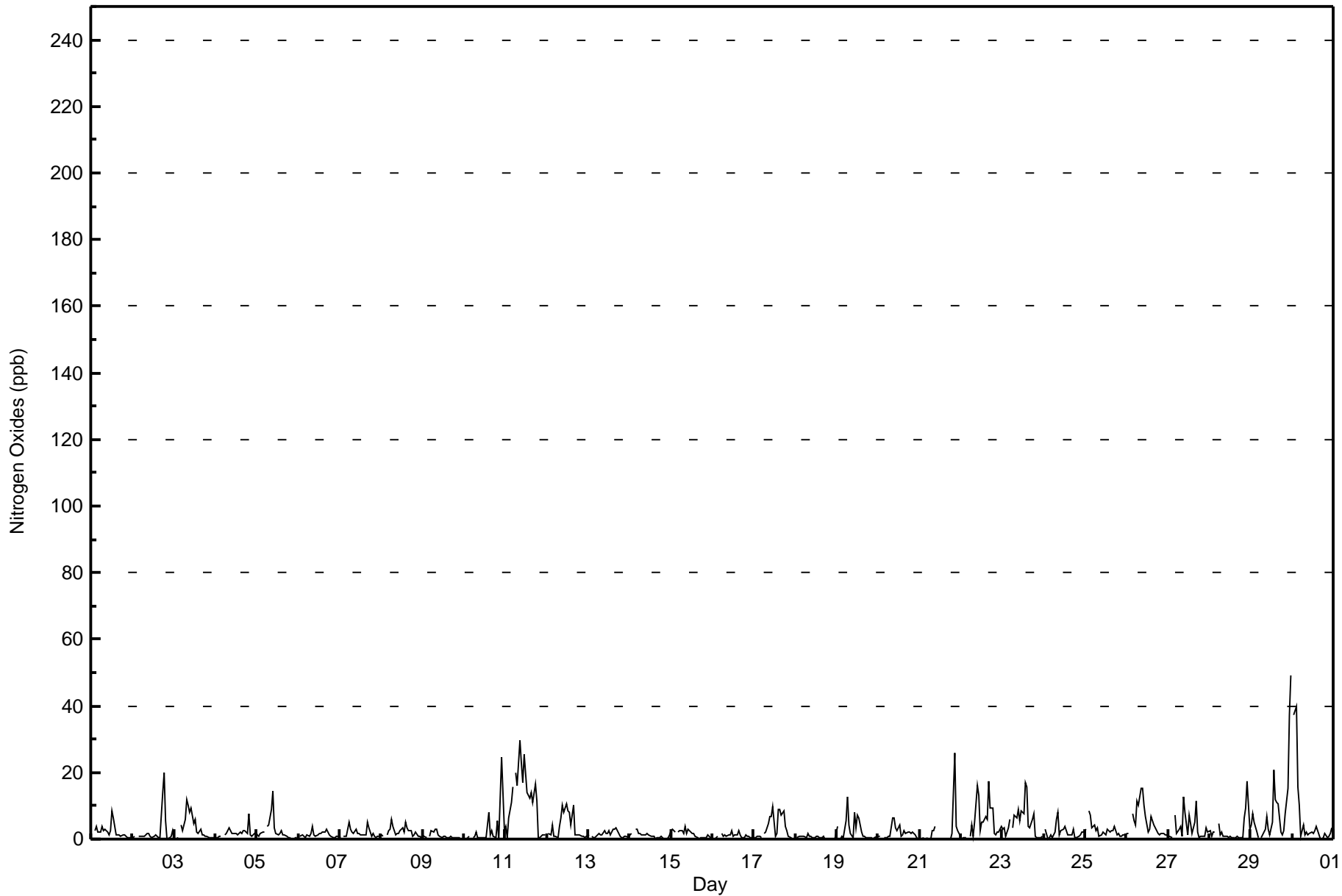
1.4	2.7	3.2	2.9	2.9	2.0	3.5	3.6	4.6	5.3	4.2	3.6	3.5	3.9	3.8	3.2	3.4	3.0	2.4	1.6	2.0	2.0	3.5	2.8		Diurnal Average
4	37	40	15	16	5	20	16	30	23	17	25	14	21	16	14	17	17	20	8	26	15	37	49		Diurnal Maximum

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Surmont - June 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	98.54	98.54
21 - 40	9	1.31	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont - June 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	25	24	30	7	29	66	42	25	35	34	68	62	77	30	72	675
21 - 40	1	0	0	0	0	0	0	0	0	0	0	3	0	0	5	0	9
11 - 80	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	25	24	30	7	29	66	42	25	35	34	72	62	77	35	72	685

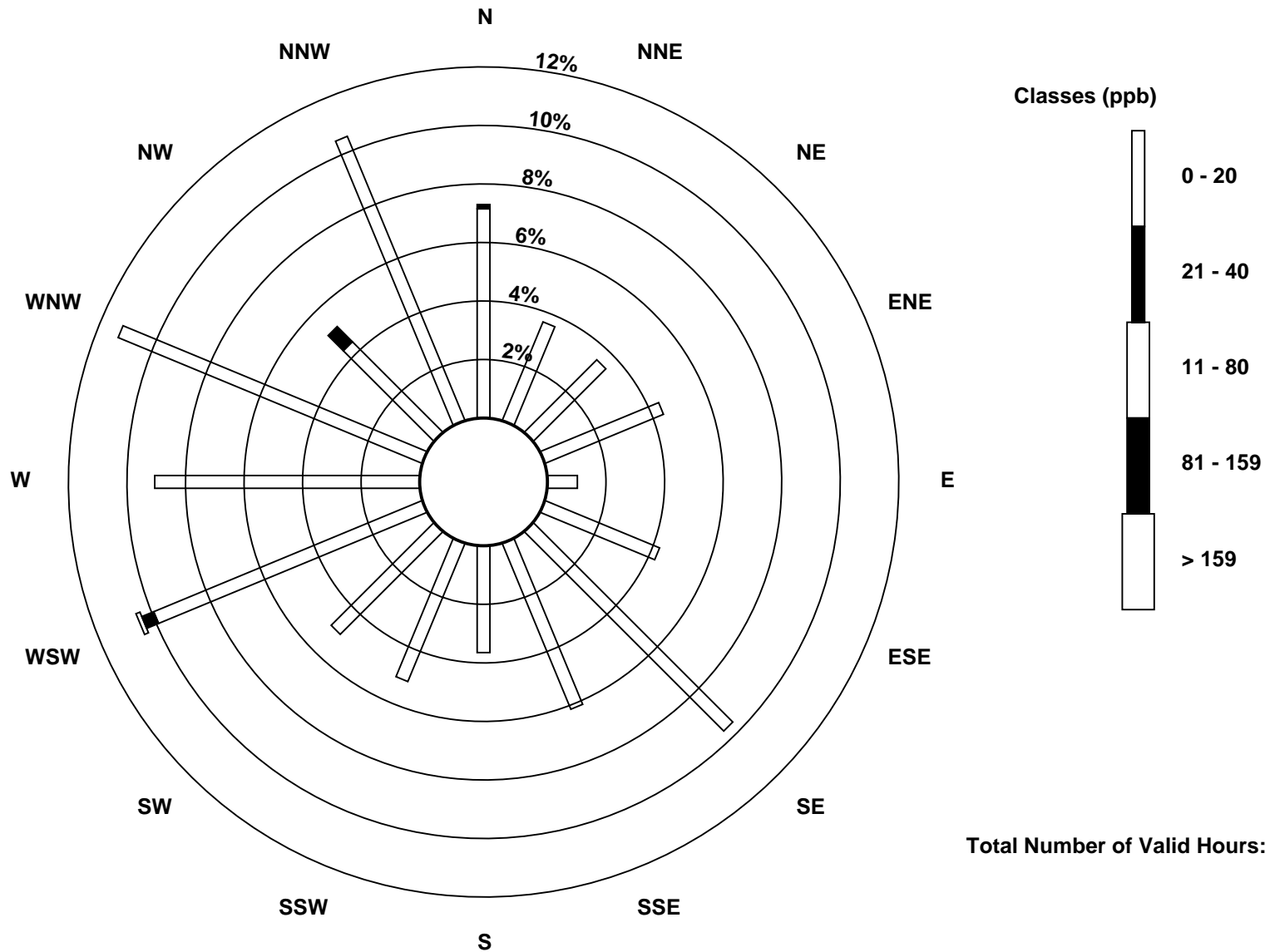
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

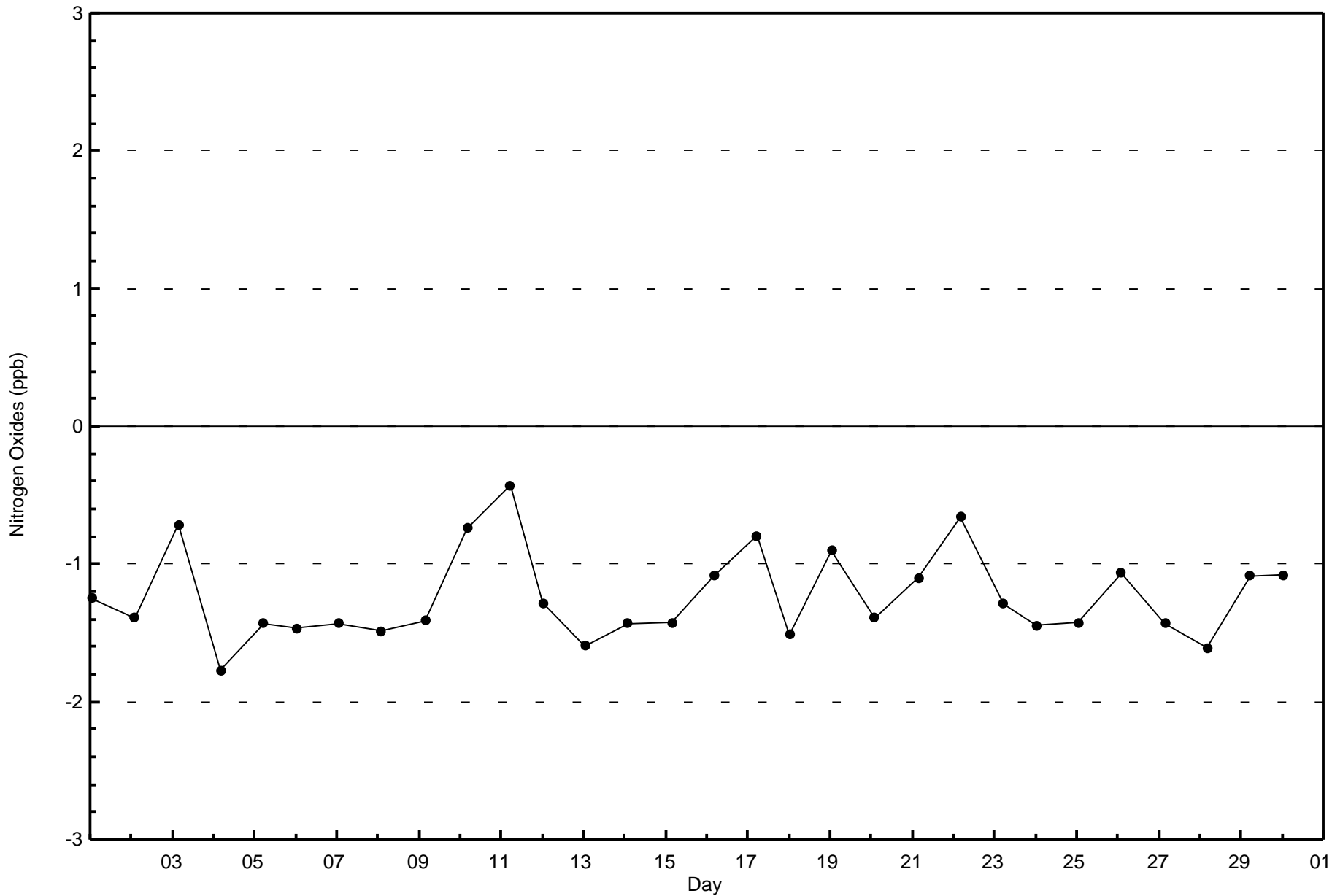
Nitrogen Oxides (NO_x) - ppb
Surmont (AMS 502)

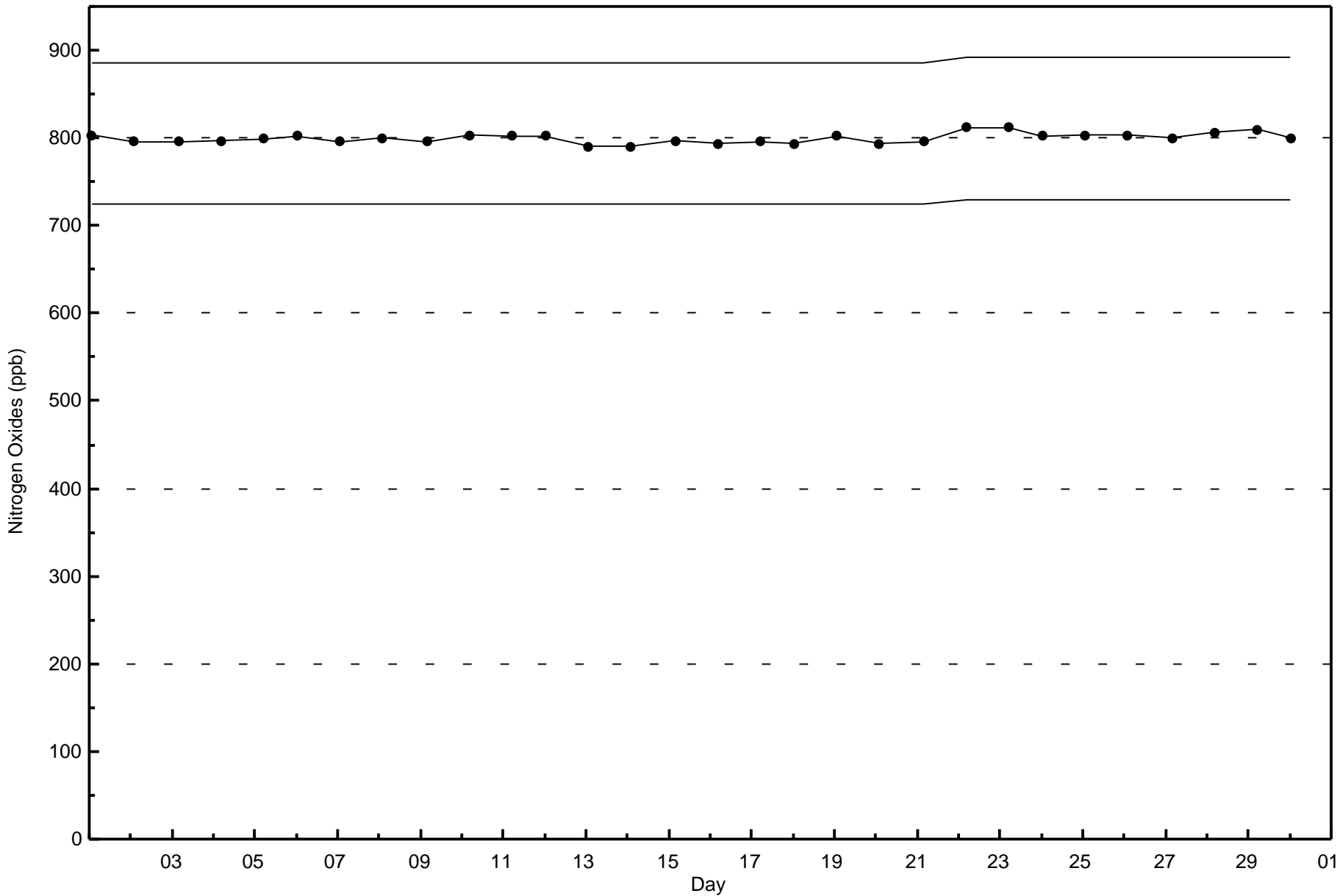




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Surmont - June 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

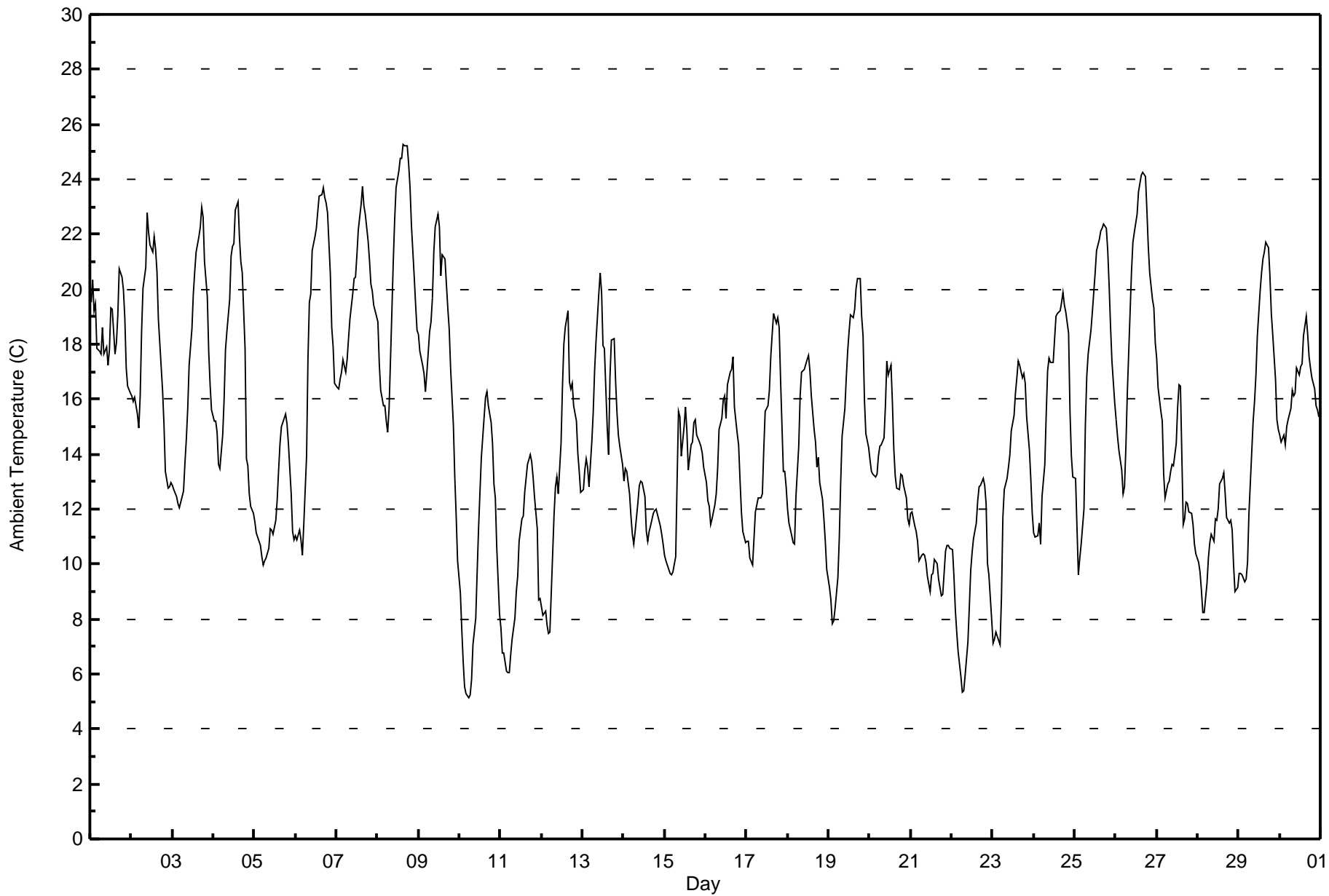
Surmont - June 2017

Maximum Value: 25.3 C on Jun 8 16:00		Maximum Daily Average: 20.6 C on Jun 8		Hours in Service: 720																																													
Minimum Value: 5.1 C on Jun 10 06:00		Minimum Daily Average: 9.5 C on Jun 22		Hours of Data: 720																																													
Maximum Diurnal Average: 17.7 C at hour 16		Minimum Diurnal Average: 11.4 C at hour 5		Hours of Missing Data: 0																																													
Monthly Average: 14.89 C		Percentiles: P ₁ = 5.9 P ₁₀ = 9.6 Q ₁ = 11.6 Median = 14.6 Q ₃ = 18.0 P ₉₀ = 21.1 P ₉₉ = 24.2		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jun	19.5	20.4	19.2	19.4	17.8	17.8	17.6	18.6	17.6	17.9	17.3	17.8	19.3	19.3	17.6	18.0	19.1	20.8	20.4	20.0	19.0	17.2	16.5	16.2	18.5	20.8																							
2-Jun	16.1	15.9	16.1	15.4	14.9	16.1	18.5	20.0	20.8	22.8	22.1	21.6	21.4	21.9	21.4	20.7	18.9	17.2	16.3	15.1	13.4	12.7	12.8	13.0	17.7	22.8																							
3-Jun	12.9	12.7	12.5	12.2	12.1	12.3	12.7	13.7	14.6	15.7	17.3	18.5	19.8	20.6	21.4	21.9	22.3	23.0	22.6	21.0	19.7	17.7	16.5	15.6	17.0	23.0																							
4-Jun	15.2	15.2	14.8	13.6	13.5	14.7	16.0	17.8	18.5	19.6	21.2	21.5	21.7	22.9	23.2	21.9	21.0	20.6	17.9	13.8	13.6	12.6	12.1	11.9	17.3	23.2																							
5-Jun	11.6	11.1	11.0	10.7	10.3	10.0	10.1	10.2	10.6	11.3	11.2	11.1	11.6	12.3	13.4	14.4	15.0	15.3	15.5	15.1	14.4	12.5	11.2	10.9	12.1	15.5																							
6-Jun	11.1	10.9	11.2	10.9	10.3	11.4	13.9	17.5	19.5	19.9	21.4	21.9	22.2	22.8	23.4	23.4	23.7	23.3	23.1	22.8	20.5	18.6	17.9	16.6	18.3	23.7																							
7-Jun	16.4	16.4	16.8	17.0	17.4	17.0	17.5	18.2	18.9	19.8	20.4	20.5	21.3	22.2	23.1	23.7	23.0	22.7	21.8	21.0	20.2	19.9	19.4	19.0	19.7	23.7																							
8-Jun	18.8	17.3	16.3	15.8	15.8	15.2	14.8	15.7	19.2	21.0	22.5	23.7	24.3	24.8	24.7	25.3	25.2	25.2	24.6	23.7	22.3	20.5	19.4	18.5	20.6	25.3																							
9-Jun	18.4	17.8	17.2	16.9	16.3	16.9	18.5	18.8	19.7	21.4	22.3	22.7	22.3	20.5	21.2	21.1	20.2	19.3	18.6	17.1	15.1	13.2	11.7	10.1	18.2	22.7																							
10-Jun	8.9	7.6	6.5	5.5	5.3	5.1	5.2	5.8	7.1	8.0	9.7	11.3	12.6	13.9	15.3	16.1	16.3	15.8	15.1	14.4	12.9	12.4	10.6	8.2	10.4	16.3																							
11-Jun	7.7	6.8	6.8	6.1	6.1	6.1	6.7	7.3	8.0	9.0	9.6	10.8	11.7	11.7	12.6	13.1	13.6	14.0	13.7	13.2	12.4	11.3	8.7	8.8	9.8	14.0																							
12-Jun	8.4	8.1	8.3	7.8	7.5	7.5	10.4	11.8	12.8	13.2	12.5	14.4	16.4	18.0	18.6	19.2	16.6	16.4	16.6	15.8	15.2	14.0	13.4	12.6	13.1	19.2																							
13-Jun	12.7	13.4	13.8	13.5	12.8	14.4	15.5	17.0	18.1	19.8	20.6	19.9	17.9	17.8	15.0	14.0	16.8	18.1	18.2	16.7	15.5	14.7	14.3	13.6	16.0	20.6																							
14-Jun	13.0	13.5	13.4	12.6	11.8	11.1	10.7	11.2	12.3	12.9	13.0	13.0	12.5	11.2	10.9	11.2	11.4	11.8	11.9	12.0	11.8	11.4	11.1	10.8	11.9	13.5																							
15-Jun	10.3	10.1	9.8	9.7	9.6	9.7	10.3	13.0	15.5	15.3	13.9	15.0	15.7	14.8	13.4	14.3	14.4	15.2	15.2	14.7	14.4	14.3	14.0	13.5	13.2	15.7																							
16-Jun	13.0	12.3	12.1	11.4	11.6	12.1	12.6	13.5	14.9	15.3	16.0	16.1	15.3	16.5	17.0	17.1	17.5	15.7	14.7	14.3	13.1	11.9	11.2	10.8	14.0	17.5																							
17-Jun	10.9	10.8	10.2	10.0	10.9	11.9	12.1	12.4	12.4	12.6	14.2	15.5	15.7	16.3	17.5	18.3	19.1	18.8	19.0	18.6	16.7	13.4	13.4	12.8	14.3	19.1																							
18-Jun	12.0	11.5	11.1	10.8	10.8	12.5	14.3	16.1	17.0	17.0	17.1	17.4	17.6	17.1	16.1	14.9	14.5	13.5	13.9	13.0	12.3	11.6	10.9	9.8	13.9	17.6																							
19-Jun	9.2	8.7	7.8	7.9	8.4	9.5	10.9	12.9	14.6	15.7	16.8	17.8	18.4	19.1	19.0	19.3	20.0	20.4	20.4	19.0	18.3	16.0	14.7	14.3	15.0	20.4																							
20-Jun	13.8	13.4	13.3	13.2	13.2	13.9	14.3	14.4	14.6	15.7	17.4	16.9	17.2	15.9	14.2	13.2	12.7	12.7	13.3	13.2	12.8	12.4	11.7	11.4	13.9	17.4																							
21-Jun	11.9	11.9	11.4	11.2	10.8	10.1	10.3	10.4	10.3	10.1	9.6	9.0	9.6	9.7	10.2	10.0	9.5	9.1	8.8	8.9	10.5	10.7	10.7	10.6	10.2	11.9																							
22-Jun	10.5	9.5	8.4	7.5	6.8	5.9	5.3	5.4	6.0	7.2	8.4	9.8	10.4	10.9	11.5	12.3	12.8	12.9	13.1	12.9	12.2	10.0	9.6	8.0	9.5	13.1																							
23-Jun	7.1	7.3	7.5	7.2	7.1	8.8	11.7	12.7	13.1	13.5	14.0	14.8	15.4	16.2	16.8	17.4	17.2	16.8	16.9	16.6	15.4	14.1	13.1	11.8	13.0	17.4																							
24-Jun	11.1	11.0	11.1	11.5	10.7	12.4	13.6	15.5	17.1	17.5	17.3	17.4	18.2	19.0	19.1	19.2	19.5	19.9	19.4	19.2	18.4	15.6	13.9	13.2	15.9	19.9																							
25-Jun	13.1	11.3	9.6	10.2	10.7	12.0	15.1	16.8	17.7	18.5	19.2	19.9	20.6	21.4	21.8	22.1	22.2	22.4	22.2	21.4	20.1	18.7	17.4	15.9	17.5	22.4																							
26-Jun	15.3	14.6	14.2	13.4	12.6	12.8	14.3	16.2	19.2	20.6	21.7	22.1	22.7	23.5	23.8	24.2	24.3	24.1	22.9	21.5	20.6	19.6	19.3	18.1	19.2	24.3																							
27-Jun	17.5	16.4	15.5	15.2	13.3	12.4	12.9	13.0	13.3	13.6	13.6	14.4	15.7	16.5	16.5	11.5	11.6	12.2	12.2	11.9	11.9	11.5	10.7	10.4	13.5	17.5																							
28-Jun	10.1	9.7	9.1	8.2	8.3	9.3	10.2	10.8	11.1	10.8	11.7	11.6	12.0	12.9	13.1	13.3	12.6	11.7	11.5	11.6	11.3	10.0	9.0	9.2	10.8	13.3																							
29-Jun	9.6	9.7	9.6	9.3	9.5	10.1	11.8	12.9	15.2	15.9	16.9	18.3	19.9	20.6	21.1	21.3	21.7	21.5	20.5	19.1	18.4	16.7	15.3	14.9	15.8	21.7																							
30-Jun	14.7	14.4	14.7	14.3	15.0	15.3	15.7	16.3	16.1	16.2	17.1	16.9	17.2	17.3	18.3	19.0	18.4	17.5	17.2	16.8	16.4	15.8	15.6	15.3	16.3	19.0																							
																								12.7	12.3	12.0	11.6	11.4	11.8	12.8	13.9	14.9	15.6	16.2	16.7	17.2	17.6	17.7	17.7	17.6	17.3	16.5	15.6	14.4	13.5	12.9	Diurnal Average		
																								19.5	20.4	19.2	19.4	17.8	17.8	18.5	20.0	20.8	22.8	22.5	23.7	24.3	24.8	24.7	25.3	25.2	25.2	24.6	23.7	22.3	20.5	19.4	19.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Surmont - June 2017

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	86	11.94	11.94
10 - 20	532	73.89	85.83
> 20	102	14.17	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

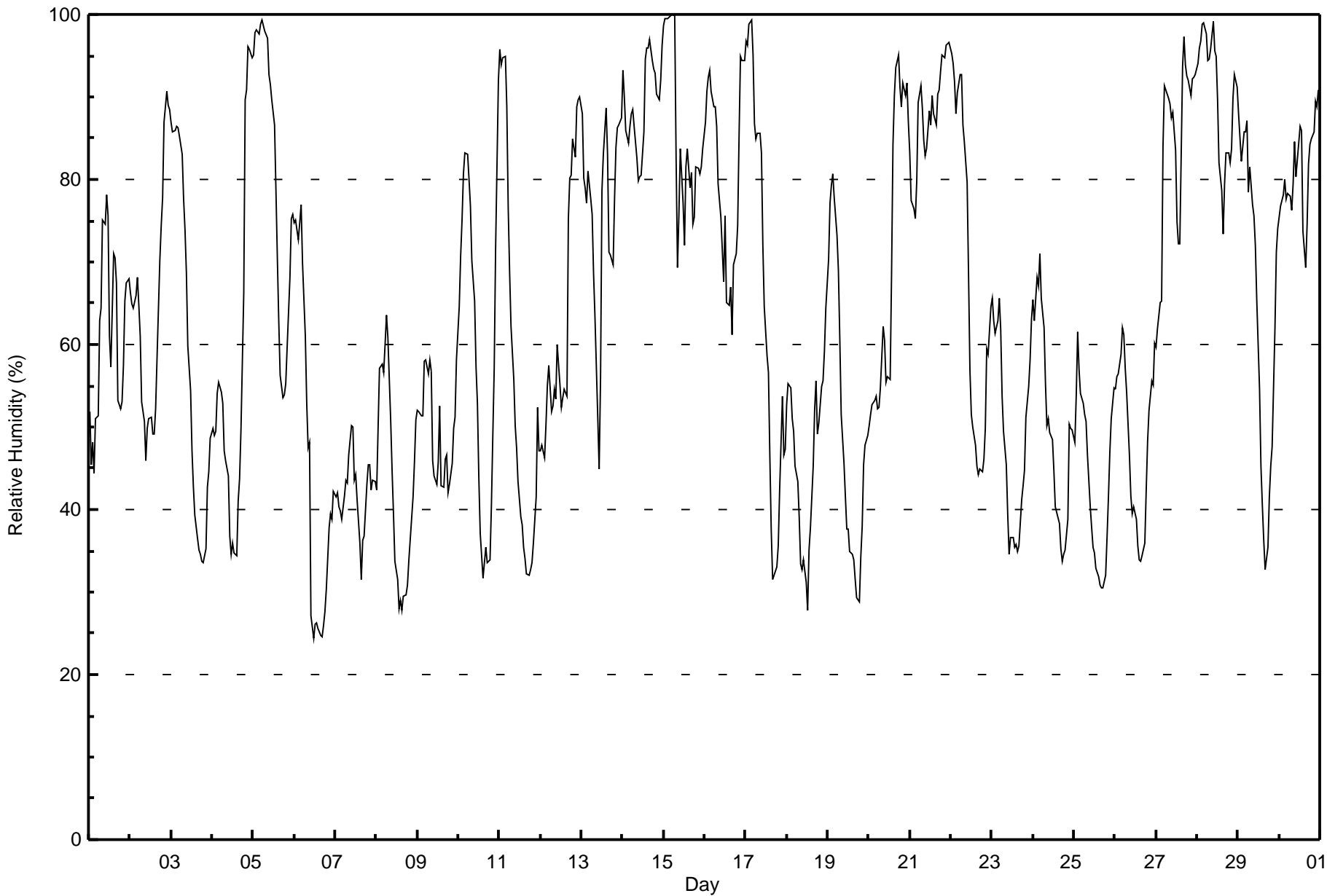
Surmont - June 2017

Maximum Value: 100 % on Jun 15 06:00																			Maximum Daily Average: 90.2 % on Jun 28						Hours in Service: 720	
Minimum Value: 24 % on Jun 6 12:00																			Minimum Daily Average: 42.1 % on Jun 7						Hours of Data: 720	
Maximum Diurnal Average: 74.0 % at hour 5																			Minimum Diurnal Average: 52.8 % at hour 16						Hours of Missing Data: 0	
Monthly Average: 63.6 %																			Percentiles: P ₁ = 27 P ₁₀ = 35 Q ₁ = 46 Median = 61 Q ₃ = 84 P ₉₀ = 93 P ₉₉ = 99						Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	52	45	48	44	51	51	63	64	75	75	78	76	61	57	71	70	67	53	52	53	58	65	67	68	61.1	78
2-Jun	66	65	64	66	68	65	61	53	51	46	50	51	51	49	49	52	58	70	74	78	87	91	89	89	64.3	91
3-Jun	87	86	86	86	86	85	83	78	74	69	60	54	47	43	39	36	35	35	34	34	35	43	45	49	58.7	87
4-Jun	50	49	49	54	55	54	53	47	46	44	37	35	36	35	34	41	44	50	66	90	91	96	96	95	56.1	96
5-Jun	95	98	98	98	99	99	99	98	97	93	91	90	87	79	70	63	56	54	54	55	60	68	75	76	81.3	99
6-Jun	75	75	73	75	77	70	61	53	47	48	27	24	26	26	25	25	26	28	30	38	39	39	42	44.8	77	
7-Jun	42	42	40	40	39	42	43	43	47	50	50	44	44	41	36	31	36	37	43	45	45	42	44	43	42.1	50
8-Jun	42	50	57	58	57	60	64	61	51	45	40	34	32	28	29	28	30	30	31	34	36	41	46	51	43.0	64
9-Jun	52	52	51	51	58	58	56	58	57	46	44	43	46	53	43	43	46	47	42	43	46	50	51	58	49.7	58
10-Jun	65	71	75	81	83	83	80	77	70	65	57	53	44	37	32	34	35	34	34	41	49	57	72	92	59.1	92
11-Jun	96	94	95	95	89	77	69	62	56	50	47	43	39	38	35	34	32	32	33	34	36	42	52	47	55.3	96
12-Jun	47	48	46	50	55	58	52	53	54	53	60	55	52	54	55	54	75	80	81	85	83	89	90	90	63.2	90
13-Jun	88	80	79	77	81	78	76	69	63	51	45	56	79	83	89	83	71	71	70	78	84	86	87	87	75.4	89
14-Jun	93	90	86	84	86	88	88	87	83	80	80	80	86	95	96	97	94	93	93	90	90	92	96	96	89.4	97
15-Jun	99	99	100	100	100	100	100	83	69	76	84	77	72	82	84	79	81	75	75	82	81	81	82	84	85.1	100
16-Jun	87	91	92	93	91	89	89	86	80	75	72	68	76	65	65	67	61	70	71	74	85	95	94	94	80.4	95
17-Jun	97	96	99	99	95	87	85	86	86	83	72	65	59	57	46	37	32	32	33	36	42	54	47	47	65.5	99
18-Jun	53	55	55	51	49	45	43	39	33	33	34	31	28	35	38	45	52	56	49	50	55	56	59	64	46.2	64
19-Jun	70	77	79	81	78	73	69	61	52	46	41	38	38	35	35	34	32	29	29	34	38	45	48	49	50.4	81
20-Jun	50	52	53	53	54	52	52	55	62	61	55	56	56	69	84	90	94	95	91	89	92	90	92	87	70.1	95
21-Jun	83	77	76	75	80	89	91	89	85	83	84	88	87	90	88	87	90	91	93	95	95	96	96	97	87.7	97
22-Jun	95	94	92	88	91	93	93	87	85	80	69	57	51	50	48	45	44	45	45	46	50	60	59	65	67.9	95
23-Jun	66	63	61	63	66	62	54	49	45	39	35	37	37	35	36	35	36	41	43	45	51	55	58	63	48.9	66
24-Jun	65	63	68	67	71	66	62	55	50	51	49	49	45	40	40	38	35	34	35	35	39	50	50	50	50.3	71
25-Jun	48	54	61	57	54	53	51	51	47	40	38	35	35	33	32	31	31	30	32	37	41	47	51	55	43.5	61
26-Jun	55	56	56	59	62	61	57	54	47	42	40	40	39	36	34	34	34	36	42	48	52	56	55	60	48.1	62
27-Jun	60	62	65	65	84	91	90	90	89	88	88	84	75	72	72	94	97	94	93	92	90	92	92	93	83.9	97
28-Jun	94	96	97	99	99	98	94	95	96	99	96	95	90	82	79	73	80	83	83	82	84	90	93	91	90.2	99
29-Jun	88	85	82	86	86	87	78	81	77	76	72	65	55	45	41	36	33	36	41	45	48	62	71	74	64.6	88
30-Jun	75	77	78	80	78	78	78	76	79	85	80	84	86	86	74	69	75	82	84	85	86	90	89	91	81.0	91
	71.2	71.4	72.1	72.5	74.0	73.0	71.2	67.9	65.1	62.3	59.2	56.9	55.2	54.3	53.3	52.8	53.8	54.7	55.8	58.9	62.2	67.2	69.3	71.6	Diurnal Average	
	99	99	100	100	100	100	100	98	97	99	96	95	90	95	96	96	97	95	93	95	95	96	96	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Surmont - June 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Surmont - June 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	115	15.97	15.97
40 - 60	237	32.92	48.89
60 - 80	153	21.25	70.14
80 - 100	215	29.86	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Surmont - June 2017

Maximum Speed: 36 km/h on Jun 21 11:00	Maximum Daily Speed Average: 28.7 km/h on Jun 21	Hours in Service: 720
Minimum Speed Value: 0 km/h on Jun 16 02:00	Minimum Daily Speed Average: 1.4 km/h on Jun 7	Hours of Data: 720
Maximum Diurnal Speed Average: 7.7 km/h at hour 5	Minimum Diurnal Speed Average: 1.9 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 4.1 km/h 295.3 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 11 Q ₃ = 16 P ₉₀ = 23 P ₉₉ = 33	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jun	SE5	SSE10	SSE12	SSE15	SSW6	SW6	NNW10	NNW5	N5	NW4	SW5	W9	NW15	NW14	WNW5	ESE5	ESE8	SE9	SSE10	S8	SSW8	SW8	WSW10	WSW12	SSW2.9	SSE15
2-Jun	WSW15	WSW12	W14	WSW12	WSW11	WSW9	W8	NW4	W2	NW3	W15	W19	W20	W20	W27	W29	W29	NW23	NW18	NNW21	W26	W30	NNW30	NNW25	W16.6	W30
3-Jun	WNW31	WNW31	WNW28	WNW27	WNW27	WNW26	WNW27	WNW24	WNW19	NW17	NW17	WNW18	WNW18	WNW18	W13	W14	W9	WSW7	WSW9	SW7	SW7	SW7	SW8	SW8	NNW16.2	WNW31
4-Jun	SW9	SW9	SW8	WSW11	WSW10	WNW7	WNW4	ESE6	ESE9	SE8	ESE7	ESE10	SE7	NE6	ESE10	NNE11	N15	N19	NNW12	NW20	NNW17	NNW20	NNW21	NNW18	NNW4.3	NNW21
5-Jun	N16	NNW19	NNW18	NNW16	NNW16	NNW20	NNW21	NNW20	NNW21	NNW22	N26	N23	NNW20	NNW21	N19	N19	N18	NNE12	NNE5	S3	SSW5	SSW5	SSW4	SW9	NNW13.7	N26
6-Jun	SW8	SSW8	SSW10	SSW9	SW12	WSW12	WSW10	SW4	E4	SSE6	W16	W14	W15	W13	W10	W12	W12	WNW9	W8	W8	WSW6	SW6	WSW9	WSW12	WSW8.4	W16
7-Jun	WSW15	WSW15	WSW15	W14	W12	NNE1	WNW2	NNE4	ENE5	NE6	NNE10	NNE10	NNE8	NE6	ENE7	ESE9	SE7	SE8	SE7	SE8	SE7	SE9	SE9	SE10	SE1.4	WSW15
8-Jun	SE10	ESE6	ENE5	ESE6	SE6	SE7	SE6	SE7	ESE8	SE11	SE14	SE15	SE14	SE15	SE13	SE14	ESE15	ESE14	SE11	SE8	SE7	ESE8	SE10	SE12	SE9.9	SE15
9-Jun	SSE11	SSW7	SSW5	SSW5	WSW3	NW1	NE3	N9	NNE18	NE21	NE21	ENE21	NE23	ENE20	NE26	ENE23	NE22	ENE22	ENE22	E17	ENE16	ENE12	NE15	NE14	ENE12.1	NE26
10-Jun	ENE15	ENE11	NE10	NE9	NE10	ENE11	ENE12	ENE11	NE11	ENE8	NE12	NNE10	NE5	E3	N3	N8	N10	N14	N9	NNW12	W4	WNW19	NW20	NNW15	NNE7.3	NW20
11-Jun	NNW14	N15	NW13	NW13	NW15	NW16	NW19	NW22	NW26	NW25	NNW26	NW23	NNW21	NW22	NNW20	NW19	NW19	NW19	NW14	N11	N8	NNW7	NW2	ESE2	NW15.4	NW26
12-Jun	SE8	SE11	SSE15	S11	S8	SSW7	SSW8	S13	SSE19	S19	SSE19	SSE22	S20	S19	S16	S19	SW11	SSW9	S14	SSW12	SSW13	SSW10	SSW12	SSW12	S12.8	SSE22
13-Jun	SW11	SW10	SSW10	SW12	SW10	SW11	SSW10	WSW12	SSW6	N5	N10	NE10	SE11	ESE8	SSW4	SE10	SSE4	SE10	SE10	SE10	SE5	SSE5	WSW3	WSW2	S4.5	WSW12
14-Jun	NNW9	NNW10	NNW14	NNW14	NNW16	NNW18	NNW18	NNW16	N15	N17	N17	N18	N16	N16	N18	N16	N16	N17	NNW18	NNW19	NNW20	NNW21	NNW20	NNW18	NNW16.4	NNW21
15-Jun	NNW16	NNW14	N11	NNW9	WNW9	NNW7	WNW8	WSW8	WNW5	NE6	NE10	NE5	NNE3	ESE2	WSW6	W8	W5	N5	NNE6	NNE4	N4	NNE3	ESE5	ESE6	NNW3.9	NNW16
16-Jun	SE5	WSW0	S2	SSE2	SE6	S4	SE4	SE5	SE4	ESE9	SE10	S6	ENE8	ENE5	ESE9	ESE9	ENE0	W16	S5	S5	ESE5	SE6	ESE8	SE9	SE4.0	W16
17-Jun	SSE7	SE5	SSE6	S6	W10	WNW14	WNW15	WNW23	WNW24	WNW23	WNW21	WNW20	WNW25	WNW20	WNW17	NW19	NW19	NW14	NNW12	NW8	WSW5	SE1	WSW8	WSW11	WNW11.5	WNW25
18-Jun	WSW13	WSW13	WSW15	WSW15	WSW17	WSW16	WSW13	WSW13	WSW14	WSW16	WSW18	WSW20	SSW11	WSW14	W25	W16	SSE6	SW8	W17	W12	SW6	W13	WNW14	WNW16	WSW13.2	W25
19-Jun	WNW17	WNW13	WNW17	WNW16	WNW19	WNW19	NW14	NNW14	N13	N15	NNW11	N9	NW8	W6	N7	NNE4	ENE7	ENE1	SW5	SW5	SW6	SW7	WSW8	WSW10	WNW7.6	WNW19
20-Jun	WSW10	WSW8	SW7	SW7	SW7	SW6	S9	S12	SSE11	SSE11	SSE12	SSE14	SSE14	SSW10	SSW10	SSE15	SE17	SE15	SSE17	SSE16	SSE14	S15	SSW10	WSW11	S9.8	SSE17
21-Jun	W22	W28	W29	W27	W31	W31	W29	WNW31	WNW34	WNW34	WNW36	WNW36	WNW35	WNW32	WNW32	WNW36	WNW33	WNW36	WNW31	WNW24	NW25	NNW30	NNW26	NNW25	WNW28.7	WNW36
22-Jun	NNW25	NNW31	NNW32	NNW29	NNW27	NNW28	NNW27	NNW26	NNW24	NNW23	NNW28	NNW27	NNW29	NNW27	NNW26	NNW25	NNW24	NNW19	NNW18	NNW15	N10	WNW6	WNW7	W4	NNW22.0	NNW32
23-Jun	WSW10	WSW13	WSW12	WSW12	WSW10	WSW9	W9	NW13	N15	NNW16	NNW16	NNW15	NNW18	NNW19	NNW20	N15	NNW14	WNW13	NW11	W9	W9	W8	WSW11	WSW11	NNW9.7	NNW20
24-Jun	WSW10	WSW10	W15	WNW11	WNW11	WNW11	WNW12	N9	N7	NE12	NNE11	NNE8	N10	N13	NNE13	NNE15	NNE9	NNE11	NNE8	NE9	N7	NW7	WNW5	WNW5	NNW6.5	NNE15
25-Jun	WNW6	W6	WSW9	SW7	SSW6	WSW7	WSW2	E4	ENE6	ENE7	ESE7	ESE4	SE9	SE13	SE16	SE17	SE17	SE15	SE16	SE15	SE17	S12	S12	SSW10	SSE7.1	SE17
26-Jun	S14	S15	S15	SSE16	SSE20	SSE17	SSE19	SSE23	SSE25	SSE25	SSE24	SSE26	SSE26	SSE23	SSE22	SSE20	SSE14	SE14	SE12	SE11	SE14	SSE18	SE9	SSE17.8	SSE26	
27-Jun	SSE10	SE4	SE7	S5	W17	WNW22	WNW19	W10	WNW11	W12	W12	WNW10	WNW9	NNE6	NE8	W9	WSW8	WNW11	W9	WSW10	SW6	SSW8	SW9	WSW10	W7.0	WNW22
28-Jun	WSW9	WSW8	S2	WNW2	W4	NNW3	N7	NNE8	NE10	NE7	ENE11	ENE13	ENE15	ENE15	ENE15	E12	E13	ENE11	E8	ESE6	SW4	SW5	WSW6	WSW9	ENE3.8	ENE15
29-Jun	WSW9	WSW8	SW9	WSW12	WSW13	SW9	SSW9	SSW8	WSW5	SE4	SE7	ENE5	NNE8	N13	NNW13	N13	N16	N11	WNW8	W8	W2	WSW7	WSW10	WSW13	W4.2	N16
30-Jun	WSW12	WSW11	WSW9	W9	W10	WNW8	NW9	N6	ESE6	SE8	SE7	ESE4	WNW7	WSW7	SW5	W8	W10	W10	W10	WNW9	WNW9	WNW4	SSW3	SSW4	W5.0	WSW12

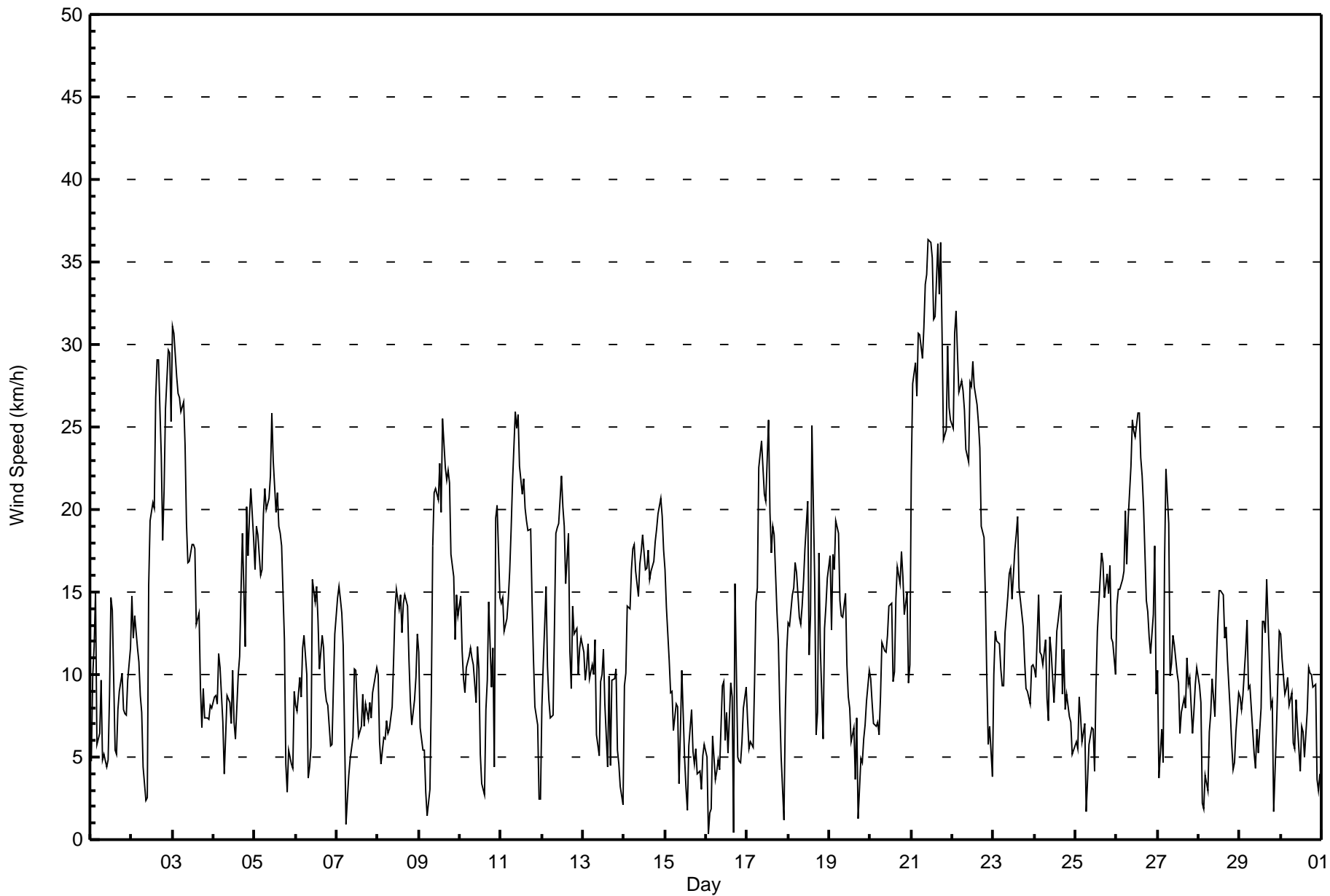
W5.5	W5.8	W6.1	W6.5	W7.7	WNW7.2	WNW7.1	NW5.2	NNW4.4	NNW3.6	NNW4.3	NNW4.0	NW4.5	NW4.3	NW4.2	NNW3.6	NNW3.6	NNW3.8	NW2.2	NNW2.3	W1.9	W3.4	W4.0	W4.5	Diurnal Average
WNW31	NNW31	NNW32	NNW29	W31	W31	W29	WNW31	WNW34	WNW34	WNW36	WNW36	WNW35	WNW32	WNW32	WNW36	WNW33	WNW36	WNW31	WNW24	W26	NNW30	WNW30	NNW25	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Surmont - June 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - June 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	94	13.06	13.06
6 - 11	283	39.31	52.36
12 - 19	226	31.39	83.75
20 - 28	90	12.50	96.25
29 - 38	27	3.75	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - June 2017**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	7	3	6	3	7	10	3	7	8	7	6	6	9	5	2	94
6 - 11	17	14	13	12	1	20	39	10	6	24	29	42	23	21	5	7	283
12 - 19	26	4	4	8	3	2	19	19	13	4	2	29	22	20	17	34	226
20 - 28	2	0	5	5	0	0	0	11	1	0	0	1	8	20	9	28	90
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	7	15	0	5	27
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	25	25	31	7	29	68	43	27	36	38	78	66	85	36	76	720

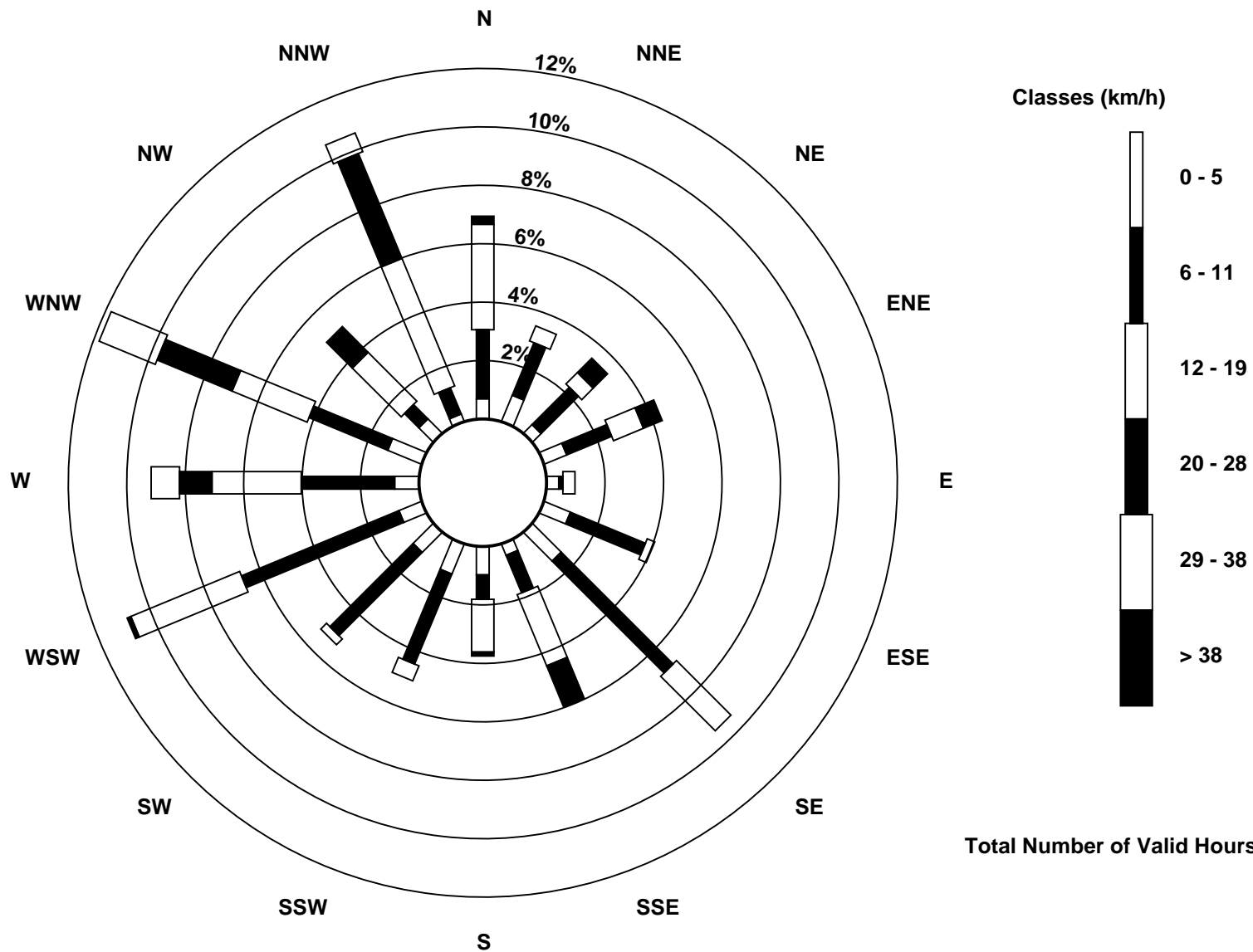
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Jun 2017

