



Wood Buffalo Environmental Association

JULY 2017

MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
August 30, 2017

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



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August 30, 2017

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

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Enclosed is the July 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 25 - Waskōw ohci Pimâtisiwin
AMS 500 - Christina Lake
AMS 502 - Surmont
AMS 505 - Sawbones Bay

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

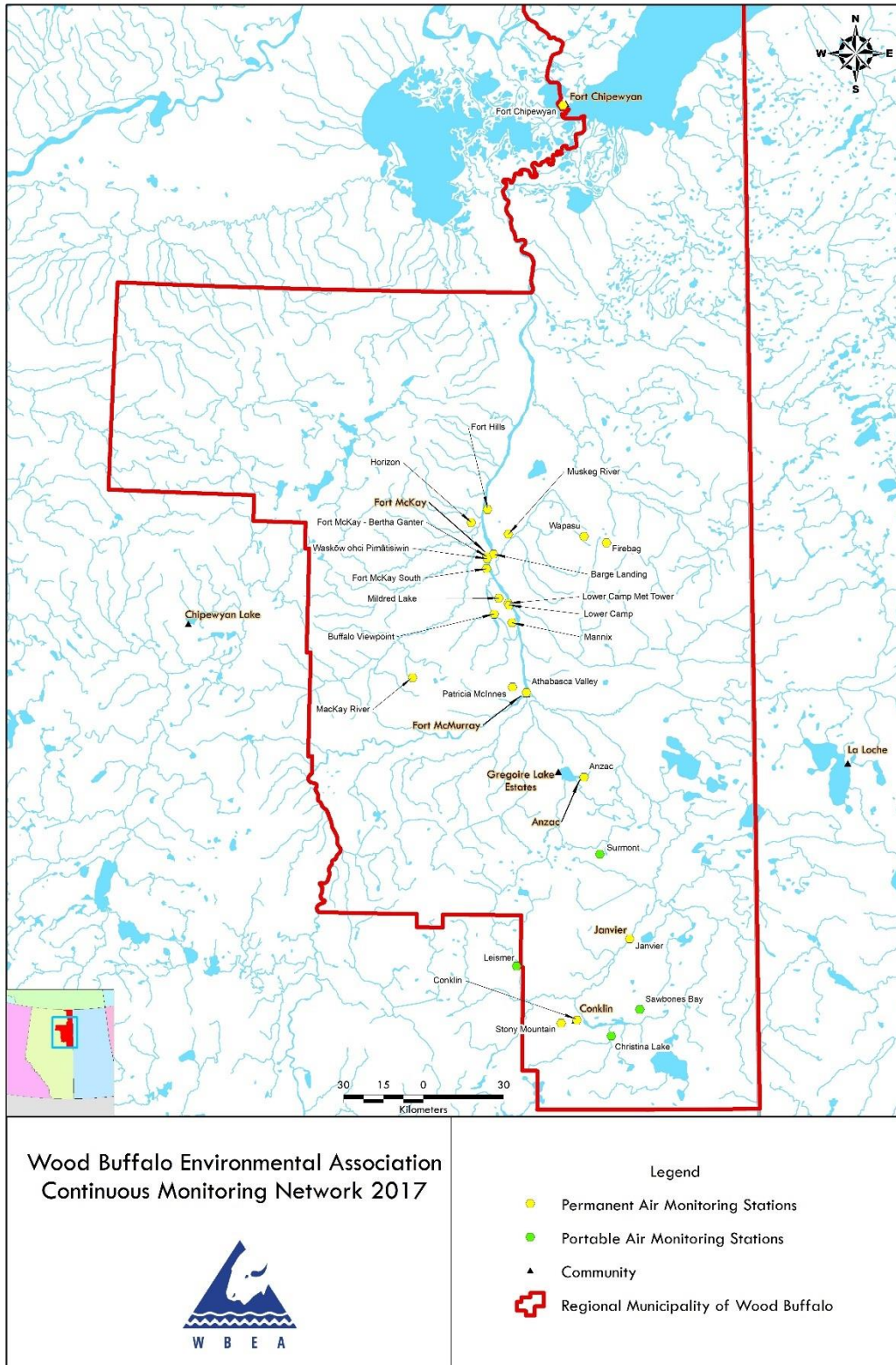


Figure 1: Map of WBEA Continuous Monitoring Network.

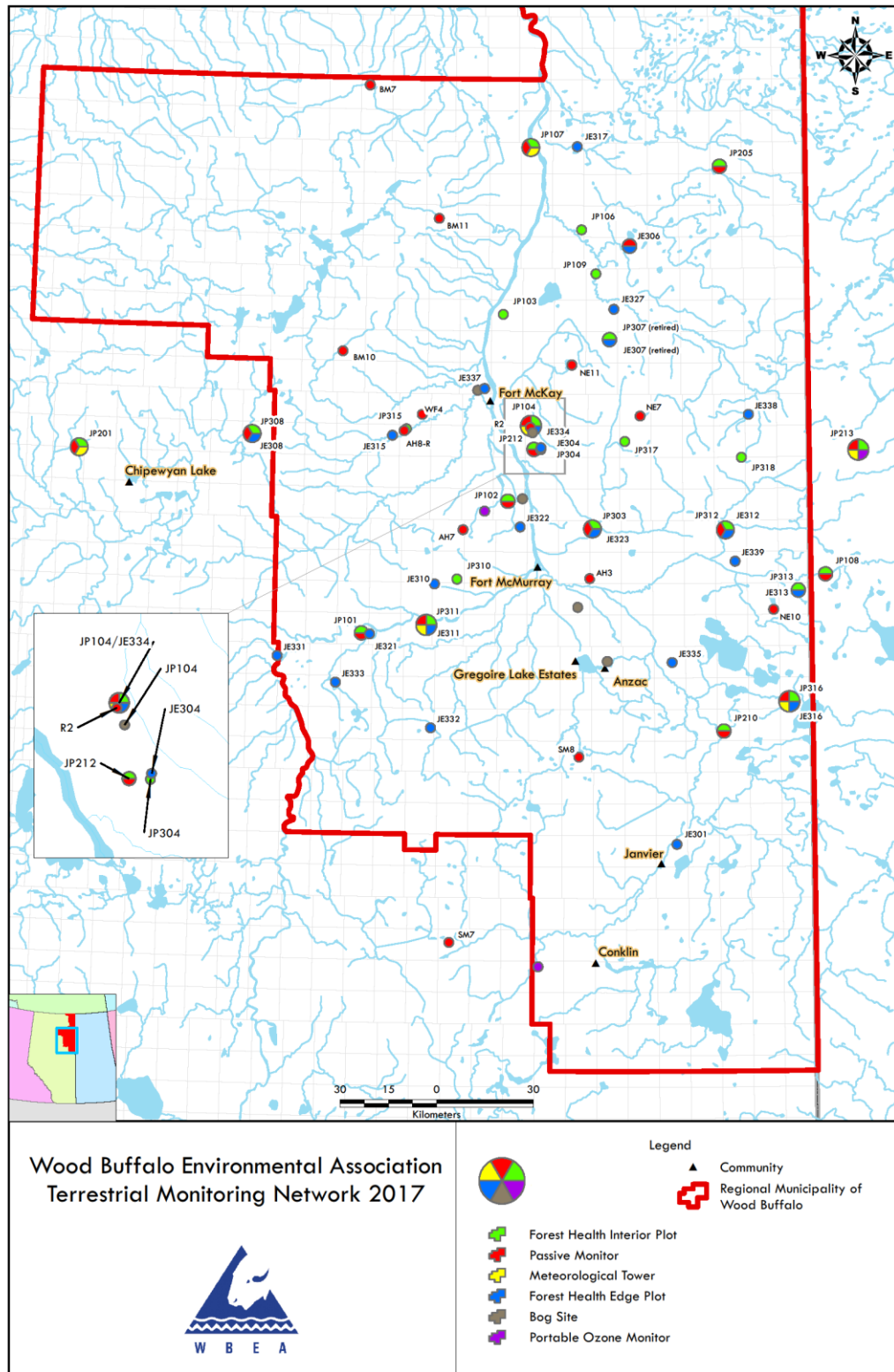


Figure 2: Map of WBEA Terrestrial Monitoring Network.

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, PM_{2.5}, O₃, NH₃, NO₂, and SO₂.

There were 7 ambient ground level concentrations in excess of the 1-hour and 24-hour H₂S air quality objectives reported to the Energy and Environmental Response Centre in real time. After data processing to account for analyzer drift with baseline correction, there were 5 concentrations in excess of the 1-hour H₂S air quality objective and 1 concentration in excess of the 24-hour H₂S 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 5 Mannix	H ₂ S	14July17, 24:00	326980	1hr	10	10	nae
AMS 5 Mannix	H ₂ S	15July17, 01:00	326981	1hr	32	32	exc
AMS 5 Mannix	H ₂ S	15July17, 02:00	326981	1hr	17	17	exc
AMS 5 Mannix	H ₂ S	16July17, 04:00	327010	1hr	13	13	exc
AMS 5 Mannix	H ₂ S	16July17, 05:00	327010	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	20July17, 01:00	327241	1hr	14	14	exc
AMS 5 Mannix	H ₂ S	24July17, 24:00	327445	24hr	5	4.8	exc

*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, NO₂ 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 NO₂ concentration. In cases where the NO_x and/or NO values exceeded the operating range of the analyzer, values reported for NO₂ were determined as the largest of either the difference between baseline-corrected NO_x and NO values, or the NO₂ 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 July 2017, there were 2 instances of a compliance monitoring instrument operating less than 90% of the time.

1. The ammonia (NH₃) analyzer at Fort McKay – Bertha Ganter AMS operated less than 90% of the time in July 2017, which is a contravention of the Air Monitoring Directive (1989, as amended), Chapter 6, Clause DQ 4-C.

Ammonia gas used to perform daily span checks has a long residency period in the analyzer, which requires additional stabilization time to return to ambient conditions. Throughout the month of July, 2 to 4 hours each day were flagged as invalid data following each daily span check, for a total of 70 hours of stabilization time. Three power outages at the air monitoring station contributed to an additional 18 hours of operational downtime.

In July 2017, the NH₃ analyzer at Fort McKay – Bertha Ganter AMS operated for 88% of the reporting period. This incident was reported to Alberta Environment and Parks on August 23, 2017 (reference number 328738).

2. The hydrogen sulphide (H₂S) analyzer at Lower Camp AMS operated less than 90% of the time in July 2017, which is a contravention of the Air Monitoring Directive (1989, as amended), Chapter 6, Clause DQ 4-C.

The HVAC unit in the air monitoring station failed on June 29, and was repaired on June 30. However, the elevated internal station temperature during that period affected the baseline response of the analyzer until July 4 when it was re-calibrated, resulting in data loss.

In July 2017, the H₂S analyzer at Lower Camp AMS operated for 89% of the reporting period. This incident was reported to Alberta Environment and Parks on August 23, 2017 (reference number 328739).

In July 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 for June 2017 are included with this report.

3.0 Monitoring Notes

General Network Notes

WBEA commissioned two new air monitoring stations in July 2017. A permanent air monitoring station was commissioned in Fort McKay at the Environment and Climate Change Canada Oski-Otin air monitoring compound on July 5, 2017. Waskōw ohci Pimâtisiwin air monitoring station was deployed to support the recommendations of the Recurrent Human Health Complaint Technical Report – Fort McKay (2016) by monitoring SO₂ and H₂S for acute emergency events. The purpose of this is to alert the Alberta Energy Regulator, Alberta Environment and Parks, and the community of Fort McKay to levels of SO₂ and H₂S that exceed certain thresholds, which may pose a risk to human health. At this station, H₂S is monitored at a higher range (0-1000 ppb) than typical compliance analyzers throughout the WBEA network in order to respond to a greater range of ambient concentrations. Temperature, wind speed and direction, and relative humidity are also continuously measured.

A portable air monitoring station, Sawbones Bay, was commissioned at the MEG Energy Christina Lake oil sands project on July 1, 2017. This station is equipped with ambient air quality analyzers for SO₂, TRS, THC, NO, NO₂, and NO_x. 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

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 70 hours this month.

Power outages occurring at the station on July 4, 15, and 22 affected the normal operations of all air quality analyzers for 6 to 9 hours, 1 to 3 hours, and 6 to 8 hours on each respective day.

Due to linearity issues associated with the calibration system ozone generator, maintenance to recalibrate the O₃ analyzer on July 21 interrupted the routine operation of the O₃ analyzer for 3 hours.

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

An internal WBEA audit on July 31 interrupted the normal operations of all air quality analyzers for 2 hours.

A power outage at the station on July 22 affected the normal operations of all analyzers for 2 to 3 hours.

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

Station 3, Lower Camp - Meteorology

No operational issues to report this month.

Station 4, Buffalo Viewpoint

Maintenance and cleaning of the sample manifold on July 17 interrupted the normal operation of the H₂S analyzer for 1 hour.

A new calibrator was installed at the station on July 25. Maintenance to verify span responses interrupted the normal operations of all air quality analyzers for 1 to 2 hours.

Station 5, Mannix

Station temperature fluctuations on July 2, 3, and 4 affected the normal operation of the THC analyzer for 43 hours.

Maintenance and cleaning of the sample manifold on July 7 interrupted the normal operations of the SO₂ and THC analyzers for 1 hour.

Flat lines in output signals of the sonic wind sensors at 75 and 90 m elevations resulted in 1 hour of downtime for each respective sensor.

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 54 hours this month.

Station operator activities on July 4 affected the normal operation of the TRS analyzer for one hour.

Unstable operation due to baseline drift on July 5 affected the normal operation of the TRS analyzer for 1 hour this month.

Station 7, Athabasca Valley

A power outage at the station on July 11 affected the normal operation of all analyzers for 1 hour.

The automated daily zero/span response of the TRS analyzer did not meet operational criteria on July 9. Troubleshooting, repairs, and analyzer calibration resulted in 22 hours of invalid data this reporting period.

Sample pump failure and maintenance to replace the pump on July 14 and 15 interrupted the routine operation of the NO₂ analyzer for 33 hours.

Numerous instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 19 hours this month.

Station 8, Fort Chipewyan

Numerous instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 22 hours this month.

Maintenance to replace the temperature and relative humidity sensors on July 12 resulted in 2 hours of invalid data.

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

Station 9, Barge Landing

Due to a zero-air generator failure, the daily zero/span point on July 4 was affected and interrupted the routine operation of the TRS analyzer for 1 hour.

Zero-air generator failure on July 4 caused the FID flame to go out and resulted in an interruption of the THC analyzer for 4 hours.

Flat-lines in the output signal of the wind sensor resulted in 6 hours of invalid data this reporting period.

Station 11, Lower Camp

Station temperature fluctuations on July 1 affected the normal operation of all air quality analyzers for 1 hour this reporting period. Temperature fluctuations caused excessive baseline drift in the H₂S analyzer, affecting the normal operation of the analyzer for an additional 81 hours this month.

On July 10, the THC analyzer was calibrated to address baseline shift due to fluctuating station temperature. This resulted in 3 hours of downtime this reporting period.

Maintenance and cleaning of the sample manifold on July 5 interrupted the normal operation of the H₂S analyzer for 1 hour.

Station 13, Fort McKay South

An internal WBEA audit on July 24 and 25 interrupted the normal operations of all air quality analyzers for 2 to 3 hours.

A power outage at the station on July 21 affected the normal operation of all analyzers for 7 hours.

Maintenance and cleaning of the sample manifold on July 10 interrupted the normal operations of the O₃ and TRS analyzers for 1 hour.

Confirmation of reference points for O₃ calibration on July 18 interrupted the normal operation of the NO₂ analyzer for 3 hours.

Unstable operation due to baseline drift on July 30 affected the normal operation of the PM_{2.5} analyzer for 1 hour.

Station 14, Anzac

Replacement of the carrier gas on July 25 interrupted the routine operation of the THC analyzer for 1 hour.

Flat-lines in the output signal of the wind sensor resulted in 3 hours of invalid data this reporting period.

Station 15, Horizon

Maintenance to the data acquisition system on July 13 interrupted the normal operation of all air quality analyzer and meteorological parameters for 2- 3 hours.

The nightly zero/span did not occur for the NO₂, SO₂, and THC analyzers on July 28. Maintenance to reinitiate daily zero/span checks affected the normal operation of these analyzers for a total of 2-3 hours this month.

Station 16, Muskeg River

A power outage at the station on July 20 affected the normal operation of all analyzers for 1 hour.

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the THC analyzer for 5 hours this month.

There were two issues associated with operation of the NO₂ analyzer resulting in 55 hours of invalid data this month. On July 17, the automated daily zero/span response of the NO₂ analyzer did not meet

operational criteria. On-site investigation revealed low sample flow, which required pump replacement and analyzer calibration. Data was flagged from the last valid daily span on July 16 until maintenance was completed on July 17, resulting in 34 hours of invalid data. On July 18, it was discovered that the newly deployed pump had failed. Downtime associated with the failed pump as well as maintenance to replace the pump and recalibrate on July 18 interrupted the operation of the NO₂ analyzer for an additional 21 hours.

Station 17, Wapasu

A power outage at the station on July 21 and 22 affected the normal operation of all meteorological sensors for 15 hours and all air quality analyzers for 27 to 31 hours.

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

Station 18, Stony Mountain

The automated daily zero/span response of the TRS analyzer did not meet operational criteria on July 28. Maintenance to reinitiate span check affected the normal operations the analyzer for 1 hour.

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

Station 19, Firebag

An internal WBEA audit taking place July 27 and 28 interrupted the normal operations of all air quality analyzers for 2 to 3 hours.

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 9 hours this reporting period.

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

Station 21, Conklin

Sample pump failure and maintenance to replace the pump on July 1 interrupted the routine operation of the NO₂ analyzer for 12 hours.

Maintenance and cleaning of the sample manifold on July 12 interrupted the normal operations of the TRS, NO₂, SO₂, and THC analyzers for 1 hour.

Depletion and replacement of the carrier gas, stabilization time, and re-calibration on July 22 interrupted the routine operation of the THC analyzer for 23 hours.

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

Station 22, Janvier

Depletion and replacement of the hydrogen cylinder and re-calibration on July 20 interrupted the routine operation of the THC analyzer for 43 hours.

There were three issues with the operation of the TRS analyzer resulting in 43 hours of invalid data this month. Maintenance to re-initiate the daily zero/span response interrupted the normal operation of the TRS analyzer for 2 hours. Analyzer failure due to a faulty TRS converter on July 27 and maintenance to replace the converter on July 28 resulted in 35 hours of invalid data. Maintenance to the daily zero/span system on July 31 interrupted the routine operation of the TRS analyzer for 6 hours.

Flat-lines in the output signal of the PM_{2.5} analyzer resulted in 8 hours of invalid data this reporting period. Sample pump failures on July 18 and 20 interrupted the normal operation of the PM_{2.5} analyzer for a total of 9 hours. Unstable operation due to excessive baseline shift following automated sample tape changes affected the routine operation of the PM_{2.5} analyzer for 29 hours.

Station 23, Fort Hills

Maintenance and cleaning of the sample manifold on July 11 interrupted the normal operation of the H₂S analyzer for 1 hour.

Two instances of unstable operation due to baseline drift affected the normal operation of the THC analyzer for 4 hours this month.

Numerous instances of unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 24 hours this reporting period.

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

Station 25, Waskōw ohci Pimâtisiwin

This station officially commenced operation on July 5, 2017.

A power outage at the station on July 21 affected the normal operations of all analyzers for 4 to 8 hours.

The H₂S analyzer was recalibrated on July 14 to address baseline drift, interrupting the routine operation of the analyzer for 6 hours.

Station 500, Christina Lake

Maintenance and cleaning of the sample manifold on July 20 interrupted the normal operation of the H₂S analyzer for 1 hour.

On July 23, the automated daily zero/span response of the NO₂ analyzer did not meet operational criteria. On-site investigation revealed low sample flow, which required pump replacement and analyzer recalibration. Data was flagged from the last valid daily span on July 23 until maintenance was completed on July 24, resulting in 38 hours of invalid data.

Station 502, Surmont

Maintenance and cleaning of the sample manifold on July 28 interrupted the normal operation of the NO₂ and SO₂ analyzers for 1 hour.

Three instances of unstable operation due to baseline drift throughout the month affected the normal operation of the H₂S analyzer for 4 hours this month.

Flat-lines in the output signal of the wind sensor resulted in 13 hours of invalid data this reporting period.

Station 505, Sawbones Bay

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

A power outage at the station on July 28 affected the normal operations of all analyzers for 1 to 2 hours.

Maintenance and cleaning of the sample manifold on July 28 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

Emilie Briggs
Air Program Coordinator

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

JULY 2017
page 1 of 3
Prepared: Aug 30 2017 8:20

APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	7	2017					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
254465-00-00							
149968-01-00							
48522-01-00							
240008-00-00			ONE-HOUR AVERAGE		24-HOUR AVERAGE		
48263-01-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
151469-01-00	SO2(ppm)	1	97.85	0.021	0	0.004	0
224816-00-00	SO2(ppm)	2	99.46	0.044	0	0.009	0
189942-00-00	SO2(ppm)	4	99.73	0.016	0	0.002	0
206355-00-00	SO2(ppm)	5	99.87	0.088	0	0.018	0
46586-00-00	SO2(ppm)	6	100.00	0.012	0	0.003	0
73203-02-00	SO2(ppm)	7	99.87	0.009	0	0.002	0
216466-01-00	SO2(ppm)	8	100.00	0.002	0	0.000	0
137467-01-00	SO2(ppm)	11	99.87	0.087	0	0.010	0
236394-00-00	SO2(ppm)	13	98.79	0.027	0	0.005	0
20809-01-00	SO2(ppm)	14	100.00	0.007	0	0.001	0
094-02-00	SO2(ppm)	15	99.87	0.017	0	0.003	0
305529-00-00	SO2(ppm)	16	99.87	0.020	0	0.003	0
026-02-00	SO2(ppm)	17	95.97	0.023	0	0.002	0
228044-00-00	SO2(ppm)	18	100.00	0.001	0	0.000	0
	SO2(ppm)	19	99.73	0.009	0	0.002	0
	SO2(ppm)	20	100.00	0.007	0	0.001	0
	SO2(ppm)	21	99.87	0.002	0	0.001	0
	SO2(ppm)	22	100.00	0.001	0	0.000	0
	SO2(ppm)	23	100.00	0.019	0	0.003	0
	SO2(ppm)	25	98.75	0.019	0	0.004	0
	SO2(ppm)	500	100.00	0.043	0	0.006	0
	SO2(ppm)	502	99.87	0.016	0	0.004	0
	SO2(ppm)	505	99.87	0.023	0	0.004	0
	H2S(ppm)	2	99.46	0.006	0	0.002	0
	H2S(ppm)	4	99.73	0.003	0	0.001	0
	H2S(ppm)	5	100.00	0.032	5	0.005	1
	H2S(ppm)	11	88.84	0.008	0	0.002	0
	H2S(ppm)	17	96.24	0.001	0	0.000	0
	H2S(ppm)	19	99.73	0.003	0	0.000	0
	H2S(ppm)	20	98.79	0.002	0	0.000	0
	H2S(ppm)	25	97.80	0.002	0	0.001	0
	H2S(ppm)	500	99.87	0.002	0	0.000	0
	H2S(ppm)	502	99.46	0.003	0	0.002	0
	H2S(ppm)	505	99.73	0.003	0	0.001	0
	TRS(ppm)	1	98.25	0.003	0	0.001	0
	TRS(ppm)	6	99.73	0.002	0	0.001	0
	TRS(ppm)	7	97.04	0.002	0	0.001	0
	TRS(ppm)	9	98.92	0.003	0	0.001	0
	TRS(ppm)	13	98.66	0.003	0	0.001	0
	TRS(ppm)	14	100.00	0.006	0	0.001	0
	TRS(ppm)	15	99.60	0.002	0	0.001	0
	TRS(ppm)	18	99.87	0.000	0	0.000	0
	TRS(ppm)	21	99.87	0.001	0	0.000	0
	TRS(ppm)	22	94.22	0.001	0	0.000	0
	TRS(ppm)	23	99.87	0.003	0	0.001	0
	THC(ppm)	1	97.72	5.5	-	2.3	-
	THC(ppm)	2	99.33	6.9	-	3.1	-
	THC(ppm)	4	99.73	3.5	-	2.7	-
	THC(ppm)	5	94.09	6.5	-	2.6	-
	THC(ppm)	6	100.00	2.7	-	2.1	-
	THC(ppm)	7	99.87	2.9	-	2.1	-
	THC(ppm)	9	98.52	3.3	-	2.4	-
	THC(ppm)	11	99.46	4.1	-	2.7	-
	THC(ppm)	13	98.79	3.7	-	2.5	-
	THC(ppm)	14	99.87	2.7	-	2.2	-
	THC(ppm)	15	99.87	4.8	-	2.7	-
	THC(ppm)	16	99.19	4.6	-	2.9	-
	THC(ppm)	17	96.10	2.8	-	2.3	-
	THC(ppm)	18	100.00	2.3	-	2.1	-
	THC(ppm)	19	99.73	2.8	-	2.3	-
	THC(ppm)	20	100.00	2.9	-	2.3	-
	THC(ppm)	21	96.77	2.8	-	2.1	-
	THC(ppm)	22	94.22	2.4	-	2.1	-
	THC(ppm)	23	99.46	4.0	-	2.0	-


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

JULY 2017
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	7	2017					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
254465-00-00							
149868-01-00				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
48522-01-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
240008-00-00	THC(ppm)	505	99.73	7.9	-	2.9	-
48263-01-00	O3(ppm)	1	97.72	0.051	0	0.031	-
151469-01-00	O3(ppm)	6	100.00	0.060	0	0.041	-
224816-00-00	O3(ppm)	7	99.87	0.063	0	0.041	-
189942-00-00	O3(ppm)	8	100.00	0.050	0	0.037	-
206355-00-00	O3(ppm)	13	98.66	0.051	0	0.031	-
46586-00-00	O3(ppm)	14	100.00	0.058	0	0.037	-
73203-02-00	O3(ppm)	17	96.37	0.062	0	0.041	-
216466-01-00	O3(ppm)	18	100.00	0.063	0	0.047	-
137467-01-00	O3(ppm)	21	100.00	0.062	0	0.038	-
236394-00-00	O3(ppm)	22	100.00	0.068	0	0.044	-
20809-01-00	NO2(ppm)	1	97.98	0.022	0	0.006	-
094-02-00	NO2(ppm)	6	100.00	0.012	0	0.005	-
305529-00-00	NO2(ppm)	7	95.43	0.013	0	0.006	-
026-02-00	NO2(ppm)	8	100.00	0.003	0	0.001	-
228044-00-00	NO2(ppm)	13	98.39	0.024	0	0.007	-
	NO2(ppm)	14	100.00	0.008	0	0.002	-
	NO2(ppm)	15	99.87	0.027	0	0.008	-
	NO2(ppm)	16	92.47	0.034	0	0.013	-
	NO2(ppm)	17	95.83	0.014	0	0.003	-
	NO2(ppm)	18	100.00	0.004	0	0.001	-
	NO2(ppm)	19	99.60	0.016	0	0.004	-
	NO2(ppm)	20	100.00	0.011	0	0.002	-
	NO2(ppm)	21	98.25	0.014	0	0.005	-
	NO2(ppm)	22	100.00	0.002	0	0.001	-
	NO2(ppm)	23	100.00	0.029	0	0.009	-
	NO2(ppm)	500	94.89	0.019	0	0.004	-
	NO2(ppm)	502	99.87	0.032	0	0.008	-
	NO2(ppm)	505	99.87	0.015	0	0.006	-
	CO(ppm)	7	99.87	0.3	0	0.2	-
	NH3(ppm)	1	88.17	0.000	0	0.000	-
	NH3(ppm)	6	92.74	0.000	0	0.000	-
	PM2.5(ug/m3)	1	98.12	41.6	-	17.9	0
	PM2.5(ug/m3)	6	100.00	29.1	-	14.5	0
	PM2.5(ug/m3)	7	97.31	68.0	-	19.1	0
	PM2.5(ug/m3)	8	97.04	45.2	-	15.0	0
	PM2.5(ug/m3)	13	98.79	41.2	-	18.4	0
	PM2.5(ug/m3)	14	100.00	51.5	-	15.3	0
	PM2.5(ug/m3)	15	99.73	36.8	-	16.9	0
	PM2.5(ug/m3)	16	99.87	81.1	-	20.7	0
	PM2.5(ug/m3)	17	96.37	32	-	14.9	0
	PM2.5(ug/m3)	18	100.00	28.3	-	14.2	0
	PM2.5(ug/m3)	21	100.00	125.9	-	24	0
	PM2.5(ug/m3)	22	93.82	39	-	14.2	0
	PM2.5(ug/m3)	23	96.77	122	-	21	0
	WIND	1	100.00	-	-	-	-
	WIND	2	99.87	-	-	-	-
	WIND	4	100.00	-	-	-	-
	WIND	5	100.00	-	-	-	-
	WIND	6	100.00	-	-	-	-
	WIND	7	100.00	-	-	-	-
	WIND	8	99.87	-	-	-	-
	WIND	9	99.19	-	-	-	-
	WIND	11	100.00	-	-	-	-
	WIND	13	100.00	-	-	-	-
	WIND	14	99.60	-	-	-	-
	WIND	15	99.73	-	-	-	-
	WIND	16	100.00	-	-	-	-
	WIND	17	97.72	-	-	-	-
	WIND	18	99.87	-	-	-	-
	WIND	19	100.00	-	-	-	-
	WIND	20	99.73	-	-	-	-
	WIND	21	99.87	-	-	-	-
	WIND	22	100.00	-	-	-	-
	WIND	502	100.00	-	-	-	-

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

JULY 2017
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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	7	2017					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
254465-00-00				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
149968-01-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
48522-01-00	WIND	23	98.66	-	-	-	-
240008-00-00	WIND	25	99.37	-	-	-	-
48263-01-00	WIND	500	100.00	-	-	-	-
151469-01-00	WIND	502	98.25	-	-	-	-
224816-00-00	WIND	505	100.00	-	-	-	-
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	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
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY - BERTHA GANTER (AMS 1)
 JULY 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	693	35	51	97.85	21	0	4	0
TRS(ppb) Average	697	34	47	98.25	3	0	1	0
THC(ppm) Average	692	35	52	97.72	5.5	-	2.3	-
NMHC(ppm) Average	692	35	52	97.72	3.436	-	0.239	-
CH4(ppm) Average	692	35	52	97.72	2.5	-	2.1	-
O3 (ppb) Average	690	37	54	97.72	51	0	31	-
NO2 (ppb) Average	693	36	51	97.98	22	0	6	-
NO (ppb) Average	693	36	51	97.98	21	-	3	-
NOX (ppb) Average	693	36	51	97.98	38	-	8	-
NH3 (ppb) Average	609	47	135	88.17	0	0	0	-
PM2.5 (ug/m3) Average	728	2	16	98.12	41.6	-	17.9	0
Wind Speed 10 m (km/h) Average	744	0	0	100	27	-	18	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100	32.3	-	24.4	-
Temperature 10 m (C) Average	744	0	0	100	31.8	-	24.6	-
Relative Humidity (%) Average	744	0	0	100	99	-	77	-
Precipitation (mm) Total	744	0	0	100	2.3	-	4.8	-
Leaf Wetness (% of range) Average	744	0	0	100	80	-	21	-
Global Solar Radiation (W/m2) Average	744	0	0	100	897	-	337	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS 1)
 JULY 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	693	0.8	2	-	0	0	0	0	0	1	21
TRS (ppb) Average	697	0.5	0	-	0	0	0	0	0	1	3
THC (ppm) Average	692	2.08	0.2	-	1.9	1.9	1.9	2	2.2	2.4	5.5
NMHC(ppm) Average	692	0.077	0.178	-	0	0	0	0	0.1	0.2	3.436
CH4(ppm) Average	692	2	0.1	-	1.9	1.9	1.9	2	2.1	2.2	2.5
O3 (ppb) Average	690	21.9	11	-	0	6	14	22	29	36	51
NO2 (ppb) Average	693	2.6	3	-	0	0	0	1	4	8	22
NO (ppb) Average	693	0.7	2	-	0	0	0	0	0	2	21
NOX (ppb) Average	693	3.3	5	-	0	0	0	1	5	9	38
NH3 (ppb) Average	609	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	728	8.42	6.7	-	0.3	1.7	3.2	6.7	12	17.5	41.6
Wind Speed 10 m (km/h) Average	744	7.8	5	-	1	3	4	7	10	15	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	744	19.64	5.3	-	5.3	13.1	15.5	19.1	23.7	26.8	32.3
Temperature 10 m (C) Average	744	19.74	4.9	-	7.2	13.5	16.1	19.4	23.1	26.2	31.8
Relative Humidity (%) Average	744	62.4	20	-	24	36	46	61	78	92	99
Precipitation (mm) Total	744	-	-	18.78	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	744	2.3	10	-	-2	-1	-1	-1	0	8	80
Global Solar Radiation (W/m2) Average	744	246.2	265	-	0	0	1	143	456	689	897

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, O3, PM 2.5, SO2, TRS	04 Jul 2017 07:00	04 Jul 2017 12:00	6	Station power failure
THC	04 Jul 2017 07:00	04 Jul 2017 13:00	7	Station power failure
NH3	04 Jul 2017 05:00	04 Jul 2017 13:00	9	Station power failure
O3, PM2.5, TRS	15 Jul 2017 16:00	15 Jul 2017 16:00	1	Station power failure
NH3, NO2, THC	15 Jul 2017 16:00	15 Jul 2017 17:00	2	Station power failure
SO2	15 Jul 2017 16:00	15 Jul 2017 18:00	3	Station power failure
TRS	21 Jul 2017 21:00	22 Jul 2017 02:00	6	Station power failure
NH3, NO2, O3, PM 2.5, SO2	21 Jul 2017 20:00	22 Jul 2017 02:00	7	Station power failure
THC	21 Jul 2017 20:00	22 Jul 2017 03:00	8	Station power failure
O3	21 Jul 2017 11:00	21 Jul 2017 13:00	3	Maintenance - analyzer recalibration
NH3	01 Jul 2017 06:00	31 Jul 2017 07:00	70	Stabilization after daily span



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay - Bertha Ganter - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 21 ppb on Jul 9 11:00	Maximum Daily Average: 4.0 ppb on Jul 21		Hours of Data:	693
Minimum Value: 0 ppb on Jul 5 18:00	Minimum Daily Average: 0.1 ppb on Jul 5		Hours of Missing Data:	51
Maximum Diurnal Average: 2.3 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 0.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 11		Percent Operational Time:	97.9

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-Jul	0	Z	0	0	0	0	0	2	1	3	2	4	4	2	0	0	1	1	2	2	1	1	1	0	1.3	4
2-Jul	0	0	Z	1	1	0	1	4	2	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0.7	4
3-Jul	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-Jul	0	0	0	0	Z	0	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	--	0
5-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	1	0	4	1	0	0	0	6	2	1	0	0	0	0	0	0	0.8	6
9-Jul	0	0	0	Z	0	0	0	2	4	8	21	3	1	1	2	2	3	2	3	2	3	2	1	0	2.5	21
10-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	2	0	0	0	0	0	0	0.5	2
11-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
12-Jul	Z	0	0	0	0	0	0	1	1	6	6	11	3	5	1	7	12	1	6	2	1	1	1	1	2.9	12
13-Jul	1	Z	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jul	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.2	0
15-Jul	0	0	0	Z	0	0	0	1	11	12	4	2	1	4	2	PF	PF	PF	1	1	1	3	3	2	2.4	12
16-Jul	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
17-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	1	2	0	0	0	0	1	1	1	0	0	1	0	0	0	0.5	2
21-Jul	0	0	0	Z	0	0	0	0	0	1	20	14	4	3	12	7	1	6	1	PF	PF	PF	PF	PF	4.0	20
22-Jul	PF	PF	1	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
23-Jul	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
24-Jul	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0.5	1
25-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0.4	1
26-Jul	0	0	Z	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	0.6	1
27-Jul	1	1	1	Z	1	1	4	3	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0.9	4
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	2	2	1	1	1	0	0	0	0	0.5	2
30-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	1	17	8	4	6	3	0	0	0	0	0	0	2.0	17
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.4	1

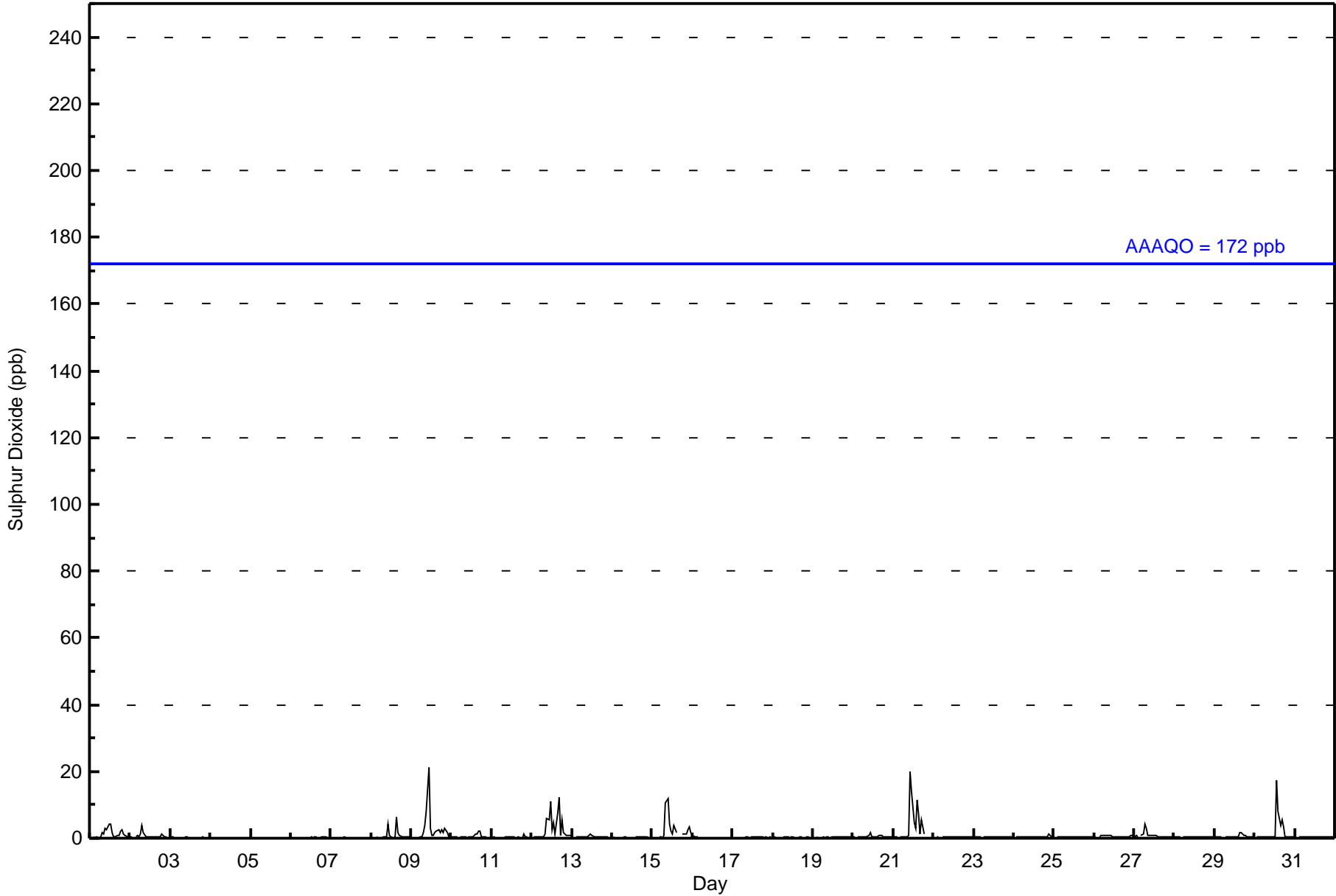
0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.6	0.9	1.3	2.3	1.5	0.7	1.3	1.1	1.3	1.2	0.7	0.7	0.6	0.5	0.5	0.4	0.4	Diurnal Average
1	1	1	1	1	1	4	4	11	12	21	14	4	17	12	7	12	6	6	2	3	3	3	2	Diurnal Maximum

Z - zerospan 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
Fort McKay - Bertha Ganter - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	684	98.70	98.70
11 - 20	8	1.15	99.86
21 - 60	1	0.14	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: 693

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - July 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	57	20	5	6	6	5	16	69	98	56	60	53	65	77	52	39	684
11 - 20	0	0	0	0	0	1	1	5	1	0	0	0	0	0	0	0	8
21 - 60	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
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	57	20	5	6	6	6	17	75	99	56	60	53	65	77	52	39	693

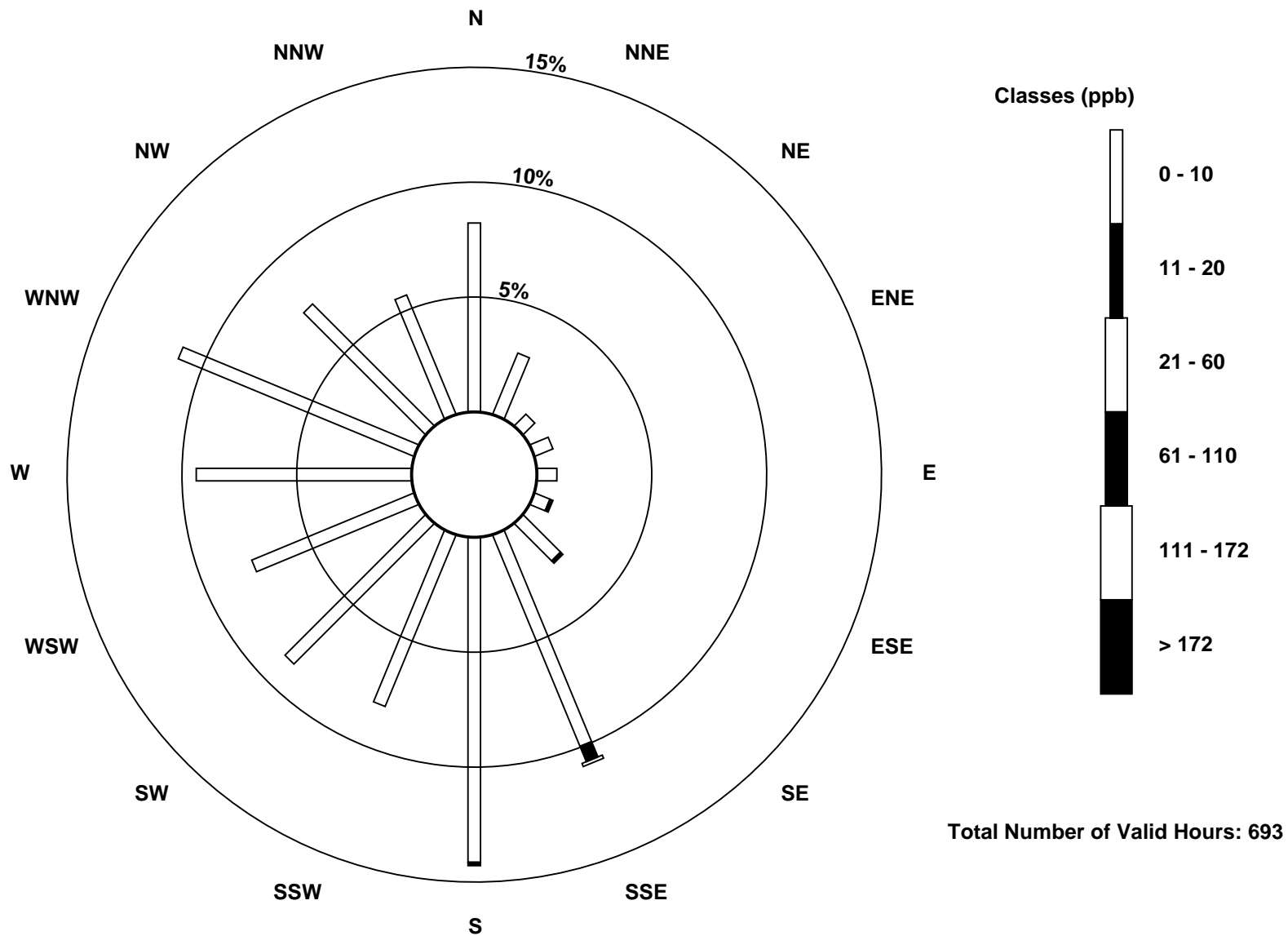
Total Number of Valid Hours: 693

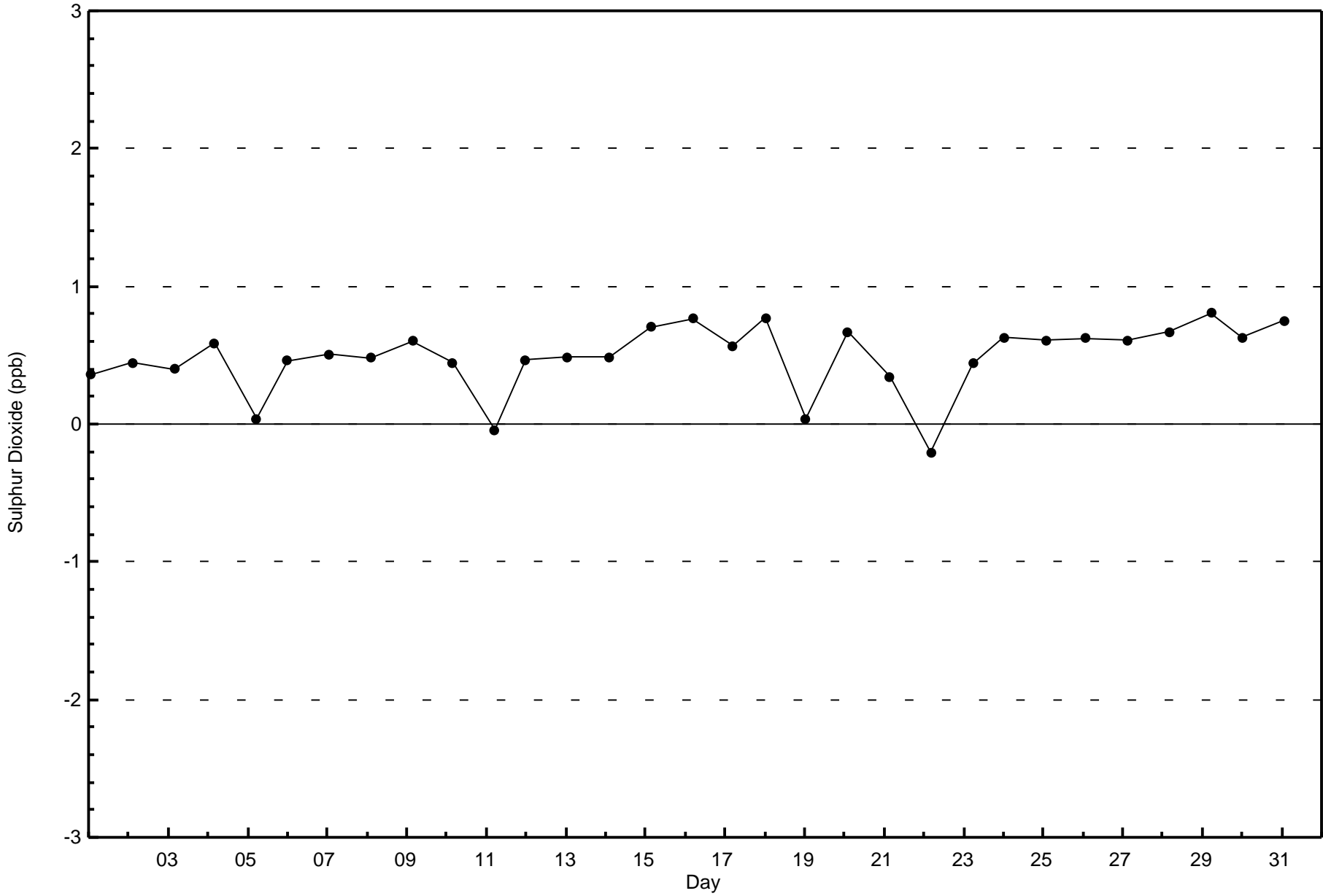
Total Number of Hours: 744

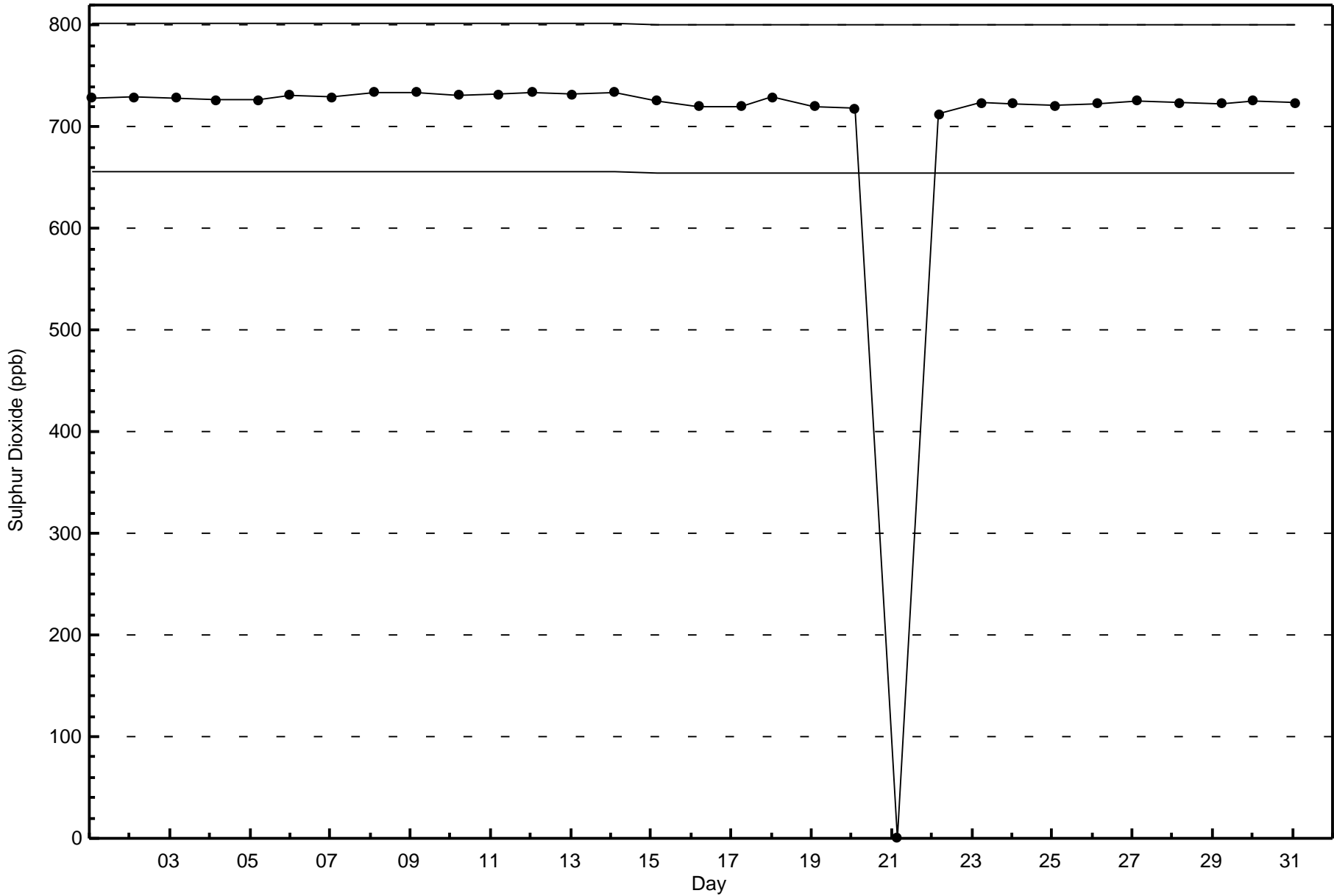


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

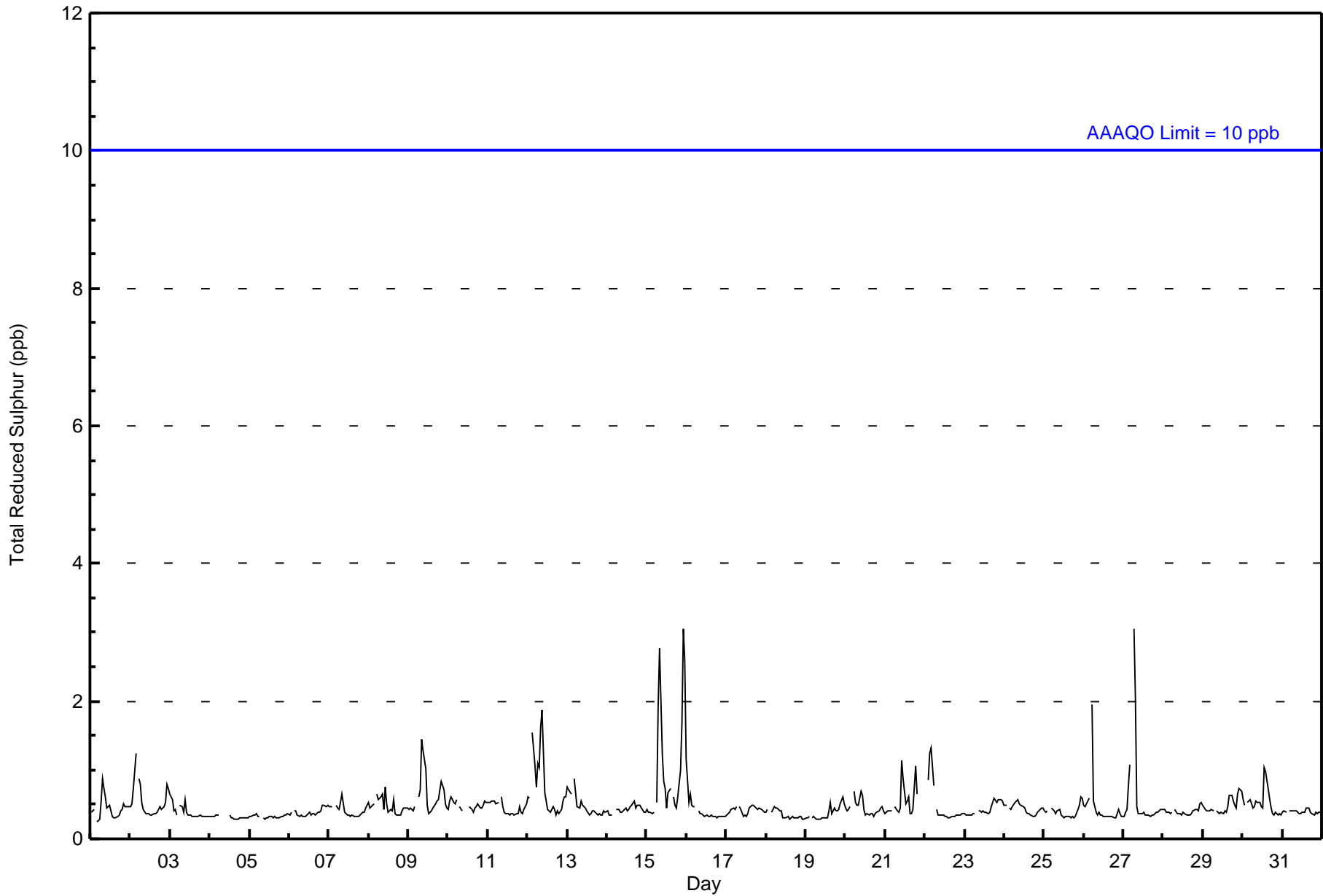
Fort McKay - Bertha Ganter - July 2017

Number of Exceedences (AAAQO):		1-hr: 0 24-hr: 0		Hours in Service:		744																																											
Maximum Value: 3 ppb on Jul 27 07:00		Maximum Daily Average: 1.0 ppb on Jul 15		Hours of Data:		697																																											
Minimum Value: 0 ppb on Jul 1 05:00		Minimum Daily Average: 0.3 ppb on Jul 4		Hours of Missing Data:		47																																											
Maximum Diurnal Average: 0.6 ppb at hour 8		Minimum Diurnal Average: 0.4 ppb at hour 13		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 = 2		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-Jul	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
2-Jul	0	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1																							
3-Jul	1	1	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
4-Jul	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																							
5-Jul	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																							
6-Jul	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																							
7-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
8-Jul	1	0	0	1	Z	1	1	1	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.5	1																							
9-Jul	0	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0.6	1																							
10-Jul	0	1	1	1	1	1	Z	0	0	C	C	C	C	0	0	0	0	0	0	1	0	0	0	1	0.5	1																							
11-Jul	1	1	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
12-Jul	1	1	Z	2	1	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0.7	2																							
13-Jul	1	1	1	Z	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1																							
14-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	1																							
15-Jul	0	0	0	0	0	Z	1	2	3	1	1	1	0	1	1	PF	1	0	0	1	1	2	3	3	1.0	3																							
16-Jul	1	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
17-Jul	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																							
18-Jul	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																							
19-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0.4	1																							
20-Jul	0	0	0	0	Z	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
21-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	1	1	PF	PF	PF	PF	0.5	1																						
22-Jul	PF	PF	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1																							
23-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0.4	1																							
24-Jul	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
25-Jul	0	0	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																							
26-Jul	0	0	1	1	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																							
27-Jul	0	0	0	1	1	Z	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3																							
28-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																							
29-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0.5	1																							
30-Jul	1	0	Z	1	1	1	0	0	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0.5	1																							
31-Jul	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																							
																								0.5	0.4	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	Diurnal Average
																								1	1	1	2	1	2	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	Diurnal Maximum
Z - zerospan C - Calibration 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
Fort McKay - Bertha Ganter - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	693	99.43	99.43
3 - 4	4	0.57	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: 697

Total Number of Hours: 744



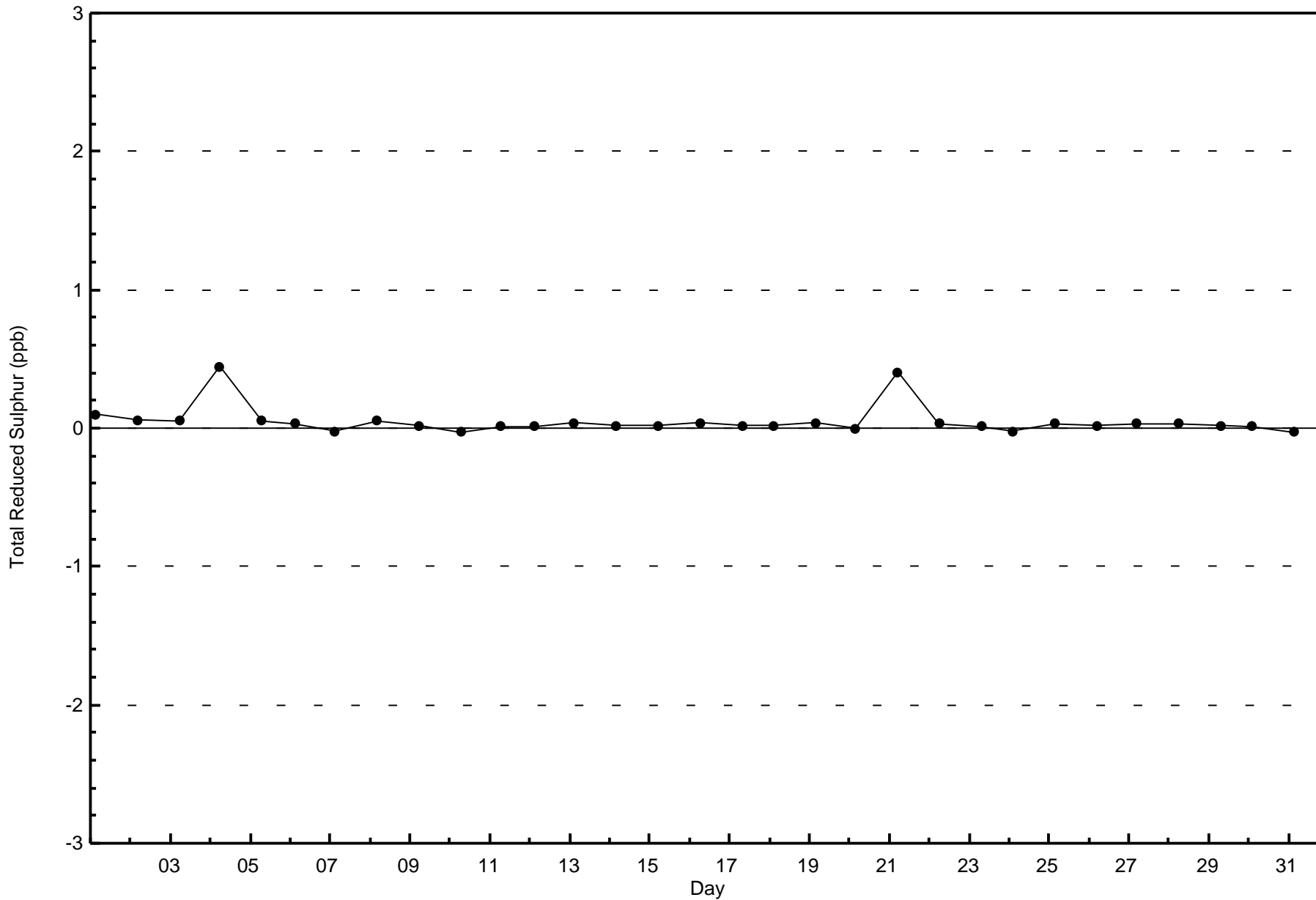
**Wood Buffalo Environmental Association
Frequency Distribution**

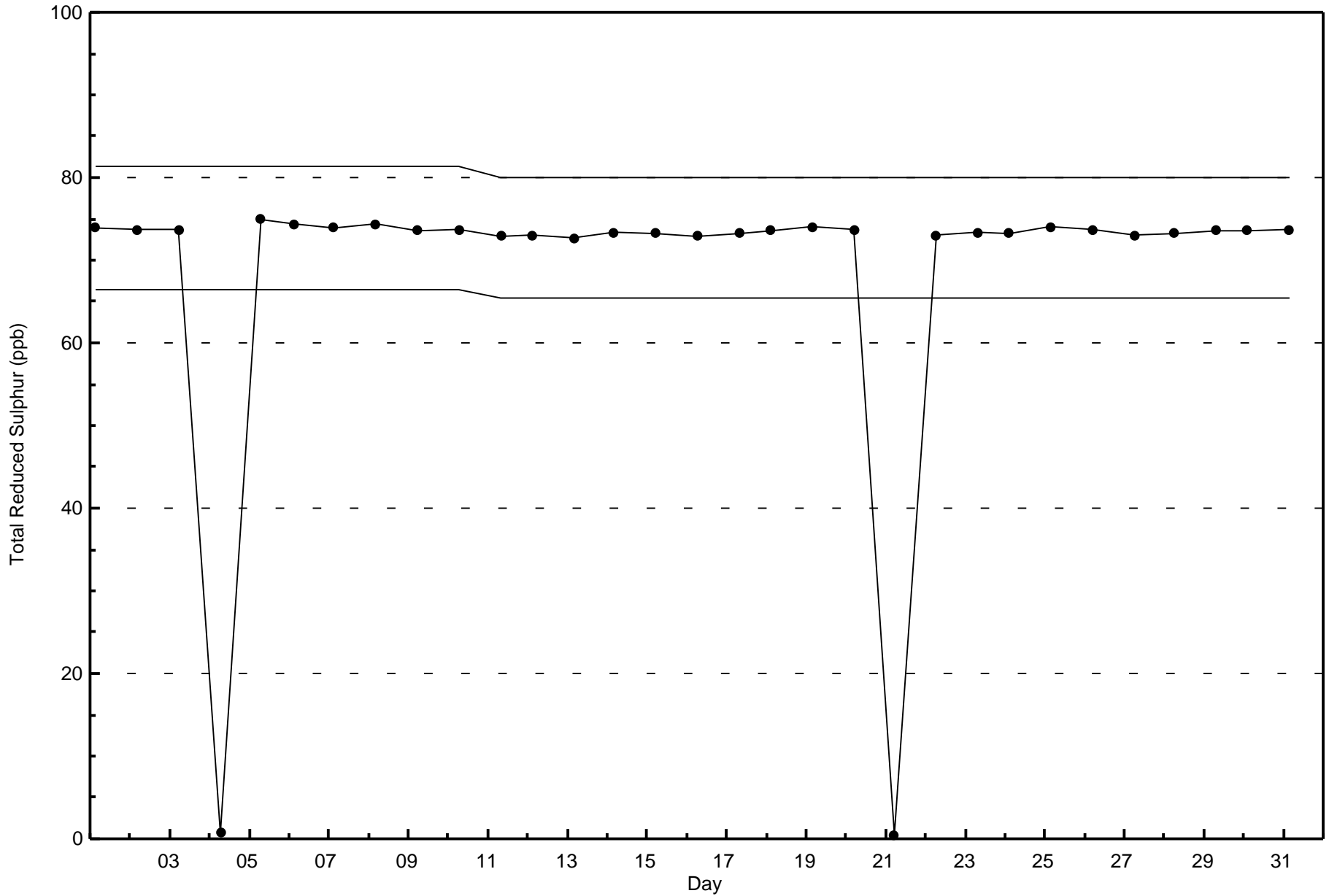
**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - July 2017**

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	21	6	7	6	6	16	75	99	56	58	51	64	80	52	39	693
3 - 4	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	4
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	21	6	7	6	6	16	77	101	56	58	51	64	80	52	39	697

Total Number of Valid Hours: 697

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

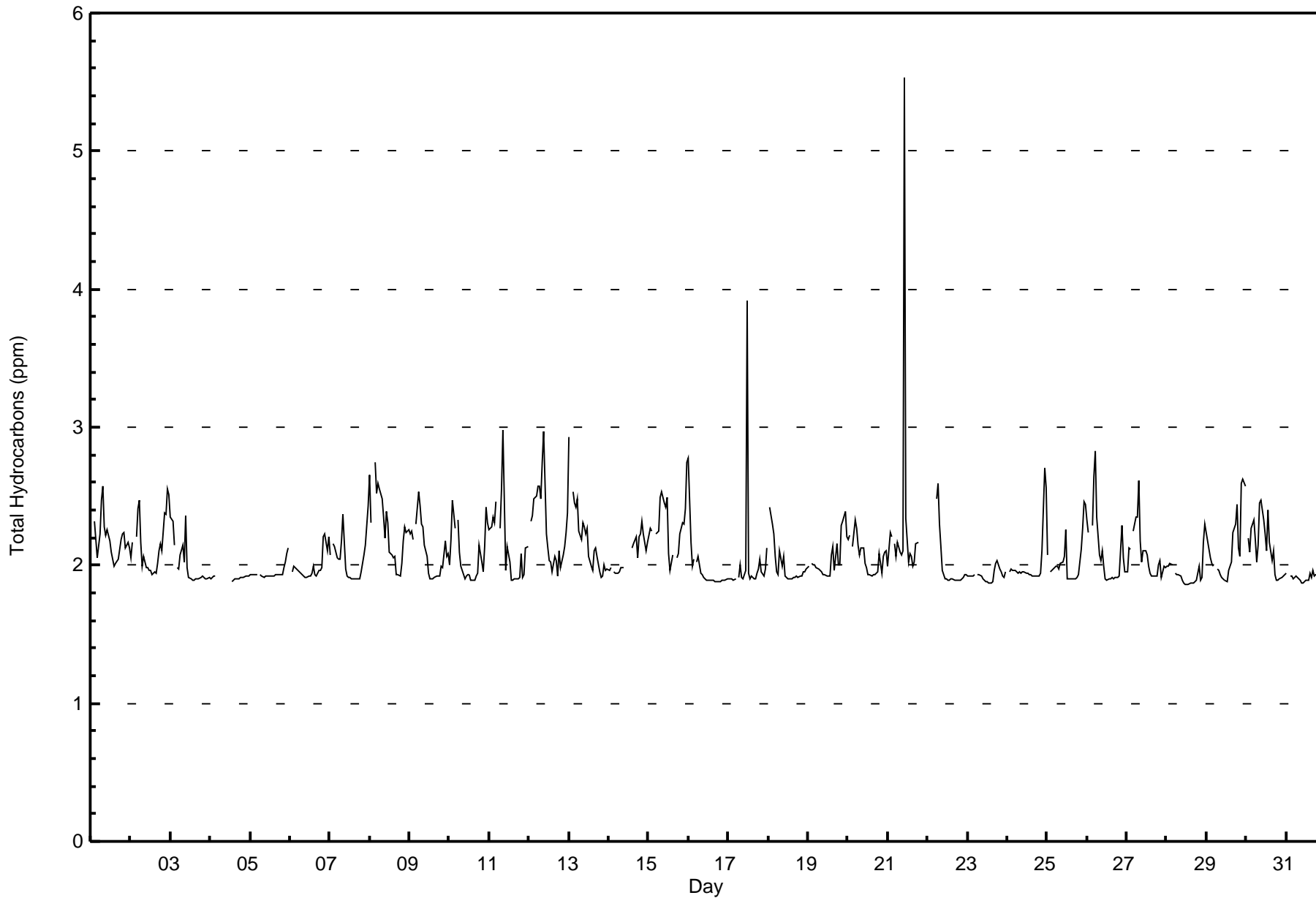
Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - July 2017

Maximum Value: 5.5 ppm on Jul 21 11:00																				Maximum Daily Average: 2.3 ppm on Jul 21					Hours in Service: 744			
Minimum Value: 1.9 ppm on Jul 28 12:00																				Minimum Daily Average: 1.9 ppm on Jul 31					Hours of Data: 692			
Maximum Diurnal Average: 2.2 ppm at hour 6																				Minimum Diurnal Average: 2.0 ppm at hour 14					Hours of Missing Data: 52			
Monthly Average: 2.08 ppm																				Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.2 P ₉₀ = 2.4 P ₉₉ = 2.8					Hours of Calibration: 35			
																				Percent Operational Time: 97.7								
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-Jul	2.3	Z	2.3	2.2	2.1	2.2	2.5	2.6	2.3	2.2	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.6
2-Jul	2.1	2.2	Z	2.2	2.4	2.5	2.2	2.0	2.1	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.1	2.2	2.1	2.4	2.4	2.6	2.5	2.1	2.1	2.6	2.6
3-Jul	2.3	2.3	2.1	Z	2.0	2.0	2.1	2.1	2.0	2.4	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	2.4
4-Jul	1.9	1.9	1.9	1.9	Z	1.9	PF	PF	PF	PF	PF	PF	PF	1.9	1.9	1.9	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-Jul	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	2.1
6-Jul	Z	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	2.0	1.9	1.9	2.0	2.0	2.0	2.2	2.2	2.1	2.2	2.0	2.0	2.2	2.2
7-Jul	2.1	Z	2.2	2.1	2.1	2.0	2.0	2.2	2.4	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	2.3	2.4	2.0	2.0	2.4	2.4
8-Jul	2.7	2.3	Z	2.7	2.5	2.6	2.6	2.5	2.3	2.2	2.4	2.3	2.1	2.1	2.1	2.1	1.9	1.9	1.9	2.0	2.2	2.3	2.2	2.3	2.3	2.3	2.7	2.7
9-Jul	2.2	2.2	2.2	Z	2.3	2.5	2.4	2.3	2.3	2.1	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.1	2.1	2.1	2.1	2.5	2.5
10-Jul	2.0	2.2	2.5	2.3	Z	2.3	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	2.1	2.0	2.1	2.4	2.3	2.1	2.1	2.5	2.5
11-Jul	2.3	2.3	2.3	2.3	2.5	Z	2.3	2.5	3.0	2.5	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.1	1.9	1.9	2.1	2.1	2.1	2.2	3.0	3.0
12-Jul	Z	2.3	2.4	2.5	2.5	2.6	2.6	2.5	2.7	3.0	2.2	2.1	2.0	2.0	2.0	2.1	2.0	1.9	2.1	2.0	2.1	2.1	2.2	2.4	2.3	2.3	3.0	3.0
13-Jul	2.9	Z	2.5	2.5	2.4	2.5	2.2	2.2	2.3	2.3	2.2	2.3	2.1	2.0	2.0	2.1	2.1	2.1	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.2	2.9	2.9
14-Jul	2.0	2.0	Z	2.0	1.9	1.9	2.0	2.0	2.0	2.0	C	C	C	C	2.1	2.2	2.2	2.1	2.2	2.2	2.3	2.2	2.1	2.2	2.1	2.2	2.3	2.3
15-Jul	2.2	2.3	2.3	Z	2.2	2.2	2.3	2.5	2.5	2.5	2.4	2.5	2.1	2.0	2.1	PF	PF	2.1	2.1	2.2	2.3	2.3	2.4	2.7	2.3	2.3	2.7	2.7
16-Jul	2.8	2.2	2.0	2.0	Z	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	1.9	1.9	2.8	2.8
17-Jul	1.9	1.9	1.9	1.9	1.9	Z	1.9	2.0	1.9	1.9	2.0	3.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.1	2.0	3.9	3.9
18-Jul	Z	2.4	2.3	2.2	2.1	2.0	1.9	2.1	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	2.0	2.0	2.0	2.0	2.0	2.4	2.4
19-Jul	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	2.1	2.1	2.0	2.2	2.0	2.0	2.3	2.3	2.4	2.2	2.0	2.0	2.4	2.4
20-Jul	2.2	2.2	Z	2.1	2.3	2.3	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	2.0	2.1	1.9	2.1	2.1	2.1	2.1	2.3	2.3
21-Jul	2.0	2.2	2.2	Z	2.2	2.1	2.2	2.1	2.1	2.1	5.5	2.3	2.0	2.1	2.1	2.0	2.0	2.2	2.2	PF	PF	PF	PF	PF	2.3	2.3	5.5	5.5
22-Jul	PF	PF	PF	2.5	Z	2.5	2.6	2.3	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	2.6	2.6
23-Jul	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	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0
24-Jul	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	2.1	2.7	2.6	2.0	2.0	2.7	2.7
25-Jul	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.5	2.4	2.0	2.0	2.5	2.5
26-Jul	2.3	2.2	Z	2.3	2.6	2.8	2.3	2.1	2.0	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.1	2.0	2.1	2.1	2.8	2.8
27-Jul	2.0	2.1	2.1	Z	2.2	2.3	2.4	2.6	2.2	2.0	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	2.1	2.1	2.6	2.6
28-Jul	2.0	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	2.0	1.9	1.9	2.2	2.3	1.9	1.9	2.3	2.3
29-Jul	2.2	2.1	2.1	2.0	2.0	Z	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2	2.3	2.4	2.1	2.1	2.6	2.6	2.6	2.1	2.1	2.6	2.6
30-Jul	Z	2.2	2.1	2.3	2.3	2.2	2.0	2.1	2.4	2.5	2.3	2.2	2.1	2.4	2.2	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.5	2.5
31-Jul	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	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration PF - Power Failure																												



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	413	59.68	59.68
2.1 - 3.0	277	40.03	99.71
3.1 - 10.0	2	0.29	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - July 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	43	9	1	3	5	2	4	29	42	31	54	42	54	40	30	24	413
2.1 - 3.0	13	11	4	3	1	4	12	47	56	25	6	10	11	37	22	15	277
3.1 - 10.0	1	0	0	0	0	0	1	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	57	20	5	6	6	6	17	76	98	56	60	52	65	77	52	39	692

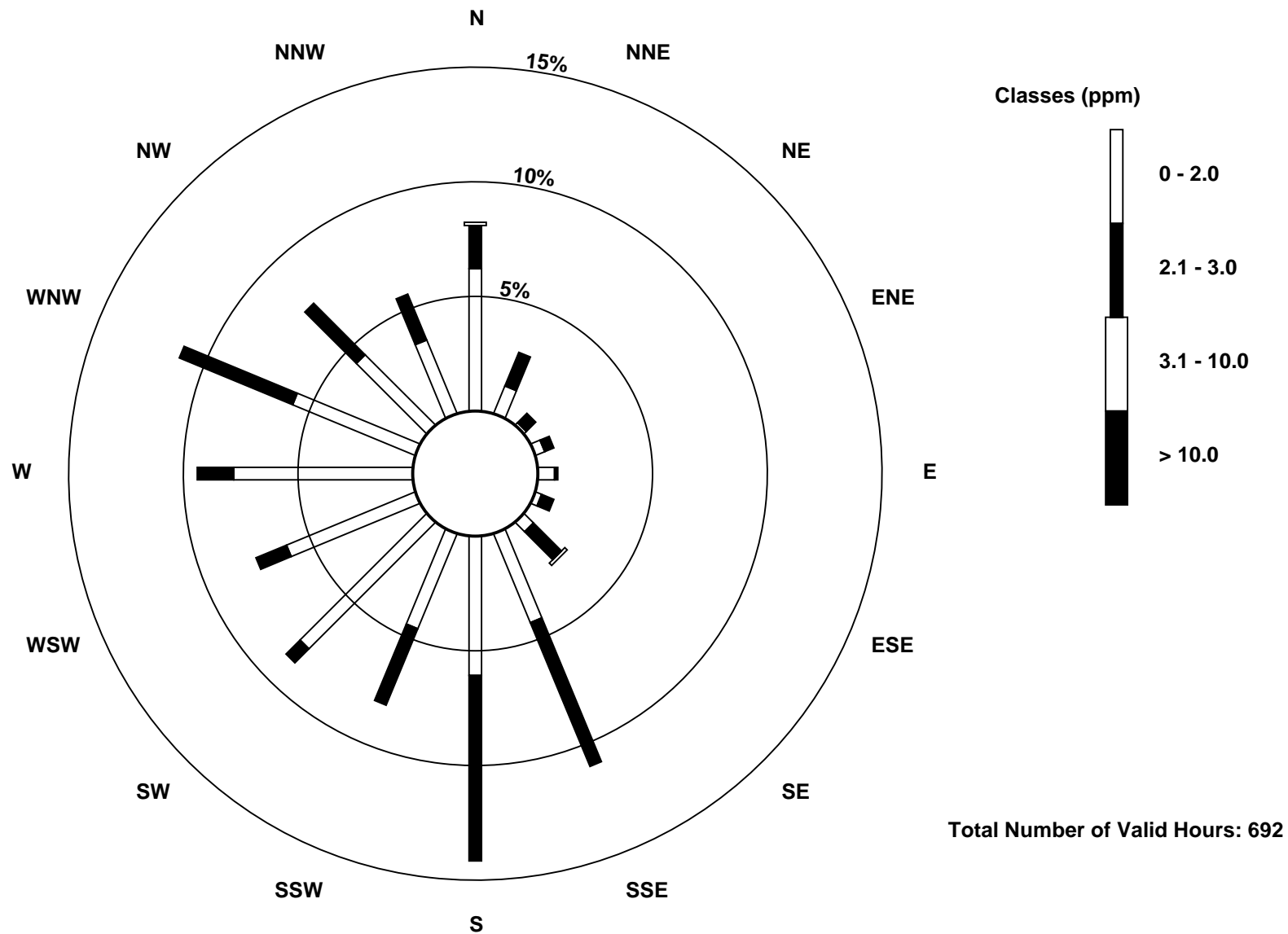
Total Number of Valid Hours: 692

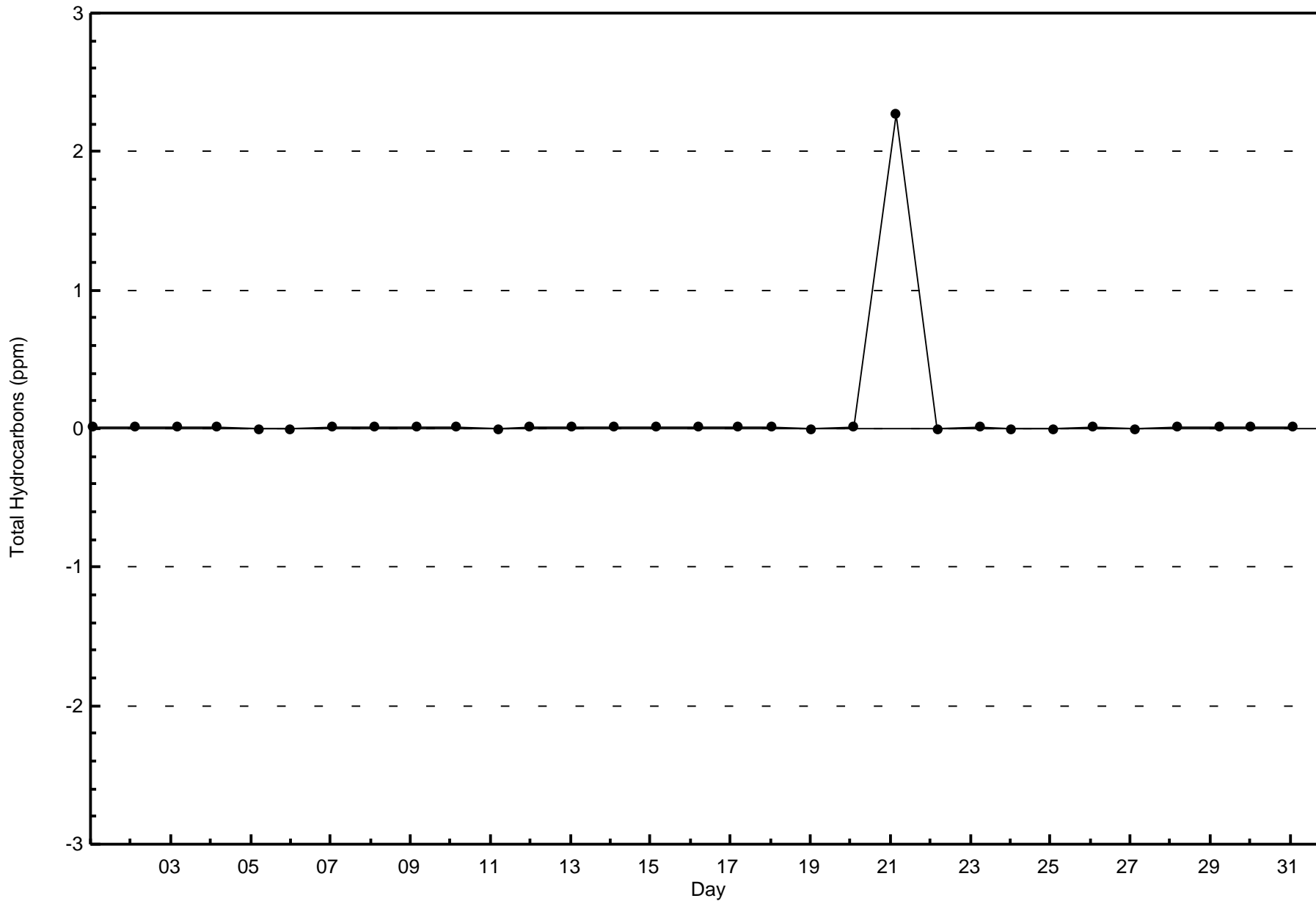
Total Number of Hours: 744

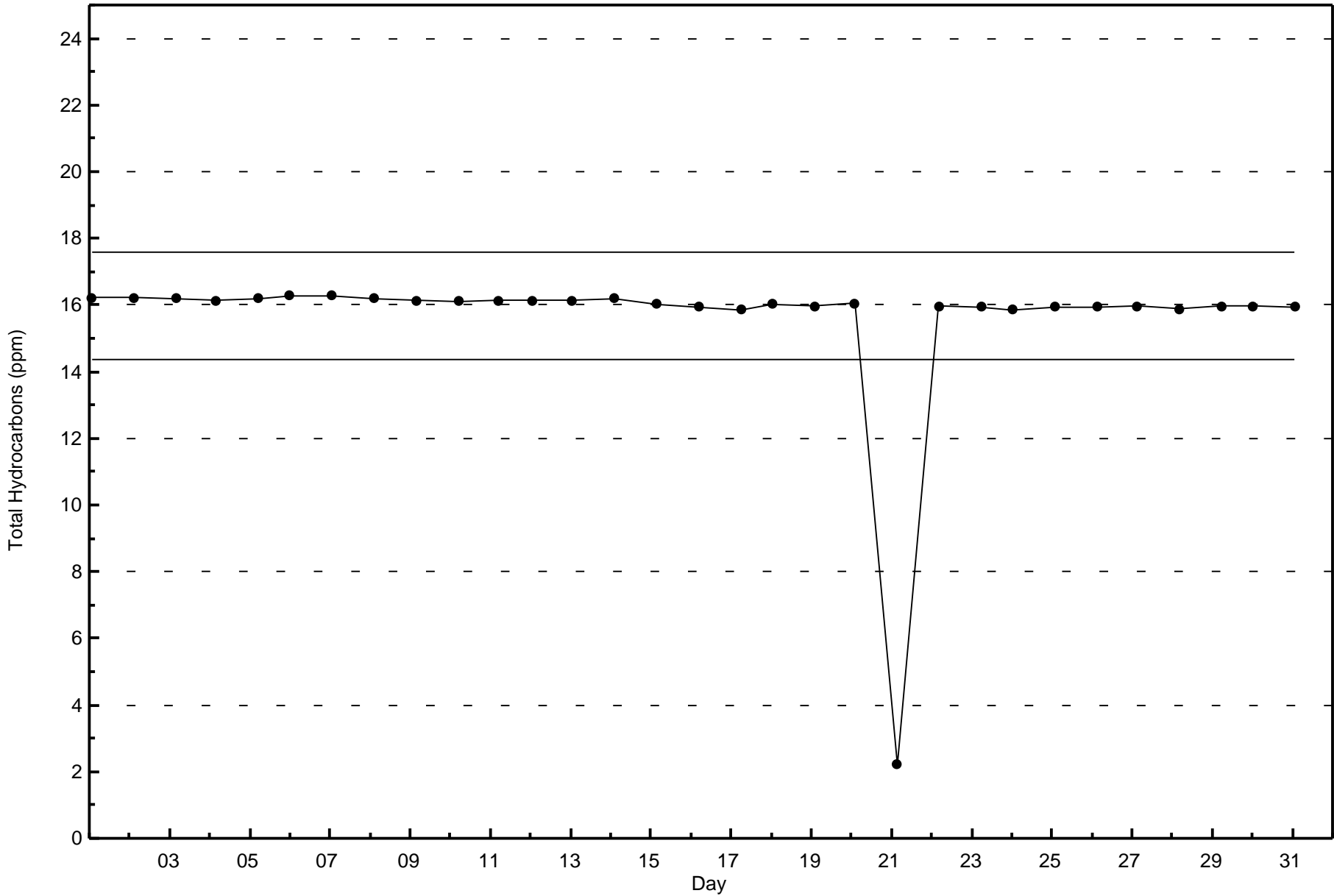


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









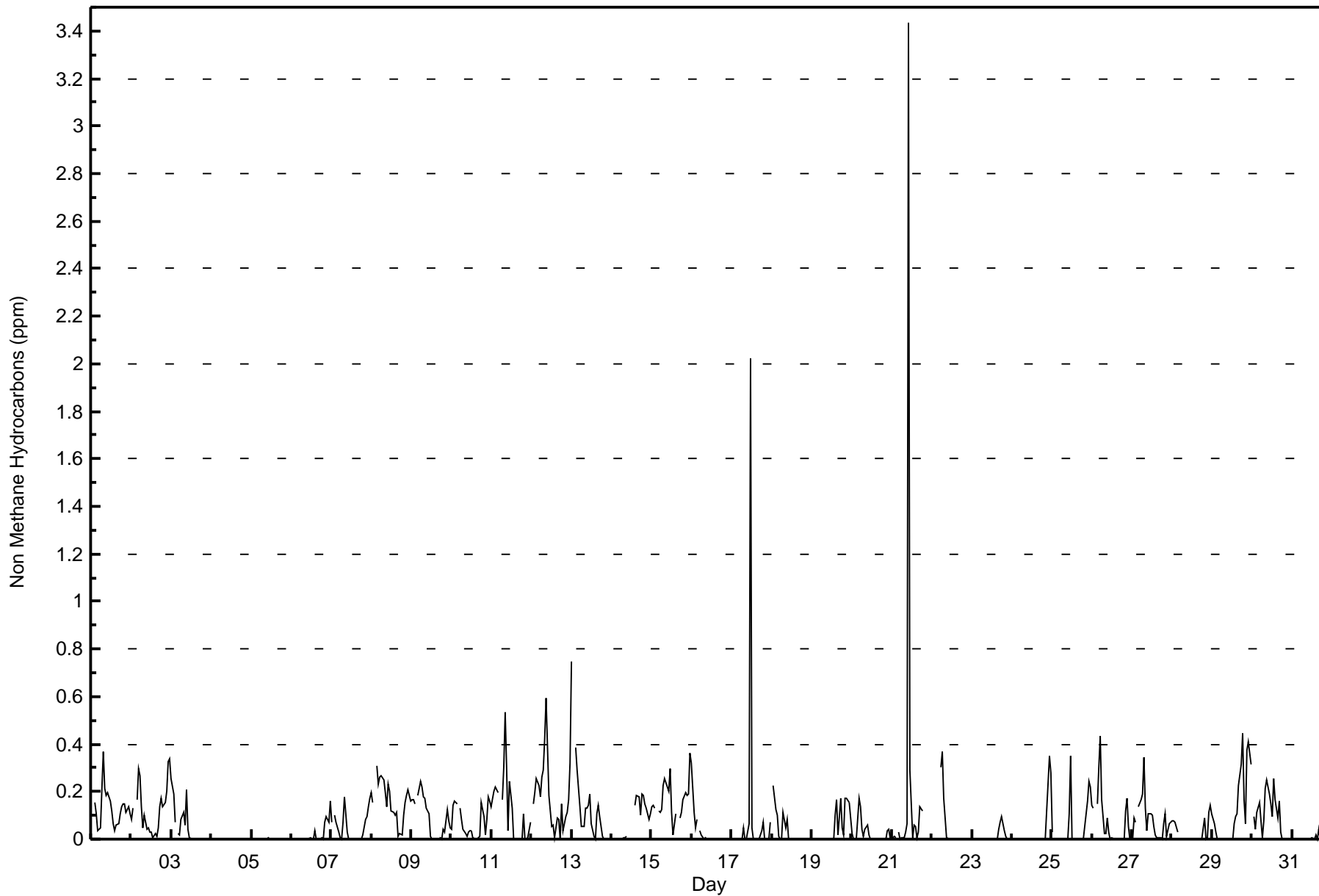
Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Fort McKay - Bertha Ganter - July 2017

Maximum Value: 3.436 ppm on Jul 21 11:00		Maximum Daily Average: 0.239 ppm on Jul 21		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Jul 3 13:00		Minimum Daily Average: 0.000 ppm on Jul 5		Hours of Data: 692																							
Maximum Diurnal Average: 0.178 ppm at hour 11		Minimum Diurnal Average: 0.024 ppm at hour 14		Hours of Missing Data: 52																							
Monthly Average: 0.077 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: 97.7																							
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-Jul	0.116	Z	0.154	0.108	0.036	0.046	0.216	0.366	0.212	0.183	0.194	0.160	0.120	0.065	0.034	0.059	0.066	0.105	0.136	0.151	0.147	0.116	0.137	0.107	0.132	0.366	
2-Jul	0.086	0.131	Z	0.168	0.297	0.266	0.137	0.047	0.099	0.044	0.048	0.032	0.030	0.004	0.022	0.009	0.050	0.136	0.173	0.135	0.157	0.201	0.329	0.338	0.128	0.338	
3-Jul	0.255	0.188	0.072	Z	0.025	0.018	0.084	0.112	0.057	0.209	0.039	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	0.046	0.255	
4-Jul	0.000	0.000	0.000	0.000	Z	0.000	PF	PF	PF	PF	PF	PF	PF	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-Jul	0.000	0.000	0.000	0.000	0.000	Z	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	0.000	0.000	0.000	0.003	
6-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.003	0.038	0.000	0.000	0.001	0.005	0.002	0.071	0.097	0.073	0.161	0.020	0.161	
7-Jul	0.071	Z	0.099	0.071	0.031	0.005	0.000	0.073	0.176	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.081	0.096	0.137	0.169	0.046	0.176	
8-Jul	0.197	0.153	Z	0.310	0.234	0.260	0.266	0.247	0.197	0.138	0.231	0.204	0.119	0.114	0.103	0.112	0.015	0.024	0.020	0.102	0.152	0.183	0.210	0.163	0.163	0.310	
9-Jul	0.165	0.167	0.147	Z	0.181	0.246	0.219	0.179	0.171	0.133	0.108	0.012	0.000	0.001	0.000	0.000	0.002	0.003	0.000	0.043	0.028	0.122	0.079	0.048	0.089	0.246	
10-Jul	0.042	0.140	0.158	0.148	Z	0.129	0.083	0.041	0.023	0.012	0.027	0.034	0.034	0.003	0.000	0.000	0.003	0.010	0.154	0.096	0.019	0.085	0.177	0.161	0.069	0.177	
11-Jul	0.139	0.204	0.221	0.210	0.198	Z	0.167	0.303	0.531	0.305	0.038	0.241	0.129	0.000	0.000	0.000	0.000	0.000	0.003	0.110	0.000	0.000	0.008	0.070	0.125	0.531	
12-Jul	Z	0.147	0.194	0.258	0.226	0.181	0.262	0.293	0.419	0.592	0.186	0.119	0.055	0.058	0.006	0.087	0.083	0.000	0.148	0.033	0.094	0.115	0.168	0.320	0.176	0.592	
13-Jul	0.750	Z	0.387	0.289	0.213	0.135	0.056	0.054	0.132	0.128	0.145	0.192	0.068	0.009	0.000	0.105	0.140	0.093	0.012	0.000	0.000	0.000	0.000	0.000	0.126	0.750	
14-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.007	0.007	0.014	C	C	C	C	0.145	0.184	0.178	0.102	0.188	0.183	0.149	0.131	0.086	0.108	0.078	0.188	
15-Jul	0.137	0.143	0.128	Z	0.121	0.116	0.123	0.225	0.255	0.220	0.200	0.296	0.113	0.017	0.104	PF	PF	0.092	0.115	0.167	0.196	0.186	0.188	0.360	0.167	0.360	
16-Jul	0.321	0.115	0.050	0.086	Z	0.036	0.021	0.002	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	0.000	0.028	0.321	
17-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.045	0.000	0.000	0.068	2.026	0.048	0.000	0.001	0.045	0.000	0.017	0.037	0.072	0.000	0.000	0.000	0.071	0.104	2.026	
18-Jul	Z	0.224	0.126	0.101	0.013	0.000	0.000	0.110	0.047	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.224	
19-Jul	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	0.099	0.169	0.017	0.170	0.045	0.016	0.174	0.171	0.156	0.090	0.048	0.174	
20-Jul	0.026	0.001	Z	0.002	0.175	0.135	0.043	0.010	0.042	0.061	0.021	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.035	0.043	0.004	0.026	0.175	
21-Jul	0.000	0.012	0.005	Z	0.032	0.000	0.006	0.007	0.028	0.064	3.436	0.292	0.008	0.061	0.054	0.009	0.031	0.136	0.121	PF	PF	PF	PF	PF	0.239	3.436	
22-Jul	PF	PF	PF	0.270	Z	0.305	0.366	0.171	0.091	0.009	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	0.061	0.366	
23-Jul	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	0.001	0.044	0.073	0.094	0.033	0.011	0.000	0.000	0.000	0.000	0.011	0.094	
24-Jul	Z	0.001	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	0.119	0.352	0.279	0.033	0.352	
25-Jul	0.032	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.106	0.350	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.104	0.163	0.243	0.217	0.053	0.350	
26-Jul	0.141	0.130	Z	0.148	0.303	0.431	0.169	0.027	0.022	0.088	0.027	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.119	0.174	0.054	0.000	0.080	0.431	
27-Jul	0.000	0.087	0.071	Z	0.137	0.168	0.190	0.345	0.128	0.036	0.105	0.109	0.100	0.053	0.016	0.009	0.007	0.005	0.000	0.065	0.109	0.013	0.067	0.068	0.082	0.345	
28-Jul	0.076	0.079	0.069	0.029	Z	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.087	0.002	0.008	0.110	0.141	0.026	0.141	
29-Jul	0.109	0.068	0.031	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.064	0.094	0.104	0.227	0.317	0.448	0.167	0.066	0.375	0.410	0.314	0.121	0.448	
30-Jul	Z	0.095	0.041	0.116	0.154	0.076	0.007	0.080	0.213	0.248	0.192	0.146	0.095	0.253	0.164	0.087	0.163	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.094	0.253	
31-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.017	0.000	0.039	0.000	0.000	0.000	0.000	0.003	0.021	0.000	0.004	0.039	
		0.106	0.087	0.078	0.089	0.091	0.098	0.080	0.091	0.095	0.087	0.178	0.146	0.032	0.024	0.029	0.031	0.035	0.042	0.055	0.049	0.056	0.080	0.102	0.106	Diurnal Average	
		0.750	0.224	0.387	0.310	0.303	0.431	0.366	0.366	0.531	0.592	3.436	2.026	0.129	0.253	0.164	0.184	0.227	0.317	0.448	0.183	0.196	0.375	0.410	0.360	Diurnal Maximum	
Z - zerospan		C - Calibration				PF - Power Failure																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	323	46.68	46.68
0.006 - 0.05	96	13.87	60.55
0.06 - 0.1	145	20.95	81.50
> 0.1	128	18.50	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter - July 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	32	2	0	2	3	3	4	19	23	24	47	37	43	37	28	19	323
0.006 - 0.05	9	6	2	1	2	0	0	8	23	7	6	6	7	7	5	7	96
0.06 - 0.1	10	5	1	2	1	1	5	28	29	14	4	5	7	20	7	6	145
> 0.1	6	7	2	1	0	2	8	21	23	11	3	4	8	13	12	7	128
Totals	57	20	5	6	6	6	17	76	98	56	60	52	65	77	52	39	692

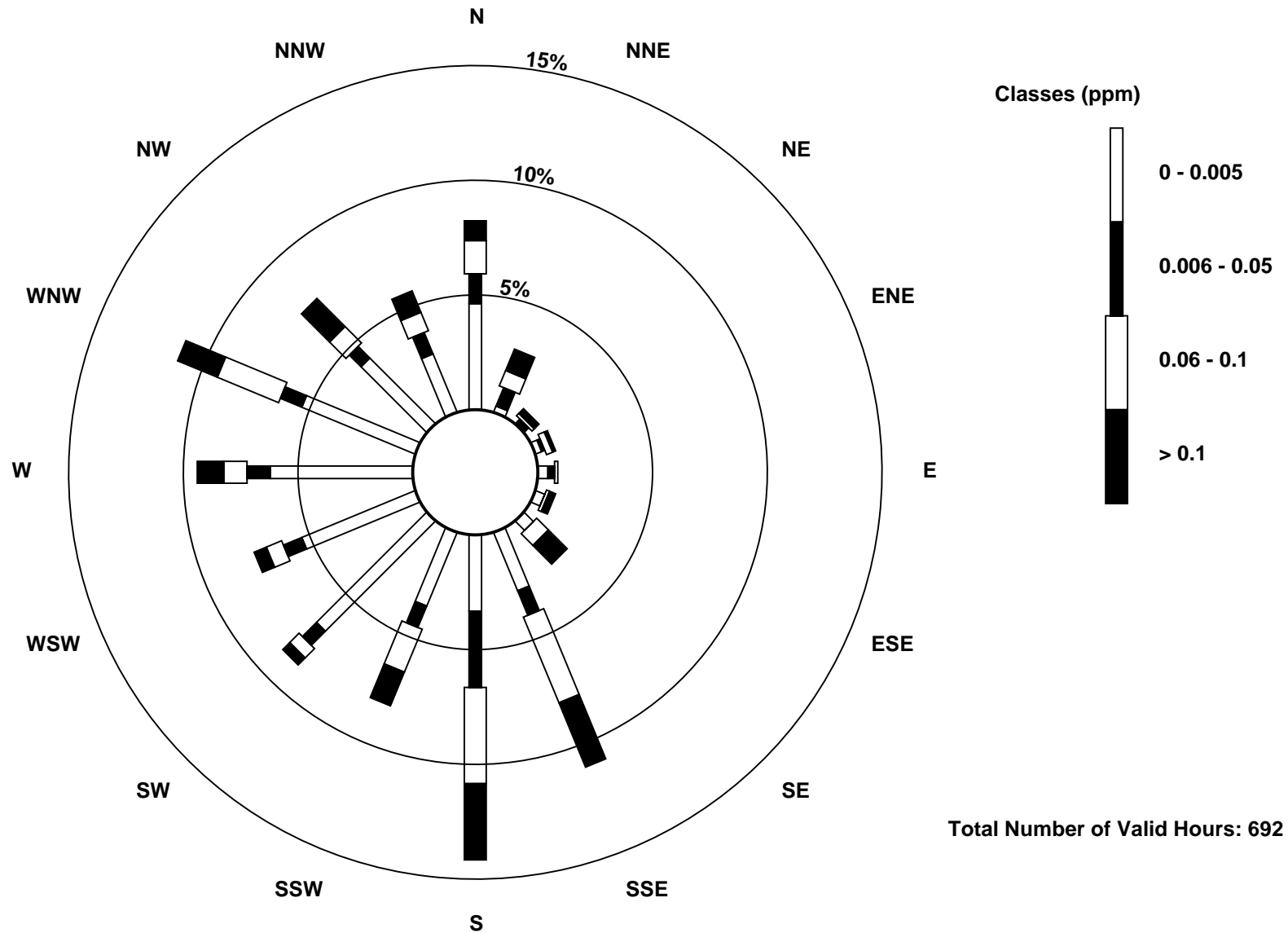
Total Number of Valid Hours: 692

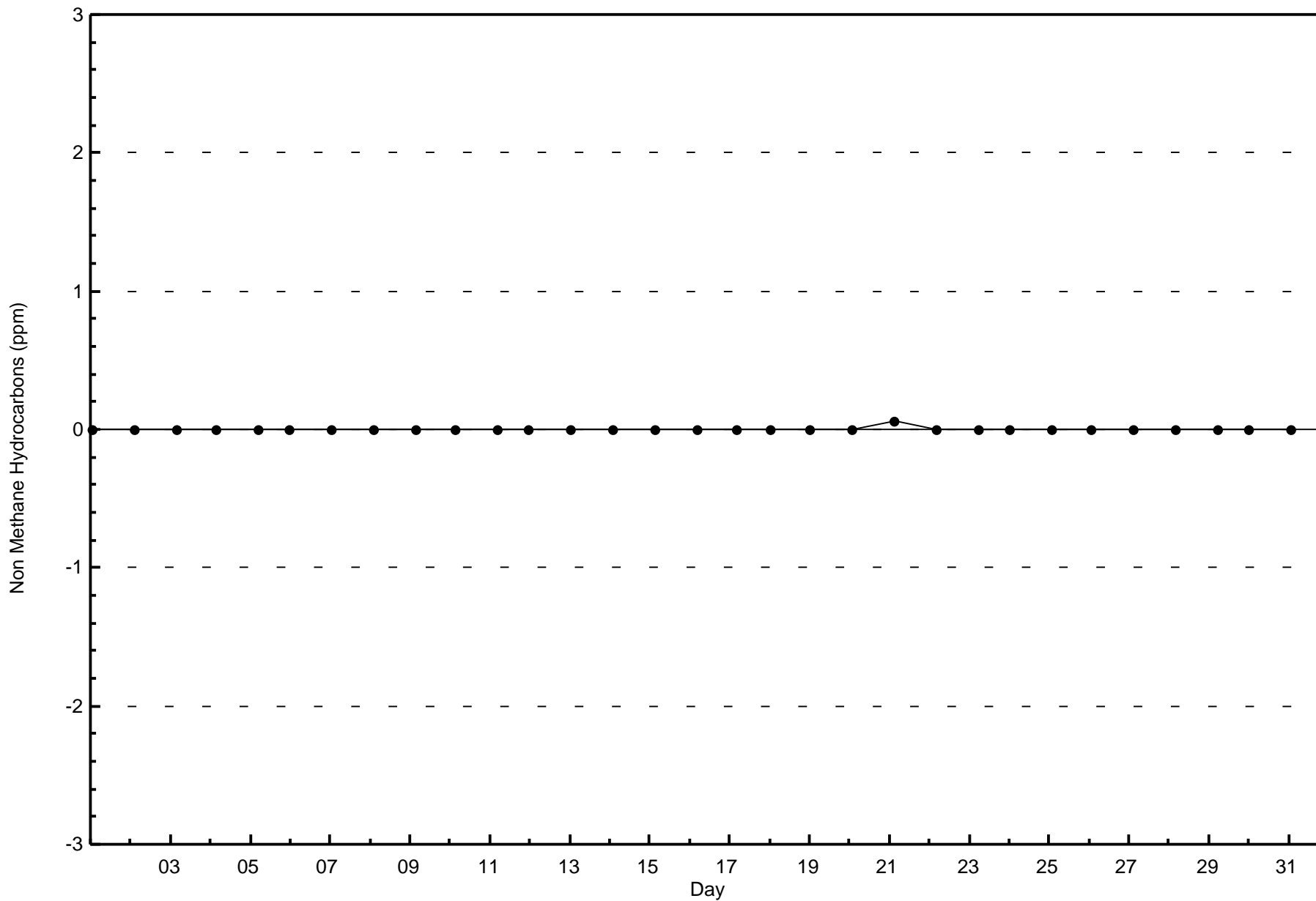
Total Number of Hours: 744

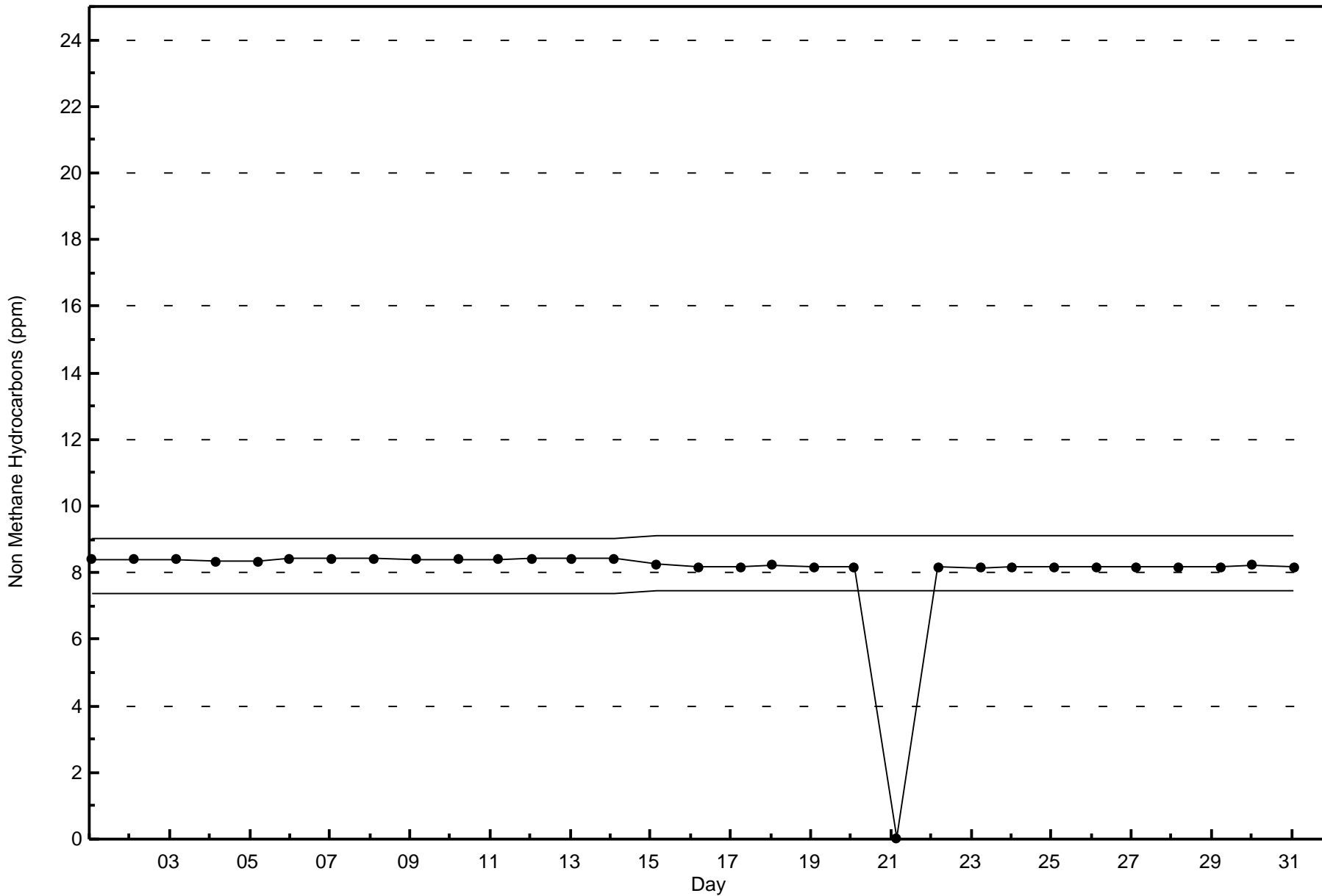


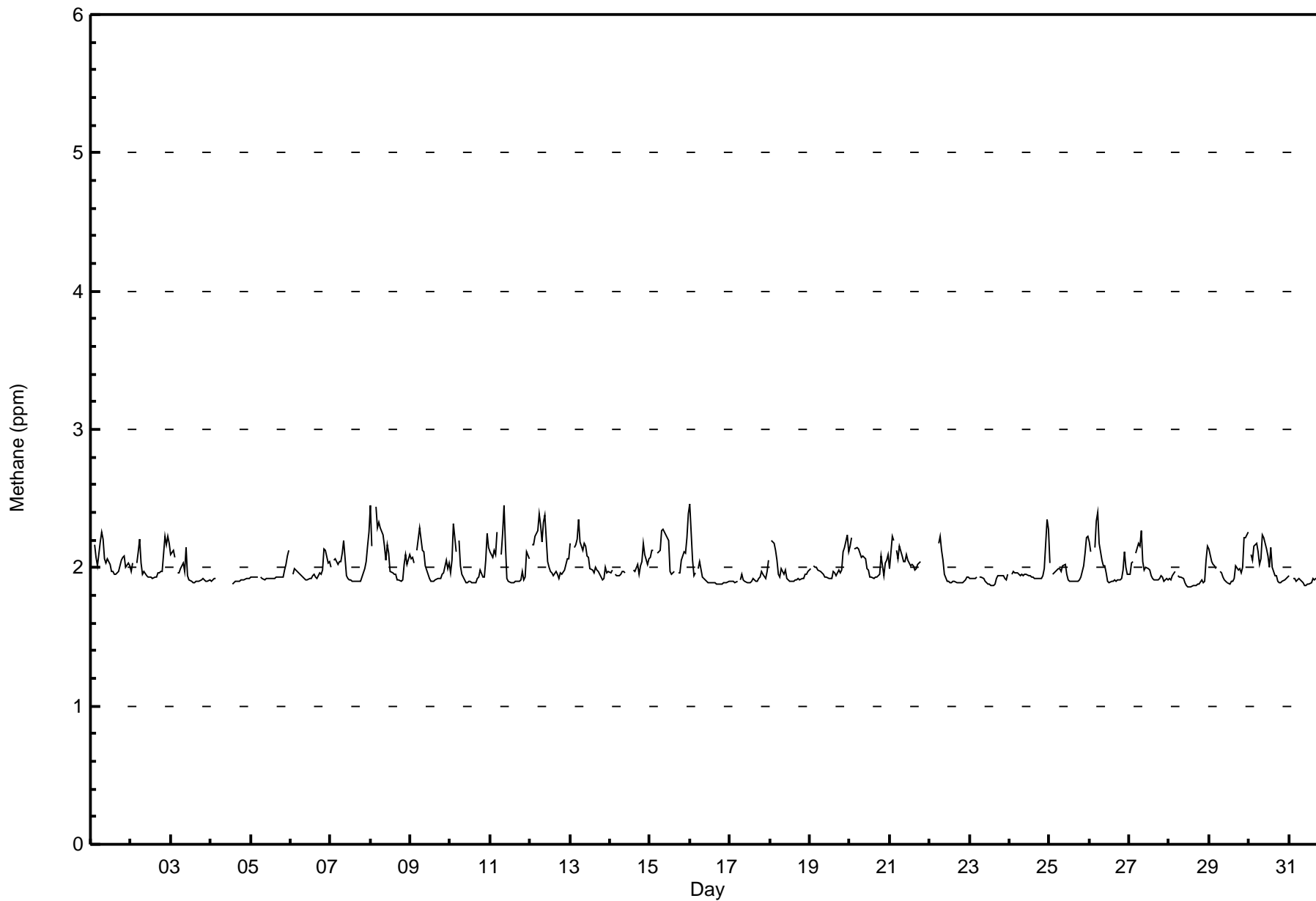
Wood Buffalo Environmental Association
Wind Rose Jul 2017

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 - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	513	74.13	74.13
2.1 - 3.0	179	25.87	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - July 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	51	17	3	5	5	3	8	51	60	42	57	46	56	47	34	28	513
2.1 - 3.0	6	3	2	1	1	3	9	25	38	14	3	6	9	30	18	11	179
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	57	20	5	6	6	6	17	76	98	56	60	52	65	77	52	39	692

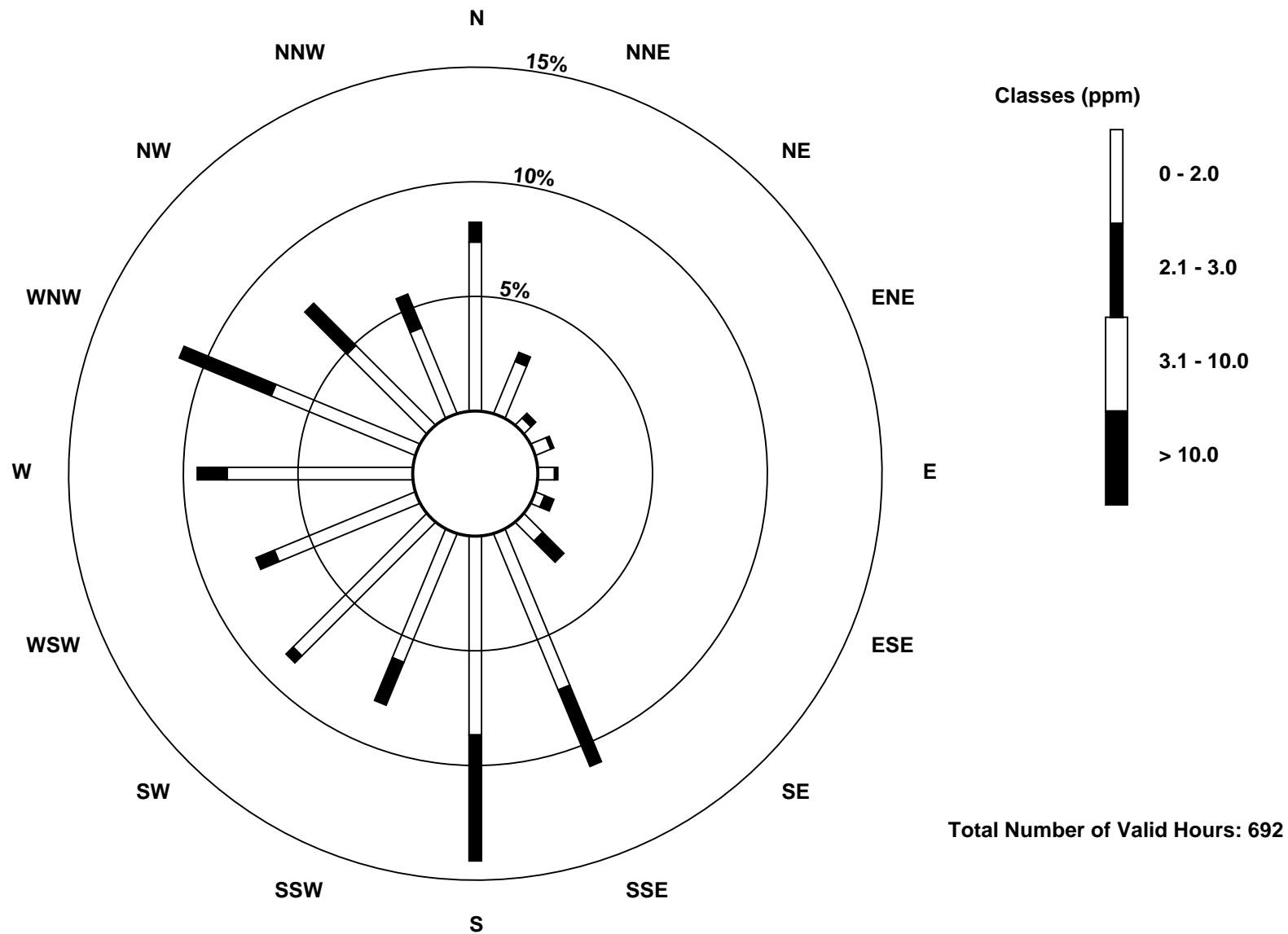
Total Number of Valid Hours: 692

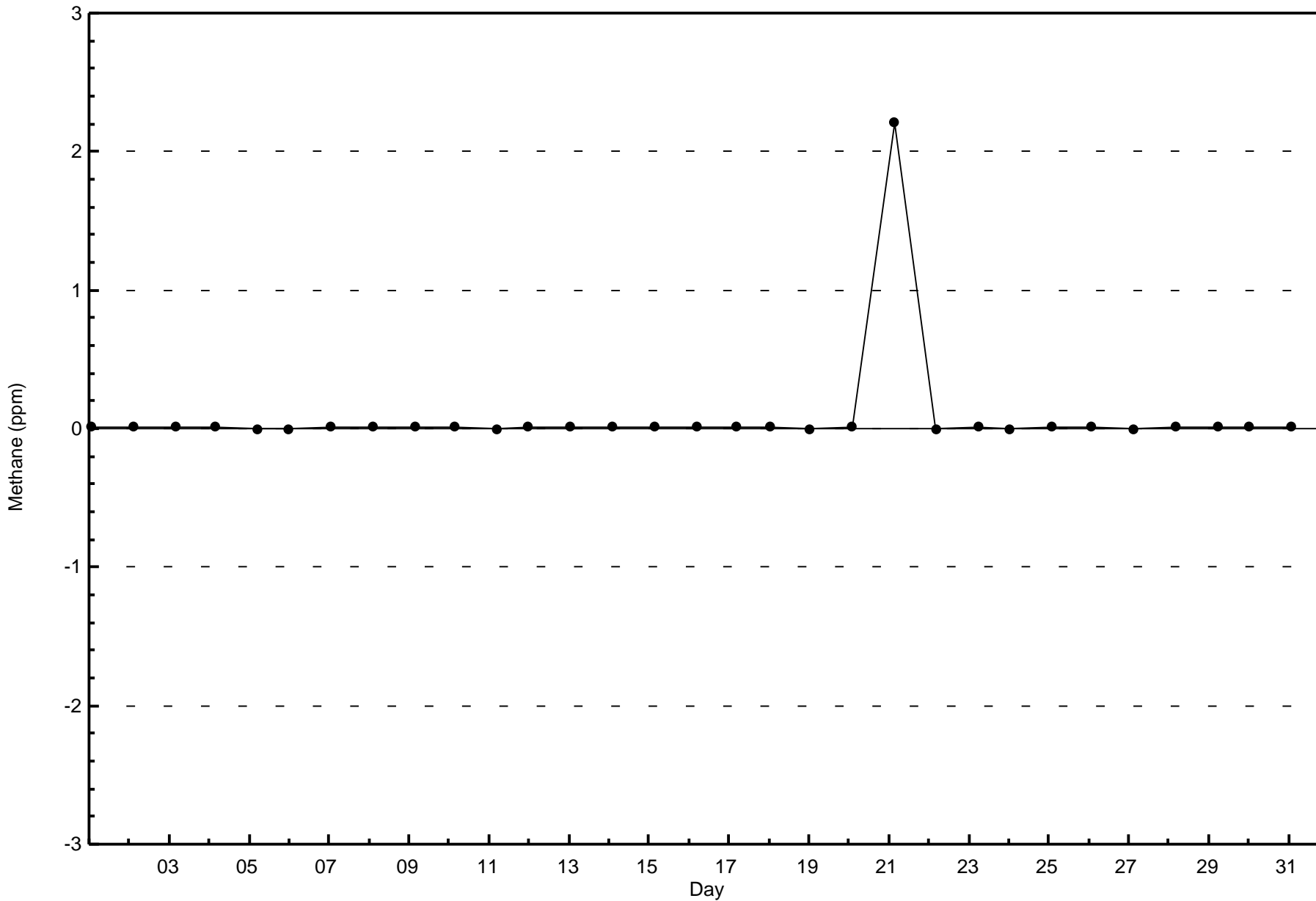
Total Number of Hours: 744

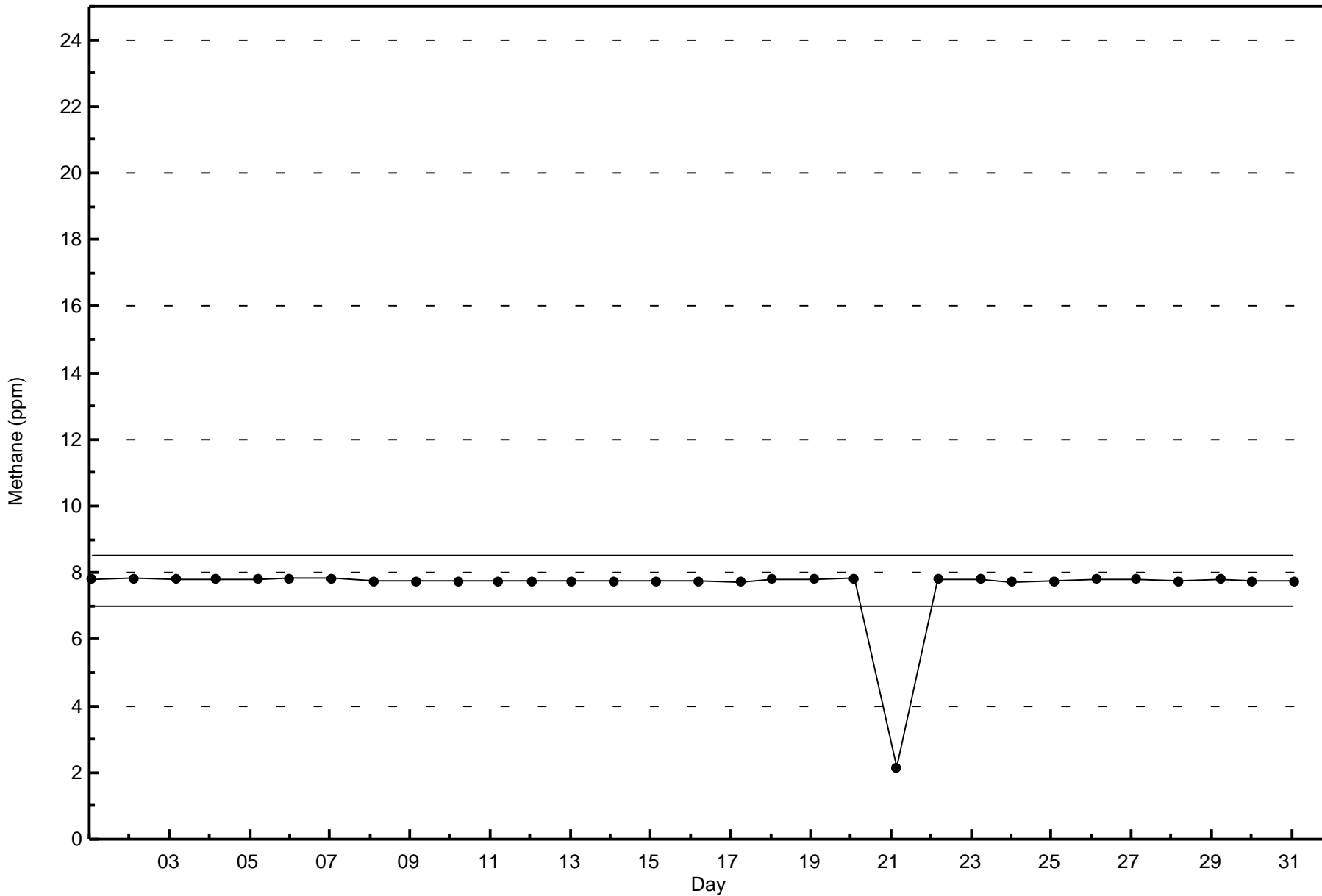


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

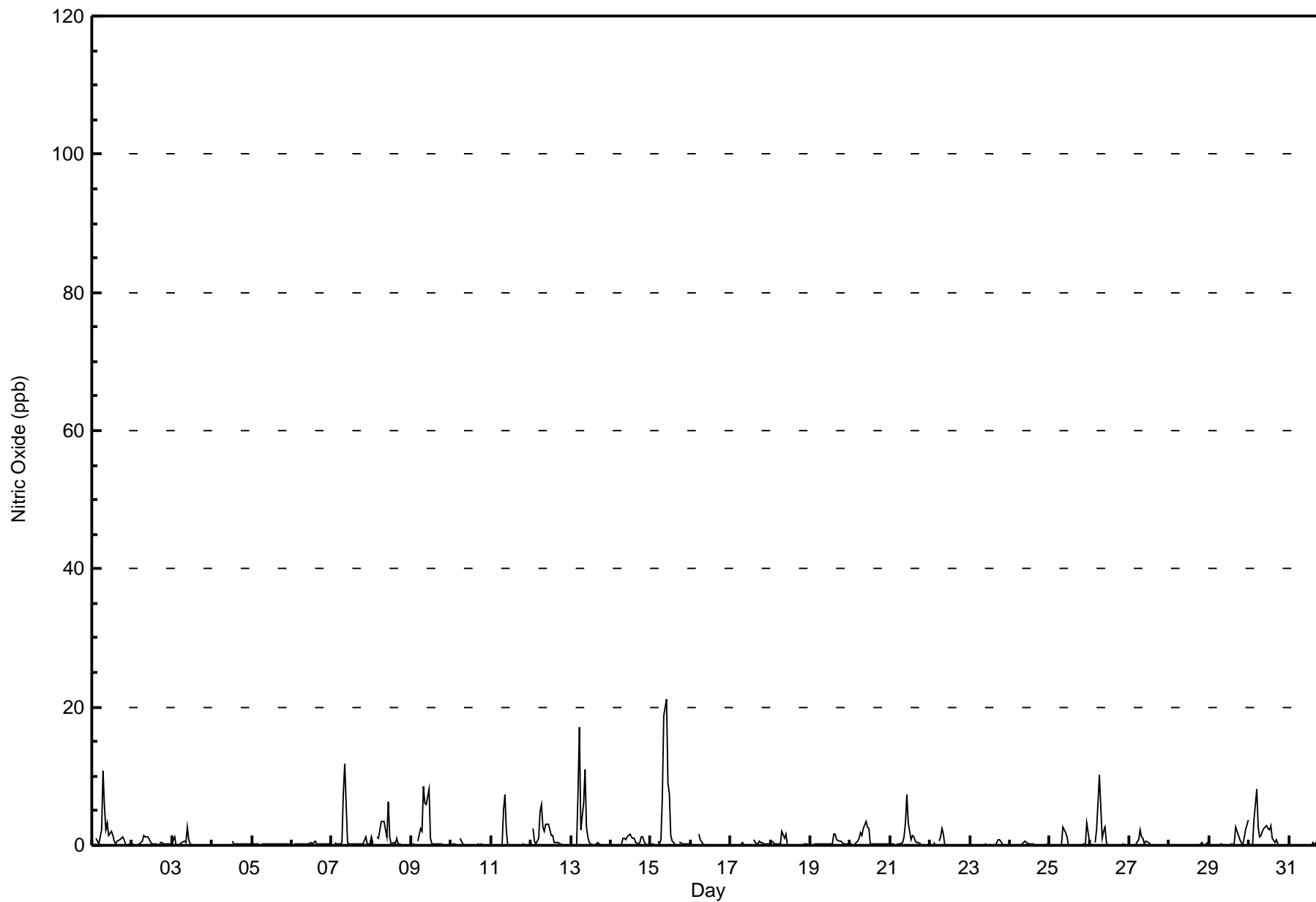
Fort McKay - Bertha Ganter - July 2017

Maximum Value: 21 ppb on Jul 15 10:00																	Maximum Daily Average: 3.3 ppb on Jul 15							Hours in Service: 744																			
Minimum Value: 0 ppb on Jul 11 12:00																	Minimum Daily Average: 0.1 ppb on Jul 28							Hours of Data: 693																			
Maximum Diurnal Average: 2.6 ppb at hour 9																	Minimum Diurnal Average: 0.1 ppb at hour 22							Hours of Missing Data: 51																			
Monthly Average: 0.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 2 P ₉₉ = 10							Hours of Calibration: 36																			
																	Percent Operational Time: 98.0																										
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-Jul	0	Z	1	1	0	2	11	6	2	3	2	2	1	1	0	1	1	1	1	1	0	0	0	0	1.6	11																	
2-Jul	0	0	Z	0	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																	
3-Jul	0	1	0	Z	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																	
4-Jul	0	0	0	0	Z	0	PF	PF	PF	PF	PF	PF	1	0	0	0	0	0	0	0	0	0	0	0	--	1																	
5-Jul	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																	
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	1																	
7-Jul	0	Z	0	0	0	0	0	7	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1.1	12																	
8-Jul	1	0	Z	1	1	2	4	4	2	1	6	1	0	0	1	0	0	0	0	0	0	0	0	0	1.1	6																	
9-Jul	0	0	0	Z	1	3	2	9	6	6	8	1	0	0	0	0	0	0	0	0	0	0	0	0	1.6	9																	
10-Jul	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																	
11-Jul	0	0	0	0	0	Z	0	5	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	7																	
12-Jul	Z	3	1	0	1	5	6	3	2	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0	1.4	6																	
13-Jul	0	Z	0	0	7	17	2	6	11	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	17																	
14-Jul	0	0	Z	0	0	0	0	1	1	1	1	2	1	1	1	0	0	0	1	1	1	0	0	0	0.6	2																	
15-Jul	0	0	0	Z	1	0	1	7	19	21	9	7	1	1	0	PF	PF	0	0	0	0	0	0	0	3.3	21																	
16-Jul	0	0	0	0	Z	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2																	
17-Jul	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	1	0	0	1	0	0	0	0	0	0	0.2	1																	
18-Jul	Z	1	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																	
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	1	1	0	0	0	0	0.4	2																	
20-Jul	0	0	Z	0	1	1	2	1	2	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4																	
21-Jul	0	0	0	Z	0	0	0	0	1	3	7	3	1	1	1	1	0	0	0	PF	PF	PF	PF	PF	1.2	7																	
22-Jul	PF	PF	0	0	Z	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																	
23-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.1	1																	
24-Jul	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																	
25-Jul	0	Z	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	0	0	0	0	0	3	2	0.5	3																	
26-Jul	0	0	Z	0	2	6	10	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	10																	
27-Jul	0	0	0	Z	0	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																	
28-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0	0	1	2	0.6	4																	
30-Jul	Z	0	0	4	8	3	1	1	2	2	3	2	2	3	1	0	1	0	0	0	0	0	0	0	1.5	8																	
31-Jul	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	0.3	0.2	0.3	0.9	1.7	1.6	2.0	2.6	2.1	1.7	0.9	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.3	0.3	Diurnal Average	
																	1	3	1	4	8	17	11	9	19	21	9	7	2	3	2	2	3	1	1	1	1	1	1	3	4	Diurnal Maximum	
Z - zerspan			C - Calibration				PF - Power Failure																																				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	692	99.86	99.86
21 - 40	1	0.14	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: 693

Total Number of Hours: 744



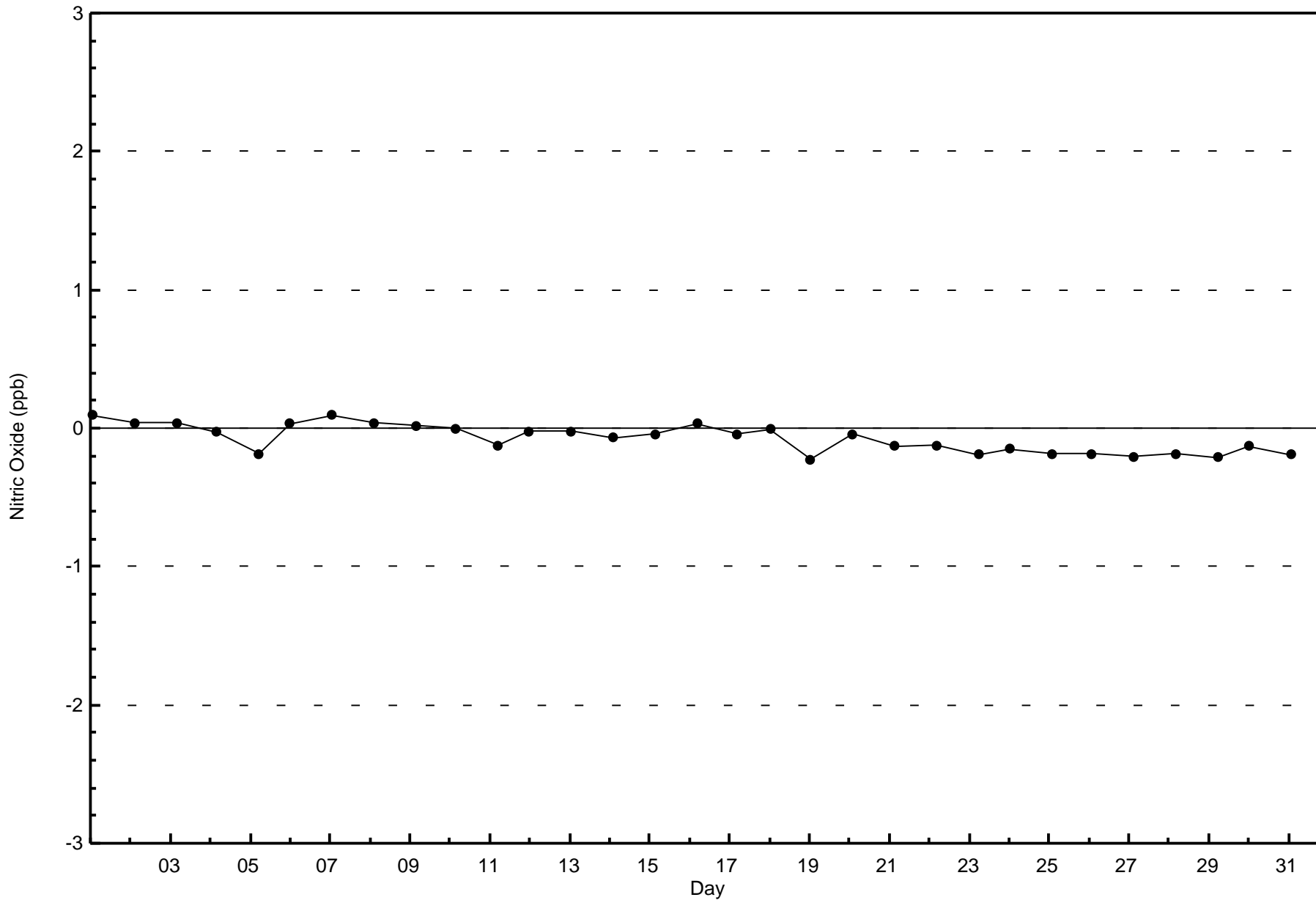
**Wood Buffalo Environmental Association
Frequency Distribution**

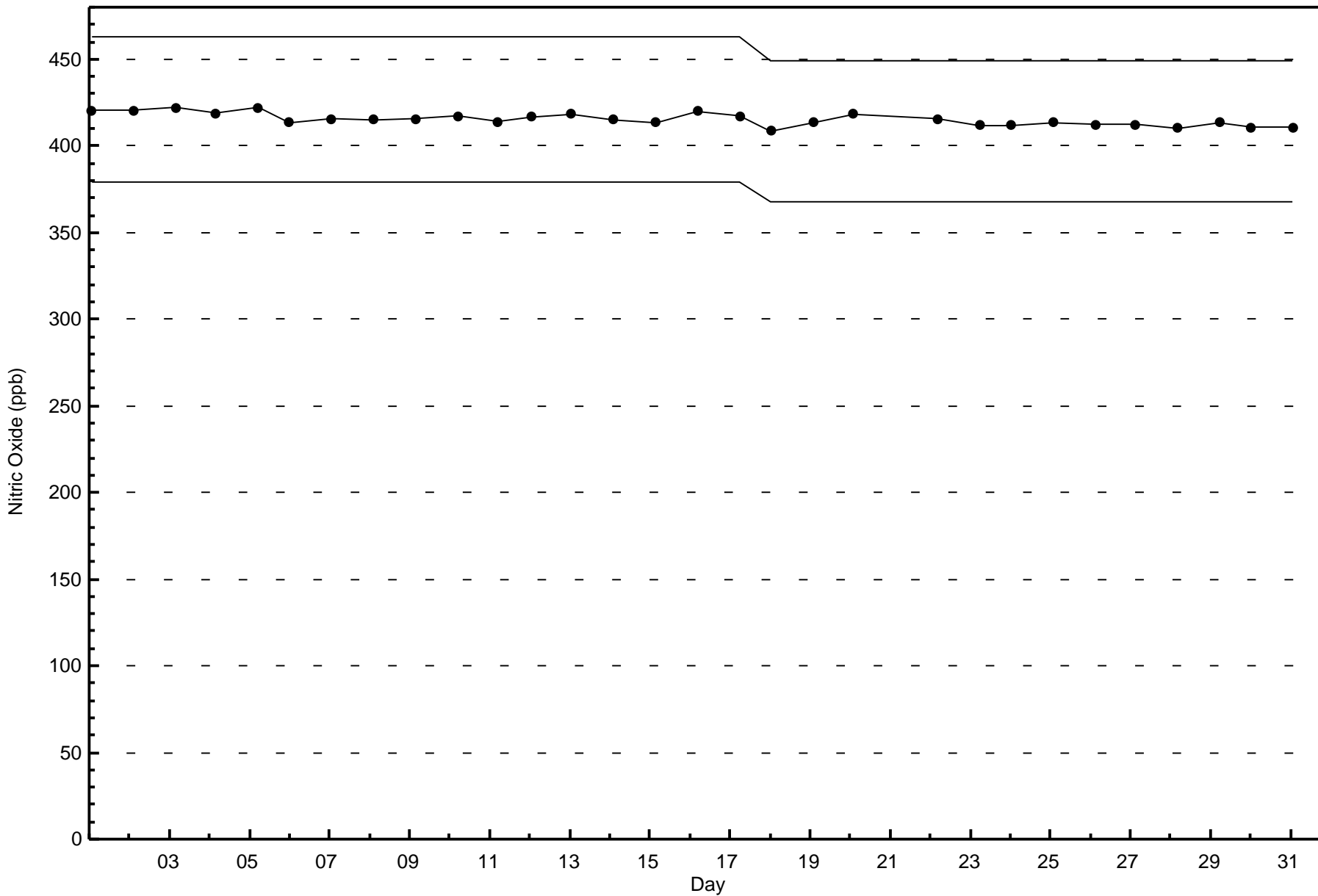
**Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	55	21	6	7	6	5	17	76	99	56	60	53	65	77	52	37	692
21 - 40	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
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	55	21	6	7	6	6	17	76	99	56	60	53	65	77	52	37	693

Total Number of Valid Hours: 693

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

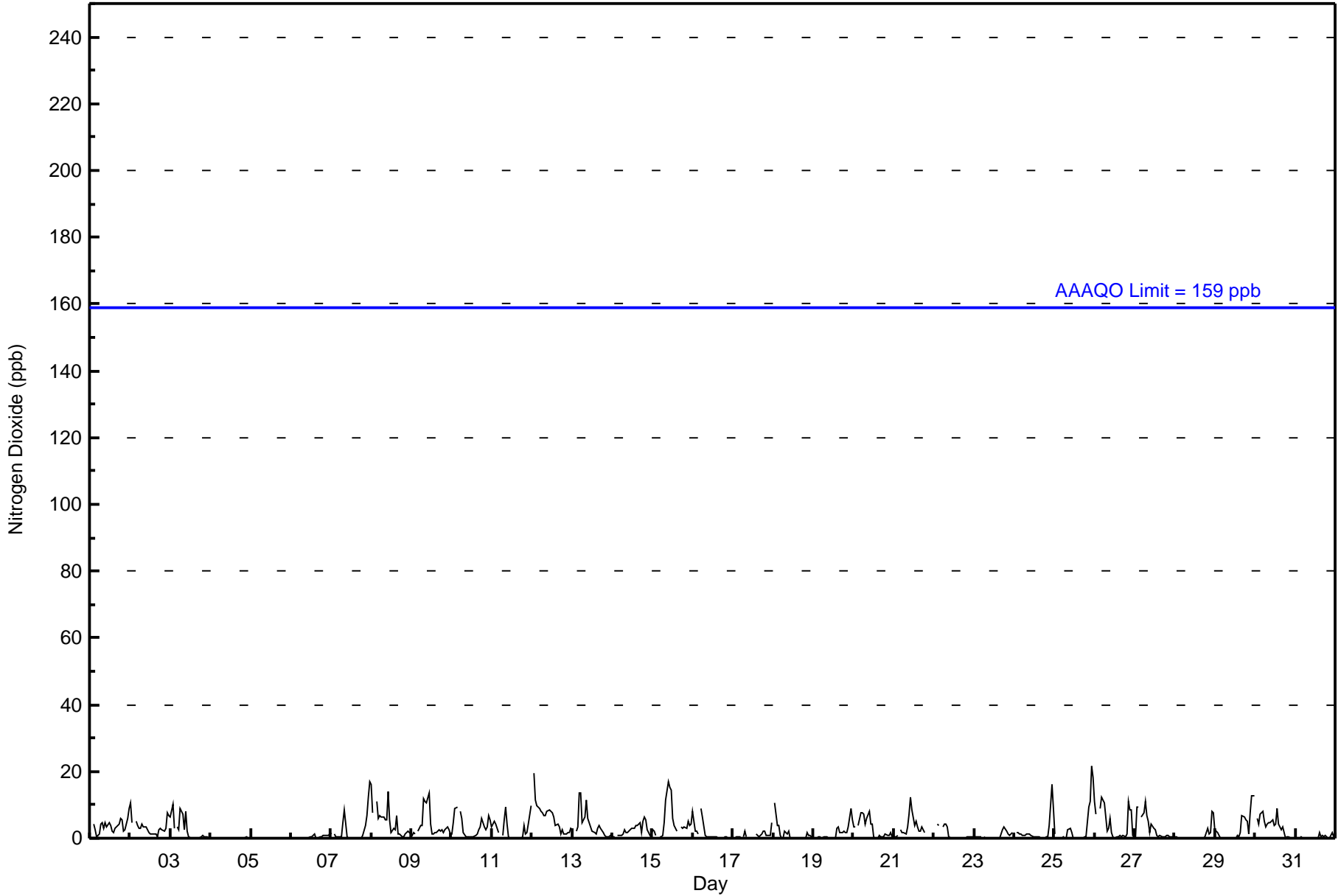
Fort McKay - Bertha Ganter - July 2017

Number of Exceedences (AAAQO):		1-hr: 0 24-hr: 0		Hours in Service:		744																																										
Maximum Value: 22 ppb on Jul 25 23:00		Maximum Daily Average: 6.1 ppb on Jul 12		Hours of Data:		693																																										
Minimum Value: 0 ppb on Jul 4 02:00		Minimum Daily Average: 0.0 ppb on Jul 5		Hours of Missing Data:		51																																										
Maximum Diurnal Average: 4.4 ppb at hour 23		Minimum Diurnal Average: 1.2 ppb at hour 15		Hours of Calibration:		36																																										
Monthly Average: 2.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 4 P ₉₀ = 8 P ₉₉ = 16		Percent Operational Time:		98.0																																										
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-Jul	3	Z	4	3	1	1	4	5	3	5	3	5	4	2	2	3	4	4	6	6	2	3	6	9	3.8	9																						
2-Jul	11	5	Z	5	4	3	3	4	3	3	2	2	1	1	1	1	1	2	3	3	2	3	8	7	3.4	11																						
3-Jul	6	10	3	Z	3	3	9	7	3	8	2	0	0	0	0	0	0	0	1	1	1	0	0	0	2.5	10																						
4-Jul	0	0	0	0	Z	0	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	--	0																						
5-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1	2	0.5	2																						
7-Jul	1	Z	1	1	0	0	0	5	9	1	0	0	0	0	0	0	0	0	0	1	4	7	12	17	2.5	17																						
8-Jul	16	8	Z	11	6	7	7	6	6	5	14	6	2	3	3	7	1	1	1	1	1	2	2	1	4.9	16																						
9-Jul	1	2	1	Z	2	4	4	12	11	11	14	4	1	1	2	2	2	2	3	2	2	3	3	1	3.9	14																						
10-Jul	1	5	9	9	Z	8	6	2	1	1	1	1	1	1	1	1	3	3	6	4	2	4	7	6	3.4	9																						
11-Jul	4	5	4	3	2	Z	1	6	10	4	1	0	0	0	0	0	0	0	0	4	1	2	4	10	2.7	10																						
12-Jul	Z	19	11	10	9	8	8	7	7	8	9	8	8	6	4	4	3	1	3	1	1	2	2	3	6.1	19																						
13-Jul	3	Z	2	4	13	14	5	7	11	6	5	3	2	2	1	3	4	3	2	1	1	1	1	1	4.0	14																						
14-Jul	1	0	Z	1	1	1	1	3	2	2	2	3	3	3	4	4	5	2	5	7	5	3	1	1	2.5	7																						
15-Jul	3	2	1	Z	0	0	1	5	12	17	15	14	6	4	2	PF	PF	3	3	3	3	5	4	4	5.1	17																						
16-Jul	8	2	2	1	Z	9	6	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1.5	9																						
17-Jul	0	0	0	0	0	Z	0	2	0	C	C	C	C	C	1	1	1	1	2	2	1	1	1	5	1.1	5																						
18-Jul	Z	11	4	4	1	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	2	1	1	0	1.2	11																						
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	3	4	2	2	2	2	2	4	9	6	1.6	9																						
20-Jul	3	4	Z	4	8	8	7	4	6	8	4	4	1	0	0	1	1	1	1	1	1	1	2	1	3.0	8																						
21-Jul	1	1	1	Z	2	2	2	1	4	7	12	8	4	5	4	2	2	3	2	PF	PF	PF	PF	PF	3.5	12																						
22-Jul	PF	PF	4	4	Z	4	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.3	4																						
23-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	1	2	0.7	3																							
24-Jul	Z	2	2	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	4	16	9	1.9	16																						
25-Jul	1	Z	0	0	0	0	0	0	2	3	2	0	0	0	0	0	0	0	1	1	9	11	22	18	3.1	22																						
26-Jul	11	7	Z	9	12	11	10	2	3	6	2	0	0	0	1	1	1	1	0	1	11	9	8	1	4.7	12																						
27-Jul	1	10	9	Z	7	8	11	7	5	2	4	3	3	1	1	1	1	1	1	1	1	0	1	1	3.2	11																						
28-Jul	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	2	8	8	1.0	8																						
29-Jul	3	2	1	0	0	Z	0	0	0	0	0	0	0	1	1	2	7	6	6	5	1	8	13	13	2.9	13																						
30-Jul	Z	6	4	7	8	5	4	4	5	5	6	4	4	9	4	3	3	2	0	0	0	0	0	0	3.6	9																						
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	1	2	1	0.4	2																						
																								3.1	4.1	2.5	3.0	3.2	3.7	3.2	3.2	3.6	3.6	3.4	2.3	1.4	1.4	1.2	1.3	1.4	1.4	1.6	1.7	2.0	2.5	4.4	4.1	Diurnal Average
																								16	19	11	11	13	14	11	12	12	17	15	14	8	9	4	7	7	6	6	7	11	11	22	18	Diurnal Maximum
Z - zerospan 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
Fort McKay - Bertha Ganter - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	692	99.86	99.86
21 - 40	1	0.14	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: 693

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - July 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	55	21	6	7	6	6	17	76	98	56	60	53	65	77	52	37	692
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	55	21	6	7	6	6	17	76	99	56	60	53	65	77	52	37	693

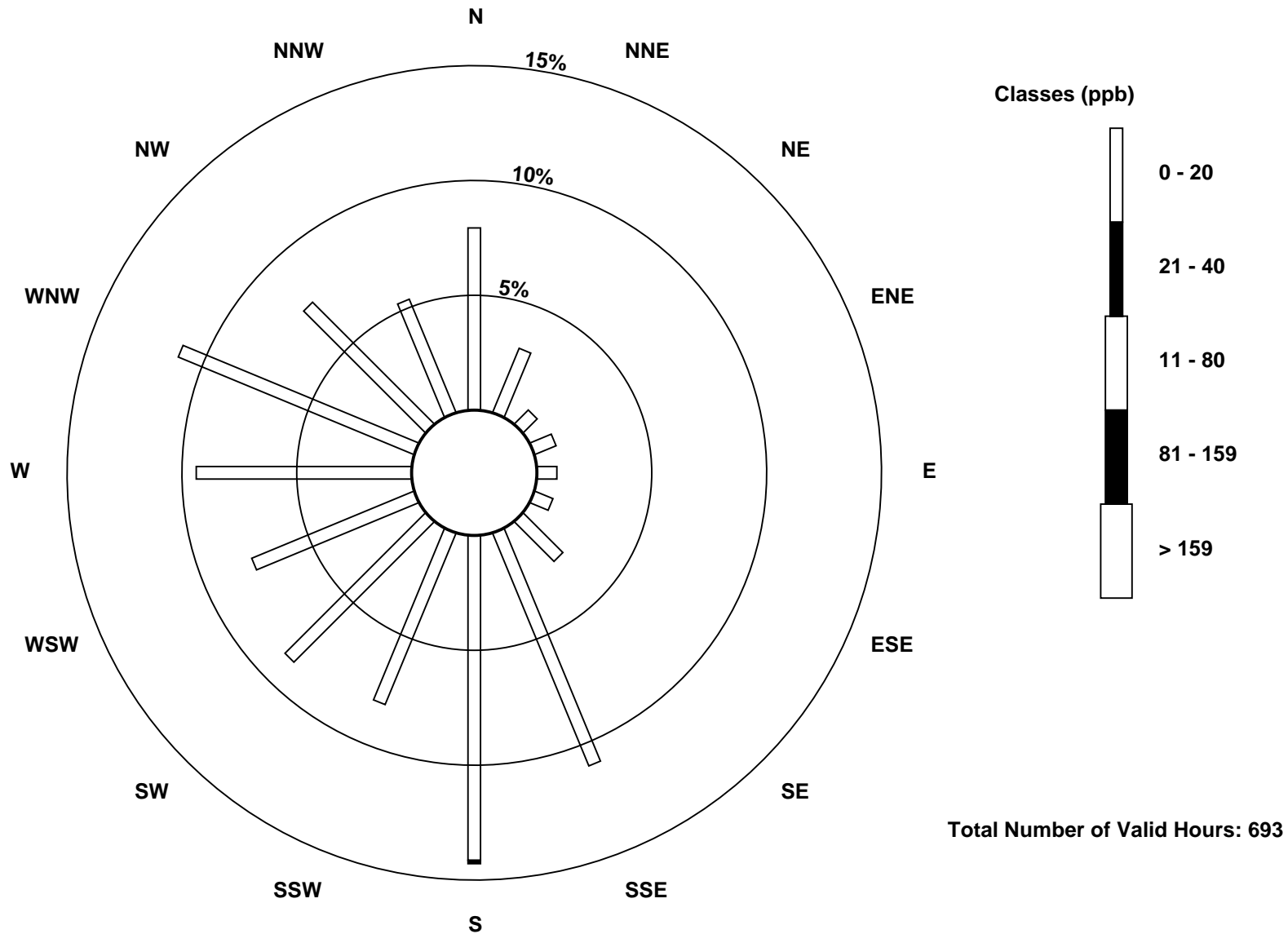
Total Number of Valid Hours: 693

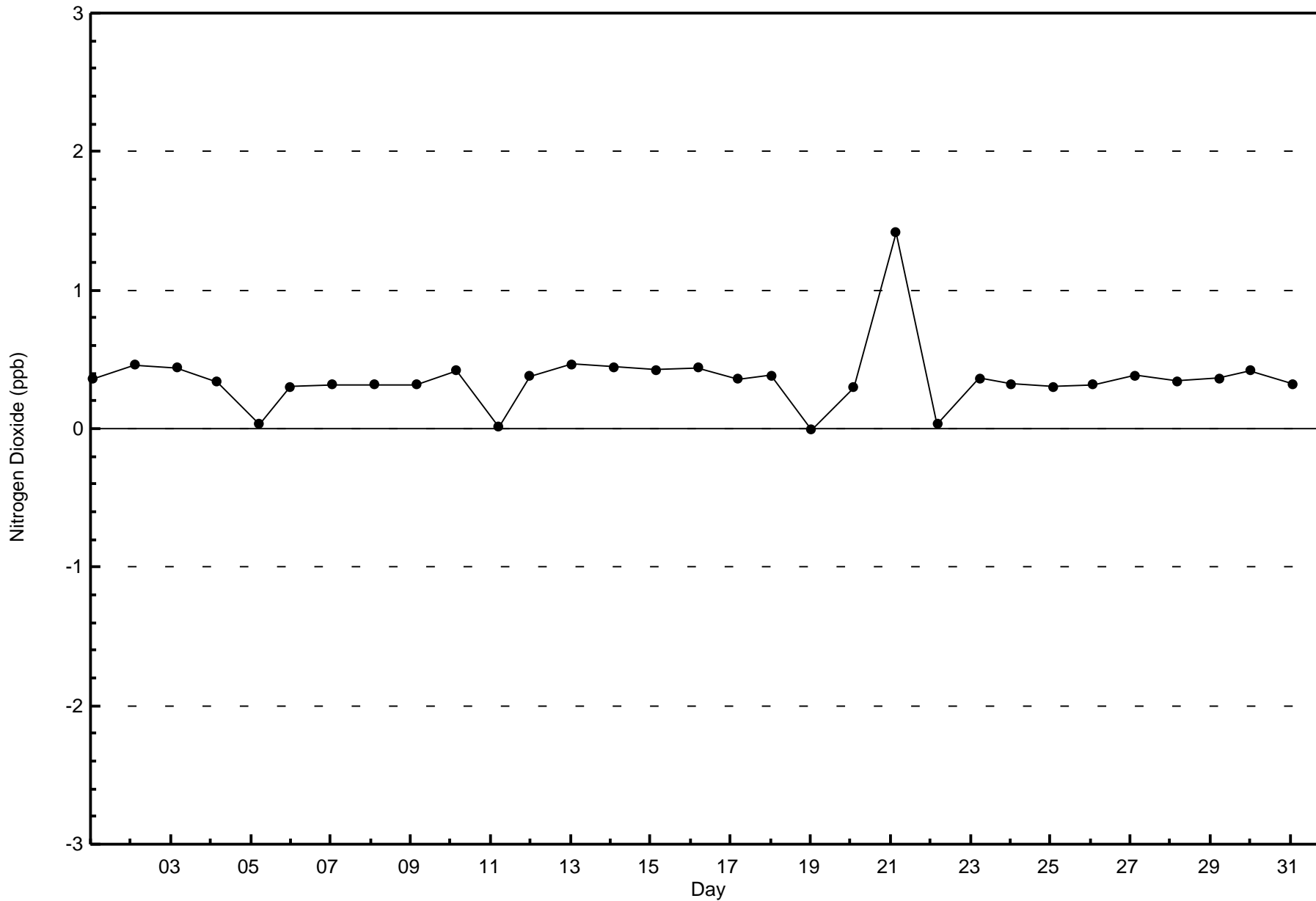
Total Number of Hours: 744

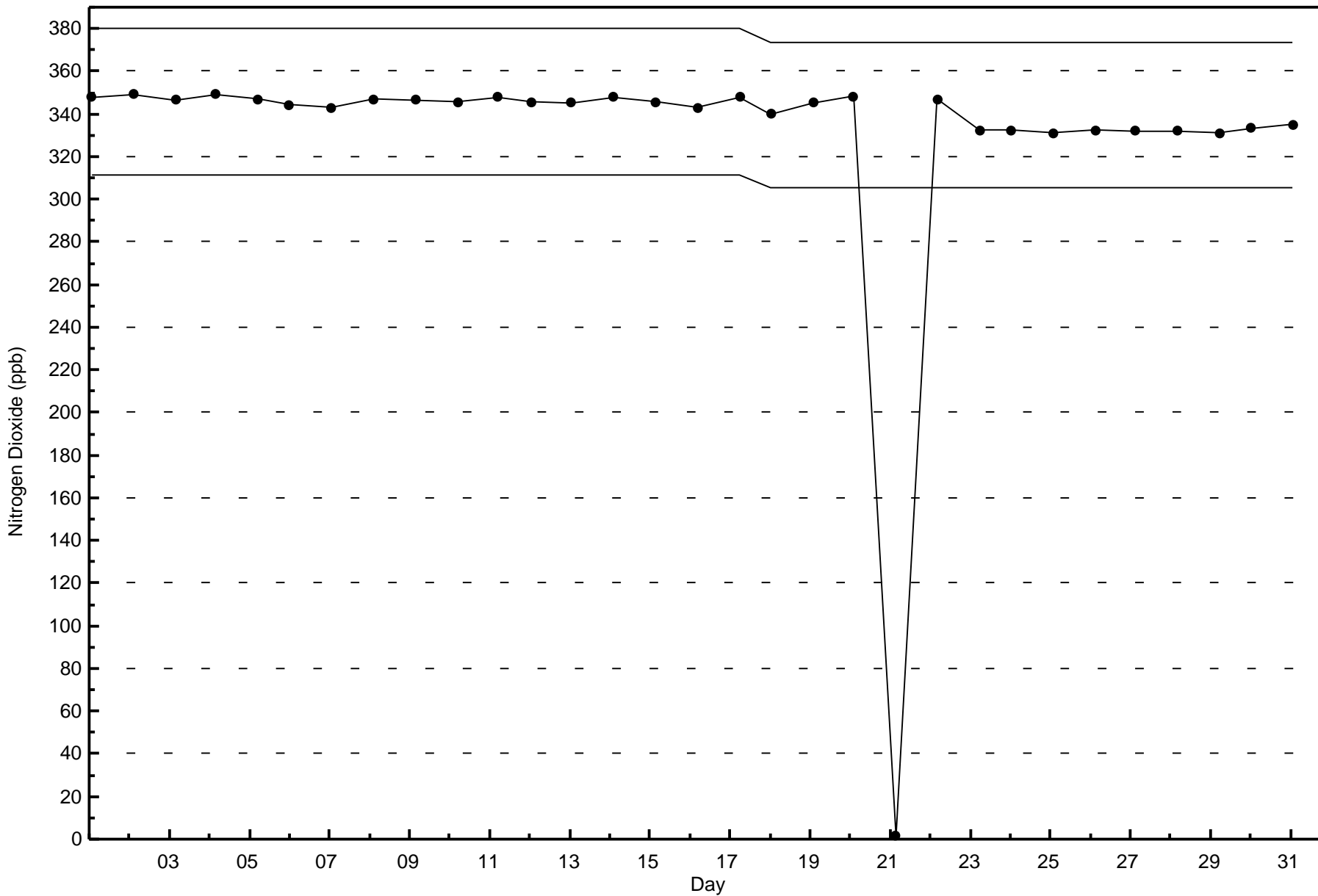


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









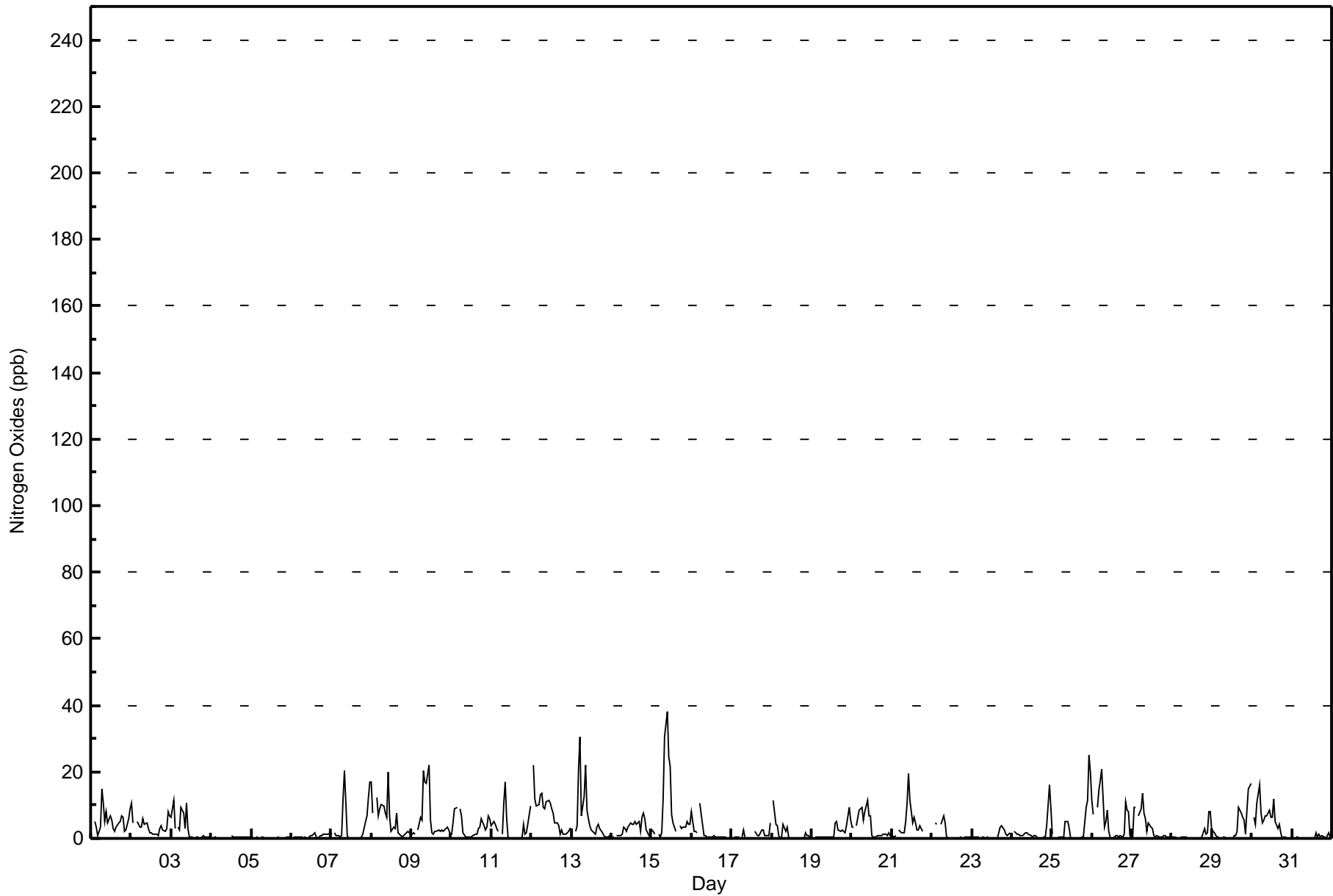
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Fort McKay - Bertha Ganter - July 2017

Maximum Value: 38 ppb on Jul 15 10:00																	Maximum Daily Average: 8.4 ppb on Jul 15										Hours in Service: 744	
Minimum Value: 0 ppb on Jul 28 13:00																	Minimum Daily Average: 0.2 ppb on Jul 5										Hours of Data: 693	
Maximum Diurnal Average: 6.2 ppb at hour 9																	Minimum Diurnal Average: 1.5 ppb at hour 15										Hours of Missing Data: 51	
Monthly Average: 3.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 5 P ₉₀ = 9 P ₉₉ = 22										Hours of Calibration: 36	
																											Percent Operational Time: 98.0	
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-Jul	4	Z	5	3	1	3	15	10	5	8	5	7	5	3	2	3	5	5	7	7	2	3	6	9	5.4	15		
2-Jul	11	5	Z	5	4	4	3	6	4	5	3	2	2	1	1	1	1	3	4	3	2	3	8	7	3.8	11		
3-Jul	7	11	3	Z	3	3	9	8	3	11	3	1	0	0	0	0	0	0	1	1	0	0	0	0	2.8	11		
4-Jul	0	0	0	0	Z	0	PF	PF	PF	PF	PF	PF	1	0	0	0	0	0	0	0	0	0	0	0	--	1		
5-Jul	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		
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	0	1	1	1	1	1	1	2	0.7	2		
7-Jul	1	Z	2	1	1	1	1	12	20	1	0	0	0	0	0	0	0	0	0	1	5	7	12	17	3.6	20		
8-Jul	17	8	Z	12	7	9	10	10	8	7	20	7	2	3	3	8	2	1	1	1	1	2	2	1	6.1	20		
9-Jul	1	2	1	Z	3	6	6	20	17	17	22	6	2	1	2	2	3	2	3	2	2	3	3	1	5.5	22		
10-Jul	1	5	9	9	Z	9	7	2	1	1	1	0	1	1	1	1	3	3	6	4	2	4	7	6	3.6	9		
11-Jul	4	5	4	3	2	Z	1	11	17	6	0	0	0	0	0	0	0	0	0	4	1	2	4	10	3.3	17		
12-Jul	Z	22	12	10	10	13	14	9	9	11	12	10	9	8	4	5	4	1	3	1	1	2	2	3	7.6	22		
13-Jul	3	Z	2	4	21	31	7	13	22	9	6	4	2	2	1	3	4	3	2	1	1	0	1	1	6.1	31		
14-Jul	0	0	Z	1	1	1	1	3	3	2	3	5	4	4	5	4	5	2	6	8	6	3	1	1	3.1	8		
15-Jul	3	2	1	Z	1	1	2	12	30	38	24	22	7	5	2	PF	PF	4	3	4	3	5	4	4	8.4	38		
16-Jul	8	2	2	2	Z	11	7	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1.6	11		
17-Jul	0	0	0	0	0	Z	1	3	1	C	C	C	C	C	2	1	1	2	2	3	1	1	1	5	1.3	5		
18-Jul	Z	11	4	4	1	0	0	4	2	4	0	0	0	0	0	0	0	0	0	0	2	1	1	0	1.5	11		
19-Jul	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	5	5	3	2	3	2	2	4	9	6	2.0	9		
20-Jul	3	4	Z	4	8	9	9	6	8	11	7	7	1	0	0	1	1	1	1	1	1	1	2	1	3.8	11		
21-Jul	1	1	1	Z	3	2	2	2	5	11	19	12	5	6	5	2	2	4	2	PF	PF	PF	PF	PF	4.6	19		
22-Jul	PF	PF	5	4	Z	4	5	7	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.6	7			
23-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	3	4	3	1	1	1	2	0.9	4		
24-Jul	Z	2	2	1	1	1	1	1	2	2	1	1	0	1	1	0	0	0	0	0	0	4	16	9	2.0	16		
25-Jul	1	Z	0	0	0	0	0	0	5	5	3	0	0	0	0	0	0	0	0	1	9	11	25	20	3.6	25		
26-Jul	12	7	Z	9	15	17	21	3	5	9	2	0	0	0	1	1	1	1	0	1	11	9	8	1	5.8	21		
27-Jul	1	10	9	Z	7	9	13	8	6	2	5	3	3	1	1	1	0	1	0	1	1	0	0	1	3.6	13		
28-Jul	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	2	8	8	1.1	8		
29-Jul	3	2	1	0	0	Z	0	0	0	0	0	0	0	1	1	2	9	8	6	5	1	9	15	16	3.5	16		
30-Jul	Z	6	4	11	16	8	5	6	7	7	9	6	6	12	5	3	4	2	0	0	0	0	0	0	5.1	16		
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	1	2	1	0.4	2		
																	Diurnal Average		Diurnal Maximum									
3.2 4.4 2.7 3.3 4.1 5.5 4.8 5.3 6.2 5.8 5.1 3.2 1.8 1.8 1.5 1.6 1.7 1.6 1.9 1.9 2.1 2.6 4.7 4.4																												
17 22 12 12 21 31 21 20 30 38 24 22 9 12 5 8 9 8 7 8 11 11 25 20																												
Z - zerospan C - Calibration PF - Power Failure																												





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	98.41	98.41
21 - 40	11	1.59	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: 693

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - July 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	20	6	7	6	5	16	73	96	55	60	53	65	77	52	37	682
21 - 40	1	1	0	0	0	1	1	3	3	1	0	0	0	0	0	0	11
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	55	21	6	7	6	6	17	76	99	56	60	53	65	77	52	37	693

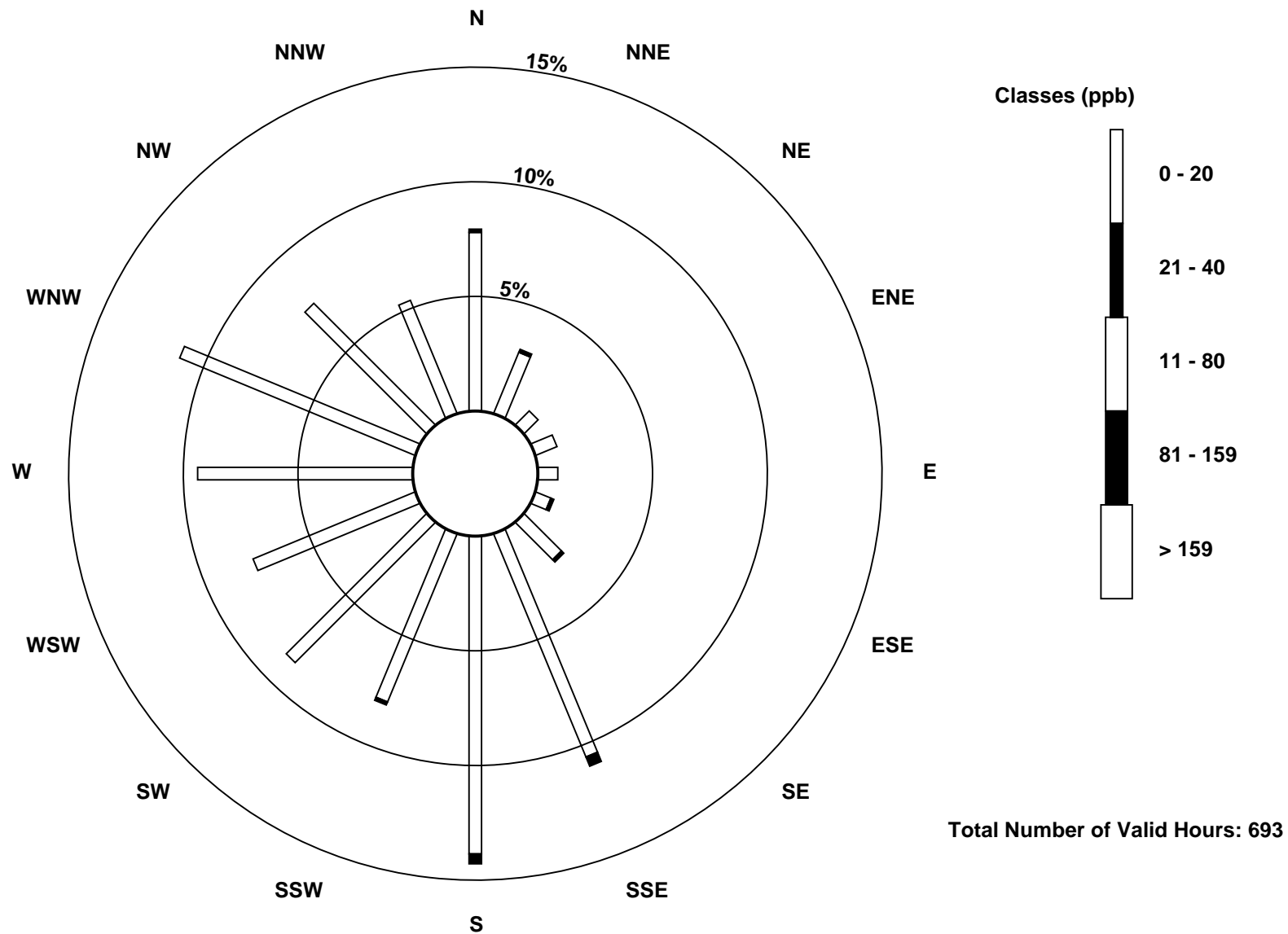
Total Number of Valid Hours: 693

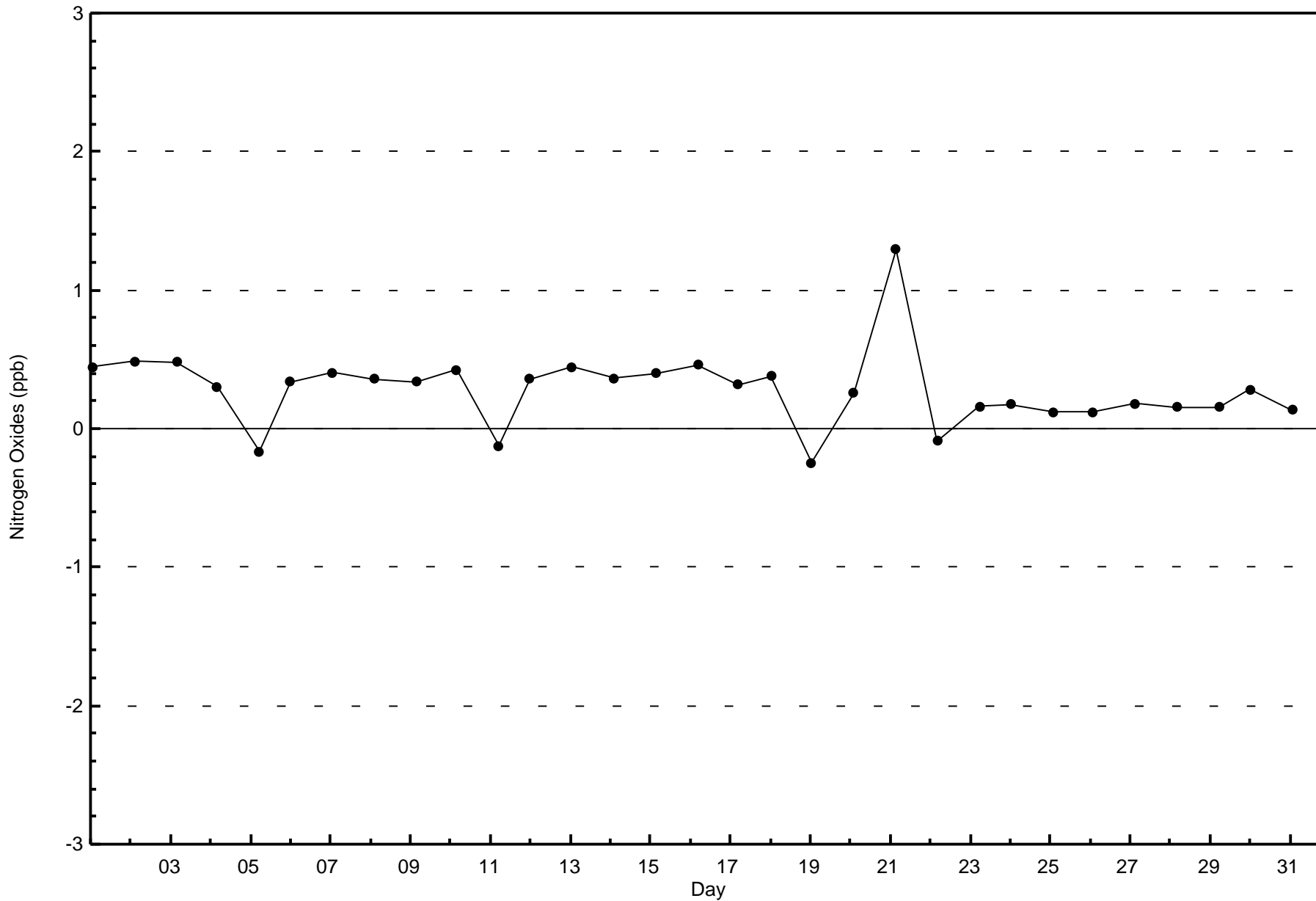
Total Number of Hours: 744

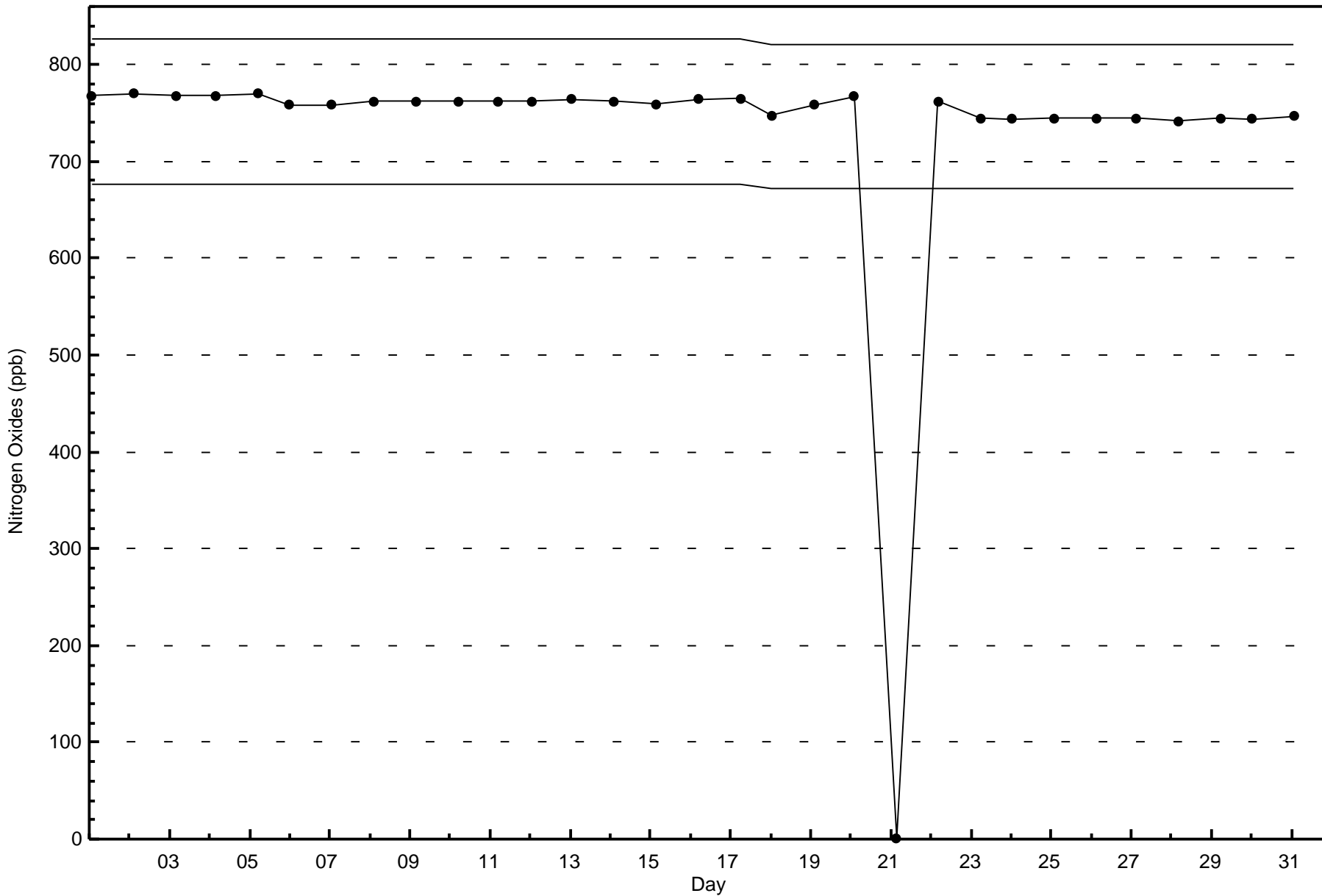


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 51 ppb on Jul 15 18:00	Maximum Daily Average: 31.1 ppb on Jul 27
Minimum Value: 0 ppb on Jul 30 05:00	Hours of Data: 690
Maximum Diurnal Average: 31.9 ppb at hour 15	Hours of Missing Data: 54
Monthly Average: 21.9 ppb	Hours of Calibration: 37
Minimum Daily Average: 15.2 ppb on Jul 1	Percent Operational Time: 97.7
Minimum Diurnal Average: 11.2 ppb at hour 6	
Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 14 Median = 22 Q ₃ = 29 P ₉₀ = 36 P ₉₉ = 48	

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-Jul	1	1	Z	1	3	2	3	8	14	16	22	25	26	26	23	20	21	23	20	22	21	18	13	17	15.2	26	
2-Jul	19	25	Z	Z	24	20	27	27	28	30	34	39	42	44	45	43	35	33	36	40	29	19	9	4	29.5	45	
3-Jul	8	10	19	20	Z	26	22	19	21	19	27	25	29	37	37	38	39	41	39	36	35	32	31	32	27.8	41	
4-Jul	32	31	29	28	24	Z	PF	PF	PF	PF	PF	PF	29	31	33	35	36	37	35	33	33	30	29	28	--	37	
5-Jul	28	27	26	25	24	23	Z	22	22	22	23	27	27	26	24	24	25	28	27	27	25	21	18	16	24.2	28	
6-Jul	15	Z	11	10	9	11	13	14	14	18	22	24	31	28	28	30	30	33	32	31	23	17	16	9	20.3	33	
7-Jul	11	7	Z	5	5	7	8	9	12	22	22	25	26	27	28	29	30	30	30	29	22	18	12	7	18.2	30	
8-Jul	3	8	2	Z	5	7	9	14	20	23	18	31	36	33	39	37	39	38	37	32	24	17	10	8	21.2	39	
9-Jul	6	3	4	3	Z	3	8	12	19	22	23	37	37	38	41	41	40	37	37	34	31	24	22	18	23.5	41	
10-Jul	18	9	5	7	10	Z	25	29	32	34	30	30	34	41	48	48	48	44	29	27	28	19	11	9	26.7	48	
11-Jul	9	7	5	6	4	4	Z	5	7	16	27	31	30	30	32	31	31	31	28	27	29	26	17	8	19.1	32	
12-Jul	3	Z	3	3	4	2	6	13	16	19	26	34	32	35	36	37	32	37	35	29	26	24	16	15	21.0	37	
13-Jul	15	19	Z	9	2	2	11	12	12	25	35	42	44	44	47	48	41	38	35	32	29	27	24	23	26.8	48	
14-Jul	24	22	22	Z	22	22	21	19	19	20	21	21	25	28	30	28	17	20	16	13	6	5	5	3	18.6	30	
15-Jul	2	1	1	1	Z	2	2	4	5	5	7	12	35	47	49	PF	51	51	49	49	42	38	36	33	23.7	51	
16-Jul	23	34	28	23	15	Z	19	20	21	22	21	22	22	22	22	23	24	25	25	23	22	22	21	20	22.6	34	
17-Jul	19	20	25	24	18	16	Z	15	17	18	20	22	23	20	21	22	21	19	18	13	11	10	7	4	17.4	25	
18-Jul	4	Z	5	3	6	8	10	14	18	20	26	26	26	25	25	24	25	25	26	27	24	20	19	19	18.4	27	
19-Jul	17	14	Z	13	14	15	16	17	18	21	24	26	28	27	24	27	28	27	26	28	28	22	11	10	20.9	28	
20-Jul	13	11	10	Z	7	6	7	8	C	C	C	C	C	C	C	30	34	34	32	30	23	24	13	11	13	--	34
21-Jul	17	9	10	5	Z	16	11	12	17	20	M	M	M	32	28	30	30	32	39	PF	PF	PF	PF	PF	--	39	
22-Jul	PF	PF	14	11	11	Z	14	15	17	19	22	25	26	33	32	30	28	28	28	27	25	23	21	21	22.4	33	
23-Jul	21	23	22	21	19	18	Z	18	19	22	25	23	23	27	31	33	25	22	22	22	17	18	17	15	21.9	33	
24-Jul	15	Z	13	14	14	15	14	13	14	16	19	19	19	22	23	24	24	25	26	29	29	23	9	14	18.8	29	
25-Jul	22	23	Z	20	17	16	16	16	16	18	23	28	27	30	30	31	32	33	36	34	23	18	4	2	22.3	36	
26-Jul	6	7	8	Z	2	5	7	14	18	23	30	35	34	34	36	36	37	36	33	32	22	22	29	36	23.6	37	
27-Jul	36	25	23	21	Z	12	20	30	31	35	36	37	43	37	38	41	40	42	43	36	29	26	20	16	31.1	43	
28-Jul	11	7	8	9	12	Z	16	15	16	21	24	26	26	26	25	24	24	24	21	21	20	15	7	5	17.5	26	
29-Jul	5	6	5	8	8	7	Z	12	14	16	19	20	22	24	23	26	26	31	30	25	15	6	1	1	15.3	31	
30-Jul	1	Z	4	0	0	2	3	3	4	5	6	12	24	33	36	34	31	35	40	37	33	34	34	34	19.3	40	
31-Jul	30	26	Z	23	25	24	21	21	22	25	26	26	25	32	25	25	25	20	19	18	14	10	10	10	21.9	32	

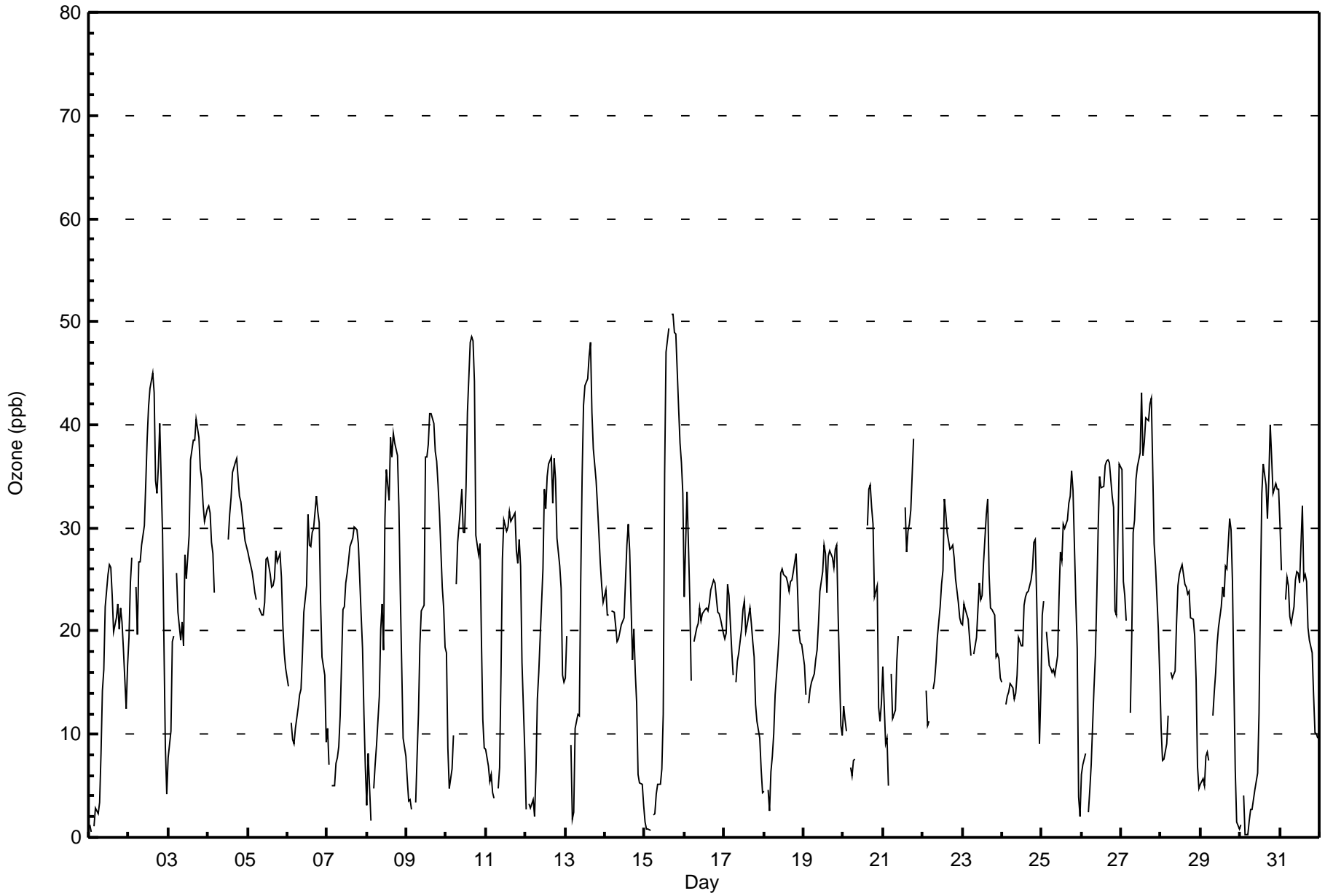
14.4	15.0	13.1	11.9	11.7	11.2	13.1	15.0	17.3	20.3	23.5	26.7	29.3	31.4	31.9	31.8	31.3	31.5	30.4	28.5	24.7	20.6	16.3	15.0	Diurnal Average	
36	34	29	28	25	26	27	30	32	35	36	42	44	47	49	48	51	51	49	49	42	38	36	36	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	288	41.74	41.74
21 - 50	400	57.97	99.71
51 - 82	2	0.29	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 690

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - July 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	29	5	1	1	1	3	9	25	50	22	12	13	28	47	25	17	288
21 - 50	29	15	4	4	4	3	6	45	53	34	46	40	37	32	29	19	400
51 - 82	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	58	20	5	5	5	6	15	72	103	56	58	53	65	79	54	36	690

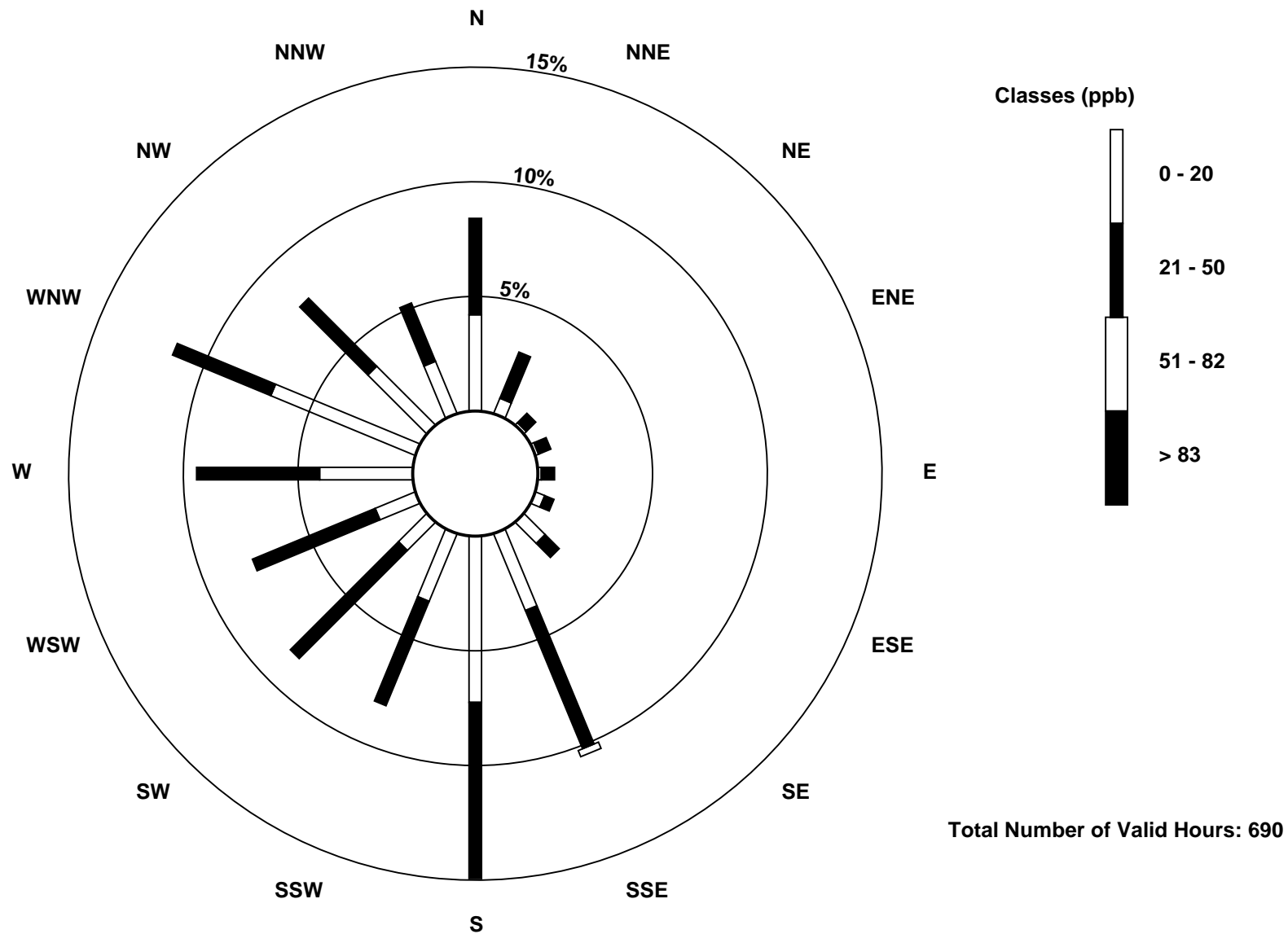
Total Number of Valid Hours: 690

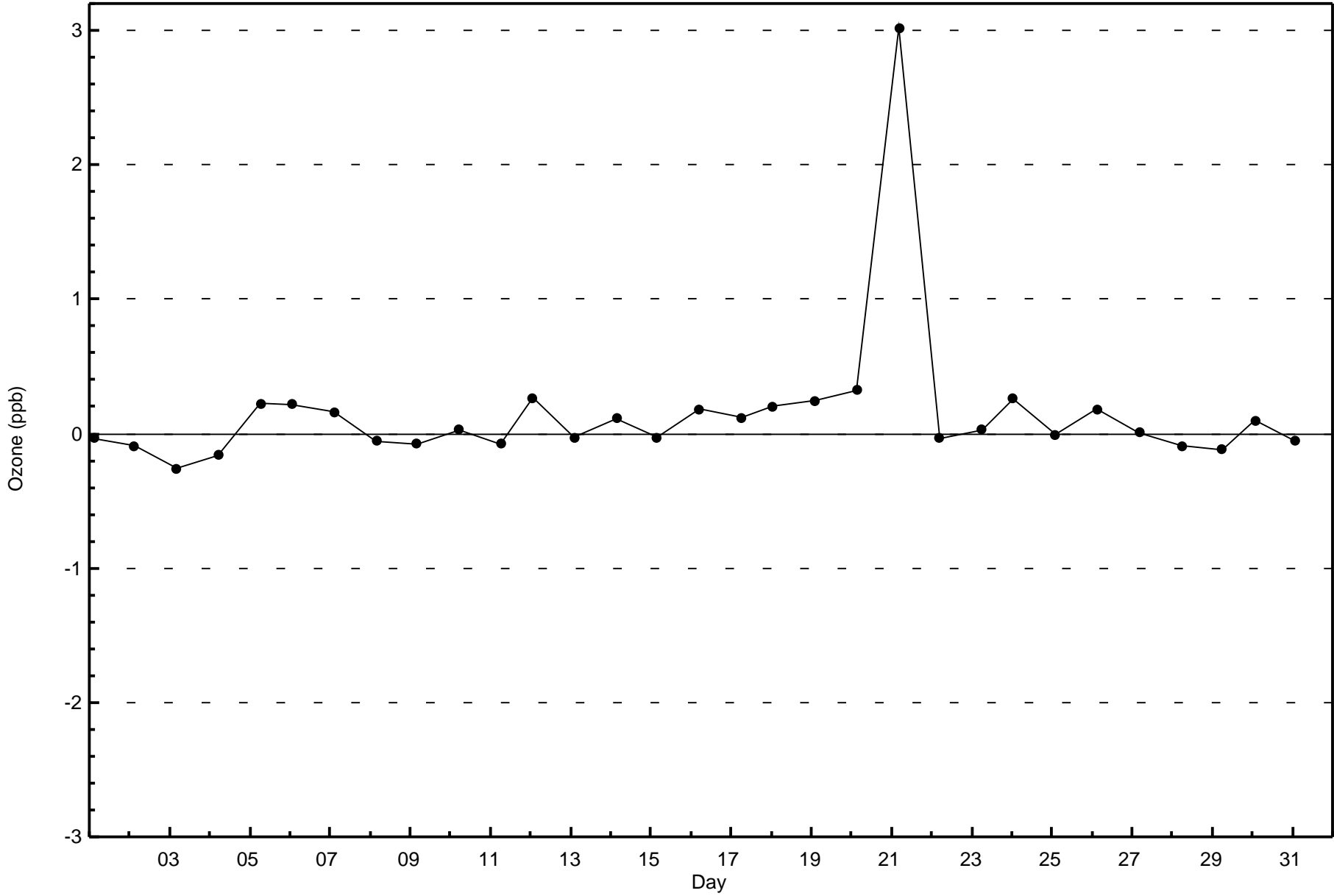
Total Number of Hours: 744

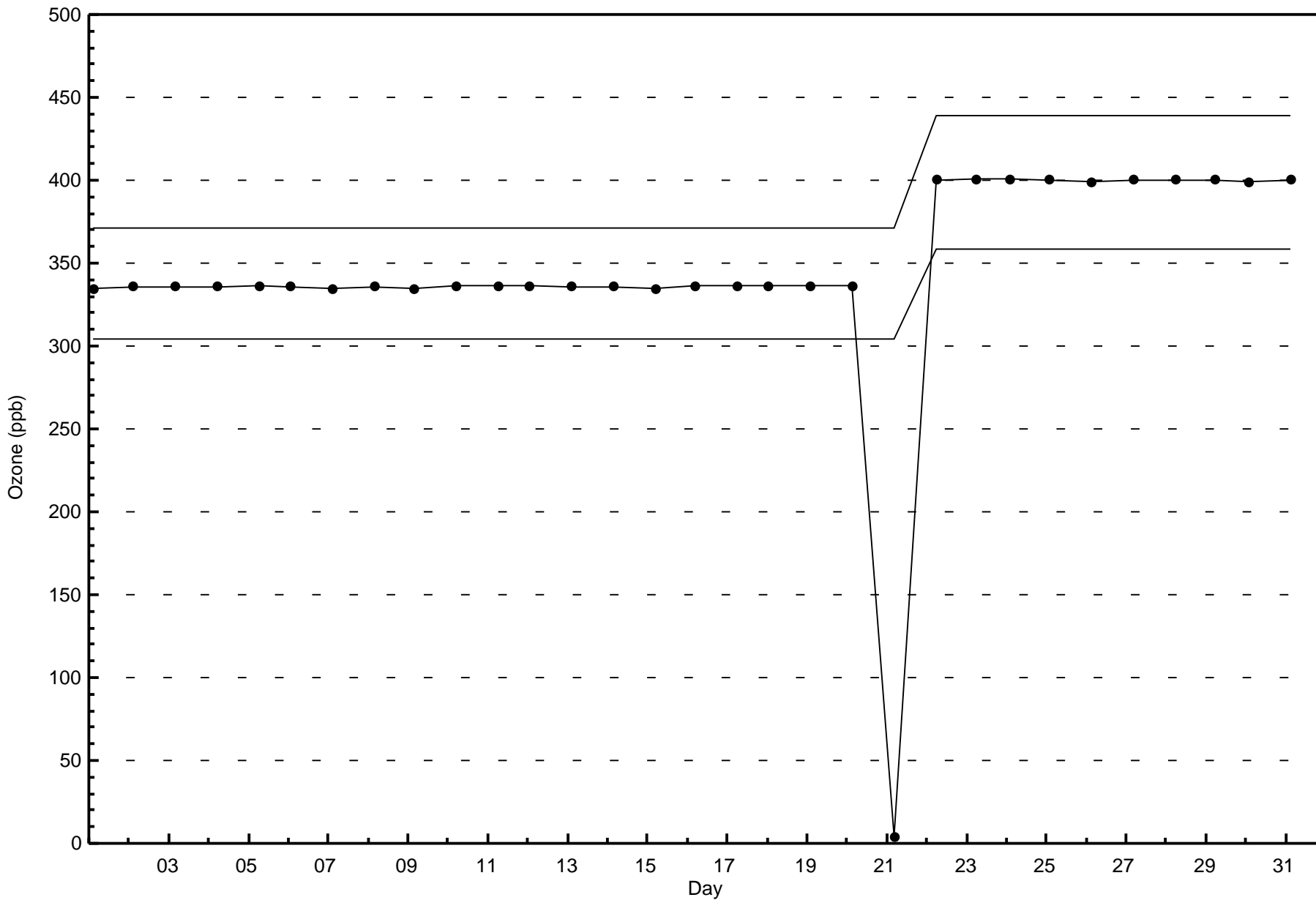


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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

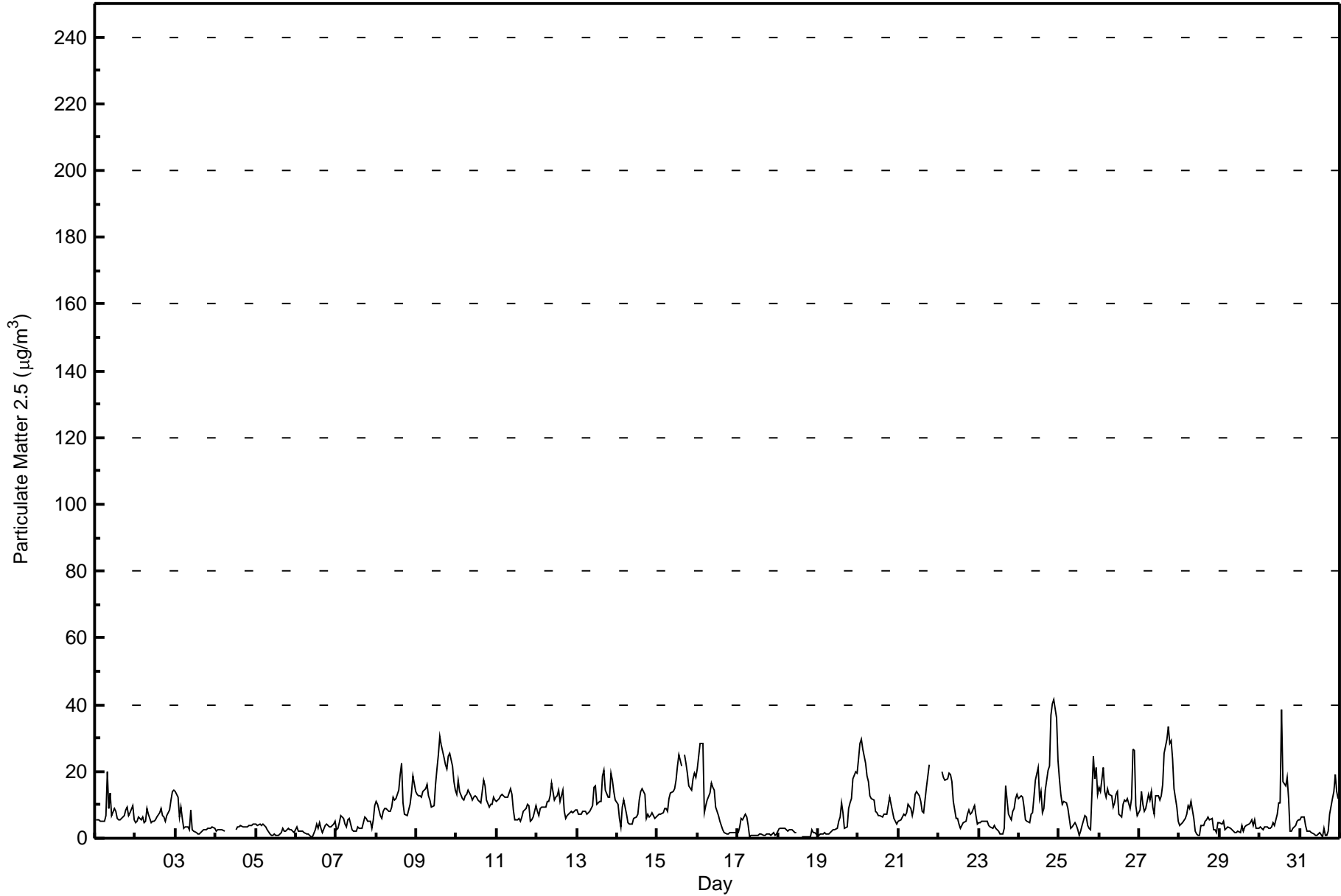
Fort McKay - Bertha Ganter - July 2017

Number of Exceedences (AAAQO):		24-hr: 0		Hours in Service:		744																																										
Maximum Value: 41.6 µg/m ³ on Jul 24 22:00		Maximum Daily Average: 17.9 µg/m ³ on Jul 9		Hours of Data:		728																																										
Minimum Value: 0.3 µg/m ³ on Jul 18 16:00		Minimum Daily Average: 1.8 µg/m ³ on Jul 18		Hours of Missing Data:		16																																										
Maximum Diurnal Average: 10.5 µg/m ³ at hour 22		Minimum Diurnal Average: 7.1 µg/m ³ at hour 13		Hours of Calibration:		2																																										
Monthly Average: 8.42 µg/m ³		Percentiles: P ₁ = 0.5 P ₁₀ = 1.7 Q ₁ = 3.2 Median = 6.7 Q ₃ = 12.0 P ₉₀ = 17.5 P ₉₉ = 28.0		Percent Operational Time:		98.1																																										
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-Jul	5.4	5.3	5.7	4.9	4.9	5.3	6.7	19.8	8.9	13.5	6.6	8.9	8.1	6.0	5.4	5.4	6.4	6.7	8.3	9.4	6.6	7.5	9.9	5.6	7.6	19.8																						
2-Jul	4.7	5.2	6.5	5.5	6.3	4.6	4.9	9.0	7.3	4.5	5.0	5.2	5.6	6.5	7.8	9.1	6.8	6.1	5.2	7.0	8.4	11.2	14.1	14.4	7.1	14.4																						
3-Jul	13.9	12.3	6.4	9.4	5.9	3.2	3.4	2.5	8.3	2.4	2.1	1.5	1.3	1.5	1.8	2.3	2.8	2.7	2.8	2.9	3.0	3.3	2.8	4.2	13.9																							
4-Jul	2.3	2.4	2.7	2.7	2.6	2.1	PF	PF	PF	PF	PF	PF	2.5	3.3	3.3	3.6	3.4	3.2	3.2	3.7	4.0	4.4	4.4	3.2	4.4																							
5-Jul	4.2	4.0	4.0	4.0	4.0	3.6	3.2	2.5	1.3	0.9	0.9	1.1	1.0	1.0	1.4	1.7	3.1	2.0	2.0	2.8	2.5	2.5	2.1	1.7	2.4	4.2																						
6-Jul	3.2	2.2	2.0	2.2	2.3	1.9	1.3	1.1	1.0	0.6	0.5	2.6	4.2	3.1	4.6	3.2	1.7	3.7	4.2	3.6	3.4	3.4	4.1	5.2	2.7	5.2																						
7-Jul	2.7	2.9	4.6	6.6	5.9	4.3	3.3	5.5	5.7	2.5	2.3	2.0	2.1	3.3	3.2	3.0	4.8	6.1	5.7	4.9	4.9	3.1	5.5	9.7	4.4	9.7																						
8-Jul	11.1	10.3	6.9	6.1	8.0	8.7	9.0	8.0	8.0	9.5	12.4	11.3	11.7	14.4	19.1	22.3	10.5	7.4	7.0	8.6	10.2	13.8	18.6	13.8	11.1	22.3																						
9-Jul	13.2	12.8	12.6	12.1	13.8	14.9	16.2	12.6	11.3	9.3	9.7	16.0	20.8	24.8	30.4	28.1	24.0	22.2	20.6	24.7	25.3	21.8	17.0	14.5	17.9	30.4																						
10-Jul	13.2	17.3	14.0	11.7	11.6	12.5	13.0	14.5	12.8	11.2	12.4	12.7	12.1	11.3	10.7	13.9	17.3	15.8	11.5	9.3	10.2	10.3	12.3	11.3	12.6	17.3																						
11-Jul	11.0	11.8	12.6	13.1	12.8	12.5	12.4	13.6	14.9	13.2	8.6	5.3	5.7	5.9	5.2	6.4	8.0	8.9	10.0	9.7	5.3	5.3	6.3	9.6	9.5	14.9																						
12-Jul	7.9	6.9	8.7	9.4	9.4	9.4	10.9	11.1	12.6	16.7	11.5	12.4	12.7	14.6	11.2	14.3	8.0	6.0	6.9	7.3	8.0	7.6	8.2	8.6	10.0	16.7																						
13-Jul	8.3	7.2	7.4	8.0	8.1	8.1	7.4	8.0	9.1	9.8	15.1	15.6	10.4	11.0	11.2	18.5	20.3	14.4	12.1	12.2	19.6	17.5	13.9	11.4	11.9	20.3																						
14-Jul	10.0	5.9	3.4	9.4	11.6	7.2	4.7	4.0	4.3	4.3	5.8	6.2	7.4	11.5	13.8	14.9	13.1	5.8	7.0	6.4	6.7	7.6	6.1	6.1	7.6	14.9																						
15-Jul	7.0	7.4	7.0	7.5	9.1	9.0	7.9	12.1	13.5	13.9	15.0	17.5	21.4	25.2	21.7	PF	24.9	22.5	19.5	15.9	14.3	17.9	19.4	18.3	15.1	25.2																						
16-Jul	20.7	28.4	28.6	28.5	7.7	9.8	11.6	13.4	16.6	15.4	14.6	9.2	6.6	5.2	3.9	2.4	1.7	1.2	1.2	1.5	1.7	1.7	1.9	1.5	9.8	28.6																						
17-Jul	1.7	3.2	6.1	5.6	7.4	6.5	3.7	0.5	0.7	1.0	0.9	1.0	1.1	1.3	1.2	0.8	0.9	1.1	1.2	1.3	1.0	1.7	0.8	1.1	2.2	7.4																						
18-Jul	2.1	2.8	2.9	3.2	2.8	2.4	2.0	2.4	2.4	2.3	1.8	1.8	C	C	0.4	0.3	0.5	0.4	0.4	0.4	2.5	1.6	1.7	1.5	1.8	3.2																						
19-Jul	0.9	1.4	1.2	1.5	1.6	1.3	1.3	1.6	2.0	2.3	2.4	3.1	5.0	6.2	10.8	7.4	2.8	3.4	8.9	10.7	11.9	17.9	20.0	19.3	6.0	20.0																						
20-Jul	23.7	28.5	29.7	26.8	22.3	18.8	16.9	12.6	11.8	11.5	8.3	7.4	6.6	6.8	6.4	7.4	7.1	7.4	9.8	12.3	8.1	6.1	5.2	4.1	12.7	29.7																						
21-Jul	5.1	5.3	6.4	7.1	6.8	7.8	10.0	8.8	6.7	8.8	13.3	13.9	12.7	11.0	8.0	7.7	11.4	15.2	21.9	PF	PF	PF	PF	PF	9.9	21.9																						
22-Jul	PF	PF	19.8	18.1	17.5	17.7	19.4	19.1	17.1	11.1	5.9	5.9	4.1	2.8	3.9	4.6	5.1	7.3	8.4	7.4	7.5	9.7	6.6	4.3	10.2	19.8																						
23-Jul	4.5	4.8	5.1	5.0	5.2	5.0	3.9	3.4	3.1	3.7	3.0	2.5	2.0	1.4	1.2	2.9	15.5	11.3	7.1	5.4	8.1	9.0	11.9	13.3	5.7	15.5																						
24-Jul	11.8	12.5	12.4	9.2	5.4	5.0	4.7	7.1	7.7	12.1	17.5	21.3	12.0	13.8	7.5	8.9	14.4	20.4	21.5	36.9	40.4	41.6	36.1	23.4	16.8	41.6																						
25-Jul	17.7	13.2	10.1	11.2	10.5	8.9	6.0	2.9	3.6	4.5	3.9	2.5	0.9	2.3	3.7	6.8	6.4	3.8	2.8	2.3	24.6	17.6	21.2	13.1	8.4	24.6																						
26-Jul	15.5	13.8	21.1	14.1	12.3	14.9	13.2	12.7	9.3	10.4	13.1	13.8	7.4	6.4	10.2	11.6	11.2	11.9	8.8	12.0	26.7	26.3	9.6	6.6	13.0	26.7																						
27-Jul	8.6	13.9	10.4	7.9	8.9	13.3	11.5	14.0	9.2	7.0	12.8	12.9	11.3	12.7	16.1	25.2	29.6	33.5	28.3	29.1	23.8	14.9	9.2	5.0	15.4	33.5																						
28-Jul	3.7	4.2	4.6	5.7	7.4	9.9	8.9	10.9	5.8	2.0	1.3	0.8	0.8	3.9	3.9	5.3	5.6	6.3	5.7	5.9	2.7	2.8	1.7	4.5	4.8	10.9																						
29-Jul	4.7	4.1	5.2	2.6	3.2	3.2	3.1	2.4	2.3	1.7	1.5	1.9	1.9	3.7	2.3	3.2	3.7	4.0	4.6	5.6	3.8	5.7	2.8	2.9	3.3	5.7																						
30-Jul	3.4	3.1	2.6	3.3	3.4	3.2	3.1	3.5	4.7	4.0	7.0	10.6	10.5	38.4	16.8	15.8	18.2	12.1	2.1	2.2	3.0	3.7	5.0	5.6	7.7	38.4																						
31-Jul	5.4	6.3	6.2	3.7	2.1	2.1	2.1	1.8	1.4	1.0	0.9	1.2	1.7	0.6	3.2	1.0	0.7	2.0	7.0	11.9	13.9	18.9	14.2	12.0	5.1	18.9																						
																								8.2	8.6	8.9	8.6	7.8	7.6	7.5	8.1	7.2	7.2	7.2	7.6	7.1	8.7	8.1	8.6	9.3	8.9	8.6	9.1	10.4	10.5	9.8	8.5	Diurnal Average
																								23.7	28.5	29.7	28.5	22.3	18.8	19.4	19.8	17.1	16.7	17.5	21.3	21.4	38.4	30.4	28.1	29.6	33.5	28.3	36.9	40.4	41.6	36.1	23.4	Diurnal Maximum
C - Calibration																								PF - Power Failure																								
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}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - July 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 - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	276	37.91	37.91
6 - 15	337	46.29	84.20
16 - 25	69	9.48	93.68
26 - 80	19	2.61	96.29
> 81.0	0	0.00	96.29

Total Number of Valid Hours: 728

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter - July 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	17	9	0	3	1	1	2	10	25	21	32	37	45	30	24	19	276
6 - 15	33	11	6	4	4	4	13	50	56	38	22	12	19	38	17	10	337
16 - 25	7	1	0	0	1	1	2	15	23	0	3	2	1	7	4	2	69
26 - 80	0	0	0	0	0	0	0	2	3	0	0	0	1	3	6	4	19
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	57	21	6	7	6	6	17	77	107	59	57	51	66	78	51	35	701

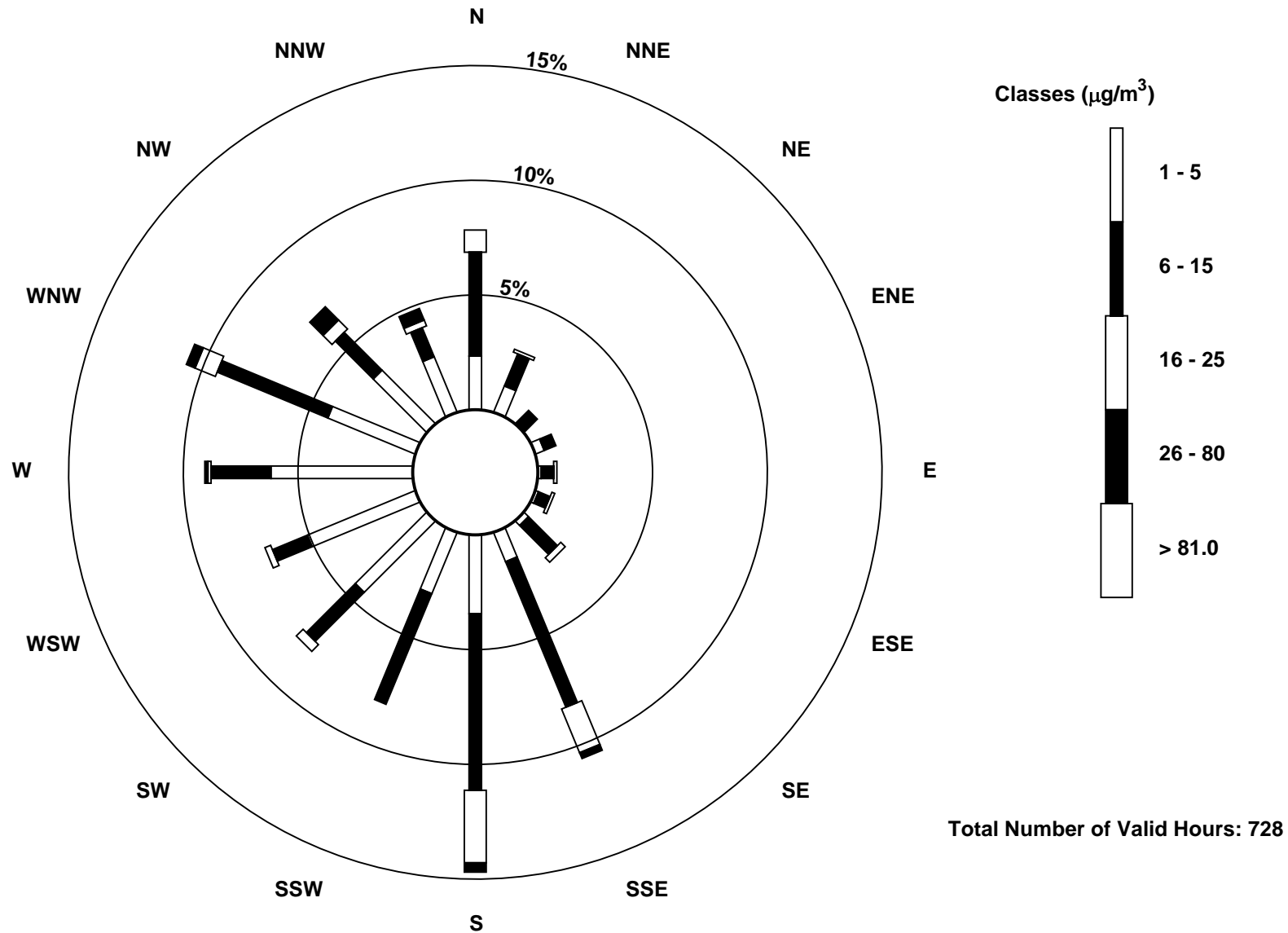
Total Number of Valid Hours: 728

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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

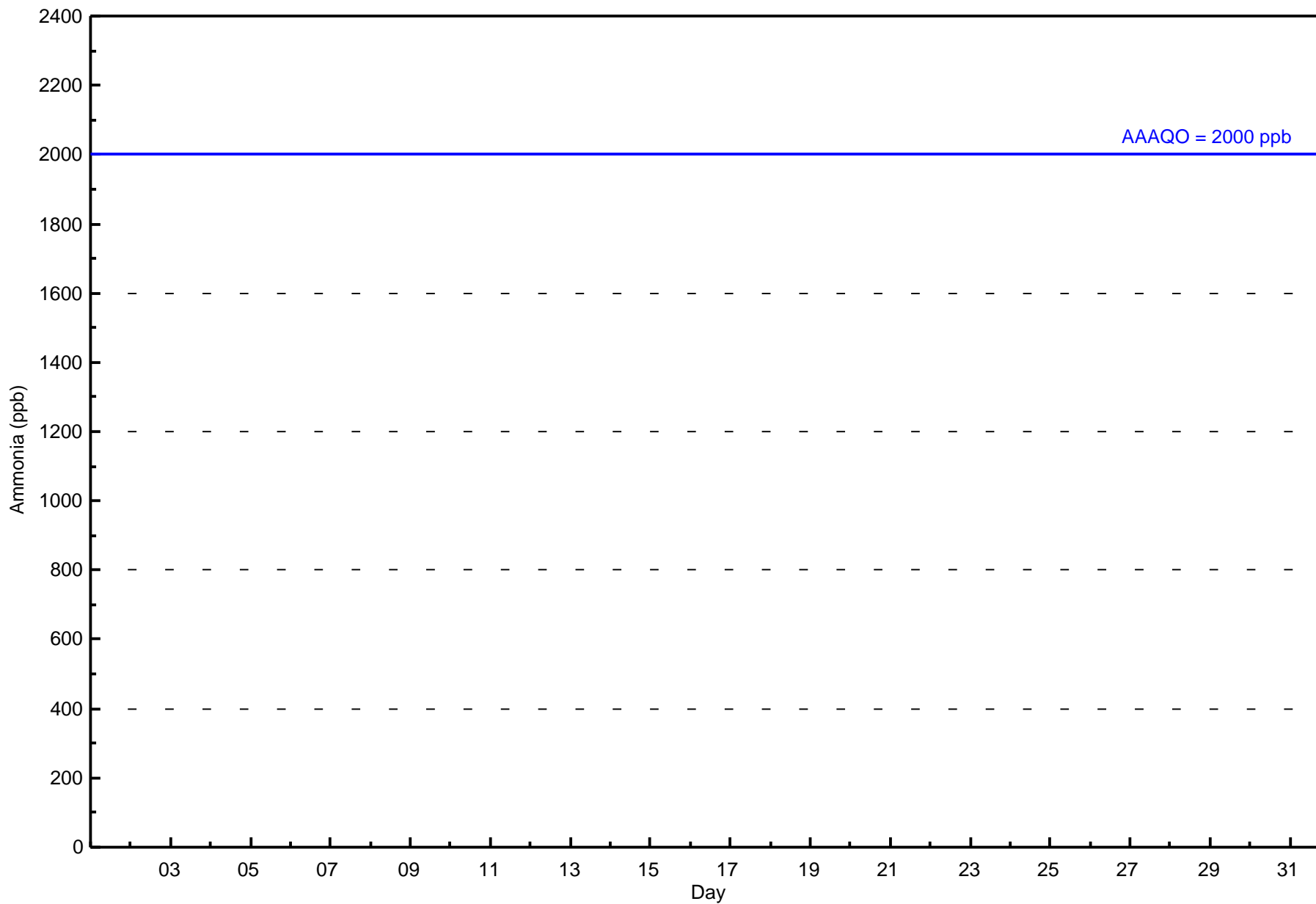
Fort McKay - Bertha Ganter - July 2017

Number of Exceedences (AAAQO): 1-hr: 0		Maximum Value: 0 ppb on Jul 1 01:00		Maximum Daily Average: 0.0 ppb on Jul 1		Hours in Service: 744																																												
Minimum Value: 0 ppb on Jul 1 01:00		Minimum Daily Average: 0.0 ppb on Jul 1		Minimum Diurnal Average: 0.0 ppb at hour 1		Hours of Data: 609																																												
Maximum Diurnal Average: 0.0 ppb at hour 1		Minimum Diurnal Average: 0.0 ppb at hour 1		Monthly Average: 0.0 ppb		Hours of Missing Data: 135																																												
		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0				Hours of Calibration: 47																																												
						Percent Operational Time: 88.2																																												
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-Jul	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
2-Jul	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																							
3-Jul	0	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
4-Jul	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	--	0																							
5-Jul	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
6-Jul	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																							
7-Jul	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																							
8-Jul	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
9-Jul	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
10-Jul	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
11-Jul	0	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
12-Jul	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
13-Jul	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
14-Jul	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
15-Jul	0	0	0	0	0	0	Z	RE	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	0																							
16-Jul	0	0	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
17-Jul	0	0	0	0	0	0	0	0	Z	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0																							
18-Jul	0	0	0	Z	RE	RE	0	0	C	C	C	C	C	C	C	C	C	C	C	0	0	0	0	0	0	--	0																							
19-Jul	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
20-Jul	0	0	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
21-Jul	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	0.0	0																							
22-Jul	PF	PF	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																							
23-Jul	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-Jul	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																							
25-Jul	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-Jul	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																							
27-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	RE	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0																							
31-Jul	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																							
																								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum
Z - zerospan C - Calibration PF - Power Failure 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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	609	100.00	100.00
6 - 10	0	0.00	100.00
11 - 15	0	0.00	100.00
16 - 20	0	0.00	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 609

Total Number of Hours: 744



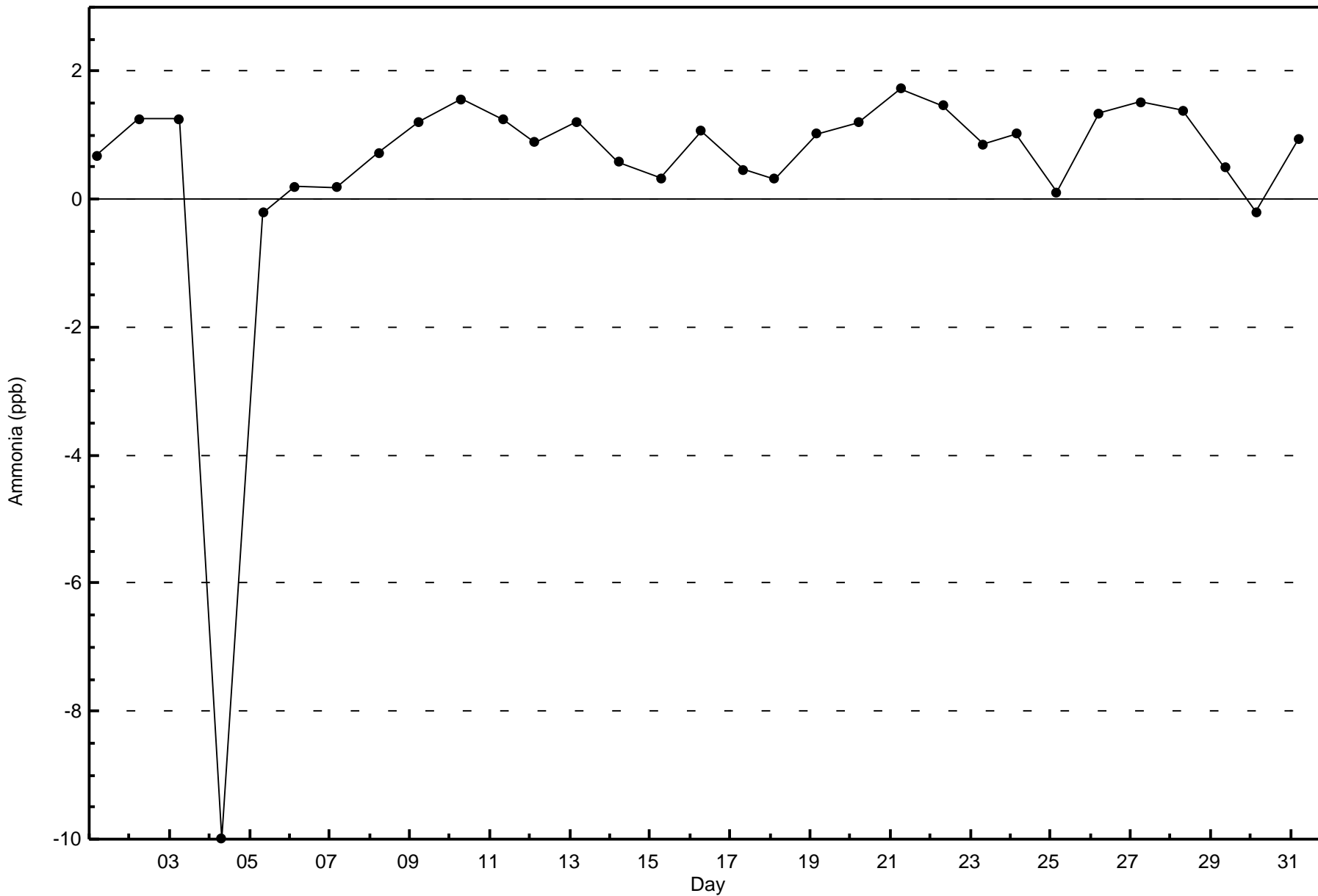
Wood Buffalo Environmental Association
Frequency Distribution

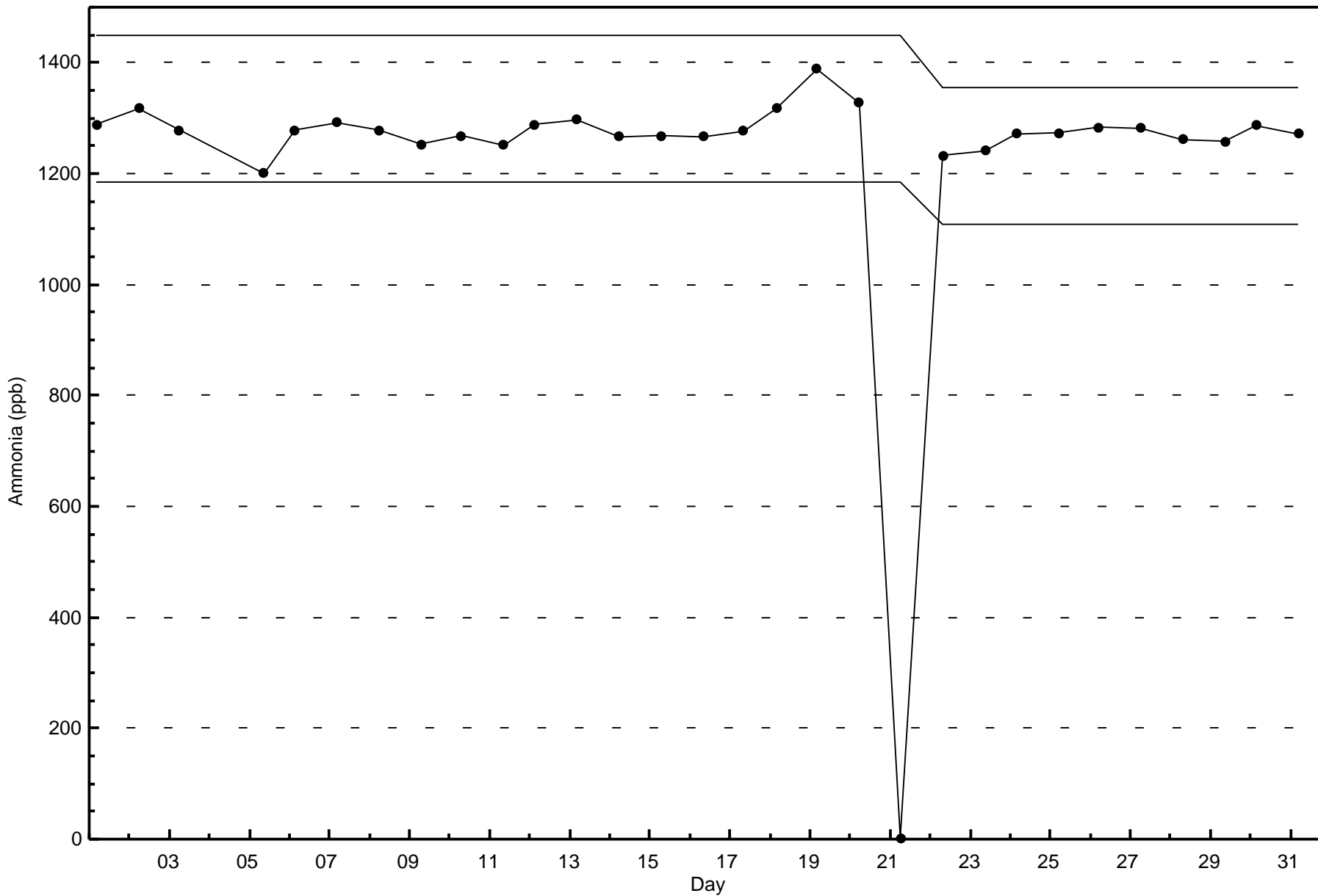
Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - July 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	48	19	6	6	5	4	15	65	86	53	49	46	60	69	47	31	609
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	48	19	6	6	5	4	15	65	86	53	49	46	60	69	47	31	609

Total Number of Valid Hours: 609

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 10 m (AT 10m) - C

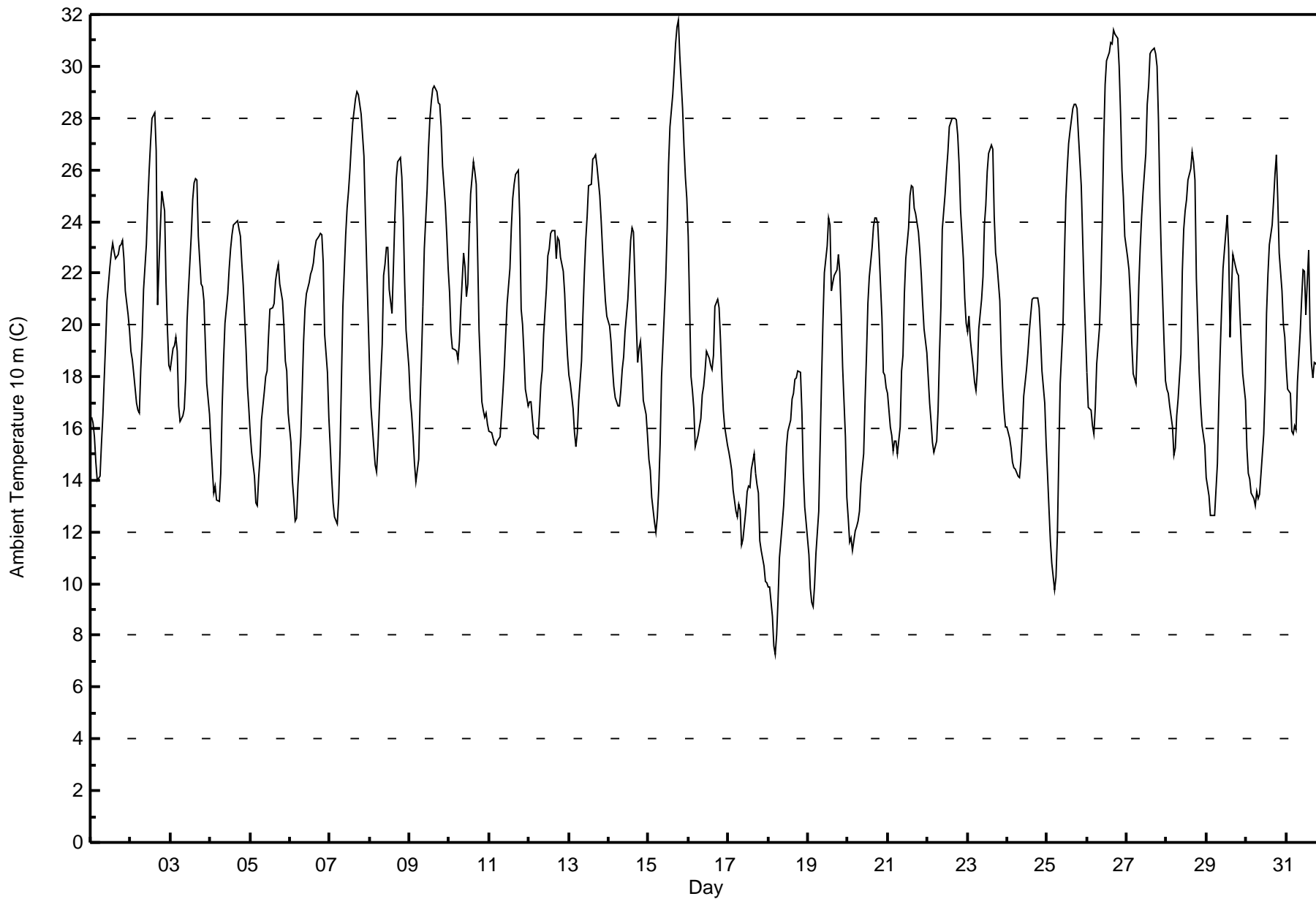
Fort McKay - Bertha Ganter - July 2017

Maximum Value: 31.8 C on Jul 15 19:00																				Maximum Daily Average: 24.6 C on Jul 26					Hours in Service: 744																							
Minimum Value: 7.2 C on Jul 18 05:00																				Minimum Daily Average: 13.0 C on Jul 17					Hours of Data: 744																							
Maximum Diurnal Average: 24.5 C at hour 16																				Minimum Diurnal Average: 14.3 C at hour 5					Hours of Missing Data: 0																							
Monthly Average: 19.74 C																				Percentiles: P ₁ = 9.7 P ₁₀ = 13.5 Q ₁ = 16.1 Median = 19.4 Q ₃ = 23.1 P ₉₀ = 26.2 P ₉₉ = 30.8					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-Jul	16.4	16.2	15.7	14.7	14.0	14.2	15.4	16.5	17.9	19.3	21.0	22.2	22.8	23.2	22.8	22.6	22.7	23.1	23.1	23.3	22.6	21.3	20.4	19.8	19.6	23.3																						
2-Jul	19.0	18.7	18.1	17.0	16.7	16.6	18.3	19.5	21.4	23.1	24.7	26.0	27.1	28.0	28.2	26.7	20.8	22.3	23.8	25.2	24.4	21.7	19.9	18.4	21.9	28.2																						
3-Jul	18.3	19.1	19.2	19.5	19.0	16.8	16.3	16.5	16.8	17.9	20.2	21.4	23.5	24.8	25.5	25.6	25.6	23.4	21.6	21.5	20.9	19.3	17.8	16.6	20.3	25.6																						
4-Jul	15.4	14.4	13.5	13.8	13.2	13.2	14.3	16.9	18.7	20.0	21.2	22.2	22.9	23.5	23.9	23.9	24.0	23.7	23.4	22.4	21.5	19.1	17.6	16.7	19.2	24.0																						
5-Jul	15.8	15.1	14.1	13.1	13.0	14.1	14.9	16.3	17.4	18.0	18.2	19.5	20.6	20.7	20.8	21.7	22.1	22.3	21.6	20.9	20.0	18.6	18.2	16.6	18.1	22.3																						
6-Jul	15.5	14.0	13.3	12.4	12.5	13.8	15.7	17.5	19.3	20.6	21.2	21.7	22.0	22.1	22.4	22.9	23.2	23.4	23.5	23.5	22.4	19.7	18.1	16.4	19.1	23.5																						
7-Jul	15.3	14.1	13.1	12.6	12.3	13.3	15.2	17.9	20.7	23.5	24.5	25.2	26.0	26.9	27.8	28.7	29.0	28.9	28.5	28.2	26.5	24.3	22.3	20.3	21.9	29.0																						
8-Jul	18.4	16.8	15.3	14.6	14.3	15.4	16.8	19.3	21.9	22.3	23.0	23.0	21.4	20.4	22.3	24.1	25.6	26.3	26.5	25.7	24.1	21.7	19.8	18.4	20.7	26.5																						
9-Jul	17.2	16.6	15.7	14.6	13.9	14.8	17.1	18.8	20.7	22.9	25.2	26.8	28.0	28.6	29.1	29.2	29.0	28.6	28.5	27.6	26.1	24.6	23.5	22.2	22.9	29.2																						
10-Jul	21.2	19.7	19.1	19.0	19.0	18.6	19.3	20.7	22.8	22.2	21.1	21.6	23.5	25.1	26.3	25.9	25.5	22.7	19.8	17.0	16.7	16.4	16.6	16.1	20.7	26.3																						
11-Jul	15.9	15.9	15.6	15.4	15.3	15.5	15.7	16.5	17.4	18.4	19.6	20.8	22.2	23.8	24.9	25.4	25.8	26.0	24.1	20.6	20.0	18.9	17.5	16.9	19.5	26.0																						
12-Jul	17.0	17.0	16.4	15.8	15.7	15.6	16.6	17.7	18.2	19.6	21.4	22.7	23.0	23.6	23.7	23.6	22.6	23.4	23.3	22.6	22.1	21.2	19.9	18.8	20.1	23.7																						
13-Jul	18.0	17.7	16.8	15.9	15.3	15.8	17.1	18.6	20.4	22.0	23.2	24.2	25.4	25.5	26.4	26.5	26.6	26.1	25.0	24.0	22.9	21.9	20.9	20.3	21.5	26.6																						
14-Jul	20.0	19.4	18.4	17.6	17.2	16.9	16.9	17.5	18.3	18.7	19.7	21.0	22.1	23.2	23.8	23.6	20.1	18.5	19.1	19.4	18.3	17.1	16.6	15.7	19.1	23.8																						
15-Jul	14.8	14.4	13.3	12.4	12.0	12.6	13.7	15.4	18.0	20.5	21.8	23.7	26.2	27.6	28.9	29.8	30.9	31.5	31.8	30.4	28.4	26.9	25.7	24.9	22.3	31.8																						
16-Jul	23.4	18.0	17.5	16.7	15.3	15.5	15.7	16.4	17.3	17.7	18.2	19.0	18.7	18.4	18.3	18.8	20.7	21.0	20.6	19.4	17.9	16.7	16.1	15.3	18.0	23.4																						
17-Jul	15.1	14.7	14.4	13.6	12.8	12.6	13.1	12.9	11.5	11.7	12.8	13.6	13.8	13.7	14.4	15.0	14.3	13.9	13.5	11.6	11.3	10.7	10.1	10.0	13.0	15.1																						
18-Jul	9.9	9.9	8.8	7.6	7.2	8.0	9.4	11.0	12.3	13.0	14.1	15.3	15.9	16.3	17.1	17.4	17.9	18.0	18.2	18.2	16.6	14.3	13.0	12.4	13.4	18.2																						
19-Jul	11.1	9.8	9.3	9.1	9.9	11.2	12.8	15.4	17.9	20.2	22.0	23.0	24.1	23.8	21.3	21.7	21.9	22.1	22.7	22.0	20.4	18.4	15.7	13.3	17.5	24.1																						
20-Jul	12.6	11.6	11.8	11.3	12.0	12.2	12.4	12.8	13.9	15.0	17.1	18.8	20.8	21.9	23.0	23.8	24.1	24.1	23.9	22.8	20.3	18.2	18.1	17.6	17.5	24.1																						
21-Jul	17.3	16.1	15.7	15.1	15.5	15.5	15.0	16.1	18.2	18.8	21.2	22.6	23.8	25.0	25.4	25.3	24.5	24.3	23.6	22.9	22.0	20.8	19.8	18.9	20.1	25.4																						
22-Jul	17.9	17.0	16.3	15.5	15.1	15.5	16.7	18.9	20.6	23.7	25.0	25.9	26.7	27.7	27.8	28.0	28.0	27.9	27.3	26.2	24.5	22.6	21.0	20.0	22.3	28.0																						
23-Jul	19.7	20.3	19.4	18.4	17.8	17.5	18.2	19.8	21.0	21.9	23.8	24.6	25.9	26.6	27.0	26.8	24.2	22.8	22.3	20.9	18.9	17.6	16.7	16.1	21.2	27.0																						
24-Jul	16.0	15.6	15.2	14.7	14.5	14.4	14.2	14.1	14.8	15.9	17.3	18.3	18.9	19.7	20.4	21.0	21.1	21.1	21.1	20.7	19.6	18.2	17.0	15.4	17.5	21.1																						
25-Jul	14.2	12.9	11.7	10.8	9.7	10.3	11.9	14.9	17.7	20.0	22.6	24.8	26.0	27.0	27.5	28.4	28.5	28.5	28.4	27.3	25.4	23.4	21.4	19.8	20.5	28.5																						
26-Jul	18.2	16.8	16.7	16.1	15.8	16.8	18.5	19.9	21.6	24.1	27.1	29.3	30.2	30.5	30.9	30.8	31.4	31.2	31.1	30.0	28.2	26.0	25.0	23.4	24.6	31.4																						
27-Jul	22.6	22.1	21.1	19.3	18.1	17.7	19.4	21.5	23.0	24.2	25.1	26.6	28.5	29.2	30.5	30.6	30.7	30.5	30.0	27.9	24.9	22.7	19.3	17.8	24.3	30.7																						
28-Jul	17.5	17.4	16.9	16.0	15.0	15.3	16.5	17.1	18.9	22.1	23.7	24.4	24.9	25.6	26.0	26.7	26.3	25.6	21.8	18.2	17.0	16.1	15.7	15.3	20.0	26.7																						
29-Jul	14.1	13.4	12.6	12.6	12.6	12.7	14.6	17.0	19.0	20.7	22.2	22.9	24.2	22.9	19.5	21.3	22.7	22.2	22.0	21.9	20.5	19.2	18.1	17.1	18.6	24.2																						
30-Jul	15.3	14.3	14.0	13.5	13.3	13.0	13.6	13.3	13.4	14.2	15.8	17.5	20.4	22.0	23.1	23.9	24.8	25.8	26.6	24.8	22.8	21.3	20.0	19.5	18.6	26.6																						
31-Jul	18.4	17.5	17.4	15.9	15.8	16.1	15.9	17.8	19.7	21.0	22.1	22.1	20.4	22.9	19.8	18.5	18.0	18.5	18.5	18.7	17.3	15.2	14.3	13.0	18.1	22.9																						
																								16.8	16.0	15.4	14.7	14.3	14.6	15.5	16.9	18.4	19.8	21.2	22.3	23.2	23.9	24.2	24.5	24.3	24.1	23.7	22.8	21.4	19.8	18.6	17.5	Diurnal Average
																								23.4	22.1	21.1	19.5	19.0	18.6	19.4	21.5	23.0	24.2	27.1	29.3	30.2	30.5	30.9	30.8	31.4	31.5	31.8	30.4	28.4	26.9	25.7	24.9	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	12	1.61	1.61
10 - 20	388	52.15	53.76
> 20	344	46.24	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

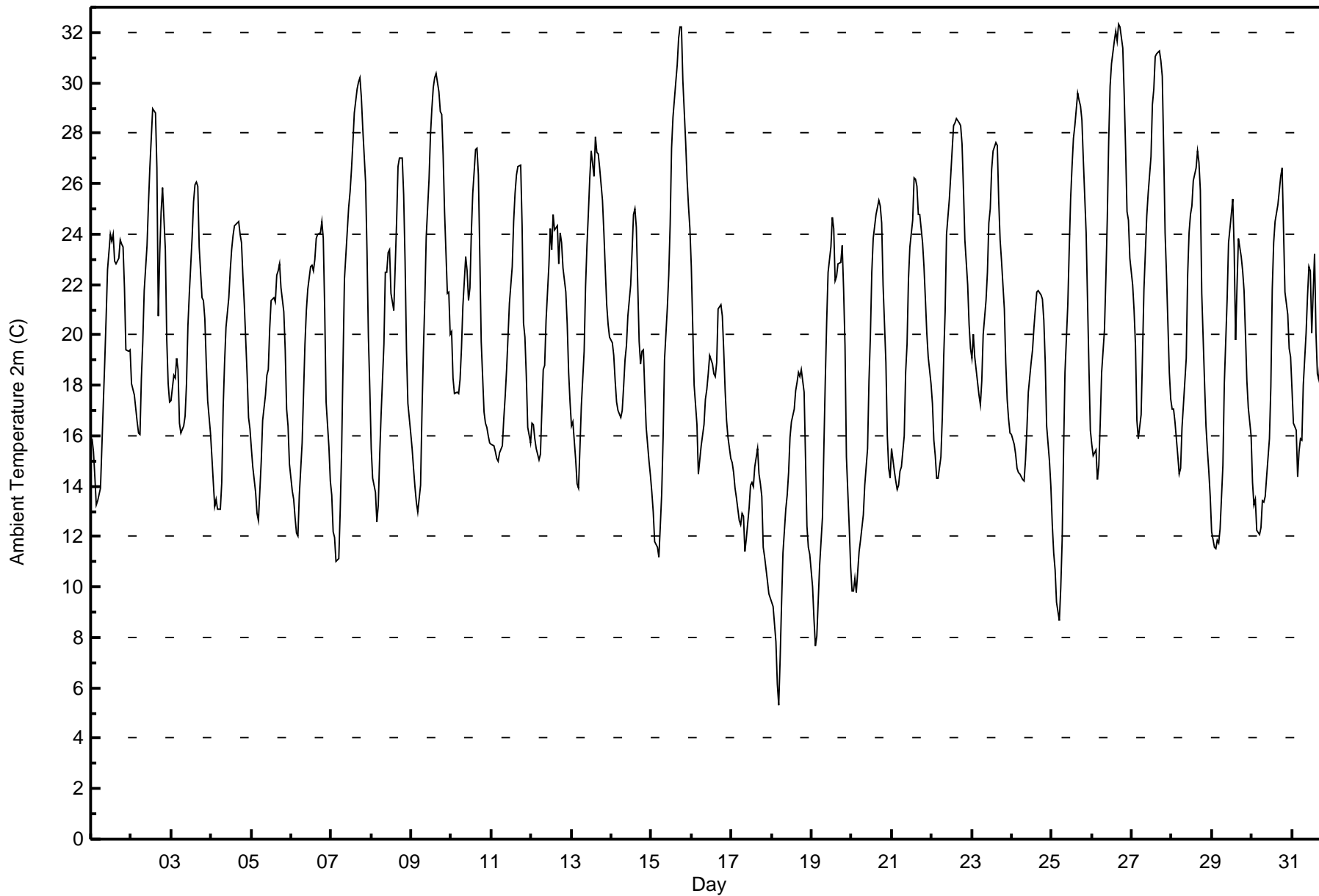
Ambient Temperature 2m (AT 2m) - C
Fort McKay - Bertha Ganter - July 2017

Maximum Value: 32.3 C on Jul 26 17:00 Maximum Daily Average: 24.4 C on Jul 26																						Hours in Service: 744				
Minimum Value: 5.3 C on Jul 18 05:00 Minimum Daily Average: 13.0 C on Jul 17																						Hours of Data: 744				
Maximum Diurnal Average: 25.2 C at hour 16 Minimum Diurnal Average: 13.6 C at hour 5																						Hours of Missing Data: 0				
Monthly Average: 19.64 C Percentiles: P₁ = 8.7 P₁₀ = 13.1 Q₁ = 15.5 Median = 19.1 Q₃ = 23.7 P₉₀ = 26.8 P₉₉ = 31.6																						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-Jul	15.9	15.4	14.4	13.3	13.4	13.9	15.6	17.3	18.9	20.7	22.6	24.0	23.7	24.0	22.9	22.8	23.0	23.8	23.6	23.5	21.9	19.4	19.4	19.4	19.7	24.0
2-Jul	18.1	17.8	17.6	16.6	16.1	16.0	18.3	19.8	21.8	23.6	25.2	26.6	27.8	29.0	28.8	26.6	20.8	23.2	24.9	25.8	23.4	19.8	18.1	17.3	21.8	29.0
3-Jul	17.4	18.4	18.3	19.1	18.6	16.5	16.1	16.4	16.8	18.0	20.4	21.7	23.9	25.3	26.0	26.1	25.9	23.5	21.5	21.3	20.7	18.9	17.4	16.1	20.2	26.1
4-Jul	15.2	14.2	13.2	13.5	13.1	13.1	14.2	17.1	18.9	20.3	21.5	22.6	23.4	23.9	24.4	24.4	24.5	24.0	23.7	22.3	21.2	18.4	16.7	16.3	19.2	24.5
5-Jul	15.5	14.8	13.8	12.9	12.6	13.8	15.0	16.6	17.6	18.4	18.6	20.2	21.3	21.5	21.3	22.4	22.5	22.8	21.9	20.9	19.4	17.1	16.4	14.9	18.0	22.8
6-Jul	13.8	13.5	12.8	12.1	12.0	13.6	15.7	17.7	19.6	21.0	21.8	22.7	22.8	22.5	23.0	23.8	24.0	24.1	24.5	23.8	21.0	17.4	15.5	14.2	18.9	24.5
7-Jul	13.6	12.2	12.0	11.0	11.1	13.0	15.4	18.9	22.2	24.1	25.0	25.7	26.6	27.6	28.8	29.7	30.1	30.2	29.4	28.2	26.1	23.3	19.9	17.9	21.8	30.2
8-Jul	15.5	14.3	13.8	12.6	13.2	15.2	16.8	19.6	22.5	22.5	23.3	23.4	21.6	21.0	22.7	24.5	26.7	27.0	27.0	25.5	23.0	19.4	17.3	16.1	20.2	27.0
9-Jul	15.5	14.7	14.0	13.4	13.0	14.1	16.9	19.4	21.4	23.9	26.2	27.9	29.0	29.8	30.2	30.4	29.7	28.9	28.8	27.1	24.9	21.6	21.7	20.0	22.6	30.4
10-Jul	20.1	18.3	17.7	17.7	17.7	18.3	19.4	21.1	23.1	22.6	21.3	21.9	24.1	25.6	27.3	27.4	26.4	23.1	19.8	16.9	16.5	16.3	16.0	15.7	20.6	27.4
11-Jul	15.7	15.6	15.4	15.1	15.0	15.3	15.6	16.7	17.6	18.6	19.9	21.2	22.7	24.5	25.6	26.4	26.7	26.7	24.3	20.5	19.9	18.3	16.3	15.7	19.6	26.7
12-Jul	16.5	16.5	15.9	15.5	15.1	15.3	17.0	18.6	18.8	20.6	22.8	24.2	23.4	24.8	24.2	24.3	22.8	24.0	23.7	22.6	21.7	20.4	18.5	17.3	20.2	24.8
13-Jul	16.4	16.6	15.1	14.1	13.9	15.5	17.1	19.4	21.9	23.5	24.8	26.2	27.3	26.3	27.8	27.3	27.2	26.6	25.3	24.0	22.6	21.2	20.4	19.9	21.7	27.8
14-Jul	19.7	19.2	18.2	17.4	17.0	16.7	17.0	18.0	19.0	19.6	20.7	22.0	23.3	24.8	25.0	24.3	19.7	18.8	19.4	19.4	17.8	16.3	15.0	14.4	19.3	25.0
15-Jul	13.8	12.9	11.8	11.6	11.2	12.4	13.7	15.9	19.0	21.1	22.3	24.4	27.4	28.6	30.1	30.7	31.8	32.2	32.2	30.1	27.7	26.2	25.1	24.2	22.4	32.2
16-Jul	22.7	18.0	17.2	16.4	14.5	15.0	15.6	16.4	17.5	17.8	18.5	19.2	18.8	18.5	18.3	18.9	21.0	21.2	20.8	19.3	17.8	16.6	15.9	15.1	18.0	22.7
17-Jul	14.9	14.5	13.9	13.5	12.7	12.4	12.9	12.8	11.4	11.9	13.2	14.0	14.1	14.0	14.8	15.5	14.5	14.1	13.6	11.6	11.2	10.2	9.7	9.6	13.0	15.5
18-Jul	9.4	9.2	7.9	6.2	5.3	7.1	9.3	11.3	13.1	13.6	14.5	16.0	16.5	17.1	17.8	18.1	18.5	18.3	18.6	17.7	15.1	12.4	11.6	11.3	13.2	18.6
19-Jul	10.0	8.7	7.6	8.0	9.4	10.9	12.7	15.5	18.2	20.5	22.5	23.5	24.7	24.2	22.2	22.3	22.8	22.9	23.5	21.8	19.6	15.2	12.3	10.8	17.1	24.7
20-Jul	9.8	9.8	10.4	9.8	11.4	11.9	12.3	12.9	14.0	15.5	18.2	19.9	22.5	23.8	24.8	25.1	25.4	25.1	24.4	22.0	18.9	16.0	14.7	14.3	17.2	25.4
21-Jul	15.5	14.6	14.2	13.9	14.0	14.6	14.8	16.0	18.5	19.6	22.2	23.5	24.6	26.2	26.2	25.9	24.8	24.8	23.7	22.7	21.4	20.1	19.1	18.1	20.0	26.2
22-Jul	17.3	15.8	15.2	14.3	14.3	15.2	16.7	19.1	20.9	24.0	25.4	26.3	27.3	28.3	28.4	28.6	28.4	28.3	27.6	25.8	23.7	22.0	20.4	19.5	22.2	28.6
23-Jul	19.1	20.0	19.1	18.1	17.6	17.2	18.2	20.0	21.4	22.5	24.5	25.0	26.6	27.3	27.6	27.5	25.3	23.8	22.9	21.1	18.9	17.4	16.6	16.1	21.4	27.6
24-Jul	16.1	15.6	15.3	14.7	14.5	14.5	14.3	14.2	15.1	16.3	17.8	18.9	19.4	20.3	21.1	21.7	21.8	21.6	21.4	20.6	18.9	16.4	15.0	14.0	17.5	21.8
25-Jul	12.5	11.4	10.7	9.4	8.6	10.0	11.9	15.4	18.5	21.2	23.4	25.4	26.7	27.8	28.3	29.6	29.3	29.1	28.5	26.9	24.0	21.4	18.7	16.2	20.2	29.6
26-Jul	15.7	15.2	15.4	14.2	14.8	16.5	18.5	20.2	22.3	24.6	27.7	29.9	30.8	31.6	32.1	31.7	32.3	32.2	31.4	29.6	27.4	24.9	24.6	23.0	24.4	32.3
27-Jul	22.0	21.0	19.6	16.6	15.9	16.8	19.3	21.8	23.3	24.7	25.6	27.1	29.2	29.8	31.1	31.1	31.3	30.9	30.2	27.4	24.0	22.4	18.5	17.5	24.0	31.3
28-Jul	17.1	17.1	16.5	15.2	14.5	14.7	16.3	17.2	19.1	22.4	24.0	24.8	25.1	26.1	26.6	27.3	26.8	25.8	21.6	18.1	16.4	15.4	14.6	13.6	19.9	27.3
29-Jul	12.2	11.6	11.5	11.9	11.8	12.3	14.8	18.1	19.7	21.4	23.7	24.2	25.4	23.4	19.8	21.9	23.9	23.1	22.6	21.8	20.0	18.2	17.1	16.0	18.6	25.4
30-Jul	14.2	13.3	13.5	12.2	12.1	12.3	13.4	13.4	13.6	14.4	15.9	18.0	21.8	23.6	24.5	25.1	25.7	26.3	26.7	24.2	21.7	20.8	19.5	19.1	18.6	26.7
31-Jul	17.8	16.5	16.2	14.4	15.4	15.9	15.8	18.0	20.1	21.5	22.7	22.5	20.1	23.2	20.1	18.5	18.3	19.1	18.7	18.6	15.5	13.1	12.9	11.2	17.7	23.2
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	20	2.69	2.69
10 - 20	386	51.88	54.57
> 20	338	45.43	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



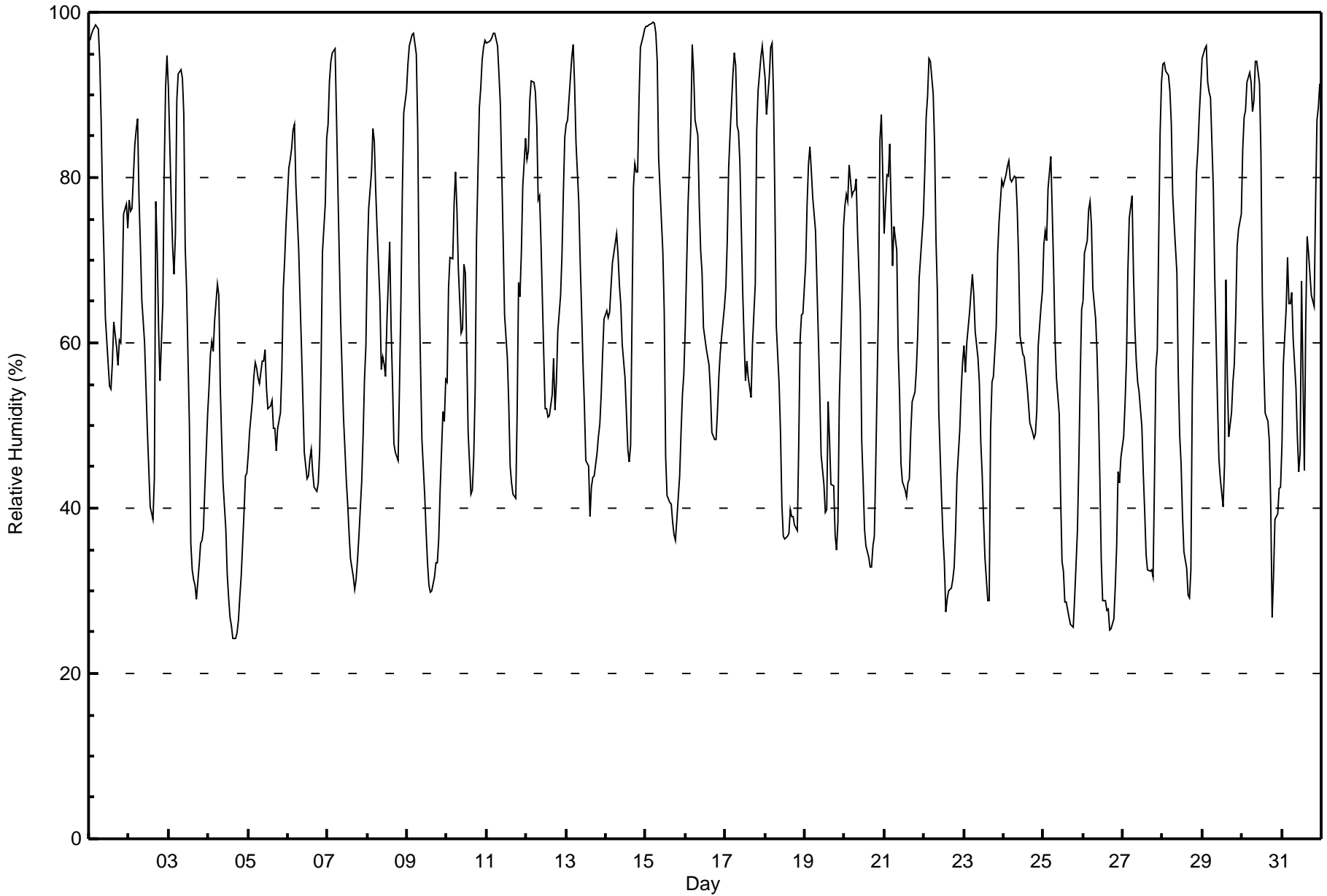
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - July 2017

Maximum Value: 99 % on Jul 15 05:00 Maximum Daily Average: 76.7 % on Jul 17																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 24 % on Jul 4 17:00 Minimum Daily Average: 42.2 % on Jul 4 Maximum Diurnal Average: 84.0 % at hour 5 Minimum Diurnal Average: 42.6 % at hour 16 Monthly Average: 62.4 % Percentiles: P ₁ = 26 P ₁₀ = 36 Q ₁ = 46 Median = 61 Q ₃ = 78 P ₉₀ = 92 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-Jul	97	97	98	98	98	98	94	87	77	71	63	57	55	54	58	63	59	57	60	60	67	76	77	74	74.8	98
2-Jul	77	76	76	84	86	87	78	72	65	60	55	49	45	40	39	44	77	71	62	55	65	81	91	95	67.9	95
3-Jul	91	77	72	68	73	89	93	93	92	88	72	66	50	36	32	31	31	29	33	36	36	37	42	51	59.1	93
4-Jul	55	59	60	59	63	67	66	55	49	43	37	32	29	27	26	24	24	25	26	29	32	39	44	44	42.2	67
5-Jul	46	49	53	56	58	57	56	55	58	58	59	55	52	52	53	50	50	47	50	52	57	66	70	74	55.5	74
6-Jul	81	82	84	86	86	79	71	65	60	53	47	44	44	46	47	44	43	42	43	47	57	71	77	85	61.8	86
7-Jul	87	92	94	95	96	87	79	70	63	51	47	43	40	37	34	32	30	31	34	37	43	49	56	60	57.7	96
8-Jul	70	76	81	86	84	78	74	65	57	58	57	56	62	72	62	55	48	47	46	55	65	78	88	90	67.1	90
9-Jul	94	96	97	97	97	95	86	67	57	48	41	37	33	31	30	30	32	33	33	36	42	52	50	56	57.1	97
10-Jul	55	67	70	70	77	81	76	69	61	62	69	68	59	49	42	42	46	54	73	89	91	94	96	97	69.0	97
11-Jul	96	96	97	97	98	97	96	93	89	80	72	63	58	52	45	43	42	41	52	67	66	71	79	85	74.0	98
12-Jul	82	83	89	92	92	90	86	77	78	72	58	52	52	51	51	54	58	52	55	61	66	71	78	85	70.3	92
13-Jul	87	87	92	95	96	91	84	77	70	64	58	52	46	45	39	43	44	44	47	49	50	54	59	63	63.9	96
14-Jul	64	63	64	67	70	72	73	71	67	65	60	56	52	47	46	48	79	82	81	81	89	96	97	98	70.2	98
15-Jul	98	98	98	99	99	99	98	94	82	75	71	64	46	42	41	40	38	37	36	39	44	49	54	56	66.5	99
16-Jul	62	77	82	86	96	93	87	85	77	71	68	62	59	58	57	54	49	48	48	52	56	59	61	64	67.2	96
17-Jul	67	72	81	85	92	95	94	86	86	82	66	60	55	58	56	53	60	64	67	86	90	95	96	94	76.7	96
18-Jul	92	88	92	96	96	90	77	62	55	49	40	37	36	37	37	40	39	39	38	37	47	60	63	64	58.8	96
19-Jul	70	77	82	84	81	78	74	67	61	54	46	43	39	40	53	48	43	43	37	35	38	53	66	74	57.7	84
20-Jul	77	78	77	81	78	78	78	80	73	64	48	43	38	35	34	33	33	35	37	45	65	85	88	80	61.0	88
21-Jul	73	80	80	84	76	69	74	71	59	54	45	43	42	41	43	44	49	53	54	57	61	68	70	75	61.2	84
22-Jul	81	87	90	94	94	90	84	73	66	52	41	37	33	27	29	30	30	31	33	37	44	49	54	58	56.1	94
23-Jul	60	56	60	64	66	68	66	61	58	55	48	44	38	34	29	49	55	56	62	71	75	77	80	56.7	80	
24-Jul	79	80	81	82	80	80	80	80	76	70	61	59	58	57	55	53	50	49	49	49	52	60	64	66	65.4	82
25-Jul	72	74	72	79	83	76	69	60	56	51	41	33	32	29	29	27	26	26	26	29	37	46	56	64	49.7	83
26-Jul	65	71	72	76	77	74	67	63	59	52	44	34	29	29	28	28	25	26	27	30	35	44	43	46	47.6	77
27-Jul	49	53	58	69	75	78	69	62	58	55	54	50	44	40	34	32	32	33	32	43	57	59	85	92	54.7	92
28-Jul	94	94	93	92	90	87	78	75	68	56	49	45	39	35	33	29	29	33	54	73	81	83	88	91	66.2	94
29-Jul	94	96	96	91	90	90	79	68	60	53	46	44	40	45	68	56	49	52	55	57	63	72	74	76	67.2	96
30-Jul	83	87	88	92	93	92	88	89	94	94	91	83	66	57	52	51	48	40	27	32	39	39	42	43	67.1	94
31-Jul	48	57	64	70	65	65	66	61	55	49	44	47	67	45	63	73	71	68	66	64	77	87	88	91	64.6	91
																		75.6 78.3 80.4 83.0 84.0 82.9 78.6 72.7 67.3 61.6 54.9 50.3 46.5 43.5 43.3 42.6 44.6 44.7 46.3 51.0 57.5 65.1 70.1 73.2						Diurnal Average		
																		98 98 98 99 99 99 98 94 94 94 91 83 67 72 68 73 79 82 81 89 91 96 97 98						Diurnal Maximum		





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

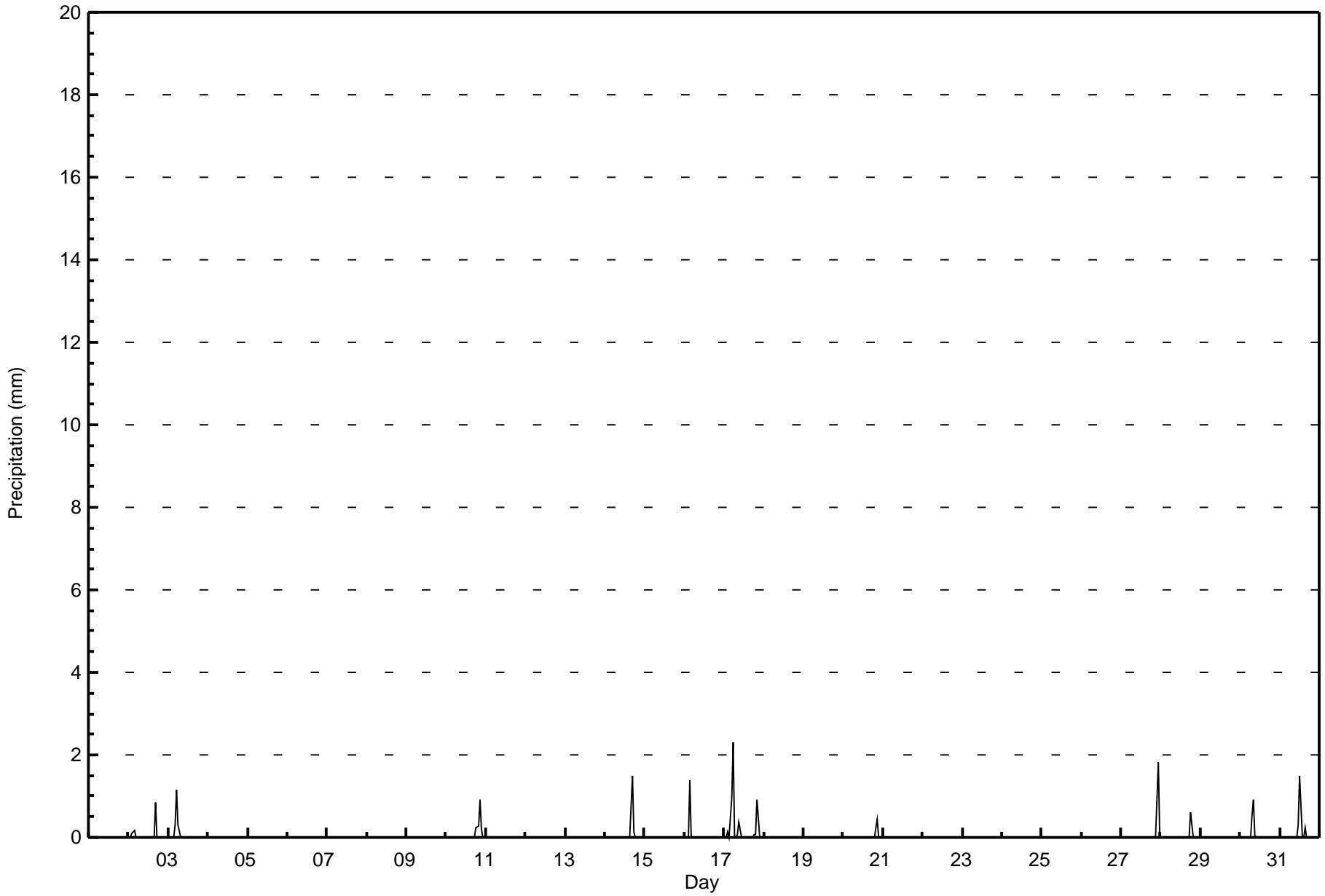
Fort McKay - Bertha Ganter - July 2017

Maximum Value: 2.3 mm on Jul 17 06:00		Maximum Daily Total: 4.8 mm on Jul 17		Hours in Service: 744																																													
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 1		Hours of Data: 744																																													
Maximum Diurnal Total: 3.4 mm at hour 6		Minimum Diurnal Total: 0.0 mm at hour 1		Hours of Missing Data: 0																																													
Monthly Total: 18.78 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 = 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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	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	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.8																					
3-Jul	0.0	0.0	0.0	0.0	0.3	1.2	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	1.8	1.2																					
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.9	0.2	0.0	0.0	0.0	0.0	1.6	0.9																					
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	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	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.5																					
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
16-Jul	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4																					
17-Jul	0.0	0.0	0.1	0.0	0.9	2.3	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.9	0.0	0.0	0.0	0.0	0.0	4.8	2.3																					
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.4	0.4																					
21-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	1.9	1.8																					
28-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6																					
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.9	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	1.5	0.9																					
31-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	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	2.0	1.5																					
																								0.0	0.0	0.2	1.6	1.3	3.4	0.3	0.5	1.0	0.4	0.0	0.3	1.5	0.0	0.0	0.2	2.3	0.2	0.9	0.3	2.3	0.2	1.8	0.0	Diurnal Average	
																								0.0	0.0	0.1	1.4	0.9	2.3	0.3	0.5	0.9	0.4	0.0	0.3	1.5	0.0	0.0	0.2	1.5	0.2	0.6	0.3	0.9	0.2	1.8	0.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Fort McKay - Bertha Ganter - July 2017**

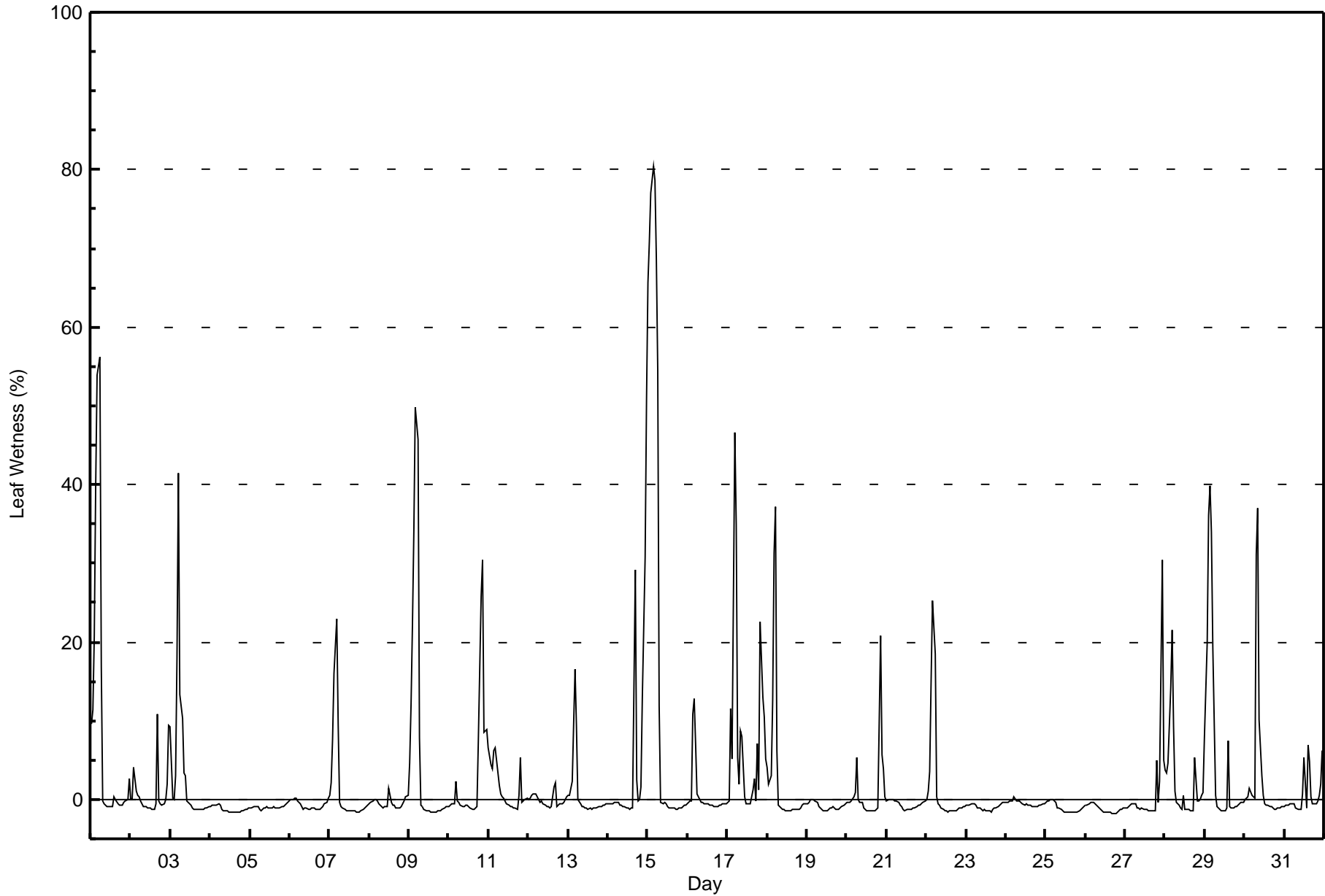
Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	729	97.98	97.98
0.4 - 0.5	3	0.40	98.39
0.6 - 0.7	1	0.13	98.52
0.8 - 1.4	7	0.94	99.46
1.5 - 10	2	0.27	99.73
> 10	0	0.00	99.73

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 80 % on Jul 15 04:00																	Maximum Daily Average: 20.5 % on Jul 15										Hours in Service: 744	
Minimum Value: -2 % on Jul 26 18:00																	Minimum Daily Average: -1.2 % on Jul 4										Hours of Data: 744	
Maximum Diurnal Average: 13.5 % at hour 5																	Minimum Diurnal Average: -1.2 % at hour 14										Hours of Missing Data: 0	
Monthly Average: 2.3 %																	Percentiles: P ₁ = -2 P ₁₀ = -1 Q ₁ = -1 Median = -1 Q ₃ = 0 P ₉₀ = 8 P ₉₉ = 47										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-Jul	10	11	21	40	54	56	17	0	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	0	0	0	3	8.5	56		
2-Jul	0	0	4	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	11	0	-1	-1	0	0	2	9	0.7	11		
3-Jul	9	0	0	3	18	41	13	10	3	3	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3.7	41		
4-Jul	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.2	-1		
5-Jul	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1.0	0		
6-Jul	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.7	0		
7-Jul	0	2	8	16	23	10	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-1	-1	-1	-1	-1	1.5	23		
8-Jul	-1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	1	0	-1	-1	-1	-1	-1	-1	-1	0	0	1	-0.5	1		
9-Jul	5	12	22	34	50	46	8	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-1	-2	-1	-1	-1	-1	-1	6.4	50		
10-Jul	-1	-1	-1	0	2	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	7	26	30	9	9	9	3.3	30		
11-Jul	7	5	4	6	7	5	2	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	5	0	0	0	0	1.4	7		
12-Jul	0	0	0	1	1	0	0	0	0	0	-1	-1	-1	-1	-1	2	2	-1	-1	-1	0	0	0	0	-0.1	2		
13-Jul	0	1	2	10	17	9	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.9	17		
14-Jul	-1	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	29	2	0	0	2	13	31	51	4.8	51			
15-Jul	66	71	77	80	79	69	54	12	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	20.5	80		
16-Jul	-1	0	0	11	13	7	1	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0.8	13		
17-Jul	0	0	11	5	47	35	5	2	9	8	0	0	-1	-1	-1	1	3	0	7	1	23	13	10	5	7.6	47		
18-Jul	4	2	3	13	31	37	6	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3.2	37		
19-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.8	0		
20-Jul	0	0	0	0	0	1	5	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	21	6	4	0	0.9	21		
21-Jul	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.7	0		
22-Jul	0	1	4	15	25	19	0	0	-1	-1	-1	-1	-1	-2	-2	-1	-1	-2	-1	-1	-1	-1	-1	-1	1.8	25		
23-Jul	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-1	-1	-1	-1	-1	-1	0	0	-1.0	0		
24-Jul	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-0.5	0		
25-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.1	0		
26-Jul	-1	-1	-1	0	0	0	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1.2	0		
27-Jul	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1	5	0	2	30	5	0.9	30		
28-Jul	4	3	5	14	22	9	1	0	-1	-1	-1	1	-1	-1	-1	-1	-2	-1	5	0	0	0	0	1	2.2	22		
29-Jul	8	20	36	40	34	19	1	-1	-1	-1	-1	-1	-1	-1	7	-1	-1	-1	-1	-1	-1	0	0	0	6.2	40		
30-Jul	0	0	0	1	1	0	0	31	37	10	3	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3.0	37		
31-Jul	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	1	5	-1	7	5	0	-1	-1	0	0	1	2	6	0.6	7		
3.3 3.9 6.1 9.2 13.5 11.6 3.4 1.2 0.8 -0.2 -0.9 -0.9 -0.9 -1.2 -0.6 -0.8 0.4 -1.0 -0.3 0.3 1.7 0.8 2.4 2.5																	Diurnal Average											
66 71 77 80 79 69 54 31 37 10 3 1 5 0 7 5 29 2 7 26 30 13 31 51																	Diurnal Maximum											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

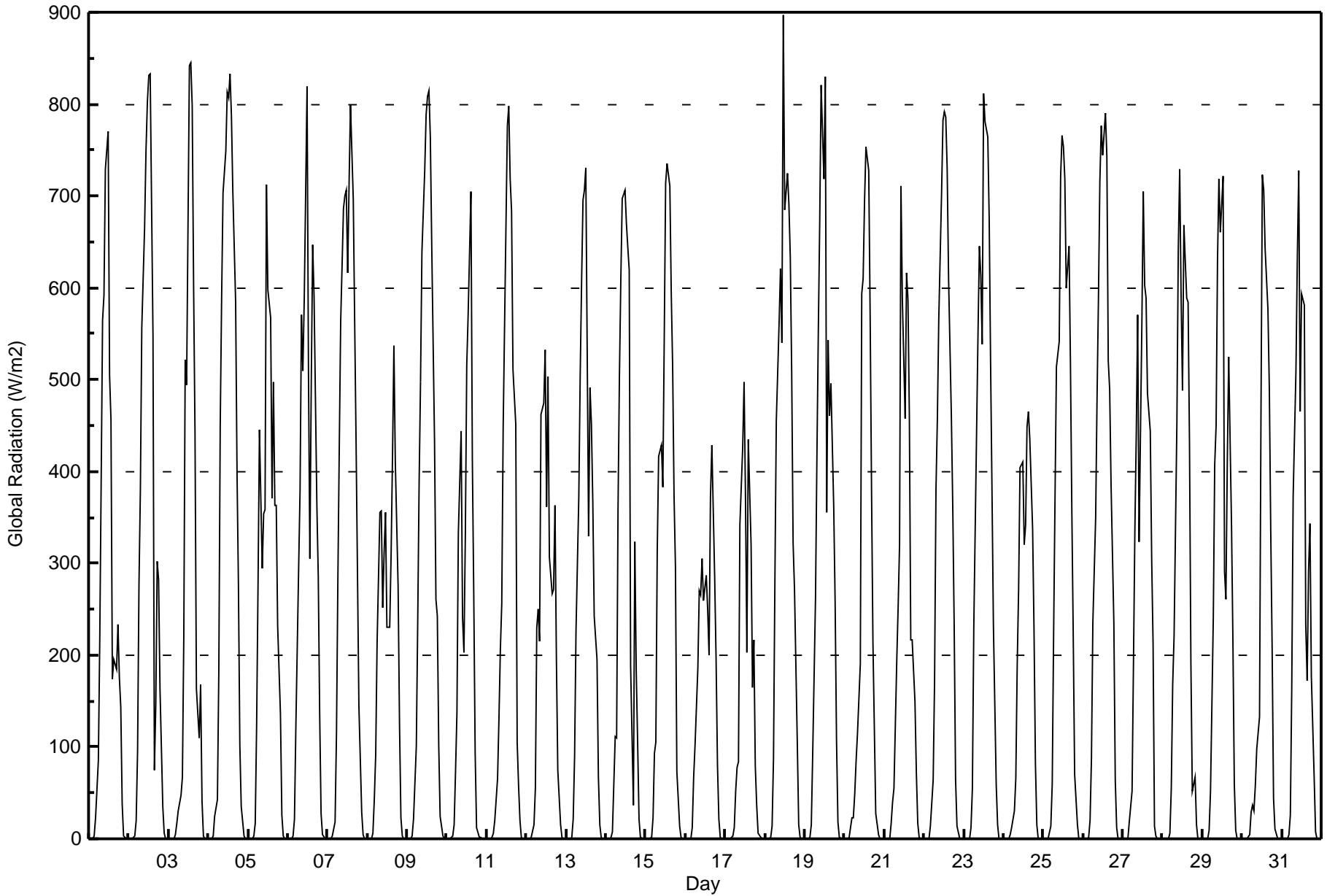
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	22	11.96	11.96
0.4 - 0.5	17	9.24	21.20
0.6 - 0.7	10	5.43	26.63
0.8 - 1.4	9	4.89	31.52
1.5 - 10	67	36.41	67.93
> 10	59	32.07	100.00

Total Number of Valid Hours: 184

Total Number of Hours: 744



Maximum Value: 897 W/m2 on Jul 18 12:00														Maximum Daily Average: 336.9 W/m2 on Jul 4														Hours in Service: 744	
Minimum Value: 0 W/m2 on Jul 1 01:00														Minimum Daily Average: 138.6 W/m2 on Jul 17														Hours of Data: 744	
Maximum Diurnal Average: 628.8 W/m2 at hour 13														Minimum Diurnal Average: 0.0 W/m2 at hour 1														Hours of Missing Data: 0	
Monthly Average: 246.2 W/m2														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 143 Q ₃ = 456 P ₉₀ = 689 P ₉₉ = 828														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-Jul	0	0	0	4	24	85	217	389	565	592	729	770	504	456	173	196	185	233	175	144	39	3	0	0	228.4	770			
2-Jul	0	0	0	2	20	96	278	380	557	665	750	803	832	833	548	75	146	303	282	164	35	6	0	0	282.3	833			
3-Jul	0	0	0	1	5	17	30	47	67	221	521	495	843	844	798	601	442	163	110	167	41	3	0	0	225.7	844			
4-Jul	0	0	0	3	24	42	183	450	588	703	749	813	807	832	787	704	585	399	276	102	35	4	0	0	336.9	832			
5-Jul	0	0	0	3	17	125	278	445	294	354	358	713	597	567	370	497	363	363	232	135	26	3	0	0	239.2	713			
6-Jul	0	0	0	3	21	121	295	380	571	509	588	819	509	306	497	646	591	364	285	136	27	4	0	0	278.0	819			
7-Jul	0	0	0	3	19	114	284	427	564	687	699	706	616	714	799	695	562	429	289	146	29	4	0	0	324.5	799			
8-Jul	0	0	0	6	42	91	214	355	358	252	311	355	230	230	309	416	537	411	274	126	23	3	0	0	189.3	537			
9-Jul	0	0	0	2	21	101	237	387	497	639	728	788	808	814	764	647	433	260	242	102	24	2	0	0	312.4	814			
10-Jul	0	0	0	3	15	73	138	332	443	240	203	331	516	571	704	413	266	94	13	2	2	0	0	0	181.7	704			
11-Jul	0	0	0	1	7	20	65	132	207	256	448	559	777	797	718	684	510	451	105	58	20	2	0	0	242.3	797			
12-Jul	0	0	0	1	15	54	231	251	214	462	474	532	361	503	306	267	272	364	197	74	16	2	0	0	191.5	532			
13-Jul	0	0	0	1	22	90	226	372	505	607	696	706	731	329	491	452	366	242	195	67	16	2	0	0	254.8	731			
14-Jul	0	0	0	1	8	111	110	358	504	609	697	706	670	644	619	188	37	324	182	105	22	2	0	0	245.7	706			
15-Jul	0	0	0	1	24	93	105	313	417	429	383	544	714	735	711	595	514	374	296	73	13	1	0	0	264.0	735			
16-Jul	0	0	0	0	12	67	102	186	270	266	305	260	287	250	199	373	429	285	197	81	21	1	0	0	149.7	429			
17-Jul	0	0	0	0	3	12	52	78	84	342	425	497	372	203	434	321	165	216	79	37	6	1	0	0	138.6	497			
18-Jul	0	0	0	1	14	87	280	455	562	622	539	897	686	724	692	633	506	323	271	103	16	2	0	0	308.8	897			
19-Jul	0	0	0	1	15	93	263	416	552	671	820	718	830	356	544	461	496	362	258	107	18	1	0	0	290.9	830			
20-Jul	0	0	0	1	23	23	49	86	116	190	593	610	695	754	728	570	380	213	121	28	5	0	0	0	216.0	754			
21-Jul	0	0	0	0	17	39	56	193	253	321	711	587	457	616	587	461	216	216	149	72	16	1	0	0	207.0	711			
22-Jul	0	0	0	1	13	64	172	381	457	565	703	782	792	786	729	611	460	361	231	63	13	1	0	0	299.3	792			
23-Jul	0	0	0	0	13	54	230	337	549	645	613	538	812	782	764	674	517	379	234	60	15	1	0	0	300.7	812			
24-Jul	0	0	0	0	5	12	30	66	189	271	404	411	320	342	448	465	434	337	228	82	15	1	0	0	169.2	465			
25-Jul	0	0	0	0	14	59	224	372	514	542	721	765	753	719	600	645	518	356	221	71	16	1	0	0	296.4	765			
26-Jul	0	0	0	1	20	88	235	349	480	589	715	777	745	790	744	520	490	386	236	64	13	0	0	0	301.7	790			
27-Jul	0	0	0	0	19	52	190	335	441	570	323	562	704	603	589	486	444	304	213	14	4	0	0	0	243.8	704			
28-Jul	0	0	0	0	6	54	167	221	454	642	729	592	488	668	588	585	430	191	52	68	15	0	0	0	247.9	729			
29-Jul	0	0	0	0	9	52	241	407	450	629	719	660	721	291	261	411	525	342	214	60	9	0	0	0	250.1	721			
30-Jul	0	0	0	0	4	29	36	30	58	98	133	453	724	706	642	577	490	336	207	45	11	0	0	0	190.9	724			
31-Jul	0	0	0	0	4	26	163	373	510	635	728	466	594	581	234	173	291	343	177	67	8	0	0	0	223.8	728			
														0.0 0.0 0.0 1.4 15.3 65.9 173.6 300.1 396.4 478.1 565.1 619.8 628.8 591.8 560.5 485.2 406.4 313.6 201.4 84.6 18.3 1.6 0.0 0.0														Diurnal Average	
														0 0 0 6 42 125 295 455 588 703 820 897 843 844 799 704 591 451 296 167 41 6 0 0														Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	267	35.89	35.89
21 - 100	79	10.62	46.51
101 - 300	121	16.26	62.77
301 - 600	172	23.12	85.89
601 - 900	105	14.11	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

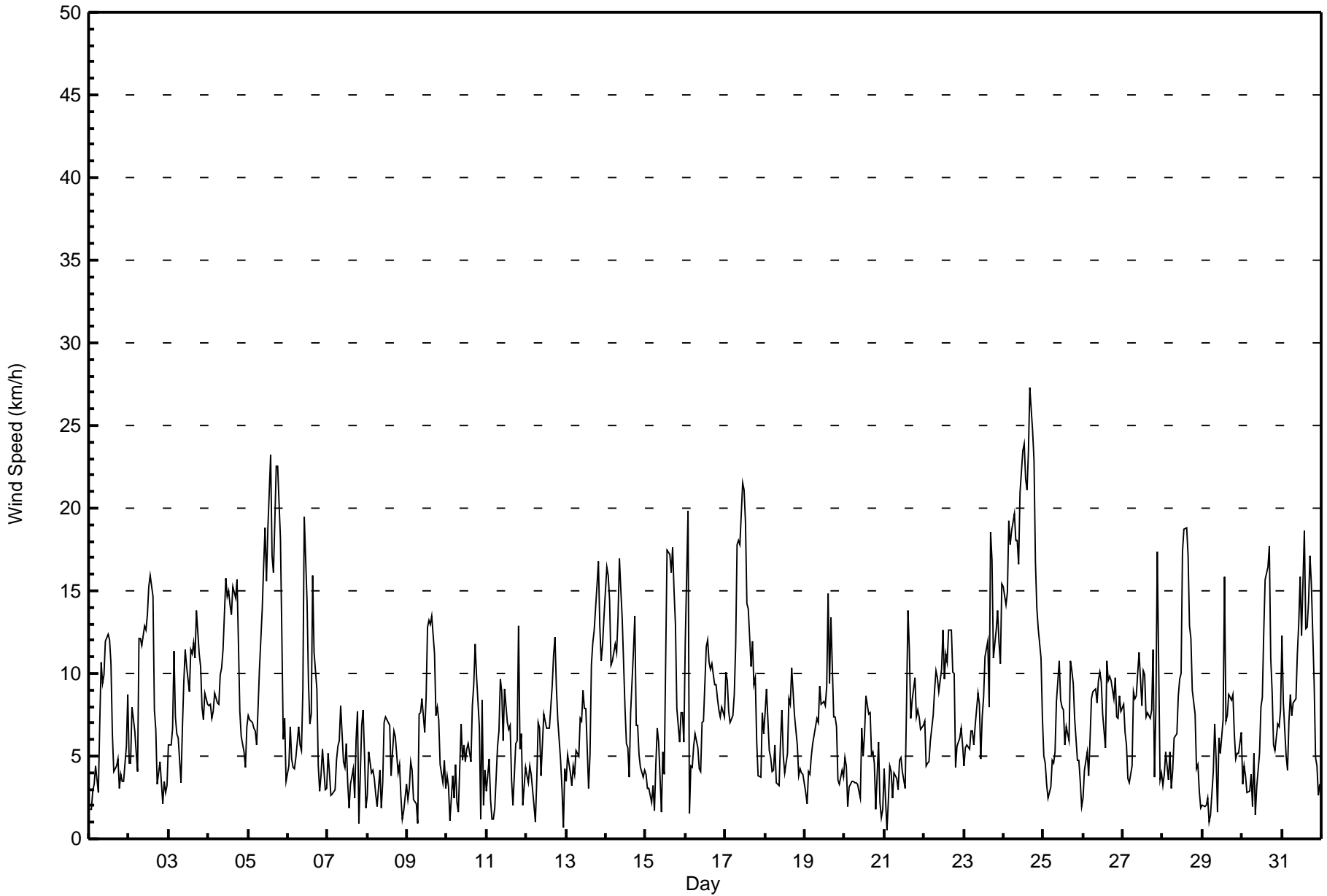
Fort McKay - Bertha Ganter - July 2017

Maximum Speed: 27 km/h on Jul 24 17:00	Maximum Daily Speed Average: 17.9 km/h on Jul 24	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 21 02:00	Minimum Daily Speed Average: 1.2 km/h on Jul 7	Hours of Data: 744
Maximum Diurnal Speed Average: 3.6 km/h at hour 13	Minimum Diurnal Speed Average: 1.5 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 2.5 km/h 259.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 7 Q ₃ = 10 P ₉₀ = 15 P ₉₉ = 23	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-Jul	S2	SSW2	SW3	S3	S4	S3	SSE7	SSE11	SSE9	SE10	SSE12	SSE12	SSE12	SSE11	S6	S4	SSE4	SSE5	SSE3	SE4	E3	SE3	S6	S9	SSE5.8	SSE12
2-Jul	SSW5	SSW5	S8	SSW7	S5	SSW4	S12	SSE12	S12	S13	S13	S14	S15	SSE16	S15	SW8	NW7	ENE3	ENE4	ESE5	NE2	NW3	WNW3	WSW3	S6.1	SSE16
3-Jul	S6	SSW6	S7	S11	S7	S6	S6	SSW3	S7	S10	S11	SSW10	SW9	SW11	SW11	SW12	SW11	SW14	SSW11	SSW10	WSW8	WSW7	WSW9	W8	SSW7.9	SW14
4-Jul	SSW8	SSW8	SSW7	SW8	WSW9	WSW8	WSW8	WSW10	WSW10	WSW11	SW16	WSW15	WSW15	WSW14	WSW14	WSW15	W15	W16	W12	W8	WSW6	SW5	WSW4	WSW7	WSW9.8	SW16
5-Jul	WSW7	WSW7	W7	WSW7	WSW7	W6	W8	WNW10	WNW14	WNW17	WNW19	NW16	NW19	NW23	NW17	NW16	NW19	NW23	NW23	NW18	NW12	WNW6	WNW7	WNW3	WNW12.0	NW23
6-Jul	W4	WNW7	W5	W4	W4	W5	W7	WNW6	WSW5	WNW9	NW19	N14	N9	NNW7	NNW8	NW16	NW11	NNW9	NNE4	ENE3	WNW4	WNW5	WNW3	W3	NW6.0	NW19
7-Jul	WNW5	WNW4	W3	SSW3	S3	S5	S6	SSE6	SE8	SW5	W4	W6	WSW3	WNW2	NW3	W4	NNW2	SSE6	SSE8	W1	NNE7	N8	NNW5	NNW2	WSW1.2	SE8
8-Jul	W3	WNW5	NW4	WNW4	W4	NNW3	NNW2	NNE4	SE2	SW3	SW7	WSW7	SSW7	SSE7	SW4	SW5	SSW7	SW6	W4	SSW4	SW3	SSE1	WSW2	WNW3	WSW2.6	WSW7
9-Jul	NW2	W3	WNW5	WNW4	W2	NW2	ESE1	SSE8	SSE8	SSE8	SSE6	SSE9	S13	SSE13	S13	SSE13	S11	S7	S8	S7	S4	S3	SSE5	SSE3	S5.5	SSE13
10-Jul	SSW4	S3	W1	S4	S2	SSE4	WNW2	SW2	W7	W5	WSW6	WSW5	SW5	SW6	S5	SSE8	SE9	E12	NNW10	WSW7	SW1	N8	WNW2	W4	SW1.9	E12
11-Jul	WNW3	WNW5	WNW2	S1	W1	WNW2	WNW6	NW7	NW10	NW9	WNW6	WNW9	W7	WNW7	W7	NW4	WNW2	SW6	SSW6	SSW13	WSW5	S6	SSW2	S4	W3.8	SSW13
12-Jul	S4	SSE3	S4	SSW4	SSW2	WNW1	SE4	SSE7	SSE7	SSE4	SSE8	SSE7	SSW7	SSE7	S7	SSE9	SSE11	SSE12	S9	SSE7	S5	S3	SSW1	SSW4	SSE5.4	SSE12
13-Jul	S3	SSW5	SSW4	SSW3	S4	SSW4	S5	SSE5	SE7	SE7	SSE9	SE8	SE8	NNE3	E5	N10	N12	N13	N15	N17	N13	NNW11	N12	NNW14	NNE2.2	N17
14-Jul	N16	N16	N14	N11	N11	N12	N11	N13	N17	N15	N13	NNE8	NE6	ENE6	NNE4	N8	NNW11	N13	NNW7	NNW7	NW5	WNW4	WNW4	WNW4	N9.0	N17
15-Jul	WNW4	WSW3	W3	W2	WSW3	WNW2	S5	SSE7	SE6	ESE2	N5	NNE4	SSE11	SSE17	SSE17	SSE17	SSE18	SSE15	SSE13	S8	SSW6	S8	S8	S6	SSE6.0	SSE18
16-Jul	WNW12	NNW20	NW2	W4	SSW4	S6	WSW6	WNW6	SW4	W4	S7	SW7	SSW12	SSW12	SSW11	SW10	WSW11	W9	W9	WSW8	WSW8	WSW7	W8	W7	WSW6.2	NNW20
17-Jul	W10	WNW10	WNW8	W7	WNW7	WNW9	NW12	NW18	NNW18	NNW18	N21	N21	N19	NNW14	NW14	N10	NNW12	NNW9	NNW10	NNW6	WNW4	W4	WNW8	NW6	NW10.3	N21
18-Jul	NW8	NW9	WNW5	WNW5	WNW4	W4	WNW6	NW3	ENE3	NNW6	NW8	WNW5	WSW4	WSW5	WSW8	WSW8	SW10	SW9	SSW7	W6	SW4	SW4	SW4	WSW4	W4.3	SW10
19-Jul	W3	S2	SSW4	SSW4	SW5	SW6	SW7	SW7	SSW7	SW9	SW8	W8	WSW8	W9	NNE15	NE9	NNE13	NNE7	NNE7	NNE7	N4	WNW3	WNW4	WNW4	WNW2.3	NNE15
20-Jul	WNW5	NW4	NW2	NNW3	NW4	NW3	N3	NW3	NNW3	ENE2	E7	ENE5	SE6	SSE9	SSE8	SSE8	SE5	ESE5	E5	ESE2	SSE6	WNW2	SSE1	S2	ESE1.2	SSE9
21-Jul	SSE4	NNW1	NW2	NW4	NE4	W2	NW4	WNW4	NE3	SE5	SE5	SSE4	NNE3	SSE8	S14	S11	S7	SSE8	S10	SSE7	S8	S7	S7	S7	S3.9	S14
22-Jul	S7	S4	S5	S5	S6	S7	S9	S10	S10	SSW9	SW10	SW13	WSW10	SW11	WSW11	SW13	SW13	SW10	SW10	WSW4	SSW6	SW6	SSW7	SSW6	SSW7.8	SW13
23-Jul	SW4	WSW6	SW6	WSW5	W7	W7	W6	W7	WNW9	NNW8	W5	W7	WSW9	SW11	SW12	W8	N19	N17	NNE11	N13	N14	N12	N11	N15	NW5.1	N19
24-Jul	N15	N14	N15	N19	N18	N19	N20	N18	N17	N21	N23	N24	N22	N21	N23	NNW27	N25	NNW23	NNW17	NNW14	NW13	NW11	NW7	NW7	N17.9	NNW27
25-Jul	NW5	WNW5	WNW3	SSW2	S3	S5	S5	S5	SSE8	SSE11	SSW8	SW8	SW8	SW6	SSW7	SSW6	S11	S10	S9	SSW7	S5	S5	S3	SSW2	SSW5.1	SSE11
26-Jul	WNW2	S4	S5	S4	S6	S8	S9	S9	SSE8	S10	S10	SW9	WSW8	SSW6	S11	S10	S10	SSE10	SSW9	S10	S7	S7	SSW9	SSW8	S7.4	S11
27-Jul	S8	S6	S6	SSW4	SSW3	SSE4	SSE9	S8	SSW9	S10	S11	SSW8	SSW10	SSW10	WSW7	W8	WNW7	WNW8	NW11	WNW4	WNW8	WNW17	NW4	SW4	SW4.8	WNW17
28-Jul	W3	WSW4	W5	W4	WSW5	SW3	SW4	SW6	SW6	SW9	W10	W10	NW17	NW19	NW19	WNW17	WNW13	NW12	WNW9	NE8	SSE4	SSW4	S3	WSW2	WNW6.0	NW19
29-Jul	NNW2	W2	WSW2	SW2	WSW1	S1	SSE4	SE7	SSE5	NNE2	E6	ESE5	SSE7	NW16	N7	N7	NNE9	NNE8	N9	NNE6	NNE5	N5	N5	NNW6	NNE2.3	NW16
30-Jul	WNW3	NNW4	N4	WNW3	NW3	WNW4	WSW2	S5	SE1	SSE3	S5	S8	SSE9	SSE12	SSE16	SSE16	SSE18	S11	SW9	SW6	SW5	W7	W7	W8	SSW4.4	SSE18
31-Jul	WNW12	WNW8	WNW5	W4	WNW7	WNW9	W7	W8	WNW8	WNW11	WNW13	NW16	NW12	NW19	NNW13	NNW13	NNW14	N17	N15	NNW9	WNW5	WNW4	W3	WNW3	NW8.7	NW19

W3.1	NNW3.1	W2.2	WSW2.4	WSW2.4	WSW2.3	WSW2.5	SW2.2	SW1.9	WSW2.1	WSW2.6	W3.2	WSW3.6	WSW3.5	WSW3.2	WSW3.1	WNW3.0	NNW1.9	NNW2.5	W1.5	W2.0	W2.9	W2.7	W2.9	Diurnal Average
N16	NNW20	N15	N19	N18	N19	N20	N18	NNW18	NNW18	N21	N23	N24	NW23	N21	N23	NNW27	N25	NNW23	NW18	NNW14	WNW17	N12	N15	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 McKay - Bertha Ganter - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	279	37.50	37.50
6 - 11	326	43.82	81.32
12 - 19	123	16.53	97.85
20 - 28	16	2.15	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - July 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	9	3	6	3	6	8	19	42	25	21	21	33	48	20	10	279
6 - 11	13	9	3	1	2	0	9	42	61	32	33	34	33	27	13	14	326
12 - 19	32	3	0	0	1	0	0	18	10	3	7	5	3	9	20	12	123
20 - 28	10	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	16
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	60	21	6	7	6	6	17	79	113	60	61	60	69	84	56	39	744

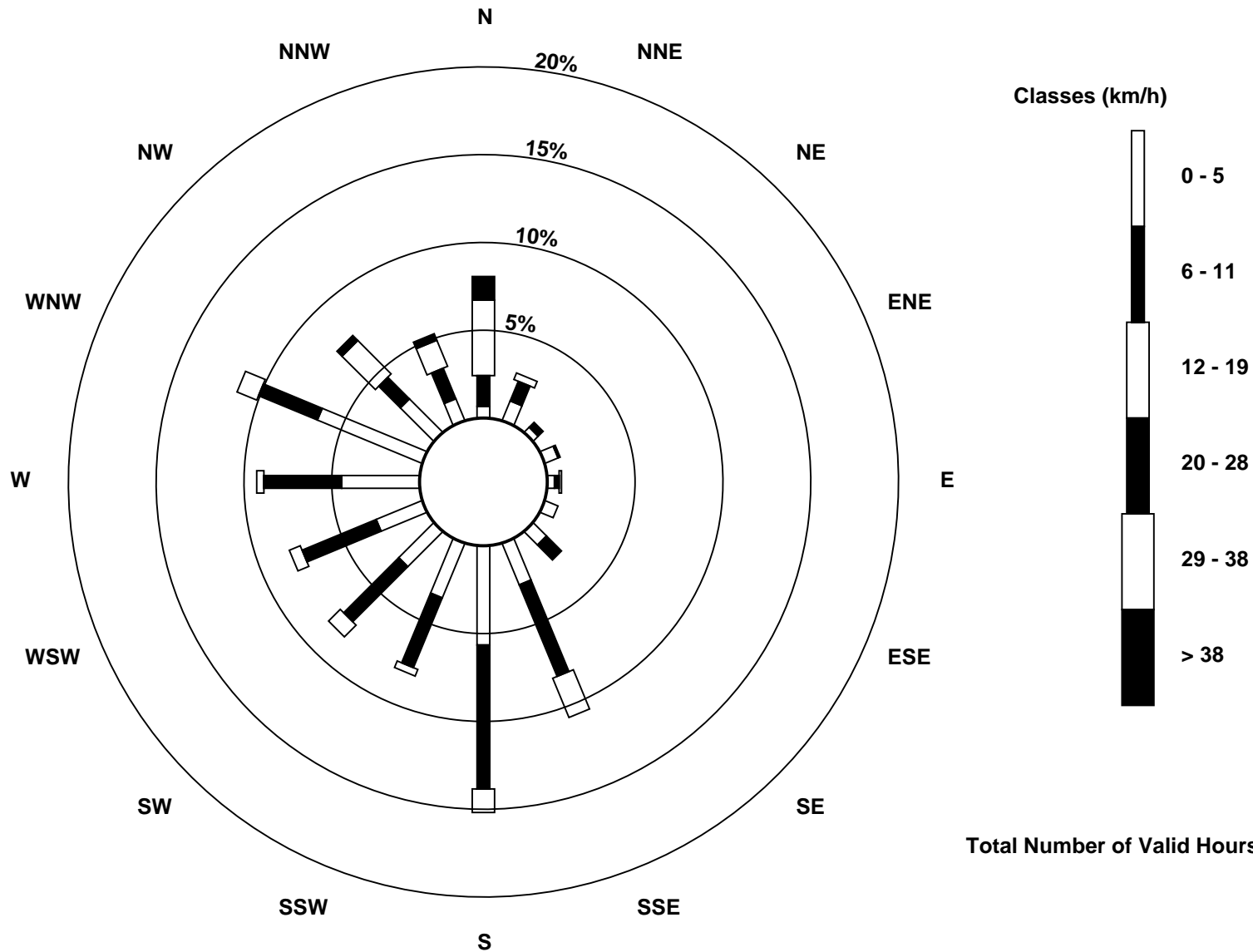
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 15 km/h on Jul 16 01:00														Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																												
Minimum Value: 1 km/h on Jul 11 05:00																																										
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 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-Jul	1	1	1	1	1	2	2	3	2	2	2	3	3	3	2	1	1	2	1	1	1	1	2	3	3																	
2-Jul	1	2	2	2	1	2	3	3	3	3	4	3	4	4	4	6	4	2	1	2	1	2	1	1	6																	
3-Jul	2	2	4	3	3	3	2	2	2	2	3	4	4	5	4	4	5	6	4	3	4	3	5	5	6																	
4-Jul	3	2	2	3	4	3	4	4	5	5	7	7	7	6	6	7	7	6	6	4	2	1	1	3	7																	
5-Jul	3	3	2	3	3	2	3	4	5	5	5	7	6	5	5	4	4	5	5	5	3	1	1	2	7																	
6-Jul	1	2	2	2	2	2	3	3	3	6	5	5	4	3	2	5	5	3	2	1	1	2	1	2	6																	
7-Jul	2	1	2	1	1	1	1	2	3	3	3	3	3	3	3	3	4	3	2	4	2	1	1	1	4																	
8-Jul	1	2	1	1	1	2	1	1	1	1	3	3	3	2	1	2	2	2	2	1	2	1	1	2	3																	
9-Jul	1	1	1	1	1	1	1	2	2	2	2	3	4	4	4	4	3	2	2	1	1	1	1	2	4																	
10-Jul	2	1	3	1	1	1	2	2	3	2	2	2	2	2	3	2	4	5	4	2	4	3	1	1	5																	
11-Jul	2	1	1	2	1	1	1	1	2	3	2	3	3	3	3	3	2	3	3	6	3	2	2	1	6																	
12-Jul	1	1	1	1	2	1	2	2	1	2	2	2	2	3	2	3	2	3	2	3	1	1	1	1	3																	
13-Jul	2	1	1	1	1	2	2	2	2	2	3	3	3	2	2	4	3	4	3	3	3	1	2	2	4																	
14-Jul	3	3	3	3	2	3	3	4	4	4	4	4	3	2	2	2	5	7	2	2	1	1	1	1	7																	
15-Jul	1	1	1	1	1	1	1	2	2	2	1	2	3	4	3	4	4	3	3	2	2	2	2	2	4																	
16-Jul	15	11	2	3	2	2	3	2	2	2	2	3	5	3	4	4	5	4	4	4	3	3	3	3	15																	
17-Jul	4	3	2	3	2	3	3	3	3	5	5	5	4	4	5	4	5	3	4	1	2	1	2	2	5																	
18-Jul	3	2	1	1	1	1	2	2	2	3	4	3	3	4	4	4	4	4	3	2	1	1	1	1	4																	
19-Jul	1	1	1	2	2	2	3	3	2	4	4	4	4	4	6	3	4	3	3	2	1	1	1	1	6																	
20-Jul	1	1	1	1	1	1	1	1	1	1	3	2	3	4	3	3	2	2	1	2	4	1	2	1	4																	
21-Jul	1	1	2	1	1	1	2	2	2	2	2	2	2	5	4	4	2	2	2	2	1	1	1	1	5																	
22-Jul	1	1	1	1	1	2	2	2	2	3	4	4	4	5	4	5	5	4	4	2	1	2	2	2	5																	
23-Jul	2	2	2	2	2	3	2	3	4	5	3	3	4	5	5	5	5	4	4	4	3	2	2	3	5																	
24-Jul	4	3	4	5	4	4	4	4	4	4	6	5	5	6	6	5	6	5	4	4	2	2	2	2	6																	
25-Jul	2	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	4	3	2	2	1	1	1	1	4																	
26-Jul	1	1	2	1	1	1	2	2	2	3	3	4	4	4	4	3	5	3	3	2	1	2	2	2	5																	
27-Jul	2	1	2	1	1	1	2	2	2	3	3	3	4	3	3	3	4	3	3	2	5	6	2	2	6																	
28-Jul	2	2	2	1	2	1	2	2	2	3	4	4	7	6	5	7	6	4	7	5	2	1	1	2	7																	
29-Jul	1	1	1	2	1	2	1	2	2	2	3	3	3	11	2	2	4	3	3	3	2	1	1	1	11																	
30-Jul	1	1	1	1	1	1	1	2	2	3	2	2	3	3	3	4	4	4	4	2	2	3	2	3	4																	
31-Jul	3	3	3	2	2	3	3	3	4	4	5	6	8	6	5	6	3	4	4	3	1	1	1	1	8																	
Diurnal Maximum																		15	11	4	5	4	4	4	4	5	6	7	7	8	11	6	7	7	7	7	6	5	6	5	5	



Wood Buffalo Environmental Association
Summary of Hour Averages

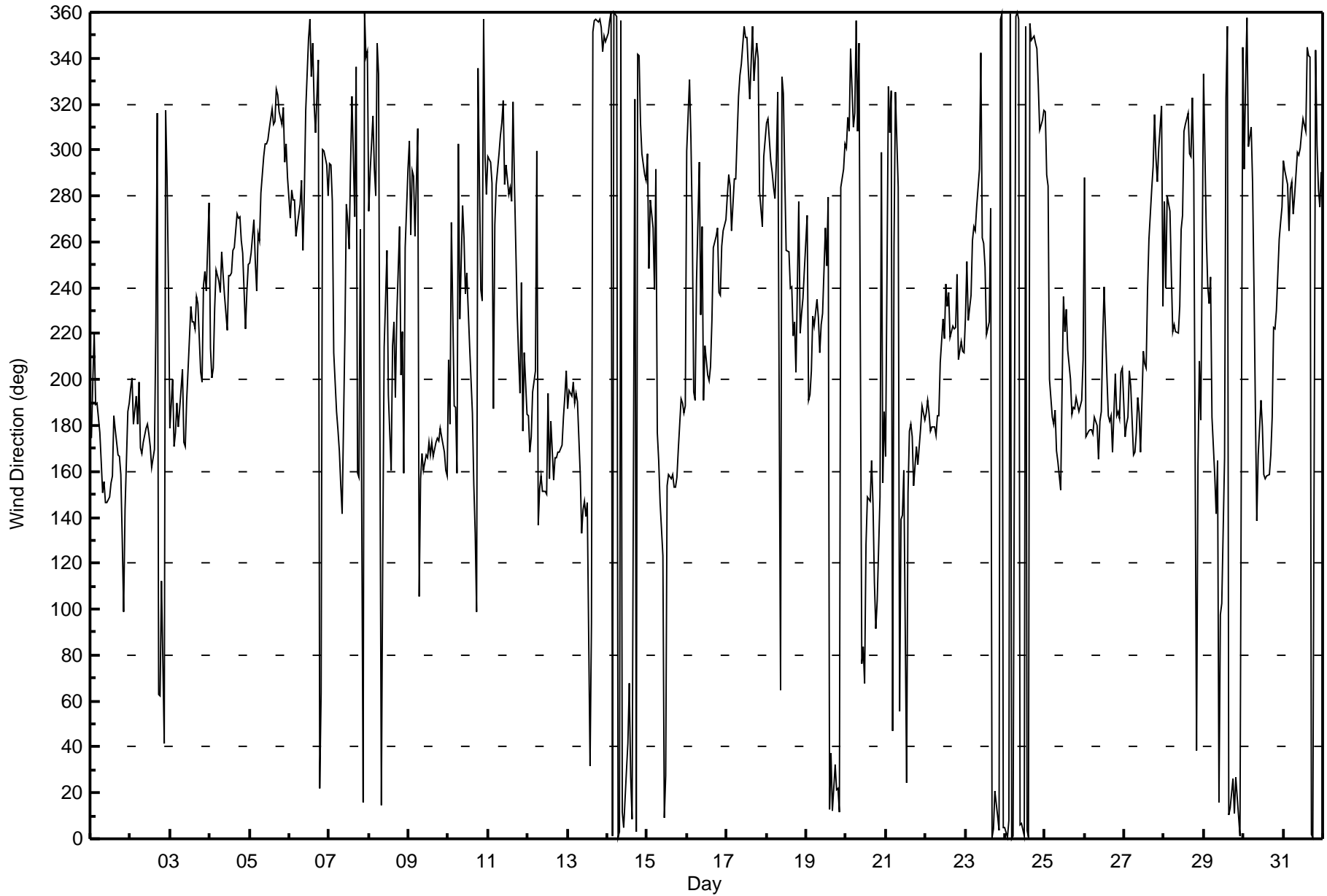
Wind Direction (WD) - deg
Fort McKay - Bertha Ganter - July 2017

Direction of Maximum Speed: 348 deg on Jul 24 17:00 Direction of Maximum Daily Speed Average: 353.8 deg on Jul 24	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 328 deg on Jul 21 02:00 Direction of Minimum Daily Speed Average: 1.2 deg on Jul 7	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-Jul	175	200	220	189	190	177	164	151	156	146	147	149	155	158	185	178	167	167	158	130	99	143	186	190	161.4
2-Jul	196	201	181	193	180	199	170	168	173	179	180	177	171	162	170	222	316	63	62	113	41	317	288	241	177.8
3-Jul	178	200	171	177	190	179	187	205	173	171	191	204	232	225	222	236	233	203	199	241	247	238	277	210.3	
4-Jul	213	201	205	231	248	243	238	256	246	237	221	245	245	246	256	257	272	270	271	261	255	222	239	250	245.7
5-Jul	251	255	270	252	238	263	260	282	297	303	302	304	309	318	311	312	326	324	317	311	318	295	303	288	302.6
6-Jul	270	282	278	278	262	267	276	287	256	282	318	349	357	332	346	320	308	339	22	64	300	299	293	280	311.2
7-Jul	294	293	277	212	186	178	169	155	142	221	276	269	257	293	324	271	336	159	157	266	16	360	340	343	242.7
8-Jul	273	291	315	291	280	347	333	14	125	214	235	256	194	160	215	225	192	228	267	202	221	159	258	291	239.7
9-Jul	304	263	291	288	262	309	106	157	168	160	167	166	173	167	172	167	173	175	173	179	175	169	161	158	175.3
10-Jul	209	180	269	189	188	159	303	226	276	262	238	246	231	215	186	154	133	99	335	239	234	357	297	281	219.9
11-Jul	297	295	285	187	267	285	298	306	312	321	285	294	280	284	278	321	286	228	210	194	242	178	212	185	269.3
12-Jul	184	168	175	195	204	300	137	152	158	151	151	150	194	157	182	156	166	166	169	168	171	184	193	204	167.8
13-Jul	187	195	193	199	190	194	191	159	133	143	147	140	146	32	94	352	356	357	355	357	353	343	349	347	12.0
14-Jul	351	356	360	1	360	358	1	3	356	11	5	30	42	67	27	9	322	3	342	341	312	299	289	287	357.4
15-Jul	298	248	278	266	239	292	177	164	146	123	9	28	154	158	157	158	153	153	157	170	192	190	185	188	166.3
16-Jul	300	331	305	266	194	191	243	294	228	266	191	215	202	199	206	226	258	263	266	238	237	258	265	270	247.6
17-Jul	280	289	284	265	287	287	306	323	333	337	354	349	349	335	322	354	330	340	347	340	282	267	297	304	324.7
18-Jul	312	314	295	291	284	279	295	325	65	332	325	289	256	255	240	240	219	225	203	277	220	229	236	248	268.1
19-Jul	272	191	193	204	228	224	235	227	212	224	229	266	249	279	13	37	12	33	21	22	11	284	291	302	286.9
20-Jul	301	314	308	344	310	316	356	308	347	76	84	68	128	149	147	165	146	112	91	104	149	299	155	186	115.0
21-Jul	166	328	307	326	47	259	325	284	56	139	141	161	24	151	178	180	175	154	171	163	171	179	189	182	170.6
22-Jul	185	191	185	178	180	180	176	184	185	207	226	218	242	232	238	218	223	222	223	246	209	217	212	212	210.5
23-Jul	227	251	226	237	260	266	265	275	292	343	262	259	249	220	225	274	1	5	21	10	4	357	360	5	314.5
24-Jul	5	1	8	359	0	1	358	360	357	6	6	1	354	4	0	355	348	350	347	344	328	309	313	317	353.8
25-Jul	316	289	284	200	184	181	187	169	164	152	197	236	221	231	213	200	185	188	192	186	188	191	208	197.3	
26-Jul	288	175	177	178	178	176	183	180	165	182	186	217	240	202	184	182	184	168	202	184	186	183	203	205	188.7
27-Jul	175	181	183	204	197	167	168	177	192	186	169	213	207	205	239	261	283	293	316	296	286	301	319	232	224.4
28-Jul	278	240	280	273	246	221	224	221	220	232	266	271	308	311	316	299	297	323	291	38	163	208	182	252	283.9
29-Jul	333	262	240	233	245	184	158	141	165	16	97	103	166	323	354	11	13	26	11	27	18	10	1	345	15.3
30-Jul	291	330	358	302	310	286	240	187	138	167	191	179	159	157	158	158	167	183	223	222	230	261	268	275	195.0
31-Jul	295	291	285	265	283	286	272	280	299	298	301	308	314	308	345	341	340	2	1	344	302	283	275	291	313.7

277.6 282.4 264.9 252.7 249.4 249.9 237.9 231.9 228.7 241.4 246.9 259.0 241.7 240.5 237.0 253.1 282.8 302.3 297.2 279.3 274.1 275.3 268.5 269.4
 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 - Bertha Ganter - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 105 deg on Jul 29 10:00 Minimum Value: 8 deg on Jul 24 21:00 Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 19 Median = 31 Q ₃ = 49 P ₉₀ = 62 P ₉₉ = 86																			Hours in Service: 744 Hours of Data: 744 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-Jul	87	55	19	15	16	46	18	19	19	17	17	16	16	20	21	26	19	23	31	17	28	23	22	21	87
2-Jul	22	31	19	16	19	48	16	19	17	21	21	23	21	17	19	58	62	52	44	27	58	33	59	41	62
3-Jul	22	19	48	15	29	40	25	40	32	19	22	36	52	49	43	41	50	47	25	24	46	48	46	47	52
4-Jul	33	21	22	43	56	49	50	57	58	53	43	52	52	52	51	53	47	40	47	52	51	31	43	49	58
5-Jul	51	50	42	52	57	56	52	39	32	23	18	26	21	13	21	19	15	14	12	13	10	17	14	39	57
6-Jul	29	23	44	37	38	55	45	49	56	55	16	33	33	38	35	26	30	26	57	67	19	12	59	24	67
7-Jul	12	17	41	48	29	15	18	25	14	75	73	61	74	101	89	84	102	63	15	83	34	14	18	73	102
8-Jul	46	23	47	24	41	72	62	31	78	37	47	54	49	34	55	45	41	47	55	19	26	71	63	49	78
9-Jul	59	29	24	25	37	49	78	17	21	20	34	38	20	21	20	19	20	17	17	12	13	31	17	56	78
10-Jul	39	41	84	38	60	32	69	74	49	65	49	53	64	50	61	22	27	36	44	40	84	14	75	29	84
11-Jul	67	22	56	97	74	72	16	21	14	18	40	34	49	56	50	81	96	67	46	39	56	17	64	22	97
12-Jul	26	22	18	21	69	81	58	18	22	55	27	29	39	41	24	23	15	18	21	14	14	49	81	17	81
13-Jul	24	22	23	33	13	53	24	36	18	26	28	40	32	66	49	19	21	19	15	15	14	9	11	11	66
14-Jul	13	14	16	16	16	16	15	17	18	20	22	49	59	53	76	26	29	23	27	13	10	11	12	16	76
15-Jul	21	36	37	50	28	84	24	22	29	80	21	56	27	17	16	16	17	16	16	16	37	19	18	17	84
16-Jul	32	25	91	61	51	23	46	47	58	60	30	39	27	23	32	43	54	59	49	50	54	49	50	49	91
17-Jul	34	24	29	50	28	24	16	9	11	14	16	16	17	25	17	24	28	28	14	15	64	36	14	15	64
18-Jul	13	14	18	20	18	39	29	59	73	61	55	72	96	75	54	56	38	44	29	34	23	30	44	55	96
19-Jul	59	35	14	39	51	43	54	42	35	42	56	59	56	41	38	46	23	40	43	33	47	22	26	21	59
20-Jul	11	17	65	28	38	23	25	43	26	60	37	52	48	34	61	34	43	30	25	69	70	53	86	64	86
21-Jul	21	84	45	17	36	65	51	54	71	21	50	51	75	69	22	20	20	17	15	14	12	11	12	10	84
22-Jul	11	17	19	17	14	14	13	21	19	35	49	40	56	50	52	40	43	50	42	46	15	21	24	24	56
23-Jul	44	56	44	60	50	60	49	51	39	44	70	54	61	49	48	65	21	16	34	17	15	14	14	15	70
24-Jul	16	14	16	16	15	16	16	15	19	19	17	17	18	19	18	16	17	15	14	8	10	15	14	19	19
25-Jul	18	19	45	39	18	15	25	30	17	16	45	57	59	57	61	72	26	23	17	15	16	12	11	44	72
26-Jul	58	25	18	16	10	11	19	17	22	26	27	48	57	86	38	30	39	25	26	14	11	20	22	23	86
27-Jul	14	15	20	21	33	17	16	20	25	31	22	37	35	34	53	51	48	33	17	60	35	18	82	54	82
28-Jul	77	44	31	36	49	64	44	44	47	47	51	52	30	24	21	27	29	35	71	49	36	28	37	65	77
29-Jul	76	73	72	69	89	86	35	26	44	105	52	70	52	50	30	26	39	32	24	47	42	19	22	17	105
30-Jul	32	20	19	30	27	18	46	26	77	89	26	20	29	18	15	16	15	38	39	31	34	48	40	39	89
31-Jul	18	21	27	33	35	30	37	39	41	36	33	28	28	24	25	35	16	19	16	13	19	23	41	28	41
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

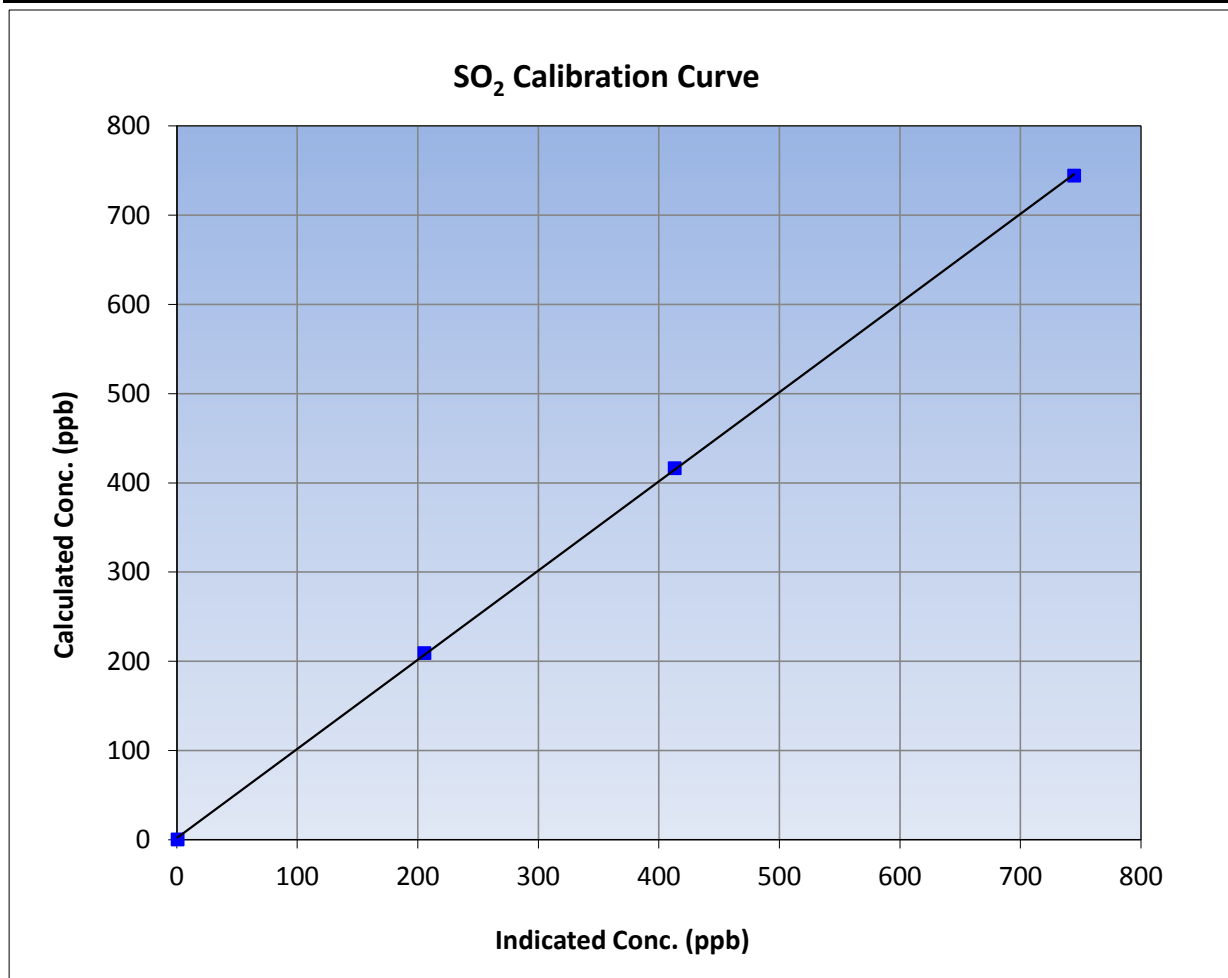
Version-03-2017

Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 9, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	10:00	End Time (MST)	13:20
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301448

Calibration Data

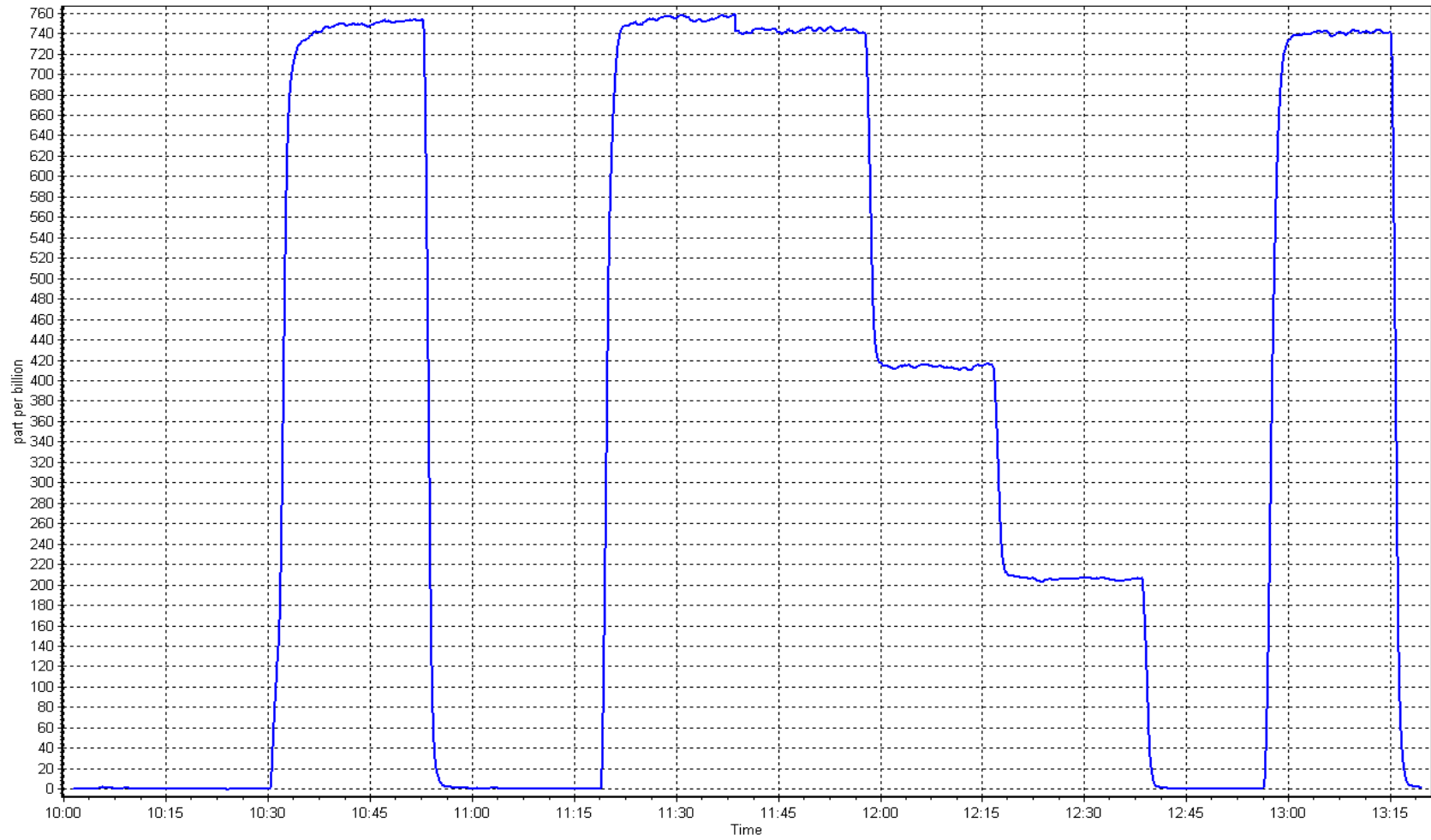
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999954	≥0.995
744.0	744.1	0.9998			
416.0	412.7	1.0079	Slope	0.999248	0.90 - 1.10
209.0	205.2	1.0183			
			Intercept	1.899776	+/-30



SO2 Calibration Plot

Date: July 14, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

TRS Calibration Summary

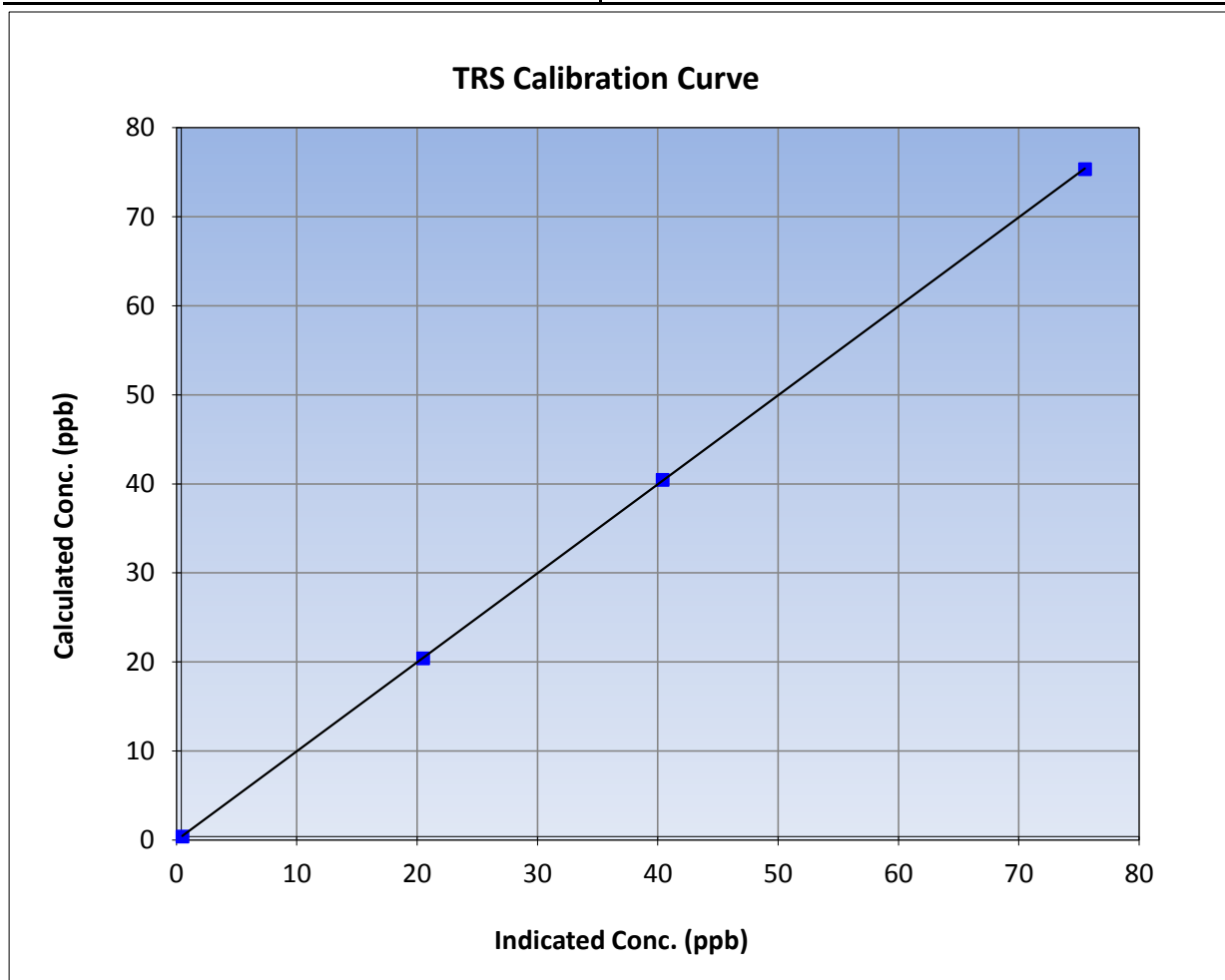
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 19, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:05	End Time (MST)	12:30
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153461

Calibration Data

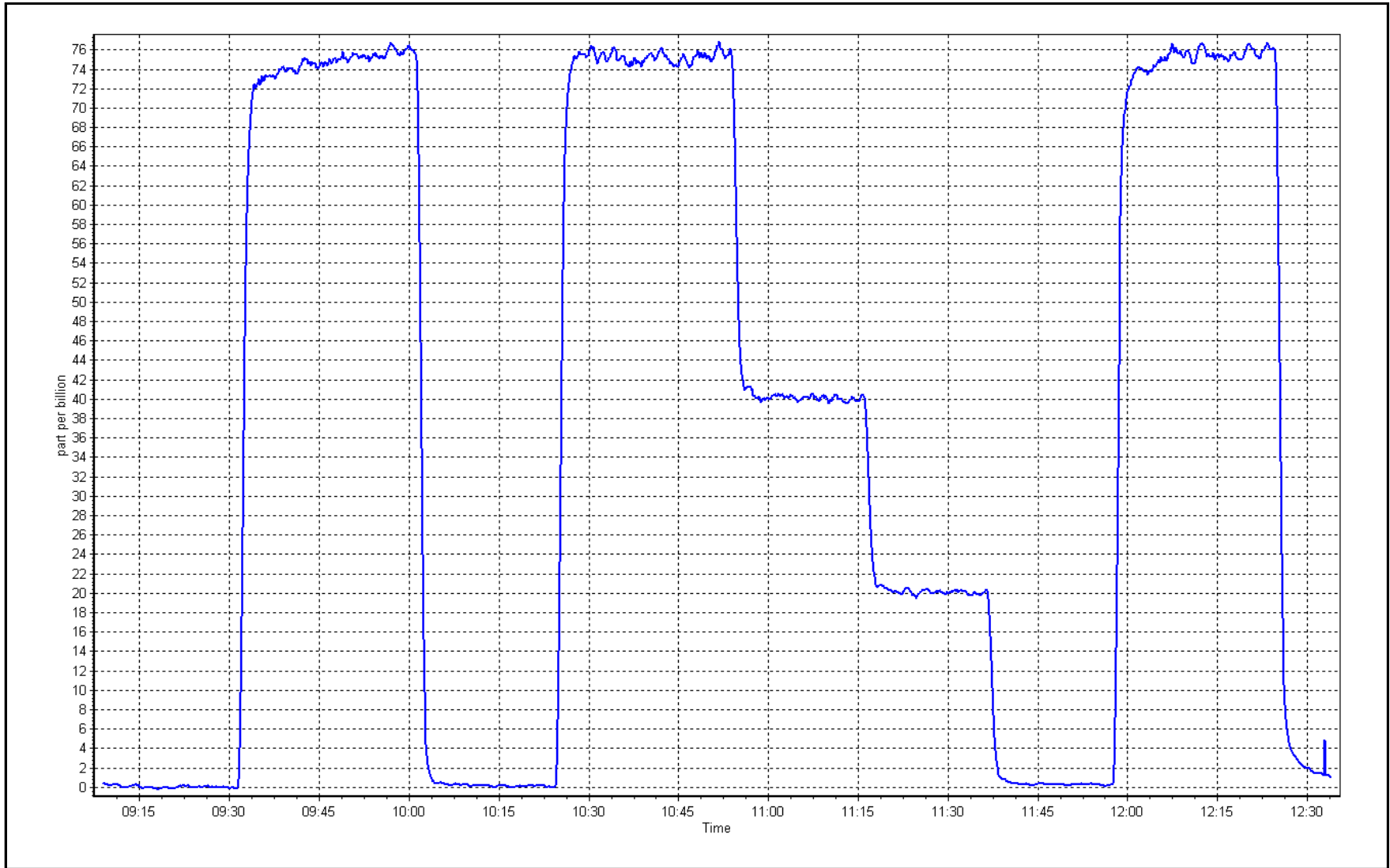
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999993	≥ 0.995
75.0	75.1	0.9980	Slope	0.999589	0.90 - 1.10
40.1	40.0	1.0013	Intercept	-0.055049	+/-3
20.0	20.1	0.9960			



TRS Calibration Plot

Date: July 10, 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:	July 14, 2017	Last Cal Date:	June 9, 2017
Start time (MST):	10:00	End time (MST):	13:20
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000683	Cal Gas Expiry Date	Monday, November 04, 2019
CH4 Cal Gas Conc.	<u>515.0</u> ppm	CH4 Equiv Conc.	1062.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	21 Deg C
Calibrator Model	API T700	Serial Number	2464
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	75.3
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.0
CH4 SP Ratio	1.73E-04	1.72E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.2	Carrier Pressure	36.7	36.7
NMHC SP Ratio	3.98E-05	3.90E-05	Fuel Pressure	47.7	47.7
NMHC Peak Area	207442	211657	Air Pressure	39.0	39.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.996263	0.999194
THC Cal Offset	0.031814	0.044437
CH4 Cal Slope	0.998454	0.999365
CH4 Cal Offset	0.028196	0.037702
NMHC Cal Slope	0.994540	0.999074
NMHC Cal Offset	0.003161	0.007088

Notes: N2 cylinder replaced 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	5998	0.0	0.00	0.00	----
as found span	5417	83.0	16.03	16.25	0.986
calibrator zero	5998	0.0	0.00	0.00	----
high point	5417	83.0	16.03	16.04	1.000
second point	5453	46.4	8.96	8.88	1.010
third point	5474	23.3	4.50	4.43	1.016
as left zero	5998	0.0	0.00	0.00	----
as left span	5417	83.0	16.03	16.01	1.002
Average Correction Factor					1.009
Corrected As found	16.25	Prev response	16.06	*% change	-1.2%

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	8.44	0.978
calibrator zero	5998	0	0.00	0.00	----
high point	5417	83	8.26	8.27	0.999
second point	5453	46.4	4.62	4.60	1.004
third point	5474	23.3	2.32	2.31	1.003
as left zero	5998	0	0.00	0.00	----
as left span	5417	83	8.26	8.25	1.001
Average Correction Factor					1.002
Corrected As found	8.44	Prev response	8.30	*% change	-1.7%

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	7.81	0.995
calibrator zero	5998	0.0	0.00	0.00	----
high point	5417	83.0	7.77	7.77	1.001
second point	5453	46.4	4.35	4.27	1.017
third point	5474	23.3	2.18	2.12	1.031
as left zero	5998	0.0	0.00	0.00	----
as left span	5417	83.0	7.77	7.76	1.002
Average Correction Factor					1.016
Corrected As found	7.81	Prev response	7.76	*% change	-0.7%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

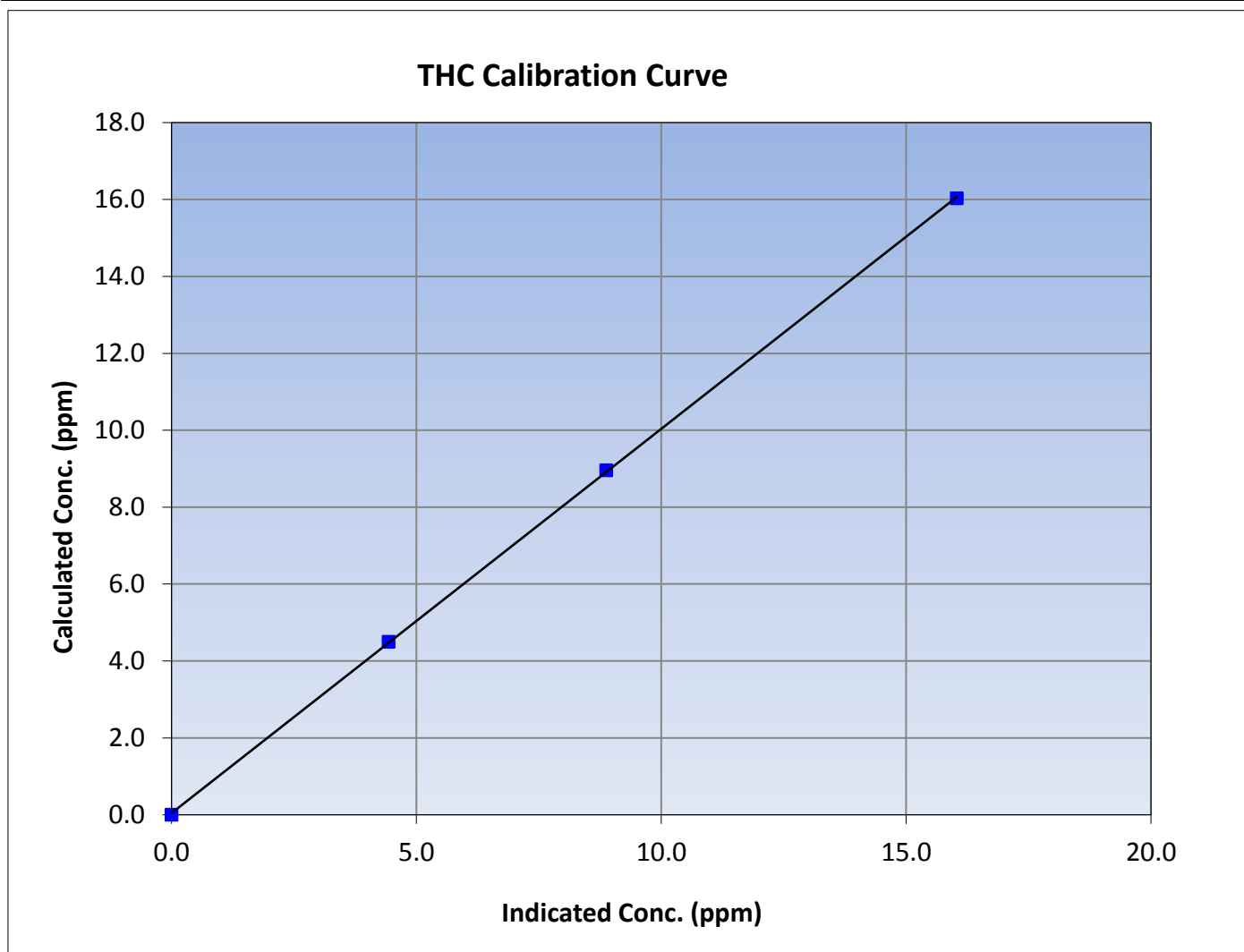
Version-02-2017

Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 9, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	10:00	End Time (MST)	13:20
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	0.999952	≥ 0.995			
16.03	16.04	0.9997						
8.96	8.88	1.0099				Slope	0.999194	0.90 - 1.10
4.50	4.43	1.0161						
			Intercept	0.044437	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

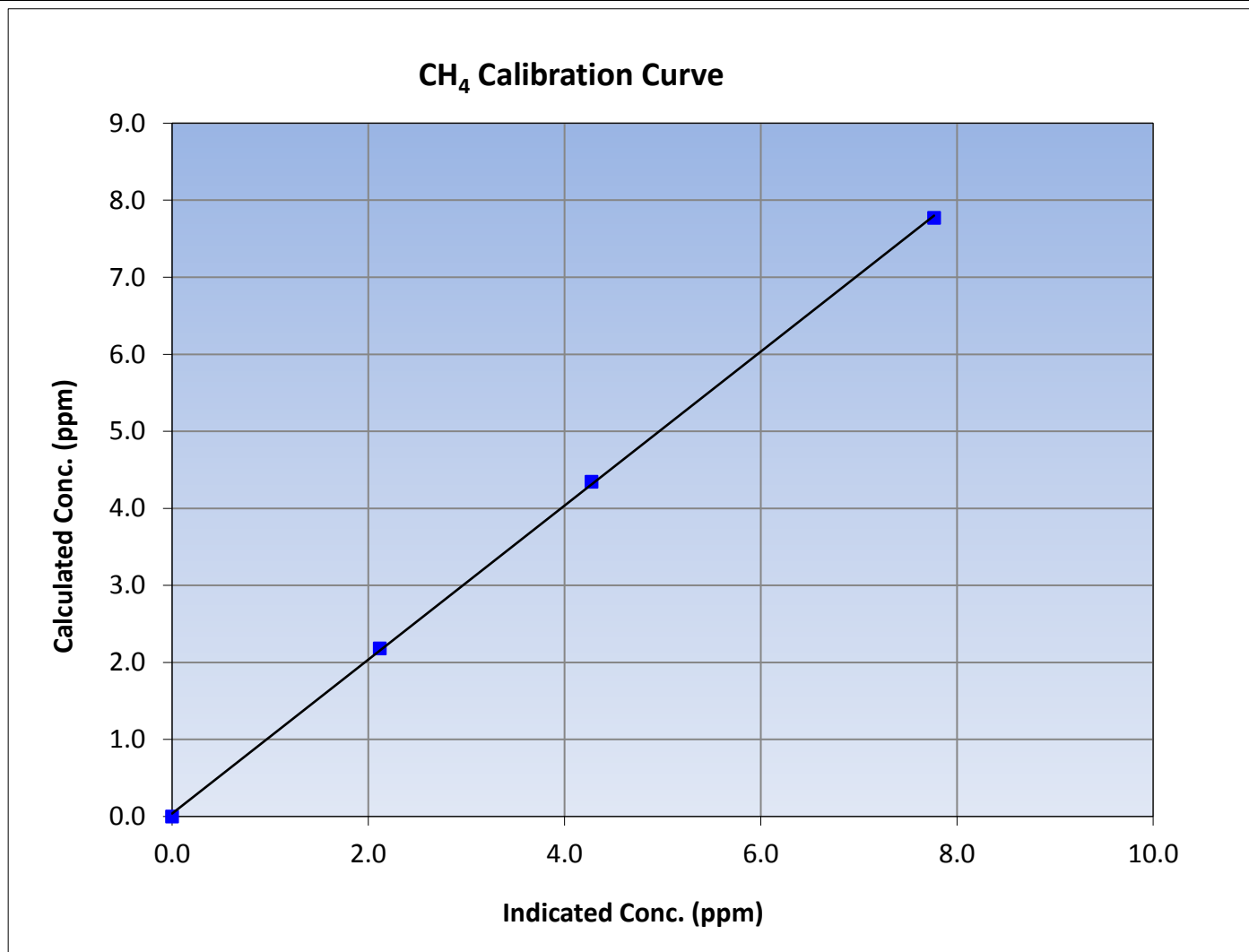
Version-02-2017

Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 9, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	10:00	End Time (MST)	13:20
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	0.999867	≥ 0.995			
7.77	7.77	1.0006						
4.35	4.27	1.0167				Slope	0.999365	0.90 - 1.10
2.18	2.12	1.0311						
			Intercept	0.037702	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