Wind Speed (WS) - km/h
Surmont (AMS 502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Surmont - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jun 21 16:00 Minimum Value: 1 km/h on Jun 8 21:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	3	3	4	4	3	2	2	3	3	3	1	3	3	4	3	1	2	2	2	3	2	1	2	5	5
2-Jun	2	2	2	2	1	1	1	2	1	2	5	4	4	4	5	6	6	5	4	4	5	5	6	5	6
3-Jun	5	6	6	6	5	6	5	6	4	4	4	4	5	5	4	4	4	2	2	1	1	1	1	1	6
4-Jun	1	1	1	2	2	3	2	3	2	2	3	3	3	3	4	6	3	4	5	6	3	4	3	4	6
5-Jun	3	3	3	4	4	4	4	4	4	4	5	6	5	4	4	4	4	3	2	2	2	1	2	1	6
6-Jun	2	2	2	3	2	2	1	1	2	3	5	6	5	5	5	5	4	3	2	2	3	4	1	2	6
7-Jun	2	2	2	2	3	1	1	1	1	2	3	2	2	1	2	3	1	1	1	1	1	2	1	2	3
8-Jun	2	1	1	1	2	1	1	2	1	2	3	5	4	4	4	4	3	4	3	1	1	1	1	2	5
9-Jun	3	2	1	1	2	1	1	2	4	5	5	6	7	5	6	6	6	5	5	5	4	3	3	3	7
10-Jun	3	3	3	2	3	3	4	3	3	4	4	4	4	3	3	3	4	4	2	5	4	6	5	3	6
11-Jun	5	3	2	3	3	3	4	5	6	5	6	5	5	5	5	4	5	4	4	3	1	2	1	2	6
12-Jun	2	2	3	4	4	2	3	3	5	5	4	5	5	5	5	5	5	3	4	3	4	3	3	3	5
13-Jun	3	2	3	3	2	3	3	4	2	3	3	3	2	4	3	4	2	2	2	3	4	3	2	1	4
14-Jun	2	2	3	3	3	3	3	2	3	3	4	4	3	4	4	3	3	3	3	3	3	3	3	3	4
15-Jun	2	4	2	1	2	2	2	4	2	4	2	2	2	2	2	1	1	1	1	1	1	1	1	1	4
16-Jun	2	1	1	1	1	1	1	1	2	2	2	3	3	2	2	2	2	4	3	1	2	1	2	2	4
17-Jun	2	2	2	2	4	3	4	4	4	5	5	5	6	4	4	5	5	4	3	2	2	1	3	1	6
18-Jun	2	2	1	2	3	2	2	2	3	3	5	6	5	8	5	4	4	5	5	4	2	3	2	2	8
19-Jun	3	2	4	3	4	3	3	3	3	4	4	4	5	4	3	2	2	3	2	1	1	1	2	2	5
20-Jun	2	2	1	1	1	1	3	2	3	3	3	3	4	4	3	3	3	2	3	4	3	4	3	4	4
21-Jun	8	5	6	5	5	6	6	7	7	7	8	7	7	6	6	9	6	7	6	5	5	6	5	5	9
22-Jun	6	7	6	7	6	6	6	6	5	6	6	6	6	6	6	6	5	5	4	4	2	2	1	2	7
23-Jun	3	1	1	1	1	1	2	4	4	4	6	5	5	5	5	4	4	3	3	1	2	1	1	1	6
24-Jun	1	1	3	2	2	2	2	2	3	3	3	3	5	5	5	5	4	4	3	3	3	2	1	1	5
25-Jun	2	3	1	1	2	1	2	1	2	2	3	3	4	4	4	4	4	3	4	3	3	3	3	3	4
26-Jun	3	4	4	4	3	4	4	5	6	6	5	5	5	6	7	5	5	4	4	2	2	2	5	2	7
27-Jun	3	2	2	2	8	4	4	5	2	2	2	3	3	2	4	6	5	3	2	3	3	2	2	4	8
28-Jun	2	1	2	1	1	2	1	2	3	2	3	4	4	4	4	3	3	2	2	2	2	1	2	2	4
29-Jun	2	2	2	3	3	2	3	3	2	3	3	3	4	4	4	4	4	3	2	2	2	2	1	2	4
30-Jun	2	1	2	1	2	2	2	2	2	1	2	2	3	2	2	2	2	1	2	2	1	2	1	1	3
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Surmont - June 2017

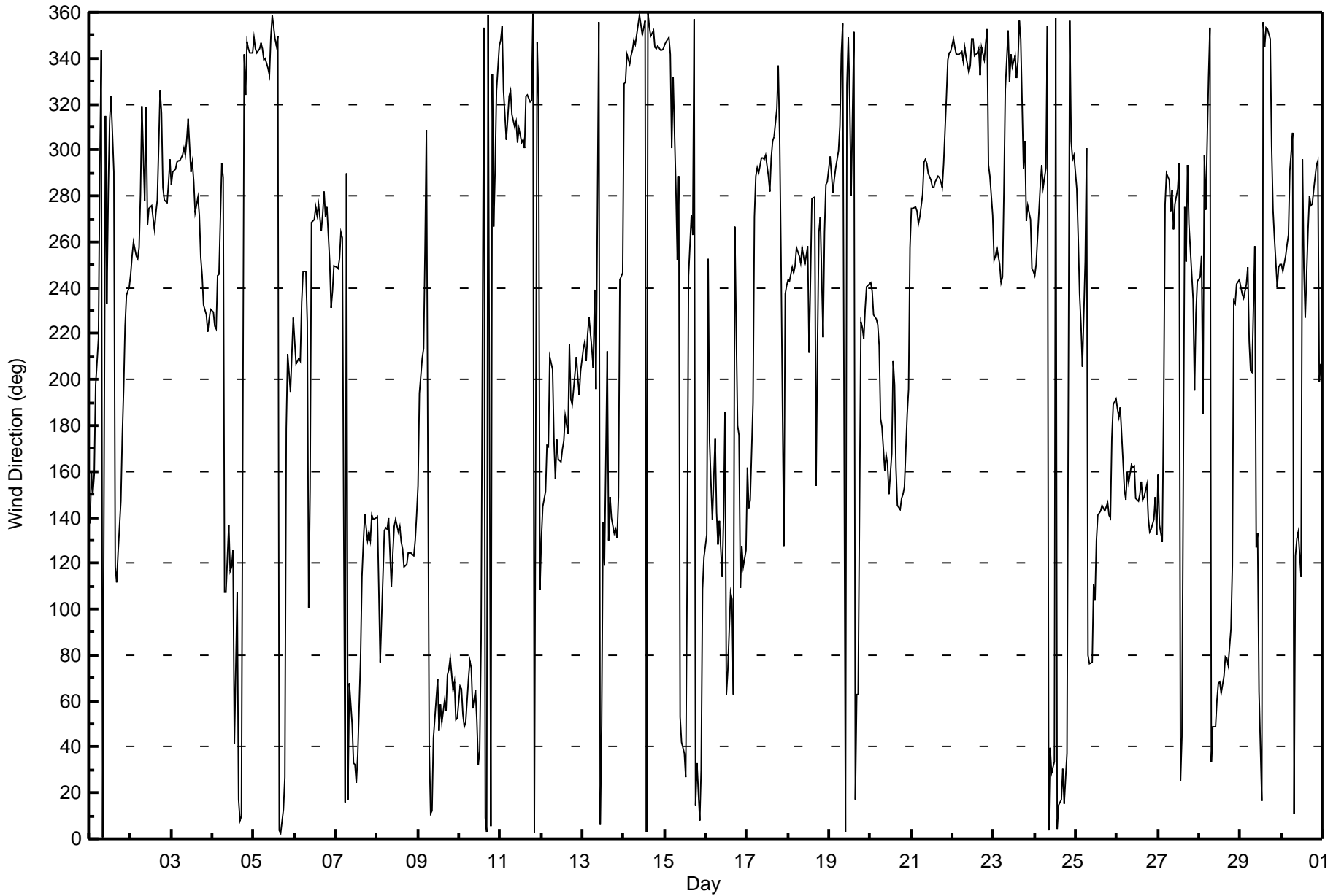
Direction of Maximum Speed: 290 deg on Jun 21 11:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 291.1 deg on Jun 21	Hours of Data: 720
Direction of Minimum Speed: 252 deg on Jun 16 02:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.4 deg on Jun 7	Percent Operational Time: 100.0
Monthly Average Direction: 284.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	137	159	150	159	198	218	292	344	0	315	233	281	313	323	290	118	112	125	147	175	197	224	237	241	212.4
2-Jun	246	254	260	254	252	257	281	319	277	318	267	275	276	270	265	273	278	326	316	283	278	277	286	296	278.2
3-Jun	285	291	291	295	296	295	298	301	298	305	314	291	294	286	272	280	271	254	245	233	228	221	226	230	286.2
4-Jun	230	223	222	245	246	294	288	107	137	117	119	126	42	108	17	8	10	341	324	347	344	342	342	342	347.8
5-Jun	349	344	342	344	347	344	339	340	336	333	349	359	348	346	350	4	3	13	27	179	211	195	211	227	345.1
6-Jun	217	207	210	208	234	247	247	225	101	152	268	270	275	272	276	265	272	282	271	275	252	231	238	249	251.5
7-Jun	249	249	253	264	261	16	290	17	68	50	33	32	25	37	78	114	129	141	130	133	130	141	139	139	143.1
8-Jun	140	109	77	115	134	135	135	140	110	124	136	139	134	136	129	126	118	120	125	125	124	123	130	141	128.0
9-Jun	154	194	209	213	256	309	40	11	12	44	53	70	47	58	51	60	56	71	74	79	65	68	52	52	59.2
10-Jun	66	65	55	49	51	70	77	75	56	65	52	32	39	87	354	9	3	359	6	333	267	291	326	345	25.3
11-Jun	348	354	326	305	314	323	326	315	310	312	303	309	303	304	301	323	324	321	322	359	3	347	322	109	319.1
12-Jun	131	145	152	171	171	210	205	173	157	174	165	164	169	173	184	176	215	192	189	196	210	201	193	204	177.8
13-Jun	214	216	208	219	227	214	205	239	196	355	6	49	138	119	212	130	149	140	133	135	131	149	243	247	180.5
14-Jun	329	329	342	338	341	344	348	346	355	359	354	350	356	3	360	354	349	352	345	344	345	343	344	344	347.8
15-Jun	346	347	349	342	301	332	282	252	288	53	42	37	27	113	245	272	263	357	14	33	8	30	108	123	343.3
16-Jun	133	252	173	155	139	174	142	128	139	114	140	186	63	73	108	104	63	266	180	176	109	128	118	126	133.5
17-Jun	162	144	147	190	271	289	292	290	297	297	296	298	289	282	296	304	306	318	337	306	253	128	237	241	289.4
18-Jun	243	243	249	246	250	257	254	251	258	254	250	258	212	243	279	280	154	215	264	271	218	264	285	286	255.6
19-Jun	297	289	282	287	292	299	311	342	355	3	328	349	321	280	352	17	63	63	225	223	218	231	240	242	303.7
20-Jun	242	239	228	227	224	215	183	180	160	167	163	150	168	208	198	161	145	143	148	150	153	185	196	257	177.5
21-Jun	274	275	275	273	268	271	281	295	296	294	290	287	284	284	286	289	288	286	284	294	323	339	342	343	291.1
22-Jun	348	345	342	342	341	343	338	345	340	334	337	348	348	341	342	344	332	345	339	347	353	294	288	271	340.9
23-Jun	252	254	258	250	242	245	281	326	352	330	342	336	341	331	339	356	348	292	304	269	276	270	248	247	304.5
24-Jun	246	250	273	285	293	284	292	354	4	40	29	33	357	5	15	17	30	15	26	37	357	304	296	298	341.4
25-Jun	283	262	237	224	206	252	301	80	76	77	111	104	130	141	143	145	144	143	146	141	140	175	189	192	155.4
26-Jun	187	184	188	164	152	148	160	155	163	162	162	148	147	150	156	148	149	155	139	134	135	139	149	133	154.8
27-Jun	159	137	129	190	276	290	287	274	282	266	277	283	294	25	45	275	252	294	268	257	235	195	229	243	267.4
28-Jun	245	254	185	298	274	332	353	33	49	49	60	68	68	63	71	79	79	76	92	119	234	233	241	244	64.8
29-Jun	241	238	236	241	249	217	204	203	258	127	133	64	16	356	345	353	353	349	301	274	262	240	249	250	277.4
30-Jun	250	247	254	259	263	291	308	11	123	131	134	114	296	249	227	266	280	276	277	282	293	295	199	207	263.7

262.9 269.7 268.3 266.4 273.7 284.8 293.7 310.4 327.8 336.4 326.6 329.0 322.3 318.5 317.4 328.1 332.8 333.3 304.7 282.3 276.0 266.7 266.7 265.6

Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Surmont - June 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Jun 16 17:00 Minimum Value: 6 deg on Jun 7 00:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 18 Q ₃ = 26 P ₉₀ = 46 P ₉₉ = 81																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jun	30	22	17	21	46	30	19	68	59	60	24	21	23	24	74	29	15	16	16	24	23	16	15	20	74
2-Jun	8	8	8	11	8	10	12	43	52	76	21	14	15	15	11	11	13	21	15	17	10	10	12	11	76
3-Jun	10	10	10	13	11	12	12	14	14	20	26	18	19	20	22	27	31	28	19	15	11	13	14	14	31
4-Jun	12	12	14	13	14	34	49	33	22	22	40	27	36	43	26	37	18	16	54	31	13	11	10	14	54
5-Jun	19	10	12	13	12	11	13	14	14	15	18	18	14	13	19	19	20	24	46	57	23	40	65	13	65
6-Jun	19	23	23	23	17	9	7	36	51	64	22	24	30	35	40	30	24	24	18	8	68	81	13	6	81
7-Jun	7	7	8	8	13	82	68	35	18	21	22	18	19	21	22	29	13	14	10	9	8	9	10	10	82
8-Jun	11	21	23	10	20	10	11	16	16	20	19	21	21	17	22	19	16	19	12	10	10	9	9	10	23
9-Jun	21	25	28	18	46	70	47	16	16	20	17	20	16	15	15	18	17	16	18	18	16	14	13	13	70
10-Jun	14	13	15	13	15	18	22	22	27	41	27	41	67	86	86	36	42	18	17	32	77	22	14	15	86
11-Jun	18	17	17	11	14	16	17	20	15	19	22	17	24	20	21	23	25	20	30	18	16	16	39	56	56
12-Jun	11	9	11	22	26	23	25	20	19	19	19	19	19	20	22	19	31	24	20	22	23	23	23	23	31
13-Jun	22	20	23	19	19	22	25	20	35	64	29	28	22	48	70	20	39	13	15	11	64	59	55	68	70
14-Jun	24	19	14	14	13	11	13	12	17	17	17	15	17	17	16	15	16	11	10	11	9	10	10	10	24
15-Jun	10	26	13	12	19	38	16	79	69	81	23	49	67	81	17	8	15	46	24	28	19	23	15	8	81
16-Jun	22	93	63	39	11	34	41	31	51	19	23	52	39	48	19	18	95	12	54	41	57	11	12	11	95
17-Jun	29	29	29	29	25	15	14	12	13	14	15	16	11	14	14	21	27	27	24	30	37	83	65	10	83
18-Jun	9	10	7	9	9	8	8	13	13	13	14	23	36	38	14	15	71	64	15	11	24	19	10	10	71
19-Jun	10	9	11	11	11	10	14	19	20	21	39	49	59	60	46	56	35	95	42	31	18	15	15	15	95
20-Jun	14	15	16	15	15	20	19	14	17	22	23	14	21	24	26	22	12	10	12	13	21	18	24	27	27
21-Jun	15	9	10	10	9	10	11	11	11	12	11	11	11	11	12	11	10	10	10	12	16	13	13	12	16
22-Jun	15	15	13	13	14	13	14	14	14	15	17	17	20	16	18	19	19	21	18	16	17	27	24	43	43
23-Jun	25	7	7	7	9	9	16	31	25	25	25	28	27	26	24	25	21	16	19	10	11	13	8	9	31
24-Jun	9	10	8	11	13	10	9	29	36	19	27	25	42	32	24	27	43	32	23	23	34	19	22	17	43
25-Jun	33	39	8	22	22	9	79	65	39	35	53	70	41	23	25	19	18	20	15	11	10	25	19	21	79
26-Jun	19	17	18	26	12	11	17	15	18	18	19	16	14	16	17	15	22	25	13	11	11	10	13	10	26
27-Jun	25	67	17	45	34	11	13	24	12	13	18	17	28	45	54	54	33	25	12	13	44	27	19	19	67
28-Jun	14	9	69	72	25	53	18	18	18	21	18	16	19	22	18	21	17	19	21	22	46	30	16	12	72
29-Jun	15	17	16	15	13	22	25	30	49	63	42	57	45	24	30	30	21	19	33	17	92	25	10	8	92
30-Jun	9	9	8	8	10	14	22	27	26	15	23	35	45	24	36	19	10	8	9	10	10	58	32	13	58
	33	93	69	72	46	82	79	79	69	81	53	70	67	86	86	56	95	95	54	57	92	83	65	68	
	Diurnal Maximum																								



Wood Buffalo Environmental Association

SO₂ Calibration Summary

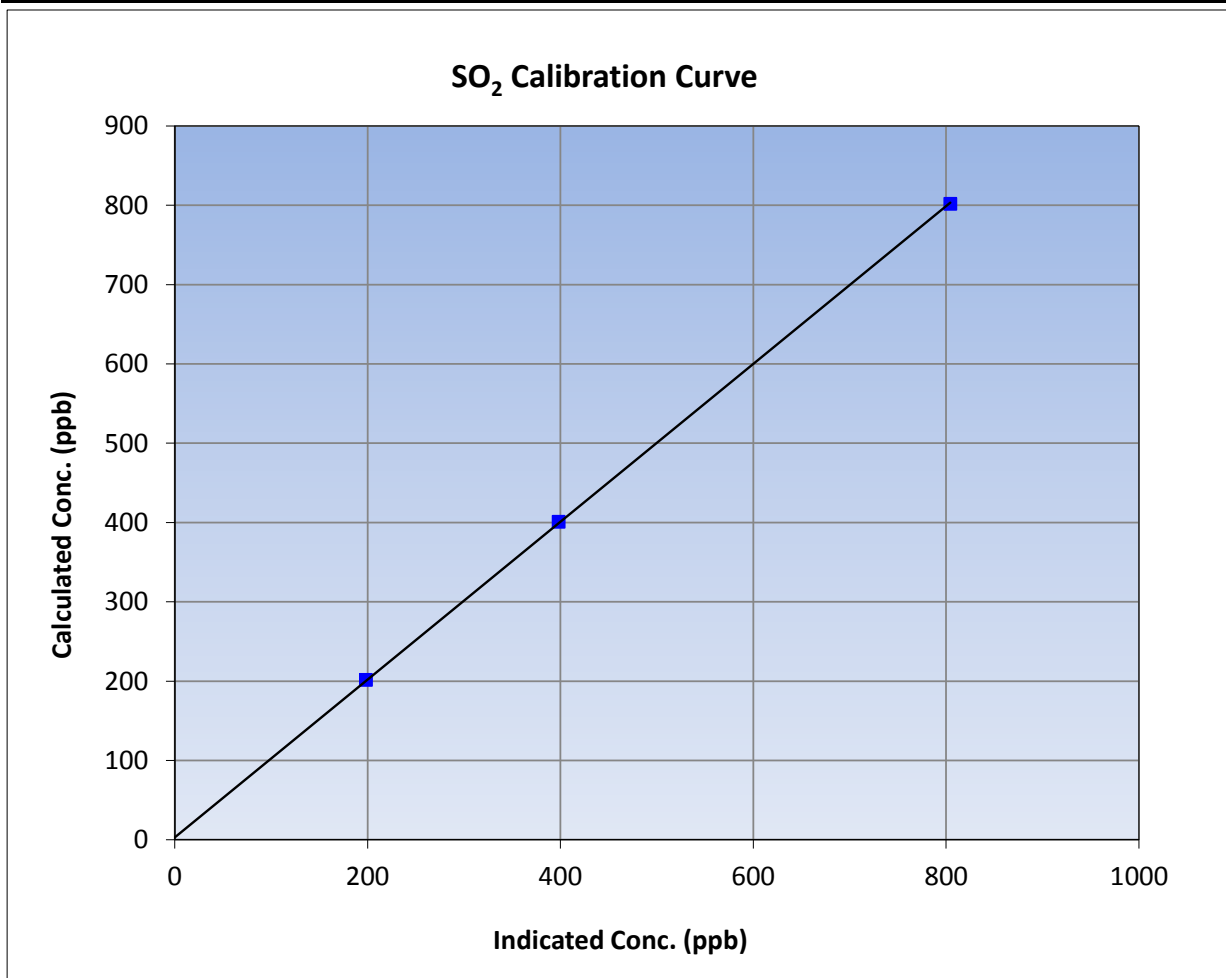
Version-03-2017

Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 24, 2017
Station Name	Surmont	Station Number	AMS 502
Start Time (MST)	10:01	End Time (MST)	14:33
Analyzer make	Thermo 43i	Analyzer serial #	1160290011

Calibration Data

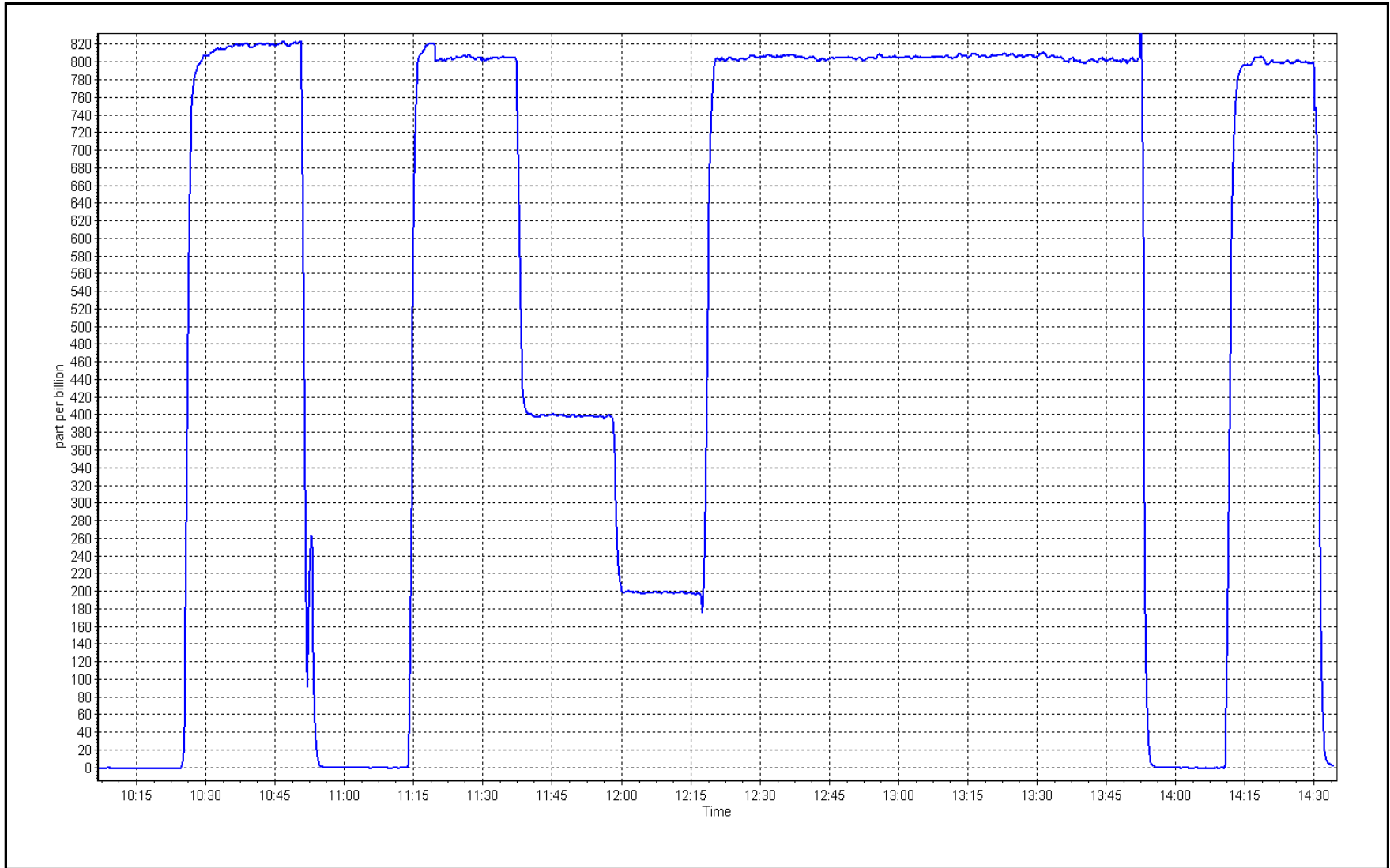
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.7	----	Correlation Coefficient	0.999963	≥0.995
801.6	804.0	0.9970			
400.7	397.8	1.0073	Slope	0.995113	0.90 - 1.10
201.4	197.9	1.0178			
			Intercept	2.883222	+/-30



SO2 Calibration Plot

Date: June 21, 2017

Location: Surmont





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name: Surmont Station number: AMS 502
Calibration Date: June 22, 2017 Last Cal Date: May 25, 2017
Start time (MST): 10:44 End time (MST): 13:52
Reason: Routine

Calibration Standards

Cal Gas Concentration 5.08 ppm Cal Gas Exp Date July 12, 2019
Cal Gas Cylinder # DR0000407
Calibrator Make/Model API T700 Serial Number 622
ZAG Make/Model API 701 Serial Number 196

Analyzer Information

Analyzer make: API T101 Analyzer serial #: 197

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	497	497
Calculated slope	0.994512	0.987675	Lamp voltage	2169	2170
Calculated intercept	-0.005456	0.541268	Pressure	23.4	23.3
Analyzer Background	21.2	23.5	Flow	0.615	0.606
Analyzer Coefficient	0.997	0.948	Intensity	48	48

H₂S Calibration Data

Set Point	Dilution air flow rate (sccm)	Source gas flow rate (sccm)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.0	0.9	----
as found span	4935	78.8	79.8	85.7	0.932
calibrator zero	5007	0.0	0.0	-0.3	----
high point	4935	78.8	79.8	80.4	0.993
second point	4972	39.5	40.0	39.9	1.004
third point	4993	19.8	20.1	19.5	1.029
as left zero	5008	0.0	0.0	-0.4	----
as left span	4975	78.8	79.2	79.6	0.995
SO2 Scrubber Check	4991	20.9	208.5	2.7	----
Average Correction Factor					1.009
Corrected As found	84.80	Previous response	80.29	*% change	-5.3%

* = > +/-5% change initiates investigation

Notes:

Zero and span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

H₂S Calibration Summary

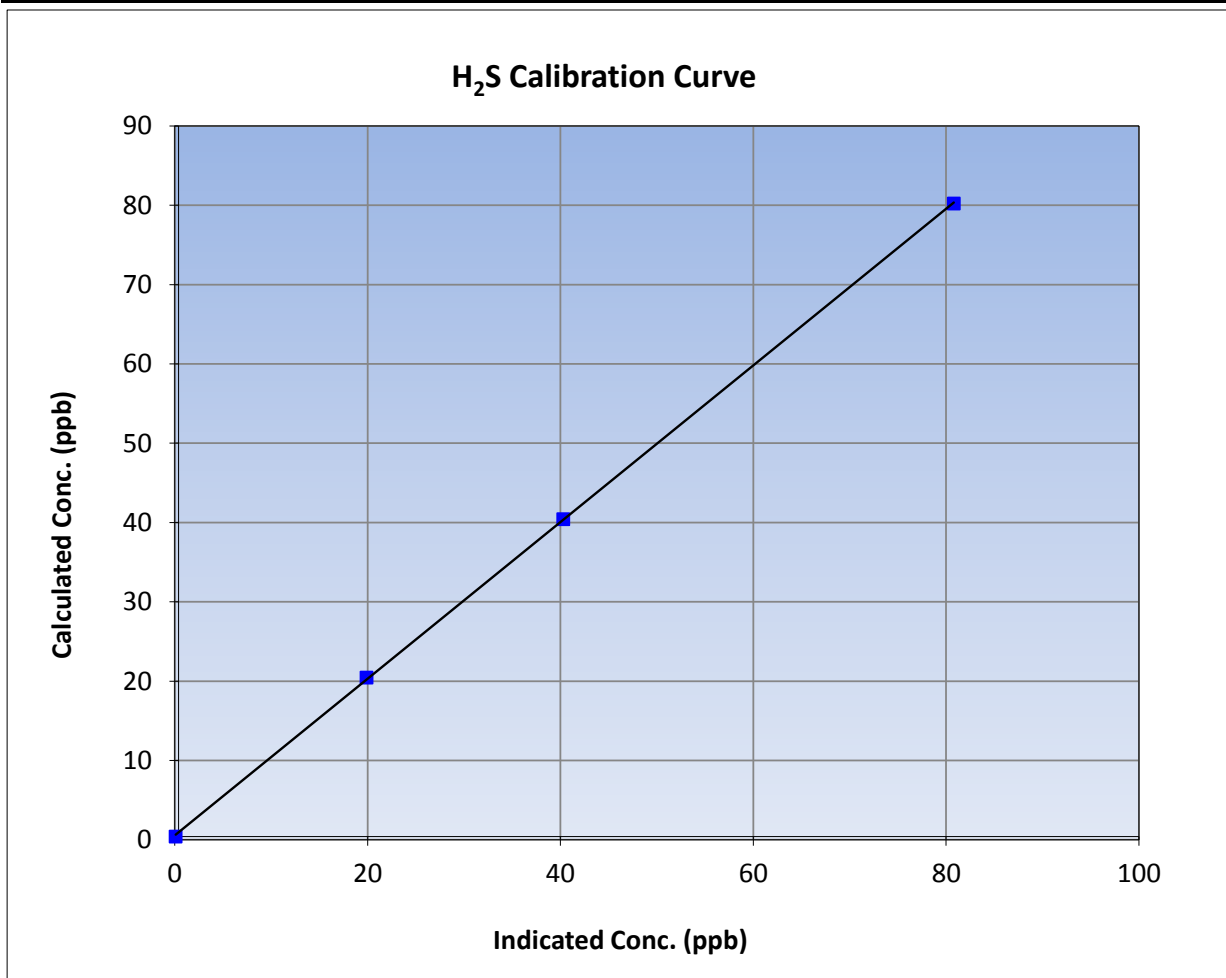
Version-03-2017

Station Information

Calibration Date	June 22, 2017	Previous Calibration	May 25, 2017
Station Name	Surmont	Station Number	AMS 502
Start Time (MST)	10:44	End Time (MST)	13:52
Analyzer make	API T101	Analyzer serial #	197

Calibration Data

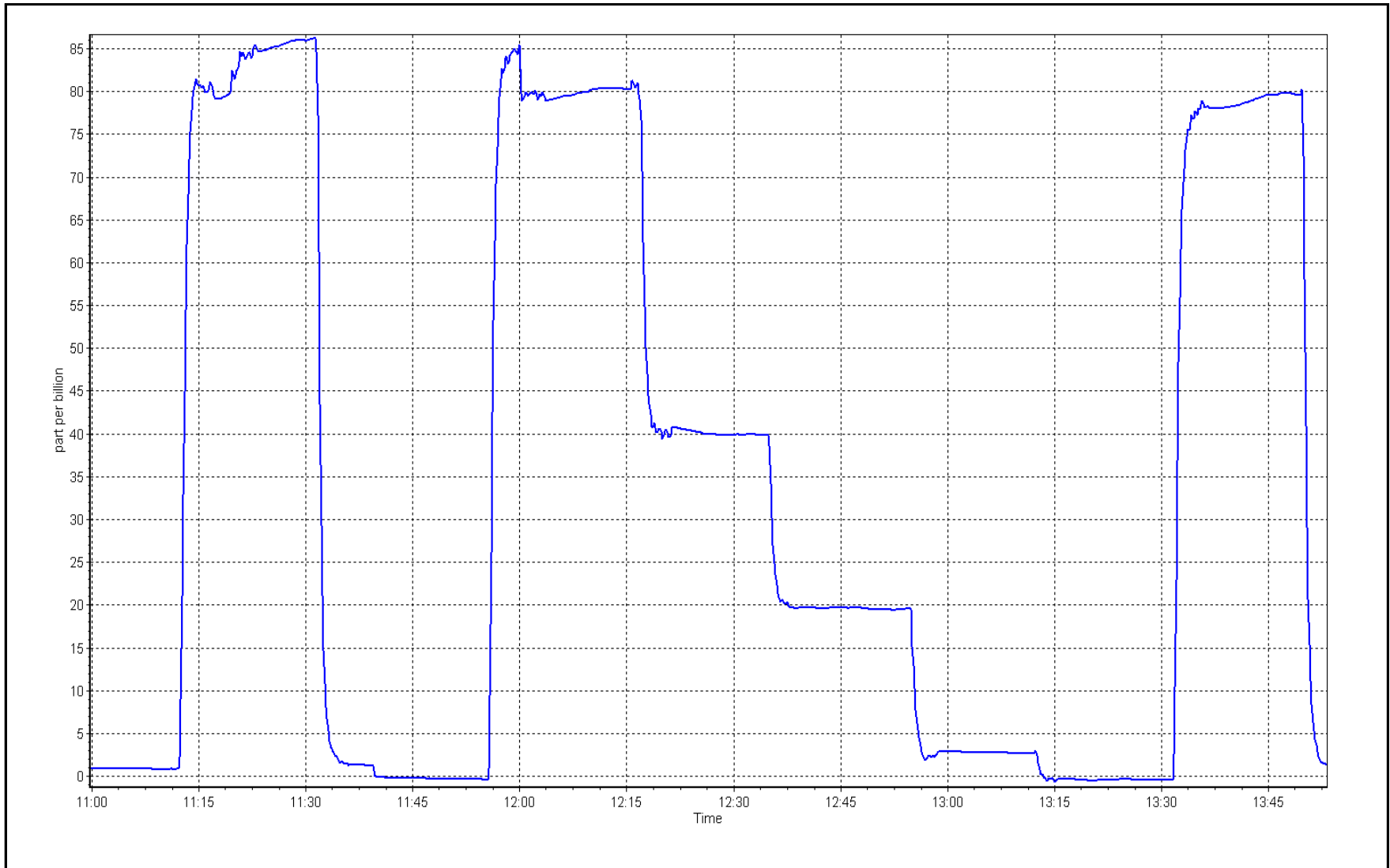
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.3	----	Correlation Coefficient	0.999957	≥0.995
79.8	80.4	0.9930			
40.0	39.9	1.0035	Slope	0.987675	0.90 - 1.10
20.1	19.5	1.0290			
			Intercept	0.541268	+/-3



H₂S Calibration Plot

Date: June 22, 2017

Location: Surmont





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Surmont	Station number:	AMS 502
Calibration Date:	June 21, 2017	Last Cal Date:	May 24, 2017
Start time (MST):	10:01	End time (MST):	14:33
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL104215	Cal Gas Expiry Date	February 12, 2018
NOX Cal Gas Conc.	<u>48.1</u> ppb	NO Cal Gas Conc.	<u>48.1</u> ppb
Calibrator Model	API T700	Serial Number	622
ZAG make/model	Teledyne API T701	Serial Number	196

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1218153356		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	0.990	1.002	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.001	PMT Temperature	-2.8	-2.7
NO2 coefficient	1.000	1.000	Reaction cell Press	159.1	158.2
NO bkgrnd	5.5	5.6	Sample Flow	0.662	0.657
NOX bkgrnd	6.0	6.1	PMT Voltage	-866.9	-866.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.994096	0.997020
NO _x Cal Offset	2.757756	3.006684
NO Cal Slope	0.993958	0.996917
NO Cal Offset	2.616760	3.042295
NO ₂ Cal Slope	0.999286	0.994637
NO ₂ Cal Offset	-0.442518	-1.317122



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

Set Point	Dilution flow rate (sccm)	Source gas flow rate (sccm)	Calculated NOx concentration (ppb) (Cc)	Calculated NO concentration (ppb) (Cc)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>
as found zero	5007	0.0	0.0	0.0	0.0	-0.7	-1.1	0.3	----	----
as found span	4930	83.2	798.3	798.3	0.0	788.1	787.9	0.2	1.0129	1.0132
calibrator zero	5008	0.0	0.0	0.0	0.0	-0.7	-1.1	0.3	----	----
high point	4930	83.2	798.3	798.3	0.0	799.0	798.8	0.2	0.9991	0.9993
second point	4973	41.6	399.0	399.0	0.0	395.4	395.8	-0.4	1.0092	1.0082
third point	4991	20.9	200.6	200.6	0.0	196.3	196.5	-0.1	1.0218	1.0208
as left zero	5009	0.0	0.0	0.0	0.0	-1.4	-1.0	-0.4	----	----
as left span	4816	83.2	816.9	404.9	412.0	802.0	404.3	397.7	1.0185	1.0015
Average Correction Factor									1.0100	1.0094

Corrected As found	NO _x = 788.8 ppb	NO = 789.0 ppb	*Percent Change	NO _x = 1.5%
Previous Response	NO _x = 800.3 ppb	NO = 800.5 ppb	*Percent Change	NO = 1.5%

* = > +/-5% change initiates investigation

GPT Calibration Data

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 concentration (ppb) (Cc)	Indicated NOx concentration (ppb) (Ic)	Indicated NO concentration (ppb) (Ic)	Indicated NO2 concentration (ppb) (Ic)	NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i>	Converter Efficiency <i>Limit = 96-104%</i>
1st NO ref point		0.0	799.1	797.6	1.5	0.9990	1.0008	----	----
1st NO2 (400 ppb O3)	404.9	392.7	800.0	404.9	395.1	0.9978	----	0.9939	100.6%
2nd NO2 (200 ppb O3)	593.6	204.0	801.9	593.6	208.3	0.9955	----	0.9794	102.1%
3rd NO2 (100 ppb O3)	688.9	108.7	799.8	688.9	110.8	0.9981	----	0.9810	101.9%
2nd NO ref point	----	0.0	801.0	799.4	1.7	0.9966	0.9986	----	----
Average Correction Factor						0.9970	0.9997	0.9848	101.6%

Notes:

Span adjusted.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

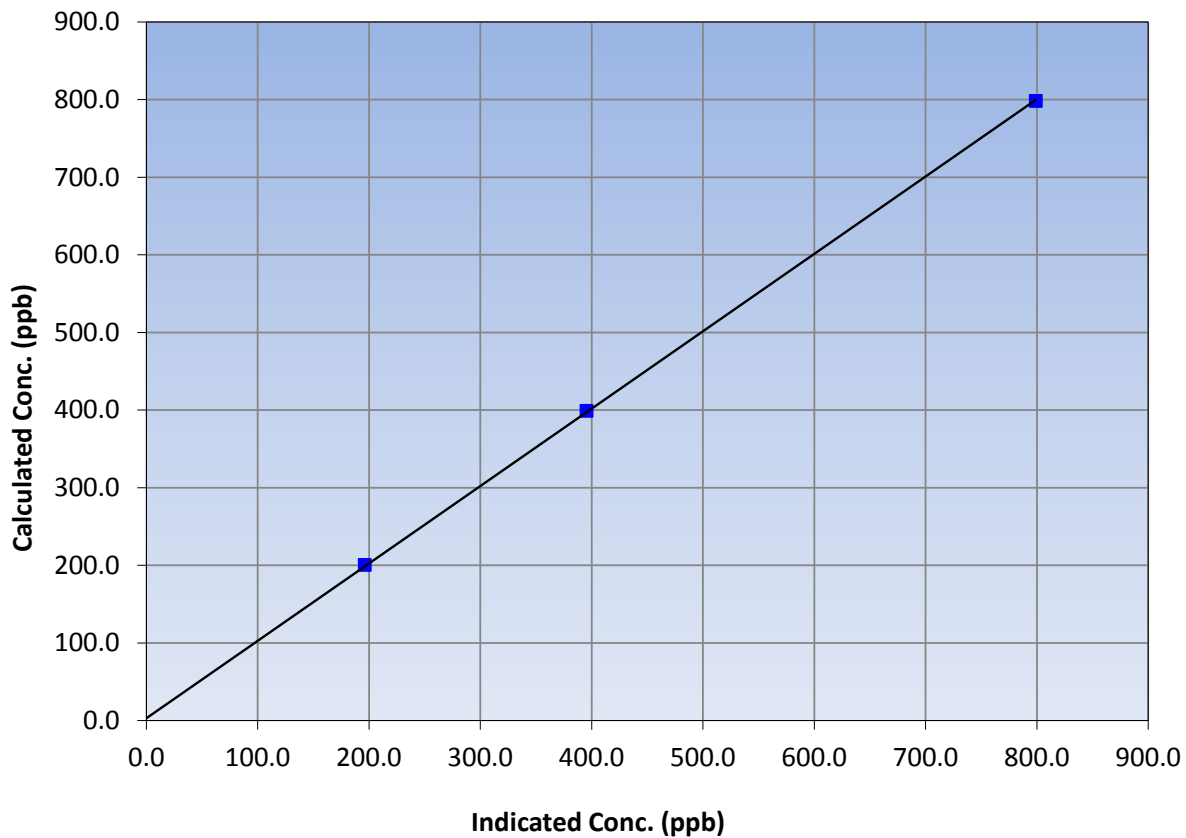
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 24, 2017
Station Name	Surmont	Station Number	AMS 502
Start Time (MST)	10:01	End Time (MST)	14:33
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	-0.7	----	Correlation Coefficient	0.999960	≥0.995
798.3	799.0	0.9991			
399.0	395.4	1.0092	Slope	0.997020	0.90 - 1.10
200.6	196.3	1.0218			
			Intercept	3.006684	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

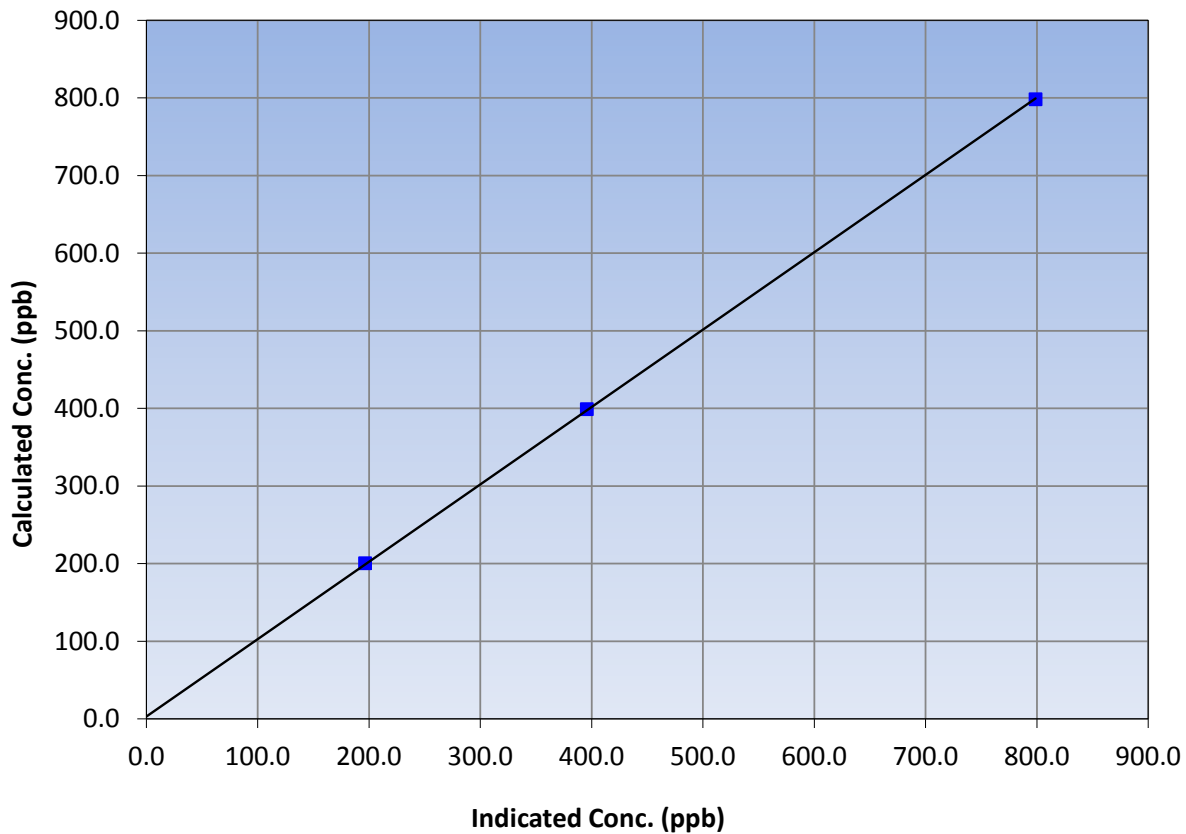
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 24, 2017
Station Name	Surmont	Station Number	AMS 502
Start Time (MST)	10:01	End Time (MST)	14:33
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-1.1	----	Correlation Coefficient	0.999972	≥0.995
798.3	798.8	0.9993			
399.0	395.8	1.0082	Slope	0.996917	0.90 - 1.10
200.6	196.5	1.0208			
			Intercept	3.042295	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

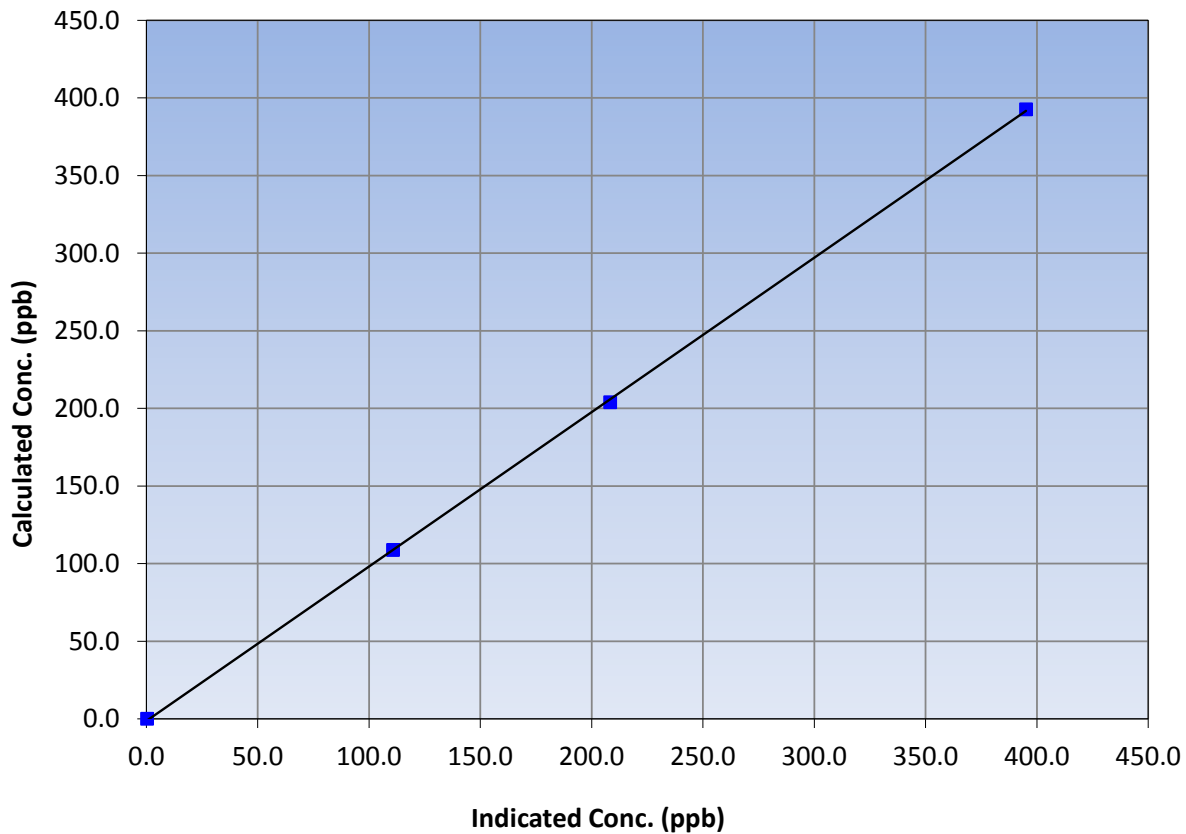
Station Information

Calibration Date	June 21, 2017	Previous Calibration	May 24, 2017
Station Name	Surmont	Station Number	AMS 502
Start Time (MST)	10:01	End Time (MST)	14:33
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>
0.0	0.3	----	Correlation Coefficient Slope Intercept	≥0.995 0.90 - 1.10 +/-20
392.7	395.1	0.9939		
204.0	208.3	0.9794		
108.7	110.8	0.9810		

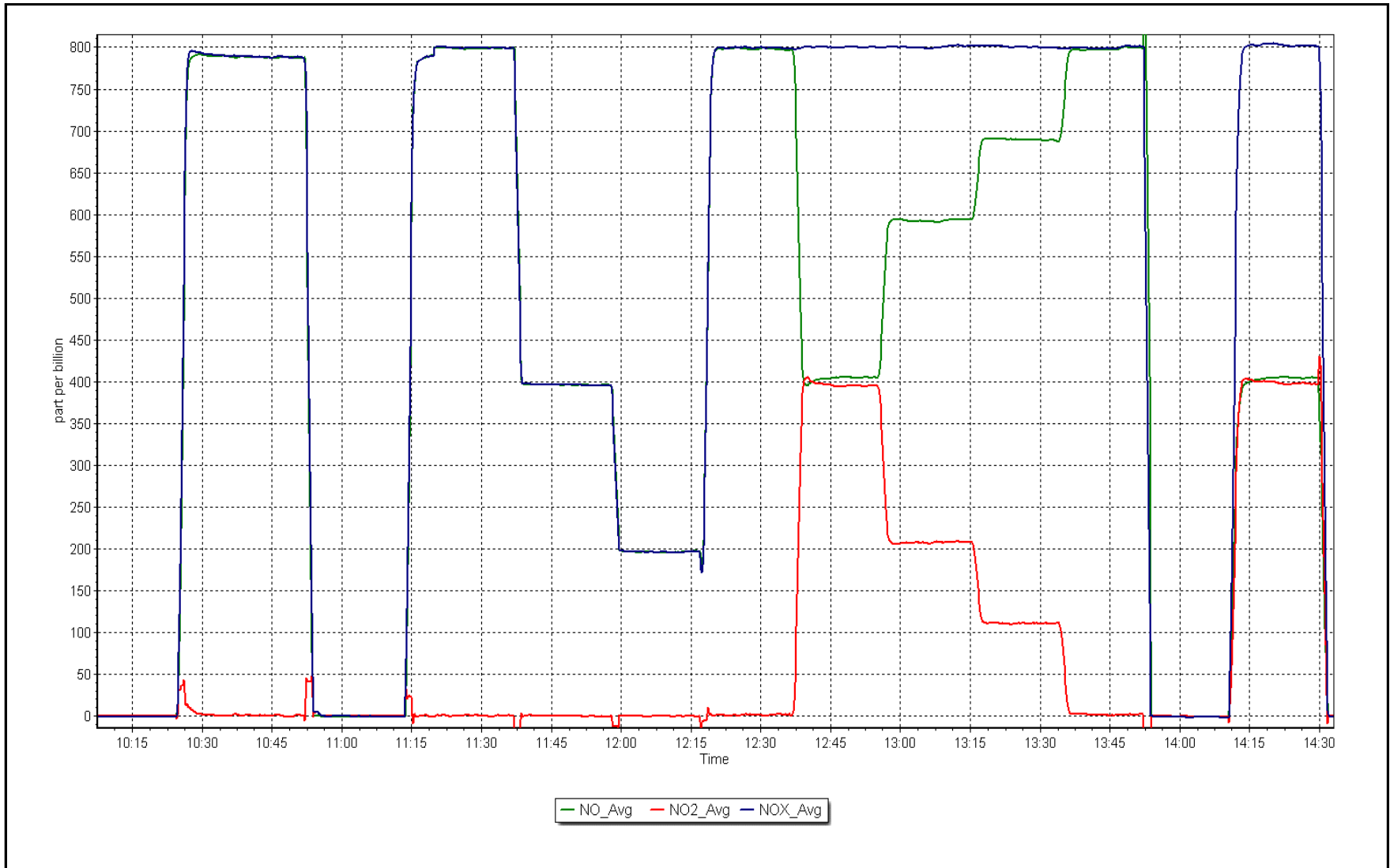
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 21, 2017

Location: Surmont





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

Passive Measurements: Maxxam Analytics Ltd
Edmonton, Alberta

VOCs: InnoTech Alberta, Inc.
Vegreville, Alberta

Particulate Matter: Atmospheric Research & Analysis, Inc.
Morrisville, NC

PAHs: Airzone One Ltd
Mississauga, Ontario

Precipitation: InnoTech Alberta, Inc.
Vegreville, Alberta



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

**INTEGRATED MONITORING PROGRAM
MONTHLY REPORT**

**HNO₃, NH₃, NO₂, O₃ AND SO₂ PASSIVE MEASUREMENTS
DATA SUMMARY
APRIL - MAY 2017**

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

Passive measurements: Maxxam Analytics Ltd
Edmonton, Alberta



FILE CONTENTS DESCRIPTION	Passive Measurements of SO ₂ , NO ₂ , O ₃ , NH ₃ and HNO ₃
SAMPLING INTERVAL	Bimonthly
SAMPLING FREQUENCY OF DATA	Bimonthly
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection
UNITS	ppbv or µg/m ³
OBSERVATION TYPE	Gas
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Diffusion
MEDIUM	Filter
ANALYTICAL METHODS	IONS by Ion Chromatography (IC)
SAMPLE PREPARATION	DI water extraction
ANALYTICAL LABORATORY	MAXXAM Analytics Inc
USER NOTE 1	Data are not blank corrected
USER NOTE 2	Concentrations are calculated by equations developed by lab
SAMPLING INSTRUMENT TYPE	SO ₂ all-season SO ₂ passive sampling system NO ₂ all-season NO ₂ passive sampling system O ₃ all-season O ₃ passive sampling system NH ₃ Ogawa passive sampler HNO ₃ Ogawa passive sampler
FLAGS USED	
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Wood Buffalo Environmental Association

Passive Measurements Ambient Air Monitoring Stations

Site ID	Site Name	Start Date/Time	End Date/Time	Species Ammonia ppb	Nitric Acid $\mu\text{g}/\text{m}^3$	Nitrogen Dioxide ppb	Ozone ppb	Sulfur Dioxide ppb	RH %	Temp K	Wind Speed cm/sec
AMS 1	Fort McKay-Bertha Ganter	2017/04/03 12:30	2017/05/26 11:30	0.2	0.5	1.7	27.2	1.3	59	280	130
AMS 1	Fort McKay-Bertha Ganter	2017/04/03 12:30	2017/05/26 11:30	0.8	0.5	1.6	29.4	1.3	59	280	130
AMS 1	Fort McKay-Bertha Ganter	2017/04/03 12:30	2017/05/26 11:30	0.8	0.6	1.6	25.9	1.4	59	280	130
AMS 2	Mildred Lake	2017/03/30 10:50	2017/05/26 13:20	1.3	0.4	1.4	27.4	2.3	60	279	130
AMS 2	Mildred Lake	2017/03/30 10:50	2017/05/26 13:20	1	0.3	1.3	38.5	2.1	60	279	130
AMS 2	Mildred Lake	2017/03/30 10:50	2017/05/26 13:20	1.6	0.4	1.4	29.9	2.6	60	279	130



Wood Buffalo Environmental Association

Site ID	Start Date/Time	End Date/Time	Passive Measurements				Remote sites			
			Ammonia ppb	Nitric Acid µg/m ³	Nitrogen Dioxide ppb	Ozone ppb	Sulfur Dioxide ppb	RH %	Temp K	Wind Speed cm/sec
AS103	2017/04/03 16:10	2017/06/05 11:50	1.1	0.5	0.2	40.9	0.3	58	281	130
AS103	2017/04/03 16:10	2017/06/05 11:50	1.4	0.4	0.2	37.9	0.3	58	281	130
AS107	2017/03/31 16:30	2017/06/05 11:05	1.4	0.4	0.5	34.3	2.2	58	281	130
AS107	2017/03/31 16:30	2017/06/05 11:05	1.2	0.4	0.6	35.8	2.1	58	281	130
JP101	2017/04/01 16:20	2017/06/06 12:10	1	0.4	0.2	37.2	0.8	58	281	130
JP101	2017/04/01 16:20	2017/06/06 12:10	0.8	0.5	0.2	35.9	0.8	58	281	130
JP102	2017/03/31 15:50	2017/06/05 09:55	1.1	0.6	1	38.5	2.1	58	281	130
JP102	2017/03/31 15:50	2017/06/05 09:55	1.4	0.5	0.8	36.1	2	58	281	130
JP104	2017/03/30 15:50	2017/06/01 12:20	1.3	0.4	1.1	33.9	1.9	57	280	130
JP104	2017/03/30 15:50	2017/06/01 12:20	1.2	0.4	1.5	32.5	2.1	57	280	130
JP107	2017/03/31 10:15	2017/05/31 12:15	0.5	0.5	0.5	36.4	0.6	61	277	130
JP107	2017/03/31 10:15	2017/05/31 12:15	0.6	0.5	0.3	40	0.6	61	277	130
JP108	2017/04/03 12:05	2017/05/29 13:00	1	0.4	0.1	30.3	0.1	60	278	130
JP108	2017/04/03 12:05	2017/05/29 13:00	M2	0.3	0.1	30.1	<0.1	60	278	130
JP201	2017/04/01 14:35	2017/05/30 10:39	1.3	0.3	0.1	34.4	0.3	55	280	130
JP201	2017/04/01 14:35	2017/05/30 10:39	1.4	0.2	0.2	35.3	0.3	55	280	130
JP205	2017/04/01 08:25	2017/05/31 14:25	1.2	0.4	<0.1	35.8	0.3	61	277	130
JP205	2017/04/01 08:25	2017/05/31 14:25	1.1	0.2	0.2	37	0.3	61	277	130
JP210	2017/04/03 15:05	2017/05/29 16:10	1	0.3	0.1	34.4	0.2	62	280	130
JP210	2017/04/03 15:05	2017/05/29 16:10	1.1	0.2	0.2	40.3	0.2	62	280	130
JP213	2017/04/03 10:15	2017/05/29 10:55	1.2	0.2	<0.1	38	0.1	60	278	130
JP213	2017/04/03 10:15	2017/05/29 10:55	1	0.2	<0.1	38.5	0.1	60	278	130
JP309	2017/03/31 13:25	2017/05/30 15:10	0.9	0.4	0.6	35	1	57	280	130
JP309	2017/03/31 13:25	2017/05/30 15:10	1.2	M2	0.5	32.5	1	57	280	130
JP311	2017/04/01 16:50	2017/06/02 08:35	1	0.3	0.1	36.6	1	58	280	130
JP311	2017/04/01 16:50	2017/06/02 08:35	1.1	0.3	0.3	37.4	1	58	280	130
JP316	2017/04/03 13:55	2017/05/29 14:40	1	0.2	<0.1	44.3	0.1	62	280	130
JP316	2017/04/03 13:55	2017/05/29 14:40	1.1	0.3	0.2	35.5	0.2	62	280	130
BM7	2017/03/31 11:15	2017/05/31 10:35	0.7	0.2	<0.1	32.7	0.1	61	277	130
BM10	2017/03/31 12:45	2017/05/30 13:50	0.9	0.2	M1	M1	M1	55	280	130
BM11	2017/03/31 11:55	2017/05/31 11:15	M1	0.6	0.1	28.3	0.3	61	277	130
JE306	2017/04/01 09:10	2017/05/31 16:28	1.4	0.3	0.3	35.5	0.4	61	277	130
JE308	2017/04/01 16:35	2017/05/30 11:15	1	0.2	0.2	31.9	0.4	55	280	130
JE312	2017/04/03 08:00	2017/05/29 09:40	0.9	0.2	0.1	29.6	0.2	62	280	130
JE316	2017/04/03 14:50	2017/05/29 15:15	1.4	0.5	0.1	33.5	0.1	62	280	130
JE323	2017/04/01 12:10	2017/06/02 10:10	1.2	0.4	0.3	33.8	0.3	58	280	130
JP212	2017/04/01 11:15	2017/06/05 09:15	1	0.2	1.4	26	1.6	57	281	130
NE7	2017/04/01 10:50	2017/06/05 07:55	1	0.2	0.3	34.3	0.4	57	281	130
NE10	2017/04/03 14:05	2017/05/29 13:45	0.7	0.1	0.1	36.3	0.1	62	280	130
NE11	2017/04/01 09:55	2017/06/05 08:30	M1	M1	M1	M1	M1	57	281	130
R2	2017/03/30 15:15	2017/06/01 15:15	0.8	0.4	1.2	22.7	1.6	67	263	130
SM7	2017/04/04 12:00	2017/06/06 10:35	1.4	0.2	0.2	34.1	0.2	58	282	130
SM8	2017/04/04 12:50	2017/06/06 07:55	0.9	0.2	<0.1	28.6	0.3	58	282	130
WF4	2017/03/31 13:40	2017/06/06 07:55	0.8	0.3	M1	M1	0.8	57	280	130
BLANK	21/03/2017		0.9	0.1	<0.1	0.1	<0.1	57	282	130
BLANK	21/03/2017		0.9	0.1	<0.1	<0.1	<0.1	57	282	130
BLANK	21/03/2017		0.9	0.1	<0.1	<0.1	<0.1	57	282	130



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

VOLATILE ORGANIC COMPOUNDS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

VOCs: InnoTech Alberta, Inc.
Vegreville, Alberta



FILE CONTENTS DESCRIPTION	VOC - Speciated Volatile Organic Compounds
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation
UNITS	ppbv (parts per billion volume)
OBSERVATION TYPE	Gas
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Evacuated canister
ANALYTICAL METHODS	GC/MS - Gas chromatography/mass spectrometer
ANALYTICAL LABORATORY	InnoTech Alberta Inc
USER NOTE 1	Data are not blank corrected
SAMPLING INSTRUMENT TYPE	Tisch TE123
FLOW RATE	10.0 cc/min (cubic centimeters per minute)
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 01-May			Patricia McInnes AMS 6 01-May	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	0.02	V0
1-Butene	0.02	< 0.02	V1	0.06	V0
1-Pentene	0.01	< 0.01	V1	0.02	V0
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	0.03	V0	0.03	V0
2,3,4-Trimethylpentane	0.01	0.01	V0	0.01	V0
2,3-Dimethylbutane	0.02	0.06	V0	0.05	V0
2,3-Dimethylpentane	0.02	0.02	V0	0.04	V0
2,4-Dimethylpentane	0.01	< 0.01	V1	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.02	V0	0.04	V0
2-Methylhexane	0.01	< 0.01	V1	< 0.01	V1
2-Methylpentane	0.01	0.06	V0	0.1	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.03	V0	0.06	V0
3-Methylpentane	0.01	0.07	V0	0.09	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	< 3	V1	< 3	V1
Acetone	0.4	2.6	V0	3.2	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.04	V0	0.07	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.05	V0	0.06	V0
Cyclopentane	0.01	0.03	V0	0.03	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.2	V0	1.9	V0
Ethylbenzene	0.01	< 0.01	V1	0.02	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.35	V0	0.45	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.32	V0	0.47	V0
Isoprene	0.01	< 0.01	V1	0.01	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	0.06	V0
Methanol	3	9	V0	14	V0
Methylcyclohexane	0.01	0.03	V0	0.06	V0
Methylcyclopentane	0.02	0.03	V0	0.07	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.21	V0	0.54	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.04	V0	0.09	V0
n-Hexane	0.01	0.03	V0	0.1	V0
n-Nonane	0.01	0.02	V0	0.02	V0
n-Octane	0.02	0.02	V0	0.05	V0
n-Pentane	0.1	0.1	V0	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.01	V0	0.02	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.04	V0	0.1	V0
trans-2-Butene	0.01	< 0.01	V1	0.02	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 01-May			Anzac AMS 14 01-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.03	V0	-9999	M2
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	-9999	M2
1,3-Butadiene	0.02	< 0.02	V1	-9999	M2
1-Butene	0.02	< 0.02	V1	-9999	M2
1-Pentene	0.01	< 0.01	V1	-9999	M2
2,2,4-Trimethylpentane	0.01	0.02	V0	-9999	M2
2,2-Dimethylbutane	0.01	0.02	V0	-9999	M2
2,3,4-Trimethylpentane	0.01	< 0.01	V1	-9999	M2
2,3-Dimethylbutane	0.02	0.05	V0	-9999	M2
2,3-Dimethylpentane	0.02	0.02	V0	-9999	M2
2,4-Dimethylpentane	0.01	< 0.01	V1	-9999	M2
2-Methyl-1-pentene	0.3	< 0.3	V1	-9999	M2
2-Methyl-2-butene	0.3	< 0.3	V1	-9999	M2
2-Methylheptane	0.01	0.03	V0	-9999	M2
2-Methylhexane	0.01	< 0.01	V1	-9999	M2
2-Methylpentane	0.01	0.07	V0	-9999	M2
3-Methyl-1-butene	0.3	< 0.3	V1	-9999	M2
3-Methylheptane	0.02	< 0.02	V1	-9999	M2
3-Methylhexane	0.02	0.04	V0	-9999	M2
3-Methylpentane	0.01	0.05	V0	-9999	M2
4-Methyl-1-pentene	0.3	< 0.3	V1	-9999	M2
Acetaldehyde	3	< 3	V1	-9999	M2
Acetone	0.4	3.9	V0	-9999	M2
alpha-Pinene	0.3	< 0.3	V1	-9999	M2
Benzene	0.01	0.07	V0	-9999	M2
beta-Pinene	0.3	< 0.3	V1	-9999	M2
cis-2-Butene	0.02	< 0.02	V1	-9999	M2
cis-2-Hexene	0.3	< 0.3	V1	-9999	M2
cis-2-Pentene	0.02	< 0.02	V1	-9999	M2
Cyclohexane	0.02	0.03	V0	-9999	M2
Cyclopentane	0.01	0.02	V0	-9999	M2
Cyclopentene	0.3	< 0.3	V1	-9999	M2
Ethanol	0.3	1.1	V0	-9999	M2
Ethylbenzene	0.01	0.02	V0	-9999	M2
Formaldehyde	3	< 3	V1	-9999	M2
Isobutane	0.02	0.28	V0	-9999	M2
Isobutylene	0.3	< 0.3	V1	-9999	M2
Isopentane	0.03	0.31	V0	-9999	M2
Isoprene	0.01	0.02	V0	-9999	M2
Isopropylalcohol	0.4	< 0.4	V1	-9999	M2
Isopropylbenzene	0.01	< 0.01	V1	-9999	M2
m,p-Xylene	0.03	0.05	V0	-9999	M2
Methanol	3	7	V0	-9999	M2
Methylcyclohexane	0.01	0.04	V0	-9999	M2
Methylcyclopentane	0.02	0.05	V0	-9999	M2
Methylethylketone	0.3	< 0.3	V1	-9999	M2
Methylisobutylketone	0.4	< 0.4	V1	-9999	M2
Methylvinylketone	0.3	< 0.3	V1	-9999	M2
n-Butane	0.03	0.23	V0	-9999	M2
n-Decane	0.06	< 0.06	V1	-9999	M2
n-Dodecane	0.4	< 0.4	V1	-9999	M2
n-Heptane	0.01	0.07	V0	-9999	M2
n-Hexane	0.01	0.06	V0	-9999	M2
n-Nonane	0.01	0.02	V0	-9999	M2
n-Octane	0.02	0.04	V0	-9999	M2
n-Pentane	0.1	0.1	V0	-9999	M2
n-Propylbenzene	0.05	< 0.05	V1	-9999	M2
n-Undecane	0.5	< 0.5	V1	-9999	M2
Naphthalene	0.5	< 0.5	V1	-9999	M2
o-Xylene	0.01	0.02	V0	-9999	M2
Styrene	0.04	< 0.04	V1	-9999	M2
Toluene	0.01	0.09	V0	-9999	M2
trans-2-Butene	0.01	< 0.01	V1	-9999	M2
trans-2-Hexene	0.3	< 0.3	V1	-9999	M2
trans-2-Pentene	0.02	< 0.02	V1	-9999	M2



Station Name Station # Sample Date	Barge Landing AMS 9 01-May	Fort McKay South AMS 13 01-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.13	V0	< 0.02	V1
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	0.14	V0	0.06	V0
2,3,4-Trimethylpentane	0.01	0.01	V0	< 0.01	V1
2,3-Dimethylbutane	0.02	0.28	V0	0.09	V0
2,3-Dimethylpentane	0.02	0.09	V0	0.02	V0
2,4-Dimethylpentane	0.01	0.05	V0	< 0.01	V1
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.16	V0	0.03	V0
2-Methylhexane	0.01	0.36	V0	< 0.01	V1
2-Methylpentane	0.01	1.51	V4	0.23	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.08	V0	< 0.02	V1
3-Methylhexane	0.02	0.32	V0	0.03	V0
3-Methylpentane	0.01	0.86	V0	0.17	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	3	V0
Acetone	0.4	2.9	V0	4.7	V0
alpha-Pinene	0.3	< 0.3	V1	0.3	V0
Benzene	0.01	0.23	V0	0.08	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.32	V0	0.05	V0
Cyclopentane	0.01	0.34	V0	0.07	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.8	V0	0.7	V0
Ethylbenzene	0.01	0.06	V0	< 0.01	V1
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	1.19	V0	0.39	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	2.71	V0	0.55	V0
Isoprene	0.01	0.02	V0	0.03	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	0.18	V0	< 0.03	V1
Methanol	3	13	V0	6	V0
Methylcyclohexane	0.01	0.51	V0	0.05	V0
Methylcyclopentane	0.02	0.67	V0	0.06	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	5.49	V4	0.26	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	1.13	V0	0.05	V0
n-Hexane	0.01	2.54	V4	0.09	V0
n-Nonane	0.01	0.17	V0	0.02	V0
n-Octane	0.02	0.44	V0	0.03	V0
n-Pentane	0.1	5.6	V4	0.4	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.05	V0	< 0.01	V1
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.41	V0	0.05	V0
trans-2-Butene	0.01	< 0.01	V1	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 01-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.02	V0
1-Pentene	0.01	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1
2,2-Dimethylbutane	0.01	0.11	V0
2,3,4-Trimethylpentane	0.01	0.03	V0
2,3-Dimethylbutane	0.02	0.24	V0
2,3-Dimethylpentane	0.02	0.11	V0
2,4-Dimethylpentane	0.01	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	0.06	V0
2-Methylhexane	0.01	< 0.01	V1
2-Methylpentane	0.01	0.05	V0
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1
3-Methylhexane	0.02	0.07	V0
3-Methylpentane	0.01	0.36	V0
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	3	V0
Acetone	0.4	3.4	V0
alpha-Pinene	0.3	< 0.3	V1
Benzene	0.01	0.04	V0
beta-Pinene	0.3	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	0.44	V0
Cyclopentane	0.01	0.13	V0
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	0.8	V0
Ethylbenzene	0.01	0.01	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	2.46	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	2.26	V0
Isoprene	0.01	< 0.01	V1
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1
Methanol	3	5	V0
Methylcyclohexane	0.01	0.21	V0
Methylcyclopentane	0.02	0.29	V0
Methylethylketone	0.3	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	0.4	V0
n-Decane	0.06	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	0.12	V0
n-Hexane	0.01	0.04	V0
n-Nonane	0.01	0.04	V0
n-Octane	0.02	0.06	V0
n-Pentane	0.1	0.1	V0
n-Propylbenzene	0.05	< 0.05	V1
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.01	V0
Styrene	0.04	< 0.04	V1
Toluene	0.01	0.05	V0
trans-2-Butene	0.01	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 07-May			Patricia McInnes AMS 6 07-May	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	0.06	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	0.03	V0
2,2-Dimethylbutane	0.01	< 0.01	V1	< 0.01	V1
2,3,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,3-Dimethylbutane	0.02	0.03	V0	0.02	V0
2,3-Dimethylpentane	0.02	0.03	V0	0.03	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.02	V0	0.02	V0
2-Methylhexane	0.01	0.09	V0	0.08	V0
2-Methylpentane	0.01	0.25	V0	0.2	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.08	V0	0.08	V0
3-Methylpentane	0.01	0.13	V0	0.1	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	5	V0	5	V0
Acetone	0.4	1.4	V0	1.2	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.07	V0	0.07	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.06	V0	0.05	V0
Cyclopentane	0.01	0.01	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1	V0	1.5	V0
Ethylbenzene	0.01	0.01	V0	0.11	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.29	V0	0.19	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.18	V0	0.16	V0
Isoprene	0.01	0.05	V0	0.02	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	0.09	V0
Methanol	3	7	V0	6	V0
Methylcyclohexane	0.01	0.13	V0	0.13	V0
Methylcyclopentane	0.02	0.12	V0	0.09	V0
Methylethylketone	0.3	< 0.3	V1	0.7	V0
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.23	V0	0.22	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.12	V0	0.13	V0
n-Hexane	0.01	0.31	V0	0.29	V0
n-Nonane	0.01	0.02	V0	0.02	V0
n-Octane	0.02	< 0.02	V1	0.02	V0
n-Pentane	0.1	0.3	V0	0.3	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.01	V0	0.03	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.06	V0	0.17	V0
trans-2-Butene	0.01	0.05	V0	0.05	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 07-May			Anzac AMS 14 07-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.03	V0	0.03	V0
1,3,5-Trimethylbenzene	0.02	0.02	V0	< 0.02	V1
1,3-Butadiene	0.02	0.02	V0	< 0.02	V1
1-Butene	0.02	0.02	V0	0.1	V0
1-Pentene	0.01	0.01	V0	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.01	V0	< 0.01	V1
2,2-Dimethylbutane	0.01	0.01	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	< 0.01	V1
2,3-Dimethylbutane	0.02	0.02	V0	< 0.02	V1
2,3-Dimethylpentane	0.02	0.02	V0	< 0.02	V1
2,4-Dimethylpentane	0.01	0.01	V0	< 0.01	V1
2-Methyl-1-pentene	0.3	0.3	V0	< 0.3	V1
2-Methyl-2-butene	0.3	0.3	V0	< 0.3	V1
2-Methylheptane	0.01	0.01	V0	0.02	V0
2-Methylhexane	0.01	0.01	V0	0.03	V0
2-Methylpentane	0.01	0.01	V0	0.02	V0
3-Methyl-1-butene	0.3	0.3	V0	< 0.3	V1
3-Methylheptane	0.02	0.02	V0	< 0.02	V1
3-Methylhexane	0.02	0.02	V0	< 0.02	V1
3-Methylpentane	0.01	0.01	V0	0.01	V0
4-Methyl-1-pentene	0.3	0.3	V0	< 0.3	V1
Acetaldehyde	3	3	V0	5	V0
Acetone	0.4	0.4	V0	1.4	V0
alpha-Pinene	0.3	0.3	V0	< 0.3	V1
Benzene	0.01	0.01	V0	0.06	V0
beta-Pinene	0.3	0.3	V0	< 0.3	V1
cis-2-Butene	0.02	0.02	V0	0.05	V0
cis-2-Hexene	0.3	0.3	V0	< 0.3	V1
cis-2-Pentene	0.02	0.02	V0	< 0.02	V1
Cyclohexane	0.02	0.02	V0	< 0.02	V1
Cyclopentane	0.01	0.01	V0	< 0.01	V1
Cyclopentene	0.3	0.3	V0	< 0.3	V1
Ethanol	0.3	0.3	V0	1	V0
Ethylbenzene	0.01	0.01	V0	0.02	V0
Formaldehyde	3	3	V4	< 3	V1
Isobutane	0.02	0.02	V0	0.21	V0
Isobutylene	0.3	0.3	V0	< 0.3	V1
Isopentane	0.03	0.03	V0	0.15	V0
Isoprene	0.01	0.01	V0	0.04	V0
Isopropylalcohol	0.4	0.4	V0	< 0.4	V1
Isopropylbenzene	0.01	0.01	V0	< 0.01	V1
m,p-Xylene	0.03	0.03	V0	0.06	V0
Methanol	3	3	V0	7	V0
Methylcyclohexane	0.01	0.01	V0	0.02	V0
Methylcyclopentane	0.02	0.02	V0	< 0.02	V1
Methylethylketone	0.3	0.3	V0	< 0.3	V1
Methylisobutylketone	0.4	0.4	V0	< 0.4	V1
Methylvinylketone	0.3	0.3	V0	< 0.3	V1
n-Butane	0.03	0.03	V0	0.2	V0
n-Decane	0.06	0.06	V0	< 0.06	V1
n-Dodecane	0.4	0.4	V0	< 0.4	V1
n-Heptane	0.01	0.01	V0	0.05	V0
n-Hexane	0.01	0.01	V0	0.03	V0
n-Nonane	0.01	0.01	V0	0.09	V0
n-Octane	0.02	0.02	V0	0.07	V0
n-Pentane	0.1	0.1	V0	0.1	V0
n-Propylbenzene	0.05	0.05	V0	< 0.05	V1
n-Undecane	0.5	0.5	V0	< 0.5	V1
Naphthalene	0.5	0.5	V0	< 0.5	V1
o-Xylene	0.01	0.01	V0	0.03	V0
Styrene	0.04	0.04	V0	< 0.04	V1
Toluene	0.01	0.01	V0	0.16	V0
trans-2-Butene	0.01	0.01	V0	0.06	V0
trans-2-Hexene	0.3	0.3	V0	< 0.3	V1
trans-2-Pentene	0.02	0.02	V0	< 0.02	V1



Station Name Station # Sample Date	Barge Landing AMS 9 07-May	Fort McKay South AMS 13 07-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.09	V0	0.08	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	0.02	V0	0.01	V0
2,3,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,3-Dimethylbutane	0.02	0.03	V0	0.05	V0
2,3-Dimethylpentane	0.02	0.02	V0	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	< 0.01	V1	0.04	V0
2-Methylhexane	0.01	0.06	V0	0.11	V0
2-Methylpentane	0.01	0.26	V0	0.41	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.07	V0	0.17	V0
3-Methylpentane	0.01	0.14	V0	0.24	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	6	V0
Acetone	0.4	1.8	V0	1.4	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.06	V0	0.09	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.05	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.06	V0	0.11	V0
Cyclopentane	0.01	0.04	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1	V0	0.7	V0
Ethylbenzene	0.01	< 0.01	V1	0.01	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.25	V0	0.26	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.32	V0	0.24	V0
Isoprene	0.01	0.09	V0	0.06	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	0.03	V0
Methanol	3	9	V0	9	V0
Methylcyclohexane	0.01	0.12	V0	0.27	V0
Methylcyclopentane	0.02	0.12	V0	0.23	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.22	V0	0.2	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.09	V0	0.25	V0
n-Hexane	0.01	0.27	V0	0.57	V0
n-Nonane	0.01	0.02	V0	0.03	V0
n-Octane	0.02	< 0.02	V1	0.05	V0
n-Pentane	0.1	0.5	V0	0.5	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	< 0.01	V1	0.02	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.04	V0	0.11	V0
trans-2-Butene	0.01	0.06	V0	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 07-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.44	V0
1,3,5-Trimethylbenzene	0.02	0.14	V0
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.18	V0
1-Pentene	0.01	0.01	V0
2,2,4-Trimethylpentane	0.01	< 0.01	V1
2,2-Dimethylbutane	0.01	0.13	V0
2,3,4-Trimethylpentane	0.01	0.11	V0
2,3-Dimethylbutane	0.02	0.4	V0
2,3-Dimethylpentane	0.02	0.76	V0
2,4-Dimethylpentane	0.01	0.27	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	1.13	V4
2-Methylhexane	0.01	1.55	V4
2-Methylpentane	0.01	2.31	V4
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	0.75	V0
3-Methylhexane	0.02	1.88	V4
3-Methylpentane	0.01	1.79	V4
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	6	V0
Acetone	0.4	1.7	V0
alpha-Pinene	0.3	0.4	V0
Benzene	0.01	0.48	V0
beta-Pinene	0.3	< 0.3	V1
cis-2-Butene	0.02	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	3.12	V4
Cyclopentane	0.01	1.11	V4
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	1.3	V0
Ethylbenzene	0.01	0.39	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	1.27	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	2.59	V0
Isoprene	0.01	0.03	V0
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	0.09	V0
m,p-Xylene	0.03	0.94	V0
Methanol	3	9	V0
Methylcyclohexane	0.01	5.62	V4
Methylcyclopentane	0.02	3.45	V4
Methylethylketone	0.3	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	1.58	V0
n-Decane	0.06	0.51	V0
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	3.95	V4
n-Hexane	0.01	3.9	V4
n-Nonane	0.01	1.5	V4
n-Octane	0.02	2.24	V4
n-Pentane	0.1	3.7	V4
n-Propylbenzene	0.05	0.13	V0
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.51	V0
Styrene	0.04	< 0.04	V1
Toluene	0.01	1.68	V4
trans-2-Butene	0.01	0.04	V0
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	0.08	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	0.02	V0
2,2-Dimethylbutane	0.01	0.02	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,3-Dimethylbutane	0.02	0.02	V0	< 0.02	V1
2,3-Dimethylpentane	0.02	0.02	V0	0.04	V0
2,4-Dimethylpentane	0.01	0.01	V0	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.01	V0	0.02	V0
2-Methylhexane	0.01	0.06	V0	0.09	V0
2-Methylpentane	0.01	0.15	V0	0.1	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	0.02	V0
3-Methylhexane	0.02	0.07	V0	0.1	V0
3-Methylpentane	0.01	0.07	V0	0.06	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	5	V0
Acetone	0.4	1.3	V0	1.3	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.05	V0	0.09	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	< 0.02	V1	< 0.02	V1
Cyclopentane	0.01	0.02	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.7	V0	1.5	V0
Ethylbenzene	0.01	< 0.01	V1	0.02	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.13	V0	0.19	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.14	V0	0.12	V0
Isoprene	0.01	0.03	V0	0.01	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	0.04	V0
Methanol	3	7	V0	6	V0
Methylcyclohexane	0.01	0.12	V0	0.18	V0
Methylcyclopentane	0.02	< 0.02	V1	0.03	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.07	V0	0.18	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.14	V0	0.16	V0
n-Hexane	0.01	0.19	V0	0.27	V0
n-Nonane	0.01	0.01	V0	< 0.01	V1
n-Octane	0.02	< 0.02	V1	< 0.02	V1
n-Pentane	0.1	0.2	V0	< 0.1	V1
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	< 0.01	V1	0.02	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.07	V0	0.15	V0
trans-2-Butene	0.01	0.06	V0	0.05	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 13-May			Anzac AMS 14 13-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	0.09	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	< 0.01	V1	< 0.01	V1
2,3,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,3-Dimethylbutane	0.02	< 0.02	V1	< 0.02	V1
2,3-Dimethylpentane	0.02	0.02	V0	0.02	V0
2,4-Dimethylpentane	0.01	0.01	V0	< 0.01	V1
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.01	V0	0.01	V0
2-Methylhexane	0.01	0.07	V0	0.06	V0
2-Methylpentane	0.01	0.06	V0	0.08	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.07	V0	0.06	V0
3-Methylpentane	0.01	0.04	V0	0.04	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	3	V0	3	V0
Acetone	0.4	2.8	V0	1	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.07	V0	0.06	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	< 0.02	V1	< 0.02	V1
Cyclopentane	0.01	0.02	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.1	V0	0.6	V0
Ethylbenzene	0.01	0.01	V0	< 0.01	V1
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.12	V0	0.09	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.1	V0	0.1	V0
Isoprene	0.01	0.02	V0	0.01	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	< 0.03	V1
Methanol	3	8	V0	6	V0
Methylcyclohexane	0.01	0.12	V0	0.12	V0
Methylcyclopentane	0.02	< 0.02	V1	< 0.02	V1
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.12	V0	0.08	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.13	V0	0.13	V0
n-Hexane	0.01	0.18	V0	0.18	V0
n-Nonane	0.01	0.01	V0	0.03	V0
n-Octane	0.02	< 0.02	V1	0.02	V0
n-Pentane	0.1	< 0.1	V1	0.1	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.01	V0	< 0.01	V1
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.1	V0	0.13	V0
trans-2-Butene	0.01	0.06	V0	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Barge Landing AMS 9 13-May	Fort McKay South AMS 13 13-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	< 0.02	V1
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	< 0.01	V1	< 0.01	V1
2,3,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,3-Dimethylbutane	0.02	< 0.02	V1	< 0.02	V1
2,3-Dimethylpentane	0.02	0.02	V0	< 0.02	V1
2,4-Dimethylpentane	0.01	0.01	V0	< 0.01	V1
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	< 0.01	V1	< 0.01	V1
2-Methylhexane	0.01	0.06	V0	< 0.01	V1
2-Methylpentane	0.01	0.13	V0	0.03	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.06	V0	0.03	V0
3-Methylpentane	0.01	0.07	V0	0.02	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	6	V0
Acetone	0.4	1.2	V0	1.4	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.05	V0	0.04	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.03	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.02	V0	< 0.02	V1
Cyclopentane	0.01	0.01	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.9	V0	0.9	V0
Ethylbenzene	0.01	0.01	V0	< 0.01	V1
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.12	V0	0.21	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.13	V0	0.11	V0
Isoprene	0.01	0.02	V0	0.05	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1	< 0.03	V1
Methanol	3	8	V0	5	V0
Methylcyclohexane	0.01	0.1	V0	0.03	V0
Methylcyclopentane	0.02	0.04	V0	< 0.02	V1
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.08	V0	0.08	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.09	V0	0.07	V0
n-Hexane	0.01	0.22	V0	0.09	V0
n-Nonane	0.01	0.01	V0	0.01	V0
n-Octane	0.02	< 0.02	V1	< 0.02	V1
n-Pentane	0.1	0.2	V0	0.1	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	< 0.01	V1	< 0.01	V1
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.06	V0	0.05	V0
trans-2-Butene	0.01	0.05	V0	0.05	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 13-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.09	V0
1-Pentene	0.01	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.04	V0
2,2-Dimethylbutane	0.01	0.05	V0
2,3,4-Trimethylpentane	0.01	0.01	V0
2,3-Dimethylbutane	0.02	0.05	V0
2,3-Dimethylpentane	0.02	0.03	V0
2,4-Dimethylpentane	0.01	0.01	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	0.01	V0
2-Methylhexane	0.01	0.07	V0
2-Methylpentane	0.01	0.25	V0
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1
3-Methylhexane	0.02	0.08	V0
3-Methylpentane	0.01	0.13	V0
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	5	V0
Acetone	0.4	1.5	V0
alpha-Pinene	0.3	< 0.3	V1
Benzene	0.01	0.1	V0
beta-Pinene	0.3	< 0.3	V1
cis-2-Butene	0.02	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	0.03	V0
Cyclopentane	0.01	0.07	V0
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	1.5	V0
Ethylbenzene	0.01	0.05	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	0.2	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	0.31	V0
Isoprene	0.01	0.02	V0
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1
m,p-Xylene	0.03	0.06	V0
Methanol	3	7	V0
Methylcyclohexane	0.01	0.13	V0
Methylcyclopentane	0.02	0.08	V0
Methylethylketone	0.3	0.4	V0
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	0.11	V0
n-Decane	0.06	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	0.13	V0
n-Hexane	0.01	0.3	V0
n-Nonane	0.01	0.03	V0
n-Octane	0.02	0.03	V0
n-Pentane	0.1	0.4	V0
n-Propylbenzene	0.05	< 0.05	V1
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.02	V0
Styrene	0.04	< 0.04	V1
Toluene	0.01	0.41	V0
trans-2-Butene	0.01	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.09	V0	0.06	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	0.04	V0
2,2-Dimethylbutane	0.01	0.02	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0.01	V0
2,3-Dimethylbutane	0.02	0.05	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.06	V0	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.11	V0	0.01	V0
2-Methylhexane	0.01	0.1	V0	0.09	V0
2-Methylpentane	0.01	0.1	V0	0.13	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.05	V0	0.03	V0
3-Methylhexane	0.02	0.14	V0	0.1	V0
3-Methylpentane	0.01	0.07	V0	0.09	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	6	V0
Acetone	0.4	1.2	V0	1.6	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.08	V0	0.1	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.06	V0	0.02	V0
Cyclopentane	0.01	0.01	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.8	V0	1.8	V0
Ethylbenzene	0.01	0.03	V0	0.02	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.36	V0	0.43	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.2	V0	0.3	V0
Isoprene	0.01	0.19	V0	0.05	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	0.07	V0	0.05	V0
Methanol	3	10	V0	12	V0
Methylcyclohexane	0.01	0.22	V0	0.16	V0
Methylcyclopentane	0.02	0.08	V0	0.05	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.43	V0	0.56	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.29	V0	0.16	V0
n-Hexane	0.01	0.22	V0	0.26	V0
n-Nonane	0.01	0.07	V0	0.01	V0
n-Octane	0.02	0.16	V0	0.02	V0
n-Pentane	0.1	0.2	V0	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.03	V0	0.02	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.21	V0	0.18	V0
trans-2-Butene	0.01	0.05	V0	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 19-May			Anzac AMS 14 19-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	0.09	V0
1-Pentene	0.01	< 0.01	V1	0.01	V0
2,2,4-Trimethylpentane	0.01	0.03	V0	0.12	V0
2,2-Dimethylbutane	0.01	< 0.01	V1	< 0.01	V1
2,3,4-Trimethylpentane	0.01	< 0.01	V1	0.04	V0
2,3-Dimethylbutane	0.02	< 0.02	V1	0.04	V0
2,3-Dimethylpentane	0.02	0.04	V0	0.13	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.06	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	< 0.01	V1	0.02	V0
2-Methylhexane	0.01	0.08	V0	0.11	V0
2-Methylpentane	0.01	0.08	V0	0.16	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.02	V0	< 0.02	V1
3-Methylhexane	0.02	0.08	V0	0.11	V0
3-Methylpentane	0.01	0.05	V0	0.1	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	7	V0	4	V0
Acetone	0.4	1.9	V0	1.3	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.08	V0	0.08	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	< 0.02	V1	0.03	V0
Cyclopentane	0.01	0.01	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.8	V0	1.1	V0
Ethylbenzene	0.01	0.02	V0	0.02	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.47	V0	0.35	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.28	V0	0.34	V0
Isoprene	0.01	0.04	V0	0.06	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	0.05	V0	0.04	V0
Methanol	3	11	V0	11	V0
Methylcyclohexane	0.01	0.11	V0	0.18	V0
Methylcyclopentane	0.02	0.03	V0	0.09	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.53	V0	0.54	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.13	V0	0.17	V0
n-Hexane	0.01	0.19	V0	0.3	V0
n-Nonane	0.01	0.02	V0	0.02	V0
n-Octane	0.02	0.02	V0	0.03	V0
n-Pentane	0.1	0.3	V0	0.3	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.02	V0	0.02	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.15	V0	0.25	V0
trans-2-Butene	0.01	0.06	V0	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Barge Landing AMS 9 19-May	Fort McKay South AMS 13 19-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.08	V0	0.05	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.05	V0	0.06	V0
2,2-Dimethylbutane	0.01	0.03	V0	0.03	V0
2,3,4-Trimethylpentane	0.01	0.02	V0	0.02	V0
2,3-Dimethylbutane	0.02	0.04	V0	0.05	V0
2,3-Dimethylpentane	0.02	0.08	V0	0.07	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.17	V0	0.18	V0
2-Methylhexane	0.01	0.12	V0	0.1	V0
2-Methylpentane	0.01	0.13	V0	0.1	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.08	V0	0.08	V0
3-Methylhexane	0.02	0.18	V0	0.17	V0
3-Methylpentane	0.01	0.08	V0	0.08	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	4	V0	3	V0
Acetone	0.4	1.8	V0	1.4	V0
alpha-Pinene	0.3	< 0.3	V1	0.5	V0
Benzene	0.01	0.08	V0	0.06	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	0.04	V0	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.1	V0	0.09	V0
Cyclopentane	0.01	0.03	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.7	V0	0.8	V0
Ethylbenzene	0.01	0.08	V0	0.05	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.44	V0	0.31	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.27	V0	0.17	V0
Isoprene	0.01	0.14	V0	0.3	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	< 0.01	V1
m,p-Xylene	0.03	0.12	V0	0.09	V0
Methanol	3	11	V0	8	V0
Methylcyclohexane	0.01	0.3	V0	0.29	V0
Methylcyclopentane	0.02	0.13	V0	0.12	V0
Methylethylketone	0.3	0.4	V0	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.37	V0	0.32	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.4	V0	0.36	V0
n-Hexane	0.01	0.25	V0	0.2	V0
n-Nonane	0.01	0.11	V0	0.1	V0
n-Octane	0.02	0.25	V0	0.25	V0
n-Pentane	0.1	0.2	V0	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.06	V0	0.04	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.42	V0	0.31	V0
trans-2-Butene	0.01	0.06	V0	0.05	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 19-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.1	V0
1-Pentene	0.01	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1
2,2-Dimethylbutane	0.01	0.05	V0
2,3,4-Trimethylpentane	0.01	0.02	V0
2,3-Dimethylbutane	0.02	0.12	V0
2,3-Dimethylpentane	0.02	0.08	V0
2,4-Dimethylpentane	0.01	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	0.05	V0
2-Methylhexane	0.01	0.08	V0
2-Methylpentane	0.01	0.09	V0
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	0.03	V0
3-Methylhexane	0.02	0.11	V0
3-Methylpentane	0.01	0.16	V0
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	5	V0
Acetone	0.4	1.4	V0
alpha-Pinene	0.3	0.4	V0
Benzene	0.01	0.06	V0
beta-Pinene	0.3	< 0.3	V1
cis-2-Butene	0.02	0.04	V0
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	0.21	V0
Cyclopentane	0.01	0.06	V0
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	0.8	V0
Ethylbenzene	0.01	0.01	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	0.8	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	0.66	V0
Isoprene	0.01	0.12	V0
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1
m,p-Xylene	0.03	< 0.03	V1
Methanol	3	7	V0
Methylcyclohexane	0.01	0.26	V0
Methylcyclopentane	0.02	0.14	V0
Methylethylketone	0.3	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	0.4	V0
n-Decane	0.06	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	0.22	V0
n-Hexane	0.01	0.22	V0
n-Nonane	0.01	0.04	V0
n-Octane	0.02	0.06	V0
n-Pentane	0.1	0.1	V0
n-Propylbenzene	0.05	< 0.05	V1
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.01	V0
Styrene	0.04	< 0.04	V1
Toluene	0.01	0.11	V0
trans-2-Butene	0.01	0.06	V0
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 25-May			Patricia McInnes AMS 6 25-May	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	0.03	V0
1,3,5-Trimethylbenzene	0.02	0.02	V0	0.02	V0
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	< 0.02	V1	0.03	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.04	V0	0.03	V0
2,2-Dimethylbutane	0.01	< 0.01	V1	0.05	V0
2,3,4-Trimethylpentane	0.01	< 0.01	V1	0.02	V0
2,3-Dimethylbutane	0.02	< 0.02	V1	0.07	V0
2,3-Dimethylpentane	0.02	< 0.02	V1	0.04	V0
2,4-Dimethylpentane	0.01	< 0.01	V1	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.02	V0	0.08	V0
2-Methylhexane	0.01	0.04	V0	0.07	V0
2-Methylpentane	0.01	0.07	V0	0.26	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	0.03	V0
3-Methylhexane	0.02	0.03	V0	0.08	V0
3-Methylpentane	0.01	0.03	V0	0.14	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	7	V0	4	V0
Acetone	0.4	2.3	V0	2	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.03	V0	0.08	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.03	V0	0.08	V0
Cyclopentane	0.01	0.01	V0	0.05	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.1	V0	0.6	V0
Ethylbenzene	0.01	0.08	V0	0.04	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.13	V0	0.23	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.14	V0	0.42	V0
Isoprene	0.01	0.13	V0	0.05	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	0.01	V0	0.01	V0
m,p-Xylene	0.03	0.11	V0	0.09	V0
Methanol	3	4	V0	5	V0
Methylcyclohexane	0.01	0.05	V0	0.14	V0
Methylcyclopentane	0.02	0.04	V0	0.14	V0
Methylethylketone	0.3	0.7	V0	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.07	V0	0.51	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.07	V0	0.2	V0
n-Hexane	0.01	0.03	V0	0.19	V0
n-Nonane	0.01	0.03	V0	0.06	V0
n-Octane	0.02	0.03	V0	0.12	V0
n-Pentane	0.1	0.1	V0	0.4	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.04	V0	0.05	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.26	V0	0.15	V0
trans-2-Butene	0.01	0.01	V0	0.02	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 25-May			Anzac AMS 14 25-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	0.04	V0
1,3,5-Trimethylbenzene	0.02	0.02	V0	0.03	V0
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.02	V0	< 0.02	V1
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	< 0.01	V1
2,2-Dimethylbutane	0.01	0.05	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	< 0.01	V1
2,3-Dimethylbutane	0.02	0.04	V0	< 0.02	V1
2,3-Dimethylpentane	0.02	0.03	V0	< 0.02	V1
2,4-Dimethylpentane	0.01	0.01	V0	< 0.01	V1
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.05	V0	0.02	V0
2-Methylhexane	0.01	0.07	V0	0.03	V0
2-Methylpentane	0.01	0.23	V0	0.09	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.02	V0	< 0.02	V1
3-Methylhexane	0.02	0.08	V0	0.03	V0
3-Methylpentane	0.01	0.1	V0	0.03	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	10	V0	< 3	V1
Acetone	0.4	4.6	V0	1.8	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.08	V0	0.05	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.03	V0	0.04	V0
Cyclopentane	0.01	0.05	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.2	V0	0.6	V0
Ethylbenzene	0.01	0.03	V0	0.04	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.24	V0	0.06	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.26	V0	0.19	V0
Isoprene	0.01	0.07	V0	0.05	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	0.01	V0	0.01	V0
m,p-Xylene	0.03	0.06	V0	0.07	V0
Methanol	3	8	V0	5	V0
Methylcyclohexane	0.01	0.11	V0	0.05	V0
Methylcyclopentane	0.02	0.07	V0	0.05	V0
Methylethylketone	0.3	0.3	V0	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.09	V0	0.09	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.17	V0	0.07	V0
n-Hexane	0.01	0.14	V0	0.04	V0
n-Nonane	0.01	0.04	V0	0.04	V0
n-Octane	0.02	0.06	V0	0.05	V0
n-Pentane	0.1	0.2	V0	0.3	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.04	V0	0.04	V0
Styrene	0.04	0.04	V0	0.07	V0
Toluene	0.01	0.11	V0	0.18	V0
trans-2-Butene	0.01	0.01	V0	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Barge Landing AMS 9 25-May	Fort McKay South AMS 13 25-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.07	V0	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	0.05	V0	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	< 0.02	V1	< 0.02	V1
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.02	V0	< 0.01	V1
2,2-Dimethylbutane	0.01	0.04	V0	0.01	V0
2,3,4-Trimethylpentane	0.01	0.02	V0	< 0.01	V1
2,3-Dimethylbutane	0.02	0.06	V0	< 0.02	V1
2,3-Dimethylpentane	0.02	< 0.02	V1	< 0.02	V1
2,4-Dimethylpentane	0.01	0.01	V0	0.01	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.02	V0	0.02	V0
2-Methylhexane	0.01	0.02	V0	0.06	V0
2-Methylpentane	0.01	0.1	V0	0.08	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.02	V0	0.06	V0
3-Methylpentane	0.01	0.06	V0	0.03	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	< 3	V1	4	V0
Acetone	0.4	1.6	V0	2	V0
alpha-Pinene	0.3	< 0.3	V1	< 0.3	V1
Benzene	0.01	0.04	V0	0.04	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	< 0.02	V1	< 0.02	V1
Cyclopentane	0.01	0.03	V0	< 0.01	V1
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.5	V0	1.2	V0
Ethylbenzene	0.01	0.08	V0	0.06	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.03	V0	0.09	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.14	V0	0.09	V0
Isoprene	0.01	0.19	V0	0.11	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	0.04	V0	0.01	V0
m,p-Xylene	0.03	0.1	V0	0.08	V0
Methanol	3	4	V0	5	V0
Methylcyclohexane	0.01	0.03	V0	0.13	V0
Methylcyclopentane	0.02	0.03	V0	< 0.02	V1
Methylethylketone	0.3	0.4	V0	0.6	V0
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.05	V0	0.05	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.03	V0	0.1	V0
n-Hexane	0.01	< 0.01	V1	0.09	V0
n-Nonane	0.01	0.04	V0	0.02	V0
n-Octane	0.02	0.03	V0	0.02	V0
n-Pentane	0.1	0.1	V0	< 0.1	V1
n-Propylbenzene	0.05	0.05	V0	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	0.6	V0	< 0.5	V1
o-Xylene	0.01	0.07	V0	0.04	V0
Styrene	0.04	0.14	V0	0.04	V0
Toluene	0.01	0.16	V0	0.15	V0
trans-2-Butene	0.01	< 0.01	V1	0.02	V0
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 25-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	0.03	V0
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.03	V0
1-Pentene	0.01	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1
2,2-Dimethylbutane	0.01	0.2	V0
2,3,4-Trimethylpentane	0.01	0.06	V0
2,3-Dimethylbutane	0.02	0.35	V0
2,3-Dimethylpentane	0.02	0.15	V0
2,4-Dimethylpentane	0.01	0.06	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	0.06	V0
2-Methylhexane	0.01	0.05	V0
2-Methylpentane	0.01	0.09	V0
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1
3-Methylhexane	0.02	0.06	V0
3-Methylpentane	0.01	0.56	V0
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	4	V0
Acetone	0.4	2.1	V0
alpha-Pinene	0.3	< 0.3	V1
Benzene	0.01	0.04	V0
beta-Pinene	0.3	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	0.78	V0
Cyclopentane	0.01	0.21	V0
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	0.8	V0
Ethylbenzene	0.01	0.04	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	1.63	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	2.4	V0
Isoprene	0.01	0.09	V0
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	0.02	V0
m,p-Xylene	0.03	0.07	V0
Methanol	3	4	V0
Methylcyclohexane	0.01	0.44	V0
Methylcyclopentane	0.02	0.55	V0
Methylethylketone	0.3	0.4	V0
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	0.53	V0
n-Decane	0.06	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	0.08	V0
n-Hexane	0.01	0.04	V0
n-Nonane	0.01	0.03	V0
n-Octane	0.02	0.04	V0
n-Pentane	0.1	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.04	V0
Styrene	0.04	0.04	V0
Toluene	0.01	0.11	V0
trans-2-Butene	0.01	0.01	V0
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	0.04	V0
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.03	V0	< 0.02	V1
1-Pentene	0.01	0.01	V0	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1	0.17	V0
2,2-Dimethylbutane	0.01	0.06	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	0.02	V0	0.03	V0
2,3-Dimethylbutane	0.02	0.1	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.06	V0	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.23	V0	0.03	V0
2-Methylhexane	0.01	0.11	V0	0.05	V0
2-Methylpentane	0.01	0.15	V0	0.12	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.08	V0	0.03	V0
3-Methylhexane	0.02	0.16	V0	0.05	V0
3-Methylpentane	0.01	0.07	V0	0.04	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	6	V0	7	V0
Acetone	0.4	3.7	V0	3.6	V0
alpha-Pinene	0.3	0.4	V0	< 0.3	V1
Benzene	0.01	0.06	V0	0.06	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.09	V0	0.02	V0
Cyclopentane	0.01	0.02	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	0.9	V0	1.8	V0
Ethylbenzene	0.01	0.06	V0	0.09	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.23	V0	0.38	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.34	V0	0.55	V0
Isoprene	0.01	1.14	V0	0.43	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	0.01	V0
m,p-Xylene	0.03	0.16	V0	0.17	V0
Methanol	3	16	V0	12	V0
Methylcyclohexane	0.01	0.3	V0	0.04	V0
Methylcyclopentane	0.02	0.15	V0	0.05	V0
Methylethylketone	0.3	< 0.3	V1	0.4	V0
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.55	V0	0.95	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.35	V0	0.05	V0
n-Hexane	0.01	0.13	V0	< 0.01	V1
n-Nonane	0.01	0.1	V0	0.02	V0
n-Octane	0.02	0.27	V0	0.03	V0
n-Pentane	0.1	0.2	V0	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.07	V0	0.07	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.28	V0	0.4	V0
trans-2-Butene	0.01	< 0.01	V1	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 31-May			Anzac AMS 14 31-May	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0.04	V0	0.04	V0
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	0.02	V0
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	< 0.02	V1	< 0.02	V1
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.05	V0	0.09	V0
2,2-Dimethylbutane	0.01	0.01	V0	< 0.01	V1
2,3,4-Trimethylpentane	0.01	0.02	V0	< 0.01	V1
2,3-Dimethylbutane	0.02	< 0.02	V1	< 0.02	V1
2,3-Dimethylpentane	0.02	0.03	V0	0.02	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.01	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.02	V0	0.03	V0
2-Methylhexane	0.01	0.05	V0	0.07	V0
2-Methylpentane	0.01	0.12	V0	0.15	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	< 0.02	V1	< 0.02	V1
3-Methylhexane	0.02	0.05	V0	0.07	V0
3-Methylpentane	0.01	0.05	V0	0.07	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	6	V0	4	V0
Acetone	0.4	4	V0	2.9	V0
alpha-Pinene	0.3	< 0.3	V1	0.4	V0
Benzene	0.01	0.07	V0	0.07	V0
beta-Pinene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.03	V0	0.04	V0
Cyclopentane	0.01	0.03	V0	0.02	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.5	V0	1	V0
Ethylbenzene	0.01	0.05	V0	0.05	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.36	V0	0.18	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.49	V0	0.39	V0
Isoprene	0.01	0.39	V0	0.63	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	0.02	V0
m,p-Xylene	0.03	0.16	V0	0.09	V0
Methanol	3	14	V0	12	V0
Methylcyclohexane	0.01	0.07	V0	0.11	V0
Methylcyclopentane	0.02	0.06	V0	0.09	V0
Methylethylketone	0.3	< 0.3	V1	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.87	V0	0.4	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.06	V0	0.12	V0
n-Hexane	0.01	0.05	V0	0.12	V0
n-Nonane	0.01	0.02	V0	0.02	V0
n-Octane	0.02	0.03	V0	0.04	V0
n-Pentane	0.1	0.3	V0	0.3	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.06	V0	0.05	V0
Styrene	0.04	< 0.04	V1	0.07	V0
Toluene	0.01	0.18	V0	0.45	V0
trans-2-Butene	0.01	< 0.01	V1	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Barge Landing AMS 9 31-May	Fort McKay South AMS 13 31-May			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1	0.05	V0
1,3,5-Trimethylbenzene	0.02	< 0.02	V1	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1	< 0.02	V1
1-Butene	0.02	0.03	V0	0.03	V0
1-Pentene	0.01	< 0.01	V1	< 0.01	V1
2,2,4-Trimethylpentane	0.01	0.07	V0	< 0.01	V1
2,2-Dimethylbutane	0.01	0.03	V0	0.06	V0
2,3,4-Trimethylpentane	0.01	0.02	V0	0.02	V0
2,3-Dimethylbutane	0.02	0.06	V0	0.1	V0
2,3-Dimethylpentane	0.02	0.05	V0	0.1	V0
2,4-Dimethylpentane	0.01	0.01	V0	0.03	V0
2-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1	< 0.3	V1
2-Methylheptane	0.01	0.22	V0	0.28	V0
2-Methylhexane	0.01	0.11	V0	0.22	V0
2-Methylpentane	0.01	0.1	V0	0.48	V0
3-Methyl-1-butene	0.3	< 0.3	V1	< 0.3	V1
3-Methylheptane	0.02	0.08	V0	0.1	V0
3-Methylhexane	0.02	0.15	V0	0.31	V0
3-Methylpentane	0.01	0.04	V0	0.26	V0
4-Methyl-1-pentene	0.3	< 0.3	V1	< 0.3	V1
Acetaldehyde	3	7	V0	6	V0
Acetone	0.4	3.9	V0	3.6	V0
alpha-Pinene	0.3	0.4	V0	1.1	V0
Benzene	0.01	0.06	V0	0.14	V0
beta-Pinene	0.3	< 0.3	V1	0.5	V0
cis-2-Butene	0.02	< 0.02	V1	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1	< 0.02	V1
Cyclohexane	0.02	0.08	V0	0.21	V0
Cyclopentane	0.01	0.02	V0	0.04	V0
Cyclopentene	0.3	< 0.3	V1	< 0.3	V1
Ethanol	0.3	1.4	V0	1.1	V0
Ethylbenzene	0.01	0.06	V0	0.08	V0
Formaldehyde	3	< 3	V1	< 3	V1
Isobutane	0.02	0.2	V0	0.28	V0
Isobutylene	0.3	< 0.3	V1	< 0.3	V1
Isopentane	0.03	0.27	V0	0.4	V0
Isoprene	0.01	1.92	V0	0.96	V0
Isopropylalcohol	0.4	< 0.4	V1	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1	0.01	V0
m,p-Xylene	0.03	0.14	V0	0.23	V0
Methanol	3	14	V0	16	V0
Methylcyclohexane	0.01	0.27	V0	0.57	V0
Methylcyclopentane	0.02	0.11	V0	0.39	V0
Methylethylketone	0.3	0.3	V0	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1	< 0.3	V1
n-Butane	0.03	0.29	V0	0.5	V0
n-Decane	0.06	< 0.06	V1	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1	< 0.4	V1
n-Heptane	0.01	0.33	V0	0.66	V0
n-Hexane	0.01	0.07	V0	0.71	V0
n-Nonane	0.01	0.09	V0	0.17	V0
n-Octane	0.02	0.26	V0	0.35	V0
n-Pentane	0.1	0.1	V0	0.5	V0
n-Propylbenzene	0.05	< 0.05	V1	< 0.05	V1
n-Undecane	0.5	< 0.5	V1	< 0.5	V1
Naphthalene	0.5	< 0.5	V1	< 0.5	V1
o-Xylene	0.01	0.06	V0	0.11	V0
Styrene	0.04	< 0.04	V1	< 0.04	V1
Toluene	0.01	0.36	V0	0.47	V0
trans-2-Butene	0.01	< 0.01	V1	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1	< 0.02	V1



Station Name Station # Sample Date	Horizon AMS 15 31-May		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	< 0.03	V1
1,3,5-Trimethylbenzene	0.02	< 0.02	V1
1,3-Butadiene	0.02	< 0.02	V1
1-Butene	0.02	0.04	V0
1-Pentene	0.01	< 0.01	V1
2,2,4-Trimethylpentane	0.01	< 0.01	V1
2,2-Dimethylbutane	0.01	0.04	V0
2,3,4-Trimethylpentane	0.01	0.01	V0
2,3-Dimethylbutane	0.02	0.05	V0
2,3-Dimethylpentane	0.02	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0
2-Methyl-1-pentene	0.3	< 0.3	V1
2-Methyl-2-butene	0.3	< 0.3	V1
2-Methylheptane	0.01	0.19	V0
2-Methylhexane	0.01	0.13	V0
2-Methylpentane	0.01	0.19	V0
3-Methyl-1-butene	0.3	< 0.3	V1
3-Methylheptane	0.02	0.07	V0
3-Methylhexane	0.02	0.16	V0
3-Methylpentane	0.01	0.1	V0
4-Methyl-1-pentene	0.3	< 0.3	V1
Acetaldehyde	3	5	V0
Acetone	0.4	4	V0
alpha-Pinene	0.3	1	V0
Benzene	0.01	0.06	V0
beta-Pinene	0.3	0.3	V0
cis-2-Butene	0.02	< 0.02	V1
cis-2-Hexene	0.3	< 0.3	V1
cis-2-Pentene	0.02	< 0.02	V1
Cyclohexane	0.02	0.11	V0
Cyclopentane	0.01	0.02	V0
Cyclopentene	0.3	< 0.3	V1
Ethanol	0.3	1	V0
Ethylbenzene	0.01	0.05	V0
Formaldehyde	3	< 3	V1
Isobutane	0.02	0.28	V0
Isobutylene	0.3	< 0.3	V1
Isopentane	0.03	0.32	V0
Isoprene	0.01	1.22	V0
Isopropylalcohol	0.4	< 0.4	V1
Isopropylbenzene	0.01	< 0.01	V1
m,p-Xylene	0.03	0.12	V0
Methanol	3	14	V0
Methylcyclohexane	0.01	0.29	V0
Methylcyclopentane	0.02	0.18	V0
Methylethylketone	0.3	< 0.3	V1
Methylisobutylketone	0.4	< 0.4	V1
Methylvinylketone	0.3	< 0.3	V1
n-Butane	0.03	0.34	V0
n-Decane	0.06	< 0.06	V1
n-Dodecane	0.4	< 0.4	V1
n-Heptane	0.01	0.4	V0
n-Hexane	0.01	0.23	V0
n-Nonane	0.01	0.09	V0
n-Octane	0.02	0.23	V0
n-Pentane	0.1	0.2	V0
n-Propylbenzene	0.05	< 0.05	V1
n-Undecane	0.5	< 0.5	V1
Naphthalene	0.5	< 0.5	V1
o-Xylene	0.01	0.06	V0
Styrene	0.04	< 0.04	V1
Toluene	0.01	0.26	V0
trans-2-Butene	0.01	< 0.01	V1
trans-2-Hexene	0.3	< 0.3	V1
trans-2-Pentene	0.02	< 0.02	V1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Volatile Organic Compounds (VOCs) - Summary