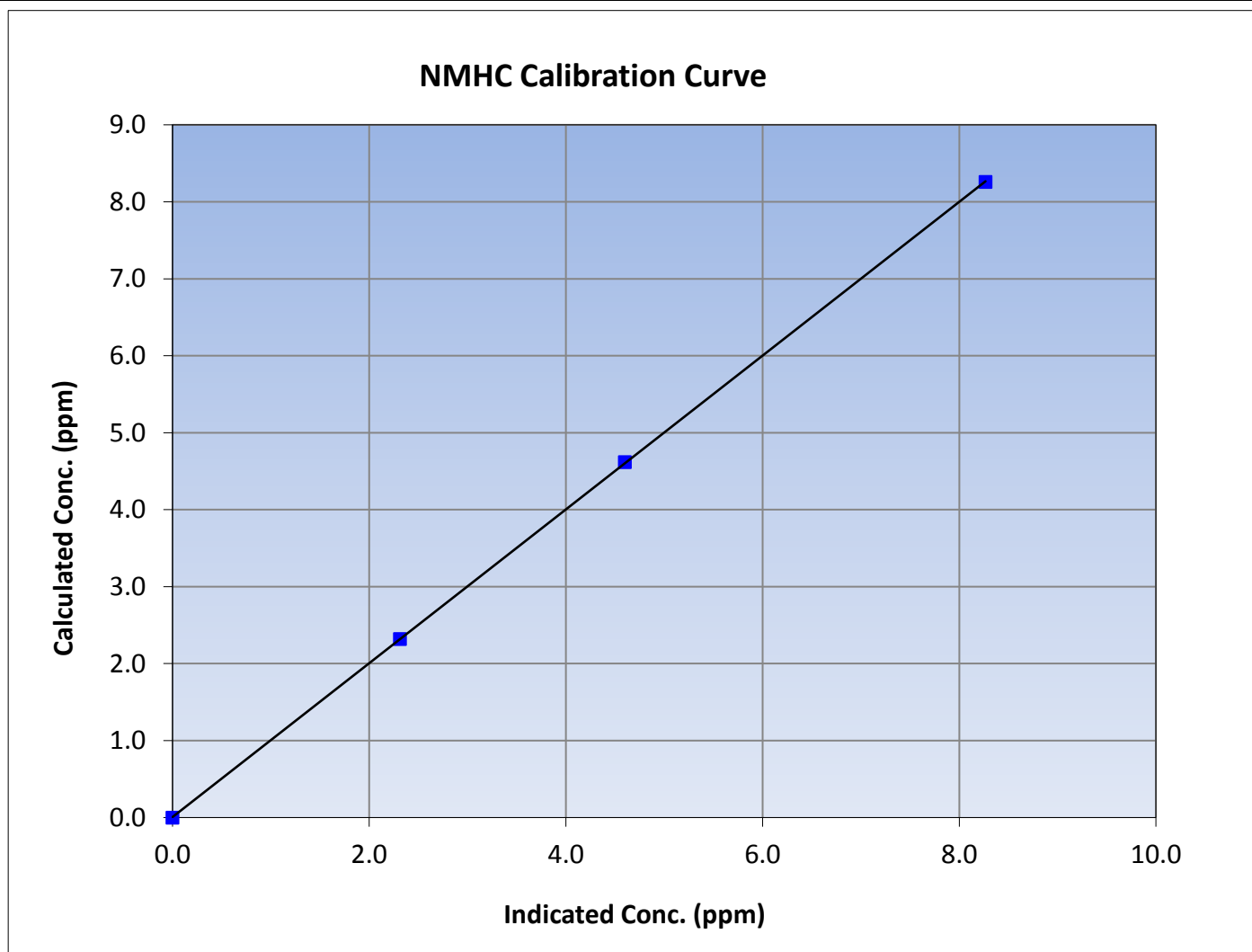
Version-02-2017

Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 9, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	10:00	End Time (MST)	13:20
Analyzer make	Thermo 55i	Analyzer serial #	1152430012

Calibration Data

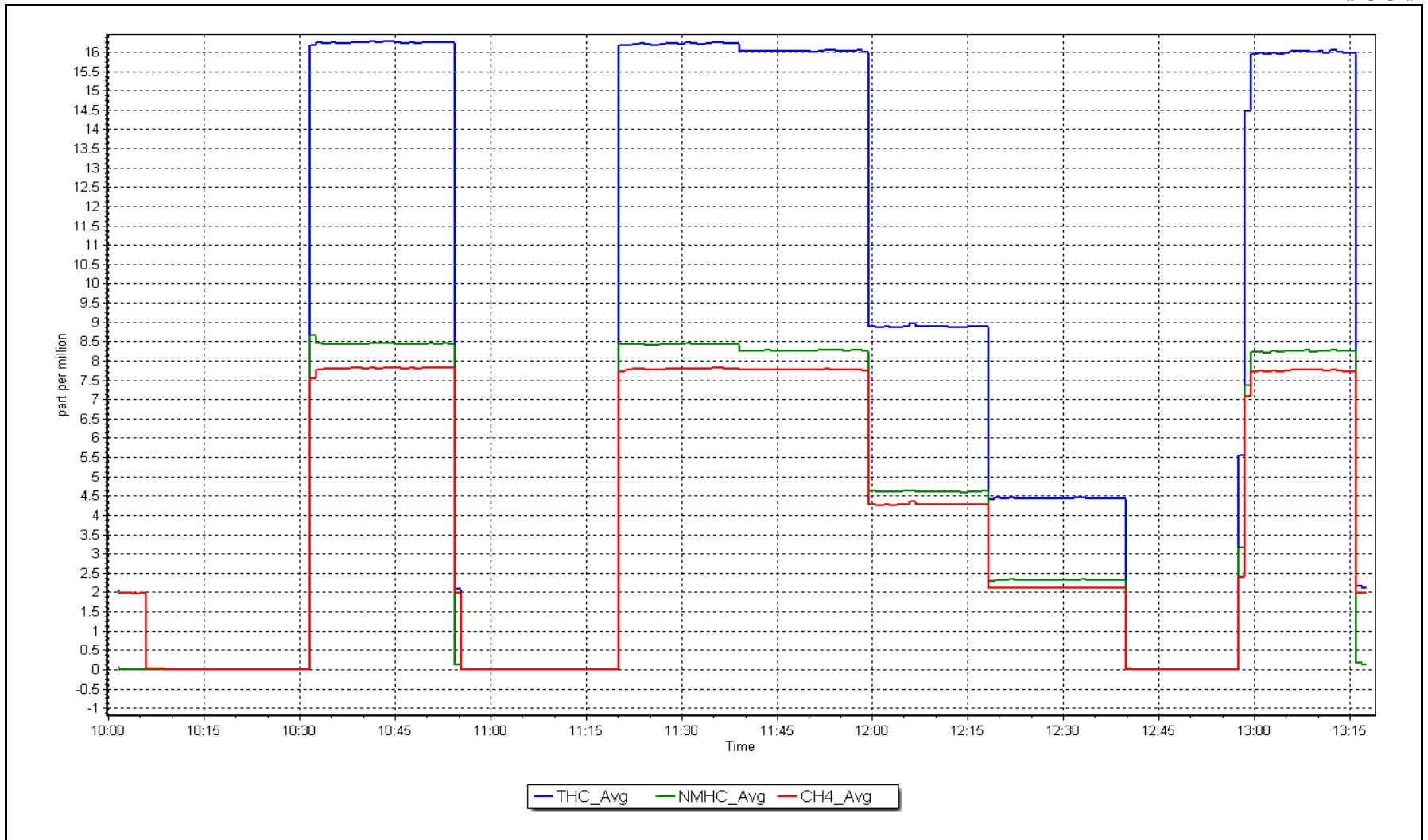
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999992	≥ 0.995			
8.26	8.27	0.9990						
4.62	4.60	1.0035				Slope	0.999074	0.90 - 1.10
2.32	2.31	1.0028						
			Intercept	0.007088	± 0.5			



NMHC Calibration Plot

Date: July 14, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-03-2017

Station Information

Station Name: Fort McKay - Bertha Ganter Station number: AMS 01
 Calibration Date: July 20, 2017 Last Cal Date: June 22, 2017
 Start time (MST): 8:35 End time (MST): 13:30
 Reason: Routine

Calibration Standards

O₃ generation mode: Photometer O₃ reference Date: Photometer
 Calibrator Make/Model: API T700 Serial Number: 2464
 ZAG Make/Model: API 701H Serial Number: 587

Analyzer Information

Analyzer make: API T400 Analyzer serial #: 1107

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 500 ppb		Pressure	26.9	26.9
Calculated slope	0.997492	0.985604	Flow cell A	777.0	778.0
Calculated intercept	0.860319	2.864319	Flow cell B	780.0	776.0
Analyzer Background	0.4	0.4	O ₃ Measurement	3955.0	3954.2
Analyzer Coefficient	1.015	1.061	O ₃ Reference	3955.1	3954.3

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	5996	0.00	0.0	0.2	----
as found span	5000	947.50	400.0	384.8	1.040
calibrator zero	5996	0.00	0.0	0.2	----
high point	5000	947.50	400.0	404.4	0.989
second point	5001	778.70	200.0	198.5	1.008
third point	4999	0.34	100.0	95.5	1.047
as left zero	5996	0.0	0.0	0.2	----
as left span	5000	880.0	350.0	351.8	0.995
Average Correction Factor					1.015

Corrected As found 384.60 Previous response 400.15 *% change 4.0%

** = > +/-8% change initiates investigation*

Notes: Span adjusted. Third point was more than 5% out. Readjusted span. See Doc-It note for notes on linearity issue.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

O₃ Calibration Summary

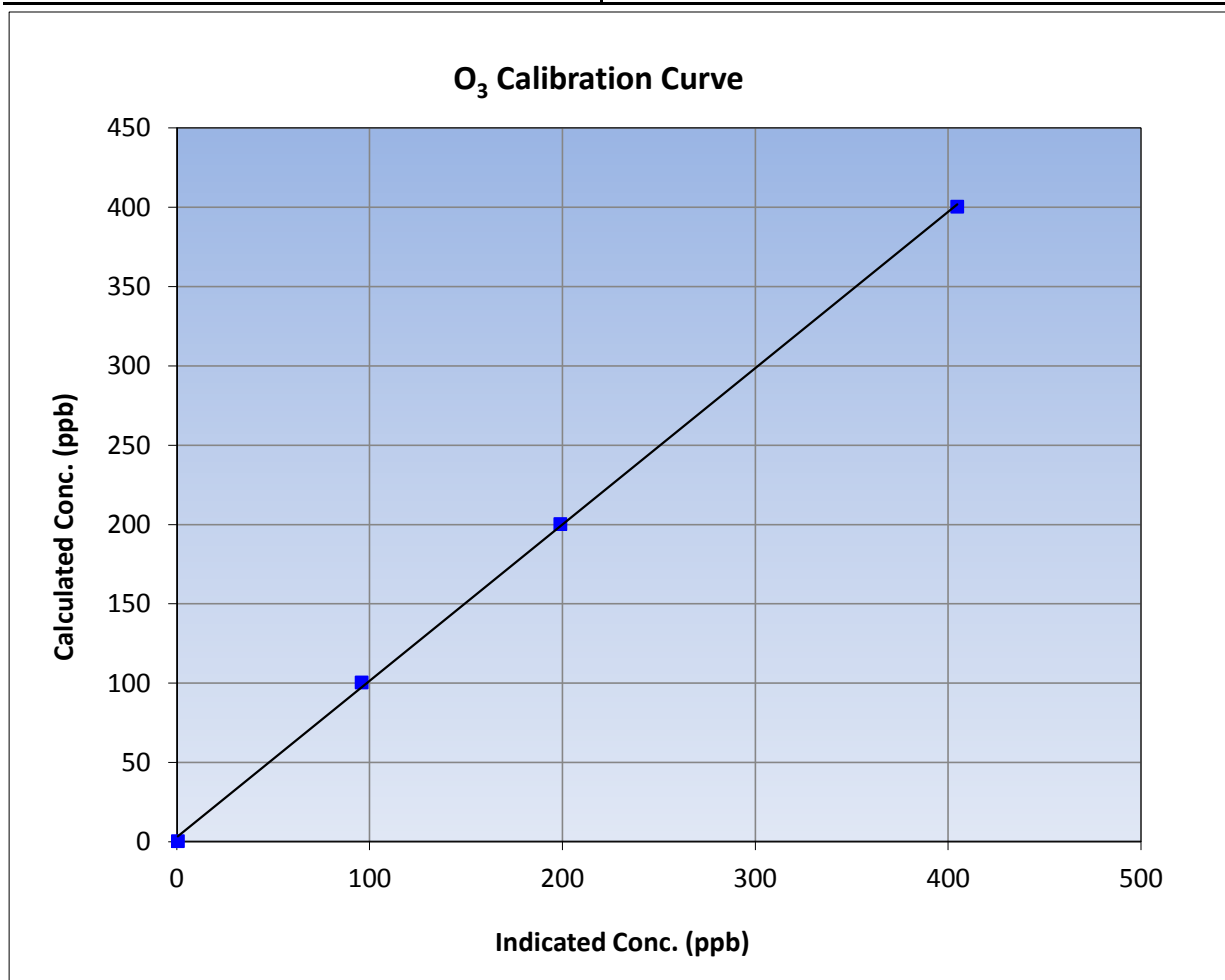
Version-03-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 22, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	8:35	End Time (MST)	13:30
Analyzer make	API T400	Analyzer serial #	1107

Calibration Data

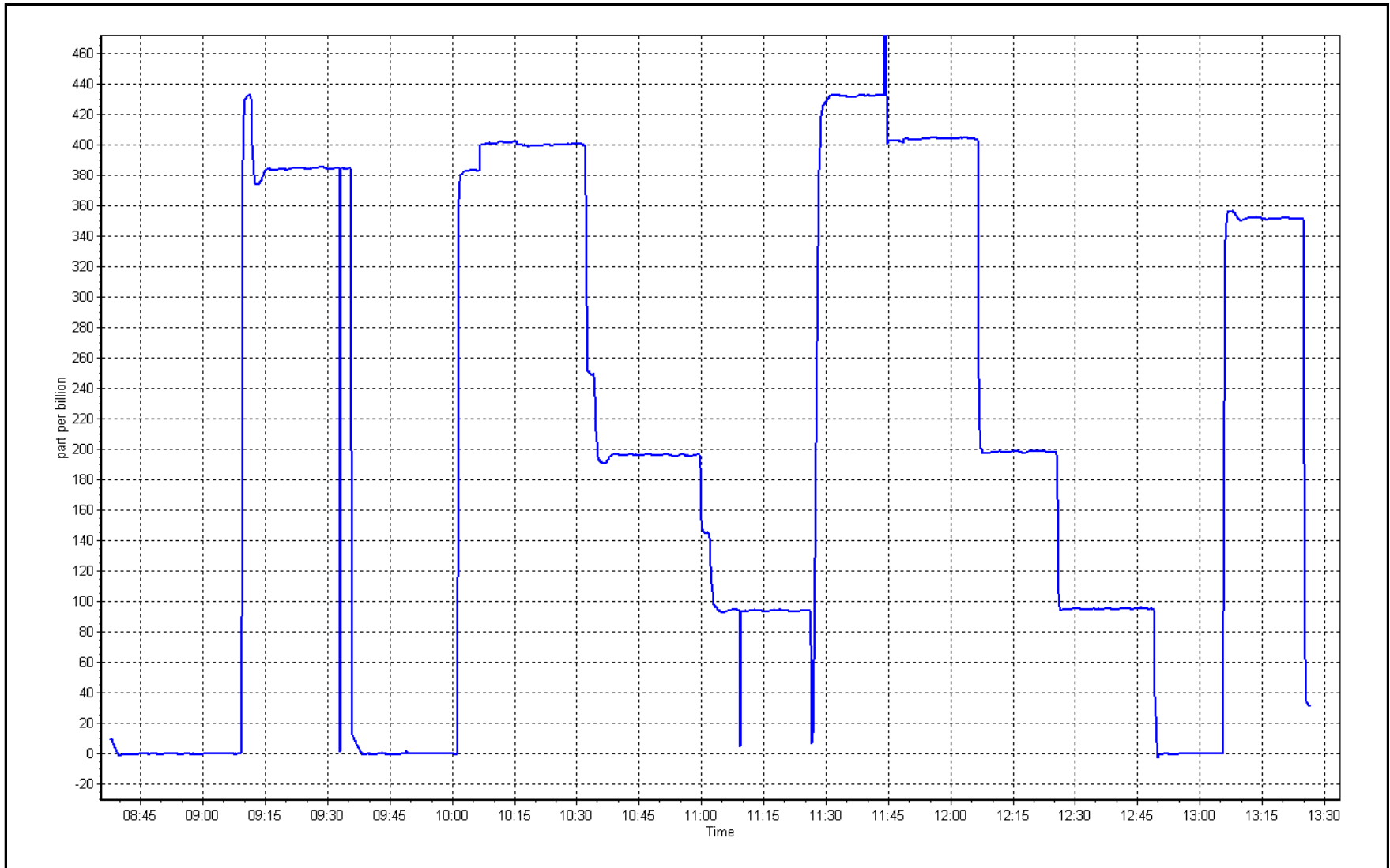
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.2	----	Correlation Coefficient	0.999740	≥0.995
400.0	404.4	0.9891			
200.0	198.5	1.0076	Slope	0.985604	0.90 - 1.10
100.0	95.5	1.0471			
			Intercept	2.864319	+/- 10



O₃ Calibration Plot

Date: July 20, 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:	July 17, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	9:25	End time (MST):	14:05
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	API T700	Serial Number	2464
ZAG make/model	API 701H	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	1.172	1.160	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.999	hamber Temperature	50.0	50.0
NO2 coefficient	1.000	1.000	Reaction cell Press	171.1	172.0
NO bkgrnd	5.9	5.8	Sample Flow	0.578	0.589
NOX bkgrnd	6.0	6.0	PMT Voltage	-791.8	-791.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.998648	0.997894
NO _x Cal Offset	1.097506	1.207635
NO Cal Slope	0.998137	0.997254
NO Cal Offset	1.048917	1.552978
NO ₂ Cal Slope	0.999138	0.998042
NO ₂ Cal Offset	0.100798	0.066658



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	0.1	-0.1	0.1	----	----
as found span	5415	83.0	750.3	750.3	0.0	758.6	758.1	0.4	0.9890	0.9897
calibrator zero	5997	0.0	0.0	0.0	0.0	0.1	-0.1	0.1	----	----
high point	5415	83.0	750.3	750.3	0.0	751.5	751.7	-0.2	0.9984	0.9981
second point	5451	46.4	419.5	419.5	0.0	418.3	418.2	0.1	1.0028	1.0031
third point	5474	23.3	210.7	210.7	0.0	208.6	208.2	0.4	1.0098	1.0118
as left zero	5997	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
as left span	5415	83.0	750.3	335.1	415.2	749.2	408.5	340.7	1.0015	0.8203
Average Correction Factor									1.0037	1.0043

Corrected As found	NO _x = 758.5 ppb	NO = 758.2 ppb		*Percent Change	NO _x = -1.1%
Previous Response	NO _x = 750.2 ppb	NO = 750.6 ppb		*Percent Change	NO = -1.0%

* = > +/-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	751.6	750.8	0.8	0.9983	0.9993	----	----
1st NO2 (400 ppb O3)	335.1	415.7	751.7	335.1	416.5	0.9981	----	0.9981	100.2%
2nd NO2 (200 ppb O3)	508.6	242.2	751.2	508.6	242.7	0.9988	----	0.9979	100.2%
3rd NO2 (100 ppb O3)	609.7	141.1	750.7	609.7	141.0	0.9995	----	1.0007	99.9%
2nd NO ref point	----	0.0	750.3	749.2	1.1	1.0000	1.0015	----	----
Average Correction Factor						0.9991	1.0004	0.9989	100.1%

Notes: Span adjusted. As left span set point was different from first GPT point. As left NO correction factor is low because of this.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

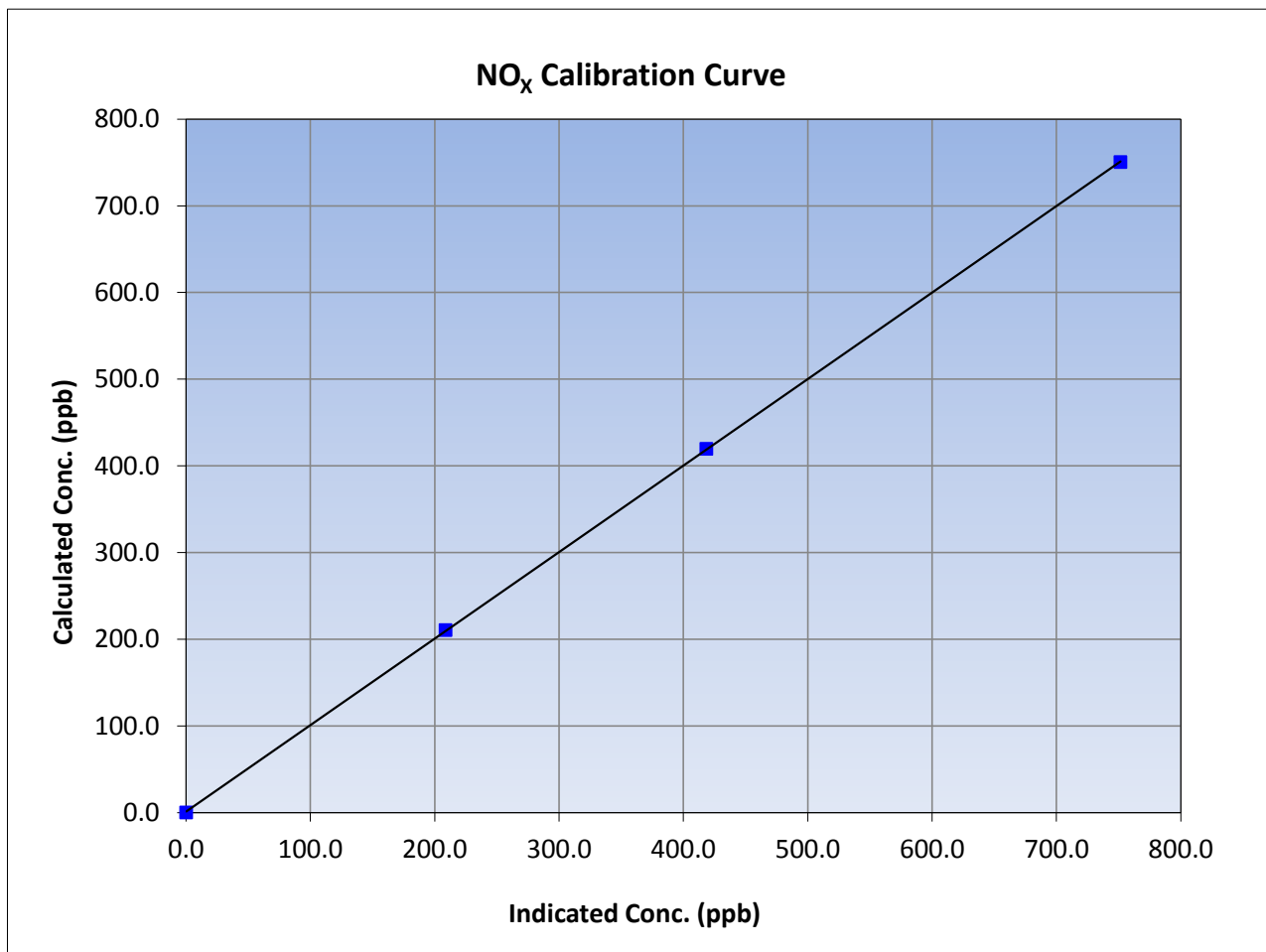
Version-03-2017

Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

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	
750.3	751.5	0.9984			
419.5	418.3	1.0028			
210.7	208.6	1.0098			
			Slope	0.997894	0.90 - 1.10
			Intercept	1.207635	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

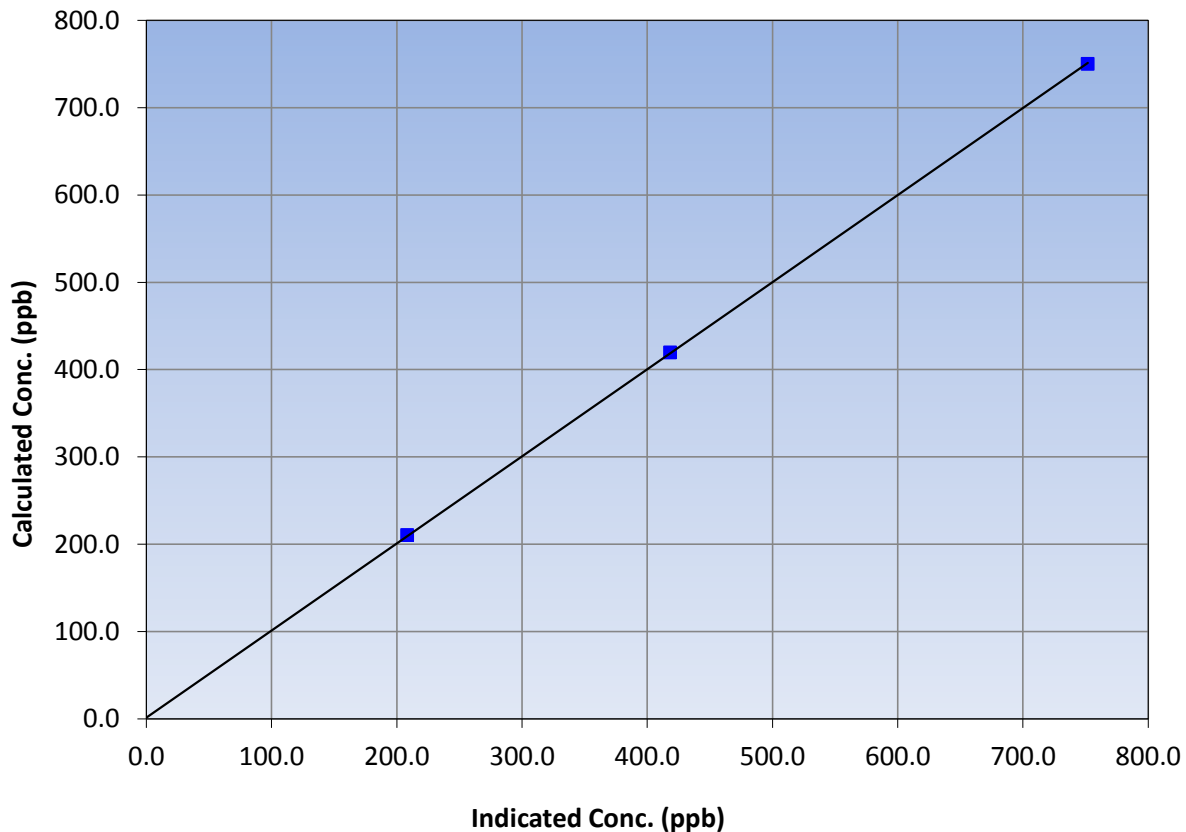
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	751.7	0.9981			
419.5	418.2	1.0031			
210.7	208.2	1.0118			
			Slope	0.997254	0.90 - 1.10
			Intercept	1.552978	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

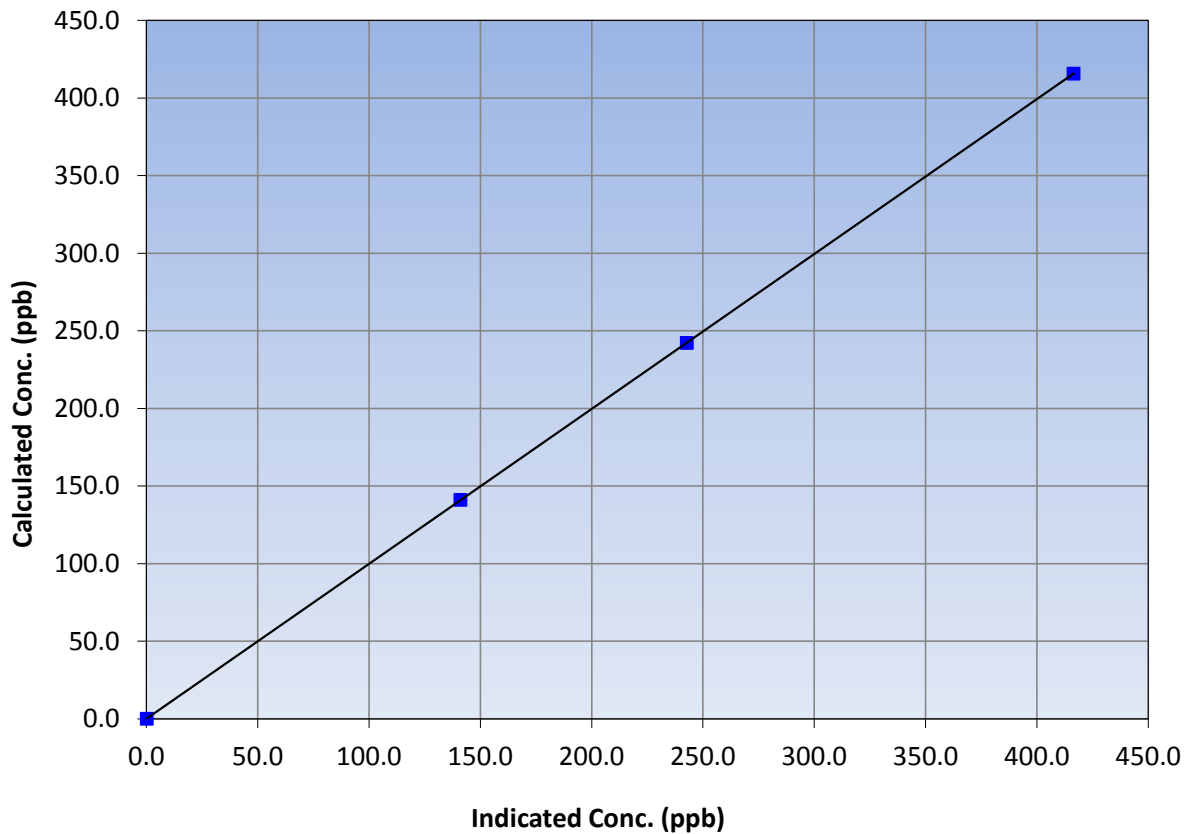
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
Analyzer make	Thermo 42i	Analyzer serial #	1218153357

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	
415.7	416.5	0.9981			
242.2	242.7	0.9979			
141.1	141.0	1.0007			
			Slope	0.998042	0.90 - 1.10
			Intercept	0.066658	+/-20

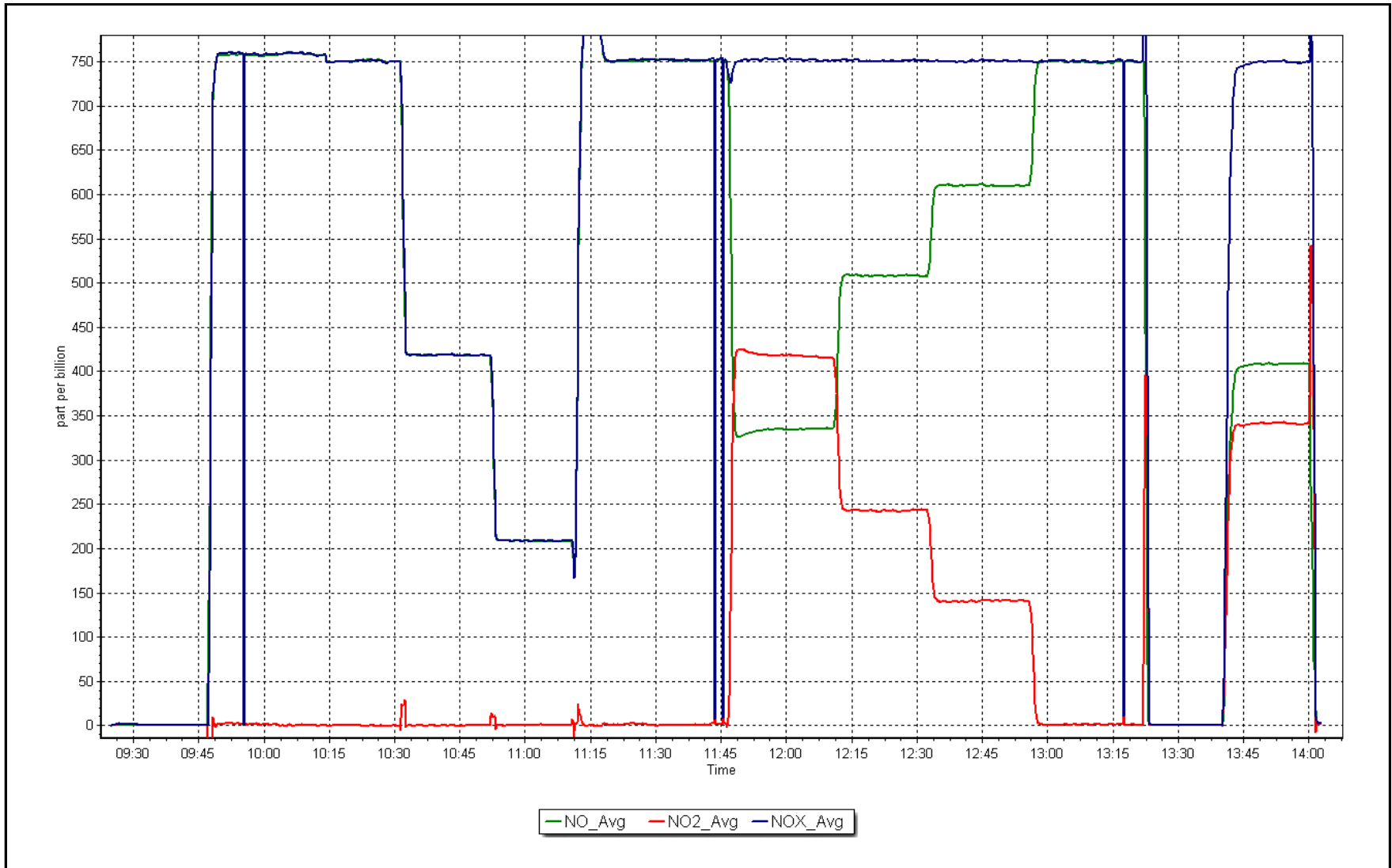
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 17, 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:	July 17, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	9:25	End time (MST):	14:05
NH3 Cal Date:	July 18, 2017	Last Cal Date:	June 22, 2017
Start time (MST):	8:30	End time (MST):	12:40
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	API T700		Serial Number	2464
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	1.101	1.096	NH3 Range (ppb)	<u>Start</u> 0 - 1000 ppb
NOX coefficient	1.250	1.235	NOX Range (ppb)	<u>Finish</u> 0 - 1000 ppb
NO2 coefficient	1.000	1.000	PMT Temperature	7.0 7.0
NH3 coefficient	0.899	0.937	Reaction cell Press	7.3 7.4
TN coefficient	1.255	1.253	Sample Flow	524 526
NO bkgrnd	-0.2	-0.2	PMT Voltage	645.0 645.0
NOX bkgrnd	-0.2	-0.2	Moly Temperature	315.3 315.8
TN bkgrnd	-0.1	-0.1	NH3 Conv Temp	825 825

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.997832	0.996887
NO _x Cal Offset	-0.317787	0.158825
NO Cal Slope	1.000058	0.998909
NO Cal Offset	0.711914	0.433231
NO ₂ Cal Slope	1.000423	1.002863
NO ₂ Cal Offset	-1.986968	-3.008252
NH3 Cal Slope	0.997108	0.995159
NH3 Cal Offset	-6.745471	2.940434
TN Cal Slope	0.982499	0.979743
TN Cal Offset	-8.385702	1.094635



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	2.1	1.9	0.2	----	----
as found NO	5415	83.0	750.3	750.3	----	748.9	747.4	1.5	1.002	----
calibrator zero	5997	0.0	0.0	0.0	0.0	2.6	0.9	1.6	----	----
high NO point	5415	83.0	750.3	750.3	----	753.7	752.7	1.0	0.995	----
NO/O3 point	5415	83.0	750.3	750.3	----	766.1	759.1	7.0	0.979	----
as found NH3	4916	94.3	1797.4	NA	1797.4	1874.7	----	1845.3	0.959	0.974
first NH3	4916	94.3	1797.4	NA	1797.4	1829.9	----	1800.0	0.982	0.999
second NH3	4948	52.4	1000.8	NA	1000.8	1032.8	----	1015.0	0.969	0.986
third NH3	4932	26.3	506.6	NA	506.6	503.3	----	492.4	1.006	1.029
Average Correction Factor									0.9874	1.0044

Corrected As found TN = 746.8 ppb NO_x = 745.5 ppb NH3 = 1845.1 ppb

Previous Response TN = 772 ppb NO_x = 752.2 ppb NH3 = 1809.4 ppb

NH3 Previous Converter Efficiency = 89.9 %

NH3 Current Converter Efficiency = 93.7 %

*Percent Change TN = 3.4%

*Percent Change NO_x = 0.9%

*Percent Change NH3 = -1.9%

* = > +/-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	0.9	0.6	2.6	----	----
as found span	5415	83.0	750.3	750.3	750.3	758.2	753.8	748.9	0.9896	0.9953
calibrator zero	5997	0.0	0.0	0.0	0.0	0.9	0.6	2.6	----	----
high point	5415	83.0	750.3	750.3	750.3	752.7	751.0	753.7	0.9968	0.9991
second point	5451	46.4	419.5	419.5	419.5	421.1	419.7	427.3	0.9962	0.9995
third point	5474	23.3	210.7	210.7	210.7	209.4	208.9	214.2	1.0060	1.0084
Average Correction Factor									0.9996	1.0023

Corrected As found TN = 746.3 ppb NO_x = 757.3 ppb NO = 753.2 ppb
 Previous Response TN = 772 ppb NO_x = 752.2 ppb NO = 749.5 ppb

*Percent Change TN = 3.4%
 *Percent Change NO_x = -0.7%
 *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	759.1	752.8	6.3	0.9884	0.9967	----	----
1st NO ₂ (400 ppb O ₃)	333.3	419.5	753.9	333.3	420.6	0.9952	----	0.9974	100.3%
2nd NO ₂ (200 ppb O ₃)	506.9	245.9	756.4	506.9	249.5	0.9919	----	0.9856	101.5%
3rd NO ₂ (100 ppb O ₃)	612.9	139.9	755.3	612.9	142.3	0.9934	----	0.9831	101.7%
2nd NO ref point	----	0.0	756.2	752.9	3.3	0.9922	0.9965	----	----
Average Correction Factor						0.9932	0.9966	0.9887	101.1%

Notes:

NO_x/NO span adjusted. NH₃ span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

TN Calibration Summary

Version-03-2017

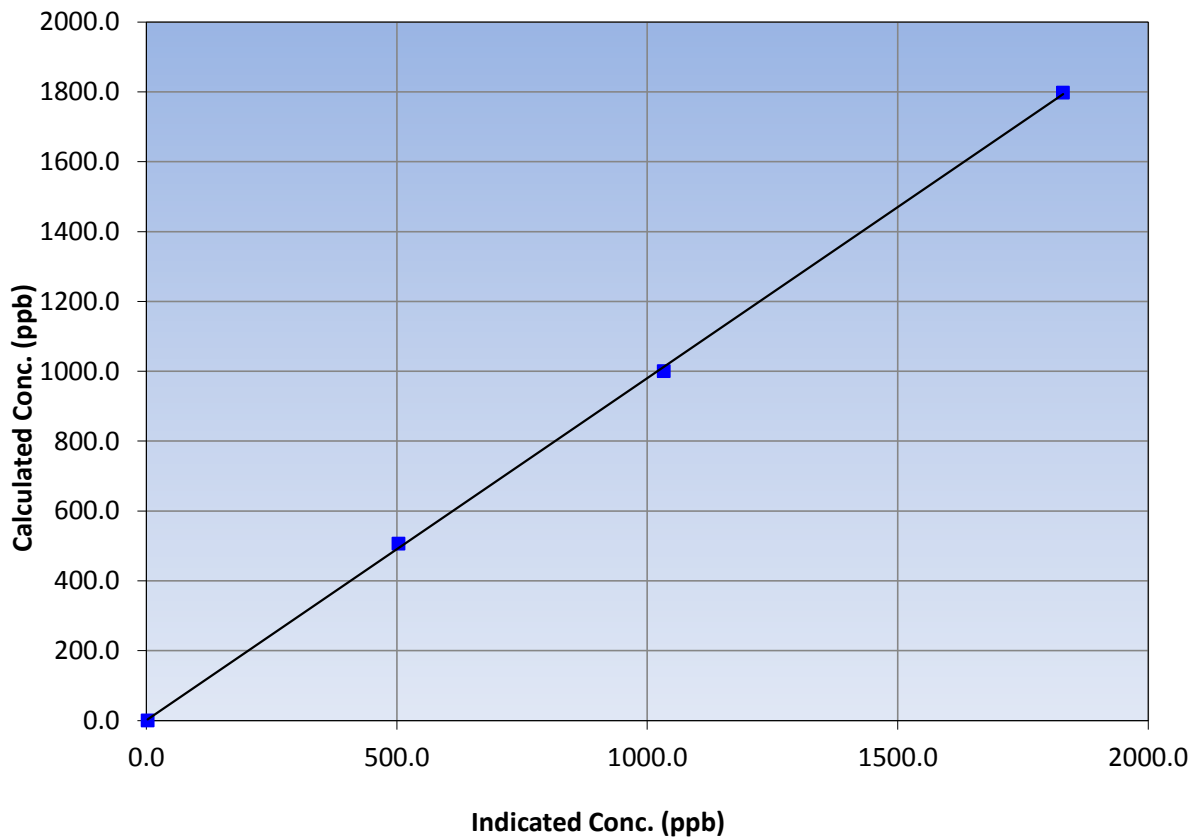
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	2.6	----	Correlation Coefficient	≥0.995	
1797.4	1829.9	0.9823			
1000.8	1032.8	0.9690			
506.6	503.3	1.0065			
			Slope	0.979743	0.90 - 1.10
			Intercept	1.094635	+/-20

TN Calibration Curve





Wood Buffalo Environmental Association

NH₃ Calibration Summary

Version-03-2017

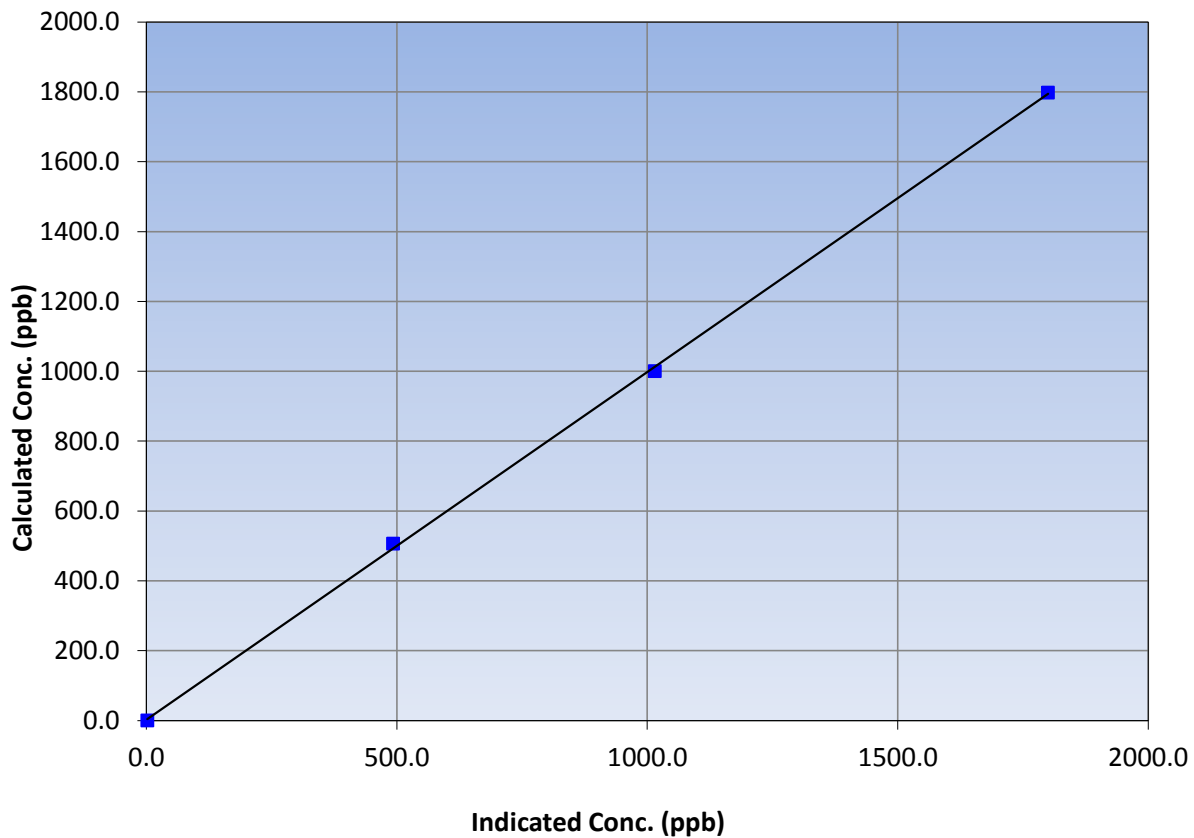
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	1.6	----	Correlation Coefficient	≥0.995	
1797.4	1800.0	0.9986			
1000.8	1015.0	0.9860			
506.6	492.4	1.0287			
			Slope	0.995159	0.90 - 1.10
			Intercept	2.940434	+/-20

NH₃ Calibration Curve





Wood Buffalo Environmental Association

NO_x Calibration Summary

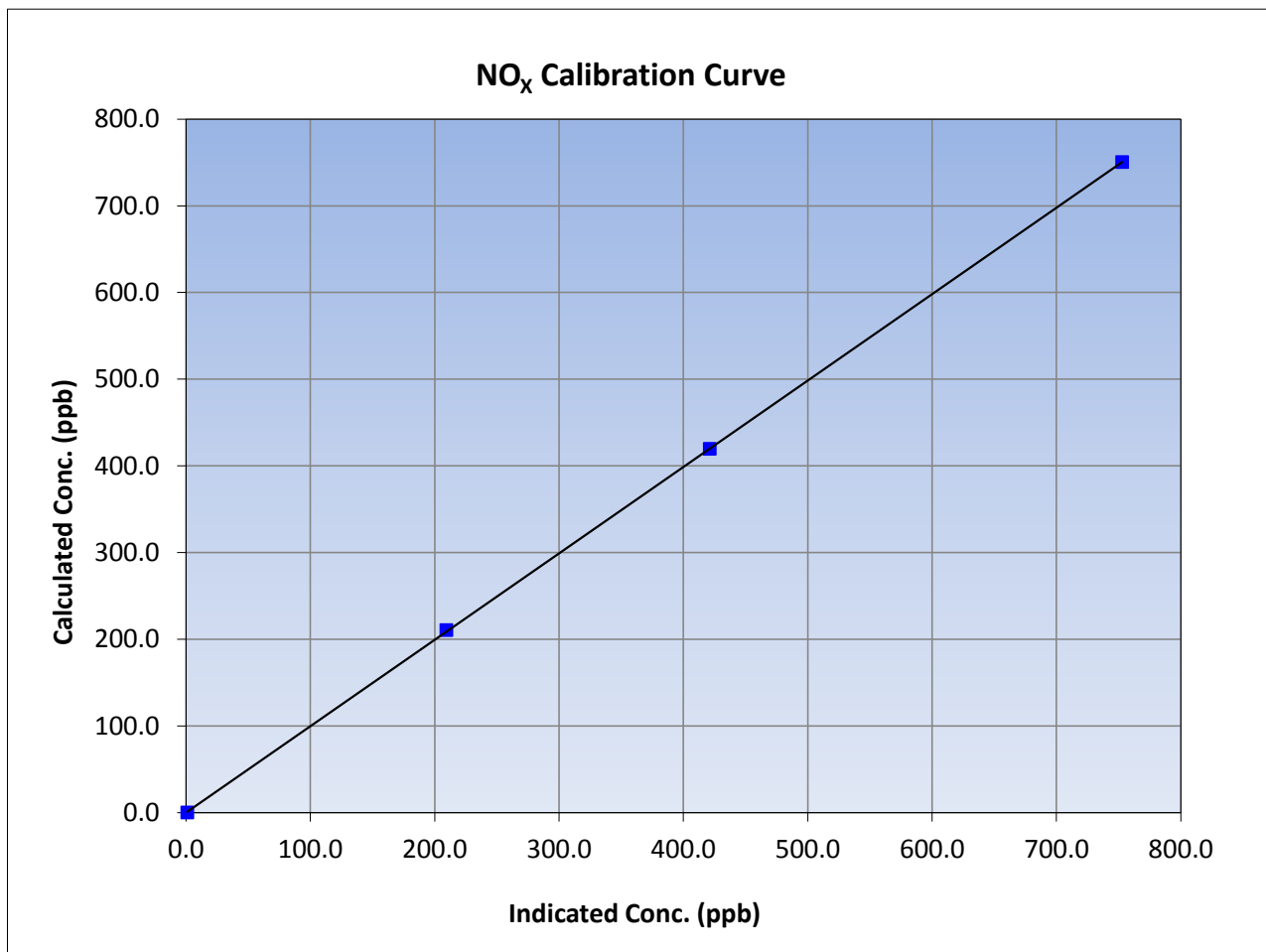
Version-03-2017

Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	0.9	----	Correlation Coefficient	≥0.995	
750.3	752.7	0.9968			
419.5	421.1	0.9962			
210.7	209.4	1.0060			
			Slope	0.996887	0.90 - 1.10
			Intercept	0.158825	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

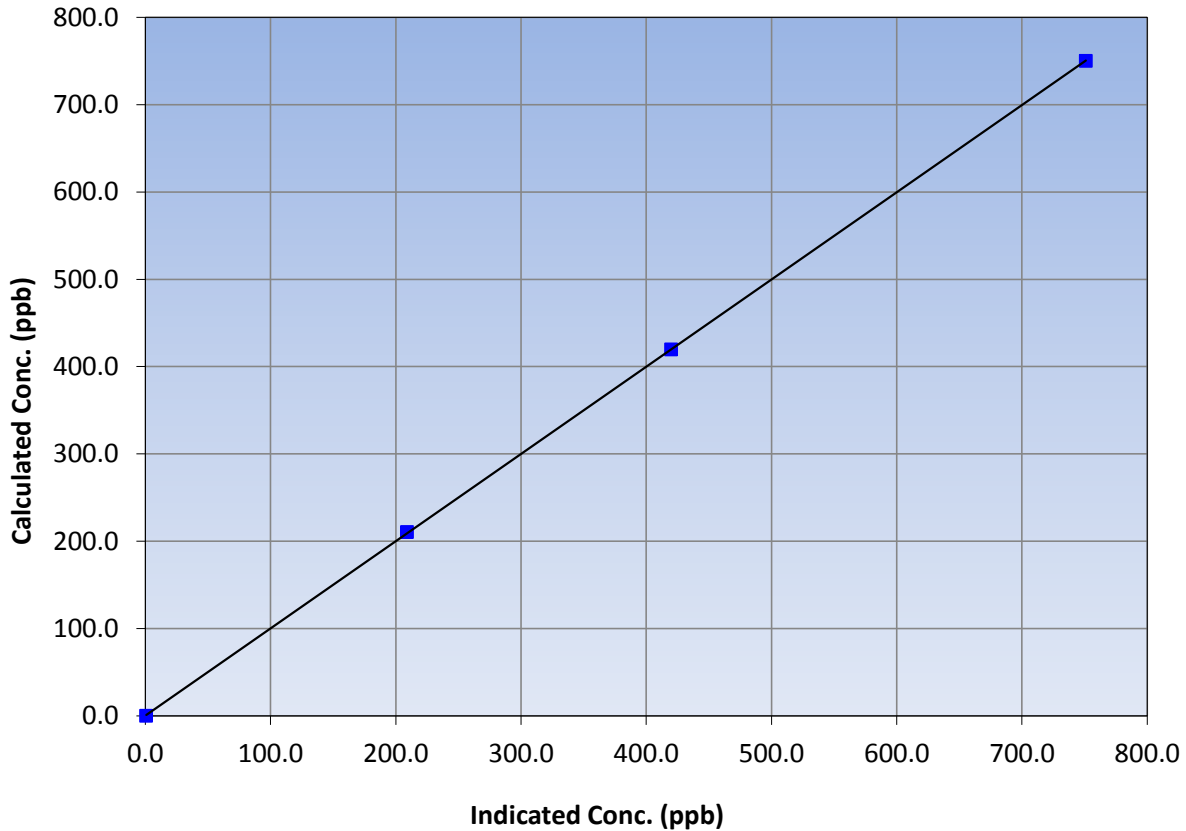
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	0.6	----	Correlation Coefficient	≥0.995	
750.3	751.0	0.9991			
419.5	419.7	0.9995			
210.7	208.9	1.0084			
			Slope	0.998909	0.90 - 1.10
			Intercept	0.433231	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

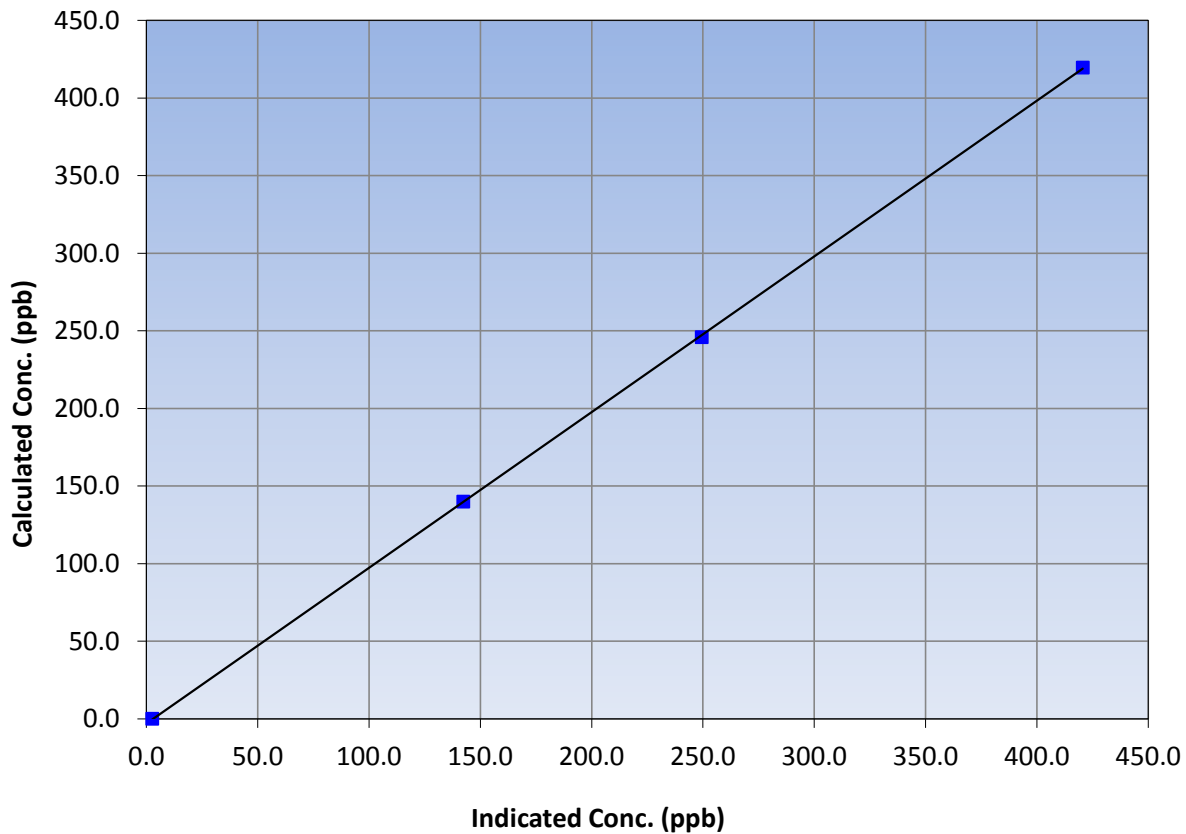
Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 20, 2017
Station Name	Fort McKay - Bertha Ganter	Station Number	AMS 01
Start Time (MST)	9:25	End Time (MST)	14:05
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	2.6	----	Correlation Coefficient	≥0.995	
419.5	420.6	0.9974			
245.9	249.5	0.9856			
139.9	142.3	0.9831			
			Slope	1.002863	0.90 - 1.10
			Intercept	-3.008252	+/-20

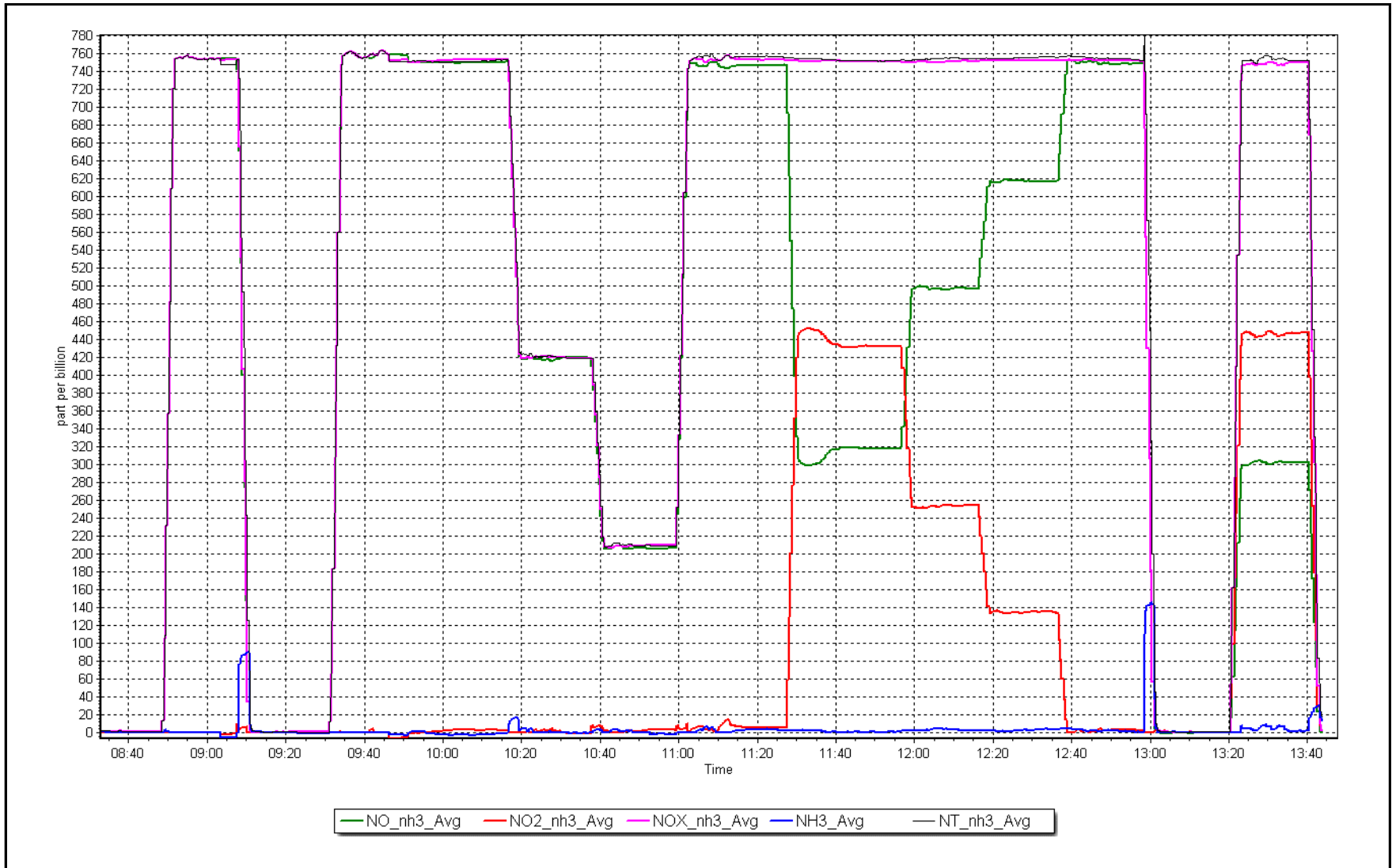
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 17, 2017

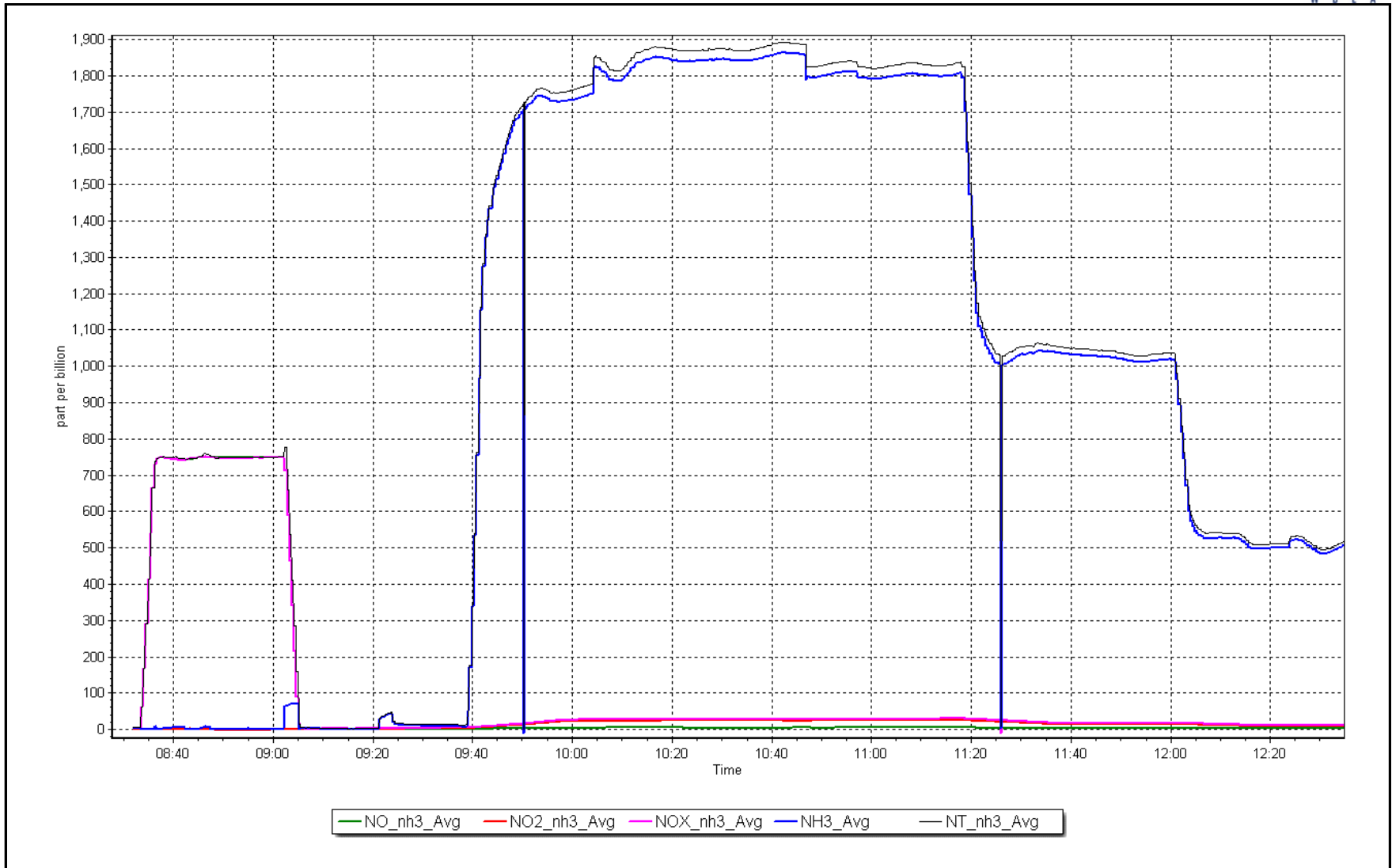
Location: Fort McKay - Bertha Ganter



NH₃ Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 23, 2017
Start time (MST):	12:30	End time (MST):	13:45
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:	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)	16	16.4	16	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	980	981.91	980	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	993.6	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	1.2	-----	0	<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 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 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, or flow. Nephelometer adjusted.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 JULY 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	705	35	39	99.46	44	0	9	0
H2S (ppb) Average	705	35	39	99.46	6	0	2	0
THC (ppm) Average	704	35	40	99.33	6.9	-	3.1	-
Temperature (C) Average	744	0	0	100	32.1	-	24.7	-
Relative Humidity (%) Average	744	0	0	100	99	-	79	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	28	-	17	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS 2)
 JULY 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	705	2.5	6	-	0	0	0	0	2	8	44
H2S (ppb) Average	705	0.5	1	-	0	0	0	0	0	1	6
THC (ppm) Average	704	2.37	0.4	-	2	2.1	2.2	2.3	2.5	2.8	6.9
Temperature 2 m (C) Average	744	19.89	4.9	-	7.7	13.8	16.2	19.5	23.3	26.6	32.1
Relative Humidity (%) Average	744	61.5	18	-	26	37	47	60	75	88	99
Wind Speed 10 m (km/h) Average	743	9	5	-	0	3	5	8	12	15	28
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S	22 Jul 2017 00:00	22 Jul 2017 01:00	2	Station power failure
THC	22 Jul 2017 00:00	22 Jul 2017 02:00	3	Station power failure
SO2	31 Jul 2017 12:00	31 Jul 2017 13:00	2	Maintenance - WBEA internal audit
H2S	31 Jul 2017 13:00	31 Jul 2017 14:00	2	Maintenance - WBEA internal audit
THC	31 Jul 2017 14:00	31 Jul 2017 15:00	2	Maintenance - WBEA internal audit
Wind Speed, Wind Direction	06 Jul 2017 21:00	06 Jul 2017 21:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

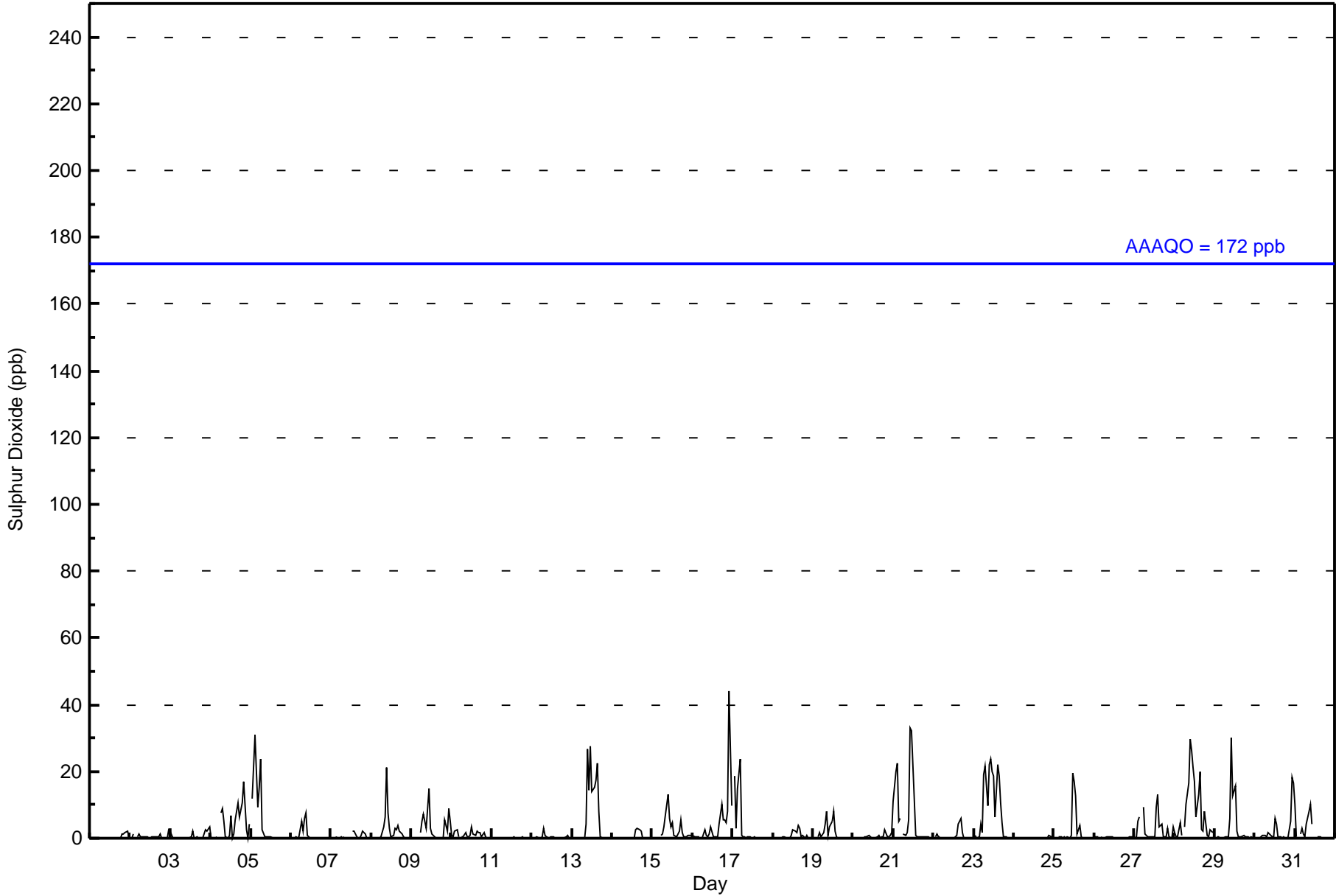
Mildred Lake - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 44 ppb on Jul 16 23:00 Maximum Daily Average: 8.9 ppb on Jul 23																	Hours in Service: 744 Hours of Data: 705									
Minimum Value: 0 ppb on Jul 1 01:00 Minimum Daily Average: 0.1 ppb on Jul 24 Maximum Diurnal Average: 5.7 ppb at hour 11 Minimum Diurnal Average: 0.9 ppb at hour 20 Monthly Average: 2.5 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 2 P ₉₀ = 8 P ₉₉ = 27																	Hours of Missing Data: 39 Hours of Calibration: 35 Percent Operational Time: 99.5									
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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	0	0.3	2
2-Jul	0	0	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0.5	3
3-Jul	2	0	0	0	Z	0	0	0	0	0	0	0	2	0	0	1	0	0	0	1	2	2	3	0.6	3	
4-Jul	0	0	0	0	0	Z	8	9	5	1	0	1	7	0	1	5	11	6	8	10	17	2	0	4	4.2	17
5-Jul	Z	12	31	20	9	15	24	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5.1	31	
6-Jul	0	Z	0	0	0	1	5	2	6	8	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	8	
7-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	2	2	1	0	0	1	2	1	0	0	0.6	2	
8-Jul	0	0	0	Z	0	0	1	3	6	21	8	3	0	1	3	3	4	2	1	0	0	0	0	2.5	21	
9-Jul	0	0	0	0	Z	2	5	7	5	3	15	3	1	1	0	0	0	0	0	0	6	2	9	5	2.8	15
10-Jul	1	0	2	3	1	Z	0	1	2	0	0	1	4	1	1	2	2	2	1	2	0	0	0	1.1	4	
11-Jul	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-Jul	0	Z	0	0	0	0	0	3	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0.4	3	
13-Jul	0	0	Z	0	0	0	0	0	4	27	15	28	14	15	17	22	8	0	0	0	0	0	0	6.6	28	
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	2	3	3	2	0	0	0	0	0	0.4	3	
15-Jul	0	0	0	0	Z	1	1	3	7	13	6	3	5	1	1	2	5	2	0	1	1	1	1	2.4	13	
16-Jul	1	0	0	0	0	Z	0	2	1	0	1	3	0	0	0	4	10	5	5	5	8	44	10	4.5	44	
17-Jul	Z	19	3	15	24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	24	
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	1	3	2	2	4	3	0	1	0	1	0	0	0.8	4	
19-Jul	0	0	Z	0	1	0	2	4	8	1	3	5	8	2	0	0	0	0	0	0	0	0	0	1.6	8	
20-Jul	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2	0	1	1	0.4	2	
21-Jul	11	20	22	5	6	Z	1	1	2	6	33	32	11	1	1	1	1	0	0	0	0	0	0	7.0	33	
22-Jul	PF	1	1	0	0	Z	0	0	0	0	0	0	1	1	4	6	2	0	0	0	0	0	0	0.7	6	
23-Jul	Z	1	0	1	4	2	19	22	10	22	24	20	19	6	22	18	11	4	1	0	0	0	0	8.9	24	
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1	
25-Jul	0	0	Z	0	0	0	0	0	0	0	1	20	17	13	1	4	0	0	0	0	0	0	0	2.5	20	
26-Jul	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
27-Jul	0	0	5	7	Z	9	1	1	1	1	0	1	0	9	13	3	4	0	0	0	3	0	4	2.8	13	
28-Jul	2	0	1	5	1	Z	3	10	17	29	26	21	17	6	13	20	2	2	8	1	0	2	2	8.3	29	
29-Jul	Z	1	0	0	0	0	0	0	0	6	30	13	16	2	0	0	0	1	0	0	0	0	0	3.2	30	
30-Jul	0	Z	0	0	1	1	1	1	2	1	0	0	6	4	0	0	0	0	0	0	0	5	18	2.5	18	
31-Jul	10	1	Z	1	3	1	0	4	8	10	4	M	M	0	0	0	0	0	0	0	0	0	0	2.1	10	
1.1 2.1 2.7 2.2 1.9 1.4 2.4 2.5 2.8 5.1 5.7 5.4 4.5 2.3 2.7 3.1 2.0 1.3 1.0 0.9 1.2 0.9 2.6 1.7																								Diurnal Average		
11 20 31 20 24 15 24 22 17 29 33 32 19 15 22 22 11 10 8 10 17 8 44 16																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance 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
Mildred Lake - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	653	92.62	92.62
11 - 20	33	4.68	97.31
21 - 60	19	2.70	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mildred Lake - July 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	52	28	8	12	16	18	33	72	65	52	84	33	54	23	51	652
11 - 20	0	0	0	0	0	0	0	6	0	2	2	0	16	6	1	0	33
21 - 60	0	0	0	0	1	1	1	1	1	1	0	1	5	6	1	0	19
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	52	28	8	13	17	19	40	73	68	54	85	54	66	25	51	704

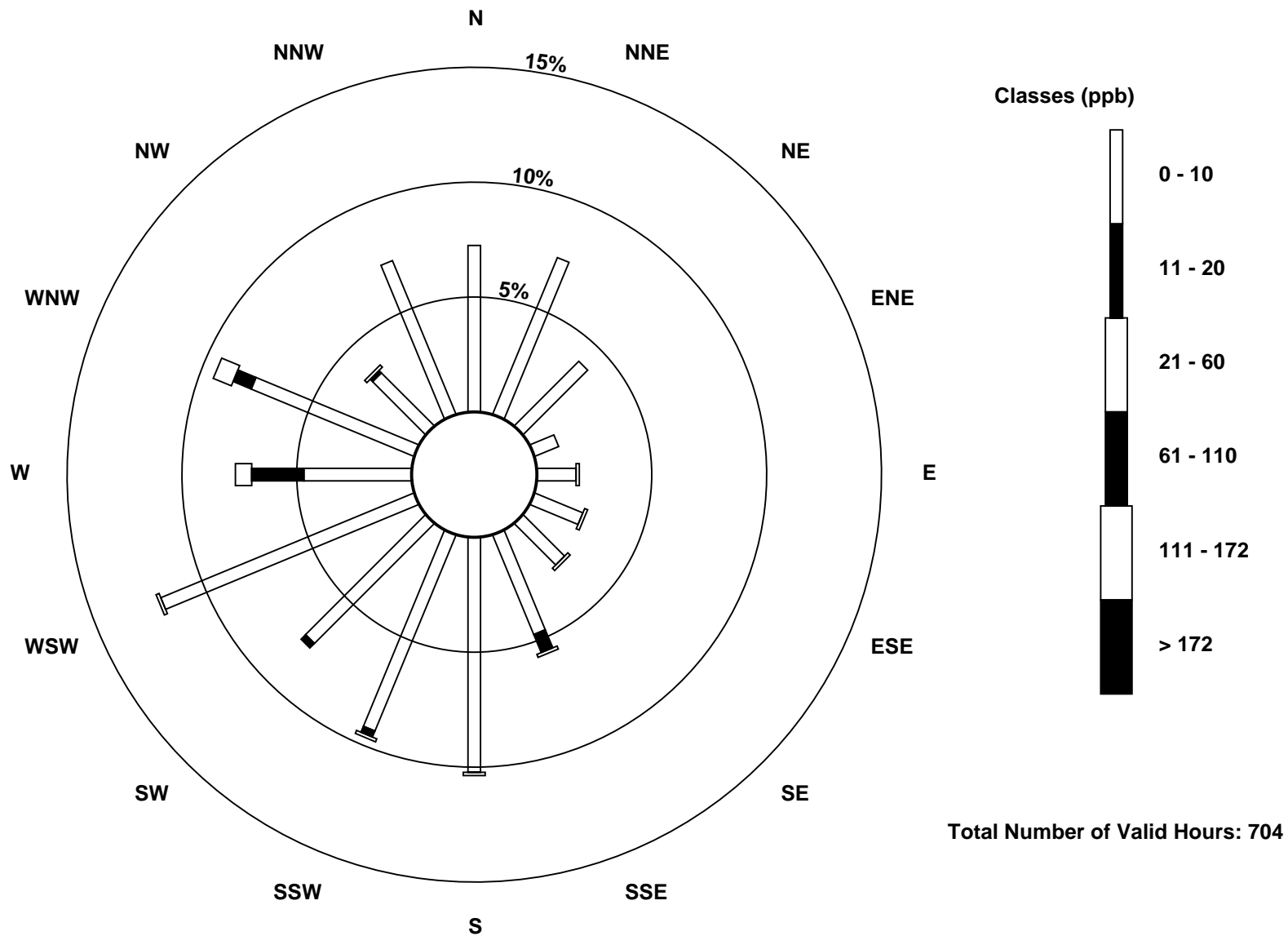
Total Number of Valid Hours: 704

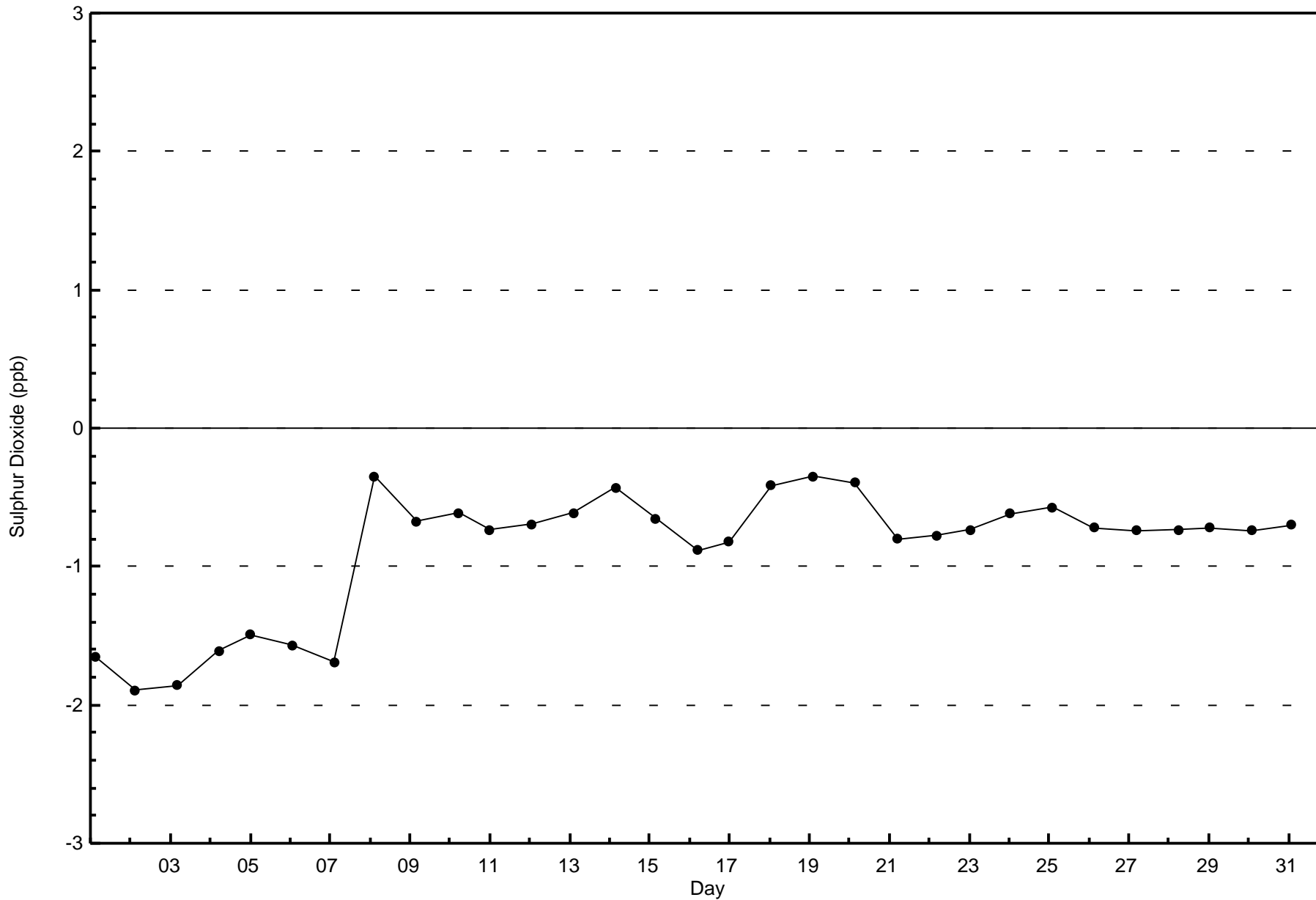
Total Number of Hours: 744

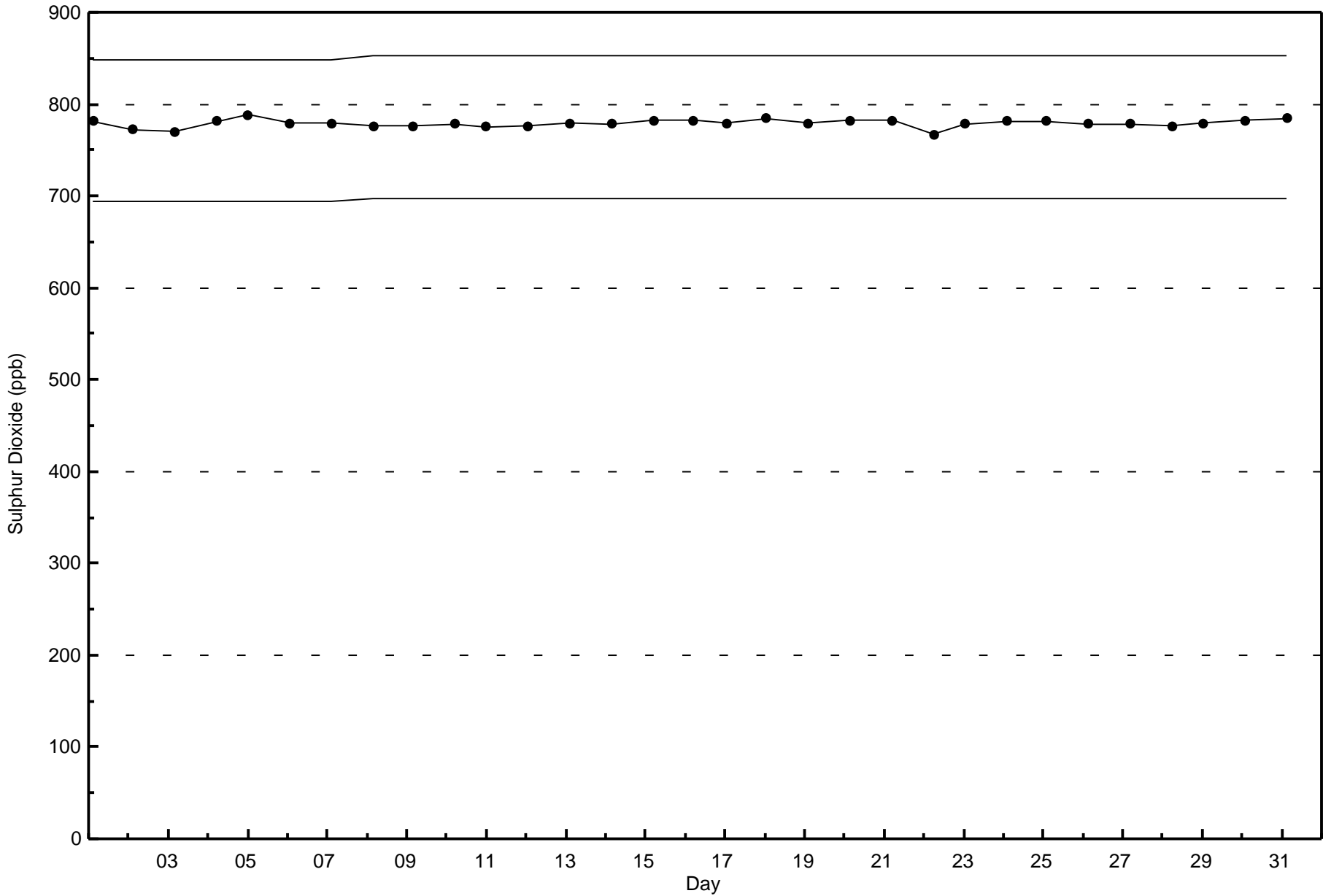


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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

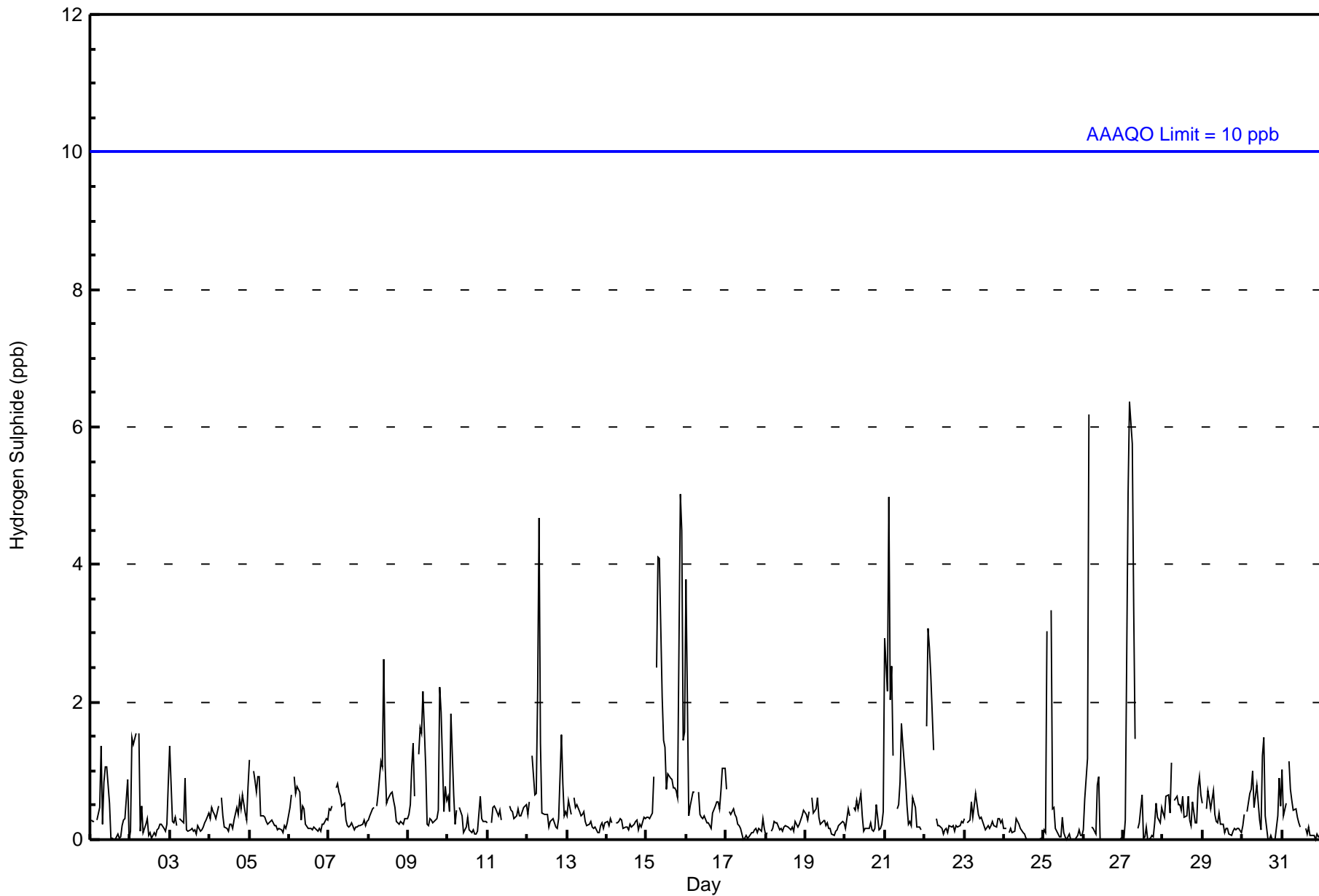








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 ppb on Jul 27 05:00 Maximum Daily Average: 1.6 ppb on Jul 15																	Hours in Service: 744 Hours of Data: 705									
Minimum Value: 0 ppb on Jul 1 15:00 Minimum Daily Average: 0.1 ppb on Jul 24 Maximum Diurnal Average: 1.1 ppb at hour 4 Minimum Diurnal Average: 0.2 ppb at hour 17 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 = 5																	Hours of Missing Data: 39 Hours of Calibration: 35 Percent Operational Time: 99.5									
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-Jul	0	0	0	Z	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
2-Jul	0	1	1	2	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2
3-Jul	1	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
4-Jul	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.4	1	
5-Jul	1	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	
6-Jul	0	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
7-Jul	0	0	0	Z	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
8-Jul	0	0	0	0	Z	0	1	1	1	3	1	1	1	1	1	1	0	0	0	0	0	0	0	0.6	3	
9-Jul	0	1	1	1	1	Z	1	2	2	2	1	0	0	0	0	0	0	0	0	2	2	0	1	0.9	2	
10-Jul	1	0	2	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	2	
11-Jul	0	Z	0	0	0	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	1	0.4	1	
12-Jul	0	1	Z	1	1	1	2	5	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0.8	5	
13-Jul	0	1	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
14-Jul	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	
15-Jul	0	0	0	0	1	Z	3	4	4	2	1	1	1	1	1	1	1	1	1	1	5	4	1	1.6	5	
16-Jul	4	0	0	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.6	4		
17-Jul	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	
18-Jul	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	
19-Jul	0	0	0	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
20-Jul	0	0	0	0	Z	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
21-Jul	3	2	5	2	3	1	Z	0	1	1	2	1	1	0	0	0	0	1	0	0	0	0	0	1.1	5	
22-Jul	PF	2	3	3	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3	
23-Jul	0	Z	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
24-Jul	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	
25-Jul	0	0	3	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3	
26-Jul	0	1	1	6	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	6	
27-Jul	0	0	3	5	6	6	3	1	Z	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1.2	6	
28-Jul	0	0	1	1	0	1	Z	1	1	1	1	0	1	0	0	1	0	0	1	0	0	1	1	0.5	1	
29-Jul	1	Z	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
30-Jul	0	0	Z	0	1	1	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0.5	1	
31-Jul	1	0	1	Z	1	1	1	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0.3	1	
0.6 0.5 1.0 1.1 1.0 0.8 0.8 0.8 0.6 0.6 0.4 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.5 0.4 0.4 0.4																								Diurnal Average		
4 2 5 6 6 6 3 5 4 3 2 1 1 1 1 1 1 1 1 1 2 5 4 1 2																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure 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 - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	684	97.02	97.02
3 - 4	14	1.99	99.01
5 - 7	7	0.99	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



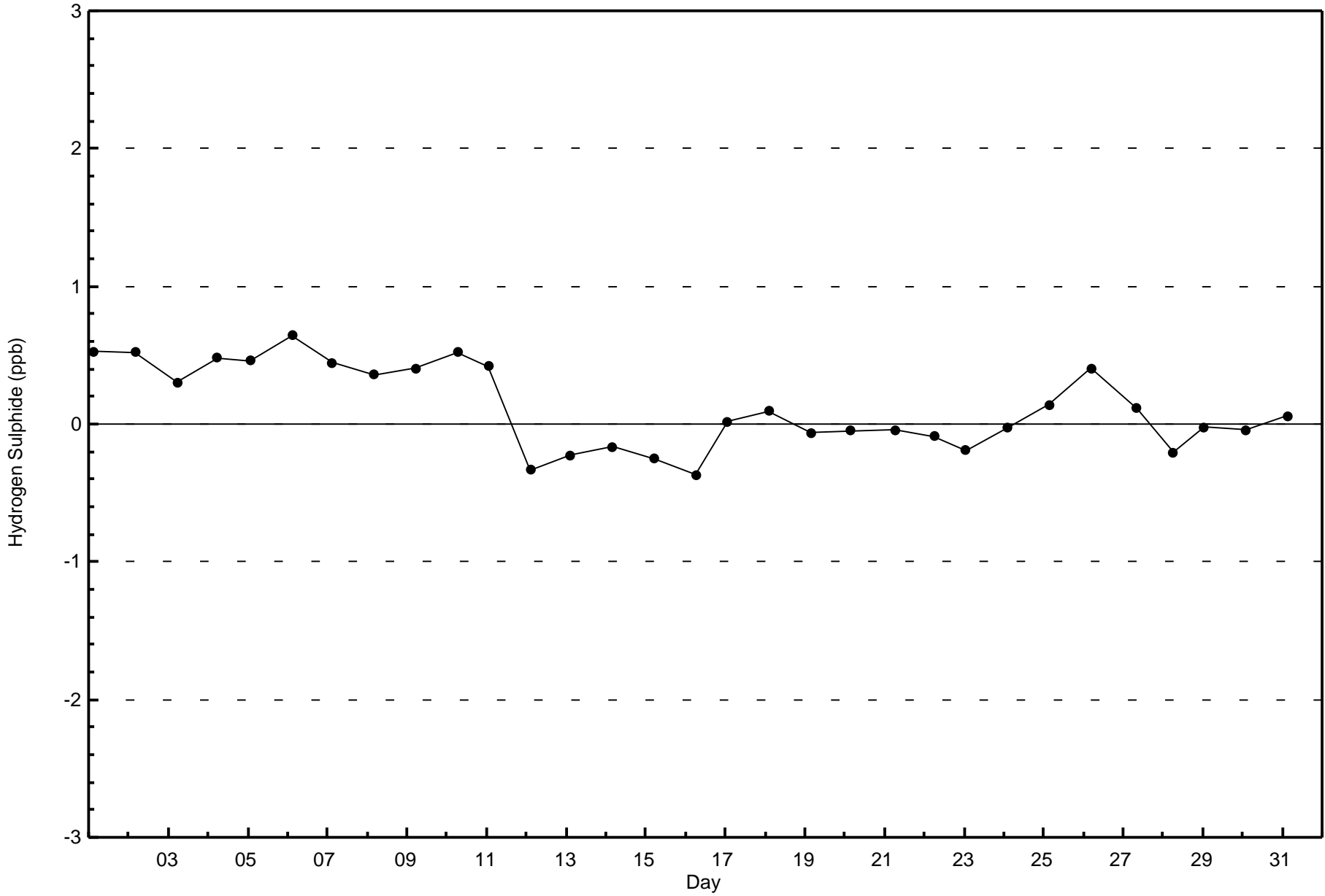
**Wood Buffalo Environmental Association
Frequency Distribution**

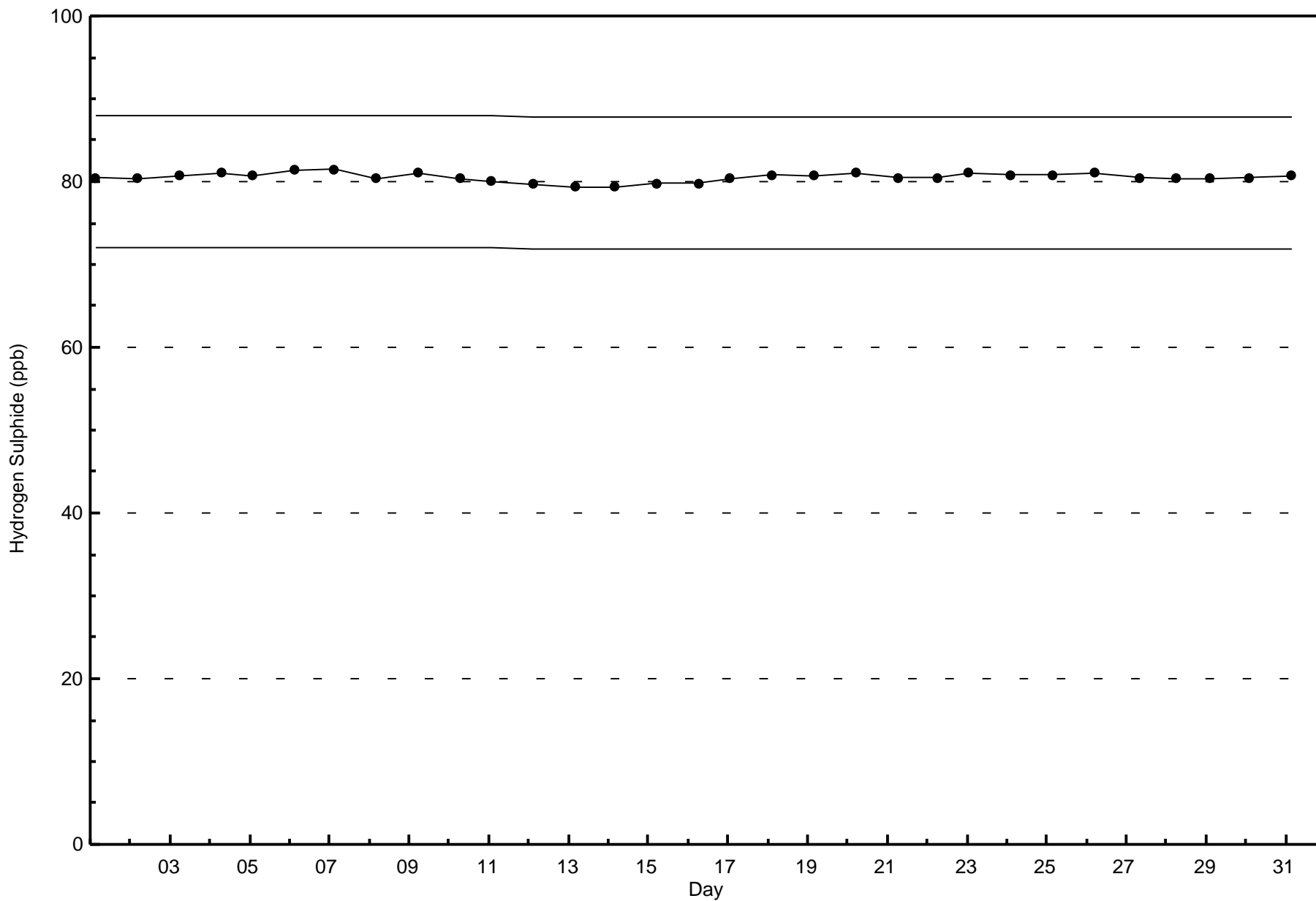
**Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	48	54	27	8	13	16	17	33	69	66	51	87	56	66	23	49	683
3 - 4	0	0	0	0	0	1	2	5	3	1	1	0	0	1	0	0	14
5 - 7	0	0	0	0	0	0	1	5	1	0	0	0	0	0	0	0	7
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	54	27	8	13	17	20	43	73	67	52	87	56	67	23	49	704

Total Number of Valid Hours: 704

Total Number of Hours: 744







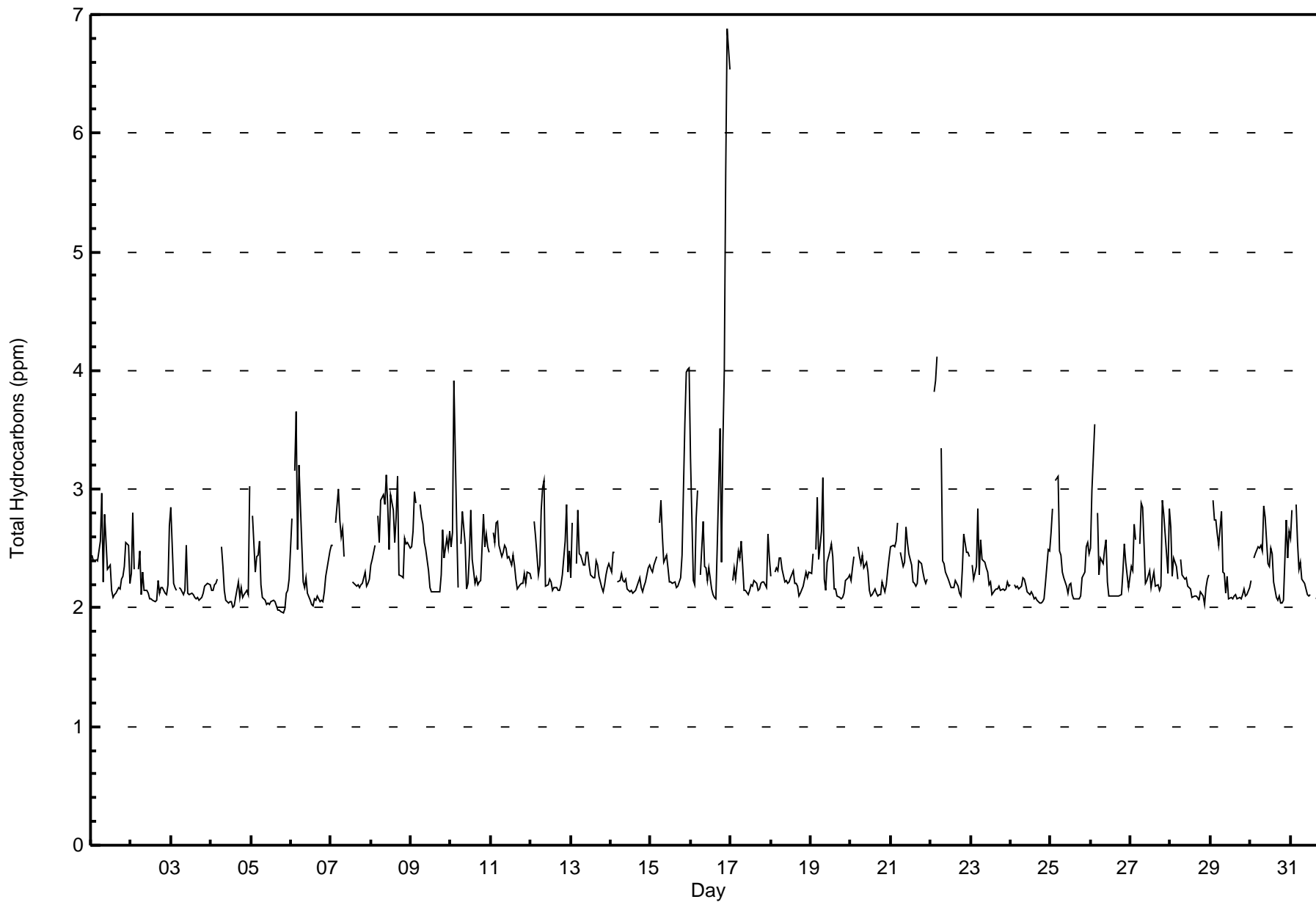
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mildred Lake - July 2017

Maximum Value: 6.9 ppm on Jul 16 23:00																	Maximum Daily Average: 3.1 ppm on Jul 16																	Hours in Service: 744	
Minimum Value: 2.0 ppm on Jul 5 20:00																	Minimum Daily Average: 2.2 ppm on Jul 5																	Hours of Data: 704	
Maximum Diurnal Average: 2.6 ppm at hour 3																	Minimum Diurnal Average: 2.2 ppm at hour 16																	Hours of Missing Data: 40	
Monthly Average: 2.37 ppm																	Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.5 P ₉₀ = 2.8 P ₉₉ = 4.0																	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-Jul	2.4	2.4	Z	2.4	2.4	2.6	3.0	2.2	2.8	2.6	2.3	2.4	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.2	2.4	3.0									
2-Jul	2.3	2.8	2.3	Z	2.3	2.5	2.1	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.7	2.2	2.8									
3-Jul	2.9	2.2	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.5	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	2.9									
4-Jul	2.1	2.2	2.2	2.2	2.2	Z	2.5	2.3	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.1	2.1	2.1	3.0	2.2	3.0										
5-Jul	Z	2.8	2.3	2.4	2.4	2.6	2.2	2.1	2.1	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	2.2	2.2	2.2	2.8									
6-Jul	2.7	Z	3.2	3.7	2.5	3.2	2.5	2.2	2.2	2.3	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.5	2.4	3.7									
7-Jul	2.5	2.5	Z	2.7	3.0	2.7	2.6	2.7	2.4	C	C	C	C	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.4	3.0									
8-Jul	2.4	2.4	2.5	Z	2.8	2.5	2.9	3.0	2.9	3.1	2.9	2.5	3.0	2.8	2.6	2.8	3.1	2.3	2.3	2.3	2.6	2.5	2.5	2.5	2.7	3.1									
9-Jul	2.5	2.6	3.0	2.9	Z	2.9	2.8	2.7	2.6	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.7	2.4	2.6	2.5	2.6	2.5	3.0									
10-Jul	2.5	2.6	3.9	2.7	2.2	Z	2.5	2.8	2.5	2.2	2.2	2.4	2.8	2.4	2.2	2.3	2.2	2.2	2.2	2.8	2.5	2.6	2.5	2.5	2.5	3.9									
11-Jul	Z	2.6	2.6	2.7	2.7	2.5	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.4	2.7									
12-Jul	2.2	Z	2.7	2.6	2.3	2.4	2.8	3.0	3.1	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.3	2.6	2.9	2.3	2.5	2.4	3.1									
13-Jul	2.2	2.7	Z	2.4	2.8	2.5	2.4	2.4	2.4	2.5	2.5	2.4	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.8									
14-Jul	2.3	2.5	2.5	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.2	2.3	2.4	2.2	2.5									
15-Jul	2.3	2.3	2.4	2.4	Z	2.7	2.9	2.6	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	3.6	4.0	4.0	4.0	4.0									
16-Jul	3.3	2.2	2.2	2.7	3.0	Z	2.3	2.7	2.4	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.5	3.5	2.4	3.4	4.0	5.7	6.9	6.5	3.1	6.9									
17-Jul	Z	2.2	2.3	2.2	2.5	2.4	2.6	2.4	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	2.6	2.4	2.3	2.6									
18-Jul	2.3	Z	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4								
19-Jul	2.3	2.5	Z	2.5	2.9	2.4	2.6	3.1	2.2	2.1	2.4	2.5	2.5	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	3.1									
20-Jul	2.2	2.3	2.4	Z	2.5	2.4	2.4	2.4	2.3	2.4	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.3	2.4	2.3	2.5									
21-Jul	2.5	2.5	2.5	2.6	2.7	Z	2.5	2.3	2.4	2.7	2.5	2.5	2.4	2.2	2.2	2.2	2.2	2.4	2.4	2.3	2.2	2.2	2.2	PF	2.4	2.7									
22-Jul	PF	PF	3.8	3.9	4.1	Z	3.3	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.3	2.6	2.5	2.5	2.4	2.6	4.1									
23-Jul	Z	2.4	2.2	2.3	2.8	2.3	2.6	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.8									
24-Jul	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.5	2.5	2.2	2.5									
25-Jul	2.6	2.8	Z	3.1	3.1	2.5	2.4	2.3	2.3	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.5	2.5	2.5	2.4	3.1									
26-Jul	2.5	3.0	3.5	Z	2.8	2.3	2.4	2.4	2.5	2.6	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.5	2.4	2.3	2.2	2.4	3.5									
27-Jul	2.3	2.3	2.7	2.6	Z	2.5	2.9	2.8	2.5	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.2	2.9	2.8	2.6	2.3	2.8	2.5	2.9									
28-Jul	2.7	2.3	2.4	2.4	2.2	Z	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.2	2.3	2.2	2.7									
29-Jul	Z	2.9	2.7	2.7	2.6	2.5	2.8	2.3	2.3	2.1	2.3	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	2.9									
30-Jul	2.2	Z	2.4	2.5	2.5	2.5	2.5	2.5	2.9	2.8	2.4	2.4	2.5	2.5	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.7	2.4	2.6	2.9									
31-Jul	2.6	2.8	Z	2.9	2.5	2.3	2.4	2.2	2.2	2.2	2.1	2.1	2.1	M	M	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.4	2.3	2.9									
																								Diurnal Average											
																								Diurnal Maximum											
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	22	3.13	3.13
2.1 - 3.0	656	93.18	96.31
3.1 - 10.0	26	3.69	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



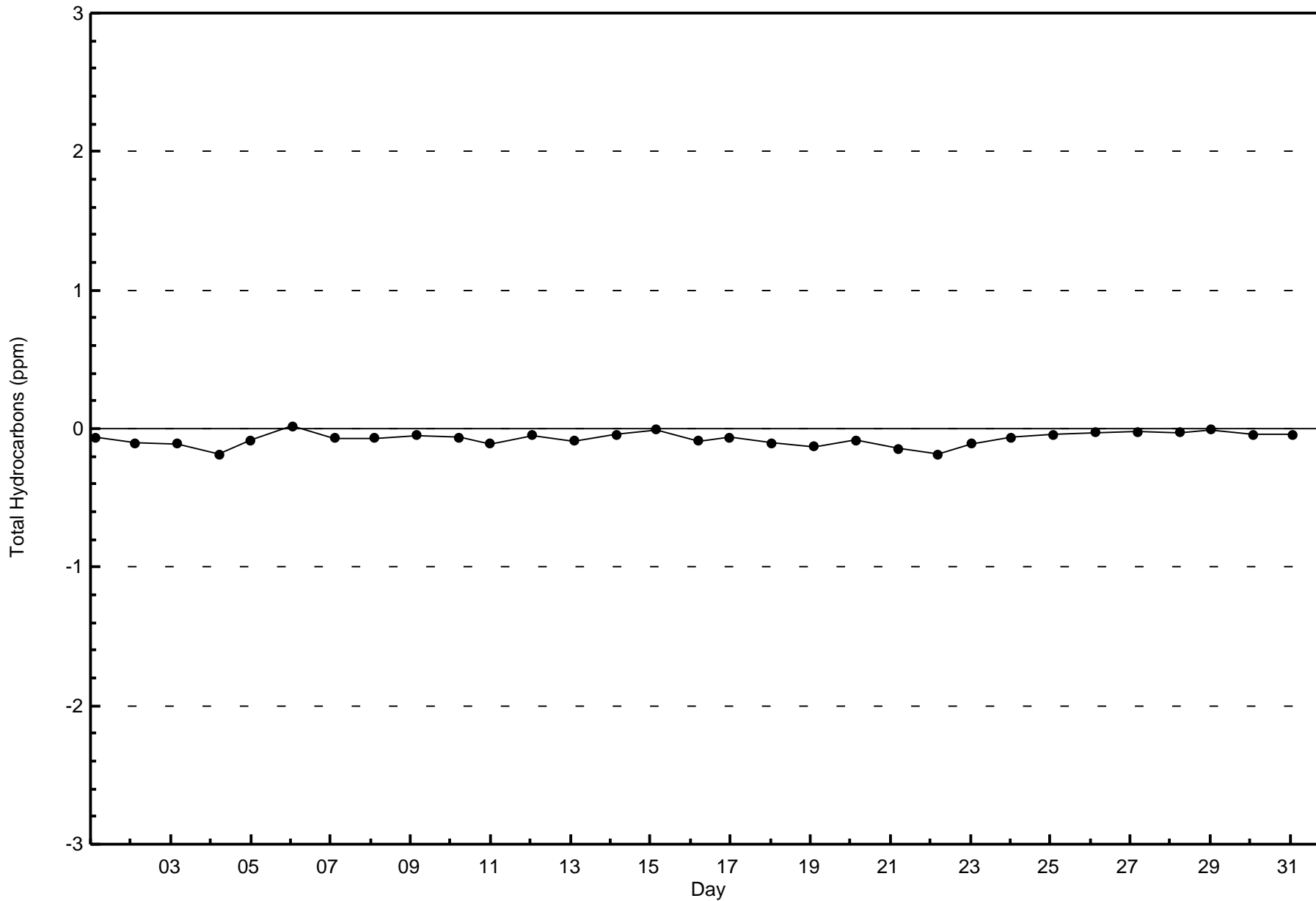
**Wood Buffalo Environmental Association
Frequency Distribution**

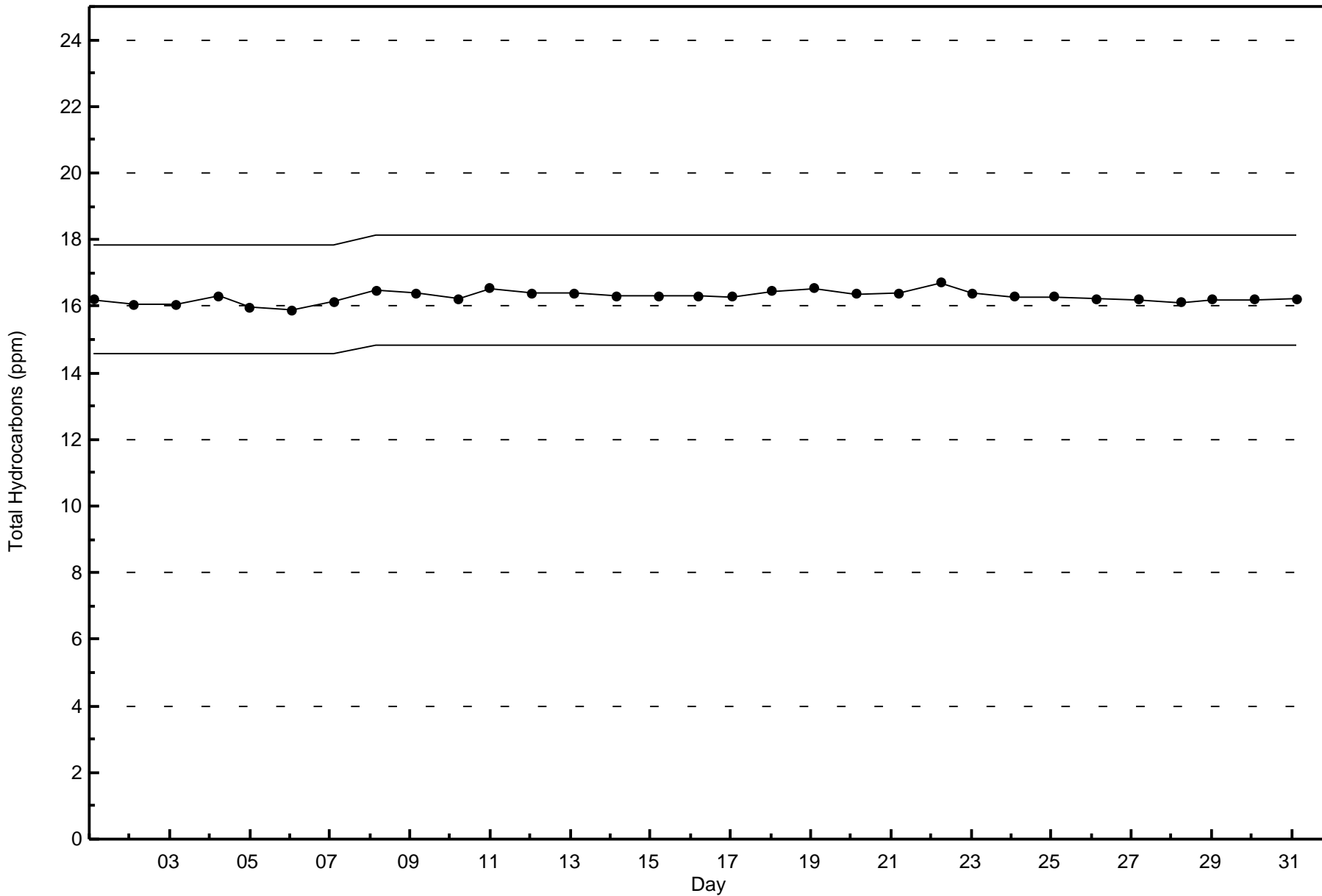
**Total Hydrocarbons (THC) - ppm
Mildred Lake - July 2017**

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	5	0	0	0	0	1	0	0	0	0	0	6	0	2	2	6	22
2.1 - 3.0	45	52	28	8	13	15	19	37	64	67	53	78	46	64	22	44	655
3.1 - 10.0	0	0	0	0	0	1	0	3	8	1	1	1	8	1	2	0	26
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	52	28	8	13	17	19	40	72	68	54	85	54	67	26	50	703

Total Number of Valid Hours: 703

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

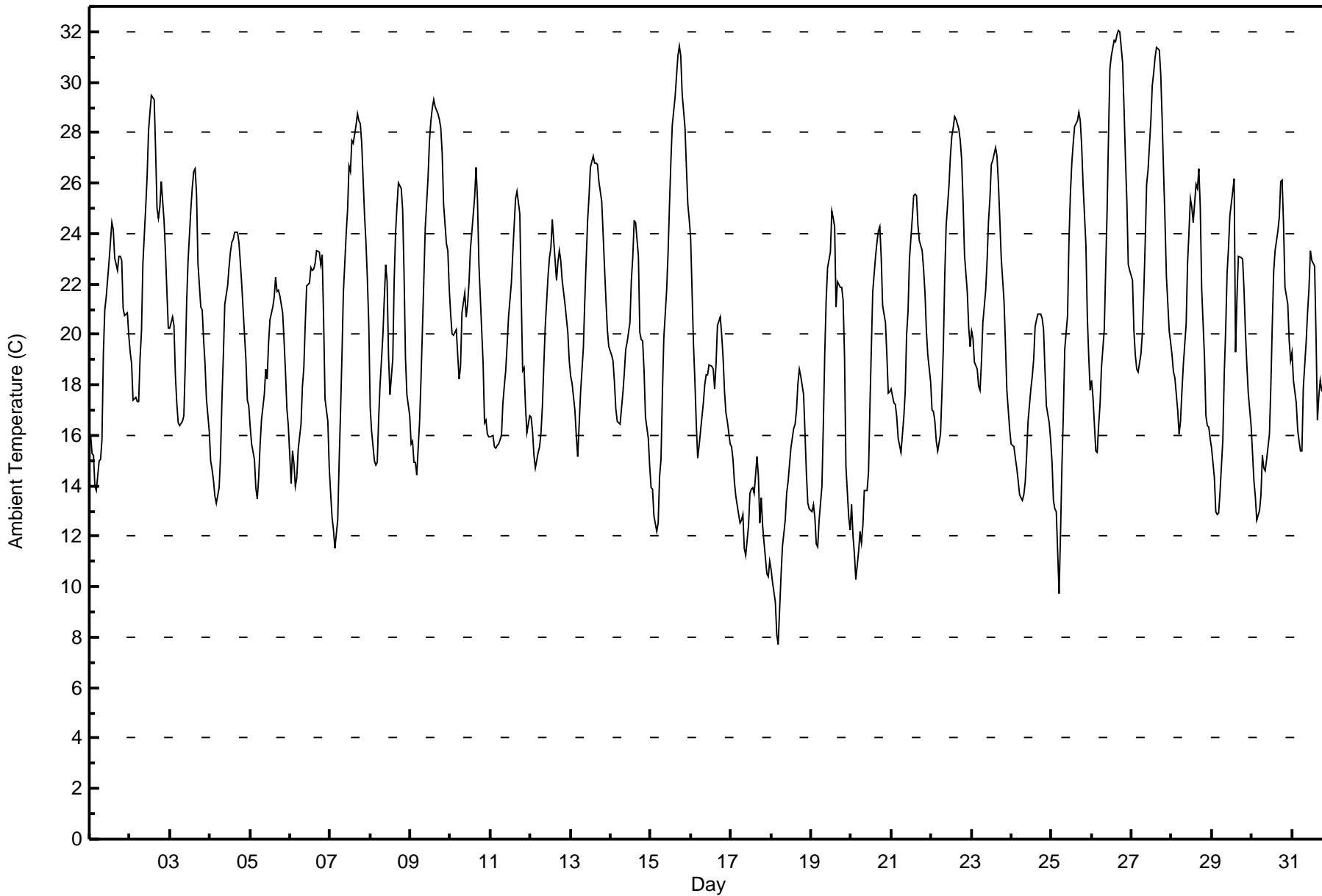
Mildred Lake - July 2017

Maximum Value: 32.1 C on Jul 26 17:00 Maximum Daily Average: 24.7 C on Jul 26																						Hours in Service:	744																								
Minimum Value: 7.7 C on Jul 18 05:00 Minimum Daily Average: 13.0 C on Jul 17																						Hours of Data:	744																								
Maximum Diurnal Average: 24.6 C at hour 17 Minimum Diurnal Average: 14.5 C at hour 5																						Hours of Missing Data:	0																								
Monthly Average: 19.89 C Percentiles: $P_1 = 10.4$ $P_{10} = 13.8$ $Q_1 = 16.2$ Median = 19.5 $Q_3 = 23.3$ $P_{90} = 26.6$ $P_{99} = 31.3$																						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-Jul	16.0	15.2	15.2	14.0	13.8	15.0	15.0	15.8	19.2	21.0	21.5	22.9	23.7	24.5	24.1	23.0	22.5	23.1	23.1	23.0	21.0	20.7	20.9	20.0	19.8	24.5																					
2-Jul	19.3	18.9	17.4	17.5	17.3	17.3	19.0	20.1	22.8	25.1	26.3	28.1	28.8	29.5	29.3	27.3	25.0	24.6	25.1	26.0	24.5	23.2	21.7	20.3	23.1	29.5																					
3-Jul	20.3	20.7	20.3	18.4	17.3	16.5	16.4	16.6	16.8	18.8	21.3	22.9	25.0	25.8	26.5	26.6	25.6	22.8	21.1	20.9	19.8	18.8	17.4	16.2	20.5	26.6																					
4-Jul	15.0	14.7	14.2	13.6	13.3	13.9	15.2	17.4	19.2	21.2	22.0	22.7	23.3	23.6	23.7	24.1	24.0	23.6	22.9	22.0	21.0	18.9	17.4	17.2	19.3	24.1																					
5-Jul	16.3	15.6	15.0	13.9	13.5	14.3	15.6	16.6	17.6	18.6	18.2	19.6	20.6	21.1	21.5	22.3	21.7	21.8	21.5	20.8	19.8	18.5	17.0	16.4	18.2	22.3																					
6-Jul	14.1	15.4	14.9	14.0	14.3	15.4	16.4	17.9	18.7	20.4	21.9	22.0	22.7	22.5	22.6	22.8	23.3	23.3	22.8	23.2	20.7	17.4	16.5	14.7	19.1	23.3																					
7-Jul	13.7	12.7	12.2	11.5	12.7	14.9	16.9	19.1	21.6	24.0	25.0	26.7	26.5	27.7	27.6	28.3	28.7	28.4	28.4	27.5	24.7	23.6	22.2	20.4	21.9	28.7																					
8-Jul	17.1	16.2	15.0	14.8	14.9	16.7	18.0	19.9	21.4	22.7	22.1	19.1	17.6	19.0	22.2	24.1	25.1	26.0	25.8	24.9	22.3	19.1	17.6	16.8	19.9	26.0																					
9-Jul	15.7	15.8	15.0	14.9	14.4	16.6	18.2	20.2	22.2	24.2	26.2	27.7	28.5	29.0	29.3	29.1	28.8	28.5	28.2	27.2	25.2	23.6	23.3	21.8	23.1	29.3																					
10-Jul	20.8	20.0	20.0	20.2	19.2	18.2	18.7	20.9	21.6	20.7	21.2	22.0	23.4	24.1	25.5	26.6	25.3	22.8	21.5	18.9	16.5	16.6	16.0	15.9	20.7	26.6																					
11-Jul	16.0	16.0	15.6	15.5	15.6	15.6	16.0	17.3	17.9	18.6	19.6	20.7	22.1	23.2	24.3	25.4	25.7	24.8	21.5	18.6	18.7	17.2	16.1	16.8	19.1	25.7																					
12-Jul	16.7	16.2	15.2	14.7	15.3	15.6	16.1	17.2	18.8	20.3	22.3	23.1	23.4	24.6	23.7	22.2	22.9	23.3	22.9	22.1	21.2	20.6	20.1	18.9	19.9	24.6																					
13-Jul	18.4	18.1	17.0	16.0	15.1	16.4	17.7	19.5	21.3	23.0	24.5	25.4	26.6	27.0	26.8	26.8	26.8	26.0	25.3	24.0	22.7	21.4	20.2	19.5	21.9	27.0																					
14-Jul	19.2	18.9	18.1	17.1	16.5	16.5	17.1	17.7	18.5	19.4	19.7	20.5	22.2	23.1	24.5	24.4	23.1	20.1	19.8	19.7	18.5	16.8	15.9	14.8	19.2	24.5																					
15-Jul	13.9	13.9	12.8	12.2	12.5	14.4	15.0	17.7	19.9	21.8	23.2	25.1	26.9	28.3	29.4	30.3	31.1	31.4	31.0	29.5	28.2	26.6	25.2	24.5	22.7	31.4																					
16-Jul	23.8	19.6	18.2	16.4	15.1	15.6	16.1	17.3	18.0	18.4	18.4	18.8	18.7	18.6	17.9	18.9	20.4	20.7	20.0	19.1	17.7	16.9	16.6	15.7	18.2	23.8																					
17-Jul	15.5	15.0	14.2	13.6	12.9	12.5	12.6	12.9	11.5	11.2	12.4	13.7	13.9	13.9	13.7	15.1	14.4	12.5	13.5	12.4	11.7	10.5	10.4	11.0	13.0	15.5																					
18-Jul	10.7	10.2	9.4	8.1	7.7	9.1	10.4	11.6	12.6	13.7	14.2	14.8	15.5	16.3	16.5	17.0	18.0	18.6	18.3	17.6	16.1	14.5	13.3	13.1	13.6	18.6																					
19-Jul	13.0	13.2	12.8	11.7	11.6	12.6	14.0	16.5	19.2	21.4	22.6	23.3	24.9	24.6	24.2	21.1	22.1	21.8	21.9	21.4	19.1	14.8	12.8	12.2	18.0	24.9																					
20-Jul	13.2	12.0	11.3	10.3	11.4	12.2	11.7	12.4	13.8	13.8	14.6	17.1	19.5	21.7	23.1	23.7	24.1	24.3	23.1	21.1	20.5	19.2	17.7	17.7	17.1	24.3																					
21-Jul	17.9	17.3	17.3	16.7	15.9	15.6	15.3	16.7	17.7	20.0	20.9	23.0	24.6	25.5	25.6	25.5	24.3	23.7	23.3	22.6	21.6	20.1	19.2	18.2	20.4	25.6																					
22-Jul	17.0	16.9	16.6	15.8	15.4	16.0	17.7	19.5	22.3	24.3	25.9	27.1	27.8	28.2	28.7	28.5	28.1	27.7	26.9	25.2	23.2	21.7	20.2	19.5	22.5	28.7																					
23-Jul	20.1	19.9	18.9	18.6	17.9	17.8	18.9	20.5	21.7	22.9	24.5	25.4	26.7	26.9	27.4	27.1	26.0	24.5	23.0	21.3	19.7	17.8	17.0	16.2	21.7	27.4																					
24-Jul	15.7	15.5	15.1	14.7	14.2	13.7	13.4	13.6	14.2	15.2	16.5	17.9	18.3	19.0	20.3	20.6	20.8	20.8	20.6	20.2	18.5	17.2	16.5	15.8	17.0	20.8																					
25-Jul	14.9	13.4	13.1	13.0	9.7	12.1	14.7	16.8	19.4	20.8	23.7	25.5	26.8	27.6	28.2	28.5	28.8	28.5	27.5	25.9	23.6	20.7	19.1	17.8	20.8	28.8																					
26-Jul	18.2	17.5	15.4	15.3	16.4	17.2	18.7	20.2	22.6	24.9	27.8	30.5	31.0	31.6	31.6	31.9	32.1	32.0	30.8	29.0	27.0	25.3	22.8	22.6	24.7	32.1																					
27-Jul	22.2	20.1	19.2	18.6	18.5	19.3	20.1	21.7	23.6	26.0	26.5	28.5	29.9	30.4	31.0	31.4	31.2	30.3	28.5	26.4	24.6	22.3	20.1	19.7	24.6	31.4																					
28-Jul	19.2	18.5	18.3	17.0	16.1	16.6	17.7	18.8	20.4	22.8	24.1	25.4	25.0	24.4	26.0	25.8	26.6	25.0	21.8	19.1	16.8	16.4	16.3	15.9	20.6	26.6																					
29-Jul	15.5	14.3	13.0	12.9	12.9	13.8	15.9	18.4	20.2	22.4	23.4	24.7	25.6	26.2	19.3	21.5	23.1	23.0	23.0	21.7	20.1	18.8	17.7	16.4	19.3	26.2																					
30-Jul	15.3	14.2	13.6	12.6	13.0	13.7	15.2	14.7	14.6	15.0	16.1	18.0	20.4	22.5	23.3	24.1	24.7	26.1	26.1	24.3	21.9	21.2	19.7	19.0	18.7	26.1																					
31-Jul	19.3	18.2	17.3	16.2	15.8	15.4	15.4	17.9	19.7	20.9	21.8	23.3	22.9	22.7	19.9	16.6	17.6	18.2	17.8	17.6	16.2	14.0	12.7	11.9	17.9	23.3																					
																						Diurnal Average		16.9	16.3	15.5	14.8	14.5	15.2	16.1	17.5	19.0	20.4	21.6	22.8	23.6	24.3	24.4	24.5	24.6	24.1	23.5	22.4	20.7	19.2	18.1	17.3
																						Diurnal Maximum		23.8	20.7	20.3	20.2	19.2	19.3	20.1	21.7	23.6	26.0	27.8	30.5	31.0	31.6	31.6	31.9	32.1	32.0	31.0	29.5	28.2	26.6	25.2	24.5



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	5	0.67	0.67
10 - 20	389	52.28	52.96
> 20	350	47.04	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

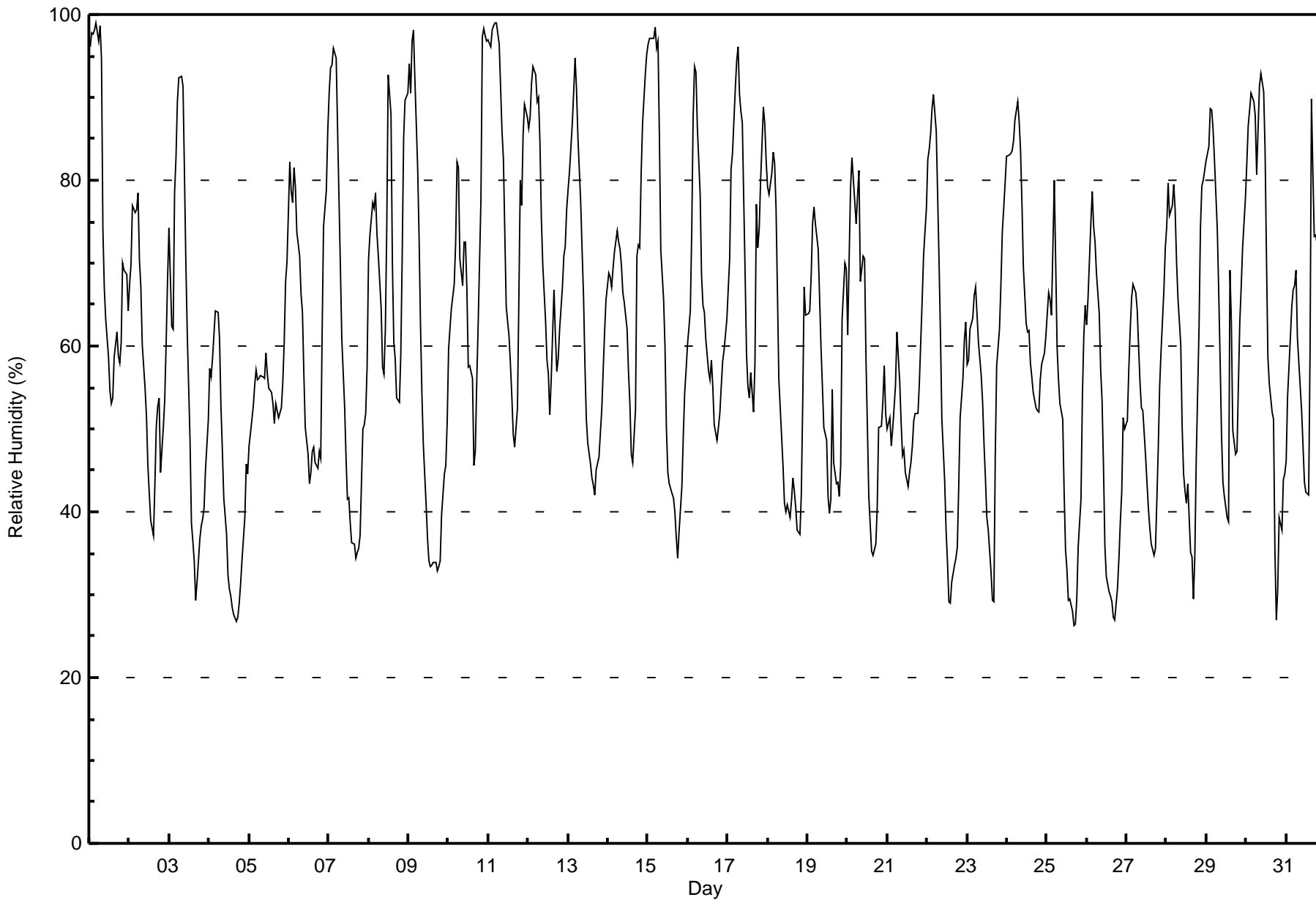
Mildred Lake - July 2017

Maximum Value: 99 % on Jul 1 05:00																		Maximum Daily Average: 78.8 % on Jul 11						Hours in Service: 744		
Minimum Value: 26 % on Jul 25 17:00																		Minimum Daily Average: 42.9 % on Jul 4						Hours of Data: 744		
Maximum Diurnal Average: 81.0 % at hour 5																		Minimum Diurnal Average: 44.7 % at hour 17						Hours of Missing Data: 0		
Monthly Average: 61.5 %																		Percentiles: P ₁ = 28 P ₁₀ = 37 Q ₁ = 47 Median = 60 Q ₃ = 75 P ₉₀ = 88 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-Jul	96	98	98	98	99	97	99	95	74	67	63	59	55	53	54	59	62	59	58	60	70	69	69	64	73.9	99
2-Jul	68	70	77	76	76	78	70	67	60	55	52	46	42	39	37	43	50	53	54	45	50	54	60	68	57.9	78
3-Jul	74	62	62	78	83	90	92	93	91	81	70	62	49	39	36	34	29	31	37	38	39	41	45	51	58.7	93
4-Jul	57	56	59	61	64	64	61	53	48	42	37	32	31	30	28	28	27	29	31	34	39	46	45	42.9	64	
5-Jul	48	50	53	55	57	56	56	56	56	56	59	57	55	54	53	51	53	52	51	53	56	60	68	70	55.6	70
6-Jul	82	79	77	82	79	74	71	66	64	57	50	47	43	45	47	48	46	45	47	46	61	74	79	86	62.3	86
7-Jul	91	94	94	96	95	86	78	70	61	53	47	42	42	39	36	36	34	35	36	37	50	50	52	57	58.7	96
8-Jul	70	73	77	77	78	74	71	65	57	57	62	74	93	88	70	60	58	54	53	59	71	85	90	91	71.2	93
9-Jul	94	91	97	98	92	81	73	63	54	48	41	37	34	33	34	34	34	33	33	34	40	45	46	51	54.9	98
10-Jul	60	62	65	67	72	82	81	70	67	72	72	67	58	58	56	46	47	56	62	78	97	98	97	97	70.4	98
11-Jul	97	96	98	99	99	99	96	91	86	83	74	65	61	58	54	49	48	53	66	80	77	85	89	88	78.8	99
12-Jul	86	88	92	94	93	90	90	85	76	70	63	58	57	52	56	67	61	57	58	62	67	71	72	77	72.5	94
13-Jul	79	81	87	91	95	91	85	77	71	66	58	51	48	46	44	43	42	45	47	50	52	57	62	66	63.9	95
14-Jul	69	68	67	69	71	74	73	72	70	66	65	62	57	53	47	46	52	71	72	72	81	87	93	95	68.9	95
15-Jul	96	97	97	97	98	96	97	85	72	66	60	50	45	43	42	42	40	37	34	38	43	49	54	57	64.0	98
16-Jul	60	64	74	88	94	93	86	78	68	65	64	61	57	56	58	55	50	49	50	52	55	58	59	63	65.0	94
17-Jul	67	71	81	83	91	94	96	90	88	87	69	59	55	54	57	52	58	77	72	74	80	89	87	82	75.5	96
18-Jul	79	78	81	83	82	77	66	56	49	46	41	40	41	39	41	44	43	40	38	37	42	53	67	64	55.4	83
19-Jul	64	64	68	75	77	75	72	66	60	55	50	49	42	40	42	55	46	43	44	42	46	63	70	69	57.3	77
20-Jul	61	70	79	83	77	75	78	81	68	71	71	58	50	42	35	35	35	36	41	50	50	53	58	52	58.8	83
21-Jul	50	51	48	50	52	55	62	56	51	47	48	45	43	45	46	48	51	52	52	56	61	66	71	77	53.3	77
22-Jul	82	84	86	89	90	86	78	70	61	51	44	38	34	29	29	31	34	34	36	43	51	56	61	63	56.7	90
23-Jul	58	58	62	63	66	67	64	61	56	53	48	44	39	38	33	29	29	47	58	62	67	74	77	80	55.5	80
24-Jul	83	83	83	84	85	87	90	87	84	77	70	63	62	62	58	56	54	53	52	52	56	58	59	61	69.1	90
25-Jul	64	66	66	64	80	70	60	56	53	51	42	35	33	29	30	28	26	27	29	36	42	54	61	65	48.6	80
26-Jul	63	66	75	79	74	73	69	64	57	53	46	36	32	30	30	29	27	27	31	34	39	42	51	50	49.0	79
27-Jul	51	57	62	66	68	66	64	60	56	52	52	47	43	40	38	36	35	36	42	48	55	60	67	72	53.0	72
28-Jul	74	80	76	77	79	77	70	66	60	50	45	43	41	43	35	35	29	35	46	62	74	79	80	81	59.9	81
29-Jul	82	84	89	89	86	82	74	67	58	49	44	42	39	39	69	63	50	47	47	55	63	67	72	78	64.0	89
30-Jul	82	87	88	90	89	88	81	86	91	93	91	84	71	59	55	52	51	35	27	31	39	38	44	45	66.5	93
31-Jul	46	54	61	65	67	67	69	61	55	52	48	44	42	42	59	90	81	73	73	71	79	90	93	93	65.7	93
	72.1	73.6	76.7	79.5	81.0	79.4	76.5	71.3	65.3	61.0	56.2	51.4	48.2	45.7	45.5	45.9	44.7	45.7	47.6	51.2	57.7	63.4	67.6	69.5	Diurnal Average	
	97	98	98	99	99	99	99	95	91	93	91	84	93	88	70	90	81	77	73	80	97	98	97	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mildred Lake - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Speed: 28 km/h on Jul 16 02:00	Maximum Daily Speed Average: 16.7 km/h on Jul 24	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 7 03:00	Minimum Daily Speed Average: 0.4 km/h on Jul 13	Hours of Data: 743
Maximum Diurnal Speed Average: 4.9 km/h at hour 14	Minimum Diurnal Speed Average: 1.4 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.9 km/h 269.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 15 P ₉₉ = 21	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-Jul	SSE3	S5	S5	SW2	SSW3	S6	SSW7	S7	S8	SSE10	S11	S8	SSW10	SW7	WSW5	SSW2	SW3	WSW3	E3	ESE5	ESE6	SE8	S10	SSW10	S5.2	S11
2-Jul	S9	S11	SSE10	S7	S10	S12	S11	S16	SSW10	SSW10	SSW11	SSW11	SSW12	SSW12	SSW15	SSW13	WNW7	ENE9	ESE9	S7	S8	SSW9	S2	SSE6	S8.3	S16
3-Jul	S8	WSW8	SSW7	SW9	WSW11	SSW9	SSW10	SW6	SW7	S10	SW9	WSW11	WSW10	WSW11	WSW11	WSW12	WSW19	WSW19	SW12	SW13	WSW12	W12	W16	W14	SW10.1	WSW19
4-Jul	WSW13	WSW10	WSW11	WSW13	WSW15	W15	W15	W17	W15	WSW15	WSW18	WSW22	WSW21	WSW22	WSW21	W19	W21	WNW21	W20	WNW18	W15	WSW10	WSW11	W12	W15.9	WSW22
5-Jul	W10	W10	W13	W11	W11	W12	WNW13	WNW17	WNW16	WNW15	WNW14	NW14	WNW12	NW14	NW16	NNW17	N13	N17	NNW19	NNW19	NNW15	NNW9	N5	NNW5	NW11.6	NNW19
6-Jul	WNW4	WNW8	NW5	W6	WNW9	WSW6	WNW11	WNW10	WNW8	WNW9	WNW11	NNW12	NNW10	NNW9	NW11	NNW12	NW12	NNW11	NNW11	NNW5	AF	WNW1	SW3	SW2	NW7.2	NW12
7-Jul	E0	E2	SSE0	SW2	SW3	SSW5	SW4	SSW5	SSW5	SSW4	NW5	W7	W4	SW5	NW6	WSW4	NW2	S2	S5	S4	N3	N10	NNE7	NE6	WSW1.2	N10
8-Jul	NNE3	N5	NNE6	NNE5	NE1	NE3	N3	NE3	E1	S2	W10	NW10	NW3	SE4	WSW1	WNW2	NW3	WNW6	WSW4	SW4	WSW3	ENE2	SE2	ESE1	NW1.4	NW10
9-Jul	E3	SE2	SW2	SW4	SSE2	ESE3	SE5	SE7	SSE8	SSE7	SSE8	SSE11	SSE13	S13	S13	S12	S12	S11	S10	S11	SE8	ESE8	SE8	SE5	SSE7.2	S13
10-Jul	S4	S4	S5	WSW8	WSW4	ESE2	S4	NW3	W5	WSW7	WSW6	W5	NW7	W7	WSW5	SW3	ESE7	E13	E4	NW11	SW5	NNE4	ENE6	NNW5	WSW1.6	E13
11-Jul	NNW4	NNW3	NE1	ENE2	NE2	NE4	N8	NNW9	NNW12	N9	NNW10	NW12	NW10	WNW8	NW9	NW7	WNW5	WSW8	SSW12	WSW8	SW6	WNW1	SE3	SSW7	NW3.8	SSW12
12-Jul	SSW4	SSE3	SSE4	S4	S5	SSE4	SE5	SE6	S6	SW4	SSW4	SSE5	SSE4	SW4	SSW4	SSW9	SSW8	S8	S11	SSE8	S6	S8	S9	S8	S5.5	S11
13-Jul	S8	S10	S7	S4	SSW4	SSW7	SSW6	SSW7	SSW5	SSW6	SSW4	NW3	SW6	SSW6	SSE4	E1	N6	NNE10	NNE11	NNE12	N11	N9	N9	N10	W0.4	NNE12
14-Jul	N11	N13	N13	NNE11	NNE10	N7	NNE12	N13	NNE14	NNE14	NNE14	NE10	NE7	NE8	N5	N5	NNW9	NNE18	NE11	NE6	N5	NNE4	N5	N5	NNE9.2	NNE18
15-Jul	NNE5	NNE5	NE3	NE1	SE2	E4	SE4	SSE8	SSE11	SSE11	SSE10	SSE14	SSE19	SSE19	S19	SSE18	SSE19	SE17	S13	S12	SSE15	S12	S10	SSE11	SSE9.7	SSE19
16-Jul	SSW6	NNW28	N8	NW8	W1	SSW7	SW7	WNW10	WNW11	WNW11	W6	W9	WSW13	WSW13	SW12	WSW14	W18	W18	WNW17	W15	W15	W14	W15	W16	W10.0	NNW28
17-Jul	WNW17	WNW17	WNW14	WNW16	WNW13	WNW12	WNW13	NNW15	NNW20	NNW18	N21	N20	N20	N16	NNW17	NNW11	N12	N11	NNW8	N8	N8	NNW5	NW7	NNW10	NNW12.1	N21
18-Jul	NNW10	NNW11	NNW10	NNW6	NNW6	NNW8	NNW9	N7	NNW7	NNW5	NW6	NW7	WNW7	WNW8	NW9	WSW5	WSW6	WSW9	W10	WNW10	WNW7	WSW5	WSW5	WSW8	NW6.0	NNW11
19-Jul	SW7	WSW8	WSW11	WSW10	W10	WSW9	WSW11	W10	WSW9	WSW10	W10	W9	WSW11	WNW11	NNW12	NE14	NNE16	NE11	ENE8	NE8	NE5	NE4	ENE4	NNE4	WNW3.7	NNE16
20-Jul	N8	NNE8	NNE4	NNE3	N3	NNE2	NNE3	SW1	WNW1	NNE6	ENE6	E8	ENE6	E8	ESE11	ESE11	ESE11	ESE9	E6	SE10	E8	ESE8	ESE5	SE6	E4.7	ESE11
21-Jul	SSE7	SSE5	SSE8	S9	ESE5	E3	N6	N5	N3	SSW1	ESE6	SE7	SSE10	S14	SSW14	SSW10	SSW8	S12	S12	S11	S11	S11	S10	S6	S6.3	SSW14
22-Jul	SSE4	S7	SSE8	S7	S8	S8	S9	SSW10	SW9	SW10	SW11	WSW11	WSW12	WSW13	WSW13	WSW14	WSW14	WSW11	WSW11	SW8	SW7	SW8	SW7	WSW7	SW8.4	WSW14
23-Jul	WSW10	WSW10	WSW10	WSW11	WSW9	WSW9	W9	W7	WNW9	WNW9	WNW10	W11	W11	WSW12	W11	W14	WNW12	N13	NNE14	NNE14	NNE14	NNE14	NNE14	NNE17	WNW6.5	NNE17
24-Jul	NNE17	NNE15	NNE19	NNE17	NNE20	NNE16	NNE15	N18	N14	NNE17	NNE18	NNE21	NNE22	NNE18	NNE23	NNE23	N19	N21	N21	N17	NNW11	NNW11	NNW10	NNW9	N16.7	NNE23
25-Jul	NNW8	NNW6	WNW6	WNW7	SW3	WSW4	WSW4	SW4	SSW7	SSW7	SW7	W8	W7	W7	SW9	SW9	SW8	SSW10	SSW8	SSW7	S5	SSW4	SW2	SSW3	WSW4.9	SSW10
26-Jul	S7	SSE3	ESE1	S6	SSW8	SSW9	SSW8	SSW8	S8	S8	SSW9	SW9	SW10	SW7	SSW4	SW7	WSW6	SW7	SW8	SSW10	SSW10	SSW10	SW7	SSW9	SSW7.3	SSW10
27-Jul	SSW11	SSE6	SE7	SSE9	SSE10	SSE12	S14	S12	S10	SW8	S5	SSW5	SW7	WNW6	W7	WSW7	WSW6	WSW4	NNW4	NNW7	WNW11	NW18	NNW10	WNW8	SW3.8	NW18
28-Jul	SW2	WNW5	WNW12	WSW9	WSW9	WSW7	WSW8	W8	W7	W12	WNW15	W13	W17	WNW14	WNW15	WNW14	WNW15	W15	W19	NNE13	ESE6	SSW5	S4	WSW3	W8.6	WNW19
29-Jul	WSW4	W4	W3	WSW5	SW4	SSW3	SSW3	SSW7	SSW4	SW5	WSW1	SW4	NW3	WSW6	NNE12	NE9	NE8	NNE11	NNE9	NNE8	NE7	NE7	NE6	NNE5	N1.6	NNE12
30-Jul	NNE6	N5	N6	N3	NE2	NNE1	SSW7	SW9	N3	SSE8	SSW7	S6	SSE11	SSE13	S14	S14	S17	SW12	WSW14	WSW11	WSW9	W10	W8	W10	SSW5.1	S17
31-Jul	WNW13	NW13	WNW9	WNW8	WNW9	WNW14	WNW10	WNW9	WNW9	WNW11	WNW13	WNW14	NW17	NNW18	N12	NE10	N11	N15	N15	NE7	SE3	NE1	NNW4	NNW5	NW8.5	NNW18

W2.3	NW2.9	NNW2.3	W3.1	WSW2.8	WSW2.6	WSW3.1	W3.3	W3.3	WSW3.4	W4.0	W4.2	W4.3	WSW4.9	W4.2	WSW3.3	NNW3.6	NNW3.0	NNW2.6	NNW2.0	W1.7	W1.6	W1.4	W2.5	Diurnal Average
NNE17	NNW28	NNE19	NNE17	NNE20	NNE16	W15	N18	NNW20	NNW18	N21	WSW22	NNE22	WSW22	NNE23	NNE23	W21	WNW21	N21	NNW19	WNW15	NW18	W16	NNE17	Diurnal Maximum

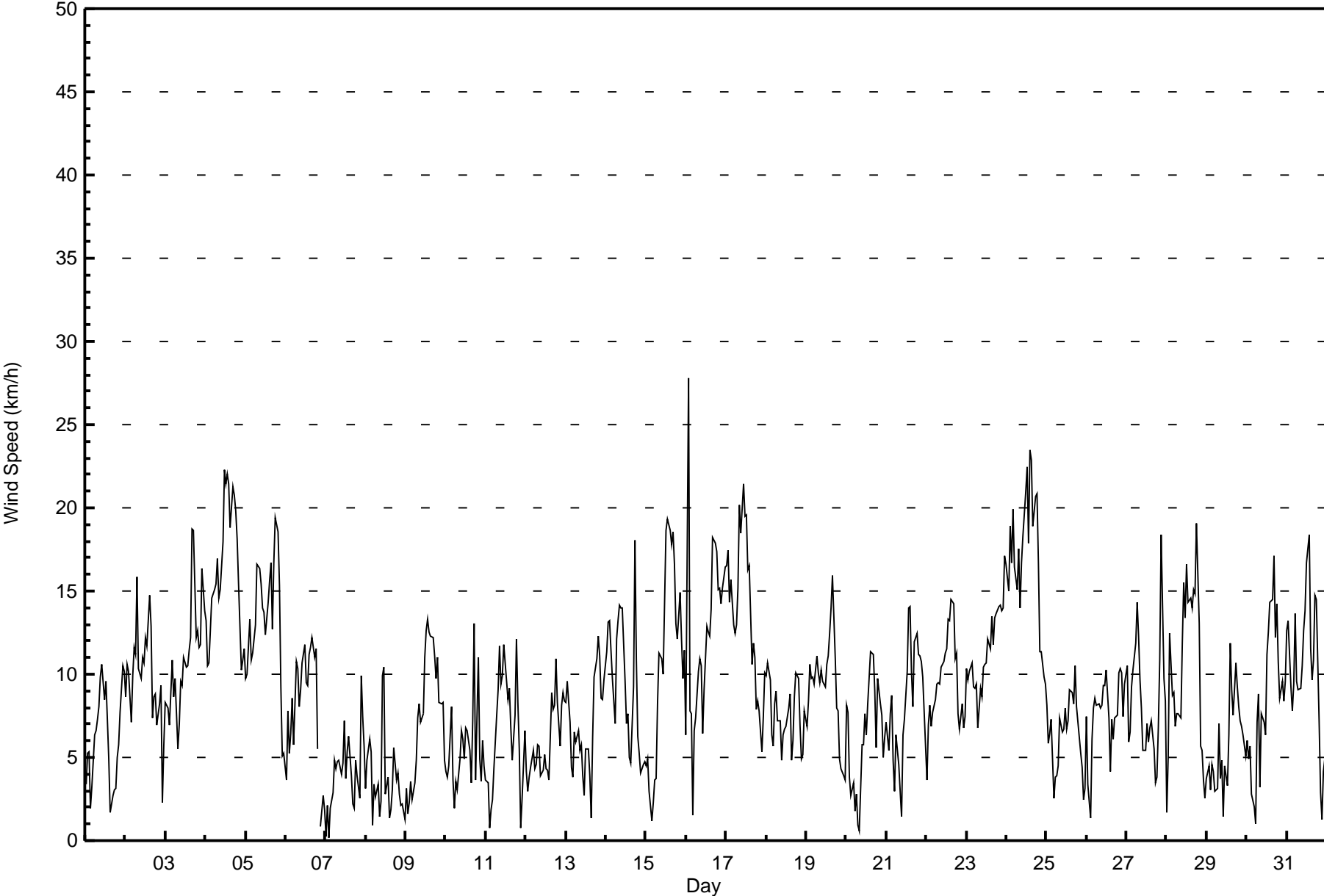
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 19 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 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-Jul	1	1	1	1	1	2	2	2	2	3	3	2	3	2	2	1	2	2	2	1	1	2	3	3	3
2-Jul	2	3	2	1	3	2	3	3	3	3	3	4	4	4	4	4	3	2	2	2	2	2	2	3	4
3-Jul	3	3	2	3	4	3	3	2	2	2	3	4	4	4	4	4	8	7	5	4	5	4	7	6	8
4-Jul	4	4	4	4	5	6	6	6	6	6	7	8	8	8	8	7	7	7	7	6	5	4	4	4	8
5-Jul	3	3	4	5	4	5	5	5	5	5	4	5	4	4	6	5	3	5	4	3	4	3	1	1	6
6-Jul	1	2	3	3	3	2	4	3	3	3	4	4	4	3	4	4	4	4	3	2	AF	1	1	1	4
7-Jul	1	1	1	1	1	1	1	2	2	2	2	3	3	3	3	2	3	2	2	1	4	2	2	2	4
8-Jul	1	2	1	2	1	1	1	1	2	1	4	3	2	3	2	2	1	2	1	1	1	1	1	2	4
9-Jul	2	1	1	1	2	2	1	2	2	2	3	3	3	4	4	3	3	3	2	2	2	2	2	1	4
10-Jul	2	1	1	3	2	2	2	3	2	2	2	2	2	2	2	2	3	3	3	5	3	2	2	2	5
11-Jul	1	2	1	2	2	2	2	3	2	2	3	3	3	3	3	3	3	3	6	3	3	2	2	2	6
12-Jul	1	1	1	2	2	1	1	1	2	2	2	2	2	2	2	4	2	3	3	2	2	2	2	2	4
13-Jul	2	2	1	3	3	2	2	2	2	2	2	2	3	2	2	2	3	2	3	3	3	2	1	2	3
14-Jul	2	3	3	3	3	2	3	3	4	3	4	4	3	3	3	2	8	5	3	2	1	1	2	1	8
15-Jul	1	2	1	1	1	1	2	2	2	3	4	4	4	5	4	4	4	4	3	3	3	2	2	3	5
16-Jul	8	11	3	4	2	3	3	4	4	3	3	4	5	5	4	5	6	7	6	6	6	5	5	6	11
17-Jul	6	5	4	5	5	4	4	5	4	4	5	5	4	5	5	4	3	6	2	2	2	3	2	2	6
18-Jul	1	2	2	1	1	2	2	2	2	3	4	3	3	3	3	3	3	4	4	3	3	2	2	3	4
19-Jul	3	3	4	3	4	3	4	4	3	4	4	4	5	4	5	4	4	4	2	2	2	1	1	2	5
20-Jul	1	2	2	1	1	1	1	1	2	1	2	2	2	3	3	3	3	3	1	3	2	1	1	2	3
21-Jul	2	1	3	2	2	2	1	2	3	2	2	2	4	4	4	3	2	3	3	3	2	2	3	1	4
22-Jul	2	1	2	1	1	2	2	2	3	4	4	4	4	5	5	5	5	4	4	2	2	2	2	2	5
23-Jul	3	4	3	4	3	3	4	3	3	3	4	4	4	5	4	5	4	5	3	4	4	3	4	4	5
24-Jul	4	4	5	5	4	3	4	4	4	4	5	6	6	5	7	6	5	6	5	4	2	1	1	1	7
25-Jul	2	1	2	3	1	1	1	2	2	2	3	3	3	3	4	3	3	3	2	2	2	1	1	2	4
26-Jul	1	1	2	2	1	1	2	2	2	2	3	3	3	3	2	3	2	2	2	3	2	3	2	2	3
27-Jul	2	2	1	1	2	2	3	3	2	3	2	3	2	3	3	2	2	2	2	3	5	6	5	3	6
28-Jul	2	3	4	3	3	4	3	3	3	5	5	5	6	6	5	5	5	6	8	6	2	2	2	1	8
29-Jul	1	2	1	1	2	1	2	2	2	2	2	3	4	7	5	3	3	3	2	2	2	1	2	2	7
30-Jul	1	1	1	1	1	1	3	3	2	2	2	2	3	3	3	4	4	5	5	4	3	3	3	4	5
31-Jul	4	3	3	3	4	4	3	3	3	3	4	5	5	5	6	3	4	4	3	3	1	1	1	1	6
																		8 11 5 5 5 6 6 6 6 6 6 7 8 8 8 8 7 8 7 8 6 6 6 7 6							
Diurnal Maximum																									
AF - Analyzer Failure																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	191	25.71	25.71
6 - 11	364	48.99	74.70
12 - 19	169	22.75	97.44
20 - 28	19	2.56	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mildred Lake - July 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	15	13	12	3	9	7	10	13	16	21	23	18	5	8	8	10	191
6 - 11	18	13	15	5	4	11	9	22	46	43	29	47	28	34	11	29	364
12 - 19	14	25	1	0	1	0	1	10	17	6	2	21	23	28	8	12	169
20 - 28	5	5	0	0	0	0	0	0	0	0	0	4	2	1	0	2	19
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	52	56	28	8	14	18	20	45	79	70	54	90	58	71	27	53	743

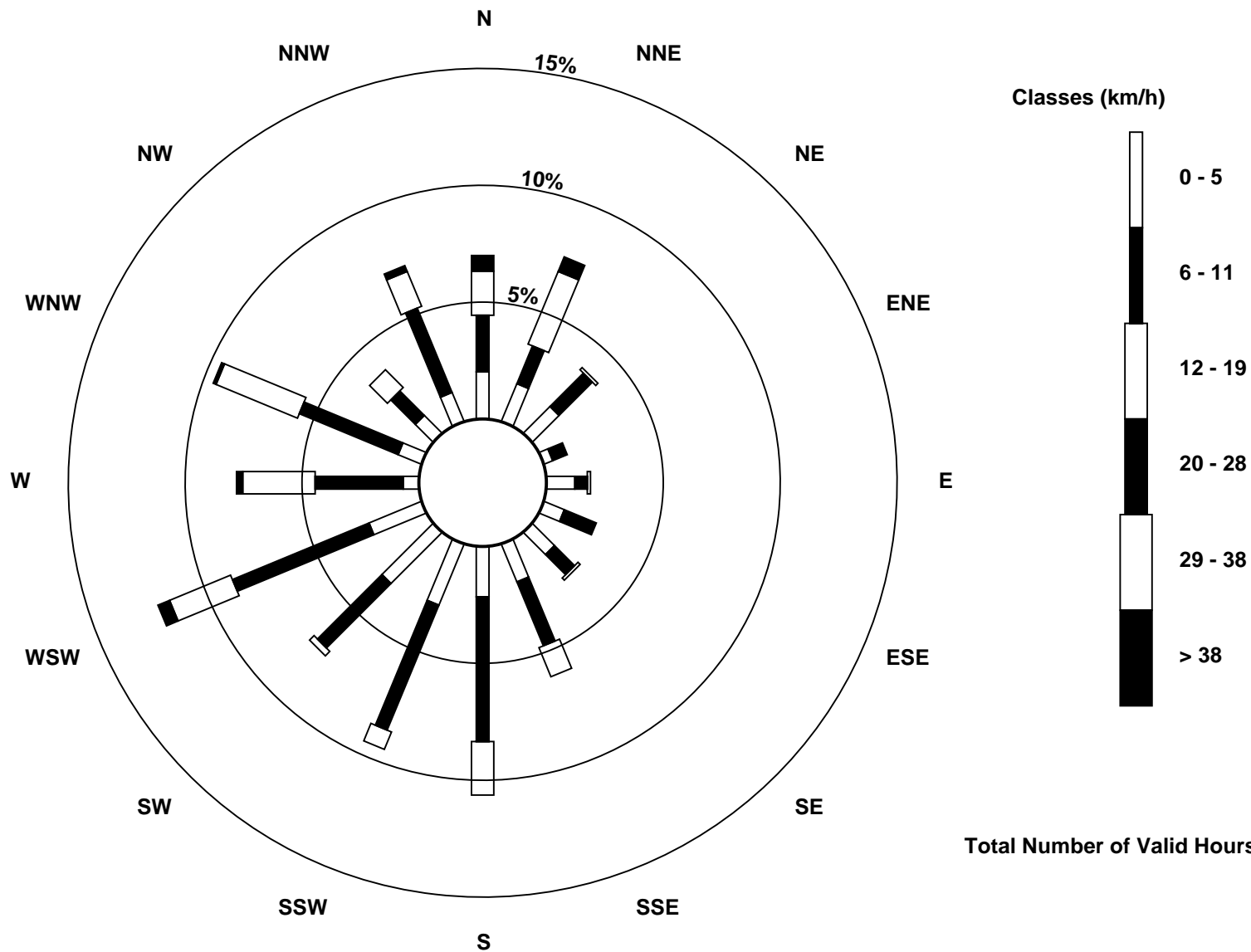
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 348 deg on Jul 16 02:00 Direction of Maximum Daily Speed Average: 8.2 deg on Jul 24	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1
Direction of Minimum Speed: 153 deg on Jul 7 03:00 Direction of Minimum Daily Speed Average: 0.4 deg on Jul 13	Percent Operational Time: 99.9
Monthly Average Direction: 259.7 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-Jul	161	177	189	224	206	188	205	178	176	167	171	182	195	214	246	199	224	237	82	107	108	137	185	206	181.9
2-Jul	185	173	155	176	175	174	178	171	202	201	202	212	202	202	195	212	292	64	117	183	188	193	169	152	185.2
3-Jul	180	242	212	221	249	198	201	216	174	218	238	249	241	239	237	251	251	236	229	251	267	260	270		236.2
4-Jul	250	253	253	251	258	264	263	275	270	249	247	252	251	250	250	261	265	282	279	282	281	252	254	260	261.1
5-Jul	268	268	281	264	262	272	283	294	295	296	303	313	300	312	315	332	350	350	342	343	332	336	4	331	309.6
6-Jul	289	299	307	280	291	247	286	291	287	286	293	334	344	348	326	335	314	327	335	338	AF	302	233	229	309.5
7-Jul	87	86	153	216	220	194	214	199	204	194	325	261	269	231	326	249	310	183	186	181	359	8	27	48	252.9
8-Jul	29	7	15	20	42	45	355	48	87	177	278	304	306	136	250	302	310	285	244	220	246	71	131	122	323.2
9-Jul	80	134	221	219	160	113	126	146	156	158	157	150	156	179	178	176	184	172	175	170	138	119	139	137	160.1
10-Jul	186	172	187	253	251	103	182	310	265	239	257	277	312	279	243	226	122	98	99	314	224	18	72	341	248.7
11-Jul	348	347	36	68	54	39	357	339	344	350	331	319	310	302	321	309	303	245	198	246	220	285	137	200	312.1
12-Jul	196	154	164	185	182	163	127	135	190	223	211	154	155	216	199	198	206	189	172	168	177	182	180	190	180.7
13-Jul	177	171	178	181	203	210	208	206	213	200	199	309	227	211	160	90	4	23	20	16	11	0	359	354	277.1
14-Jul	352	6	11	19	31	9	14	9	19	24	26	40	52	36	6	6	343	12	54	42	1	18	9	10	17.9
15-Jul	25	16	44	55	133	81	132	156	155	153	153	148	157	165	170	157	153	145	172	178	168	170	169	165	156.6
16-Jul	204	348	4	310	273	209	214	288	302	300	280	265	240	242	236	246	278	275	283	269	268	271	271	276	275.1
17-Jul	285	290	292	288	290	297	302	328	342	346	356	2	358	353	332	347	10	3	348	360	352	348	322	333	331.7
18-Jul	343	346	344	338	341	337	341	355	342	328	326	304	295	288	312	251	254	243	269	301	286	252	255	252	308.2
19-Jul	236	247	257	255	259	247	256	259	245	245	261	265	255	291	338	47	33	37	77	50	43	47	64	24	289.8
20-Jul	8	12	23	22	7	27	30	232	301	21	69	89	78	96	120	110	108	107	96	138	95	113	103	142	88.2
21-Jul	157	150	166	189	122	89	3	355	5	199	120	131	168	182	193	210	201	175	176	182	184	187	185	179	175.1
22-Jul	165	177	167	174	183	190	178	192	216	228	236	244	246	250	248	248	254	247	243	229	223	221	229	240	224.8
23-Jul	244	251	247	254	255	251	266	281	291	302	283	279	265	243	260	279	284	352	22	29	24	24	22	20	301.7
24-Jul	18	19	17	23	15	19	14	9	11	13	15	22	12	17	12	12	8	356	352	353	339	336	337	334	8.2
25-Jul	330	330	292	298	223	245	240	234	212	202	220	273	273	268	225	218	221	210	210	203	189	206	231	201	237.8
26-Jul	183	159	105	183	193	196	194	195	180	186	206	221	219	227	211	218	241	227	223	205	200	202	218	210	204.6
27-Jul	202	158	137	150	154	158	169	170	183	216	190	207	233	293	271	250	250	237	342	339	286	309	341	302	220.0
28-Jul	225	282	293	258	251	257	254	270	278	277	283	277	280	292	293	293	300	276	281	16	105	213	189	243	280.6
29-Jul	247	281	265	241	227	200	207	211	193	224	252	228	307	253	28	52	41	18	19	26	43	45	44	16	2.0
30-Jul	12	353	1	8	40	32	192	227	5	166	203	191	155	166	169	187	180	228	243	239	243	260	266	259	211.5
31-Jul	296	317	300	294	292	303	302	290	303	295	296	292	319	329	351	38	3	9	2	37	134	42	346	343	323.2

265.1 304.2 287.2 262.1 253.2 240.3 250.6 261.6 270.0 258.3 270.4 272.6 261.8 257.7 266.9 258.6 282.3 302.3 288.8 295.5 261.1 270.6 267.0 271.3
 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

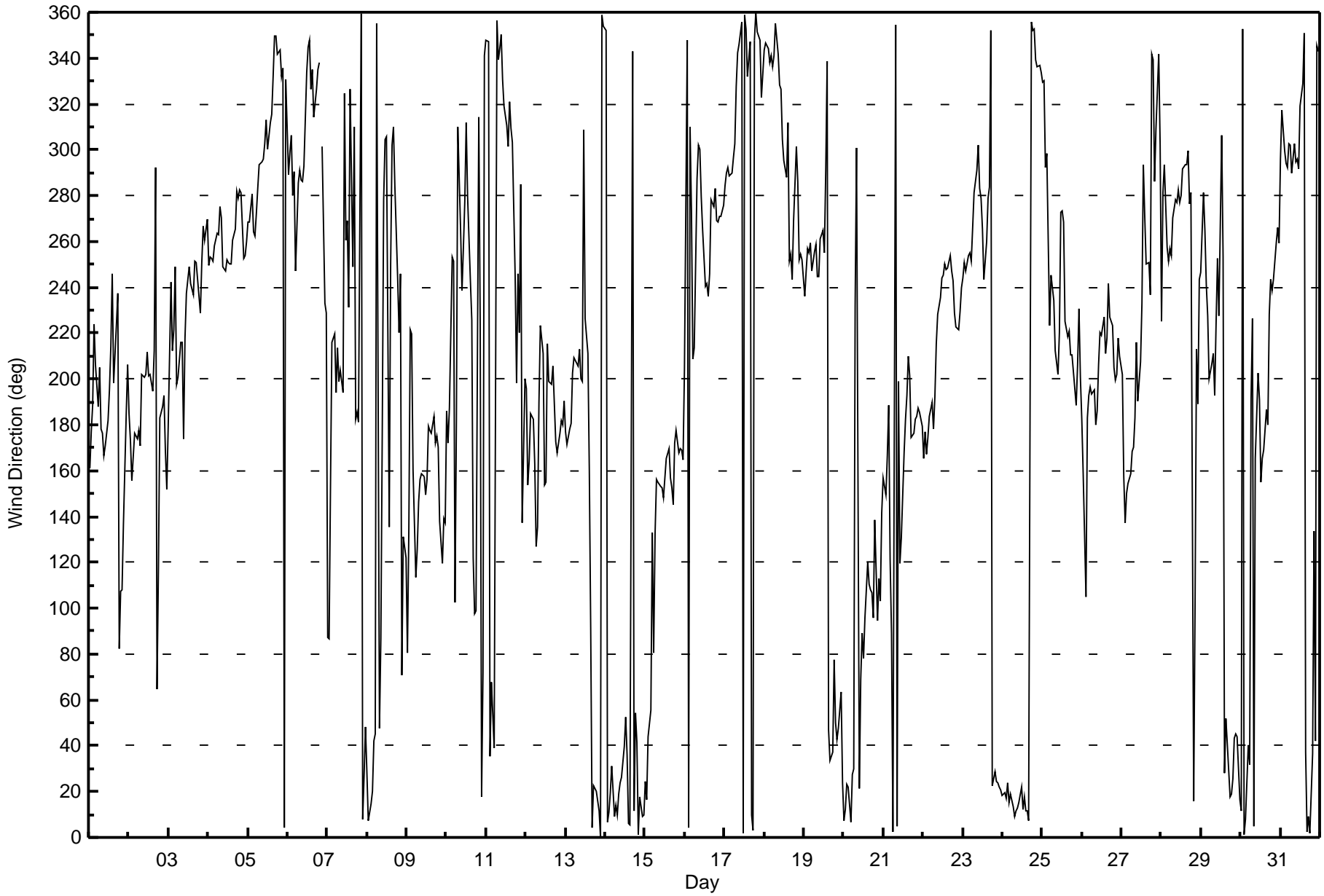
Wind Direction (WD) - deg
Mildred Lake - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Jul 11 22:00 Minimum Value: 7 deg on Jul 25 00:00 Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 19 Median = 26 Q ₃ = 33 P ₉₀ = 54 P ₉₉ = 92																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 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-Jul	22	16	19	54	34	23	19	22	24	23	18	24	26	26	36	55	58	27	56	24	12	15	29	18	58
2-Jul	21	21	15	17	19	18	18	16	21	22	27	26	22	26	20	28	53	29	24	22	19	15	94	25	94
3-Jul	21	27	29	29	28	22	18	27	29	21	27	30	36	34	32	32	28	28	28	27	31	30	29	29	36
4-Jul	27	28	26	27	27	26	25	23	29	28	28	26	29	26	28	28	27	23	23	21	22	28	26	28	29
5-Jul	27	26	22	28	25	28	25	21	22	23	22	24	23	23	23	19	23	17	14	12	12	15	17	9	28
6-Jul	31	17	37	23	22	28	26	26	32	29	28	25	36	32	25	36	24	26	16	18	AF	68	26	29	68
7-Jul	94	45	97	37	28	17	30	32	31	56	55	52	68	65	46	56	93	91	36	33	70	14	18	21	97
8-Jul	56	20	12	14	88	27	60	33	79	67	29	23	81	67	93	76	54	27	43	18	67	58	46	74	93
9-Jul	57	69	54	16	38	38	25	21	23	33	38	25	29	26	20	20	18	19	18	12	21	12	15	29	69
10-Jul	34	28	32	31	59	77	44	75	42	28	34	36	26	30	45	61	35	15	64	35	65	56	32	40	77
11-Jul	33	35	76	72	39	36	21	12	13	17	28	21	31	30	29	38	58	30	26	31	46	98	74	17	98
12-Jul	22	62	49	30	29	34	19	22	31	40	44	43	57	47	44	26	22	25	16	15	30	16	15	15	62
13-Jul	18	13	14	77	56	34	27	27	31	31	61	82	47	47	66	92	42	17	17	16	15	12	11	11	92
14-Jul	12	16	14	17	19	18	18	20	24	23	23	31	59	49	56	54	27	24	21	24	12	13	12	11	59
15-Jul	13	11	20	55	45	24	46	20	19	18	22	20	20	19	16	19	17	18	27	15	12	12	11	12	55
16-Jul	46	19	40	29	88	19	25	28	23	25	42	36	28	31	29	29	25	24	21	26	24	26	25	22	88
17-Jul	21	19	18	20	23	19	18	16	12	14	15	19	19	19	18	38	23	16	20	22	13	20	16	12	38
18-Jul	9	9	8	9	9	8	15	24	30	73	70	42	51	37	34	81	43	31	32	20	29	33	33	24	81
19-Jul	27	27	26	28	25	29	31	33	27	30	34	34	34	29	47	22	21	29	25	24	14	12	12	33	47
20-Jul	12	10	52	35	29	58	36	77	92	17	31	25	39	35	22	20	18	25	35	31	11	10	28	23	92
21-Jul	18	21	20	15	41	58	11	49	85	96	29	32	33	23	20	22	21	18	16	17	16	13	15	19	96
22-Jul	33	12	11	14	12	17	17	20	24	28	31	30	32	29	33	29	29	31	28	25	21	20	27	25	33
23-Jul	25	32	28	28	25	29	28	33	26	30	31	33	31	30	33	28	29	41	19	18	18	17	17	17	41
24-Jul	16	17	17	19	17	18	16	15	17	18	18	20	18	19	18	18	20	16	16	15	11	8	8	7	20
25-Jul	8	15	17	16	36	24	26	31	23	26	41	41	45	46	35	30	31	19	19	14	14	15	46	59	59
26-Jul	9	34	73	17	12	13	13	15	22	25	23	30	28	42	69	42	35	29	24	16	14	16	19	17	73
27-Jul	14	19	16	12	12	13	13	15	22	29	48	48	31	56	40	28	36	48	38	27	19	19	35	22	56
28-Jul	73	43	18	29	32	46	30	30	40	26	26	29	26	23	23	22	22	28	28	44	22	35	31	34	73
29-Jul	27	28	23	19	28	48	38	22	66	54	96	79	90	54	28	30	38	20	21	18	16	16	14	48	96
30-Jul	12	13	12	32	30	64	27	30	75	25	25	28	20	19	17	21	17	40	25	26	27	25	28	29	75
31-Jul	24	17	15	17	30	19	21	27	28	26	25	28	30	27	48	20	20	19	15	23	30	30	13	8	48
94 69 97 77 88 77 60 77 92 96 96 82 90 67 93 92 93 91 64 44 70 98 94 74																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Mildred Lake	Station number:	AMS 02
Calibration Date:	July 7, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	9:24	End time (MST):	12:15
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	-653.1
Calculated slope	0.995099	0.991547	Lamp voltage	802	802
Calculated intercept	0.793031	1.677183	Pressure	701.8	696.5
Analyzer Background	20.8	19.6	Flow	0.499	0.496
Analyzer Coefficient	0.956	0.951	Intensity	91	90

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	-1.8	----
as found span	4931	76.4	781.2	787.0	0.993
calibrator zero	5000	0.0	0.0	-0.5	----
high point	4931	76.4	781.2	787.0	0.993
second point	4969	38.3	391.6	391.9	0.999
third point	4986	19.2	196.4	195.7	1.004
as left zero	5003	0.0	0.0	-0.3	----
as left span	4932	76.4	781.0	785.4	0.994
Average Correction Factor					0.999

Corrected As found	788.73	Previous response	784.23	*% change	-0.6%
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* = > +/-5% change initiates investigation

Notes: Adjusted zero and span

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

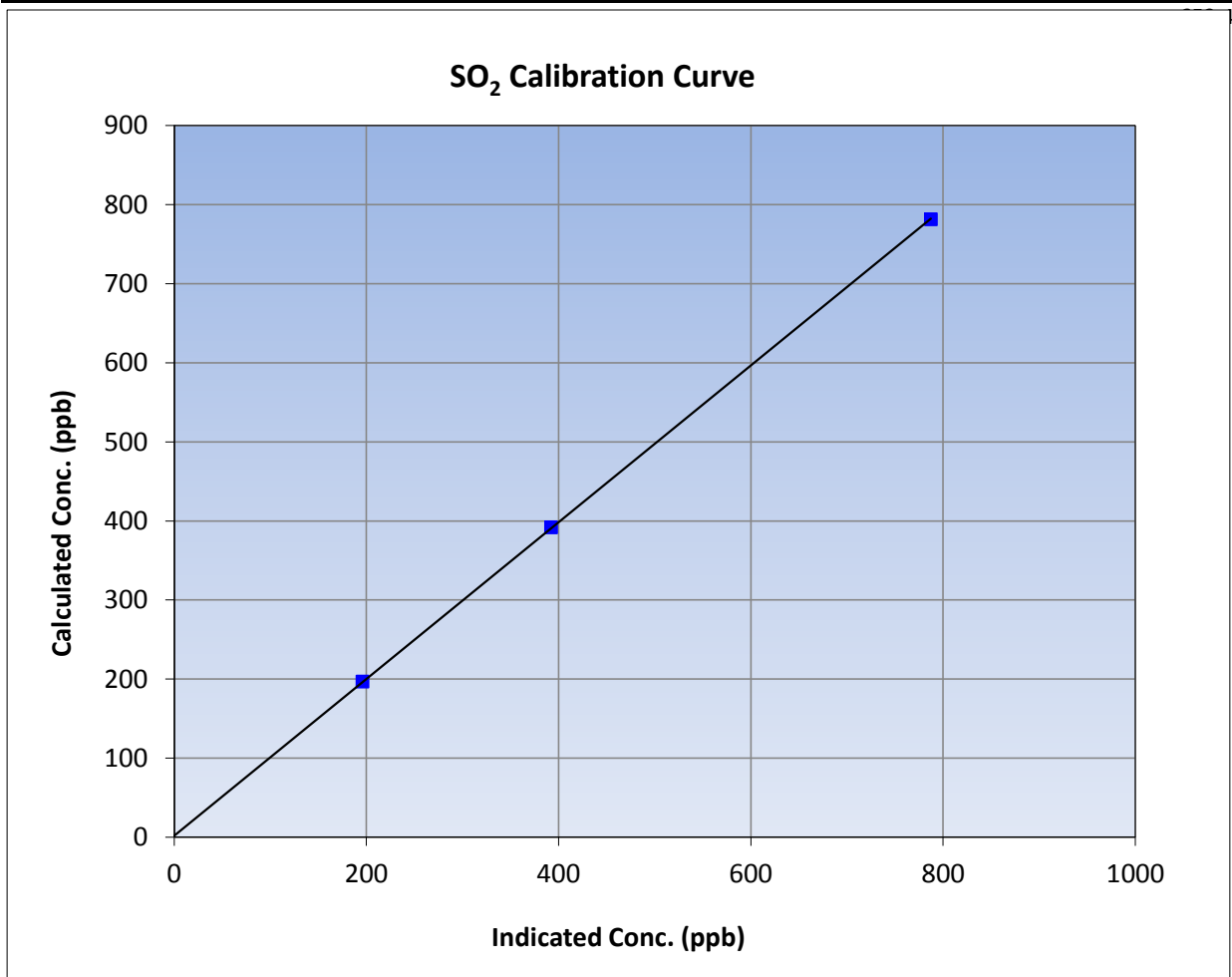
Version-03-2017

Station Information

Calibration Date	July 7, 2017	Previous Calibration	June 7, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	9:42	End Time (MST)	12:15
Analyzer make	Thermo 43i	Analyzer serial #	JC1404901075

Calibration Data

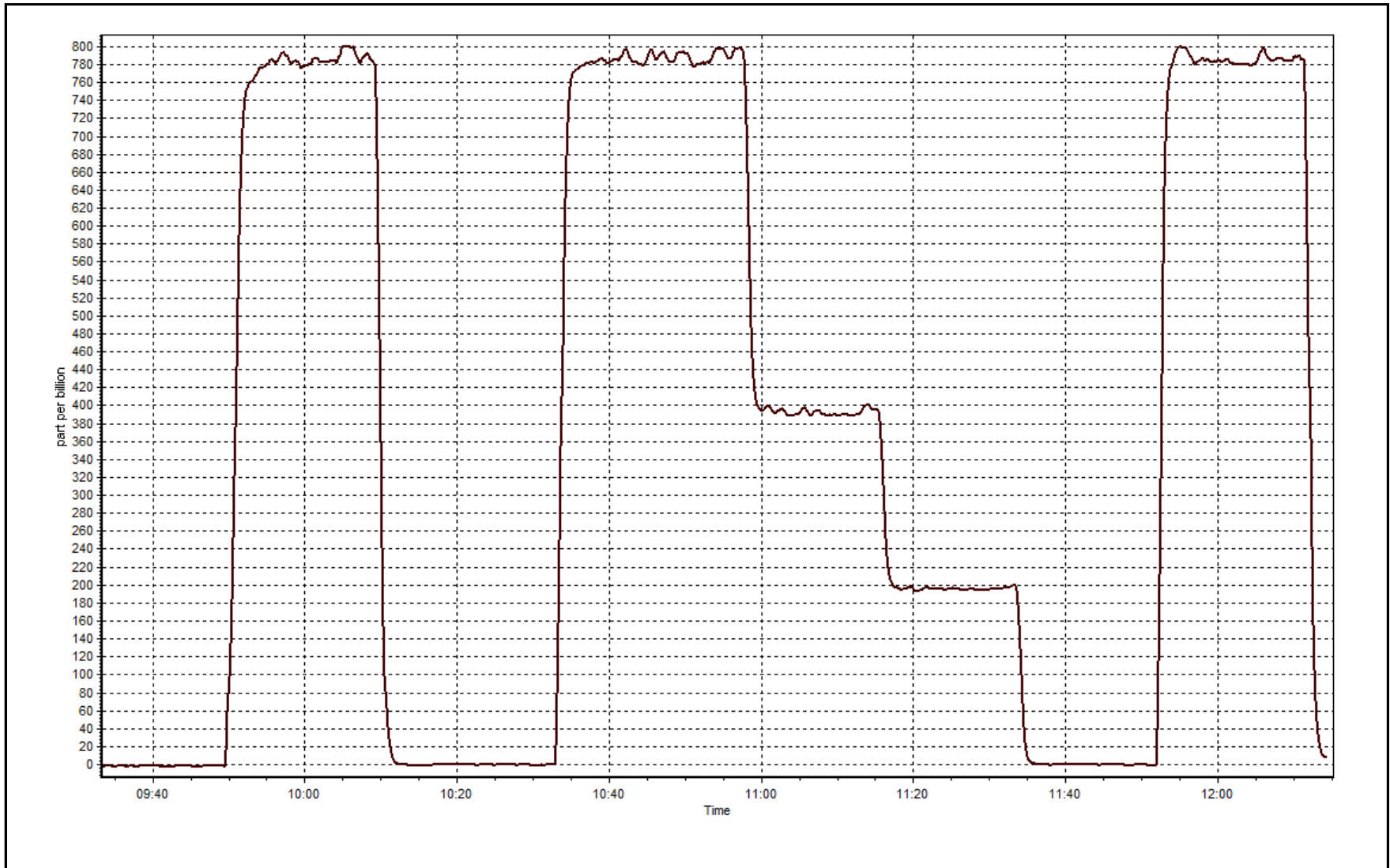
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.5	----	Correlation Coefficient	≥0.995
781.2	787.0	0.9926		
391.6	391.9	0.9993	Slope	0.90 - 1.10
196.4	195.7	1.0037		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 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:	July 11, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	10:05	End time (MST):	12:19
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	0.999083	0.987731	Lamp voltage	788	787
Calculated intercept	-0.318313	0.330918	Pressure	561.5	560.3
Analyzer Background	16.8	17.5	Flow	0.981	0.974
Analyzer Coefficient	0.976	0.976	Intensity	88	88

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	81.3	0.992
calibrator zero	5000	0.0	0.0	-0.3	----
high point	4927	80.1	80.6	81.3	0.992
second point	4966	40.1	40.4	40.6	0.994
third point	4988	20.1	20.2	20.0	1.012
as left zero	5004	0.0	0.0	-0.2	----
as left span	3945	64.1	80.6	81.6	0.988
SO2 Scrubber Check	4841	20.1	200.0	-0.2	----
Average Correction Factor					0.999
Corrected As found	80.78	Previous response	81.00	*% change	0.3%

* = > +/-5% change initiates investigation

Notes:

Adjusted zero. SO2 scrubber check performed with 200 ppb from an SO2 cylinder.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

H₂S Calibration Summary

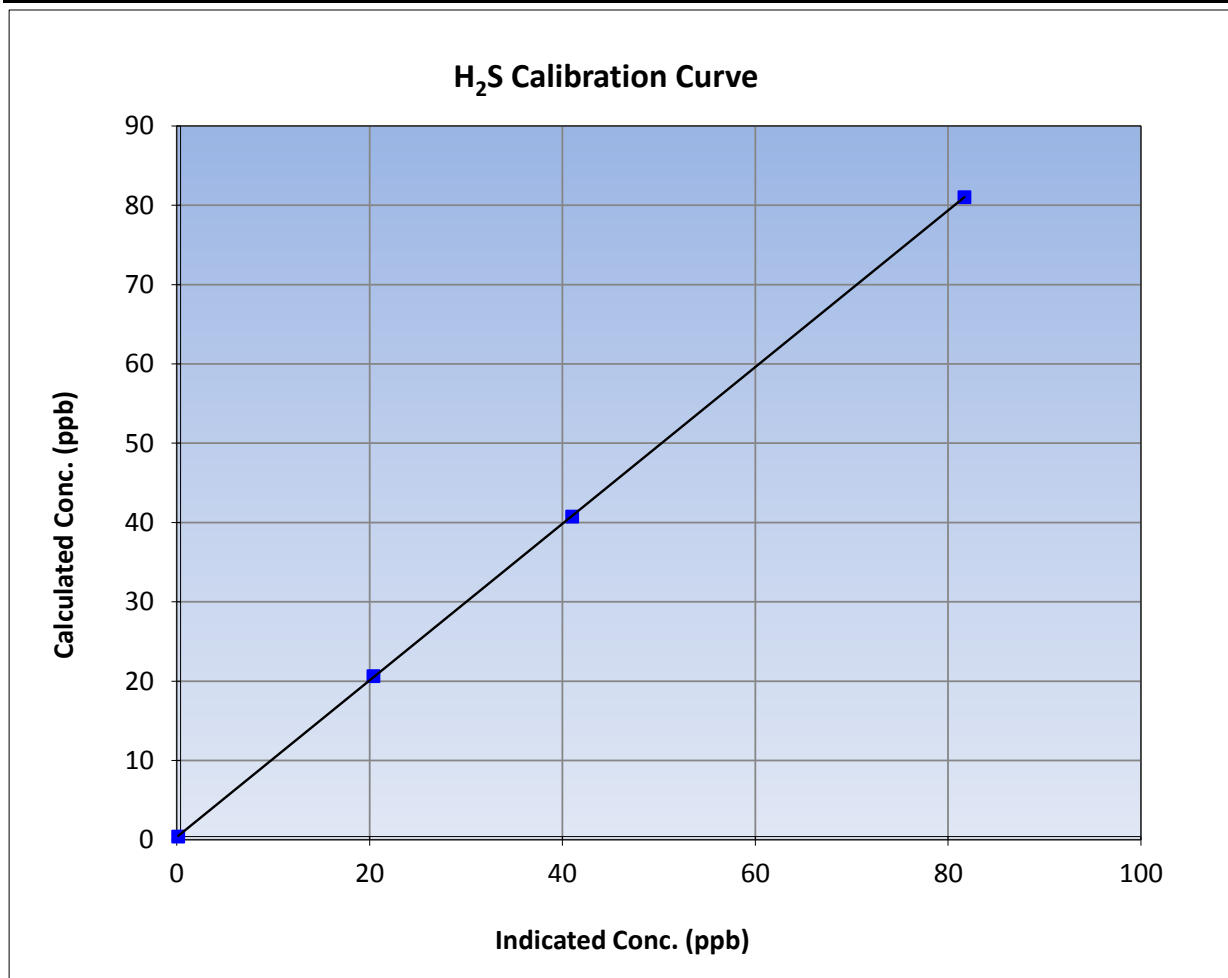
Version-03-2017

Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 8, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	10:05	End Time (MST)	12:19
Analyzer make	TEI 450i	Analyzer serial #	815129107

Calibration Data

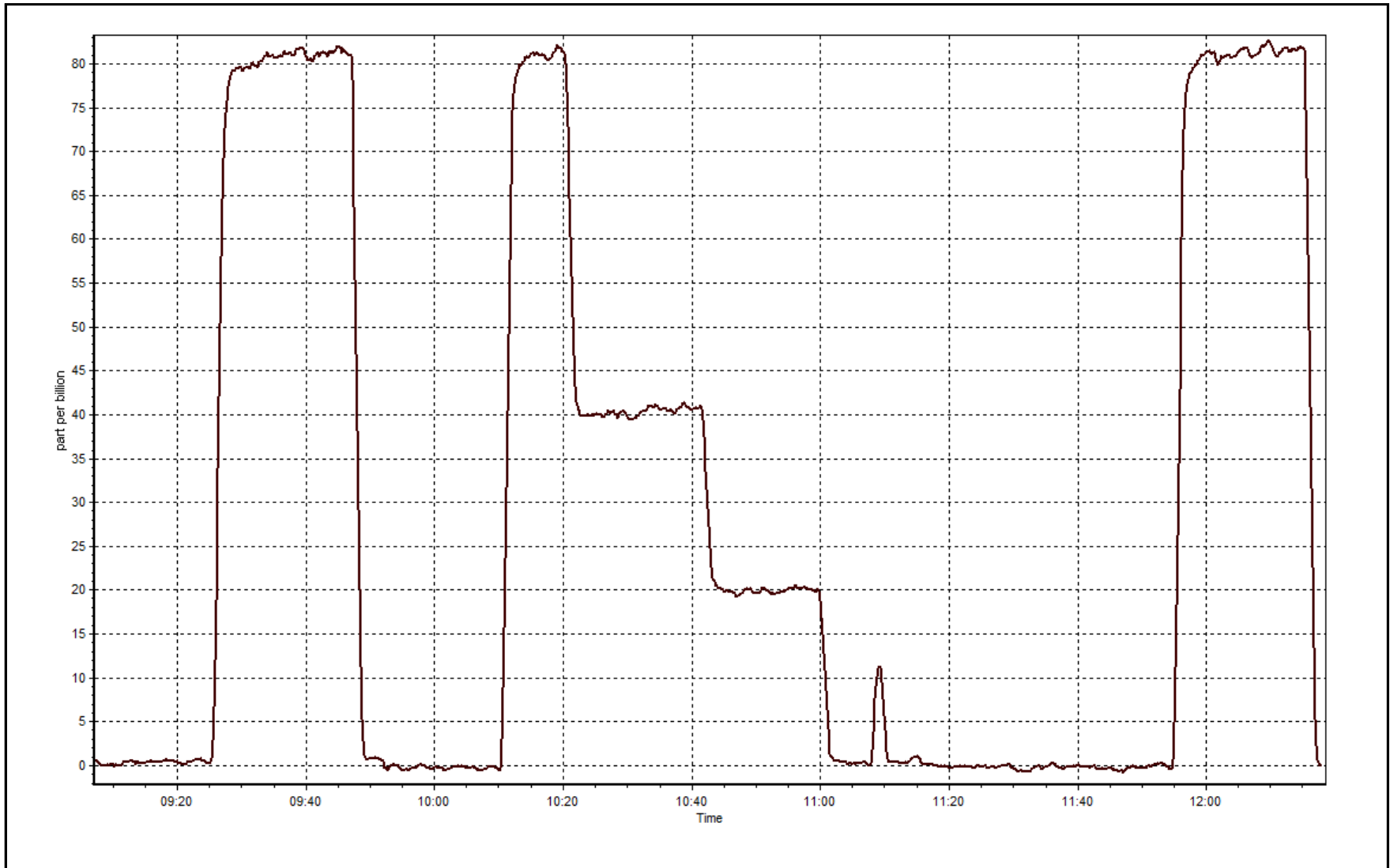
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999990	≥0.995
80.6	81.3	0.9917			
40.4	40.6	0.9944	Slope	0.987731	0.90 - 1.10
20.2	20.0	1.0119			
			Intercept	0.330918	+/-3



H₂S Calibration Plot

Date: July 11, 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:	July 7, 2017	Last Cal Date:	June 29, 2017
Start time (MST):	9:24	End time (MST):	12:14
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>	
Analyzer Range	0 - 25 ppm	Bias voltage supply	-302.2
Calculated slope	0.999511	Sample pressure	8.2
Calculated intercept	0.015419	Fuel pressure	21.8
Analyzer Background	0.58	Air pressure	33.1
Analyzer Coefficient	3.771	Flame temperature	143.6

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	-0.05	----
as found span	4931	76.4	16.49	16.19	1.019
calibrator zero	5002	0.0	0.00	-0.05	----
high point	4931	76.4	16.49	16.48	1.001
second point	4969	38.3	8.27	8.21	1.007
third point	4987	19.2	4.15	4.09	1.014
as left zero	5004	0.0	0.00	-0.07	----
as left span	4932	76.4	16.49	16.41	1.005
Average Correction Factor					1.007
Corrected As found	16.24	Previous response	16.49	*% change	1.5%

* = > +/-5% change initiates investigation

Notes:

Adjusted Span.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

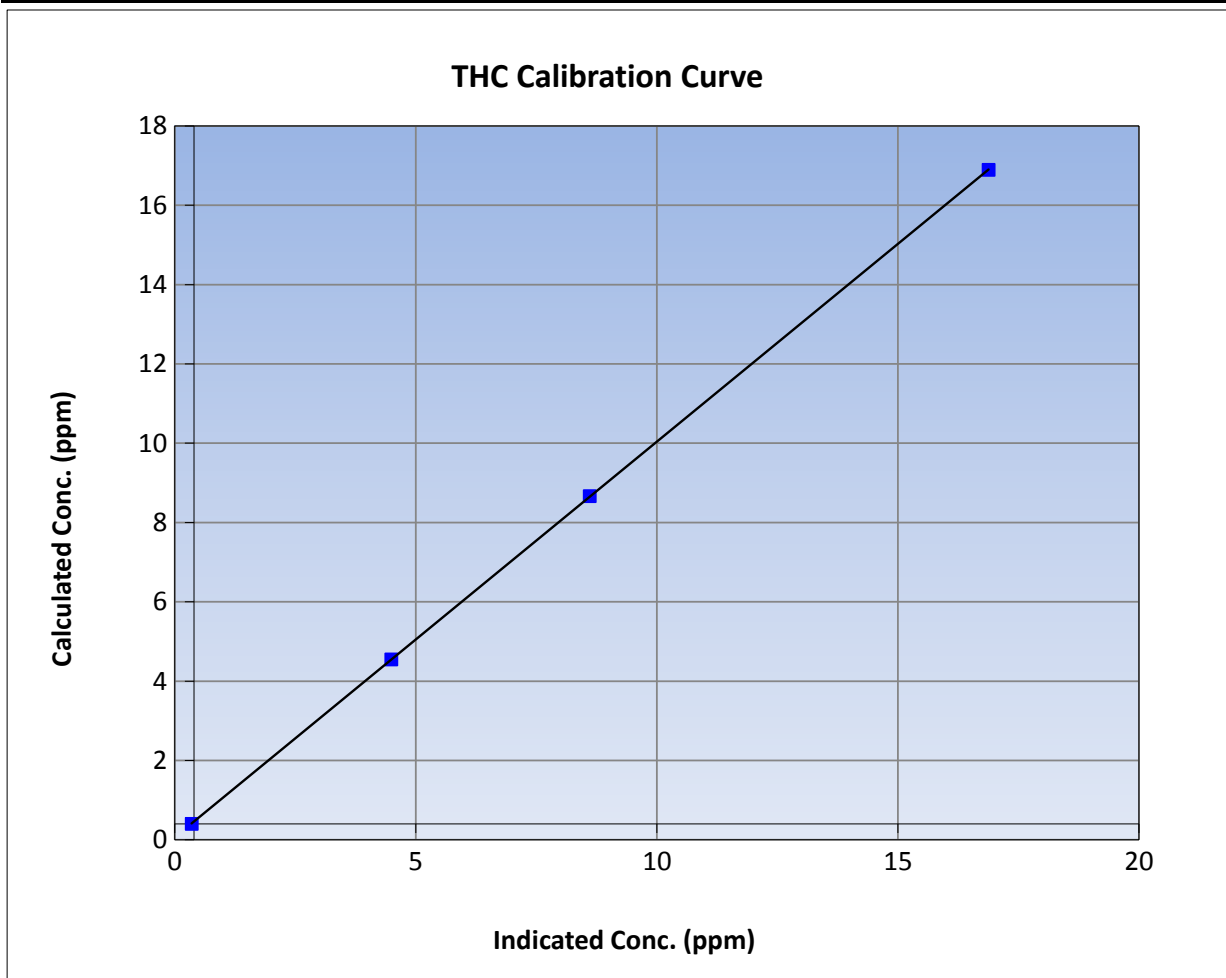
Version-03-2017

Station Information

Calibration Date	July 7, 2017	Previous Calibration	June 29, 2017
Station Name	Mildred Lake	Station Number	AMS 02
Start Time (MST)	9:24	End Time (MST)	12:14
Analyzer make	Thermo 51i-LT	Analyzer serial #	1300156231

Calibration Data

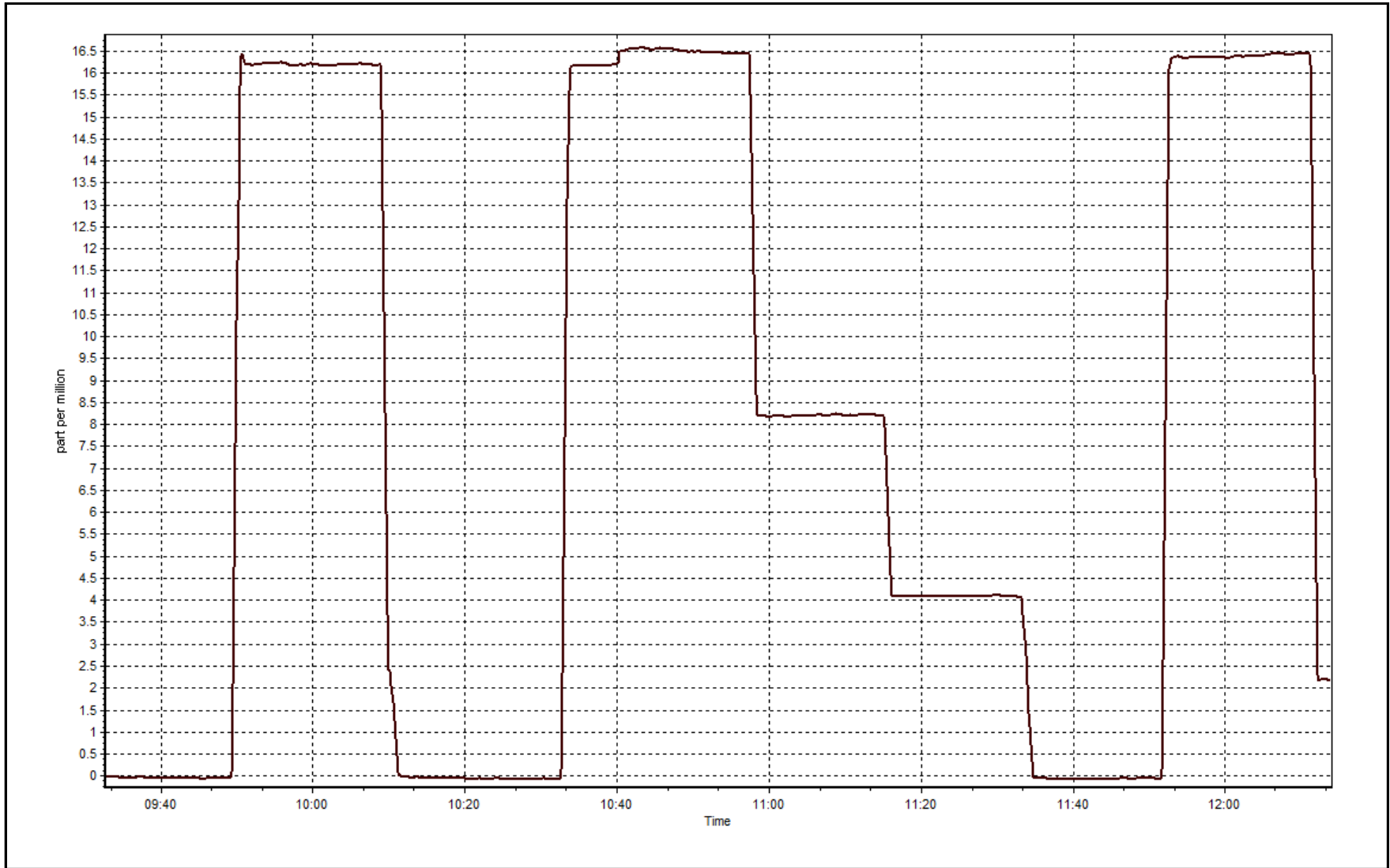
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999997	≥0.995
16.5	16.5	1.0008			
8.3	8.2	1.0071	Slope	0.997649	0.90 - 1.10
4.1	4.1	1.0137			
			Intercept	0.061273	+/-1.5



THC Calibration Plot

Date: July 7, 2017

Location: Mildred Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 JULY 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	744	0	0	100	31.9	-	25.0	-
Temperature 45 m (C) Average	744	0	0	100	32	-	24.9	-
Temperature 100 m (C) Average	744	0	0	100	31.7	-	24.8	-
Temperature 167 m (C) Average	744	0	0	100	31.2	-	24.7	-
Relative Humidity 20 m (%) Average	744	0	0	100	99	-	78.0	-
Relative Humidity 45 m (%) Average	744	0	0	100	98	-	77.0	-
Relative Humidity 100 m (%) Average	744	0	0	100	99	-	75.0	-
Relative Humidity 167 m (%) Average	744	0	0	100	98	-	72.0	-
Wind Speed 20 m (km/h) Average	744	0	0	100	27	-	19.0	-
Wind Speed 45 m (km/h) Average	744	0	0	100	38	-	27.0	-
Wind Speed 100 m (km/h) Average	744	0	0	100	43	-	34.0	-
Wind Speed 167 m (km/h) Average	744	0	0	100	49	-	41.0	-
Wind Direction 20 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 167 m (deg) Average	744	0	0	100	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100	0.8	-	0.3	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100	1.4	-	0.6	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100	2.8	-	0.9	-
Vertical Wind Speed 167 m (km/h) Average	744	0	0	100	4.4	-	1.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 JULY 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	744	20.12	4.6	-	8.5	14.5	16.9	19.8	23.3	26.3	31.9
Temperature 45 m (C) Average	744	20.06	4.5	-	8.9	14.4	16.9	19.8	23.1	26.1	32
Temperature 100 m (C) Average	744	19.85	4.3	-	8.8	14.6	16.9	19.7	22.6	25.8	31.7
Temperature 167 m (C) Average	744	19.61	4.1	-	8.6	14.4	16.7	19.4	22.2	25.4	31.2
Relative Humidity 20 m (%) Average	744	61.3	19	-	24	36	47	59	76	87	99
Relative Humidity 45 m (%) Average	744	60	18	-	23	35	46	58	74	85	98
Relative Humidity 100 m (%) Average	744	57.9	17	-	23	34	45	57	72	81	99
Relative Humidity 167 m (%) Average	744	56.8	16	-	23	34	45	57	69	79	98
Wind Speed 20 m (km/h) Average	744	8.1	5	-	0	2	4	8	11	15	27
Wind Speed 45 m (km/h) Average	744	11.1	7	-	0	2	6	10	15	20	38
Wind Speed 100 m (km/h) Average	744	15.4	9	-	0	4	8	15	21	28	43
Wind Speed 167 m (km/h) Average	744	18.2	11	-	1	6	10	16	25	34	49
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 167 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	-0.12	0.3	-	-1	-0.5	-0.3	-0.1	0.1	0.3	0.8
Vertical Wind Speed 45 m (km/h) Average	744	-0.1	0.5	-	-1.5	-0.8	-0.5	-0.1	0.2	0.6	1.4
Vertical Wind Speed 100 m (km/h) Average	744	0.25	0.5	-	-1.4	-0.4	-0.1	0.2	0.6	1	2.8
Vertical Wind Speed 167 m (km/h) Average	744	0.59	0.8	-	-1.5	-0.3	0.1	0.5	1	1.6	4.4

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

OPERATIONAL NOTES

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



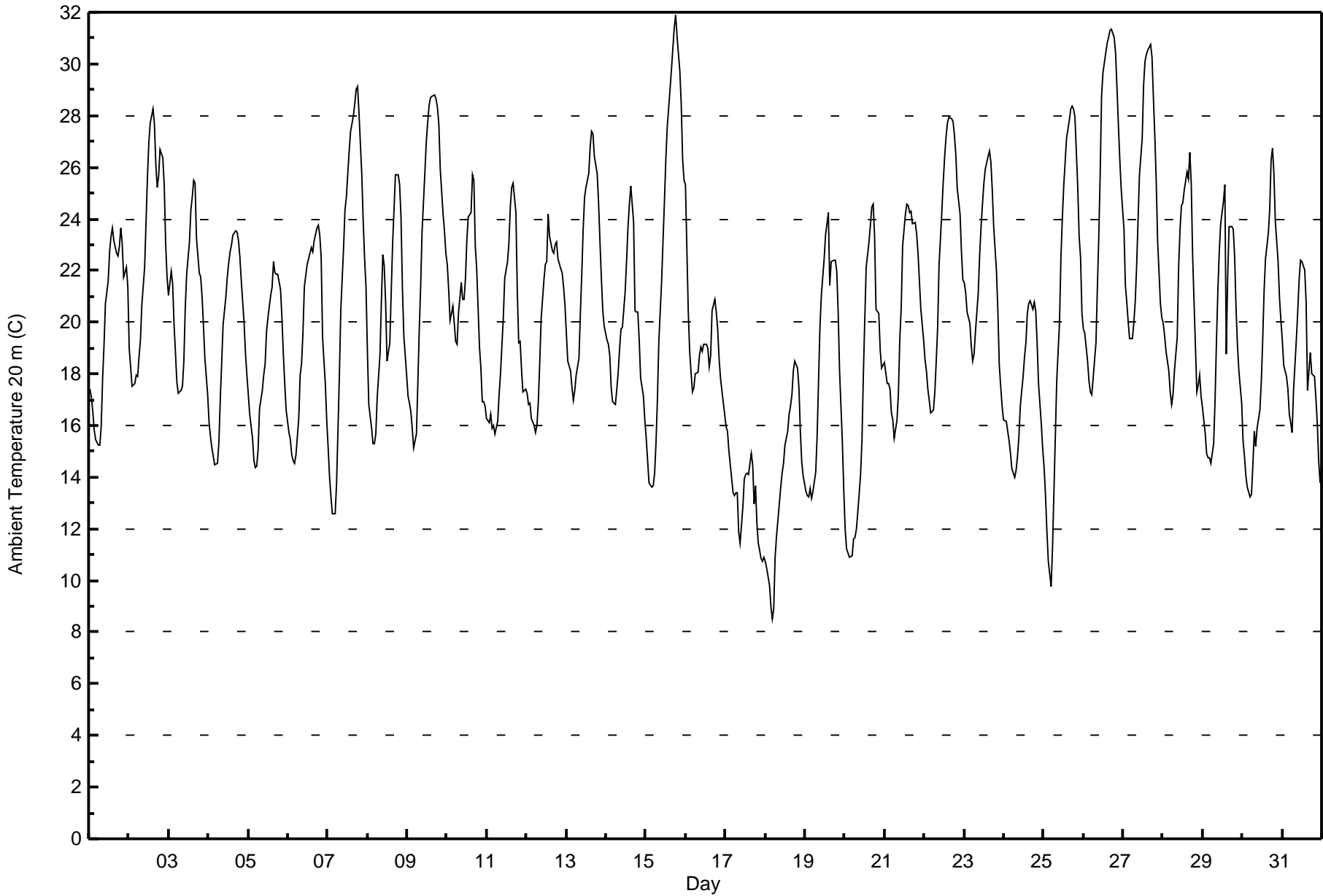
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 20 m (AT20m) - C

Lower Camp Met Tower - July 2017

Maximum Value: 31.9 C on Jul 15 19:00 Maximum Daily Average: 25.0 C on Jul 26																						Hours in Service:	744																							
Minimum Value: 8.5 C on Jul 18 05:00 Minimum Daily Average: 13.3 C on Jul 17																						Hours of Data:	744																							
Maximum Diurnal Average: 24.5 C at hour 17 Minimum Diurnal Average: 15.4 C at hour 5																						Hours of Missing Data:	0																							
Monthly Average: 20.12 C Percentiles: P ₁ = 10.8 P ₁₀ = 14.5 Q ₁ = 16.9 Median = 19.8 Q ₃ = 23.3 P ₉₀ = 26.3 P ₉₉ = 31.0																						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-Jul	17.4	17.1	16.5	15.8	15.4	15.2	15.2	15.9	17.8	19.1	20.7	21.6	22.7	23.3	23.7	23.1	22.6	22.6	22.9	23.6	23.1	21.8	22.1	21.4	20.0	23.7																				
2-Jul	19.0	18.3	17.5	17.7	17.9	17.9	18.7	19.3	20.7	22.1	23.9	25.6	26.9	27.7	28.3	27.6	26.1	25.2	25.6	26.7	26.4	25.3	23.0	21.7	22.9	28.3																				
3-Jul	21.0	22.0	21.5	19.9	18.8	17.7	17.3	17.4	17.5	18.5	20.6	21.8	23.1	24.4	24.8	25.5	25.4	23.3	21.9	21.8	21.0	19.9	18.6	17.2	20.9	25.5																				
4-Jul	16.1	15.5	15.1	14.8	14.5	14.5	15.3	17.0	18.4	19.9	21.0	21.8	22.3	22.7	23.0	23.4	23.5	23.5	23.2	22.5	21.6	20.0	18.8	17.9	19.4	23.5																				
5-Jul	17.2	16.4	15.5	14.7	14.4	14.4	15.1	16.6	17.4	18.0	18.4	19.6	20.2	21.0	21.4	22.4	21.9	21.9	21.8	21.3	20.2	18.8	17.6	16.6	18.4	22.4																				
6-Jul	15.7	15.4	14.9	14.6	14.5	14.9	16.3	18.0	18.4	19.6	21.4	22.3	22.5	22.7	22.9	22.7	23.1	23.6	23.8	23.4	22.5	19.4	17.5	16.1	19.4	23.8																				
7-Jul	15.1	14.0	13.2	12.6	12.6	13.8	15.8	17.9	20.5	22.9	24.4	24.9	25.7	26.6	27.4	28.0	28.5	29.0	29.1	28.1	25.7	23.9	22.5	21.4	21.8	29.1																				
8-Jul	18.8	16.8	15.9	15.3	15.3	15.7	17.1	18.8	20.8	22.6	22.2	20.8	18.5	19.2	21.1	23.0	24.4	25.7	25.7	25.3	24.0	21.3	19.5	18.0	20.2	25.7																				
9-Jul	17.1	16.9	16.5	15.9	15.1	15.7	17.7	19.7	21.4	23.5	25.7	27.0	27.7	28.4	28.7	28.7	28.8	28.6	28.3	27.7	25.9	24.2	23.5	22.7	23.1	28.8																				
10-Jul	22.3	21.2	20.1	20.6	20.0	19.3	19.1	20.4	21.5	20.9	20.9	21.7	23.2	24.1	24.3	25.7	25.5	23.0	22.1	19.0	18.2	16.9	16.9	16.8	21.0	25.7																				
11-Jul	16.3	16.1	16.4	15.9	16.0	15.7	16.1	17.2	18.0	19.1	20.2	21.7	22.3	23.1	24.5	25.2	25.4	24.3	21.2	19.2	19.3	18.2	17.3	17.4	19.4	25.4																				
12-Jul	17.3	16.8	16.9	16.3	16.0	15.7	16.0	16.9	18.4	20.1	21.7	22.2	22.4	24.2	23.3	22.8	22.7	23.0	23.1	22.4	22.1	21.9	21.4	20.7	20.2	24.2																				
13-Jul	19.6	18.5	18.1	17.5	17.0	17.3	17.9	18.6	20.3	21.8	23.6	24.8	25.2	25.8	26.8	27.4	27.3	26.4	25.7	24.6	23.1	21.7	20.4	19.8	22.1	27.4																				
14-Jul	19.3	19.2	18.7	17.5	16.9	16.8	17.4	18.0	19.0	19.7	19.8	21.2	22.4	23.7	24.6	25.3	23.9	20.5	20.4	20.4	19.3	17.8	17.1	16.2	19.8	25.3																				
15-Jul	15.5	14.6	13.8	13.6	13.7	14.2	15.3	17.0	19.3	21.6	23.1	24.7	26.3	27.5	29.0	29.8	30.6	31.4	31.9	31.1	29.7	28.4	26.3	25.5	23.1	31.9																				
16-Jul	25.3	20.5	18.9	18.1	17.3	17.5	18.0	18.1	18.7	19.0	18.9	19.1	19.0	18.3	18.7	20.5	20.9	20.4	19.7	18.6	17.8	17.3	16.4	19.0	25.3																					
17-Jul	16.0	15.8	15.0	14.5	13.4	13.3	13.4	13.4	11.9	11.4	12.8	14.0	14.1	14.2	14.1	14.9	14.5	13.0	13.7	12.2	11.5	10.9	10.8	10.9	13.3	16.0																				
18-Jul	10.8	10.5	9.8	9.0	8.5	8.9	10.9	11.7	12.9	13.6	14.2	14.6	15.2	15.8	16.4	16.7	17.2	18.1	18.5	18.2	17.5	15.8	14.6	14.1	13.9	18.5																				
19-Jul	13.4	13.3	13.2	13.6	13.2	13.5	14.2	15.6	17.8	19.8	21.0	22.5	23.4	23.8	24.3	21.4	22.4	22.4	22.4	22.0	20.4	18.1	15.4	13.5	18.4	24.3																				
20-Jul	12.0	11.2	11.0	10.9	11.0	11.6	11.6	12.0	12.6	14.1	15.4	18.0	20.1	22.1	23.1	23.7	24.4	24.6	23.3	20.5	20.4	18.9	18.2	18.3	17.1	24.6																				
21-Jul	18.4	17.6	17.6	17.4	16.5	16.2	15.5	16.2	17.2	19.4	20.5	22.9	24.2	24.6	24.5	24.3	24.3	23.8	23.9	23.4	22.7	21.6	20.5	19.3	20.5	24.6																				
22-Jul	18.6	18.1	17.4	17.0	16.5	16.6	17.3	18.5	19.8	22.2	24.3	25.5	26.4	27.2	27.7	28.0	27.9	27.8	27.2	26.5	25.2	24.2	22.7	21.7	22.7	28.0																				
23-Jul	21.5	21.2	20.4	20.0	19.1	18.5	18.7	19.7	21.2	22.6	23.7	24.6	25.4	25.9	26.4	26.6	26.2	25.1	23.7	22.0	20.4	18.4	17.5	16.7	21.9	26.6																				
24-Jul	16.2	16.2	15.8	15.4	14.9	14.3	14.0	14.3	14.8	15.5	16.8	17.9	18.7	19.2	20.4	20.7	20.9	20.5	20.8	20.5	19.2	17.6	16.0	15.1	17.3	20.9																				
25-Jul	14.4	13.3	11.9	10.8	9.8	11.3	13.5	15.6	17.7	20.0	22.5	24.0	25.3	26.2	27.1	27.8	28.3	28.4	28.2	27.9	25.2	23.3	22.5	20.3	20.6	28.4																				
26-Jul	19.8	19.6	18.5	17.7	17.3	17.2	17.9	19.2	21.3	23.3	25.7	28.7	29.7	30.4	30.8	31.0	31.3	31.3	31.0	30.4	29.1	27.6	26.3	25.1	25.0	31.3																				
27-Jul	23.6	21.4	20.8	20.0	19.3	19.4	19.9	20.8	22.1	23.9	25.6	27.1	29.2	30.1	30.4	30.5	30.8	30.3	28.7	27.2	25.5	23.2	20.7	20.2	24.6	30.8																				
28-Jul	20.0	19.5	18.9	18.1	17.3	16.8	17.2	18.1	19.4	22.1	23.6	24.5	24.6	25.1	25.8	25.5	26.6	25.4	22.5	19.1	17.3	17.5	17.9	17.1	20.8	26.6																				
29-Jul	16.7	15.7	14.9	14.7	14.7	14.5	15.3	17.0	19.3	21.2	22.7	23.8	24.7	25.3	18.8	21.8	23.7	23.7	23.6	22.5	20.5	19.1	18.1	16.9	19.5	25.3																				
30-Jul	15.4	14.8	14.0	13.6	13.2	13.4	14.5	15.8	15.2	15.9	16.6	17.7	19.3	21.2	22.5	23.5	24.4	26.3	26.7	25.8	23.9	22.4	21.0	20.1	19.0	26.7																				
31-Jul	19.3	18.3	17.9	17.4	16.4	16.1	15.7	17.4	19.3	20.4	21.7	22.4	22.4	22.0	20.8	17.4	18.1	18.8	18.0	17.9	17.0	16.1	14.6	13.8	18.3	22.4																				
																						17.7	17.0	16.3	15.8	15.4	15.4	16.1	17.2	18.4	19.8	21.1	22.2	23.0	23.8	24.0	24.3	24.5	24.3	23.9	23.0	21.8	20.4	19.3	18.4	Diurnal Average
																						25.3	22.0	21.5	20.6	20.0	19.4	19.9	20.8	22.1	23.9	25.7	28.7	29.7	30.4	30.8	31.0	31.3	31.4	31.9	31.1	29.7	28.4	26.3	25.5	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	5	0.67	0.67
10 - 20	378	50.81	51.48
> 20	361	48.52	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

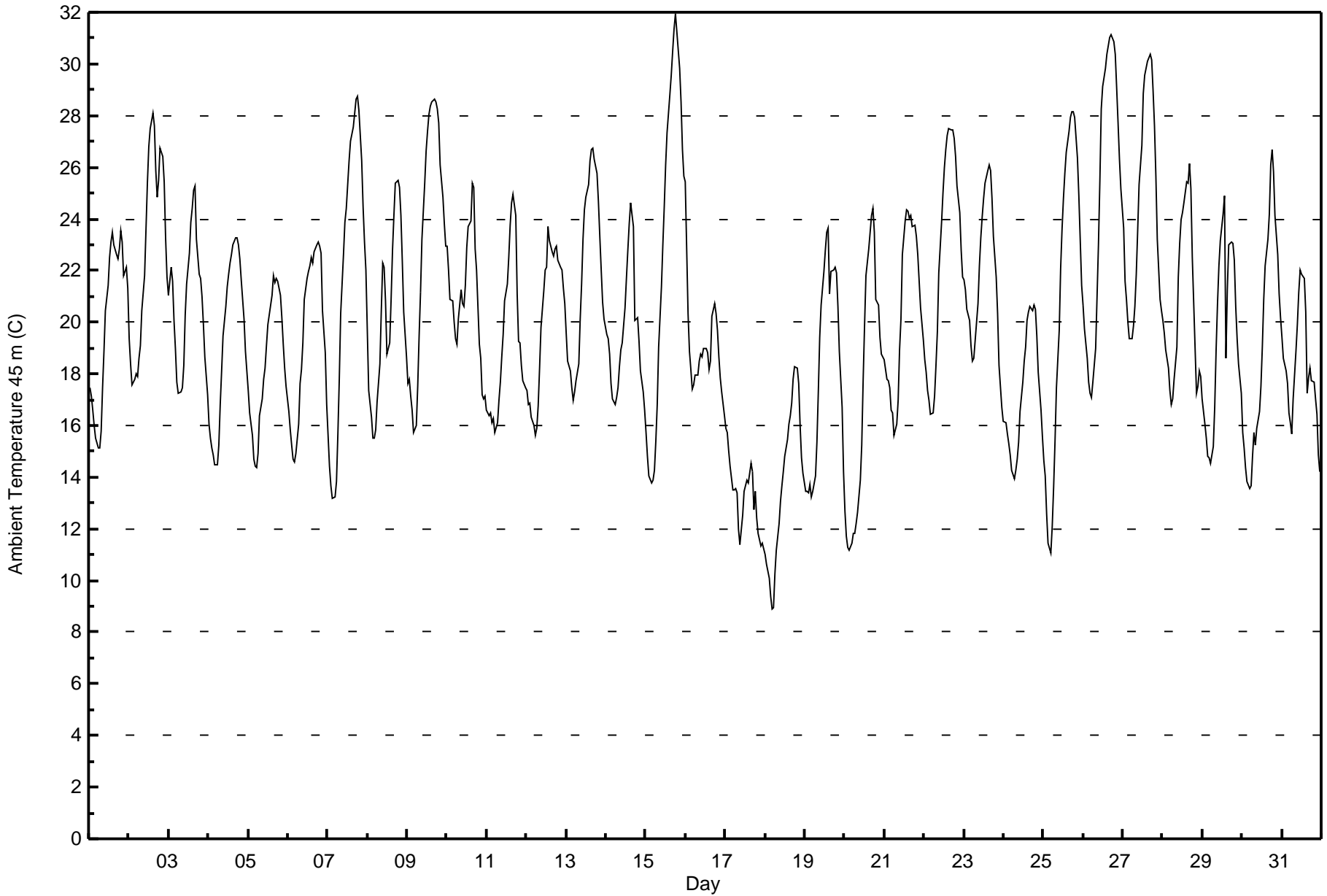


Maximum Value: 32.0 C on Jul 15 19:00																						Maximum Daily Average: 24.9 C on Jul 26																						Hours in Service: 744		
Minimum Value: 8.9 C on Jul 18 05:00																						Minimum Daily Average: 13.3 C on Jul 17																						Hours of Data: 744		
Maximum Diurnal Average: 24.2 C at hour 17																						Minimum Diurnal Average: 15.5 C at hour 6																						Hours of Missing Data: 0		
Monthly Average: 20.06 C																						Percentiles: P ₁ = 11.1 P ₁₀ = 14.4 Q ₁ = 16.9 Median = 19.8 Q ₃ = 23.1 P ₉₀ = 26.1 P ₉₉ = 30.5																						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-Jul	17.5	17.1	16.6	16.0	15.5	15.1	15.1	15.8	17.5	18.9	20.5	21.4	22.5	23.1	23.5	23.0	22.6	22.4	22.8	23.6	23.1	21.8	22.1	21.3	19.9	23.6																				
2-Jul	19.4	18.4	17.6	17.8	18.0	17.9	18.6	19.1	20.4	21.8	23.6	25.4	26.8	27.5	28.1	27.6	25.9	24.8	25.5	26.7	26.4	25.4	23.3	21.8	22.8	28.1																				
3-Jul	21.1	22.1	21.6	20.1	19.0	17.7	17.2	17.3	17.4	18.3	20.3	21.5	22.7	23.9	24.4	25.1	25.3	23.2	21.9	21.7	21.0	19.9	18.6	17.2	20.8	25.3																				
4-Jul	16.1	15.5	15.1	14.9	14.5	14.5	15.2	16.8	18.1	19.5	20.6	21.4	21.9	22.3	22.6	23.0	23.3	23.3	23.0	22.5	21.7	20.1	18.9	18.1	19.3	23.3																				
5-Jul	17.3	16.5	15.6	14.7	14.4	14.4	14.9	16.4	17.0	17.8	18.2	19.1	19.9	20.7	21.1	21.8	21.5	21.7	21.6	21.0	20.2	19.1	18.2	17.5	18.4	21.8																				
6-Jul	16.5	15.8	15.2	14.7	14.6	14.9	16.1	17.6	18.2	19.2	20.9	21.7	21.9	22.2	22.5	22.3	22.7	23.0	23.1	23.0	22.7	20.5	18.8	16.8	19.4	23.1																				
7-Jul	15.6	14.4	13.7	13.2	13.2	13.8	15.7	17.8	20.3	22.6	23.8	24.4	25.3	26.2	27.0	27.6	28.1	28.7	28.8	28.2	26.2	24.5	23.1	22.0	21.8	28.8																				
8-Jul	19.7	17.4	16.3	15.5	15.5	15.8	16.9	18.4	20.5	22.3	22.1	20.8	18.8	19.2	20.9	22.8	24.1	25.4	25.5	25.2	24.1	22.4	20.4	18.7	20.4	25.5																				
9-Jul	17.6	17.8	17.1	16.6	15.7	16.0	17.5	19.5	21.1	23.2	25.4	26.6	27.4	28.0	28.4	28.5	28.6	28.5	28.3	27.7	26.1	24.8	23.8	23.0	23.2	28.6																				
10-Jul	22.9	22.0	20.9	20.8	20.0	19.4	19.1	20.1	21.3	20.7	20.6	21.4	22.9	23.7	23.9	25.4	25.2	22.8	22.0	19.2	18.6	17.2	17.0	17.1	21.0	25.4																				
11-Jul	16.6	16.4	16.5	16.1	16.3	15.8	16.1	17.0	17.7	18.7	19.5	20.8	21.5	22.5	23.8	24.6	24.9	24.2	21.1	19.2	19.2	18.4	17.7	17.5	19.3	24.9																				
12-Jul	17.4	16.8	16.9	16.3	16.0	15.6	15.9	16.8	18.2	19.8	21.2	22.0	22.1	23.7	23.2	22.7	22.5	22.9	23.0	22.4	22.1	22.0	21.3	20.7	20.1	23.7																				
13-Jul	19.6	18.5	18.1	17.5	17.0	17.3	17.7	18.4	20.1	21.5	23.2	24.3	24.8	25.3	26.3	26.7	26.7	26.3	25.8	24.7	23.3	22.0	20.8	20.1	21.9	26.7																				
14-Jul	19.5	19.4	18.8	17.6	17.0	16.8	17.1	17.5	18.3	19.0	19.2	20.6	21.7	22.8	23.8	24.6	23.7	20.1	20.1	20.2	19.3	18.1	17.3	16.6	19.5	24.6																				
15-Jul	15.7	14.8	14.0	13.8	13.9	14.3	15.4	16.8	19.0	21.4	23.0	24.4	26.1	27.3	28.8	29.6	30.5	31.3	32.0	31.2	29.8	28.5	26.7	25.7	23.1	32.0																				
16-Jul	25.4	20.3	18.9	18.2	17.4	17.6	17.9	17.9	18.5	18.8	18.7	19.0	19.0	18.8	18.2	18.5	20.2	20.7	20.4	19.7	18.6	17.9	17.3	16.4	18.9	25.4																				
17-Jul	15.9	15.7	15.0	14.4	13.5	13.5	13.5	13.4	12.0	11.4	12.5	13.5	13.7	13.9	13.8	14.5	14.2	12.7	13.5	12.4	11.8	11.3	11.4	11.2	13.3	15.9																				
18-Jul	11.0	10.6	10.1	9.4	8.9	9.0	10.2	11.2	12.2	13.1	13.7	14.2	14.8	15.5	16.1	16.4	16.8	17.8	18.3	18.2	17.6	16.0	14.7	14.1	13.7	18.3																				
19-Jul	13.5	13.5	13.4	13.7	13.3	13.4	14.1	15.3	17.3	19.4	20.7	21.9	22.8	23.5	23.6	21.1	22.0	22.0	22.1	21.9	20.6	18.9	16.7	14.2	18.3	23.6																				
20-Jul	12.7	11.7	11.3	11.1	11.5	11.8	11.8	12.2	12.6	13.9	15.3	17.7	19.9	21.8	22.8	23.5	24.2	24.4	23.5	20.9	20.7	19.4	18.7	18.7	17.2	24.4																				
21-Jul	18.6	17.8	17.7	17.5	16.6	16.5	15.6	16.0	17.0	18.9	20.1	22.6	23.9	24.3	24.3	24.0	24.2	23.7	23.8	23.3	22.6	21.6	20.5	19.3	20.4	24.3																				
22-Jul	18.6	18.1	17.4	17.0	16.4	16.5	17.1	18.3	19.7	21.9	23.9	25.0	26.0	26.7	27.3	27.5	27.4	27.4	27.1	26.4	25.3	24.2	22.8	21.8	22.5	27.5																				
23-Jul	21.6	21.3	20.5	20.1	19.1	18.5	18.6	19.3	20.7	22.2	23.2	24.1	24.8	25.4	25.9	26.1	25.9	24.8	23.3	21.7	20.3	18.4	17.5	16.7	21.7	26.1																				
24-Jul	16.1	16.1	15.7	15.3	14.8	14.2	14.0	14.3	14.7	15.3	16.5	17.7	18.5	19.0	20.1	20.4	20.6	20.5	20.7	20.5	19.5	18.1	16.6	15.6	17.3	20.7																				
25-Jul	14.7	14.0	12.6	11.4	11.1	12.1	13.6	15.4	17.5	19.7	22.1	23.6	24.8	25.8	26.6	27.4	27.9	28.1	28.1	27.9	26.3	24.9	23.1	21.4	20.8	28.1																				
26-Jul	20.7	19.7	18.6	17.7	17.3	17.1	17.7	19.0	21.0	23.0	25.4	28.3	29.1	29.8	30.4	30.7	31.0	31.1	30.9	30.4	29.1	27.7	26.3	25.1	24.9	31.1																				
27-Jul	23.7	21.6	20.9	20.0	19.4	19.4	19.8	20.6	21.9	23.5	25.3	26.8	28.9	29.6	29.8	30.1	30.4	30.2	29.0	27.6	25.7	23.2	20.9	20.5	24.5	30.4																				
28-Jul	20.1	19.6	19.0	18.2	17.4	16.8	17.0	17.8	19.0	21.7	23.1	24.0	24.2	24.7	25.4	25.4	26.1	25.2	22.5	19.0	17.2	17.5	18.1	17.9	20.7	26.1																				
29-Jul	17.0	16.0	15.5	14.8	14.8	14.5	15.2	16.7	18.9	20.7	22.2	23.1	24.2	24.9	18.6	21.2	23.0	23.1	23.1	22.4	20.6	19.3	18.4	17.3	19.4	24.9																				
30-Jul	15.7	15.2	14.4	13.9	13.6	13.7	14.8	15.7	15.2	15.9	16.6	17.5	19.0	20.9	22.2	23.2	24.2	26.1	26.7	25.8	24.1	22.6	21.1	20.2	19.1	26.7																				
31-Jul	19.4	18.6	18.1	17.7	16.5	16.1	15.7	17.1	18.9	19.9	21.1	22.0	21.9	21.7	20.4	17.2	17.8	18.2	17.8	17.7	17.0	16.4	14.9	14.2	18.2	22.0																				
																						18.0	17.2	16.5	16.0	15.6	15.5	16.0	16.9	18.1	19.5	20.7	21.8	22.6	23.4	23.7	24.0	24.2	24.0	23.7	23.0	22.0	20.7	19.6	18.7	Diurnal Average
																						25.4	22.1	21.6	20.8	20.0	19.4	19.8	20.6	21.9	23.5	25.4	28.3	29.1	29.8	30.4	30.7	31.0	31.3	32.0	31.2	29.8	28.5	26.7	25.7	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	3	0.40	0.40
10 - 20	375	50.40	50.81
> 20	366	49.19	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

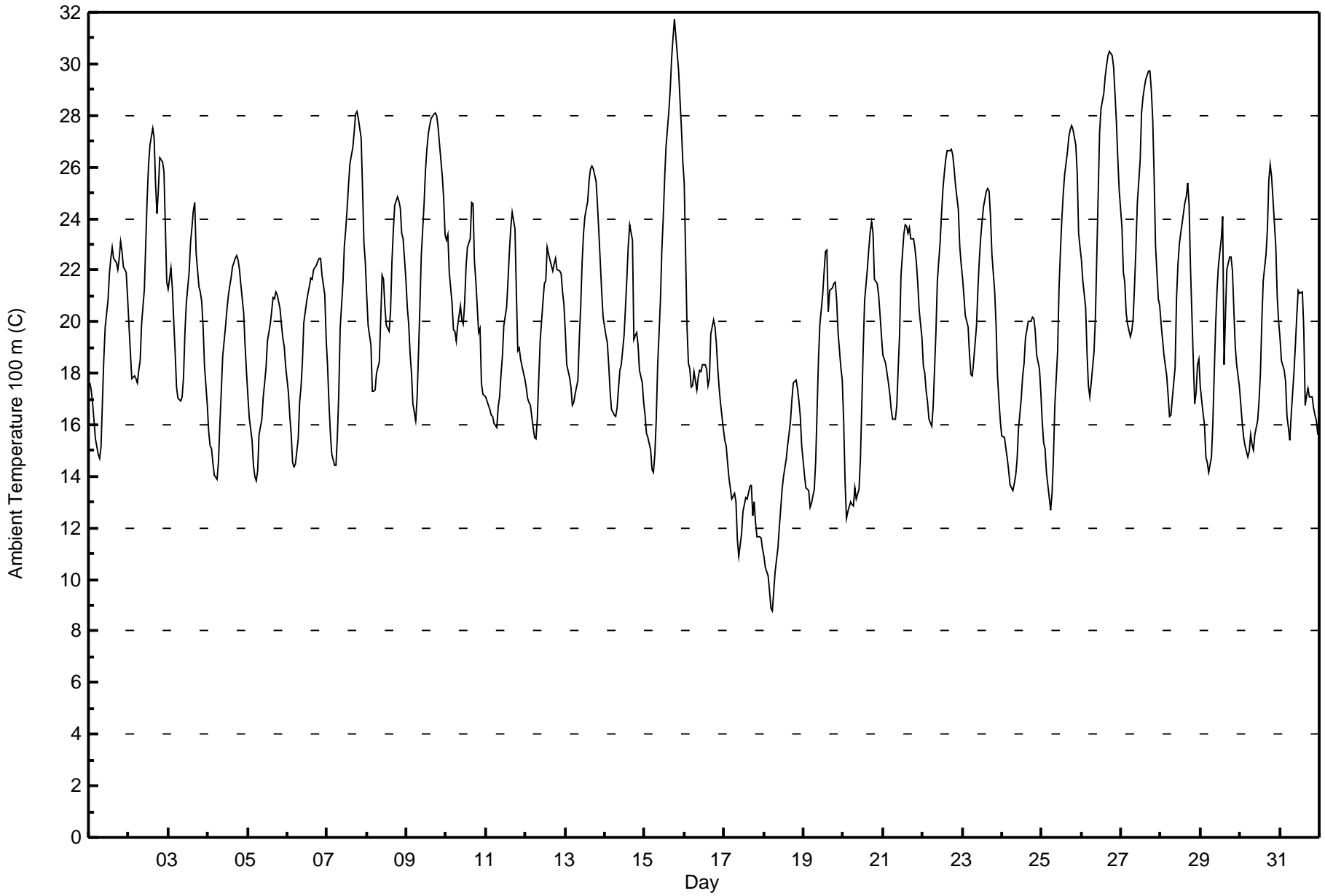


Maximum Value: 31.7 C on Jul 15 19:00																				Maximum Daily Average: 24.8 C on Jul 26					Hours in Service: 744																							
Minimum Value: 8.8 C on Jul 18 06:00																				Minimum Daily Average: 12.9 C on Jul 17					Hours of Data: 744																							
Maximum Diurnal Average: 23.6 C at hour 17																				Minimum Diurnal Average: 15.4 C at hour 6					Hours of Missing Data: 0																							
Monthly Average: 19.85 C																				Percentiles: P ₁ = 10.9 P ₁₀ = 14.6 Q ₁ = 16.9 Median = 19.7 Q ₃ = 22.6 P ₉₀ = 25.8 P ₉₉ = 30.1					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-Jul	17.6	17.4	16.8	16.1	15.5	14.8	14.7	15.1	16.9	18.5	19.8	20.8	21.8	22.4	22.9	22.5	22.3	22.0	22.5	23.1	22.7	22.1	21.9	21.0	19.6	23.1																						
2-Jul	19.8	18.8	17.8	17.9	17.8	17.6	18.1	18.5	19.9	21.2	23.1	24.8	26.1	26.9	27.5	27.1	25.3	24.2	25.1	26.4	26.2	25.8	23.7	21.5	22.5	27.5																						
3-Jul	21.3	22.1	21.3	20.0	18.8	17.4	17.0	16.9	17.1	17.8	19.6	20.7	21.9	23.1	23.6	24.3	24.6	22.7	21.4	21.1	20.8	19.8	18.3	16.8	20.3	24.6																						
4-Jul	15.7	15.2	15.1	14.6	14.0	13.9	14.6	16.1	17.3	18.7	19.8	20.5	21.0	21.4	21.7	22.2	22.5	22.6	22.4	22.0	21.4	20.4	19.1	18.0	18.8	22.6																						
5-Jul	17.1	16.3	15.4	14.4	14.0	13.8	14.2	15.6	16.2	17.1	17.6	18.2	19.3	19.9	20.4	20.9	20.9	21.1	21.1	20.5	19.9	19.4	19.0	18.3	18.0	21.1																						
6-Jul	17.3	16.3	15.6	14.6	14.4	14.5	15.4	16.9	17.5	18.5	20.0	20.7	21.1	21.4	21.7	21.6	22.0	22.2	22.4	22.5	22.5	21.8	21.0	19.3	19.2	22.5																						
7-Jul	18.3	16.8	15.7	14.9	14.4	14.4	15.6	17.2	19.8	21.5	22.9	23.6	24.4	25.3	26.2	26.7	27.3	28.0	28.1	27.9	27.1	25.2	23.0	22.3	21.9	28.1																						
8-Jul	21.0	19.9	19.1	17.3	17.3	17.4	18.0	18.4	20.1	21.8	21.6	20.5	19.9	19.6	20.4	22.3	23.5	24.5	24.8	24.7	24.4	23.4	23.2	21.6	21.0	24.8																						
9-Jul	20.6	19.9	18.7	18.0	16.8	16.2	17.0	18.8	20.6	22.6	24.6	25.9	26.7	27.3	27.6	27.9	28.1	28.1	28.0	27.6	26.9	25.7	24.8	23.4	23.4	28.1																						
10-Jul	23.2	23.4	21.9	20.7	19.7	19.6	19.3	19.9	20.6	20.1	19.9	20.7	22.1	22.9	23.2	24.6	24.6	22.4	21.6	19.6	19.8	17.6	17.2	17.2	20.9	24.6																						
11-Jul	17.1	16.8	16.6	16.4	16.3	16.1	15.9	16.7	17.1	18.0	18.7	19.9	20.5	21.6	22.7	23.6	24.2	23.6	21.1	18.9	19.0	18.6	18.3	17.8	19.0	24.2																						
12-Jul	17.5	17.0	16.9	16.8	15.9	15.5	15.4	16.3	17.8	19.3	20.8	21.5	21.6	22.9	22.6	22.2	22.0	22.3	22.4	22.0	22.0	21.9	21.2	20.6	19.8	22.9																						
13-Jul	19.6	18.3	17.8	17.4	16.8	16.9	17.2	17.7	19.4	20.6	22.3	23.4	24.1	24.7	25.5	25.9	26.0	25.9	25.4	24.5	23.4	22.3	21.1	20.2	21.5	26.0																						
14-Jul	19.5	19.2	18.3	17.3	16.6	16.4	16.3	16.7	17.4	18.1	18.4	19.5	20.6	21.7	22.9	23.8	23.2	19.3	19.5	19.6	19.1	18.1	17.6	16.9	19.0	23.8																						
15-Jul	16.4	15.7	15.5	15.0	14.2	14.2	14.9	16.2	18.3	20.8	22.8	24.0	25.6	26.8	28.2	29.0	30.2	31.0	31.7	31.1	29.7	28.6	27.5	26.2	23.1	31.7																						
16-Jul	25.4	19.8	18.4	18.1	17.5	17.5	18.1	17.4	17.8	18.1	18.1	18.3	18.2	17.5	17.8	19.5	20.0	19.8	19.2	18.2	17.4	16.8	15.9	18.5	25.4																							
17-Jul	15.4	15.2	14.5	13.9	13.1	13.2	13.3	13.0	11.6	10.9	11.8	12.6	12.9	13.2	13.1	13.6	13.6	12.5	13.0	12.2	11.7	11.6	11.6	11.2	12.9	15.4																						
18-Jul	10.9	10.5	10.1	9.5	8.9	8.8	9.5	10.3	11.2	12.0	12.8	13.5	14.0	14.7	15.2	15.7	16.2	17.0	17.6	17.7	17.4	16.9	16.3	15.2	13.4	17.7																						
19-Jul	14.1	13.6	13.5	13.5	12.8	12.9	13.5	14.6	16.5	18.5	19.9	21.0	21.9	22.7	22.8	20.4	21.2	21.3	21.5	21.5	20.8	19.6	18.2	17.7	18.1	22.8																						
20-Jul	16.2	13.8	12.4	12.6	13.0	12.9	12.8	13.5	13.1	13.5	14.7	16.8	19.0	20.8	22.1	22.9	23.5	23.9	23.4	21.6	21.5	21.1	20.3	19.5	17.7	23.9																						
21-Jul	18.7	18.4	18.0	17.6	17.2	16.6	16.2	16.2	16.7	18.2	19.5	21.8	23.4	23.8	23.7	23.4	23.7	23.2	23.2	22.8	22.3	21.5	20.5	19.3	20.2	23.8																						
22-Jul	18.3	18.0	17.3	16.9	16.2	16.0	16.7	18.2	19.6	21.6	23.1	24.2	25.2	25.8	26.3	26.6	26.6	26.7	26.5	25.9	25.3	24.3	23.0	22.3	22.1	26.7																						
23-Jul	21.7	21.0	20.2	19.8	18.7	17.9	17.9	18.5	19.9	21.3	22.4	23.2	23.9	24.5	25.1	25.2	25.0	24.1	22.6	21.2	19.9	17.9	17.0	16.2	21.0	25.2																						
24-Jul	15.6	15.5	15.1	14.7	14.2	13.7	13.4	13.7	14.0	14.7	15.8	17.0	17.9	18.4	19.4	19.7	20.0	20.0	20.2	20.1	19.6	18.7	18.2	17.2	17.0	20.2																						
25-Jul	16.1	15.3	15.1	14.2	13.2	12.7	13.3	14.8	16.8	18.9	21.3	22.7	24.0	25.0	25.7	26.6	27.2	27.5	27.6	27.5	26.9	25.8	23.4	22.9	21.0	27.6																						
26-Jul	22.4	21.6	20.6	18.8	17.5	17.1	17.7	18.8	20.2	22.5	25.0	27.3	28.2	28.8	29.5	29.9	30.3	30.5	30.3	29.9	28.8	27.8	26.4	25.1	24.8	30.5																						
27-Jul	23.7	21.9	21.5	20.3	19.9	19.4	19.6	20.1	21.4	22.9	24.6	26.2	28.1	28.7	29.1	29.4	29.7	29.7	29.0	27.8	25.6	22.9	20.9	20.6	24.3	29.7																						
28-Jul	19.9	19.3	18.7	17.9	17.1	16.3	16.4	17.1	18.2	20.9	22.2	23.0	23.4	23.8	24.6	24.8	25.4	24.5	22.1	18.5	16.8	17.3	18.3	18.5	20.2	25.4																						
29-Jul	17.5	16.5	16.0	14.8	14.5	14.2	14.7	16.1	18.1	19.9	21.2	22.2	23.2	24.1	18.3	20.3	22.0	22.5	22.5	22.0	20.4	19.0	18.3	17.4	19.0	24.1																						
30-Jul	16.7	16.1	15.5	15.2	14.8	15.0	15.6	15.2	15.0	15.6	16.2	16.9	18.0	20.0	21.6	22.6	23.6	25.5	26.1	25.6	24.8	22.9	21.0	20.0	19.1	26.1																						
31-Jul	19.4	18.5	18.1	17.7	16.4	15.9	15.4	16.4	18.1	19.1	20.2	21.2	21.1	21.2	19.7	16.8	17.2	17.4	17.1	17.1	16.7	16.4	16.1	15.6	17.9	21.2																						
																								18.5	17.7	17.0	16.4	15.7	15.4	15.7	16.5	17.6	18.8	20.0	21.1	21.9	22.6	22.9	23.2	23.6	23.4	23.2	22.6	22.0	21.0	20.1	19.2	Diurnal Average
																								25.4	23.4	21.9	20.7	19.9	19.6	19.6	20.1	21.4	22.9	25.0	27.3	28.2	28.8	29.5	29.9	30.3	31.0	31.7	31.1	29.7	28.6	27.5	26.2	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

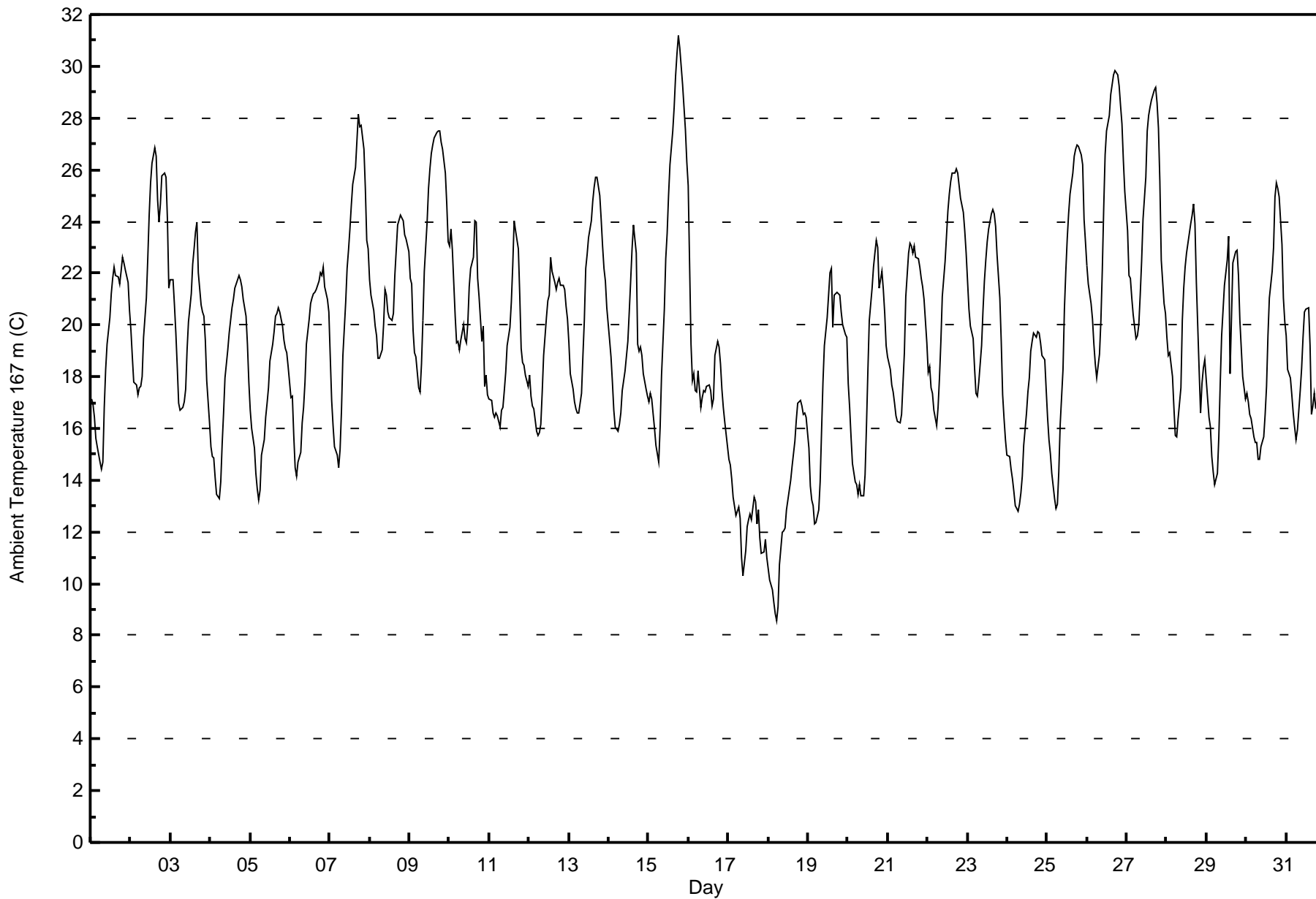
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	4	0.54	0.54
10 - 20	397	53.36	53.90
> 20	343	46.10	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 31.2 C on Jul 15 19:00																				Maximum Daily Average: 24.7 C on Jul 26					Hours in Service: 744																							
Minimum Value: 8.6 C on Jul 18 06:00																				Minimum Daily Average: 12.4 C on Jul 17					Hours of Data: 744																							
Maximum Diurnal Average: 23.1 C at hour 17																				Minimum Diurnal Average: 15.5 C at hour 6					Hours of Missing Data: 0																							
Monthly Average: 19.61 C																				Percentiles: P ₁ = 10.6 P ₁₀ = 14.4 Q ₁ = 16.7 Median = 19.4 Q ₃ = 22.2 P ₉₀ = 25.4 P ₉₉ = 29.6					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-Jul	17.1	16.9	16.4	15.6	15.3	14.7	14.4	14.7	16.8	18.3	19.3	20.3	21.2	21.8	22.3	21.9	21.8	21.6	22.1	22.6	22.4	22.1	21.6	20.5	19.3	22.6																						
2-Jul	19.8	18.8	17.8	17.7	17.3	17.6	17.6	18.0	19.5	21.1	22.6	24.2	25.5	26.2	26.9	26.5	24.8	24.0	24.7	25.8	25.9	25.7	24.1	21.4	22.2	26.9																						
3-Jul	21.8	21.7	20.8	19.7	18.4	17.0	16.7	16.8	17.1	17.5	19.0	20.1	21.2	22.4	22.9	23.6	24.0	22.0	20.8	20.5	20.4	19.4	17.8	16.2	19.9	24.0																						
4-Jul	15.3	14.9	14.9	14.1	13.5	13.3	14.0	15.4	16.6	17.9	19.1	19.7	20.2	20.6	21.0	21.4	21.8	21.9	21.8	21.5	21.0	20.3	19.3	17.8	18.2	21.9																						
5-Jul	16.7	16.0	15.2	14.3	13.7	13.3	13.6	14.9	15.5	16.4	17.0	17.5	18.6	19.3	19.7	20.3	20.4	20.7	20.5	20.0	19.4	19.1	18.9	18.4	17.5	20.7																						
6-Jul	17.2	17.2	15.7	14.5	14.2	14.7	15.1	16.2	16.8	17.8	19.3	20.2	20.8	21.0	21.2	21.3	21.4	21.7	22.0	21.9	22.2	21.5	21.0	20.5	19.0	22.2																						
7-Jul	18.8	17.1	16.1	15.3	15.0	14.5	15.2	16.7	18.8	20.9	22.2	22.9	23.7	24.6	25.4	26.1	27.1	28.1	27.7	27.7	26.8	25.3	23.2	22.9	21.8	28.1																						
8-Jul	21.8	21.2	20.6	19.9	19.6	18.7	18.7	19.0	20.0	21.4	21.1	20.5	20.3	20.2	20.5	21.9	22.9	23.9	24.3	24.1	24.0	23.5	23.3	22.8	21.4	24.3																						
9-Jul	21.8	21.6	19.8	18.9	18.7	17.6	17.4	18.5	20.2	22.1	24.0	25.3	26.0	26.6	27.0	27.2	27.4	27.5	27.5	27.1	26.8	25.9	24.7	23.2	23.4	27.5																						
10-Jul	23.0	23.7	22.9	20.3	19.3	19.4	19.0	19.4	20.0	19.5	19.3	20.1	21.5	22.2	22.6	24.0	24.0	21.8	21.1	19.4	20.0	17.6	18.1	17.3	20.6	24.0																						
11-Jul	17.1	17.1	16.6	16.4	16.6	16.5	16.1	16.7	16.8	17.5	18.2	19.2	19.9	20.9	22.3	24.0	23.6	23.0	21.2	19.1	18.6	18.4	18.1	17.6	18.8	24.0																						
12-Jul	18.0	17.2	16.9	16.7	15.9	15.7	15.9	16.2	17.4	18.8	20.3	20.9	21.1	22.6	22.1	21.6	21.4	21.6	21.8	21.5	21.5	21.3	20.7	20.2	19.5	22.6																						
13-Jul	19.3	18.1	17.5	17.0	16.8	16.6	16.6	17.4	18.8	20.2	22.2	22.7	23.4	24.0	24.8	25.3	25.7	25.7	25.0	24.1	23.0	22.2	21.7	20.7	21.2	25.7																						
14-Jul	19.4	18.8	17.8	16.7	16.1	15.9	16.2	16.6	17.4	17.8	18.3	19.3	20.5	21.7	22.9	23.8	22.8	19.3	19.0	19.2	18.8	18.1	17.5	17.2	18.8	23.8																						
15-Jul	17.0	17.4	17.1	16.0	15.4	15.0	14.7	16.0	18.1	20.6	22.6	23.6	25.0	26.2	27.5	28.4	29.6	30.5	31.2	30.7	29.3	28.4	27.5	26.3	23.1	31.2																						
16-Jul	25.4	19.2	17.9	18.1	17.4	17.4	18.2	16.8	17.2	17.5	17.4	17.7	17.7	17.5	16.8	17.1	18.8	19.4	19.1	18.5	17.5	16.8	16.3	15.3	18.0	25.4																						
17-Jul	14.8	14.6	14.1	13.4	12.6	12.8	12.9	12.5	11.0	10.3	11.3	12.2	12.5	12.7	12.5	13.4	13.2	12.3	12.9	11.8	11.2	11.2	11.7	11.0	12.4	14.8																						
18-Jul	10.6	10.2	9.7	9.2	8.9	8.6	9.1	10.7	12.0	12.1	12.1	12.9	13.3	14.0	14.5	15.0	15.5	16.3	17.0	17.1	16.9	16.6	16.6	16.4	13.1	17.1																						
19-Jul	15.2	13.8	13.2	13.0	12.3	12.4	12.9	13.9	15.9	17.8	19.2	20.3	21.2	22.0	22.2	19.9	21.1	21.3	21.2	21.2	20.5	20.0	19.6	19.5	17.9	22.2																						
20-Jul	17.7	16.8	15.7	14.7	13.9	13.8	13.5	13.9	13.4	13.4	14.2	16.1	18.2	20.2	21.4	22.2	22.8	23.3	23.0	21.4	22.1	21.4	20.4	19.2	18.0	23.3																						
21-Jul	18.7	18.3	17.7	17.4	17.0	16.5	16.3	16.2	16.6	17.7	18.9	21.1	22.8	23.2	23.1	22.8	23.1	22.6	22.6	22.2	21.8	21.5	21.0	19.3	19.9	23.2																						
22-Jul	18.2	18.4	17.6	17.4	16.7	16.1	16.8	17.9	19.4	21.1	22.4	23.5	24.4	25.0	25.5	25.9	25.9	26.0	25.9	25.4	24.9	24.3	23.6	22.8	21.9	26.0																						
23-Jul	21.7	20.6	19.9	19.5	18.3	17.4	17.3	17.8	19.2	20.6	21.7	22.5	23.2	23.7	24.3	24.5	24.3	23.8	22.7	21.1	19.4	17.3	16.4	15.6	20.5	24.5																						
24-Jul	15.0	14.9	14.5	14.0	13.6	13.0	12.8	13.1	13.5	14.2	15.4	16.6	17.4	18.0	19.0	19.4	19.7	19.5	19.8	19.7	19.3	18.8	18.7	17.5	16.6	19.8																						
25-Jul	16.4	15.5	15.0	14.3	13.3	12.9	13.1	14.3	16.2	18.3	20.6	22.1	23.3	24.3	25.1	25.9	26.5	26.8	27.0	26.9	26.6	26.2	24.1	23.2	20.7	27.0																						
26-Jul	22.3	21.6	20.8	20.2	19.2	18.5	18.0	18.9	20.2	22.1	24.5	26.6	27.5	28.1	28.9	29.3	29.7	29.8	29.7	29.3	28.5	27.8	26.4	25.2	24.7	29.8																						
27-Jul	23.6	21.9	21.8	21.1	20.4	19.5	19.6	20.0	21.2	22.5	24.1	25.7	27.5	28.1	28.4	28.7	29.1	29.2	28.6	27.6	25.5	22.5	20.8	20.5	24.1	29.2																						
28-Jul	19.5	18.8	18.9	18.0	16.8	15.7	15.7	16.4	17.6	20.2	21.4	22.2	22.8	23.1	23.9	24.2	24.7	23.9	21.6	18.2	16.6	17.7	18.4	18.7	19.8	24.7																						
29-Jul	17.9	16.5	16.0	14.9	14.3	13.8	14.2	15.7	17.7	19.6	20.6	21.5	22.5	23.4	18.1	20.2	22.4	22.9	22.9	21.9	20.2	19.1	18.0	17.1	18.8	23.4																						
30-Jul	17.3	17.0	16.5	16.4	15.7	15.5	15.5	14.8	14.8	15.3	15.7	16.5	17.6	19.6	21.0	22.0	23.0	24.9	25.5	25.3	24.9	23.1	21.0	20.1	19.1	25.5																						
31-Jul	19.6	18.3	18.0	17.3	16.6	16.0	15.6	15.9	17.4	18.4	19.5	20.5	20.6	20.7	19.2	16.5	16.8	17.3	16.8	17.0	16.3	16.2	16.4	15.8	17.6	20.7																						
																								18.7	17.9	17.2	16.5	15.9	15.5	15.6	16.2	17.2	18.3	19.5	20.5	21.3	22.1	22.4	22.7	23.1	23.0	22.8	22.2	21.7	21.0	20.2	19.4	Diurnal Average
																								25.4	23.7	22.9	21.1	20.4	19.5	19.6	20.0	21.2	22.5	24.5	26.6	27.5	28.1	28.9	29.3	29.7	30.5	31.2	30.7	29.3	28.4	27.5	26.3	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	5	0.67	0.67
10 - 20	402	54.03	54.70
> 20	337	45.30	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

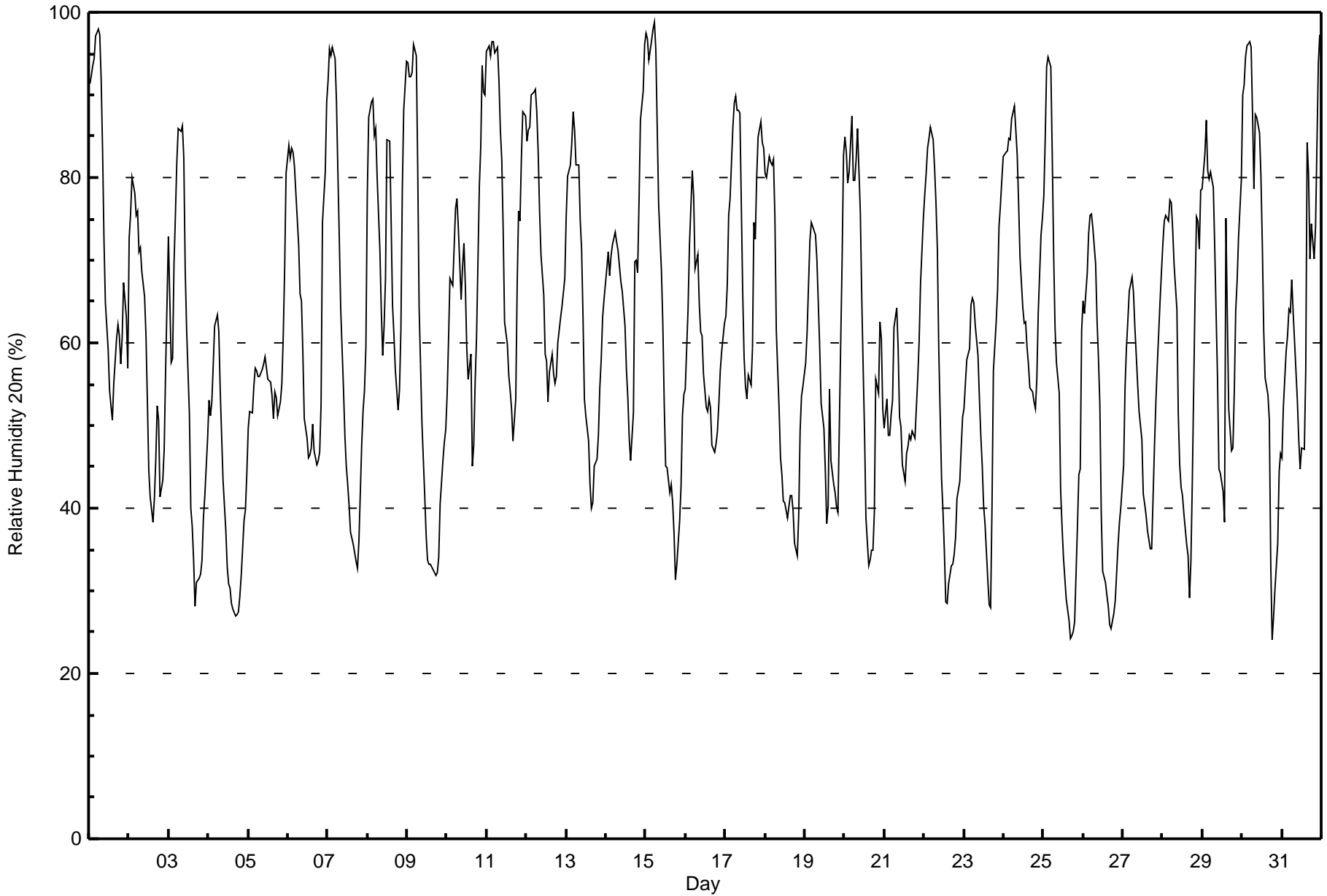
Lower Camp Met Tower - July 2017

Maximum Value: 99 % on Jul 15 06:00 Maximum Daily Average: 77.7 % on Jul 11																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Minimum Value: 24 % on Jul 30 19:00 Minimum Daily Average: 41.7 % on Jul 4 Maximum Diurnal Average: 80.3 % at hour 5 Minimum Diurnal Average: 44.0 % at hour 17 Monthly Average: 61.3 % Percentiles: P ₁ = 26 P ₁₀ = 36 Q ₁ = 47 Median = 59 Q ₃ = 76 P ₉₀ = 87 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-Jul	91	92	94	94	97	98	97	92	83	73	65	59	54	52	51	55	61	62	61	57	61	67	63	57	72.4	98
2-Jul	73	76	80	78	75	76	71	72	69	66	61	53	45	41	38	41	46	52	51	41	43	47	57	65	59.0	80
3-Jul	73	58	58	70	75	82	86	86	86	82	69	62	51	40	38	34	28	31	31	32	34	39	42	48	55.6	86
4-Jul	53	51	53	57	62	63	61	54	49	43	37	33	31	30	29	28	27	27	27	29	32	38	40	44	41.7	63
5-Jul	50	52	52	55	57	57	56	56	57	58	58	57	56	55	54	51	54	53	51	53	55	61	69	80	56.5	80
6-Jul	84	82	84	83	81	78	72	66	65	59	51	49	46	46	47	50	47	45	46	47	53	75	81	89	63.6	89
7-Jul	92	96	95	96	94	89	81	73	64	54	49	45	43	40	37	36	35	34	33	36	48	52	54	59	59.7	96
8-Jul	78	87	89	89	85	86	80	71	64	58	62	68	85	84	75	65	61	57	52	54	62	78	88	94	73.9	94
9-Jul	94	92	92	93	96	95	81	64	58	50	41	37	34	33	33	33	32	32	32	34	41	46	48	49	55.9	96
10-Jul	54	60	68	67	72	76	77	74	65	69	72	67	60	56	59	45	48	55	61	79	84	94	90	90	68.4	94
11-Jul	95	96	95	96	96	95	96	92	86	82	74	63	60	56	54	52	48	53	67	76	75	82	88	88	77.7	96
12-Jul	84	86	86	90	90	91	88	83	76	71	66	59	58	53	56	59	56	55	56	60	63	64	66	68	70.1	91
13-Jul	75	80	81	84	88	86	82	82	75	71	63	53	51	48	43	40	41	45	46	49	55	58	63	65	63.5	88
14-Jul	69	71	68	70	72	73	72	71	69	67	66	62	57	53	48	46	52	70	70	69	77	87	91	96	68.6	96
15-Jul	97	97	94	97	98	99	95	86	77	69	62	53	45	45	42	43	41	37	31	33	39	43	51	54	63.6	99
16-Jul	54	64	72	76	81	78	69	71	65	61	61	56	52	52	53	52	48	47	48	49	53	57	59	62	60.0	81
17-Jul	63	67	75	77	86	89	90	88	88	88	66	58	55	53	56	55	59	74	73	80	85	87	84	84	74.2	90
18-Jul	81	80	83	82	81	82	75	62	52	46	44	41	41	39	40	42	41	40	36	34	39	49	54	55	54.9	83
19-Jul	58	61	67	72	75	74	73	70	65	59	53	50	45	38	40	54	46	43	42	40	39	50	70	83	56.9	83
20-Jul	85	83	79	81	87	80	80	82	86	76	66	57	49	39	33	34	35	35	40	56	54	63	60	52	62.1	87
21-Jul	50	53	49	49	51	53	62	64	59	51	50	45	43	47	47	49	48	49	48	52	56	60	67	75	53.3	75
22-Jul	78	80	84	85	86	85	81	77	71	59	44	40	35	29	28	31	33	33	34	36	41	43	47	51	54.7	86
23-Jul	52	55	58	59	64	65	65	62	59	53	49	45	40	38	31	28	28	40	57	63	66	74	77	80	54.6	80
24-Jul	83	83	83	85	85	87	89	86	83	77	70	64	62	63	60	57	55	54	53	52	56	64	73	75	70.7	89
25-Jul	78	85	93	95	93	83	71	62	58	54	42	38	34	32	29	27	24	25	25	26	38	44	45	61	52.5	95
26-Jul	65	64	69	73	75	76	74	70	63	58	52	39	32	31	30	28	26	25	27	29	32	36	38	40	48.0	76
27-Jul	45	55	60	63	66	68	66	62	58	55	52	48	42	40	39	37	35	35	41	47	53	57	65	69	52.5	69
28-Jul	72	75	75	75	77	77	74	70	64	51	45	43	41	39	36	34	29	34	43	66	75	75	71	79	59.2	79
29-Jul	79	83	87	81	80	81	79	72	64	56	45	44	42	38	75	63	52	47	47	54	64	67	73	80	64.6	87
30-Jul	90	91	95	96	96	96	88	79	88	87	85	80	72	61	56	54	51	33	24	27	30	36	44	47	66.9	96
31-Jul	46	52	59	61	64	64	68	64	57	53	48	45	47	47	57	84	80	70	74	70	74	84	94	97	65.0	97
																			72.3				Diurnal Average			
																			97				Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	104	13.98	13.98
40 - 60	271	36.42	50.40
60 - 80	215	28.90	79.30
80 - 100	154	20.70	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

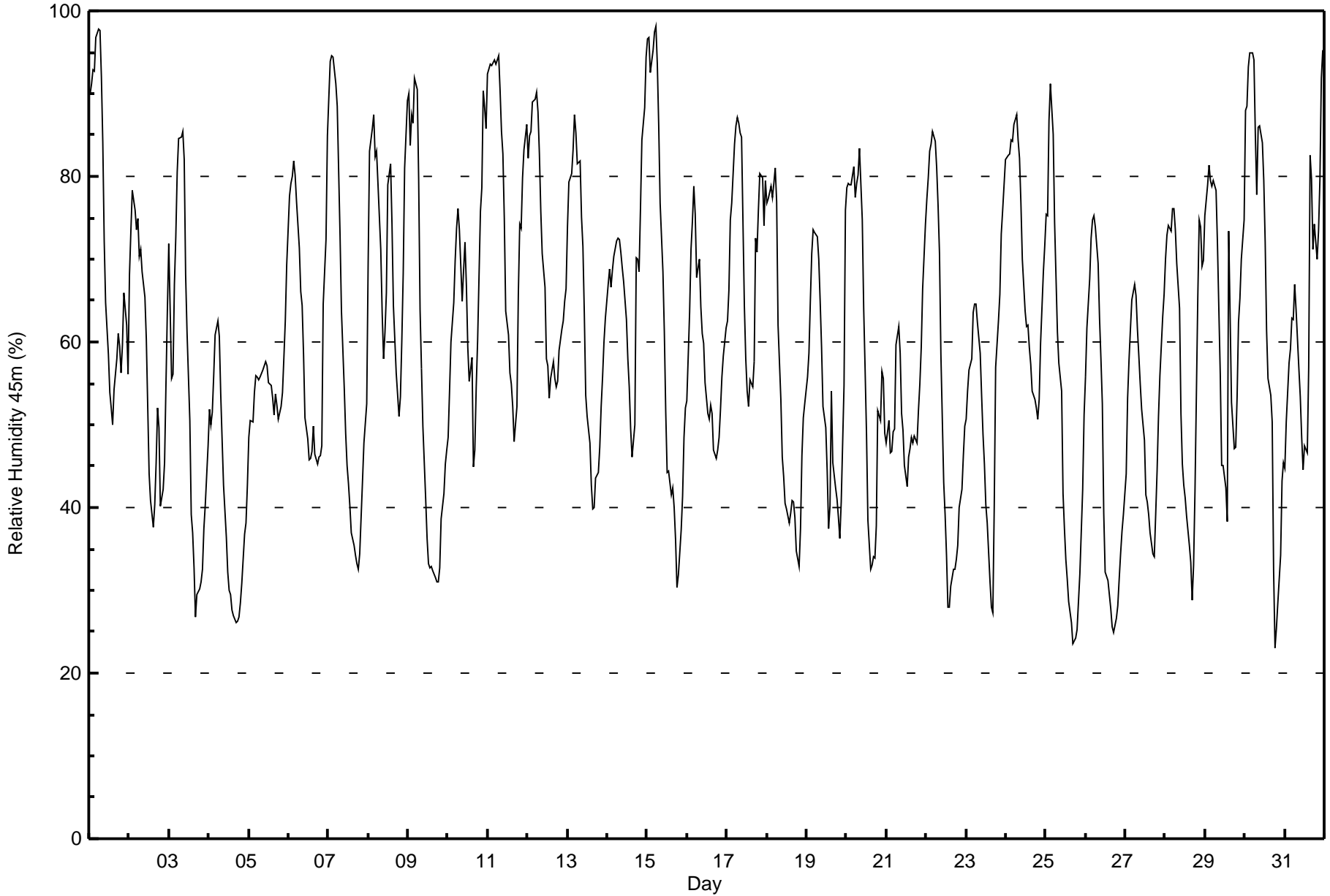
Lower Camp Met Tower - July 2017

Maximum Value: 98 % on Jul 15 06:00																			Maximum Daily Average: 76.7 % on Jul 11						Hours in Service: 744																			
Minimum Value: 23 % on Jul 30 19:00																			Minimum Daily Average: 40.7 % on Jul 4						Hours of Data: 744																			
Maximum Diurnal Average: 78.4 % at hour 6																			Minimum Diurnal Average: 43.4 % at hour 17						Hours of Missing Data: 0																			
Monthly Average: 60.0 %																			Percentiles: P ₁ = 26 P ₁₀ = 35 Q ₁ = 46 Median = 58 Q ₃ = 74 P ₉₀ = 85 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-Jul	90	91	93	93	97	98	98	92	84	72	65	59	54	52	50	54	58	61	59	56	60	66	62	56	71.6	98																		
2-Jul	68	73	78	76	74	75	70	71	68	65	60	52	44	41	38	40	45	52	50	40	42	45	55	64	57.9	78																		
3-Jul	72	56	56	67	73	81	85	85	82	68	61	51	39	37	33	27	30	30	31	32	37	40	47	54.3	85																			
4-Jul	52	50	51	56	61	63	61	54	48	43	37	32	30	30	28	27	26	26	27	28	31	37	38	43	40.7	63																		
5-Jul	49	51	50	54	56	56	55	56	57	57	58	57	55	55	53	51	54	52	51	52	54	58	63	69	55.1	69																		
6-Jul	78	79	80	82	80	77	71	66	64	58	51	48	46	46	47	50	46	45	46	46	47	64	72	85	61.5	85																		
7-Jul	89	94	95	94	91	88	81	73	64	54	49	45	43	40	37	35	34	33	33	34	43	48	50	53	58.4	95																		
8-Jul	69	83	86	88	82	83	79	71	64	58	61	66	79	82	74	64	60	56	51	53	60	68	81	89	71.2	89																		
9-Jul	90	84	87	87	92	91	80	64	57	50	41	36	33	33	33	32	31	31	31	33	39	42	45	47	53.6	92																		
10-Jul	48	54	60	65	70	74	76	74	65	69	72	67	59	55	58	45	47	55	60	76	79	90	88	86	66.3	90																		
11-Jul	92	93	93	94	94	94	95	90	85	83	75	64	61	56	55	52	48	52	66	74	74	80	83	86	76.7	95																		
12-Jul	82	85	85	89	89	90	88	83	76	71	67	58	57	53	56	58	56	55	55	59	61	63	65	66	69.4	90																		
13-Jul	74	79	80	83	88	85	81	82	75	72	63	54	51	48	43	40	40	44	44	47	52	56	60	63	62.7	88																		
14-Jul	67	69	67	69	70	72	72	72	71	69	67	63	58	55	50	46	50	70	70	68	76	84	88	94	68.3	94																		
15-Jul	97	97	93	95	97	98	94	86	77	68	61	52	44	44	41	42	40	36	30	32	37	41	48	52	62.7	98																		
16-Jul	53	64	71	74	79	75	68	70	64	61	60	55	51	51	52	51	47	46	47	49	52	56	58	62	59.0	79																		
17-Jul	63	66	75	77	84	86	87	86	85	85	64	58	54	52	55	55	58	73	71	76	80	80	74	79	71.8	87																		
18-Jul	77	77	79	77	79	81	77	62	53	46	44	40	40	38	39	41	41	39	35	33	37	46	51	53	53.6	81																		
19-Jul	56	59	65	71	74	73	73	70	65	59	52	50	44	37	40	54	45	42	41	39	36	41	55	76	54.9	76																		
20-Jul	79	79	79	79	81	77	79	80	83	75	64	57	49	38	33	33	34	34	38	52	51	56	56	49	59.8	83																		
21-Jul	48	51	47	47	49	50	60	62	59	51	49	45	43	46	47	48	48	49	48	52	55	59	66	74	52.1	74																		
22-Jul	77	80	83	84	85	84	81	77	71	58	43	39	34	28	28	30	33	33	34	35	40	42	46	50	54.0	85																		
23-Jul	51	54	57	58	64	65	65	62	59	53	49	45	40	38	31	28	27	40	57	63	66	73	76	79	54.1	79																		
24-Jul	82	82	83	84	84	86	88	84	82	77	70	64	62	62	59	57	54	53	52	51	53	60	69	72	69.6	88																		
25-Jul	75	75	87	91	85	74	68	61	57	54	42	37	34	31	29	26	24	24	24	25	32	37	42	51	49.5	91																		
26-Jul	56	62	68	73	75	75	74	69	63	58	52	39	32	31	30	28	26	25	27	28	31	34	37	39	47.2	75																		
27-Jul	44	53	58	61	65	67	66	62	58	55	52	48	42	41	39	37	34	34	39	44	51	56	63	66	51.5	67																		
28-Jul	70	73	74	73	76	76	74	69	64	51	45	43	41	39	35	33	29	33	42	65	75	74	69	70	58.1	76																		
29-Jul	75	79	81	80	79	79	78	72	64	56	45	45	42	38	73	63	53	47	47	53	62	65	70	75	63.5	81																		
30-Jul	88	88	93	95	95	94	85	78	86	86	84	79	72	61	56	54	50	32	23	25	28	34	43	45	65.7	95																		
31-Jul	45	50	57	59	63	63	67	64	57	53	48	45	47	47	57	83	80	71	74	70	73	80	92	95	64.2	95																		
																			69.5	72.0	74.6	76.6	78.4	78.4	76.6	72.5	68.1	62.9	56.7	51.7	48.2	45.4	45.3	44.9	43.4	44.3	45.2	48.1	52.0	57.2	61.5	65.7	Diurnal Average	
																			97	97	95	95	97	98	98	92	86	86	84	79	79	82	74	83	80	73	74	76	80	90	92	95	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	116	15.59	15.59
40 - 60	275	36.96	52.55
60 - 80	233	31.32	83.87
80 - 100	120	16.13	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

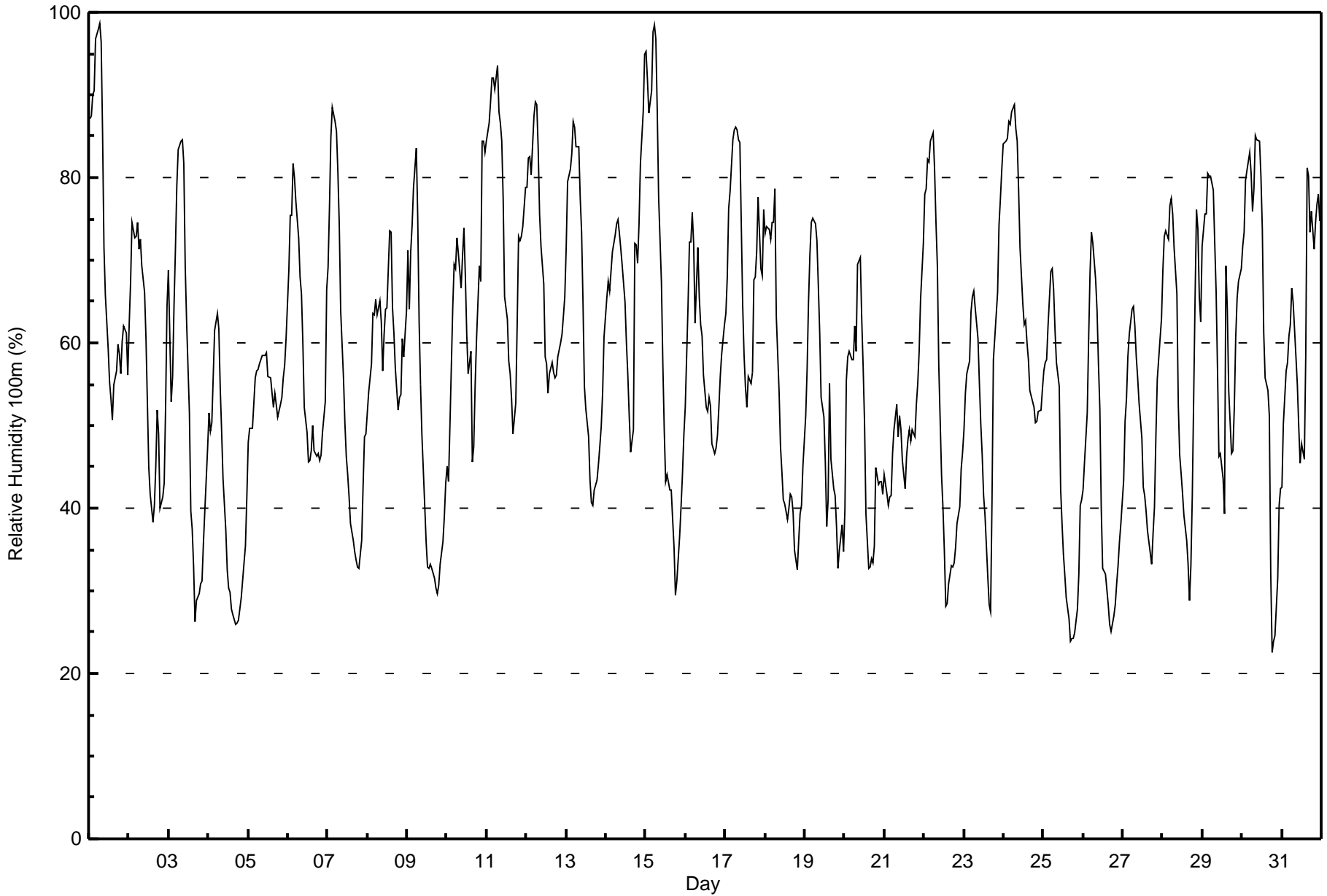
Lower Camp Met Tower - July 2017

Maximum Value: 99 % on Jul 1 07:00																		Maximum Daily Average: 74.8 % on Jul 11						Hours in Service: 744		
Minimum Value: 23 % on Jul 30 19:00																		Minimum Daily Average: 40.5 % on Jul 4						Hours of Data: 744		
Maximum Diurnal Average: 75.7 % at hour 6																		Minimum Diurnal Average: 43.6 % at hour 17						Hours of Missing Data: 0		
Monthly Average: 57.9 %																		Percentiles: P ₁ = 25 P ₁₀ = 34 Q ₁ = 45 Median = 57 Q ₃ = 72 P ₉₀ = 81 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-Jul	87	87	90	91	97	98	99	96	85	72	66	59	55	53	51	55	57	60	59	56	60	62	61	56	71.3	99
2-Jul	62	67	75	73	73	75	71	73	69	66	60	53	45	42	38	40	45	52	49	40	41	43	52	64	57.0	75
3-Jul	69	53	56	64	71	79	83	84	85	82	69	62	52	40	37	33	26	29	30	31	31	36	40	47	53.7	85
4-Jul	51	49	50	56	62	64	62	55	49	44	37	33	30	30	28	27	26	26	26	28	29	33	35	41	40.5	64
5-Jul	48	50	50	53	56	57	57	57	58	58	58	59	56	56	54	52	54	53	51	52	53	56	57	61	54.8	61
6-Jul	69	75	75	82	80	77	73	68	66	60	52	49	46	46	47	50	47	46	47	46	46	49	53	66	59.0	82
7-Jul	69	76	85	88	87	86	81	74	64	56	50	46	44	41	38	36	35	34	33	33	36	43	49	49	55.5	88
8-Jul	52	54	58	64	63	65	63	65	62	57	61	64	64	74	73	64	61	57	52	53	54	61	58	64	61.0	74
9-Jul	71	64	71	74	79	84	75	63	55	49	40	36	33	33	33	33	32	30	30	31	33	36	39	43	48.6	84
10-Jul	45	43	50	64	69	69	73	71	67	70	74	68	61	56	59	46	47	55	61	69	67	84	84	83	64.0	84
11-Jul	84	87	89	92	92	91	94	88	87	84	77	66	63	58	56	53	49	53	62	73	72	73	74	79	74.8	94
12-Jul	79	82	83	80	87	89	89	84	76	72	67	58	57	54	56	58	56	56	56	58	60	61	63	66	68.6	89
13-Jul	72	79	81	83	87	86	84	84	78	73	65	55	52	49	43	41	40	42	43	45	48	50	54	61	62.2	87
14-Jul	65	67	66	69	71	73	74	75	73	71	69	65	60	56	51	47	50	72	72	70	74	82	88	95	69.0	95
15-Jul	95	92	88	90	98	99	97	88	78	67	57	50	43	44	42	42	39	35	29	31	37	40	44	49	61.4	99
16-Jul	52	65	72	72	76	72	62	72	66	62	61	56	52	52	53	52	48	47	47	49	52	56	59	62	59.0	76
17-Jul	64	68	76	78	85	86	86	86	85	84	65	59	55	52	56	55	57	68	68	71	78	69	68	76	70.5	86
18-Jul	73	74	74	73	75	75	79	63	54	47	44	41	40	39	40	42	41	39	35	33	36	39	40	45	51.7	79
19-Jul	51	57	65	71	75	75	74	72	67	61	53	51	46	38	41	55	46	42	41	38	33	35	38	35	52.5	75
20-Jul	40	55	58	59	58	58	62	59	69	70	63	57	50	39	33	33	34	33	35	45	43	43	43	42	49.3	70
21-Jul	44	42	40	41	42	47	49	53	49	51	50	46	42	46	48	50	48	49	49	52	55	59	65	72	49.6	72
22-Jul	78	79	82	82	84	85	81	75	69	57	44	40	35	28	28	31	33	33	33	35	38	40	45	47	53.5	85
23-Jul	49	54	56	58	64	66	66	64	61	55	50	46	42	39	32	28	27	41	58	63	66	74	77	81	54.9	81
24-Jul	84	84	85	87	87	88	89	86	84	78	71	65	62	63	60	58	54	53	52	50	51	52	52	54	68.7	89
25-Jul	57	58	58	62	69	69	66	61	58	55	42	38	34	32	29	27	24	24	24	25	28	32	40	41	43.9	69
26-Jul	42	45	52	61	68	73	72	68	64	58	52	40	33	32	30	28	26	25	27	28	31	33	36	38	44.3	73
27-Jul	43	51	53	58	61	64	64	62	58	56	53	49	43	42	40	37	34	33	37	40	49	56	60	63	50.2	64
28-Jul	69	73	74	73	77	77	76	72	66	53	46	44	42	39	36	33	29	33	42	66	76	74	66	62	58.1	77
29-Jul	72	76	76	80	80	80	79	72	66	57	46	47	44	39	69	64	54	47	47	52	61	65	67	69	62.9	80
30-Jul	72	73	80	81	83	80	76	79	85	85	84	80	74	61	56	54	51	32	23	24	25	31	40	42	61.3	85
31-Jul	42	50	57	58	61	62	67	65	58	55	50	45	48	46	58	81	80	73	76	71	75	77	78	75	62.8	81
	62.9	65.5	68.5	71.5	74.6	75.7	74.9	72.0	68.1	63.4	57.4	52.5	48.5	45.7	45.7	45.3	43.6	44.3	44.9	47.1	49.6	53.0	55.7	59.0	Diurnal Average	
	95	92	90	92	98	99	99	96	87	85	84	80	74	74	73	81	80	73	76	73	78	84	88	95	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	120	16.13	16.13
40 - 60	293	39.38	55.51
60 - 80	241	32.39	87.90
80 - 100	90	12.10	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

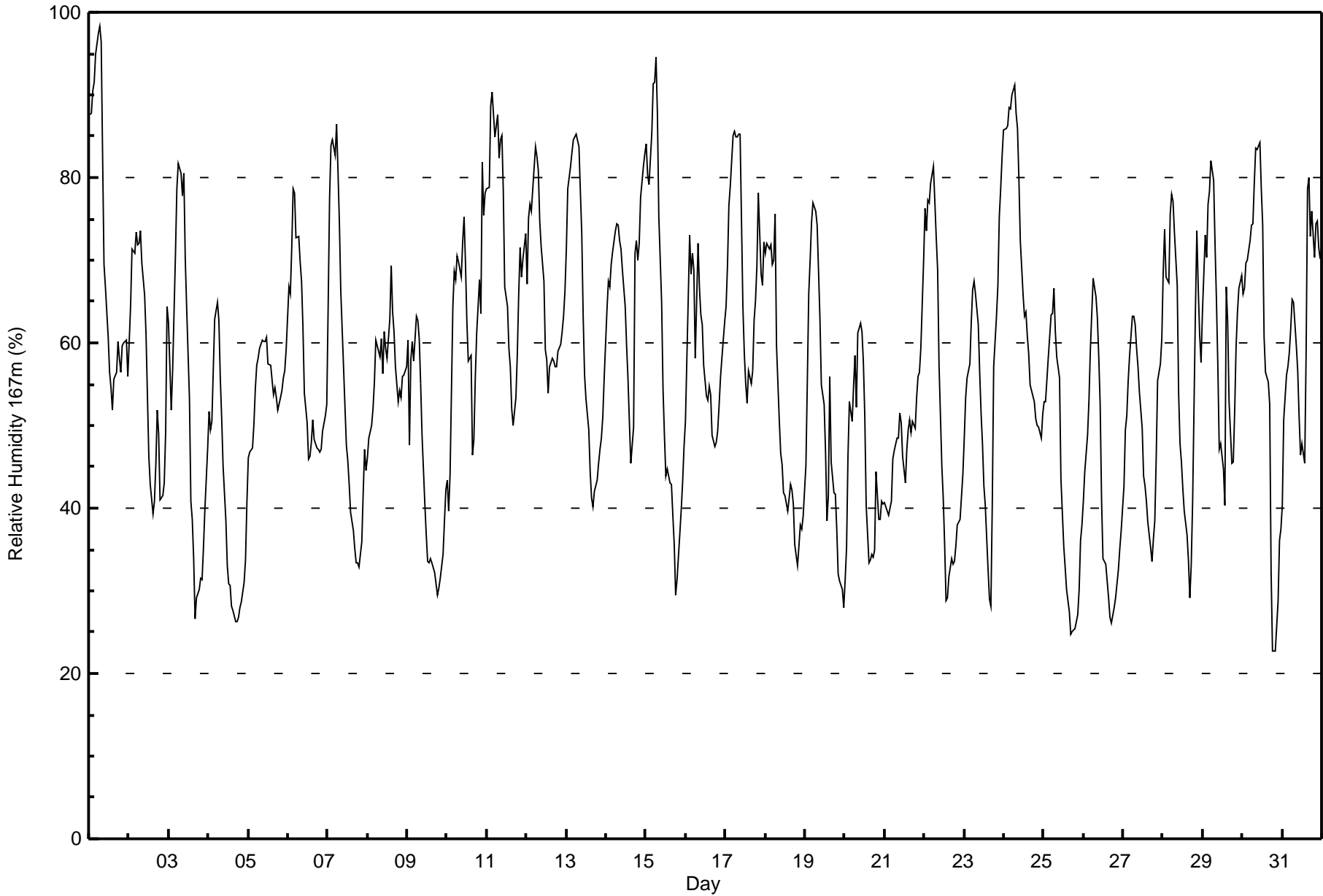
Lower Camp Met Tower - July 2017

Maximum Value: 98 % on Jul 1 07:00																	Maximum Daily Average: 72.4 % on Jul 11																	Hours in Service: 744								
Minimum Value: 23 % on Jul 30 21:00																	Minimum Daily Average: 40.9 % on Jul 4																	Hours of Data: 744								
Maximum Diurnal Average: 73.3 % at hour 7																	Minimum Diurnal Average: 44.1 % at hour 17																	Hours of Missing Data: 0								
Monthly Average: 56.8 %																	Percentiles: P ₁ = 26 P ₁₀ = 34 Q ₁ = 45 Median = 57 Q ₃ = 69 P ₉₀ = 79 P ₉₉ = 92																	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-Jul	88	88	91	92	95	98	98	97	83	69	67	61	56	55	52	56	56	60	58	56	60	60	60	56	71.2	98																
2-Jul	60	65	71	71	73	72	72	74	70	66	61	54	46	43	39	41	45	52	49	41	42	43	49	64	56.8	74																
3-Jul	62	52	57	64	71	79	82	81	78	80	70	64	53	41	39	34	27	29	30	32	31	35	40	47	53.2	82																
4-Jul	52	49	50	57	63	65	63	56	51	45	39	33	31	31	28	28	26	26	27	28	29	31	34	41	40.9	65																
5-Jul	46	47	47	50	54	57	58	59	60	60	60	61	58	57	55	54	55	53	52	53	54	56	57	59	55.2	61																
6-Jul	67	66	72	79	78	73	73	70	67	62	54	50	46	46	48	51	48	47	47	47	47	49	51	53	57.9	79																
7-Jul	65	77	84	85	83	86	81	75	66	57	52	48	46	43	39	37	35	33	33	33	36	42	47	45	55.3	86																
8-Jul	46	49	50	52	55	60	60	58	60	56	61	59	58	63	69	64	61	57	53	54	53	56	56	57	57.1	69																
9-Jul	60	48	58	60	58	63	63	60	55	49	41	37	34	33	34	33	32	31	30	30	32	34	38	42	44.0	63																
10-Jul	43	40	44	64	69	68	71	70	68	72	75	70	63	58	58	46	48	56	61	68	64	82	75	78	62.9	82																
11-Jul	79	79	89	90	88	85	88	82	85	85	78	67	64	59	57	52	50	53	59	66	72	68	70	73	72.4	90																
12-Jul	67	75	77	76	81	84	83	81	75	72	67	59	58	54	57	58	58	57	57	59	60	61	63	66	66.9	84																
13-Jul	71	79	81	83	85	85	85	84	78	73	63	56	53	50	44	41	40	42	43	45	47	49	51	56	61.9	85																
14-Jul	64	67	67	69	71	74	74	74	72	71	69	64	60	56	50	45	50	71	72	70	72	78	81	83	67.7	83																
15-Jul	84	80	79	85	91	92	95	88	75	65	54	49	44	45	43	43	39	36	30	31	37	40	43	47	59.0	95																
16-Jul	51	66	73	68	71	69	58	72	67	63	62	57	53	53	55	54	49	47	48	49	52	56	58	62	58.9	73																
17-Jul	64	69	77	79	85	86	85	85	85	85	64	59	55	53	57	55	57	63	65	69	78	68	67	72	70.1	86																
18-Jul	71	72	71	72	70	70	76	60	51	47	45	42	42	40	41	43	42	40	36	33	36	38	38	39	50.5	76																
19-Jul	45	55	66	70	75	77	76	74	69	63	55	53	47	39	42	56	46	42	42	37	32	31	30	28	52.0	77																
20-Jul	31	35	46	53	50	55	58	52	61	62	61	58	51	40	33	34	34	34	35	44	39	39	41	40	45.4	62																
21-Jul	41	40	39	40	41	46	47	48	48	52	50	46	43	47	49	51	49	51	50	53	56	57	59	70	48.9	70																
22-Jul	76	73	77	77	79	81	77	73	69	57	45	41	36	29	29	32	34	33	34	35	38	39	41	44	52.1	81																
23-Jul	48	53	56	58	63	66	67	66	62	57	52	48	43	40	33	29	28	41	57	63	67	75	79	83	55.5	83																
24-Jul	86	86	86	88	88	90	91	88	86	80	72	66	63	64	61	59	55	54	53	51	50	50	49	51	69.4	91																
25-Jul	53	53	56	58	63	63	67	61	58	56	44	39	35	33	30	27	25	25	25	25	27	30	36	38	42.9	67																
26-Jul	41	44	49	53	59	64	68	66	63	58	53	41	34	33	31	29	27	26	28	29	31	33	35	37	43.0	68																
27-Jul	43	50	51	55	59	63	63	62	59	57	54	50	44	43	41	38	35	34	36	38	46	55	58	61	49.8	63																
28-Jul	69	74	68	67	76	78	77	73	67	54	48	46	42	40	37	34	29	33	41	64	74	67	61	58	57.3	78																
29-Jul	64	73	70	77	78	82	80	72	65	57	47	48	45	40	67	63	53	45	46	52	60	64	67	68	61.7	82																
30-Jul	66	67	70	70	72	74	74	79	84	83	84	79	74	61	56	55	52	32	23	23	23	29	36	38	58.5	84																
31-Jul	40	51	56	57	59	62	65	65	60	57	51	46	48	45	59	79	80	73	76	70	74	75	71	70	62.1	80																
																	59.5	62.0	65.4	68.4	71.0	73.1	73.3	71.1	67.7	63.6	58.1	53.2	49.2	46.2	46.3	45.8	44.1	44.4	45.0	46.8	48.9	51.2	53.0	55.7	Diurnal Average	
																	88	88	91	92	95	98	98	97	86	85	84	79	74	64	69	79	80	73	76	70	78	82	81	83	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	128	17.20	17.20
40 - 60	307	41.26	58.47
60 - 80	242	32.53	90.99
80 - 100	67	9.01	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Speed: 27 km/h on Jul 4 13:00	Maximum Daily Speed Average: 18.6 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 25 02:00	Minimum Daily Speed Average: 0.2 km/h on Jul 13	Hours of Data: 744
Maximum Diurnal Speed Average: 5.3 km/h at hour 14	Minimum Diurnal Speed Average: 1.5 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 3.3 km/h 255.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 8 Q ₃ = 11 P ₉₀ = 15 P ₉₉ = 23	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-Jul	SE4	SE5	S4	SW3	S2	S7	S7	SSE7	SE9	SSE11	SSE9	SE6	S8	SW8	SSW5	N1	NW4	WNW4	NNE3	ESE4	SE3	SSE6	S11	S10	S4.6	S11
2-Jul	S12	SSE14	SE8	SSE3	SSE9	S12	S13	SSE12	SSE10	SE12	SSE12	S11	SSW11	S12	S12	SSW15	WSW10	NNE4	SE7	S10	S11	S11	SE2	SE4	S8.7	SSW15
3-Jul	SSE7	SW6	S5	SW7	WSW8	SSE5	S8	SW4	SW9	SSE9	WSW8	WSW12	WSW14	WSW14	WSW13	W13	WSW22	WSW25	SW18	SW21	WSW15	WSW13	WSW19	W16	WSW10.7	WSW25
4-Jul	WSW17	SW15	WSW12	WSW16	W16	W18	W19	W20	W18	WSW18	WSW23	W24	WSW27	WSW24	W26	WSW24	W24	W23	W22	W18	W15	WSW12	WSW13	W10	W18.6	WSW27
5-Jul	WNW11	W13	WNW13	W16	W14	WNW13	W14	WNW15	WNW15	WNW12	NW12	NW11	NW12	NW10	NW12	NNW11	N9	NNW10	NNW11	NNW11	NNW9	NNW5	NNW1	SSE1	NNW9.8	W16
6-Jul	WSW1	NW4	NW1	W2	WSW2	W11	W10	WNW9	W11	WSW12	WNW11	NNW7	N7	N7	NNW8	N7	NW8	NNW7	NNW6	NW5	NNW1	SSW1	SE1	ENE0	NW4.7	WSW12
7-Jul	SSE0	NNW1	ENE0	SE2	SE3	SE4	SE4	SE3	S2	WSW2	W6	WSW9	WSW7	WSW6	SW6	WSW5	N1	ESE1	W2	S2	NNE2	N7	NNW4	NE2	WSW1.3	WSW9
8-Jul	N2	NW3	NW3	N1	N2	NW2	NNW4	N3	WNW2	SE2	WNW9	WNW5	WSW1	SE4	SE1	S1	ESE1	W1	WSW6	W4	WSW4	NNW1	S1	W0	WNW1.4	WNW9
9-Jul	NNW2	N2	W2	S2	N1	NNE2	WSW1	SSE3	SSE7	SSE5	SSE7	SSE10	SSE12	SSE11	SSE10	S11	S11	SSE9	SSE9	SSE10	SSE4	SE4	SSE3	SE1	SSE4.9	SSE12
10-Jul	SSE3	NNW1	WNW1	W9	SSW1	E2	ESE1	NNW4	WSW6	WSW9	W9	W5	W6	W7	WSW8	W3	ESE6	ESE7	SSE1	NW9	SW8	N4	SE1	NNW3	W2.6	W9
11-Jul	NNW4	NW3	NE1	N2	N2	N1	NNW2	NNW4	N7	N5	NNW8	NNW8	NW8	WNW8	NNW5	NNE5	WNW5	WSW8	S11	WSW8	S4	E1	ESE4	SSE4	NW2.2	S11
12-Jul	SE4	ESE5	SE4	SE6	SE6	SE7	SE7	SE7	SE6	W1	ENE1	SE7	ESE6	SE2	S6	SW10	SSW7	SSW9	S9	SSE6	SSE6	S9	S10	S9	SSE5.5	S10
13-Jul	SSE9	SE7	SSE11	SSE8	SSE5	SSW4	SW5	SSE6	SE4	SSE6	ESE3	W5	WNW5	NW6	NW6	NW5	NNW4	NNE7	NNE8	N10	N7	N4	NNW4	N4	NE0.2	SSE11
14-Jul	NNW6	N7	N9	NNW6	N7	NNW5	N8	N8	N10	N10	N11	NNE6	N6	N5	NNW4	N2	NNW5	N12	NNE6	N3	NNW3	N2	N0	NNE1	N5.7	N12
15-Jul	NNW2	NNE2	ENE1	NNW1	NNW1	NW2	SE1	SE8	SE7	SE4	SSE5	SE11	SSE17	SSE18	S19	SSE15	SSE15	SE15	S13	S15	S18	S17	SSE13	SSE14	SSE8.9	S19
16-Jul	S12	NNW19	N6	NW7	WSW3	S4	SW9	WNW12	WNW10	WNW6	W7	WSW13	SW18	SW18	SW18	WSW19	W19	W18	W18	W19	W18	W16	W16	W18	W11.2	W19
17-Jul	WNW17	WNW17	WNW15	W16	W13	WNW15	WNW15	NW13	NNW12	NNW9	NNW15	N14	N14	N11	NNW9	NNE8	N7	NNW8	NW4	NNW5	NNW3	NNW5	NW4	NNW5	NW9.2	WNW17
18-Jul	NNW4	NNW5	NW5	NW4	NW3	NW4	N3	NNE5	N4	N4	W4	WSW3	WSW8	WSW9	W10	W8	W9	W9	W11	WNW10	W9	WSW10	WSW11	WSW12	W5.5	WSW12
19-Jul	SW9	S5	SSW4	W10	W10	SSW5	W9	W11	W11	W11	WSW13	W12	W14	W13	NNW11	NNE11	NNE11	NNE8	NE6	NE6	NE3	NW1	NNW1	NNW2	W4.5	W14
20-Jul	NNW3	NNE1	NW2	NNW1	NNW5	NNW3	NW3	NNW2	NNW3	N3	NE3	ENE2	SSE2	S5	SE9	SE7	ESE6	SE5	E4	SE6	SSE1	SE3	ENE2	SE4	ESE1.3	SE9
21-Jul	SSE5	SSE4	SSE7	SSE6	E3	N2	NNW4	N3	NNW2	N3	NE2	E3	SSE11	SSE11	S13	SSW9	SSW7	S14	S13	S15	S14	S12	SSE10	SSE7	S5.8	S15
22-Jul	ESE6	SSE13	SSE12	SSE15	SSE8	S9	SSE8	SSE11	SSE11	SSW8	WSW14	W13	W14	W14	W14	W16	W14	W14	WSW13	WSW14	WSW10	SW11	SW14	WSW14	SW8.3	W16
23-Jul	WSW12	W10	W10	WSW11	W12	W15	W16	W11	W10	W10	W12	WSW13	WSW14	W15	WSW16	W14	W13	NW9	N10	N12	N11	N9	N9	N10	W9.1	W16
24-Jul	N11	N10	N12	N10	N14	N12	N11	N12	N10	N14	N14	N17	N17	N15	N16	N18	N17	N15	N13	NNW13	NNW8	NNW3	N4	NNW2	N11.7	N18
25-Jul	WNW2	W0	E1	ESE1	ESE2	SE4	S5	SW4	SSE3	ESE1	WSW7	WSW11	WSW11	WSW9	WSW10	WSW8	WSW8	WSW9	WSW9	SSW7	SSE5	SSE3	ESE7	SE3	SW3.9	WSW11
26-Jul	SSE7	SSE9	SE7	SSE8	SSE8	SSE7	SE8	SSE8	SE7	SSE9	SSE7	WNW6	W10	WNW6	SW4	SSW7	SSW8	SSW9	SSW11	SSW11	SSW10	SSW10	SSW10	SSW9	S6.3	SSW11
27-Jul	S5	SE8	SSE10	SSE10	SSE12	SSE14	SSE14	SSE13	SSE11	SSE10	SSE8	SSE11	SW7	WNW7	WNW7	WNW6	WNW8	WNW6	N2	NNW4	W10	NW14	NNW7	WNW9	SSW3.4	SSE14
28-Jul	S3	WSW4	W9	W12	WSW8	W10	W11	W11	W10	W12	W16	W16	W20	WNW14	W15	W15	WNW14	W17	W20	N12	SSE3	SW5	S1	N2	W9.7	W20
29-Jul	S2	W2	WSW1	SSW3	SW3	SSE5	SSE5	SSE5	SE4	NE3	W6	WNW7	W5	WSW7	N10	NNE5	NNE3	N7	N7	N6	N4	NNW4	N3	NNE3	NNW1.4	N10
30-Jul	N1	NW4	NNW3	NNW2	NNW4	NNW3	WSW2	SSW7	NNW1	SSE9	S5	SSE6	SSE9	SSE11	SSE14	SSE16	S17	SW12	WSW17	WSW14	WSW13	W11	W12	W13	SW5.0	S17
31-Jul	WNW10	NNW5	WNW4	WNW6	W13	W14	W10	W9	W9	W12	WNW11	WNW12	NNW11	NNW12	NNW9	NNE7	NNW7	N11	N10	NNE7	ESE0	E1	N1	N2	NW6.2	W14

SW2.3	W1.5	WSW1.5	WSW3.1	WSW2.7	WSW2.7	WSW3.4	WSW2.7	WSW2.5	WSW2.5	W4.3	W4.6	WSW5.3	WSW5.3	WSW5.2	WSW4.1	W4.5	W4.2	W3.7	W3.2	WSW3.5	WSW3.0	SW2.7	WSW2.8		Diurnal Average
WSW17	NNW19	WNW15	W16	W16	W18	W19	W20	W18	WSW18	WSW23	W24	WSW27	WSW24	W26	WSW24	W24	WSW25	W22	SW21	W18	S17	WSW19	W18		Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

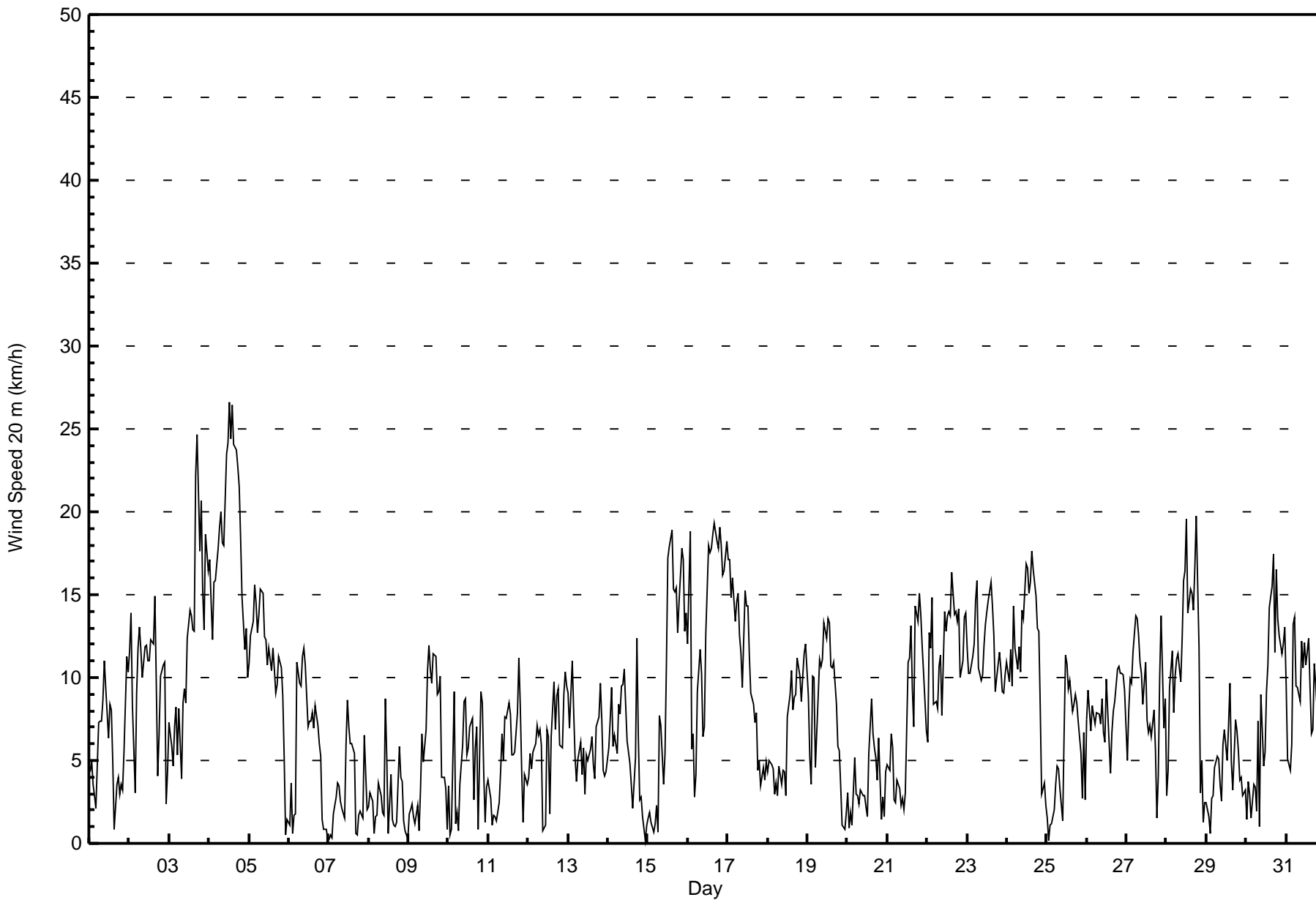
Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 25 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																	Hours in Service: 744 Hours of Data: 744 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-Jul	1	2	3	1	1	2	2	2	3	4	3	2	3	3	3	1	1	2	1	2	2	2	5	4	5
2-Jul	5	6	3	3	3	5	4	4	3	4	4	4	4	5	4	6	6	3	4	3	2	2	3	3	6
3-Jul	4	3	3	4	4	2	4	2	3	4	4	5	5	6	5	6	8	9	6	6	5	5	8	6	9
4-Jul	5	4	4	5	6	7	7	8	7	7	9	9	10	9	10	9	9	9	8	7	6	3	4	4	10
5-Jul	5	4	5	6	6	6	6	7	6	5	6	5	5	5	5	5	3	4	5	5	4	2	1	1	7
6-Jul	1	2	2	2	2	5	4	5	5	4	5	4	4	3	4	3	4	4	2	2	1	1	1	1	5
7-Jul	1	1	1	1	1	1	1	1	1	2	4	4	4	4	4	4	3	1	1	1	2	3	2	1	4
8-Jul	1	2	2	1	1	1	2	1	2	1	5	3	2	3	2	1	1	2	2	2	2	1	1	1	5
9-Jul	1	1	2	1	1	1	1	2	2	2	3	4	4	5	4	5	4	4	3	3	2	2	2	1	5
10-Jul	2	2	2	4	3	2	2	3	3	3	4	3	3	4	3	2	4	5	2	4	5	3	2	2	5
11-Jul	1	1	1	1	1	1	2	2	3	2	3	4	4	3	3	2	3	5	5	5	3	2	2	2	5
12-Jul	2	2	2	1	2	2	2	2	2	2	2	4	3	4	3	3	2	3	3	2	2	2	2	2	4
13-Jul	3	3	3	2	2	2	2	3	2	2	2	3	3	3	3	2	2	4	3	4	2	2	1	2	4
14-Jul	2	3	4	3	3	2	4	3	4	4	4	3	3	2	2	2	5	5	4	2	1	1	1	1	5
15-Jul	1	1	1	1	1	1	2	3	3	2	3	5	7	6	6	5	5	6	4	4	4	5	3	6	7
16-Jul	5	11	4	5	3	2	3	5	5	4	3	5	5	5	5	7	8	8	7	7	7	6	7	7	11
17-Jul	7	7	6	6	6	6	5	4	5	4	7	6	6	5	4	4	4	6	2	4	1	2	1	2	7
18-Jul	2	2	1	1	1	1	2	2	2	3	4	2	4	4	4	4	4	4	5	4	2	2	3	3	5
19-Jul	3	2	3	5	5	3	7	5	4	5	5	6	5	5	7	5	5	4	3	3	2	1	1	1	7
20-Jul	2	1	2	1	1	2	1	1	2	2	2	1	2	3	3	4	3	2	2	3	2	2	1	3	4
21-Jul	2	2	2	2	2	2	2	2	2	2	1	2	5	4	4	3	4	4	3	4	3	4	3	3	5
22-Jul	3	3	4	3	4	3	3	4	3	4	5	5	5	6	6	7	6	5	5	4	2	3	4	3	7
23-Jul	4	4	4	4	4	5	6	4	4	5	5	5	5	6	6	7	5	6	4	4	4	4	4	7	7
24-Jul	4	4	5	4	6	5	4	5	4	5	6	7	6	6	7	7	7	6	6	5	3	2	1	1	7
25-Jul	1	1	1	1	1	1	2	3	2	2	4	5	4	4	4	4	4	4	3	3	3	2	2	1	5
26-Jul	3	3	2	3	3	3	2	2	3	3	3	4	4	4	4	4	4	4	4	3	3	3	3	3	4
27-Jul	3	2	3	3	3	4	4	4	4	4	4	4	4	4	4	3	3	3	1	2	6	9	3	5	9
28-Jul	2	3	4	5	4	5	5	5	4	6	7	7	8	7	6	7	7	9	9	8	2	3	2	1	9
29-Jul	1	1	2	2	2	2	2	2	2	2	3	4	3	6	9	3	2	3	3	3	1	1	1	1	9
30-Jul	1	2	1	1	1	2	2	4	3	3	3	2	4	4	4	5	5	6	6	4	3	4	4	4	6
31-Jul	7	2	3	3	5	6	5	4	4	5	5	6	5	6	7	5	4	5	4	5	1	1	1	1	7
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	266	35.75	35.75
6 - 11	293	39.38	75.13
12 - 19	170	22.85	97.98
20 - 28	15	2.02	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

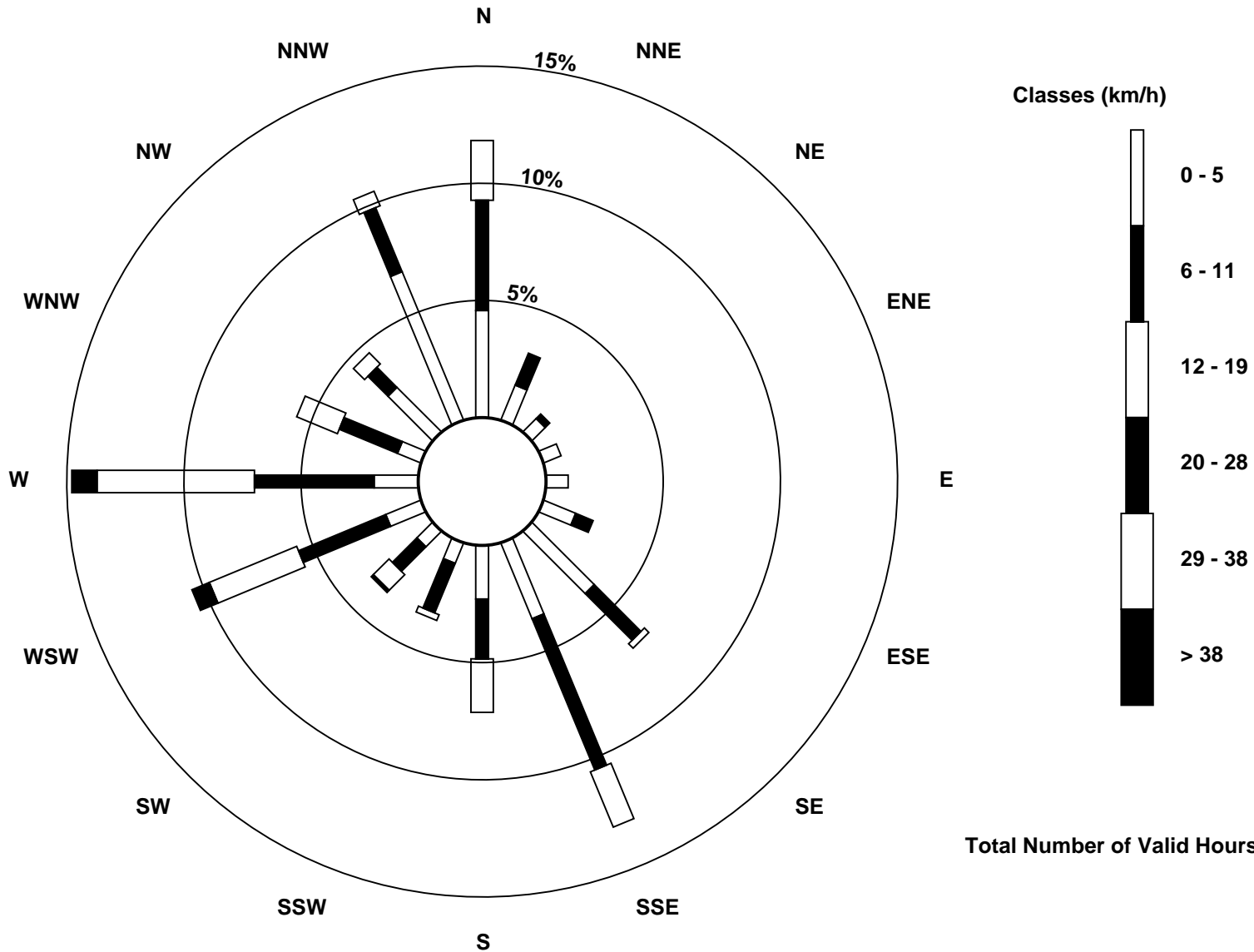
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Speed: 38 km/h on Jul 4 15:00	Maximum Daily Speed Average: 26.6 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 9 02:00	Minimum Daily Speed Average: 1.1 km/h on Jul 13	Hours of Data: 744
Maximum Diurnal Speed Average: 7.0 km/h at hour 14	Minimum Diurnal Speed Average: 2.0 km/h at hour 2	Hours of Missing Data: 0
Monthly Average Velocity: 4.5 km/h 252.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 20 P ₉₉ = 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-Jul	SE6	SE7	S5	SSW4	SSE3	S8	S9	SSE8	SE11	SSE13	SE11	SE8	S9	SSW10	S6	NNW1	NW4	WNV6	NNE4	ESE5	SE4	SE7	S14	S12	SSE5.7	S14
2-Jul	SSE14	SSE17	SE12	SE5	SSE12	SSE14	SSE15	SSE15	SE12	SE15	SE15	SSE13	S13	S14	S14	S17	WSW12	NNE6	SE8	SSE12	S13	S14	SE4	SE6	SSE10.7	SSE17
3-Jul	SSE10	SW8	SSE6	SW10	SW12	SSE7	S10	SSW5	SW11	SE12	SW12	WSW17	WSW19	WSW19	WSW17	WSW18	WSW32	WSW37	SW22	SW26	SW20	WSW18	WSW26	WSW24	SW14.7	WSW37
4-Jul	WSW24	SW18	SW16	WSW23	WSW24	W26	WSW27	WSW29	WSW26	WSW25	WSW31	WSW34	WSW38	WSW36	WSW38	WSW35	WSW34	W32	W30	W26	W22	WSW17	SW18	WSW15	WSW26.6	WSW38
5-Jul	W16	W18	W19	W22	W21	W18	W19	W21	WNV21	WNV17	WNV17	NW14	NW16	NW14	NW16	NW15	NNW13	NNW14	NNW17	NNW16	NW13	NW9	NNW3	S1	WNV13.9	W22
6-Jul	WSW3	WNV6	W2	WSW3	W4	W16	W14	WNV13	WSW16	WSW17	WNV14	NW10	N10	N10	NW10	NNW10	NW12	NW10	NNW8	NW7	NNW3	WSW1	SW1	WNV0	WNV6.9	WSW17
7-Jul	S0	WNV1	WSW1	SSE2	SE6	SE4	SE4	ESE3	SSE2	WSW3	WSW8	WSW11	WSW9	WSW7	SW8	SW7	NNW1	E0	W2	S2	NE2	NNE11	NNW7	NNE3	WSW1.5	NNE11
8-Jul	N3	NNW4	NNW4	N1	NNW2	NNW2	NNW5	N4	WNV2	SE2	W13	W8	SW1	SE4	E2	S1	ENE1	W3	WSW8	WSW6	SW6	N2	S1	NNW0	WNV1.8	W13
9-Jul	NNW2	NW0	W3	SSW3	ENE1	NNE2	SSE1	SE4	SE8	SSE6	SE8	SE13	SE15	SE13	SSE11	S13	S12	SSE11	SSE11	SSE12	SE6	ESE8	SE7	SE3	SSE6.5	SE15
10-Jul	SSE5	SSE2	SE1	WSW13	SW2	E2	ESE2	NNW5	WSW8	WSW12	WSW12	W7	W7	W9	WSW10	W4	ESE8	E11	SE1	NW14	SW13	NNW7	ESE2	NW4	WSW3.4	NW14
11-Jul	NNW6	NNW5	NE1	NNE2	NNE3	N2	NNW4	NNW7	NNW9	NNW7	NNW10	NW10	NW11	WNV10	NW7	N7	WNV7	WSW11	S13	SW12	S5	SE1	ESE5	SSE5	NW3.2	S13
12-Jul	SE5	ESE7	SE6	SE7	SE7	SE9	SE8	SE9	SE7	W1	NE1	ESE9	ESE9	ESE2	S7	SSW11	SSW8	SSW10	SSE10	SSE7	SSE8	SSE11	SSE12	S11	SSE6.6	SSE12
13-Jul	SE12	SE10	SSE13	SSE9	SE6	S5	SW7	SE7	SE4	SE6	E3	W7	WNV7	WNV7	WNV8	NW6	NNW5	NNE11	NNE13	N15	N11	N8	NNW8	NNW8	NNE1.1	N15
14-Jul	NNW10	N12	N14	NNW9	N10	NNW9	N12	N11	N13	NNW14	N14	NNE8	N8	N6	NNW4	N3	NW8	N18	NNE9	N4	NNW5	N4	NE1	N2	N8.3	N18
15-Jul	N2	N2	NNE1	NW1	NE1	N2	ESE2	SE9	SE8	SE4	SE8	SE15	SE23	SSE22	SSE21	SE19	SE19	SE21	SSE15	SSE16	SSE20	SSE16	SSE17	SSE17	SSE11.0	SE23
16-Jul	SSE14	NNW28	NNW8	NW10	WSW5	S6	SW12	W16	WNV14	WNV9	WSW10	WSW18	SW23	SW22	SW22	SW25	W28	W26	W25	W27	W26	W23	W23	W26	WSW15.6	NNW28
17-Jul	W24	W25	WNV22	W23	W19	WNV21	WNV22	NW17	NNW18	NNW15	NNW23	NNW20	N20	NNW16	NW13	N12	N10	NNW12	NW6	NNW9	NNW7	NW7	NNW7	NNW8	NW13.3	W25
18-Jul	NNW7	NNW8	NW8	NW7	NNW5	NW5	NNW4	NNE6	N4	N6	W6	WSW3	WSW10	WSW11	WSW13	W11	W12	WSW12	W15	W15	WSW12	SW13	SW16	SW16	W7.2	SW16
19-Jul	SW12	S6	SW5	WSW16	WSW15	SSW6	WSW13	WSW16	WSW15	WSW15	WSW18	WSW17	WSW18	W18	NW14	NNE16	NNE15	NNE12	NE9	NE9	NE7	NNW1	NNE1	N3	W6.1	WSW18
20-Jul	NNW6	N3	NW2	NW1	NNW6	NNW5	NNW3	NNW2	NNW5	N4	NE4	NE3	SE1	SSE6	SE11	SE9	ESE8	SE7	E7	ESE10	ESE3	ESE6	E4	SE8	E2.5	SE11
21-Jul	SE6	SE7	SE9	SE8	ESE6	NNE2	NNW6	NNW5	NNW3	N3	NE2	E4	SE14	SSE13	S15	SSW11	S8	SSE16	S15	S16	S15	S13	SSE12	SE10	SSE6.9	S16
22-Jul	ESE8	SSE15	SE15	SSE18	SSE10	SSE10	SE10	SE13	SSE13	SSW10	WSW20	WSW17	WSW18	WSW20	W20	WSW23	WSW20	WSW20	WSW20	SW18	SW13	SW15	SW17	SW18	SW11.1	WSW23
23-Jul	WSW17	WSW15	WSW16	WSW17	WSW18	WSW23	W22	W15	W14	W13	W16	WSW17	WSW19	WSW20	WSW21	W21	W18	NW12	N14	N17	N15	N13	N13	NNW15	W12.5	WSW23
24-Jul	N16	N13	N17	N13	N20	N16	N16	N17	N15	N20	N19	N24	N24	N21	N23	N26	N24	NNW23	NNW19	NNW20	NNW13	NNW6	N7	N5	N17.2	N26
25-Jul	NNW3	NNW2	ENE1	ESE1	SSE3	S3	SSW5	SW5	SE4	ESE1	WSW9	WSW14	WSW14	SW12	WSW13	WSW10	WSW11	SW12	SSW11	SSW10	S8	S7	ESE8	SE7	SW5.4	WSW14
26-Jul	SE12	SE13	SE9	SE11	SSE10	SE10	SE10	SE9	SE9	SE10	SE7	W8	W13	WNV7	SSW5	SSW8	SSW10	SSW11	SSW13	SSW14	S13	S13	SSW14	SSW13	S8.1	SSW14
27-Jul	SSE7	SE11	SE13	SE12	SE15	SE18	SE16	SE16	SE14	SE13	SE10	SSE13	SSW9	W8	WNV10	W9	WNV11	WNV8	NNW3	NW6	W15	WNV20	NW10	WNV14	S3.9	WNV20
28-Jul	S4	WSW7	W14	WSW17	WSW12	W14	WSW16	WSW17	WSW14	W17	WSW23	WSW23	WSW27	W19	W22	W22	WNV20	W25	W28	N16	SE4	SSW6	S3	WNV2	W13.9	W28
29-Jul	SSW3	WSW2	WSW3	SSW4	SW3	SSE5	SSE5	SE6	ESE4	NE3	W7	WNV8	W6	WSW9	N14	NNE7	NNE5	N10	NNW10	N8	N6	NNW5	N4	NNE5	NNW2.2	N14
30-Jul	N3	NNW4	NNW5	NNE2	NNW4	N5	SSW3	SSW9	NNW2	SSE10	SSE6	SSE6	SE10	SE13	SSE17	SSE19	SSE19	SW17	WSW25	WSW19	SW18	WSW18	W17	WSW19	SSW6.4	WSW25
31-Jul	W14	NNW8	WNV7	W9	WSW20	W20	W15	W14	W11	W17	W15	WNV17	NNW15	NNW18	NNW13	NNE10	NNW9	N16	N13	NNE10	E1	E2	NNW2	NNW2	WNV8.8	W20

SW3.1	WSW2.0	WSW2.2	WSW4.5	WSW3.9	WSW3.7	WSW4.5	WSW3.7	WSW3.3	W5.9	W6.2	WSW6.8	WSW7.0	WSW6.8	WSW5.3	W6.1	W5.9	W4.9	W4.1	WSW4.4	WSW3.8	SW3.5	WSW3.9	Diurnal Average				
WSW24	NNW28	WNV22	WSW23	WSW24	W26	WSW27	WSW29	WSW26	WSW25	WSW31	WSW34	WSW38	WSW36	WSW38	WSW35	WSW34	WSW37	W30	W27	W26	W23	WSW26	W26	Diurnal Maximum			

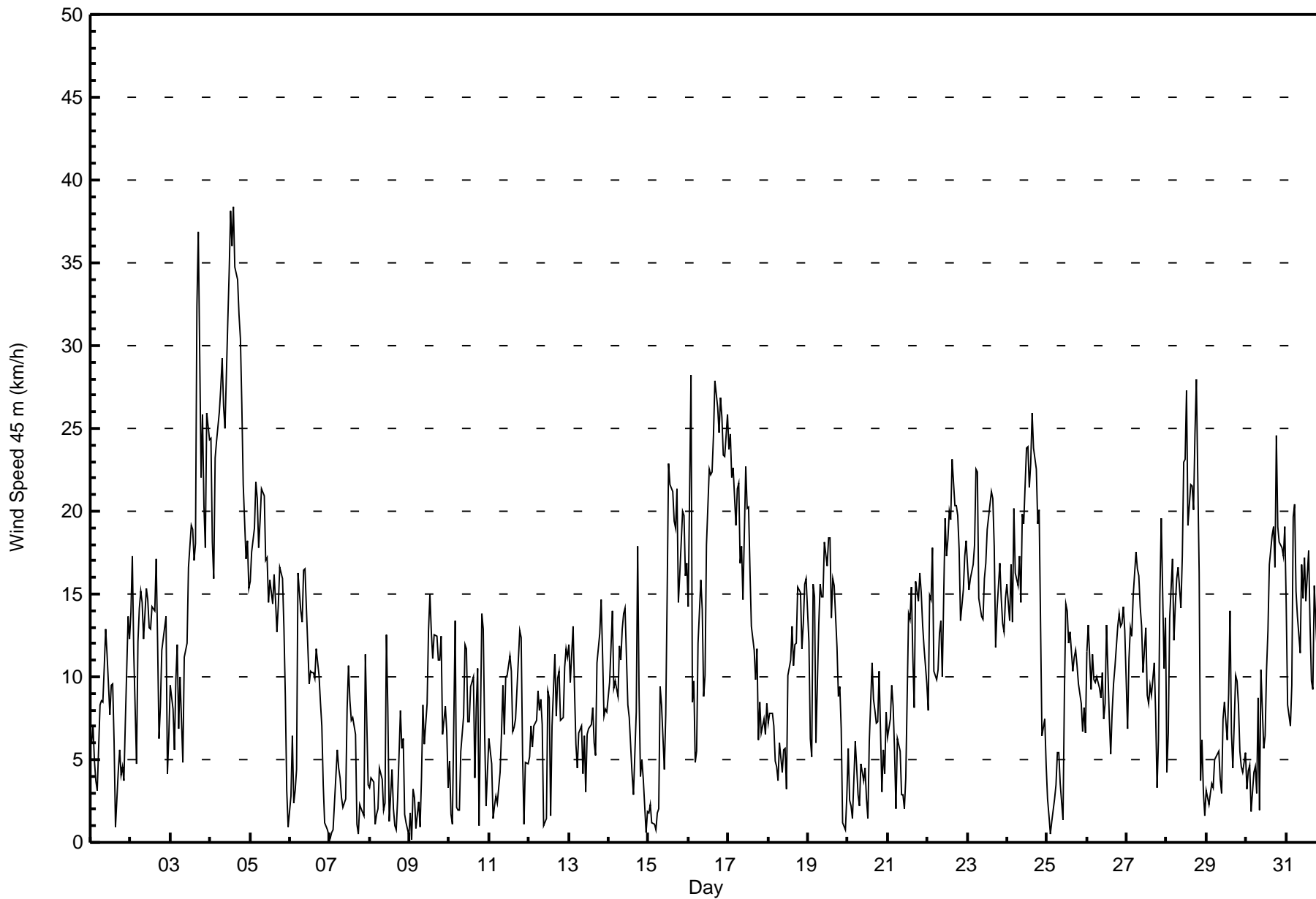
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on Jul 16 02:00 Minimum Value: 0 km/h on Jul 7 03:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 4 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																		Hours in Service: 744 Hours of Data: 744 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-Jul	1	2	3	2	2	2	3	2	3	4	3	3	3	4	3	1	1	2	1	3	3	3	5	4	5
2-Jul	6	6	3	4	4	5	4	5	3	4	4	4	4	4	5	7	6	4	4	3	3	3	3	3	7
3-Jul	4	4	3	4	5	3	3	2	4	4	5	4	5	5	6	7	8	5	6	5	5	9	6	9	
4-Jul	5	3	3	4	6	7	7	8	6	6	8	9	9	9	9	8	9	8	8	7	5	3	3	4	9
5-Jul	5	4	5	5	5	6	5	7	6	5	6	5	6	6	6	5	3	5	5	5	4	2	3	1	7
6-Jul	3	3	3	2	3	5	4	5	5	4	4	5	4	3	5	4	5	4	3	2	1	1	1	1	5
7-Jul	1	1	0	1	2	1	1	1	1	3	4	4	4	4	4	4	3	2	2	2	3	3	2	2	4
8-Jul	2	2	2	1	1	1	2	2	2	1	7	4	3	3	2	1	1	2	2	2	3	2	1	1	7
9-Jul	1	2	2	1	1	1	1	2	3	3	4	5	5	5	5	4	4	3	3	3	3	3	3	2	5
10-Jul	2	2	2	5	3	2	2	4	3	3	4	3	3	3	3	2	5	6	3	4	6	4	2	2	6
11-Jul	1	1	1	2	1	2	2	2	3	3	3	4	4	3	3	2	3	6	5	5	3	2	2	2	6
12-Jul	3	2	2	1	2	2	2	2	2	2	2	4	3	4	3	4	3	3	3	2	2	3	2	2	4
13-Jul	3	3	3	2	2	2	2	3	2	3	2	3	3	3	3	2	3	5	4	4	3	2	1	2	5
14-Jul	3	4	4	3	3	3	4	3	4	4	4	4	4	3	2	2	7	6	4	2	2	2	1	1	7
15-Jul	1	1	1	1	1	1	3	3	4	2	4	6	7	6	6	5	6	6	4	4	5	5	3	6	7
16-Jul	6	13	5	6	4	3	4	5	5	5	4	6	4	5	5	6	7	8	6	7	7	6	6	7	13
17-Jul	7	6	6	6	6	5	5	4	6	5	8	7	6	5	4	5	4	8	2	5	2	3	2	2	8
18-Jul	2	2	2	1	1	1	2	2	2	4	4	3	4	4	4	4	5	5	6	4	2	2	2	2	6
19-Jul	3	2	4	6	4	4	8	5	5	4	5	6	5	5	7	6	6	5	4	3	2	1	1	1	8
20-Jul	2	1	1	1	2	2	2	1	2	2	2	2	2	4	4	4	4	3	3	4	2	2	2	4	4
21-Jul	2	3	3	3	2	2	2	2	3	2	1	2	5	5	4	4	4	4	3	4	3	4	3	3	5
22-Jul	3	3	4	2	5	3	3	4	3	4	4	5	5	6	6	7	6	5	5	3	2	3	4	3	7
23-Jul	3	4	4	4	4	4	6	4	4	5	5	5	5	6	6	7	5	6	4	4	5	4	4	7	
24-Jul	4	4	5	5	6	5	4	5	4	5	6	7	7	7	8	7	6	6	6	3	2	1	1	8	
25-Jul	1	1	1	1	1	1	2	3	2	2	5	5	4	4	4	4	4	3	3	2	3	2	1	5	
26-Jul	3	3	2	3	4	3	2	2	3	3	4	5	4	4	4	4	5	4	4	3	3	3	4	4	5
27-Jul	3	2	3	3	3	4	4	5	4	4	4	5	4	4	4	3	3	3	2	4	8	10	3	6	10
28-Jul	2	5	4	5	4	5	5	6	4	7	6	6	7	8	6	7	7	11	9	9	2	3	3	2	11
29-Jul	2	2	2	2	2	2	2	2	2	2	3	4	3	8	12	3	3	3	4	3	2	2	2	2	12
30-Jul	2	2	1	2	1	2	3	4	4	3	3	2	4	4	4	5	5	7	5	3	2	4	4	4	7
31-Jul	8	2	3	4	4	5	5	4	4	4	5	6	6	6	9	6	5	6	5	6	1	1	1	1	9
Diurnal Maximum																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	179	24.06	24.06
6 - 11	235	31.59	55.65
12 - 19	238	31.99	87.63
20 - 28	80	10.75	98.39
29 - 38	12	1.61	100.00
> 38	0	0.00	100.00

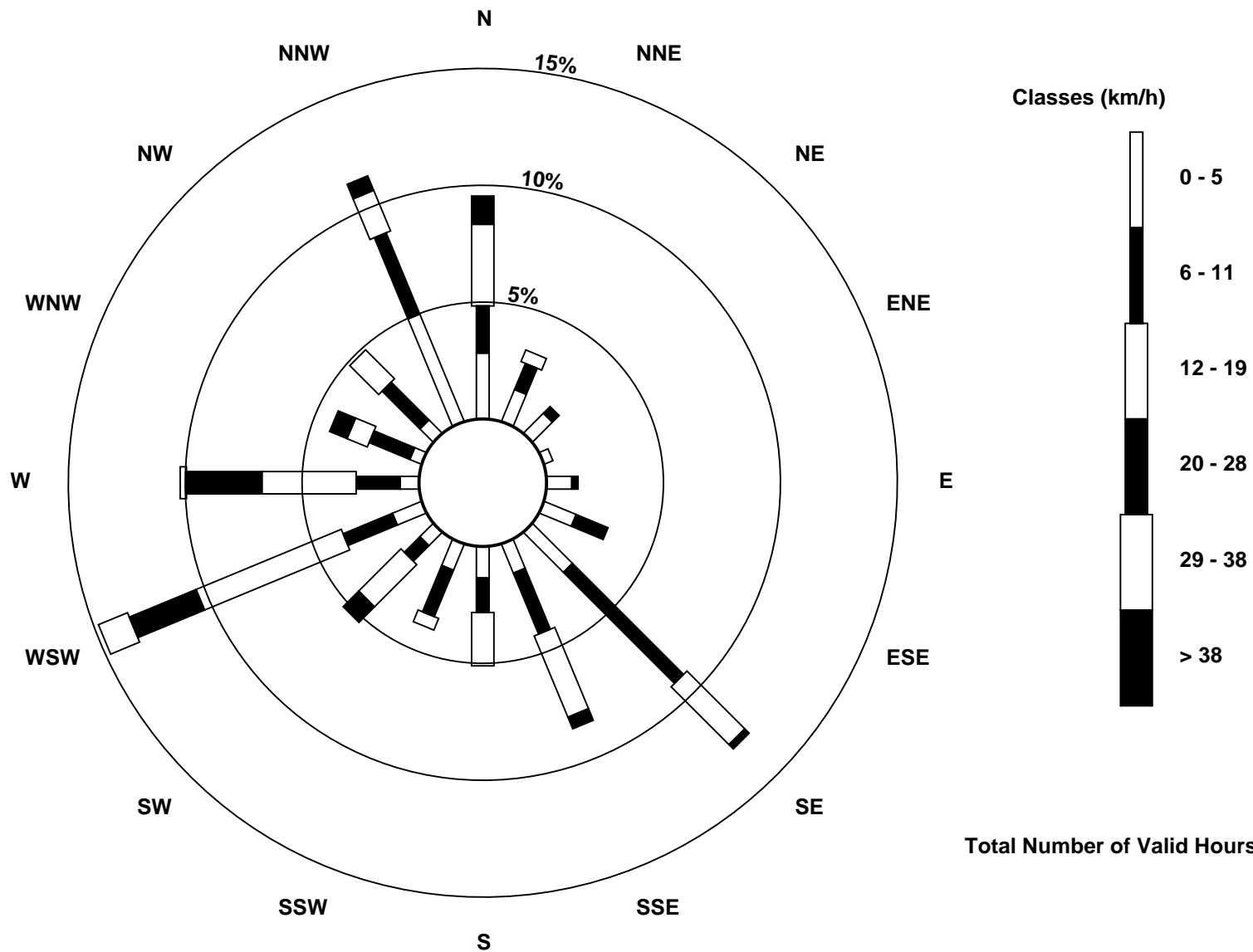
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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 - July 2017

Maximum Speed: 43 km/h on Jul 16 02:00	Maximum Daily Speed Average: 33.9 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 1 16:00	Minimum Daily Speed Average: 1.8 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 8.0 km/h at hour 14	Minimum Diurnal Speed Average: 3.8 km/h at hour 10	Hours of Missing Data: 0
Monthly Average Velocity: 5.8 km/h 250.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 8 Median = 15 Q ₃ = 21 P ₉₀ = 28 P ₉₉ = 40	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-Jul	SSE5	SSE6	S6	SSW5	SSE6	SSE9	SSE11	SSE9	SE12	SSE15	SE14	SE10	S10	SSW10	S7	SSE0	W5	W6	NE3	SE7	SE6	SE18	S19	S17	SSE7.5	S19
2-Jul	S18	SSE25	SE17	SSE9	SSE16	SSE21	SSE20	SSE21	SSE15	SE20	SSE18	SSE15	SSW14	S15	S15	S20	WSW15	NE9	SE11	S13	S16	S21	SSE13	SE13	SSE14.3	SSE25
3-Jul	SSE15	SW16	S7	SW18	WSW17	S8	S14	SSW8	SW15	SE17	SW14	WSW18	WSW21	WSW21	WSW19	WSW21	WSW37	WSW42	SW28	SW32	SW29	WSW26	WSW35	WSW32	SW19.2	WSW42
4-Jul	WSW32	SW27	SW25	WSW30	WSW31	WSW34	WSW35	WSW36	WSW30	WSW28	WSW35	WSW41	WSW43	WSW40	WSW43	WSW40	WSW42	WSW41	W42	W37	W34	WSW26	WSW28	WSW24	WSW33.9	WSW43
5-Jul	W25	W27	W29	W31	W30	W24	W26	W28	WNW27	WNW22	WNW23	NW19	NNW21	NW20	NW22	NW20	NNW18	NNW21	NNW25	NNW26	NW22	NW18	NNW13	NW8	WNW20.0	W31
6-Jul	WNW7	W16	W8	WSW10	WSW11	WSW22	W18	WNW16	WSW19	WSW18	WNW18	NW13	N15	N14	NW13	NNW14	NW16	NW13	NNW12	NW10	NNW5	NNE2	SW4	WSW3	WNW9.8	WSW22
7-Jul	SSW2	SE3	SW1	SW4	SSW4	S3	SSE2	SE3	SSW1	WSW5	WSW9	WSW12	WSW10	WSW9	WSW8	WSW8	NW1	N1	W3	SSW2	ENE1	NNE23	N10	ENE8	WSW1.9	NNE23
8-Jul	NE4	NNE5	N9	NNE4	S1	ESE2	ESE1	NNE3	SSE1	SE5	W18	W14	W5	S4	ESE3	SW1	W2	W5	WSW8	WSW7	SW13	NNE2	ESE3	ESE4	W1.8	W18
9-Jul	ESE8	SE11	SW5	S5	SE7	SE6	SE6	SE9	SE13	SE9	SE13	SE18	SE21	SE17	SSE14	SSE15	SSE15	SSE14	SSE14	SSE17	SE20	SE20	SE21	SE15	SE12.6	SE21
10-Jul	S9	SSE9	SE7	WSW18	SW6	ESE3	S3	NW7	WSW8	WSW12	WSW13	W9	W8	W12	WSW11	W5	ESE12	E17	SE3	NW20	SW20	N9	ENE10	NNE4	WSW3.9	NW20
11-Jul	NNW7	NNW9	W2	NNE2	N3	NNE6	NNW9	NNW11	NNW12	NNW8	NNW12	NW12	NW13	NNW12	NW9	N7	WNW8	WSW13	S17	SW19	S7	WSW5	SSW1	SSE6	WNW4.7	SW19
12-Jul	SSE7	SSE6	SE7	SSE7	SSE7	SSE11	SE11	SE12	SSE8	W2	NE1	SE12	SE10	ESE4	S7	SSW13	SSW9	SSW11	S11	SSE10	SSE10	S14	S16	S19	SSE8.5	S19
13-Jul	SSE16	SSE14	SSE12	SSE8	SSE7	SSW6	SW7	SE7	SE4	SE7	ESE4	W7	WNW8	WNW8	WNW9	NW8	NNW7	NNE16	NNE20	NNE23	NNE21	N16	N16	N14	NNE2.6	NNE23
14-Jul	NNW17	N21	N21	N16	N15	N14	N17	N15	N18	N18	N19	NNE11	N10	N8	NNW5	N3	NW11	N26	NE14	NNE6	N6	N7	N5	N4	N12.4	N26
15-Jul	N5	NNE4	SE2	SSE3	SE5	ESE4	SE6	SE15	SE15	SE11	SE18	SE25	SE36	SSE31	SSE25	SE27	SE32	SE32	SSE18	SSE21	SSE26	SSE28	SSE24	SSE25	SSE17.1	SE36
16-Jul	S20	NNW43	N13	WNW17	W8	SW9	SW20	W22	WNW18	WNW11	WSW12	WSW20	SW26	SW25	SW26	SW28	W35	W35	W33	WSW35	W35	WSW32	W33	W36	WSW20.7	NNW43
17-Jul	W33	W34	W31	W31	W25	WNW30	WNW32	NW26	NNW28	NNW23	NNW33	N28	N28	N23	NW19	N16	N14	NNW18	NNW10	NNW14	NNW10	NNW12	NW11	NW16	NW19.2	W34
18-Jul	NNW15	NNW16	NNW15	NNW13	NNW10	NNW6	NNW5	N8	NNE6	N7	WNW7	W4	WSW12	WSW12	WSW15	W12	W14	WSW15	WSW18	W21	WSW15	WSW16	WSW21	WSW22	W9.6	WSW22
19-Jul	WSW19	SW13	WSW14	WSW21	WSW20	SW10	WSW18	WSW19	WSW16	WSW17	WSW20	WSW19	WSW20	W23	NNW16	NE22	NNE22	NNE17	NE12	NE14	NE16	ENE9	ESE5	ENE3	W6.8	W23
20-Jul	NNE6	N8	N4	ESE3	E4	NW2	ENE3	S4	NW3	NE6	ENE7	E4	ESE3	SSE8	SE16	SE13	ESE12	ESE10	E15	ESE18	E16	SE17	ESE19	SE21	ESE7.2	SE21
21-Jul	SE14	SE20	SE20	SE19	SE16	SE6	NE5	NNW6	NNW5	N2	E3	ESE6	SE20	SSE20	S16	SSW12	S9	SSE16	S16	S18	S22	S21	S17	SSE16	SSE11.4	S22
22-Jul	SE13	SSE16	SSE20	SSE18	SSE15	SSE15	SSE14	SSE12	SSE11	SW11	WSW21	WSW20	WSW21	WSW24	WSW25	WSW28	WSW24	WSW24	WSW23	SW21	SW20	SW29	SW31	SW30	SW15.5	SW31
23-Jul	WSW25	WSW23	WSW23	WSW25	WSW25	WSW26	WSW27	W17	W17	W17	W20	WSW18	WSW21	WSW22	WSW23	WSW24	W22	NW14	NNE20	N24	N21	N20	N18	N20	W14.7	WSW27
24-Jul	N22	N20	N25	N20	N29	N24	N23	N26	N21	N29	N30	N35	N36	N32	N34	N38	N36	N34	NNW29	NNW32	NNW23	NNW18	NNW19	NW16	N26.4	N38
25-Jul	NNW11	WNW6	W10	W11	W6	WSW9	SW9	SW6	SSW3	SW3	WSW10	WSW16	WSW15	SW13	WSW14	WSW12	SW13	SW13	SW14	SSW12	S13	SSW16	S5	S5	SW8.9	SSW16
26-Jul	SSE8	S8	SSE10	SSE15	SSE16	SSE14	SSE11	SSE9	SE13	SSE11	SSE7	W10	WSW15	WNW9	SSW6	SSW9	SSW11	SSW12	SSW14	SSW15	SSW16	SSW22	SSW30	SSW27	S11.0	SSW30
27-Jul	SSW15	SE11	SSE15	SE18	SE21	SE25	SSE22	SE23	SSE18	SE16	SSE14	SSE16	SSW10	W9	W11	W11	W12	WNW10	NW6	NW12	W22	WNW30	NW18	W22	SSW6.0	WNW30
28-Jul	SW7	WSW11	W21	WSW25	WSW18	WSW21	WSW20	WSW19	WSW18	WSW21	WSW26	WSW28	WSW33	W24	W26	W27	WNW25	W30	W37	N23	ESE7	SSW11	SSW9	SW5	W18.0	W37
29-Jul	WSW9	W7	WSW11	WSW9	WSW8	SSW6	S5	S5	ESE4	NE2	W9	WNW10	W8	WSW11	N22	NNE10	NNE6	N13	N14	NNE14	NE11	NE7	NE6	NE7	NNW3.3	N22
30-Jul	NE6	ENE3	ENE2	ESE3	SE3	SSE1	S8	SW12	NNW5	SSE12	S6	S7	SE15	SE18	SSE20	SSE21	SSE20	SW19	WSW28	WSW25	WSW28	WSW28	WSW28	WSW29	SSW9.2	WSW29
31-Jul	W24	NW15	WNW16	W16	W27	W31	W24	W18	W14	WSW19	W18	WNW22	NW20	NW26	NNW17	NNE17	N13	N22	N21	NNE14	ENE2	E1	NW2	NW8	WNW12.8	W31

SW5.5WSW4.1WSW4.5WSW7.4 SW6.3 SW5.8 SW6.3WSW5.3WSW4.2WSW3.8 W6.4WSW7.1WSW7.5WSW8.0WSW7.4WSW5.8 W7.2 W6.4 W5.7 W5.4WSW5.4WSW5.2 SW6.1WSW6.4	Diurnal Average
W33NNW43 W31 W31 WSW31WSW34WSW35WSW36WSW30 N29 WSW35WSW41WSW43WSW40WSW43WSW40WSW42WSW42 W42 W37 W35WSW32WSW35 W36	Diurnal Maximum

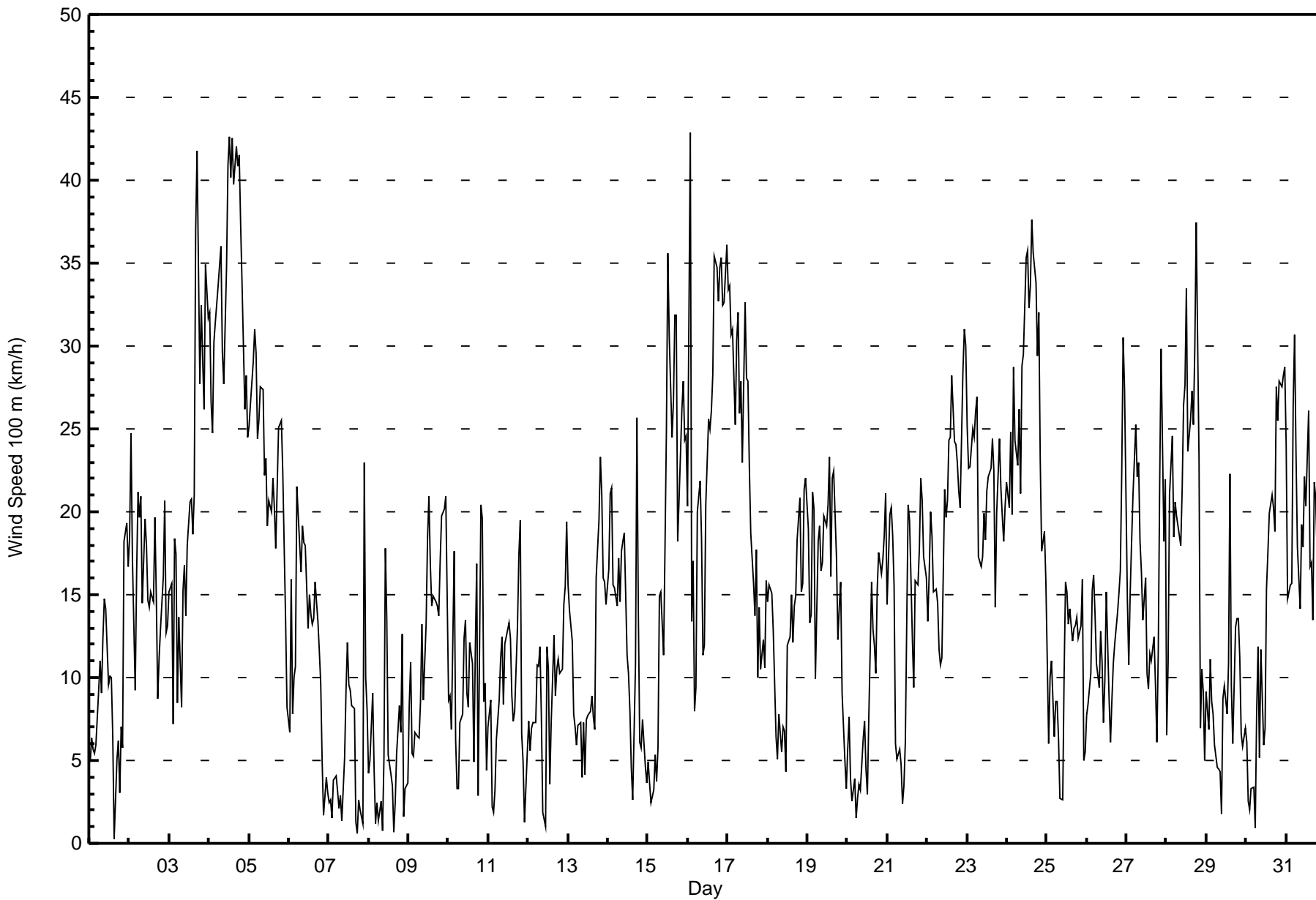
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 15 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 6 21:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 10																	Hours in Service: 744 Hours of Data: 744 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-Jul	2	1	2	3	4	3	4	2	2	2	3	2	3	4	3	2	3	3	2	3	3	3	5	4	5
2-Jul	6	5	4	6	4	5	6	5	4	3	3	5	5	5	5	7	6	5	3	3	3	3	4	3	7
3-Jul	3	4	4	5	4	4	4	3	4	4	4	3	4	4	5	6	8	6	4	5	5	10	6	10	
4-Jul	3	3	4	4	5	6	6	6	4	5	6	6	6	6	7	6	7	7	6	4	3	2	4	7	
5-Jul	4	4	5	5	5	7	5	6	6	6	5	4	5	5	5	3	5	5	5	4	2	3	2	7	
6-Jul	2	2	6	3	3	2	4	4	3	3	4	4	3	3	5	5	5	3	3	2	1	1	1	2	6
7-Jul	1	1	1	1	2	1	1	1	2	3	4	3	4	4	4	4	3	1	1	1	5	5	2	3	5
8-Jul	3	1	2	3	1	2	2	1	2	1	8	5	5	4	2	1	2	3	2	1	1	2	1	2	8
9-Jul	3	4	3	2	2	2	3	3	2	3	4	4	4	5	4	4	4	4	4	3	3	2	3	3	5
10-Jul	3	2	3	6	5	2	2	5	3	2	2	2	2	3	3	2	6	7	4	4	6	5	3	2	7
11-Jul	2	2	1	1	2	2	2	2	3	3	3	4	3	3	3	2	3	5	6	7	3	2	2	2	7
12-Jul	3	2	2	1	2	3	2	2	3	1	1	4	3	4	3	4	3	3	3	2	2	3	3	2	4
13-Jul	3	3	3	2	2	2	2	3	2	2	2	3	3	2	3	2	3	5	3	4	3	2	1	2	5
14-Jul	3	4	3	3	3	3	3	2	2	3	3	3	4	3	2	2	11	5	4	2	2	1	2	1	11
15-Jul	2	2	1	2	2	1	3	3	4	3	5	4	4	7	6	6	3	4	5	6	6	5	6	7	7
16-Jul	8	15	7	7	5	5	3	6	5	5	4	6	4	4	5	5	6	6	6	6	6	5	5	5	15
17-Jul	7	6	6	5	6	5	4	4	6	6	8	7	5	5	4	5	4	10	3	6	3	5	3	3	10
18-Jul	2	2	3	2	1	1	2	2	2	4	4	3	4	4	4	4	6	4	5	4	2	2	1	1	6
19-Jul	2	3	4	5	4	5	9	4	3	4	3	5	4	4	6	5	6	5	4	3	2	3	2	2	9
20-Jul	4	1	2	2	2	1	2	2	2	2	3	2	2	5	4	5	4	3	4	5	5	3	4	2	5
21-Jul	4	3	2	2	3	2	2	2	3	1	1	4	6	6	5	4	3	3	4	3	5	4	4	3	6
22-Jul	3	3	2	2	3	3	3	3	3	5	3	3	4	4	6	5	4	3	4	2	2	3	2	2	6
23-Jul	2	4	4	4	3	3	3	3	3	4	5	4	3	5	4	5	5	5	3	4	4	3	2	3	5
24-Jul	3	3	4	4	4	4	3	4	4	4	5	5	6	5	6	5	6	5	6	5	4	2	2	1	6
25-Jul	2	2	2	2	2	2	2	2	2	3	4	4	3	3	3	4	4	3	3	3	2	4	2	2	4
26-Jul	2	2	3	3	3	3	3	3	2	2	3	5	4	4	5	5	5	5	4	4	3	6	5	5	6
27-Jul	8	2	2	1	2	2	3	3	4	3	6	6	4	4	4	3	3	2	3	7	10	11	4	7	11
28-Jul	4	6	3	5	4	5	4	5	3	6	5	5	8	9	5	8	6	9	11	8	3	5	4	2	11
29-Jul	2	3	3	2	3	2	2	2	2	2	2	3	3	9	13	3	3	3	4	2	3	3	2	1	13
30-Jul	2	2	2	4	3	1	4	5	6	3	3	3	3	2	4	5	5	7	4	2	2	3	3	3	7
31-Jul	9	4	3	5	3	4	4	3	4	4	5	6	6	7	10	7	7	6	4	6	1	1	1	2	10
Diurnal Maximum																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	104	13.98	13.98
6 - 11	180	24.19	38.17
12 - 19	227	30.51	68.68
20 - 28	164	22.04	90.73
29 - 38	59	7.93	98.66
> 38	10	1.34	100.00

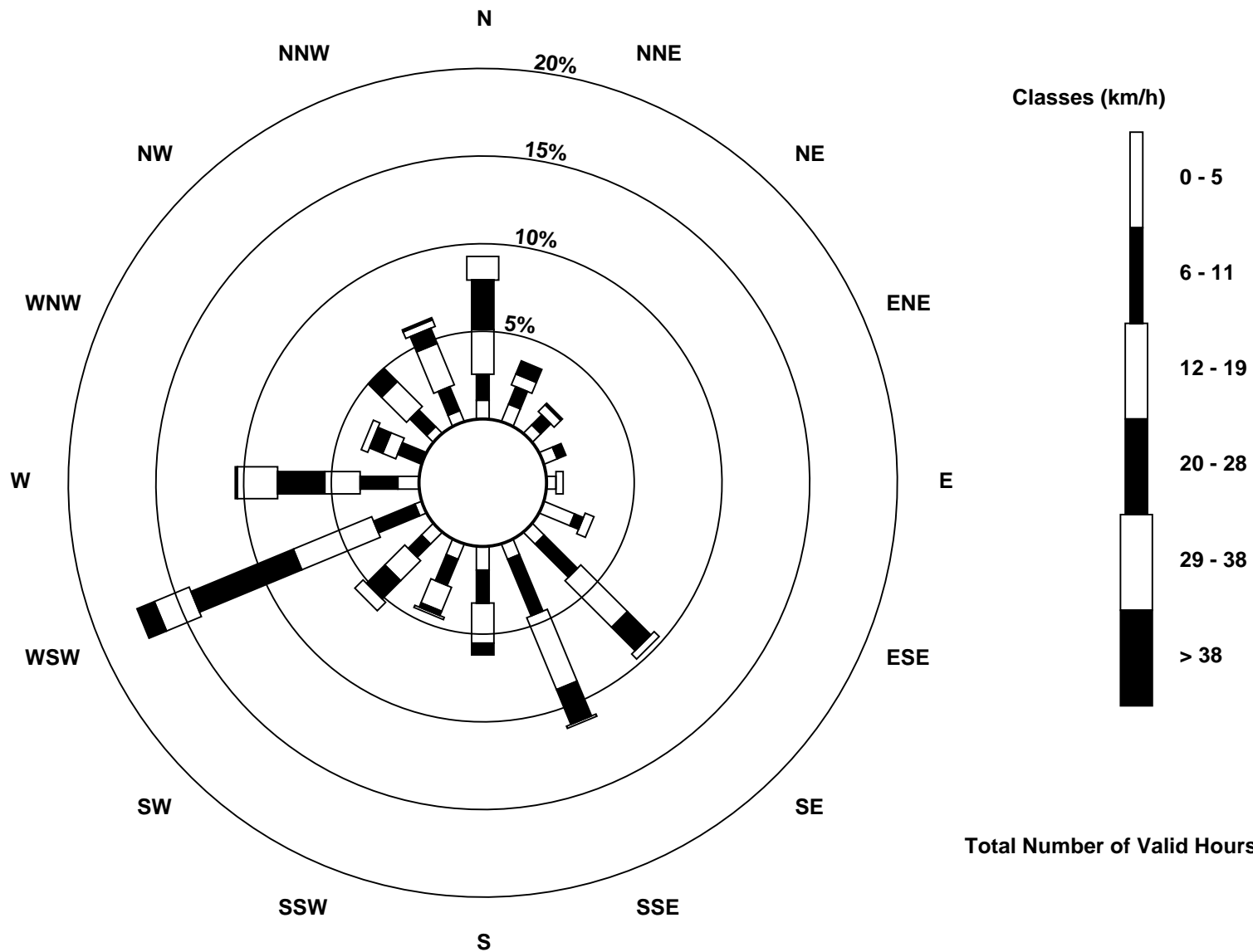
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 167 m (WS167m) - km/h

Lower Camp Met Tower - July 2017

Maximum Speed: 49 km/h on Jul 16 02:00	Maximum Daily Speed Average: 40.7 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 12 11:00	Minimum Daily Speed Average: 2.5 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 10.3 km/h at hour 4	Minimum Diurnal Speed Average: 5.4 km/h at hour 10	Hours of Missing Data: 0
Monthly Average Velocity: 7.7 km/h 254.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 10 Median = 16 Q ₃ = 25 P ₉₀ = 34 P ₉₉ = 46	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-Jul	SSW4	S4	SSW5	SSW5	S4	SSE9	SSE11	SSE9	SSE10	SSE13	SSE12	SSE8	S11	SSW11	SSW7	S2	WSW5	W5	ESE2	SE8	SE10	SE24	S25	SSW24	S8.2	S25
2-Jul	SSW24	SSE27	SSE18	S14	SSE16	SSE26	SSE21	SSE19	S13	SSE17	SSE17	S15	SSW16	S17	S17	SSW23	WSW18	NE8	SE12	S16	SSW22	SSW24	S17	SE18	S16.2	SSE27
3-Jul	S15	WSW22	SSW11	SW25	WSW23	SSW12	SSW18	SSW12	SW18	SSE15	SW16	WSW20	WSW23	WSW23	WSW21	WSW25	WSW43	WSW48	SW32	SW36	WSW35	WSW33	WSW44	W38	WSW23.6	WSW48
4-Jul	WSW40	WSW34	WSW34	WSW39	WSW38	WSW41	WSW43	WSW42	WSW34	WSW32	WSW39	WSW46	WSW49	WSW46	WSW49	WSW45	WSW47	W46	W46	W42	W41	WSW36	WSW41	WSW35	WSW40.7	WSW49
5-Jul	W34	W37	W40	W39	W37	W32	W29	W30	WNW30	WNW24	WNW26	NW21	WNW23	NW22	NW24	NW22	NNW20	NNW24	NNW29	NNW30	NW27	NW25	NNW21	NNW16	WNW24.2	W40
6-Jul	WNW11	WNW21	WNW14	W17	W16	W24	W23	WNW18	W22	WSW19	WNW20	NW14	N15	NNW14	NW15	NNW15	NW17	NW15	NNW13	NNW11	N6	NNE3	SW4	WSW6	WNW12.4	W24
7-Jul	WSW5	WSW1	W5	W7	WSW7	WSW5	SSW5	SSW4	WSW5	WSW7	WSW10	WSW13	WSW11	WSW10	WSW9	WSW9	WNW2	WNW2	WNW3	SW2	N1	NE28	NE17	ENE18	W2.6	NE28
8-Jul	E11	SE4	SE1	ESE4	SSE5	ESE8	SE6	SE4	ESE4	SE5	W19	W18	W6	S4	ESE2	W3	W6	W8	WSW9	WSW8	WSW13	SW3	SE3	E4	SW2.5	W19
9-Jul	ESE11	ESE22	SSE10	S9	SSE14	SSE11	SE14	SE12	SE13	SE9	SE15	SE19	SE21	SE18	SSE15	SSE16	S17	SSE15	SSE15	SSE16	SE26	SE26	SE28	SE20	SE15.8	SE28
10-Jul	S14	S13	SSE9	WSW22	WSW11	SSE4	SSW7	WNW8	WSW8	WSW13	WSW14	W10	WNW9	W13	WSW12	W5	ESE11	E20	SE4	WNW26	SW22	N6	ENE14	ENE8	WSW5.1	WNW26
11-Jul	NE4	WNW4	W6	WNW5	NW4	NNE7	NNW12	NW16	NNW15	NNW10	NNW13	NW13	NW14	WNW13	NW9	N7	WNW8	WSW14	S19	SW27	SSW8	W8	W2	SSW6	WNW6.2	SW27
12-Jul	SW7	SSW5	S4	S7	SSW7	SSW5	S3	SSE8	S8	WSW3	S1	SE10	SE9	SE3	S7	SSW14	SSW11	SSW12	S13	SSE11	SSE13	S20	S17	S20	S8.4	S20
13-Jul	S18	SSE17	S12	SSW7	SSW6	SW7	SW9	S5	SSW3	SE6	SSE3	W8	W9	WNW9	WNW9	NW8	NNW8	NNE17	NNE23	NNE27	NNE27	NNE23	NNE25	NNE21	N3.6	NNE27
14-Jul	N21	N27	N25	N19	N21	N18	N18	N18	N19	N19	N19	NNE12	N11	N9	N5	NNW2	NW12	N28	NE16	NE8	NE3	N4	NNE6	NE5	N13.6	N28
15-Jul	NE4	ENE4	ESE8	SSE8	SSE6	SSE6	SSE9	SSE17	SE18	SE17	SE23	SE28	SE36	SSE31	SSE26	SE28	SE32	SE34	S22	S27	SSE30	S33	S32	S32	SSE20.2	SE36
16-Jul	S26	NNW49	N16	NW21	W12	SW9	SW19	W27	WNW20	WNW13	W13	WSW23	SW27	SW27	SW28	WSW32	W40	W39	W37	W40	W42	W40	W40	W42	W23.9	NNW49
17-Jul	W42	W38	WNW35	W36	W30	WNW37	WNW37	NW32	NNW33	NNW27	NNW36	N30	N30	N24	NNW21	N16	N16	NNW23	NNW12	NNW17	N12	NNW14	NW15	NW22	NNW22.9	W42
18-Jul	NNW19	NNW20	NNW18	NNW15	NNW14	NNW11	NNW6	N8	N6	N7	WNW8	W6	WSW13	WSW14	WSW16	W13	W16	WSW17	WSW21	W23	W18	WSW20	WSW26	WSW31	WNW11.7	WSW31
19-Jul	WSW31	WSW22	WSW22	WSW29	WSW28	WSW13	WSW24	WSW23	WSW19	WSW20	WSW22	WSW22	WSW23	W25	NNW17	NE23	NNE23	NNE18	NE13	NE17	NE20	ENE15	ENE12	ENE11	W8.7	WSW31
20-Jul	ENE11	ENE9	SE6	SE12	SE12	SSW3	ESE3	SE9	SSE2	E7	E10	ESE7	E4	SE8	SE16	ESE13	ESE13	ESE10	ESE18	ESE18	ESE22	SE25	SE22	SE26	ESE11.0	SE26
21-Jul	SE21	SE25	SE26	SSE23	SE18	SE12	E4	NW4	NNW4	NNE2	ESE5	ESE8	SE22	SSE19	S18	SSW14	SSW10	S17	S19	S22	S26	S26	S24	S17	SSE14.1	SE26
22-Jul	SSE14	S16	S17	S15	S14	S15	S11	S11	SSW10	SW13	WSW24	WSW22	WSW24	WSW27	WSW28	WSW32	WSW28	WSW28	WSW28	WSW26	WSW26	SW36	WSW39	WSW39	SW19.8	WSW39
23-Jul	WSW37	WSW33	WSW33	WSW34	WSW33	WSW33	W31	W19	W18	W19	W22	WSW20	WSW23	WSW25	WSW26	WSW28	W25	NW13	NNE20	NNE24	NNE23	N22	N20	N22	W17.6	WSW37
24-Jul	N23	NNE22	N28	NNE21	N31	NNE27	N26	N29	N24	N29	N31	N37	N38	N34	N36	N39	N38	N37	N33	NNW38	NNW28	NNW26	NNW29	NNW25	N29.8	N39
25-Jul	NNW20	NW14	W14	W14	W12	W13	WSW10	WSW7	WSW6	WSW6	WSW12	WSW17	WSW16	SW15	WSW16	WSW14	SW14	SW15	SW15	SW15	SSW15	SW25	SSW16	SW11	WSW11.8	SSW25
26-Jul	SSW10	SSW10	SSW8	S11	SSW12	S12	SSW9	SSW7	SSE10	SSE9	S6	WSW11	WSW17	WNW9	SW8	SSW11	SSW13	SSW13	SSW16	SSW19	SSW26	SSW38	SW43	SW39	SSW14.3	SW43
27-Jul	SSW27	S8	S15	S16	S20	SSE23	SSE20	SSE17	S13	SSE13	SSE12	SSE16	SSW12	W9	W12	W12	W13	W10	NW8	NW16	WNW26	WNW36	NW24	WNW27	SW8.4	WNW36
28-Jul	WSW7	W15	W27	W32	W26	W26	WSW23	WSW22	W21	W24	WSW30	WSW31	W37	W27	W29	W30	WNW29	W35	W46	N28	E12	SSW11	SSW15	SSW9	W21.2	W46
29-Jul	WSW14	W11	W11	W16	W14	WSW9	SW7	SSW6	SSE3	WNW2	W10	W10	W9	WSW13	N28	NE11	NNE7	N13	N13	NNE15	NE19	ENE17	ENE10	E9	NW4.0	N28
30-Jul	ESE11	SE9	SE12	SSE15	SE16	SSE8	S13	SW17	NW11	SSE9	SSW7	SSW7	SE14	SSE16	SSE19	SSE20	S22	SW22	WSW34	WSW34	WSW39	WSW41	W38	W40	SW12.9	WSW41
31-Jul	WNW31	NW22	NNW22	WNW18	W28	WNW32	WNW25	W19	W15	W21	W20	WNW24	NW23	NW31	NNW19	NNE23	N16	N24	N23	NNE16	NNE5	N3	NW8	NW14	NW16.2	WNW32

WSW8.4	W6.8	WSW6.8	WSW10.3	WSW9.3	WSW8.0	WSW8.4	WSW7.7	W6.6	WSW5.4	W7.7	W8.7	WSW8.9	WSW9.3	W8.7	WSW7.1	W8.7	W7.6	W6.8	W6.9	WSW6.5	WSW7.5	WSW8.1	WSW8.3	Diurnal Average
W42	NNW49	W40	W39	WSW38	WSW41	WSW43	WSW42	WSW34	WSW32	WSW39	WSW46	WSW49	WSW46	WSW49	WSW45	WSW47	WSW48	W46	W42	W42	WSW41	WSW44	W42	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

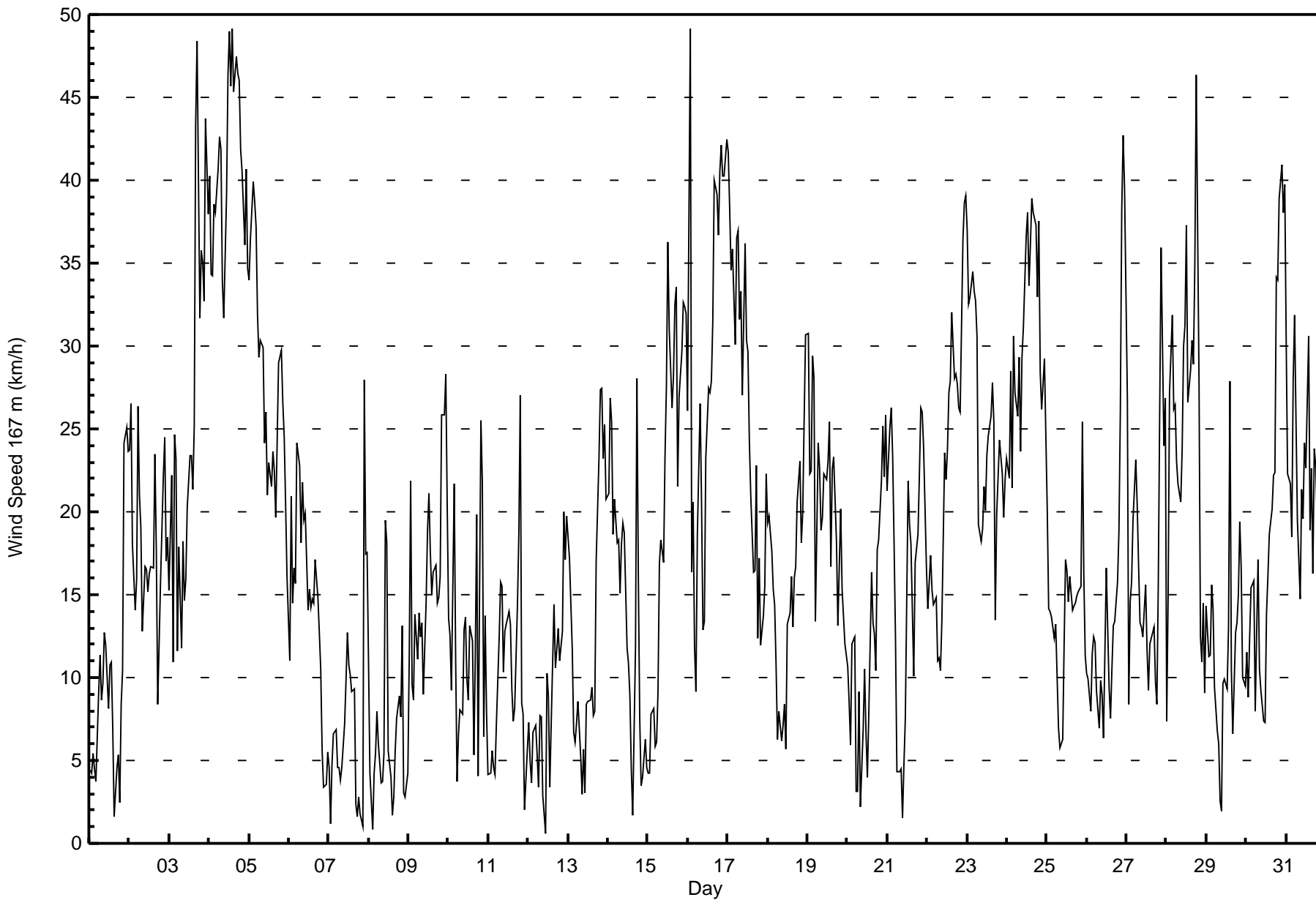
Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 19 km/h on Jul 10 20:00 Minimum Value: 1 km/h on Jul 6 21:00 Percentiles: P ₁ = 1 P ₁₀ = 2 O ₁ = 2 Median = 3 O ₃ = 5 P ₉₀ = 6 P ₉₉ = 11																		Hours in Service: 744 Hours of Data: 744 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-Jul	2	1	3	2	2	4	3	1	2	2	3	2	3	4	3	2	4	3	1	3	4	3	5	4	5
2-Jul	6	5	3	7	3	5	5	5	4	3	3	4	4	4	4	7	7	4	4	4	3	2	4	3	7
3-Jul	4	5	5	5	5	5	4	5	5	3	5	4	4	5	4	5	6	8	6	4	5	4	8	6	8
4-Jul	4	3	4	4	5	6	5	3	5	6	6	6	6	6	6	6	6	6	5	5	3	3	2	4	6
5-Jul	4	3	3	3	3	6	4	6	5	6	5	4	5	5	5	3	5	5	4	5	3	3	1	6	
6-Jul	3	2	5	2	3	2	4	4	3	3	3	4	3	3	5	5	5	3	3	2	1	1	1	1	5
7-Jul	2	1	2	1	1	1	1	1	2	3	4	3	4	5	4	4	3	1	1	1	5	3	3	4	5
8-Jul	4	2	1	2	1	1	2	1	2	2	9	6	5	4	2	1	3	2	2	1	1	3	1	1	9
9-Jul	6	4	5	2	3	3	2	2	2	2	3	3	3	5	4	4	4	4	4	5	3	3	4	2	6
10-Jul	3	2	2	7	6	2	2	4	3	2	3	2	2	3	3	2	6	6	5	19	7	5	4	4	19
11-Jul	1	1	2	2	1	2	2	1	2	3	3	4	3	3	3	2	3	5	9	6	4	3	2	3	9
12-Jul	2	2	1	2	1	1	1	2	2	2	1	3	3	5	3	3	3	3	3	2	2	2	2	2	5
13-Jul	2	2	2	2	1	2	2	2	1	2	2	3	3	2	2	2	3	5	3	4	3	2	2	3	5
14-Jul	2	4	4	3	2	4	3	2	2	3	3	3	3	3	2	2	13	6	5	3	1	2	2	1	13
15-Jul	1	1	1	2	1	2	4	3	3	3	5	3	4	7	5	5	4	4	4	4	2	3	4	4	7
16-Jul	6	15	9	7	4	5	4	5	5	5	4	6	4	4	5	5	5	5	4	5	4	4	4	4	15
17-Jul	5	6	5	5	5	4	4	3	5	5	8	7	5	5	5	5	4	8	4	5	2	5	4	2	8
18-Jul	1	2	3	2	1	2	2	2	2	4	5	4	4	4	4	5	6	4	5	3	2	2	1	3	6
19-Jul	2	3	4	6	4	5	10	4	4	4	3	5	3	4	6	5	5	6	4	3	2	1	1	1	10
20-Jul	2	2	2	2	3	2	3	3	2	2	3	3	2	5	4	4	4	3	4	5	2	2	4	3	5
21-Jul	3	4	3	2	4	3	3	2	2	1	2	4	5	6	4	4	3	2	3	3	2	2	3	3	6
22-Jul	3	2	2	3	2	3	3	3	3	6	3	3	4	4	6	5	4	3	4	3	2	2	1	1	6
23-Jul	2	3	3	3	3	3	4	3	3	3	5	5	4	5	4	5	5	4	3	4	4	3	3	3	5
24-Jul	3	4	4	4	4	4	4	4	4	4	5	5	6	5	6	5	5	5	6	4	3	1	1	2	6
25-Jul	1	2	2	1	1	1	2	2	2	3	4	4	3	3	3	4	4	3	3	2	4	2	4	3	4
26-Jul	2	2	1	2	1	2	2	2	2	2	3	5	4	3	5	5	6	5	3	4	4	2	3	3	6
27-Jul	12	3	2	2	3	3	3	3	3	3	5	6	4	4	3	3	3	3	2	8	11	11	7	5	12
28-Jul	4	5	3	4	4	5	3	5	3	5	4	5	7	10	5	9	5	11	11	6	5	6	2	3	11
29-Jul	3	2	1	2	2	2	2	2	1	3	2	3	3	9	11	4	2	2	3	2	4	4	4	2	11
30-Jul	3	4	4	5	5	4	3	5	7	4	2	3	2	2	3	5	4	8	4	2	3	4	3	2	8
31-Jul	7	3	4	4	2	3	3	3	4	3	5	6	6	6	9	6	7	6	3	5	1	1	2	2	9
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	74	9.95	9.95
6 - 11	154	20.70	30.65
12 - 19	216	29.03	59.68
20 - 28	177	23.79	83.47
29 - 38	83	11.16	94.62
> 38	40	5.38	100.00

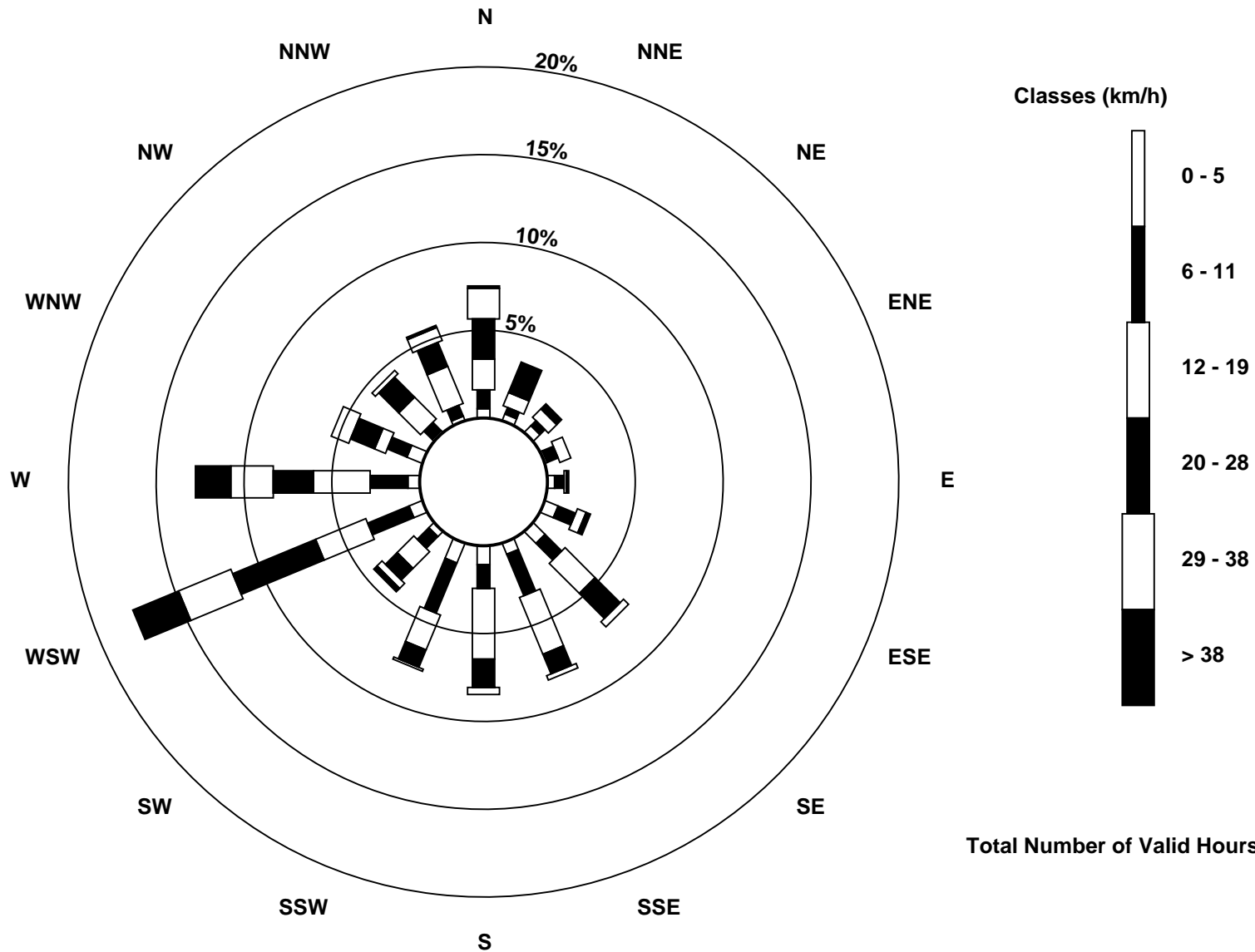
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 256 deg on Jul 4 13:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 260.4 deg on Jul 4	Hours of Data: 744
Direction of Minimum Speed: 265 deg on Jul 25 02:00	Direction of Minimum Daily Speed Average: 0.2 deg on Jul 13
Direction of Minimum Speed: 265 deg on Jul 25 02:00	Hours of Missing Data: 0
Monthly Average Direction: 277.7 deg	Percent Operational Time: 100.0

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-Jul	144	146	188	223	171	181	185	159	143	159	154	146	189	220	200	0	323	294	32	120	133	160	180	190	172.2
2-Jul	176	159	143	150	163	169	169	160	156	144	153	174	200	187	182	195	256	30	143	172	190	187	127	138	171.4
3-Jul	156	219	171	225	239	165	190	222	235	152	238	250	256	255	257	260	255	253	234	228	238	258	258	269	240.2
4-Jul	246	235	237	252	262	270	269	267	260	256	252	262	256	257	260	257	267	272	278	279	278	249	244	265	260.4
5-Jul	284	279	284	277	280	285	280	290	300	300	307	316	314	316	319	335	355	347	343	337	329	330	336	166	305.3
6-Jul	238	320	323	269	256	272	273	294	265	258	302	328	9	1	329	350	320	327	339	320	331	207	137	61	305.7
7-Jul	168	333	68	135	126	137	140	128	177	242	261	250	245	251	236	238	349	106	274	169	17	9	341	40	239.4
8-Jul	8	316	318	360	353	320	337	354	285	142	284	287	255	133	125	172	108	260	252	259	249	333	170	274	288.0
9-Jul	338	351	280	169	4	16	245	163	158	160	150	156	152	154	164	181	181	160	160	161	160	126	157	141	161.2
10-Jul	158	332	282	265	205	97	122	339	254	258	267	278	265	276	253	261	108	111	148	319	236	349	141	328	266.3
11-Jul	329	316	54	2	7	351	339	339	352	353	341	328	326	299	332	21	295	247	183	241	180	99	119	158	312.9
12-Jul	128	121	140	141	140	137	142	142	141	264	59	131	122	137	175	214	205	208	176	166	160	173	174	178	161.6
13-Jul	151	145	166	163	152	197	235	152	131	149	109	281	291	311	305	318	344	15	27	11	3	351	348	354	51.2
14-Jul	341	355	358	347	356	338	1	2	360	351	3	21	10	354	335	355	328	2	27	7	340	357	4	16	357.6
15-Jul	343	33	57	347	330	321	146	144	162	156	160	144	154	161	169	155	158	141	172	172	170	170	156	160	159.6
16-Jul	173	340	351	316	253	181	224	285	295	301	267	257	236	236	233	242	275	274	274	270	275	273	277	276	266.5
17-Jul	282	289	294	280	277	296	299	317	335	339	348	355	356	353	331	14	359	345	322	346	329	328	325	338	320.1
18-Jul	332	332	321	307	319	317	350	21	9	4	279	250	258	258	260	270	280	263	268	283	260	238	243	244	276.0
19-Jul	234	178	201	263	259	208	260	264	261	262	255	264	262	276	332	31	22	21	44	40	55	322	340	348	279.8
20-Jul	333	12	318	337	330	341	317	332	341	357	52	63	162	171	146	139	117	136	99	126	160	141	61	137	108.4
21-Jul	150	148	151	159	86	9	334	350	330	11	45	88	148	165	191	203	192	175	181	178	178	176	168	156	170.1
22-Jul	119	162	157	160	161	169	151	156	156	210	252	267	260	268	271	267	265	263	257	241	239	224	235	239	225.8
23-Jul	245	265	259	258	268	260	268	267	268	276	273	256	250	259	257	269	274	320	9	4	0	357	359	355	280.6
24-Jul	356	4	3	10	0	3	357	358	358	4	7	9	4	3	6	360	3	354	351	345	329	343	354	334	359.6
25-Jul	291	265	90	107	121	146	185	219	153	105	251	245	252	238	249	256	246	240	221	212	168	161	113	143	222.3
26-Jul	147	152	141	155	161	152	142	149	146	155	154	282	271	292	217	205	206	202	209	204	199	200	205	207	186.5
27-Jul	175	134	155	157	155	154	157	155	155	149	154	165	215	287	295	282	296	302	356	328	279	309	327	294	192.4
28-Jul	173	257	278	265	253	272	266	261	266	268	264	268	266	282	274	280	293	273	281	360	157	215	179	359	272.5
29-Jul	180	259	248	205	215	163	155	149	127	38	269	299	271	255	7	21	14	356	352	8	350	329	3	13	330.4
30-Jul	354	321	338	347	330	342	247	200	339	162	174	168	151	151	160	160	173	230	251	247	245	261	277	269	215.6
31-Jul	284	341	300	288	269	275	276	269	276	269	284	298	338	338	334	18	346	357	3	24	103	82	356	349	308.9

228.1 259.4 244.8 246.2 253.3 245.6 246.6 250.0 252.3 249.8 267.6 266.5 255.6 258.5 256.1 257.1 272.0 278.2 264.6 263.4 241.9 240.6 234.6 247.3
 Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

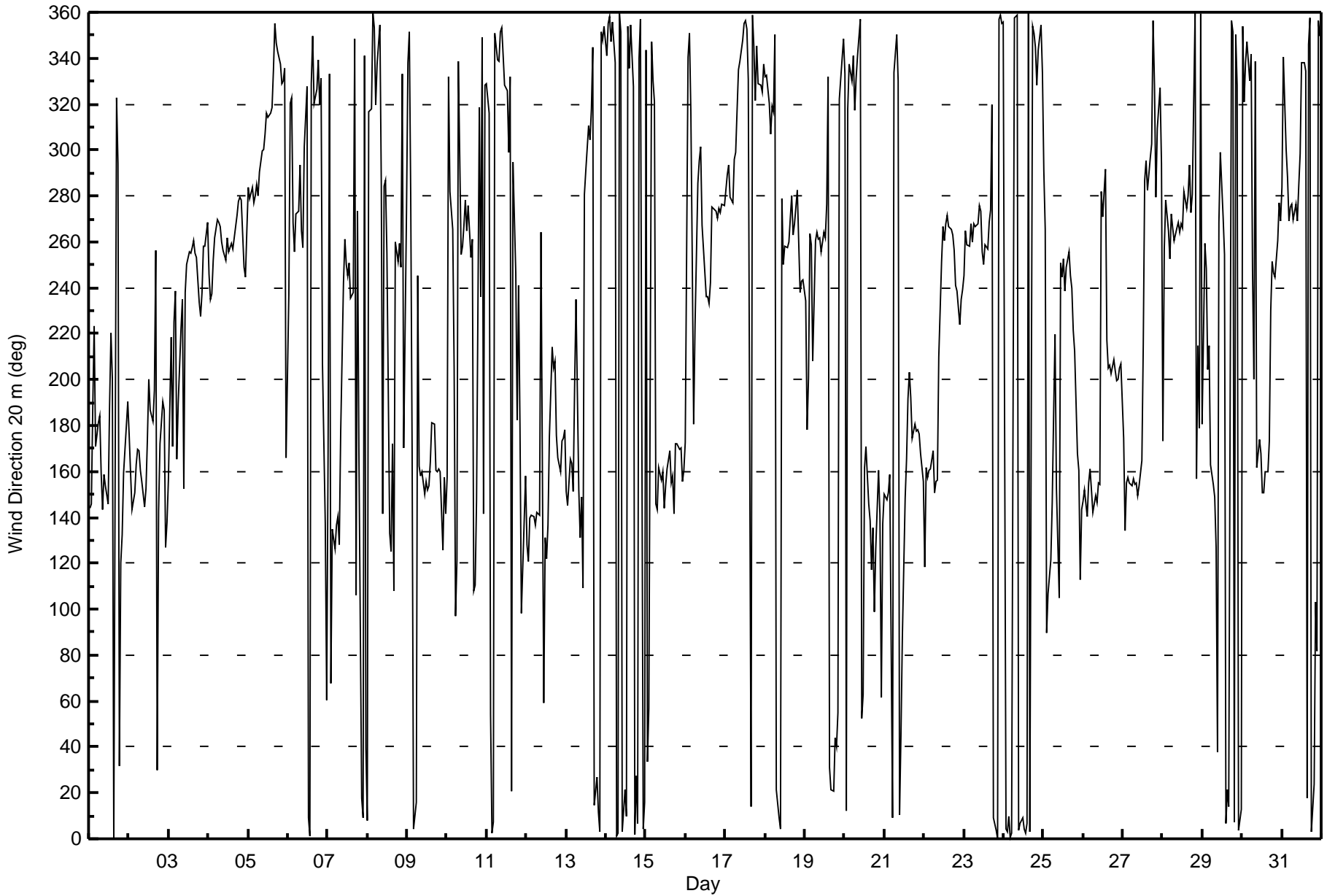
Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Jul 15 07:00 Minimum Value: 8 deg on Jul 22 02:00 Percentiles: P ₁ = 11 P ₁₀ = 16 Q ₁ = 20 Median = 26 Q ₃ = 41 P ₉₀ = 68 P ₉₉ = 97																								Hours in Service: 744 Hours of Data: 744 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-Jul	18	19	43	46	43	17	21	24	23	19	22	24	26	23	46	78	34	36	23	41	35	23	22	16	78
2-Jul	20	16	17	73	20	16	14	19	19	18	17	29	22	23	20	25	59	51	36	16	11	11	83	48	83
3-Jul	31	37	40	34	23	36	36	48	23	22	38	22	20	22	23	26	19	16	13	10	19	24	22	23	48
4-Jul	15	11	12	17	21	20	20	20	20	19	22	20	20	19	19	21	21	21	21	21	20	15	12	23	23
5-Jul	20	18	18	17	20	22	21	23	25	23	24	27	23	28	24	31	22	24	23	22	20	17	99	60	99
6-Jul	62	39	98	83	89	23	24	32	24	21	30	44	34	28	36	30	29	34	26	19	72	50	76	97	98
7-Jul	85	81	86	63	23	21	21	42	41	97	52	28	36	50	43	53	88	93	58	47	96	25	22	60	97
8-Jul	55	33	44	79	59	39	51	35	69	57	34	56	96	68	87	79	77	97	22	27	43	67	70	92	97
9-Jul	61	58	57	65	74	33	81	33	21	34	28	23	20	26	30	25	22	25	18	13	27	33	35	83	83
10-Jul	41	85	82	21	79	75	103	57	24	20	24	32	31	28	23	76	68	42	93	25	48	60	95	55	103
11-Jul	22	27	78	64	55	63	50	24	22	30	29	30	31	30	48	34	41	42	28	27	46	72	36	39	78
12-Jul	65	24	22	16	16	17	18	19	21	94	84	29	28	96	64	16	16	15	19	26	26	14	11	11	96
13-Jul	18	24	9	12	21	36	25	28	31	26	56	41	44	36	34	37	28	28	29	22	18	16	16	18	56
14-Jul	20	23	21	23	22	27	29	26	26	23	27	40	39	38	65	69	52	26	45	58	23	69	90	63	90
15-Jul	30	42	71	77	75	52	106	21	25	41	39	23	19	18	13	19	18	20	18	12	10	11	12	13	106
16-Jul	27	26	49	38	79	36	18	21	26	35	33	21	14	15	14	18	25	22	20	19	20	20	19	19	79
17-Jul	20	20	22	20	23	19	18	18	23	24	23	25	23	22	25	31	28	26	30	28	20	24	24	22	31
18-Jul	18	20	19	11	14	17	47	37	47	71	74	75	35	32	26	31	33	31	24	22	20	9	11	10	75
19-Jul	14	35	57	30	23	56	68	24	24	25	19	25	25	22	50	35	34	32	34	30	26	70	68	39	70
20-Jul	34	62	58	76	29	42	22	46	35	37	47	59	82	40	23	34	37	33	51	41	74	33	75	52	82
21-Jul	22	24	16	21	61	51	22	47	53	40	52	65	23	22	20	21	33	13	13	12	11	12	14	23	65
22-Jul	34	8	15	9	18	17	21	16	15	47	20	22	24	24	26	23	23	20	19	11	13	11	12	11	47
23-Jul	14	20	20	19	19	17	19	23	22	26	27	24	23	23	20	26	23	51	26	23	20	19	20	20	51
24-Jul	20	23	22	26	21	21	23	22	22	22	25	24	23	24	26	23	24	22	23	22	16	24	16	39	39
25-Jul	49	93	74	81	26	24	28	35	36	88	61	25	22	26	24	37	28	21	17	20	23	51	19	31	93
26-Jul	11	15	14	17	17	22	16	15	24	17	31	47	27	40	83	41	26	33	28	11	11	11	11	12	83
27-Jul	57	24	11	12	14	13	15	17	19	21	28	26	33	40	39	30	21	29	62	43	30	24	26	33	62
28-Jul	49	46	21	21	26	23	23	24	25	25	24	25	24	30	25	28	30	26	25	44	54	42	77	57	77
29-Jul	36	66	87	45	48	30	22	23	37	78	35	44	46	53	67	43	57	19	19	24	23	24	33	30	87
30-Jul	69	37	38	75	27	49	83	27	100	14	45	30	23	20	17	16	13	46	15	13	12	17	18	17	100
31-Jul	40	26	40	24	18	21	31	26	28	23	30	30	33	28	48	43	30	28	23	37	104	73	81	71	104
85 93 98 83 89 75 106 57 100 97 84 75 96 96 87 79 88 97 93 58 104 73 99 97																									
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 250 deg on Jul 4 15:00 Direction of Maximum Daily Speed Average: 251.2 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 324 deg on Jul 9 02:00 Direction of Minimum Daily Speed Average: 1.1 deg on Jul 13	Percent Operational Time: 100.0
Monthly Average Direction: 275.5 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-Jul	136	139	173	201	161	171	170	150	133	148	141	138	179	211	191	331	308	283	23	115	132	144	172	179	161.7
2-Jul	168	149	135	144	151	158	159	147	143	137	144	164	191	177	173	187	251	27	132	167	179	176	135	130	160.8
3-Jul	147	218	168	220	232	156	182	211	228	138	232	242	248	247	250	251	246	245	226	221	231	249	250	258	233.5
4-Jul	237	227	231	243	252	259	258	256	251	247	244	253	248	248	250	248	257	261	269	268	267	240	236	253	251.2
5-Jul	270	268	272	266	269	273	269	281	289	289	297	308	305	308	309	326	346	338	334	330	321	324	331	189	296.0
6-Jul	246	284	272	253	260	261	264	283	255	250	290	321	2	353	319	343	313	316	332	317	344	242	223	286	294.4
7-Jul	189	296	253	156	135	132	128	116	165	256	254	242	241	245	233	234	334	80	272	173	44	13	338	31	240.9
8-Jul	356	339	341	10	342	343	337	351	282	131	273	277	233	127	99	169	70	264	245	248	235	8	191	331	284.1
9-Jul	339	324	268	202	66	26	148	146	142	147	138	144	142	142	151	169	169	150	151	148	133	122	131	131	147.0
10-Jul	161	149	144	254	224	85	107	330	248	249	257	270	262	267	248	259	102	98	128	310	232	346	104	324	257.8
11-Jul	334	334	34	18	14	354	342	334	345	343	337	322	318	292	322	9	287	240	173	236	169	138	118	154	310.1
12-Jul	130	117	135	138	135	129	134	134	133	268	36	123	113	115	170	206	197	199	168	149	150	166	167	171	152.7
13-Jul	145	134	157	156	143	188	229	140	124	136	99	269	286	300	295	308	337	12	26	11	3	351	340	344	16.5
14-Jul	334	349	353	345	354	338	355	359	356	344	0	20	3	349	333	351	321	356	27	4	339	357	36	1	353.0
15-Jul	358	3	12	326	41	352	111	137	145	138	143	134	142	149	160	144	144	133	163	166	163	163	151	153	148.6
16-Jul	167	333	346	306	244	185	215	275	287	292	258	248	229	228	226	235	264	263	264	260	264	261	264	265	258.4
17-Jul	271	279	282	269	268	286	289	308	329	333	340	348	349	345	325	7	354	338	319	341	330	324	331	331	312.6
18-Jul	331	331	323	313	328	326	347	14	6	359	276	253	254	251	252	263	269	255	259	272	252	230	233	236	271.0
19-Jul	229	182	215	253	250	213	251	255	252	254	247	255	253	268	326	28	17	20	38	37	51	340	13	350	272.8
20-Jul	347	6	312	314	333	343	335	333	344	358	48	52	136	159	134	126	106	125	89	111	105	123	93	125	90.0
21-Jul	143	139	141	144	102	21	339	346	331	2	37	87	138	152	182	193	185	166	171	169	170	170	160	143	158.3
22-Jul	116	151	145	148	147	150	138	144	147	205	244	257	252	258	261	257	256	253	248	233	230	216	223	228	219.6
23-Jul	237	253	248	247	257	251	259	259	259	267	264	249	243	250	249	259	264	314	5	1	356	350	354	348	271.9
24-Jul	351	359	359	4	357	358	351	352	355	358	3	5	2	359	3	355	359	348	343	338	326	337	350	350	354.8
25-Jul	327	328	71	111	151	184	192	219	143	103	245	238	245	233	242	248	237	233	213	206	176	179	111	134	218.0
26-Jul	140	143	137	143	147	139	135	137	135	141	143	269	261	282	210	197	197	194	200	192	187	189	196	199	176.2
27-Jul	167	124	142	144	144	142	143	141	142	138	144	154	209	280	285	275	287	291	336	319	270	300	323	283	186.3
28-Jul	189	247	267	254	244	262	256	251	258	260	256	258	257	271	265	270	283	262	271	360	129	206	185	284	262.1
29-Jul	197	239	249	211	220	166	150	142	111	34	266	290	265	252	2	18	13	351	346	7	358	336	6	18	330.6
30-Jul	359	328	345	12	339	350	202	195	334	153	166	157	137	139	150	151	165	226	242	238	236	250	265	258	211.9
31-Jul	274	333	294	276	258	266	263	260	269	260	276	287	328	331	327	18	343	351	359	17	86	92	338	329	299.5
227.1 258.3 245.0 240.1 244.0 242.6 242.2 249.4 253.3 249.1 262.5 260.2 251.2 254.4 253.0 254.5 267.4 273.6 264.2 266.0 240.0 237.7 231.1 240.1																									
Diurnal Average																									

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

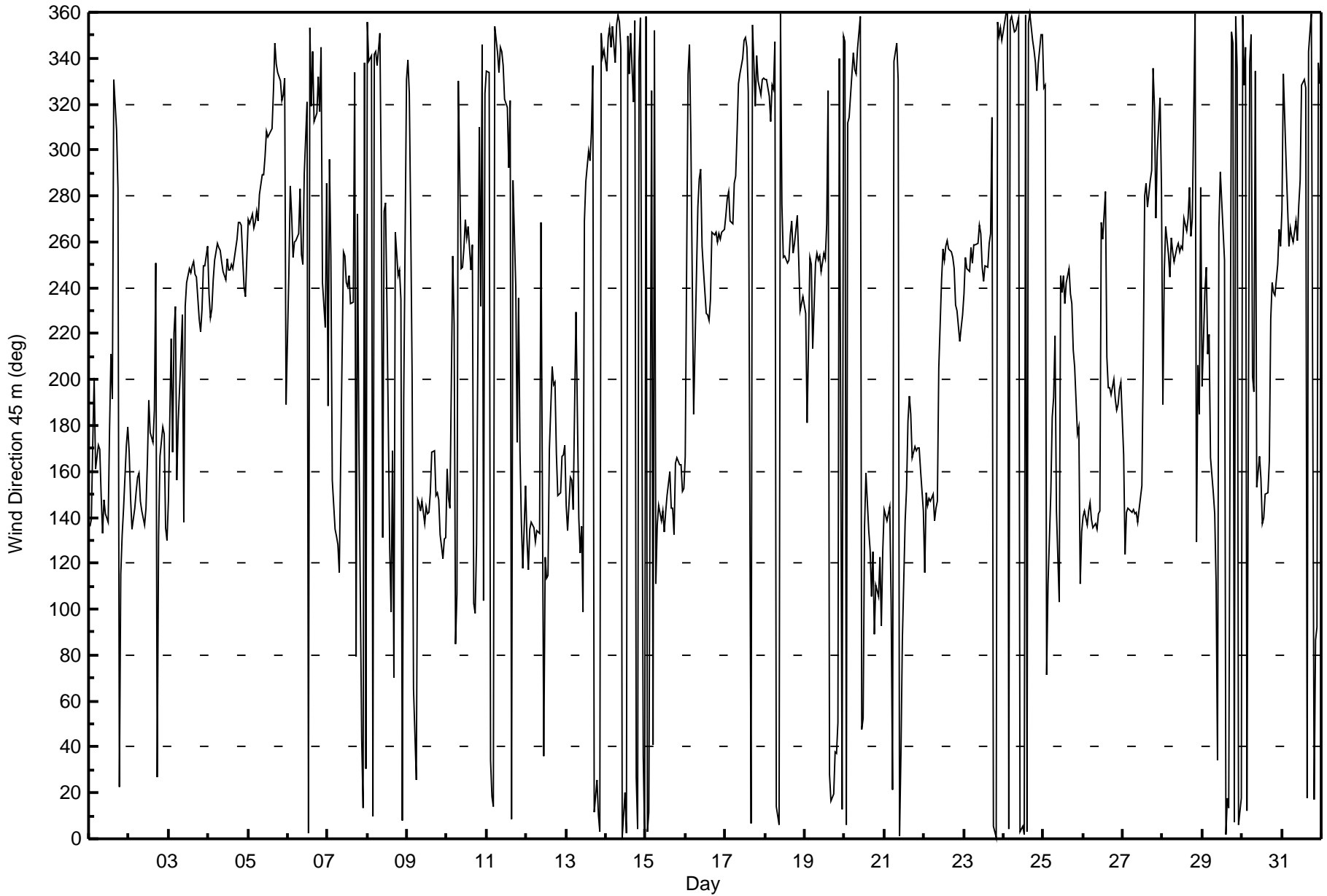
Wind Direction 45 m (WD45m) - deg
Lower Camp Met Tower - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 14 23:00 Minimum Value: 5 deg on Jul 18 22:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 14 Median = 20 Q ₃ = 34 P ₉₀ = 58 P ₉₉ = 91																	Hours in Service: 744 Hours of Data: 744 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-Jul	13	13	38	36	28	14	20	21	18	15	17	18	23	22	37	88	31	25	14	37	34	20	22	13	88
2-Jul	19	16	11	71	17	16	10	15	14	11	14	27	21	21	17	24	59	36	31	13	7	6	68	33	71
3-Jul	30	31	31	27	17	33	35	49	21	18	36	15	13	13	15	16	11	8	9	8	16	19	18	16	49
4-Jul	9	8	8	9	12	12	12	11	12	12	13	14	13	13	11	12	14	14	13	13	12	10	7	17	17
5-Jul	13	12	13	11	12	15	13	16	17	17	17	21	17	21	18	27	16	17	15	14	15	11	42	66	66
6-Jul	64	28	82	68	42	12	16	25	16	13	21	39	26	20	33	24	23	28	20	13	34	57	81	83	83
7-Jul	94	73	50	38	13	20	18	39	44	89	41	22	28	41	39	57	81	102	46	50	77	19	15	47	102
8-Jul	46	27	20	53	75	37	42	33	75	41	32	48	83	77	76	82	88	83	15	17	27	77	44	92	92
9-Jul	49	89	58	31	88	36	81	31	17	29	22	17	15	22	27	23	18	20	16	12	22	16	22	44	89
10-Jul	26	65	77	20	72	77	72	56	17	12	15	23	22	20	16	55	70	29	93	22	40	52	91	64	93
11-Jul	12	17	66	61	41	56	34	16	14	23	25	23	25	21	42	25	34	38	29	21	41	84	46	29	84
12-Jul	51	18	16	10	11	12	12	13	16	87	77	25	19	91	70	17	17	16	16	24	21	9	7	7	91
13-Jul	14	16	7	12	16	35	21	25	32	23	58	30	35	26	25	32	22	21	18	15	14	11	10	10	58
14-Jul	13	18	16	15	16	20	23	20	20	16	23	32	31	32	49	59	53	20	32	45	24	35	102	34	102
15-Jul	33	36	68	69	65	63	77	16	22	34	33	16	13	15	11	15	14	13	15	9	8	8	11	12	77
16-Jul	22	20	40	33	81	31	16	16	18	27	26	16	11	11	10	12	16	15	13	11	12	11	12	12	81
17-Jul	13	12	14	12	17	11	10	13	14	16	16	18	16	17	17	23	23	18	25	21	11	17	12	14	25
18-Jul	11	15	14	8	9	13	34	28	39	67	61	76	24	29	20	24	27	21	17	14	15	5	5	5	76
19-Jul	9	32	40	15	14	50	60	16	15	17	11	18	17	15	50	24	25	23	23	18	14	77	86	22	86
20-Jul	17	26	49	68	23	33	40	48	24	32	39	52	87	44	18	27	30	27	38	33	54	18	41	29	87
21-Jul	18	16	12	17	42	72	17	28	52	37	56	45	17	19	18	19	34	9	9	8	8	9	14	19	72
22-Jul	26	7	11	6	16	16	15	13	11	46	12	15	18	16	15	14	13	12	12	7	9	8	10	9	46
23-Jul	8	13	13	12	12	10	12	15	16	19	21	19	16	16	13	19	16	52	19	17	16	14	15	14	52
24-Jul	14	18	17	19	16	17	15	16	17	16	19	18	18	18	20	17	19	15	15	14	10	14	8	9	20
25-Jul	21	39	96	45	26	23	20	28	38	86	59	20	15	19	16	27	21	18	16	17	8	32	14	10	96
26-Jul	5	8	10	11	14	17	11	12	17	12	28	40	19	34	76	41	25	33	28	10	8	9	11	12	76
27-Jul	52	20	7	9	9	9	12	13	13	16	24	24	31	34	35	23	13	24	44	39	28	19	18	15	52
28-Jul	45	28	14	10	15	15	14	16	16	17	15	17	17	23	20	21	24	22	21	39	63	42	56	78	78
29-Jul	34	55	44	34	44	29	22	21	35	72	30	36	40	51	51	36	46	14	12	19	18	24	23	19	72
30-Jul	27	35	27	68	21	42	75	26	100	12	41	27	20	16	13	13	10	43	8	8	6	10	11	10	100
31-Jul	33	18	32	17	10	12	17	16	22	14	23	22	31	23	45	33	27	23	17	25	96	48	66	54	96
94 89 96 71 88 77 81 56 100 89 77 76 87 91 76 88 88 102 93 50 96 84 102 92																									
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 100 m (WD100m) - deg

Lower Camp Met Tower - July 2017

Direction of Maximum Speed: 336 deg on Jul 16 02:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 249.6 deg on Jul 4	Hours of Data: 744
Direction of Minimum Speed: 162 deg on Jul 1 16:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.8 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 256.4 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-Jul	161	155	182	197	157	166	161	151	139	150	143	143	181	210	190	162	280	272	38	130	129	132	178	191	163.8
2-Jul	185	152	146	166	153	157	158	147	148	140	150	167	194	178	178	190	251	37	134	180	190	184	159	132	164.2
3-Jul	152	230	189	227	240	185	188	207	226	140	225	238	246	244	248	247	243	241	227	222	236	253	250	257	232.5
4-Jul	238	232	235	246	251	256	254	254	249	244	240	250	245	246	248	245	254	258	266	265	264	246	240	249	249.6
5-Jul	261	260	264	260	262	267	265	280	289	287	294	305	302	308	311	324	344	339	333	331	320	322	330	322	294.7
6-Jul	286	261	270	248	253	254	263	284	255	252	289	322	359	350	320	343	309	317	333	326	348	22	233	247	291.6
7-Jul	207	146	223	230	212	182	167	140	198	250	254	241	238	254	240	244	317	349	274	200	58	28	8	57	256.7
8-Jul	56	22	356	24	187	116	114	28	149	135	267	273	270	175	102	236	281	264	244	244	230	33	110	117	261.0
9-Jul	122	131	220	181	139	126	130	134	135	137	135	141	141	142	148	166	168	149	157	150	132	127	134	132	142.5
10-Jul	181	153	144	252	230	123	178	304	249	246	255	263	270	263	248	261	103	99	124	305	227	7	73	17	241.2
11-Jul	348	337	260	26	359	12	347	328	342	341	336	317	315	296	326	1	286	237	175	232	184	241	194	168	303.6
12-Jul	151	148	146	166	159	147	139	143	153	273	51	133	126	114	180	207	202	200	171	152	153	170	174	178	162.5
13-Jul	161	148	165	165	163	197	223	145	141	131	122	269	286	293	290	305	331	19	30	16	15	9	2	351	14.9
14-Jul	345	359	2	358	4	355	359	1	2	349	8	25	3	358	348	357	322	359	39	28	8	358	3	4	0.9
15-Jul	7	12	125	159	133	102	134	141	138	127	141	137	142	147	159	143	141	135	167	166	162	162	161	161	147.7
16-Jul	170	336	359	298	259	215	221	271	284	291	256	245	227	228	225	234	262	259	261	257	259	257	259	261	257.6
17-Jul	269	276	280	269	266	287	291	309	329	335	344	350	350	349	325	3	353	348	329	348	347	332	320	321	314.5
18-Jul	330	338	339	330	336	329	347	10	12	352	285	264	253	255	251	263	260	251	256	268	254	246	247	244	279.6
19-Jul	237	226	240	249	247	231	247	253	248	252	244	252	251	266	328	36	21	23	40	40	53	62	103	71	272.6
20-Jul	13	10	355	103	94	310	57	171	315	34	75	92	117	149	132	125	107	121	96	111	100	132	123	133	109.3
21-Jul	144	144	143	144	135	125	42	339	345	358	96	109	139	148	183	195	187	168	173	172	175	177	175	156	157.3
22-Jul	138	159	148	155	153	150	148	160	166	217	240	251	248	255	255	255	252	249	245	233	236	225	225	235	220.7
23-Jul	241	250	245	246	253	249	257	260	260	263	260	251	239	248	247	258	261	323	14	8	5	1	1	358	272.9
24-Jul	1	7	5	7	2	6	360	358	1	3	7	8	6	4	7	360	2	354	347	343	334	329	327	324	357.6
25-Jul	321	295	272	266	261	242	226	235	194	227	243	239	242	232	239	243	235	228	215	211	187	205	175	172	234.0
26-Jul	168	170	161	159	159	153	153	148	138	148	151	263	258	283	212	204	203	193	200	197	197	205	211	212	190.7
27-Jul	199	136	150	144	146	142	149	146	148	145	148	157	209	280	279	271	280	282	321	311	274	297	325	278	198.7
28-Jul	222	249	266	255	251	258	252	251	256	257	254	256	256	270	265	269	283	262	268	5	106	204	194	215	260.2
29-Jul	242	261	258	249	248	212	187	173	119	42	267	284	260	256	3	31	15	359	356	19	39	35	44	56	327.0
30-Jul	54	62	75	115	135	161	173	214	334	156	178	171	136	143	154	156	167	225	241	240	242	250	258	256	209.6
31-Jul	272	318	293	278	262	269	264	261	271	258	278	287	326	326	337	27	351	357	4	20	59	91	310	324	302.1

232.7 257.5 248.3 242.0 235.3 234.1 236.0 247.9 255.7 247.7 259.6 257.5 249.8 256.0 257.1 256.8 267.8 278.9 269.7 275.9 239.7 237.1 230.7 236.5
Diurnal Average

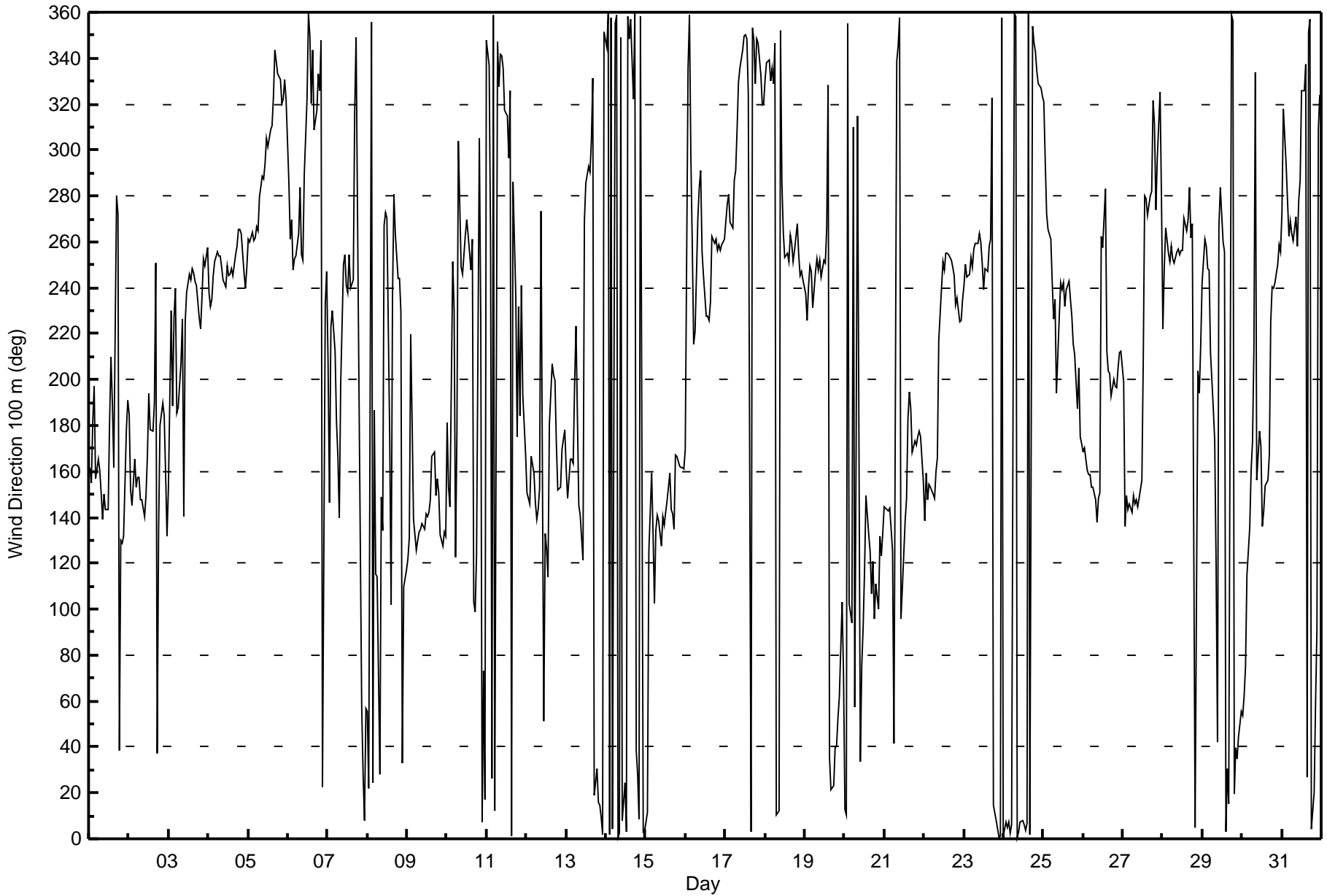
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 1 16:00 Minimum Value: 2 deg on Jul 19 01:00 Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 9 Median = 14 Q ₃ = 24 P ₉₀ = 40 P ₉₉ = 90																	Hours in Service: 744 Hours of Data: 744 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-Jul	17	10	30	35	22	18	18	17	11	9	11	15	21	18	27	102	36	16	52	29	32	8	26	14	102
2-Jul	17	16	11	25	13	10	9	9	13	7	10	24	18	20	18	23	55	29	30	13	9	5	29	13	55
3-Jul	15	11	20	16	9	32	25	21	14	12	30	11	9	9	12	11	9	6	5	5	13	13	14	12	32
4-Jul	7	4	5	7	7	7	6	6	8	9	9	11	9	9	8	9	10	10	8	7	7	5	3	9	11
5-Jul	8	6	7	6	7	11	8	12	13	13	14	17	13	16	14	21	12	12	9	8	8	5	5	5	21
6-Jul	30	9	61	11	10	5	11	21	11	10	15	32	17	14	30	16	23	22	16	8	17	73	9	63	73
7-Jul	28	15	35	17	13	24	33	28	73	55	29	15	22	29	37	45	81	94	30	42	93	10	20	28	94
8-Jul	26	14	6	41	67	45	91	51	84	15	28	28	60	73	50	92	84	33	12	8	3	74	19	34	92
9-Jul	15	18	42	35	22	15	18	11	6	17	9	8	8	17	23	20	18	19	17	9	5	3	5	10	42
10-Jul	17	15	30	9	50	76	49	46	19	8	8	14	17	12	9	32	58	14	92	23	23	48	24	53	92
11-Jul	14	7	58	70	42	24	15	8	10	18	20	16	18	15	32	24	32	30	31	11	30	26	66	22	70
12-Jul	28	29	12	10	14	10	5	7	15	63	95	14	17	77	55	13	13	13	14	20	18	7	5	4	95
13-Jul	9	12	8	15	20	26	15	15	29	11	49	22	32	19	20	23	14	17	9	8	6	6	5	7	49
14-Jul	6	11	7	10	10	12	13	13	11	9	15	22	23	19	37	65	46	14	19	28	17	11	12	10	65
15-Jul	22	23	32	24	15	29	31	7	9	11	9	6	5	12	10	12	6	5	18	8	5	5	6	6	32
16-Jul	17	16	32	17	47	24	7	12	14	23	19	12	7	7	7	9	14	9	7	6	6	6	6	6	47
17-Jul	9	8	9	8	14	7	5	8	9	10	11	12	11	11	13	17	21	10	20	18	10	7	12	9	21
18-Jul	4	8	5	4	4	16	21	14	26	60	68	69	19	25	16	22	21	16	14	9	8	4	4	3	69
19-Jul	2	9	14	8	8	24	35	9	9	11	8	11	12	11	52	15	16	14	16	12	8	16	20	28	52
20-Jul	35	10	35	52	42	57	39	41	61	17	23	35	67	46	11	18	19	21	15	24	10	6	6	4	67
21-Jul	10	3	4	5	7	34	33	25	19	48	40	35	9	17	18	18	29	8	7	7	5	6	9	10	48
22-Jul	11	9	5	5	8	10	9	16	18	39	9	9	14	11	10	8	8	7	8	4	4	4	4	3	39
23-Jul	4	7	6	7	6	5	8	9	10	12	15	15	10	11	10	15	12	54	12	8	9	8	7	8	54
24-Jul	8	9	9	9	7	9	8	7	9	7	10	8	8	9	12	9	11	10	11	8	6	3	3	3	12
25-Jul	4	16	11	6	10	10	10	24	51	71	30	14	12	14	11	20	15	13	10	11	8	9	28	18	71
26-Jul	9	11	7	6	7	8	14	15	8	12	26	33	13	25	70	36	25	29	24	11	9	7	4	5	70
27-Jul	40	21	7	5	4	4	7	6	9	10	23	25	27	33	25	14	11	15	25	28	23	14	13	11	40
28-Jul	38	22	9	6	8	9	8	9	8	11	9	11	14	19	18	17	22	21	19	41	36	42	16	26	42
29-Jul	10	27	9	14	18	18	31	26	24	72	23	24	30	35	26	24	33	12	9	11	14	26	24	15	72
30-Jul	23	89	67	55	63	86	21	25	84	18	27	27	5	9	10	12	10	37	5	5	4	4	5	4	89
31-Jul	23	12	10	15	6	6	9	9	19	11	20	20	27	20	46	19	17	16	7	16	70	59	27	16	70
Diurnal Maximum																									





Maximum Value: 0.8 km/h on Jul 15 20:00		Maximum Daily Average: 0.3 km/h on Jul 2		Hours in Service: 744																																													
Minimum Value: -1.0 km/h on Jul 24 05:00		Minimum Daily Average: -0.6 km/h on Jul 24		Hours of Data: 744																																													
Maximum Diurnal Average: 0.0 km/h at hour 22		Minimum Diurnal Average: -0.2 km/h at hour 18		Hours of Missing Data: 0																																													
Monthly Average: -0.12 km/h		Percentiles: P ₁ = -0.8 P ₁₀ = -0.5 Q ₁ = -0.3 Median = -0.1 Q ₃ = 0.1 P ₉₀ = 0.3 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-Jul	0.2	0.2	0.1	0.0	0.1	0.4	0.3	0.3	-0.1	0.3	0.3	0.1	0.3	0.0	0.2	-0.1	-0.3	-0.2	-0.3	0.0	0.0	0.1	0.4	0.4	0.1	0.4																							
2-Jul	0.4	0.3	-0.2	0.1	0.2	0.5	0.6	0.2	0.0	0.2	0.2	0.3	0.3	0.6	0.6	0.5	-0.3	-0.2	-0.1	0.5	0.5	0.6	0.2	-0.1	0.3	0.6																							
3-Jul	0.1	0.1	0.1	0.1	0.0	0.2	0.3	0.0	0.0	0.3	0.1	-0.2	-0.3	-0.2	-0.4	-0.2	-0.4	-0.2	-0.2	-0.2	-0.2	-0.3	-0.5	-0.4	-0.1	0.3																							
4-Jul	-0.1	-0.1	0.0	-0.2	-0.3	-0.6	-0.5	-0.5	-0.3	-0.5	-0.5	-0.6	-0.3	-0.4	-0.5	-0.5	-0.7	-0.8	-0.8	-0.6	-0.6	0.0	-0.1	-0.3	-0.4	0.0																							
5-Jul	-0.4	-0.6	-0.5	-0.7	-0.5	-0.6	-0.6	-0.6	-0.5	-0.7	-0.5	-0.5	-0.6	-0.6	-0.5	-0.6	-0.4	-0.4	-0.4	-0.5	-0.4	-0.5	-0.4	0.0	0.1	-0.5	0.1																						
6-Jul	0.0	-0.1	-0.1	-0.2	0.0	-0.4	-0.3	-0.3	-0.2	-0.1	-0.5	-0.2	-0.4	-0.3	-0.3	-0.4	-0.4	-0.3	-0.5	-0.5	0.0	0.1	0.1	0.1	-0.2	0.1																							
7-Jul	0.0	0.1	0.1	0.1	-0.1	0.0	0.0	-0.1	0.0	0.4	0.1	-0.1	0.0	0.0	0.1	0.1	-0.1	0.2	0.0	0.1	-0.1	-0.4	-0.3	-0.1	0.0	0.4																							
8-Jul	-0.1	-0.1	-0.1	0.0	-0.1	0.0	-0.3	-0.2	-0.2	0.1	-0.3	-0.1	-0.1	0.1	0.0	-0.1	0.1	0.1	0.0	-0.1	0.0	0.0	0.1	0.1	-0.1	0.1																							
9-Jul	-0.1	0.0	-0.1	0.1	0.0	-0.1	0.0	-0.1	0.0	0.3	0.1	0.1	0.1	0.3	0.2	0.4	0.5	0.2	0.1	0.0	0.2	0.0	0.1	0.0	0.1	0.5																							
10-Jul	0.1	0.1	-0.1	-0.2	0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.3	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.5	-0.1	-0.3	0.0	-0.4	0.0	-0.4	-0.1	0.1																							
11-Jul	-0.4	-0.2	0.0	-0.3	-0.1	-0.2	-0.2	-0.2	-0.4	-0.2	-0.4	-0.4	-0.5	-0.3	-0.1	-0.1	-0.3	-0.1	0.1	0.0	0.1	0.0	0.0	0.1	-0.2	0.1																							
12-Jul	0.1	-0.1	0.1	0.2	0.0	-0.1	0.1	0.1	0.0	0.1	-0.3	-0.2	-0.3	0.1	0.4	0.1	0.1	0.1	0.4	0.2	0.2	0.5	0.6	0.6	0.1	0.6																							
13-Jul	0.2	0.0	0.4	0.4	0.2	0.3	0.1	0.3	0.1	0.2	0.2	0.1	-0.1	-0.4	-0.2	-0.3	-0.3	-0.3	-0.3	-0.5	-0.3	-0.2	-0.1	-0.2	0.0	0.4																							
14-Jul	-0.2	-0.4	-0.4	-0.4	-0.3	-0.3	-0.4	-0.5	-0.6	-0.4	-0.8	-0.3	-0.3	-0.2	-0.3	0.1	-0.1	-0.8	-0.4	-0.1	-0.2	-0.1	0.0	0.0	-0.3	0.1																							
15-Jul	0.0	-0.1	0.0	0.0	0.0	-0.2	-0.1	0.0	0.2	0.2	0.3	0.0	0.4	0.4	0.6	0.2	0.4	0.1	0.5	0.8	0.7	0.7	0.3	0.3	0.2	0.8																							
16-Jul	0.5	-0.5	-0.4	-0.3	-0.1	0.2	0.1	-0.6	-0.4	-0.3	-0.1	-0.1	-0.3	-0.1	-0.1	-0.2	-0.7	-0.5	-0.7	-0.6	-0.6	-0.5	-0.6	-0.6	-0.3	0.5																							
17-Jul	-0.6	-0.4	-0.5	-0.6	-0.5	-0.5	-0.6	-0.7	-0.4	-0.3	-0.7	-0.8	-0.8	-0.6	-0.4	-0.3	-0.5	-0.3	-0.3	-0.3	-0.2	-0.2	-0.3	-0.3	-0.5	-0.2																							
18-Jul	-0.3	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.4	-0.2	-0.4	0.2	-0.1	0.1	-0.4	-0.4	-0.1	-0.4	-0.3	-0.3	-0.4	-0.3	0.0	-0.1	-0.1	-0.2	0.2																							
19-Jul	0.0	0.3	0.2	-0.4	-0.3	0.3	-0.3	-0.3	-0.1	-0.3	-0.4	-0.3	-0.3	-0.6	-0.7	-0.7	-0.8	-0.5	-0.5	-0.4	-0.2	0.1	0.0	0.0	-0.3	0.3																							
20-Jul	-0.1	0.0	-0.2	-0.1	-0.4	-0.2	-0.2	-0.1	-0.2	-0.3	-0.2	0.2	0.3	0.3	-0.1	0.0	-0.1	0.1	-0.3	-0.3	0.1	0.0	0.0	0.0	-0.1	0.3																							
21-Jul	0.0	0.0	-0.1	0.1	-0.2	-0.2	-0.3	-0.2	-0.2	-0.1	-0.3	-0.2	0.0	0.6	0.7	0.4	0.2	0.6	0.7	0.7	0.7	0.7	0.4	0.0	0.2	0.7																							
22-Jul	-0.4	0.4	0.3	0.0	0.2	0.3	0.2	0.0	0.2	0.1	-0.1	-0.4	-0.3	-0.3	-0.3	-0.5	-0.2	-0.3	-0.2	-0.1	-0.1	0.0	-0.2	0.0	-0.1	0.4																							
23-Jul	0.0	-0.3	-0.2	-0.4	-0.2	-0.3	-0.7	-0.2	-0.2	-0.4	-0.5	-0.3	-0.2	-0.4	-0.3	-0.3	-0.5	-0.6	-0.5	-0.6	-0.5	-0.5	-0.5	-0.5	-0.4	0.0																							
24-Jul	-0.5	-0.6	-0.7	-0.5	-1.0	-0.8	-0.5	-0.5	-0.5	-0.9	-0.6	-1.0	-0.9	-0.7	-0.8	-1.0	-0.8	-0.5	-0.4	-0.4	-0.4	-0.1	-0.1	-0.1	-0.6	-0.1																							
25-Jul	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.2	-0.1	0.0	-0.2	0.0	0.0	-0.2	-0.1	0.2	0.2	0.4	0.3	0.1	0.1	0.1	0.1	0.4																							
26-Jul	0.2	0.3	0.2	-0.1	-0.1	0.1	0.1	0.3	0.4	0.1	0.1	-0.1	-0.3	-0.2	0.1	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.5	0.5	0.2	0.5																							
27-Jul	0.1	-0.2	0.2	0.2	0.3	0.1	0.0	0.2	0.2	0.3	0.4	0.2	0.3	-0.2	-0.3	-0.1	-0.4	-0.4	-0.1	-0.3	-0.3	-0.6	-0.4	-0.3	-0.1	0.4																							
28-Jul	0.2	0.0	-0.4	-0.3	-0.1	-0.4	-0.3	-0.2	-0.1	-0.4	-0.3	-0.3	-0.6	-0.4	-0.5	-0.6	-0.4	-0.4	-0.5	-0.7	0.1	0.1	0.2	-0.1	-0.3	0.2																							
29-Jul	0.1	0.0	0.1	0.0	0.1	0.2	0.1	0.1	0.2	-0.1	0.0	-0.4	-0.1	-0.2	-0.5	0.0	-0.2	-0.6	-0.4	-0.3	-0.3	-0.3	-0.1	-0.2	-0.1	0.2																							
30-Jul	0.0	-0.3	-0.2	0.0	-0.3	-0.2	0.0	0.4	0.0	0.3	0.2	0.1	0.8	0.5	0.2	0.3	0.7	0.1	-0.1	-0.2	0.0	-0.2	-0.6	-0.4	0.0	0.8																							
31-Jul	-0.5	-0.4	-0.3	-0.4	-0.5	-0.4	-0.2	-0.3	-0.3	-0.4	-0.2	-0.2	-0.5	-0.7	-0.6	-0.5	-0.4	-0.5	-0.5	-0.5	0.0	0.0	0.0	0.0	-0.3	0.0																							
																								0.0	-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	-0.1	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.0	-0.1	Diurnal Average	
																								0.5	0.4	0.4	0.4	0.3	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.3	0.8	0.6	0.7	0.5	0.7	0.6	0.7	0.8	0.7	0.7	0.6	0.6	Diurnal Maximum



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.9 km/h on Jul 16 02:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 0.1 km/h on Jul 7 02:00																									
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.0 Median = 1.7 Q ₃ = 2.4 P ₉₀ = 3.1 P ₉₉ = 4.5																									
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-Jul	0.5	0.7	0.8	0.3	0.4	1.0	1.3	1.4	2.0	2.1	2.1	1.4	1.6	1.5	1.2	0.4	0.5	0.9	0.5	0.7	0.6	1.0	1.6	1.5	2.1
2-Jul	1.5	2.1	1.4	0.9	1.6	1.9	1.9	2.5	2.0	2.6	2.4	2.0	1.7	1.9	1.9	2.0	2.4	1.6	1.4	1.5	1.3	1.2	1.3	1.0	2.6
3-Jul	1.2	1.2	0.9	1.3	1.4	1.2	1.4	0.9	1.4	2.2	2.1	2.3	2.7	2.6	2.4	2.7	4.0	4.2	2.2	2.4	2.2	2.2	3.6	3.3	4.2
4-Jul	2.7	1.9	1.6	2.8	3.1	3.6	3.8	4.1	3.6	3.2	3.8	4.7	4.5	4.6	4.7	4.6	4.4	4.5	3.8	3.0	1.8	1.8	1.9	1.9	4.7
5-Jul	2.3	2.4	2.7	2.9	2.9	2.7	2.9	3.5	3.5	2.8	2.8	2.6	2.7	2.6	2.8	2.8	2.0	2.4	2.8	2.6	1.8	0.8	0.3	0.2	3.5
6-Jul	0.4	0.9	0.7	0.7	0.8	2.3	2.1	2.4	2.4	2.4	2.5	2.3	2.3	2.0	2.1	1.8	2.2	2.0	1.4	0.9	0.2	0.2	0.2	0.1	2.5
7-Jul	0.2	0.1	0.1	0.2	0.4	0.6	0.8	1.0	1.2	1.6	1.9	2.0	1.9	2.0	1.8	1.6	1.3	1.0	0.7	0.3	0.6	1.5	0.6	0.6	2.0
8-Jul	0.4	0.3	0.2	0.1	0.3	0.2	0.9	0.8	1.0	0.8	2.1	1.5	0.7	1.0	1.1	0.9	0.9	1.0	1.0	0.6	0.6	0.3	0.2	0.1	2.1
9-Jul	0.3	0.4	0.4	0.3	0.2	0.4	0.6	1.0	1.6	1.4	1.7	2.3	2.5	2.3	2.0	1.7	1.7	1.7	1.6	1.6	1.0	0.7	1.0	0.6	2.5
10-Jul	0.5	0.4	0.5	1.7	1.1	0.7	0.5	1.3	1.3	1.7	1.9	1.4	1.5	1.8	1.7	1.2	1.9	2.2	0.9	2.0	1.9	1.1	0.7	0.5	2.2
11-Jul	0.6	0.4	0.3	0.5	0.4	0.4	0.8	1.1	1.6	1.4	2.0	2.0	2.3	2.1	1.8	1.8	1.4	1.7	1.8	1.7	0.9	0.5	0.5	0.7	2.3
12-Jul	0.8	0.9	0.7	0.7	0.9	1.3	1.3	1.4	1.4	1.0	1.2	1.9	1.7	1.6	1.2	1.3	1.1	1.4	1.3	1.0	0.9	1.0	1.1	1.1	1.9
13-Jul	1.5	1.4	1.2	1.0	0.7	0.9	1.1	1.4	1.4	1.7	1.6	1.8	1.7	1.4	1.7	1.3	0.9	1.9	2.2	2.2	1.5	0.8	0.7	0.8	2.2
14-Jul	1.1	1.7	2.1	1.4	1.5	1.4	2.2	2.0	2.6	2.4	2.6	2.2	1.9	1.9	1.5	1.3	1.5	3.2	2.1	1.0	0.5	0.4	0.1	0.2	3.2
15-Jul	0.2	0.3	0.3	0.1	0.2	0.4	0.7	1.7	1.8	1.2	1.6	2.6	3.8	3.4	2.5	3.1	3.2	3.4	1.8	1.7	1.9	1.9	1.7	1.8	3.8
16-Jul	1.5	4.9	1.7	1.6	0.9	0.9	1.4	2.5	2.5	1.9	1.6	2.5	2.4	2.4	2.3	2.8	4.0	3.8	3.4	3.6	3.4	3.4	3.3	3.7	4.9
17-Jul	3.5	3.7	3.2	3.2	2.6	3.0	3.2	2.6	3.0	2.6	3.8	3.5	3.3	2.7	2.2	2.4	1.8	2.1	1.0	1.4	0.6	0.9	0.5	1.0	3.8
18-Jul	0.8	1.0	0.8	0.5	0.3	0.5	0.9	1.5	1.4	1.9	1.8	1.5	2.1	2.0	2.2	1.9	2.0	1.9	2.2	2.1	1.2	1.0	1.3	1.5	2.2
19-Jul	1.1	0.9	1.1	2.2	2.1	1.3	2.4	2.4	2.3	2.4	2.6	2.6	2.8	2.8	3.6	3.2	3.0	2.5	1.7	1.6	0.8	0.4	0.2	0.2	3.6
20-Jul	0.4	0.2	0.3	0.2	0.7	0.6	0.4	0.4	0.6	0.8	1.1	1.2	1.4	1.6	2.0	1.7	1.7	1.3	1.2	1.7	0.7	0.5	0.7	1.2	2.0
21-Jul	0.7	0.9	1.2	1.1	1.0	0.6	0.6	0.9	0.8	1.1	0.9	1.4	2.3	2.3	1.9	1.6	1.4	1.5	1.5	1.7	1.7	1.5	1.6	1.7	2.3
22-Jul	1.3	1.4	2.1	1.9	1.4	1.8	1.9	2.0	2.0	2.0	2.6	2.8	2.7	3.1	3.0	3.3	2.9	2.8	2.5	1.6	1.2	1.6	1.9	1.8	3.3
23-Jul	1.7	2.0	1.9	2.2	2.4	2.8	3.1	2.2	2.3	2.4	2.6	2.4	2.8	2.9	3.0	3.2	2.8	2.8	2.4	2.8	2.4	2.0	2.0	2.3	3.2
24-Jul	2.6	2.3	2.9	2.5	3.1	2.7	2.5	2.9	2.5	3.3	3.5	4.3	4.2	3.8	4.1	4.3	4.0	3.6	3.1	3.1	1.6	0.7	0.6	0.3	4.3
25-Jul	0.2	0.2	0.3	0.2	0.2	0.5	1.0	1.0	1.3	1.2	1.8	2.3	2.2	1.9	2.0	1.8	1.8	1.5	1.3	1.0	0.7	0.9	0.7	0.3	2.3
26-Jul	0.9	1.5	1.0	1.7	1.6	1.5	1.6	1.6	1.9	1.8	1.7	2.0	2.3	1.9	1.9	1.7	1.6	1.8	1.7	1.5	1.4	1.5	1.7	1.7	2.3
27-Jul	1.5	1.2	1.4	1.5	1.9	2.3	2.6	2.7	2.5	2.5	2.1	2.2	1.7	1.9	1.8	1.6	1.7	1.1	0.3	0.7	2.2	3.5	1.5	1.8	3.5
28-Jul	0.8	1.1	1.9	2.3	1.7	2.1	2.3	2.5	2.2	2.8	3.3	3.5	3.8	3.3	3.3	3.3	3.4	3.5	4.2	3.3	1.0	1.0	0.8	0.5	4.2
29-Jul	0.5	0.4	0.6	0.7	0.8	0.9	0.9	1.4	1.4	1.6	1.8	1.9	1.9	2.1	2.8	1.8	1.4	1.7	1.4	1.4	0.7	0.6	0.6	0.5	2.8
30-Jul	0.4	0.5	0.4	0.4	0.5	0.5	0.8	1.3	0.9	1.2	1.0	1.4	2.4	2.5	2.5	2.6	2.1	2.5	2.8	2.0	1.7	2.1	2.3	2.3	2.8
31-Jul	2.4	1.0	0.9	1.2	2.5	2.9	2.5	2.2	2.2	2.5	2.6	2.8	2.9	3.0	3.1	2.0	1.9	2.8	2.5	2.0	0.3	0.2	0.2	0.2	3.1
	3.5	4.9	3.2	3.2	3.1	3.6	3.8	4.1	3.6	3.3	3.8	4.7	4.5	4.6	4.7	4.6	4.6	4.4	4.5	3.8	3.4	3.5	3.6	3.7	
	Diurnal Maximum																								



Maximum Value: 1.4 km/h on Jul 30 13:00		Maximum Daily Average: 0.6 km/h on Jul 15		Hours in Service: 744																																												
Minimum Value: -1.5 km/h on Jul 16 02:00		Minimum Daily Average: -0.8 km/h on Jul 5		Hours of Data: 744																																												
Maximum Diurnal Average: 0.0 km/h at hour 10		Minimum Diurnal Average: -0.2 km/h at hour 18		Hours of Missing Data: 0																																												
Monthly Average: -0.10 km/h		Percentiles: P ₁ = -1.2 P ₁₀ = -0.8 Q ₁ = -0.5 Median = -0.1 Q ₃ = 0.2 P ₉₀ = 0.6 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-Jul	0.6	0.5	0.3	0.0	0.2	0.4	0.2	0.4	0.4	0.7	0.8	0.5	0.3	-0.1	0.1	-0.2	-0.4	-0.3	-0.2	0.1	0.0	0.4	0.5	0.3	0.2	0.8																						
2-Jul	0.6	1.0	0.5	0.2	0.6	0.8	1.0	0.7	0.3	0.7	0.7	0.6	0.3	0.8	0.5	0.5	-0.2	-0.3	0.3	0.7	0.2	0.2	0.6	0.1	0.5	1.0																						
3-Jul	0.6	0.2	0.2	0.0	0.2	0.3	0.2	-0.2	0.2	0.8	0.2	-0.2	-0.3	-0.1	-0.3	-0.1	-0.4	0.0	0.0	0.0	-0.2	-0.4	-0.5	-0.7	0.0	0.8																						
4-Jul	0.1	0.1	0.0	-0.1	-0.4	-1.0	-0.6	-0.8	-0.5	-0.2	-0.4	-0.9	-0.5	-0.7	-1.0	-0.4	-0.9	-1.3	-1.4	-1.3	-1.0	0.1	0.1	-0.2	-0.6	0.1																						
5-Jul	-0.7	-0.9	-1.0	-1.1	-1.1	-0.9	-1.0	-0.9	-1.1	-1.0	-1.0	-0.7	-1.0	-0.7	-0.9	-0.7	-0.8	-0.7	-1.0	-0.6	-0.8	-0.6	-0.1	0.1	-0.8	0.1																						
6-Jul	0.0	-0.2	-0.2	-0.2	0.0	-0.4	-0.3	-0.5	-0.2	-0.2	-1.0	-0.4	-0.3	-0.5	-0.4	-0.6	-0.8	-0.7	-0.6	-0.5	-0.1	0.1	0.1	0.1	-0.3	0.1																						
7-Jul	0.0	0.0	0.1	0.2	0.3	0.3	0.2	0.1	-0.2	0.6	0.2	-0.2	0.1	0.0	0.1	0.1	-0.2	0.2	-0.1	0.1	0.0	-0.4	-0.5	0.1	0.0	0.6																						
8-Jul	-0.1	-0.1	-0.1	0.0	-0.1	0.0	-0.4	-0.2	0.0	0.1	-0.4	-0.3	0.0	0.2	0.1	0.1	0.2	0.3	0.0	-0.1	-0.1	0.1	0.1	0.1	0.0	0.3																						
9-Jul	0.0	0.0	-0.1	0.0	0.1	0.1	0.0	0.1	0.4	0.3	0.6	0.7	0.7	0.7	0.4	0.4	0.6	0.6	0.5	0.4	0.5	0.5	0.5	0.2	0.3	0.7																						
10-Jul	0.2	0.2	0.0	-0.3	0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.4	0.0	-0.1	-0.1	-0.1	0.0	0.2	0.0	0.0	-0.9	0.1	-0.6	0.1	-0.5	-0.1	0.2																						
11-Jul	-0.5	-0.3	0.0	-0.2	-0.2	-0.2	-0.2	-0.4	-0.7	-0.3	-0.5	-0.4	-0.7	-0.5	0.0	0.0	-0.4	0.2	0.4	0.3	0.1	0.1	0.3	0.3	-0.2	0.4																						
12-Jul	0.3	0.1	0.3	0.6	0.4	0.3	0.5	0.4	0.2	0.1	-0.3	0.3	0.0	0.3	0.5	0.1	0.0	0.1	0.5	0.3	0.5	0.5	0.5	0.3	0.3	0.6																						
13-Jul	0.7	0.3	0.7	0.8	0.4	0.4	0.1	0.6	0.5	0.5	0.4	0.1	-0.1	-0.5	-0.5	-0.3	-0.4	-0.4	-0.2	-0.5	-0.4	-0.3	-0.4	-0.3	0.0	0.8																						
14-Jul	-0.4	-0.5	-0.7	-0.4	-0.3	-0.2	-0.5	-0.7	-0.8	-0.6	-0.8	-0.2	-0.2	-0.1	-0.4	0.1	-0.3	-0.8	-0.3	-0.1	-0.4	-0.1	0.0	0.0	-0.4	0.1																						
15-Jul	0.0	0.0	0.0	0.0	0.0	-0.2	0.1	0.4	0.6	0.5	0.5	0.8	1.2	1.1	1.1	0.8	1.1	0.9	0.6	1.0	1.0	1.0	1.2	0.9	0.6	1.2																						
16-Jul	0.8	-1.5	-0.4	-0.7	0.1	0.3	0.1	-1.0	-0.8	-0.4	-0.2	-0.1	0.0	0.1	0.3	0.2	-1.2	-0.9	-1.0	-1.1	-1.1	-0.8	-1.1	-1.2	-0.5	0.8																						
17-Jul	-1.1	-1.3	-1.0	-0.9	-0.8	-1.3	-1.2	-1.1	-0.9	-0.6	-1.1	-0.8	-1.1	-0.9	-0.7	-0.3	-0.6	-0.5	-0.3	-0.5	-0.4	-0.5	-0.4	-0.5	-0.8	-0.3																						
18-Jul	-0.5	-0.4	-0.3	-0.3	-0.2	-0.4	-0.1	-0.2	0.0	-0.3	0.3	-0.1	0.1	-0.4	-0.5	-0.3	-0.6	-0.5	-0.2	-0.7	-0.3	0.4	0.2	0.2	-0.2	0.4																						
19-Jul	0.2	0.3	0.1	-0.3	0.0	0.6	-0.2	-0.3	-0.1	-0.3	-0.2	-0.3	-0.3	-1.0	-0.9	-0.4	-0.5	-0.4	-0.4	-0.4	-0.1	0.2	0.2	0.0	-0.2	0.6																						
20-Jul	-0.2	0.0	-0.1	-0.1	-0.6	-0.3	-0.2	0.0	-0.4	-0.2	-0.1	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.0	0.0	0.2	0.2	0.2	0.4	0.0	0.4																						
21-Jul	0.2	0.2	0.3	0.4	0.1	-0.1	-0.6	-0.3	-0.2	0.2	-0.4	0.1	0.6	1.0	0.7	0.4	0.3	0.8	0.9	0.7	0.8	0.9	0.7	0.1	0.3	1.0																						
22-Jul	-0.3	0.8	0.7	0.7	0.6	0.7	0.5	0.5	0.6	0.4	0.0	-0.4	-0.3	-0.6	-0.6	-0.6	-0.5	-0.6	-0.3	0.1	0.1	0.1	0.0	0.2	0.1	0.8																						
23-Jul	0.2	-0.2	-0.3	-0.2	-0.5	-0.4	-0.9	-0.3	-0.3	-0.5	-0.7	-0.1	-0.1	-0.2	-0.4	-0.6	-0.5	-0.6	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7	-0.4	0.2																						
24-Jul	-0.7	-0.5	-0.7	-0.5	-1.0	-0.7	-0.6	-0.7	-0.6	-1.0	-0.8	-1.1	-1.1	-0.9	-0.9	-1.3	-1.0	-0.9	-0.8	-1.0	-0.7	-0.3	-0.2	-0.1	-0.7	-0.1																						
25-Jul	-0.1	0.0	0.1	0.2	0.2	0.1	0.2	0.1	0.4	0.4	-0.2	0.1	-0.2	0.1	-0.1	-0.2	0.0	0.0	0.3	0.2	0.6	0.7	0.5	0.5	0.2	0.7																						
26-Jul	1.1	1.2	0.7	0.2	0.2	0.4	0.4	0.8	0.7	0.4	0.5	-0.3	-0.3	-0.4	-0.1	0.3	0.5	0.4	0.2	-0.1	0.0	0.0	0.0	0.0	0.3	1.2																						
27-Jul	0.1	0.3	0.8	0.6	0.9	0.4	0.6	0.7	0.3	0.8	0.6	0.6	0.3	-0.4	-0.6	-0.1	-0.8	-0.6	-0.1	-0.5	-0.5	-1.1	-0.7	-0.8	0.0	0.9																						
28-Jul	0.3	0.0	-0.5	-0.4	0.1	-0.5	-0.3	-0.1	-0.1	-0.5	-0.2	-0.7	-0.8	-0.5	-0.8	-1.0	-0.6	-0.9	-1.0	-1.0	0.2	0.2	0.3	0.0	-0.4	0.3																						
29-Jul	0.0	0.0	0.1	-0.2	0.0	0.5	0.3	0.4	0.5	0.1	-0.2	-0.5	-0.4	-0.4	-0.6	0.1	-0.1	-0.7	-0.5	-0.2	-0.2	-0.3	-0.2	-0.3	-0.1	0.5																						
30-Jul	0.0	-0.5	-0.2	0.0	-0.4	-0.3	0.1	0.5	-0.1	0.8	0.4	0.3	1.4	1.0	0.7	0.8	0.9	0.3	0.0	0.0	0.1	-0.3	-0.9	-0.5	0.2	1.4																						
31-Jul	-0.8	-0.6	-0.5	-0.5	-0.6	-0.8	-0.1	-0.4	-0.4	-0.6	-0.4	-0.6	-0.8	-1.1	-1.0	-0.3	-0.6	-0.8	-0.5	-0.3	0.1	0.1	0.0	-0.1	-0.5	0.1																						
																								0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.0	-0.1	Diurnal Average
																								1.1	1.2	0.8	0.8	0.9	0.8	1.0	0.8	0.7	0.8	0.8	0.8	1.4	1.1	1.1	0.8	1.1	0.9	0.9	1.0	1.0	1.0	1.2	0.9	Diurnal Maximum



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.4 km/h on Jul 16 02:00 Minimum Value: 0.1 km/h on Jul 7 02:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.1 Median = 1.8 Q ₃ = 2.4 P ₉₀ = 3.1 P ₉₉ = 4.3																							Hours in Service: 744 Hours of Data: 744 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-Jul	0.5	0.8	0.8	0.4	0.5	1.2	1.5	1.3	2.0	2.0	2.1	1.4	1.7	1.7	1.3	0.5	0.5	1.0	0.4	0.9	0.9	1.1	1.9	1.9	2.1
2-Jul	1.7	2.2	1.4	1.0	1.6	2.0	2.1	2.6	2.0	2.4	2.5	2.2	2.1	2.2	2.2	2.1	2.6	1.6	1.5	1.7	1.5	1.4	1.6	1.2	2.6
3-Jul	1.3	1.5	1.0	1.6	1.6	1.4	1.6	1.0	1.4	2.3	1.9	2.2	2.5	2.5	2.4	2.7	3.6	3.7	2.5	2.8	2.3	2.4	3.8	3.3	3.8
4-Jul	2.5	2.1	1.7	2.7	3.2	3.8	3.9	4.0	3.3	3.0	3.5	4.4	4.2	4.1	4.2	4.2	4.4	4.5	4.5	4.0	3.2	1.8	1.8	2.2	4.5
5-Jul	2.5	2.6	3.0	3.0	3.3	3.1	3.0	3.6	3.7	3.0	2.9	2.8	2.6	2.8	2.8	2.9	2.0	2.5	2.9	2.9	2.2	0.9	0.4	0.2	3.7
6-Jul	0.6	1.2	0.9	1.0	1.0	2.5	2.3	2.5	2.4	2.3	2.7	2.5	2.3	2.1	2.3	1.9	2.4	2.0	1.5	0.9	0.3	0.2	0.2	0.2	2.7
7-Jul	0.2	0.1	0.1	0.3	0.4	0.6	0.9	1.1	1.2	1.7	2.0	2.2	2.2	2.3	2.1	1.9	1.4	1.1	0.8	0.5	0.7	1.7	0.7	0.9	2.3
8-Jul	0.5	0.3	0.3	0.2	0.3	0.3	0.8	0.7	1.1	0.8	2.4	1.7	0.9	0.9	1.2	1.0	1.0	1.2	1.0	0.6	0.8	0.4	0.2	0.2	2.4
9-Jul	0.3	0.5	0.5	0.4	0.3	0.5	0.7	1.1	1.6	1.4	1.8	2.1	2.5	2.2	2.1	2.1	2.0	1.8	1.6	1.6	1.2	0.8	1.3	0.9	2.5
10-Jul	0.8	0.6	0.6	1.7	1.3	0.8	0.7	1.4	1.3	1.5	2.0	1.6	1.7	2.0	1.7	1.3	2.0	2.3	1.2	2.1	2.2	1.3	0.9	0.6	2.3
11-Jul	0.6	0.5	0.3	0.6	0.3	0.5	0.9	1.1	1.5	1.4	2.2	2.3	2.4	2.2	2.0	2.0	1.5	1.7	2.0	1.9	1.1	0.6	0.6	0.8	2.4
12-Jul	0.9	0.9	0.7	0.7	0.9	1.3	1.3	1.4	1.4	1.1	1.3	1.8	1.7	1.8	1.3	1.5	1.4	1.7	1.5	1.1	0.9	1.2	1.2	1.2	1.8
13-Jul	1.6	1.4	1.1	1.0	0.9	1.0	1.2	1.4	1.5	1.7	1.6	2.2	2.0	1.5	1.9	1.5	0.9	1.9	2.3	2.4	1.8	0.9	0.9	1.0	2.4
14-Jul	1.4	2.0	2.3	1.6	1.6	1.7	2.3	2.1	2.6	2.3	2.5	2.3	2.0	2.0	1.7	1.5	1.8	3.3	2.3	1.1	0.6	0.5	0.2	0.2	3.3
15-Jul	0.2	0.3	0.3	0.2	0.3	0.4	0.8	1.8	2.0	1.3	1.9	2.7	3.9	3.6	2.7	3.1	3.3	3.4	2.0	1.8	1.9	2.0	1.8	1.8	3.9
16-Jul	1.6	5.4	1.9	1.7	1.0	1.0	1.5	2.6	2.6	2.0	1.7	2.4	2.4	2.4	2.5	3.0	4.3	4.2	3.6	3.7	3.8	3.5	3.6	4.0	5.4
17-Jul	3.9	3.6	3.2	3.4	2.7	2.9	3.0	2.6	3.3	2.8	4.1	3.8	3.4	2.9	2.4	2.4	1.8	2.3	1.1	1.5	0.8	0.9	0.6	1.1	4.1
18-Jul	1.0	1.2	0.9	0.4	0.3	0.5	1.2	1.6	1.6	2.1	2.1	1.8	2.3	2.3	2.2	2.1	2.2	2.1	2.4	2.3	1.2	0.9	1.1	1.2	2.4
19-Jul	1.1	1.1	1.2	2.3	2.4	1.5	2.6	2.7	2.3	2.6	2.3	2.8	2.7	3.0	3.7	3.3	3.3	2.5	1.9	1.6	0.9	0.6	0.4	0.2	3.7
20-Jul	0.5	0.3	0.3	0.2	0.7	0.8	0.4	0.4	0.7	0.8	1.2	1.4	1.5	1.7	2.1	1.8	1.8	1.3	1.2	1.6	0.9	0.7	1.2	1.5	2.1
21-Jul	1.0	1.1	1.3	1.3	1.2	0.8	0.7	0.9	0.8	1.2	0.8	1.6	2.4	2.5	2.2	1.9	1.6	1.6	1.8	1.8	1.9	1.8	1.8	1.9	2.5
22-Jul	1.4	1.4	2.1	1.7	1.5	2.1	2.0	2.0	2.1	2.0	2.5	2.7	2.8	3.1	3.1	3.4	3.0	2.6	2.3	1.7	1.2	1.8	2.3	2.0	3.4
23-Jul	1.6	2.0	2.0	2.2	2.5	2.6	3.0	2.3	2.4	2.6	2.6	2.5	2.7	2.9	2.7	3.1	2.9	3.1	2.6	3.0	2.5	2.1	2.1	2.3	3.1
24-Jul	2.5	2.6	3.0	2.6	3.3	2.8	2.7	3.0	2.6	3.4	3.7	4.3	4.3	4.0	4.4	4.4	4.3	3.9	3.5	3.5	1.9	0.7	0.6	0.3	4.4
25-Jul	0.4	0.2	0.4	0.3	0.3	0.7	0.9	1.1	1.3	1.3	1.8	2.4	2.2	2.1	2.1	2.0	1.9	1.5	1.4	1.1	0.8	1.1	0.8	0.5	2.4
26-Jul	0.8	1.5	1.0	1.7	1.8	1.7	1.4	1.6	2.0	1.8	1.9	2.2	2.4	2.1	2.3	1.9	1.8	1.9	1.9	1.5	1.5	1.4	1.7	1.7	2.4
27-Jul	1.5	1.1	1.3	1.5	1.9	2.1	2.6	2.9	2.5	2.6	2.2	2.3	2.0	2.1	1.9	1.7	1.6	1.0	0.5	0.8	2.3	3.7	1.5	1.8	3.7
28-Jul	0.8	1.2	2.1	2.2	1.7	2.5	2.4	2.7	2.3	3.0	3.5	3.7	4.0	3.3	3.3	3.2	3.4	3.3	4.3	3.4	1.2	1.2	0.9	0.6	4.3
29-Jul	0.6	0.5	0.9	0.8	1.0	1.1	1.1	1.4	1.6	1.6	2.1	2.2	2.1	2.3	2.8	2.0	1.7	1.6	1.5	1.5	0.9	0.8	0.7	0.7	2.8
30-Jul	0.5	0.6	0.5	0.6	0.6	0.5	0.9	1.6	1.1	1.2	1.2	1.5	2.5	2.5	2.4	2.6	2.4	2.5	2.4	1.9	1.5	1.9	2.4	2.5	2.6
31-Jul	2.3	1.2	1.1	1.3	2.5	3.1	2.6	2.3	2.3	2.6	2.8	3.1	2.9	3.4	3.1	2.2	2.0	3.1	2.6	2.1	0.3	0.2	0.2	0.2	3.4
Diurnal Maximum																									



Maximum Value: 2.8 km/h on Jul 15 17:00		Maximum Daily Average: 0.9 km/h on Jul 15		Hours in Service: 744																						
Minimum Value: -1.4 km/h on Jul 16 02:00		Minimum Daily Average: -0.5 km/h on Jul 17		Hours of Data: 744																						
Maximum Diurnal Average: 0.4 km/h at hour 5		Minimum Diurnal Average: 0.1 km/h at hour 20		Hours of Missing Data: 0																						
Monthly Average: 0.25 km/h		Percentiles: P ₁ = -1.0 P ₁₀ = -0.4 Q ₁ = -0.1 Median = 0.2 Q ₃ = 0.6 P ₉₀ = 1.0 P ₉₉ = 1.8		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-Jul	0.2	0.4	0.2	0.1	0.2	0.7	0.8	0.3	0.9	0.8	1.3	0.7	0.4	0.3	0.5	0.0	-0.5	-0.3	0.0	0.2	0.1	1.5	0.6	0.1	0.4	1.5
2-Jul	0.3	1.3	0.5	0.1	0.6	1.2	0.8	1.8	0.8	0.6	0.9	0.7	0.2	0.8	0.4	0.5	0.8	0.4	0.3	0.2	0.7	0.5	1.6	0.6	0.7	1.8
3-Jul	0.8	0.7	-0.1	0.6	1.0	0.3	0.2	-0.1	0.9	1.4	0.5	0.2	0.2	0.5	0.2	0.6	0.9	1.2	1.1	1.1	1.0	0.2	0.6	0.4	0.6	1.4
4-Jul	0.9	0.9	0.7	0.9	1.1	0.5	1.1	0.8	0.4	0.8	1.0	0.4	1.0	0.5	1.3	0.5	0.5	-0.6	-0.4	-0.4	0.4	0.5	0.7	0.6	0.6	1.3
5-Jul	0.0	0.0	-0.6	-0.3	-0.5	0.0	-0.6	0.0	-0.5	-0.1	-0.9	-0.4	-0.8	0.0	-0.7	-0.1	-0.6	-0.7	-0.8	-0.8	-0.6	-0.5	-0.2	-0.2	-0.4	0.0
6-Jul	-0.3	0.8	0.1	0.4	0.9	1.3	0.4	-0.2	0.2	0.1	-1.3	-0.5	0.0	0.1	0.2	-0.5	0.1	-0.5	0.1	-0.3	-0.1	0.1	0.1	0.0	0.1	1.3
7-Jul	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	1.4	0.6	0.2	0.0	0.4	0.3	0.4	-0.3	0.5	0.1	0.1	0.2	0.3	-0.3	-0.3	0.2	1.4
8-Jul	0.2	0.2	0.1	0.2	0.1	0.1	0.1	-0.1	0.1	0.2	0.5	0.4	-0.2	0.0	0.0	0.3	0.1	0.5	0.4	0.1	0.8	0.1	0.1	0.2	0.2	0.8
9-Jul	0.4	0.5	0.1	0.1	0.4	0.4	0.1	-0.2	0.6	0.2	0.7	0.4	0.6	0.7	0.7	0.4	0.6	1.3	1.3	1.4	1.6	1.0	1.7	0.9	0.7	1.7
10-Jul	0.1	0.2	0.4	0.3	0.1	0.2	0.1	-0.1	0.0	0.3	0.3	0.3	-0.3	0.1	0.2	-0.2	0.6	0.8	0.1	-0.8	1.5	0.2	-0.1	-0.2	0.2	1.5
11-Jul	-0.3	-0.2	0.0	-0.1	-0.2	-0.3	-0.1	-0.4	-0.5	0.4	0.3	0.4	-0.7	-0.7	0.9	0.0	0.0	0.9	0.3	1.5	-0.1	0.1	0.0	0.3	0.1	1.5
12-Jul	0.3	0.0	0.3	0.0	0.1	0.4	0.3	0.2	0.2	0.3	0.0	0.6	0.2	1.1	0.3	0.0	-0.3	0.0	0.0	0.4	0.5	0.1	0.1	-0.3	0.2	1.1
13-Jul	0.7	0.7	0.3	0.7	0.2	0.9	0.6	0.6	0.6	0.4	0.2	-0.2	0.7	-0.7	-0.1	0.1	0.1	0.2	0.0	0.2	0.2	0.1	0.1	0.0	0.3	0.9
14-Jul	0.0	0.1	0.1	-0.1	0.1	0.2	-0.2	-0.3	-0.5	-0.5	-0.3	0.2	-0.4	-0.3	-0.1	0.3	-0.1	-0.3	0.1	0.0	-0.1	0.0	0.1	0.1	-0.1	0.3
15-Jul	0.1	0.0	0.1	0.1	0.3	0.1	0.2	0.6	1.8	1.0	1.9	1.5	1.8	2.4	1.1	1.9	2.8	1.3	0.3	0.6	0.3	0.2	0.8	0.8	0.9	2.8
16-Jul	0.4	-1.4	0.4	-0.5	0.5	0.6	1.1	-0.5	-0.6	0.2	0.4	0.8	0.7	1.0	1.0	0.8	-0.1	0.4	0.1	0.3	0.3	0.5	0.1	-0.2	0.3	1.1
17-Jul	-0.3	-0.8	-0.3	-0.2	-0.3	-1.0	-0.9	-0.8	-1.0	-0.4	-1.1	-0.4	-0.4	-0.1	-0.6	-0.2	0.1	-0.3	-0.1	-0.2	-0.1	-0.3	-0.4	-0.6	-0.5	0.1
18-Jul	-0.5	-0.3	-0.1	-0.2	0.0	-0.3	0.0	-0.3	0.0	-0.2	0.5	0.7	0.2	0.2	0.2	-0.3	-0.6	-0.3	0.5	-0.3	0.4	0.6	0.6	0.5	0.0	0.7
19-Jul	1.0	0.7	0.9	1.4	1.0	1.8	1.0	0.7	0.4	0.3	0.0	0.0	0.2	-0.8	-0.2	0.2	0.1	0.3	-0.6	-0.1	0.1	0.3	0.1	0.2	0.4	1.8
20-Jul	0.0	0.1	0.0	0.2	-0.1	-0.1	0.0	0.2	-0.3	0.5	-0.1	-0.1	0.3	0.5	0.2	0.6	1.0	0.8	0.2	0.3	0.3	0.7	1.0	1.3	0.3	1.3
21-Jul	0.4	0.9	0.8	0.9	1.2	-0.1	0.0	-0.2	-0.1	-0.1	-0.5	-0.2	0.7	2.3	0.9	0.3	0.6	0.0	0.1	-0.1	0.1	0.2	0.6	1.3	0.4	2.3
22-Jul	-0.8	-0.1	1.3	0.8	1.1	1.7	1.1	0.5	0.3	0.6	0.6	0.2	0.9	-0.3	0.1	0.1	0.4	0.1	0.6	0.6	0.5	1.4	1.6	1.5	0.6	1.7
23-Jul	0.8	0.7	0.8	0.8	0.5	1.0	0.2	0.3	0.2	-0.4	-0.5	0.2	0.2	0.0	0.6	0.0	0.1	-0.1	0.5	0.1	0.1	0.1	0.2	0.1	0.3	1.0
24-Jul	-0.1	0.4	0.4	0.4	0.3	0.2	0.2	0.0	-0.1	-0.4	0.6	-0.3	0.3	0.4	0.4	-0.2	-0.4	-0.3	-0.6	-1.0	-0.6	-0.3	-0.4	-0.4	-0.1	0.6
25-Jul	-0.3	-0.2	-0.2	0.0	0.0	0.1	0.5	0.6	0.1	1.0	0.3	0.9	-0.2	0.3	-0.4	-0.2	0.2	0.0	0.9	0.3	0.8	0.8	-0.2	0.1	0.2	1.0
26-Jul	0.0	0.3	0.6	0.6	1.1	0.6	0.5	0.3	0.6	0.4	0.4	-0.2	-0.1	-0.4	0.0	0.3	0.7	0.7	0.6	0.1	0.5	-0.4	0.3	0.9	0.3	1.1
27-Jul	0.3	-0.2	0.7	1.0	1.6	0.3	1.5	0.9	1.0	0.8	0.9	0.8	0.8	-0.3	-0.3	-0.3	-0.6	-0.3	0.0	-0.4	-0.3	-1.0	-0.5	-0.5	0.2	1.6
28-Jul	1.0	0.4	0.4	0.8	1.4	0.3	0.7	1.4	0.5	0.0	1.0	0.8	-0.1	0.6	0.3	-0.3	0.1	0.3	-0.2	0.4	0.5	0.5	0.6	0.3	0.5	1.4
29-Jul	0.1	-0.1	-0.1	-0.5	-0.4	-0.1	0.0	0.3	0.8	0.3	-0.4	-0.4	-0.9	-0.2	0.2	0.5	-0.1	-0.2	-0.2	0.2	0.2	-0.1	-0.1	-0.3	-0.1	0.8
30-Jul	0.1	0.0	0.3	0.3	0.2	0.0	0.1	0.6	-0.3	0.7	0.3	0.6	1.5	1.1	1.3	1.1	-0.1	0.3	1.0	0.7	0.4	0.4	-0.3	-0.1	0.4	1.5
31-Jul	0.2	-0.4	-0.4	0.1	0.4	0.1	1.3	0.5	0.2	-0.2	-0.3	-0.2	-0.5	-1.0	-0.5	0.3	0.0	-0.3	0.1	0.1	0.0	0.0	0.0	-0.2	0.0	1.3
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.0 km/h on Jul 16 02:00 Minimum Value: 0.2 km/h on Jul 31 22:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.2 Median = 1.9 Q ₃ = 2.6 P ₉₀ = 3.2 P ₉₉ = 4.2		Hours in Service: 744 Hours of Data: 744 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-Jul	0.7	0.8	0.7	0.6	0.7	1.3	1.9	1.2	1.3	1.4	1.9	1.5	2.4	2.6	1.9	1.0	0.8	0.7	0.5	1.2	1.5	1.3	2.1	1.9	2.6																						
2-Jul	1.6	1.9	1.6	1.6	1.6	2.1	2.2	2.4	2.0	1.9	2.2	2.6	2.9	3.1	2.7	2.6	2.8	1.5	1.8	1.8	1.4	1.3	2.0	1.5	3.1																						
3-Jul	1.5	1.9	1.3	1.8	1.9	1.5	1.5	1.3	1.4	1.9	2.4	3.0	2.8	3.2	3.1	3.2	3.5	3.4	2.5	2.9	2.2	2.1	3.8	3.1	3.8																						
4-Jul	2.4	2.0	1.6	2.7	3.4	3.5	3.8	3.8	3.2	3.4	4.2	4.3	4.4	4.3	3.8	4.3	4.0	4.0	3.6	3.0	2.4	1.3	1.6	2.3	4.4																						
5-Jul	2.8	2.4	3.1	2.3	2.8	3.6	2.6	4.0	4.0	3.3	2.9	3.4	2.8	3.1	3.0	3.4	1.9	2.6	2.7	2.6	1.9	0.9	0.6	0.4	4.0																						
6-Jul	1.0	1.5	1.1	1.4	1.3	1.6	2.3	2.7	2.3	2.7	2.8	2.6	2.2	2.1	2.5	2.0	2.7	2.5	1.9	0.9	0.3	0.3	0.3	0.4	2.8																						
7-Jul	0.3	0.2	0.2	0.4	0.5	0.5	0.7	0.9	1.2	2.2	2.7	3.3	3.0	3.4	3.0	2.6	2.2	1.5	1.2	0.7	0.8	1.3	1.2	1.7	3.4																						
8-Jul	1.1	0.4	0.4	0.4	0.3	0.3	0.6	0.6	1.0	0.7	2.0	1.7	1.0	0.8	1.0	1.2	1.1	1.7	1.4	0.5	0.6	0.6	0.3	0.3	2.0																						
9-Jul	0.6	0.8	0.9	0.6	0.8	0.8	1.0	1.4	1.1	1.1	1.4	2.1	2.5	2.7	2.5	2.7	2.5	2.0	1.9	1.8	1.0	0.7	1.4	1.3	2.7																						
10-Jul	1.1	1.1	0.8	1.8	1.6	0.8	0.8	1.3	1.8	1.9	2.0	1.7	2.0	2.2	2.0	2.0	2.0	2.2	1.4	2.0	1.6	1.9	1.6	1.2	2.2																						
11-Jul	0.6	0.5	0.4	0.5	0.3	0.5	0.8	0.9	1.3	1.8	2.3	3.1	2.8	2.8	2.6	1.7	1.8	1.8	2.0	1.8	1.2	0.7	0.6	0.9	3.1																						
12-Jul	0.9	0.8	0.7	0.7	0.9	1.1	0.9	1.1	1.3	1.2	1.4	1.6	1.5	2.1	1.6	1.8	1.5	1.9	1.7	1.4	1.1	1.1	1.0	1.1	2.1																						
13-Jul	1.5	1.8	1.2	1.0	1.1	1.1	1.5	1.2	1.3	1.2	1.4	2.6	2.9	2.2	2.4	2.1	1.3	2.2	2.2	2.0	1.7	0.8	0.6	0.6	2.9																						
14-Jul	0.9	1.8	1.8	1.9	1.9	1.9	2.2	2.2	2.0	2.6	2.4	2.9	2.4	1.8	2.3	1.9	1.9	2.4	2.7	1.7	0.6	0.4	0.3	0.3	2.9																						
15-Jul	0.4	0.4	0.3	0.4	0.5	0.6	1.0	1.6	1.4	1.5	2.0	2.0	2.7	3.3	3.4	2.8	2.4	2.3	2.1	2.2	1.9	1.8	2.0	1.9	3.4																						
16-Jul	1.6	5.0	2.0	1.3	1.1	1.4	1.4	2.7	2.8	2.4	2.2	3.0	3.0	3.2	3.1	3.4	3.8	3.6	3.2	3.2	3.2	3.3	2.9	2.9	5.0																						
17-Jul	4.1	3.4	2.8	3.1	2.5	2.5	1.9	2.2	3.3	3.1	3.9	3.4	3.1	2.9	2.6	2.4	2.0	1.9	0.9	1.3	0.6	0.6	0.9	1.3	4.1																						
18-Jul	0.9	0.9	0.8	0.3	0.3	0.7	1.4	1.6	1.9	2.6	3.1	2.2	3.1	3.2	3.1	2.7	2.9	2.8	2.7	2.2	1.1	0.6	0.5	0.6	3.2																						
19-Jul	0.6	1.3	2.2	2.5	2.6	2.2	3.0	2.8	2.6	3.0	3.1	3.1	3.4	2.9	4.0	3.3	3.2	2.8	2.2	1.6	0.9	1.1	0.5	0.5	4.0																						
20-Jul	0.5	0.5	0.4	0.5	0.8	0.5	0.4	0.8	0.6	1.0	1.0	1.4	2.1	2.0	2.4	2.3	2.3	1.6	1.3	1.4	1.1	0.9	1.3	1.2	2.4																						
21-Jul	1.5	1.1	1.3	1.3	0.9	1.1	0.7	0.5	0.4	1.1	1.1	1.6	2.3	2.8	3.0	2.5	2.2	1.5	1.9	1.5	1.4	1.5	1.7	1.7	3.0																						
22-Jul	1.7	1.5	1.4	1.2	1.3	1.8	1.6	1.6	1.8	2.5	2.9	2.9	3.5	2.9	2.9	3.4	2.6	2.3	2.0	1.8	0.9	1.1	1.8	1.4	3.5																						
23-Jul	1.6	2.2	1.9	2.1	2.3	2.4	2.4	2.3	2.5	2.7	3.0	3.2	3.5	3.5	3.5	3.2	3.0	2.9	2.5	2.3	2.1	1.8	1.6	2.0	3.5																						
24-Jul	2.0	2.3	3.0	2.5	2.7	2.7	2.3	2.6	2.6	2.5	3.5	3.7	3.6	3.3	3.9	3.4	3.6	3.2	3.4	3.2	1.6	0.8	0.8	0.7	3.9																						
25-Jul	0.5	0.7	0.8	0.7	0.5	1.0	1.3	1.4	1.2	1.6	2.5	3.4	3.0	3.0	3.0	2.7	2.7	2.3	2.2	1.4	1.0	1.3	1.2	0.9	3.4																						
26-Jul	0.8	1.0	0.9	1.1	1.3	1.1	1.2	1.1	1.1	1.3	1.9	2.6	3.0	2.6	3.1	2.7	2.8	2.7	2.6	1.9	1.6	1.9	2.2	2.2	3.1																						
27-Jul	2.1	1.2	1.2	1.2	1.3	1.5	2.0	2.0	1.9	1.9	2.1	2.4	2.9	2.5	2.1	1.9	1.9	1.4	0.5	0.8	2.0	3.5	1.7	1.5	3.5																						
28-Jul	1.3	1.4	2.0	2.2	2.1	2.5	2.8	2.8	2.5	3.1	3.7	4.0	3.6	3.5	3.5	3.2	3.5	3.1	4.2	3.3	2.0	1.3	1.3	1.1	4.2																						
29-Jul	0.9	0.8	1.2	1.3	1.5	1.2	1.2	1.1	1.7	1.9	2.5	2.7	2.6	3.0	2.6	2.3	1.6	1.4	1.0	1.4	1.5	1.5	1.3	0.9	3.0																						
30-Jul	0.9	0.5	1.1	1.4	1.5	0.8	1.3	2.0	1.3	1.4	1.3	1.4	1.7	1.7	2.6	2.9	2.6	2.7	2.6	1.6	0.9	1.4	1.6	2.0	2.9																						
31-Jul	1.8	1.7	1.3	1.4	1.6	2.2	2.1	2.2	2.4	2.8	3.2	3.4	3.4	3.4	3.7	2.4	2.1	2.6	2.0	1.9	0.6	0.2	0.4	0.4	3.7																						
Diurnal Maximum																								4.1	5.0	3.1	3.1	3.4	3.6	3.8	4.0	4.0	3.4	4.2	4.3	4.4	4.3	4.0	4.3	4.0	4.0	4.2	3.3	3.2	3.5	3.8	3.1



Maximum Value: 4.4 km/h on Jul 27 00:00		Maximum Daily Average: 1.4 km/h on Jul 4		Hours in Service: 744																							
Minimum Value: -1.5 km/h on Jul 6 11:00		Minimum Daily Average: -0.2 km/h on Jul 17		Hours of Data: 744																							
Maximum Diurnal Average: 0.9 km/h at hour 23		Minimum Diurnal Average: 0.3 km/h at hour 13		Hours of Missing Data: 0																							
Monthly Average: 0.59 km/h		Percentiles: P ₁ = -0.8 P ₁₀ = -0.3 Q ₁ = 0.1 Median = 0.5 Q ₃ = 1.0 P ₉₀ = 1.6 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-Jul	0.3	0.2	0.3	0.3	0.3	1.2	1.1	0.3	0.8	0.4	1.2	0.6	0.8	0.8	1.0	0.2	-0.2	-0.1	0.2	0.0	0.8	1.9	1.8	1.9	0.7	1.9	
2-Jul	1.9	0.8	0.6	0.6	0.6	1.7	0.5	1.6	0.8	0.4	0.5	0.7	0.7	1.2	0.7	1.1	1.6	0.6	0.5	1.2	2.5	2.8	4.0	1.1	1.2	4.0	
3-Jul	1.2	1.5	0.7	1.7	1.4	0.9	0.8	0.6	1.8	0.9	0.9	0.6	0.4	0.7	0.5	1.0	1.9	2.4	2.1	2.0	1.7	0.6	1.5	0.8	1.2	2.4	
4-Jul	1.9	2.0	1.6	1.6	2.0	1.2	1.7	1.4	0.8	1.5	2.3	1.4	1.6	2.1	1.3	2.2	1.5	1.4	0.1	0.2	0.1	0.9	1.3	2.0	1.4	2.3	
5-Jul	1.2	0.6	0.2	0.2	0.3	0.8	-0.2	1.0	-0.1	0.5	-0.4	-0.1	-1.0	0.4	-0.8	0.2	-0.5	-0.5	-0.7	-0.6	-0.5	-0.5	-0.2	-0.2	-0.1	1.2	
6-Jul	-0.4	0.8	0.5	1.1	1.5	1.9	0.7	0.2	0.4	0.3	-1.5	-0.4	-0.1	0.0	0.8	-0.1	0.4	-0.5	0.6	-0.3	-0.1	0.3	0.3	0.5	0.3	1.9	
7-Jul	0.2	0.1	0.1	0.2	0.4	0.2	0.5	0.4	0.7	1.6	1.0	0.2	-0.1	0.6	0.3	0.8	-0.5	-0.1	0.2	0.1	0.4	1.0	0.4	-0.3	0.4	1.6	
8-Jul	0.5	0.2	0.1	0.2	0.3	0.5	0.5	0.4	0.3	0.4	1.2	1.1	-0.2	0.2	0.0	0.0	0.1	0.7	0.6	0.2	1.3	0.3	0.3	0.2	0.4	1.3	
9-Jul	0.6	1.3	0.6	0.3	1.1	0.7	0.8	0.0	0.8	0.0	0.4	-0.4	-0.2	0.6	1.1	0.6	0.9	1.4	1.3	1.9	2.2	1.6	2.4	1.5	0.9	2.4	
10-Jul	0.8	0.1	0.4	0.9	0.8	0.5	0.4	0.2	0.3	0.6	0.6	0.7	-0.3	0.3	0.3	-0.2	0.9	1.4	0.2	1.2	2.6	0.7	0.1	0.0	0.6	2.6	
11-Jul	-0.1	0.0	0.3	0.0	0.0	-0.1	-0.1	-0.3	-0.3	0.4	0.3	0.4	-0.4	-0.8	1.3	-0.1	0.5	1.6	1.3	3.4	0.4	0.3	0.1	0.4	0.4	3.4	
12-Jul	0.6	0.3	0.2	0.3	0.7	0.3	0.2	0.0	0.3	0.2	-0.1	0.8	0.3	1.5	0.5	0.7	0.4	0.7	-0.1	0.5	0.3	0.0	-0.1	0.4	0.4	1.5	
13-Jul	0.3	0.4	0.5	0.7	0.5	1.3	0.7	0.4	0.2	0.0	-0.1	-0.2	0.5	-0.7	0.1	0.3	0.2	0.3	0.3	0.4	0.6	0.8	1.0	0.5	0.4	1.3	
14-Jul	0.1	0.3	0.5	0.1	0.0	0.3	0.0	0.0	-0.4	-0.6	-0.3	0.3	-0.4	-0.6	-0.4	-0.3	-0.1	-0.1	0.5	0.2	0.1	0.2	0.2	0.1	0.0	0.5	
15-Jul	0.1	0.1	0.5	0.4	0.3	0.5	0.4	0.6	2.6	1.5	2.7	1.7	1.4	2.5	0.5	2.3	3.1	1.7	1.0	0.4	0.4	0.3	0.8	0.9	1.1	3.1	
16-Jul	1.1	-1.0	0.6	-0.3	0.5	1.2	1.8	0.0	-0.1	1.4	0.8	1.1	1.5	1.9	1.8	1.8	1.0	1.6	0.9	1.1	1.1	1.6	1.3	0.7	1.0	1.9	
17-Jul	0.4	0.0	0.5	0.4	0.3	-0.6	-0.6	-0.7	-0.7	-0.4	-0.8	-0.1	-0.2	0.4	-0.5	-0.4	0.4	-0.2	-0.1	0.0	0.1	-0.3	-0.3	-0.6	-0.2	0.5	
18-Jul	-0.2	0.1	0.2	0.1	0.0	-0.2	0.0	-0.5	-0.1	-0.1	1.0	0.9	0.0	0.3	0.6	-0.3	-0.7	0.1	0.9	0.3	0.6	0.7	0.8	1.1	0.2	1.1	
19-Jul	2.1	1.6	1.8	2.0	1.8	2.8	2.0	1.6	0.9	0.7	0.1	0.0	1.0	-0.5	-0.1	0.6	0.2	0.6	-0.6	0.5	0.5	0.8	0.4	0.4	0.9	2.8	
20-Jul	0.2	0.3	0.4	0.9	0.7	0.3	0.3	0.5	0.1	0.5	0.1	0.1	-0.2	0.2	-0.3	0.9	1.4	1.2	1.1	0.6	1.2	1.4	1.6	1.9	0.6	1.9	
21-Jul	0.7	1.0	0.7	0.5	1.5	0.4	0.4	0.0	0.0	-0.3	-0.6	-0.2	0.3	2.9	1.4	1.3	0.9	-0.2	-0.1	-0.1	-0.2	0.6	1.9	1.3	0.6	2.9	
22-Jul	-0.8	0.4	0.7	0.5	0.7	0.9	0.5	0.5	0.6	0.9	0.9	0.6	1.5	0.2	0.8	0.5	0.7	0.4	0.9	1.3	1.1	2.5	2.7	1.8	0.9	2.7	
23-Jul	1.6	1.5	1.8	1.7	1.1	1.6	1.0	0.4	0.4	-0.3	-0.2	0.7	0.6	-0.1	0.7	0.4	0.6	0.4	0.8	0.5	0.4	0.1	0.5	0.3	0.7	1.8	
24-Jul	0.1	0.5	0.4	0.5	0.3	0.4	0.4	0.2	0.2	-0.3	0.7	-0.3	0.2	0.5	0.8	0.3	-0.2	-0.2	0.0	-0.7	-0.2	-0.1	-0.3	-0.3	0.1	0.8	
25-Jul	-0.4	-0.2	0.0	0.1	0.2	0.3	0.6	0.6	0.1	1.2	0.6	1.2	-0.2	0.5	-0.5	0.1	0.4	0.2	1.6	1.3	1.9	3.9	0.7	0.7	0.6	3.9	
26-Jul	0.6	0.8	0.7	0.2	1.4	0.9	1.0	0.6	0.6	0.2	0.2	0.1	-0.1	-0.5	0.4	0.9	1.1	1.2	1.6	1.6	2.4	3.2	3.9	4.4	1.1	4.4	
27-Jul	3.8	0.1	0.1	0.3	0.7	0.7	0.9	0.5	0.4	0.5	1.0	1.1	1.4	-0.4	-0.1	-0.1	-0.6	-0.1	0.3	-0.1	0.0	-0.6	-0.3	-0.1	0.4	3.8	
28-Jul	1.1	1.1	0.8	1.0	2.1	0.9	1.2	1.9	0.7	0.8	1.6	1.6	0.2	1.2	0.8	0.5	0.5	1.2	0.4	1.0	1.1	1.5	1.5	0.9	1.1	2.1	
29-Jul	0.7	0.2	-0.3	-0.3	-0.5	0.3	0.2	0.3	0.5	0.3	-0.6	-0.4	-0.8	0.0	1.0	0.3	0.2	0.1	-0.1	0.5	1.0	0.2	0.0	0.2	0.1	1.0	
30-Jul	0.6	0.5	1.0	1.1	1.1	0.3	0.7	1.4	-0.2	0.5	0.6	1.2	1.0	0.8	0.7	1.2	-0.1	0.6	1.7	1.3	0.9	0.9	0.4	0.5	0.8	1.7	
31-Jul	0.7	0.0	0.1	0.5	0.4	0.2	1.5	0.7	1.0	0.0	0.0	-0.3	-0.4	-0.9	-0.4	1.1	0.4	-0.1	-0.1	0.3	-0.1	0.0	-0.1	-0.3	0.2	1.5	
		0.7	0.5	0.5	0.6	0.7	0.7	0.6	0.5	0.4	0.5	0.5	0.5	0.3	0.5	0.5	0.6	0.5	0.6	0.6	0.6	0.8	0.9	0.9	0.7	Diurnal Average	
		3.8	2.0	1.8	2.0	2.1	2.8	2.0	1.9	2.6	1.6	2.7	1.7	1.6	2.9	1.8	2.3	3.1	2.4	2.1	3.4	2.6	3.9	4.0	4.4	Diurnal Maximum	



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 1 24-hr: 0 Maximum Value: 10.8 km/h on Jul 10 20:00 Minimum Value: 0.2 km/h on Jul 7 02:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.7 Q ₃ = 2.6 P ₉₀ = 3.2 P ₉₉ = 4.2																								Hours in Service: 744 Hours of Data: 744 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-Jul	0.6	0.5	0.6	0.7	0.5	1.3	1.9	0.9	1.1	1.0	1.9	1.4	2.2	2.7	1.8	1.4	1.0	0.9	0.7	1.4	2.1	1.4	2.1	1.6	2.7
2-Jul	1.7	1.8	1.5	1.0	1.5	1.7	2.0	2.5	1.9	1.9	2.0	2.5	2.5	2.9	2.2	2.5	2.8	1.6	1.6	1.3	0.9	0.9	2.4	1.6	2.9
3-Jul	1.5	2.0	1.3	1.9	1.9	1.5	0.9	1.1	1.2	2.0	2.5	2.9	2.6	3.4	3.2	3.0	3.2	2.6	2.4	2.9	2.1	1.7	3.2	2.6	3.4
4-Jul	2.0	1.9	1.5	2.6	3.0	2.9	3.1	3.0	2.7	3.4	4.3	3.8	3.6	3.7	3.3	3.9	3.4	3.3	3.2	2.7	1.8	0.8	0.9	1.7	4.3
5-Jul	2.0	1.8	2.0	1.3	1.8	2.9	2.3	4.1	4.3	3.8	3.1	3.8	3.0	3.5	3.4	3.9	2.0	2.2	2.4	2.2	1.9	0.8	0.4	0.5	4.3
6-Jul	1.0	1.3	1.2	1.2	1.3	0.9	2.0	2.7	2.0	2.6	3.2	3.0	2.9	2.5	2.8	2.2	3.1	2.7	2.2	1.0	0.3	0.4	0.3	0.5	3.2
7-Jul	0.3	0.2	0.2	0.3	0.4	0.3	0.4	0.5	1.2	2.2	3.1	3.5	3.3	3.5	3.2	2.6	2.4	1.7	1.4	0.7	0.7	0.8	1.3	1.8	3.5
8-Jul	1.3	0.7	0.3	0.4	0.4	0.4	0.9	0.6	0.8	0.8	1.7	2.1	1.0	0.8	0.7	1.0	1.3	1.6	1.4	0.5	0.4	0.5	0.2	0.2	2.1
9-Jul	0.8	1.0	1.3	0.8	1.2	0.8	1.2	1.5	1.2	1.6	1.5	2.5	2.7	3.3	2.9	2.7	2.4	2.1	1.9	1.9	1.0	0.9	1.8	1.3	3.3
10-Jul	1.0	0.7	0.8	1.7	1.5	1.0	0.7	1.4	1.7	1.8	1.7	1.2	2.0	2.3	1.7	2.2	2.1	2.0	1.8	10.8	2.9	3.1	1.6	1.8	10.8
11-Jul	0.6	0.7	0.6	0.5	0.3	0.5	0.7	0.7	0.9	1.9	2.6	3.1	3.0	3.0	2.9	2.1	2.1	1.9	1.8	1.5	1.1	1.0	0.6	0.9	3.1
12-Jul	1.0	0.6	0.4	0.6	0.7	0.9	0.4	0.9	1.0	1.0	1.5	1.6	1.6	2.1	1.5	1.5	1.5	1.7	1.3	1.4	1.1	0.7	0.6	0.7	2.1
13-Jul	0.8	1.4	0.8	0.8	0.6	0.8	1.3	1.0	0.9	0.7	1.4	2.9	3.1	2.5	2.7	2.3	1.3	2.0	2.0	2.0	1.8	0.9	0.6	0.9	3.1
14-Jul	1.3	1.9	2.0	2.3	1.6	1.9	2.2	2.2	2.2	2.4	2.6	3.1	2.9	2.2	2.3	1.8	2.1	2.2	2.6	2.0	0.6	0.4	0.3	0.4	3.1
15-Jul	0.4	0.4	0.3	0.5	0.4	0.5	0.9	1.6	1.5	1.6	2.2	2.2	3.1	3.3	3.2	3.1	2.8	2.2	1.8	1.7	1.5	0.8	0.8	0.8	3.3
16-Jul	1.6	4.4	2.2	1.2	0.8	1.4	0.9	2.5	3.1	2.6	2.3	2.9	2.8	3.2	2.9	3.1	3.5	3.4	2.8	2.4	2.4	2.3	2.4	2.3	4.4
17-Jul	3.3	3.1	2.5	2.6	2.4	2.6	1.8	2.0	2.8	2.9	3.6	3.8	3.1	3.0	2.5	2.5	2.1	1.6	0.9	1.2	0.7	0.6	0.7	0.9	3.8
18-Jul	0.6	0.8	0.9	0.3	0.3	0.6	1.3	1.6	2.0	2.8	3.5	2.6	3.6	3.4	3.4	2.9	3.3	2.8	2.8	2.3	1.1	0.7	0.3	0.4	3.6
19-Jul	0.5	1.4	2.0	2.2	2.0	2.3	2.8	2.5	2.2	2.7	3.0	3.3	3.5	2.9	4.4	3.6	3.5	3.1	2.5	1.8	0.8	0.6	0.4	0.3	4.4
20-Jul	0.6	0.6	0.5	0.7	1.0	0.6	0.4	1.0	0.8	0.9	1.1	1.7	1.8	2.3	2.9	2.7	2.7	2.0	1.5	1.8	0.8	1.0	1.5	1.5	2.9
21-Jul	1.5	1.2	1.6	1.4	1.0	1.2	0.6	0.6	0.4	0.8	1.3	1.6	2.8	3.4	2.6	2.5	2.2	1.1	1.1	0.9	0.7	1.0	1.0	1.1	3.4
22-Jul	1.5	1.2	1.0	0.8	0.8	1.1	1.2	1.3	1.6	2.7	3.1	2.8	3.5	3.0	2.7	2.9	2.3	1.9	1.5	1.3	0.8	0.6	1.0	0.7	3.5
23-Jul	1.2	1.8	1.3	1.7	1.5	1.6	2.0	1.9	2.3	2.5	2.9	3.3	3.5	3.4	3.4	3.3	3.0	2.9	2.9	2.8	2.3	2.2	1.8	2.4	3.5
24-Jul	2.2	2.7	3.0	2.8	3.1	2.9	2.6	2.7	2.7	2.7	4.0	4.1	4.1	3.7	4.4	3.8	3.8	3.1	3.2	2.2	1.3	0.7	0.5	0.5	4.4
25-Jul	0.6	0.9	0.8	0.6	0.5	0.7	1.1	1.2	1.2	1.7	2.5	3.4	3.1	3.4	3.0	2.8	3.0	2.7	2.5	1.2	0.8	0.6	1.5	1.6	3.4
26-Jul	1.0	0.9	0.7	0.7	0.7	0.9	0.9	1.1	1.1	1.4	1.8	2.6	2.9	2.8	3.2	2.8	3.0	2.8	2.4	1.6	1.1	1.0	1.5	1.4	3.2
27-Jul	2.2	1.0	1.0	1.0	1.0	1.5	1.3	1.7	1.5	1.7	2.2	2.2	3.0	2.7	2.2	1.7	1.9	1.4	0.7	0.9	1.3	3.5	1.5	1.1	3.5
28-Jul	1.3	1.4	1.8	1.5	1.9	2.4	2.1	2.4	2.1	3.0	3.5	4.0	3.3	3.5	3.8	3.1	3.8	2.8	3.6	3.2	2.5	1.5	1.0	1.0	4.0
29-Jul	0.9	0.8	0.8	1.0	1.3	0.9	1.2	1.2	1.2	1.7	2.5	2.9	2.8	3.4	2.6	2.2	1.7	1.7	1.0	1.4	1.1	1.7	1.7	0.9	3.4
30-Jul	1.2	0.9	1.7	1.9	2.2	1.3	1.2	2.3	1.7	1.3	1.1	1.4	1.5	1.7	2.5	2.8	2.2	2.6	2.1	1.0	0.4	0.8	1.0	1.2	2.8
31-Jul	1.9	2.1	1.4	1.6	1.5	1.5	1.8	1.9	2.8	2.8	3.6	3.7	3.6	3.2	4.2	2.3	2.1	2.8	1.9	1.8	0.7	0.3	0.4	0.3	4.2
	3.3	4.4	3.0	2.8	3.1	2.9	3.1	4.1	4.3	3.8	4.3	4.1	4.1	3.7	4.4	3.9	3.8	3.4	3.6	10.8	2.9	3.5	3.2	2.6	
	Diurnal Maximum																								



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 JULY 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	708	34	36	99.73	16	0	2	0
H2S (ppb) Average	708	34	36	99.73	3	0	1	0
THC (ppm) Average	708	34	36	99.73	3.5	-	2.7	-
Temperature (C) Average	744	0	0	100	31.4	-	23.9	-
Relative Humidity (%) Average	744	0	0	100	99	-	81	-
Wind Speed 10 m (km/h) Average	744	0	0	100	28	-	22	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS 4)
 JULY 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	708	0.5	1	-	0	0	0	0	0	1	16
H2S (ppb) Average	708	0.3	0	-	0	0	0	0	0	1	3
THC (ppm) Average	708	2.32	0.2	-	2.1	2.2	2.2	2.3	2.4	2.5	3.5
Temperature 2 m (C) Average	744	19.47	4.6	-	8.5	13.7	15.9	19.2	22.7	25.8	31.4
Relative Humidity (%) Average	744	62.8	18	-	26	38	50	62	76	88	99
Wind Speed 10 m (km/h) Average	744	10	6	-	0	4	6	9	14	18	28
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	25 Jul 2017 13:00	25 Jul 2017 14:00	2	Maintenance - verify daily QA response
H2S	17 Jul 2017 10:00	17 Jul 2017 10:00	1	Maintenance - sample manifold cleaning
H2S	25 Jul 2017 14:00	25 Jul 2017 14:00	1	Maintenance - verify daily QA response
THC	25 Jul 2017 13:00	25 Jul 2017 14:00	1	Maintenance - verify daily QA response



Wood Buffalo Environmental Association
Summary of Hour Averages

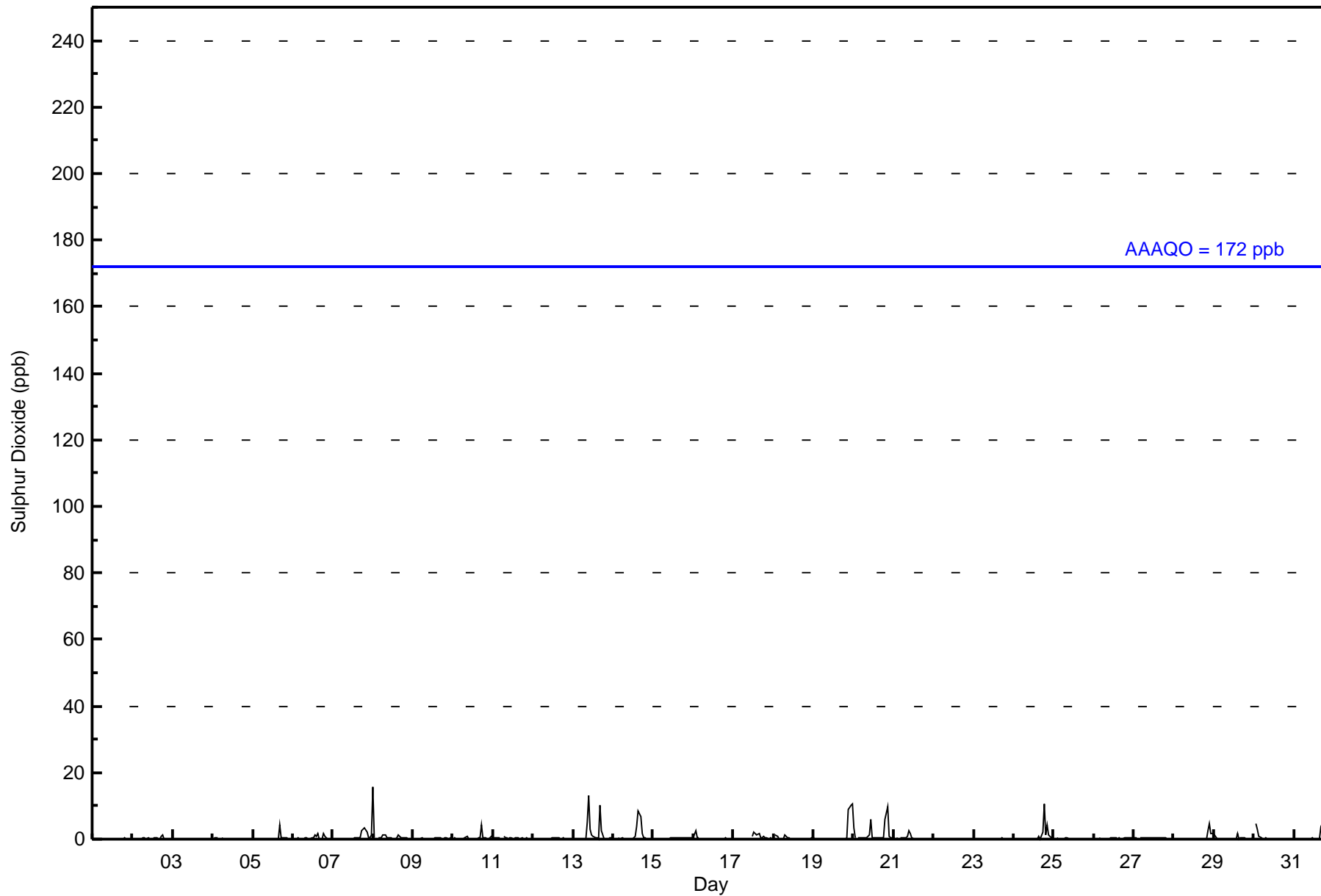
Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																																		
Maximum Value: 16 ppb on Jul 8 01:00														Maximum Daily Average: 1.7 ppb on Jul 13																																		
Minimum Value: 0 ppb on Jul 1 10:00														Minimum Daily Average: 0.1 ppb on Jul 1																																		
Maximum Diurnal Average: 1.0 ppb at hour 17														Minimum Diurnal Average: 0.1 ppb at hour 5																																		
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																																		
														Hours of Data: 708																																		
														Hours of Missing Data: 36																																		
														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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.2	1																						
3-Jul	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-Jul	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																						
5-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0.3	4																						
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	2	1	0	0	0	0	0.4	2																						
7-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	2	0	0	1	0.6	3																						
8-Jul	16	1	Z	0	0	0	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1.1	16																						
9-Jul	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																						
10-Jul	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	4	0	1	0	0	1	1	0.5	4																						
11-Jul	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
12-Jul	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																						
13-Jul	0	Z	0	0	0	0	0	0	5	13	3	1	1	1	0	0	10	2	0	0	0	0	0	0	1.7	13																						
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	4	8	7	2	0	0	0	0	0	0	1.1	8																						
15-Jul	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																						
16-Jul	0	3	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																						
17-Jul	0	0	0	0	0	Z	0	0	C	C	C	1	2	2	1	2	0	0	1	0	0	0	0	0	0.5	2																						
18-Jul	Z	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	10	11	1.4	11																						
20-Jul	3	1	Z	0	0	0	0	0	0	1	6	1	0	0	0	0	0	0	0	0	6	10	1	0	1.4	10																						
21-Jul	0	0	0	Z	0	0	0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3																						
22-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1																						
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	11	1	4	1	0	0	0	1.0	11																						
25-Jul	0	Z	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0.2	0																						
26-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.2	1																						
27-Jul	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	2	2	0.6	4																						
29-Jul	2	1	0	0	0	Z	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0.3	2																						
30-Jul	Z	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5																						
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0.4	3																						
																								0.9	0.5	0.3	0.2	0.1	0.2	0.2	0.2	0.4	0.7	0.5	0.3	0.3	0.3	0.4	0.6	1.0	0.7	0.7	0.6	0.8	0.6	0.6	0.6	Diurnal Average
																								16	5	3	1	0	0	1	1	5	13	6	1	2	2	4	8	10	4	11	6	10	9	10	11	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
Buffalo Viewpoint - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	704	99.44	99.44
11 - 20	4	0.56	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - July 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	43	18	7	8	11	42	85	60	57	44	88	86	49	41	26	704
11 - 20	1	1	0	1	0	0	0	0	0	1	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	40	44	18	8	8	11	42	85	60	58	44	88	86	49	41	26	708

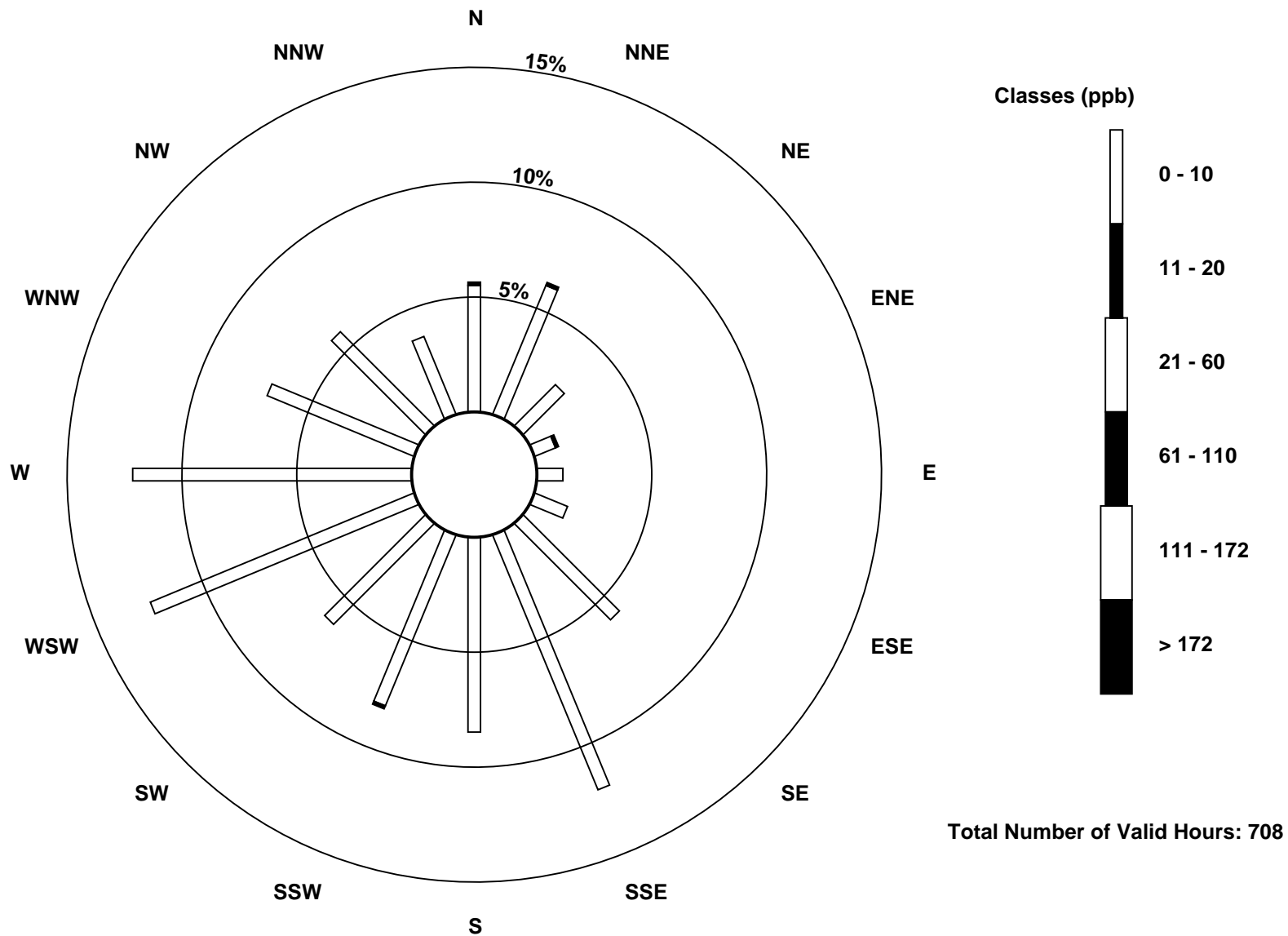
Total Number of Valid Hours: 708

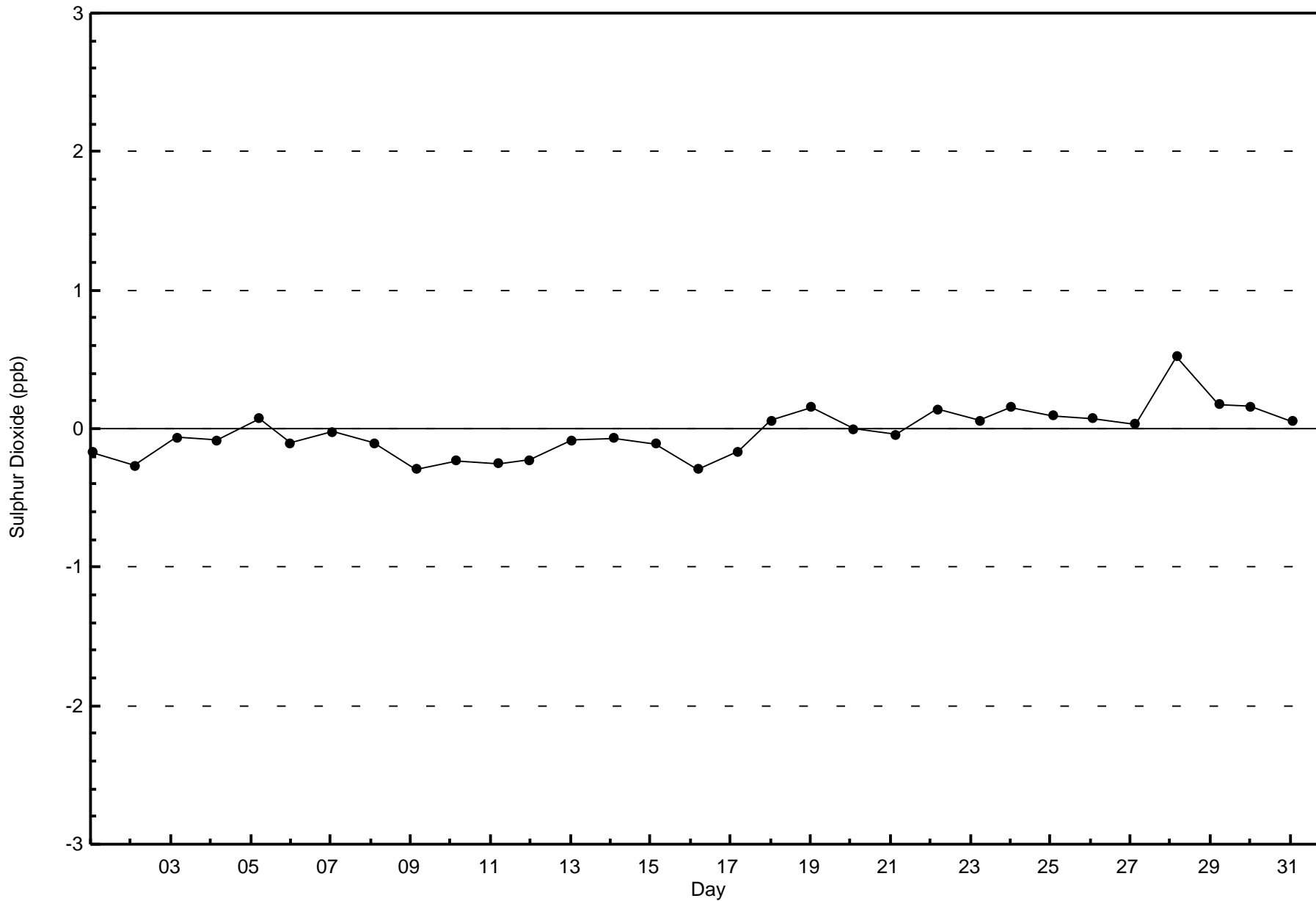
Total Number of Hours: 744

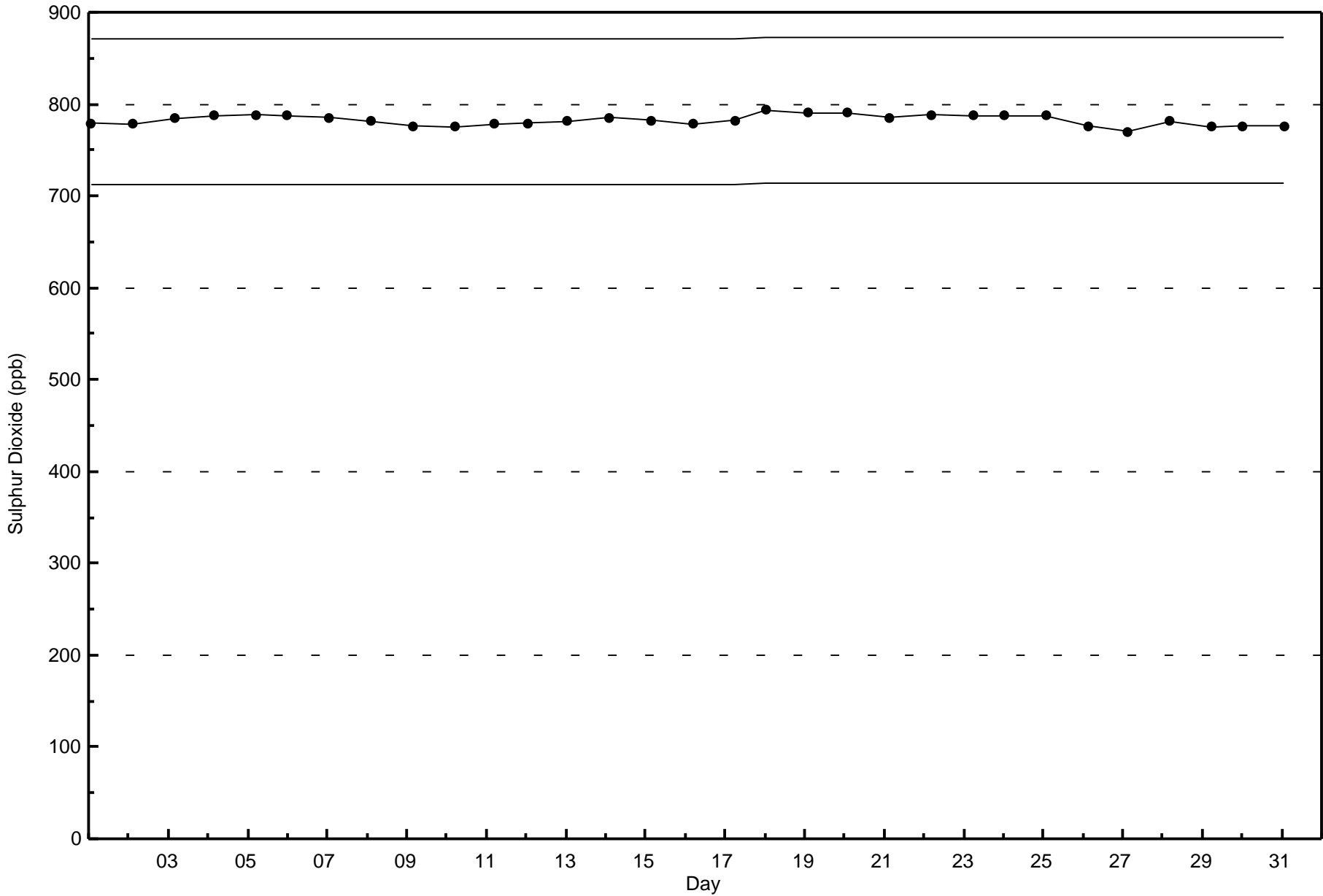


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3 ppb on Jul 20 22:00	Maximum Daily Average: 1.0 ppb on Jul 20		Hours of Data:	708
Minimum Value: 0 ppb on Jul 2 07:00	Minimum Daily Average: 0.1 ppb on Jul 2		Hours of Missing Data:	36
Maximum Diurnal Average: 0.7 ppb at hour 6	Minimum Diurnal Average: 0.2 ppb at hour 16		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 = 2		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-Jul	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1	
2-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	1	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
8-Jul	2	1	1	Z	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2	
9-Jul	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
10-Jul	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.3	1	
11-Jul	0	0	0	1	1	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
12-Jul	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Jul	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
14-Jul	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	
15-Jul	0	1	1	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
16-Jul	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	
17-Jul	0	0	0	0	0	0	Z	0	0	M	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	0	
18-Jul	0	Z	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
19-Jul	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-Jul	1	0	1	Z	2	2	1	1	1	1	1	3	1	1	0	0	0	0	0	0	1	2	3	1	0	1.0	3
21-Jul	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
22-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0.5	2	
25-Jul	0	0	Z	0	0	1	2	1	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0.3	2	
26-Jul	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-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
29-Jul	1	1	1	1	1	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
30-Jul	0	Z	1	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
31-Jul	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

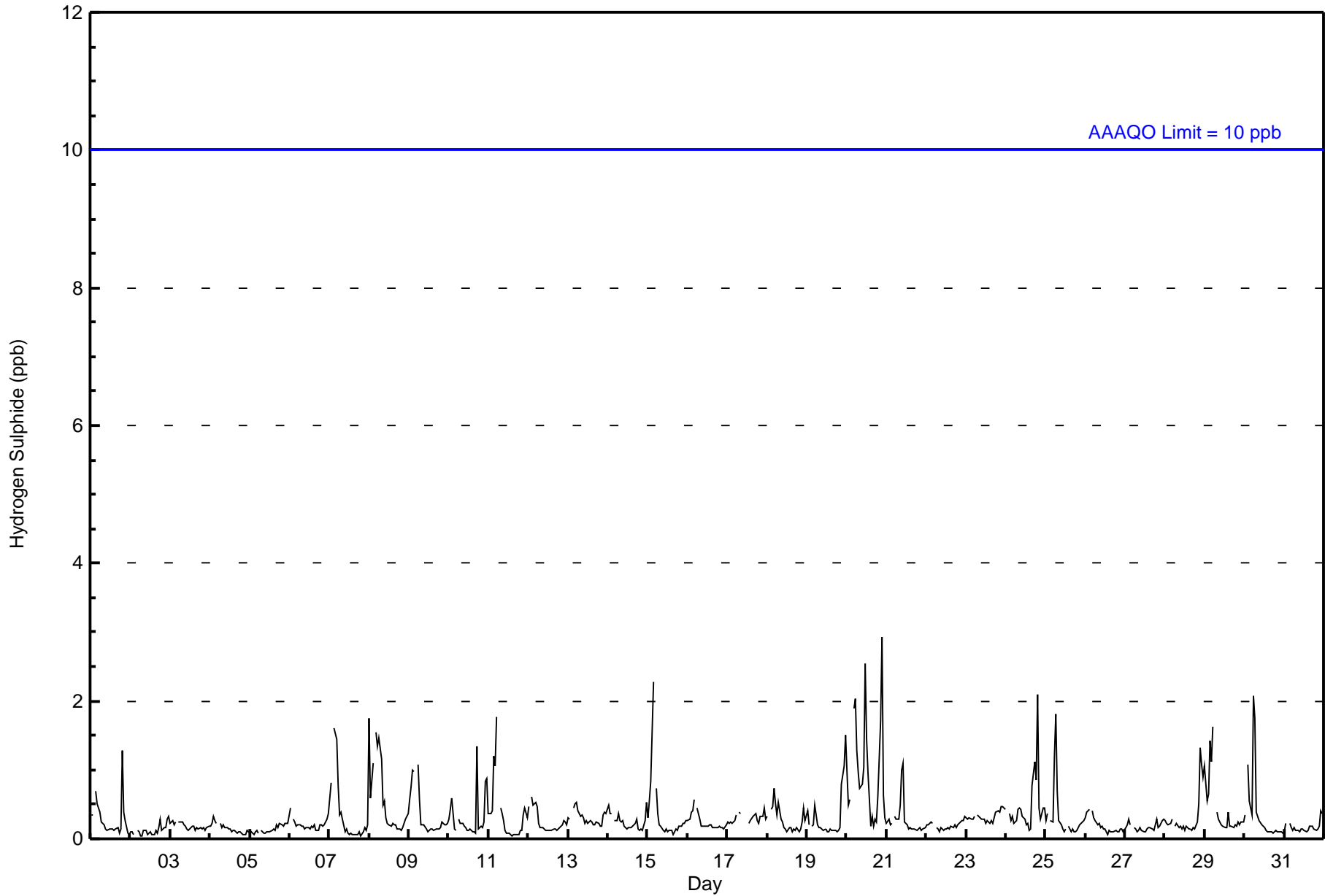
0.4	0.3	0.4	0.5	0.5	0.7	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	Diurnal Average
2	1	1	2	2	2	2	2	1	1	1	1	3	1	1	0	0	1	1	1	2	2	3	1	1	Diurnal Maximum

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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	99.72	99.72
3 - 4	2	0.28	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - July 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	37	45	19	7	9	11	40	82	59	59	48	88	84	49	42	27	706
3 - 4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
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	37	45	19	7	9	11	42	82	59	59	48	88	84	49	42	27	708

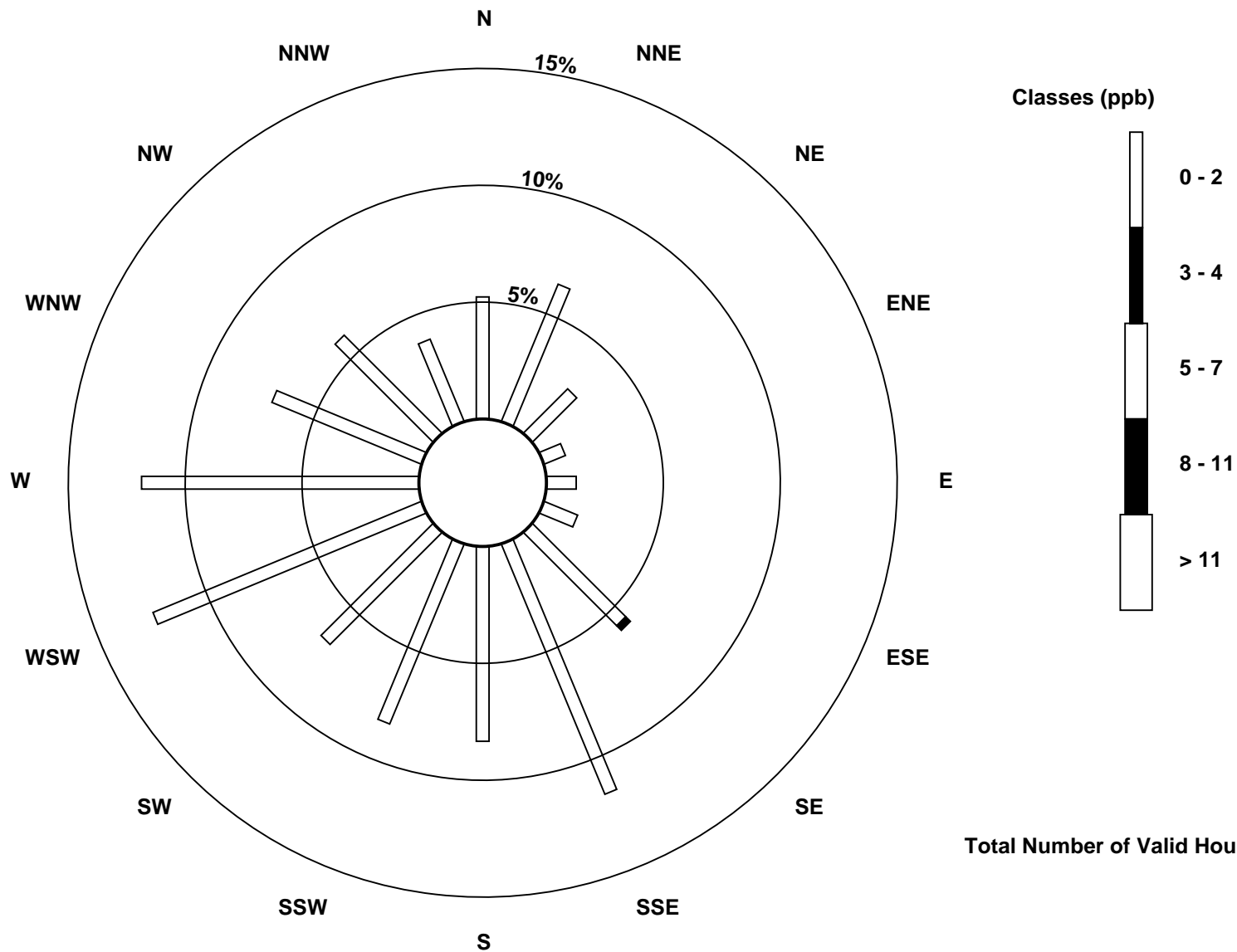
Total Number of Valid Hours: 708

Total Number of Hours: 744

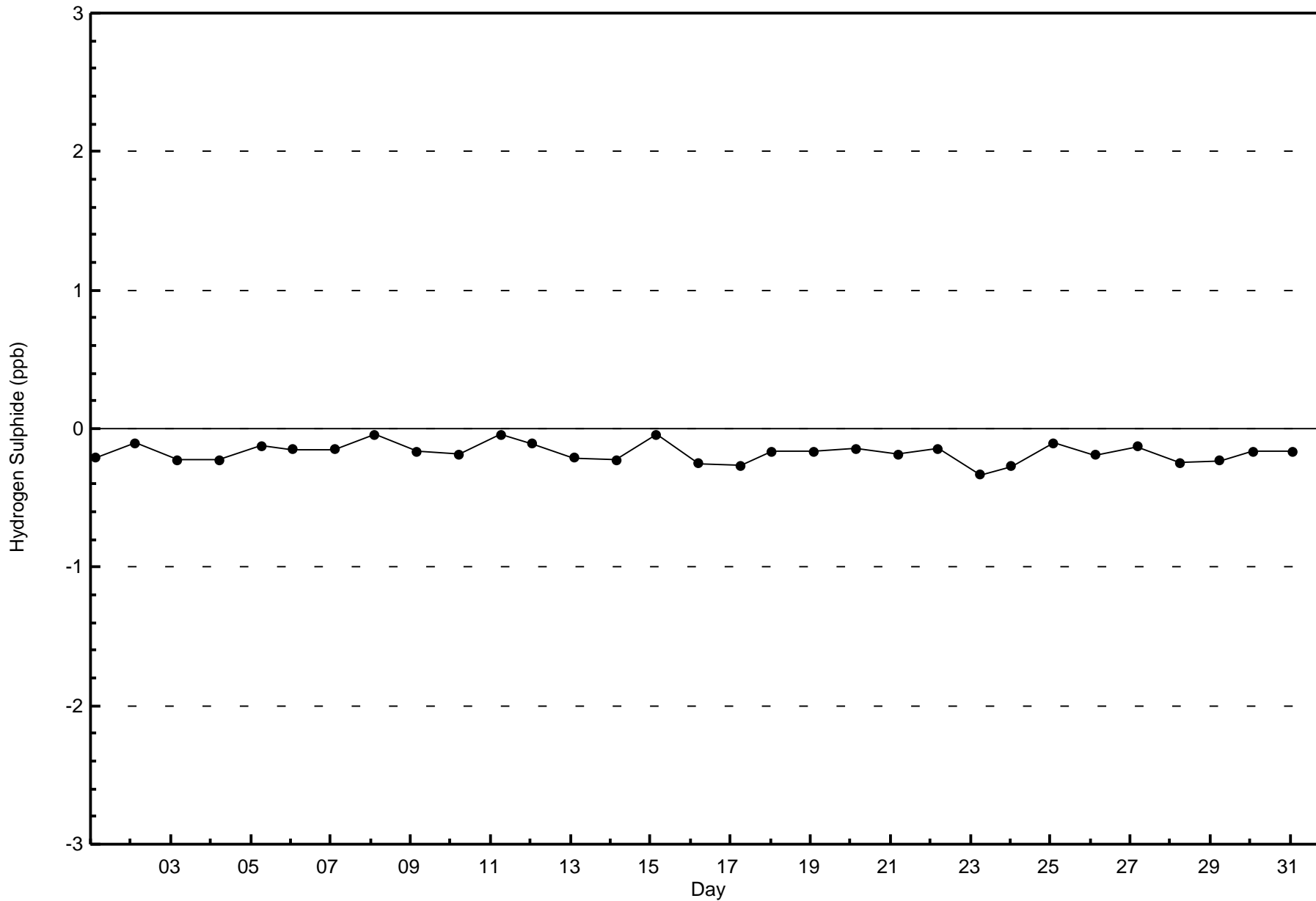


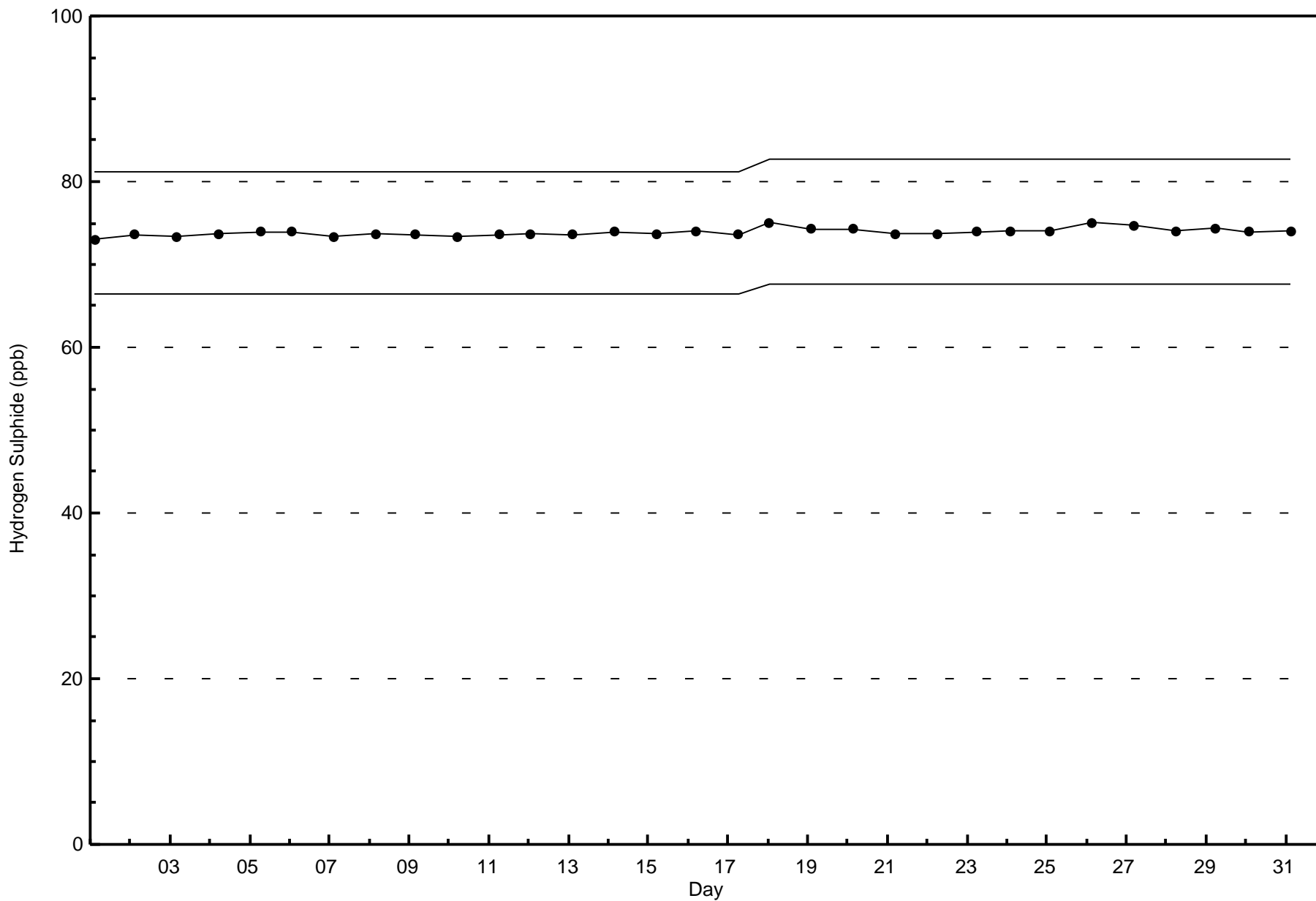
Wood Buffalo Environmental Association
Wind Rose Jul 2017

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



Total Number of Valid Hours: 708







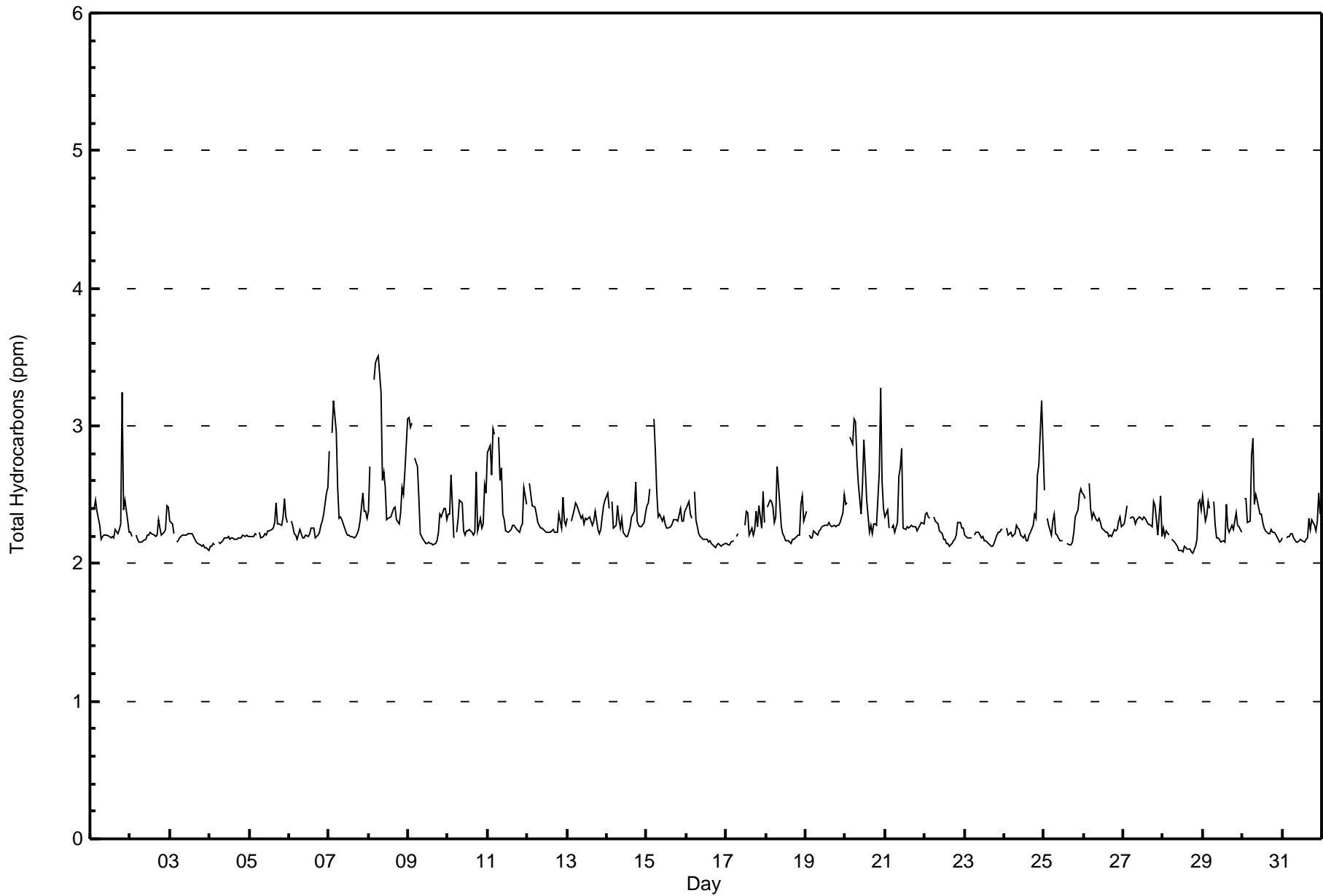
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Buffalo Viewpoint - July 2017

Maximum Value: 3.5 ppm on Jul 8 07:00																			Maximum Daily Average: 2.7 ppm on Jul 8						Hours in Service: 744		
Minimum Value: 2.1 ppm on Jul 28 19:00																			Minimum Daily Average: 2.2 ppm on Jul 4						Hours of Data: 708		
Maximum Diurnal Average: 2.4 ppm at hour 5																			Minimum Diurnal Average: 2.2 ppm at hour 16						Hours of Missing Data: 36		
Monthly Average: 2.32 ppm																			Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.5 P ₉₉ = 3.2						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-Jul	2.5	Z	2.4	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	3.2	2.4	2.5	2.3	2.2	2.3	3.2	
2-Jul	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	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.2	2.4	
3-Jul	2.3	2.3	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	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	
4-Jul	2.1	2.1	2.1	2.1	Z	2.2	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	2.2	2.2	2.2	
5-Jul	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.3	2.5	
6-Jul	Z	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.6	2.3	2.6	
7-Jul	2.8	Z	3.0	3.2	3.0	2.5	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.4	2.3	2.4	3.2	
8-Jul	2.4	2.7	Z	3.3	3.5	3.5	3.5	3.2	2.6	2.7	2.5	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.4	2.6	2.5	2.7	3.0	2.7	3.5	
9-Jul	3.1	3.0	3.0	Z	2.8	2.7	2.5	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.3	2.4	2.4	2.3	2.4	3.1	
10-Jul	2.4	2.4	2.6	2.2	Z	2.2	2.3	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7	2.2	2.3	2.3	2.6	2.5	2.3	2.7	
11-Jul	2.8	2.9	2.6	3.0	2.9	Z	2.9	2.6	2.7	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.6	2.4	2.5	3.0	
12-Jul	Z	2.6	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.5	2.3	2.3	2.3	2.6	
13-Jul	2.3	Z	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.3	2.4	2.5	2.3	2.5	
14-Jul	2.5	2.4	Z	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.6	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.6	
15-Jul	2.4	2.4	2.5	Z	3.0	2.8	2.5	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.4	3.0	
16-Jul	2.4	2.4	2.4	2.3	Z	2.5	2.3	2.2	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	2.2	2.5
17-Jul	2.1	2.1	2.1	2.2	2.2	Z	2.2	2.2	2.2	C	C	C	2.3	2.4	2.4	2.2	2.3	2.2	2.3	2.4	2.3	2.4	2.3	2.5	2.3	2.3	2.5
18-Jul	Z	2.4	2.5	2.5	2.4	2.3	2.3	2.7	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.3	2.3	2.7	
19-Jul	2.4	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.3	2.5	
20-Jul	2.4	2.4	Z	2.9	2.9	3.1	3.0	2.8	2.6	2.4	2.6	2.9	2.7	2.5	2.2	2.3	2.2	2.3	2.3	2.3	2.7	3.3	2.6	2.4	2.6	3.3	
21-Jul	2.3	2.4	2.3	Z	2.3	2.3	2.2	2.3	2.6	2.7	2.8	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.8	
22-Jul	2.4	2.4	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.4	
23-Jul	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
24-Jul	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.6	2.7	3.2	2.9	2.3	3.2	
25-Jul	2.5	Z	2.3	2.3	2.2	2.3	2.4	2.2	2.2	2.2	2.2	2.2	2.2	M	M	2.1	2.1	2.1	2.2	2.2	2.3	2.4	2.5	2.5	2.5	2.3	2.5
26-Jul	2.5	2.5	Z	2.6	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.6
27-Jul	2.3	2.3	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.2	2.5	2.2	2.3	2.5	
28-Jul	2.3	2.2	2.2	2.2	Z	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	2.4	2.5	2.4	2.2	2.5	
29-Jul	2.5	2.3	2.4	2.5	2.4	Z	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.2	2.3	2.3	2.3	2.4	2.3	2.3	2.2	2.3	2.5
30-Jul	Z	2.5	2.5	2.3	2.3	2.8	2.9	2.4	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.9
31-Jul	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	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.2	2.3	2.5	2.4	2.2	2.5	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	697	98.45	98.45
3.1 - 10.0	11	1.55	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - July 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	39	44	18	8	7	10	41	84	57	57	43	88	86	49	40	26	697
3.1 - 10.0	1	0	0	0	1	1	1	1	3	1	1	0	0	0	1	0	11
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	44	18	8	8	11	42	85	60	58	44	88	86	49	41	26	708

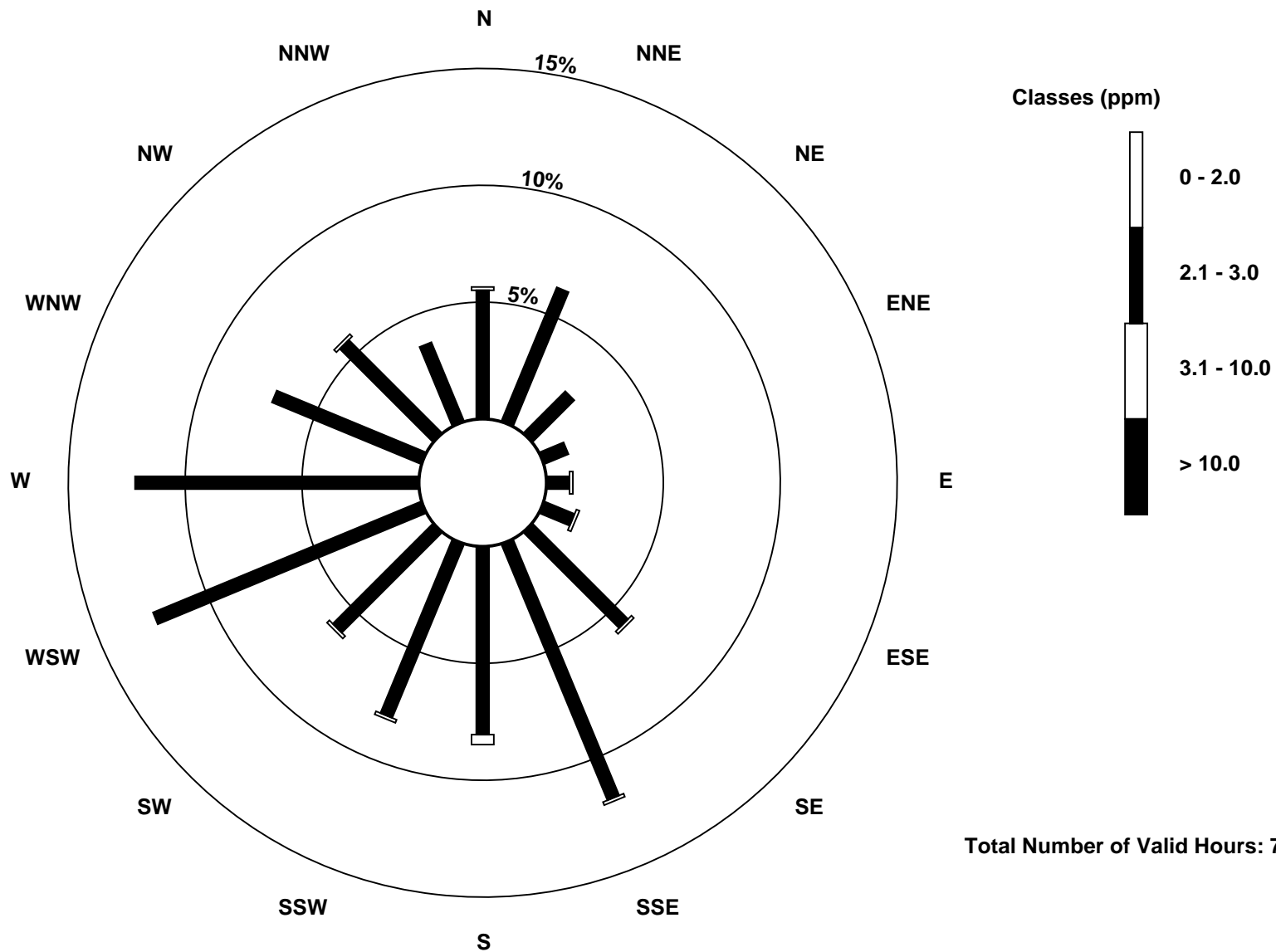
Total Number of Valid Hours: 708

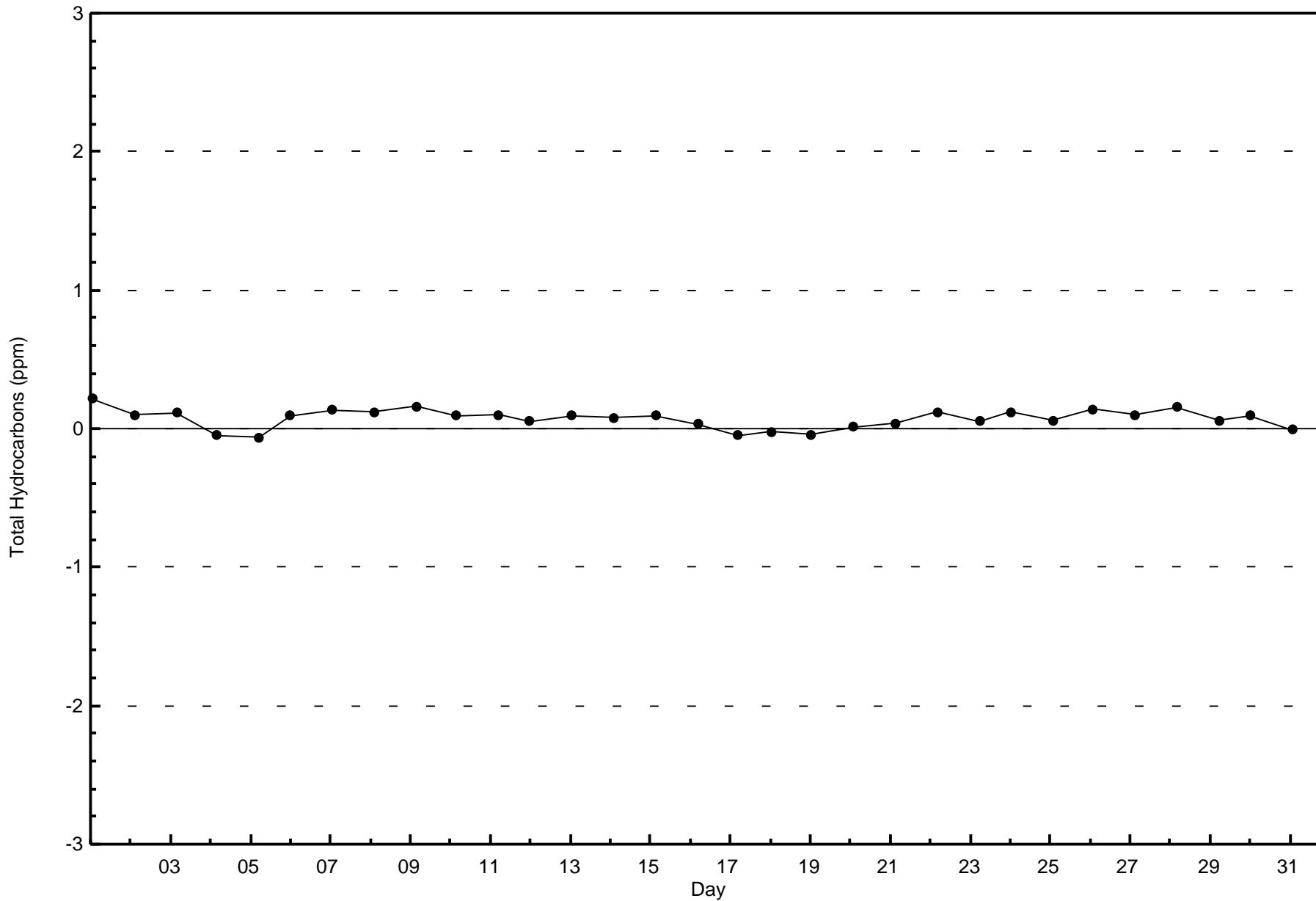
Total Number of Hours: 744

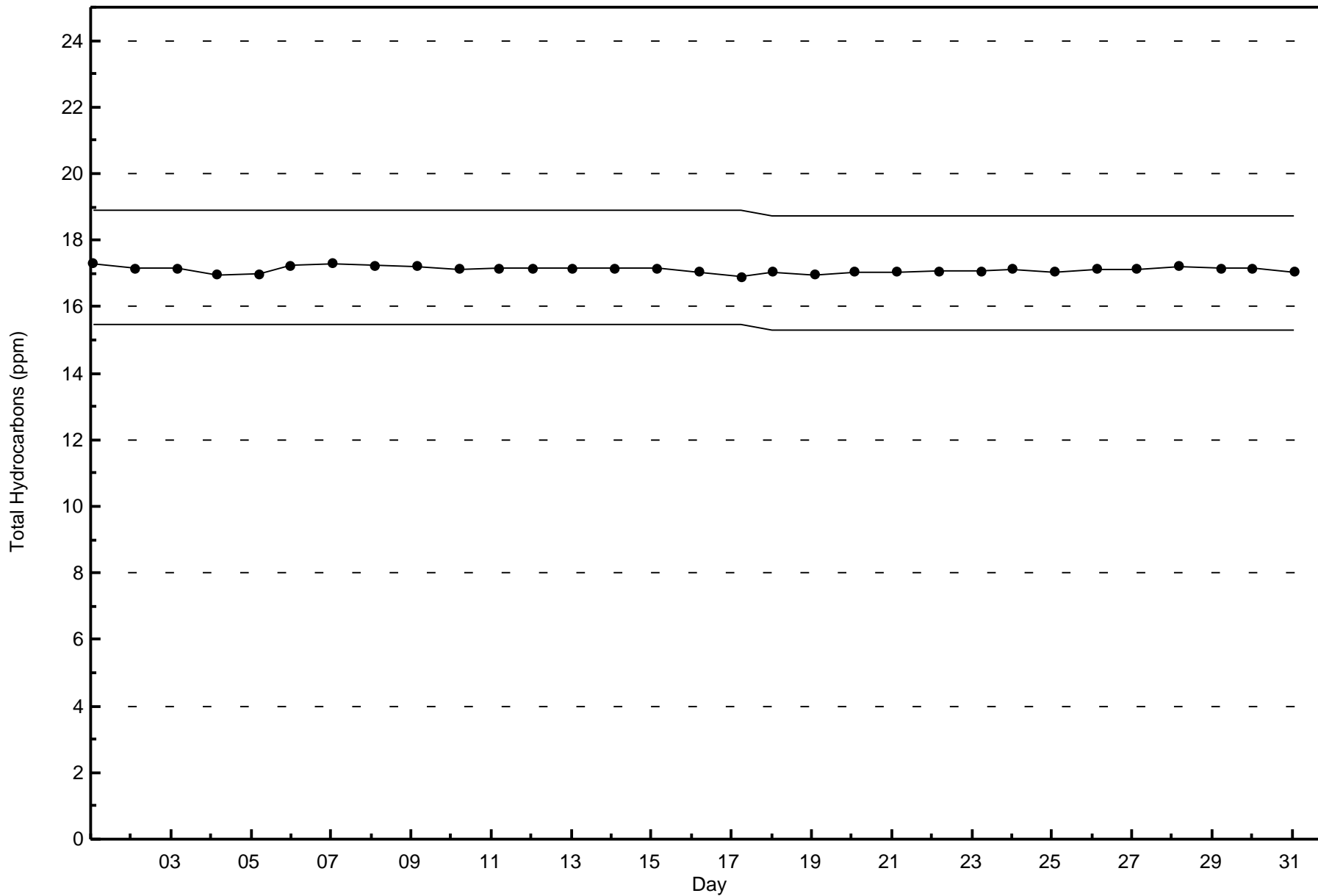


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint (AMS 4)





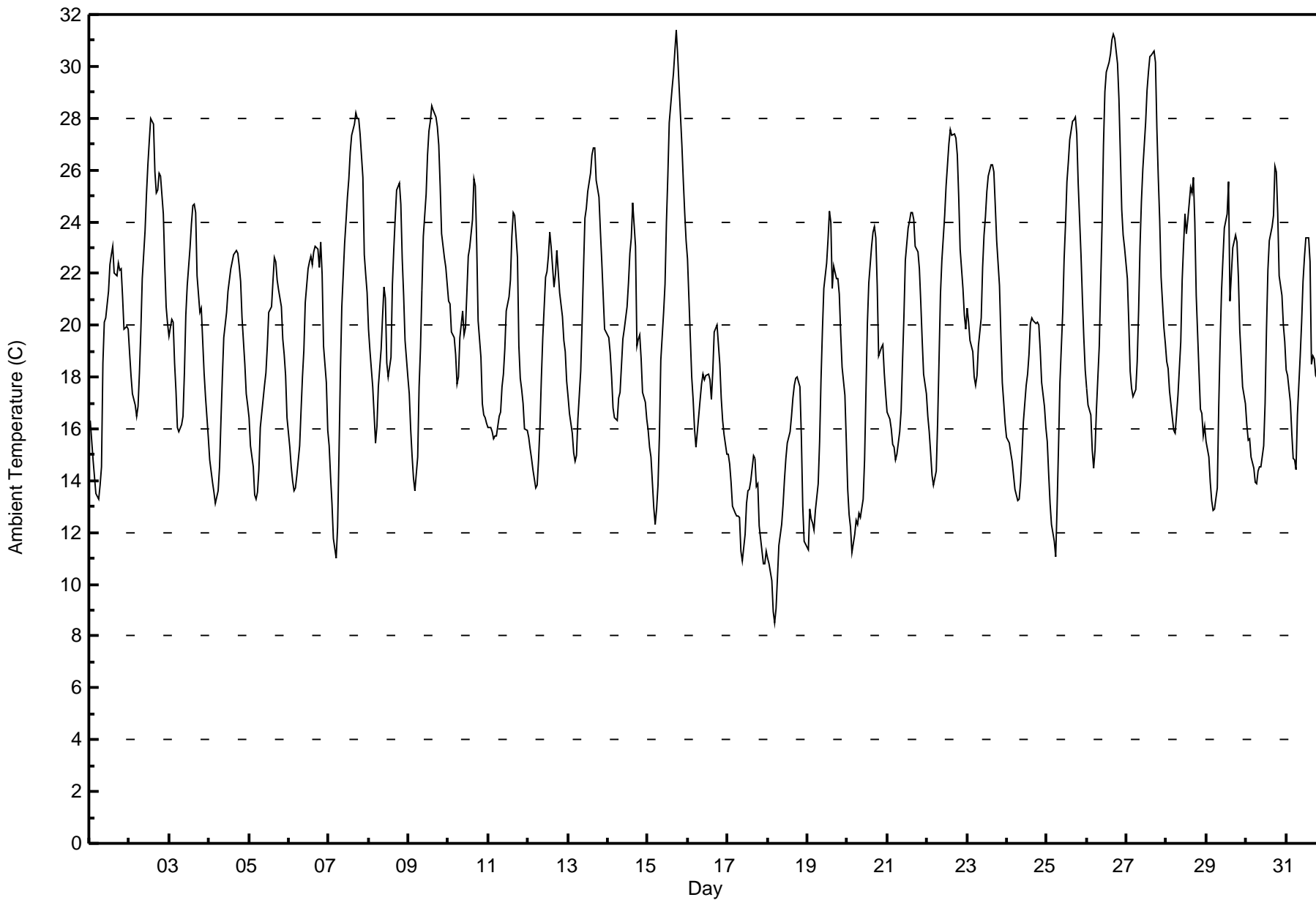




Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Value: 31.4 C on Jul 15 18:00 Maximum Daily Average: 23.9 C on Jul 26																						Hours in Service:	744			
Minimum Value: 8.5 C on Jul 18 05:00 Minimum Daily Average: 12.9 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 24.2 C at hour 17 Minimum Diurnal Average: 14.3 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: 19.47 C Percentiles: P ₁ = 10.8 P ₁₀ = 13.7 Q ₁ = 15.9 Median = 19.2 Q ₃ = 22.7 P ₉₀ = 25.8 P ₉₉ = 30.4																						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-Jul	16.3	15.6	14.8	14.2	13.5	13.3	13.8	14.6	18.5	20.1	20.3	21.3	22.4	22.7	23.0	22.0	21.9	22.4	22.1	22.2	21.1	19.9	20.0	19.8	19.0	23.0
2-Jul	18.9	18.1	17.3	16.9	16.5	16.9	18.2	19.8	21.8	23.7	25.1	26.2	27.1	28.0	27.8	26.0	25.1	25.2	25.9	25.8	24.3	22.3	20.7	20.1	22.4	28.0
3-Jul	19.6	20.2	20.1	18.5	17.4	16.1	15.9	16.2	16.5	18.1	20.4	21.5	23.0	23.9	24.6	24.7	24.4	21.9	20.5	20.7	19.4	18.2	17.3	15.7	19.8	24.7
4-Jul	14.8	14.4	13.9	13.6	13.1	13.6	14.5	16.3	18.0	19.5	20.5	21.3	21.7	22.2	22.4	22.7	22.9	22.8	22.3	21.7	20.3	18.5	17.3	16.9	18.6	22.9
5-Jul	16.4	15.4	14.5	13.5	13.3	13.6	14.5	16.1	17.1	17.7	18.2	19.2	20.5	20.7	21.7	22.6	22.4	21.7	21.4	20.7	19.5	18.9	18.1	16.4	18.1	22.6
6-Jul	15.3	14.5	14.0	13.6	13.7	14.2	15.3	16.7	18.0	19.0	20.9	22.2	22.5	22.7	22.3	22.8	23.0	22.9	22.2	23.2	22.0	19.2	17.8	15.9	18.9	23.2
7-Jul	15.4	14.2	13.1	11.8	11.0	12.2	15.0	18.3	20.7	23.1	24.0	25.0	25.7	26.7	27.4	27.8	28.2	28.0	28.0	27.4	25.7	22.7	21.9	21.2	21.4	28.2
8-Jul	19.9	19.1	17.6	16.6	15.5	16.1	17.6	19.1	20.4	21.5	21.0	18.6	18.0	18.8	21.6	23.0	24.1	25.2	25.5	24.7	22.6	21.2	19.4	18.0	20.2	25.5
9-Jul	17.3	16.0	15.0	14.1	13.6	14.9	17.6	19.2	21.4	23.4	25.1	26.6	27.5	27.9	28.5	28.3	28.1	27.7	27.0	25.4	23.6	22.6	22.3	21.6	22.3	28.5
10-Jul	21.0	20.8	19.7	19.5	18.9	17.7	18.0	19.5	20.6	19.7	19.9	21.3	22.7	23.0	24.1	25.7	25.4	23.1	20.2	18.8	17.0	16.5	16.4	16.2	20.2	25.7
11-Jul	16.1	16.1	15.9	15.6	15.7	15.8	16.5	16.7	17.6	18.1	19.1	20.5	21.1	21.7	23.4	24.4	24.3	22.6	19.2	17.9	17.5	17.0	16.0	15.9	18.5	24.4
12-Jul	15.7	15.2	14.9	14.4	13.7	13.8	14.8	16.1	18.0	19.5	21.8	22.1	22.7	23.6	23.0	21.5	22.0	22.9	22.1	21.3	20.3	19.4	19.0	17.9	19.0	23.6
13-Jul	17.3	16.6	15.8	15.1	14.8	15.0	16.4	18.2	20.1	22.2	24.1	24.5	25.2	25.9	26.6	26.9	26.9	25.6	25.0	23.6	22.4	21.2	19.9	19.7	21.2	26.9
14-Jul	19.6	19.0	18.0	16.8	16.4	16.3	17.2	17.4	18.4	19.5	19.8	20.7	21.6	22.8	23.4	24.8	23.0	19.2	19.5	19.6	18.7	17.4	17.0	16.4	19.3	24.8
15-Jul	15.9	15.3	14.9	13.0	12.3	12.9	13.8	15.7	18.6	20.5	21.6	24.0	25.8	27.8	29.1	29.7	30.6	31.4	30.4	29.2	27.0	25.6	24.4	23.3	22.2	31.4
16-Jul	22.6	19.5	18.0	17.1	16.0	15.3	15.9	17.2	17.8	18.1	17.9	18.0	18.1	17.9	17.1	18.2	19.8	20.0	19.2	18.5	17.2	16.3	15.8	15.0	17.8	22.6
17-Jul	15.0	14.6	14.0	13.0	12.8	12.6	12.6	12.6	11.3	10.9	11.9	13.1	13.6	13.7	14.0	15.0	14.9	13.8	13.9	12.3	11.8	10.8	10.8	11.3	12.9	15.0
18-Jul	11.0	10.8	10.2	8.9	8.5	9.0	10.2	11.5	12.3	13.1	14.0	14.8	15.4	15.9	16.5	17.2	17.7	18.0	18.0	17.6	15.7	13.0	11.6	11.6	13.4	18.0
19-Jul	11.3	12.9	12.5	12.4	12.1	12.9	13.9	15.5	17.9	19.8	21.4	22.4	23.3	24.4	24.0	21.4	22.3	21.8	21.8	21.2	19.7	18.4	17.3	15.5	18.2	24.4
20-Jul	13.7	12.7	12.2	11.2	11.9	12.4	12.3	12.8	12.6	13.3	14.8	17.5	20.1	21.7	23.0	23.6	23.8	23.4	21.5	18.8	19.2	19.2	18.2	17.4	17.0	23.8
21-Jul	16.7	16.4	16.0	15.4	15.3	14.8	15.0	15.9	16.7	18.6	20.4	22.5	23.7	24.0	24.4	24.4	24.1	23.1	22.8	22.2	20.9	19.4	18.1	17.3	19.5	24.4
22-Jul	16.5	15.9	15.1	14.2	13.9	14.4	16.3	18.7	21.2	22.5	24.2	25.4	26.2	27.0	27.5	27.3	27.4	27.2	26.6	25.0	22.9	21.4	20.4	19.9	21.5	27.5
23-Jul	20.6	20.1	19.4	19.0	18.0	17.7	18.1	19.2	20.3	22.2	23.5	24.2	25.2	25.8	26.2	26.2	25.9	24.6	23.3	21.5	19.6	17.8	17.0	16.2	21.3	26.2
24-Jul	15.7	15.5	15.1	14.7	14.2	13.7	13.2	13.3	13.9	15.0	16.2	17.7	18.1	18.8	20.1	20.3	20.2	20.1	20.1	20.0	19.0	17.8	16.9	16.0	16.9	20.3
25-Jul	15.5	14.3	13.1	12.3	11.7	11.0	13.0	15.3	17.8	20.5	22.6	23.9	25.6	26.3	27.2	27.9	27.9	28.0	27.4	25.5	22.8	21.0	19.5	18.3	20.4	28.0
26-Jul	17.6	16.9	16.6	15.2	14.5	15.2	16.8	19.2	21.6	23.9	27.0	29.0	29.8	30.2	30.5	31.0	31.2	31.1	30.1	28.8	26.6	24.5	23.5	23.0	23.9	31.2
27-Jul	21.8	20.1	18.2	17.5	17.3	17.5	18.6	20.5	23.0	24.8	26.0	27.8	29.1	29.8	30.3	30.4	30.6	30.2	27.6	25.7	24.1	21.9	19.9	19.3	23.8	30.6
28-Jul	18.6	18.3	17.5	16.4	15.9	15.9	16.6	17.3	19.4	21.7	23.1	24.3	23.5	24.1	25.3	25.1	25.7	24.0	21.2	18.2	16.8	16.6	15.7	16.1	19.9	25.7
29-Jul	15.5	14.9	13.9	13.2	12.9	12.9	13.7	16.8	19.3	21.3	22.5	23.8	24.3	25.5	20.9	21.9	23.0	23.5	23.2	21.9	19.8	18.7	17.6	17.0	19.1	25.5
30-Jul	16.2	15.6	15.6	14.9	14.5	14.0	13.9	14.3	14.5	14.5	15.4	17.0	19.8	22.1	23.3	23.8	24.3	26.2	25.9	24.3	21.9	21.2	20.0	19.4	18.9	26.2
31-Jul	18.3	18.0	17.0	15.8	14.8	14.8	14.4	16.6	18.8	20.1	21.7	22.6	23.3	23.4	22.5	18.5	18.8	18.7	18.1	17.9	16.6	15.9	15.1	14.2	18.2	23.4
																						Diurnal Average				
																						Diurnal Maximum				





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	3	0.40	0.40
10 - 20	416	55.91	56.32
> 20	325	43.68	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

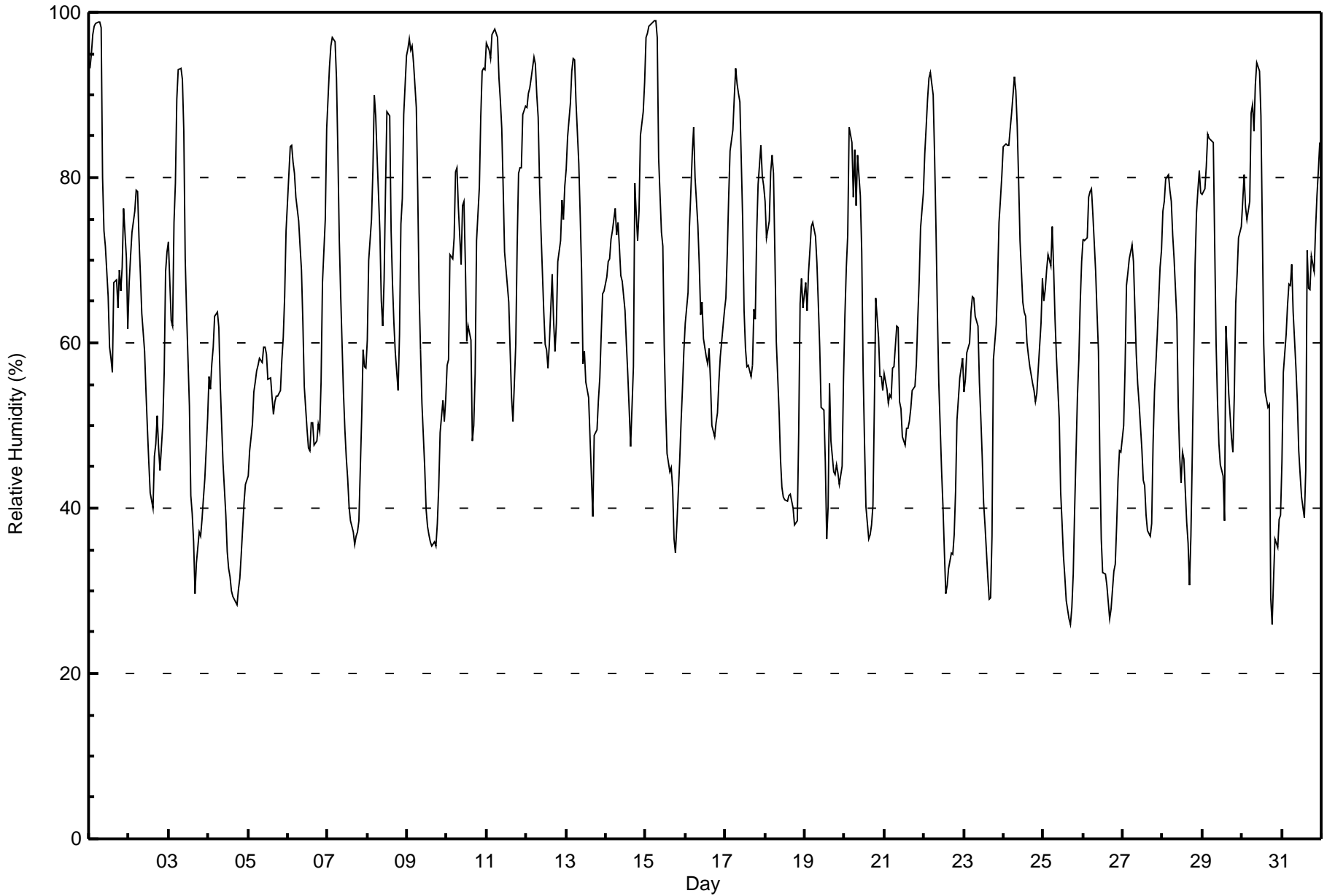


Wood Buffalo Environmental Association

Summary of Hour Averages

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

Maximum Value: 99 % on Jul 15 06:00																			Maximum Daily Average: 80.8 % on Jul 11						Hours in Service: 744																			
Minimum Value: 26 % on Jul 30 19:00																			Minimum Daily Average: 43.5 % on Jul 4						Hours of Data: 744																			
Maximum Diurnal Average: 81.4 % at hour 6																			Minimum Diurnal Average: 45.5 % at hour 17						Hours of Missing Data: 0																			
Monthly Average: 62.8 %																			Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 50 Median = 62 Q ₃ = 76 P ₉₀ = 88 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-Jul	93	95	97	98	99	99	99	98	80	74	72	66	59	58	56	67	68	64	69	66	69	76	70	62	77.3	99																		
2-Jul	67	71	73	76	78	78	73	68	64	59	54	50	46	42	40	46	48	51	47	44	50	56	69	71	59.2	78																		
3-Jul	72	63	62	75	79	90	93	93	92	86	70	64	52	41	39	36	30	33	37	37	39	41	44	51	59.1	93																		
4-Jul	56	54	58	60	63	64	62	55	50	45	39	35	33	32	30	29	29	28	30	32	34	41	43	43	43.5	64																		
5-Jul	44	47	50	54	55	57	57	58	58	59	59	59	56	56	53	51	53	54	54	54	58	61	66	74	56.1	74																		
6-Jul	80	84	84	82	80	78	75	72	69	62	55	50	47	47	50	50	48	48	50	49	55	67	75	86	64.3	86																		
7-Jul	90	93	96	97	96	92	83	73	66	54	50	46	44	40	38	37	36	37	37	38	51	59	57	57	61.1	97																		
8-Jul	60	70	75	81	90	87	83	73	65	62	68	78	88	87	73	67	62	59	54	61	74	77	88	95	74.1	95																		
9-Jul	96	97	95	96	94	88	78	66	59	53	45	40	38	37	36	35	36	35	38	43	49	53	50	53	58.8	97																		
10-Jul	57	58	71	70	73	81	81	76	70	77	77	70	60	62	60	48	50	56	72	79	87	93	93	93	71.4	93																		
11-Jul	96	95	94	97	98	98	97	92	89	86	79	71	67	65	59	53	51	60	72	81	81	81	88	89	80.8	98																		
12-Jul	89	90	91	92	95	94	90	87	79	74	64	60	59	57	60	68	63	59	62	70	72	77	75	79	75.2	95																		
13-Jul	81	85	89	93	94	94	89	82	75	69	57	59	55	53	49	44	39	49	49	53	56	61	66	66	67.0	94																		
14-Jul	68	70	70	73	74	76	73	75	72	68	67	64	60	56	52	48	57	79	76	72	76	85	88	92	70.4	92																		
15-Jul	97	97	98	99	99	99	99	97	82	73	72	60	52	47	44	45	42	36	35	38	46	50	54	59	67.5	99																		
16-Jul	62	66	74	78	83	86	80	74	69	63	65	61	58	57	59	55	50	49	50	51	55	58	60	64	63.8	86																		
17-Jul	65	71	78	83	86	90	93	91	90	89	75	64	59	57	57	56	57	64	63	73	79	84	80	79	74.4	93																		
18-Jul	77	73	75	81	83	81	71	60	52	46	43	41	41	41	41	42	41	40	38	38	49	65	68	64	56.2	83																		
19-Jul	67	64	68	71	74	75	73	70	65	60	52	52	46	36	40	55	48	44	44	45	44	43	45	56	55.7	75																		
20-Jul	63	69	73	86	84	78	83	77	83	78	71	57	48	40	36	37	38	40	52	65	61	56	56	54	61.9	86																		
21-Jul	56	54	53	54	53	57	57	62	62	53	52	49	48	50	50	50	52	54	55	57	63	68	74	78	56.7	78																		
22-Jul	83	86	89	92	93	90	83	74	64	55	45	40	35	30	31	33	35	34	37	42	51	56	57	58	58.0	93																		
23-Jul	54	56	59	60	64	66	65	63	62	55	51	46	41	38	32	29	29	37	58	62	68	75	77	80	55.3	80																		
24-Jul	84	84	84	84	86	88	92	90	86	80	72	65	64	63	60	59	57	55	54	53	54	57	62	68	70.9	92																		
25-Jul	65	66	69	71	69	74	69	63	58	51	42	38	34	32	29	27	26	28	32	40	54	58	65	70	51.2	74																		
26-Jul	73	72	73	78	78	79	76	69	64	59	46	36	32	32	31	29	27	28	32	33	38	43	47	47	50.8	79																		
27-Jul	50	57	67	68	70	72	70	64	59	55	53	47	43	43	39	37	37	38	48	54	58	61	69	71	55.4	72																		
28-Jul	76	77	80	80	78	77	73	70	63	52	46	43	47	46	38	36	31	37	47	70	76	78	81	78	61.6	81																		
29-Jul	78	79	81	85	85	85	84	72	60	53	48	45	44	38	62	58	54	48	47	54	65	68	73	74	64.1	85																		
30-Jul	77	80	76	75	77	88	89	86	91	94	93	87	74	60	54	52	53	29	26	31	36	35	39	39	64.3	94																		
31-Jul	46	56	61	65	67	67	70	64	57	53	47	44	41	39	45	71	67	66	70	69	74	78	81	84	61.7	84																		
																			71.7	73.6	76.2	79.1	80.6	81.4	79.3	74.7	69.5	64.4	59.0	54.4	50.7	47.8	46.6	46.8	45.5	46.5	49.5	53.4	58.8	63.3	66.4	68.8	Diurnal Average	
																			97	97	98	99	99	99	99	98	92	94	93	87	88	87	73	71	68	79	76	81	87	93	93	95	Diurnal Maximum	





Maximum Speed: 28 km/h on Jul 16 02:00	Maximum Daily Speed Average: 21.4 km/h on Jul 24	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 11 06:00	Minimum Daily Speed Average: 1.1 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 5.4 km/h at hour 15	Minimum Diurnal Speed Average: 1.6 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 266.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 18 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-Jul	S5	S6	S6	S5	SSE5	SSE6	S7	SSE7	SE7	SE9	SE7	SE6	S6	SW6	WNNW5	NNW3	W4	SSW1	E4	ESE5	SE6	SE8	S8	SSW11	SSE4.4	SSW11	
2-Jul	SSE8	SSE9	SSE8	SSE6	SSE8	SSE10	S11	S12	SSW10	SSW10	SSW11	SSW12	SSW11	S12	SSW11	SW13	WSW9	NE9	S5	SSW9	S6	S6	SE8	SE5	S7.7	SW13	
3-Jul	S6	SSW8	SSW5	SW8	WSW10	S8	SSW9	S6	SSW5	SSE7	SW10	WSW12	W14	W15	W15	WSW15	WSW24	WSW19	SW14	SW15	WSW12	WSW12	WSW21	WSW18	WSW10.9	WSW24	
4-Jul	SW14	SW14	SW12	WSW16	WSW16	WSW19	WSW18	WSW22	WSW18	WSW17	WSW23	WSW24	W28	WSW26	W27	WSW26	W26	W28	W24	W22	W17	SW12	SW14	WSW14	WSW19.5	W28	
5-Jul	WSW19	WSW18	W18	WSW18	WSW18	W20	W22	WNNW18	WNNW18	WNNW16	WNNW18	NW14	WNNW16	NW16	NW15	NNW15	NNW12	NNW16	NNW18	NNW18	NNW16	NNW13	NNW9	WSW5	WNNW13.6	W22	
6-Jul	W7	WNNW6	W7	W7	W9	W11	W13	WNNW10	W10	W12	WNNW12	WNNW11	NW9	N8	NNW12	NNW13	WNNW13	NW12	NNW11	NNW4	SW1	SW6	SSW6	S4	WNNW7.2	WNNW13	
7-Jul	SW4	SW3	SW4	S5	SSE7	SSE7	S4	SSW3	WSW3	W5	W6	WNNW6	WNNW7	WNNW4	WSW2	WSW7	W5	SSE3	SSW4	S4	SW4	NNE11	NE11	ENE8	SW1.6	NNE11	
8-Jul	NNE3	NW5	N5	N1	S0	SW1	E1	SSE1	SSE3	SSE4	WNNW11	WSW4	WNNW4	SSE5	N2	NNE6	N4	NW5	WSW4	SW4	SW7	SSE4	S3	S4	W1.1	WNNW11	
9-Jul	S4	SSW5	SSW5	S5	SSE4	SE2	SE4	SE7	SE7	ESE7	SE8	SE10	SE11	SE11	SSE8	SSE10	SSE8	SSE8	SSE6	SSE6	SE7	SE7	SSE7	SSE5	SSE6.3	SE11	
10-Jul	SSE4	SE5	SW7	W16	SW7	SE4	SSE5	WNNW4	W5	WSW7	W9	WNNW6	WNNW5	WNNW6	WNNW5	WNNW3	WNNW1	SE8	S6	NW16	SSW6	NE3	E9	NNW4	WSW2.8	NW16	
11-Jul	NW6	WSW5	WSW4	SSW2	SSW2	E0	N6	NNW11	NNW9	NNW10	NW11	NW9	NW10	NW9	NW8	WNNW7	W5	WSW9	S11	SW9	SSW5	W2	SSE4	S7	WNNW4.0	NNW11	
12-Jul	SSE7	SSE8	S6	S6	SSE7	SSE7	SSE6	S4	SSW6	WSW5	SW3	S4	SE5	WNNW5	NW2	SSW6	SSW6	S5	S8	SSE5	SSE5	SSE6	SSE7	S6	S4.8	S8	
13-Jul	SSE8	SSE8	SSE7	SSE5	S6	S5	SSE5	SSW5	SSW4	S2	SW2	NNE6	SE2	NNE5	NW5	NW6	N3	NNE12	NNE16	NNE19	NNE17	NNE12	N9	NNE12	NNE2.8	NNE19	
14-Jul	N14	N19	NNE15	NNE11	NNE12	N10	N13	NNE13	NNE15	N15	NNE15	NNE10	NNE7	NE7	ENE4	WNNW2	NW8	N19	NE13	NE6	NE4	NNE5	NNE2	NNE3	NNE9.4	N19	
15-Jul	NNE4	NNE3	SSW2	S5	SSE5	SSE4	SSE6	SSE7	SE8	SE8	SE7	SE12	SE14	SSE13	SE14	SE14	SE14	SE14	SSE10	S10	S11	SSE9	SSE10	S8	SSE9	SSE7.9	SE14
16-Jul	S6	NNW28	N10	NW10	SW6	S7	SSW8	W16	WNNW12	WNNW13	WSW8	WSW12	SW13	SW15	SW13	WSW14	W25	W24	W23	W21	W20	WSW17	WSW17	W22	W12.4	NNW28	
17-Jul	W25	W21	WNNW16	W17	W15	WNNW15	WNNW15	NW19	NNW22	NNW20	N23	N22	N21	N19	NNW17	NNW10	NNE14	N18	N12	NNW13	NNW9	N8	NW8	NW11	NW13.5	W25	
18-Jul	NNW9	NNW11	NNW10	NNW9	NW7	WNNW5	NW7	N5	N4	WNNW5	WNNW6	WNNW8	W5	NW9	W9	WSW10	W11	W11	WSW11	W9	SW7	SSW8	SSW9	S9	WNNW5.9	NNW11	
19-Jul	S8	SW12	WSW14	WSW14	WSW12	SSW4	WSW6	W13	WSW12	WSW14	W14	W17	W15	W16	NW10	NE19	NE17	NNE12	NE9	NE9	NE9	ENE7	E3	ENE1	W4.2	NE19	
20-Jul	NNE7	N4	NNE4	S1	W1	SSW1	ESE2	SSW4	SSE3	E5	ENE7	SE7	SE7	ESE9	SE12	ESE10	ESE9	ESE7	SSW1	ENE10	E9	SE6	SE7	SSE5	ESE4.2	SE12	
21-Jul	SE5	SSE7	SSE7	SSE7	SSE5	SSE4	SE1	WNNW5	WSW4	ESE2	E4	SE8	SSE9	SSE11	S12	SSW9	SSW6	SSE9	SSE8	SSE9	S8	S8	SSE7	S7	SSE5.9	S12	
22-Jul	SSE9	SSE10	SSE9	SSE6	S7	S6	S6	S7	SW8	WSW9	WSW13	WSW15	WSW16	WSW15	WSW17	W20	W17	W16	WSW11	SW9	SW9	SW8	SW10	SW12	SW8.8	W20	
23-Jul	WSW13	WSW14	WSW13	WSW13	WSW14	WSW14	W17	W13	W10	W11	WSW11	W13	WSW14	WSW16	WSW17	W19	W16	NW9	NNE16	NNE20	NNE20	NNE17	NNE15	NNE19	WNNW8.9	NNE20	
24-Jul	NNE19	NNE17	NNE22	NNE20	NNE26	NNE23	N22	N20	N17	N21	N23	NNE27	N28	N27	N27	N27	N28	N25	N25	NNW19	NNW15	NW13	NW11	N21.4	N28		
25-Jul	NW10	WNNW6	W6	WSW8	WSW7	SW5	SW5	SW5	SW6	SW7	WSW9	WSW10	W8	WSW8	WSW10	WSW8	WSW8	SW7	SSW6	SSW5	SSE5	S6	SSE7	SSE9	WSW5.6	WSW10	
26-Jul	SSE7	SE8	SE8	S7	S7	S7	SSW5	SSE5	SE7	SSE6	SW7	W9	WNNW10	WSW9	SSW7	SSW8	SW7	WSW9	SW9	SSW9	S8	S7	SSW10	SSW10	SSW6.1	SSW10	
27-Jul	SSW9	SSE8	SE10	SE9	SSE8	SSE7	SSE8	SSE9	S6	SSW7	SSW7	SSW9	WSW6	NW10	WNNW9	WNNW9	NW7	NW2	WSW5	NW8	W17	WNNW18	NW8	WNNW12	WSW3.8	WNNW18	
28-Jul	SSW4	W9	W9	W8	WSW12	W21	W13	W12	W15	W17	W20	W20	W18	W16	W15	W16	WNNW17	W18	WNNW20	N18	ESE3	SSW8	SSE6	SSW7	W11.6	W21	
29-Jul	SSW5	W6	WSW5	SW5	SSW5	SSW4	SE5	SSW4	SSW4	NW6	NW5	W5	ENE1	W5	N17	NE11	NE8	NNE11	NNE10	NNE11	NNE11	NE9	NE8	NE8	NNE2.6	N17	
30-Jul	NE7	ENE3	ESE4	SE5	SSE4	SW3	SSW5	SW7	NNW5	SSE8	S7	S5	SSE8	SSE9	S10	S13	S12	WSW14	WSW14	SW11	SW13	WSW14	WSW15	WSW17	SSW6.0	WSW17	
31-Jul	W15	NW12	W9	WSW6	W14	W24	W16	W15	W14	W14	WNNW15	WNNW16	NW19	NW24	NW18	NE17	N16	N17	N18	NNE12	E3	WNNW2	WNNW8	NW7	NW10.1	W24	

WSW2.9	W2.9	WSW3.0	WSW4.1	SW4.3	SW4.2	WSW4.1	W4.5	W4.0	W4.1	W5.4	W5.2	W5.0	W5.4	W5.4	W4.4	NNW5.2	NNW4.6	NNW3.5	NW3.3	W1.6	WSW1.7	SW2.5	WSW3.3	Diurnal Average
W25	NNW28	NNE22	NNE20	NNE26	W24	N22	WSW22	NNW22	N21	N23	NNE27	W28	N27	W27	N27	N27	W28	N25	N25	NNE20	WNNW18	WSW21	W22	Diurnal Maximum

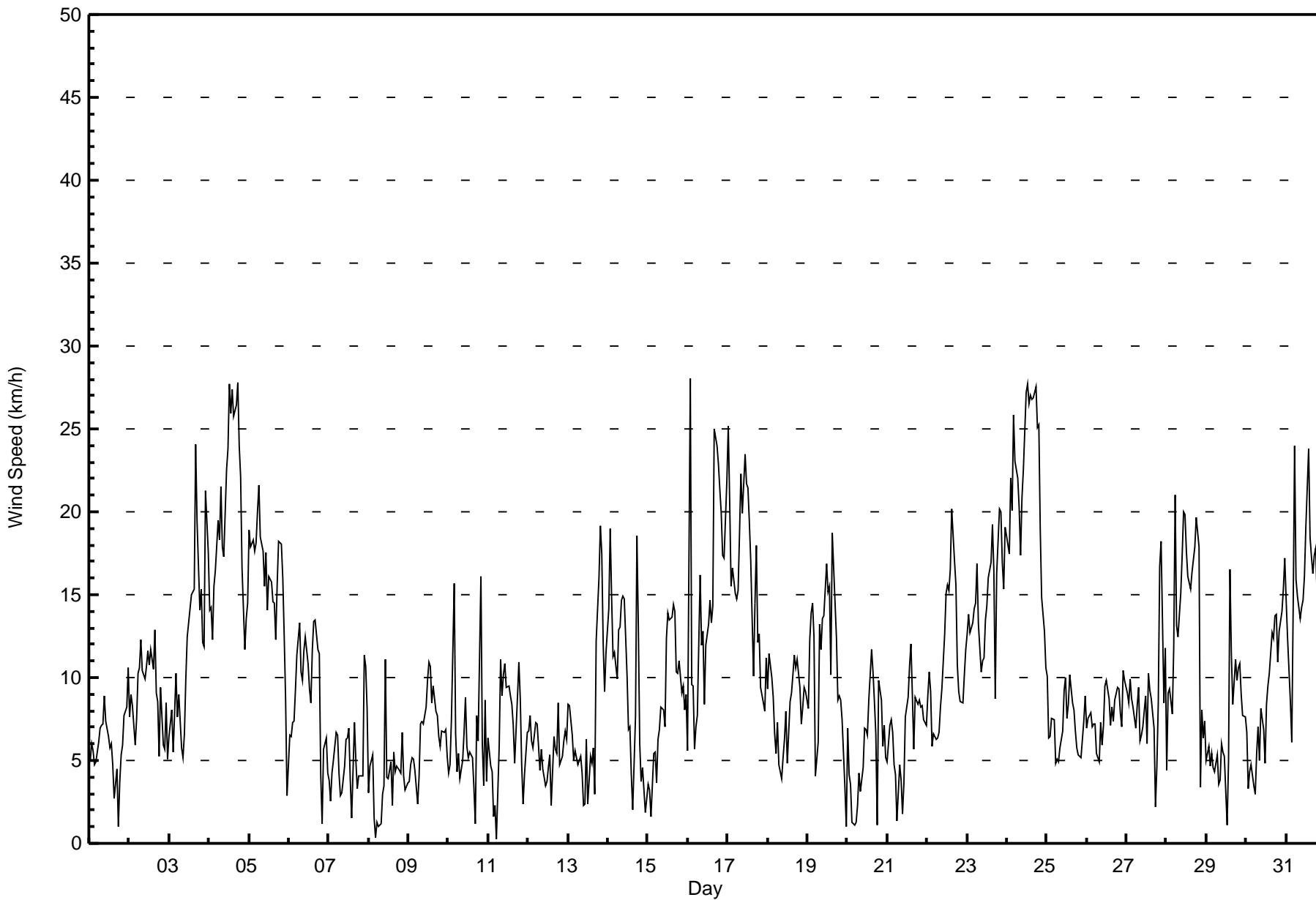
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jul 16 02:00 Minimum Value: 0 km/h on Jul 7 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: 744 Hours of Data: 744 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-Jul	1	1	1	1	1	2	2	2	2	3	3	2	2	2	2	2	2	1	1	1	1	2	2	3	3
2-Jul	2	2	2	2	3	3	3	4	3	3	3	4	3	4	4	4	4	3	4	2	1	2	2	3	4
3-Jul	2	3	4	3	3	2	2	1	2	2	3	4	4	4	5	5	7	6	4	4	3	3	9	6	9
4-Jul	4	3	3	4	4	5	5	5	5	5	7	7	7	7	7	7	7	6	6	5	5	2	3	4	7
5-Jul	4	4	4	4	4	4	4	5	5	4	4	4	4	4	4	4	3	5	4	4	3	3	2	2	5
6-Jul	2	2	2	2	3	2	3	2	3	3	4	3	3	3	3	4	4	3	3	2	2	1	1	1	4
7-Jul	1	1	1	1	1	1	1	1	1	2	3	3	3	3	2	2	2	1	1	1	0	3	2	1	3
8-Jul	2	1	1	2	1	2	2	1	2	2	3	4	2	2	2	2	2	1	1	1	1	1	1	1	4
9-Jul	1	1	1	1	2	1	1	2	2	2	2	3	4	4	3	4	3	3	2	1	1	1	2	1	4
10-Jul	1	2	3	5	3	2	1	2	2	2	2	1	1	1	2	2	1	4	2	5	4	3	2	2	5
11-Jul	2	1	1	1	1	1	2	3	2	2	2	3	2	2	3	2	2	3	4	2	2	2	2	1	4
12-Jul	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	3	1	1	2	2	1	3
13-Jul	2	2	2	1	1	1	1	2	1	2	2	2	2	2	2	2	2	4	4	4	4	3	2	2	4
14-Jul	4	4	3	3	3	4	4	3	3	4	3	3	3	3	3	2	5	4	4	2	1	1	2	2	5
15-Jul	1	1	2	1	1	2	2	2	2	2	2	4	4	5	5	4	4	4	3	3	2	2	2	2	5
16-Jul	5	10	4	5	1	1	2	5	4	4	2	4	3	4	3	4	6	6	5	6	5	4	4	5	10
17-Jul	5	5	5	4	4	4	4	4	5	5	6	5	6	5	4	3	4	7	3	4	2	5	4	3	7
18-Jul	2	3	3	2	1	2	2	2	2	3	3	4	3	4	3	4	4	3	3	2	1	1	1	1	4
19-Jul	2	3	3	4	3	3	4	4	3	4	4	5	4	5	6	5	5	5	3	2	2	1	2	2	6
20-Jul	1	3	3	2	2	2	2	2	2	1	2	2	3	3	3	3	3	2	2	4	2	2	1	2	4
21-Jul	2	2	2	2	1	2	2	2	2	2	2	2	3	4	4	3	2	3	3	3	2	2	2	1	4
22-Jul	1	2	3	1	1	2	2	2	2	3	3	5	4	5	5	5	5	4	3	2	1	1	2	2	5
23-Jul	3	3	3	3	3	3	4	3	3	3	3	4	4	4	5	5	4	4	4	5	4	4	4	4	5
24-Jul	4	4	5	5	6	5	5	4	4	5	5	6	6	6	7	6	6	6	6	6	5	3	2	2	7
25-Jul	2	2	1	2	2	1	1	1	2	2	3	3	3	3	3	3	2	2	1	1	1	1	1	1	3
26-Jul	2	1	1	1	1	2	1	1	2	2	3	4	3	4	4	3	3	2	2	3	2	1	3	2	4
27-Jul	2	2	2	2	2	2	3	2	2	2	2	3	3	3	3	2	2	1	3	3	5	6	4	3	6
28-Jul	2	3	3	2	4	5	4	3	3	4	5	5	6	5	4	6	5	6	8	6	3	2	1	1	8
29-Jul	2	2	2	1	1	1	2	2	2	2	2	2	2	8	7	3	3	3	2	3	2	2	2	1	8
30-Jul	1	2	1	1	2	1	2	4	3	2	2	1	2	3	3	4	4	4	4	2	2	3	3	4	4
31-Jul	3	3	3	2	4	4	4	3	4	4	4	4	5	6	7	5	5	4	4	5	2	2	1	2	7
																	Diurnal Maximum								





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	175	23.52	23.52
6 - 11	324	43.55	67.07
12 - 19	190	25.54	92.61
20 - 28	55	7.39	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - July 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	8	2	4	7	5	11	25	19	27	13	12	9	15	6	4	175
6 - 11	6	11	13	4	2	6	28	62	40	31	23	26	20	18	24	10	324
12 - 19	13	21	4	0	0	0	5	2	5	1	13	47	39	17	11	12	190
20 - 28	15	7	0	0	0	0	0	0	0	0	0	7	21	1	1	3	55
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	42	47	19	8	9	11	44	89	64	59	49	92	89	51	42	29	744

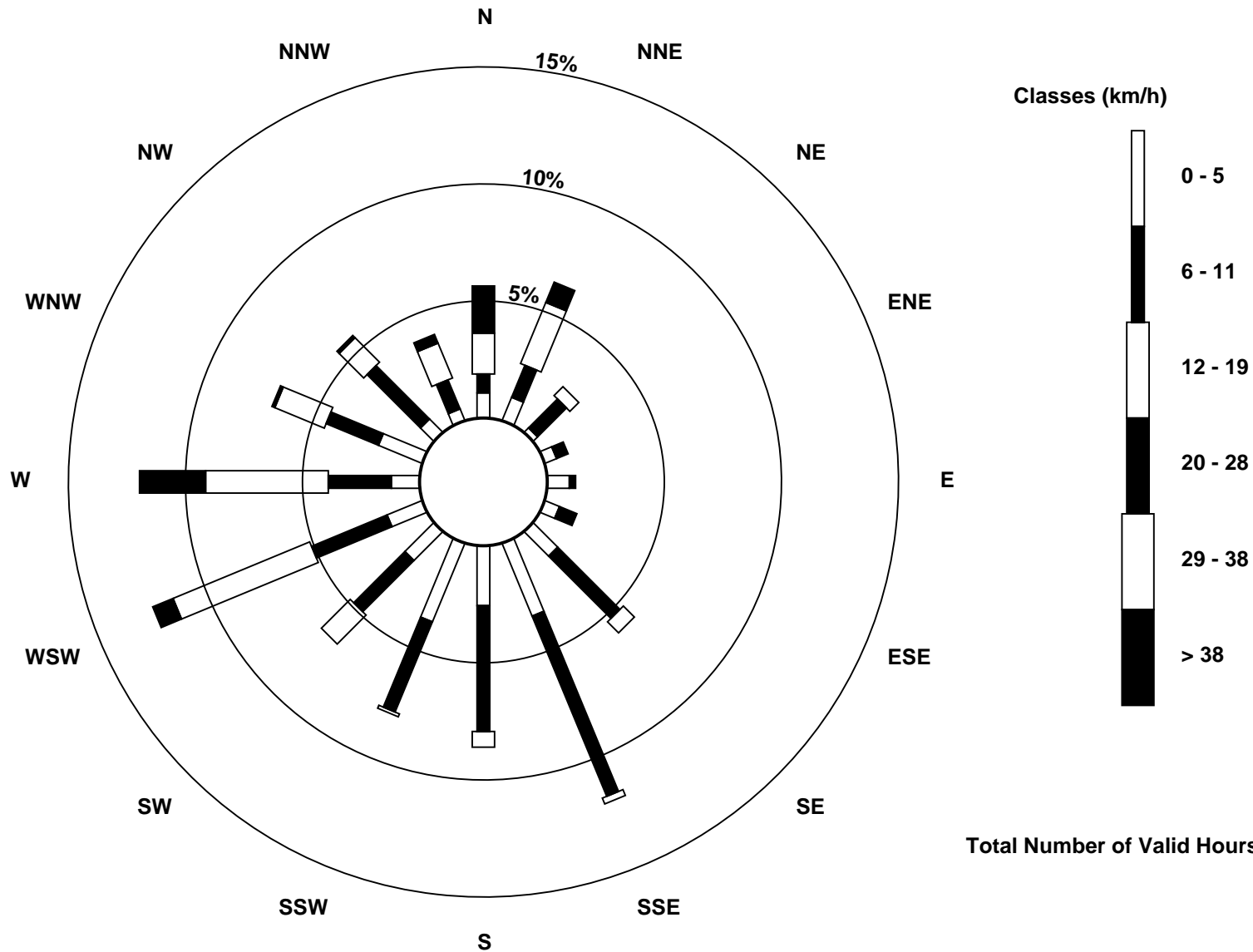
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 341 deg on Jul 16 02:00 Direction of Maximum Daily Speed Average: 4.0 deg on Jul 24	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 89 deg on Jul 11 06:00 Direction of Minimum Daily Speed Average: 1.1 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 250.0 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-Jul	180	171	186	169	164	164	188	157	137	128	125	141	172	223	297	331	273	195	88	113	124	146	187	192	163.9
2-Jul	161	152	149	160	163	167	178	176	209	200	200	198	195	190	196	216	241	34	176	195	183	177	145	145	182.9
3-Jul	172	213	194	230	248	180	199	188	207	164	230	249	264	261	263	252	252	246	225	222	238	245	256	258	238.1
4-Jul	236	229	229	246	249	254	250	257	256	248	240	253	259	240	261	256	260	265	272	269	264	235	232	246	252.5
5-Jul	258	255	259	258	258	262	268	285	291	301	297	311	293	310	311	332	345	343	333	335	337	325	308	258	295.5
6-Jul	268	297	269	260	265	264	270	285	259	261	290	301	321	349	333	335	302	325	341	341	219	221	206	190	291.0
7-Jul	228	217	218	184	160	158	178	205	237	274	268	292	286	296	242	257	260	150	201	190	222	16	45	61	235.2
8-Jul	31	325	354	359	183	219	93	161	159	151	290	247	286	159	359	17	359	306	241	223	217	164	175	186	263.4
9-Jul	178	203	207	182	155	142	146	145	131	118	124	137	130	132	168	157	152	154	158	147	133	137	156	163	148.6
10-Jul	154	138	217	261	225	142	151	299	264	240	266	283	294	287	283	291	292	128	189	309	213	34	79	329	251.6
11-Jul	322	250	257	193	192	89	1	331	335	328	326	319	305	313	321	295	272	241	186	223	205	276	166	187	289.6
12-Jul	166	150	169	175	155	155	167	170	192	255	222	190	138	296	307	195	192	191	176	152	167	158	164	172	175.8
13-Jul	159	164	164	147	170	183	164	198	210	191	236	19	124	13	316	312	360	16	25	20	18	16	10	12	29.0
14-Jul	359	7	16	15	18	4	359	18	13	10	13	24	32	42	75	286	313	7	42	50	41	21	21	19	14.6
15-Jul	24	22	199	175	167	155	162	159	132	139	135	130	138	157	157	137	137	158	176	175	155	163	173	165	151.5
16-Jul	185	341	358	307	233	176	202	277	289	282	256	257	228	227	224	244	269	265	264	264	261	257	256	261	263.4
17-Jul	269	281	287	272	272	291	294	315	334	337	355	2	0	350	337	334	19	7	357	328	341	4	305	322	325.7
18-Jul	329	336	329	329	312	302	320	2	354	303	303	301	281	307	280	254	270	260	257	279	233	213	202	186	286.0
19-Jul	191	229	242	245	243	195	257	261	240	247	265	266	270	272	310	44	35	30	47	35	55	68	97	64	276.0
20-Jul	20	7	13	181	264	196	121	206	148	95	76	131	141	120	129	117	122	118	204	77	82	144	138	150	113.8
21-Jul	145	152	164	168	148	159	145	284	250	118	99	139	147	153	178	206	200	158	159	167	169	169	162	169	165.4
22-Jul	156	154	158	168	171	172	169	180	222	238	257	256	239	255	256	265	265	265	245	231	223	218	218	224	230.4
23-Jul	240	249	241	248	254	253	266	275	269	266	257	278	254	252	258	271	277	308	20	22	24	16	17	14	287.6
24-Jul	12	16	13	19	12	15	10	4	3	8	9	15	7	9	8	4	360	355	357	348	332	325	312	4.0	
25-Jul	314	284	260	255	256	219	224	225	227	228	256	253	273	249	249	250	249	217	206	198	163	176	165	153	236.5
26-Jul	156	135	141	178	172	169	193	164	132	148	220	262	292	248	195	212	225	239	220	194	185	185	203	204	197.3
27-Jul	195	147	137	145	149	153	163	159	172	211	198	194	243	311	298	294	309	304	253	304	272	299	322	284	238.3
28-Jul	198	268	272	269	248	266	259	262	268	267	269	270	267	264	259	274	285	261	282	0	111	206	156	212	266.4
29-Jul	210	259	237	216	211	202	143	204	212	307	317	275	63	261	9	43	49	15	21	23	33	50	53	55	13.9
30-Jul	55	76	102	144	156	235	201	225	334	164	187	183	153	164	173	180	175	242	247	234	232	245	253	255	210.5
31-Jul	269	311	278	251	260	267	261	264	281	279	296	299	305	311	318	35	6	11	11	22	85	284	303	304	306.2
242.1 268.6 246.9 241.0 236.2 236.0 242.2 261.0 268.1 268.6 278.1 276.9 272.3 272.5 278.6 280.1 286.8 301.8 292.6 311.5 268.3 256.1 227.6 239.4																									
Diurnal Average																									

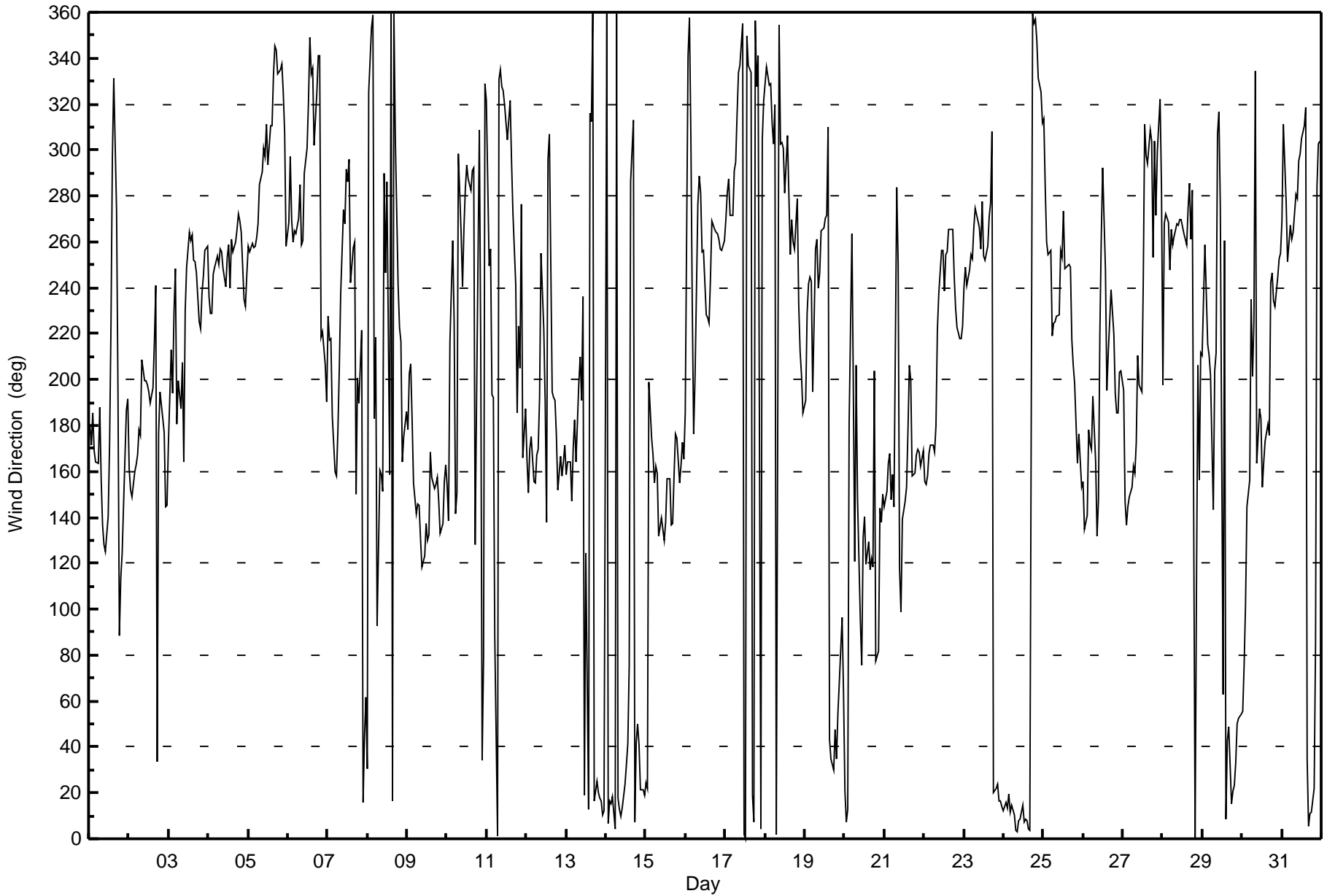
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Jul 7 15:00 Minimum Value: 7 deg on Jul 26 02:00 Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 17 Median = 21 Q ₃ = 28 P ₉₀ = 48 P ₉₉ = 85																			Hours in Service: 744 Hours of Data: 744 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-Jul	15	13	22	31	19	21	23	27	28	25	30	34	39	24	30	35	21	61	15	18	9	20	25	23	61
2-Jul	26	22	19	25	26	24	21	25	20	25	27	28	30	28	23	24	53	36	68	20	26	26	12	56	68
3-Jul	22	36	62	38	22	21	20	23	44	31	20	22	21	19	21	21	18	18	14	15	19	16	21	19	62
4-Jul	17	14	14	17	17	17	18	16	17	20	18	20	19	19	17	18	16	14	14	12	16	13	12	16	20
5-Jul	14	15	13	14	14	13	12	19	21	21	23	23	20	22	22	25	21	23	17	17	16	16	17	48	48
6-Jul	19	19	16	17	15	13	14	20	27	18	22	26	26	32	20	27	22	22	21	34	95	9	13	25	95
7-Jul	17	28	21	22	11	14	19	37	56	59	46	45	39	72	101	38	44	51	21	14	10	19	14	9	101
8-Jul	69	21	24	92	95	88	81	81	59	50	21	71	70	61	84	22	37	28	24	11	9	46	29	21	95
9-Jul	27	23	15	16	27	49	25	24	23	21	25	26	26	26	35	30	31	25	21	20	13	17	23	32	49
10-Jul	40	23	20	15	28	71	21	56	34	17	14	24	23	25	38	57	86	39	37	24	46	79	32	52	86
11-Jul	18	29	38	69	52	88	21	18	17	16	17	27	25	23	31	27	34	21	22	26	43	58	63	20	88
12-Jul	10	18	19	19	9	13	15	27	24	24	58	53	61	42	61	25	27	39	24	18	19	20	21	21	61
13-Jul	19	18	20	19	18	23	22	34	40	83	85	33	85	48	47	27	47	18	16	15	15	14	14	16	85
14-Jul	19	18	17	17	16	18	19	18	19	21	20	27	44	44	68	76	29	22	18	21	24	9	60	17	76
15-Jul	21	25	87	14	17	32	24	28	23	24	19	19	23	29	28	23	21	28	22	23	20	21	22	23	87
16-Jul	45	21	30	28	31	15	21	17	22	19	18	20	17	18	22	13	13	12	14	14	14	15	14	14	45
17-Jul	13	16	18	12	18	18	19	18	17	17	22	19	22	23	20	25	21	21	22	20	16	23	19	17	25
18-Jul	17	17	16	14	13	21	20	34	66	60	48	39	58	42	34	32	28	22	19	18	16	9	13	18	66
19-Jul	28	15	16	17	19	53	65	20	20	21	24	20	24	21	41	18	21	23	23	17	17	10	51	94	94
20-Jul	21	53	19	73	78	76	29	19	39	30	25	33	43	31	23	21	21	19	81	26	18	20	15	25	81
21-Jul	25	24	26	28	35	53	71	44	44	62	59	28	32	30	28	27	27	23	25	22	21	21	20	18	71
22-Jul	13	15	22	20	16	24	24	29	23	22	21	20	21	23	22	15	19	17	19	12	9	10	10	11	29
23-Jul	16	16	16	17	16	16	14	17	21	21	24	24	25	22	21	17	20	55	18	16	16	16	16	18	55
24-Jul	18	17	17	17	18	18	18	18	19	19	18	18	19	20	19	21	21	24	25	28	23	14	12	14	28
25-Jul	15	18	16	16	16	21	17	25	26	28	28	29	47	34	27	34	24	19	16	11	22	8	13	8	47
26-Jul	10	7	16	17	13	17	18	25	23	28	32	34	29	38	45	34	30	22	15	20	20	17	16	19	45
27-Jul	18	19	12	15	16	22	22	20	36	26	40	39	49	23	23	25	26	50	55	24	13	21	29	19	55
28-Jul	48	20	18	26	19	11	18	17	15	16	15	22	28	17	22	22	21	21	31	35	64	18	15	10	64
29-Jul	47	35	39	19	30	45	16	45	44	42	49	58	96	62	30	22	27	21	20	16	16	14	13	9	96
30-Jul	10	33	15	27	19	35	18	38	71	23	20	34	29	32	32	27	25	22	18	14	11	16	16	15	71
31-Jul	16	20	19	22	15	10	14	14	21	23	23	21	22	20	38	18	23	19	20	24	61	46	14	16	61
																			69 53 87 92 95 88 81 81 71 83 85 71 96 72 101 76 86 61 81 35 95 79 63 94						
Diurnal Maximum																									





Wood Buffalo Environmental Association

SO₂ Calibration Summary

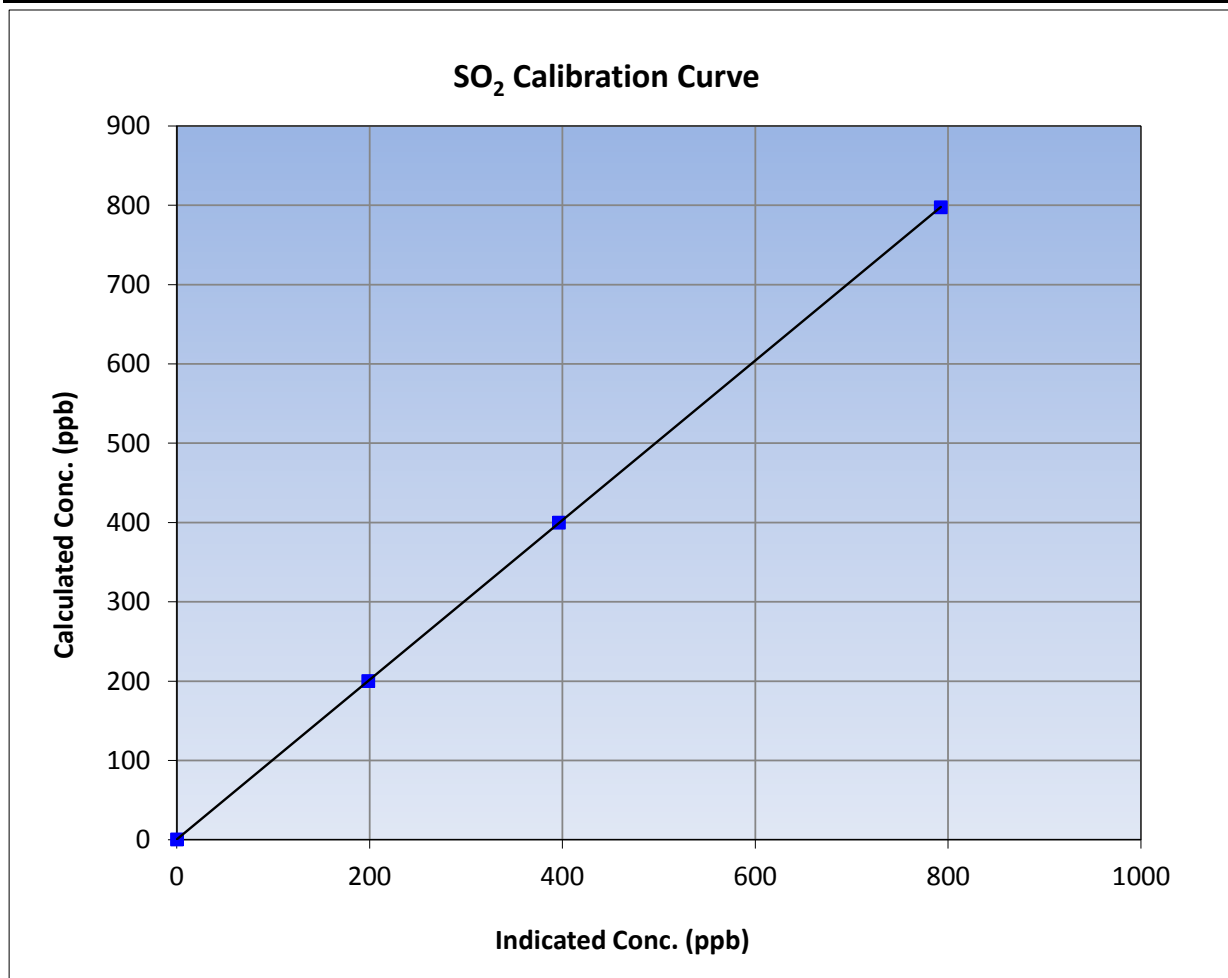
Version-03-2017

Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 22, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:40	End Time (MST)	11:25
Analyzer make	Thermo 43i	Analyzer serial #	JC1327300932

Calibration Data

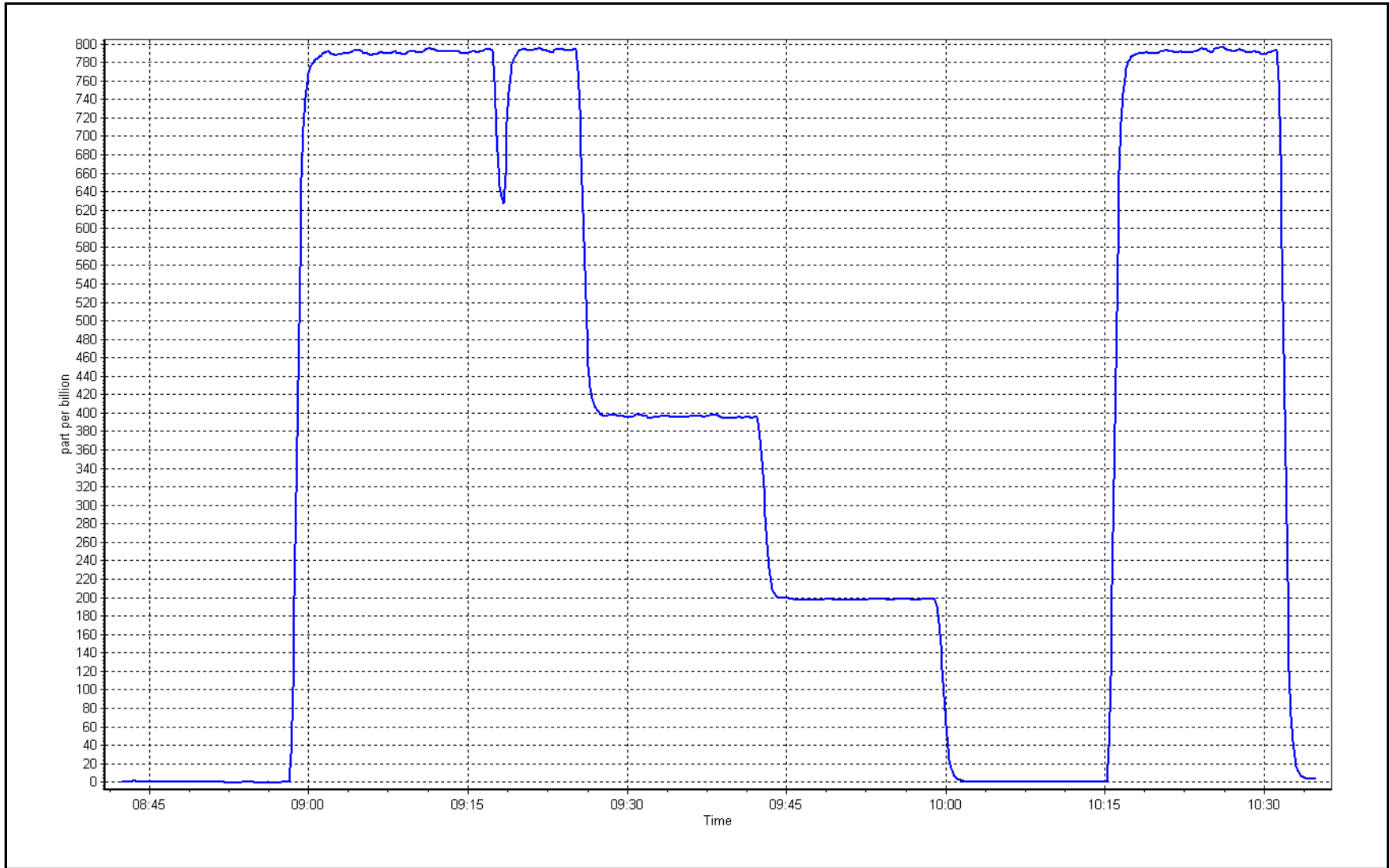
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.2	----	Correlation Coefficient	≥0.995
797.2	792.1	1.0065		
399.7	396.0	1.0092	Slope	0.90 - 1.10
199.8	198.3	1.0073		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 17, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

H₂S Calibration Summary

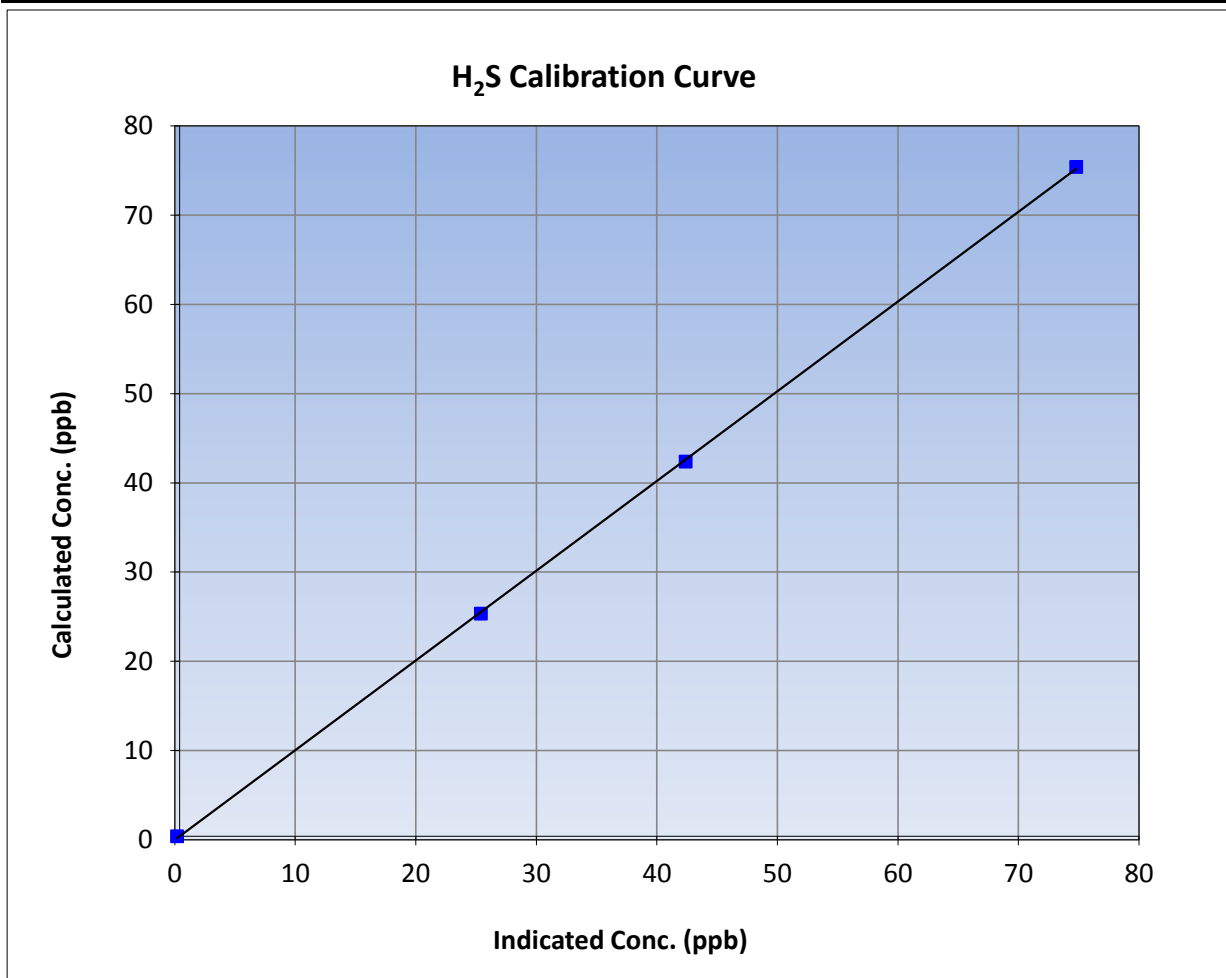
Version-03-2017

Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 19, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	10:32	End Time (MST)	12:27
Analyzer make	Thermo 450i	Analyzer serial #	1336160094

Calibration Data

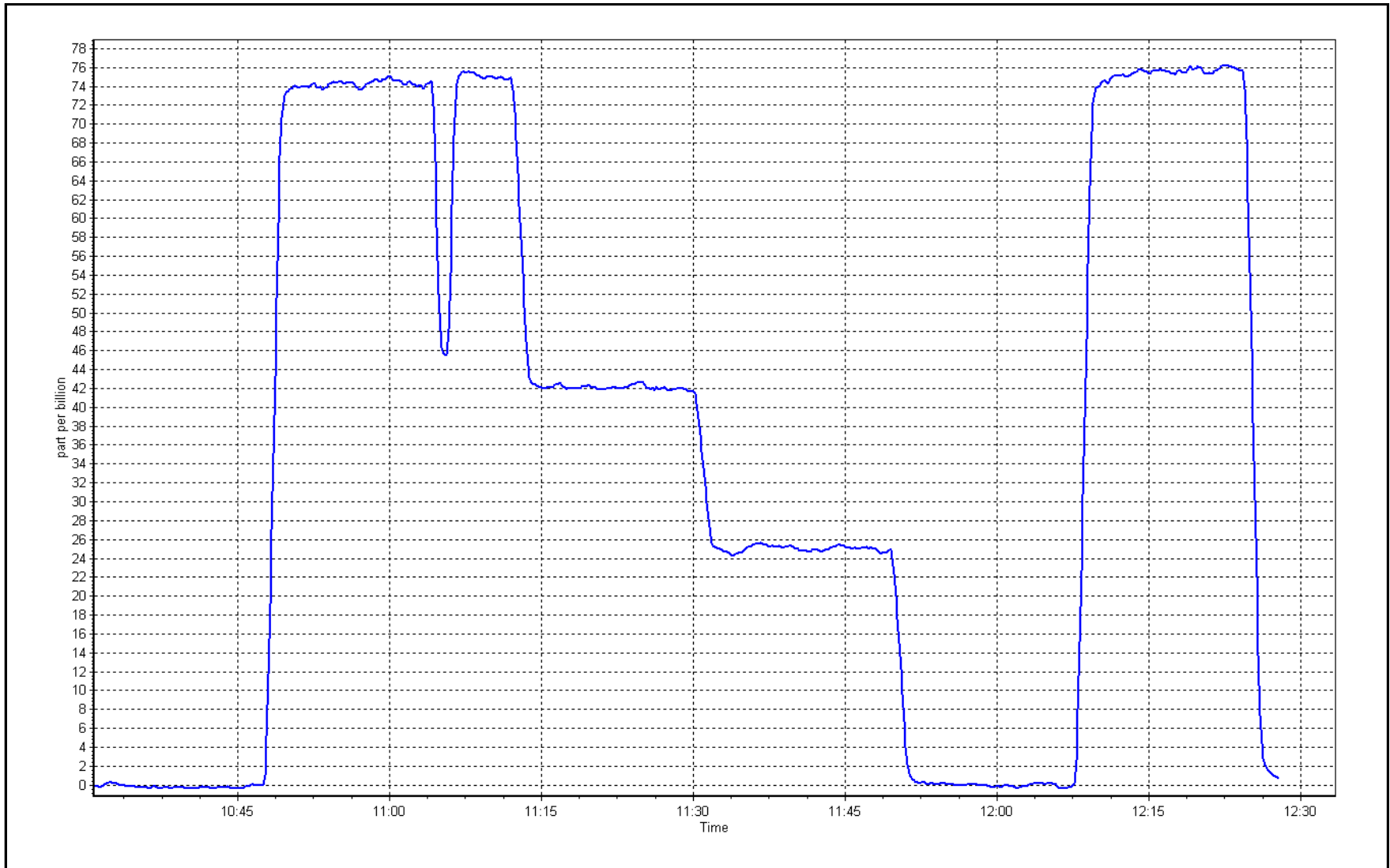
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999940	≥0.995
75.0	74.4	1.0082			
42.0	42.0	0.9995	Slope	1.005803	0.90 - 1.10
25.0	25.0	0.9981			
			Intercept	-0.019877	+/-3



H₂S Calibration Plot

Date: July 17, 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:	July 17, 2017	Last Cal Date:	June 22, 2017
Start time (MST):	8:40	End time (MST):	10:34
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	-288.0
Calculated slope	1.003030	Sample pressure	8.7
Calculated intercept	-0.004089	Fuel pressure	19.3
Analyzer Background	3.450	Air pressure	34.6
Analyzer Coefficient	3.899	Flame temperature	147.6
			<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	5000	0.0	0.00	-0.03	----
as found span	4938	80.5	17.02	16.96	1.004
calibrator zero	5000	0.0	0.00	-0.03	----
high point	4938	80.5	17.02	16.96	1.004
second point	4959	40.2	8.53	8.49	1.005
third point	4981	20.1	4.27	4.25	1.004
as left zero	5000	0.0	0.00	0.01	----
as left span	4914	80.5	17.10	16.97	1.008
Average Correction Factor					1.004
Corrected As found	16.99	Previous response	16.98	*% change	-0.1%

* = > +/-5% change initiates investigation

Notes: No adjustments or maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

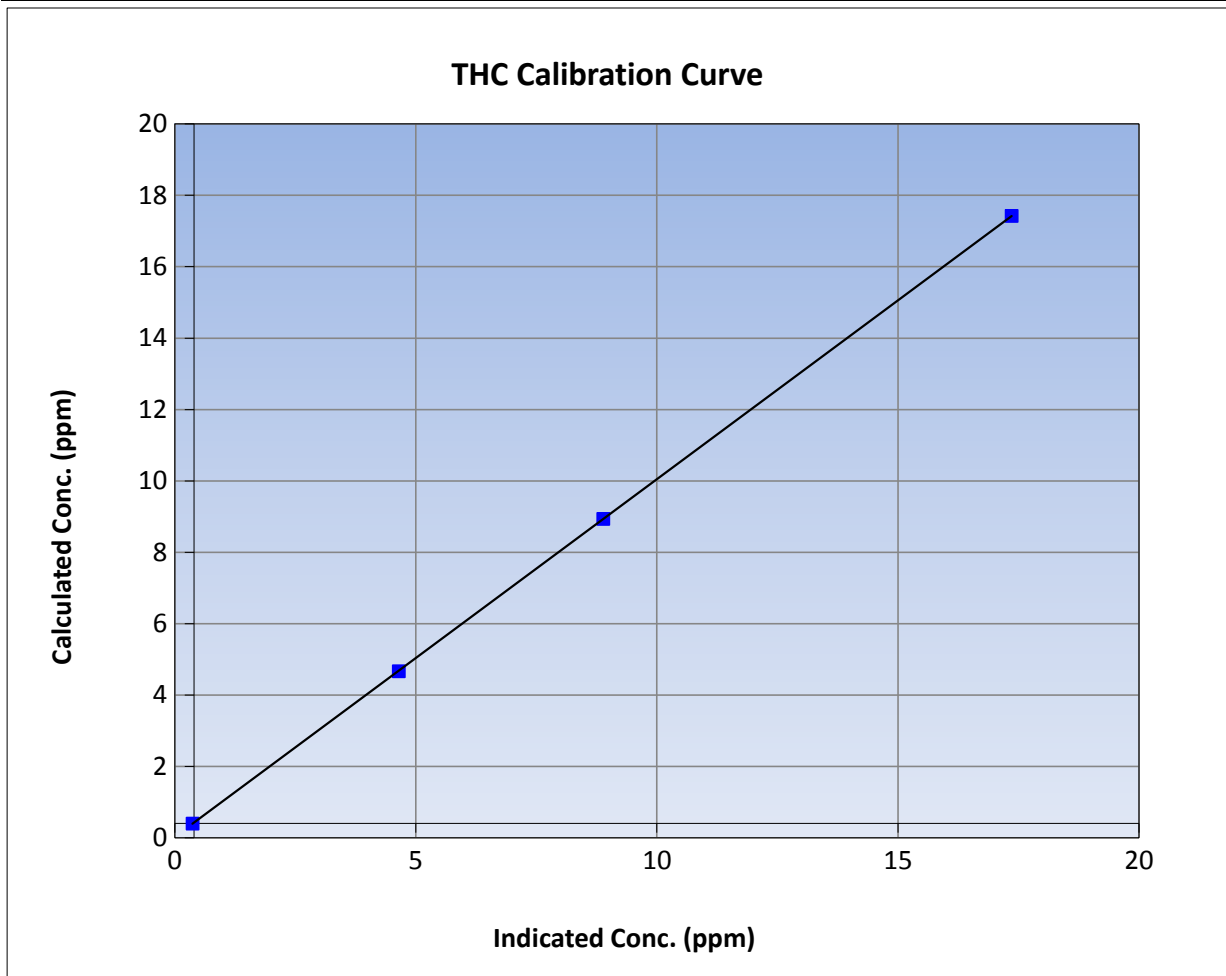
Version-03-2017

Station Information

Calibration Date	July 17, 2017	Previous Calibration	June 22, 2017
Station Name	Buffalo Viewpoint	Station Number	AMS 04
Start Time (MST)	8:00	End Time (MST)	10:34
Analyzer make	Thermo 51i-LT	Analyzer serial #	1170050149

Calibration Data

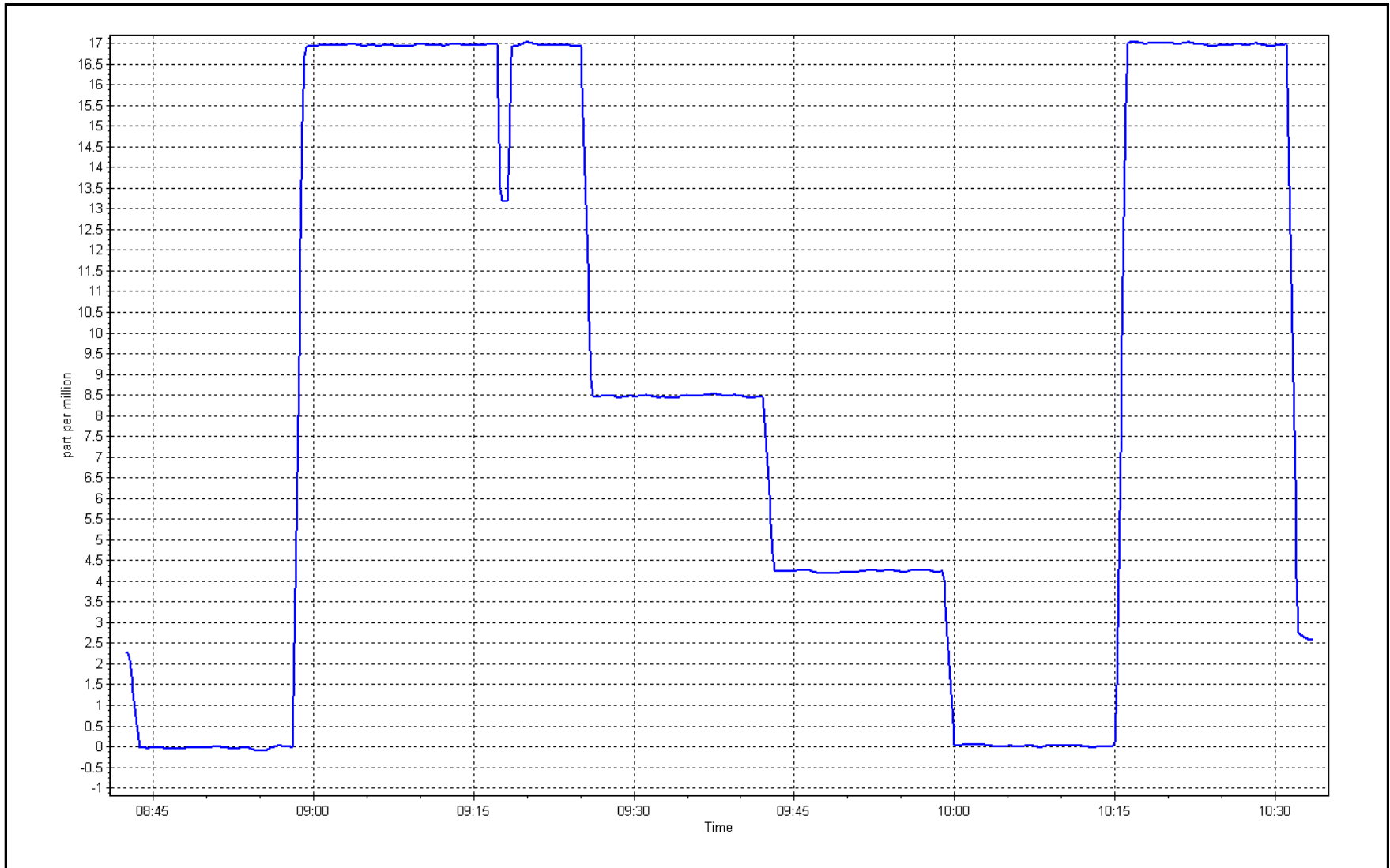
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
17.0	17.0	1.0037			
8.5	8.5	1.0052	Slope	1.002395	0.90 - 1.10
4.3	4.3	1.0036			
			Intercept	0.020298	+/-1.5



THC Calibration Plot

Date: July 17, 2017

Location: Buffalo Viewpoint





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 5
MANNIX
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)

JULY 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	705	38	39	99.87	88	0	18	0
H2S (ppb) Average	710	34	34	100	32	5	5	1
THC (ppm) Average	664	36	80	94.09	6.5	-	2.6	-
Temperature 2 m (C) Average	744	0	0	100	31.3	-	23.4	-
Temperature 20 m (C) Average	744	0	0	100	31.1	-	24	-
Temperature 45 m (C) Average	744	0	0	100	31.2	-	24	-
Temperature 75 m (C) Average	744	0	0	100	31.1	-	24.1	-
Temperature 90 m (C) Average	744	0	0	100	31	-	24.1	-
Relative Humidity 2 m (%) Average	744	0	0	100	98	-	81	-
Relative Humidity 20 m (%) Average	744	0	0	100	98	-	77	-
Relative Humidity 45 m (%) Average	744	0	0	100	99	-	76	-
Relative Humidity 75 m (%) Average	744	0	0	100	98	-	74	-
Relative Humidity 90 m (%) Average	744	0	0	100	98	-	73	-
Wind Speed 20 m (km/h) Average	744	0	0	100	34	-	24	-
Wind Speed 45 m (km/h) Average	744	0	0	100	41	-	30	-
Wind Speed 75 m (km/h) Average	742	0	2	99.73	45	-	34	-
Wind Speed 90 m (km/h) Average	743	0	1	99.87	46	-	36	-
Wind Direction 20 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 75 m (deg) Average	742	0	2	99.73	-	-	-	-
Wind Direction 90 m (deg) Average	743	0	1	99.87	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100	1.3	-	0.6	-
Vertical Wind Speed 45 m (km/h) Average	744	0	0	100	2.3	-	1.2	-
Vertical Wind Speed 75 m (km/h) Average	742	0	2	99.73	2	-	0.7	-
Vertical Wind Speed 90 m (km/h) Average	743	0	1	99.87	2.1	-	0.8	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS 5)
 JULY 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	705	1.7	6	-	0	0	0	0	0	3	88
H2S (ppb) Average	710	0.9	2	-	0	0	0	0	1	3	32
THC (ppm) Average	664	2.25	0.3	-	2	2.1	2.1	2.2	2.3	2.5	6.5
Temperature 2 m (C) Average	744	19.41	4.7	-	7.9	13.7	15.8	19.1	22.7	25.7	31.3
Temperature 20 m (C) Average	744	19.7	4.3	-	9.1	14.2	16.6	19.5	22.6	25.6	31.1
Temperature 45 m (C) Average	744	19.59	4.2	-	9.1	14.3	16.5	19.5	22.4	25.4	31.2
Temperature 75 m (C) Average	744	19.47	4.2	-	9	14.3	16.6	19.3	22.2	25.2	31.1
Temperature 90 m (C) Average	744	19.42	4.1	-	9	14.3	16.6	19.1	22	25.1	31
Relative Humidity 2 m (%) Average	744	62.6	18	-	26	39	49	61	77	89	98
Relative Humidity 20 m (%) Average	744	58.1	17	-	22	35	45	57	71	83	98
Relative Humidity 45 m (%) Average	744	57.3	17	-	21	34	44	57	70	81	99
Relative Humidity 75 m (%) Average	744	56.7	16	-	21	34	44	56	69	78	98
Relative Humidity 90 m (%) Average	744	56.7	16	-	21	34	44	57	69	78	98
Wind Speed 20 m (km/h) Average	744	11.1	6	-	0	4	7	10	15	20	34
Wind Speed 45 m (km/h) Average	744	15.4	8	-	1	6	10	15	21	26	41
Wind Speed 75 m (km/h) Average	742	17.2	9	-	1	6	10	16	24	29	45
Wind Speed 90 m (km/h) Average	743	18.2	9	-	1	6	11	17	25	31	46
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0.06	0.4	-	-1	-0.4	-0.2	0	0.3	0.6	1.3
Vertical Wind Speed 45 m (km/h) Average	744	0.2	0.7	-	-1.9	-0.5	-0.3	0.1	0.7	1.2	2.3
Vertical Wind Speed 75 m (km/h) Average	742	0.24	0.4	-	-1.2	-0.2	0	0.2	0.5	0.7	2
Vertical Wind Speed 90 m (km/h) Average	743	0.21	0.4	-	-1	-0.3	-0.1	0.2	0.5	0.7	2.1

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC	07 Jul 2017 10:00	07 Jul 2017 10:00	1	Maintenance - sample manifold cleaned
THC	02 Jul 2017 11:00	04 Jul 2017 05:00	43	Unstable Operation - station temperature fluctuations
Wind Speed, Wind Direction, Vertical Wind Speed 75 m	01 Jul 2017 05:00	01 Jul 2017 05:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 90 m	01 Jul 2017 06:00	01 Jul 2017 06:00	1	Flat line in sensor output signal



Summary of Hour Averages

Mannix - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 88 ppb on Jul 24 03:00	Maximum Daily Average: 17.6 ppb on Jul 24		Hours of Data:	705
Minimum Value: 0 ppb on Jul 5 05:00	Minimum Daily Average: 0.1 ppb on Jul 4		Hours of Missing Data:	39
Maximum Diurnal Average: 5.5 ppb at hour 3	Minimum Diurnal Average: 0.6 ppb at hour 21		Hours of Calibration:	38
Monthly Average: 1.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 3 P ₉₉ = 29		Percent Operational Time:	99.9

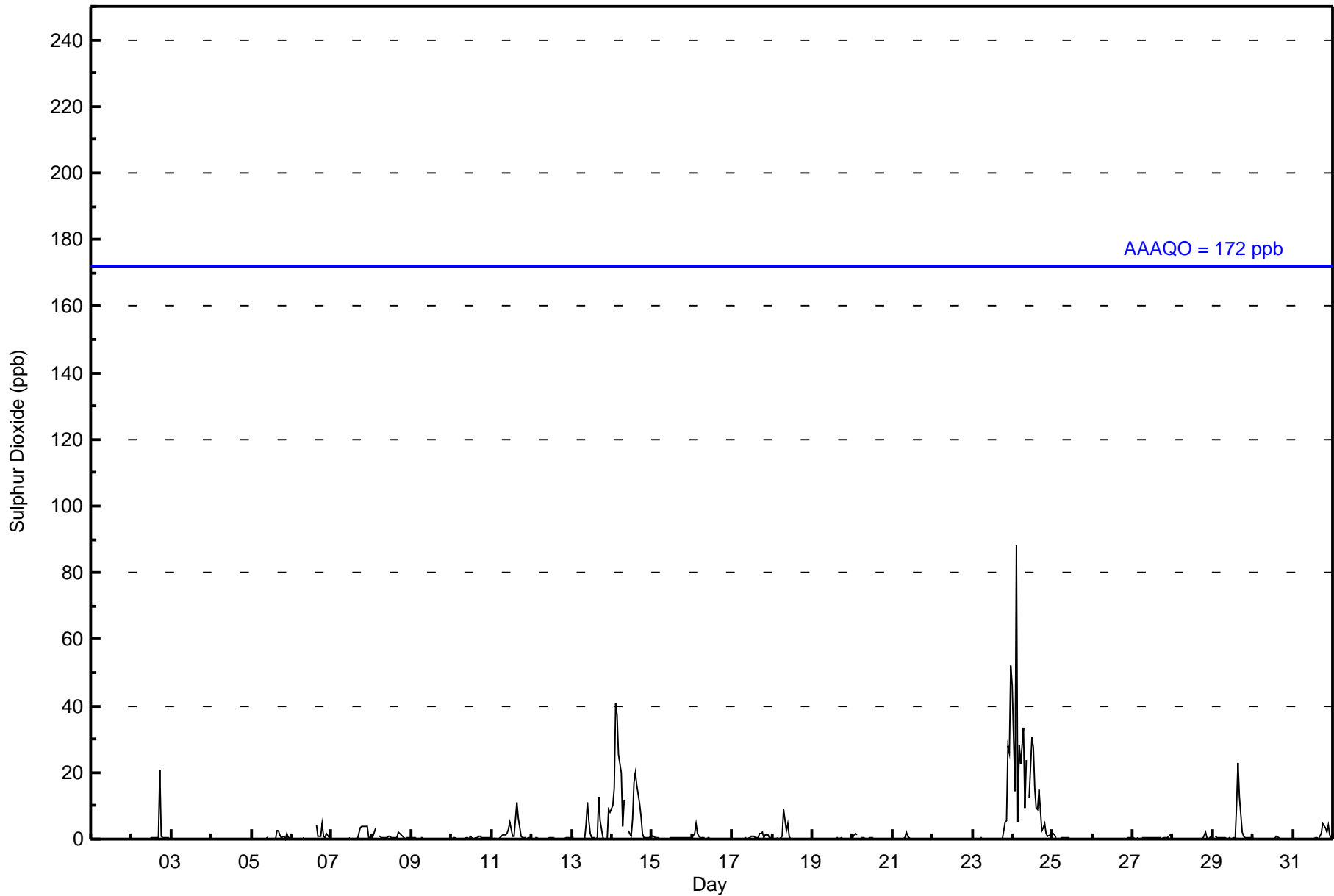
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	21	1	0	0	0	0	0	1.1	21
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
4-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	0	1	0	2	0	0.5	3
6-Jul	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	4	1	1	5	1	1	2	0	0	--	5
7-Jul	0	0	Z	0	0	0	0	0	0	M	0	0	0	0	0	0	2	4	4	4	4	4	0	0	1.0	4
8-Jul	0	1	3	Z	1	1	0	0	0	0	1	1	0	0	0	0	2	2	1	0	0	0	0	0	0.7	3
9-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0.3	1
11-Jul	Z	0	0	0	0	0	1	1	1	2	3	5	1	1	6	11	6	1	1	0	0	0	0	0	1.8	11
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
13-Jul	1	1	Z	0	0	0	0	0	4	11	6	2	0	0	0	0	13	5	0	0	0	0	9	8	2.7	13
14-Jul	10	15	41	37	25	20	4	11	12	Z	3	1	6	17	20	16	10	7	2	0	0	0	0	1	11.3	41
15-Jul	1	1	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Jul	0	2	5	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
17-Jul	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	2	2	2	0	1	1	0	0	0.6	2
18-Jul	0	Z	0	0	0	0	1	9	2	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	9
19-Jul	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-Jul	0	1	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
21-Jul	0	0	0	0	Z	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
22-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	28	26	52	5.2	52
24-Jul	46	15	88	5	28	22	33	9	24	Z	12	30	28	15	9	15	3	3	5	2	1	1	1	1	17.6	88
25-Jul	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
26-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0.4	1
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0.2	2
29-Jul	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	10	23	13	2	1	0	0	0	0	0	2.3	23
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1
31-Jul	0	1	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	4	3	2	4	1	0	0.9	4
	2.4	1.5	5.5	1.8	2.2	1.8	1.4	1.1	1.8	0.8	1.0	1.5	1.3	1.3	1.7	2.3	2.3	1.7	0.8	0.8	0.6	1.5	1.4	2.2	Diurnal Average	
	46	15	88	37	28	22	33	11	24	11	12	30	28	17	20	23	15	21	5	5	5	28	26	52	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
Mannix - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	674	95.60	95.60
11 - 20	15	2.13	97.73
21 - 60	15	2.13	99.86
61 - 110	1	0.14	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mannix - July 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	17	23	12	11	9	16	75	99	52	29	52	118	81	28	26	26	674
11 - 20	6	2	3	0	0	0	1	0	0	0	0	0	0	1	0	2	15
21 - 60	13	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15
61 - 110	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	37	26	16	11	9	16	76	99	52	29	52	118	81	29	26	28	705

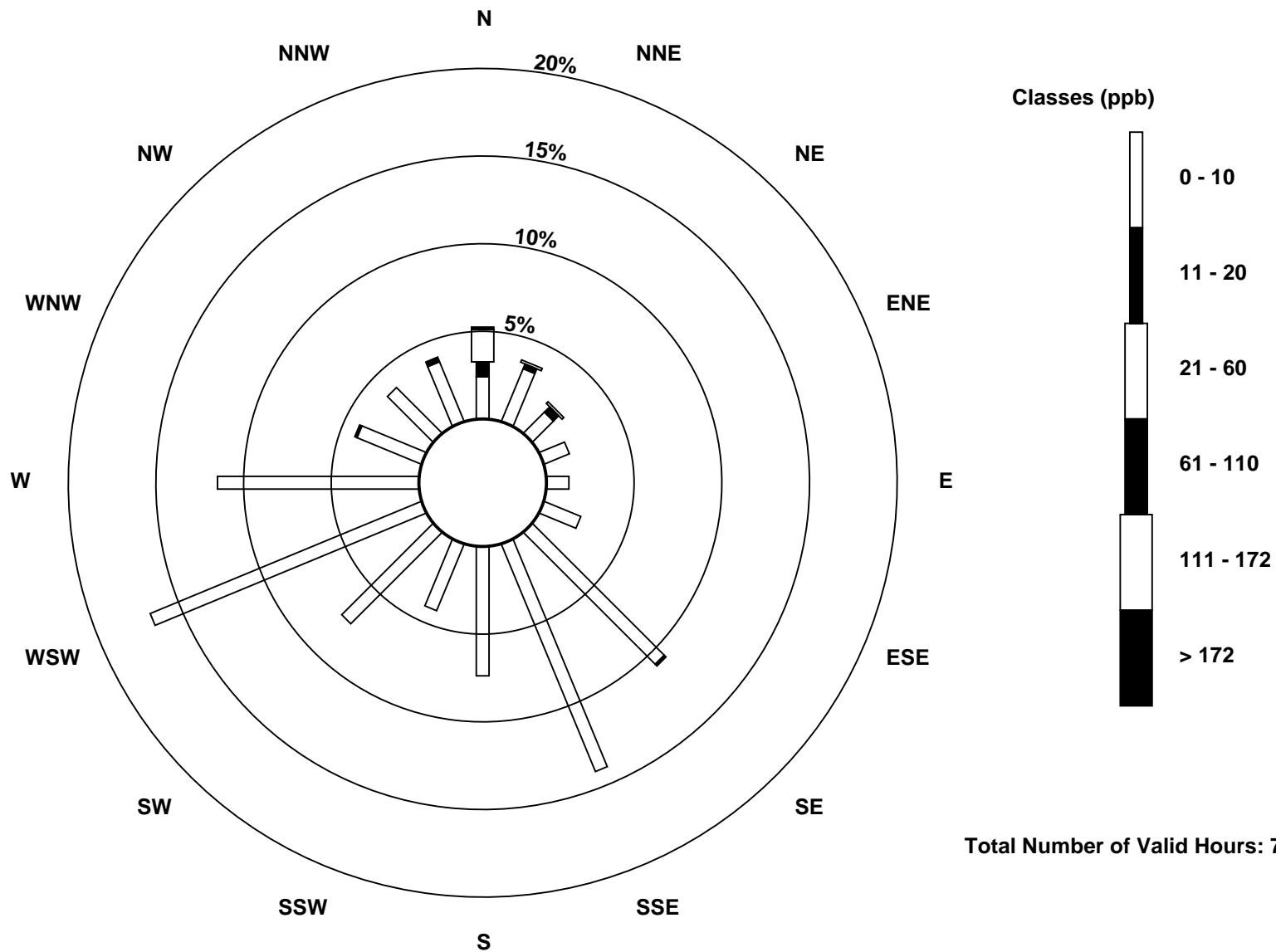
Total Number of Valid Hours: 705

Total Number of Hours: 744

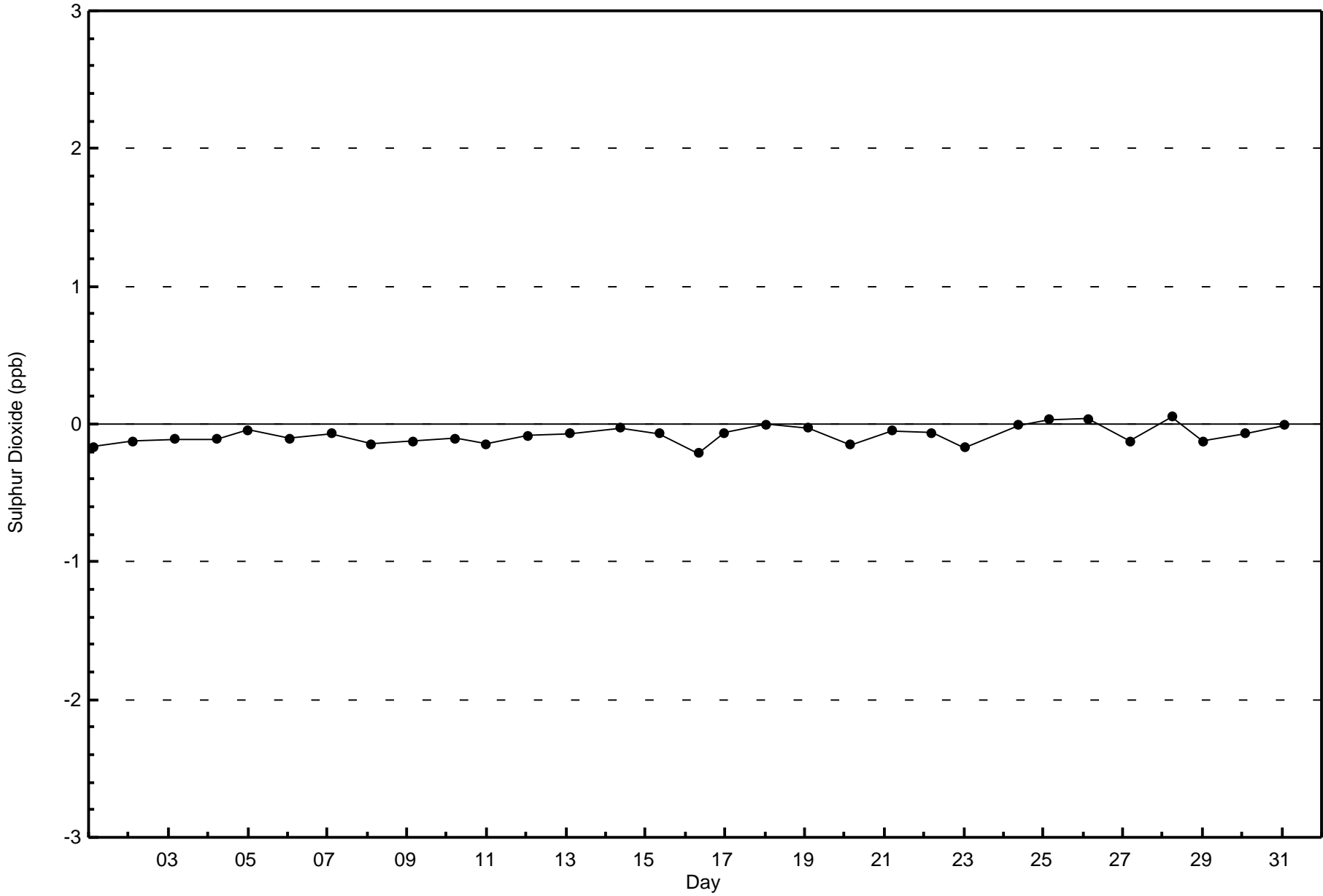


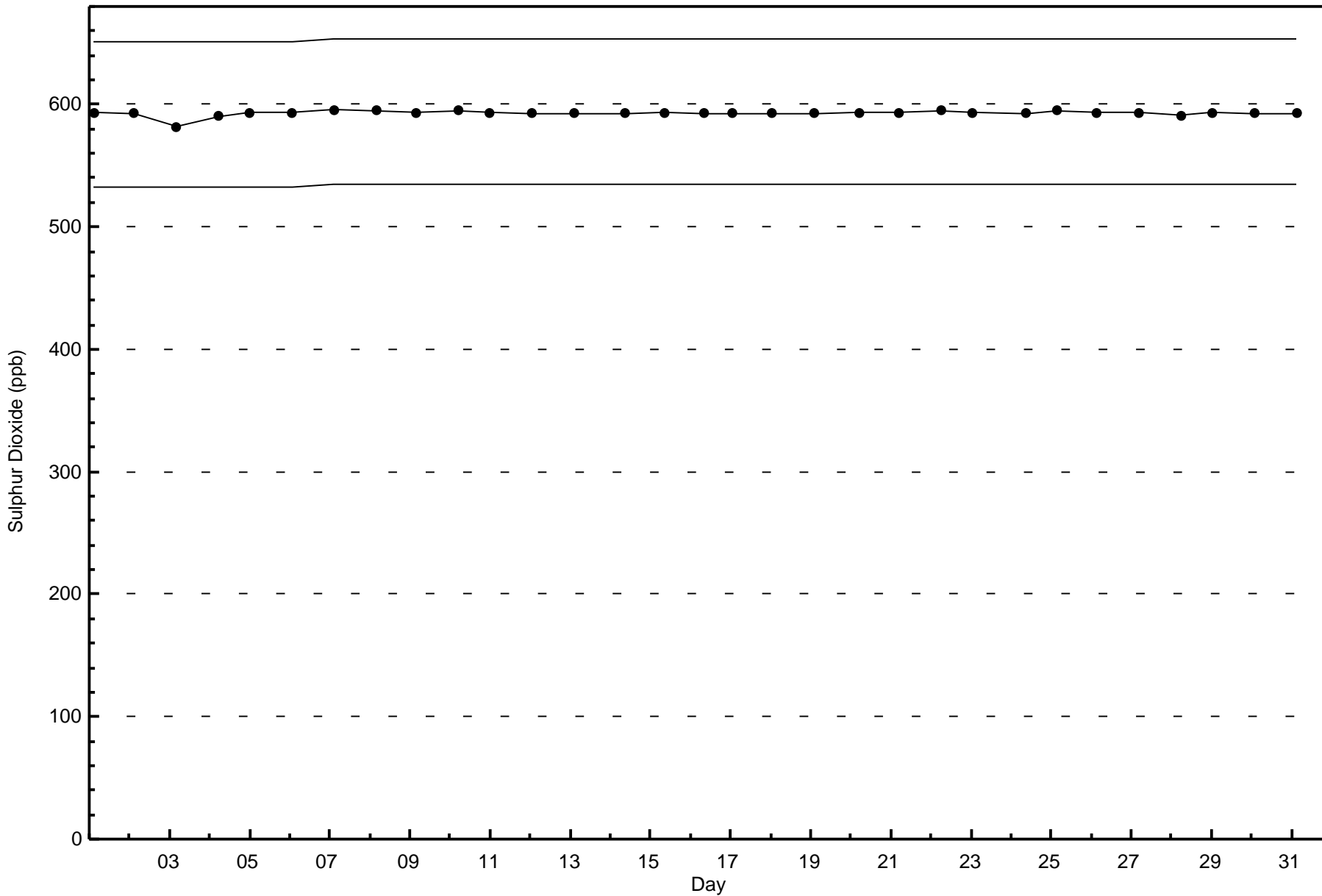
Wood Buffalo Environmental Association
Wind Rose Jul 2017

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



Total Number of Valid Hours: 705



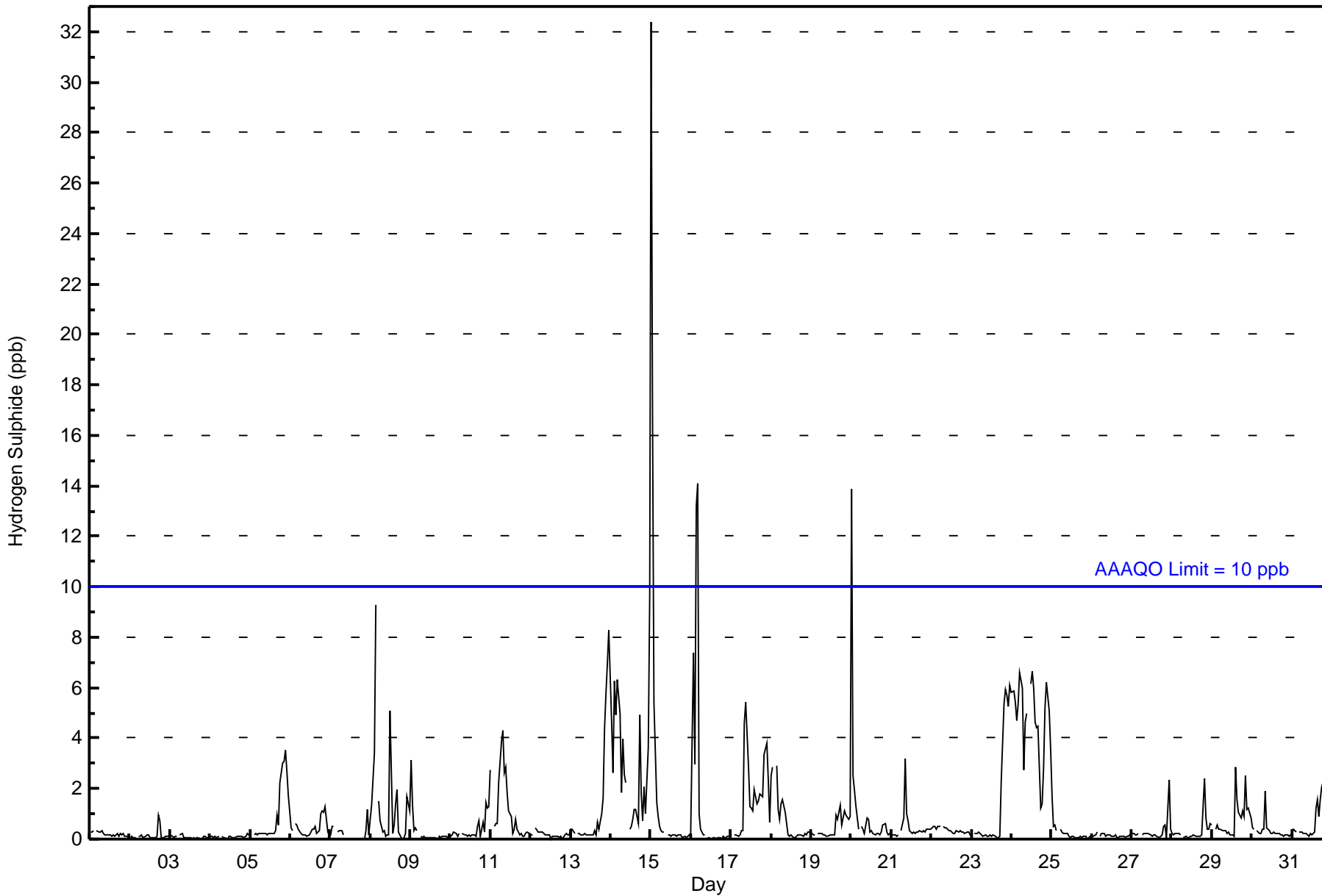




Number of Exceedences (AAAQO):	1-hr: 5	24-hr: 1	Hours in Service:	744
Maximum Value: 32 ppb on Jul 15 01:00	Maximum Daily Average: 4.8 ppb on Jul 24		Hours of Data:	710
Minimum Value: 0 ppb on Jul 2 01:00	Minimum Daily Average: 0.1 ppb on Jul 3		Hours of Missing Data:	34
Maximum Diurnal Average: 2.4 ppb at hour 1	Minimum Diurnal Average: 0.3 ppb at hour 11		Hours of Calibration:	34
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 3 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-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.2	1
3-Jul	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
4-Jul	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
5-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	3	3	3	3	2	0.9	3
6-Jul	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0.5	1
7-Jul	0	1	1	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1
8-Jul	1	1	3	9	Z	1	1	0	0	0	0	5	0	1	1	2	0	0	0	0	0	2	1	1.3	9	
9-Jul	3	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
10-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0.4	1	
11-Jul	3	Z	1	1	1	2	4	4	3	3	2	1	1	0	1	0	0	0	0	0	0	0	0	1.2	4	
12-Jul	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	
13-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	2	4	6	7	1.4	8	
14-Jul	5	3	6	5	6	5	2	4	3	2	Z	0	1	1	1	1	5	2	1	2	1	4	10	3.0	10	
15-Jul	32	17	5	1	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	32	
16-Jul	0	7	3	13	14	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	14	
17-Jul	0	Z	0	0	0	0	0	0	5	5	3	1	1	1	2	1	2	2	2	2	3	4	2	1.7	5	
18-Jul	2	3	Z	3	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3	
19-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.5	1	
20-Jul	14	3	2	1	0	Z	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	1.2	14	
21-Jul	0	0	0	0	0	Z	0	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
22-Jul	0	1	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
23-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	6	6	5	6	1.4	6	
24-Jul	6	6	5	5	5	7	6	3	5	5	Z	6	7	6	5	4	4	1	1	3	5	6	5	4	4.8	7
25-Jul	2	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
26-Jul	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	
27-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0.3	2	
28-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0.3	2	
29-Jul	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	3	2	1	1	1	1	3	1	1	0.8	3	
30-Jul	0	0	Z	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
31-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	2	1	2	2	2	2	3	5	2	1.0	5	
	2.4	1.8	1.2	1.7	1.3	0.9	0.7	0.6	0.8	0.8	0.3	0.4	0.6	0.4	0.5	0.5	0.5	0.6	0.6	0.9	1.2	1.3	1.3	1.2	Diurnal Average	
	32	17	6	13	14	7	6	4	5	5	3	6	7	6	5	4	4	5	2	5	6	6	7	10	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 - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	635	89.44	89.44
3 - 4	32	4.51	93.94
5 - 7	35	4.93	98.87
8 - 11	3	0.42	99.30
> 11	5	0.70	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



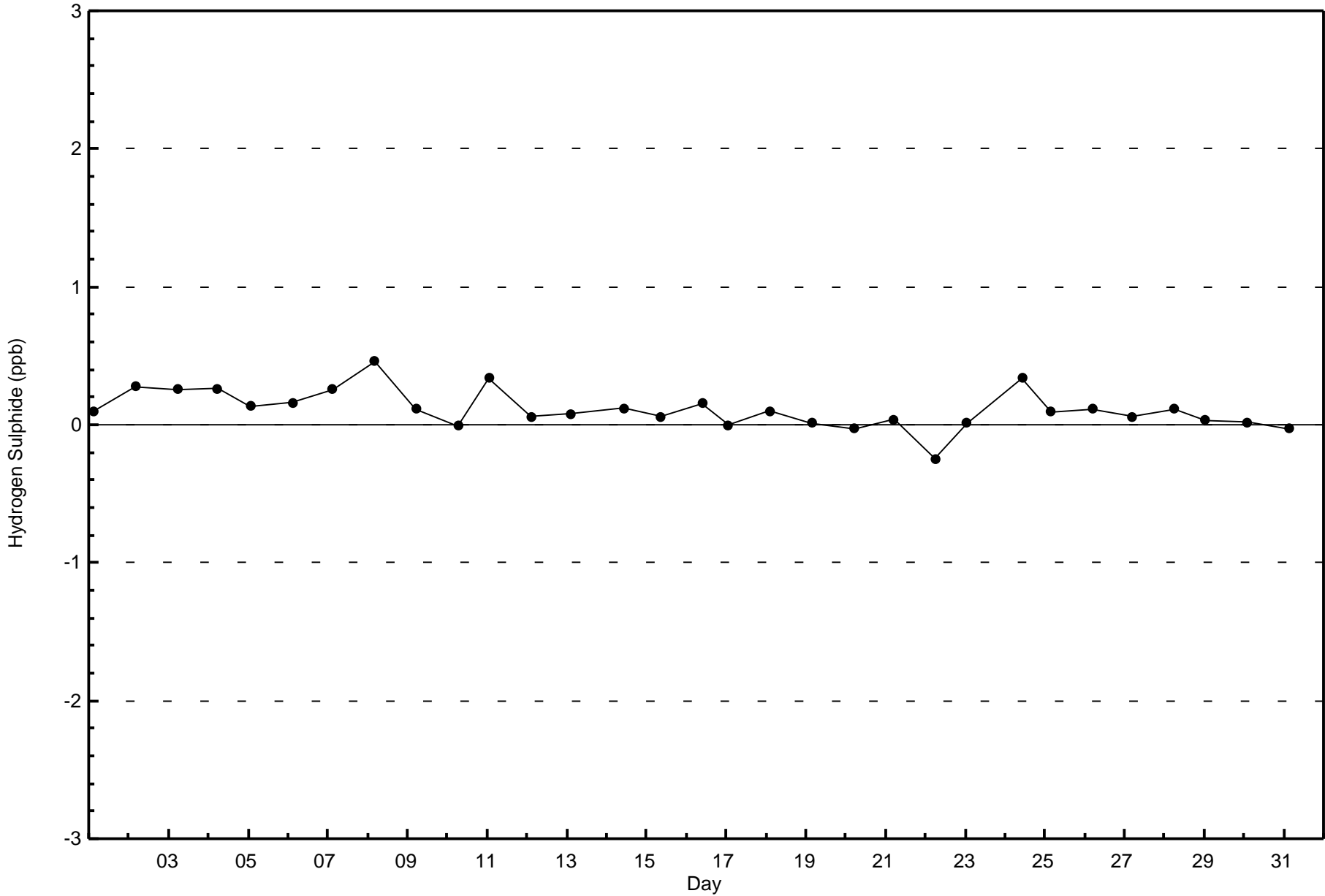
**Wood Buffalo Environmental Association
Frequency Distribution**

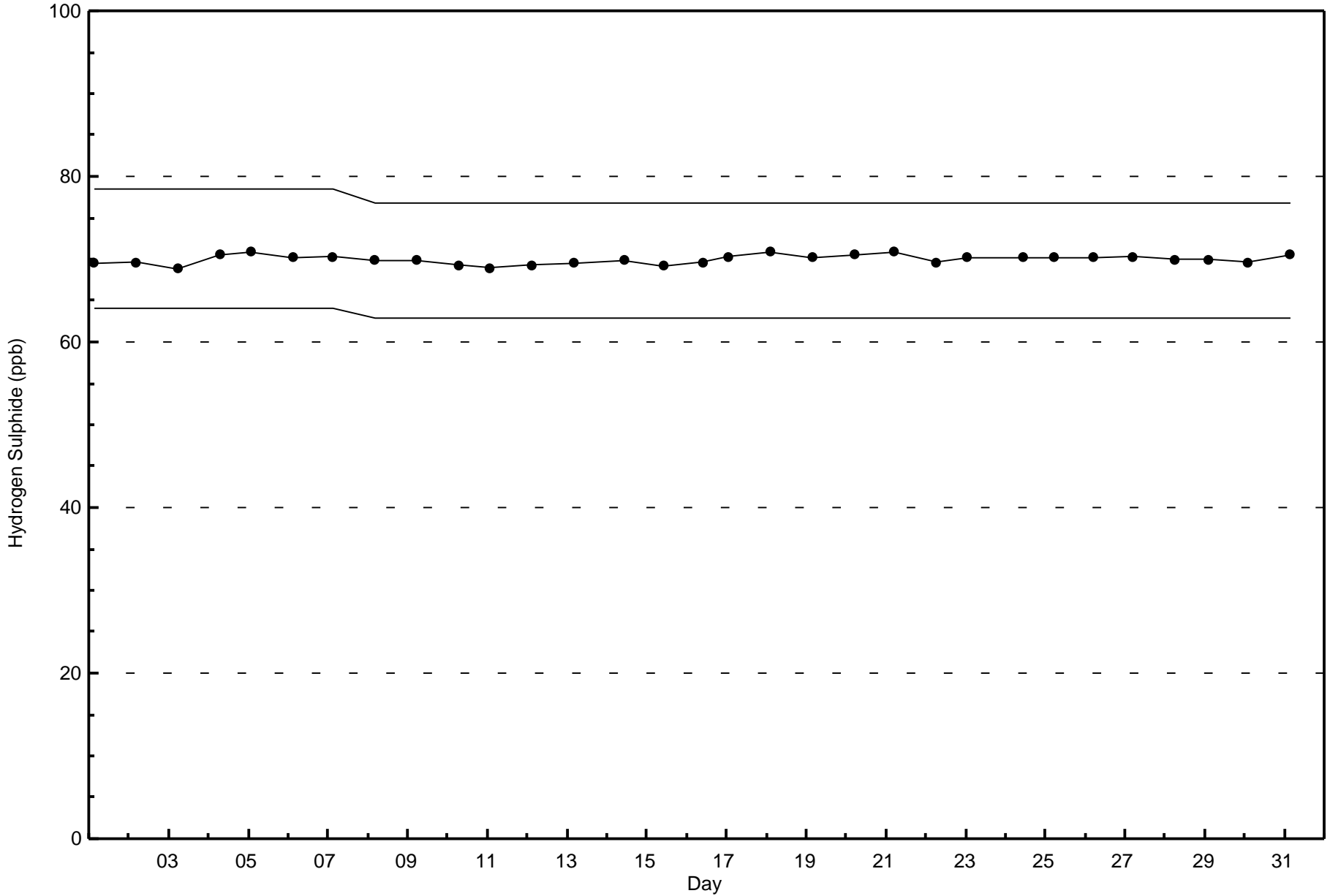
**Hydrogen Sulphide (H₂S) - ppb
Mannix - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	7	19	15	10	7	17	76	97	52	29	53	114	84	27	14	14	635
3 - 4	8	2	0	0	1	0	0	0	0	0	0	2	0	2	10	7	32
5 - 7	22	2	0	0	1	0	0	0	0	0	0	0	0	0	4	6	35
8 - 11	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3
> 11	0	2	0	1	0	0	0	0	0	0	0	1	0	1	0	0	5
Totals	38	25	17	11	9	17	76	97	52	29	53	117	84	30	28	27	710

Total Number of Valid Hours: 710

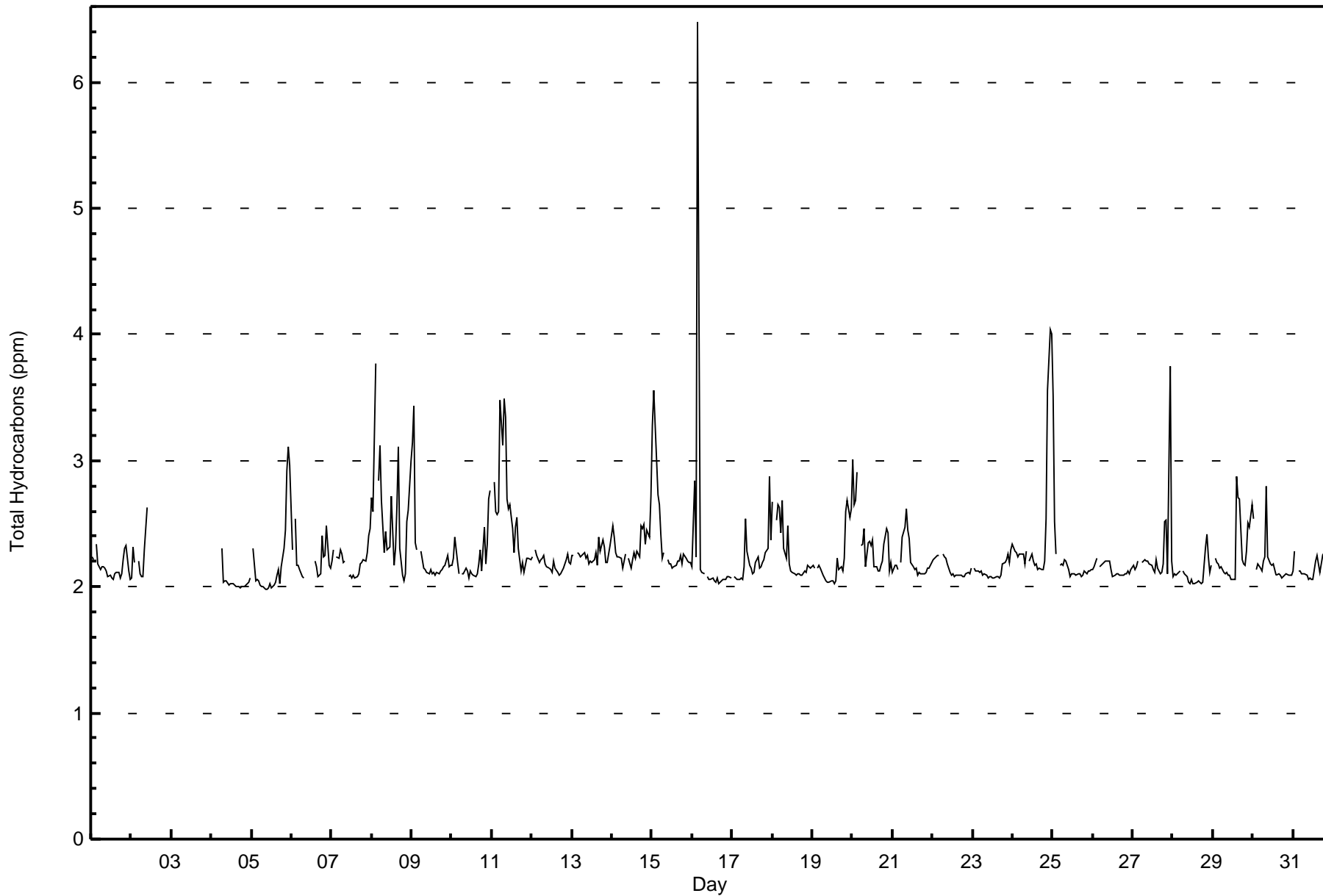
Total Number of Hours: 744







Maximum Value: 6.5 ppm on Jul 16 04:00		Maximum Daily Average: 2.6 ppm on Jul 11		Hours in Service: 744																								
Minimum Value: 2.0 ppm on Jul 5 10:00		Minimum Daily Average: 2.0 ppm on Jul 4		Hours of Data: 664																								
Maximum Diurnal Average: 2.4 ppm at hour 4		Minimum Diurnal Average: 2.1 ppm at hour 14		Hours of Missing Data: 80																								
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 = 3.5		Hours of Calibration: 36																								
				Percent Operational Time: 94.1																								
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-Jul	2.2	2.2	Z	2.3	2.2	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	2.2	2.3	2.3	2.1	2.1	2.2	2.3		
2-Jul	2.1	2.3	2.2	Z	2.2	2.1	2.1	2.1	2.3	2.6	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.6
3-Jul	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	UO	--	--
4-Jul	UO	UO	UO	UO	UO	Z	2.3	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	2.0	2.1	2.1	2.0	2.0	2.3
5-Jul	Z	2.3	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	2.1	2.1	2.0	2.2	2.3	2.5	2.9	3.1	3.0	2.2	2.2	3.1	
6-Jul	2.3	Z	2.5	2.2	2.2	2.1	2.1	2.1	C	C	C	C	C	C	2.2	2.2	2.1	2.1	2.4	2.2	2.2	2.5	2.2	2.1	--	--	2.5	
7-Jul	2.2	2.3	Z	2.2	2.2	2.3	2.3	2.2	2.2	M	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.2	2.2	2.5	
8-Jul	2.7	2.6	3.8	Z	2.8	3.1	2.7	2.3	2.4	2.3	2.3	2.3	2.7	2.2	2.3	2.6	3.1	2.3	2.1	2.1	2.1	2.5	2.6	3.0	2.6	2.6	3.8	
9-Jul	3.1	3.4	2.3	2.3	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	3.4	
10-Jul	2.2	2.2	2.4	2.2	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	2.3	2.1	2.5	2.2	2.3	2.7	2.8	2.2	2.2	2.8	
11-Jul	Z	2.8	2.6	2.6	2.6	3.5	3.1	3.5	3.3	2.7	2.6	2.7	2.5	2.3	2.5	2.6	2.3	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.6	3.5	
12-Jul	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	
13-Jul	2.2	2.3	Z	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.4	2.3	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.4	
14-Jul	2.5	2.4	2.3	2.2	2.2	2.2	2.1	2.2	2.3	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.5	2.5	2.5	2.3	2.4	2.4	2.7	2.3	2.7	
15-Jul	3.3	3.6	3.3	2.7	2.6	2.4	2.2	2.3	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.4	2.4	3.6	
16-Jul	2.2	2.8	2.2	6.5	4.2	2.1	2.1	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	2.1	2.1	2.1	2.4	6.5	
17-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.9	2.4	2.2	2.9	
18-Jul	2.7	Z	2.5	2.7	2.6	2.4	2.7	2.3	2.2	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.7	2.7	
19-Jul	2.2	2.1	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.1	2.2	2.1	2.2	2.1	2.2	2.6	2.7	2.6	2.6	2.2	2.2	2.7	
20-Jul	3.0	2.6	2.7	2.9	Z	2.3	2.3	2.5	2.2	2.4	2.4	2.3	2.4	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.5	2.4	2.1	2.2	2.4	2.4	3.0	
21-Jul	2.1	2.2	2.2	2.1	Z	2.2	2.4	2.5	2.6	2.4	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.6	
22-Jul	2.2	2.2	2.2	2.2	2.3	Z	2.3	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	2.2	2.3	
23-Jul	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	2.1	2.1	2.3	
24-Jul	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.3	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	4.0	
25-Jul	3.5	2.5	2.3	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	2.1	2.1	2.2	2.2	3.5	
26-Jul	2.1	2.2	2.2	Z	2.2	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	2.1	2.1	2.1	2.2	
27-Jul	2.2	2.1	2.2	2.2	Z	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	2.2	2.5	2.5	2.1	3.7	2.2	2.3	3.7		
28-Jul	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.4	2.2	2.1	2.2	2.1	2.1	2.4	
29-Jul	Z	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.9	2.7	2.7	2.2	2.2	2.2	2.3	2.5	2.5	2.6	2.3	2.9	2.9	
30-Jul	2.5	Z	2.1	2.2	2.2	2.1	2.2	2.2	2.8	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	2.2	2.2	2.8	
31-Jul	2.1	2.3	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	2.1	2.2	2.3	2.2	2.2	2.3	2.4	2.3	2.2	2.2	2.4	
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan																								C - Calibration				
																								M - Maintenance				
																								UO - Unstable Operation				





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	43	6.48	6.48
2.1 - 3.0	601	90.51	96.99
3.1 - 10.0	20	3.01	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 664

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mannix - July 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	1	0	0	0	0	0	0	0	0	0	0	3	25	11	3	0	0	43
2.1 - 3.0	35	25	14	10	7	16	69	94	44	28	39	80	70	24	19	27		601
3.1 - 10.0	1	1	1	1	2	0	2	0	0	0	0	1	0	3	7	1		20
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
Totals	37	26	15	11	9	16	71	94	44	28	42	106	81	30	26	28		664

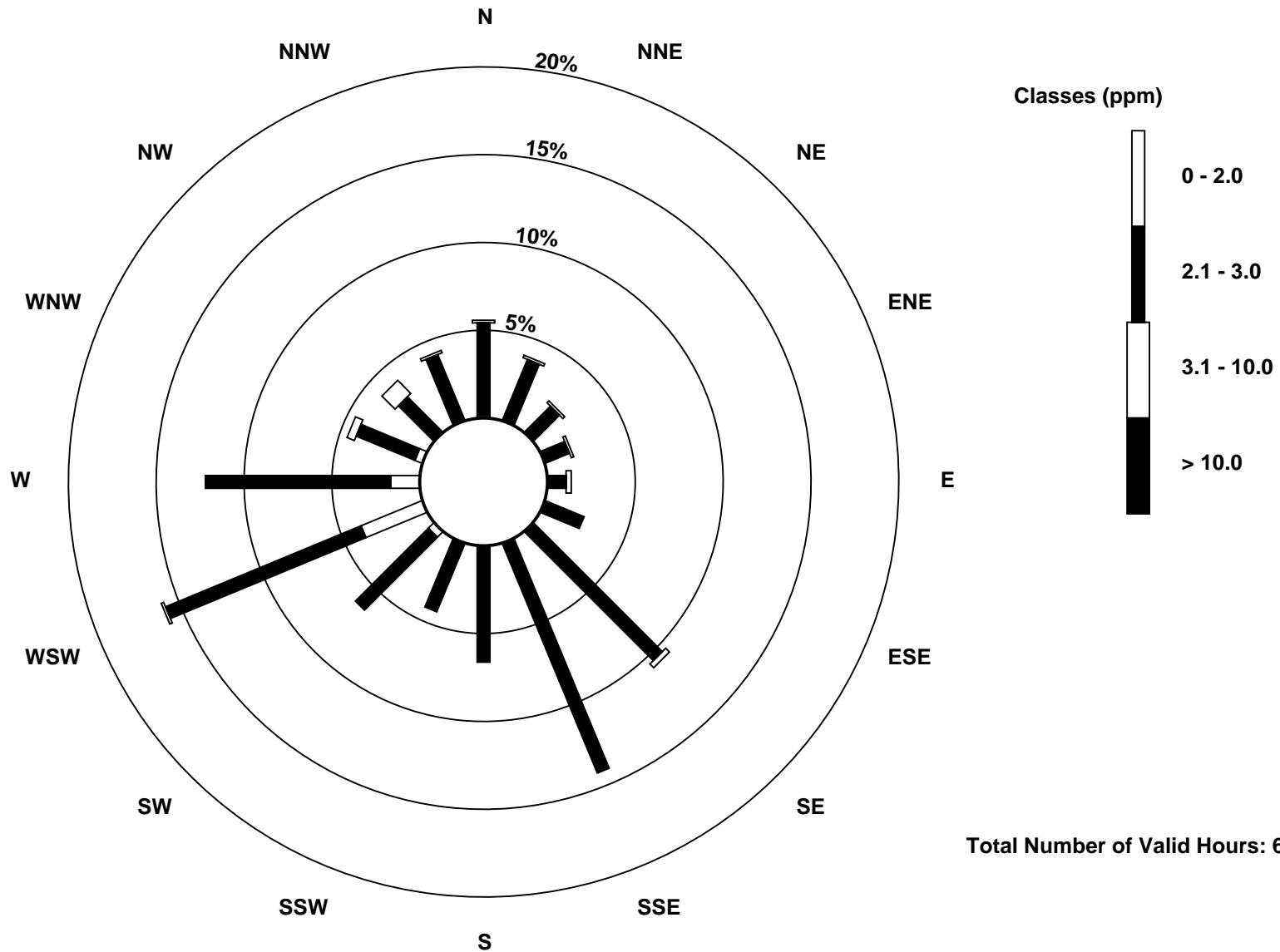
Total Number of Valid Hours: 664

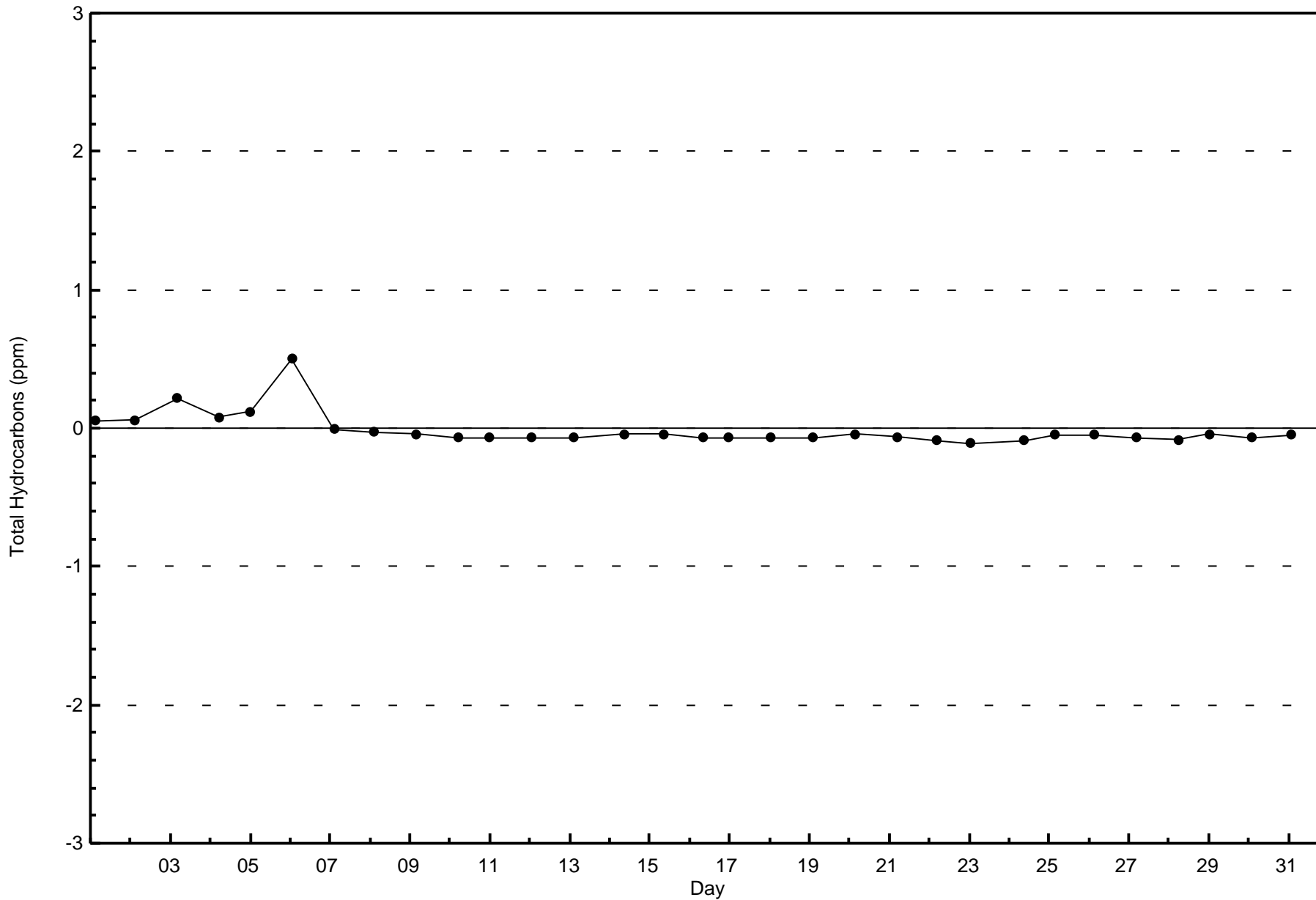
Total Number of Hours: 744

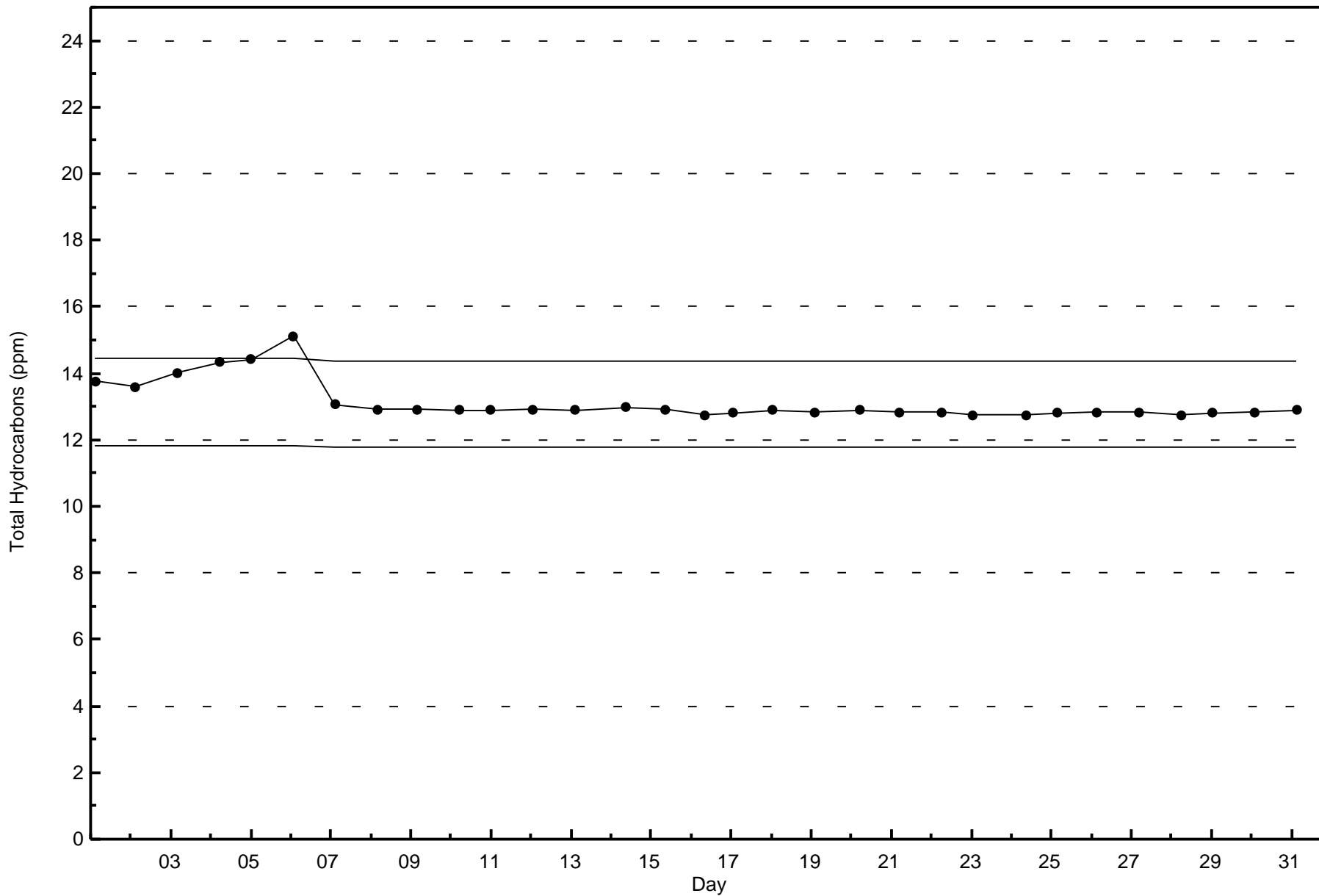


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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

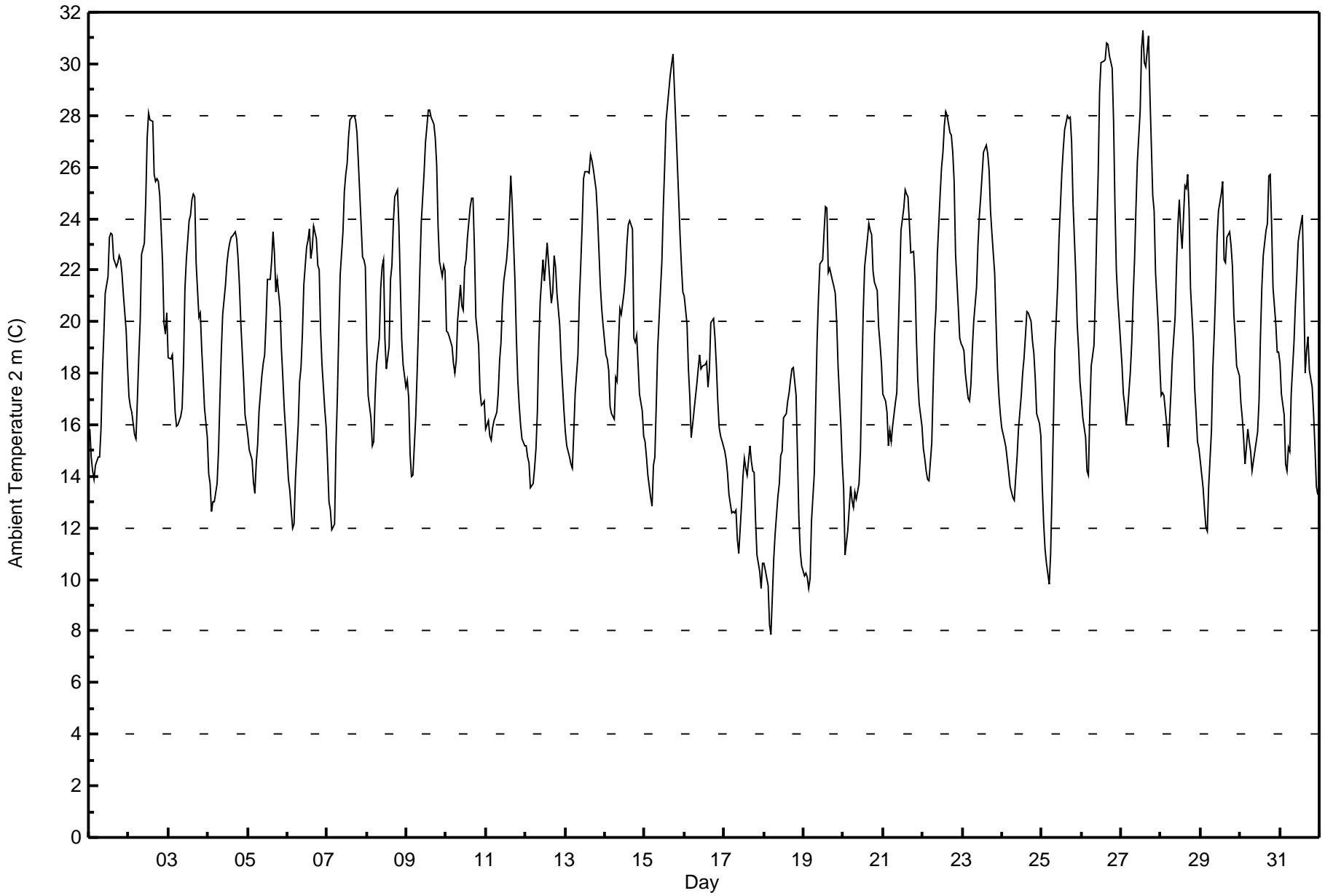








Maximum Value: 31.3 C on Jul 27 14:00																				Maximum Daily Average: 23.4 C on Jul 27					Hours in Service: 744																							
Minimum Value: 7.9 C on Jul 18 05:00																				Minimum Daily Average: 13.0 C on Jul 17					Hours of Data: 744																							
Maximum Diurnal Average: 24.2 C at hour 17																				Minimum Diurnal Average: 14.1 C at hour 5					Hours of Missing Data: 0																							
Monthly Average: 19.41 C																				Percentiles: P ₁ = 10.1 P ₁₀ = 13.7 Q ₁ = 15.8 Median = 19.1 Q ₃ = 22.7 P ₉₀ = 25.7 P ₉₉ = 30.3					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-Jul	15.9	14.8	14.2	13.9	14.4	14.7	14.7	15.9	18.0	19.5	21.1	21.8	23.3	23.4	23.4	22.4	22.1	22.3	22.6	22.4	21.8	21.1	19.6	18.2	19.2	23.4																						
2-Jul	17.1	16.7	16.5	15.6	15.5	17.0	18.6	20.0	22.6	23.1	24.8	27.1	28.1	27.8	27.8	25.7	25.4	25.6	25.4	24.9	22.3	20.0	19.5	20.4	22.0	28.1																						
3-Jul	18.6	18.6	18.7	17.7	16.5	15.9	16.0	16.3	16.6	18.4	21.2	22.4	23.9	24.2	24.7	24.9	24.9	22.3	20.2	20.3	18.9	17.9	16.7	15.5	19.6	24.9																						
4-Jul	14.1	13.7	12.7	13.0	13.0	13.7	15.0	17.0	18.8	20.3	21.4	22.2	22.7	23.1	23.3	23.3	23.5	23.2	22.5	21.4	19.9	17.7	16.4	16.0	18.7	23.5																						
5-Jul	15.6	15.0	14.7	13.8	13.3	14.5	15.3	16.6	17.9	18.4	18.7	20.0	21.6	21.7	22.4	23.5	22.6	21.2	21.6	20.5	18.9	17.8	16.7	15.8	18.2	23.5																						
6-Jul	13.9	13.5	12.7	12.0	12.1	13.9	16.0	17.7	18.2	19.5	21.4	22.9	23.1	23.6	22.4	22.9	23.7	23.2	22.2	22.0	19.7	18.4	16.6	15.9	18.6	23.7																						
7-Jul	14.5	13.0	12.7	11.9	12.1	15.2	17.1	19.6	21.8	23.5	25.1	25.7	26.1	27.2	27.8	28.0	28.0	27.8	27.3	26.2	23.8	22.5	22.4	22.1	21.7	28.0																						
8-Jul	19.2	17.1	16.2	15.2	15.4	17.2	18.3	19.4	21.3	22.1	22.4	19.3	18.2	19.0	21.6	22.2	23.8	24.9	25.1	23.7	21.5	19.3	18.3	17.4	19.9	25.1																						
9-Jul	17.7	17.0	14.9	14.0	14.1	16.3	18.0	19.9	22.0	23.9	25.8	27.0	27.6	28.2	28.2	27.9	27.7	27.1	26.1	23.7	22.4	21.8	22.2	22.0	22.3	28.2																						
10-Jul	19.6	19.6	19.4	19.0	18.4	18.0	18.5	20.1	21.4	20.6	20.5	22.1	22.4	23.3	24.5	24.8	24.8	22.8	20.2	19.1	17.3	16.8	16.8	16.9	20.3	24.8																						
11-Jul	15.9	16.2	15.6	15.4	15.9	16.1	16.5	17.2	18.5	19.2	20.7	21.6	22.4	23.1	24.3	25.7	24.6	21.5	19.4	17.7	16.8	16.0	15.5	15.2	18.8	25.7																						
12-Jul	15.2	14.8	14.5	13.6	13.7	14.3	15.1	16.5	19.1	20.8	22.4	21.6	22.3	23.1	22.3	20.7	21.1	22.6	22.2	21.1	19.9	18.5	17.5	16.5	18.7	23.1																						
13-Jul	15.7	15.2	14.7	14.5	14.3	15.7	17.2	18.7	20.8	22.2	23.7	25.5	25.8	25.8	25.7	26.5	26.2	26.0	25.1	24.1	22.8	21.4	20.5	19.9	21.2	26.5																						
14-Jul	18.7	18.6	18.1	16.7	16.4	16.2	17.9	17.7	19.1	20.5	20.3	21.2	21.8	23.0	23.7	23.9	23.6	19.3	19.2	19.5	18.4	17.2	16.5	15.6	19.3	23.9																						
15-Jul	15.4	14.7	14.0	13.2	12.9	14.4	14.7	16.8	18.9	21.2	22.3	24.4	26.0	27.8	29.0	29.6	30.0	30.4	29.0	27.6	24.9	23.4	22.2	21.1	21.8	30.4																						
16-Jul	21.0	19.9	18.2	17.1	15.5	16.0	16.6	17.6	18.2	18.7	18.2	18.3	18.4	18.5	17.5	18.1	19.9	20.1	19.3	18.3	16.9	15.9	15.6	15.2	17.9	21.0																						
17-Jul	15.0	14.7	14.1	13.3	12.6	12.7	12.6	12.7	11.6	11.0	12.9	14.0	14.7	14.3	14.0	15.2	14.6	14.2	14.2	12.3	10.9	10.3	9.7	10.7	13.0	15.2																						
18-Jul	10.6	10.3	9.8	8.3	7.9	9.3	10.8	11.7	13.2	13.7	14.8	15.0	16.3	16.5	16.9	17.2	17.7	18.2	18.2	17.1	14.7	12.3	11.1	10.5	13.4	18.2																						
19-Jul	10.2	10.2	10.1	9.7	10.1	12.2	14.1	16.8	19.3	21.0	22.3	22.4	23.5	24.5	24.4	21.9	22.0	21.6	21.4	21.1	20.0	18.3	16.0	14.5	17.8	24.5																						
20-Jul	13.5	10.9	11.4	12.0	13.6	13.1	12.8	13.4	13.1	13.7	15.0	17.7	20.4	22.2	23.2	23.8	23.5	23.4	22.0	21.5	21.2	19.8	19.1	18.4	17.4	23.8																						
21-Jul	17.2	16.9	16.5	15.2	15.8	15.4	16.0	16.9	17.2	19.5	21.5	23.5	24.4	25.1	25.0	24.9	23.8	22.6	22.7	21.6	19.4	17.7	16.8	15.9	19.6	25.1																						
22-Jul	15.1	14.7	14.2	13.9	13.8	15.3	17.5	19.5	20.5	22.6	24.9	26.0	26.6	27.6	28.2	28.0	27.3	27.2	26.6	25.4	22.6	20.5	19.3	19.1	21.5	28.2																						
23-Jul	19.1	18.9	18.0	17.0	16.9	17.6	18.9	20.0	21.3	23.0	24.1	24.9	25.7	26.6	26.9	26.5	25.8	24.3	23.4	21.9	19.9	18.2	17.1	16.5	21.3	26.9																						
24-Jul	15.9	15.4	15.1	14.7	14.2	13.6	13.2	13.1	13.9	14.7	15.8	17.1	18.0	18.6	19.5	20.4	20.4	20.0	19.3	18.8	17.8	16.5	16.1	15.6	16.6	20.4																						
25-Jul	13.6	12.2	11.2	10.6	9.8	11.0	13.5	16.2	18.9	21.4	23.3	24.5	25.8	26.7	27.5	28.0	27.9	27.9	27.0	24.6	21.8	19.9	18.9	17.6	20.0	28.0																						
26-Jul	17.0	16.3	15.5	14.2	14.1	16.5	18.3	19.1	21.2	23.7	25.8	28.9	30.1	30.1	30.2	30.8	30.7	30.3	29.9	27.7	24.4	22.0	20.9	20.0	23.2	30.8																						
27-Jul	18.3	17.2	16.8	16.0	16.5	18.1	19.2	21.0	22.4	24.4	26.2	28.1	30.6	31.3	30.1	29.9	31.1	28.8	26.8	24.9	24.3	21.9	19.8	18.3	23.4	31.3																						
28-Jul	17.2	17.3	17.1	16.0	15.2	16.1	17.2	18.5	20.2	22.1	23.8	24.7	23.6	22.9	25.3	25.1	25.7	24.4	21.3	19.3	17.4	16.5	15.4	15.1	19.9	25.7																						
29-Jul	14.6	13.6	12.7	12.0	11.9	13.6	15.8	18.2	19.6	21.3	23.3	24.3	25.0	25.4	22.4	22.3	23.3	23.5	22.9	22.1	20.3	19.4	18.3	17.9	19.3	25.4																						
30-Jul	16.8	16.2	15.5	14.5	15.9	15.4	15.0	14.2	14.6	15.0	15.7	16.9	19.4	21.3	22.6	23.6	23.8	25.7	25.7	23.7	21.3	19.9	18.8	18.8	18.8	25.7																						
31-Jul	18.4	17.2	16.4	14.5	14.2	15.1	15.0	17.2	19.2	20.6	21.8	23.1	23.5	24.1	21.3	18.0	18.9	19.4	18.1	17.5	16.5	15.1	13.6	13.3	18.0	24.1																						
																								16.1	15.5	14.9	14.1	14.1	15.0	16.0	17.3	18.7	20.0	21.3	22.4	23.3	23.9	24.1	24.1	24.2	23.6	22.8	21.7	20.0	18.5	17.5	17.0	Diurnal Average
																								21.0	19.9	19.4	19.0	18.4	18.1	19.2	21.0	22.6	24.4	26.2	28.9	30.6	31.3	30.2	30.8	31.1	30.4	29.9	27.7	24.9	23.4	22.4	22.1	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	7	0.94	0.94
10 - 20	416	55.91	56.85
> 20	321	43.15	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