2017
Indicated Sites and Dates

Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 May 01 - May 31 Average	Bertha Ganter - Fort McKay AMS 1 May 01 - May 31 Std Dev	Bertha Ganter - Fort McKay AMS 1 May 01 - May 31 Total Samples (#)	Bertha Ganter - Fort McKay AMS 1 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.02	6	1
1,3,5-Trimethylbenzene	0.00	0.01	6	1
1,3-Butadiene	0.00	0.00	6	0
1-Butene	0.05	0.04	6	4
1-Pentene	0.00	0.00	6	1
2,2,4-Trimethylpentane	0.01	0.02	6	1
2,2-Dimethylbutane	0.02	0.02	6	4
2,3,4-Trimethylpentane	0.01	0.01	6	3
2,3-Dimethylbutane	0.04	0.04	6	5
2,3-Dimethylpentane	0.03	0.02	6	5
2,4-Dimethylpentane	0.01	0.01	6	4
2-Methyl-1-pentene	0.00	0.00	6	0
2-Methyl-2-butene	0.00	0.00	6	0
2-Methylheptane	0.07	0.09	6	6
2-Methylhexane	0.07	0.04	6	5
2-Methylpentane	0.13	0.07	6	6
3-Methyl-1-butene	0.00	0.00	6	0
3-Methylheptane	0.02	0.03	6	2
3-Methylhexane	0.09	0.05	6	6
3-Methylpentane	0.07	0.03	6	6
4-Methyl-1-pentene	0.00	0.00	6	0
Acetaldehyde	4.33	2.42	6	5
Acetone	2.08	0.98	6	6
alpha-Pinene	0.07	0.16	6	1
Benzene	0.06	0.02	6	6
beta-Pinene	0.00	0.00	6	0
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.00	0.00	6	0
cis-2-Pentene	0.00	0.00	6	0
Cyclohexane	0.05	0.03	6	5
Cyclopentane	0.02	0.01	6	6
Cyclopentene	0.00	0.00	6	0
Ethanol	0.95	0.19	6	6
Ethylbenzene	0.03	0.03	6	4
Formaldehyde	0.00	0.00	6	0
Isobutane	0.25	0.10	6	6
Isobutylene	0.00	0.00	6	0
Isopentane	0.22	0.09	6	6
Isoprene	0.26	0.44	6	5
Isopropylalcohol	0.00	0.00	6	0
Isopropylbenzene	0.00	0.00	6	1
m,p-Xylene	0.06	0.07	6	3
Methanol	8.83	4.07	6	6
Methylcyclohexane	0.14	0.10	6	6
Methylcyclopentane	0.07	0.06	6	5
Methylethylketone	0.12	0.29	6	1
Methylisobutylketone	0.00	0.00	6	0
Methylvinylketone	0.00	0.00	6	0
n-Butane	0.26	0.19	6	6
n-Decane	0.00	0.00	6	0
n-Dodecane	0.00	0.00	6	0
n-Heptane	0.17	0.12	6	6
n-Hexane	0.15	0.11	6	6
n-Nonane	0.04	0.04	6	6
n-Octane	0.08	0.11	6	4
n-Pentane	0.18	0.08	6	6
n-Propylbenzene	0.00	0.00	6	0
n-Undecane	0.00	0.00	6	0
Naphthalene	0.00	0.00	6	0
o-Xylene	0.03	0.03	6	5
Styrene	0.00	0.00	6	0
Toluene	0.15	0.11	6	6
trans-2-Butene	0.03	0.03	6	4
trans-2-Hexene	0.00	0.00	6	0
trans-2-Pentene	0.00	0.00	6	0



Station Name Station # Sample Date	Patricia McInnes AMS 6 May 01 - May 31 Average	Patricia McInnes AMS 6 May 01 - May 31 Std Dev	Patricia McInnes AMS 6 May 01 - May 31 Total Samples (#)	Patricia McInnes AMS 6 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.02	6	2
1,3,5-Trimethylbenzene	0.00	0.01	6	1
1,3-Butadiene	0.00	0.01	6	1
1-Butene	0.05	0.03	6	5
1-Pentene	0.00	0.01	6	1
2,2,4-Trimethylpentane	0.05	0.06	6	5
2,2-Dimethylbutane	0.01	0.02	6	2
2,3,4-Trimethylpentane	0.01	0.01	6	4
2,3-Dimethylbutane	0.03	0.02	6	5
2,3-Dimethylpentane	0.05	0.01	6	6
2,4-Dimethylpentane	0.02	0.01	6	6
2-Methyl-1-pentene	0.00	0.00	6	0
2-Methyl-2-butene	0.00	0.00	6	0
2-Methylheptane	0.03	0.03	6	6
2-Methylhexane	0.06	0.03	6	5
2-Methylpentane	0.15	0.06	6	6
3-Methyl-1-butene	0.00	0.00	6	0
3-Methylheptane	0.02	0.01	6	4
3-Methylhexane	0.08	0.02	6	6
3-Methylpentane	0.09	0.03	6	6
4-Methyl-1-pentene	0.00	0.00	6	0
Acetaldehyde	4.50	2.43	6	5
Acetone	2.15	1.02	6	6
alpha-Pinene	0.00	0.00	6	0
Benzene	0.08	0.01	6	6
beta-Pinene	0.00	0.00	6	0
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.00	0.00	6	0
cis-2-Pentene	0.00	0.00	6	0
Cyclohexane	0.04	0.03	6	5
Cyclopentane	0.02	0.02	6	4
Cyclopentene	0.00	0.00	6	0
Ethanol	1.52	0.48	6	6
Ethylbenzene	0.05	0.04	6	6
Formaldehyde	0.00	0.00	6	0
Isobutane	0.31	0.12	6	6
Isobutylene	0.00	0.00	6	0
Isopentane	0.34	0.17	6	6
Isoprene	0.10	0.17	6	6
Isopropylalcohol	0.00	0.00	6	0
Isopropylbenzene	0.00	0.01	6	2
m,p-Xylene	0.08	0.05	6	6
Methanol	9.17	3.92	6	6
Methylcyclohexane	0.12	0.06	6	6
Methylcyclopentane	0.07	0.04	6	6
Methylethylketone	0.18	0.30	6	2
Methylisobutylketone	0.00	0.00	6	0
Methylvinylketone	0.00	0.00	6	0
n-Butane	0.49	0.28	6	6
n-Decane	0.00	0.00	6	0
n-Dodecane	0.00	0.00	6	0
n-Heptane	0.13	0.05	6	6
n-Hexane	0.19	0.11	6	5
n-Nonane	0.02	0.02	6	5
n-Octane	0.04	0.04	6	5
n-Pentane	0.22	0.13	6	5
n-Propylbenzene	0.00	0.00	6	0
n-Undecane	0.00	0.00	6	0
Naphthalene	0.00	0.00	6	0
o-Xylene	0.04	0.02	6	6
Styrene	0.00	0.00	6	0
Toluene	0.19	0.11	6	6
trans-2-Butene	0.03	0.02	6	5
trans-2-Hexene	0.00	0.00	6	0
trans-2-Pentene	0.00	0.00	6	0



Station Name Station # Sample Date	Athabasca Valley AMS 7 May 01 - May 31 Average	Athabasca Valley AMS 7 May 01 - May 31 Std Dev	Athabasca Valley AMS 7 May 01 - May 31 Total Samples (#)	Athabasca Valley AMS 7 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.02	0.02	6	4
1,3,5-Trimethylbenzene	0.01	0.01	6	2
1,3-Butadiene	0.00	0.01	6	1
1-Butene	0.03	0.04	6	4
1-Pentene	0.00	0.00	6	1
2,2,4-Trimethylpentane	0.02	0.02	6	4
2,2-Dimethylbutane	0.02	0.02	6	4
2,3,4-Trimethylpentane	0.01	0.01	6	3
2,3-Dimethylbutane	0.02	0.02	6	3
2,3-Dimethylpentane	0.03	0.01	6	6
2,4-Dimethylpentane	0.01	0.01	6	5
2-Methyl-1-pentene	0.05	0.12	6	1
2-Methyl-2-butene	0.05	0.12	6	1
2-Methylheptane	0.02	0.02	6	5
2-Methylhexane	0.05	0.03	6	5
2-Methylpentane	0.10	0.08	6	6
3-Methyl-1-butene	0.05	0.12	6	1
3-Methylheptane	0.01	0.01	6	3
3-Methylhexane	0.06	0.02	6	6
3-Methylpentane	0.05	0.03	6	6
4-Methyl-1-pentene	0.05	0.12	6	1
Acetaldehyde	4.83	3.54	6	5
Acetone	2.93	1.57	6	6
alpha-Pinene	0.05	0.12	6	1
Benzene	0.06	0.03	6	6
beta-Pinene	0.05	0.12	6	1
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.05	0.12	6	1
cis-2-Pentene	0.00	0.01	6	1
Cyclohexane	0.02	0.01	6	4
Cyclopentane	0.02	0.02	6	6
Cyclopentene	0.05	0.12	6	1
Ethanol	1.17	0.50	6	6
Ethylbenzene	0.02	0.02	6	6
Formaldehyde	0.50	1.22	6	1
Isobutane	0.25	0.16	6	6
Isobutylene	0.05	0.12	6	1
Isopentane	0.25	0.16	6	6
Isoprene	0.09	0.15	6	6
Isopropylalcohol	0.07	0.16	6	1
Isopropylbenzene	0.00	0.01	6	2
m,p-Xylene	0.06	0.05	6	5
Methanol	8.50	3.73	6	6
Methylcyclohexane	0.08	0.04	6	6
Methylcyclopentane	0.04	0.03	6	5
Methylethylketone	0.10	0.15	6	2
Methylisobutylketone	0.07	0.16	6	1
Methylvinylketone	0.05	0.12	6	1
n-Butane	0.31	0.33	6	6
n-Decane	0.01	0.02	6	1
n-Dodecane	0.07	0.16	6	1
n-Heptane	0.10	0.06	6	6
n-Hexane	0.11	0.08	6	6
n-Nonane	0.02	0.01	6	6
n-Octane	0.03	0.02	6	5
n-Pentane	0.17	0.12	6	5
n-Propylbenzene	0.01	0.02	6	1
n-Undecane	0.08	0.20	6	1
Naphthalene	0.08	0.20	6	1
o-Xylene	0.03	0.02	6	6
Styrene	0.01	0.02	6	2
Toluene	0.11	0.06	6	6
trans-2-Butene	0.02	0.03	6	4
trans-2-Hexene	0.05	0.12	6	1
trans-2-Pentene	0.00	0.01	6	1



Station Name Station # Sample Date	Anzac AMS 14 May 01 - May 31 Average	Anzac AMS 14 May 01 - May 31 Std Dev	Anzac AMS 14 May 01 - May 31 Total Samples (#)	Anzac AMS 14 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.02	0.02	5	3
1,3,5-Trimethylbenzene	0.01	0.01	5	2
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.06	0.05	5	3
1-Pentene	0.00	0.00	5	1
2,2,4-Trimethylpentane	0.04	0.06	5	2
2,2-Dimethylbutane	0.00	0.00	5	0
2,3,4-Trimethylpentane	0.01	0.02	5	1
2,3-Dimethylbutane	0.01	0.02	5	1
2,3-Dimethylpentane	0.03	0.05	5	3
2,4-Dimethylpentane	0.01	0.03	5	2
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.02	0.01	5	5
2-Methylhexane	0.06	0.03	5	5
2-Methylpentane	0.10	0.06	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.00	0.00	5	0
3-Methylhexane	0.05	0.04	5	4
3-Methylpentane	0.05	0.04	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	3.20	1.92	5	4
Acetone	1.68	0.74	5	5
alpha-Pinene	0.08	0.18	5	1
Benzene	0.06	0.01	5	5
beta-Pinene	0.00	0.00	5	0
cis-2-Butene	0.03	0.02	5	3
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.02	0.02	5	3
Cyclopentane	0.01	0.01	5	2
Cyclopentene	0.00	0.00	5	0
Ethanol	0.86	0.24	5	5
Ethylbenzene	0.03	0.02	5	4
Formaldehyde	0.00	0.00	5	0
Isobutane	0.18	0.11	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.23	0.13	5	5
Isoprene	0.16	0.26	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.01	0.01	5	2
m,p-Xylene	0.05	0.03	5	4
Methanol	8.20	3.11	5	5
Methylcyclohexane	0.10	0.06	5	5
Methylcyclopentane	0.05	0.05	5	3
Methylethylketone	0.00	0.00	5	0
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.26	0.20	5	5
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.11	0.05	5	5
n-Hexane	0.13	0.11	5	5
n-Nonane	0.04	0.03	5	5
n-Octane	0.04	0.02	5	5
n-Pentane	0.22	0.11	5	5
n-Propylbenzene	0.00	0.00	5	0
n-Undecane	0.00	0.00	5	0
Naphthalene	0.00	0.00	5	0
o-Xylene	0.03	0.02	5	4
Styrene	0.03	0.04	5	2
Toluene	0.23	0.13	5	5
trans-2-Butene	0.04	0.03	5	3
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Barge Landing AMS 9 May 01 - May 31 Average	Barge Landing AMS 9 May 01 - May 31 Std Dev	Barge Landing AMS 9 May 01 - May 31 Total Samples (#)	Barge Landing AMS 9 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.02	0.03	6	2
1,3,5-Trimethylbenzene	0.01	0.02	6	1
1,3-Butadiene	0.00	0.00	6	0
1-Butene	0.07	0.05	6	5
1-Pentene	0.00	0.00	6	0
2,2,4-Trimethylpentane	0.02	0.03	6	3
2,2-Dimethylbutane	0.04	0.05	6	5
2,3,4-Trimethylpentane	0.01	0.01	6	4
2,3-Dimethylbutane	0.08	0.10	6	5
2,3-Dimethylpentane	0.04	0.04	6	5
2,4-Dimethylpentane	0.02	0.02	6	6
2-Methyl-1-pentene	0.00	0.00	6	0
2-Methyl-2-butene	0.00	0.00	6	0
2-Methylheptane	0.10	0.10	6	4
2-Methylhexane	0.12	0.12	6	6
2-Methylpentane	0.37	0.56	6	6
3-Methyl-1-butene	0.00	0.00	6	0
3-Methylheptane	0.04	0.04	6	3
3-Methylhexane	0.13	0.11	6	6
3-Methylpentane	0.21	0.32	6	6
4-Methyl-1-pentene	0.00	0.00	6	0
Acetaldehyde	3.83	2.23	6	5
Acetone	2.20	1.01	6	6
alpha-Pinene	0.07	0.16	6	1
Benzene	0.09	0.07	6	6
beta-Pinene	0.00	0.00	6	0
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.00	0.00	6	0
cis-2-Pentene	0.00	0.00	6	0
Cyclohexane	0.10	0.12	6	5
Cyclopentane	0.08	0.13	6	6
Cyclopentene	0.00	0.00	6	0
Ethanol	1.05	0.43	6	6
Ethylbenzene	0.05	0.03	6	5
Formaldehyde	0.00	0.00	6	0
Isobutane	0.37	0.42	6	6
Isobutylene	0.00	0.00	6	0
Isopentane	0.64	1.02	6	6
Isoprene	0.40	0.75	6	6
Isopropylalcohol	0.00	0.00	6	0
Isopropylbenzene	0.01	0.02	6	1
m,p-Xylene	0.09	0.07	6	4
Methanol	9.83	3.66	6	6
Methylcyclohexane	0.22	0.18	6	6
Methylcyclopentane	0.18	0.24	6	6
Methylethylketone	0.18	0.20	6	3
Methylisobutylketone	0.00	0.00	6	0
Methylvinylketone	0.00	0.00	6	0
n-Butane	1.08	2.16	6	6
n-Decane	0.00	0.00	6	0
n-Dodecane	0.00	0.00	6	0
n-Heptane	0.35	0.41	6	6
n-Hexane	0.56	0.98	6	5
n-Nonane	0.07	0.06	6	6
n-Octane	0.16	0.18	6	4
n-Pentane	1.12	2.20	6	6
n-Propylbenzene	0.01	0.02	6	1
n-Undecane	0.00	0.00	6	0
Naphthalene	0.10	0.24	6	1
o-Xylene	0.04	0.03	6	4
Styrene	0.02	0.06	6	1
Toluene	0.24	0.18	6	6
trans-2-Butene	0.03	0.03	6	3
trans-2-Hexene	0.00	0.00	6	0
trans-2-Pentene	0.00	0.00	6	0



Station Name Station # Sample Date	Fort McKay South AMS 13 May 01 - May 31 Average	Fort McKay South AMS 13 May 01 - May 31 Std Dev	Fort McKay South AMS 13 May 01 - May 31 Total Samples (#)	Fort McKay South AMS 13 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.01	0.02	6	1
1,3,5-Trimethylbenzene	0.00	0.00	6	0
1,3-Butadiene	0.00	0.00	6	0
1-Butene	0.03	0.03	6	3
1-Pentene	0.00	0.00	6	0
2,2,4-Trimethylpentane	0.01	0.02	6	1
2,2-Dimethylbutane	0.03	0.03	6	5
2,3,4-Trimethylpentane	0.01	0.01	6	2
2,3-Dimethylbutane	0.05	0.04	6	4
2,3-Dimethylpentane	0.04	0.04	6	4
2,4-Dimethylpentane	0.02	0.01	6	4
2-Methyl-1-pentene	0.00	0.00	6	0
2-Methyl-2-butene	0.00	0.00	6	0
2-Methylheptane	0.09	0.11	6	5
2-Methylhexane	0.08	0.08	6	4
2-Methylpentane	0.22	0.19	6	6
3-Methyl-1-butene	0.00	0.00	6	0
3-Methylheptane	0.03	0.05	6	2
3-Methylhexane	0.13	0.11	6	6
3-Methylpentane	0.13	0.11	6	6
4-Methyl-1-pentene	0.00	0.00	6	0
Acetaldehyde	4.67	1.51	6	6
Acetone	2.42	1.41	6	6
alpha-Pinene	0.32	0.44	6	3
Benzene	0.08	0.04	6	6
beta-Pinene	0.08	0.20	6	1
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.00	0.00	6	0
cis-2-Pentene	0.00	0.00	6	0
Cyclohexane	0.08	0.08	6	4
Cyclopentane	0.03	0.03	6	4
Cyclopentene	0.00	0.00	6	0
Ethanol	0.90	0.21	6	6
Ethylbenzene	0.03	0.03	6	4
Formaldehyde	0.00	0.00	6	0
Isobutane	0.26	0.10	6	6
Isobutylene	0.00	0.00	6	0
Isopentane	0.26	0.18	6	6
Isoprene	0.25	0.36	6	6
Isopropylalcohol	0.00	0.00	6	0
Isopropylbenzene	0.00	0.01	6	2
m,p-Xylene	0.07	0.09	6	4
Methanol	8.17	4.17	6	6
Methylcyclohexane	0.22	0.20	6	6
Methylcyclopentane	0.13	0.15	6	4
Methylethylketone	0.10	0.24	6	1
Methylisobutylketone	0.00	0.00	6	0
Methylvinylketone	0.00	0.00	6	0
n-Butane	0.24	0.17	6	6
n-Decane	0.00	0.00	6	0
n-Dodecane	0.00	0.00	6	0
n-Heptane	0.25	0.23	6	6
n-Hexane	0.29	0.28	6	6
n-Nonane	0.06	0.06	6	6
n-Octane	0.12	0.15	6	5
n-Pentane	0.28	0.21	6	5
n-Propylbenzene	0.00	0.00	6	0
n-Undecane	0.00	0.00	6	0
Naphthalene	0.00	0.00	6	0
o-Xylene	0.04	0.04	6	4
Styrene	0.01	0.02	6	1
Toluene	0.19	0.17	6	6
trans-2-Butene	0.03	0.03	6	4
trans-2-Hexene	0.00	0.00	6	0
trans-2-Pentene	0.00	0.00	6	0



Station Name Station # Sample Date	Horizon AMS 15 May 01 - May 31 Average	Horizon AMS 15 May 01 - May 31 Std Dev	Horizon AMS 15 May 01 - May 31 Total Samples (#)	Horizon AMS 15 May 01 - May 31 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.07	0.18	6	1
1,3,5-Trimethylbenzene	0.03	0.06	6	2
1,3-Butadiene	0.00	0.00	6	0
1-Butene	0.08	0.06	6	6
1-Pentene	0.00	0.00	6	1
2,2,4-Trimethylpentane	0.01	0.02	6	1
2,2-Dimethylbutane	0.10	0.06	6	6
2,3,4-Trimethylpentane	0.04	0.04	6	6
2,3-Dimethylbutane	0.20	0.15	6	6
2,3-Dimethylpentane	0.20	0.28	6	6
2,4-Dimethylpentane	0.07	0.10	6	6
2-Methyl-1-pentene	0.00	0.00	6	0
2-Methyl-2-butene	0.00	0.00	6	0
2-Methylheptane	0.25	0.44	6	6
2-Methylhexane	0.31	0.61	6	5
2-Methylpentane	0.50	0.89	6	6
3-Methyl-1-butene	0.00	0.00	6	0
3-Methylheptane	0.14	0.30	6	3
3-Methylhexane	0.39	0.73	6	6
3-Methylpentane	0.52	0.65	6	6
4-Methyl-1-pentene	0.00	0.00	6	0
Acetaldehyde	4.67	1.03	6	6
Acetone	2.35	1.09	6	6
alpha-Pinene	0.30	0.39	6	3
Benzene	0.13	0.17	6	6
beta-Pinene	0.05	0.12	6	1
cis-2-Butene	0.02	0.02	6	3
cis-2-Hexene	0.00	0.00	6	0
cis-2-Pentene	0.00	0.00	6	0
Cyclohexane	0.78	1.18	6	6
Cyclopentane	0.27	0.42	6	6
Cyclopentene	0.00	0.00	6	0
Ethanol	1.03	0.30	6	6
Ethylbenzene	0.09	0.15	6	6
Formaldehyde	0.00	0.00	6	0
Isobutane	1.11	0.86	6	6
Isobutylene	0.00	0.00	6	0
Isopentane	1.42	1.10	6	6
Isoprene	0.25	0.48	6	5
Isopropylalcohol	0.00	0.00	6	0
Isopropylbenzene	0.02	0.04	6	2
m,p-Xylene	0.20	0.37	6	4
Methanol	7.67	3.56	6	6
Methylcyclohexane	1.16	2.19	6	6
Methylcyclopentane	0.78	1.32	6	6
Methylethylketone	0.13	0.21	6	2
Methylisobutylketone	0.00	0.00	6	0
Methylvinylketone	0.00	0.00	6	0
n-Butane	0.56	0.52	6	6
n-Decane	0.09	0.21	6	1
n-Dodecane	0.00	0.00	6	0
n-Heptane	0.82	1.54	6	6
n-Hexane	0.79	1.53	6	6
n-Nonane	0.29	0.59	6	6
n-Octane	0.44	0.88	6	6
n-Pentane	0.78	1.43	6	6
n-Propylbenzene	0.02	0.05	6	1
n-Undecane	0.00	0.00	6	0
Naphthalene	0.00	0.00	6	0
o-Xylene	0.11	0.20	6	6
Styrene	0.01	0.02	6	1
Toluene	0.44	0.62	6	6
trans-2-Butene	0.03	0.03	6	4
trans-2-Hexene	0.00	0.00	6	0
trans-2-Pentene	0.00	0.00	6	0



Wood Buffalo Environmental Association

VOC (ppb) summary

2017 May

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99%	Max.	Mean	Std. Dev.	Median	Outlier	Test
1,2,4-Trimethylbenzene	34.1%	41	27	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.04	0.05	0.44	0.44	0.02	0.07	0.00	0.37	
1,3,5-Trimethylbenzene	22.0%	41	32	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.14	0.14	0.01	0.02	0.00	0.13	
1,3-Butadiene	4.9%	41	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.02	
1-Butene	73.2%	41	11	0.00	0.00	0.00	0.05	0.08	0.08	0.09	0.09	0.10	0.18	0.18	0.05	0.04	0.05	0.27	
1-Pentene	12.2%	41	36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.02	
2,2,4-Trimethylpentane	41.5%	41	24	0.00	0.00	0.00	0.01	0.03	0.04	0.06	0.06	0.09	0.17	0.17	0.02	0.04	0.00	0.21	
2,2-Dimethylbutane	63.4%	41	15	0.00	0.00	0.00	0.02	0.03	0.05	0.05	0.06	0.13	0.20	0.20	0.03	0.04	0.02	0.25	
2,3,4-Trimethylpentane	56.1%	41	18	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.11	0.11	0.01	0.02	0.01	0.11	
2,3-Dimethylbutane	70.7%	41	12	0.00	0.00	0.00	0.04	0.05	0.06	0.07	0.12	0.28	0.40	0.40	0.06	0.09	0.04	0.52	
2,3-Dimethylpentane	85.4%	41	6	0.00	0.00	0.02	0.03	0.04	0.06	0.07	0.10	0.13	0.76	0.76	0.06	0.12	0.03	0.65	
2,4-Dimethylpentane	80.5%	41	8	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.03	0.06	0.27	0.27	0.02	0.04	0.02	0.23	
2-Methyl-1-pentene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
2-Methyl-2-butene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
2-Methylheptane	90.2%	41	4	0.00	0.01	0.02	0.02	0.03	0.06	0.11	0.19	0.23	1.13	1.13	0.08	0.18	0.02	1.00	
2-Methylhexane	85.4%	41	6	0.00	0.00	0.04	0.07	0.08	0.10	0.11	0.12	0.22	1.55	1.55	0.11	0.24	0.07	1.31	
2-Methylpentane	100.0%	41	0	0.01	0.06	0.08	0.12	0.13	0.20	0.23	0.26	0.48	2.31	2.31	0.23	0.41	0.12	2.26	
3-Methyl-1-butene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
3-Methylheptane	41.5%	41	24	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.08	0.08	0.75	0.75	0.04	0.12	0.00	0.63	
3-Methylhexane	97.6%	41	1	0.00	0.03	0.05	0.07	0.08	0.11	0.15	0.17	0.31	1.88	1.88	0.13	0.29	0.07	1.57	
3-Methylpentane	100.0%	41	0	0.01	0.03	0.05	0.07	0.09	0.13	0.14	0.26	0.56	1.79	1.79	0.16	0.30	0.07	1.68	
4-Methyl-1-pentene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
Acetaldehyde	87.8%	41	5	0.00	0.00	3.00	4.00	5.00	6.00	6.00	7.00	7.00	10.00	10.00	4.32	2.17	4.00	15.18	
Acetone	100.0%	41	0	0.40	1.20	1.40	1.80	2.10	3.20	3.60	3.90	4.00	4.70	4.70	2.27	1.12	1.80	7.88	
alpha-Pinene	24.4%	41	31	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.40	0.50	1.10	1.10	0.13	0.26	0.00	1.45	
Benzene	100.0%	41	0	0.01	0.04	0.05	0.07	0.07	0.08	0.08	0.10	0.14	0.48	0.48	0.08	0.07	0.07	0.44	
beta-Pinene	7.3%	41	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.50	0.50	0.03	0.10	0.00	0.53	
cis-2-Butene	51.2%	41	20	0.00	0.00	0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.02	0.02	0.02	0.12	
cis-2-Hexene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
cis-2-Pentene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.02	
Cyclohexane	78.0%	41	9	0.00	0.00	0.02	0.04	0.06	0.09	0.10	0.21	0.44	3.12	3.12	0.16	0.50	0.04	2.63	
Cyclopentane	82.9%	41	7	0.00	0.00	0.01	0.02	0.02	0.04	0.05	0.07	0.21	1.11	1.11	0.06	0.18	0.02	0.96	
Cyclopentene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
Ethanol	100.0%	41	0	0.30	0.60	0.80	1.00	1.10	1.30	1.50	1.70	1.80	1.90	1.90	1.07	0.39	1.00	3.04	
Ethylbenzene	85.4%	41	6	0.00	0.00	0.01	0.03	0.04	0.06	0.06	0.08	0.09	0.39	0.39	0.04	0.06	0.03	0.36	
Formaldehyde	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	3.00	0.07	0.47	0.00	2.42	
Isobutane	100.0%	41	0	0.02	0.09	0.19	0.26	0.29	0.38	0.43	0.80	1.27	2.46	2.46	0.39	0.47	0.26	2.72	
Isobutylene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
Isopentane	100.0%	41	0	0.03	0.11	0.15	0.28	0.32	0.40	0.47	0.66	2.40	2.71	2.71	0.49	0.68	0.28	3.91	
Isoprene	95.1%	41	2	0.00	0.01	0.02	0.05	0.07	0.14	0.19	0.63	1.14	1.92	1.92	0.22	0.40	0.05	2.23	
Isopropylalcohol	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.01	0.06	0.00	0.32	
Isopropylbenzene	29.3%	41	29	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.09	0.09	0.01	0.02	0.00	0.08	
m,p-Xylene	73.2%	41	11	0.00	0.00	0.00	0.06	0.07	0.10	0.12	0.16	0.18	0.94	0.94	0.09	0.15	0.06	0.83	
Methanol	100.0%	41	0	3.00	5.00	6.00	8.00	9.00	11.00	12.00	14.00	14.00	16.00	16.00	8.63	3.55	8.00	26.37	
Methylcyclohexane	100.0%	41	0	0.01	0.03	0.06	0.13	0.14	0.26	0.27	0.30	0.51	5.62	5.62	0.30	0.86	0.13	4.61	
Methylcyclopentane	85.4%	41	6	0.00	0.00	0.03	0.07	0.09	0.13	0.14	0.29	0.55	3.45	3.45	0.19	0.54	0.07	2.89	
Methylethylketone	26.8%	41	30	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.40	0.60	0.70	0.70	0.12	0.21	0.00	1.19	
Methylisobutylketone	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.01	0.06	0.00	0.32	
Methylvinylketone	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
n-Butane	100.0%	41	0	0.03	0.07	0.11	0.26	0.37	0.51	0.53	0.56	0.95	5.49	5.49	0.46	0.86	0.26	4.75	
n-Decane	4.9%	41	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51	0.01	0.08	0.00	0.41	
n-Dodecane	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.01	0.06	0.00	0.32	
n-Heptane	100.0%	41	0	0.01	0.05	0.07	0.13	0.14	0.22	0.29	0.40	0.66	3.95	3.95	0.28	0.62	0.13	3.38	
n-Hexane	95.1%	41	2	0.00	0.03	0.06	0.18	0.20	0.26	0.27	0.31	0.71	3.90	3.90	0.32	0.70	0.18	3.80	
n-Nonane	97.6%	41	1	0.00	0.01	0.02	0.03	0.03	0.06	0.09	0.10	0.17	1.50	1.50	0.08	0.23	0.03	1.23	
n-Octane	82.9%	41	7	0.00	0.00	0.02	0.03	0.05	0.07	0.16	0.26	0.35	2.24	2.24	0.13	0.35	0.03	1.90	
n-Pentane	92.7%	41	3	0.00	0.10	0.10	0.20	0.20	0.30	0.30	0.50	0.50	5.60	5.60	0.43	1.00	0.20	5.43	
n-Propylbenzene	7.3%	41	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.13	0.13	0.01	0.02	0.00	0.12	
n-Undecane	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.01	0.08	0.00	0.40	
Naphthalene	4.9%	41	39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.60	0.03	0.12	0.00	0.63	
o-Xylene	85.4%	41	6	0.00	0.00	0.01	0.03	0.04	0.05	0.06	0.07	0.07	0.51	0.51	0.04	0.08	0.03	0.44	
Styrene	17.1%	41	34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.14	0.14	0.01	0.03	0.00	0.15	
Toluene	100.0%	41	0	0.01	0.05	0.10	0.15	0.18	0.26	0.31	0.41	0.45	1.68	1.68	0.22	0.27	0.15	1.55	
trans-2-Butene	65.9%	41	14	0.00	0.00	0.00	0.02	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.03	0.03	0.02	0.16	
trans-2-Hexene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.01	0.05	0.00	0.24	
trans-2-Pentene	2.4%	41	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.02	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - IONS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM_{2.5}) - IONS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



FILE CONTENTS DESCRIPTION	Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation
UNITS	$\mu\text{g}/\text{m}^3$ (microgram per cubic meter)
OBSERVATION TYPE	Particles
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$
PARTICLE DIAMETER	$< 2.5 \mu\text{m}$ or $< 10 \mu\text{m}$
MEDIUM	47 mm Teflon Filter
ANALYTICAL METHODS	MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC)
SAMPLE PREPARATION	DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis
ANALYTICAL LABORATORY	Atmospheric Research & Analysis Inc
USER NOTE 1	Data are not blank corrected
USER NOTE 2	Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler
USER NOTE 3	Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler
VOLUME STANDARDIZATION	Actual Volume at Ambient Conditions (since 01-Jan-2011)
SAMPLING INSTRUMENT TYPE	For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	01-May			01-May		01-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	23.8			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	5.62	V0	7.69	V0	0.17	V0
Calcium	0.16	0.08	V0	0.22	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V0
Potassium	0.09	-9999	M2	0.00	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.00	V1	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.03	V0	0.00	V1
Sulphate	0.25	1.30	V0	2.74	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.36	V0	0.78	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		01-May	
Sample Date	01-May			01-May		01-May	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	7.00	V0	4.30	V0	0.17	V0
Calcium	0.16	0.18	V0	0.08	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V0
Potassium	0.09	0.01	V0	0.00	V0	0.00	V1
Sodium	0.05	0.03	V0	0.01	V0	0.00	V1
Chloride	0.12	0.02	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.02	V0	0.00	V1
Sulphate	0.25	2.06	V0	1.30	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.59	V0	0.36	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	07-May			07-May		07-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	1.61	V0	1.17	V4	0.29	V0
Calcium	0.16	0.01	V0	0.05	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V0
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.00	V0	0.00	V0	0.00	V1
Chloride	0.12	0.00	V1	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.00	V1	0.00	V1
Sulphate	0.25	0.18	V0	0.15	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.05	V0	0.04	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		07-May	
Sample Date	07-May			07-May		07-May	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	1.54	V0	1.38	V0	0.29	V0
Calcium	0.16	0.04	V0	0.05	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V0
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.01	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	-9999	M2	0.00	V1	0.00	V1
Sulphate	0.25	0.16	V0	0.19	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.04	V0	0.05	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	13-May			13-May		13-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.23	V4	1.80	V0	0.09	V0
Calcium	0.16	0.09	V0	0.12	V0	0.03	V0
Magnesium	0.03	0.03	V0	0.00	V0	0.00	V0
Potassium	0.09	0.01	V0	0.00	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.00	V1	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.00	V1	0.04	V0
Sulphate	0.25	0.52	V0	0.56	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.12	V0	0.16	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		13-May	
Sample Date	13-May			13-May		13-May	
Particulate Size	PM2.5			PM2.5		PM2.5	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	2.33	V0	1.79	V4	0.09	V0
Calcium	0.16	0.08	V0	0.02	V0	0.03	V0
Magnesium	0.03	0.00	V0	0.01	V0	0.00	V0
Potassium	0.09	0.00	V1	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V1
Chloride	0.12	0.01	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.00	V1	0.00	V1	0.04	V0
Sulphate	0.25	0.67	V0	0.61	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.15	V0	0.17	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	19-May			19-May		19-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	4.14	V0	2.98	V0	0.14	V0
Calcium	0.16	0.10	V0	0.15	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.02	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V0
Chloride	0.12	0.00	V1	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.44	V0	0.36	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.09	V0	0.10	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		19-May	
Sample Date	19-May			19-May		19-May	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	4.14	V0	2.77	V0	0.14	V0
Calcium	0.16	0.15	V0	0.07	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.01	V0	0.00	V0
Chloride	0.12	0.01	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.40	V0	0.31	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.10	V0	0.07	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	25-May			25-May		25-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	23.8			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.93	V0	4.72	V0	0.30	V0
Calcium	0.16	0.66	V0	0.31	V0	0.00	V1
Magnesium	0.03	0.03	V0	0.01	V0	0.00	V1
Potassium	0.09	0.00	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.02	V0	0.00	V1
Chloride	0.12	0.01	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.00	V1	0.01	V0	0.00	V1
Sulphate	0.25	0.13	V0	0.58	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.02	V0	0.15	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		25-May	
Sample Date	25-May			25-May		25-May	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m ³)	23.4			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.72	V0	1.79	V0	0.30	V0
Calcium	0.16	0.25	V0	0.05	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V0	0.00	V1
Sodium	0.05	0.01	V0	0.00	V0	0.00	V1
Chloride	0.12	0.01	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.00	V1	0.00	V1
Sulphate	0.25	0.30	V0	0.16	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.08	V0	0.04	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	31-May			31-May		31-May	
Particulate Size	PM2.5			PM2.5			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	16.21	V0	7.84	V0	0.05	V0
Calcium	0.16	0.39	V0	0.43	V0	0.01	V0
Magnesium	0.03	0.05	V0	0.03	V0	0.00	V0
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.05	V0	0.01	V0	0.01	V0
Chloride	0.12	0.01	V0	0.01	V0	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.04	V0	0.01	V0
Sulphate	0.25	1.73	V0	0.61	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.46	V0	0.19	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		31-May	
Sample Date	31-May			31-May		31-May	
Particulate Size	PM2.5			PM2.5		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	7.85	V0	6.41	V0	0.05	V0
Calcium	0.16	0.33	V0	0.31	V0	0.01	V0
Magnesium	0.03	0.03	V0	0.02	V0	0.00	V0
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.02	V0	0.01	V0	0.01	V0
Chloride	0.12	0.00	V1	0.00	V1	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.03	V0	0.01	V0
Sulphate	0.25	0.56	V0	0.57	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.17	V0	0.17	V0	0.00	V0



Station Name	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay
Station #	AMS 1	AMS 1	AMS 1	AMS 1
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	5.79	5.27	6	6
Calcium	0.22	0.25	6	6
Magnesium	0.02	0.02	6	6
Potassium	0.01	0.01	5	5
Sodium	0.01	0.02	6	6
Chloride	0.00	0.00	6	2
Fluoride	0.00	0.00	6	0
Nitrate	0.03	0.03	6	5
Sulphate	0.72	0.65	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.18	0.18	6	6



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.37	2.90	6	6
Calcium	0.21	0.14	6	6
Magnesium	0.01	0.01	6	6
Potassium	0.01	0.01	6	6
Sodium	0.01	0.00	6	6
Chloride	0.00	0.00	6	5
Fluoride	0.00	0.00	6	0
Nitrate	0.02	0.02	6	4
Sulphate	0.83	0.95	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.24	0.27	6	6



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
	µg/m³	µg/m³		
Particulate Matter	4.43	2.52	6	6
Calcium	0.17	0.11	6	6
Magnesium	0.01	0.01	6	6
Potassium	0.01	0.01	6	5
Sodium	0.01	0.01	6	6
Chloride	0.01	0.01	6	5
Fluoride	0.00	0.00	6	0
Nitrate	0.04	0.03	5	4
Sulphate	0.69	0.69	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.19	0.20	6	6



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	3.07	1.94	6	6
Calcium	0.09	0.11	6	6
Magnesium	0.01	0.01	6	6
Potassium	0.01	0.01	6	6
Sodium	0.01	0.00	6	6
Chloride	0.00	0.00	6	2
Fluoride	0.00	0.00	6	0
Nitrate	0.01	0.01	6	3
Sulphate	0.52	0.42	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.14	0.12	6	6



Wood Buffalo Environmental Association

PM2.5 Ion (µg/sample) Summary

2017 May

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99%	Max.	Mean	Std. Dev.	Median	Outlier Test
Particulate Matter	100.0%	24	0	28	37	43	93	99	154	168	188	188	389	389	106	80	93	504
Calcium	100.0%	24	0	0.27	0.90	1.56	2.88	3.66	7.35	7.44	9.30	10.35	15.78	15.78	4.19	3.82	2.88	23.28
Magnesium	100.0%	24	0	0.06	0.09	0.15	0.24	0.30	0.45	0.60	0.69	0.72	1.23	1.23	0.33	0.28	0.24	1.72
Potassium	95.7%	23	1	0.06	0.09	0.09	0.18	0.24	0.30	0.33	0.42	0.45	0.48	0.48	0.22	0.13	0.18	0.88
Sodium	100.0%	24	0	0.09	0.09	0.15	0.21	0.24	0.33	0.33	0.39	0.78	1.14	1.14	0.27	0.24	0.21	1.45
Chloride	58.3%	24	10	0.06	0.06	0.09	0.12	0.12	0.15	0.15	0.21	0.21	0.54	0.54	0.13	0.10	0.12	0.61
Fluoride	0.0%	24	24	0.00	0.03	0.03	0.03	0.03	0.03	0.06	0.06	0.06	0.09	0.09	0.04	0.02	0.03	
Nitrate	69.6%	23	7	0.12	0.15	0.15	0.39	0.51	0.81	0.81	1.02	2.04	2.19	2.19	0.56	0.56	0.39	3.37
Sulphate	100.0%	24	0	3.15	3.72	6.99	13.44	13.65	16.05	30.93	41.49	49.38	65.73	65.73	16.55	15.99	13.44	96.52
Phosphate	0.0%	24	24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
Ammonium (as N)	100.0%	24	0	0.49	0.93	1.79	3.59	3.84	4.66	8.53	11.02	14.28	18.68	18.68	4.51	4.58	3.59	27.42



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - IONS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



FILE CONTENTS DESCRIPTION	Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation
UNITS	$\mu\text{g}/\text{m}^3$ (microgram per cubic meter)
OBSERVATION TYPE	Particles
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$
PARTICLE DIAMETER	$< 2.5 \mu\text{m}$ or $< 10 \mu\text{m}$
MEDIUM	47 mm Teflon Filter
ANALYTICAL METHODS	MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC)
SAMPLE PREPARATION	DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis
ANALYTICAL LABORATORY	Atmospheric Research & Analysis Inc
USER NOTE 1	Data are not blank corrected
USER NOTE 2	Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler
USER NOTE 3	Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler
VOLUME STANDARDIZATION	Actual Volume at Ambient Conditions (since 01-Jan-2011)
SAMPLING INSTRUMENT TYPE	For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	01-May			01-May		01-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	23.5			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	28.43	V0	15.77	V0	0.02	V1
Calcium	0.16	1.29	V0	0.46	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.05	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.08	V0	0.10	V0	0.00	V1
Chloride	0.12	0.03	V0	0.09	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.21	V0	0.18	V0	0.00	V1
Sulphate	0.25	1.55	V0	2.81	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.36	V0	0.76	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		01-May	
Sample Date	01-May			01-May		01-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	22.36	V0	8.72	V0	0.02	V1
Calcium	0.16	1.63	V0	0.18	V0	0.00	V1
Magnesium	0.03	0.06	V0	0.03	V0	0.00	V1
Potassium	0.09	0.03	V0	0.00	V0	0.00	V1
Sodium	0.05	0.31	V0	0.03	V0	0.00	V1
Chloride	0.12	0.36	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.28	V0	0.10	V0	0.00	V1
Sulphate	0.25	2.25	V0	1.44	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.58	V0	0.36	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		01-May	
Sample Date	01-May			01-May		01-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	17.12	V0	18.68	V0	0.02	V1
Calcium	0.16	0.41	V0	0.28	V0	0.00	V1
Magnesium	0.03	0.04	V0	0.06	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.05	V0	0.09	V0	0.00	V1
Chloride	0.12	0.02	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.12	V0	0.14	V0	0.00	V1
Sulphate	0.25	1.37	V0	1.44	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.33	V0	0.33	V0	0.00	V0



Station Name	Muskeg River	Travel Blank			
Station #	AMS 16				
Sample Date	01-May	01-May			
Particulate Size	PM10				
Total Air Volume (m ³)	24	24			
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	21.05	V0	0.02	V1
Calcium	0.16	0.53	V0	0.00	V1
Magnesium	0.03	0.07	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.10	V0	0.00	V1
Chloride	0.12	0.11	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.16	V0	0.00	V1
Sulphate	0.25	1.37	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.32	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	07-May			07-May		07-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	4.94	V0	3.43	V0	0.09	V0
Calcium	0.16	0.15	V0	0.05	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.02	V0	0.00	V1
Potassium	0.09	0.01	V0	0.02	V0	0.00	V1
Sodium	0.05	0.02	V0	0.02	V0	0.00	V1
Chloride	0.12	0.02	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.05	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.22	V0	0.18	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.05	V0	0.04	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		07-May	
Sample Date	07-May			07-May		07-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	5.48	V0	3.41	V0	0.09	V0
Calcium	0.16	0.18	V0	0.10	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.01	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.05	V0	0.01	V0	0.00	V1
Chloride	0.12	0.06	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.20	V0	0.21	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.04	V0	0.05	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		07-May	
Sample Date	07-May			07-May		07-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	4.46	V0	11.96	V0	0.09	V0
Calcium	0.16	0.09	V0	0.15	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.02	V0	0.00	V1
Potassium	0.09	0.03	V0	0.02	V0	0.00	V1
Sodium	0.05	0.01	V0	0.06	V0	0.00	V1
Chloride	0.12	0.02	V0	0.03	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.03	V0	0.00	V1
Sulphate	0.25	0.21	V0	0.24	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.04	V0	0.05	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16				
Sample Date	07-May			07-May	
Particulate Size	PM10				
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	20.24	V0	0.09	V0
Calcium	0.16	0.78	V0	0.00	V1
Magnesium	0.03	0.08	V0	0.00	V1
Potassium	0.09	0.02	V0	0.00	V1
Sodium	0.05	0.08	V0	0.00	V1
Chloride	0.12	0.08	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.00	V1
Sulphate	0.25	0.35	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.04	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	13-May			13-May		13-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	7.62	V0	3.71	V0	0.17	V0
Calcium	0.16	0.50	V0	0.13	V0	0.01	V0
Magnesium	0.03	0.03	V0	0.01	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.02	V0	0.00	V1
Chloride	0.12	0.02	V0	0.03	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.90	V0	0.60	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.14	V0	0.16	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		13-May	
Sample Date	13-May			13-May		13-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.59	V0	2.73	V0	0.17	V0
Calcium	0.16	0.07	V0	0.03	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.02	V0	0.00	V0	0.00	V1
Chloride	0.12	0.03	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.67	V0	0.59	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.17	V0	0.17	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		13-May	
Sample Date	13-May			13-May		13-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	-9999	M2	15.15	V0	0.17	V0
Calcium	0.16	-9999	M2	0.40	V0	0.01	V0
Magnesium	0.03	-9999	M2	0.06	V0	0.00	V1
Potassium	0.09	-9999	M2	0.01	V0	0.00	V1
Sodium	0.05	-9999	M2	0.02	V0	0.00	V1
Chloride	0.12	-9999	M2	0.02	V0	0.00	V1
Fluoride	0.15	-9999	M2	0.00	V1	0.00	V1
Nitrate	0.20	-9999	M2	0.04	V0	0.00	V1
Sulphate	0.25	-9999	M2	0.56	V0	0.00	V1
Phosphate	0.26	-9999	M2	0.00	V1	0.00	V1
Ammonium (as N)	0.02	-9999	M2	0.12	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			13-May	
Sample Date	13-May			13-May	
Particulate Size	PM10			24	
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	8.68	V0	0.17	V0
Calcium	0.16	0.27	V0	0.01	V0
Magnesium	0.03	0.03	V0	0.00	V1
Potassium	0.09	0.02	V0	0.00	V1
Sodium	0.05	0.02	V0	0.00	V1
Chloride	0.12	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.00	V1
Sulphate	0.25	0.59	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	19-May			19-May		19-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	17.85	V0	10.22	V0	0.20	V0
Calcium	0.16	0.75	V0	0.37	V0	0.01	V0
Magnesium	0.03	0.04	V0	0.07	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.05	V0	0.04	V0	0.00	V1
Chloride	0.12	0.06	V0	0.06	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.08	V0	0.06	V0	0.00	V1
Sulphate	0.25	0.56	V0	0.41	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.13	V0	0.10	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		19-May	
Sample Date	19-May			19-May		19-May	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	12.98	V0	6.33	V0	0.20	V0
Calcium	0.16	0.47	V0	0.15	V0	0.01	V0
Magnesium	0.03	0.07	V0	0.02	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.06	V0	0.01	V0	0.00	V1
Chloride	0.12	0.08	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.07	V0	0.04	V0	0.00	V1
Sulphate	0.25	0.45	V0	0.34	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.09	V0	0.09	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15			
Sample Date	19-May			19-May		19-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	14.11	V0	5.17	V0	0.20	V0
Calcium	0.16	0.32	V0	0.07	V0	0.01	V0
Magnesium	0.03	0.04	V0	0.01	V0	0.00	V1
Potassium	0.09	0.03	V0	0.01	V0	0.00	V1
Sodium	0.05	0.04	V0	0.02	V0	0.00	V1
Chloride	0.12	0.02	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.49	V0	0.34	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.11	V0	0.08	V0	0.00	V0



Station Name	Muskeg River	Travel Blank			
Station #	AMS 16				
Sample Date	19-May	19-May			
Particulate Size	PM10				
Total Air Volume (m ³)	24	24			
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	-9999	M2	0.20	V0
Calcium	0.16	-9999	M2	0.01	V0
Magnesium	0.03	-9999	M2	0.00	V1
Potassium	0.09	-9999	M2	0.00	V1
Sodium	0.05	-9999	M2	0.00	V1
Chloride	0.12	-9999	M2	0.00	V1
Fluoride	0.15	-9999	M2	0.00	V1
Nitrate	0.20	-9999	M2	0.00	V1
Sulphate	0.25	-9999	M2	0.00	V1
Phosphate	0.26	-9999	M2	0.00	V1
Ammonium (as N)	0.02	-9999	M2	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	25-May			25-May		25-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	23.5			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	39.03	V0	29.23	V0	0.18	V0
Calcium	0.16	4.65	V0	0.95	V0	0.00	V1
Magnesium	0.03	0.08	V0	0.06	V0	0.00	V1
Potassium	0.09	0.01	V0	0.02	V0	0.00	V1
Sodium	0.05	0.04	V0	0.13	V0	0.00	V1
Chloride	0.12	0.07	V0	0.07	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.03	V0	0.07	V0	0.00	V1
Sulphate	0.25	0.26	V0	0.86	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.15	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		25-May	
Sample Date	25-May			25-May		25-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	20.61	V0	5.01	V0	0.18	V0
Calcium	0.16	0.55	V0	0.14	V0	0.00	V1
Magnesium	0.03	0.07	V0	0.01	V0	0.00	V1
Potassium	0.09	0.02	V0	0.01	V0	0.00	V1
Sodium	0.05	0.08	V0	0.01	V0	0.00	V1
Chloride	0.12	0.04	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.45	V0	0.19	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.06	V0	0.04	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		25-May	
Sample Date	25-May			25-May		25-May	
Particulate Size	PM10			PM10		24	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	9.54	V0	24.96	V0	0.18	V0
Calcium	0.16	0.33	V0	0.27	V0	0.00	V1
Magnesium	0.03	0.04	V0	0.06	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.02	V0	0.05	V0	0.00	V1
Chloride	0.12	0.02	V0	0.03	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.19	V0	0.34	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.03	V0	0.05	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16				
Sample Date	25-May			25-May	
Particulate Size	PM10				
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	-9999	M2	0.18	V0
Calcium	0.16	-9999	M2	0.00	V1
Magnesium	0.03	-9999	M2	0.00	V1
Potassium	0.09	-9999	M2	0.00	V1
Sodium	0.05	-9999	M2	0.00	V1
Chloride	0.12	-9999	M2	0.00	V1
Fluoride	0.15	-9999	M2	0.00	V1
Nitrate	0.20	-9999	M2	0.00	V1
Sulphate	0.25	-9999	M2	0.00	V1
Phosphate	0.26	-9999	M2	0.00	V1
Ammonium (as N)	0.02	-9999	M2	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	31-May			31-May		31-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	76.34	V0	26.53	V0	0.31	V0
Calcium	0.16	3.09	V0	0.76	V0	0.01	V0
Magnesium	0.03	0.13	V0	0.09	V0	0.00	V0
Potassium	0.09	0.04	V0	0.03	V0	0.00	V1
Sodium	0.05	0.36	V0	0.05	V0	0.00	V1
Chloride	0.12	0.26	V0	0.04	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.44	V0	0.18	V0	0.00	V1
Sulphate	0.25	2.18	V0	0.65	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.48	V0	0.19	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		31-May	
Sample Date	31-May			31-May		31-May	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	34.25	V0	23.83	V0	0.31	V0
Calcium	0.16	0.99	V0	0.64	V0	0.01	V0
Magnesium	0.03	0.09	V0	0.09	V0	0.00	V0
Potassium	0.09	0.03	V0	0.03	V0	0.00	V1
Sodium	0.05	0.09	V0	0.06	V0	0.00	V1
Chloride	0.12	0.10	V0	0.06	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.20	V0	0.17	V0	0.00	V1
Sulphate	0.25	0.70	V0	0.68	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.16	V0	0.19	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15			
Sample Date	31-May			31-May		31-May	
Particulate Size	PM10			PM10			
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	50.79	V0	50.61	V0	0.31	V0
Calcium	0.16	1.41	V0	1.36	V0	0.01	V0
Magnesium	0.03	0.11	V0	0.11	V0	0.00	V0
Potassium	0.09	0.04	V0	0.03	V0	0.00	V1
Sodium	0.05	0.37	V0	0.20	V0	0.00	V1
Chloride	0.12	0.11	V0	0.06	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.29	V0	0.32	V0	0.00	V1
Sulphate	0.25	2.47	V0	2.61	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.52	V0	0.66	V0	0.00	V0



Station Name	Muskeg River	Travel Blank			
Station #	AMS 16				
Sample Date	31-May	31-May			
Particulate Size	PM10				
Total Air Volume (m ³)	24	24			
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	-9999	M2	0.31	V0
Calcium	0.16	-9999	M2	0.01	V0
Magnesium	0.03	-9999	M2	0.00	V0
Potassium	0.09	-9999	M2	0.00	V1
Sodium	0.05	-9999	M2	0.00	V1
Chloride	0.12	-9999	M2	0.00	V1
Fluoride	0.15	-9999	M2	0.00	V1
Nitrate	0.20	-9999	M2	0.00	V1
Sulphate	0.25	-9999	M2	0.00	V1
Phosphate	0.26	-9999	M2	0.00	V1
Ammonium (as N)	0.02	-9999	M2	0.00	V0



Station Name	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay
Station #	AMS 1	AMS 1	AMS 1	AMS 1
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	29.03	26.47	6	6
Calcium	1.74	1.76	6	6
Magnesium	0.06	0.04	6	6
Potassium	0.01	0.01	6	6
Sodium	0.09	0.13	6	6
Chloride	0.07	0.09	6	6
Fluoride	0.00	0.00	6	0
Nitrate	0.14	0.16	6	6
Sulphate	0.94	0.78	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.20	0.18	6	6



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	14.81	11.14	6	6
Calcium	0.45	0.35	6	6
Magnesium	0.05	0.03	6	6
Potassium	0.02	0.01	6	6
Sodium	0.06	0.05	6	6
Chloride	0.05	0.02	6	6
Fluoride	0.00	0.00	6	0
Nitrate	0.09	0.08	6	6
Sulphate	0.92	0.95	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.23	0.27	6	6



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
	µg/m³	µg/m³		
Particulate Matter	16.54	11.55	6	6
Calcium	0.65	0.58	6	6
Magnesium	0.05	0.03	6	6
Potassium	0.02	0.01	6	6
Sodium	0.10	0.10	6	6
Chloride	0.11	0.13	6	6
Fluoride	0.00	0.00	6	0
Nitrate	0.10	0.11	6	6
Sulphate	0.78	0.74	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.18	0.20	6	6



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	8.34	7.89	6	6
Calcium	0.20	0.22	6	6
Magnesium	0.03	0.03	6	6
Potassium	0.02	0.01	6	6
Sodium	0.02	0.02	6	6
Chloride	0.02	0.02	6	6
Fluoride	0.00	0.00	6	0
Nitrate	0.06	0.06	6	6
Sulphate	0.58	0.47	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.15	0.12	6	6



Station Name	Fort McKay South	Fort McKay South	Fort McKay South	Fort McKay South
Station #	AMS 13	AMS 13	AMS 13	AMS 13
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	19.20	18.29	5	5
Calcium	0.51	0.52	5	5
Magnesium	0.05	0.04	5	5
Potassium	0.02	0.01	5	5
Sodium	0.10	0.15	5	5
Chloride	0.04	0.04	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.10	0.12	5	5
Sulphate	0.95	0.98	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.21	0.21	5	5



Station Name	Horizon	Horizon	Horizon	Horizon
Station #	AMS 15	AMS 15	AMS 15	AMS 15
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	21.09	15.90	6	6
Calcium	0.42	0.47	6	6
Magnesium	0.05	0.03	6	6
Potassium	0.01	0.01	6	6
Sodium	0.07	0.07	6	6
Chloride	0.03	0.02	6	6
Fluoride	0.00	0.00	6	0
Nitrate	0.09	0.12	6	6
Sulphate	0.92	0.94	6	6
Phosphate	0.00	0.00	6	0
Ammonium (as N)	0.21	0.24	6	6



Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	16.66	6.92	3	3
Calcium	0.53	0.26	3	3
Magnesium	0.06	0.03	3	3
Potassium	0.01	0.01	3	3
Sodium	0.07	0.04	3	3
Chloride	0.07	0.05	3	3
Fluoride	0.00	0.00	3	0
Nitrate	0.07	0.07	3	3
Sulphate	0.77	0.53	3	3
Phosphate	0.00	0.00	3	0
Ammonium (as N)	0.14	0.15	3	3



Wood Buffalo Environmental Association

PM10 Ion (µg/sample) Summary

2017 May

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99% Max.	Mean	Std. Dev.	Median	Outlier Test	
Particulate Matter	100.0%	38	0	66	86	132	364	428	572	637	917	1219	1832	1832	432	378	364	2323
Calcium	100.0%	38	0	0.60	1.62	3.60	9.66	11.22	18.15	22.68	33.90	74.25	109.20	109.20	15.66	21.09	9.66	121.10
Magnesium	100.0%	38	0	0.18	0.27	0.42	1.26	1.32	1.65	1.95	2.25	2.70	3.15	3.15	1.18	0.79	1.26	5.12
Potassium	100.0%	38	0	0.09	0.15	0.18	0.39	0.39	0.54	0.63	0.69	0.90	0.90	0.90	0.39	0.22	0.39	1.48
Sodium	100.0%	38	0	0.09	0.30	0.45	1.17	1.29	1.86	2.16	4.68	8.67	8.88	8.88	1.74	2.17	1.17	12.58
Chloride	100.0%	38	0	0.12	0.33	0.39	0.75	0.99	1.56	1.86	2.52	6.21	8.70	8.70	1.33	1.65	0.75	9.55
Fluoride	0.0%	38	38	0.03	0.03	0.03	0.06	0.06	0.09	0.09	0.09	0.12	0.12	0.12	0.06	0.03	0.06	
Nitrate	100.0%	38	0	0.30	0.39	0.57	1.05	1.59	3.75	4.26	6.60	7.59	10.53	10.53	2.27	2.46	1.05	14.58
Sulphate	100.0%	38	0	4.26	4.74	8.13	14.19	15.66	32.76	34.47	53.94	62.64	67.35	67.35	20.11	18.00	14.19	110.09
Phosphate	0.0%	38	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Ammonium (as N)	100.0%	38	0	0.65	0.96	1.16	3.10	3.77	7.62	7.90	12.44	15.93	18.36	18.36	4.61	4.57	3.10	27.48



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - METALS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM_{2.5}) - METALS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM metals: Atmospheric Research & Analysis, Inc.
Morrisville, NC



FILE CONTENTS DESCRIPTION	Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation
UNITS	$\mu\text{g}/\text{m}^3$ (microgram per cubic meter)
OBSERVATION TYPE	Particles
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$
PARTICLE DIAMETER MEDIUM	< 2.5 μm or < 10 μm 47 mm Teflon Filter
ANALYTICAL METHODS	MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC)
SAMPLE PREPARATION	DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis
ANALYTICAL LABORATORY	Atmospheric Research & Analysis Inc
USER NOTE 1	Data are not blank corrected
USER NOTE 2	Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler
USER NOTE 3	Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler
VOLUME STANDARDIZATION	Actual Volume at Ambient Conditions (since 01-Jan-2011)
SAMPLING INSTRUMENT TYPE	For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	01-May		01-May		01-May	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m ³)	23.5		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	5.89	V0	8.26	V0	0.26	V0
Aluminum	0.1380326	0.0594227	V0	0.0497723	V0	0.0000000	V1
Antimony	0.0001784	0.0000321	V0	0.0000415	V0	0.0000000	V1
Arsenic	0.0001060	0.0000598	V0	0.0000792	V0	0.0000000	V1
Barium	0.0092847	0.0004736	V0	0.0005702	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000025	V0	0.0000043	V0	0.0000000	V1
Cadmium	0.0000174	0.0000041	V0	0.0000067	V0	0.0000000	V1
Calcium	0.4112124	0.0817537	V0	0.0468804	V0	0.0000000	V1
Cerium	0.0000174	0.0000554	V0	0.0000508	V0	0.0000000	V1
Cesium	0.0000100	0.0000048	V0	0.0000044	V0	0.0000000	V1
Chromium	0.0022262	0.0002473	V0	0.0002112	V0	0.0000000	V1
Cobalt	0.0000273	0.0000201	V0	0.0000196	V0	0.0000017	V0
Copper	0.0017171	0.0002748	V0	0.0003711	V0	0.0002305	V0
Iron	0.0393063	0.0543523	V0	0.0480212	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000298	V0	0.0000258	V0	0.0000000	V1
Lead	0.0008577	0.0001315	V0	0.0001341	V0	0.0000000	V1
Lithium	0.0000374	0.0000532	V0	0.0000477	V0	0.0000000	V1
Magnesium	0.0091409	0.0136927	V0	0.0133482	V0	0.0004161	V0
Manganese	0.0006949	0.0009738	V0	0.0008531	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000499	V0	0.0002581	V0	0.0000000	V1
Neodymium	0.0000140	0.0000269	V0	0.0000204	V0	0.0000000	V1
Nickel	0.0005429	0.0001463	V0	0.0002781	V0	0.0000496	V0
Niobium	0.0000202	0.0000054	V0	0.0000055	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0129408	V0	0.0111277	V0	0.0101239	V0
Platinum	0.0000088	0.0000015	V0	0.0000015	V0	0.0000018	V0
Potassium	0.0061261	0.0220975	V0	0.0371445	V0	0.0008908	V0
Praseodymium	0.0000070	0.0000063	V0	0.0000055	V0	0.0000000	V1
Rubidium	0.0000184	0.0000756	V0	0.0000754	V0	0.0000000	V1
Samarium	0.0000133	0.0000053	V0	0.0000035	V0	0.0000000	V1
Selenium	0.0003366	0.0000654	V0	0.0000981	V0	0.0000000	V1
Silicon	0.7676322	0.2119866	V0	0.2313378	V0	0.0484123	V0
Silver	0.0000100	0.0000005	V0	0.0000009	V0	0.0000000	V1
Sodium	0.0169447	0.0134073	V0	0.0181206	V0	0.0018952	V0
Strontium	0.0003375	0.0002600	V0	0.0002226	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000015	V0	0.0000014	V0	0.0000000	V1
Thorium	0.0000059	0.0000079	V0	0.0000066	V0	0.0000000	V1
Tin	0.0004414	-9999	M2	0.0001644	V0	0.0000304	V0
Titanium	0.0015201	0.0025039	V0	0.0030476	V0	0.0002584	V0
Tungsten	0.0000938	0.0000085	V0	0.0000158	V0	0.0000000	V1
Uranium	0.0000048	0.0000024	V0	0.0000026	V0	0.0000000	V1
Vanadium	0.0007697	0.0002551	V0	0.0013951	V0	0.0000000	V1
Zinc	0.0055897	0.0011017	V0	0.0011895	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 01-May PM2.5 24	Results (µg/m ³)	QC Flag	AMS 14 01-May PM2.5 24	Results (µg/m ³)	QC Flag	01-May 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	7.12	V0	4.37	V0	0.26	V0
Aluminum	0.1380326	0.0555376	V0	0.0285957	V0	0.0000000	V1
Antimony	0.0001784	0.0001043	V0	0.0000181	V0	0.0000000	V1
Arsenic	0.0001060	0.0000706	V0	0.0000487	V0	0.0000000	V1
Barium	0.0092847	0.0013556	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000058	V0	0.0000027	V0	0.0000000	V1
Cadmium	0.0000174	0.0000053	V0	0.0000069	V0	0.0000000	V1
Calcium	0.4112124	0.0641597	V0	0.0224829	V0	0.0000000	V1
Cerium	0.0000174	0.0000608	V0	0.0000314	V0	0.0000000	V1
Cesium	0.0000100	0.0000048	V0	0.0000032	V0	0.0000000	V1
Chromium	0.0022262	0.0003204	V0	0.0001331	V0	0.0000000	V1
Cobalt	0.0000273	0.0000263	V0	0.0000123	V0	0.0000017	V0
Copper	0.0017171	0.0007708	V0	0.0001562	V0	0.0002305	V0
Iron	0.0393063	0.0638621	V0	0.0262137	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000291	V0	-9999	M2	0.0000000	V1
Lead	0.0008577	0.0001434	V0	0.0001196	V0	0.0000000	V1
Lithium	0.0000374	0.0000561	V0	0.0000242	V0	0.0000000	V1
Magnesium	0.0091409	0.0153903	V0	0.0075048	V0	0.0004161	V0
Manganese	0.0006949	0.0011868	V0	0.0004559	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002373	V0	0.0000553	V0	0.0000000	V1
Neodymium	0.0000140	0.0000249	V0	0.0000119	V0	0.0000000	V1
Nickel	0.0005429	0.0003200	V0	0.0001033	V0	0.0000496	V0
Niobium	0.0000202	0.0000070	V0	0.0000034	V0	0.0000000	V1
Palladium	0.0000632	0.0000061	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0118823	V0	0.0102096	V0	0.0101239	V0
Platinum	0.0000088	0.0000021	V0	0.0000018	V0	0.0000018	V0
Potassium	0.0061261	0.0323581	V0	0.0144391	V0	0.0008908	V0
Praseodymium	0.0000070	0.0000063	V0	0.0000036	V0	0.0000000	V1
Rubidium	0.0000184	0.0000941	V0	0.0000451	V0	0.0000000	V1
Samarium	0.0000133	0.0000042	V0	0.0000026	V0	0.0000000	V1
Selenium	0.0003366	0.0001023	V0	0.0000538	V0	0.0000000	V1
Silicon	0.7676322	0.2340425	V0	0.1720514	V0	0.0484123	V0
Silver	0.0000100	0.0000017	V0	0.0000030	V0	0.0000000	V1
Sodium	0.0169447	0.0349484	V0	0.0087083	V0	0.0018952	V0
Strontium	0.0003375	0.0002989	V0	0.0001451	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000015	V0	0.0000014	V0	0.0000000	V1
Thorium	0.0000059	0.0000073	V0	0.0000044	V0	0.0000000	V1
Tin	0.0004414	0.0001601	V0	0.0001097	V0	0.0000304	V0
Titanium	0.0015201	0.0032564	V0	0.0016949	V0	0.0002584	V0
Tungsten	0.0000938	0.0000344	V0	0.0000107	V0	0.0000000	V1
Uranium	0.0000048	0.0000027	V0	0.0000015	V0	0.0000000	V1
Vanadium	0.0007697	0.0010832	V0	0.0002009	V0	0.0000000	V1
Zinc	0.0055897	0.0021509	V0	0.0005712	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	07-May		07-May			07-May
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m ³)	24		24			24	
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	QC Flag
Particulate Matter	1.00	1.47	V0	1.83	V0	0.09	V0
Aluminum	0.1380326	0.0308719	V0	0.0335884	V0	0.0106420	V0
Antimony	0.0001784	0.0000199	V0	0.0000158	V0	0.0000000	V1
Arsenic	0.0001060	0.0000266	V0	0.0000547	V0	0.0000000	V1
Barium	0.0092847	0.0000000	V1	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000056	V0	0.0000022	V0	0.0000004	V0
Cadmium	0.0000174	0.0000033	V0	0.0000041	V0	0.0000000	V1
Calcium	0.4112124	0.0220371	V0	0.0431799	V0	0.0000000	V1
Cerium	0.0000174	0.0000242	V0	0.0000281	V0	0.0000000	V1
Cesium	0.0000100	0.0000021	V0	0.0000026	V0	0.0000000	V1
Chromium	0.0022262	0.0002123	V0	0.0001861	V0	0.0001343	V0
Cobalt	0.0000273	0.0000101	V0	0.0000102	V0	0.0000037	V0
Copper	0.0017171	0.0004602	V0	0.0003291	V0	0.0001016	V0
Iron	0.0393063	0.0165108	V0	0.0272364	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000113	V0	0.0000145	V0	0.0000000	V1
Lead	0.0008577	0.0000885	V0	0.0000649	V0	0.0000000	V1
Lithium	0.0000374	0.0000244	V0	0.0000219	V0	0.0000000	V1
Magnesium	0.0091409	0.0046078	V0	0.0092013	V0	0.0004898	V0
Manganese	0.0006949	0.0004467	V0	0.0004728	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000355	V0	0.0000483	V0	0.0000000	V1
Neodymium	0.0000140	0.0000110	V0	0.0000119	V0	0.0000000	V1
Nickel	0.0005429	0.0001455	V0	0.0000832	V0	0.0000894	V0
Niobium	0.0000202	0.0000030	V0	0.0000037	V0	0.0000000	V1
Palladium	0.0000632	0.0000036	V0	0.0000000	V1	0.0000051	V0
Phosphorus	0.0459574	0.0101380	V0	0.0091726	V0	0.0091831	V0
Platinum	0.0000088	0.0000015	V0	0.0000025	V0	0.0000017	V0
Potassium	0.0061261	0.0108453	V0	0.0126635	V0	0.0006677	V0
Praseodymium	0.0000070	0.0000027	V0	0.0000032	V0	0.0000000	V1
Rubidium	0.0000184	0.0000341	V0	0.0000406	V0	0.0000000	V1
Samarium	0.0000133	0.0000020	V0	0.0000022	V0	0.0000000	V1
Selenium	0.0003366	0.0000226	V0	0.0000247	V0	0.0000000	V1
Silicon	0.7676322	0.0548499	V0	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000009	V0	0.0000012	V0	0.0000009	V0
Sodium	0.0169447	0.0073245	V0	0.0108921	V0	0.0016452	V0
Strontium	0.0003375	0.0000967	V0	0.0001372	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000009	V0	0.0000008	V0	0.0000000	V1
Thorium	0.0000059	0.0000035	V0	0.0000040	V0	0.0000000	V1
Tin	0.0004414	0.0000664	V0	0.0000426	V0	0.0000000	V1
Titanium	0.0015201	0.0010946	V0	0.0021070	V0	0.0006018	V0
Tungsten	0.0000938	0.0000046	V0	0.0000087	V0	0.0000169	V0
Uranium	0.0000048	0.0000010	V0	0.0000013	V0	0.0000000	V1
Vanadium	0.0007697	0.0000924	V0	0.0001219	V0	0.0000329	V0
Zinc	0.0055897	0.0005219	V0	0.0012522	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 07-May PM2.5 24	AMS 14 07-May PM2.5 24	AMS 14 07-May PM2.5 24	AMS 14 07-May PM2.5 24	AMS 14 07-May PM2.5 24	AMS 14 07-May PM2.5 24	AMS 14 07-May PM2.5 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	1.61	V0	1.36	V0	0.09	V0
Aluminum	0.1380326	0.0346509	V0	0.0142014	V0	0.0106420	V0
Antimony	0.0001784	0.0000618	V0	0.0000207	V0	0.0000000	V1
Arsenic	0.0001060	0.0000791	V0	0.0000286	V0	0.0000000	V1
Barium	0.0092847	0.0007382	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000036	V0	0.0000022	V0	0.0000004	V0
Cadmium	0.0000174	0.0000046	V0	0.0000058	V0	0.0000000	V1
Calcium	0.4112124	0.0261167	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000219	V0	0.0000211	V0	0.0000000	V1
Cesium	0.0000100	0.0000022	V0	0.0000019	V0	0.0000000	V1
Chromium	0.0022262	0.0003257	V0	0.0001132	V0	0.0001343	V0
Cobalt	0.0000273	0.0000114	V0	0.0000079	V0	0.0000037	V0
Copper	0.0017171	0.0005161	V0	0.0002280	V0	0.0001016	V0
Iron	0.0393063	0.0267671	V0	0.0194278	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000099	V0	0.0000094	V0	0.0000000	V1
Lead	0.0008577	0.0001046	V0	0.0000930	V0	0.0000000	V1
Lithium	0.0000374	0.0000150	V0	0.0000099	V0	0.0000000	V1
Magnesium	0.0091409	0.0062784	V0	0.0047089	V0	0.0004898	V0
Manganese	0.0006949	0.0004639	V0	0.0003519	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000733	V0	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000084	V0	0.0000063	V0	0.0000000	V1
Nickel	0.0005429	0.0001871	V0	0.0000590	V0	0.0000894	V0
Niobium	0.0000202	0.0000026	V0	0.0000019	V0	0.0000000	V1
Palladium	0.0000632	0.0000042	V0	0.0000000	V1	0.0000051	V0
Phosphorus	0.0459574	0.0089358	V0	0.0097685	V0	0.0091831	V0
Platinum	0.0000088	0.0000037	V0	0.0000017	V0	0.0000017	V0
Potassium	0.0061261	0.0109549	V0	0.0127051	V0	0.0006677	V0
Praseodymium	0.0000070	0.0000022	V0	0.0000020	V0	0.0000000	V1
Rubidium	0.0000184	0.0000279	V0	0.0000308	V0	0.0000000	V1
Samarium	0.0000133	0.0000014	V0	0.0000009	V0	0.0000000	V1
Selenium	0.0003366	0.0000373	V0	0.0000166	V0	0.0000000	V1
Silicon	0.7676322	0.0635059	V0	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000011	V0	0.0000013	V0	0.0000009	V0
Sodium	0.0169447	0.0143027	V0	0.0092672	V0	0.0016452	V0
Strontium	0.0003375	0.0001068	V0	0.0000683	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000009	V0	0.0000012	V0	0.0000000	V1
Thorium	0.0000059	0.0000029	V0	0.0000024	V0	0.0000000	V1
Tin	0.0004414	0.0001149	V0	0.0000569	V0	0.0000000	V1
Titanium	0.0015201	0.0022042	V0	0.0008651	V0	0.0006018	V0
Tungsten	0.0000938	0.0000161	V0	0.0000095	V0	0.0000169	V0
Uranium	0.0000048	0.0000009	V0	0.0000008	V0	0.0000000	V1
Vanadium	0.0007697	0.0000715	V0	0.0000592	V0	0.0000329	V0
Zinc	0.0055897	0.0007259	V0	0.0006075	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort								
	Station Name	McKay			Patricia McInnes			Travel Blank	
	Station #	AMS 1		AMS 6			13-May		
	Sample Date	13-May		13-May					
Particulate Size	PM2.5		PM2.5						
Total Air Volume (m ³)	24		24						
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag			
Particulate Matter	1.00	2.85	V0	1.84	V0	0.10	V0		
Aluminum	0.1380326	0.0474134	V0	0.0120032	V0	0.0000000	V1		
Antimony	0.0001784	0.0000240	V0	0.0000532	V0	0.0000000	V1		
Arsenic	0.0001060	0.0000277	V0	0.0000303	V0	0.0000000	V1		
Barium	0.0092847	0.0000000	V1	0.0004780	V0	0.0000000	V1		
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1		
Bismuth	0.0000093	0.0000033	V0	0.0000051	V0	0.0000004	V0		
Cadmium	0.0000174	0.0000031	V0	0.0000054	V0	0.0000000	V1		
Calcium	0.4112124	0.0628637	V0	0.0000000	V1	0.0000000	V1		
Cerium	0.0000174	0.0000332	V0	0.0000177	V0	0.0000000	V1		
Cesium	0.0000100	0.0000030	V0	0.0000012	V0	0.0000000	V1		
Chromium	0.0022262	0.0002118	V0	0.0002685	V0	0.0001937	V0		
Cobalt	0.0000273	0.0000113	V0	0.0000061	V0	0.0000027	V0		
Copper	0.0017171	0.0002823	V0	0.0004166	V0	0.0001043	V0		
Iron	0.0393063	0.0313916	V0	0.0152263	V0	0.0018902	V0		
Lanthanum	0.0000130	0.0000151	V0	0.0000086	V0	0.0000000	V1		
Lead	0.0008577	0.0000857	V0	0.0000951	V0	0.0000000	V1		
Lithium	0.0000374	0.0000412	V0	0.0000084	V0	0.0000000	V1		
Magnesium	0.0091409	0.0087157	V0	0.0038035	V0	0.0005181	V0		
Manganese	0.0006949	0.0005414	V0	0.0002366	V0	0.0000457	V0		
Molybdenum	0.0007116	0.0000000	V1	0.0000487	V0	0.0000347	V0		
Neodymium	0.0000140	0.0000140	V0	0.0000054	V0	0.0000000	V1		
Nickel	0.0005429	0.0001333	V0	0.0000822	V0	0.0001478	V0		
Niobium	0.0000202	0.0000050	V0	0.0000018	V0	0.0000000	V1		
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000034	V0		
Phosphorus	0.0459574	0.0087372	V0	0.0076102	V0	0.0082576	V0		
Platinum	0.0000088	0.0000014	V0	0.0000023	V0	0.0000021	V0		
Potassium	0.0061261	0.0154735	V0	0.0067474	V0	0.0009160	V0		
Praseodymium	0.0000070	0.0000038	V0	0.0000015	V0	0.0000000	V1		
Rubidium	0.0000184	0.0000530	V0	0.0000177	V0	0.0000000	V1		
Samarium	0.0000133	0.0000022	V0	0.0000008	V0	0.0000000	V1		
Selenium	0.0003366	0.0000297	V0	0.0000178	V0	0.0000000	V1		
Silicon	0.7676322	0.1065515	V0	0.0348597	V0	0.0000000	V1		
Silver	0.0000100	0.0000012	V0	0.0000009	V0	0.0000043	V0		
Sodium	0.0169447	0.0080365	V0	0.0077661	V0	0.0015009	V0		
Strontium	0.0003375	0.0001846	V0	0.0000665	V0	0.0000000	V1		
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1		
Thallium	0.0000090	0.0000009	V0	0.0000007	V0	0.0000000	V1		
Thorium	0.0000059	0.0000045	V0	0.0000018	V0	0.0000000	V1		
Tin	0.0004414	0.0000637	V0	0.0000754	V0	0.0000630	V0		
Titanium	0.0015201	0.0017705	V0	0.0012344	V0	0.0006928	V0		
Tungsten	0.0000938	0.0000049	V0	0.0000052	V0	0.0000000	V1		
Uranium	0.0000048	0.0000013	V0	0.0000006	V0	0.0000000	V1		
Vanadium	0.0007697	0.0001943	V0	0.0000926	V0	0.0000347	V0		
Zinc	0.0055897	0.0006736	V0	0.0006216	V0	0.0000000	V1		



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	MDL (µg/sample)	AMS 7 13-May PM2.5 23.6	Results (µg/m ³)	QC Flag	AMS 14 13-May PM2.5 24	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	1.87	V4	1.66	V4	0.10	V0
Aluminum	0.1380326	0.0128576	V0	0.0077128	V0	0.0000000	V1
Antimony	0.0001784	0.0000423	V0	0.0000396	V0	0.0000000	V1
Arsenic	0.0001060	0.0000317	V0	0.0000324	V0	0.0000000	V1
Barium	0.0092847	0.0004115	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000058	V0	0.0000050	V0	0.0000004	V0
Cadmium	0.0000174	0.0000048	V0	0.0000066	V0	0.0000000	V1
Calcium	0.4112124	0.0183183	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000144	V0	0.0000082	V0	0.0000000	V1
Cesium	0.0000100	0.0000013	V0	0.0000011	V0	0.0000000	V1
Chromium	0.0022262	0.0005819	V0	0.0001690	V0	0.0001937	V0
Cobalt	0.0000273	0.0000104	V0	0.0000065	V0	0.0000027	V0
Copper	0.0017171	0.0004797	V0	0.0003129	V0	0.0001043	V0
Iron	0.0393063	0.0153472	V0	0.0077925	V0	0.0018902	V0
Lanthanum	0.0000130	0.0000068	V0	0.0000045	V0	0.0000000	V1
Lead	0.0008577	0.0001048	V0	0.0000994	V0	0.0000000	V1
Lithium	0.0000374	0.0000112	V0	0.0000055	V0	0.0000000	V1
Magnesium	0.0091409	0.0037612	V0	0.0023819	V0	0.0005181	V0
Manganese	0.0006949	0.0003562	V0	0.0001574	V0	0.0000457	V0
Molybdenum	0.0007116	0.0001081	V0	0.0000308	V0	0.0000347	V0
Neodymium	0.0000140	0.0000048	V0	0.0000030	V0	0.0000000	V1
Nickel	0.0005429	-9999	M2	0.0001014	V0	0.0001478	V0
Niobium	0.0000202	0.0000018	V0	0.0000010	V0	0.0000000	V1
Palladium	0.0000632	0.0000035	V0	0.0000000	V1	0.0000034	V0
Phosphorus	0.0459574	0.0077987	V0	0.0080074	V0	0.0082576	V0
Platinum	0.0000088	-9999	M2	0.0000014	V0	0.0000021	V0
Potassium	0.0061261	0.0068037	V0	0.0048992	V0	0.0009160	V0
Praseodymium	0.0000070	0.0000014	V0	0.0000009	V0	0.0000000	V1
Rubidium	0.0000184	0.0000186	V0	0.0000121	V0	0.0000000	V1
Samarium	0.0000133	0.0000008	V0	0.0000000	V1	0.0000000	V1
Selenium	0.0003366	0.0000408	V0	0.0000191	V0	0.0000000	V1
Silicon	0.7676322	0.0793341	V0	0.0511215	V0	0.0000000	V1
Silver	0.0000100	0.0000013	V0	0.0000007	V0	0.0000043	V0
Sodium	0.0169447	0.0069795	V0	0.0048463	V0	0.0015009	V0
Strontium	0.0003375	0.0000656	V0	0.0000555	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000007	V0	0.0000006	V0	0.0000000	V1
Thorium	0.0000059	0.0000020	V0	0.0000009	V0	0.0000000	V1
Tin	0.0004414	0.0001132	V0	0.0000618	V0	0.0000630	V0
Titanium	0.0015201	0.0025102	V0	0.0007308	V0	0.0006928	V0
Tungsten	0.0000938	0.0000054	V0	0.0000000	V1	0.0000000	V1
Uranium	0.0000048	0.0000005	V0	0.0000003	V0	0.0000000	V1
Vanadium	0.0007697	0.0000915	V0	0.0000834	V0	0.0000347	V0
Zinc	0.0055897	0.0007511	V0	-9999	M2	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	19-May		19-May		19-May	
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m ³)	24		24			24	
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	8.81	V4	3.46	V0	0.14	V0
Aluminum	0.1380326	0.0750350	V0	0.0400460	V0	0.0000000	V1
Antimony	0.0001784	0.0000358	V0	0.0000436	V0	0.0000000	V1
Arsenic	0.0001060	0.0000502	V0	0.0001710	V0	0.0000000	V1
Barium	0.0092847	0.0007569	V0	0.0007047	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000039	V0	0.0000032	V0	0.0000014	V0
Cadmium	0.0000174	0.0000051	V0	0.0000068	V0	0.0000000	V1
Calcium	0.4112124	0.1227254	V0	0.0530181	V0	0.0000000	V1
Cerium	0.0000174	0.0000649	V0	0.0000456	V0	0.0000011	V0
Cesium	0.0000100	0.0000050	V0	0.0000029	V0	0.0000012	V0
Chromium	0.0022262	0.0002671	V0	0.0001737	V0	0.0001381	V0
Cobalt	0.0000273	0.0000224	V0	0.0000131	V0	0.0000035	V0
Copper	0.0017171	0.0007343	V0	0.0005568	V0	0.0001620	V0
Iron	0.0393063	0.0723535	V0	0.0463921	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000303	V0	0.0000246	V0	0.0000011	V0
Lead	0.0008577	0.0000865	V0	0.0000884	V0	0.0000000	V1
Lithium	0.0000374	0.0000544	V0	0.0000263	V0	0.0000025	V0
Magnesium	0.0091409	0.0239122	V0	0.0152437	V0	0.0004316	V0
Manganese	0.0006949	0.0013518	V0	0.0007784	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000494	V0	0.0000639	V0	0.0000490	V0
Neodymium	0.0000140	0.0000269	V0	0.0000165	V0	0.0000010	V0
Nickel	0.0005429	0.0002622	V0	0.0000903	V0	0.0000684	V0
Niobium	0.0000202	0.0000089	V0	0.0000056	V0	0.0000000	V1
Palladium	0.0000632	0.0000037	V0	0.0000035	V0	0.0000051	V0
Phosphorus	0.0459574	0.0104906	V0	0.0098934	V0	0.0069543	V0
Platinum	0.0000088	0.0000016	V0	0.0000021	V0	0.0000016	V0
Potassium	0.0061261	0.0309947	V0	0.0202283	V0	0.0004577	V0
Praseodymium	0.0000070	0.0000071	V0	0.0000044	V0	0.0000009	V0
Rubidium	0.0000184	0.0001005	V0	0.0000553	V0	0.0000009	V0
Samarium	0.0000133	0.0000046	V0	0.0000031	V0	0.0000009	V0
Selenium	0.0003366	0.0000835	V0	0.0000750	V0	0.0000000	V1
Silicon	0.7676322	0.2476029	V0	0.1061918	V0	0.0000000	V1
Silver	0.0000100	-9999	M2	0.0000016	V0	0.0000011	V0
Sodium	0.0169447	0.0407535	V0	0.0126258	V0	0.0007859	V0
Strontium	0.0003375	0.0002946	V0	0.0001843	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000015	V0	0.0000012	V0	0.0000007	V0
Thorium	0.0000059	0.0000076	V0	0.0000053	V0	0.0000008	V0
Tin	0.0004414	0.0000641	V0	0.0000776	V0	0.0000202	V0
Titanium	0.0015201	0.0031950	V0	0.0023740	V0	0.0004329	V0
Tungsten	0.0000938	0.0000141	V0	0.0000139	V0	0.0000000	V1
Uranium	0.0000048	0.0000027	V0	0.0000021	V0	0.0000007	V0
Vanadium	0.0007697	0.0001573	V0	0.0000826	V0	0.0000000	V1
Zinc	0.0055897	0.0012965	V0	0.0010180	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 19-May PM2.5 24	Results (µg/m ³)	QC Flag	AMS 14 19-May PM2.5 24	Results (µg/m ³)	QC Flag	Results (µg/m ³) 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.62	V0	2.83	V0	0.14	V0
Aluminum	0.1380326	0.0405541	V0	0.0209646	V0	0.0000000	V1
Antimony	0.0001784	0.0001609	V0	0.0000114	V0	0.0000000	V1
Arsenic	0.0001060	0.0001233	V0	0.0000322	V0	0.0000000	V1
Barium	0.0092847	0.0020850	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000066	V0	0.0000015	V0	0.0000014	V0
Cadmium	0.0000174	0.0000066	V0	0.0000148	V0	0.0000000	V1
Calcium	0.4112124	0.0509232	V0	0.0202556	V0	0.0000000	V1
Cerium	0.0000174	0.0000785	V0	0.0000198	V0	0.0000011	V0
Cesium	0.0000100	0.0000029	V0	0.0000018	V0	0.0000012	V0
Chromium	0.0022262	0.0002220	V0	0.0001555	V0	0.0001381	V0
Cobalt	0.0000273	0.0000173	V0	0.0000074	V0	0.0000035	V0
Copper	0.0017171	0.0011189	V0	0.0035128	V0	0.0001620	V0
Iron	0.0393063	0.0556789	V0	0.0175873	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000236	V0	0.0000096	V0	0.0000011	V0
Lead	0.0008577	0.0001040	V0	0.0000735	V0	0.0000000	V1
Lithium	0.0000374	0.0000290	V0	0.0000145	V0	0.0000025	V0
Magnesium	0.0091409	0.0131997	V0	0.0061268	V0	0.0004316	V0
Manganese	0.0006949	0.0008690	V0	0.0004117	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001204	V0	0.0000000	V1	0.0000490	V0
Neodymium	0.0000140	0.0000191	V0	0.0000075	V0	0.0000010	V0
Nickel	0.0005429	0.0001398	V0	0.0000748	V0	0.0000684	V0
Niobium	0.0000202	0.0000060	V0	0.0000029	V0	0.0000000	V1
Palladium	0.0000632	0.0000056	V0	0.0000000	V1	0.0000051	V0
Phosphorus	0.0459574	0.0107379	V0	0.0106361	V0	0.0069543	V0
Platinum	0.0000088	0.0000022	V0	0.0000014	V0	0.0000016	V0
Potassium	0.0061261	0.0186828	V0	0.0156899	V0	0.0004577	V0
Praseodymium	0.0000070	0.0000054	V0	0.0000020	V0	0.0000009	V0
Rubidium	0.0000184	0.0000535	V0	0.0000356	V0	0.0000009	V0
Samarium	0.0000133	0.0000030	V0	0.0000014	V0	0.0000009	V0
Selenium	0.0003366	0.0000985	V0	0.0000468	V0	0.0000000	V1
Silicon	0.7676322	0.0868957	V0	0.0000000	V1	0.0000000	V1
Silver	0.0000100	0.0000019	V0	0.0000011	V0	0.0000011	V0
Sodium	0.0169447	0.0142385	V0	0.0069322	V0	0.0007859	V0
Strontium	0.0003375	0.0002418	V0	0.0000871	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000012	V0	0.0000008	V0	0.0000007	V0
Thorium	0.0000059	0.0000056	V0	0.0000027	V0	0.0000008	V0
Tin	0.0004414	0.0002193	V0	0.0000500	V0	0.0000202	V0
Titanium	0.0015201	0.0034082	V0	0.0010188	V0	0.0004329	V0
Tungsten	0.0000938	0.0000227	V0	0.0000076	V0	0.0000000	V1
Uranium	0.0000048	0.0000017	V0	0.0000009	V0	0.0000007	V0
Vanadium	0.0007697	0.0000872	V0	0.0000435	V0	0.0000000	V1
Zinc	0.0055897	0.0015031	V0	0.0008371	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1	QC Flag	AMS 6	QC Flag	25-May	
	Sample Date	25-May		25-May			
Particulate Size	PM2.5		PM2.5				
Total Air Volume (m ³)	23.5		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	3.73	V0	4.19	V0	0.17	V0
Aluminum	0.1380326	0.1149046	V0	0.1325807	V0	0.0000000	V1
Antimony	0.0001784	0.0000077	V0	0.0000241	V0	0.0000000	V1
Arsenic	0.0001060	0.0000346	V0	0.0000401	V0	0.0000000	V1
Barium	0.0092847	0.0008488	V0	0.0010152	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000054	V0	0.0000000	V1
Bismuth	0.0000093	0.0000017	V0	0.0000038	V0	0.0000006	V0
Cadmium	0.0000174	0.0000018	V0	0.0000024	V0	0.0000000	V1
Calcium	0.4112124	0.4286112	V0	0.0874064	V0	0.0000000	V1
Cerium	0.0000174	0.0001112	V0	0.0001273	V0	0.0000000	V1
Cesium	0.0000100	0.0000083	V0	0.0000085	V0	0.0000000	V1
Chromium	0.0022262	0.0002060	V0	0.0002465	V0	0.0000000	V1
Cobalt	0.0000273	0.0000328	V0	0.0000382	V0	0.0000016	V0
Copper	0.0017171	0.0002028	V0	0.0003378	V0	0.0000807	V0
Iron	0.0393063	0.1182484	V0	0.1014039	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000535	V0	0.0000584	V0	0.0000000	V1
Lead	0.0008577	0.0000803	V0	0.0000861	V0	0.0000000	V1
Lithium	0.0000374	0.0000885	V0	0.0001201	V0	0.0000000	V1
Magnesium	0.0091409	0.0258384	V0	0.0213620	V0	0.0004253	V0
Manganese	0.0006949	0.0017339	V0	0.0016350	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000688	V0	0.0001486	V0	0.0000551	V0
Neodymium	0.0000140	0.0000495	V0	0.0000507	V0	0.0000000	V1
Nickel	0.0005429	0.0003951	V0	0.0002139	V0	0.0000471	V0
Niobium	0.0000202	0.0000152	V0	0.0000151	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000032	V0	0.0000000	V1
Phosphorus	0.0459574	0.0102308	V0	0.0092990	V0	0.0090643	V0
Platinum	0.0000088	0.0000016	V0	0.0000025	V0	0.0000018	V0
Potassium	0.0061261	0.0352093	V0	0.0339650	V0	0.0004888	V0
Praseodymium	0.0000070	0.0000128	V0	0.0000136	V0	0.0000000	V1
Rubidium	0.0000184	0.0001482	V0	0.0001433	V0	0.0000000	V1
Samarium	0.0000133	0.0000082	V0	0.0000101	V0	0.0000000	V1
Selenium	0.0003366	0.0000832	V0	0.0001008	V0	0.0000000	V1
Silicon	0.7676322	0.2110404	V0	0.3320663	V0	0.0000000	V1
Silver	0.0000100	0.0000009	V0	0.0000014	V0	0.0000007	V0
Sodium	0.0169447	0.0116609	V0	0.0190422	V0	0.0008943	V0
Strontium	0.0003375	0.0006233	V0	0.0003673	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000014	V0	0.0000016	V0	0.0000000	V1
Thorium	0.0000059	0.0000154	V0	0.0000165	V0	0.0000000	V1
Tin	0.0004414	0.0000533	V0	0.0000564	V0	0.0000344	V0
Titanium	0.0015201	0.0050067	V0	0.0059977	V0	0.0008328	V0
Tungsten	0.0000938	0.0000075	V0	0.0000165	V0	0.0000000	V1
Uranium	0.0000048	0.0000040	V0	0.0000047	V0	0.0000000	V1
Vanadium	0.0007697	0.0002270	V0	0.0005474	V0	0.0000000	V1
Zinc	0.0055897	0.0005878	V0	0.0010495	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 25-May PM2.5 24	Results (µg/m ³)	QC Flag	AMS 14 25-May PM2.5 24	Results (µg/m ³)	QC Flag	25-May 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.88	V0	1.79	V0	0.17	V0
Aluminum	0.1380326	0.1302340	V0	0.0489389	V0	0.0000000	V1
Antimony	0.0001784	0.0000426	V0	0.0000000	V1	0.0000000	V1
Arsenic	0.0001060	0.0000390	V0	0.0000206	V0	0.0000000	V1
Barium	0.0092847	0.0009720	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000057	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000040	V0	0.0000011	V0	0.0000006	V0
Cadmium	0.0000174	0.0000026	V0	0.0000028	V0	0.0000000	V1
Calcium	0.4112124	0.0706718	V0	0.0366673	V0	0.0000000	V1
Cerium	0.0000174	0.0001069	V0	0.0000418	V0	0.0000000	V1
Cesium	0.0000100	0.0000083	V0	0.0000038	V0	0.0000000	V1
Chromium	0.0022262	0.0004126	V0	0.0003336	V0	0.0000000	V1
Cobalt	0.0000273	0.0000341	V0	0.0000150	V0	0.0000016	V0
Copper	0.0017171	0.0004310	V0	0.0003151	V0	0.0000807	V0
Iron	0.0393063	0.0864576	V0	0.0262623	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000513	V0	0.0000200	V0	0.0000000	V1
Lead	0.0008577	0.0000855	V0	0.0000613	V0	0.0000000	V1
Lithium	0.0000374	0.0001165	V0	0.0000403	V0	0.0000000	V1
Magnesium	0.0091409	0.0170788	V0	0.0079996	V0	0.0004253	V0
Manganese	0.0006949	0.0015568	V0	0.0004827	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001035	V0	0.0000365	V0	0.0000551	V0
Neodymium	0.0000140	0.0000450	V0	0.0000171	V0	0.0000000	V1
Nickel	0.0005429	0.0002249	V0	0.0002037	V0	0.0000471	V0
Niobium	0.0000202	0.0000141	V0	0.0000048	V0	0.0000000	V1
Palladium	0.0000632	0.0000064	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0095551	V0	0.0087660	V0	0.0090643	V0
Platinum	0.0000088	0.0000020	V0	0.0000014	V0	0.0000018	V0
Potassium	0.0061261	0.0405288	V0	0.0180635	V0	0.0004888	V0
Praseodymium	0.0000070	0.0000119	V0	0.0000047	V0	0.0000000	V1
Rubidium	0.0000184	0.0001534	V0	0.0000575	V0	0.0000000	V1
Samarium	0.0000133	0.0000082	V0	0.0000034	V0	0.0000000	V1
Selenium	0.0003366	0.0000810	V0	0.0000438	V0	0.0000000	V1
Silicon	0.7676322	0.2720932	V0	0.1388039	V0	0.0000000	V1
Silver	0.0000100	0.0000015	V0	0.0000010	V0	0.0000007	V0
Sodium	0.0169447	0.0172497	V0	0.0198031	V0	0.0008943	V0
Strontium	0.0003375	0.0003250	V0	0.0001438	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000016	V0	0.0000008	V0	0.0000000	V1
Thorium	0.0000059	0.0000141	V0	0.0000061	V0	0.0000000	V1
Tin	0.0004414	0.0001240	V0	0.0000391	V0	0.0000344	V0
Titanium	0.0015201	0.0045320	V0	0.0018462	V0	0.0008328	V0
Tungsten	0.0000938	0.0000134	V0	0.0000050	V0	0.0000000	V1
Uranium	0.0000048	0.0000042	V0	0.0000017	V0	0.0000000	V1
Vanadium	0.0007697	0.0005181	V0	0.0002136	V0	0.0000000	V1
Zinc	0.0055897	0.0016536	V0	0.0003342	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	31-May		31-May		31-May	
Particulate Size		PM2.5		PM2.5		PM2.5	
Total Air Volume (m ³)		24		24		24	
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	14.78	V0	7.51	V0	0.11	V0
Aluminum	0.1380326	0.3896862	V0	0.0888479	V0	0.0000000	V1
Antimony	0.0001784	0.0000487	V0	0.0000719	V0	0.0000000	V1
Arsenic	0.0001060	0.0001693	V0	0.0000816	V0	0.0000000	V1
Barium	0.0092847	0.0034066	V0	0.0014323	V0	0.0000000	V1
Beryllium	0.0000946	0.0000147	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000101	V0	0.0000069	V0	0.0000007	V0
Cadmium	0.0000174	0.0000186	V0	0.0000117	V0	0.0000000	V1
Calcium	0.4112124	0.5718448	V0	0.1040595	V0	0.0000000	V1
Cerium	0.0000174	0.0004103	V0	0.0001019	V0	0.0000000	V1
Cesium	0.0000100	0.0000316	V0	0.0000072	V0	0.0000000	V1
Chromium	0.0022262	0.0006841	V0	0.0006014	V0	0.0001208	V0
Cobalt	0.0000273	0.0001122	V0	0.0000308	V0	0.0000019	V0
Copper	0.0017171	0.0009585	V0	0.0005174	V0	0.0000000	V1
Iron	0.0393063	0.3614704	V0	0.0925320	V0	0.0030162	V0
Lanthanum	0.0000130	0.0002036	V0	0.0000512	V0	0.0000000	V1
Lead	0.0008577	0.0004247	V0	0.0002292	V0	0.0000000	V1
Lithium	0.0000374	0.0003382	V0	0.0000700	V0	0.0000020	V0
Magnesium	0.0091409	0.0873342	V0	0.0280991	V0	0.0000000	V1
Manganese	0.0006949	0.0060280	V0	0.0018832	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002598	V0	0.0000802	V0	0.0000358	V0
Neodymium	0.0000140	0.0001777	V0	0.0000424	V0	0.0000006	V0
Nickel	0.0005429	0.0008520	V0	0.0003034	V0	0.0000588	V0
Niobium	0.0000202	0.0000428	V0	0.0000120	V0	0.0000000	V1
Palladium	0.0000632	0.0000078	V0	0.0000000	V1	0.0000044	V0
Phosphorus	0.0459574	0.0143436	V0	0.0103546	V0	0.0076878	V0
Platinum	0.0000088	0.0000043	V0	0.0000019	V0	0.0000016	V0
Potassium	0.0061261	0.1213217	V0	0.0408853	V0	0.0005394	V0
Praseodymium	0.0000070	0.0000463	V0	0.0000112	V0	0.0000003	V0
Rubidium	0.0000184	0.0005257	V0	0.0001265	V0	0.0000000	V1
Samarium	0.0000133	0.0000332	V0	0.0000072	V0	0.0000000	V1
Selenium	0.0003366	0.0003386	V0	0.0001313	V0	0.0000000	V1
Silicon	0.7676322	0.9563042	V0	0.3030853	V0	0.0000000	V1
Silver	0.0000100	0.0000035	V0	0.0000017	V0	0.0000007	V0
Sodium	0.0169447	0.0597634	V0	0.0185230	V0	0.0008717	V0
Strontium	0.0003375	0.0015726	V0	0.0003983	V0	0.0000000	V1
Tantalum	0.0000394	0.0000031	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000072	V0	0.0000032	V0	0.0000000	V1
Thorium	0.0000059	0.0000565	V0	0.0000141	V0	0.0000000	V1
Tin	0.0004414	0.0001247	V0	0.0001088	V0	0.0000212	V0
Titanium	0.0015201	0.0143119	V0	0.0034824	V0	0.0003438	V0
Tungsten	0.0000938	0.0000327	V0	0.0000673	V0	0.0000000	V1
Uranium	0.0000048	0.0000154	V0	0.0000049	V0	0.0000000	V1
Vanadium	0.0007697	0.0015080	V0	0.0002130	V0	0.0000597	V0
Zinc	0.0055897	0.0032557	V0	0.0014962	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 31-May PM2.5 24	Results (µg/m ³)	QC Flag	AMS 14 31-May PM2.5 24	Results (µg/m ³)	QC Flag	31-May 24 Results (µg/m ³) QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	8.32	V0	6.47	V0	0.11	V0
Aluminum	0.1380326	0.1416136	V0	0.0832932	V0	0.0000000	V1
Antimony	0.0001784	0.0001584	V0	0.0000181	V0	0.0000000	V1
Arsenic	0.0001060	0.0001172	V0	0.0000607	V0	0.0000000	V1
Barium	0.0092847	0.0029472	V0	0.0009433	V0	0.0000000	V1
Beryllium	0.0000946	0.0000055	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000108	V0	0.0000045	V0	0.0000007	V0
Cadmium	0.0000174	0.0000131	V0	0.0000090	V0	0.0000000	V1
Calcium	0.4112124	0.1779861	V0	0.0922840	V0	0.0000000	V1
Cerium	0.0000174	0.0001780	V0	0.0000952	V0	0.0000000	V1
Cesium	0.0000100	0.0000112	V0	0.0000063	V0	0.0000000	V1
Chromium	0.0022262	0.0003296	V0	0.0002069	V0	0.0001208	V0
Cobalt	0.0000273	0.0000491	V0	0.0000259	V0	0.0000019	V0
Copper	0.0017171	0.0011944	V0	0.0001997	V0	0.0000000	V1
Iron	0.0393063	0.1752664	V0	0.0706724	V0	0.0030162	V0
Lanthanum	0.0000130	0.0000867	V0	0.0000474	V0	0.0000000	V1
Lead	0.0008577	0.0005990	V0	0.0001908	V0	0.0000000	V1
Lithium	0.0000374	0.0001128	V0	0.0000558	V0	0.0000020	V0
Magnesium	0.0091409	0.0446481	V0	0.0263850	V0	0.0000000	V1
Manganese	0.0006949	0.0033316	V0	0.0017802	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001011	V0	0.0000657	V0	0.0000358	V0
Neodymium	0.0000140	0.0000735	V0	0.0000403	V0	0.0000006	V0
Nickel	0.0005429	0.0002713	V0	0.0001496	V0	0.0000588	V0
Niobium	0.0000202	0.0000191	V0	0.0000090	V0	0.0000000	V1
Palladium	0.0000632	0.0000060	V0	0.0000000	V1	0.0000044	V0
Phosphorus	0.0459574	0.0119435	V0	0.0087642	V0	0.0076878	V0
Platinum	0.0000088	0.0000188	V0	0.0000016	V0	0.0000016	V0
Potassium	0.0061261	0.0552385	V0	0.0323430	V0	0.0005394	V0
Praseodymium	0.0000070	0.0000186	V0	0.0000106	V0	0.0000003	V0
Rubidium	0.0000184	0.0001920	V0	0.0001105	V0	0.0000000	V1
Samarium	0.0000133	0.0000117	V0	0.0000071	V0	0.0000000	V1
Selenium	0.0003366	0.0001776	V0	0.0001099	V0	0.0000000	V1
Silicon	0.7676322	0.4699596	V0	0.3346475	V0	0.0000000	V1
Silver	0.0000100	0.0000312	V0	0.0000019	V0	0.0000007	V0
Sodium	0.0169447	0.0260251	V0	0.0139999	V0	0.0008717	V0
Strontium	0.0003375	0.0006548	V0	0.0003175	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000045	V0	0.0000030	V0	0.0000000	V1
Thorium	0.0000059	0.0000221	V0	0.0000140	V0	0.0000000	V1
Tin	0.0004414	0.0002040	V0	0.0000568	V0	0.0000212	V0
Titanium	0.0015201	0.0086375	V0	0.0034758	V0	0.0003438	V0
Tungsten	0.0000938	0.0000387	V0	0.0000140	V0	0.0000000	V1
Uranium	0.0000048	0.0000067	V0	0.0000039	V0	0.0000000	V1
Vanadium	0.0007697	0.0003350	V0	0.0001878	V0	0.0000597	V0
Zinc	0.0055897	0.0024850	V0	0.0008298	V0	0.0000000	V1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

Particulate Matter (PM2.5) - METALS - Summary

2017

Indicated Sites and Dates

Station Name	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay
Station #	AMS 1	AMS 1	AMS 1	AMS 1
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	6.25	4.90	6	6
Aluminum	0.1195556	0.1353954	6	6
Antimony	0.0000280	0.0000141	6	6
Arsenic	0.0000614	0.0000545	6	6
Barium	0.0009143	0.0012733	6	4
Beryllium	0.0000024	0.0000060	6	1
Bismuth	0.0000045	0.0000030	6	6
Cadmium	0.0000060	0.0000063	6	6
Calcium	0.2149727	0.2278672	6	6
Cerium	0.0001165	0.0001471	6	6
Cesium	0.0000091	0.0000112	6	6
Chromium	0.0003048	0.0001874	6	6
Cobalt	0.0000348	0.0000388	6	6
Copper	0.0004855	0.0003006	6	6
Iron	0.1090545	0.1286339	6	6
Lanthanum	0.0000573	0.0000732	6	6
Lead	0.0001495	0.0001361	6	6
Lithium	0.0001000	0.0001186	6	6
Magnesium	0.0273502	0.0305391	6	6
Manganese	0.0018459	0.0021056	6	6
Molybdenum	0.0000772	0.0000923	6	5
Neodymium	0.0000510	0.0000635	6	6
Nickel	0.0003224	0.0002784	6	6
Niobium	0.0000134	0.0000150	6	6
Palladium	0.0000025	0.0000031	6	3
Phosphorus	0.0111468	0.0020752	6	6
Platinum	0.0000020	0.0000011	6	6
Potassium	0.0393237	0.0411984	6	6
Praseodymium	0.0000132	0.0000166	6	6
Rubidium	0.0001562	0.0001854	6	6
Samarium	0.0000093	0.0000120	6	6
Selenium	0.0001038	0.0001179	6	6
Silicon	0.2980559	0.3306476	6	6
Silver	0.0000014	0.0000012	5	5
Sodium	0.0234910	0.0217049	6	6
Strontium	0.0005053	0.0005527	6	6
Tantalum	0.0000005	0.0000013	6	1
Thallium	0.0000022	0.0000024	6	6
Thorium	0.0000159	0.0000203	6	6
Tin	0.0000744	0.0000285	5	5
Titanium	0.0046471	0.0049221	6	6
Tungsten	0.0000121	0.0000107	6	6
Uranium	0.0000044	0.0000055	6	6
Vanadium	0.0004057	0.0005430	6	6
Zinc	0.0012395	0.0010341	6	6



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.52	2.78	6	6
Aluminum	0.0594731	0.0438236	6	6
Antimony	0.0000417	0.0000201	6	6
Arsenic	0.0000762	0.0000508	6	6
Barium	0.0007001	0.0004882	6	5
Beryllium	0.0000009	0.0000022	6	1
Bismuth	0.0000042	0.0000016	6	6
Cadmium	0.0000062	0.0000032	6	6
Calcium	0.0557574	0.0365736	6	5
Cerium	0.0000619	0.0000433	6	6
Cesium	0.0000045	0.0000028	6	6
Chromium	0.0002812	0.0001609	6	6
Cobalt	0.0000197	0.0000125	6	6
Copper	0.0004215	0.0000955	6	6
Iron	0.0551353	0.0347489	6	6
Lanthanum	0.0000305	0.0000200	6	6
Lead	0.0001163	0.0000598	6	6
Lithium	0.0000491	0.0000410	6	6
Magnesium	0.0151763	0.0086447	6	6
Manganese	0.0009765	0.0006499	6	6
Molybdenum	0.0001080	0.0000824	6	6
Neodymium	0.0000246	0.0000179	6	6
Nickel	0.0001752	0.0001028	6	6
Niobium	0.0000073	0.0000052	6	6
Palladium	0.0000011	0.0000017	6	2
Phosphorus	0.0095762	0.0012015	6	6
Platinum	0.0000021	0.0000004	6	6
Potassium	0.0252723	0.0140561	6	6
Praseodymium	0.0000066	0.0000048	6	6
Rubidium	0.0000765	0.0000493	6	6
Samarium	0.0000045	0.0000035	6	6
Selenium	0.0000746	0.0000451	6	6
Silicon	0.1679235	0.1406755	6	5
Silver	0.0000013	0.0000004	6	6
Sodium	0.0144950	0.0047286	6	6
Strontium	0.0002294	0.0001301	6	6
Tantalum	0.0000000	0.0000000	6	0
Thallium	0.0000015	0.0000009	6	6
Thorium	0.0000080	0.0000059	6	6
Tin	0.0000875	0.0000438	6	6
Titanium	0.0030405	0.0016443	6	6
Tungsten	0.0000212	0.0000230	6	6
Uranium	0.0000027	0.0000018	6	6
Vanadium	0.0004088	0.0005136	6	6
Zinc	0.0011045	0.0002920	6	6



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	4.40	2.75	6	6
Aluminum	0.0692413	0.0535616	6	6
Antimony	0.0000950	0.0000549	6	6
Arsenic	0.0000768	0.0000382	6	6
Barium	0.0014183	0.0009446	6	6
Beryllium	0.0000019	0.0000029	6	2
Bismuth	0.0000061	0.0000026	6	6
Cadmium	0.0000062	0.0000037	6	6
Calcium	0.0680293	0.0576765	6	6
Cerium	0.0000767	0.0000605	6	6
Cesium	0.0000051	0.0000039	6	6
Chromium	0.0003654	0.0001221	6	6
Cobalt	0.0000248	0.0000150	6	6
Copper	0.0007518	0.0003357	6	6
Iron	0.0705632	0.0573563	6	6
Lanthanum	0.0000346	0.0000301	6	6
Lead	0.0001902	0.0002012	6	6
Lithium	0.0000567	0.0000476	6	6
Magnesium	0.0167261	0.0146371	6	6
Manganese	0.0012940	0.0010938	6	6
Molybdenum	0.0001239	0.0000577	6	6
Neodymium	0.0000293	0.0000259	6	6
Nickel	0.0002286	0.0000704	5	5
Niobium	0.0000084	0.0000068	6	6
Palladium	0.0000053	0.0000012	6	6
Phosphorus	0.0101422	0.0016685	6	6
Platinum	0.0000058	0.0000073	5	5
Potassium	0.0274278	0.0186685	6	6
Praseodymium	0.0000076	0.0000065	6	6
Rubidium	0.0000899	0.0000703	6	6
Samarium	0.0000049	0.0000042	6	6
Selenium	0.0000896	0.0000513	6	6
Silicon	0.2009718	0.1582481	6	6
Silver	0.0000064	0.0000121	6	6
Sodium	0.0189573	0.0099598	6	6
Strontium	0.0002821	0.0002099	6	6
Tantalum	0.0000000	0.0000000	6	0
Thallium	0.0000017	0.0000014	6	6
Thorium	0.0000090	0.0000077	6	6
Tin	0.0001559	0.0000466	6	6
Titanium	0.0040914	0.0023701	6	6
Tungsten	0.0000218	0.0000128	6	6
Uranium	0.0000028	0.0000023	6	6
Vanadium	0.0003644	0.0003945	6	6
Zinc	0.0015449	0.0007163	6	6