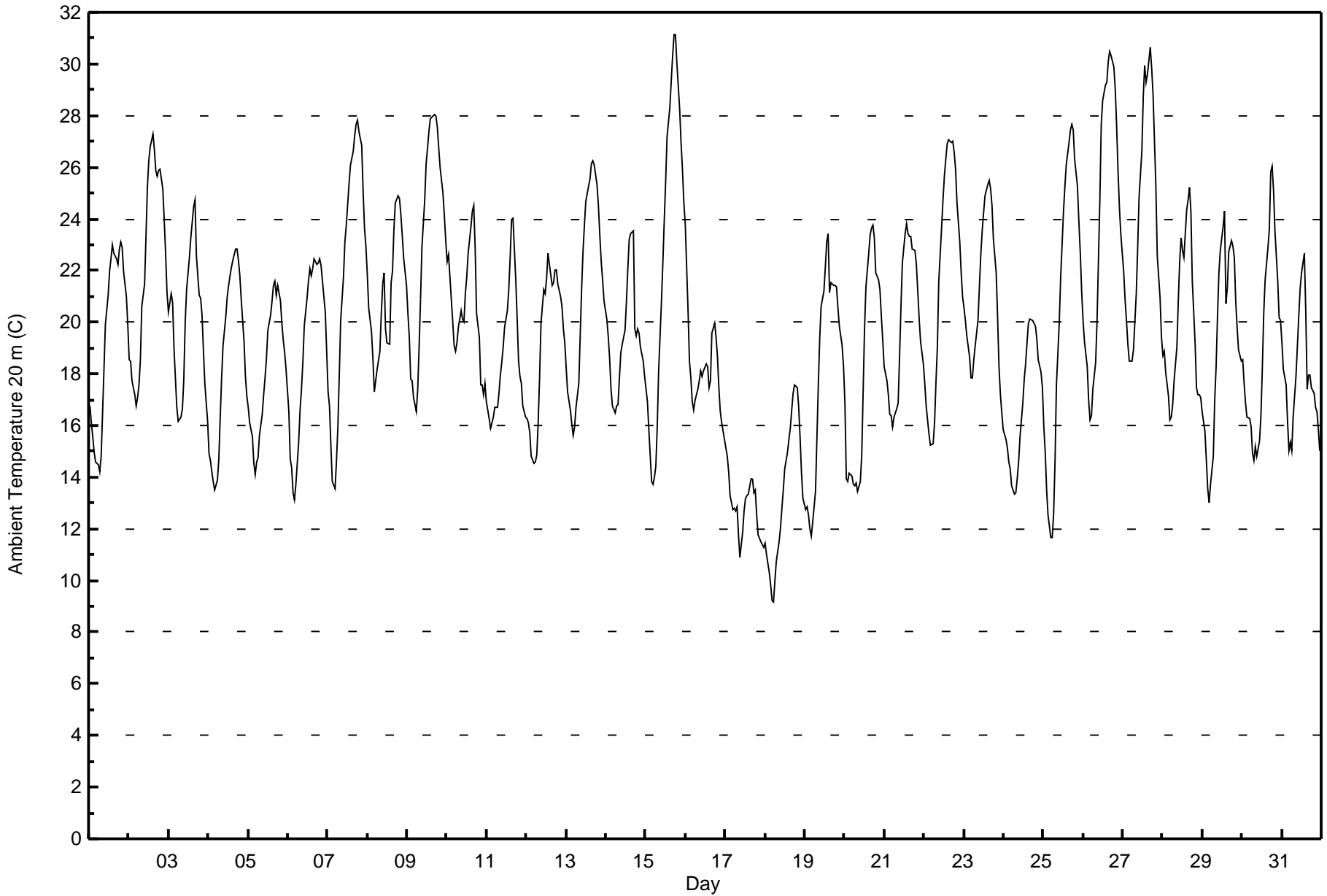
Mannix - July 2017

Maximum Value: 31.1 C on Jul 15 18:00 Maximum Daily Average: 24.0 C on Jul 26																						Hours in Service:	744			
Minimum Value: 9.1 C on Jul 18 06:00 Minimum Daily Average: 12.9 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 23.8 C at hour 17 Minimum Diurnal Average: 15.1 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: 19.70 C Percentiles: P ₁ = 11.0 P ₁₀ = 14.2 Q ₁ = 16.6 Median = 19.5 Q ₃ = 22.6 P ₉₀ = 25.6 P ₉₉ = 30.0																						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-Jul	16.8	16.1	15.6	15.0	14.6	14.5	14.2	14.8	16.5	18.2	19.9	21.0	22.0	22.4	23.0	22.7	22.5	22.3	22.9	23.1	22.9	22.0	21.0	19.9	19.3	23.1
2-Jul	18.5	18.5	17.7	17.2	16.8	17.1	17.6	18.6	20.6	21.5	23.3	25.2	26.3	26.8	27.3	26.7	25.8	25.7	25.9	25.9	25.2	23.9	22.7	21.2	22.3	27.3
3-Jul	20.4	21.1	20.8	19.0	17.9	16.7	16.2	16.3	16.7	17.8	20.0	21.3	22.5	23.3	23.9	24.5	24.8	22.6	21.0	21.0	20.3	19.0	17.6	16.1	20.0	24.8
4-Jul	14.9	14.6	14.2	13.8	13.5	13.9	14.7	16.3	17.8	19.1	20.2	21.0	21.4	21.8	22.1	22.4	22.8	22.9	22.4	21.8	20.9	19.2	17.9	17.2	18.6	22.9
5-Jul	16.7	16.1	15.6	14.6	14.1	14.6	14.8	15.6	16.5	17.2	17.9	18.6	19.7	20.3	20.8	21.4	21.6	21.0	21.4	20.8	19.9	19.3	18.8	18.2	18.1	21.6
6-Jul	16.5	14.7	14.4	13.4	13.2	13.7	15.3	16.6	17.4	18.4	19.8	20.9	21.6	22.1	21.8	22.1	22.5	22.2	22.3	22.5	22.2	21.6	20.4	18.9	18.9	22.5
7-Jul	17.3	16.8	15.2	13.8	13.6	14.6	15.9	17.9	20.0	21.8	23.1	23.8	24.6	25.4	26.1	26.6	27.2	27.7	27.8	27.4	26.8	25.1	23.7	22.9	21.9	27.8
8-Jul	21.9	20.6	19.6	18.6	17.3	17.8	18.2	18.9	20.4	21.5	21.9	19.8	19.2	19.1	21.5	22.0	23.6	24.6	24.9	24.8	24.1	23.3	22.5	21.4	21.1	24.9
9-Jul	20.4	19.4	17.8	17.7	17.1	16.5	17.4	19.0	20.9	22.9	24.7	26.2	26.7	27.4	27.9	27.9	28.1	28.0	27.6	26.8	26.0	25.0	24.1	23.2	23.3	28.1
10-Jul	22.3	22.6	21.8	20.0	19.1	18.9	19.2	19.8	20.4	20.1	20.0	21.1	21.8	22.7	23.7	24.3	24.5	22.9	20.4	19.4	17.6	17.5	17.2	17.6	20.6	24.5
11-Jul	16.9	16.3	15.9	16.1	16.3	16.7	16.7	17.2	18.0	18.4	19.0	19.8	20.4	21.2	22.5	24.0	24.0	21.6	20.1	18.5	17.9	17.6	16.8	16.3	18.7	24.0
12-Jul	16.3	16.1	15.7	14.8	14.5	14.6	14.9	16.1	17.9	20.0	21.2	21.1	21.7	22.7	22.3	21.4	21.5	22.0	22.0	21.5	21.0	20.6	19.7	19.2	19.1	22.7
13-Jul	18.2	17.3	16.6	16.0	15.6	16.0	16.7	17.6	19.5	21.3	22.7	23.7	24.7	25.3	25.5	26.2	26.2	26.1	25.3	24.5	23.4	22.4	21.7	20.8	21.4	26.2
14-Jul	20.1	19.5	18.6	17.4	16.8	16.5	16.7	16.8	17.9	18.8	19.1	19.7	20.7	22.1	23.2	23.4	23.6	19.7	19.5	19.7	19.6	19.0	18.5	17.9	19.4	23.6
15-Jul	17.4	16.9	15.8	13.8	13.7	14.0	14.4	16.0	18.1	20.8	22.3	23.9	25.4	27.1	28.3	29.4	30.3	31.1	31.1	30.1	28.3	26.9	25.9	24.6	22.7	31.1
16-Jul	23.8	20.4	18.5	17.9	16.9	16.6	17.0	17.4	17.7	18.1	17.9	18.1	18.4	18.3	17.5	17.8	19.6	19.9	19.4	18.6	17.5	16.6	16.1	15.5	18.1	23.8
17-Jul	15.1	14.8	14.2	13.3	12.8	12.8	12.7	12.8	11.8	10.9	11.9	12.7	13.2	13.3	13.3	13.9	14.0	13.4	13.5	12.5	11.8	11.5	11.4	11.3	12.9	15.1
18-Jul	11.5	11.0	10.3	9.8	9.2	9.1	10.0	10.8	11.5	12.1	12.8	13.5	14.3	15.0	15.4	15.9	16.6	17.2	17.6	17.5	16.7	15.5	14.1	13.2	13.4	17.6
19-Jul	12.7	12.9	12.5	12.0	11.7	12.3	13.5	15.5	17.6	19.3	20.6	21.2	22.1	23.1	23.4	21.1	21.6	21.4	21.4	21.4	20.6	19.8	19.1	18.3	18.1	23.4
20-Jul	16.9	14.0	13.8	14.2	14.1	13.7	13.7	13.8	13.5	13.8	14.9	17.3	19.8	21.4	22.7	23.4	23.6	23.8	23.2	21.9	21.6	21.3	20.2	19.3	18.2	23.8
21-Jul	18.3	17.7	17.2	16.4	16.4	15.9	16.3	16.6	16.9	18.7	20.6	22.3	23.5	23.8	23.4	23.3	23.3	22.8	22.8	22.2	21.2	20.1	19.3	18.4	19.9	23.8
22-Jul	17.6	16.8	16.2	15.7	15.2	15.3	16.1	17.7	19.0	21.6	23.7	24.7	25.6	26.3	26.9	27.1	26.9	27.0	26.6	25.9	24.6	23.1	21.9	21.0	21.8	27.1
23-Jul	20.6	20.1	19.5	18.7	17.9	17.9	18.5	19.1	20.1	21.4	22.6	23.5	24.2	24.9	25.3	25.5	25.2	24.5	23.2	21.9	20.2	18.3	17.2	16.5	21.1	25.5
24-Jul	15.9	15.4	15.1	14.6	14.3	13.7	13.4	13.4	14.0	14.6	15.5	16.9	17.8	18.4	19.2	19.9	20.1	20.0	19.9	19.9	19.4	18.6	18.1	17.5	16.9	20.1
25-Jul	15.9	15.0	13.5	12.5	11.7	11.7	12.6	14.6	17.6	20.0	21.7	22.9	24.2	25.2	26.1	27.0	27.4	27.7	27.5	26.3	25.3	23.9	22.7	21.2	20.6	27.7
26-Jul	20.0	19.3	18.3	17.0	16.2	16.4	17.4	18.4	20.1	22.4	24.7	27.7	28.6	29.2	29.3	30.1	30.5	30.3	29.9	29.0	27.6	25.8	24.4	23.4	24.0	30.5
27-Jul	22.0	20.9	20.1	19.1	18.5	18.5	18.9	20.0	21.1	22.9	24.8	26.6	28.7	29.9	29.3	29.6	30.6	29.8	28.8	27.0	25.2	22.6	20.9	19.4	24.0	30.6
28-Jul	18.7	18.9	18.1	17.1	16.2	16.3	16.8	17.8	19.0	20.8	22.3	23.2	22.8	22.5	24.3	24.7	25.2	24.3	21.6	19.2	17.5	17.2	17.2	17.1	20.0	25.2
29-Jul	16.5	15.8	14.7	13.5	13.0	13.7	14.8	17.0	18.3	20.2	21.9	22.8	23.7	24.3	20.7	21.3	22.7	23.2	22.9	22.5	20.8	19.8	18.9	18.5	19.2	24.3
30-Jul	18.5	17.6	16.9	16.3	16.3	15.9	14.9	14.7	15.2	14.8	15.4	16.4	18.2	20.4	21.7	22.9	23.6	25.8	26.0	25.1	23.5	21.6	20.2	20.1	19.3	26.0
31-Jul	19.2	18.2	17.6	16.2	15.0	15.3	15.0	16.3	17.9	19.1	20.2	21.3	21.9	22.6	20.4	17.4	17.9	17.9	17.5	17.3	16.7	16.5	15.8	15.0	17.8	22.6
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C
Mannix - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	4	0.54	0.54
10 - 20	396	53.23	53.76
> 20	344	46.24	100.00

Total Number of Valid Hours: 744

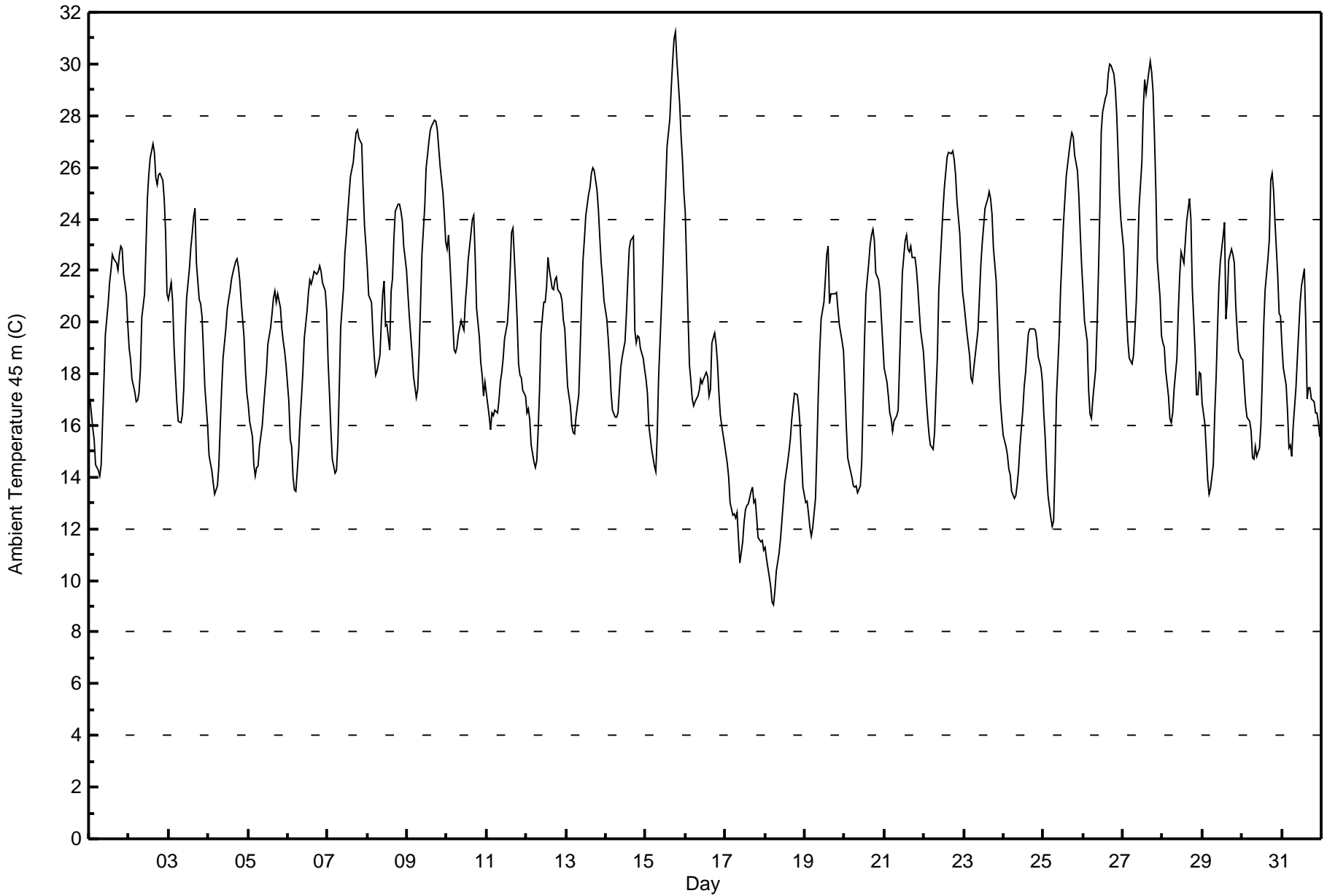
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2017

Maximum Value: 31.2 C on Jul 15 19:00																				Maximum Daily Average: 24.0 C on Jul 26					Hours in Service:	744																							
Minimum Value: 9.1 C on Jul 18 06:00																				Minimum Daily Average: 12.6 C on Jul 17					Hours of Data:	744																							
Maximum Diurnal Average: 23.4 C at hour 17																				Minimum Diurnal Average: 15.1 C at hour 6					Hours of Missing Data:	0																							
Monthly Average: 19.59 C																				Percentiles: P ₁ = 10.8 P ₁₀ = 14.3 Q ₁ = 16.5 Median = 19.5 Q ₃ = 22.4 P ₉₀ = 25.4 P ₉₉ = 29.8					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-Jul	17.0	16.5	15.9	15.4	14.5	14.3	14.0	14.5	16.1	17.8	19.5	20.7	21.5	22.0	22.6	22.5	22.3	22.0	22.6	22.9	22.8	21.9	21.0	19.9	19.2	22.9																							
2-Jul	19.0	18.6	17.8	17.3	16.9	17.0	17.2	18.2	20.2	21.1	23.0	24.8	25.7	26.4	26.9	26.6	25.6	25.3	25.7	25.8	25.5	24.8	23.5	21.1	22.2	26.9																							
3-Jul	20.9	21.5	20.8	19.1	18.0	16.9	16.1	16.1	16.4	17.5	19.6	20.9	22.1	22.9	23.5	24.1	24.4	22.3	20.9	20.7	20.3	18.9	17.5	16.0	19.9	24.4																							
4-Jul	14.8	14.5	14.3	13.8	13.4	13.7	14.4	16.0	17.4	18.6	19.8	20.5	20.9	21.2	21.6	21.9	22.3	22.5	22.1	21.6	20.8	19.4	18.1	17.2	18.4	22.5																							
5-Jul	16.8	16.2	15.6	14.5	14.0	14.4	14.4	15.2	16.0	16.7	17.5	18.1	19.2	19.8	20.3	20.9	21.2	20.8	21.1	20.6	19.8	19.3	18.9	18.4	17.9	21.2																							
6-Jul	16.9	15.5	15.2	14.0	13.5	13.5	15.0	16.2	17.1	18.1	19.4	20.4	21.1	21.7	21.5	21.7	22.0	21.8	22.0	22.2	22.0	21.5	21.2	20.5	18.9	22.2																							
7-Jul	18.5	17.2	15.9	14.7	14.1	14.3	15.3	17.5	19.8	21.3	22.7	23.4	24.2	24.9	25.6	26.2	26.8	27.3	27.5	27.1	26.9	25.2	23.8	23.0	21.8	27.5																							
8-Jul	22.1	21.0	20.8	19.6	18.7	18.0	18.1	18.7	20.0	21.1	21.6	19.8	19.9	18.9	21.2	21.7	23.3	24.3	24.6	24.6	24.3	23.9	22.9	22.0	21.3	24.6																							
9-Jul	21.1	20.2	19.5	18.8	17.9	17.1	17.4	18.8	20.7	22.6	24.5	26.0	26.5	27.0	27.4	27.6	27.8	27.8	27.4	26.8	26.0	25.0	24.1	23.1	23.4	27.8																							
10-Jul	22.9	23.4	22.4	20.0	19.0	18.8	19.1	19.5	20.1	19.8	19.7	20.8	21.5	22.4	23.4	24.0	24.2	22.6	20.5	19.4	18.5	18.0	17.1	17.7	20.6	24.2																							
11-Jul	17.2	16.4	15.9	16.5	16.4	16.6	16.5	17.0	17.7	18.1	18.6	19.4	20.0	20.8	22.0	23.5	23.6	21.3	20.1	18.4	17.9	17.8	17.3	17.1	18.6	23.6																							
12-Jul	16.5	16.6	16.2	15.2	14.6	14.4	14.6	15.8	17.4	19.6	20.8	20.8	21.4	22.5	22.0	21.3	21.3	21.6	21.8	21.3	21.1	20.8	20.1	19.7	19.1	22.5																							
13-Jul	18.6	17.5	16.8	16.0	15.7	15.7	16.3	17.2	19.0	20.8	22.4	23.2	24.1	24.9	25.2	25.7	26.0	25.9	25.1	24.3	23.3	22.3	21.6	20.9	21.2	26.0																							
14-Jul	20.1	19.4	18.5	17.3	16.6	16.3	16.3	16.5	17.4	18.3	18.7	19.3	20.3	21.6	22.8	23.2	23.3	19.7	19.2	19.5	19.4	19.0	18.6	18.2	19.1	23.3																							
15-Jul	17.8	17.2	16.0	15.1	14.8	14.5	14.2	15.7	17.9	20.6	22.1	23.7	25.2	26.8	27.9	29.1	30.1	31.0	31.2	30.2	28.5	27.2	26.3	25.0	22.8	31.2																							
16-Jul	24.2	20.2	18.3	17.8	17.0	16.8	16.9	17.1	17.4	17.8	17.6	17.8	18.1	17.9	17.2	17.4	19.2	19.6	19.1	18.4	17.3	16.5	16.0	15.3	18.0	24.2																							
17-Jul	14.9	14.6	14.0	13.0	12.5	12.6	12.4	12.6	11.6	10.7	11.5	12.3	12.8	12.9	13.0	13.5	13.6	13.0	13.1	12.4	11.7	11.5	11.5	11.2	12.6	14.9																							
18-Jul	11.3	10.8	10.2	9.8	9.2	9.1	9.6	10.4	11.1	11.6	12.3	13.0	13.8	14.5	15.0	15.4	16.2	16.8	17.2	17.2	16.7	15.9	14.8	13.6	13.1	17.2																							
19-Jul	13.0	13.1	12.6	12.0	11.7	12.0	13.2	15.2	17.2	18.9	20.1	20.8	21.6	22.6	23.0	20.7	21.1	21.1	21.1	21.1	20.5	19.9	19.3	18.9	17.9	23.0																							
20-Jul	17.5	15.9	14.8	14.5	14.0	13.7	13.6	13.6	13.4	13.7	14.6	17.0	19.4	21.1	22.3	23.0	23.4	23.6	23.1	21.9	21.6	21.2	20.2	19.2	18.2	23.6																							
21-Jul	18.2	17.7	17.1	16.5	16.3	15.8	16.2	16.4	16.6	18.4	20.2	21.9	23.2	23.4	22.9	22.7	22.9	22.5	22.5	22.1	21.4	20.5	19.7	18.9	19.7	23.4																							
22-Jul	18.0	17.1	16.3	15.7	15.2	15.1	15.7	17.3	18.7	21.2	23.3	24.3	25.2	25.8	26.4	26.6	26.5	26.6	26.3	25.7	24.7	23.4	22.2	21.2	21.6	26.6																							
23-Jul	20.7	20.1	19.6	18.7	17.8	17.7	18.2	18.7	19.7	20.9	22.2	23.0	23.7	24.4	24.8	25.0	24.8	24.2	22.9	21.6	19.9	18.1	16.9	16.2	20.8	25.0																							
24-Jul	15.6	15.2	14.9	14.3	14.1	13.5	13.2	13.3	13.7	14.3	15.2	16.6	17.5	18.1	18.9	19.6	19.8	19.8	19.7	19.7	19.3	18.6	18.2	17.7	16.7	19.8																							
25-Jul	16.4	15.5	14.2	13.3	12.4	12.1	12.3	14.4	17.1	19.5	21.3	22.5	23.8	24.7	25.7	26.6	27.0	27.3	27.2	26.5	25.9	24.9	23.5	22.2	20.7	27.3																							
26-Jul	21.2	20.0	19.2	17.4	16.4	16.3	17.0	18.2	19.8	21.9	24.4	27.4	28.2	28.7	28.9	29.6	30.0	29.9	29.6	29.1	28.1	26.6	25.0	24.0	24.0	30.0																							
27-Jul	22.8	21.5	20.4	19.3	18.6	18.4	18.7	19.7	20.8	22.5	24.5	26.2	28.2	29.4	28.9	29.3	30.1	29.7	28.9	27.2	25.1	22.4	20.9	19.5	23.9	30.1																							
28-Jul	19.2	19.0	18.1	17.2	16.2	16.1	16.5	17.4	18.6	20.4	21.8	22.7	22.5	22.3	23.9	24.3	24.8	24.0	21.3	18.9	17.2	17.2	18.1	18.0	19.8	24.8																							
29-Jul	16.8	16.1	15.0	13.9	13.3	13.6	14.5	16.4	17.9	19.7	21.4	22.4	23.3	23.9	20.1	20.9	22.4	22.8	22.6	22.3	20.7	19.7	18.9	18.6	19.0	23.9																							
30-Jul	18.6	17.6	16.8	16.3	16.1	15.8	14.7	14.7	15.2	14.8	15.2	16.0	17.8	19.9	21.3	22.5	23.2	25.5	25.8	25.1	23.9	21.8	20.4	20.2	19.1	25.8																							
31-Jul	19.1	18.2	17.6	16.6	15.1	15.2	14.8	15.9	17.4	18.6	19.7	20.8	21.4	22.1	20.0	17.0	17.5	17.4	17.0	16.9	16.5	16.5	16.1	15.6	17.6	22.1																							
																								18.3	17.6	16.8	15.9	15.3	15.1	15.4	16.3	17.4	18.6	19.8	20.9	21.7	22.4	22.8	23.0	23.4	23.2	22.9	22.3	21.5	20.6	19.8	19.0	Diurnal Average	
																								24.2	23.4	22.4	20.0	19.0	18.8	19.1	19.7	20.8	22.6	24.5	27.4	28.2	29.4	28.9	29.6	30.1	31.0	31.0	31.2	30.2	28.5	27.2	26.3	25.0	Diurnal Maximum





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	4	0.54	0.54
10 - 20	408	54.84	55.38
> 20	332	44.62	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Summary of Hour Averages

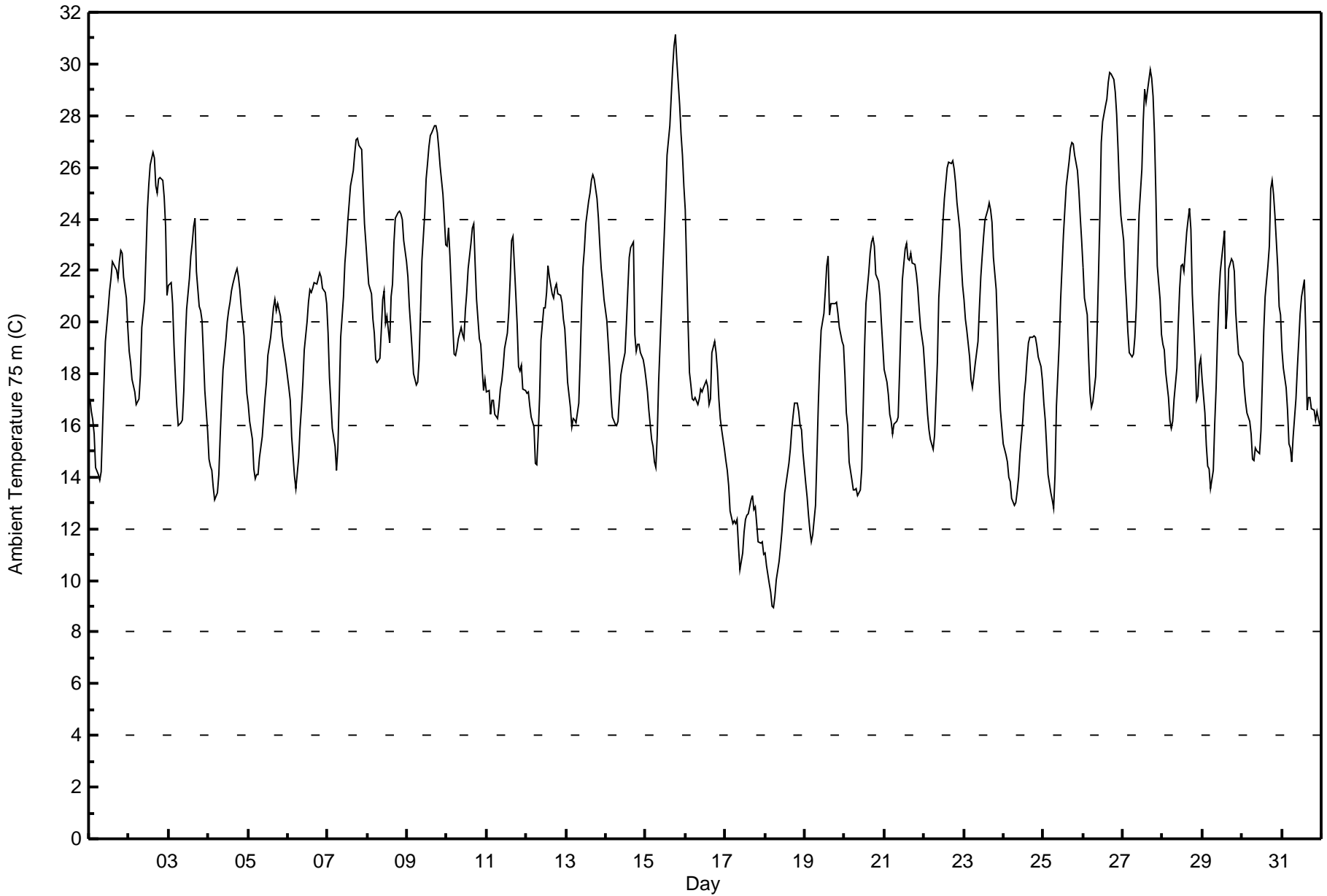
Mannix - July 2017

Maximum Value: 31.1 C on Jul 15 19:00 Maximum Daily Average: 24.1 C on Jul 26																						Hours in Service:	744			
Minimum Value: 9.0 C on Jul 18 06:00 Minimum Daily Average: 12.3 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 23.1 C at hour 17 Minimum Diurnal Average: 15.1 C at hour 6																						Hours of Missing Data:	0			
Monthly Average: 19.47 C Percentiles: P ₁ = 10.6 P ₁₀ = 14.3 Q ₁ = 16.6 Median = 19.3 Q ₃ = 22.2 P ₉₀ = 25.2 P ₉₉ = 29.5																						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-Jul	17.0	16.6	16.2	15.7	14.4	14.1	13.9	14.2	16.0	17.6	19.3	20.5	21.2	21.7	22.4	22.2	22.0	21.7	22.4	22.8	22.7	21.7	21.0	19.8	19.0	22.8
2-Jul	18.9	18.5	17.8	17.3	16.8	16.9	17.1	17.9	19.8	20.9	22.6	24.4	25.3	26.1	26.6	26.4	25.3	25.0	25.5	25.6	25.5	24.8	23.7	21.1	22.1	26.6
3-Jul	21.4	21.5	20.7	19.1	17.9	16.8	16.0	16.1	16.2	17.3	19.2	20.5	21.7	22.5	23.1	23.7	24.0	22.0	20.6	20.5	20.1	18.8	17.4	15.8	19.7	24.0
4-Jul	14.7	14.4	14.3	13.6	13.1	13.4	14.1	15.6	17.0	18.2	19.3	20.0	20.5	20.8	21.2	21.5	21.9	22.1	21.8	21.3	20.6	19.5	18.2	17.2	18.1	22.1
5-Jul	16.8	16.2	15.5	14.3	13.9	14.1	14.1	14.8	15.6	16.3	17.1	17.7	18.7	19.4	19.9	20.5	20.9	20.4	20.7	20.2	19.5	19.1	18.7	18.3	17.6	20.9
6-Jul	17.4	17.0	15.6	14.8	14.0	13.6	14.8	15.9	16.7	17.7	18.9	20.0	20.8	21.3	21.1	21.3	21.5	21.5	21.7	21.9	21.7	21.3	21.1	20.7	18.9	21.9
7-Jul	19.6	17.9	16.8	15.9	15.2	14.3	15.1	17.1	19.4	21.0	22.3	23.0	23.9	24.6	25.3	25.9	26.5	27.0	27.1	26.9	26.7	25.2	23.8	23.0	21.8	27.1
8-Jul	22.2	21.5	21.1	20.1	19.6	18.5	18.4	18.6	19.7	20.9	21.2	20.0	20.2	19.2	21.0	21.5	23.0	24.0	24.3	24.3	24.2	24.0	23.2	22.3	21.4	24.3
9-Jul	21.8	20.6	19.8	18.9	18.0	17.6	17.7	18.5	20.4	22.4	24.2	25.5	26.2	26.8	27.2	27.4	27.6	27.6	27.3	26.8	26.1	25.0	24.0	23.0	23.3	27.6
10-Jul	23.0	23.7	22.5	19.9	18.8	18.7	19.0	19.4	19.8	19.5	19.4	20.4	21.2	22.1	23.0	23.7	23.8	22.2	20.9	19.4	19.1	18.2	17.3	17.8	20.5	23.8
11-Jul	17.3	17.4	16.4	17.0	17.0	16.4	16.2	16.8	17.4	17.7	18.3	19.0	19.6	20.4	21.6	23.2	23.3	21.1	19.9	18.3	18.1	18.3	17.4	17.3	18.6	23.3
12-Jul	17.2	17.3	16.8	16.3	16.0	14.5	14.5	15.6	17.1	19.3	20.5	20.6	21.2	22.2	21.8	21.1	21.0	21.3	21.5	21.1	21.1	20.8	20.1	19.8	19.1	22.2
13-Jul	18.8	17.7	16.7	16.0	16.3	16.2	16.1	16.9	18.6	20.5	22.1	22.9	23.8	24.7	25.0	25.5	25.7	25.5	24.8	24.1	23.0	22.1	21.5	20.9	21.1	25.7
14-Jul	20.1	19.2	18.3	17.1	16.3	16.1	16.0	16.1	17.1	17.9	18.3	18.8	20.0	21.3	22.5	22.9	23.1	19.5	18.9	19.2	19.1	18.8	18.5	18.2	18.9	23.1
15-Jul	17.8	17.3	16.6	15.5	15.2	14.6	14.4	15.6	17.7	20.6	22.0	23.4	24.8	26.5	27.6	28.8	29.8	30.7	31.1	30.1	28.4	27.3	26.4	25.3	22.8	31.1
16-Jul	24.4	20.0	18.1	17.6	17.0	17.0	17.1	16.8	17.0	17.4	17.3	17.5	17.7	17.5	16.8	17.0	18.8	19.2	18.8	18.1	17.1	16.3	15.8	15.1	17.7	24.4
17-Jul	14.6	14.3	13.7	12.7	12.2	12.3	12.2	12.4	11.3	10.4	11.1	11.9	12.4	12.5	12.6	13.1	13.3	12.7	12.8	12.2	11.5	11.5	11.5	11.0	12.3	14.6
18-Jul	11.0	10.6	9.9	9.6	9.0	9.0	9.4	10.0	10.7	11.3	11.9	12.6	13.4	14.2	14.5	15.1	15.8	16.4	16.9	16.9	16.5	16.0	15.8	15.0	13.0	16.9
19-Jul	13.8	13.3	12.6	11.9	11.5	11.8	12.9	14.8	16.8	18.5	19.7	20.3	21.2	22.2	22.6	20.3	20.7	20.7	20.7	20.8	20.3	19.8	19.3	19.1	17.7	22.6
20-Jul	18.0	16.5	16.0	14.6	13.9	13.5	13.5	13.5	13.3	13.5	14.3	16.6	19.0	20.7	21.9	22.7	23.1	23.3	22.9	21.9	21.6	21.0	20.0	19.1	18.1	23.3
21-Jul	18.2	17.7	17.2	16.4	16.2	15.7	16.0	16.2	16.3	18.1	20.0	21.7	22.8	23.1	22.5	22.4	22.7	22.3	22.2	21.8	21.3	20.5	19.8	19.1	19.6	23.1
22-Jul	18.2	17.3	16.5	15.8	15.4	15.1	15.6	17.0	18.4	20.9	22.9	23.9	24.8	25.4	26.0	26.2	26.1	26.2	25.9	25.4	24.6	23.6	22.3	21.4	21.5	26.2
23-Jul	20.9	20.1	19.7	18.6	17.8	17.5	17.9	18.4	19.3	20.5	21.7	22.6	23.3	24.0	24.3	24.6	24.4	23.9	22.5	21.3	19.6	17.8	16.6	15.9	20.5	24.6
24-Jul	15.3	14.9	14.6	14.0	13.8	13.2	12.9	13.0	13.4	14.0	14.9	16.2	17.2	17.7	18.6	19.2	19.4	19.4	19.5	19.4	19.1	18.6	18.3	17.7	16.4	19.5
25-Jul	16.8	16.2	15.2	14.1	13.4	13.1	12.8	14.1	16.7	19.2	20.9	22.1	23.4	24.4	25.3	26.2	26.7	26.9	26.9	26.5	25.9	25.1	24.1	23.2	20.8	26.9
26-Jul	22.1	21.0	20.3	18.6	17.2	16.7	16.9	17.9	19.6	21.8	24.1	26.9	27.8	28.3	28.6	29.3	29.7	29.6	29.4	28.9	28.0	26.7	25.2	24.2	24.1	29.7
27-Jul	23.1	21.8	20.8	19.6	18.8	18.7	18.8	19.4	20.5	22.3	24.2	25.9	27.8	29.0	28.5	29.0	29.8	29.4	28.8	27.3	25.0	22.2	20.9	19.5	23.8	29.8
28-Jul	19.1	18.9	18.1	17.1	16.2	15.9	16.2	17.0	18.2	20.0	21.3	22.2	22.2	22.0	23.5	24.0	24.4	23.6	21.1	18.7	17.0	17.1	18.3	18.6	19.6	24.4
29-Jul	17.8	16.5	15.3	14.4	14.3	13.5	14.3	16.0	17.5	19.4	21.0	22.0	23.0	23.5	19.7	20.5	22.1	22.5	22.3	22.0	20.4	19.5	18.8	18.5	19.0	23.5
30-Jul	18.4	17.5	16.9	16.5	16.2	15.7	14.7	14.6	15.2	15.0	14.9	15.8	17.7	19.7	21.0	22.2	22.9	25.2	25.5	24.9	24.1	22.1	20.6	20.3	19.1	25.5
31-Jul	18.9	18.2	17.5	16.6	15.3	15.1	14.6	15.6	17.0	18.2	19.2	20.3	21.0	21.7	19.7	16.6	17.1	17.1	16.7	16.6	16.2	16.5	16.3	16.0	17.4	21.7
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	5	0.67	0.67
10 - 20	415	55.78	56.45
> 20	324	43.55	100.00

Total Number of Valid Hours: 744

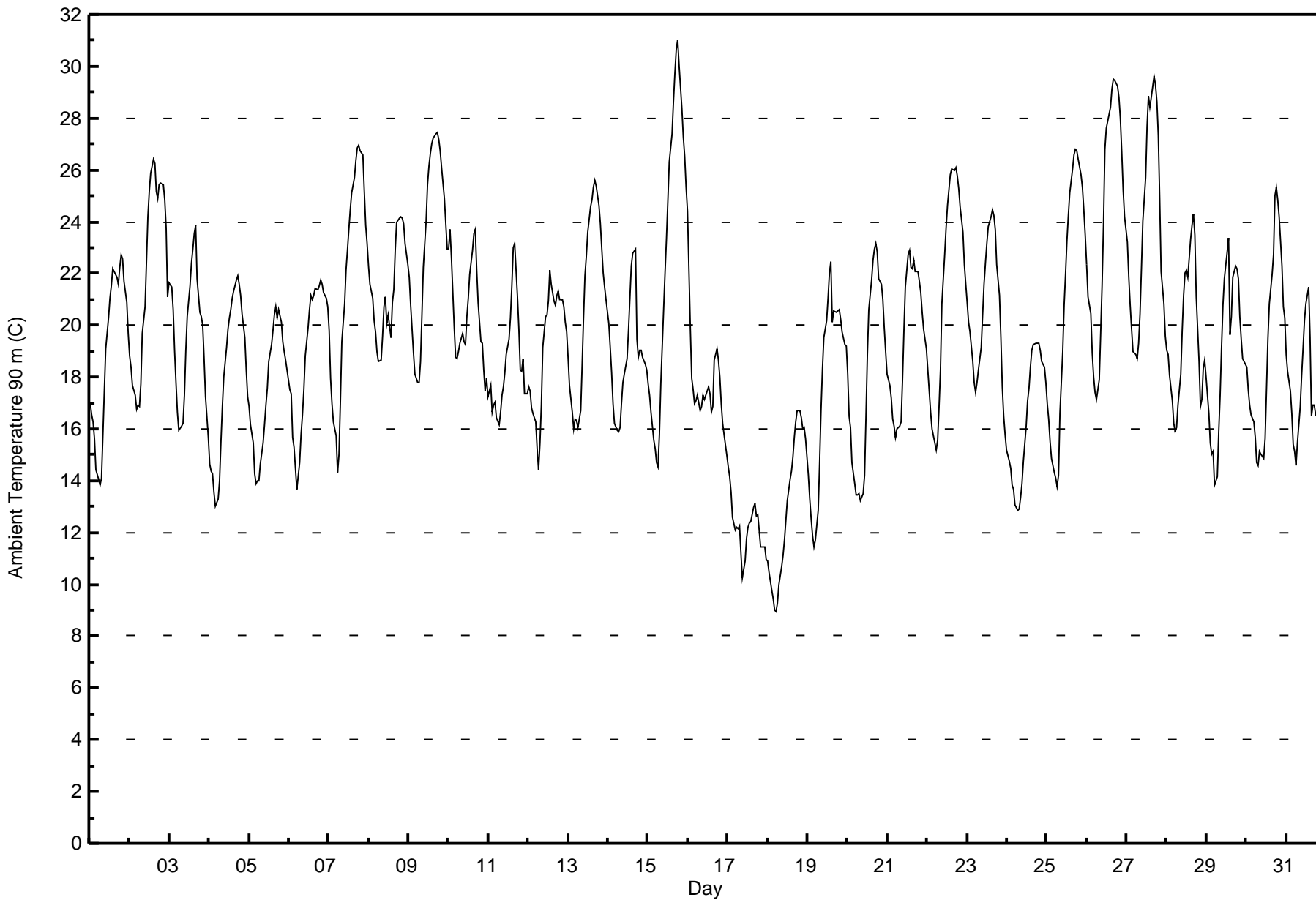
Total Number of Hours: 744



Summary of Hour Averages

Mannix - July 2017

Maximum Value: 31.0 C on Jul 15 19:00 Maximum Daily Average: 24.1 C on Jul 26																						Hours in Service:	744			
Minimum Value: 9.0 C on Jul 18 06:00 Minimum Daily Average: 12.2 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 23.0 C at hour 17 Minimum Diurnal Average: 15.2 C at hour 6																						Hours of Missing Data:	0			
Monthly Average: 19.42 C Percentiles: P ₁ = 10.4 P ₁₀ = 14.3 Q ₁ = 16.6 Median = 19.1 Q ₃ = 22.0 P ₉₀ = 25.1 P ₉₉ = 29.4																						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-Jul	17.0	16.6	16.3	15.6	14.4	14.0	13.8	14.1	15.8	17.5	19.1	20.3	21.0	21.5	22.2	22.1	21.9	21.6	22.3	22.7	22.6	21.7	20.9	19.7	18.9	22.7
2-Jul	18.8	18.4	17.7	17.3	16.8	16.9	16.9	17.8	19.7	20.7	22.5	24.2	25.2	25.9	26.4	26.2	25.1	24.9	25.5	25.5	25.4	24.9	23.8	21.1	22.0	26.4
3-Jul	21.6	21.5	20.6	19.0	17.8	16.7	16.0	16.1	16.2	17.3	19.1	20.4	21.5	22.4	22.9	23.5	23.9	21.8	20.5	20.3	20.0	18.7	17.3	15.7	19.6	23.9
4-Jul	14.6	14.4	14.3	13.6	13.0	13.3	14.0	15.5	16.8	18.0	19.1	19.9	20.3	20.6	21.0	21.3	21.8	21.9	21.6	21.1	20.5	19.5	18.3	17.3	18.0	21.9
5-Jul	16.9	16.2	15.4	14.3	13.9	14.0	14.0	14.7	15.5	16.2	16.9	17.6	18.6	19.3	19.8	20.4	20.7	20.3	20.6	20.1	19.4	19.0	18.6	18.3	17.5	20.7
6-Jul	17.5	17.3	15.7	15.3	14.5	13.7	14.7	15.8	16.5	17.5	18.8	19.9	20.6	21.2	21.0	21.2	21.4	21.4	21.5	21.8	21.6	21.2	21.1	20.7	18.8	21.8
7-Jul	19.8	17.9	17.0	16.3	15.7	14.3	15.0	17.1	19.3	20.8	22.1	22.9	23.7	24.4	25.1	25.7	26.4	26.9	27.0	26.7	26.6	25.1	23.8	23.1	21.8	27.0
8-Jul	22.3	21.6	21.1	20.2	19.7	19.0	18.6	18.7	19.6	20.7	21.1	20.1	20.4	19.5	20.9	21.4	22.9	24.0	24.1	24.2	24.1	23.9	23.2	22.4	21.4	24.2
9-Jul	21.9	20.8	19.9	19.0	18.1	17.8	17.8	18.6	20.4	22.2	24.0	25.5	26.1	26.6	27.0	27.2	27.4	27.4	27.2	26.7	26.1	24.9	23.9	22.9	23.3	27.4
10-Jul	22.9	23.7	22.6	19.9	18.8	18.7	19.0	19.3	19.7	19.4	19.2	20.3	21.0	22.0	22.9	23.5	23.7	22.1	20.9	19.4	19.3	18.3	17.5	18.0	20.5	23.7
11-Jul	17.2	17.7	16.6	16.9	17.0	16.4	16.2	16.7	17.3	17.6	18.2	18.9	19.5	20.3	21.5	23.0	23.2	21.1	19.8	18.3	18.2	18.7	17.4	17.3	18.5	23.2
12-Jul	17.6	17.5	16.8	16.6	16.3	15.3	14.5	15.5	16.9	19.1	20.4	20.4	21.0	22.1	21.6	21.0	20.8	21.2	21.3	21.0	21.0	20.7	20.1	19.7	19.1	22.1
13-Jul	18.8	17.7	16.6	16.0	16.4	16.3	16.0	16.7	18.5	20.3	21.9	22.7	23.6	24.6	24.9	25.3	25.6	25.4	24.6	23.9	22.9	22.0	21.5	21.0	21.0	25.6
14-Jul	20.1	19.1	18.2	17.0	16.2	15.9	15.9	16.0	17.0	17.8	18.1	18.7	19.8	21.1	22.3	22.8	22.9	19.5	18.7	19.0	19.1	18.8	18.5	18.3	18.8	22.9
15-Jul	17.7	17.3	16.7	15.5	15.2	14.7	14.5	15.8	17.8	20.6	22.0	23.3	24.8	26.3	27.4	28.6	29.7	30.6	31.0	30.1	28.4	27.3	26.5	25.3	22.8	31.0
16-Jul	24.4	19.9	18.0	17.5	17.0	17.1	17.3	16.7	16.9	17.3	17.1	17.3	17.6	17.4	16.7	16.9	18.7	19.1	18.7	18.0	17.0	16.2	15.8	15.0	17.6	24.4
17-Jul	14.5	14.1	13.5	12.6	12.1	12.2	12.1	12.2	11.2	10.3	10.9	11.7	12.2	12.4	12.4	13.0	13.1	12.6	12.7	12.1	11.4	11.4	11.4	10.9	12.2	14.5
18-Jul	10.9	10.5	9.8	9.5	9.0	9.0	9.3	10.0	10.7	11.1	11.7	12.5	13.2	14.0	14.4	14.9	15.7	16.3	16.7	16.7	16.5	16.0	16.1	15.6	12.9	16.7
19-Jul	14.2	13.3	12.5	11.9	11.4	11.7	12.8	14.7	16.7	18.3	19.5	20.2	21.0	22.0	22.4	20.1	20.5	20.5	20.6	20.6	20.2	19.8	19.3	19.2	17.7	22.4
20-Jul	18.1	16.5	16.1	14.7	13.9	13.5	13.5	13.5	13.3	13.5	14.2	16.5	18.9	20.6	21.8	22.5	23.0	23.2	22.8	21.8	21.6	21.0	19.9	19.0	18.1	23.2
21-Jul	18.1	17.7	17.2	16.4	16.1	15.7	16.0	16.1	16.2	17.9	19.8	21.5	22.7	22.9	22.3	22.2	22.5	22.1	22.0	21.7	21.3	20.5	19.9	19.1	19.5	22.9
22-Jul	18.3	17.5	16.7	16.0	15.7	15.2	15.6	16.9	18.3	20.8	22.7	23.8	24.7	25.2	25.8	26.0	26.0	26.1	25.8	25.3	24.5	23.6	22.4	21.6	21.4	26.1
23-Jul	20.9	20.1	19.7	18.6	17.8	17.4	17.8	18.3	19.1	20.4	21.6	22.4	23.2	23.8	24.2	24.4	24.2	23.7	22.4	21.1	19.5	17.6	16.5	15.8	20.4	24.4
24-Jul	15.2	14.7	14.5	13.8	13.7	13.1	12.8	12.9	13.3	13.9	14.8	16.1	17.1	17.6	18.4	19.1	19.3	19.3	19.3	19.3	19.0	18.6	18.4	17.8	16.3	19.3
25-Jul	17.0	16.4	15.5	14.9	14.3	14.1	13.8	14.2	16.6	19.0	20.8	22.0	23.3	24.2	25.1	26.1	26.6	26.8	26.7	26.4	25.8	25.3	24.5	23.5	20.9	26.8
26-Jul	22.4	21.1	20.4	18.9	18.0	17.4	17.1	17.9	19.7	21.5	23.9	26.8	27.6	28.1	28.4	29.1	29.5	29.4	29.2	28.8	28.0	26.7	25.2	24.2	24.1	29.5
27-Jul	23.2	21.9	20.8	19.9	19.0	18.9	18.7	19.3	20.4	22.2	24.0	25.7	27.7	28.9	28.4	28.8	29.6	29.3	28.7	27.4	24.9	22.1	20.9	19.6	23.8	29.6
28-Jul	19.1	18.9	18.1	17.1	16.2	15.9	16.1	16.9	18.1	19.8	21.2	22.0	22.1	21.9	23.3	23.8	24.3	23.5	21.1	18.6	16.9	17.1	18.3	18.7	19.5	24.3
29-Jul	18.0	16.6	15.5	15.0	15.1	13.8	14.2	15.9	17.3	19.1	20.8	21.8	22.8	23.4	19.6	20.4	21.9	22.3	22.2	21.8	20.3	19.4	18.7	18.5	18.9	23.4
30-Jul	18.4	17.5	16.9	16.5	16.3	15.7	14.7	14.6	15.1	15.0	14.9	15.6	17.5	19.5	20.9	22.0	22.7	25.0	25.3	24.9	24.2	22.3	20.7	20.3	19.0	25.3
31-Jul	18.9	18.2	17.5	16.6	15.4	15.1	14.6	15.5	16.9	18.1	19.1	20.2	20.8	21.5	19.5	16.5	16.9	16.9	16.5	16.5	16.1	16.6	16.3	16.0	17.3	21.5
																						Diurnal Average				
																						Diurnal Maximum				





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	6	0.81	0.81
10 - 20	417	56.05	56.85
> 20	321	43.15	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



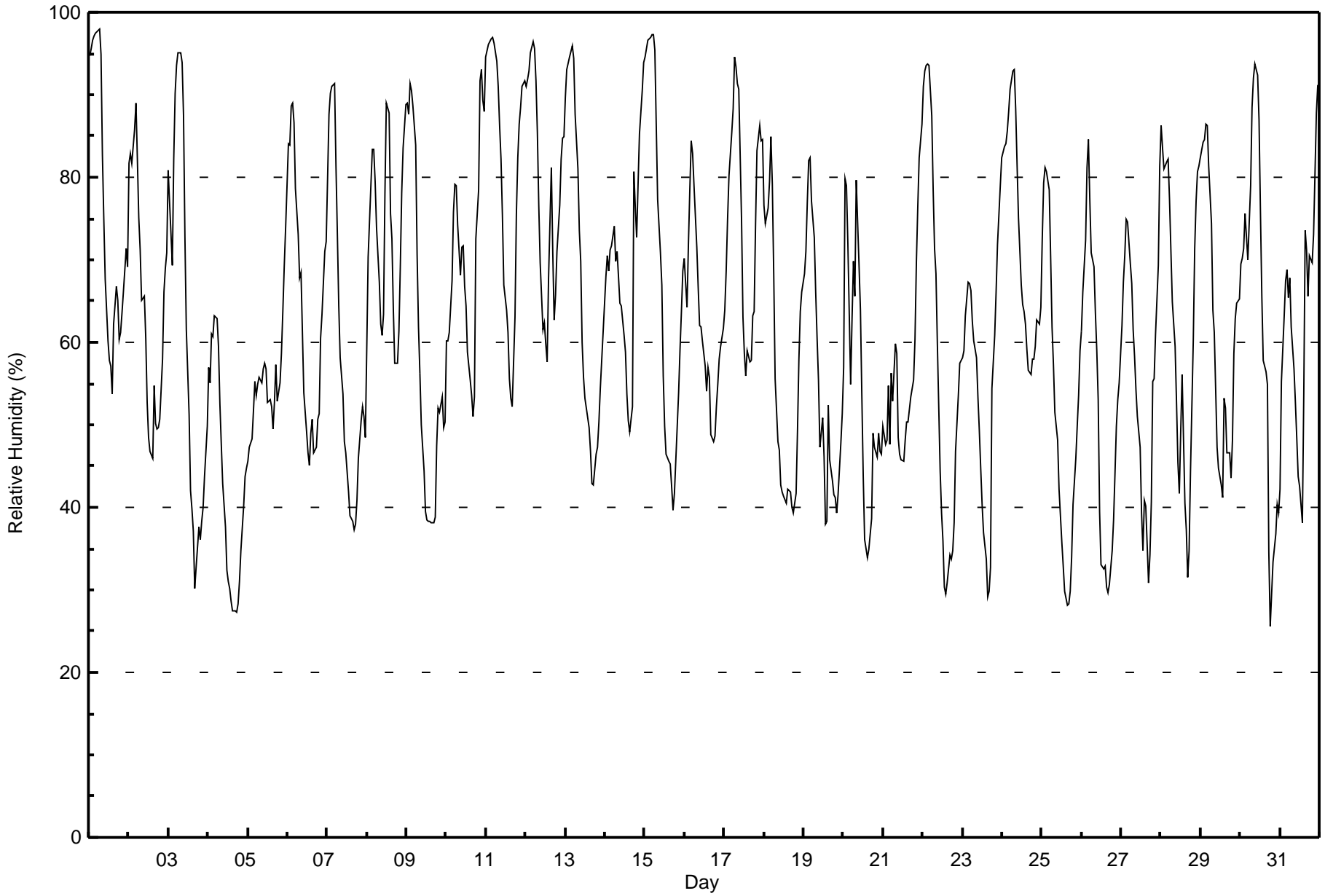
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Mannix - July 2017

Maximum Value: 98 % on Jul 1 07:00																		Maximum Daily Average: 80.8 % on Jul 11																		Hours in Service: 744							
Minimum Value: 26 % on Jul 30 19:00																		Minimum Daily Average: 42.8 % on Jul 4																		Hours of Data: 744							
Maximum Diurnal Average: 81.0 % at hour 5																		Minimum Diurnal Average: 45.9 % at hour 17																		Hours of Missing Data: 0							
Monthly Average: 62.6 %																		Percentiles: P ₁ = 29 P ₁₀ = 39 Q ₁ = 49 Median = 61 Q ₃ = 77 P ₉₀ = 89 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-Jul	95	96	97	97	98	98	98	95	83	75	68	60	58	57	54	62	67	65	60	61	64	66	71	69	75.5	98																	
2-Jul	82	83	82	86	89	82	75	71	65	66	61	53	48	47	46	55	50	49	50	51	58	66	69	71	64.7	89																	
3-Jul	81	73	69	82	90	93	95	95	94	87	73	62	51	42	40	37	30	33	38	36	38	40	44	50	61.4	95																	
4-Jul	57	55	61	61	63	63	60	53	48	43	38	32	31	30	29	27	28	27	28	31	35	40	44	45	42.8	63																	
5-Jul	46	47	48	52	55	53	55	56	55	57	57	57	53	53	52	49	53	57	53	55	59	64	69	74	55.4	74																	
6-Jul	84	84	89	89	87	79	73	68	68	61	54	49	47	45	49	51	47	47	51	51	60	63	71	72	64.1	89																	
7-Jul	80	88	90	91	91	81	73	64	58	54	48	47	44	42	39	38	37	38	41	46	50	52	51	48	58.1	91																	
8-Jul	59	70	79	83	83	79	74	67	62	61	63	78	89	88	76	72	64	57	58	61	69	78	84	89	72.7	89																	
9-Jul	89	88	91	90	89	84	71	62	56	50	44	39	38	38	38	38	38	39	48	52	51	53	50	50	57.8	91																	
10-Jul	60	60	61	67	76	79	79	74	68	72	72	67	64	59	55	54	51	53	73	78	92	93	89	88	70.2	93																	
11-Jul	95	96	96	97	97	96	94	91	86	82	75	67	64	61	56	53	52	63	76	82	86	88	91	92	80.8	97																	
12-Jul	91	92	93	95	96	96	92	85	77	70	62	62	60	58	68	81	71	63	66	71	77	82	85	85	78.1	96																	
13-Jul	90	93	95	95	96	94	88	81	74	70	60	56	53	51	50	47	43	43	47	47	50	54	58	61	66.4	96																	
14-Jul	68	71	69	71	72	74	70	71	68	65	64	61	59	54	51	49	52	81	76	73	79	85	91	94	69.4	94																	
15-Jul	95	96	97	97	97	97	95	86	77	71	67	56	50	46	46	45	43	40	42	46	54	59	64	69	68.0	97																	
16-Jul	70	64	72	79	84	83	79	72	67	62	62	60	57	54	57	56	49	48	49	52	55	58	60	62	62.9	84																	
17-Jul	64	69	75	80	85	88	95	93	91	91	75	63	59	56	59	58	58	63	64	74	83	86	84	85	74.9	95																	
18-Jul	77	74	76	80	85	79	68	56	48	47	43	42	41	41	42	42	42	40	39	42	49	58	64	66	55.9	85																	
19-Jul	68	71	77	82	82	77	73	66	61	55	47	51	46	38	38	52	46	43	42	41	39	42	48	51	55.7	82																	
20-Jul	57	80	79	72	55	63	70	66	80	69	64	54	44	36	34	35	37	39	49	47	46	49	47	46	54.8	80																	
21-Jul	50	48	48	55	48	56	53	60	59	48	46	46	46	48	50	50	52	53	55	60	70	76	82	87	56.1	87																	
22-Jul	91	93	94	94	93	87	78	71	68	60	44	39	36	30	29	31	34	34	35	38	47	54	57	58	58.2	94																	
23-Jul	58	59	63	67	67	66	63	60	58	53	49	45	40	37	34	29	30	33	54	61	66	72	75	79	55.0	79																	
24-Jul	82	84	84	86	88	91	93	93	88	81	75	67	65	64	62	59	57	56	58	58	59	63	62	64	72.5	93																	
25-Jul	73	79	81	81	78	70	62	57	52	48	42	39	36	33	30	28	28	30	34	40	46	50	54	59	51.2	81																	
26-Jul	61	66	72	81	85	77	71	69	63	59	53	39	33	33	33	30	30	31	35	38	44	50	53	55	52.6	85																	
27-Jul	62	67	71	75	75	69	67	62	58	54	51	47	39	35	41	40	31	34	41	55	56	61	69	81	55.9	81																	
28-Jul	86	84	81	82	82	77	71	65	59	53	45	42	49	56	40	37	32	35	44	60	71	77	81	81	62.1	86																	
29-Jul	82	84	85	86	86	81	74	64	61	54	47	45	43	41	53	52	47	47	44	48	59	63	65	65	61.5	86																	
30-Jul	70	70	71	76	70	75	79	88	92	94	92	87	76	66	58	56	55	35	26	29	33	37	40	39	63.1	94																	
31-Jul	42	55	63	67	69	65	68	62	57	53	48	44	43	38	54	74	71	66	71	70	73	80	88	91	63.0	91																	
																		73.0	75.4	77.7	80.5	81.0	79.3	75.9	71.7	67.8	63.4	57.8	53.4	50.4	47.6	47.1	48.1	45.9	46.5	49.7	53.5	58.7	63.2	66.4	68.6	Diurnal Average	
																		95	96	97	97	98	98	98	95	94	94	92	87	89	88	76	81	71	81	76	82	92	93	91	94	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - July 2017

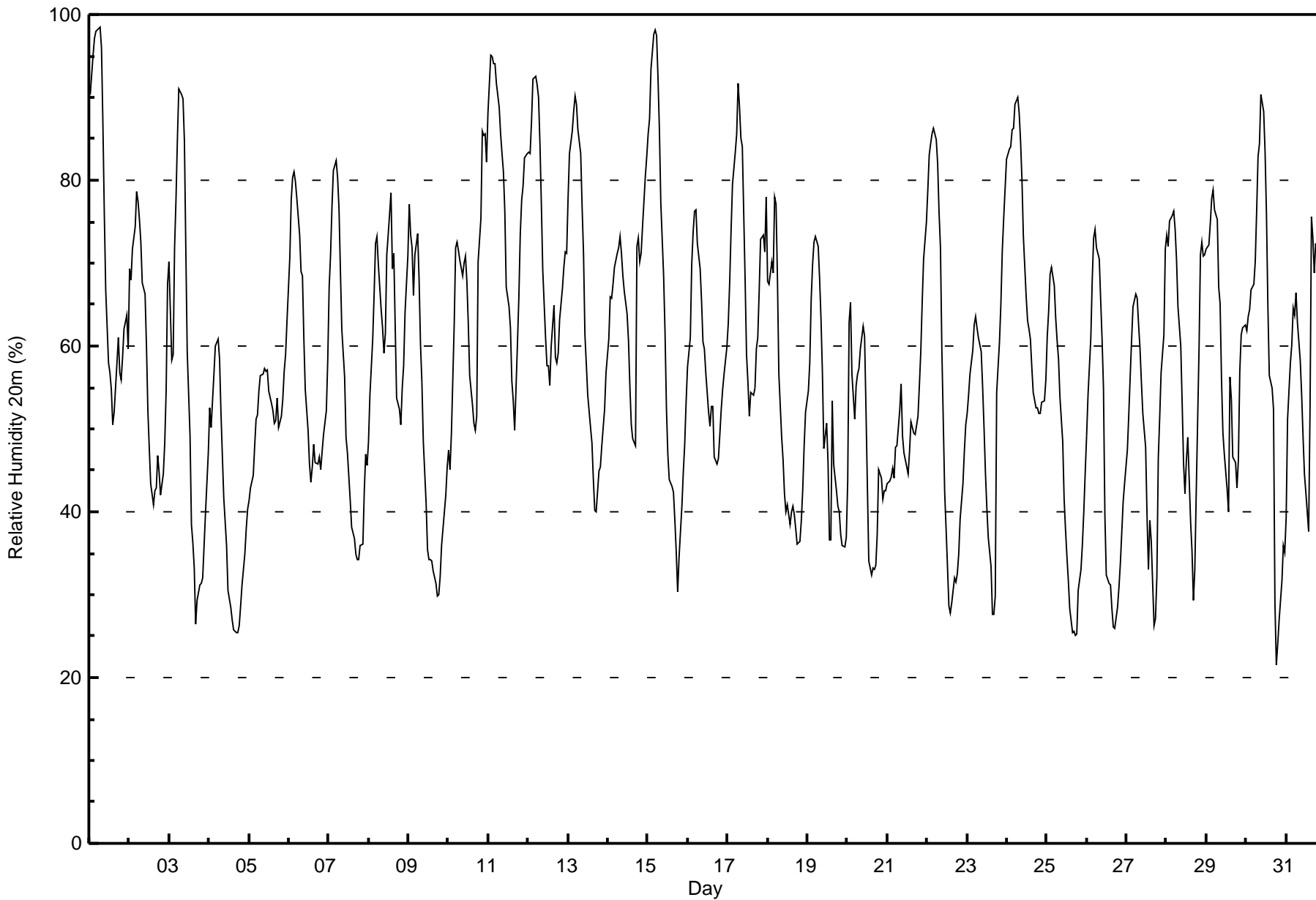
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	84	11.29	11.29
40 - 60	266	35.75	47.04
60 - 80	238	31.99	79.03
80 - 100	156	20.97	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 98 % on Jul 1 07:00																		Maximum Daily Average: 77.0 % on Jul 11																		Hours in Service: 744							
Minimum Value: 22 % on Jul 30 19:00																		Minimum Daily Average: 40.0 % on Jul 4																		Hours of Data: 744							
Maximum Diurnal Average: 75.2 % at hour 6																		Minimum Diurnal Average: 42.8 % at hour 17																		Hours of Missing Data: 0							
Monthly Average: 58.1 %																		Percentiles: P ₁ = 26 P ₁₀ = 35 Q ₁ = 45 Median = 57 Q ₃ = 71 P ₉₀ = 83 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-Jul	90	93	95	97	98	98	98	96	87	76	67	58	57	55	51	52	58	61	57	56	59	62	64	60	72.6	98																	
2-Jul	69	68	72	74	79	77	75	73	68	66	60	52	48	43	41	43	43	47	45	42	45	48	55	67	58.3	79																	
3-Jul	70	58	59	72	78	85	91	90	90	85	72	59	49	39	36	33	27	29	31	31	32	36	40	47	55.8	91																	
4-Jul	53	50	53	57	60	61	58	52	47	42	36	31	29	28	27	26	25	25	26	29	31	35	38	40	40.0	61																	
5-Jul	41	43	44	48	51	52	55	56	57	57	57	57	54	53	52	51	51	54	50	52	54	57	59	63	52.8	63																	
6-Jul	71	78	80	81	80	78	73	69	68	61	55	50	46	44	45	48	46	46	47	45	47	49	52	58	59.0	81																	
7-Jul	67	71	77	81	82	80	77	69	62	56	49	47	44	41	38	37	35	34	34	36	36	43	47	46	53.8	82																	
8-Jul	48	54	61	66	72	73	70	64	62	59	61	71	73	79	69	71	62	54	52	51	55	58	64	71	63.4	79																	
9-Jul	77	73	72	66	71	73	68	60	56	48	41	35	34	34	34	33	31	30	30	32	36	40	42	45	48.5	77																	
10-Jul	47	45	50	63	72	73	72	70	68	70	71	68	63	56	53	51	50	51	70	75	86	85	86	82	65.7	86																	
11-Jul	88	95	95	94	94	92	89	86	83	81	76	67	65	62	56	53	50	60	66	74	78	79	83	83	77.0	95																	
12-Jul	83	83	87	92	92	91	90	84	77	69	61	58	58	55	60	65	59	58	59	63	67	70	71	71	71.9	92																	
13-Jul	78	83	86	88	90	89	86	83	77	71	61	58	54	50	48	44	40	40	45	45	48	50	52	57	63.6	90																	
14-Jul	61	66	66	67	70	71	72	73	71	68	67	64	61	55	50	49	48	72	73	70	71	74	80	83	66.8	83																	
15-Jul	86	88	93	98	98	97	92	86	77	69	62	52	47	44	43	42	39	35	30	35	41	45	48	53	62.5	98																	
16-Jul	57	61	70	74	76	76	72	69	65	61	60	57	52	50	53	53	47	46	47	49	52	55	57	60	59.1	76																	
17-Jul	63	68	74	80	83	86	92	89	85	84	68	59	56	51	54	54	55	60	61	67	73	73	71	78	70.1	92																	
18-Jul	68	67	70	69	78	77	68	57	49	46	42	40	41	39	40	41	40	38	36	36	39	43	48	52	51.0	78																	
19-Jul	55	58	66	70	73	73	72	68	63	57	48	51	46	37	37	53	46	42	41	40	37	36	36	37	51.6	73																	
20-Jul	44	63	65	57	51	55	57	57	60	62	61	52	43	34	32	33	33	34	37	45	44	42	43	43	47.8	65																	
21-Jul	43	44	44	45	44	48	48	52	55	49	47	46	45	47	51	50	50	49	52	55	59	65	71	75	51.5	75																	
22-Jul	79	83	84	86	86	85	82	76	72	59	42	38	33	29	28	29	32	31	32	35	39	43	47	51	54.3	86																	
23-Jul	52	54	57	60	63	64	62	61	59	55	50	45	40	37	33	28	28	30	54	60	65	71	75	79	53.4	79																	
24-Jul	83	84	84	86	86	89	90	88	85	80	73	66	63	62	61	57	54	52	53	52	52	53	53	56	69.3	90																	
25-Jul	61	64	69	70	67	63	61	59	54	48	42	38	35	32	28	25	26	25	25	30	33	36	40	45	44.8	70																	
26-Jul	49	54	61	68	73	74	72	70	66	61	55	40	32	31	31	28	26	26	28	31	34	37	41	43	47.2	74																	
27-Jul	47	52	56	61	65	66	66	63	60	56	52	48	40	33	39	36	26	27	32	46	51	57	61	72	50.5	72																	
28-Jul	73	72	75	76	76	74	70	65	60	53	46	42	46	49	39	35	29	33	42	60	71	73	71	71	58.4	76																	
29-Jul	72	72	75	78	79	77	75	67	65	56	50	47	43	40	56	54	47	46	43	46	57	61	62	63	59.5	79																	
30-Jul	62	64	64	67	67	70	76	83	84	90	88	83	76	65	56	55	52	29	22	24	27	32	36	35	58.7	90																	
31-Jul	39	51	58	60	65	64	67	63	58	54	49	45	42	38	53	76	73	69	72	70	72	74	78	82	61.3	82																	
																		63.8	66.4	69.7	72.5	74.8	75.2	74.1	71.0	67.4	62.9	57.0	52.4	48.8	45.5	45.0	45.3	42.8	43.0	45.0	47.8	51.3	54.3	57.1	60.3	Diurnal Average	
																		90	95	95	98	98	98	98	96	90	90	88	83	76	79	69	76	73	72	73	75	86	85	86	83	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

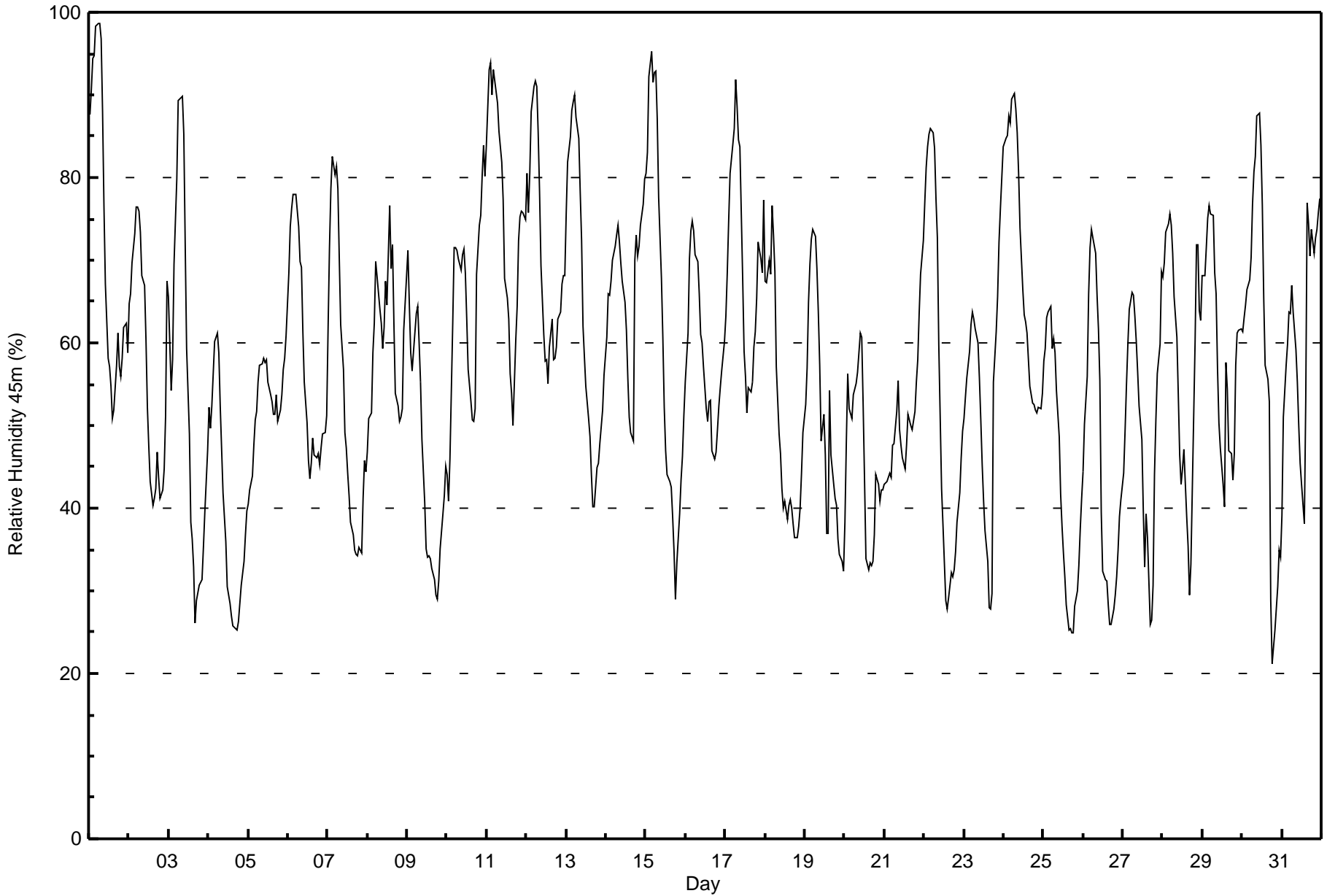
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	123	16.53	16.53
40 - 60	290	38.98	55.51
60 - 80	244	32.80	88.31
80 - 100	87	11.69	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 99 % on Jul 1 07:00																		Maximum Daily Average: 75.8 % on Jul 11																		Hours in Service: 744	
Minimum Value: 21 % on Jul 30 19:00																		Minimum Daily Average: 39.8 % on Jul 4																		Hours of Data: 744	
Maximum Diurnal Average: 74.2 % at hour 7																		Minimum Diurnal Average: 42.9 % at hour 17																		Hours of Missing Data: 0	
Monthly Average: 57.3 %																		Percentiles: P ₁ = 25 P ₁₀ = 34 Q ₁ = 44 Median = 57 Q ₃ = 70 P ₉₀ = 81 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-Jul	88	91	94	95	98	99	99	97	88	76	67	58	57	55	51	52	57	61	57	56	58	62	62	59	72.4	99											
2-Jul	65	66	70	73	76	76	76	73	68	67	60	52	48	43	40	41	42	47	44	41	42	45	51	67	57.3	76											
3-Jul	66	54	58	70	75	80	89	90	90	85	72	59	49	38	36	33	26	29	31	31	31	35	39	47	54.7	90											
4-Jul	52	50	52	56	60	61	59	52	47	42	36	30	29	28	27	26	25	25	26	28	31	34	37	40	39.8	61											
5-Jul	41	42	44	48	51	52	55	57	57	58	58	58	55	54	53	51	51	54	50	52	54	57	58	61	52.9	61											
6-Jul	68	74	76	78	78	78	74	70	69	61	55	50	46	44	45	48	46	46	47	45	47	49	49	51	58.2	78											
7-Jul	62	71	79	83	80	81	79	70	62	57	49	47	44	41	38	37	35	34	34	35	35	41	46	44	53.6	83											
8-Jul	47	51	51	59	62	70	68	64	62	59	62	67	65	77	69	72	62	54	52	50	51	52	62	68	60.7	77											
9-Jul	71	65	59	57	59	64	64	60	55	48	41	35	34	34	34	33	31	29	29	31	35	39	41	45	45.6	71											
10-Jul	44	41	46	62	71	72	71	70	69	71	71	68	63	57	53	51	50	52	68	74	75	80	84	80	64.4	84											
11-Jul	84	93	94	90	93	92	89	86	84	82	77	68	65	63	56	54	50	60	64	72	75	76	76	75	75.8	94											
12-Jul	81	76	80	88	91	92	91	85	78	69	61	58	58	55	59	63	58	58	59	63	64	67	68	68	70.5	92											
13-Jul	76	82	85	88	89	90	87	85	78	72	62	58	55	51	49	44	40	40	45	45	48	50	52	56	63.6	90											
14-Jul	61	66	66	68	70	72	73	74	72	70	67	65	62	56	51	49	48	70	73	71	72	74	77	80	66.9	80											
15-Jul	81	83	92	95	92	93	93	87	78	68	61	52	47	44	43	42	39	35	29	33	39	43	46	51	61.1	95											
16-Jul	55	61	70	74	75	74	71	70	66	61	60	57	52	51	53	53	47	46	47	49	52	55	57	60	58.9	75											
17-Jul	63	68	75	81	84	86	92	89	85	84	68	59	56	52	55	54	55	59	61	65	72	70	68	77	69.9	92											
18-Jul	67	67	70	68	77	73	69	57	49	47	42	40	41	39	40	41	40	38	36	36	38	40	44	49	50.4	77											
19-Jul	53	57	65	69	73	74	73	69	64	57	48	51	46	37	37	54	46	43	41	40	36	34	34	32	51.4	74											
20-Jul	38	48	56	52	51	54	54	55	56	61	61	53	43	34	33	33	33	34	37	44	43	41	42	42	45.8	61											
21-Jul	43	43	44	44	44	48	48	52	55	50	48	46	45	48	51	51	50	50	52	55	58	64	68	72	51.1	72											
22-Jul	77	81	84	85	86	85	83	77	73	60	42	38	33	29	28	29	32	32	33	35	38	42	46	49	54.1	86											
23-Jul	51	53	56	59	62	64	63	62	60	56	51	45	41	37	34	28	28	30	55	61	66	72	76	80	53.7	80											
24-Jul	84	85	85	87	87	89	90	88	85	81	74	66	63	63	61	58	55	53	53	52	51	52	52	54	69.5	90											
25-Jul	58	59	63	64	64	59	60	59	54	49	42	38	35	32	28	25	25	25	25	28	30	33	37	41	43.1	64											
26-Jul	44	50	56	66	71	74	73	71	66	62	55	40	32	31	31	28	26	26	28	30	32	35	39	41	46.1	74											
27-Jul	44	49	55	60	64	66	66	63	60	56	52	48	40	33	39	36	26	26	31	44	51	56	60	69	49.8	69											
28-Jul	68	70	73	74	76	74	71	66	61	54	46	43	45	47	39	35	29	33	42	60	72	72	64	63	57.4	76											
29-Jul	68	68	71	75	77	76	75	68	66	57	50	47	43	40	58	54	47	47	43	47	57	61	62	62	59.2	77											
30-Jul	61	63	65	66	68	70	77	81	83	87	88	84	77	65	57	56	53	29	21	23	25	31	35	34	58.3	88											
31-Jul	39	51	57	60	64	64	67	64	59	55	50	45	43	38	53	77	74	71	74	71	73	74	76	77	61.5	77											
	61.2	63.9	67.5	70.8	73.1	74.2	74.2	71.3	67.7	63.3	57.3	52.5	48.8	45.6	45.2	45.5	42.9	43.1	44.8	47.5	50.1	52.8	55.1	57.9	Diurnal Average												
	88	93	94	95	98	99	99	97	90	87	88	84	77	77	69	77	74	71	74	74	75	80	84	80	Diurnal Maximum												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

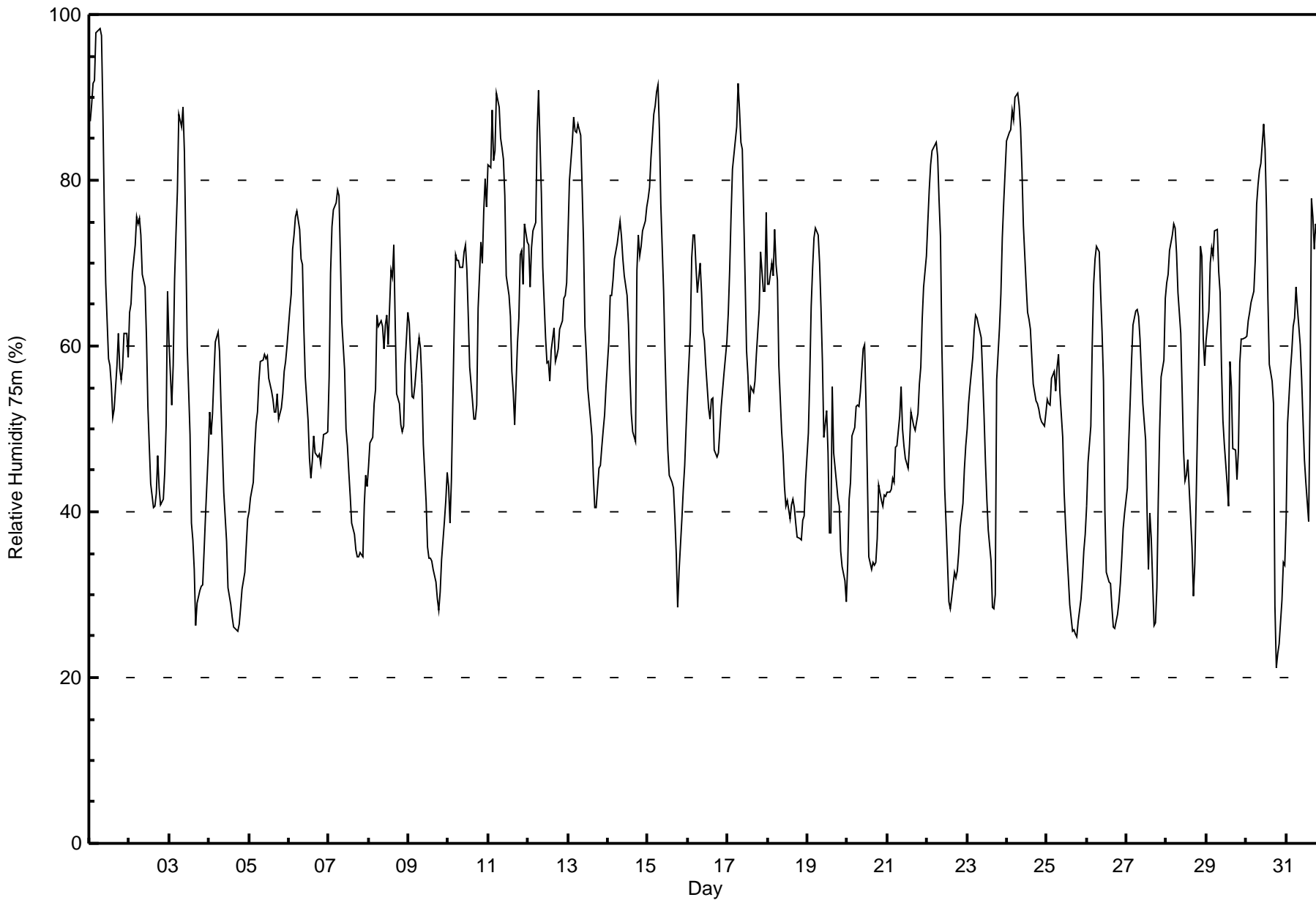
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	126	16.94	16.94
40 - 60	297	39.92	56.85
60 - 80	242	32.53	89.38
80 - 100	79	10.62	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 98 % on Jul 1 07:00																	Maximum Daily Average: 73.7 % on Jul 11																	Hours in Service: 744	
Minimum Value: 21 % on Jul 30 19:00																	Minimum Daily Average: 39.9 % on Jul 4																	Hours of Data: 744	
Maximum Diurnal Average: 73.4 % at hour 7																	Minimum Diurnal Average: 43.4 % at hour 17																	Hours of Missing Data: 0	
Monthly Average: 56.7 %																	Percentiles: P ₁ = 26 P ₁₀ = 34 Q ₁ = 44 Median = 56 Q ₃ = 69 P ₉₀ = 78 P ₉₉ = 92																	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-Jul	87	89	92	92	98	98	98	97	88	76	68	58	58	55	51	52	58	61	57	56	57	61	62	59	72.1	98									
2-Jul	64	65	69	72	76	75	75	73	69	67	61	53	48	43	40	41	42	47	43	41	42	45	51	67	57.0	76									
3-Jul	60	53	58	68	74	79	88	86	89	83	72	60	49	39	37	33	26	29	31	31	31	35	40	47	54.1	89									
4-Jul	52	49	52	56	60	62	59	53	48	42	36	31	30	29	27	26	26	26	26	29	31	33	36	39	39.9	62									
5-Jul	40	42	44	48	51	52	56	58	58	59	59	59	56	55	54	52	52	54	51	52	54	57	58	60	53.3	60									
6-Jul	64	66	72	73	76	76	74	71	70	62	56	51	46	44	46	49	47	47	47	46	48	49	49	50	57.5	76									
7-Jul	56	69	74	76	77	79	78	71	63	57	50	48	45	42	39	37	35	35	34	35	35	41	44	43	52.7	79									
8-Jul	45	48	49	53	55	64	62	63	62	60	63	64	60	69	68	72	63	54	53	50	50	50	58	64	58.3	72									
9-Jul	63	59	54	54	55	59	61	60	55	48	41	36	34	34	34	33	31	30	28	30	34	39	41	45	44.1	63									
10-Jul	43	39	44	63	71	70	70	70	69	71	72	69	64	57	53	51	51	53	65	72	70	76	80	77	63.4	80									
11-Jul	82	81	88	82	84	91	89	85	84	83	78	68	66	64	57	54	51	60	63	71	72	67	75	73	73.7	91									
12-Jul	72	67	72	74	75	86	91	85	78	70	61	58	58	56	60	62	58	59	60	62	63	66	66	68	67.7	91									
13-Jul	74	80	85	88	86	86	87	85	79	73	62	59	55	51	49	44	41	41	45	46	48	50	52	55	63.3	88									
14-Jul	60	66	66	68	71	72	74	75	73	71	69	66	62	57	52	50	48	69	73	71	72	74	75	77	67.1	77									
15-Jul	78	79	83	88	89	91	92	86	77	67	59	53	47	44	43	43	39	35	28	33	39	43	46	50	59.7	92									
16-Jul	54	62	71	73	73	70	66	70	66	62	61	58	53	51	54	54	47	47	47	50	53	55	57	61	58.9	73									
17-Jul	64	69	76	81	85	87	92	89	85	84	68	60	57	52	55	54	56	59	62	64	71	67	67	76	69.9	92									
18-Jul	67	68	70	68	74	70	68	58	50	47	43	41	41	39	41	42	41	39	37	37	37	39	39	44	49.9	74									
19-Jul	50	56	65	69	73	74	73	70	65	58	49	52	47	37	37	55	47	44	42	41	35	33	32	29	51.4	74									
20-Jul	34	42	44	49	50	53	53	53	54	60	60	53	44	35	33	34	34	34	37	43	41	41	42	42	44.3	60									
21-Jul	42	42	43	44	44	48	48	52	55	50	48	46	45	48	52	51	50	50	52	55	58	63	67	71	51.0	71									
22-Jul	75	79	82	84	84	85	83	78	73	60	43	39	34	29	28	30	33	32	33	35	38	41	45	48	53.7	85									
23-Jul	50	53	55	59	62	64	63	63	61	57	52	46	42	38	34	28	28	30	56	62	66	73	77	81	54.1	81									
24-Jul	85	86	86	89	87	90	91	89	86	81	75	67	64	63	62	59	55	53	53	52	51	51	50	52	69.9	91									
25-Jul	54	53	53	56	57	55	57	59	54	49	42	38	35	32	29	26	26	25	25	27	30	32	35	37	41.1	59									
26-Jul	41	46	50	60	67	71	72	71	66	62	56	40	33	32	31	29	26	26	28	29	31	34	38	40	44.9	72									
27-Jul	43	48	53	58	63	64	64	64	64	61	57	53	49	40	33	40	37	26	27	31	41	50	56	66	49.3	66									
28-Jul	68	69	72	73	75	74	71	66	62	54	47	44	44	46	39	36	30	34	42	60	72	71	61	58	57.0	75									
29-Jul	61	64	70	72	71	74	74	69	66	57	51	48	43	41	58	55	48	47	44	47	58	61	61	61	58.4	74									
30-Jul	61	63	64	65	67	70	77	79	81	82	87	84	76	66	58	56	53	29	21	23	24	29	34	33	57.6	87									
31-Jul	39	51	57	59	62	63	67	65	60	56	51	46	44	39	53	78	76	72	75	71	73	72	73	73	61.5	78									
59.0																	61.4																	Diurnal Average	
87																	92																	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

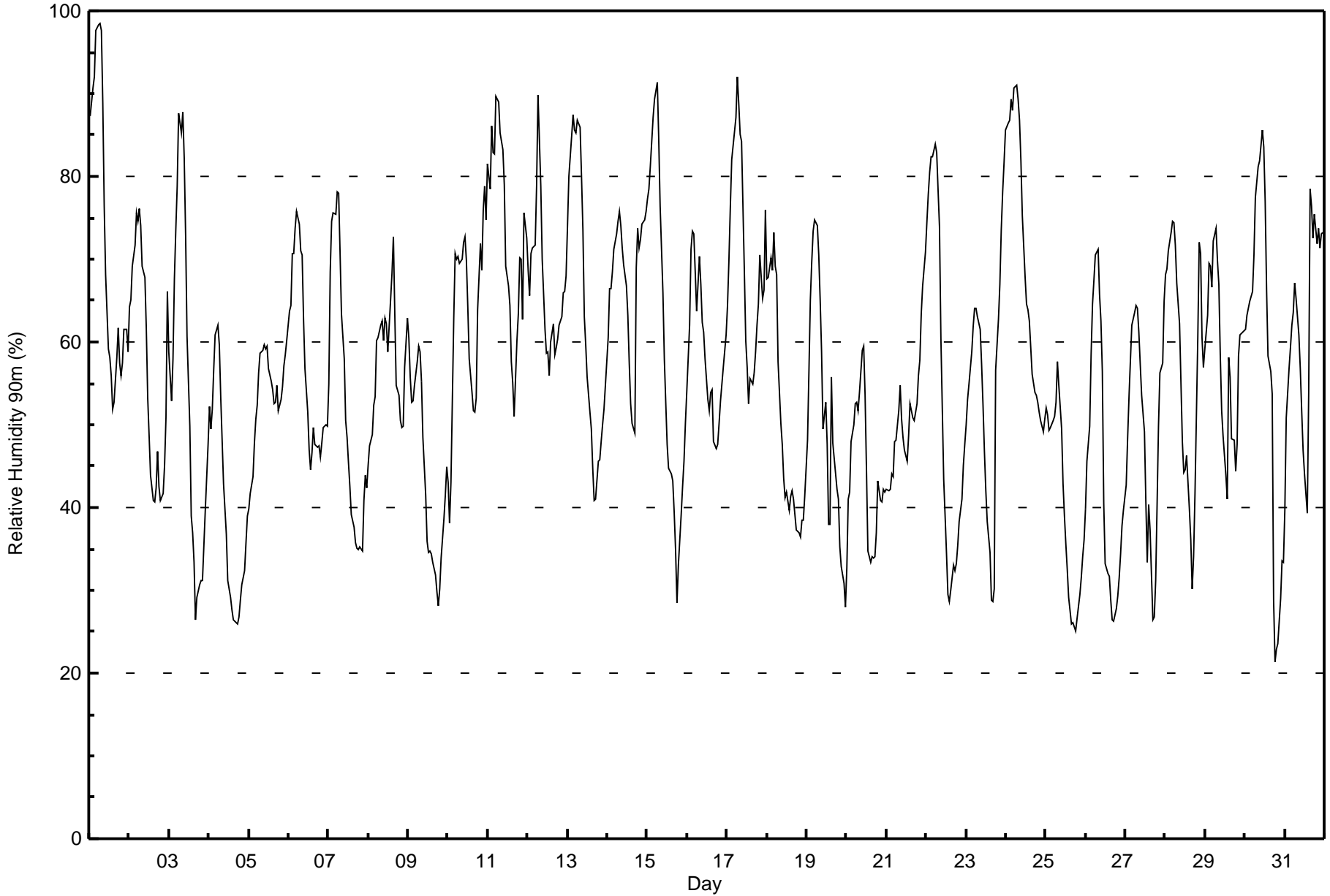
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	128	17.20	17.20
40 - 60	303	40.73	57.93
60 - 80	247	33.20	91.13
80 - 100	66	8.87	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 98 % on Jul 1 07:00														Maximum Daily Average: 73.4 % on Jul 11														Hours in Service: 744	
Minimum Value: 21 % on Jul 30 19:00														Minimum Daily Average: 39.9 % on Jul 25														Hours of Data: 744	
Maximum Diurnal Average: 73.1 % at hour 7														Minimum Diurnal Average: 43.7 % at hour 18														Hours of Missing Data: 0	
Monthly Average: 56.7 %														Percentiles: P ₁ = 26 P ₁₀ = 34 Q ₁ = 44 Median = 57 Q ₃ = 69 P ₉₀ = 78 P ₉₉ = 91														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-Jul	87	89	91	92	98	98	98	98	89	76	68	59	58	56	52	53	58	62	57	56	57	62	61	59	72.3	98			
2-Jul	64	65	69	72	76	75	76	74	69	68	62	53	49	44	41	41	42	47	43	41	42	45	51	66	57.2	76			
3-Jul	59	53	58	68	73	79	88	85	88	82	73	61	50	39	37	33	26	29	31	31	31	35	40	48	54.0	88			
4-Jul	52	49	52	57	61	62	60	53	48	43	37	31	30	29	28	26	26	26	27	29	31	32	36	39	40.2	62			
5-Jul	40	42	44	48	51	52	56	59	59	60	59	60	57	55	54	53	53	55	52	53	55	57	58	60	53.7	60			
6-Jul	64	64	71	71	74	76	74	71	70	63	57	52	47	45	47	50	48	47	47	46	48	50	50	50	57.5	76			
7-Jul	55	68	75	76	75	78	78	71	63	58	51	48	45	43	39	38	36	35	35	35	35	41	44	42	52.7	78			
8-Jul	45	48	49	52	53	60	61	62	63	60	63	62	59	65	68	73	63	55	54	51	50	50	57	63	57.7	73			
9-Jul	61	56	53	53	55	58	60	59	55	49	41	36	35	35	34	33	32	30	28	30	34	39	42	45	43.7	61			
10-Jul	43	38	43	63	71	70	70	70	70	72	73	70	64	58	54	52	52	53	64	72	69	76	79	75	63.3	79			
11-Jul	81	78	86	83	83	90	89	85	84	83	79	69	67	64	58	55	51	60	63	70	70	63	76	73	73.4	90			
12-Jul	69	66	71	71	72	79	90	84	79	70	62	59	59	56	60	62	58	59	60	62	63	66	66	68	67.1	90			
13-Jul	74	80	85	88	86	85	87	86	80	74	63	60	56	52	50	45	41	41	46	46	48	50	52	55	63.6	88			
14-Jul	60	66	67	68	71	73	75	76	74	71	69	67	63	57	53	50	49	69	74	71	72	74	75	76	67.6	76			
15-Jul	77	78	81	87	89	90	91	85	76	66	58	53	48	45	44	43	40	35	29	33	39	43	46	50	59.4	91			
16-Jul	54	62	71	73	73	68	64	70	67	62	61	58	53	52	54	54	48	47	48	50	53	55	57	61	59.0	73			
17-Jul	64	70	76	82	85	87	92	89	85	84	68	60	57	53	56	55	56	59	62	65	71	65	66	76	70.1	92			
18-Jul	68	68	70	69	73	69	68	58	50	48	44	41	42	40	41	42	41	39	37	37	36	39	38	41	50.0	73			
19-Jul	48	56	65	70	73	75	74	71	65	59	50	53	48	38	38	56	48	44	42	41	35	33	31	28	51.6	75			
20-Jul	33	41	42	48	50	53	53	52	54	59	60	54	44	35	33	34	34	34	37	43	41	41	42	42	44.0	60			
21-Jul	42	42	42	44	44	48	48	52	55	51	48	47	46	49	53	52	51	51	52	56	58	63	67	71	51.3	71			
22-Jul	74	78	81	82	82	84	83	78	74	61	43	39	34	30	29	30	33	32	33	35	38	41	45	48	53.7	84			
23-Jul	50	53	55	59	62	64	64	63	62	57	52	47	42	38	35	29	29	30	57	63	67	74	78	82	54.6	82			
24-Jul	86	87	87	89	88	91	91	89	87	82	75	68	65	64	63	59	56	54	54	53	52	51	49	51	70.3	91			
25-Jul	52	51	49	50	50	51	53	58	55	49	43	39	36	32	29	26	26	26	25	27	30	31	34	36	39.9	58			
26-Jul	40	46	50	58	65	67	71	71	66	62	56	41	33	32	32	29	27	26	28	29	32	34	38	40	44.7	71			
27-Jul	43	48	53	58	62	64	64	64	61	57	54	49	41	33	40	37	26	27	31	40	50	56	57	65	49.3	65			
28-Jul	68	69	71	73	75	74	72	67	62	55	48	44	45	46	40	36	30	34	42	60	72	71	60	57	57.2	75			
29-Jul	59	63	69	69	67	72	74	70	67	58	52	49	44	41	58	56	48	48	44	48	58	61	61	61	58.2	74			
30-Jul	62	63	64	65	66	70	77	79	81	82	86	84	77	66	58	56	54	29	21	23	24	29	34	33	57.7	86			
31-Jul	40	51	57	59	62	64	67	65	61	57	52	47	44	39	54	79	76	73	75	72	74	71	73	73	61.9	79			
														58.5 60.9 64.4 67.6 69.8 71.8 73.1 71.4 68.4 63.8 58.2 53.4 49.5 46.1 46.1 46.3 43.8 43.7 45.1 47.4 49.4 51.5 53.6 55.9														Diurnal Average	
														87 89 91 92 98 98 98 98 89 84 86 84 77 66 68 79 76 73 75 72 74 76 79 82														Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	128	17.20	17.20
40 - 60	306	41.13	58.33
60 - 80	247	33.20	91.53
80 - 100	63	8.47	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 34 km/h on Jul 4 16:00	Maximum Daily Speed Average: 23.4 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 20 03:00	Minimum Daily Speed Average: 1.4 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 6.5 km/h at hour 13	Minimum Diurnal Speed Average: 2.2 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 4.3 km/h 242.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 15 P ₉₀ = 20 P ₉₉ = 28	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-Jul	SSE5	SSE6	S6	S3	SSE6	SSE8	SSE10	SSE9	SE9	SE13	SE10	SE6	S6	SSW6	SE5	SE4	SSW3	W4	E3	ESE5	SE7	SE12	SSE11	S11	SSE6.3	SE13
2-Jul	S9	ESE9	SE10	SSE6	SSE7	SSE13	SSE12	SSE14	SSE9	SE12	SE13	S11	S11	SSE11	S13	S13	SW10	NE7	SE6	S10	S9	SSE9	SE9	SE10	SSE9.0	SSE14
3-Jul	SSE7	SW7	S8	SW9	SW7	SSE7	S9	SSW6	SW8	SE9	S6	WSW15	WSW15	WSW16	WSW19	WSW18	WSW26	WSW28	SW15	SW20	SW17	WSW18	WSW20	WSW21	SW12.4	WSW28
4-Jul	SW16	SW14	SW13	WSW18	WSW20	WSW23	WSW24	WSW25	WSW23	WSW24	SW27	WSW32	WSW32	WSW32	WSW34	WSW34	WSW30	WSW29	W29	WSW23	WSW17	WSW15	SW16	WSW18	WSW23.4	WSW34
5-Jul	WSW17	WSW16	WSW18	W19	WSW14	WSW20	W24	W24	W23	W21	W20	NNW19	W18	NNW20	NNW18	NNW16	NNW11	N12	NNW16	NW14	NW13	NW9	NW6	W5	W14.7	W24
6-Jul	WSW7	WSW10	WSW9	WSW10	SW8	WSW9	WSW11	W14	WSW13	WSW15	W17	W13	NNW10	NNW9	NNW12	NW11	W17	NNW12	NW10	NW8	NW3	WSW2	WSW7	WSW8	W9.2	W17
7-Jul	W4	WSW5	SW8	SW7	SSW5	SSE3	S2	SSW2	WSW2	W4	NNW8	NNW8	W7	NNW8	NNW10	NNW7	W7	W4	WSW4	S4	S5	N8	NNE12	NE10	W3.1	NNE12
8-Jul	ENE4	NNW3	NNW3	NE2	S2	SE2	SE1	SE2	S2	SSE4	W10	W10	NNW4	SW5	SE4	NE5	NW2	W5	W6	W6	WSW7	S1	ESE3	ESE3	WSW1.4	W10
9-Jul	E5	SE4	SSW6	S7	SSE8	SSE8	SE8	SE8	SE7	SE7	SE9	SE13	SE14	SSE11	SSE9	SE11	SE11	SSE12	SSE11	SSE11	SE9	SE9	SE12	SE11	SE8.9	SE14
10-Jul	S7	SE6	S4	WSW11	SW4	SE7	SW3	SW5	SW3	SW8	W9	W6	W7	W9	W8	W4	ENE11	E12	SSW8	NNW10	SSW8	NW2	NE9	ENE4	SW2.6	E12
11-Jul	NNW6	WSW9	WSW5	WSW3	W1	NE4	N6	NW9	NW7	NW8	NW11	NW12	NNW11	NNW11	NNW12	NNW8	WSW10	SW10	S9	SW11	SSE4	ESE2	SSW5	SSW5	W5.0	NW12
12-Jul	SSE4	SSE4	SSE6	SSE7	SSE6	SSE6	SE5	SE5	S5	SSE4	SSE5	SSE10	SE6	SE7	SSE8	SSW8	SW8	S6	SSE6	SE6	SSE6	SSE8	SSE8	SSE9	SSE6.0	SSE10
13-Jul	SSE10	SSE9	SSE8	SSE7	SSE7	S6	S5	SSE5	S5	SE4	SSE3	S5	S5	ESE5	E5	W2	NE5	NNE8	NNE15	NNE17	N16	N13	N12	N12	ENE2.5	NNE17
14-Jul	NNW12	NNW16	N17	N13	N15	NNW9	NNW9	N11	N12	N12	NNE13	NNE12	NNE9	NE8	NE4	NNE4	S1	NNW17	NNE15	NE7	ENE3	SW1	NNW1	NE1	N8.5	NNW17
15-Jul	NNE3	ENE2	E2	SSW4	S4	S5	SSE8	SE9	SE11	SE10	SE9	SE14	SE20	SSE21	SSE19	SE15	SE17	SE14	S11	SSE15	SSE15	SSE14	SSE13	SSE13	SE10.6	SSE21
16-Jul	SSE10	NW25	NNW10	NNW11	WSW8	SSW7	SSW7	W15	W18	W15	WSW12	WSW15	SW16	SW17	SW17	SW17	WSW26	WSW24	WSW25	WSW20	WSW21	WSW19	WSW18	WSW23	WSW14.1	WSW26
17-Jul	W29	W28	W25	W25	W18	W20	W20	NNW18	NW18	NNW18	NNW20	NNW19	NNW18	NNW16	NW12	NW10	N11	NNW14	NNW9	NNW10	NNW7	NNW8	NNW5	NNW10	NNW13.6	W29
18-Jul	NW10	NW9	NNW7	NW6	W5	W6	NNW5	NNE6	NW4	NNW7	W11	W11	WSW6	NNW8	W10	WSW11	WSW12	WSW15	WSW13	WSW12	WSW9	SW8	SW9	SW9	W7.1	WSW15
19-Jul	SW8	SSW7	SW7	SW7	SSW4	SSW8	SW9	WSW11	WSW9	WSW15	WSW16	WSW18	W19	W18	W18	NNE20	NNE18	NNE15	NE12	NE11	NE10	NE8	ENE5	ENE4	W3.8	NNE20
20-Jul	NNE3	WSW4	ESE0	ESE6	ESE9	SSE6	ESE3	SSE5	SSE6	E5	ENE8	E7	E8	ESE11	ESE10	ESE11	ESE8	SE8	SE7	ENE8	E8	SE8	SE11	SE12	ESE6.2	SE12
21-Jul	SE11	SE12	SE11	SSE10	SE10	SE6	ESE3	W3	WSW5	ESE3	SE4	SSE4	SE14	SSE16	S14	S10	SSE12	SSE13	SSE11	SSE13	SSE12	SSE11	SSE11	SSE10	SSE8.7	SSE16
22-Jul	SSE10	SSE10	SSE11	SSE11	SSE11	SSE13	SSE10	SSE10	SE9	SSW7	WSW14	WSW16	WSW17	WSW19	WSW19	WSW22	WSW19	WSW19	WSW19	SW15	SW10	SSW10	SW11	SW12	SW10.6	WSW22
23-Jul	SW12	WSW13	SW12	SW10	WSW11	SW10	WSW14	W15	W15	W15	W16	WSW18	WSW17	WSW16	WSW18	W23	W21	W16	N15	N18	NNE20	N22	N22	N24	NNW10.1	N24
24-Jul	N24	N22	N28	N21	N25	N24	N25	N15	N14	N18	N20	N24	N20	N21	N22	N22	N22	NNW21	NNW18	NNW17	NNW13	NW10	NW12	NW11	N18.7	N28
25-Jul	NNW8	W8	WSW9	WSW12	WSW9	WSW9	SW6	SW5	SSE3	SW5	WSW9	W12	W9	W9	W11	W9	W7	SW7	SW6	S7	S8	S10	S8	SSE9	WSW6.4	W12
26-Jul	SSE8	SE7	SSE8	SSE10	SSE12	SSE10	SSE6	SE6	SE7	SE8	SE6	SW5	SW9	SSW6	SSE9	S8	SSW8	S11	S10	S10	S9	S10	S11	S9	S7.5	SSE12
27-Jul	SSE9	SSE12	SSE11	SSE10	SE9	SE11	SSE11	SE10	SE9	SE12	SE12	SSE13	SSW10	SSW10	W11	WSW6	SSW9	SSW6	S5	NNW7	W17	W26	NNW14	W14	SSW5.9	W26
28-Jul	SSE6	WSW9	W15	WSW12	WSW12	WSW8	WSW13	W15	W15	WSW19	WSW22	WSW25	WSW25	WSW17	WSW20	W22	W22	WSW24	WSW23	NNW17	ENE9	SSW7	SSW6	SSW5	WSW13.3	WSW25
29-Jul	WSW7	WSW9	WSW8	WSW10	SW7	SSW4	S4	S3	SSE4	S2	SW2	WSW2	NNW6	WSW5	N18	NNE12	NNE8	NNE9	NNE10	NNE9	NNE12	NE10	NE8	ENE7	N2.1	N18
30-Jul	ESE6	SE7	SE9	SE7	SE13	SSE10	S7	S6	NNW3	SSE6	S7	SSE6	SE9	SE9	SE14	SSE13	SSE14	SW17	SW19	WSW15	WSW15	WSW17	WSW15	WSW17	S7.3	SW19
31-Jul	W22	W15	W13	WSW11	WSW13	W19	W19	W15	W16	W18	W18	W20	W25	NNW23	NNW16	NNE17	N12	NNW15	N13	N14	NNE5	NNE2	W5	W9	NNW11.5	W25

SW3.7	WSW3.8	SW3.7	SW4.9	SSW4.2	SSW4.4	SW4.3	WSW4.5	WSW4.2	WSW4.1	WSW5.3	WSW6.3	WSW6.5	WSW6.3	WSW6.0	W4.7	WSW5.3	W5.3	W4.0	W3.0	WSW2.2	SW2.8	SW2.9	SW3.6	Diurnal Average
W29	W28	N28	W25	N25	N24	N25	WSW25	W23	WSW24	SW27	WSW32	WSW32	WSW32	WSW34	WSW34	WSW30	WSW29	W29	WSW23	WSW21	W26	N22	N24	Diurnal Maximum

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

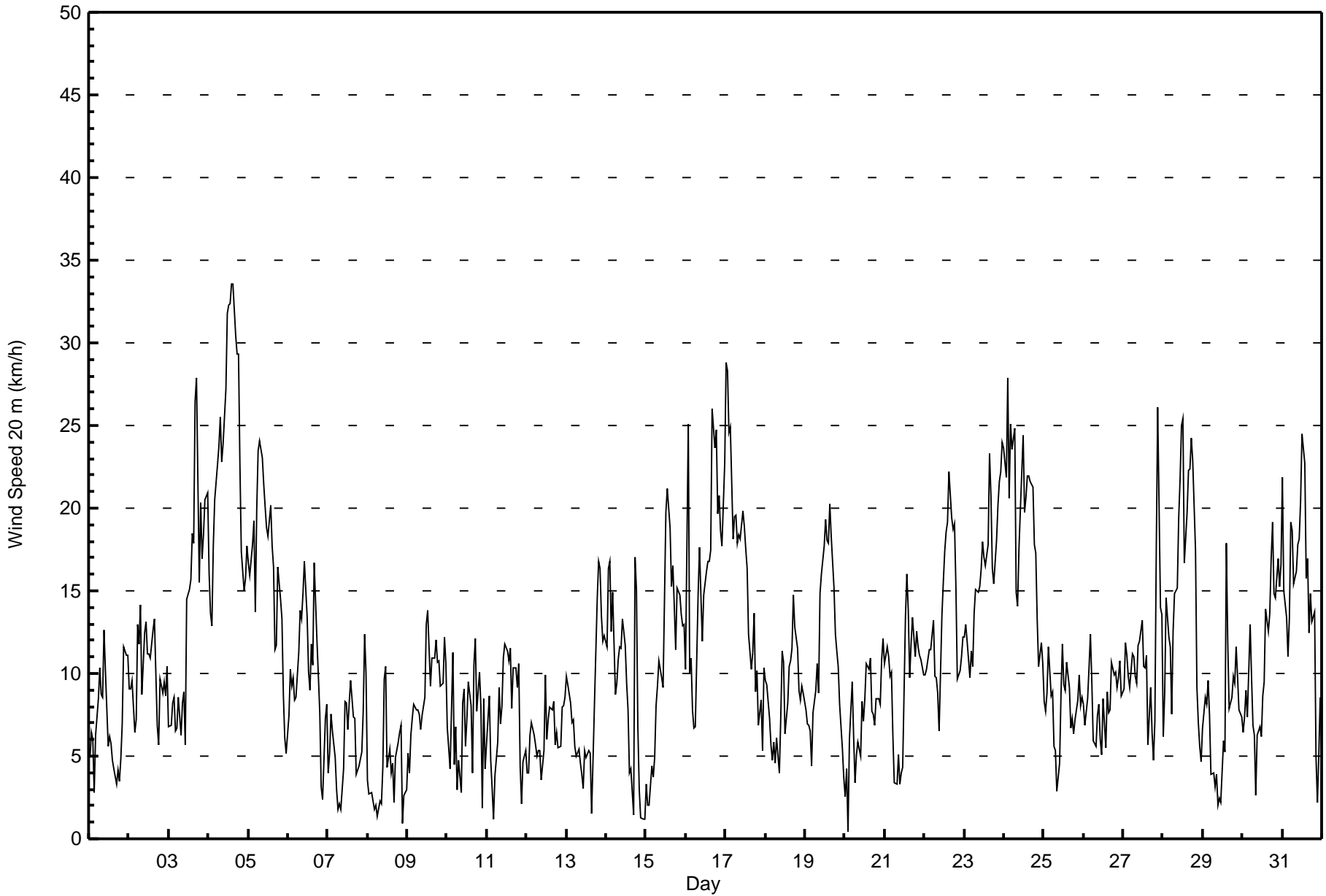


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 14 23:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 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-Jul	2	2	1	1	3	3	3	3	3	4	4	3	4	3	3	2	2	2	2	3	4	4	4	4	4
2-Jul	3	4	3	2	4	4	4	4	4	4	5	5	5	5	5	6	7	5	5	3	3	2	2	3	7
3-Jul	2	3	4	6	4	3	4	3	4	3	3	5	5	6	6	6	7	9	6	7	5	5	7	6	9
4-Jul	4	4	5	4	5	6	6	6	6	6	6	8	8	9	9	8	8	8	6	6	4	3	4	4	9
5-Jul	4	3	4	4	3	5	5	5	5	6	6	6	5	5	6	6	5	5	6	6	5	4	2	1	6
6-Jul	2	1	2	1	2	2	3	4	3	4	6	5	5	4	5	5	6	5	4	3	2	2	1	1	6
7-Jul	2	1	1	1	2	1	1	1	2	2	4	4	4	4	4	4	4	3	3	2	1	5	4	3	5
8-Jul	2	1	1	1	2	2	2	2	2	2	5	5	3	3	3	2	2	2	2	1	2	1	1	1	5
9-Jul	3	2	2	2	2	2	2	2	3	3	3	5	5	5	4	4	4	4	3	2	2	2	4	4	5
10-Jul	3	2	2	3	4	2	2	3	3	3	2	3	2	3	3	3	5	6	3	5	3	3	2	3	6
11-Jul	2	2	1	2	2	1	3	4	3	4	5	5	4	4	4	4	4	5	5	5	3	1	2	2	5
12-Jul	2	2	1	2	2	2	2	2	3	2	3	3	3	3	3	3	3	3	2	2	1	2	2	2	3
13-Jul	2	3	2	2	2	2	2	2	2	2	2	3	3	3	2	3	3	3	4	5	4	4	4	3	5
14-Jul	4	6	6	6	6	4	4	3	5	5	4	4	4	3	3	3	2	7	5	3	2	1	1	1	7
15-Jul	1	1	1	2	1	2	3	3	3	3	4	5	6	6	6	5	5	5	4	4	4	4	3	3	6
16-Jul	4	12	6	6	3	2	3	7	4	4	3	6	5	6	5	6	6	7	6	6	5	5	4	7	12
17-Jul	5	5	4	4	4	4	4	5	7	7	8	7	7	6	5	5	4	6	4	4	3	3	3	3	8
18-Jul	3	4	4	2	1	1	2	2	3	4	4	4	5	4	5	4	5	5	3	3	2	1	2	2	5
19-Jul	2	2	3	2	2	2	3	3	3	5	6	6	5	5	6	6	5	5	4	3	3	2	2	1	6
20-Jul	2	1	1	3	3	2	3	2	2	2	2	3	3	4	4	4	4	3	3	3	2	3	4	4	4
21-Jul	3	3	3	3	4	3	2	3	3	3	2	3	5	6	5	5	5	4	4	4	3	3	3	2	6
22-Jul	3	3	3	3	3	4	3	3	3	4	4	6	6	7	7	6	6	6	5	4	2	3	3	3	7
23-Jul	3	3	3	3	3	3	4	3	4	4	5	5	5	7	6	6	5	5	4	5	6	6	6	6	7
24-Jul	7	7	7	6	8	8	9	5	6	6	7	8	8	8	6	8	8	8	7	6	4	3	4	3	9
25-Jul	2	1	1	2	2	2	2	2	2	3	4	5	4	4	4	4	4	3	3	2	2	2	1	5	
26-Jul	1	1	2	3	3	3	2	2	2	3	2	4	4	4	4	5	5	4	4	3	3	3	3	3	5
27-Jul	2	2	3	2	3	3	3	4	3	3	4	5	5	5	4	3	4	3	1	3	6	10	5	7	10
28-Jul	2	3	2	3	3	4	3	4	4	5	5	6	9	6	5	7	6	7	8	7	4	3	2	1	9
29-Jul	1	2	2	2	2	2	2	2	2	2	2	3	3	3	7	4	3	3	3	3	3	2	2	3	7
30-Jul	3	2	3	4	4	3	2	4	4	3	3	3	3	3	4	5	5	7	5	3	3	3	3	4	7
31-Jul	4	3	3	2	3	4	5	4	3	5	5	6	6	8	7	6	5	6	6	5	2	1	2	1	8
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	128	17.20	17.20
6 - 11	332	44.62	61.83
12 - 19	204	27.42	89.25
20 - 28	71	9.54	98.79
29 - 38	9	1.21	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Mannix - July 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	0	5	6	6	5	9	11	16	18	9	10	10	12	5	4	2	128
6 - 11	4	7	10	5	3	8	50	67	33	20	28	31	23	17	17	9	332
12 - 19	18	12	1	0	1	0	18	22	2	0	16	53	32	8	6	15	204
20 - 28	17	2	0	0	0	0	1	1	0	0	2	25	18	2	1	2	71
29 - 38	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	26	17	11	9	17	80	106	53	29	56	126	87	32	28	28	744

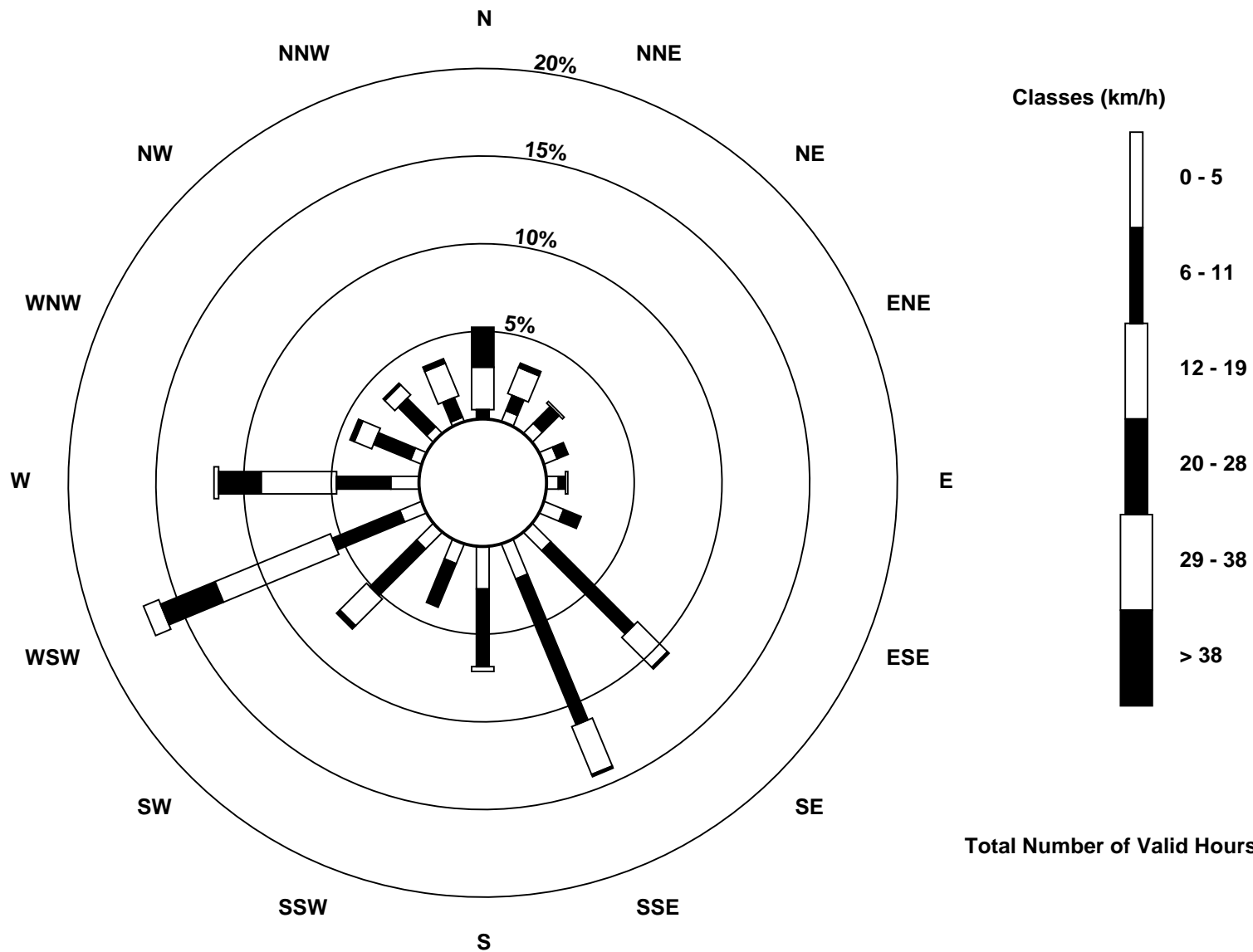
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Maximum Speed: 41 km/h on Jul 4 15:00	Maximum Daily Speed Average: 30.0 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 11 22:00	Minimum Daily Speed Average: 1.5 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 7.9 km/h at hour 13	Minimum Diurnal Speed Average: 3.8 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 5.6 km/h 235.2 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 10 Median = 15 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-Jul	S6	SSE11	S11	S6	SE9	SSE12	SSE14	SSE11	SE11	SE16	SE13	SE7	S9	SSW8	SE6	SE6	SSW5	W5	E4	ESE6	ESE10	SE16	SSE20	S21	SSE9.1	S21
2-Jul	S17	SE14	SE15	SSE12	SSE12	SSE21	SSE16	SE18	SSE13	SE16	SE17	SSE17	S17	SSE16	SSE19	S22	SW15	NNE9	SSE10	S17	S18	SSE20	SSE16	ESE13	SSE14.3	S22
3-Jul	SSE12	SW13	S16	SW14	SW11	SSE11	S14	SSW10	SW12	SE12	S8	SW17	WSW18	WSW18	SW23	WSW22	WSW33	SW35	SSW23	SSW29	SW24	SW25	SW28	WSW27	SW17.2	SW35
4-Jul	SW23	SW21	SW21	SW24	SW28	WSW29	WSW30	WSW30	WSW28	SW29	SW35	WSW39	SW40	SW40	SW41	WSW41	WSW38	WSW34	WSW34	WSW27	WSW23	SW23	SW25	SW25	WSW30.0	SW41
5-Jul	WSW24	WSW23	WSW23	WSW24	WSW20	WSW25	WSW27	W28	W27	W25	W25	W23	W22	WNW26	WNW23	WNW22	NW17	NNW18	NW25	NW23	NW22	NW15	NW12	WNW8	W19.4	W28
6-Jul	W11	W17	W14	WSW15	WSW13	WSW12	WSW14	W17	WSW16	WSW17	W20	W17	WNW13	NW13	WNW16	NW16	W21	WNW16	NW16	NW12	NW6	W2	SW7	SW11	W12.4	W21
7-Jul	W8	W7	W7	WSW7	SSW7	S4	S3	SSW3	WSW2	W5	W10	WNW11	W8	WNW11	WNW13	WNW9	W9	W4	WSW6	S7	S6	N12	NNE18	NE15	W4.3	NNE18
8-Jul	ENE7	NNW2	N3	NE5	ESE4	ESE3	ESE3	SE2	S4	SSE6	W13	W14	NNW8	SW7	SE5	NE5	NW3	W6	W8	WSW7	WSW10	SSW3	ESE4	E5	WSW1.5	W14
9-Jul	E8	ESE9	SSE10	SSE14	SE14	SE11	SE10	SE9	SE8	SE9	SE11	SE16	SE17	SE15	SE13	SE14	SE14	SE16	SE15	SE16	SE14	SE13	SE18	SE15	SE12.6	SE18
10-Jul	S14	SE11	SSE6	WSW15	WSW7	SE9	SSW4	SSW7	SW4	SW10	WSW10	W7	W9	WSW11	W9	W5	ENE12	E14	SSW13	WNW15	SSW14	WSW3	NNE13	NE7	SW3.9	WSW15
11-Jul	WNW8	W10	W7	WNW6	WNW4	NNE5	NNW8	NW15	NW11	NW13	NW16	WNW17	WNW16	WNW14	WNW15	WNW11	WSW13	SW15	S14	SW16	S8	ESE1	S7	SSW12	W7.2	WNW17
12-Jul	SSE6	SSE7	SSE10	SSE14	SSE11	SSE8	SE6	SE7	S8	S5	SSE7	SE12	SE8	SE8	SSE12	SSW12	SSW12	S8	SSE9	SE8	SSE9	SSE14	SSE16	SSE17	SSE9.3	SSE17
13-Jul	SSE18	SSE17	SSE15	SSE12	SSE14	S10	S8	SSE7	S6	SE5	SSE3	S7	S6	ESE6	E6	W3	NE6	NNE10	NNE19	N23	N23	N20	N19	N19	ENE3.0	N23
14-Jul	NNW19	NNW26	N26	N19	N22	NNW14	NNW15	N14	N15	N16	N17	NNE14	NNE11	NNE9	NNE5	NNE5	S1	NNW26	NNE20	NNE9	ENE4	SSE2	S2	E1	N11.9	NNW26
15-Jul	NE3	ENE4	ENE4	SE8	SE8	SSE9	SE12	SE12	SE13	SE13	SE13	ESE18	SE24	SE28	SSE25	SE20	SE21	SE18	SSE20	SSE23	SSE23	SSE22	SSE21	SSE22	SE15.3	SE28
16-Jul	SSE20	NW36	NNW16	WNW16	WSW10	SSW12	SSW13	W18	W21	W17	WSW14	WSW18	SW22	SW23	SW23	SW24	WSW31	WSW29	WSW30	WSW25	WSW27	WSW25	WSW24	WSW28	WSW18.1	NW36
17-Jul	WSW33	W32	W28	WSW28	WSW22	W23	W24	WNW25	NW28	NW27	NNW30	NNW28	NNW26	NNW24	NW20	NW15	N16	NNW21	NNW14	NNW16	NNW11	NW15	WNW11	WNW17	WNW18.9	WSW33
18-Jul	NW16	NW16	NW13	NW10	W6	WNW7	WNW7	NNE7	NW6	W9	W13	W13	WSW8	W11	W13	WSW13	WSW14	WSW18	WSW16	SW14	WSW13	SW15	SW18	SW18	W9.8	WSW18
19-Jul	SW16	SW14	SW13	SW12	SW8	SSW12	SW12	WSW13	SW11	WSW18	WSW18	WSW20	WSW22	WSW21	W21	NNE26	NNE23	NNE20	NNE15	NNE14	NE15	NE11	ENE9	NE8	W5.1	NNE26
20-Jul	NE5	SE1	E3	E9	ESE12	SE9	E5	SSE7	SE10	E7	ENE10	E8	ENE10	ESE12	ESE12	ESE12	ESE10	ESE9	SE10	ENE11	E11	SE12	ESE15	ESE15	ESE8.5	ESE15
21-Jul	SE15	ESE16	SE15	SE15	ESE13	SE9	ESE5	W4	W6	ESE3	SE5	SSE6	SE17	SSE21	S21	S15	SSE15	SE18	SSE15	SSE18	SSE20	SSE22	SSE21	SSE18	SSE12.7	SSE22
22-Jul	SSE18	SSE19	SSE17	SE18	SSE18	SSE20	SSE13	SSE13	SE11	S9	SW16	SW19	SW21	WSW22	SW24	SW28	WSW24	WSW23	SW24	SW21	SW16	SSW20	SSW20	SW21	SSW14.9	SW28
23-Jul	SW20	SW19	SW20	SW17	SW17	SW15	WSW16	W17	W17	W17	W18	WSW21	WSW20	WSW19	WSW21	W26	W24	W20	N19	N25	N28	N30	N31	N33	W12.6	N33
24-Jul	N33	N30	N39	N28	N34	N33	N36	N23	N20	N25	N29	N33	N29	N29	N30	N31	NNW31	NNW32	NNW27	NNW26	NW22	NW19	NW21	NW19	N27.3	N39
25-Jul	WNW17	WNW13	W15	W15	W12	WSW12	SW7	SW6	SSE4	SW6	WSW10	WSW14	W12	W11	W12	W11	WSW8	SW9	SSW9	S13	S19	S21	S17	SSE16	SW9.1	S21
26-Jul	SSE15	SSE13	SSE14	SSE19	SSE21	SSE16	SSE8	SE7	SE9	SE10	SE7	SW6	SW11	SSW7	SSE12	S11	S12	S16	S18	S19	S20	S22	S22	S19	S12.8	S22
27-Jul	S18	SSE21	SSE19	SE16	SE16	SE18	SE17	SE13	SE12	SE14	SE15	SE17	SSW15	SSW16	W14	WSW7	SSW14	S10	S6	WNW12	W21	W33	WNW22	W18	S8.9	W33
28-Jul	S10	WSW13	WSW19	WSW17	WSW17	WSW12	WSW15	WSW16	WSW17	WSW22	WSW26	WSW29	WSW31	WSW21	WSW23	WSW25	W26	WSW29	WSW29	NNW25	NE11	S12	S13	SSW12	WSW16.6	WSW31
29-Jul	SW10	WSW13	WSW12	WSW13	WSW12	SSW7	S6	S4	SSE5	S2	SW3	WSW3	WNW8	SW7	NNW25	NNE14	N10	N11	N12	NNE12	NNE16	NE14	NE10	ENE10	NNW3.0	NNW25
30-Jul	ESE9	SE11	SE13	SE12	SE18	SE14	SSE12	S11	WNW6	SSE11	S12	SSE9	SE11	SE12	SE17	SSE17	SSE19	SW22	SW25	SW21	SW23	WSW25	WSW23	WSW24	S10.4	SW25
31-Jul	W26	W22	W18	WSW14	WSW20	W24	WSW22	W17	W18	W20	W21	W24	W30	WNW30	NW21	NNE21	N17	NNW22	NNW20	N19	N6	N3	W7	W12	WNW15.0	WNW30

SW6.0	WSW5.2	SW4.8	SW6.4	SSW6.0	SSW6.1	SW5.5	SW5.4	WSW5.1	SW4.8	WSW6.3	WSW7.6	WSW7.9	WSW7.5	WSW6.1	WSW6.6	W6.7	WSW5.4	W4.2	SW3.8	SW4.8	SSW5.1	SW5.6	Diurnal Average					
WSW33	NW36	N39	N28	N34	N33	N36	WSW30	NW28	SW29	SW35	WSW39	SW40	SW40	SW41	WSW41	WSW38	SW35	WSW34	SSW29	N28	W33	N31	N33	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

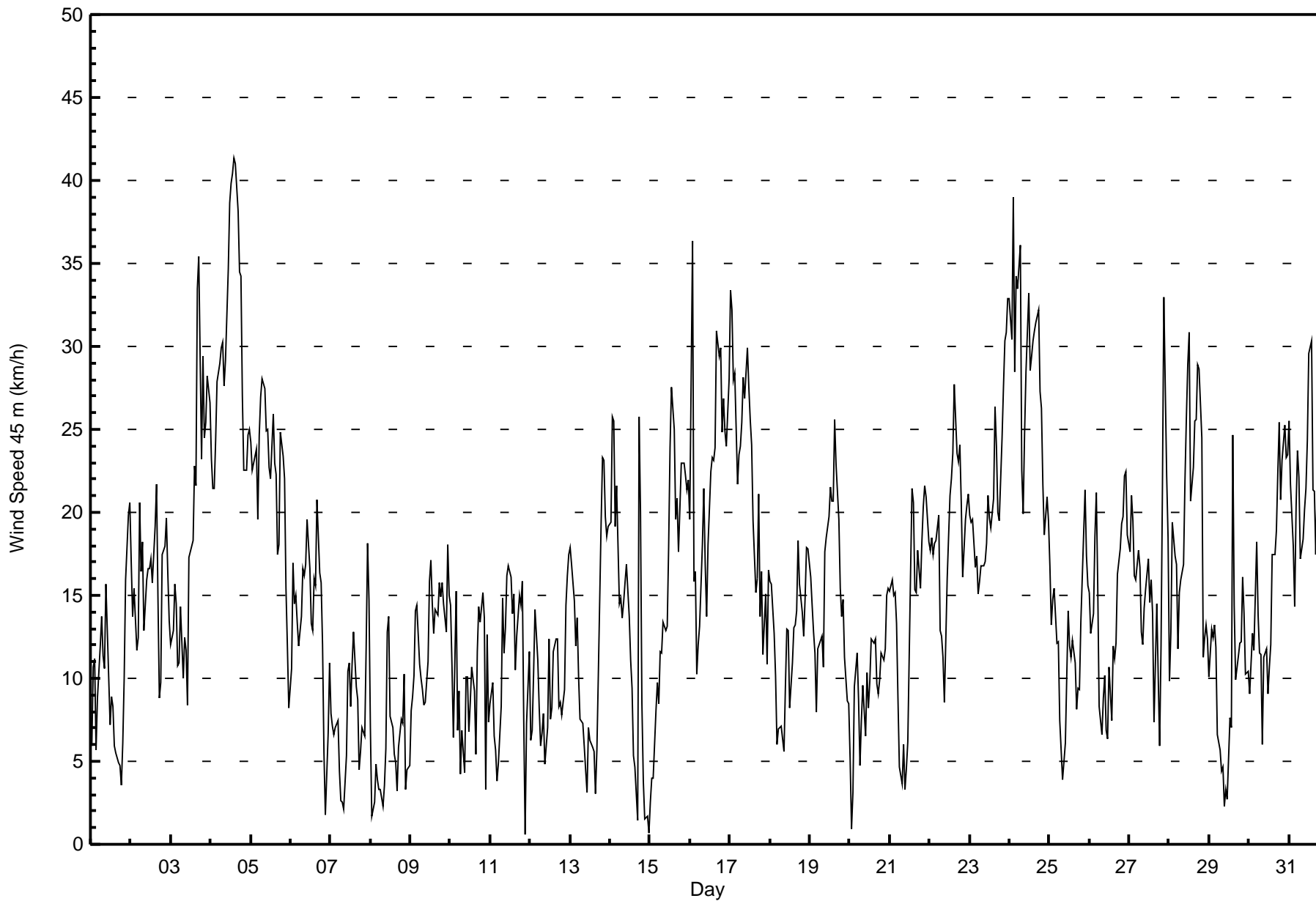
Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 7 03:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 744 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-Jul	1	3	1	2	2	4	2	2	2	4	4	3	3	3	3	2	2	3	2	2	5	4	4	4	5
2-Jul	3	5	2	2	3	3	4	3	4	3	4	5	4	5	5	6	8	5	6	3	2	1	4	3	8
3-Jul	2	3	4	7	5	5	5	3	3	3	4	4	4	5	7	6	8	8	5	6	4	4	7	5	8
4-Jul	4	4	4	4	5	5	6	6	6	7	8	8	9	7	8	8	7	8	6	6	4	2	3	3	9
5-Jul	4	4	3	3	3	5	4	4	5	5	5	5	5	7	4	5	4	4	5	5	4	4	2	2	5
6-Jul	2	1	1	1	2	2	3	3	3	4	5	4	4	4	4	4	5	4	3	3	2	1	2	3	5
7-Jul	3	1	1	1	1	1	1	1	2	3	4	4	4	5	3	4	4	3	2	1	1	7	4	4	7
8-Jul	4	1	1	1	1	3	2	2	2	2	5	5	3	3	2	2	2	2	2	1	1	3	2	2	5
9-Jul	3	3	3	2	2	1	2	2	3	3	3	5	5	4	4	4	4	3	2	2	3	3	4	4	5
10-Jul	2	4	2	4	5	4	3	3	3	2	2	2	2	3	2	3	6	6	3	7	6	5	2	4	7
11-Jul	2	2	1	1	2	2	3	4	2	3	3	3	3	3	3	3	4	6	7	5	3	1	2	2	7
12-Jul	3	3	2	1	3	2	2	2	2	2	4	2	3	4	3	3	3	2	2	2	1	2	1	1	4
13-Jul	2	3	1	2	2	3	2	2	2	2	3	3	4	3	3	3	2	3	4	5	4	3	3	3	5
14-Jul	4	5	6	6	5	4	4	3	4	4	4	4	4	3	3	3	3	6	6	3	2	2	1	1	6
15-Jul	1	1	1	2	1	2	3	3	3	3	4	5	6	5	5	5	5	5	4	4	3	3	2	4	6
16-Jul	5	13	7	5	4	4	3	7	4	4	3	6	5	5	5	6	6	7	6	5	5	5	4	6	13
17-Jul	5	4	3	3	4	3	3	4	6	6	7	6	6	5	4	5	4	7	3	5	3	3	3	3	7
18-Jul	3	3	4	2	1	2	2	2	3	4	4	4	5	5	4	4	5	5	3	3	2	1	1	2	5
19-Jul	2	3	3	3	2	2	3	3	3	5	5	6	4	4	5	5	5	5	3	3	3	2	2	2	6
20-Jul	3	1	2	3	4	3	3	2	2	2	2	3	3	4	4	4	4	3	3	4	3	4	4	4	4
21-Jul	3	4	4	3	5	4	2	3	3	4	3	4	5	5	4	4	4	3	3	3	4	2	1	2	5
22-Jul	2	2	3	3	2	3	2	3	3	3	4	5	6	6	7	6	5	6	4	3	2	2	2	2	7
23-Jul	2	3	2	3	3	2	3	3	3	4	4	5	5	6	5	5	5	4	4	6	5	5	4	5	6
24-Jul	6	7	6	5	8	8	8	6	6	6	7	7	8	8	6	7	7	6	5	5	4	3	3	3	8
25-Jul	2	2	2	1	1	2	2	2	2	3	4	4	3	4	4	4	4	3	2	2	1	1	1	1	4
26-Jul	1	1	2	3	2	4	2	2	2	2	2	5	4	4	4	6	5	4	3	3	2	2	2	3	6
27-Jul	2	2	2	2	2	3	3	3	3	3	3	5	4	6	4	4	3	3	2	4	5	8	5	8	8
28-Jul	3	3	2	3	3	5	3	5	3	4	6	6	9	5	5	6	6	8	7	7	4	6	2	1	9
29-Jul	1	2	2	1	3	2	2	2	2	2	2	4	3	4	8	3	3	3	3	3	2	2	2	3	8
30-Jul	4	3	4	4	3	4	3	5	6	3	3	2	2	3	4	4	4	6	4	3	2	3	3	4	6
31-Jul	4	3	3	2	2	4	5	4	3	4	4	5	5	7	7	6	6	5	6	6	3	1	4	1	7
																		Diurnal Maximum							



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	60	8.06	8.06
6 - 11	185	24.87	32.93
12 - 19	288	38.71	71.64
20 - 28	164	22.04	93.68
29 - 38	41	5.51	99.19
> 38	6	0.81	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 45 m (WS45m) - km/h
Mannix - July 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	3	4	3	4	8	5	4	8	4	2	3	7	1	1	1	60
6 - 11	3	6	6	7	5	7	31	23	23	7	13	15	20	12	4	3	185
12 - 19	13	9	3	1	1	10	50	44	21	13	22	38	25	14	17	7	288
20 - 28	11	5	0	0	0	0	4	19	6	3	28	38	24	5	9	12	164
29 - 38	14	0	0	0	0	0	0	0	0	1	3	15	3	1	1	3	41
> 38	1	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	6
Totals	44	23	13	11	10	25	90	90	58	28	71	111	79	33	32	26	744

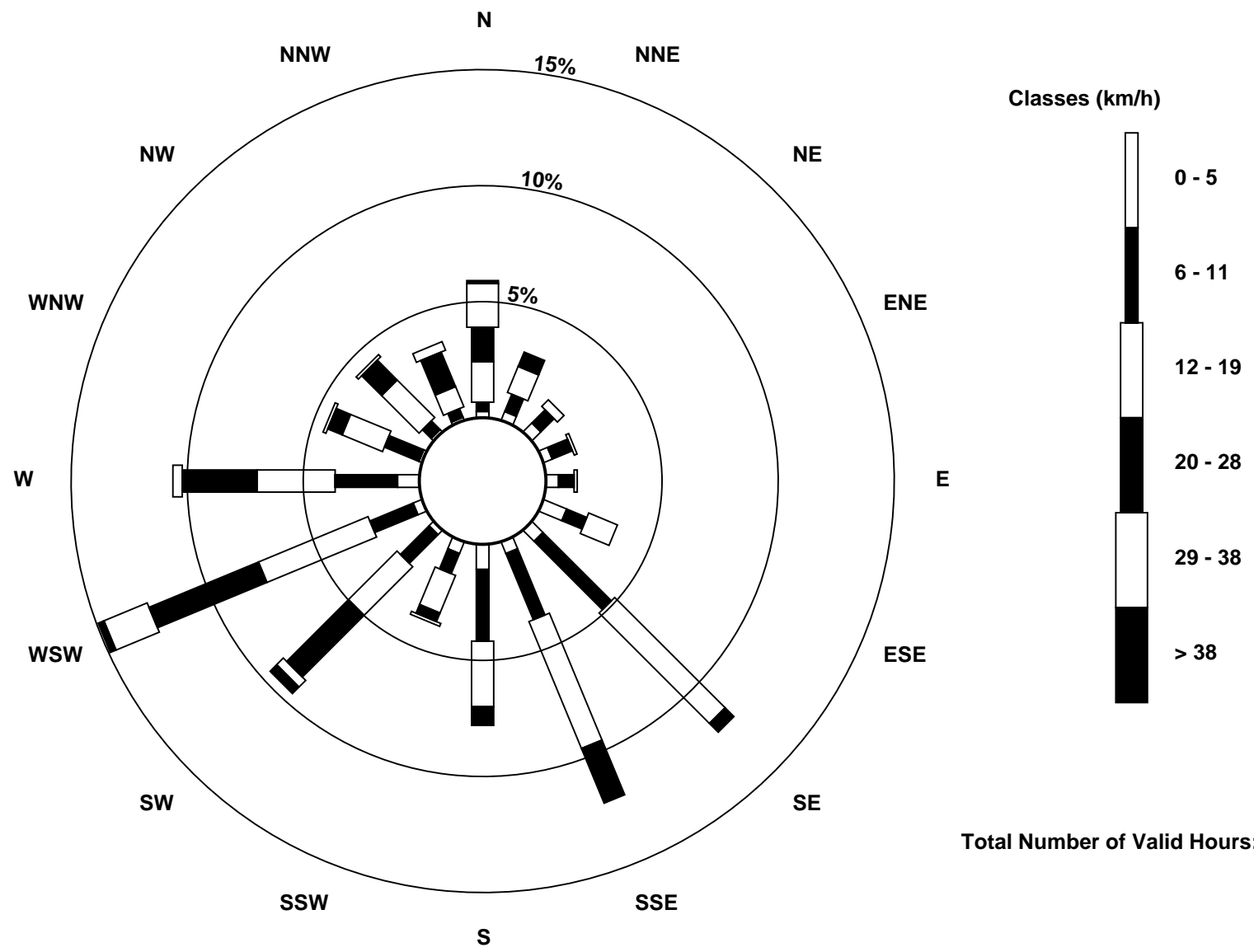
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Maximum Speed: 45 km/h on Jul 4 16:00	Maximum Daily Speed Average: 34.1 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 14 17:00	Minimum Daily Speed Average: 1.6 km/h on Jul 8	Hours of Data: 742
Maximum Diurnal Speed Average: 8.1 km/h at hour 14	Minimum Diurnal Speed Average: 4.3 km/h at hour 21	Hours of Missing Data: 2
Monthly Average Velocity: 6.2 km/h 238.1 deg	Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 10 Median = 16 Q ₃ = 24 P ₉₀ = 29 P ₉₉ = 41	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-Jul	SSW7	SSE8	S11	S5	AF	SE12	AF	SSE12	SSE11	SE16	SE13	SE7	S9	SSW9	SE6	SE5	S5	WSW4	ESE3	SE7	SE11	SE16	SSE24	S24	SSE9.3	S24
2-Jul	S21	SE16	SE18	SSE17	SSE16	SSE25	SSE19	SE19	SSE14	SE16	SE17	SSE18	S18	SSE17	SSE21	S25	SW17	NNE9	SSE12	S21	S22	S24	SSE19	SE13	SSE16.5	SSE25
3-Jul	S15	SW17	S19	SW19	WSW14	S11	S18	SSW12	SW15	SE12	S10	SW18	WSW19	WSW19	SW24	WSW23	WSW37	SW39	SSW27	SSW33	SW29	SW30	SW32	WSW30	SW19.8	SW39
4-Jul	SW29	SW27	SW28	WSW29	WSW33	WSW34	WSW34	WSW31	SW31	SW38	WSW42	SW43	SW44	SW44	WSW45	WSW42	WSW37	WSW37	WSW30	WSW26	WSW29	SW31	SW31	WSW34.1	WSW45	
5-Jul	WSW31	WSW29	WSW28	WSW28	WSW25	WSW28	W29	W29	W28	W26	W26	W23	W23	WNNW27	WNNW23	WNNW23	NW18	NNW21	NW28	NW26	NW25	NW18	NW14	NW10	W21.3	WSW31
6-Jul	W14	W22	W18	W21	WSW19	WSW17	WSW16	W17	WSW17	WSW17	W20	W17	WNNW14	NW13	WNNW16	NW17	W21	WNNW17	NW17	NW13	NNW7	NW2	SW4	SSW8	W13.7	W22
7-Jul	W8	NW6	NW4	WNNW6	WSW6	SSW5	SSW3	SSW3	SW2	W5	W10	WNNW11	W9	WNNW11	WNNW13	WNNW10	W9	W4	WSW6	S7	S6	NNE15	NNE23	NE18	WNNW4.2	NNE23
8-Jul	ENE10	SSE1	ESE1	E4	ESE6	ESE5	ESE5	ESE3	S3	SSE6	W13	W16	NNW8	SW6	SSE6	NE5	NW3	W6	W8	WSW7	SW11	SW4	SE4	E3	SW1.6	W16
9-Jul	E10	ESE9	SE11	SE16	SE17	SE10	ESE9	SE9	SE8	SE8	SE10	SE14	SE16	SE15	SE13	SE13	SE14	SE17	SE19	SE21	SE17	ESE12	SE20	SE13	SE13.0	SE21
10-Jul	S18	SE14	SSE8	WSW19	WSW10	SSE9	S7	S7	SW4	SW10	WSW10	W6	W9	WSW11	WSW9	W6	ENE12	E15	S13	WNNW17	SSW12	WSW3	NNE16	NE11	SSW3.9	WSW19
11-Jul	NW8	WNNW7	W7	WNNW5	NW5	NNE6	NNW9	NW17	NW13	NW13	NW16	NW17	WNNW16	WNNW14	WNNW15	WNNW11	WSW13	SW17	S16	SW19	SSW10	W4	SSW5	SSW9	W7.5	SW19
12-Jul	S6	SSW6	SSE8	SSE11	S10	SSE10	SE6	SSE8	S8	S5	SSE7	SE12	SE8	SE8	SSE12	SSW14	SSW13	S9	SSE9	SE9	SE11	SSE18	SSE21	SSE22	SSE9.8	SSE22
13-Jul	SSE22	SSE22	SSE18	SSE13	SSE10	SSW9	S8	SSE8	SSE6	SE4	SSE3	S7	SSE6	ESE6	E6	W3	NNE6	NNE11	NNE23	NNE28	N27	N24	N23	N24	ENE3.5	NNE28
14-Jul	NNW23	N30	N30	N22	N25	N17	NNW16	N14	N15	N17	NNE18	NNE15	NNE12	NNE10	NNE6	NNE4	S1	NNW29	NNE23	NE11	ENE4	SE3	SSE4	SE3	N13.4	N30
15-Jul	ENE3	E4	E6	SE10	SE10	SE11	SE13	SE13	SE14	SE14	SE17	ESE16	SE22	SE29	SE26	SE19	SE20	SE16	S24	SSE27	SSE28	SSE29	SSE28	SSE29	SE17.3	SSE29
16-Jul	SSE25	NW40	NNW18	WNNW18	W11	SSW12	SSW18	W20	W22	W17	WSW14	WSW19	SW24	SW26	SW25	SW26	WSW33	WSW32	WSW34	WSW28	WSW32	WSW31	WSW29	WSW32	WSW20.2	NW40
17-Jul	WSW37	W34	W29	W31	WSW24	W25	W26	WNNW27	NNW31	NW30	NNW33	NNW30	NNW28	NNW26	NW21	NW16	N17	NNW24	NNW15	NNW19	NNW14	NNW18	WNNW13	WNNW19	NW20.7	WSW37
18-Jul	NW18	NW18	NNW15	NW12	WNNW7	WNNW8	NW7	NNE8	NW6	WNNW10	W13	W13	WSW9	W11	W14	WSW14	WSW14	WSW19	WSW16	WSW14	WSW15	SW18	SW24	SW27	W10.9	SW27
19-Jul	SW24	SW21	SW18	SW16	SW11	SW14	SW14	WSW13	SW11	WSW19	WSW20	WSW20	WSW22	W22	W21	NNE27	NNE25	NNE22	NNE17	NE17	NE18	NE14	ENE12	NE12	W5.7	NNE27
20-Jul	ENE8	SSE3	SE3	E8	ESE9	SE8	E5	SE8	SE12	E7	ENE12	E8	ENE10	ESE10	ESE11	ESE11	ESE9	ESE9	ESE9	ENE13	E12	SE12	ESE12	ESE12	ESE8.3	ENE13
21-Jul	SE15	ESE13	ESE13	SE16	ESE10	ESE9	E5	WNNW3	W6	ESE3	ESE5	SE6	SE15	SSE22	SSE22	S16	SSE16	SE18	SSE17	SSE21	SSE25	SSE27	SSE26	SSE24	SSE13.4	SSE27
22-Jul	SSE21	SSE22	SSE22	SSE23	SSE24	SSE24	SSE14	SSE13	SE12	SSW10	SW17	SW20	SW23	WSW24	SW25	SW29	WSW25	WSW25	SW26	SW23	SW20	SSW26	SSW27	SW28	SSW17.5	SW29
23-Jul	SW26	SW25	SW25	SW22	WSW22	SW19	WSW17	W17	W17	W17	W19	WSW22	WSW20	WSW20	WSW22	W27	W25	W21	N21	N26	N31	N33	N34	N36	W13.7	N36
24-Jul	N36	N35	N42	N32	N38	N38	N41	N26	N22	N28	N32	N37	N32	N33	N34	N34	N35	NNW36	NNW30	NNW31	NNW26	NW24	NW27	NW24	N31.2	N42
25-Jul	NNW20	WNNW17	W19	W20	W16	W17	WSW11	SW6	S4	SW6	WSW11	WSW14	W12	W12	W12	W11	W8	SW9	SSW10	S15	S22	S27	SSW21	S17	WSW10.4	S27
26-Jul	S15	S11	SSE9	SSE22	SSE23	S19	SSE10	SE6	SE8	SE10	SE6	SW7	SW11	SSW8	SSE12	S12	S13	S18	S20	S23	S24	S28	SSW29	SSW25	S14.4	SSW29
27-Jul	S22	SSE23	SSE24	SSE23	SSE22	SE24	SSE22	SE14	SE12	SE14	SE15	SE18	SSW15	SSW17	W14	SW8	SSW16	S11	SSW6	WNNW15	W24	W35	WNNW25	W23	SSW10.5	W35
28-Jul	S9	WSW16	W23	WSW21	WSW22	WSW16	WSW17	WSW16	WSW17	WSW23	WSW28	WSW31	WSW33	WSW23	WSW24	WSW27	W26	WSW31	WSW32	NNW27	NE13	S14	S17	S16	WSW18.3	WSW33
29-Jul	SW15	WSW17	WSW15	WSW18	WSW16	SW8	S6	S4	SSE5	S3	SW3	WSW3	WNNW7	SW7	NNW27	NNE16	NNE11	NNE13	NNE13	NNE14	NNE20	NE17	ENE13	E11	NNW3.6	NNW27
30-Jul	ESE7	SE12	ESE10	SE12	SE19	SE17	SSE15	SSW14	WNNW9	SSE12	S13	SSE10	SE11	SE12	SE18	SSE19	SSE21	SW24	SW28	SW24	SW30	WSW33	WSW31	WSW30	SSW11.6	WSW33
31-Jul	W29	WNNW26	W21	W16	WSW26	W28	W25	W18	W19	W21	W22	W25	W30	WNNW32	NW22	NNE24	N19	NNW23	N22	N21	N7	NNW6	WNNW7	WNNW12	WNNW16.6	WNNW32

SW7.5	WSW6.6	SW5.6	SW7.5	SW7.1	SSW6.8	SW6.3	WSW5.7	WSW5.3	WSW4.9	WSW6.4	WSW7.9	WSW8.1	WSW8.1	WSW7.7	WSW6.3	WSW6.8	W7.0	WSW5.7	W4.3	SW4.3	SW5.8	SSW6.0	SW6.5	Diurnal Average	
WSW37	NW40	N42	N32	N38	N38	N41	WSW34	NW31	SW31	SW38	WSW42	SW43	SW44	SW44	WSW45	WSW42	SW39	WSW37	SSW33	WSW32	W35	N34	N36	Diurnal Maximum	

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

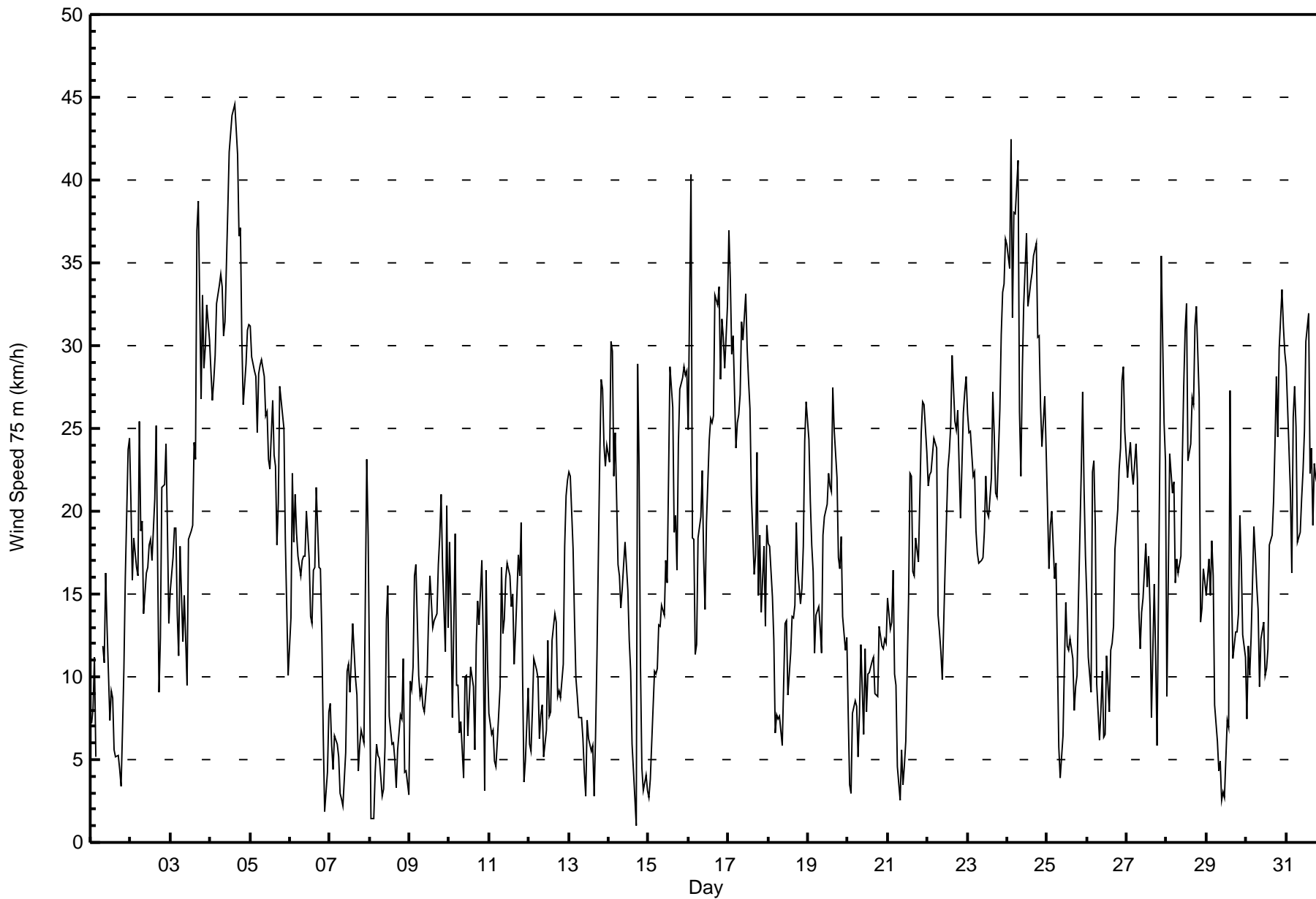


Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 75 m (WS75m) - km/h

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 7 05:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9																		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	1	3	1	2	AF	3	AF	2	2	4	4	3	3	3	2	2	2	2	2	3	6	7	4	4	7																						
2-Jul	3	6	3	2	4	3	4	3	4	3	4	4	4	5	5	7	8	5	8	3	2	1	5	4	8																						
3-Jul	2	3	4	7	4	5	6	2	3	3	4	4	5	5	7	6	8	9	5	6	4	4	7	5	9																						
4-Jul	3	3	4	4	4	5	6	5	5	6	7	8	9	6	8	8	7	8	6	5	3	2	3	3	9																						
5-Jul	3	3	3	3	3	4	4	5	5	5	5	5	4	5	4	4	3	4	5	5	4	4	2	2	5																						
6-Jul	3	2	2	1	2	2	2	3	3	4	5	4	4	4	4	4	5	4	3	3	3	1	2	1	5																						
7-Jul	1	2	2	2	1	1	1	1	2	3	4	4	4	4	4	4	4	3	2	1	1	9	3	4	9																						
8-Jul	4	2	1	1	2	3	3	2	2	3	6	5	3	3	2	2	2	2	1	2	1	3	2	1	6																						
9-Jul	3	4	3	3	2	5	3	3	3	3	4	6	5	5	4	5	5	3	2	3	4	5	5	5	6																						
10-Jul	3	3	3	4	5	5	3	2	3	2	2	2	2	3	2	3	6	7	4	8	6	6	2	6	8																						
11-Jul	3	3	2	2	1	1	3	3	2	3	3	3	3	3	2	3	4	7	10	5	3	2	3	2	10																						
12-Jul	3	2	2	2	2	2	2	2	2	2	4	2	3	4	3	3	3	2	2	2	2	1	1	1	4																						
13-Jul	1	2	1	1	2	2	2	2	2	2	2	3	4	3	3	3	2	3	4	5	4	3	3	3	5																						
14-Jul	4	5	7	6	5	4	4	3	4	3	3	4	4	4	3	3	3	6	5	3	2	2	2	1	7																						
15-Jul	1	2	2	1	2	2	4	3	4	5	4	6	8	6	5	6	6	6	3	3	4	3	2	4	8																						
16-Jul	5	13	8	5	4	5	3	7	4	4	2	7	4	5	5	7	5	8	5	5	4	4	4	5	13																						
17-Jul	5	4	3	3	4	3	3	3	5	6	7	6	6	5	5	5	4	8	4	4	3	3	3	2	8																						
18-Jul	2	3	5	2	2	2	2	2	2	4	4	4	5	5	4	4	4	5	3	3	2	2	1	1	5																						
19-Jul	2	3	3	3	3	3	3	3	3	5	5	7	4	5	6	4	4	5	3	3	3	3	2	2	7																						
20-Jul	4	1	2	3	3	4	3	2	3	3	2	3	3	4	4	5	4	3	3	6	5	5	5	5	6																						
21-Jul	4	5	6	5	4	5	2	3	3	4	3	4	6	5	3	3	4	3	3	4	4	1	1	3	6																						
22-Jul	2	1	2	2	2	4	2	2	3	3	3	5	6	6	6	5	5	5	4	3	2	2	2	2	6																						
23-Jul	2	2	2	3	3	3	3	3	3	3	4	5	5	6	5	5	4	4	4	5	4	4	3	4	6																						
24-Jul	5	7	5	5	8	7	8	6	6	6	6	7	7	8	6	7	7	6	5	5	4	3	3	4	8																						
25-Jul	2	1	2	1	2	1	3	2	2	3	4	4	4	4	4	4	4	3	2	3	2	1	2	1	4																						
26-Jul	1	3	3	3	1	4	3	2	3	2	3	5	4	4	5	6	5	4	3	3	2	3	3	3	6																						
27-Jul	2	1	1	2	2	2	3	4	3	3	4	5	4	6	4	5	3	4	2	5	6	8	5	10	10																						
28-Jul	3	3	2	3	3	6	3	4	3	4	5	5	9	4	5	6	5	9	7	7	5	8	2	1	9																						
29-Jul	2	2	2	2	3	3	2	2	2	2	2	3	3	4	9	3	3	3	3	3	2	2	2	4	9																						
30-Jul	3	4	4	5	5	4	5	5	8	3	3	2	2	3	4	5	4	6	4	2	3	2	3	4	8																						
31-Jul	4	3	4	2	2	3	5	3	3	4	3	5	5	7	7	6	5	4	6	6	3	1	4	1	7																						
Diurnal Maximum																								5	13	8	7	8	7	8	7	8	6	7	8	9	8	9	8	8	9	10	8	6	9	7	10
AF - Analyzer Failure																																															





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	57	7.68	7.68
6 - 11	169	22.78	30.46
12 - 19	243	32.75	63.21
20 - 28	184	24.80	88.01
29 - 38	79	10.65	98.65
> 38	10	1.35	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - July 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	0	1	1	2	5	7	6	5	8	4	5	4	3	2	4	0	57
6 - 11	1	8	2	3	7	15	26	19	18	11	13	10	15	12	5	4	169
12 - 19	6	10	7	5	2	6	49	22	19	10	15	32	23	14	16	7	243
20 - 28	13	9	0	0	0	0	6	34	12	5	25	27	28	7	9	9	184
29 - 38	18	0	0	0	0	0	1	2	0	2	10	29	8	1	2	6	79
> 38	2	0	0	0	0	0	0	0	0	0	4	3	0	0	1	0	10
Totals	40	28	10	10	14	28	88	82	57	32	72	105	77	36	37	26	742

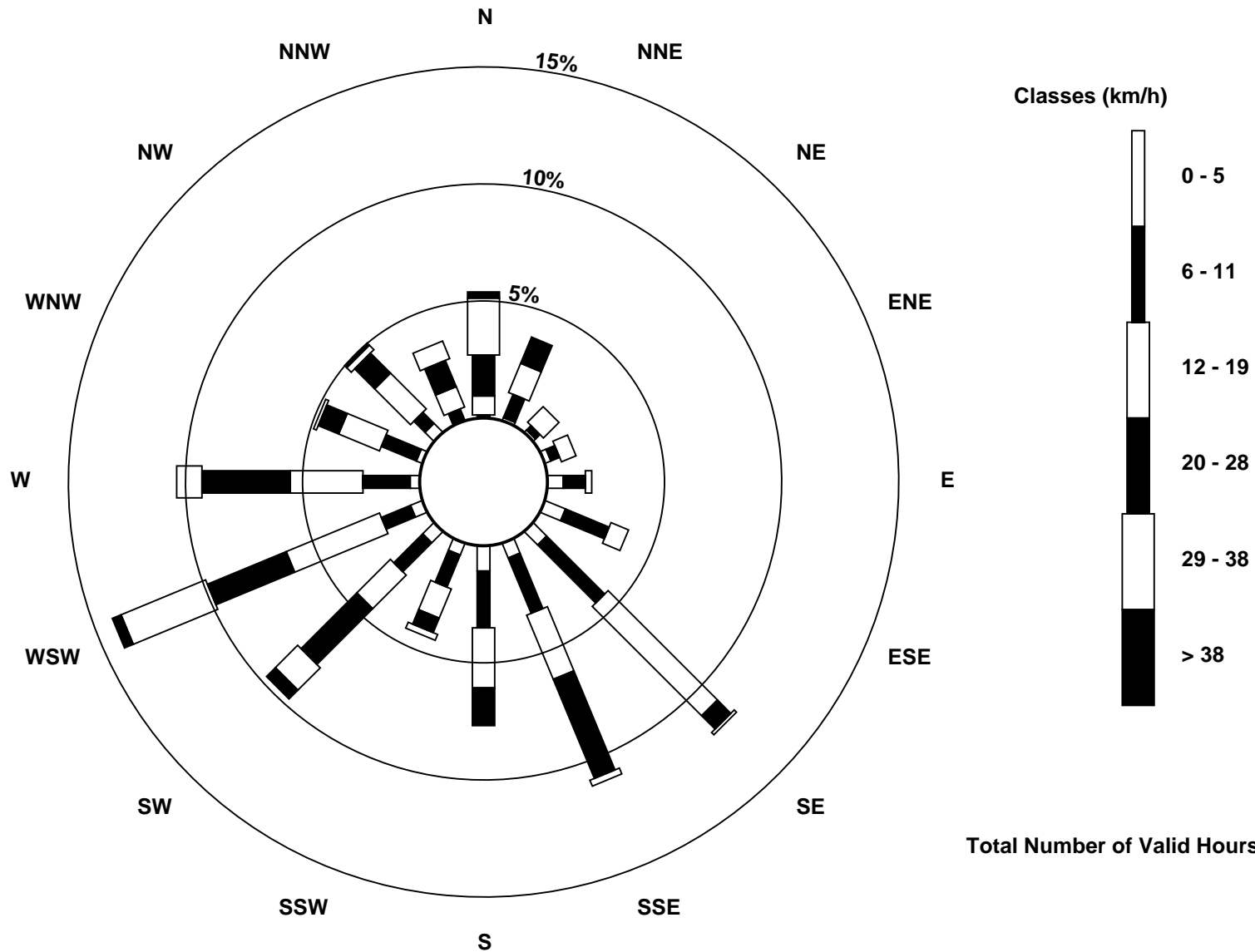
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - July 2017

Maximum Speed: 46 km/h on Jul 4 16:00	Maximum Daily Speed Average: 35.9 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 14 17:00	Minimum Daily Speed Average: 1.9 km/h on Jul 8	Hours of Data: 743
Maximum Diurnal Speed Average: 8.5 km/h at hour 14	Minimum Diurnal Speed Average: 4.7 km/h at hour 21	Hours of Missing Data: 1
Monthly Average Velocity: 6.7 km/h 241.6 deg	Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 11 Median = 17 Q ₃ = 25 P ₉₀ = 31 P ₉₉ = 43	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-Jul	SW9	S7	S9	S5	SE9	AF	SSE14	SSE12	SSE11	SE17	SE13	SE8	S9	SSW9	SE6	SE6	SSW5	WSW5	ESE5	SE9	SE13	SE19	S25	S26	SSE9.7	S26
2-Jul	S22	SE18	SSE19	SSE18	SSE18	SSE27	SSE20	SSE20	S14	SE17	SE17	S18	S19	S17	S21	S26	SW18	NNE9	SSE13	S22	S22	S25	SSE20	SE17	SSE17.4	SSE27
3-Jul	S16	SW19	S20	SW21	WSW15	S11	S19	SSW13	SW16	SSE13	S10	SW19	WSW19	WSW20	SW25	WSW24	WSW38	WSW40	SW28	SW34	SW30	WSW32	WSW35	WSW32	SW21.1	WSW40
4-Jul	SW31	SW29	SW31	WSW32	WSW35	WSW36	WSW36	WSW35	WSW31	SW32	SW39	WSW43	WSW44	SW45	WSW45	WSW46	WSW43	WSW38	WSW39	WSW32	WSW28	WSW32	SW34	WSW35	WSW35.9	WSW46
5-Jul	WSW34	WSW32	WSW31	WSW31	WSW27	WSW31	W30	W30	W29	W27	W28	WNW24	W23	WNW28	WNW24	WNW24	NW19	NNW22	NNW29	NW28	NW27	NW20	NW15	NW11	WNW22.8	WSW34
6-Jul	WNW14	W22	WNW20	W23	W22	WSW20	W18	W18	WSW18	WSW18	W21	W18	WNW14	NW14	WNW17	NW17	W22	NW17	NW17	NW13	NNW7	NW2	SW4	SSW7	W14.7	W23
7-Jul	W8	NNW5	NNW3	WNW4	SW4	SW6	SW3	SSW3	SW3	W6	W11	WNW11	W10	WNW11	WNW14	WNW10	W9	W5	WSW6	SSW7	SSW6	NNE16	NNE25	NE20	WNW4.1	NNE25
8-Jul	E12	SSE4	ESE3	E5	SE8	ESE8	SE7	ESE4	S3	SSE6	W14	W17	NNW7	SSW5	SSE6	NE5	NW3	W6	W8	WSW8	SW12	SW5	SE4	ESE5	SSW1.9	W17
9-Jul	E12	E14	SE11	SE17	SE18	SE13	ESE11	SE11	SE9	SE9	SE11	SE16	SE17	SE16	SE14	SE14	SE15	SE17	SE20	SE23	SE20	ESE14	SE23	SE16	SE14.7	SE23
10-Jul	S19	SSE15	SSE9	WSW20	WSW11	SSE9	S8	SSW8	SW4	SW10	W10	W7	W9	W11	W10	W6	ENE12	E17	S13	WNW19	SSW12	WSW3	NE17	NE12	SW4.2	WSW20
11-Jul	NNW7	NW5	WNW5	WNW3	NW4	NNE6	NNW10	NW18	NW13	NW14	NW16	NW17	WNW17	WNW15	WNW15	WNW11	W13	SW18	S17	SW21	SSW12	WSW6	SW4	SSW8	WNW7.7	SW21
12-Jul	S5	SSW6	SSE7	SSE9	S8	S9	SSE7	SSE9	S9	S6	SSE7	SSE12	SE8	SE9	SSE13	SSW14	SSW14	S9	SSE9	SE9	SE11	SSE19	SSE22	SSE23	SSE9.9	SSE23
13-Jul	SSE23	SSE23	S18	S12	S7	SSW8	SSW8	SSE8	S6	SE5	SSE3	S8	S6	ESE6	E6	W3	NE6	NNE12	NNE25	NNE29	N29	N26	N25	NNE26	ENE3.3	NNE29
14-Jul	N24	N32	N31	N23	N26	N18	NNW17	N14	N15	N17	NNE18	NNE15	NNE13	NNE10	NNE6	NNE4	S1	NNW33	NNE23	NE11	ENE5	SE4	SSE5	SE5	N13.8	NNW33
15-Jul	E3	E6	ESE8	SE10	SE10	SE11	SE14	SE15	SE16	SE17	SE20	SE19	SE25	SE30	SSE27	SE21	SE22	SE19	S25	SSE29	SSE30	SSE31	SSE31	SSE31	SE18.9	SSE31
16-Jul	SSE27	NW43	N20	WNW20	W12	SW11	SSW21	W21	W24	W18	WSW15	WSW10	SW25	SW27	SW26	SW27	WSW34	WSW34	WSW35	WSW29	WSW34	WSW33	WSW31	WSW35	WSW21.4	NW43
17-Jul	W39	W36	W31	W32	W25	W27	W28	WNW29	NW34	NNW32	NNW35	NNW31	NNW29	NNW27	NW22	NW17	N18	NNW25	NNW16	NNW19	NNW15	NNW19	NW14	WNW21	NW22.2	W39
18-Jul	NW19	NW19	NNW16	NW13	NW7	NW8	NW8	NNE8	NW6	NNW10	W14	W14	WSW9	W12	W14	WSW14	WSW15	WSW20	WSW17	WSW15	WSW17	WSW19	WSW25	SW30	W11.7	SW30
19-Jul	SW29	SW24	SW21	WSW19	SW14	SW15	SW16	WSW14	SW12	WSW19	WSW20	WSW21	WSW23	W22	W22	NNE28	NNE25	NNE23	NNE18	NE17	NE19	NE15	ENE13	NE14	W6.5	SW29
20-Jul	ENE9	SSE4	SSE4	ESE14	ESE14	SE10	E7	SE10	SE12	E9	ENE13	E9	ENE11	ESE13	ESE13	ESE13	ESE10	SE10	ESE10	ENE14	E15	SE14	ESE16	ESE17	ESE10.6	ESE17
21-Jul	SE16	ESE16	ESE17	SE18	ESE14	ESE11	E7	NW2	W5	ESE4	ESE5	SSE7	SE17	SSE23	S22	S16	SSE16	SSE19	SSE18	SSE22	SSE26	SSE28	S28	S25	SSE14.3	S28
22-Jul	S22	S23	SSE23	SSE24	SSE24	SSE24	SSE14	SSE13	SSE12	SSW11	SW17	SW20	WSW23	WSW24	WSW26	SW30	WSW26	WSW26	WSW27	SW24	SW21	SW28	SW30	SW31	SSW18.8	SW31
23-Jul	SW29	WSW28	SW28	SW25	WSW25	WSW21	WSW18	W17	W18	W18	W19	WSW23	WSW21	WSW20	WSW23	W28	W26	W22	N21	N26	N32	N34	N35	N38	W14.9	N38
24-Jul	N37	N36	N44	N33	N39	N39	N43	N27	N23	N30	N34	N38	N34	N34	N35	N36	N37	NNW39	NNW32	NNW33	NNW29	NNW27	NW31	NW27	N33.0	N44
25-Jul	NNW22	NW18	WNW20	WNW22	WNW19	W17	W13	WSW7	S4	SW7	WSW11	W15	W12	W12	W13	W12	W8	SW10	SW10	S15	S24	SSW30	SSW23	SSW18	WSW11.2	SSW30
26-Jul	SSW15	SSW11	S7	SSE19	S20	S18	S10	SE7	SE9	SE11	SE7	SW7	SW12	SSW8	SSE12	S12	SSW14	S18	S20	S23	S25	SSW30	SSW31	SSW27	S14.6	SSW31
27-Jul	SSW24	S23	SSE24	SSE24	SSE23	SSE25	SSE24	SSE15	SE12	SE14	SE16	SSE19	SSW16	SSW18	W15	WSW8	SSW16	SSW12	SSW6	WNW17	W25	W38	WNW28	W26	SSW11.5	W38
28-Jul	SSW9	WSW18	W26	WSW23	WSW24	WSW18	WSW18	WSW17	WSW18	WSW24	WSW28	WSW32	WSW34	WSW24	WSW25	W28	W28	WSW32	WSW35	NNW29	NE14	S14	S17	SSW16	WSW19.4	WSW35
29-Jul	SW16	WSW19	W16	W20	W19	WSW11	SSW6	S5	SSE5	SSW3	SW3	WSW3	WNW8	WSW7	NNW29	NNE16	NNE11	NNE13	NNE13	NNE14	NNE21	NE18	ENE13	E13	NW4.0	NNW29
30-Jul	ESE12	SE14	ESE12	SE13	SE19	SE19	S17	SSW15	WNW12	SSE11	S14	S11	SE11	SE12	SE19	SSE19	SSE21	SW25	SW29	WSW26	WSW33	WSW37	WSW35	WSW33	SSW12.2	WSW37
31-Jul	W31	WNW29	WNW24	W18	W28	W30	W27	W19	W19	W22	W23	W26	W32	WNW34	NW24	NNE25	N20	NNW24	N23	N22	N7	NNW7	WNW8	NW12	WNW17.9	WNW34

SW8.3	WSW7.3	WSW6.1	SW8.0	SW7.3	SW7.3	SW6.8	WSW6.2	WSW5.8	WSW5.2	WSW6.8	WSW8.3	WSW8.4	WSW8.5	WSW8.1	WSW6.8	WSW7.2	W7.4	WSW6.2	W4.9	SW4.7	SW6.5	SW6.6	SW7.0	Diurnal Average
W39	NW43	N44	N33	N39	N39	N43	WSW35	NW34	WSW32	SW39	WSW43	WSW44	SW45	WSW45	WSW46	WSW43	WSW40	WSW39	SW34	WSW34	W38	WSW35	N38	Diurnal Maximum

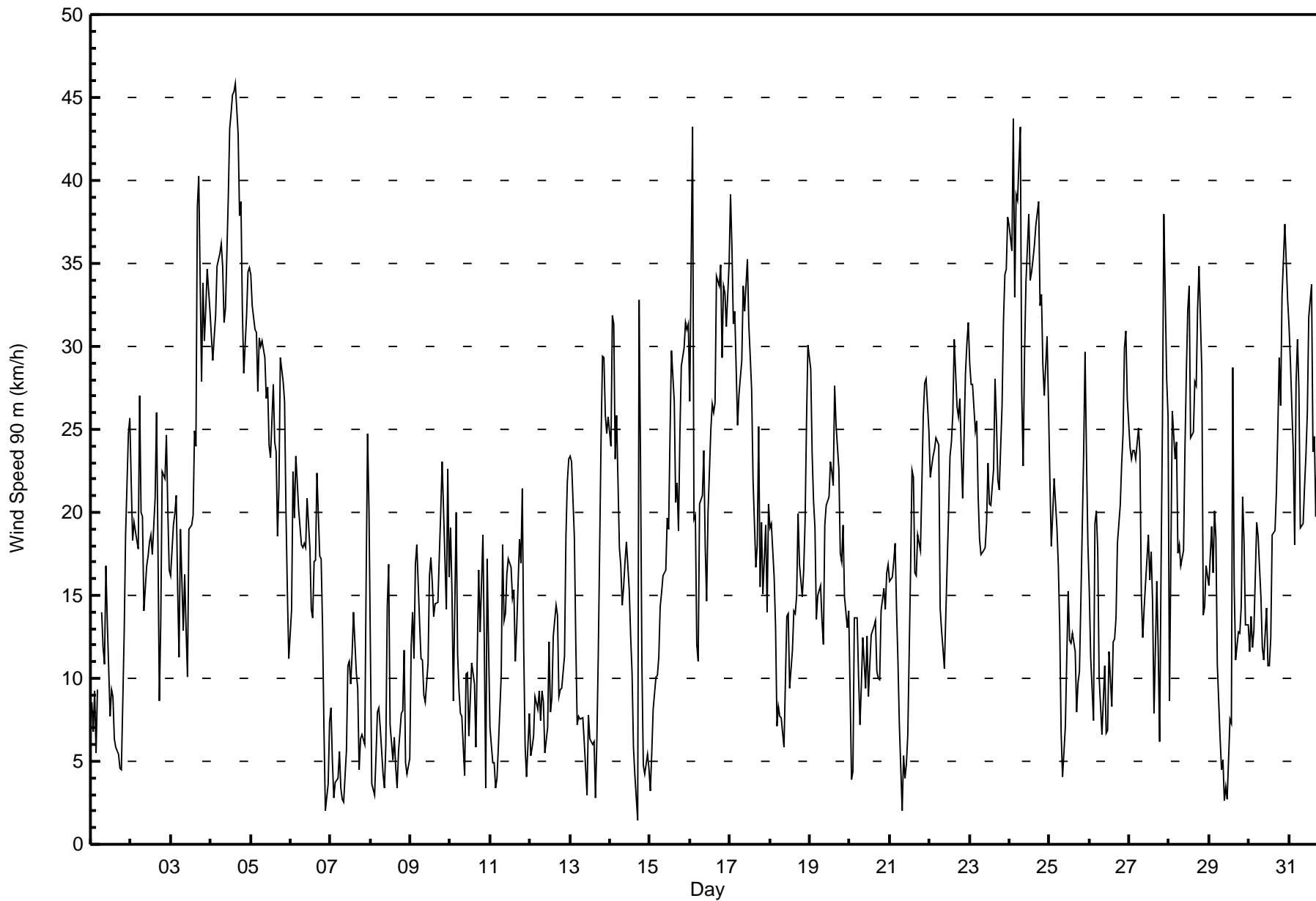
AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 16 km/h on Jul 14 18:00	Hours of Data: 743
Minimum Value: 1 km/h on Jul 15 01:00	Hours of Missing Data: 1
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 9	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-Jul	1	2	2	2	2	AF	2	2	2	4	3	3	3	3	2	2	2	2	2	2	6	5	4	4	6	
2-Jul	3	5	2	2	4	3	4	3	4	3	4	4	4	4	5	7	8	4	7	3	2	1	4	3	8	
3-Jul	2	3	4	6	4	5	6	2	3	2	4	4	5	5	6	6	8	9	5	6	4	4	7	5	9	
4-Jul	3	4	4	4	4	5	6	6	5	6	7	8	8	6	8	8	7	8	6	5	4	2	3	3	8	
5-Jul	3	3	3	3	3	4	4	5	5	5	6	5	4	5	4	4	4	4	4	5	4	4	2	2	6	
6-Jul	3	2	2	1	2	2	2	3	3	4	5	4	4	4	4	4	5	4	3	3	3	1	2	1	5	
7-Jul	2	2	1	3	1	1	2	1	2	3	4	4	4	4	3	4	4	3	2	1	1	10	3	4	10	
8-Jul	5	2	2	2	2	3	2	2	2	2	6	5	2	4	2	2	2	2	1	2	1	3	1	1	6	
9-Jul	4	6	2	3	2	5	3	3	3	3	3	5	4	4	4	4	4	3	1	2	4	4	4	4	6	
10-Jul	3	2	2	5	6	5	3	2	3	2	2	2	2	3	2	3	6	6	5	9	6	6	2	6	9	
11-Jul	3	2	2	2	1	1	3	3	2	3	4	3	3	3	2	3	4	7	9	5	3	3	2	2	9	
12-Jul	2	2	2	1	2	1	1	2	2	2	4	2	3	4	3	3	3	2	2	2	3	1	1	1	4	
13-Jul	1	1	1	2	2	1	2	2	2	2	2	3	4	3	3	3	2	3	3	5	4	3	3	3	5	
14-Jul	4	5	7	6	5	4	4	3	4	3	3	4	3	4	3	3	3	16	5	3	2	2	1	1	16	
15-Jul	1	1	2	1	2	2	4	3	3	4	3	5	6	5	5	5	5	5	3	4	4	2	2	3	6	
16-Jul	5	13	8	4	3	5	3	7	4	4	2	7	4	5	4	7	5	8	5	5	4	4	4	6	13	
17-Jul	5	5	3	3	4	3	3	3	5	6	7	6	6	6	5	5	4	8	3	4	3	3	3	2	8	
18-Jul	2	3	5	2	2	2	2	2	3	4	4	4	5	5	4	4	4	5	3	3	2	2	1	2	5	
19-Jul	2	3	3	3	4	3	3	3	3	5	5	7	4	5	6	4	4	5	3	3	2	2	2	1	7	
20-Jul	5	1	2	5	4	3	3	3	3	2	2	3	3	3	4	4	4	3	3	5	3	5	4	4	5	
21-Jul	4	4	5	4	4	5	3	3	3	4	2	4	5	5	3	3	4	2	3	3	4	1	1	2	5	
22-Jul	1	1	1	1	2	3	2	2	2	3	3	5	6	6	6	5	5	5	4	3	2	2	2	2	6	
23-Jul	2	2	2	3	3	3	3	3	3	3	4	5	5	6	5	5	4	3	4	6	4	3	3	4	6	
24-Jul	5	7	5	5	8	7	7	6	7	6	6	8	7	8	6	7	7	6	5	5	4	3	3	4	8	
25-Jul	2	1	1	1	1	1	2	2	2	3	4	4	4	4	4	4	4	3	2	2	2	1	3	2	4	
26-Jul	1	2	2	3	2	2	3	2	2	2	2	5	4	4	4	6	5	4	3	3	2	3	3	3	6	
27-Jul	2	1	1	1	1	2	4	4	3	3	4	5	4	6	4	5	3	4	2	5	7	8	6	12	12	
28-Jul	3	3	3	3	3	6	3	5	3	4	5	5	9	4	5	6	5	9	7	7	5	8	1	1	9	
29-Jul	2	2	2	3	2	4	2	2	2	2	3	3	3	4	9	3	3	3	3	4	2	2	2	3	9	
30-Jul	5	4	3	3	4	4	5	5	9	2	3	2	2	3	3	4	4	6	4	3	3	2	4	4	9	
31-Jul	4	2	4	3	3	4	5	3	3	4	4	5	5	7	7	6	6	5	6	6	3	1	4	1	7	
	5	13	8	6	8	7	7	7	9	6	7	8	9	8	9	8	8	16	9	9	7	10	7	12		
Diurnal Maximum																										

AF - Analyzer Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	55	7.40	7.40
6 - 11	147	19.78	27.19
12 - 19	241	32.44	59.62
20 - 28	181	24.36	83.98
29 - 38	103	13.86	97.85
> 38	16	2.15	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - July 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	0	1	1	1	2	6	4	6	5	5	8	3	3	3	5	2	55
6 - 11	1	6	2	2	6	8	26	14	18	15	8	12	12	7	5	5	147
12 - 19	5	11	7	5	6	13	39	23	19	14	12	22	29	12	17	7	241
20 - 28	12	10	1	0	0	0	8	24	21	4	16	33	29	11	6	6	181
29 - 38	18	1	0	0	0	0	1	5	0	3	11	38	9	4	2	11	103
> 38	4	0	0	0	0	0	0	0	0	0	2	7	1	0	1	1	16
Totals	40	29	11	8	14	27	78	72	63	41	57	115	83	37	36	32	743

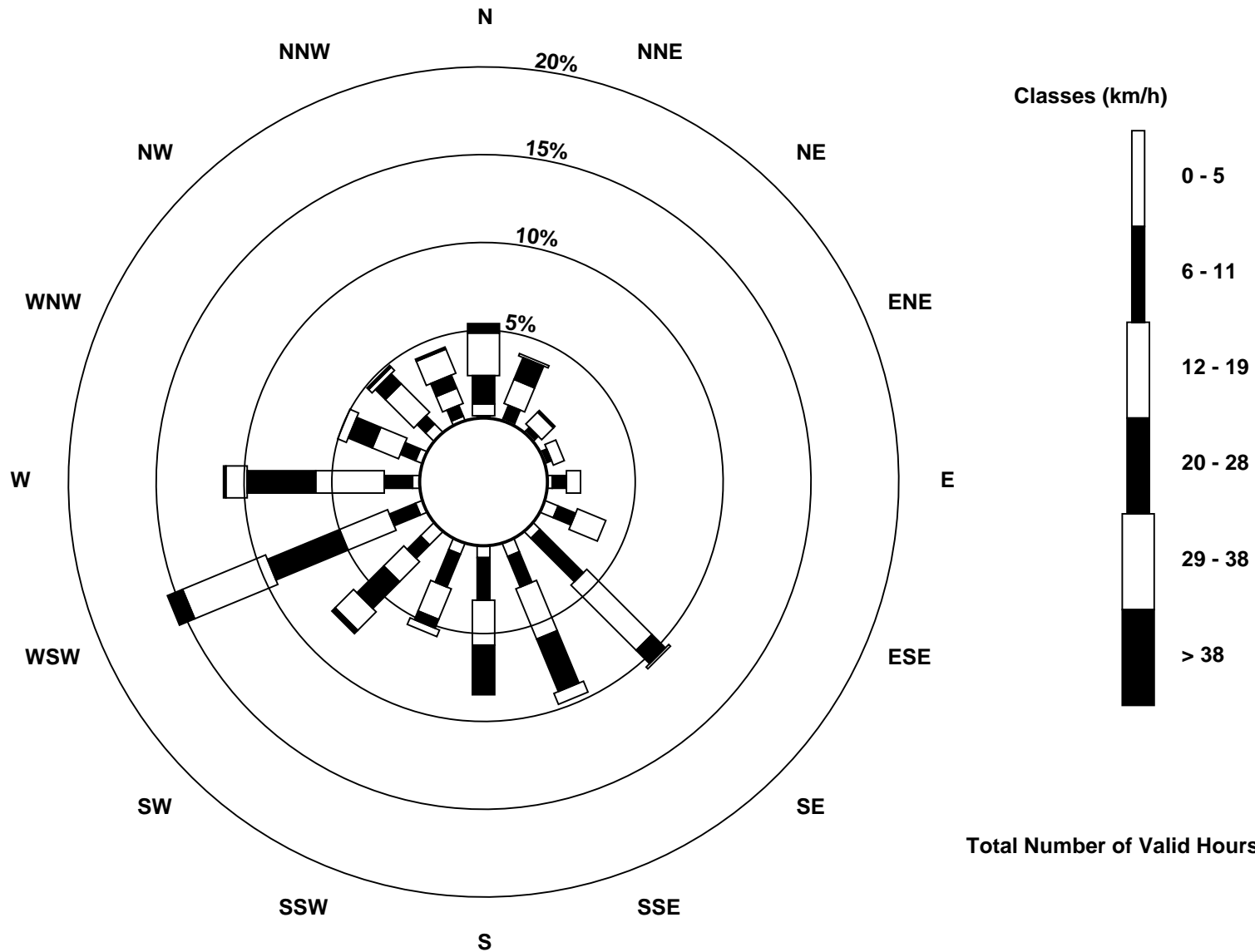
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

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





Direction of Maximum Speed: 248 deg on Jul 4 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 242.7 deg on Jul 4	Hours of Data: 744
Direction of Minimum Speed: 117 deg on Jul 20 03:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.4 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 240.9 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-Jul	160	155	183	169	149	156	154	153	141	146	143	146	177	206	145	140	211	272	97	115	125	134	168	180	155.3
2-Jul	172	123	139	150	152	153	152	151	165	137	139	169	183	168	169	177	227	35	138	176	175	167	144	130	157.3
3-Jul	155	215	184	226	232	160	181	201	224	140	184	239	250	250	238	247	242	241	216	220	229	237	238	249	228.4
4-Jul	230	222	223	240	239	248	246	252	245	239	234	244	238	237	239	248	242	256	259	256	251	238	231	239	242.7
5-Jul	244	250	257	262	250	256	263	269	274	274	280	282	277	289	287	299	327	349	330	322	319	319	311	276	281.2
6-Jul	247	257	248	242	234	245	257	278	252	257	272	281	295	307	298	323	279	300	309	319	321	252	238	243	273.0
7-Jul	262	249	234	226	194	165	174	197	250	271	286	294	280	291	289	288	265	265	248	187	183	9	23	46	274.2
8-Jul	73	303	347	43	190	125	125	143	189	157	264	265	329	231	135	48	316	270	272	261	244	185	116	110	250.8
9-Jul	82	131	198	180	150	149	142	135	142	137	137	131	137	149	148	144	146	149	151	148	141	141	139	135	143.6
10-Jul	178	129	189	252	232	146	219	219	224	228	259	278	265	263	264	268	67	89	206	289	199	314	43	59	230.1
11-Jul	284	257	246	255	265	40	349	307	323	320	316	305	306	289	295	296	258	221	183	228	167	119	210	201	277.2
12-Jul	159	151	163	167	161	152	137	143	169	161	156	152	143	132	159	213	218	187	158	144	165	153	164	167	162.2
13-Jul	158	156	157	152	162	171	172	154	170	133	159	183	169	105	88	272	47	30	24	16	9	5	1	2	71.9
14-Jul	340	348	358	355	6	346	342	7	8	2	17	30	30	35	36	29	176	348	27	39	64	228	285	45	6.5
15-Jul	14	69	98	203	171	169	152	140	137	137	142	131	134	147	152	134	133	136	169	153	154	154	155	156	145.4
16-Jul	164	319	347	287	245	196	196	265	275	268	257	242	223	225	223	226	255	250	254	243	251	247	242	254	250.7
17-Jul	262	270	268	261	260	271	273	288	319	328	332	339	339	341	324	314	357	340	335	330	339	329	291	289	301.1
18-Jul	319	324	327	324	261	260	298	29	315	282	271	275	250	285	271	244	255	247	247	241	242	223	223	222	266.2
19-Jul	219	212	232	231	210	200	225	250	240	244	254	257	261	264	264	21	27	26	34	42	43	54	75	57	280.1
20-Jul	14	248	117	105	119	148	110	156	155	91	67	96	81	121	111	109	117	130	139	67	81	134	129	130	113.8
21-Jul	139	133	136	150	128	136	114	267	257	114	134	162	136	156	174	186	154	150	158	156	163	166	167	161	154.0
22-Jul	155	156	154	151	152	157	155	154	141	196	241	242	238	250	239	237	245	246	239	233	223	212	214	226	214.0
23-Jul	232	240	227	229	237	234	254	267	266	266	265	258	257	253	255	266	268	273	11	11	12	9	7	9	282.5
24-Jul	9	9	9	11	7	5	358	352	1	10	3	10	1	359	3	356	352	341	339	334	328	318	317	304	356.3
25-Jul	291	274	257	252	249	238	232	231	161	235	252	264	272	266	270	275	262	234	215	174	176	189	176	160	240.0
26-Jul	158	145	148	153	157	159	149	129	135	143	132	228	231	207	154	188	193	190	190	190	181	185	190	188	172.0
27-Jul	167	155	154	147	143	141	148	141	136	139	137	148	205	201	274	246	207	197	174	283	265	278	297	267	194.2
28-Jul	165	249	259	249	243	237	250	261	260	255	250	254	249	248	251	260	268	253	258	337	58	198	204	213	254.0
29-Jul	242	250	238	238	232	194	171	179	153	175	219	255	293	244	351	23	20	20	18	24	20	43	45	70	349.2
30-Jul	110	134	137	137	137	148	171	187	286	166	175	164	143	141	138	155	152	228	236	237	237	242	250	253	189.2
31-Jul	263	277	270	242	254	262	261	264	268	264	269	277	280	297	328	18	357	335	352	7	17	33	259	266	287.9

224.8 247.2 232.9 230.1 210.5 207.0 226.8 241.5 246.8 239.1 254.2 254.1 248.3 245.7 250.1 259.7 256.0 264.5 261.1 271.7 239.6 230.5 221.4 225.9
Diurnal Average

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



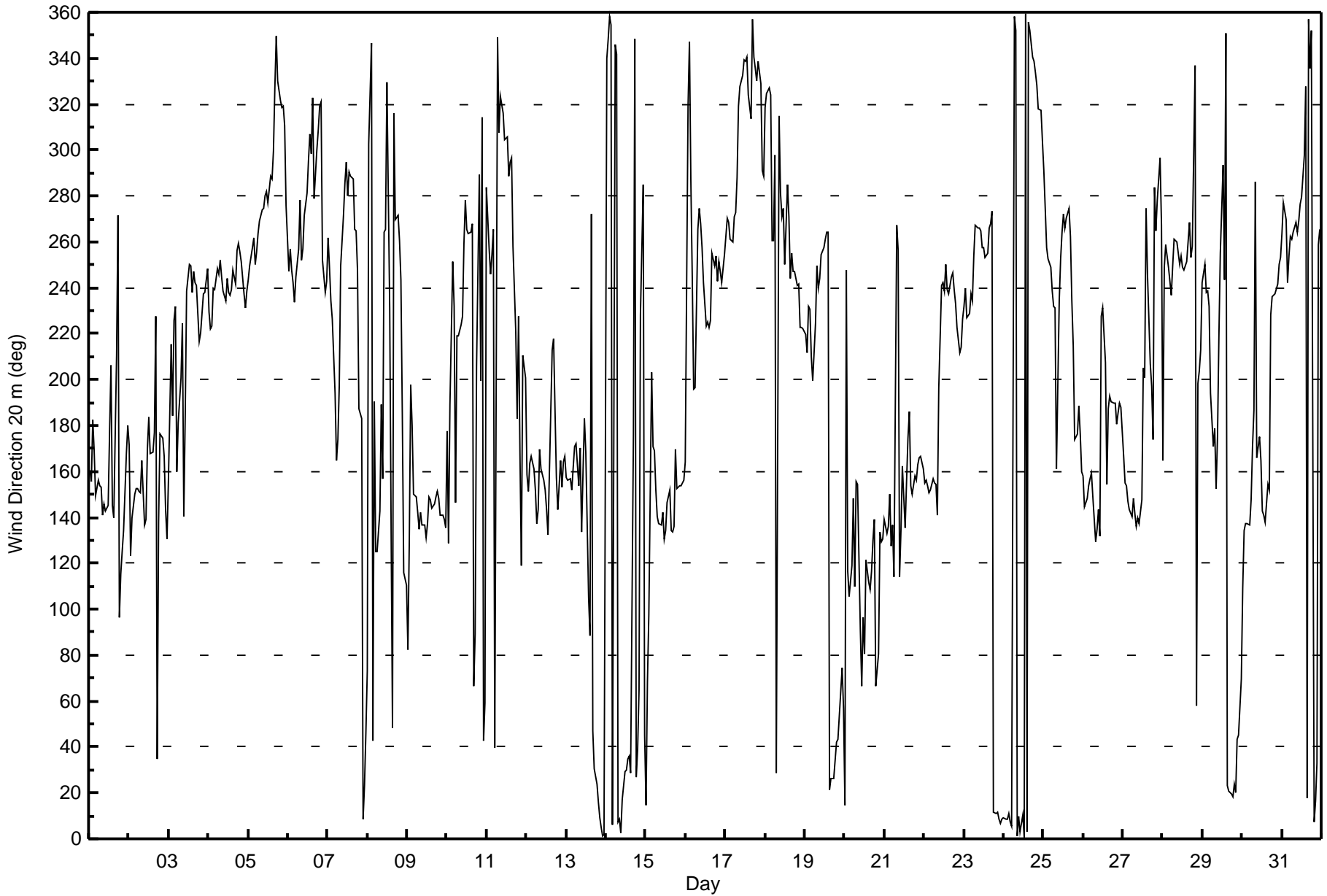
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 98 deg on Jul 29 12:00 Minimum Value: 6 deg on Jul 6 04:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 17 Q ₃ = 26 P ₉₀ = 45 P ₉₉ = 79																			Hours in Service: 744 Hours of Data: 744 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-Jul	18	10	24	45	16	16	15	19	15	14	15	24	36	39	44	28	47	48	29	18	13	12	24	19	48
2-Jul	26	14	11	21	21	12	14	12	27	12	15	26	25	27	21	23	53	66	58	17	13	11	21	10	66
3-Jul	25	30	20	55	39	21	30	31	28	15	43	18	20	19	16	18	13	13	16	14	17	10	15	13	55
4-Jul	15	14	14	10	11	12	11	11	13	14	15	14	15	14	13	14	15	12	12	11	11	8	9	9	15
5-Jul	10	10	9	8	12	11	9	11	13	12	15	16	14	16	16	19	23	21	17	17	17	19	19	19	23
6-Jul	9	7	16	6	9	13	14	13	19	16	17	20	33	32	21	33	23	26	20	19	29	36	6	6	36
7-Jul	44	10	6	10	16	20	45	48	85	39	25	32	46	42	23	42	31	68	55	25	10	73	15	11	85
8-Jul	73	37	48	64	72	47	90	76	72	38	41	38	64	32	47	27	55	24	18	13	7	71	34	21	90
9-Jul	15	55	32	13	10	8	13	12	19	17	19	16	14	21	24	21	17	13	10	9	10	11	13	19	55
10-Jul	25	24	44	12	48	13	46	47	80	20	15	25	21	17	22	49	44	34	17	29	21	82	23	58	82
11-Jul	20	13	20	23	86	26	21	19	27	21	20	19	22	21	20	31	36	48	45	22	62	57	29	22	86
12-Jul	41	19	13	13	16	14	16	16	26	37	32	14	28	21	25	16	19	25	17	13	12	10	11	11	41
13-Jul	10	11	11	10	13	17	22	28	32	41	57	51	55	40	42	86	58	23	13	12	12	13	13	13	86
14-Jul	15	16	15	19	16	25	23	17	26	27	19	24	30	32	62	48	77	20	14	17	47	63	56	47	77
15-Jul	18	37	44	36	32	28	16	13	12	12	13	13	11	14	14	15	13	17	18	11	10	10	10	10	44
16-Jul	14	38	28	18	27	23	22	19	15	14	14	16	16	15	15	15	15	15	11	11	10	11	11	10	38
17-Jul	9	8	8	7	12	9	8	12	15	15	18	20	19	19	21	26	28	17	21	17	21	19	27	17	28
18-Jul	16	17	20	16	17	17	50	25	57	52	20	24	63	42	30	25	28	19	22	16	11	8	10	10	63
19-Jul	12	13	18	16	27	18	15	18	22	16	20	15	17	17	21	16	16	19	19	15	12	18	22	26	27
20-Jul	67	33	90	14	16	21	36	38	15	33	25	21	28	22	23	26	24	21	19	31	16	16	11	12	90
21-Jul	11	11	12	16	18	27	67	60	50	79	45	61	20	19	21	27	22	12	14	13	11	12	12	11	79
22-Jul	10	11	12	10	10	12	14	16	16	52	18	17	17	22	17	17	17	16	13	12	13	12	12	10	52
23-Jul	11	9	11	15	11	12	14	13	14	15	14	17	22	20	20	14	14	26	14	13	12	12	12	12	26
24-Jul	13	13	12	13	13	13	15	16	18	16	17	14	18	17	18	20	19	16	16	15	15	14	14	17	20
25-Jul	13	9	9	7	8	9	18	17	50	46	27	22	32	32	23	26	40	26	21	18	11	10	12	8	50
26-Jul	7	8	8	10	11	12	16	14	14	16	22	66	30	49	31	38	42	26	18	15	14	13	15	16	66
27-Jul	14	9	11	9	11	11	14	14	15	13	14	20	31	27	28	44	28	20	23	29	15	12	15	48	48
28-Jul	15	21	8	9	11	32	13	12	14	13	14	15	20	22	16	16	13	14	23	36	25	37	11	15	37
29-Jul	12	18	18	6	25	22	32	56	37	72	71	98	35	43	37	26	36	37	18	20	12	12	15	13	98
30-Jul	19	21	13	15	11	12	25	39	74	22	19	23	18	17	13	17	15	27	11	9	8	8	10	10	74
31-Jul	7	11	11	8	10	9	9	11	14	15	17	14	16	18	48	14	27	22	23	21	19	35	40	7	48
73 55 90 64 86 47 90 76 85 79 71 98 64 49 62 86 77 68 58 36 62 82 56 58																								Diurnal Maximum	





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - July 2017

Direction of Maximum Speed: 234 deg on Jul 4 15:00 Direction of Maximum Daily Speed Average: 236.8 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 116 deg on Jul 11 22:00 Direction of Minimum Daily Speed Average: 1.5 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 240.6 deg	

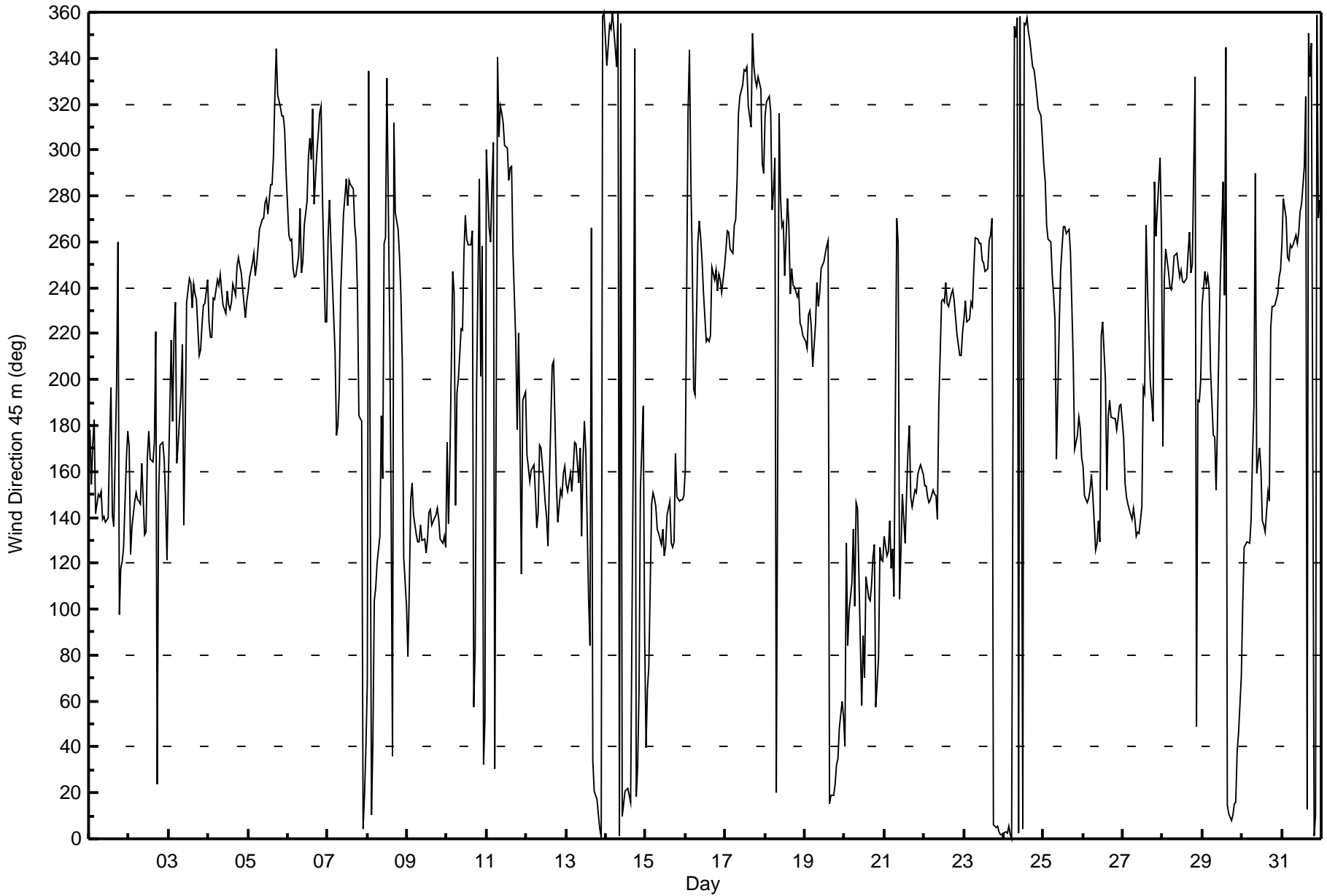
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	178	154	172	182	142	150	149	151	139	140	138	140	172	197	141	136	197	260	98	118	121	127	165	177	153.6
2-Jul	171	124	136	147	151	148	147	146	163	132	134	167	178	165	164	173	221	24	150	172	172	166	147	122	155.8
3-Jul	157	217	182	220	234	164	173	195	216	137	179	234	244	243	231	241	237	235	210	213	224	233	233	244	220.8
4-Jul	225	219	218	235	235	244	241	246	238	232	229	239	233	231	234	242	237	250	253	250	247	233	227	234	236.8
5-Jul	239	245	251	255	245	250	258	265	270	270	277	279	272	285	285	297	323	344	324	318	315	315	309	290	279.3
6-Jul	263	261	261	248	245	245	254	274	247	252	267	278	297	305	296	318	276	299	307	316	319	279	225	225	273.3
7-Jul	262	278	260	244	212	175	180	196	238	272	280	288	276	287	285	283	267	261	237	184	182	4	19	40	279.0
8-Jul	68	334	10	42	104	109	120	132	184	157	259	262	332	222	144	36	312	273	266	254	237	207	122	101	237.7
9-Jul	80	110	148	155	141	133	129	129	137	130	131	125	131	142	144	137	140	141	144	139	130	129	132	127	134.1
10-Jul	173	138	166	247	238	146	194	200	222	222	255	271	261	258	259	265	58	82	196	287	201	258	32	52	217.6
11-Jul	300	266	260	285	303	30	341	306	319	316	312	302	301	287	292	293	255	217	178	220	178	116	191	195	276.2
12-Jul	167	161	156	160	163	151	136	142	171	170	155	146	141	127	156	206	208	182	154	138	152	150	159	162	160.1
13-Jul	154	152	160	151	161	173	172	155	170	132	165	182	169	104	84	266	34	21	17	11	4	1	358	360	75.4
14-Jul	337	346	354	353	360	345	336	359	1	355	10	20	21	22	19	16	178	344	19	31	64	152	189	90	359.3
15-Jul	40	65	75	146	151	148	145	135	133	128	135	123	127	141	147	129	127	130	168	149	147	148	148	150	139.3
16-Jul	160	316	344	287	252	196	194	260	269	262	252	238	216	218	217	219	249	244	248	239	246	243	238	249	244.6
17-Jul	256	265	264	257	255	267	270	287	316	323	328	335	335	336	319	310	351	336	331	327	332	326	294	290	301.4
18-Jul	315	321	323	316	274	282	296	20	316	280	266	269	245	279	266	237	248	241	240	236	239	224	223	219	263.5
19-Jul	216	214	228	230	223	206	224	242	232	238	248	252	255	258	261	15	19	19	24	32	35	48	60	53	272.5
20-Jul	40	129	84	99	112	135	101	147	144	85	58	88	70	114	105	104	110	123	128	57	79	127	122	121	105.3
21-Jul	132	123	125	138	118	126	106	270	260	105	126	150	129	150	169	180	149	145	152	150	159	161	163	159	148.3
22-Jul	154	154	149	146	148	152	150	149	139	189	234	235	234	242	233	232	237	239	234	227	219	210	211	221	205.0
23-Jul	227	234	225	226	234	232	248	262	261	259	259	252	251	247	248	261	263	270	6	5	5	3	2	2	278.1
24-Jul	2	3	2	6	2	0	354	349	357	2	358	4	355	354	357	351	348	336	335	330	324	318	315	305	350.4
25-Jul	293	286	267	261	260	245	236	226	166	224	248	258	267	266	263	265	256	232	208	170	176	184	179	166	234.2
26-Jul	162	149	147	148	152	158	150	126	129	138	129	219	225	200	152	184	191	184	183	183	178	183	188	189	170.4
27-Jul	174	155	149	146	144	139	144	139	132	134	133	145	197	194	268	241	199	191	182	286	262	274	296	264	188.0
28-Jul	171	243	257	247	240	239	244	254	255	250	244	248	243	242	244	255	265	246	250	332	49	191	190	199	246.7
29-Jul	233	247	241	245	240	204	176	175	152	182	216	244	286	236	345	15	11	8	10	15	16	38	46	71	331.2
30-Jul	102	127	128	129	129	139	167	189	290	159	170	161	138	137	134	151	147	223	232	232	232	237	245	248	185.3
31-Jul	259	279	270	253	252	259	257	259	263	259	264	273	277	293	323	13	351	332	347	1	11	359	271	278	287.3

214.4 238.6 224.4 221.6 206.5 199.6 218.0 235.6 242.6 235.1 250.4 250.0 244.7 241.0 244.7 252.7 251.7 263.6 252.1 264.0 226.4 219.6 211.0 215.7
Diurnal Average

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



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jul 29 12:00 Minimum Value: 2 deg on Jul 25 22:00 Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 20 P ₉₀ = 38 P ₉₉ = 73																		Hours in Service: 744 Hours of Data: 744 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-Jul	14	7	16	43	11	16	10	13	11	11	11	18	28	27	42	24	45	48	45	14	10	10	20	10	48
2-Jul	21	10	8	11	15	7	11	8	20	9	10	20	15	19	14	19	26	60	54	8	5	3	19	8	60
3-Jul	24	17	13	27	25	20	26	26	24	13	38	15	17	17	13	15	11	10	11	9	13	8	12	11	38
4-Jul	12	7	9	7	8	9	9	8	9	11	13	11	13	12	11	12	11	10	8	8	5	5	7	7	13
5-Jul	7	7	7	6	8	8	7	10	11	11	13	14	12	13	12	13	18	11	11	11	11	12	10	13	18
6-Jul	10	8	13	5	5	7	12	9	17	13	15	16	29	28	15	29	21	21	12	14	26	40	6	6	40
7-Jul	23	7	9	10	17	15	34	40	72	27	18	26	41	30	17	38	30	60	47	19	8	71	12	11	72
8-Jul	30	53	63	25	27	42	48	66	71	34	40	29	45	32	48	24	45	17	16	11	4	58	15	14	71
9-Jul	11	25	19	6	5	6	9	11	15	15	15	13	11	19	20	16	13	9	6	6	6	9	9	14	25
10-Jul	14	16	38	9	41	19	45	46	74	16	14	18	18	14	21	35	44	33	9	29	25	82	19	44	82
11-Jul	19	9	11	18	60	20	18	11	17	12	13	13	16	16	15	26	36	39	44	15	38	90	24	8	90
12-Jul	20	16	7	6	12	9	13	11	16	28	29	9	20	19	21	9	12	16	14	10	8	5	4	4	29
13-Jul	5	5	5	6	8	10	14	23	25	36	69	35	53	40	42	68	46	16	8	7	7	7	8	8	69
14-Jul	9	10	9	11	9	15	14	11	19	21	14	18	24	25	49	47	76	18	9	12	38	89	60	71	89
15-Jul	15	16	26	8	8	12	12	9	9	9	9	11	8	11	10	12	10	17	13	8	5	5	4	4	26
16-Jul	8	40	21	14	27	18	14	18	13	13	11	13	12	11	12	12	13	12	8	9	7	8	8	8	40
17-Jul	7	7	7	6	11	7	7	9	10	9	12	13	12	11	14	19	21	10	11	12	15	12	14	13	21
18-Jul	9	10	13	10	15	12	37	19	47	32	16	19	56	37	26	22	26	15	19	15	8	4	4	4	56
19-Jul	5	6	11	10	15	10	11	14	18	12	18	13	17	15	21	11	12	14	14	11	8	12	14	13	21
20-Jul	58	71	50	12	11	18	29	35	11	28	21	19	27	19	22	25	22	18	13	30	17	13	8	9	71
21-Jul	8	7	9	10	13	24	56	66	46	80	47	52	17	14	13	17	18	6	9	8	4	4	4	5	80
22-Jul	5	3	6	5	5	6	7	9	11	48	16	14	15	19	15	14	15	13	10	8	7	4	5	5	48
23-Jul	6	5	5	9	6	8	11	10	14	13	12	16	21	19	18	12	13	24	9	8	7	6	6	7	24
24-Jul	7	9	7	8	8	8	10	11	12	12	12	9	12	12	13	14	14	9	10	9	9	8	7	10	14
25-Jul	7	7	4	4	5	5	14	15	44	35	22	19	28	27	19	26	32	20	17	16	4	2	5	3	44
26-Jul	6	4	4	4	3	6	11	10	9	10	19	62	20	38	27	35	31	20	9	6	5	5	7	7	62
27-Jul	10	5	4	5	5	7	8	10	10	8	11	17	25	16	24	40	20	15	22	25	16	10	10	43	43
28-Jul	14	21	6	6	7	17	9	10	11	10	11	13	17	17	13	14	11	13	23	35	24	37	4	6	37
29-Jul	10	15	15	5	18	19	20	45	31	73	58	99	29	37	35	19	27	29	13	14	8	10	12	13	99
30-Jul	15	18	10	10	7	7	19	28	62	14	9	16	12	13	9	14	13	25	8	6	5	5	7	7	62
31-Jul	6	8	8	7	5	6	7	10	12	12	15	12	14	15	45	10	20	17	17	16	16	31	57	5	57
Diurnal Maximum																									





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - July 2017

Direction of Maximum Speed: 242 deg on Jul 4 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 237.6 deg on Jul 4	Hours of Data: 742
Direction of Minimum Speed: 179 deg on Jul 14 17:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.6 deg on Jul 8	Percent Operational Time: 99.7
Monthly Average Direction: 242.8 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-Jul	209	157	170	188	AF	146	AF	155	147	141	139	141	170	195	141	133	191	250	113	126	124	128	168	180	157.4
2-Jul	174	131	142	151	151	147	148	146	166	135	135	168	178	165	165	175	219	25	158	172	176	169	153	125	158.4
3-Jul	171	222	185	221	238	169	171	196	215	141	180	233	244	243	231	242	238	235	211	213	225	235	235	245	221.6
4-Jul	227	221	220	237	237	245	242	246	239	233	229	239	234	231	234	242	237	250	254	251	248	237	230	235	237.6
5-Jul	241	246	251	255	247	251	259	266	271	272	278	281	274	286	286	299	325	346	326	321	317	317	312	307	280.2
6-Jul	279	268	275	260	258	251	258	275	248	252	269	279	301	307	298	320	278	302	311	321	327	306	228	213	277.5
7-Jul	267	316	304	283	240	199	197	202	223	277	277	288	278	287	285	282	275	263	238	186	188	13	27	46	293.6
8-Jul	72	162	103	80	121	118	122	116	173	156	260	266	344	217	152	36	316	278	265	252	232	216	131	100	214.2
9-Jul	82	102	131	142	136	126	123	129	136	129	128	124	130	140	143	136	139	139	142	136	127	123	131	127	131.0
10-Jul	172	146	162	248	247	147	173	190	230	224	258	271	263	258	257	266	61	84	189	290	203	251	33	54	213.2
11-Jul	318	295	275	294	318	33	344	311	324	319	314	305	302	289	295	297	258	220	181	221	197	259	201	193	281.1
12-Jul	172	195	147	160	178	161	144	148	170	178	155	145	140	127	156	206	207	181	155	138	141	151	160	162	161.8
13-Jul	160	157	165	159	165	192	183	160	168	134	157	176	167	103	86	280	33	24	20	13	7	5	2	10	66.9
14-Jul	345	351	358	358	3	351	342	0	4	358	13	22	22	23	21	20	179	347	21	35	67	126	162	134	3.9
15-Jul	78	83	95	139	137	139	138	139	132	127	133	123	128	140	146	131	128	131	169	150	147	148	148	150	139.7
16-Jul	161	319	348	292	264	208	201	260	271	261	254	239	216	217	217	220	248	245	248	241	247	245	240	250	245.7
17-Jul	258	266	266	260	258	271	274	291	319	325	332	337	337	339	322	313	353	340	335	330	336	332	302	296	305.0
18-Jul	318	324	327	320	298	303	306	24	323	282	267	270	242	277	265	237	250	241	241	240	242	234	233	227	266.3
19-Jul	222	219	231	234	232	216	228	242	231	238	249	252	255	259	263	20	21	21	26	34	38	52	57	53	271.6
20-Jul	66	150	137	101	112	130	93	142	135	85	62	89	72	113	104	103	110	122	123	62	82	125	120	118	104.5
21-Jul	129	122	122	132	116	120	96	297	265	104	116	143	129	149	168	180	149	143	150	150	159	160	164	163	148.4
22-Jul	161	161	154	150	151	154	151	149	143	192	234	234	235	243	234	233	237	239	235	227	221	213	212	223	205.0
23-Jul	229	236	231	229	237	235	247	262	260	259	260	253	251	248	248	261	264	272	11	8	8	5	4	4	277.4
24-Jul	4	6	4	8	4	3	357	354	1	5	1	6	358	357	360	354	351	339	338	333	327	324	322	313	353.0
25-Jul	305	303	279	273	274	261	255	230	176	227	250	258	266	268	262	264	260	231	210	172	179	186	192	188	241.3
26-Jul	189	178	158	156	162	169	162	132	130	140	133	220	226	202	154	185	190	182	183	183	180	186	192	193	177.4
27-Jul	186	166	158	154	150	145	148	146	136	135	135	146	195	195	270	236	198	189	201	292	266	276	299	267	191.3
28-Jul	186	249	262	252	242	245	246	254	256	252	245	248	245	245	244	257	266	247	249	334	49	187	180	191	247.7
29-Jul	225	251	255	257	256	234	189	182	156	187	219	253	287	235	346	17	13	12	13	19	21	48	59	83	327.6
30-Jul	102	129	123	127	128	137	167	201	298	154	170	165	138	138	136	151	147	224	233	234	235	239	246	249	192.1
31-Jul	262	286	278	267	258	263	261	260	263	260	265	276	279	295	326	16	354	336	350	4	8	336	296	302	291.9

219.4 245.1 234.1 227.0 221.6 207.0 223.9 236.5 245.1 238.1 252.2 252.6 247.4 242.9 245.8 253.9 253.5 266.3 252.3 264.2 228.2 222.1 213.6 219.7
Diurnal Average

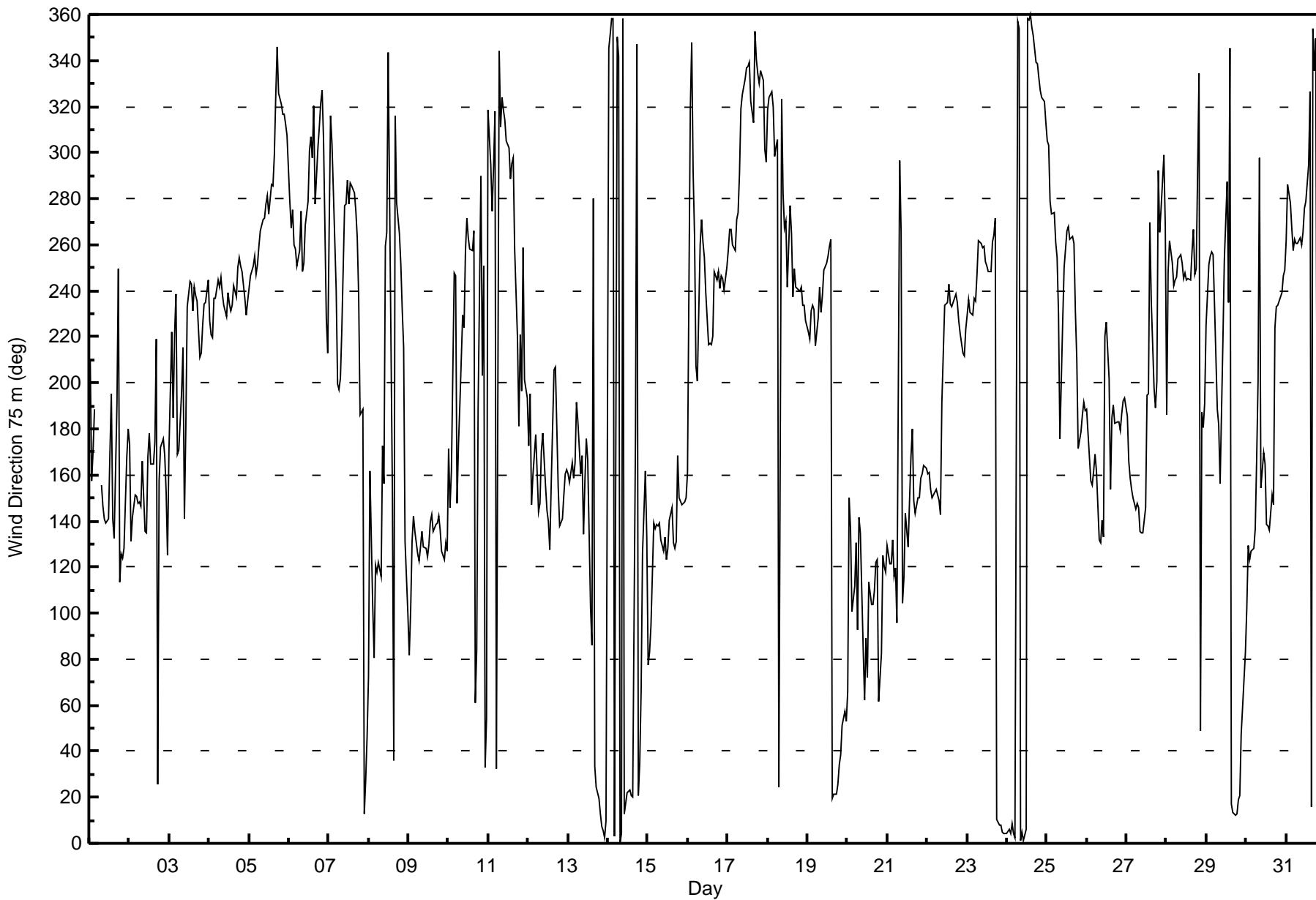
AF - Analyzer Failure
All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 84 deg on Jul 10 22:00			Hours of Data:	742
Minimum Value: 2 deg on Jul 2 22:00			Hours of Missing Data:	2
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 19 P ₉₀ = 35 P ₉₉ = 75			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-Jul	7	11	12	39	AF	10	AF	12	11	10	9	17	27	26	38	22	44	48	37	11	11	11	21	9	48
2-Jul	18	10	8	8	13	6	9	7	19	9	10	18	13	18	13	18	17	71	47	6	4	2	20	10	71
3-Jul	28	12	13	18	18	19	22	22	21	13	34	14	16	15	13	14	9	9	10	7	13	7	11	10	34
4-Jul	11	6	7	6	6	7	7	7	7	10	12	10	13	11	10	9	11	11	9	7	7	4	4	5	13
5-Jul	5	5	6	6	6	7	7	9	10	10	13	12	11	12	11	12	17	10	9	10	10	10	9	10	17
6-Jul	14	10	13	3	3	4	10	9	17	13	13	14	29	26	13	28	19	22	12	13	25	46	16	7	46
7-Jul	33	23	19	13	14	12	30	40	66	29	19	25	35	28	16	36	32	62	44	19	7	75	10	9	75
8-Jul	16	75	76	20	19	35	31	52	69	30	40	27	45	47	49	22	42	18	13	11	6	45	15	17	76
9-Jul	11	20	12	5	5	10	11	15	14	16	14	13	11	17	20	16	13	8	4	5	8	12	8	14	20
10-Jul	12	10	35	10	31	35	36	49	75	14	14	20	15	12	19	31	45	32	10	34	32	84	17	32	84
11-Jul	30	8	11	21	50	17	16	10	13	10	12	13	14	13	13	27	35	41	43	11	31	56	35	13	56
12-Jul	18	27	7	10	10	7	14	10	14	25	33	8	18	22	19	8	11	13	12	12	9	4	4	3	33
13-Jul	4	3	4	5	10	18	17	22	19	35	83	32	67	40	37	76	37	13	6	6	6	5	6	9	83
14-Jul	7	8	7	9	8	14	13	11	16	19	10	16	20	21	41	51	81	18	9	9	23	34	18	32	81
15-Jul	20	17	20	7	9	8	14	8	9	11	8	13	10	10	9	12	10	18	12	9	4	4	3	3	20
16-Jul	7	40	20	13	28	18	12	18	13	13	11	12	11	10	11	11	13	11	7	8	6	6	7	7	40
17-Jul	6	7	7	5	10	6	6	8	8	8	11	12	11	10	14	19	20	9	10	11	12	11	15	12	20
18-Jul	7	9	11	8	13	11	34	15	44	25	16	17	50	34	24	20	24	14	18	15	6	3	6	3	50
19-Jul	3	4	9	8	11	8	11	12	15	11	16	13	17	15	21	9	9	12	12	9	7	10	10	8	21
20-Jul	24	50	39	15	14	19	24	28	8	23	17	19	23	19	20	24	21	17	14	29	17	14	12	14	50
21-Jul	9	11	13	9	15	22	38	82	47	78	39	39	17	13	12	15	15	6	8	7	4	3	3	3	82
22-Jul	4	4	5	3	3	6	6	7	11	43	15	13	14	16	13	13	15	11	9	7	5	3	3	4	43
23-Jul	5	4	4	7	5	6	9	9	14	12	11	16	21	18	11	12	23	8	6	5	5	5	5	5	23
24-Jul	6	8	5	6	7	6	8	10	10	10	11	7	11	12	11	13	13	8	9	8	7	6	5	8	13
25-Jul	4	7	4	3	3	5	11	21	38	39	21	18	26	26	21	24	35	21	16	16	4	3	5	5	39
26-Jul	12	12	13	3	3	4	11	15	12	12	21	59	18	39	27	35	28	19	8	5	4	5	5	5	59
27-Jul	7	5	3	4	3	4	6	10	11	8	12	16	23	15	22	41	20	14	21	21	16	10	11	34	41
28-Jul	18	18	5	5	5	12	9	10	11	9	10	12	16	13	12	14	10	12	23	36	23	36	4	7	36
29-Jul	15	10	10	6	15	17	20	42	28	70	62	83	29	37	35	16	24	26	10	11	7	9	9	14	83
30-Jul	16	16	13	10	6	6	17	27	60	13	8	15	10	13	9	13	12	25	7	5	4	4	5	6	60
31-Jul	6	9	6	8	4	6	8	10	11	12	15	11	12	14	45	9	19	16	15	15	18	20	35	5	45
	33	75	76	39	50	35	38	82	75	78	83	83	67	47	49	76	81	71	47	36	32	84	35	34	
	Diurnal Maximum																								

AF - Analyzer Failure



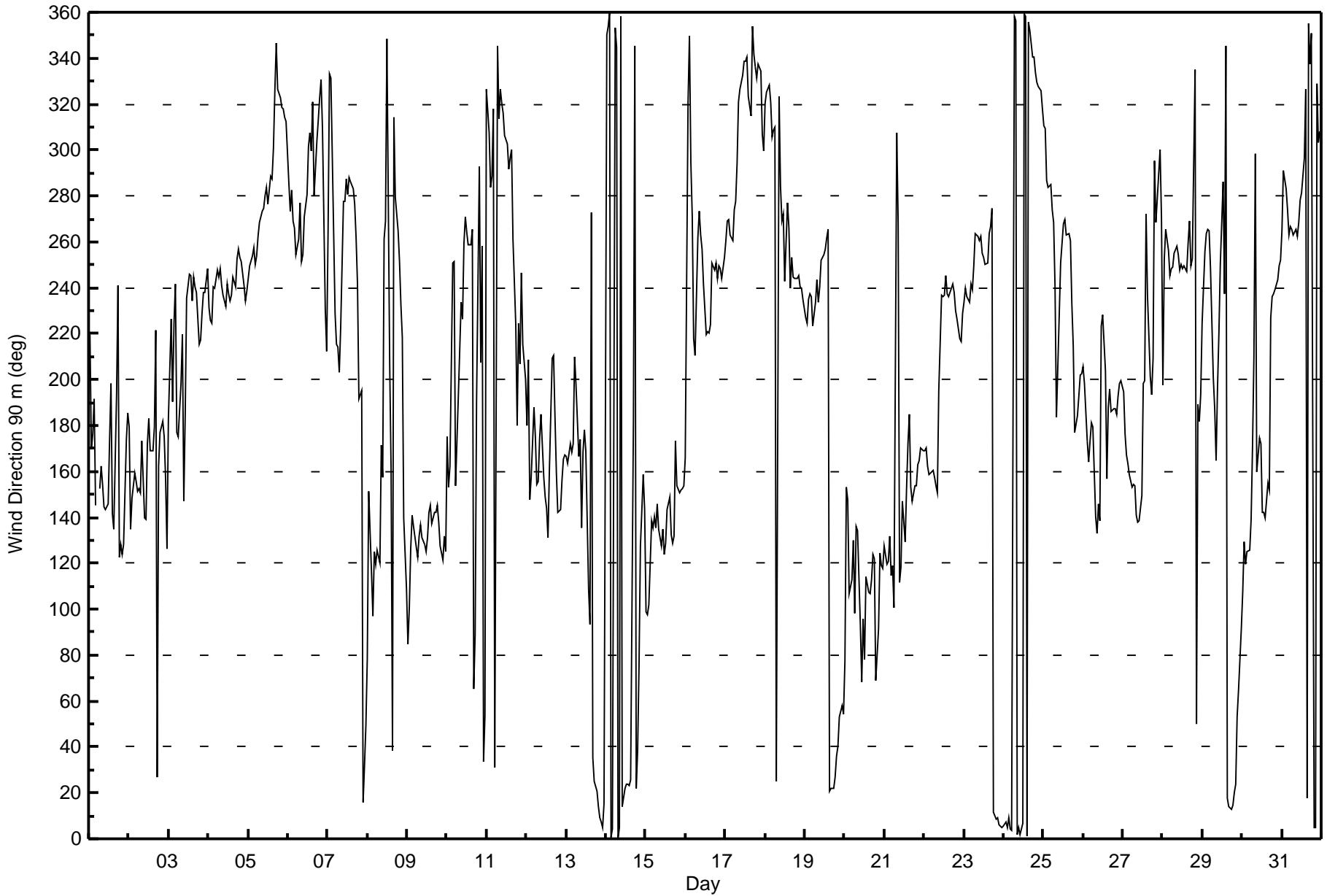


Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 90 m (WD90m) - deg

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 87 deg on Jul 21 08:00																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9								
Minimum Value: 2 deg on Jul 6 04:00																									
Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 19 P ₉₀ = 33 P ₉₉ = 74																									
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-Jul	5	15	16	34	11	AF	12	12	12	9	10	16	26	25	34	20	43	41	30	7	7	10	21	9	43
2-Jul	18	11	8	8	11	6	8	8	19	8	10	18	13	17	13	18	14	71	44	5	4	2	22	7	71
3-Jul	27	10	12	15	16	20	20	20	18	14	33	13	15	14	12	14	8	9	10	7	12	7	11	10	33
4-Jul	10	5	6	6	6	7	7	6	7	9	11	10	12	11	9	9	10	10	9	7	6	3	3	5	12
5-Jul	4	5	6	6	6	7	7	9	10	10	12	12	11	11	11	12	17	9	8	9	10	9	9	9	17
6-Jul	15	10	13	2	3	3	9	9	16	13	12	13	28	25	12	27	18	22	12	12	24	45	19	6	45
7-Jul	35	22	25	22	19	8	27	36	57	27	21	25	29	27	15	34	30	65	41	18	7	74	9	8	74
8-Jul	19	35	39	14	15	28	25	43	60	29	39	27	47	62	50	24	45	17	13	11	5	38	14	8	62
9-Jul	8	14	11	5	5	9	7	13	13	15	13	12	10	15	19	16	12	8	4	5	5	9	7	13	19
10-Jul	11	8	31	11	20	37	30	48	72	13	15	19	13	12	17	31	50	30	12	33	34	83	16	21	83
11-Jul	34	19	18	33	52	16	15	9	12	10	12	12	13	13	13	27	33	40	42	9	26	28	39	19	52
12-Jul	16	23	13	14	7	8	13	8	14	23	29	9	18	20	18	8	10	13	11	13	11	4	3	3	29
13-Jul	4	3	5	7	13	21	20	20	18	33	75	30	64	44	34	81	39	13	6	5	5	5	5	11	81
14-Jul	6	7	7	8	7	12	12	11	15	19	9	15	19	22	43	53	76	22	8	9	22	27	12	16	76
15-Jul	18	13	15	7	9	7	13	7	8	8	6	10	9	10	9	11	9	19	12	9	4	3	3	3	19
16-Jul	7	39	20	12	26	23	10	17	12	13	11	11	11	10	10	10	12	10	7	8	6	6	6	7	39
17-Jul	6	7	6	5	10	6	6	8	7	7	10	11	10	9	13	18	20	9	10	11	12	11	15	11	20
18-Jul	6	9	11	8	13	10	35	15	44	26	18	18	46	35	24	19	23	13	17	15	6	3	5	3	46
19-Jul	3	4	8	7	10	7	10	11	14	10	15	13	16	14	21	8	9	12	12	8	6	9	9	8	21
20-Jul	22	46	36	7	8	15	19	23	8	19	17	17	23	15	17	22	18	15	12	28	14	12	9	9	46
21-Jul	9	7	9	8	9	18	32	87	48	73	38	33	16	14	12	14	15	6	7	7	4	3	3	3	87
22-Jul	4	4	5	3	2	6	6	8	11	40	13	12	13	15	13	13	14	10	9	6	5	4	3	3	40
23-Jul	4	4	3	5	4	5	9	9	13	12	11	15	19	17	18	11	12	24	7	6	5	4	5	5	24
24-Jul	6	7	5	6	6	6	7	9	10	9	10	7	10	11	11	12	12	8	9	7	6	5	5	7	12
25-Jul	5	6	3	4	5	5	9	22	34	32	21	17	24	22	22	24	34	19	15	15	4	3	5	4	34
26-Jul	9	12	20	4	4	4	11	16	11	12	23	56	17	35	27	32	26	18	8	5	4	5	5	5	56
27-Jul	6	6	3	4	4	4	5	10	12	8	12	15	22	15	21	40	19	13	17	19	16	9	12	28	40
28-Jul	17	17	5	5	5	10	8	10	10	9	10	12	15	11	12	13	10	11	22	36	22	37	4	7	37
29-Jul	17	9	9	7	14	14	18	36	26	70	60	85	28	36	34	15	24	26	10	10	7	9	9	12	85
30-Jul	11	13	8	7	5	6	16	27	56	15	7	15	10	13	9	14	12	24	6	4	3	3	4	6	56
31-Jul	6	9	6	9	4	6	8	10	11	11	14	10	11	14	45	10	19	15	15	14	19	15	30	6	45
35 46 39 34 52 37 35 87 72 73 75 85 64 62 50 81 76 71 44 36 34 83 39 28 Diurnal Maximum																									
AF - Analyzer Failure																									





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Vertical Wind Speed 20 m (VW20m) - km/h

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.3 km/h on Jul 16 02:00 Minimum Value: 0.2 km/h on Jul 15 00:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.7 Q ₁ = 1.2 Median = 1.6 Q ₃ = 2.2 P ₉₀ = 2.7 P ₉₉ = 3.9																								Hours in Service: 744 Hours of Data: 744 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-Jul	0.5	0.7	0.6	0.5	1.0	1.4	1.6	1.5	1.5	1.8	1.7	1.2	1.7	1.4	1.3	0.8	0.8	0.8	0.8	0.8	1.2	1.7	1.9	2.3	2.3
2-Jul	1.6	1.5	1.3	0.9	1.0	1.9	1.8	2.0	2.0	1.8	2.0	2.4	2.4	2.0	2.3	2.5	1.9	1.7	2.1	1.9	1.3	1.3	1.2	1.5	2.5
3-Jul	1.0	1.3	1.5	1.7	1.2	0.9	1.5	1.1	1.4	1.4	1.7	2.1	2.2	2.1	2.3	2.4	3.4	3.4	2.6	2.9	2.4	2.3	2.7	2.5	3.4
4-Jul	2.3	2.2	1.8	2.2	2.7	2.9	3.3	3.2	3.1	3.0	3.7	4.1	3.9	4.0	3.9	4.0	4.0	3.3	3.3	2.7	2.1	1.6	1.8	2.1	4.1
5-Jul	2.1	2.1	2.0	1.9	1.7	2.5	2.4	2.5	2.8	2.3	2.5	2.5	2.6	2.7	2.6	2.6	2.3	2.2	3.1	2.7	2.4	1.7	1.1	0.5	3.1
6-Jul	0.3	0.8	0.6	0.6	0.8	1.1	1.5	1.9	1.9	1.9	2.2	2.2	2.1	2.1	2.0	2.3	2.3	2.2	1.9	1.5	0.6	0.2	0.2	0.2	2.3
7-Jul	0.4	0.2	0.3	0.4	0.6	0.7	1.0	1.2	1.3	1.5	1.9	2.0	1.9	1.9	2.1	1.8	1.6	1.2	1.2	0.8	0.4	1.4	1.6	1.3	2.1
8-Jul	0.7	0.3	0.3	0.3	0.3	0.6	0.7	0.6	1.1	1.1	1.7	1.3	0.8	0.9	1.0	1.3	1.0	0.9	1.0	0.6	0.5	0.2	0.2	0.2	1.7
9-Jul	0.6	0.9	0.8	0.9	0.7	0.8	1.1	1.3	1.3	1.4	1.7	2.1	2.1	2.0	2.0	1.9	1.8	1.8	1.4	1.3	1.3	1.2	1.9	1.6	2.1
10-Jul	0.9	0.5	0.6	1.4	1.0	0.9	0.6	1.2	1.2	1.3	1.3	1.2	1.2	1.3	1.5	1.2	1.9	2.0	1.3	1.7	1.1	1.5	1.2	1.0	2.0
11-Jul	0.7	0.6	0.5	0.3	0.7	0.6	1.0	1.8	1.5	1.8	2.2	2.2	2.3	2.1	2.1	1.9	1.8	1.9	1.9	1.6	0.8	0.4	0.6	0.8	2.3
12-Jul	0.6	0.5	0.7	1.0	0.9	0.9	0.9	0.9	1.4	1.1	1.4	1.4	1.4	1.5	1.5	1.3	1.5	1.3	1.2	0.8	0.7	0.9	1.1	1.2	1.5
13-Jul	1.2	1.3	1.1	0.9	1.0	1.1	1.1	1.3	1.5	1.4	1.5	1.9	1.8	1.7	1.4	1.4	1.4	1.3	2.2	2.5	2.4	2.0	1.8	1.9	2.5
14-Jul	2.2	3.0	2.9	2.3	2.4	1.9	2.1	1.8	2.2	2.4	2.4	2.2	2.1	2.0	1.8	1.4	1.0	2.9	2.2	1.2	0.6	0.3	0.2	0.2	3.0
15-Jul	0.2	0.2	0.3	0.4	0.5	0.8	1.3	1.4	1.6	1.5	1.5	2.3	2.7	3.0	2.6	2.3	2.5	2.2	2.0	2.1	2.0	1.9	1.6	1.6	3.0
16-Jul	1.6	4.3	2.2	1.5	0.6	1.1	1.2	2.0	2.2	1.8	1.5	2.1	2.3	2.6	2.6	2.7	3.0	3.2	3.1	2.4	2.8	2.6	2.2	2.9	4.3
17-Jul	2.8	2.4	2.0	2.1	2.0	1.9	1.9	2.5	3.2	3.2	3.7	3.5	3.2	3.1	2.4	2.3	2.4	2.7	1.9	2.0	1.3	1.6	0.8	1.7	3.7
18-Jul	1.8	1.9	1.6	1.1	0.5	0.8	1.3	1.5	1.6	1.8	1.9	2.0	2.0	2.0	2.0	1.9	2.0	2.2	1.8	1.3	1.0	0.7	0.9	1.1	2.2
19-Jul	1.1	1.2	1.2	1.1	0.9	1.3	1.5	1.7	1.6	2.2	2.2	2.3	2.5	2.3	2.3	2.8	2.9	2.6	1.8	1.5	1.5	0.9	0.8	0.4	2.9
20-Jul	0.6	0.3	0.3	1.0	1.7	1.1	0.7	1.0	1.0	1.0	1.4	1.6	1.9	1.9	2.2	2.0	1.5	1.2	1.1	1.6	1.2	1.3	1.7	2.0	2.2
21-Jul	1.5	1.7	1.7	1.5	1.7	1.0	0.8	1.1	1.1	1.4	1.6	1.6	2.3	2.5	2.7	2.2	1.9	1.8	1.7	1.9	1.8	1.8	1.6	1.3	2.7
22-Jul	1.2	1.4	1.5	1.5	1.5	2.1	1.5	1.6	1.6	1.6	1.9	2.3	2.4	2.6	2.6	2.9	2.6	2.4	2.4	2.0	1.1	1.5	1.6	1.5	2.9
23-Jul	1.4	1.5	1.4	1.5	1.4	1.4	1.8	1.6	1.9	2.0	2.1	2.4	2.4	2.4	2.5	2.5	2.4	2.1	2.4	2.6	2.8	3.1	3.2	3.4	3.4
24-Jul	3.4	3.3	3.9	2.9	3.6	3.6	4.0	2.7	2.4	2.8	3.3	3.6	3.4	3.6	3.6	3.9	3.9	3.7	3.2	3.2	2.5	1.8	2.1	1.7	4.0
25-Jul	1.2	0.7	0.6	0.6	0.8	0.8	0.9	1.0	1.2	1.5	1.6	2.0	2.1	1.9	1.8	1.8	1.5	1.5	1.2	1.1	1.2	1.3	1.0	0.9	2.1
26-Jul	0.7	0.6	0.8	1.3	1.8	1.5	1.0	1.1	1.4	1.5	1.4	1.8	1.7	1.6	1.8	1.9	1.9	2.1	1.9	1.8	1.5	1.5	1.8	1.4	2.1
27-Jul	1.2	1.5	1.5	1.2	1.3	1.7	1.8	1.6	1.6	1.8	2.0	2.2	2.3	2.2	1.9	1.6	1.8	1.1	0.5	1.1	1.7	2.7	2.1	1.4	2.7
28-Jul	0.8	0.9	1.4	1.3	1.3	1.4	1.8	1.7	1.9	2.4	2.9	3.1	3.0	2.3	2.4	2.5	2.4	2.9	2.9	3.2	1.6	1.3	0.6	0.5	3.2
29-Jul	0.4	0.6	0.7	0.5	0.7	0.8	1.0	1.3	1.4	1.4	1.6	1.8	1.7	1.8	3.5	2.3	1.9	2.0	1.5	1.5	1.5	1.3	1.0	1.0	3.5
30-Jul	1.1	1.2	1.3	1.3	2.0	1.4	1.2	1.4	1.4	1.2	1.4	1.3	1.5	1.8	2.1	2.3	2.2	2.6	2.4	1.6	1.5	1.8	1.9	2.1	2.6
31-Jul	1.7	1.7	1.3	0.8	1.6	1.8	1.7	1.7	2.0	2.1	2.4	2.6	2.8	3.5	3.1	2.5	2.6	2.8	2.6	2.4	0.9	0.3	0.4	0.5	3.5
Diurnal Maximum																									
3.4 4.3 3.9 2.9 3.6 3.6 4.0 3.2 3.2 3.2 3.7 4.1 3.9 4.0 3.9 4.0 4.0 3.7 3.3 3.2 2.8 3.1 3.2 3.4																									



Summary of Hour Averages

Mannix - July 2017

Maximum Value: 2.3 km/h on Jul 15 14:00		Maximum Daily Average: 1.2 km/h on Jul 2		Hours in Service: 744																						
Minimum Value: -1.9 km/h on Jul 24 18:00		Minimum Daily Average: -1.1 km/h on Jul 24		Hours of Data: 744																						
Maximum Diurnal Average: 0.3 km/h at hour 6		Minimum Diurnal Average: 0.0 km/h at hour 18		Hours of Missing Data: 0																						
Monthly Average: 0.20 km/h		Percentiles: P ₁ = -1.3 P ₁₀ = -0.5 Q ₁ = -0.3 Median = 0.1 Q ₃ = 0.7 P ₉₀ = 1.2 P ₉₉ = 1.8		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-Jul	0.2	0.7	0.3	0.3	0.8	1.2	1.3	0.7	0.8	0.9	1.0	0.4	0.8	0.6	0.7	0.6	0.5	0.2	0.3	0.6	0.9	1.1	1.3	0.8	0.7	1.3
2-Jul	0.9	1.0	1.4	0.8	1.0	1.8	1.4	1.8	1.6	1.2	1.5	1.5	1.0	1.2	1.3	1.4	0.4	0.1	1.3	0.9	0.8	1.3	1.6	0.9	1.2	1.8
3-Jul	0.9	0.1	0.6	0.0	-0.1	0.5	0.8	0.2	0.2	1.1	0.6	0.0	0.3	0.0	-0.3	0.2	-0.6	-0.1	-0.1	-0.2	-0.3	-0.2	-0.1	-0.3	0.1	1.1
4-Jul	-0.2	0.0	0.1	-0.2	-0.4	-0.3	-0.2	-0.2	-0.1	-0.5	0.1	-0.2	-0.3	-0.3	-0.6	-0.4	-0.1	-0.2	-0.2	-0.4	-0.3	-0.2	-0.1	-0.4	-0.2	0.1
5-Jul	-0.4	-0.3	-0.2	-0.2	-0.3	-0.5	-0.2	0.2	0.2	-0.3	-0.4	0.2	0.0	-0.7	-0.7	-1.0	-0.3	-0.8	-1.1	-0.3	-0.7	-0.3	-0.4	-0.1	-0.4	0.2
6-Jul	-0.3	-0.4	-0.3	-0.4	-0.3	-0.3	0.0	-0.2	0.1	0.0	-0.5	-0.1	0.2	-0.1	-0.6	-0.6	0.0	-0.6	-0.3	-0.5	-0.1	-0.2	0.0	0.0	-0.2	0.2
7-Jul	0.0	-0.2	-0.3	-0.2	-0.1	0.3	0.5	0.3	0.2	-0.5	0.0	-0.2	0.2	-0.3	-0.2	-0.2	-0.2	0.3	0.7	0.4	0.1	-0.5	-0.3	0.1	0.0	0.7
8-Jul	0.5	-0.1	0.0	0.0	0.2	0.3	0.2	0.2	0.4	0.4	0.1	-0.4	-0.2	0.1	0.7	0.0	0.2	-0.2	0.2	0.0	-0.1	0.1	0.4	0.2	0.1	0.7
9-Jul	0.4	0.7	0.6	0.9	1.0	1.0	0.7	0.7	0.5	0.6	1.0	1.3	0.7	1.2	1.4	1.1	1.2	1.3	1.1	1.1	0.9	0.7	1.3	1.0	0.9	1.4
10-Jul	0.6	0.9	0.3	-0.1	-0.1	0.9	0.1	0.4	0.1	0.1	0.3	-0.3	0.1	-0.1	0.3	-0.1	0.2	1.2	0.1	-0.3	0.0	0.1	0.0	0.3	0.2	1.2
11-Jul	-0.1	0.0	-0.1	-0.2	0.0	0.1	-0.4	-0.6	-0.4	-0.2	-0.8	-0.4	-0.3	-0.1	-0.3	0.5	0.1	0.1	0.7	-0.1	0.4	0.0	0.2	0.2	-0.1	0.7
12-Jul	0.3	0.2	0.5	0.9	0.4	0.6	0.4	0.7	0.9	0.5	0.5	0.9	0.2	0.3	1.1	0.0	0.5	0.3	0.5	0.8	0.5	1.1	1.1	1.1	0.6	1.1
13-Jul	1.4	1.3	1.1	1.0	0.8	0.5	0.6	0.9	0.4	0.7	0.1	0.5	1.0	0.8	0.7	-0.1	0.4	0.1	-0.1	-0.5	-1.0	-0.8	-0.7	-0.7	0.3	1.4
14-Jul	-1.0	-1.2	-0.7	-0.5	-0.8	-0.4	-0.1	-0.5	-0.2	-0.3	0.0	0.3	-0.4	0.4	0.2	0.1	0.3	-1.1	-0.4	0.2	0.5	0.2	0.2	0.1	-0.2	0.5
15-Jul	0.1	0.2	0.2	0.6	0.6	0.5	0.9	1.1	0.9	0.6	1.2	1.5	1.3	2.3	2.1	1.4	1.3	1.2	1.2	1.9	1.8	1.8	1.8	1.7	1.2	2.3
16-Jul	1.3	-1.4	-0.5	-0.3	-0.3	0.1	0.2	-0.4	-0.1	0.1	0.0	-0.1	0.2	0.7	0.4	0.3	-0.3	-0.1	-0.3	-0.3	-0.4	-0.3	-0.3	-0.1	-0.1	1.3
17-Jul	-0.3	-0.2	0.1	-0.3	-0.3	-0.1	-0.3	-0.8	-0.8	-1.4	-1.3	-1.2	-1.0	-1.3	-0.6	-0.1	-0.6	-1.0	-0.7	-0.9	-0.4	-0.6	0.1	-0.4	-0.6	0.1
18-Jul	-0.7	-0.5	-0.4	-0.4	-0.2	-0.3	0.4	0.4	0.3	-0.1	-0.5	-0.2	0.2	-0.2	-0.4	-0.3	-0.4	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	0.4
19-Jul	-0.2	0.0	0.0	0.1	0.1	-0.1	-0.1	-0.1	0.4	-0.1	-0.1	0.1	0.1	-0.1	-0.3	-0.2	-0.5	-0.2	-0.1	0.1	0.1	0.3	0.7	0.3	0.0	0.7
20-Jul	0.1	0.2	0.1	0.6	1.7	0.8	0.6	0.4	0.6	0.5	0.7	0.7	0.9	0.9	1.3	1.2	1.4	1.0	1.0	0.7	0.4	0.8	0.8	0.9	0.8	1.7
21-Jul	1.1	0.9	1.2	1.0	1.1	0.7	0.3	0.2	0.0	0.3	0.3	0.9	1.0	1.8	1.7	0.8	1.3	1.5	1.4	1.4	1.4	1.4	1.3	1.4	1.0	1.8
22-Jul	1.6	1.6	1.5	1.5	1.5	1.6	1.1	1.3	1.2	0.8	0.0	-0.2	0.2	0.2	-0.1	-0.1	0.1	-0.2	-0.2	0.0	0.0	-0.2	-0.2	-0.1	0.5	1.6
23-Jul	-0.1	-0.2	-0.1	0.0	-0.2	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.3	-0.4	-0.2	-0.5	-0.1	-0.4	-1.0	-0.9	-1.3	-1.3	-1.3	-0.3	0.3
24-Jul	-1.2	-1.0	-1.7	-0.9	-1.4	-1.4	-1.6	-0.6	-0.4	-0.4	-1.0	-1.2	-0.5	-0.8	-1.0	-1.3	-1.1	-1.9	-1.3	-1.3	-1.1	-1.0	-1.1	-0.8	-1.1	-0.4
25-Jul	-0.6	-0.5	-0.3	-0.4	0.0	-0.2	0.0	0.0	0.7	0.6	0.5	0.4	0.4	-0.1	-0.1	0.2	-0.1	0.4	0.2	0.7	0.7	0.5	0.6	0.8	0.2	0.8
26-Jul	0.7	0.7	0.8	1.4	1.8	1.1	0.8	0.3	0.4	0.7	0.4	0.0	-0.5	0.4	0.8	0.9	0.8	0.6	0.6	0.7	0.8	0.7	0.5	0.5	0.7	1.8
27-Jul	0.9	1.8	1.9	1.6	1.5	1.6	1.6	1.3	1.2	1.2	1.3	1.3	0.6	0.8	0.0	0.3	0.5	0.3	0.2	-0.4	-0.3	-0.6	-0.6	0.0	0.7	1.9
28-Jul	0.5	-0.1	-0.2	-0.4	-0.4	-0.2	-0.3	-0.1	-0.2	-0.4	0.2	0.1	-0.4	-0.3	0.0	0.0	-0.3	-0.4	-0.4	-1.2	0.4	0.4	0.3	0.2	-0.1	0.5
29-Jul	-0.1	-0.2	-0.1	-0.4	-0.2	0.0	0.7	0.7	0.5	0.1	1.4	-0.1	0.1	0.3	-0.9	-0.2	0.1	0.1	-0.4	0.0	-0.3	0.0	0.3	0.8	0.1	1.4
30-Jul	0.9	1.1	1.0	1.0	1.3	1.2	0.5	0.4	0.0	0.7	0.8	0.9	1.0	1.2	1.6	2.0	1.7	0.3	-0.1	-0.2	-0.3	-0.5	-0.3	-0.4	0.6	2.0
31-Jul	-0.2	-0.4	-0.2	-0.2	-0.2	-0.2	-0.1	-0.4	-0.1	-0.2	-0.3	-0.5	-0.9	-0.5	-0.6	-0.3	-0.1	-0.9	-0.6	-0.7	0.1	0.0	-0.1	-0.3	-0.3	0.1
	0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.2	0.2	Diurnal Average	
	1.6	1.8	1.9	1.6	1.8	1.8	1.6	1.8	1.6	1.2	1.5	1.5	1.3	2.3	2.1	2.0	1.7	1.5	1.4	1.9	1.8	1.8	1.8	1.7	Diurnal Maximum	



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.6 km/h on Jul 4 12:00 Minimum Value: 0.2 km/h on Jul 6 23:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.1 Median = 1.8 Q ₃ = 2.5 P ₉₀ = 2.9 P ₉₉ = 4.1																								Hours in Service: 744 Hours of Data: 744 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-Jul	0.3	0.5	0.3	0.5	1.0	1.9	1.5	1.5	1.6	1.8	2.1	1.7	2.2	1.8	1.9	1.2	1.0	0.9	0.9	0.8	1.1	1.9	1.9	2.1	2.2
2-Jul	1.4	1.7	1.3	0.9	1.0	1.6	2.0	2.0	2.1	2.0	2.3	2.6	2.5	2.3	2.2	2.2	2.1	1.8	2.0	1.6	0.9	0.6	1.0	1.3	2.6
3-Jul	1.3	1.6	1.4	1.7	1.3	0.8	1.2	1.0	1.2	1.4	2.2	2.5	2.8	2.5	2.8	2.8	3.4	3.5	2.5	2.9	2.4	2.4	3.2	2.6	3.5
4-Jul	2.2	2.2	1.8	2.4	3.0	3.4	3.6	3.5	3.4	3.1	4.1	4.6	4.4	4.5	4.1	4.4	4.2	4.1	3.5	2.9	2.1	1.4	1.5	2.0	4.6
5-Jul	2.1	2.3	2.2	2.1	1.8	2.7	2.8	2.8	3.1	2.6	2.9	2.9	3.1	2.6	2.7	2.8	2.6	2.4	3.1	3.0	2.6	1.7	0.9	0.5	3.1
6-Jul	0.3	0.5	0.4	0.4	0.4	1.1	1.8	1.9	2.1	2.5	2.4	2.9	2.8	2.6	2.0	2.6	2.7	2.4	1.9	1.5	0.6	0.5	0.2	0.2	2.9
7-Jul	0.5	0.3	0.2	0.2	0.3	0.7	1.2	1.3	1.5	1.8	2.3	2.8	2.5	2.6	2.6	2.5	2.2	1.6	1.7	0.8	0.2	1.4	1.7	1.1	2.8
8-Jul	0.9	0.3	0.4	0.3	0.3	0.5	0.7	0.7	1.3	1.1	1.7	1.0	0.7	0.7	1.3	1.4	1.3	1.2	1.2	0.7	0.2	0.3	0.4	0.3	1.7
9-Jul	0.5	1.0	0.9	0.6	0.5	0.7	1.2	1.5	1.6	1.9	2.2	2.8	2.6	2.6	2.9	2.4	2.3	1.9	1.3	1.4	1.4	1.5	1.9	1.7	2.9
10-Jul	0.5	0.6	0.6	1.5	1.1	0.9	0.7	1.2	1.3	1.6	1.7	1.7	1.7	1.8	2.0	1.7	1.9	2.1	0.9	1.6	0.9	1.4	1.2	1.0	2.1
11-Jul	0.5	0.5	0.4	0.3	0.6	0.7	1.0	1.4	1.6	2.0	2.0	2.5	2.6	2.5	2.3	2.6	2.1	1.8	1.8	1.4	0.8	0.4	0.6	0.3	2.6
12-Jul	0.4	0.4	0.4	0.6	0.5	0.8	0.9	1.2	1.7	1.3	1.7	1.4	1.8	2.0	1.6	1.3	1.6	1.7	1.5	0.9	0.4	0.6	0.6	0.6	2.0
13-Jul	0.8	0.9	0.7	0.7	0.6	0.7	1.0	1.6	1.7	1.7	2.0	2.6	2.5	2.3	2.1	2.0	1.7	1.6	2.4	2.6	2.4	1.8	1.8	1.6	2.6
14-Jul	1.9	2.8	2.8	2.3	2.2	2.1	2.4	2.0	2.3	2.7	2.8	2.9	2.6	2.5	2.4	2.1	1.3	2.6	2.2	1.4	0.8	0.4	0.3	0.3	2.9
15-Jul	0.3	0.3	0.4	0.2	0.3	0.6	1.2	1.4	1.7	1.6	1.9	2.8	3.0	3.4	2.8	2.8	2.7	2.6	1.5	1.8	1.8	1.6	1.4	1.1	3.4
16-Jul	1.0	4.5	2.5	1.2	0.5	0.7	1.0	2.1	2.5	2.1	1.8	2.2	2.2	3.0	2.6	2.9	3.2	3.5	3.4	2.7	2.7	2.8	2.3	3.0	4.5
17-Jul	2.9	2.7	2.1	2.2	2.1	1.8	1.8	2.1	3.4	3.2	4.0	3.6	3.5	3.1	2.6	2.5	2.5	2.6	2.1	1.6	1.2	1.3	0.7	1.3	4.0
18-Jul	1.7	2.0	1.8	1.1	0.5	0.7	1.5	1.8	2.3	2.3	2.4	2.4	2.6	2.6	2.4	2.4	2.4	2.5	2.1	1.5	1.0	0.4	0.5	0.7	2.6
19-Jul	1.0	1.1	1.5	1.4	1.2	1.1	1.8	2.1	2.2	2.6	2.7	2.8	3.0	3.0	2.6	3.0	2.9	2.6	1.9	1.7	1.4	0.9	1.1	0.7	3.0
20-Jul	0.7	0.2	0.3	1.3	2.1	1.3	0.8	1.0	1.0	1.0	1.7	2.0	2.4	2.4	2.8	2.4	2.1	1.5	1.3	1.8	1.4	1.7	1.8	2.2	2.8
21-Jul	1.4	1.7	1.8	1.8	1.8	1.0	1.0	1.1	1.2	1.8	2.1	2.0	2.8	2.7	2.6	2.3	2.2	1.8	1.7	1.6	1.1	1.0	0.8	0.6	2.8
22-Jul	0.7	0.7	1.1	1.3	1.3	1.4	1.2	1.5	1.8	2.0	2.5	2.6	3.1	3.2	3.1	3.2	2.9	2.7	2.4	2.1	0.8	1.0	1.2	1.1	3.2
23-Jul	1.3	1.4	1.1	1.5	1.3	1.5	2.0	1.8	2.3	2.6	2.7	2.9	2.9	3.0	2.9	3.0	2.6	2.2	2.4	2.2	2.4	2.5	2.4	2.8	3.0
24-Jul	3.1	3.2	3.2	2.7	3.4	3.5	3.6	2.8	2.6	3.0	3.3	3.5	3.7	3.5	3.4	4.0	4.0	3.7	3.2	3.2	2.6	1.8	1.9	1.5	4.0
25-Jul	0.7	0.8	0.3	0.2	0.3	0.4	0.9	1.3	1.5	2.1	2.4	2.6	2.8	2.6	2.4	2.4	2.2	2.0	1.3	0.8	0.5	0.7	0.5	0.3	2.8
26-Jul	0.5	0.6	0.6	0.9	0.9	1.0	1.0	1.2	1.6	1.8	1.7	2.3	2.2	2.3	2.2	2.3	2.4	1.9	1.5	1.3	1.2	1.0	1.4	1.3	2.4
27-Jul	0.9	0.9	1.2	1.1	1.2	1.5	1.7	1.7	1.8	1.8	2.3	2.5	2.7	2.5	2.4	2.2	1.9	1.3	0.6	0.9	1.5	2.7	1.7	1.4	2.7
28-Jul	0.8	0.8	1.2	1.3	1.3	1.6	1.9	2.3	2.3	2.9	3.5	3.6	3.0	2.6	2.9	2.8	2.6	3.0	2.8	3.0	1.8	0.9	0.2	0.3	3.6
29-Jul	0.5	0.5	0.4	0.5	0.4	0.8	1.3	1.6	1.6	2.0	2.1	2.5	2.4	2.6	3.7	2.6	2.4	2.2	1.7	1.6	1.4	1.2	1.2	1.1	3.7
30-Jul	1.5	1.3	1.1	1.3	1.9	1.5	1.0	1.6	1.6	1.0	1.1	1.6	2.0	2.4	2.4	2.7	2.4	2.7	2.5	1.6	1.3	1.7	2.0	2.2	2.7
31-Jul	1.9	1.5	1.0	0.7	1.3	1.8	1.7	1.9	2.4	2.6	2.9	2.8	2.9	3.6	3.2	3.0	3.1	2.9	2.8	2.3	1.1	0.3	0.5	0.3	3.6
Diurnal Maximum																									



Summary of Hour Averages

Mannix - July 2017

Maximum Value: 2.0 km/h on Jul 29 11:00		Maximum Daily Average: 0.7 km/h on Jul 2		Hours in Service: 744																						
Minimum Value: -1.2 km/h on Jul 24 03:00		Minimum Daily Average: -0.3 km/h on Jul 24		Hours of Data: 742																						
Maximum Diurnal Average: 0.4 km/h at hour 14		Minimum Diurnal Average: 0.1 km/h at hour 22		Hours of Missing Data: 2																						
Monthly Average: 0.24 km/h		Percentiles: P ₁ = -0.7 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 0.7 P ₉₉ = 1.3		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-Jul	0.0	0.4	0.2	0.2	AF	0.4	AF	0.1	0.3	0.2	0.2	0.0	0.4	0.5	0.6	0.3	0.5	0.2	0.2	0.4	0.1	-0.1	0.5	0.4	0.3	0.6
2-Jul	0.5	0.1	0.4	0.5	0.5	0.9	0.7	0.9	1.3	0.4	0.6	1.1	0.8	0.8	0.9	0.9	0.5	0.3	1.2	0.5	0.6	0.5	0.7	0.1	0.7	1.3
3-Jul	0.5	0.0	0.3	0.1	0.0	0.2	0.6	0.1	0.1	0.5	0.6	0.0	0.6	0.3	-0.2	0.7	-0.1	0.5	-0.1	-0.4	-0.1	0.0	0.4	0.3	0.2	0.7
4-Jul	0.0	0.0	0.1	0.1	0.0	0.2	0.2	0.5	0.0	-0.2	0.0	0.3	0.3	0.0	0.0	0.5	1.3	0.6	-0.1	0.1	-0.2	0.1	-0.2	0.1	0.2	1.3
5-Jul	0.0	0.1	0.4	0.3	0.2	0.0	0.6	1.1	1.2	0.4	0.4	1.3	0.6	0.1	-0.1	-0.4	0.6	-0.5	-0.3	0.7	0.1	0.3	0.1	0.3	0.3	1.3
6-Jul	0.0	0.2	0.1	0.0	0.0	0.0	0.3	0.3	0.2	0.3	-0.1	0.3	1.0	0.6	-0.1	-0.1	0.6	-0.1	0.3	-0.2	0.2	-0.3	0.1	0.0	0.2	1.0
7-Jul	0.2	0.1	-0.1	0.0	0.0	0.2	0.2	0.2	0.4	-0.5	0.4	0.2	0.5	0.1	0.1	0.0	-0.1	0.7	0.9	0.3	0.0	-0.1	-0.2	-0.1	0.1	0.9
8-Jul	0.2	0.1	0.1	0.0	0.0	0.4	0.1	0.1	0.4	0.2	0.4	-0.2	0.0	0.0	0.6	0.0	0.3	-0.1	0.5	0.1	0.0	0.1	0.2	0.3	0.1	0.6
9-Jul	0.0	0.2	0.0	0.4	0.2	0.0	-0.1	0.0	0.1	0.1	0.5	0.4	-0.6	0.7	0.8	0.4	0.5	0.4	0.4	0.1	-0.1	-0.1	0.0	0.0	0.2	0.8
10-Jul	0.3	0.6	0.3	0.2	0.1	0.3	0.1	0.4	0.1	0.0	0.6	0.0	0.4	0.3	0.4	0.0	-0.2	0.5	0.1	0.5	0.1	0.1	0.1	0.2	0.2	0.6
11-Jul	0.2	0.2	0.2	0.0	0.2	0.0	0.0	-0.1	-0.1	0.1	-0.4	0.1	0.6	0.6	0.3	1.2	0.6	0.0	0.4	0.0	0.2	0.1	0.2	0.1	0.2	1.2
12-Jul	0.2	0.1	0.3	0.5	0.3	0.3	0.2	0.4	0.5	0.4	0.1	0.3	-0.2	-0.2	0.6	-0.1	0.2	0.2	0.2	0.3	0.1	0.7	0.8	0.7	0.3	0.8
13-Jul	0.9	1.1	0.5	0.7	0.3	0.2	0.3	0.7	0.1	0.5	-0.2	0.2	0.9	0.9	1.0	-0.1	0.3	0.0	0.0	-0.4	-0.6	-0.4	-0.3	-0.3	0.3	1.1
14-Jul	-0.4	-0.4	-0.1	0.4	-0.5	0.4	0.3	-0.2	0.4	0.3	0.0	0.3	-0.6	0.6	0.3	0.1	0.3	-0.3	-0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.6
15-Jul	0.1	0.2	0.1	0.3	0.2	0.1	0.3	0.5	0.0	-0.3	0.3	0.4	-0.1	0.5	0.8	0.3	-0.2	0.2	0.7	1.0	1.1	1.2	1.1	1.2	0.4	1.2
16-Jul	0.8	0.2	0.2	0.4	-0.1	0.1	0.0	0.0	0.7	0.6	0.2	0.0	0.3	0.6	0.3	0.3	0.4	0.5	0.1	0.3	0.1	0.2	0.1	0.2	0.3	0.8
17-Jul	0.5	0.7	0.7	0.3	0.3	0.5	0.7	0.5	0.4	-0.2	-0.7	-0.2	-0.4	-0.5	0.1	0.6	-0.3	-0.4	-0.4	-0.4	0.0	-0.1	0.6	0.2	0.1	0.7
18-Jul	-0.1	0.0	0.0	0.0	0.0	-0.2	0.8	0.3	0.8	0.4	-0.4	-0.1	0.3	0.2	-0.4	-0.6	0.0	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.8
19-Jul	-0.1	0.1	0.2	0.3	0.1	-0.2	-0.2	0.1	0.5	0.3	0.5	0.5	0.7	0.3	0.0	0.0	-0.1	0.0	-0.3	0.1	0.2	0.1	0.5	0.2	0.2	0.7
20-Jul	0.2	0.2	0.1	0.5	1.0	0.4	0.4	0.3	0.1	0.4	0.5	0.5	0.8	0.3	1.0	0.6	0.9	0.4	0.5	0.6	0.1	0.2	-0.2	0.0	0.4	1.0
21-Jul	0.2	-0.3	0.2	0.2	0.4	0.1	0.2	0.4	0.1	0.0	0.1	0.9	0.1	0.8	1.3	0.4	0.7	0.6	0.9	0.8	1.1	1.1	0.8	1.0	0.5	1.3
22-Jul	1.2	1.0	1.2	1.2	1.1	1.2	0.6	1.0	0.5	0.8	0.0	-0.2	0.4	0.6	0.4	0.2	0.7	0.3	0.1	0.2	0.0	-0.2	-0.2	0.0	0.5	1.2
23-Jul	0.0	0.0	0.1	0.2	0.2	0.1	0.4	0.4	0.1	0.1	0.6	0.4	0.5	0.7	-0.1	0.4	0.3	0.4	-0.2	-0.5	-0.5	-0.7	-0.7	-0.6	0.1	0.7
24-Jul	-0.6	-0.5	-1.2	-0.5	-1.0	-1.0	-0.7	0.3	0.4	0.3	-0.5	-0.4	0.7	0.2	0.1	-0.1	-0.3	-0.9	-0.4	-0.7	-0.5	-0.5	-0.5	-0.1	-0.3	0.7
25-Jul	0.2	0.2	0.2	-0.1	0.5	0.1	0.4	0.2	0.8	0.7	0.6	0.9	0.6	0.3	0.1	0.5	-0.1	0.5	0.4	0.6	0.4	0.2	0.0	0.3	0.3	0.9
26-Jul	0.2	0.2	0.3	1.1	1.1	0.5	0.3	0.0	-0.3	0.3	0.0	-0.1	-0.4	0.2	0.1	0.8	0.5	0.1	0.2	0.3	0.4	0.2	0.1	0.2	0.3	1.1
27-Jul	0.4	0.9	1.5	1.3	1.1	1.0	1.1	0.8	0.4	0.2	0.4	0.7	0.6	0.5	0.3	0.6	0.1	0.4	0.3	0.1	0.3	0.5	0.4	0.4	0.6	1.5
28-Jul	0.3	0.1	0.3	-0.1	-0.2	0.1	-0.1	0.5	0.4	-0.2	0.7	0.7	0.1	-0.1	0.3	0.4	0.5	0.2	0.3	-0.2	0.2	0.3	0.5	0.5	0.2	0.7
29-Jul	-0.1	0.0	0.2	-0.1	0.1	0.0	0.3	0.6	0.3	0.2	2.0	-0.2	0.4	0.4	-0.2	-0.3	0.2	0.1	-0.3	0.0	0.0	0.0	0.2	0.4	0.2	2.0
30-Jul	0.9	0.6	0.1	0.3	0.2	0.3	0.2	0.4	0.2	0.4	0.4	0.6	0.4	0.6	0.6	1.4	0.8	0.5	0.1	0.0	-0.1	-0.2	0.1	0.2	0.4	1.4
31-Jul	0.4	0.5	0.4	0.2	0.3	0.3	0.3	0.0	0.5	0.1	0.1	0.1	-0.1	0.9	0.0	-0.2	0.6	-0.1	0.0	-0.2	0.1	0.2	0.2	0.2	0.2	0.9
																								Diurnal Average		
																								Diurnal Maximum		
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.8 km/h on Jul 4 12:00 Minimum Value: 0.1 km/h on Jul 8 21:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.9 Q ₃ = 2.7 P ₉₀ = 3.1 P ₉₉ = 4.0		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	0.4	0.3	0.3	0.4	AF	1.2	AF	1.4	1.5	1.7	2.1	1.8	2.6	2.1	2.0	1.3	1.0	0.9	1.1	1.0	1.5	2.1	1.7	2.1	2.6
2-Jul	1.3	1.9	1.2	0.6	0.7	1.4	1.9	2.1	2.3	2.1	2.4	3.0	2.9	2.6	2.4	2.2	2.1	1.9	2.4	1.4	0.8	0.5	1.0	1.6	3.0
3-Jul	1.4	1.8	1.4	1.8	1.6	0.8	0.9	0.8	0.9	1.3	2.3	2.6	3.1	2.6	3.1	3.1	3.4	3.3	2.3	2.6	2.3	2.3	3.3	2.5	3.4
4-Jul	2.0	1.9	1.6	2.4	2.9	3.2	3.4	3.4	3.1	2.8	3.8	4.8	4.7	4.2	4.2	4.0	4.0	4.6	3.4	2.8	1.9	1.0	1.5	1.9	4.8
5-Jul	1.9	2.1	2.1	2.1	1.6	2.6	3.0	3.0	3.3	2.7	2.9	3.3	3.6	2.7	3.2	3.1	3.0	2.3	2.9	2.9	2.3	1.9	0.8	0.8	3.6
6-Jul	0.3	0.3	0.3	0.3	0.2	0.7	1.6	1.9	2.1	2.5	2.9	3.4	3.3	3.2	2.3	2.6	2.8	2.7	2.0	1.5	0.7	0.6	0.2	0.2	3.4
7-Jul	0.4	0.4	0.2	0.2	0.2	0.5	1.0	1.3	1.6	2.0	2.7	3.4	3.0	2.8	2.9	2.9	2.6	2.0	1.9	0.9	0.2	1.3	1.5	0.9	3.4
8-Jul	1.3	0.5	0.5	0.6	0.8	0.8	1.0	0.7	1.1	1.2	1.7	1.1	0.7	0.6	1.2	1.4	1.4	1.4	1.4	0.7	0.1	0.3	0.4	0.9	1.7
9-Jul	0.9	1.9	1.2	0.7	0.6	1.2	1.5	1.6	1.7	2.1	2.6	3.3	2.8	3.2	3.4	2.7	2.5	1.9	1.1	1.3	1.7	1.8	2.2	2.1	3.4
10-Jul	0.5	0.5	0.7	1.6	1.2	0.7	0.6	1.3	1.4	1.6	2.0	1.9	1.8	2.1	2.3	2.1	2.0	2.4	1.0	1.5	1.1	1.4	0.8	0.9	2.4
11-Jul	0.7	0.5	0.4	0.3	0.4	0.6	0.9	1.3	1.6	1.9	2.3	2.8	2.9	2.8	2.5	3.2	2.4	1.7	1.8	1.2	0.7	0.6	0.6	0.3	3.2
12-Jul	0.4	0.3	0.3	0.4	0.4	0.6	0.8	1.0	1.7	1.4	1.9	1.5	1.8	2.1	1.5	1.1	1.5	2.0	1.6	0.9	0.6	0.5	0.4	0.6	2.1
13-Jul	0.6	0.7	0.7	0.5	0.3	0.3	0.9	1.7	1.9	2.0	2.0	2.9	2.8	2.7	2.5	2.2	2.0	1.7	2.2	2.1	2.1	1.7	1.7	1.4	2.9
14-Jul	1.5	2.4	2.7	2.6	2.0	2.3	2.5	2.2	2.7	3.1	2.8	3.1	2.9	2.7	2.9	2.4	1.6	2.2	1.8	1.2	0.9	0.5	0.4	0.4	3.1
15-Jul	0.5	0.7	0.8	0.3	0.5	0.6	1.1	1.1	1.7	1.7	1.9	2.9	3.1	3.3	3.2	2.9	2.9	2.9	1.4	1.7	1.6	1.3	1.2	1.0	3.3
16-Jul	0.8	4.1	2.5	1.1	0.5	0.6	0.7	2.3	2.7	2.3	1.8	2.2	2.2	3.1	2.5	3.0	3.3	3.5	3.3	2.6	2.6	2.7	2.3	3.1	4.1
17-Jul	3.1	2.9	2.2	2.2	2.2	2.0	1.9	2.1	3.1	3.0	3.7	3.8	3.5	3.0	2.6	2.8	2.4	2.5	2.1	1.4	1.0	1.1	0.8	1.2	3.8
18-Jul	1.6	2.0	1.8	1.1	0.7	0.9	1.8	2.0	2.7	2.8	2.6	2.7	3.1	3.1	2.8	2.4	2.8	2.7	2.2	1.4	0.7	0.4	0.3	0.3	3.1
19-Jul	0.5	1.0	1.6	1.7	1.5	1.3	1.9	2.2	2.3	2.7	2.8	2.9	3.2	3.2	2.8	2.9	2.9	2.4	1.8	1.4	1.1	0.7	1.3	0.9	3.2
20-Jul	0.6	0.3	0.6	2.1	2.4	1.5	1.2	1.4	0.9	1.4	1.7	2.5	2.7	2.9	3.4	2.9	2.6	2.0	1.7	2.0	2.0	2.0	2.3	2.6	3.4
21-Jul	1.6	2.1	2.4	2.1	2.3	1.3	1.4	1.1	1.1	1.9	2.3	2.2	3.1	3.0	2.9	2.5	2.2	1.8	1.6	1.5	0.8	0.6	0.6	0.6	3.1
22-Jul	0.6	0.5	0.9	0.8	0.9	0.9	1.1	1.6	1.6	2.2	2.6	2.6	3.1	3.6	3.4	3.3	3.0	3.0	2.5	2.0	0.7	0.8	0.8	0.9	3.6
23-Jul	1.3	1.4	1.0	1.4	1.2	1.4	2.0	1.9	2.3	2.8	3.3	3.1	3.2	3.4	3.3	3.1	3.0	1.9	2.3	1.9	2.1	2.3	2.2	2.6	3.4
24-Jul	3.0	3.1	2.9	2.7	3.3	3.3	3.4	2.8	2.7	2.8	3.2	3.4	3.8	3.3	3.4	3.8	3.8	3.4	3.1	3.0	2.3	1.7	1.5	1.4	3.8
25-Jul	0.8	0.6	0.2	0.3	0.4	0.3	0.8	1.3	1.7	2.2	2.8	3.1	2.9	2.9	2.7	2.7	2.6	2.5	1.5	0.8	0.6	0.6	0.3	0.3	3.1
26-Jul	0.7	0.8	0.5	0.6	0.5	0.7	0.8	1.2	1.5	1.8	1.8	2.6	2.5	2.7	2.4	2.7	2.8	2.0	1.4	1.3	1.2	1.1	1.4	1.2	2.8
27-Jul	0.9	0.7	0.8	0.9	0.9	1.0	1.4	1.5	1.8	1.8	2.5	2.7	3.0	3.0	2.7	2.5	2.1	1.4	0.7	0.8	1.5	2.8	1.8	1.1	3.0
28-Jul	0.9	0.8	1.2	1.2	1.2	1.6	1.8	2.4	2.5	3.0	3.6	3.9	3.2	2.4	3.0	2.9	2.9	3.0	2.6	3.0	1.7	0.7	0.3	0.3	3.9
29-Jul	0.3	0.4	0.3	0.4	0.4	0.6	1.2	1.7	1.7	2.1	2.5	2.6	2.8	2.8	3.6	2.6	2.6	2.3	1.7	1.6	1.2	1.1	1.2	1.7	3.6
30-Jul	2.2	1.6	1.5	1.5	1.9	1.3	0.7	1.8	1.5	0.7	0.9	1.5	2.0	2.5	2.6	2.7	2.5	2.8	2.6	1.3	1.2	1.3	1.6	2.2	2.8
31-Jul	1.9	1.3	1.1	0.8	0.8	1.9	1.5	2.1	2.5	2.8	3.0	3.1	3.1	3.8	3.3	3.0	3.5	3.3	2.9	2.3	1.1	0.5	0.5	0.4	3.8
Diurnal Maximum																								3.1	
AF - Analyzer Failure																									



Maximum Value: 2.1 km/h on Jul 24 13:00 Maximum Daily Average: 0.8 km/h on Jul 24 Minimum Value: -1.0 km/h on Jul 18 16:00 Minimum Daily Average: -0.3 km/h on Jul 4 Maximum Diurnal Average: 0.3 km/h at hour 9 Minimum Diurnal Average: 0.1 km/h at hour 22 Monthly Average: 0.21 km/h Percentiles: P ₁ = -0.7 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 0.7 P ₉₉ = 1.5																								Hours in Service: 744 Hours of Data: 743 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-Jul	-0.1	0.1	-0.1	0.2	0.3	AF	0.3	-0.3	0.1	0.1	0.0	-0.1	0.1	0.4	0.8	0.3	0.4	0.1	0.2	0.4	0.0	-0.2	0.1	-0.2	0.1	0.8
2-Jul	-0.1	0.2	0.3	0.2	0.3	0.6	0.4	0.7	1.1	0.5	0.7	0.7	0.4	0.4	0.4	0.2	0.3	0.7	0.9	0.1	0.0	0.1	0.6	0.1	0.4	1.1
3-Jul	0.2	-0.2	-0.1	-0.1	-0.3	-0.1	0.1	-0.1	-0.2	0.4	0.4	-0.3	0.5	0.1	-0.6	0.4	-0.8	-0.1	-0.6	-0.9	-0.6	-0.4	-0.1	-0.1	-0.1	0.5
4-Jul	-0.4	-0.4	-0.4	-0.3	-0.4	0.0	-0.4	0.1	-0.4	-0.7	-0.5	-0.3	-0.3	-0.7	-0.5	-0.1	1.0	0.2	-0.4	-0.1	-0.5	-0.5	-0.5	-0.6	-0.3	1.0
5-Jul	-0.3	0.0	0.1	0.1	0.0	-0.2	0.3	0.9	1.0	0.2	0.4	1.4	0.4	0.1	-0.1	-0.4	1.1	0.2	0.3	1.2	0.5	0.8	0.3	0.5	0.4	1.4
6-Jul	0.1	0.1	0.2	-0.1	0.0	-0.1	0.2	0.1	-0.1	0.2	-0.2	0.3	1.2	0.8	-0.1	0.3	0.5	0.0	0.6	0.0	0.5	-0.2	0.0	-0.1	0.2	1.2
7-Jul	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.4	-0.6	0.4	0.1	0.5	0.0	0.0	-0.2	0.8	1.1	0.2	-0.1	0.5	0.6	0.3	0.2	0.2	1.1
8-Jul	0.5	0.1	0.2	0.1	0.0	0.3	0.1	0.1	0.3	0.1	0.3	-0.2	0.2	0.0	0.5	0.1	0.3	-0.1	0.4	0.0	-0.2	0.1	0.2	0.2	0.1	0.5
9-Jul	0.3	0.4	0.0	0.4	0.6	0.0	-0.3	0.0	0.0	0.0	0.5	0.3	-0.7	0.6	0.7	0.2	0.4	0.2	0.3	0.5	-0.1	-0.2	0.2	-0.2	0.2	0.7
10-Jul	-0.1	0.4	0.2	-0.1	0.1	0.3	0.1	0.1	0.2	-0.3	0.6	0.0	0.2	0.2	0.3	-0.1	0.1	0.7	-0.2	0.7	-0.2	0.3	0.6	0.5	0.2	0.7
11-Jul	0.3	0.2	0.2	0.1	0.3	0.2	0.3	0.3	0.1	0.3	0.0	0.3	0.8	0.7	0.5	1.5	0.6	-0.3	0.0	-0.3	0.0	0.2	0.2	0.0	0.3	1.5
12-Jul	0.1	0.0	0.1	0.2	0.0	0.1	0.1	0.2	0.2	0.2	0.0	0.1	-0.3	-0.3	0.4	-0.4	-0.2	0.1	0.0	0.2	0.1	0.3	0.1	0.0	0.1	0.4
13-Jul	0.2	0.4	0.0	0.2	0.0	0.0	0.1	0.6	-0.1	0.5	-0.4	-0.1	0.7	1.1	1.2	-0.1	0.5	0.3	0.8	0.7	0.5	0.5	0.6	0.8	0.4	1.2
14-Jul	0.4	0.7	1.1	1.5	0.5	1.2	0.8	0.4	1.0	0.9	0.7	0.9	-0.3	0.9	0.5	0.1	0.5	0.2	0.7	0.3	0.3	0.3	0.3	0.2	0.6	1.5
15-Jul	0.2	0.2	0.1	0.3	0.2	0.1	0.3	0.5	0.1	-0.3	0.4	0.3	-0.2	0.2	0.3	0.1	-0.3	0.0	0.0	0.5	0.6	0.7	0.5	0.4	0.2	0.7
16-Jul	0.1	0.8	0.9	0.4	-0.1	-0.1	-0.3	0.0	0.5	0.5	0.0	-0.4	-0.2	0.1	-0.1	-0.1	0.1	0.1	-0.2	-0.2	-0.2	-0.1	-0.5	0.0	0.0	0.9
17-Jul	0.1	0.3	0.5	0.0	0.1	0.3	0.5	0.5	0.8	0.5	0.1	0.7	0.3	0.2	0.6	0.8	0.3	0.1	-0.1	0.1	0.5	0.3	0.8	0.4	0.4	0.8
18-Jul	0.2	0.2	0.4	0.2	0.1	-0.1	0.9	0.6	1.1	0.5	-0.6	-0.3	0.1	0.3	-0.6	-1.0	-0.2	-0.6	-0.3	-0.3	-0.2	-0.3	-0.3	-0.5	0.0	1.1
19-Jul	-0.5	-0.2	0.1	0.1	-0.1	-0.4	-0.4	0.0	0.2	-0.1	0.3	0.4	0.5	0.3	-0.2	1.1	0.8	0.7	0.2	0.7	0.7	0.3	0.8	0.4	0.2	1.1
20-Jul	0.4	0.2	0.1	0.5	0.9	0.5	0.5	0.2	0.2	0.4	0.8	0.7	1.1	0.2	1.0	0.5	1.0	0.4	0.5	0.9	0.2	0.1	-0.3	-0.2	0.4	1.1
21-Jul	0.1	-0.5	0.2	0.2	0.2	0.1	0.1	0.5	0.1	0.0	0.0	0.9	0.0	0.4	0.7	-0.2	0.5	0.4	0.5	0.4	0.3	0.2	-0.1	0.1	0.2	0.9
22-Jul	0.4	0.2	0.5	0.5	0.4	0.5	0.3	0.7	0.4	0.8	-0.3	-0.5	0.1	0.3	0.1	-0.2	0.4	0.0	-0.3	-0.2	-0.2	-0.6	-0.6	-0.5	0.1	0.8
23-Jul	-0.4	-0.3	-0.3	0.0	0.1	-0.1	0.3	0.2	-0.1	-0.1	0.3	0.1	0.4	0.5	-0.4	0.1	0.2	0.3	0.5	0.5	0.6	0.4	0.5	0.7	0.2	0.7
24-Jul	0.7	0.8	0.2	0.8	0.4	0.4	0.7	1.6	1.4	1.5	0.5	0.9	2.1	1.7	1.4	1.3	0.9	0.2	0.5	0.2	0.2	0.0	0.0	0.3	0.8	2.1
25-Jul	0.4	0.3	0.1	-0.1	0.5	0.1	0.4	0.2	0.7	0.5	0.5	0.7	0.5	0.3	-0.1	0.4	-0.2	0.4	0.3	0.1	-0.3	-0.4	-0.6	-0.2	0.2	0.7
26-Jul	-0.2	-0.1	0.1	0.2	0.2	0.1	0.1	0.0	-0.3	0.2	0.0	-0.1	-0.5	-0.1	-0.3	0.6	0.2	-0.4	-0.3	-0.3	-0.3	-0.5	-0.6	-0.5	-0.1	0.6
27-Jul	-0.2	0.1	0.5	0.6	0.6	0.7	0.8	0.7	0.3	0.2	0.3	0.6	0.2	0.1	0.2	0.5	-0.3	0.2	0.1	0.3	0.3	0.4	0.5	0.1	0.3	0.8
28-Jul	0.1	0.0	0.1	-0.2	-0.5	0.0	-0.3	0.4	0.3	-0.6	0.3	0.3	-0.3	-0.4	0.1	0.2	0.4	-0.2	-0.2	0.7	0.5	0.0	0.1	0.1	0.0	0.7
29-Jul	-0.3	-0.1	0.2	-0.2	0.1	0.0	0.1	0.6	0.2	0.1	2.1	-0.2	0.6	0.4	0.8	0.2	0.5	0.7	0.0	0.5	0.7	0.4	0.5	0.5	0.3	2.1
30-Jul	0.6	0.7	0.0	0.2	-0.2	0.5	0.0	0.1	0.3	0.1	0.2	0.3	0.2	0.5	0.7	1.1	0.6	0.0	-0.4	-0.3	-0.5	-0.5	-0.1	0.0	0.2	1.1
31-Jul	0.2	0.6	0.3	0.1	0.1	0.0	0.2	-0.2	0.4	-0.2	-0.1	-0.1	-0.3	1.1	0.5	0.6	1.4	0.6	0.9	0.6	0.4	0.5	0.3	0.2	0.3	1.4
																								Diurnal Average		
																								Diurnal Maximum		
0.1 0.2 0.2 0.2 0.1 0.2 0.2 0.3 0.3 0.2 0.2 0.2 0.3 0.3 0.3 0.2 0.3 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.7 0.8 1.1 1.5 0.9 1.2 0.9 1.6 1.4 1.5 2.1 1.4 2.1 1.7 1.4 1.5 1.4 1.0 1.1 1.2 0.7 0.8 0.8 0.8																										
AF - Analyzer Failure																										



Summary of Hour Standard Deviations

Mannix - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9.6 km/h on Jul 14 18:00		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9																							
Minimum Value: 0.2 km/h on Jul 8 21:00																									
Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.0 Median = 1.9 Q ₃ = 2.7 P ₉₀ = 3.2 P ₉₉ = 4.3																									
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-Jul	0.4	0.3	0.3	0.5	0.8	AF	1.5	1.4	1.6	1.7	2.2	1.9	2.8	2.3	2.1	1.4	1.0	0.8	0.9	0.9	1.3	2.0	1.8	2.1	2.8
2-Jul	1.9	1.9	1.3	0.7	0.6	1.3	2.1	2.3	2.5	2.1	2.6	3.2	3.1	2.8	2.5	2.2	2.1	2.1	2.5	1.4	0.9	0.4	1.0	1.4	3.2
3-Jul	1.5	1.9	1.5	2.0	1.6	0.8	0.8	0.8	0.8	1.2	2.5	2.6	3.3	2.8	3.3	3.2	3.4	3.4	2.5	2.7	2.2	2.4	3.4	2.5	3.4
4-Jul	2.1	2.1	1.6	2.4	3.0	3.2	3.5	3.5	3.3	2.9	4.0	4.8	4.8	4.5	4.4	4.4	4.2	4.7	3.5	2.8	1.9	0.9	1.4	1.9	4.8
5-Jul	1.8	2.1	2.2	2.2	1.7	2.7	3.0	3.1	3.5	2.7	2.9	3.4	3.6	2.9	3.3	3.3	3.1	2.2	2.8	2.9	2.2	1.9	0.9	0.9	3.6
6-Jul	0.3	0.4	0.4	0.2	0.2	0.6	1.5	1.9	2.1	2.5	3.1	3.6	3.4	3.4	2.3	2.7	3.0	2.8	2.1	1.5	0.8	0.6	0.2	0.2	3.6
7-Jul	0.4	0.4	0.2	0.3	0.3	0.3	0.8	1.3	1.7	2.1	2.9	3.5	3.2	3.0	3.0	3.0	2.6	2.2	2.0	1.0	0.2	1.3	1.5	0.8	3.5
8-Jul	1.1	0.5	0.5	0.4	0.5	0.6	0.9	0.8	1.1	1.3	1.6	1.3	0.8	0.6	1.1	1.4	1.4	1.4	1.5	0.7	0.2	0.3	0.3	0.4	1.6
9-Jul	0.5	1.1	1.2	0.7	0.5	1.1	1.3	1.6	1.8	2.0	2.6	3.4	2.9	3.4	3.6	2.8	2.6	1.9	0.9	1.2	1.5	1.7	2.3	2.0	3.6
10-Jul	0.6	0.5	0.7	1.7	1.2	0.8	0.6	1.2	1.6	1.6	2.0	2.0	1.8	2.0	2.4	2.3	2.0	2.1	1.0	1.5	1.3	1.6	0.7	0.9	2.4
11-Jul	0.7	0.5	0.4	0.3	0.4	0.5	0.9	1.2	1.5	1.8	2.4	2.7	3.0	2.9	2.6	3.2	2.5	1.6	1.7	1.2	0.7	0.7	0.6	0.3	3.2
12-Jul	0.4	0.3	0.3	0.4	0.3	0.6	0.7	0.9	1.6	1.4	2.0	1.5	1.8	2.2	1.6	1.1	1.5	2.1	1.7	0.7	0.7	0.6	0.4	0.6	2.2
13-Jul	0.6	0.7	0.7	0.5	0.3	0.3	0.9	1.7	1.9	2.2	2.1	3.0	3.0	2.8	2.6	2.2	2.0	1.8	1.9	1.9	2.1	1.7	1.8	1.4	3.0
14-Jul	1.4	2.4	2.9	2.9	2.2	2.3	2.4	2.3	2.7	3.1	3.0	3.2	3.1	3.0	2.9	2.4	1.8	9.6	1.7	1.1	0.8	0.6	0.4	0.4	9.6
15-Jul	0.5	0.4	0.4	0.3	0.4	0.5	1.0	0.9	1.6	1.6	1.8	2.9	3.2	3.5	3.4	2.9	2.9	2.7	1.5	1.8	1.6	1.1	1.1	0.9	3.5
16-Jul	0.7	3.8	2.5	1.1	0.5	0.6	0.6	2.4	2.9	2.3	1.8	2.3	2.3	3.2	2.6	3.1	3.3	3.4	3.3	2.7	2.6	2.6	2.4	3.1	3.8
17-Jul	3.2	2.9	2.1	2.1	2.2	2.0	1.9	2.1	2.9	3.0	3.5	3.8	3.5	3.1	2.7	2.9	2.4	2.3	2.1	1.4	1.0	1.0	1.0	1.1	3.8
18-Jul	1.6	1.8	1.8	1.2	0.8	1.0	1.8	2.2	2.8	3.0	2.7	2.8	3.2	3.2	2.9	2.5	3.0	2.8	2.4	1.4	0.6	0.4	0.2	0.3	3.2
19-Jul	0.6	1.1	1.7	1.7	1.7	1.4	2.0	2.2	2.4	2.8	3.1	3.1	3.3	3.4	3.0	3.0	2.9	2.5	1.8	1.4	1.0	0.6	1.3	0.8	3.4
20-Jul	0.6	0.3	0.4	1.3	2.0	1.6	0.9	1.1	0.8	1.1	1.5	2.4	2.7	2.8	3.3	2.7	2.5	2.1	1.7	1.9	1.6	2.1	2.2	2.5	3.3
21-Jul	1.6	2.0	2.4	2.1	1.9	1.3	1.1	1.1	1.1	1.9	2.3	2.3	3.2	3.3	3.1	2.7	2.4	1.9	1.6	1.5	0.7	0.5	0.5	0.5	3.3
22-Jul	0.6	0.5	0.8	0.7	0.8	0.8	1.0	1.6	1.7	2.3	2.7	2.7	3.3	3.8	3.6	3.7	3.1	3.1	2.6	2.1	0.7	0.9	0.8	0.9	3.8
23-Jul	1.3	1.3	0.9	1.4	1.2	1.4	2.0	1.9	2.2	3.0	3.3	3.3	3.5	3.5	3.5	3.3	3.1	2.0	2.2	1.9	2.1	2.4	2.2	2.7	3.5
24-Jul	3.1	3.2	3.1	2.9	3.4	3.4	3.4	3.0	2.7	3.1	3.2	3.5	3.9	3.5	3.6	3.9	3.7	3.3	3.1	2.8	2.1	1.7	1.5	1.2	3.9
25-Jul	0.8	0.5	0.3	0.3	0.5	0.3	0.7	1.1	1.6	2.2	2.8	3.3	3.1	3.1	2.8	2.9	2.6	2.7	1.7	0.9	0.6	0.5	0.3	0.4	3.3
26-Jul	0.6	0.8	0.5	0.5	0.5	0.6	0.7	1.0	1.5	1.8	1.8	2.6	2.7	2.7	2.5	2.9	3.0	2.0	1.4	1.3	1.3	1.0	1.4	1.3	3.0
27-Jul	1.1	0.6	0.7	0.8	0.8	0.9	1.4	1.5	1.7	1.9	2.5	2.8	3.3	3.1	2.9	2.6	2.2	1.4	0.8	0.8	1.4	2.9	3.0	2.2	3.3
28-Jul	1.0	0.8	1.3	1.3	1.2	1.7	1.7	2.4	2.5	3.0	3.7	3.9	3.4	2.5	3.2	3.0	3.0	3.0	2.6	2.9	1.6	0.6	0.3	0.3	3.9
29-Jul	0.3	0.3	0.3	0.4	0.4	0.7	1.1	1.7	1.6	2.2	2.7	2.7	3.0	2.9	3.3	2.6	2.7	2.4	1.8	1.5	1.0	1.1	1.3	1.4	3.3
30-Jul	1.9	1.5	1.4	1.4	1.6	1.1	0.6	1.9	1.5	0.7	0.8	1.5	2.0	2.5	2.7	2.9	2.5	3.0	2.6	1.4	1.1	1.2	1.5	2.3	3.0
31-Jul	2.0	1.2	1.0	0.8	0.8	1.8	1.5	2.1	2.6	2.9	3.1	3.3	3.2	3.8	3.4	3.0	3.6	3.4	2.7	2.3	1.1	0.6	0.6	0.4	3.8
Diurnal Maximum																									
3.2 3.8 3.1 2.9 3.4 3.4 3.5 3.5 3.5 3.1 4.0 4.8 4.8 4.5 4.4 4.4 4.2 9.6 3.5 2.9 2.6 2.9 3.4 3.1																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	July 6, 2017	Last Cal Date:	June 9, 2017
Start time (MST):	10:45	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 701		Serial Number	146

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	0.998443	1.002378	Lamp voltage	817	816
Calculated intercept	0.529561	0.360876	Pressure	699.8	705.9
Analyzer Background	7.2	7.2	Flow	0.471	0.477
Analyzer Coefficient	0.911	0.911	Intensity	91	90

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	0.0	----
as found span	4935	61.0	600.7	599.4	1.002
calibrator zero	4998	0.0	0.0	0.0	----
high point	4933	61.0	601.0	599.4	1.003
second point	4970	30.5	300.1	298.7	1.005
third point	4981	15.2	149.7	148.7	1.007
as left zero	4998	0.0	0.0	0.1	----
as left span	4933	61.0	601.0	601.9	0.998
Average Correction Factor					1.005
Corrected As found	599.40	Previous response	601.13	*% change	0.3%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfounds. No adjustments made.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

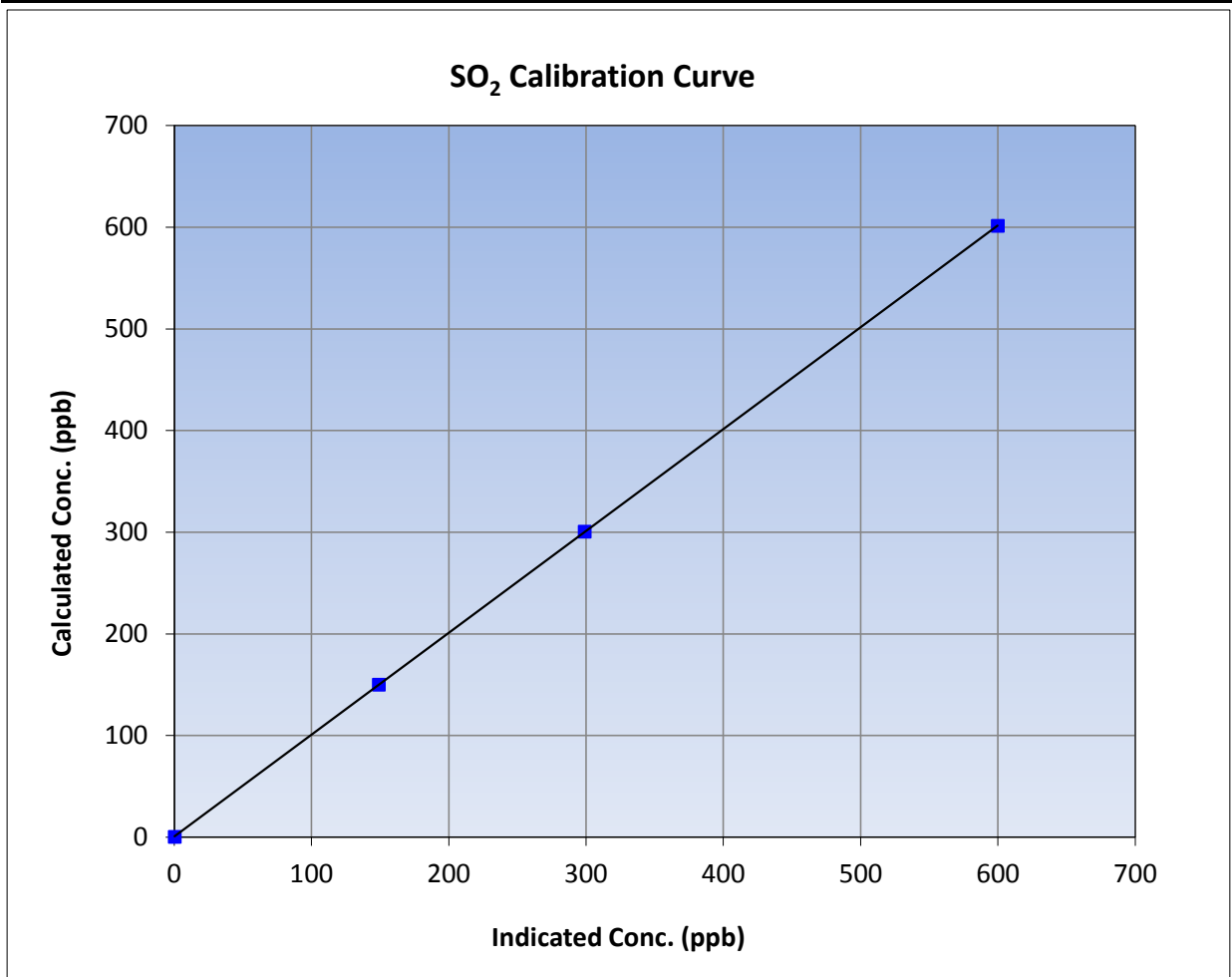
Version-03-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 9, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	10:45	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	0.0	----	Correlation Coefficient	≥0.995
601.0	599.4	1.0026		
300.1	298.7	1.0047	Slope	0.90 - 1.10
149.7	148.7	1.0066		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 6, 2017

Location: Mannix





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	July 7, 2017	Last Cal Date:	June 9, 2017
Start time (MST):	8:44	End time (MST):	11:55
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	0.998573	0.996260	Lamp voltage	794	796
Calculated intercept	-0.109818	0.039194	Pressure	534.7	537.1
Analyzer Background	16.4	16.5	Flow	1.015	1.009
Analyzer Coefficient	0.971	0.971	Intensity	96	95

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	0.2	----
as found span	5912	85.2	71.5	70.5	1.014
calibrator zero	5997	0.0	0.0	0.0	----
high point	5912	85.2	71.5	71.7	0.997
second point	5953	45.4	38.1	38.2	0.997
third point	5967	28.4	23.8	23.8	1.001
as left zero	5997	0.0	0.0	0.1	----
as left span	5912	85.2	71.5	72.0	0.992
SO2 Scrubber Check	4982	15.2	152.1	0.9	----
Average Correction Factor					0.998
Corrected As found	70.30	Previous response	71.67	*% change	2.0%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfinds. Replaced pump after asfinds for preventative maintenance. Adjusted the zero. Did not adjust the span but used new value after changing the filter.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

H₂S Calibration Summary

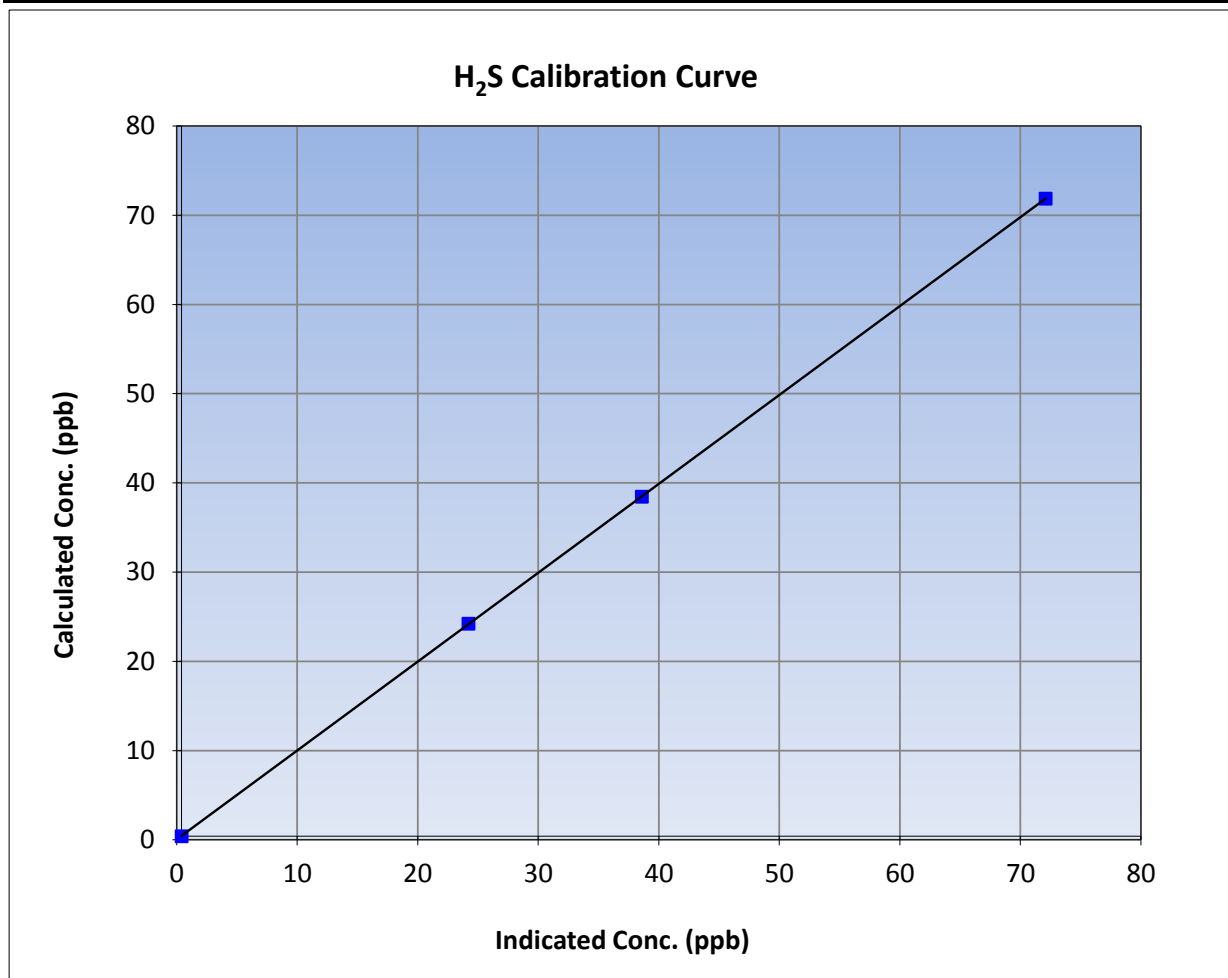
Version-03-2017

Station Information

Calibration Date	July 7, 2017	Previous Calibration	June 9, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	8:44	End Time (MST)	11:55
Analyzer make	Thermo 430i	Analyzer serial #	815129108

Calibration Data

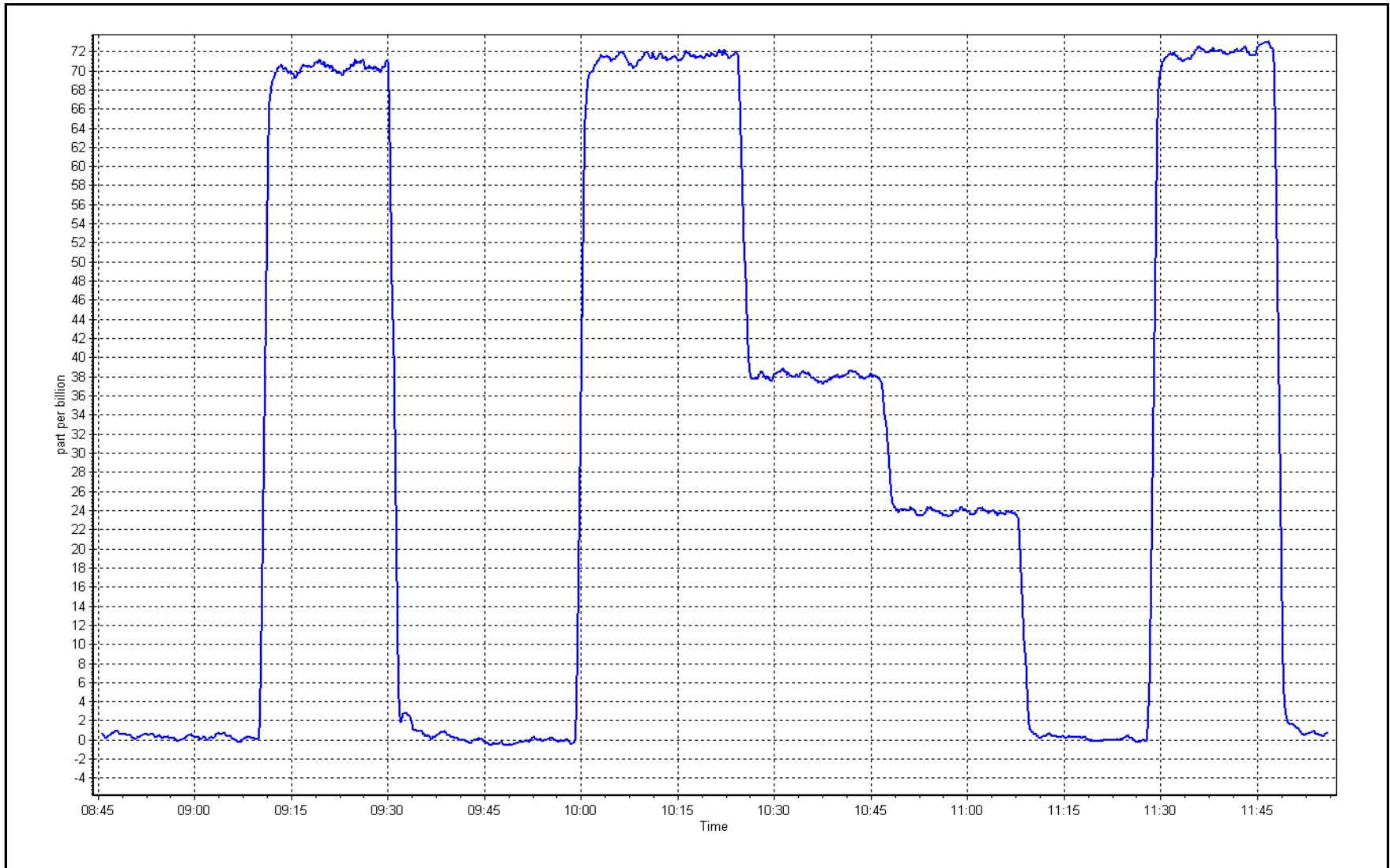
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
71.5	71.7	0.9966			
38.1	38.2	0.9966	Slope	0.996260	0.90 - 1.10
23.8	23.8	1.0011			
			Intercept	0.039194	+/-3



H₂S Calibration Plot

Date: July 7, 2017

Location: Mannix





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Mannix	Station number:	AMS 05
Calibration Date:	July 6, 2017	Last Cal Date:	June 9, 2017
Start time (MST):	10:10	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	146

Analyzer Information

Analyzer make:	Thermo 51i-LT	Analyzer serial #:	1317958295
	<u>Start</u>	<u>Finish</u>	<u>Start</u> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-296 -295
Calculated slope	0.997522	Sample pressure	9.4 9.4
Calculated intercept	0.015617	Fuel pressure	20.2 20.2
Analyzer Background	3.410	Air pressure	34.6 42.3
Analyzer Coefficient	3.634	Flame temperature	157.9 162.9

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	0.02	----
as found span	4935	61.0	12.99	13.21	0.984
calibrator zero	4997	0.0	0.00	0.01	----
high point	4935	61.0	12.99	12.96	1.003
second point	4970	30.5	6.49	6.39	1.015
third point	4981	15.2	3.24	3.25	0.995
as left zero	4997	0.0	0.00	0.03	----
as left span	4933	61.0	13.00	12.96	1.003
Average Correction Factor					1.004
Corrected As found	13.18	Previous response	13.01	*% change	-1.3%

* = > +/-5% change initiates investigation

Notes: Initial As Finds were unavailable due to failing zero air supply; listed asfounds were after zero air was replaced. Changed inlet filter after as founds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

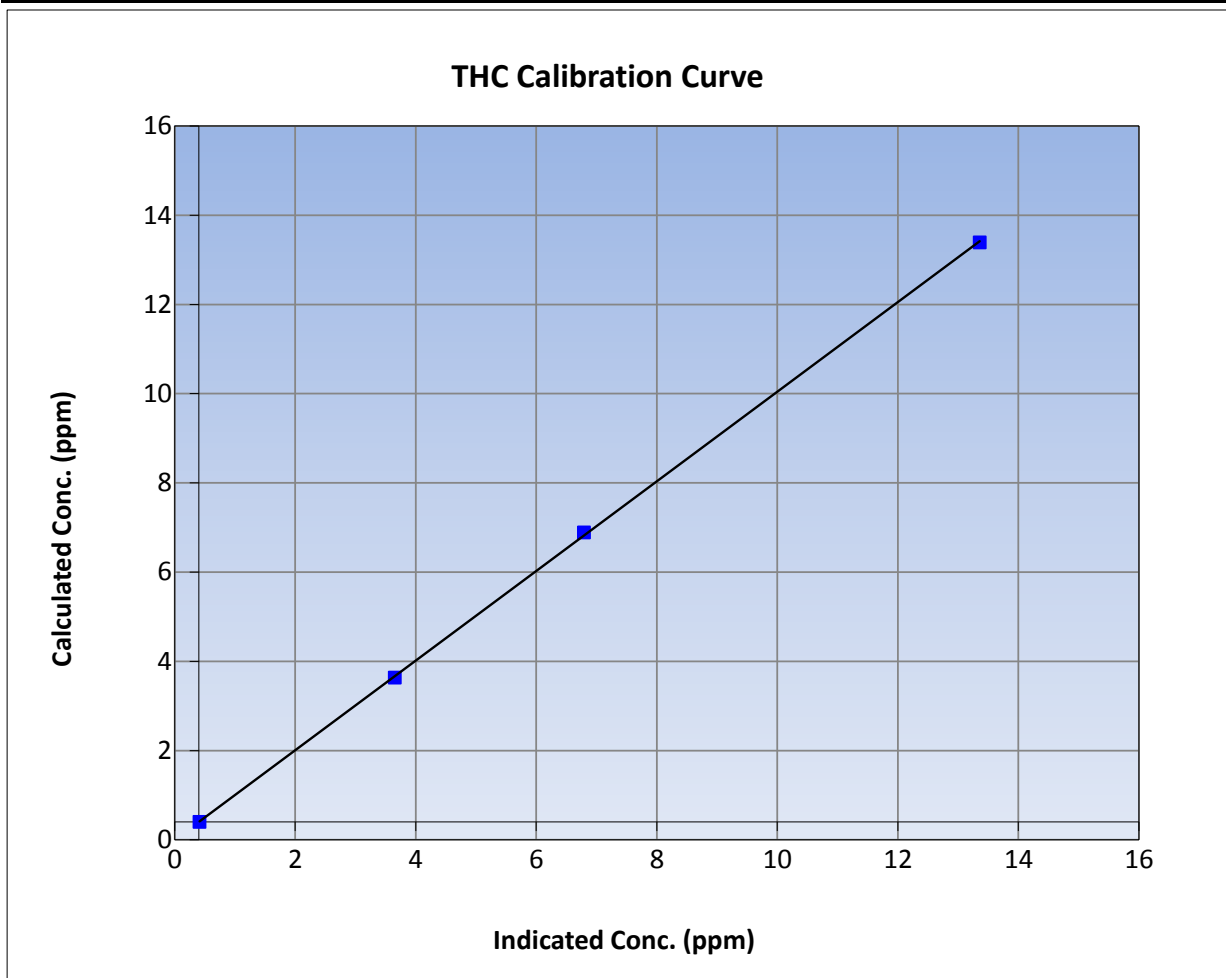
Version-03-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 9, 2017
Station Name	Mannix	Station Number	AMS 05
Start Time (MST)	10:10	End Time (MST)	14:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1317958295

Calibration Data

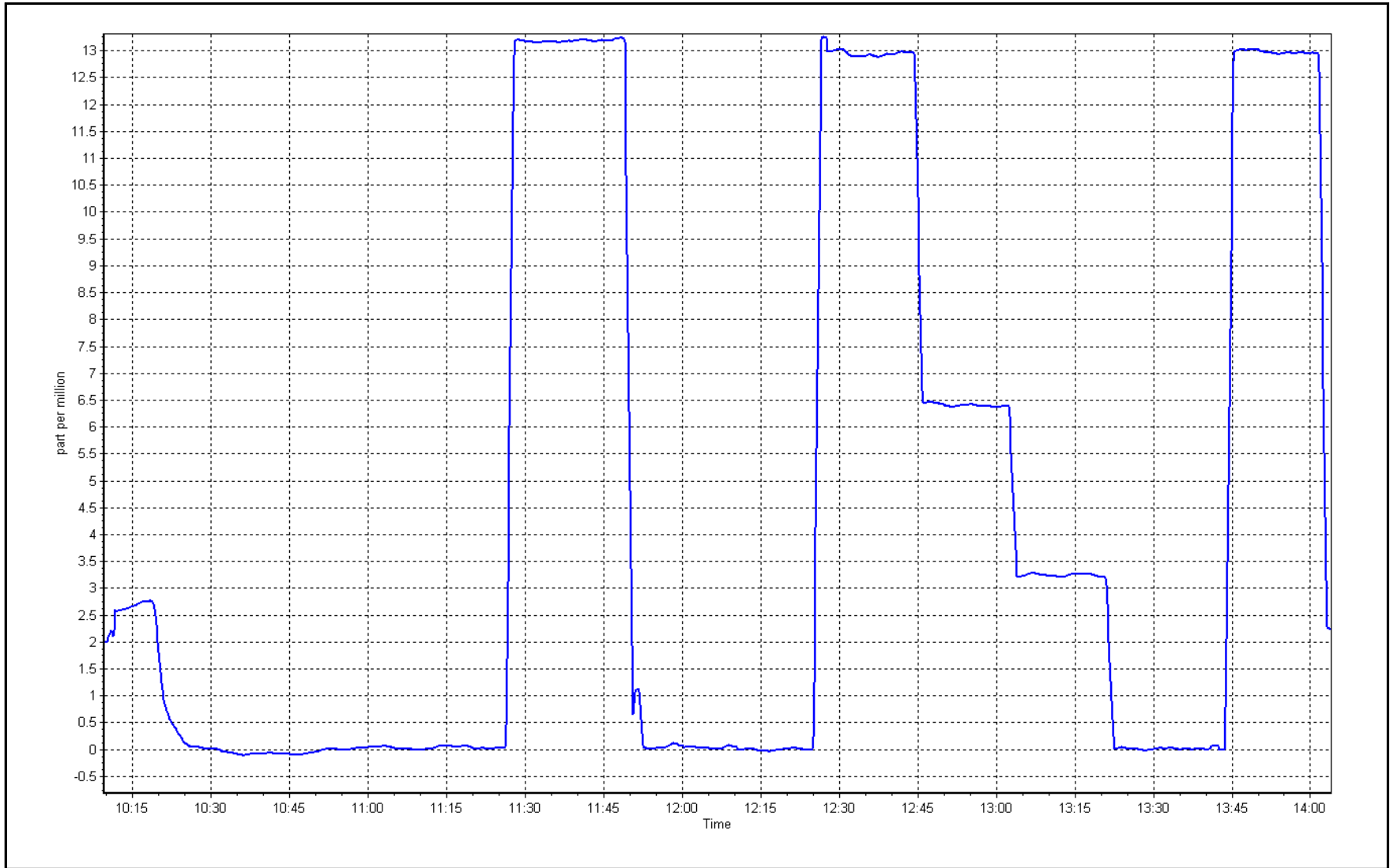
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999931	
13.0	13.0	1.0026			≥0.995
6.5	6.4	1.0153	Slope	1.004572	
3.2	3.3	0.9954			0.90 - 1.10
			Intercept	0.000143	+/-1.5



THC Calibration Plot

Date: July 6, 2017

Location: Mannix





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
 JULY 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	710	34	34	100	12	0	3	0
TRS (ppb) Average	706	36	38	99.73	2	0	1	0
THC (ppm) Average	710	34	34	100	2.7	-	2.1	-
NMHC(ppm) Average	710	34	34	100	0.156	-	0.014	-
CH4(ppm) Average	710	34	34	100	2.7	-	2.1	-
O3 (ppb) Average	709	35	35	100	60	0	41	-
NO2 (ppb) Average	706	38	38	100	12	0	5	-
NO (ppb) Average	706	38	38	100	6	-	1	-
NOX (ppb) Average	706	38	38	100	17	-	6	-
NH3 (ppb) Average	644	46	100	92.74	0	0	0	-
PM2.5 (ug/m3) Average	742	2	2	100	29.1	-	14.5	0
Temperature 2 m (C) Average	744	0	0	100	32.5	-	24	-
Relative Humidity (%) Average	744	0	0	100	100	-	81	-
Wind Speed 10 m (km/h) Average	743	1	1	100	32	-	22	-
Wind Direction 10 m (deg) Average	743	1	1	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS 6)
 JULY 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	710	0.5	1	-	0	0	0	0	0	1	12
TRS (ppb) Average	706	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	710	1.92	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.7
NMHC(ppm) Average	710	0.001	0.009	-	0	0	0	0	0	0	0.156
CH4(ppm) Average	710	1.92	0.1	-	1.8	1.8	1.9	1.9	1.9	2	2.7
O3 (ppb) Average	709	29.9	9	-	6	17	23	30	36	42	60
NO2 (ppb) Average	706	1.8	2	-	0	0	1	1	2	4	12
NO (ppb) Average	706	0.5	1	-	0	0	0	0	1	1	6
NOX (ppb) Average	706	2.4	2	-	0	0	1	2	3	5	17
NH3 (ppb) Average	644	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	742	6.77	5.6	-	0.2	1.4	2.6	5	9.1	15.3	29.1
Temperature 2 m (C) Average	744	19.44	4.9	-	8.2	13.1	15.6	19.2	23.2	26	32.5
Relative Humidity (%) Average	744	60	19	-	25	35	45	58	74	88	100
Wind Speed 10 m (km/h) Average	743	10.9	6	-	1	4	6	10	15	19	32
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	04 Jul 2017 15:00	04 Jul 2017 15:00	1	Maintenance - Station operator on site
TRS	05 Jul 2017 19:00	05 Jul 2017 19:00	1	Unstable operation - excessive baseline drift
NH3	01 Jul 2017 04:00	31 Jul 2017 04:00	54	Stabilization after daily span



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

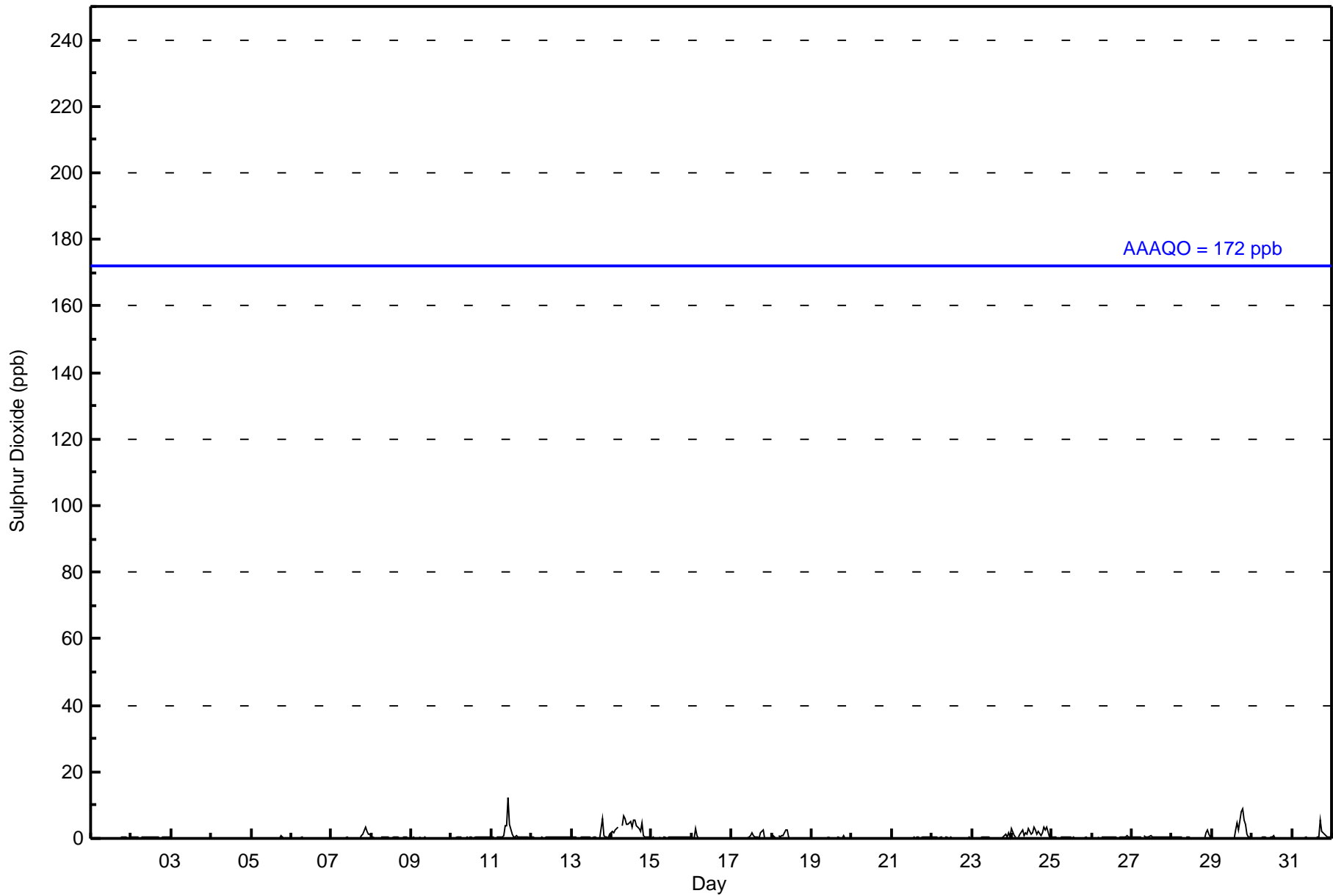
Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 12 ppb on Jul 11 11:00										Maximum Daily Average: 3.2 ppb on Jul 14										Hours of Data: 710						
Minimum Value: 0 ppb on Jul 7 03:00										Minimum Daily Average: 0.1 ppb on Jul 4										Hours of Missing Data: 34						
Maximum Diurnal Average: 1.0 ppb at hour 19										Minimum Diurnal Average: 0.2 ppb at hour 6										Hours of Calibration: 34						
Monthly Average: 0.5 ppb										Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 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-Jul	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-Jul	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
3-Jul	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
4-Jul	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
5-Jul	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
6-Jul	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
7-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	2	1	1	0.5	3
8-Jul	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
9-Jul	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
10-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
11-Jul	0	1	Z	1	1	1	1	1	4	4	12	4	1	1	0	1	0	0	0	0	0	0	0	0	1.5	12
12-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	1	0.6	6
14-Jul	2	2	3	3	4	Z	4	7	6	4	4	5	3	5	5	4	3	2	5	1	0	0	0	0	3.2	7
15-Jul	0	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
16-Jul	0	0	3	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3
17-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	1	0	0	2	2	3	0	0	0	0	0.5	3
18-Jul	0	1	0	Z	1	0	1	1	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
19-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1
20-Jul	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
21-Jul	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
22-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
23-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0.3	2
24-Jul	3	1	0	Z	0	1	3	1	2	1	3	1	2	3	2	1	2	1	2	4	3	3	1	0	1.7	4
25-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
27-Jul	0	0	0	0	0	0	1	Z	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0.5	3
29-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	3	5	3	8	9	5	4	1	0	0	1.8	9
30-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	1
31-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	6	2	1	1	0	0	1	0.6	6
0.3 0.3 0.4 0.3 0.3 0.2 0.5 0.5 0.7 0.6 0.8 0.6 0.4 0.5 0.5 0.5 0.5 0.4 0.7 1.0 0.7 0.6 0.5 0.3 0.3																								Diurnal Average		
3 2 3 3 4 1 4 7 6 4 12 5 3 5 5 5 5 3 8 9 5 4 3 2 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
Patricia McInnes - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	99.86	99.86
11 - 20	1	0.14	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: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - July 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	18	12	4	11	31	23	39	72	62	73	95	70	53	41	54	708
11 - 20	1	0	0	0	0	0	0	0	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	51	18	12	4	11	31	23	39	72	62	73	95	70	53	41	54	709

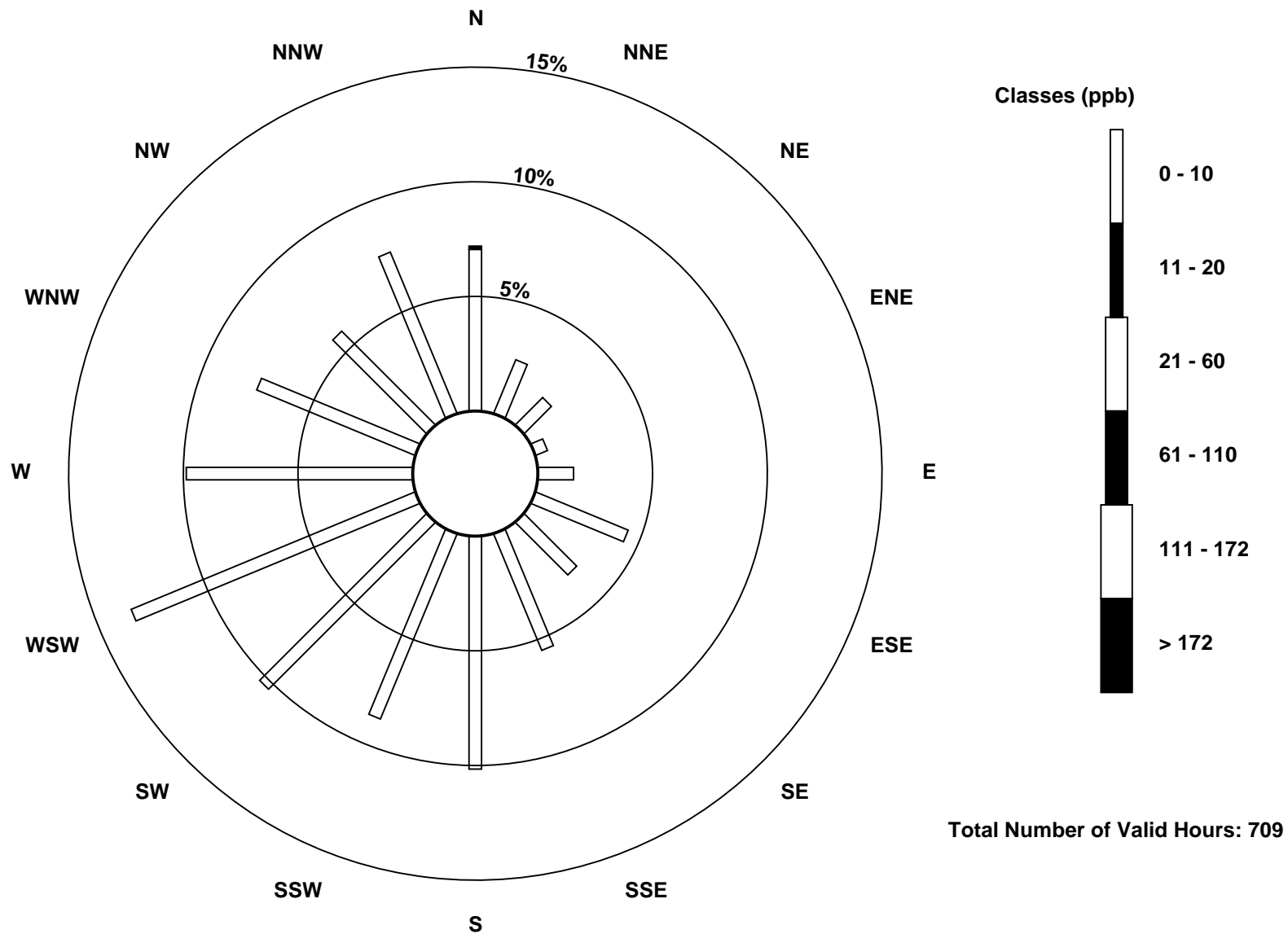
Total Number of Valid Hours: 709

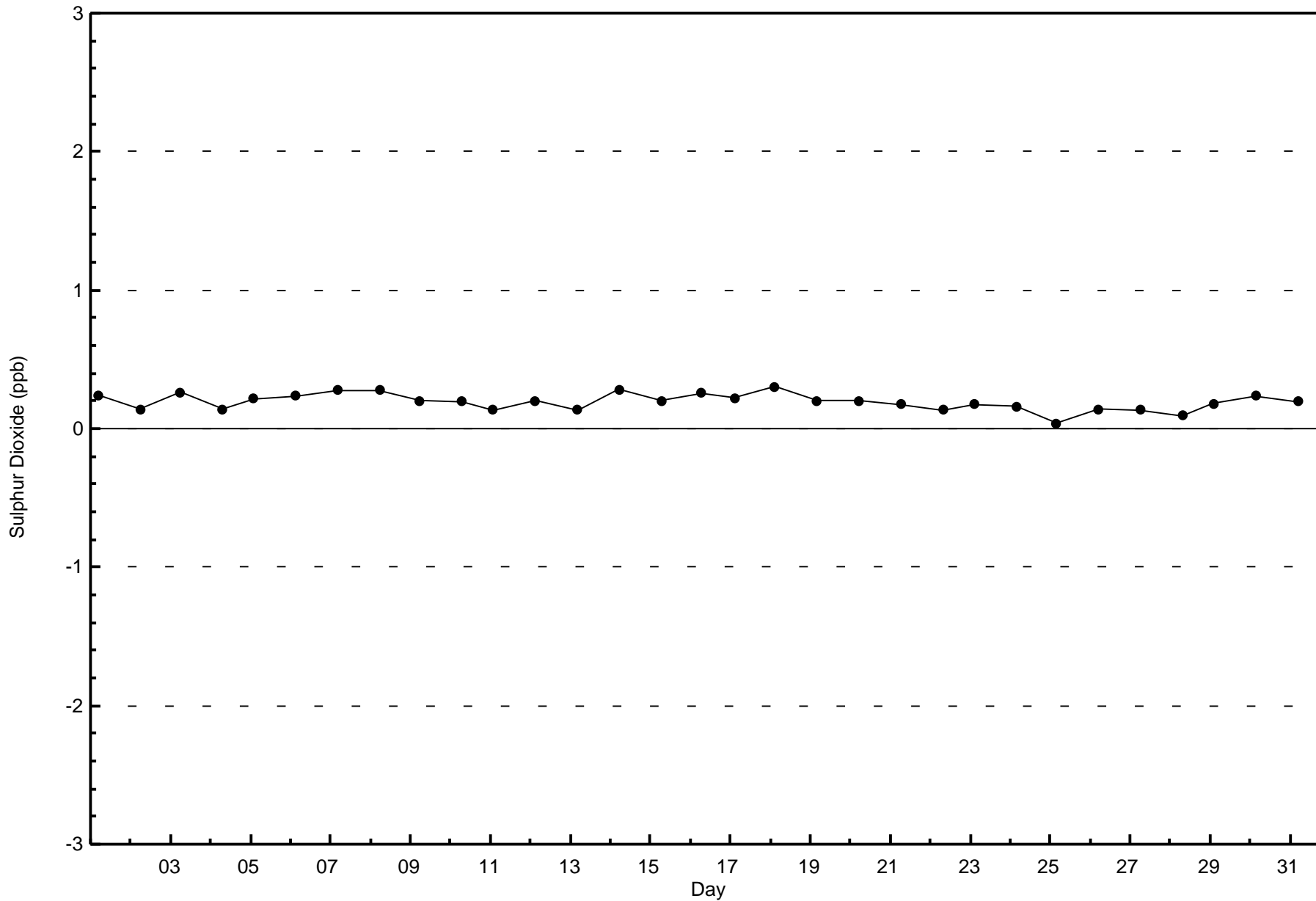
Total Number of Hours: 744

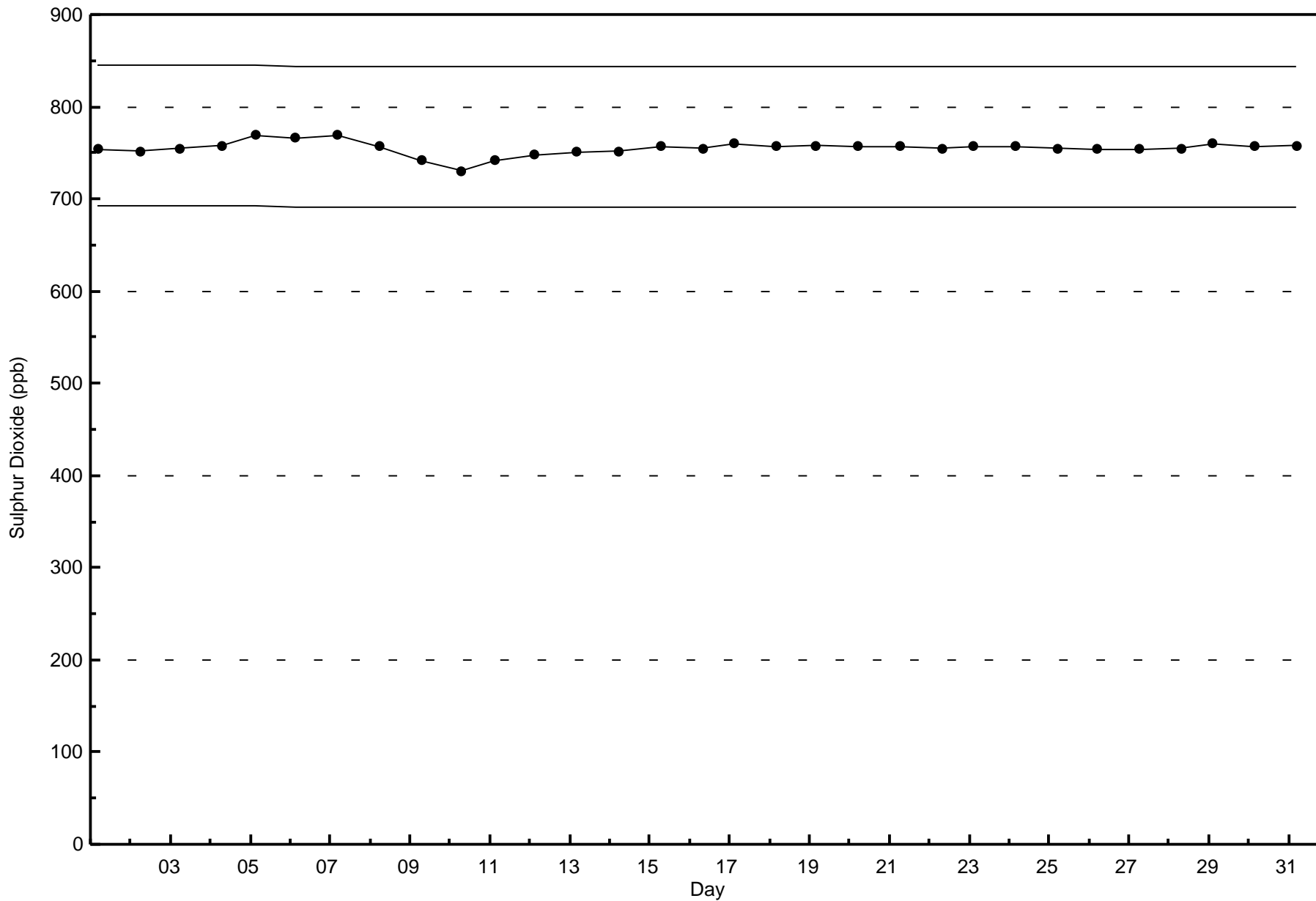


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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







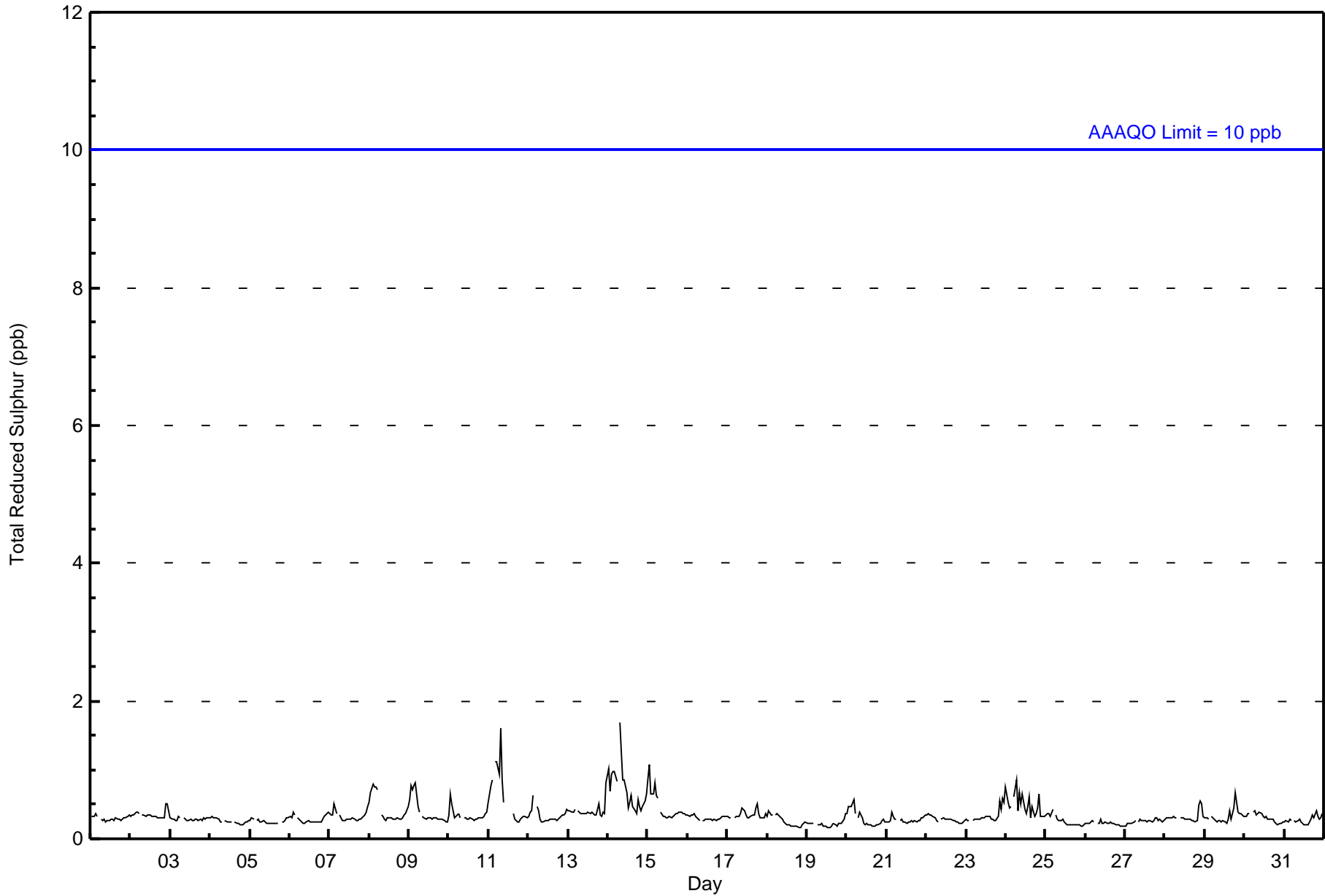


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 2 ppb on Jul 14 08:00										Maximum Daily Average: 0.7 ppb on Jul 14										Hours of Data: 706							
Minimum Value: 0 ppb on Jul 19 13:00										Minimum Daily Average: 0.2 ppb on Jul 19										Hours of Missing Data: 38							
Maximum Diurnal Average: 0.4 ppb at hour 5										Minimum Diurnal Average: 0.3 ppb at hour 13										Hours of Calibration: 36							
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: 99.7							
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-Jul	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	
2-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1
3-Jul	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
4-Jul	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0.3	0
5-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0.3	0
6-Jul	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
7-Jul	0	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
8-Jul	1	1	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Jul	1	1	1	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
10-Jul	0	1	1	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Jul	1	1	1	Z	1	1	1	2	1	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.6	2
12-Jul	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	0.3	1
13-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.4	1
14-Jul	1	1	1	1	1	1	Z	2	1	1	1	1	0	1	1	0	0	0	1	0	0	0	1	1	1	0.7	2
15-Jul	1	1	1	1	1	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
16-Jul	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
17-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
18-Jul	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-Jul	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
20-Jul	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	0.3	1
21-Jul	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
22-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0.3	1
24-Jul	1	1	0	0	Z	1	1	0	1	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0.5	1
25-Jul	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
26-Jul	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
27-Jul	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-Jul	0	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.3	1
29-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.3	1
30-Jul	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
31-Jul	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
0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.4																								Diurnal Average			
1 1 1 1 1 1 1 1 2 1 1 1 1 0 1 1 0 0 0 0 1 1 1 1 1 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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - July 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	15	12	5	11	31	21	40	76	60	74	91	74	54	39	55	705
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	15	12	5	11	31	21	40	76	60	74	91	74	54	39	55	705

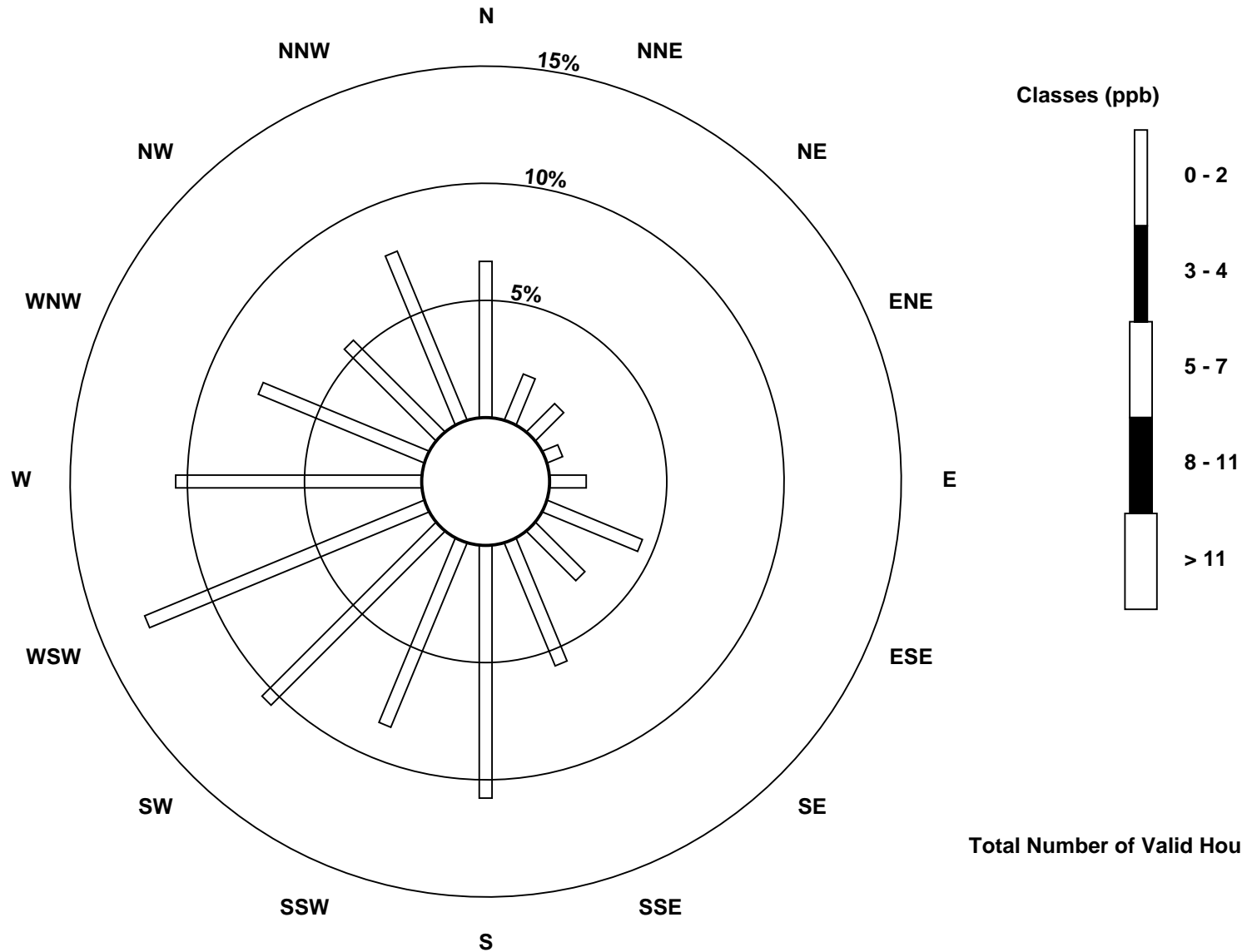
Total Number of Valid Hours: 705

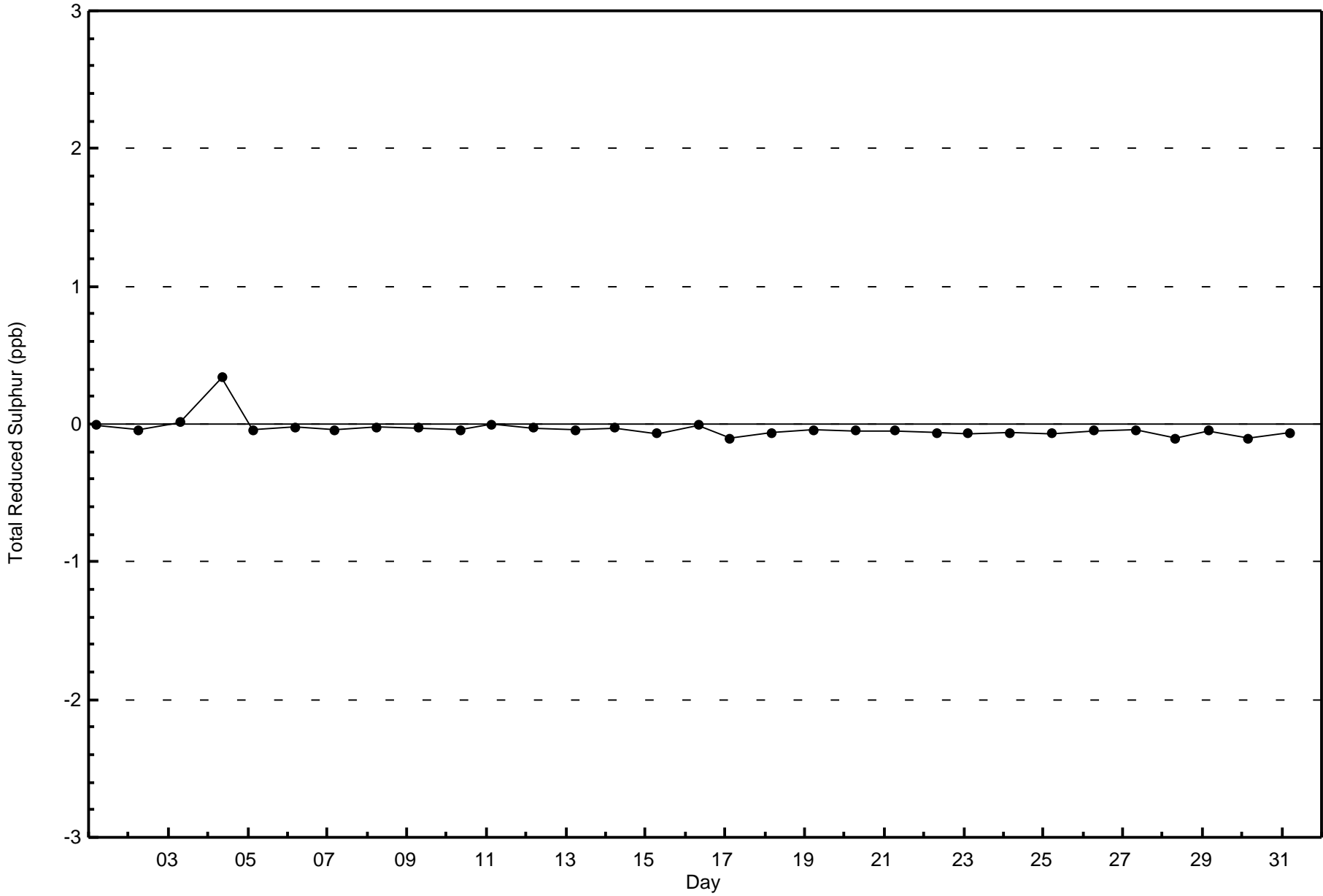
Total Number of Hours: 744

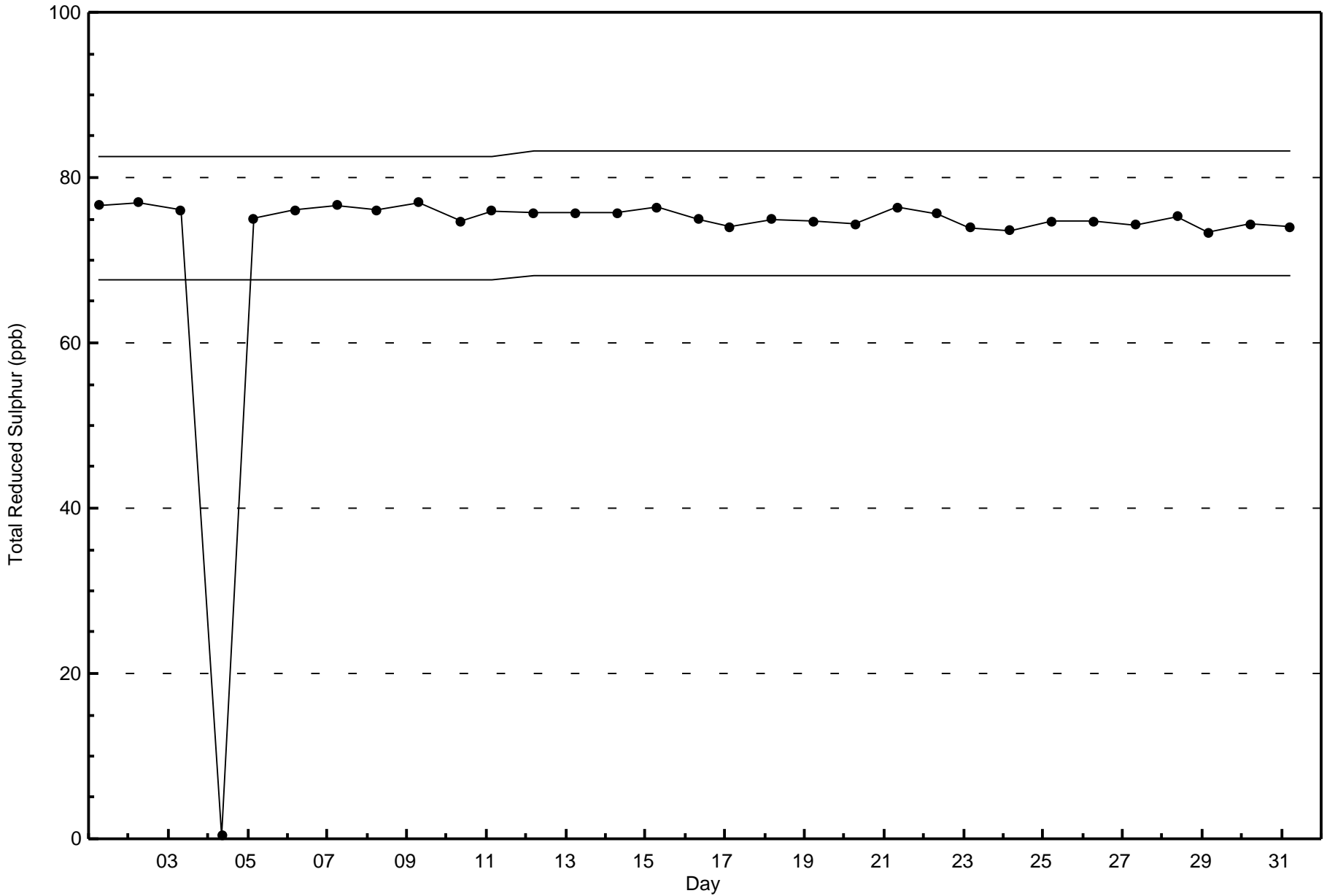


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes (AMS 6)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

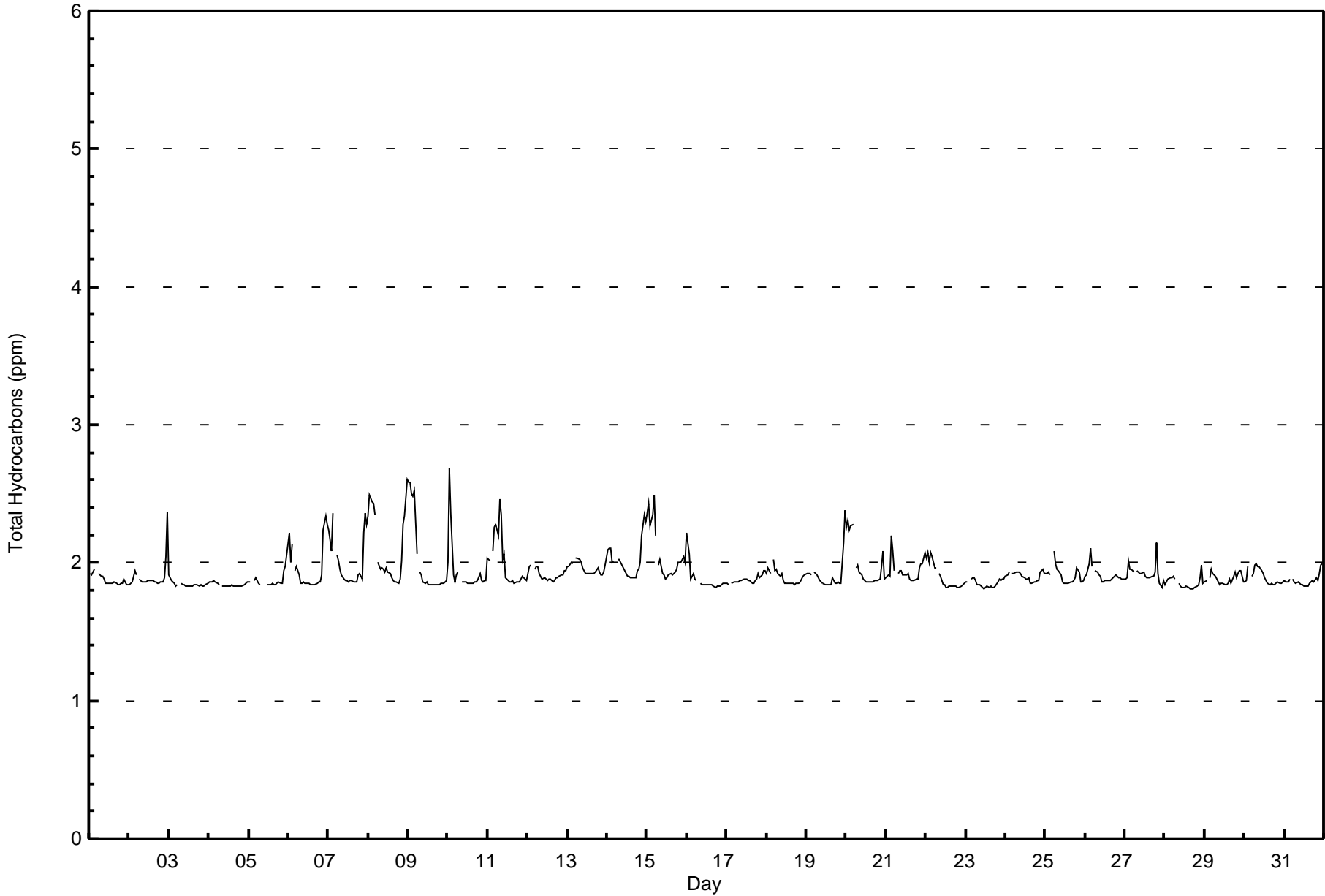
Patricia McInnes - July 2017

Maximum Value: 2.7 ppm on Jul 10 02:00 Maximum Daily Average: 2.1 ppm on Jul 8																								Hours in Service: 744								
Minimum Value: 1.8 ppm on Jul 28 16:00 Minimum Daily Average: 1.8 ppm on Jul 4																								Hours of Data: 710								
Maximum Diurnal Average: 2.0 ppm at hour 4 Minimum Diurnal Average: 1.9 ppm at hour 16																								Hours of Missing Data: 34								
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 = 2.5																								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-Jul	1.9	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	1.8	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.9	1.9	1.9	2.0	2.4	1.9	2.4		
2-Jul	1.8	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	2.4	1.9	1.9	1.9	2.0	2.4	1.9	2.4	
3-Jul	1.9	1.9	1.9	1.9	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9
4-Jul	1.9	1.9	1.9	1.9	1.9	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	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	
5-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.8	1.8	C	C	C	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.9	2.0	2.1	1.9	1.9	1.9	2.0	2.1	1.9	2.1	
6-Jul	2.2	2.0	2.1	Z	1.9	2.0	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.2	2.3	2.3	2.0	2.0	2.0	2.3	2.3	2.0	2.3	
7-Jul	2.2	2.2	2.1	2.4	Z	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	2.2	2.4	2.3	2.0	2.0	2.0	2.4	2.3	2.0	2.4	
8-Jul	2.3	2.5	2.4	2.4	2.3	Z	2.0	2.0	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.9	2.0	2.3	2.3	2.6	2.1	2.1	2.6	2.6	2.1	2.6	
9-Jul	2.6	2.6	2.5	2.5	2.5	2.1	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	1.9	1.9	1.9	2.0	2.0	2.0	2.6	2.6	2.0	2.6	
10-Jul	2.0	2.7	2.4	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.8	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	1.9	1.9	1.9	2.7	
11-Jul	2.0	2.0	Z	2.1	2.3	2.3	2.2	2.5	2.3	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	2.5	2.5	2.0	2.5	
12-Jul	1.9	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	1.9	1.9	1.9	1.9	1.9	2.0
13-Jul	2.0	2.0	2.0	2.0	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	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
14-Jul	2.1	2.1	2.1	2.0	2.0	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	2.0	2.2	2.3	2.3	2.0	2.0	2.0	2.3	2.3	2.0	2.3
15-Jul	2.4	2.4	2.3	2.4	2.5	2.2	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	2.1	2.1	2.1	2.5	2.5	2.1	2.5	
16-Jul	2.2	2.1	1.9	1.9	1.9	1.9	1.9	Z	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.2	
17-Jul	1.8	1.8	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
18-Jul	1.9	2.0	1.9	Z	2.0	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	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	1.9	2.0	
19-Jul	1.9	1.9	1.9	1.9	Z	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	1.8	1.9	1.9	1.8	1.9	1.9	1.9	2.1	2.4	1.9	2.4		
20-Jul	2.3	2.3	2.2	2.3	2.3	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	2.0	2.1	1.9	2.0	2.0	2.1	1.9	2.0	2.3	
21-Jul	1.9	1.9	1.9	2.2	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	2.0	2.0	2.0	2.1	1.9	1.9	1.9	2.2	2.2	1.9	2.2
22-Jul	2.0	2.1	2.0	2.1	2.0	2.0	2.0	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	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.1
23-Jul	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
24-Jul	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	1.8	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	2.0	2.0
25-Jul	1.9	1.9	1.9	1.9	Z	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	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	1.9	2.1
26-Jul	1.9	1.9	2.0	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
27-Jul	1.9	1.9	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	2.1	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1
28-Jul	1.8	1.9	1.9	1.9	1.9	1.9	1.9	Z	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	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	2.0
29-Jul	1.9	1.9	Z	1.9	2.0	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	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
30-Jul	1.9	1.9	2.0	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	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	1.8	1.8	1.8	1.8	1.8	2.0
31-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
																								Diurnal Average								
																								Diurnal Maximum								
Z - zerospan C - Calibration																																



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Patricia McInnes - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	642	90.42	90.42
2.1 - 3.0	68	9.58	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Patricia McInnes - July 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	16	11	4	11	30	22	38	68	57	67	89	65	44	33	42	641
2.1 - 3.0	7	2	1	0	0	1	1	1	4	5	6	6	5	9	8	12	68
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	51	18	12	4	11	31	23	39	72	62	73	95	70	53	41	54	709

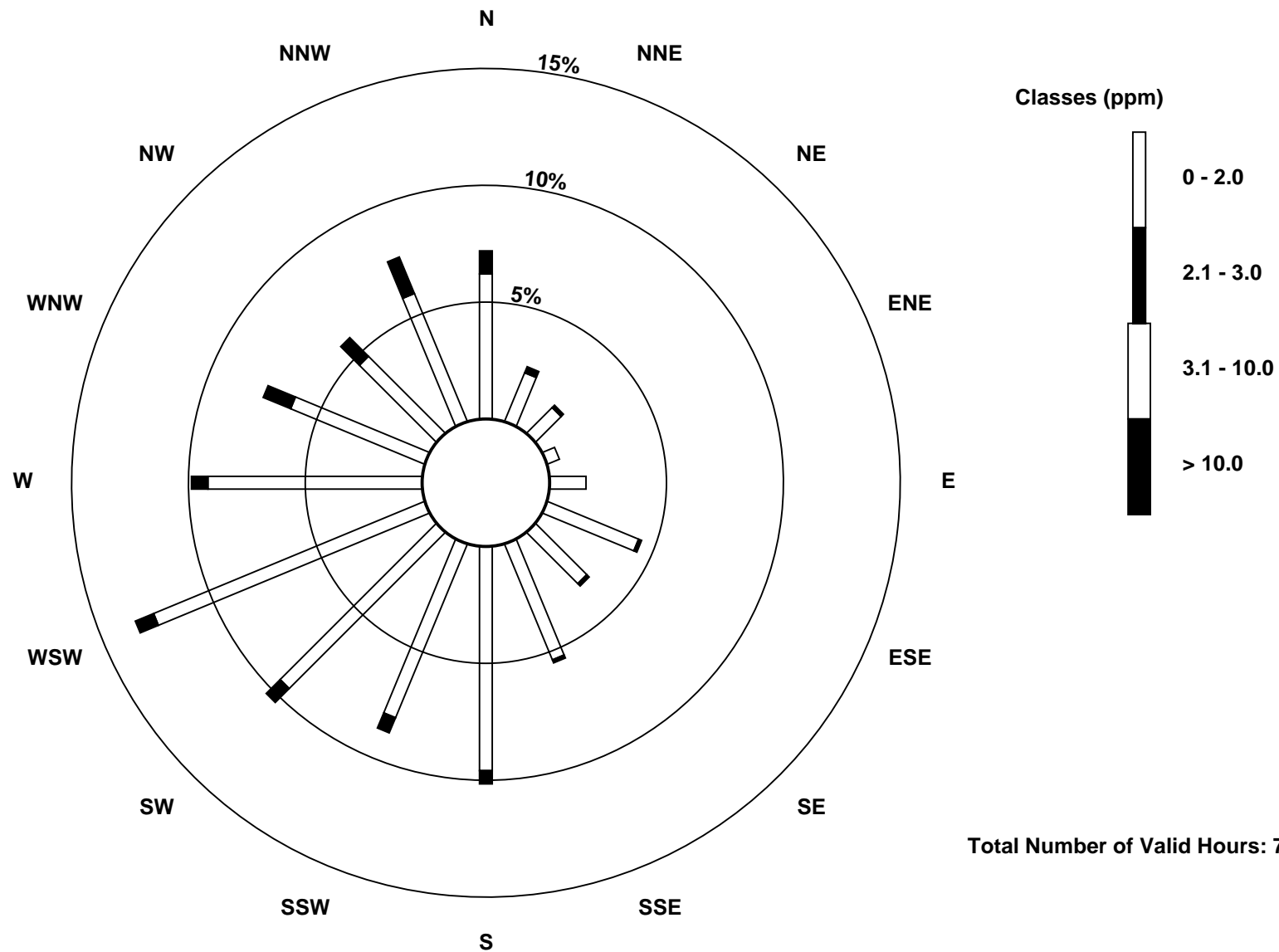
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

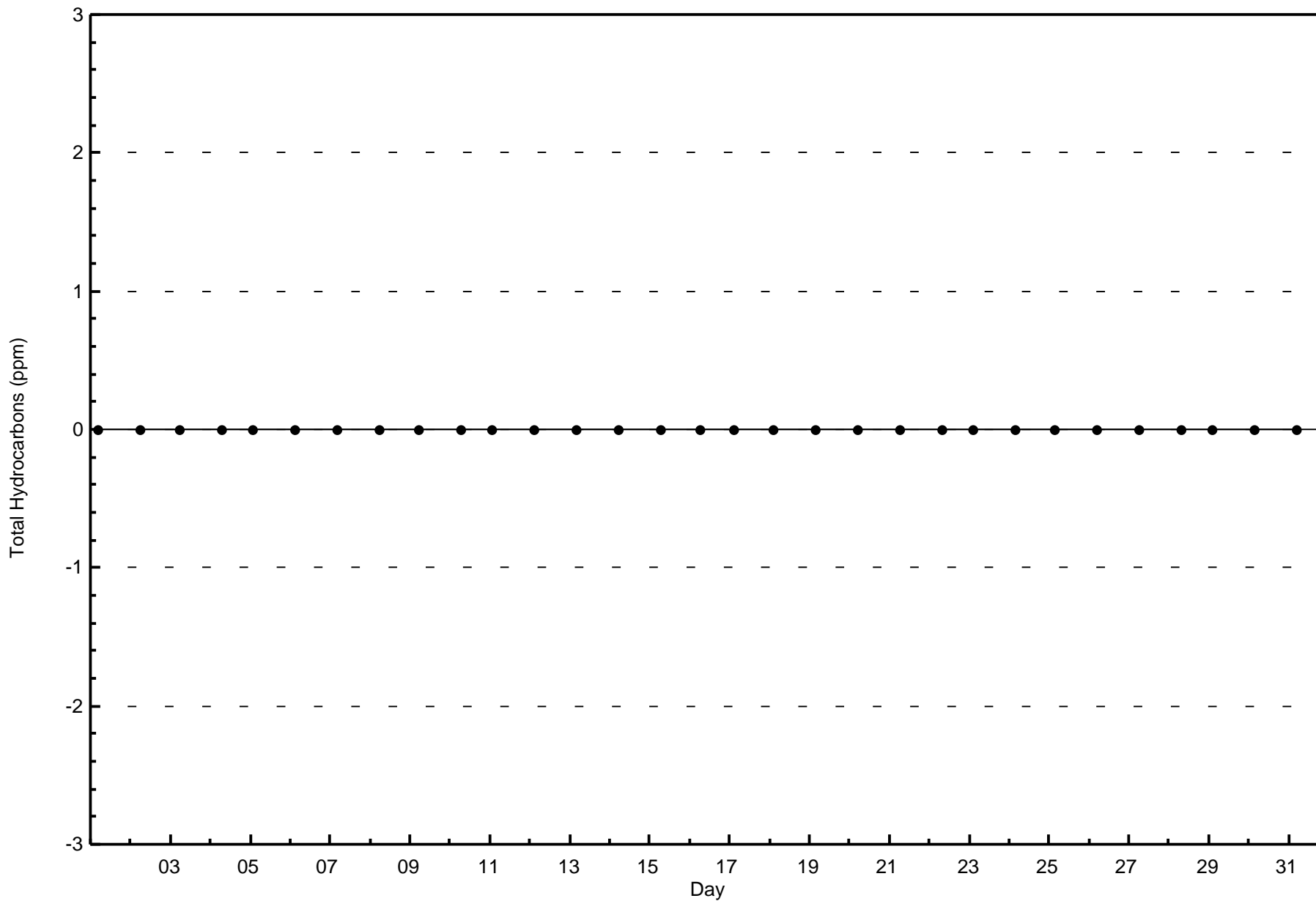
Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)

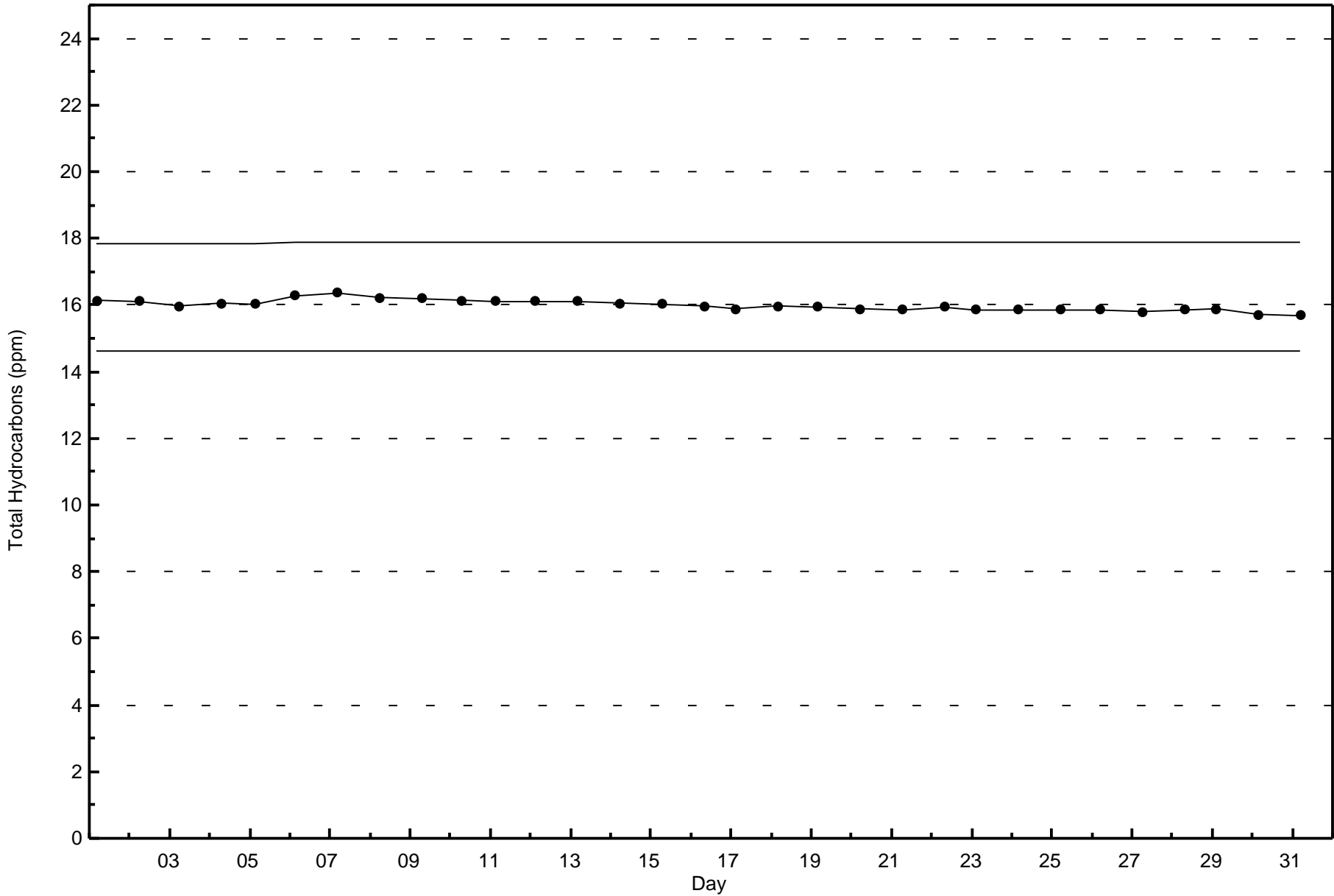


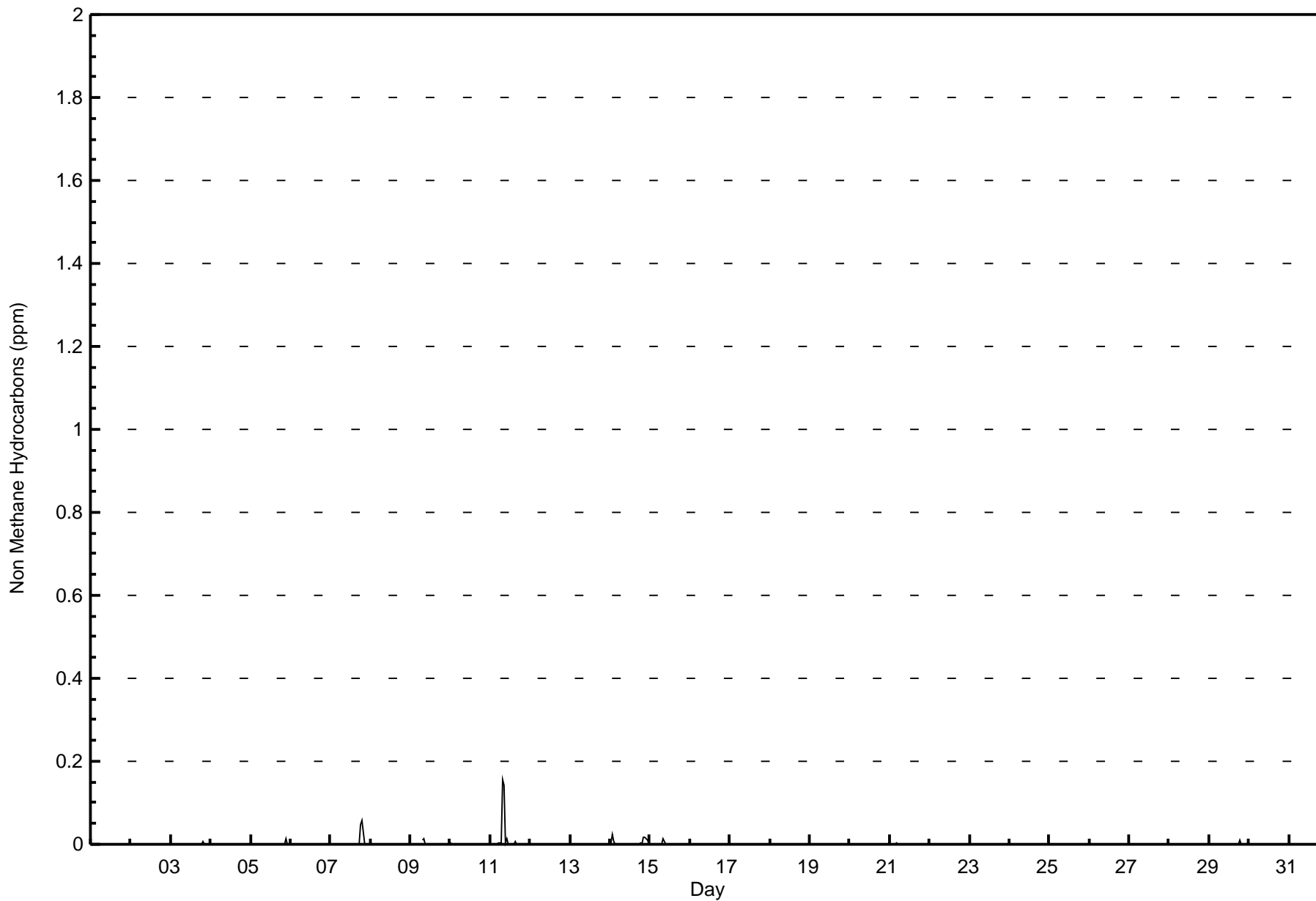


Wood Buffalo Environmental Association
Zero Responses

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









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	693	97.61	97.61
0.006 - 0.05	14	1.97	99.58
0.06 - 0.1	2	0.28	99.86
> 0.1	1	0.14	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



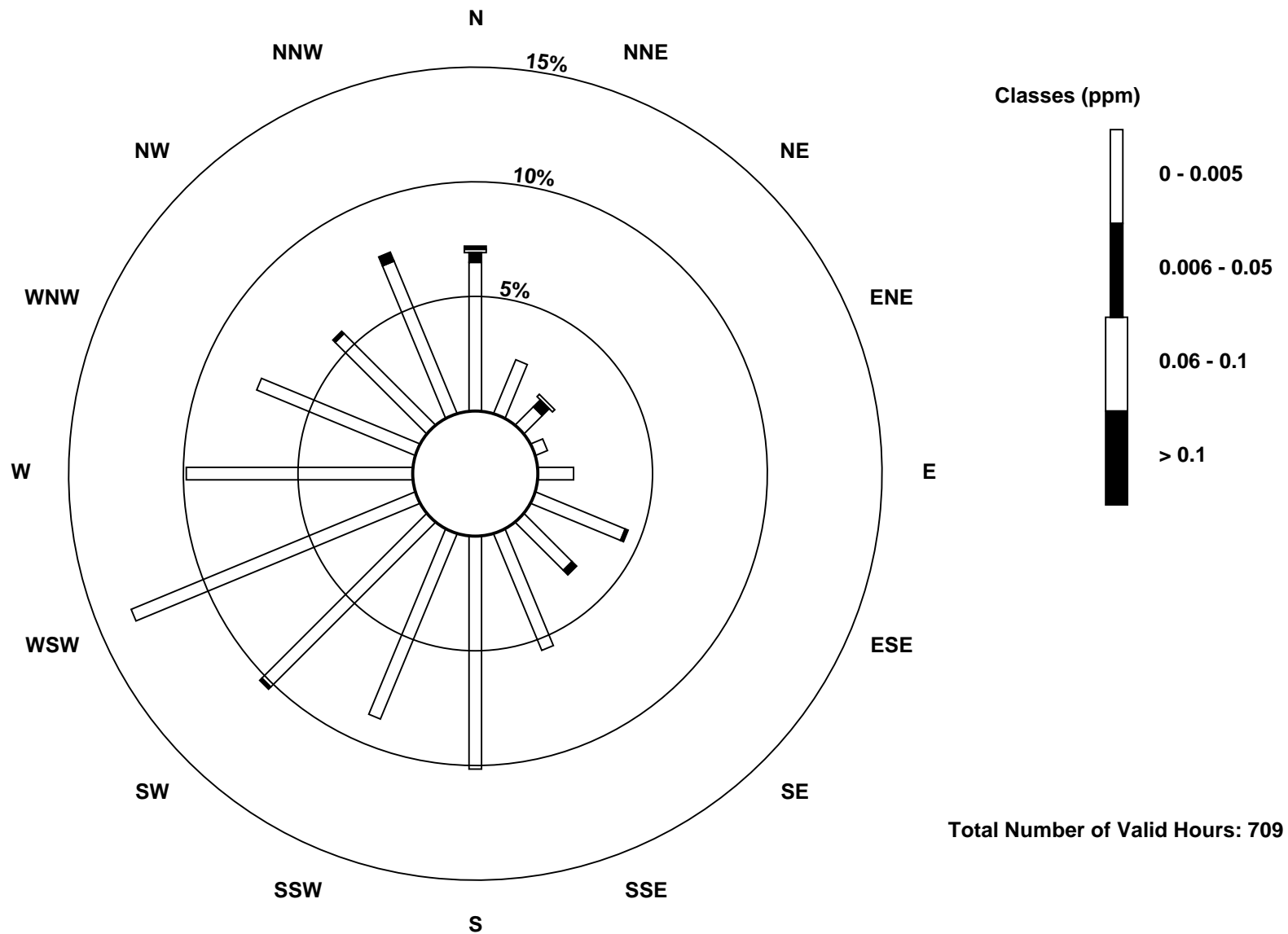
Wood Buffalo Environmental Association
Frequency Distribution

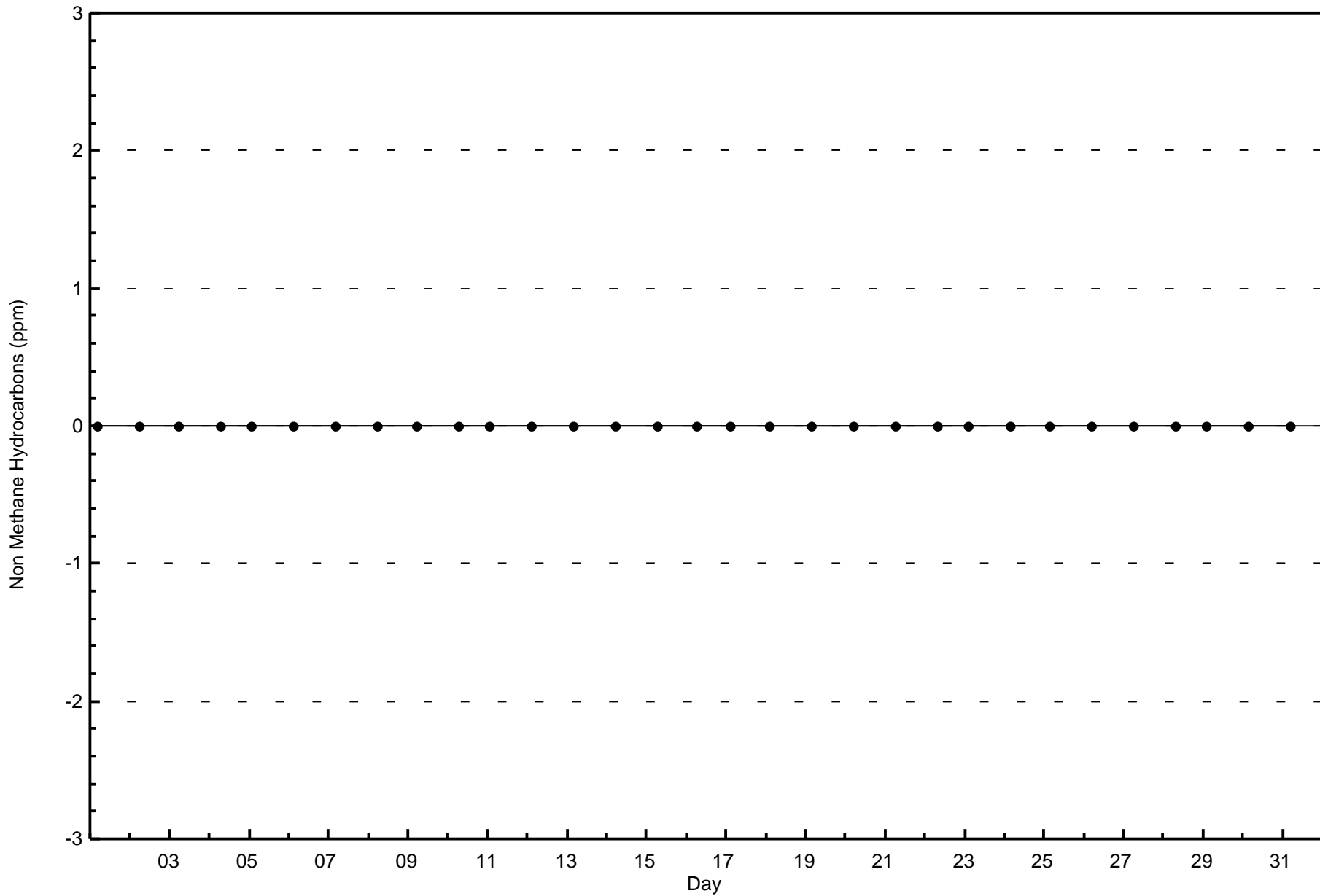
Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - July 2017

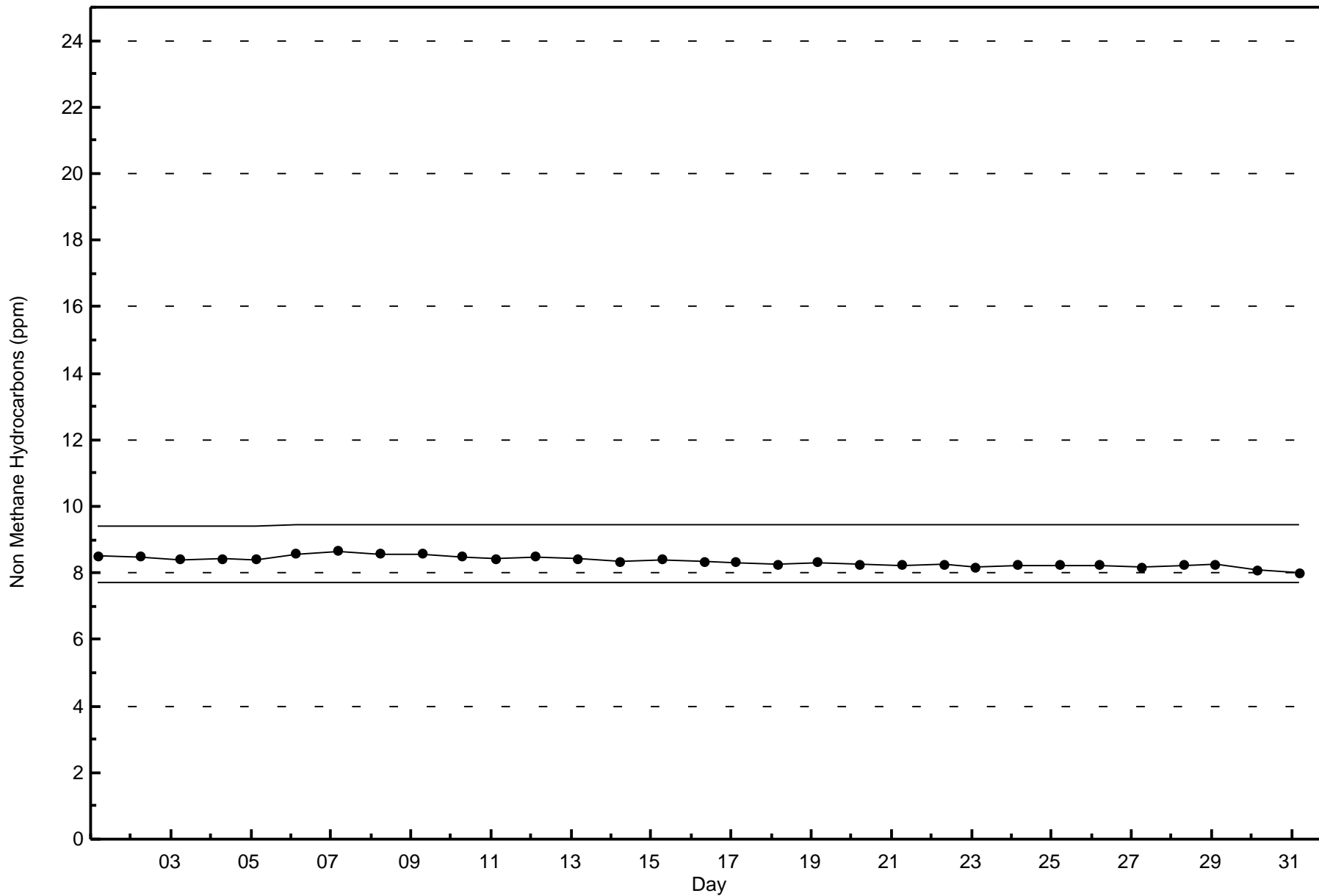
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	46	18	8	4	11	30	21	39	72	62	72	95	70	53	40	51	692
0.006 - 0.05	3	0	3	0	0	1	2	0	0	0	1	0	0	0	1	3	14
0.06 - 0.1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
> 0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	51	18	12	4	11	31	23	39	72	62	73	95	70	53	41	54	709

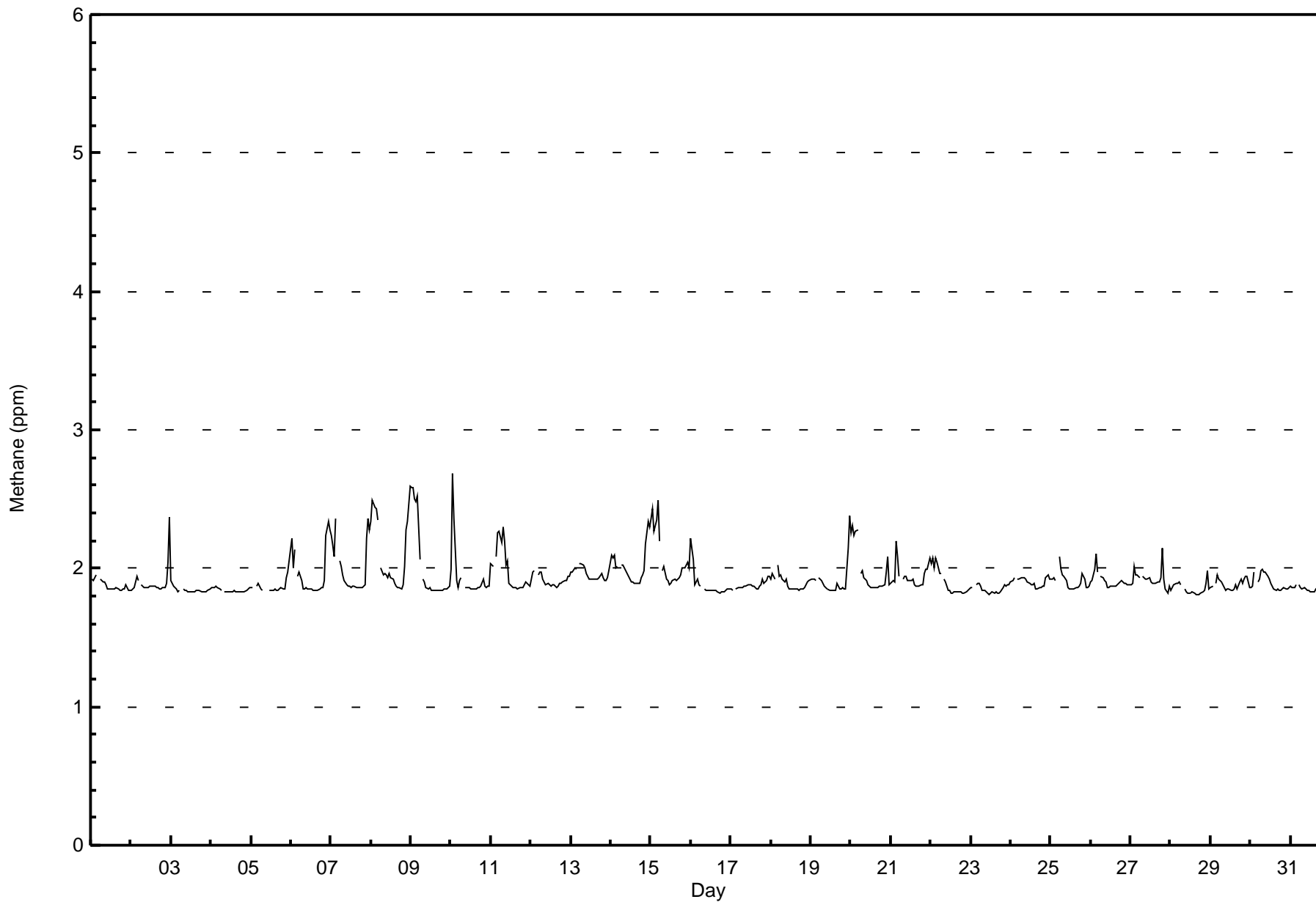
Total Number of Valid Hours: 709

Total Number of Hours: 744











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	642	90.42	90.42
2.1 - 3.0	68	9.58	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - July 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	16	11	4	11	30	22	38	68	57	67	89	65	44	33	42	641
2.1 - 3.0	7	2	1	0	0	1	1	1	4	5	6	6	5	9	8	12	68
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	51	18	12	4	11	31	23	39	72	62	73	95	70	53	41	54	709

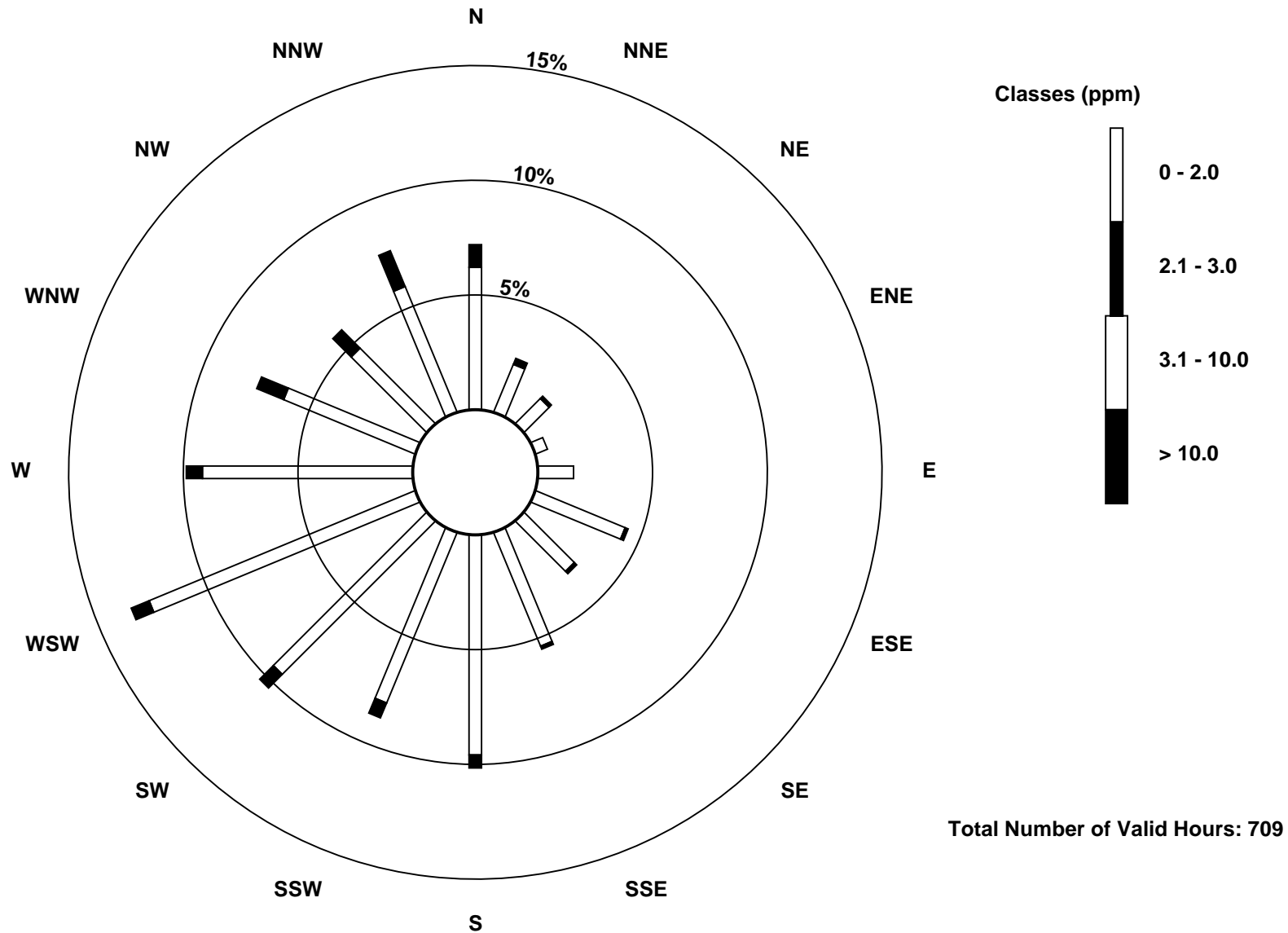
Total Number of Valid Hours: 709

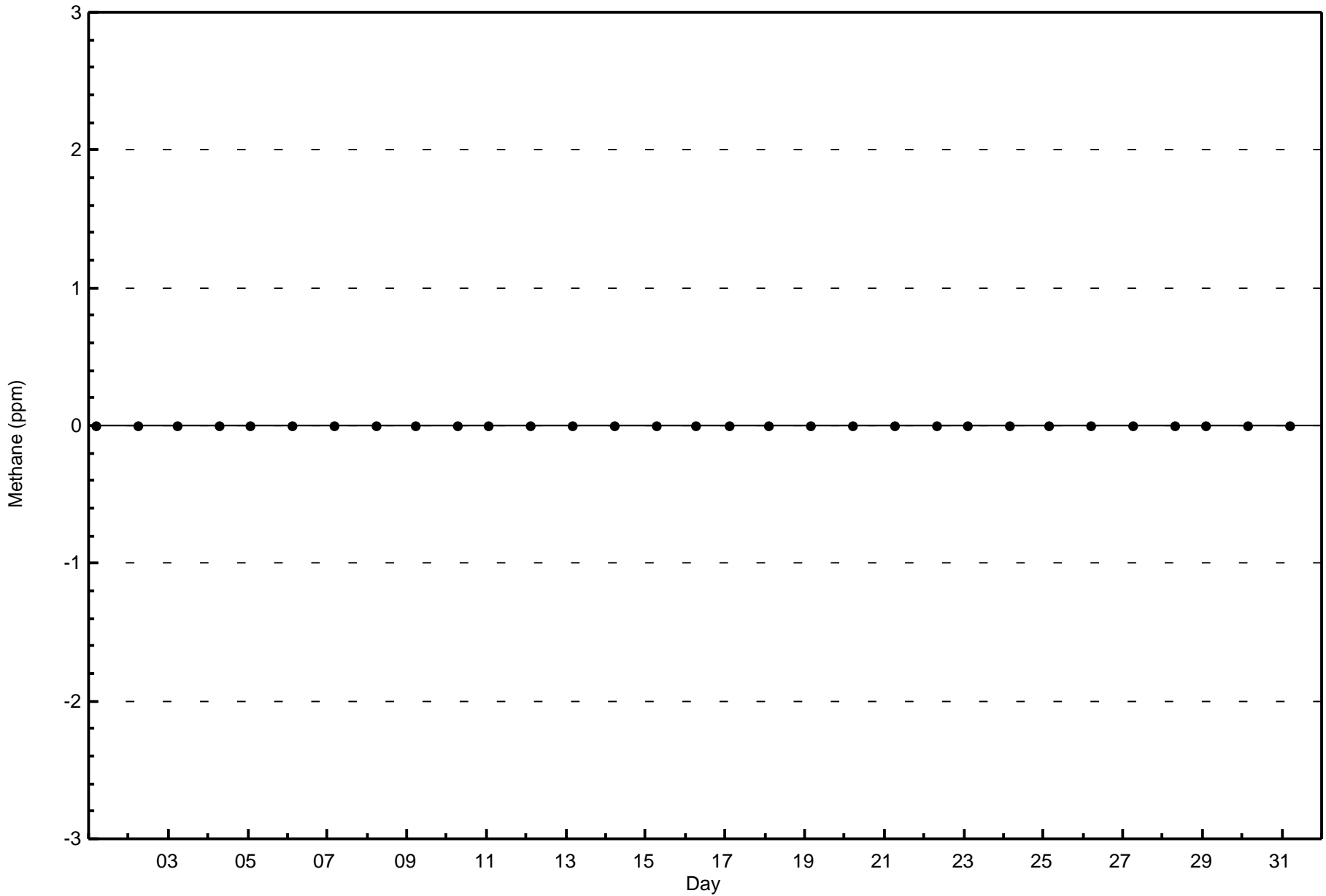
Total Number of Hours: 744

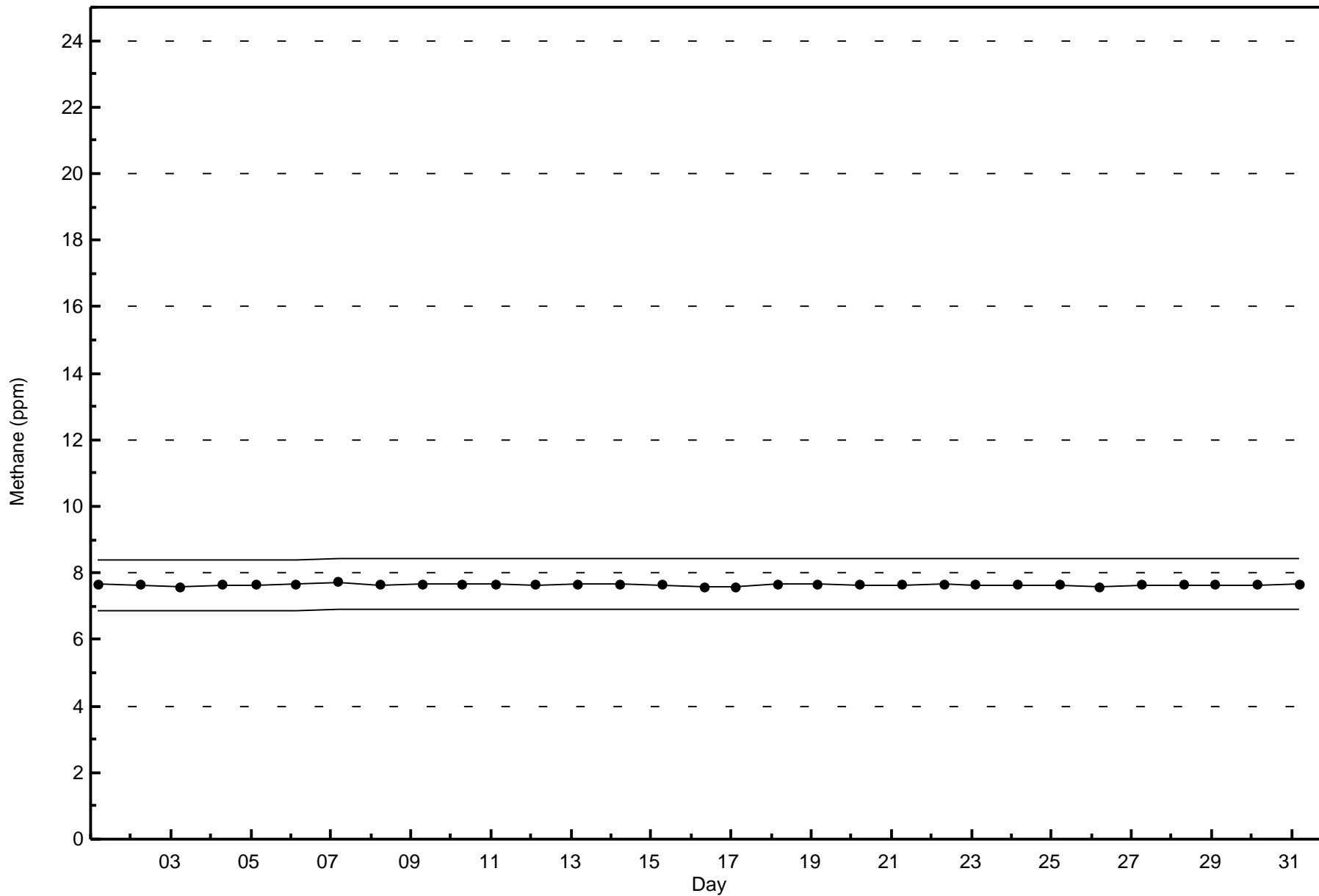


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









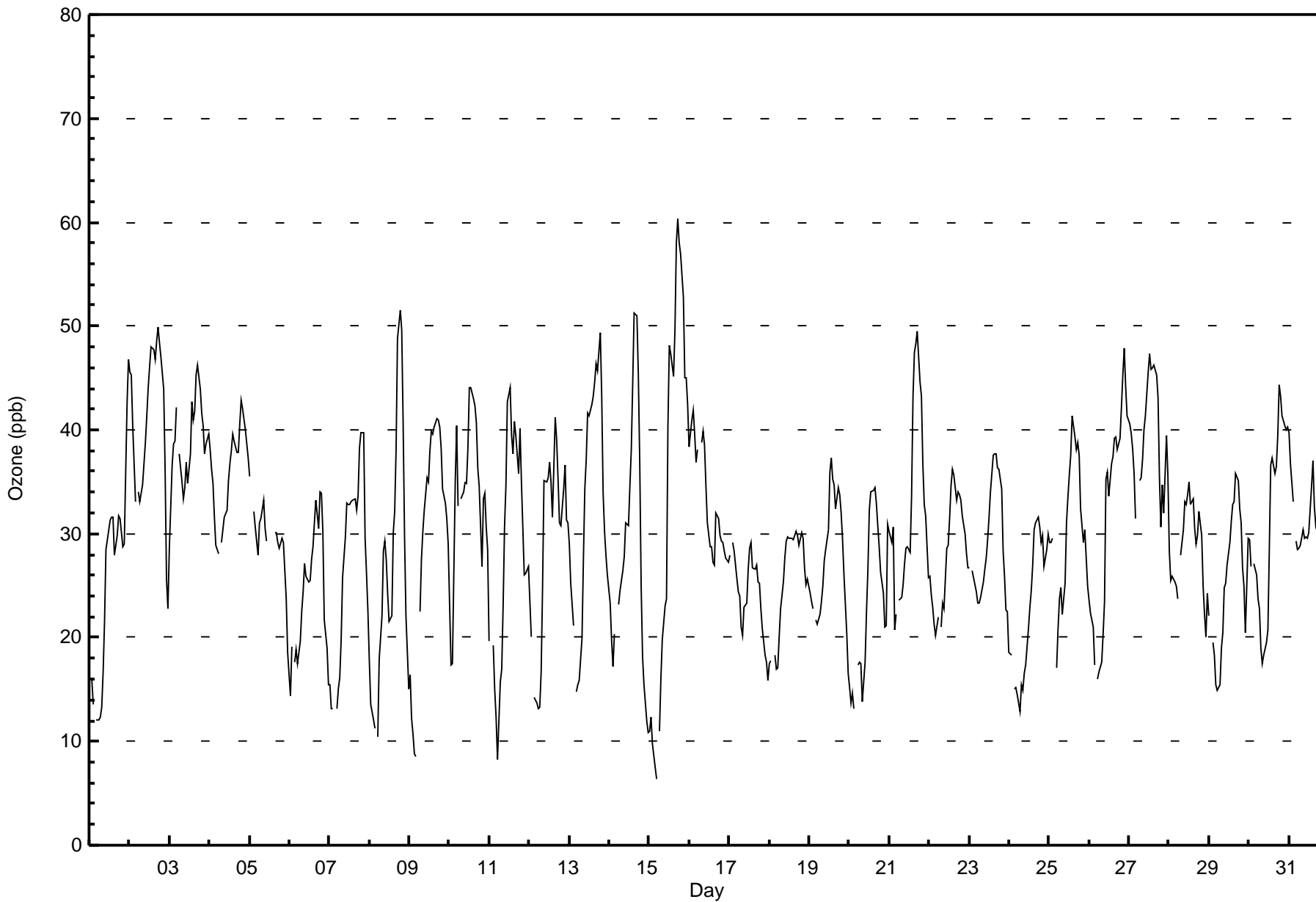
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 60 ppb on Jul 15 18:00										Maximum Daily Average: 40.7 ppb on Jul 2										Hours of Data: 709																													
Minimum Value: 6 ppb on Jul 15 05:00										Minimum Daily Average: 22.7 ppb on Jul 24										Hours of Missing Data: 35																													
Maximum Diurnal Average: 37.8 ppb at hour 17										Minimum Diurnal Average: 20.9 ppb at hour 6										Hours of Calibration: 35																													
Monthly Average: 29.9 ppb										Percentiles: P ₁ = 11 P ₁₀ = 17 Q ₁ = 23 Median = 30 Q ₃ = 36 P ₉₀ = 42 P ₉₉ = 51										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-Jul	16	16	14	Z	12	12	12	13	17	22	28	30	31	32	32	28	30	32	32	30	29	29	43	47	25.4	47																							
2-Jul	46	45	40	33	Z	34	33	34	35	39	41	44	46	48	48	47	49	50	48	47	44	36	26	23	40.7	50																							
3-Jul	29	37	39	39	42	Z	38	35	33	34	37	35	38	43	41	42	45	46	44	42	40	38	39	40	38.9	46																							
4-Jul	38	36	35	32	29	28	Z	29	30	32	32	35	37	38	40	39	38	38	41	43	42	40	39	37	35.9	43																							
5-Jul	36	Z	32	31	29	28	31	31	33	30	29	C	C	C	C	30	30	29	29	30	29	26	24	19	29.3	36																							
6-Jul	14	19	Z	18	19	18	20	23	24	27	26	25	25	28	29	31	33	30	34	34	30	22	19	16	24.5	34																							
7-Jul	15	13	13	Z	13	15	16	20	26	30	33	33	33	33	33	33	32	34	38	40	40	30	26	22	27.0	40																							
8-Jul	18	14	12	11	Z	10	18	22	28	29	28	24	22	22	30	32	38	49	51	50	41	30	22	15	26.8	51																							
9-Jul	16	12	11	9	9	Z	22	28	30	32	35	35	38	40	40	40	41	41	40	38	34	33	31	29	29.8	41																							
10-Jul	23	17	18	35	40	33	Z	33	34	35	35	38	44	44	43	42	41	36	35	27	33	34	31	28	33.9	44																							
11-Jul	20	Z	19	15	12	8	16	17	23	31	35	43	44	39	38	41	39	36	40	35	31	26	26	27	28.7	44																							
12-Jul	23	20	Z	14	14	13	13	17	25	35	35	35	37	35	32	41	39	35	31	31	34	37	31	31	28.7	41																							
13-Jul	29	25	21	Z	15	15	16	20	28	34	37	42	41	42	43	45	46	46	49	43	34	30	28	26	32.9	49																							
14-Jul	23	20	17	20	Z	23	25	25	26	28	31	31	35	38	44	51	45	37	25	18	15	12	11	11	28.4	51																							
15-Jul	11	12	10	7	6	Z	11	16	20	23	24	40	48	47	45	50	58	60	58	57	53	45	45	42	34.3	60																							
16-Jul	38	41	42	40	37	38	Z	39	40	38	35	31	29	29	27	27	32	32	30	29	29	28	28	27	33.3	42																							
17-Jul	28	Z	29	28	26	24	24	21	20	23	23	27	29	29	27	27	27	25	25	23	21	18	18	16	24.2	29																							
18-Jul	18	18	Z	18	17	17	20	23	25	28	29	30	30	30	29	30	30	30	29	30	30	27	25	26	25.5	30																							
19-Jul	24	23	23	Z	22	21	22	23	25	27	29	30	36	37	35	35	32	34	34	32	29	26	20	17	27.8	37																							
20-Jul	15	14	15	13	Z	17	18	18	14	18	22	27	32	34	34	34	33	31	29	26	24	21	21	31	23.5	34																							
21-Jul	30	29	31	21	22	Z	24	24	25	27	29	29	28	34	43	47	48	49	45	43	37	33	32	26	32.8	49																							
22-Jul	26	24	23	21	20	22	Z	21	23	23	29	29	31	35	36	36	33	34	34	33	32	30	28	27	28.2	36																							
23-Jul	27	Z	26	25	24	23	23	24	25	27	28	29	32	34	38	38	38	36	36	34	28	26	23	22	29.0	38																							
24-Jul	19	18	Z	15	15	14	13	15	15	16	17	21	23	25	27	30	31	32	31	29	30	27	28	30	22.7	32																							
25-Jul	29	29	30	Z	17	21	24	25	22	25	31	33	36	38	41	39	38	39	37	32	29	30	28	25	30.4	41																							
26-Jul	24	22	21	17	Z	16	17	18	20	23	35	36	34	37	37	39	39	38	39	42	45	48	44	41	31.9	48																							
27-Jul	41	40	38	36	31	Z	35	35	37	40	41	46	47	46	46	46	45	43	35	31	35	32	39	36	39.2	47																							
28-Jul	28	26	26	25	25	24	Z	28	30	33	33	34	35	33	33	31	29	30	32	30	25	22	20	24	28.5	35																							
29-Jul	22	Z	20	18	16	15	15	19	21	25	25	27	29	31	33	33	36	35	32	31	27	25	20	30	25.4	36																							
30-Jul	29	27	Z	27	26	24	23	19	18	18	20	21	29	37	37	36	36	39	44	43	41	40	40	40	31.1	44																							
31-Jul	40	37	33	Z	29	28	29	29	30	30	30	29	30	35	37	33	31	31	29	22	22	19	17	15	28.9	40																							
																								25.7	24.4	24.5	22.8	21.8	20.9	21.4	24.0	25.9	28.5	30.4	32.3	34.2	35.7	36.6	37.2	37.8	37.6	37.0	34.9	32.8	29.8	28.1	27.3	Diurnal Average	
																								46	45	42	40	42	38	38	39	40	40	41	46	48	48	48	51	58	60	58	57	53	48	45	47	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	123	17.35	17.35
21 - 50	578	81.52	98.87
51 - 82	8	1.13	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Patricia McInnes - July 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	3	2	1	1	2	1	4	13	21	10	10	4	11	14	12	123
21 - 50	37	14	10	4	8	30	23	34	56	41	62	85	68	40	23	42	577
51 - 82	0	1	0	0	0	0	0	1	3	1	0	0	0	1	1	0	8
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	51	18	12	5	9	32	24	39	72	63	72	95	72	52	38	54	708

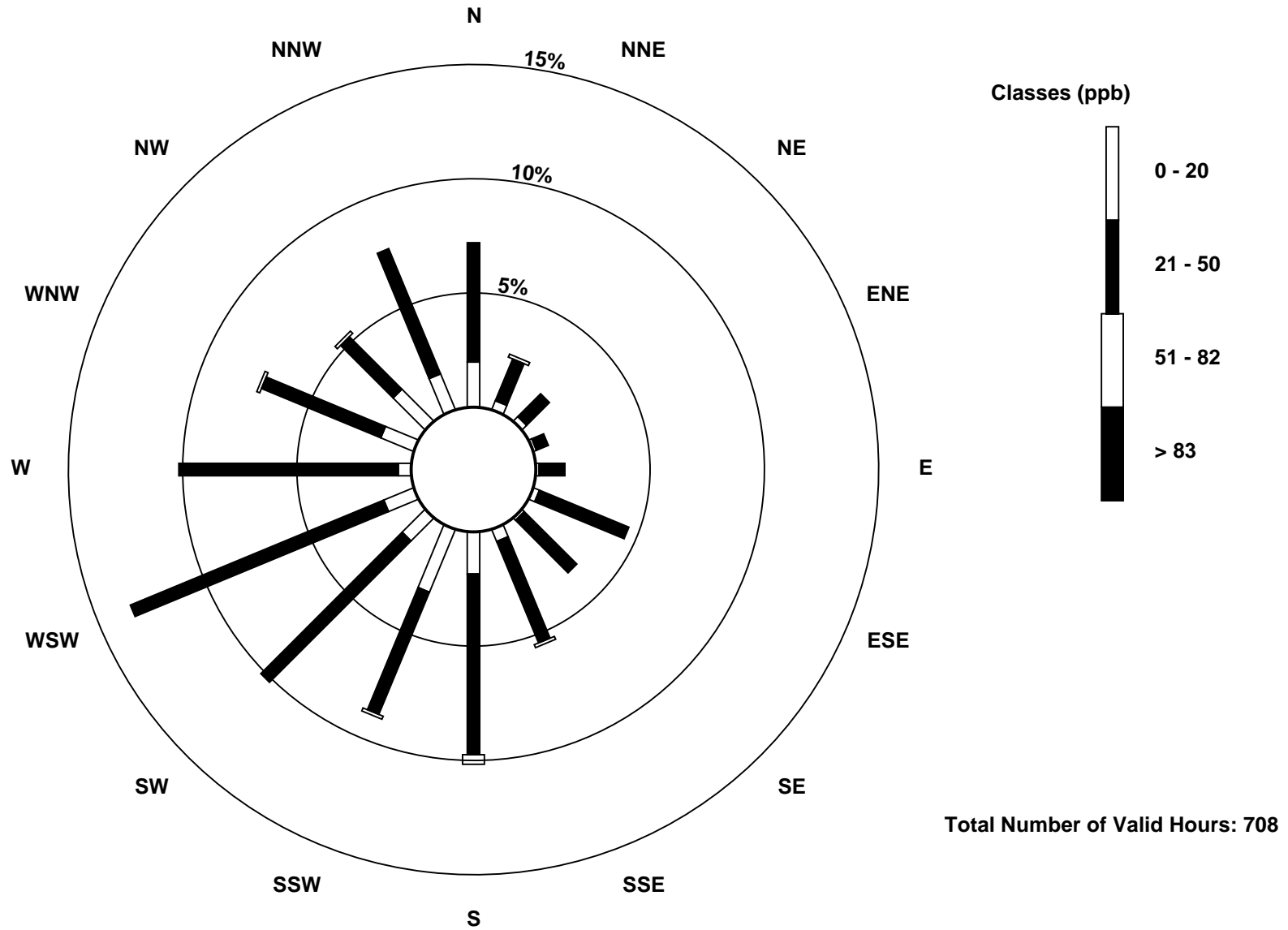
Total Number of Valid Hours: 708

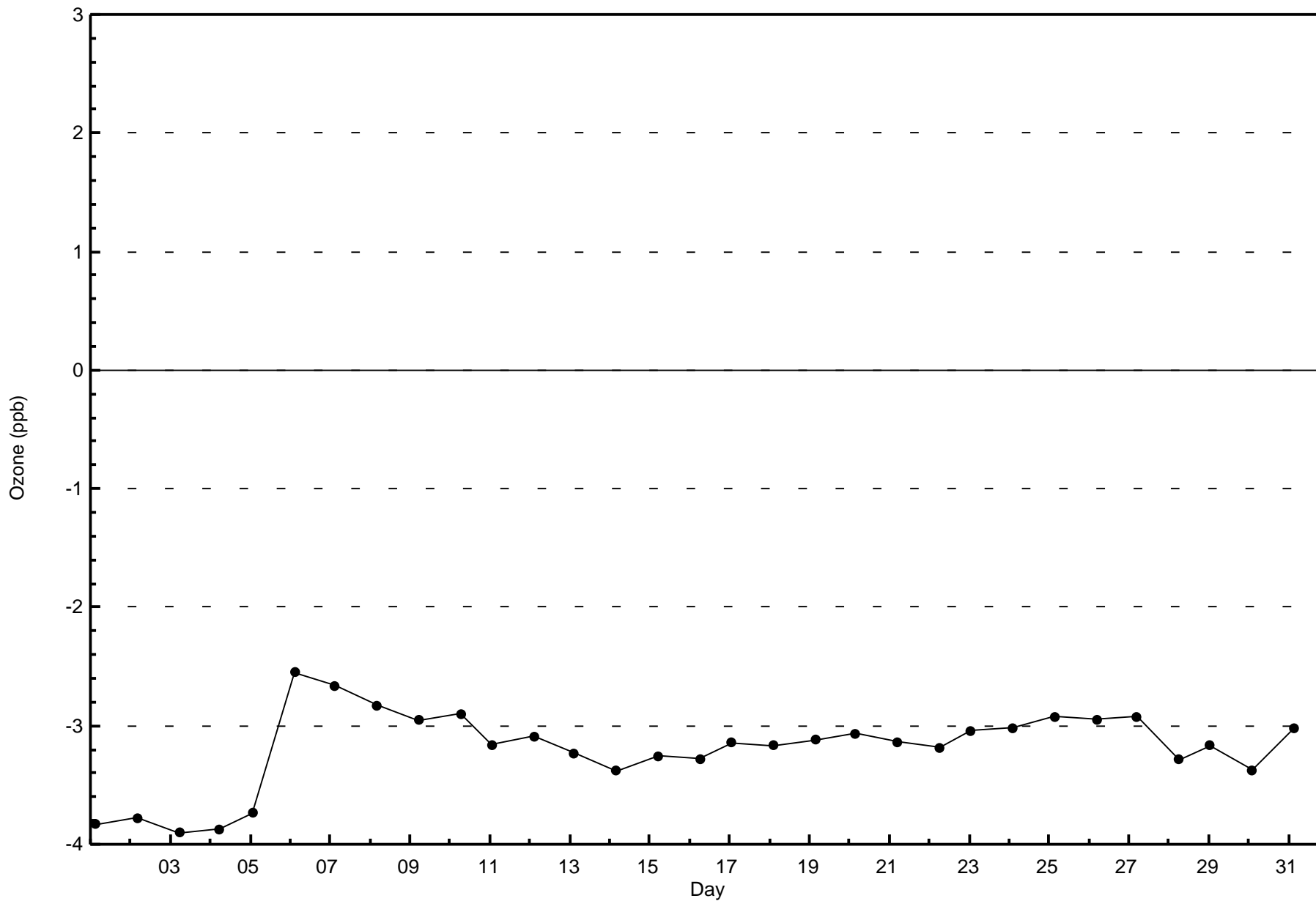
Total Number of Hours: 744

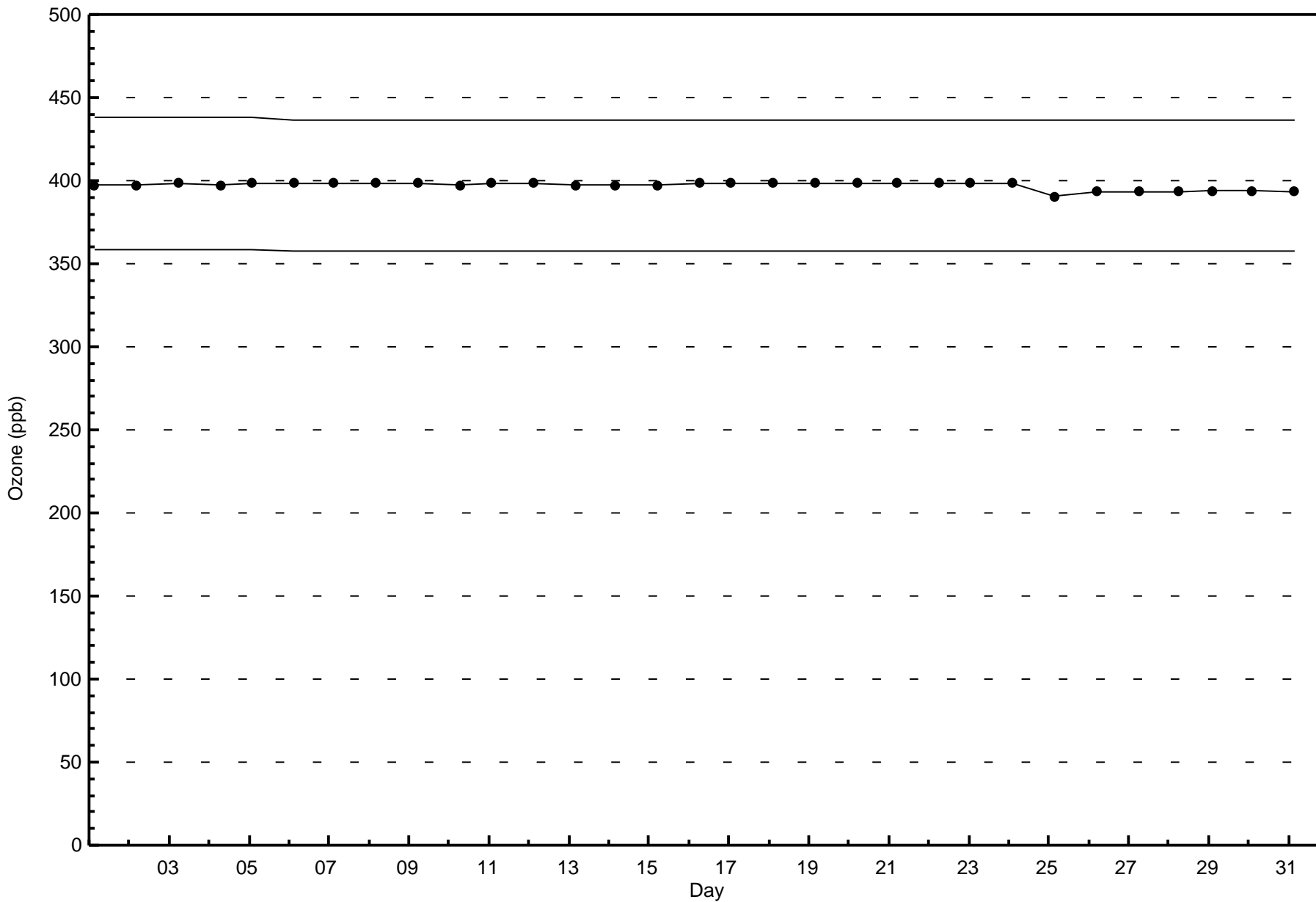


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









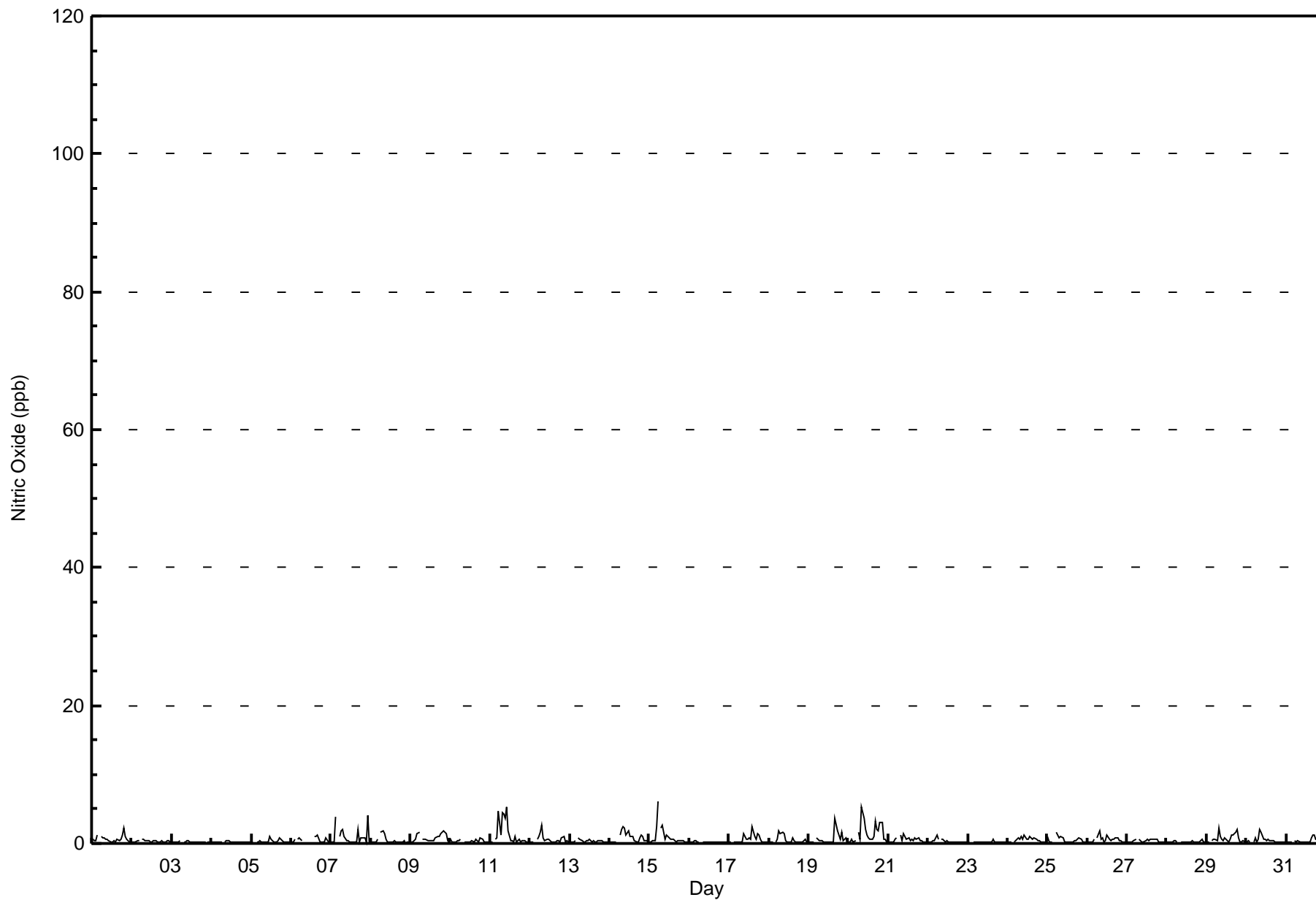
Maximum Value: 6 ppb on Jul 15 06:00																	Maximum Daily Average: 1.5 ppb on Jul 20																	Hours in Service: 744	
Minimum Value: 0 ppb on Jul 8 22:00																	Minimum Daily Average: 0.2 ppb on Jul 16																	Hours of Data: 706	
Maximum Diurnal Average: 1.2 ppb at hour 8																	Minimum Diurnal Average: 0.2 ppb at hour 24																	Hours of Missing Data: 38	
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 = 4																	Hours of Calibration: 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-Jul	1	0	0	1	Z	1	1	1	1	1	0	0	0	0	0	1	0	1	1	2	1	1	0	0	0.6	2									
2-Jul	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
3-Jul	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									
4-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0									
5-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0.3	1									
6-Jul	0	0	1	Z	1	1	0	C	C	C	C	C	C	C	1	1	1	0	0	0	0	1	0	0	--	1									
7-Jul	0	0	0	4	Z	1	2	2	1	0	0	0	0	0	0	0	2	0	1	1	1	0	4	0	0.9	4									
8-Jul	0	0	0	0	1	Z	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2									
9-Jul	0	0	0	1	2	2	Z	1	1	1	0	0	0	0	0	1	1	1	1	2	2	1	0	0	0.8	2									
10-Jul	1	0	0	0	0	0	1	Z	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0.3	1									
11-Jul	0	0	Z	1	1	5	1	5	4	4	5	2	0	0	0	1	0	1	0	0	0	0	0	0	1.4	5									
12-Jul	0	0	0	Z	1	1	2	3	1	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0.6	3									
13-Jul	0	0	0	0	Z	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
14-Jul	0	0	0	0	0	Z	1	2	2	2	1	2	1	1	1	0	0	0	1	1	1	0	1	0	0.8	2									
15-Jul	0	0	0	0	2	6	Z	2	3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.0	6									
16-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0									
17-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	1	1	2	1	1	1	1	1	1	0	0	0	0.6	2									
18-Jul	0	0	0	Z	0	1	2	1	2	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0.5	2									
19-Jul	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	4	2	1	1	2	0	1	0	0.6	4									
20-Jul	0	0	1	0	0	Z	2	1	5	4	2	1	1	1	1	1	3	2	2	3	3	1	1	0	1.5	5									
21-Jul	0	0	0	0	1	1	Z	1	0	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0.6	1									
22-Jul	0	0	0	0	0	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1									
23-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1									
24-Jul	0	0	0	Z	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1									
25-Jul	1	0	0	0	Z	2	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.5	2									
26-Jul	0	0	0	0	1	Z	1	2	1	1	0	1	1	1	0	1	1	1	1	0	0	0	0	0	0.5	2									
27-Jul	0	0	0	0	0	1	Z	1	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0.4	1									
28-Jul	0	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1									
29-Jul	0	0	Z	0	1	1	1	2	1	1	0	1	0	0	1	1	1	2	2	1	0	0	0	0	0.7	2									
30-Jul	0	0	0	Z	0	1	0	1	2	2	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0.5	2									
31-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0.4	1									
																	Diurnal Average		Diurnal Maximum																
																	0.2		1																
																	0.2		0																
																	0.2		1																
																	0.5		4																
																	0.5		2																
																	1.1		6																
																	0.8		2																
																	1.2		5																
																	1.0		5																
																	0.8		4																
																	0.7		5																
																	0.5		2																
																	0.4		1																
																	0.4		1																
																	0.5		2																
																	0.5		1																
																	0.7		4																
																	0.6		2																
																	0.6		2																
																	0.6		3																
																	0.5		3																
																	0.3		1																
																	0.4		4																
																	0.2		0																

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Patricia McInnes - July 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	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705
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	51	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705

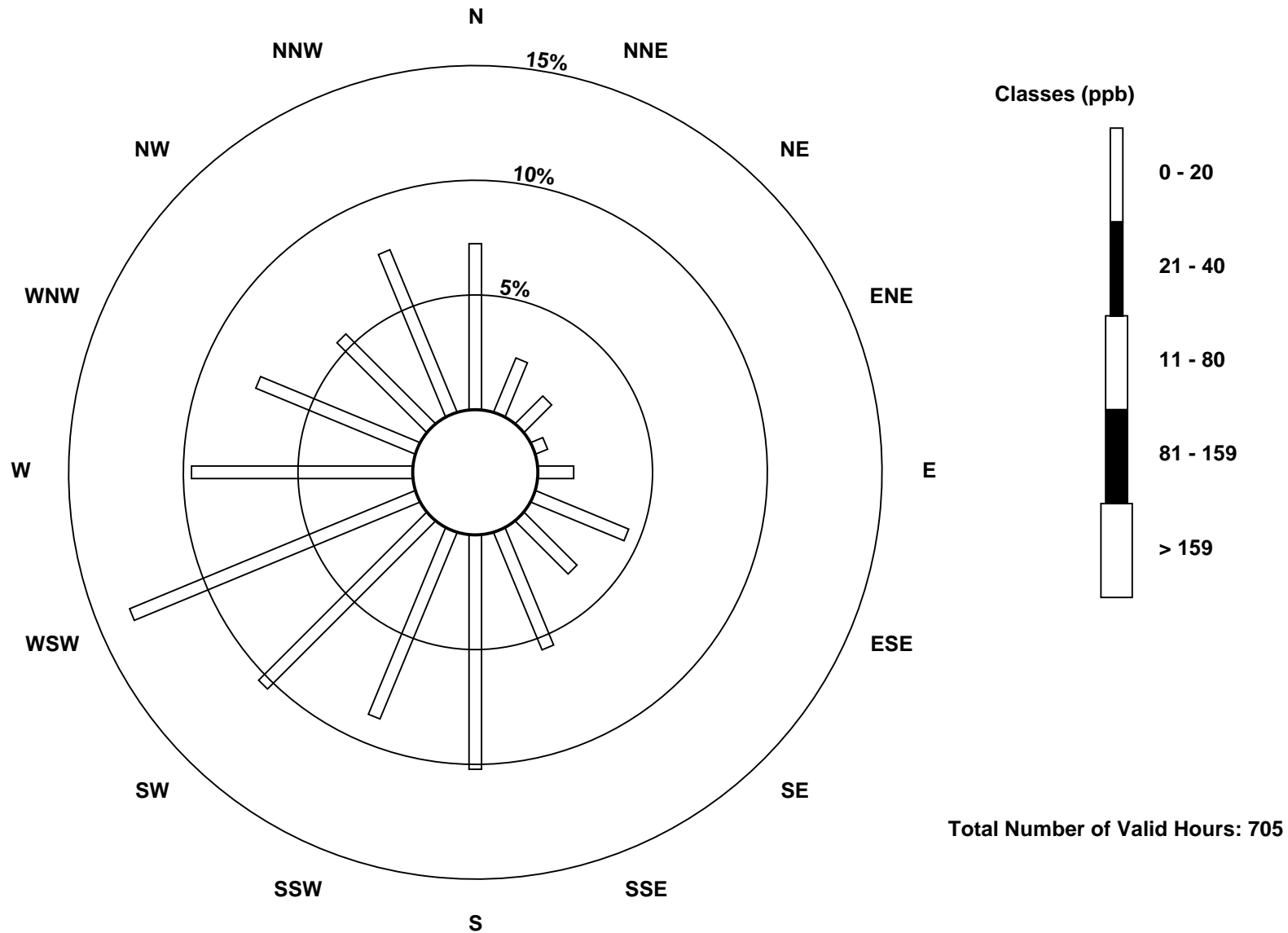
Total Number of Valid Hours: 705

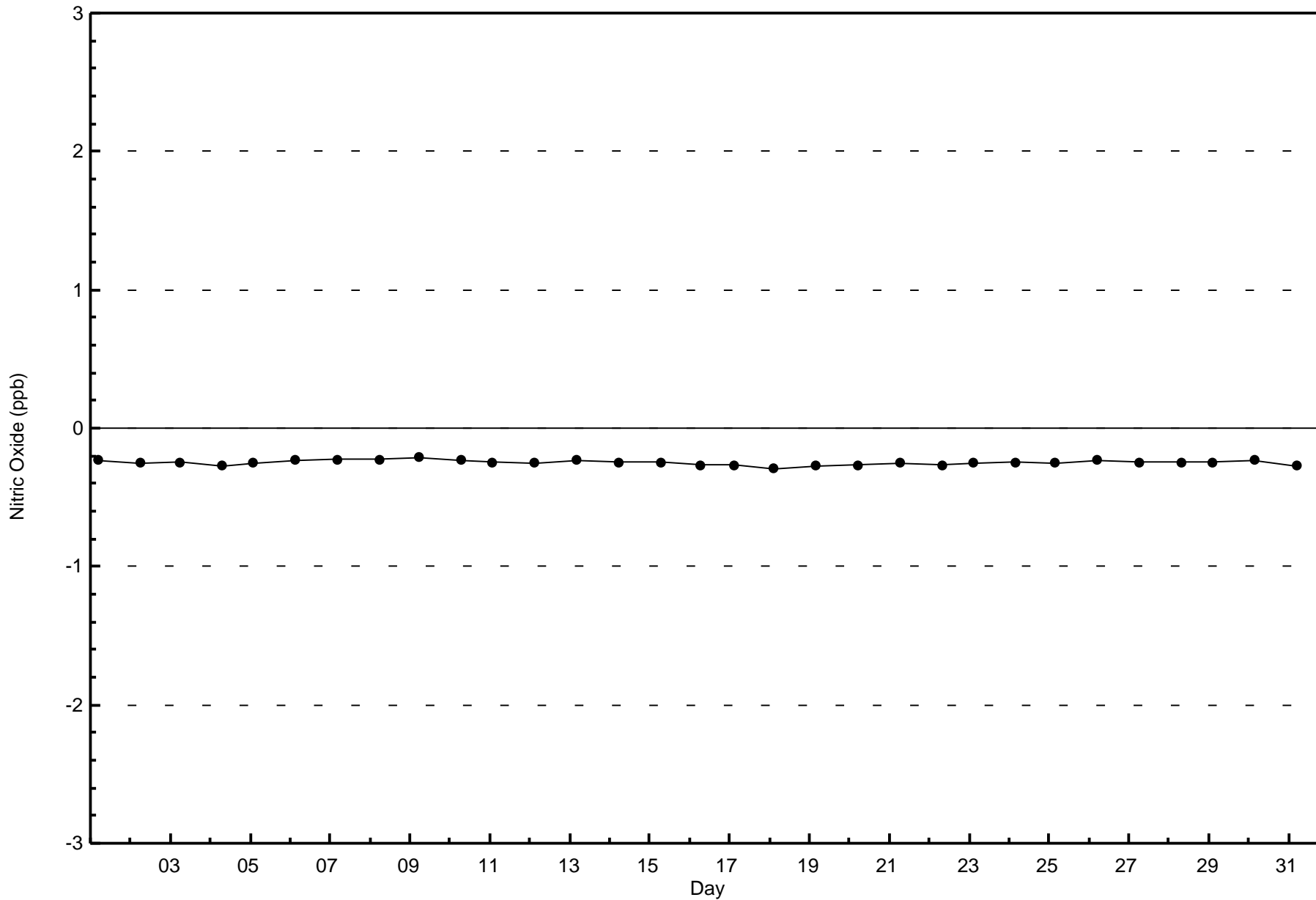
Total Number of Hours: 744

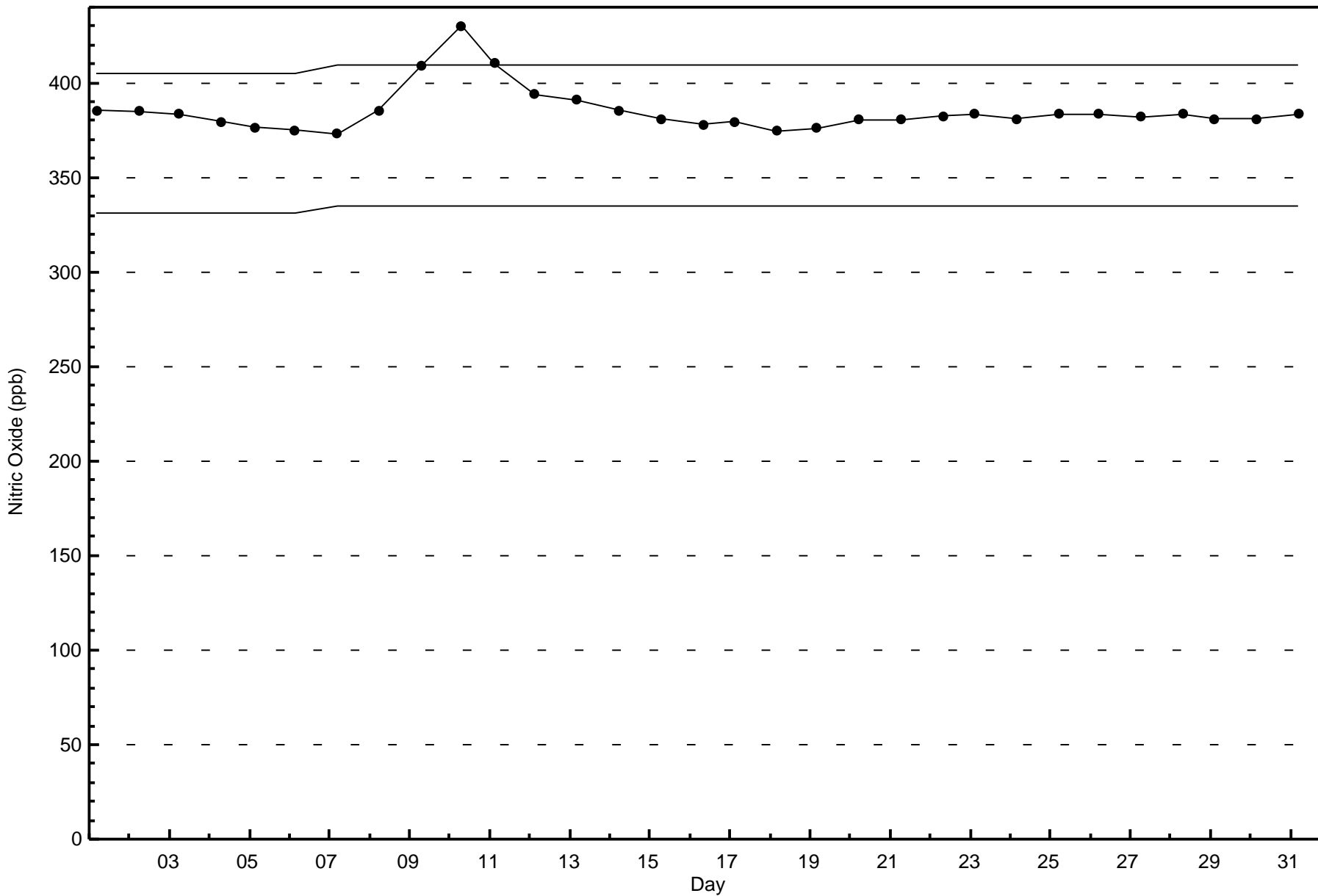


Wood Buffalo Environmental Association
Wind Rose Jul 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

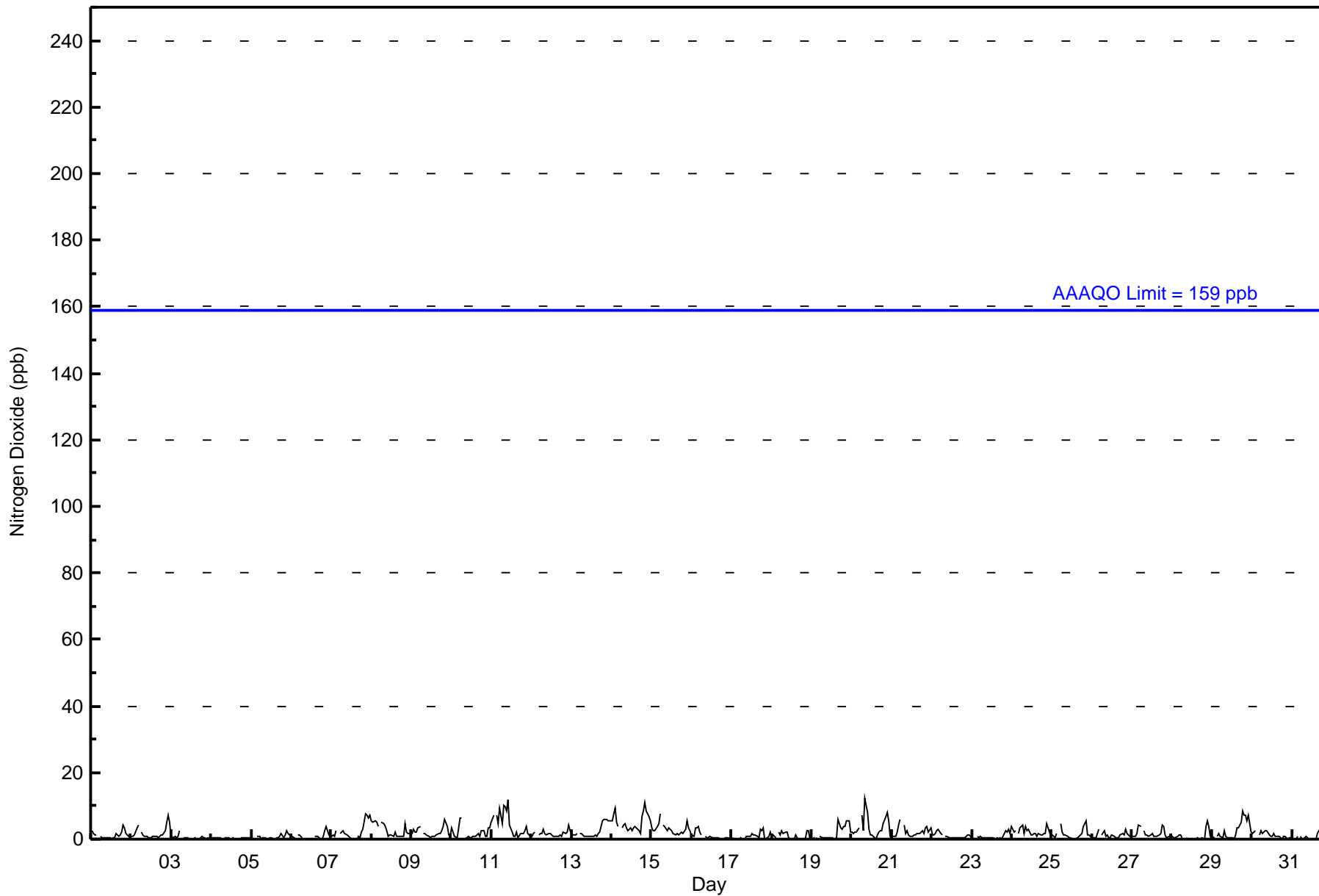
Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744												
Maximum Value: 12 ppb on Jul 20 09:00														Maximum Daily Average: 5.1 ppb on Jul 14		Hours of Data: 706										
Minimum Value: 0 ppb on Jul 5 14:00														Minimum Daily Average: 0.3 ppb on Jul 4		Hours of Missing Data: 38										
Maximum Diurnal Average: 3.2 ppb at hour 22														Minimum Diurnal Average: 0.8 ppb at hour 14		Hours of Calibration: 38										
Monthly Average: 1.8 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O 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-Jul	3	2	1	1	Z	1	1	0	0	1	0	0	0	0	0	2	1	1	2	4	3	2	1	1	1.2	4
2-Jul	1	1	1	3	4	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	3	5	7	5	1.9	7
3-Jul	1	1	1	1	1	3	Z	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0.5	3
4-Jul	0	0	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Jul	0	0	Z	1	1	1	0	0	0	0	1	1	0	0	0	0	0	1	2	0	1	3	2	1	0.7	3
6-Jul	1	0	1	Z	1	1	1	C	C	C	C	C	C	C	1	1	1	0	0	1	3	4	1	1	--	4
7-Jul	1	1	1	2	Z	2	2	3	2	1	1	0	0	0	0	0	1	0	2	3	8	7	6	7	2.3	8
8-Jul	5	5	6	5	4	Z	5	5	4	2	1	1	1	1	2	1	1	1	1	1	5	2	2	2	2.7	6
9-Jul	2	3	2	2	3	4	Z	2	2	1	1	1	1	1	1	1	2	2	3	4	6	4	1	1	2.0	6
10-Jul	4	2	1	1	3	6	6	Z	0	0	1	1	1	1	1	1	2	1	2	3	1	1	4	3	2.0	6
11-Jul	5	7	Z	7	5	9	5	10	10	9	12	4	2	1	1	2	1	2	2	2	2	4	2	1	4.5	12
12-Jul	1	2	2	Z	1	2	2	3	2	1	2	2	1	1	1	1	1	1	1	2	2	2	4	3	1.6	4
13-Jul	2	1	1	2	Z	2	2	1	1	1	1	1	1	1	1	1	2	2	6	6	6	5	5	5	2.3	6
14-Jul	6	8	9	5	4	Z	3	4	5	4	3	3	3	4	4	3	3	2	7	9	11	8	7	5	5.1	11
15-Jul	3	2	2	4	5	8	Z	4	4	3	3	3	3	2	1	2	1	2	2	2	3	6	3	3	3.0	8
16-Jul	1	1	4	3	4	2	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1.0	4
17-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	2	1	1	1	0	3	3	3	0	0	1	2	0.9	3
18-Jul	1	1	0	Z	2	1	3	2	2	2	1	0	0	0	1	1	0	0	0	0	0	3	3	1	1.0	3
19-Jul	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	1	6	3	3	4	4	5	6	2	1.7	6
20-Jul	2	2	2	2	3	Z	7	3	12	8	3	1	1	1	0	1	2	2	3	5	7	8	5	1	3.6	12
21-Jul	1	1	1	2	4	6	Z	4	2	3	1	1	1	1	1	2	2	2	2	2	4	4	2	3	2.2	6
22-Jul	1	1	2	3	3	2	1	Z	1	1	0	1	0	0	0	0	0	1	0	1	1	1	1	1	1.0	3
23-Jul	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	3	2	3	2	0.8	3
24-Jul	4	2	2	Z	2	3	4	2	4	2	3	1	1	2	2	1	2	1	1	2	2	5	2	1	2.2	5
25-Jul	1	1	1	2	Z	5	2	1	1	1	0	0	0	0	0	0	1	1	2	4	6	1	1	1	1.5	6
26-Jul	1	0	1	2	3	Z	1	2	1	1	1	1	1	1	1	1	1	1	2	1	3	2	1	1	1.2	3
27-Jul	1	1	1	2	4	4	Z	3	1	1	1	1	2	1	1	1	1	2	4	4	1	1	1	1	1.7	4
28-Jul	1	1	1	1	1	1	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	4	6	4	1	1.0	6
29-Jul	1	1	Z	1	2	1	1	3	1	1	1	1	0	0	1	4	3	5	9	7	7	5	7	2	2.7	9
30-Jul	2	2	3	Z	1	2	2	2	2	2	1	1	1	2	1	1	1	0	0	1	1	0	0	0	1.2	3
31-Jul	0	0	0	1	Z	1	0	0	1	0	0	0	0	0	0	2	2	3	2	3	2	3	2	2	1.1	3
1.7 1.6 1.7 2.1 2.5 2.6 2.0 2.3 2.1 1.6 1.3 0.9 0.8 0.8 0.8 1.0 1.2 1.3 2.0 2.4 3.1 3.2 2.8 1.9																								Diurnal Average		
6 8 9 7 5 9 7 10 12 9 12 4 3 4 4 4 6 5 9 9 11 8 7 7																								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
Patricia McInnes - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - July 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	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705
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	51	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705

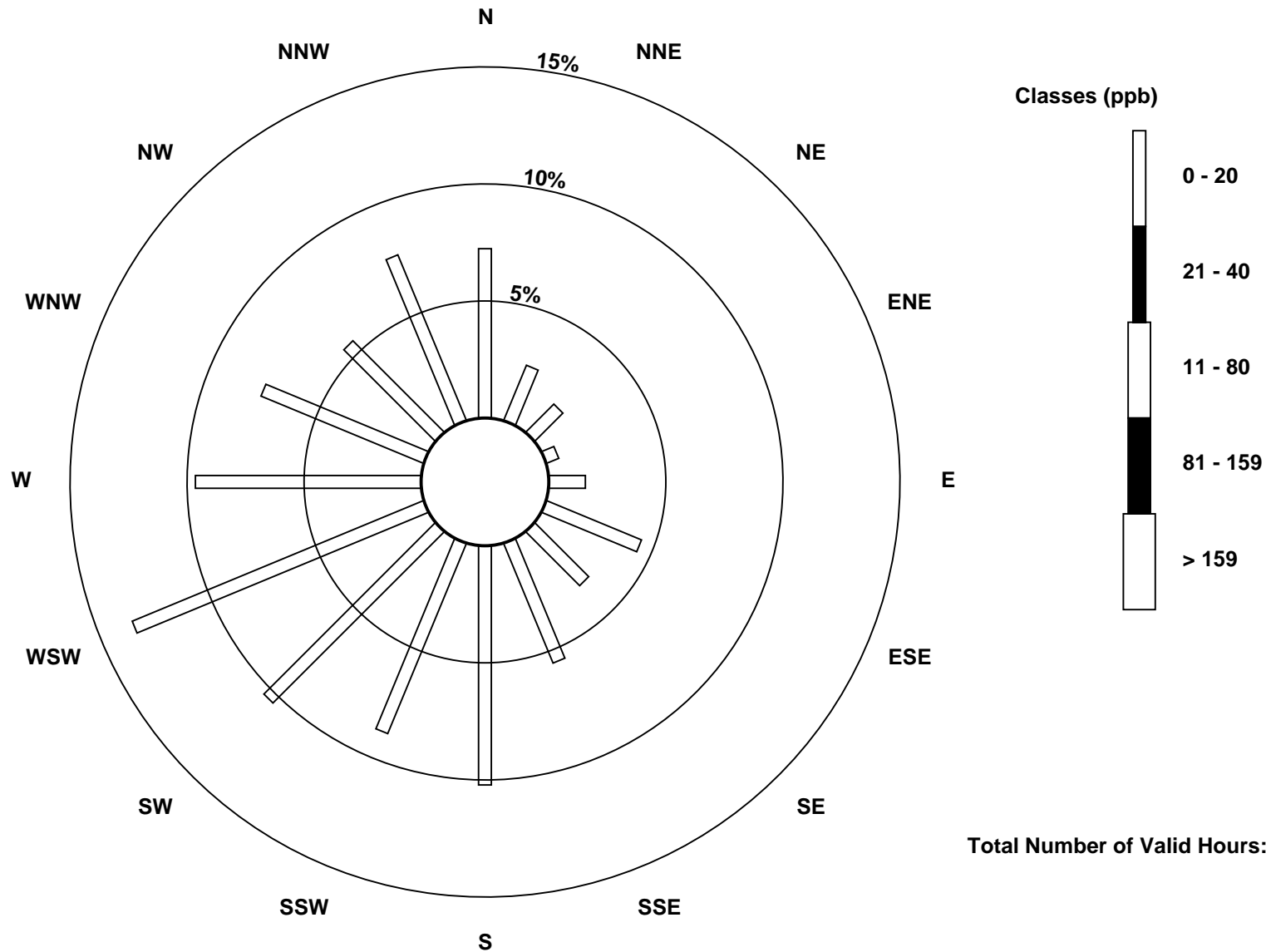
Total Number of Valid Hours: 705

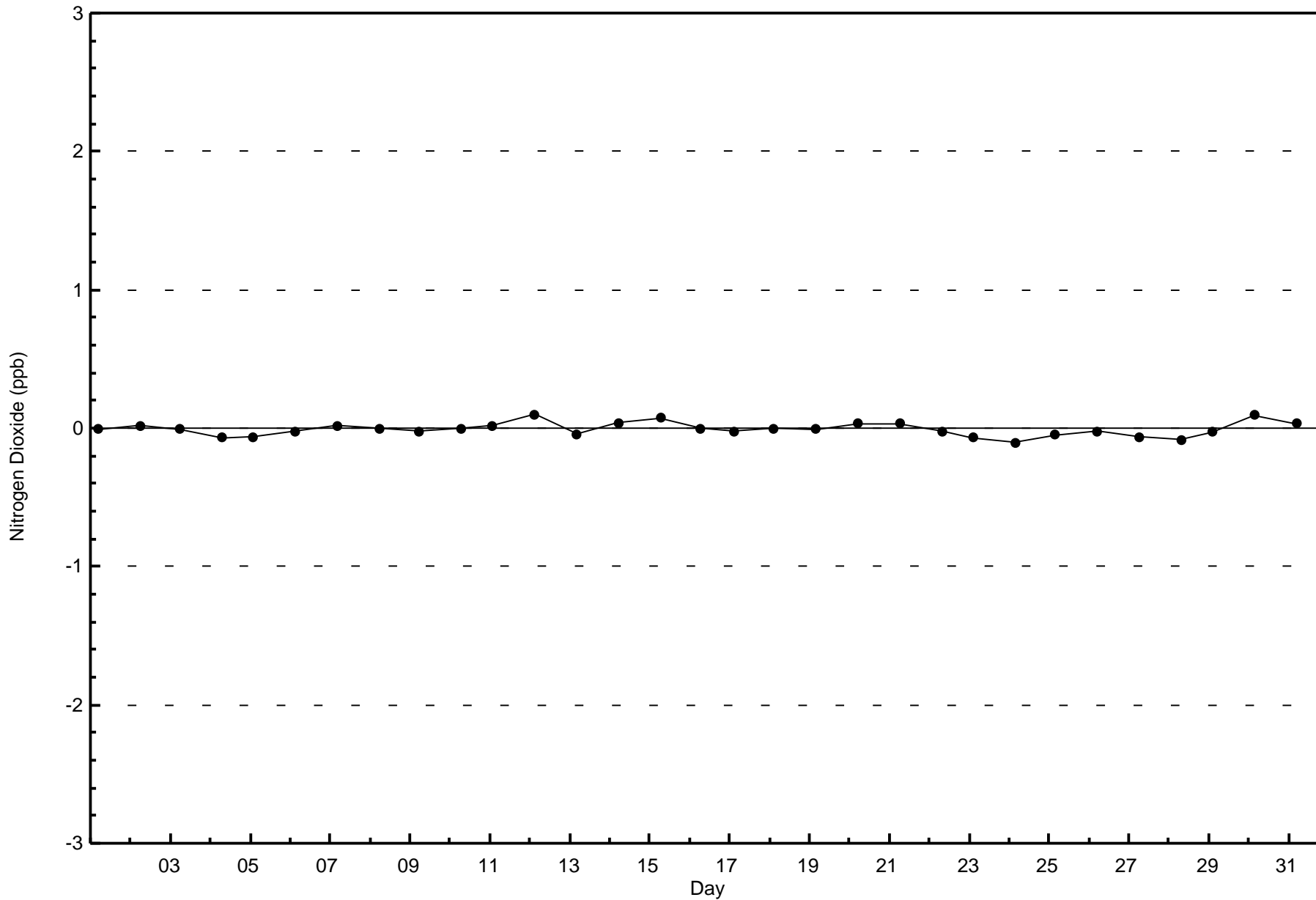
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes (AMS 6)

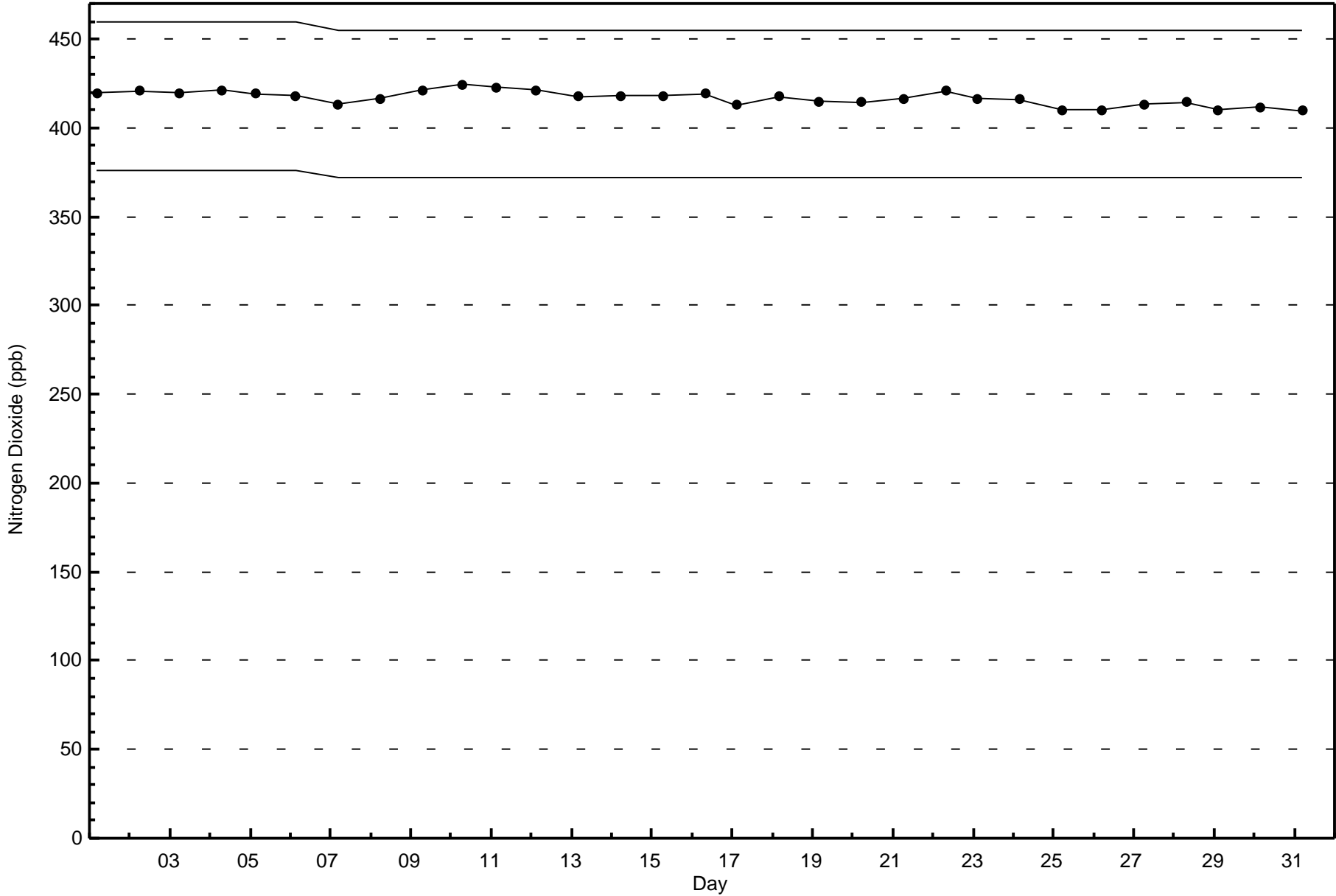






Wood Buffalo Environmental Association
Span Responses

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





Wood Buffalo Environmental Association
Summary of Hour Averages

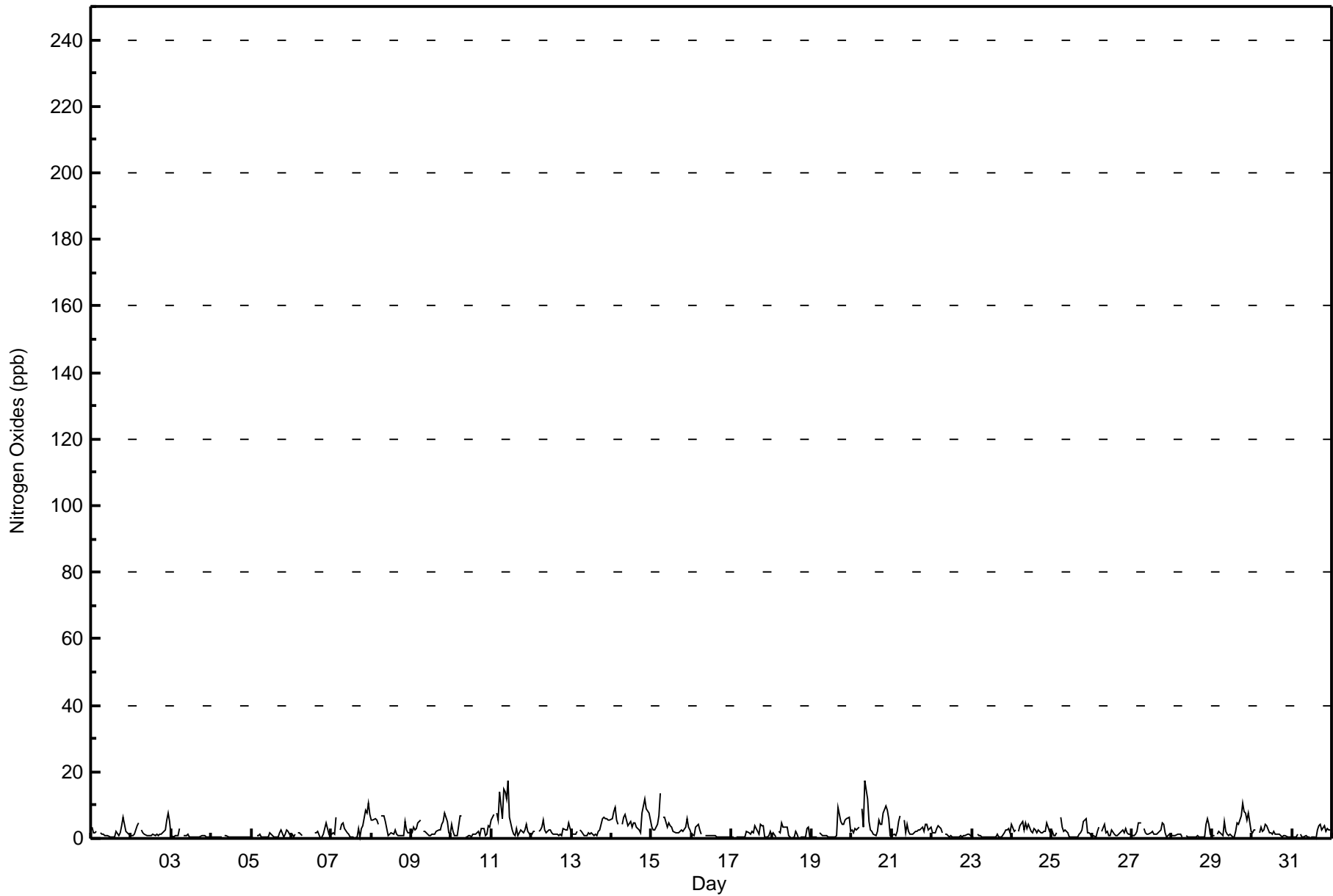
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - July 2017

Maximum Value: 17 ppb on Jul 20 09:00																	Maximum Daily Average: 6.0 ppb on Jul 14																	Hours in Service: 744	
Minimum Value: 0 ppb on Jul 31 15:00																	Minimum Daily Average: 0.5 ppb on Jul 4																	Hours of Data: 706	
Maximum Diurnal Average: 3.7 ppb at hour 6																	Minimum Diurnal Average: 1.1 ppb at hour 14																	Hours of Missing Data: 38	
Monthly Average: 2.4 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 5 P ₉₉ = 11																	Hours of Calibration: 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-Jul	3	2	2	2	Z	2	1	1	1	1	1	1	0	1	1	2	1	2	4	6	4	2	1	1	1.8	6									
2-Jul	1	1	1	4	5	Z	3	2	1	1	1	1	1	1	1	1	1	1	1	2	3	5	7	5	2.2	7									
3-Jul	1	1	1	1	1	3	Z	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	0	0.7	3									
4-Jul	1	0	1	1	1	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	1									
5-Jul	0	0	Z	1	1	1	0	1	1	0	0	2	1	0	0	0	1	2	2	1	1	3	2	1	1.0	3									
6-Jul	1	0	1	Z	2	2	1	C	C	C	C	C	C	C	2	2	2	0	0	1	3	5	1	1	--	5									
7-Jul	1	1	1	6	Z	3	4	5	3	2	1	0	0	0	0	0	3	1	3	4	9	8	10	7	3.2	10									
8-Jul	5	5	6	5	4	Z	7	7	5	3	1	1	2	1	3	1	1	1	1	1	5	2	2	2	3.1	7									
9-Jul	2	3	2	3	5	6	Z	2	2	2	1	1	1	1	1	2	3	3	4	5	8	5	2	1	2.8	8									
10-Jul	4	2	1	1	4	7	7	Z	1	1	1	1	1	1	1	2	2	1	3	3	1	1	4	3	2.3	7									
11-Jul	5	7	Z	8	6	14	6	15	14	12	17	6	2	1	1	3	1	2	2	2	3	4	2	1	5.9	17									
12-Jul	1	2	2	Z	2	2	3	6	2	2	2	3	2	1	1	1	1	1	1	3	3	2	5	3	2.2	6									
13-Jul	2	1	1	2	Z	3	2	1	1	1	2	1	2	1	1	1	2	3	6	6	6	6	6	5	2.7	6									
14-Jul	6	8	9	5	4	Z	4	6	7	6	4	5	4	5	5	4	3	2	8	10	12	9	7	6	6.0	12									
15-Jul	3	3	3	4	7	14	Z	6	6	3	5	4	3	2	2	2	2	2	3	2	3	6	4	3	4.0	14									
16-Jul	1	1	4	4	4	2	1	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.2	4									
17-Jul	0	0	Z	0	0	1	0	0	0	2	2	1	2	2	4	2	1	4	4	4	4	0	0	1	2	1.5	4								
18-Jul	1	2	1	Z	2	2	4	3	4	4	1	0	0	0	2	1	0	0	0	0	1	3	3	1	1.5	4									
19-Jul	0	0	0	1	Z	2	1	1	1	1	1	1	1	0	0	1	10	5	4	4	5	6	6	2	2.3	10									
20-Jul	2	2	3	2	4	Z	9	3	17	12	5	3	2	1	1	2	6	4	4	8	10	9	6	1	5.1	17									
21-Jul	1	1	1	2	5	7	Z	6	2	4	2	1	1	2	2	2	3	2	3	2	4	4	3	4	2.8	7									
22-Jul	2	2	2	3	4	3	2	Z	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1.3	4									
23-Jul	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	2	3	2	3	2	1.0	3									
24-Jul	4	2	3	Z	2	4	5	2	5	3	4	2	2	3	3	2	2	2	2	2	2	5	2	1	2.7	5									
25-Jul	2	1	1	2	Z	6	3	2	2	2	1	1	0	0	0	1	1	2	2	5	6	2	2	1	2.0	6									
26-Jul	1	1	1	2	4	Z	2	4	2	2	1	1	2	1	1	1	1	2	2	2	3	2	1	1	1.7	4									
27-Jul	1	1	1	2	5	5	Z	3	2	1	1	2	2	1	1	1	2	2	5	4	2	1	1	1	2.1	5									
28-Jul	1	1	1	1	1	1	1	Z	1	0	0	0	0	0	0	1	0	0	0	0	4	6	4	1	1.2	6									
29-Jul	1	1	Z	1	2	2	1	5	2	1	1	1	1	0	2	5	4	7	11	8	8	5	8	2	3.4	11									
30-Jul	2	3	3	Z	2	3	2	3	4	4	2	2	1	2	1	1	1	1	0	1	1	0	0	0	1.7	4									
31-Jul	0	0	0	1	Z	1	0	1	1	1	0	0	0	0	0	2	4	4	2	4	2	3	2	3	1.5	4									
1.9 1.8 1.9 2.5 3.0 3.7 2.8 3.4 3.1 2.5 2.0 1.5 1.2 1.1 1.3 1.5 1.9 1.9 2.6 3.0 3.6 3.5 3.2 2.1																								Diurnal Average											
6 8 9 8 7 14 9 15 17 12 17 6 4 5 5 5 10 7 11 10 12 9 10 7																								Diurnal Maximum											
Z - zerospan		C - Calibration																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



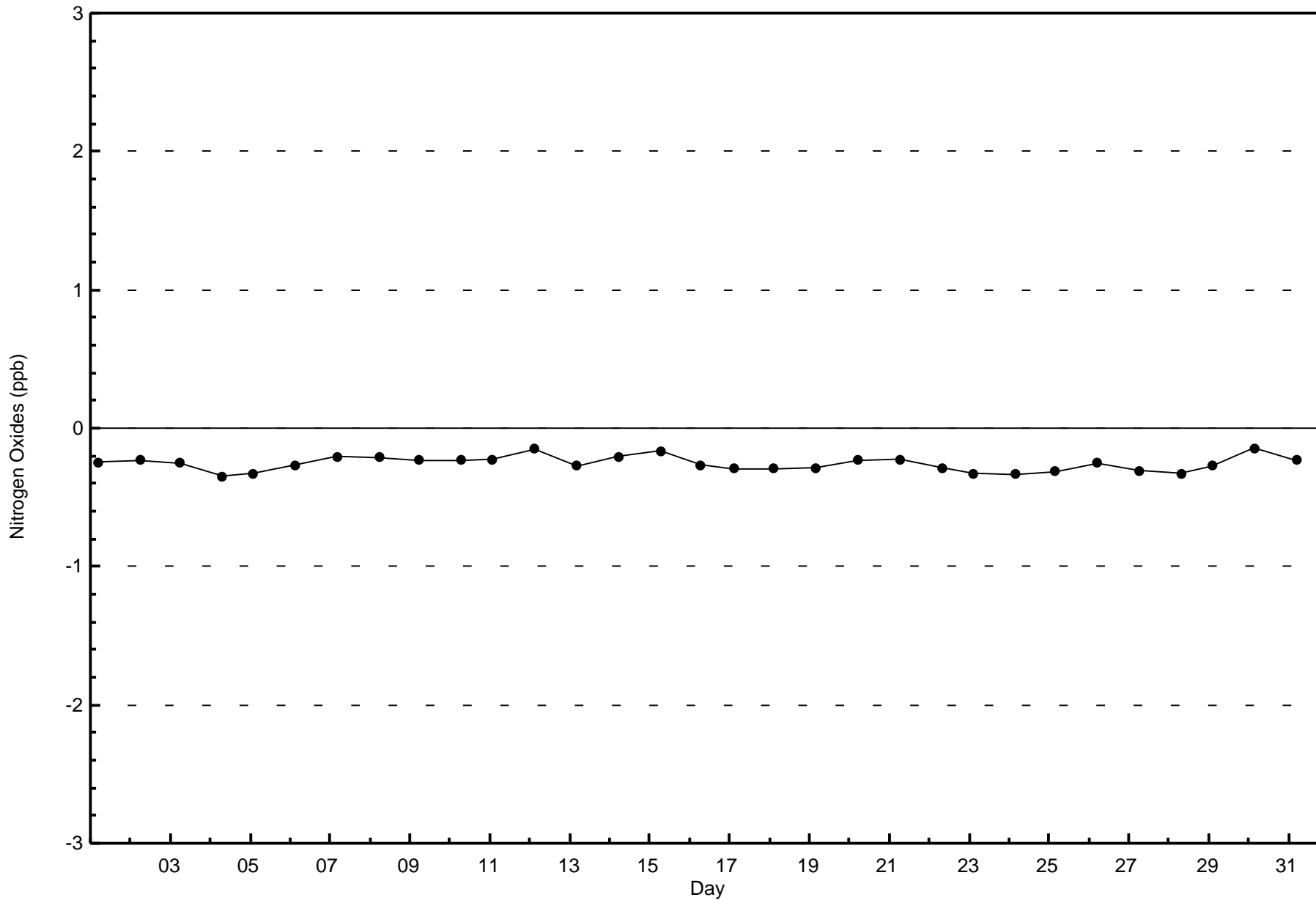
**Wood Buffalo Environmental Association
Frequency Distribution**

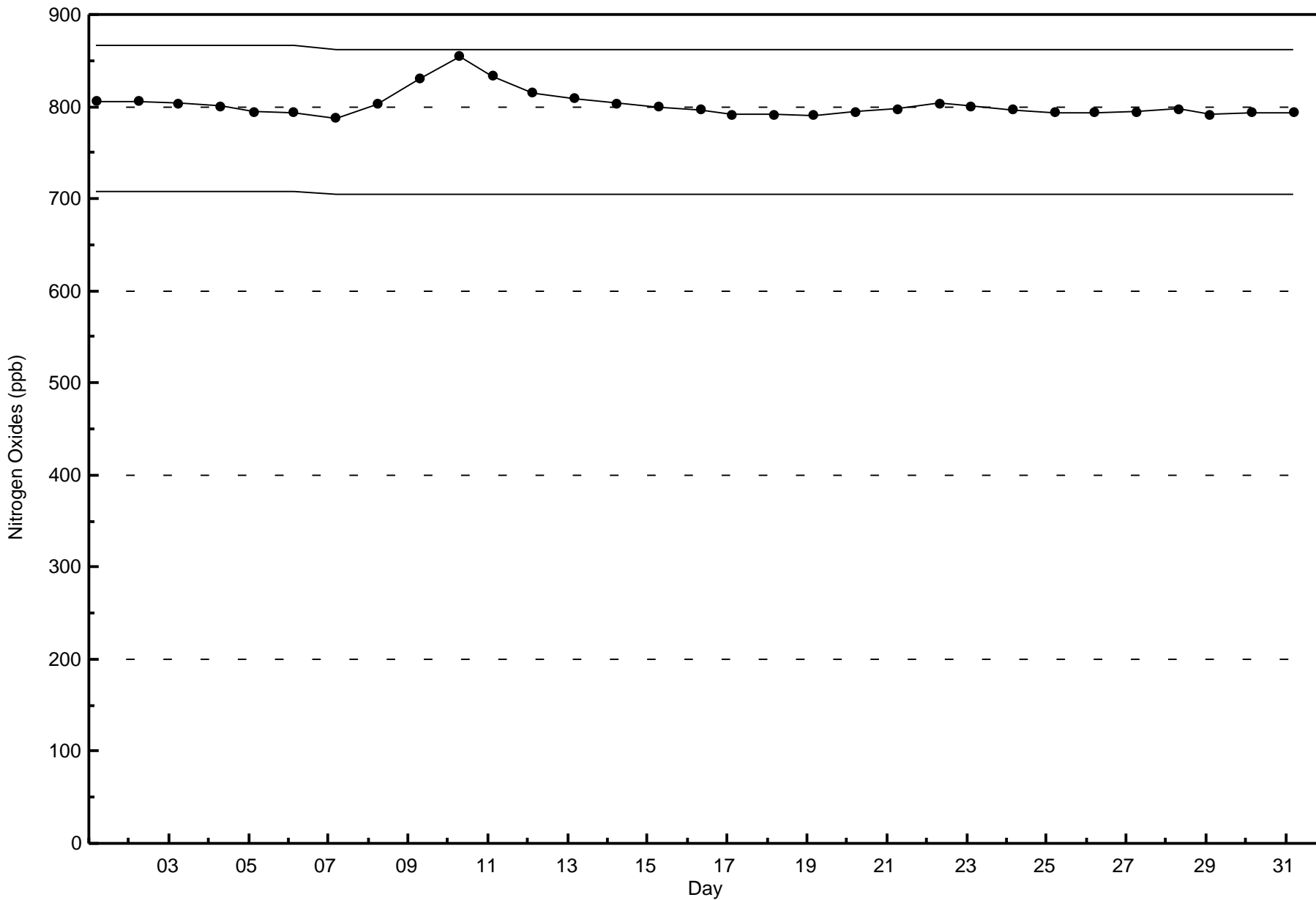
**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - July 2017**

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	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705
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	51	18	12	4	11	31	23	39	72	62	73	95	68	53	39	54	705

Total Number of Valid Hours: 705

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH₃) - ppb

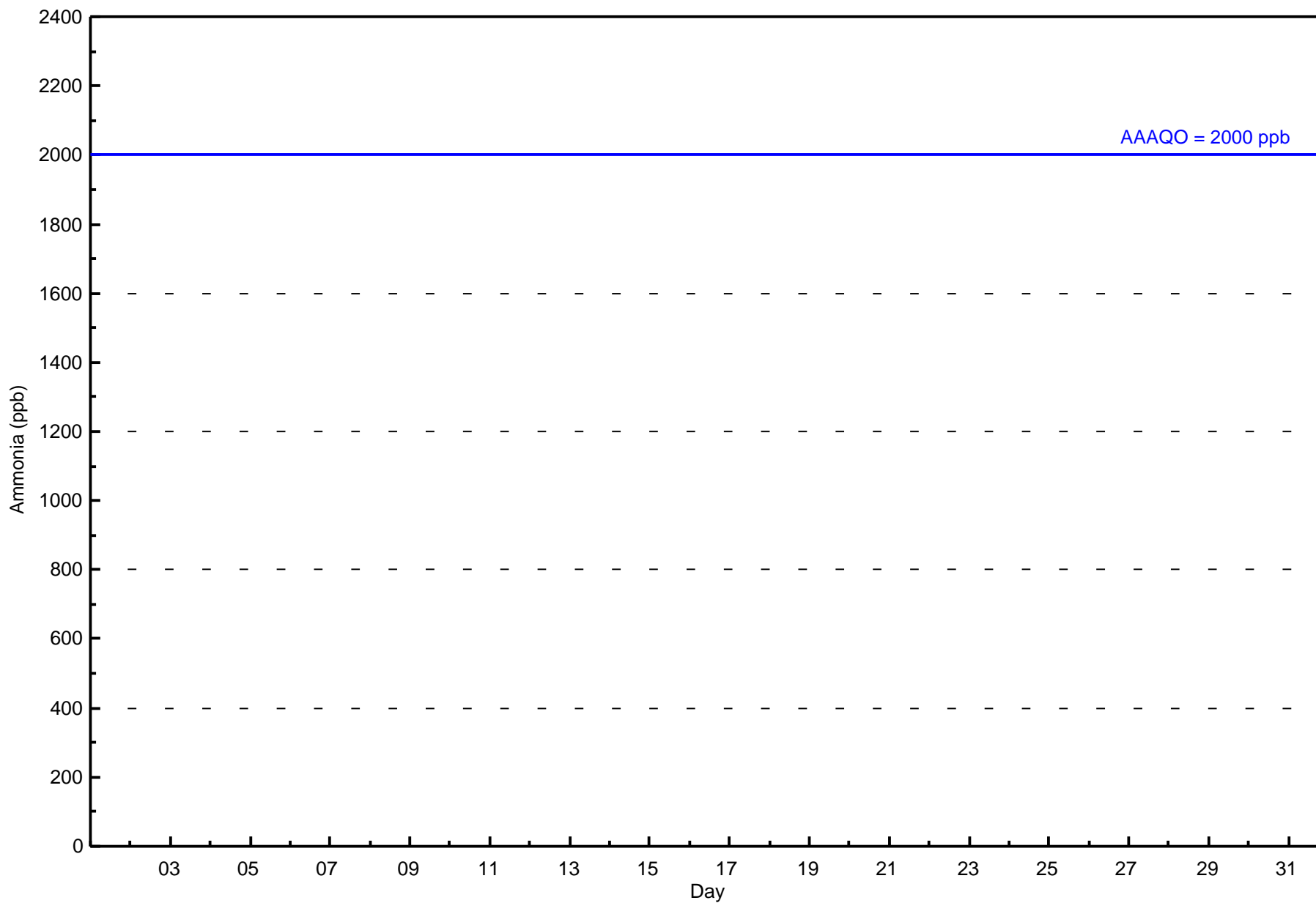
Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 Maximum Value: 0 ppb on Jul 1 01:00 Maximum Daily Average: 0.0 ppb on Jul 1																	Hours in Service: 744 Hours of Data: 644 Hours of Missing Data: 100 Hours of Calibration: 46 Percent Operational Time: 92.7										
Minimum Value: 0 ppb on Jul 1 01:00 Maximum Diurnal Average: 0.0 ppb at hour 1 Monthly Average: 0.0 ppb																	Minimum Daily Average: 0.0 ppb on Jul 1 Minimum Diurnal Average: 0.0 ppb at hour 1 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-Jul	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
2-Jul	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
3-Jul	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
4-Jul	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
5-Jul	Z	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
6-Jul	0	Z	RE	RE	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0
7-Jul	0	0	Z	RE	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	--	0
8-Jul	0	0	0	SP	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
9-Jul	0	0	0	0	SP	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
10-Jul	0	0	0	0	0	SP	RE	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
11-Jul	SP	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
12-Jul	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
13-Jul	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
14-Jul	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
15-Jul	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
16-Jul	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
17-Jul	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
18-Jul	0	Z	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
19-Jul	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
20-Jul	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
21-Jul	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
22-Jul	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
23-Jul	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
24-Jul	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
25-Jul	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
26-Jul	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
27-Jul	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
28-Jul	0	0	0	0	0	Z	RE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
29-Jul	Z	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
30-Jul	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
31-Jul	0	0	Z	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																								Diurnal Average			
0																								Diurnal Maximum			
Z - zerospan C - Calibration SP - Span RE - Recovery Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	644	100.00	100.00
6 - 10	0	0.00	100.00
11 - 15	0	0.00	100.00
16 - 20	0	0.00	100.00
21 - 25	0	0.00	100.00
> 26	0	0.00	100.00

Total Number of Valid Hours: 644

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ammonia (NH₃) - ppb
Patricia McInnes - July 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	47	18	12	4	9	29	23	32	66	56	63	89	62	48	34	51	643
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	47	18	12	4	9	29	23	32	66	56	63	89	62	48	34	51	643

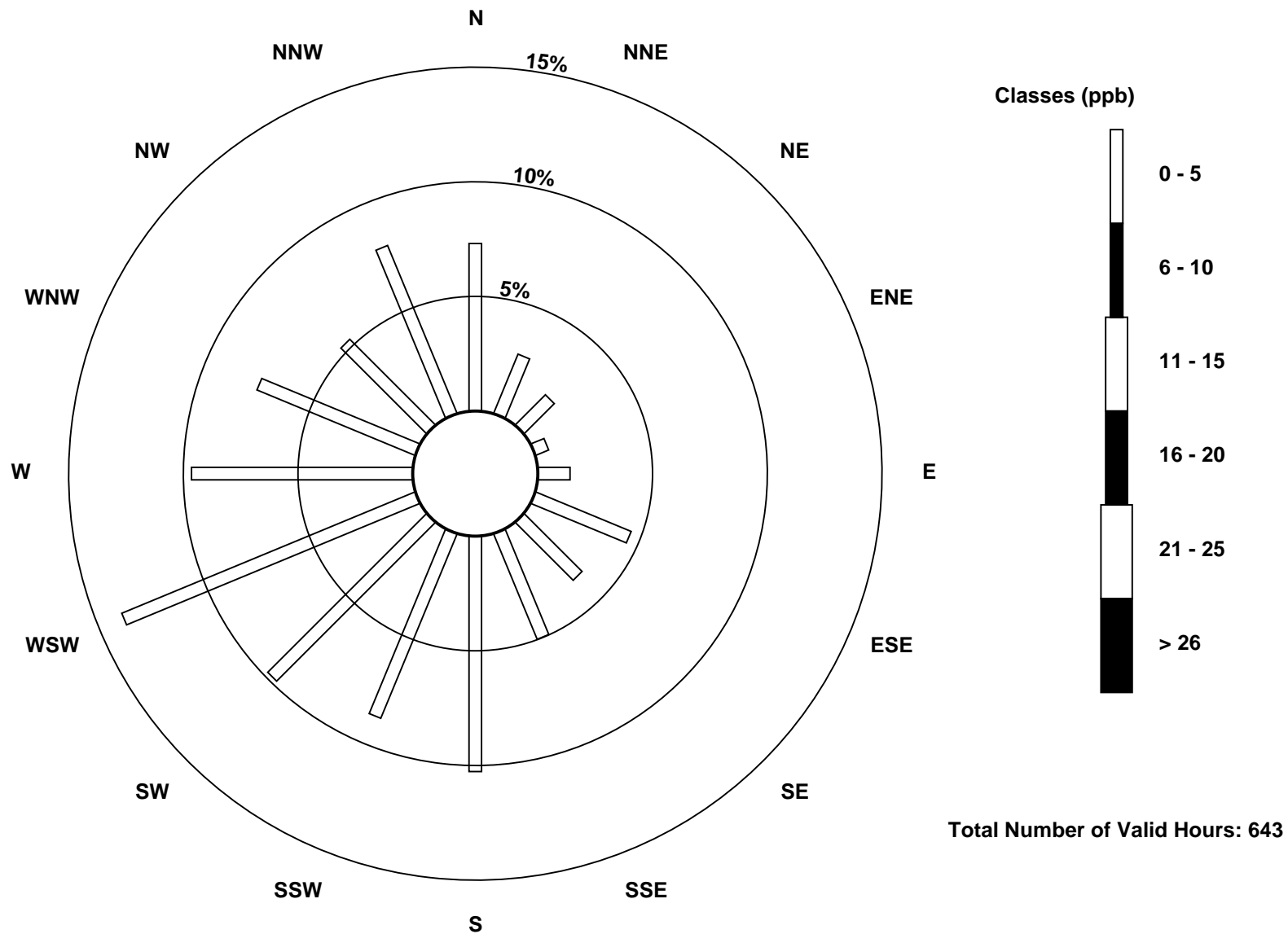
Total Number of Valid Hours: 643

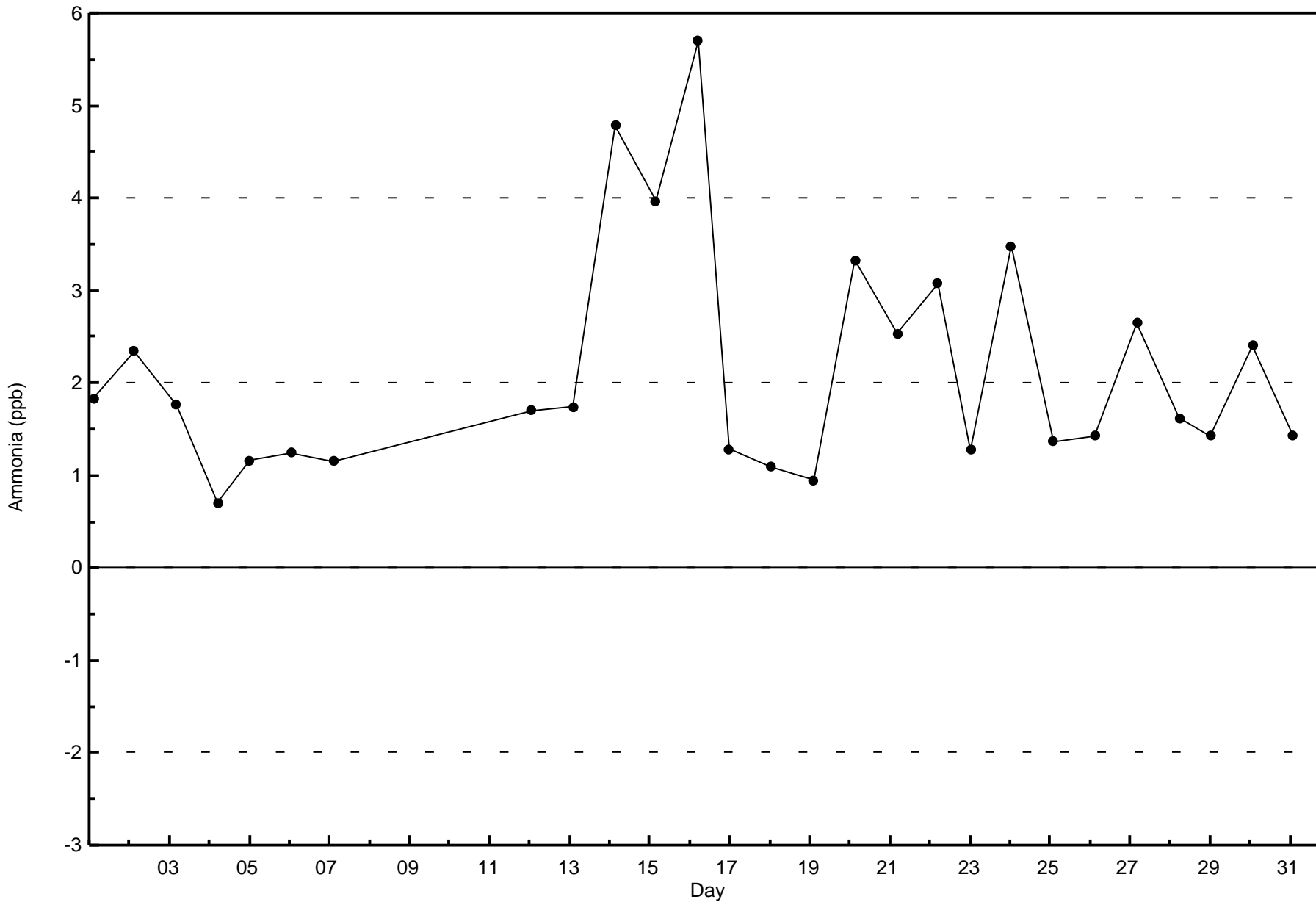
Total Number of Hours: 744

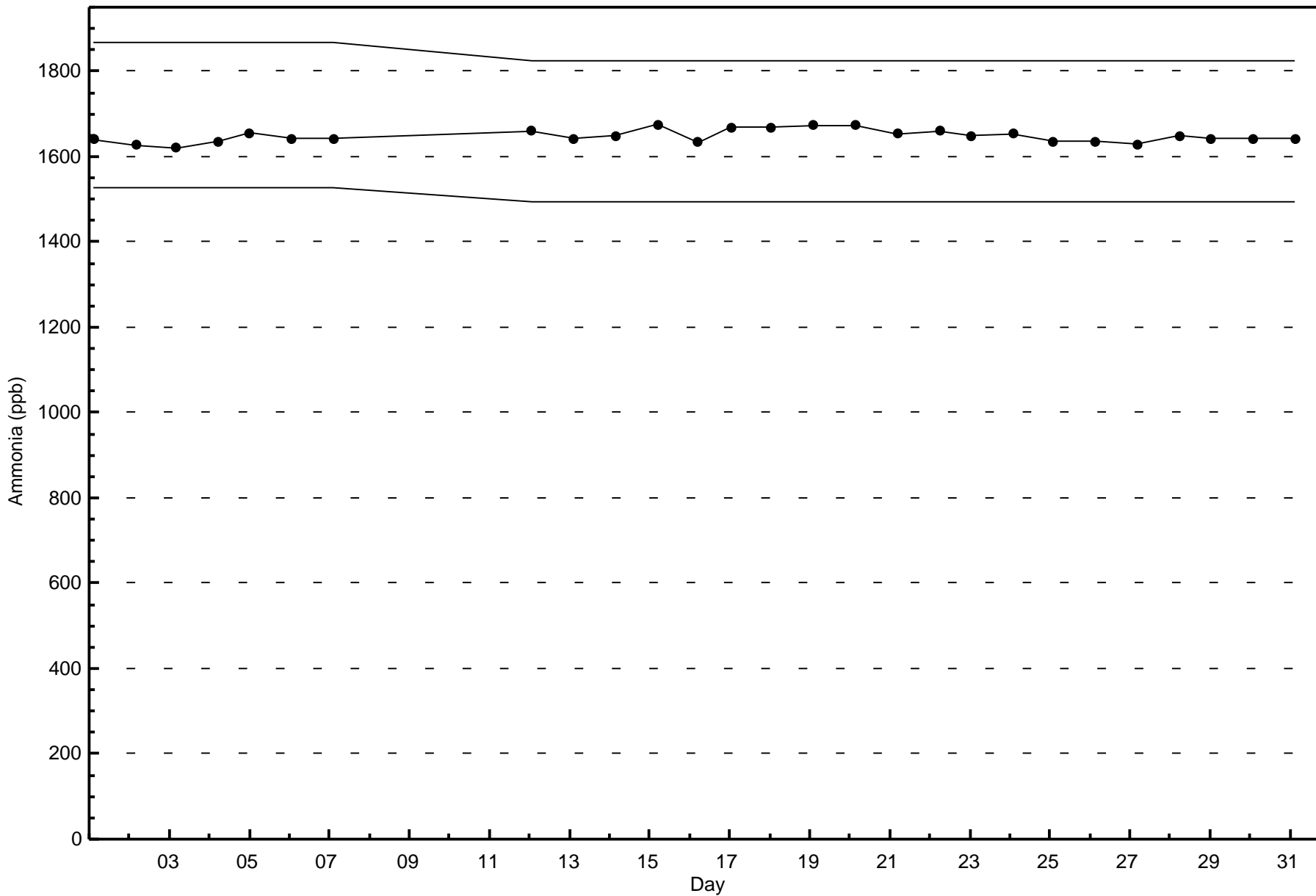


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ammonia (NH₃) - ppb
Patricia McInnes (AMS 6)





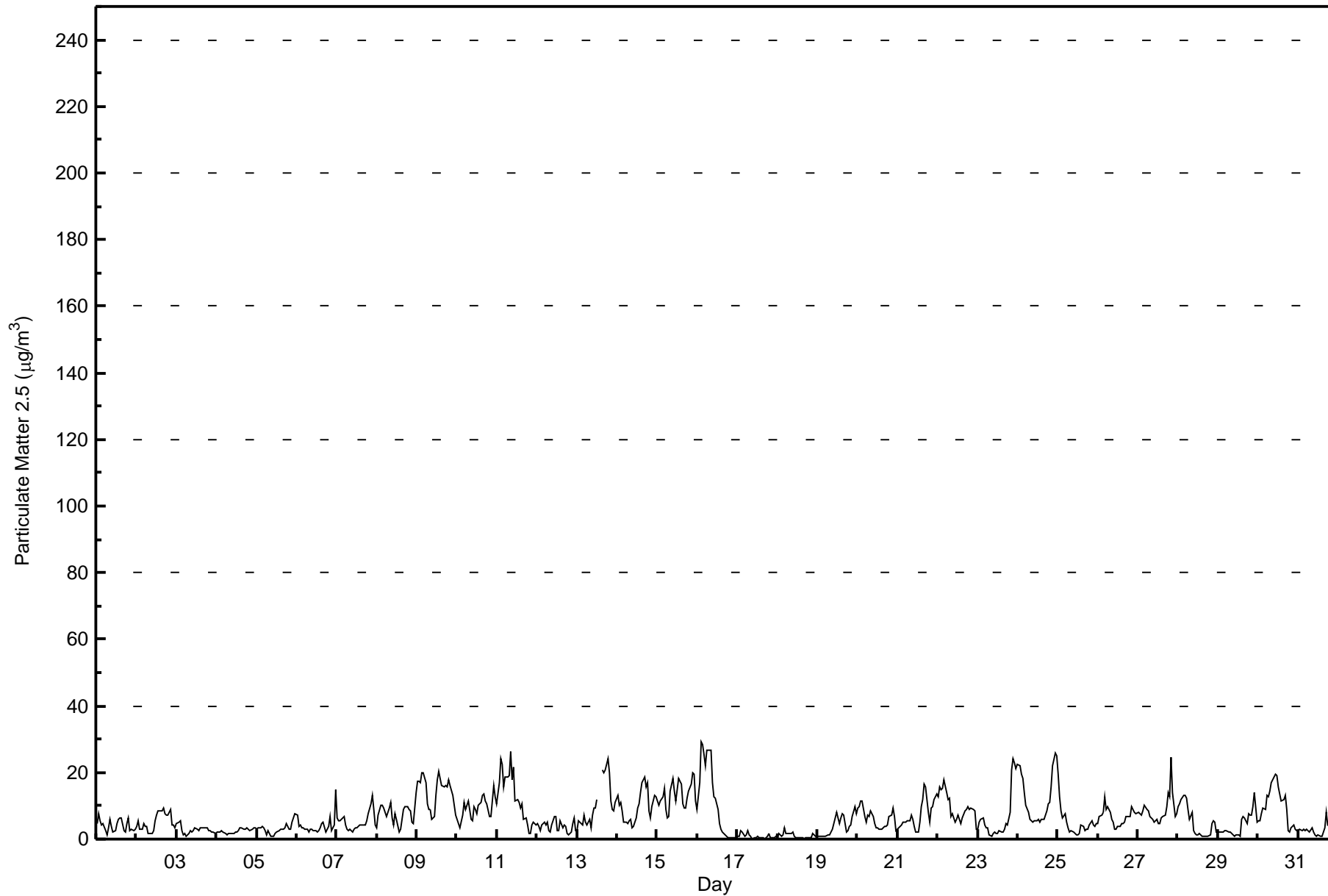




Summary of Hour Averages

Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 29.1 µg/m ³ on Jul 16 03:00 Minimum Value: 0.2 µg/m ³ on Jul 18 17:00 Maximum Diurnal Average: 8.2 µg/m ³ at hour 4 Monthly Average: 6.77 µg/m ³		Maximum Daily Average: 14.5 µg/m ³ on Jul 9 Minimum Daily Average: 0.9 µg/m ³ on Jul 17 Minimum Diurnal Average: 5.4 µg/m ³ at hour 11 Percentiles: P ₁ = 0.3 P ₁₀ = 1.4 Q ₁ = 2.6 Median = 5.0 Q ₃ = 9.1 P ₉₀ = 15.3 P ₉₉ = 25.6		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 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-Jul	4.8	7.6	5.4	4.0	4.7	2.3	1.4	3.3	5.8	3.7	2.1	2.4	4.9	6.0	6.3	6.2	2.6	2.3	4.9	6.2	2.5	2.9	2.4	3.0	4.1	7.6
2-Jul	3.8	5.5	3.1	3.0	4.6	3.8	3.7	1.7	1.6	1.7	2.6	5.3	7.2	8.6	8.6	8.7	9.1	7.6	7.1	7.3	8.8	4.1	4.2	3.3	5.2	9.1
3-Jul	4.6	5.0	5.3	2.7	1.4	1.8	1.0	1.7	2.4	1.9	2.5	3.3	3.1	2.7	3.2	3.3	3.4	3.2	3.4	2.5	2.4	2.0	1.9	1.9	2.8	5.3
4-Jul	1.9	1.9	2.1	2.3	2.3	1.7	1.4	1.8	1.8	1.9	1.7	2.2	2.2	2.4	3.2	3.6	3.1	3.1	3.4	3.0	2.7	3.0	3.4	3.2	2.5	3.6
5-Jul	3.0	3.3	3.5	3.7	3.3	2.5	1.4	2.7	1.0	0.8	0.7	1.7	2.3	2.6	2.9	3.0	2.8	3.5	4.8	3.2	2.9	4.9	6.4	7.5	3.1	7.5
6-Jul	7.0	3.6	4.4	3.6	3.2	3.0	2.9	1.9	2.9	3.0	2.6	2.4	2.3	2.5	3.4	4.5	5.0	2.2	2.8	3.7	6.9	2.6	4.1	14.9	4.0	14.9
7-Jul	6.4	5.6	5.7	5.9	6.8	4.1	3.1	2.7	2.8	2.2	3.1	3.3	3.2	3.7	4.2	4.1	4.3	4.4	5.7	7.4	10.7	13.0	8.9	4.4	5.2	13.0
8-Jul	3.4	7.1	10.2	10.1	9.1	8.0	6.8	9.4	11.1	6.5	4.3	7.5	5.8	2.0	2.9	6.0	8.7	9.9	9.6	8.7	8.5	4.9	4.9	14.1	7.5	14.1
9-Jul	17.4	17.4	16.8	19.8	20.0	16.9	10.7	9.1	9.0	5.9	6.9	12.9	17.8	20.2	18.4	15.9	15.7	16.1	15.8	17.6	16.1	13.0	10.2	7.3	14.5	20.2
10-Jul	5.9	4.6	3.3	7.2	11.2	9.1	10.0	11.3	5.7	5.7	9.9	9.0	7.8	10.2	10.9	13.2	13.4	11.3	10.6	6.7	6.6	11.3	16.0	12.8	9.3	16.0
11-Jul	10.7	17.0	24.3	22.6	15.5	18.6	18.7	19.3	26.3	17.8	21.7	11.4	11.8	10.9	9.4	10.5	6.1	6.4	4.3	1.9	1.9	4.2	5.0	4.2	12.5	26.3
12-Jul	4.5	3.7	2.6	4.4	5.2	4.1	5.0	2.6	2.0	4.1	6.9	6.7	2.5	2.7	5.3	3.4	4.4	3.9	1.7	1.4	2.3	4.8	6.4	2.6	3.9	6.9
13-Jul	2.5	5.3	4.7	4.4	7.2	5.3	4.3	5.9	3.4	7.1	9.3	9.5	11.8	C	C	20.8	19.9	20.6	24.2	19.9	11.5	9.0	8.6	10.9	10.3	24.2
14-Jul	13.1	10.3	11.1	8.5	4.9	5.1	4.8	5.7	5.8	3.6	4.0	6.5	9.3	10.6	14.0	17.0	18.8	15.6	16.7	8.6	6.3	9.8	13.1	12.7	9.8	18.8
15-Jul	11.3	10.4	11.6	12.8	15.2	8.8	6.4	6.7	14.5	18.2	14.5	11.6	14.9	18.2	16.6	10.6	9.2	9.4	12.1	14.2	16.4	20.0	19.7	11.5	13.1	20.0
16-Jul	9.1	16.9	29.1	28.5	25.3	21.9	26.6	26.8	26.6	16.9	12.9	12.4	8.8	4.5	2.9	2.1	1.6	0.8	0.6	0.4	0.5	0.6	0.6	0.6	11.5	29.1
17-Jul	0.7	1.1	2.6	2.1	0.9	1.1	2.6	1.4	0.8	0.2	0.5	0.5	0.7	0.4	0.5	0.3	0.2	0.5	0.9	1.9	0.5	0.6	0.6	0.7	0.9	2.6
18-Jul	0.5	1.8	1.0	1.2	3.5	1.6	1.8	1.5	1.6	2.0	1.0	0.4	0.2	0.2	0.4	0.3	0.2	0.2	0.4	0.5	0.6	1.7	1.3	0.7	1.0	3.5
19-Jul	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.2	2.0	3.0	4.7	8.2	6.5	4.8	6.3	7.8	7.2	2.1	2.5	3.8	4.2	6.7	10.0	7.8	4.0	10.0
20-Jul	9.4	9.9	11.6	11.5	6.9	5.1	7.0	6.8	8.3	6.8	4.5	3.3	3.2	3.1	2.9	3.2	3.6	3.7	4.3	6.7	7.1	9.1	6.7	2.7	6.1	11.6
21-Jul	2.9	3.9	4.4	5.3	5.0	5.2	5.6	5.7	7.0	6.1	4.0	2.1	2.1	5.2	9.6	12.0	16.4	15.6	8.0	5.1	9.4	9.9	12.0	13.7	7.3	16.4
22-Jul	12.6	15.7	14.8	15.4	17.7	13.9	11.9	12.2	6.9	7.5	4.9	5.9	7.3	5.8	4.5	6.5	8.5	8.9	9.6	8.7	9.1	8.7	8.6	2.8	9.5	17.7
23-Jul	3.1	5.0	6.1	6.4	4.4	3.5	3.2	1.5	0.8	1.7	2.0	1.7	1.7	2.7	1.9	2.2	2.8	4.6	4.4	8.1	20.8	24.0	22.8	21.0	6.5	24.0
24-Jul	22.5	22.1	19.6	18.2	14.0	10.1	8.0	6.0	5.3	4.9	5.4	5.4	6.0	5.3	6.0	6.0	5.8	8.5	10.4	11.0	15.6	21.9	25.9	24.8	12.0	25.9
25-Jul	19.3	12.8	8.4	6.4	7.5	5.0	3.3	2.1	2.4	2.0	1.5	1.1	1.3	1.9	4.3	3.9	2.5	2.8	3.0	4.3	5.4	4.4	3.8	4.7	4.8	19.3
26-Jul	4.8	7.0	7.2	8.2	12.8	8.8	9.6	7.9	5.8	5.1	3.1	3.0	3.7	4.0	4.5	4.8	5.2	6.7	6.7	6.9	9.8	9.0	8.1	7.8	6.7	12.8
27-Jul	8.0	7.6	7.3	8.5	10.1	8.8	8.3	7.0	6.2	5.8	5.2	6.0	4.8	4.6	6.2	6.8	7.1	9.6	14.1	12.7	24.7	13.9	6.6	7.5	8.6	24.7
28-Jul	9.9	10.8	11.8	13.0	13.3	12.4	8.9	6.1	8.2	2.4	1.7	1.4	1.2	1.7	0.9	0.9	0.8	1.0	1.0	1.4	4.7	5.7	5.0	2.2	5.3	13.3
29-Jul	2.1	2.2	2.2	2.3	2.6	2.6	2.0	1.9	1.5	1.2	1.0	1.1	1.2	1.1	6.1	6.9	6.4	4.6	7.8	7.4	7.4	9.6	14.1	5.3	4.2	14.1
30-Jul	5.4	5.6	7.8	9.3	8.8	13.2	12.8	14.4	16.8	17.8	19.5	19.1	15.6	13.4	11.6	11.8	13.3	8.9	2.7	2.2	3.4	4.1	3.0	2.5	10.1	19.5
31-Jul	2.3	2.8	2.7	2.8	2.6	3.0	2.6	1.9	3.2	2.1	1.2	0.9	1.1	0.9	0.8	2.1	3.3	7.9	4.2	4.8	6.8	8.4	9.0	10.9	3.7	10.9
																								Diurnal Average		
																								Diurnal Maximum		
6.9 7.6 8.1 8.2 8.1 6.8 6.3 6.1 6.4 5.5 5.4 5.4 5.6 5.4 6.0 6.7 6.8 6.6 6.7 6.4 7.6 8.0 8.2 7.4																										
22.5 22.1 29.1 28.5 25.3 21.9 26.6 26.8 26.6 18.2 21.7 19.1 17.8 20.2 18.4 20.8 19.9 20.6 24.2 19.9 24.7 24.0 25.9 24.8																										
C - Calibration																										
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 - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	341	45.96	45.96
6 - 15	276	37.20	83.15
16 - 25	65	8.76	91.91
26 - 80	7	0.94	92.86
> 81.0	0	0.00	92.86

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - July 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	19	4	1	0	6	12	6	18	33	35	42	63	49	17	16	19	340
6 - 15	20	10	10	4	3	12	11	19	38	31	25	24	14	18	15	22	276
16 - 25	10	4	1	1	2	7	6	4	5	1	4	1	2	7	3	7	65
26 - 80	1	0	0	0	0	0	0	0	0	0	0	2	0	2	1	1	7
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	18	12	5	11	31	23	41	76	67	71	90	65	44	35	49	688

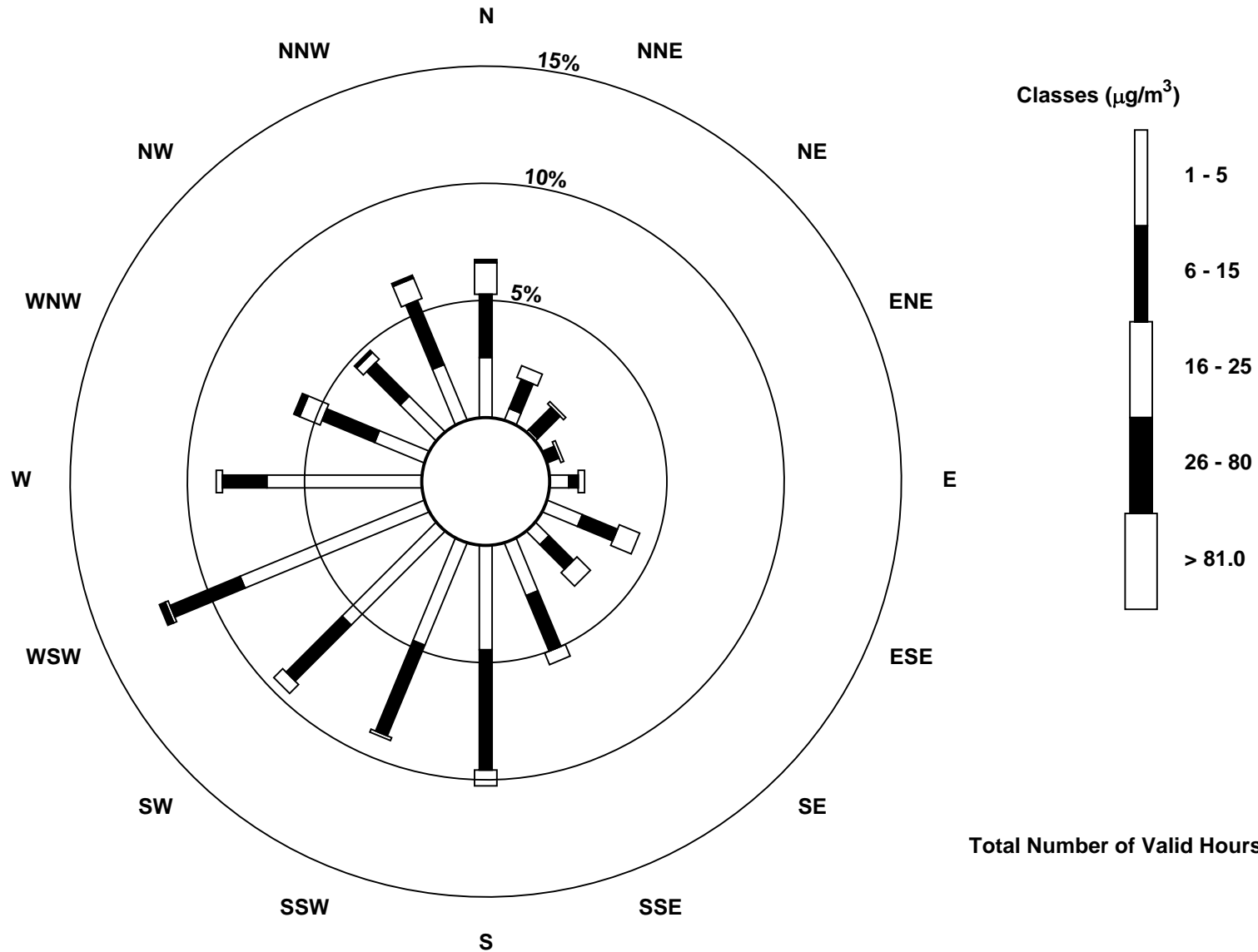
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes (AMS 6)



Total Number of Valid Hours: 741



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

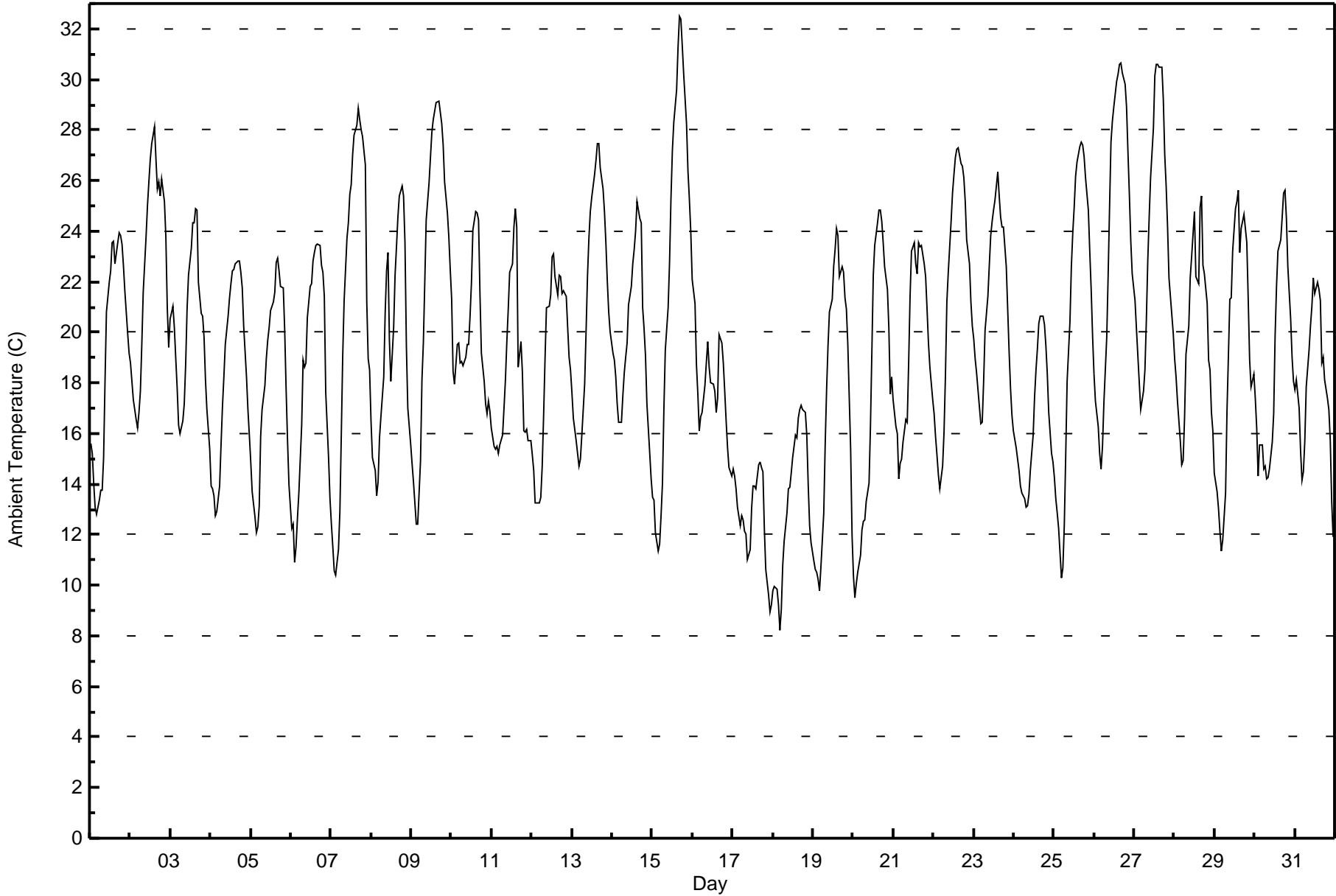
Patricia McInnes - July 2017

Maximum Value: 32.5 C on Jul 15 17:00 Maximum Daily Average: 24.0 C on Jul 26																						Hours in Service:	744			
Minimum Value: 8.2 C on Jul 18 05:00 Minimum Daily Average: 12.7 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 24.3 C at hour 16 Minimum Diurnal Average: 13.8 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: 19.44 C Percentiles: P ₁ = 9.8 P ₁₀ = 13.1 Q ₁ = 15.6 Median = 19.2 Q ₃ = 23.2 P ₉₀ = 26.0 P ₉₉ = 30.6																						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-Jul	15.6	15.2	14.1	13.1	12.8	13.4	13.7	13.8	15.1	18.1	20.8	22.0	22.4	23.5	23.6	22.7	23.5	23.9	23.8	23.5	22.7	21.7	20.0	19.2	19.1	23.9
2-Jul	18.8	18.1	17.3	16.6	16.2	16.9	17.7	19.5	21.6	23.8	25.0	26.0	26.9	27.4	28.1	26.9	25.6	25.9	25.4	26.1	25.2	23.8	21.0	19.4	22.5	28.1
3-Jul	20.5	21.0	20.2	19.0	17.8	16.3	16.0	16.5	17.1	18.7	20.9	22.2	23.3	24.3	24.3	24.9	24.9	22.0	20.7	20.6	19.8	18.1	16.9	15.4	20.1	24.9
4-Jul	13.9	13.8	13.5	12.8	12.9	13.9	15.5	17.1	18.3	19.5	20.7	21.4	21.9	22.4	22.5	22.7	22.8	22.8	22.4	21.7	20.2	18.2	16.9	16.0	18.5	22.8
5-Jul	14.9	13.7	12.7	12.1	12.3	13.2	15.9	16.9	17.9	19.0	19.7	20.2	20.9	21.2	21.6	22.8	22.9	22.4	21.8	21.8	20.1	17.7	15.7	14.0	18.0	22.9
6-Jul	12.2	12.4	10.9	11.5	12.7	13.6	16.3	18.9	18.6	18.8	20.6	21.8	21.9	22.8	23.2	23.5	23.5	23.4	22.6	22.4	21.4	17.6	15.1	13.5	18.3	23.5
7-Jul	12.4	11.5	10.5	10.4	11.4	12.9	15.9	19.1	21.3	23.7	24.3	25.4	25.9	27.0	27.8	28.2	28.9	28.4	28.0	27.7	26.6	21.2	19.0	18.5	21.1	28.9
8-Jul	16.5	15.0	14.5	13.5	14.1	15.8	16.7	18.2	20.8	22.4	23.2	19.7	18.1	20.2	22.2	23.4	24.6	25.4	25.8	25.4	23.5	19.4	17.0	15.6	19.6	25.8
9-Jul	14.8	14.1	13.3	12.4	12.4	14.9	18.1	19.6	22.0	24.4	25.9	26.9	27.9	28.4	28.8	29.1	29.1	28.7	28.2	27.4	26.0	24.7	23.8	22.5	22.6	29.1
10-Jul	21.3	18.5	17.9	19.5	19.6	18.8	18.8	18.7	19.0	19.5	19.5	20.6	22.0	24.0	24.8	24.7	24.5	21.6	19.2	18.0	17.2	16.8	17.3	16.9	19.9	24.8
11-Jul	16.2	15.5	15.4	15.5	15.2	15.5	15.9	17.0	18.1	19.6	20.9	22.4	22.7	24.2	24.9	24.2	18.6	19.6	18.4	16.1	16.1	16.2	15.7	15.7	18.3	24.9
12-Jul	15.1	14.6	13.3	13.3	13.3	13.5	14.7	16.7	19.0	21.0	21.0	21.5	23.0	23.1	22.2	21.5	22.2	22.2	21.5	21.6	21.4	20.2	19.0	18.5	18.9	23.1
13-Jul	17.6	16.6	15.7	15.2	14.7	15.0	15.9	17.9	20.0	22.2	23.7	24.8	25.3	26.2	26.8	27.5	27.5	26.5	25.7	24.8	23.5	22.1	20.8	20.0	21.5	27.5
14-Jul	19.2	18.9	18.3	17.2	16.4	16.5	17.5	18.4	19.0	19.6	21.1	21.8	22.7	23.3	24.0	25.2	24.5	24.3	21.0	20.2	19.1	17.2	15.2	14.2	19.8	25.2
15-Jul	13.5	13.4	12.1	11.4	11.6	12.8	14.0	16.9	19.3	21.0	22.7	25.3	27.2	28.3	29.6	31.2	32.5	32.4	31.3	30.2	28.2	26.4	25.3	24.0	22.5	32.5
16-Jul	22.1	21.1	18.7	17.6	16.1	16.7	16.9	17.9	18.8	19.6	18.6	18.0	17.7	16.9	17.4	19.9	19.6	18.8	17.6	17.6	16.5	15.4	14.7	14.3	17.9	22.1
17-Jul	14.6	14.3	13.8	13.1	12.4	12.7	12.6	12.2	12.0	11.0	11.4	13.1	14.0	13.9	13.8	14.8	14.9	14.7	14.5	12.2	10.6	9.6	9.0	9.2	12.7	14.9
18-Jul	9.8	9.9	9.9	9.2	8.2	9.0	10.8	11.7	12.9	13.8	13.9	14.4	15.0	15.9	15.9	16.6	17.0	17.1	17.0	16.8	15.9	14.0	12.3	11.7	13.3	17.1
19-Jul	11.0	10.6	10.5	10.2	9.8	10.7	12.9	15.5	17.7	19.5	20.8	21.3	22.6	23.3	24.1	23.8	22.2	22.6	22.4	21.4	20.9	19.5	15.4	12.0	17.5	24.1
20-Jul	10.4	9.5	10.1	10.5	11.2	12.2	12.5	12.6	13.3	14.1	16.3	19.3	22.2	23.4	24.3	24.8	24.8	24.4	23.6	22.6	21.7	20.2	17.6	18.2	17.5	24.8
21-Jul	17.3	16.3	16.0	14.2	14.8	15.0	15.6	16.5	16.4	18.8	21.4	23.2	23.5	22.7	22.3	23.6	23.4	23.4	22.7	22.2	20.9	19.6	18.6	17.3	19.4	23.6
22-Jul	16.8	15.9	15.2	14.4	13.8	14.7	16.1	18.3	21.2	22.4	24.4	25.5	26.3	26.9	27.2	27.3	26.7	26.6	26.1	25.2	23.7	22.7	21.2	20.2	21.6	27.3
23-Jul	19.8	18.9	18.4	17.1	16.4	16.4	18.0	20.1	21.4	22.7	23.8	24.4	24.9	25.2	26.4	25.4	24.6	24.2	24.2	22.6	20.9	19.3	17.8	16.7	21.2	26.4
24-Jul	16.1	15.4	15.0	14.5	13.9	13.6	13.4	13.1	13.1	13.6	14.5	16.0	17.4	18.5	19.4	20.4	20.7	20.6	20.3	19.4	18.4	16.9	15.2	14.9	16.4	20.7
25-Jul	14.3	13.4	12.8	12.2	10.3	10.7	12.4	15.1	18.1	20.4	22.6	24.0	24.9	26.2	26.8	27.3	27.5	27.4	27.0	26.1	24.8	23.2	21.7	19.9	20.4	27.5
26-Jul	18.4	17.3	16.3	15.2	14.6	15.5	17.2	19.8	22.3	24.9	27.5	28.4	28.9	29.9	30.2	30.6	30.7	30.3	29.8	28.9	27.1	25.4	23.6	22.3	24.0	30.7
27-Jul	21.3	20.2	19.1	18.0	16.9	17.7	18.5	20.5	22.8	24.5	26.1	28.1	30.1	30.6	30.6	30.5	30.5	29.2	27.0	25.8	24.2	22.1	20.7	19.9	24.0	30.6
28-Jul	19.0	18.3	17.3	15.7	14.8	14.9	16.6	19.1	20.2	22.1	23.0	23.9	24.8	22.2	22.0	24.9	25.4	22.6	22.3	21.1	18.9	18.5	16.8	16.1	20.0	25.4
29-Jul	14.4	13.7	13.0	12.1	11.4	11.8	13.7	16.9	19.1	21.3	21.4	23.2	24.9	25.2	25.6	23.2	24.1	24.7	24.1	23.5	21.3	18.9	17.9	18.3	19.3	25.6
30-Jul	17.4	16.2	14.3	15.5	15.6	14.6	14.7	14.2	14.2	14.6	15.7	16.8	19.8	21.8	23.2	23.7	24.6	25.5	25.6	24.5	22.6	20.5	19.0	18.0	18.9	25.6
31-Jul	17.7	18.1	17.0	15.3	14.2	14.5	15.7	17.8	19.3	20.2	21.0	22.2	21.5	22.0	21.7	21.3	18.8	19.0	18.1	17.4	17.0	15.7	13.3	11.9	17.9	22.2
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Patricia McInnes - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Patricia McInnes - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	11	1.48	1.48
10 - 20	396	53.23	54.70
> 20	337	45.30	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

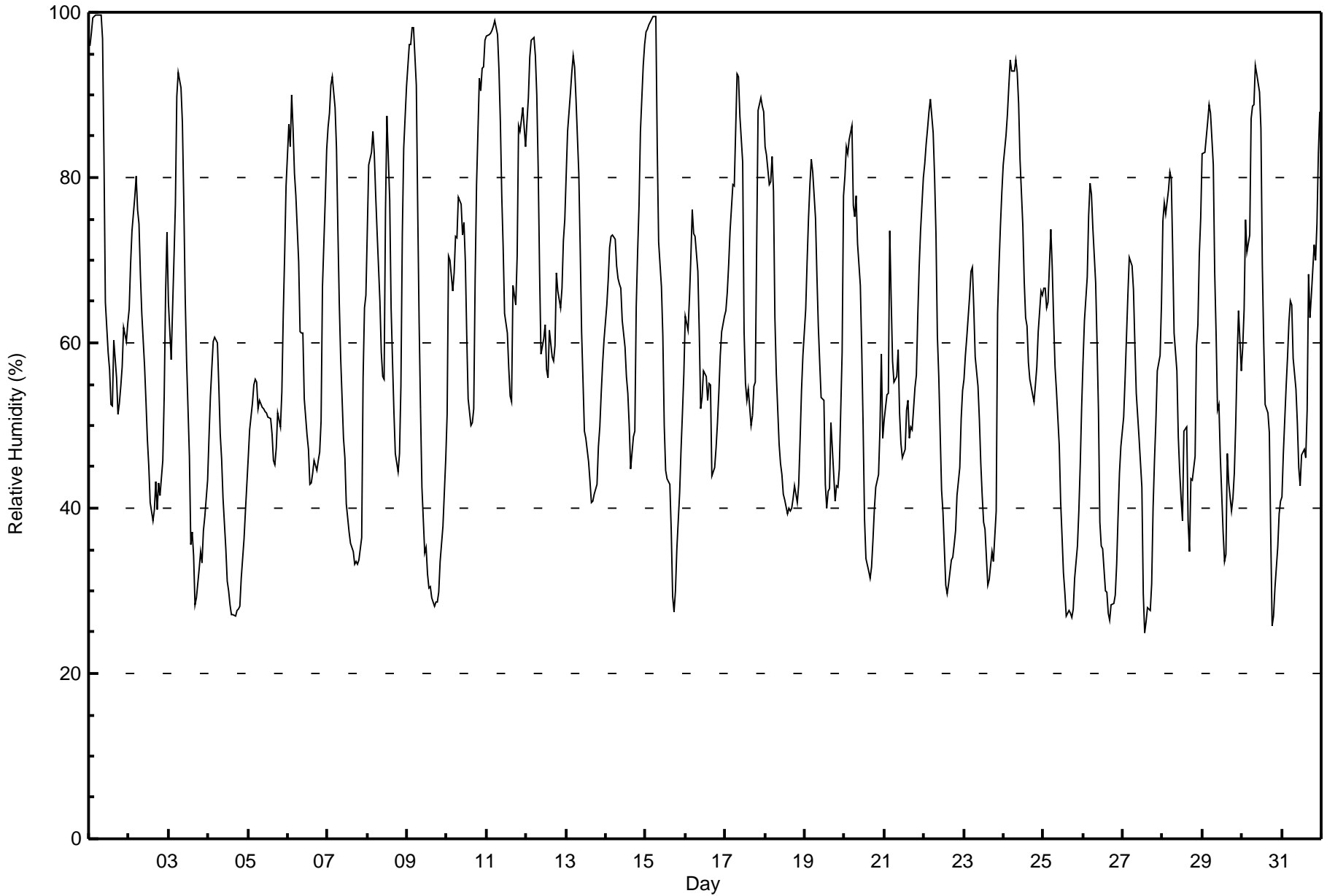
Patricia McInnes - July 2017

Maximum Value: 100 % on Jul 1 08:00																	Maximum Daily Average: 80.6 % on Jul 11																	Hours in Service: 744										
Minimum Value: 25 % on Jul 27 14:00																	Minimum Daily Average: 40.4 % on Jul 4																	Hours of Data: 744										
Maximum Diurnal Average: 80.8 % at hour 5																	Minimum Diurnal Average: 42.4 % at hour 16																	Hours of Missing Data: 0										
Monthly Average: 60.0 %																	Percentiles: P ₁ = 27 P ₁₀ = 35 Q ₁ = 45 Median = 58 Q ₃ = 74 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-Jul	96	98	99	100	100	100	100	100	97	83	65	59	57	53	52	60	56	51	53	55	57	62	60	62	73.8	100																		
2-Jul	64	70	73	78	80	76	74	68	64	57	53	48	45	41	39	40	43	40	43	41	46	54	66	73	57.3	80																		
3-Jul	65	58	64	70	77	90	93	91	87	77	65	58	46	36	37	34	28	29	33	35	33	37	39	43	55.2	93																		
4-Jul	49	54	57	60	61	60	55	49	46	41	35	31	30	28	27	27	28	28	28	28	32	36	40	43	40.4	61																		
5-Jul	46	50	53	55	56	55	52	53	52	52	52	51	51	51	49	46	45	47	51	50	54	63	71	79	53.5	79																		
6-Jul	86	84	90	86	81	78	70	61	61	61	53	49	47	43	43	44	46	45	46	47	51	67	78	83	62.4	90																		
7-Jul	86	88	91	92	89	84	74	65	58	48	46	41	39	37	36	35	33	34	33	34	36	56	64	66	56.8	92																		
8-Jul	74	81	83	86	83	78	73	65	59	56	56	76	87	77	64	58	52	47	44	47	55	73	84	91	68.6	91																		
9-Jul	93	96	96	98	98	91	76	63	52	42	35	35	32	30	31	29	28	29	29	30	34	38	42	46	53.0	98																		
10-Jul	51	70	70	66	68	73	73	78	77	73	75	70	61	53	50	50	52	68	79	92	91	93	93	97	71.8	97																		
11-Jul	97	97	97	98	98	99	97	93	87	78	71	64	61	57	54	53	67	65	70	86	86	87	88	84	80.6	99																		
12-Jul	87	90	95	97	97	95	90	81	69	59	60	62	57	56	62	58	58	60	68	66	64	67	72	75	72.6	97																		
13-Jul	80	86	90	93	95	93	89	80	72	61	55	49	48	46	43	41	41	42	43	47	50	54	58	60	63.2	95																		
14-Jul	65	68	71	73	73	73	69	68	67	67	63	59	56	54	50	45	49	49	64	71	77	86	94	96	66.9	96																		
15-Jul	98	98	99	99	99	100	100	84	72	67	61	50	45	44	43	37	29	27	30	35	42	47	52	56	63.0	100																		
16-Jul	63	62	65	70	76	73	73	69	61	52	53	57	56	53	55	55	44	45	47	50	54	59	61	63	59.1	76																		
17-Jul	64	66	70	73	79	79	86	92	92	87	82	61	55	53	54	50	51	55	55	72	88	90	89	88	72.2	92																		
18-Jul	84	83	79	79	82	78	63	56	48	46	44	42	41	39	40	40	40	41	43	41	43	48	54	59	54.7	84																		
19-Jul	64	70	75	79	82	81	75	68	62	58	53	53	43	40	42	42	50	44	41	43	43	45	59	78	57.9	82																		
20-Jul	80	84	83	85	86	77	75	78	72	67	59	50	39	34	32	31	33	36	40	42	44	50	59	48	57.6	86																		
21-Jul	51	54	54	74	65	58	55	56	59	52	48	46	47	52	53	49	50	50	55	56	63	69	74	80	57.0	80																		
22-Jul	82	84	86	88	89	85	80	73	61	56	42	39	35	31	30	31	34	34	36	37	41	45	51	54	55.2	89																		
23-Jul	56	58	61	66	69	69	64	58	55	51	45	42	38	37	31	31	33	35	34	40	64	69	74	78	52.4	78																		
24-Jul	81	85	88	91	94	93	93	94	93	89	82	74	67	63	62	58	56	54	53	55	57	61	66	66	74.0	94																		
25-Jul	67	67	64	65	74	69	63	57	54	48	41	37	32	30	27	28	27	27	28	32	35	40	45	52	46.1	74																		
26-Jul	58	63	68	75	79	78	74	67	60	52	38	35	35	30	30	27	26	28	29	29	33	39	44	47	47.8	79																		
27-Jul	51	56	61	66	70	69	66	60	54	51	48	42	30	25	26	28	28	31	40	46	50	57	58	65	49.1	70																		
28-Jul	75	77	76	78	81	80	71	61	57	49	44	41	38	49	50	39	35	44	43	46	60	62	71	75	58.4	81																		
29-Jul	83	83	85	87	89	88	81	69	61	52	53	46	37	34	34	47	43	40	41	44	50	58	64	57	59.3	89																		
30-Jul	59	64	75	71	73	87	89	89	94	93	90	86	69	60	53	52	49	37	26	27	30	35	39	41	62.0	94																		
31-Jul	41	47	55	58	63	65	65	58	54	50	45	43	46	47	46	52	68	63	66	72	70	74	83	88	59.1	88																		
																	70.8	73.8	76.5	79.2	80.8	79.8	76.1	71.1	66.3	60.4	55.3	51.5	47.5	44.6	43.4	42.4	42.6	42.6	44.8	48.3	52.7	58.7	64.2	67.5	Diurnal Average			
																	98	98	99	100	100	100	100	100	100	100	97	93	90	86	87	77	64	60	68	68	79	92	91	93	94	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Patricia McInnes - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Patricia McInnes - July 2017

Maximum Speed: 32 km/h on Jul 4 12:00	Maximum Daily Speed Average: 21.9 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 9 04:00	Minimum Daily Speed Average: 0.3 km/h on Jul 13	Hours of Data: 743
Maximum Diurnal Speed Average: 6.0 km/h at hour 12	Minimum Diurnal Speed Average: 3.2 km/h at hour 21	Hours of Missing Data: 1
Monthly Average Velocity: 4.6 km/h 259.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 19 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-Jul	S4	SW4	SSW4	SSW5	S6	SSW5	S7	S8	S7	S8	SSW6	SW6	SW8	S6	SW8	W4	NW2	SSE4	SE7	ESE7	ESE9	S10	SSW10	SW15	S5.4	SW15
2-Jul	SW12	S9	SSW6	SSE3	S4	SSE8	SE8	SSE10	SSE10	SSE11	S13	S13	S14	S15	S16	SSW13	WSW13	SSW15	SSW14	S9	SSW5	S4	SSE3	SSW3	S8.8	S16
3-Jul	SW9	SW15	SSW12	WSW13	SW9	SSE7	SSE3	WSW6	WSW12	S8	SSW11	WSW16	W15	WSW17	WSW18	WSW17	WSW29	WSW25	SW16	SW19	WSW18	WSW19	WSW18	WSW15	WSW13.4	WSW29
4-Jul	WSW11	SW13	SW15	WSW15	WSW18	WSW22	WSW23	W25	WSW22	SW22	WSW29	WSW32	WSW30	WSW28	WSW31	WSW31	WSW29	WSW26	W28	W23	W16	WSW12	WSW15	WSW17	WSW21.9	WSW32
5-Jul	WSW14	WSW12	WSW11	WSW12	WSW13	WSW13	W19	W21	WNW22	WNW22	WNW20	WNW20	WNW19	NW17	NW18	NW18	NW19	NNW18	N12	NNW16	NNW11	NNW5	WNW6	WNW6	WNW13.3	WNW22
6-Jul	W5	WSW6	W6	W7	WSW9	WSW9	WSW7	WNW11	WNW11	W11	W18	WNW17	NW13	NW13	NNW16	NW16	NNW16	NW17	NW13	NNW11	NNW6	WNW4	WNW5	WSW3	WNW9.0	W18
7-Jul	WSW3	SSW2	SW3	SW3	SSW4	SSW5	S4	SSE5	S7	SSE5	NNW5	W5	W9	W6	NW10	NNW10	N7	N8	NE10	NE7	ENE5	WNW2	NNW4	N5	WNW1.5	NW10
8-Jul	NNW3	NW5	NW3	WNW4	NNW1	SSW1	ESE5	SSE5	S5	S8	W11	W7	W6	WNW2	SSW7	SW10	W6	WNW8	NW6	NW4	W1	W3	W2	WNW2	W2.8	W11
9-Jul	NNE1	SW1	W3	SW1	SW2	S2	SE5	SE7	SE8	ESE10	ESE13	SE14	ESE15	E16	ESE14	ESE14	E13	ESE12	ESE11	ESE10	ESE8	ESE10	SE11	S6	ESE7.8	E16
10-Jul	SSE2	NNW3	WNW5	NNW8	NE4	SSW4	SSW7	W10	NW11	W6	W6	WNW6	WSW5	SSW5	S5	SSE7	S8	W10	NNW5	NW7	NW15	W6	ENE4	NE5	W3.2	NW15
11-Jul	NW6	WNW6	W3	NW1	NW3	NNE1	NNW5	N11	N12	N13	N13	N13	NNE12	NNE11	N10	NE15	WNW24	SW3	SW18	WSW15	WNW3	SSE4	WSW5	WSW7	NW4.8	WNW24
12-Jul	SSW5	S3	S3	SSW6	SSW6	SSW5	S5	S6	S7	SSW5	SSE8	SSE6	SE7	S6	SW10	WSW12	SW6	SSW5	W4	SSE4	S11	SSE8	S5	SSE7	S5.3	WSW12
13-Jul	S7	S7	S6	SSW6	SSW5	SSW3	SSW7	SW8	SW9	SSW5	S8	SSE8	S8	SW3	SE7	WNW4	NNW3	NE11	N13	NNE16	N13	N11	NNW9	NNW11	WSW0.3	NNE16
14-Jul	NNW9	NNW11	N14	NNW13	N13	N13	NNW13	NNW12	NNW14	NNW12	NNE13	NNE12	NNE11	NE11	NNE5	WNW6	NW8	N17	N12	N6	NNW3	NW4	NW4	NW4	N9.5	N17
15-Jul	NW5	N4	WSW2	SW2	WSW1	SSE3	S5	SSE5	ESE7	SE11	ESE13	ESE18	SE20	SE22	SE20	SE18	SSE15	SSW14	S14	S14	S10	SSE8	SSE8	SSE7	SSE8.4	SE22
16-Jul	WSW4	NNW18	NNW18	NW9	WSW3	SW8	WSW9	WSW14	WNW12	WNW16	WNW12	SW12	SW16	WSW19	SW19	WSW20	W27	W24	W25	WSW20	WSW16	WSW15	WSW18	WSW20	W13.5	W27
17-Jul	W21	W22	W19	W17	W17	W16	WNW14	WNW13	NW18	NNW22	NNW19	NNW24	N22	NNW19	NNW16	NNW16	NW13	N13	N12	NW11	WNW6	WNW6	WNW8	WNW9	NW13.1	NNW24
18-Jul	NW10	NW8	NW11	NNW8	NW5	WNW5	NNW8	N8	NNW7	N6	NNW9	NW7	NW7	N4	ESE6	W3	WSW12	W12	W9	W9	WSW9	WSW8	SW8	SW10	WNW5.5	WSW12
19-Jul	SW12	SW13	SW13	SW13	SW14	SW16	WSW16	WSW15	SW14	C	SW17	WSW19	W19	W18	W16	WNW15	NNE18	NNE17	NNE15	NNE11	NE8	NE6	NE2	NNW3	W7.4	WSW19
20-Jul	WNW3	WNW3	NNW2	NW3	N2	N4	NNE3	NW3	ENE4	E6	E8	E10	ESE11	ESE15	ESE15	ESE14	ESE13	E14	E12	E9	ESE7	ESE4	SE6	SE11	E5.9	ESE15
21-Jul	ESE7	ESE6	ESE8	NNW2	SE4	E2	ENE1	N3	NNW5	ENE7	E9	SE13	SE14	SSE17	SSE12	SE11	SE13	SE12	SE12	SSE13	S7	S6	S6	S5	SE6.4	SSE17
22-Jul	S7	S7	S7	S6	SSE6	SSE8	S8	S8	SSW11	SW12	WSW14	SW15	SW18	WSW21	SW20	WSW20	WSW18	WSW16	WSW15	WSW14	WSW11	SW10	SW10	SW10	SW10.8	WSW21
23-Jul	SW11	SW10	SW11	SW10	SW13	SW13	WSW15	WSW13	WSW14	W15	W18	W18	W17	WSW16	WSW13	W15	W13	W10	NW9	NW7	NNW16	NNW16	N17	NNW16	W10.5	W18
24-Jul	N18	N19	N20	N19	N21	NNW20	N21	N22	N22	N20	N21	N21	N24	N25	N23	N28	N27	NNW27	NNW26	NNW20	NNW15	NW10	WNW10	WNW11	N19.8	N28
25-Jul	WNW9	WNW9	WNW10	WNW7	SSE4	SSW5	SSW7	SSW7	S8	SSW9	W11	W11	W8	W9	W11	WSW9	S9	SSW11	SSW9	S7	S7	SSW8	SW7	SW8	SW6.1	W11
26-Jul	SW8	SW8	SSW7	SSW5	SSW5	SSW7	SSW8	SSW7	S7	S8	SW13	SW13	SSW10	S11	SSW11	SSW11	SW11	SSW14	S14	SSW12	SSW9	SSW11	SW11	SW11	SSW9.4	S14
27-Jul	SSW10	SSW10	S9	SSE8	SSE7	SSE9	S8	S10	S13	SSW11	S11	S14	S15	S14	SSW13	SW10	SSW9	SW5	SW4	WSW3	WNW13	WNW23	NW11	S8	SSW7.6	WNW23
28-Jul	SW7	WSW9	WSW11	SW10	SW12	WSW13	W12	WSW9	WSW9	W17	W24	W24	WSW22	WNW20	WNW14	W15	WNW18	W19	W13	NW15	N9	SSW4	SW4	SW6	W11.9	W24
29-Jul	SW8	SW9	SW9	SW9	SSW5	SW7	SSW6	SSW7	S8	S10	SSW10	WSW11	W13	W16	WNW13	NNE18	NNE14	N12	NE11	NNE8	N7	NNW8	NE4	ESE6	W2.6	NNE18
30-Jul	ESE7	ESE4	E3	SE8	SE10	SSE8	S10	S3	SE7	SSW5	S5	S7	SSE8	SSE10	S12	S15	S16	WSW17	W15	W11	WSW12	WSW15	WSW16	WSW16	SSW6.5	WSW17
31-Jul	WSW13	W14	WNW12	SW9	SW10	WSW11	W11	W13	W13	W15	WNW17	WNW18	WNW19	WNW19	WNW26	N23	NNE20	N20	NNW19	N14	N14	NNW5	WSW6	WSW5	WNW10.9	WNW26

WSW4.9	W5.0	W4.3	WSW4.4	SW4.1	SW4.7	WSW4.4	WSW4.9	WSW4.6	WSW4.0	W5.9	WSW6.0	WSW5.5	WSW5.1	WSW5.2	W4.8	W5.8	W6.0	WNW4.0	WNW4.0	WNW3.2	W3.8	WSW4.3	WSW4.7		Diurnal Average
W21	W22	N20	N19	N21	WSW22	WSW23	W25	N22	SW22	WSW29	WSW32	WSW30	WSW28	WSW31	WSW31	WSW29	NNW27	W28	W23	WSW18	WNW23	WSW18	WSW20		Diurnal Maximum

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



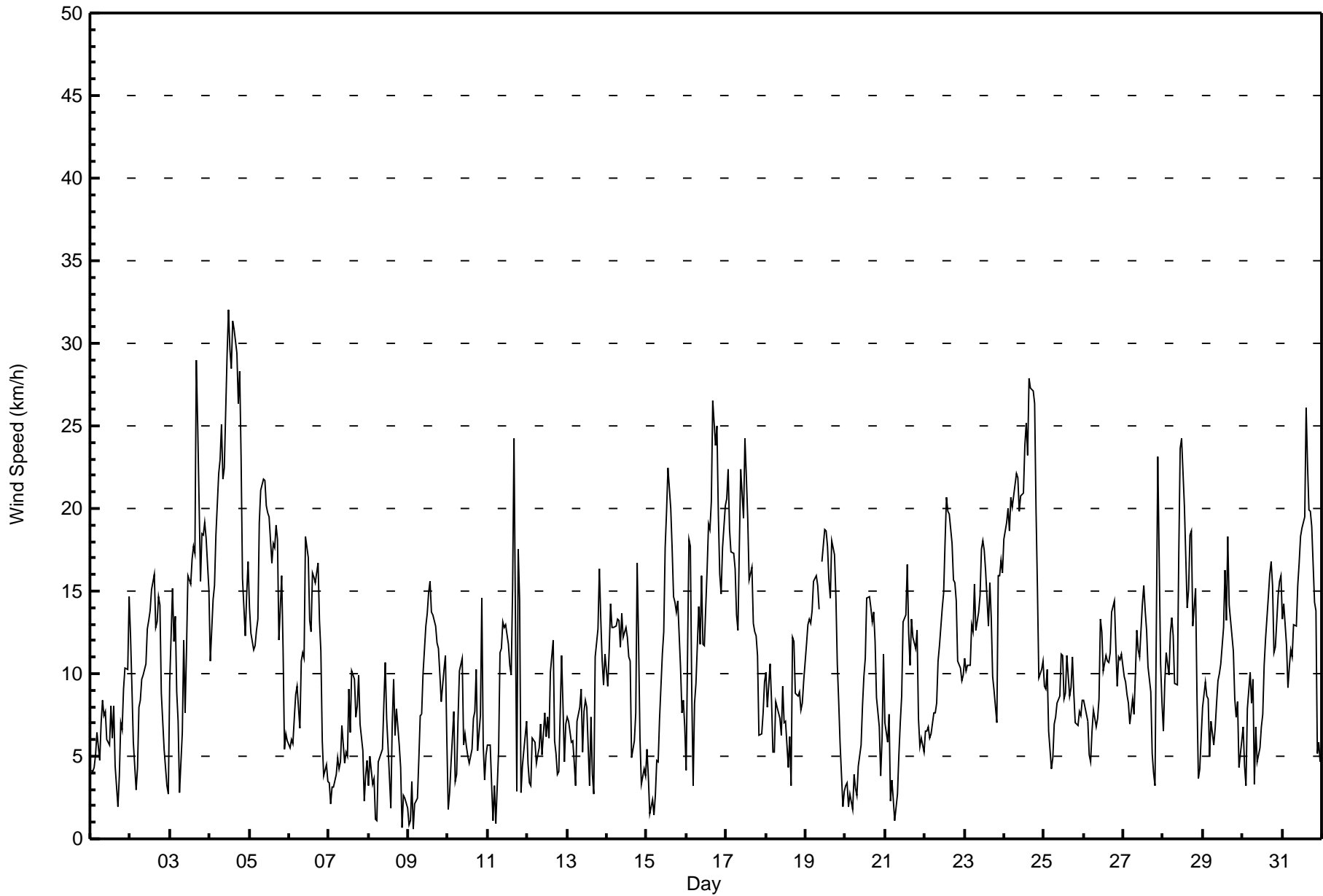
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jul 16 02:00	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 Percent Operational Time: 100.0
Minimum Value: 1 km/h on Jul 5 23:00	
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-Jul	1	1	2	1	2	2	2	2	2	2	2	3	3	3	3	2	2	2	1	2	2	4	3	4	4	
2-Jul	3	4	2	2	2	2	2	3	2	3	3	4	4	4	4	4	4	5	4	2	1	1	1	2	5	
3-Jul	3	4	3	4	4	3	2	1	4	2	4	4	4	5	5	5	7	8	4	5	5	5	4	3	8	
4-Jul	3	2	2	3	3	5	4	5	5	5	7	7	7	7	7	6	6	7	5	4	2	2	3	7		
5-Jul	2	1	2	2	2	2	5	5	5	5	5	4	4	4	4	5	5	4	4	4	3	2	1	1	5	
6-Jul	1	2	1	2	1	1	2	4	5	3	5	4	4	4	4	4	4	5	4	2	2	1	1	1	5	
7-Jul	1	1	1	1	1	1	1	1	2	3	3	3	3	3	5	4	3	3	3	2	2	2	4	1	5	
8-Jul	1	1	1	1	1	3	1	2	2	2	3	5	3	1	2	2	2	2	2	1	1	1	1	2	5	
9-Jul	1	1	1	1	2	2	2	2	2	2	4	4	4	4	4	4	3	3	3	2	2	3	3	3	4	
10-Jul	1	2	2	3	2	1	2	2	2	1	1	1	2	3	3	2	2	4	2	4	4	3	3	2	4	
11-Jul	2	2	1	1	1	1	2	3	2	3	3	3	3	3	4	4	8	4	4	3	3	3	2	2	8	
12-Jul	2	1	1	2	2	1	1	2	2	2	2	2	3	3	5	3	3	1	1	3	3	2	2	1	5	
13-Jul	1	1	1	2	1	2	2	2	2	3	3	4	3	3	3	2	2	3	2	3	3	2	2	2	4	
14-Jul	2	2	3	2	2	3	3	2	2	3	3	3	4	4	4	3	3	4	3	3	2	1	1	1	4	
15-Jul	1	1	1	1	1	1	2	2	2	3	3	4	5	6	4	5	4	4	4	3	4	2	2	2	6	
16-Jul	1	11	7	4	1	2	2	4	4	4	3	3	4	5	4	5	6	7	6	4	3	2	3	4	11	
17-Jul	4	5	4	4	4	4	3	2	6	4	5	5	6	4	4	4	4	4	3	6	1	2	2	2	6	
18-Jul	2	1	2	2	1	1	2	2	3	3	3	3	4	3	3	4	4	3	4	2	2	1	1	1	4	
19-Jul	2	2	2	2	2	3	3	3	3	C	5	4	5	5	5	5	4	3	3	2	2	2	1	1	5	
20-Jul	1	1	1	1	1	2	1	1	2	2	2	3	4	4	4	4	3	3	3	2	2	1	3	2	4	
21-Jul	2	2	3	1	1	2	2	1	1	2	2	4	4	4	3	3	4	2	3	3	2	1	1	1	4	
22-Jul	1	1	1	1	1	1	2	2	2	3	4	4	4	4	5	5	6	4	4	4	2	2	1	1	6	
23-Jul	1	1	1	1	2	2	4	2	3	4	4	4	4	4	5	4	3	2	3	4	4	3	3	3	5	
24-Jul	4	4	4	4	4	5	4	4	5	4	5	5	6	6	6	6	6	6	6	4	3	2	1	1	6	
25-Jul	1	1	1	4	2	1	2	2	2	2	3	4	3	4	4	4	3	3	3	2	2	1	1	1	4	
26-Jul	1	1	1	1	1	1	2	2	2	2	4	4	4	4	3	4	4	4	4	3	2	2	2	2	4	
27-Jul	2	2	2	1	1	1	2	2	3	3	3	3	4	4	3	3	3	2	2	2	4	5	5	4	5	
28-Jul	2	2	2	2	2	3	3	2	3	4	5	6	6	5	4	4	5	7	4	6	5	4	2	2	7	
29-Jul	2	2	2	2	1	2	1	1	2	3	2	3	4	4	5	4	3	3	3	2	1	1	2	2	5	
30-Jul	2	1	1	3	3	6	3	3	2	2	1	2	2	2	4	4	4	7	4	3	3	2	2	3	7	
31-Jul	2	3	4	3	1	3	3	3	4	4	4	5	6	7	7	6	4	4	4	3	4	2	1	1	7	
	4	11	7	4	4	6	5	5	6	5	7	7	7	7	7	7	8	8	7	6	5	5	5	4		
Diurnal Maximum																										

C - Calibration





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	148	19.92	19.92
6 - 11	292	39.30	59.22
12 - 19	237	31.90	91.12
20 - 28	59	7.94	99.06
29 - 38	7	0.94	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - July 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	4	4	4	2	5	0	13	15	24	12	10	10	12	12	15	148
6 - 11	10	4	7	1	5	16	14	25	46	34	37	20	24	19	16	14	292
12 - 19	22	9	1	0	4	11	7	4	15	9	26	49	30	17	13	20	237
20 - 28	16	1	0	0	0	0	3	0	0	0	2	12	11	8	0	6	59
29 - 38	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	54	18	12	5	11	32	24	42	76	67	77	98	75	56	41	55	743

Total Number of Valid Hours: 743

Total Number of Hours: 744

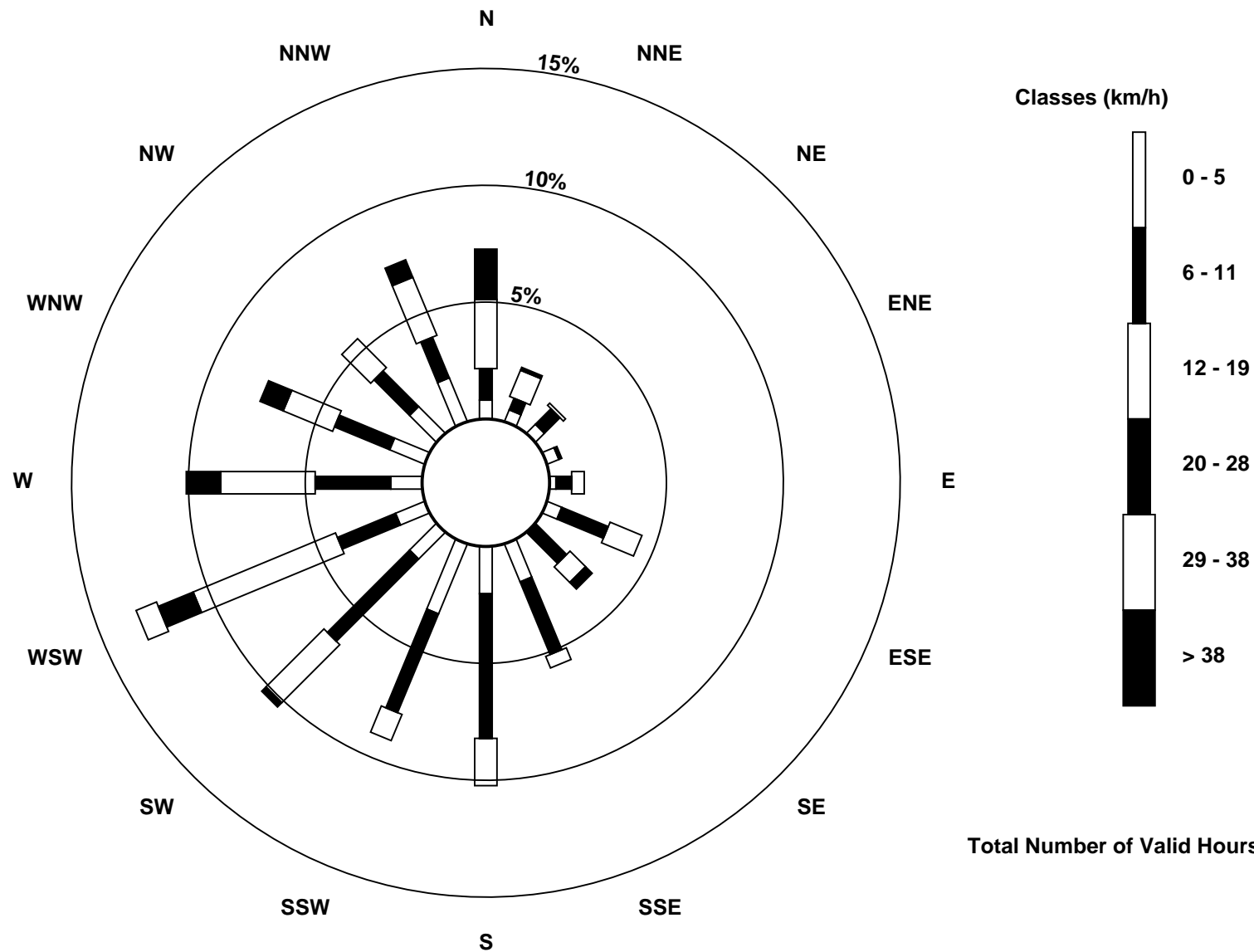


Wood Buffalo Environmental Association

Wind Rose Jul 2017

Wind Speed (WS) - km/h

Patricia McInnes (AMS 6)



Total Number of Valid Hours: 743



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Patricia McInnes - July 2017

Direction of Maximum Speed: 246 deg on Jul 4 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 250.7 deg on Jul 4	Hours of Data: 743
Direction of Minimum Speed: 234 deg on Jul 9 04:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.3 deg on Jul 13	Percent Operational Time: 100.0
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-Jul	171	219	213	200	185	196	171	179	182	183	208	229	231	187	228	259	325	148	127	115	122	169	212	220	190.8
2-Jul	220	190	193	167	170	161	144	152	159	164	184	186	183	177	172	211	249	211	194	191	201	184	168	193	186.6
3-Jul	230	226	205	243	218	148	159	245	243	176	197	246	274	256	245	241	247	250	225	224	244	254	247	253	238.0
4-Jul	245	234	231	245	248	252	256	261	247	233	245	246	249	251	247	246	247	254	266	280	265	254	252	254	250.7
5-Jul	252	244	248	249	246	247	278	281	282	290	296	300	302	307	308	306	310	328	3	327	343	337	285	286	292.5
6-Jul	265	254	281	279	247	240	250	300	284	281	275	282	304	317	336	324	345	307	322	338	329	302	283	252	298.1
7-Jul	248	192	215	228	212	208	180	161	172	166	341	262	259	275	315	327	357	349	49	54	77	292	338	4	302.7
8-Jul	332	316	326	298	348	197	122	155	180	173	268	269	280	297	199	231	263	293	312	305	270	279	272	284	260.1
9-Jul	26	222	263	234	225	183	124	138	133	122	122	128	116	101	118	109	99	110	103	110	112	120	129	170	119.5
10-Jul	154	348	296	330	46	202	206	266	304	259	262	284	253	207	178	166	175	261	348	309	314	277	70	41	273.8
11-Jul	320	299	276	326	308	33	340	351	2	353	357	350	25	13	7	45	285	223	220	241	293	155	256	243	325.9
12-Jul	207	185	187	204	207	202	174	175	178	201	153	147	137	182	235	239	231	213	263	164	169	163	183	164	189.5
13-Jul	176	176	184	197	199	198	201	223	224	195	171	150	185	214	128	286	348	37	8	18	9	355	346	341	239.0
14-Jul	329	337	349	348	350	350	356	347	341	341	337	25	27	36	25	286	315	11	8	352	331	305	304		353.2
15-Jul	314	349	257	231	253	158	177	150	122	125	123	114	137	143	133	133	166	193	178	185	173	148	155	163	150.0
16-Jul	248	333	346	314	254	225	239	253	285	283	285	229	225	241	231	240	262	265	259	258	253	254	251	257	260.7
17-Jul	263	270	265	276	262	274	288	286	315	334	339	344	351	347	339	338	319	355	349	316	302	296	297	302	310.9
18-Jul	321	324	326	334	316	299	343	351	348	357	344	307	314	1	105	261	257	269	267	264	254	237	229	230	299.1
19-Jul	235	233	233	234	232	234	238	238	234	C	231	249	261	271	278	294	17	14	17	24	42	43	51	343	265.7
20-Jul	283	290	338	313	350	355	33	308	66	89	96	98	102	102	102	107	108	97	95	85	103	107	125	127	96.7
21-Jul	106	122	114	347	124	89	76	355	348	69	94	129	126	158	165	138	129	126	146	162	171	184	191	175	136.0
22-Jul	187	179	172	171	164	159	172	180	212	214	256	216	228	245	232	237	245	241	241	245	244	226	226	233	224.2
23-Jul	230	232	226	230	231	231	245	258	250	263	275	276	265	256	255	276	268	261	305	319	345	347	350	347	272.1
24-Jul	354	355	360	359	357	347	358	2	356	360	3	359	358	357	355	3	355	346	345	340	338	312	302	298	351.9
25-Jul	292	301	301	298	163	195	209	205	179	193	272	278	281	268	262	242	187	203	193	188	191	209	215	218	234.7
26-Jul	221	214	197	193	201	206	204	198	186	182	228	235	204	184	193	213	216	204	188	194	199	212	218	215	205.3
27-Jul	209	204	187	166	162	158	177	169	189	199	190	182	174	179	198	223	203	229	225	240	287	296	310	191	203.8
28-Jul	233	241	244	233	235	239	266	250	253	269	279	260	258	292	285	279	300	272	277	306	356	199	226	216	267.1
29-Jul	232	230	229	233	204	214	212	206	169	170	209	239	259	268	298	18	18	4	39	25	353	348	41	103	275.0
30-Jul	103	102	98	129	135	156	191	189	131	199	187	184	166	152	177	178	188	251	267	259	247	249	246	253	202.5
31-Jul	253	276	282	225	227	258	276	275	270	269	288	284	286	297	300	352	17	350	339	354	7	341	255	244	299.9

251.1 259.2 259.9 256.7 235.8 233.3 243.5 254.6 252.4 250.6 264.0 256.6 254.5 255.9 252.1 271.1 275.6 279.1 289.2 289.6 291.5 260.9 252.1 245.9
 Diurnal Average

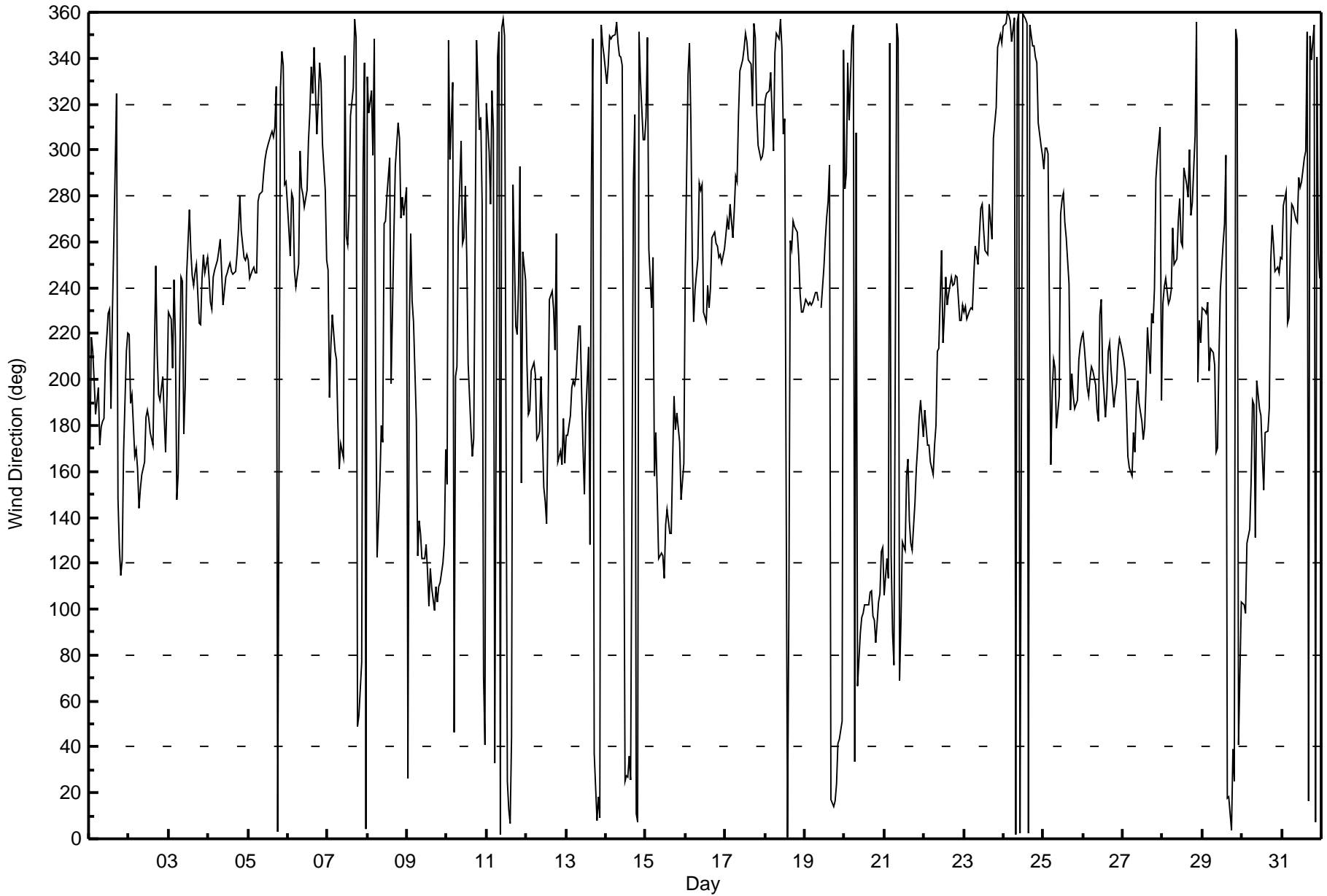
C - Calibration
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Patricia McInnes - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Jul 9 04:00 Minimum Value: 5 deg on Jul 6 00:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 14 Median = 18 Q ₃ = 27 P ₉₀ = 45 P ₉₉ = 81																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 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-Jul	40	10	30	17	18	29	23	16	21	24	41	59	36	54	29	32	63	57	16	13	12	37	14	13	63
2-Jul	16	22	19	56	37	17	18	17	21	33	27	26	26	22	20	28	23	16	18	15	16	27	23	40	56
3-Jul	18	17	16	15	21	33	59	17	16	33	26	30	22	27	20	26	16	13	17	16	16	11	11	10	59
4-Jul	10	11	10	12	10	11	13	12	14	16	17	16	17	17	16	16	14	20	14	14	12	9	9	9	20
5-Jul	9	8	8	10	10	10	15	14	16	18	17	16	16	15	17	17	16	15	27	14	16	25	7	5	27
6-Jul	16	14	14	12	10	10	24	25	25	23	20	24	22	23	15	24	21	16	18	13	15	9	26	18	26
7-Jul	20	32	26	36	18	13	27	28	28	66	68	80	41	65	25	30	44	41	22	23	15	81	55	27	81
8-Jul	42	20	49	19	63	91	26	40	38	23	32	67	65	83	26	20	25	22	30	20	86	16	27	51	91
9-Jul	84	89	33	101	77	68	25	23	22	23	22	26	21	17	26	24	18	22	15	13	11	13	13	43	101
10-Jul	78	41	27	30	51	30	20	18	13	26	16	18	27	71	75	29	23	42	43	41	12	35	73	32	78
11-Jul	21	21	28	69	36	60	29	14	17	16	22	20	26	30	37	18	27	82	17	11	78	70	36	28	82
12-Jul	18	28	21	18	19	22	23	25	25	55	26	36	35	61	35	13	41	28	46	80	15	14	23	10	80
13-Jul	14	12	16	16	25	48	19	19	20	48	34	45	45	74	39	75	79	23	15	13	15	15	12	10	79
14-Jul	8	10	13	13	13	15	17	14	19	16	23	26	26	23	31	68	40	27	16	17	14	23	10	18	68
15-Jul	8	21	45	52	60	63	33	31	22	13	13	13	19	17	18	18	30	21	15	13	13	14	13	16	63
16-Jul	41	41	24	19	52	14	16	26	20	15	15	18	14	16	14	15	15	16	12	11	11	10	11	10	52
17-Jul	11	13	13	14	11	13	13	11	15	10	12	15	16	16	17	23	23	29	19	23	8	8	10	11	29
18-Jul	14	9	9	9	18	17	18	22	42	60	31	48	45	81	46	95	19	21	26	14	9	7	7	11	95
19-Jul	9	9	9	9	9	11	12	14	16	C	20	17	16	24	20	34	16	16	20	13	14	16	71	49	71
20-Jul	39	17	68	44	61	51	48	58	35	31	17	23	28	21	21	20	16	17	15	12	14	49	44	11	68
21-Jul	13	17	20	53	35	63	91	66	35	36	30	22	26	17	19	29	21	16	17	13	15	15	13	17	91
22-Jul	15	13	9	11	10	13	17	19	18	26	27	30	20	18	21	16	18	15	15	13	11	11	9	9	30
23-Jul	8	9	8	8	9	10	12	16	17	19	20	17	19	22	34	20	23	15	25	20	12	13	15	14	34
24-Jul	14	17	16	15	17	15	17	15	17	15	15	18	16	17	16	17	18	16	16	11	12	15	8	6	18
25-Jul	7	7	7	76	40	19	14	22	18	36	30	26	49	46	27	43	31	21	16	15	13	13	10	9	76
26-Jul	10	13	14	14	12	13	15	25	36	28	27	26	33	32	43	32	34	25	16	16	15	15	12	12	43
27-Jul	14	16	14	11	11	11	17	16	18	21	30	19	20	17	22	26	30	30	25	42	20	12	35	21	42
28-Jul	24	14	13	10	9	12	21	28	28	17	15	17	17	24	18	15	18	17	19	20	58	72	36	18	72
29-Jul	17	11	17	14	21	18	19	21	17	26	27	30	32	19	45	18	21	21	21	16	15	10	46	18	46
30-Jul	13	16	20	14	19	44	26	80	16	43	29	20	26	25	24	20	22	24	14	9	10	8	8	10	80
31-Jul	12	12	15	14	10	22	14	16	20	20	22	21	19	17	13	34	16	17	13	16	14	34	8	11	34
84 89 68 101 77 91 91 80 42 66 68 80 65 83 75 95 79 82 46 80 86 81 73 51																									
Diurnal Maximum																									
C - Calibration																									





Wood Buffalo Environmental Association

SO₂ Calibration Summary

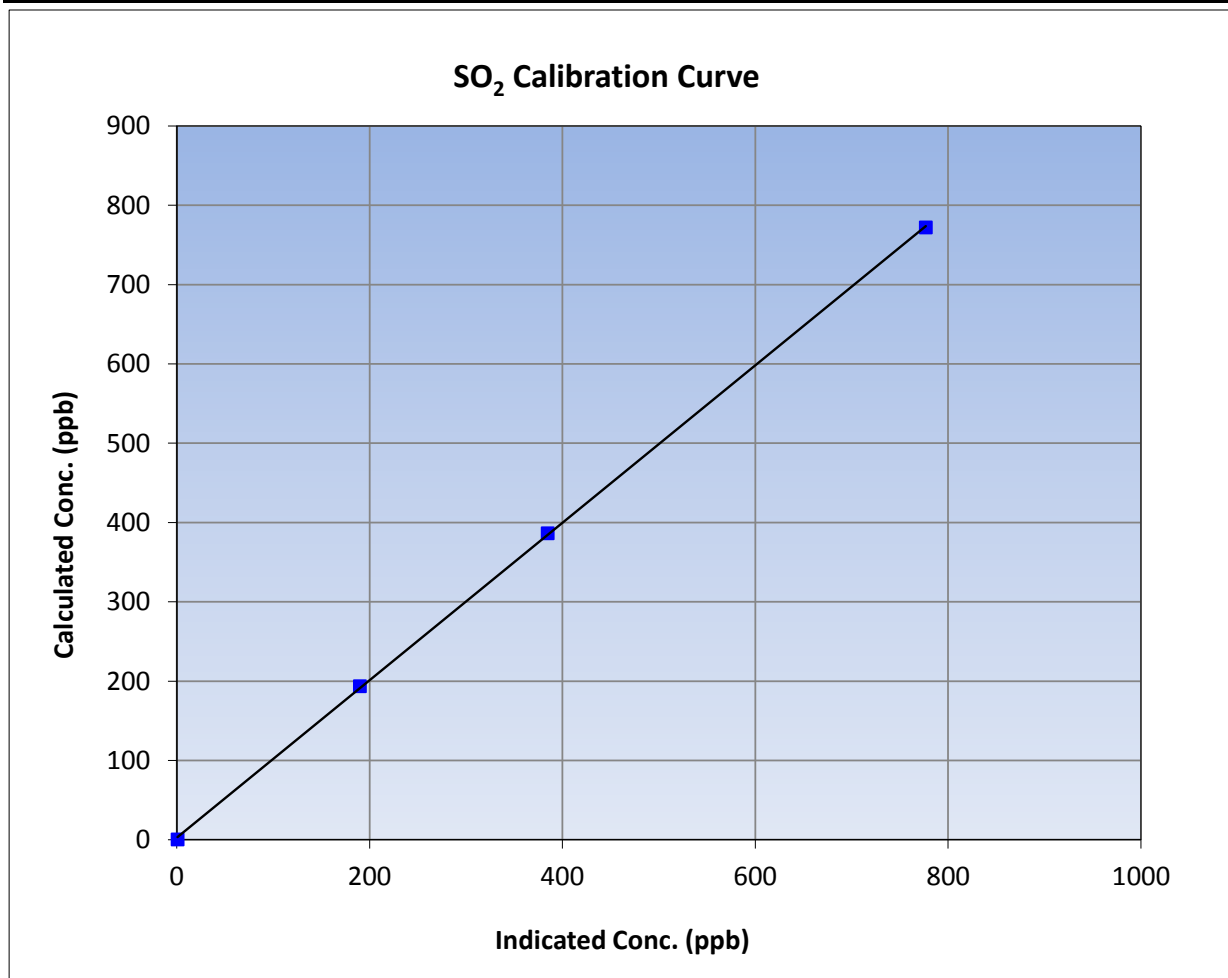
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:50	End Time (MST)	11:05
Analyzer make	Thermo 43i	Analyzer serial #	1008841397

Calibration Data

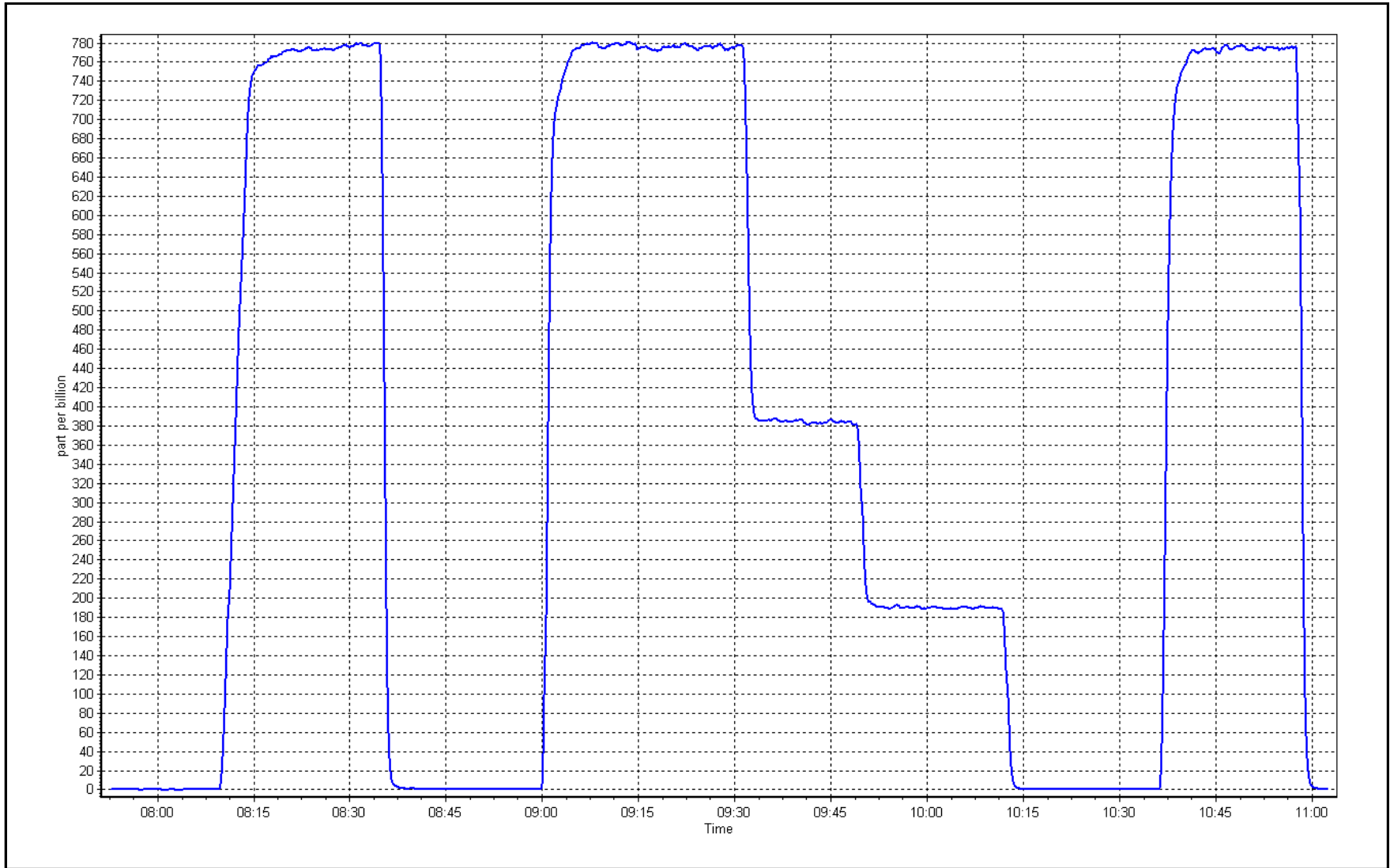
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Serial Number	Limits	
0.0	0.4	----	Serial Number	0.999932	≥0.995
771.8	776.5	0.9939	Slope	0.992639	0.90 - 1.10
386.0	384.3	1.0043	Intercept	2.590154	+/-30
193.4	189.5	1.0204			



SO2 Calibration Plot

Date: July 5, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TRS Calibration Summary

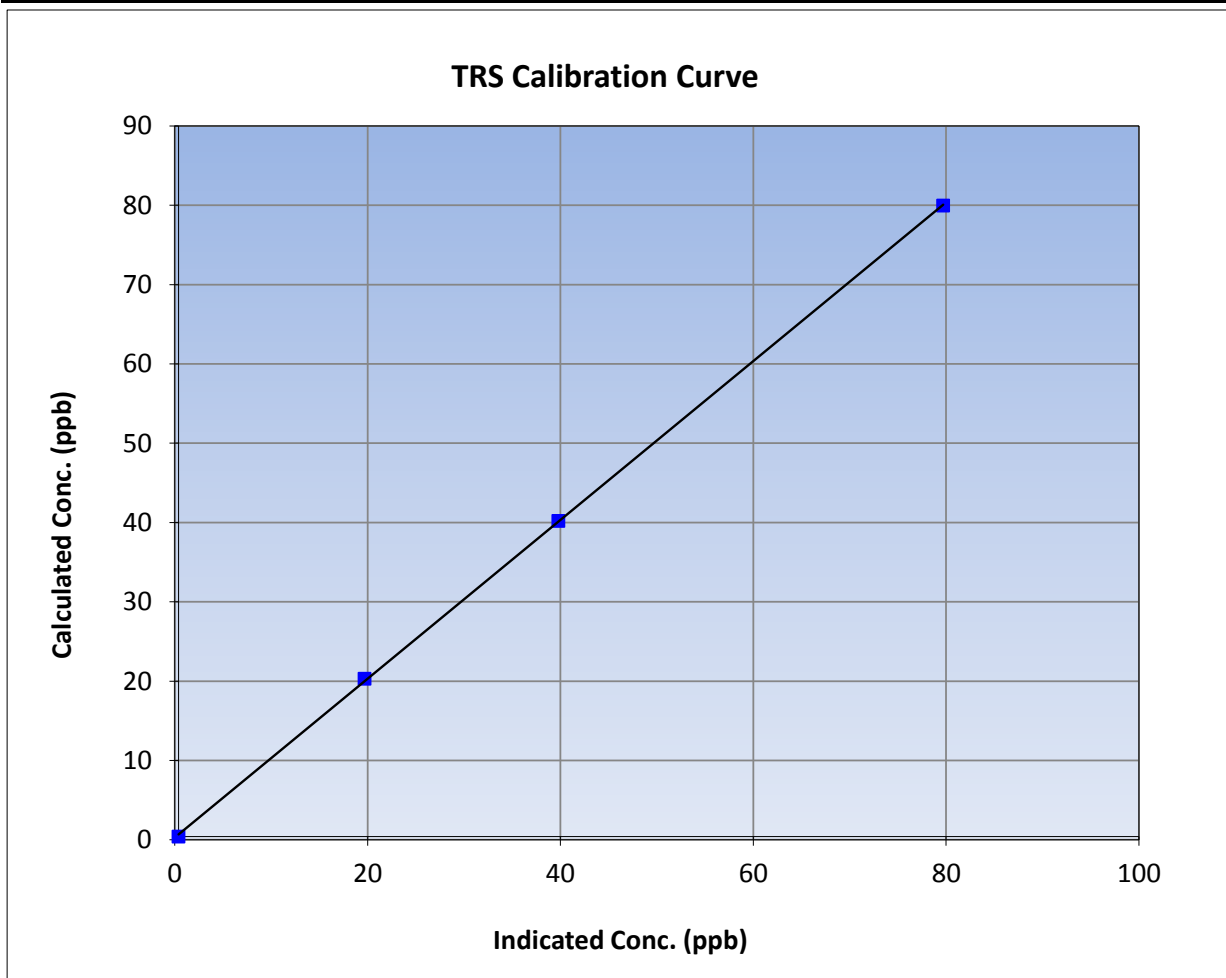
Version-03-2017

Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 5, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	10:20	End Time (MST)	14:10
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1218153358

Calibration Data

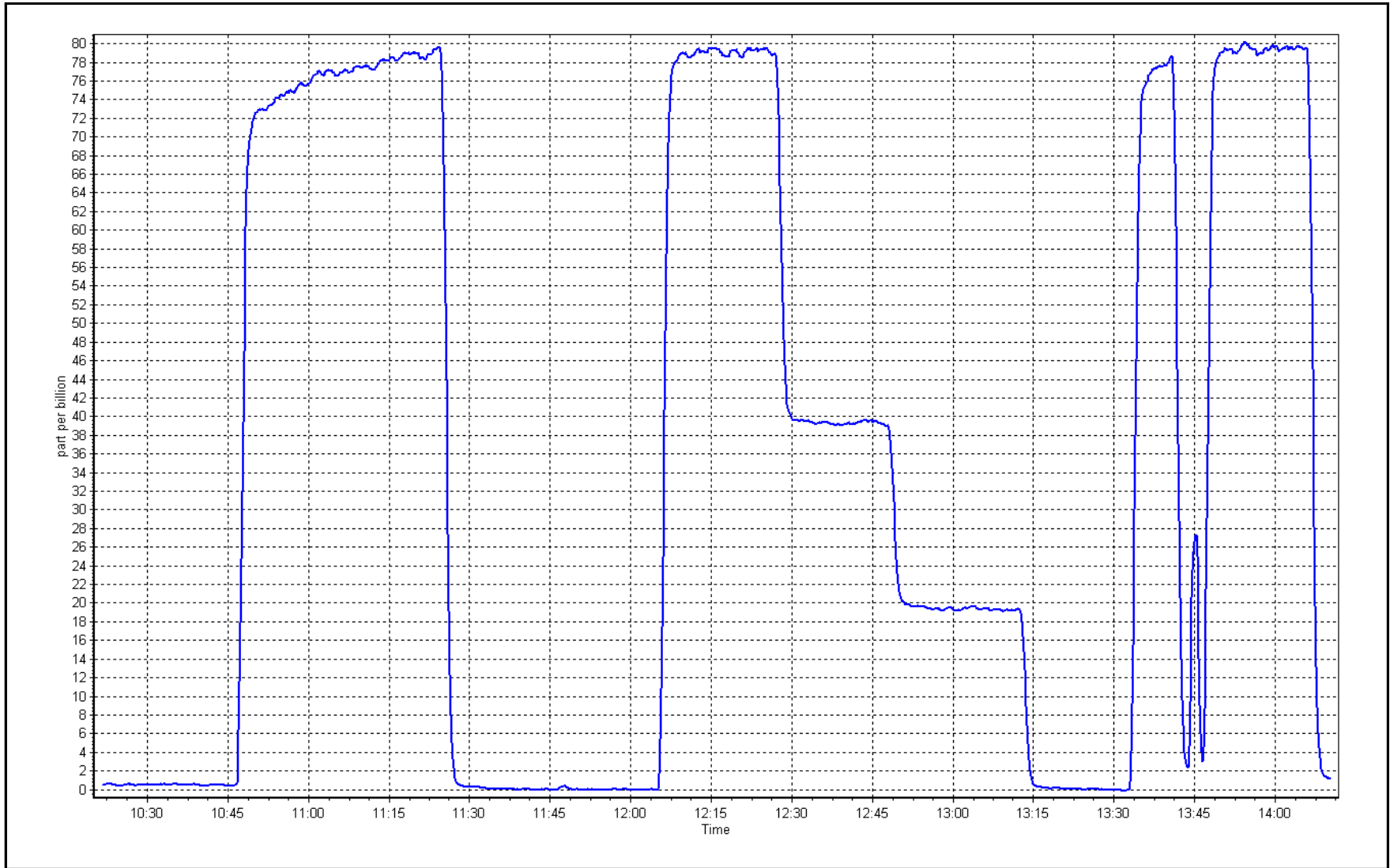
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999945	≥0.995
79.6	79.3	1.0033			
39.8	39.4	1.0104	Slope	1.001289	0.90 - 1.10
19.9	19.3	1.0314			
			Intercept	0.274474	+/-3



TRS Calibration Plot

Date: July 11, 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:	July 5, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	7:50	End time (MST):	11:05
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	75.1	75.0
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.1	175.0
CH4 SP Ratio	2.18E-04	2.18E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.1	12.3	Carrier Pressure	35.8	35.7
NMHC SP Ratio	4.46E-05	4.55E-05	Fuel Pressure	42.3	42.3
NMHC Peak Area	191861	188161	Air Pressure	32.4	32.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.000279	0.998420
THC Cal Offset	0.040122	0.059489
CH4 Cal Slope	0.996940	0.997763
CH4 Cal Offset	0.027573	0.036545
NMHC Cal Slope	1.003197	0.998811
NMHC Cal Offset	0.012332	0.023175

Notes: H2 generator filled with deionized water. 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	16.06	1.011
calibrator zero	5537	0.0	0.00	0.00	----
high point	5458	84.2	16.24	16.24	1.000
second point	5499	42.1	8.12	8.02	1.013
third point	5522	21.1	4.07	3.97	1.024
as left zero	5537	0.0	0.00	0.00	----
as left span	5458	84.2	16.24	16.19	1.003
Average Correction Factor					1.012
Corrected As found	16.06	Prev response	16.19	*% change	0.8%

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	8.39	1.021
calibrator zero	5537	0	0.00	0.00	----
high point	5458	84.2	8.56	8.57	1.000
second point	5499	42.1	4.28	4.24	1.010
third point	5522	21.1	2.15	2.11	1.017
as left zero	5537	0	0.00	0.00	----
as left span	5458	84.2	8.56	8.53	1.005
Average Correction Factor					1.009
Corrected As found	8.39	Prev response	8.53	*% change	1.6%

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	7.67	1.001
calibrator zero	5537	0.0	0.00	0.00	----
high point	5458	84.2	7.67	7.68	1.000
second point	5499	42.1	3.84	3.77	1.017
third point	5522	21.1	1.92	1.87	1.031
as left zero	5537	0.0	0.00	0.00	----
as left span	5458	84.2	7.67	7.66	1.001
Average Correction Factor					1.016
Corrected As found	7.67	Prev response	7.67	*% change	0.0%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

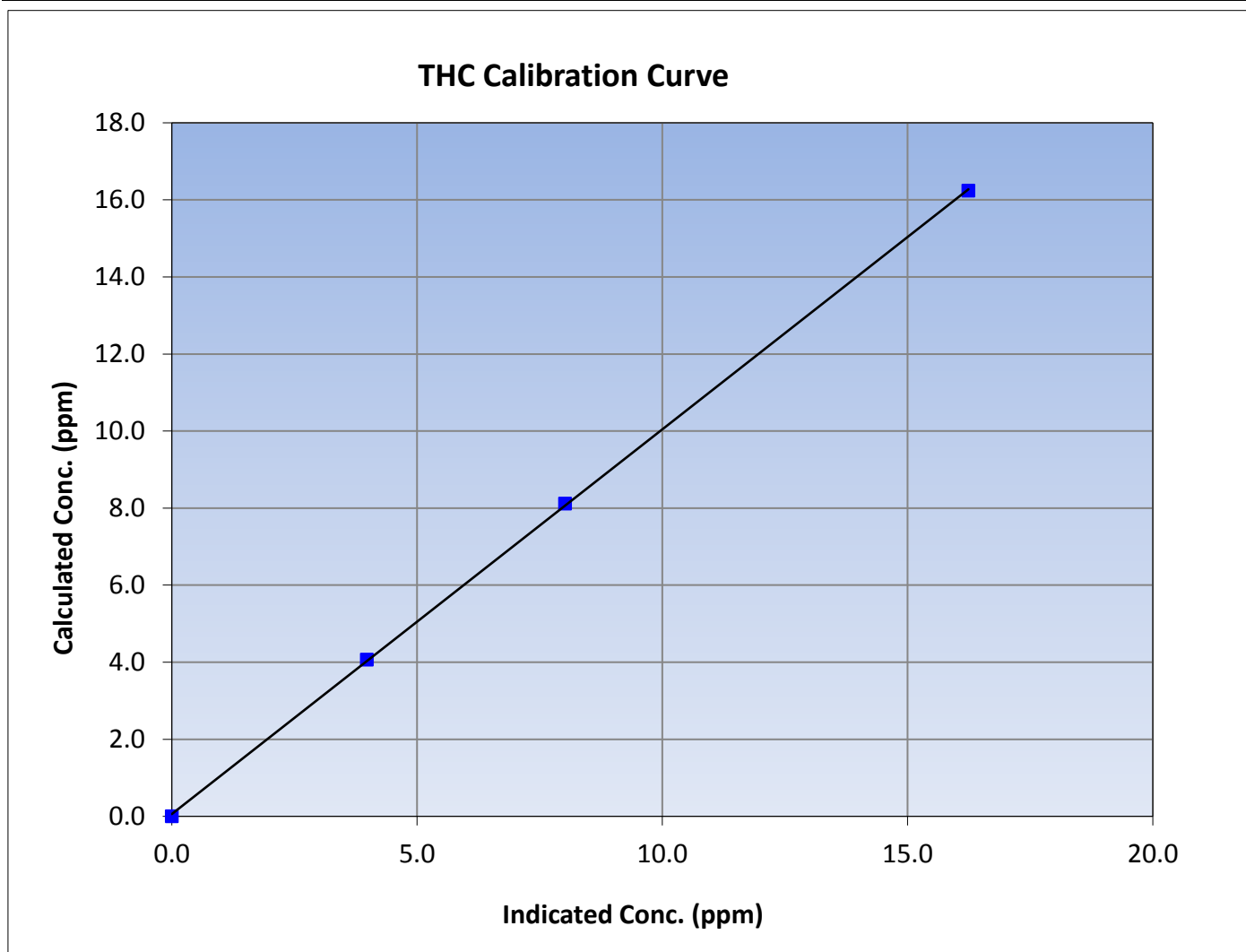
Version-02-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:50	End Time (MST)	11:05
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	0.999932	≥ 0.995			
16.24	16.24	0.9998						
8.12	8.02	1.0129				Slope	0.998420	0.90 - 1.10
4.07	3.97	1.0237						
			Intercept	0.059489	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

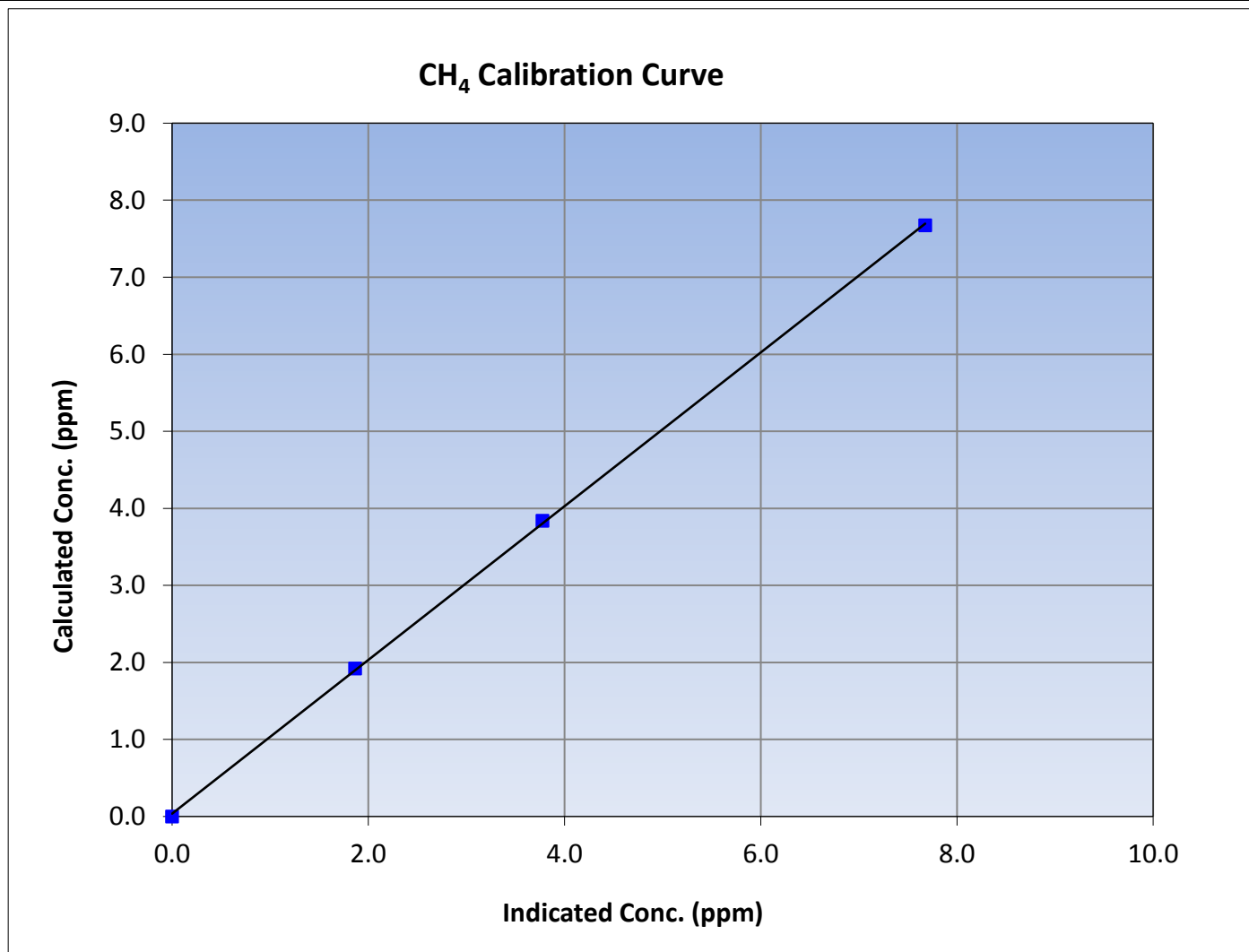
Version-02-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:50	End Time (MST)	11:05
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	0.999885	≥ 0.995
7.67	7.68	0.9995			
3.84	3.77	1.0167			
1.92	1.87	1.0307			
			Slope	0.997763	0.90 - 1.10
			Intercept	0.036545	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

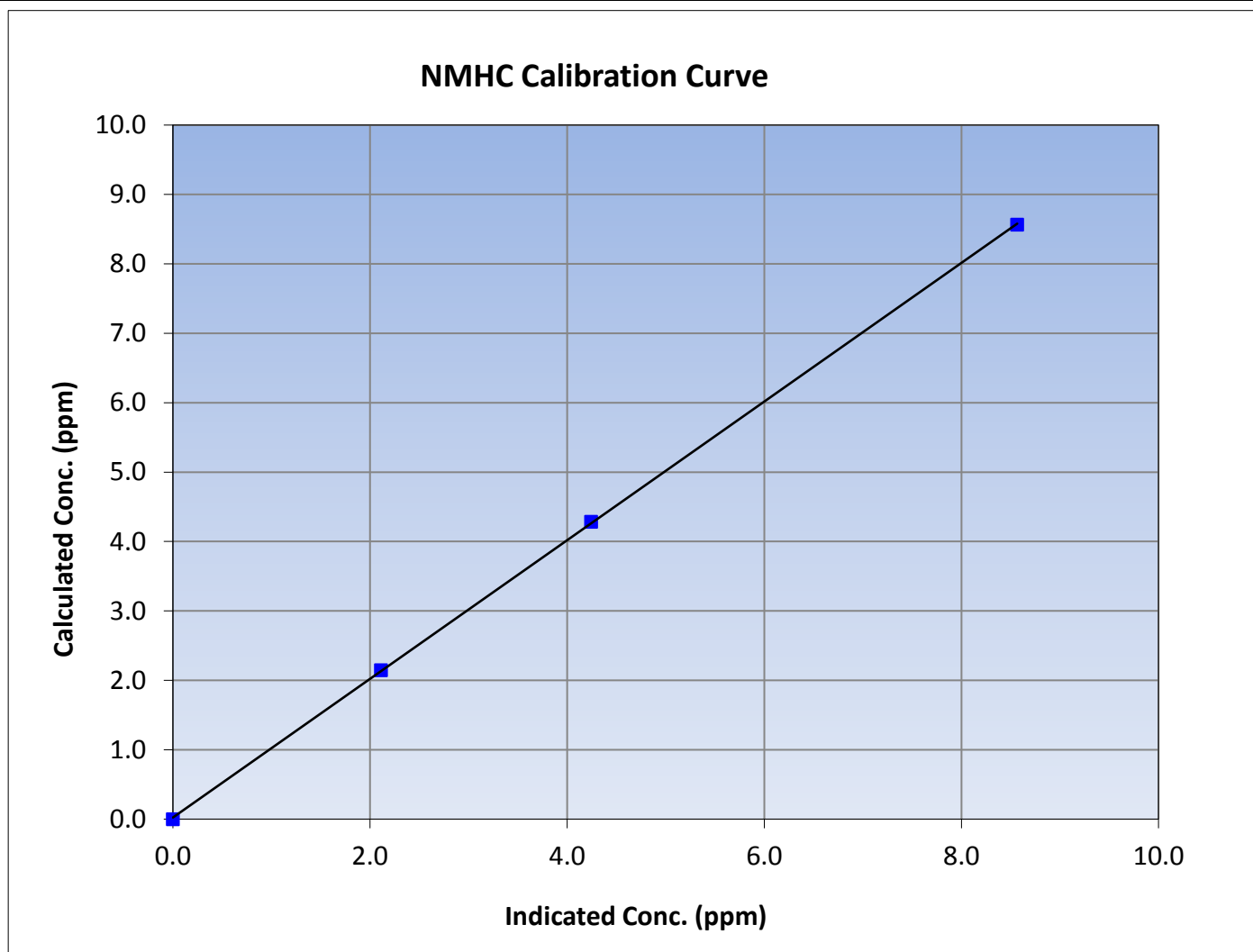
Version-02-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:50	End Time (MST)	11:05
Analyzer make	Thermo 55i	Analyzer serial #	1331259521

Calibration Data

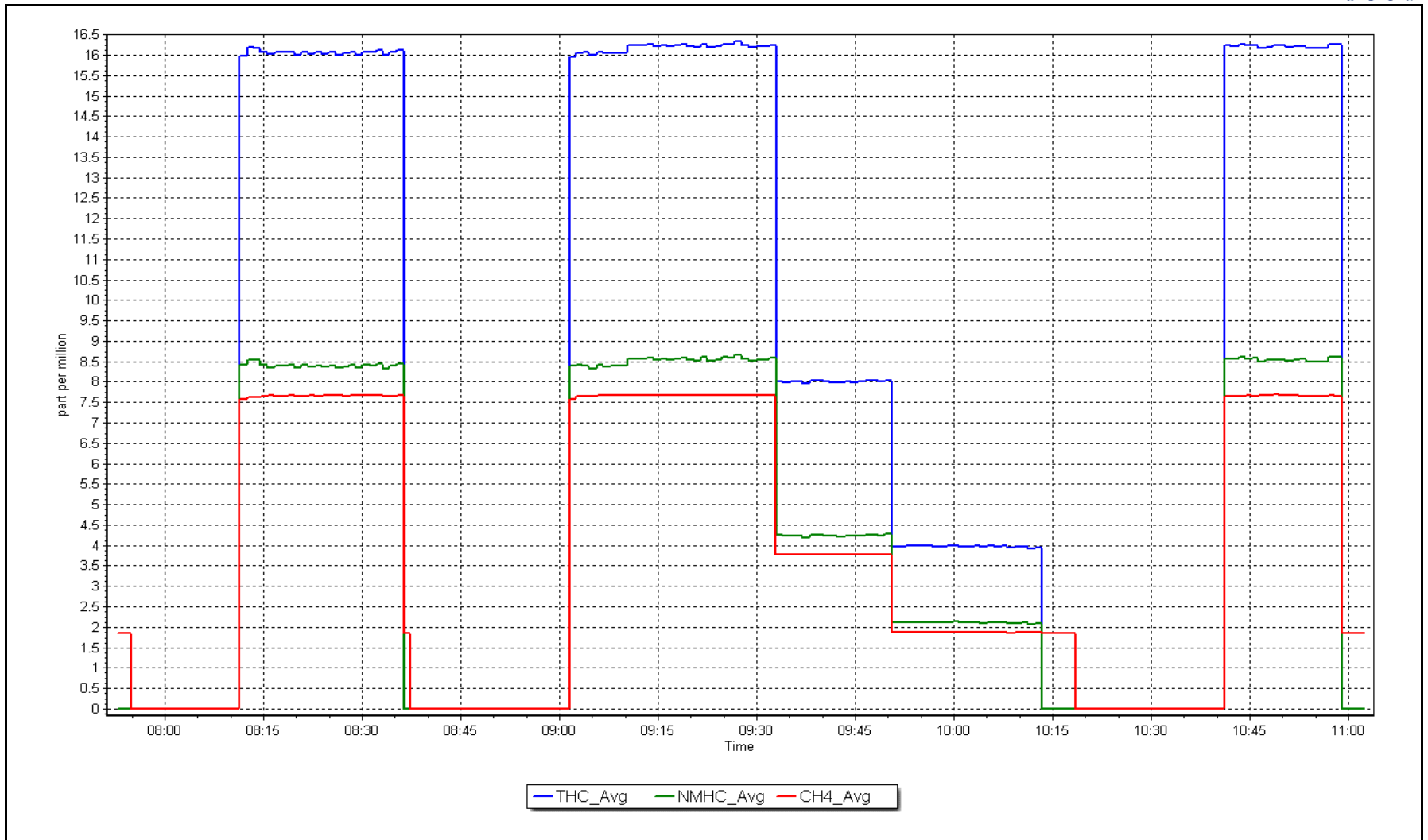
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999962	≥ 0.995			
8.56	8.57	0.9997						
4.28	4.24	1.0097				Slope	0.998811	0.90 - 1.10
2.15	2.11	1.0170						
			Intercept	0.023175	± 0.5			



NMHC Calibration Plot

Date: July 5, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

O₃ Calibration Summary

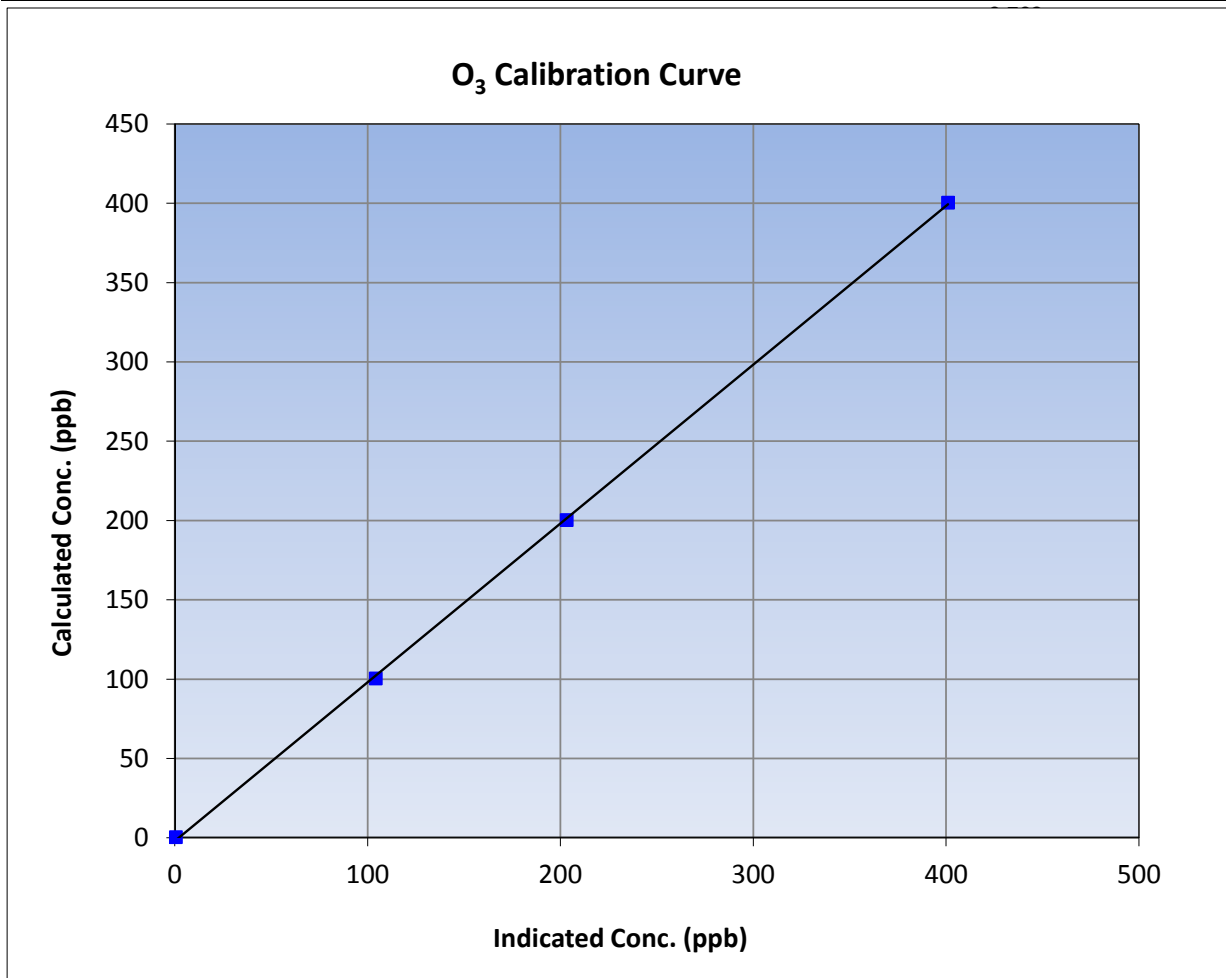
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	11:00	End Time (MST)	14:30
Analyzer make	Thermo 49i	Analyzer serial #	1300156234

Calibration Data

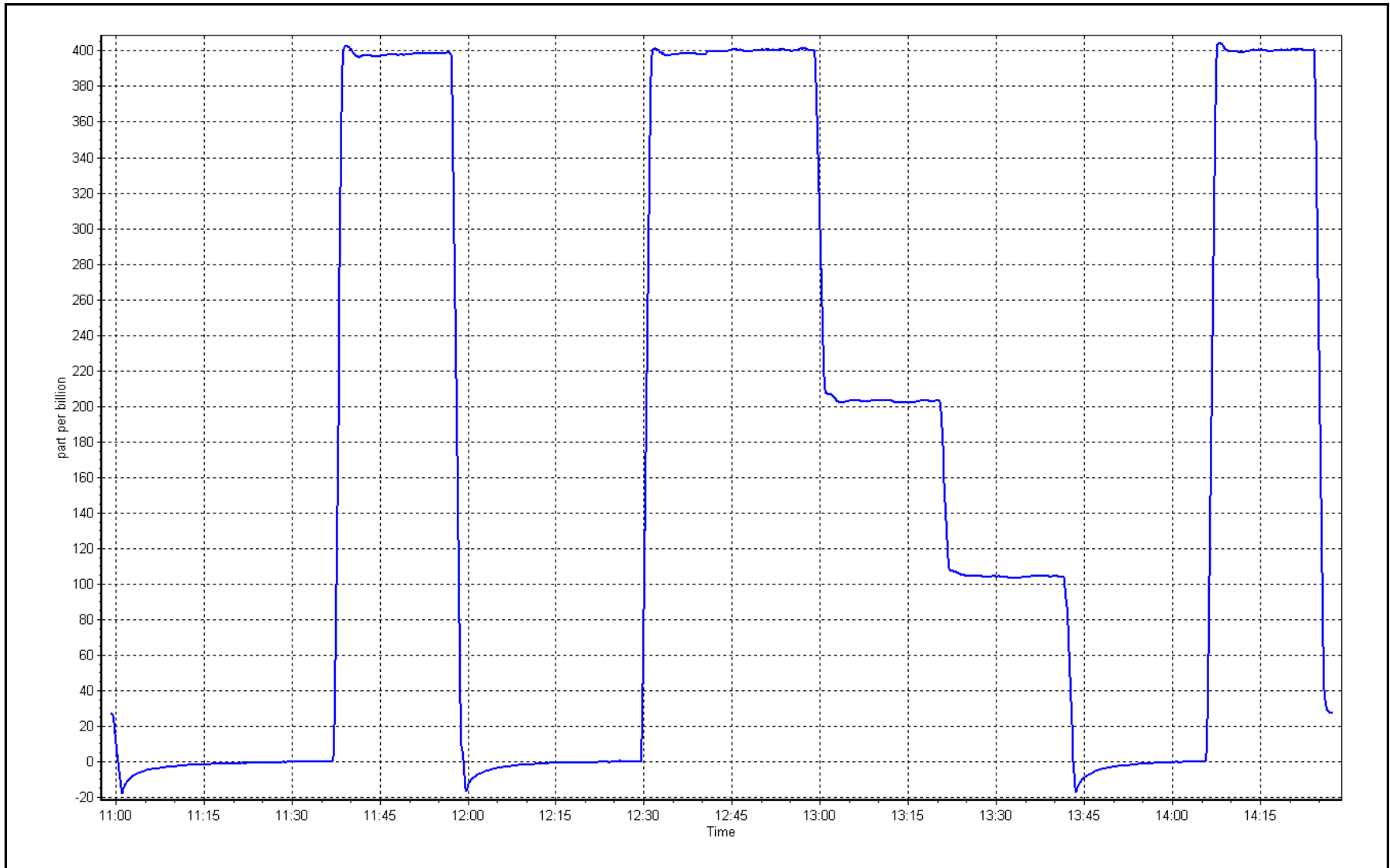
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999892	≥0.995
400.0	400.6	0.9985			
200.0	202.9	0.9857	Slope	1.001265	0.90 - 1.10
100.0	103.9	0.9625			
			Intercept	-2.123827	+/- 10



O₃ Calibration Plot

Date: July 5, 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:	July 6, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	7:35	End time (MST):	13:35
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	1.010	1.015	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.001	1.001	PMT Temperature	-2.9	-3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	184.6	185.1
NO bkgrnd	2.9	3.0	Sample Flow	0.762	0.759
NOX bkgrnd	3.2	3.2	PMT Voltage	-773.3	-772.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.000579	0.997978
NO _x Cal Offset	1.780840	2.656818
NO Cal Slope	0.998929	0.997648
NO Cal Offset	2.277693	2.596558
NO ₂ Cal Slope	0.999921	1.000413
NO ₂ Cal Offset	1.389442	1.449644



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	-0.3	-0.2	-0.1	----	----
as found span	5543	84.2	796.0	796.0	0.0	801.7	800.6	1.1	0.9929	0.9942
calibrator zero	5543	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.1	----	----
high point	5543	84.2	796.0	796.0	0.0	796.1	796.4	-0.3	0.9998	0.9995
second point	5543	42.1	398.0	398.0	0.0	394.9	395.2	-0.3	1.0078	1.0071
third point	5543	21.1	199.5	199.5	0.0	194.9	194.9	0.1	1.0234	1.0234
as left zero	5543	0.0	0.0	0.0	0.0	0.1	-0.2	0.2	----	----
as left span	5543	84.2	796.0	376.8	419.2	791.5	374.4	417.0	1.0057	1.0064
Average Correction Factor									1.0104	1.0100

Corrected As found	NO _x = 802.0 ppb	NO = 800.8 ppb		*Percent Change	NO _x = -1.0%
Previous Response	NO _x = 793.7 ppb	NO = 794.5 ppb		*Percent Change	NO = -0.8%
<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	793.7	791.8	1.8	1.0029	1.0053	----	----
1st NO2 (400 ppb O3)	376.8	415.0	790.9	376.8	414.1	1.0064	----	1.0022	99.8%
2nd NO2 (200 ppb O3)	580.4	211.4	789.5	580.4	209.1	1.0082	----	1.0110	98.9%
3rd NO2 (100 ppb O3)	682.9	108.9	789.0	682.9	106.1	1.0088	----	1.0264	97.4%
2nd NO ref point	----	0.0	788.4	787.0	1.4	1.0096	1.0114	----	----
Average Correction Factor						1.0083	1.0083	1.0132	98.7%

Notes: Span adjusted.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

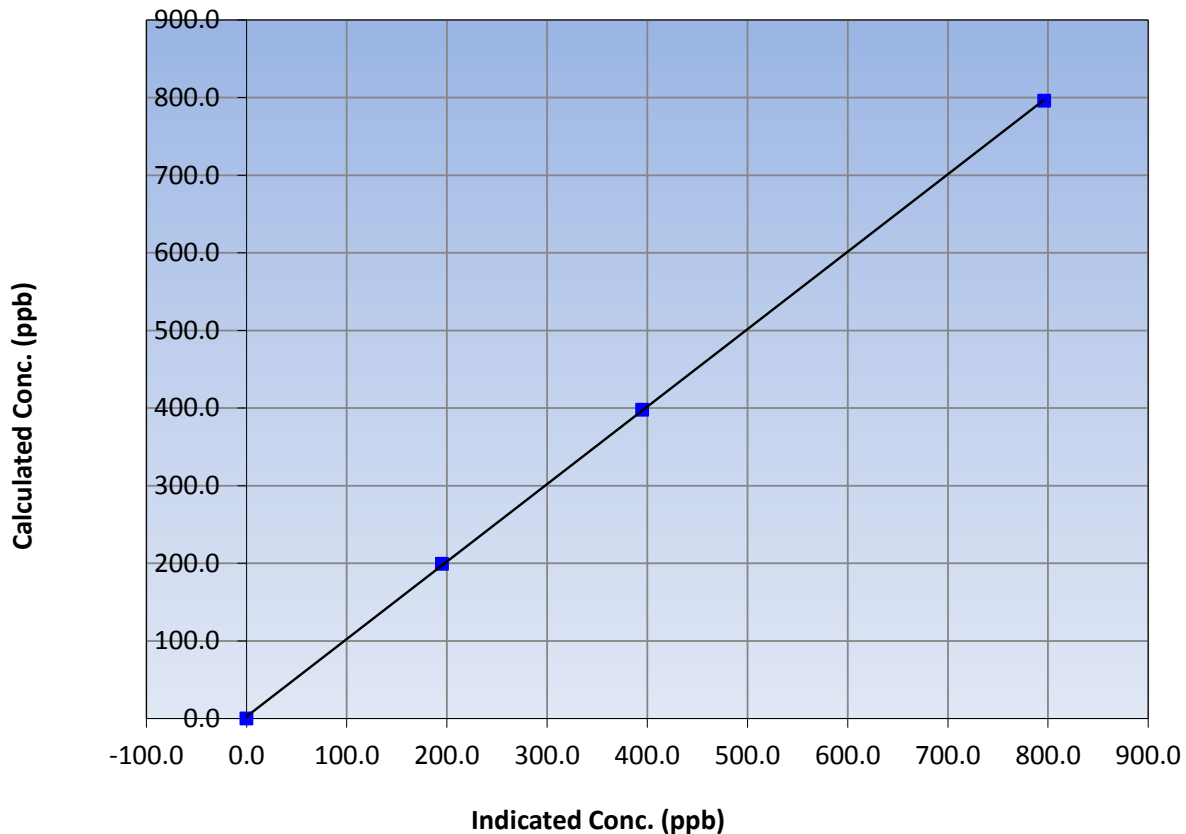
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	-0.3	----	Correlation Coefficient	≥0.995	
796.0	796.1	0.9998			
398.0	394.9	1.0078			
199.5	194.9	1.0234			
			Slope	0.997978	0.90 - 1.10
			Intercept	2.656818	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

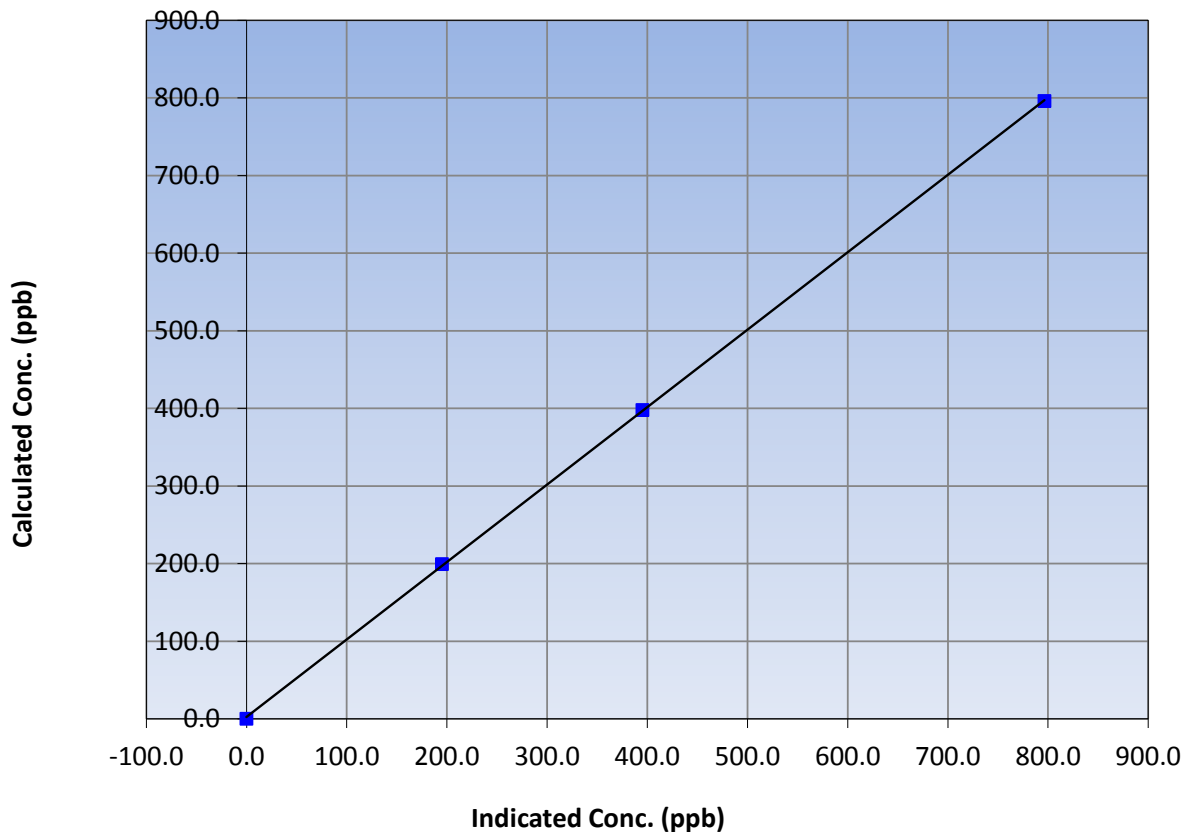
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	-0.2	----	Correlation Coefficient	≥0.995	
796.0	796.4	0.9995			
398.0	395.2	1.0071			
199.5	194.9	1.0234			
			Slope	0.997648	0.90 - 1.10
			Intercept	2.596558	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

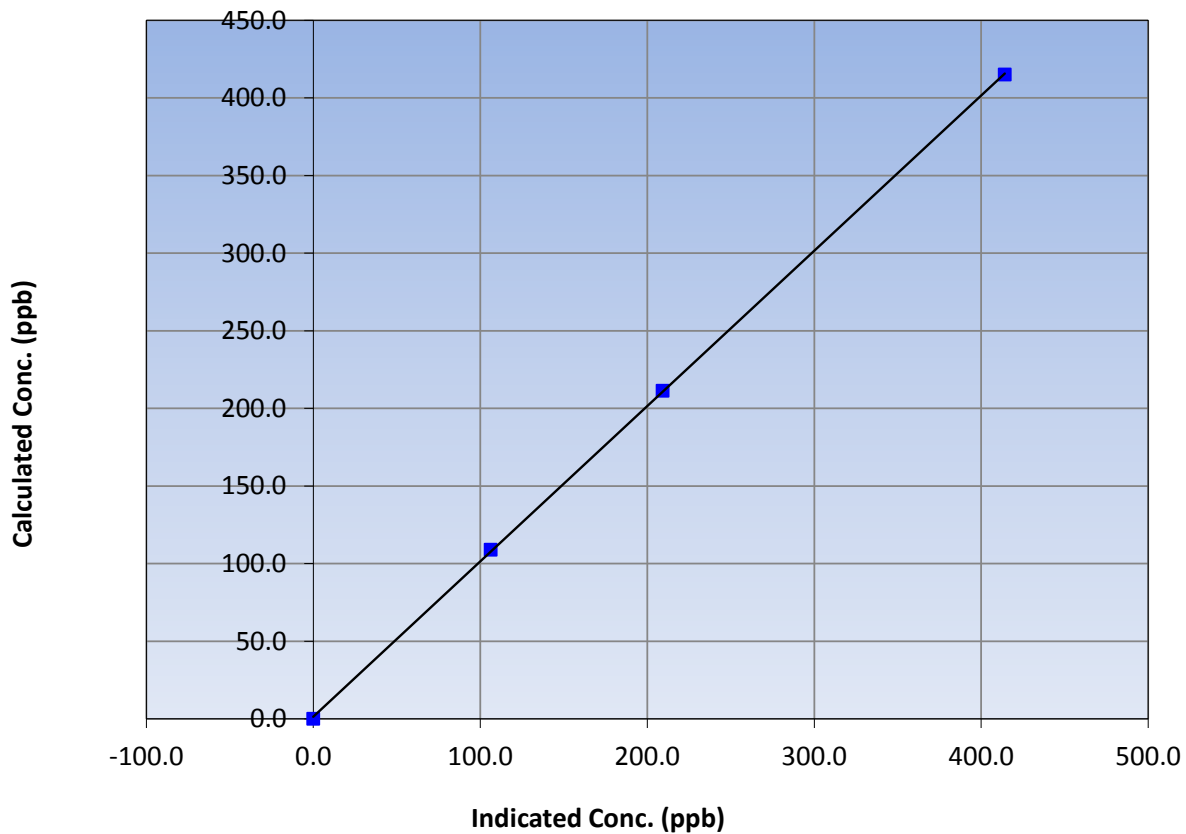
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	
415.0	414.1	1.0022			
211.4	209.1	1.0110			
108.9	106.1	1.0264			
			Slope	1.000413	0.90 - 1.10
			Intercept	1.449644	+/-20

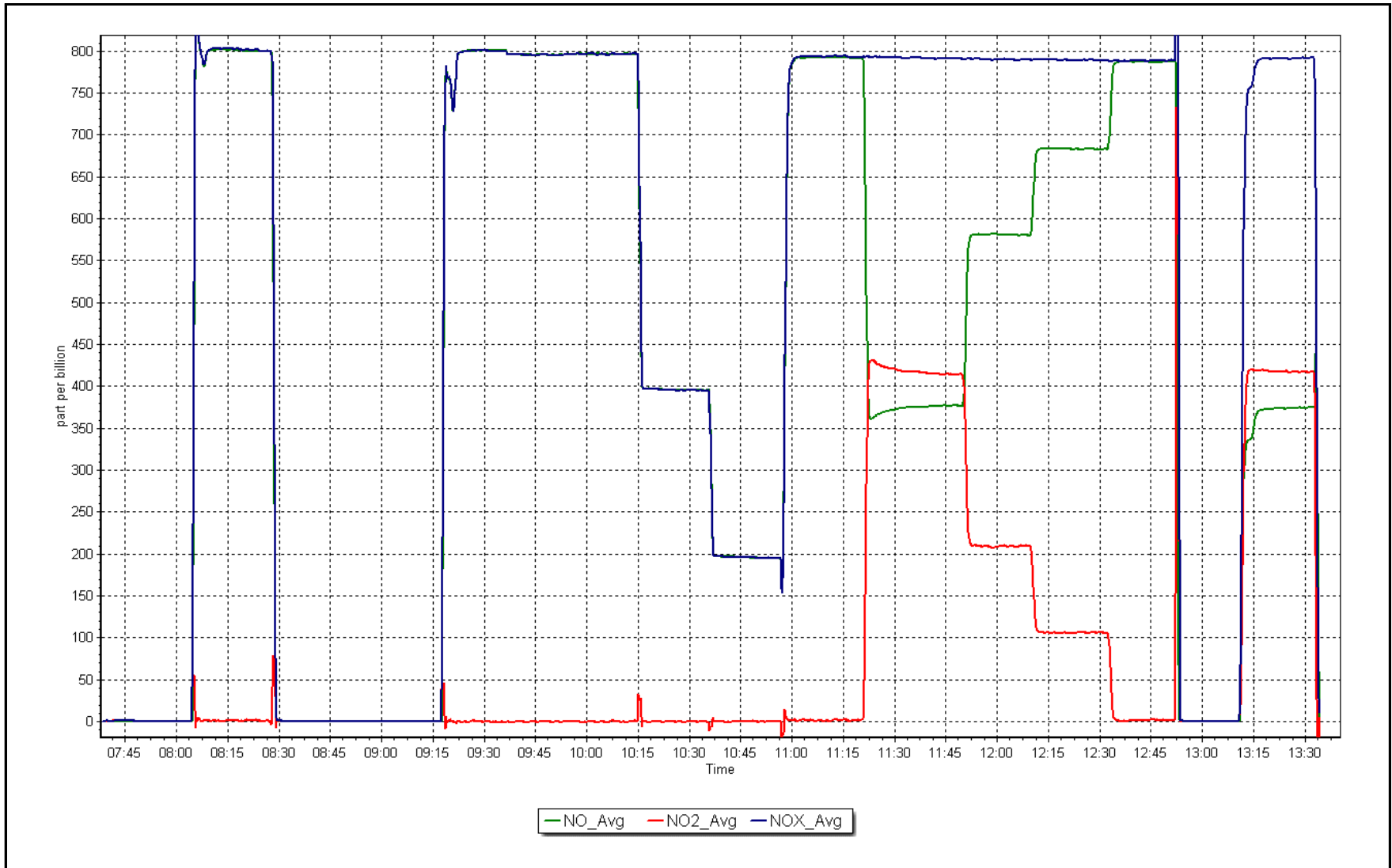
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 6, 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:	July 6, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	7:35	End time (MST):	13:35
NH3 Cal Date:	July 7, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	7:45	End time (MST):	11:15
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	1.336	1.355	NH3 Range (ppb)	0 - 1000 ppb
NOX coefficient	1.336	1.388	NOX Range (ppb)	0 - 1000 ppb
NO2 coefficient	1.000	1.000	PMT Temperature	7.0 7.0
NH3 coefficient	1.047	1.037	Reaction cell Press	4.5 4.5
TN coefficient	1.387	1.403	Sample Flow	560 563
NO bkgnd	-0.9	-0.9	PMT Voltage	693 693
NOX bkgnd	-0.7	-0.7	Moly Temperature	316.1 315.2
TN bkgnd	0.2	0.2	NH3 Conv Temp	825 825

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002689	0.999878
NO _x Cal Offset	1.827160	2.923630
NO Cal Slope	1.001446	1.001348
NO Cal Offset	3.082898	2.841507
NO ₂ Cal Slope	0.996734	0.997179
NO ₂ Cal Offset	-0.814950	-1.972342
NH3 Cal Slope	0.998950	0.999950
NH3 Cal Offset	-1.643167	-4.189648
TN Cal Slope	0.978962	0.978463
TN Cal Offset	-2.239295	-4.707110



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	0.7	0.7	0.0	----	----
as found NO	5543	84.2	796.0	796.0	----	797.3	801.0	-3.8	0.998	----
calibrator zero	5543	0.0	0.0	0.0	0.0	0.2	0.5	-0.3	----	----
high NO point	5543	84.2	796.0	796.0	----	794.8	795.5	-0.7	1.001	----
NO/O3 point	5543	84.2	796.0	796.0	----	803.4	802.4	1.0	0.991	----
as found NH3	4544	85.1	1786.7	NA	1786.7	1798.7	----	1759.9	0.993	1.015
first NH3	4544	85.1	1786.7	NA	1786.7	1825.9	----	1786.1	0.979	1.000
second NH3	4544	47.4	995.1	NA	995.1	1029.7	----	1007.2	0.966	0.988
third NH3	4544	23.7	497.6	NA	497.6	515.0	----	503.3	0.966	0.989
Average Correction Factor									0.9961	0.9923

Corrected As found TN = 796.6 ppb NO_x = 800.3 ppb NH3 = 1759.9 ppb

Previous Response TN = 815.3 ppb NO_x = 792.0 ppb NH3 = 1790.2 ppb

NH3 Previous Converter Efficiency = 104.7 %

NH3 Current Converter Efficiency = 103.7 %

*Percent Change TN = 2.3%

*Percent Change NO_x = -1.0%

*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	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	-2.5	-2.5	-2.7	----	----
as found span	5543	84.2	796.0	796.0	796.0	797.0	797.5	791.5	0.9987	0.9981
calibrator zero	5543	0.0	0.0	0.0	0.0	0.5	0.6	0.2	----	----
high point	5543	84.2	796.0	796.0	796.0	795.5	794.9	794.8	1.0006	1.0014
second point	5543	42.1	398.0	398.0	398.0	391.3	389.3	387.6	1.0171	1.0223
third point	5543	21.1	199.5	199.5	199.5	194.6	195.4	190.8	1.0250	1.0208
Average Correction Factor									1.0142	1.0148

Corrected As found TN = 794.2 ppb NO_x = 799.5 ppb NO = 800.0 ppb
 Previous Response TN = 815.3 ppb NO_x = 792.0 ppb NO = 791.7 ppb

*Percent Change TN = 2.7%
 *Percent Change NO_x = -0.9%
 *Percent Change NO = -1.0%
 * = > +/-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	802.4	798.1	4.2	0.9920	0.9973	----	----
1st NO ₂ (400 ppb O ₃)	377.2	420.9	800.2	377.2	423.0	0.9947	----	0.9950	100.5%
2nd NO ₂ (200 ppb O ₃)	587.3	210.8	802.1	587.3	214.7	0.9924	----	0.9818	101.9%
3rd NO ₂ (100 ppb O ₃)	691.6	106.5	801.9	691.6	110.3	0.9926	----	0.9655	103.6%
2nd NO ref point	----	0.0	802.1	798.4	3.6	0.9924	0.9970	----	----
Average Correction Factor						0.9930	0.9971	0.9808	102.0%

Notes:

Nox/NO span adjusted. NH₃ span adjusted.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

TN Calibration Summary

Version-03-2017

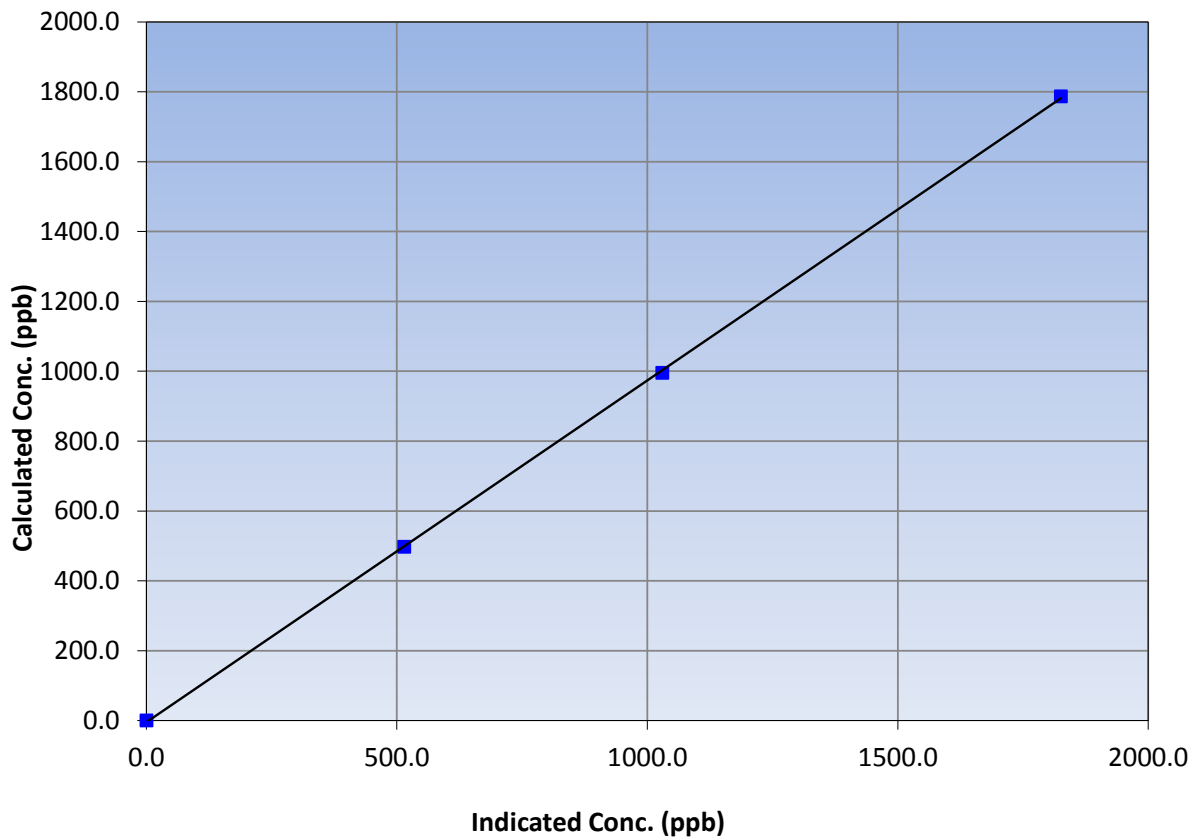
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	0.2	----	Correlation Coefficient	≥0.995	
1786.7	1825.9	0.9785			
995.1	1029.7	0.9664			
497.6	515.0	0.9662			
			Slope	0.978463	0.90 - 1.10
			Intercept	-4.707110	+/-20

TN Calibration Curve





Wood Buffalo Environmental Association

NH₃ Calibration Summary

Version-03-2017

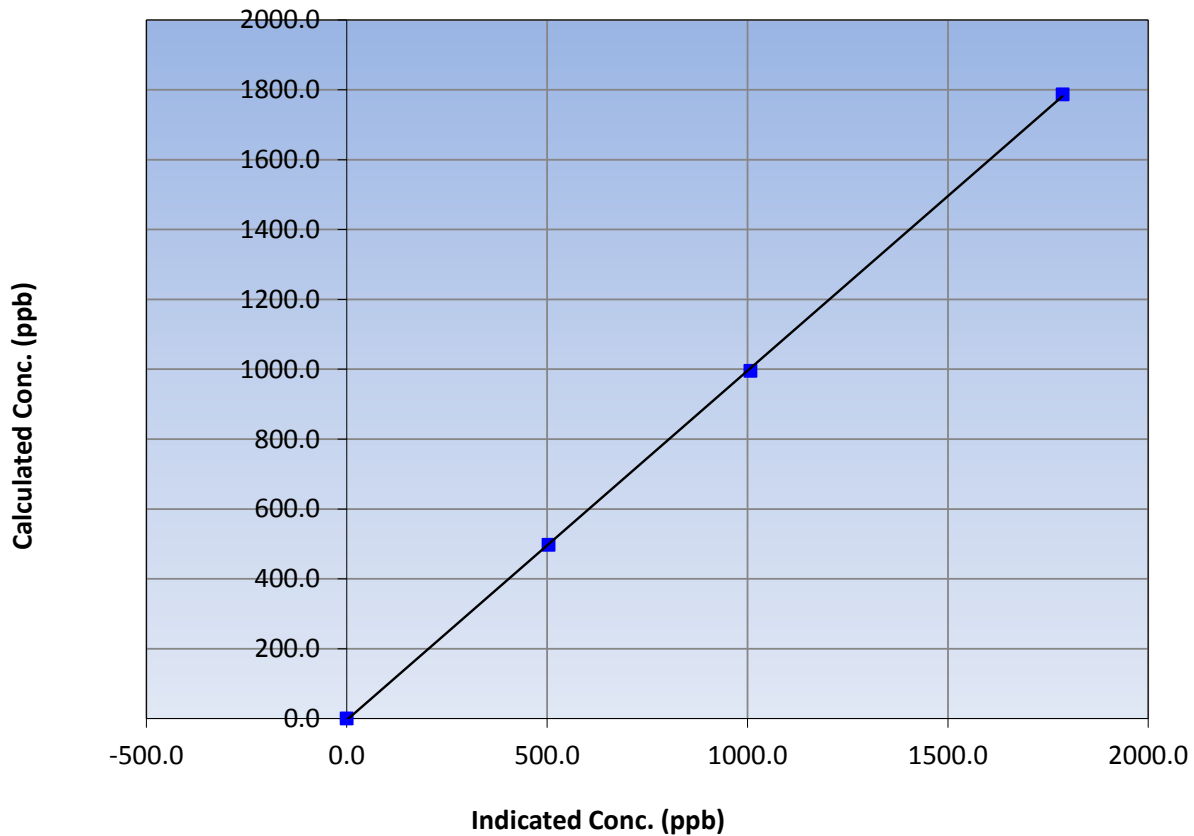
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	-0.3	----	Correlation Coefficient	≥0.995	
1786.7	1786.1	1.0003			
995.1	1007.2	0.9880			
497.6	503.3	0.9886			
			Slope	0.999950	0.90 - 1.10
			Intercept	-4.189648	+/-20

NH₃ Calibration Curve





Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

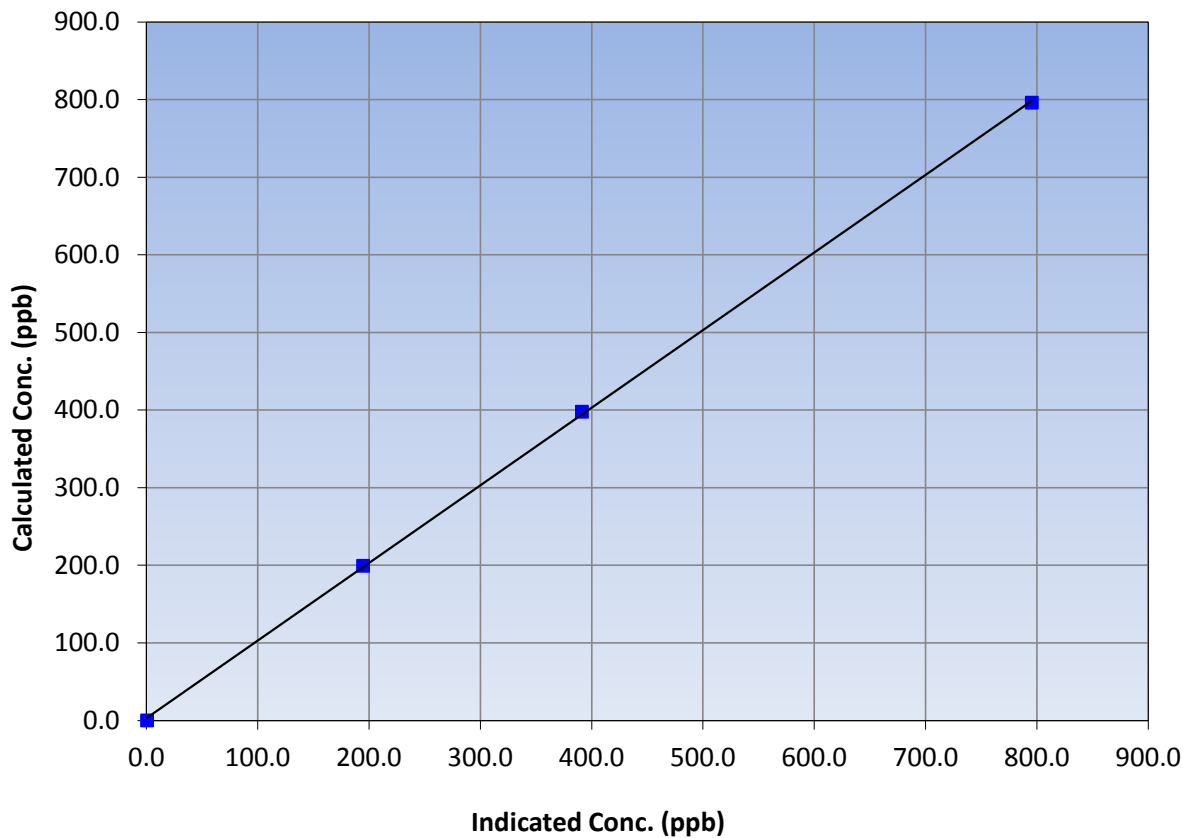
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	0.5	----	Correlation Coefficient	≥0.995	
796.0	795.5	1.0006			
398.0	391.3	1.0171			
199.5	194.6	1.0250			
			Slope	0.999878	0.90 - 1.10
			Intercept	2.923630	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

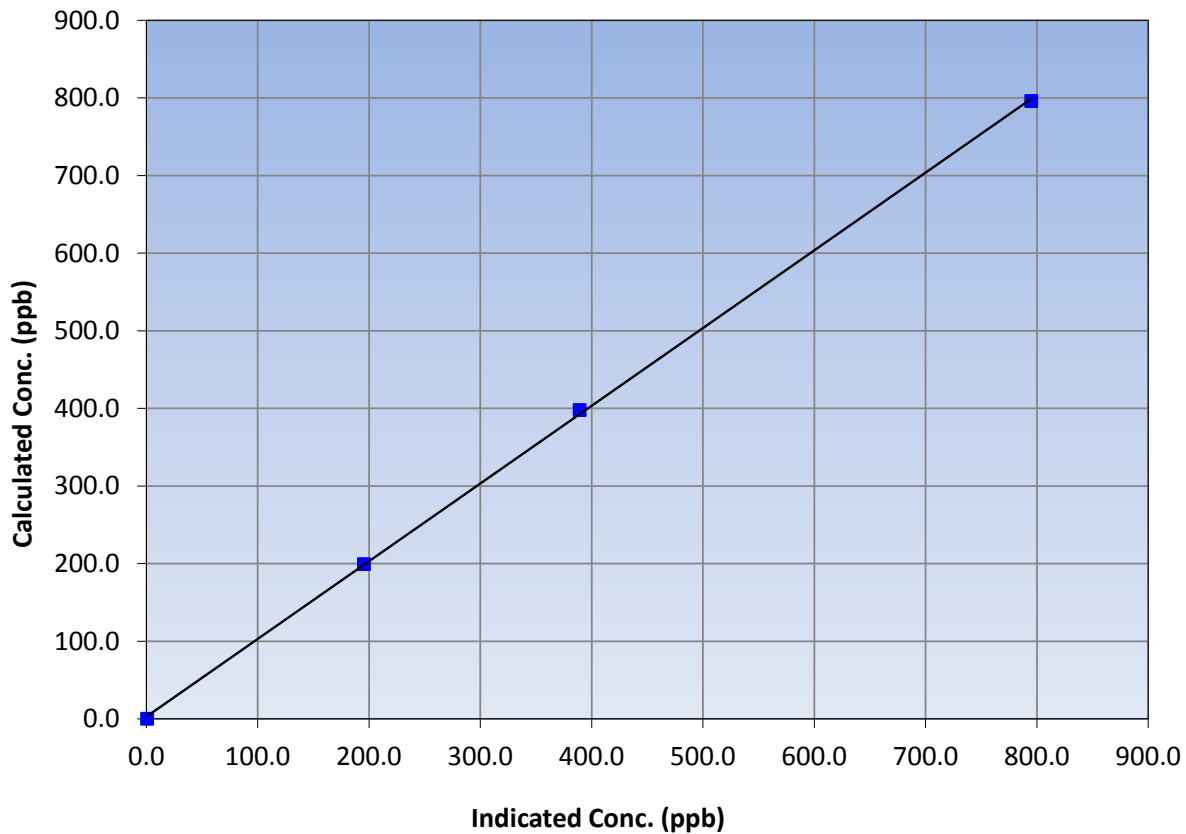
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	794.9	1.0014			
398.0	389.3	1.0223			
199.5	195.4	1.0208			
			Slope	1.001348	0.90 - 1.10
			Intercept	2.841507	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

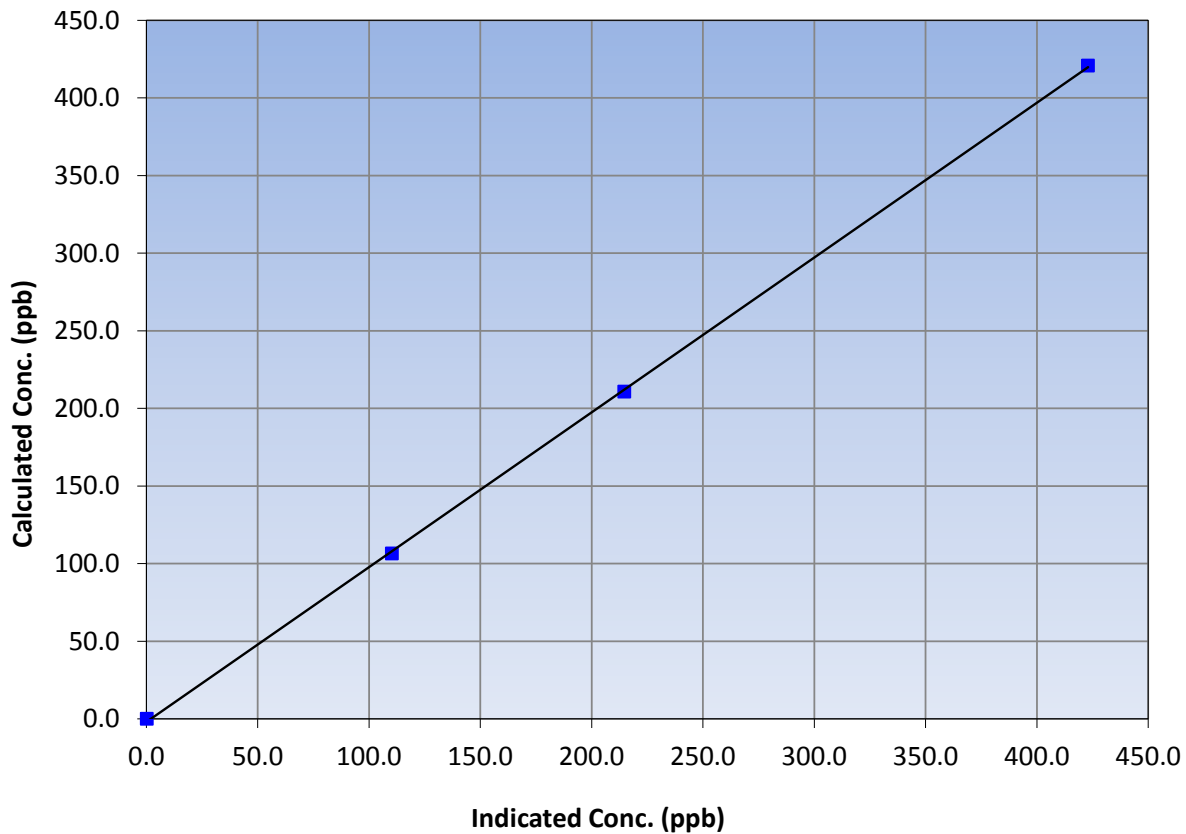
Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 7, 2017
Station Name	Patricia McInnes	Station Number	AMS 06
Start Time (MST)	7:35	End Time (MST)	13:35
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	0.2	----	Correlation Coefficient	≥0.995	
420.9	423.0	0.9950			
210.8	214.7	0.9818			
106.5	110.3	0.9655			
			Slope	0.997179	0.90 - 1.10
			Intercept	-1.972342	+/-20

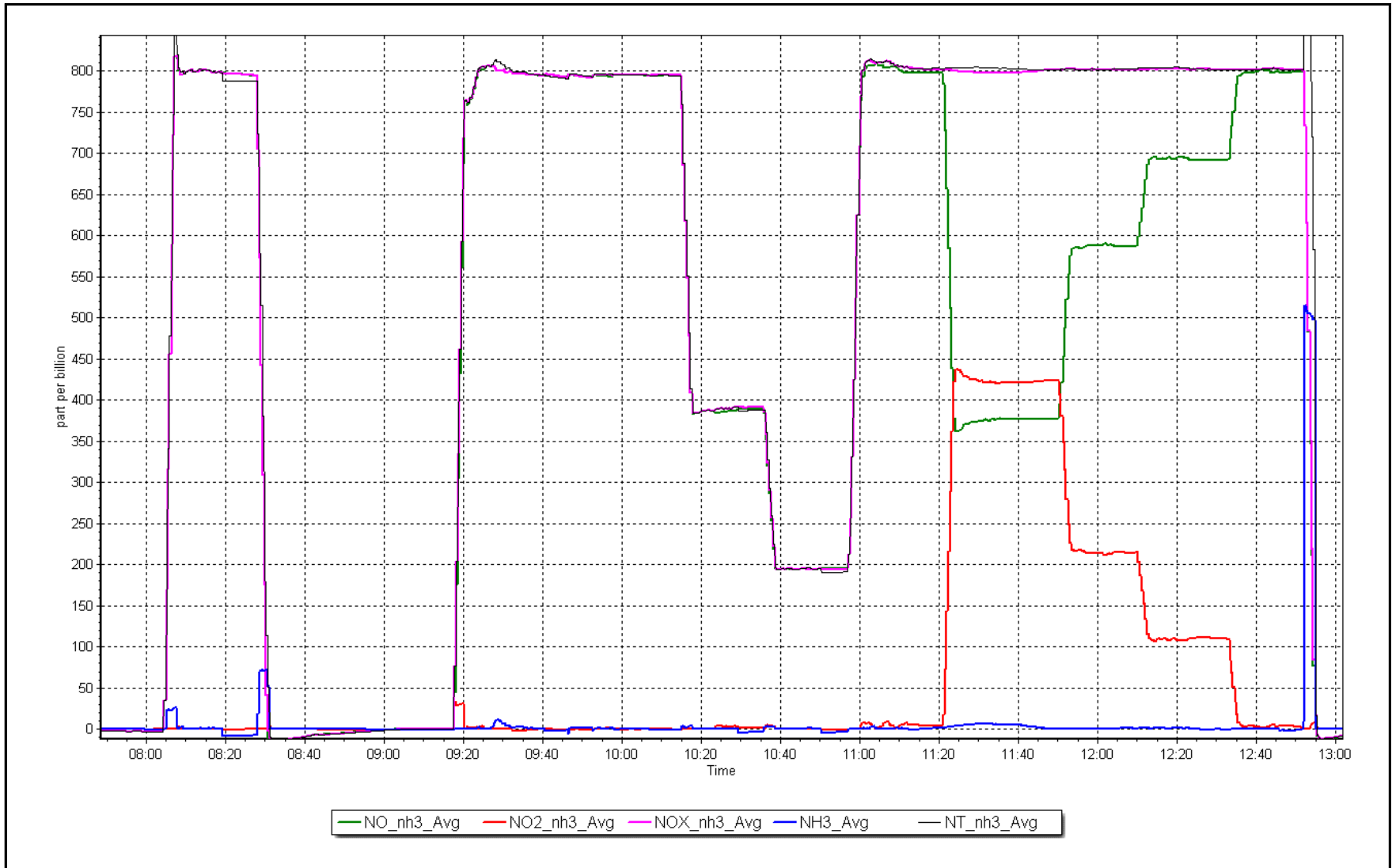
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 6, 2017

Location: Patricia McInnes



NH₃ Calibration Plot

Date: July 7, 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:	July 13, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	12:50	End time (MST):	14:50
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:	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>	<i>(Limits)</i>
T1 (°C)	25	26.5	25	<input type="checkbox"/>	<i>+/- 2 °C</i>
P3 (hPa)	971	967.9	971	<input type="checkbox"/>	<i>+/- 13 hPa</i>
flow (LPH)	1000	998.4	1000	<input type="checkbox"/>	<i>+/- 50 LPH</i>
Nephelometer zero	0.8	-----	-0.4	<input checked="" type="checkbox"/>	<i>+/- 0.5 ug/m3</i>
Instrument Clock:	Verified	<input checked="" type="checkbox"/>			
Cyclone cleaning :	PM10 Cyclone	<input type="checkbox"/>	PM2.5 Cyclone	<input type="checkbox"/>	
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test:	Date of check: _____	Last Cal Date: <u>June 7, 2017</u>	
	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>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: No adjustments made to T1, P3, or flow. Nephelometer zero adjusted.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Patricia McInnes	Station Number:	AMS 06
Calibration Date:	July 19, 2017	Prev Cal Date:	August 5, 2016
Start Time (MST):	9:00	End Time (MST):	10:00
Barometric Press:	NA	Station Temp:	22 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	E5132
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	20.1	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9989
Average Correction Factor			1.0002

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r ²)	0.999998	0.999999	<i>≥0.995</i>
Calculated slope	0.998863	0.998909	<i>0.90 - 1.10</i>
Calculated intercept	0.064097	0.030357	<i>+/- 2</i>

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	E4854
As Found Declination (deg west of North)	<u>16</u>	As Left Declination (deg west of North)	<u>16</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.4	n/a
90	87.7	1.0262
180	177.8	1.0124
270	269.9	1.0004
357	353.9	1.0088
Average Correction Factor		1.0119

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r ²)	0.999948	0.999956	<i>≥0.995</i>
Calculated slope	0.998687	1.005283	<i>0.90 - 1.10</i>
Calculated intercept	0.175636	0.519861	<i>+/- 7</i>

Notes: As found and as left declination confirmed with solar noon marking. Also checked with compass; declination showing 16 degrees West of North. WS and WD bearings were good.