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM2.5	PM2.5	PM2.5	PM2.5
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	3.08	1.99	6	6
Aluminum	0.0339511	0.0280539	6	6
Antimony	0.0000180	0.0000130	6	5
Arsenic	0.0000372	0.0000147	6	6
Barium	0.0001572	0.0003851	6	1
Beryllium	0.0000000	0.0000000	6	0
Bismuth	0.0000028	0.0000016	6	6
Cadmium	0.0000076	0.0000041	6	6
Calcium	0.0286150	0.0342453	6	4
Cerium	0.0000362	0.0000311	6	6
Cesium	0.0000030	0.0000019	6	6
Chromium	0.0001852	0.0000794	6	6
Cobalt	0.0000125	0.0000073	6	6
Copper	0.0007875	0.0013366	6	6
Iron	0.0279927	0.0219881	6	6
Lanthanum	0.0000182	0.0000173	5	5
Lead	0.0001063	0.0000461	6	6
Lithium	0.0000250	0.0000195	6	6
Magnesium	0.0091845	0.0086688	6	6
Manganese	0.0006066	0.0005865	6	6
Molybdenum	0.0000314	0.0000274	6	4
Neodymium	0.0000144	0.0000136	6	6
Nickel	0.0001153	0.0000532	6	6
Niobium	0.0000038	0.0000029	6	6
Palladium	0.0000000	0.0000000	6	0
Phosphorus	0.0093586	0.0010054	6	6
Platinum	0.0000015	0.0000002	6	6
Potassium	0.0163566	0.0090245	6	6
Praseodymium	0.0000040	0.0000035	6	6
Rubidium	0.0000486	0.0000339	6	6
Samarium	0.0000026	0.0000025	6	5
Selenium	0.0000483	0.0000338	6	6
Silicon	0.1161041	0.1285221	6	4
Silver	0.0000015	0.0000008	6	6
Sodium	0.0105928	0.0054437	6	6
Strontium	0.0001362	0.0000965	6	6
Tantalum	0.0000000	0.0000000	6	0
Thallium	0.0000013	0.0000009	6	6
Thorium	0.0000051	0.0000047	6	6
Tin	0.0000624	0.0000245	6	6
Titanium	0.0016053	0.0010219	6	6
Tungsten	0.0000078	0.0000049	6	5
Uranium	0.0000015	0.0000013	6	6
Vanadium	0.0001314	0.0000775	6	6
Zinc	0.0006360	0.0002086	5	5



Wood Buffalo Environmental Association

PM2.5 Metal (µg/sample) Summary

2017 May

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99% Max.	Mean	Std. Dev.	Median	Outlier	Test	
Particulate Matter	100.0%	24		0	33	39	44	88	101	171	180	200	211	355	355	109	79	88	503
Aluminium	100.0%	24		0	0.1851	0.3034	0.7409	1.1745	1.3329	2.1323	2.7003	3.1819	3.3987	9.3525	9.3525	1.6895	1.8896	1.1745	11.1377
Antimony	95.8%	24	1	0.0001	0.0003	0.0005	0.0010	0.0010	0.0013	0.0015	0.0025	0.0038	0.0039	0.0039	0.0011	0.0010	0.0010	0.0010	0.0061
Arsenic	100.0%	24	0	0.0005	0.0007	0.0008	0.0012	0.0014	0.0019	0.0020	0.0030	0.0041	0.0041	0.0041	0.0015	0.0010	0.0012	0.0067	
Barium	66.7%	24	8	0.0045	0.0055	0.0076	0.0169	0.0182	0.0244	0.0325	0.0500	0.0707	0.0818	0.0818	0.0212	0.0203	0.0169	0.1227	
Beryllium	16.7%	24	20	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004	0.0004	0.0001	0.0001	0.0001	0.0004
Bismuth	100.0%	24	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0001	0.0001	0.0001	0.0004
Cadmium	100.0%	24	0	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0002	0.0001	0.0001	0.0007
Calcium	87.5%	24	3	0.2562	0.4005	0.5396	1.2724	1.5398	2.2148	2.4974	4.2717	10.0724	13.7243	13.7243	2.2363	3.1722	1.2724	18.0973	
Cerium	100.0%	24	0	0.0002	0.0004	0.0006	0.0012	0.0015	0.0024	0.0026	0.0031	0.0043	0.0098	0.0098	0.0017	0.0020	0.0012	0.0118	
Cesium	100.0%	24	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0008	0.0008	0.0001	0.0001	0.0001	0.0009	
Chromium	100.0%	24	0	0.0027	0.0037	0.0048	0.0058	0.0064	0.0079	0.0080	0.0137	0.0144	0.0164	0.0164	0.0068	0.0036	0.0058	0.0246	
Cobalt	100.0%	24	0	0.0001	0.0002	0.0002	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0027	0.0027	0.0005	0.0005	0.0004	0.0032	
Copper	100.0%	24	0	0.0037	0.0048	0.0075	0.0103	0.0113	0.0176	0.0185	0.0269	0.0287	0.0843	0.0843	0.0147	0.0163	0.0103	0.0962	
Iron	100.0%	24	0	0.1870	0.3654	0.6291	1.1525	1.3363	2.0750	2.2208	2.7788	4.2064	8.6753	8.6753	1.5726	1.7908	1.1525	10.5266	
Lanthanum	100.0%	24	0	0.0001	0.0002	0.0003	0.0006	0.0007	0.0012	0.0013	0.0021	0.0049	0.0049	0.0049	0.0010	0.0013	0.0006	0.0074	
Lead	100.0%	24	0	0.0015	0.0018	0.0021	0.0024	0.0025	0.0032	0.0034	0.0055	0.0102	0.0144	0.0144	0.0034	0.0030	0.0024	0.0182	
Lithium	100.0%	24	0	0.0001	0.0002	0.0005	0.0010	0.0012	0.0017	0.0021	0.0028	0.0029	0.0081	0.0081	0.0014	0.0017	0.0010	0.0097	
Magnesium	100.0%	24	0	0.0572	0.0913	0.1507	0.3204	0.3658	0.5739	0.6072	0.6744	1.0716	2.0960	2.0960	0.4097	0.4336	0.3204	2.5778	
Manganese	100.0%	24	0	0.0038	0.0084	0.0109	0.0205	0.0229	0.0392	0.0407	0.0452	0.0800	0.1447	0.1447	0.0283	0.0304	0.0205	0.1803	
Molybdenum	87.5%	24	3	0.0007	0.0007	0.0012	0.0016	0.0018	0.0026	0.0029	0.0057	0.0062	0.0062	0.0062	0.0021	0.0017	0.0016	0.0106	
Neodymium	100.0%	24	0	0.0001	0.0001	0.0003	0.0005	0.0006	0.0010	0.0011	0.0012	0.0018	0.0043	0.0043	0.0007	0.0009	0.0005	0.0051	
Nickel	100.0%	23	0	0.0014	0.0020	0.0024	0.0036	0.0049	0.0065	0.0067	0.0077	0.0093	0.0204	0.0204	0.0050	0.0040	0.0036	0.0250	
Niobium	100.0%	24	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0003	0.0003	0.0004	0.0005	0.0010	0.0010	0.0002	0.0002	0.0001	0.0013	
Palladium	45.8%	24	13	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0000	0.0001	0.0003	
Phosphorus	100.0%	24	0	0.1826	0.1922	0.2145	0.2404	0.2450	0.2577	0.2671	0.2866	0.3041	0.3442	0.3442	0.2407	0.0382	0.2404	0.4318	
Platinum	100.0%	23	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0005	0.0001	0.0001	0.0005	
Potassium	100.0%	24	0	0.1176	0.1619	0.3049	0.4855	0.7439	0.8274	0.8915	0.9812	1.3257	2.9117	2.9117	0.6490	0.5756	0.4855	3.5272	
Praseodymium	100.0%	24	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0003	0.0003	0.0003	0.0004	0.0011	0.0011	0.0002	0.0002	0.0001	0.0013	
Rubidium	100.0%	24	0	0.0003	0.0004	0.0009	0.0014	0.0018	0.0030	0.0034	0.0037	0.0046	0.0126	0.0126	0.0022	0.0025	0.0014	0.0148	
Samarium	95.8%	24	1	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0008	0.0008	0.0001	0.0002	0.0001	0.0009	
Selenium	100.0%	24	0	0.0004	0.0005	0.0009	0.0018	0.0020	0.0024	0.0025	0.0032	0.0043	0.0081	0.0081	0.0019	0.0017	0.0018	0.0101	
Silicon	87.5%	24	3	0.0186	0.6729	1.5241	4.1292	4.9817	6.5302	7.2740	8.0315	11.2790	22.9513	22.9513	4.7330	4.8585	4.1292	29.0256	
Silver	100.0%	23	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0007	0.0007	0.0001	0.0001	0.0000	0.0008	
Sodium	100.0%	24	0	0.1163	0.1664	0.2090	0.3360	0.3433	0.4570	0.4753	0.8388	0.9781	1.4343	1.4343	0.4046	0.3035	0.3360	1.9220	
Strontium	100.0%	24	0	0.0013	0.0016	0.0026	0.0053	0.0061	0.0078	0.0088	0.0146	0.0157	0.0377	0.0377	0.0069	0.0076	0.0053	0.0450	
Tantalum	4.2%	24	23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	
Thallium	100.0%	24	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0000	0.0000	0.0000	0.0002	
Thorium	100.0%	24	0	0.0000	0.0000	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0014	0.0014	0.0002	0.0003	0.0001	0.0016	
Tin	100.0%	24	0	0.0009	0.0012	0.0014	0.0019	0.0026	0.0030	0.0038	0.0049	0.0053	0.0066	0.0066	0.0025	0.0015	0.0019	0.0099	
Titanium	100.0%	24	0	0.0175	0.0245	0.0425	0.0592	0.0767	0.0836	0.1088	0.1439	0.2073	0.3435	0.3435	0.0801	0.0708	0.0592	0.4340	
Tungsten	95.8%	24	1	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0008	0.0009	0.0016	0.0016	0.0004	0.0004	0.0003	0.0021	
Uranium	100.0%	24	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0004	0.0004	0.0001	0.0001	0.0001	0.0004	
Vanadium	100.0%	24	0	0.0010	0.0017	0.0022	0.0047	0.0051	0.0080	0.0124	0.0260	0.0335	0.0362	0.0362	0.0079	0.0099	0.0047	0.0574	
Zinc	100.0%	24	0	0.0080	0.0137	0.0162	0.0252	0.0285	0.0361	0.0397	0.0596	0.0781	0.1217	0.1217	0.0315	0.0253	0.0252	0.1581	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - METALS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM metals: Atmospheric Research & Analysis, Inc.
Morrisville, NC



FILE CONTENTS DESCRIPTION	Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation
UNITS	$\mu\text{g}/\text{m}^3$ (microgram per cubic meter)
OBSERVATION TYPE	Particles
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	Filtration with PM ₁₀ Inlet for PM ₁₀ and with PM ₁₀ Inlet/Very Sharp Cut Cyclone for PM _{2.5}
PARTICLE DIAMETER	< 2.5 μm or < 10 μm
MEDIUM	47 mm Teflon Filter
ANALYTICAL METHODS	MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC)
SAMPLE PREPARATION	DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis
ANALYTICAL LABORATORY	Atmospheric Research & Analysis Inc
USER NOTE 1	Data are not blank corrected
USER NOTE 2	Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler
USER NOTE 3	Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler
VOLUME STANDARDIZATION	Actual Volume at Ambient Conditions (since 01-Jan-2011)
SAMPLING INSTRUMENT TYPE	For PM ₁₀ FRM Partisol PM ₁₀ sampler For PM _{2.5} FRM Partisol PM _{2.5} sampler
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	01-May	01-May
	Sample Date	01-May	01-May	01-May	01-May	01-May	01-May
Particulate Size	PM10	PM10	PM10	PM10	PM10	PM10	PM10
Total Air Volume (m ³)	23.7	23.7	24	24	24	24	24
MDL (µg/sample)	1.00	24.43	20.67	20.67	0.15	0.15	0.15
Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)	Results (µg/m ³)
QC Flag	QC Flag	QC Flag	QC Flag	QC Flag	QC Flag	QC Flag	QC Flag
Particulate Matter	1.00	24.43	V0	20.67	V0	0.15	V0
Aluminum	0.1380326	1.0147404	V0	0.5007928	V0	0.0000000	V1
Antimony	0.0001784	0.0000392	V0	0.0001437	V0	0.0000000	V1
Arsenic	0.0001060	0.0002130	V0	0.0001570	V0	0.0000000	V1
Barium	0.0092847	0.0076271	V0	0.0048421	V0	0.0000000	V1
Beryllium	0.0000946	0.0000261	V0	0.0000137	V0	0.0000000	V1
Bismuth	0.0000093	0.0000068	V0	0.0000089	V0	0.0000000	V1
Cadmium	0.0000174	0.0000080	V0	0.0000081	V0	0.0000000	V1
Calcium	0.4112124	1.5371017	V0	0.6932882	V0	0.0000000	V1
Cerium	0.0000174	0.0009977	V0	0.0005131	V0	0.0000000	V1
Cesium	0.0000100	0.0000751	V0	0.0000373	V0	0.0000000	V1
Chromium	0.0022262	0.0011524	V0	0.0007926	V0	0.0000000	V1
Cobalt	0.0000273	0.0002616	V0	0.0001428	V0	0.0000016	V0
Copper	0.0017171	0.0008572	V0	0.0010562	V0	0.0000945	V0
Iron	0.0393063	0.7858189	V0	0.4481098	V0	0.0000000	V1
Lanthanum	0.0000130	0.0004859	V0	0.0002495	V0	0.0000000	V1
Lead	0.0008577	0.0004415	V0	0.0002933	V0	0.0000000	V1
Lithium	0.0000374	0.0009999	V0	0.0004385	V0	0.0000000	V1
Magnesium	0.0091409	0.1918885	V0	0.1371608	V0	0.0004991	V0
Manganese	0.0006949	0.0120296	V0	0.0069691	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001532	V0	0.0003541	V0	0.0000348	V0
Neodymium	0.0000140	0.0004331	V0	0.0002198	V0	0.0000000	V1
Nickel	0.0005429	0.0008709	V0	0.0007391	V0	0.0000450	V0
Niobium	0.0000202	0.0001098	V0	0.0000499	V0	0.0000000	V1
Palladium	0.0000632	0.0000118	V0	0.0000081	V0	0.0000046	V0
Phosphorus	0.0459574	0.0214566	V0	0.0159734	V0	0.0105676	V0
Platinum	0.0000088	0.0000018	V0	0.0000020	V0	0.0000014	V0
Potassium	0.0061261	0.2723715	V0	0.1584245	V0	0.0009096	V0
Praseodymium	0.0000070	0.0001146	V0	0.0000584	V0	0.0000000	V1
Rubidium	0.0000184	0.0012446	V0	0.0006633	V0	0.0000000	V1
Samarium	0.0000133	0.0000814	V0	0.0000407	V0	0.0000000	V1
Selenium	0.0003366	0.0005636	V0	0.0003033	V0	0.0000000	V1
Silicon	0.7676322	2.4199717	V0	1.5298188	V0	0.0442379	V0
Silver	0.0000100	0.0000032	V0	0.0000040	V0	0.0000000	V1
Sodium	0.0169447	0.1079596	V0	0.1320503	V0	0.0008947	V0
Strontium	0.0003375	0.0038246	V0	0.0020202	V0	0.0000000	V1
Tantalum	0.0000394	0.0000074	V0	0.0000037	V0	0.0000000	V1
Thallium	0.0000090	0.0000106	V0	0.0000057	V0	0.0000000	V1
Thorium	0.0000059	0.0001321	V0	0.0000636	V0	0.0000000	V1
Tin	0.0004414	0.0001024	V0	0.0001399	V0	0.0000000	V1
Titanium	0.0015201	0.0371597	V0	0.0164768	V0	0.0007090	V0
Tungsten	0.0000938	0.0000817	V0	0.0001286	V0	0.0000000	V1
Uranium	0.0000048	0.0000367	V0	0.0000186	V0	0.0000000	V1
Vanadium	0.0007697	0.0021165	V0	0.0025050	V0	0.0000000	V1
Zinc	0.0055897	0.0028702	V0	0.0032971	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 01-May PM10 23.6	AMS 14 01-May PM10 24	AMS 14 01-May PM10 24	AMS 14 01-May PM10 24	AMS 14 01-May PM10 24	AMS 14 01-May PM10 24	AMS 14 01-May PM10 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	23.19	V0	8.96	V0	0.15	V0
Aluminum	0.1380326	0.4559331	V0	0.1890124	V0	0.0000000	V1
Antimony	0.0001784	0.0002661	V0	0.0000353	V0	0.0000000	V1
Arsenic	0.0001060	0.0001365	V0	0.0000840	V0	0.0000000	V1
Barium	0.0092847	0.0063924	V0	0.0018917	V0	0.0000000	V1
Beryllium	0.0000946	0.0000156	V0	0.0000053	V0	0.0000000	V1
Bismuth	0.0000093	0.0000146	V0	0.0000039	V0	0.0000000	V1
Cadmium	0.0000174	0.0000093	V0	0.0000083	V0	0.0000000	V1
Calcium	0.4112124	0.7752258	V0	0.2193174	V0	0.0000000	V1
Cerium	0.0000174	0.0006333	V0	0.0002160	V0	0.0000000	V1
Cesium	0.0000100	0.0000316	V0	0.0000147	V0	0.0000000	V1
Chromium	0.0022262	0.0007349	V0	0.0003423	V0	0.0000000	V1
Cobalt	0.0000273	0.0001651	V0	0.0000769	V0	0.0000016	V0
Copper	0.0017171	0.0018880	V0	0.0003494	V0	0.0000945	V0
Iron	0.0393063	0.4717644	V0	0.1810907	V0	0.0000000	V1
Lanthanum	0.0000130	0.0002348	V0	0.0001110	V0	0.0000000	V1
Lead	0.0008577	0.0002979	V0	0.0001912	V0	0.0000000	V1
Lithium	0.0000374	0.0003949	V0	0.0001614	V0	0.0000000	V1
Magnesium	0.0091409	0.1394240	V0	0.0538698	V0	0.0004991	V0
Manganese	0.0006949	0.0083613	V0	0.0031788	V0	0.0000000	V1
Molybdenum	0.0007116	0.0003261	V0	0.0000745	V0	0.0000348	V0
Neodymium	0.0000140	0.0002117	V0	0.0000925	V0	0.0000000	V1
Nickel	0.0005429	0.0006693	V0	0.0002500	V0	0.0000450	V0
Niobium	0.0000202	0.0000497	V0	0.0000226	V0	0.0000000	V1
Palladium	0.0000632	0.0000102	V0	0.0000000	V1	0.0000046	V0
Phosphorus	0.0459574	0.0186206	V0	0.0151431	V0	0.0105676	V0
Platinum	0.0000088	0.0000032	V0	0.0000016	V0	0.0000014	V0
Potassium	0.0061261	0.1557903	V0	0.0672357	V0	0.0009096	V0
Praseodymium	0.0000070	0.0000533	V0	0.0000246	V0	0.0000000	V1
Rubidium	0.0000184	0.0006052	V0	0.0002587	V0	0.0000000	V1
Samarium	0.0000133	0.0000382	V0	0.0000169	V0	0.0000000	V1
Selenium	0.0003366	0.0003113	V0	0.0001470	V0	0.0000000	V1
Silicon	0.7676322	1.8175037	V0	0.5776442	V0	0.0442379	V0
Silver	0.0000100	0.0000035	V0	0.0000028	V0	0.0000000	V1
Sodium	0.0169447	0.2384882	V0	0.0478150	V0	0.0008947	V0
Strontium	0.0003375	0.0022298	V0	0.0007656	V0	0.0000000	V1
Tantalum	0.0000394	0.0000043	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000056	V0	0.0000031	V0	0.0000000	V1
Thorium	0.0000059	0.0000579	V0	0.0000286	V0	0.0000000	V1
Tin	0.0004414	0.0002441	V0	0.0000922	V0	0.0000000	V1
Titanium	0.0015201	0.0167190	V0	0.0075602	V0	0.0007090	V0
Tungsten	0.0000938	0.0002415	V0	0.0001656	V0	0.0000000	V1
Uranium	0.0000048	0.0000181	V0	0.0000087	V0	0.0000000	V1
Vanadium	0.0007697	0.0019545	V0	0.0005593	V0	0.0000000	V1
Zinc	0.0055897	0.0068555	V0	0.0013557	V0	0.0000000	V1



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Fort McKay South			Horizon		Travel Blank	
		AMS 13 01-May PM10 24	Results (µg/m ³)	QC Flag	AMS 15 01-May PM10 24	Results (µg/m ³)	QC Flag	01-May 24 Results (µg/m ³) QC Flag
Particulate Matter	1.00	19.48	V0	23.33	V0	0.15	V0	
Aluminum	0.1380326	0.6050040	V0	0.6776971	V0	0.0000000	V1	
Antimony	0.0001784	0.0000324	V0	0.0000263	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001183	V0	0.0001311	V0	0.0000000	V1	
Barium	0.0092847	0.0038134	V0	0.0047920	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000164	V0	0.0000199	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000044	V0	0.0000047	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000054	V0	0.0000056	V0	0.0000000	V1	
Calcium	0.4112124	0.3351224	V0	0.2219976	V0	0.0000000	V1	
Cerium	0.0000174	0.0005243	V0	0.0005761	V0	0.0000000	V1	
Cesium	0.0000100	0.0000412	V0	0.0000488	V0	0.0000000	V1	
Chromium	0.0022262	0.0007753	V0	0.0008332	V0	0.0000000	V1	
Cobalt	0.0000273	0.0001429	V0	0.0001628	V0	0.0000016	V0	
Copper	0.0017171	0.0005326	V0	0.0005787	V0	0.0000945	V0	
Iron	0.0393063	0.4011096	V0	0.4879839	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0002544	V0	0.0002803	V0	0.0000000	V1	
Lead	0.0008577	0.0002372	V0	0.0002547	V0	0.0000000	V1	
Lithium	0.0000374	0.0007529	V0	0.0006359	V0	0.0000000	V1	
Magnesium	0.0091409	0.0922682	V0	0.1103804	V0	0.0004991	V0	
Manganese	0.0006949	0.0062056	V0	0.0076731	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001173	V0	0.0000882	V0	0.0000348	V0	
Neodymium	0.0000140	0.0002303	V0	0.0002573	V0	0.0000000	V1	
Nickel	0.0005429	0.0005190	V0	0.0006022	V0	0.0000450	V0	
Niobium	0.0000202	0.0000605	V0	0.0000656	V0	0.0000000	V1	
Palladium	0.0000632	0.0000068	V0	0.0000071	V0	0.0000046	V0	
Phosphorus	0.0459574	0.0161285	V0	0.0176020	V0	0.0105676	V0	
Platinum	0.0000088	0.0000018	V0	0.0000018	V0	0.0000014	V0	
Potassium	0.0061261	0.1450881	V0	0.1784208	V0	0.0009096	V0	
Praseodymium	0.0000070	0.0000602	V0	0.0000674	V0	0.0000000	V1	
Rubidium	0.0000184	0.0006699	V0	0.0007950	V0	0.0000000	V1	
Samarium	0.0000133	0.0000424	V0	0.0000492	V0	0.0000000	V1	
Selenium	0.0003366	0.0002797	V0	0.0003161	V0	0.0000000	V1	
Silicon	0.7676322	2.0072816	V0	2.2016878	V0	0.0442379	V0	
Silver	0.0000100	0.0000019	V0	0.0000019	V0	0.0000000	V1	
Sodium	0.0169447	0.0612232	V0	0.0799437	V0	0.0008947	V0	
Strontium	0.0003375	0.0015800	V0	0.0018192	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000036	V0	0.0000039	V0	0.0000000	V1	
Thallium	0.0000090	0.0000054	V0	0.0000063	V0	0.0000000	V1	
Thorium	0.0000059	0.0000745	V0	0.0000770	V0	0.0000000	V1	
Tin	0.0004414	0.0000962	V0	0.0000595	V0	0.0000000	V1	
Titanium	0.0015201	0.0188224	V0	0.0207149	V0	0.0007090	V0	
Tungsten	0.0000938	0.0000580	V0	0.0000162	V0	0.0000000	V1	
Uranium	0.0000048	0.0000204	V0	0.0000228	V0	0.0000000	V1	
Vanadium	0.0007697	0.0011771	V0	0.0015171	V0	0.0000000	V1	
Zinc	0.0055897	0.0019786	V0	0.0018588	V0	0.0000000	V1	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank			
		AMS 16	QC Flag	01-May	QC Flag		
Station Name	Station #	Sample Date	Particulate Size	Total Air Volume (m ³)	24	24	
AMS 16	01-May	PM10	24	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	17.86	V0	0.15	V0		
Aluminum	0.1380326	0.5820909	V0	0.0000000	V1		
Antimony	0.0001784	0.0000317	V0	0.0000000	V1		
Arsenic	0.0001060	0.0001514	V0	0.0000000	V1		
Barium	0.0092847	0.0043239	V0	0.0000000	V1		
Beryllium	0.0000946	0.0000189	V0	0.0000000	V1		
Bismuth	0.0000093	0.0000051	V0	0.0000000	V1		
Cadmium	0.0000174	0.0000060	V0	0.0000000	V1		
Calcium	0.4112124	0.5364862	V0	0.0000000	V1		
Cerium	0.0000174	0.0006019	V0	0.0000000	V1		
Cesium	0.0000100	0.0000385	V0	0.0000000	V1		
Chromium	0.0022262	0.0007524	V0	0.0000000	V1		
Cobalt	0.0000273	0.0001647	V0	0.0000016	V0		
Copper	0.0017171	0.0006111	V0	0.0000945	V0		
Iron	0.0393063	0.6050922	V0	0.0000000	V1		
Lanthanum	0.0000130	0.0002877	V0	0.0000000	V1		
Lead	0.0008577	0.0002834	V0	0.0000000	V1		
Lithium	0.0000374	0.0007117	V0	0.0000000	V1		
Magnesium	0.0091409	0.1160140	V0	0.0004991	V0		
Manganese	0.0006949	0.0103982	V0	0.0000000	V1		
Molybdenum	0.0007116	0.0001102	V0	0.0000348	V0		
Neodymium	0.0000140	0.0002546	V0	0.0000000	V1		
Nickel	0.0005429	0.0005670	V0	0.0000450	V0		
Niobium	0.0000202	0.0000687	V0	0.0000000	V1		
Palladium	0.0000632	0.0000070	V0	0.0000046	V0		
Phosphorus	0.0459574	0.0167054	V0	0.0105676	V0		
Platinum	0.0000088	0.0000044	V0	0.0000014	V0		
Potassium	0.0061261	0.1472279	V0	0.0009096	V0		
Praseodymium	0.0000070	0.0000686	V0	0.0000000	V1		
Rubidium	0.0000184	0.0006617	V0	0.0000000	V1		
Samarium	0.0000133	0.0000468	V0	0.0000000	V1		
Selenium	0.0003366	0.0003594	V0	0.0000000	V1		
Silicon	0.7676322	1.7521535	V0	0.0442379	V0		
Silver	0.0000100	0.0000019	V0	0.0000000	V1		
Sodium	0.0169447	0.0800664	V0	0.0008947	V0		
Strontium	0.0003375	0.0019481	V0	0.0000000	V1		
Tantalum	0.0000394	0.0000039	V0	0.0000000	V1		
Thallium	0.0000090	0.0000065	V0	0.0000000	V1		
Thorium	0.0000059	0.0000799	V0	0.0000000	V1		
Tin	0.0004414	0.0000881	V0	0.0000000	V1		
Titanium	0.0015201	0.0246635	V0	0.0007090	V0		
Tungsten	0.0000938	0.0000574	V0	0.0000000	V1		
Uranium	0.0000048	0.0000234	V0	0.0000000	V1		
Vanadium	0.0007697	0.0012356	V0	0.0000000	V1		
Zinc	0.0055897	0.0021208	V0	0.0000000	V1		



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	07-May		07-May		07-May	
Particulate Size	PM10		PM10				
Total Air Volume (m ³)	24		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	4.90	V0	2.89	V0	0.09	V0
Aluminum	0.1380326	0.1754241	V0	0.0350839	V0	0.0000000	V1
Antimony	0.0001784	0.0000205	V0	0.0000119	V0	0.0000000	V1
Arsenic	0.0001060	0.0000374	V0	0.0000317	V0	0.0000000	V1
Barium	0.0092847	0.0011349	V0	0.0004727	V0	0.0000000	V1
Beryllium	0.0000946	0.0000048	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000051	V0	0.0000022	V0	0.0000053	V0
Cadmium	0.0000174	0.0000032	V0	0.0000035	V0	0.0000000	V1
Calcium	0.4112124	0.1495756	V0	0.0518744	V0	0.0000000	V1
Cerium	0.0000174	0.0001544	V0	0.0000336	V0	0.0000000	V1
Cesium	0.0000100	0.0000110	V0	0.0000025	V0	0.0000000	V1
Chromium	0.0022262	0.0002221	V0	0.0001167	V0	0.0001395	V0
Cobalt	0.0000273	0.0000442	V0	0.0000108	V0	0.0000028	V0
Copper	0.0017171	0.0006659	V0	0.0002894	V0	0.0001009	V0
Iron	0.0393063	0.0940477	V0	0.0355434	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000694	V0	0.0000166	V0	0.0000000	V1
Lead	0.0008577	0.0001150	V0	0.0000576	V0	0.0000000	V1
Lithium	0.0000374	0.0001463	V0	0.0000244	V0	0.0000000	V1
Magnesium	0.0091409	0.0276686	V0	0.0154993	V0	0.0004363	V0
Manganese	0.0006949	0.0017214	V0	0.0008896	V0	0.0000305	V0
Molybdenum	0.0007116	0.0000546	V0	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000624	V0	0.0000129	V0	0.0000000	V1
Nickel	0.0005429	0.0002163	V0	0.0000771	V0	0.0000874	V0
Niobium	0.0000202	0.0000208	V0	0.0000035	V0	0.0000000	V1
Palladium	0.0000632	0.0000035	V0	0.0000000	V1	0.0000044	V0
Phosphorus	0.0459574	0.0153902	V0	0.0171786	V0	0.0093470	V0
Platinum	0.0000088	0.0000028	V0	0.0000040	V0	0.0000016	V0
Potassium	0.0061261	0.0536145	V0	0.0394970	V0	0.0005174	V0
Praseodymium	0.0000070	0.0000166	V0	0.0000037	V0	0.0000000	V1
Rubidium	0.0000184	0.0002086	V0	0.0000577	V0	0.0000000	V1
Samarium	0.0000133	0.0000120	V0	0.0000023	V0	0.0000000	V1
Selenium	0.0003366	0.0001094	V0	0.0000340	V0	0.0000000	V1
Silicon	0.7676322	0.4235075	V0	0.1502545	V0	0.0000000	V1
Silver	0.0000100	0.0000009	V0	-9999	M2	0.0000018	V0
Sodium	0.0169447	0.0247344	V0	0.0175651	V0	0.0007499	V0
Strontium	0.0003375	0.0004546	V0	0.0001764	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000016	V0	0.0000007	V0	0.0000000	V1
Thorium	0.0000059	0.0000191	V0	0.0000044	V0	0.0000000	V1
Tin	0.0004414	0.0000560	V0	0.0000478	V0	0.0000000	V1
Titanium	0.0015201	0.0082251	V0	0.0015692	V0	0.0003834	V0
Tungsten	0.0000938	0.0000127	V0	0.0000129	V0	0.0000000	V1
Uranium	0.0000048	0.0000057	V0	0.0000022	V0	0.0000000	V1
Vanadium	0.0007697	0.0004162	V0	0.0001218	V0	0.0000000	V1
Zinc	0.0055897	0.0006915	V0	0.0007502	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 07-May PM10 23.6	AMS 14 07-May PM10 24	AMS 14 07-May PM10 24	AMS 14 07-May PM10 24	AMS 14 07-May PM10 24	AMS 14 07-May PM10 24	AMS 14 07-May PM10 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	5.60	V0	3.01	V0	0.09	V0
Aluminum	0.1380326	0.1018036	V0	0.0495805	V0	0.0000000	V1
Antimony	0.0001784	0.0001222	V0	0.0000194	V0	0.0000000	V1
Arsenic	0.0001060	0.0000819	V0	0.0000303	V0	0.0000000	V1
Barium	0.0092847	0.0023655	V0	0.0007079	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000059	V0	0.0000017	V0	0.0000053	V0
Cadmium	0.0000174	0.0000049	V0	0.0000047	V0	0.0000000	V1
Calcium	0.4112124	0.1873831	V0	0.0675911	V0	0.0000000	V1
Cerium	0.0000174	0.0001146	V0	0.0000591	V0	0.0000000	V1
Cesium	0.0000100	0.0000068	V0	0.0000033	V0	0.0000000	V1
Chromium	0.0022262	0.0002541	V0	0.0002009	V0	0.0001395	V0
Cobalt	0.0000273	0.0000398	V0	0.0000266	V0	0.0000028	V0
Copper	0.0017171	0.0010382	V0	0.0002517	V0	0.0001009	V0
Iron	0.0393063	0.1364753	V0	0.0678086	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000527	V0	0.0000272	V0	0.0000000	V1
Lead	0.0008577	0.0001517	V0	0.0000781	V0	0.0000000	V1
Lithium	0.0000374	0.0000723	V0	0.0000351	V0	0.0000000	V1
Magnesium	0.0091409	0.0451574	V0	0.0181802	V0	0.0004363	V0
Manganese	0.0006949	0.0024928	V0	0.0012573	V0	0.0000305	V0
Molybdenum	0.0007116	0.0000748	V0	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000472	V0	0.0000224	V0	0.0000000	V1
Nickel	0.0005429	0.0001736	V0	0.0001368	V0	0.0000874	V0
Niobium	0.0000202	0.0000128	V0	0.0000056	V0	0.0000000	V1
Palladium	0.0000632	0.0000062	V0	0.0000055	V0	0.0000044	V0
Phosphorus	0.0459574	0.0189258	V0	0.0148522	V0	0.0093470	V0
Platinum	0.0000088	0.0000021	V0	0.0000020	V0	0.0000016	V0
Potassium	0.0061261	0.0539754	V0	0.0277147	V0	0.0005174	V0
Praseodymium	0.0000070	0.0000119	V0	0.0000064	V0	0.0000000	V1
Rubidium	0.0000184	0.0001416	V0	0.0000759	V0	0.0000000	V1
Samarium	0.0000133	0.0000083	V0	0.0000040	V0	0.0000000	V1
Selenium	0.0003366	0.0000836	V0	0.0000482	V0	0.0000000	V1
Silicon	0.7676322	0.3656094	V0	0.2195398	V0	0.0000000	V1
Silver	0.0000100	0.0000010	V0	0.0000008	V0	0.0000018	V0
Sodium	0.0169447	0.0550369	V0	0.0174224	V0	0.0007499	V0
Strontium	0.0003375	0.0005219	V0	0.0001939	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000014	V0	0.0000010	V0	0.0000000	V1
Thorium	0.0000059	0.0000138	V0	0.0000066	V0	0.0000000	V1
Tin	0.0004414	0.0001425	V0	0.0000424	V0	0.0000000	V1
Titanium	0.0015201	0.0050857	V0	0.0019741	V0	0.0003834	V0
Tungsten	0.0000938	0.0000887	V0	0.0000650	V0	0.0000000	V1
Uranium	0.0000048	0.0000039	V0	0.0000019	V0	0.0000000	V1
Vanadium	0.0007697	0.0003744	V0	0.0001821	V0	0.0000000	V1
Zinc	0.0055897	0.0029757	V0	0.0006888	V0	0.0000000	V1



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		07-May	
Sample Date	07-May			07-May		07-May	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m ³)	24			24		24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	4.18	V0	8.20	V0	0.09	V0
Aluminum	0.1380326	0.1521750	V0	0.4599055	V0	0.0000000	V1
Antimony	0.0001784	0.0000000	V1	0.0000179	V0	0.0000000	V1
Arsenic	0.0001060	0.0000348	V0	0.0000760	V0	0.0000000	V1
Barium	0.0092847	0.0009414	V0	0.0028470	V0	0.0000000	V1
Beryllium	0.0000946	0.0000045	V0	0.0000121	V0	0.0000000	V1
Bismuth	0.0000093	0.0000021	V0	0.0000034	V0	0.0000053	V0
Cadmium	0.0000174	0.0000025	V0	0.0000032	V0	0.0000000	V1
Calcium	0.4112124	0.0791818	V0	0.1425063	V0	0.0000000	V1
Cerium	0.0000174	0.0001334	V0	0.0003742	V0	0.0000000	V1
Cesium	0.0000100	0.0000086	V0	0.0000312	V0	0.0000000	V1
Chromium	0.0022262	0.0003713	V0	0.0005347	V0	0.0001395	V0
Cobalt	0.0000273	0.0000433	V0	0.0001069	V0	0.0000028	V0
Copper	0.0017171	0.0002420	V0	0.0003907	V0	0.0001009	V0
Iron	0.0393063	0.0722881	V0	0.2323138	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000617	V0	0.0001736	V0	0.0000000	V1
Lead	0.0008577	0.0000854	V0	0.0001481	V0	0.0000000	V1
Lithium	0.0000374	0.0001387	V0	0.0004641	V0	0.0000000	V1
Magnesium	0.0091409	0.0208935	V0	0.0647196	V0	0.0004363	V0
Manganese	0.0006949	0.0013741	V0	0.0039238	V0	0.0000305	V0
Molybdenum	0.0007116	0.0000703	V0	0.0000691	V0	0.0000000	V1
Neodymium	0.0000140	0.0000575	V0	0.0001616	V0	0.0000000	V1
Nickel	0.0005429	0.0003494	V0	0.0004263	V0	0.0000874	V0
Niobium	0.0000202	0.0000149	V0	0.0000466	V0	0.0000000	V1
Palladium	0.0000632	0.0000035	V0	0.0000058	V0	0.0000044	V0
Phosphorus	0.0459574	0.0162842	V0	0.0254085	V0	0.0093470	V0
Platinum	0.0000088	0.0000017	V0	0.0000018	V0	0.0000016	V0
Potassium	0.0061261	0.0490548	V0	0.1155160	V0	0.0005174	V0
Praseodymium	0.0000070	0.0000149	V0	0.0000430	V0	0.0000000	V1
Rubidium	0.0000184	0.0001756	V0	0.0005245	V0	0.0000000	V1
Samarium	0.0000133	0.0000103	V0	0.0000307	V0	0.0000000	V1
Selenium	0.0003366	0.0000835	V0	0.0002248	V0	0.0000000	V1
Silicon	0.7676322	0.4329672	V0	1.1587033	V0	0.0000000	V1
Silver	0.0000100	0.0000007	V0	0.0000019	V0	0.0000018	V0
Sodium	0.0169447	0.0176440	V0	0.0610683	V0	0.0007499	V0
Strontium	0.0003375	0.0003500	V0	0.0011270	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000030	V0	0.0000000	V1
Thallium	0.0000090	0.0000013	V0	0.0000035	V0	0.0000000	V1
Thorium	0.0000059	0.0000160	V0	0.0000490	V0	0.0000000	V1
Tin	0.0004414	0.0000734	V0	0.0000713	V0	0.0000000	V1
Titanium	0.0015201	0.0054685	V0	0.0161373	V0	0.0003834	V0
Tungsten	0.0000938	0.0000106	V0	0.0000180	V0	0.0000000	V1
Uranium	0.0000048	0.0000045	V0	0.0000191	V0	0.0000000	V1
Vanadium	0.0007697	0.0004507	V0	0.0008790	V0	0.0000000	V1
Zinc	0.0055897	0.0006145	V0	0.0014817	V0	0.0000000	V1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			07-May	
Sample Date	07-May			07-May	
Particulate Size	PM10			24	
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	16.38	V0	0.09	V0
Aluminum	0.1380326	0.6509437	V0	0.0000000	V1
Antimony	0.0001784	0.0000173	V0	0.0000000	V1
Arsenic	0.0001060	0.0001063	V0	0.0000000	V1
Barium	0.0092847	0.0050349	V0	0.0000000	V1
Beryllium	0.0000946	0.0000207	V0	0.0000000	V1
Bismuth	0.0000093	0.0000038	V0	0.0000053	V0
Cadmium	0.0000174	0.0000046	V0	0.0000000	V1
Calcium	0.4112124	0.6870791	V0	0.0000000	V1
Cerium	0.0000174	0.0007042	V0	0.0000000	V1
Cesium	0.0000100	0.0000382	V0	0.0000000	V1
Chromium	0.0022262	0.0010416	V0	0.0001395	V0
Cobalt	0.0000273	0.0001840	V0	0.0000028	V0
Copper	0.0017171	0.0005966	V0	0.0001009	V0
Iron	0.0393063	0.8566953	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003289	V0	0.0000000	V1
Lead	0.0008577	0.0002346	V0	0.0000000	V1
Lithium	0.0000374	0.0007460	V0	0.0000000	V1
Magnesium	0.0091409	0.1481022	V0	0.0004363	V0
Manganese	0.0006949	0.0135628	V0	0.0000305	V0
Molybdenum	0.0007116	0.0001253	V0	0.0000000	V1
Neodymium	0.0000140	0.0002958	V0	0.0000000	V1
Nickel	0.0005429	0.0006640	V0	0.0000874	V0
Niobium	0.0000202	0.0000734	V0	0.0000000	V1
Palladium	0.0000632	0.0000093	V0	0.0000044	V0
Phosphorus	0.0459574	0.0212568	V0	0.0093470	V0
Platinum	0.0000088	0.0000023	V0	0.0000016	V0
Potassium	0.0061261	0.1594830	V0	0.0005174	V0
Praseodymium	0.0000070	0.0000791	V0	0.0000000	V1
Rubidium	0.0000184	0.0007411	V0	0.0000000	V1
Samarium	0.0000133	0.0000548	V0	0.0000000	V1
Selenium	0.0003366	0.0003778	V0	0.0000000	V1
Silicon	0.7676322	1.8260125	V0	0.0000000	V1
Silver	0.0000100	0.0000024	V0	0.0000018	V0
Sodium	0.0169447	0.0790294	V0	0.0007499	V0
Strontium	0.0003375	0.0021108	V0	0.0000000	V1
Tantalum	0.0000394	0.0000044	V0	0.0000000	V1
Thallium	0.0000090	0.0000065	V0	0.0000000	V1
Thorium	0.0000059	0.0000850	V0	0.0000000	V1
Tin	0.0004414	0.0000811	V0	0.0000000	V1
Titanium	0.0015201	0.0239598	V0	0.0003834	V0
Tungsten	0.0000938	0.0001172	V0	0.0000000	V1
Uranium	0.0000048	0.0000228	V0	0.0000000	V1
Vanadium	0.0007697	0.0011702	V0	0.0000000	V1
Zinc	0.0055897	0.0019011	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	13-May		13-May		13-May	
Particulate Size	PM10		PM10				
Total Air Volume (m ³)	24		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	5.40	V0	3.56	V0	0.16	V0
Aluminum	0.1380326	0.1501518	V0	0.0556819	V0	0.0000000	V1
Antimony	0.0001784	0.0000308	V0	0.0001571	V0	0.0000000	V1
Arsenic	0.0001060	0.0000403	V0	0.0000359	V0	0.0000000	V1
Barium	0.0092847	0.0010655	V0	0.0016939	V0	0.0000000	V1
Beryllium	0.0000946	0.0000047	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000038	V0	0.0000084	V0	0.0000004	V0
Cadmium	0.0000174	0.0000031	V0	0.0000043	V0	0.0000000	V1
Calcium	0.4112124	0.4654432	V0	0.0865290	V0	0.0000000	V1
Cerium	0.0000174	0.0001399	V0	0.0000703	V0	0.0000000	V1
Cesium	0.0000100	0.0000114	V0	0.0000043	V0	0.0000000	V1
Chromium	0.0022262	0.0004286	V0	0.0004472	V0	0.0001019	V0
Cobalt	0.0000273	0.0000403	V0	0.0000224	V0	0.0000020	V0
Copper	0.0017171	0.0004520	V0	0.0010667	V0	0.0001217	V0
Iron	0.0393063	0.1209494	V0	0.0699922	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000674	V0	0.0000315	V0	0.0000000	V1
Lead	0.0008577	0.0001345	V0	0.0001172	V0	0.0000000	V1
Lithium	0.0000374	0.0001819	V0	0.0000379	V0	0.0000000	V1
Magnesium	0.0091409	0.0340653	V0	0.0223095	V0	0.0004032	V0
Manganese	0.0006949	0.0022518	V0	0.0011919	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000418	V0	0.0000669	V0	0.0000000	V1
Neodymium	0.0000140	0.0000601	V0	0.0000255	V0	0.0000000	V1
Nickel	0.0005429	0.0003034	V0	0.0001987	V0	0.0000677	V0
Niobium	0.0000202	0.0000152	V0	0.0000065	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000054	V0	0.0000000	V1
Phosphorus	0.0459574	0.0113703	V0	0.0113738	V0	0.0074859	V0
Platinum	0.0000088	0.0000031	V0	0.0000035	V0	0.0000014	V0
Potassium	0.0061261	0.0518046	V0	0.0306979	V0	0.0013314	V0
Praseodymium	0.0000070	0.0000153	V0	0.0000070	V0	0.0000000	V1
Rubidium	0.0000184	0.0002075	V0	0.0000832	V0	0.0000021	V0
Samarium	0.0000133	0.0000105	V0	0.0000040	V0	0.0000000	V1
Selenium	0.0003366	0.0000926	V0	0.0000550	V0	0.0000000	V1
Silicon	0.7676322	0.3515586	V0	0.1794735	V0	0.0000000	V1
Silver	0.0000100	0.0000012	V0	0.0000014	V0	0.0000007	V0
Sodium	0.0169447	0.0203222	V0	0.0319535	V0	0.0008339	V0
Strontium	0.0003375	0.0010737	V0	0.0002757	V0	0.0000150	V0
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000018	V0	0.0000013	V0	0.0000000	V1
Thorium	0.0000059	0.0000187	V0	0.0000087	V0	0.0000000	V1
Tin	0.0004414	0.0000663	V0	0.0001858	V0	0.0000193	V0
Titanium	0.0015201	0.0076582	V0	0.0029833	V0	0.0004772	V0
Tungsten	0.0000938	0.0000094	V0	0.0000324	V0	0.0000000	V1
Uranium	0.0000048	0.0000052	V0	0.0000023	V0	0.0000000	V1
Vanadium	0.0007697	0.0002813	V0	0.0001987	V0	0.0000960	V0
Zinc	0.0055897	0.0008424	V0	0.0011868	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 13-May PM10 24	Results (µg/m ³)	QC Flag	AMS 14 13-May PM10 24	Results (µg/m ³)	QC Flag	24 Results (µg/m ³) QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	3.75	V0	2.92	V0	0.16	V0
Aluminum	0.1380326	0.0483275	V0	0.0191883	V0	0.0000000	V1
Antimony	0.0001784	0.0001106	V0	0.0000486	V0	0.0000000	V1
Arsenic	0.0001060	0.0000434	V0	0.0000448	V0	0.0000000	V1
Barium	0.0092847	0.0014404	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000088	V0	0.0000062	V0	0.0000004	V0
Cadmium	0.0000174	0.0000059	V0	0.0000079	V0	0.0000000	V1
Calcium	0.4112124	0.0656730	V0	0.0201421	V0	0.0000000	V1
Cerium	0.0000174	0.0000569	V0	0.0000194	V0	0.0000000	V1
Cesium	0.0000100	0.0000040	V0	0.0000018	V0	0.0000000	V1
Chromium	0.0022262	0.0002785	V0	0.0002329	V0	0.0001019	V0
Cobalt	0.0000273	0.0000183	V0	0.0000077	V0	0.0000020	V0
Copper	0.0017171	0.0009778	V0	0.0003238	V0	0.0001217	V0
Iron	0.0393063	0.0535633	V0	0.0173456	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000311	V0	0.0000097	V0	0.0000000	V1
Lead	0.0008577	0.0001511	V0	0.0001260	V0	0.0000000	V1
Lithium	0.0000374	0.0000331	V0	0.0000111	V0	0.0000000	V1
Magnesium	0.0091409	0.0193747	V0	0.0091274	V0	0.0004032	V0
Manganese	0.0006949	0.0010926	V0	0.0006457	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000978	V0	0.0000000	V1	0.0000000	V1
Neodymium	0.0000140	0.0000218	V0	0.0000076	V0	0.0000000	V1
Nickel	0.0005429	0.0001222	V0	0.0000726	V0	0.0000677	V0
Niobium	0.0000202	0.0000070	V0	0.0000021	V0	0.0000000	V1
Palladium	0.0000632	0.0000038	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0147245	V0	0.0168204	V0	0.0074859	V0
Platinum	0.0000088	0.0000025	V0	0.0000022	V0	0.0000014	V0
Potassium	0.0061261	0.0401242	V0	0.0546104	V0	0.0013314	V0
Praseodymium	0.0000070	0.0000060	V0	0.0000022	V0	0.0000000	V1
Rubidium	0.0000184	0.0000838	V0	0.0000535	V0	0.0000021	V0
Samarium	0.0000133	0.0000040	V0	0.0000012	V0	0.0000000	V1
Selenium	0.0003366	0.0000529	V0	0.0000348	V0	0.0000000	V1
Silicon	0.7676322	0.1293978	V0	0.0992563	V0	0.0000000	V1
Silver	0.0000100	0.0000013	V0	0.0000009	V0	0.0000007	V0
Sodium	0.0169447	0.0317425	V0	0.0079606	V0	0.0008339	V0
Strontium	0.0003375	0.0002488	V0	0.0001097	V0	0.0000150	V0
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000013	V0	0.0000010	V0	0.0000000	V1
Thorium	0.0000059	0.0000083	V0	0.0000038	V0	0.0000000	V1
Tin	0.0004414	0.0001546	V0	0.0000909	V0	0.0000193	V0
Titanium	0.0015201	0.0028397	V0	0.0008636	V0	0.0004772	V0
Tungsten	0.0000938	0.0000235	V0	0.0000044	V0	0.0000000	V1
Uranium	0.0000048	0.0000023	V0	0.0000009	V0	0.0000000	V1
Vanadium	0.0007697	0.0001767	V0	0.0002242	V0	0.0000960	V0
Zinc	0.0055897	0.0013478	V0	0.0008434	V0	0.0000000	V1



Compound Name	Station Name	Fort McKay South		Horizon		Travel Blank	
	Station #	AMS 13		AMS 15		13-May	
	Sample Date	13-May		13-May		13-May	
	Particulate Size	PM10		PM10			
	Total Air Volume (m ³)	24		24		24	
	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	10.28	V0	14.19	V0	0.16	V0
Aluminum	0.1380326	0.1365817	V0	0.5768119	V0	0.0000000	V1
Antimony	0.0001784	0.0000362	V0	0.0000295	V0	0.0000000	V1
Arsenic	0.0001060	0.0000500	V0	0.0001054	V0	0.0000000	V1
Barium	0.0092847	0.0014557	V0	0.0043610	V0	0.0000000	V1
Beryllium	0.0000946	0.0000046	V0	0.0000191	V0	0.0000000	V1
Bismuth	0.0000093	0.0000059	V0	0.0000051	V0	0.0000004	V0
Cadmium	0.0000174	0.0000038	V0	0.0000043	V0	0.0000000	V1
Calcium	0.4112124	0.1994783	V0	0.5157772	V0	0.0000000	V1
Cerium	0.0000174	0.0001206	V0	0.0007835	V0	0.0000000	V1
Cesium	0.0000100	0.0000081	V0	0.0000401	V0	0.0000000	V1
Chromium	0.0022262	0.0003068	V0	0.0008122	V0	0.0001019	V0
Cobalt	0.0000273	0.0000434	V0	0.0001462	V0	0.0000020	V0
Copper	0.0017171	0.0004929	V0	0.0005777	V0	0.0001217	V0
Iron	0.0393063	0.1207375	V0	0.6492681	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000601	V0	0.0002931	V0	0.0000000	V1
Lead	0.0008577	0.0001524	V0	0.0002480	V0	0.0000000	V1
Lithium	0.0000374	0.0000903	V0	0.0005735	V0	0.0000000	V1
Magnesium	0.0091409	0.0372304	V0	0.1317172	V0	0.0004032	V0
Manganese	0.0006949	0.0029210	V0	0.0087859	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001638	V0	0.0000763	V0	0.0000000	V1
Neodymium	0.0000140	0.0000495	V0	0.0002622	V0	0.0000000	V1
Nickel	0.0005429	0.0002109	V0	0.0005681	V0	0.0000677	V0
Niobium	0.0000202	0.0000132	V0	0.0000678	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000075	V0	0.0000000	V1
Phosphorus	0.0459574	0.0130667	V0	0.0163554	V0	0.0074859	V0
Platinum	0.0000088	0.0000030	V0	0.0000017	V0	0.0000014	V0
Potassium	0.0061261	0.0581628	V0	0.1449615	V0	0.0013314	V0
Praseodymium	0.0000070	0.0000130	V0	0.0000687	V0	0.0000000	V1
Rubidium	0.0000184	0.0001878	V0	0.0007031	V0	0.0000021	V0
Samarium	0.0000133	0.0000091	V0	0.0000470	V0	0.0000000	V1
Selenium	0.0003366	0.0000726	V0	0.0003341	V0	0.0000000	V1
Silicon	0.7676322	0.4845717	V0	1.6640308	V0	0.0000000	V1
Silver	0.0000100	0.0000012	V0	0.0000030	V0	0.0000007	V0
Sodium	0.0169447	0.0732559	V0	0.0534687	V0	0.0008339	V0
Strontium	0.0003375	0.0006079	V0	0.0018851	V0	0.0000150	V0
Tantalum	0.0000394	0.0000000	V1	0.0000041	V0	0.0000000	V1
Thallium	0.0000090	0.0000021	V0	0.0000063	V0	0.0000000	V1
Thorium	0.0000059	0.0000142	V0	0.0000795	V0	0.0000000	V1
Tin	0.0004414	0.0000979	V0	0.0000605	V0	0.0000193	V0
Titanium	0.0015201	0.0038350	V0	0.0227701	V0	0.0004772	V0
Tungsten	0.0000938	0.0000999	V0	0.0000336	V0	0.0000000	V1
Uranium	0.0000048	0.0000045	V0	0.0000216	V0	0.0000000	V1
Vanadium	0.0007697	0.0002952	V0	0.0011653	V0	0.0000960	V0
Zinc	0.0055897	0.0013413	V0	0.0015061	V0	0.0000000	V1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			13-May	
Sample Date	13-May			13-May	
Particulate Size	PM10			24	
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	8.97	V0	0.16	V0
Aluminum	0.1380326	0.3715580	V0	0.0000000	V1
Antimony	0.0001784	0.0000280	V0	0.0000000	V1
Arsenic	0.0001060	0.0000637	V0	0.0000000	V1
Barium	0.0092847	0.0023868	V0	0.0000000	V1
Beryllium	0.0000946	0.0000097	V0	0.0000000	V1
Bismuth	0.0000093	0.0000085	V0	0.0000004	V0
Cadmium	0.0000174	0.0000048	V0	0.0000000	V1
Calcium	0.4112124	0.2615393	V0	0.0000000	V1
Cerium	0.0000174	0.0003819	V0	0.0000000	V1
Cesium	0.0000100	0.0000241	V0	0.0000000	V1
Chromium	0.0022262	0.0004367	V0	0.0001019	V0
Cobalt	0.0000273	0.0000889	V0	0.0000020	V0
Copper	0.0017171	0.0004296	V0	0.0001217	V0
Iron	0.0393063	0.2857907	V0	0.0000000	V1
Lanthanum	0.0000130	0.0001860	V0	0.0000000	V1
Lead	0.0008577	0.0001940	V0	0.0000000	V1
Lithium	0.0000374	0.0003666	V0	0.0000000	V1
Magnesium	0.0091409	0.0587810	V0	0.0004032	V0
Manganese	0.0006949	0.0054824	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000686	V0	0.0000000	V1
Neodymium	0.0000140	0.0001543	V0	0.0000000	V1
Nickel	0.0005429	0.0003153	V0	0.0000677	V0
Niobium	0.0000202	0.0000444	V0	0.0000000	V1
Palladium	0.0000632	0.0000051	V0	0.0000000	V1
Phosphorus	0.0459574	0.0146342	V0	0.0074859	V0
Platinum	0.0000088	0.0000015	V0	0.0000014	V0
Potassium	0.0061261	0.1004990	V0	0.0013314	V0
Praseodymium	0.0000070	0.0000413	V0	0.0000000	V1
Rubidium	0.0000184	0.0004558	V0	0.0000021	V0
Samarium	0.0000133	0.0000294	V0	0.0000000	V1
Selenium	0.0003366	0.0001998	V0	0.0000000	V1
Silicon	0.7676322	0.9981548	V0	0.0000000	V1
Silver	0.0000100	0.0000022	V0	0.0000007	V0
Sodium	0.0169447	0.0350034	V0	0.0008339	V0
Strontium	0.0003375	0.0009633	V0	0.0000150	V0
Tantalum	0.0000394	0.0000025	V0	0.0000000	V1
Thallium	0.0000090	0.0000039	V0	0.0000000	V1
Thorium	0.0000059	0.0000483	V0	0.0000000	V1
Tin	0.0004414	0.0001080	V0	0.0000193	V0
Titanium	0.0015201	0.0130984	V0	0.0004772	V0
Tungsten	0.0000938	0.0000216	V0	0.0000000	V1
Uranium	0.0000048	0.0000134	V0	0.0000000	V1
Vanadium	0.0007697	0.0006505	V0	0.0000960	V0
Zinc	0.0055897	0.0017698	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort								
	Station Name	McKay			Patricia McInnes			Travel Blank	
	Station #	AMS 1		AMS 6			19-May		
	Sample Date	19-May		19-May					
Particulate Size	PM10		PM10						
Total Air Volume (m ³)	24		24						
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag			
Particulate Matter	1.00	13.27	V0	9.79	V0	0.17	V0		
Aluminum	0.1380326	0.4650331	V0	0.2582208	V0	0.0000000	V1		
Antimony	0.0001784	0.0000717	V0	0.0001702	V0	0.0000000	V1		
Arsenic	0.0001060	0.0001284	V0	0.0002537	V0	0.0000000	V1		
Barium	0.0092847	0.0039582	V0	0.0040833	V0	0.0000000	V1		
Beryllium	0.0000946	0.0000159	V0	0.0000078	V0	0.0000000	V1		
Bismuth	0.0000093	0.0000050	V0	0.0000082	V0	0.0000006	V0		
Cadmium	0.0000174	0.0000075	V0	0.0000113	V0	0.0000000	V1		
Calcium	0.4112124	0.8884137	V0	0.5035347	V0	0.0000000	V1		
Cerium	0.0000174	0.0004287	V0	0.0003102	V0	0.0000000	V1		
Cesium	0.0000100	0.0000308	V0	0.0000150	V0	0.0000000	V1		
Chromium	0.0022262	0.0006704	V0	0.0004820	V0	0.0002066	V0		
Cobalt	0.0000273	0.0001222	V0	0.0000841	V0	0.0000038	V0		
Copper	0.0017171	0.0016200	V0	0.0014633	V0	0.0002375	V0		
Iron	0.0393063	0.3999567	V0	0.3609806	V0	0.0029463	V0		
Lanthanum	0.0000130	0.0002030	V0	0.0001505	V0	0.0000000	V1		
Lead	0.0008577	0.0001989	V0	0.0002238	V0	0.0000000	V1		
Lithium	0.0000374	0.0004016	V0	0.0001859	V0	0.0000000	V1		
Magnesium	0.0091409	0.1040505	V0	0.1314879	V0	0.0006377	V0		
Manganese	0.0006949	0.0064118	V0	0.0060867	V0	0.0000600	V0		
Molybdenum	0.0007116	0.0001355	V0	0.0000755	V0	0.0000000	V1		
Neodymium	0.0000140	0.0001851	V0	0.0001247	V0	0.0000010	V0		
Nickel	0.0005429	0.0005153	V0	0.0004359	V0	0.0001079	V0		
Niobium	0.0000202	0.0000434	V0	0.0000290	V0	0.0000000	V1		
Palladium	0.0000632	0.0000060	V0	0.0000065	V0	0.0000074	V0		
Phosphorus	0.0459574	0.0214142	V0	0.0221785	V0	0.0091609	V0		
Platinum	0.0000088	0.0000028	V0	0.0000028	V0	0.0000019	V0		
Potassium	0.0061261	0.1463265	V0	0.1009670	V0	0.0006354	V0		
Praseodymium	0.0000070	0.0000484	V0	0.0000339	V0	0.0000004	V0		
Rubidium	0.0000184	0.0005664	V0	0.0003300	V0	0.0000008	V0		
Samarium	0.0000133	0.0000334	V0	0.0000219	V0	0.0000000	V1		
Selenium	0.0003366	0.0002639	V0	0.0002106	V0	0.0000143	V0		
Silicon	0.7676322	1.3394608	V0	0.9375592	V0	0.0000000	V1		
Silver	0.0000100	0.0000027	V0	0.0000027	V0	0.0000011	V0		
Sodium	0.0169447	0.0711775	V0	0.0764960	V0	0.0013618	V0		
Strontium	0.0003375	0.0018540	V0	0.0014129	V0	0.0000000	V1		
Tantalum	0.0000394	0.0000028	V0	0.0000019	V0	0.0000000	V1		
Thallium	0.0000090	0.0000047	V0	0.0000036	V0	0.0000000	V1		
Thorium	0.0000059	0.0000529	V0	0.0000405	V0	0.0000000	V1		
Tin	0.0004414	0.0000930	V0	0.0001888	V0	0.0000231	V0		
Titanium	0.0015201	0.0187360	V0	0.0098354	V0	0.0003496	V0		
Tungsten	0.0000938	0.0000453	V0	0.0001275	V0	0.0000000	V1		
Uranium	0.0000048	0.0000151	V0	0.0000109	V0	0.0000000	V1		
Vanadium	0.0007697	0.0009982	V0	0.0005467	V0	0.0000000	V1		
Zinc	0.0055897	0.0022417	V0	0.0039399	V0	0.0000000	V1		