Calibration Performed By: Devin Russell/Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JULY 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	707	36	37	99.87	9	0	2	0
TRS (ppb) Average	687	35	57	97.04	2	0	1	0
THC (ppm) Average	707	36	37	99.87	2.9	-	2.1	-
NMHC (ppm) Average	707	36	37	99.87	0.504	-	0.1	-
CH4(ppm) Average	707	36	37	99.87	2.4	-	2	-
O3 (ppb) Average	706	37	38	99.87	63	0	41	-
NO2 (ppb) Average	675	35	69	95.43	13	0	6	-
NO (ppb) Average	675	35	69	95.43	10	-	2	-
NOX (ppb) Average	675	35	69	95.43	24	-	7	-
PM2.5 (ug/m3) Average	723	1	21	97.31	68	-	19.1	0
CO(ppm) Average	709	34	35	99.87	0.3	0	0.2	-
Temperature 2 m (C) Average	744	0	0	100	33.6	-	24.5	-
Barometric Pressure (inHg) Average	744	0	0	100	29.3	-	29.2	-
Relative Humidity (%) Average	744	0	0	100	98	-	78	-
Wind Speed 10 m (km/h) Average	742	2	2	100	29	-	21	-
Wind Direction 10 m (deg) Average	742	2	2	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
 JULY 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	707	0.5	1	-	0	0	0	0	0	1	9
TRS (ppb) Average	687	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	707	1.97	0.1	-	1.9	1.9	1.9	2	2	2.1	2.9
NMHC (ppm) Average	707	0.007	0.036	-	0	0	0	0	0	0	0.504
CH4(ppm) Average	707	1.97	0.1	-	1.9	1.9	1.9	1.9	2	2	2.4
O3 (ppb) Average	706	32.2	10	-	10	18	25	32	39	45	63
NO2 (ppb) Average	675	3.2	3	-	0	1	1	3	4	7	13
NO (ppb) Average	675	0.7	1	-	0	0	0	0	1	2	10
NOX (ppb) Average	675	3.9	3	-	0	1	1	3	5	8	24
PM2.5 (ug/m3) Average	723	7.83	7.3	-	0.1	1.6	3.4	5.5	10.5	15.9	68
CO(ppm) Average	709	0.11	0	-	0	0.1	0.1	0.1	0.1	0.2	0.3
Temperature 2 m (C) Average	744	20.31	4.7	-	10.3	14.6	16.7	20	23.7	26.6	33.6
Barometric Pressure (inHg) Average	744	28.92	0.1	-	28.6	28.8	28.8	28.9	29	29.1	29.3
Relative Humidity (%) Average	744	60	18	-	25	35	46	59	74	86	98
Wind Speed 10 m (km/h) Average	742	10	6	-	0	3	5	9	14	19	29
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS 7)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	11 Jul 2017 11:00	11 Jul 2017 11:00	1	Station power failure
NO2, NO, NOX	14 Jul 2017 04:00	15 Jul 2017 09:00	30	Analyzer failure - sample pump died
NO2, NO, NOX	15 Jul 2017 10:00	15 Jul 2017 12:00	3	Maintenance - replaced pump and subsequent calibration
TRS	09 Jul 2017 07:00	09 Jul 2017 07:00	1	Maintenance - reinitiated daily QA check
TRS	11 Jul 2017 08:00	11 Jul 2017 13:00	6	Maintenance - converter replacement and subsequent calibration
TRS	12 Jul 2017 14:00	12 Jul 2017 18:00	5	Maintenance - converter replacement and subsequent calibration
TRS	13 Jul 2017 08:00	13 Jul 2017 13:00	6	Maintenance - kicker replacement and subsequent calibration
TRS	19 Jul 2017 07:00	19 Jul 2017 10:00	4	Maintenance - recalibration to address baseline drift
PM2.5	03 Jul 2017 07:00	03 Jul 2017 08:00	2	Unstable operation - excessive baseline drift
PM2.5	07 Jul 2017 14:00	07 Jul 2017 14:00	1	Unstable operation - excessive baseline drift
PM2.5	23 Jul 2017 11:00	23 Jul 2017 13:00	3	Unstable operation - excessive baseline drift
PM2.5	23 Jul 2017 15:00	23 Jul 2017 16:00	2	Unstable operation - excessive baseline drift
PM2.5	25 Jul 2017 14:00	25 Jul 2017 14:00	1	Unstable operation - excessive baseline drift
PM2.5	25 Jul 2017 17:00	25 Jul 2017 19:00	3	Unstable operation - excessive baseline drift
PM2.5	26 Jul 2017 15:00	26 Jul 2017 17:00	3	Unstable operation - excessive baseline drift
PM2.5	27 Jul 2017 13:00	27 Jul 2017 16:00	4	Unstable operation - excessive baseline drift



Wood Buffalo Environmental Association
Summary of Hour Averages

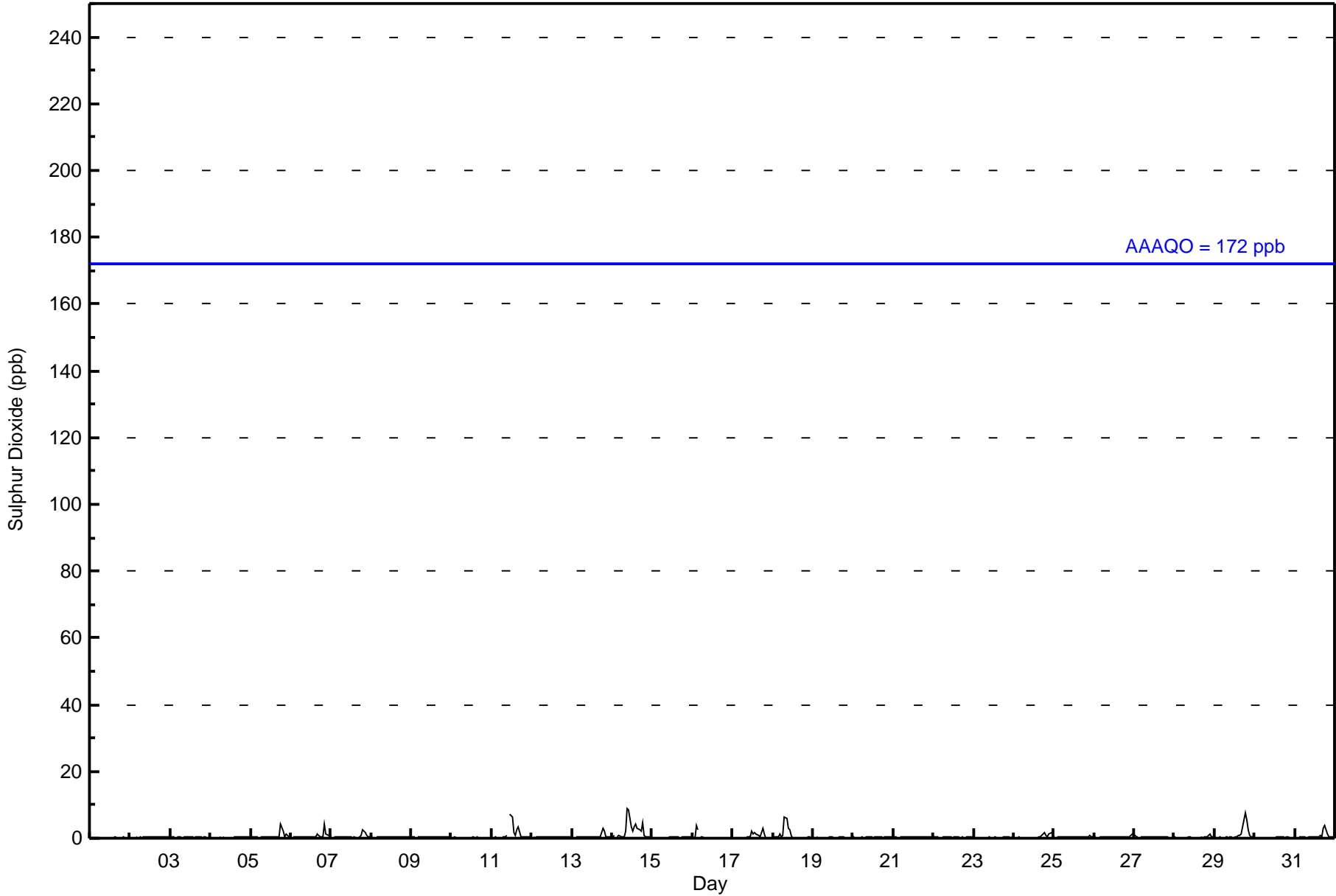
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2017

Number of Exceedences (AAAQO):		1-hr: 0 24-hr: 0		Hours in Service: 744																							
Maximum Value: 9 ppb on Jul 14 10:00		Maximum Daily Average: 2.3 ppb on Jul 14		Hours of Data: 707																							
Minimum Value: 0 ppb on Jul 1 01:00		Minimum Daily Average: 0.1 ppb on Jul 1		Hours of Missing Data: 37																							
Maximum Diurnal Average: 1.1 ppb at hour 19		Minimum Diurnal Average: 0.3 ppb at hour 6		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: 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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0.4	1	
3-Jul	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	
4-Jul	0	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.3	0	
5-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	4	2	1	1	1	1	0.7	4	
6-Jul	Z	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	4	1	1	1	0.7	4	
7-Jul	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	1	0.6	2	
8-Jul	1	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	1	
9-Jul	0	0	0	Z	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
10-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	1	PF	7	6	2	1	3	3	1	1	0	0	0	0	0	1.2	7	
12-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1	
13-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	1	0.5	3	
14-Jul	1	1	Z	1	1	1	1	0	2	9	8	4	2	3	4	3	2	2	5	1	0	0	0	0	2.3	9	
15-Jul	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-Jul	0	0	4	2	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4	
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	2	1	2	1	1	0	2	3	1	0	0	0	0	0.7	3	
18-Jul	Z	0	0	1	1	1	1	7	6	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1.1	7	
19-Jul	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-Jul	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	
21-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1	
22-Jul	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	
23-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	1	2	1	0.5	2	
25-Jul	0	Z	0	0	0	0	1	0	0	0	1	0	1	1	1	0	1	1	0	0	1	1	1	1	0.5	1	
26-Jul	1	1	Z	1	1	1	1	1	1	1	0	0	1	0	1	0	0	0	0	0	1	1	1	1	0.6	1	
27-Jul	1	1	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.3	1	
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	6	8	6	3	1	0	1.3	8	
30-Jul	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	
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	4	1	1	0	0	1	0.7	4	
		0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.5	0.5	0.7	0.7	0.7	0.6	0.5	0.5	0.5	0.5	0.7	1.1	0.7	0.6	0.5	0.4	0.4	Diurnal Average	
		1	1	4	2	1	1	1	7	6	9	8	7	6	3	4	3	3	6	8	6	4	1	2	1	Diurnal Maximum	
Z - zeronpan 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
Athabasca Valley - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 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	37	11	3	10	28	45	96	40	32	35	92	81	43	30	29	93	705
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	37	11	3	10	28	45	96	40	32	35	92	81	43	30	29	93	705

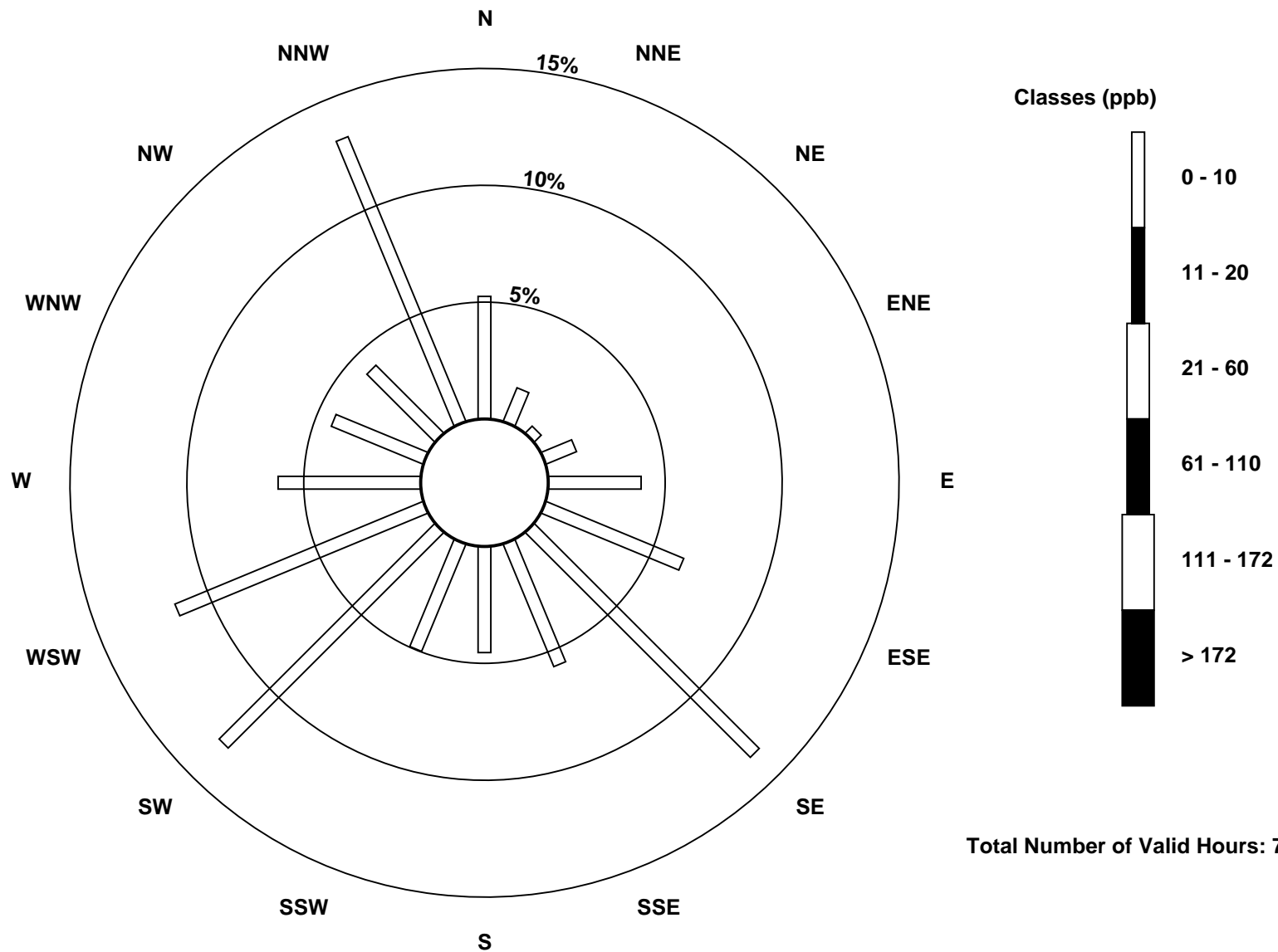
Total Number of Valid Hours: 705

Total Number of Hours: 744

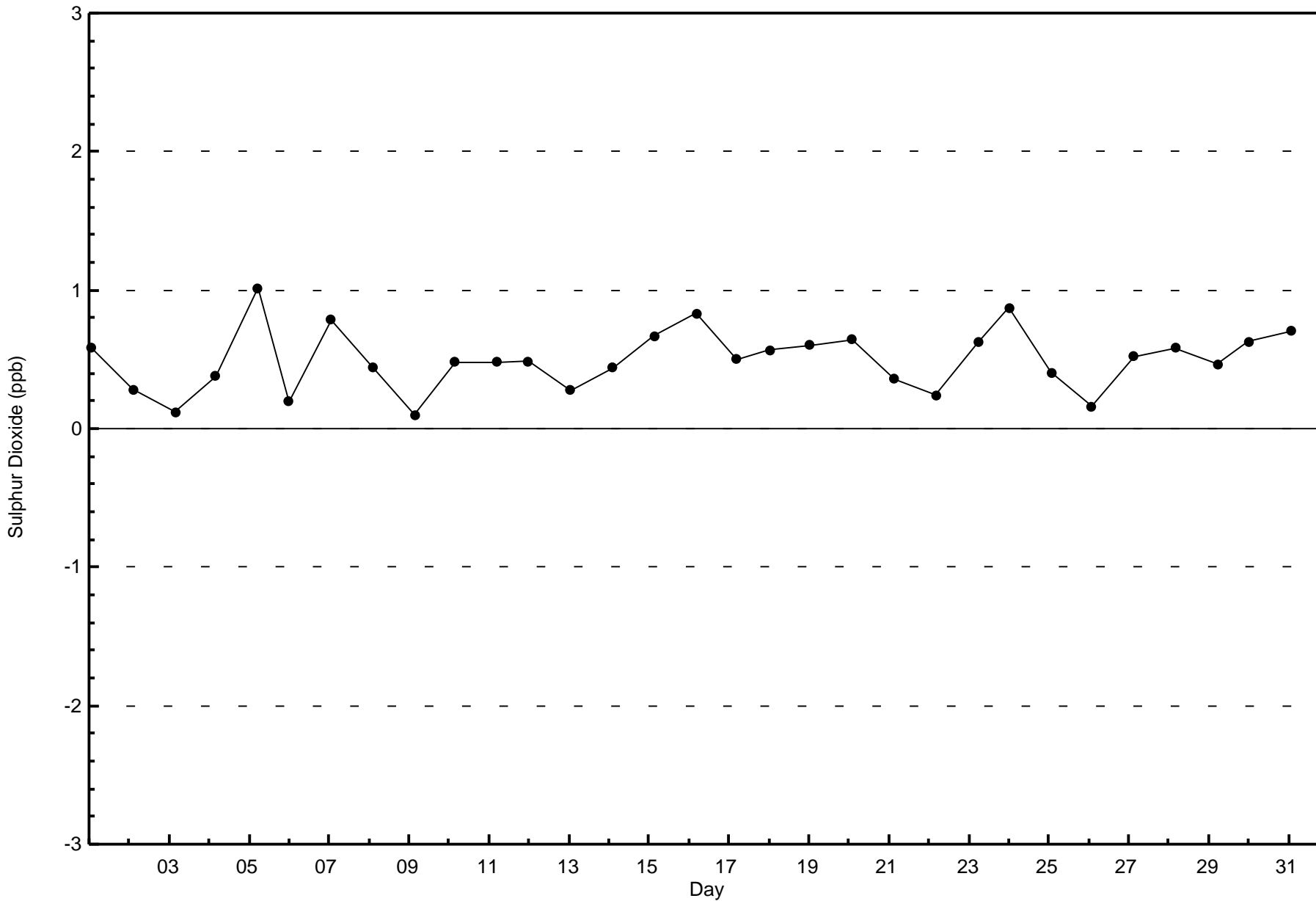


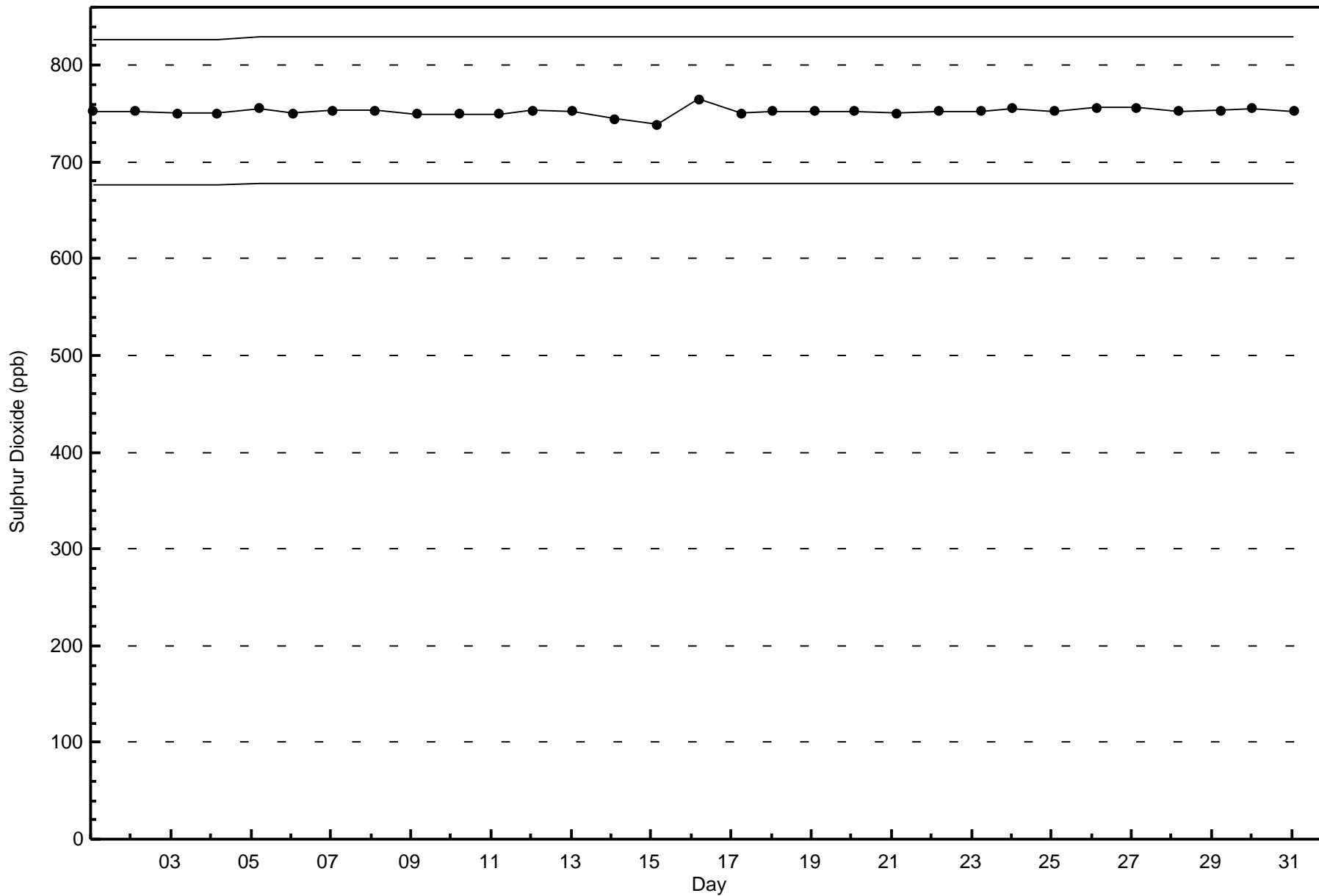
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 705







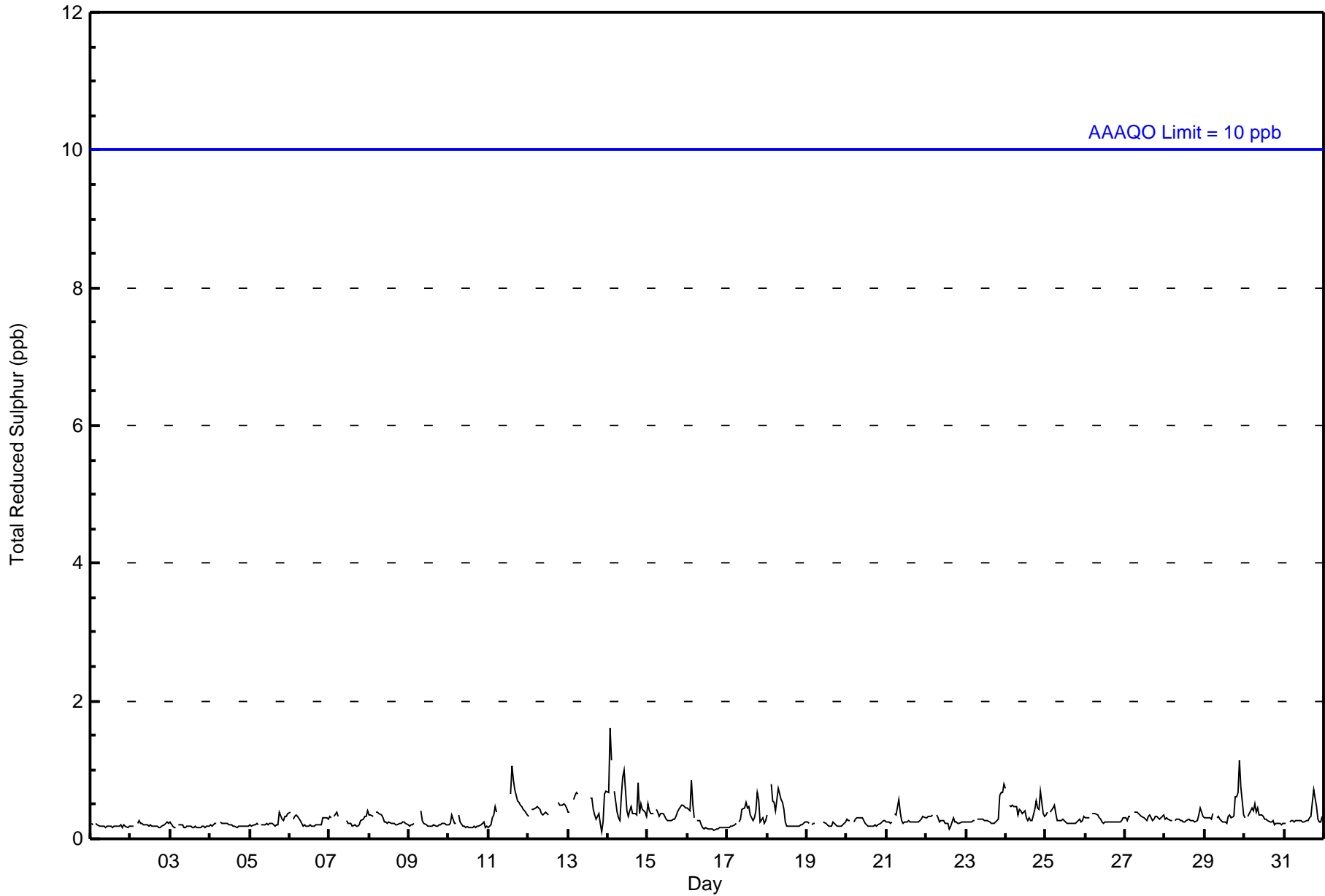
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 14 02:00 Maximum Daily Average: 0.6 ppb on Jul 14														Hours in Service: 744 Hours of Data: 687												
Minimum Value: 0 ppb on Jul 13 21:00 Minimum Daily Average: 0.2 ppb on Jul 3 Maximum Diurnal Average: 0.4 ppb at hour 3 Minimum Diurnal Average: 0.2 ppb at hour 13 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														Hours of Missing Data: 57 Hours of Calibration: 35 Percent Operational Time: 97.0												
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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
8-Jul	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
9-Jul	0	0	0	0	Z	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
10-Jul	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-Jul	0	0	0	0	0	0	Z	M	M	M	M	M	M	1	1	1	1	1	1	0	0	0	0	0	--	1
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	M	M	M	M	M	M	1	0	0	1	0	0	0.4	1
13-Jul	0	0	Z	1	1	1	1	M	M	M	M	M	M	1	1	0	0	0	0	0	0	0	1	1	--	1
14-Jul	1	2	1	Z	1	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0.6	2
15-Jul	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
16-Jul	0	0	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0.3	1
18-Jul	0	Z	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
19-Jul	0	0	Z	0	0	0	M	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
20-Jul	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-Jul	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
22-Jul	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
23-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
24-Jul	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0.4	1
25-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0.4	1
30-Jul	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
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.3	1
0.3 0.3 0.4 0.3 0.4 0.3 0.4 0.3 0.3 0.3 0.3 0.3 0.2 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																								Diurnal Average		
1 2 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 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
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 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: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 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	35	12	3	9	28	47	96	36	30	30	90	82	41	30	29	88	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	35	12	3	9	28	47	96	36	30	30	90	82	41	30	29	88	686

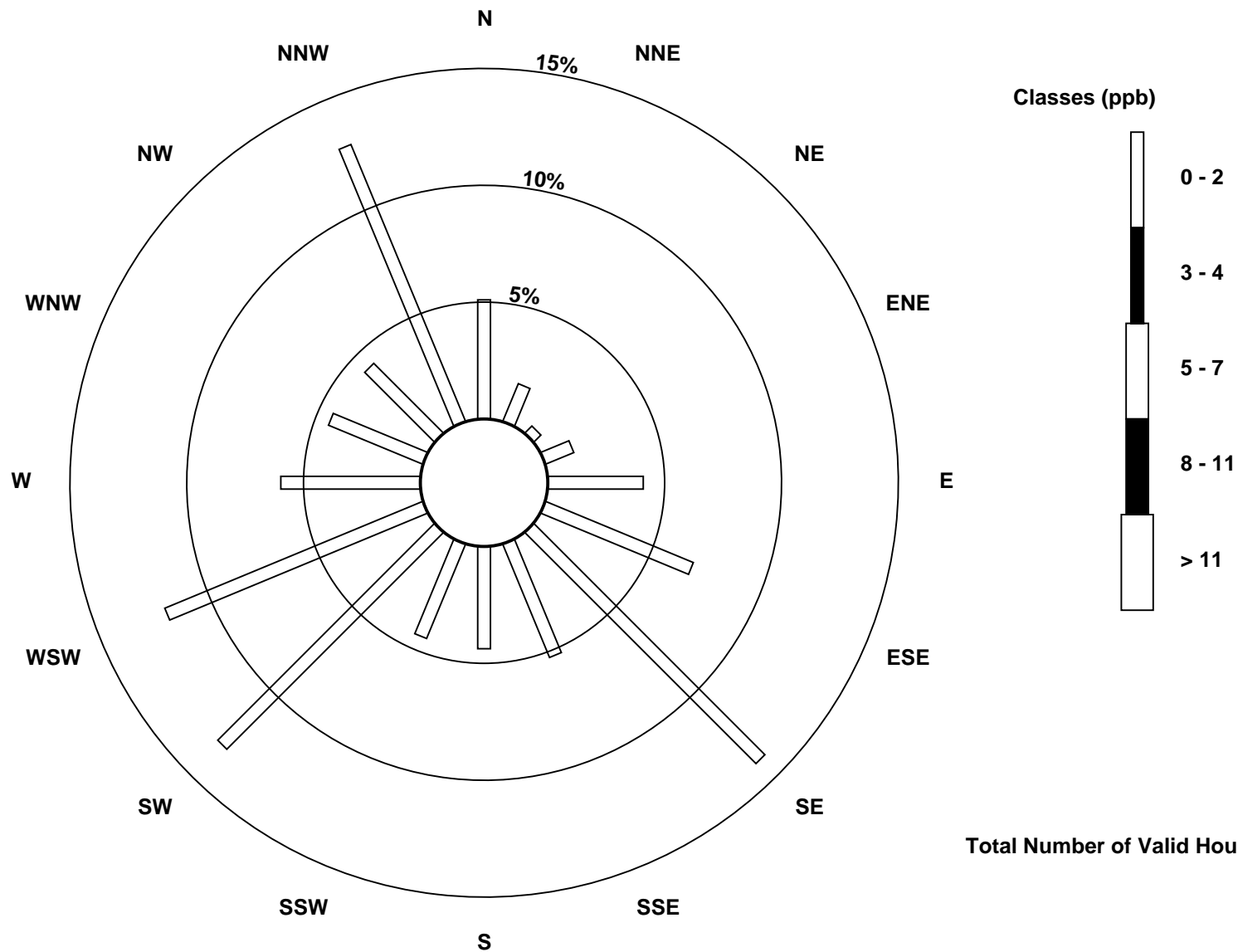
Total Number of Valid Hours: 686

Total Number of Hours: 744

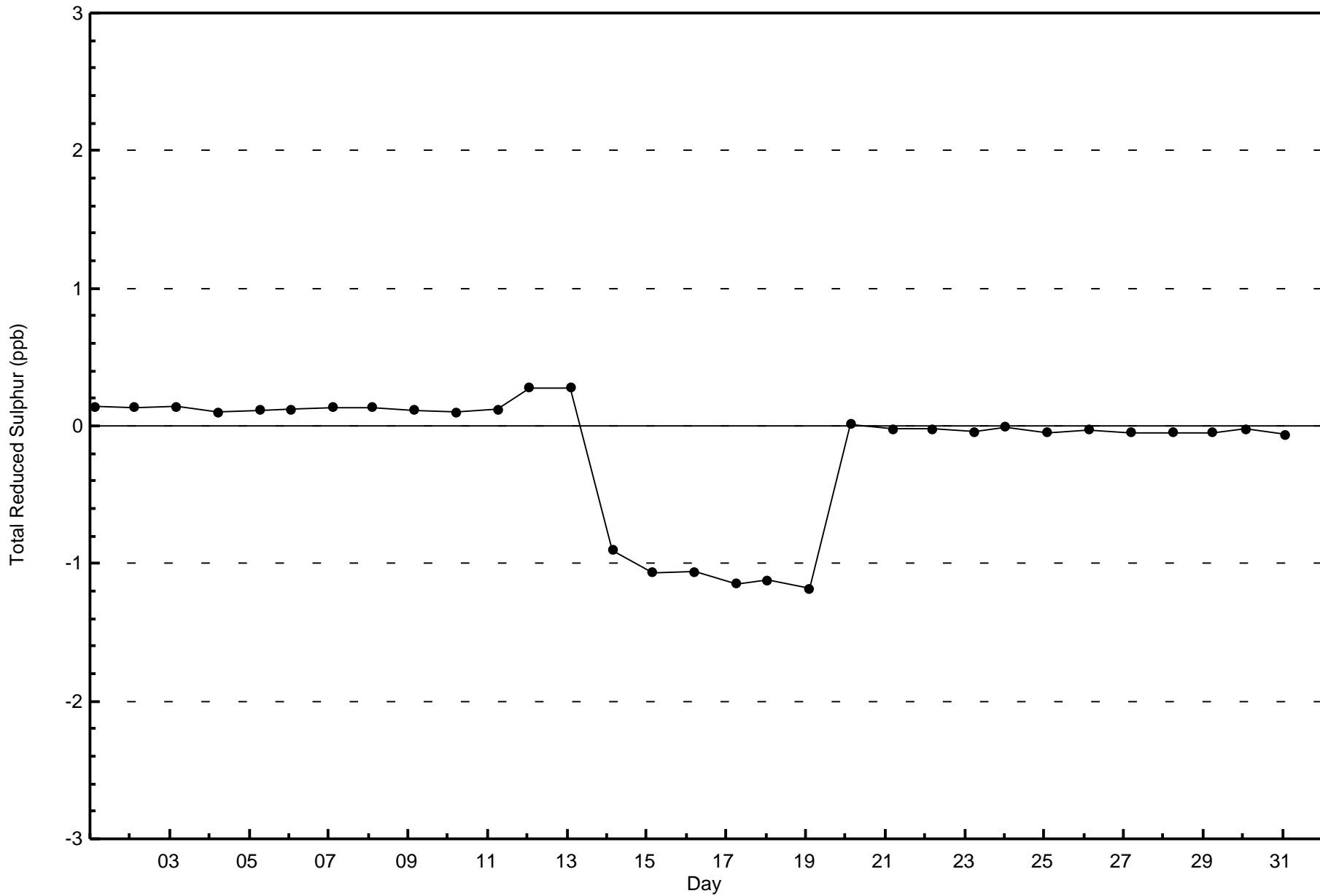


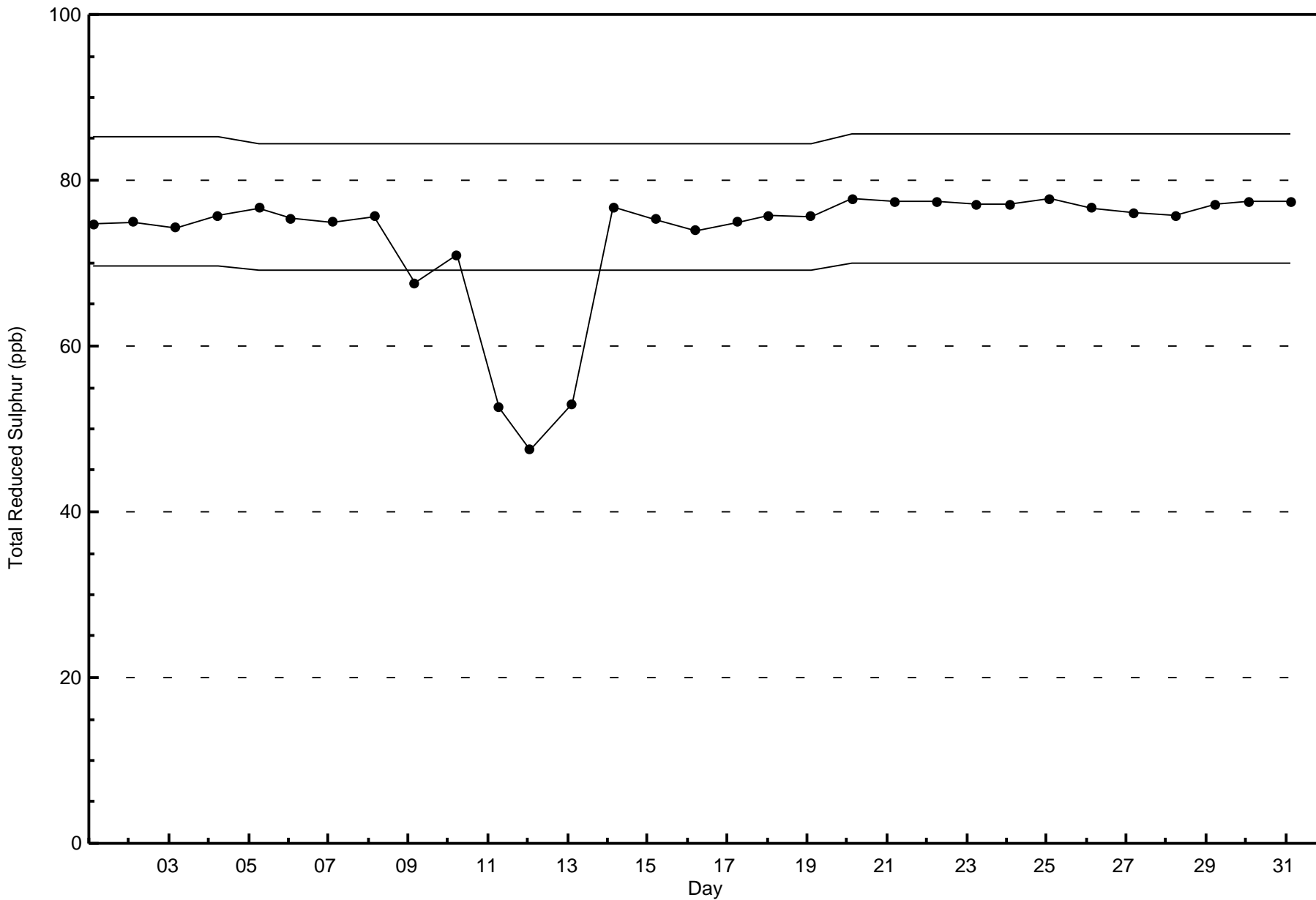
Wood Buffalo Environmental Association
Wind Rose Jul 2017

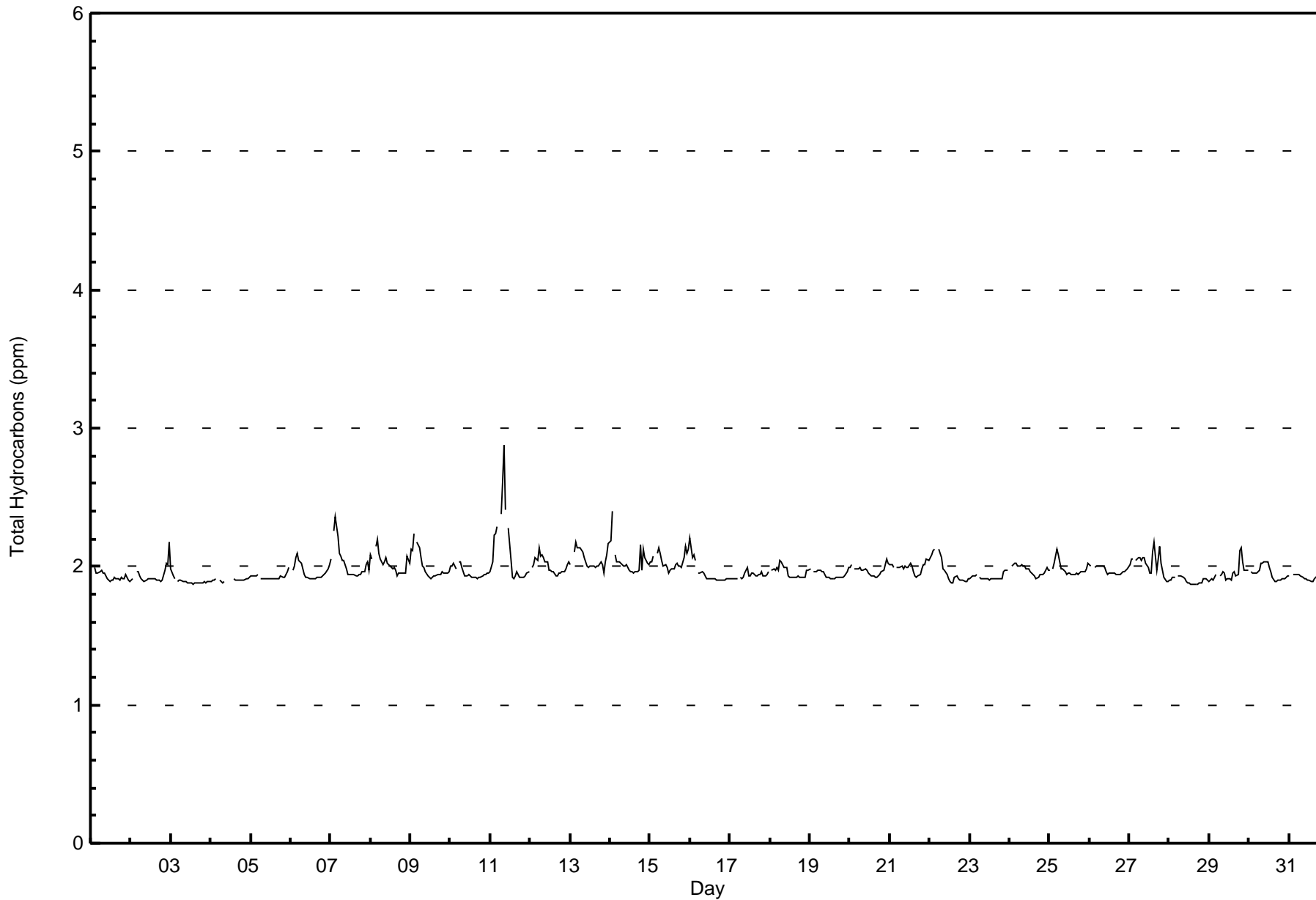
Total Reduced Sulphur (TRS) - ppb
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 686









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	623	88.12	88.12
2.1 - 3.0	84	11.88	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 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	33	11	2	10	25	35	59	34	30	33	90	81	43	29	29	77	621
2.1 - 3.0	4	0	1	0	3	10	37	6	2	2	2	0	0	1	0	16	84
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	37	11	3	10	28	45	96	40	32	35	92	81	43	30	29	93	705

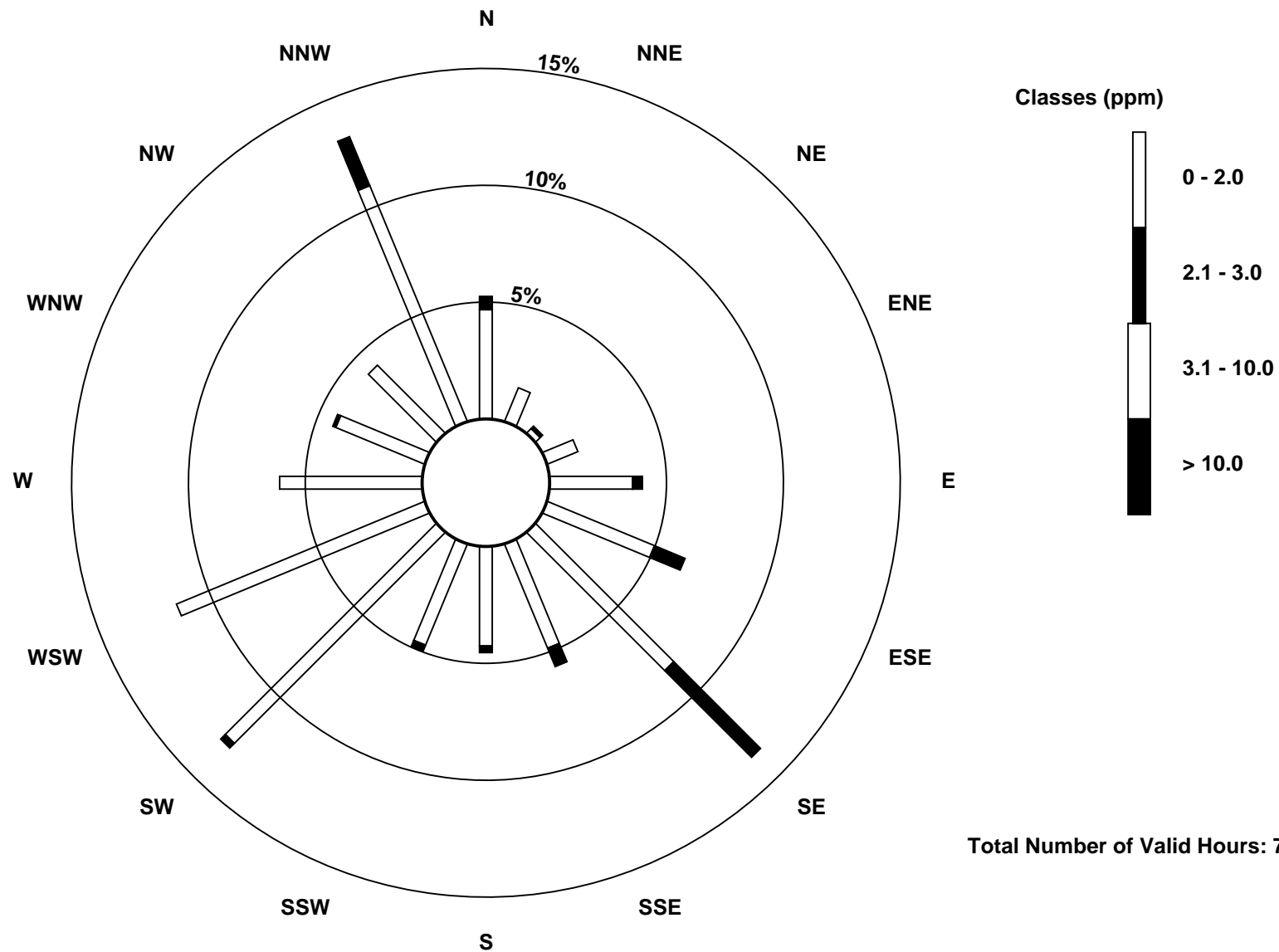
Total Number of Valid Hours: 705

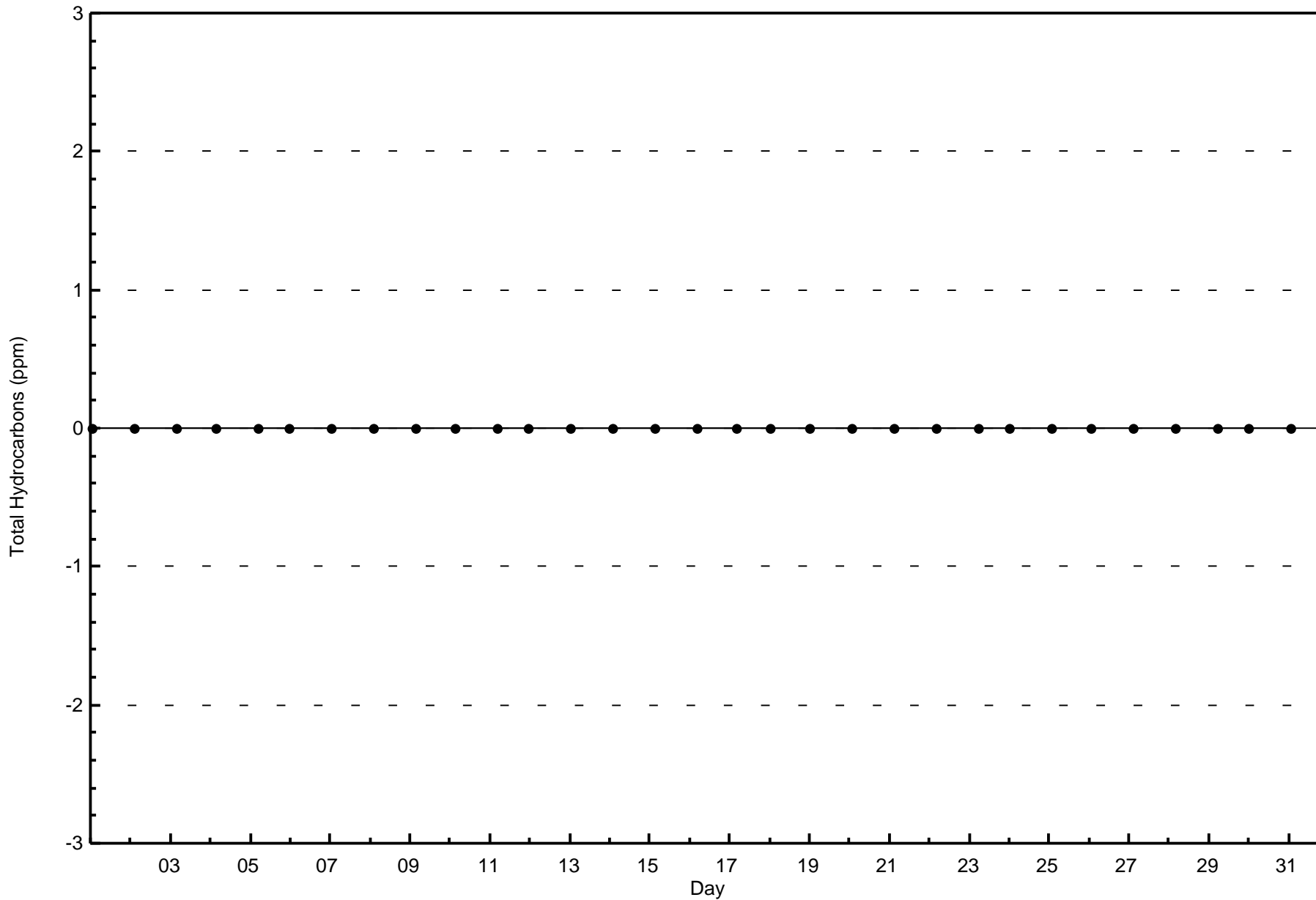
Total Number of Hours: 744

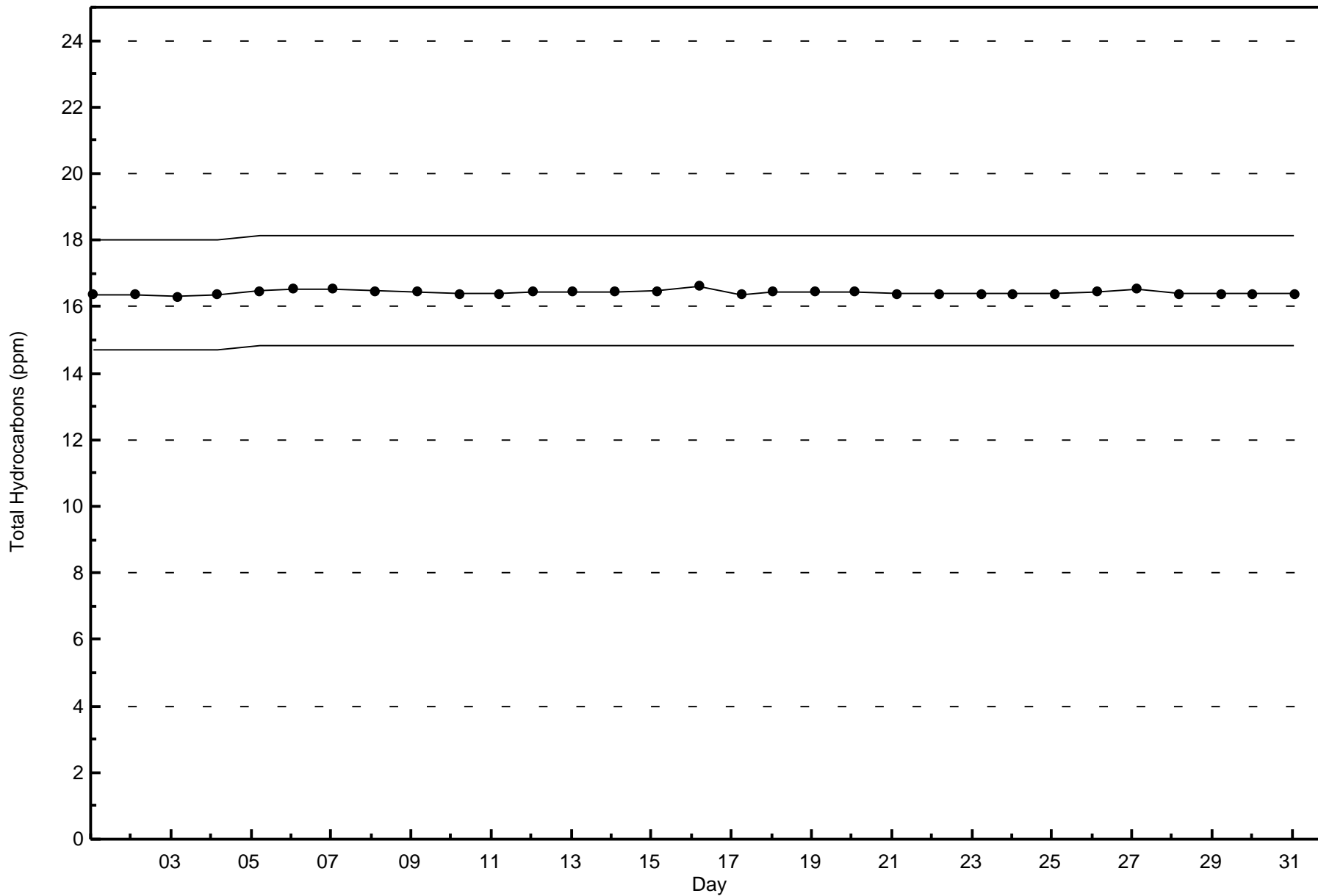


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)

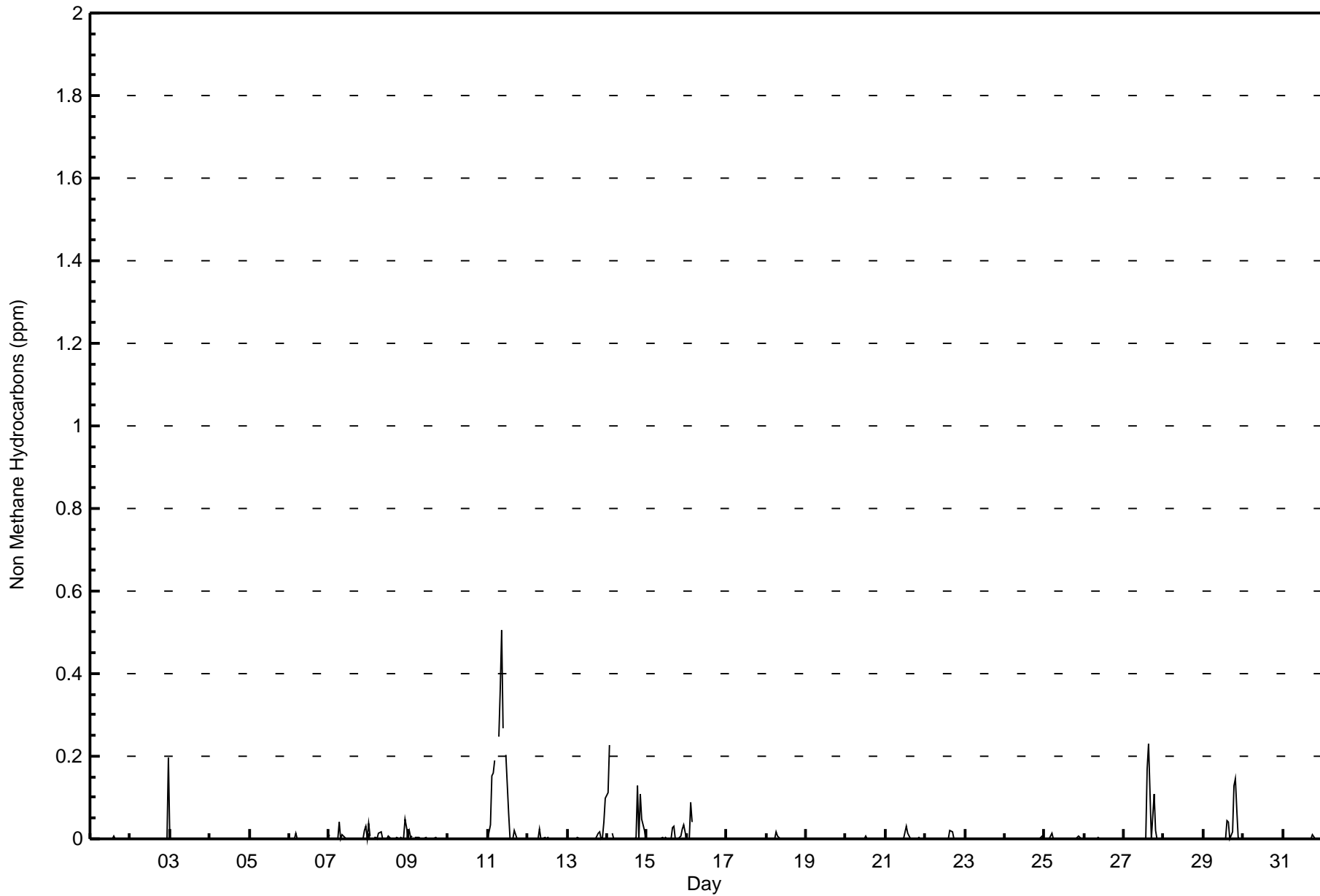








Maximum Value: 0.504 ppm on Jul 11 09:00		Maximum Daily Average: 0.100 ppm on Jul 11		Hours in Service: 744																													
Minimum Value: 0.000 ppm on Jul 1 01:00		Minimum Daily Average: 0.000 ppm on Jul 3		Hours of Data: 707																													
Maximum Diurnal Average: 0.017 ppm at hour 9		Minimum Diurnal Average: 0.000 ppm at hour 6		Hours of Missing Data: 37																													
Monthly Average: 0.007 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: 36																													
				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-Jul	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	0.006	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	0.000	0.006	
2-Jul	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	0.195	0.008	0.195		
3-Jul	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	0.000	0.000	0.000	0.000	
4-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	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	0.000	0.000	0.000	0.000	0.000		
5-Jul	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	0.000	0.000	0.000		
6-Jul	Z	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013	
7-Jul	0.009	Z	0.001	0.001	0.000	0.001	0.040	0.000	0.012	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	0.000	0.000	0.000	0.022	0.030	0.000	0.005	0.040
8-Jul	0.036	0.006	Z	0.003	0.005	0.000	0.013	0.016	0.000	0.001	0.000	0.000	0.008	0.001	0.001	0.001	0.000	0.003	0.001	0.003	0.001	0.004	0.047	0.011	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.047
9-Jul	0.021	0.002	0.006	Z	0.002	0.003	0.002	0.000	0.001	0.000	0.004	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.021
10-Jul	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	0.000	0.000	0.000	0.000	0.000
11-Jul	0.000	0.034	0.153	0.159	0.189	Z	0.248	0.361	0.504	0.268	PF	0.203	0.060	0.000	0.000	0.002	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.504	
12-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.025	0.001	0.000	0.003	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	0.000	0.001	0.025	0.025	
13-Jul	0.000	Z	0.000	0.001	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.097	
14-Jul	0.113	0.228	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.228	
15-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.002	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	0.000	0.000	0.006	0.035	
16-Jul	0.002	0.000	0.088	0.039	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	0.006	0.088		
17-Jul	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	0.000	0.000	0.000	0.000	
18-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.018	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	0.000	0.000	0.000	0.000	0.000	0.001	0.018		
19-Jul	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	0.000	0.000	0.000	0.000	
20-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	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	0.001	0.007	
21-Jul	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	0.030	0.014	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	0.030	
22-Jul	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	0.000	0.000	0.002	0.019	
23-Jul	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	0.000	0.000	0.000	0.000	
24-Jul	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.006
25-Jul	0.000	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014	
26-Jul	0.000	0.000	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002
27-Jul	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	0.000	0.000	0.000	0.000	0.000
28-Jul	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	0.000	0.000	0.000	0.000	
29-Jul	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	0.000	0.000	0.000	0.000	0.000
30-Jul	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	0.000	0.000	0.000	0.000	0.000
31-Jul	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	0.000	0.000	0.000	0.000	0.010
		0.007	0.011	0.010	0.008	0.009	0.000	0.010	0.013	0.017	0.009	0.000	0.007	0.004	0.001	0.007	0.010	0.002	0.002	0.013	0.006	0.006	0.003	0.006	0.010					Diurnal Average			
		0.113	0.228	0.153	0.159	0.189	0.003	0.248	0.361	0.504	0.268	0.004	0.203	0.060	0.014	0.170	0.231	0.031	0.053	0.130	0.146	0.109	0.046	0.047	0.195					Diurnal Maximum			
Z - zerospan		C - Calibration			PF - Power Failure																												





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	638	90.24	90.24
0.006 - 0.05	47	6.65	96.89
0.06 - 0.1	10	1.41	98.30
> 0.1	12	1.70	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - July 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	30	10	2	9	25	39	84	37	29	35	87	80	42	28	25	74	636
0.006 - 0.05	4	1	1	1	3	6	11	3	1	0	4	1	1	1	4	5	47
0.06 - 0.1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	8	10
> 0.1	2	0	0	0	0	0	1	0	1	0	1	0	0	1	0	6	12
Totals	37	11	3	10	28	45	96	40	32	35	92	81	43	30	29	93	705

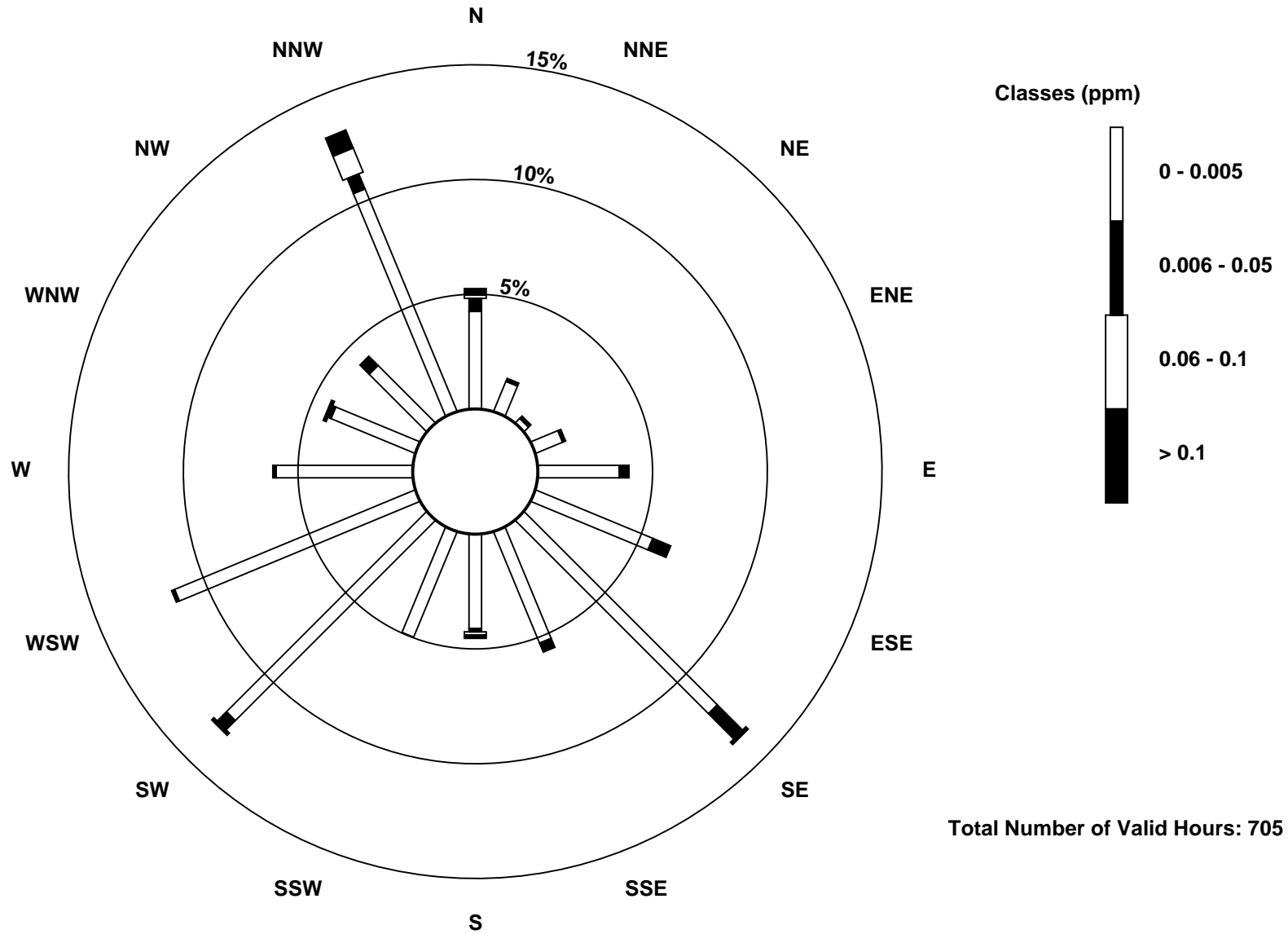
Total Number of Valid Hours: 705

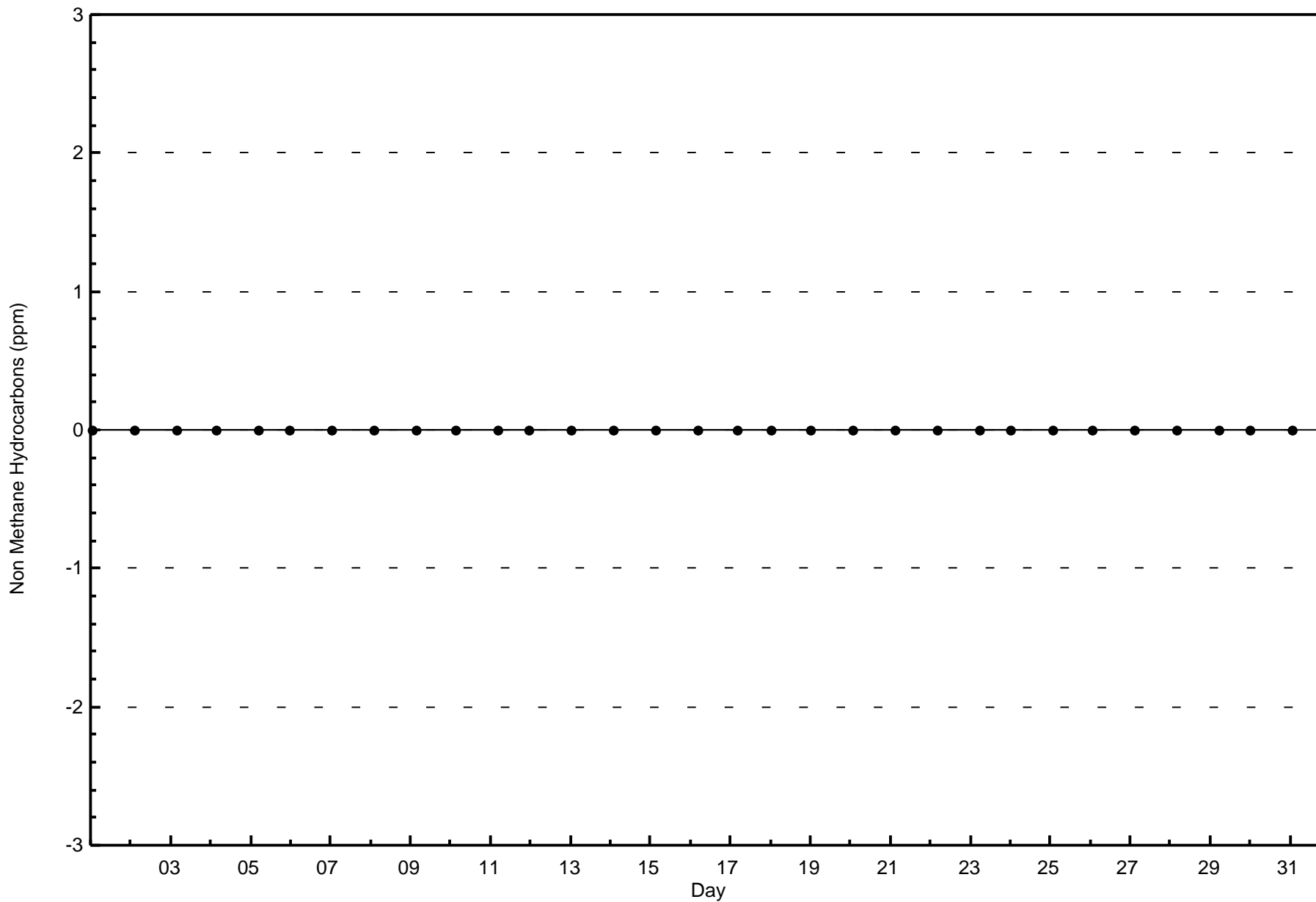
Total Number of Hours: 744

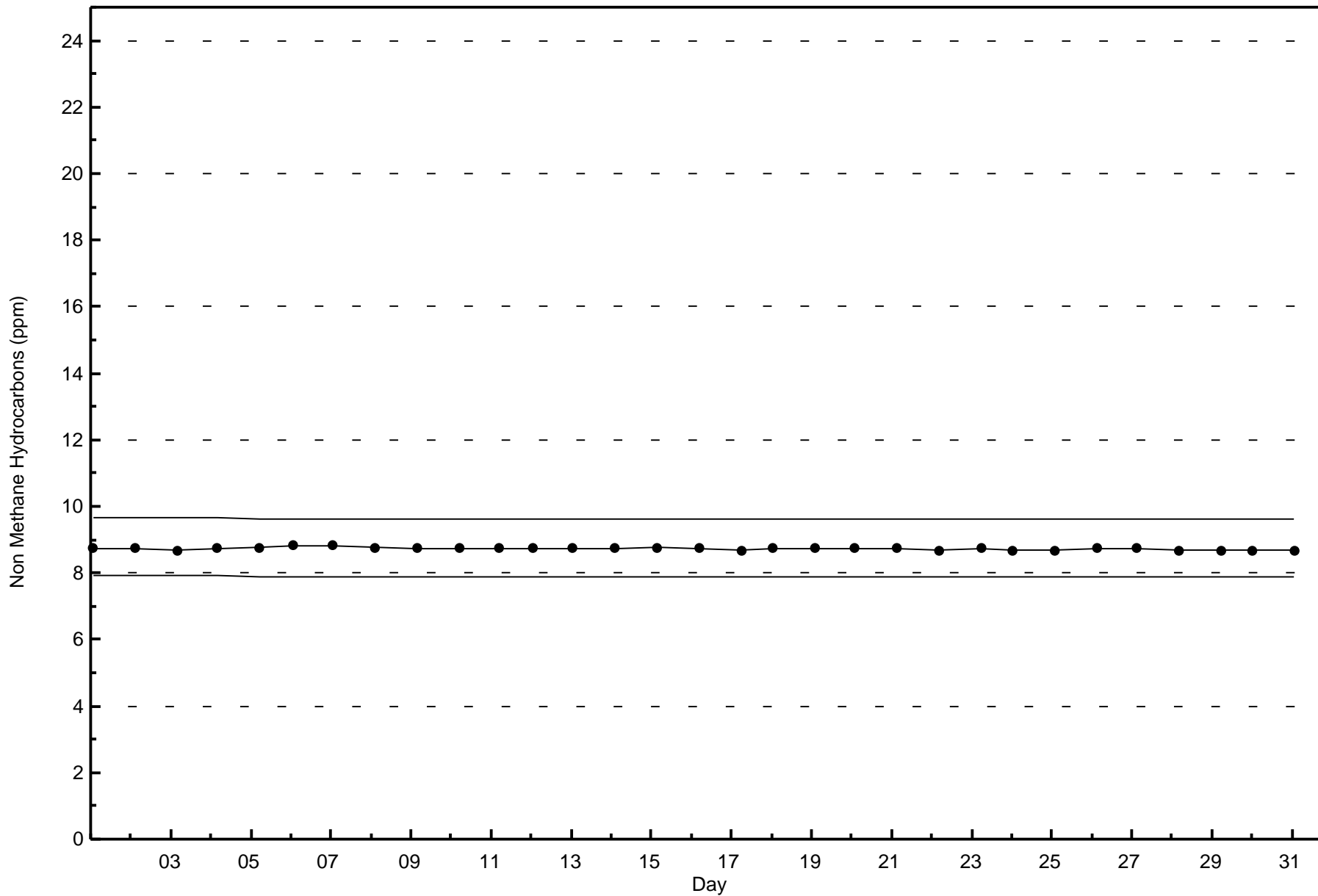


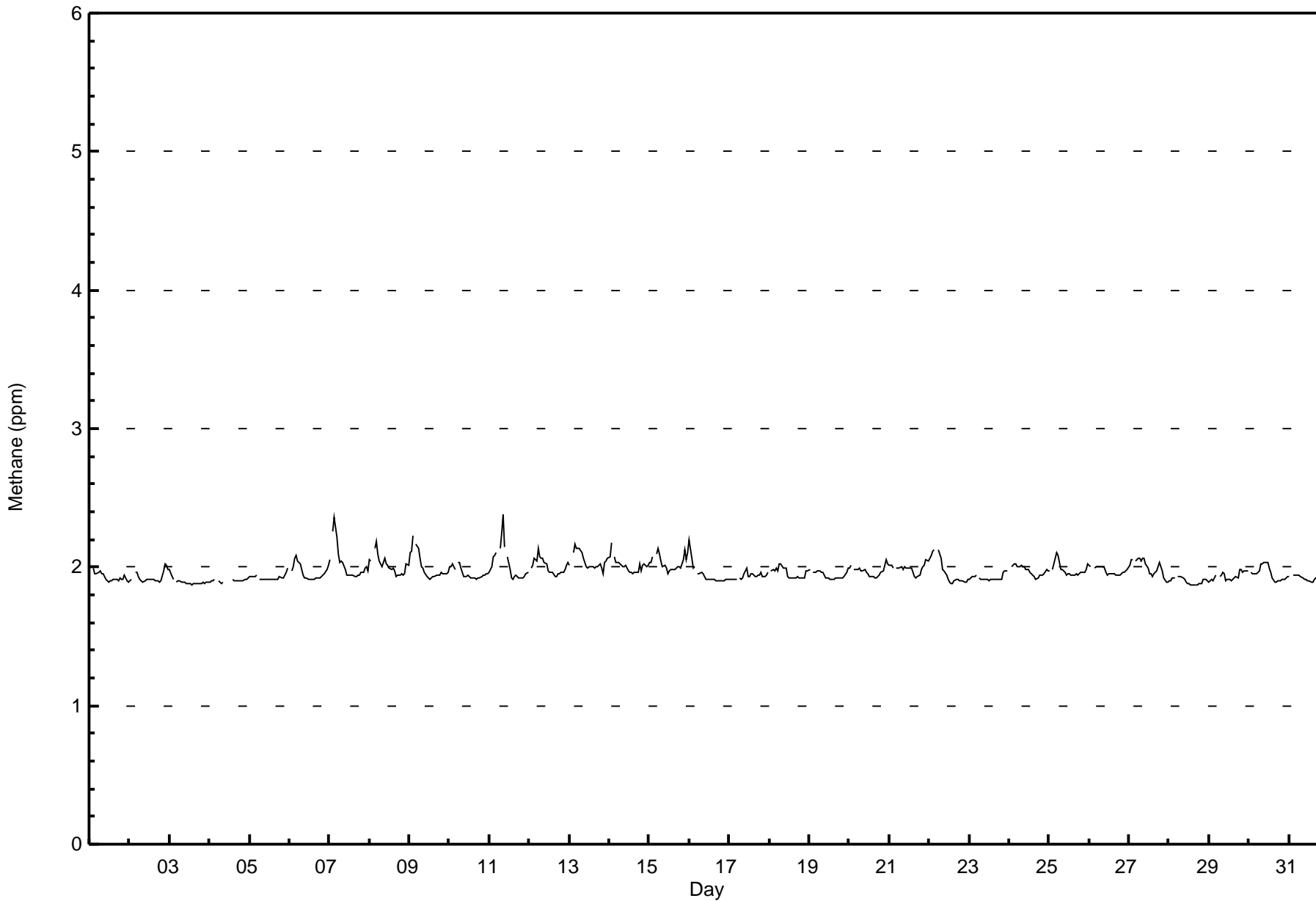
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley (AMS 7)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	638	90.24	90.24
2.1 - 3.0	69	9.76	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - July 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	34	11	3	10	25	37	62	34	32	33	91	81	43	29	29	82	636
2.1 - 3.0	3	0	0	0	3	8	34	6	0	2	1	0	0	1	0	11	69
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	37	11	3	10	28	45	96	40	32	35	92	81	43	30	29	93	705

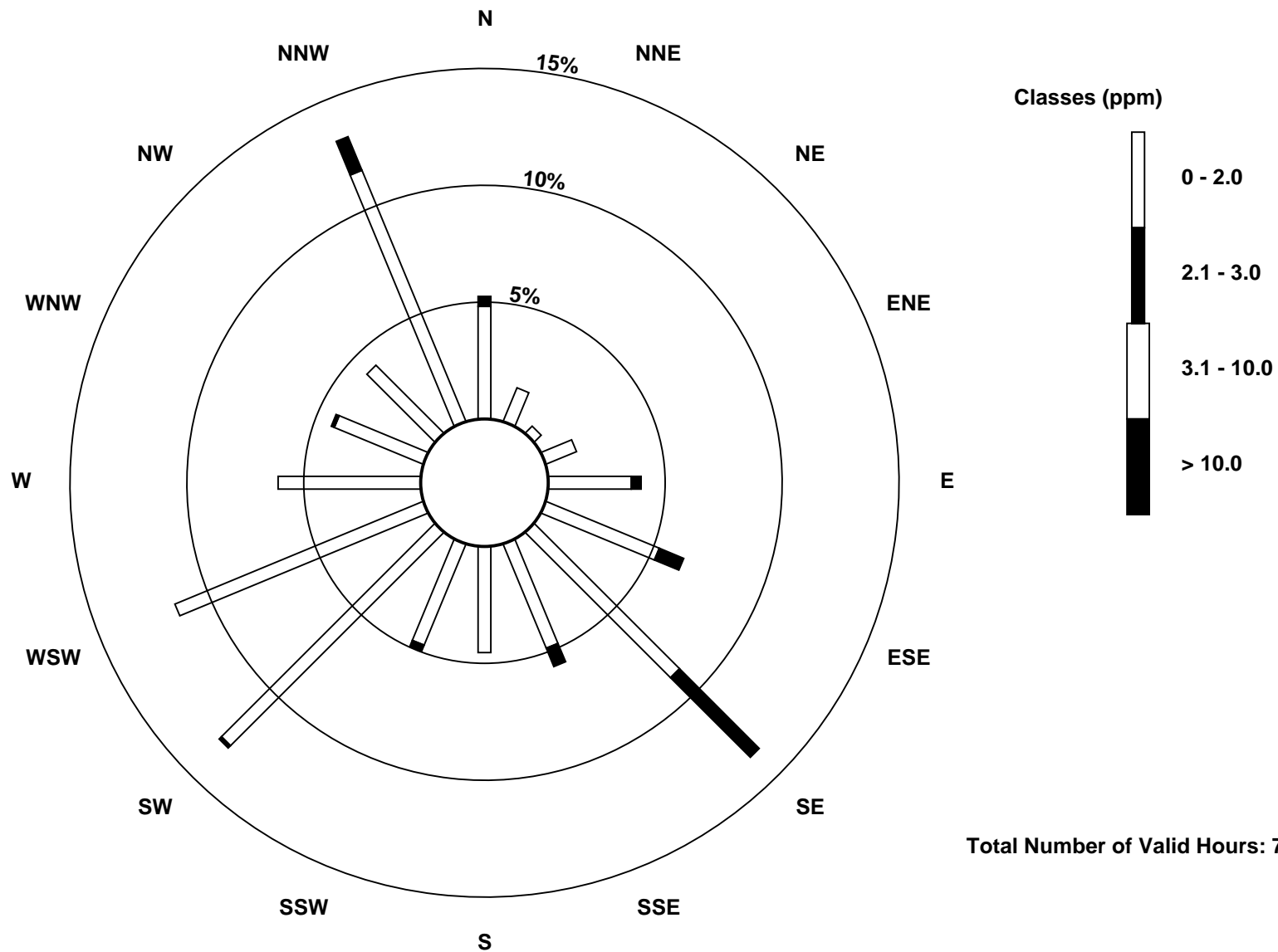
Total Number of Valid Hours: 705

Total Number of Hours: 744

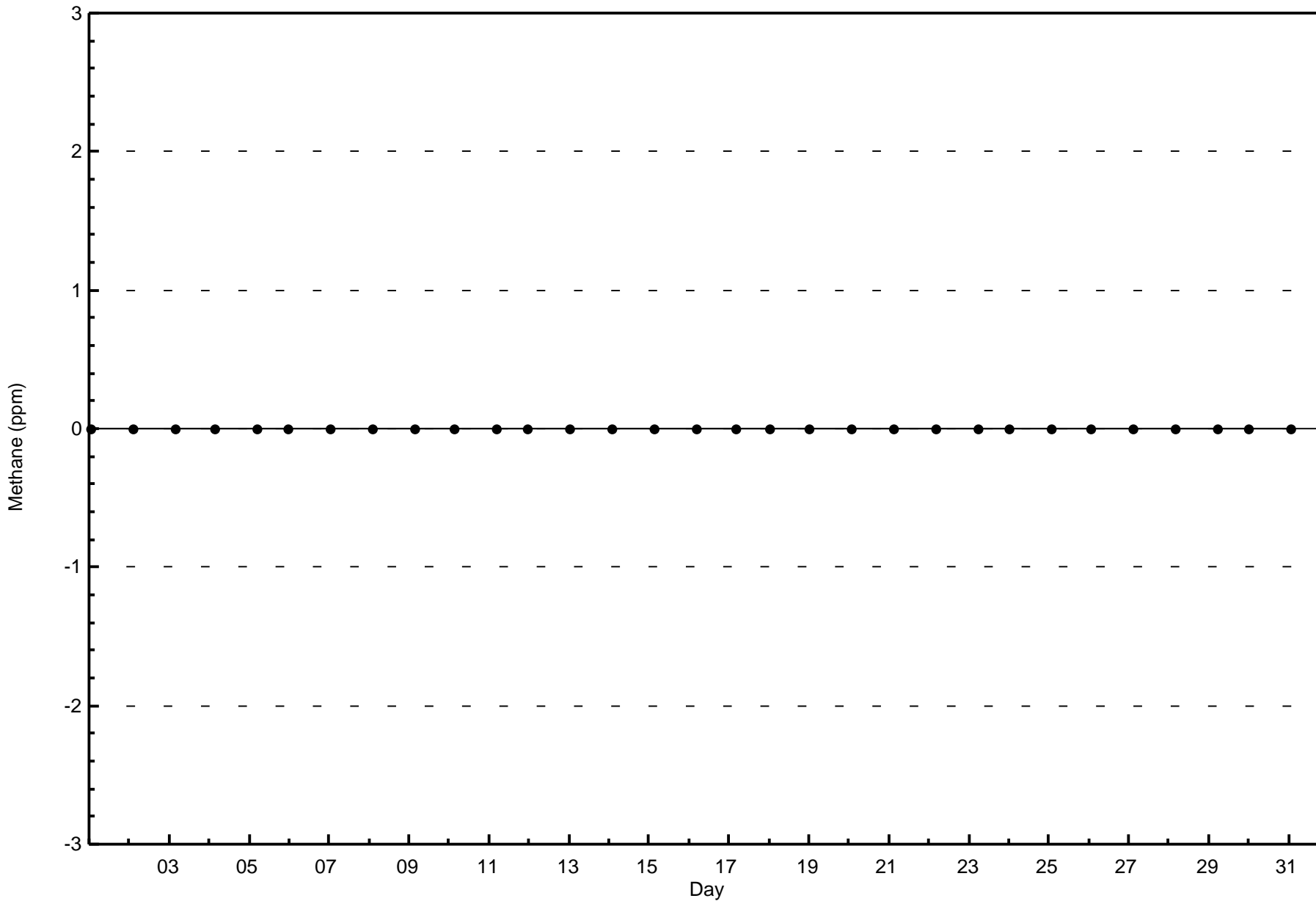


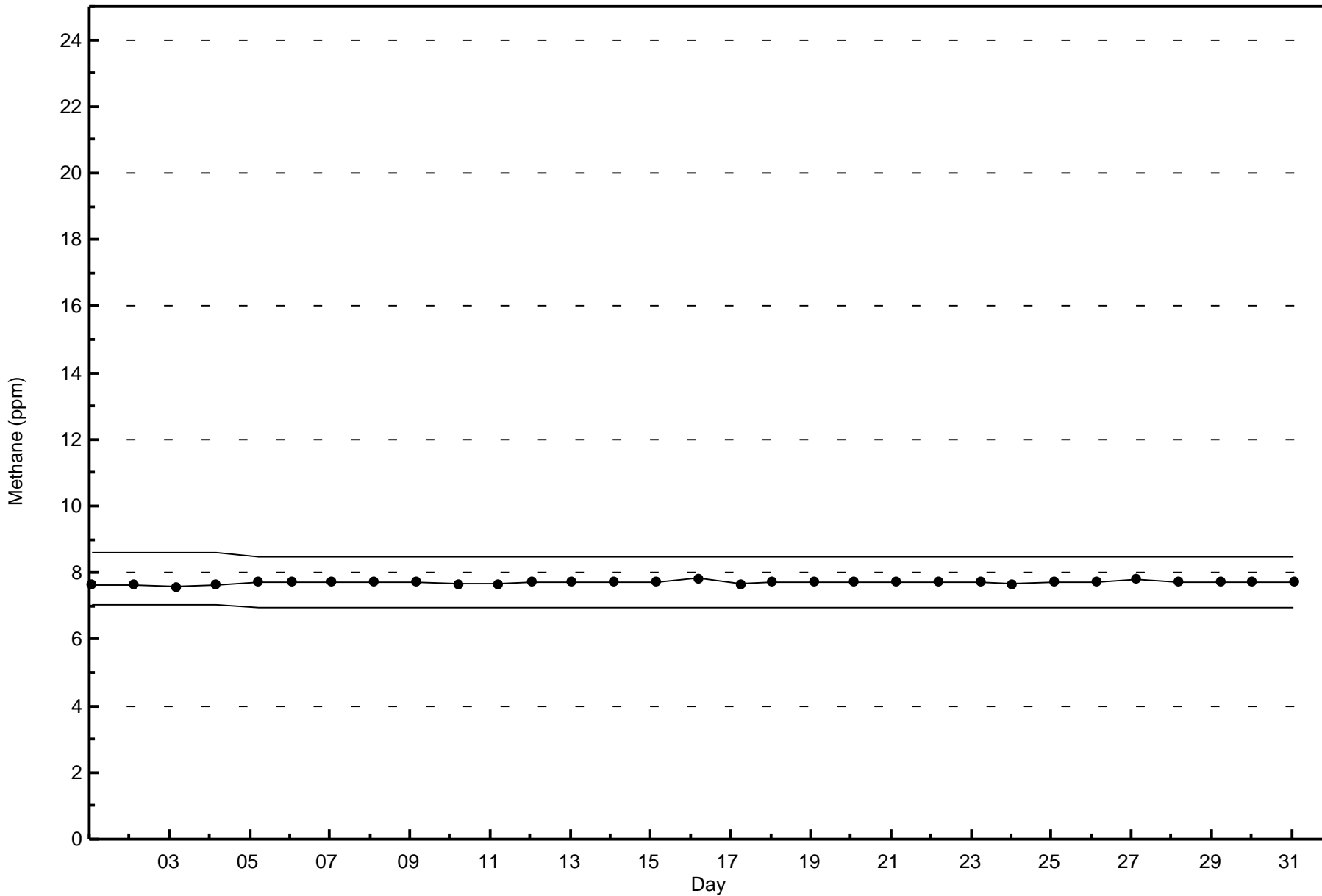
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Methane (CH₄) - ppm
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 705







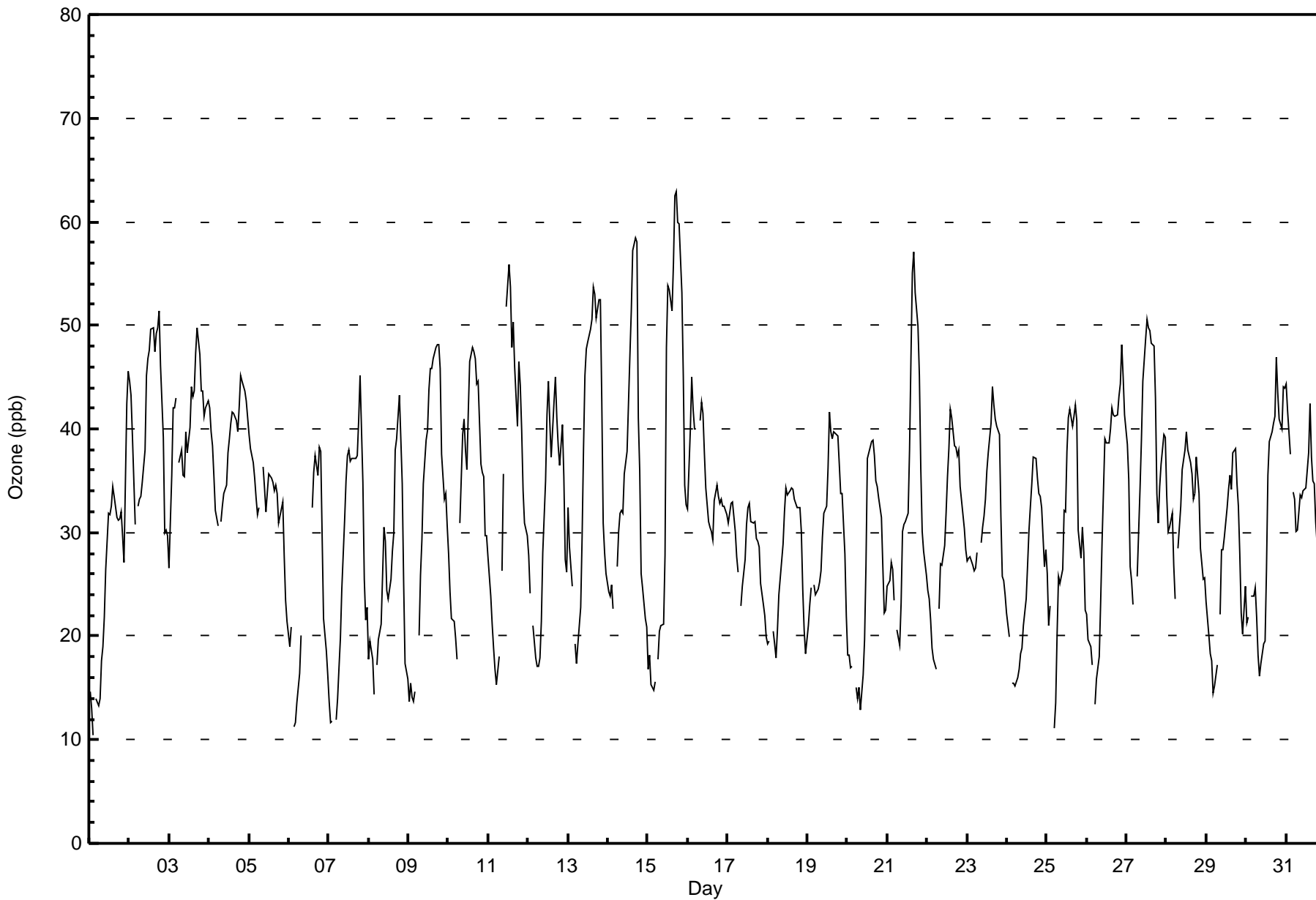
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 63 ppb on Jul 15 18:00										Maximum Daily Average: 41.0 ppb on Jul 2										Hours of Data: 706																													
Minimum Value: 10 ppb on Jul 1 03:00										Minimum Daily Average: 25.5 ppb on Jul 20										Hours of Missing Data: 38																													
Maximum Diurnal Average: 42.0 ppb at hour 17										Minimum Diurnal Average: 21.3 ppb at hour 6										Hours of Calibration: 37																													
Monthly Average: 32.2 ppb										Percentiles: P ₁ = 13 P ₁₀ = 18 Q ₁ = 25 Median = 32 Q ₃ = 39 P ₉₀ = 45 P ₉₉ = 57										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-Jul	15	13	10	Z	14	13	14	18	19	22	26	32	32	33	34	34	31	31	31	32	30	27	42	46	26.0	46																							
2-Jul	45	43	39	31	Z	33	33	33	35	38	45	47	48	50	50	47	49	50	51	46	39	30	30	30	41.0	51																							
3-Jul	27	35	42	42	43	Z	37	38	36	35	40	38	40	44	43	44	47	50	47	44	44	41	42	43	40.9	50																							
4-Jul	42	40	38	35	32	31	Z	31	33	34	35	38	39	41	42	41	41	40	42	45	45	44	43	41	38.7	45																							
5-Jul	39	38	37	35	33	32	32	Z	36	34	32	34	36	35	35	34	35	34	31	32	33	28	23	21	33.1	39																							
6-Jul	19	21	Z	11	12	14	16	20	C	C	C	C	C	C	32	36	37	36	38	38	30	22	19	16	--	38																							
7-Jul	14	12	12	Z	12	14	17	20	25	31	35	37	38	37	37	37	37	37	41	45	35	25	22	23	27.9	45																							
8-Jul	18	20	18	14	Z	17	20	21	26	30	29	24	24	25	28	30	38	39	43	39	35	25	17	16	25.9	43																							
9-Jul	14	15	14	14	15	Z	20	26	29	35	39	40	44	46	46	47	48	48	48	46	38	33	34	31	33.4	48																							
10-Jul	28	24	22	21	20	18	Z	31	39	41	38	36	42	46	48	47	47	44	45	37	36	35	30	30	35.0	48																							
11-Jul	28	24	21	19	17	15	18	Z	26	36	PF	52	56	54	48	50	46	40	46	44	40	34	31	30	35.2	56																							
12-Jul	28	24	Z	21	18	17	17	18	21	28	35	41	45	41	37	43	45	41	38	36	40	35	27	26	31.5	45																							
13-Jul	32	29	25	Z	19	17	19	23	30	38	45	48	48	50	51	54	53	51	52	52	43	31	28	26	37.5	54																							
14-Jul	24	24	25	Z	23	Z	27	30	32	32	36	38	42	47	51	57	58	58	41	36	26	25	22	21	35.1	58																							
15-Jul	17	18	15	15	16	Z	18	21	21	21	28	48	54	53	51	56	63	63	60	60	53	45	35	33	37.5	63																							
16-Jul	32	40	45	42	40	40	Z	41	43	42	38	34	31	30	30	29	33	35	33	33	33	33	33	32	35.7	45																							
17-Jul	31	32	33	33	30	28	26	Z	23	25	27	31	32	33	31	31	31	29	29	29	25	23	22	20	28.4	33																							
18-Jul	19	19	Z	20	19	18	21	24	27	29	32	34	34	34	34	34	33	33	32	32	30	25	21	18	27.1	34																							
19-Jul	21	23	25	Z	25	24	25	25	26	30	32	33	36	42	40	39	40	39	39	37	34	34	28	22	31.2	42																							
20-Jul	18	18	17	17	Z	15	14	15	13	16	20	27	37	38	39	39	37	35	34	33	31	27	22	22	25.5	39																							
21-Jul	25	25	27	26	23	Z	21	19	23	30	31	31	32	38	47	55	57	53	50	45	36	30	28	26	33.9	57																							
22-Jul	24	24	22	19	18	17	Z	23	27	27	29	32	35	38	42	41	38	38	37	38	34	32	30	28	30.1	42																							
23-Jul	27	27	28	27	26	27	28	Z	29	31	32	33	36	38	41	44	42	41	40	39	32	26	25	24	32.3	44																							
24-Jul	22	20	Z	15	15	15	16	17	18	19	21	24	27	30	33	35	37	37	35	34	34	32	27	28	25.7	37																							
25-Jul	26	21	23	Z	11	14	20	26	25	26	32	32	38	41	42	40	41	42	41	30	28	30	28	22	29.6	42																							
26-Jul	22	20	19	17	Z	13	16	18	23	29	34	39	39	39	40	42	41	41	41	43	44	48	45	41	32.9	48																							
27-Jul	39	35	27	25	23	Z	26	30	34	39	45	49	51	50	50	48	48	43	34	31	34	37	39	39	38.0	51																							
28-Jul	34	30	31	32	27	24	Z	28	33	36	37	38	40	38	37	36	33	34	37	34	28	27	26	26	32.3	40																							
29-Jul	23	20	18	18	14	15	17	Z	22	28	28	30	32	34	36	34	38	38	35	33	28	22	20	25	26.5	38																							
30-Jul	21	22	Z	24	24	25	22	18	16	17	19	20	26	35	39	40	41	41	47	44	41	40	44	44	30.8	47																							
31-Jul	44	42	38	Z	34	33	30	30	34	33	34	34	34	38	42	37	35	35	31	27	25	19	17	17	32.3	44																							
																								26.4	25.7	25.7	23.9	22.3	21.3	22.0	24.8	27.5	30.4	32.9	35.7	38.2	39.9	40.5	41.4	42.0	41.2	40.5	38.5	34.9	31.1	29.0	28.0	Diurnal Average	
																								45	43	45	42	43	40	37	41	43	42	45	52	56	54	51	57	63	63	60	60	53	48	45	46	Diurnal Maximum	
Z - zerospan C - Calibration PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	109	15.44	15.44
21 - 50	570	80.74	96.18
51 - 82	27	3.82	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - July 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	4	1	2	6	21	36	10	6	2	2	0	1	1	3	12	109
21 - 50	30	7	2	9	21	23	50	28	26	32	94	82	40	27	24	73	568
51 - 82	5	1	0	0	0	1	9	1	2	1	0	0	0	1	1	5	27
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	12	3	11	27	45	95	39	34	35	96	82	41	29	28	90	704

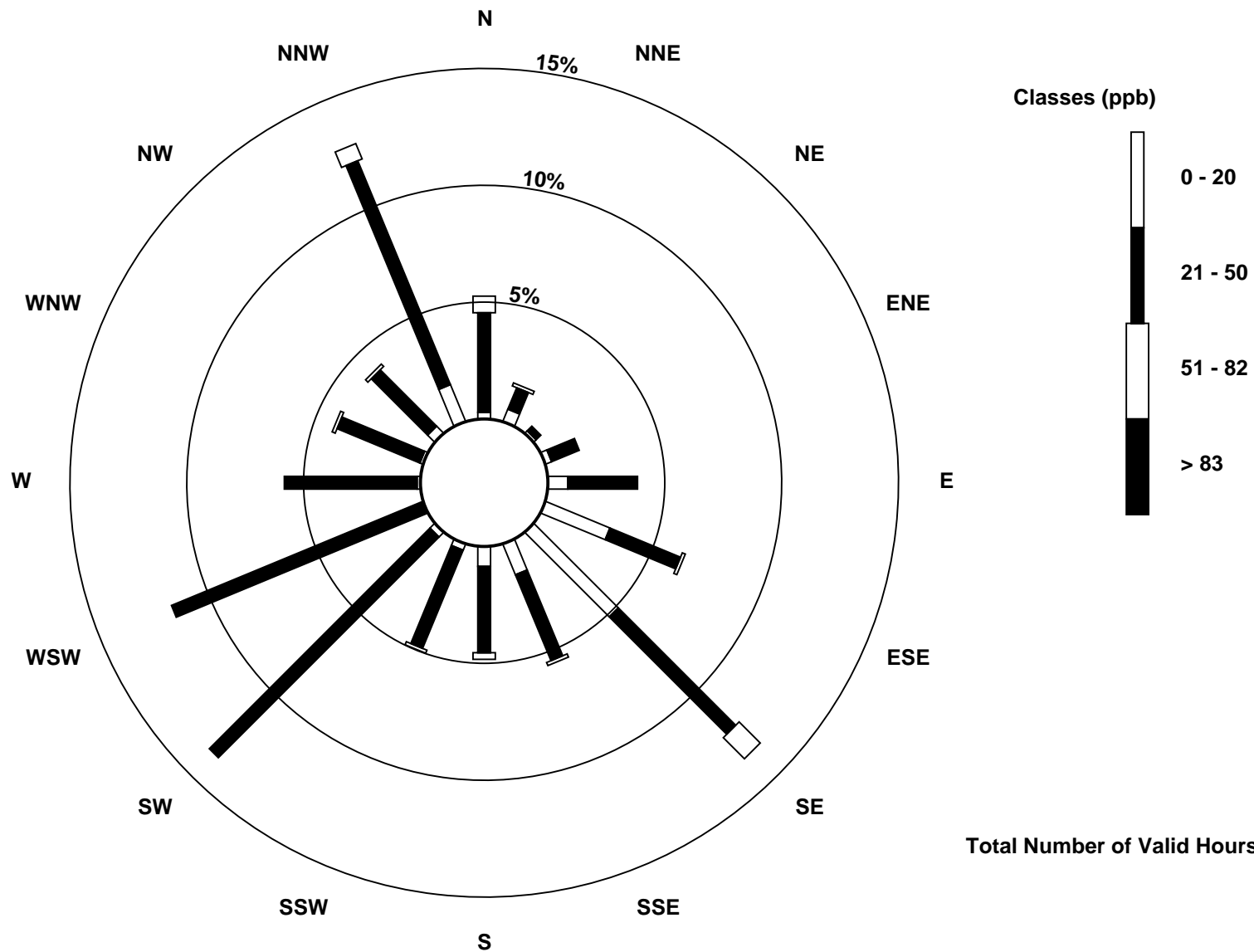
Total Number of Valid Hours: 704

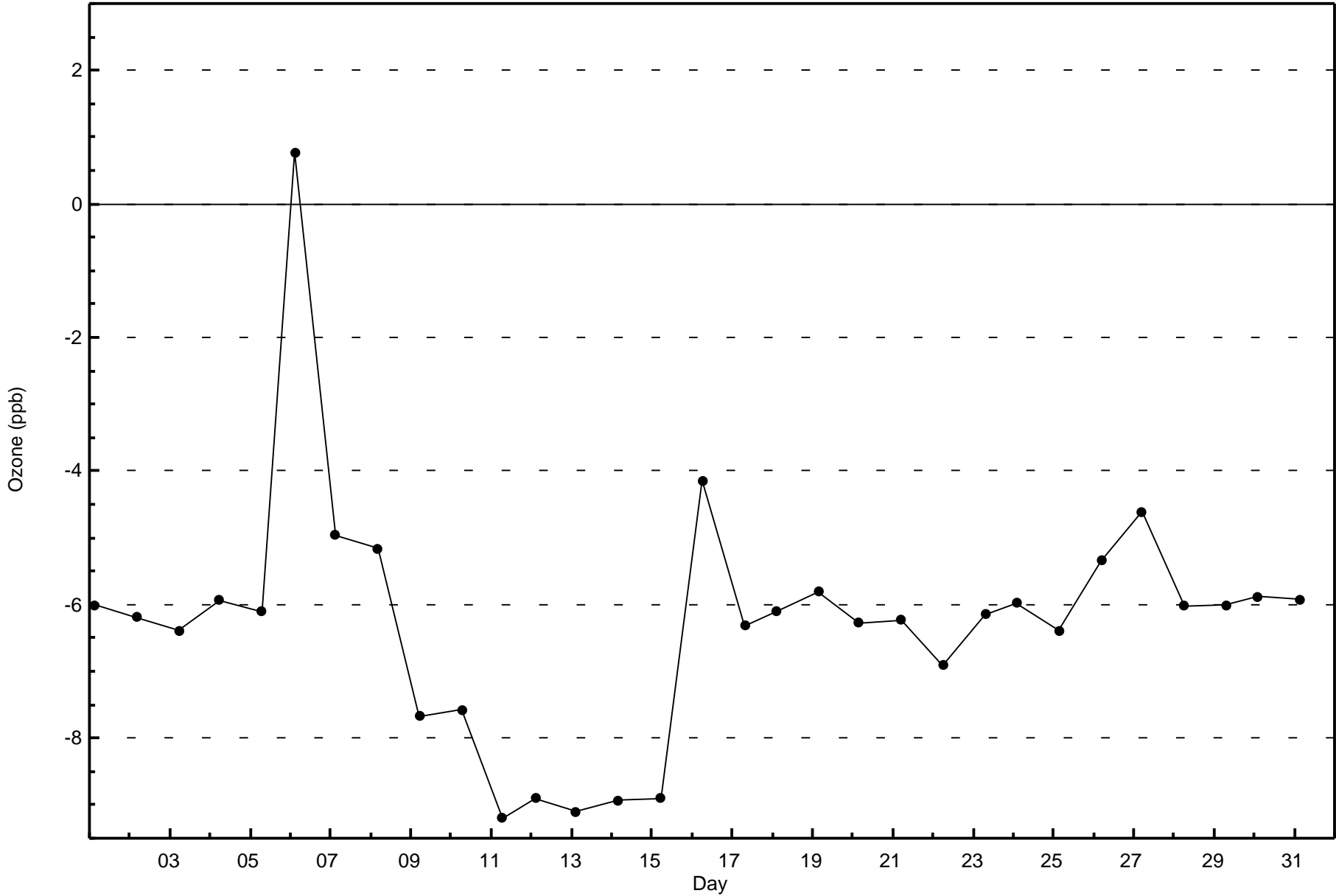
Total Number of Hours: 744

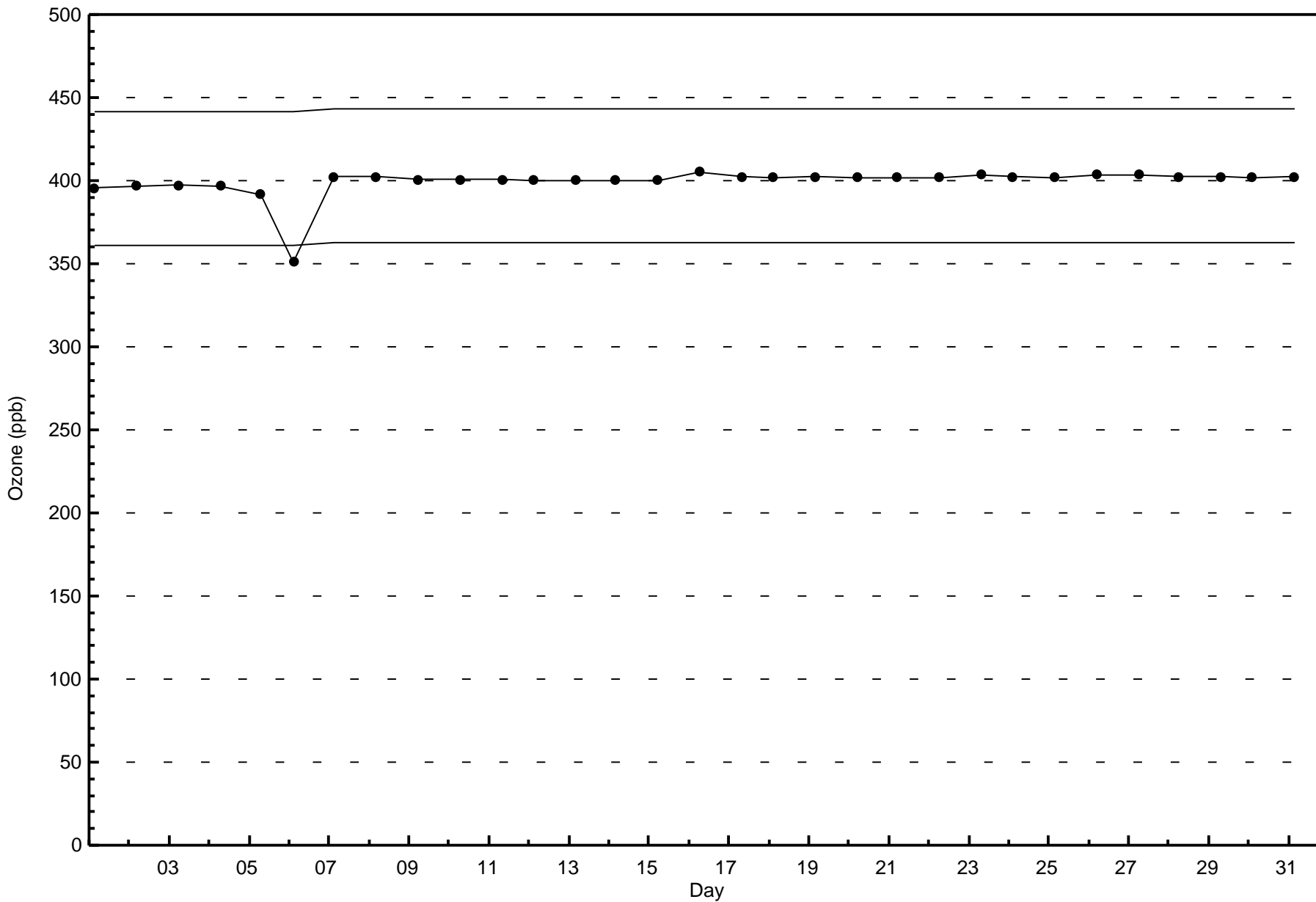


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Athabasca Valley (AMS 7)







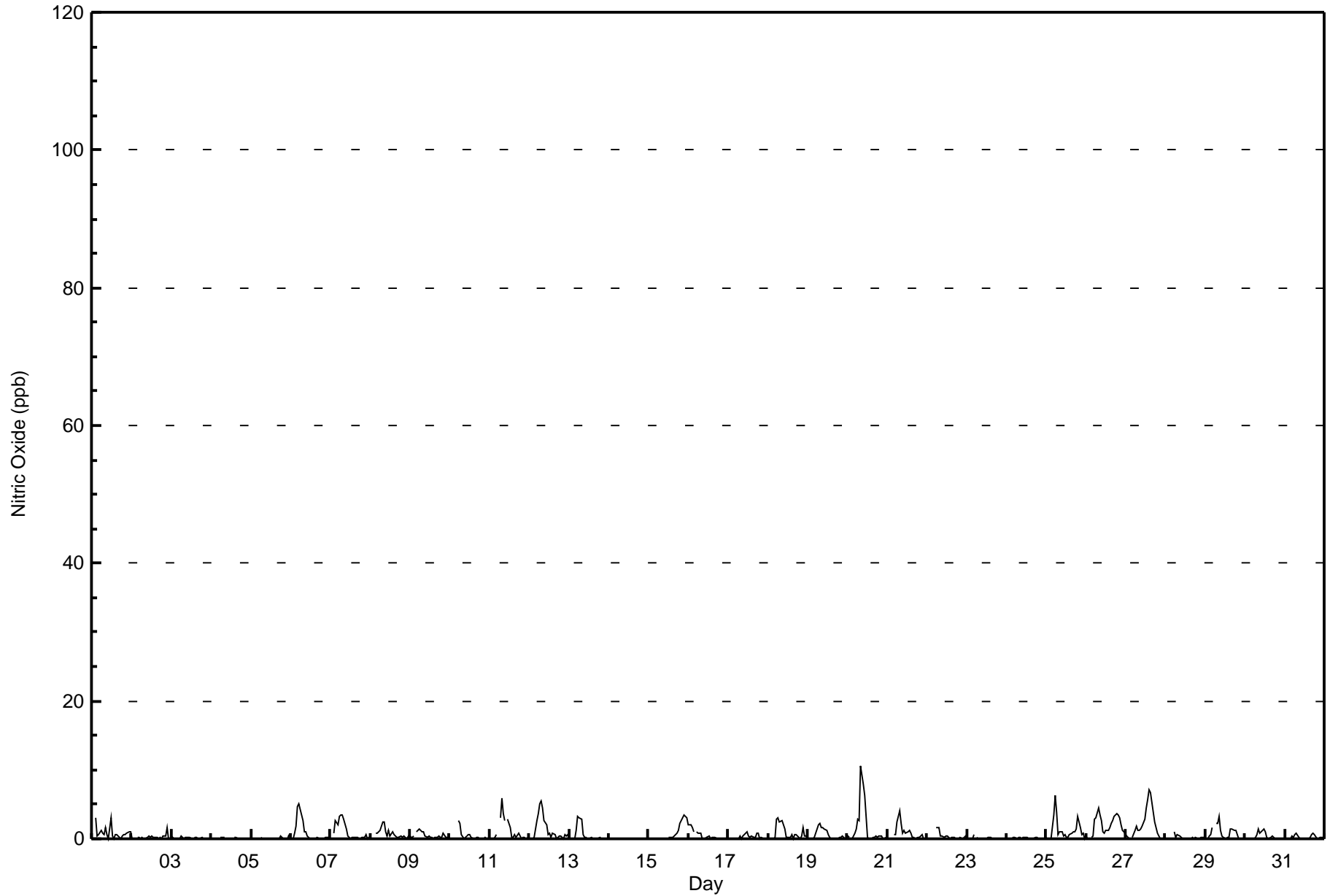


Maximum Value: 10 ppb on Jul 20 09:00																	Maximum Daily Average: 2.0 ppb on Jul 26																	Hours in Service: 744														
Minimum Value: 0 ppb on Jul 1 18:00																	Minimum Daily Average: 0.1 ppb on Jul 5																	Hours of Data: 675														
Maximum Diurnal Average: 1.8 ppb at hour 6																	Minimum Diurnal Average: 0.1 ppb at hour 2																	Hours of Missing Data: 69														
Monthly Average: 0.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 6																	Hours of Calibration: 35														
																																		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-Jul	1	Z	3	0	1	1	1	1	2	1	0	3	0	0	1	1	0	0	0	1	1	1	1	1	0.8	3																						
2-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.2	2																						
3-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0.1	0																						
5-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1																						
6-Jul	Z	0	1	2	5	5	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	5																						
7-Jul	0	Z	1	3	2	3	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.0	3																						
8-Jul	0	0	Z	1	1	1	1	2	2	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0.7	2																						
9-Jul	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1																						
10-Jul	0	0	0	0	Z	3	2	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	3																						
11-Jul	0	0	0	0	1	Z	3	6	4	3	PF	3	2	0	0	1	0	1	0	0	0	0	0	0	1.1	6																						
12-Jul	Z	0	0	0	3	4	5	6	4	3	2	1	1	0	1	1	0	0	0	0	0	1	0	1	1.4	6																						
13-Jul	0	Z	0	0	1	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3																						
14-Jul	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0																						
15-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	0	0	0	0	1	1	1	2	3	4	3	3	--	4																					
16-Jul	2	2	2	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																						
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0.2	1																						
18-Jul	Z	0	0	0	0	3	3	3	3	2	1	0	0	0	1	0	1	1	0	0	0	2	0	0	0.9	3																						
19-Jul	0	Z	0	0	0	1	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2																						
20-Jul	0	0	Z	0	1	1	3	3	10	8	6	3	0	0	0	0	0	0	0	0	0	0	0	0	1.7	10																						
21-Jul	0	0	0	Z	1	1	2	4	2	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0.8	4																						
22-Jul	0	0	0	0	Z	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																						
23-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
24-Jul	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-Jul	0	Z	0	0	4	6	4	1	1	1	0	1	0	0	1	1	1	1	1	1	3	2	1	1	1.3	6																						
26-Jul	0	0	Z	0	0	3	3	4	3	3	1	1	1	1	2	2	3	3	4	3	3	2	1	1	2.0	4																						
27-Jul	0	0	0	Z	0	1	2	1	1	1	2	3	4	6	7	7	4	2	2	1	0	0	0	0	2.0	7																						
28-Jul	0	0	0	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
29-Jul	0	0	0	1	2	Z	2	2	3	1	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0.8	3																						
30-Jul	Z	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
31-Jul	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0.2	1																						
																								0.2	0.1	0.3	0.3	1.0	1.8	1.7	1.7	1.6	1.1	0.8	0.8	0.5	0.4	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.5	0.3	0.3	Diurnal Average
																								2	2	3	3	5	6	5	6	10	8	6	3	4	6	7	7	4	3	4	3	3	4	3	3	Diurnal Maximum
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure				PF - Power Failure																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	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: 675

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - July 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	36	10	2	9	28	43	89	40	32	35	92	80	43	30	27	77	673
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	36	10	2	9	28	43	89	40	32	35	92	80	43	30	27	77	673

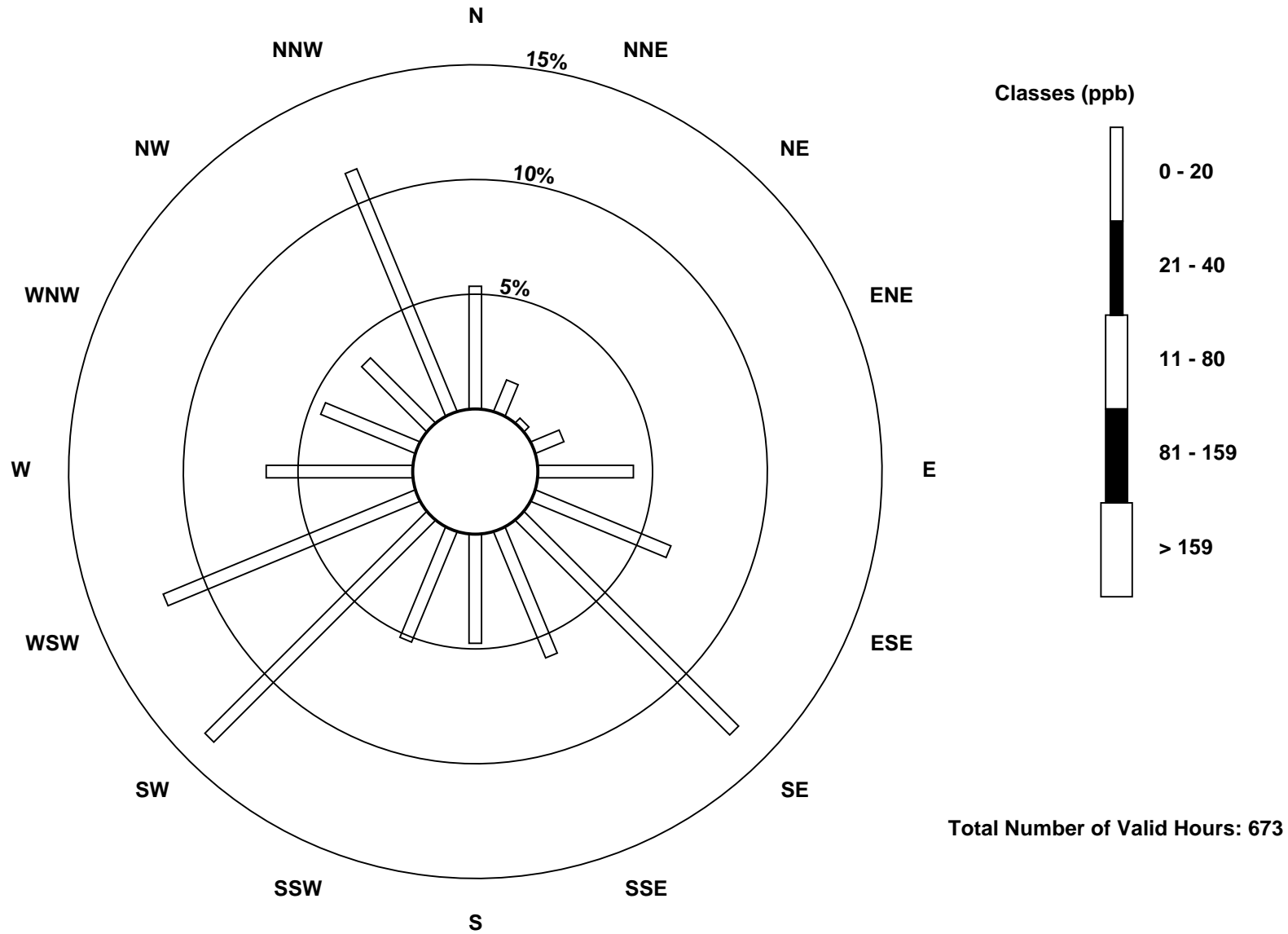
Total Number of Valid Hours: 673

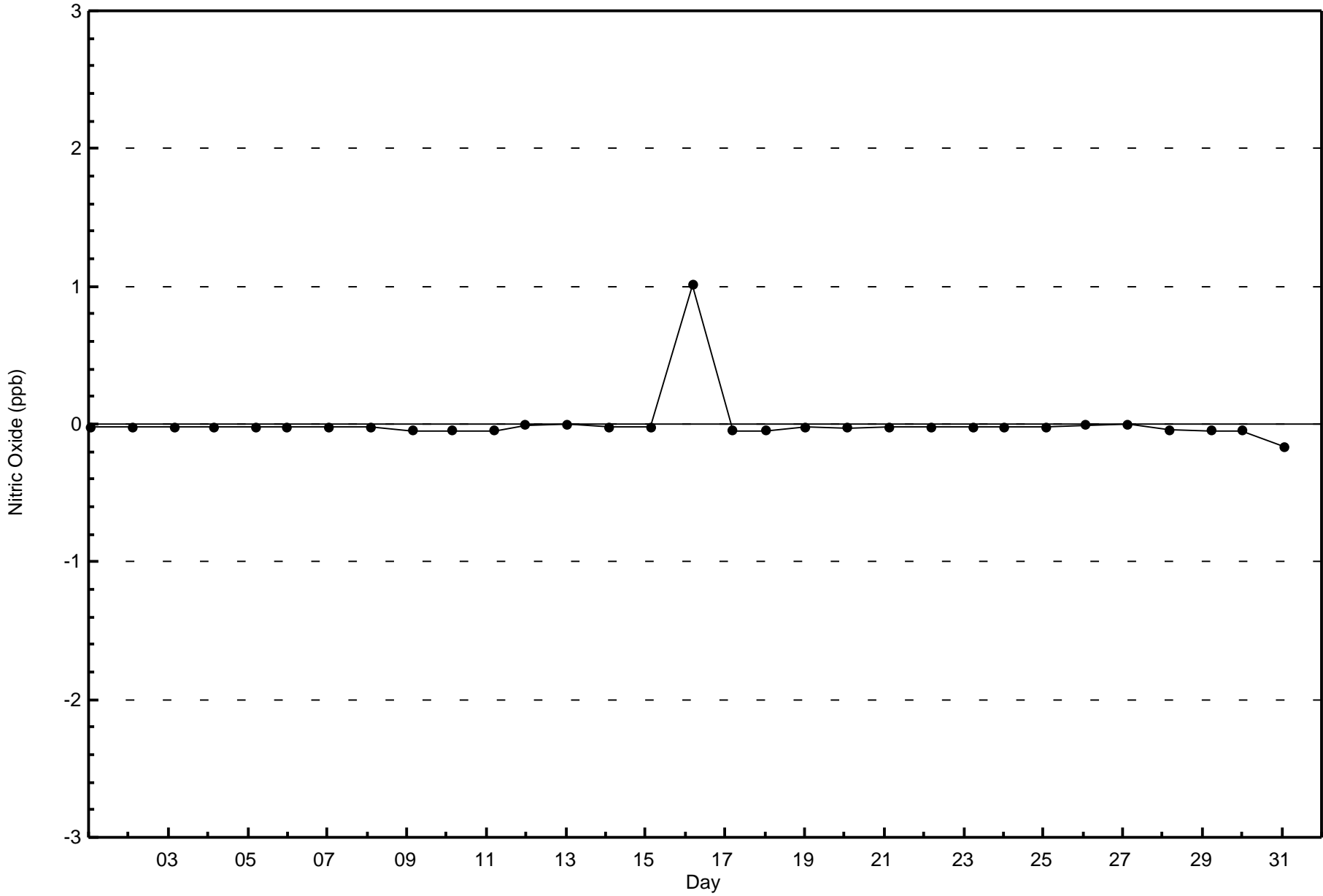
Total Number of Hours: 744

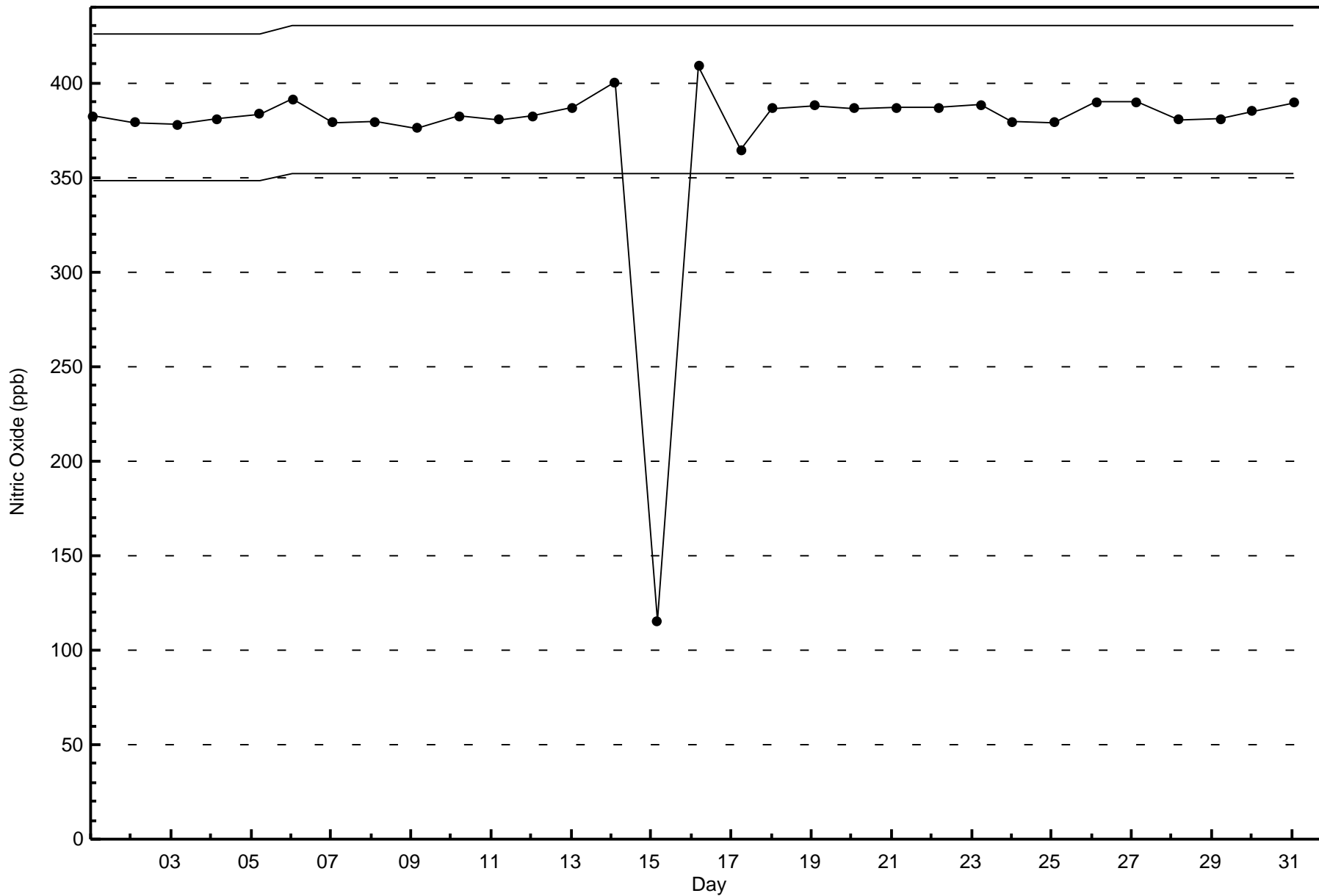


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association
Summary of Hour Averages

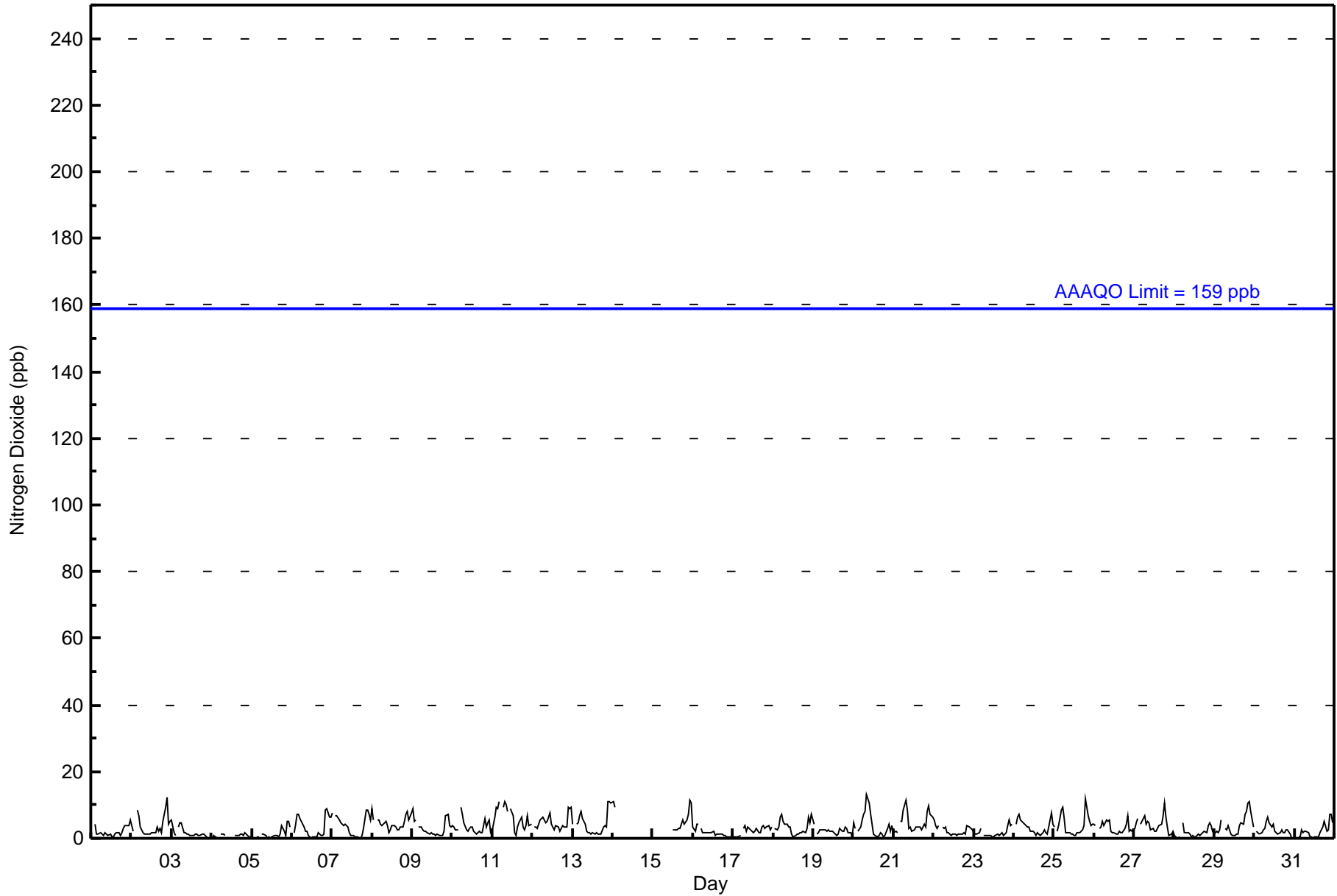
Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																	
Maximum Value: 13 ppb on Jul 20 09:00										Maximum Daily Average: 6.1 ppb on Jul 11										Hours of Data: 675							
Minimum Value: 0 ppb on Jul 5 12:00										Minimum Daily Average: 0.8 ppb on Jul 4										Hours of Missing Data: 69							
Maximum Diurnal Average: 5.5 ppb at hour 22										Minimum Diurnal Average: 1.4 ppb at hour 14										Hours of Calibration: 35							
Monthly Average: 3.2 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 O ₃ = 4 P ₉₀ = 7 P ₉₉ = 11										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-Jul	6	Z	4	1	1	2	1	1	2	1	1	1	0	0	1	2	2	1	2	3	4	4	4	5	2.1	6	
2-Jul	4	2	Z	8	7	4	2	2	1	1	1	1	2	2	2	3	2	3	2	5	10	12	4	5	3.7	12	
3-Jul	5	2	1	Z	3	5	5	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.6	5	
4-Jul	0	1	0	0	Z	1	1	1	1	C	C	C	C	C	1	1	1	1	1	1	2	1	0	0	0.8	2	
5-Jul	0	0	0	0	1	Z	1	1	1	0	0	0	1	1	1	1	1	1	1	4	2	1	5	5	3	1.3	5
6-Jul	Z	2	4	7	7	6	4	3	2	2	1	0	0	0	1	1	2	1	1	1	9	9	6	6	3.3	9	
7-Jul	8	Z	7	7	6	5	4	4	4	3	2	1	1	1	1	0	0	0	1	3	8	8	7	6	3.7	8	
8-Jul	9	6	Z	5	6	4	4	5	5	4	2	3	4	4	3	3	3	3	4	5	7	8	6	8	4.7	9	
9-Jul	9	5	5	Z	4	3	3	2	2	2	1	2	1	1	1	1	1	1	1	2	7	7	4	3	2.9	9	
10-Jul	4	3	2	3	Z	9	7	5	2	2	3	3	3	2	1	2	2	2	2	6	3	5	6	2	3.5	9	
11-Jul	2	6	10	9	11	Z	9	11	10	8	PF	9	7	2	1	4	5	6	4	3	4	7	4	4	6.1	11	
12-Jul	Z	3	3	3	5	6	6	5	5	5	8	4	4	3	4	3	2	3	4	3	3	9	9	9	4.8	9	
13-Jul	4	Z	4	5	7	8	6	4	2	2	2	1	2	1	2	1	1	1	4	4	4	11	11	11	4.2	11	
14-Jul	11	9	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	11	
15-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	3	3	3	3	3	4	6	4	7	12	10	--	12	
16-Jul	4	2	4	4	Z	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	0	1.7	4	
17-Jul	0	0	0	0	1	Z	3	4	2	4	3	2	2	2	3	2	2	3	4	3	4	4	3	3	2.3	4	
18-Jul	Z	3	3	3	6	7	5	4	4	4	3	1	1	1	1	1	2	2	2	2	3	6	5	7	3.3	7	
19-Jul	4	Z	1	2	3	3	3	3	2	2	2	2	2	1	1	1	3	2	2	3	3	2	2	1	2.2	4	
20-Jul	5	3	Z	2	3	6	7	8	13	11	7	4	1	1	1	1	2	1	1	1	3	4	2	4	3.9	13	
21-Jul	2	2	2	Z	5	5	9	11	8	3	3	2	2	3	4	3	3	3	4	3	8	10	7	6	4.7	11	
22-Jul	6	4	3	4	Z	4	3	3	2	2	1	1	1	1	1	1	1	1	2	1	4	3	3	3	2.4	6	
23-Jul	2	1	1	2	3	Z	1	1	1	1	1	0	1	1	1	1	1	2	1	2	4	6	4	4	1.7	6	
24-Jul	Z	4	6	7	6	5	4	4	3	3	2	2	2	1	2	1	1	2	3	2	1	4	8	4	3.3	8	
25-Jul	3	Z	2	4	9	10	6	2	2	2	1	1	1	1	2	2	2	3	4	12	7	5	4	4	3.8	12	
26-Jul	4	4	Z	3	4	5	4	5	5	6	2	2	2	1	1	2	2	2	3	4	7	2	3	2	3.3	7	
27-Jul	3	5	6	Z	4	6	7	4	5	5	2	3	2	2	3	4	4	7	10	6	3	1	1	2	4.1	10	
28-Jul	1	1	0	1	Z	5	2	2	2	1	1	1	1	1	1	1	1	2	2	2	4	5	4	2	1.7	5	
29-Jul	1	2	2	3	5	Z	3	3	4	3	1	1	1	1	1	4	5	4	7	8	11	11	8	4	4.0	11	
30-Jul	Z	2	2	1	2	3	3	5	6	5	4	4	2	2	1	2	2	2	2	3	3	1	0	0	2.4	6	
31-Jul	0	Z	1	1	3	2	2	2	2	1	0	0	0	1	1	2	2	3	5	2	3	7	7	5	2.2	7	
3.9 3.0 2.9 3.4 4.5 4.7 4.0 3.8 3.5 3.0 2.1 2.0 1.7 1.4 1.5 1.8 2.0 2.3 2.9 3.3 4.5 5.5 4.6 4.2																								Diurnal Average			
11 9 10 9 11 10 9 11 13 11 8 9 7 4 4 4 5 7 10 12 11 12 12 12 11																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure PF - Power Failure																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	675	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: 675

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 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	36	10	2	9	28	43	89	40	32	35	92	80	43	30	27	77	673
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	36	10	2	9	28	43	89	40	32	35	92	80	43	30	27	77	673

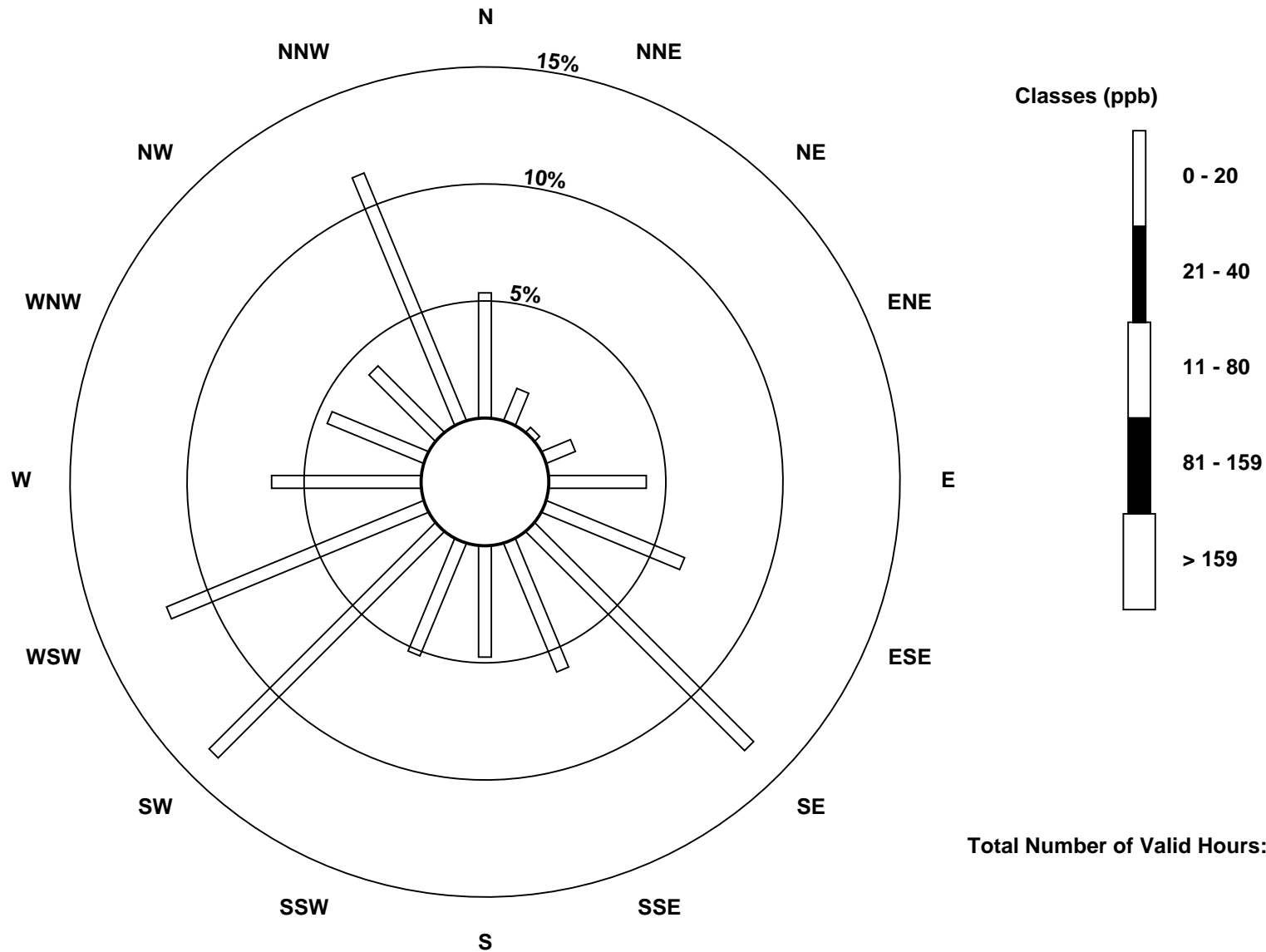
Total Number of Valid Hours: 673

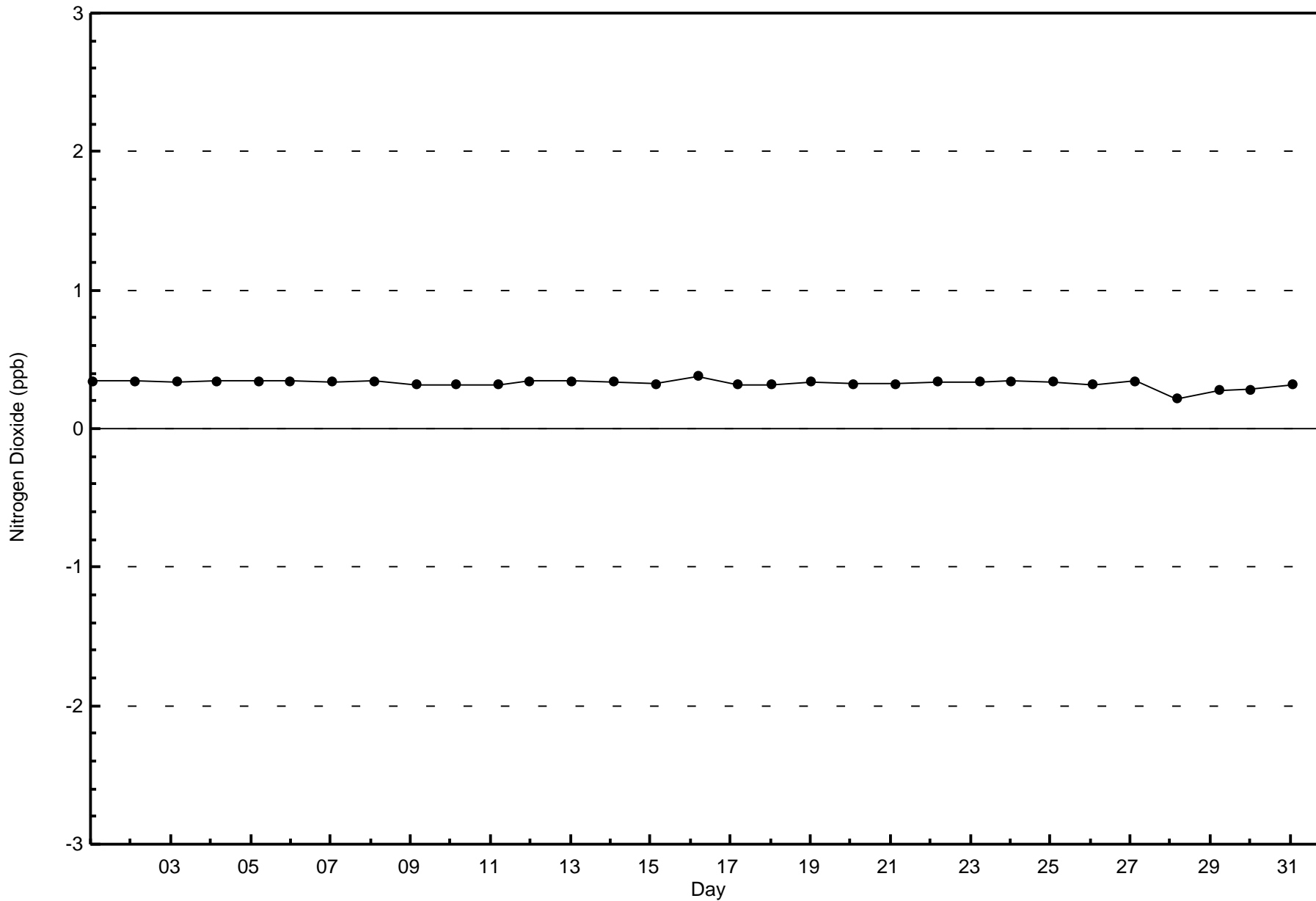
Total Number of Hours: 744

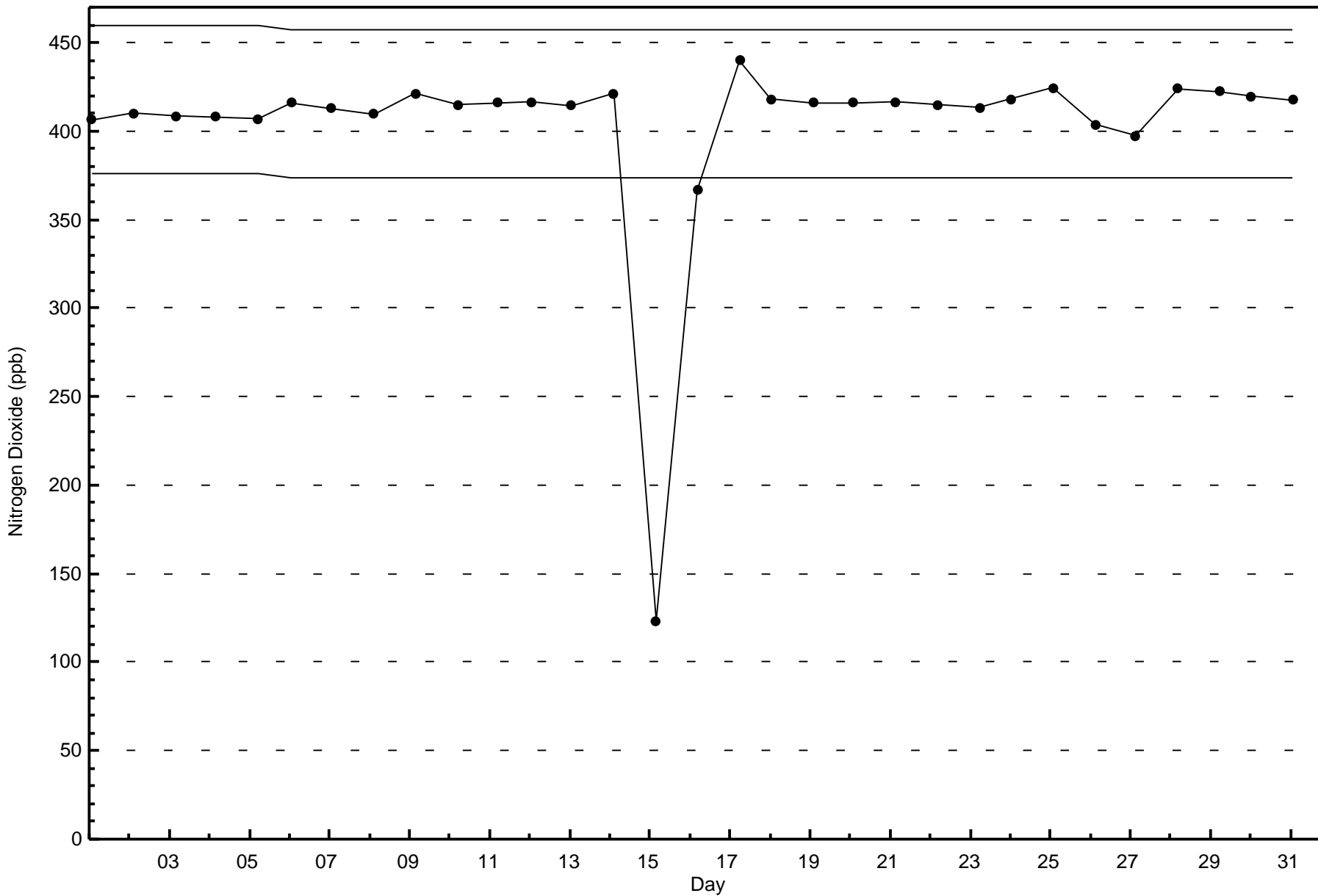


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley (AMS 7)









Wood Buffalo Environmental Association
Summary of Hour Averages

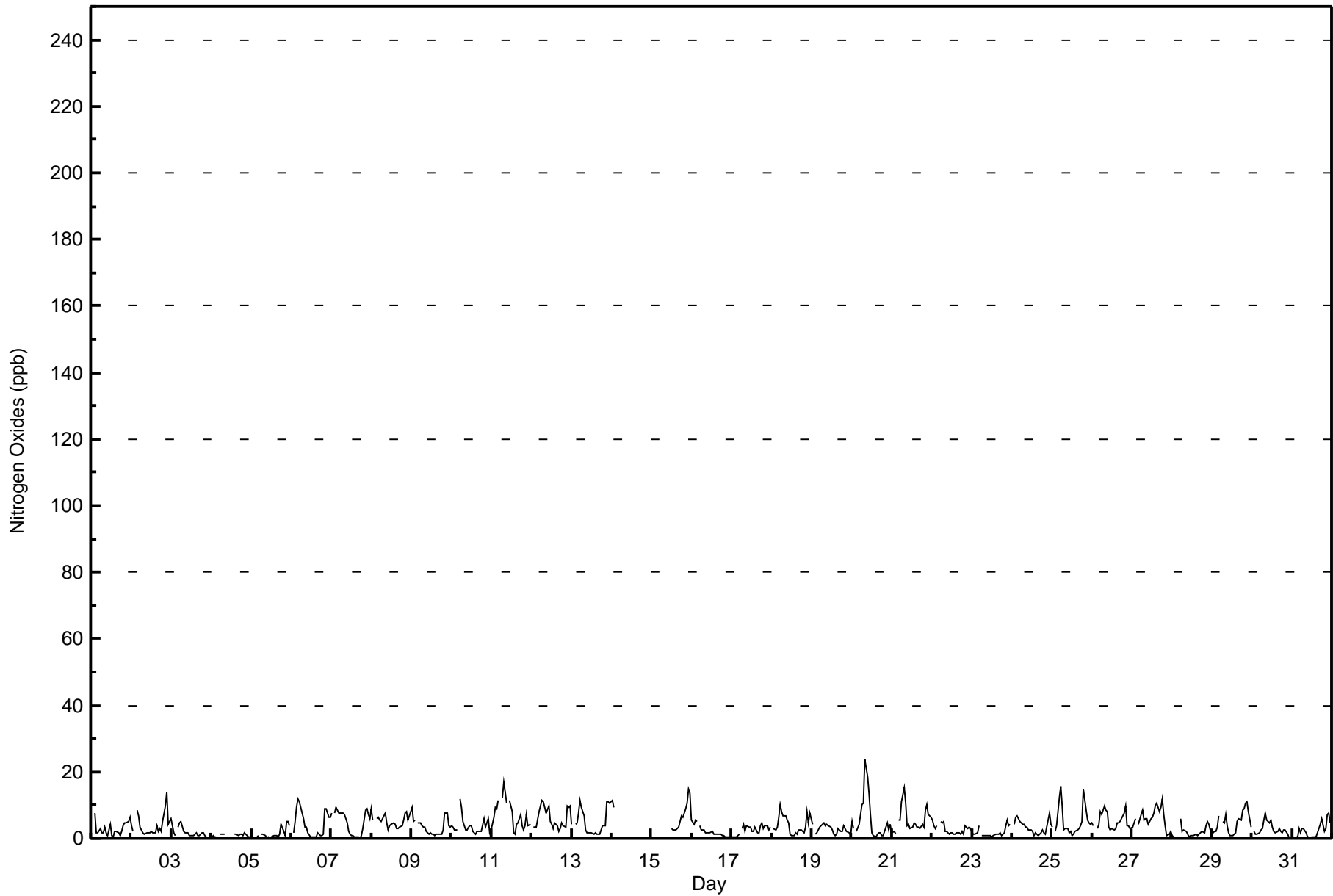
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2017

Maximum Value: 24 ppb on Jul 20 09:00																		Maximum Daily Average: 7.1 ppb on Jul 11						Hours in Service: 744																									
Minimum Value: 0 ppb on Jul 31 01:00																		Minimum Daily Average: 0.9 ppb on Jul 4						Hours of Data: 675																									
Maximum Diurnal Average: 6.5 ppb at hour 6																		Minimum Diurnal Average: 1.8 ppb at hour 14						Hours of Missing Data: 69																									
Monthly Average: 3.9 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 O ₃ = 5 P ₉₀ = 8 P ₉₉ = 15						Hours of Calibration: 35																									
																		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-Jul	6	Z	7	2	2	3	2	2	3	2	1	4	1	0	2	2	2	1	2	4	4	5	5	6	3.0	7																							
2-Jul	4	2	Z	9	7	4	3	2	1	2	2	2	2	2	2	4	2	3	2	5	10	14	4	5	4.0	14																							
3-Jul	6	2	1	Z	3	5	5	2	2	2	1	1	1	1	1	2	1	1	2	2	1	0	0	0	1.7	6																							
4-Jul	0	1	0	0	Z	1	1	1	1	1	C	C	C	C	C	1	1	1	1	1	2	1	0	0	0.9	2																							
5-Jul	0	0	0	0	1	Z	1	1	1	1	0	0	0	1	1	1	1	1	4	2	1	5	5	4	1.4	5																							
6-Jul	Z	2	5	9	12	11	8	6	3	3	1	0	0	0	0	1	2	1	1	1	9	9	6	6	4.2	12																							
7-Jul	8	Z	7	9	8	8	8	7	7	5	2	1	1	1	1	1	0	0	1	3	9	9	7	6	4.7	9																							
8-Jul	9	6	Z	6	6	6	5	7	8	5	2	4	4	5	4	3	3	3	4	5	7	8	5	8	5.4	9																							
9-Jul	9	5	6	Z	5	5	4	3	3	2	1	2	1	1	1	1	1	1	1	2	8	8	4	3	3.4	9																							
10-Jul	4	3	3	3	Z	12	9	5	2	3	3	4	4	2	1	2	2	2	2	6	3	5	6	2	3.8	12																							
11-Jul	2	6	9	9	12	Z	12	17	14	11	PF	12	8	2	1	4	5	7	4	3	4	7	4	4	7.1	17																							
12-Jul	Z	3	3	3	8	10	11	11	9	8	10	5	4	3	5	4	2	3	5	4	3	10	9	10	6.2	11																							
13-Jul	4	Z	4	4	8	11	9	7	3	2	2	2	2	1	2	1	1	1	4	4	4	11	11	11	4.7	11																							
14-Jul	11	9	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	11																							
15-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	3	3	3	3	3	5	7	6	9	11	15	13	--	15																						
16-Jul	6	4	6	5	Z	4	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	0	0	0	2.1	6																							
17-Jul	0	0	0	0	1	Z	3	4	2	4	3	2	2	3	2	2	4	5	3	4	4	3	3	3	2.5	5																							
18-Jul	Z	3	3	3	6	10	8	7	7	6	5	1	1	1	2	1	3	3	3	2	3	8	5	8	4.2	10																							
19-Jul	4	Z	1	2	3	3	4	5	4	4	4	4	3	1	1	1	3	2	2	4	3	2	2	1	2.7	5																							
20-Jul	5	3	Z	2	4	7	10	10	24	19	13	7	2	1	1	1	2	2	1	1	3	4	2	4	5.6	24																							
21-Jul	2	2	1	Z	6	6	11	15	10	4	4	3	3	5	4	3	4	3	4	3	8	10	7	6	5.5	15																							
22-Jul	6	4	3	4	Z	5	5	5	2	2	1	2	2	1	1	2	2	1	2	1	4	3	3	3	2.7	6																							
23-Jul	2	1	1	2	4	Z	1	1	1	1	1	0	1	1	1	1	1	2	1	2	4	6	4	4	1.8	6																							
24-Jul	Z	4	6	7	6	5	4	4	3	3	3	2	2	1	1	1	1	2	3	2	1	3	8	4	3.4	8																							
25-Jul	3	Z	2	4	12	16	10	2	3	3	2	2	1	1	2	2	3	4	5	15	8	6	5	4	5.0	16																							
26-Jul	5	4	Z	3	4	8	7	10	9	8	3	3	3	3	3	5	5	5	7	8	10	4	4	3	5.2	10																							
27-Jul	3	5	6	Z	4	7	9	6	6	6	4	6	7	8	10	11	8	9	12	7	4	1	1	2	6.1	12																							
28-Jul	1	1	0	1	Z	6	2	2	2	1	1	1	1	1	1	1	1	2	2	2	4	5	4	3	1.9	6																							
29-Jul	1	2	2	3	7	Z	5	5	7	4	2	1	1	1	2	5	6	6	8	9	11	11	8	4	4.8	11																							
30-Jul	Z	2	1	1	2	3	3	6	8	6	5	6	3	2	2	2	3	2	2	3	2	1	0	0	2.7	8																							
31-Jul	0	Z	1	0	3	2	3	3	2	1	0	0	0	1	0	2	3	4	6	2	3	7	8	5	2.4	8																							
																								4.1	3.1	3.2	3.7	5.5	6.5	5.7	5.5	5.1	4.1	2.9	2.8	2.2	1.8	2.0	2.4	2.4	2.7	3.4	3.7	4.9	6.0	4.9	4.5	Diurnal Average	
																								11	9	9	9	12	16	12	17	24	19	13	12	8	8	10	11	8	9	12	15	11	14	15	13	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				PF - Power Failure													



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	674	99.85	99.85
21 - 40	1	0.15	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 675

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 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	36	10	2	9	27	43	89	40	32	35	92	80	43	30	27	77	672
21 - 40	0	0	0	0	1	0	0	0	0	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	36	10	2	9	28	43	89	40	32	35	92	80	43	30	27	77	673

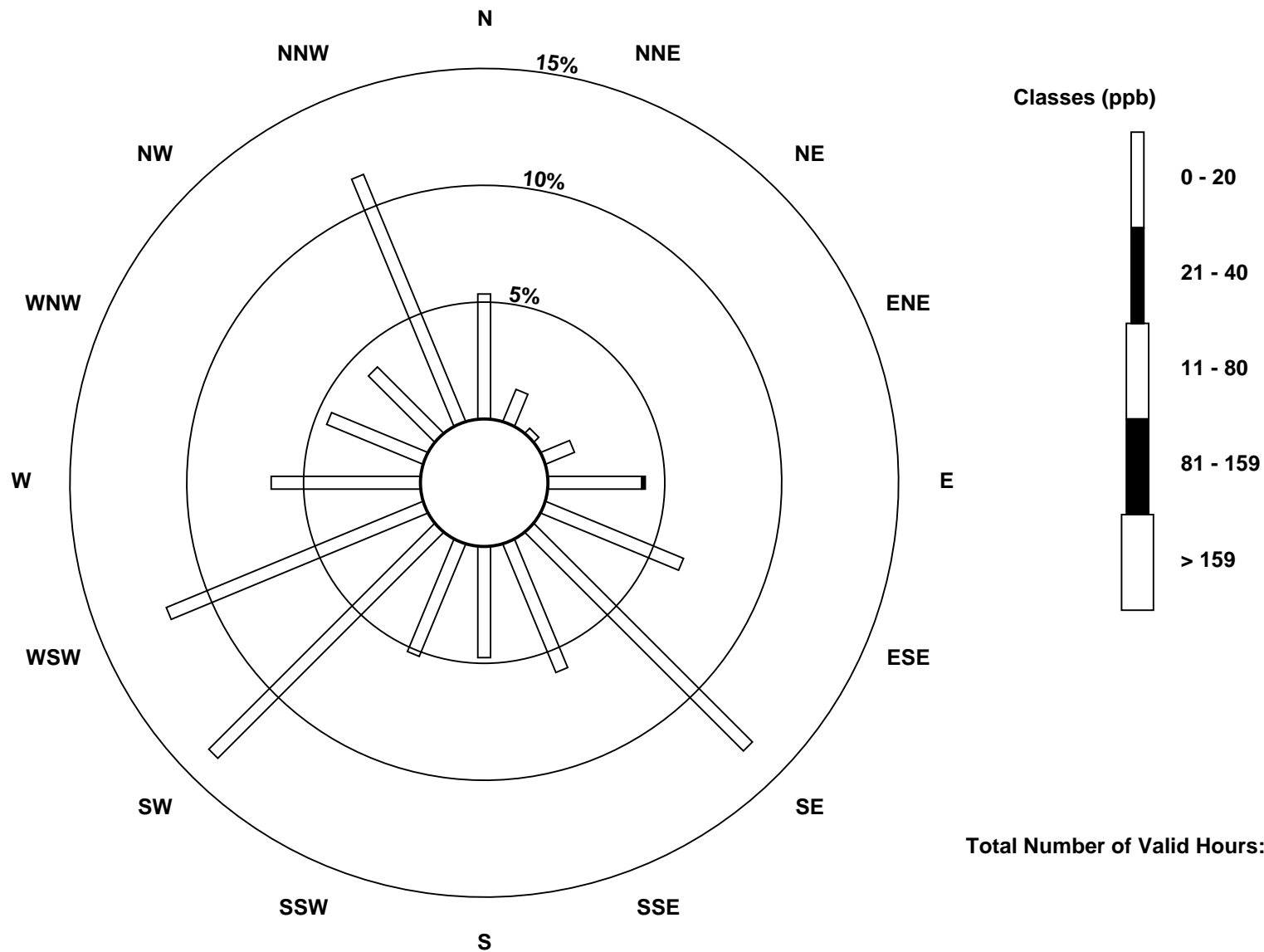
Total Number of Valid Hours: 673

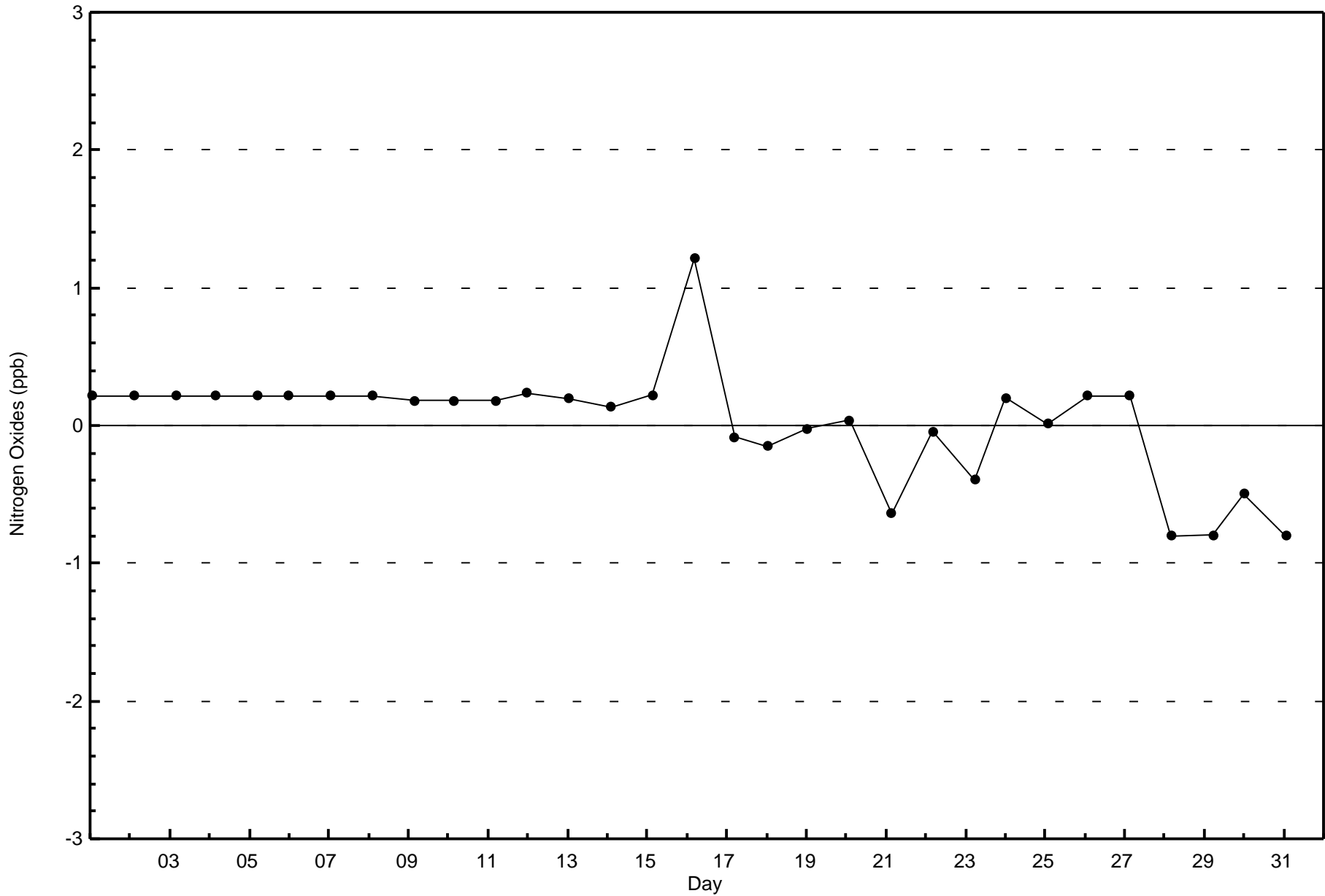
Total Number of Hours: 744

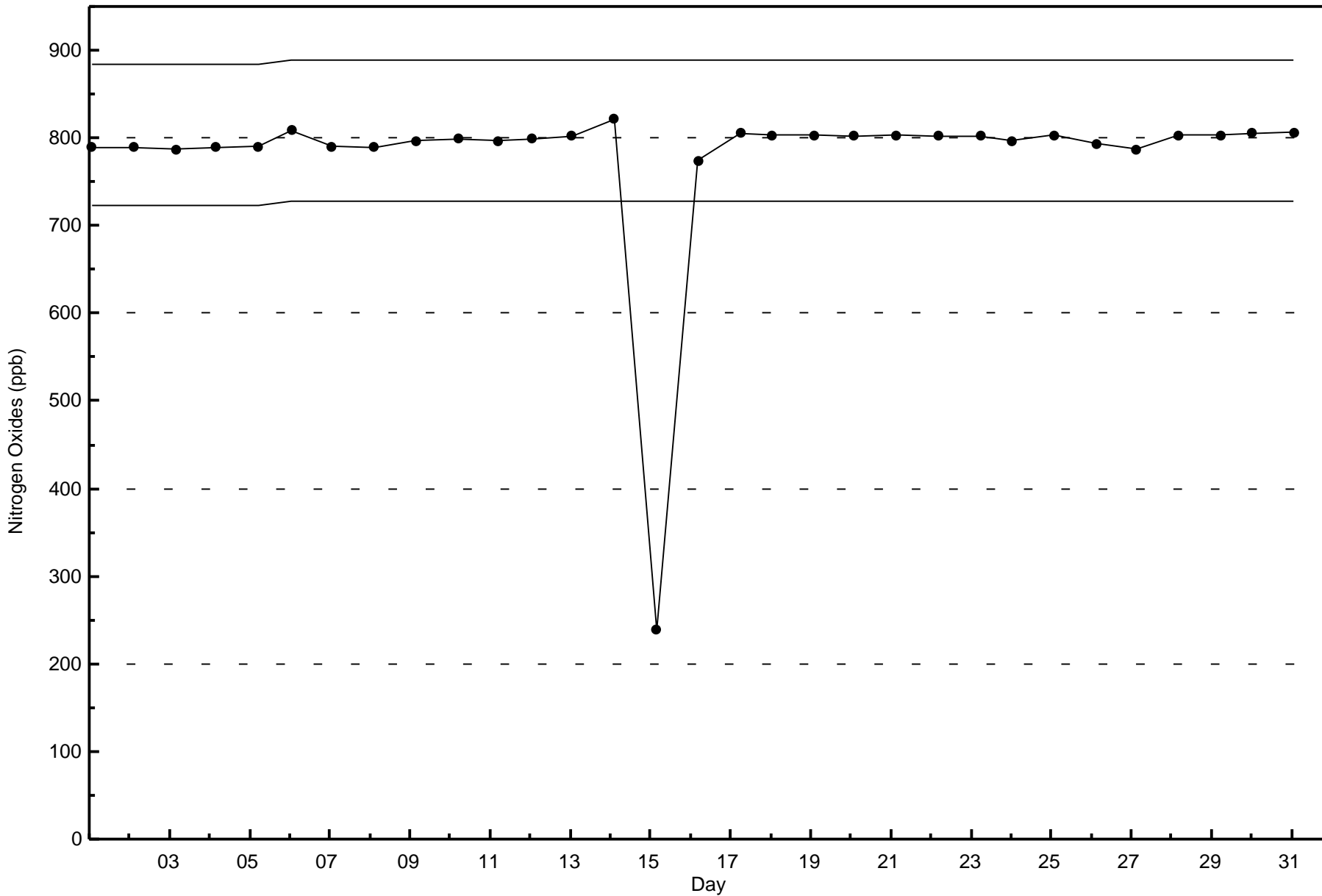


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley (AMS 7)







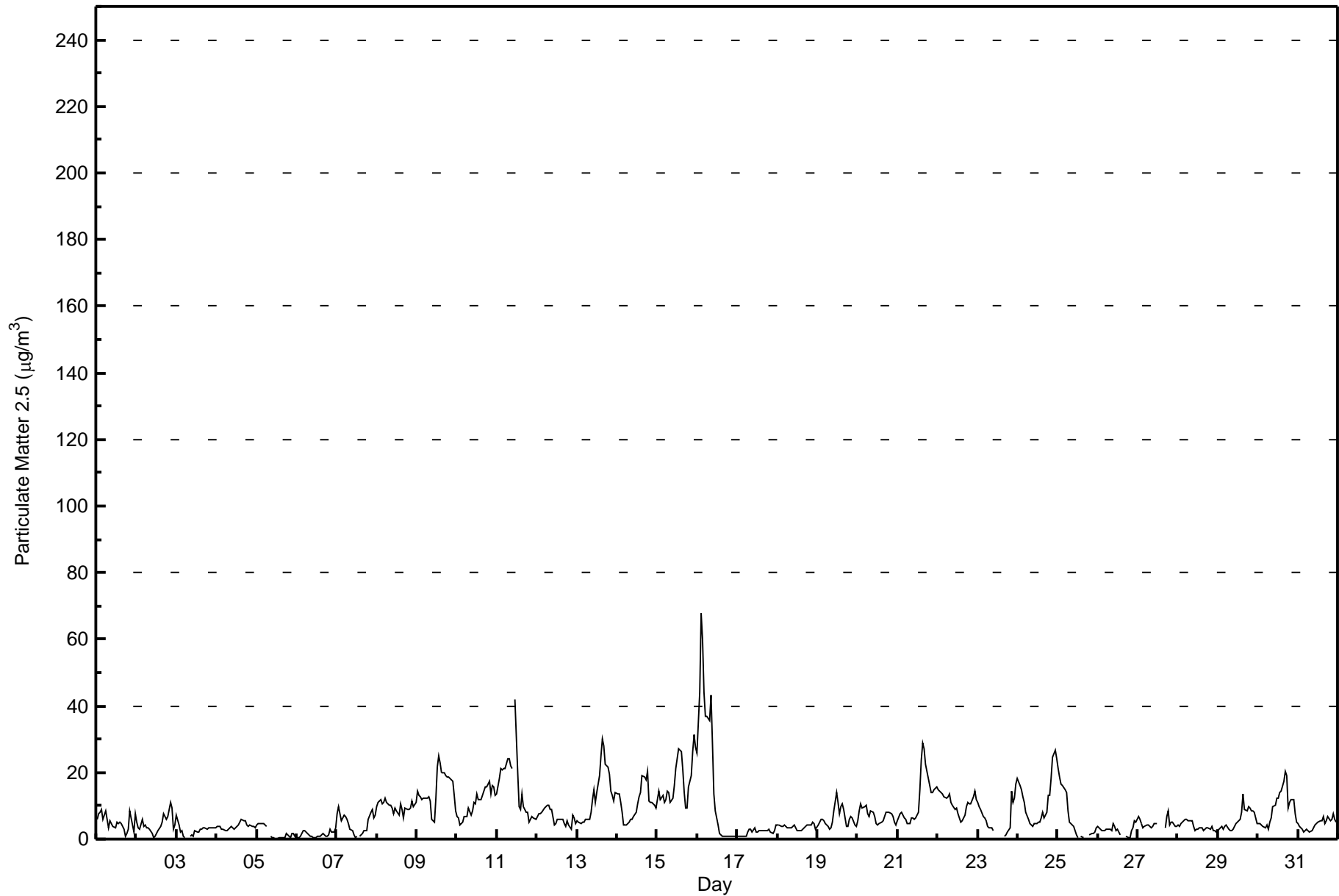


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 68.0 µg/m ³ on Jul 16 03:00 Minimum Value: 0.1 µg/m ³ on Jul 5 12:00 Maximum Diurnal Average: 9.3 µg/m ³ at hour 3 Monthly Average: 7.83 µg/m ³		Maximum Daily Average: 19.1 µg/m ³ on Jul 16 Minimum Daily Average: 1.4 µg/m ³ on Jul 6 Minimum Diurnal Average: 5.6 µg/m ³ at hour 11 Percentiles: P ₁ = 0.3 P ₁₀ = 1.6 Q ₁ = 3.4 Median = 5.5 Q ₃ = 10.5 P ₉₀ = 15.9 P ₉₉ = 32.8		Hours in Service: 744 Hours of Data: 723 Hours of Missing Data: 21 Hours of Calibration: 1 Percent Operational Time: 97.3																																													
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-Jul	6.0	7.5	8.0	8.9	5.8	8.5	6.1	3.4	5.6	4.9	3.7	3.5	5.1	4.8	5.2	4.5	2.8	0.8	1.5	2.9	8.5	6.5	2.0	7.8	5.2	8.9																							
2-Jul	5.3	3.5	2.8	6.1	4.0	4.1	3.5	3.6	3.1	1.6	0.2	0.9	1.9	2.6	3.7	5.0	7.5	6.6	5.7	7.0	10.9	9.1	3.1	4.3	4.4	10.9																							
3-Jul	7.2	4.1	2.2	2.7	1.0	0.6	UO	UO	1.0	1.1	0.8	2.4	2.2	2.3	2.9	2.9	3.4	3.2	3.1	3.5	3.4	3.5	3.5	3.6	2.8	7.2																							
4-Jul	3.8	3.8	3.8	3.1	2.8	2.7	2.7	3.1	3.5	3.7	3.1	3.5	3.8	4.4	5.1	5.8	5.6	5.3	4.1	3.8	4.4	3.9	3.7	3.5	3.9	5.8																							
5-Jul	4.1	4.7	4.5	4.7	4.5	4.2	3.8	C	0.9	0.4	0.3	0.1	0.2	0.2	0.3	0.3	0.4	0.4	1.6	0.7	0.3	1.6	1.6	1.0	1.8	4.7																							
6-Jul	0.6	0.5	1.0	1.8	2.4	2.4	1.9	1.4	0.8	0.7	0.5	0.4	0.8	0.9	0.9	1.2	1.8	0.9	0.8	1.5	2.9	2.2	2.0	3.6	1.4	3.6																							
7-Jul	7.5	9.9	7.7	5.7	7.2	7.0	5.8	4.5	2.9	2.5	1.3	0.4	0.7	UO	1.0	1.5	2.3	2.4	2.6	5.9	8.1	9.1	6.5	7.4	4.8	9.9																							
8-Jul	9.9	10.9	11.8	10.8	11.2	12.5	10.9	10.4	10.2	9.5	7.6	9.3	8.3	7.0	10.5	9.0	6.4	9.3	8.7	8.8	9.1	11.6	9.7	10.8	9.8	12.5																							
9-Jul	14.5	13.2	12.6	11.8	12.4	12.3	12.1	12.6	11.4	6.1	5.1	12.2	21.6	25.2	22.7	20.1	19.7	18.9	18.6	18.6	18.4	17.3	13.0	8.3	15.0	25.2																							
10-Jul	6.9	6.5	4.3	5.2	6.9	6.7	6.9	9.3	7.1	8.3	10.8	10.7	13.5	11.9	11.7	13.3	14.4	15.8	15.9	17.3	13.6	16.2	15.6	13.0	10.9	17.3																							
11-Jul	13.6	18.0	21.1	20.7	21.3	21.4	24.3	24.2	22.0	21.1	PF	42.0	19.7	9.6	8.9	13.5	9.7	7.9	8.3	5.2	5.8	6.7	6.2	5.9	15.5	42.0																							
12-Jul	7.0	7.4	7.6	8.2	9.2	9.9	10.2	10.0	9.0	8.7	4.3	4.9	6.0	6.0	6.0	5.8	4.5	3.6	5.4	4.4	3.1	7.4	6.3	4.5	6.6	10.2																							
13-Jul	5.5	4.9	4.6	5.2	5.3	5.8	6.1	5.8	8.1	12.0	15.0	11.0	13.8	18.9	25.1	30.2	28.1	22.4	21.4	19.6	14.4	13.2	11.4	13.9	13.4	30.2																							
14-Jul	13.5	13.7	11.0	8.0	4.4	4.2	4.5	5.2	6.1	5.9	6.8	8.0	10.5	12.6	13.8	19.0	18.6	17.7	20.3	11.4	11.0	11.2	10.0	9.5	10.7	20.3																							
15-Jul	11.9	14.4	12.0	13.1	11.2	11.7	14.5	13.8	11.2	12.3	16.1	21.2	24.2	27.2	26.2	20.6	13.9	9.4	9.2	15.8	19.2	26.5	31.5	27.4	17.3	31.5																							
16-Jul	26.0	43.9	68.0	59.8	44.1	36.7	36.7	35.4	43.2	29.0	13.4	8.5	4.3	1.7	1.1	1.0	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	19.1	68.0																							
17-Jul	0.9	0.8	0.9	1.0	0.8	0.8	2.2	3.0	2.9	2.2	3.3	2.2	2.0	2.4	2.7	2.6	2.4	2.5	2.7	2.9	2.3	1.5	2.6	4.0	2.2	4.0																							
18-Jul	4.4	4.1	3.9	3.7	4.1	3.6	3.5	3.4	3.5	4.0	4.3	3.3	2.6	2.6	2.7	3.0	3.5	4.0	4.4	4.4	4.2	4.9	4.5	3.1	3.7	4.9																							
19-Jul	4.1	5.2	6.1	6.1	5.4	4.7	3.9	3.1	3.4	5.0	8.4	13.8	10.9	7.5	9.8	10.5	9.1	3.9	3.9	6.1	6.7	6.2	4.4	3.8	6.3	13.8																							
20-Jul	5.7	8.5	10.6	9.4	9.9	10.0	7.5	6.9	8.4	8.0	6.9	4.8	4.4	4.6	5.1	5.5	6.7	7.9	8.1	8.2	7.8	6.6	5.0	4.2	7.1	10.6																							
21-Jul	5.3	7.4	7.9	7.3	6.4	6.0	4.6	4.5	6.2	6.2	6.0	6.4	8.2	14.6	23.9	28.8	27.2	22.6	18.2	16.3	14.2	14.0	14.8	15.5	12.2	28.8																							
22-Jul	14.8	14.4	14.1	13.4	12.9	12.4	12.6	13.6	10.9	10.0	8.8	9.1	7.5	6.5	5.1	5.7	7.3	9.7	10.9	10.5	10.7	12.6	14.4	11.7	10.8	14.8																							
23-Jul	11.0	9.8	8.8	7.0	6.2	5.3	4.0	3.5	3.4	2.7	UO	UO	UO	1.5	UO	UO	1.0	1.3	2.2	3.4	14.2	11.0	12.4	16.7	6.6	16.7																							
24-Jul	18.1	15.9	14.8	12.9	10.9	7.9	5.9	4.6	4.0	3.8	4.7	4.5	5.3	5.2	6.5	7.9	6.4	8.2	13.1	13.2	18.1	24.5	26.9	24.3	11.1	26.9																							
25-Jul	21.1	18.5	16.5	15.9	14.8	13.8	8.5	5.1	4.6	3.9	2.4	1.5	0.6	UO	1.0	0.5	UO	UO	UO	1.4	1.8	1.8	2.3	3.4	7.0	21.1																							
26-Jul	3.7	3.5	2.7	2.4	2.7	2.9	3.1	3.0	2.5	4.7	3.7	2.6	2.9	1.2	UO	UO	UO	UO	0.6	0.3	0.4	2.5	3.3	5.4	5.1	2.8	5.4																						
27-Jul	6.7	5.9	4.7	3.4	3.7	4.0	4.3	3.9	3.4	4.0	4.6	4.9	UO	UO	UO	UO	3.2	6.6	8.5	4.3	5.0	5.2	3.7	3.7	4.7	8.5																							
28-Jul	4.1	3.9	4.6	5.5	5.8	5.9	5.6	5.4	5.5	3.7	2.5	2.9	3.1	3.3	3.5	2.5	2.8	3.5	3.3	3.0	3.8	2.6	2.7	2.3	3.8	5.9																							
29-Jul	2.6	3.5	3.7	2.9	4.0	4.4	3.2	2.6	2.7	2.8	3.7	4.8	5.3	6.0	8.0	13.4	9.0	8.7	9.5	9.3	8.4	8.5	7.9	4.8	5.8	13.4																							
30-Jul	4.6	4.5	4.2	3.9	3.3	4.1	2.8	5.0	6.5	9.6	10.3	12.2	12.5	14.1	14.3	17.2	20.5	19.0	9.3	11.1	11.7	11.9	7.6	5.2	9.4	20.5																							
31-Jul	4.6	3.9	3.2	2.3	2.6	2.8	2.6	2.0	2.6	3.6	4.2	4.6	5.0	5.4	5.3	6.7	4.8	5.4	6.7	5.5	6.0	7.8	6.0	5.1	4.5	7.8																							
																								8.2	8.9	9.3	8.8	8.0	7.7	7.5	7.3	7.0	6.5	5.6	7.2	7.1	7.5	8.3	9.2	8.4	7.7	7.6	7.3	8.1	8.7	8.0	7.7	Diurnal Average	
																								26.0	43.9	68.0	59.8	44.1	36.7	36.7	35.4	43.2	29.0	16.1	42.0	24.2	27.2	26.2	30.2	28.1	22.6	21.4	19.6	19.2	26.5	31.5	27.4	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
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	309	42.74	42.74
6 - 15	285	39.42	82.16
16 - 25	57	7.88	90.04
26 - 80	21	2.90	92.95
> 81.0	0	0.00	92.95

Total Number of Valid Hours: 723

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 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	16	3	0	7	13	16	37	10	11	20	44	47	22	16	13	32	307
6 - 15	14	7	3	4	11	27	51	26	19	9	37	20	9	6	5	37	285
16 - 25	4	2	0	0	4	6	9	3	2	3	1	3	1	3	4	12	57
26 - 80	2	0	0	0	0	0	5	2	0	0	2	2	2	1	1	4	21
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	36	12	3	11	28	49	102	41	32	32	84	72	34	26	23	85	670

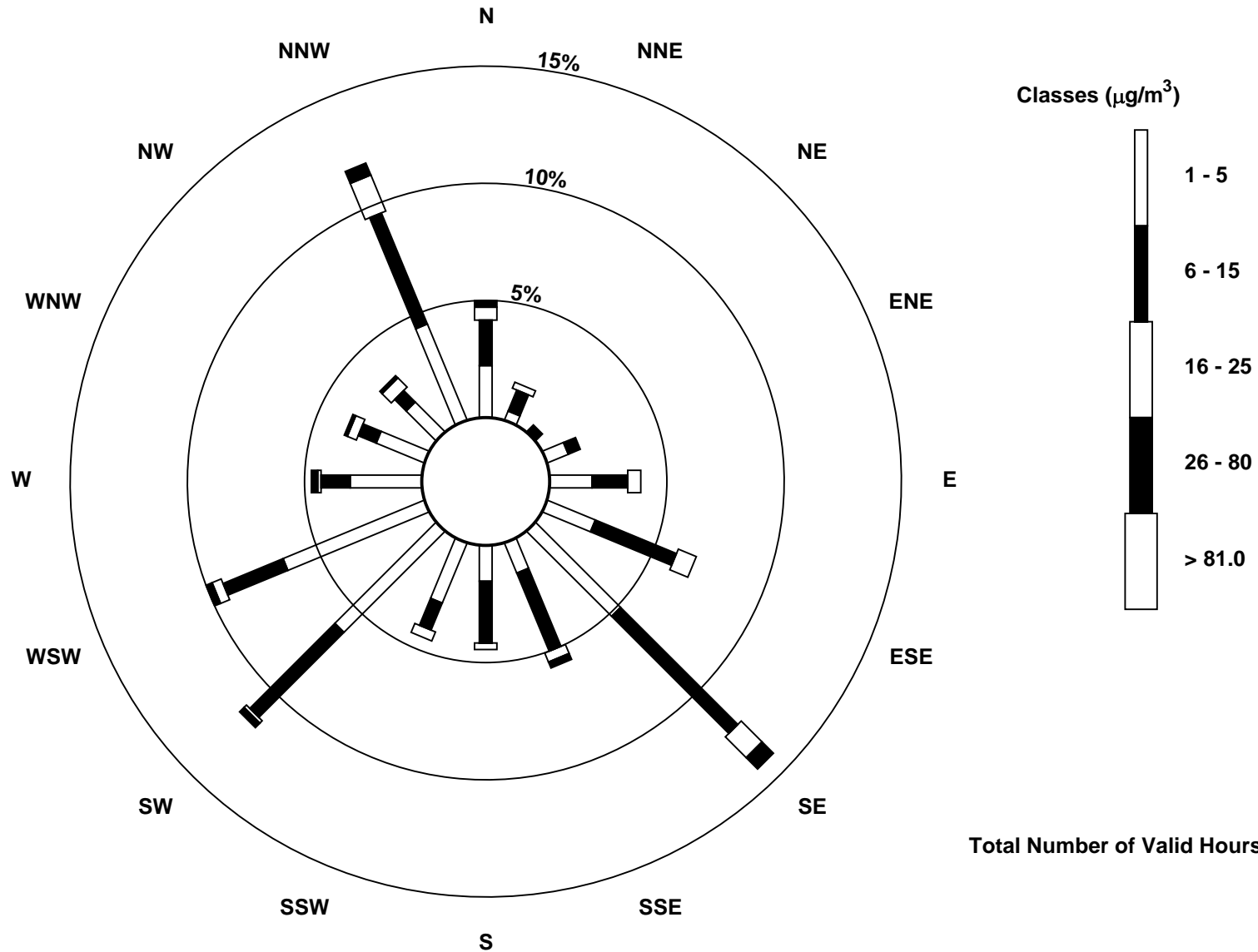
Total Number of Valid Hours: 721

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 721



Wood Buffalo Environmental Association
Summary of Hour Averages

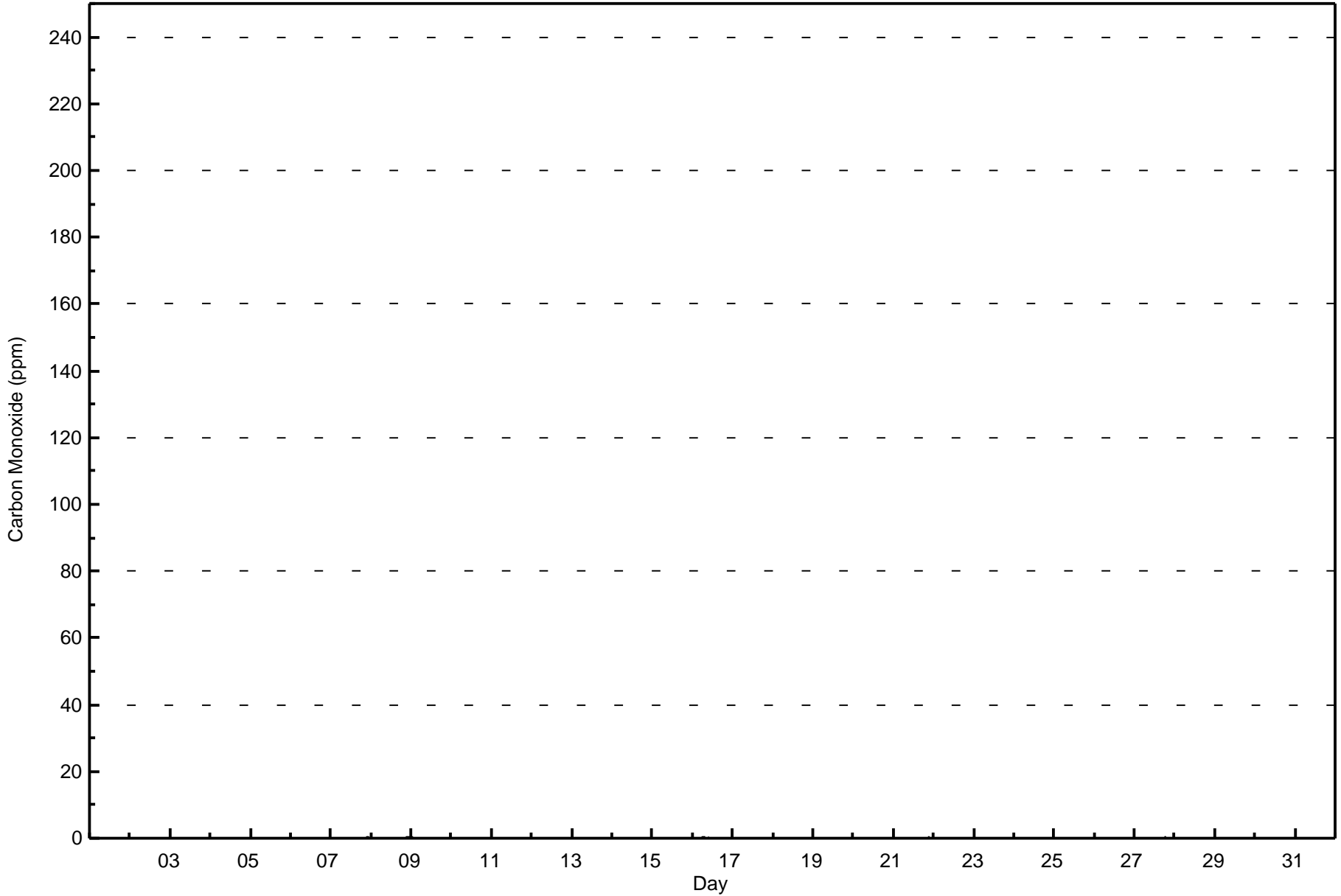
Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.3 ppm on Jul 7 22:00 Maximum Daily Average: 0.2 ppm on Jul 8		Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9																								
Minimum Value: 0.0 ppm on Jul 27 15:00 Maximum Diurnal Average: 0.1 ppm at hour 22 Monthly Average: 0.11 ppm		Minimum Daily Average: 0.0 ppm on Jul 4 Minimum Diurnal Average: 0.1 ppm at hour 14 Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.2 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-Jul	0.2	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	0.2	0.1	0.2	0.1	0.2
2-Jul	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	0.2	0.2	0.2	0.2	0.1	0.2
3-Jul	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	0.0	0.0	0.1	0.1
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	C	C	C	C	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
6-Jul	0.1	0.1	0.1	0.2	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	0.2	0.2	0.1	0.1	0.2
7-Jul	0.1	0.2	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	0.3	0.2	0.2	0.1	0.3
8-Jul	0.2	0.2	0.2	0.2	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	0.2	0.2	0.2	0.3	0.3	0.2	0.3
9-Jul	0.3	0.2	0.2	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.3
10-Jul	0.1	0.1	0.1	0.1	0.1	0.2	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	0.1	0.2	0.2	0.1	0.1	0.2
11-Jul	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	Z	PF	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	0.2
12-Jul	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.1	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	0.2	0.2	0.1	0.2
13-Jul	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
14-Jul	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
15-Jul	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2
16-Jul	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	Z	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	0.2
17-Jul	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	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	0.1
18-Jul	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-Jul	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
20-Jul	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	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	0.1	0.1	0.2
21-Jul	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1
22-Jul	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	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	0.2	0.2	0.2	0.2	0.1
23-Jul	0.2	0.2	0.2	0.2	0.2	0.2	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	0.2	0.2	0.1	0.2
24-Jul	0.2	0.2	0.2	0.2	Z	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	0.1	0.1	0.2	0.2	0.1	0.2
25-Jul	0.2	0.2	0.2	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
26-Jul	0.1	0.1	0.1	0.1	0.1	0.1	Z	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	0.1	0.1	0.1	0.1
27-Jul	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1
28-Jul	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	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
29-Jul	0.1	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	0.1	0.1	0.1	0.1
30-Jul	0.1	0.1	0.1	0.1	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1
31-Jul	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	0.1	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		
																								Diurnal Maximum		
Z - zeronpan C - Calibration PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm																										



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	709	100.00	100.00
0.4 - 0.5	0	0.00	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - July 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	37	12	3	10	28	48	94	40	35	35	94	85	42	27	26	91	707
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	37	12	3	10	28	48	94	40	35	35	94	85	42	27	26	91	707

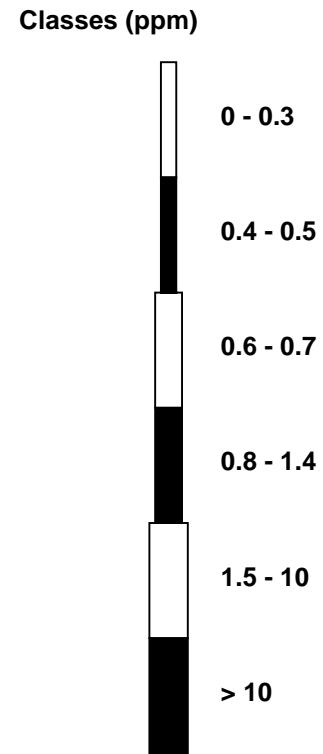
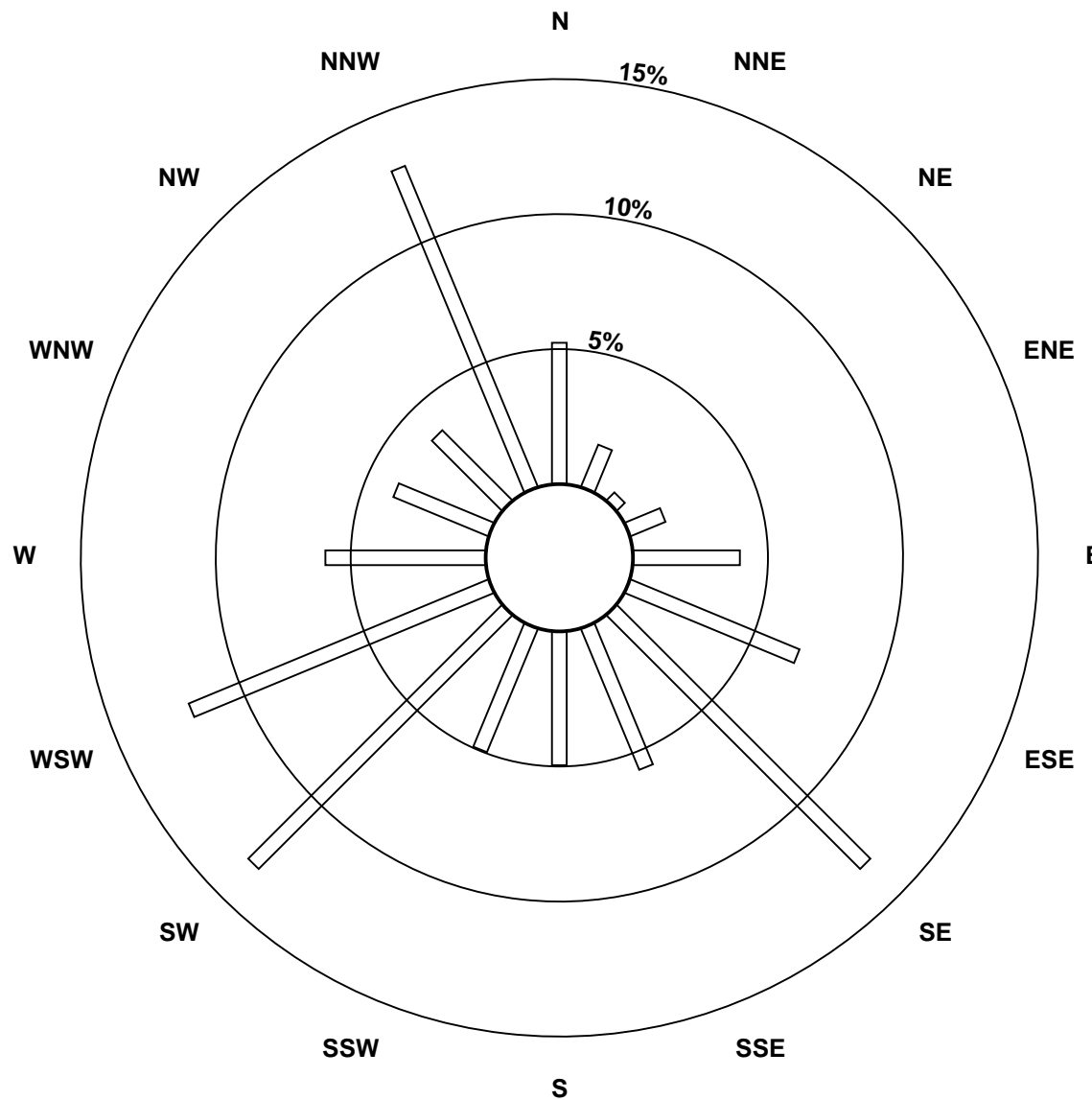
Total Number of Valid Hours: 707

Total Number of Hours: 744

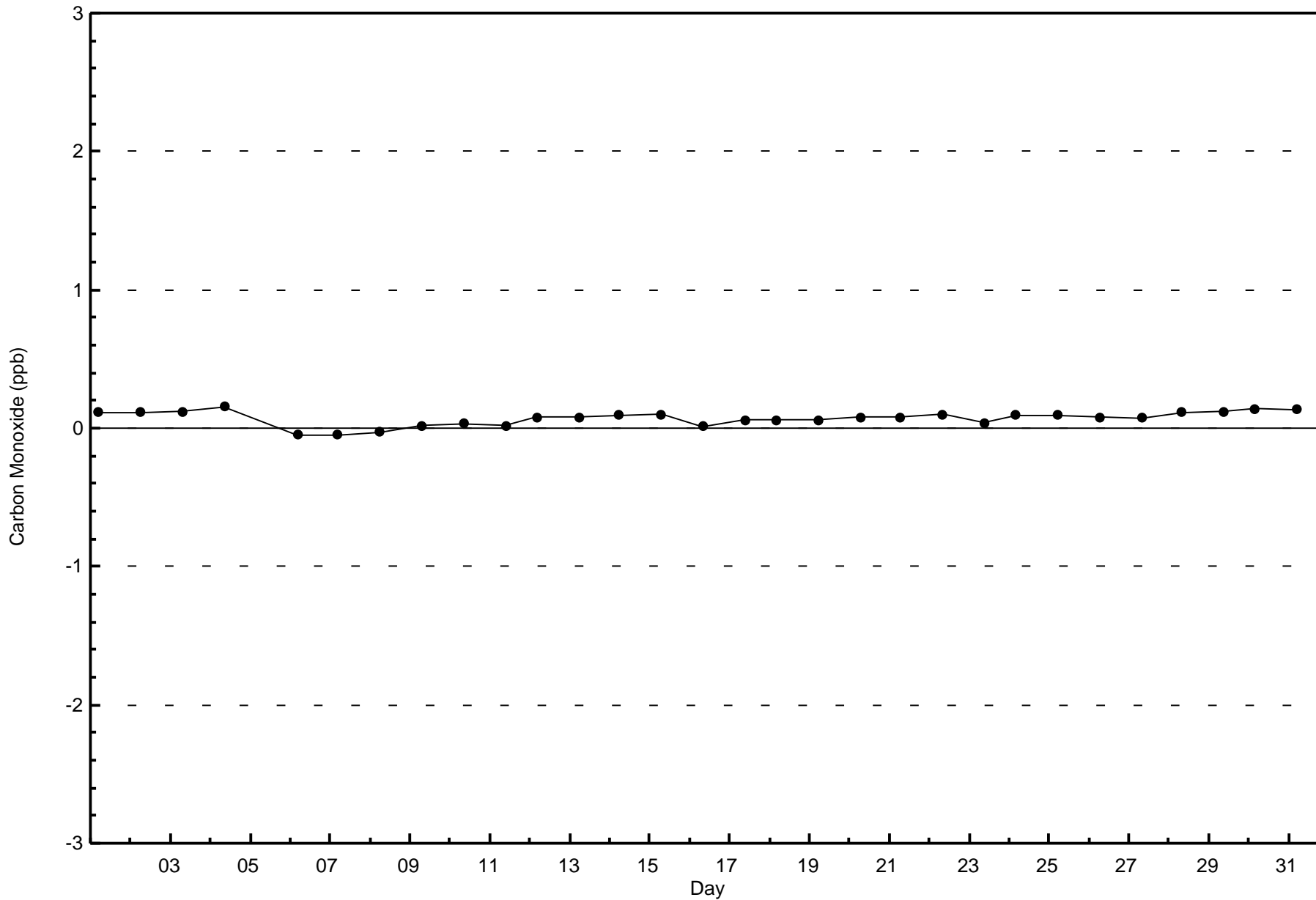


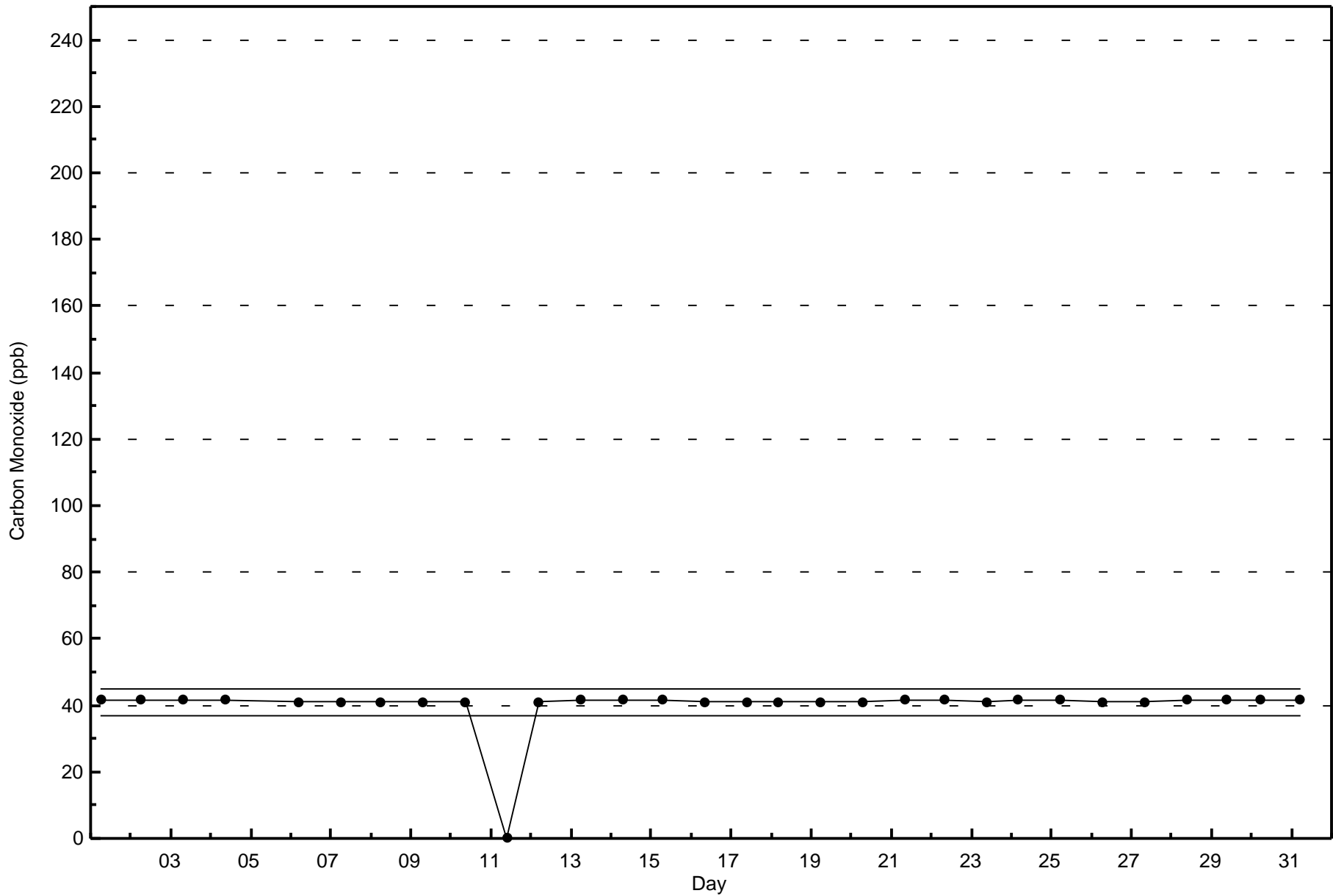
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association
Summary of Hour Averages

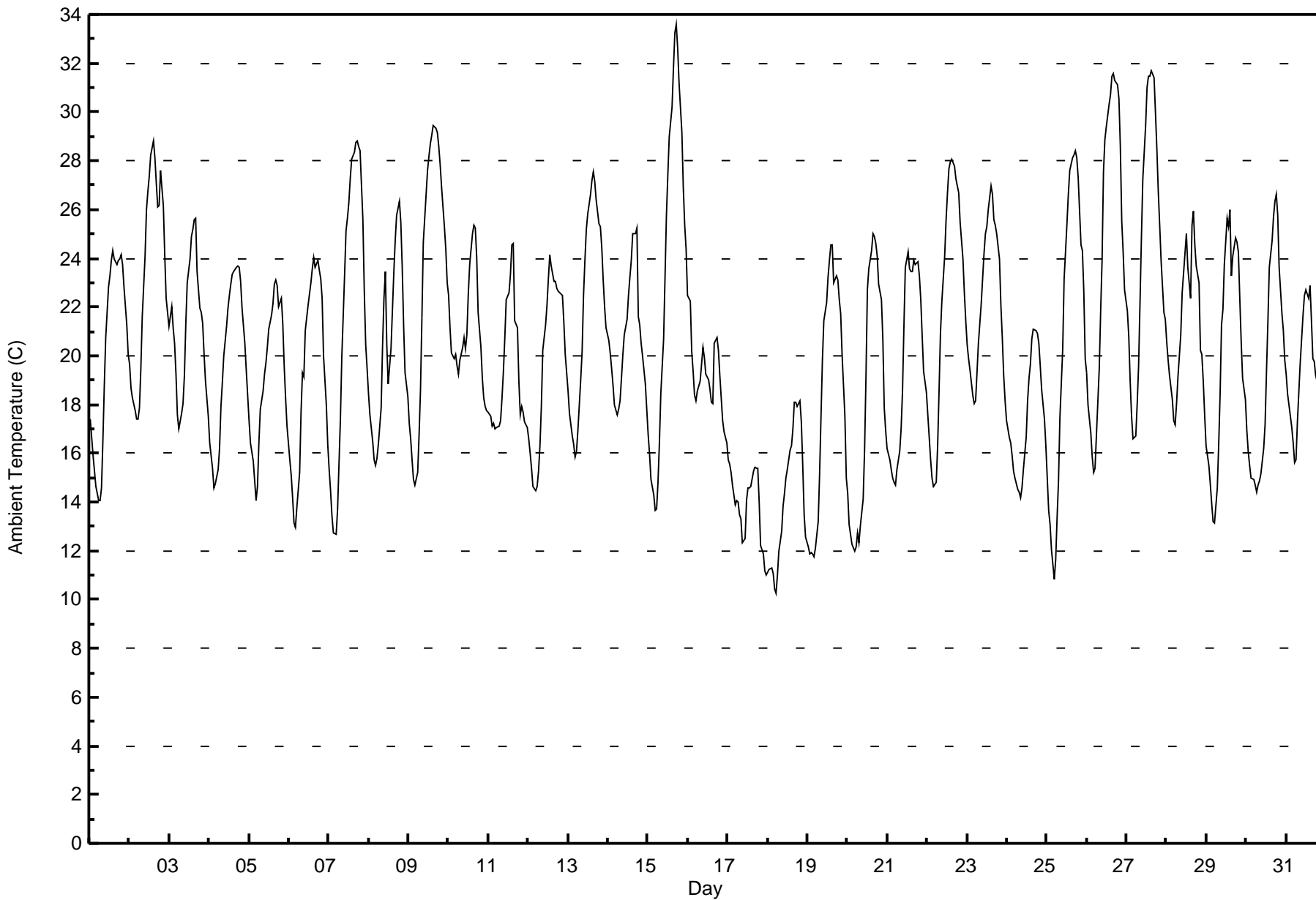
Ambient Temperature (AT) - C
Athabasca Valley - July 2017

Maximum Value: 33.6 C on Jul 15 18:00 Maximum Daily Average: 24.5 C on Jul 27																						Hours in Service:	744			
Minimum Value: 10.3 C on Jul 18 06:00 Minimum Daily Average: 13.9 C on Jul 17																						Hours of Data:	744			
Maximum Diurnal Average: 24.9 C at hour 17 Minimum Diurnal Average: 15.1 C at hour 5																						Hours of Missing Data:	0			
Monthly Average: 20.31 C Percentiles: P ₁ = 11.2 P ₁₀ = 14.6 Q ₁ = 16.7 Median = 20.0 Q ₃ = 23.7 P ₉₀ = 26.6 P ₉₉ = 31.4																						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-Jul	17.4	16.6	15.9	15.3	14.7	14.1	14.1	14.6	16.5	18.8	20.8	22.8	23.3	23.9	24.3	24.0	23.8	23.9	24.0	24.2	23.7	22.8	21.3	20.0	20.0	24.3
2-Jul	19.6	18.7	18.3	17.7	17.4	17.4	17.8	19.5	21.6	24.1	26.0	26.7	27.4	28.3	28.8	28.1	27.1	26.1	26.2	27.6	26.2	24.2	22.3	21.8	23.3	28.8
3-Jul	21.2	22.0	21.1	20.5	19.2	17.6	17.0	17.6	18.0	19.2	21.3	23.0	24.0	24.9	25.2	25.6	25.6	23.5	21.9	21.8	21.3	20.0	19.0	17.5	21.2	25.6
4-Jul	16.4	15.9	15.4	14.6	14.8	15.3	16.2	17.9	18.9	20.0	21.2	22.0	22.4	22.9	23.3	23.4	23.6	23.7	23.6	23.1	22.0	20.5	19.4	18.4	19.8	23.7
5-Jul	17.4	16.5	15.7	14.9	14.1	14.6	16.4	17.8	18.6	19.3	19.7	20.4	21.1	21.7	22.1	23.0	23.1	22.9	22.0	22.4	21.3	19.6	18.3	17.1	19.2	23.1
6-Jul	15.7	15.1	14.2	13.1	13.0	13.8	15.2	17.7	19.3	19.2	21.0	22.1	22.5	23.0	23.6	24.0	23.6	23.9	23.5	23.1	22.3	20.0	18.0	16.4	19.3	24.0
7-Jul	15.3	14.5	13.4	12.7	12.7	13.7	15.6	17.4	20.0	23.3	25.1	25.6	26.3	27.3	28.1	28.4	28.8	28.8	28.6	28.4	25.6	22.7	20.5	19.5	21.8	28.8
8-Jul	18.4	17.6	16.5	15.7	15.5	15.8	16.4	17.9	20.4	22.3	23.4	20.5	18.9	20.3	21.8	23.4	24.7	25.7	26.3	25.5	23.6	21.2	19.3	18.3	20.4	26.3
9-Jul	17.2	16.6	15.7	14.9	14.7	15.2	16.8	18.6	21.6	24.7	26.6	27.6	28.2	28.7	29.1	29.5	29.3	29.2	28.6	27.8	26.9	25.3	24.4	23.0	23.3	29.5
10-Jul	22.5	21.1	20.1	19.9	20.0	19.6	19.2	19.8	20.4	20.7	20.3	20.9	22.5	23.7	25.0	25.4	25.3	24.0	21.8	20.4	19.0	18.3	17.9	17.7	21.1	25.4
11-Jul	17.7	17.5	17.1	17.2	17.0	17.1	17.1	17.3	18.3	19.4	20.7	22.3	22.6	23.4	24.6	24.6	21.4	21.2	19.0	17.6	17.9	17.7	17.3	17.0	19.3	24.6
12-Jul	16.6	16.0	15.4	14.7	14.5	14.7	15.3	16.3	17.9	20.2	21.3	22.1	23.2	24.2	23.7	23.0	23.0	22.8	22.6	22.6	22.5	21.4	20.0	19.3	19.7	24.2
13-Jul	18.6	17.7	16.7	16.3	15.9	16.1	17.0	19.0	20.2	22.4	23.9	25.2	25.8	26.6	27.2	27.5	27.2	26.4	25.4	25.3	24.4	23.1	22.0	21.2	22.1	27.5
14-Jul	20.6	20.1	19.5	18.8	18.0	17.6	17.8	18.2	19.1	20.0	20.9	21.5	22.5	23.2	23.9	25.0	25.0	25.2	21.6	21.2	20.5	20.0	18.8	17.8	20.7	25.2
15-Jul	16.7	16.0	14.9	14.3	13.6	13.7	14.8	16.4	18.4	20.7	23.3	25.7	27.5	29.0	30.2	31.8	33.2	33.6	32.6	31.2	29.2	26.9	25.3	24.4	23.5	33.6
16-Jul	22.5	22.2	20.1	19.3	18.4	18.1	18.6	19.0	19.6	20.4	19.9	19.3	19.0	18.6	18.1	18.0	20.5	20.8	20.2	19.2	18.2	17.3	16.9	16.4	19.2	22.5
17-Jul	15.8	15.6	15.2	14.7	13.9	14.0	14.0	13.5	13.3	12.3	12.5	14.0	14.6	14.6	14.6	15.3	15.4	15.4	15.4	14.0	12.2	11.9	11.2	11.0	13.9	15.8
18-Jul	11.1	11.2	11.3	11.1	10.4	10.3	11.0	12.0	12.8	13.8	14.3	15.0	15.3	16.1	16.3	17.0	18.1	18.1	18.0	18.1	17.3	15.5	13.5	12.6	14.2	18.1
19-Jul	12.2	11.9	12.0	11.9	11.8	12.1	13.2	15.2	17.5	19.8	21.4	22.2	23.2	23.9	24.6	24.6	23.0	23.3	23.1	22.3	21.7	20.0	17.5	15.0	18.5	24.6
20-Jul	14.4	13.1	12.7	12.3	12.0	12.1	12.7	12.3	13.0	14.1	16.1	19.1	22.7	23.6	24.3	25.0	24.9	24.6	24.1	22.9	22.3	20.7	17.9	16.9	18.1	25.0
21-Jul	16.2	15.7	15.3	15.0	14.8	14.7	15.3	16.1	17.0	18.6	21.2	23.6	24.3	23.6	23.5	23.4	23.9	23.7	23.9	23.3	22.3	20.8	19.4	18.5	19.8	24.3
22-Jul	17.6	16.6	15.7	15.0	14.6	14.8	16.3	18.5	20.9	22.2	24.1	25.6	26.7	27.7	28.0	28.1	27.7	27.2	26.9	26.7	25.4	24.0	22.6	21.4	22.3	28.1
23-Jul	20.5	19.9	19.4	18.4	18.0	18.1	19.3	20.5	22.1	23.2	24.2	25.0	25.3	26.0	26.9	26.6	25.6	25.3	25.0	24.0	22.1	20.8	19.2	18.2	22.2	26.9
24-Jul	17.4	16.7	16.4	15.9	15.2	15.0	14.5	14.4	14.2	14.6	15.3	16.7	18.1	19.1	19.6	20.7	21.1	21.0	20.9	20.5	19.6	18.6	17.4	16.3	17.5	21.1
25-Jul	15.0	13.7	13.1	12.0	10.8	11.6	13.4	14.9	17.5	20.3	23.2	24.3	25.4	26.6	27.6	28.1	28.3	28.4	28.2	27.3	24.6	24.3	22.7	19.9	20.9	28.4
26-Jul	19.3	18.0	16.9	15.9	15.2	15.4	16.8	19.5	21.9	23.9	27.5	28.9	29.4	30.3	30.7	31.4	31.6	31.3	31.1	30.5	28.6	25.6	24.3	22.7	24.4	31.6
27-Jul	21.9	20.8	19.0	17.5	16.6	16.7	18.0	19.6	22.2	24.9	27.2	29.4	31.0	31.4	31.5	31.7	31.4	30.0	28.5	26.7	25.3	23.9	21.8	21.5	24.5	31.7
28-Jul	20.5	19.8	19.2	18.2	17.3	17.2	18.1	19.1	20.9	22.6	23.4	24.2	25.0	23.6	22.4	25.4	25.9	24.6	23.7	23.0	20.2	20.0	19.0	17.6	21.3	25.9
29-Jul	16.3	15.5	14.7	14.0	13.2	13.1	14.6	16.4	18.4	21.3	21.9	23.8	25.6	25.3	26.0	23.3	24.1	24.8	24.6	24.2	22.4	20.6	19.1	18.2	20.1	26.0
30-Jul	17.0	16.0	15.5	15.0	14.9	14.7	14.4	14.7	14.9	15.2	16.2	17.2	19.4	21.4	23.6	24.7	25.7	26.4	26.6	25.7	23.6	21.7	21.0	19.8	19.4	26.6
31-Jul	19.3	18.4	17.5	17.1	16.4	15.6	15.7	17.3	19.7	20.7	21.7	22.5	22.7	22.4	22.9	21.4	19.9	19.8	19.2	18.7	17.9	17.3	16.3	15.2	19.0	22.9
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	0	0.00	0.00
10 - 20	367	49.33	49.33
> 20	377	50.67	100.00

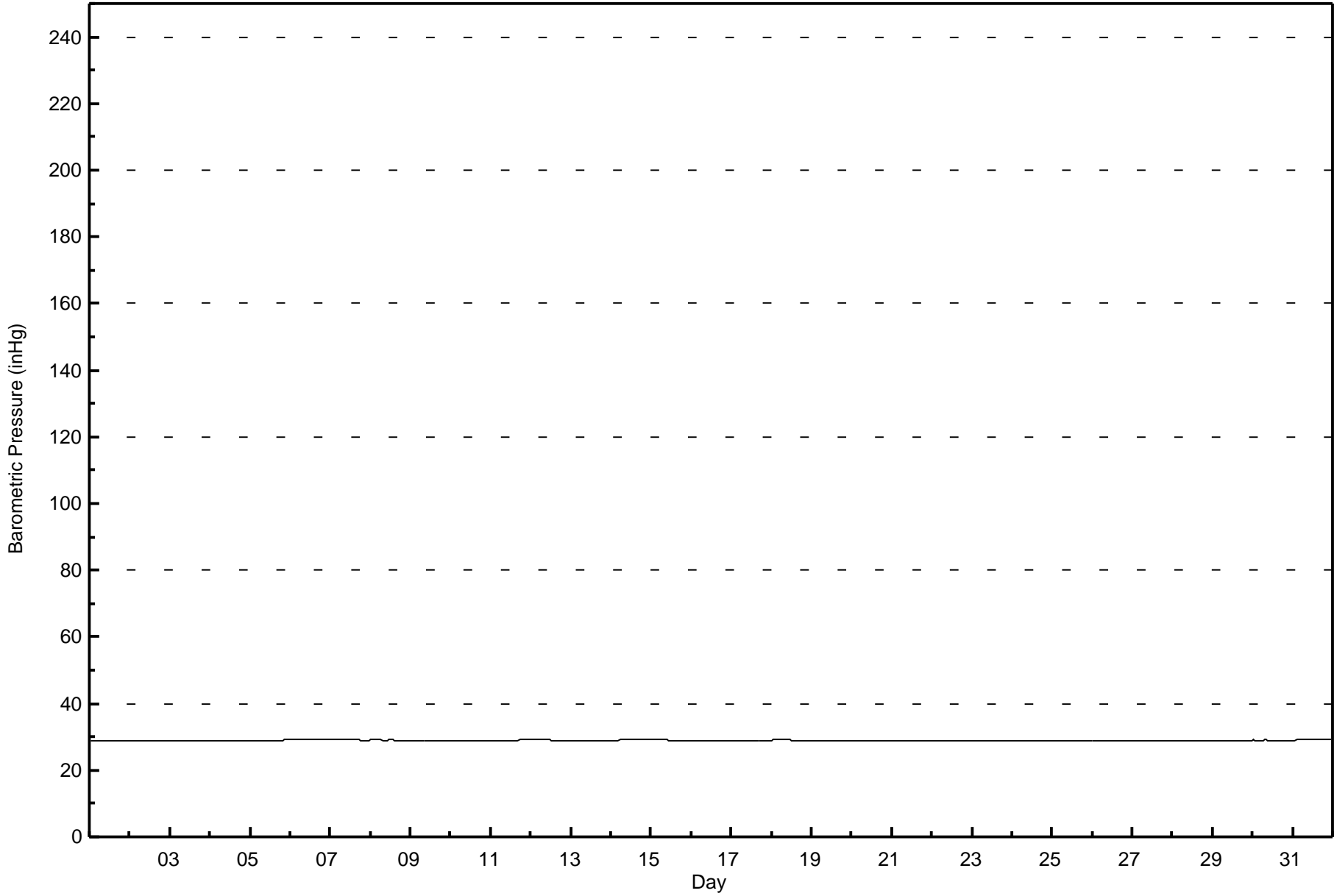
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Athabasca Valley - July 2017

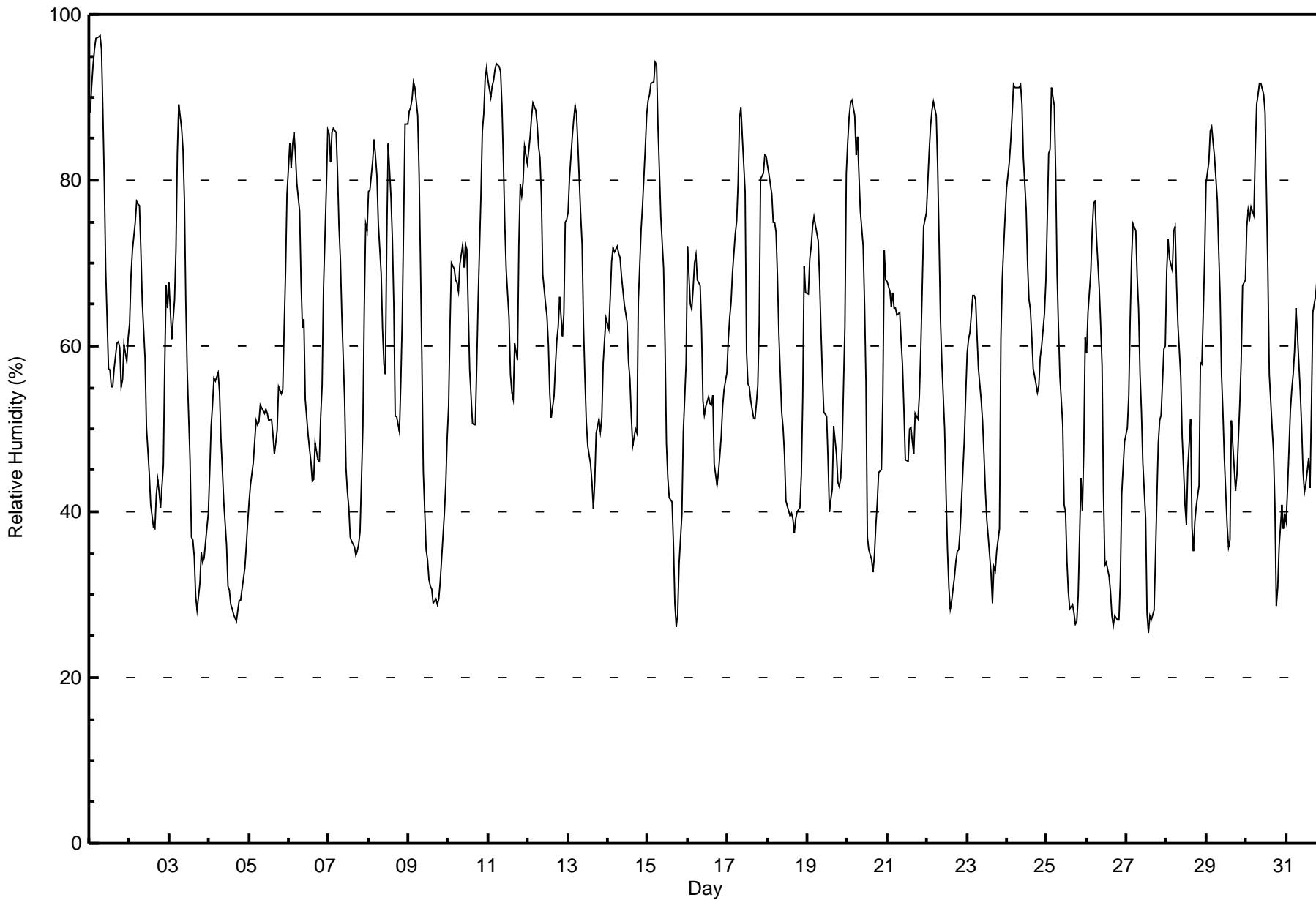




Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Athabasca Valley - July 2017

Maximum Value: 98 % on Jul 1 07:00																	Maximum Daily Average: 78.2 % on Jul 11																	Hours in Service: 744								
Minimum Value: 25 % on Jul 27 14:00																	Minimum Daily Average: 39.2 % on Jul 4																	Hours of Data: 744								
Maximum Diurnal Average: 78.2 % at hour 5																	Minimum Diurnal Average: 42.7 % at hour 16																	Hours of Missing Data: 0								
Monthly Average: 60.0 %																	Percentiles: P ₁ = 27 P ₁₀ = 35 Q ₁ = 46 Median = 59 Q ₃ = 74 P ₉₀ = 86 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-Jul	88	91	94	96	97	97	98	96	88	80	69	57	57	55	55	57	60	61	60	55	56	60	58	61	72.8	98																
2-Jul	63	68	72	75	77	77	77	72	65	59	50	47	45	41	38	38	42	44	42	40	46	58	67	65	57.0	77																
3-Jul	68	61	63	66	72	83	89	86	84	78	65	57	46	37	37	35	30	28	31	35	34	34	36	40	53.9	89																
4-Jul	45	50	53	56	56	57	54	49	45	41	36	31	31	29	28	28	27	28	29	29	31	33	36	39	39.2	57																
5-Jul	41	43	46	49	51	51	51	53	52	52	52	52	51	51	49	47	48	50	55	54	55	62	69	78	52.6	78																
6-Jul	84	82	84	86	83	80	76	68	62	63	54	49	48	46	44	44	48	46	46	52	55	67	79	86	63.8	86																
7-Jul	86	82	86	86	86	81	74	70	64	54	45	42	40	37	36	36	35	35	36	38	50	65	75	74	58.9	86																
8-Jul	79	79	82	85	83	80	75	69	62	58	57	73	84	78	73	65	52	52	50	56	63	75	87	87	70.9	87																
9-Jul	88	89	90	92	91	88	81	70	58	45	35	34	32	31	31	29	29	29	30	32	34	40	43	49	52.9	92																
10-Jul	53	62	70	69	68	68	67	70	72	69	72	72	64	57	51	51	51	57	65	78	86	88	92	94	68.6	94																
11-Jul	92	90	91	92	93	94	94	93	89	82	75	69	63	57	54	54	60	58	72	80	78	80	84	82	78.2	94																
12-Jul	83	85	88	89	88	87	84	83	78	69	65	64	60	54	51	54	58	61	62	66	61	64	75	75	71.0	89																
13-Jul	76	80	85	87	89	88	84	76	72	62	56	51	48	46	44	40	44	49	51	50	51	58	61	63	63.0	89																
14-Jul	62	66	70	72	71	72	71	71	69	67	65	63	58	56	52	48	50	50	65	70	74	77	84	88	66.2	88																
15-Jul	90	90	92	92	94	94	87	81	76	69	60	48	44	42	41	36	29	26	28	34	40	50	54	58	60.5	94																
16-Jul	72	65	64	67	70	71	68	67	62	53	52	53	54	53	53	54	46	43	45	47	49	53	55	57	57.2	72																
17-Jul	61	63	65	69	74	75	80	87	89	85	79	59	55	55	53	51	51	53	55	63	80	81	83	83	68.8	89																
18-Jul	82	81	78	75	75	74	68	61	52	50	47	41	41	39	40	39	37	39	40	41	44	54	70	66	55.6	82																
19-Jul	66	71	72	74	76	75	73	68	62	56	52	51	46	40	42	43	50	47	44	43	44	48	62	81	57.7	81																
20-Jul	85	88	89	90	88	83	85	81	76	72	65	56	37	35	34	33	35	38	41	45	45	54	72	68	62.2	90																
21-Jul	68	67	65	66	65	65	64	64	61	58	52	46	46	50	50	49	47	52	51	54	60	67	74	76	59.0	76																
22-Jul	80	84	87	89	89	88	82	73	63	58	50	42	35	31	28	29	32	34	35	35	38	45	49	54	55.4	89																
23-Jul	59	61	62	66	66	66	61	57	53	51	47	42	39	37	33	29	33	33	35	38	61	68	72	76	51.9	76																
24-Jul	79	82	85	88	91	91	91	91	92	89	83	76	70	66	64	61	57	55	54	55	59	60	64	68	73.8	92																
25-Jul	75	83	84	91	89	81	69	62	56	51	41	40	34	30	28	29	28	26	27	30	44	40	48	61	51.9	91																
26-Jul	59	64	69	74	77	77	73	67	63	58	42	34	34	32	30	28	26	27	27	27	32	42	45	48	48.2	77																
27-Jul	50	54	63	70	75	74	68	64	57	52	46	39	28	25	27	27	28	35	42	48	51	52	60	60	49.8	75																
28-Jul	69	73	70	69	74	74	67	63	56	49	45	41	38	45	51	38	35	39	41	43	58	58	64	71	55.5	74																
29-Jul	80	82	86	86	85	83	78	72	66	57	52	47	38	36	37	51	48	43	45	49	53	58	67	68	61.0	86																
30-Jul	74	76	75	77	76	83	89	90	92	92	90	88	78	69	57	50	47	41	29	31	36	41	38	40	65.0	92																
31-Jul	39	43	52	55	57	59	65	62	55	50	45	42	43	46	43	53	64	65	66	70	70	69	76	81	57.1	81																
																	70.8	72.7	75.2	77.4	78.2	77.9	75.6	72.1	67.4	62.2	56.3	51.9	48.1	45.4	43.7	42.7	42.9	43.4	45.2	47.9	52.8	58.1	64.5	67.6	Diurnal Average	
																	92	91	94	96	97	97	98	96	92	92	90	88	84	78	73	65	64	65	72	80	86	88	92	94	Diurnal Maximum	





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Athabasca Valley - July 2017

Maximum Speed: 29 km/h on Jul 28 12:00	Maximum Daily Speed Average: 20.7 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 8 19:00	Minimum Daily Speed Average: 0.9 km/h on Jul 13	Hours of Data: 742
Maximum Diurnal Speed Average: 6.9 km/h at hour 12	Minimum Diurnal Speed Average: 2.4 km/h at hour 8	Hours of Missing Data: 2
Monthly Average Velocity: 3.6 km/h 257.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 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-Jul	SSE5	SSE2	S3	SSW4	S8	S7	S6	S7	SE3	NW2	W4	SW5	SW5	NW3	NW4	N3	W4	NNW3	E3	ESE6	ESE6	SSE10	SSE8	SSE6	S2.6	SSE10
2-Jul	SE7	SE8	SE5	S3	SSE6	SE9	SE11	SE12	SE10	ESE9	S9	SSW11	SSW10	SSW11	SSW11	SSW10	WSW12	SW12	S9	SSW5	SE6	SSE4	SE7	SE7	S6.8	WSW12
3-Jul	S5	SSW11	SSW10	SW4	SW6	SE8	SE5	SW5	SW9	SE6	SW8	SW16	W16	SW14	SW17	SW18	WSW24	WSW27	SW15	SW14	WSW16	W19	WSW17	WSW17	SW11.5	WSW27
4-Jul	WSW13	SW11	SW13	WSW14	WSW18	WSW16	WSW19	W24	WSW21	SW20	SW25	WSW28	WSW27	WSW28	WSW26	WSW28	WSW28	WSW27	W28	NNW29	W20	WSW14	WSW17	WSW17	WSW20.7	NNW29
5-Jul	WSW18	WSW23	WSW21	WSW20	WSW20	WSW18	W17	W23	W26	NNW25	NNW21	NNW21	NNW22	NNW17	NNW19	NNW20	NNW16	NNW16	N10	NNW13	NNW14	NW6	NW3	SSW2	NNW14.1	W26
6-Jul	ESE1	S5	S4	SE4	SE5	ESE6	E5	ENE5	WNN4	WSW12	W14	NNW20	NNW14	NNW10	NNW14	NNW16	NNW15	NNW15	NNW16	NNW9	NNW4	WSW3	SW2	E2	NW4.8	NNW20
7-Jul	E3	SE2	SE2	SE3	SE3	SE6	ESE5	ENE6	ENE6	C	C	NNW4	N1	WNN3	N6	N9	N9	NNW8	N7	NNE5	NNW2	S1	NNW1	SW6	NNE2.1	N9
8-Jul	ESE3	E2	S1	SSW2	ESE3	SE3	SE5	SE5	SE5	SSW5	SW11	SW15	SW3	WSW3	SW7	SW8	SW7	ESE2	E0	WNN2	W2	SW2	ESE1	E2	SSW2.7	SW15
9-Jul	ESE3	SE3	SE5	SE5	SE6	ESE7	ESE5	ESE6	SE6	SE7	SE9	SSE12	SE14	ESE11	ESE12	ESE12	E12	E13	E12	ESE8	SE5	SE7	SE8	S6	ESE7.6	SE14
10-Jul	SE4	NE1	S1	SSW3	ESE5	SSE4	SE9	WSW3	WNN9	SW8	SW8	SW7	SW4	SW6	WNN3	WSW3	SW5	WNN6	NW8	W5	NNW9	SSE2	SE3	N4	WSW2.3	NNW9
11-Jul	WNN4	NW5	WNN5	NNW1	NNW1	NNE2	N2	NNW11	NNW10	NNW11	NNW13	N12	NNW15	N11	N11	NNE8	WNN22	SSE6	SW18	SW10	NNE3	SSE4	WSW3	S5	NW4.6	WNN22
12-Jul	S6	SSE5	SSE4	SSE4	SSE6	SSE6	SE6	SE4	N1	ENE4	ESE5	ESE3	E3	S7	S11	SW8	WNN5	WSW5	SW5	SW3	S8	S6	SSE3	SE7	SSE3.7	S11
13-Jul	SE9	SE7	SE5	SE7	SE7	SE7	SE5	SSE2	SW7	SW4	W4	WSW4	SW4	WSW6	WNN4	N2	NNW7	N8	N8	NNE11	N9	N7	NNW9	NNW10	N0.9	NNE11
14-Jul	NNW6	NNW7	NNW15	NNW14	NNW14	NNW15	NNW13	NNW14	N11	NNW12	NNW14	NNW14	NNW12	NNW11	NNW11	NW6	NNW6	NNW7	N14	NNW10	NNW6	NE3	WSW3	ENE1	NNW9.6	NNW15
15-Jul	NW6	NNE2	SE4	ESE4	SE7	ESE7	SE9	SE8	SE8	SE10	SE12	SE17	SE21	SE21	SE19	SE16	SE15	S14	SSE11	SE14	SE11	SE6	SSE4	SSE4	SE9.6	SE21
16-Jul	NNW1	NNW20	NNW22	NW12	WSW4	SW8	SW8	WSW8	WNN5	W15	W16	WSW13	SW16	WSW18	WSW19	SW16	WSW19	W26	W27	WSW18	WSW17	WSW16	WSW19	WSW22	W13.6	W27
17-Jul	WSW19	W20	WSW19	W15	WSW16	W16	W11	W15	WNN18	NNW24	NNW23	NNW22	NNW21	NNW17	NNW20	NNW16	NW13	N10	NNW13	NW14	NW5	WNN6	W7	W7	NW12.3	NNW24
18-Jul	WNN6	NNW7	NNW9	NNW10	NW9	NNW6	NNW6	N6	N8	N6	N8	NNE6	NNE5	NNE3	E7	ENE5	SW6	SW13	SW12	WSW9	WSW9	SW7	SE2	ESE4	NW2.9	WSW13
19-Jul	ESE3	S4	SSW7	S3	SSW7	SSW8	SSW14	SSW14	SSW11	SW16	SW17	SW17	WSW15	W19	W19	WNN18	N13	NNW14	N12	N9	NNE5	ENE6	E3	E3	WSW5.2	W19
20-Jul	ESE6	ESE6	ESE6	SE5	SE6	SSE2	ESE4	ESE4	E5	SE2	SE2	N3	ESE11	E12	E15	E14	E13	E13	E11	E6	ESE5	SE4	E4	SE5	ESE6.5	E15
21-Jul	E3	ESE5	ESE6	ENE3	SSE5	ESE3	WNN1	NW2	N4	NW7	W3	SE13	SE14	SSE15	SSE11	SE13	SE12	ESE11	SSE11	S13	SSE6	S6	SE5	SE7	SE5.7	SSE15
22-Jul	SE8	SE9	SE10	SE11	SE12	SE12	SE8	SE4	SW8	SW11	SW12	SW13	SW18	SW18	SW22	SW21	SW19	SW15	WSW11	WSW14	WSW7	SW6	SW8	SW9	SSW9.1	SW22
23-Jul	SW10	SW9	SSW8	SW9	SW11	SW11	WSW14	WSW12	WSW12	W12	W15	W16	W18	W14	SW12	WSW17	W17	WSW12	WNN7	NNW9	NNW17	NNW19	NNW21	NNW19	W10.0	NNW21
24-Jul	NNW19	NNW21	NNW17	NNW17	NNW19	NNW19	NNW20	N17	NNW21	NNW19	NNW18	NNW22	NNW21	NNW24	NNW23	NNW26	NNW27	NNW28	NNW23	NNW18	NNW13	NW9	W7	WSW6	NNW18.3	NNW28
25-Jul	SW6	SSW3	SSW4	E2	ESE4	SE6	SE4	SW7	SW4	SSW2	SW5	SW10	WSW5	WSW7	SW9	SW10	SW9	SW9	SW8	S6	SW5	S5	SSE5	ENE5	SSW4.5	SW10
26-Jul	ESE7	SE9	SE10	SE10	SE9	SE11	SE9	ESE5	ENE6	E6	SSW11	SW16	SW10	WSW7	WSW8	WSW8	SW9	SW14	SSW12	S10	S6	SW6	SSW9	SSW6	S5.8	SW16
27-Jul	SSE7	SSE7	SE8	SE11	SE9	SE11	SE8	SE10	SE10	E6	SW6	SSW9	SSW12	SSW12	SW9	S8	S11	SE7	S4	SW4	W11	WNN20	NNW10	SSW4	S5.0	WNN20
28-Jul	WSW4	WSW12	WSW18	WSW15	S5	S3	WSW6	SW12	WSW12	WSW19	WNN25	W29	W26	WNN24	WNN18	WNN17	WNN20	W24	W17	NW13	NNW9	SSE5	SSE6	S6	W11.9	W29
29-Jul	SSW4	SSE5	S3	SSE4	SSE7	SE7	SSE3	SE3	E7	ENE3	SW7	SW8	WSW10	W17	NW12	N15	NNW13	NNW13	NNW10	NNW6	NNW7	NNW8	NE3	ESE5	NW2.0	W17
30-Jul	ESE4	ESE4	ESE5	ESE5	SE7	SSE12	SE9	ESE6	SE8	SE5	ESE3	ESE3	ESE5	N3	SSW4	S10	S11	WSW14	W16	W10	WSW11	WSW14	WSW20	WSW22	SSW4.7	WSW22
31-Jul	WSW19	SW10	WSW10	WSW14	SW11	SW11	SW12	SW10	W14	W19	NNW22	NNW20	NNW23	NNW16	NW27	NNW19	N16	N16	N13	N14	N11	NNE5	NNE1	SW3	WNN9.5	NW27

SSW2.6	SW2.5	SW2.7	SW2.5	SSW3.2	S3.5	SSW2.7	SW2.4	W3.1	W4.2	W6.6	W6.9	W5.8	W5.6	W5.7	W4.7	W5.9	NNW5.7	NNW5.7	NNW4.1	NNW3.3	WSW3.0	WSW2.9	SW3.3	Diurnal Average	
WSW19	WSW23	NNW22	WSW20	WSW20	NNW19	NNW20	W24	W26	WNN25	WNN25	W29	WSW27	WSW28	NNW27	WSW28	WSW28	NNW28	W28	WNN29	W20	WNN20	NNW21	WSW22	Diurnal Maximum	

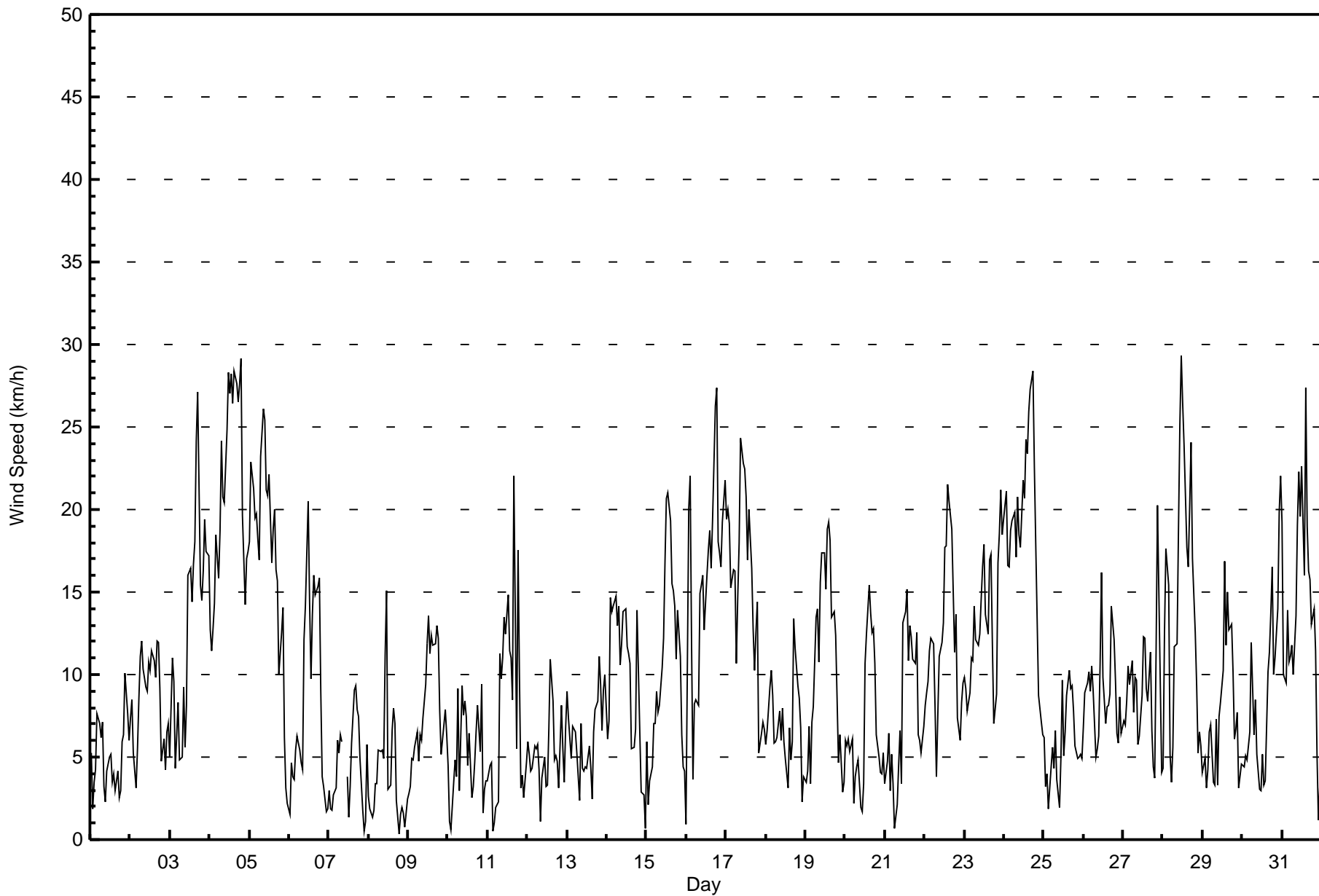
C - Calibration
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 14 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 7 09:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	1	2	1	2	2	2	1	2	2	1	1	2	2	2	2	1	1	1	3	2	1	3	3	2	3	
2-Jul	2	3	1	1	2	2	3	3	3	3	4	3	3	3	3	3	4	4	6	1	2	1	3	2	6	
3-Jul	2	8	4	3	3	3	2	2	4	2	4	4	4	5	5	5	8	9	4	4	4	5	4	3	9	
4-Jul	3	5	3	4	4	3	4	6	5	5	6	8	7	8	8	7	7	8	7	6	5	2	3	3	8	
5-Jul	3	4	4	3	3	3	6	5	5	5	6	4	5	4	5	5	6	5	3	4	4	1	2	2	6	
6-Jul	2	2	1	1	1	2	2	2	6	3	7	5	5	3	5	4	5	5	4	3	3	1	2	1	7	
7-Jul	2	2	2	2	2	1	2	1	1	C	C	2	2	3	3	3	3	2	2	2	1	1	3	3	3	
8-Jul	2	1	2	2	2	4	3	2	2	2	4	3	3	2	1	2	1	2	1	1	2	2	2	2	4	
9-Jul	2	2	2	2	1	2	1	2	2	3	3	3	4	4	4	3	4	4	3	3	2	2	2	4	4	
10-Jul	2	1	2	4	2	2	2	3	3	1	1	2	1	1	2	1	2	5	4	2	3	2	2	3	5	
11-Jul	2	2	2	1	1	1	2	2	2	3	3	3	2	3	3	3	10	4	5	6	1	3	3	1	10	
12-Jul	1	1	1	2	1	1	1	2	1	2	2	2	3	4	3	2	2	1	2	3	3	2	1	2	4	
13-Jul	2	2	1	2	2	1	2	2	2	2	2	3	2	2	1	2	2	2	2	3	2	2	3	2	3	
14-Jul	1	2	3	3	3	3	4	3	2	3	3	2	2	2	2	2	2	5	4	2	1	1	2	2	5	
15-Jul	1	2	1	1	1	2	2	2	2	3	3	4	5	5	5	5	5	4	4	4	3	2	2	2	5	
16-Jul	3	14	8	4	3	2	3	3	5	7	5	3	4	4	4	5	7	7	8	4	3	3	4	4	14	
17-Jul	4	5	4	4	3	4	3	3	6	4	5	7	5	5	5	4	3	3	4	7	3	2	1	2	7	
18-Jul	2	2	2	2	1	1	1	2	2	2	3	4	2	3	2	2	4	4	3	2	2	2	1	1	4	
19-Jul	2	2	2	2	4	4	4	3	3	3	4	4	5	6	5	5	3	3	3	2	2	4	1	2	6	
20-Jul	1	2	1	1	1	2	2	2	2	2	1	2	4	5	5	4	3	4	3	1	1	1	1	2	5	
21-Jul	2	1	3	1	2	2	1	2	2	2	2	4	4	4	3	3	4	3	3	3	2	2	2	2	4	
22-Jul	2	2	2	2	2	2	2	2	2	3	2	4	4	4	4	4	4	4	3	4	3	2	2	2	4	
23-Jul	2	3	3	3	3	3	4	3	3	4	5	4	5	6	5	6	4	3	2	4	8	3	3	3	8	
24-Jul	3	3	4	5	5	4	5	5	6	4	4	4	6	6	6	6	7	6	6	4	3	2	1	1	7	
25-Jul	2	3	3	1	2	1	2	3	1	2	3	3	3	5	3	3	3	2	2	1	2	1	2	1	5	
26-Jul	2	1	3	2	2	2	2	2	1	1	5	3	3	2	3	4	3	4	4	3	2	2	3	2	5	
27-Jul	2	1	2	2	2	2	2	2	2	2	2	3	4	4	3	3	4	2	2	2	4	6	4	3	6	
28-Jul	2	3	3	5	2	2	4	2	4	5	5	6	8	7	5	4	5	7	5	4	5	4	2	1	8	
29-Jul	2	1	1	2	1	2	2	2	1	3	2	2	4	4	7	4	2	3	2	3	2	2	2	1	7	
30-Jul	1	1	2	1	2	7	3	2	3	2	2	1	3	2	3	4	4	6	5	2	2	3	3	3	7	
31-Jul	5	2	5	2	4	3	2	2	4	3	4	6	7	5	7	8	4	4	4	4	4	2	2	2	8	
																	Diurnal Maximum									
C - Calibration																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	212	28.57	28.57
6 - 11	271	36.52	65.09
12 - 19	190	25.61	90.70
20 - 28	67	9.03	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - July 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	9	3	7	14	31	31	21	16	12	18	11	6	9	8	7	212
6 - 11	18	3	0	4	6	17	58	16	18	19	48	15	6	5	9	29	271
12 - 19	10	0	0	0	8	2	13	4	2	5	27	44	21	5	8	41	190
20 - 28	0	0	0	0	0	0	2	0	0	0	4	17	10	11	4	19	67
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	12	3	11	28	50	104	41	36	36	97	87	44	31	29	96	742

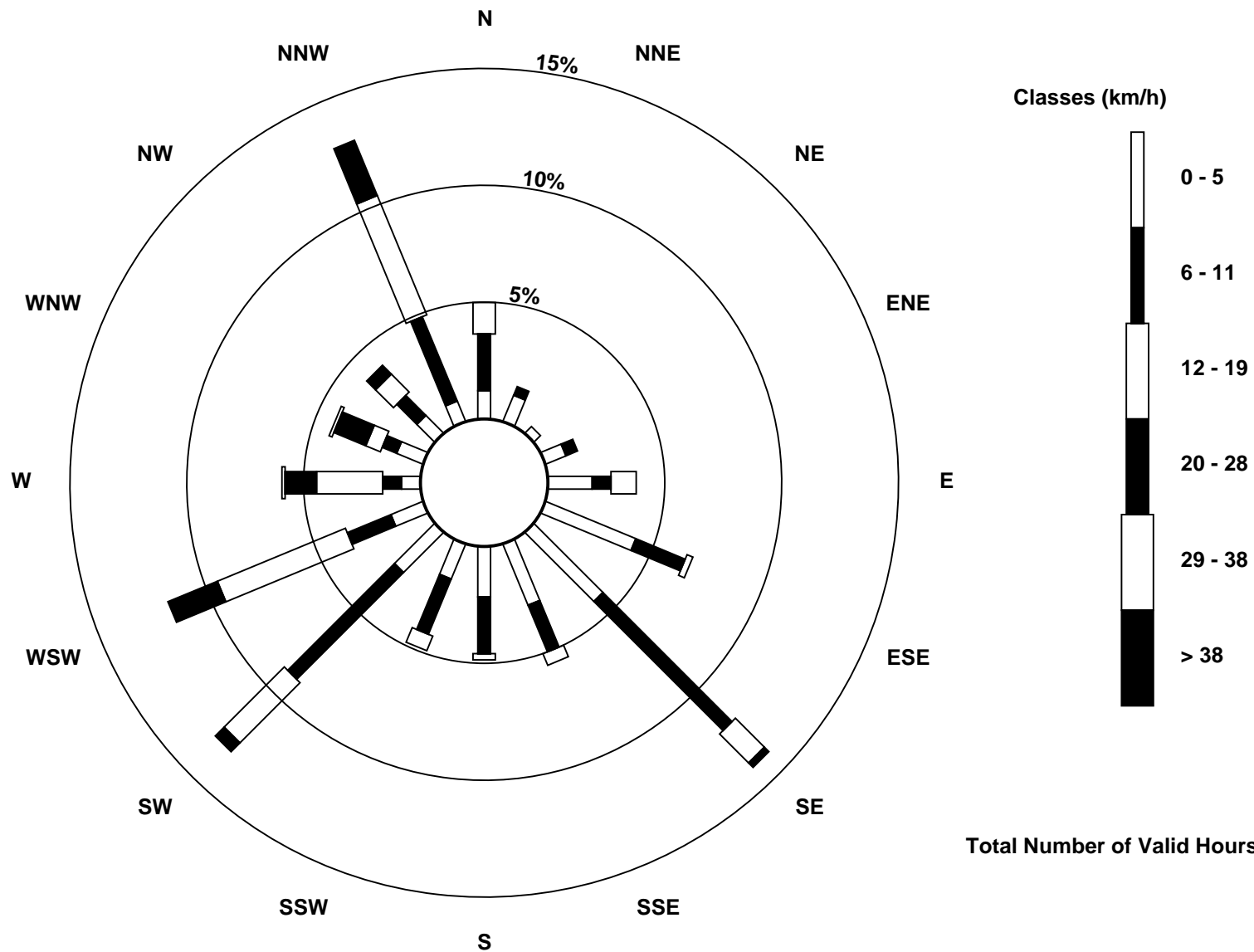
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Athabasca Valley (AMS 7)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - July 2017

Direction of Maximum Speed: 276 deg on Jul 28 12:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 250.0 deg on Jul 4	Hours of Data: 742
Direction of Minimum Speed: 85 deg on Jul 8 19:00	Direction of Minimum Daily Speed Average: 0.9 deg on Jul 13
Direction of Minimum Speed: 85 deg on Jul 8 19:00	Hours of Missing Data: 2
Monthly Average Direction: 265.0 deg	Percent Operational Time: 100.0

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-Jul	152	149	181	209	183	182	191	169	132	314	271	229	229	308	322	356	278	342	81	102	120	155	167	166	179.0
2-Jul	142	135	142	178	154	146	136	132	127	119	180	204	209	198	206	204	241	218	185	203	144	148	129	142	170.6
3-Jul	178	202	207	230	224	144	140	219	224	131	227	226	263	236	230	231	246	253	226	228	246	259	254	254	234.0
4-Jul	253	232	226	242	248	247	247	264	245	226	232	243	242	244	242	247	248	257	275	282	272	256	253	255	250.0
5-Jul	249	245	246	249	243	244	273	280	280	293	300	309	320	323	313	321	327	337	354	344	336	313	315	202	290.8
6-Jul	118	190	184	134	138	122	87	72	303	253	262	292	310	330	335	328	344	337	327	329	338	242	217	99	313.9
7-Jul	87	125	126	133	127	126	121	73	74	C	C	346	356	285	10	6	5	348	349	26	308	188	347	234	30.1
8-Jul	108	93	170	199	112	141	133	141	146	211	222	228	236	245	235	230	220	114	85	287	279	233	105	86	199.9
9-Jul	111	142	128	129	132	119	123	123	135	140	141	147	127	114	108	118	99	99	92	103	126	137	142	184	122.7
10-Jul	133	50	175	210	115	147	134	248	296	236	221	225	215	228	282	250	229	283	321	279	326	162	124	0	242.1
11-Jul	283	320	292	332	331	23	5	337	347	342	341	349	337	349	359	28	285	151	225	224	21	165	254	183	320.6
12-Jul	169	151	163	157	165	151	145	129	355	64	105	109	87	169	176	221	291	243	220	234	173	175	157	141	166.6
13-Jul	138	142	126	130	130	133	128	158	220	220	262	248	232	258	284	359	331	351	356	14	8	353	339	342	354.9
14-Jul	340	328	339	337	333	339	348	345	349	348	341	340	339	340	335	321	334	336	355	341	338	49	238	72	340.6
15-Jul	322	29	124	113	131	122	138	137	131	135	133	126	130	142	136	128	140	172	167	144	137	135	156	161	137.7
16-Jul	331	330	332	307	247	217	216	240	289	273	273	242	226	243	244	233	253	267	264	255	247	244	248	246	260.3
17-Jul	246	259	257	280	254	262	267	271	302	329	334	347	344	345	332	339	306	358	343	319	313	301	270	269	304.7
18-Jul	296	333	334	331	319	330	345	4	8	359	357	13	27	28	82	57	215	236	230	240	244	214	134	114	316.2
19-Jul	102	180	201	178	198	192	211	212	210	217	226	234	247	278	273	290	349	347	351	8	24	62	91	95	252.0
20-Jul	120	109	117	125	139	147	107	113	91	132	135	359	114	99	92	95	96	92	92	91	110	125	99	124	103.9
21-Jul	100	119	122	67	149	112	285	317	350	324	281	146	138	159	159	144	134	104	151	169	162	169	143	133	142.6
22-Jul	133	132	131	137	139	137	132	145	225	225	216	223	227	227	229	228	231	235	239	252	242	217	214	217	208.9
23-Jul	222	219	210	218	217	220	241	245	237	272	276	276	280	266	235	238	273	253	295	322	334	335	336	335	270.3
24-Jul	335	337	346	343	344	330	339	352	339	340	348	337	347	344	342	341	343	340	340	338	331	307	266	250	338.5
25-Jul	232	203	208	97	122	128	146	218	216	209	219	215	252	254	235	227	229	227	221	177	217	186	164	75	209.6
26-Jul	107	136	135	133	129	129	124	113	76	81	212	217	232	237	251	240	224	227	205	190	181	223	205	201	184.7
27-Jul	157	152	144	142	137	139	139	133	134	96	222	199	210	208	220	183	170	129	190	223	265	300	345	205	179.3
28-Jul	243	245	241	237	188	174	247	219	245	258	283	276	272	295	291	292	297	277	279	308	346	166	151	174	269.0
29-Jul	194	156	184	166	148	141	168	136	83	78	229	214	246	277	305	351	339	340	343	346	338	346	50	112	309.8
30-Jul	115	105	110	109	124	157	144	114	131	137	109	116	120	353	211	191	184	237	274	262	244	242	246	240	202.5
31-Jul	238	230	245	239	236	229	230	231	264	271	284	288	296	328	307	345	2	352	358	350	7	17	24	234	292.6

213.3 224.2 226.8 223.7 192.8 180.7 191.6 232.5 267.4 272.6 265.9 260.0 265.3 270.5 271.4 274.4 278.4 281.7 285.9 288.3 289.3 253.3 239.9 224.6
 Diurnal Average

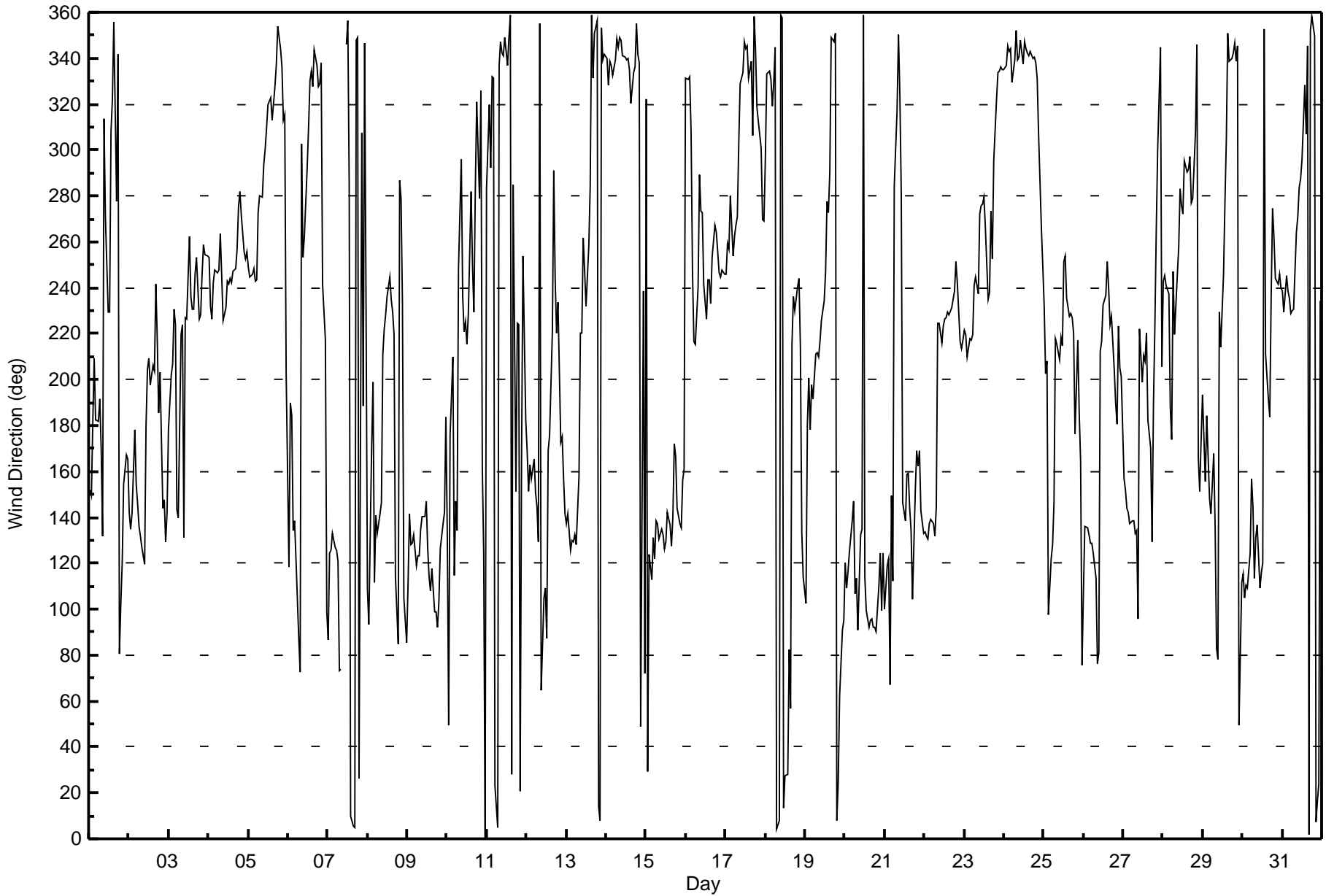
C - Calibration
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Athabasca Valley - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Jul 7 23:00																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 2 Percent Operational Time: 100.0								
Minimum Value: 7 deg on Jul 31 04:00																									
Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 22 Q ₃ = 37 P ₉₀ = 62 P ₉₉ = 90																									
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-Jul	19	56	48	68	28	14	23	26	58	66	27	39	44	54	60	44	30	19	64	18	18	25	37	36	68
2-Jul	19	28	21	38	33	19	15	16	24	34	46	32	32	35	27	24	18	22	48	23	18	41	25	17	48
3-Jul	40	35	26	74	43	23	42	24	27	42	48	16	23	22	22	17	17	15	18	19	17	14	13	12	74
4-Jul	14	26	14	14	12	14	14	13	15	15	18	15	17	19	17	16	16	16	18	13	13	11	10	10	26
5-Jul	11	10	11	10	10	11	21	15	15	16	20	15	15	22	19	17	24	20	21	20	14	28	50	86	86
6-Jul	78	48	40	34	18	22	34	71	83	21	32	20	27	28	16	17	20	18	17	13	36	41	85	70	85
7-Jul	50	41	45	28	22	15	22	11	13	C	C	65	96	69	58	39	25	22	19	29	53	79	99	31	99
8-Jul	59	63	68	75	53	51	32	45	39	49	18	14	81	37	16	19	12	58	95	61	55	65	79	68	95
9-Jul	62	47	34	29	22	23	27	25	36	36	28	24	26	33	29	29	30	23	15	19	24	20	17	47	62
10-Jul	35	76	89	73	48	54	14	75	25	30	12	13	37	17	59	48	30	66	27	45	25	84	68	62	89
11-Jul	43	26	19	82	70	37	53	9	18	15	14	19	11	18	25	33	47	66	17	59	32	73	77	36	82
12-Jul	15	17	28	35	15	20	22	52	79	46	46	66	91	65	22	27	24	20	47	53	22	15	41	17	91
13-Jul	14	12	23	24	24	13	37	82	16	49	55	62	66	27	33	65	18	17	18	18	18	19	12	15	82
14-Jul	15	18	12	13	11	14	20	16	19	18	13	11	14	13	9	18	20	54	20	15	12	31	50	84	84
15-Jul	22	62	48	21	20	26	16	20	16	15	17	18	17	19	19	23	31	25	19	16	14	22	27	32	62
16-Jul	89	42	15	19	55	14	24	41	20	21	15	20	14	15	15	17	22	14	15	15	12	11	12	11	89
17-Jul	11	13	14	19	15	15	16	12	22	11	13	21	20	19	14	19	25	29	19	20	51	26	18	30	51
18-Jul	40	18	14	13	16	20	20	31	26	44	33	51	50	73	25	44	75	21	17	20	18	15	72	38	75
19-Jul	60	78	42	88	63	56	20	12	14	13	16	22	24	25	21	25	19	19	20	17	21	31	58	32	88
20-Jul	25	27	25	18	26	73	32	24	24	75	84	66	33	29	20	21	20	17	16	13	20	31	39	38	84
21-Jul	35	41	33	38	31	54	94	74	45	30	67	23	26	23	32	26	25	24	26	14	24	30	30	23	94
22-Jul	12	14	15	13	13	12	15	59	17	15	13	13	15	17	17	14	14	15	14	13	22	19	16	13	59
23-Jul	16	18	23	25	22	19	16	16	25	31	24	27	20	31	32	23	19	18	32	22	10	8	9	9	32
24-Jul	10	10	19	17	18	12	14	19	14	16	19	11	19	18	16	15	16	13	14	12	10	17	17	15	19
25-Jul	31	77	69	74	25	16	40	32	55	95	54	21	66	53	32	20	17	12	20	17	16	20	50	22	95
26-Jul	17	10	12	12	12	11	12	30	19	13	45	11	24	30	32	39	37	15	24	23	29	20	23	28	45
27-Jul	17	11	11	10	13	12	26	19	14	31	44	36	28	25	26	39	23	35	67	77	33	25	29	86	86
28-Jul	48	12	9	19	45	76	63	14	31	20	16	16	16	30	15	13	25	19	19	35	42	53	31	28	76
29-Jul	64	20	42	36	15	17	59	64	21	92	25	24	32	18	49	20	11	13	15	24	13	14	60	31	92
30-Jul	29	28	25	25	31	39	29	28	26	33	54	52	62	62	78	38	27	35	12	10	11	10	10	9	78
31-Jul	12	17	54	7	24	16	10	23	20	18	15	18	19	23	18	32	21	21	20	19	19	20	72	73	73
89 78 89 88 70 76 94 82 83 95 84 66 96 73 78 65 75 66 95 77 55 84 99 86																									
Diurnal Maximum																									
C - Calibration																									





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	July 4, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	9:00	End time (MST):	13:15
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	1.002224	1.001839	Lamp voltage	803	803
Calculated intercept	1.402052	1.180382	Pressure	691.3	691.3
Analyzer Background	18.1	18.1	Flow	0.478	0.478
Analyzer Coefficient	1.012	1.012	Intensity	43590	43590

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	0.5	----
as found span	4978	78.8	766.7	765.2	1.002
calibrator zero	5000	0.0	0.0	0.5	----
high point	4978	78.8	766.7	765.2	1.002
second point	4973	39.5	387.7	384.2	1.009
third point	4994	19.8	194.3	191.6	1.014
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	78.8	763.4	768.0	0.994
Average Correction Factor					1.008

Corrected As found	764.70	Previous response	763.58	*% change	-0.1%
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* = > +/-5% change initiates investigation

Notes:

No adjustments or maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

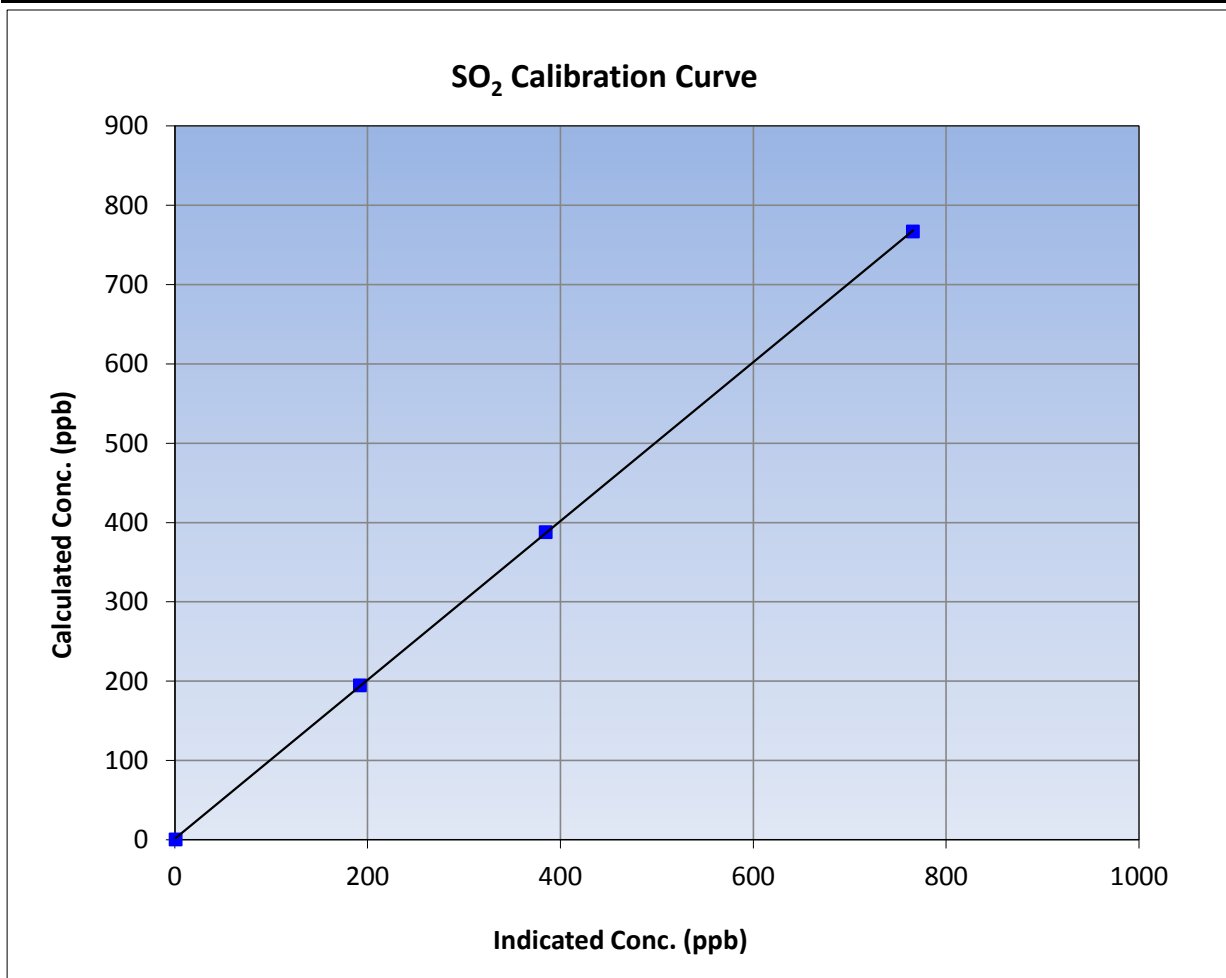
Version-03-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	End Time (MST)	13:15
Analyzer make	Thermo 45C	Analyzer serial #	630718530

Calibration Data

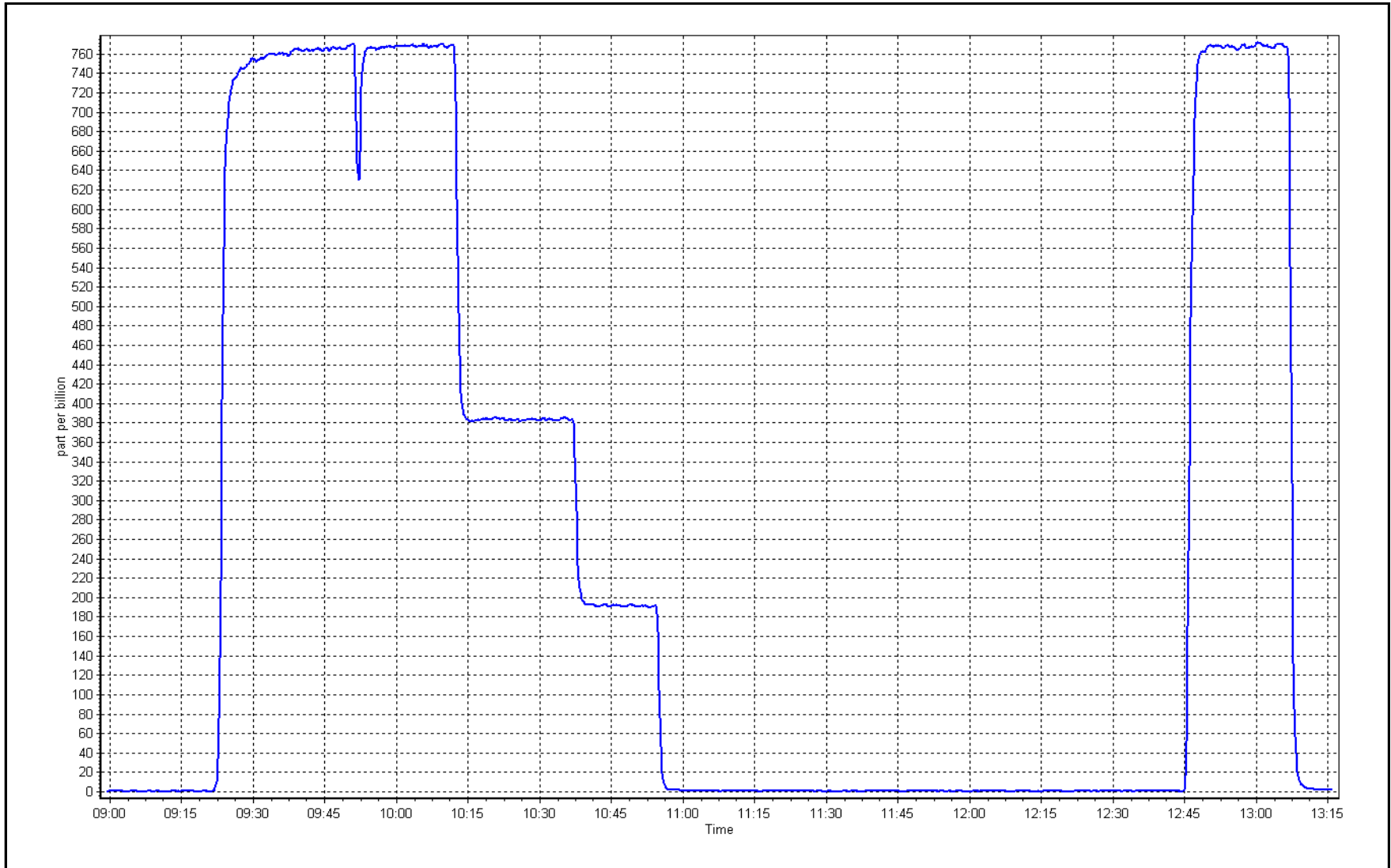
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.5	----	Correlation Coefficient	≥0.995	
766.7	765.2	1.0019			
387.7	384.2	1.0091			
194.3	191.6	1.0141			
			Slope	1.001839	0.90 - 1.10
			Intercept	1.180382	+/-30



SO2 Calibration Plot

Date: July 4, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

TRS Calibration Summary

Version-03-2017

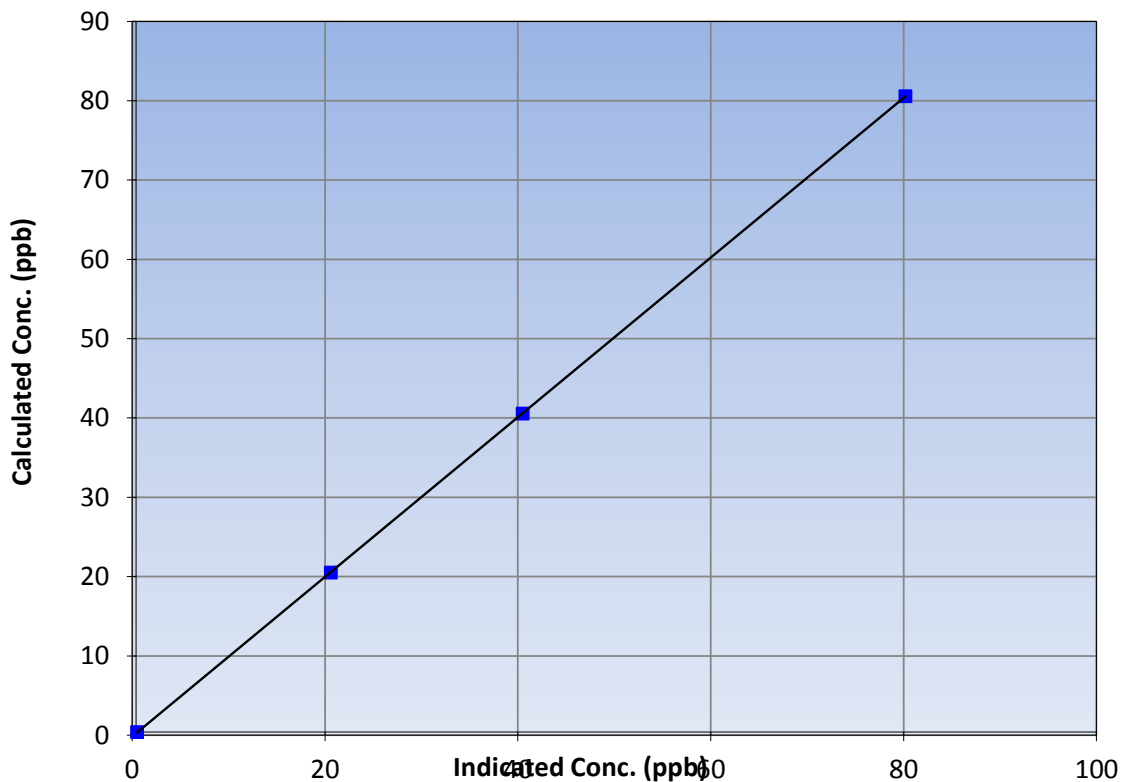
Station Information

Calibration Date	July 7, 2017	Previous Calibration	June 6, 2017
Station Name	AMS 7	Station Number	Athabasca Valley
Start Time (MST)	6:40	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	<u>Limits</u>	
0.0	0.1	----	Correlation Coefficient	0.999997	
80.2	79.8	1.0049			≥0.995
40.1	40.1	1.0012	Slope	1.006470	
20.1	20.2	0.9964			0.90 - 1.10
			Intercept	-0.159485	+/-3

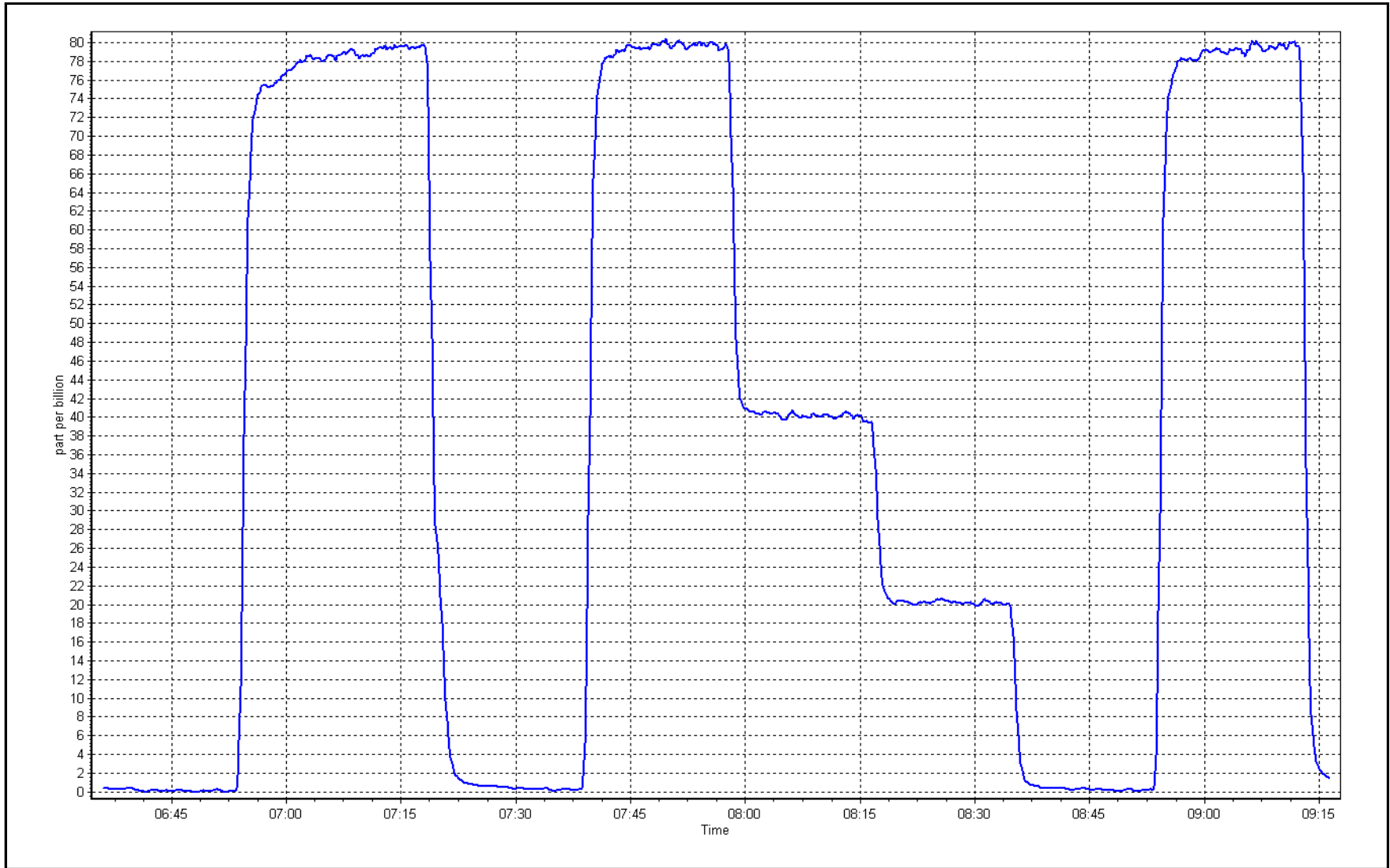
TRS Calibration Curve



TRS Calibration Plot

Date: July 7, 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:	July 4, 2017	Last Cal Date:	June 14, 2017
Start time (MST):	9:00	End time (MST):	13:15
Reason:	Maintenance		

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	0.000213	0.000216	Flame Temp	405.0	405.0
CH4 Retention time	12.8	13.0	Carrier Pressure	36.1	36.1
NMHC SP Ratio	4.13E-05	4.15E-05	Fuel Pressure	44.8	44.8
NMHC Peak Area	211476	210660	Air Pressure	26.0	25.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.991203	0.995877
THC Cal Offset	0.011522	0.017547
CH4 Cal Slope	0.984458	0.999899
CH4 Cal Offset	0.020912	0.018733
NMHC Cal Slope	0.992297	0.991131
NMHC Cal Offset	-0.001032	0.000954

Notes: Span adjusted, no maintenance done

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	16.36	1.003
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	16.40	16.47	0.996
second point	4973	39.5	8.22	8.21	1.002
third point	4994	19.8	4.10	4.10	1.001
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	16.54	16.47	1.004
Average Correction Factor					1.000
Corrected As found	16.36	Prev response	16.54	*% change	1.1%

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	0.00	0.00	----
as found span	4973	78.8	8.67	8.71	0.996
calibrator zero	5000	0.0	0.00	0.00	----
high point	4973	78.8	8.67	8.75	0.991
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	0.00	0.00	----
as left span	4932	78.8	8.74	8.75	0.999
Average Correction Factor					0.991
Corrected As found	8.71	Prev response	8.74	*% change	0.3%

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	7.65	1.011
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	3.83	1.012
third point	4994	19.8	1.93	1.91	1.013
as left zero	5000	0.0	0.00	0.00	----
as left span	4932	78.8	7.80	7.73	1.009
Average Correction Factor					1.008
Corrected As found	7.65	Prev response	7.83	*% change	2.4%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

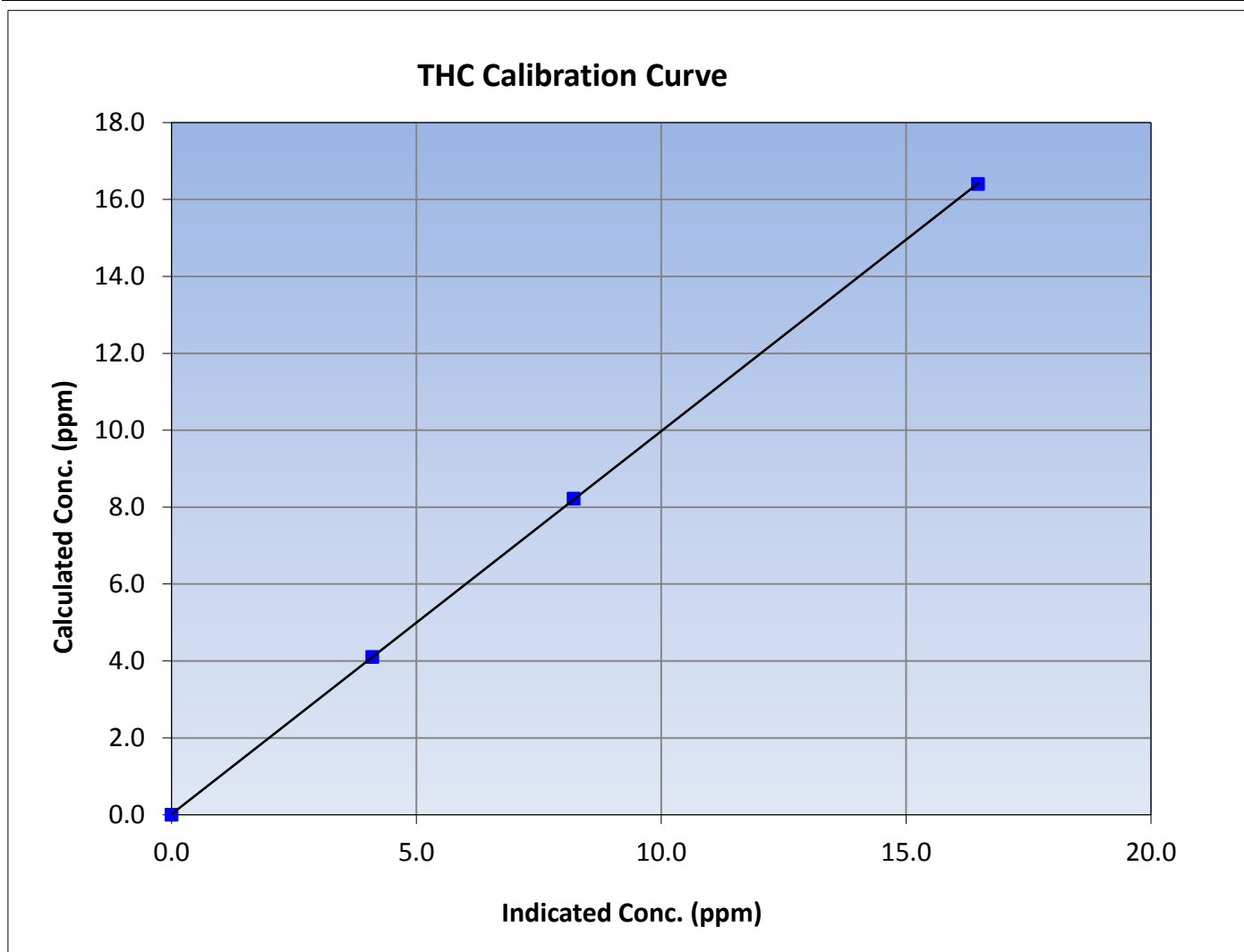
Version-02-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 14, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	End Time (MST)	13:15
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	0.999990	≥ 0.995			
16.40	16.47	0.9960						
8.22	8.21	1.0016				Slope	0.995877	0.90 - 1.10
4.10	4.10	1.0011						
			Intercept	0.017547	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

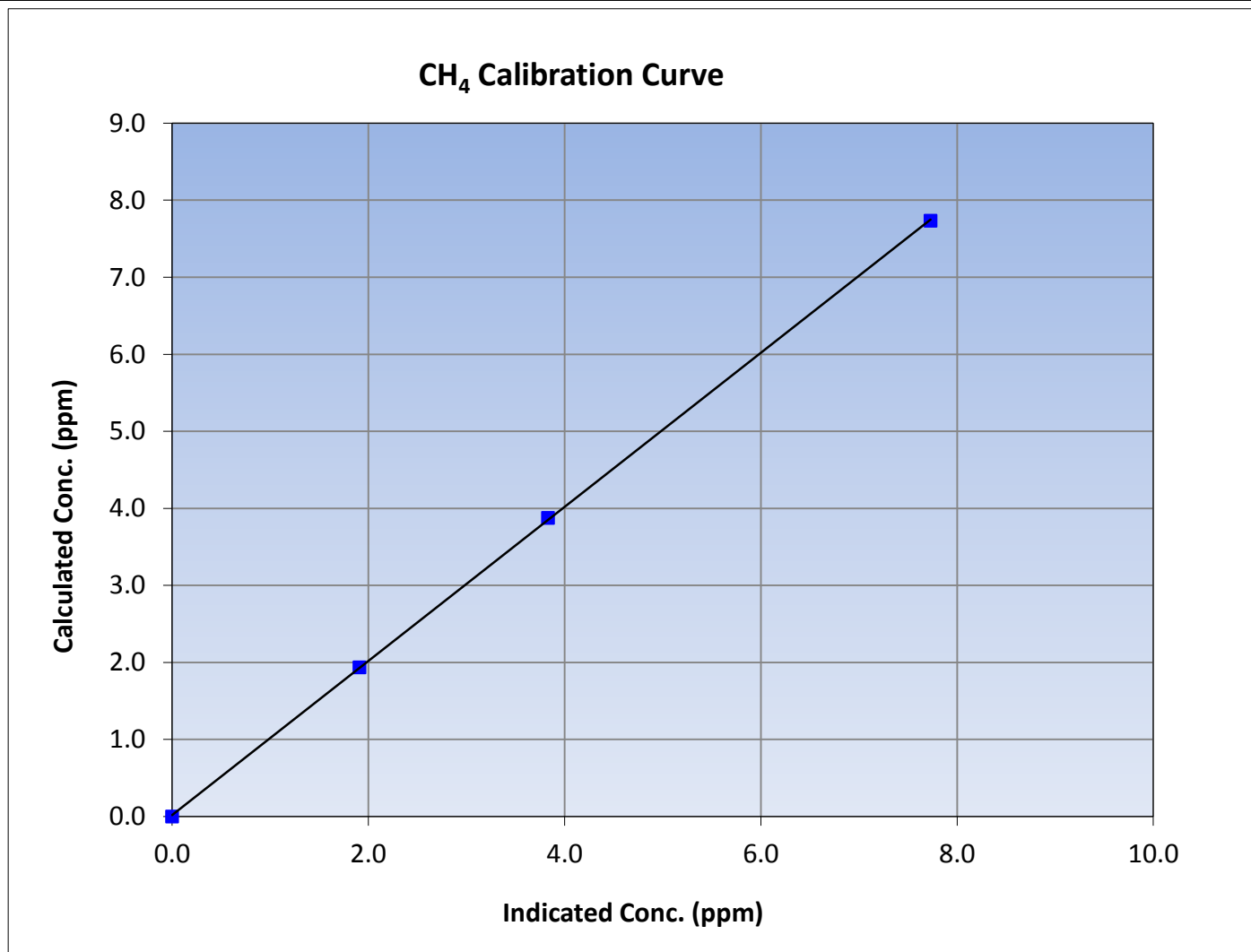
Version-02-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 14, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	End Time (MST)	13:15
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	0.999957	≥ 0.995
7.73	7.73	1.0003			
3.88	3.83	1.0120			
1.93	1.91	1.0130			
			Slope	0.999899	0.90 - 1.10
			Intercept	0.018733	+/-0.5





Wood Buffalo Environmental Association

NMHC Calibration Summary

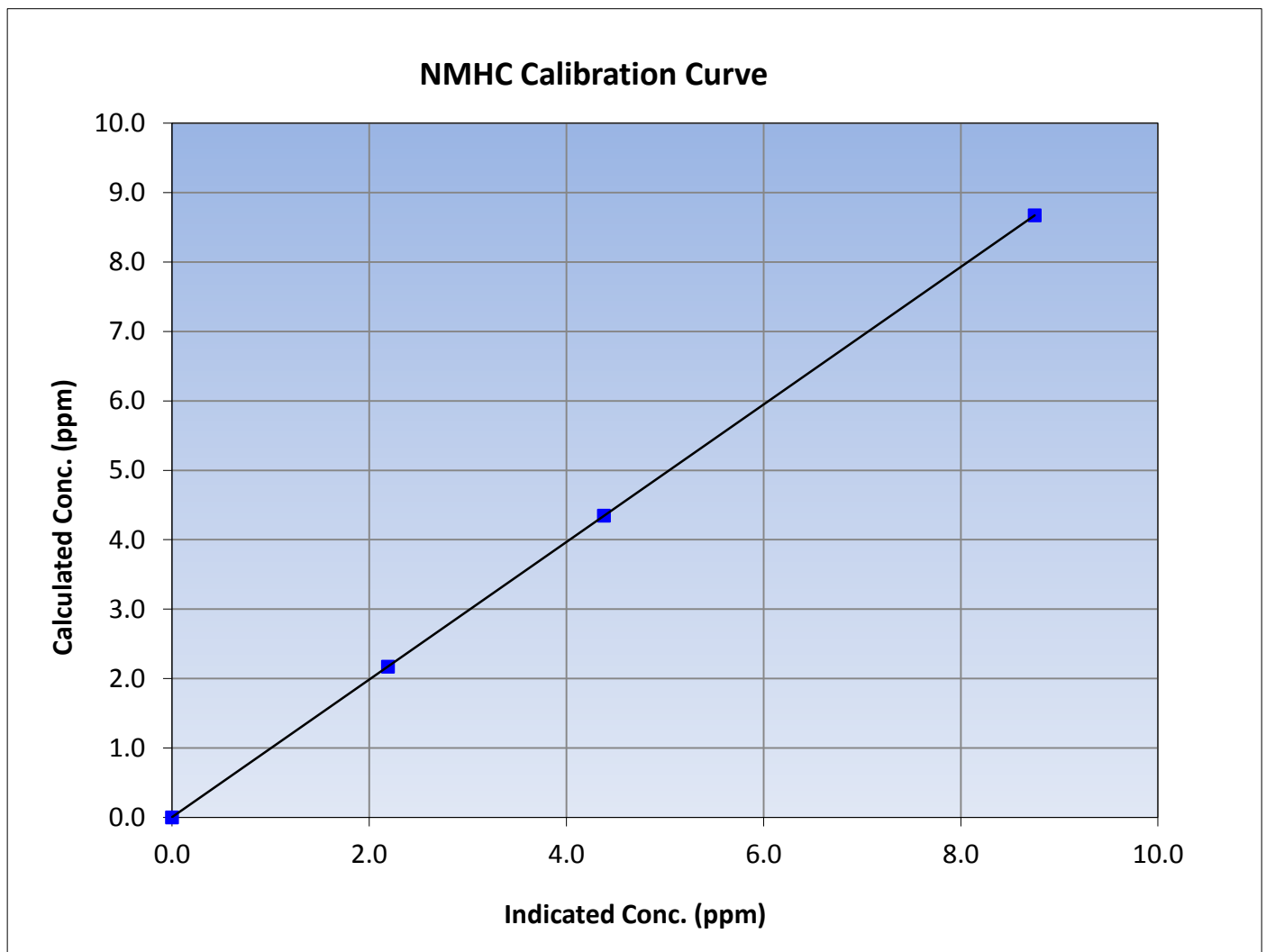
Version-02-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 14, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	End Time (MST)	13:15
Analyzer make	Thermo 55i	Analyzer serial #	1426262594

Calibration Data

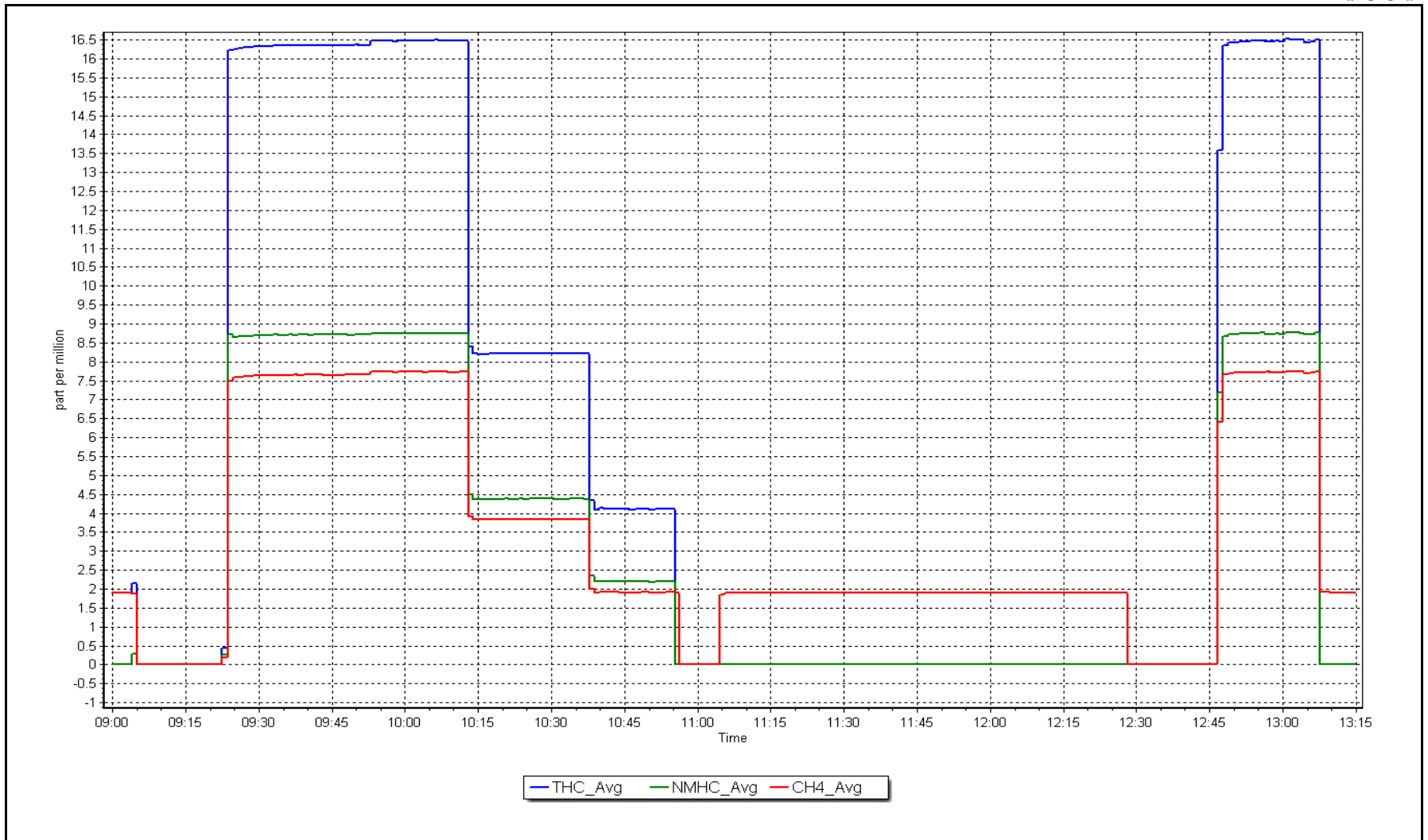
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999999	≥ 0.995
8.67	8.75	0.9910			
4.35	4.38	0.9924			
2.17	2.19	0.9907			
			Slope	0.991131	0.90 - 1.10
			Intercept	0.000954	+/-0.5



NMHC Calibration Plot

Date: July 4, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

O₃ Calibration Summary

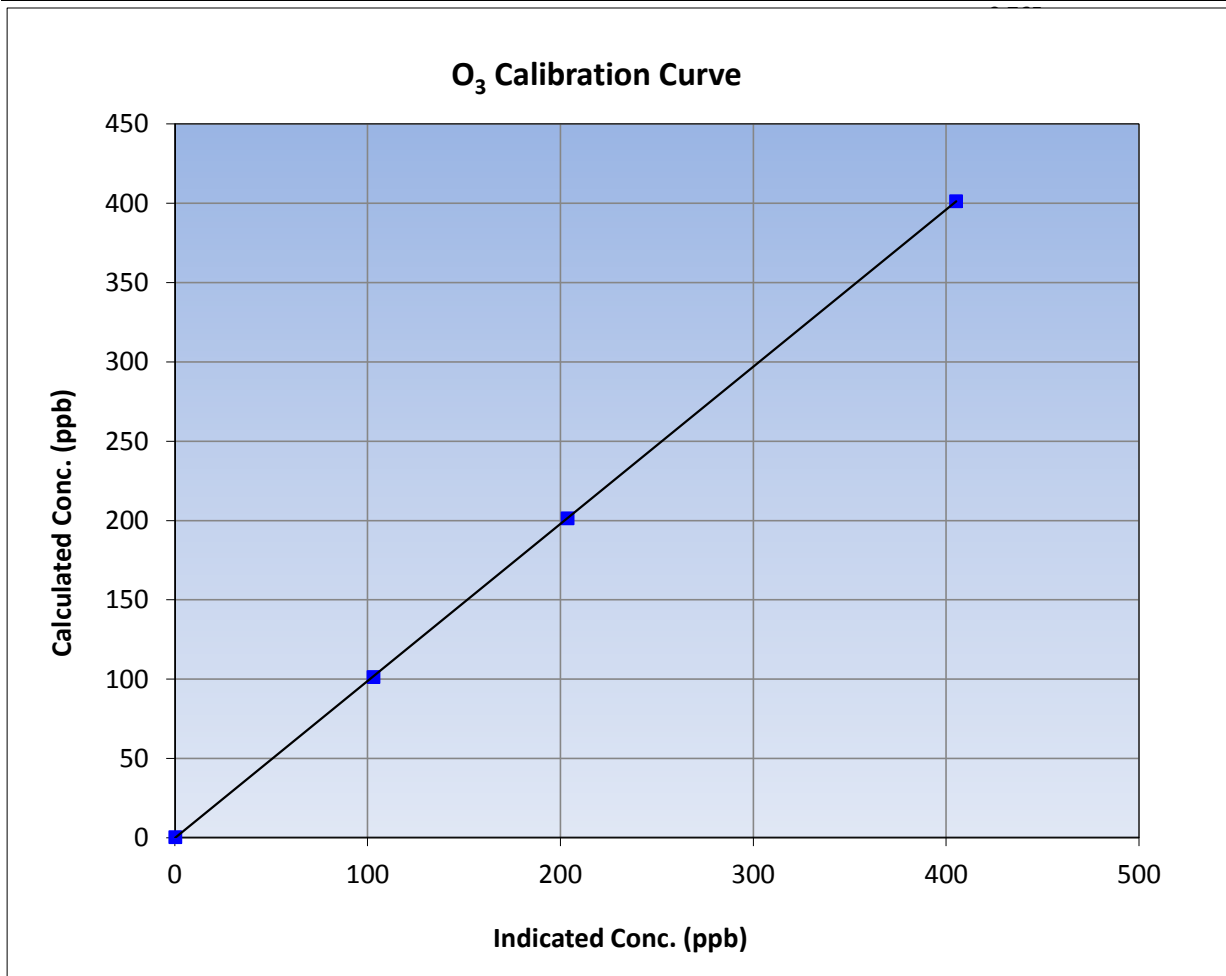
Version-03-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 5, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:58	End Time (MST)	13:20
Analyzer make	Thermo 49i	Analyzer serial #	1507964700

Calibration Data

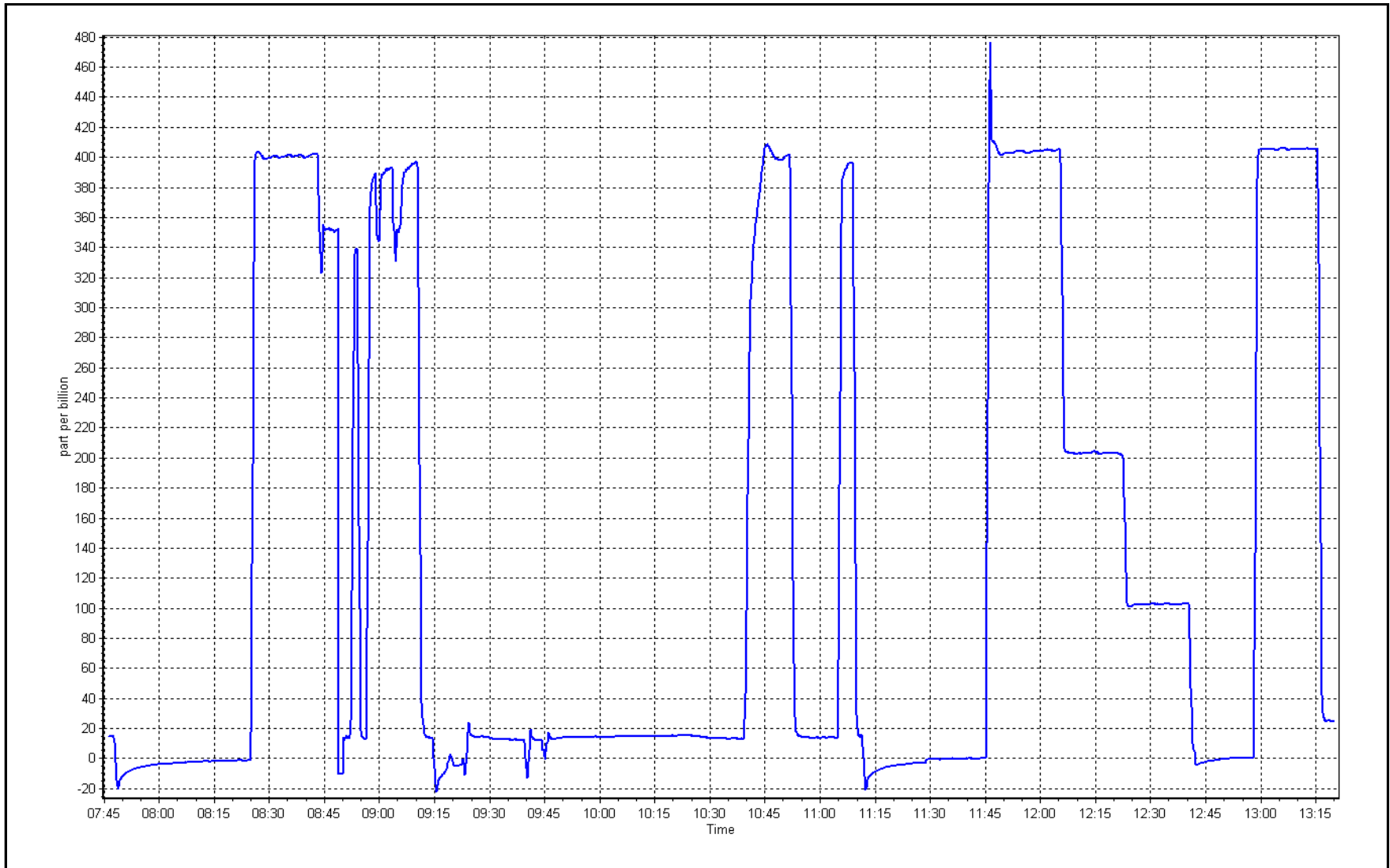
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.1	----	Correlation Coefficient	0.999996	≥0.995
401.0	404.8	0.9906			
201.0	203.3	0.9887	Slope	0.990838	0.90 - 1.10
101.0	102.6	0.9844			
			Intercept	-0.272330	+/- 10



O₃ Calibration Plot

Date: July 6, 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:	July 4, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	9:00	End time (MST):	13:15
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
NO ₂ coefficient	1.000	1.000	Reaction cell Press	158.5	157.5
NO bkgrnd	3.5	3.5	Sample Flow	0.809	0.800
NOX bkgrnd	3.6	3.6	PMT Voltage	-784	-784

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.006084	1.007145
NO _x Cal Offset	0.107348	0.289941
NO Cal Slope	1.006444	1.007262
NO Cal Offset	0.107123	0.349656
NO ₂ Cal Slope	1.005724	0.998364
NO ₂ Cal Offset	0.816310	0.339398



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	799.6	799.3	0.4	1.0067	1.0071
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	799.6	799.3	0.4	1.0067	1.0071
second point	4973	39.5	403.5	403.5	0.0	398.9	399.1	0.0	1.0115	1.0110
third point	4994	19.7	200.4	200.4	0.0	199.0	198.9	0.2	1.0070	1.0075
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	390.9	414.1	784.7	386.9	398.0	1.0258	1.0103
Average Correction Factor									1.0084	1.0085

Corrected As found	NO _x = 799.4 ppb	NO = 799.3 ppb		*Percent Change	NO _x = 0.1%
Previous Response	NO _x = 800.0 ppb	NO = 799.7 ppb		*Percent Change	NO = 0.0%
<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	791.2	793.0	-1.7	1.0174	1.0151	----	----
1st NO2 (400 ppb O3)	390.9	402.1	793.6	390.9	402.8	1.0143	----	0.9983	100.2%
2nd NO2 (200 ppb O3)	589.5	203.5	792.5	589.5	203.0	1.0157	----	1.0025	99.8%
3rd NO2 (100 ppb O3)	691.0	102.0	792.3	691.0	101.3	1.0160	----	1.0069	99.3%
2nd NO ref point	----	0.0	795.4	798.2	-1.7	1.0120	1.0085	----	----
Average Correction Factor						1.0145	1.0118	1.0025	99.7%

Notes: No adjustments or maintenance done, 2nd NO ref used due to drift during the GPT

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

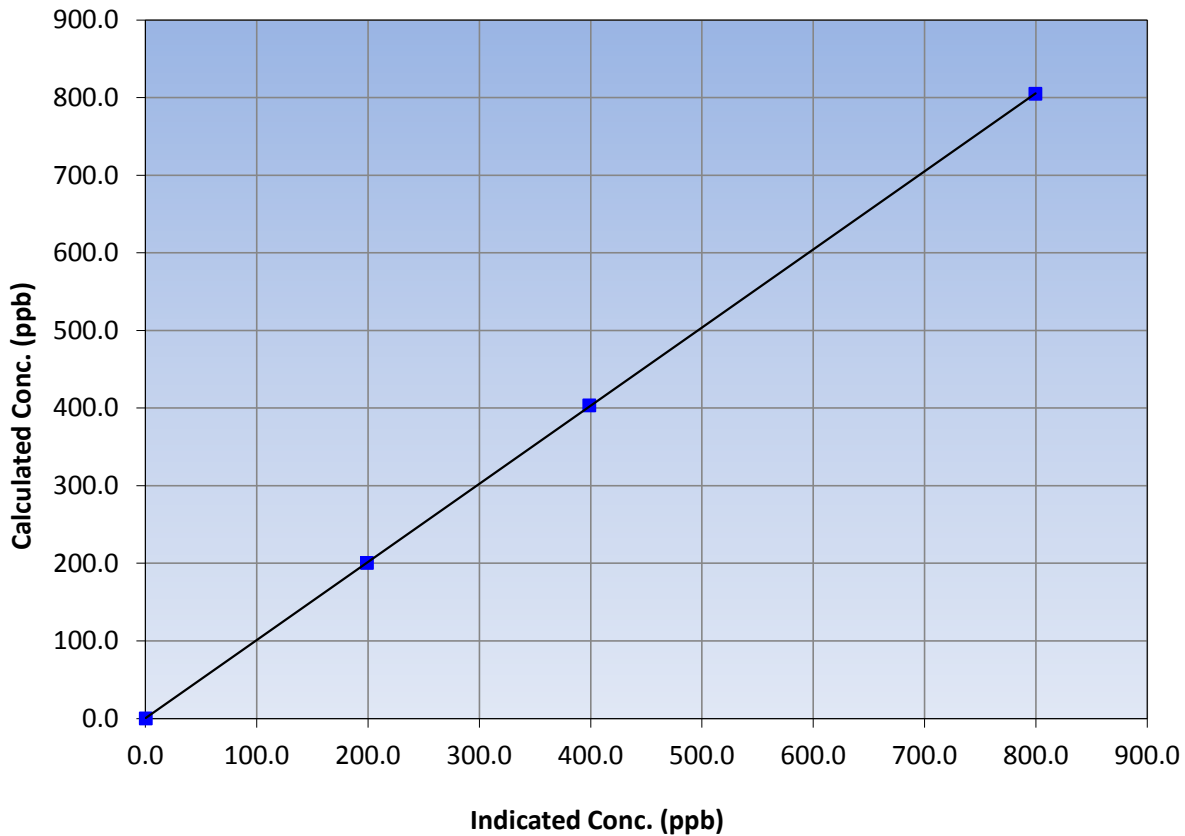
Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	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	0.2	----	Correlation Coefficient	≥0.995	
805.0	799.6	1.0067			
403.5	398.9	1.0115			
200.4	199.0	1.0070			
			Slope	1.007145	0.90 - 1.10
			Intercept	0.289941	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

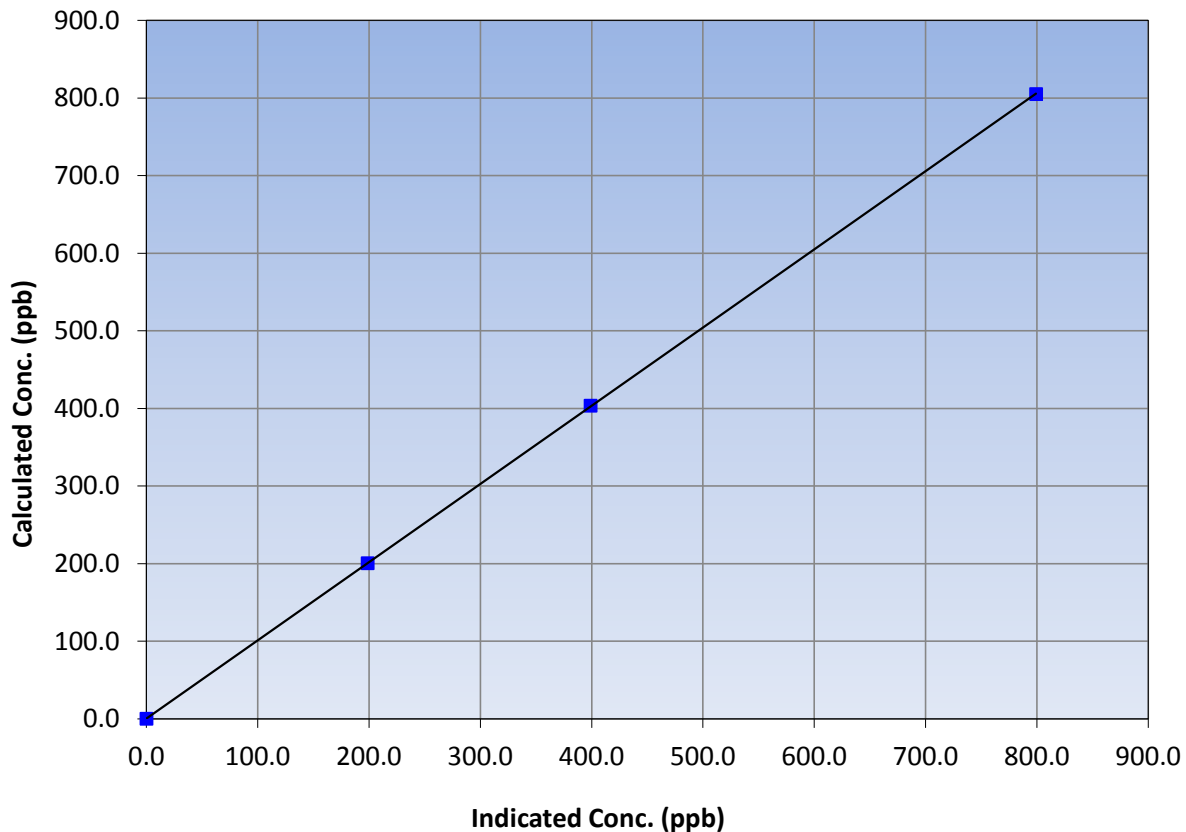
Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	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	Limits	
0.0	0.0	----	Correlation Coefficient	≥0.995	
805.0	799.3	1.0071			
403.5	399.1	1.0110			
200.4	198.9	1.0075			
			Slope	1.007262	0.90 - 1.10
			Intercept	0.349656	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

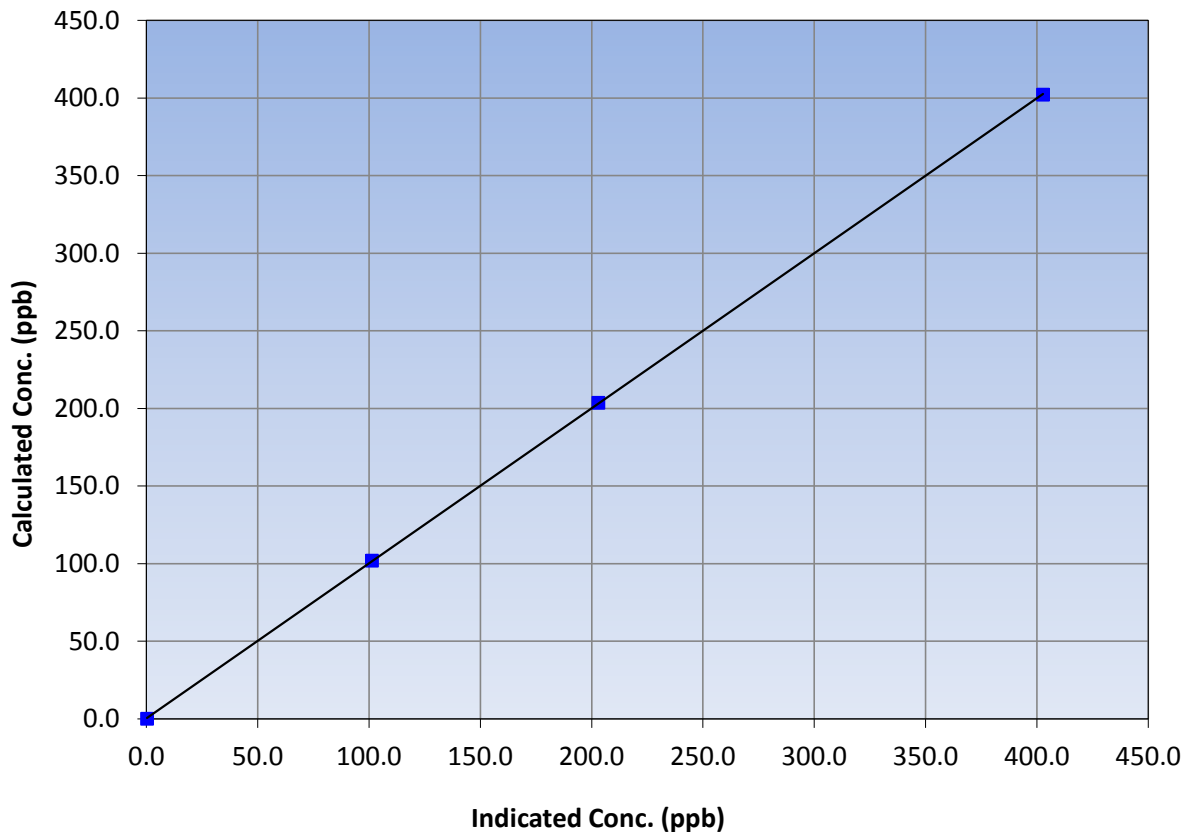
Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 2, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	9:00	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	
402.1	402.8	0.9983			
203.5	203.0	1.0025			
102.0	101.3	1.0069			
			Slope	0.998364	0.90 - 1.10
			Intercept	0.339398	+/-20

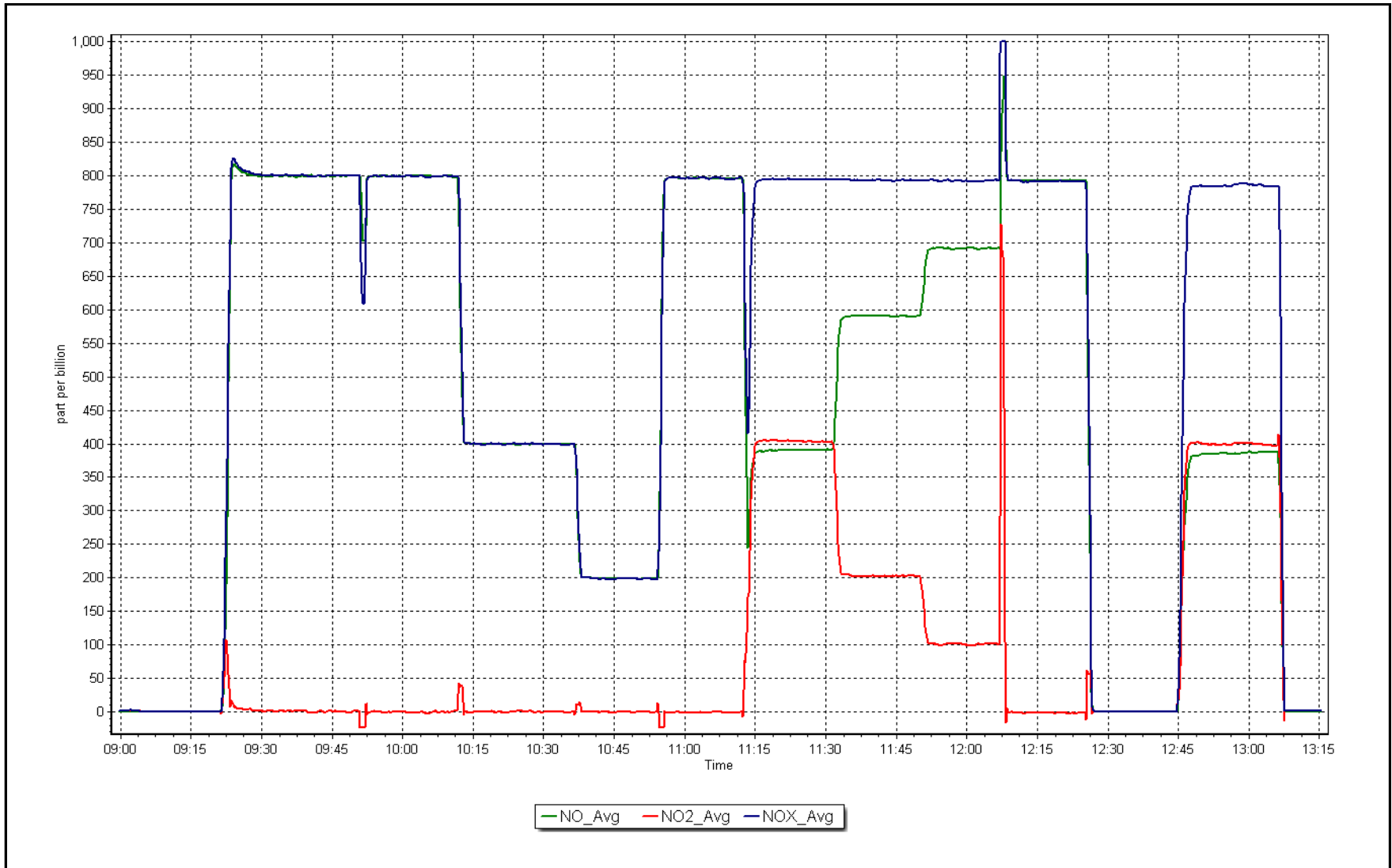
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 4, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Athabasca Valley	Station number:	AMS 07
Calibration Date:	July 5, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	7:02	End time (MST):	8:02
Sharp Model:	Thermo 5030	S/N:	E515
Particulate Fraction:	PM2.5	C14 Source S/N:	3256
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)	17	18	17	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	982	979	982	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	990	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	2.3	-----	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:	<u>July 5, 2017</u>	Last Cal Date:	<u>April 5, 2017</u>
	Flow w/o adaptor:	<u>16.5</u>	Flow w/ adaptor:	<u>16.17</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: <u>2518</u>	Foil S/N: <u>2518</u>	
Foil Calibration	Foil Mass: <u>1337</u>	Foil Mass: <u>1337</u>	
	Calibration Date: <u>July 5, 2017</u>	Calibration Date: <u>April 5, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>6885</u>	Correction Factor: <u>6939</u>	-0.78%

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 and flow adjusted

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association

CO Calibration Summary

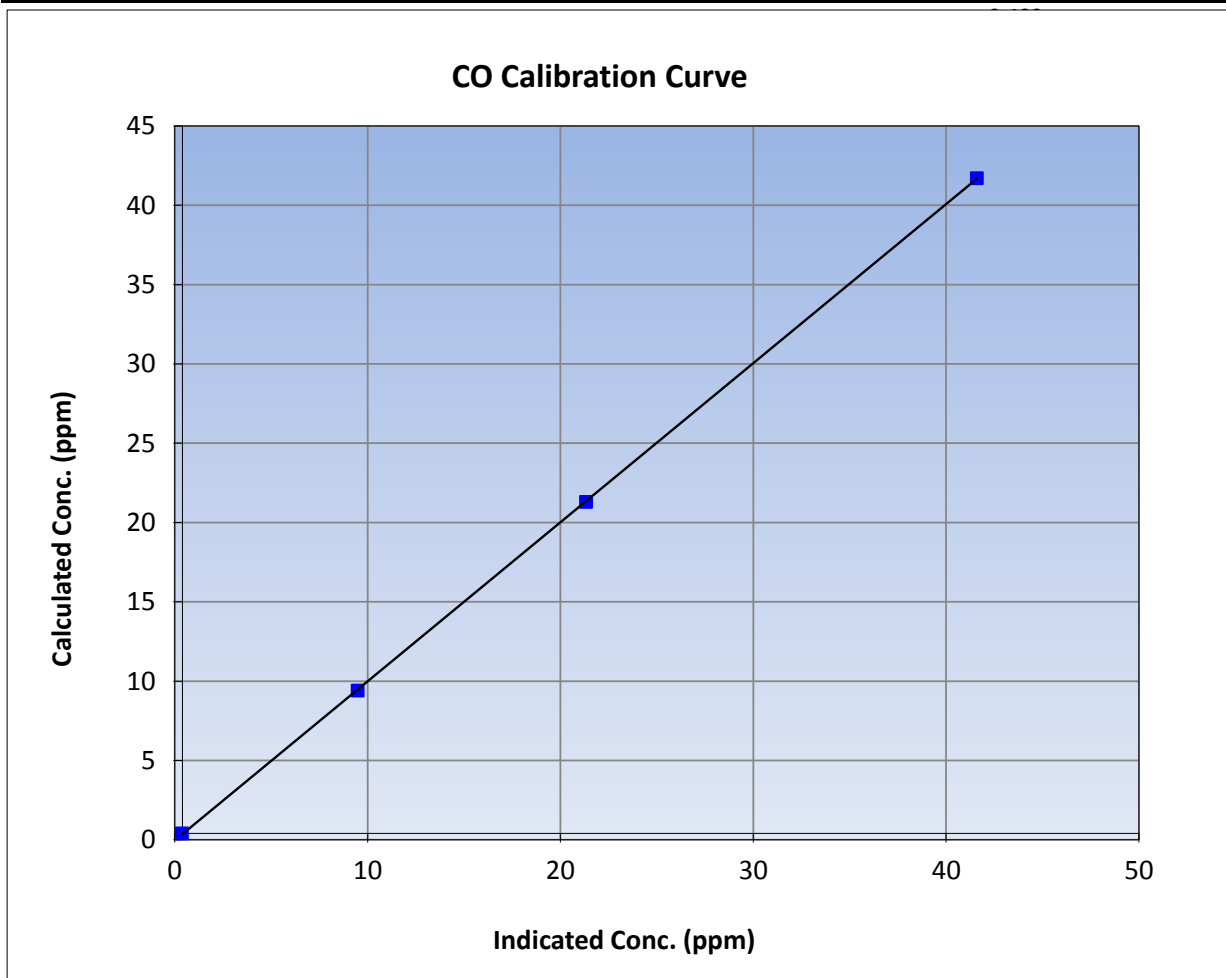
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 6, 2017
Station Name	Athabasca Valley	Station Number	AMS 07
Start Time (MST)	7:15	End Time (MST)	10:53
Analyzer make	Thermo 48i-LTE	Analyzer serial #	1408761381

Calibration Data

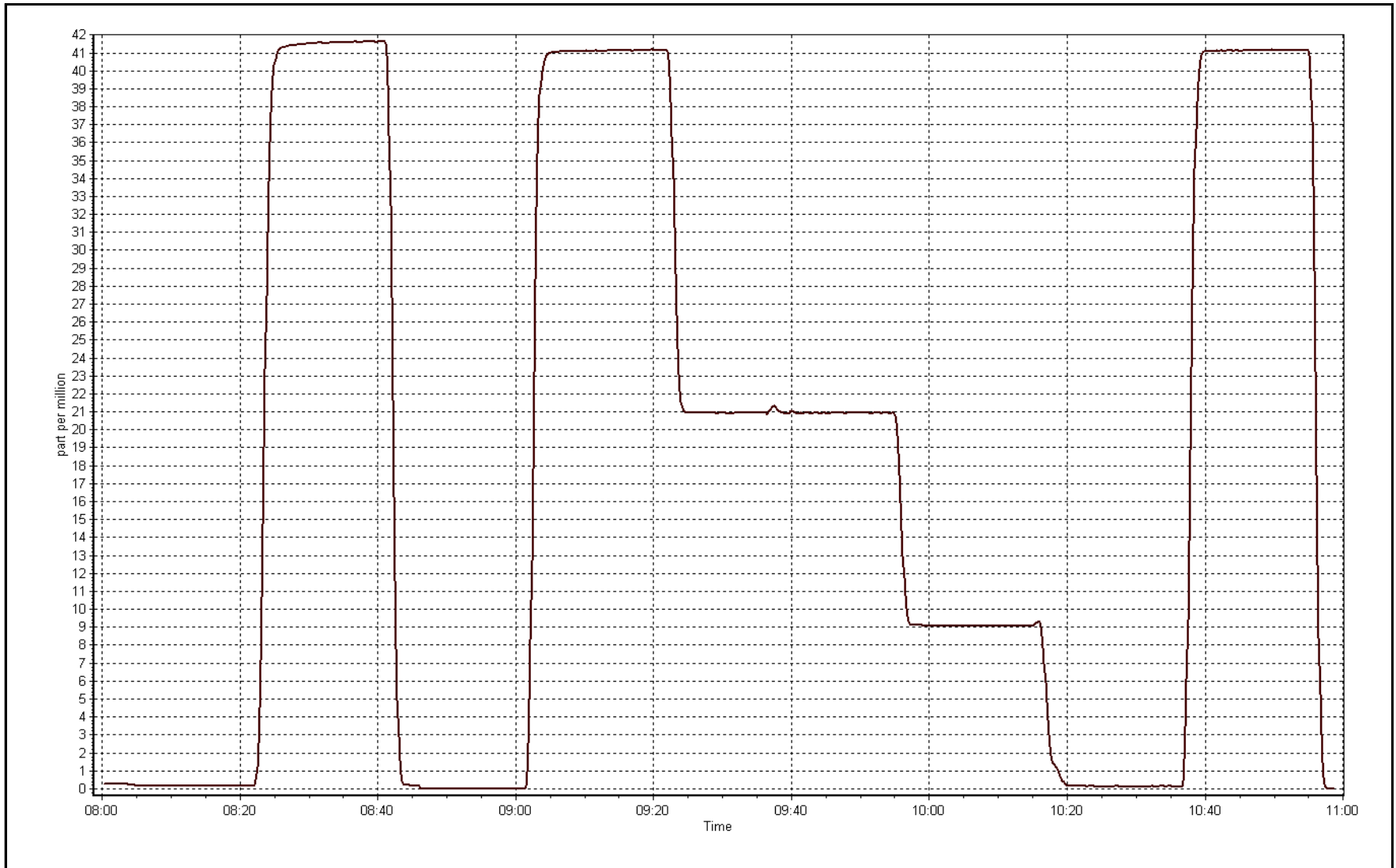
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999989	≥0.995
41.3	41.2	1.0027			
20.9	20.9	0.9990	Slope	1.002988	0.90 - 1.10
9.0	9.1	0.9916			
			Intercept	-0.044645	+/-1.5



CO Calibration Plot

Date: July 5, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Athabasca Valley	Station Number:	AMS 07
Calibration Date:	July-07-17	Prev Cal Date:	September-22-16
Start Time (MST):	9:17	End Time (MST):	10:39
Barometric Press:	737	Station Temp:	25.9 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	E5131
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	39.6	0.9939
600	58.6	59.2	0.9891
800	77.8	78.5	0.9905
Average Correction Factor			0.9941

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999992	≥0.995
Calculated slope	0.997419	0.988783	0.90 - 1.10
Calculated intercept	0.066761	0.128442	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N/A (Faded Out)
As Found Declination (deg west of North)	<u>14</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	0.1	n/a
90	88.3	1.0193
180	177.8	1.0124
270	267.7	1.0086
357	359.8	0.9922
Average Correction Factor		1.0081

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999898	≥0.995
Calculated slope	0.988332	0.994550	0.90 - 1.10
Calculated intercept	1.618865	1.634158	+/- 7

Notes: Torque test Passed

Calibration Performed By: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JULY 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	707	37	37	100	2	0	0	0
O3(ppb) Average	710	34	34	100	50	0	37	-
NO2(ppb) Average	707	37	37	100	3	0	1	-
NO(ppb) Average	707	37	37	100	1	-	0	-
NOX(ppb) Average	707	37	37	100	3	-	1	-
PM2.5(ug/m3) Average	720	2	24	97.04	45.2	-	15	0
Wind Speed 10 m (km/h) Average	741	2	3	99.87	33	-	23	-
Wind Direction 10 m (deg) Average	741	2	3	99.87	-	-	-	-
Temperature 2 m (C) Average	742	0	2	99.73	28.1	-	23.6	-
Relative Humidity (%) Average	742	0	2	99.73	100	-	86	-
Precipitation (mm) Total	744	0	0	100	5.6	-	6.9	-
Leaf Wetness (% of range) Average	744	0	0	100	32	-	5	-
Global Solar Radiation (W/m2) Average	744	0	0	100	919	-	368	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 JULY 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	707	0	0	-	0	0	0	0	0	0	0	2
O3(ppb) Average	710	24.7	7	-	9	16	20	24	29	34	50	50
NO2(ppb) Average	707	0.3	0	-	0	0	0	0	0	1	3	3
NO(ppb) Average	707	0.1	0	-	0	0	0	0	0	0	1	1
NOX(ppb) Average	707	0.3	0	-	0	0	0	0	0	1	3	3
PM2.5(ug/m3) Average	720	4.91	4.9	-	0	0.6	1.9	3.7	6.3	10	45.2	45.2
Wind Speed 10 m (km/h) Average	741	12.9	6	-	1	6	9	12	17	21	33	33
Wind Direction 10 m (deg) Average	741	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	742	18.85	3.8	-	6.3	14.3	16.4	18.6	21.3	23.8	28.1	28.1
Relative Humidity (%) Average	742	66.6	16	-	24	45	55	68	77	88	100	100
Precipitation (mm) Total	744	-	-	26.42	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	744	0.7	4	-	-1	-1	-1	0	0	4	32	32
Global Solar Radiation (W/m2) Average	744	249.7	269	-	0	1	4	140	464	690	919	919

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	17 Jul 2017 14:00	17 Jul 2017 18:00	5	Unstable operation - excessive baseline drift
PM 2.5	17 Jul 2017 20:00	18 Jul 2017 02:00	7	Unstable operation - excessive baseline drift
PM2.5	18 Jul 2017 09:00	18 Jul 2017 10:00	2	Unstable operation - excessive baseline drift
PM 2.5	20 Jul 2017 02:00	20 Jul 2017 05:00	4	Unstable operation - excessive baseline drift
PM2.5	20 Jul 2017 11:00	20 Jul 2017 11:00	1	Unstable operation - excessive baseline drift
PM 2.5	29 Jul 2017 14:00	29 Jul 2017 16:00	3	Unstable operation - excessive baseline drift
Temperature 2 m, Relative Humidity	12 Jul 2017 10:00	12 Jul 2017 11:00	2	Maintenance - sensor replacement
Wind Speed, Wind Direction	06 Jul 2017 06:00	06 Jul 2017 06:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

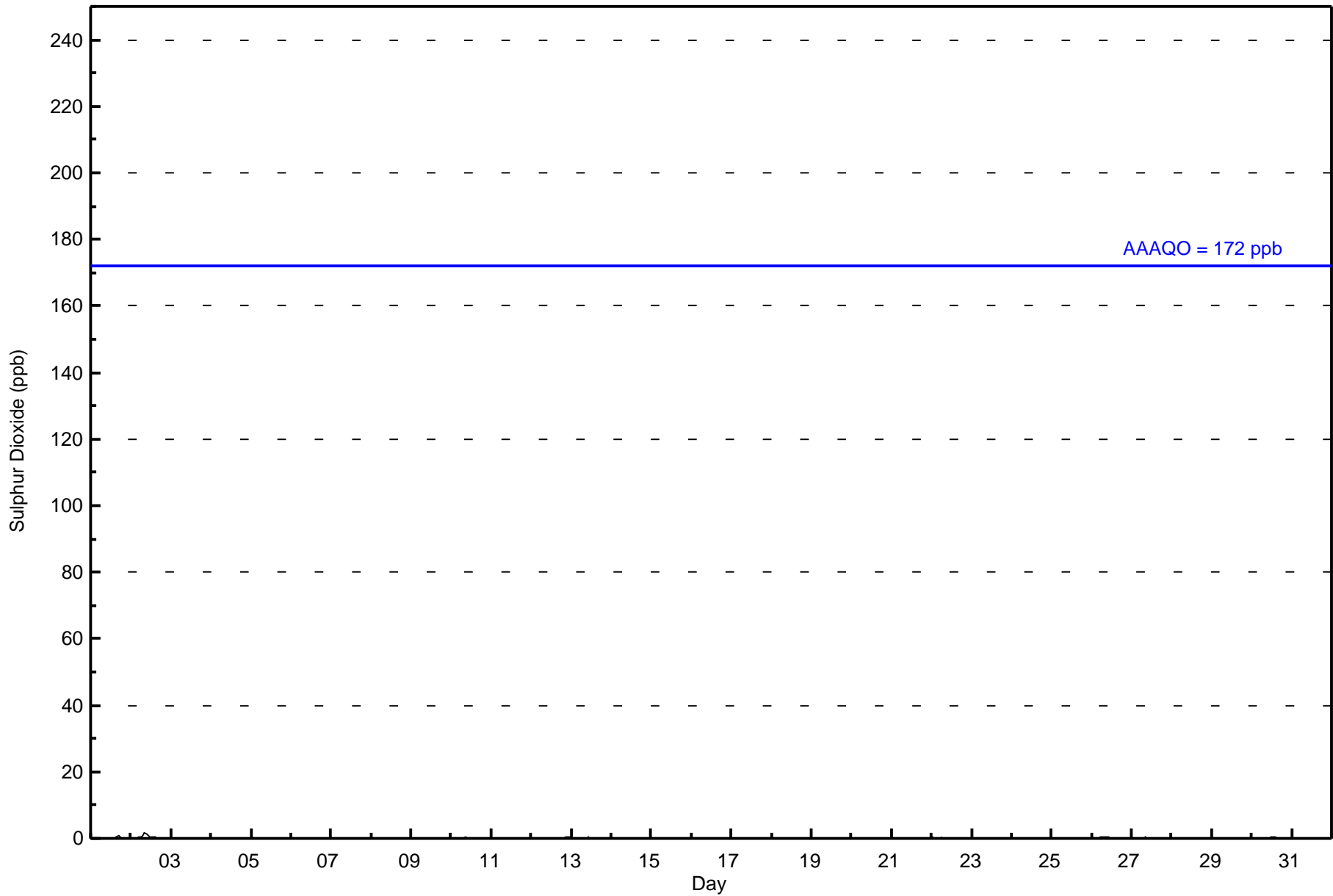
Fort Chipewyan - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 2 09:00 Maximum Daily Average: 0.4 ppb on Jul 2																	Hours in Service: 744 Hours of Data: 707									
Minimum Value: 0 ppb on Jul 3 11:00 Minimum Daily Average: 0.0 ppb on Jul 4 Maximum Diurnal Average: 0.1 ppb at hour 9 Minimum Diurnal Average: 0.0 ppb at hour 4 Monthly Average: 0.0 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1																	Hours of Missing Data: 37 Hours of Calibration: 37 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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.1	1
2-Jul	0	0	Z	0	0	0	0	1	2	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0.4	2
3-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	1	0	0	--	1
13-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jul	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-Jul	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-Jul	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-Jul	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	1
31-Jul	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
0.0 0.0 0.0 0.0 0.0 0.1 0.0 0.1 0.1 0.1 0.1 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																								Diurnal Average		
0 0 0 0 0 0 1 1 2 1 1 0 1 0 1 0 1 0 0 0 0 0 1 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
Fort Chipewyan - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - July 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	37	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706
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	37	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706

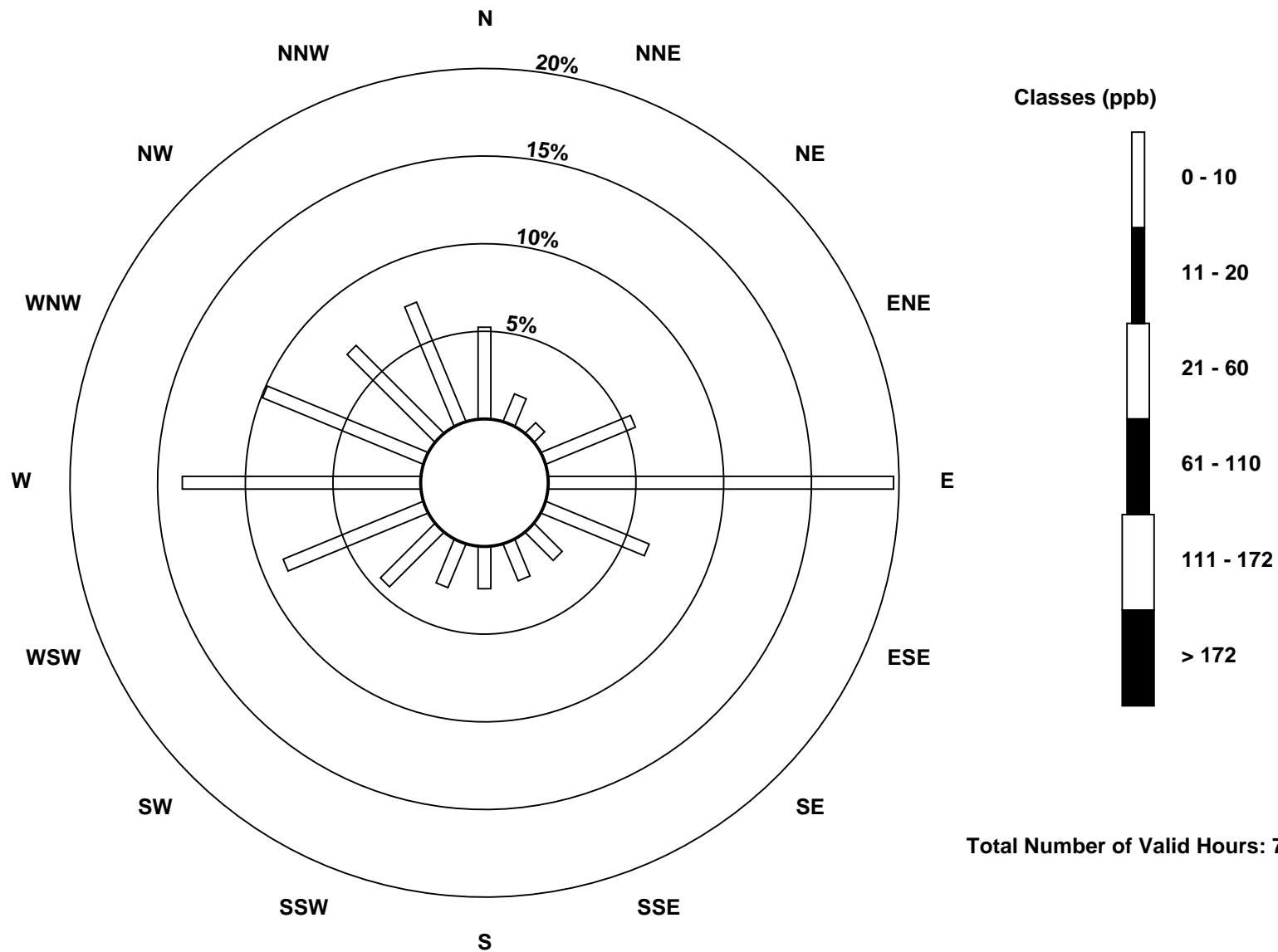
Total Number of Valid Hours: 706

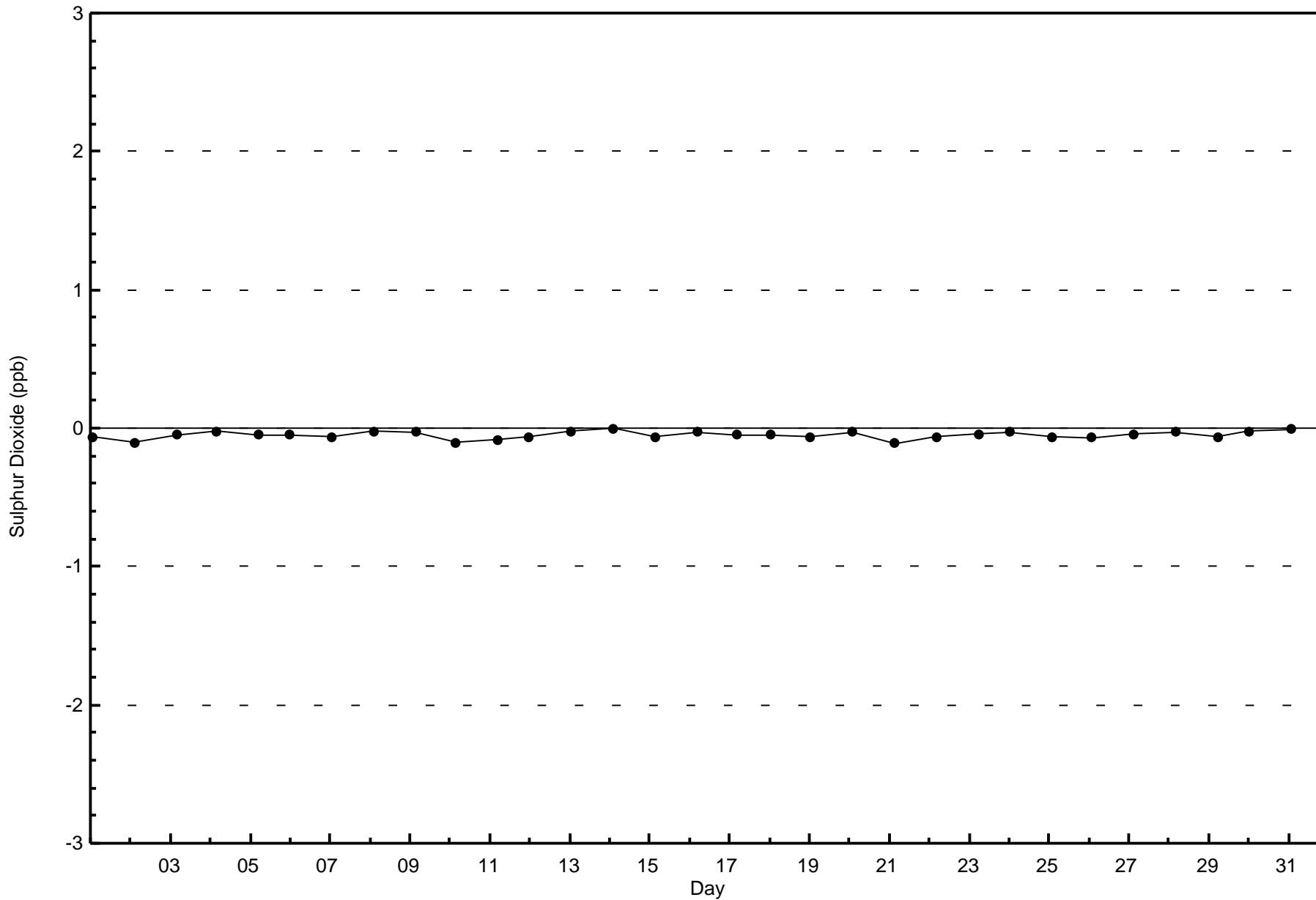
Total Number of Hours: 744

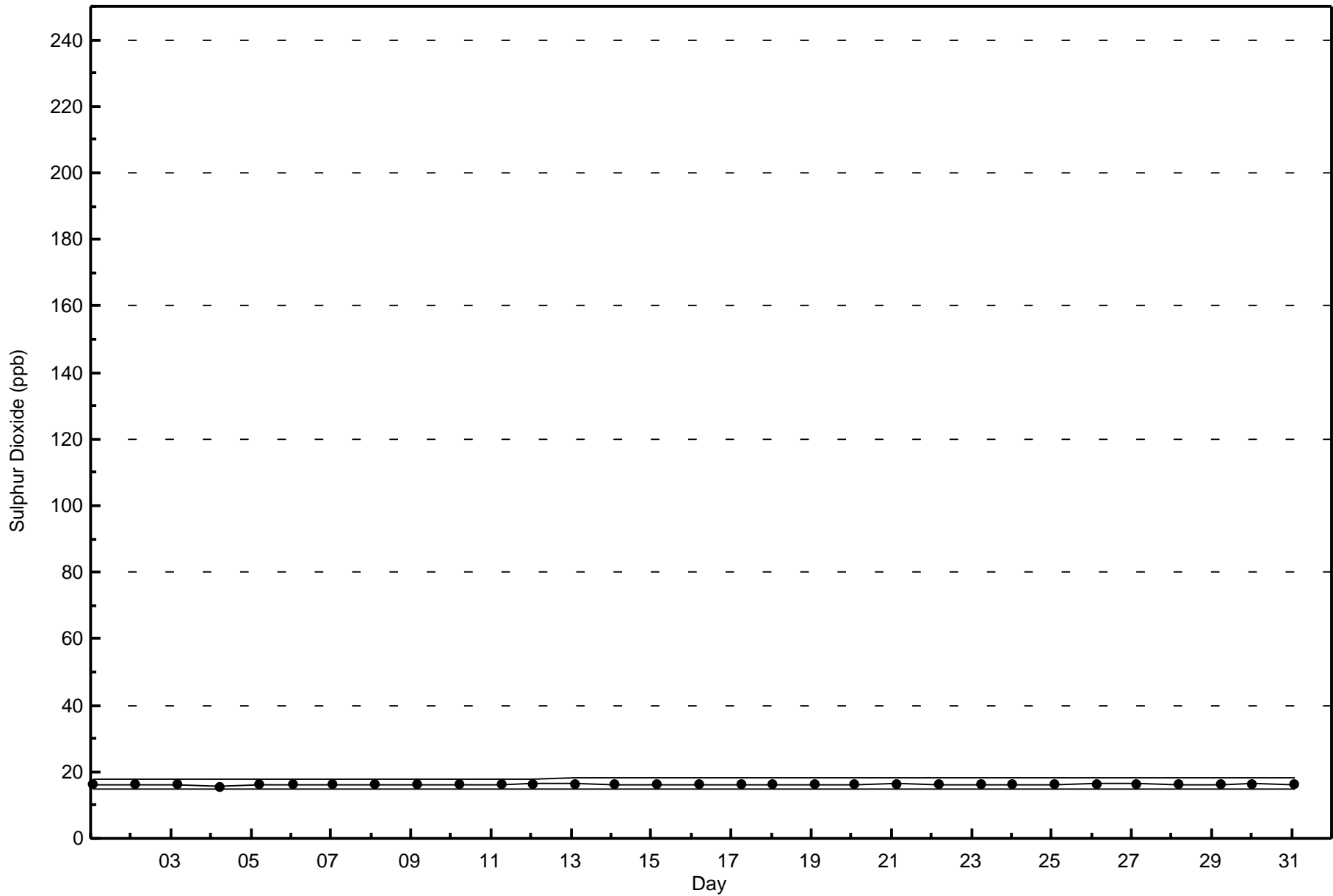


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)









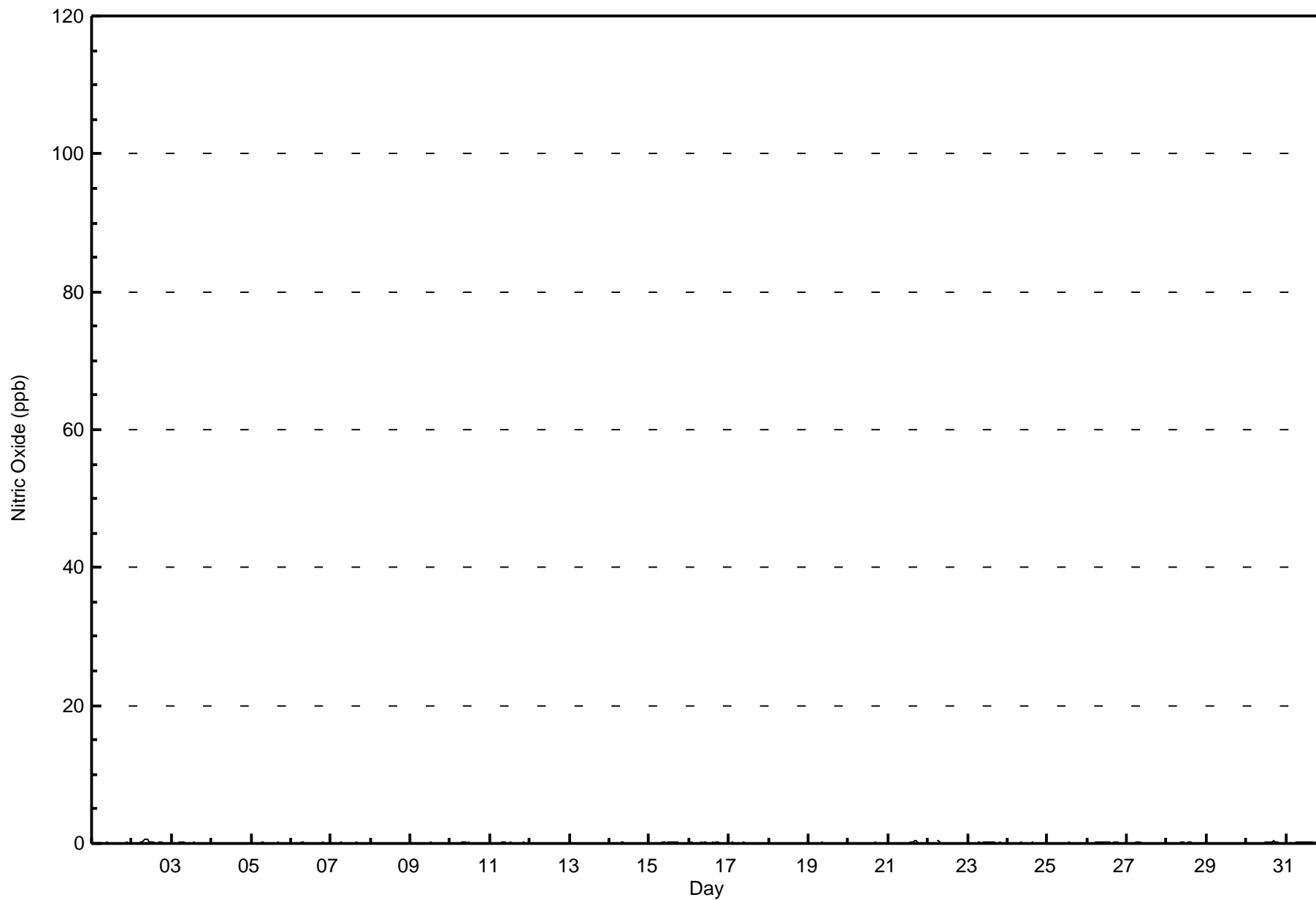
Maximum Value: 1 ppb on Jul 2 09:00		Maximum Daily Average: 0.2 ppb on Jul 2		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 3 21:00		Minimum Daily Average: 0.0 ppb on Jul 4		Hours of Data: 707																						
Maximum Diurnal Average: 0.1 ppb at hour 9		Minimum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 37																						
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: 37																						
				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-Jul	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-Jul	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Jul	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-Jul	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-Jul	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-Jul	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
7-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	--	0
13-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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
27-Jul	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-Jul	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-Jul	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-Jul	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
31-Jul	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	
																								Diurnal Average	Diurnal Maximum	

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - July 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	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706
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	37	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706

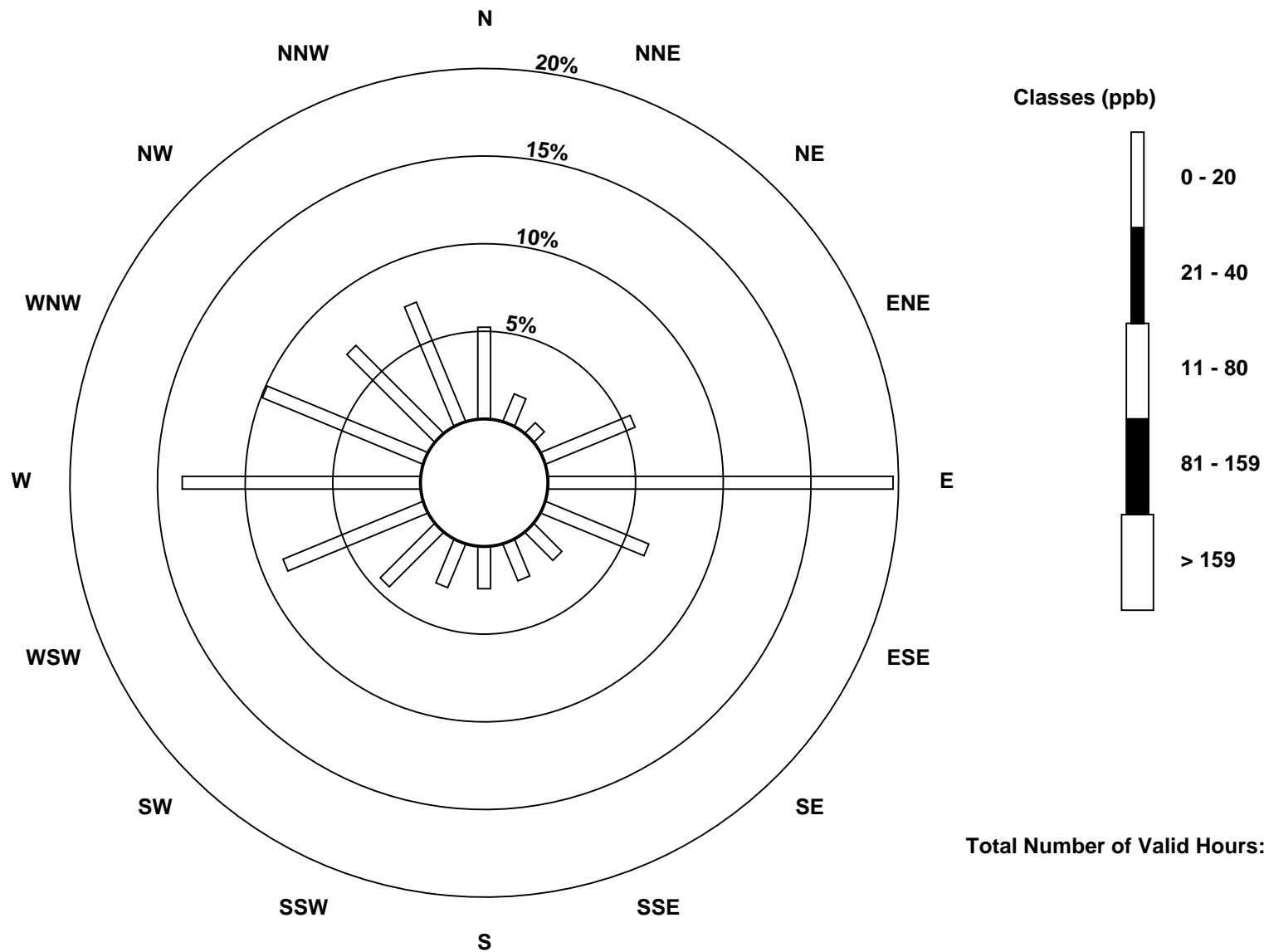
Total Number of Valid Hours: 706

Total Number of Hours: 744

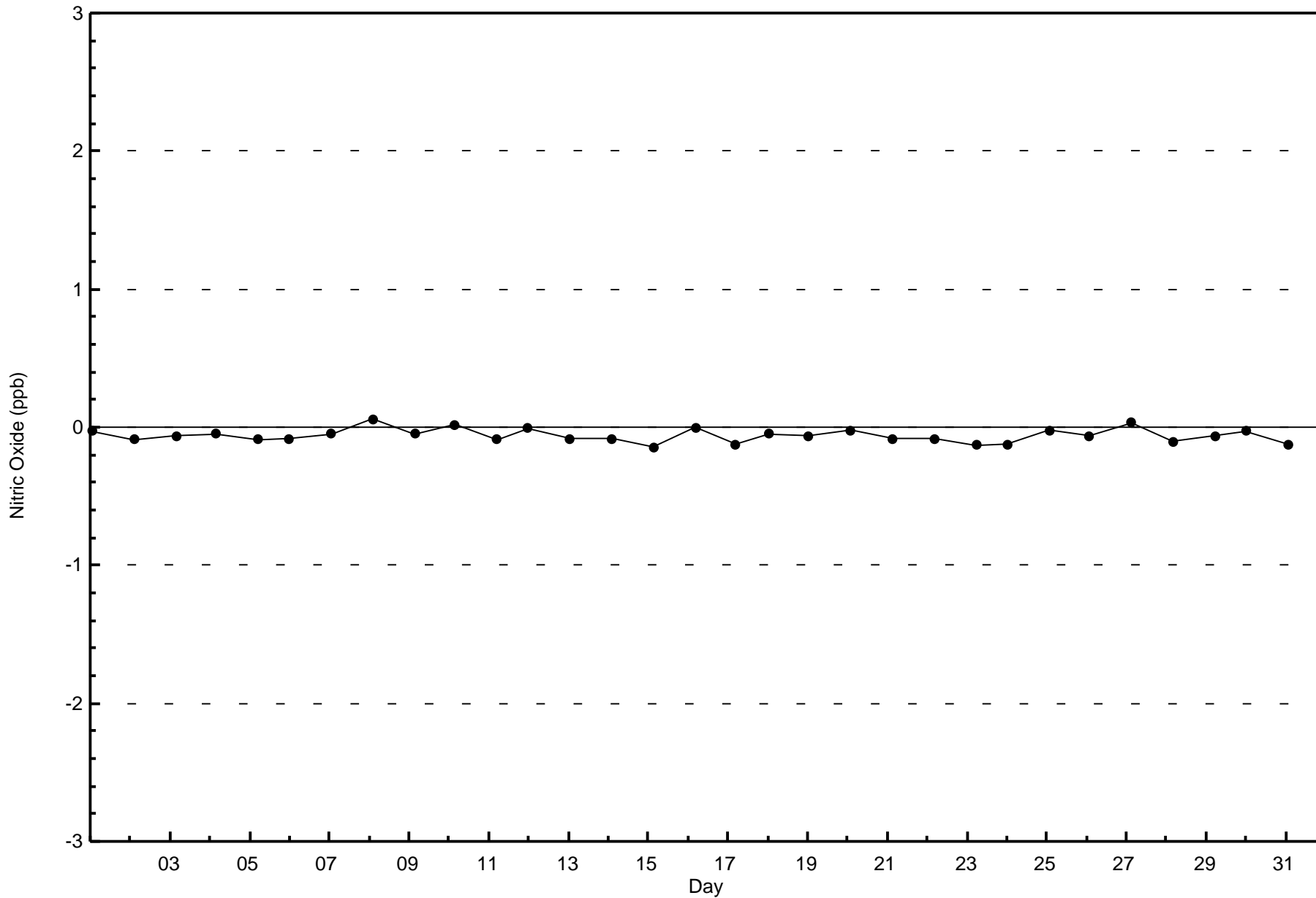


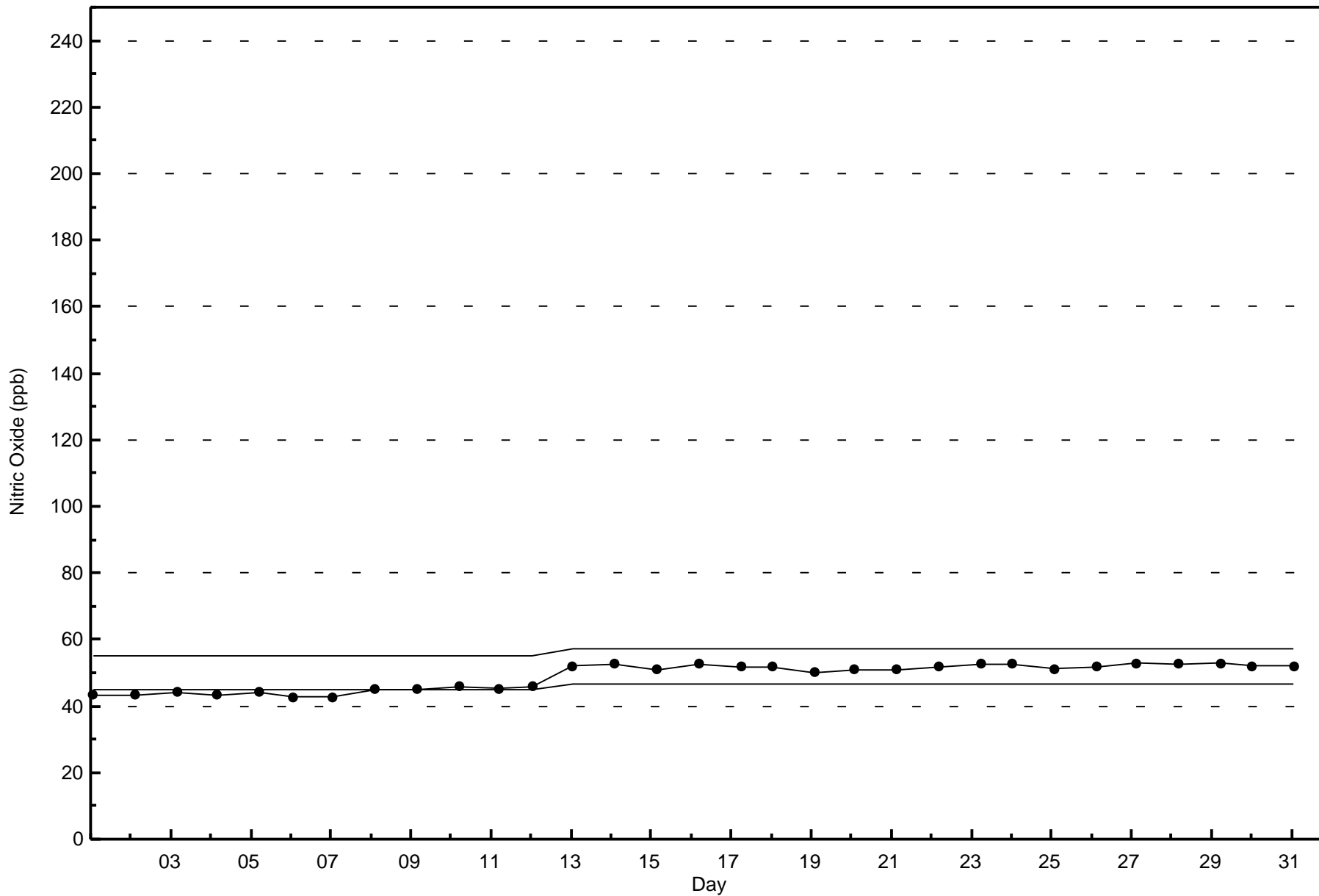
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

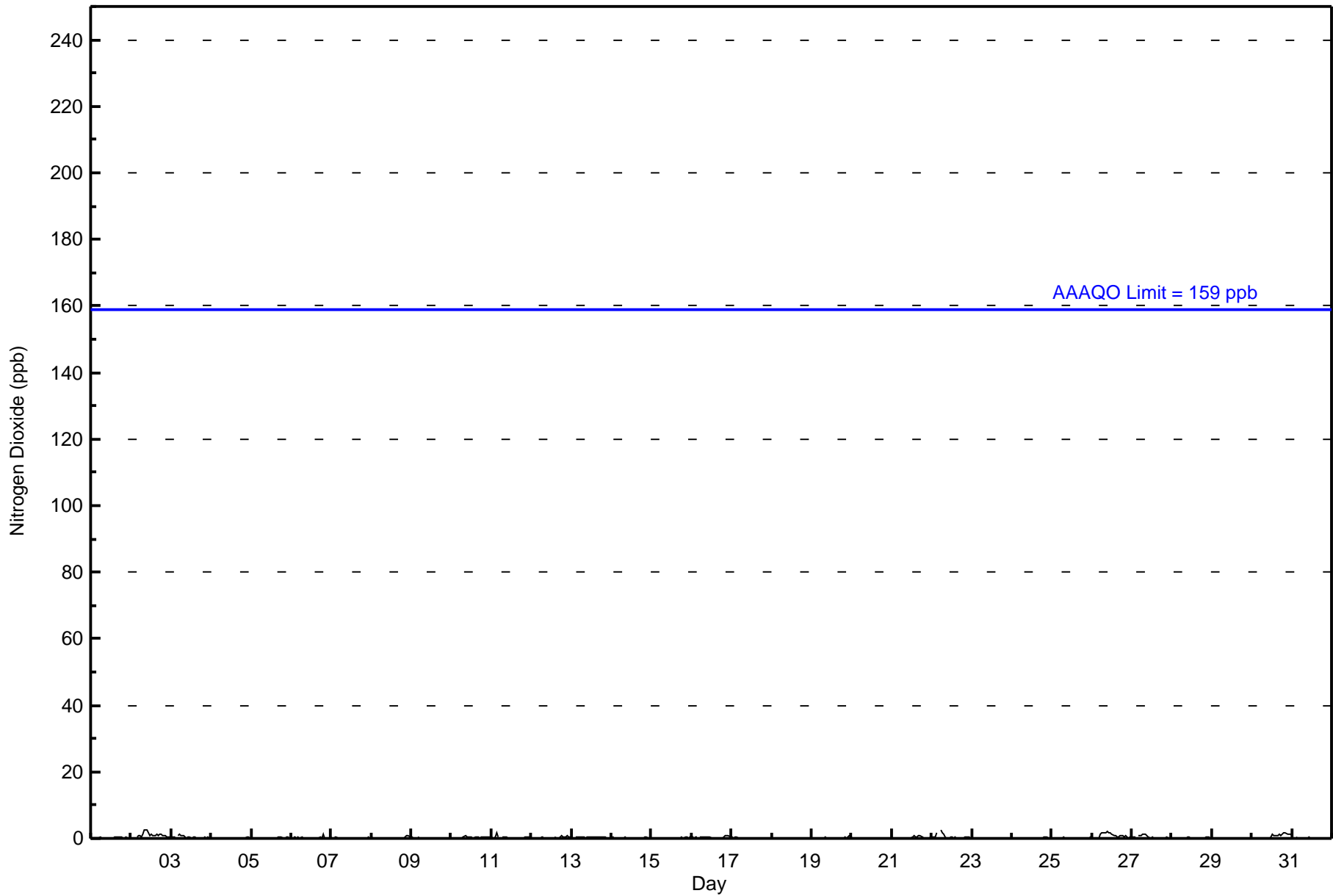
Fort Chipewyan - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Jul 2 10:00 Maximum Daily Average: 1.0 ppb on Jul 2																	Hours in Service: 744 Hours of Data: 707									
Minimum Value: 0 ppb on Jul 7 13:00 Minimum Daily Average: 0.1 ppb on Jul 20 Maximum Diurnal Average: 0.4 ppb at hour 9 Minimum Diurnal Average: 0.2 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 = 1 P ₉₉ = 2																	Hours of Missing Data: 37 Hours of Calibration: 37 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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
2-Jul	0	0	Z	0	1	1	1	1	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1.0	3
3-Jul	0	0	0	Z	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.4	1	
4-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1	
5-Jul	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-Jul	Z	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	
7-Jul	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-Jul	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1	
9-Jul	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-Jul	0	0	0	0	Z	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
11-Jul	0	0	1	2	1	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
12-Jul	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	1	0	1	1	1	--	1	
13-Jul	1	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.3	1	
14-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1	
16-Jul	1	0	0	1	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1	
17-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1	
20-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0.3	1	
22-Jul	1	1	1	2	Z	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2	
23-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1	
26-Jul	0	0	Z	0	0	1	2	2	2	2	2	2	1	1	1	1	1	1	1	0	1	1	0	0.9	2	
27-Jul	0	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
28-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	1	0.6	2	
31-Jul	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	
0.3 0.2 0.2 0.3 0.2 0.4 0.3 0.4 0.4 0.3 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.3 0.4 0.3 0.3																								Diurnal Average		
1 1 1 2 1 2 2 2 3 3 2 2 1 1 1 1 1 1 1 1 1 2 2 1 1 1																								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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - July 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	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706
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	37	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706

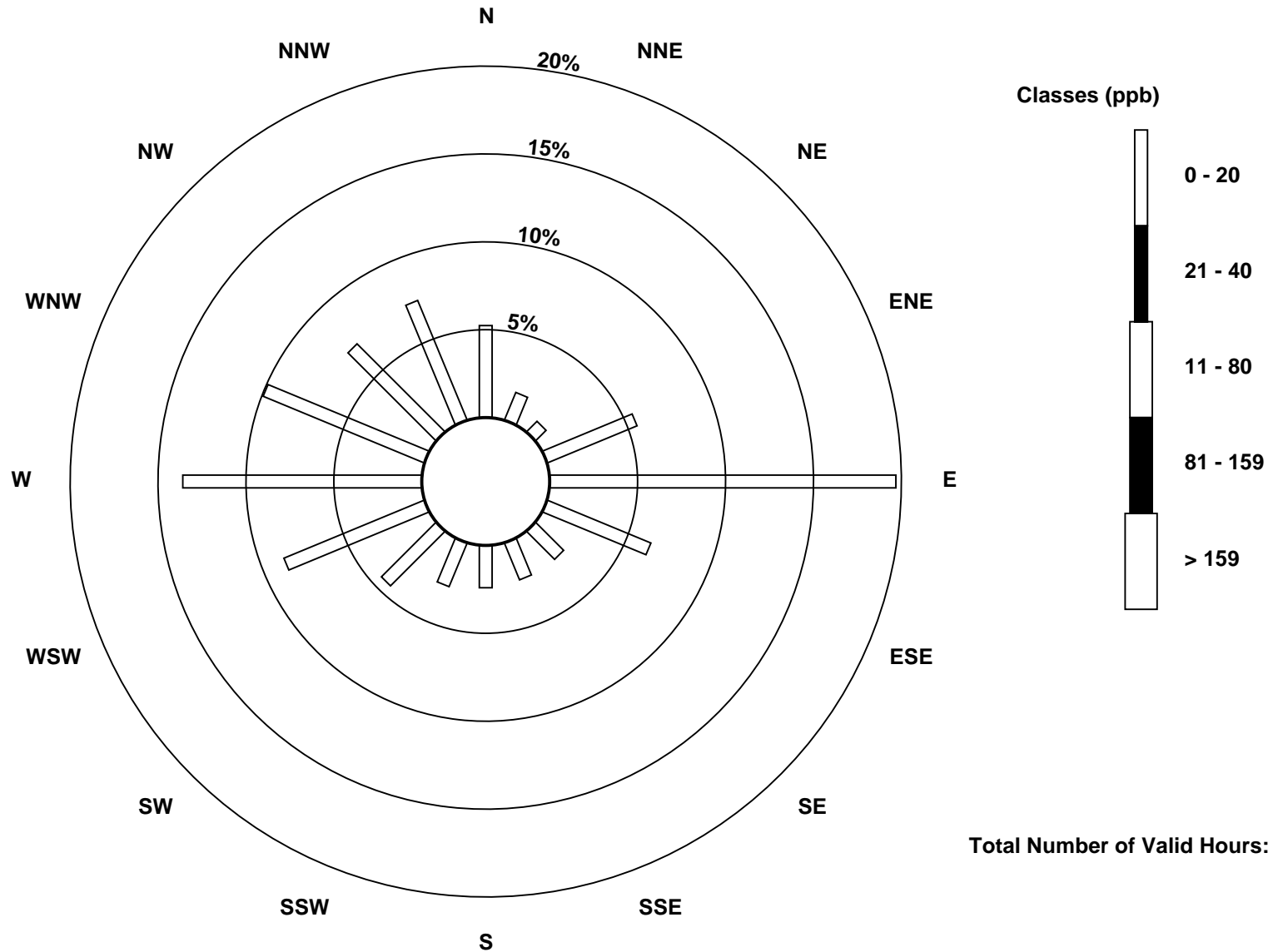
Total Number of Valid Hours: 706

Total Number of Hours: 744

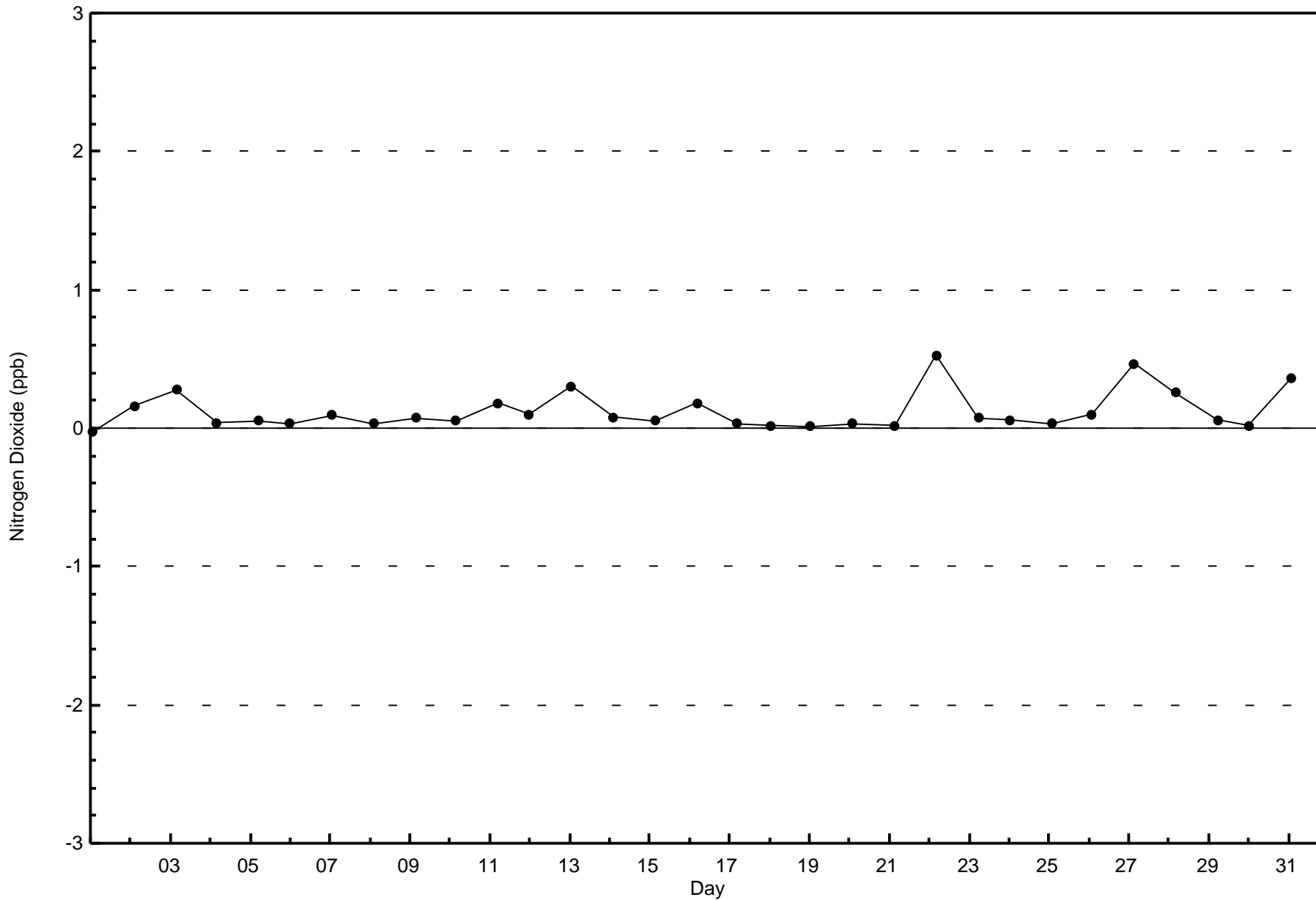


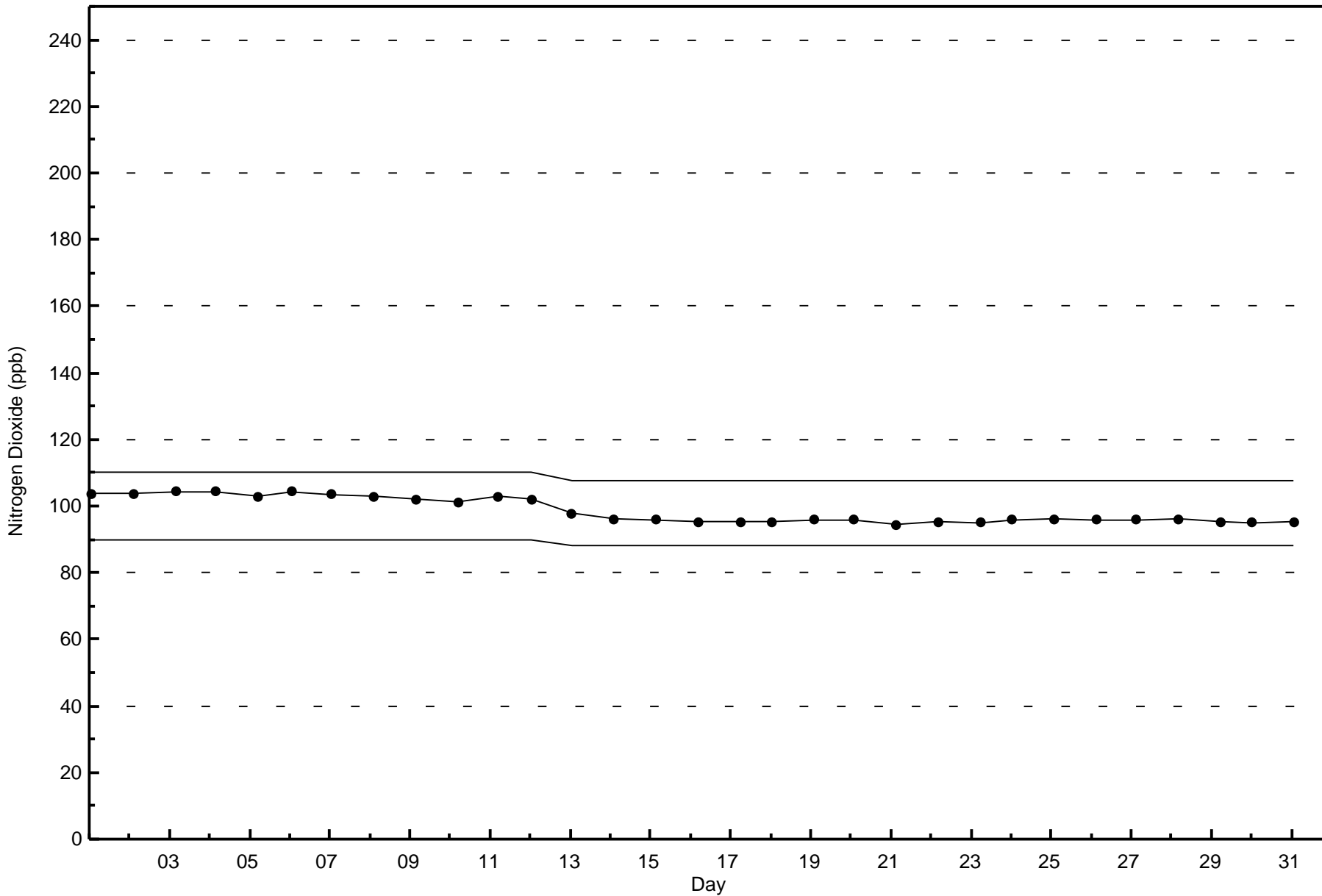
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 706

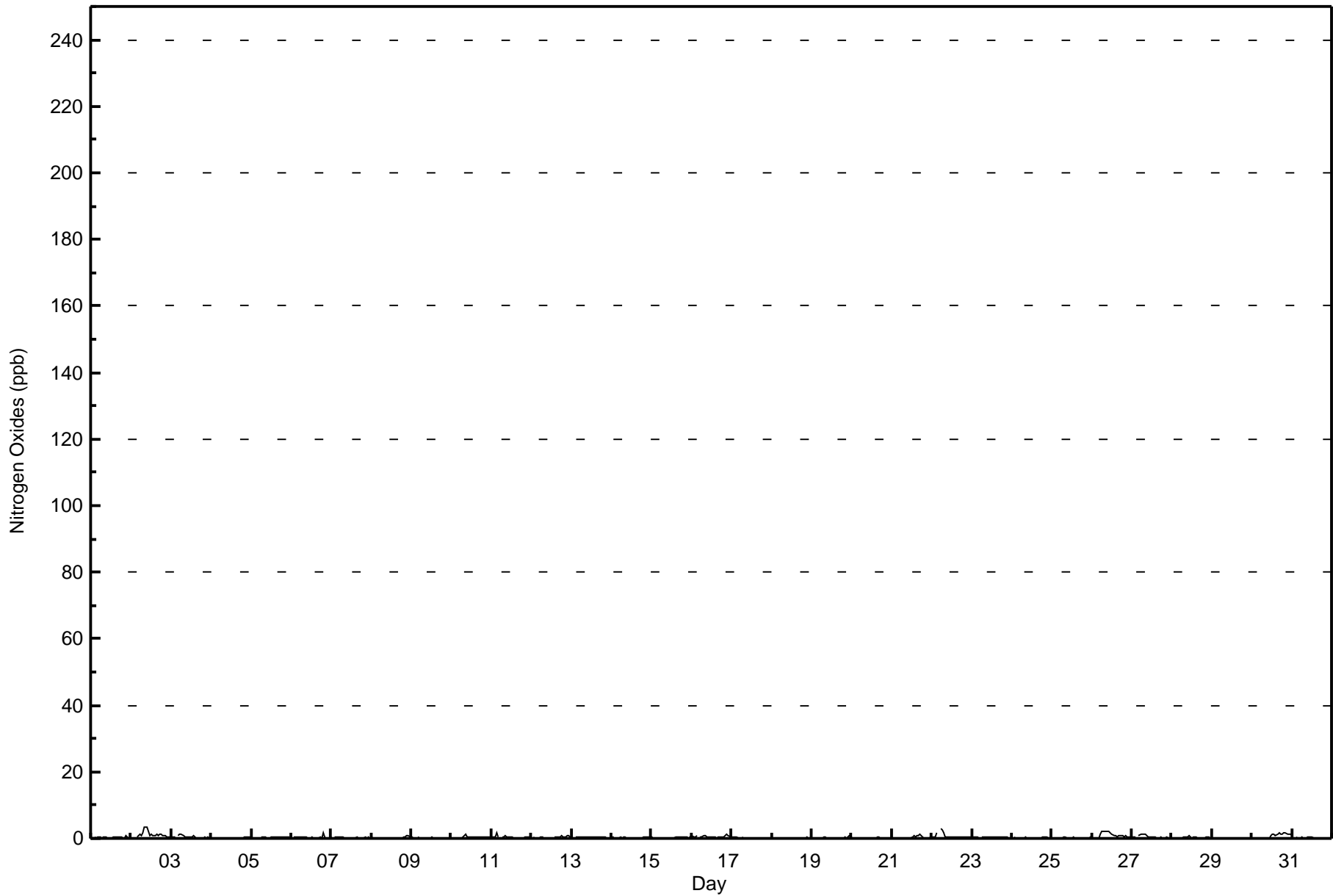






Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - July 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	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706
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	12	6	39	139	45	16	16	17	19	31	61	96	70	50	52	706

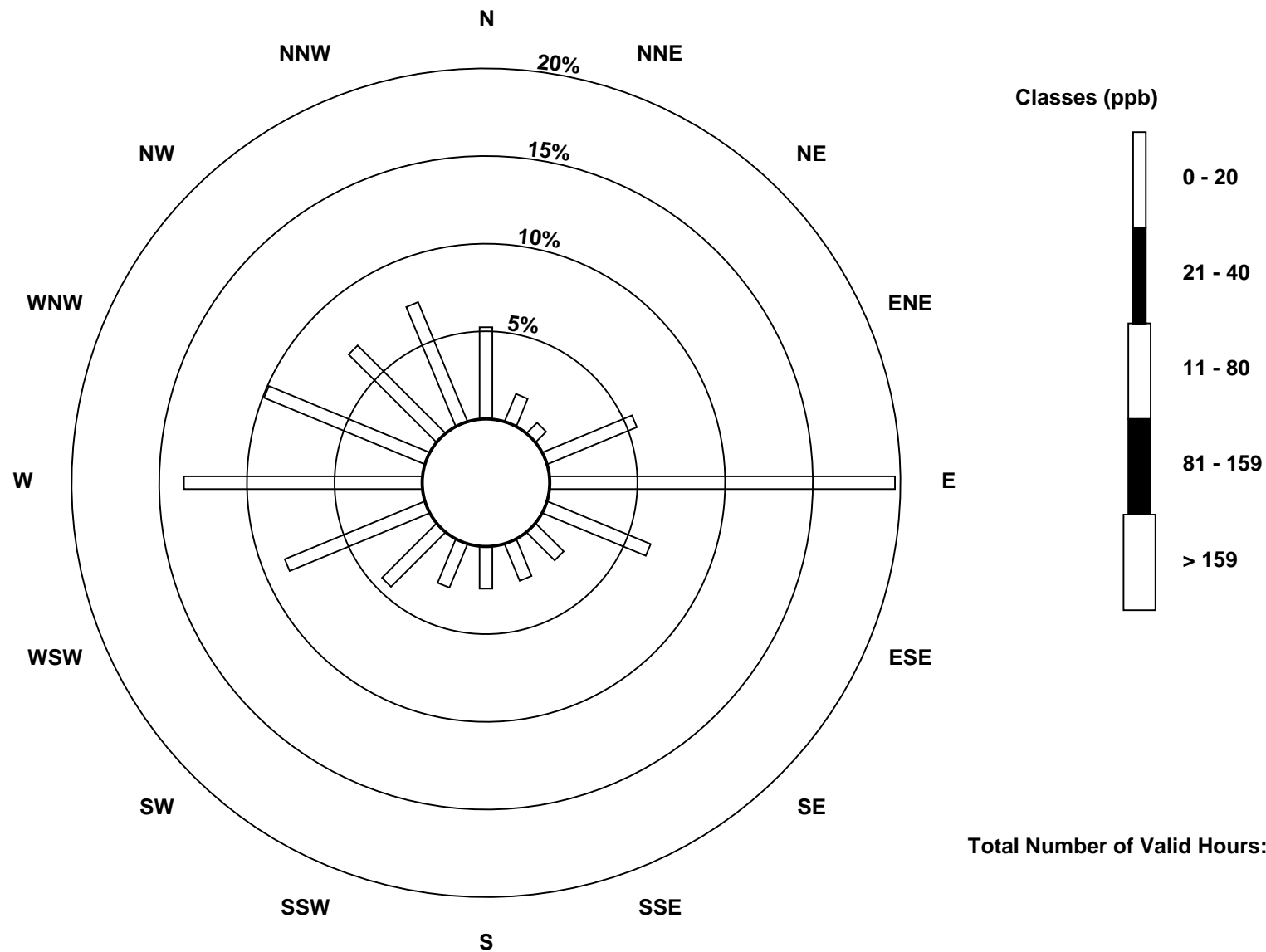
Total Number of Valid Hours: 706

Total Number of Hours: 744

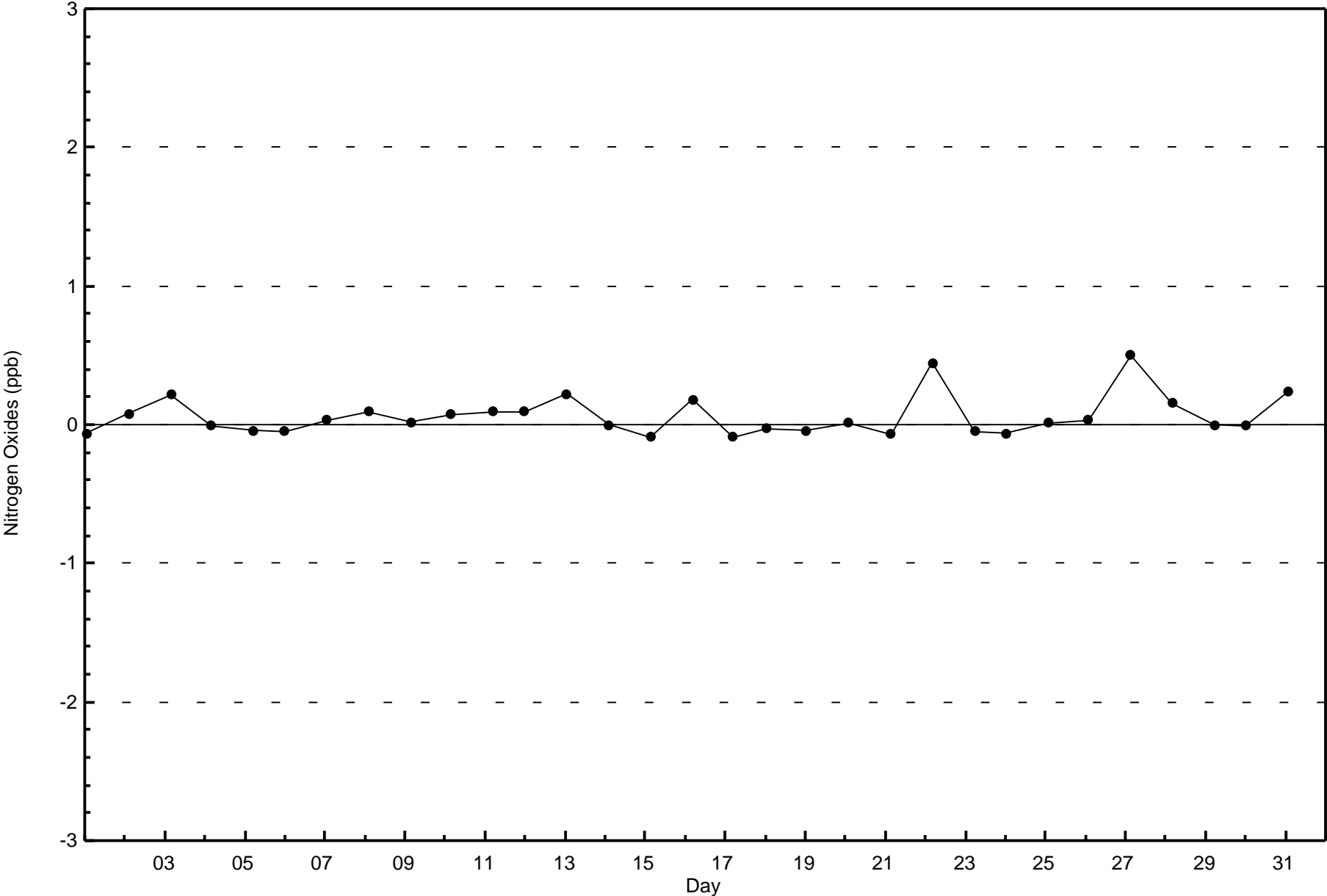


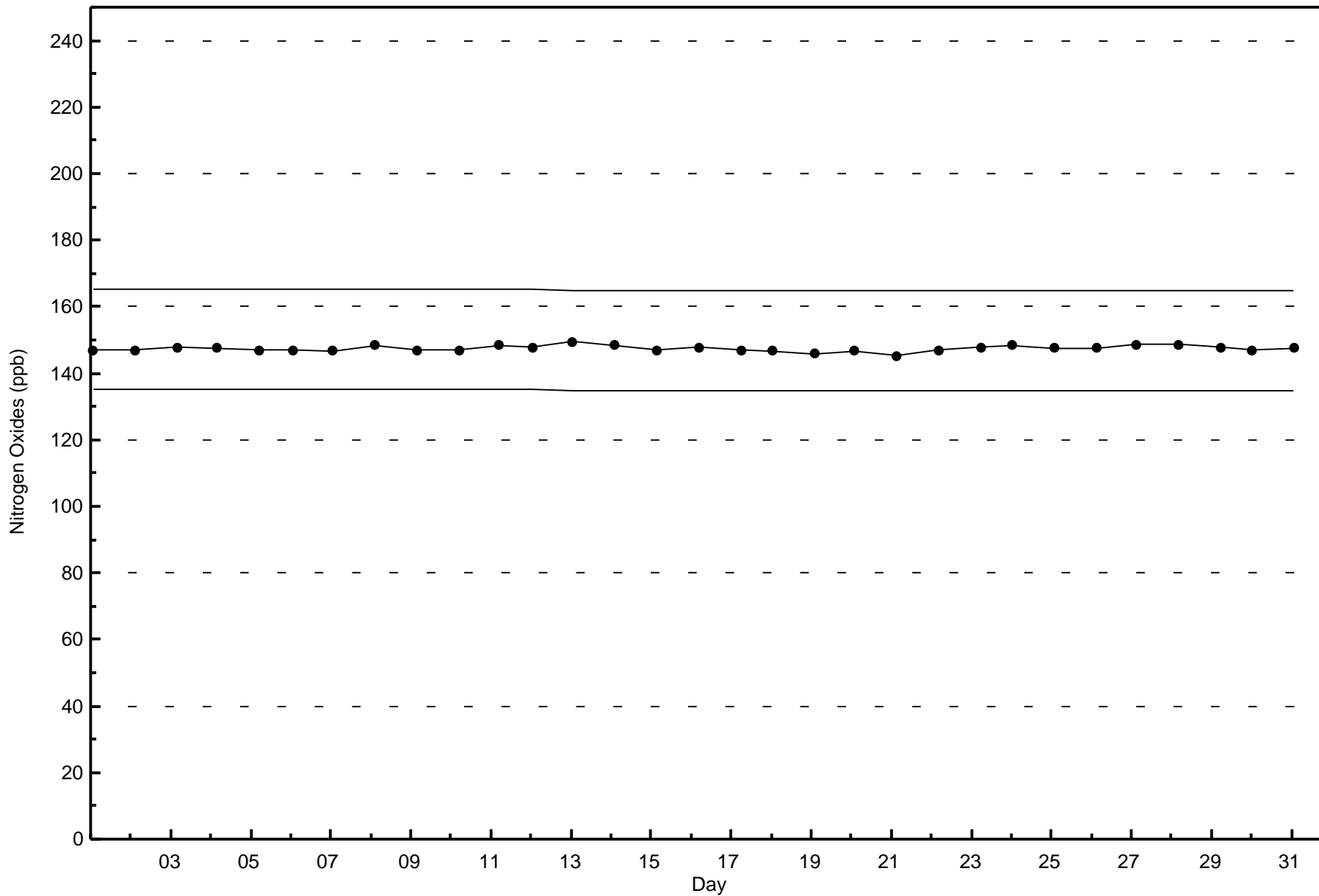
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

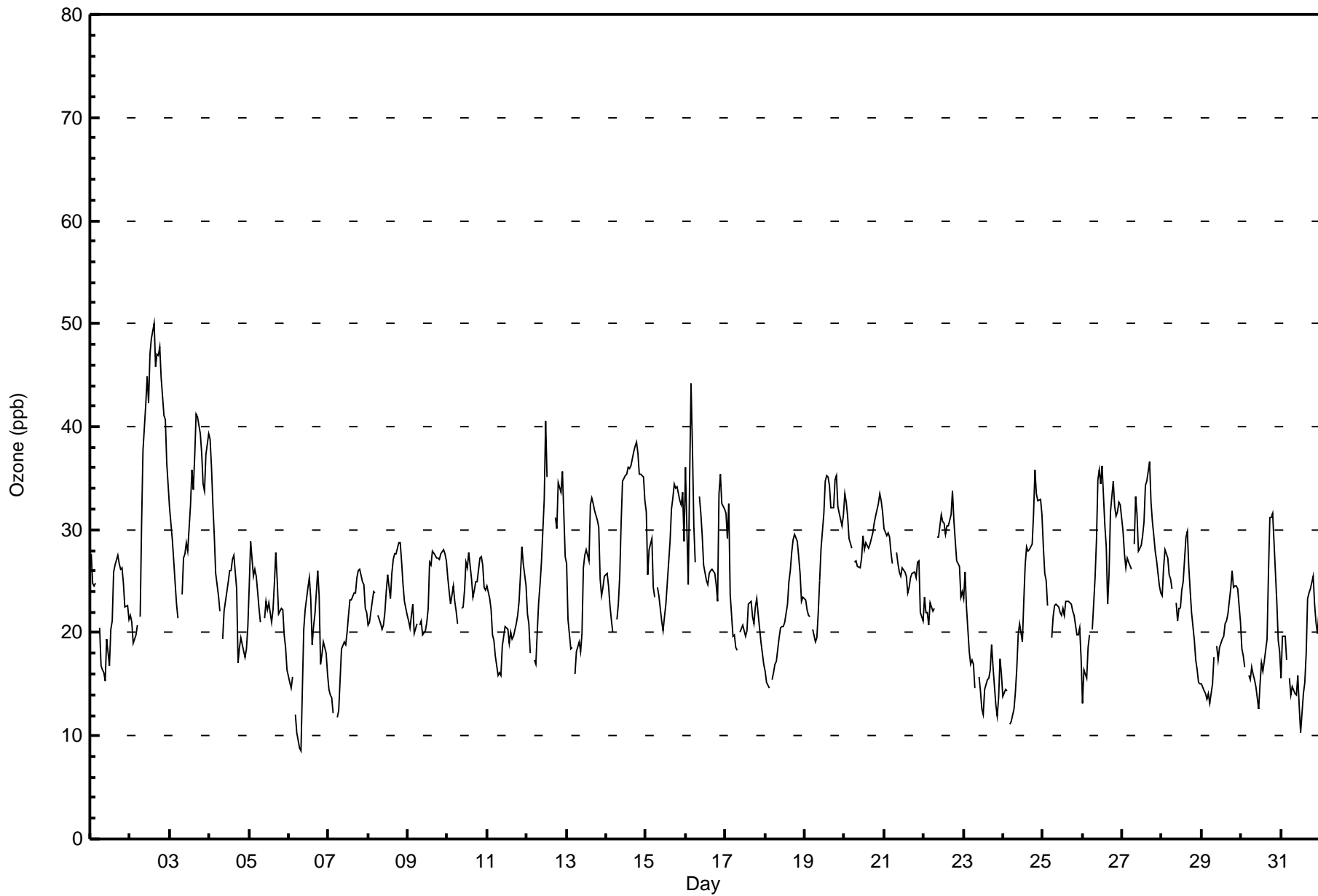
Fort Chipewyan - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 50 ppb on Jul 2 15:00										Maximum Daily Average: 37.0 ppb on Jul 2										Hours of Data: 710						
Minimum Value: 9 ppb on Jul 6 08:00										Minimum Daily Average: 16.5 ppb on Jul 23										Hours of Missing Data: 34						
Maximum Diurnal Average: 28.4 ppb at hour 18										Minimum Diurnal Average: 19.0 ppb at hour 7										Hours of Calibration: 34						
Monthly Average: 24.7 ppb										Percentiles: P ₁ = 12 P ₁₀ = 16 Q ₁ = 20 Median = 24 Q ₃ = 29 P ₉₀ = 34 P ₉₉ = 45										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-Jul	28	25	25	25	Z	20	17	16	16	15	19	17	20	21	26	27	28	27	26	26	25	23	23	21	22.4	28
2-Jul	22	21	19	20	21	Z	22	31	38	42	45	42	47	48	50	46	47	47	48	45	41	41	36	34	37.0	50
3-Jul	32	29	27	25	23	21	Z	24	27	28	29	28	32	36	34	37	41	41	39	37	34	34	37	39	32.0	41
4-Jul	39	36	32	29	26	24	22	Z	19	22	24	25	26	26	27	27	24	17	19	20	19	18	18	21	24.4	39
5-Jul	25	29	26	26	26	24	22	21	Z	21	23	22	23	21	22	25	28	25	22	22	22	20	19	16	23.0	29
6-Jul	15	15	16	Z	12	10	9	9	14	20	22	24	25	23	19	21	22	26	24	17	18	19	18	16	18.0	26
7-Jul	14	14	14	12	Z	12	13	15	18	19	19	20	22	23	23	24	24	25	26	26	25	25	22	22	19.9	26
8-Jul	21	21	23	24	24	Z	22	21	20	21	22	24	26	23	26	27	28	28	29	29	27	25	23	22	24.1	29
9-Jul	21	20	22	23	20	21	Z	21	21	20	20	21	22	27	27	28	28	27	27	27	28	28	28	27	24.1	28
10-Jul	25	24	23	24	23	22	21	Z	22	23	24	27	26	28	25	23	24	25	25	27	27	27	24	24	24.6	28
11-Jul	25	23	22	20	19	18	16	16	16	19	20	21	20	19	20	19	20	21	22	23	26	28	27	25	21.0	28
12-Jul	22	21	18	Z	17	17	20	23	25	27	33	41	35	C	C	C	C	31	30	35	34	36	32	27	27.5	41
13-Jul	27	21	18	19	Z	16	18	19	18	20	26	28	28	27	32	33	33	32	31	30	25	24	24	25	25.0	33
14-Jul	26	25	23	21	20	Z	21	23	25	31	35	35	35	36	36	36	38	38	39	37	35	35	35	33	31.2	39
15-Jul	32	26	28	29	24	23	Z	24	24	21	20	22	23	25	29	32	33	34	34	34	33	32	34	29	28.1	34
16-Jul	36	25	35	44	38	30	27	Z	33	32	29	27	25	25	26	26	26	26	25	23	33	35	33	32	30.0	44
17-Jul	32	29	33	24	20	20	19	18	Z	20	21	20	20	20	23	23	22	21	23	23	22	19	18	17	21.9	33
18-Jul	16	15	15	Z	15	16	17	17	20	20	21	21	21	23	25	26	28	29	30	29	27	26	23	23	21.9	30
19-Jul	23	22	22	22	Z	20	19	20	22	25	28	32	35	35	35	34	32	32	35	35	32	32	30	31	28.4	35
20-Jul	33	33	31	29	28	Z	27	27	27	26	27	29	28	29	28	29	29	30	31	31	33	34	33	32	29.7	34
21-Jul	30	29	30	29	28	27	Z	28	27	26	26	26	26	25	24	24	25	26	26	25	27	27	22	21	26.3	30
22-Jul	23	22	22	21	23	22	22	Z	29	29	31	31	31	30	30	30	31	34	31	29	27	26	23	24	27.1	34
23-Jul	23	26	22	18	17	17	17	15	Z	16	14	13	12	15	15	16	16	19	17	13	12	14	17	16	16.5	26
24-Jul	14	14	14	Z	11	11	13	14	17	20	21	19	23	27	28	28	28	29	32	36	34	33	33	31	23.0	36
25-Jul	28	26	25	23	Z	20	22	23	23	23	22	22	22	22	23	23	23	23	22	22	20	20	20	17	22.2	28
26-Jul	13	16	16	19	20	Z	20	25	29	35	36	34	36	30	28	23	26	32	35	32	31	32	33	32	27.6	36
27-Jul	30	28	26	27	27	26	Z	29	33	31	28	29	29	31	34	35	37	33	31	29	28	27	25	24	29.4	37
28-Jul	24	26	28	27	26	25	24	Z	23	21	22	22	24	25	29	30	26	24	22	19	17	16	15	15	23.2	30
29-Jul	15	14	14	14	14	13	15	18	Z	19	17	19	19	20	21	21	22	24	26	24	25	25	24	21	19.3	26
30-Jul	18	18	17	Z	16	15	17	16	16	15	13	15	17	16	17	19	26	31	31	32	29	23	19	18	19.7	32
31-Jul	16	20	20	17	Z	16	14	15	14	14	16	13	10	14	15	18	23	24	24	26	23	21	20	22	18.0	26
24.1 23.0 22.7 23.5 21.5 19.5 19.0 20.3 22.8 23.2 24.3 24.7 25.5 25.7 26.7 27.0 27.9 28.4 28.3 27.9 27.0 26.5 25.5 24.5																								Diurnal Average		
39 36 35 44 38 30 27 31 38 42 45 42 47 48 50 46 47 47 48 45 41 41 37 39																								Diurnal Maximum		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	192	27.04	27.04
21 - 50	518	72.96	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - July 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	1	1	2	22	11	4	1	4	4	1	9	23	36	22	31	191
21 - 50	20	10	5	36	117	33	13	17	14	15	27	53	70	33	31	22	516
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	39	11	6	38	139	44	17	18	18	19	28	62	93	69	53	53	707

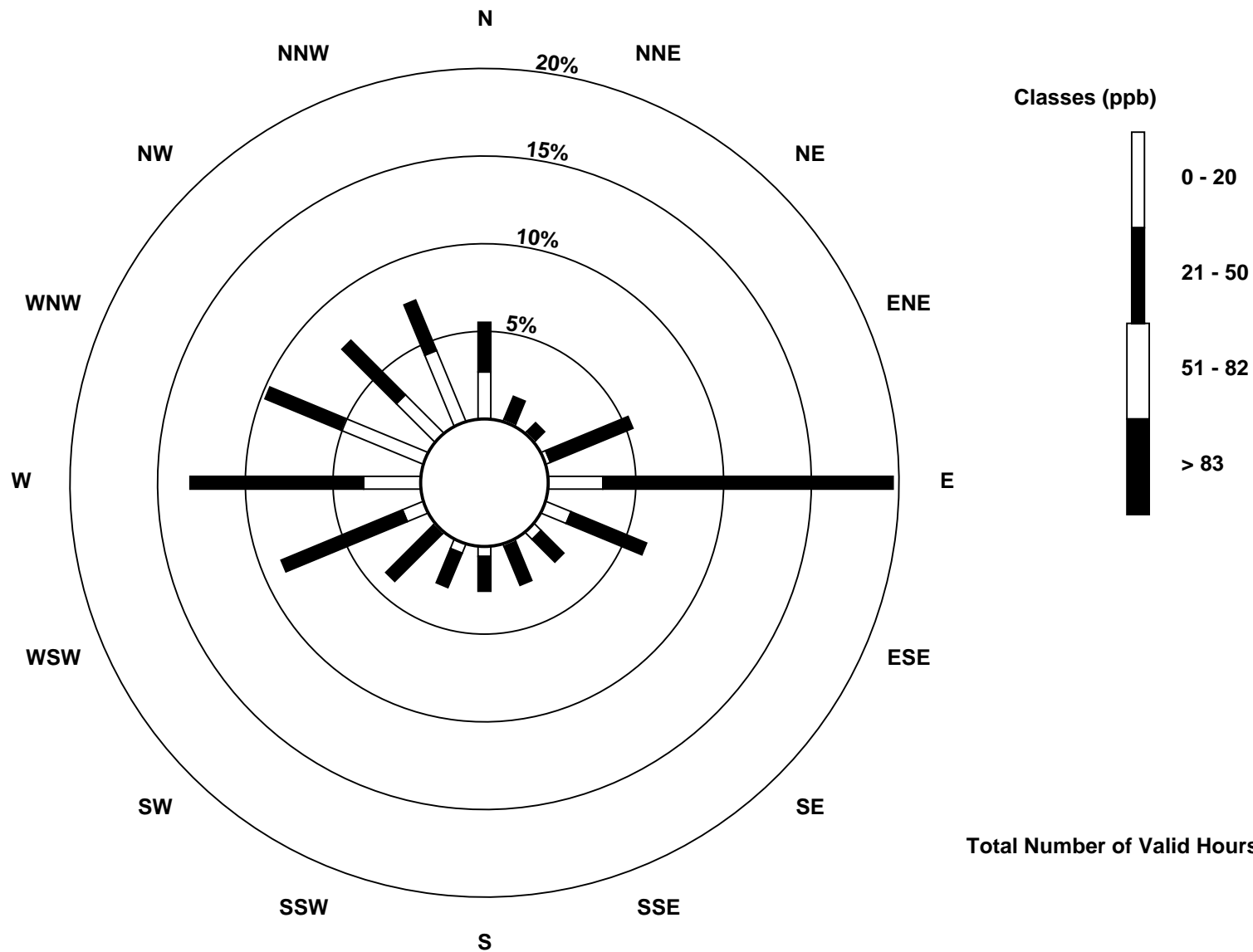
Total Number of Valid Hours: 707

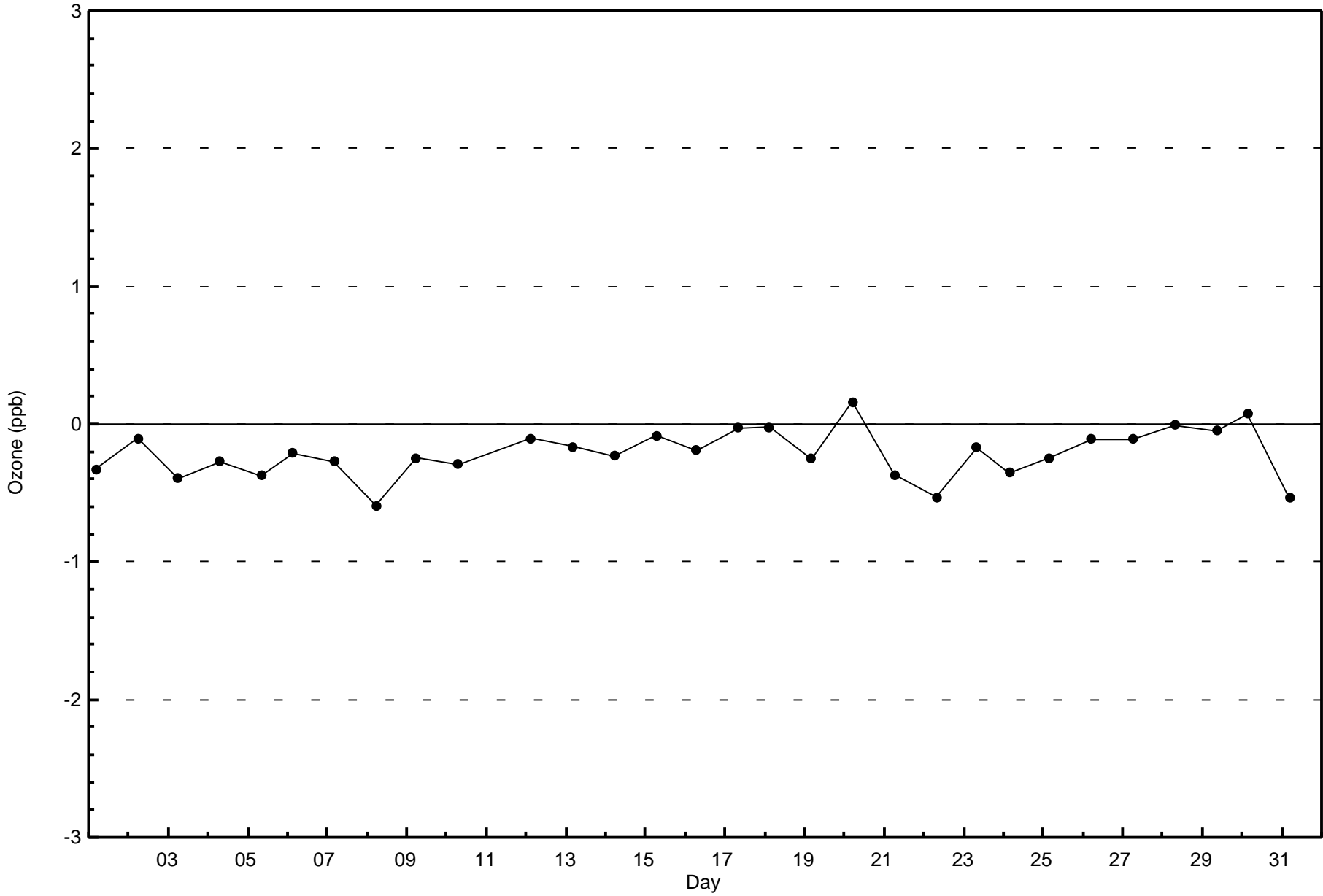
Total Number of Hours: 744

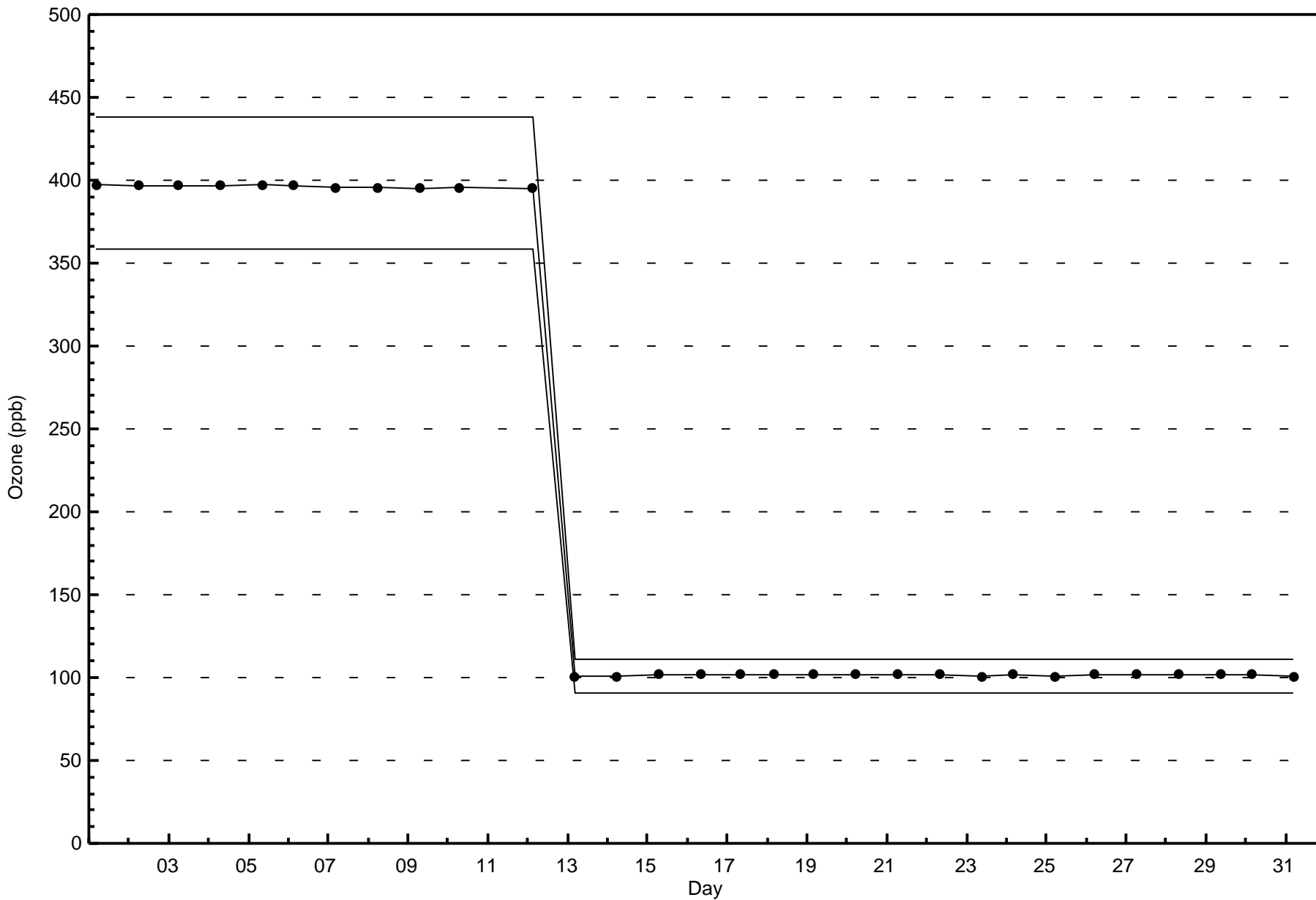


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)







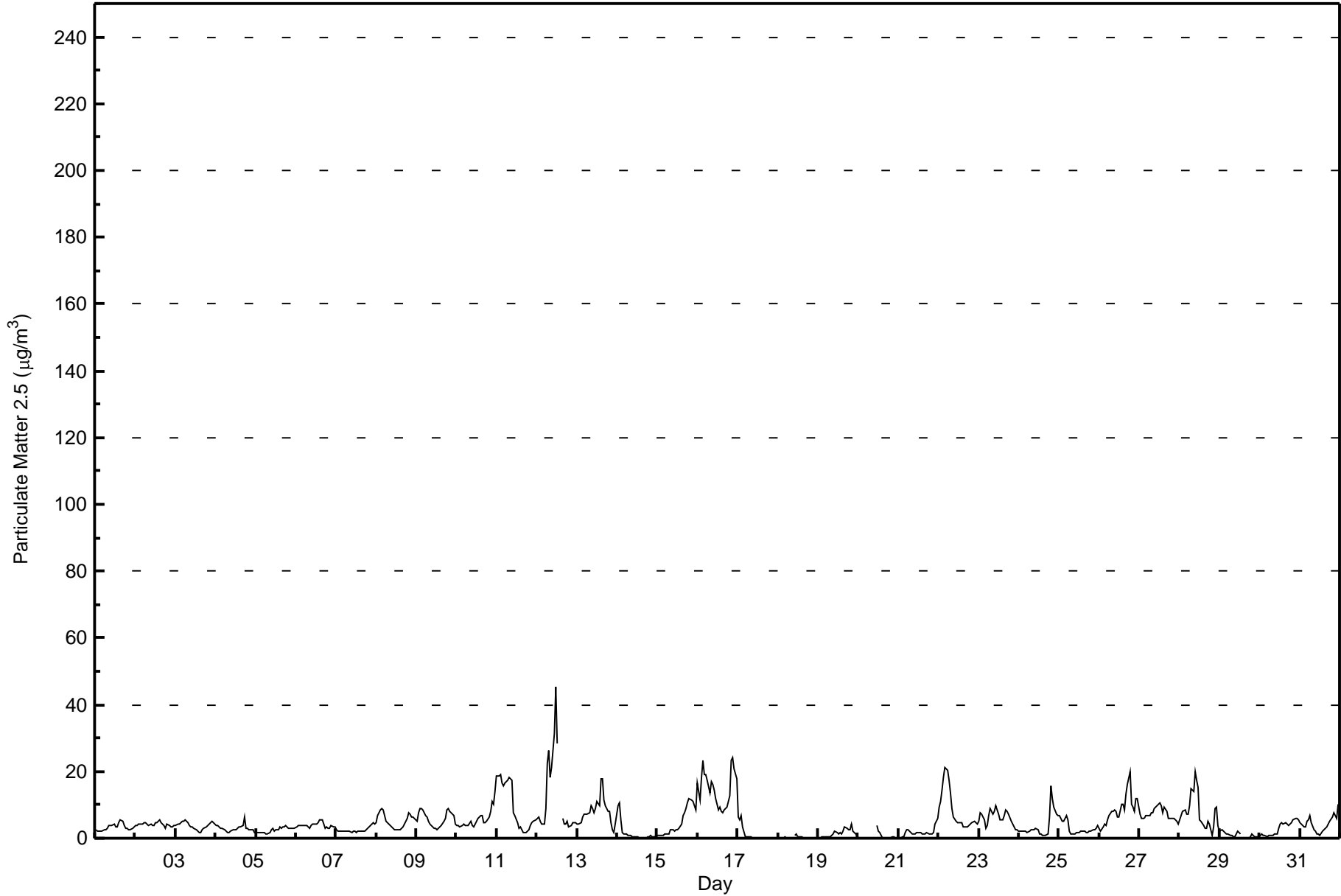


Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 45.2 µg/m ³ on Jul 12 12:00 Minimum Value: 0.0 µg/m ³ on Jul 18 17:00 Maximum Diurnal Average: 5.5 µg/m ³ at hour 12 Monthly Average: 4.91 µg/m ³		Maximum Daily Average: 15.0 µg/m ³ on Jul 16 Minimum Daily Average: 0.2 µg/m ³ on Jul 18 Minimum Diurnal Average: 3.9 µg/m ³ at hour 14 Percentiles: P ₁ = 0.1 P ₁₀ = 0.6 Q ₁ = 1.9 Median = 3.7 Q ₃ = 6.3 P ₉₀ = 10.0 P ₉₉ = 23.1		Hours in Service: 744 Hours of Data: 720 Hours of Missing Data: 24 Hours of Calibration: 2 Percent Operational Time: 97.0																						
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-Jul	2.4	2.0	2.2	2.1	2.2	2.3	2.6	3.1	3.7	3.8	3.7	4.2	3.4	3.2	4.7	5.5	5.0	3.6	3.0	2.9	2.6	2.7	3.1	3.6	3.2	5.5
2-Jul	3.8	3.9	4.4	4.2	4.2	4.5	4.7	4.0	4.0	4.1	3.8	3.7	4.7	4.5	5.5	4.8	4.3	3.9	2.9	4.0	3.9	3.4	3.5	3.7	4.1	5.5
3-Jul	3.9	4.1	4.2	4.6	5.0	5.1	5.4	4.9	3.7	3.3	3.3	3.1	2.6	2.1	1.8	1.8	2.4	3.1	3.6	3.8	4.1	4.6	4.9	4.1	3.7	5.4
4-Jul	3.9	3.8	3.4	3.1	2.8	2.5	1.9	1.7	1.8	2.1	2.5	2.5	2.7	3.0	3.2	3.6	3.9	6.2	3.1	2.8	2.5	2.7	2.4	1.5	2.9	6.2
5-Jul	1.6	1.6	1.7	1.7	1.6	1.5	1.5	1.5	1.6	2.6	2.8	2.2	2.4	2.5	3.2	3.1	3.3	3.4	3.6	3.1	2.9	2.9	3.0	3.0	2.4	3.6
6-Jul	3.4	3.7	3.7	3.6	3.7	3.9	3.8	3.4	3.2	3.8	4.4	4.3	4.4	4.8	5.7	5.7	5.3	3.0	3.3	2.8	3.2	3.6	3.5	3.3	3.9	5.7
7-Jul	2.5	2.1	2.1	2.0	2.0	2.0	2.2	2.1	2.0	1.9	1.9	1.9	1.8	2.0	2.2	2.2	2.1	2.2	2.7	3.2	3.9	4.3	4.7	4.2	2.5	4.7
8-Jul	4.6	7.0	8.7	8.7	8.4	6.7	5.0	4.1	3.8	3.2	2.9	2.6	2.6	2.7	2.4	2.9	3.5	4.4	5.8	7.5	7.2	6.5	6.3	5.4	5.1	8.7
9-Jul	5.2	7.6	8.9	8.9	8.6	6.7	6.3	5.1	4.2	3.8	3.1	2.8	2.6	2.9	3.2	3.7	4.9	6.0	8.3	8.8	8.1	7.2	6.6	4.2	5.7	8.9
10-Jul	3.6	3.8	3.5	3.7	4.3	3.9	3.8	3.9	5.2	3.8	3.5	4.2	4.9	6.1	6.7	6.7	4.6	4.6	5.0	6.5	7.9	11.2	10.4	14.2	5.7	14.2
11-Jul	18.9	18.8	18.9	16.6	15.7	16.4	17.6	18.2	17.8	17.5	7.8	6.9	4.6	3.1	3.4	2.6	1.9	1.9	2.2	2.5	3.8	4.6	5.2	5.5	9.7	18.9
12-Jul	6.1	6.2	5.3	4.1	4.3	8.8	22.6	26.4	18.1	21.1	31.3	45.2	28.5	C	C	5.8	4.1	4.4	4.9	3.6	3.8	4.8	4.7	4.6	12.2	45.2
13-Jul	4.4	4.1	4.8	6.5	7.4	7.2	7.2	7.6	9.7	8.9	7.7	8.8	11.1	9.6	18.0	18.0	11.4	9.6	8.2	8.2	4.6	2.4	1.8	4.4	8.0	18.0
14-Jul	9.7	10.4	5.6	1.9	1.4	1.2	1.1	0.8	0.7	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.8	0.6	0.6	0.9	1.6	10.4
15-Jul	0.9	0.9	0.8	0.9	1.1	1.2	1.2	1.1	2.4	2.7	2.2	2.8	2.7	3.0	4.3	6.6	7.6	8.7	10.5	11.7	11.5	10.8	9.8	8.6	4.7	11.7
16-Jul	16.6	11.3	18.1	23.2	19.0	19.0	17.4	13.6	16.8	16.2	14.5	11.9	8.6	9.5	8.2	7.6	8.6	9.4	11.2	12.7	23.1	24.1	20.9	17.8	15.0	24.1
17-Jul	6.5	5.6	7.0	3.6	0.6	0.4	0.5	0.4	0.4	0.2	0.1	0.1	0.0	UO	UO	UO	UO	UO	0.1	UO	UO	UO	UO	UO	--	7.0
18-Jul	UO	UO	0.1	0.1	0.2	0.2	0.1	0.1	UO	UO	0.7	1.1	0.5	0.5	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	1.1
19-Jul	0.2	0.2	0.3	0.4	0.5	0.5	0.6	0.6	0.8	1.2	1.9	1.7	1.4	1.5	1.4	2.1	3.4	3.0	2.6	2.4	4.4	2.1	1.2	0.7	1.5	4.4
20-Jul	0.1	UO	UO	UO	UO	0.1	0.1	0.1	0.1	0.1	UO	3.7	2.2	1.9	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.5	3.7
21-Jul	0.1	0.2	0.2	0.6	1.9	2.6	2.4	1.6	1.3	1.3	1.3	1.5	1.6	1.6	1.3	1.2	1.3	1.6	1.4	1.3	1.2	1.8	4.1	5.8	1.6	5.8
22-Jul	9.4	11.2	14.4	18.1	21.2	20.4	17.3	13.5	8.7	6.5	4.9	4.5	4.8	4.7	4.7	3.6	3.2	3.2	3.7	4.3	4.5	5.0	4.8	4.3	8.4	21.2
23-Jul	5.2	7.4	7.3	5.4	3.1	3.7	6.9	8.8	7.1	8.2	9.8	8.3	7.0	5.3	5.5	6.8	8.3	8.0	7.1	5.3	4.1	3.3	2.6	2.7	6.1	9.8
24-Jul	2.2	2.2	2.0	2.0	2.1	1.8	2.3	2.6	2.7	2.6	3.0	2.4	1.4	1.1	0.9	0.9	0.8	1.5	6.4	15.8	11.9	9.5	7.3	6.6	3.8	15.8
25-Jul	6.8	5.9	5.1	5.2	6.7	5.5	2.2	1.4	1.5	1.4	1.5	1.6	1.7	1.9	2.0	2.0	1.8	1.7	2.1	2.1	2.4	2.4	3.0	3.8	3.0	6.8
26-Jul	2.8	2.2	3.2	4.2	4.0	5.4	6.8	8.1	7.8	8.4	8.2	6.4	6.3	10.3	10.3	8.6	13.0	15.9	19.7	10.3	9.1	7.9	12.1	11.7	8.5	19.7
27-Jul	7.2	5.8	6.1	6.1	6.6	6.8	6.9	7.4	7.7	8.8	9.2	10.2	10.6	9.8	7.7	9.4	8.1	6.1	5.8	6.1	6.0	5.8	5.0	4.2	7.2	10.6
28-Jul	5.6	6.9	8.2	8.3	7.1	7.3	9.6	14.9	14.1	20.1	17.6	15.4	5.6	5.0	3.6	3.0	2.9	5.3	4.2	0.9	3.2	9.0	9.2	3.8	7.9	20.1
29-Jul	2.1	2.6	2.2	1.9	1.4	1.2	0.9	0.7	0.5	0.5	1.4	2.2	1.5	UO	UO	UO	0.1	0.2	0.4	1.4	0.8	0.4	0.4	0.6	1.1	2.6
30-Jul	1.0	1.2	1.0	0.7	0.6	0.7	0.8	0.8	0.9	1.1	1.4	2.8	4.4	4.7	4.2	4.5	4.3	4.0	4.1	4.6	5.7	5.9	5.8	5.4	2.9	5.9
31-Jul	4.9	4.1	3.3	3.4	5.0	5.5	6.6	4.8	2.4	2.0	1.1	1.2	1.0	2.3	2.6	2.9	3.6	4.0	5.0	6.6	7.6	6.9	6.1	10.1	4.3	10.1
																								Diurnal Average		
4.9 5.1 5.2 5.2 5.1 5.0 5.4 5.4 5.1 5.4 5.3 5.5 4.5 3.9 4.2 4.3 4.1 4.3 4.6 4.9 5.2 5.2 5.1 5.0																								Diurnal Maximum		
18.9 18.8 18.9 23.2 21.2 20.4 22.6 26.4 18.1 21.1 31.3 45.2 28.5 10.3 18.0 18.0 13.0 15.9 19.7 15.8 23.1 24.1 20.9 17.8																										
C - Calibration 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}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	406	56.39	56.39
6 - 15	173	24.03	80.42
16 - 25	36	5.00	85.42
26 - 80	4	0.56	85.97
> 81.0	0	0.00	85.97

Total Number of Valid Hours: 720

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Chipewyan - July 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	21	8	2	9	85	30	16	15	15	10	10	35	63	42	24	20	405
6 - 15	10	2	1	20	23	7	1	2	2	5	16	15	27	18	14	10	173
16 - 25	1	0	2	0	1	1	0	0	0	4	1	3	3	6	5	8	35
26 - 80	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	10	5	29	110	39	17	17	17	19	27	53	93	67	43	38	616

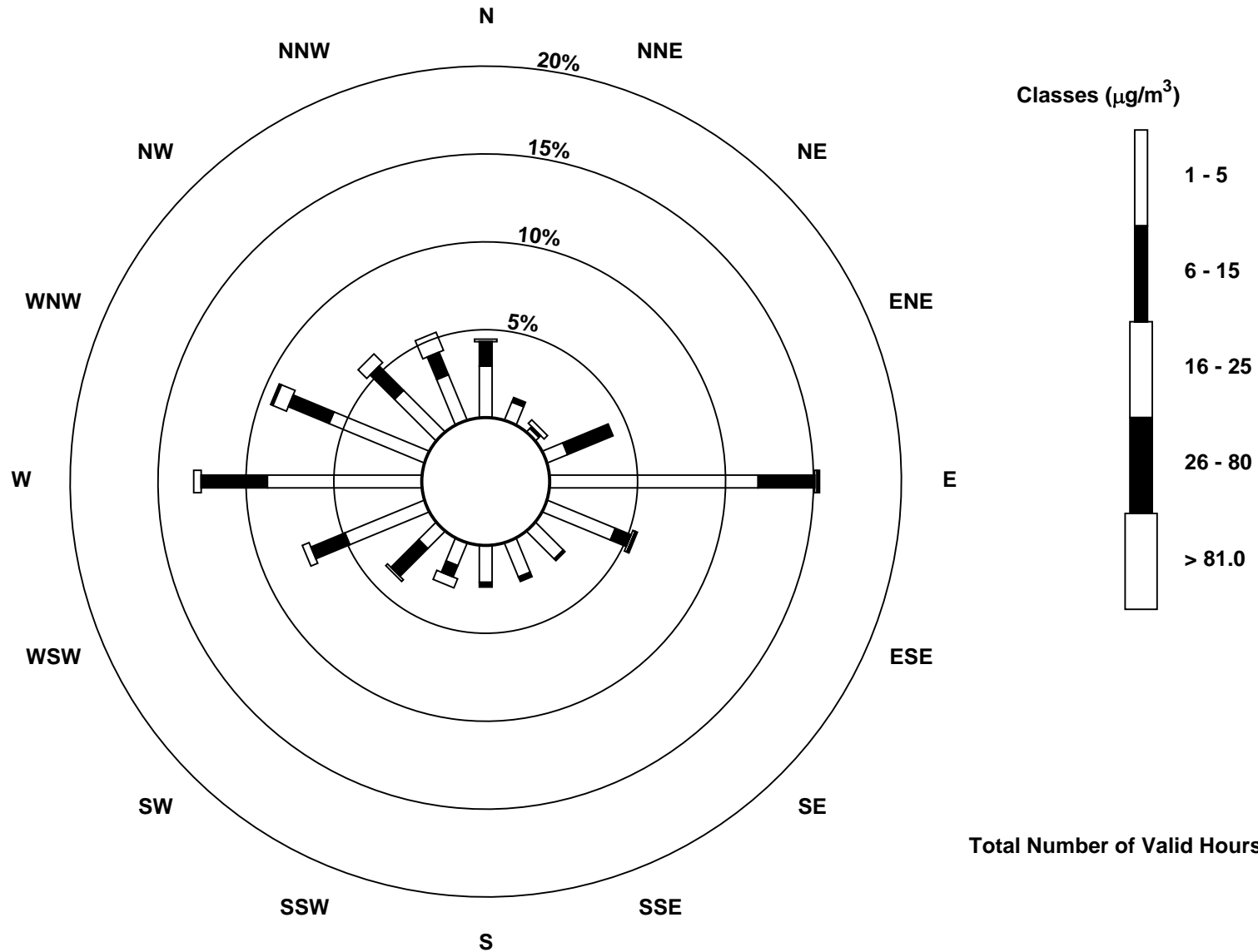
Total Number of Valid Hours: 717

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

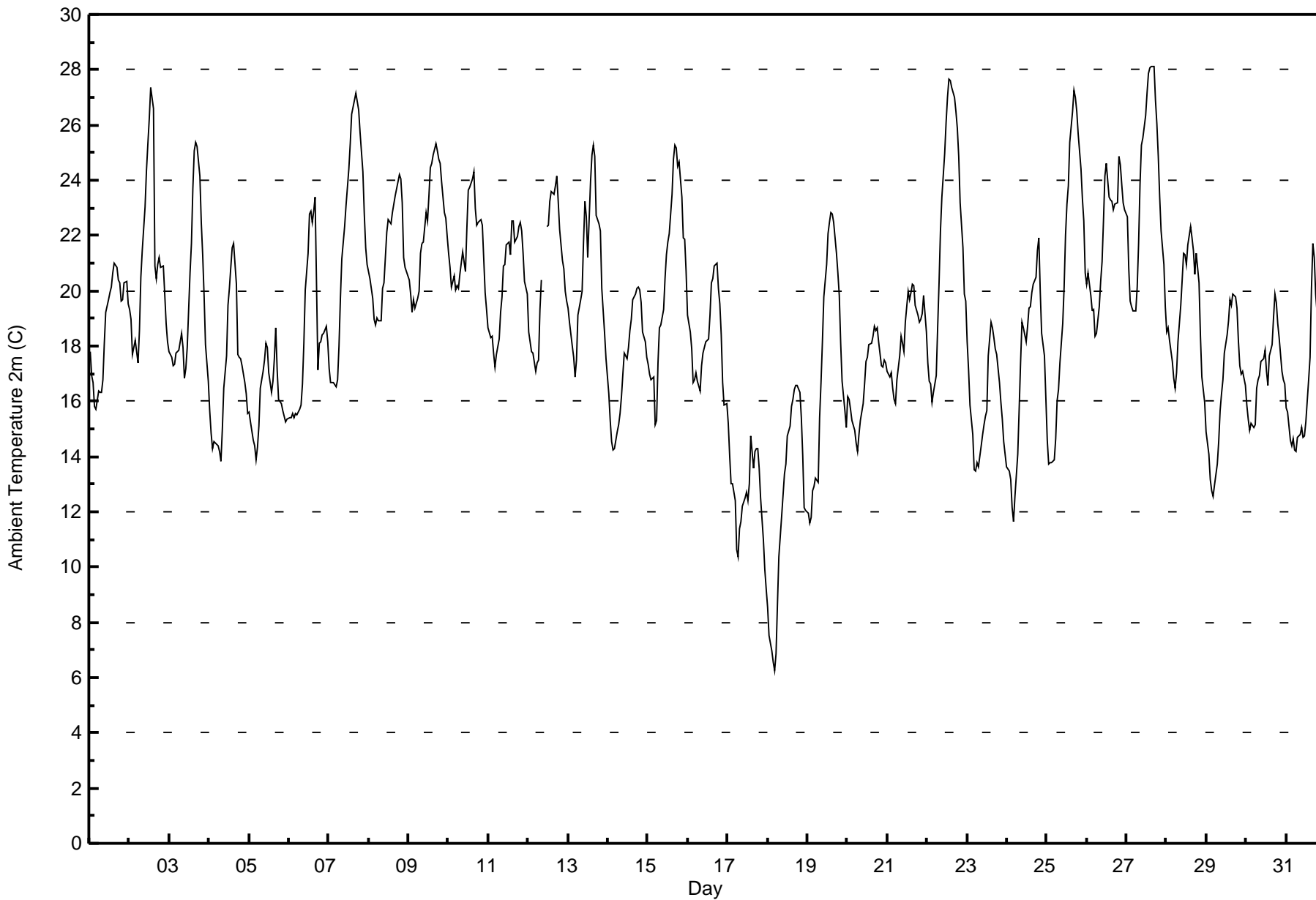
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 717



Maximum Value: 28.1 C on Jul 27 17:00 Maximum Daily Average: 23.6 C on Jul 27																				Hours in Service: 744 Hours of Data: 742						
Minimum Value: 6.3 C on Jul 18 05:00 Minimum Daily Average: 12.3 C on Jul 18 Maximum Diurnal Average: 22.0 C at hour 17 Minimum Diurnal Average: 15.6 C at hour 5 Monthly Average: 18.85 C Percentiles: P ₁ = 9.2 P ₁₀ = 14.3 Q ₁ = 16.4 Median = 18.6 Q ₃ = 21.3 P ₉₀ = 23.8 P ₉₉ = 27.1																				Hours of Missing Data: 2 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-Jul	17.8	16.9	16.7	15.8	15.7	16.4	16.3	16.3	16.8	18.1	19.2	19.7	20.0	20.1	20.7	21.0	20.9	20.4	20.3	19.6	19.7	20.3	20.4	19.5	18.7	21.0
2-Jul	19.3	19.0	17.7	18.2	17.8	17.4	18.5	20.5	21.4	23.1	24.4	25.3	26.2	27.4	26.6	20.9	20.4	20.9	21.2	20.8	20.9	19.9	18.8	18.1	21.0	27.4
3-Jul	17.8	17.6	17.3	17.3	17.8	17.8	17.8	18.5	18.0	16.8	17.2	18.0	20.6	21.7	23.7	25.0	25.2	24.2	22.5	21.3	19.8	18.1	16.7	19.8	25.4	
4-Jul	15.7	14.9	14.3	14.6	14.5	14.4	14.2	13.8	15.0	16.5	17.6	19.5	20.1	20.8	21.6	21.7	20.2	17.7	17.6	17.5	17.3	16.7	16.3	15.6	17.0	21.7
5-Jul	15.6	15.3	14.6	14.4	13.9	14.4	15.1	16.5	17.1	17.5	18.1	17.9	17.1	16.3	16.7	17.5	18.6	17.1	16.0	15.9	15.7	15.4	15.3	15.3	16.1	18.6
6-Jul	15.4	15.4	15.6	15.4	15.5	15.5	15.7	15.8	16.6	18.1	20.0	21.4	22.8	22.9	22.5	22.9	23.4	17.1	18.1	18.2	18.4	18.5	18.7	18.1	18.4	23.4
7-Jul	17.2	16.7	16.7	16.7	16.5	16.8	18.0	19.7	21.1	22.3	23.1	23.7	24.4	25.3	26.4	26.9	27.1	26.9	26.5	25.7	24.3	22.8	21.5	20.9	22.0	27.1
8-Jul	20.7	20.4	19.7	18.9	18.7	19.0	18.9	18.9	20.1	20.3	21.2	22.1	22.6	22.4	22.8	23.1	23.5	23.7	24.2	24.1	23.2	21.2	20.8	20.6	21.3	24.2
9-Jul	20.4	19.9	19.2	19.7	19.4	19.7	20.0	21.4	21.7	21.7	22.8	22.5	23.5	24.5	24.6	24.9	25.3	25.1	24.8	24.6	23.9	22.9	22.7	22.0	22.4	25.3
10-Jul	21.4	20.9	20.1	20.5	20.0	20.2	20.1	20.6	21.4	21.1	20.7	22.3	23.6	23.8	24.0	24.3	23.0	22.4	22.5	22.6	22.4	21.2	19.9	19.3	21.6	24.3
11-Jul	18.7	18.3	18.3	17.8	17.2	17.7	18.3	19.2	19.8	20.9	20.9	21.7	21.7	21.3	22.5	22.5	21.8	22.0	22.3	22.5	22.2	21.4	20.3	19.9	20.4	22.5
12-Jul	18.5	18.2	17.8	17.7	17.1	17.4	17.5	19.3	20.4	M	M	22.3	22.4	23.2	23.6	23.5	23.8	24.1	23.2	22.2	21.1	20.8	20.0	19.6	20.6	24.1
13-Jul	19.4	18.9	18.0	17.6	16.9	17.5	19.1	19.7	20.0	21.8	23.2	22.7	21.2	23.9	24.9	25.3	24.9	22.7	22.4	22.2	20.1	19.3	18.4	17.5	20.7	25.3
14-Jul	16.3	15.3	14.5	14.2	14.3	14.9	15.1	15.6	16.2	17.0	17.8	17.5	17.9	18.6	19.0	19.7	19.9	20.1	20.1	20.0	19.6	18.5	18.2	17.6	17.4	20.1
15-Jul	17.4	17.0	16.8	16.9	15.1	15.3	17.4	18.7	18.8	19.3	20.5	21.3	21.8	22.1	23.5	24.7	25.3	25.2	24.5	24.7	23.4	21.9	21.9	20.7	20.6	25.3
16-Jul	19.1	18.5	17.9	16.7	16.8	17.0	16.7	16.4	17.3	17.8	17.9	18.2	18.2	19.1	20.3	20.5	20.9	21.0	20.1	19.5	18.4	16.7	15.9	15.9	18.2	21.0
17-Jul	15.2	14.0	13.0	13.0	12.4	10.6	10.4	11.4	11.7	12.2	12.5	12.7	12.4	13.0	14.7	13.6	14.2	14.3	14.3	13.6	12.5	11.0	9.9	9.2	12.6	15.2
18-Jul	8.5	7.5	7.0	6.5	6.3	6.9	8.6	10.4	11.8	12.6	13.4	13.7	14.7	15.1	15.8	16.1	16.4	16.6	16.6	16.3	15.4	14.0	12.2	12.1	12.3	16.6
19-Jul	12.0	11.6	11.8	12.8	12.9	13.2	13.1	15.4	16.7	18.2	19.8	20.9	22.1	22.5	22.9	22.8	22.5	21.3	20.7	19.8	18.1	16.7	15.7	15.1	17.4	22.9
20-Jul	16.2	16.1	15.7	15.3	14.9	14.5	14.2	14.8	15.3	15.9	16.6	17.4	17.6	18.0	18.1	18.3	18.7	18.6	18.7	18.2	17.3	17.2	17.5	17.4	16.8	18.7
21-Jul	17.1	16.9	17.0	16.5	16.1	15.9	16.8	17.7	18.4	18.1	17.8	18.9	20.0	19.7	20.0	20.2	20.2	19.5	19.1	18.9	18.9	19.2	19.8	18.5	18.4	20.2
22-Jul	17.4	16.7	16.6	16.0	16.3	17.0	18.7	20.3	22.2	23.4	24.9	26.1	27.0	27.7	27.6	27.4	27.0	26.5	25.9	24.9	23.2	21.5	19.9	19.6	22.2	27.7
23-Jul	18.1	17.1	15.9	14.8	13.5	13.5	13.8	13.7	14.4	14.8	15.1	15.5	15.7	17.7	18.8	18.6	18.3	17.9	17.7	16.7	16.0	15.4	14.5	14.1	15.9	18.8
24-Jul	13.6	13.5	13.2	12.1	11.6	12.5	14.1	15.7	17.4	18.8	18.7	18.1	18.7	19.4	19.4	20.0	20.2	20.5	21.4	21.9	20.0	18.5	17.6	16.1	17.2	21.9
25-Jul	14.6	13.7	13.8	13.8	13.9	14.7	16.0	16.4	17.4	18.8	20.2	22.0	23.2	23.8	25.4	26.5	27.2	27.0	26.5	25.7	24.4	23.3	22.5	20.7	20.5	27.2
26-Jul	20.3	20.7	19.9	19.3	19.3	18.4	18.5	19.4	20.3	21.0	22.5	24.1	24.6	23.4	23.3	23.2	22.9	23.2	23.2	24.9	24.5	23.8	23.2	22.9	22.0	24.9
27-Jul	22.7	20.8	19.6	19.4	19.3	20.1	21.7	23.8	25.3	25.5	26.3	27.1	27.9	28.1	28.1	28.1	26.9	26.1	24.9	23.4	22.1	20.9	19.4	23.6	28.1	
28-Jul	18.5	18.6	18.2	17.4	16.8	16.5	17.0	18.2	19.5	20.4	21.4	21.3	20.9	21.7	22.3	21.9	21.5	20.6	21.3	20.3	18.4	16.9	16.4	16.0	19.2	22.3
29-Jul	14.9	14.1	13.2	12.8	12.6	13.0	13.7	14.6	15.6	16.3	16.8	17.7	18.4	18.9	19.7	19.5	19.9	19.8	19.4	18.2	17.3	17.0	17.1	16.6	16.5	19.9
30-Jul	15.9	15.3	14.9	15.2	15.0	15.2	16.5	16.8	16.9	17.4	17.6	17.8	17.1	16.6	17.6	18.0	19.0	19.9	19.6	18.8	18.3	17.1	16.8	16.6	17.1	19.9
31-Jul	15.8	15.6	14.6	14.4	14.6	14.2	14.2	14.7	14.8	15.0	14.7	14.8	15.3	16.8	17.6	20.1	21.7	21.2	19.9	18.5	16.8	16.3	15.9	15.6	16.4	21.7
17.1 16.6 16.1 15.9 15.6 15.7 16.3 17.2 18.0 18.7 19.4 20.1 20.6 21.1 21.8 21.9 22.0 21.5 21.2 20.8 19.9 18.9 18.3 17.7																								Diurnal Average		
22.7 20.9 20.1 20.5 20.0 20.2 20.1 21.7 23.8 25.3 25.5 26.3 27.1 27.9 28.1 28.1 28.1 27.0 26.5 25.7 24.5 23.8 23.2 22.9																								Diurnal Maximum		
M - Maintenance																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	9	1.21	1.21
10 - 20	461	62.13	63.34
> 20	272	36.66	100.00

Total Number of Valid Hours: 742

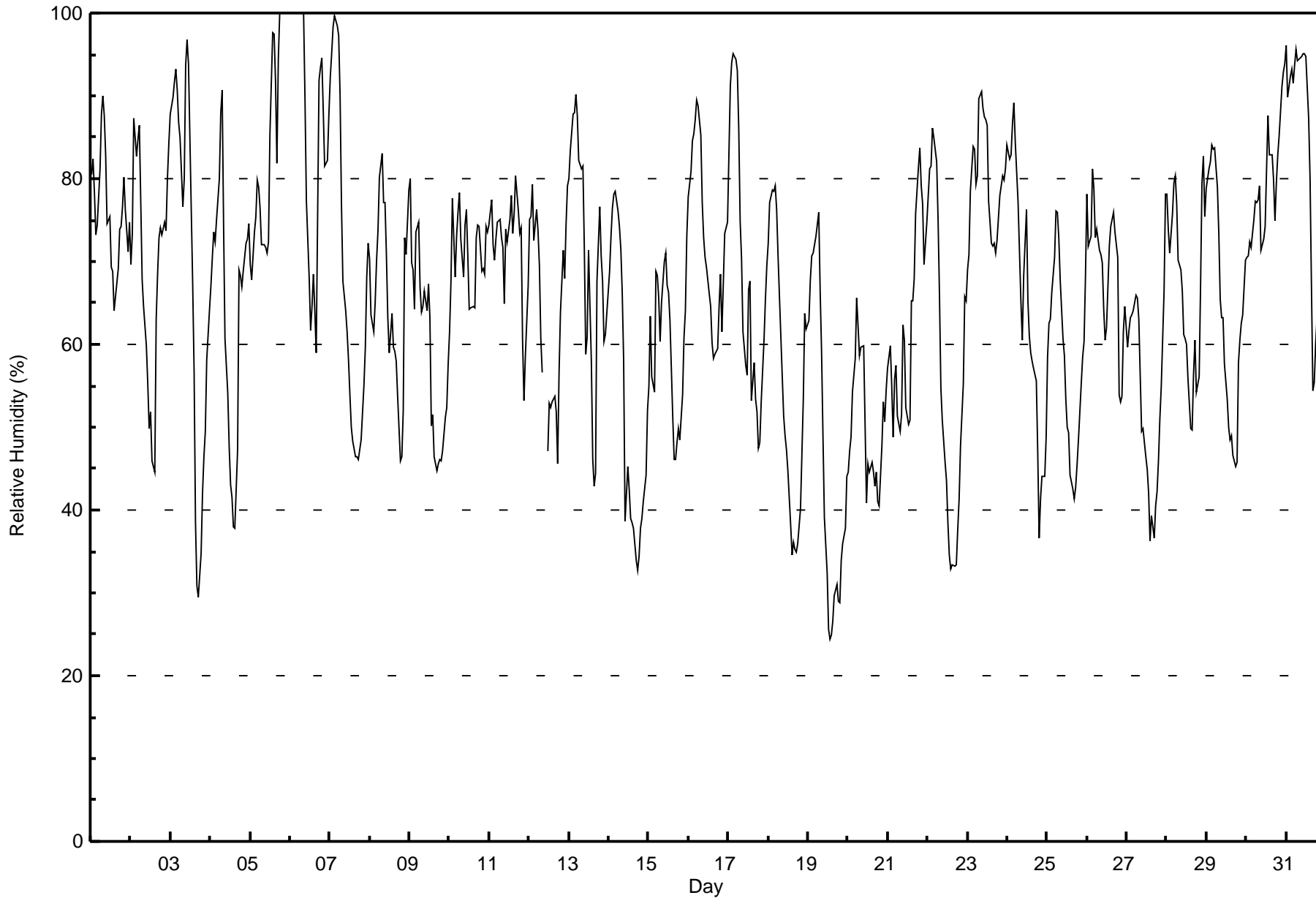
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Fort Chipewyan - July 2017

Maximum Value: 100 % on Jul 5 19:00														Maximum Daily Average: 86.3 % on Jul 6														Hours in Service: 744	
Minimum Value: 24 % on Jul 19 14:00														Minimum Daily Average: 46.3 % on Jul 19														Hours of Data: 742	
Maximum Diurnal Average: 79.6 % at hour 6														Minimum Diurnal Average: 54.1 % at hour 17														Hours of Missing Data: 2	
Monthly Average: 66.6 %														Percentiles: P ₁ = 29 P ₁₀ = 45 Q ₁ = 55 Median = 68 Q ₃ = 77 P ₉₀ = 88 P ₉₉ = 100														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-Jul	81	82	78	73	74	81	88	90	88	83	75	75	69	69	64	66	69	74	74	77	80	76	71	75	76.4	90			
2-Jul	70	73	87	83	85	86	77	68	64	60	55	50	52	46	45	63	68	73	74	73	75	74	80	84	69.4	87			
3-Jul	88	90	92	93	91	87	85	77	80	94	97	94	76	67	57	38	31	30	35	42	47	50	58	64	69.2	97			
4-Jul	67	71	73	72	75	80	88	91	75	61	54	48	43	42	38	38	47	69	68	67	69	72	73	75	64.8	91			
5-Jul	70	68	74	75	80	79	76	72	72	72	71	72	85	98	97	92	82	94	100	100	100	100	100	100	84.6	100			
6-Jul	100	100	100	100	100	100	100	100	100	90	77	68	62	65	69	64	59	92	93	95	88	81	82	88	86.3	100			
7-Jul	92	95	98	100	98	97	90	77	68	64	62	58	54	50	48	46	46	46	47	48	55	60	68	72	68.4	100			
8-Jul	70	64	61	65	70	74	80	83	77	77	71	63	59	64	60	59	58	54	46	46	52	73	71	79	65.7	83			
9-Jul	80	70	69	64	74	75	67	64	65	67	64	67	63	50	52	46	45	46	46	46	47	51	52	58	59.5	80			
10-Jul	62	68	78	68	73	76	78	73	68	74	76	71	64	64	65	64	73	74	74	69	69	69	74	74	70.8	78			
11-Jul	74	77	72	70	73	75	75	73	72	65	74	72	75	78	73	76	80	76	73	74	61	53	59	67	71.6	80			
12-Jul	75	76	79	73	76	74	70	61	57	M	M	47	53	52	53	54	52	46	57	64	71	68	75	79	64.1	79			
13-Jul	80	83	88	88	90	88	82	81	82	71	59	61	71	58	46	43	44	68	77	71	68	60	61	64	70.1	90			
14-Jul	69	73	77	78	78	76	74	72	66	58	39	45	42	39	38	38	34	33	34	38	39	41	44	52	53.2	78			
15-Jul	55	63	56	54	69	68	66	60	65	70	71	67	66	63	51	46	46	48	50	49	54	61	64	73	59.8	73			
16-Jul	78	81	85	85	87	90	89	85	77	73	71	69	66	65	60	58	59	59	64	68	62	67	73	75	72.8	90			
17-Jul	83	91	94	95	94	93	86	75	70	62	58	56	67	68	53	58	53	52	47	48	53	61	65	70	68.8	95			
18-Jul	72	77	79	79	79	76	71	66	56	51	49	47	45	38	35	36	35	35	36	40	47	53	64	62	55.3	79			
19-Jul	63	68	71	71	72	73	76	66	59	49	39	32	26	24	25	27	30	31	29	29	34	36	38	44	46.3	76			
20-Jul	45	47	49	54	58	66	62	59	60	60	50	41	46	45	46	45	43	45	41	41	48	53	51	54	50.2	66			
21-Jul	57	60	55	49	56	57	51	49	51	62	61	52	50	51	65	65	68	76	81	84	79	77	70	75	62.6	84			
22-Jul	78	81	81	86	85	82	75	66	55	51	46	44	38	35	33	33	33	33	38	41	48	55	66	65	56.2	86			
23-Jul	69	71	78	84	84	79	80	90	90	88	87	87	86	77	72	72	72	71	73	78	79	80	80	81	79.6	90			
24-Jul	84	82	83	87	89	84	77	71	65	60	68	76	65	61	59	58	57	56	47	37	41	44	44	49	64.4	89			
25-Jul	59	63	63	66	71	76	76	73	68	61	59	53	50	49	44	42	41	43	45	49	55	58	60	68	58.0	76			
26-Jul	78	72	73	81	79	73	74	71	71	70	64	60	62	72	74	75	76	74	70	54	53	54	61	64	69.0	81			
27-Jul	60	62	63	63	64	66	66	63	56	49	50	46	45	42	36	39	37	41	42	46	51	55	67	78	53.6	78			
28-Jul	78	74	71	76	79	80	77	70	69	66	61	61	60	56	50	50	57	61	54	56	67	79	83	75	67.1	83			
29-Jul	79	81	82	84	84	84	79	73	65	63	63	58	53	50	48	49	47	45	46	58	61	63	64	70	64.5	84			
30-Jul	70	71	72	72	75	77	77	78	79	71	73	74	81	88	83	83	80	75	79	83	85	91	93	94	79.3	94			
31-Jul	96	90	92	93	92	94	96	94	95	95	95	95	95	87	80	67	54	55	60	67	78	81	77	70	83.3	96			
														73.6 74.9 76.6 76.8 79.2 79.6 77.7 73.9 70.5 67.9 64.6 61.7 60.4 58.4 55.5 54.5 54.1 57.2 58.2 59.2 61.8 64.4 67.4 70.9														Diurnal Average	
														100 100 100 100 100 100 100 100 100 100 95 97 95 95 98 97 92 82 94 100 100 100 100 100														Diurnal Maximum	
M - Maintenance																													





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - July 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	45	6.06	6.06
40 - 60	197	26.55	32.61
60 - 80	357	48.11	80.73
80 - 100	128	17.25	97.98

Total Number of Valid Hours: 742

Total Number of Hours: 744



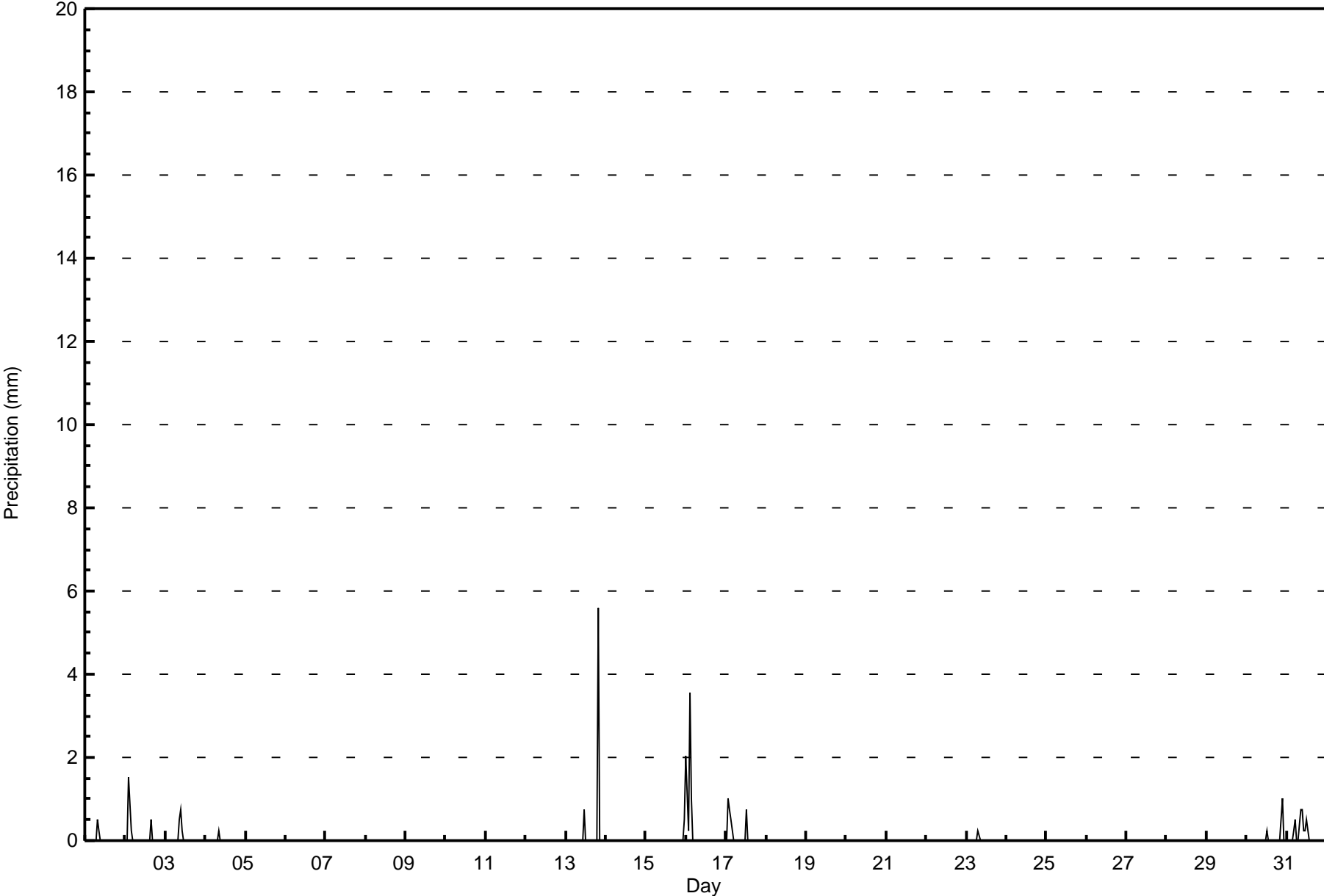
Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

Fort Chipewyan - July 2017

Maximum Value: 5.6 mm on Jul 13 20:00		Maximum Daily Total: 6.9 mm on Jul 16		Hours in Service: 744																							
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 5		Hours of Data: 744																							
Maximum Diurnal Total: 5.8 mm at hour 3		Minimum Diurnal Total: 0.0 mm at hour 7		Hours of Missing Data: 0																							
Monthly Total: 26.42 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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.8	0.5	
2-Jul	0.0	0.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.5	
3-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.8	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	1.5	0.8	
4-Jul	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	0.0	0.0	0.0	0.3	0.3	
5-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	6.4	5.6	
14-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	0.5
16-Jul	2.0	0.3	3.6	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	6.9	3.6	
17-Jul	0.0	1.0	0.8	0.5	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	3.0	1.0	
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.0	0.0	0.0	0.0	0.3	0.3	0.3
24-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	1.0	0.0	1.3	1.0	1.0
31-Jul	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.8	0.8	0.3	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	3.3	0.8	0.8
																								Diurnal Average	Diurnal Maximum		
																								2.0	2.0		
																								1.3	1.0		
																								5.8	3.6		
																								1.8	1.0		
																								0.3	0.3		
																								0.5	0.5		
																								0.0	0.0		
																								0.8	0.5		
																								1.8	0.8		
																								1.5	0.8		
																								0.5	0.3		
																								1.0	0.8		
																								1.5	0.8		
																								0.0	0.0		
																								0.5	0.5		
																								0.0	0.0		
																								0.0	0.0		
																								0.0	0.0		
																								5.6	5.6		
																								0.0	0.0		
																								1.0	1.0		
																								0.0	0.0		
																								0.5	0.5		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Fort Chipewyan - July 2017**

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	724	97.31	97.31
0.4 - 0.5	7	0.94	98.25
0.6 - 0.7	0	0.00	98.25
0.8 - 1.4	9	1.21	99.46
1.5 - 10	4	0.54	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

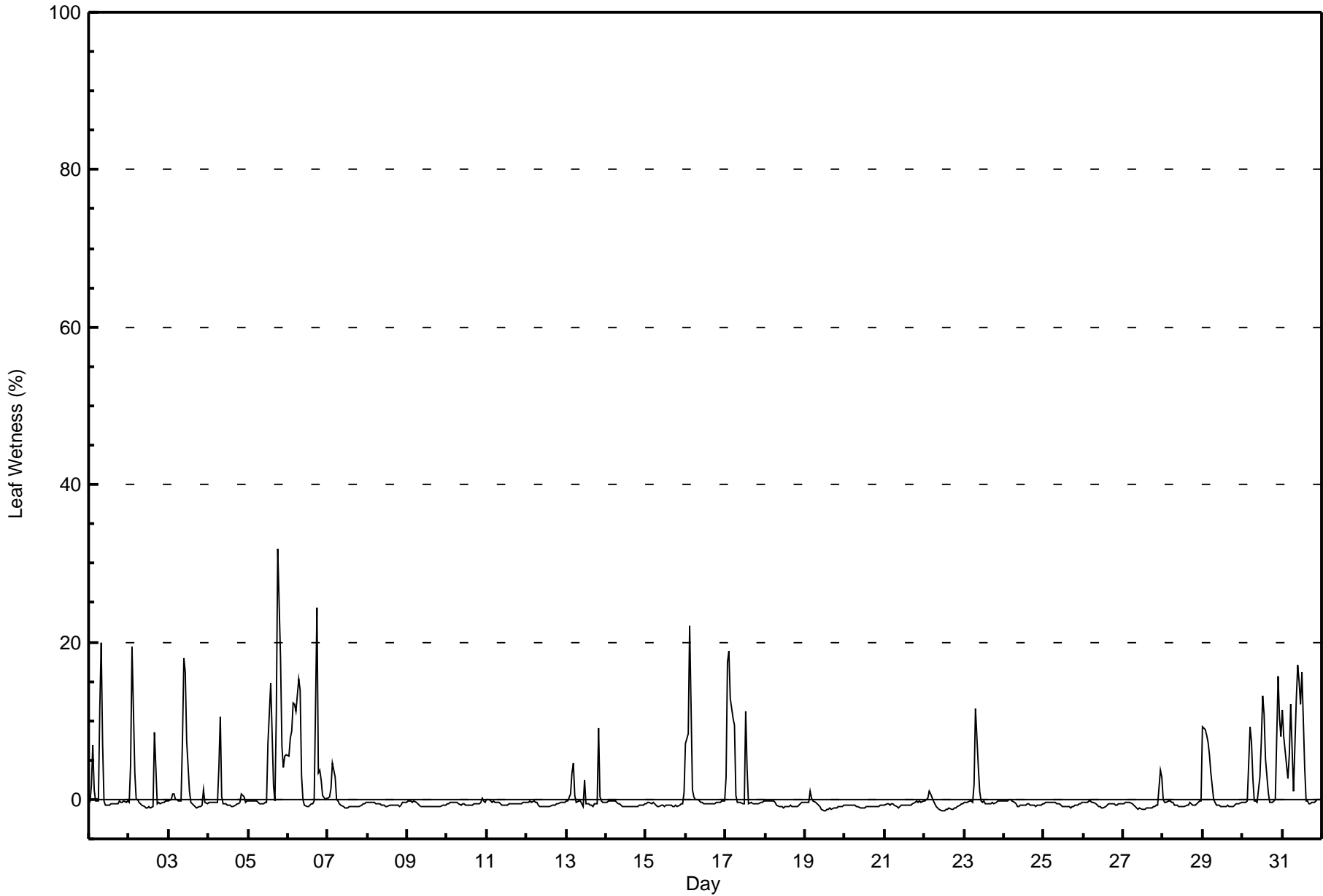
**Leaf Wetness (SW) - %
Fort Chipewyan - July 2017**

Maximum Value: 32 % on Jul 5 19:00																	Maximum Daily Average: 5.2 % on Jul 31																	Hours in Service: 744			
Minimum Value: -1 % on Jul 19 13:00																	Minimum Daily Average: -0.9 % on Jul 20																	Hours of Data: 744			
Maximum Diurnal Average: 2.7 % at hour 3																	Minimum Diurnal Average: -0.6 % at hour 17																	Hours of Missing Data: 0			
Monthly Average: 0.7 %																	Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = -1 Median = 0 Q ₃ = 0 P ₉₀ = 4 P ₉₉ = 17																	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-Jul	0	2	7	1	0	0	12	20	7	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	1.7	20											
2-Jul	0	4	19	3	0	0	0	-1	-1	-1	-1	-1	-1	-1	8	4	-1	0	0	0	0	0	0	0	1.2	19											
3-Jul	0	0	1	1	0	0	0	0	7	18	16	7	1	0	-1	-1	-1	-1	-1	-1	-1	1	0	-1	1.9	18											
4-Jul	0	0	0	0	0	0	4	10	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	1	0	0	0	0	0.2	10											
5-Jul	0	0	0	0	0	0	0	-1	0	0	0	0	7	15	8	2	0	11	32	18	7	4	6	6	4.6	32											
6-Jul	6	8	9	12	12	11	15	14	3	0	-1	-1	-1	-1	-1	-1	0	24	3	4	2	0	0	0	5.0	24											
7-Jul	0	0	1	5	3	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-0.2	5											
8-Jul	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	-0.6	0											
9-Jul	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.7	0											
10-Jul	-1	-1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	-0.5	0											
11-Jul	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	0	0	0	0	-0.5	0											
12-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.6	0											
13-Jul	0	0	1	3	5	0	0	0	0	-1	-1	3	0	-1	-1	-1	-1	-1	0	9	0	0	0	0	0.5	9											
14-Jul	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0											
15-Jul	-1	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	-0.6	1											
16-Jul	7	8	22	12	1	0	0	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0	1.9	22											
17-Jul	3	17	19	13	10	9	1	0	0	0	0	-1	11	4	-1	0	-1	-1	-1	-1	-1	0	0	0	3.4	19											
18-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.6	0											
19-Jul	0	0	0	1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.8	1											
20-Jul	-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											
21-Jul	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	-0.6	0											
22-Jul	0	0	0	1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.7	1											
23-Jul	0	0	0	0	0	0	2	12	4	1	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0.5	12											
24-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.6	0											
25-Jul	-1	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	-0.7	0											
26-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	-0.6	0											
27-Jul	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	4	3	-0.5	4											
28-Jul	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	0	0	0	-0.5	0											
29-Jul	9	9	8	7	6	3	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1.3	9											
30-Jul	0	0	0	0	9	7	3	0	0	0	3	7	13	11	5	1	0	0	0	0	0	16	10	8	3.7	16											
31-Jul	11	8	4	3	6	12	6	1	13	17	15	12	16	4	0	0	-1	-1	0	0	0	0	0	0	5.2	17											
0.9																	1.6																	Diurnal Average			
11																	22																	Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Fort Chipewyan - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Fort Chipewyan - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	13	10.16	10.16
0.4 - 0.5	5	3.91	14.06
0.6 - 0.7	5	3.91	17.97
0.8 - 1.4	12	9.38	27.34
1.5 - 10	58	45.31	72.66
> 10	35	27.34	100.00

Total Number of Valid Hours: 128

Total Number of Hours: 744



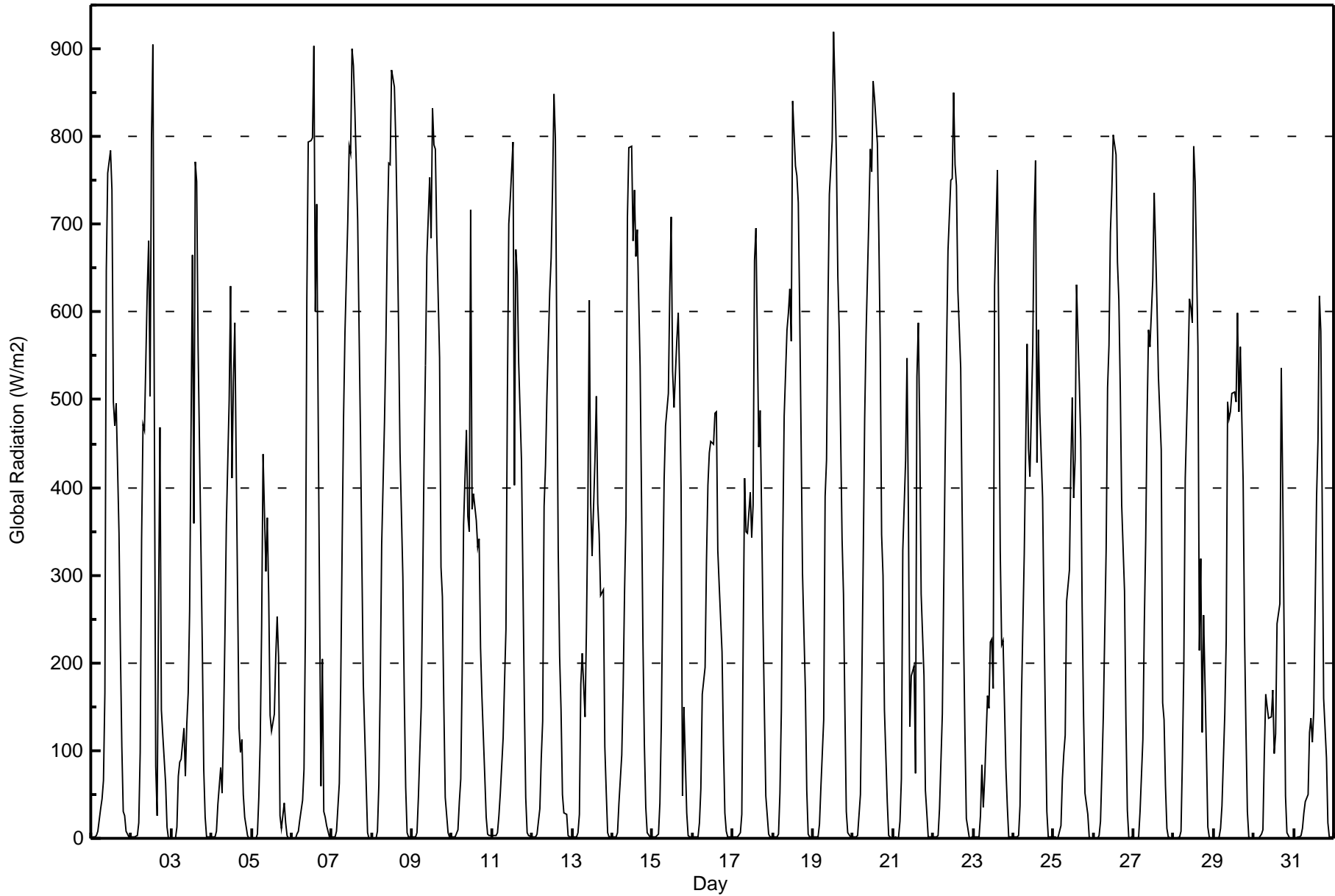
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - July 2017

Maximum Value: 919 W/m2 on Jul 19 13:00														Maximum Daily Average: 367.7 W/m2 on Jul 7														Hours in Service: 744	
Minimum Value: 0 W/m2 on Jul 3 00:00														Minimum Daily Average: 117.9 W/m2 on Jul 30														Hours of Data: 744	
Maximum Diurnal Average: 601.5 W/m2 at hour 14														Minimum Diurnal Average: 0.9 W/m2 at hour 2														Hours of Missing Data: 0	
Monthly Average: 249.7 W/m2														Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 4 Median = 140 Q ₃ = 464 P ₉₀ = 690 P ₉₉ = 853														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-Jul	1	1	1	3	9	34	46	67	166	648	759	783	739	498	470	496	348	214	105	30	26	8	1	1	227.1	783			
2-Jul	1	1	1	4	17	98	341	471	466	625	680	504	799	904	82	26	263	469	146	117	63	12	0	0	253.8	904			
3-Jul	0	0	0	13	71	87	91	125	71	130	166	259	666	360	771	748	560	448	216	80	24	1	1	1	203.7	771			
4-Jul	1	1	1	7	38	81	51	126	232	358	499	629	410	520	587	425	126	98	112	50	24	3	0	0	182.5	629			
5-Jul	0	0	0	4	47	111	241	437	305	366	277	140	123	141	208	253	207	25	12	40	18	4	0	0	123.3	437			
6-Jul	0	0	0	5	7	21	44	78	241	615	794	796	798	903	601	723	490	60	205	31	24	15	1	1	268.9	903			
7-Jul	1	1	1	9	63	175	333	480	576	704	789	782	901	880	831	705	579	458	313	176	63	6	0	0	367.7	901			
8-Jul	0	0	0	7	60	177	334	475	568	689	769	768	875	857	794	697	578	439	298	163	57	7	2	2	359.0	875			
9-Jul	2	2	2	7	47	149	282	429	539	663	754	685	832	790	786	687	548	310	275	153	47	7	1	1	333.2	832			
10-Jul	1	1	1	9	43	68	190	358	465	368	350	716	376	393	362	331	341	217	162	71	25	5	3	3	202.3	716			
11-Jul	3	3	3	6	26	52	115	178	239	503	701	728	794	402	671	642	543	430	296	157	46	6	2	2	272.8	794			
12-Jul	2	2	2	5	34	92	133	379	426	505	623	661	743	848	797	329	207	146	50	28	28	4	2	2	252.0	848			
13-Jul	2	2	2	6	27	175	211	139	241	378	613	381	322	429	504	381	345	277	283	104	53	6	2	2	203.6	613			
14-Jul	2	2	2	6	40	95	173	284	367	707	787	788	680	740	663	694	537	386	225	108	36	6	2	2	305.5	788			
15-Jul	2	1	2	5	40	129	279	409	470	507	624	708	533	491	568	599	520	400	48	150	30	4	1	1	271.7	708			
16-Jul	1	1	1	2	18	56	164	195	317	402	439	453	449	485	486	329	288	213	107	28	8	2	1	1	185.3	486			
17-Jul	1	1	1	2	6	27	228	411	350	348	394	343	380	658	695	447	489	374	248	145	48	5	2	1	233.4	695			
18-Jul	1	1	1	5	52	145	339	481	579	599	626	566	840	767	755	725	599	454	302	170	54	4	1	1	336.2	840			
19-Jul	1	1	1	2	15	58	135	389	432	605	734	796	919	853	775	641	576	342	278	146	31	6	1	1	322.4	919			
20-Jul	1	1	1	3	49	180	323	478	575	710	785	760	864	843	792	691	565	347	300	147	42	3	1	1	352.6	864			
21-Jul	1	1	1	2	20	68	329	432	547	364	127	185	196	74	527	588	464	279	186	54	30	2	1	1	186.5	588			
22-Jul	1	1	1	2	34	142	289	437	557	669	750	752	850	768	744	624	537	375	237	119	22	2	1	1	329.8	850			
23-Jul	1	1	1	2	26	83	35	70	163	147	223	227	170	629	761	564	327	220	225	81	37	2	1	1	166.5	761			
24-Jul	1	1	1	3	37	158	324	443	564	444	413	555	707	773	428	580	487	389	252	133	31	2	1	1	280.3	773			
25-Jul	1	1	1	1	15	67	96	117	270	306	426	503	388	432	631	519	455	262	140	51	27	2	1	0	196.3	631			
26-Jul	0	0	1	3	19	78	140	329	514	562	690	738	801	779	657	613	511	380	282	133	32	1	1	1	302.8	801			
27-Jul	1	1	0	2	31	112	243	340	481	580	561	637	736	675	606	527	444	155	136	60	12	1	0	1	264.2	736			
28-Jul	1	0	0	1	9	92	199	411	536	614	606	588	789	748	560	214	319	121	254	98	14	1	0	0	257.3	789			
29-Jul	0	1	1	1	11	37	141	226	498	478	486	507	509	498	599	486	561	408	232	122	30	1	0	0	243.1	599			
30-Jul	0	0	0	1	5	10	97	165	150	136	139	169	96	119	246	268	536	402	235	48	7	0	1	1	117.9	536			
31-Jul	1	1	1	1	4	11	29	41	50	120	136	109	144	390	455	618	577	376	159	92	18	1	1	1	139.0	618			
	0.9	0.9	1.0	4.1	29.6	92.6	192.7	303.3	385.6	479.1	539.4	555.4	594.5	601.5	594.0	521.6	449.2	305.7	203.8	99.5	32.4	4.1	1.0	0.9	Diurnal Average				
	3	3	3	13	71	180	341	481	579	710	794	796	919	904	831	748	599	469	313	176	63	15	3	3	Diurnal Maximum				





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - July 2017

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	239	32.12	32.12
21 - 100	99	13.31	45.43
101 - 300	128	17.20	62.63
301 - 600	169	22.72	85.35
601 - 900	105	14.11	99.46
> 900	4	0.54	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Fort Chipewyan - July 2017

Maximum Speed: 33 km/h on Jul 4 11:00	Maximum Daily Speed Average: 22.1 km/h on Jul 20	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 11 23:00	Minimum Daily Speed Average: 1.8 km/h on Jul 13	Hours of Data: 741
Maximum Diurnal Speed Average: 3.5 km/h at hour 18	Minimum Diurnal Speed Average: 0.2 km/h at hour 11	Hours of Missing Data: 3
Monthly Average Velocity: 0.5 km/h 1.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 17 P ₉₀ = 21 P ₉₉ = 28	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-Jul	ESE15	ESE7	ESE6	SSW5	NE2	ESE6	S2	ESE5	ESE7	ESE9	E15	E16	E21	E22	E21	E23	E19	E17	E16	E17	E15	ESE16	SE19	ESE17	E12.4	E23
2-Jul	SE17	S10	S10	SE25	SE26	SE21	SSE21	S24	S31	S25	S20	SSW17	SSE14	SSE24	SSE21	WSW23	SE13	E13	ESE21	E21	SE29	SE24	SE18	SE15	SSE17.3	S31
3-Jul	SSE14	ESE8	SSE8	SSE9	SSE8	S7	SSW12	SW17	SW21	SW9	S16	S14	SSE13	SSE12	SSW13	SW22	WSW19	WSW19	WSW17	SW14	SW16	WSW18	W11	W17	SSW11.2	SW22
4-Jul	WSW18	WSW16	WSW13	WSW19	WSW22	WSW22	W18	WSW18	WSW28	W29	W33	WSW30	W32	W28	W32	W33	W20	NNW10	NNW10	W8	WSW8	WNW6	W11	W9	W19.0	W33
5-Jul	W16	W18	W17	W16	W17	NNW18	W18	W19	W17	W19	W17	W18	NNW12	NNW10	W11	W11	WNW8	WNW6	NW4	WSW7	WNW8	WNW6	WNW8	WNW7	W12.5	W19
6-Jul	NNW7	W5	W6	WSW5	WSW2	AF	SW4	WSW7	W6	NNW5	N7	N4	SSE7	SSW11	WSW14	W15	W12	ENE16	S3	W10	NNW13	W11	W9	W7	W5.2	ENE16
7-Jul	WNW11	W9	W9	W10	W11	NNW10	W10	WNW10	W10	W12	WSW13	WSW15	W14	W11	W8	WSW11	WSW9	WSW12	WSW12	WSW9	W9	W10	WNW8	NW9	W10.1	WSW15
8-Jul	NNW11	NNE9	NE10	ENE10	ENE10	ENE12	E15	E18	E18	E20	E20	E22	E21	E20	E19	E17	E17	E18	E17	ENE14	ENE11	ESE7	ENE10	E8	E13.9	E22
9-Jul	E9	SSE3	S3	SE4	E9	ESE13	ESE10	ESE7	E14	E15	E16	E18	E20	E23	E23	E23	ENE22	ENE21	ENE22	ENE23	ENE21	ENE20	ENE21	ENE20	E15.0	E23
10-Jul	ENE21	ENE22	E17	E15	E16	E17	E16	E16	E11	E14	E12	E8	WNW9	WNW9	NW9	NW8	E6	E7	E5	ESE2	S7	SW15	W11	NW10	E6.0	ENE22
11-Jul	WNW9	NNW4	NE9	NNW6	NW5	N5	NNW5	W4	WNW5	NE4	E12	E10	E14	E12	E11	E14	E17	E16	E10	ESE7	WNW8	NW6	NNE1	SSW3	ENE4.3	E17
12-Jul	W7	WNW7	WNW7	WNW9	WNW9	WNW7	WNW7	WNW7	WNW4	C	C	ESE11	E15	E15	E13	E10	E2	NNW4	ESE7	SE19	SE22	SSE17	SSE14	SSE11	SE3.4	SE22
13-Jul	SSE10	SE7	S5	SW8	SW8	WSW5	W5	WSW9	WNW9	WNW7	NW7	W10	SW9	SW4	NW9	NNW8	NNE6	E16	E10	E5	NE8	N12	N14	N14	NW1.8	E16
14-Jul	N14	N12	N11	N10	N9	NNE7	NNE10	NNE11	NE8	E18	ENE22	E27	E27	E23	E19	E17	E19	E16	E14	E10	ENE6	NE2	E2	SSW1	ENE10.7	E27
15-Jul	WSW3	S4	ESE2	SSE6	SW5	WNW3	SSW4	ESE4	ENE8	ESE12	E13	E14	E16	E18	E22	E21	ENE20	ENE19	ENE14	ENE10	ENE10	ENE8	ENE10	WSW7	E8.4	E22
16-Jul	NNW8	W12	WSW17	NW3	WSW18	SW20	W17	W15	WSW17	W19	W20	WSW21	WSW20	WSW22	WSW22	W21	W18	W23	W19	W14	NNW11	NW7	NNW8	NNW10	W14.6	W23
17-Jul	NNW13	NNW13	NW14	NNW14	NNW17	N19	N15	N14	N13	NNW15	NNW16	N14	NNW11	NW12	N14	NNW17	N18	NNW14	NNW13	NNW11	NNW11	NNW10	NNW8	NNW8	NNW13.2	N19
18-Jul	NW9	NW10	NW11	NNW11	NNW11	NW11	NW11	NW9	NNW12	NNW11	W10	W10	WSW15	WSW14	WSW15	WSW18	WSW18	WSW18	WSW17	SW18	SSW15	SW17	SW18	SW15	W10.3	WSW18
19-Jul	SW14	WSW11	WSW11	W13	W12	W14	W13	W14	NNW13	NNW12	NW8	NW10	NW10	NW14	NW13	NW13	N13	N13	N11	NNE10	NNE9	NNE10	NNE12	ENE12	NW7.9	NW14
20-Jul	E17	E19	E25	E23	E24	ESE20	ESE16	E16	E18	E20	E22	E20	E22	E25	E25	ENE24	ENE24	ENE23	ENE24	ENE26	ENE25	ENE27	E28	E29	E22.1	E29
21-Jul	E27	E24	E21	ESE14	ESE16	E12	ESE13	ESE14	ESE15	E18	E16	E16	E12	ENE5	SE6	E11	E10	ESE13	E14	E14	E14	E14	S14	SW12	E12.7	E27
22-Jul	SW9	SW8	SW7	SSW8	SSW8	SSW8	SSW9	SW14	SW14	SW15	WSW15	WSW17	WSW20	WSW19	WSW18	W17	W15	W13	WNW10	W7	WSW7	SW6	S5	SSW1	WSW10.3	WSW20
23-Jul	NNW10	N14	N15	NNW14	NNW18	N18	NNW13	W7	NNW12	NNW13	NW12	NNW12	NNW9	NNW11	N12	N11	N10	NNW10	NNW10	NW9	N11	NNW10	NNW12	NNW12	NNW10.9	NNW18
24-Jul	NNW12	NNW14	N15	N15	NNW15	NNW15	N12	N12	N12	NNE11	ENE11	E26	E22	E22	E17	ESE12	ESE11	ESE10	N3	NNW9	NW10	NNW9	NNW10	NW8	NNE7.1	E26
25-Jul	NW9	NW8	WNW9	NW11	W7	W9	W12	W11	W13	W12	WSW13	WSW16	WSW16	W15	W17	W15	W13	W11	W9	W6	WNW6	WNW6	NNW2	ESE3	W9.5	W17
26-Jul	E6	ENE6	E7	E10	E12	ESE11	E10	ESE14	ESE12	E9	E7	E7	E10	E14	E11	E15	E14	ESE14	E14	E14	E10	E10	E16	E11	E10.9	E16
27-Jul	SSE6	SW10	SW9	SSW5	SSW9	SW9	SW9	SSW11	SW13	WSW15	WSW16	WSW14	WSW15	WSW14	W14	W13	W14	W11	W8	W7	W8	WNW9	W13	SW10	WSW9.6	WSW16
28-Jul	WSW9	W11	W12	W8	NNW12	W11	W11	W16	W20	NNW20	NW19	NW18	NW20	NW16	NW18	NW14	NW12	NNW12	NNW11	NW9	WNW8	NNW12	NW9	N7	WNW12.1	W20
29-Jul	NNW5	NNW5	N7	NNW6	NW6	NW7	NW5	NW7	NNW10	NNW10	NW9	NW10	NW12	NNW10	NNW11	NNW10	N10	N8	NNE5	E17	E19	E20	E22	ESE25	N4.5	ESE25
30-Jul	ESE27	ESE25	ESE26	ESE23	SE14	ESE13	ESE21	E26	E26	ESE20	SE12	SSW12	SSW10	SSW7	S6	SE8	ESE11	E7	E11	E11	ENE11	NNW6	WNW1	ENE9	ESE11.7	ESE27
31-Jul	WNW6	W8	NNW12	NNW17	NNW16	WNW9	WNW9	W11	NNW9	NNW13	NW10	NW9	N8	N10	NNW9	NW8	NNW7	NNW10	NNW14	NNW12	NNW10	NW9	NNW10	N12	WNW9.2	WNW17

N0.6	NW1.0	NNW1.0	NNW0.8	W1.6	NNW1.2	W1.3	WSW2.0	WSW2.9	W1.6	W0.2	SSW0.9	SE0.7	E0.9	NNW0.7	NW1.6	NE2.3	NE3.5	NE2.9	ENE2.7	ENE2.5	NNE0.9	NE1.4	NE1.2	Diurnal Average	
ESE27	ESE25	ESE26	SE25	SE26	WSW22	ESE21	E26	S31	W29	W33	WSW30	W32	W28	W32	W33	ENE24	ENE23	ENE24	ENE26	SE29	ENE27	E28	E29	Diurnal Maximum	

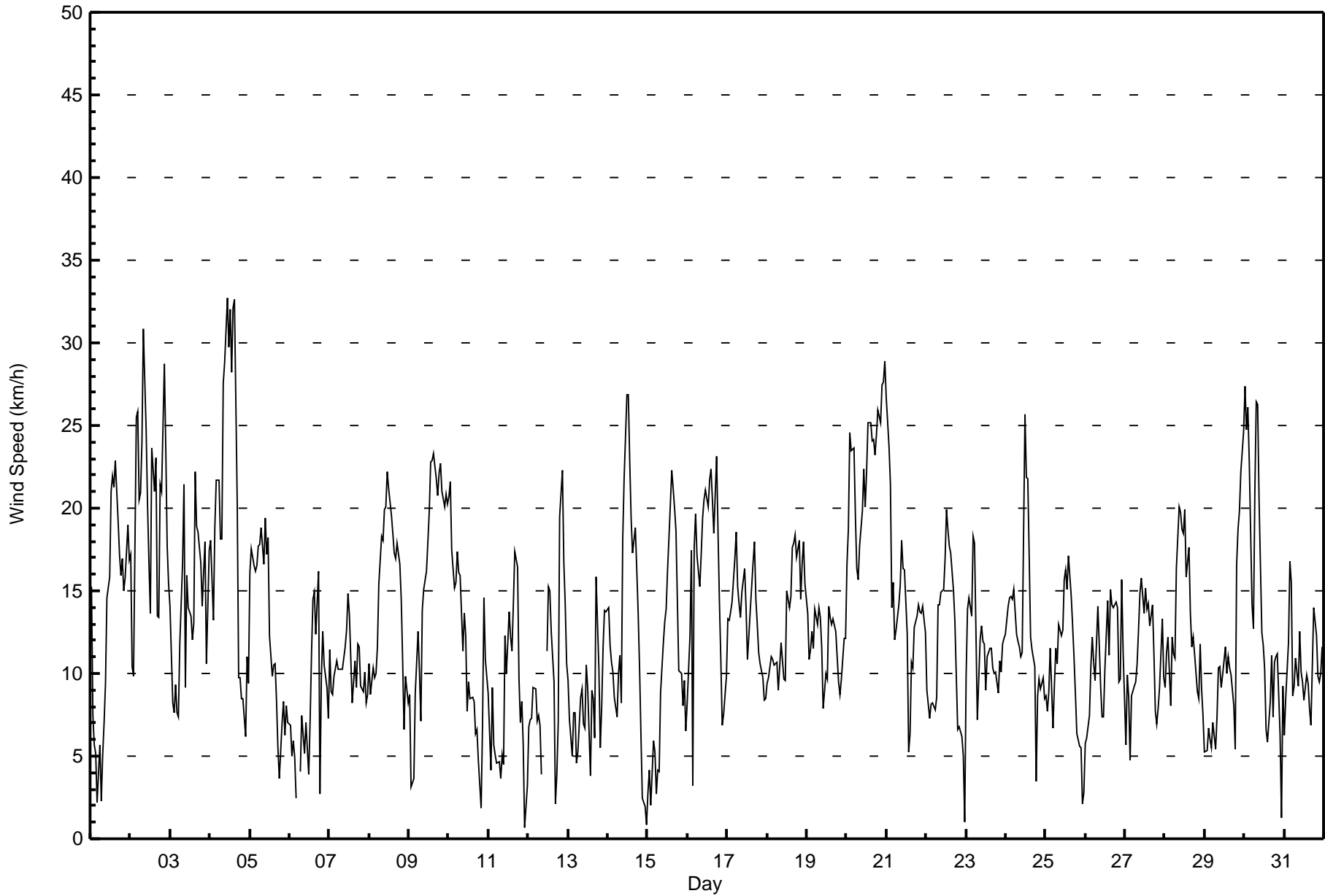
C - Calibration AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744											
Maximum Value: 11 km/h on Jul 4 17:00														Hours of Data: 741											
Minimum Value: 1 km/h on Jul 26 11:00														Hours of Missing Data: 3											
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 9														Hours of Calibration: 2											
														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-Jul	2	3	1	3	3	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	3	2	2	3
2-Jul	2	3	3	4	4	3	3	5	4	3	4	3	7	3	3	8	4	2	5	3	7	4	2	3	8
3-Jul	3	2	3	2	2	1	3	3	4	3	3	2	2	2	6	5	5	4	4	2	3	9	4	5	9
4-Jul	5	4	4	4	5	5	5	5	6	8	10	9	9	9	9	9	11	4	4	2	2	2	3	2	11
5-Jul	5	5	4	4	4	4	5	5	4	4	4	5	5	3	3	3	2	3	2	2	2	2	2	2	5
6-Jul	2	1	1	2	1	AF	2	2	2	2	3	3	2	4	4	3	4	9	3	2	2	2	2	1	9
7-Jul	2	1	1	2	2	2	2	3	2	4	3	4	3	4	3	3	3	3	3	2	1	1	1	1	4
8-Jul	2	4	2	1	2	3	2	2	2	1	1	2	1	2	2	2	1	2	2	2	3	1	1	1	4
9-Jul	2	2	1	2	2	2	2	1	2	2	2	1	2	2	2	2	2	3	3	4	3	3	3	2	4
10-Jul	3	3	2	2	3	3	2	3	1	2	2	2	3	3	2	3	3	2	2	5	3	4	2	2	5
11-Jul	3	1	3	2	3	2	1	2	1	2	2	1	2	3	1	2	2	2	2	4	2	1	2	1	4
12-Jul	1	1	1	1	2	2	2	2	1	C	C	1	2	2	1	2	2	1	5	3	5	2	2	2	5
13-Jul	2	2	1	2	2	2	2	3	2	2	2	4	2	2	3	3	4	3	2	8	6	3	4	4	8
14-Jul	4	3	3	2	2	2	3	3	3	7	5	2	3	3	3	2	2	3	2	2	1	1	1	1	7
15-Jul	1	1	1	2	1	1	2	1	1	1	2	1	2	3	3	3	3	3	3	3	1	3	3	7	7
16-Jul	4	4	4	5	4	6	5	4	4	5	5	6	6	6	6	4	5	7	6	3	6	2	2	3	7
17-Jul	5	4	3	4	6	6	5	6	5	5	6	5	5	5	6	7	7	5	5	4	4	3	3	2	7
18-Jul	2	2	2	2	2	3	3	3	4	4	5	4	5	5	5	5	5	4	4	3	2	2	3	4	5
19-Jul	3	2	2	4	3	3	3	4	3	3	3	4	4	5	5	5	4	5	4	3	2	2	2	2	5
20-Jul	4	3	3	2	2	3	2	1	2	2	2	2	3	3	3	3	4	4	4	4	4	4	3	3	4
21-Jul	3	3	4	2	3	2	1	2	1	2	4	2	2	2	3	1	2	2	1	1	2	2	3	2	4
22-Jul	2	3	2	1	2	1	3	2	3	3	3	4	5	5	4	5	4	3	2	1	1	1	2	3	5
23-Jul	3	3	4	6	5	5	4	2	4	3	3	3	3	4	4	4	4	3	3	3	3	3	3	3	6
24-Jul	3	3	3	3	3	4	4	4	4	4	5	3	3	2	3	2	2	2	3	3	2	1	2	1	5
25-Jul	1	1	3	2	1	2	2	2	3	3	3	4	4	4	4	4	4	3	2	1	1	2	1	2	4
26-Jul	4	1	1	2	2	2	2	1	2	1	1	1	2	1	2	2	3	4	3	2	2	3	2	2	4
27-Jul	1	3	2	2	1	2	2	3	2	4	3	3	5	3	4	3	4	3	3	1	1	1	4	3	5
28-Jul	2	3	3	1	2	2	3	4	5	5	6	6	6	5	6	5	4	3	3	3	3	2	3	2	6
29-Jul	2	1	1	1	1	1	2	3	3	3	3	4	5	4	4	4	4	3	3	5	3	3	2	2	5
30-Jul	2	2	2	2	2	1	4	3	3	3	4	3	3	4	2	2	2	2	2	2	2	3	2	2	4
31-Jul	3	2	3	4	5	3	3	3	3	4	3	3	3	3	3	3	3	4	3	3	2	2	2	2	5
														Diurnal Maximum											
C - Calibration														AF - Analyzer Failure											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	57	7.69	7.69
6 - 11	292	39.41	47.10
12 - 19	285	38.46	85.56
20 - 28	98	13.23	98.79
29 - 38	9	1.21	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - July 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	3	1	4	5	1	1	6	6	3	4	3	5	3	7	57
6 - 11	14	9	4	13	29	18	3	8	5	10	12	12	43	47	35	30	292
12 - 19	24	1	0	6	71	17	8	6	3	5	13	37	44	19	14	17	285
20 - 28	0	0	0	19	39	9	5	3	3	0	3	10	4	2	1	0	98
29 - 38	0	0	0	0	1	0	1	0	1	0	0	1	5	0	0	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	41	12	7	39	144	49	18	18	18	21	31	64	99	73	53	54	741

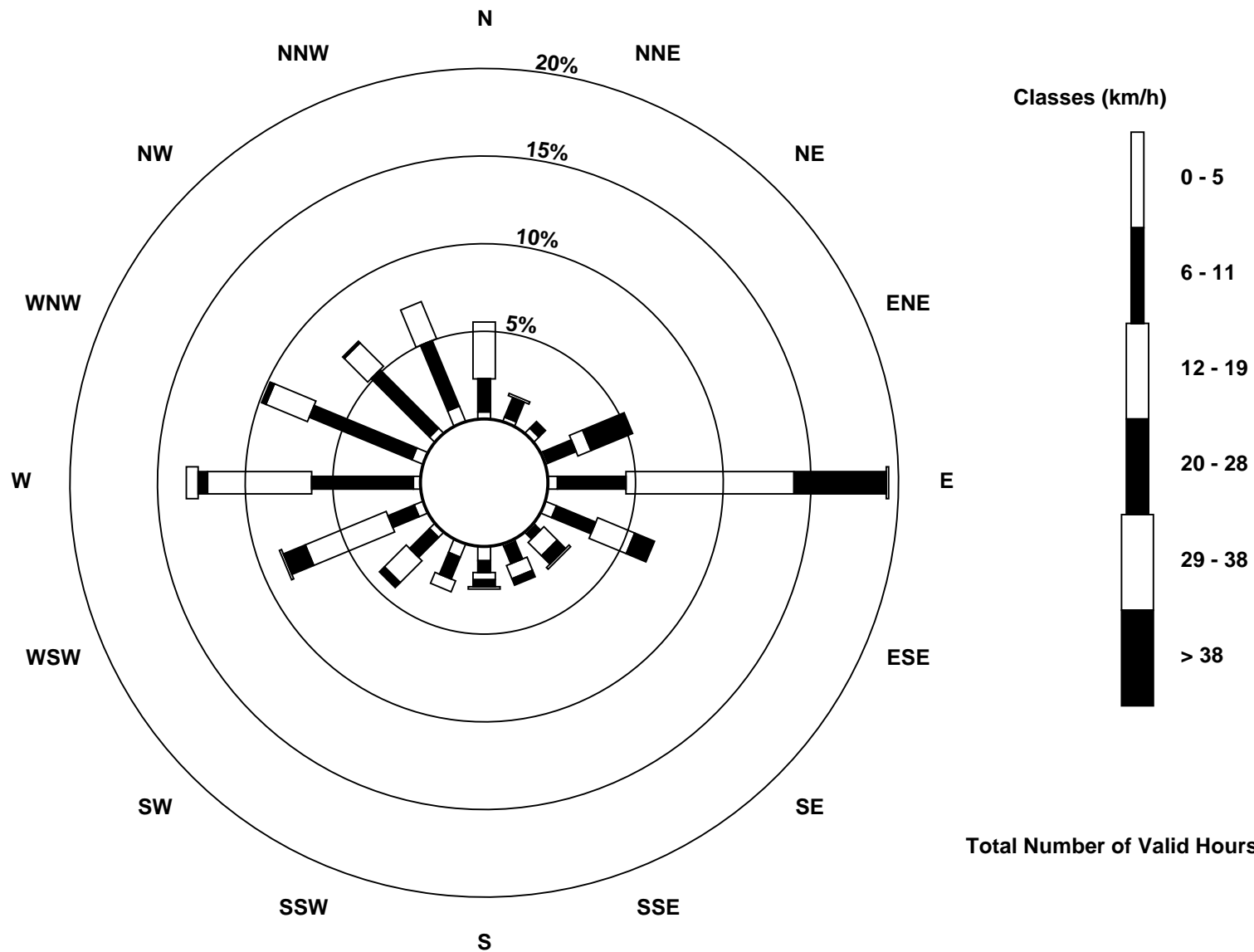
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 741



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - July 2017

Direction of Maximum Speed: 263 deg on Jul 4 11:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 83.2 deg on Jul 20	Hours of Data: 741
Direction of Minimum Speed: 18 deg on Jul 11 23:00	Direction of Minimum Daily Speed Average: 1.8 deg on Jul 13
Direction of Minimum Speed: 18 deg on Jul 11 23:00	Hours of Missing Data: 3
Monthly Average Direction: 290.8 deg	Percent Operational Time: 99.9

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-Jul	113	109	110	200	52	105	186	112	108	104	89	87	82	84	80	82	86	86	87	85	93	122	130	116	96.7
2-Jul	143	176	169	135	145	145	150	169	183	179	184	199	148	149	155	238	146	95	105	101	127	137	128	135	151.3
3-Jul	160	110	163	161	159	191	210	214	223	222	172	180	163	160	196	225	238	247	239	225	229	257	270	259	211.6
4-Jul	256	258	253	250	249	251	268	251	245	259	263	256	268	266	262	265	281	340	303	265	254	282	274	277	262.6
5-Jul	265	274	275	274	276	282	280	280	272	265	265	262	295	302	281	274	289	293	325	250	287	299	288	289	277.3
6-Jul	327	260	263	245	253	AF	224	237	266	296	351	353	162	207	248	260	270	67	179	279	285	276	273	279	267.0
7-Jul	285	277	273	267	280	284	277	282	277	269	254	254	259	276	276	256	255	256	249	258	263	278	295	324	270.3
8-Jul	346	29	55	59	76	73	87	88	85	91	88	86	89	88	87	88	88	83	80	77	77	113	73	81	80.5
9-Jul	88	167	176	139	100	106	113	118	99	84	87	88	86	82	83	81	78	68	63	61	64	67	72	73	81.5
10-Jul	70	77	82	84	85	90	88	100	99	89	91	98	299	300	304	306	89	89	87	116	185	231	278	317	80.7
11-Jul	298	339	35	336	314	350	344	274	297	44	98	96	94	94	84	92	86	82	83	105	294	317	18	192	65.5
12-Jul	269	284	292	285	289	284	303	289	289	C	C	102	95	95	94	89	84	333	105	138	138	162	162	160	137.5
13-Jul	166	140	175	214	235	246	265	255	283	298	315	268	232	224	320	331	19	86	92	97	55	1	358	353	313.0
14-Jul	351	359	6	7	4	12	26	32	35	84	75	94	92	90	92	93	90	84	88	89	73	35	88	207	68.1
15-Jul	250	180	121	147	222	303	195	117	103	103	94	93	92	87	83	81	73	70	67	59	62	73	72	247	86.7
16-Jul	327	281	246	319	248	230	260	259	258	263	259	254	258	246	252	261	273	271	272	279	347	318	328	299	265.4
17-Jul	328	328	308	318	343	353	359	1	354	346	344	350	336	326	350	344	352	344	338	338	342	340	330	328	341.2
18-Jul	317	319	320	333	329	326	326	314	298	296	270	265	244	258	244	249	249	247	241	223	204	215	221	226	262.2
19-Jul	236	245	258	269	272	263	266	280	289	284	305	323	320	316	324	325	357	356	0	12	25	17	27	60	311.2
20-Jul	86	94	92	94	92	108	105	92	93	91	87	91	87	88	81	71	70	68	64	61	65	75	81	86	83.2
21-Jul	87	89	97	117	118	99	116	115	112	92	85	82	80	63	127	100	101	102	92	86	89	98	181	229	101.2
22-Jul	231	222	221	212	196	200	204	222	232	236	238	243	245	249	256	269	268	275	288	268	249	235	188	199	241.3
23-Jul	340	355	358	338	334	353	342	281	284	290	304	302	310	340	353	354	2	345	333	323	352	335	343	340	334.2
24-Jul	348	347	349	350	347	348	355	355	350	29	75	94	93	97	97	119	121	113	7	328	323	329	331	313	29.8
25-Jul	315	310	297	312	277	275	269	265	270	262	252	241	248	272	268	268	271	267	260	264	282	285	333	105	271.2
26-Jul	86	72	83	95	96	113	93	107	108	93	95	95	100	98	90	95	95	103	88	84	82	94	89	101	94.7
27-Jul	159	216	229	193	193	215	219	207	215	241	241	258	252	253	272	263	270	270	278	275	279	283	269	228	245.2
28-Jul	237	266	260	265	283	267	263	280	279	289	316	317	325	311	305	305	322	293	298	317	288	292	311	355	295.0
29-Jul	330	327	353	341	317	319	326	318	302	299	306	304	305	301	323	331	353	1	13	86	79	86	95	119	5.7
30-Jul	120	123	123	121	134	113	102	92	90	111	129	201	212	205	184	142	113	94	96	87	76	327	283	58	115.0
31-Jul	282	269	285	285	283	303	284	279	283	296	322	311	351	353	343	325	334	286	282	283	288	304	339	9	302.9

358.3 322.7 308.3 281.3 272.5 286.1 270.9 239.7 247.1 261.3 259.4 191.6 131.9 99.7 347.2 305.5 35.3 45.1 48.0 65.4 64.0 18.9 46.2 53.5
 Diurnal Average

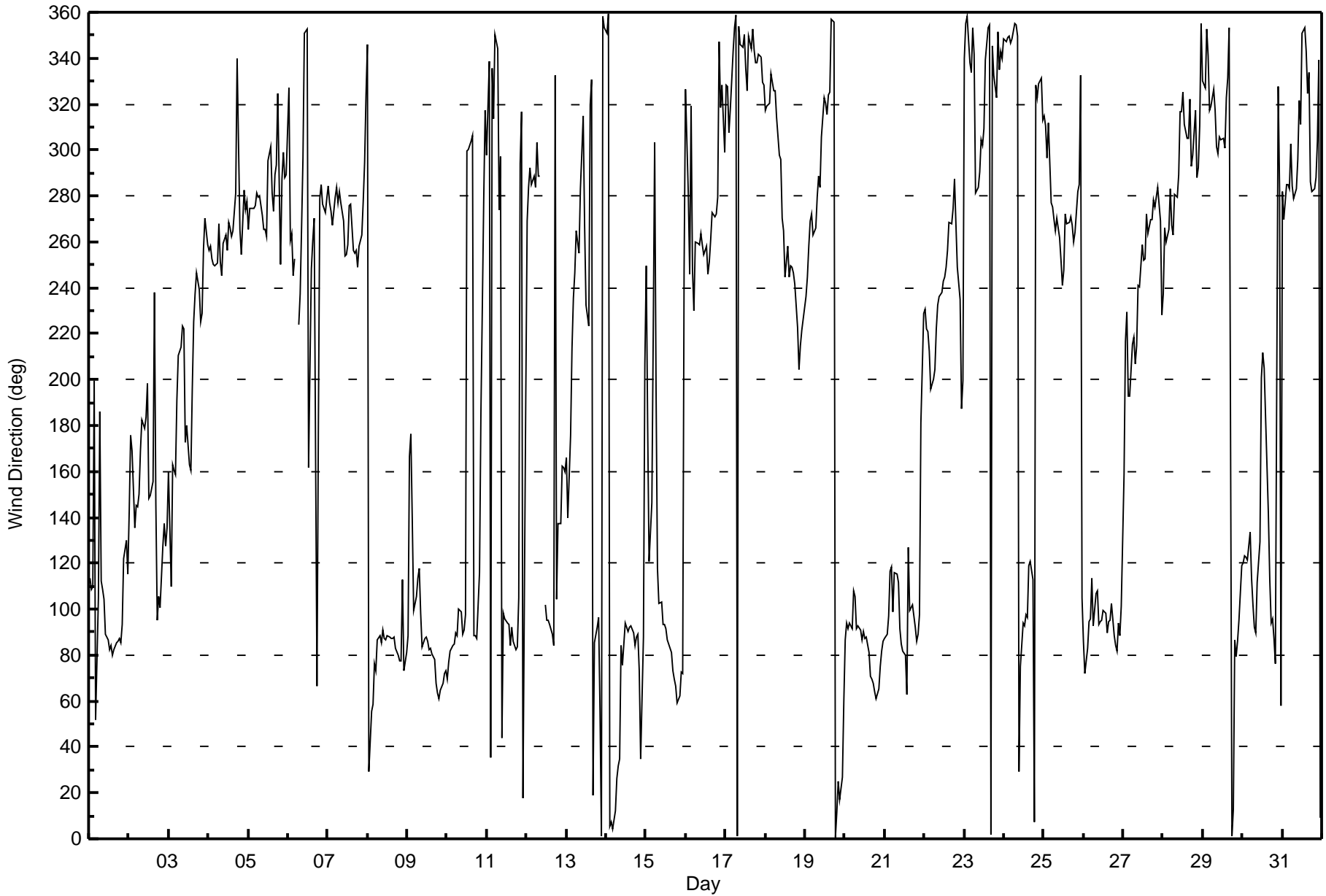
C - Calibration AF - Analyzer Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Chipewyan - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Jul 16 04:00 Minimum Value: 3 deg on Jul 8 10:00 Percentiles: P ₁ = 4 P ₁₀ = 7 Q ₁ = 10 Median = 16 Q ₃ = 23 P ₉₀ = 36 P ₉₉ = 82																		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 2 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-Jul	7	19	25	28	78	44	69	37	9	16	5	4	6	4	5	5	5	4	4	5	6	13	7	9	78
2-Jul	11	30	24	8	7	8	11	11	8	9	11	14	22	9	8	37	33	9	12	10	11	8	9	14	37
3-Jul	13	36	37	12	20	13	10	13	13	29	9	11	15	15	36	17	18	17	15	9	14	25	25	16	37
4-Jul	16	16	13	14	15	16	16	17	15	16	15	17	17	20	17	17	32	30	23	17	15	26	15	14	32
5-Jul	16	15	15	15	14	16	17	17	18	15	17	17	22	22	17	18	26	49	53	19	15	18	14	29	53
6-Jul	36	14	20	22	25	AF	17	16	17	39	31	74	34	35	22	20	33	26	62	12	11	11	10	18	74
7-Jul	11	11	10	13	14	15	16	17	17	23	22	22	22	28	48	31	41	21	16	14	12	10	15	15	48
8-Jul	13	38	9	8	10	11	5	5	5	3	6	8	5	5	5	5	4	5	6	5	10	19	8	8	38
9-Jul	13	46	33	45	13	14	14	28	10	4	4	3	4	5	4	6	6	9	8	9	9	8	8	7	46
10-Jul	8	7	5	8	9	5	9	14	20	6	5	23	30	27	21	20	53	13	56	92	47	17	19	17	92
11-Jul	29	22	18	30	80	34	24	42	30	46	7	10	7	9	6	6	7	6	10	50	14	13	91	48	91
12-Jul	15	10	8	12	13	20	18	23	53	C	C	8	7	7	6	8	86	36	42	7	10	9	9	7	86
13-Jul	10	15	23	13	12	25	32	18	19	27	35	36	16	69	27	37	59	9	5	58	50	18	20	20	69
14-Jul	18	20	17	18	18	22	17	22	30	26	18	6	6	9	7	7	7	11	7	10	9	39	28	58	58
15-Jul	45	25	62	29	25	44	55	32	10	7	7	4	4	6	6	8	11	11	12	11	9	18	16	83	83
16-Jul	56	33	25	100	13	19	14	15	15	16	16	16	17	15	16	16	16	15	15	16	36	27	19	21	100
17-Jul	24	20	17	20	26	22	25	25	26	26	29	27	36	31	29	27	25	26	27	24	23	22	20	17	36
18-Jul	13	12	13	15	15	14	17	25	24	24	41	37	27	27	26	23	18	16	16	10	7	11	8	9	41
19-Jul	11	13	12	19	21	14	15	16	17	25	52	39	47	32	31	33	27	26	24	22	12	13	13	11	52
20-Jul	14	13	9	8	7	11	12	7	6	6	6	7	8	6	10	10	10	9	10	9	9	9	6	6	14
21-Jul	6	6	13	11	14	14	10	8	7	6	8	7	9	32	33	7	7	6	8	6	6	10	27	10	33
22-Jul	12	16	13	13	11	10	11	11	12	14	18	17	16	16	21	20	16	18	16	18	17	9	39	82	82
23-Jul	21	21	21	33	22	23	26	40	17	16	21	21	20	28	31	28	26	24	26	24	20	21	19	19	40
24-Jul	18	17	17	16	16	18	20	23	27	37	39	6	8	7	9	10	12	19	68	21	15	12	12	11	68
25-Jul	14	12	10	13	18	13	13	14	14	17	18	15	16	15	16	17	17	15	15	13	11	18	54	74	74
26-Jul	17	11	8	13	18	6	14	11	12	11	15	13	9	7	11	8	12	12	10	6	12	29	10	15	29
27-Jul	35	17	12	65	14	12	9	12	12	17	14	22	22	25	18	22	15	15	31	15	12	9	18	17	65
28-Jul	20	15	14	14	11	15	16	15	17	18	24	23	21	28	23	22	28	18	22	18	17	15	22	21	28
29-Jul	29	21	15	18	16	19	24	23	31	26	34	30	37	37	33	33	40	31	37	17	9	11	7	10	40
30-Jul	5	6	6	7	12	13	6	7	7	9	11	28	33	37	22	17	9	10	7	13	10	43	88	13	88
31-Jul	69	14	14	14	17	19	16	16	19	23	20	19	23	23	23	40	47	41	15	14	15	12	15	17	69
69 46 62 100 80 44 69 42 53 46 52 74 47 69 48 40 86 49 68 92 50 43 91 83																									
Diurnal Maximum																									
C - Calibration						AF - Analyzer Failure																			





Wood Buffalo Environmental Association

SO₂ Calibration Summary

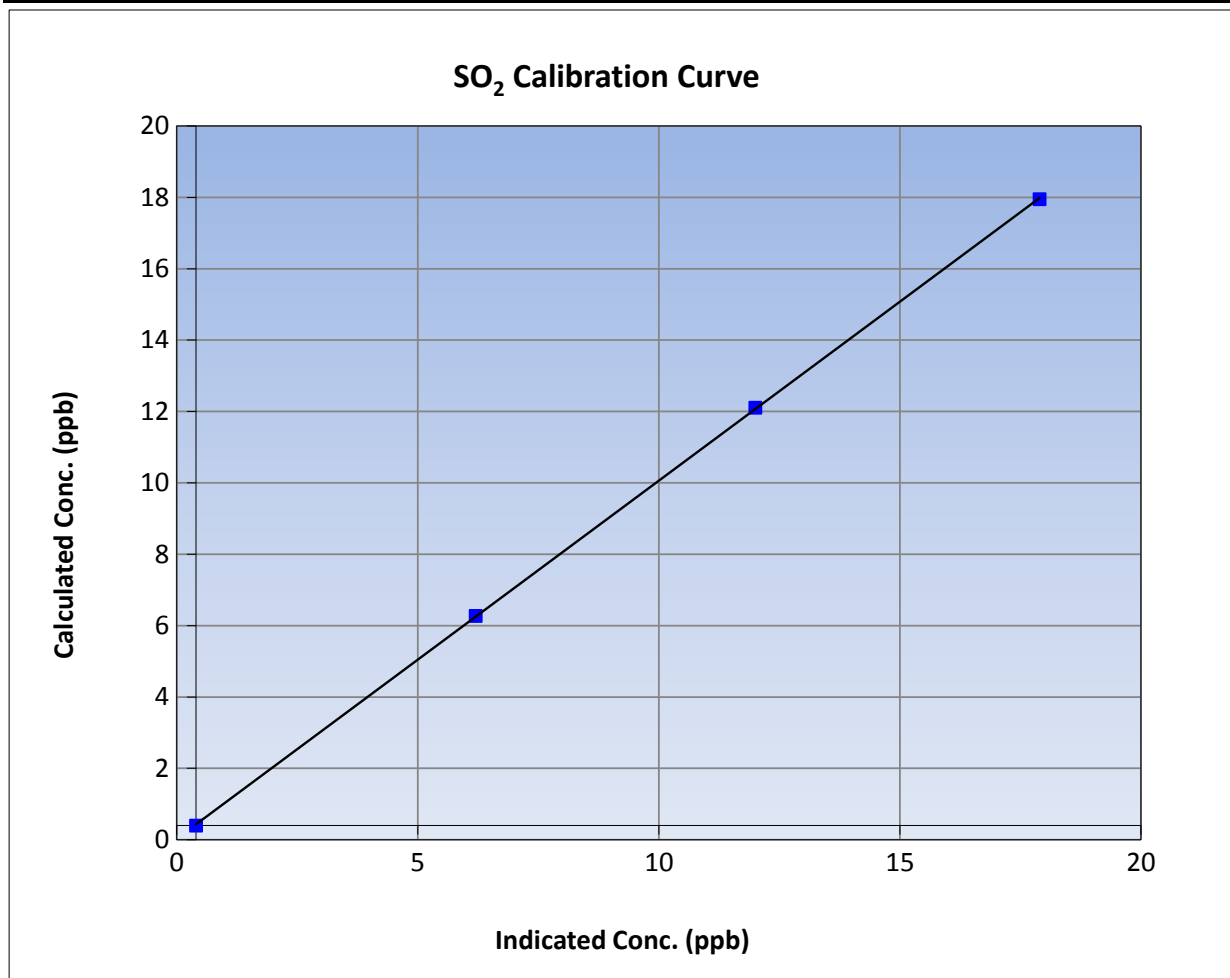
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 1, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	8:40	End Time (MST)	13:50
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1136451241

Calibration Data

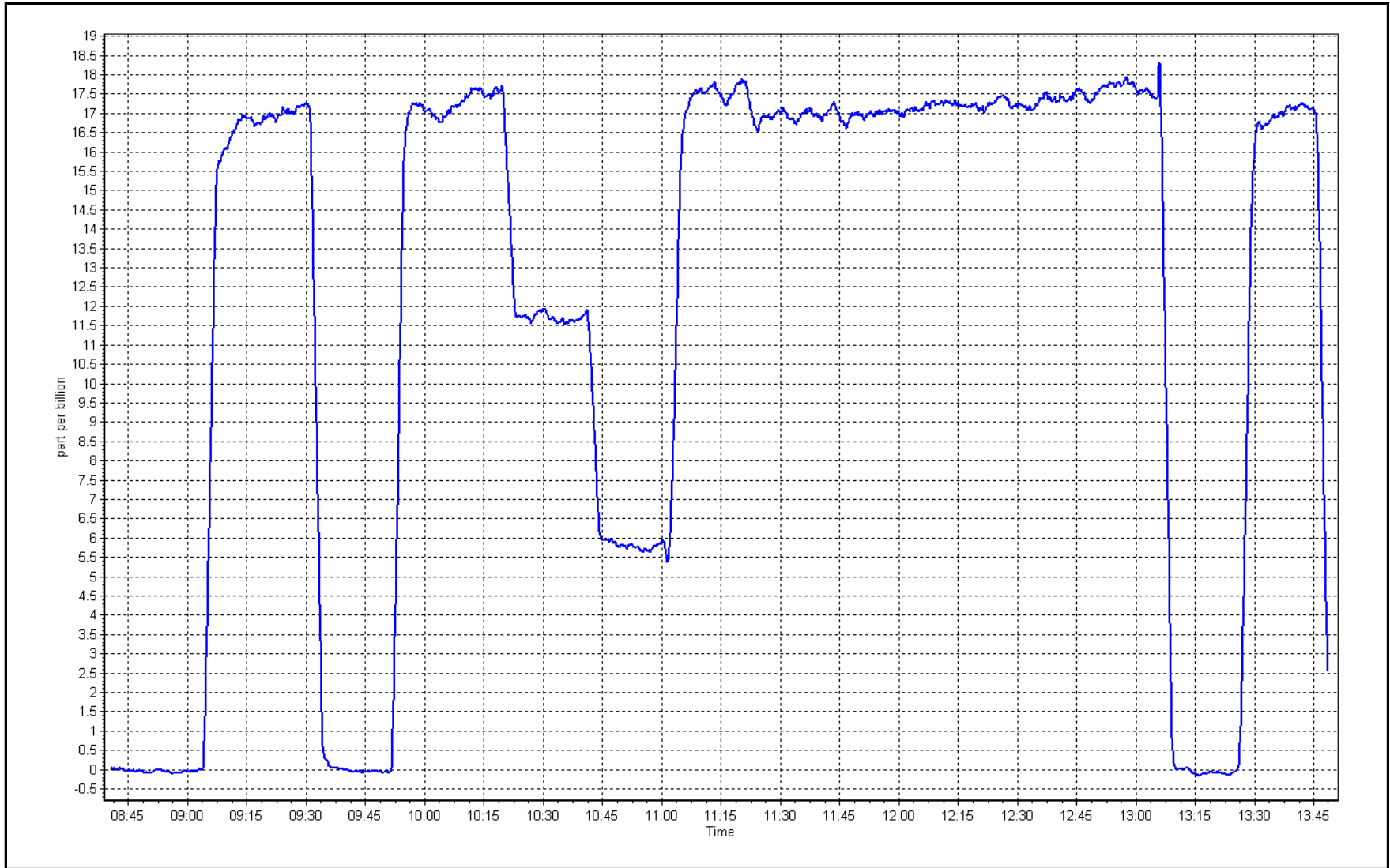
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999971	≥0.995
17.5	17.5	1.0027			
11.7	11.6	1.0096	Slope	1.003027	0.90 - 1.10
5.9	5.8	1.0129			
			Intercept	0.031908	+/-30



SO2 Calibration Plot

Date: July 12, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

O₃ Calibration Summary

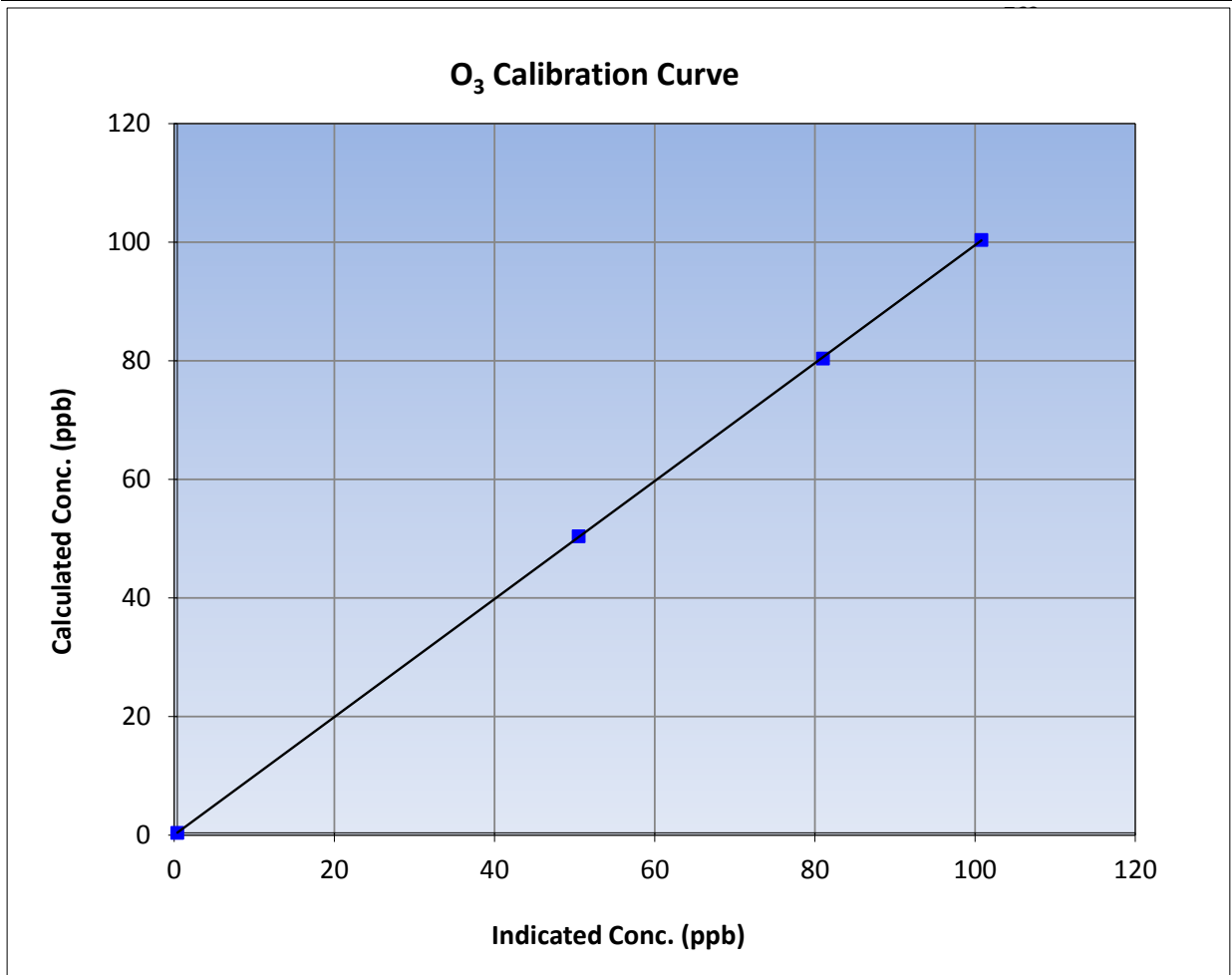
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 1, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	13:05	End Time (MST)	16:40
Analyzer make	API T400	Analyzer serial #	1020

Calibration Data

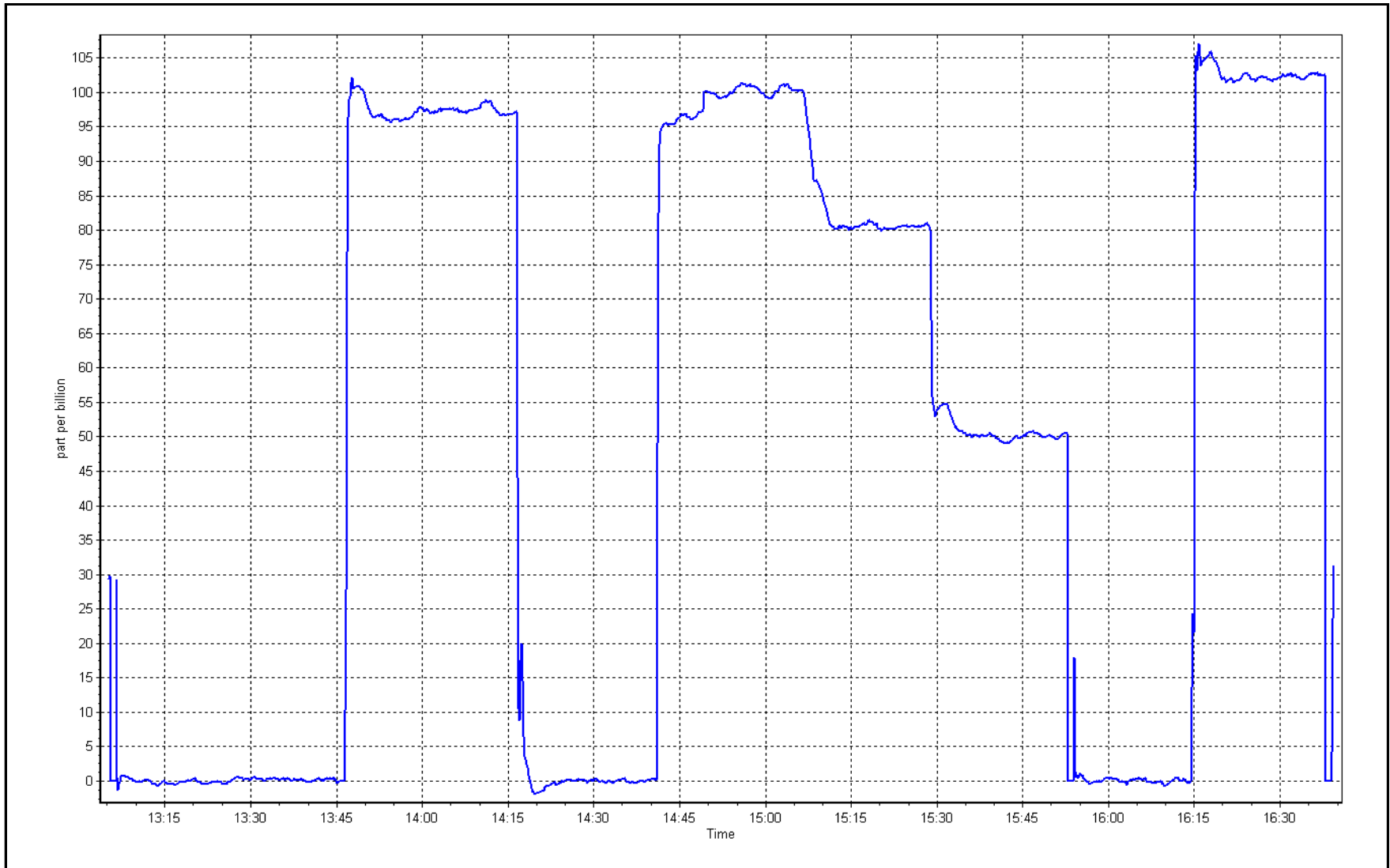
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.0	----	Correlation Coefficient	≥0.995
100.0	100.4	0.9960		
80.0	80.6	0.9926	Slope	0.90 - 1.10
50.0	50.1	0.9980		
			Intercept	+/- 10



O₃ Calibration Plot

Date: July 12, 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:	July 12, 2017	Last Cal Date:	June 1, 2017
Start time (MST):	8:40	End time (MST):	13:50
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	1.313	1.313	NOX Range (ppb)	0 - 1000 ppb	
NOX slope	1.328	1.328	PMT Temperature	5.1	5.1
NO2 slope	1.000	1.000	Reaction cell Press	5.0	4.9
NO offset	0.1	0.1	Sample Flow	1112	1112
NOX offset	0.2	0.2	PMT Voltage	502.0	502.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.000128	1.004752
NO _x Cal Offset	0.090805	0.221130
NO Cal Slope	0.999345	1.003543
NO Cal Offset	0.281941	0.160754
NO ₂ Cal Slope	1.004438	1.009610
NO ₂ Cal Offset	-0.061416	0.439061



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	5996	0.0	0.0	0.0	0.0	0.0	0.0	0.1	----	----
as found span	5955	44.8	150.1	150.1	0.0	149.1	149.1	0.0	1.0066	1.0066
calibrator zero	5996	0.0	0.0	0.0	0.0	0.0	0.1	0.0	----	----
high point	5955	44.8	150.1	150.1	0.0	149.4	149.6	-0.2	1.0046	1.0032
second point	5970	29.9	100.2	100.2	0.0	99.2	99.5	-0.3	1.0097	1.0067
third point	5985	15.0	50.3	50.3	0.0	49.6	49.6	0.0	1.0131	1.0131
as left zero	5996	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	----	----
as left span	5955	44.8	150.1	43.8	106.3	147.8	43.6	104.2	1.0155	1.0046
Average Correction Factor									1.0091	1.0077

Corrected As found NO_x = 149.1 ppb NO = 149.1 ppb *Percent Change NO_x = 0.6%
 Previous Response NO_x = 150.0 ppb NO = 149.9 ppb *Percent Change NO = 0.5%
 * = > +/-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	148.6	149.0	-0.4	1.0100	1.0073	----	----
1st NO2 (100 ppb O3)	43.8	105.2	148.3	43.8	104.5	1.0120	----	1.0067	99.3%
2nd NO2 (80 ppb O3)	61.9	87.1	147.3	61.9	85.4	1.0189	----	1.0199	98.0%
3rd NO2 (50 ppb O3)	93.3	55.7	147.4	93.3	54.0	1.0182	----	1.0315	96.9%
2nd NO ref point	----	0.0	148.5	149.1	-0.6	1.0107	1.0066	----	----
Average Correction Factor						1.0150	1.0069	1.0194	98.1%

Notes:

No adjustments made.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

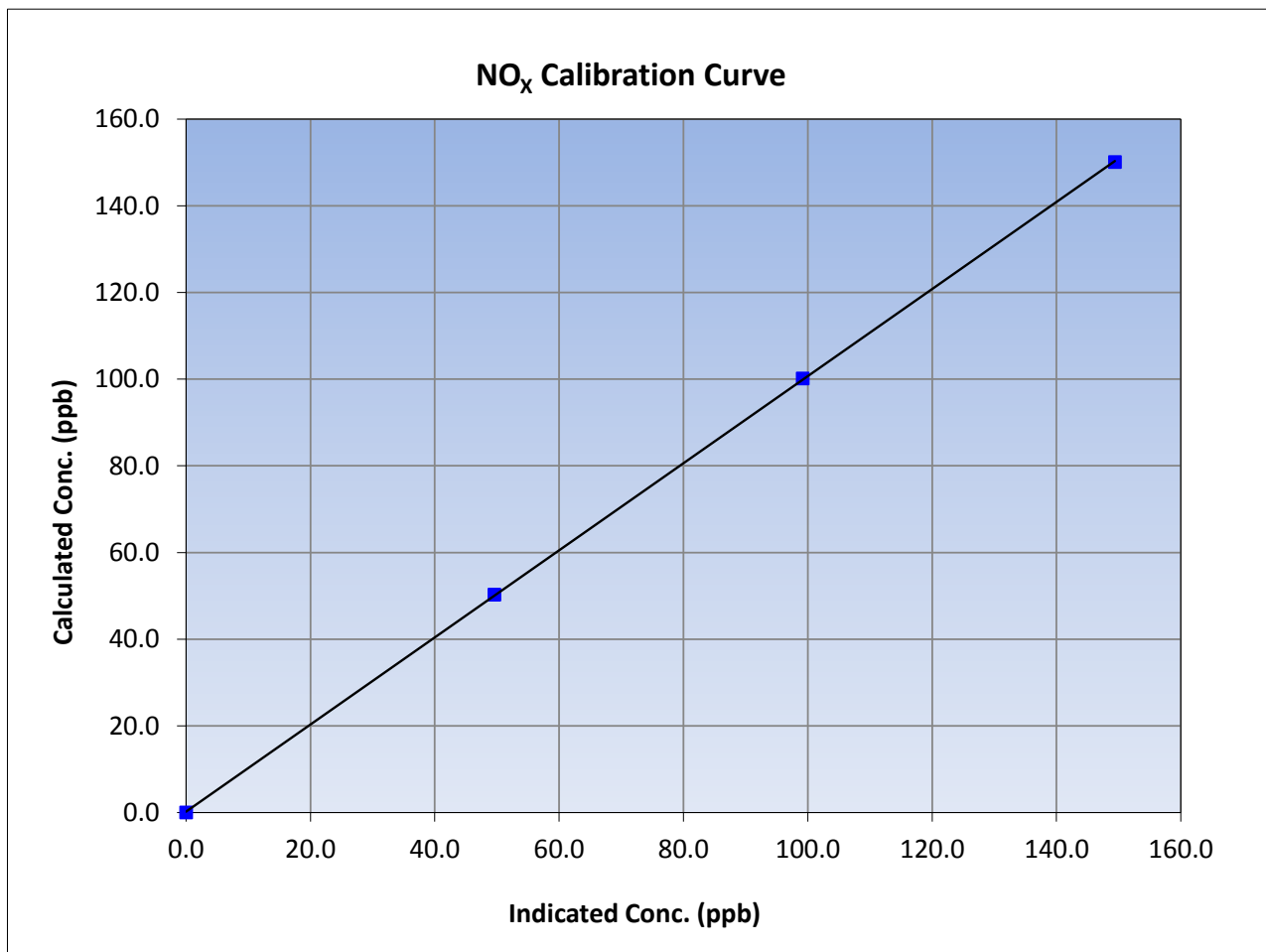
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 1, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	8:40	End Time (MST)	13:50
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	149.4	1.0046			
100.2	99.2	1.0097			
50.3	49.6	1.0131			
			Slope	1.004752	0.90 - 1.10
			Intercept	0.221130	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

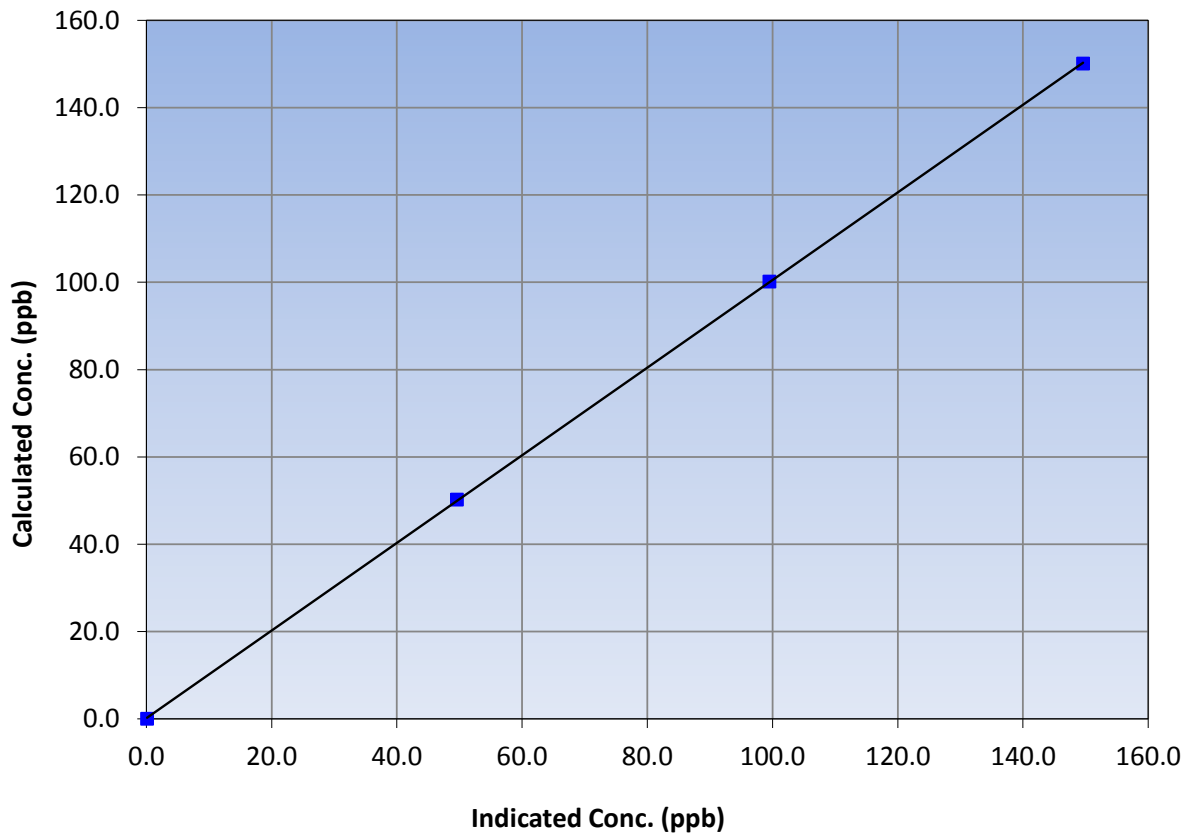
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 1, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	8:40	End Time (MST)	13:50
Analyzer make	API T200u	Analyzer serial #	11039

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	
150.1	149.6	1.0032			
100.2	99.5	1.0067			
50.3	49.6	1.0131			
			Slope	1.003543	0.90 - 1.10
			Intercept	0.160754	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

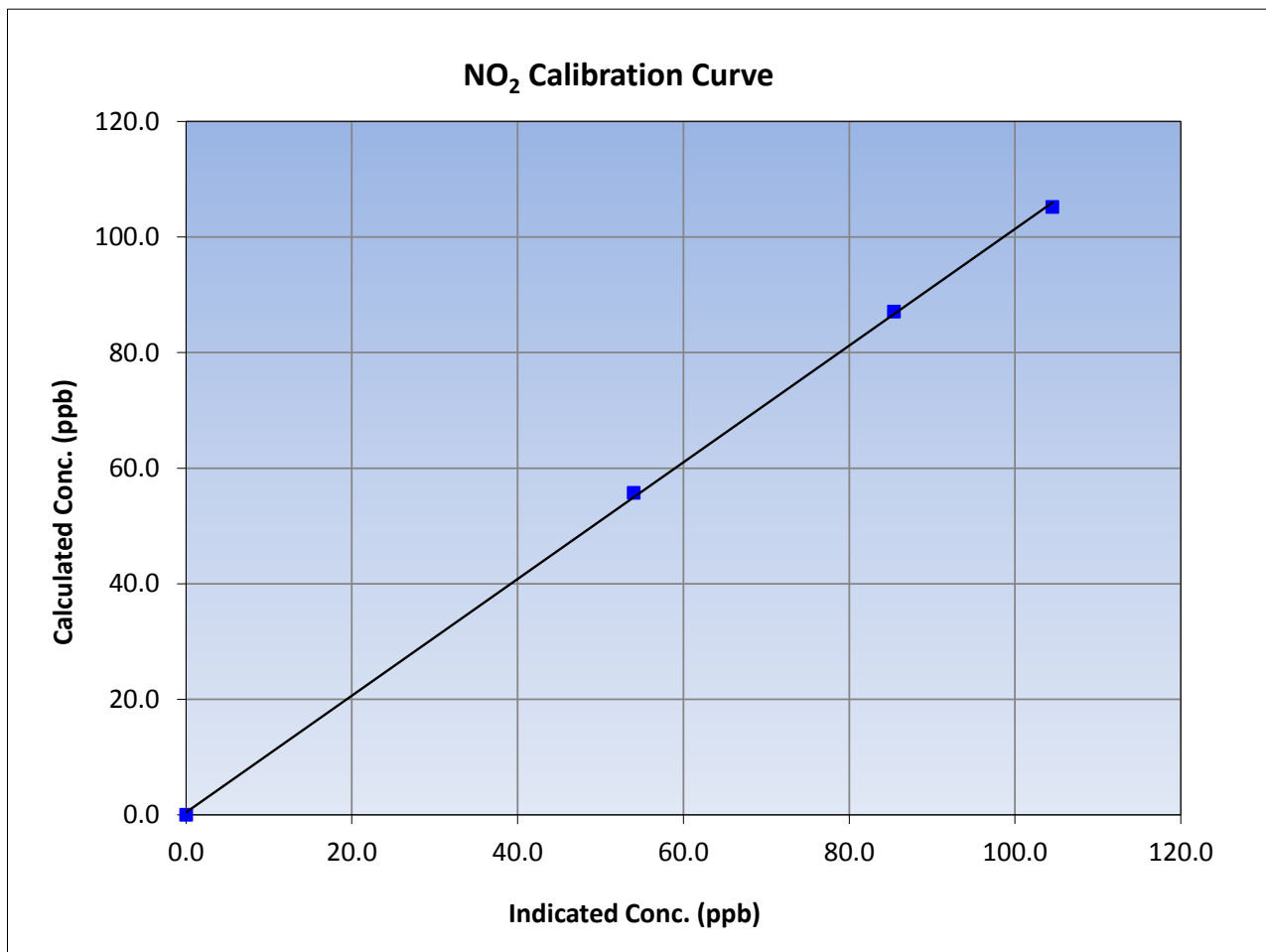
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 1, 2017
Station Name	Fort Chipewyan	Station Number	AMS 08
Start Time (MST)	8:40	End Time (MST)	13:50
Analyzer make	API T200u	Analyzer serial #	11039

Calibration Data

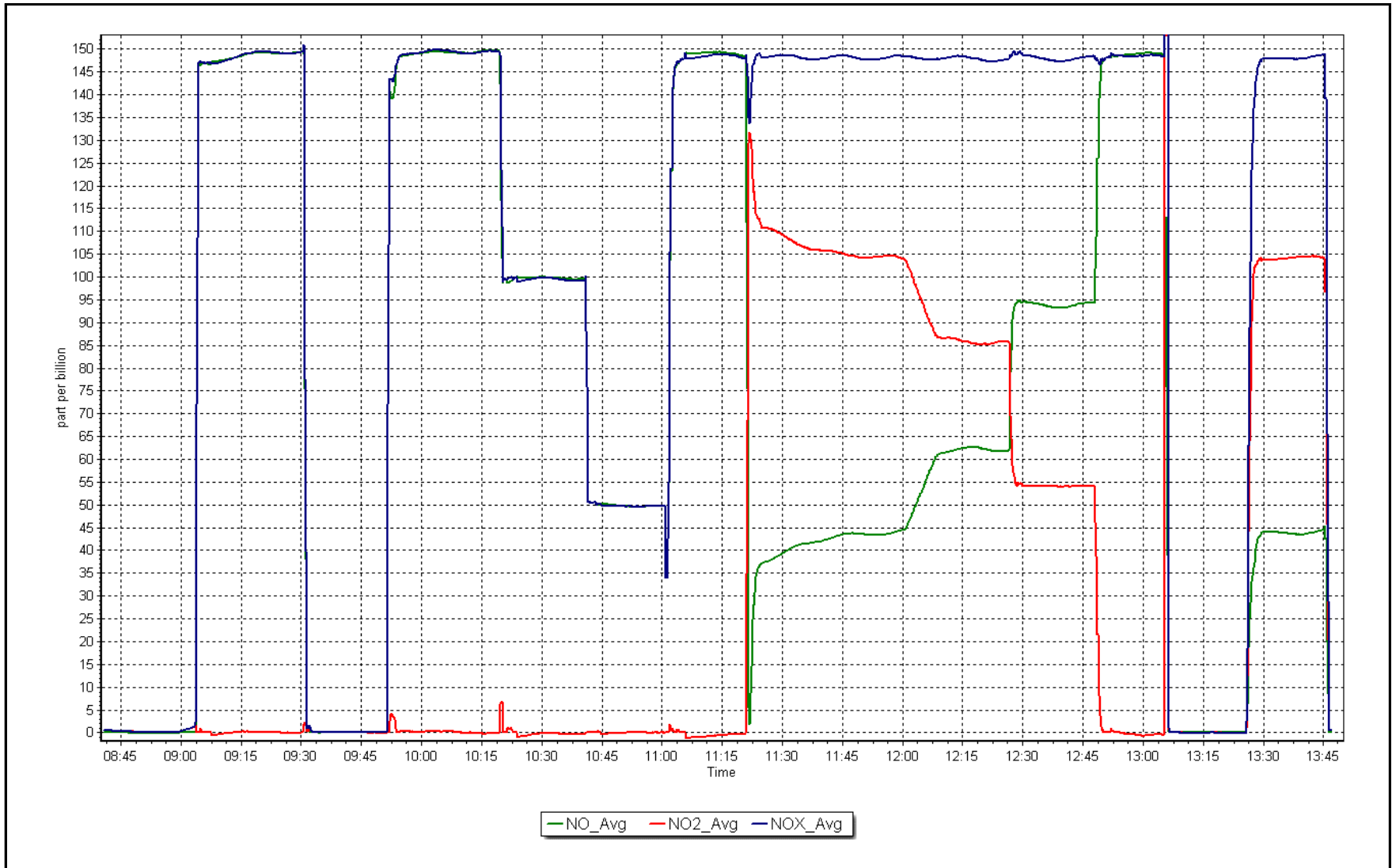
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<i>Limits</i>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
105.2	104.5	1.0067			
87.1	85.4	1.0199			
55.7	54.0	1.0315			
			Slope	1.009610	0.90 - 1.10
			Intercept	0.439061	+/-20



NO_x Calibration Plot

Date: July 12, 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:	July 12, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	13:10	End time (MST):	15:10
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:	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)	23	24.2	23	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	985	986.58	985	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	985.8	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.6	-----	-0.2	<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: June 2, 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: _____	
(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:		June 2, 2017			
Date Pump Rebuilt/Replaced:		Not available			

Notes: No adjustments made. Cyclone head cleaned.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Fort Chipewyan	Station Number:	AMS 08
Calibration Date:	July 12, 2017	Prev Cal Date:	September 1, 2016
Start Time (MST):	9:00	End Time (MST):	10:30
Barometric Press:	NA	Station Temp:	22 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	G3212
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	0.9975
800	77.8	77.8	0.9994
Average Correction Factor			0.9979

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r ²)	0.999994	0.999999	<i>≥0.995</i>
Calculated slope	0.998424	0.999200	<i>0.90 - 1.10</i>
Calculated intercept	-0.012541	-0.033032	<i>+/- 2</i>

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	NA
As Found Declination (deg west of North)	<u>16</u>	As Left Declination (deg west of North)	<u>16</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	-0.8	n/a
90	86.6	1.0393
180	177.8	1.0124
270	268.9	1.0042
357	354.2	1.0080
Average Correction Factor		1.0159

	<i>Start</i>	<i>Finish</i>	<i>Limits</i>
Correl Coeff (r ²)	0.999978	0.999971	<i>≥0.995</i>
Calculated slope	0.994062	1.002011	<i>0.90 - 1.10</i>
Calculated intercept	0.848365	1.705296	<i>+/- 7</i>

Notes: WD serial number is faded. WS bearings replaced. Speed readings were the same before and after bearing replacement.

Calibration Performed By: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 9 BARGE LANDING JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JULY 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	702	34	42	98.92	3	0	1	0
THC(ppm) Average	699	34	45	98.52	3.3	-	2.4	-
Temperature (C) Average	744	0	0	100	32.6	-	24.8	-
Relative Humidity (%) Average	744	0	0	100	99	-	77	-
Wind Speed 10 m (km/h) Average	738	0	6	99.19	21	-	14	-
Wind Direction 10 m (deg) Average	738	0	6	99.19	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 JULY 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	702	0.4	0	-	0	0	0	0	0	1	3
THC(ppm) Average	699	2.22	0.2	-	2	2	2.1	2.2	2.3	2.5	3.3
Temperature (C) Average	744	19.89	5.4	-	6.5	13.3	15.7	19.4	23.8	27.3	32.6
Relative Humidity (%) Average	744	62	20	-	25	36	46	60	77	92	99
Wind Speed 10 m (km/h) Average	738	6.4	4	-	0	2	4	6	9	11	21
Wind Direction 10 m (deg) Average	738	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	04 Jul 2017 07:00	04 Jul 2017 07:00	1	Recovery
TRS	21 Jul 2017 20:00	22 Jul 2017 02:00	7	Station power failure
THC	04 Jul 2017 06:00	04 Jul 2017 09:00	4	Analyzer failure
THC	21 Jul 2017 20:00	22 Jul 2017 02:00	7	Station power failure
Wind Speed, Wind Direction	14 Jul 2017 23:00	15 Jul 2017 00:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	29 Jul 2017 00:00	29 Jul 2017 00:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	30 Jul 2017 05:00	30 Jul 2017 07:00	3	Flat line in sensor output signal

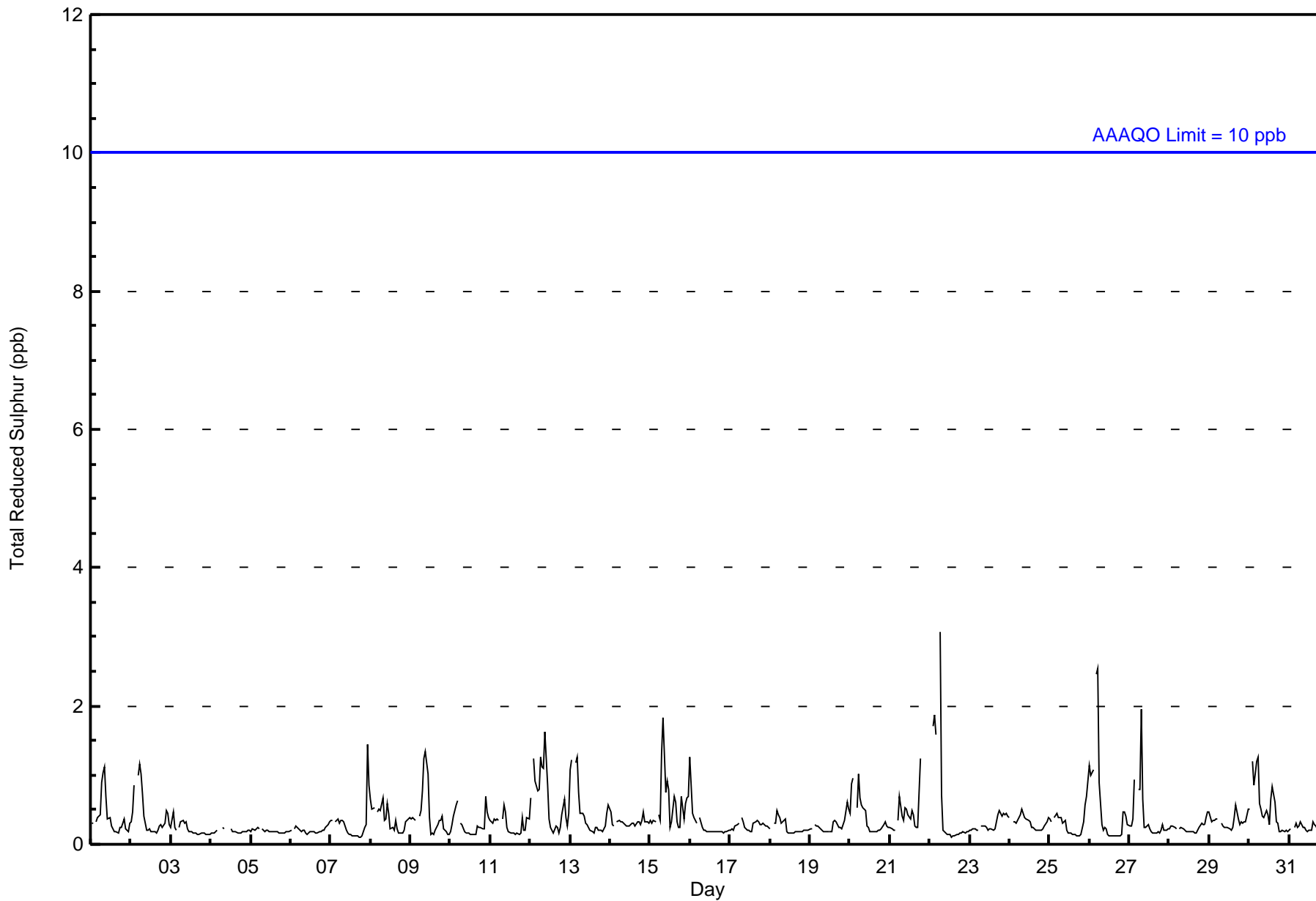


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Jul 22 07:00 Maximum Daily Average: 0.6 ppb on Jul 12																	Hours in Service: 744 Hours of Data: 702 Hours of Missing Data: 42 Hours of Calibration: 34 Percent Operational Time: 98.9									
Minimum Value: 0 ppb on Jul 7 19:00 Minimum Daily Average: 0.2 ppb on Jul 4 Maximum Diurnal Average: 0.6 ppb at hour 7 Minimum Diurnal Average: 0.2 ppb at hour 13 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																										
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-Jul	0	0	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
2-Jul	0	0	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
3-Jul	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-Jul	0	0	0	0	0	Z	RE	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
5-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
6-Jul	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-Jul	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
8-Jul	1	1	1	Z	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
9-Jul	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	
10-Jul	0	0	0	1	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1	
11-Jul	0	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
12-Jul	1	Z	1	1	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0.6	2	
13-Jul	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1	
14-Jul	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-Jul	0	0	0	0	Z	0	0	1	2	1	1	1	0	0	1	1	0	0	0	1	0	1	1	0.6	2	
16-Jul	1	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
17-Jul	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	
18-Jul	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-Jul	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
20-Jul	0	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
21-Jul	0	0	0	0	Z	0	1	0	0	1	1	0	0	0	0	0	0	0	1	PF	PF	PF	PF	PF	0.4	1
22-Jul	PF	PF	2	2	2	Z	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
23-Jul	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	
24-Jul	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
25-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
26-Jul	1	1	1	Z	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3	
27-Jul	0	0	0	1	Z	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2	
28-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.3	1	
30-Jul	1	Z	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.5	1	
31-Jul	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	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration PF - Power Failure RE - Recovery 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
Barge Landing - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Barge Landing - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	700	99.72	99.72
3 - 4	2	0.28	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: 702

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - July 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	54	20	15	8	8	15	32	57	53	65	66	121	41	36	55	48	694
3 - 4	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
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	54	20	15	8	8	15	32	57	55	65	66	121	41	36	55	48	696

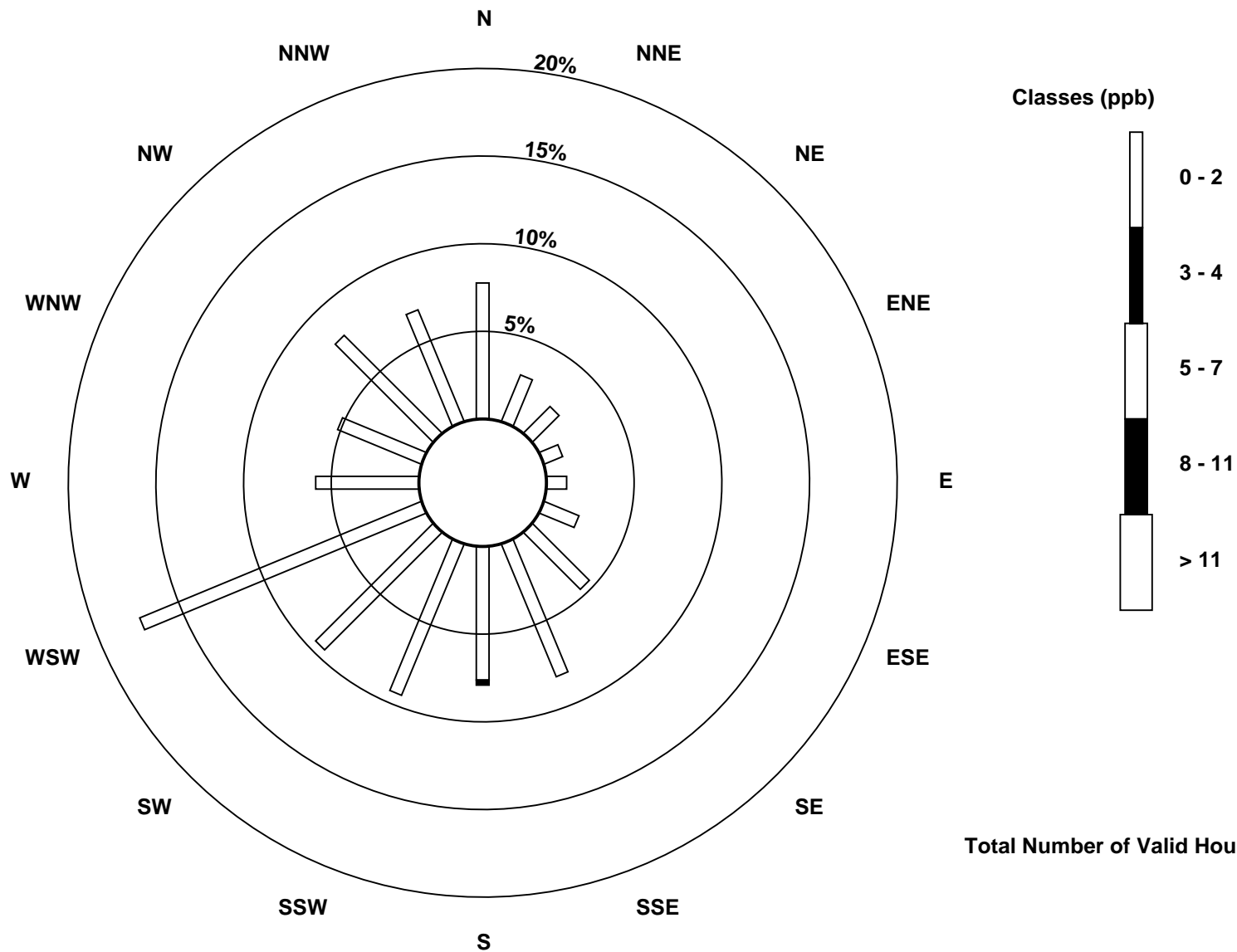
Total Number of Valid Hours: 696

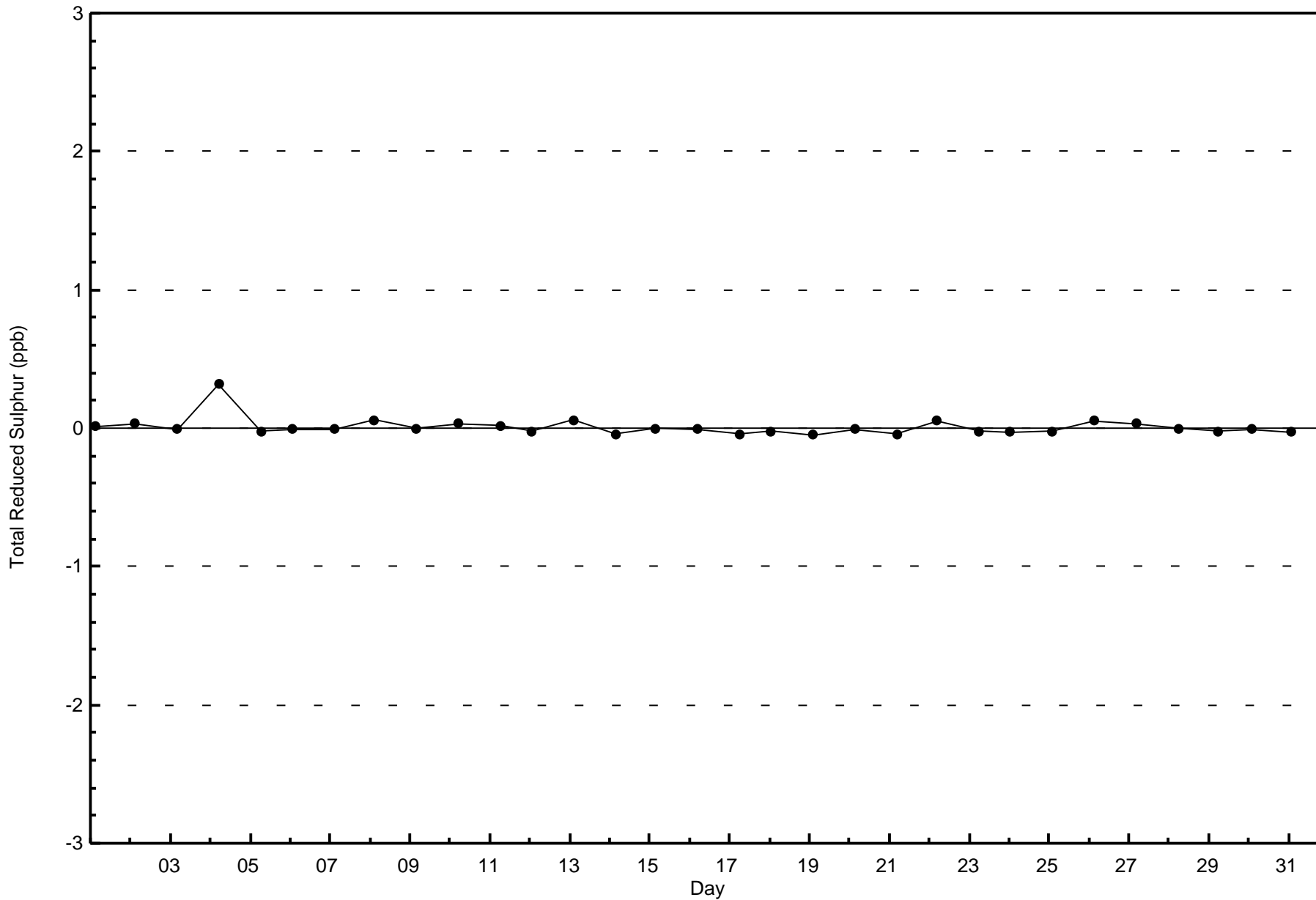
Total Number of Hours: 744

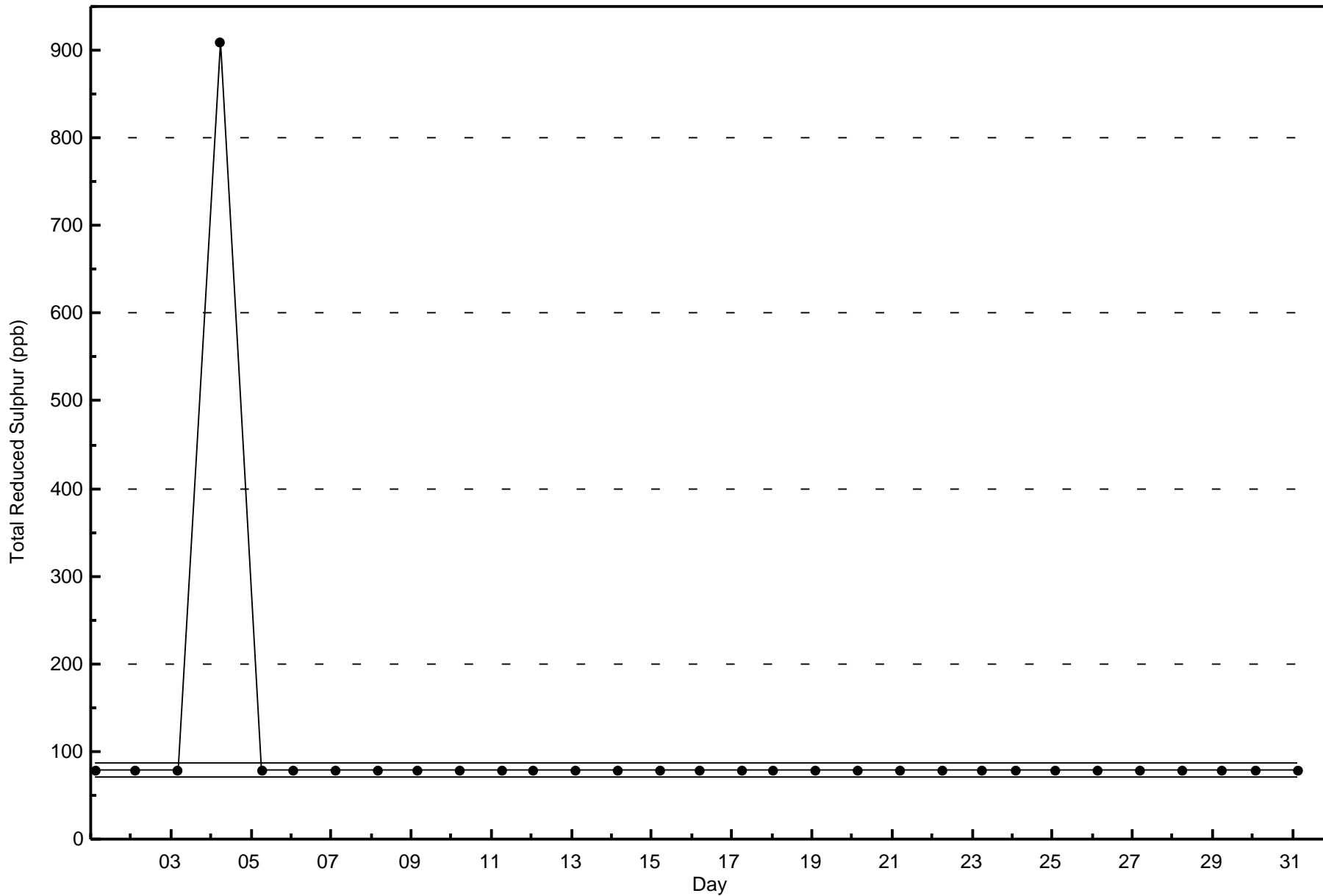


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)









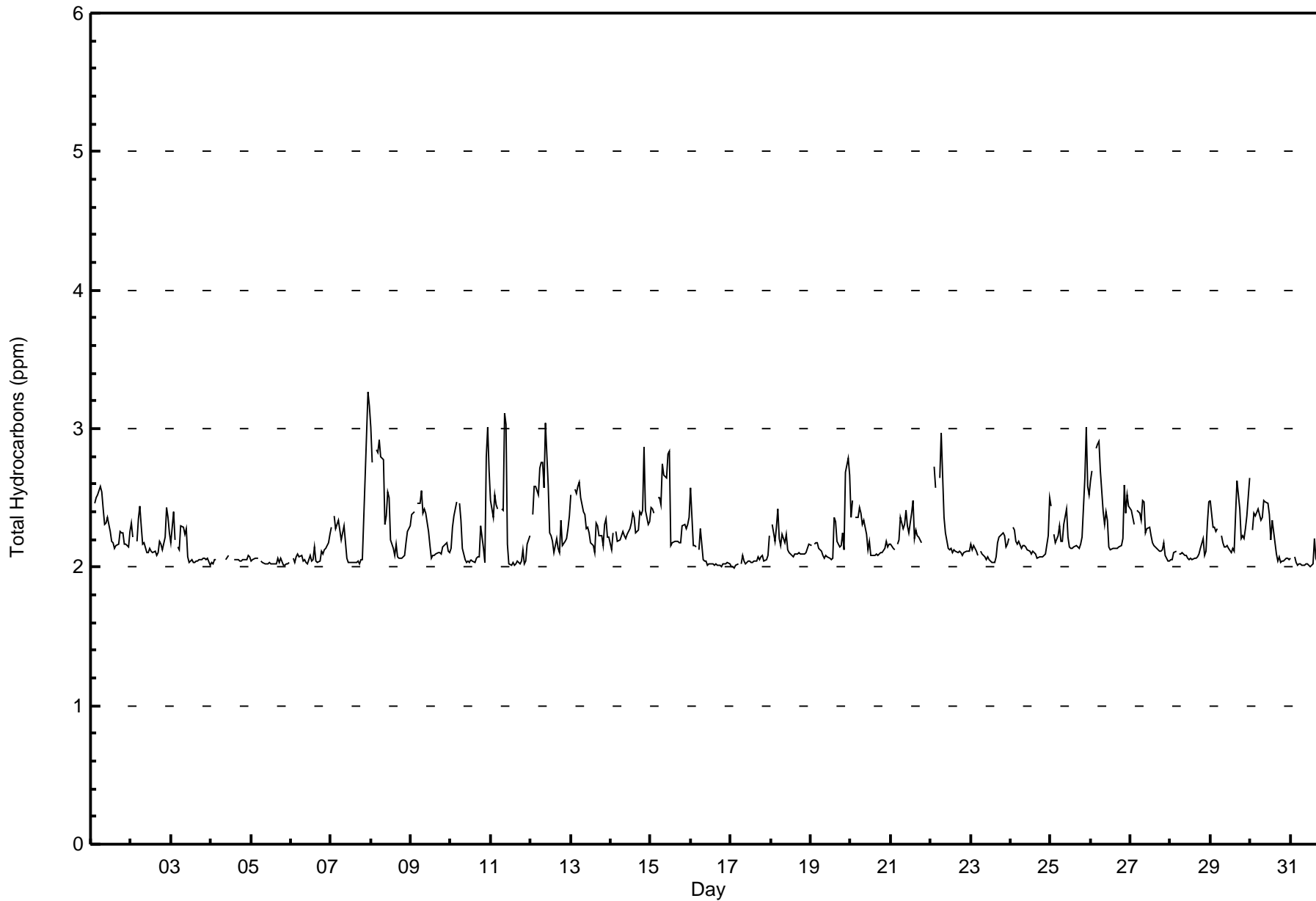
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Barge Landing - July 2017

Maximum Value: 3.3 ppm on Jul 7 23:00																			Maximum Daily Average: 2.4 ppm on Jul 26						Hours in Service: 744		
Minimum Value: 2.0 ppm on Jul 17 03:00																			Minimum Daily Average: 2.0 ppm on Jul 5						Hours of Data: 699		
Maximum Diurnal Average: 2.4 ppm at hour 6																			Minimum Diurnal Average: 2.1 ppm at hour 13						Hours of Missing Data: 45		
Monthly Average: 2.22 ppm																			Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.0						Hours of Calibration: 34		
																									Percent Operational Time: 98.5		
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-Jul	2.3	Z	2.5	2.5	2.5	2.6	2.5	2.4	2.3	2.3	2.4	2.3	2.2	2.2	2.1	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.1	2.3	2.3	2.6	
2-Jul	2.3	2.2	Z	2.2	2.3	2.4	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.4	2.4	2.3	2.2	2.4	
3-Jul	2.2	2.4	2.2	Z	2.1	2.1	2.3	2.3	2.2	2.3	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.4		
4-Jul	2.0	2.0	2.1	2.1	Z	AF	AF	AF	AF	2.1	2.1	C	C	C	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	--	2.1		
5-Jul	2.0	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	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1		
6-Jul	Z	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	
7-Jul	2.3	Z	2.4	2.3	2.3	2.3	2.2	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.7	3.0	3.3	3.2	2.3	3.3	
8-Jul	3.0	2.8	Z	2.8	2.8	2.9	2.8	2.8	2.3	2.4	2.5	2.5	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	3.0	
9-Jul	2.4	2.4	2.4	Z	2.5	2.5	2.6	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.6	
10-Jul	2.1	2.3	2.4	2.5	Z	2.5	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.3	2.1	2.0	2.8	3.0	2.7	2.2	3.0	
11-Jul	2.5	2.4	2.5	2.5	2.4	Z	2.4	2.4	3.1	3.0	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.2	2.3	3.1	
12-Jul	Z	2.4	2.6	2.6	2.5	2.7	2.8	2.8	2.6	3.0	2.6	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.3	2.2	2.2	2.2	2.3	2.4	2.4	3.0	
13-Jul	2.5	Z	2.6	2.5	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.2	2.2	2.3	2.6	
14-Jul	2.1	2.2	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.2	2.3	2.4	2.4	2.4	2.9	2.4	2.3	2.3	2.3	2.9	
15-Jul	2.4	2.4	2.4	Z	2.5	2.5	2.5	2.8	2.7	2.6	2.8	2.8	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	2.8	
16-Jul	2.6	2.2	2.2	2.1	Z	2.1	2.3	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	2.1	2.6	
17-Jul	2.0	2.0	2.0	2.0	2.0	Z	2.0	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	2.0	2.1	2.1	2.2	2.0	2.2	
18-Jul	Z	2.3	2.2	2.3	2.4	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	2.1	2.2	2.2	2.4	
19-Jul	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.3	2.2	2.1	2.2	2.2	2.1	2.7	2.8	2.7	2.2	2.8	
20-Jul	2.4	2.5	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.5	
21-Jul	2.2	2.1	2.1	Z	2.2	2.2	2.4	2.3	2.3	2.4	2.3	2.3	2.4	2.5	2.2	2.3	2.2	2.2	2.2	2.2	PF	PF	PF	PF	PF	2.3	2.5
22-Jul	PF	PF	2.7	2.6	Z	2.6	3.0	2.7	2.4	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	2.3	3.0	
23-Jul	2.2	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.2	
24-Jul	Z	2.3	2.3	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	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.5	2.2	2.5	
25-Jul	2.4	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.6	3.0	2.6	2.5	2.3	3.0
26-Jul	2.6	2.7	Z	2.9	2.9	2.9	2.7	2.4	2.3	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.6	2.4	2.5	2.4	2.4	2.9	
27-Jul	2.4	2.4	2.3	Z	2.4	2.4	2.3	2.5	2.5	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.2	2.5	
28-Jul	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	2.1	2.1	2.1	2.2	2.1	2.1	2.3	2.5	2.1	2.5	
29-Jul	2.5	2.3	2.3	2.3	2.3	Z	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.4	2.6	2.4	2.2	2.2	2.3	2.4	2.6	2.3	2.6	
30-Jul	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.5	2.5	2.5	2.4	2.2	2.3	2.3	2.1	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.5	
31-Jul	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration AF - Analyzer Failure PF - Power Failure																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	112	16.02	16.02
2.1 - 3.0	584	83.55	99.57
3.1 - 10.0	3	0.43	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 699

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - July 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	0	0	0	0	0	0	0	2	2	10	36	15	15	20	9	112
2.1 - 3.0	51	19	14	8	9	17	32	58	53	62	56	82	26	20	32	39	578
3.1 - 10.0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	20	14	8	9	17	32	58	55	64	66	118	41	35	53	48	693

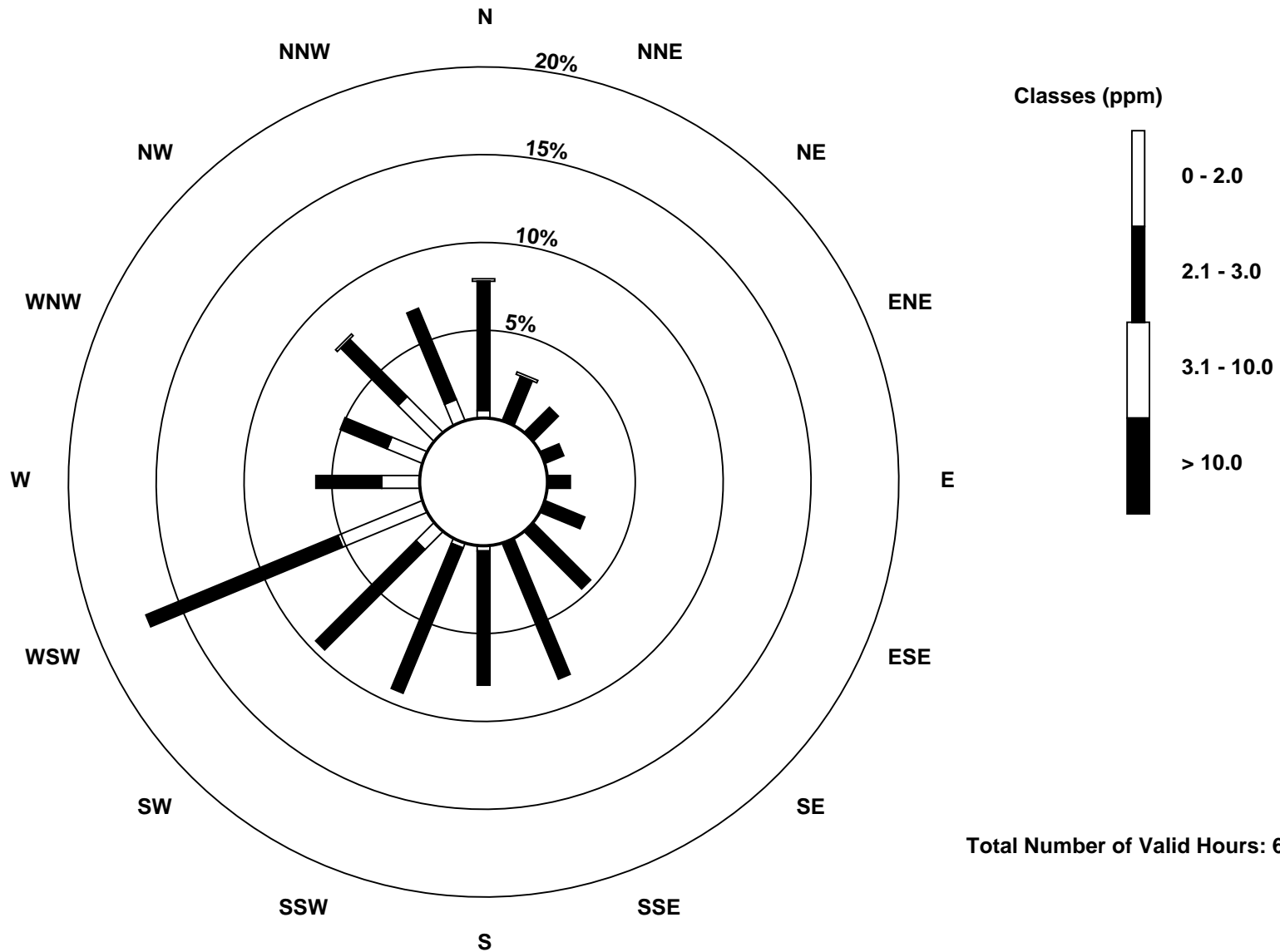
Total Number of Valid Hours: 693

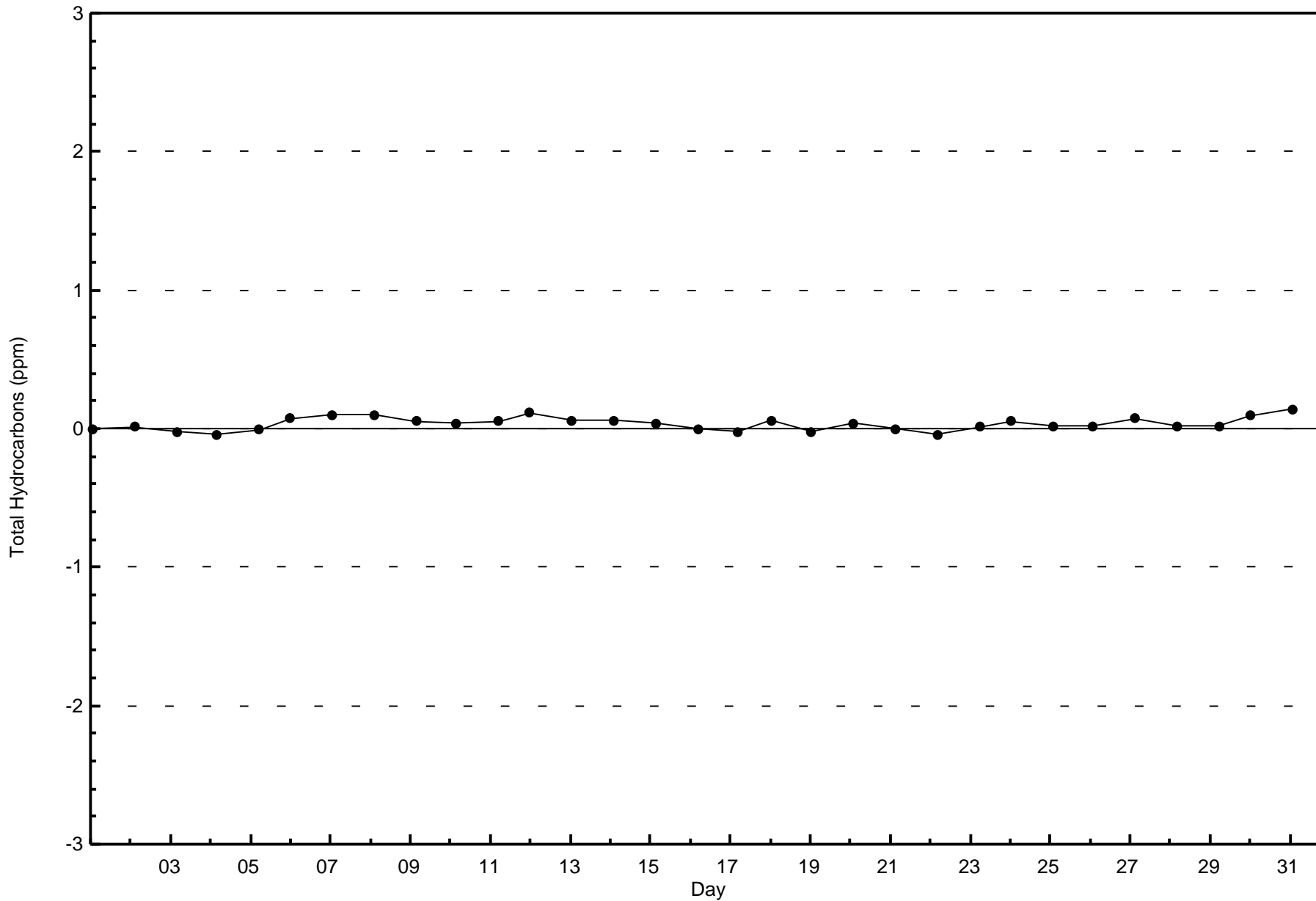
Total Number of Hours: 744

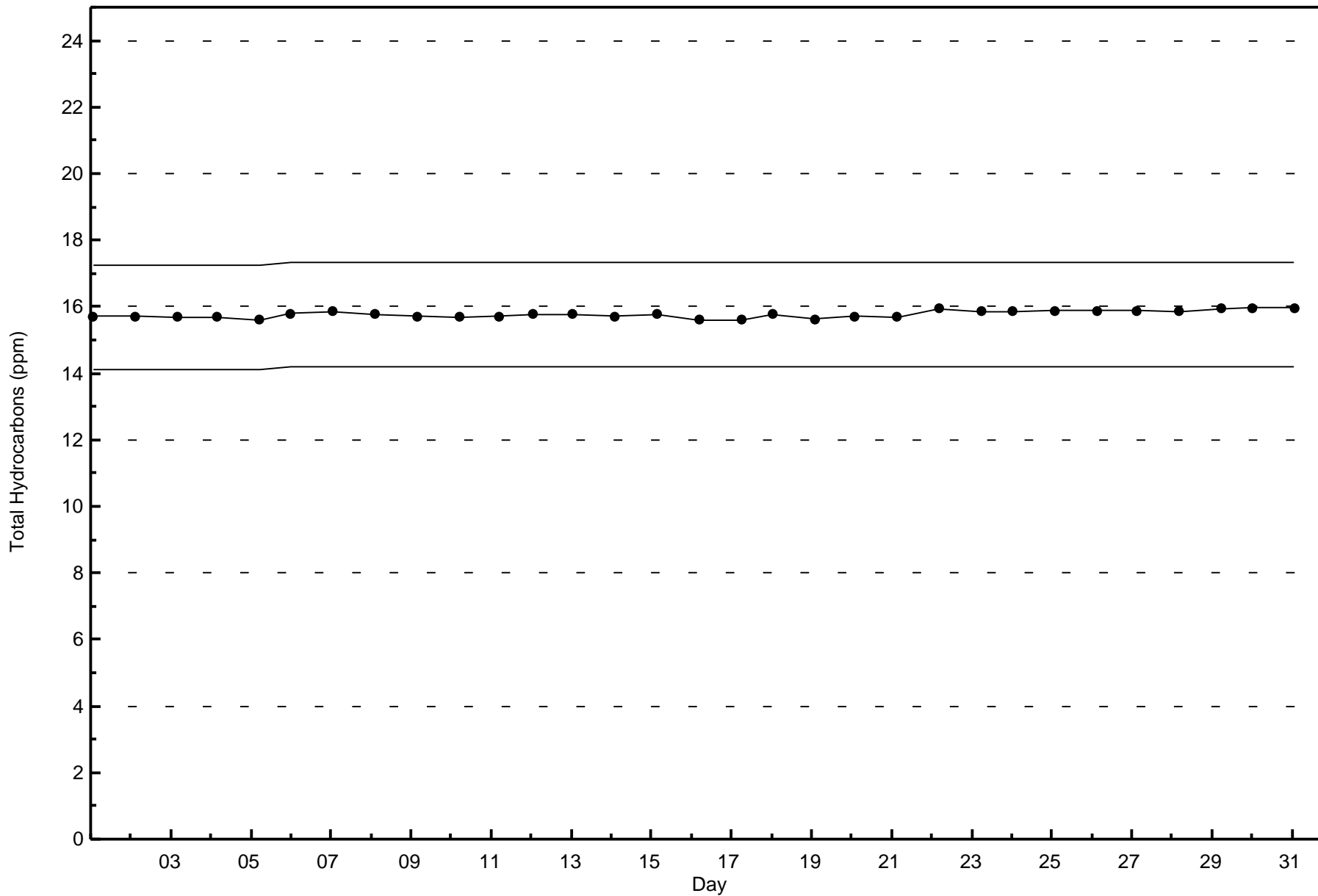


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)









Wood Buffalo Environmental Association
Summary of Hour Averages

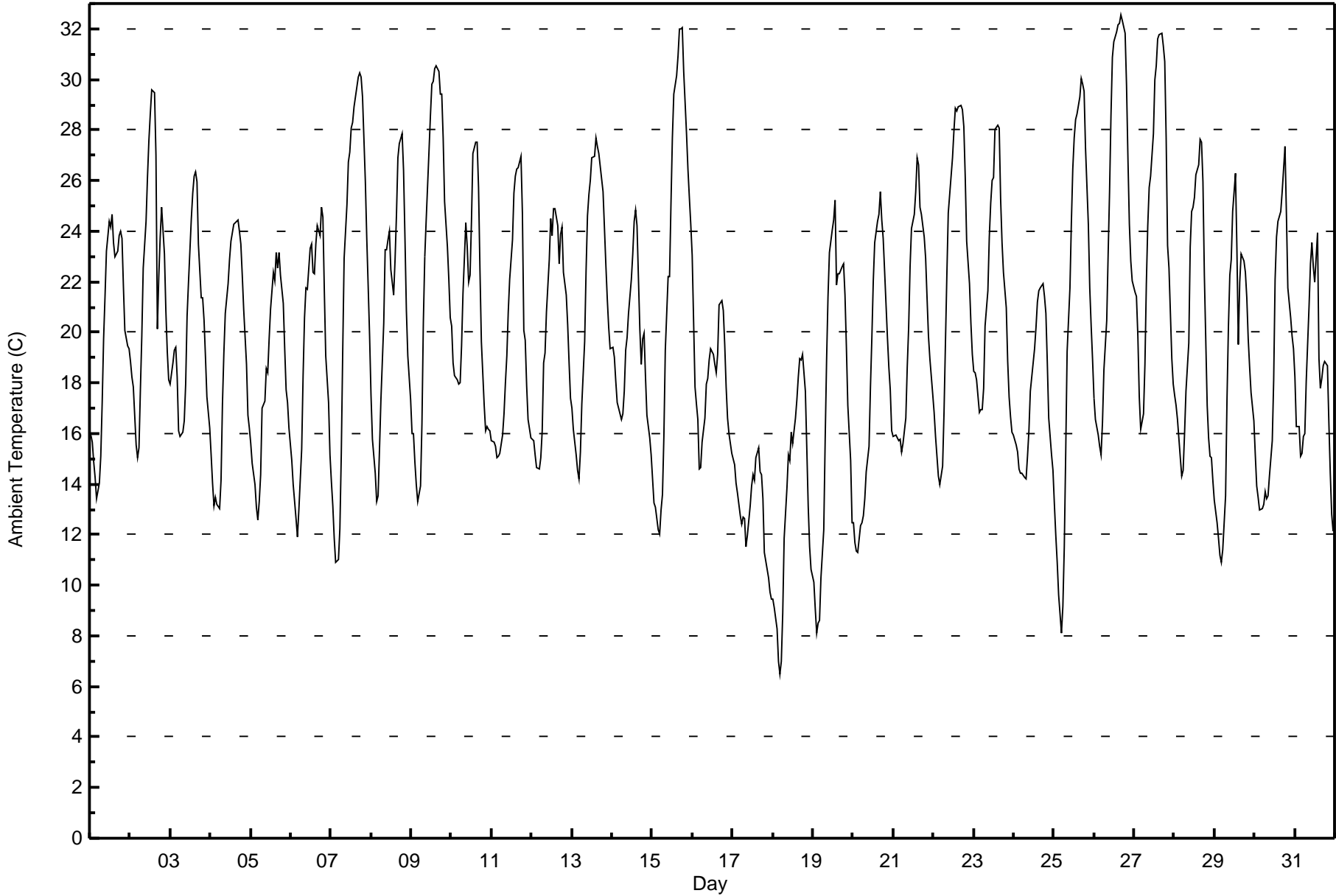
Ambient Temperature (AT) - C
Barge Landing - July 2017

Maximum Value: 32.6 C on Jul 26 17:00 Maximum Daily Average: 24.8 C on Jul 26																						Hours in Service: 744				
Minimum Value: 6.5 C on Jul 18 05:00 Minimum Daily Average: 13.0 C on Jul 17																						Hours of Data: 744				
Maximum Diurnal Average: 25.3 C at hour 16 Minimum Diurnal Average: 13.6 C at hour 5																						Hours of Missing Data: 0				
Monthly Average: 19.89 C Percentiles: P₁ = 8.6 P₁₀ = 13.3 Q₁ = 15.7 Median = 19.4 Q₃ = 23.8 P₉₀ = 27.3 P₉₉ = 32.0																						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-Jul	15.9	15.7	14.9	14.2	13.4	14.0	15.1	17.2	19.8	21.4	23.2	24.4	24.2	24.7	23.5	23.0	23.2	23.8	24.0	23.7	21.8	20.1	19.5	19.4	20.0	24.7
2-Jul	18.8	18.2	17.9	15.5	15.0	15.4	17.7	19.9	22.6	24.4	26.1	27.6	28.6	29.6	29.5	27.0	20.1	22.2	23.8	24.9	23.1	20.9	19.3	18.1	21.9	29.6
3-Jul	18.0	18.8	19.3	19.4	18.2	16.1	15.9	16.1	16.5	18.0	20.6	22.0	24.5	25.5	26.2	26.4	26.0	23.5	21.4	21.4	20.5	19.0	17.4	16.2	20.3	26.4
4-Jul	15.2	14.0	13.2	13.5	13.2	13.0	14.2	17.2	19.2	20.8	21.9	22.8	23.6	24.0	24.3	24.4	24.0	23.5	22.3	20.9	18.7	16.7	16.2	16.2	19.2	24.4
5-Jul	15.6	14.8	14.0	13.1	12.6	13.3	14.4	17.0	17.3	18.6	18.4	19.7	20.9	22.3	22.0	23.1	22.6	23.2	22.3	21.1	19.4	17.7	17.2	16.2	18.2	23.2
6-Jul	14.9	14.0	13.3	12.6	11.9	13.0	15.4	18.3	20.6	21.7	21.7	23.3	23.5	22.3	22.3	23.5	24.2	23.8	24.9	24.6	21.6	19.1	17.2	15.2	19.3	24.9
7-Jul	14.1	13.1	11.9	10.9	11.0	12.2	15.2	19.3	23.0	25.1	26.7	27.1	28.1	28.3	28.9	29.7	30.1	30.3	30.1	29.3	25.9	23.7	21.8	19.8	22.3	30.3
8-Jul	17.5	15.8	14.4	13.3	13.5	15.4	17.3	20.4	23.3	23.3	23.7	24.0	22.5	21.5	22.9	24.7	26.9	27.4	27.9	26.4	23.7	20.8	19.1	17.3	21.0	27.9
9-Jul	16.0	16.0	14.9	14.0	13.3	13.9	16.4	20.4	23.0	24.4	27.2	28.6	29.8	29.9	30.4	30.5	30.3	29.4	29.4	27.7	25.2	23.4	22.1	20.6	23.2	30.5
10-Jul	20.2	18.8	18.3	18.1	18.0	18.0	19.4	21.6	24.3	23.4	22.0	22.2	24.4	27.1	27.5	27.5	25.7	22.5	19.7	17.1	16.1	16.3	16.1	16.1	20.8	27.5
11-Jul	15.7	15.7	15.5	15.0	15.1	15.2	16.0	16.8	18.0	19.1	20.8	22.1	23.6	25.5	26.2	26.5	26.5	26.9	24.7	20.1	19.7	17.9	16.6	15.8	19.8	26.9
12-Jul	15.8	15.7	15.1	14.7	14.6	15.0	16.1	18.8	19.2	20.8	22.9	24.5	23.8	24.9	24.9	24.2	22.7	23.9	24.2	22.4	21.5	20.3	18.8	17.4	20.1	24.9
13-Jul	17.0	16.2	15.1	14.5	14.2	15.3	17.2	19.6	22.4	24.6	25.4	26.0	26.9	27.0	27.7	27.4	27.1	26.5	25.5	24.1	22.7	21.3	20.2	19.4	21.8	27.7
14-Jul	19.4	19.0	18.0	17.2	17.0	16.6	16.8	17.7	19.3	19.8	20.7	22.1	23.1	24.4	24.8	24.2	20.2	18.7	19.8	20.0	18.2	16.7	15.8	15.1	19.4	24.8
15-Jul	14.2	13.2	13.1	12.2	12.0	13.0	13.6	15.9	19.3	22.2	22.2	25.1	27.7	29.4	30.1	30.9	32.0	32.0	32.1	30.3	27.8	26.5	25.3	24.3	22.7	32.1
16-Jul	23.0	17.8	17.2	16.6	14.6	14.6	15.7	16.6	18.0	18.2	18.9	19.3	19.1	18.7	18.4	19.1	21.1	21.3	20.8	19.5	17.9	16.6	16.0	15.2	18.1	23.0
17-Jul	15.0	14.8	14.1	13.6	12.7	12.4	12.7	12.7	11.5	12.0	13.1	13.9	14.4	14.1	15.1	15.5	14.5	14.3	13.4	11.3	11.0	10.3	9.7	9.5	13.0	15.5
18-Jul	9.5	9.1	8.3	7.0	6.5	7.0	8.9	11.8	13.9	15.2	14.9	16.0	15.6	16.6	17.4	18.2	19.0	18.9	19.1	17.7	15.4	13.2	11.5	10.6	13.4	19.1
19-Jul	10.1	9.1	8.1	8.5	8.6	10.3	12.2	15.7	18.9	21.4	23.1	24.0	24.4	25.2	21.9	22.3	22.3	22.6	22.7	21.5	19.4	17.1	14.9	12.4	17.4	25.2
20-Jul	12.5	11.7	11.3	11.3	12.4	12.5	12.8	13.4	14.5	15.5	17.8	19.8	22.1	23.5	24.4	24.6	25.5	24.4	23.7	22.4	19.8	18.6	17.7	16.1	17.9	25.5
21-Jul	15.9	16.0	15.8	15.7	15.8	15.3	15.6	16.6	18.6	20.2	22.6	24.1	24.7	25.6	26.9	26.6	25.0	24.7	23.8	22.9	21.4	19.9	18.9	17.6	20.4	26.9
22-Jul	16.9	15.9	15.1	14.3	14.0	14.7	16.8	19.6	22.3	24.7	26.2	26.9	28.0	28.9	28.7	28.9	29.0	28.8	28.1	26.1	23.6	22.0	20.4	19.2	22.5	29.0
23-Jul	18.4	18.4	18.1	16.8	16.9	16.9	17.8	20.3	21.7	23.8	25.1	26.0	26.1	28.0	28.2	28.1	25.3	23.5	22.4	21.0	18.9	17.5	16.7	16.1	21.3	28.2
24-Jul	16.0	15.5	15.2	14.6	14.4	14.4	14.2	14.2	15.1	16.1	17.7	18.8	19.3	20.2	21.2	21.6	21.8	21.9	21.4	20.8	18.8	16.6	15.2	14.5	17.5	21.9
25-Jul	13.2	12.0	10.9	9.6	8.1	9.2	11.5	15.2	19.3	21.8	24.4	26.5	27.7	28.4	28.6	29.3	30.0	29.8	29.5	27.3	24.3	21.7	20.2	18.9	20.7	30.0
26-Jul	17.4	16.6	15.9	15.5	15.2	16.4	18.5	20.5	23.1	25.5	28.6	30.9	31.5	31.9	32.1	32.2	32.6	32.3	31.8	29.8	26.9	24.3	22.8	22.0	24.8	32.6
27-Jul	21.6	21.4	19.9	17.4	16.2	16.8	18.7	21.9	24.2	25.7	26.2	27.8	30.0	30.5	31.6	31.8	31.8	31.3	30.7	27.7	23.5	22.5	18.9	18.0	24.4	31.8
28-Jul	17.5	17.1	16.6	15.0	14.3	14.5	16.0	17.7	19.6	23.4	24.8	25.0	25.4	26.2	26.6	27.7	27.5	26.0	22.2	17.1	15.8	15.1	15.1	14.2	20.0	27.7
29-Jul	13.3	12.5	11.8	11.2	10.9	11.4	13.6	17.4	20.2	22.3	22.9	24.8	26.3	23.3	19.5	22.0	23.1	22.8	22.4	21.3	19.7	18.6	17.6	16.5	18.6	26.3
30-Jul	15.1	13.9	13.5	13.0	13.0	13.2	13.7	13.4	13.5	14.3	15.7	18.1	22.1	23.8	24.4	24.8	25.6	26.5	27.3	24.7	21.7	20.6	19.9	19.3	18.8	27.3
31-Jul	18.2	16.3	16.3	15.1	15.2	15.9	16.0	18.1	21.1	22.7	23.5	22.6	22.0	24.0	19.0	17.8	18.2	18.7	18.8	18.7	16.4	14.4	12.8	12.1	18.1	24.0
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	16	2.15	2.15
10 - 20	383	51.48	53.63
> 20	345	46.37	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

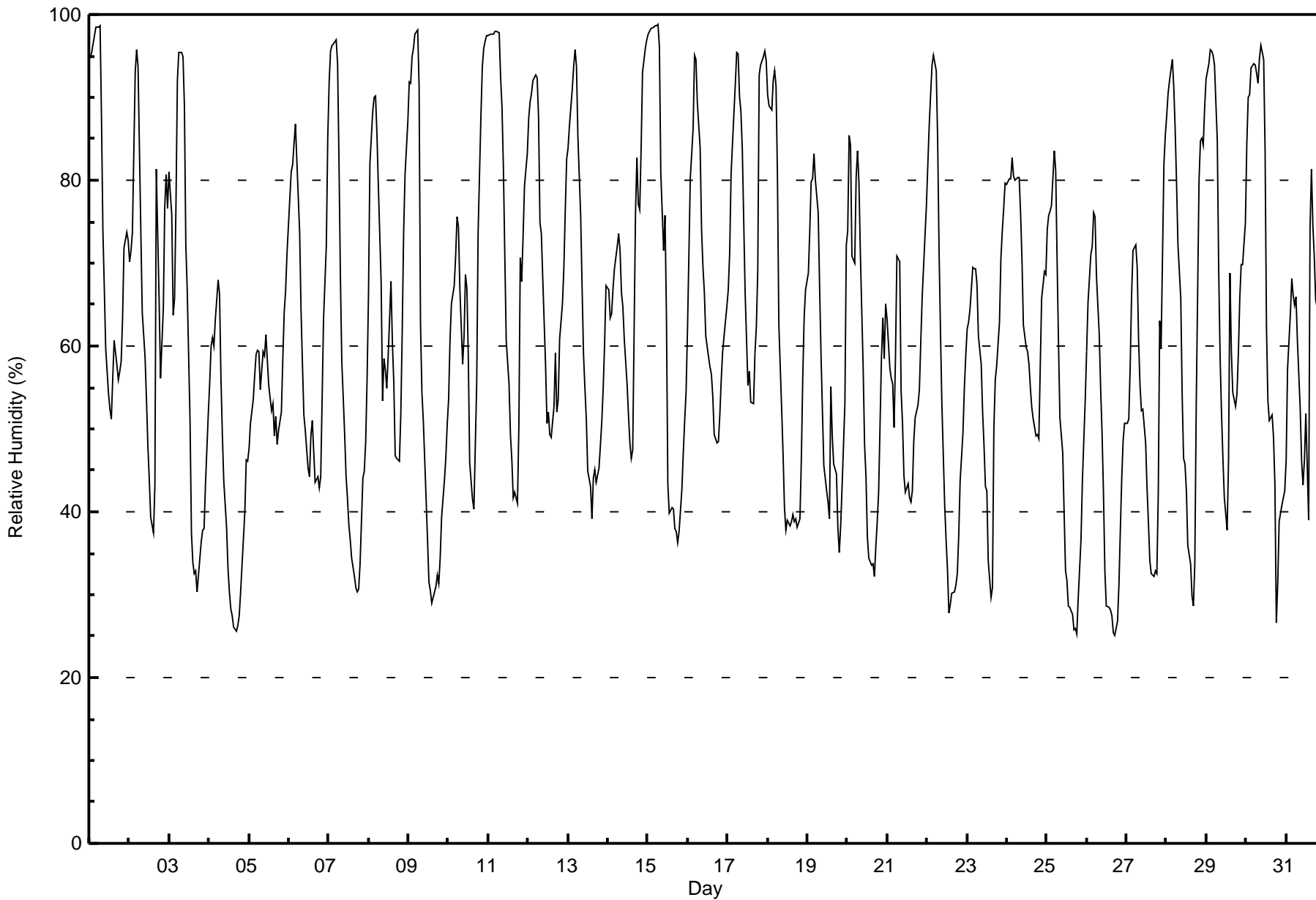
Barge Landing - July 2017

Maximum Value: 99 % on Jul 15 07:00 Maximum Daily Average: 77.3 % on Jul 17																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0									
Minimum Value: 25 % on Jul 26 18:00 Minimum Daily Average: 43.4 % on Jul 4 Maximum Diurnal Average: 84.3 % at hour 6 Minimum Diurnal Average: 42.8 % at hour 14 Monthly Average: 62.0 % Percentiles: P ₁ = 26 P ₁₀ = 36 Q ₁ = 46 Median = 60 Q ₃ = 77 P ₉₀ = 92 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-Jul	95	95	96	97	98	99	99	87	74	67	60	54	52	51	56	61	58	56	57	58	63	72	74	73	73.0	99	
2-Jul	70	72	74	93	96	94	84	74	64	59	54	48	44	39	38	43	81	73	66	56	65	77	81	77	67.5	96	
3-Jul	81	76	64	66	77	92	95	95	95	89	72	67	51	37	34	33	33	30	34	36	38	38	43	52	59.5	95	
4-Jul	56	60	61	60	63	68	66	56	49	44	38	33	30	28	27	26	26	26	27	30	34	40	46	46	43.4	68	
5-Jul	48	51	54	56	59	59	59	55	59	59	61	58	55	52	53	49	52	48	50	52	58	64	67	71	56.2	71	
6-Jul	78	81	82	84	87	82	74	64	58	52	50	45	44	49	51	47	44	44	43	44	54	63	72	85	61.6	87	
7-Jul	92	96	96	96	97	94	82	68	58	50	44	42	38	37	34	32	31	30	31	34	44	45	49	56	57.3	97	
8-Jul	66	82	88	90	90	86	79	68	53	58	57	55	59	68	60	56	47	46	46	52	62	74	81	87	67.1	90	
9-Jul	92	92	95	96	98	98	91	63	54	51	42	37	31	30	29	30	31	32	31	34	39	44	47	50	55.7	98	
10-Jul	54	61	65	67	71	76	74	67	58	61	69	67	59	46	42	40	48	56	74	88	94	96	97	97	67.7	97	
11-Jul	98	98	98	98	98	98	98	92	89	81	71	61	55	49	46	42	42	41	50	71	68	73	79	83	74.1	98	
12-Jul	87	89	90	92	93	92	88	75	73	68	58	51	52	49	49	53	59	52	54	61	65	69	76	83	69.9	93	
13-Jul	84	87	91	94	96	94	85	76	67	59	55	51	45	43	39	44	45	44	45	48	51	55	60	67	63.5	96	
14-Jul	67	63	64	67	69	72	74	72	66	65	61	55	52	48	46	47	76	83	77	76	84	93	96	97	69.6	97	
15-Jul	98	98	98	98	99	99	99	96	81	72	76	64	43	40	40	40	38	38	36	38	43	47	51	55	66.1	99	
16-Jul	62	80	83	86	95	95	89	84	74	70	67	61	59	57	57	54	49	48	49	52	56	59	61	65	67.2	95	
17-Jul	67	71	81	84	91	95	95	90	88	84	67	61	55	57	53	53	59	62	69	93	94	95	96	94	77.3	96	
18-Jul	90	89	89	92	93	91	80	63	52	47	40	38	39	38	39	40	39	39	38	39	46	56	63	67	58.7	93	
19-Jul	69	74	80	80	83	80	76	67	59	52	46	43	41	39	55	49	46	45	38	35	38	43	53	72	56.8	83	
20-Jul	74	85	84	71	70	80	84	80	71	57	48	44	37	34	34	34	32	36	39	42	58	63	58	65	57.6	85	
21-Jul	63	57	56	55	50	59	71	70	55	51	44	42	43	42	41	43	49	51	53	55	60	66	70	77	55.2	77	
22-Jul	82	87	90	94	95	93	85	72	62	53	41	37	33	28	29	30	30	31	33	37	44	49	55	59	56.2	95	
23-Jul	62	63	64	69	69	67	61	58	52	48	43	43	34	30	31	50	56	58	63	70	74	77	80	80	58.0	80	
24-Jul	79	80	80	83	80	80	80	80	76	70	63	60	59	58	55	53	51	49	49	49	57	66	69	69	66.5	83	
25-Jul	74	76	76	77	84	81	70	60	51	47	40	33	32	29	28	28	26	26	25	30	37	44	49	53	49.0	84	
26-Jul	59	65	71	72	76	76	68	61	55	49	42	33	29	28	28	28	25	25	27	31	38	44	49	51	47.1	76	
27-Jul	51	51	58	66	72	72	69	61	55	52	52	48	43	39	34	32	32	33	33	42	63	60	82	85	53.6	85	
28-Jul	88	91	92	95	91	86	80	72	66	54	47	46	43	36	34	30	29	34	53	80	85	85	84	89	66.1	95	
29-Jul	92	94	96	96	95	94	85	69	59	52	46	42	38	46	69	59	54	53	54	59	66	70	70	75	68.0	96	
30-Jul	84	90	90	94	94	94	93	92	95	96	95	83	62	53	51	52	49	43	27	31	39	41	42	42	68.0	96	
31-Jul	46	57	64	68	66	65	66	61	52	46	43	46	52	39	74	81	75	71	66	64	73	83	90	93	64.2	93	
	74.4	77.7	79.7	81.9	83.7	84.3	80.9	72.6	65.4	60.2	54.7	49.9	45.8	42.8	43.7	43.2	45.3	45.2	46.1	51.0	57.6	62.8	67.2	71.5	Diurnal Average		
	98	98	98	98	99	99	99	96	95	96	95	95	83	62	68	74	81	81	83	77	93	94	96	97	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Barge Landing - July 2017

Maximum Speed: 21 km/h on Jul 4 16:00	Maximum Daily Speed Average: 13.9 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 7 20:00	Minimum Daily Speed Average: 1.3 km/h on Jul 29	Hours of Data: 738
Maximum Diurnal Speed Average: 4.7 km/h at hour 12	Minimum Diurnal Speed Average: 1.3 km/h at hour 2	Hours of Missing Data: 6
Monthly Average Velocity: 2.7 km/h 247.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 O ₁ = 4 Median = 6 O ₃ = 9 P ₉₀ = 11 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-Jul	SE3	SE3	SSE3	SSE3	SSE4	SSE4	S6	SSE8	SSE5	SSW6	SSW7	S8	S8	SSW7	SSW5	SW5	SSW3	SSW4	SW2	SE4	ESE4	SE5	S6	SSW8	S4.4	SSE8	
2-Jul	S5	S6	S8	S5	S4	S4	SSE9	S9	SSW9	SSW11	SSW10	S11	S12	S10	S12	SW6	N4	E5	E5	SE6	ESE4	ENE1	SE1	S3	S5.5	S12	
3-Jul	SSE6	SSW6	SSW7	SSW9	SSW7	S6	S5	SW4	S5	S8	SSW9	SW10	WSW11	WSW12	WSW14	WSW13	WSW12	WSW18	SW11	SW12	WSW11	WSW12	WSW13	W8	SW8.5	WSW18	
4-Jul	WSW10	SW8	SW8	WSW12	WSW15	WSW13	WSW12	WSW14	WSW15	WSW16	WSW18	WSW18	WSW18	WSW18	WSW20	WSW19	WSW21	W18	W18	W18	W13	WSW9	WSW8	WSW7	WSW10	WSW13.9	WSW21
5-Jul	WSW11	WSW10	WSW11	WSW9	WSW8	WSW9	W10	NW10	WNW9	NW10	WNW7	NW10	NW12	NW10	NW10	NW10	NW9	NW12	NNW11	NW9	NW5	NW2	NW2	NNW4	WNW7.7	NW12	
6-Jul	W3	W4	WNW3	WSW5	SW6	SW5	WSW5	WSW7	W8	W8	NW9	NNW9	NNW7	NNW5	NNW4	NW9	NW7	NNW5	NNW3	NNW3	WNW2	NNW1	N1	WSW2	WNW3.9	NW9	
7-Jul	NW1	W1	WSW2	SW2	S3	SSW3	SW5	WSW5	SW5	SW7	WSW6	WSW5	SW4	SW3	W6	W3	NW2	WSW3	W2	W0	NNE7	NNE5	NNE3	N2	WSW2.1	SW7	
8-Jul	WSW1	NW2	NW1	ESE1	WSW2	E1	WNW2	N3	ESE2	WSW4	WSW9	WSW9	SW6	SSE5	WSW6	WSW7	SW7	WSW8	SW5	SSW4	SW4	SSE2	ESE2	SE1	SW2.9	WSW9	
9-Jul	E2	SSE1	WNW2	NW2	SSE2	ESE1	SSE3	S5	WSW4	NW5	W4	W6	SE6	SSE7	SSE7	S8	S8	SSW7	SSW7	S5	SSE6	SE7	SE6	SE4	S3.1	S8	
10-Jul	SW5	SE4	ESE2	S3	SE3	SE4	WNW1	WSW2	WSW7	WSW7	WSW8	WSW6	WSW7	WSW9	W5	SSW2	SE9	E10	N5	SW6	SSW2	N3	WSW1	W2	SW2.2	E10	
11-Jul	W2	NW2	W3	S2	SSW1	WSW1	NW2	WNW3	NW4	NNW4	WNW5	WNW7	WNW7	W7	W6	WNW5	NW3	WSW7	SW6	SSW10	SW6	S4	SE3	SSE4	W3.0	SSW10	
12-Jul	S3	SE4	SE4	SSE3	SE3	SE4	SE4	S5	SSW4	WSW4	SW4	SW5	WSW6	WSW4	SW6	S7	S7	S9	S7	SSE7	SSE4	SSE4	SE3	SSE4	S3.9	S9	
13-Jul	S5	SE3	SE3	SSE3	SSE4	SSW4	SSW5	SW5	W5	WSW4	WSW6	WSW3	SE2	WNW3	NW5	NNW5	N5	NNE7	N9	N9	N7	N6	N5	NNW5	NW1.4	N9	
14-Jul	N9	N9	N9	N6	N7	N9	N8	N9	N9	NNE8	NE8	NE6	NNE4	ENE4	ENE4	NNW5	NNE9	NNE5	N3	NNW2	N1	AF	AF	NNE5.7	N9		
15-Jul	E0	SSE2	S1	S1	S2	ESE1	SSE4	S5	SSE3	SSW1	NNW5	WNW2	SE10	SE13	SSE14	SE13	SE13	SE13	SE13	SSE9	SSE9	SSE7	SSE5	SSE5.8	SSE14		
16-Jul	NW7	NNW10	NNW1	WSW5	SSW3	SSW5	WSW5	WNW5	WSW6	WSW6	SSW6	SW8	SW12	SW12	SW12	WSW11	WSW14	WSW14	W13	WSW13	WSW12	WSW11	WSW11	W11	WSW7.9	WSW14	
17-Jul	W12	WNW7	WNW5	WSW9	W7	W7	NW6	NNW8	NNW8	NNW9	N12	N11	N10	NNW8	NNW9	NNW6	NNW7	NNW6	NNW6	NNW2	W3	WNW3	NW4	NW4	NW5.9	N12	
18-Jul	NW4	NNW5	NW3	NW4	WNW4	W4	W3	NW4	NNW4	NNW4	NNW6	NW6	NNW4	WNW2	W8	WSW11	WSW11	WSW10	SW8	W6	SW4	SW4	SSW5	SSW4	W4.1	WSW11	
19-Jul	SW4	SW3	SW3	SSW4	SW6	WSW8	WSW8	WSW8	WSW8	WSW10	WSW10	W8	WSW8	WNW9	NNE12	NE9	NE9	ENE7	NE7	NE7	ENE5	NE2	N1	NW2	W1.8	NNE12	
20-Jul	NNW4	NNW4	NE1	E3	NNW1	N2	NNE1	NNW3	ENE1	ESE3	E5	ESE6	ESE7	SE8	SE6	SE6	SSE5	SE5	ESE4	ESE3	S5	E3	SE4	S1	ESE2.4	SE8	
21-Jul	SSE2	SE5	SSE3	SSW1	ESE4	NW1	NNW4	WNW3	N3	SSW2	S1	NW5	NW6	NNW4	SSW11	SSW10	S7	SSE8	SSE8	S6	SSE7	SSE6	SSE5	SSE6	S2.6	SSW11	
22-Jul	SSE6	SSE4	SSE5	SSE5	SSE6	SSE5	S6	SSW9	SW8	SSW9	WSW12	WSW14	WSW13	WSW13	WSW14	WSW15	WSW14	WSW12	WSW12	WSW7	SW4	SW5	SSW5	SSW5	SW7.4	WSW15	
23-Jul	S4	SSW4	SSW5	SSW4	SW5	WSW7	WSW7	WSW6	NW8	NW7	NW1	WSW8	NW5	WSW13	WSW14	W8	N10	NNE10	NNE9	NNE9	N8	N8	N7	N8	WNW3.1	WSW14	
24-Jul	N9	N8	N9	N10	N10	N11	N11	N8	N10	N12	N12	N14	N13	N12	N12	N13	NNW14	NNW14	N12	N10	NNW6	NNW4	NNW5	NNW5	N9.9	NNW14	
25-Jul	NNW5	NW4	W5	WSW4	SSW3	SSE4	SW5	SW5	SW7	SSW7	SW8	WSW9	SW9	WSW7	SW8	SW8	SSW7	SW7	SSW5	S5	SSE4	SSE5	SE4	SE4	SW4.7	WSW9	
26-Jul	ESE1	SSE3	SSE5	SSE4	SSE5	S6	SSW8	SSW8	SSW7	SW8	SSW8	WSW10	WSW10	SW7	SSW7	SSW7	SSW8	SSW7	SSW8	SSW7	S5	S6	SSE6	SSE5	SSW5.8	WSW10	
27-Jul	S6	SSW6	S5	SE1	SE3	SSE4	SSE6	S8	SW8	SW8	S8	SW7	SW9	SW10	WSW9	WSW8	W6	NW4	NW5	WNW3	W5	NW10	NW4	WSW4	SW4.0	NW10	
28-Jul	NW1	SW3	WSW3	SSE3	SW5	SW6	WSW7	WSW8	SW7	WSW10	WSW13	W10	NW9	NW11	NW10	WNW12	WNW8	NW8	WNW6	ENE7	SE4	SW4	S3	AF	W4.7	WSW13	
29-Jul	WNW1	WSW3	SW3	SW2	SSE2	SSE2	S3	SSW3	SW4	W4	NNE4	N2	WSW5	NW9	NNE4	NNE3	NE5	NE6	NE6	ENE7	NE5	NE4	NE4	N4	NNE1.3	NW9	
30-Jul	NNW2	N2	N2	NNW1	AF	AF	AF	SSW5	SSW3	SSE2	SSW4	SSW6	SSW6	S8	S12	SSE13	S13	SSW9	WSW11	WSW7	WSW6	WSW10	WSW10	W10	SSW5.0	SSE13	
31-Jul	NW5	WNW3	W5	WSW5	WSW8	W8	WSW5	W4	WNW5	WNW8	WNW10	NW9	WNW9	NW12	NNE6	N6	NNW7	N10	NNE10	N6	NW2	WNW3	SSW2	W3	NW4.7	NW12	

WSW1.7	WSW1.3	SW1.6	SW2.1	SW2.3	SW2.3	SW2.9	WSW3.4	WSW3.5	WSW3.9	WSW4.2	W4.7	WSW4.1	WSW4.5	WSW4.2	WSW4.0	WSW3.1	W2.1	W2.2	WSW1.5	SW1.4	WSW1.3	SW1.5	WSW1.9	Diurnal Average	
W12	WSW10	WSW11	WSW12	WSW15	WSW13	WSW12	WSW14	WSW15	WSW16	WSW18	WSW18	WSW18	WSW18	WSW20	WSW19	WSW21	W18	WSW18	W18	W13	WSW12	WSW12	WSW13	W11	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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 7 km/h on Jul 16 01:00	Hours of Data: 738
Minimum Value: 0 km/h on Jul 25 23:00	Hours of Missing Data: 6
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7	Hours of Calibration: 0
	Percent Operational Time: 99.2

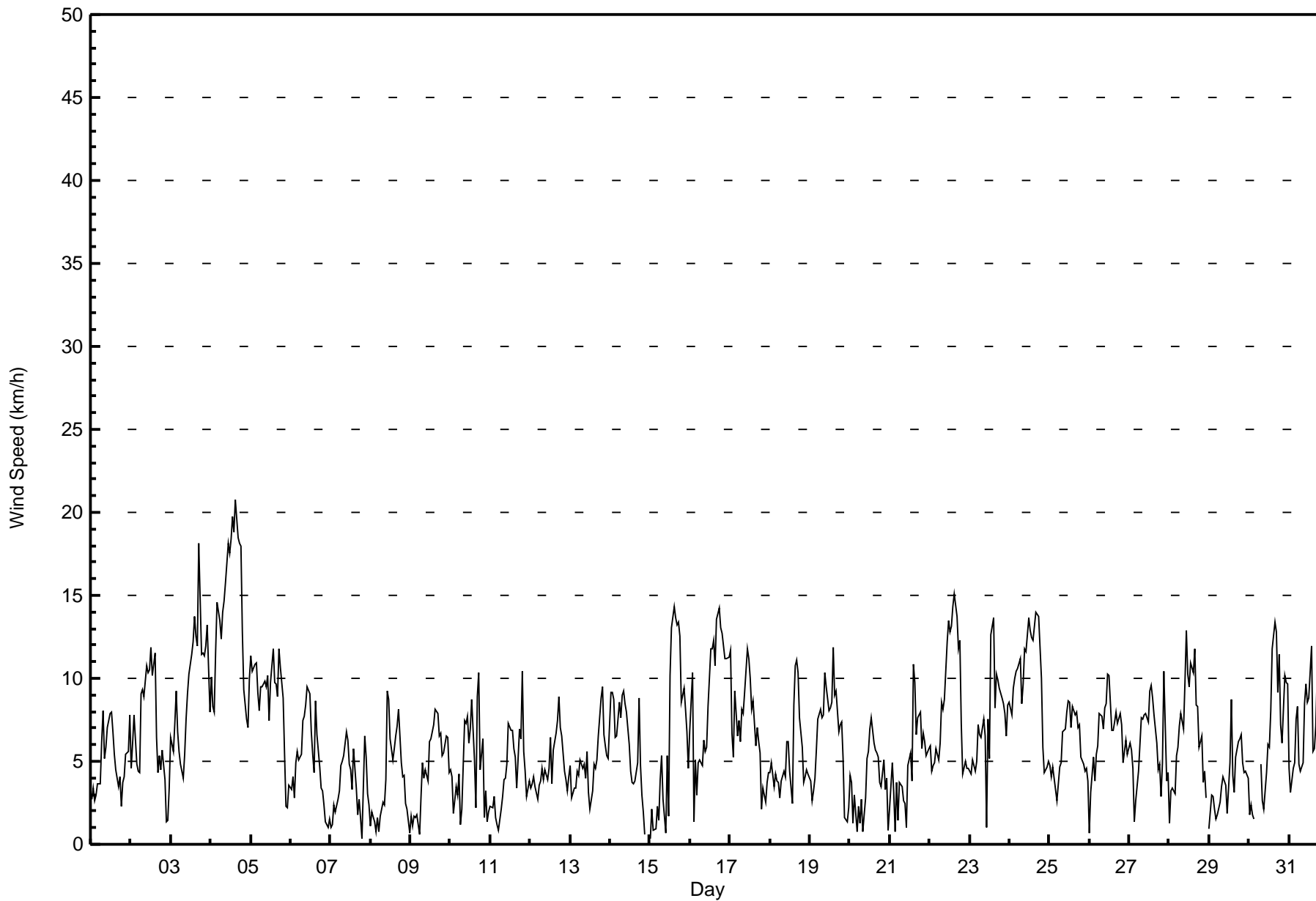
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Jul	1	1	1	1	1	2	2	3	2	2	3	3	3	3	2	2	1	2	1	1	1	2	1	3	3
2-Jul	2	2	3	2	2	1	3	4	3	4	4	4	4	4	4	4	3	2	2	2	1	1	1	1	4
3-Jul	2	2	3	4	3	2	2	2	2	3	3	3	4	4	5	4	5	6	4	4	5	5	7	4	7
4-Jul	4	3	2	4	5	4	4	5	5	5	6	6	7	7	6	7	7	7	7	5	3	2	2	3	7
5-Jul	3	3	3	3	3	3	4	4	4	4	4	3	4	4	4	4	3	4	4	4	2	1	2	1	4
6-Jul	2	2	2	2	2	2	2	2	3	4	4	3	3	2	1	4	3	2	2	1	1	1	1	1	4
7-Jul	1	1	1	2	1	1	1	1	1	2	3	3	3	3	3	2	2	2	2	2	2	1	2	1	3
8-Jul	1	1	1	1	2	1	2	1	1	2	4	3	3	3	2	2	2	2	2	1	1	1	1	1	4
9-Jul	2	1	1	1	1	1	3	2	1	1	2	2	4	3	3	4	3	3	3	2	1	1	1	2	4
10-Jul	2	1	2	1	1	1	2	2	2	2	2	2	2	2	3	2	4	4	2	2	2	1	1	1	4
11-Jul	2	1	2	2	1	2	1	1	1	1	2	3	3	3	3	2	1	3	3	4	2	1	1	1	4
12-Jul	1	1	1	1	1	1	1	2	1	2	2	2	2	2	3	3	3	3	3	2	1	1	2	1	3
13-Jul	1	2	1	1	1	2	2	2	2	2	2	1	2	2	2	2	2	2	3	3	2	1	1	1	3
14-Jul	3	3	3	2	2	3	3	3	3	3	3	2	2	2	2	2	2	4	3	2	1	1	AF	AF	4
15-Jul	1	2	1	1	1	1	2	2	2	2	1	2	3	5	5	5	5	5	4	2	3	3	2	2	5
16-Jul	7	6	2	4	2	2	3	2	2	2	2	3	4	4	4	4	5	5	5	4	4	3	4	4	7
17-Jul	4	3	3	3	3	3	2	3	3	5	4	4	4	3	3	3	3	3	2	1	2	1	1	1	5
18-Jul	1	1	1	1	1	2	1	2	2	2	2	2	3	4	4	4	4	4	2	2	1	1	1	1	4
19-Jul	1	2	2	1	2	2	3	2	2	3	4	3	3	4	4	3	3	3	2	2	2	1	1	1	4
20-Jul	1	1	1	1	2	1	1	1	1	1	2	2	2	3	3	3	3	2	1	1	2	1	1	1	3
21-Jul	2	1	2	1	1	1	1	2	1	1	2	2	2	2	4	4	2	2	3	2	2	2	1	1	4
22-Jul	2	1	1	1	1	1	2	3	3	3	4	5	4	5	5	5	5	5	4	3	1	2	1	1	5
23-Jul	1	1	2	1	2	4	2	2	3	3	2	3	3	4	5	5	4	3	3	2	3	2	2	2	5
24-Jul	3	2	3	3	3	3	4	3	3	4	4	4	4	4	4	5	5	4	4	2	1	1	1	1	5
25-Jul	1	1	1	1	1	1	2	1	2	2	3	3	3	3	3	3	3	3	2	2	1	1	0	1	3
26-Jul	1	1	1	1	1	2	3	3	2	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	3
27-Jul	2	2	1	1	1	1	2	3	3	2	3	3	3	3	3	3	2	1	2	1	3	5	1	3	5
28-Jul	2	2	3	1	2	2	2	2	3	3	4	4	4	4	4	5	4	4	4	3	2	1	1	AF	5
29-Jul	1	1	2	2	1	2	2	2	2	2	2	2	3	5	2	2	2	2	2	2	2	2	2	1	5
30-Jul	1	1	1	1	AF	AF	AF	2	3	3	2	2	2	3	4	4	5	4	4	2	2	3	3	3	5
31-Jul	3	1	2	2	2	3	2	2	3	3	4	4	4	4	4	4	2	3	3	2	1	1	1	1	4
	7	6	3	4	5	4	4	5	5	5	6	6	7	7	6	7	7	7	7	5	5	5	7	4	
Diurnal Maximum																									

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Barge Landing - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	350	47.43	47.43
6 - 11	315	42.68	90.11
12 - 19	71	9.62	99.73
20 - 28	2	0.27	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - July 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	17	8	7	5	8	13	27	42	29	31	33	25	20	22	32	31	350
6 - 11	33	9	8	3	1	4	7	20	26	36	31	68	18	13	22	16	315
12 - 19	7	3	0	0	0	0	2	5	4	0	4	34	6	1	3	2	71
20 - 28	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
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	20	15	8	9	17	36	67	59	67	68	129	44	36	57	49	738

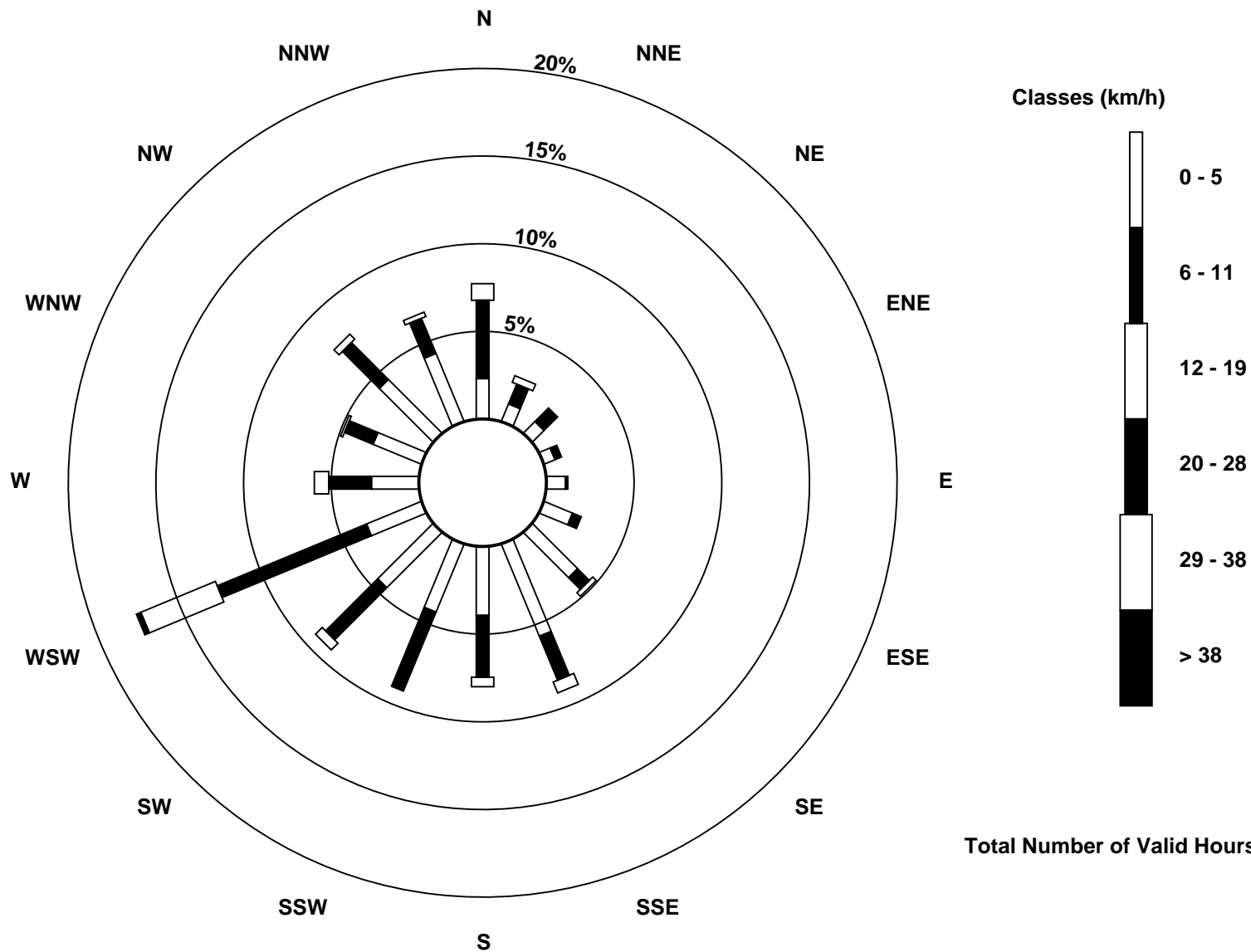
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Barge Landing (AMS 9)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - July 2017

Direction of Maximum Speed: 255 deg on Jul 4 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 251.9 deg on Jul 4	Hours of Data: 738
Direction of Minimum Speed: 261 deg on Jul 7 20:00	Hours of Missing Data: 6
Direction of Minimum Daily Speed Average: 1.3 deg on Jul 29	Percent Operational Time: 99.2
Monthly Average Direction: 254.1 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-Jul	128	139	147	155	148	147	175	152	166	205	192	178	182	195	208	224	211	197	231	127	112	127	173	198	174.6
2-Jul	171	191	183	178	171	185	168	172	192	197	198	191	178	187	190	230	3	96	90	125	105	64	141	179	177.7
3-Jul	157	193	200	193	201	182	185	218	183	174	213	226	242	250	243	245	245	245	227	223	248	258	248	278	228.3
4-Jul	239	225	234	247	251	251	248	255	251	249	244	250	250	252	255	255	262	262	263	261	258	251	251	252	251.9
5-Jul	250	253	257	251	247	254	258	269	306	292	311	303	307	314	320	303	325	320	329	317	323	305	315	327	291.6
6-Jul	268	280	282	248	236	229	235	258	268	281	321	343	339	341	346	323	305	348	348	334	301	342	356	245	299.2
7-Jul	316	279	247	221	181	196	215	223	230	236	243	252	235	227	260	281	312	258	277	261	32	13	32	0	252.1
8-Jul	258	308	313	120	243	85	286	4	119	238	243	255	220	163	245	250	236	239	233	212	215	148	119	125	232.6
9-Jul	100	163	294	324	151	121	151	173	247	322	281	271	139	159	163	175	188	199	198	181	147	130	137	137	175.5
10-Jul	216	141	115	169	140	133	300	257	258	244	243	245	237	242	260	199	124	95	6	233	194	1	257	273	217.5
11-Jul	268	322	259	191	213	243	309	303	320	337	283	285	287	266	271	298	305	255	218	212	227	173	143	162	259.5
12-Jul	170	134	139	159	141	133	142	180	205	249	223	229	239	240	233	185	181	185	179	153	150	151	133	155	181.1
13-Jul	173	133	135	159	151	207	207	225	260	252	249	254	126	286	322	337	5	29	9	6	2	352	354	344	325.0
14-Jul	352	5	5	2	3	10	5	10	359	29	51	53	29	57	56	63	327	16	27	7	341	7	AF	AF	15.2
15-Jul	86	156	187	176	178	123	157	183	167	210	336	282	144	162	159	151	149	144	144	149	161	165	162	167	156.0
16-Jul	311	338	340	255	202	195	246	283	240	256	210	235	226	227	227	240	255	255	262	250	249	252	253	259	249.8
17-Jul	267	296	285	257	273	271	311	329	335	345	354	351	357	346	333	344	339	344	334	333	270	282	315	313	320.2
18-Jul	316	331	320	305	293	270	274	304	329	327	332	319	348	295	267	248	247	243	229	266	236	216	207	196	273.8
19-Jul	216	234	230	205	231	241	238	237	240	240	248	263	256	282	30	49	45	59	42	46	60	55	2	316	274.6
20-Jul	343	344	36	89	342	351	14	330	71	114	95	107	113	139	124	125	154	129	105	112	181	97	130	170	112.3
21-Jul	167	136	147	195	114	319	338	292	5	204	172	326	321	332	194	213	188	152	163	181	157	165	166	163	181.0
22-Jul	165	154	164	155	155	166	180	199	215	213	247	238	251	244	253	247	241	237	244	252	222	226	200	198	225.0
23-Jul	183	205	205	201	225	244	244	258	305	317	313	246	324	241	240	270	357	29	33	27	7	2	5	3	298.9
24-Jul	7	2	10	8	11	10	7	6	4	11	6	8	10	11	11	8	348	345	349	351	341	334	337	333	1.7
25-Jul	327	306	260	243	206	166	215	223	222	193	227	249	236	244	231	222	227	208	221	198	171	164	149	136	220.3
26-Jul	119	156	151	157	167	174	194	209	213	214	213	238	255	234	213	204	195	204	198	192	171	170	162	159	198.9
27-Jul	181	196	178	136	144	148	165	187	217	219	185	228	236	225	257	257	279	324	323	286	278	313	314	248	232.3
28-Jul	310	224	256	157	226	236	244	240	232	239	258	268	308	316	317	297	283	322	292	73	140	215	176	AF	269.2
29-Jul	294	252	225	230	150	162	175	194	230	279	24	11	245	315	15	17	50	46	51	59	54	49	48	355	17.1
30-Jul	338	3	8	347	AF	AF	AF	194	200	157	201	202	198	186	174	158	179	195	244	243	245	253	252	261	211.6
31-Jul	315	293	272	241	258	265	248	263	300	292	285	320	293	319	20	353	344	8	13	356	316	300	206	275	308.5

252.6 254.0 232.3 222.9 217.3 225.0 228.8 238.0 253.8 254.1 257.2 262.7 254.2 253.0 247.5 249.8 257.8 260.7 267.8 241.9 226.1 239.6 215.0 243.6
 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

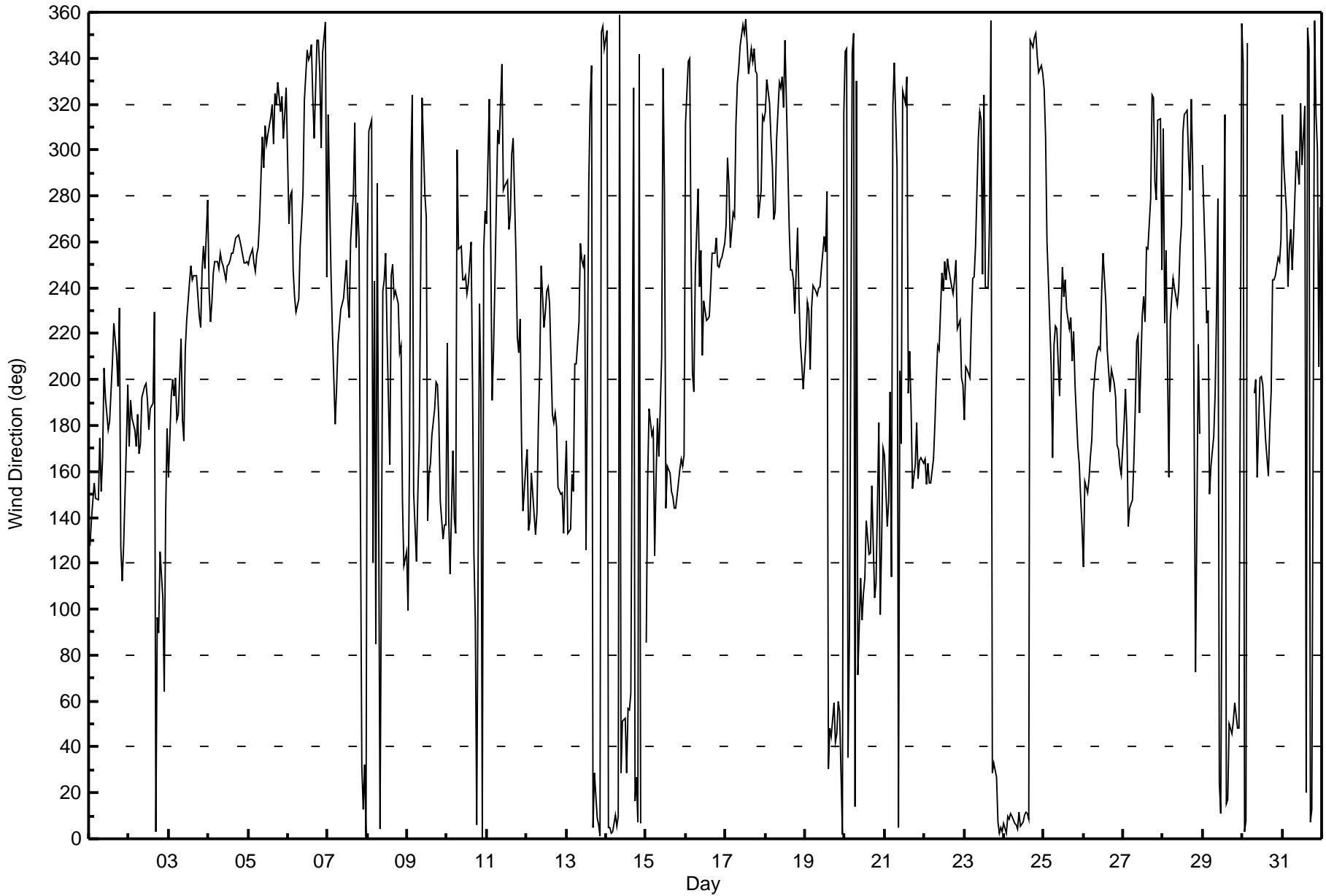
Wind Direction (WD) - deg
Barge Landing - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Jul 15 10:00 Minimum Value: 8 deg on Jul 26 00:00 Percentiles: P ₁ = 12 P ₁₀ = 19 Q ₁ = 24 Median = 30 Q ₃ = 41 P ₉₀ = 62 P ₉₉ = 89																	Hours in Service: 744 Hours of Data: 738 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2								
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-Jul	56	14	24	29	17	47	29	26	54	53	47	44	36	44	33	25	26	43	40	21	18	19	27	25	56
2-Jul	25	24	28	24	32	31	24	34	32	32	35	38	34	40	33	58	58	23	28	16	16	49	79	32	79
3-Jul	18	28	28	29	28	24	28	33	40	32	32	29	28	26	30	30	27	24	24	26	30	25	27	42	42
4-Jul	22	26	23	23	21	20	21	24	23	23	24	29	26	26	27	25	31	28	29	27	21	15	14	19	31
5-Jul	19	21	23	21	23	26	28	30	33	36	32	41	35	29	29	39	30	27	25	29	24	34	25	26	41
6-Jul	28	35	69	25	24	28	36	30	40	43	31	28	37	25	30	32	42	33	45	28	24	68	50	36	69
7-Jul	28	62	21	78	32	30	28	32	33	37	53	57	68	75	54	68	90	76	88	83	23	21	40	25	90
8-Jul	74	40	54	81	89	76	66	53	73	40	20	29	37	56	23	29	29	26	36	26	16	41	42	82	89
9-Jul	76	75	50	53	42	83	72	39	48	29	64	50	65	54	47	47	38	32	31	23	17	10	13	37	83
10-Jul	24	35	86	34	36	25	86	78	32	22	25	25	31	29	64	89	22	23	56	31	91	36	72	63	91
11-Jul	63	29	49	70	65	90	44	35	28	36	45	36	44	38	47	46	57	54	31	32	31	22	36	29	90
12-Jul	28	21	18	29	22	15	28	36	37	45	51	60	29	74	37	37	31	31	33	19	15	12	18	18	74
13-Jul	18	58	12	18	17	36	30	34	42	54	47	82	76	73	63	45	40	31	24	23	22	18	16	16	82
14-Jul	23	24	23	25	23	24	24	24	25	31	30	42	71	70	67	48	48	36	42	37	17	52	AF	AF	71
15-Jul	80	61	84	88	41	79	40	37	70	100	24	78	27	29	27	25	25	21	20	18	24	21	22	24	100
16-Jul	33	31	76	62	55	31	47	49	33	32	35	26	26	26	27	27	28	24	26	22	21	21	22	25	76
17-Jul	29	37	39	25	36	32	32	23	23	26	25	26	26	28	28	34	42	36	24	31	40	27	17	19	42
18-Jul	19	19	21	17	19	26	38	49	46	62	43	36	40	75	46	35	26	25	27	29	27	15	18	19	75
19-Jul	24	37	28	26	25	20	21	25	21	30	33	43	36	38	28	28	26	29	29	21	18	83	37	52	83
20-Jul	13	20	72	32	77	22	40	31	80	32	30	32	30	35	53	49	55	24	21	29	56	43	22	76	80
21-Jul	63	17	24	86	24	69	23	44	50	52	95	49	30	65	34	34	30	23	24	25	17	18	19	18	95
22-Jul	17	20	19	17	15	22	29	30	32	31	25	25	27	30	25	25	25	28	22	22	21	25	24	24	32
23-Jul	20	24	36	26	37	34	27	33	33	45	98	39	60	28	31	58	29	28	26	23	23	24	23	24	98
24-Jul	23	23	25	24	23	23	22	25	25	25	27	26	26	26	27	27	26	24	25	24	18	12	13	13	27
25-Jul	11	22	14	17	31	28	28	28	28	32	37	35	37	46	36	39	33	36	27	24	14	12	10	8	46
26-Jul	96	35	13	16	14	23	29	29	33	35	37	31	27	52	53	46	42	43	30	23	18	14	15	16	96
27-Jul	23	24	24	51	20	18	26	30	33	33	40	38	33	31	28	37	42	37	30	73	58	31	32	52	73
28-Jul	93	56	53	21	23	21	18	23	28	26	29	35	38	31	32	39	40	49	60	36	39	24	30	AF	93
29-Jul	33	25	58	58	43	64	29	47	46	53	58	95	68	51	35	53	36	29	29	23	19	20	23	20	95
30-Jul	30	20	49	21	AF	AF	AF	28	89	79	39	32	48	42	30	26	28	38	23	18	15	20	21	27	89
31-Jul	40	33	33	24	19	26	39	47	54	37	40	31	37	30	54	57	23	26	26	25	19	23	60	24	60
96 75 86 88 89 90 86 78 89 100 98 95 76 75 67 89 90 76 88 83 91 83 79 82																									
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Barge Landing - July 2017





Wood Buffalo Environmental Association

TRS Calibration Summary

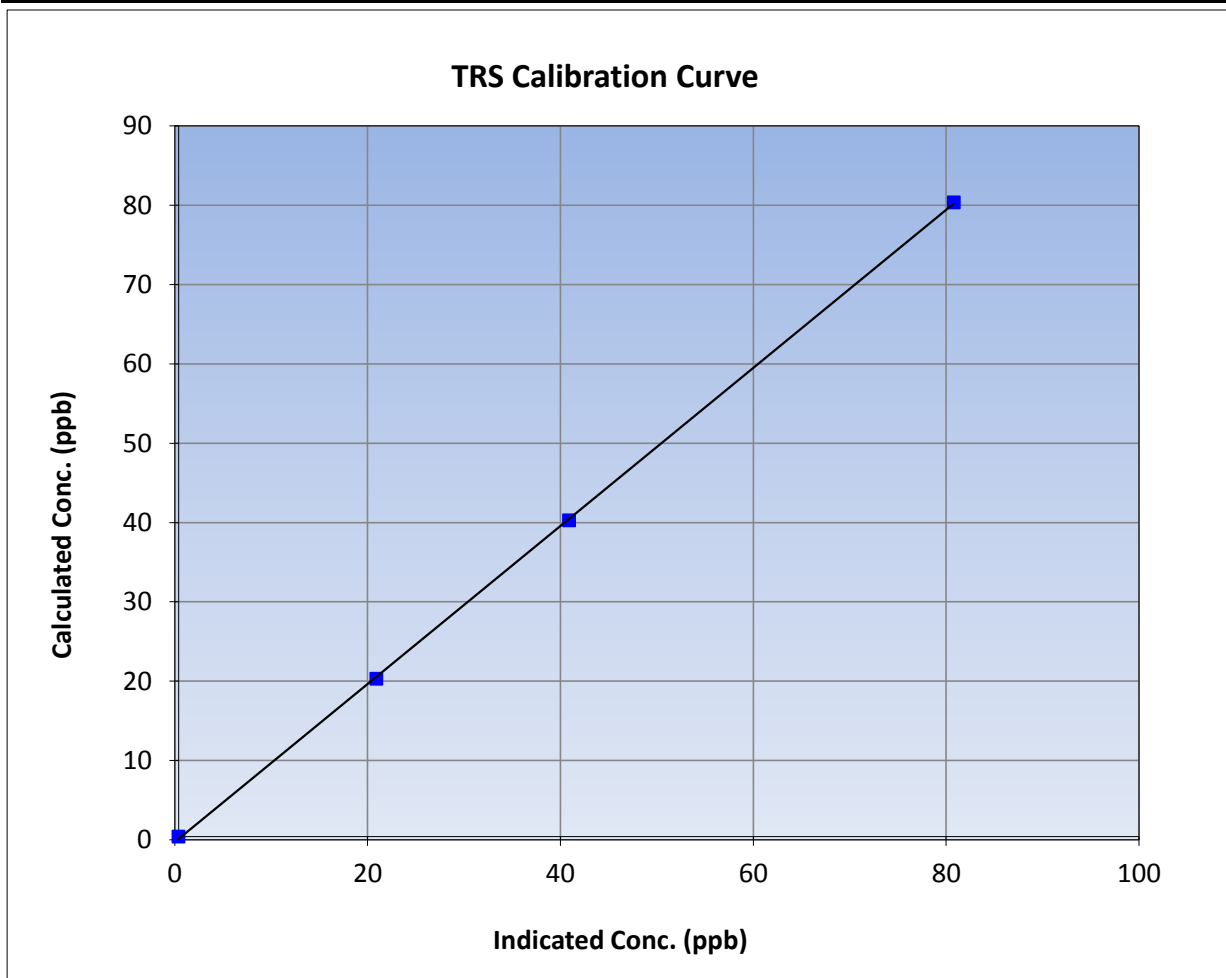
Version-03-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 24, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	8:44	End Time (MST)	11:48
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1331259320

Calibration Data

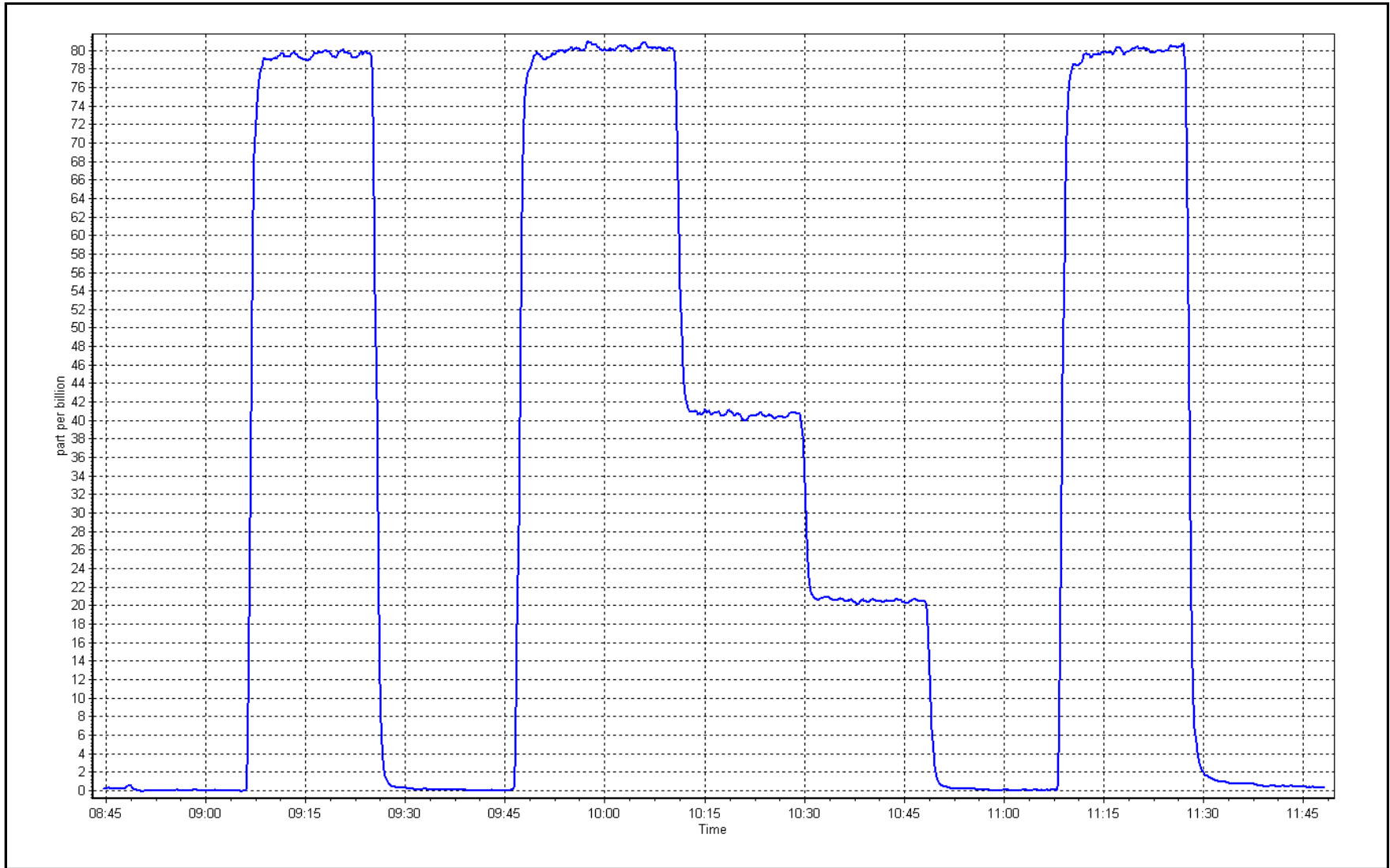
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999947	≥0.995
80.0	80.4	0.9947			
39.9	40.5	0.9851	Slope	0.996187	0.90 - 1.10
19.9	20.5	0.9712			
			Intercept	-0.269145	+/-3



TRS Calibration Plot

Date: July 4, 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:	July 4, 2017	Last Cal Date:	June 12, 2017
Start time (MST):	11:30	End time (MST):	14:03
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>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-300
Calculated slope	0.999097	Sample pressure	9.2
Calculated intercept	0.010968	Fuel pressure	24.1
Analyzer Background	6.05	Air pressure	34.7
Analyzer Coefficient	4.624	Flame temperature	163.4
			<u>Finish</u>
			-301
			9.2
			24.1
			34.7
			163.5

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	-0.01	----
as found span	4931	74.3	15.67	15.73	0.996
calibrator zero	5007	0.0	0.00	-0.01	----
high point	4931	74.3	15.67	15.67	1.000
second point	4958	39.8	8.41	8.42	0.999
third point	4982	14.9	3.15	3.17	0.993
as left zero	5007	0.0	0.00	0.01	----
as left span	4928	74.3	15.68	15.60	1.005
Average Correction Factor					0.997
Corrected As found	15.74	Previous response	15.67	*% change	-0.4%

* = > +/-5% change initiates investigation

Notes: Changed inlet filter. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

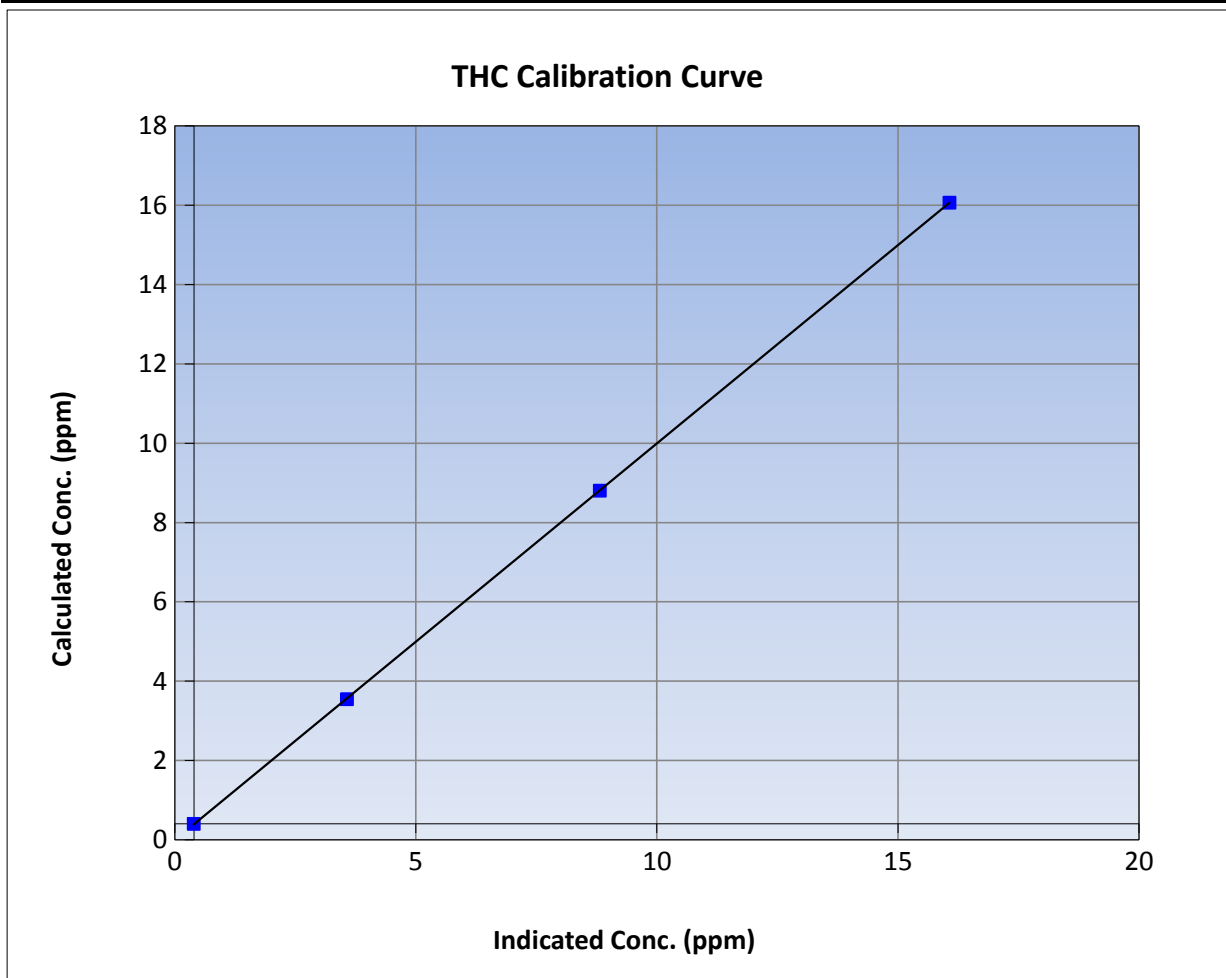
Version-03-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 12, 2017
Station Name	Barge Landing	Station Number	AMS 09
Start Time (MST)	11:30	End Time (MST)	14:03
Analyzer make	Thermo 51i-LT	Analyzer serial #	1327059296

Calibration Data

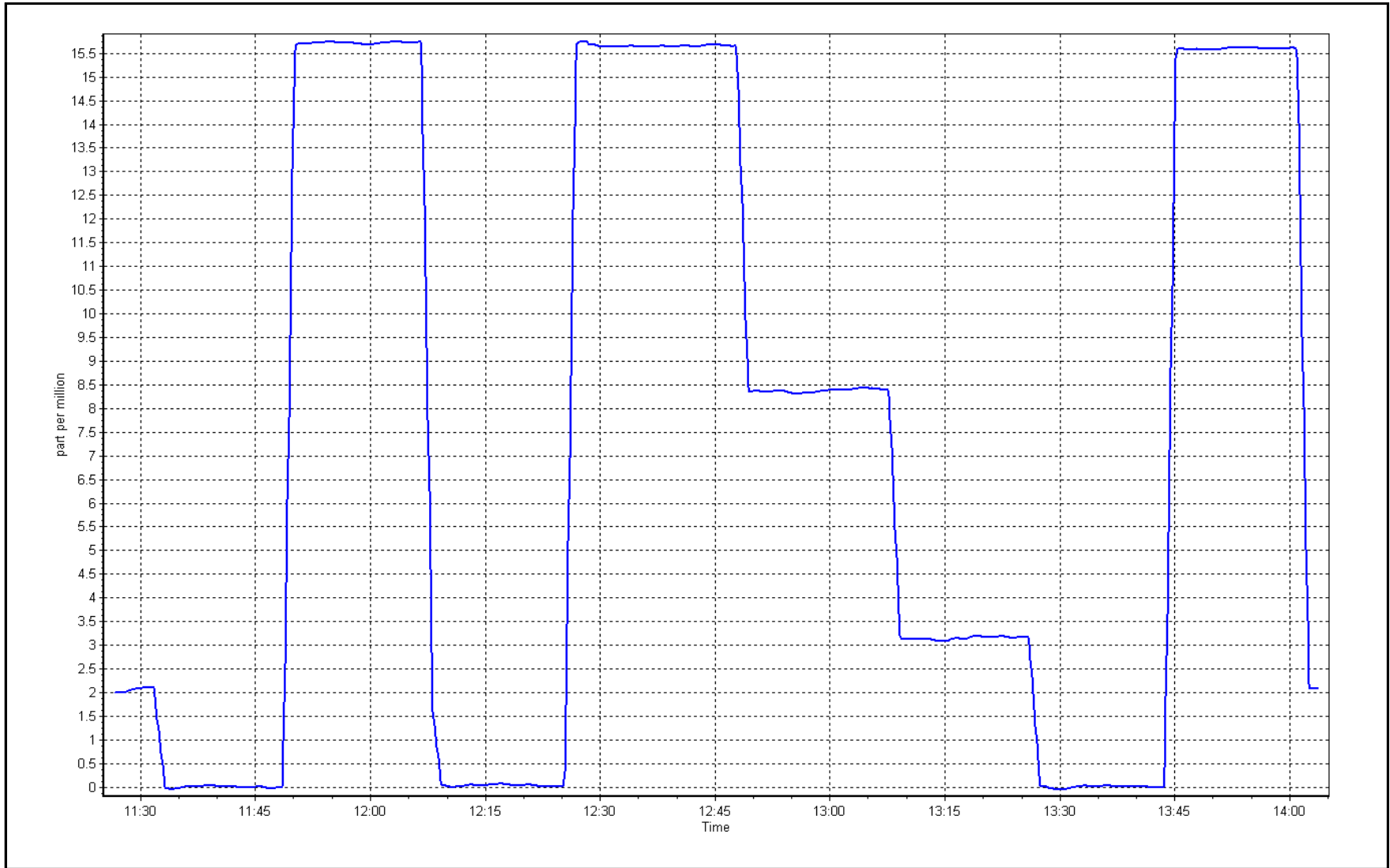
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
15.7	15.7	0.9999			
8.4	8.4	0.9989	Slope	1.000132	0.90 - 1.10
3.1	3.2	0.9929			
			Intercept	-0.007663	+/-1.5



THC Calibration Plot

Date: July 4, 2017

Location: Barge Landing





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 11 LOWER CAMP JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JULY 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	709	34	35	99.87	87	0	10	0
H2S (ppb) Average	629	32	115	88.84	8	0	2	0
THC (ppm) Average	706	34	38	99.46	4.1	-	2.7	-
Temperature (C) Average	744	0	0	100	32.6	-	25	-
Relative Humidity (%) Average	744	0	0	100	98	-	79	-
Wind Speed 10 m (km/h) Average	744	0	0	100	32	-	22	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 JULY 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	709	2.6	7	-	0	0	0	1	2	5	87
H2S (ppb) Average	629	0.7	1	-	0	0	0	0	1	2	8
THC (ppm) Average	706	2.35	0.3	-	2	2.1	2.1	2.3	2.4	2.7	4.1
Temperature 2 m (C) Average	744	20.13	4.7	-	8.5	14.3	16.5	19.7	23.5	26.7	32.6
Relative Humidity (%) Average	744	62.9	19	-	23	38	49	62	77	89	98
Wind Speed 10 m (km/h) Average	744	9.3	6	-	0	2	5	8	13	18	32
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	01 Jul 2017 01:00	01 Jul 2017 01:00	1	Unstable Operation - station temperature fluctuations
H2S	01 Jul 2017 02:00	04 Jul 2017 10:00	81	Unstable Operation - station temperature fluctuations
H2S	05 Jul 2017 11:00	05 Jul 2017 11:00	1	Maintenance - sample manifold cleaned
THC	10 Jul 2017 11:00	10 Jul 2017 13:00	3	Maintenance - calibration to address baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

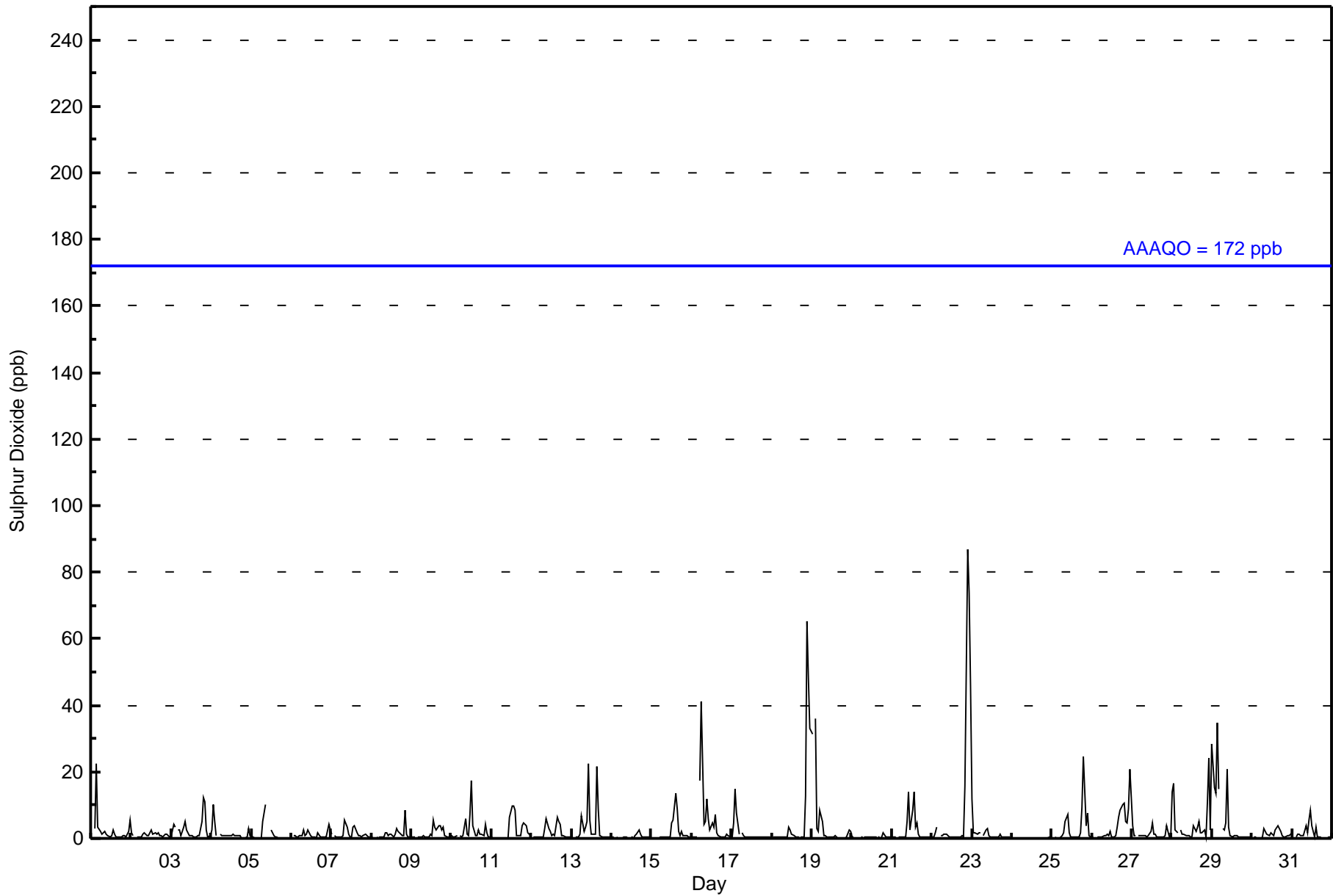
Lower Camp - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 87 ppb on Jul 22 22:00	Maximum Daily Average: 10.4 ppb on Jul 22
Minimum Value: 0 ppb on Jul 5 20:00	Hours of Data: 709
Maximum Diurnal Average: 6.4 ppb at hour 22	Hours of Missing Data: 35
Monthly Average: 2.6 ppb	Hours of Calibration: 34
Minimum Daily Average: 0.1 ppb on Jul 24	Percent Operational Time: 99.9
Minimum Diurnal Average: 1.2 ppb at hour 18	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 2 P ₉₀ = 5 P ₉₉ = 33	

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-Jul	UO	Z	3	22	3	2	1	2	2	1	1	1	1	2	1	1	0	0	0	1	1	0	2	5	2.4	22
2-Jul	2	1	Z	0	0	0	0	1	2	1	1	2	3	1	2	1	2	1	1	1	1	1	1	0	1.1	3
3-Jul	0	4	3	Z	2	2	1	3	5	3	2	1	1	0	0	1	1	5	12	11	3	0	1	2.8	12	
4-Jul	3	10	5	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	3	1	1.5	10	
5-Jul	1	0	0	0	0	Z	0	5	10	C	C	C	2	1	0	0	0	0	0	0	0	0	0	1.1	10	
6-Jul	Z	1	1	0	1	1	1	3	1	1	2	1	0	0	0	0	2	0	0	0	0	0	4	2	1.0	4
7-Jul	1	Z	1	1	0	0	0	1	5	4	1	1	1	3	4	2	1	1	0	1	1	1	0	0	1.3	5
8-Jul	0	0	Z	0	0	0	0	0	2	2	1	1	1	1	3	2	2	1	1	8	1	1	0	1.3	8	
9-Jul	0	0	0	Z	1	0	1	1	1	1	1	1	1	6	3	3	4	4	2	3	1	0	0	1.5	6	
10-Jul	1	1	0	1	Z	1	1	1	6	1	1	7	18	4	1	1	3	1	1	1	4	2	1	0	2.5	18
11-Jul	0	0	0	0	0	Z	0	0	0	0	0	6	10	10	8	1	1	1	4	5	4	4	2	1	2.5	10
12-Jul	Z	1	0	0	0	0	0	0	3	6	3	2	1	1	1	6	5	4	1	1	0	1	1	0	1.7	6
13-Jul	0	Z	0	0	0	1	7	2	4	5	22	5	1	1	1	22	9	1	0	0	0	0	0	0	3.7	22
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0.5	3
15-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	5	6	13	9	2	1	2	1	1	1	1	1	1.9	13
16-Jul	1	1	0	0	Z	17	41	4	5	12	6	3	4	3	7	2	1	1	0	0	0	1	1	1	4.8	41
17-Jul	0	5	15	7	1	Z	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	15
18-Jul	Z	0	0	0	0	0	0	0	0	1	3	3	1	1	0	0	0	0	0	0	13	65	48	33	7.5	65
19-Jul	32	Z	36	3	2	9	5	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	4.2	36
20-Jul	1	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0.4	2
21-Jul	0	0	0	Z	1	0	0	0	0	5	14	3	8	14	3	5	1	1	0	0	0	0	0	0	2.6	14
22-Jul	0	0	2	3	Z	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	16	87	74	46	10.4	87
23-Jul	12	2	2	1	2	2	Z	1	3	3	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1.4	12
24-Jul	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-Jul	0	Z	0	0	0	0	1	2	5	7	2	1	0	0	0	1	1	2	9	24	4	7	1	0	2.9	24
26-Jul	0	1	Z	0	0	1	1	1	1	1	1	2	0	0	1	4	6	8	10	11	5	5	9	21	3.9	21
27-Jul	4	1	1	Z	1	1	1	1	1	1	1	2	5	1	1	0	0	0	1	1	1	4	0	0	1.2	5
28-Jul	14	17	3	2	Z	2	1	1	1	1	1	1	1	4	2	3	5	2	2	2	0	11	24	3	4.4	24
29-Jul	29	15	14	35	15	Z	3	3	5	21	3	1	0	1	1	1	0	0	0	0	0	0	0	0	6.4	35
30-Jul	Z	0	0	0	0	0	0	3	2	1	1	2	1	1	2	4	3	2	1	0	1	1	1	1	1.2	4
31-Jul	2	Z	0	1	1	1	1	1	4	2	6	9	4	0	3	0	0	0	0	0	0	0	0	0	1.6	9

4.1	2.4	3.4	3.1	1.3	1.7	2.4	1.3	2.3	2.7	2.5	1.9	2.3	2.1	2.0	2.3	1.8	1.2	1.5	2.3	2.5	6.4	5.8	4.0	Diurnal Average
32	17	36	35	15	17	41	5	10	21	22	9	18	14	13	22	9	8	10	24	16	87	74	46	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 - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	672	94.78	94.78
11 - 20	19	2.68	97.46
21 - 60	15	2.12	99.58
61 - 110	3	0.42	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - July 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	23	12	9	13	41	93	51	21	11	15	95	84	51	53	51	672
11 - 20	0	1	0	0	0	0	2	3	1	1	4	4	3	0	0	0	19
21 - 60	0	1	0	0	1	0	0	2	2	3	3	2	0	0	1	0	15
61 - 110	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3
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	25	12	9	14	41	95	56	24	17	23	101	87	51	54	51	709

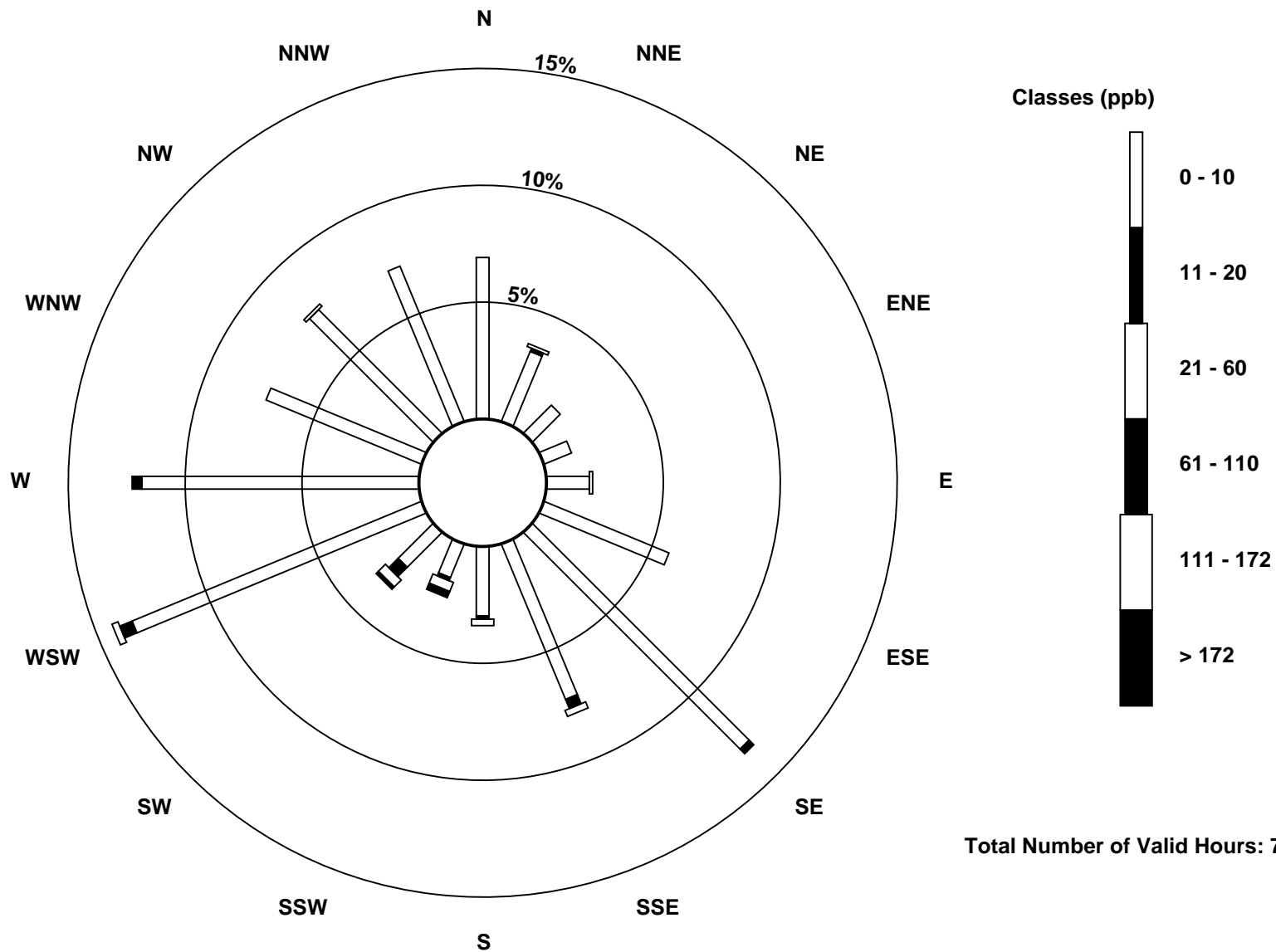
Total Number of Valid Hours: 709

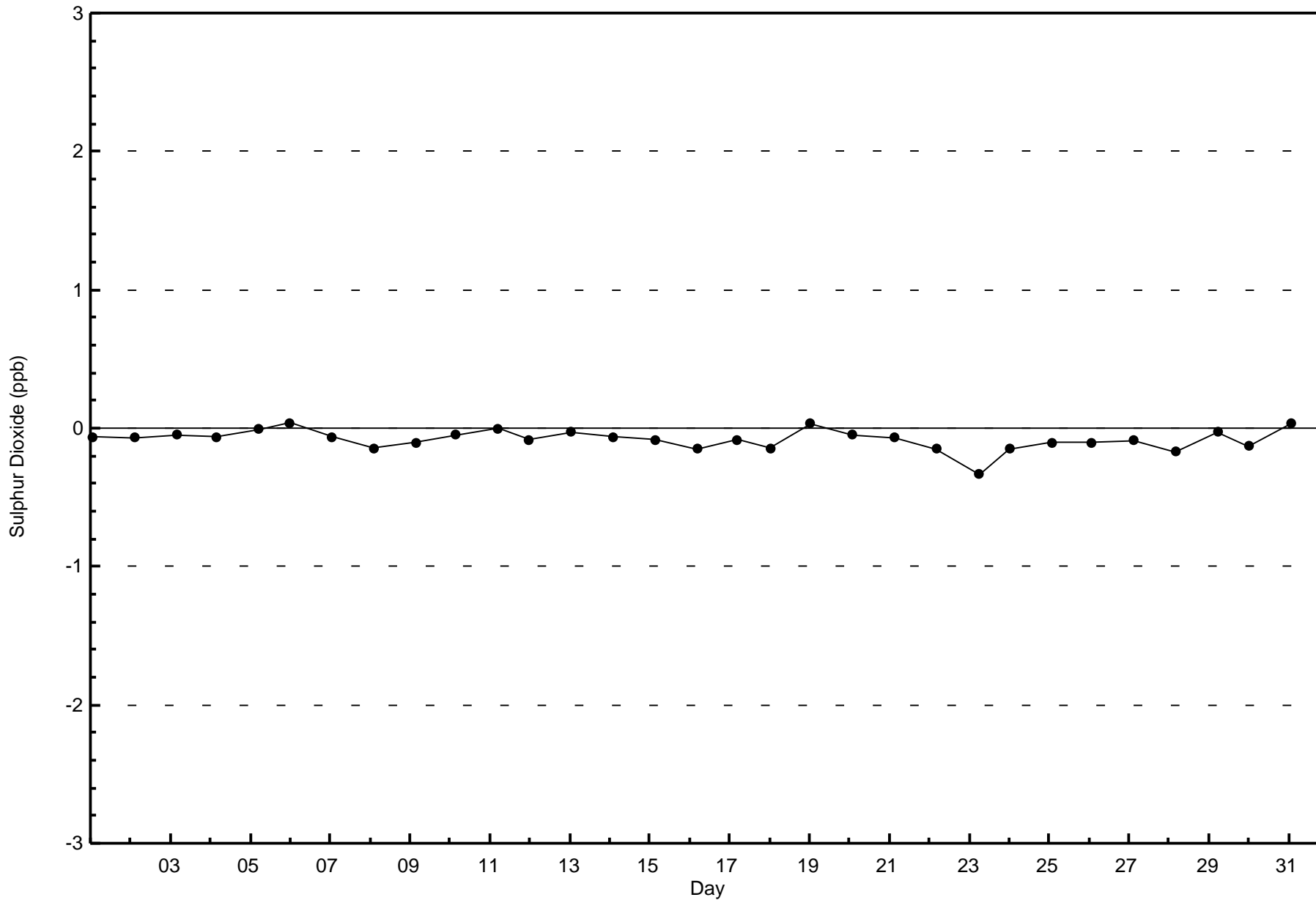
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)

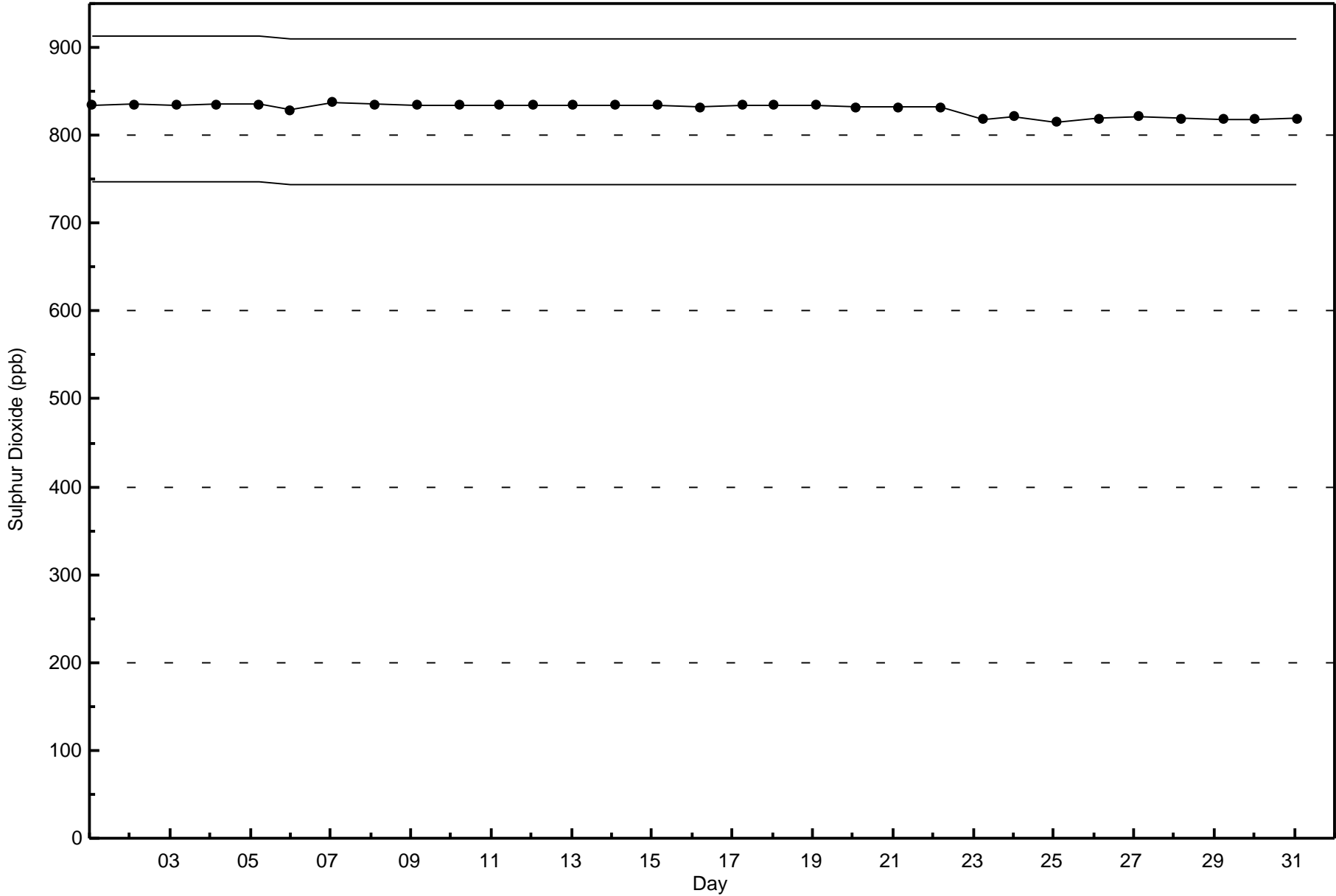






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - July 2017





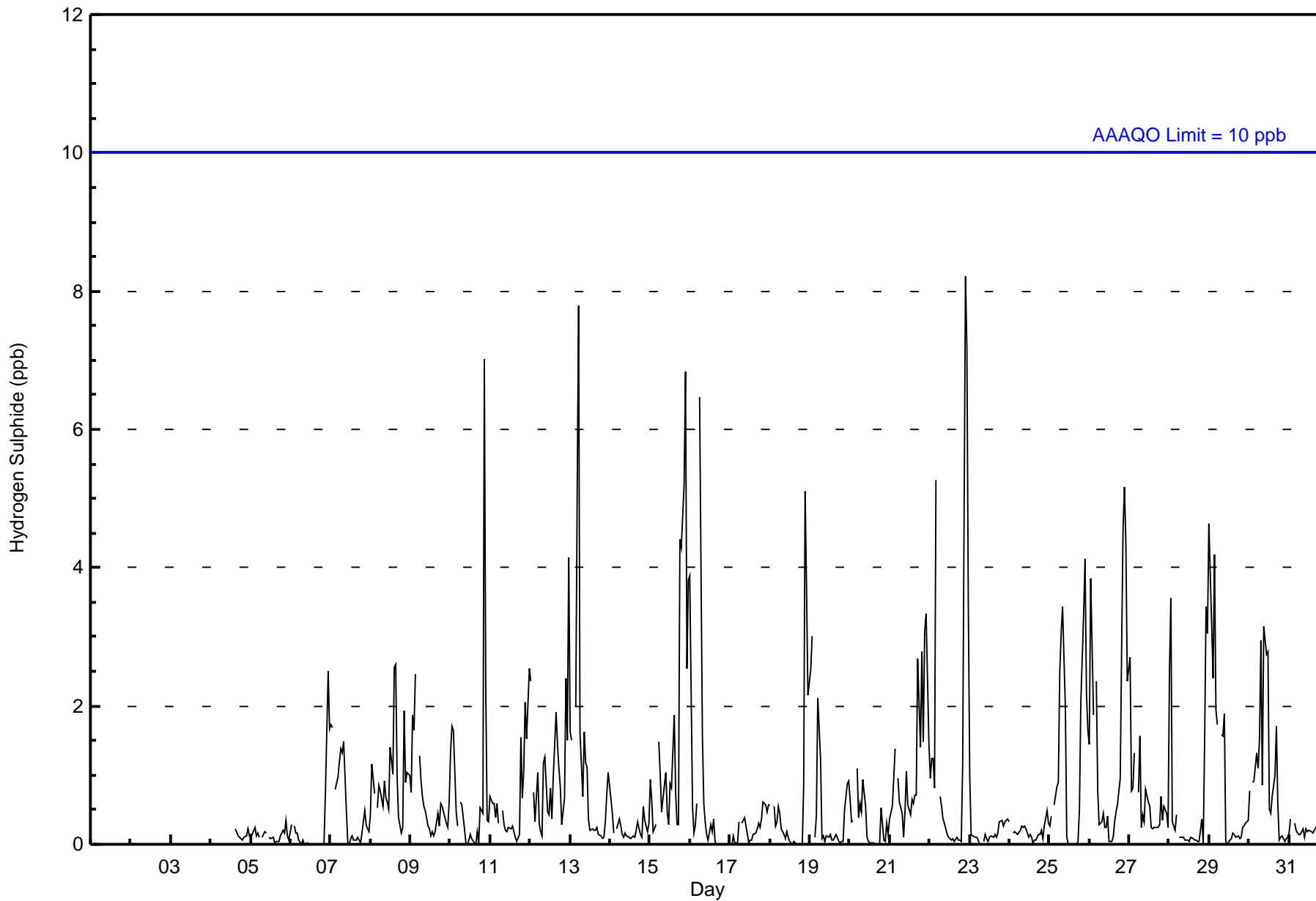
Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Lower Camp - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 ppb on Jul 22 22:00 Maximum Daily Average: 1.7 ppb on Jul 15														Hours in Service: 744 Hours of Data: 629													
Minimum Value: 0 ppb on Jul 6 09:00 Minimum Daily Average: 0.1 ppb on Jul 5 Maximum Diurnal Average: 1.7 ppb at hour 22 Minimum Diurnal Average: 0.2 ppb at hour 14 Monthly Average: 0.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6														Hours of Missing Data: 115 Hours of Calibration: 32 Percent Operational Time: 88.8													
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-Jul	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-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
3-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
4-Jul	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	
5-Jul	0	0	0	0	0	0	Z	0	0	0	M	0	C	C	C	0	0	0	0	0	0	0	0	0	0.1	0	
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0.3	3
7-Jul	2	2	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
8-Jul	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	3	3	1	0	0	0	2	1	1	1	1	1.0	3
9-Jul	1	2	2	2	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0.7	2	
10-Jul	1	2	2	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	1	0	7	2	0	0	0.8	7	
11-Jul	1	1	1	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	1	2	2	3	0.7	3	
12-Jul	2	Z	1	0	1	0	0	0	1	1	0	0	1	0	1	2	1	1	1	0	1	2	2	4	1.1	4	
13-Jul	2	2	Z	2	5	8	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1.2	8	
14-Jul	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
15-Jul	1	1	0	0	Z	1	1	0	1	1	0	0	1	1	2	1	0	0	4	4	5	7	3	4	1.7	7	
16-Jul	4	1	0	0	1	Z	6	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6	
17-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.2	1	
18-Jul	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	4	2	0.7	5	
19-Jul	3	3	Z	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.6	3	
20-Jul	1	0	0	Z	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1	
21-Jul	0	1	1	1	Z	1	1	0	0	0	1	1	0	1	1	1	1	3	1	3	1	3	3	1	1.2	3	
22-Jul	1	1	1	1	5	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	8	7	4	1.4	8	
23-Jul	1	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
24-Jul	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-Jul	0	0	Z	1	1	1	2	3	3	2	0	0	0	0	0	0	0	0	1	2	3	4	2	2	1.2	4	
26-Jul	1	4	2	Z	2	1	0	0	0	0	0	0	0	0	0	0	1	1	3	5	5	4	2	1.5	5		
27-Jul	3	1	1	1	Z	1	2	0	0	0	1	1	1	0	0	0	0	0	1	0	1	0	0	0	0.6	3	
28-Jul	3	4	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	0.7	4		
29-Jul	5	3	2	4	2	2	Z	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	5	
30-Jul	1	Z	1	1	1	1	2	3	1	3	3	3	1	0	1	1	2	1	0	0	0	0	0	0	1.1	3	
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1	
																								Diurnal Average	Diurnal Maximum		
1.2 1.3 0.7 0.8 1.0 1.0 1.0 0.7 0.6 0.6 0.4 0.3 0.2 0.2 0.3 0.3 0.3 0.3 0.5 0.6 1.1 1.7 1.4 1.2 5 4 2 4 5 8 6 3 3 3 3 3 1 1 3 3 2 3 4 4 7 8 7 4																								Diurnal Average	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
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	580	92.21	92.21
3 - 4	36	5.72	97.93
5 - 7	11	1.75	99.68
8 - 11	2	0.32	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 629

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - July 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	24	8	9	13	37	75	18	9	11	11	76	85	52	54	49	580
3 - 4	0	0	1	0	1	2	6	16	3	1	2	3	0	0	0	1	36
5 - 7	0	0	0	0	0	0	2	2	2	2	3	0	0	0	0	0	11
8 - 11	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	24	9	9	14	39	83	36	15	15	16	79	85	52	54	50	629

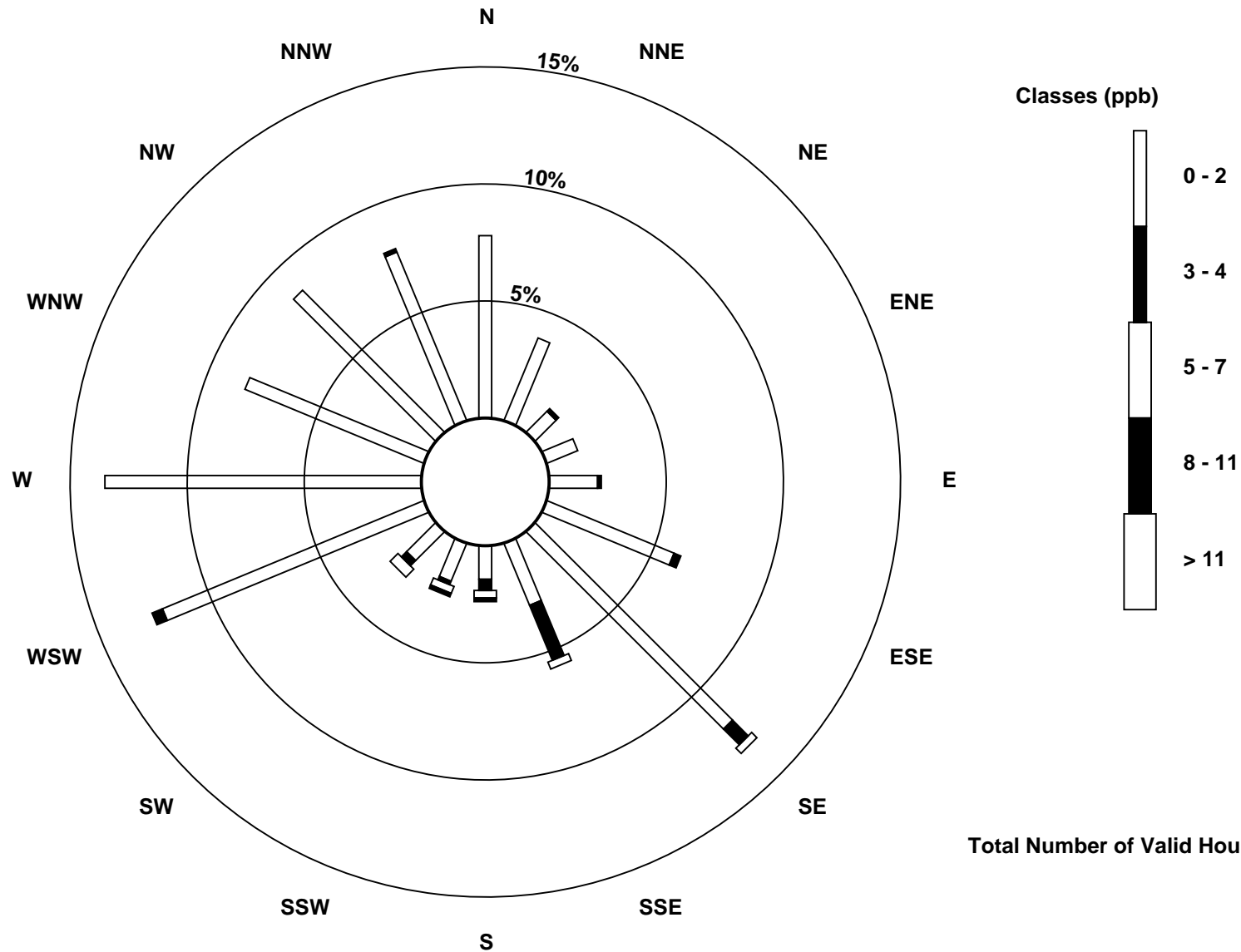
Total Number of Valid Hours: 629

Total Number of Hours: 744

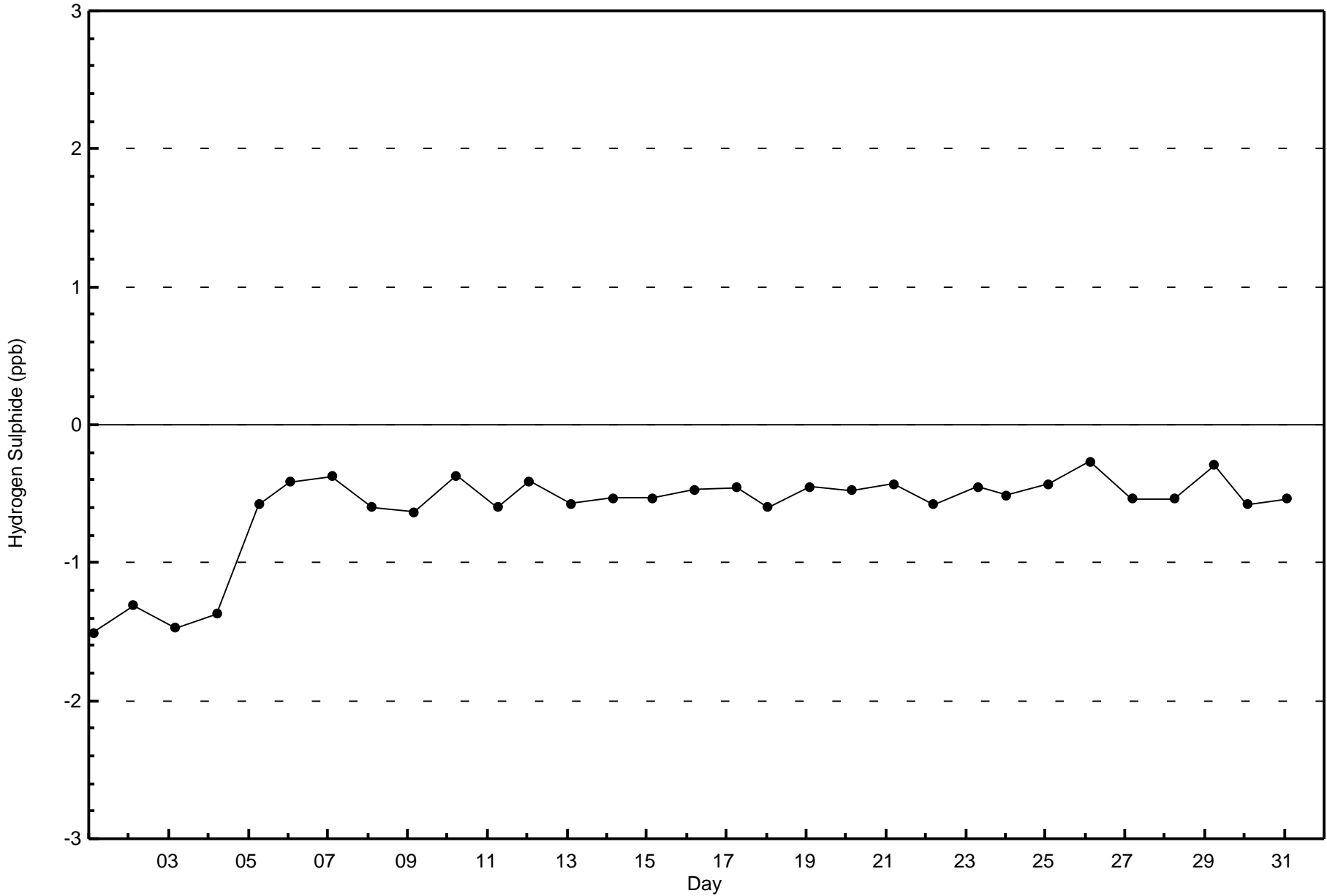


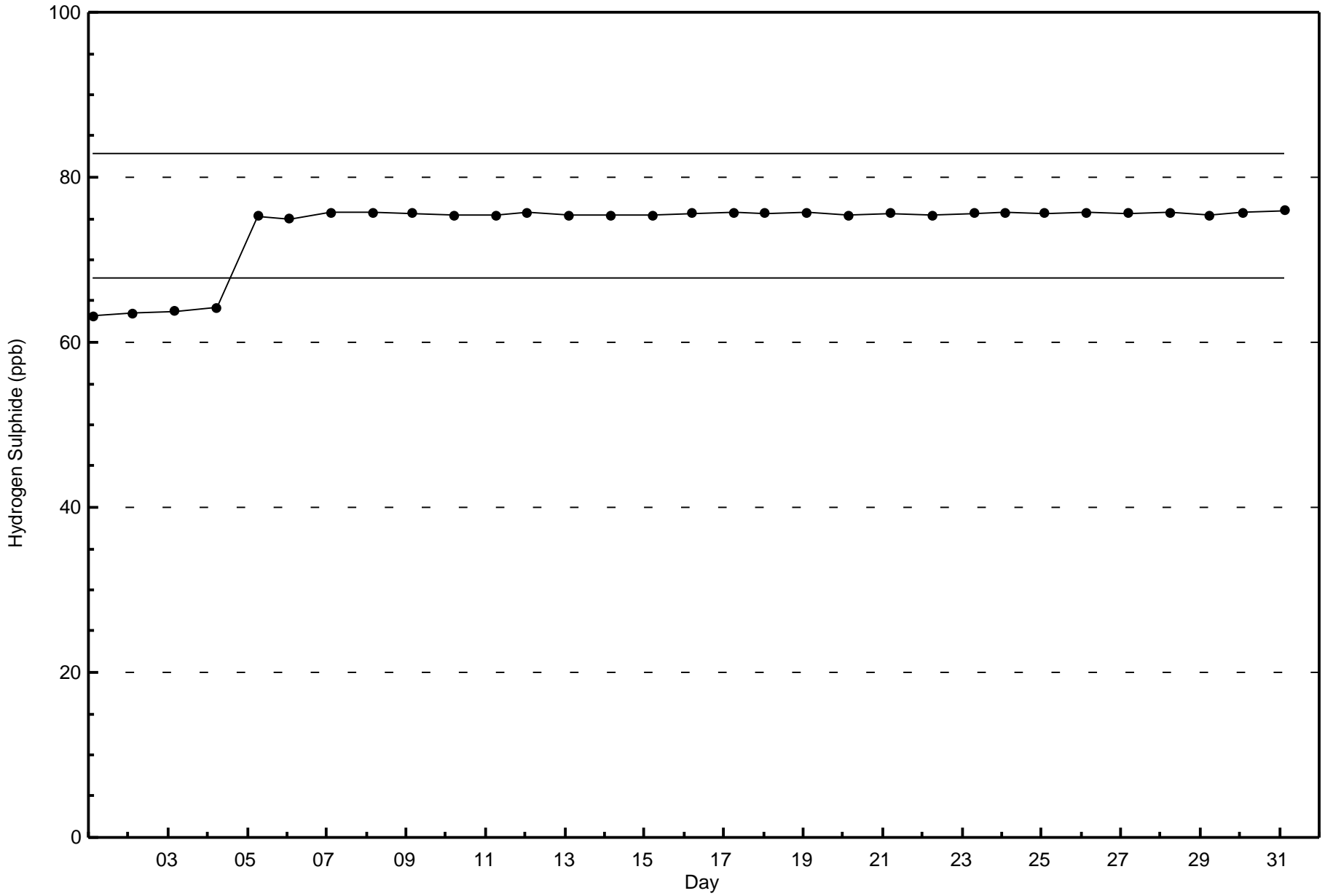
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)



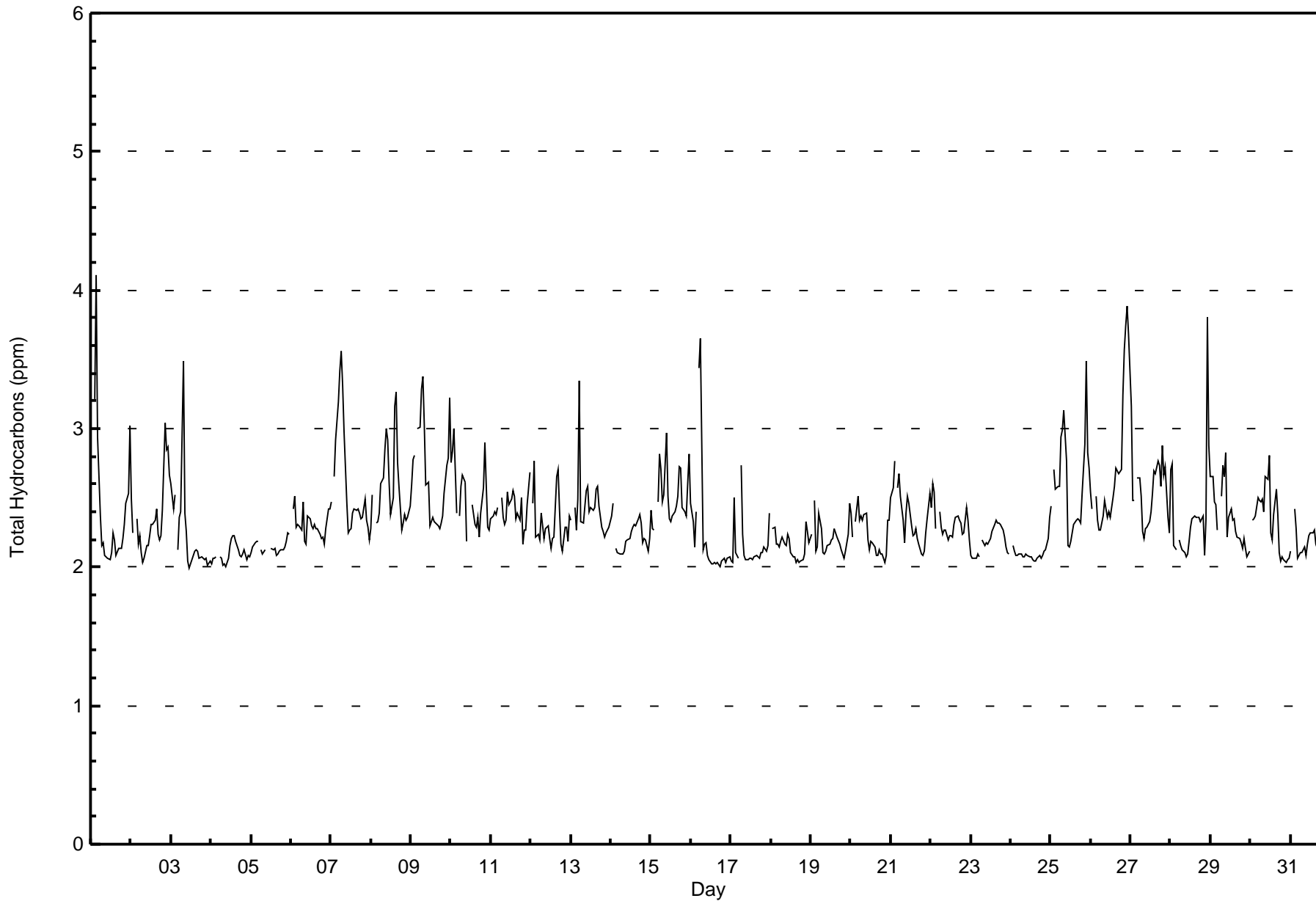
Total Number of Valid Hours: 629







Maximum Value: 4.1 ppm on Jul 1 04:00																			Maximum Daily Average: 2.7 ppm on Jul 26						Hours in Service: 744				
Minimum Value: 2.0 ppm on Jul 3 12:00																			Minimum Daily Average: 2.1 ppm on Jul 4						Hours of Data: 706				
Maximum Diurnal Average: 2.5 ppm at hour 7																			Minimum Diurnal Average: 2.2 ppm at hour 13						Hours of Missing Data: 38				
Monthly Average: 2.35 ppm																			Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.5						Hours of Calibration: 34				
																									Percent Operational Time: 99.5				
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-Jul	UO	Z	3.2	4.1	2.9	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.5	3.0	2.4	4.1			
2-Jul	2.5	2.2	Z	2.3	2.2	2.2	2.1	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.2	2.2	2.2	2.4	3.0	2.8	2.9	2.7	2.4	3.0			
3-Jul	2.6	2.4	2.5	Z	2.1	2.4	2.4	3.5	2.4	2.3	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.2	3.5				
4-Jul	2.0	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	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	2.2				
5-Jul	2.1	2.1	2.2	2.2	2.2	Z	2.1	2.1	2.1	C	C	C	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				
6-Jul	Z	2.4	2.5	2.3	2.3	2.3	2.3	2.5	2.2	2.2	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.5				
7-Jul	2.5	Z	2.7	2.9	3.2	3.4	3.6	3.3	3.0	2.5	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.3	2.3	2.6	3.6				
8-Jul	2.3	2.5	Z	2.3	2.3	2.4	2.6	2.6	2.9	3.0	2.9	2.6	2.4	2.5	3.2	3.3	2.8	2.6	2.3	2.3	2.4	2.3	2.4	2.6	3.3				
9-Jul	2.6	2.8	2.8	Z	3.0	3.0	3.3	3.4	3.0	2.6	2.6	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.7	2.8	2.7	3.4				
10-Jul	2.8	2.8	3.0	2.4	Z	2.4	2.6	2.7	2.6	2.2	M	M	M	2.4	2.3	2.3	2.4	2.2	2.4	2.6	2.9	2.6	2.3	2.5	3.0				
11-Jul	2.3	2.4	2.4	2.4	2.4	Z	2.5	2.4	2.3	2.3	2.5	2.4	2.5	2.6	2.5	2.4	2.4	2.3	2.5	2.2	2.3	2.3	2.4	2.4	2.7				
12-Jul	Z	2.5	2.8	2.2	2.2	2.2	2.4	2.3	2.2	2.3	2.3	2.2	2.1	2.2	2.2	2.7	2.7	2.4	2.2	2.1	2.3	2.3	2.2	2.3	2.8				
13-Jul	2.3	Z	2.4	2.3	2.5	3.3	2.3	2.3	2.4	2.6	2.6	2.4	2.4	2.4	2.6	2.6	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.4	3.3				
14-Jul	2.4	2.5	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.1	2.2	2.2	2.5				
15-Jul	2.4	2.3	2.3	Z	2.5	2.8	2.7	2.5	2.5	3.0	2.5	2.3	2.3	2.4	2.4	2.4	2.5	2.7	2.7	2.4	2.4	2.4	2.6	2.5	3.0				
16-Jul	2.5	2.3	2.1	2.4	Z	3.4	3.7	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.2	3.7				
17-Jul	2.0	2.0	2.5	2.1	2.1	Z	2.7	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	2.2	2.4	2.1	2.7				
18-Jul	Z	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.3	2.3	2.2	2.3				
19-Jul	2.2	Z	2.5	2.1	2.1	2.4	2.3	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.5				
20-Jul	2.4	2.2	Z	2.3	2.5	2.3	2.4	2.3	2.4	2.4	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3	2.2	2.5				
21-Jul	2.5	2.6	2.8	Z	2.6	2.7	2.5	2.3	2.2	2.4	2.5	2.5	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.4	2.8				
22-Jul	2.4	2.6	2.5	2.3	Z	2.4	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.6				
23-Jul	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.3				
24-Jul	Z	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	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.1	2.4				
25-Jul	2.4	Z	2.7	2.6	2.6	2.6	2.9	3.0	3.1	2.8	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.5	2.9	3.5	2.8	2.6	3.5				
26-Jul	2.5	2.4	Z	2.5	2.3	2.3	2.3	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.6	2.7	2.7	2.7	2.7	3.2	3.6	3.7	3.9	2.7	3.9				
27-Jul	3.2	2.5	2.5	Z	2.6	2.6	2.5	2.3	2.2	2.3	2.3	2.3	2.4	2.5	2.7	2.7	2.8	2.7	2.6	2.9	2.7	2.7	2.4	2.5	3.2				
28-Jul	2.7	2.7	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.1	2.4	3.8	2.4	3.8				
29-Jul	2.7	2.7	2.5	2.4	Z	2.5	2.7	2.7	2.8	2.2	2.4	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.4	2.8				
30-Jul	Z	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.4	2.7	2.6	2.8	2.3	2.2	2.4	2.6	2.4	2.1	2.0	2.1	2.1	2.0	2.1	2.3	2.8				
31-Jul	2.1	Z	2.4	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.1	2.3	2.2	2.4				
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan																								C - Calibration		M - Maintenance		UO - Unstable Operation	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	29	4.11	4.11
2.1 - 3.0	653	92.49	96.60
3.1 - 10.0	24	3.40	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - July 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	2	0	0	1	0	0	1	1	0	0	4	14	6	0	0	0	29
2.1 - 3.0	47	24	11	8	12	40	90	49	17	17	18	86	78	51	54	51	653
3.1 - 10.0	0	1	1	0	2	1	4	6	7	0	1	0	1	0	0	0	24
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	49	25	12	9	14	41	95	56	24	17	23	100	85	51	54	51	706

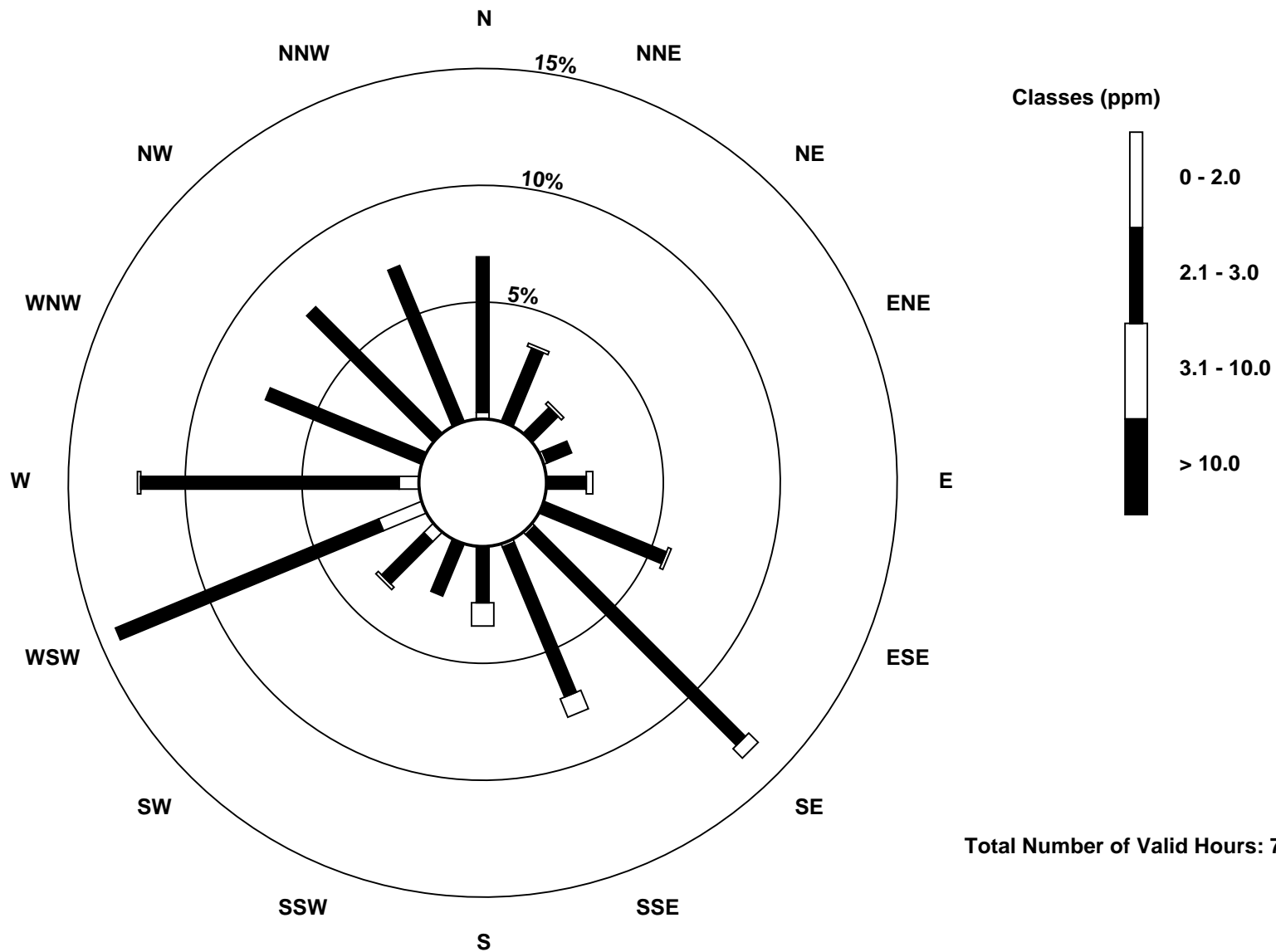
Total Number of Valid Hours: 706

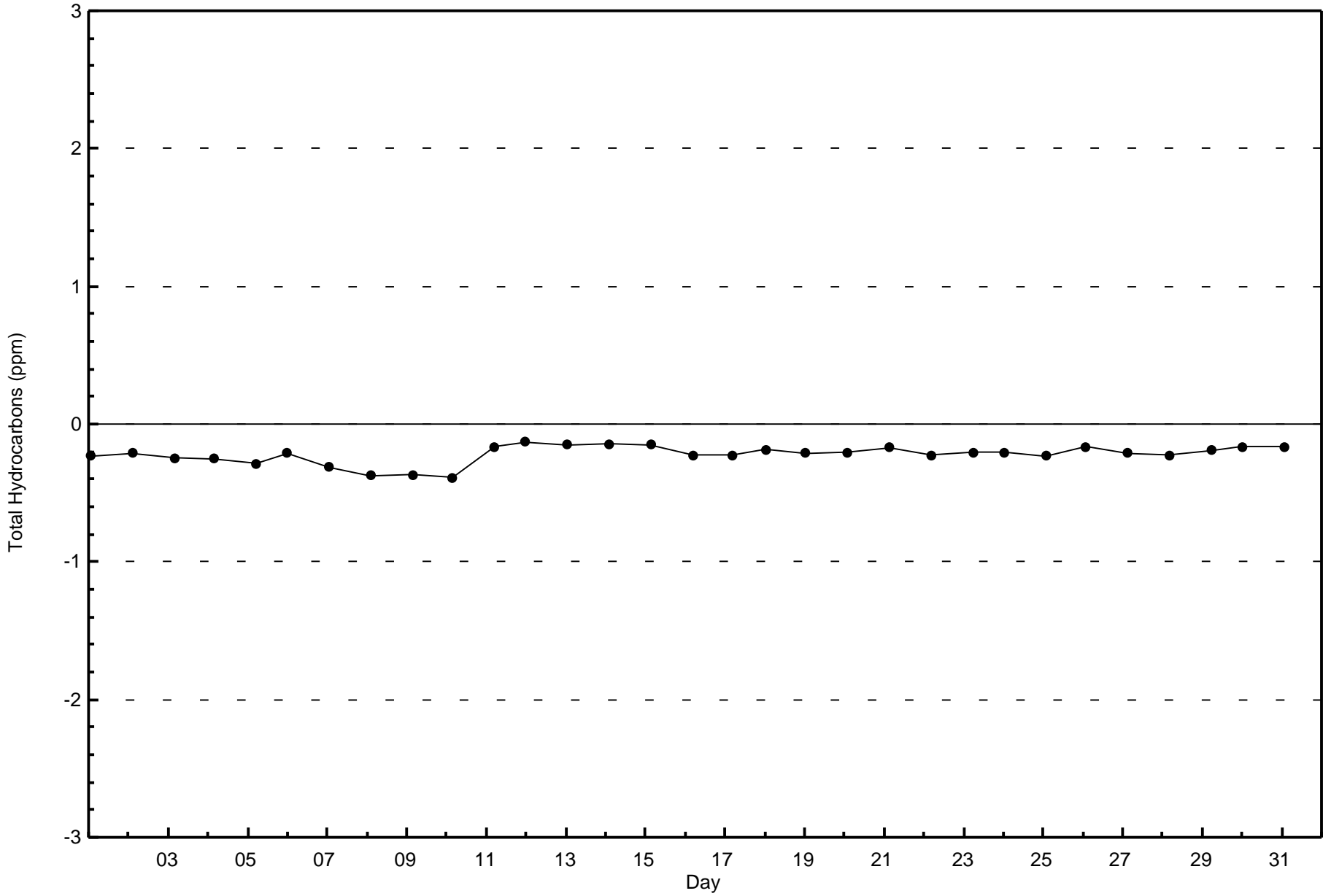
Total Number of Hours: 744

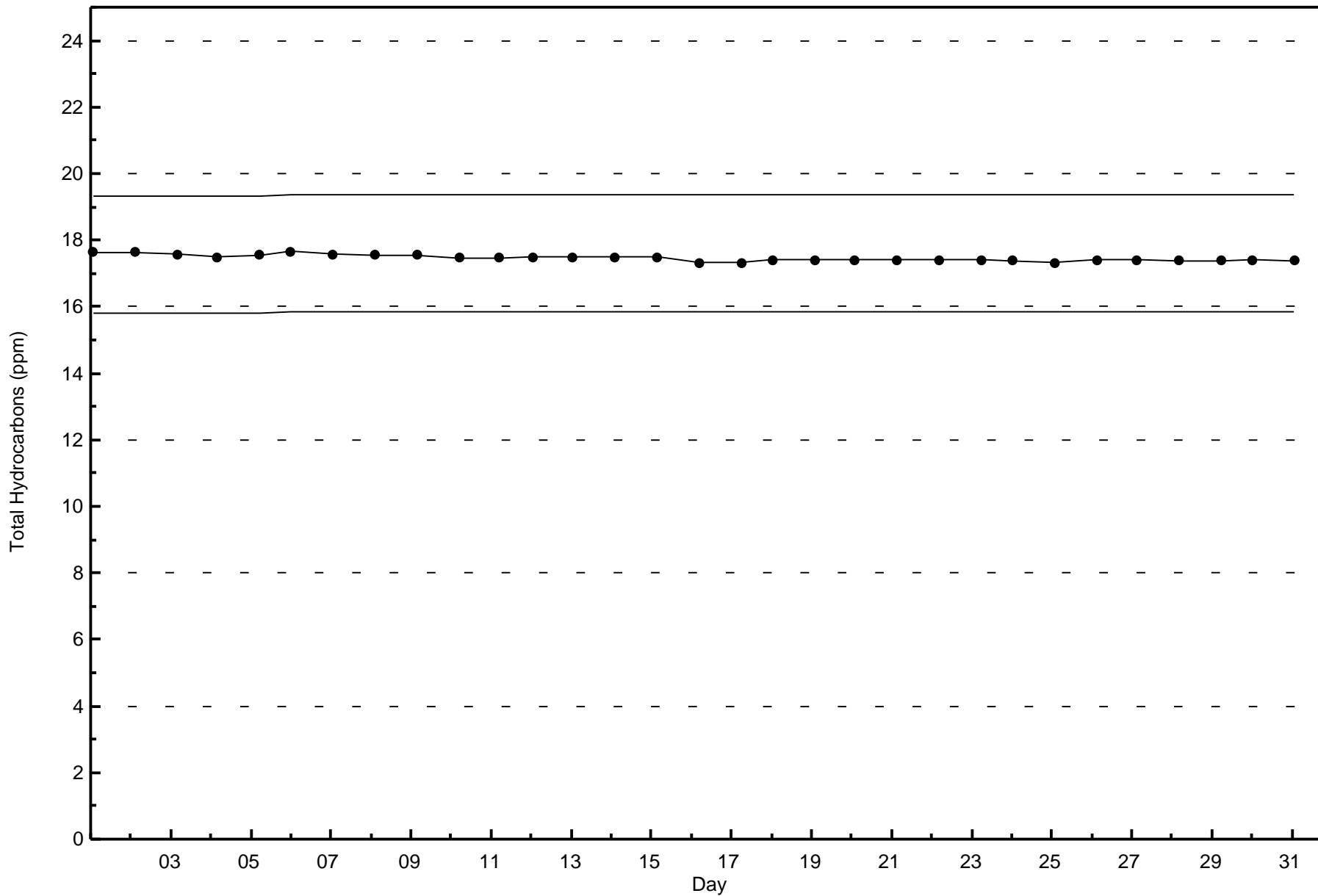


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

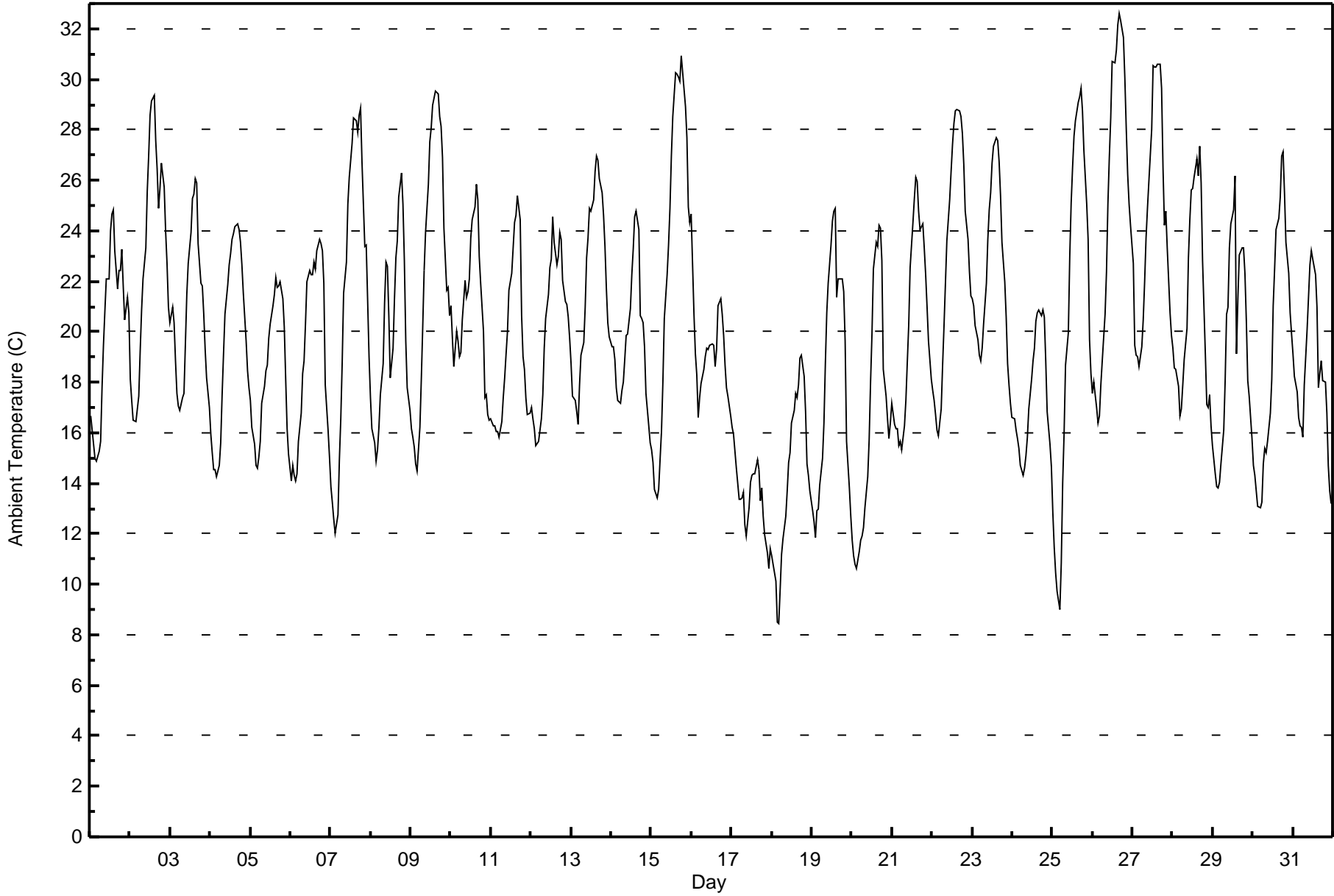
Lower Camp - July 2017

Maximum Value: 32.6 C on Jul 26 17:00 Maximum Daily Average: 25.0 C on Jul 26																						Hours in Service: 744				
Minimum Value: 8.5 C on Jul 18 05:00 Minimum Daily Average: 13.5 C on Jul 17																						Hours of Data: 744				
Maximum Diurnal Average: 24.7 C at hour 17 Minimum Diurnal Average: 15.1 C at hour 5																						Hours of Missing Data: 0				
Monthly Average: 20.13 C Percentiles: P₁ = 10.6 P₁₀ = 14.3 Q₁ = 16.5 Median = 19.7 Q₃ = 23.5 P₉₀ = 26.7 P₉₉ = 30.5																						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-Jul	16.7	16.1	15.6	15.0	14.9	15.3	15.7	17.8	19.5	20.8	22.1	22.1	24.0	24.7	24.8	23.2	21.7	22.4	22.4	23.3	21.8	20.5	21.4	20.8	20.1	24.8
2-Jul	18.1	17.3	16.5	16.4	17.0	17.5	19.2	20.9	22.1	23.3	25.6	27.0	28.6	29.1	29.4	27.6	26.4	24.9	25.7	26.7	25.7	24.0	22.7	21.0	23.0	29.4
3-Jul	20.3	21.0	20.3	18.9	17.6	17.1	16.9	17.4	17.6	19.5	21.5	22.7	23.9	25.3	25.4	26.1	25.9	23.5	21.9	21.8	20.7	19.3	18.2	17.0	20.8	26.1
4-Jul	15.9	15.2	14.5	14.6	14.3	14.7	15.6	17.5	19.1	20.7	21.9	22.6	23.1	23.7	23.9	24.2	24.3	24.1	23.5	22.7	21.6	19.6	18.4	17.8	19.7	24.3
5-Jul	17.3	16.2	15.6	14.7	14.6	15.0	15.7	17.1	17.9	18.5	18.7	19.8	20.3	21.1	21.5	22.2	21.8	21.8	22.0	21.3	20.2	18.1	16.1	15.1	18.4	22.2
6-Jul	14.1	14.7	14.3	14.1	14.4	15.6	16.8	18.3	18.9	20.3	22.0	22.4	22.2	22.3	22.7	22.5	23.2	23.7	23.5	23.2	21.9	17.9	16.1	15.0	19.2	23.7
7-Jul	13.9	13.3	12.6	12.0	12.7	15.0	16.5	18.8	21.5	22.8	25.1	26.1	26.8	27.5	28.5	28.4	27.9	28.6	28.8	26.7	23.4	23.4	21.2	19.0	21.7	28.8
8-Jul	17.4	16.1	15.6	14.9	15.3	16.2	17.5	18.7	21.2	22.8	22.6	20.6	18.2	19.4	21.3	22.9	23.6	25.3	26.3	25.1	22.8	19.6	17.8	16.9	19.9	26.3
9-Jul	16.2	15.8	15.4	14.7	14.5	16.2	18.1	20.2	22.5	24.0	25.8	27.5	28.1	29.0	29.3	29.5	29.4	28.5	28.1	26.9	24.1	21.7	21.8	20.7	22.8	29.5
10-Jul	21.0	19.7	18.6	20.0	19.7	19.0	19.2	20.4	22.0	21.3	21.6	22.1	23.7	24.4	24.9	25.8	25.2	23.0	21.9	20.0	17.4	17.5	16.7	16.5	20.9	25.8
11-Jul	16.5	16.3	16.3	16.1	16.1	15.8	16.5	17.4	18.2	19.1	20.0	21.6	22.3	23.4	24.4	24.6	25.4	24.5	20.6	19.0	18.5	17.4	16.7	16.8	19.3	25.4
12-Jul	17.0	16.6	16.2	15.5	15.7	16.1	16.5	17.5	19.3	20.5	21.5	22.5	22.9	24.6	23.6	22.6	23.0	23.9	23.7	22.1	21.2	21.1	20.6	19.7	20.2	24.6
13-Jul	18.7	17.5	17.3	16.8	16.4	17.9	19.1	19.6	21.0	22.9	23.7	24.9	24.8	25.2	26.3	27.0	26.8	26.1	25.5	24.6	23.4	21.7	20.4	19.8	22.0	27.0
14-Jul	19.4	19.4	18.9	17.8	17.3	17.2	17.7	18.0	18.9	19.9	20.9	22.2	23.3	24.6	24.8	24.1	20.6	20.5	20.4	19.4	17.6	16.3	15.6	15.6	19.8	24.8
15-Jul	15.3	14.8	13.8	13.4	13.7	14.9	16.0	18.0	20.5	22.2	23.4	24.9	26.9	28.5	30.3	30.2	30.1	29.9	30.9	30.3	28.9	27.7	24.9	24.4	23.1	30.9
16-Jul	24.7	20.7	19.1	18.3	16.6	17.4	18.0	18.5	19.0	19.3	19.3	19.5	19.5	18.6	19.3	21.0	21.3	20.7	19.9	18.7	17.8	17.4	16.6	16.6	19.2	24.7
17-Jul	16.2	16.0	15.3	14.6	13.4	13.4	13.4	13.6	12.4	11.9	13.0	14.1	14.3	14.4	14.4	14.9	14.5	13.3	13.8	12.7	12.0	11.2	10.6	11.4	13.5	16.2
18-Jul	11.1	10.8	10.1	8.5	8.5	9.8	11.2	11.8	12.7	13.7	14.8	15.2	16.4	16.9	17.6	17.4	17.9	19.0	19.1	18.2	16.8	14.7	14.3	13.7	14.2	19.1
19-Jul	12.9	12.4	11.9	12.9	13.0	13.9	15.0	16.4	18.7	20.7	21.9	23.5	24.4	24.8	24.9	21.4	22.1	22.1	22.1	21.6	19.6	15.7	13.8	12.7	18.3	24.9
20-Jul	11.8	11.1	10.8	10.6	11.3	11.8	11.9	12.3	13.0	14.3	15.7	18.0	19.9	22.5	23.5	23.4	24.2	24.1	22.8	18.5	17.5	16.6	15.7	16.4	16.6	24.2
21-Jul	17.2	16.3	16.1	16.2	15.5	15.7	15.3	16.3	17.3	18.8	20.2	22.6	24.3	25.3	26.1	26.0	24.8	24.0	24.3	23.3	22.2	21.0	19.6	18.1	20.3	26.1
22-Jul	17.7	17.3	16.7	16.1	15.9	17.0	18.7	20.3	21.9	23.6	25.2	26.3	27.4	28.3	28.7	28.8	28.7	28.5	27.9	26.6	24.8	23.7	22.4	21.4	23.1	28.8
23-Jul	21.3	21.0	20.3	19.7	19.1	18.9	19.3	20.3	21.9	23.7	24.8	25.5	26.7	27.3	27.7	27.6	26.7	25.4	23.5	22.0	20.6	18.7	17.9	17.2	22.4	27.7
24-Jul	16.6	16.6	16.1	15.8	15.4	14.7	14.3	14.6	15.1	15.8	16.9	18.1	18.8	19.3	20.4	20.7	20.9	20.7	20.9	20.6	18.8	16.8	15.6	14.7	17.4	20.9
25-Jul	12.9	11.5	10.5	9.7	9.0	10.9	14.0	16.0	18.7	20.0	23.0	25.1	26.5	27.8	28.4	29.1	29.3	29.6	28.7	27.2	25.1	23.6	19.7	18.4	20.6	29.6
26-Jul	17.6	18.0	17.0	16.4	16.7	17.9	18.8	20.7	22.3	25.0	26.9	28.5	30.7	30.6	31.1	32.2	32.6	32.4	31.6	30.0	28.0	26.2	25.0	24.2	25.0	32.6
27-Jul	22.7	19.4	19.1	19.0	18.6	19.4	20.5	22.0	23.7	24.9	25.9	28.0	30.5	30.5	30.5	30.6	30.6	29.6	26.5	24.2	24.8	23.3	20.8	19.9	24.4	30.6
28-Jul	19.4	18.6	18.5	17.9	16.7	17.0	17.9	18.9	20.1	22.9	24.4	25.6	25.7	26.1	26.8	26.2	27.4	25.9	22.8	19.1	17.1	17.0	17.5	16.2	21.1	27.4
29-Jul	15.5	14.4	13.9	13.8	14.1	14.8	16.1	18.1	20.7	21.0	23.3	24.3	24.9	26.2	19.2	21.3	23.0	23.3	23.3	22.3	20.4	18.0	17.4	15.8	19.4	26.2
30-Jul	14.7	14.3	13.7	13.1	13.0	13.3	14.8	15.4	15.2	15.7	16.8	18.1	21.1	22.5	24.1	24.5	25.3	27.0	27.1	25.5	23.5	22.3	20.8	19.9	19.2	27.1
31-Jul	19.1	18.2	17.6	16.6	16.3	16.2	15.8	17.9	20.1	21.4	22.6	23.2	22.9	22.2	21.0	17.8	18.3	18.9	18.1	18.0	16.8	14.7	13.7	13.2	18.4	23.2
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	5	0.67	0.67
10 - 20	378	50.81	51.48
> 20	361	48.52	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