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 19-May PM10 24	Results (µg/m ³)	QC Flag	AMS 14 19-May PM10 24	Results (µg/m ³)	QC Flag	Results (µg/m ³) 24
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	13.36	V0	5.92	V0	0.17	V0
Aluminum	0.1380326	0.3748956	V0	0.0795760	V0	0.0000000	V1
Antimony	0.0001784	0.0005504	V0	0.0000149	V0	0.0000000	V1
Arsenic	0.0001060	0.0002424	V0	0.0000444	V0	0.0000000	V1
Barium	0.0092847	0.0097347	V0	0.0010174	V0	0.0000000	V1
Beryllium	0.0000946	0.0000125	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000188	V0	0.0000017	V0	0.0000006	V0
Cadmium	0.0000174	0.0000107	V0	0.0000128	V0	0.0000000	V1
Calcium	0.4112124	0.6929303	V0	0.1013596	V0	0.0000000	V1
Cerium	0.0000174	0.0005901	V0	0.0000790	V0	0.0000000	V1
Cesium	0.0000100	0.0000235	V0	0.0000052	V0	0.0000000	V1
Chromium	0.0022262	0.0007589	V0	0.0002034	V0	0.0002066	V0
Cobalt	0.0000273	0.0001327	V0	0.0000318	V0	0.0000038	V0
Copper	0.0017171	0.0036950	V0	0.0028675	V0	0.0002375	V0
Iron	0.0393063	0.5456015	V0	0.0902500	V0	0.0029463	V0
Lanthanum	0.0000130	0.0002191	V0	0.0000383	V0	0.0000000	V1
Lead	0.0008577	0.0003021	V0	0.0000899	V0	0.0000000	V1
Lithium	0.0000374	0.0002709	V0	0.0000538	V0	0.0000000	V1
Magnesium	0.0091409	0.1595219	V0	0.0283286	V0	0.0006377	V0
Manganese	0.0006949	0.0083759	V0	0.0020610	V0	0.0000600	V0
Molybdenum	0.0007116	0.0001621	V0	0.0000466	V0	0.0000000	V1
Neodymium	0.0000140	0.0001953	V0	0.0000361	V0	0.0000010	V0
Nickel	0.0005429	0.0004965	V0	0.0001234	V0	0.0001079	V0
Niobium	0.0000202	0.0000464	V0	0.0000087	V0	0.0000000	V1
Palladium	0.0000632	0.0000162	V0	0.0000000	V1	0.0000074	V0
Phosphorus	0.0459574	0.0255021	V0	0.0158391	V0	0.0091609	V0
Platinum	0.0000088	0.0000043	V0	0.0000023	V0	0.0000019	V0
Potassium	0.0061261	0.1360935	V0	0.0388551	V0	0.0006354	V0
Praseodymium	0.0000070	0.0000537	V0	0.0000088	V0	0.0000004	V0
Rubidium	0.0000184	0.0004785	V0	0.0001151	V0	0.0000008	V0
Samarium	0.0000133	0.0000313	V0	0.0000061	V0	0.0000000	V1
Selenium	0.0003366	0.0003063	V0	0.0000717	V0	0.0000143	V0
Silicon	0.7676322	1.2578443	V0	0.4135157	V0	0.0000000	V1
Silver	0.0000100	0.0000071	V0	0.0000014	V0	0.0000011	V0
Sodium	0.0169447	0.1070200	V0	0.0191021	V0	0.0013618	V0
Strontium	0.0003375	0.0020171	V0	0.0003144	V0	0.0000000	V1
Tantalum	0.0000394	0.0000039	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000049	V0	0.0000015	V0	0.0000000	V1
Thorium	0.0000059	0.0000555	V0	0.0000097	V0	0.0000000	V1
Tin	0.0004414	0.0004313	V0	0.0000658	V0	0.0000231	V0
Titanium	0.0015201	0.0154276	V0	0.0064265	V0	0.0003496	V0
Tungsten	0.0000938	0.0002391	V0	0.0000596	V0	0.0000000	V1
Uranium	0.0000048	0.0000157	V0	0.0000037	V0	0.0000000	V1
Vanadium	0.0007697	0.0008093	V0	0.0001929	V0	0.0000000	V1
Zinc	0.0055897	0.0099301	V0	0.0010672	V0	0.0000000	V1



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Fort McKay South			Horizon		Travel Blank	
		AMS 13 19-May PM10 24	Results (µg/m ³)	QC Flag	AMS 15 19-May PM10 24	Results (µg/m ³)	QC Flag	Results (µg/m ³)
Particulate Matter	1.00	12.04	V0	6.41	V0	0.17	V0	
Aluminum	0.1380326	0.4977309	V0	0.2199483	V0	0.0000000	V1	
Antimony	0.0001784	0.0000459	V0	0.0000206	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001583	V0	0.0000696	V0	0.0000000	V1	
Barium	0.0092847	0.0039687	V0	0.0016825	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000126	V0	0.0000073	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000044	V0	0.0000023	V0	0.0000006	V0	
Cadmium	0.0000174	0.0000072	V0	0.0000034	V0	0.0000000	V1	
Calcium	0.4112124	0.2225333	V0	0.0709758	V0	0.0000000	V1	
Cerium	0.0000174	0.0004046	V0	0.0001846	V0	0.0000000	V1	
Cesium	0.0000100	0.0000369	V0	0.0000152	V0	0.0000000	V1	
Chromium	0.0022262	0.0007582	V0	0.0003721	V0	0.0002066	V0	
Cobalt	0.0000273	0.0001216	V0	0.0000502	V0	0.0000038	V0	
Copper	0.0017171	0.0008282	V0	0.0003184	V0	0.0002375	V0	
Iron	0.0393063	0.3037661	V0	0.1380224	V0	0.0029463	V0	
Lanthanum	0.0000130	0.0001961	V0	0.0000907	V0	0.0000000	V1	
Lead	0.0008577	0.0001827	V0	0.0001085	V0	0.0000000	V1	
Lithium	0.0000374	0.0004025	V0	0.0001791	V0	0.0000000	V1	
Magnesium	0.0091409	0.0899701	V0	0.0376189	V0	0.0006377	V0	
Manganese	0.0006949	0.0044821	V0	0.0021946	V0	0.0000600	V0	
Molybdenum	0.0007116	0.0000738	V0	0.0000843	V0	0.0000000	V1	
Neodymium	0.0000140	0.0001843	V0	0.0000823	V0	0.0000010	V0	
Nickel	0.0005429	0.0005709	V0	0.0002302	V0	0.0001079	V0	
Niobium	0.0000202	0.0000498	V0	0.0000249	V0	0.0000000	V1	
Palladium	0.0000632	0.0000063	V0	0.0000044	V0	0.0000074	V0	
Phosphorus	0.0459574	0.0284069	V0	0.0164446	V0	0.0091609	V0	
Platinum	0.0000088	0.0000018	V0	0.0000017	V0	0.0000019	V0	
Potassium	0.0061261	0.1464571	V0	0.0652156	V0	0.0006354	V0	
Praseodymium	0.0000070	0.0000472	V0	0.0000213	V0	0.0000004	V0	
Rubidium	0.0000184	0.0006136	V0	0.0002513	V0	0.0000008	V0	
Samarium	0.0000133	0.0000340	V0	0.0000156	V0	0.0000000	V1	
Selenium	0.0003366	0.0002763	V0	0.0001501	V0	0.0000143	V0	
Silicon	0.7676322	1.3427697	V0	0.5339919	V0	0.0000000	V1	
Silver	0.0000100	0.0000028	V0	0.0000013	V0	0.0000011	V0	
Sodium	0.0169447	0.0611417	V0	0.0401626	V0	0.0013618	V0	
Strontium	0.0003375	0.0013926	V0	0.0005707	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000030	V0	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000046	V0	0.0000023	V0	0.0000000	V1	
Thorium	0.0000059	0.0000567	V0	0.0000271	V0	0.0000000	V1	
Tin	0.0004414	0.0001286	V0	0.0000501	V0	0.0000231	V0	
Titanium	0.0015201	0.0163617	V0	0.0084248	V0	0.0003496	V0	
Tungsten	0.0000938	0.0000379	V0	0.0000094	V0	0.0000000	V1	
Uranium	0.0000048	0.0000165	V0	0.0000078	V0	0.0000000	V1	
Vanadium	0.0007697	0.0011993	V0	0.0004101	V0	0.0000000	V1	
Zinc	0.0055897	0.0019759	V0	0.0007797	V0	0.0000000	V1	



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16				
Sample Date	19-May			19-May	
Particulate Size	PM10				
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	19.55	V0	0.17	V0
Aluminum	0.1380326	0.7805792	V0	0.0000000	V1
Antimony	0.0001784	0.0000462	V0	0.0000000	V1
Arsenic	0.0001060	0.0001430	V0	0.0000000	V1
Barium	0.0092847	0.0052874	V0	0.0000000	V1
Beryllium	0.0000946	0.0000226	V0	0.0000000	V1
Bismuth	0.0000093	0.0000091	V0	0.0000006	V0
Cadmium	0.0000174	0.0000065	V0	0.0000000	V1
Calcium	0.4112124	0.7736521	V0	0.0000000	V1
Cerium	0.0000174	0.0010125	V0	0.0000000	V1
Cesium	0.0000100	0.0000455	V0	0.0000000	V1
Chromium	0.0022262	0.0024195	V0	0.0002066	V0
Cobalt	0.0000273	0.0001925	V0	0.0000038	V0
Copper	0.0017171	0.0009049	V0	0.0002375	V0
Iron	0.0393063	0.7295936	V0	0.0029463	V0
Lanthanum	0.0000130	0.0005004	V0	0.0000000	V1
Lead	0.0008577	0.0002770	V0	0.0000000	V1
Lithium	0.0000374	0.0008864	V0	0.0000000	V1
Magnesium	0.0091409	0.1453195	V0	0.0006377	V0
Manganese	0.0006949	0.0117110	V0	0.0000600	V0
Molybdenum	0.0007116	0.0002058	V0	0.0000000	V1
Neodymium	0.0000140	0.0004168	V0	0.0000010	V0
Nickel	0.0005429	0.0009260	V0	0.0001079	V0
Niobium	0.0000202	0.0000884	V0	0.0000000	V1
Palladium	0.0000632	0.0000121	V0	0.0000074	V0
Phosphorus	0.0459574	0.0252603	V0	0.0091609	V0
Platinum	0.0000088	0.0000022	V0	0.0000019	V0
Potassium	0.0061261	0.1868166	V0	0.0006354	V0
Praseodymium	0.0000070	0.0001129	V0	0.0000004	V0
Rubidium	0.0000184	0.0008150	V0	0.0000008	V0
Samarium	0.0000133	0.0000746	V0	0.0000000	V1
Selenium	0.0003366	0.0005096	V0	0.0000143	V0
Silicon	0.7676322	1.9080692	V0	0.0000000	V1
Silver	0.0000100	0.0000043	V0	0.0000011	V0
Sodium	0.0169447	0.0859953	V0	0.0013618	V0
Strontium	0.0003375	0.0023734	V0	0.0000000	V1
Tantalum	0.0000394	0.0000057	V0	0.0000000	V1
Thallium	0.0000090	0.0000077	V0	0.0000000	V1
Thorium	0.0000059	0.0001158	V0	0.0000000	V1
Tin	0.0004414	0.0001130	V0	0.0000231	V0
Titanium	0.0015201	0.0302255	V0	0.0003496	V0
Tungsten	0.0000938	0.0000681	V0	0.0000000	V1
Uranium	0.0000048	0.0000288	V0	0.0000000	V1
Vanadium	0.0007697	0.0014921	V0	0.0000000	V1
Zinc	0.0055897	0.0033757	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1	QC Flag	AMS 6	QC Flag	25-May	
	Sample Date	25-May		25-May			
Particulate Size	PM10		PM10				
Total Air Volume (m ³)	23.7		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	38.49	V0	28.83	V0	0.16	V0
Aluminum	0.1380326	0.8594066	V0	1.2556700	V0	0.0000000	V1
Antimony	0.0001784	0.0000175	V0	0.0001249	V0	0.0000000	V1
Arsenic	0.0001060	0.0001924	V0	0.0001901	V0	0.0000000	V1
Barium	0.0092847	0.0069769	V0	0.0089407	V0	0.0000000	V1
Beryllium	0.0000946	0.0000271	V0	0.0000357	V0	0.0000000	V1
Bismuth	0.0000093	0.0000039	V0	0.0000090	V0	0.0000020	V0
Cadmium	0.0000174	0.0000040	V0	0.0000062	V0	0.0000000	V1
Calcium	0.4112124	3.3476386	V0	1.0291518	V0	0.0000000	V1
Cerium	0.0000174	0.0008196	V0	0.0013151	V0	0.0000000	V1
Cesium	0.0000100	0.0000611	V0	0.0000743	V0	0.0000000	V1
Chromium	0.0022262	0.0010207	V0	0.0014042	V0	0.0001365	V0
Cobalt	0.0000273	0.0002681	V0	0.0003239	V0	0.0000029	V0
Copper	0.0017171	0.0005130	V0	0.0030965	V0	0.0000999	V0
Iron	0.0393063	0.8796792	V0	0.9681294	V0	0.0000000	V1
Lanthanum	0.0000130	0.0004037	V0	0.0005446	V0	0.0000000	V1
Lead	0.0008577	0.0004007	V0	0.0004267	V0	0.0000000	V1
Lithium	0.0000374	0.0007013	V0	0.0011931	V0	0.0000000	V1
Magnesium	0.0091409	0.1959827	V0	0.2463121	V0	0.0005912	V0
Manganese	0.0006949	0.0132384	V0	0.0155910	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001324	V0	0.0002479	V0	0.0000439	V0
Neodymium	0.0000140	0.0003575	V0	0.0004928	V0	0.0000000	V1
Nickel	0.0005429	0.0008025	V0	0.0012463	V0	0.0000739	V0
Niobium	0.0000202	0.0001040	V0	0.0001333	V0	0.0000000	V1
Palladium	0.0000632	0.0000110	V0	0.0000164	V0	0.0000000	V1
Phosphorus	0.0459574	0.0218518	V0	0.0241672	V0	0.0082354	V0
Platinum	0.0000088	0.0000029	V0	0.0000030	V0	0.0000025	V0
Potassium	0.0061261	0.2574569	V0	0.2986520	V0	0.0008393	V0
Praseodymium	0.0000070	0.0000942	V0	0.0001298	V0	0.0000000	V1
Rubidium	0.0000184	0.0011834	V0	0.0013121	V0	0.0000000	V1
Samarium	0.0000133	0.0000644	V0	0.0000887	V0	0.0000000	V1
Selenium	0.0003366	0.0005363	V0	0.0006379	V0	0.0000000	V1
Silicon	0.7676322	3.1604063	V0	3.4287700	V0	0.0000000	V1
Silver	0.0000100	0.0000038	V0	0.0000047	V0	0.0000022	V0
Sodium	0.0169447	0.0803629	V0	0.1872816	V0	0.0010664	V0
Strontium	0.0003375	0.0046643	V0	0.0035714	V0	0.0000000	V1
Tantalum	0.0000394	0.0000069	V0	0.0000089	V0	0.0000000	V1
Thallium	0.0000090	0.0000096	V0	0.0000114	V0	0.0000000	V1
Thorium	0.0000059	0.0001128	V0	0.0001464	V0	0.0000000	V1
Tin	0.0004414	0.0000539	V0	0.0001381	V0	0.0000218	V0
Titanium	0.0015201	0.0375889	V0	0.0467062	V0	0.0003676	V0
Tungsten	0.0000938	0.0000281	V0	0.0002181	V0	0.0000044	V0
Uranium	0.0000048	0.0000344	V0	0.0000439	V0	0.0000000	V1
Vanadium	0.0007697	0.0019539	V0	0.0027913	V0	0.0000417	V0
Zinc	0.0055897	0.0018221	V0	0.0047418	V0	0.0004298	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 25-May PM10 24	Results (µg/m ³)	QC Flag	AMS 14 25-May PM10 24	Results (µg/m ³)	QC Flag	Results (µg/m ³) 24 QC Flag
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	29.82	V0	7.62	V0	0.16	V0
Aluminum	0.1380326	1.2202726	V0	0.3085842	V0	0.0000000	V1
Antimony	0.0001784	0.0000906	V0	0.0000077	V0	0.0000000	V1
Arsenic	0.0001060	0.0001851	V0	0.0000678	V0	0.0000000	V1
Barium	0.0092847	0.0168174	V0	0.0021213	V0	0.0000000	V1
Beryllium	0.0000946	0.0000361	V0	0.0000088	V0	0.0000000	V1
Bismuth	0.0000093	0.0000074	V0	0.0000020	V0	0.0000020	V0
Cadmium	0.0000174	0.0000063	V0	0.0000035	V0	0.0000000	V1
Calcium	0.4112124	1.0577589	V0	0.3040508	V0	0.0000000	V1
Cerium	0.0000174	0.0012838	V0	0.0002930	V0	0.0000000	V1
Cesium	0.0000100	0.0000733	V0	0.0000225	V0	0.0000000	V1
Chromium	0.0022262	0.0015195	V0	0.0005864	V0	0.0001365	V0
Cobalt	0.0000273	0.0002980	V0	0.0000724	V0	0.0000029	V0
Copper	0.0017171	0.0010494	V0	0.0004088	V0	0.0000999	V0
Iron	0.0393063	1.0261458	V0	0.1666337	V0	0.0000000	V1
Lanthanum	0.0000130	0.0005156	V0	0.0001393	V0	0.0000000	V1
Lead	0.0008577	0.0003940	V0	0.0001325	V0	0.0000000	V1
Lithium	0.0000374	0.0012568	V0	0.0002761	V0	0.0000000	V1
Magnesium	0.0091409	0.2181956	V0	0.0555131	V0	0.0005912	V0
Manganese	0.0006949	0.0164475	V0	0.0028702	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001813	V0	0.0000604	V0	0.0000439	V0
Neodymium	0.0000140	0.0004782	V0	0.0001265	V0	0.0000000	V1
Nickel	0.0005429	0.0010818	V0	0.0003644	V0	0.0000739	V0
Niobium	0.0000202	0.0001343	V0	0.0000302	V0	0.0000000	V1
Palladium	0.0000632	0.0000148	V0	0.0000045	V0	0.0000000	V1
Phosphorus	0.0459574	0.0246228	V0	0.0146761	V0	0.0082354	V0
Platinum	0.0000088	0.0000020	V0	0.0000028	V0	0.0000025	V0
Potassium	0.0061261	0.3105538	V0	0.0892064	V0	0.0008393	V0
Praseodymium	0.0000070	0.0001238	V0	0.0000326	V0	0.0000000	V1
Rubidium	0.0000184	0.0013522	V0	0.0003931	V0	0.0000000	V1
Samarium	0.0000133	0.0000869	V0	0.0000229	V0	0.0000000	V1
Selenium	0.0003366	0.0006213	V0	0.0001546	V0	0.0000000	V1
Silicon	0.7676322	3.8396457	V0	0.9132106	V0	0.0000000	V1
Silver	0.0000100	0.0000056	V0	0.0000017	V0	0.0000022	V0
Sodium	0.0169447	0.1588196	V0	0.0389108	V0	0.0010664	V0
Strontium	0.0003375	0.0034176	V0	0.0009262	V0	0.0000000	V1
Tantalum	0.0000394	0.0000084	V0	0.0000017	V0	0.0000000	V1
Thallium	0.0000090	0.0000113	V0	0.0000030	V0	0.0000000	V1
Thorium	0.0000059	0.0001412	V0	0.0000390	V0	0.0000000	V1
Tin	0.0004414	0.0001429	V0	0.0000656	V0	0.0000218	V0
Titanium	0.0015201	0.0458297	V0	0.0092824	V0	0.0003676	V0
Tungsten	0.0000938	0.0000946	V0	0.0000219	V0	0.0000044	V0
Uranium	0.0000048	0.0000414	V0	0.0000101	V0	0.0000000	V1
Vanadium	0.0007697	0.0025911	V0	0.0006151	V0	0.0000417	V0
Zinc	0.0055897	0.0046743	V0	0.0011502	V0	0.0004298	V0



Compound Name	MDL (µg/sample)	Fort McKay South		Horizon		Travel Blank	
		Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag
Particulate Matter	1.00	10.71	V0	21.50	V0	0.16	V0
Aluminum	0.1380326	0.5160629	V0	1.1501343	V0	0.0000000	V1
Antimony	0.0001784	0.0000208	V0	0.0000398	V0	0.0000000	V1
Arsenic	0.0001060	0.0001076	V0	0.0002696	V0	0.0000000	V1
Barium	0.0092847	0.0038951	V0	0.0097401	V0	0.0000000	V1
Beryllium	0.0000946	0.0000180	V0	0.0000369	V0	0.0000000	V1
Bismuth	0.0000093	0.0000031	V0	0.0000056	V0	0.0000020	V0
Cadmium	0.0000174	0.0000031	V0	0.0000058	V0	0.0000000	V1
Calcium	0.4112124	0.4954646	V0	0.4086624	V0	0.0000000	V1
Cerium	0.0000174	0.0005037	V0	0.0013471	V0	0.0000000	V1
Cesium	0.0000100	0.0000322	V0	0.0000792	V0	0.0000000	V1
Chromium	0.0022262	0.0006201	V0	0.0015779	V0	0.0001365	V0
Cobalt	0.0000273	0.0001348	V0	0.0003200	V0	0.0000029	V0
Copper	0.0017171	0.0005322	V0	0.0007767	V0	0.0000999	V0
Iron	0.0393063	0.5273422	V0	1.2023049	V0	0.0000000	V1
Lanthanum	0.0000130	0.0002430	V0	0.0006879	V0	0.0000000	V1
Lead	0.0008577	0.0001810	V0	0.0004477	V0	0.0000000	V1
Lithium	0.0000374	0.0004507	V0	0.0009520	V0	0.0000000	V1
Magnesium	0.0091409	0.1107241	V0	0.1957156	V0	0.0005912	V0
Manganese	0.0006949	0.0078974	V0	0.0143725	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000873	V0	0.0001443	V0	0.0000439	V0
Neodymium	0.0000140	0.0002189	V0	0.0007019	V0	0.0000000	V1
Nickel	0.0005429	0.0005280	V0	0.0013254	V0	0.0000739	V0
Niobium	0.0000202	0.0000588	V0	0.0001322	V0	0.0000000	V1
Palladium	0.0000632	0.0000249	V0	0.0000161	V0	0.0000000	V1
Phosphorus	0.0459574	0.0190336	V0	0.0294252	V0	0.0082354	V0
Platinum	0.0000088	0.0000021	V0	0.0000024	V0	0.0000025	V0
Potassium	0.0061261	0.1297800	V0	0.2931935	V0	0.0008393	V0
Praseodymium	0.0000070	0.0000590	V0	0.0001834	V0	0.0000000	V1
Rubidium	0.0000184	0.0005825	V0	0.0013456	V0	0.0000000	V1
Samarium	0.0000133	0.0000394	V0	0.0001370	V0	0.0000000	V1
Selenium	0.0003366	0.0002715	V0	0.0006752	V0	0.0000000	V1
Silicon	0.7676322	1.3555106	V0	3.2661449	V0	0.0000000	V1
Silver	0.0000100	0.0000031	V0	0.0000049	V0	0.0000022	V0
Sodium	0.0169447	0.0501080	V0	0.1168041	V0	0.0010664	V0
Strontium	0.0003375	0.0016368	V0	0.0027799	V0	0.0000000	V1
Tantalum	0.0000394	0.0000036	V0	0.0000081	V0	0.0000000	V1
Thallium	0.0000090	0.0000051	V0	0.0000128	V0	0.0000000	V1
Thorium	0.0000059	0.0000761	V0	0.0001755	V0	0.0000000	V1
Tin	0.0004414	0.0001049	V0	0.0000572	V0	0.0000218	V0
Titanium	0.0015201	0.0184481	V0	0.0441408	V0	0.0003676	V0
Tungsten	0.0000938	0.0000468	V0	0.0000307	V0	0.0000044	V0
Uranium	0.0000048	0.0000174	V0	0.0000474	V0	0.0000000	V1
Vanadium	0.0007697	0.0011202	V0	0.0027958	V0	0.0000417	V0
Zinc	0.0055897	0.0013108	V0	0.0024010	V0	0.0004298	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			25-May	
Sample Date	25-May			25-May	
Particulate Size	PM10			24	
Total Air Volume (m ³)	24			24	
Compound Name	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	63.16	V0	0.16	V0
Aluminum	0.1380326	3.9733904	V0	0.0000000	V1
Antimony	0.0001784	0.0000310	V0	0.0000000	V1
Arsenic	0.0001060	0.0003768	V0	0.0000000	V1
Barium	0.0092847	0.0205203	V0	0.0000000	V1
Beryllium	0.0000946	0.0001060	V0	0.0000000	V1
Bismuth	0.0000093	0.0000123	V0	0.0000020	V0
Cadmium	0.0000174	0.0000095	V0	0.0000000	V1
Calcium	0.4112124	1.8537623	V0	0.0000000	V1
Cerium	0.0000174	0.0036582	V0	0.0000000	V1
Cesium	0.0000100	0.0002371	V0	0.0000000	V1
Chromium	0.0022262	0.0035902	V0	0.0001365	V0
Cobalt	0.0000273	0.0007553	V0	0.0000029	V0
Copper	0.0017171	0.0013175	V0	0.0000999	V0
Iron	0.0393063	2.7136908	V0	0.0000000	V1
Lanthanum	0.0000130	0.0018607	V0	0.0000000	V1
Lead	0.0008577	0.0009228	V0	0.0000000	V1
Lithium	0.0000374	0.0063214	V4	0.0000000	V1
Magnesium	0.0091409	0.4900089	V0	0.0005912	V0
Manganese	0.0006949	0.0416034	V0	0.0000000	V1
Molybdenum	0.0007116	0.0003293	V0	0.0000439	V0
Neodymium	0.0000140	0.0015660	V0	0.0000000	V1
Nickel	0.0005429	0.0025544	V0	0.0000739	V0
Niobium	0.0000202	0.0004200	V0	0.0000000	V1
Palladium	0.0000632	0.0000480	V0	0.0000000	V1
Phosphorus	0.0459574	0.0380581	V0	0.0082354	V0
Platinum	0.0000088	0.0000041	V0	0.0000025	V0
Potassium	0.0061261	0.7821915	V0	0.0008393	V0
Praseodymium	0.0000070	0.0004174	V0	0.0000000	V1
Rubidium	0.0000184	0.0039024	V0	0.0000000	V1
Samarium	0.0000133	0.0002863	V0	0.0000000	V1
Selenium	0.0003366	0.0017315	V0	0.0000000	V1
Silicon	0.7676322	8.6841534	V0	0.0000000	V1
Silver	0.0000100	0.0000119	V0	0.0000022	V0
Sodium	0.0169447	0.3896257	V0	0.0010664	V0
Strontium	0.0003375	0.0091103	V0	0.0000000	V1
Tantalum	0.0000394	0.0000279	V0	0.0000000	V1
Thallium	0.0000090	0.0000288	V0	0.0000000	V1
Thorium	0.0000059	0.0004916	V0	0.0000000	V1
Tin	0.0004414	0.0001376	V0	0.0000218	V0
Titanium	0.0015201	0.1312691	V0	0.0003676	V0
Tungsten	0.0000938	0.0002024	V0	0.0000044	V0
Uranium	0.0000048	0.0001245	V0	0.0000000	V1
Vanadium	0.0007697	0.0058603	V0	0.0000417	V0
Zinc	0.0055897	0.0060342	V0	0.0004298	V0



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1	QC Flag	AMS 6	QC Flag		
	Sample Date	31-May		31-May		31-May	
Particulate Size	PM10		PM10				
Total Air Volume (m ³)	24		24		24		
MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	
Particulate Matter	1.00	80.58	V0	26.57	V0	0.11	V0
Aluminum	0.1380326	2.3803361	V0	0.7730962	V0	0.0000000	V1
Antimony	0.0001784	0.0000958	V0	0.0002603	V0	0.0000000	V1
Arsenic	0.0001060	0.0005172	V0	0.0002287	V0	0.0000000	V1
Barium	0.0092847	0.0225597	V0	0.0106062	V0	0.0000000	V1
Beryllium	0.0000946	0.0000824	V0	0.0000229	V0	0.0000000	V1
Bismuth	0.0000093	0.0000166	V0	0.0000158	V0	0.0000004	V0
Cadmium	0.0000174	0.0000241	V0	0.0000198	V0	0.0000000	V1
Calcium	0.4112124	4.0635325	V0	0.9809104	V0	0.0000000	V1
Cerium	0.0000174	0.0024187	V0	0.0008565	V0	0.0000013	V0
Cesium	0.0000100	0.0001731	V0	0.0000489	V0	0.0000000	V1
Chromium	0.0022262	0.0030788	V0	0.0010967	V0	0.0000000	V1
Cobalt	0.0000273	0.0007316	V0	0.0002190	V0	0.0000026	V0
Copper	0.0017171	0.0028347	V0	0.0020422	V0	0.0007168	V0
Iron	0.0393063	2.2048577	V0	0.7601173	V0	0.0021662	V0
Lanthanum	0.0000130	0.0011584	V0	0.0004160	V0	0.0000006	V0
Lead	0.0008577	0.0011002	V0	0.0005458	V0	0.0000427	V0
Lithium	0.0000374	0.0022845	V0	0.0005370	V0	0.0000021	V0
Magnesium	0.0091409	0.5508620	V0	0.2752530	V0	0.0006461	V0
Manganese	0.0006949	0.0337229	V0	0.0148896	V0	0.0000000	V1
Molybdenum	0.0007116	0.0004325	V0	0.0001316	V0	0.0000410	V0
Neodymium	0.0000140	0.0010840	V0	0.0003653	V0	0.0000000	V1
Nickel	0.0005429	0.0026797	V0	0.0007675	V0	0.0000560	V0
Niobium	0.0000202	0.0002926	V0	0.0000950	V0	0.0000000	V1
Palladium	0.0000632	0.0000315	V0	0.0000169	V0	0.0000000	V1
Phosphorus	0.0459574	0.0483997	V0	0.0292605	V0	0.0080407	V0
Platinum	0.0000088	0.0000086	V0	0.0000047	V0	0.0000018	V0
Potassium	0.0061261	0.7702814	V0	0.2577699	V0	0.0007662	V0
Praseodymium	0.0000070	0.0002834	V0	0.0000967	V0	0.0000000	V1
Rubidium	0.0000184	0.0030132	V0	0.0010110	V0	0.0000020	V0
Samarium	0.0000133	0.0002015	V0	0.0000667	V0	0.0000000	V1
Selenium	0.0003366	0.0014916	V0	0.0005669	V0	0.0000000	V1
Silicon	0.7676322	8.7700219	V0	2.8048874	V0	0.0000000	V1
Silver	0.0000100	0.0000123	V0	0.0000049	V0	0.0000000	V1
Sodium	0.0169447	0.4253108	V0	0.1243746	V0	0.0009116	V0
Strontium	0.0003375	0.0105916	V0	0.0031010	V0	0.0000000	V1
Tantalum	0.0000394	0.0000207	V0	0.0000070	V0	0.0000021	V0
Thallium	0.0000090	0.0000292	V0	0.0000112	V0	0.0000000	V1
Thorium	0.0000059	0.0002940	V0	0.0001169	V0	0.0000000	V1
Tin	0.0004414	0.0001873	V0	0.0003056	V0	0.0000000	V1
Titanium	0.0015201	0.0934065	V0	0.0320747	V0	0.0004369	V0
Tungsten	0.0000938	0.0002524	V0	0.0002102	V0	0.0000133	V0
Uranium	0.0000048	0.0001078	V0	0.0000354	V0	0.0000000	V1
Vanadium	0.0007697	0.0067595	V0	0.0015428	V0	0.0000930	V0
Zinc	0.0055897	0.0079231	V0	0.0072795	V0	0.0005162	V0



Compound Name	Station Name	Athabasca Valley		Anzac		Travel Blank	
	Station #	AMS 7		AMS 14			
	Sample Date	31-May		31-May		31-May	
	Particulate Size	PM10		PM10			
Total Air Volume (m ³)	MDL (µg/sample)	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
		17.2		24		24	
Particulate Matter	1.00	-9999	V6	23.14	V0	0.11	V0
Aluminum	0.1380326	-9999	V6	0.7193391	V0	0.0000000	V1
Antimony	0.0001784	-9999	V6	0.0000400	V0	0.0000000	V1
Arsenic	0.0001060	-9999	V6	0.0002341	V0	0.0000000	V1
Barium	0.0092847	-9999	V6	0.0087660	V0	0.0000000	V1
Beryllium	0.0000946	-9999	V6	0.0000208	V0	0.0000000	V1
Bismuth	0.0000093	-9999	V6	0.0000076	V0	0.0000004	V0
Cadmium	0.0000174	-9999	V6	0.0000179	V0	0.0000000	V1
Calcium	0.4112124	-9999	V6	0.8662295	V0	0.0000000	V1
Cerium	0.0000174	-9999	V6	0.0008209	V0	0.0000013	V0
Cesium	0.0000100	-9999	V6	0.0000460	V0	0.0000000	V1
Chromium	0.0022262	-9999	V6	0.0008908	V0	0.0000000	V1
Cobalt	0.0000273	-9999	V6	0.0002180	V0	0.0000026	V0
Copper	0.0017171	-9999	V6	0.0006377	V0	0.0007168	V0
Iron	0.0393063	-9999	V6	0.7269430	V0	0.0021662	V0
Lanthanum	0.0000130	-9999	V6	0.0004011	V0	0.0000006	V0
Lead	0.0008577	-9999	V6	0.0005339	V0	0.0000427	V0
Lithium	0.0000374	-9999	V6	0.0004790	V0	0.0000021	V0
Magnesium	0.0091409	-9999	V6	0.2548253	V0	0.0006461	V0
Manganese	0.0006949	-9999	V6	0.0164988	V0	0.0000000	V1
Molybdenum	0.0007116	-9999	V6	0.0000797	V0	0.0000410	V0
Neodymium	0.0000140	-9999	V6	0.0003565	V0	0.0000000	V1
Nickel	0.0005429	-9999	V6	0.0006750	V0	0.0000560	V0
Niobium	0.0000202	-9999	V6	0.0000886	V0	0.0000000	V1
Palladium	0.0000632	-9999	V6	0.0000110	V0	0.0000000	V1
Phosphorus	0.0459574	-9999	V6	0.0299117	V0	0.0080407	V0
Platinum	0.0000088	-9999	V6	0.0000025	V0	0.0000018	V0
Potassium	0.0061261	-9999	V6	0.2472415	V0	0.0007662	V0
Praseodymium	0.0000070	-9999	V6	0.0000946	V0	0.0000000	V1
Rubidium	0.0000184	-9999	V6	0.0009711	V0	0.0000020	V0
Samarium	0.0000133	-9999	V6	0.0000653	V0	0.0000000	V1
Selenium	0.0003366	-9999	V6	0.0004768	V0	0.0000000	V1
Silicon	0.7676322	-9999	V6	2.4521277	V0	0.0000000	V1
Silver	0.0000100	-9999	V6	0.0000037	V0	0.0000000	V1
Sodium	0.0169447	-9999	V6	0.1275925	V0	0.0009116	V0
Strontium	0.0003375	-9999	V6	0.0026116	V0	0.0000000	V1
Tantalum	0.0000394	-9999	V6	0.0000068	V0	0.0000021	V0
Thallium	0.0000090	-9999	V6	0.0000119	V0	0.0000000	V1
Thorium	0.0000059	-9999	V6	0.0001151	V0	0.0000000	V1
Tin	0.0004414	-9999	V6	0.0001259	V0	0.0000000	V1
Titanium	0.0015201	-9999	V6	0.0272187	V0	0.0004369	V0
Tungsten	0.0000938	-9999	V6	0.0001840	V0	0.0000133	V0
Uranium	0.0000048	-9999	V6	0.0000341	V0	0.0000000	V1
Vanadium	0.0007697	-9999	V6	0.0014956	V0	0.0000930	V0
Zinc	0.0055897	-9999	V6	0.0026263	V0	0.0005162	V0



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Fort McKay South			Horizon		Travel Blank	
		AMS 13 31-May PM10 24	Results (µg/m ³)	QC Flag	AMS 15 31-May PM10 24	Results (µg/m ³)	QC Flag	Results (µg/m ³)
Particulate Matter	1.00	47.45	V0	59.27	V0	0.11	V0	
Aluminum	0.1380326	1.2212575	V0	2.0597761	V0	0.0000000	V1	
Antimony	0.0001784	0.0000627	V0	0.0001032	V0	0.0000000	V1	
Arsenic	0.0001060	0.0003281	V0	0.0004472	V0	0.0000000	V1	
Barium	0.0092847	0.0109621	V0	0.0179264	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000379	V0	0.0000622	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000106	V0	0.0000141	V0	0.0000004	V0	
Cadmium	0.0000174	0.0000163	V0	0.0000218	V0	0.0000000	V1	
Calcium	0.4112124	1.5009541	V0	1.7929213	V0	0.0000000	V1	
Cerium	0.0000174	0.0012383	V0	0.0019391	V0	0.0000013	V0	
Cesium	0.0000100	0.0000858	V0	0.0001519	V0	0.0000000	V1	
Chromium	0.0022262	0.0015437	V0	0.0025457	V0	0.0000000	V1	
Cobalt	0.0000273	0.0003604	V0	0.0005728	V0	0.0000026	V0	
Copper	0.0017171	0.0017612	V0	0.0016329	V0	0.0007168	V0	
Iron	0.0393063	1.2169556	V0	1.7947598	V0	0.0021662	V0	
Lanthanum	0.0000130	0.0005911	V0	0.0009298	V0	0.0000006	V0	
Lead	0.0008577	0.0005833	V0	0.0008292	V0	0.0000427	V0	
Lithium	0.0000374	0.0010683	V0	0.0017692	V0	0.0000021	V0	
Magnesium	0.0091409	0.2913099	V0	0.4516806	V0	0.0006461	V0	
Manganese	0.0006949	0.0197291	V0	0.0268091	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0002939	V0	0.0002864	V0	0.0000410	V0	
Neodymium	0.0000140	0.0005538	V0	0.0008704	V0	0.0000000	V1	
Nickel	0.0005429	0.0013884	V0	0.0020279	V0	0.0000560	V0	
Niobium	0.0000202	0.0001436	V0	0.0002447	V0	0.0000000	V1	
Palladium	0.0000632	0.0000160	V0	0.0000256	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0291251	V0	0.0425037	V0	0.0080407	V0	
Platinum	0.0000088	0.0000024	V0	0.0000039	V0	0.0000018	V0	
Potassium	0.0061261	0.3697601	V0	0.5833714	V0	0.0007662	V0	
Praseodymium	0.0000070	0.0001428	V0	0.0002289	V0	0.0000000	V1	
Rubidium	0.0000184	0.0015654	V0	0.0024864	V0	0.0000020	V0	
Samarium	0.0000133	0.0001020	V0	0.0001612	V0	0.0000000	V1	
Selenium	0.0003366	0.0007404	V0	0.0012281	V0	0.0000000	V1	
Silicon	0.7676322	4.7878819	V0	7.4863910	V0	0.0000000	V1	
Silver	0.0000100	0.0000061	V0	0.0000098	V0	0.0000000	V1	
Sodium	0.0169447	0.2884499	V0	0.3005692	V0	0.0009116	V0	
Strontium	0.0003375	0.0043182	V0	0.0068962	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000098	V0	0.0000170	V0	0.0000021	V0	
Thallium	0.0000090	0.0000151	V0	0.0000238	V0	0.0000000	V1	
Thorium	0.0000059	0.0001693	V0	0.0002697	V0	0.0000000	V1	
Tin	0.0004414	0.0001522	V0	0.0001752	V0	0.0000000	V1	
Titanium	0.0015201	0.0481031	V0	0.0812322	V0	0.0004369	V0	
Tungsten	0.0000938	0.0001357	V0	0.0001511	V0	0.0000133	V0	
Uranium	0.0000048	0.0000501	V0	0.0000876	V0	0.0000000	V1	
Vanadium	0.0007697	0.0034966	V0	0.0054175	V0	0.0000930	V0	
Zinc	0.0055897	0.0049307	V0	0.0054247	V0	0.0005162	V0	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank		
		AMS 16	QC Flag	31-May	QC Flag	
Station Name	Station #	Sample Date	Particulate Size	Total Air Volume (m ³)	24	24
AMS 16	31-May	PM10	24	24	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	64.33	V0	0.11	V0	
Aluminum	0.1380326	2.7378615	V0	0.0000000	V1	
Antimony	0.0001784	0.0000767	V0	0.0000000	V1	
Arsenic	0.0001060	0.0005352	V0	0.0000000	V1	
Barium	0.0092847	0.0226392	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000882	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000175	V0	0.0000004	V0	
Cadmium	0.0000174	0.0000232	V0	0.0000000	V1	
Calcium	0.4112124	2.7118614	V0	0.0000000	V1	
Cerium	0.0000174	0.0028889	V0	0.0000013	V0	
Cesium	0.0000100	0.0001745	V0	0.0000000	V1	
Chromium	0.0022262	0.0030686	V0	0.0000000	V1	
Cobalt	0.0000273	0.0007370	V0	0.0000026	V0	
Copper	0.0017171	0.0015392	V0	0.0007168	V0	
Iron	0.0393063	2.8782726	V0	0.0021662	V0	
Lanthanum	0.0000130	0.0013537	V0	0.0000006	V0	
Lead	0.0008577	0.0010961	V0	0.0000427	V0	
Lithium	0.0000374	0.0028937	V0	0.0000021	V0	
Magnesium	0.0091409	0.5678270	V0	0.0006461	V0	
Manganese	0.0006949	0.0466829	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0003596	V0	0.0000410	V0	
Neodymium	0.0000140	0.0012512	V0	0.0000000	V1	
Nickel	0.0005429	0.0025595	V0	0.0000560	V0	
Niobium	0.0000202	0.0003222	V0	0.0000000	V1	
Palladium	0.0000632	0.0000355	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0443173	V0	0.0080407	V0	
Platinum	0.0000088	0.0000036	V0	0.0000018	V0	
Potassium	0.0061261	0.7499150	V0	0.0007662	V0	
Praseodymium	0.0000070	0.0003282	V0	0.0000000	V1	
Rubidium	0.0000184	0.0030823	V0	0.0000020	V0	
Samarium	0.0000133	0.0002275	V0	0.0000000	V1	
Selenium	0.0003366	0.0014370	V0	0.0000000	V1	
Silicon	0.7676322	6.9794498	V0	0.0000000	V1	
Silver	0.0000100	0.0000113	V0	0.0000000	V1	
Sodium	0.0169447	0.4155138	V0	0.0009116	V0	
Strontium	0.0003375	0.0088921	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000208	V0	0.0000021	V0	
Thallium	0.0000090	0.0000305	V0	0.0000000	V1	
Thorium	0.0000059	0.0003631	V0	0.0000000	V1	
Tin	0.0004414	0.0002059	V0	0.0000000	V1	
Titanium	0.0015201	0.1028414	V0	0.0004369	V0	
Tungsten	0.0000938	0.0001667	V0	0.0000133	V0	
Uranium	0.0000048	0.0001084	V0	0.0000000	V1	
Vanadium	0.0007697	0.0063668	V0	0.0000930	V0	
Zinc	0.0055897	0.0060269	V0	0.0005162	V0	



Station Name	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay	Bertha Ganter - Fort McKay
Station #	AMS 1	AMS 1	AMS 1	AMS 1
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	27.85	28.81	6	6
Aluminum	0.8408487	0.8320689	6	6
Antimony	0.0000459	0.0000312	6	6
Arsenic	0.0001881	0.0001772	6	6
Barium	0.0072204	0.0080135	6	6
Beryllium	0.0000268	0.0000289	6	6
Bismuth	0.0000069	0.0000049	6	6
Cadmium	0.0000083	0.0000080	6	6
Calcium	1.7419508	1.6064616	6	6
Cerium	0.0008265	0.0008539	6	6
Cesium	0.0000604	0.0000610	6	6
Chromium	0.0010955	0.0010325	6	6
Cobalt	0.0002447	0.0002588	6	6
Copper	0.0011571	0.0009243	6	6
Iron	0.7475516	0.7852621	6	6
Lanthanum	0.0003980	0.0004102	6	6
Lead	0.0003985	0.0003699	6	6
Lithium	0.0007859	0.0008026	6	6
Magnesium	0.1840863	0.1939615	6	6
Manganese	0.0115626	0.0118674	6	6
Molybdenum	0.0001583	0.0001419	6	6
Neodymium	0.0003637	0.0003843	6	6
Nickel	0.0008980	0.0009109	6	6
Niobium	0.0000976	0.0001038	6	6
Palladium	0.0000106	0.0000112	6	5
Phosphorus	0.0233138	0.0129918	6	6
Platinum	0.0000037	0.0000025	6	6
Potassium	0.2586426	0.2681035	6	6
Praseodymium	0.0000954	0.0001006	6	6
Rubidium	0.0010706	0.0010544	6	6
Samarium	0.0000672	0.0000716	6	6
Selenium	0.0005096	0.0005220	6	6
Silicon	2.7441545	3.1519048	6	6
Silver	0.0000040	0.0000042	6	6
Sodium	0.1216446	0.1525184	6	6
Strontium	0.0037438	0.0037220	6	6
Tantalum	0.0000063	0.0000077	6	4
Thallium	0.0000096	0.0000103	6	6
Thorium	0.0001049	0.0001040	6	6
Tin	0.0000931	0.0000502	6	6
Titanium	0.0337957	0.0320717	6	6
Tungsten	0.0000716	0.0000924	6	6
Uranium	0.0000341	0.0000386	6	6
Vanadium	0.0020876	0.0024120	6	6
Zinc	0.0027318	0.0026747	6	6



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	15.38	11.50	6	6
Aluminum	0.4797576	0.4722676	6	6
Antimony	0.0001447	0.0000803	6	6
Arsenic	0.0001495	0.0000955	6	6
Barium	0.0051065	0.0039795	6	6
Beryllium	0.0000134	0.0000140	6	4
Bismuth	0.0000088	0.0000043	6	6
Cadmium	0.0000089	0.0000061	6	6
Calcium	0.5575481	0.4243945	6	6
Cerium	0.0005165	0.0004956	6	6
Cesium	0.0000304	0.0000283	6	6
Chromium	0.0007232	0.0004712	6	6
Cobalt	0.0001338	0.0001212	6	6
Copper	0.0015024	0.0009689	6	6
Iron	0.4404788	0.3709973	6	6
Lanthanum	0.0002348	0.0002122	6	6
Lead	0.0002774	0.0001852	6	6
Lithium	0.0004028	0.0004398	6	6
Magnesium	0.1380038	0.1086312	6	6
Manganese	0.0076030	0.0064152	6	6
Molybdenum	0.0001460	0.0001315	6	5
Neodymium	0.0002068	0.0001920	6	6
Nickel	0.0005774	0.0004298	6	6
Niobium	0.0000529	0.0000518	6	6
Palladium	0.0000089	0.0000066	6	5
Phosphorus	0.0200220	0.0064257	6	6
Platinum	0.0000033	0.0000010	6	6
Potassium	0.1476681	0.1118913	6	6
Praseodymium	0.0000549	0.0000505	6	6
Rubidium	0.0005762	0.0005120	6	6
Samarium	0.0000374	0.0000349	6	6
Selenium	0.0003013	0.0002546	6	6
Silicon	1.5051273	1.3642257	6	6
Silver	0.0000035	0.0000015	5	5
Sodium	0.0949535	0.0649074	6	6
Strontium	0.0017596	0.0014127	6	6
Tantalum	0.0000036	0.0000037	6	4
Thallium	0.0000057	0.0000047	6	6
Thorium	0.0000634	0.0000578	6	6
Tin	0.0001677	0.0000846	6	6
Titanium	0.0182743	0.0178109	6	6
Tungsten	0.0001216	0.0000860	6	6
Uranium	0.0000189	0.0000174	6	6
Vanadium	0.0012844	0.0011749	6	6
Zinc	0.0035326	0.0024069	6	6



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	15.14	11.23	5	6
Aluminum	0.4402465	0.4693351	5	6
Antimony	0.0002280	0.0001932	5	6
Arsenic	0.0001379	0.0000794	5	6
Barium	0.0073500	0.0062451	5	6
Beryllium	0.0000128	0.0000148	5	4
Bismuth	0.0000111	0.0000054	5	6
Cadmium	0.0000074	0.0000025	5	6
Calcium	0.5557942	0.4167945	5	6
Cerium	0.0005358	0.0004947	5	6
Cesium	0.0000278	0.0000279	5	6
Chromium	0.0007092	0.0005129	5	6
Cobalt	0.0001308	0.0001119	5	6
Copper	0.0017297	0.0011612	5	6
Iron	0.4467101	0.3863169	5	6
Lanthanum	0.0002106	0.0001942	5	6
Lead	0.0002593	0.0001058	5	6
Lithium	0.0004056	0.0004982	5	6
Magnesium	0.1163347	0.0825247	5	6
Manganese	0.0073540	0.0060742	5	6
Molybdenum	0.0001684	0.0000985	5	6
Neodymium	0.0001908	0.0001818	5	6
Nickel	0.0005087	0.0003924	5	6
Niobium	0.0000501	0.0000509	5	6
Palladium	0.0000102	0.0000054	5	6
Phosphorus	0.0204792	0.0045106	5	6
Platinum	0.0000028	0.0000009	5	6
Potassium	0.1393074	0.1080812	5	6
Praseodymium	0.0000497	0.0000471	5	6
Rubidium	0.0005322	0.0005085	5	6
Samarium	0.0000338	0.0000331	5	6
Selenium	0.0002751	0.0002281	5	6
Silicon	1.4820002	1.4830005	5	6
Silver	0.0000037	0.0000026	5	6
Sodium	0.1182214	0.0832296	5	6
Strontium	0.0016871	0.0013062	5	6
Tantalum	0.0000033	0.0000035	5	4
Thallium	0.0000049	0.0000041	5	6
Thorium	0.0000553	0.0000532	5	6
Tin	0.0002231	0.0001239	5	6
Titanium	0.0171803	0.0171465	5	6
Tungsten	0.0001375	0.0000979	5	6
Uranium	0.0000163	0.0000157	5	6
Vanadium	0.0011812	0.0010469	5	6
Zinc	0.0051567	0.0033604	5	6



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	8.60	7.53	6	6
Aluminum	0.2275467	0.2633979	6	6
Antimony	0.0000277	0.0000160	6	6
Arsenic	0.0000842	0.0000759	6	6
Barium	0.0024174	0.0032061	6	5
Beryllium	0.0000058	0.0000082	6	3
Bismuth	0.0000038	0.0000025	6	6
Cadmium	0.0000092	0.0000054	6	6
Calcium	0.2631151	0.3132958	6	6
Cerium	0.0002479	0.0002993	6	6
Cesium	0.0000156	0.0000169	6	6
Chromium	0.0004095	0.0002774	6	6
Cobalt	0.0000722	0.0000764	6	6
Copper	0.0008065	0.0010182	6	6
Iron	0.2083453	0.2613825	6	6
Lanthanum	0.0001211	0.0001462	6	6
Lead	0.0001919	0.0001722	6	6
Lithium	0.0001694	0.0001810	6	6
Magnesium	0.0699741	0.0924745	6	6
Manganese	0.0044186	0.0059942	6	6
Molybdenum	0.0000435	0.0000356	6	4
Neodymium	0.0001069	0.0001303	6	6
Nickel	0.0002704	0.0002243	6	6
Niobium	0.0000263	0.0000323	6	6
Palladium	0.0000035	0.0000044	6	3
Phosphorus	0.0178738	0.0059493	6	6
Platinum	0.0000022	0.0000004	6	6
Potassium	0.0874773	0.0811828	6	6
Praseodymium	0.0000282	0.0000345	6	6
Rubidium	0.0003112	0.0003479	6	6
Samarium	0.0000194	0.0000239	6	6
Selenium	0.0001555	0.0001652	6	6
Silicon	0.7792157	0.8679330	6	6
Silver	0.0000019	0.0000011	6	6
Sodium	0.0431339	0.0439290	6	6
Strontium	0.0008202	0.0009355	6	6
Tantalum	0.0000014	0.0000027	6	2
Thallium	0.0000036	0.0000042	6	6
Thorium	0.0000338	0.0000422	6	6
Tin	0.0000805	0.0000290	6	6
Titanium	0.0088876	0.0095518	6	6
Tungsten	0.0000834	0.0000746	6	6
Uranium	0.0000099	0.0000124	6	6
Vanadium	0.0005449	0.0005035	6	6
Zinc	0.0012886	0.0006957	6	6



Station Name	Fort McKay South	Fort McKay South	Fort McKay South	Fort McKay South
Station #	AMS 13	AMS 13	AMS 13	AMS 13
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	17.36	15.53	6	6
Aluminum	0.5214687	0.3954216	6	6
Antimony	0.0000330	0.0000214	6	5
Arsenic	0.0001328	0.0001059	6	6
Barium	0.0041727	0.0035824	6	6
Beryllium	0.0000157	0.0000123	6	6
Bismuth	0.0000051	0.0000030	6	6
Cadmium	0.0000064	0.0000052	6	6
Calcium	0.4721224	0.5232285	6	6
Cerium	0.0004875	0.0004080	6	6
Cesium	0.0000355	0.0000284	6	6
Chromium	0.0007292	0.0004438	6	6
Cobalt	0.0001411	0.0001163	6	6
Copper	0.0007315	0.0005377	6	6
Iron	0.4403665	0.4167735	6	6
Lanthanum	0.0002344	0.0001946	6	6
Lead	0.0002370	0.0001767	6	6
Lithium	0.0004839	0.0003730	6	6
Magnesium	0.1070660	0.0967193	6	6
Manganese	0.0071015	0.0066035	6	6
Molybdenum	0.0001344	0.0000856	6	6
Neodymium	0.0002157	0.0001834	6	6
Nickel	0.0005944	0.0004119	6	6
Niobium	0.0000568	0.0000475	6	6
Palladium	0.0000096	0.0000092	6	5
Phosphorus	0.0203408	0.0067977	6	6
Platinum	0.0000021	0.0000005	6	6
Potassium	0.1497171	0.1160720	6	6
Praseodymium	0.0000562	0.0000473	6	6
Rubidium	0.0006325	0.0005062	6	6
Samarium	0.0000396	0.0000338	6	6
Selenium	0.0002873	0.0002422	6	6
Silicon	1.7351638	1.6094062	6	6
Silver	0.0000026	0.0000019	6	6
Sodium	0.0919705	0.0981092	6	6
Strontium	0.0016476	0.0014118	6	6
Tantalum	0.0000033	0.0000036	6	4
Thallium	0.0000056	0.0000049	6	6
Thorium	0.0000678	0.0000567	6	6
Tin	0.0001089	0.0000276	6	6
Titanium	0.0185065	0.0159117	6	6
Tungsten	0.0000648	0.0000454	6	6
Uranium	0.0000189	0.0000167	6	6
Vanadium	0.0012898	0.0011500	6	6
Zinc	0.0020253	0.0015109	6	6



Station Name Station # Sample Date Particulate Size Compound Name	Horizon AMS 15 May 01 - May 31 PM10 Average µg/m ³	Horizon AMS 15 May 01 - May 31 PM10 Std Dev µg/m ³	Horizon AMS 15 May 01 - May 31 PM10 Total Samples (#)	Horizon AMS 15 May 01 - May 31 PM10 Total ≥ MDL (#)
Particulate Matter	22.15	19.42	6	6
Aluminum	0.8573789	0.6643449	6	6
Antimony	0.0000395	0.0000321	6	6
Arsenic	0.0001831	0.0001485	6	6
Barium	0.0068915	0.0060693	6	6
Beryllium	0.0000262	0.0000203	6	6
Bismuth	0.0000059	0.0000042	6	6
Cadmium	0.0000074	0.0000072	6	6
Calcium	0.5254734	0.6427274	6	6
Cerium	0.0008674	0.0006603	6	6
Cesium	0.0000611	0.0000493	6	6
Chromium	0.0011126	0.0008150	6	6
Cobalt	0.0002265	0.0001921	6	6
Copper	0.0007125	0.0004788	6	6
Iron	0.7507755	0.6352030	6	6
Lanthanum	0.0004092	0.0003274	6	6
Lead	0.0003394	0.0002673	6	6
Lithium	0.0007623	0.0005533	6	6
Magnesium	0.1653054	0.1506664	6	6
Manganese	0.0106265	0.0089894	6	6
Molybdenum	0.0001247	0.0000836	6	6
Neodymium	0.0003893	0.0003190	6	6
Nickel	0.0008633	0.0006807	6	6
Niobium	0.0000970	0.0000808	6	6
Palladium	0.0000111	0.0000082	6	6
Phosphorus	0.0246233	0.0102755	6	6
Platinum	0.0000022	0.0000009	6	6
Potassium	0.2301131	0.1892179	6	6
Praseodymium	0.0001021	0.0000837	6	6
Rubidium	0.0010177	0.0008055	6	6
Samarium	0.0000734	0.0000603	6	6
Selenium	0.0004881	0.0004049	6	6
Silicon	2.7184916	2.5146269	6	6
Silver	0.0000038	0.0000032	6	6
Sodium	0.1086694	0.0976965	6	6
Strontium	0.0025130	0.0022739	6	6
Tantalum	0.0000060	0.0000060	6	5
Thallium	0.0000092	0.0000080	6	6
Thorium	0.0001130	0.0000920	6	6
Tin	0.0000790	0.0000477	6	6
Titanium	0.0322367	0.0267986	6	6
Tungsten	0.0000432	0.0000537	6	6
Uranium	0.0000344	0.0000291	6	6
Vanadium	0.0020308	0.0018451	6	6
Zinc	0.0022420	0.0016468	6	6



Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	31.71	25.08	6	6
Aluminum	1.5160706	1.4834293	6	6
Antimony	0.0000385	0.0000209	6	6
Arsenic	0.0002294	0.0001852	6	6
Barium	0.0100321	0.0090273	6	6
Beryllium	0.0000443	0.0000415	6	6
Bismuth	0.0000094	0.0000050	6	6
Cadmium	0.0000091	0.0000071	6	6
Calcium	1.1373967	0.9439740	6	6
Cerium	0.0015413	0.0013787	6	6
Cesium	0.0000930	0.0000899	6	6
Chromium	0.0018848	0.0013180	6	6
Cobalt	0.0003537	0.0003062	6	6
Copper	0.0008998	0.0004427	6	6
Iron	1.3448558	1.1411217	6	6
Lanthanum	0.0007529	0.0006884	6	6
Lead	0.0005013	0.0003987	6	6
Lithium	0.0019876	0.0023071	6	6
Magnesium	0.2543421	0.2165009	6	6
Manganese	0.0215734	0.0177591	6	6
Molybdenum	0.0001998	0.0001209	6	6
Neodymium	0.0006565	0.0005970	6	6
Nickel	0.0012644	0.0010202	6	6
Niobium	0.0001695	0.0001598	6	6
Palladium	0.0000195	0.0000178	6	6
Phosphorus	0.0267053	0.0119712	6	6
Platinum	0.0000030	0.0000012	6	6
Potassium	0.3543555	0.3202813	6	6
Praseodymium	0.0001746	0.0001578	6	6
Rubidium	0.0016097	0.0014860	6	6
Samarium	0.0001199	0.0001087	6	6
Selenium	0.0007692	0.0006457	6	6
Silicon	3.6913322	3.2684260	6	6
Silver	0.0000057	0.0000047	6	6
Sodium	0.1808723	0.1728860	6	6
Strontium	0.0042330	0.0037247	6	6
Tantalum	0.0000109	0.0000107	6	6
Thallium	0.0000140	0.0000122	6	6
Thorium	0.0001973	0.0001840	6	6
Tin	0.0001223	0.0000456	6	6
Titanium	0.0543429	0.0497122	6	6
Tungsten	0.0001056	0.0000693	6	6
Uranium	0.0000536	0.0000492	6	6
Vanadium	0.0027959	0.0025893	6	6
Zinc	0.0035381	0.0020133	6	6



Wood Buffalo Environmental Association

PM10 Metal (µg/sample) Summary

Compound	% Det	N	N < Det.	Min.	2017 May										Mean	Std. Dev.	Median	Outlier Test	
					10%	25%	50%	60%	75%	80%	90%	95%	99% Max.						
Particulate Matter	100.0%	42	0	69.0000	90.0000	154.0000	340.0000	469.0000	579.0000	638.0000	1139.0000	1516.0000	1934.0000	1934.0000	480.0000	446.0000	340.0000	2708.0000	
Aluminum	100.0%	42	0	0.4605	1.3364	4.2102	12.0190	14.5201	18.7339	24.0493	30.1361	57.1281	95.3614	95.3614	16.8609	19.1903	12.0190	112.8123	
Antimony	97.6%	42	1	0.0002	0.0004	0.0005	0.0010	0.0012	0.0025	0.0029	0.0041	0.0063	0.0132	0.0132	0.0020	0.0025	0.0010	0.0144	
Arsenic	100.0%	42	0	0.0007	0.0009	0.0015	0.0031	0.0038	0.0050	0.0056	0.0079	0.0107	0.0128	0.0128	0.0038	0.0031	0.0031	0.0192	
Barium	97.6%	42	1	0.0051	0.0244	0.0407	0.1038	0.1208	0.2146	0.2338	0.4036	0.4925	0.5433	0.5433	0.1497	0.1451	0.1038	0.8755	
Beryllium	83.3%	42	7	0.0000	0.0001	0.0001	0.0004	0.0005	0.0005	0.0006	0.0009	0.0020	0.0025	0.0025	0.0005	0.0006	0.0004	0.0033	
Bismuth	100.0%	42	0	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0004	0.0005	0.0005	0.0002	0.0001	0.0001	0.0007	
Cadmium	100.0%	42	0	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0006	0.0002	0.0001	0.0001	0.0009	
Calcium	100.0%	42	0	0.4834	1.7034	4.4222	12.0848	16.6303	23.5418	24.6996	43.0301	65.0847	97.5248	97.5248	18.2123	21.2332	12.0848	124.3784	
Cerium	100.0%	42	0	0.0005	0.0017	0.0037	0.0126	0.0149	0.0206	0.0243	0.0323	0.0580	0.0878	0.0878	0.0173	0.0188	0.0126	0.1113	
Cesium	100.0%	42	0	0.0000	0.0001	0.0003	0.0009	0.0010	0.0012	0.0018	0.0021	0.0042	0.0057	0.0057	0.0011	0.0012	0.0009	0.0073	
Chromium	100.0%	42	0	0.0028	0.0056	0.0089	0.0182	0.0195	0.0263	0.0337	0.0581	0.0736	0.0862	0.0862	0.0230	0.0202	0.0182	0.1240	
Cobalt	100.0%	42	0	0.0002	0.0006	0.0011	0.0034	0.0039	0.0053	0.0064	0.0086	0.0176	0.0181	0.0181	0.0045	0.0046	0.0034	0.0277	
Copper	100.0%	42	0	0.0058	0.0078	0.0118	0.0199	0.0245	0.0369	0.0392	0.0619	0.0688	0.0887	0.0887	0.0263	0.0208	0.0199	0.1302	
Iron	100.0%	42	0	0.4163	1.6798	3.2208	11.1336	14.5222	18.6239	20.8484	29.2069	52.9166	69.0785	69.0785	15.1704	16.3466	11.1336	96.9034	
Lanthanum	100.0%	42	0	0.0002	0.0008	0.0017	0.0058	0.0069	0.0100	0.0120	0.0165	0.0278	0.0447	0.0447	0.0082	0.0092	0.0058	0.0541	
Lead	100.0%	42	0	0.0014	0.0026	0.0036	0.0057	0.0068	0.0102	0.0107	0.0174	0.0221	0.0264	0.0264	0.0078	0.0064	0.0057	0.0399	
Lithium	100.0%	42	0	0.0003	0.0009	0.0039	0.0108	0.0129	0.0181	0.0228	0.0302	0.0548	0.1517	0.1517	0.0172	0.0257	0.0108	0.1459	
Magnesium	100.0%	42	0	0.2191	0.5014	0.9029	2.7843	3.2919	4.6972	5.9115	6.9914	11.7602	13.6278	13.6278	3.6249	3.4611	2.7843	20.9304	
Manganese	100.0%	42	0	0.0155	0.0302	0.0588	0.1842	0.2109	0.3275	0.3573	0.4735	0.8094	1.1204	1.1204	0.2441	0.2535	0.1842	1.5118	
Molybdenum	92.9%	42	3	0.0006	0.0011	0.0017	0.0026	0.0032	0.0042	0.0049	0.0077	0.0085	0.0104	0.0104	0.0034	0.0025	0.0026	0.0158	
Neodymium	100.0%	42	0	0.0002	0.0006	0.0015	0.0053	0.0062	0.0088	0.0103	0.0168	0.0260	0.0376	0.0376	0.0074	0.0082	0.0053	0.0485	
Nickel	100.0%	42	0	0.0017	0.0033	0.0060	0.0136	0.0158	0.0190	0.0222	0.0333	0.0613	0.0643	0.0643	0.0172	0.0159	0.0136	0.0968	
Niobium	100.0%	42	0	0.0001	0.0002	0.0005	0.0012	0.0016	0.0023	0.0026	0.0034	0.0070	0.0101	0.0101	0.0019	0.0022	0.0012	0.0128	
Palladium	85.7%	42	6	0.0000	0.0000	0.0001	0.0002	0.0002	0.0004	0.0004	0.0006	0.0008	0.0012	0.0012	0.0003	0.0002	0.0002	0.0015	
Phosphorus	100.0%	42	0	0.2729	0.3522	0.3834	0.4568	0.5179	0.6121	0.6818	0.7179	1.0201	1.1616	1.1616	0.5282	0.2101	0.4568	1.5788	
Platinum	100.0%	42	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0000	0.0001	0.0002	
Potassium	100.0%	42	0	0.6652	0.9630	1.3959	3.5118	3.8022	6.1017	6.4552	8.8742	17.9980	18.7726	18.7726	4.7283	4.6750	3.5118	28.1031	
Praseodymium	100.0%	42	0	0.0001	0.0002	0.0004	0.0014	0.0016	0.0023	0.0027	0.0044	0.0068	0.0100	0.0100	0.0019	0.0022	0.0014	0.0128	
Rubidium	100.0%	42	0	0.0013	0.0020	0.0050	0.0147	0.0169	0.0243	0.0295	0.0376	0.0723	0.0937	0.0937	0.0199	0.0209	0.0147	0.1241	
Samarium	100.0%	42	0	0.0000	0.0001	0.0003	0.0009	0.0011	0.0016	0.0019	0.0033	0.0048	0.0069	0.0069	0.0014	0.0015	0.0009	0.0089	
Selenium	100.0%	42	0	0.0008	0.0013	0.0026	0.0073	0.0080	0.0127	0.0136	0.0178	0.0345	0.0416	0.0416	0.0097	0.0097	0.0073	0.0583	
Silicon	100.0%	42	0	2.3822	5.2690	11.6297	36.7157	43.8243	64.1587	74.9016	114.9092	179.6734	210.4805	210.4805	50.8675	53.6723	36.7157	319.2289	
Silver	100.0%	42	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0010	0.0010	0.0001	0.0002	0.0001	0.0009
Sodium	100.0%	42	0	0.1911	0.4585	0.9339	1.8359	1.9216	3.0038	3.1692	6.9228	9.3510	10.2075	10.2075	2.6037	2.5989	1.8359	15.5981	
Strontium	100.0%	42	0	0.0026	0.0066	0.0146	0.0445	0.0485	0.0689	0.0820	0.1105	0.2134	0.2542	0.2542	0.0568	0.0593	0.0445	0.3531	
Tantalum	69.0%	42	13	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0005	0.0007	0.0007	0.0001	0.0001	0.0001	0.0009	
Thallium	100.0%	42	0	0.0000	0.0000	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0007	0.0007	0.0007	0.0002	0.0002	0.0001	0.0011	
Thorium	100.0%	42	0	0.0001	0.0002	0.0005	0.0015	0.0019	0.0028	0.0031	0.0042	0.0071	0.0118	0.0118	0.0022	0.0024	0.0015	0.0144	
Tin	100.0%	42	0	0.0010	0.0013	0.0016	0.0025	0.0031	0.0037	0.0042	0.0049	0.0073	0.0104	0.0104	0.0031	0.0020	0.0025	0.0129	
Titanium	100.0%	42	0	0.0207	0.0716	0.1838	0.4428	0.5465	0.7698	0.8909	1.1545	2.2418	3.1505	3.1505	0.6331	0.6893	0.4428	4.0794	
Tungsten	100.0%	42	0	0.0001	0.0003	0.0006	0.0016	0.0023	0.0036	0.0040	0.0052	0.0057	0.0068	0.0068	0.0022	0.0019	0.0016	0.0119	
Uranium	100.0%	42	0	0.0000	0.0001	0.0001	0.0004	0.0005	0.0008	0.0009	0.0012	0.0026	0.0030	0.0030	0.0006	0.0007	0.0004	0.0042	
Vanadium	100.0%	42	0	0.0029	0.0048	0.0100	0.0281	0.0358	0.0463	0.0601	0.0839	0.1406	0.1622	0.1622	0.0386	0.0408	0.0281	0.2427	
Zinc	100.0%	42	0	0.0147	0.0187	0.0315	0.0475	0.0630	0.1122	0.1183	0.1618	0.1902	0.2383	0.2383	0.0722	0.0583	0.0475	0.3635	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

POLYCYCLIC AROMATIC HYDROCARBONS DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PAHs: Airzone One Ltd
Mississauga, Ontario



FILE CONTENTS DESCRIPTION	PAH - Speciated PAH Gas + Particle Phase Measurements
SAMPLING INTERVAL	24 hour
SAMPLING FREQUENCY OF DATA	Once every 6 days
UNITS	ng/m ³ (nanogram per cubic meter)
OBSERVATION TYPE	Particles + gas
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	filtration and adsorbent
PARTICLE DIAMETER	TSP (total suspended particle)
MEDIUM	a glass fiber filter + PUF/XAD-2/PUF
ANALYTICAL METHOD	Gas Chromatograph/Mass Spectrometer (GC/MS)
SAMPLE PREPARATION	Solvent Extraction
ANALYTICAL LABORATORY	AIRZONE One Inc.
USER NOTE 1	Data are recovery corrected
USER NOTE 2	Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler
USER NOTE 3	Blank sample concentration (ng/m ³) is calculated using expected actual volume of sampler
VOLUME STANDARDIZATION	Actual Volume at Ambient Conditions
SAMPLING INSTRUMENT TYPE	Tisch TE-1000 High-Volume Sampler
FLAGS USED	
V0	Valid value
V1	Valid value but comprised wholly or partially of below detection limit data
V4	Valid value despite failing to meet some QC or statistical criteria
V5	Valid value but qualified because of possible contamination
V6	Valid value but qualified due to non-standard sampling conditions
M1	Missing value because no value is available
M2	Missing value because invalidated by Data Originator



Station Name	Bertha Ganter -				Travel Blank			
	Station #	Fort McKay	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date		01-May	01-May	01-May	01-May	01-May	01-May	01-May
Total Air Volume (m ³)		315.98	315.98	315.99	315.99	316	316	316
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	
Naphthalene	0.008	3.646	V0	10.687	V0	0.127	V0	
Acenaphthylene	0.011	1.186	V0	0.762	V0	0.099	V0	
Acenaphthene	0.006	1.630	V0	0.768	V0	0.020	V0	
Fluorene	0.007	0.455	V0	0.604	V0	0.056	V0	
Phenanthrene	0.007	3.195	V0	3.985	V0	0.046	V0	
Anthracene	0.017	0.285	V0	0.363	V0	0.007	V1	
Acridine	0.019	0.157	V0	0.058	V0	0.002	V1	
Fluoranthene	0.007	0.439	V0	0.940	V0	0.010	V0	
Pyrene	0.008	0.405	V0	0.801	V0	0.008	V1	
Benzo(c)phenanthrene	0.015	0.019	V0	0.067	V0	0.003	V1	
Benz(a)anthracene	0.014	0.061	V0	0.171	V0	0.008	V1	
Chrysene	0.013	0.191	V0	0.281	V0	0.009	V1	
7,12-Dimethylbenz(a)anthracene	0.013	0.170	V0	0.165	V0	0.003	V1	
Benzo(b)fluoranthene	0.020	0.058	V0	0.224	V0	0.005	V1	
Benzo(k)fluoranthene	0.013	0.058	V0	0.223	V0	0.005	V1	
Benzo(a)pyrene	0.016	0.038	V0	0.061	V0	0.004	V1	
3-Methylcholanthrene	0.022	0.045	V0	0.027	V0	0.002	V1	
Indeno(123-cd)pyrene	0.017	0.012	V1	0.081	V0	0.003	V1	
Dibenz(a,h)anthracene	0.020	0.022	V0	0.032	V0	0.002	V1	
Benzo(ghi)perylene	0.020	0.044	V0	0.067	V0	0.001	V1	
Dibenzo(a,l)pyrene	0.024	0.016	V1	0.013	V1	0.004	V1	
Dibenzo(a,i)pyrene	0.025	0.029	V0	0.030	V0	0.028	V0	
Dibenzo(a,h)pyrene	0.020	0.020	V1	0.032	V0	0.005	V1	



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		01-May	
Sample Date	01-May			01-May		01-May	
Total Air Volume (m ³)	315.99			315.98		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	9.873	V0	16.415	V0	0.127	V0
Acenaphthylene	0.011	1.077	V0	1.715	V0	0.099	V0
Acenaphthene	0.006	0.489	V0	3.343	V0	0.020	V0
Fluorene	0.007	0.376	V0	1.912	V0	0.056	V0
Phenanthrene	0.007	2.846	V0	3.912	V0	0.046	V0
Anthracene	0.017	0.155	V0	0.312	V0	0.007	V1
Acridine	0.019	0.044	V0	0.048	V0	0.002	V1
Fluoranthene	0.007	0.606	V0	0.477	V0	0.010	V0
Pyrene	0.008	0.771	V0	0.206	V0	0.008	V1
Benzo(c)phenanthrene	0.015	0.029	V0	0.013	V1	0.003	V1
Benz(a)anthracene	0.014	0.070	V0	0.064	V0	0.008	V1
Chrysene	0.013	0.190	V0	0.056	V0	0.009	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.103	V0	0.092	V0	0.003	V1
Benzo(b)fluoranthene	0.020	0.084	V0	0.022	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.089	V0	0.022	V0	0.005	V1
Benzo(a)pyrene	0.016	0.049	V0	0.022	V0	0.004	V1
3-Methylcholanthrene	0.022	0.022	V0	0.018	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.028	V0	0.022	V0	0.003	V1
Dibenz(a,h)anthracene	0.020	0.024	V0	0.017	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.083	V0	0.026	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.022	V1	0.011	V1	0.004	V1
Dibenzo(a,i)pyrene	0.025	0.029	V0	0.027	V0	0.028	V0
Dibenzo(a,h)pyrene	0.020	0.022	V0	0.018	V1	0.005	V1



Station Name	Bertha Ganter -				Travel Blank			
	Station #	Fort McKay	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date		07-May	07-May	07-May	07-May	07-May	07-May	07-May
Total Air Volume (m ³)		315.98	315.98	315.99	315.99	316	316	316
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	
Naphthalene	0.008	2.546	V0	2.156	V0	0.144	V0	
Acenaphthylene	0.011	1.866	V0	0.830	V0	0.089	V0	
Acenaphthene	0.006	0.616	V0	0.589	V0	0.094	V0	
Fluorene	0.007	0.360	V0	0.455	V0	0.065	V0	
Phenanthrene	0.007	1.072	V0	0.553	V0	0.040	V0	
Anthracene	0.017	0.120	V0	0.067	V0	0.025	V0	
Acridine	0.019	0.017	V1	0.023	V0	0.005	V1	
Fluoranthene	0.007	0.134	V0	0.135	V0	0.008	V0	
Pyrene	0.008	0.137	V0	0.121	V0	0.014	V0	
Benzo(c)phenanthrene	0.015	0.013	V1	0.010	V1	0.002	V1	
Benz(a)anthracene	0.014	0.082	V0	0.050	V0	0.009	V1	
Chrysene	0.013	0.055	V0	0.050	V0	0.007	V1	
7,12-Dimethylbenz(a)anthracene	0.013	0.022	V0	0.049	V0	0.005	V1	
Benzo(b)fluoranthene	0.020	0.017	V1	0.021	V0	0.005	V1	
Benzo(k)fluoranthene	0.013	0.017	V0	0.021	V0	0.005	V1	
Benzo(a)pyrene	0.016	0.013	V1	0.012	V1	0.002	V1	
3-Methylcholanthrene	0.022	0.009	V1	0.009	V1	0.002	V1	
Indeno(123-cd)pyrene	0.017	0.011	V1	0.011	V1	0.001	V1	
Dibenz(a,h)anthracene	0.020	0.014	V1	0.014	V1	0.001	V1	
Benzo(ghi)perylene	0.020	0.007	V1	0.008	V1	0.001	V1	
Dibenzo(a,l)pyrene	0.024	0.007	V1	0.007	V1	0.001	V1	
Dibenzo(a,i)pyrene	0.025	0.007	V1	0.008	V1	0.001	V1	
Dibenzo(a,h)pyrene	0.020	0.008	V1	0.008	V1	0.001	V1	



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		07-May	
Sample Date	07-May			07-May		07-May	
Total Air Volume (m ³)	316			315.98		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	2.799	V0	9.709	V0	0.144	V0
Acenaphthylene	0.011	1.647	V0	0.750	V0	0.089	V0
Acenaphthene	0.006	0.858	V0	2.683	V0	0.094	V0
Fluorene	0.007	0.613	V0	1.769	V0	0.065	V0
Phenanthrene	0.007	0.759	V0	3.236	V0	0.040	V0
Anthracene	0.017	0.121	V0	0.293	V0	0.025	V0
Acridine	0.019	0.015	V1	0.010	V1	0.005	V1
Fluoranthene	0.007	0.166	V0	0.592	V0	0.008	V0
Pyrene	0.008	0.204	V0	0.453	V0	0.014	V0
Benzo(c)phenanthrene	0.015	0.016	V0	0.030	V0	0.002	V1
Benz(a)anthracene	0.014	0.060	V0	0.068	V0	0.009	V1
Chrysene	0.013	0.066	V0	0.141	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.046	V0	0.023	V0	0.005	V1
Benzo(b)fluoranthene	0.020	0.024	V0	0.063	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.025	V0	0.063	V0	0.005	V1
Benzo(a)pyrene	0.016	0.018	V0	0.026	V0	0.002	V1
3-Methylcholanthrene	0.022	0.010	V1	0.011	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.013	V1	0.012	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.015	V1	0.014	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.011	V1	0.018	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.008	V1	0.008	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.011	V1	0.009	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.009	V1	0.009	V1	0.001	V1



Station Name	Bertha Ganter -						
	Station #	Fort McKay			Patricia McInnes		Travel Blank
Sample Date	AMS 1	AMS 6			AMS 6		AMS 6
Total Air Volume (m ³)	13-May	13-May			13-May		13-May
	315.99	315.99			315.99		316
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	1.112	V0	5.917	V0	0.155	V0
Acenaphthylene	0.011	0.897	V0	1.274	V0	0.040	V0
Acenaphthene	0.006	0.579	V0	0.564	V0	0.090	V0
Fluorene	0.007	0.331	V0	0.560	V0	0.068	V0
Phenanthrene	0.007	0.698	V0	0.751	V0	0.041	V0
Anthracene	0.017	0.185	V0	0.141	V0	0.016	V1
Acridine	0.019	0.017	V1	0.013	V1	0.002	V1
Fluoranthene	0.007	0.200	V0	0.170	V0	0.008	V0
Pyrene	0.008	0.232	V0	0.186	V0	0.006	V1
Benzo(c)phenanthrene	0.015	0.007	V1	0.010	V1	0.001	V1
Benz(a)anthracene	0.014	0.033	V0	0.016	V0	0.008	V1
Chrysene	0.013	0.032	V0	0.038	V0	0.008	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.029	V0	0.024	V0	0.008	V1
Benzo(b)fluoranthene	0.020	0.011	V1	0.018	V1	0.006	V1
Benzo(k)fluoranthene	0.013	0.011	V1	0.018	V0	0.006	V1
Benzo(a)pyrene	0.016	0.014	V1	0.011	V1	0.003	V1
3-Methylcholanthrene	0.022	0.015	V1	0.011	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.013	V1	0.010	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.015	V1	0.011	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.010	V1	0.008	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.007	V1	0.007	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.008	V1	0.008	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.008	V1	0.009	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		13-May	
Sample Date	13-May			13-May		13-May	
Total Air Volume (m ³)	316.01			315.86		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	2.030	V0	1.076	V0	0.155	V0
Acenaphthylene	0.011	0.520	V0	0.589	V0	0.040	V0
Acenaphthene	0.006	0.503	V0	1.266	V0	0.090	V0
Fluorene	0.007	0.332	V0	0.776	V0	0.068	V0
Phenanthrene	0.007	0.461	V0	1.160	V0	0.041	V0
Anthracene	0.017	0.121	V0	0.170	V0	0.016	V1
Acridine	0.019	0.011	V1	0.019	V0	0.002	V1
Fluoranthene	0.007	0.141	V0	0.177	V0	0.008	V0
Pyrene	0.008	0.129	V0	0.124	V0	0.006	V1
Benzo(c)phenanthrene	0.015	0.016	V0	0.014	V1	0.001	V1
Benz(a)anthracene	0.014	0.034	V0	0.021	V0	0.008	V1
Chrysene	0.013	0.034	V0	0.020	V0	0.008	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.026	V0	0.030	V0	0.008	V1
Benzo(b)fluoranthene	0.020	0.013	V1	0.012	V1	0.006	V1
Benzo(k)fluoranthene	0.013	0.013	V1	0.012	V1	0.006	V1
Benzo(a)pyrene	0.016	0.012	V1	0.013	V1	0.003	V1
3-Methylcholanthrene	0.022	0.014	V1	0.013	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.012	V1	0.011	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.017	V1	0.015	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.013	V1	0.010	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.009	V1	0.009	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.009	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.008	V1	0.001	V1



Station Name	Bertha Ganter -						
	Station #	Fort McKay			Patricia McInnes		Travel Blank
Sample Date	AMS 1	AMS 6			AMS 6		19-May
Total Air Volume (m ³)	19-May	19-May			19-May		19-May
	315.99	315.98			315.98		316
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	3.195	V0	8.621	V0	0.179	V0
Acenaphthylene	0.011	2.705	V0	1.587	V0	0.120	V0
Acenaphthene	0.006	1.615	V0	0.986	V0	0.095	V0
Fluorene	0.007	0.842	V0	1.277	V0	0.044	V0
Phenanthrene	0.007	2.262	V0	1.994	V0	0.047	V0
Anthracene	0.017	0.240	V0	0.415	V0	0.026	V0
Acridine	0.019	0.021	V0	0.020	V0	0.004	V1
Fluoranthene	0.007	0.212	V0	0.513	V0	0.005	V1
Pyrene	0.008	0.294	V0	0.463	V0	0.011	V0
Benzo(c)phenanthrene	0.015	0.015	V0	0.017	V0	0.020	V0
Benz(a)anthracene	0.014	0.068	V0	0.040	V0	0.009	V1
Chrysene	0.013	0.075	V0	0.112	V0	0.009	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.048	V0	0.043	V0	0.011	V1
Benzo(b)fluoranthene	0.020	0.041	V0	0.063	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.041	V0	0.063	V0	0.006	V1
Benzo(a)pyrene	0.016	0.017	V0	0.028	V0	0.004	V1
3-Methylcholanthrene	0.022	0.018	V1	0.014	V1	0.003	V1
Indeno(123-cd)pyrene	0.017	0.011	V1	0.010	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.019	V1	0.019	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.018	V1	0.032	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.012	V1	0.011	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.014	V1	0.013	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.013	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		19-May	
Sample Date	19-May			19-May		19-May	
Total Air Volume (m ³)	316.01			315.85		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	4.037	V0	10.792	V0	0.179	V0
Acenaphthylene	0.011	2.728	V0	3.174	V0	0.120	V0
Acenaphthene	0.006	1.141	V0	3.219	V0	0.095	V0
Fluorene	0.007	0.758	V0	2.737	V0	0.044	V0
Phenanthrene	0.007	1.483	V0	5.188	V0	0.047	V0
Anthracene	0.017	0.129	V0	0.501	V0	0.026	V0
Acridine	0.019	0.031	V0	0.030	V0	0.004	V1
Fluoranthene	0.007	0.326	V0	0.862	V0	0.005	V1
Pyrene	0.008	0.345	V0	0.588	V0	0.011	V0
Benzo(c)phenanthrene	0.015	0.011	V1	0.039	V0	0.020	V0
Benz(a)anthracene	0.014	0.030	V0	0.070	V0	0.009	V1
Chrysene	0.013	0.075	V0	0.275	V0	0.009	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.032	V0	0.057	V0	0.011	V1
Benzo(b)fluoranthene	0.020	0.041	V0	0.131	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.041	V0	0.131	V0	0.006	V1
Benzo(a)pyrene	0.016	0.014	V1	0.029	V0	0.004	V1
3-Methylcholanthrene	0.022	0.012	V1	0.015	V1	0.003	V1
Indeno(123-cd)pyrene	0.017	0.012	V1	0.033	V0	0.001	V1
Dibenz(a,h)anthracene	0.020	0.017	V1	0.017	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.014	V1	0.047	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.010	V1	0.013	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.014	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.012	V1	0.001	V1



Compound Name	Bertha Ganter -						
	Station Name	Fort McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	25-May		25-May		25-May	
Total Air Volume (m ³)		315.98		315.98		316	
	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	1.830	V0	1.907	V0	0.076	V0
Acenaphthylene	0.011	1.301	V0	1.552	V0	0.065	V0
Acenaphthene	0.006	0.994	V0	1.706	V0	0.087	V0
Fluorene	0.007	0.510	V0	0.552	V0	0.048	V0
Phenanthrene	0.007	0.815	V0	1.926	V0	0.063	V0
Anthracene	0.017	0.094	V0	0.215	V0	0.012	V1
Acridine	0.019	0.032	V0	0.029	V0	0.008	V1
Fluoranthene	0.007	0.139	V0	0.233	V0	0.007	V0
Pyrene	0.008	0.165	V0	0.291	V0	0.012	V0
Benzo(c)phenanthrene	0.015	0.017	V0	0.020	V0	0.004	V1
Benz(a)anthracene	0.014	0.121	V0	0.077	V0	0.008	V1
Chrysene	0.013	0.120	V0	0.177	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.043	V0	0.079	V0	0.007	V1
Benzo(b)fluoranthene	0.020	0.020	V0	0.051	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.020	V0	0.052	V0	0.007	V1
Benzo(a)pyrene	0.016	0.014	V1	0.018	V0	0.004	V1
3-Methylcholanthrene	0.022	0.016	V1	0.012	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.017	V0	0.025	V0	0.001	V1
Dibenz(a,h)anthracene	0.020	0.019	V1	0.016	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.017	V1	0.021	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.014	V1	0.011	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.018	V1	0.013	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.012	V1	0.012	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		25-May	
Sample Date	25-May			25-May		25-May	
Total Air Volume (m ³)	316.02			315.86		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	1.839	V0	2.504	V0	0.076	V0
Acenaphthylene	0.011	0.954	V0	1.744	V0	0.065	V0
Acenaphthene	0.006	1.144	V0	2.140	V0	0.087	V0
Fluorene	0.007	0.456	V0	1.384	V0	0.048	V0
Phenanthrene	0.007	1.142	V0	2.386	V0	0.063	V0
Anthracene	0.017	0.120	V0	0.488	V0	0.012	V1
Acridine	0.019	0.028	V0	0.012	V1	0.008	V1
Fluoranthene	0.007	0.111	V0	0.359	V0	0.007	V0
Pyrene	0.008	0.192	V0	0.203	V0	0.012	V0
Benzo(c)phenanthrene	0.015	0.018	V0	0.015	V0	0.004	V1
Benz(a)anthracene	0.014	0.027	V0	0.038	V0	0.008	V1
Chrysene	0.013	0.121	V0	0.044	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.057	V0	0.027	V0	0.007	V1
Benzo(b)fluoranthene	0.020	0.032	V0	0.009	V1	0.006	V1
Benzo(k)fluoranthene	0.013	0.032	V0	0.009	V1	0.007	V1
Benzo(a)pyrene	0.016	0.016	V0	0.015	V1	0.004	V1
3-Methylcholanthrene	0.022	0.011	V1	0.011	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.009	V1	0.010	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.015	V1	0.015	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.014	V1	0.013	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.011	V1	0.011	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.015	V1	0.010	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.010	V1	0.011	V1	0.001	V1



Compound Name	Bertha Ganter -						
	Station Name	Fort McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	31-May		31-May		31-May	
Total Air Volume (m ³)	315.98		315.98		316		
	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	2.191	V0	3.610	V0	0.113	V0
Acenaphthylene	0.011	2.095	V0	2.362	V0	0.091	V0
Acenaphthene	0.006	2.572	V0	1.145	V0	0.080	V0
Fluorene	0.007	0.876	V0	0.699	V0	0.020	V0
Phenanthrene	0.007	2.117	V0	2.293	V0	0.060	V0
Anthracene	0.017	0.355	V0	0.210	V0	0.008	V1
Acridine	0.019	0.031	V0	0.022	V0	0.010	V1
Fluoranthene	0.007	0.225	V0	0.539	V0	0.005	V1
Pyrene	0.008	0.357	V0	0.437	V0	0.007	V1
Benzo(c)phenanthrene	0.015	0.022	V0	0.017	V0	0.010	V1
Benz(a)anthracene	0.014	0.050	V0	0.109	V0	0.007	V1
Chrysene	0.013	0.222	V0	0.109	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.062	V0	0.014	V0	0.013	V1
Benzo(b)fluoranthene	0.020	0.049	V0	0.027	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.050	V0	0.027	V0	0.006	V1
Benzo(a)pyrene	0.016	0.017	V0	0.015	V1	0.005	V1
3-Methylcholanthrene	0.022	0.013	V1	0.011	V1	0.003	V1
Indeno(123-cd)pyrene	0.017	0.018	V0	0.016	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.020	V0	0.016	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.008	V1	0.006	V1	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.010	V1	0.011	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.014	V1	0.012	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.011	V1	0.010	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		31-May	
Sample Date	31-May			31-May		31-May	
Total Air Volume (m ³)	316			315.85		316	
Compound Name	MDL (ng/m ³)	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag	Results (ng/m ³)	QC Flag
Naphthalene	0.008	6.782	V0	8.418	V0	0.113	V0
Acenaphthylene	0.011	1.792	V0	1.454	V0	0.091	V0
Acenaphthene	0.006	1.075	V0	4.799	V0	0.080	V0
Fluorene	0.007	0.582	V0	4.445	V0	0.020	V0
Phenanthrene	0.007	1.408	V0	8.556	V0	0.060	V0
Anthracene	0.017	0.195	V0	1.360	V0	0.008	V1
Acridine	0.019	0.026	V0	0.014	V1	0.010	V1
Fluoranthene	0.007	0.307	V0	1.596	V0	0.005	V1
Pyrene	0.008	0.369	V0	0.734	V0	0.007	V1
Benzo(c)phenanthrene	0.015	0.015	V0	0.018	V0	0.010	V1
Benz(a)anthracene	0.014	0.023	V0	0.011	V1	0.007	V1
Chrysene	0.013	0.083	V0	0.047	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.027	V0	0.027	V0	0.013	V1
Benzo(b)fluoranthene	0.020	0.040	V0	0.021	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.041	V0	0.022	V0	0.006	V1
Benzo(a)pyrene	0.016	0.024	V0	0.013	V1	0.005	V1
3-Methylcholanthrene	0.022	0.010	V1	0.009	V1	0.003	V1
Indeno(123-cd)pyrene	0.017	0.015	V1	0.010	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.013	V1	0.022	V0	0.002	V1
Benzo(ghi)perylene	0.020	0.014	V1	0.020	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.013	V1	0.015	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.013	V1	0.014	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.012	V1	0.013	V1	0.001	V1



Station Name	Bertha Ganter - Fort McKay AMS 1	Bertha Ganter - Fort McKay AMS 1	Bertha Ganter - Fort McKay AMS 1	Bertha Ganter - Fort McKay AMS 1
Station #	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Sample Date	Average ng/m ³	Std Dev ng/m ³	Total Samples (#)	Total ≥ MDL (#)
Compound Name				
Naphthalene	2.420	0.920	6	6
Acenaphthylene	1.675	0.672	6	6
Acenaphthene	1.334	0.762	6	6
Fluorene	0.562	0.239	6	6
Phenanthrene	1.693	0.991	6	6
Anthracene	0.213	0.100	6	6
Acridine	0.046	0.055	6	4
Fluoranthene	0.225	0.112	6	6
Pyrene	0.265	0.106	6	6
Benzo(c)phenanthrene	0.016	0.005	6	4
Benz(a)anthracene	0.069	0.030	6	6
Chrysene	0.116	0.076	6	6
7,12-Dimethylbenz(a)anthracene	0.062	0.055	6	6
Benzo(b)fluoranthene	0.033	0.019	6	4
Benzo(k)fluoranthene	0.033	0.019	6	5
Benzo(a)pyrene	0.019	0.010	6	3
3-Methylcholanthrene	0.019	0.013	6	1
Indeno(123-cd)pyrene	0.014	0.003	6	2
Dibenz(a,h)anthracene	0.018	0.003	6	2
Benzo(ghi)perylene	0.017	0.014	6	1
Dibenzo(a,l)pyrene	0.011	0.004	6	0
Dibenzo(a,i)pyrene	0.015	0.008	6	1
Dibenzo(a,h)pyrene	0.011	0.004	6	0



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Compound Name	Average ng/m ³	Std Dev ng/m ³	Total Samples (#)	Total ≥ MDL (#)
Naphthalene	5.483	3.591	6	6
Acenaphthylene	1.394	0.588	6	6
Acenaphthene	0.960	0.430	6	6
Fluorene	0.691	0.298	6	6
Phenanthrene	1.917	1.236	6	6
Anthracene	0.235	0.132	6	6
Acridine	0.027	0.016	6	5
Fluoranthene	0.422	0.307	6	6
Pyrene	0.383	0.245	6	6
Benzo(c)phenanthrene	0.023	0.022	6	4
Benz(a)anthracene	0.077	0.056	6	6
Chrysene	0.128	0.090	6	6
7,12-Dimethylbenz(a)anthracene	0.062	0.055	6	6
Benzo(b)fluoranthene	0.067	0.079	6	5
Benzo(k)fluoranthene	0.067	0.079	6	6
Benzo(a)pyrene	0.024	0.019	6	3
3-Methylcholanthrene	0.014	0.007	6	1
Indeno(123-cd)pyrene	0.025	0.028	6	2
Dibenz(a,h)anthracene	0.018	0.007	6	1
Benzo(ghi)perylene	0.024	0.024	6	3
Dibenzo(a,l)pyrene	0.010	0.002	6	0
Dibenzo(a,i)pyrene	0.014	0.008	6	1
Dibenzo(a,h)pyrene	0.014	0.009	6	1



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	May 01 - May 31	May 01 - May 31	May 01 - May 31	May 01 - May 31
Compound Name	Average ng/m ³	Std Dev ng/m ³	Total Samples (#)	Total ≥ MDL (#)
Naphthalene	4.560	3.173	6	6
Acenaphthylene	1.453	0.779	6	6
Acenaphthene	0.868	0.307	6	6
Fluorene	0.520	0.161	6	6
Phenanthrene	1.350	0.830	6	6
Anthracene	0.140	0.030	6	6
Acridine	0.026	0.012	6	4
Fluoranthene	0.276	0.184	6	6
Pyrene	0.335	0.233	6	6
Benzo(c)phenanthrene	0.017	0.006	6	5
Benz(a)anthracene	0.040	0.019	6	6
Chrysene	0.095	0.055	6	6
7,12-Dimethylbenz(a)anthracene	0.049	0.029	6	6
Benzo(b)fluoranthene	0.039	0.024	6	5
Benzo(k)fluoranthene	0.040	0.026	6	5
Benzo(a)pyrene	0.022	0.014	6	4
3-Methylcholanthrene	0.013	0.005	6	1
Indeno(123-cd)pyrene	0.015	0.007	6	1
Dibenz(a,h)anthracene	0.017	0.004	6	1
Benzo(ghi)perylene	0.025	0.029	6	1
Dibenzo(a,l)pyrene	0.012	0.005	6	0
Dibenzo(a,i)pyrene	0.015	0.007	6	1
Dibenzo(a,h)pyrene	0.012	0.005	6	1



Station Name Station # Sample Date	Anzac AMS 14 May 01 - May 31 Average ng/m ³	Anzac AMS 14 May 01 - May 31 Std Dev ng/m ³	Anzac AMS 14 May 01 - May 31 Total Samples (#)	Anzac AMS 14 May 01 - May 31 Total ≥ MDL (#)
Compound Name				
Naphthalene	8.152	5.652	6	6
Acenaphthylene	1.571	0.925	6	6
Acenaphthene	2.908	1.200	6	6
Fluorene	2.171	1.287	6	6
Phenanthrene	4.073	2.584	6	6
Anthracene	0.521	0.430	6	6
Acridine	0.022	0.014	6	3
Fluoranthene	0.677	0.506	6	6
Pyrene	0.385	0.246	6	6
Benzo(c)phenanthrene	0.022	0.011	6	4
Benz(a)anthracene	0.045	0.026	6	5
Chrysene	0.097	0.096	6	6
7,12-Dimethylbenz(a)anthracene	0.042	0.027	6	6
Benzo(b)fluoranthene	0.043	0.047	6	4
Benzo(k)fluoranthene	0.043	0.047	6	4
Benzo(a)pyrene	0.019	0.007	6	3
3-Methylcholanthrene	0.013	0.003	6	0
Indeno(123-cd)pyrene	0.016	0.009	6	2
Dibenz(a,h)anthracene	0.017	0.003	6	1
Benzo(ghi)perylene	0.022	0.013	6	3
Dibenzo(a,l)pyrene	0.011	0.003	6	0
Dibenzo(a,i)pyrene	0.014	0.007	6	1
Dibenzo(a,h)pyrene	0.012	0.004	6	0



Wood Buffalo Environmental Association

PAH (ng/m³) Summary

2017 May

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99%	Max.	Mean	Std. Dev.	Median	Outlier Test
Naphthalene	100.0%	24	0	1.0762	1.8301	2.1556	3.6104	4.0369	8.6209	9.7085	10.6867	10.7921	16.4149	16.4149	5.1538	4.0664	3.6104	25.4857
Acenaphthylene	100.0%	24	0	0.5202	0.7498	0.9536	1.5521	1.6474	1.8660	2.0950	2.7048	2.7275	3.1743	3.1743	1.5233	0.7097	1.5521	5.0716
Acenaphthene	100.0%	24	0	0.4891	0.5642	0.7682	1.1443	1.2660	2.1404	2.5722	3.2187	3.3433	4.7990	4.7990	1.5178	1.0974	1.1443	7.0045
Fluorene	100.0%	24	0	0.3314	0.3602	0.4564	0.6126	0.7575	1.2775	1.3842	1.9118	2.7374	4.4446	4.4446	0.9859	0.9433	0.6126	5.7022
Phenanthrene	100.0%	24	0	0.4611	0.6977	1.0722	1.9939	2.2625	3.1951	3.2361	3.9851	5.1884	8.5558	8.5558	2.2583	1.8263	1.9939	11.3899
Anthracene	100.0%	24	0	0.0668	0.1198	0.1287	0.2102	0.2402	0.3551	0.3633	0.4879	0.5013	1.3601	1.3601	0.2773	0.2612	0.2102	1.5832
Acridine	66.7%	24	8	0.0100	0.0122	0.0167	0.0225	0.0277	0.0311	0.0317	0.0480	0.0579	0.1571	0.1571	0.0303	0.0296	0.0225	0.1780
Fluoranthene	100.0%	24	0	0.1113	0.1354	0.1703	0.3068	0.3590	0.5394	0.5922	0.8625	0.9402	1.5963	1.5963	0.4001	0.3440	0.3068	2.1201
Pyrene	100.0%	24	0	0.1210	0.1288	0.1919	0.2944	0.3573	0.4534	0.4632	0.7345	0.7710	0.8010	0.8010	0.3420	0.2071	0.2944	1.3775
Benzo(c)phenanthrene	70.8%	24	7	0.0069	0.0102	0.0139	0.0166	0.0173	0.0201	0.0219	0.0304	0.0390	0.0669	0.0669	0.0195	0.0123	0.0166	0.0810
Benz(a)anthracene	95.8%	24	1	0.0110	0.0206	0.0326	0.0596	0.0644	0.0701	0.0767	0.1093	0.1207	0.1708	0.1708	0.0580	0.0368	0.0596	0.2421
Chrysene	100.0%	24	0	0.0203	0.0335	0.0498	0.0829	0.1118	0.1769	0.1905	0.2215	0.2746	0.2809	0.2809	0.1089	0.0767	0.0829	0.4925
7,12-Dimethylbenz(a)anthracene	100.0%	24	0	0.0136	0.0225	0.0270	0.0430	0.0478	0.0624	0.0789	0.1027	0.1646	0.1700	0.1700	0.0539	0.0416	0.0430	0.2617
Benzo(b)fluoranthene	75.0%	24	6	0.0091	0.0115	0.0197	0.0316	0.0411	0.0582	0.0630	0.0836	0.1306	0.2235	0.2235	0.0455	0.0471	0.0316	0.2809
Benzo(k)fluoranthene	83.3%	24	4	0.0093	0.0117	0.0199	0.0318	0.0413	0.0581	0.0631	0.0891	0.1307	0.2234	0.2234	0.0459	0.0472	0.0318	0.2820
Benzo(a)pyrene	54.2%	24	11	0.0110	0.0123	0.0136	0.0168	0.0176	0.0260	0.0283	0.0379	0.0494	0.0607	0.0607	0.0212	0.0124	0.0168	0.0834
3-Methylcholanthrene	12.5%	24	21	0.0088	0.0093	0.0109	0.0130	0.0137	0.0157	0.0177	0.0223	0.0275	0.0446	0.0446	0.0148	0.0077	0.0130	0.0533
Indeno(123-cd)pyrene	29.2%	24	17	0.0092	0.0099	0.0106	0.0122	0.0135	0.0178	0.0218	0.0276	0.0330	0.0806	0.0806	0.0175	0.0148	0.0122	0.0916
Dibenz(a,h)anthracene	20.8%	24	19	0.0108	0.0135	0.0149	0.0165	0.0169	0.0195	0.0199	0.0222	0.0238	0.0315	0.0315	0.0174	0.0043	0.0165	0.0391
Benzo(ghi)perylene	33.3%	24	16	0.0063	0.0076	0.0103	0.0140	0.0178	0.0261	0.0318	0.0467	0.0674	0.0829	0.0829	0.0220	0.0196	0.0140	0.1201
Dibenzo(a,l)pyrene	0.0%	24	24	0.0067	0.0073	0.0088	0.0107	0.0110	0.0126	0.0129	0.0152	0.0157	0.0220	0.0220	0.0110	0.0034	0.0107	
Dibenzo(a,i)pyrene	16.7%	24	20	0.0067	0.0080	0.0099	0.0129	0.0135	0.0147	0.0181	0.0286	0.0292	0.0304	0.0304	0.0144	0.0071	0.0129	0.0500
Dibenzo(a,h)pyrene	8.3%	24	22	0.0075	0.0083	0.0093	0.0105	0.0119	0.0130	0.0131	0.0199	0.0225	0.0323	0.0323	0.0124	0.0056	0.0105	0.0406



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PRECIPITATION DATA SUMMARY MAY 2017

Prepared
July 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

Precipitation: InnoTech Alberta, Inc.
Vegreville, Alberta



ORGANIZATION ACRONYM	WBEA	
ORGANIZATION NAME	Wood Buffalo Environmental Association	
FILE CONTENTS DESCRIPTION	Precipitation Measurement of ions, pH and conductivity	
CONTACT PERSON NAME	Sanjay Prasad	1-780-799-4420
SAMPLING INTERVAL	A week	
SAMPLING FREQUENCY OF DATA	A week	
EXPLANATION OF ZERO VALUES	Zero values are contained in this file and should be treated as values below detection - Method Detection values (MDL.) are provided with each observation	
UNITS	mg/L (milligram per liter)	
OBSERVATION TYPE	Wet Precipitation	
FIELD SAMPLING OR MEASUREMENT PRINCIPLE	moveable cover with precipitation sensors	
MEDIUM	Polyethylene Collection bucket	
ANALYTICALMETHODS	pH by pH meter Conductivity by Conductivity meter IONS by Ion Chromatography (IC)	
SAMPLE PREPARATION ANALYTICAL LABORATORY	2000-2008	MAXXAM Analytics Inc
	2009-current	InnoTech Alberta Inc
USER NOTE 1	Data are not blank corrected	
SAMPLING INSTRUMENT TYPE	2000-2016 March	MIC precipitation collector
	2016 March- 2016 Sep	NTN Precip N-CON Sampler
	2016 Sep- current	Total Precipitation Collector (TPC-3000)
FLAGS USED		
V0	Valid value	
V1	Valid value but comprised wholly or partially of below detection limit data	
V4	Valid value despite failing to meet some QC or statistical criteria	
V5	Valid value but qualified because of possible contamination	
V6	Valid value but qualified due to non-standard sampling conditions	
V8	Dry Week	
V9	Insufficient sample collected for analyzes	
V10	Insufficient data to conduct all quality control checks	
M1	Missing value because no value is available	
M2	Missing value because invalidated by Data Originator	



Wood Buffalo Environmental Association
Precipitation summary

2017 May

Fort McKay-Bertha Ganter AMS 1	Start Date End Date Dry Week Precip	02-May-17 10-May-17			10-May-17 17-May-17			17-May-17 24-May-17			24-May-17 05-Jun-17		
		X			X			X			X		
		Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag
Acidity	µeq/L	18	2	V0	17	2	V0	16	2	V0	18	2	V0
Ammonium	mg/L	0.792	0.009	V0	0.162	0.009	V0	0.695	0.009	V0	0.415	0.009	V0
Bicarbonate (calc)	µeq/L	57.3			13.1			23.3			5.47		
Calcium	mg/L	2.48	0.005	V0	0.243	0.005	V0	0.468	0.005	V0	0.316	0.005	V0
Chloride	mg/L	0.641	0.004	V0	0.096	0.004	V0	0.253	0.004	V0	0.091	0.004	V0
Conductivity (25°C)	µS/cm	23	1	V0	3	1	V0	9	1	V0	7	1	V0
Conductivity (calc)	µS/cm	25.4			3.43			9.25			6.39		
Conductivity Difference %		2.4		V0	22.5		V0	-0.849		V0	-10.7		V0
Magnesium	mg/L	0.314	0.009	V0	0.05	0.009	V0	0.093	0.009	V0	0.701	0.069	V0
Nitrate	mg/L	2.47	2.47	V0	0.221	0.004	V0	0.0882	0.004	V0	0.843	0.004	V0
pH		7.05			6.41			6.66			6.03		
Phosphate	mg/L	<0.04	0.04	V1	<0.04	0.04	V1	<0.04	0.04	V1	<0.04	0.04	V1
Potassium	mg/L	0.3	0.006	V0	0.116	0.006	V0	0.133	0.006	V0	0.111	0.006	V0
Sodium	mg/L	0.395	0.006	V0	0.027	0.006	V0	0.149	0.006	V0	0.042	0.006	V0
Sulfate	mg/L	3.17	0.004	V0	0.307	0.004	V0	0.871	0.004	V0	0.806	0.004	V0
Sum Anions	µeq/L	181			25.8			62.8			39.2		
Sum Cations	µeq/L	218			29.7			79.7			50.1		
Total Ions	µeq/L	399			55.5			142.5			89.3		
Ion Difference	%	9.33		V0	7.1		-	11.8		V0	12.1		-
Ion Difference	µeq/L	37		-	3.9		V0	16.9		-	10.9		V0



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