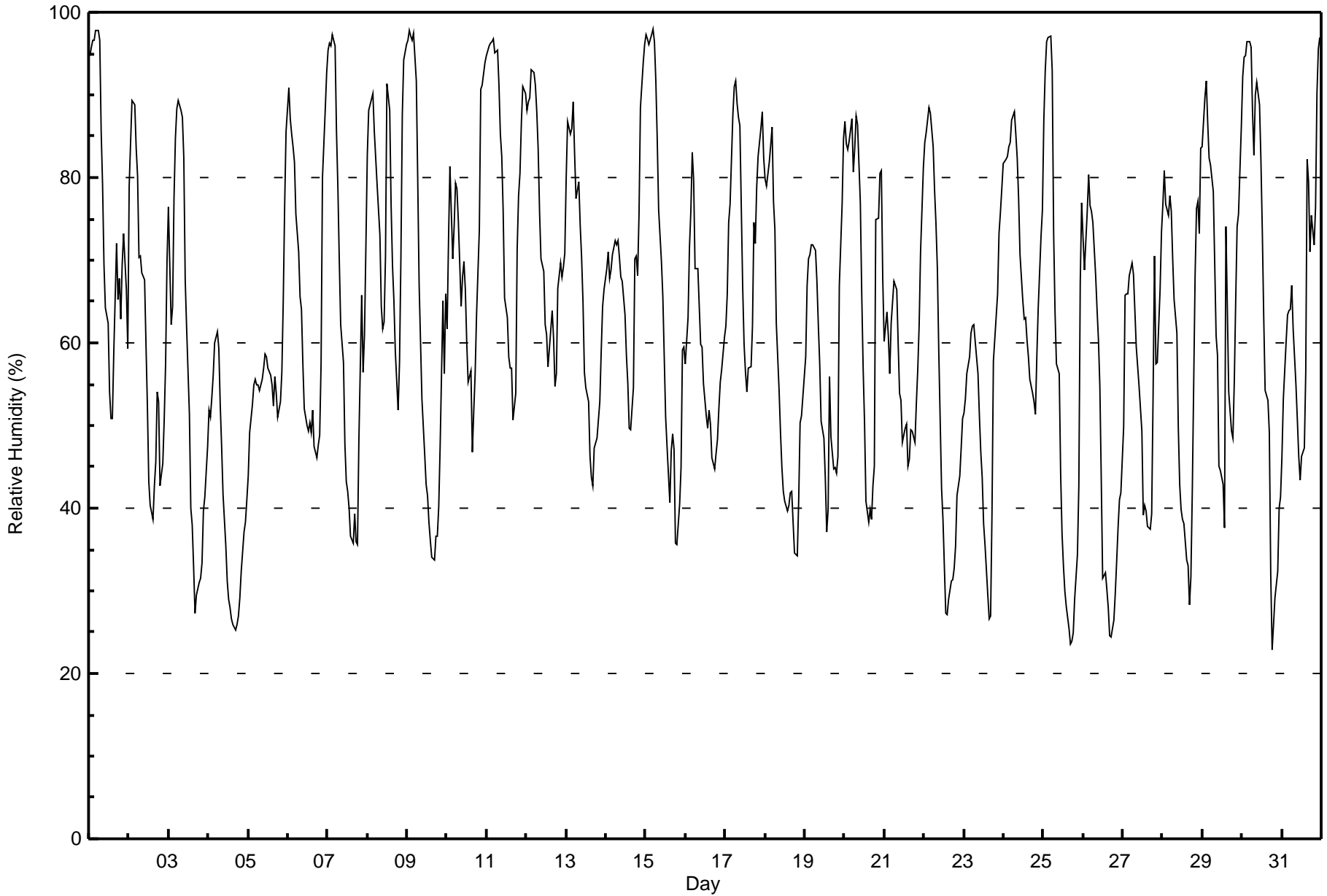
Lower Camp - July 2017

Maximum Value: 98 % on Jul 15 05:00 Maximum Daily Average: 79.5 % on Jul 11																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 23 % on Jul 30 19:00 Minimum Daily Average: 40.3 % on Jul 4 Maximum Diurnal Average: 81.9 % at hour 5 Minimum Diurnal Average: 45.7 % at hour 17 Monthly Average: 62.9 % Percentiles: P ₁ = 25 P ₁₀ = 38 Q ₁ = 49 Median = 62 Q ₃ = 77 P ₉₀ = 89 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-Jul	95	96	97	97	98	98	97	86	79	69	64	62	54	51	51	59	72	65	68	63	70	73	67	59	74.5	98
2-Jul	79	84	89	89	83	80	70	71	68	68	60	52	43	40	39	43	46	54	53	43	45	51	58	70	61.6	89
3-Jul	76	62	64	77	85	88	89	88	87	82	68	62	51	40	38	33	27	30	31	32	33	40	41	48	57.2	89
4-Jul	52	51	53	56	60	61	59	53	48	42	35	31	29	28	27	26	25	26	27	29	32	37	38	41	40.3	61
5-Jul	44	49	53	55	56	55	55	54	56	57	59	58	57	56	55	52	56	54	51	53	56	65	77	86	57.0	86
6-Jul	91	87	85	84	82	76	71	66	64	58	52	50	49	50	49	52	48	46	48	49	57	80	88	93	65.6	93
7-Jul	95	96	96	97	96	86	79	70	62	58	48	43	42	40	37	36	39	36	36	48	66	56	61	72	62.3	97
8-Jul	83	88	89	90	86	82	79	73	64	62	62	70	91	88	77	69	65	59	52	58	70	88	94	96	76.6	96
9-Jul	97	98	97	97	97	92	80	67	60	53	46	43	42	38	36	34	34	37	37	40	47	65	56	66	60.8	98
10-Jul	62	73	81	70	74	79	79	75	64	68	70	67	60	55	57	47	52	56	63	74	91	91	93	94	70.6	94
11-Jul	95	96	96	96	97	95	95	91	85	82	76	65	63	58	57	57	51	54	71	78	81	87	91	90	79.5	97
12-Jul	88	89	90	93	93	91	88	83	76	70	69	62	61	57	59	64	60	55	56	67	70	68	69	71	72.9	93
13-Jul	80	87	85	86	89	83	78	80	74	70	65	56	55	53	46	44	43	47	49	51	53	59	64	66	65.1	89
14-Jul	69	71	68	69	71	72	72	72	70	68	67	63	58	55	50	49	55	70	71	68	76	88	94	96	69.3	96
15-Jul	97	97	96	97	98	97	92	85	76	70	66	58	51	47	41	47	49	47	36	36	41	45	59	59	66.1	98
16-Jul	57	63	72	76	83	80	69	69	64	60	60	55	51	50	52	50	46	45	47	48	52	55	57	61	59.2	83
17-Jul	62	66	75	77	88	91	92	89	87	86	67	60	57	54	57	57	62	75	72	79	83	86	88	82	74.6	92
18-Jul	80	79	82	84	86	77	74	62	54	49	45	42	41	40	40	42	42	38	35	34	41	50	51	54	55.1	86
19-Jul	58	67	70	71	72	72	71	67	62	58	51	49	43	37	40	56	49	45	45	44	46	67	77	85	58.4	85
20-Jul	87	84	83	84	87	81	84	88	86	77	66	57	50	41	38	40	39	43	45	75	75	80	81	68	68.3	88
21-Jul	60	64	61	56	62	65	67	66	60	54	53	48	50	50	45	46	49	49	48	53	57	62	71	81	57.5	81
22-Jul	84	85	87	89	88	84	79	74	69	59	42	39	33	27	27	29	31	31	33	35	42	44	47	51	54.5	89
23-Jul	52	53	56	58	61	62	62	60	56	51	47	44	38	36	29	27	27	39	58	63	66	73	76	79	53.1	79
24-Jul	82	82	82	84	84	87	88	85	82	78	71	65	63	63	60	58	56	54	53	51	58	64	73	76	70.8	88
25-Jul	87	93	96	97	97	93	73	64	57	56	44	37	33	30	28	25	24	24	25	29	34	43	67	77	55.6	97
26-Jul	73	69	76	80	77	76	75	68	64	60	55	44	32	32	30	28	25	24	27	30	34	38	41	42	49.9	80
27-Jul	50	66	66	66	68	70	68	64	60	57	55	49	39	40	40	38	37	39	54	70	57	58	66	73	56.3	73
28-Jul	77	81	77	75	78	76	70	65	61	50	43	40	39	38	34	33	28	32	42	68	76	77	73	84	59.0	84
29-Jul	84	90	92	87	82	82	78	70	61	58	45	45	43	38	74	64	54	49	48	56	65	74	76	86	66.7	92
30-Jul	92	95	95	96	96	96	88	83	90	92	89	82	73	63	54	53	49	32	23	26	29	32	40	41	67.1	96
31-Jul	46	53	60	63	64	64	67	62	55	51	46	43	46	47	56	82	79	71	75	72	76	90	96	97	65.2	97
																		75.2 77.9 79.7 80.5 81.9 80.3 77.0 72.6 67.9 63.6 57.5 53.0 49.6 46.6 45.9 46.4 45.7 46.0 47.6 52.3 57.4 64.1 68.7 72.3						Diurnal Average		
																		97 98 97 97 98 98 97 91 90 92 89 82 91 88 77 82 79 75 75 79 91 91 96 97						Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Lower Camp - July 2017

Maximum Speed: 32 km/h on Jul 4 13:00	Maximum Daily Speed Average: 22.1 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 29 03:00	Minimum Daily Speed Average: 1.0 km/h on Jul 7	Hours of Data: 744
Maximum Diurnal Speed Average: 6.1 km/h at hour 15	Minimum Diurnal Speed Average: 2.3 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 3.8 km/h 263.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 5 Median = 8 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 28	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-Jul	SE3	SE5	SSE4	SSE2	S2	S6	SSE5	SE6	SE12	SE10	SE9	SE7	S6	SSW8	S4	SSE2	NNW3	NW6	NNE3	E3	ESE2	SSE3	SSE7	SSE6	SSE3.7	SE12
2-Jul	SSE8	SE10	ESE6	SSE1	SE7	SSE9	SSE9	SE11	SE11	SE14	SE9	SSE8	S9	SSE10	SSE9	S9WSW10	NNE7	ESE6	SSE7	SSE7	SSE7	SSE8	ESE5	SSE6.7	SE14	
3-Jul	SE7	SSW4	SSE4	SSW5	SW7	SE5	S7	S1	SW8	SE10	SW9WSW14	WSW16	WSW16	W15WSW18	WSW26	WSW28	SW16	SW17	SW14	WSW14	WSW20	WSW21	WSW10	WSW28		
4-Jul	WSW18	SW13	SW12	WSW19	WSW20	WSW22	WSW23	WSW26	WSW21	WSW21	WSW26	WSW28	WSW32	WSW30	WSW30	WSW29	WSW29	WSW29	W27	W23	W18	WSW13	WSW14	WSW15	WSW22.1	WSW32
5-Jul	W18	W16	W17	W18	W17	W20	W20	W22	W21	WNNW17	WNNW17	WNNW15	WNNW17	WNNW16	NW15	NNW11	NNW12	NNW15	NW16	NW12	NW5	SSE1	ESE2	WNNW13.3	W22	
6-Jul	E1	W6	W5	W5	W7	WSW12	WSW14	W14	WSW15	WSW14	WNNW13	NW10	N11	N11	NW11	NNW9	WNNW12	NW10	NW8	NW6	NW1	NNW1	ESE1	ESE1	WNNW6.6	WSW15
7-Jul	ESE1	ENE1	ENE2	ESE2	E4	ESE5	SE6	SE4	SE5	NW4	W10	WSW10	W8	W7	WSW7	W4	NNE4	N1	NNW0	SE3	N2	N7	WNNW5	SE0	W1.0	W10
8-Jul	NNW1	WNNW5	WNNW4	NE1	NNE2	NW3	NNW5	NNW4	NNW1	ESE4	W11	W8	SSW1	ESE3	E3	NE2	NNE3	WNNW5	WSW7	W5	WSW2	N1	ESE1	ESE1	WNNW1.7	W11
9-Jul	W1	WNNW3	W4	ESE2	NE0	NNE3	NNE1	SE7	SE8	SE6	ESE8	SE11	SE13	SE11	SE9	SSE9	SSE8	SE7	SE7	SE6	SSE3	E1	SE4	W2	SE4.4	SE13
10-Jul	SE3	WNNW1	WNNW2	WSW10	E1	NE1	E2	NNW6	W7	WSW11	WSW11	W9	W8	W11	WSW10	NW4	E12	ESE12	ENE2	NW12	SW7	NNE7	ESE1	WNNW3	W2.8	NW12
11-Jul	WNNW5	WNNW4	E2	NNW1	N1	NNW2	NW4	NW6	NNW9	N7	NNW11	WNNW11	NW11	WNNW11	NW8	N7	WNNW7	WSW10	S9	WSW9	SSE2	SE1	ESE3	SSE3	WNNW3.7	NNW11
12-Jul	ESE5	ESE5	SE4	SE4	SE5	ESE9	SE8	ESE9	SE7	E3	NE3	ESE11	ESE9	ESE6	S6	SSW7	SSW5	S6	SSE5	SE6	SE4	SSE5	SSE6	SSE6	SE5.2	ESE11
13-Jul	SE7	SE7	SSE6	SSE5	SE4	S3	SW5	SE8	SE7	SE7	E4	WNNW7	WNNW8	NNW7	NW9	NW8	NW5	N11	NNE14	N13	N9	NW5	NW6	NW5	N1.8	NNE14
14-Jul	NW7	NNW9	NNW10	NNW9	NNW8	NW8	NNW12	N11	NNW13	NNW13	N13	NNE10	NNW8	N7	NNW2	N4	NNW5	N16	NNE10	NNE5	NNW5	NW2	ENE1	NNW1	NNW7.5	N16
15-Jul	WNNW3	N2	NE1	NNE0	W1	NNW1	ESE3	SE10	SE9	SE5	SE7	ESE15	SE18	SE15	SE12	SE15	SE14	SE18	SSE8	SSE9	SSE10	SE9	SE8	SSE8	SE7.6	SE18
16-Jul	SSE7	NW25	NNW8	WNNW9	WSW5	SSE3	SW9	W15	W14	W13	WSW10	WSW17	SW17	SW18	SW16	WSW18	W24	WSW25	W24	WSW24	W23	WSW20	W20	W24	WSW14.1	WSW25
17-Jul	W24	W23	W21	W20	W19	W17	WNNW19	WNNW17	NW17	NW14	NNW20	NNW18	NNW18	NNW15	NW14	N12	N9	NNW11	NW6	NNW8	NW6	NW7	WNNW5	NW7	NW12.2	W24
18-Jul	NW6	NW7	WNNW7	W6	WNNW4	NW6	NNW4	NNE7	NNE5	N7	W7	NW2	W9	W10	W12	W10	W11	W12	WSW15	W14	WSW9	SW8	SW10	WSW9	W6.7	WSW15
19-Jul	SW4	SE4	S4	WSW12	SW6	SE5	SW5	W15	W11	W14	WSW16	W16	WSW17	W16	NW13	NNE17	NNE16	NNE13	NNE8	NE10	ENE4	WNNW1	N1	WNNW3	WNNW4.3	NNE17
20-Jul	W5	N1	NW2	NNW1	WNNW5	NW3	WNNW4	NW2	NW4	NNW4	NE5	NE3	NNE3	ESE4	ESE11	ESE12	ESE10	ESE8	E6	ESE7	SSE2	ESE1	SSW2	ESE3	E1.7	ESE12
21-Jul	ESE2	ESE4	SE5	SSE3	E7	NNW3	WNNW5	NNW5	NW4	N4	NNE4	NE3	ESE12	SE10	S9	S7	SSE6	SSE9	SSE9	SSE9	SSE8	SSE7	SSE6	SE7	SSE3.7	ESE12
22-Jul	SE8	SE7	SE9	SE10	SE7	SE7	SE9	SE9	SE9	SSW5	WSW16	W15	WSW18	WSW18	W20	W22	WSW19	WSW18	WSW15	SW14	SW9	SSW9	SSW11	SW13	SW8.2	W22
23-Jul	WSW13	WSW14	WSW12	WSW13	WSW15	WSW17	WSW18	WSW15	W15	W13	WSW15	W15	WSW16	WSW16	WSW19	W20	W18	NW10	NNE15	N17	N13	N11	N11	NNW12	W11.1	W20
24-Jul	N13	N13	N16	N12	N18	N16	NNW13	NNW14	N13	N16	N20	N23	N23	N21	N23	N23	N22	NNW19	NNW16	NW18	NNW11	WNNW5	WNNW5	WNNW4	N15.1	N23
25-Jul	NW0	E1	E2	E2	E2	ESE5	SE5	ESE4	SE5	ENE4	WSW6	WSW13	WSW11	WSW10	W10	WSW9	WSW10	WSW9	SW8	SSW5	SSE5	SSE4	N1	ENE1	SW3.1	WSW13
26-Jul	SE4	SE7	SE5	SE8	SE8	SE9	SE10	SE7	SE10	SE9	SE9	WNNW3	W12	WNNW9	S1	S5	SSW7	S8	S8	S6	S7	S7	S7	S8	SSE5.1	W12
27-Jul	SSE6	ESE4	SE8	SE10	SE10	SE12	SE10	SE13	SE11	SE13	SE10	SSE9	SSW8	WNNW10	WNNW11	WNNW10	WNNW12	NW4	NE1	NNW3	WSW14	WNNW19	NW9	W12	SSW2.4	WNNW19
28-Jul	SSE3	WSW4	WSW14	WSW15	SW7	WSW11	WSW15	WSW16	WSW15	WSW17	WSW21	WSW22	WSW24	W19	W19	W20	W19	W22	W27	N15	ESE4	SSW3	SSE4	NNW2	W12.4	W27
29-Jul	SSW2	WSW3	SE0	SSW3	SW3	SE4	SE5	SE6	SE5	NNE6	WNNW7	NW10	WNNW7	W7	N12	N8	NNE6	N9	NNW7	N9	NNW5	WNNW4	NE2	ENE2	NNW2.4	N12
30-Jul	W3	W4	WNNW4	W3	W4	WNNW5	SSE2	S5	WNNW2	SSE6	SE5	SE7	SE11	SE13	SE10	SE12	SSE10	SW12	WSW19	WSW15	WSW13	WSW16	W15	WSW17	SW5.1	WSW19
31-Jul	W13	NW7	WNNW7	W8	WSW17	W18	WSW16	WSW14	W12	W16	W15	W16	NW15	NW16	NW12	NNE10	NNW9	N15	N12	NNE10	ENE1	ESE1	WNNW3	WNNW2	WNNW8.2	WSW18

WSW2.8	W2.5	W2.3	WSW3.7	WSW3.2	WSW2.8	WSW3.8	WSW3.0	WSW2.8	W2.7	W5.1	W5.5	W6.0	W6.0	W6.1	W4.2	W5.0	WNNW5.2	W4.3	WNNW3.6	WSW3.3	WSW3.3	SW3.1	WSW3.5	Diurnal Average
W24	NW25	W21	W20	WSW20	WSW22	WSW23	WSW26	W21	WSW21	WSW26	WSW28	WSW32	WSW30	WSW30	WSW29	WSW29	WSW29	W27	WSW24	W23	WSW20	W20	W24	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

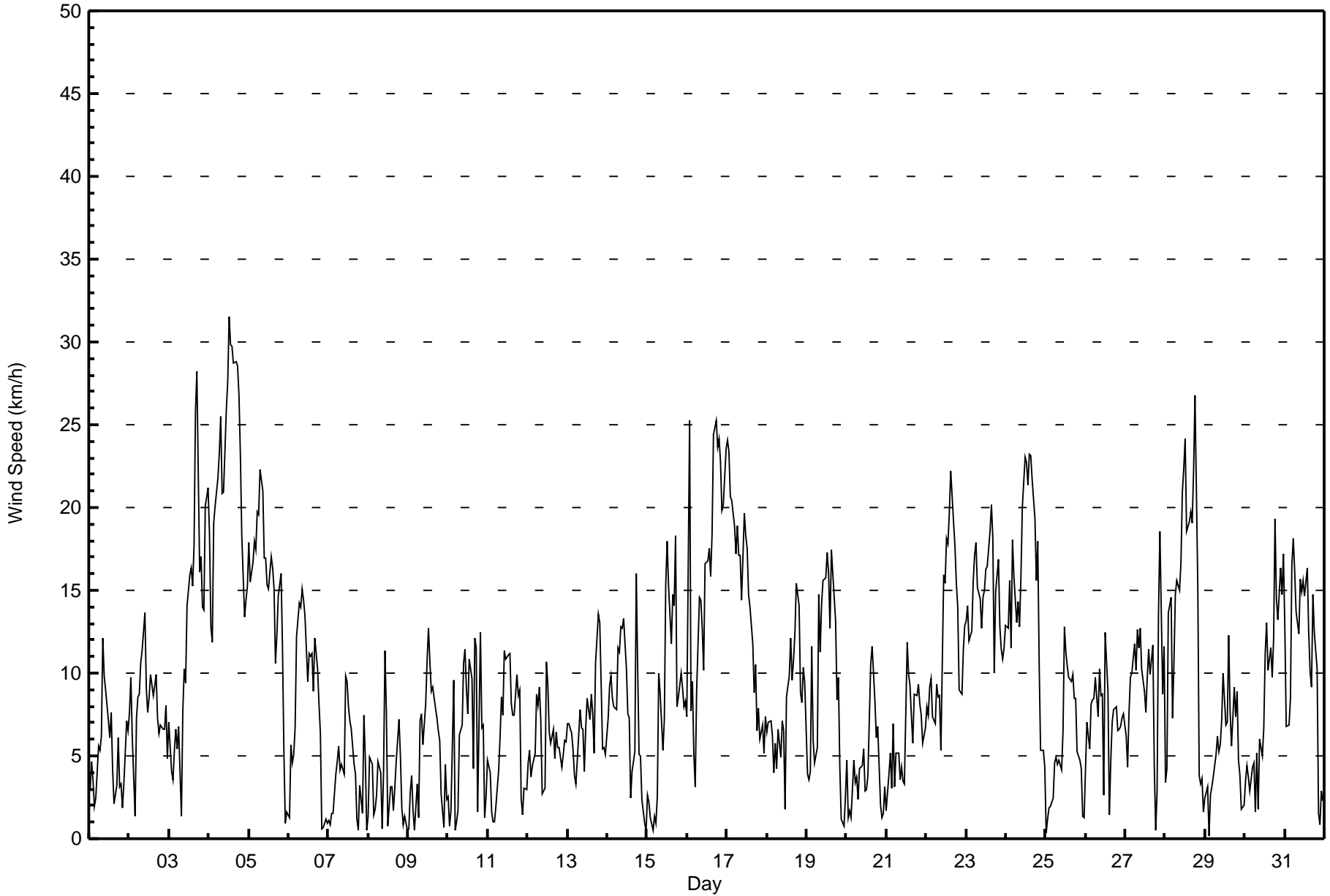
Wind Speed (WS) - km/h
Lower Camp - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jul 16 02:00 Minimum Value: 1 km/h on Jul 7 20:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 744 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-Jul	1	1	1	2	1	2	3	3	3	3	3	3	3	3	2	1	2	2	2	2	2	1	3	3	3
2-Jul	4	4	3	2	3	3	3	3	4	3	3	3	4	4	4	5	5	4	3	2	2	2	3	3	5
3-Jul	3	2	2	3	3	3	3	2	3	4	4	4	4	4	4	4	6	7	4	5	5	4	8	5	8
4-Jul	5	3	3	4	4	5	5	4	5	6	6	7	6	6	6	6	7	6	5	5	4	2	3	3	7
5-Jul	4	3	3	4	4	4	4	5	5	4	3	4	4	4	3	4	3	4	4	3	4	1	1	1	5
6-Jul	1	3	2	2	2	3	3	3	3	3	4	4	3	3	3	3	3	3	2	1	2	1	2	1	4
7-Jul	1	1	1	1	1	2	2	1	1	2	3	3	3	3	4	3	1	1	1	1	2	2	2	1	4
8-Jul	1	1	1	1	2	1	2	1	1	2	6	4	3	2	2	1	1	2	2	2	2	2	2	1	6
9-Jul	1	1	2	2	2	1	1	2	2	2	2	3	5	4	4	4	3	3	3	2	2	1	3	2	5
10-Jul	1	1	2	3	2	3	2	3	3	2	2	2	2	3	3	2	4	6	3	4	5	4	2	2	6
11-Jul	1	1	2	2	1	2	2	1	2	3	3	3	3	3	2	2	2	4	4	4	2	2	2	1	4
12-Jul	2	2	1	1	2	3	2	3	3	1	1	4	2	2	2	3	2	2	2	2	2	2	2	2	4
13-Jul	2	3	2	1	1	1	2	2	2	2	2	2	3	2	2	2	1	4	3	3	2	1	1	1	4
14-Jul	2	3	3	2	2	2	3	3	3	3	3	4	3	2	2	2	7	4	4	2	1	2	1	1	7
15-Jul	1	2	2	1	1	1	3	3	3	3	4	5	5	5	4	6	4	5	3	3	3	3	2	3	6
16-Jul	3	11	5	5	4	3	3	4	3	4	3	5	4	4	4	4	5	6	5	6	5	4	4	5	11
17-Jul	5	5	4	4	4	4	4	3	4	4	5	5	5	4	4	4	3	6	2	5	1	2	1	2	6
18-Jul	1	2	1	1	2	1	2	2	2	3	3	2	4	4	4	3	3	3	3	3	3	2	2	2	4
19-Jul	2	2	1	3	4	2	6	3	3	4	4	4	4	3	6	4	4	4	3	3	3	1	2	1	6
20-Jul	2	1	2	1	1	2	2	1	1	2	2	1	1	3	3	4	3	3	2	3	2	2	2	2	4
21-Jul	1	2	2	2	2	2	2	2	2	1	1	1	3	4	4	3	2	3	3	3	2	3	2	2	4
22-Jul	3	3	2	2	2	2	3	3	3	4	4	4	5	4	5	5	4	4	4	3	3	3	3	3	5
23-Jul	3	3	3	3	3	3	4	3	3	4	4	4	4	5	4	4	5	4	3	4	4	3	3	4	5
24-Jul	3	4	3	3	4	4	3	4	3	4	5	5	5	5	6	6	5	6	4	4	3	1	1	1	6
25-Jul	1	1	1	1	1	1	1	1	1	1	4	3	3	3	4	4	3	3	3	2	1	2	1	1	4
26-Jul	2	2	2	2	2	3	3	2	3	3	3	4	4	3	4	3	4	4	3	3	2	2	3	3	4
27-Jul	2	1	2	2	2	3	3	3	4	4	4	3	4	3	3	2	2	3	1	2	7	8	3	5	8
28-Jul	2	3	3	4	3	5	3	4	3	5	4	5	5	7	4	6	5	7	9	6	3	2	2	2	9
29-Jul	2	1	2	2	2	2	2	2	1	3	3	3	3	5	9	3	2	2	2	2	2	1	2	2	9
30-Jul	1	1	1	1	1	2	3	3	3	2	2	4	3	4	3	4	4	6	4	4	3	3	3	3	6
31-Jul	6	2	3	4	4	5	4	3	3	4	4	5	6	6	9	6	5	5	3	4	1	1	1	1	9
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	240	32.26	32.26
6 - 11	269	36.16	68.41
12 - 19	181	24.33	92.74
20 - 28	48	6.45	99.19
29 - 38	6	0.81	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - July 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	11	11	10	14	27	28	22	8	11	2	5	12	29	18	23	240
6 - 11	16	10	1	0	2	13	62	34	16	7	11	20	21	14	26	16	269
12 - 19	18	5	0	0	1	4	13	1	0	0	11	55	36	12	12	13	181
20 - 28	7	0	0	0	0	0	0	0	0	0	0	18	21	0	1	1	48
29 - 38	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	50	26	12	10	17	44	103	57	24	18	24	104	90	55	57	53	744

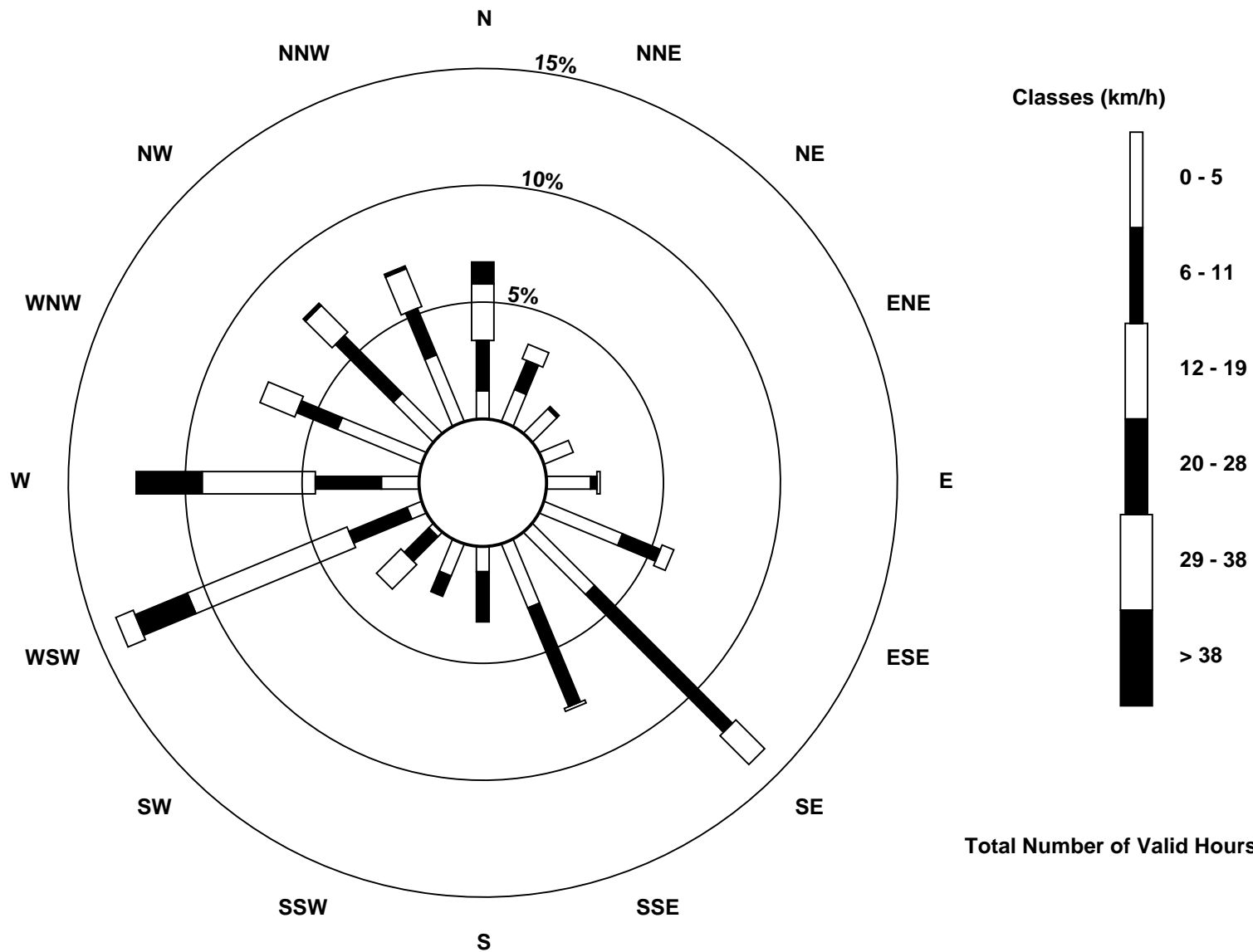
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - July 2017

Direction of Maximum Speed: 252 deg on Jul 4 13:00 Direction of Maximum Daily Speed Average: 250.8 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 146 deg on Jul 29 03:00 Direction of Minimum Daily Speed Average: 1.0 deg on Jul 7	Percent Operational Time: 100.0
Monthly Average Direction: 275.6 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-Jul	138	136	164	161	182	171	165	141	125	139	133	125	172	210	178	155	330	309	16	80	106	168	166	167	151.3
2-Jul	163	141	122	152	139	156	156	137	127	126	136	158	185	163	165	182	253	27	118	152	164	161	150	117	149.6
3-Jul	141	198	159	213	221	136	182	191	224	127	229	255	258	254	259	253	247	243	227	220	229	246	247	255	235.6
4-Jul	238	226	233	243	250	255	254	255	249	244	250	252	247	253	249	254	257	264	265	263	240	237	252	252	250.8
5-Jul	264	263	267	262	264	268	265	271	281	282	291	299	301	299	303	316	346	333	325	321	309	310	165	103	288.4
6-Jul	88	279	268	267	266	255	256	274	257	251	289	317	356	355	311	344	295	313	322	304	318	340	104	77	291.5
7-Jul	102	62	71	106	100	111	124	124	126	315	266	246	261	277	254	281	28	359	343	132	1	354	282	142	268.2
8-Jul	327	283	286	35	16	318	327	339	327	122	267	269	198	106	80	51	21	297	257	270	241	2	118	109	293.1
9-Jul	259	295	274	105	47	29	29	127	130	132	123	124	129	132	138	156	158	141	141	143	148	90	127	275	135.4
10-Jul	129	301	284	258	86	34	86	332	263	257	258	268	280	267	255	318	98	106	60	306	228	14	118	288	274.1
11-Jul	300	282	87	340	357	329	310	316	338	349	336	302	307	297	307	2	291	238	172	238	153	142	111	153	301.9
12-Jul	114	107	141	144	131	121	127	119	124	81	48	119	113	121	172	199	196	191	161	136	144	161	162	160	137.6
13-Jul	138	127	151	147	145	176	214	128	125	131	99	301	303	328	312	307	323	10	26	8	356	319	314	321	4.0
14-Jul	315	340	345	333	345	326	346	359	348	339	359	12	342	354	333	2	331	351	29	13	335	312	69	332	348.5
15-Jul	295	349	34	33	269	345	115	124	131	130	130	122	132	139	150	132	133	124	152	158	158	140	149	136.5	
16-Jul	158	323	348	301	237	163	215	272	271	274	257	246	230	231	228	239	263	258	261	256	260	256	260	262	258.1
17-Jul	266	269	273	261	262	277	282	296	317	322	329	342	341	341	318	7	1	328	314	340	326	309	300	322	304.1
18-Jul	309	313	298	275	283	316	328	13	13	351	267	314	264	266	264	275	279	259	256	270	248	221	229	242	274.8
19-Jul	236	134	188	245	218	143	235	262	259	265	256	259	257	264	319	26	27	23	20	43	61	295	9	300	286.0
20-Jul	280	356	315	342	282	306	286	310	325	339	48	43	15	110	122	106	109	120	89	107	167	116	202	114	87.8
21-Jul	116	122	124	147	100	346	291	332	325	6	16	37	123	139	175	183	154	163	164	167	164	159	155	146	146.8
22-Jul	131	133	140	141	139	142	132	132	133	199	248	262	255	257	260	260	258	256	252	233	225	207	208	219	225.6
23-Jul	237	253	253	247	254	249	254	257	260	265	252	259	250	253	258	262	262	306	14	358	353	349	354	347	273.1
24-Jul	350	1	359	5	356	0	348	347	352	353	359	1	358	356	2	355	354	340	337	326	305	293	299	292	350.1
25-Jul	307	100	99	100	99	114	132	120	132	75	255	250	255	243	262	247	242	248	221	198	163	161	7	61	222.4
26-Jul	125	135	133	133	142	130	127	133	126	129	131	292	265	299	176	174	202	180	188	184	175	171	177	179	160.6
27-Jul	149	109	137	140	141	132	132	132	131	125	125	147	200	296	287	284	291	305	48	337	258	291	310	275	193.4
28-Jul	156	248	256	249	235	258	253	252	258	258	254	254	257	265	259	268	272	262	265	1	121	209	163	348	259.4
29-Jul	200	252	146	200	232	129	127	131	134	21	290	308	303	264	356	9	14	352	344	6	343	288	35	66	340.2
30-Jul	268	281	283	271	278	284	152	177	299	147	132	135	130	128	140	140	161	228	245	239	237	252	265	257	216.7
31-Jul	265	317	290	266	252	259	252	258	264	262	273	281	319	326	318	20	346	351	357	22	59	116	290	298	294.1

237.8 274.2 260.2 246.4 243.1 246.8 242.7 254.9 254.2 266.3 270.0 271.6 265.6 268.2 269.6 276.7 276.9 281.8 277.1 288.4 251.4 252.2 234.7 248.3
 Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

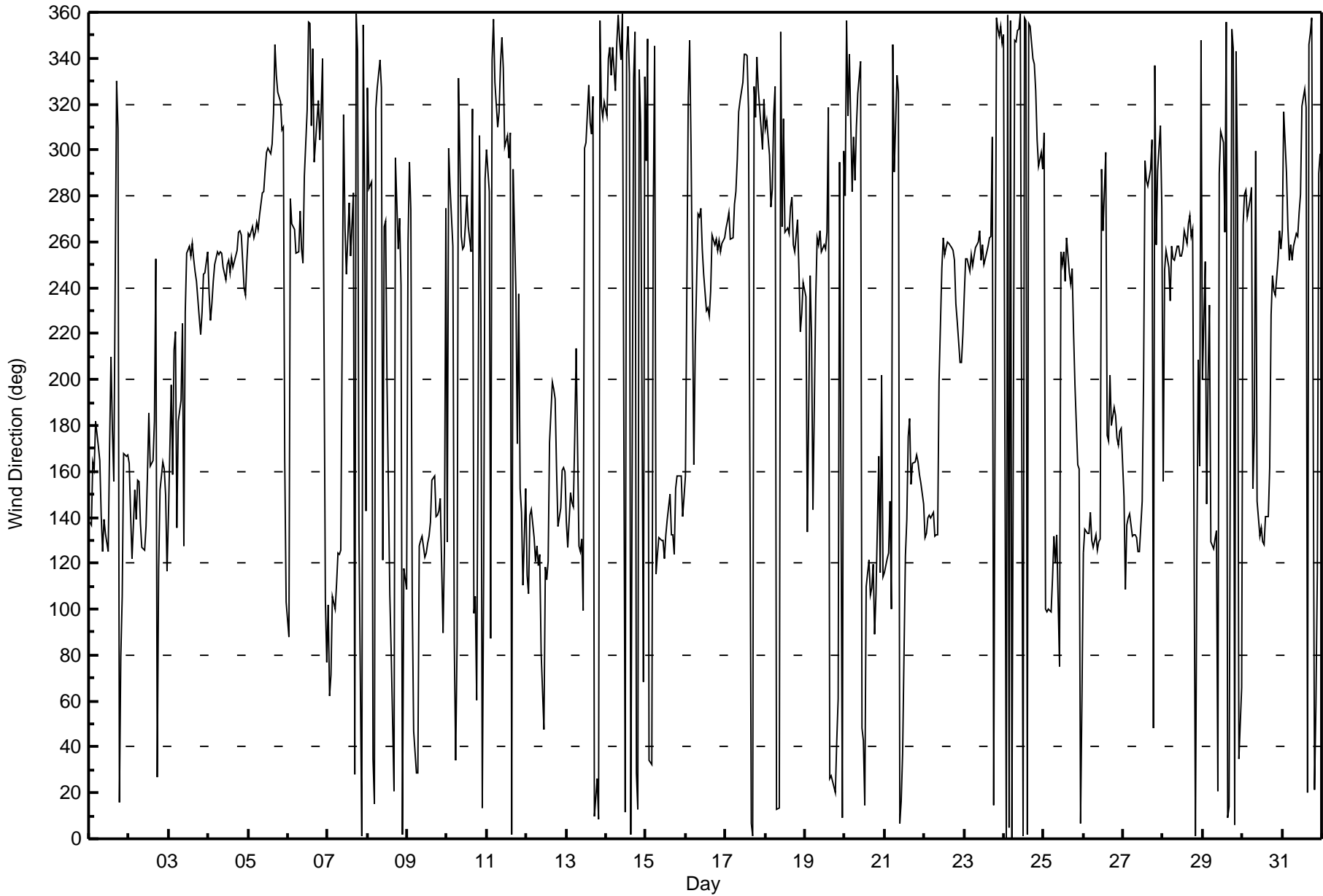
Wind Direction (WD) - deg
Lower Camp - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Jul 9 00:00 Minimum Value: 11 deg on Jul 17 02:00 Percentiles: P ₁ = 12 P ₁₀ = 14 Q ₁ = 19 Median = 26 Q ₃ = 42 P ₉₀ = 68 P ₉₉ = 94																			Hours in Service: 744 Hours of Data: 744 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-Jul	29	20	45	64	39	37	46	43	19	29	30	28	50	41	55	68	59	27	28	53	50	35	33	30	68
2-Jul	35	27	27	91	34	35	35	29	23	15	27	45	47	43	38	39	58	36	41	25	24	25	26	53	91
3-Jul	28	43	55	37	36	33	42	94	35	26	45	17	16	18	17	19	13	14	16	19	21	18	18	15	94
4-Jul	16	17	15	13	13	14	13	13	13	15	15	15	16	14	14	14	13	12	12	12	13	13	14	14	17
5-Jul	12	12	11	12	12	12	13	13	16	15	17	17	15	15	16	24	21	20	17	13	15	16	75	41	75
6-Jul	60	53	46	43	21	16	13	24	17	16	22	35	22	19	30	25	31	28	26	16	87	68	65	72	87
7-Jul	48	43	31	47	24	35	20	23	26	61	25	29	56	48	67	71	54	79	77	16	75	27	18	92	92
8-Jul	60	16	18	56	61	38	49	40	90	35	47	45	81	78	48	70	45	47	19	31	79	91	75	97	97
9-Jul	95	32	35	67	92	32	72	22	20	40	17	23	23	28	39	40	38	36	31	32	49	89	49	59	95
10-Jul	57	88	79	21	96	81	79	36	23	17	16	14	25	19	18	52	25	29	83	19	55	50	89	82	96
11-Jul	28	20	75	80	85	65	42	19	20	22	26	21	26	20	35	24	32	47	38	28	87	83	57	57	87
12-Jul	44	31	31	27	35	25	21	18	35	61	31	22	18	34	43	31	41	37	35	33	36	24	29	24	61
13-Jul	33	30	27	28	34	50	41	23	21	21	63	43	19	25	17	26	22	24	12	17	18	24	15	13	63
14-Jul	19	26	21	20	24	23	23	23	20	22	24	24	38	31	86	44	57	23	22	29	26	75	57	74	86
15-Jul	37	56	70	89	63	76	96	25	31	39	32	18	21	28	33	25	23	14	28	30	28	30	22	27	96
16-Jul	31	21	40	33	73	60	26	17	14	21	17	15	16	16	19	16	16	14	12	12	12	13	14	12	73
17-Jul	12	11	12	13	14	13	12	12	14	16	19	21	22	21	17	23	33	24	28	25	14	18	29	18	33
18-Jul	18	19	20	11	21	15	33	35	44	48	53	90	37	34	26	29	29	17	17	13	22	16	16	16	90
19-Jul	70	62	36	17	49	47	81	16	18	15	16	17	16	20	52	17	22	26	31	19	51	66	71	36	81
20-Jul	25	69	69	66	32	53	23	52	33	36	29	51	61	57	24	21	24	20	43	37	67	96	71	66	96
21-Jul	70	33	29	45	38	54	27	46	36	32	30	36	23	33	43	48	41	32	29	32	29	27	31	33	70
22-Jul	37	29	23	22	28	38	33	33	32	63	18	17	18	18	17	14	14	14	15	12	19	23	24	20	63
23-Jul	13	15	17	15	13	13	14	13	14	23	21	20	18	20	15	15	18	55	21	19	20	19	20	21	55
24-Jul	20	19	19	18	19	19	20	20	21	21	21	21	20	20	19	21	22	22	21	15	14	15	11	17	22
25-Jul	71	34	41	43	29	21	19	18	21	35	74	21	25	25	34	37	26	31	24	33	24	47	57	38	74
26-Jul	30	23	33	26	24	31	24	27	18	21	20	89	18	57	94	70	62	44	38	31	25	26	28	29	94
27-Jul	39	36	20	20	21	19	28	25	26	17	26	37	50	34	23	18	16	68	92	66	19	19	23	20	92
28-Jul	49	69	13	13	43	33	14	15	15	17	14	15	18	22	20	21	22	19	19	41	57	70	55	72	72
29-Jul	63	69	90	74	50	41	33	22	22	42	49	29	56	70	41	21	26	19	18	19	36	38	87	69	90
30-Jul	39	31	55	55	23	47	96	38	94	28	48	44	22	18	31	27	35	49	13	14	14	14	12	12	96
31-Jul	35	22	36	19	11	13	13	15	20	16	23	23	33	26	54	31	32	26	20	22	71	82	22	41	82
95 88 90 91 96 81 96 94 94 63 74 90 81 78 94 71 62 79 92 66 87 96 89 97																									
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - July 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Lower Camp	Station number:	AMS 11
Calibration Date:	July 5, 2017	Last Cal Date:	June 12, 2017
Start time (MST):	8:58	End time (MST):	11:33
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	-675.3	-675.3	
Calculated slope	0.999459	0.999905	Lamp voltage	800	802
Calculated intercept	-0.175695	0.633925	Pressure	712.9	708.7
Analyzer Background	12.0	11.9	Flow	0.632	0.628
Analyzer Coefficient	1.044	1.034	Intensity	91	90

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	0.0	----
as found span	4916	83.8	829.7	838.1	0.990
calibrator zero	5005	0.0	0.0	0.0	----
high point	4916	83.8	829.7	829.3	1.000
second point	4961	42.4	419.5	419.0	1.001
third point	4980	21.2	209.8	208.3	1.007
as left zero	5004	0.0	0.0	0.2	----
as left span	4915	83.8	829.8	828.3	1.002
Average Correction Factor					1.003
Corrected As found	838.14	Previous response	830.28	*% change	-0.9%

* = > +/-5% change initiates investigation

Notes:

Slightly adjusted span after as founds.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

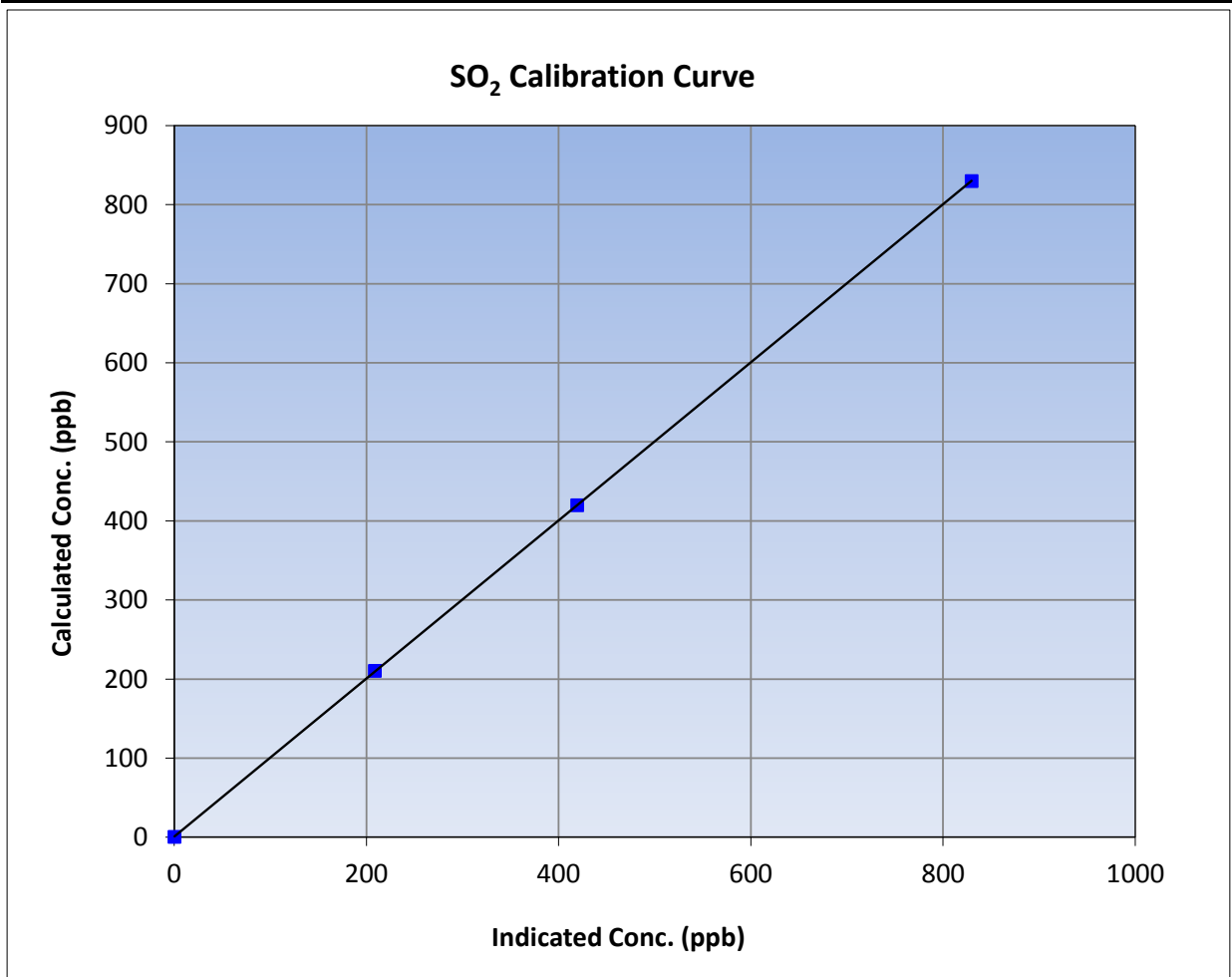
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 12, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	8:58	End Time (MST)	11:33
Analyzer make	TEI 43i	Analyzer serial #	100841398

Calibration Data

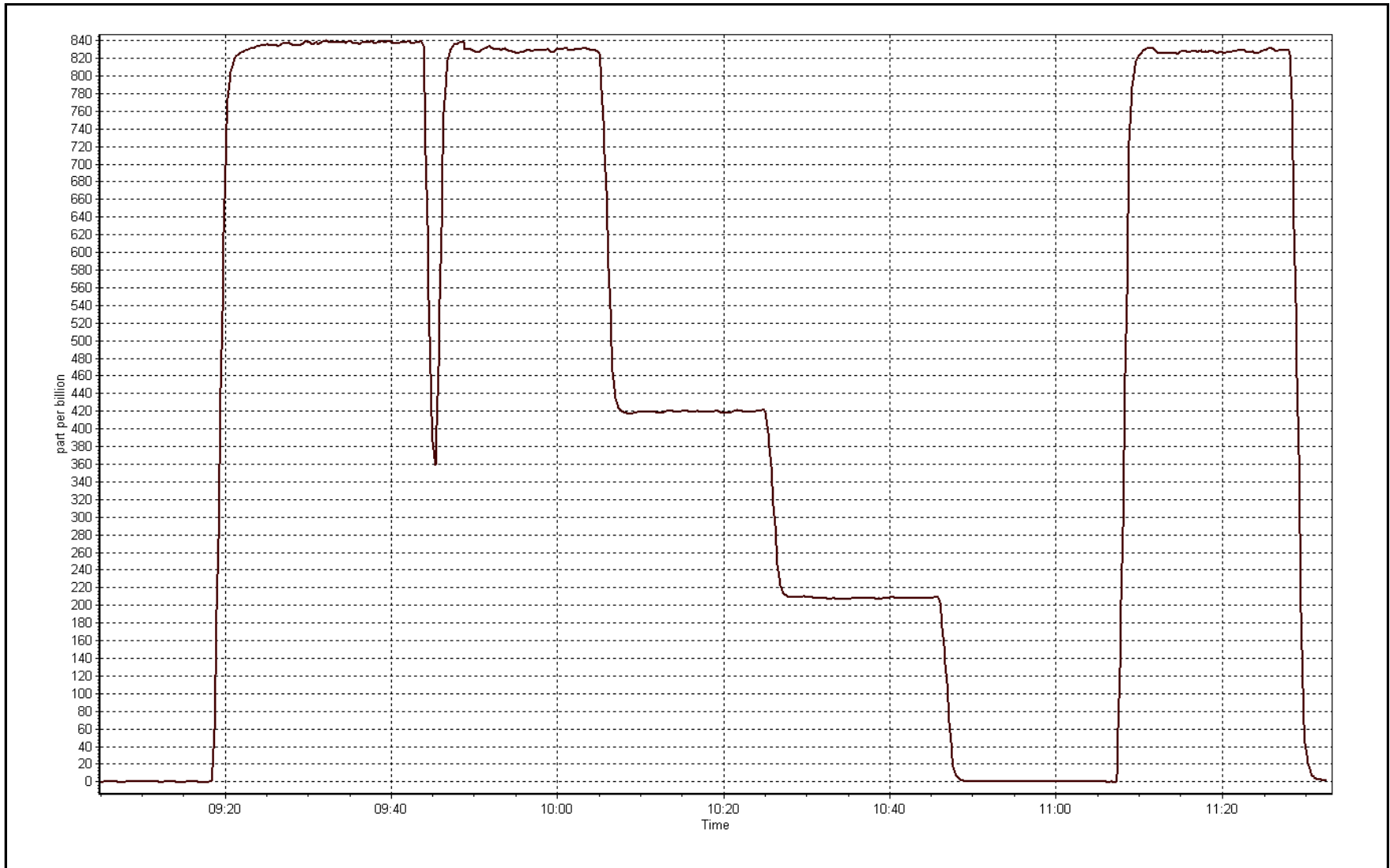
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999997	≥0.995
829.7	829.3	1.0005			
419.5	419.0	1.0011	Slope	0.999905	0.90 - 1.10
209.8	208.3	1.0074			
			Intercept	0.633925	+/-30



SO2 Calibration Plot

Date: July 5, 2017

Location: Lower Camp





Wood Buffalo Environmental Association

H₂S Calibration Summary

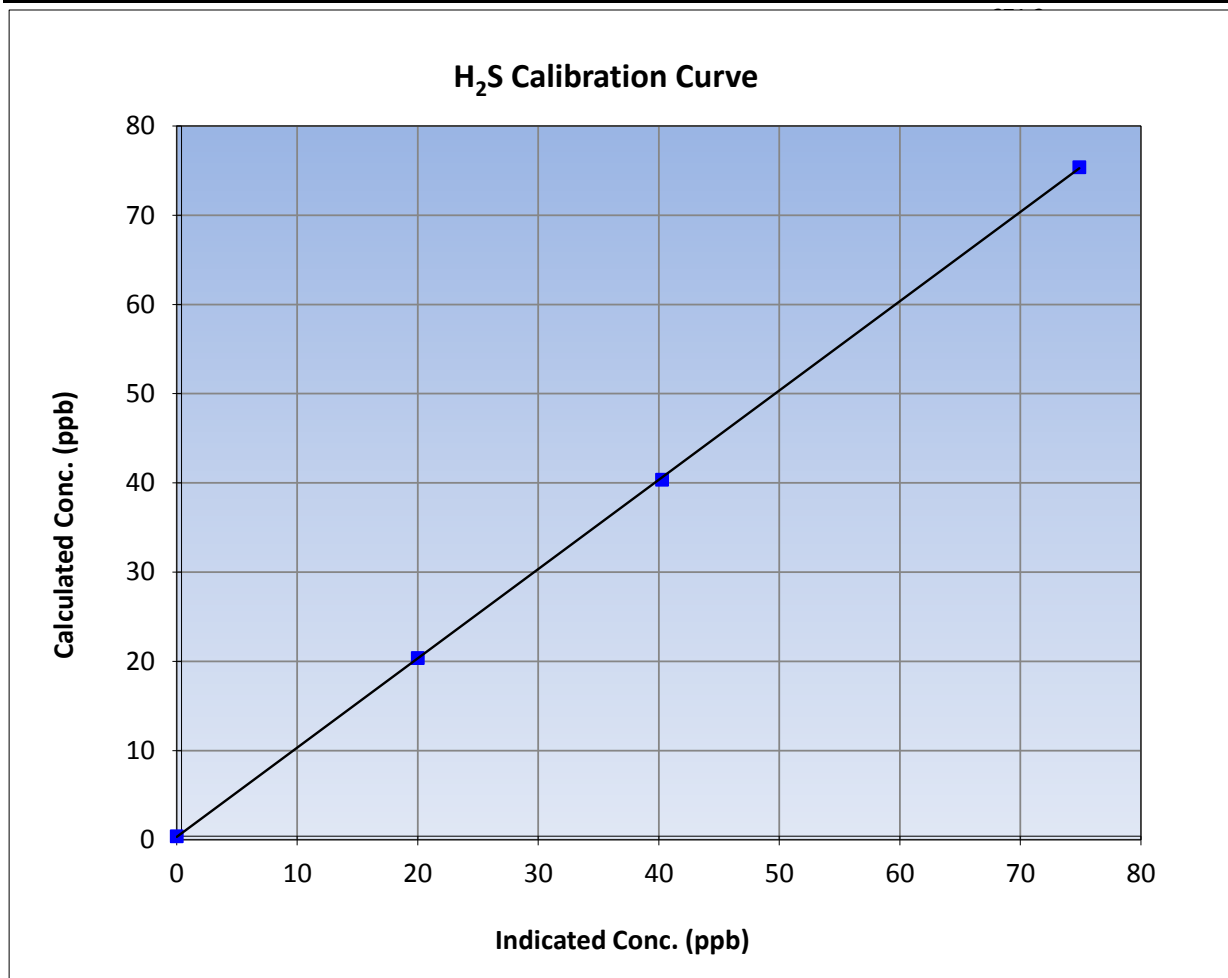
Version-03-2017

Station Information

Calibration Date	July 4, 2017	Previous Calibration	June 13, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	9:48	End Time (MST)	14:28
Analyzer make	Thermo 450i	Analyzer serial #	1410661328

Calibration Data

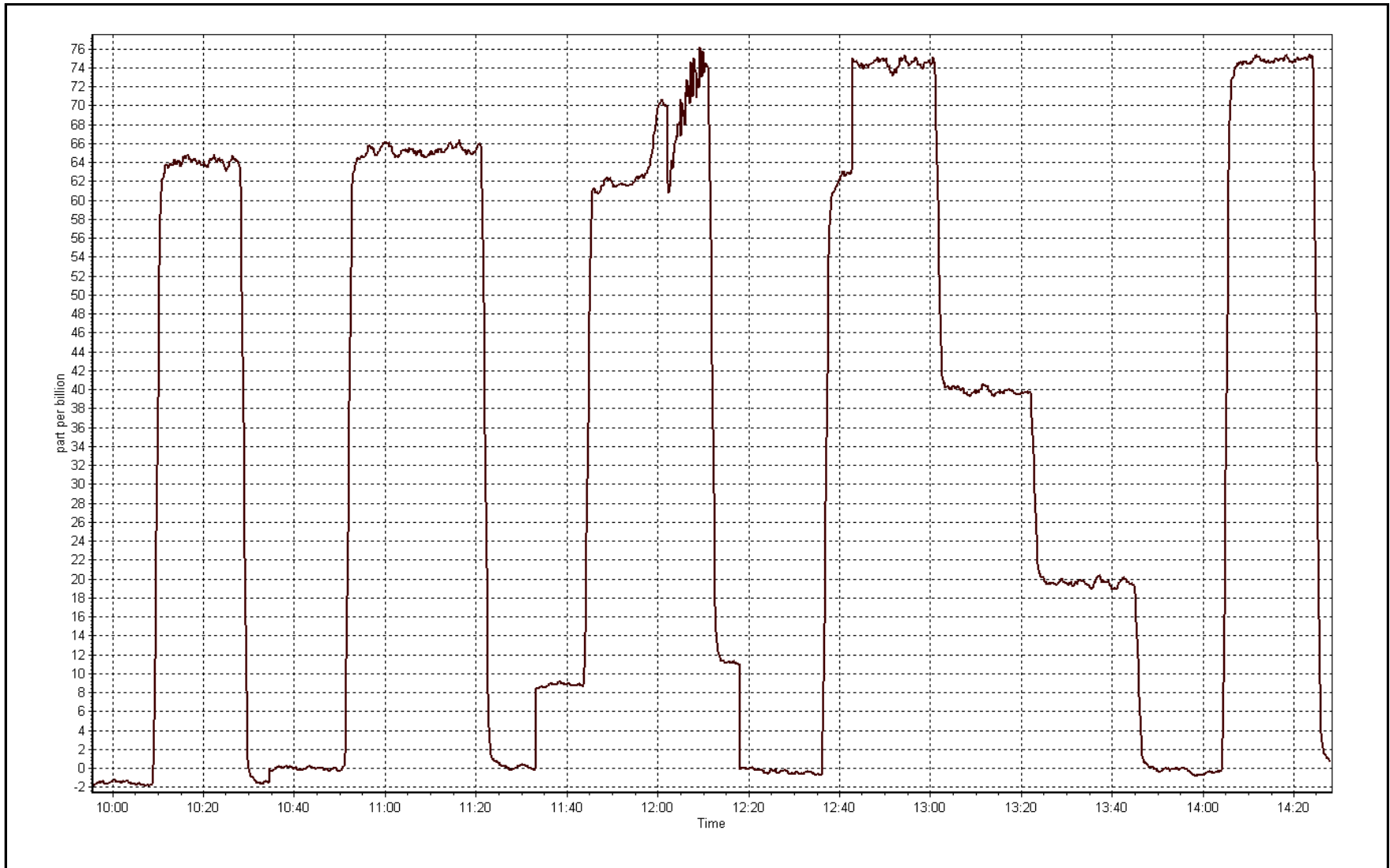
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.4	----	Correlation Coefficient	0.999971	≥0.995
75.0	74.5	1.0067			
40.0	39.9	1.0024	Slope	1.000728	0.90 - 1.10
20.0	19.6	1.0196			
			Intercept	0.319948	+/-3



H₂S Calibration Plot

Date: July 4, 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:	July 5, 2017	Last Cal Date:	June 12, 2017
Start time (MST):	8:58	End time (MST):	11:33
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> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-297.5 -237.6
Calculated slope	0.999022	Sample pressure	7.8 7.8
Calculated intercept	0.000342	Fuel pressure	25.2 25.2
Analyzer Background	3.710	Air pressure	40.3 40.2
Analyzer Coefficient	4.467	Flame temperature	166.7 166.9

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	-0.29	----
as found span	4916	83.8	17.48	17.46	1.001
calibrator zero	5002	0.0	0.00	-0.29	----
high point	4916	83.8	17.48	17.46	1.001
second point	4961	42.4	8.84	8.72	1.014
third point	4980	21.2	4.42	4.22	1.048
as left zero	5004	0.0	0.00	-0.23	----
as left span	4915	83.8	17.48	17.52	0.998
Average Correction Factor					1.021
Corrected As found	17.75	Previous response	17.50	*% change	-1.4%

* = > +/-5% change initiates investigation

Notes: No adjustments made.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

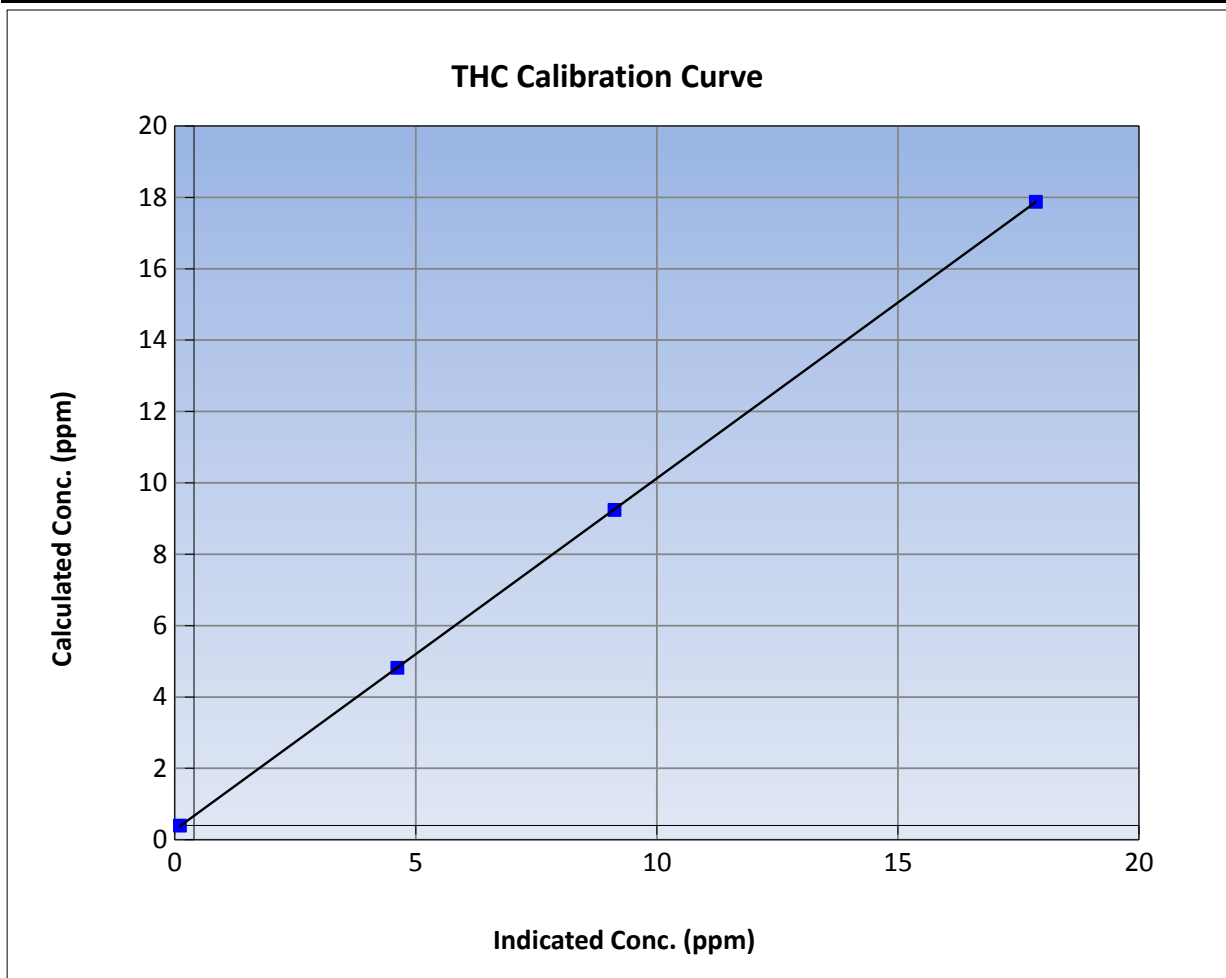
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 12, 2017
Station Name	Lower Camp	Station Number	AMS 11
Start Time (MST)	8:58	End Time (MST)	11:33
Analyzer make	51-i-LT	Analyzer serial #	1218153353

Calibration Data

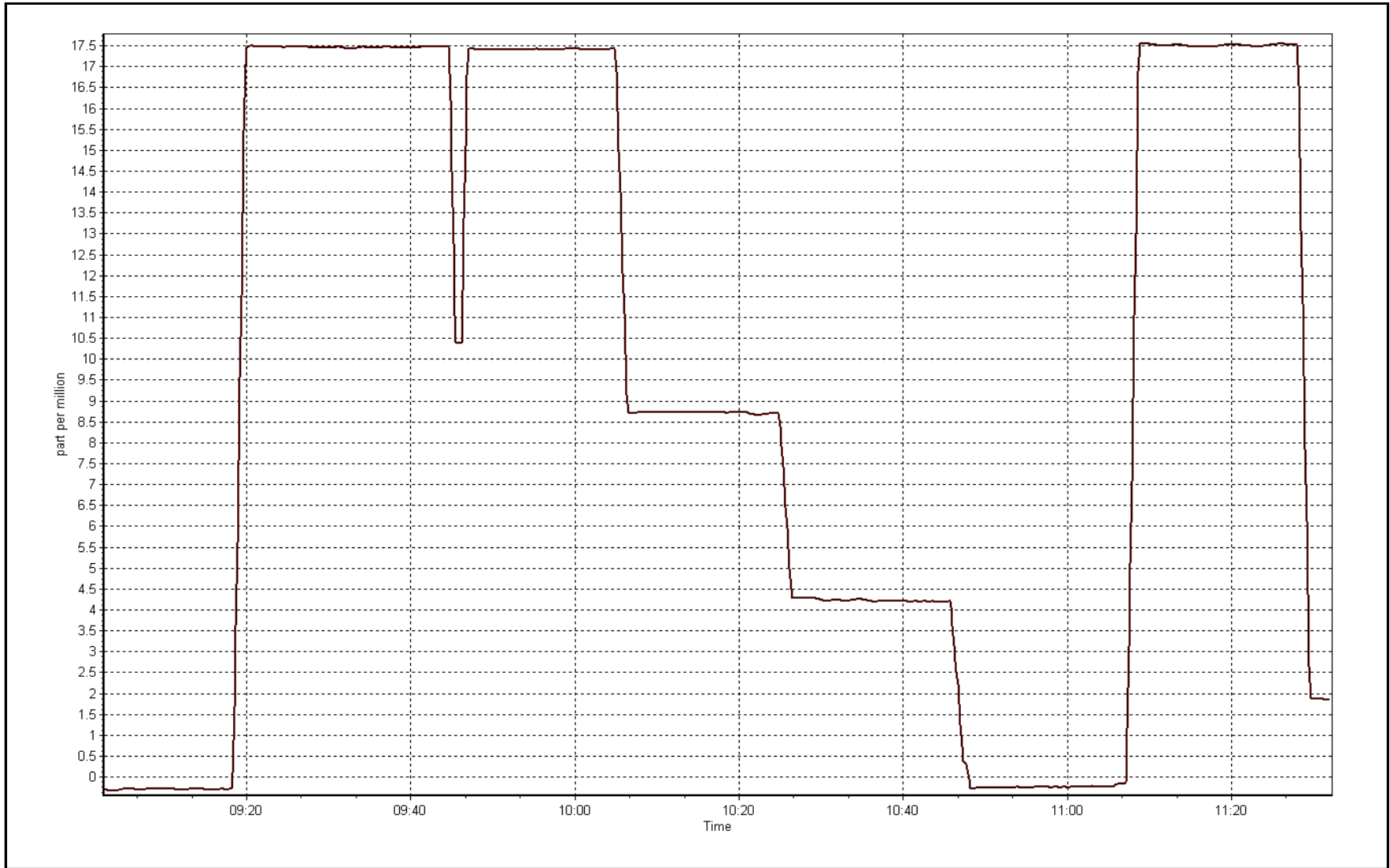
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999995	≥0.995
17.5	17.5	1.0012			
8.8	8.7	1.0136	Slope	0.985018	0.90 - 1.10
4.4	4.2	1.0477			
			Intercept	0.270597	+/-1.5



THC Calibration Plot

Date: July 5, 2017

Location: Lower Camp





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JULY 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	700	35	44	98.79	27	0	5	0
TRS(ppb) Average	700	34	44	98.66	3	0	1	0
THC(ppm) Average	700	35	44	98.79	3.7	-	2.5	-
O3(ppb) Average	700	34	44	98.66	51	0	31	-
NO2(ppb) Average	697	35	47	98.39	24	0	7	-
NO(ppb) Average	697	35	47	98.39	39	-	5	-
NOX(ppb) Average	697	35	47	98.39	53	-	10	-
PM2.5(ug/m3) Average	734	1	10	98.79	41.2	-	18.4	0
ET(C) Average	744	0	0	100	32.2	-	23.9	-
RH(%) Average	744	0	0	100	98	-	76	-
WS(km/h) Average	744	0	0	100	27	-	19	-
WD(deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 JULY 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	700	0.9	2	-	0	0	0	0	0	1	27
TRS(ppb) Average	700	0.2	0	-	0	0	0	0	0	0	3
THC(ppm) Average	700	2.23	0.2	-	2	2.1	2.1	2.1	2.3	2.5	3.7
O3(ppb) Average	700	22	12	-	1	3	12	23	31	38	51
NO2(ppb) Average	697	2.6	3	-	0	0	0	1	3	7	24
NO(ppb) Average	697	0.9	3	-	0	0	0	0	0	2	39
NOX(ppb) Average	697	3.5	6	-	0	0	0	1	4	9	53
PM2.5(ug/m3) Average	734	7.8	6.3	-	0.2	1.5	2.9	6.5	10.8	15.3	41.2
Temperature 2 m (C) Average	744	19.25	5.6	-	6.2	12	14.8	18.9	23.5	26.4	32.2
Relative Humidity (%) Average	744	63.1	20	-	25	36	48	61	81	91	98
Wind Speed 10 m (km/h) Average	744	7.9	5	-	1	2	4	7	11	14	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	21 Jul 2017 20:00	22 Jul 2017 02:00	7	Station power failure
TRS, O3	10 Jul 2017 10:00	10 Jul 2017 10:00	1	Maintenance - cleaned glass manifold
TRS	24 Jul 2017 15:00	24 Jul 2017 16:00	2	Maintenance - WBEA internal audit
SO2	24 Jul 2017 14:00	24 Jul 2017 15:00	2	Maintenance - WBEA internal audit
THC	25 Jul 2017 09:00	25 Jul 2017 10:00	2	Maintenance - WBEA internal audit
O3	25 Jul 2017 14:00	25 Jul 2017 15:00	2	Maintenance - WBEA internal audit
NO2, NO, NOX	18 Jul 2017 08:00	18 Jul 2017 09:00	2	Maintenance - NOX reference point generated for O3 cal
NO2, NO, NOX	25 Jul 2017 11:00	25 Jul 2017 13:00	3	Maintenance - WBEA internal audit
PM2.5	30 Jul 2017 18:00	30 Jul 2017 19:00	2	Unstable operation - baseline drift



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay South - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 27 ppb on Jul 12 12:00	Maximum Daily Average: 4.5 ppb on Jul 12		Hours of Data:	700
Minimum Value: 0 ppb on Jul 25 06:00	Minimum Daily Average: 0.1 ppb on Jul 25		Hours of Missing Data:	44
Maximum Diurnal Average: 2.4 ppb at hour 11	Minimum Diurnal Average: 0.3 ppb at hour 6		Hours of Calibration:	35
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 13		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-Jul	0	0	Z	0	0	0	0	2	2	2	2	3	3	0	0	0	1	2	5	3	1	0	0	0	1.2	5	
2-Jul	0	0	0	Z	0	0	2	4	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0.6	4	
3-Jul	0	1	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
4-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0.3	2	
8-Jul	0	0	0	Z	0	0	0	0	0	0	3	1	0	0	3	6	1	1	1	0	0	0	0	0	0.9	6	
9-Jul	0	0	0	0	Z	0	0	2	4	10	20	1	2	2	2	3	2	2	1	1	1	1	1	0	2.4	20	
10-Jul	0	0	0	0	0	Z	0	0	0	C	C	C	C	1	1	2	3	2	0	0	0	0	0	0	0.7	3	
11-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1	
12-Jul	0	Z	0	0	0	0	0	1	2	12	1	27	1	5	1	18	10	0	9	10	1	1	1	1	4.5	27	
13-Jul	1	0	Z	0	0	1	1	1	1	1	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0.7	4	
14-Jul	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-Jul	0	0	0	0	Z	0	0	1	14	17	8	3	2	4	1	3	4	3	1	1	1	1	1	1	2.9	17	
16-Jul	1	0	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	
17-Jul	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
18-Jul	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
19-Jul	1	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	1	
20-Jul	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0.5	2	
21-Jul	0	0	0	0	Z	0	0	0	0	3	26	7	2	5	11	4	1	2	1	PF	PF	PF	PF	PF	3.6	26	
22-Jul	PF	PF	2	2	2	Z	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.9	2	
23-Jul	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	
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	1	1	0	0	0.4	1	
25-Jul	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-Jul	0	0	0	Z	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	1
27-Jul	0	0	0	0	Z	1	4	2	1	1	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0.8	4	
28-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0.4	2	
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	20	4	7	7	3	1	1	1	0	0	0	2.1	20	
31-Jul	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	

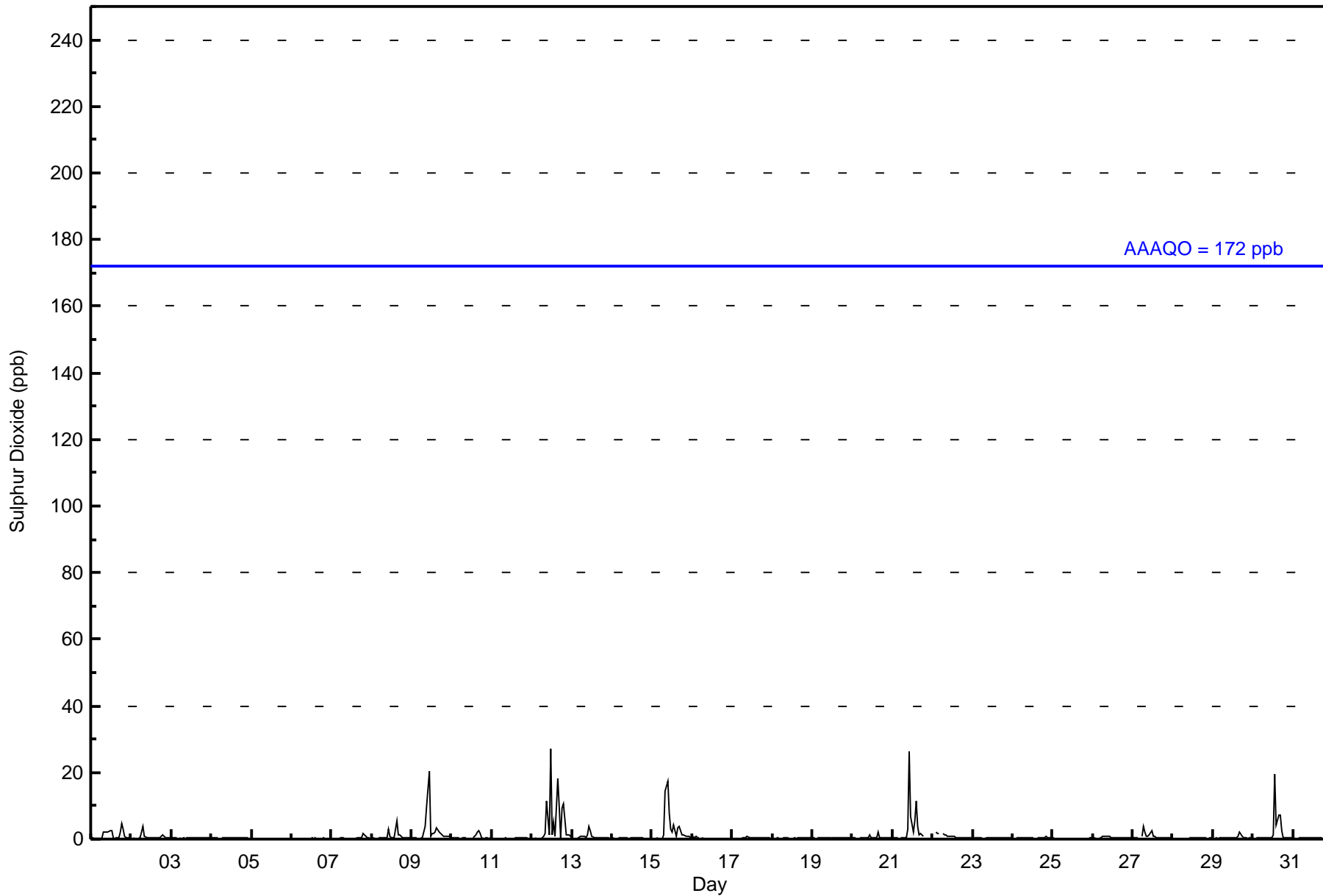
0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.7	1.1	1.8	2.4	1.8	0.6	1.5	1.0	1.7	1.2	0.7	0.9	0.9	0.4	0.3	0.3	0.3	Diurnal Average
1	1	2	2	2	1	4	4	14	17	26	27	3	20	11	18	10	3	9	10	1	1	1	1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance 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
Fort McKay South - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	691	98.71	98.71
11 - 20	7	1.00	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: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort McKay South - July 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	53	23	9	4	5	10	14	36	83	85	92	101	52	45	38	41	691
11 - 20	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	7
21 - 60	0	0	0	0	0	0	1	0	0	1	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	53	23	9	4	5	10	17	38	85	87	92	101	52	45	38	41	700

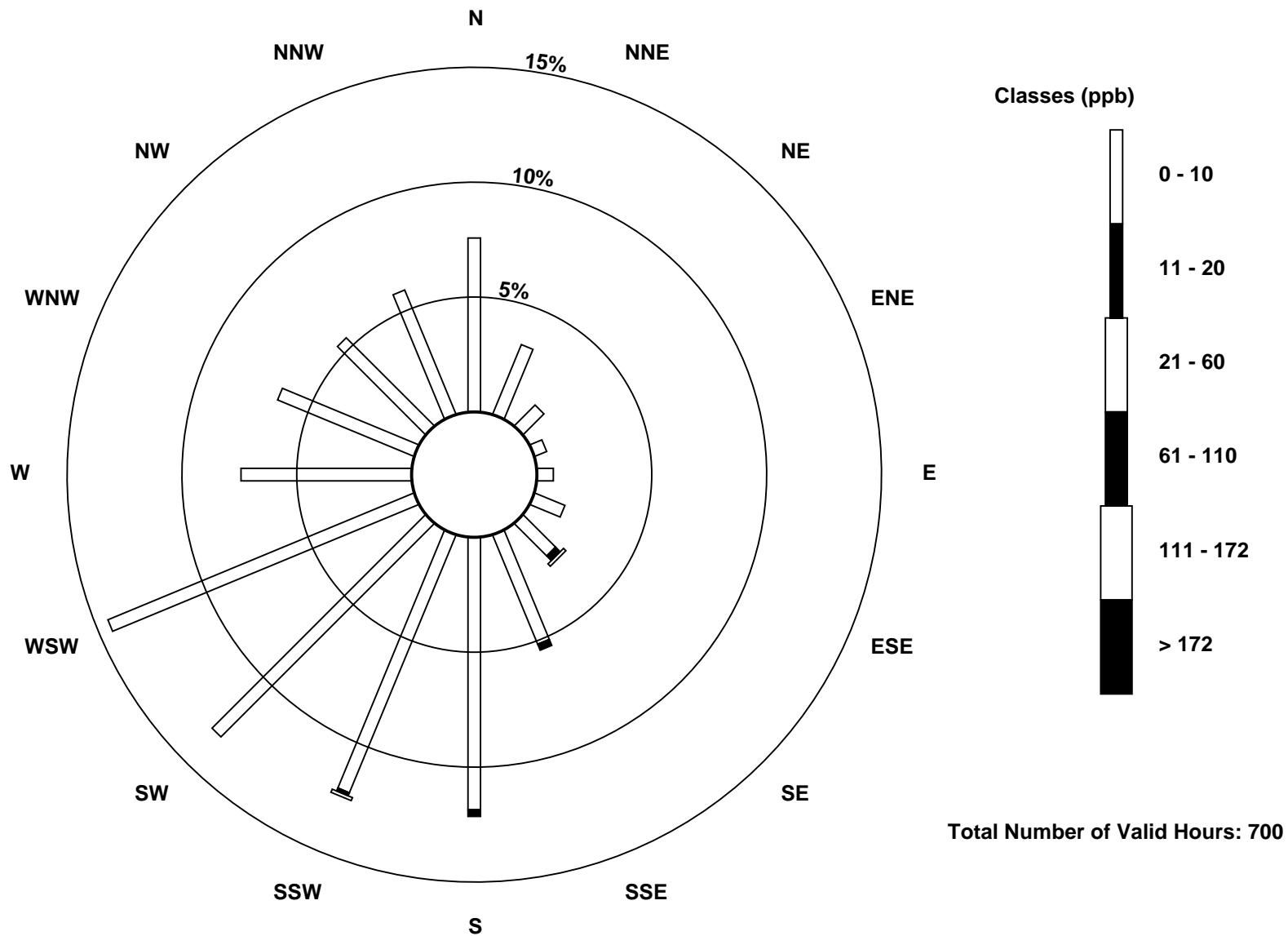
Total Number of Valid Hours: 700

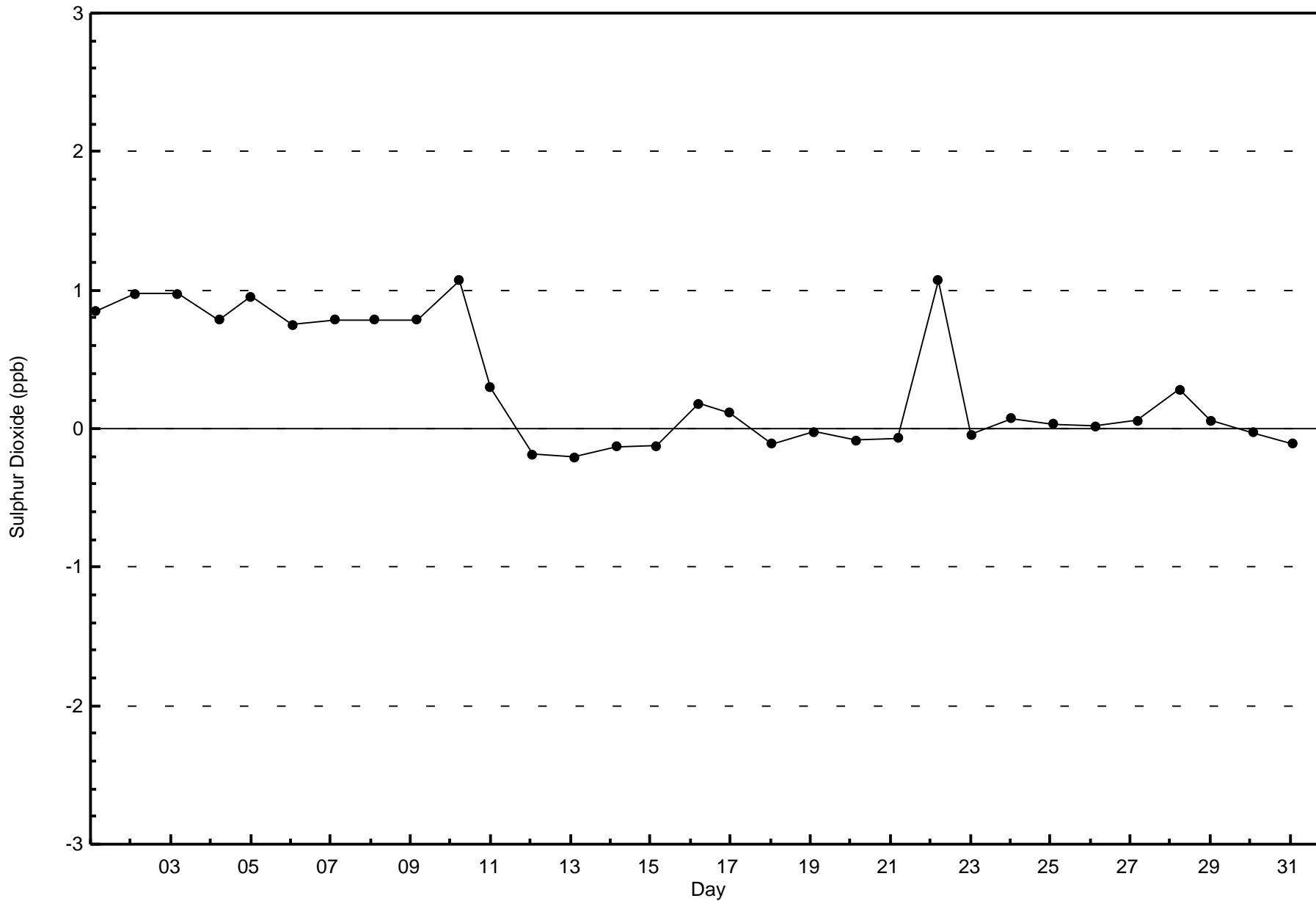
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)

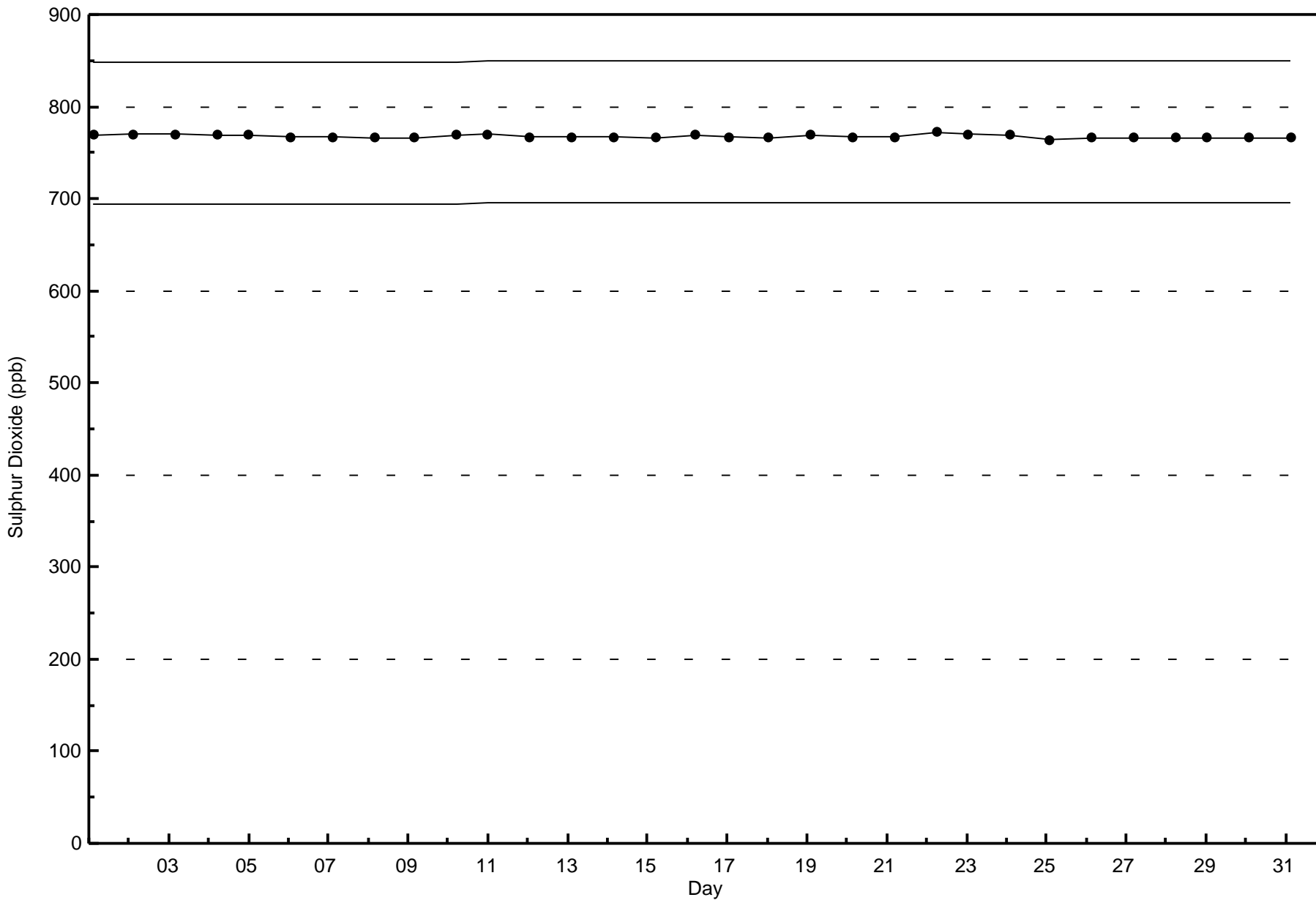






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

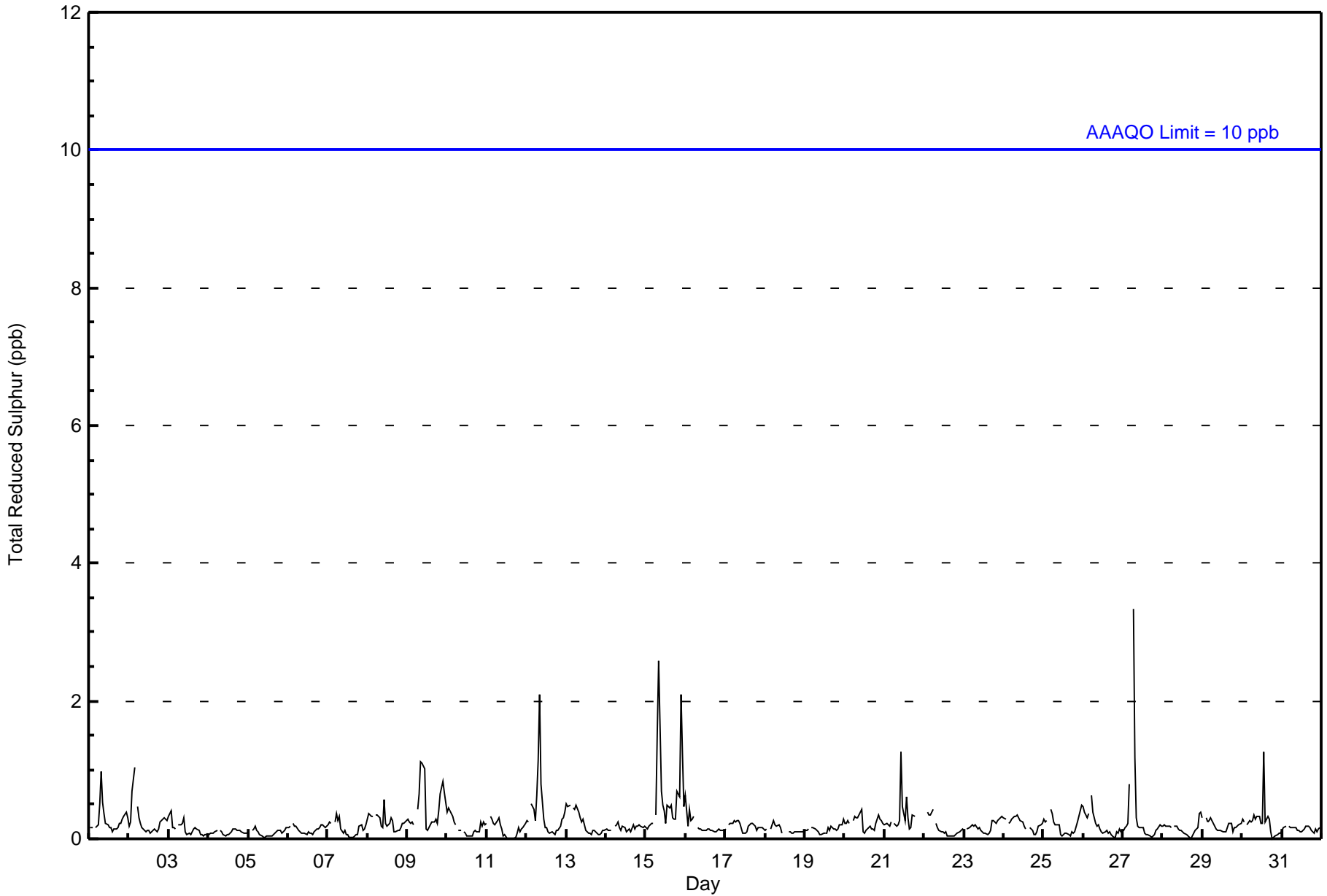
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																								
Maximum Value: 3 ppb on Jul 27 07:00										Maximum Daily Average: 0.6 ppb on Jul 15										Hours of Data: 700																														
Minimum Value: 0 ppb on Jul 11 16:00										Minimum Daily Average: 0.1 ppb on Jul 5										Hours of Missing Data: 44																														
Maximum Diurnal Average: 0.4 ppb at hour 7										Minimum Diurnal Average: 0.1 ppb at hour 13										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 = 1										Percent Operational Time: 98.7																														
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-Jul	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																							
2-Jul	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	0.3	1																							
3-Jul	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																							
4-Jul	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	0.1	0																							
5-Jul	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																							
6-Jul	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																							
7-Jul	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																							
8-Jul	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	0.2	1																							
9-Jul	0	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1																							
10-Jul	0	0	0	0	0	0	Z	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0																							
11-Jul	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																							
12-Jul	0	0	Z	1	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
13-Jul	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	0.2	1																							
14-Jul	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																							
15-Jul	0	0	0	0	0	Z	0	2	3	1	0	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0.6	3																							
16-Jul	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	0.2	1																							
17-Jul	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																							
18-Jul	0	0	Z	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	0																							
19-Jul	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																							
20-Jul	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																							
21-Jul	0	0	0	0	0	Z	0	0	0	0	1	0	0	1	0	0	0	0	0	0	PF	PF	PF	PF	PF	0.3	1																							
22-Jul	PF	PF	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-Jul	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																							
24-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0.2	0																							
25-Jul	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																							
26-Jul	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	0.2	1																							
27-Jul	0	0	0	0	1	Z	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																							
28-Jul	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	0.1	0																							
29-Jul	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																							
30-Jul	0	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																							
31-Jul	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																							
																								0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	Diurnal Average
																								1	0	1	1	1	1	3	2	3	1	1	0	0	1	0	0	0	0	0	0	0	1	1	2	1	1	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance 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
Fort McKay South - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	698	99.71	99.71
3 - 4	2	0.29	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: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - July 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	53	23	9	4	5	10	16	38	78	91	94	102	50	46	36	43	698
3 - 4	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
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	53	23	9	4	5	10	17	38	79	91	94	102	50	46	36	43	700

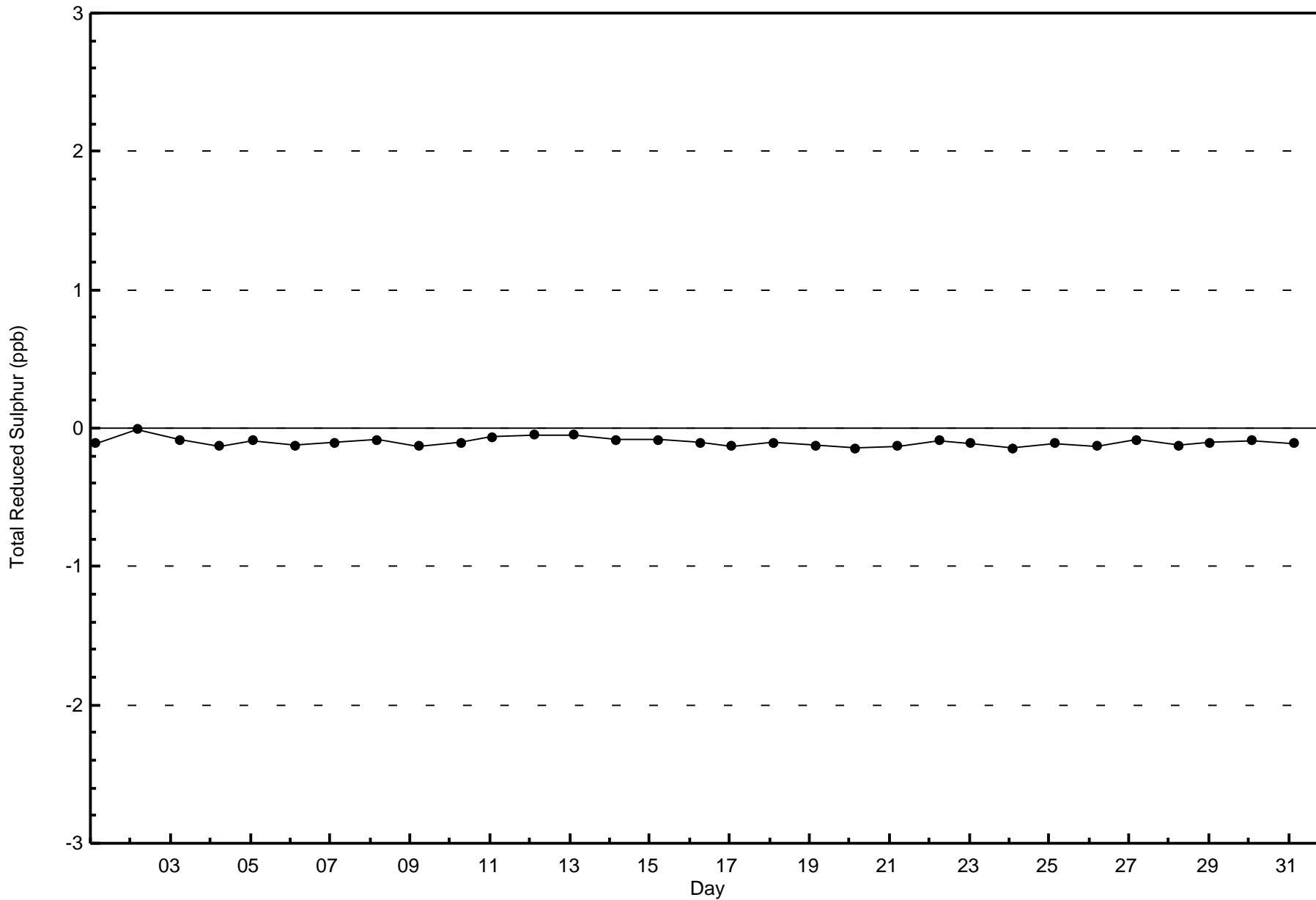
Total Number of Valid Hours: 700

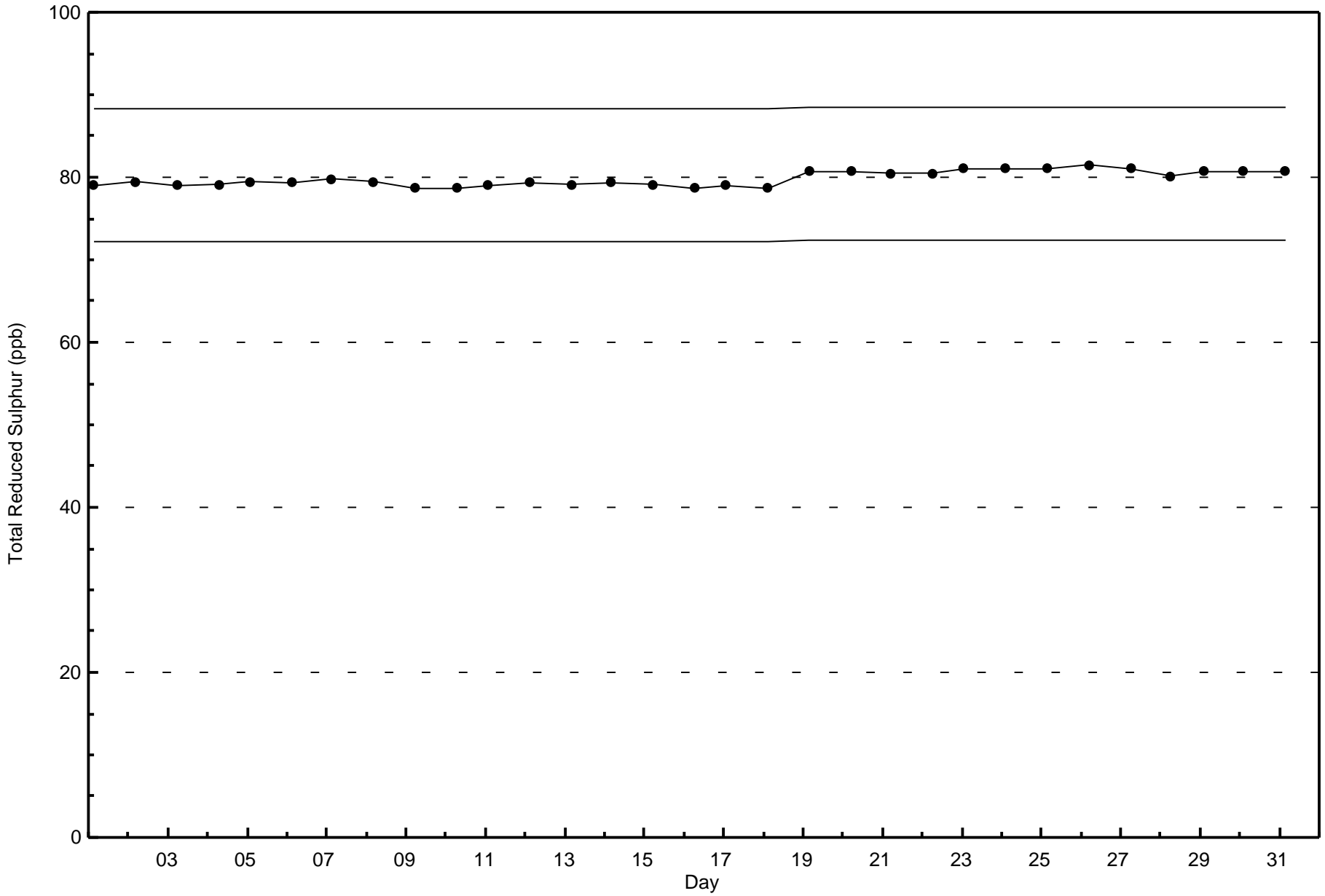
Total Number of Hours: 744



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

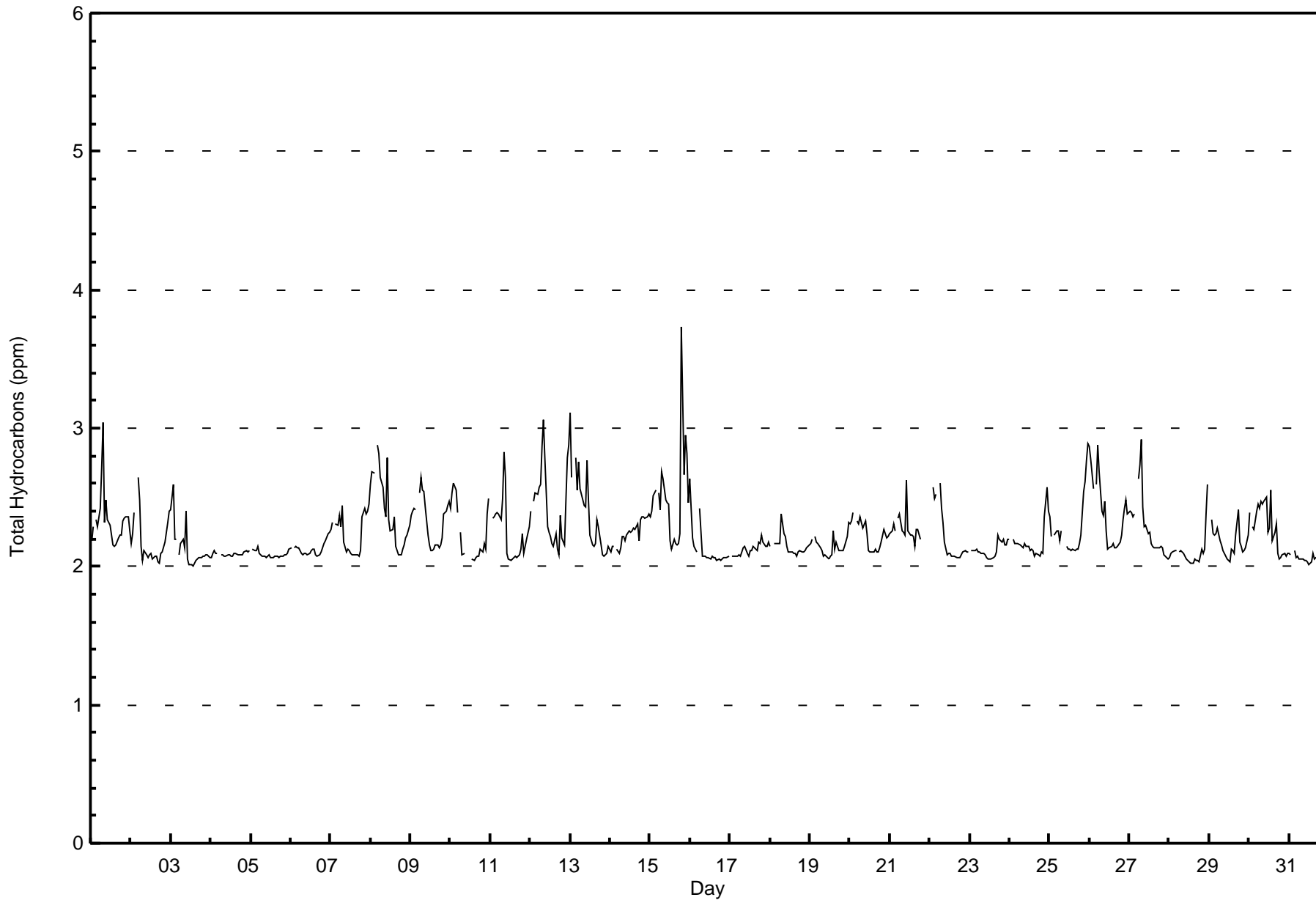
Fort McKay South - July 2017

Maximum Value: 3.7 ppm on Jul 15 20:00		Maximum Daily Average: 2.5 ppm on Jul 15		Hours in Service: 744																							
Minimum Value: 2.0 ppm on Jul 3 14:00		Minimum Daily Average: 2.1 ppm on Jul 31		Hours of Data: 700																							
Maximum Diurnal Average: 2.4 ppm at hour 6		Minimum Diurnal Average: 2.1 ppm at hour 16		Hours of Missing Data: 44																							
Monthly Average: 2.23 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 2.9		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-Jul	2.2	2.3	Z	2.3	2.3	2.4	2.7	3.0	2.3	2.5	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.3	3.0	
2-Jul	2.2	2.2	2.4	Z	2.6	2.5	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.2	2.6	
3-Jul	2.4	2.6	2.2	2.2	Z	2.1	2.2	2.2	2.1	2.4	2.1	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	2.6	
4-Jul	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
5-Jul	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	2.1	2.1	2.1	2.1	
6-Jul	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	2.2	2.2	2.3	2.1	2.3	
7-Jul	2.3	2.3	Z	2.3	2.3	2.4	2.3	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	2.4	2.4	2.4	2.4	2.2	2.4	
8-Jul	2.6	2.7	2.7	Z	2.9	2.8	2.6	2.6	2.4	2.4	2.8	2.3	2.3	2.3	2.4	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.9	
9-Jul	2.4	2.4	2.4	2.4	Z	2.5	2.6	2.6	2.5	2.4	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.4	2.4	2.4	2.5	2.3	2.6	
10-Jul	2.4	2.5	2.6	2.5	2.4	Z	2.3	2.1	2.1	C	C	C	C	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.4	2.5	2.2	2.6	
11-Jul	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.5	2.8	2.6	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.3	2.8	
12-Jul	2.4	Z	2.5	2.5	2.5	2.6	2.6	2.9	3.1	2.8	2.3	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.4	2.2	2.2	2.5	2.8	2.9	2.4	3.1	
13-Jul	3.1	2.6	Z	2.8	2.6	2.8	2.6	2.5	2.4	2.4	2.8	2.5	2.2	2.2	2.1	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.4	3.1	
14-Jul	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.4	2.4	2.2	2.4	
15-Jul	2.4	2.4	2.5	2.5	Z	2.5	2.4	2.7	2.6	2.5	2.5	2.4	2.2	2.1	2.2	2.2	2.2	2.2	2.2	3.7	2.7	3.0	2.8	2.5	2.5	3.7	
16-Jul	2.6	2.2	2.1	2.1	2.1	Z	2.4	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.6	
17-Jul	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	2.2	2.1	2.1	2.2	2.2	
18-Jul	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.4	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	2.4	
19-Jul	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.3	
20-Jul	2.3	2.3	2.4	Z	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.4	
21-Jul	2.2	2.3	2.3	2.3	Z	2.3	2.4	2.3	2.2	2.2	2.6	2.3	2.2	2.2	2.2	2.1	2.3	2.3	2.2	PF	PF	PF	PF	PF	2.3	2.6	
22-Jul	PF	PF	2.6	2.5	2.5	Z	2.6	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.6	
23-Jul	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	2.2	2.2	2.2	2.1	2.2	
24-Jul	2.2	Z	2.2	2.2	2.2	2.2	2.2	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	2.4	2.6	2.4	2.2	2.6	
25-Jul	2.4	2.2	Z	2.2	2.3	2.3	2.2	2.3	M	M	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.5	2.6	2.8	2.9	2.3	2.9
26-Jul	2.9	2.8	2.6	Z	2.6	2.9	2.7	2.4	2.4	2.5	2.3	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.5	2.4	2.4	2.9	
27-Jul	2.4	2.4	2.4	2.4	Z	2.6	2.7	2.9	2.4	2.3	2.3	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	2.3	2.9	
28-Jul	2.1	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	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.4	2.6	2.1	2.6	
29-Jul	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.4	
30-Jul	2.4	Z	2.3	2.3	2.4	2.5	2.4	2.5	2.4	2.5	2.5	2.3	2.3	2.6	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.6	
31-Jul	2.1	2.1	Z	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	2.1	2.1	2.1	2.1	2.2	2.1	2.2	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																											



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	28	4.00	4.00
2.1 - 3.0	669	95.57	99.57
3.1 - 10.0	3	0.43	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - July 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	1	0	0	1	0	1	0	4	3	5	3	4	5	1	28
2.1 - 3.0	55	23	8	4	5	9	16	36	84	81	89	96	49	41	33	40	669
3.1 - 10.0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	23	9	4	5	10	17	37	85	86	92	101	52	45	38	41	700

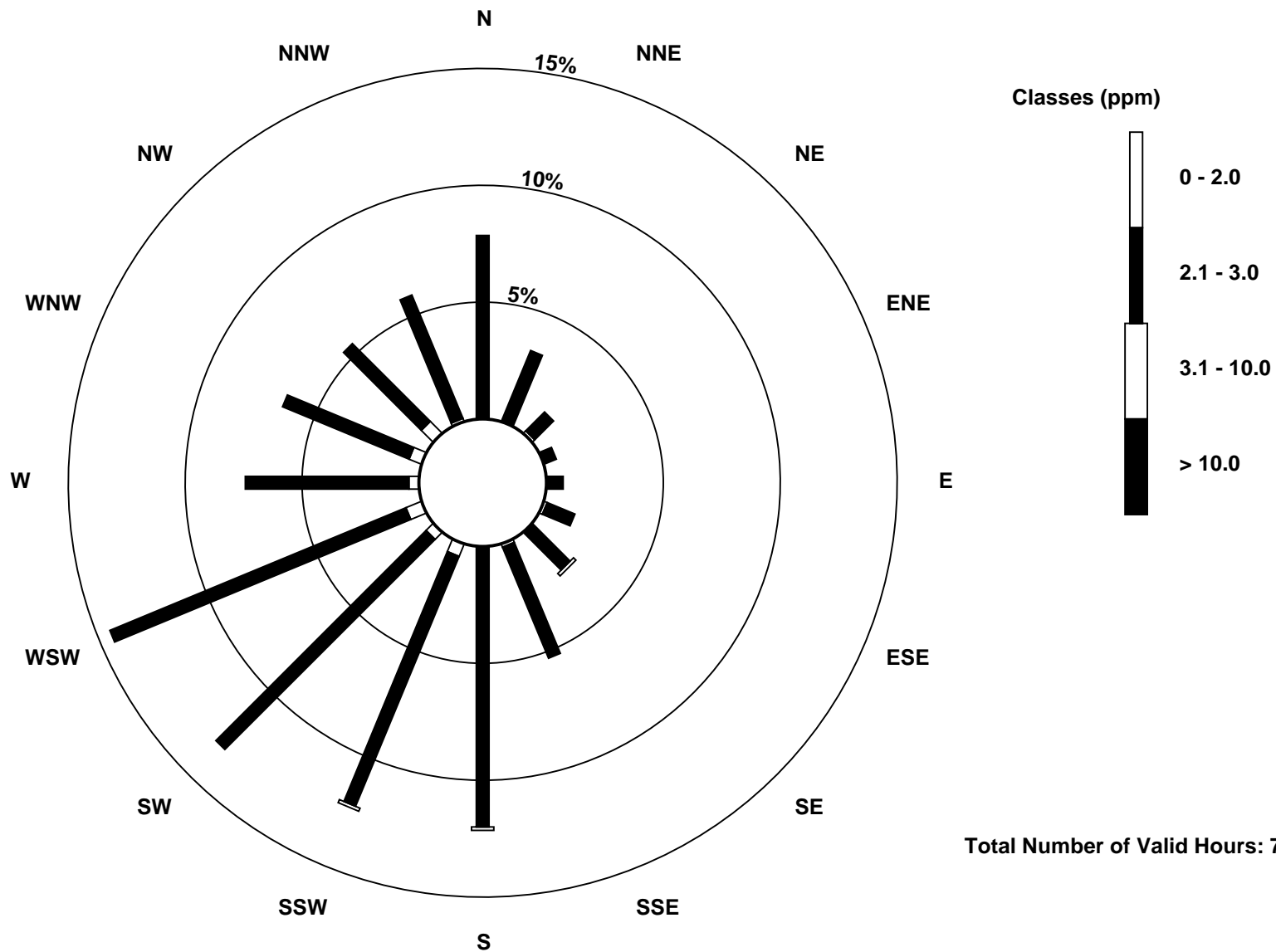
Total Number of Valid Hours: 700

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

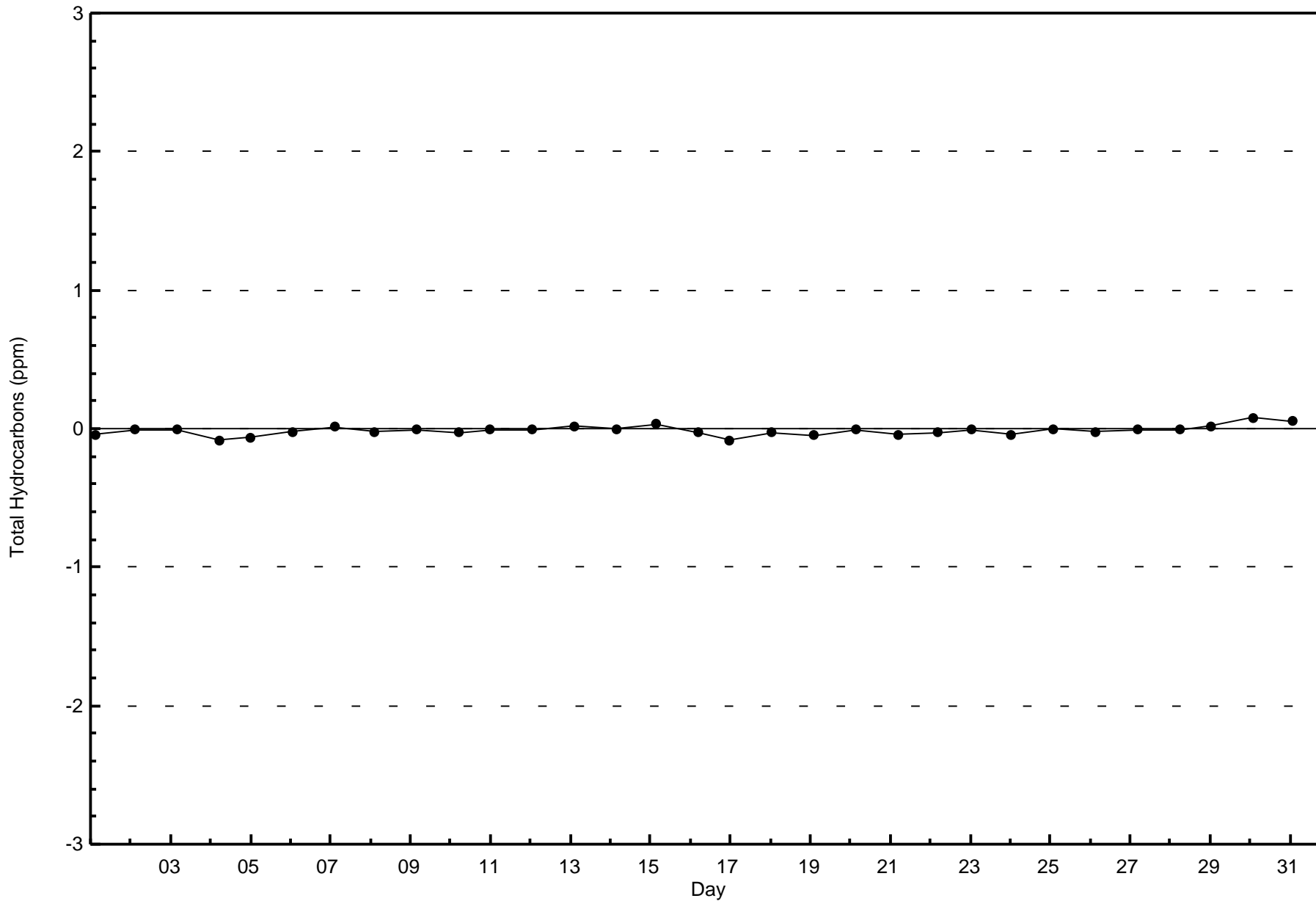
Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)

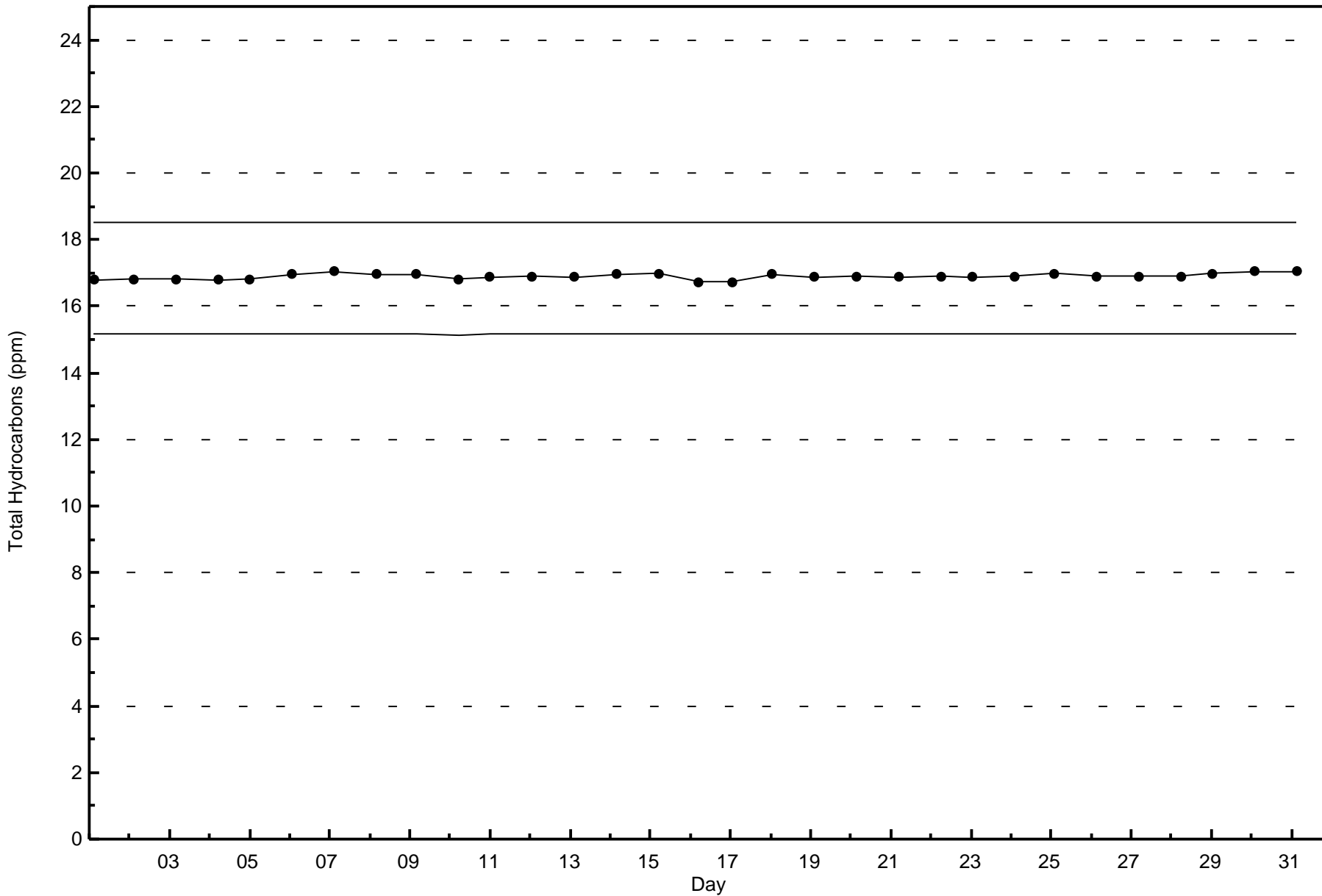




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

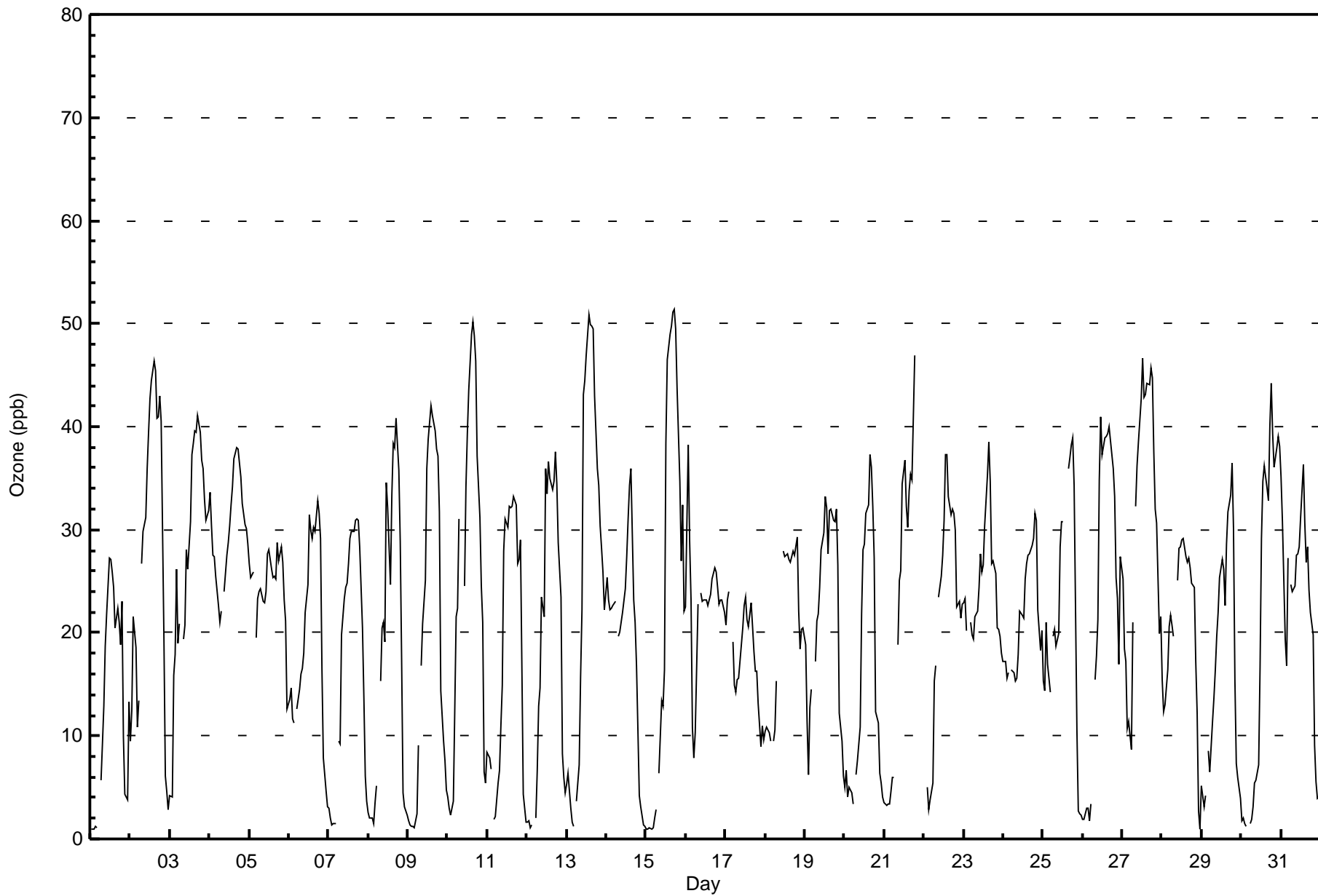
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																								
Maximum Value: 51 ppb on Jul 15 18:00										Maximum Daily Average: 31.1 ppb on Jul 27										Hours of Data: 700																														
Minimum Value: 1 ppb on Jul 1 01:00										Minimum Daily Average: 13.7 ppb on Jul 1										Hours of Missing Data: 44																														
Maximum Diurnal Average: 34.5 ppb at hour 16										Minimum Diurnal Average: 9.6 ppb at hour 4										Hours of Calibration: 34																														
Monthly Average: 22.0 ppb										Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 12 Median = 23 Q ₃ = 31 P ₉₀ = 38 P ₉₉ = 50										Percent Operational Time: 98.7																														
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-Jul	1	1	1	1	1	Z	6	9	13	19	22	27	27	26	24	20	22	21	19	23	10	4	4	13	13.7	27																								
2-Jul	10	13	22	19	11	13	Z	27	30	31	36	40	43	44	46	45	41	41	43	41	19	6	5	3	27.3	46																								
3-Jul	4	4	16	18	26	19	21	Z	19	21	28	26	31	37	38	40	39	41	39	37	36	33	31	32	27.7	41																								
4-Jul	34	30	28	27	26	23	21	Z	24	27	29	30	32	34	37	38	38	36	35	33	30	30	29	30.2	38																									
5-Jul	27	25	26	Z	20	23	24	24	23	23	24	28	28	26	25	25	25	29	27	28	27	23	21	13	24.6	29																								
6-Jul	14	15	12	11	Z	13	14	16	16	18	22	25	32	30	29	30	30	33	32	29	17	8	5	3	19.6	33																								
7-Jul	3	2	1	2	2	Z	10	9	20	23	24	25	27	29	30	30	31	31	31	28	20	14	6	4	17.4	31																								
8-Jul	3	2	2	1	4	5	Z	15	20	21	19	35	32	25	33	38	38	41	36	29	17	5	3	2	18.6	41																								
9-Jul	2	1	1	1	1	2	9	Z	17	21	25	36	39	40	42	41	40	38	37	32	14	10	8	5	20.1	42																								
10-Jul	4	3	2	4	12	22	22	31	Z	M	25	34	39	44	49	50	49	46	37	31	25	21	6	5	25.6	50																								
11-Jul	8	8	7	Z	2	2	5	7	11	15	28	31	30	32	32	32	33	32	27	27	29	17	4	2	18.4	33																								
12-Jul	2	2	1	1	Z	2	7	13	15	23	22	36	33	37	35	34	35	38	34	29	23	8	6	4	19.1	38																								
13-Jul	5	6	3	2	1	Z	4	7	16	22	43	45	47	51	50	50	49	43	36	34	30	28	26	22	27.0	51																								
14-Jul	25	23	22	22	23	Z	Z	20	20	21	22	24	27	31	34	36	23	21	17	11	4	3	1	1	19.8	36																								
15-Jul	1	1	1	1	1	2	3	Z	6	13	13	16	38	46	49	50	51	51	49	44	35	27	32	22	24.1	51																								
16-Jul	23	38	29	23	11	8	10	23	Z	24	23	23	23	23	23	24	25	26	26	24	23	23	23	22	22.6	38																								
17-Jul	21	23	24	Z	19	15	14	15	16	17	21	23	23	21	21	23	21	18	16	16	13	9	11	10	17.8	24																								
18-Jul	10	11	10	10	Z	10	11	15	C	C	C	28	27	28	27	27	27	28	28	29	22	18	20	20	20.4	29																								
19-Jul	19	11	6	13	15	Z	17	21	22	24	28	30	33	32	28	32	32	31	31	32	27	12	10	6	22.2	33																								
20-Jul	5	7	4	5	5	3	Z	6	8	11	22	28	29	32	32	37	36	32	27	12	11	6	5	4	16.0	37																								
21-Jul	4	3	3	3	5	6	6	Z	19	25	26	34	37	32	30	34	35	35	47	PF	PF	PF	PF	PF	21.4	47																								
22-Jul	PF	PF	5	3	4	5	15	17	Z	23	26	27	31	37	37	33	31	32	32	30	22	23	21	23	22.8	37																								
23-Jul	23	23	20	Z	21	20	19	22	22	24	28	26	27	30	35	38	35	27	27	26	20	20	20	18	24.9	38																								
24-Jul	17	17	16	16	Z	16	16	15	16	18	22	22	21	25	27	28	28	28	29	32	31	22	18	20	21.8	32																								
25-Jul	15	14	21	17	14	Z	20	20	19	20	28	31	31	M	M	36	37	38	39	34	11	3	2	2	21.6	39																								
26-Jul	2	2	3	3	2	3	Z	15	18	21	35	41	37	39	39	39	40	39	36	33	25	23	17	27	23.5	41																								
27-Jul	25	18	17	11	11	9	21	Z	32	36	38	43	47	43	43	44	44	46	45	38	32	31	20	22	31.1	47																								
28-Jul	15	12	13	16	21	22	21	20	Z	25	28	28	29	29	27	27	27	26	25	24	17	12	3	1	20.4	29																								
29-Jul	5	3	4	Z	9	7	11	14	16	20	22	25	27	26	23	29	32	33	36	30	15	7	6	4	17.6	36																								
30-Jul	2	2	1	1	Z	2	2	3	5	6	7	17	29	35	36	34	33	40	44	39	36	38	39	38	21.3	44																								
31-Jul	35	31	19	17	27	Z	25	24	25	27	28	28	31	36	31	27	28	24	22	20	9	6	4	4	22.9	36																								
																								12.1	11.8	11.0	9.6	11.2	11.0	13.6	16.6	17.7	21.3	25.4	29.3	31.8	33.3	33.7	34.5	34.1	33.8	32.6	29.3	21.8	16.4	13.6	12.7	Diurnal Average		
																								35	38	29	27	27	23	25	31	32	36	43	45	47	51	50	50	51	51	51	49	44	36	38	39	38	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																																		
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																		



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay South - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	287	41.00	41.00
21 - 50	410	58.57	99.57
51 - 82	3	0.43	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 700

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay South - July 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	18	6	2	3	1	0	8	6	35	46	36	47	22	21	15	21	287
21 - 50	37	17	7	0	4	8	7	29	45	47	59	51	29	25	23	22	410
51 - 82	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	3
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	23	9	3	5	9	17	35	80	93	95	98	51	46	38	43	700

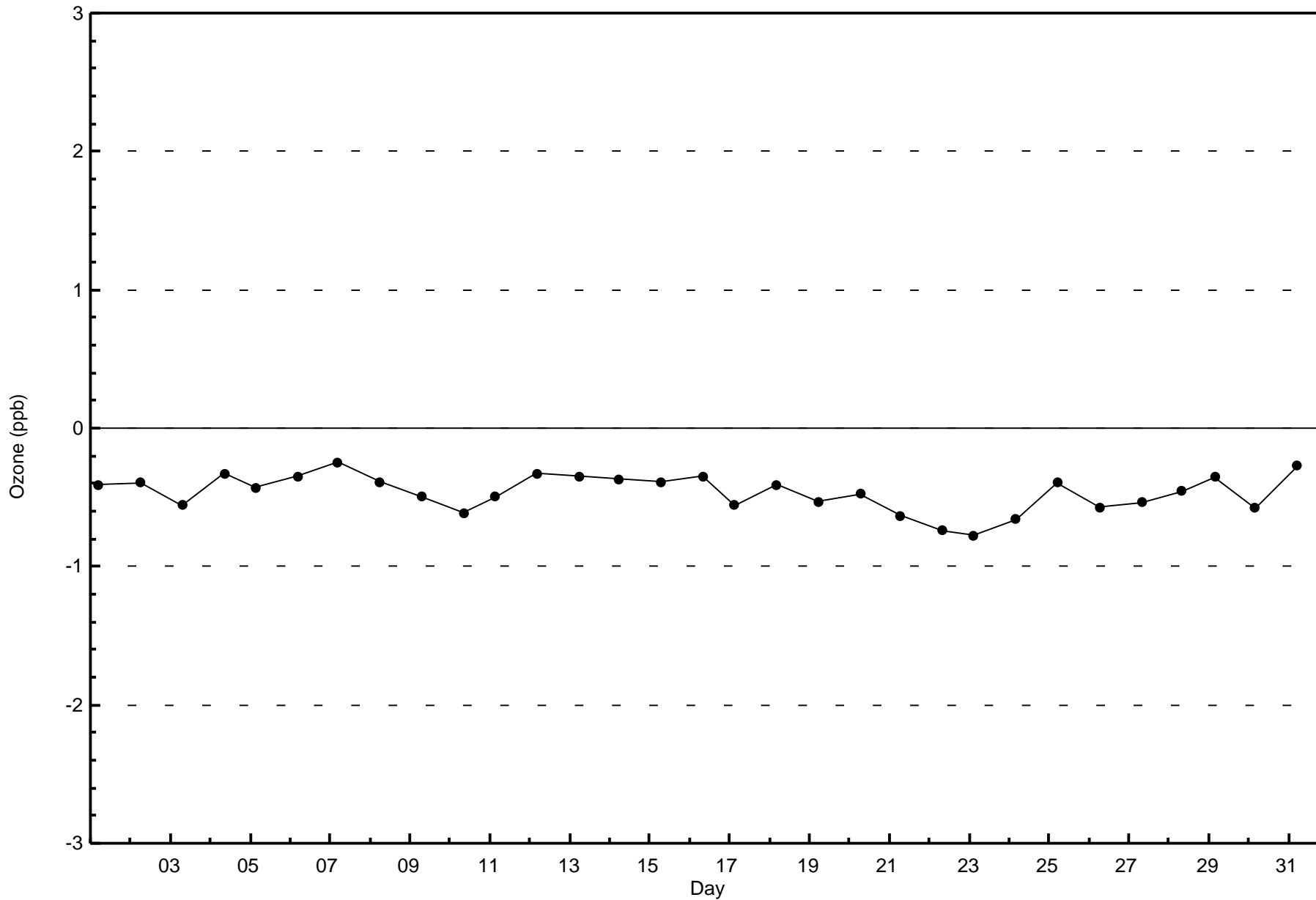
Total Number of Valid Hours: 700

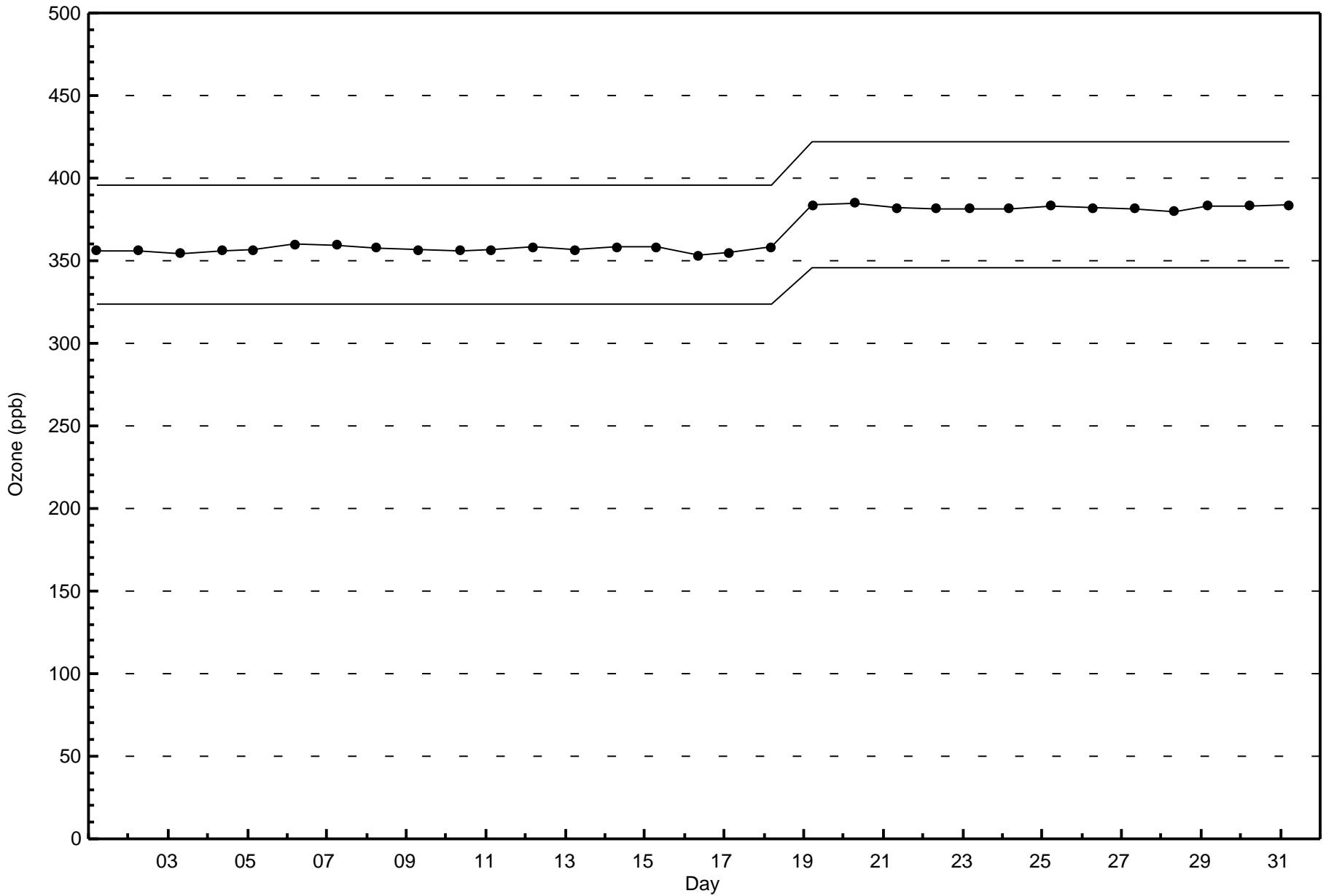
Total Number of Hours: 744



Wood Buffalo Environmental Association
Zero Responses

Ozone (O₃) - ppb
Fort McKay South - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

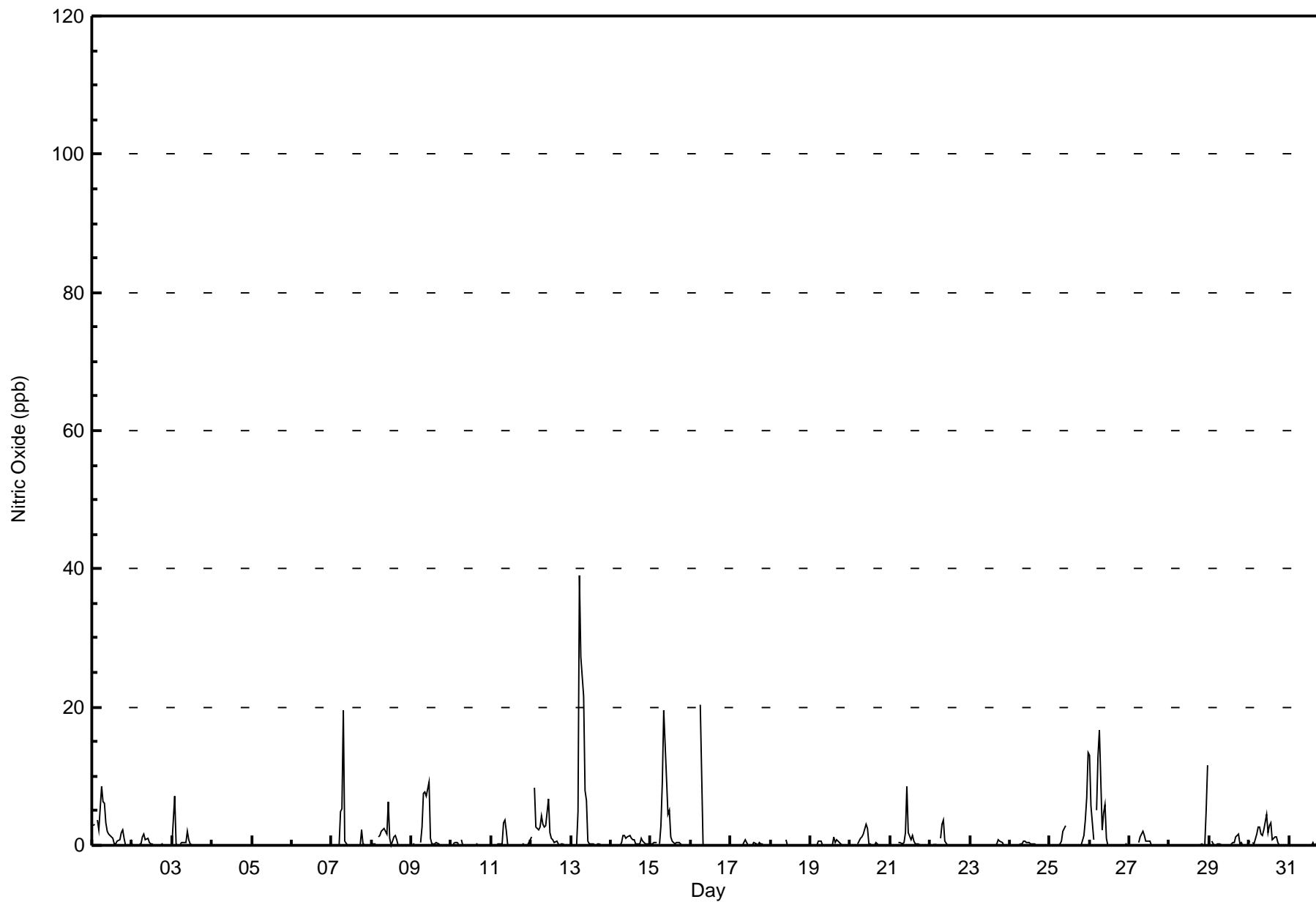
Fort McKay South - July 2017

Maximum Value: 39 ppb on Jul 13 06:00																	Maximum Daily Average: 4.7 ppb on Jul 13										Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 1 22:00																	Minimum Daily Average: 0.0 ppb on Jul 4										Hours of Data: 697																						
Maximum Diurnal Average: 3.2 ppb at hour 7																	Minimum Diurnal Average: 0.1 ppb at hour 21										Hours of Missing Data: 47																						
Monthly Average: 0.9 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 2 P ₉₉ = 15										Hours of Calibration: 35																						
																	Percent Operational Time: 98.4																																
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-Jul	3	3	Z	4	2	9	6	6	3	2	2	1	1	0	0	1	1	2	2	1	0	0	0	1	2.1	9																							
2-Jul	0	0	0	Z	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
3-Jul	0	7	0	0	Z	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7																							
4-Jul	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																							
5-Jul	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-Jul	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-Jul	0	0	Z	0	0	5	5	20	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1.4	20																							
8-Jul	0	0	0	Z	1	1	2	2	2	2	6	1	0	1	1	1	0	0	0	0	0	0	0	0	1.0	6																							
9-Jul	0	0	0	0	Z	0	3	7	8	7	9	1	0	0	0	0	0	0	0	0	0	0	0	0	1.6	9																							
10-Jul	0	0	0	0	0	Z	1	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
11-Jul	Z	0	0	0	0	0	0	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	4																							
12-Jul	1	Z	8	3	2	3	4	3	3	3	7	2	1	1	0	1	0	0	0	0	0	0	0	0	1.8	8																							
13-Jul	0	0	Z	0	5	39	27	22	8	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4.7	39																							
14-Jul	0	0	0	Z	0	0	0	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0.5	1																							
15-Jul	0	0	0	0	Z	0	3	9	19	9	4	5	1	1	0	0	0	0	0	0	0	0	0	0	2.4	19																							
16-Jul	0	0	0	0	0	Z	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	20																							
17-Jul	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																							
18-Jul	0	Z	0	0	0	0	0	M	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	1																							
19-Jul	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0.2	1																							
20-Jul	0	0	0	Z	0	1	1	1	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3																							
21-Jul	0	0	0	0	Z	0	0	0	0	2	9	2	1	1	1	0	0	0	0	PF	PF	PF	PF	PF	1.0	9																							
22-Jul	PF	PF	0	0	0	Z	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	4																							
23-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.1	1																							
24-Jul	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
25-Jul	0	0	Z	0	0	0	0	1	2	3	M	M	M	0	0	0	0	0	0	0	1	4	7	13	1.6	13																							
26-Jul	13	6	1	Z	5	13	17	2	5	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0	17																							
27-Jul	0	0	0	0	Z	0	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	12	0.8	12																							
29-Jul	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0.3	2																							
30-Jul	1	Z	0	0	2	3	3	2	1	2	5	2	3	3	1	1	1	0	0	0	0	0	0	0	1.3	5																							
31-Jul	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																							
																								0.7	0.7	0.5	0.3	0.7	2.9	3.2	2.9	2.2	1.9	1.7	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.4	0.9	Diurnal Average
																								13	7	8	4	5	39	27	22	19	9	9	5	3	3	1	1	1	1	2	2	1	1	4	7	13	Diurnal Maximum
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																																								



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	694	99.57	99.57
21 - 40	3	0.43	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: 697

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - July 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	55	23	9	3	5	10	17	38	85	85	89	101	52	44	38	40	694
21 - 40	0	0	0	0	0	0	0	0	0	2	1	0	0	0	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	55	23	9	3	5	10	17	38	85	87	90	101	52	44	38	40	697

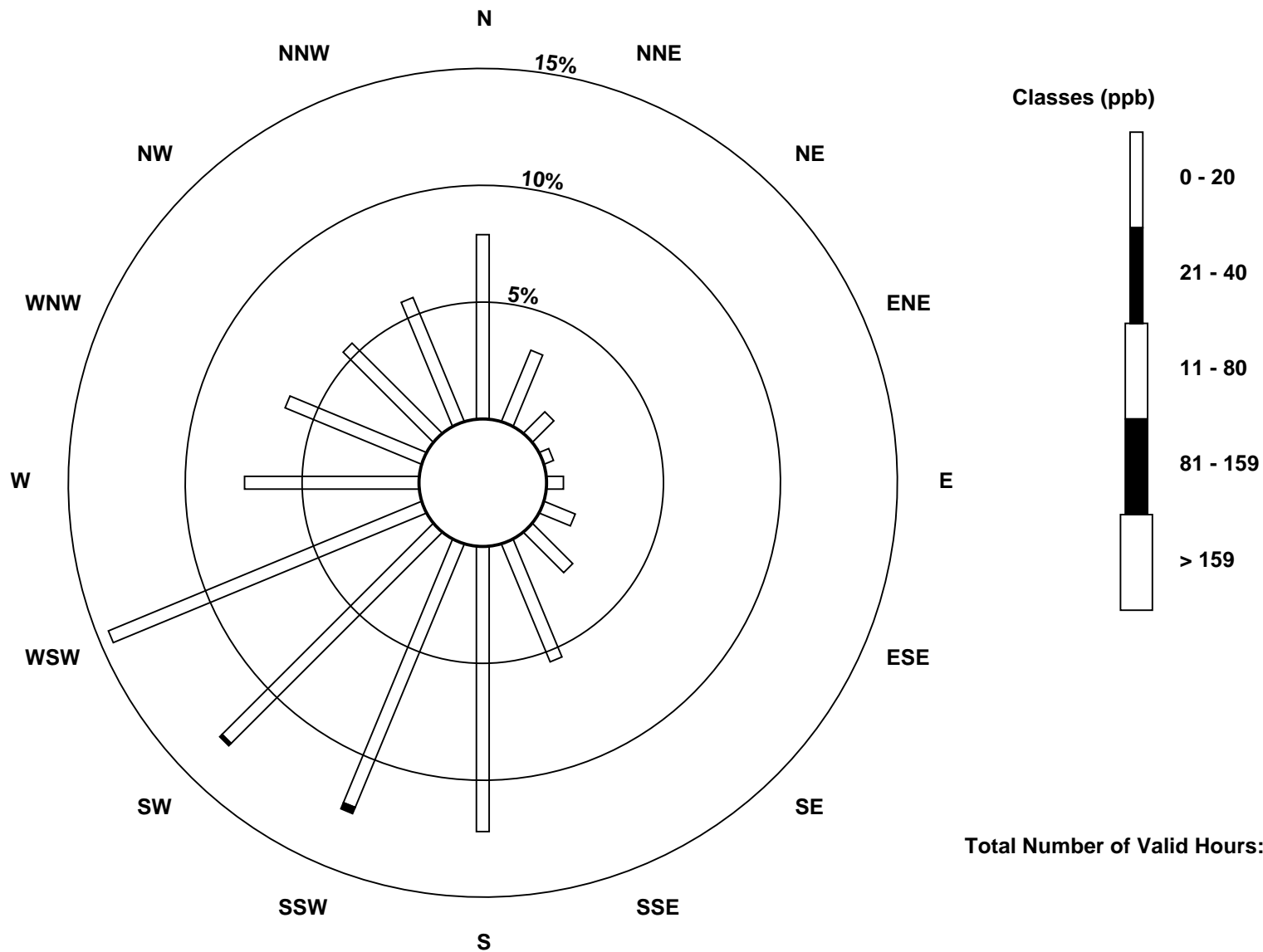
Total Number of Valid Hours: 697

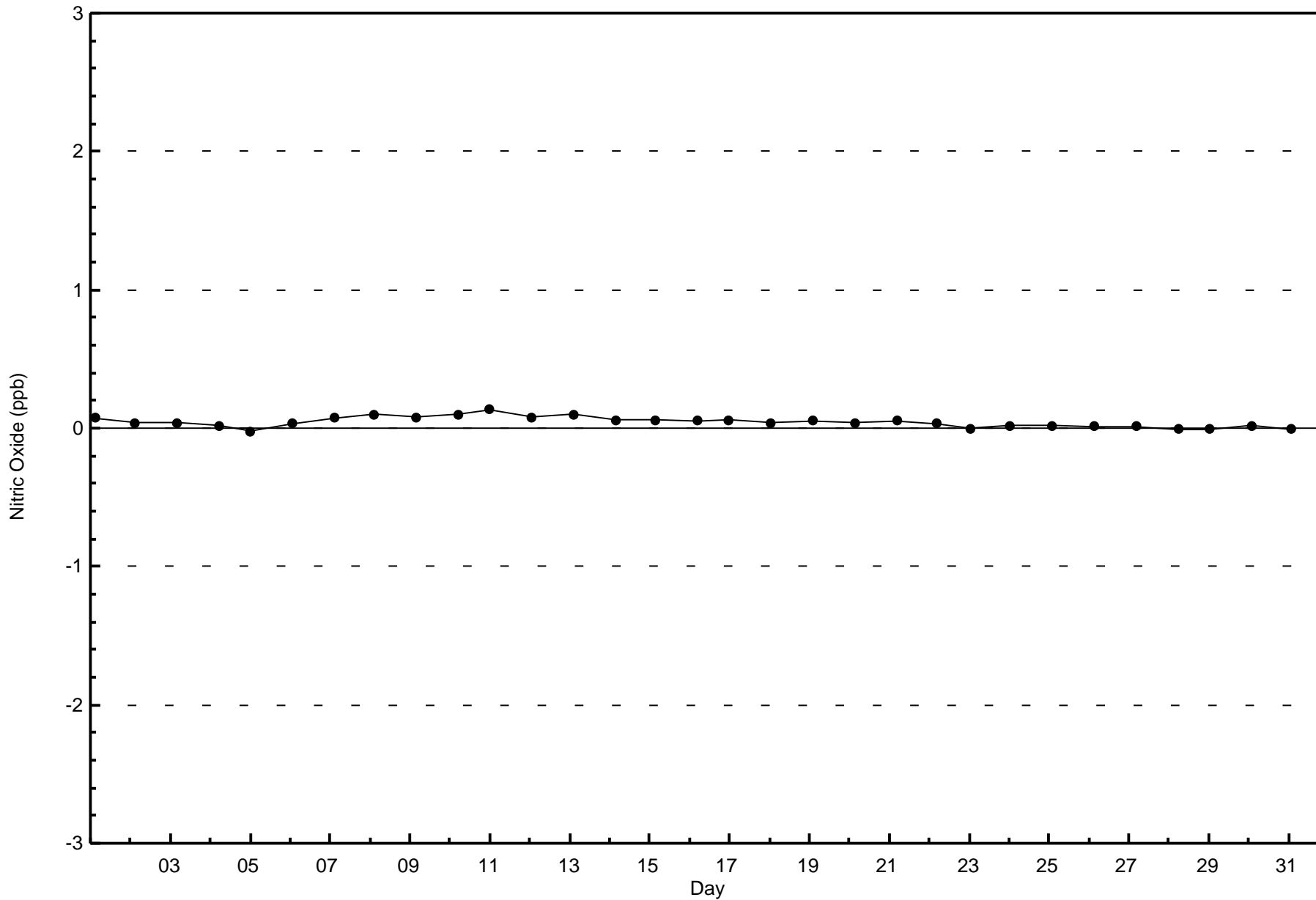
Total Number of Hours: 744

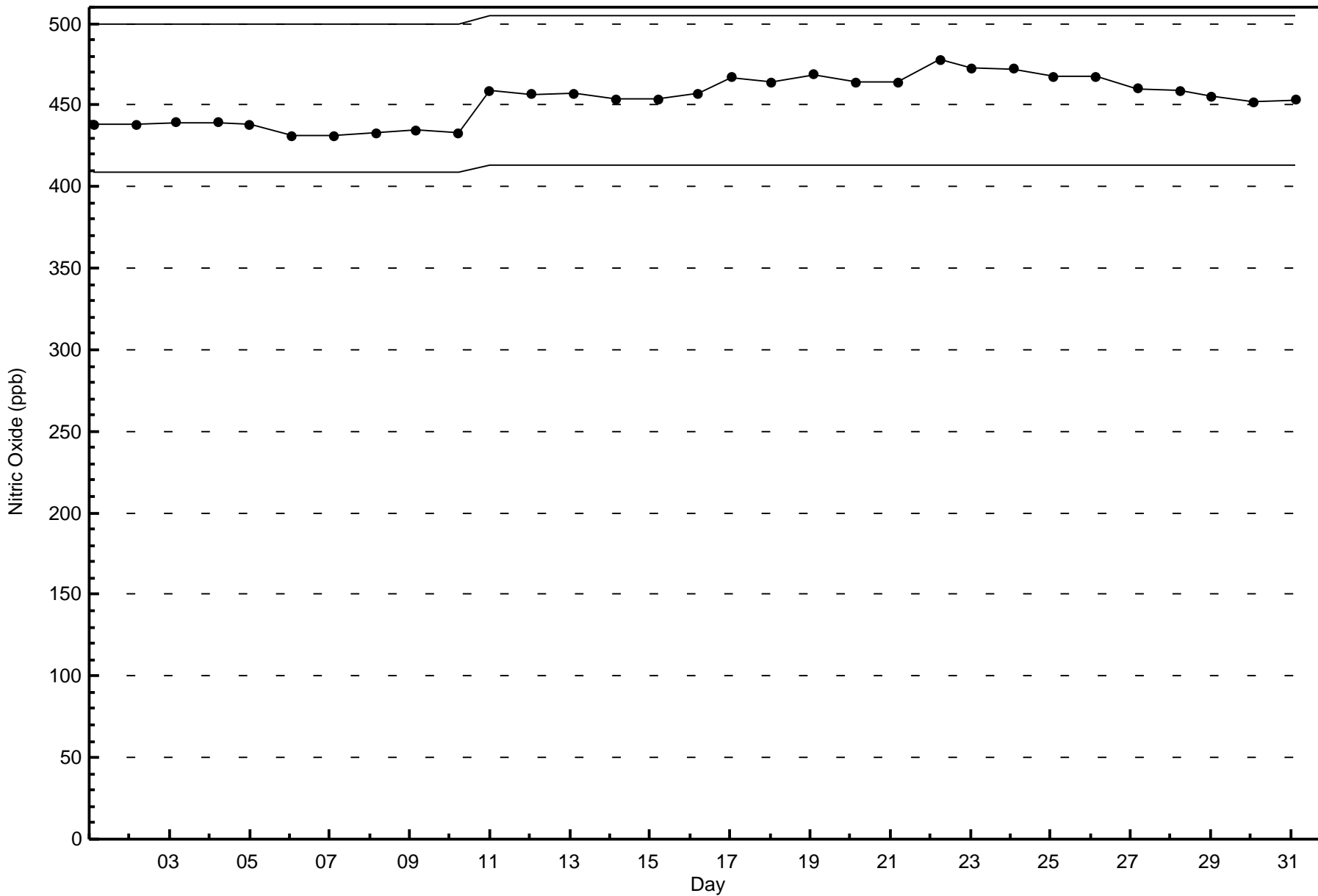


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 24 ppb on Jul 26 23:00	Maximum Daily Average: 6.8 ppb on Jul 26
Minimum Value: 0 ppb on Jul 18 12:00	Hours of Data: 697
Maximum Diurnal Average: 4.0 ppb at hour 10	Hours of Missing Data: 47
Monthly Average: 2.6 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.2 ppb on Jul 5	Percent Operational Time: 98.4
Minimum Diurnal Average: 1.5 ppb at hour 15	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 3 P ₉₀ = 7 P ₉₉ = 16	

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-Jul	2	2	Z	2	1	2	4	5	4	4	3	3	3	1	2	3	5	7	9	6	4	2	4	12	3.9	12
2-Jul	6	4	4	Z	3	2	4	4	2	3	2	1	1	1	1	1	1	1	2	2	2	1	2	3	2.3	6
3-Jul	4	16	4	7	Z	6	7	5	4	6	2	1	0	0	0	0	0	0	1	0	0	0	0	0	2.8	16
4-Jul	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
5-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0.4	1
7-Jul	0	0	Z	0	0	3	4	11	1	1	0	0	0	0	0	0	0	0	1	2	3	7	8	8	2.2	11
8-Jul	11	13	8	Z	5	4	5	6	6	7	15	5	2	7	7	5	1	1	1	1	1	1	1	2	4.9	15
9-Jul	4	3	1	1	Z	1	4	10	12	12	12	4	2	2	2	3	2	2	2	1	1	2	3	2	3.7	12
10-Jul	2	5	9	10	7	Z	7	1	1	C	C	C	C	1	1	4	3	3	4	4	10	3	5	5	4.4	10
11-Jul	Z	3	3	2	1	1	1	5	8	5	1	0	0	0	0	0	0	0	1	5	1	2	5	9	2.3	9
12-Jul	10	Z	8	7	5	3	6	8	8	8	13	7	5	4	4	5	2	1	3	3	2	2	2	2	5.1	13
13-Jul	1	2	Z	1	4	14	15	15	11	11	5	3	4	3	2	2	5	4	2	2	1	1	1	3	4.8	15
14-Jul	1	1	1	Z	1	1	2	4	3	2	3	3	3	3	4	3	4	2	4	4	3	2	1	0	2.3	4
15-Jul	0	1	0	0	Z	0	2	6	14	15	15	12	6	4	2	3	4	4	4	2	2	2	2	2	4.5	15
16-Jul	5	2	3	1	1	Z	18	1	1	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	1.7	18
17-Jul	Z	0	0	1	1	0	0	1	2	2	0	0	0	1	1	1	1	2	2	3	1	1	1	1	0.9	3
18-Jul	1	Z	2	1	0	0	0	M	M	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2
19-Jul	1	1	Z	0	1	2	2	1	1	0	0	0	0	0	3	2	2	2	2	1	1	1	1	3	1.2	3
20-Jul	3	3	4	Z	5	3	3	4	4	7	4	1	1	0	1	3	1	1	1	1	2	2	1	1	2.4	7
21-Jul	1	1	1	2	Z	3	3	2	2	5	16	6	4	5	2	1	2	2	2	PF	PF	PF	PF	PF	3.3	16
22-Jul	PF	PF	3	2	1	Z	4	5	6	2	0	0	1	0	0	0	0	0	0	0	1	2	2	1	1.5	6
23-Jul	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	3	3	3	3	2	2	3	1.1	3	
24-Jul	2	Z	3	2	2	2	1	2	2	2	1	1	1	1	1	0	0	0	1	1	7	10	4	2.0	10	
25-Jul	2	1	Z	0	0	0	1	2	3	4	M	M	M	0	0	0	0	0	2	2	18	19	17	17	4.5	19
26-Jul	17	13	6	Z	7	10	12	5	7	10	4	1	1	1	1	1	1	1	1	2	7	11	24	14	6.8	24
27-Jul	14	15	10	8	Z	4	7	9	8	6	5	4	4	1	1	1	1	1	1	1	1	1	1	1	4.5	15
28-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	9	9	1.3	9
29-Jul	Z	3	1	1	1	1	0	0	0	0	0	0	1	1	1	2	4	7	3	5	3	3	4	5	2.1	7
30-Jul	7	Z	3	2	3	2	2	4	4	5	8	3	6	10	3	5	5	2	0	0	1	0	0	0	3.3	10
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	1	1	0	0	0	0	0.5	2

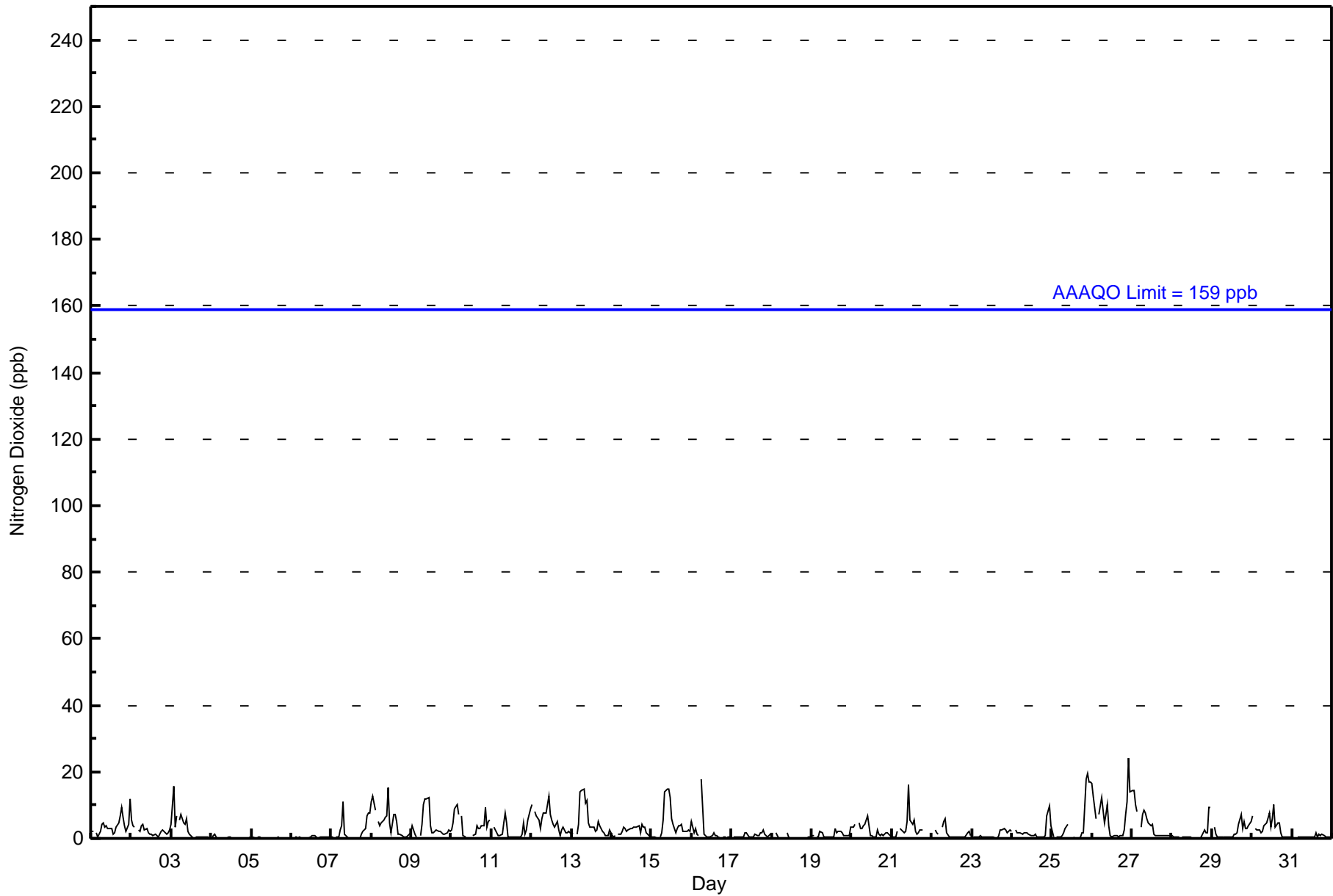
3.8	3.5	3.0	2.0	1.9	2.5	3.8	3.7	3.8	4.0	3.9	2.1	1.7	1.7	1.5	1.6	1.6	1.6	1.6	1.7	1.8	2.3	2.5	3.6	3.6	Diurnal Average
17	16	10	10	7	14	18	15	14	15	16	12	6	10	7	5	5	7	9	6	18	19	24	17	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	99.86	99.86
21 - 40	1	0.14	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: 697

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - July 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	55	23	9	3	5	10	17	38	85	86	90	101	52	44	38	40	696
21 - 40	0	0	0	0	0	0	0	0	0	1	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	55	23	9	3	5	10	17	38	85	87	90	101	52	44	38	40	697

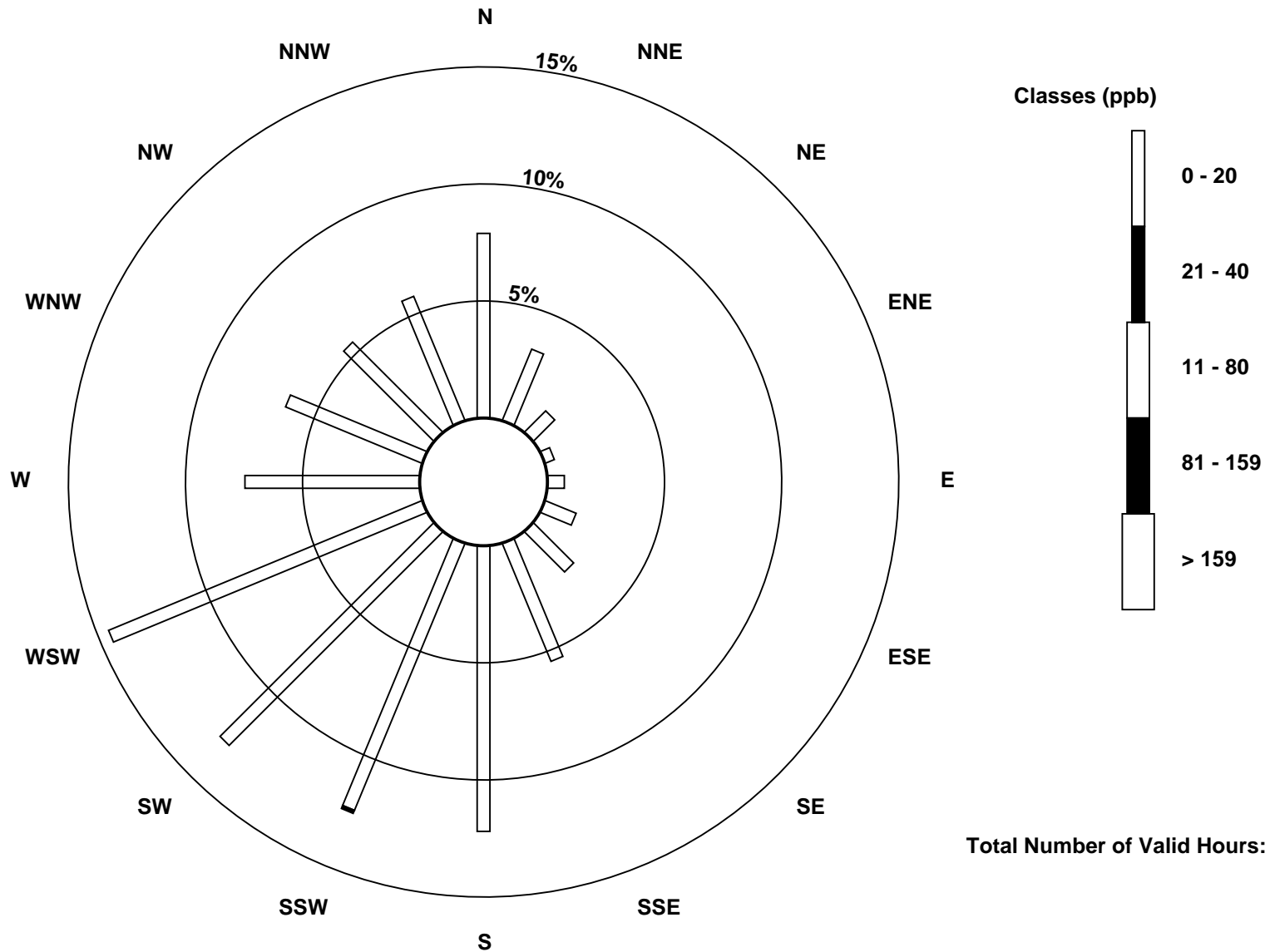
Total Number of Valid Hours: 697

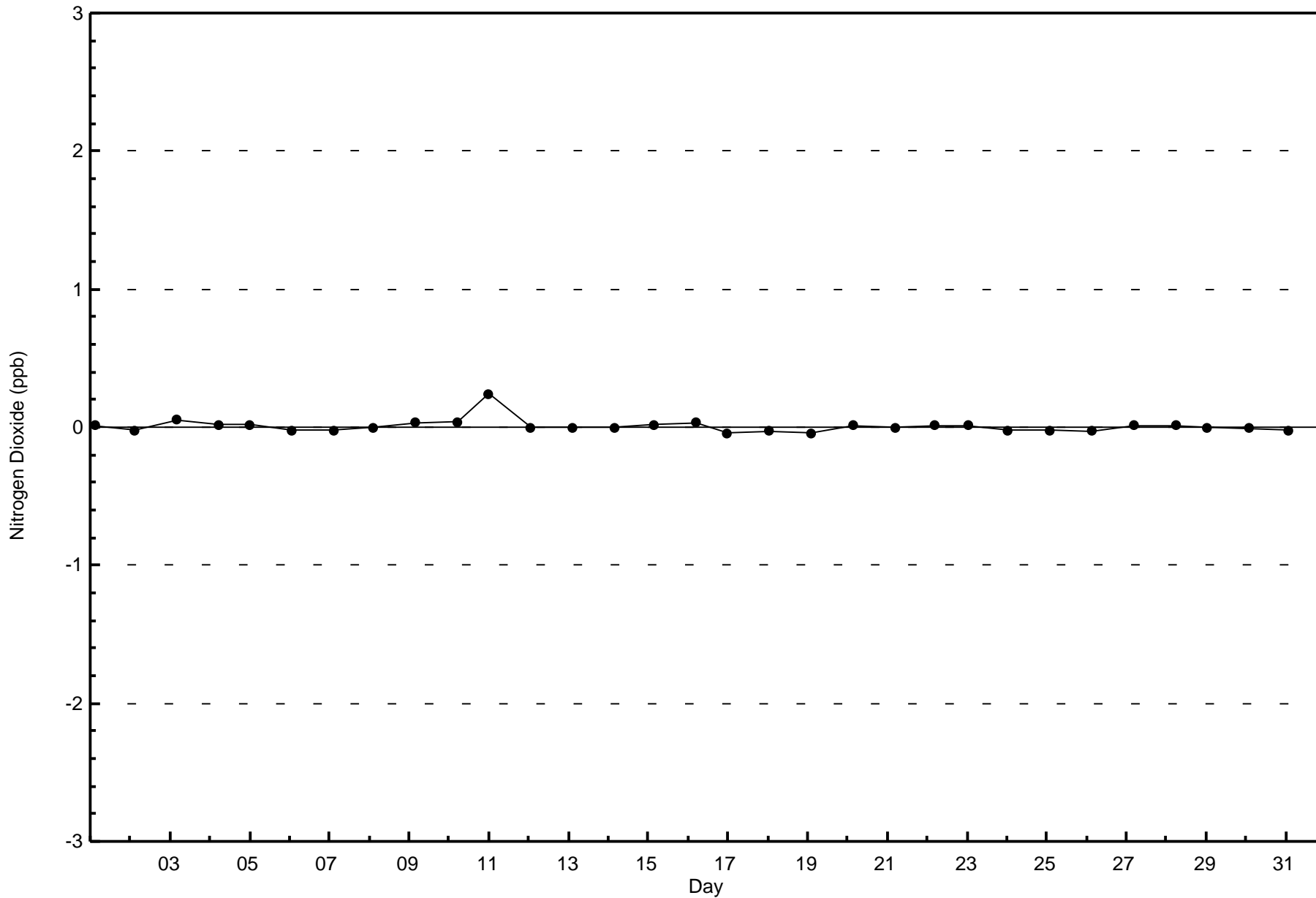
Total Number of Hours: 744

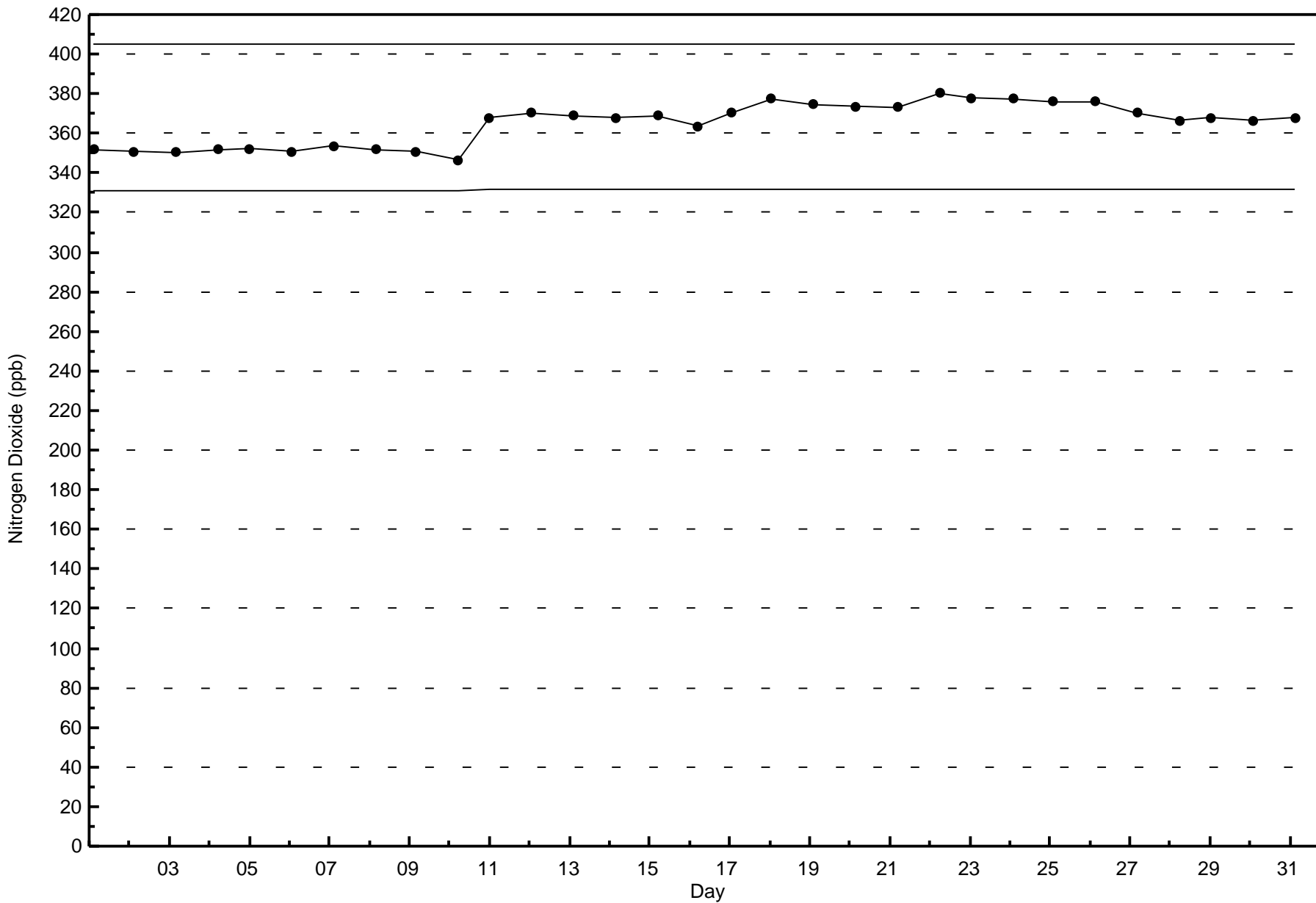


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association
Summary of Hour Averages

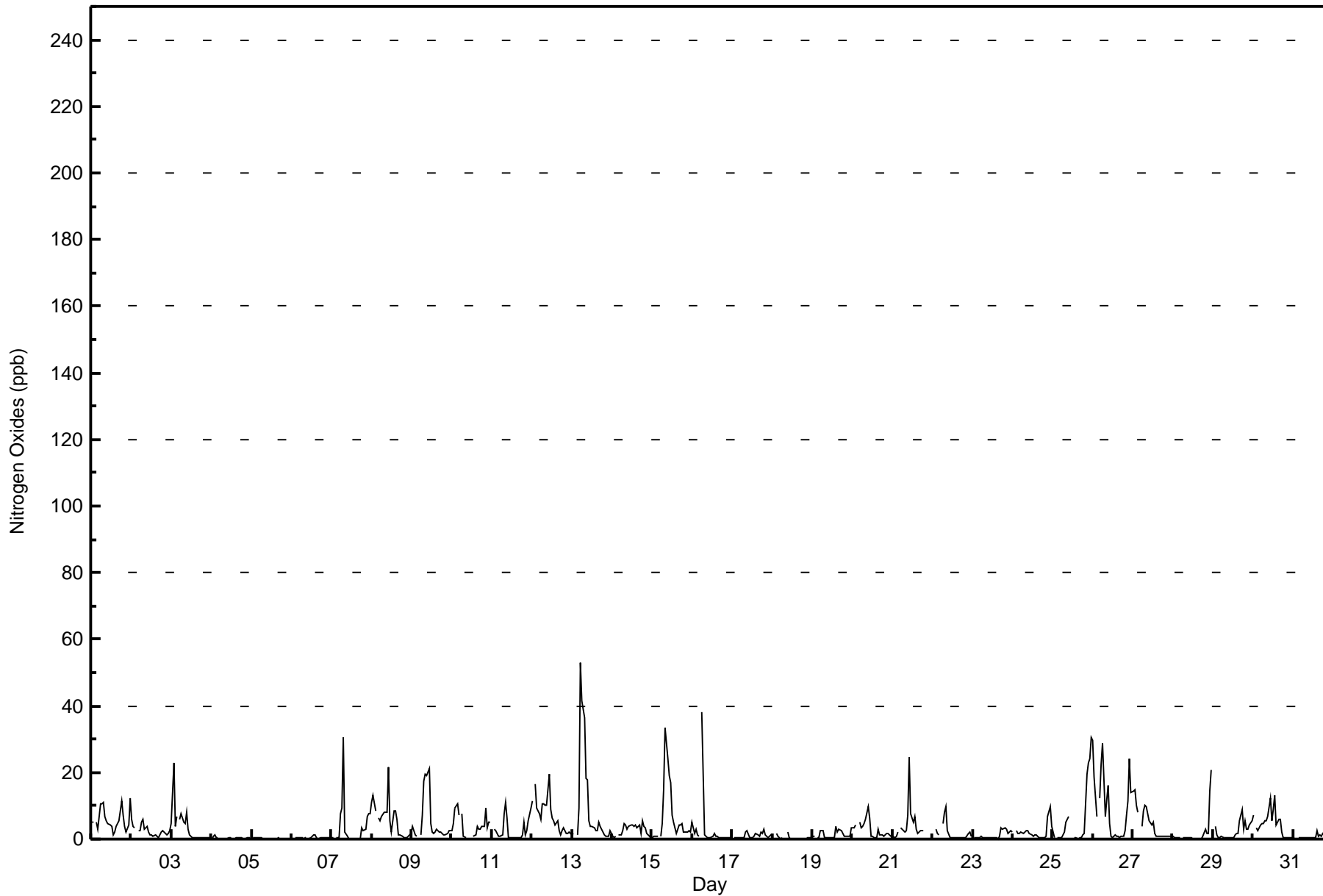
Nitrogen Oxides (NO_x) - ppb
Fort McKay South - July 2017

Maximum Value: 53 ppb on Jul 13 06:00		Maximum Daily Average: 9.7 ppb on Jul 26		Hours in Service: 744																																												
Minimum Value: 0 ppb on Jul 18 20:00		Minimum Daily Average: 0.2 ppb on Jul 5		Hours of Data: 697																																												
Maximum Diurnal Average: 6.9 ppb at hour 7		Minimum Diurnal Average: 1.7 ppb at hour 15		Hours of Missing Data: 47																																												
Monthly Average: 3.5 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 4 P ₉₀ = 9 P ₉₉ = 30		Hours of Calibration: 35																																												
				Percent Operational Time: 98.4																																												
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-Jul	5	5	Z	5	3	11	10	11	7	6	5	4	4	1	2	4	5	8	12	7	4	2	4	12	6.0	12																						
2-Jul	6	4	4	Z	3	2	5	6	3	4	2	1	1	1	1	1	1	1	2	2	2	1	2	3	2.5	6																						
3-Jul	4	23	4	7	Z	6	8	5	5	8	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3.4	23																						
4-Jul	0	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
5-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0.4	1																						
7-Jul	0	0	Z	0	0	8	9	30	2	1	0	0	0	0	0	0	0	0	3	2	3	7	8	7	3.6	30																						
8-Jul	11	13	8	Z	6	5	7	8	8	8	21	6	2	9	9	6	1	1	1	1	1	1	1	2	5.9	21																						
9-Jul	4	3	1	1	Z	1	7	18	20	19	21	5	2	2	2	3	2	2	2	1	1	2	3	2	5.4	21																						
10-Jul	2	5	9	11	7	Z	8	1	0	C	C	C	C	1	1	4	3	3	4	4	9	3	5	5	4.5	11																						
11-Jul	Z	3	3	2	1	1	1	8	11	7	1	0	0	0	0	0	0	0	1	5	1	2	5	9	2.8	11																						
12-Jul	11	Z	16	9	8	6	10	10	10	10	20	9	7	5	4	6	3	1	3	3	2	2	2	2	6.9	20																						
13-Jul	1	2	Z	1	9	53	42	36	18	18	5	4	4	3	2	3	5	4	2	1	1	1	1	3	9.6	53																						
14-Jul	1	1	1	Z	1	1	3	5	4	3	4	4	4	4	4	3	4	2	5	4	4	2	1	1	2.8	5																						
15-Jul	1	1	1	1	Z	1	5	15	33	24	19	17	7	5	2	3	4	4	4	2	2	2	2	2	6.9	33																						
16-Jul	5	2	3	1	1	Z	38	1	1	1	1	0	1	2	1	1	0	0	0	0	0	0	0	0	2.6	38																						
17-Jul	Z	0	0	1	1	0	0	1	2	3	0	1	0	1	2	1	1	2	2	3	1	1	1	1	1.1	3																						
18-Jul	1	Z	2	1	0	0	0	M	M	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	2																						
19-Jul	1	1	Z	0	0	3	3	1	0	0	0	0	0	0	4	2	3	2	2	1	1	1	1	3	1.4	4																						
20-Jul	3	3	4	Z	5	3	4	5	6	10	6	1	1	0	1	3	1	1	1	1	2	2	1	1	2.9	10																						
21-Jul	1	1	1	2	Z	4	3	2	3	7	25	8	5	7	3	2	2	3	2	PF	PF	PF	PF	PF	4.3	25																						
22-Jul	PF	PF	3	2	1	Z	5	8	10	3	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1.9	10																						
23-Jul	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	4	3	3	3	2	2	3	1.2	4																							
24-Jul	2	Z	3	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	1	7	10	4	2.1	10																							
25-Jul	2	1	Z	0	0	1	1	2	5	7	M	M	M	0	0	0	0	0	1	2	19	23	24	30	6.0	30																						
26-Jul	30	18	7	Z	12	23	29	7	12	16	5	1	1	1	1	1	1	1	1	2	7	11	24	14	9.7	30																						
27-Jul	14	15	10	8	Z	4	9	10	10	7	5	4	5	2	1	1	1	1	1	1	1	1	1	1	4.9	15																						
28-Jul	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	2	14	21	2.1	21																						
29-Jul	Z	4	1	1	0	1	1	0	0	1	0	1	0	1	2	2	6	9	3	5	3	3	4	5	2.3	9																						
30-Jul	7	Z	3	3	4	5	5	5	5	7	12	5	9	13	4	6	6	2	0	0	0	0	0	0	4.5	13																						
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	2	1	0	0	1	1	0.6	2																						
																								4.6	4.2	3.5	2.3	2.6	5.4	6.9	6.6	6.0	5.8	5.5	2.6	2.0	2.1	1.7	1.8	1.8	1.8	1.9	1.9	2.4	2.7	4.0	4.5	Diurnal Average
																								30	23	16	11	12	53	42	36	33	24	25	17	9	13	9	6	6	9	12	7	19	23	24	30	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				PF - Power Failure																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	97.27	97.27
21 - 40	17	2.44	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: 697

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - July 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	55	23	9	3	5	10	14	37	82	83	84	100	52	43	38	40	678
21 - 40	0	0	0	0	0	0	3	1	3	2	6	1	0	1	0	0	17
11 - 80	0	0	0	0	0	0	0	0	0	2	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	55	23	9	3	5	10	17	38	85	87	90	101	52	44	38	40	697

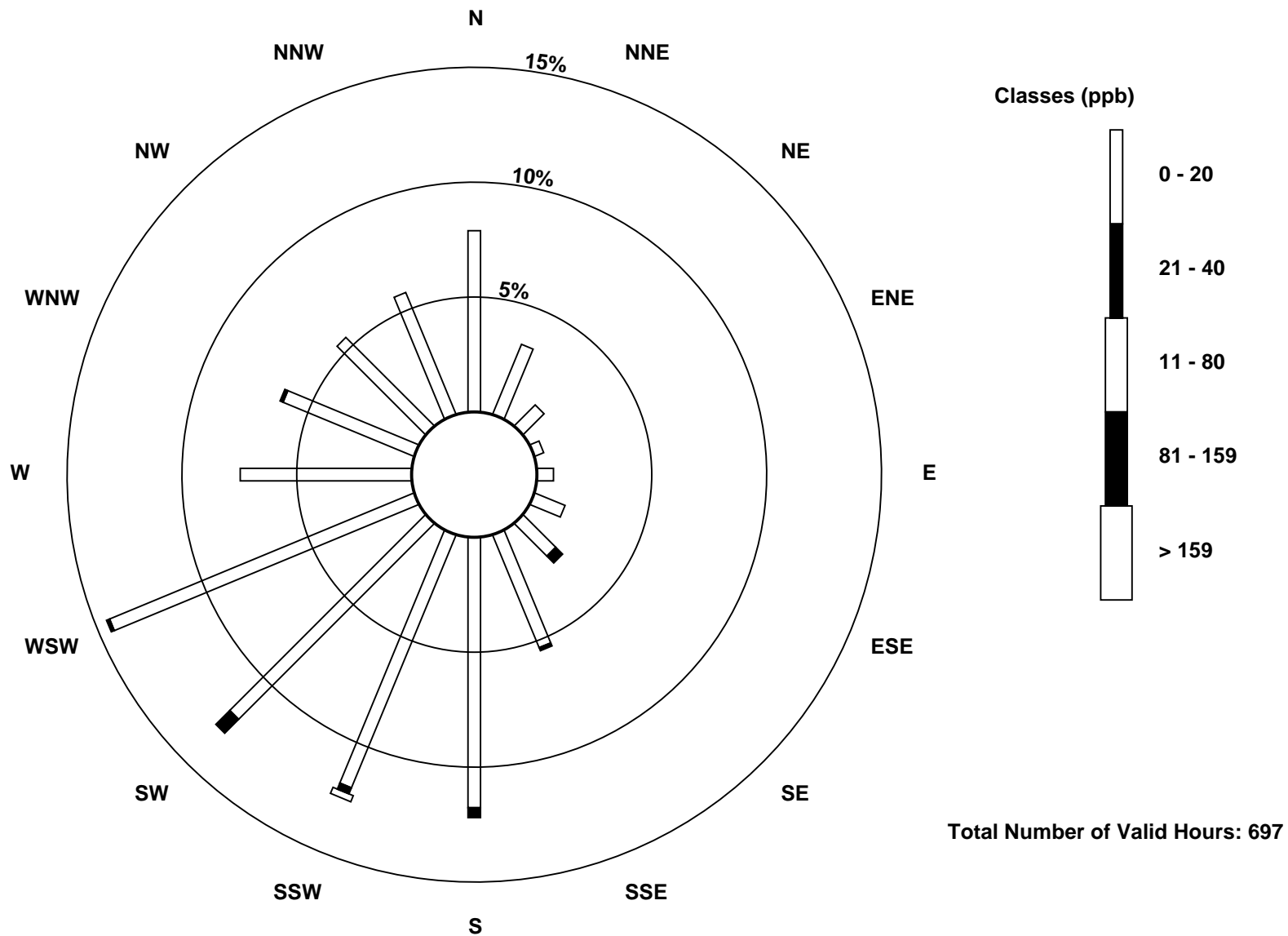
Total Number of Valid Hours: 697

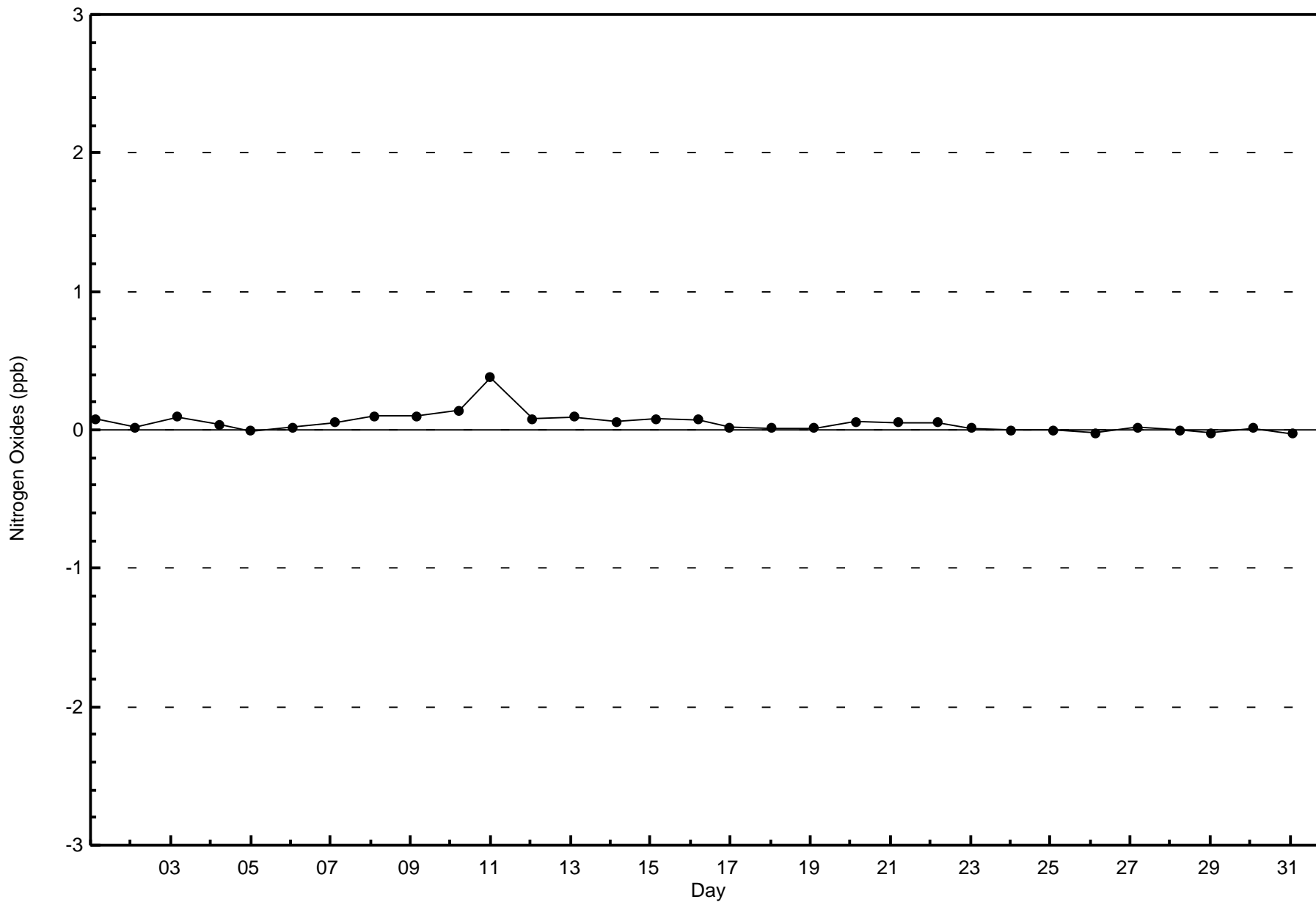
Total Number of Hours: 744

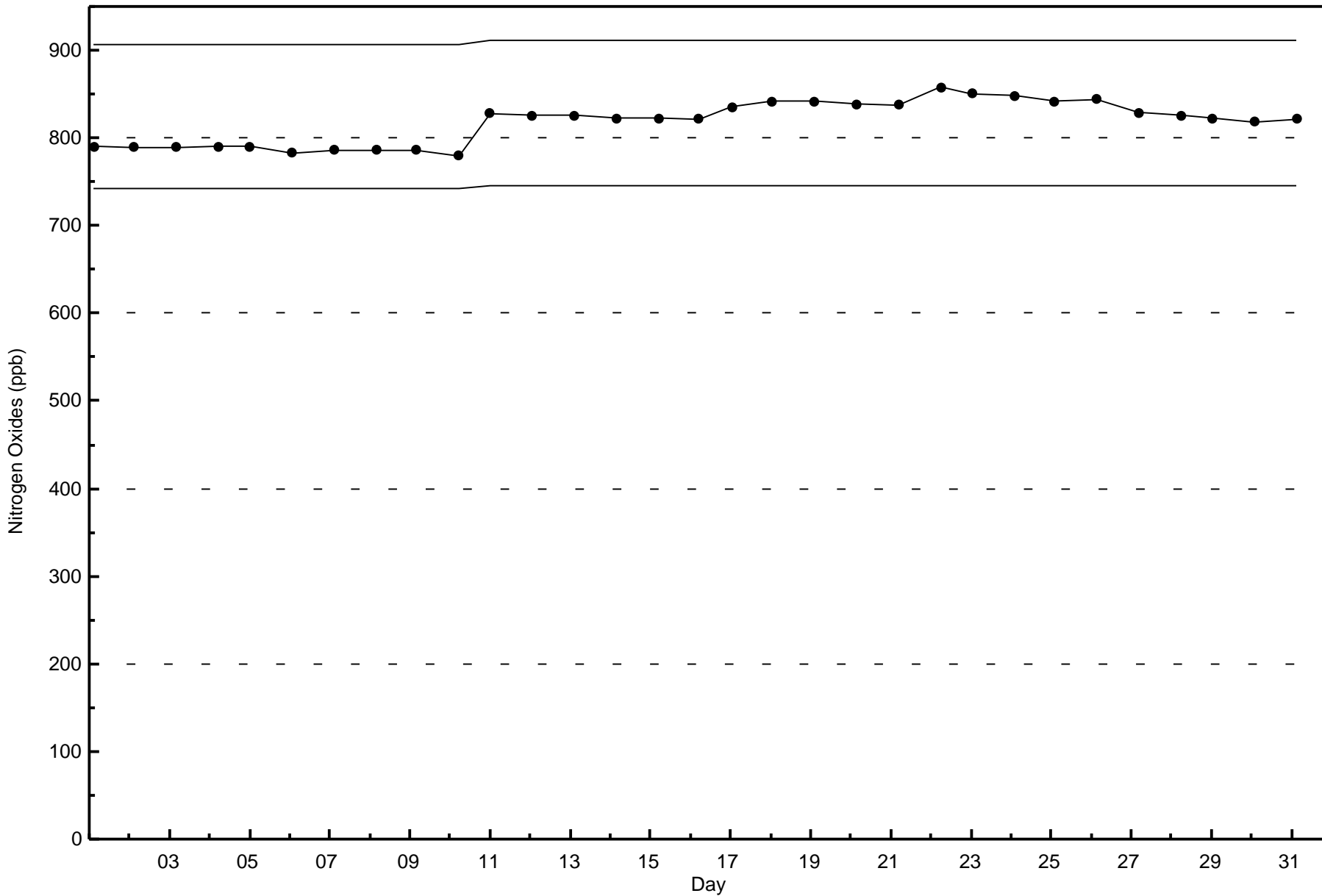


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

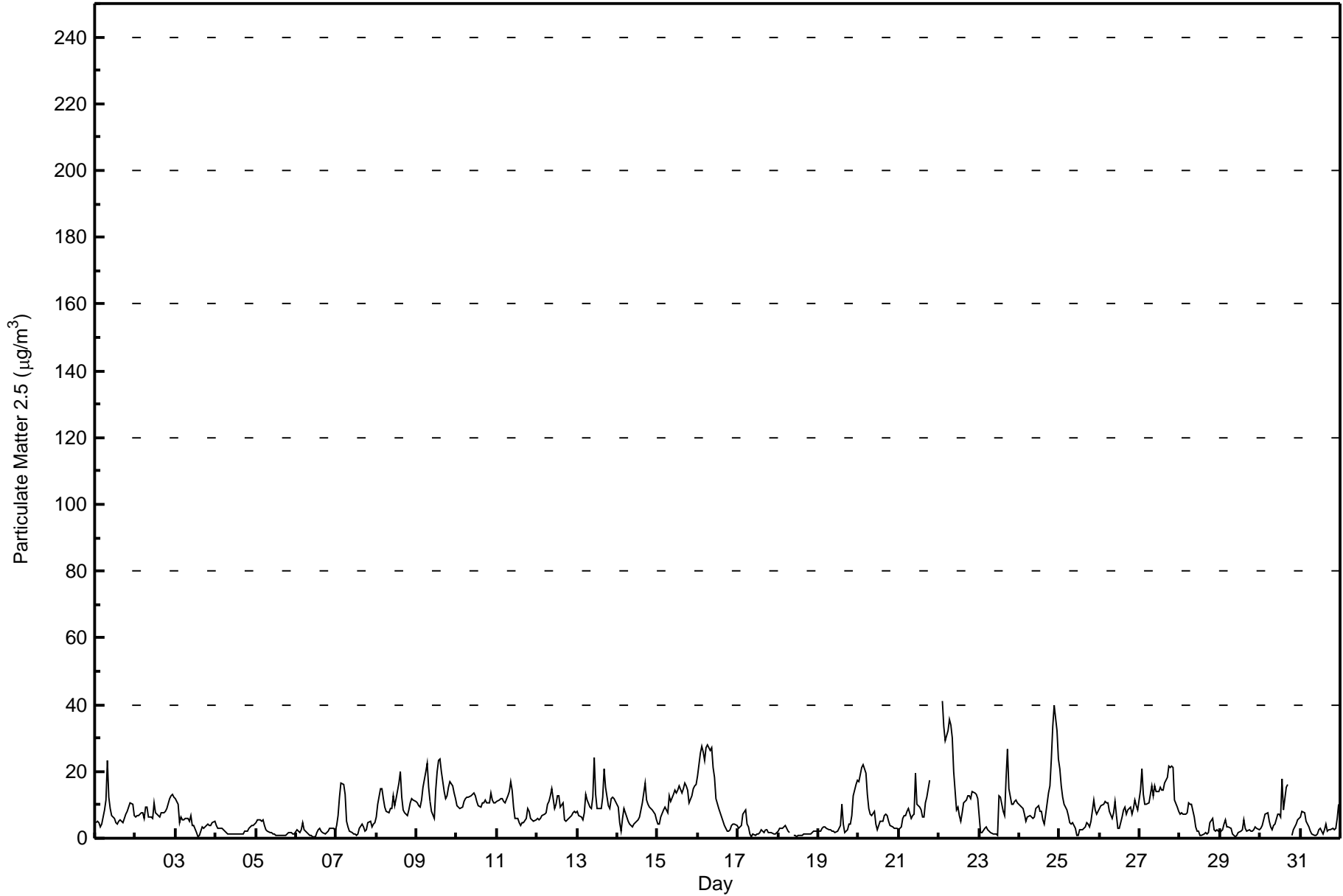
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 41.2 µg/m ³ on Jul 22 03:00 Minimum Value: 0.2 µg/m ³ on Jul 6 11:00 Maximum Diurnal Average: 9.3 µg/m ³ at hour 4 Monthly Average: 7.80 µg/m ³		Maximum Daily Average: 18.4 µg/m ³ on Jul 22 Minimum Daily Average: 1.8 µg/m ³ on Jul 18 Minimum Diurnal Average: 6.1 µg/m ³ at hour 12 Percentiles: P ₁ = 0.7 P ₁₀ = 1.5 Q ₁ = 2.9 Median = 6.5 Q ₃ = 10.8 P ₉₀ = 15.3 P ₉₉ = 31.4		Hours in Service: 744 Hours of Data: 734 Hours of Missing Data: 10 Hours of Calibration: 1 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-Jul	4.6	5.3	4.6	3.6	4.2	8.7	11.4	23.3	12.4	8.9	6.6	5.8	4.8	4.4	4.9	5.5	4.8	5.8	7.3	8.1	9.5	10.7	10.1	6.8	7.6	23.3																													
2-Jul	6.5	7.0	6.9	7.5	7.6	6.1	9.2	9.3	6.5	6.4	5.8	10.6	7.6	7.4	6.5	7.6	7.8	7.5	8.0	9.0	11.8	12.5	13.1	12.5	8.4	13.1																													
3-Jul	12.0	10.2	4.8	6.3	5.4	5.6	5.8	5.3	6.7	3.9	3.7	1.5	0.3	0.7	2.1	3.3	3.0	3.9	4.0	3.9	4.0	4.7	5.1	4.7	12.0																														
4-Jul	3.9	3.1	3.1	3.0	3.0	2.3	1.8	1.3	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	2.0	2.2	2.3	2.9	3.8	3.9	4.2	2.2	4.2																													
5-Jul	4.8	5.4	5.4	5.2	5.3	3.9	2.4	2.2	1.9	1.6	1.4	1.1	1.0	0.9	0.7	0.8	1.0	0.7	0.8	1.5	1.6	1.9	1.5	1.4	2.3	5.4																													
6-Jul	2.6	2.1	1.7	2.6	4.8	2.8	1.8	1.3	1.0	0.7	0.2	0.6	1.8	2.4	2.8	2.1	1.5	1.3	1.5	2.0	3.1	3.1	2.8	2.3	2.0	4.8																													
7-Jul	3.6	7.0	12.5	16.5	16.1	13.3	5.0	3.2	2.2	1.8	1.4	1.1	0.8	1.2	2.9	4.3	3.5	2.3	2.6	4.8	4.9	3.5	4.4	4.7	5.1	16.5																													
8-Jul	6.3	10.1	14.8	14.8	12.0	9.1	7.9	7.5	8.8	8.7	12.7	9.9	11.8	16.7	19.9	12.3	8.6	7.5	6.7	8.4	10.4	11.8	11.6	10.8	10.8	19.9																													
9-Jul	10.4	9.7	9.5	11.2	15.1	19.9	22.5	15.3	10.9	8.0	5.8	14.6	19.8	23.2	23.9	20.0	14.1	11.8	12.7	15.4	17.2	15.9	13.4	11.7	14.7	23.9																													
10-Jul	9.8	9.2	8.9	9.4	10.9	11.8	12.1	12.1	12.6	13.3	13.6	12.6	11.0	9.7	9.2	10.5	10.8	11.3	10.8	10.4	13.4	11.6	10.7	10.5	11.1	13.6																													
11-Jul	11.2	11.4	12.0	11.9	10.9	10.8	12.8	14.2	16.8	14.2	9.2	6.0	5.7	4.7	3.8	4.7	4.4	6.1	8.9	8.1	6.0	5.5	5.0	5.3	8.7	16.8																													
12-Jul	5.8	5.5	5.7	7.0	7.3	7.4	10.2	11.0	12.9	14.6	8.8	10.0	12.8	12.6	9.3	10.6	5.7	4.9	5.4	6.0	6.6	7.8	8.2	7.8	8.5	14.6																													
13-Jul	7.9	6.7	6.3	5.4	7.5	13.3	11.3	9.2	9.1	12.2	24.0	12.9	9.1	9.0	8.8	12.2	20.6	15.4	9.9	8.9	11.7	12.2	12.1	11.2	11.1	24.0																													
14-Jul	9.1	4.8	2.3	6.1	9.0	6.5	5.0	4.2	3.8	3.4	4.1	5.0	5.3	6.5	8.4	10.6	16.7	11.5	10.0	9.3	8.8	8.5	7.3	5.7	7.2	16.7																													
15-Jul	4.2	4.3	6.5	8.5	9.5	8.4	7.4	12.5	10.9	13.1	14.4	13.6	14.2	15.5	13.7	14.8	16.6	15.5	14.4	10.6	12.8	14.7	15.6	16.0	12.0	16.6																													
16-Jul	18.6	25.2	27.4	25.8	23.1	27.2	28.2	26.3	27.1	21.0	18.2	11.9	8.8	7.5	6.3	4.9	3.8	2.2	1.9	2.7	3.7	4.3	4.4	3.6	13.9	28.2																													
17-Jul	3.1	3.4	4.0	7.4	8.4	4.4	3.3	1.1	0.5	1.5	0.9	1.2	1.3	1.8	2.6	1.9	2.6	2.5	1.6	1.5	1.6	1.4	1.2	1.6	2.5	8.4																													
18-Jul	2.2	2.9	3.1	3.3	3.7	2.9	2.0	1.8	C	1.0	0.7	0.5	0.8	0.8	0.8	1.3	1.4	1.4	1.4	1.2	1.8	2.1	2.2	2.2	1.8	3.7																													
19-Jul	2.0	2.2	3.0	3.6	3.4	2.9	2.6	2.4	2.2	2.1	1.5	2.3	2.9	3.9	10.2	4.4	1.6	2.3	4.1	4.4	6.8	12.6	16.0	17.4	4.9	17.4																													
20-Jul	16.9	19.1	21.3	22.1	19.5	13.1	9.0	7.1	6.8	7.9	4.3	2.7	4.0	5.1	5.1	6.7	7.0	6.9	4.9	3.7	3.3	3.1	3.0	2.8	8.6	22.1																													
21-Jul	2.6	3.3	6.0	6.6	6.8	8.2	8.9	6.1	7.0	7.3	19.5	10.3	9.5	8.4	6.5	6.5	10.6	12.2	17.2	PF	PF	PF	PF	PF	8.6	19.5																													
22-Jul	PF	PF	41.2	33.3	29.3	32.3	35.7	34.0	30.3	19.8	8.5	9.1	6.8	5.0	7.8	10.5	11.3	12.8	12.6	12.0	13.9	13.7	13.1	11.9	18.4	41.2																													
23-Jul	6.8	1.8	1.8	3.0	3.3	2.6	2.0	1.9	1.4	1.4	1.2	0.8	12.9	12.2	7.9	6.9	17.8	26.6	14.8	10.1	10.3	11.2	11.3	10.6	7.5	26.6																													
24-Jul	10.1	9.2	8.7	7.0	5.2	6.5	6.9	6.4	5.8	6.4	8.9	9.5	8.0	8.1	5.7	4.4	7.1	13.4	15.9	23.7	33.6	39.6	32.3	23.8	12.8	39.6																													
25-Jul	20.6	15.7	12.4	10.2	8.5	6.8	4.8	4.2	4.6	3.0	0.9	0.7	2.5	2.4	2.7	3.4	4.6	4.0	3.4	5.3	11.5	8.3	7.1	7.8	6.5	20.6																													
26-Jul	8.8	9.8	10.1	11.1	10.8	10.8	8.1	5.8	7.6	10.8	6.7	2.9	2.9	6.2	8.6	9.3	7.2	8.4	9.1	7.3	8.8	11.5	9.8	8.6	8.4	11.5																													
27-Jul	14.3	20.6	13.1	10.3	10.4	10.6	13.3	15.6	12.5	15.7	13.8	14.0	15.4	14.3	14.2	16.6	18.1	21.7	21.4	21.7	21.3	11.5	9.3	7.8	14.9	21.7																													
28-Jul	7.3	7.4	7.4	7.2	7.6	10.7	10.1	10.3	6.5	3.4	2.2	2.3	0.8	0.8	1.2	1.6	1.5	1.9	4.9	5.8	2.6	2.2	2.5	2.3	4.6	10.7																													
29-Jul	1.9	2.6	4.0	5.4	3.4	3.5	3.1	1.3	0.8	0.5	0.8	1.6	2.3	2.4	5.4	3.1	2.2	2.7	2.0	2.3	2.4	3.3	3.2	2.5	2.6	5.4																													
30-Jul	2.8	3.9	5.3	7.1	7.8	5.1	3.4	2.7	3.9	4.4	7.2	7.3	6.3	17.7	8.6	15.2	16.2	UO	UO	0.8	2.6	4.1	5.5	6.0	6.5	17.7																													
31-Jul	6.3	8.2	7.5	4.9	4.2	3.4	2.3	1.4	1.0	0.7	1.4	2.4	2.9	1.1	2.6	4.1	2.2	2.4	2.6	2.8	2.7	2.9	6.0	10.1	3.6	10.1																													
																								7.6	7.9	9.1	9.3	9.2	9.1	8.7	8.4	7.8	7.1	6.8	6.1	6.3	6.9	6.9	7.1	7.6	7.6	7.4	7.1	8.4	8.6	8.4	7.8	Diurnal Average							
																								20.6	25.2	41.2	33.3	29.3	32.3	35.7	34.0	30.3	21.0	24.0	14.6	19.8	23.2	23.9	20.0	20.6	26.6	21.4	23.7	33.6	39.6	32.3	23.8	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
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	292	39.78	39.78
6 - 15	341	46.46	86.24
16 - 25	53	7.22	93.46
26 - 80	17	2.32	95.78
> 81.0	0	0.00	95.78

Total Number of Valid Hours: 734

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay South - July 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	21	13	2	1	1	0	4	6	15	27	59	48	33	22	18	22	292
6 - 15	32	9	7	1	1	10	10	24	61	58	33	49	12	17	6	11	341
16 - 25	1	1	0	1	2	0	3	8	7	6	0	4	3	5	7	5	53
26 - 80	1	0	0	0	0	0	0	0	4	3	2	1	2	1	2	1	17
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	23	9	3	4	10	17	38	87	94	94	102	50	45	33	39	703

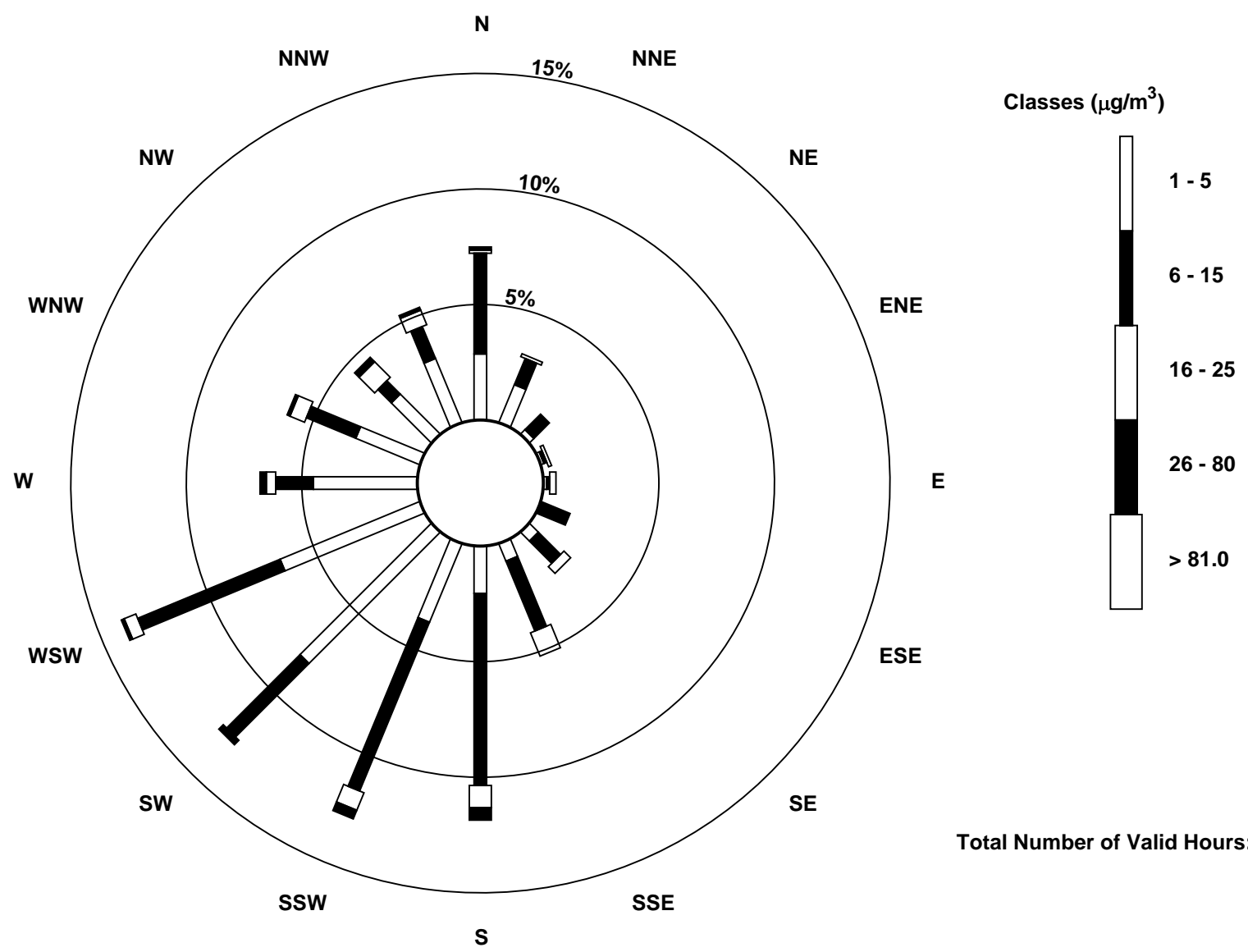
Total Number of Valid Hours: 734

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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

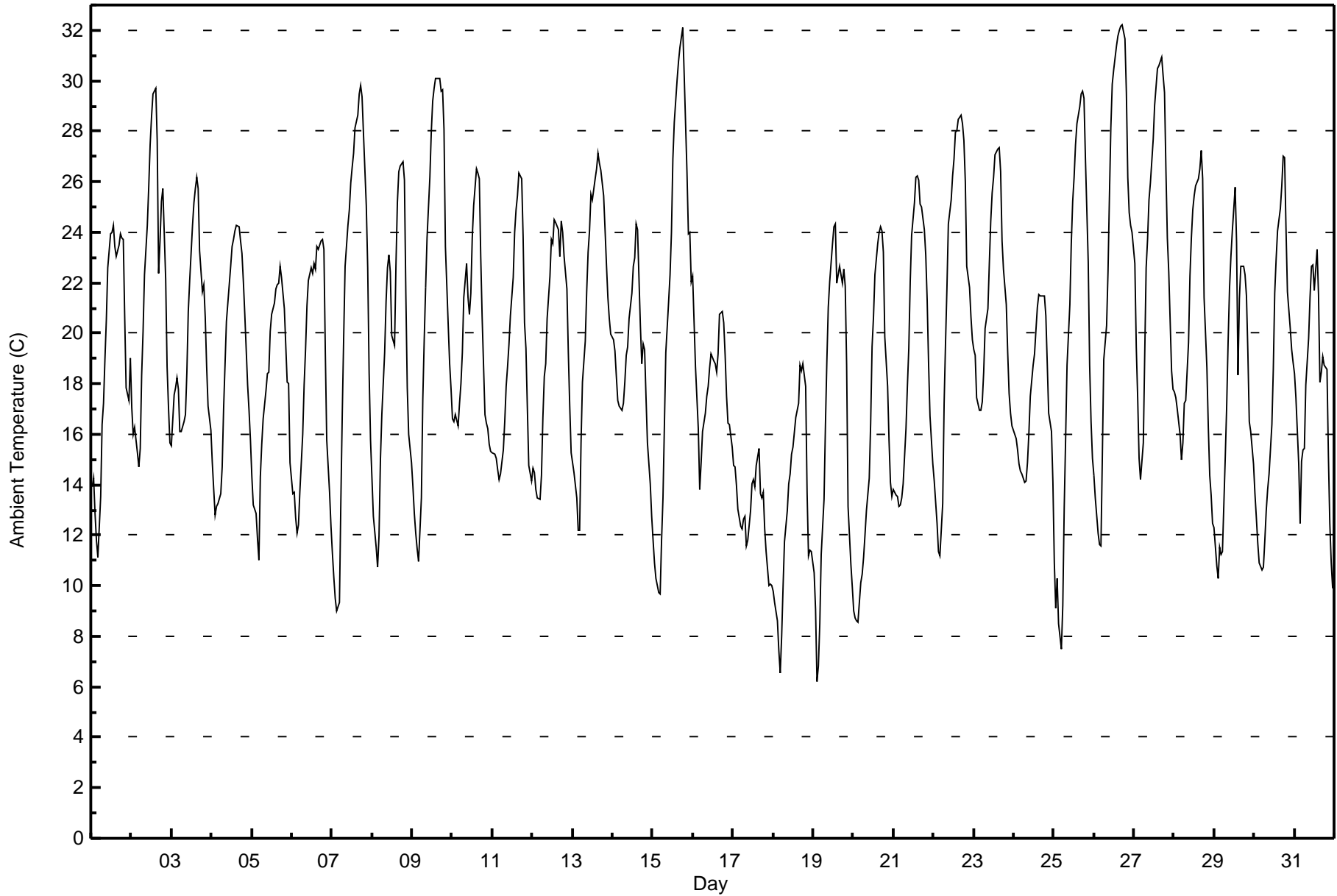
Ambient Temperature (AT) - C
Fort McKay South - July 2017

Maximum Value: 32.2 C on Jul 26 18:00 Maximum Daily Average: 23.9 C on Jul 26																						Hours in Service: 744																									
Minimum Value: 6.2 C on Jul 19 03:00 Minimum Daily Average: 12.9 C on Jul 17																						Hours of Data: 744																									
Maximum Diurnal Average: 24.9 C at hour 16 Minimum Diurnal Average: 12.5 C at hour 5																						Hours of Missing Data: 0																									
Monthly Average: 19.25 C Percentiles: P₁ = 8.5 P₁₀ = 12.0 Q₁ = 14.8 Median = 18.9 Q₃ = 23.5 P₉₀ = 26.4 P₉₉ = 31.6																						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-Jul	13.9	14.3	12.9	11.8	11.2	13.5	16.4	17.2	19.0	20.5	22.6	24.0	24.0	24.3	23.5	23.0	23.5	23.9	23.8	23.7	20.6	17.8	17.3	19.0	19.2	24.3																					
2-Jul	17.1	16.0	16.3	15.3	14.7	15.4	18.4	20.1	22.3	24.3	25.8	27.5	28.6	29.5	29.7	27.6	22.4	23.7	25.2	25.7	22.2	18.7	17.1	15.7	21.6	29.7																					
3-Jul	15.6	17.6	17.8	18.2	17.8	16.1	16.1	16.5	16.8	18.5	20.9	22.1	24.3	25.2	25.7	26.2	25.7	23.3	21.7	21.9	20.7	18.7	17.1	16.2	20.0	26.2																					
4-Jul	14.9	13.8	12.8	13.1	13.3	13.7	14.7	17.0	18.7	20.5	21.9	22.6	23.4	23.7	24.1	24.3	24.2	23.7	23.1	22.0	20.7	17.9	17.0	15.8	19.0	24.3																					
5-Jul	14.3	13.2	12.9	11.9	11.0	14.3	15.6	16.6	17.7	18.4	18.5	20.1	20.8	21.2	21.8	21.9	22.0	22.6	22.2	21.0	19.5	18.1	18.0	14.9	17.8	22.6																					
6-Jul	13.6	13.7	12.7	12.1	12.4	13.7	16.0	18.0	19.4	21.1	22.1	22.6	22.4	22.7	22.6	23.4	23.3	23.7	23.7	23.3	19.3	15.8	13.7	12.4	18.5	23.7																					
7-Jul	11.3	10.3	9.5	9.0	9.3	13.4	16.9	19.9	22.6	24.3	24.9	26.0	26.6	27.1	28.1	28.7	29.5	29.8	29.4	27.9	25.1	22.6	18.5	15.8	21.1	29.8																					
8-Jul	14.2	12.7	11.5	10.7	12.0	15.0	16.8	19.3	21.2	22.6	23.1	22.4	19.9	19.5	22.7	25.1	26.4	26.6	26.8	26.1	21.5	17.8	16.0	14.9	19.4	26.8																					
9-Jul	13.9	12.8	12.1	11.5	10.9	13.5	17.4	19.7	21.8	23.8	26.2	28.0	29.2	29.7	30.1	30.1	30.1	29.6	29.6	28.1	23.4	20.3	18.8	17.8	22.0	30.1																					
10-Jul	16.6	16.5	16.8	16.3	17.3	18.0	19.2	21.4	22.7	21.4	20.7	21.6	23.8	25.1	26.5	26.3	26.1	23.1	20.6	16.8	16.5	16.2	15.6	15.3	20.0	26.5																					
11-Jul	15.3	15.2	15.1	14.6	14.2	14.4	15.4	16.5	17.9	18.7	19.6	20.7	22.2	24.0	24.9	25.4	26.3	26.1	23.8	20.4	19.4	17.0	14.8	14.1	19.0	26.3																					
12-Jul	14.6	14.5	13.8	13.5	13.4	14.4	16.7	18.3	18.8	20.6	22.3	23.7	23.5	24.5	24.4	24.1	23.0	24.4	24.0	23.1	21.8	19.2	17.1	15.3	19.5	24.5																					
13-Jul	14.9	14.5	13.5	12.2	12.2	15.7	18.1	19.7	21.7	23.2	24.0	25.5	25.3	26.1	26.5	27.1	26.7	26.5	25.5	24.1	22.7	21.4	20.6	19.9	21.1	27.1																					
14-Jul	19.7	19.3	18.3	17.3	17.1	17.0	17.2	18.1	19.1	19.5	20.6	21.6	22.6	23.0	24.3	24.1	20.3	18.8	19.6	19.4	17.4	15.6	14.1	12.8	19.0	24.3																					
15-Jul	11.8	10.9	10.3	9.7	9.7	11.8	13.5	16.3	19.2	21.3	22.3	24.0	26.9	28.4	30.0	30.8	31.3	31.7	32.1	30.3	26.4	23.9	24.0	22.1	21.6	32.1																					
16-Jul	22.3	18.7	17.5	16.2	13.8	14.9	16.1	16.8	17.5	17.9	18.6	19.2	18.9	18.8	18.5	19.2	20.7	20.9	20.4	19.1	17.5	16.4	16.4	15.5	18.0	22.3																					
17-Jul	14.8	14.7	14.0	13.0	12.4	12.2	12.6	12.7	11.6	11.8	13.0	14.0	14.2	13.9	14.8	15.4	13.6	13.5	13.7	12.3	11.3	10.0	10.1	10.0	12.9	15.4																					
18-Jul	9.8	9.4	8.6	7.4	6.5	8.0	10.0	11.8	13.0	14.0	14.5	15.2	15.5	16.7	17.0	17.2	18.7	18.5	18.8	17.9	13.7	11.2	11.4	11.3	13.2	18.8																					
19-Jul	10.5	9.1	6.2	6.8	8.5	11.2	13.5	16.4	18.9	21.0	22.0	23.5	24.2	24.3	22.0	22.3	22.6	22.0	22.6	21.8	18.7	13.2	10.8	9.9	16.8	24.3																					
20-Jul	9.0	8.7	8.6	8.6	10.1	10.5	11.1	12.0	13.0	14.3	16.5	19.5	20.6	22.3	23.6	24.0	24.2	24.0	23.2	19.8	17.9	15.8	14.1	13.5	16.0	24.2																					
21-Jul	13.8	13.6	13.5	13.2	13.2	13.5	14.1	16.2	17.9	19.4	22.1	23.9	25.1	26.2	26.2	26.1	25.1	25.0	24.1	23.1	21.3	18.8	16.7	14.8	19.5	26.2																					
22-Jul	14.2	13.3	12.5	11.4	11.2	13.2	17.2	19.6	21.8	24.3	25.3	26.2	26.9	28.0	28.0	28.5	28.7	28.3	27.6	26.0	22.7	21.8	20.6	19.7	21.5	28.7																					
23-Jul	19.4	19.1	17.4	17.0	17.0	17.3	18.4	20.2	21.0	22.8	24.5	25.6	26.2	27.1	27.3	27.4	26.4	23.7	22.5	21.2	19.3	17.6	16.8	16.3	21.3	27.4																					
24-Jul	16.2	15.8	15.4	14.8	14.6	14.5	14.1	14.2	14.9	16.1	17.5	18.7	19.2	20.1	21.0	21.5	21.5	21.5	21.5	20.7	18.8	16.8	16.1	14.1	17.5	21.5																					
25-Jul	10.9	9.1	10.3	8.5	7.5	9.2	13.1	15.8	18.8	21.1	23.5	25.2	26.2	27.5	28.3	29.0	29.5	29.6	29.3	27.0	22.8	18.7	16.5	15.1	19.7	29.6																					
26-Jul	14.4	13.5	12.1	11.7	11.6	15.2	19.0	20.3	22.4	25.4	28.1	29.9	30.5	31.4	31.8	32.0	32.2	32.2	31.6	29.5	26.2	24.8	24.3	24.0	23.9	32.2																					
27-Jul	22.8	19.4	17.5	15.0	14.2	15.7	19.2	22.6	23.7	25.3	25.9	27.7	29.1	29.7	30.5	30.6	30.9	30.2	29.6	26.5	23.8	22.4	18.5	17.8	23.7	30.9																					
28-Jul	17.7	17.5	17.0	16.0	15.0	15.7	17.2	17.3	19.6	22.3	23.8	24.9	25.5	25.9	26.1	26.5	27.2	26.1	21.4	18.6	16.3	14.4	13.6	12.5	19.9	27.2																					
29-Jul	12.3	10.8	10.3	11.5	11.3	11.3	15.1	17.1	19.6	21.8	23.1	24.1	25.8	23.6	18.4	21.4	22.6	22.6	22.3	21.5	19.2	16.5	16.1	14.8	18.0	25.8																					
30-Jul	13.6	12.7	11.7	10.9	10.6	10.7	11.8	13.0	13.8	14.4	16.4	18.6	21.6	22.9	24.0	25.0	25.8	27.0	27.0	24.1	21.7	20.2	19.4	18.9	18.2	27.0																					
31-Jul	18.4	17.4	14.8	12.4	14.9	15.4	15.4	18.0	19.8	21.4	22.6	22.7	21.7	23.3	21.5	18.1	18.4	19.1	18.7	18.6	15.2	12.5	10.9	9.9	17.6	23.3																					
																						14.9	14.1	13.3	12.6	12.5	13.8	15.7	17.4	18.9	20.4	21.7	22.9	23.7	24.4	24.6	24.9	24.8	24.6	24.0	22.6	20.1	17.8	16.5	15.5	Diurnal Average	
																						22.8	19.4	18.3	18.2	17.8	18.0	19.2	22.6	23.7	25.4	28.1	29.9	30.5	31.4	31.8	32.0	32.2	32.2	32.1	30.3	26.4	24.8	24.3	24.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Fort McKay South - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	26	3.49	3.49
10 - 20	391	52.55	56.05
> 20	327	43.95	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

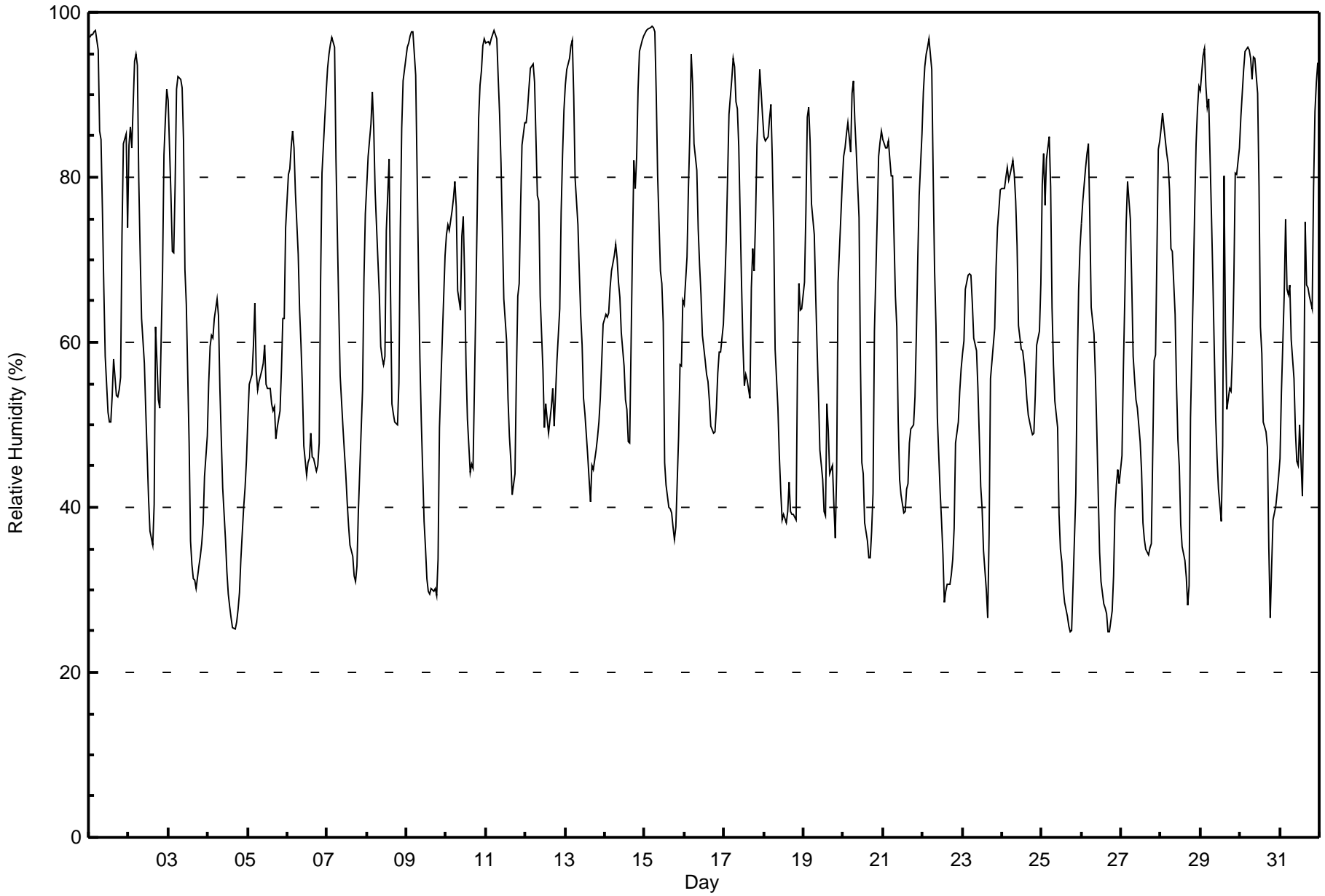
**Relative Humidity (RH) - %
Fort McKay South - July 2017**

Maximum Value: 98 % on Jul 15 05:00																			Maximum Daily Average: 76.2 % on Jul 17						Hours in Service: 744																			
Minimum Value: 25 % on Jul 26 18:00																			Minimum Daily Average: 42.5 % on Jul 4						Hours of Data: 744																			
Maximum Diurnal Average: 85.4 % at hour 5																			Minimum Diurnal Average: 43.0 % at hour 16						Hours of Missing Data: 0																			
Monthly Average: 63.1 %																			Percentiles: P ₁ = 26 P ₁₀ = 36 Q ₁ = 48 Median = 61 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-Jul	97	97	97	98	98	95	86	85	76	67	58	52	50	50	54	58	54	53	54	56	73	84	85	74	72.9	98																		
2-Jul	84	86	84	94	95	94	80	71	63	57	52	46	41	37	35	40	62	58	53	52	69	83	87	91	67.2	95																		
3-Jul	89	78	71	71	79	91	92	92	91	84	69	65	48	36	33	31	31	30	33	34	36	38	44	49	58.9	92																		
4-Jul	55	60	61	61	63	65	63	54	48	42	36	32	29	28	27	25	26	28	30	34	40	42	46	46	42.5	65																		
5-Jul	51	55	56	60	65	56	54	55	57	58	60	55	54	54	52	52	48	50	52	57	63	63	74	74	56.3	74																		
6-Jul	80	81	84	86	84	78	71	64	60	54	47	44	45	46	49	46	46	44	45	48	67	80	87	90	63.6	90																		
7-Jul	93	95	96	97	96	82	73	64	56	50	47	44	41	38	35	34	32	31	33	39	49	54	68	76	59.3	97																		
8-Jul	79	83	86	90	86	78	74	66	59	58	57	58	74	82	66	53	51	50	50	55	74	86	92	94	70.9	94																		
9-Jul	96	96	97	98	98	92	81	69	58	51	38	35	31	30	29	30	30	30	29	34	50	60	65	71	58.3	98																		
10-Jul	73	74	74	76	78	80	76	66	64	73	75	68	57	51	44	45	45	55	65	87	91	93	96	97	70.9	97																		
11-Jul	96	96	96	97	97	98	97	92	88	82	74	65	60	53	49	46	42	44	56	66	67	76	84	87	75.3	98																		
12-Jul	87	88	91	93	94	92	85	78	77	66	57	50	53	51	49	52	54	50	54	58	64	76	83	88	70.3	94																		
13-Jul	91	93	94	96	97	90	80	74	69	63	60	53	51	46	43	41	45	45	47	48	50	53	58	62	64.6	97																		
14-Jul	63	63	64	67	69	71	72	70	67	65	61	57	53	52	48	48	71	82	79	82	91	95	97	97	70.2	97																		
15-Jul	97	98	98	98	98	98	98	90	80	69	67	62	45	43	40	40	39	38	36	38	49	57	57	65	66.7	98																		
16-Jul	65	70	79	85	95	91	84	81	74	69	66	61	58	56	55	53	50	49	49	52	56	59	59	62	65.7	95																		
17-Jul	67	72	80	88	92	94	93	89	88	84	67	60	55	56	55	53	67	71	69	75	84	93	90	87	76.2	94																		
18-Jul	85	84	85	87	89	82	73	59	52	46	42	38	39	38	39	43	39	39	39	39	57	67	64	64	58.0	89																		
19-Jul	67	76	87	88	84	77	73	66	59	54	47	43	39	39	53	49	44	45	40	36	44	67	75	79	59.8	88																		
20-Jul	83	84	85	87	83	90	92	87	83	75	57	45	44	38	36	34	34	37	42	61	75	83	84	86	66.9	92																		
21-Jul	85	84	84	84	82	80	80	66	62	50	43	42	39	39	42	43	48	50	50	53	61	70	78	85	62.5	85																		
22-Jul	90	93	95	96	97	93	80	69	62	51	42	38	34	29	30	31	31	32	34	37	48	50	54	57	57.2	97																		
23-Jul	59	60	67	68	68	68	65	60	59	54	48	43	40	35	30	27	37	56	58	62	69	74	76	79	56.7	79																		
24-Jul	79	79	80	81	80	80	82	80	77	72	62	59	59	57	56	53	51	50	49	49	54	60	61	67	65.7	82																		
25-Jul	79	83	77	82	85	79	64	57	53	50	39	35	33	30	28	27	26	25	25	30	42	56	66	72	51.8	85																		
26-Jul	74	77	81	83	84	75	64	61	56	49	42	35	31	28	28	27	25	25	27	32	40	43	45	43	49.0	84																		
27-Jul	46	57	65	74	80	75	67	58	56	53	52	48	44	38	36	35	34	35	36	47	58	59	83	84	55.0	84																		
28-Jul	86	88	86	83	82	79	71	71	63	55	48	45	38	35	34	32	28	30	51	67	76	84	88	91	63.0	91																		
29-Jul	91	95	96	91	88	89	75	68	59	51	46	42	38	47	80	61	52	54	54	59	68	80	80	84	68.7	96																		
30-Jul	87	90	93	95	96	95	94	92	95	94	90	79	62	59	50	49	47	35	27	33	38	40	42	44	67.8	96																		
31-Jul	46	54	66	75	66	66	67	60	56	49	46	45	50	41	52	75	67	67	66	64	79	88	92	94	63.7	94																		
																			78.1	80.3	82.4	84.8	85.4	83.0	77.6	71.4	66.6	61.1	54.7	49.8	46.4	44.0	43.8	43.0	43.8	44.6	46.0	50.8	60.3	68.2	72.4	75.4	Diurnal Average	
																			97	98	98	98	98	98	98	92	95	94	90	79	74	82	80	75	71	82	79	87	91	95	97	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort McKay South - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - July 2017

Maximum Speed: 27 km/h on Jul 24 17:00	Maximum Daily Speed Average: 18.2 km/h on Jul 24	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 11 04:00	Minimum Daily Speed Average: 0.6 km/h on Jul 20	Hours of Data: 744
Maximum Diurnal Speed Average: 4.6 km/h at hour 14	Minimum Diurnal Speed Average: 1.8 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 2.9 km/h 246.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 11 P ₉₀ = 14 P ₉₉ = 23	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-Jul	SSW2	W1	SW2	SSW3	SSW3	S3	SSE8	SE10	SE9	SSE8	SSE12	S11	SSE12	S12	S7	SSW5	SSE5	SSW5	S2	ESE3	WSW1	WSW3	SSW4	SSW10	S5.3	SSE12
2-Jul	S4	S8	S9	SSW8	S4	S3	S13	SSE14	S14	S13	S15	S15	S16	S17	S18	SSW14	NW6	E5	ESE4	SSE5	WSW1	WNW2	WSW2	WSW2	S7.7	S18
3-Jul	S5	SSW8	S5	S10	SSW8	S5	S6	SSW4	S7	S10	SSW12	SSW12	SW12	WSW12	SW13	SW12	WSW13	SW16	SSW13	SSW13	SW10	SW7	SW11	WSW7	SSW9.0	SW16
4-Jul	SSW9	SSW8	SSW9	SW10	WSW12	SW10	SW11	WSW15	WSW15	SW15	SW19	SW19	SW19	SW20	WSW19	WSW18	WSW18	WSW18	WSW14	WSW11	SW6	SW7	SW7	SW7	SSW12.9	SW20
5-Jul	SW6	SW5	WSW7	SW6	SSW6	W6	WSW9	W11	WNW11	WNW11	NW12	NW12	WNW10	NW11	NW12	NNW11	NNW13	NNW15	NW13	NNW12	NW6	WNW5	NW6	WSW2	WNW7.5	NNW15
6-Jul	WSW8	W7	W6	WSW8	WSW6	WSW8	WSW9	WNW8	W8	W7	NW10	NNW11	NNE9	NNW8	NNW8	NNW13	NNW10	NW9	N6	NNE3	W2	SW1	WSW3	WSW3	WNW5.2	NNW13
7-Jul	SW1	WSW2	SW3	S3	S1	S5	S5	S5	S6	SW7	WNW6	WSW5	SW3	W6	W1	WNW2	W5	W2	SE7	SSE4	N6	N6	NW3	WSW2	SW2.1	SW7
8-Jul	WSW3	SW2	W1	SW2	WSW2	NNW2	NW2	NE4	NNE2	SW3	SW9	WSW11	SSW7	SSE2	W3	WSW6	SSW8	SW7	WSW4	SSW5	WSW5	SW3	WSW2	WSW2	WSW3.1	WSW11
9-Jul	SW2	WSW3	SW2	W2	WSW3	NW1	ENE1	ESE6	SE6	ESE6	SSE10	SSE13	SSE14	SSE13	SSE14	SSE15	S12	S11	SSE11	S7	SSW3	WSW2	SW2	W3	SSE5.7	SSE15
10-Jul	SW3	SSW3	W1	SSW5	SSE3	S5	WSW3	WSW5	WSW5	SW9	SW9	WSW7	WSW8	SW7	SSW5	ESE7	ESE8	E10	NNW7	WSW10	SSW7	N8	WNW2	W3	SW2.9	E10
11-Jul	WNW2	W3	SSW1	SSE1	WSW2	W2	N2	NW4	NW6	NNW6	W6	WNW8	WNW7	WNW7	WNW7	NW6	WSW4	WSW7	SSW7	SSW13	SW6	S5	SW2	SW4	W3.5	SSW13
12-Jul	SSW3	S2	SSW3	SSW4	S2	W1	SSE3	SE7	SE6	SSW5	SSW5	SSW8	S6	S6	SSW7	S11	S12	S14	S10	S9	S5	SW2	SSW2	SSW4	S5.4	S14
13-Jul	SSW2	SSW3	SW3	SSW3	SSW4	SSW6	SSW5	SW5	SSE5	SSE6	E5	SE8	NE5	ESE2	NE6	NNE9	NNE10	N11	N15	N16	N13	NNW10	N11	NNW10	N2.8	N16
14-Jul	NNW14	N15	N15	N12	N12	N13	N13	NNE15	NNE16	N17	N14	NNE12	NNE10	NE6	NE5	NNE6	NW8	N15	NNE7	NNW4	WNW3	WNW2	WSW2	SW2	N9.1	N17
15-Jul	SSW2	SW3	W2	SW3	WSW3	S1	S4	SSE5	SE6	SE8	NNE5	ENE5	SSE14	SSE18	SSE20	SE18	SE17	SSE13	S9	SSE6	S7	S8	S5	SSE7.2	SSE20	
16-Jul	WNW8	NNW17	NW4	WSW4	SSW5	SSW7	SW7	W5	W6	WSW5	SSW6	SW8	SSW13	SSW14	SSW12	SW12	WSW14	WSW13	WSW11	SW11	SW10	SW10	WSW11	WSW11	WSW7.8	NNW17
17-Jul	W12	W9	W9	WSW11	WSW7	W9	WNW7	NW11	NNW11	NNW14	N19	N19	N17	NNW13	NW9	NNW10	NW8	NNW8	NNW6	NNW6	WNW4	WSW3	WNW7	WNW6	NW7.7	N19
18-Jul	WNW5	NW6	WNW6	WNW5	W5	W6	WNW4	NNW4	ENE6	NNW5	WNW4	NW6	W3	WSW8	WSW8	SW10	SW11	SW9	W2	W5	SW5	WSW7	SW8	SW8	W4.6	SW11
19-Jul	SW7	WSW3	WNW2	SW5	SW5	SW5	SW7	SW10	SW9	SW10	SW10	WSW10	W9	WNW10	N16	NNE14	NNE17	NNE9	NNE8	NNE9	N4	W3	WSW3	WNW1	WNW2.9	NNE17
20-Jul	NW4	NNW3	WSW2	NNW3	NW3	WNW1	WSW2	NW3	NW2	NNE4	E5	SSE9	SSE8	SE6	SE6	SE7	ESE5	NE5	NE3	W2	NW3	NW3	W2	W3	ESE0.6	SSE9
21-Jul	W2	WSW2	WNW1	NNW2	NNW3	WNW3	NNW3	WNW3	NE4	ESE3	SE6	SE8	SSE11	SSE15	S15	S14	S8	SSE9	SSE12	S8	S8	S5	SW4	S4	S4.5	S15
22-Jul	S3	SSW3	SW3	SSW4	SSW5	S5	S9	S13	S11	SSW12	SW13	WSW13	WSW13	SW14	SW14	SW14	WSW13	WSW12	WSW10	WSW6	SSW5	SSW7	SSW8	SSW7	SW8.3	SW14
23-Jul	SSW7	SW6	SSW5	SW8	WSW8	WSW9	WSW9	W8	W8	NW5	W7	WSW11	SW11	SW14	SW14	WSW13	NNW10	N19	NNE15	N15	N17	N12	N12	N17	WNW5.1	N19
24-Jul	N17	N18	N18	N19	N19	N20	N19	N19	N18	N19	N25	N26	N23	N23	N23	N25	N27	N22	N20	NNW16	NW9	WNW8	NW7	NW4	N18.2	N27
25-Jul	E1	SSW3	WNW2	SSW2	S2	SSE3	S5	SSW5	SSW8	SSE8	SW8	SW9	WNW7	SW7	SW8	SSW9	SSW9	SSW9	SSW8	SSW7	SSW5	SW2	SW3	SW2	SSW4.8	SSW9
26-Jul	WNW2	SSW3	SSW4	SSW3	S5	S8	S11	SSW9	SSW9	S11	SSW11	SW10	SW9	S13	S13	S13	S13	S11	S11	S10	SSW8	SSW9	SSW10	SSW11	SSW8.5	S13
27-Jul	SSW7	S5	SW3	WSW3	SSW3	S4	S9	S10	SSW10	SSW9	S13	SSW10	SSW10	SW9	W8	W8	WNW7	WNW7	NW6	WNW4	W9	WNW13	WNW4	W4	SW5.2	WNW13
28-Jul	WSW3	WSW8	WSW8	WSW8	SW7	SW6	WSW6	WSW7	WSW7	WSW11	WSW14	WSW12	NW12	WNW12	WNW12	WNW12	NW11	W9	W9	NNE12	S2	SSW5	SSW3	WSW1	W6.5	WSW14
29-Jul	WSW4	S2	SW3	WSW7	SW3	SE1	S5	SW6	SW4	N3	E6	NE2	SSW6	NW11	N6	NNE8	N11	N11	N11	NNE9	N6	NNW5	NNW6	NNW6	NNW2.6	N11
30-Jul	NNW3	NNW4	NNW3	NW2	WSW3	WSW3	SW3	S4	ENE1	S4	S5	S8	S8	SSE12	S16	SSE18	S19	SSW11	SW11	SW6	SW7	WSW8	WSW8	WSW10	SSW5.4	S19
31-Jul	WNW10	WNW7	SSW3	SW6	W10	W11	W10	W9	W9	W9	WNW10	NW12	NNW12	NW14	N16	N7	NNW14	N17	N15	NNW8	W3	WSW2	SSW1	S2	NW6.6	N17

W3.0	W2.5	WSW2.5	WSW3.2	WSW3.0	WSW2.8	SW3.4	SW2.8	SW2.5	SW2.8	WSW3.5	WSW3.9	SW3.7	SW4.6	SW3.5	SW3.1	W2.8	WNW2.3	W1.9	W1.8	W2.6	W3.1	WSW3.2	WSW3.2	Diurnal Average
N17	N18	N18	N19	N19	N20	N19	N19	N18	N19	N25	N26	N23	N23	N23	N25	N27	N22	N20	N16	N17	WNW13	N12	N17	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

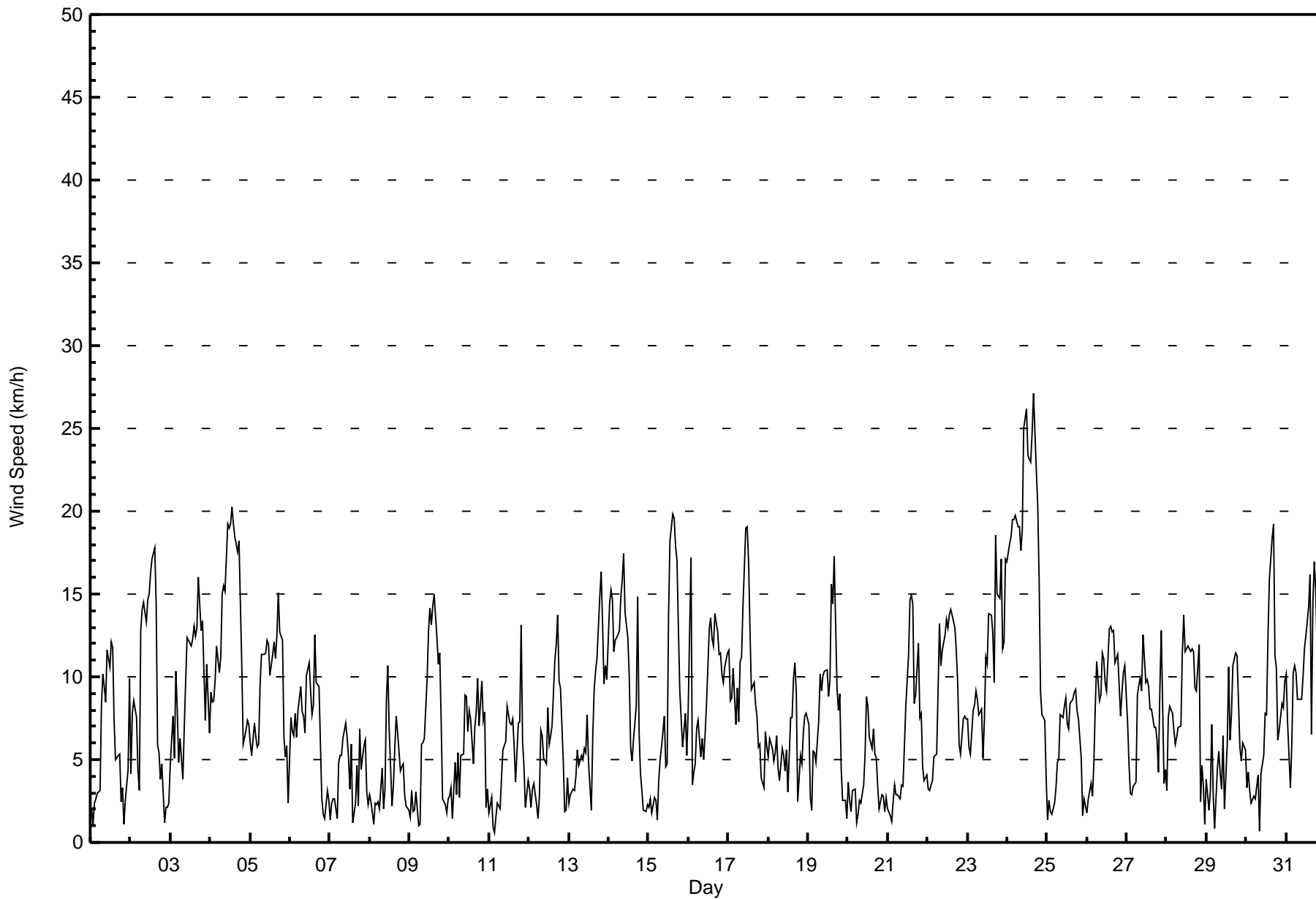
Wind Speed (WS) - km/h
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jul 16 01:00 Minimum Value: 1 km/h on Jul 30 06:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 744 Hours of Data: 744 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-Jul	1	1	2	1	1	2	2	2	2	2	3	3	4	3	2	1	1	3	1	1	1	1	2	3	4
2-Jul	2	2	2	2	1	1	4	3	3	4	4	4	4	4	4	5	3	2	2	1	1	1	1	1	5
3-Jul	2	3	3	2	3	2	1	2	2	3	3	4	4	5	5	4	6	6	4	4	4	3	5	3	6
4-Jul	3	2	2	3	4	4	4	5	5	5	6	7	6	7	7	7	7	7	5	4	2	2	2	2	7
5-Jul	1	1	2	1	1	3	4	4	5	5	4	4	4	4	4	5	4	5	4	4	3	1	1	1	5
6-Jul	3	2	4	4	2	3	3	3	3	3	4	4	3	3	4	4	4	3	2	1	1	1	1	1	4
7-Jul	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	2	2	2	3	3	1	2	3
8-Jul	1	1	1	1	2	1	2	2	1	2	3	3	3	2	2	2	2	2	1	1	1	1	1	1	3
9-Jul	2	1	1	1	1	1	1	1	2	2	3	3	5	4	4	4	3	3	3	3	1	1	1	2	5
10-Jul	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3	3	3	2	3	1	2	3
11-Jul	2	1	2	1	1	2	1	2	2	2	2	3	3	3	3	3	2	3	6	5	4	2	1	1	6
12-Jul	1	1	1	1	1	1	2	1	1	2	2	2	2	3	2	4	2	3	3	2	1	1	1	1	4
13-Jul	1	1	1	1	1	2	2	1	2	2	2	4	2	2	2	3	2	3	3	4	3	2	2	2	4
14-Jul	3	4	3	4	3	3	3	3	4	4	4	3	3	3	3	2	4	4	2	1	1	1	1	1	4
15-Jul	1	1	1	1	2	1	1	2	3	3	1	2	3	4	5	4	4	4	3	2	2	3	3	2	5
16-Jul	10	8	2	4	2	2	2	2	3	3	2	3	3	4	4	4	5	5	5	4	3	3	4	4	10
17-Jul	4	3	4	3	2	3	2	4	3	5	5	6	5	5	3	4	5	2	4	3	2	2	2	2	6
18-Jul	1	2	2	2	1	2	2	2	2	3	3	3	3	4	4	4	4	4	2	2	1	1	1	2	4
19-Jul	1	1	1	1	2	2	4	4	3	3	4	4	4	4	6	4	5	3	2	2	2	1	1	1	6
20-Jul	1	2	1	1	1	1	1	1	1	1	2	2	3	3	3	2	2	1	2	2	2	1	1	1	3
21-Jul	1	1	1	1	1	1	2	2	2	2	3	3	3	4	4	4	2	3	3	2	1	2	2	1	4
22-Jul	1	1	1	1	1	1	2	3	3	4	4	4	5	5	5	5	5	4	4	3	1	2	2	2	5
23-Jul	2	1	1	2	3	2	3	3	3	2	3	4	4	5	5	5	6	4	4	3	4	3	3	4	6
24-Jul	3	4	4	5	4	4	4	4	4	5	6	5	5	6	6	6	6	6	5	5	3	2	2	2	6
25-Jul	1	1	2	1	1	1	1	1	2	2	4	4	3	3	4	4	3	3	2	2	1	1	1	1	4
26-Jul	1	2	1	1	1	2	2	2	3	3	4	4	4	5	4	5	4	3	3	2	1	3	2	3	5
27-Jul	2	1	2	2	1	1	2	2	3	3	4	3	3	4	3	3	2	2	2	3	3	7	2	2	7
28-Jul	2	2	2	3	2	2	2	3	3	4	5	5	5	5	5	5	5	4	6	6	2	1	2	1	6
29-Jul	2	1	3	3	3	1	1	2	2	3	2	4	3	8	3	3	3	3	2	2	2	1	1	1	8
30-Jul	1	1	1	1	1	1	1	1	1	3	2	2	2	3	4	4	4	4	4	2	2	2	2	3	4
31-Jul	3	2	1	3	3	3	3	3	3	4	4	4	4	6	5	5	4	4	4	4	1	1	1	1	6
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Fort McKay South - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	272	36.56	36.56
6 - 11	312	41.94	78.49
12 - 19	147	19.76	98.25
20 - 28	13	1.75	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - July 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	4	7	3	3	6	1	10	36	45	35	44	26	22	14	13	272
6 - 11	10	12	2	1	2	4	14	11	34	41	51	43	27	22	18	20	312
12 - 19	34	7	0	0	0	0	2	15	22	10	15	19	1	4	7	11	147
20 - 28	10	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	13
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	23	9	4	5	10	17	38	92	96	102	106	54	48	39	44	744

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - July 2017

Direction of Maximum Speed: 353 deg on Jul 24 17:00 Direction of Maximum Daily Speed Average: 357.8 deg on Jul 24	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 163 deg on Jul 11 04:00 Direction of Minimum Daily Speed Average: 0.6 deg on Jul 20	Percent Operational Time: 100.0
Monthly Average Direction: 250.6 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-Jul	210	265	235	196	200	174	166	137	142	163	165	176	159	169	185	197	152	208	173	105	253	253	210	192	173.0
2-Jul	177	188	184	196	185	187	171	168	178	188	191	176	178	181	170	201	316	101	102	154	242	293	258	245	181.4
3-Jul	186	192	183	180	194	185	183	196	187	175	194	209	222	244	233	220	239	225	207	205	233	235	228	240	211.9
4-Jul	212	201	206	217	239	231	229	248	241	228	219	229	226	231	237	242	252	252	250	251	234	219	220	220	233.0
5-Jul	221	228	247	215	194	265	250	274	291	290	304	313	299	315	309	331	340	331	311	330	312	284	306	250	296.6
6-Jul	254	265	260	257	251	244	251	283	266	279	306	346	14	341	348	328	330	320	353	31	276	223	247	242	298.8
7-Jul	219	238	223	190	170	178	186	185	191	218	299	244	234	279	266	293	268	265	137	168	358	356	315	249	231.9
8-Jul	250	236	280	225	254	342	320	36	31	218	235	243	206	162	265	238	208	229	257	204	254	217	246	255	237.0
9-Jul	234	248	226	264	238	307	63	123	126	110	149	154	163	158	159	163	169	171	167	177	192	248	215	263	165.1
10-Jul	224	210	266	192	164	174	256	257	251	214	231	249	258	227	202	111	115	90	330	240	210	355	290	271	224.1
11-Jul	284	270	198	163	252	278	355	319	319	328	270	286	290	286	291	323	249	246	204	204	230	185	234	215	263.9
12-Jul	201	191	205	197	180	259	166	134	139	196	206	198	190	188	194	174	177	178	179	175	178	236	201	206	182.6
13-Jul	205	207	231	210	196	205	192	215	159	158	98	139	45	102	34	19	13	11	357	360	355	344	349	343	5.9
14-Jul	346	360	360	353	355	359	7	16	15	10	11	19	18	35	55	27	315	358	13	327	295	291	244	231	2.8
15-Jul	213	234	263	217	254	186	174	163	126	139	22	73	148	147	153	150	143	143	156	177	168	187	172	185	155.1
16-Jul	293	340	316	246	212	211	229	268	260	250	206	215	205	204	210	223	246	245	250	235	232	236	240	250	239.0
17-Jul	260	275	262	244	256	261	286	322	335	343	356	356	355	333	325	348	320	338	333	345	297	255	288	294	317.8
18-Jul	297	314	299	283	272	270	297	340	59	329	303	308	262	249	257	234	219	233	270	264	232	239	236	230	264.3
19-Jul	233	242	292	231	229	222	236	232	219	231	235	249	265	291	7	29	16	27	32	33	5	269	247	299	291.6
20-Jul	323	335	248	337	323	283	240	311	326	26	99	155	155	135	129	132	113	41	46	262	318	321	278	260	108.6
21-Jul	281	254	292	329	346	295	339	299	39	109	144	135	154	165	182	183	185	157	164	179	178	182	214	181	172.7
22-Jul	190	211	222	203	194	186	176	182	187	203	235	244	253	235	236	231	243	242	239	241	207	208	212	208	220.9
23-Jul	212	214	205	224	245	238	254	265	272	323	270	253	235	227	232	244	335	4	19	11	6	354	354	2	294.9
24-Jul	4	4	0	1	2	6	359	1	359	7	4	6	359	5	5	1	353	353	350	348	326	300	311	323	357.8
25-Jul	83	206	285	213	186	154	191	205	205	165	222	228	292	231	218	208	207	205	201	194	205	222	222	232	210.1
26-Jul	284	211	205	197	177	174	182	198	193	181	196	221	235	183	175	179	176	186	186	190	194	202	204	211	192.3
27-Jul	199	190	219	240	204	183	173	170	194	200	181	210	205	234	261	262	284	299	310	298	261	292	303	260	229.3
28-Jul	255	240	248	247	226	236	243	239	239	248	252	256	307	299	301	293	306	272	278	19	182	202	193	250	267.1
29-Jul	250	177	226	244	224	126	190	226	228	10	95	45	205	307	1	22	7	5	7	21	6	344	341	341	342.5
30-Jul	330	327	327	305	248	257	215	184	78	177	187	190	169	154	170	168	170	195	224	217	224	239	254	256	199.0
31-Jul	286	287	202	234	259	261	259	275	279	279	301	319	342	317	350	359	346	8	5	344	273	240	210	178	311.3
	260.4	268.8	257.7	240.6	242.2	240.5	226.4	235.7	231.0	230.9	239.5	242.6	233.9	230.8	230.7	227.1	266.5	282.5	279.8	263.1	259.8	261.6	254.4	249.7	
	Diurnal Average																								

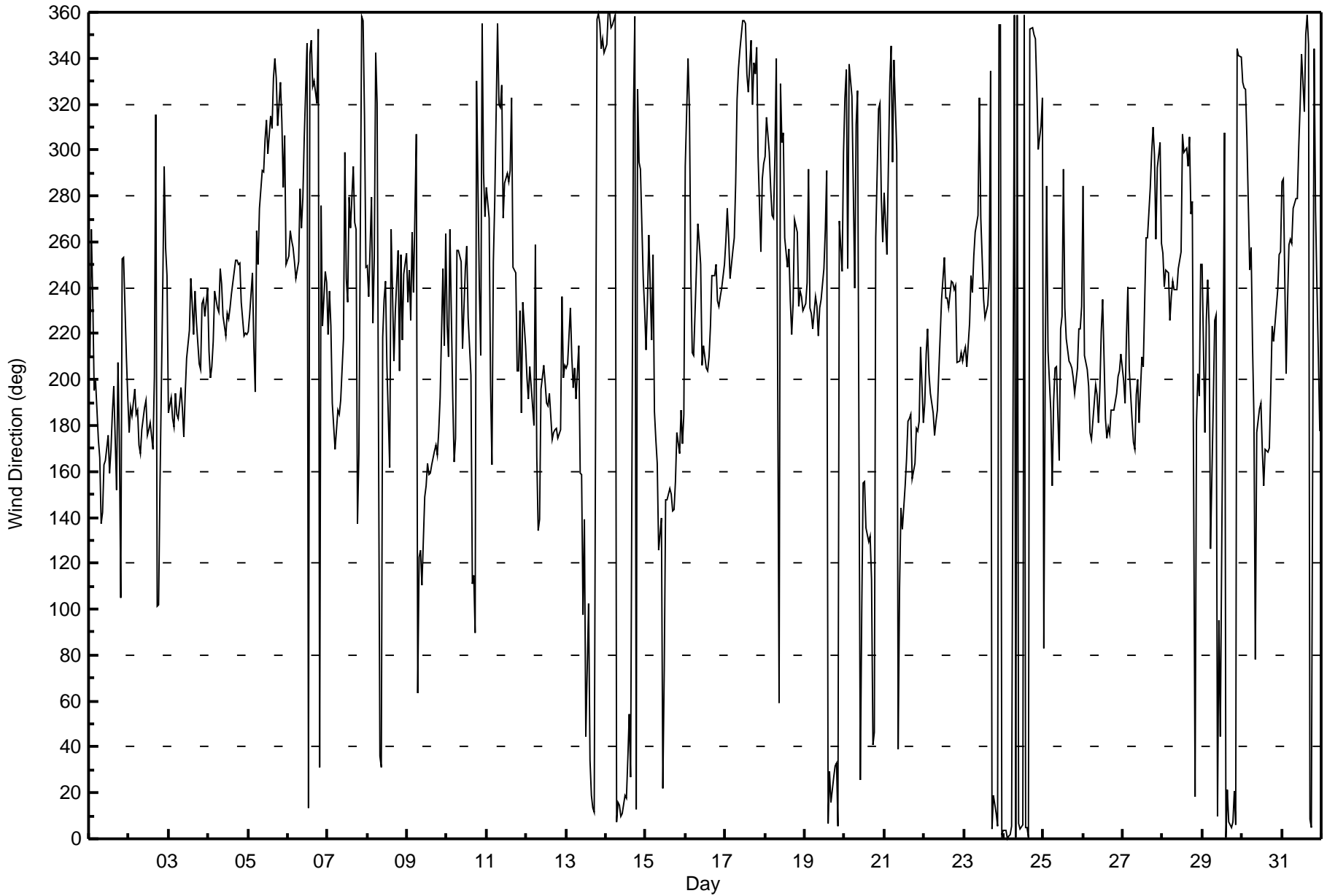
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Jul 7 15:00 Minimum Value: 7 deg on Jul 18 22:00 Percentiles: P ₁ = 10 P ₁₀ = 16 Q ₁ = 20 Median = 29 Q ₃ = 42 P ₉₀ = 57 P ₉₉ = 87		Hours in Service: 744 Hours of Data: 744 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-Jul	49	64	65	37	23	35	18	17	23	28	25	34	23	28	19	23	26	43	69	36	39	21	28	13	69	
2-Jul	30	10	14	13	26	35	10	15	16	22	19	22	20	22	18	49	63	25	56	20	75	47	65	45	75	
3-Jul	22	14	43	14	16	36	23	37	29	20	20	29	30	36	33	29	31	27	21	20	32	31	34	43	43	
4-Jul	21	18	19	24	26	27	28	26	26	25	27	30	29	27	30	30	31	27	28	27	24	18	21	21	31	
5-Jul	19	24	18	20	18	54	35	34	35	38	29	38	37	30	33	30	21	22	25	21	19	17	16	46	54	
6-Jul	31	17	47	54	22	20	27	41	45	59	43	41	37	37	45	32	32	23	39	52	28	60	11	19	60	
7-Jul	55	40	17	39	71	14	37	42	35	47	52	62	88	56	106	90	67	84	25	49	36	20	17	48	106	
8-Jul	34	33	75	33	57	59	60	34	76	57	26	24	35	82	64	40	32	35	40	22	8	29	51	41	82	
9-Jul	66	40	55	56	30	65	76	24	26	38	22	20	23	27	28	21	21	20	17	16	36	41	45	39	76	
10-Jul	43	28	77	24	72	29	63	41	43	22	24	28	32	37	69	34	23	33	49	28	31	23	46	45	77	
11-Jul	82	52	87	105	58	47	64	31	24	42	34	32	45	51	48	50	63	49	31	29	53	20	72	24	105	
12-Jul	31	35	29	19	55	39	69	16	20	47	54	32	33	43	30	25	14	16	17	14	17	49	29	14	69	
13-Jul	26	31	40	27	21	29	43	37	58	53	60	48	52	83	34	28	18	21	17	17	16	12	14	14	83	
14-Jul	16	15	16	14	15	18	15	18	20	19	21	24	28	54	69	41	46	18	31	19	18	55	24	39	69	
15-Jul	42	21	54	39	39	72	39	28	44	22	39	48	15	15	15	16	14	13	15	13	18	14	22	21	72	
16-Jul	47	25	59	82	44	22	32	52	45	52	33	33	22	20	22	31	28	29	33	25	25	26	26	25	82	
17-Jul	26	28	26	21	28	22	25	20	18	19	20	20	22	25	33	34	24	29	32	25	51	41	20	21	51	
18-Jul	18	18	19	20	18	19	44	61	50	70	72	62	83	59	51	39	35	35	65	28	8	7	12	13	83	
19-Jul	12	31	47	15	22	36	35	28	32	37	35	43	50	41	43	22	19	27	29	19	37	23	57	56	57	
20-Jul	12	45	43	22	28	45	55	33	42	31	35	25	29	54	57	31	31	26	34	34	55	40	41	34	57	
21-Jul	37	31	40	35	43	37	38	54	66	52	52	28	22	21	22	20	18	26	15	14	10	19	20	22	66	
22-Jul	19	18	20	18	14	14	14	13	19	25	30	28	32	34	31	34	31	29	27	22	13	16	17	16	34	
23-Jul	18	18	15	20	20	20	28	31	42	61	53	37	36	37	34	40	59	18	23	17	16	15	15	16	61	
24-Jul	15	16	17	16	16	16	17	16	17	17	17	17	18	19	19	18	19	19	20	17	18	17	14	17	43	43
25-Jul	66	46	93	64	48	29	28	33	26	29	49	43	50	58	52	46	31	24	19	10	11	67	20	31	93	
26-Jul	45	71	25	27	11	10	14	20	25	21	29	44	43	29	27	35	26	26	16	10	9	13	15	19	71	
27-Jul	23	22	37	18	33	21	12	20	23	30	22	30	28	35	37	42	36	27	23	56	25	30	56	46	56	
28-Jul	75	21	18	21	25	41	35	33	45	31	31	43	44	34	37	32	35	34	51	26	60	34	38	75	75	
29-Jul	42	62	68	32	85	87	32	35	63	75	50	88	75	49	40	27	17	18	15	18	22	14	15	10	88	
30-Jul	39	20	15	31	25	37	31	30	87	68	24	21	40	22	18	17	15	37	25	18	17	19	21	24	87	
31-Jul	26	24	47	36	20	23	19	31	35	45	45	33	27	28	26	58	20	18	17	19	21	38	83	56	83	
		82	71	93	105	85	87	76	61	87	75	72	88	88	83	106	90	67	84	69	56	75	67	83	75	
		Diurnal Maximum																								





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Fort McKay South	Station number:	AMS 13
Calibration Date:	July 10, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	8:10	End time (MST):	13:06
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	1.000823	1.000057	Lamp voltage	2172	2172
Calculated intercept	0.993549	2.055394	Pressure	26.1	26.1
Analyzer Background	32.9	34.9	Flow	685	685
Analyzer Coefficient	1.052	1.053	Lamp Ratio	73	73

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	1.0	----
as found span	4923	78.8	784.6	780.8	1.005
calibrator zero	5000	0.0	0.0	0.1	----
high point	4923	78.8	784.6	783.9	1.001
second point	4961	39.4	392.4	388.1	1.011
third point	4977	19.7	196.3	192.9	1.018
as left zero	5000	0.0	0.0	0.1	----
as left span	4923	78.8	784.6	776.3	1.011

Average Correction Factor				1.010	
Corrected As found	779.80	Previous response	782.93	*% change	0.4%

* = > +/-5% change initiates investigation

Notes:

zero adjusted, no maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

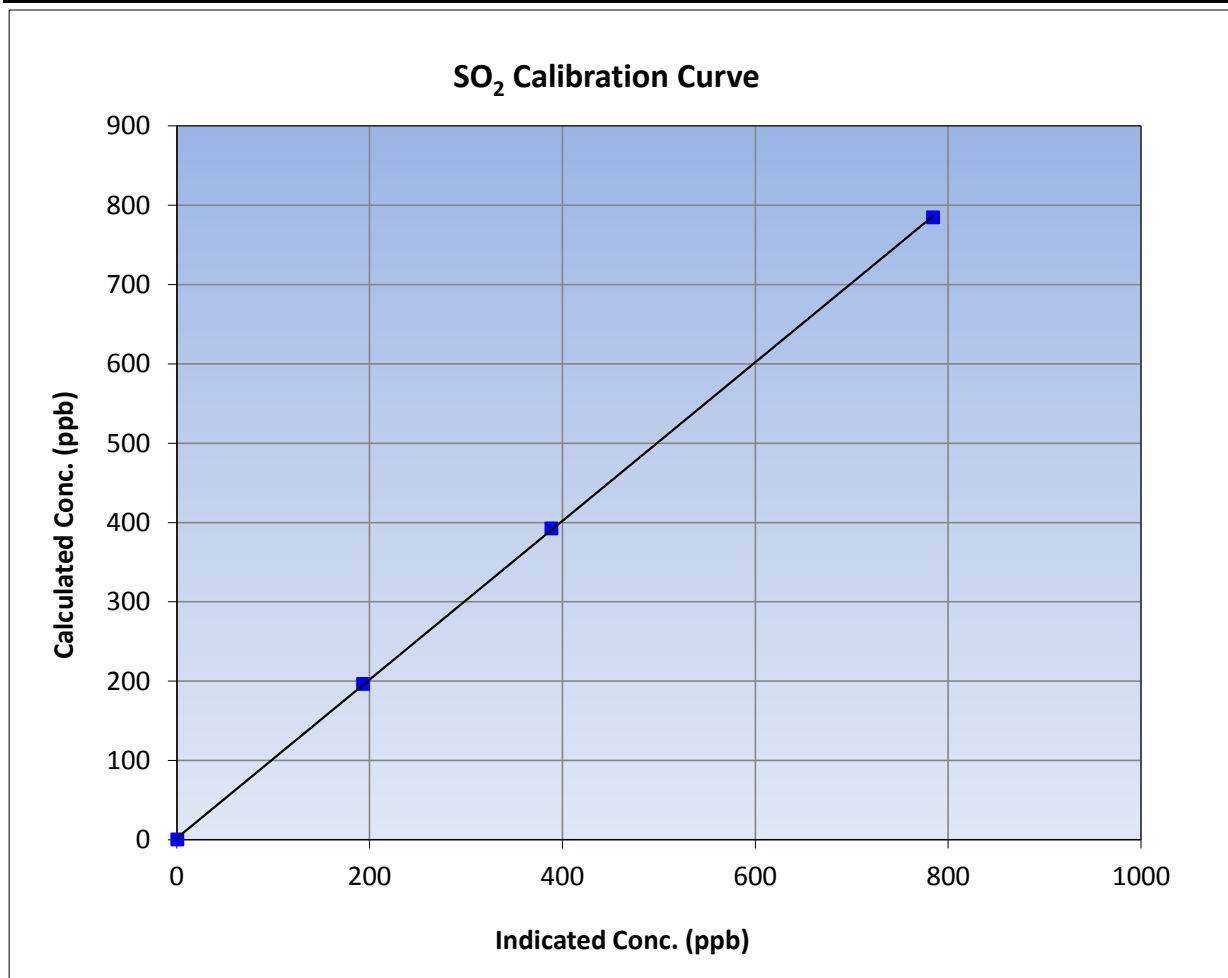
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 7, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:10	End Time (MST)	13:06
Analyzer make	API T100	Analyzer serial #	599

Calibration Data

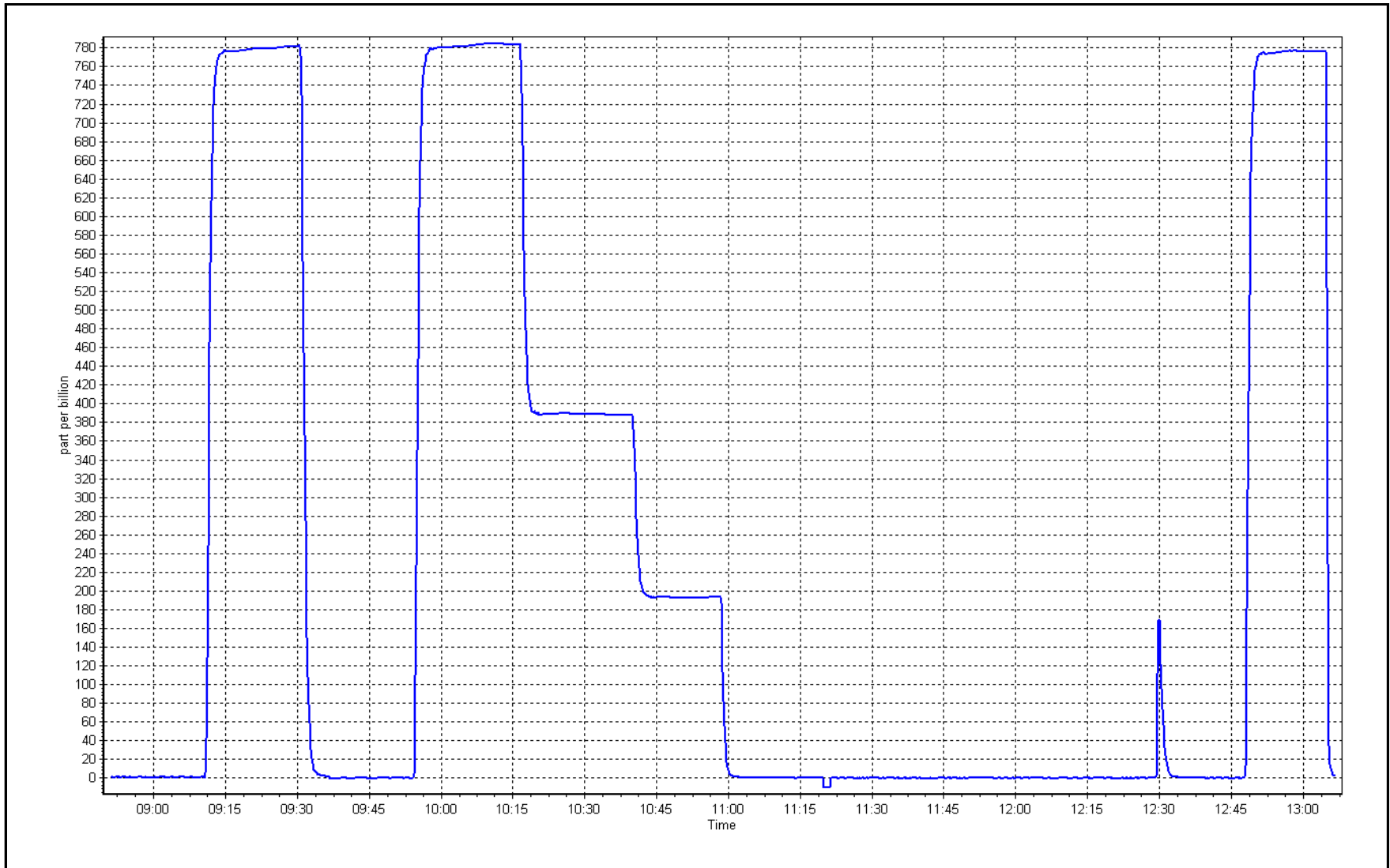
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999960	≥0.995
784.6	783.9	1.0008	Slope	1.000057	0.90 - 1.10
392.4	388.1	1.0111	Intercept	2.055394	+/-30
196.3	192.9	1.0178			



SO2 Calibration Plot

Date: July 10, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

TRS Calibration Summary

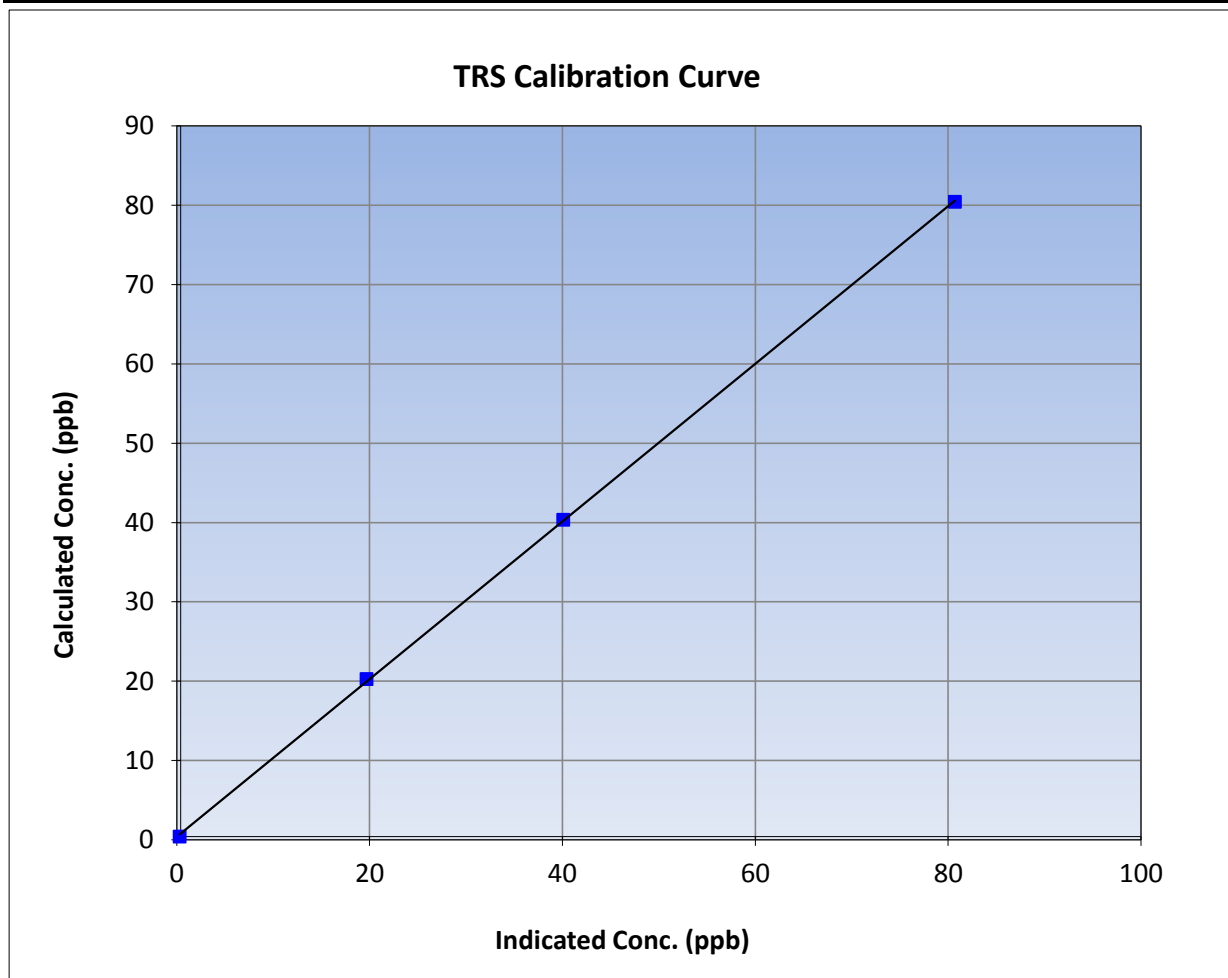
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 8, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	10:55	End Time (MST)	13:35
Analyzer make	Thermo 43i-LTE	Analyzer serial #	1218153359

Calibration Data

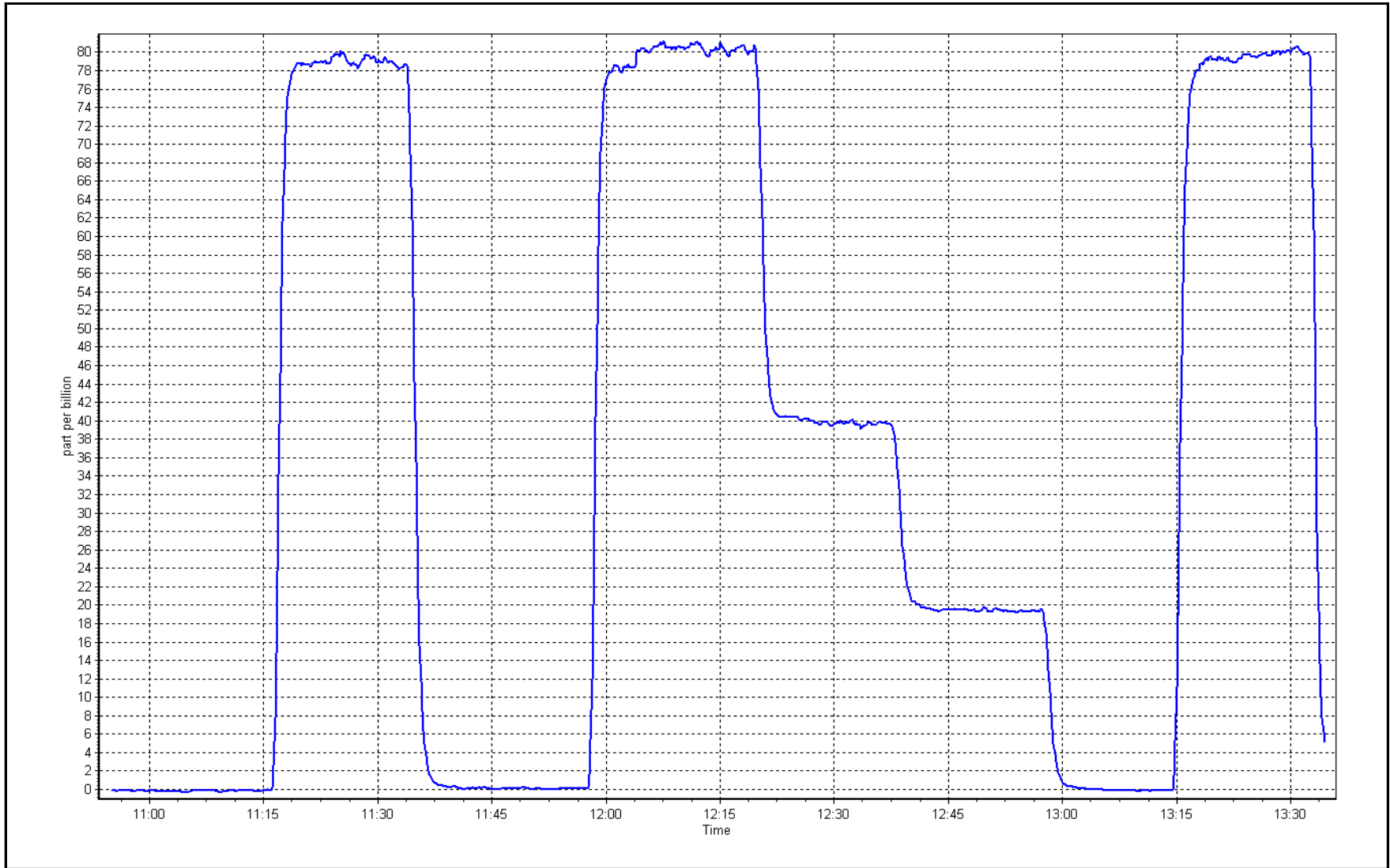
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999941	≥0.995
80.0	80.3	0.9967			
40.0	39.7	1.0065	Slope	0.993557	0.90 - 1.10
19.9	19.3	1.0292			
			Intercept	0.388877	+/-3



TRS Calibration Plot

Date: July 18, 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:	July 10, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	8:50	End time (MST):	13:05
Reason:	Routine		

Calibration Standards

Gas Cert Reference	LL110515	Cal Gas Expiry Date	Saturday, September 08, 2018
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>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-303.2
Calculated slope	1.005277	Sample pressure	9.2
Calculated intercept	0.025511	Fuel pressure	23.1
Analyzer Background	3.042	Air pressure	34.3
Analyzer Coefficient	1.390	Flame temperature	152.2

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	5000	0.0	0.00	-0.03	----
as found span	4920	78.9	16.84	16.70	1.008
calibrator zero	5000	0.0	0.00	-0.04	----
high point	4920	78.9	16.84	16.72	1.007
second point	4969	39.3	8.37	8.24	1.016
third point	4981	19.6	4.18	4.06	1.030
as left zero	5000	0.0	0.00	-0.02	----
as left span	4920	78.9	16.84	16.80	1.002
Average Correction Factor					1.018
Corrected As found	16.73	Previous response	16.73	*% change	0.0%

* = > +/-5% change initiates investigation

Notes: no maintenance or adjustments done,

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

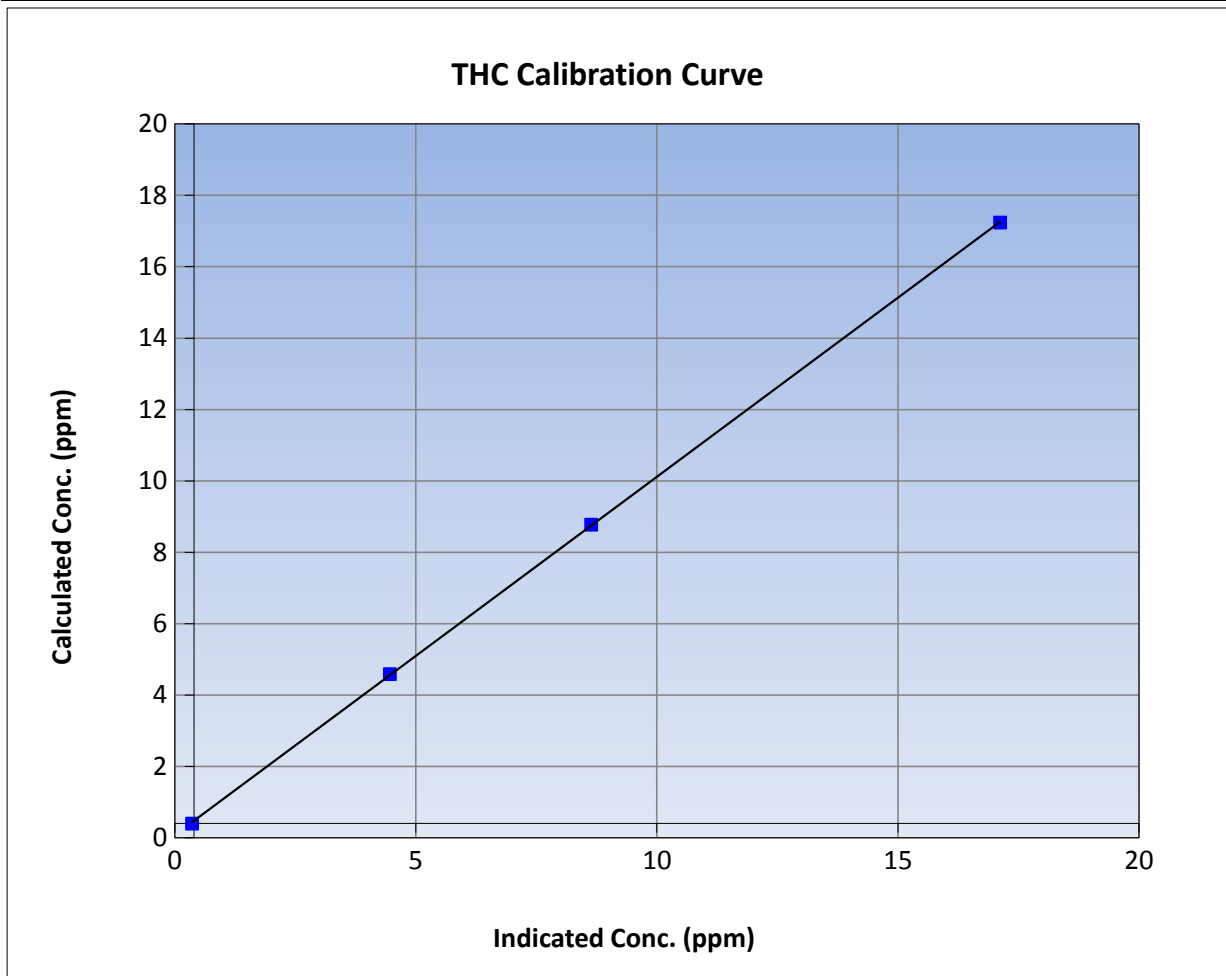
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 7, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:50	End Time (MST)	13:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1505164380

Calibration Data

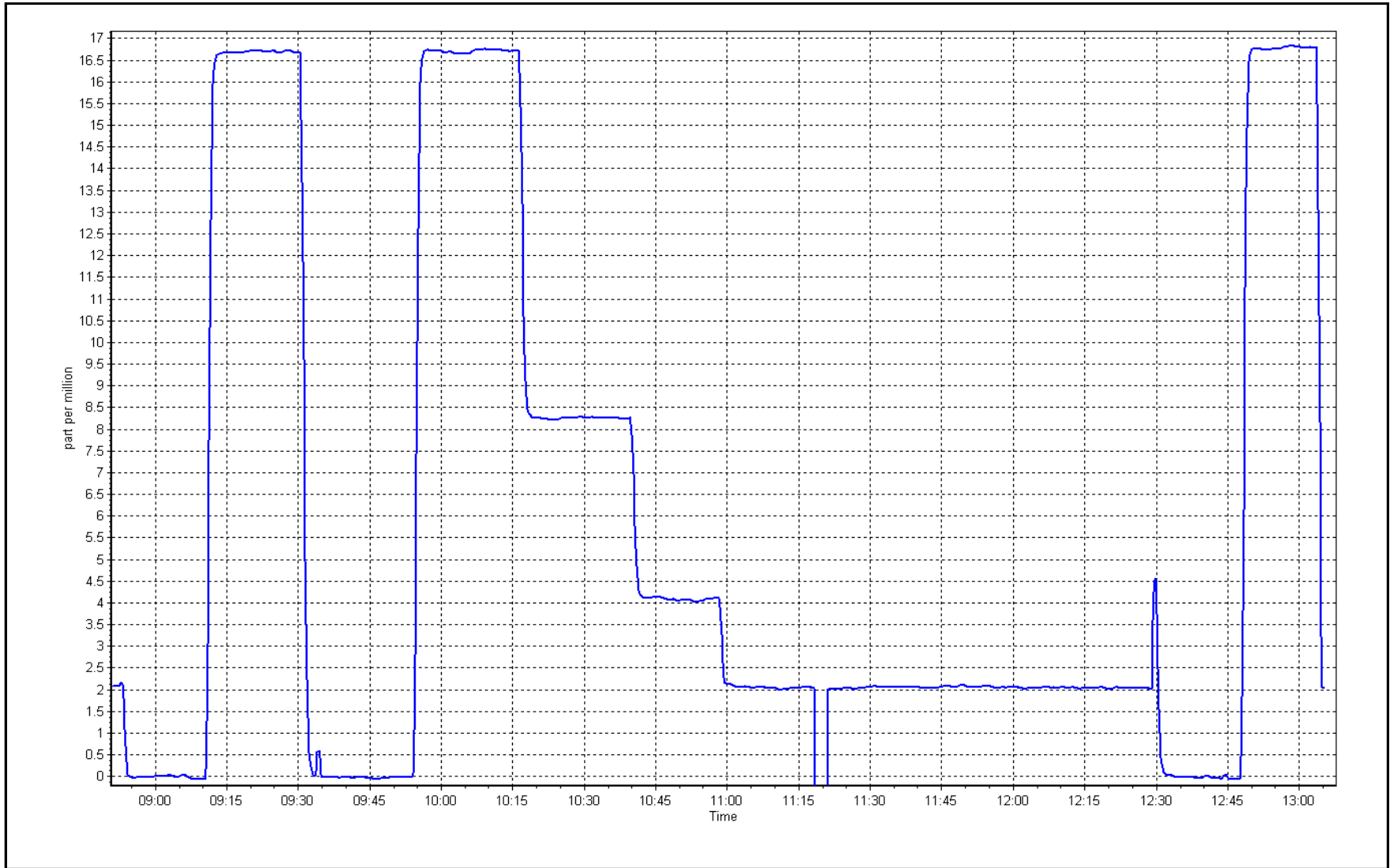
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999979	≥0.995
16.8	16.7	1.0072			
8.4	8.2	1.0161	Slope	1.003882	0.90 - 1.10
4.2	4.1	1.0301			
			Intercept	0.075829	+/-1.5



THC Calibration Plot

Date: July 10, 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:	July 10, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	8:50	End time (MST):	13:06
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	LL110515	Cal Gas Expiry Date	Saturday, September 08, 2018
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	1.140	1.208	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	1.002	1.002	PMT Temperature	-2.8 -2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	203.4 203.4
NO bkgrnd	8.4	9.0	Sample Flow	0.720 0.720
NOX bkgrnd	8.5	9.0	PMT Voltage	-827.7 -827.7

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.000841	0.996034
NO _x Cal Offset	0.689004	1.225716
NO Cal Slope	1.000634	0.995640
NO Cal Offset	0.708630	1.404158
NO ₂ Cal Slope	1.004965	0.997100
NO ₂ Cal Offset	0.189110	-0.094698



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	758.5	754.8	3.6	1.0572	1.0582
calibrator zero	5000	0.0	0.0	0.0	0.0	0.3	0.1	0.1	----	----
high point	4923	78.8	801.9	798.7	3.2	804.8	801.8	3.0	0.9964	0.9962
second point	4961	39.4	401.1	399.5	1.6	400.1	398.4	1.6	1.0024	1.0027
third point	4977	19.7	200.7	199.9	0.8	199.1	198.3	0.8	1.0079	1.0080
as left zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.0	----	----
as left span	4923	78.8	801.9	448.2	353.7	813.8	453.1	360.7	0.9854	0.9892
Average Correction Factor									1.0022	1.0023

Corrected As found	NO _x = 758.4 ppb	NO = 754.8 ppb		*Percent Change	NO _x = 5.6%
Previous Response	NO _x = 800.5 ppb	NO = 797.5 ppb		*Percent Change	NO = 5.7%
<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		3.2	801.5	798.6	2.9	1.0005	1.0002	----	----
1st NO2 (400 ppb O3)	448.2	353.6	802.9	448.2	354.7	0.9987	----	0.9968	100.3%
2nd NO2 (200 ppb O3)	591.2	210.6	802.4	591.2	211.2	0.9994	----	0.9969	100.3%
3rd NO2 (100 ppb O3)	689.3	112.5	802.2	689.3	112.9	0.9996	----	0.9960	100.4%
2nd NO ref point	----	3.2	801.6	799.1	2.5	1.0004	0.9996	----	----
Average Correction Factor						0.9995	0.9999	0.9966	100.3%

Notes: Span adjusted, No maintenance done, pressure and flow have changed since last calibration; Pump and charcoal changed out in January 2017, All other diagnostics are similar to last calibration
 Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

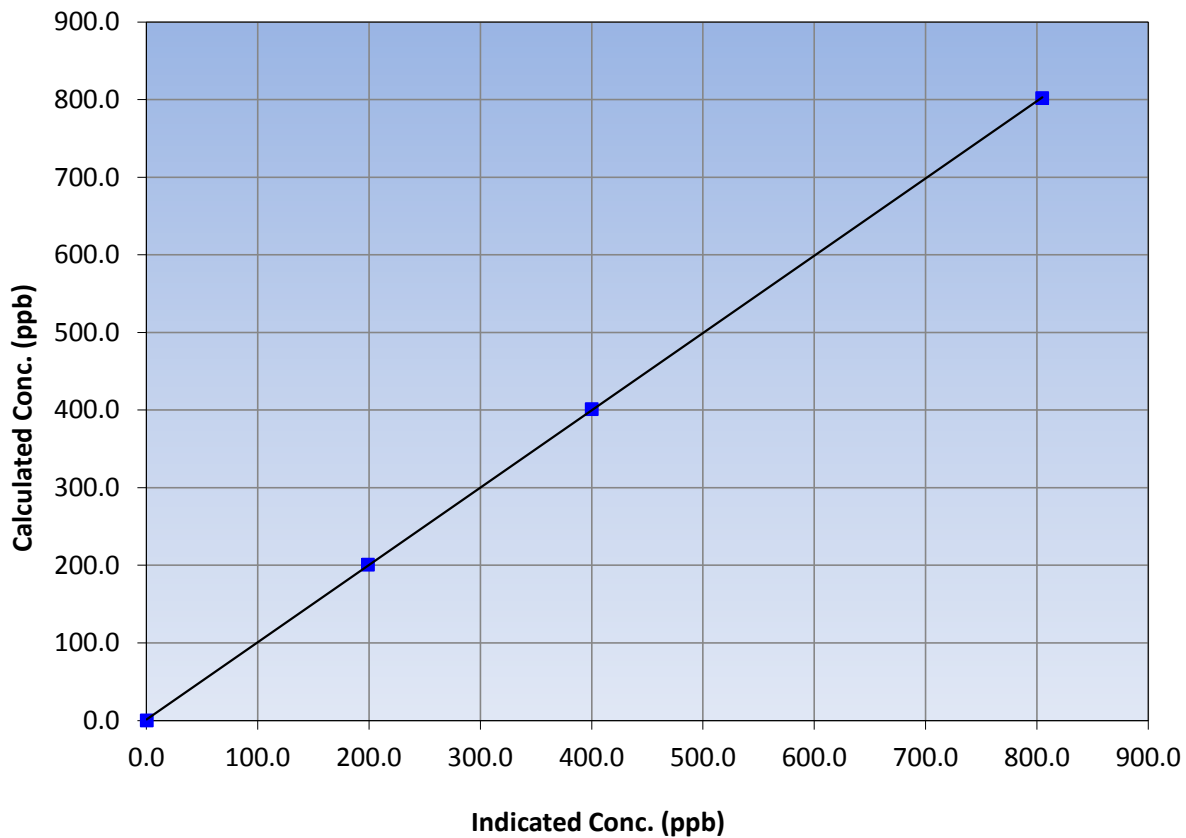
Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 7, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:50	End Time (MST)	13:06
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	804.8	0.9964			
401.1	400.1	1.0024			
200.7	199.1	1.0079			
			Slope	0.996034	0.90 - 1.10
			Intercept	1.225716	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

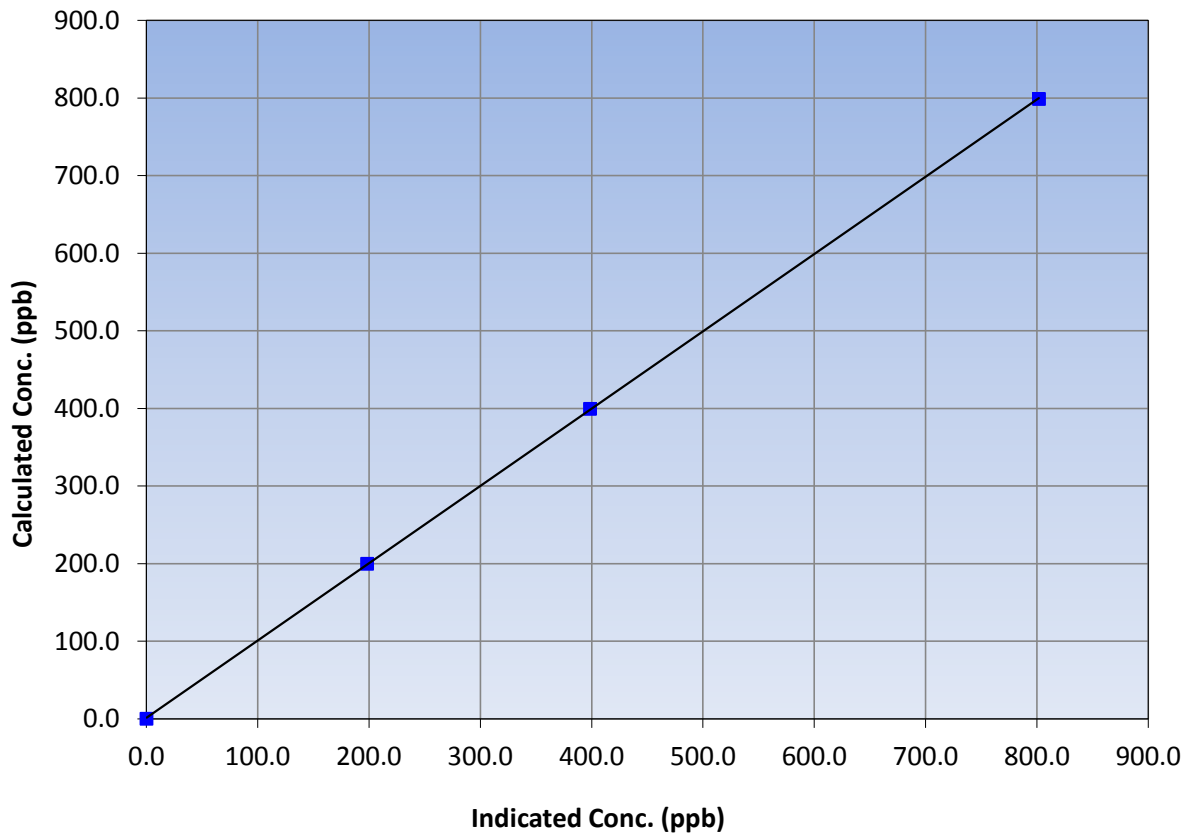
Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 7, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:50	End Time (MST)	13:06
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	
798.7	801.8	0.9962			
399.5	398.4	1.0027			
199.9	198.3	1.0080			
			Slope	0.995640	0.90 - 1.10
			Intercept	1.404158	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

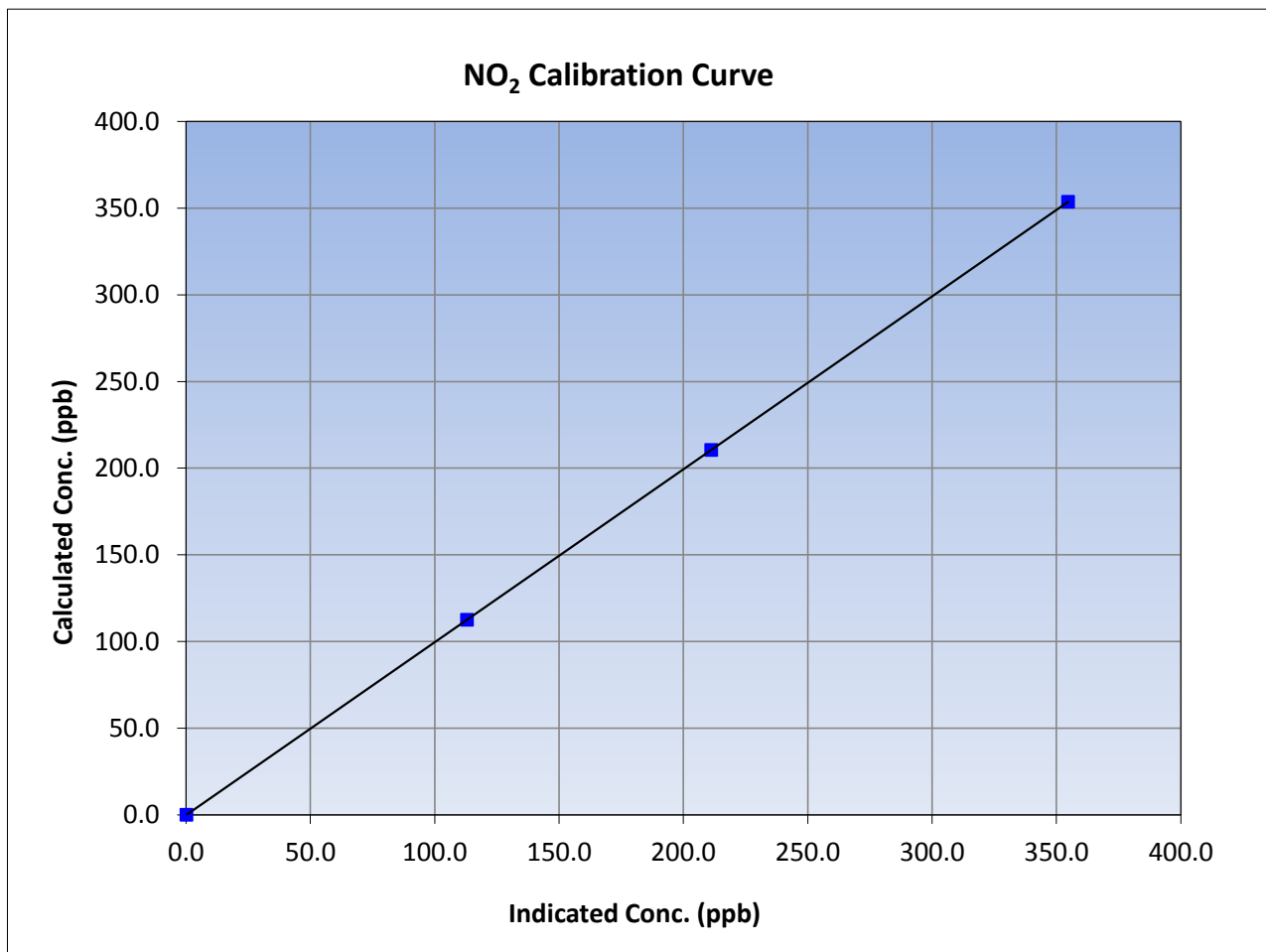
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 7, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:50	End Time (MST)	13:06
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Data

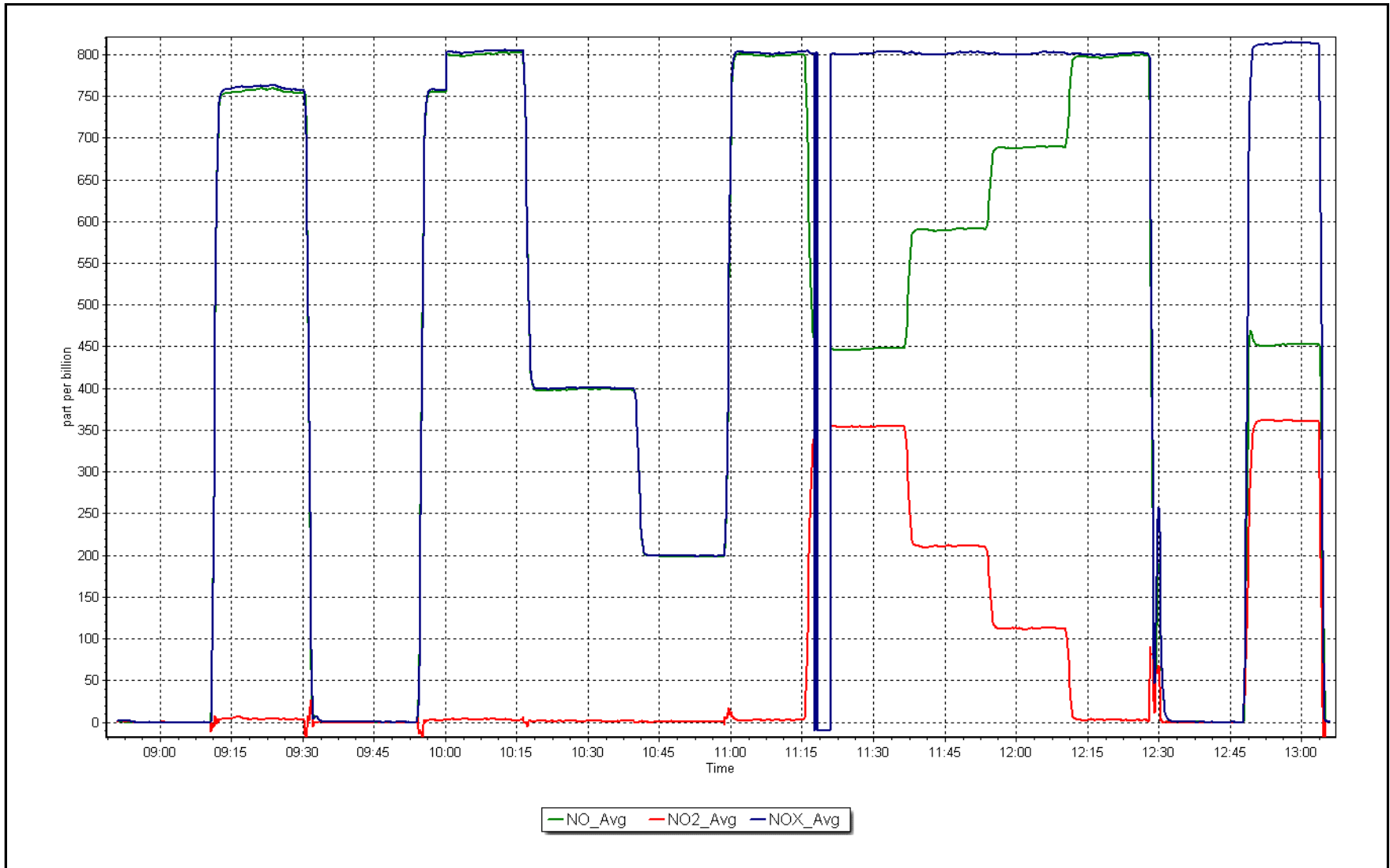
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.1	----	Correlation Coefficient	≥0.995	
353.6	354.7	0.9968			
210.6	211.2	0.9969			
112.5	112.9	0.9960			
			Slope	0.997100	0.90 - 1.10
			Intercept	-0.094698	+/-20



NO_x Calibration Plot

Date: July 10, 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:	July 18, 2017	Last Cal Date:	July 10, 2017
Start time (MST):	8:50	End time (MST):	8:41
Reason:	GPT Check		

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	1.208	1.208	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	1.002	1.002	PMT Temperature	-3.1 -2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	213.9 203.4
NO bkgrnd	9.0	9.0	Sample Flow	0.783 0.720
NOX bkgrnd	9.0	9.0	PMT Voltage	-827.7 -827.7

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.000841	0.951353
NO _x Cal Offset	0.689004	-0.190271
NO Cal Slope	1.000634	0.952815
NO Cal Offset	0.708630	-0.095281
NO ₂ Cal Slope	1.004965	0.997606
NO ₂ Cal Offset	0.189110	1.472979



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	0.2	0.1	0.0	----	----
as found span	4923	78.8	801.9	798.7	3.2	843.1	838.4	4.7	0.9511	0.9527
calibrator zero	5000	0.0	0.0	0.0	0.0	0.2	0.1	0.0	----	----
high point	4923	78.8	801.9	798.7	3.2	843.1	838.4	4.7	0.9511	0.9527
second point										
third point										
as left zero										
as left span										
Average Correction Factor									0.9511	0.9527

Corrected As found	NO _x = 842.9 ppb	NO = 838.3 ppb		*Percent Change	NO _x = -5.0%
Previous Response	NO _x = 800.5 ppb	NO = 797.5 ppb		*Percent Change	NO = -4.9%
<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		3.2	843.1	838.4	4.7	0.9511	0.9527	----	----
1st NO2 (400 ppb O3)	461.7	379.9	841.9	461.7	380.1	0.9525	----	0.9993	100.1%
2nd NO2 (200 ppb O3)	614.1	227.5	840.4	614.1	226.2	0.9542	----	1.0055	99.5%
3rd NO2 (100 ppb O3)	718.1	123.5	838.4	718.1	120.3	0.9565	----	1.0262	97.4%
2nd NO ref point		3.2							
Average Correction Factor						0.9544	0.9527	1.0104	99.0%

Notes: GPT check for O3 calibration

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO₂ Calibration Summary

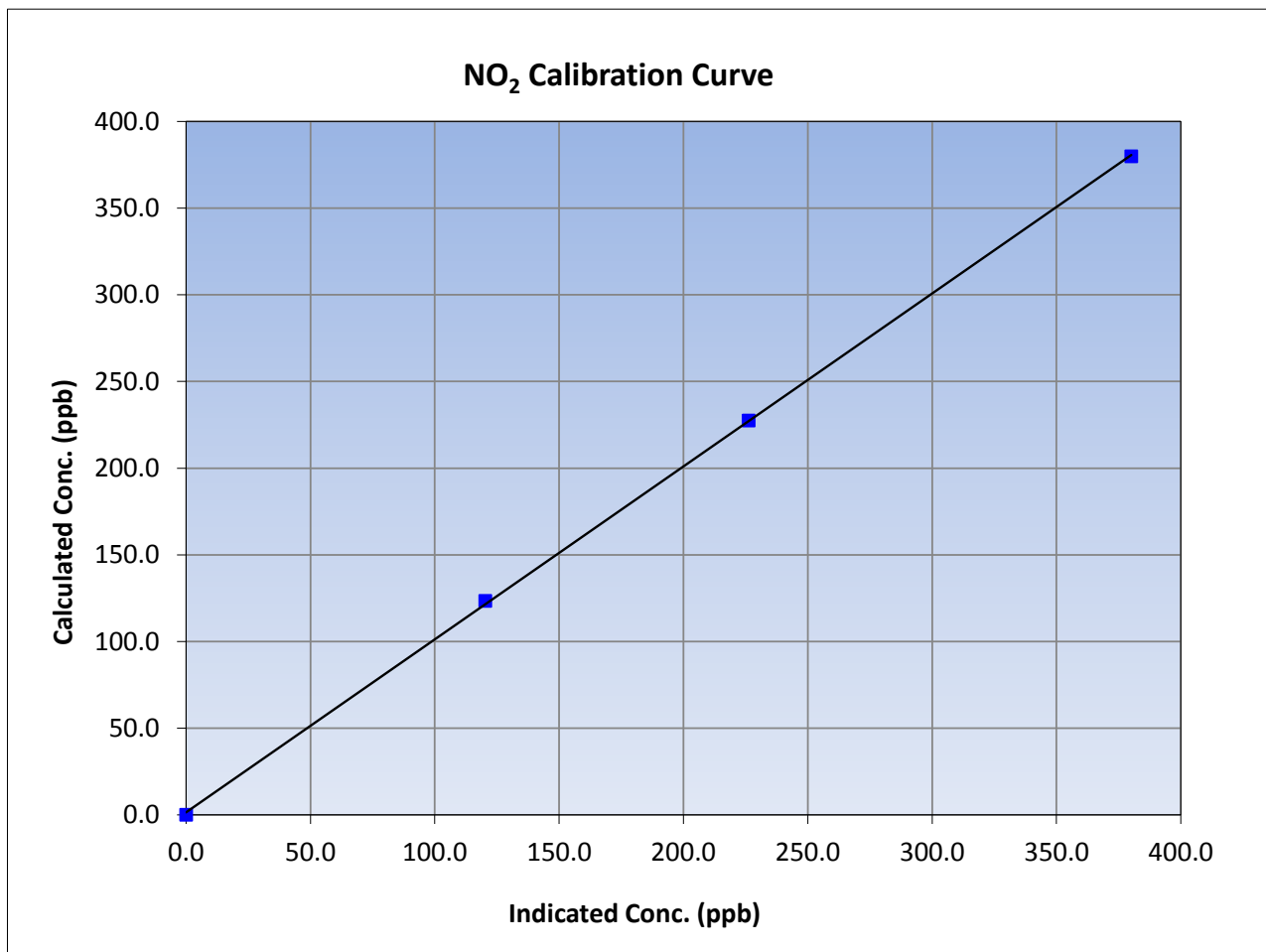
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	July 10, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	8:50	End Time (MST)	8:41
Analyzer make	Thermo 42i	Analyzer serial #	1410661329

Calibration Data

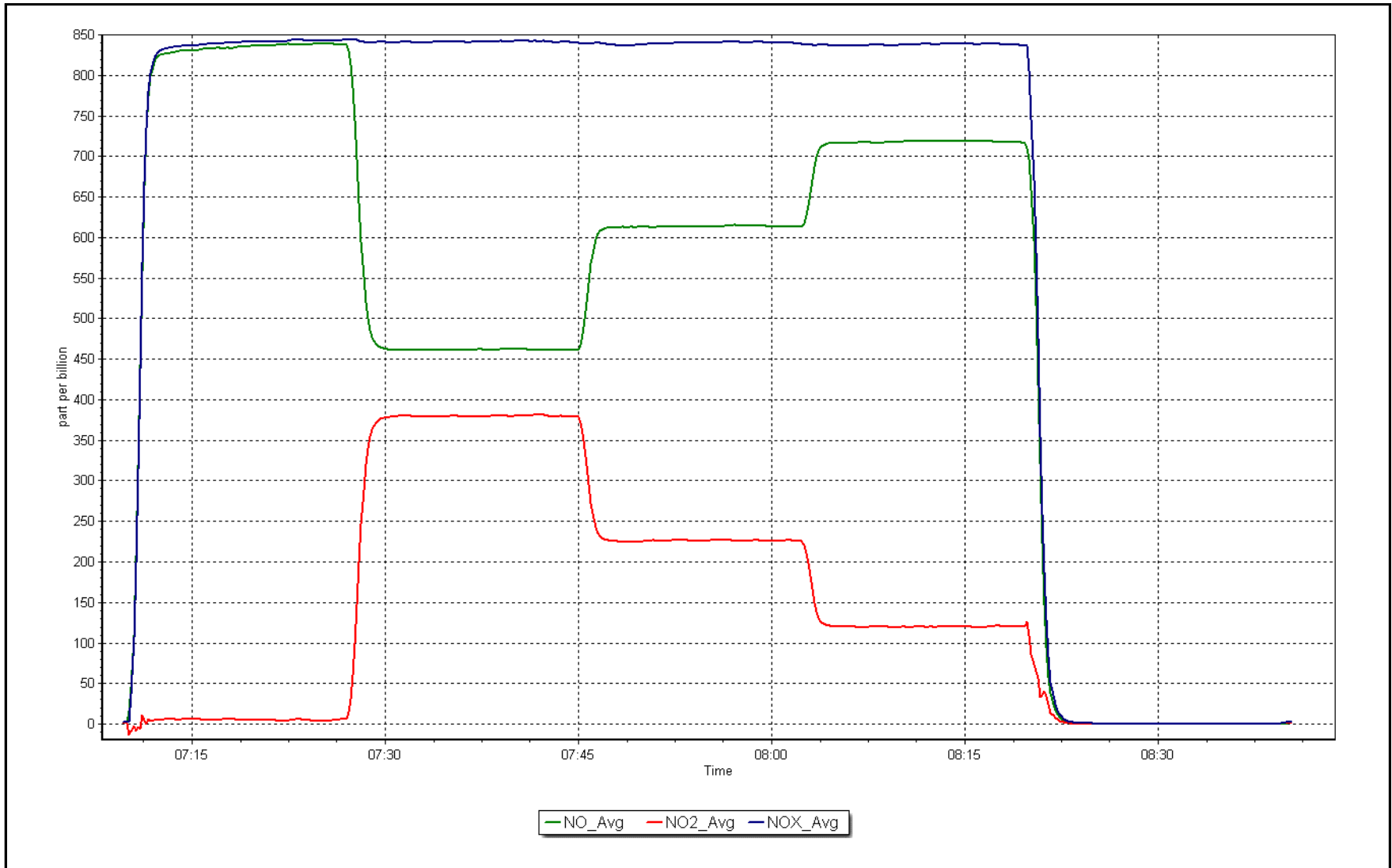
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	≥0.995	
379.9	380.1	0.9993			
227.5	226.2	1.0055			
123.5	120.3	1.0262			
			Slope	0.997606	0.90 - 1.10
			Intercept	1.472979	+/-20



NO_x Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	8:40	End time (MST):	10:57
Reason:	Routine		

Calibration Standards

O3 generation mode:	Nox GPT	O3 reference Date:	July 18, 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	26.8	26.8
Calculated slope	1.006029	1.000229	Flow	763	763
Calculated intercept	-0.494757	0.708928	Intensity	4051.8	4051.8
Analyzer Background	1.3	1.4			
Analyzer Coefficient	1.002	1.095			

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	0.0	----
as found span	5000	0.896	376.7	360.0	1.046
calibrator zero	5000	0.0	0.0	0.0	----
high point	5000	0.896	376.7	376.0	1.002
second point	5000	0.581	224.3	224.1	1.001
third point	5000	0.355	120.3	118.2	1.018
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	0.896	376.7	387.2	0.973
Average Correction Factor					1.007

Corrected As found	360.00	Previous response	374.94	*% change	4.1%
--------------------	--------	-------------------	--------	-----------	------

* = > +/-8% change initiates investigation

Notes:

no maintenance done, span adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

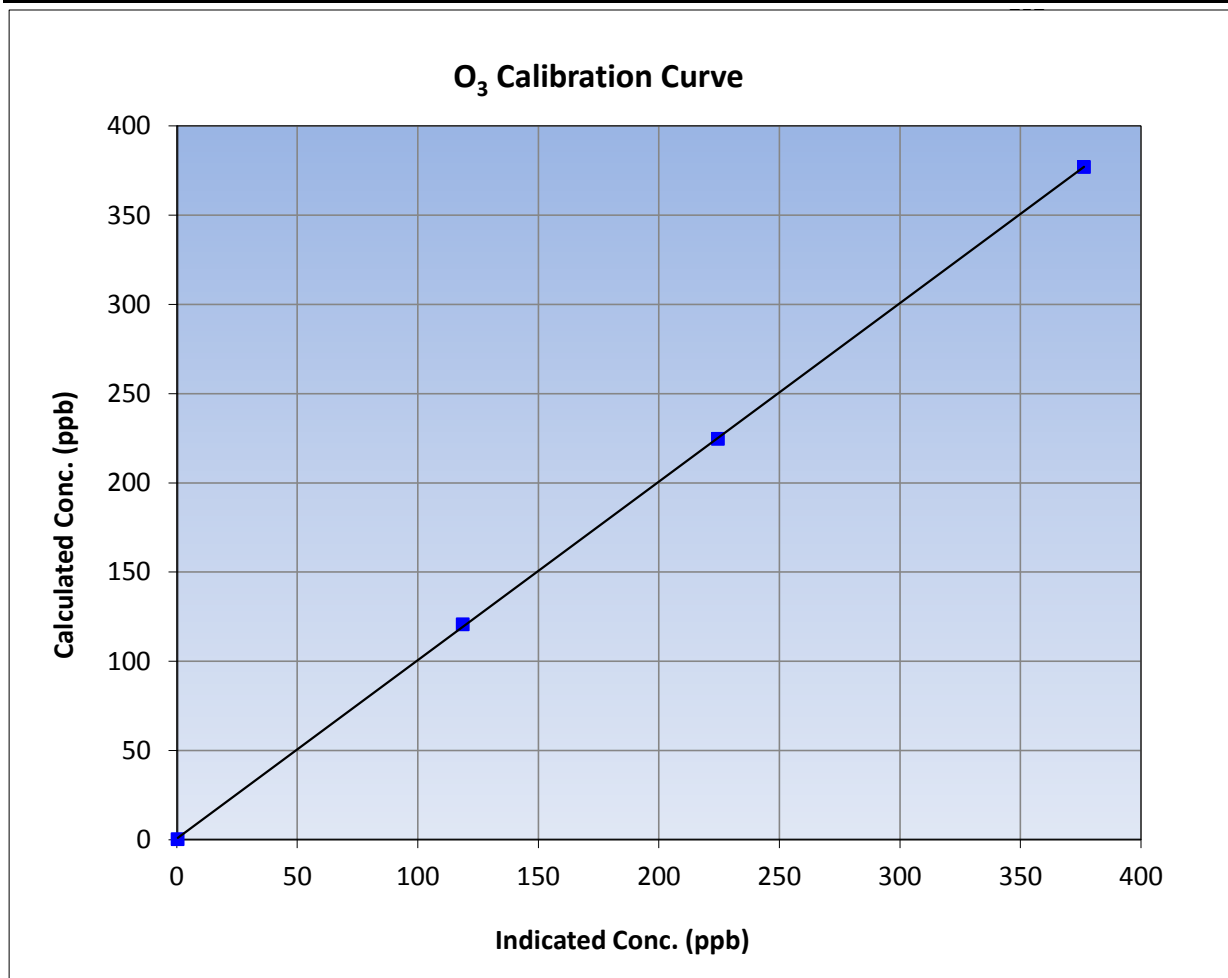
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 8, 2017
Station Name	Fort McKay South	Station Number	AMS 13
Start Time (MST)	6:50	End Time (MST)	10:57
Analyzer make	API T400	Analyzer serial #	825

Calibration Data

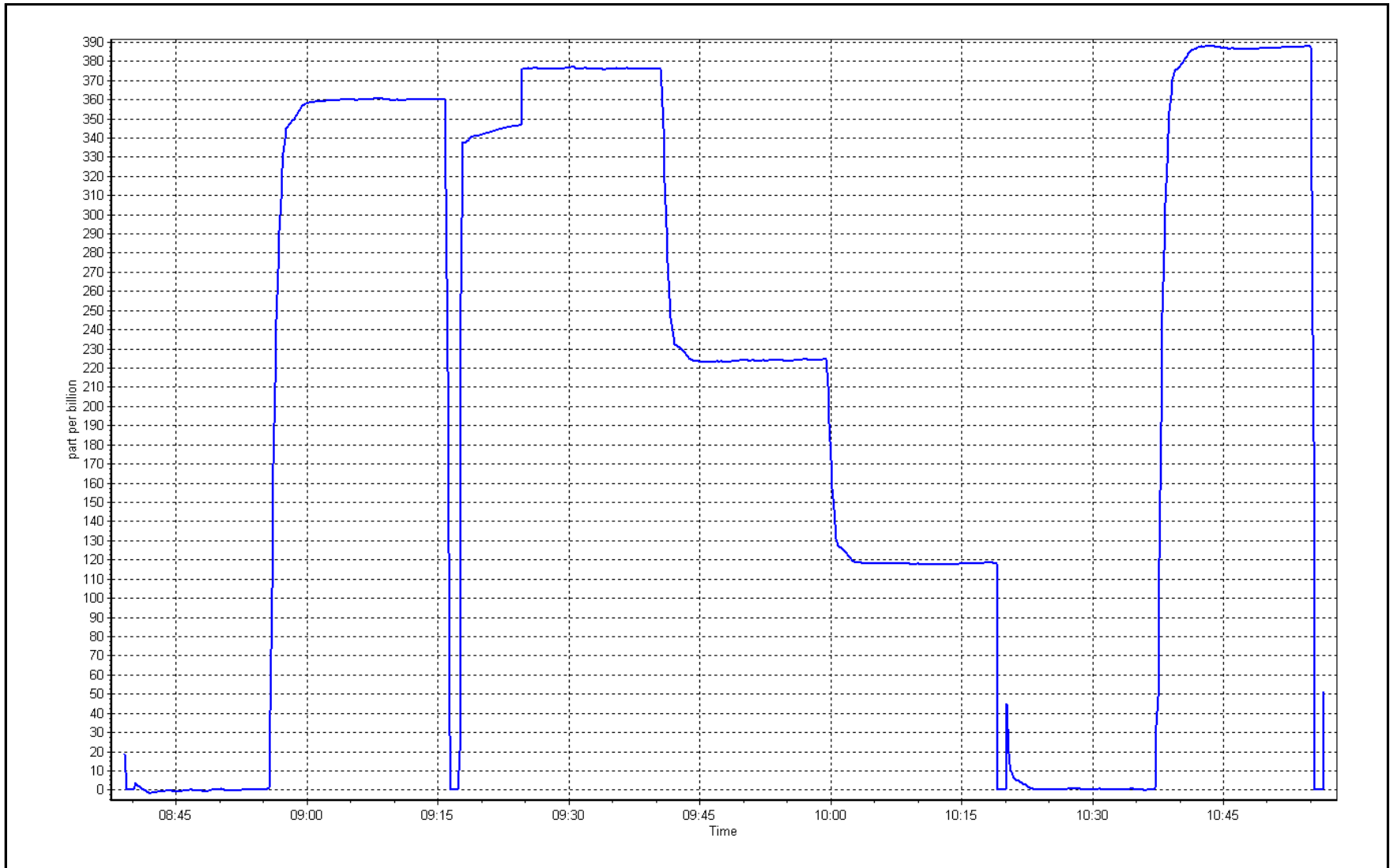
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999965	≥ 0.995
376.7	376.0	1.0019	Slope	1.000229	0.90 - 1.10
224.3	224.1	1.0009	Intercept	0.708928	+/- 10
120.3	118.2	1.0178			



O₃ Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 13, 2017
Start time (MST):	7:50	End time (MST):	8:41
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)	13	14.1	13	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	973	983	973	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	990	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.5	-----	-0.1	<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: July 18, 2017 Last Cal Date: April 11, 2017
 Flow w/o adaptor: 16.43 Flow w/ adaptor: 16.04

(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>5872</u>	Foil S/N: <u>5872</u>	
Foil Calibration	Foil Mass: <u>1337</u>	Foil Mass: <u>1337</u>	
	Calibration Date: <u>July 18, 2017</u>	Calibration Date: <u>April 11, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>7081</u>	Correction Factor: <u>7150</u>	-0.97%

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: No adjustments done, Cyclone head cleaned

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 14
ANZAC
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 JULY 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	708	36	36	100	7	0	1	0
TRS(ppb) Average	710	34	34	100	6	0	1	0
THC(ppm) Average	707	36	37	99.87	2.7	-	2.2	-
NMHC(ppm) Average	707	36	37	99.87	0.279	-	0.135	-
CH4(ppm) Average	707	36	37	99.87	2.5	-	2.1	-
NO2(ppb) Average	708	36	36	100	8	0	2	-
NO(ppb) Average	708	36	36	100	5	-	0	-
NOX(ppb) Average	708	36	36	100	10	-	3	-
O3(ppb) Average	710	34	34	100	58	0	37	-
PM2.5(ug/m3) Average	743	1	1	100	51.5	-	15.3	0
AT 2m(C) Average	744	0	0	100	31.3	-	23.4	-
RH(%) Average	744	0	0	100	98	-	81	-
Leaf Wetness (% of range) Average	744	0	0	100	52	-	12	-
WS(km/h) Average	741	0	3	99.6	26	-	18	-
WD(deg) Average	741	0	3	99.6	-	-	-	-
PC(mm) Total	744	0	0	100	5.3	-	5.8	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	25 Jul 2017 10:00	25 Jul 2017 10:00	1	Maintenance - replaced carrier gas
Wind Speed, Wind Direction	07 Jul 2017 22:00	07 Jul 2017 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Jul 2017 21:00	08 Jul 2017 21:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Jul 2017 23:00	08 Jul 2017 23:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 7 ppb on Jul 11 12:00	Maximum Daily Average: 1.0 ppb on Jul 11		Hours of Data:	708
Minimum Value: 0 ppb on Jul 8 22:00	Minimum Daily Average: 0.0 ppb on Jul 20		Hours of Missing Data:	36
Maximum Diurnal Average: 0.5 ppb at hour 12	Minimum Diurnal Average: 0.2 ppb at hour 1		Hours of Calibration:	36
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 = 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-Jul	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-Jul	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	
3-Jul	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-Jul	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	
5-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	1	0.4	3
6-Jul	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	
7-Jul	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	
8-Jul	0	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
9-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Jul	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0	
11-Jul	0	0	0	0	0	Z	0	0	0	0	1	7	4	4	3	2	0	0	0	0	0	0	0	0	1.0	7	
12-Jul	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	
13-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
14-Jul	0	0	Z	1	0	0	0	0	0	0	0	1	2	2	1	1	1	0	0	0	1	0	0	0	0.5	2	
15-Jul	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	
16-Jul	0	0	1	1	Z	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4	
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	1	1	2	2	1	1	1	1	1	2	1	0	0.6	2	
18-Jul	Z	1	1	1	1	1	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0.6	2	
19-Jul	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-Jul	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-Jul	0	0	1	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
22-Jul	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	
23-Jul	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	
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.3	2	
25-Jul	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1	
26-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1	
27-Jul	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	
28-Jul	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-Jul	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	
30-Jul	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	
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1	

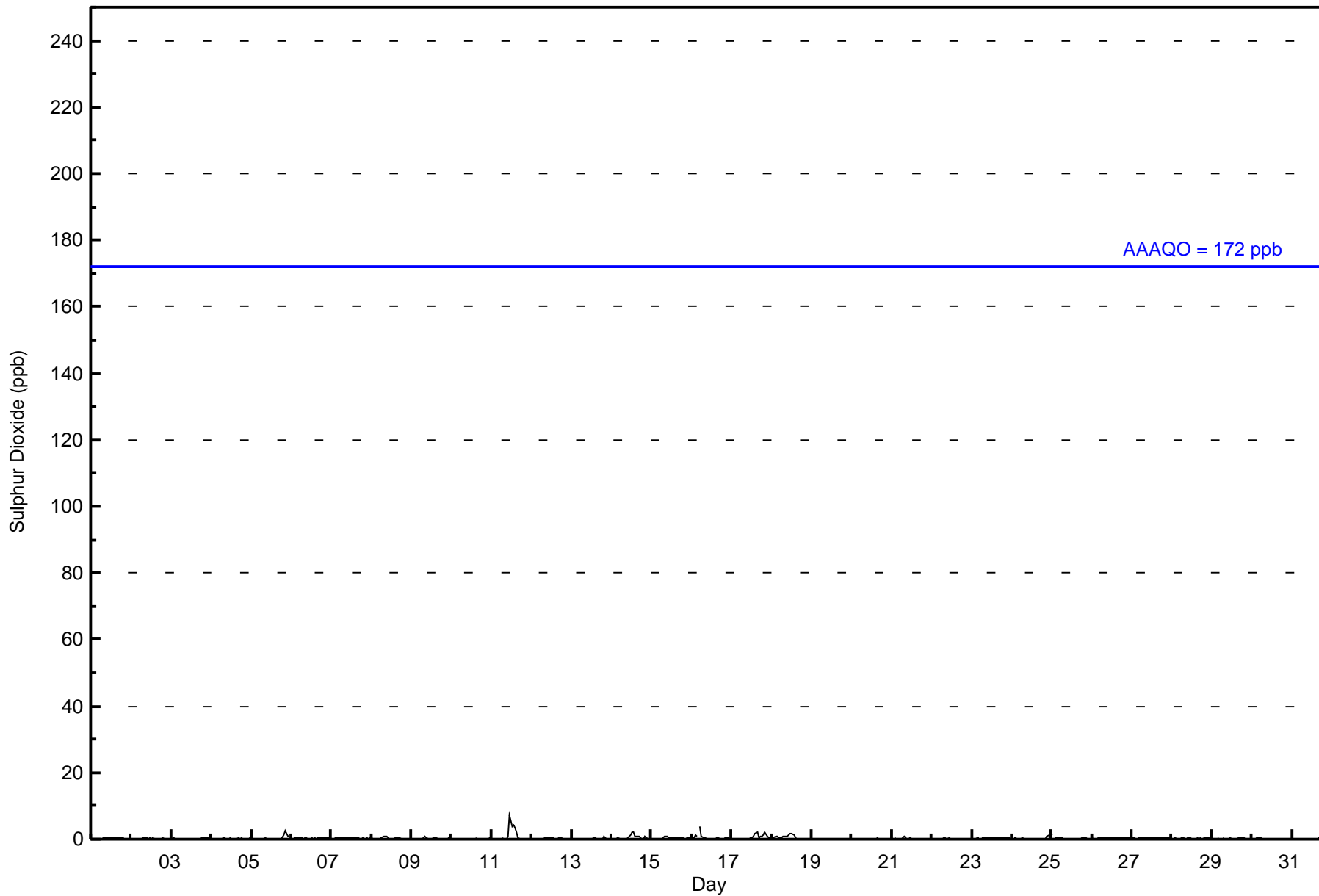
0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.5	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	Diurnal Average
1	1	1	1	1	4	1	1	1	1	1	1	7	4	4	3	2	1	1	1	1	3	2	1	2	Diurnal Maximum

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
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	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: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - July 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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705
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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705

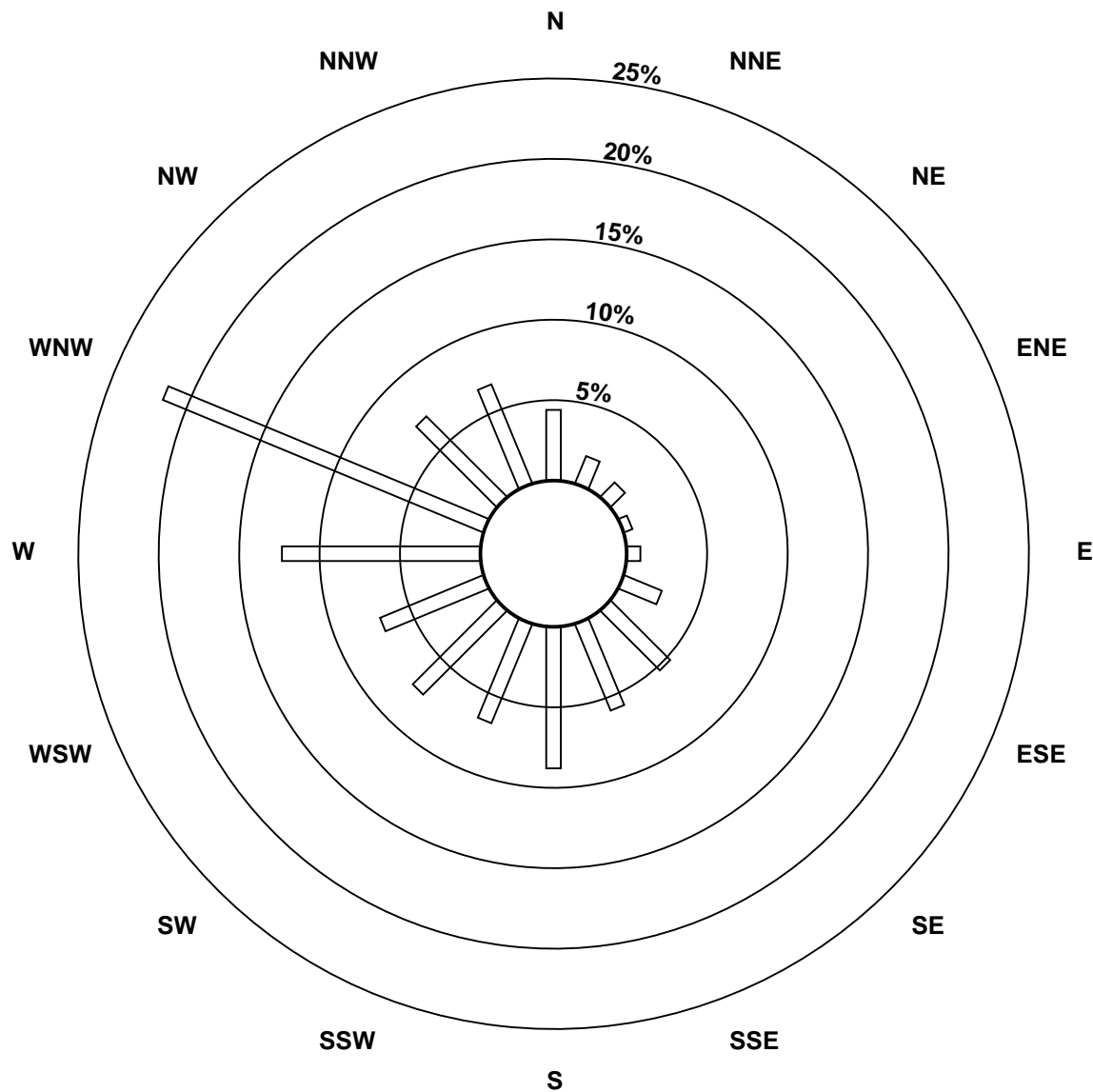
Total Number of Valid Hours: 705

Total Number of Hours: 744

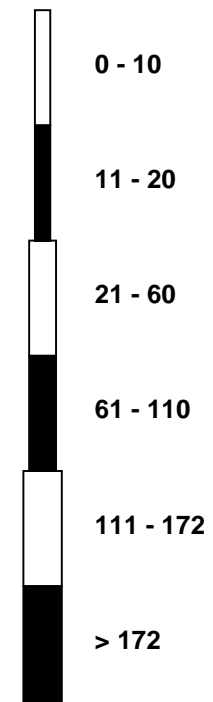


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)



Classes (ppb)



Total Number of Valid Hours: 705

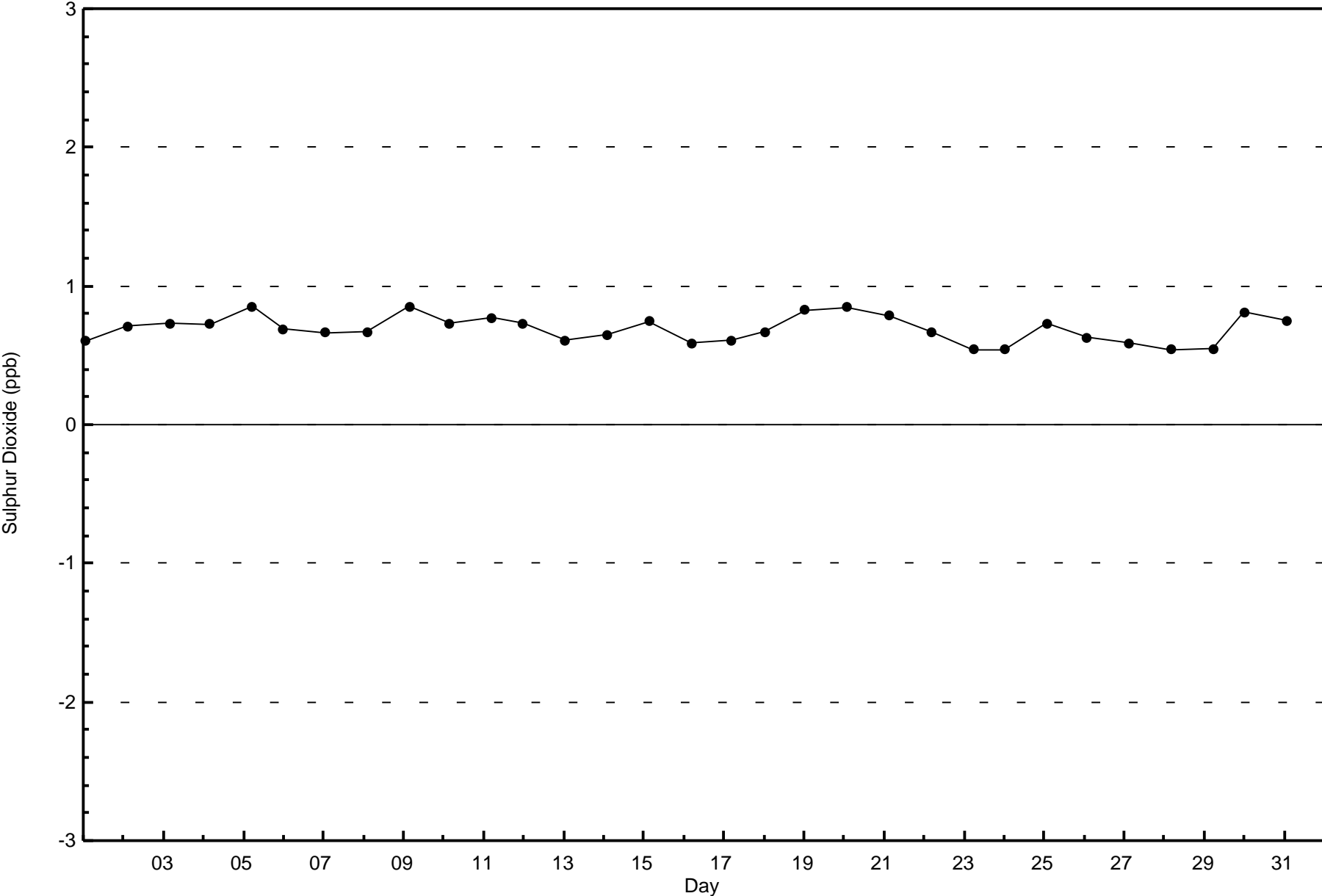


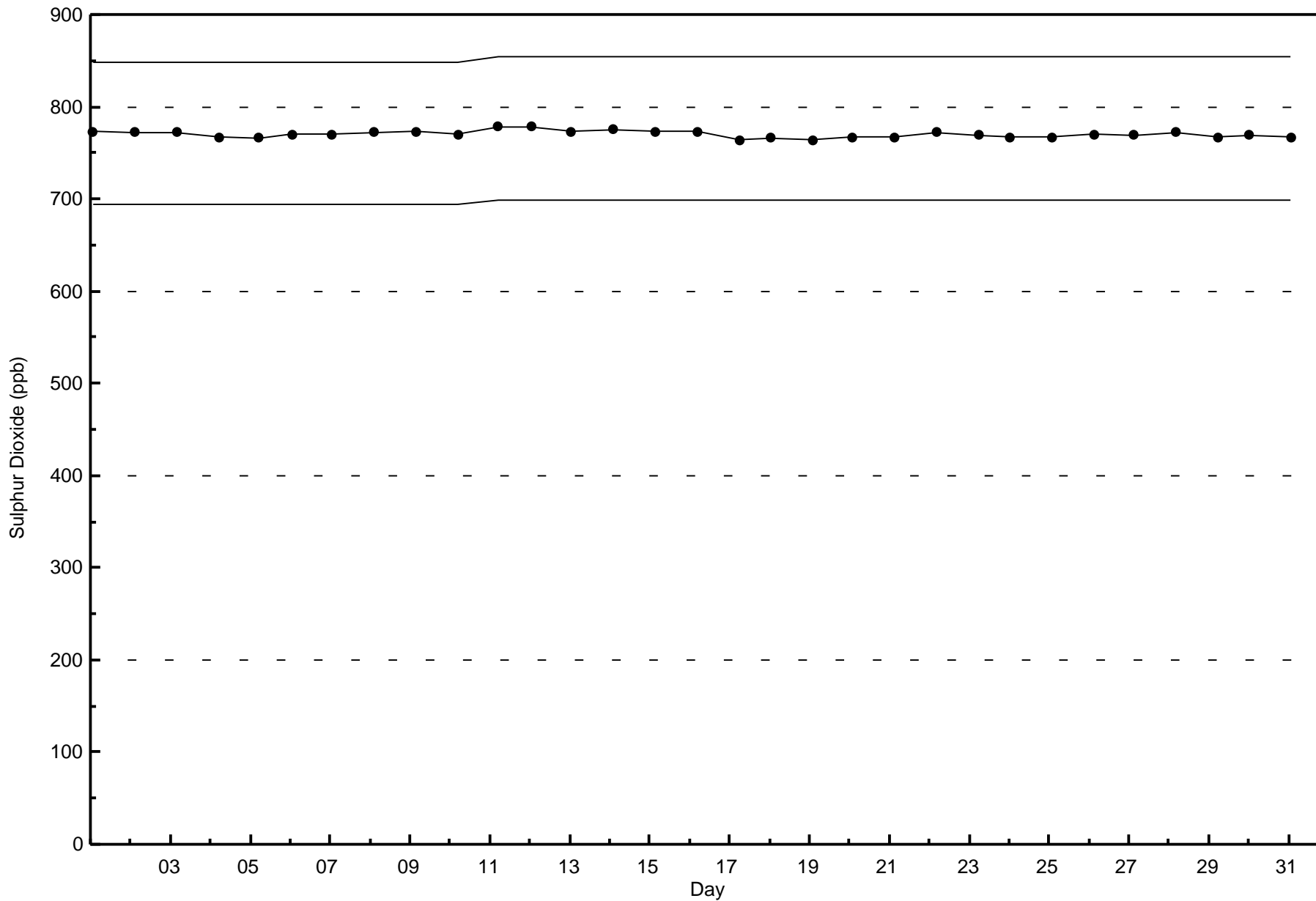
Wood Buffalo Environmental Association

Zero Responses

Sulphur Dioxide (SO₂) - ppb

Anzac - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

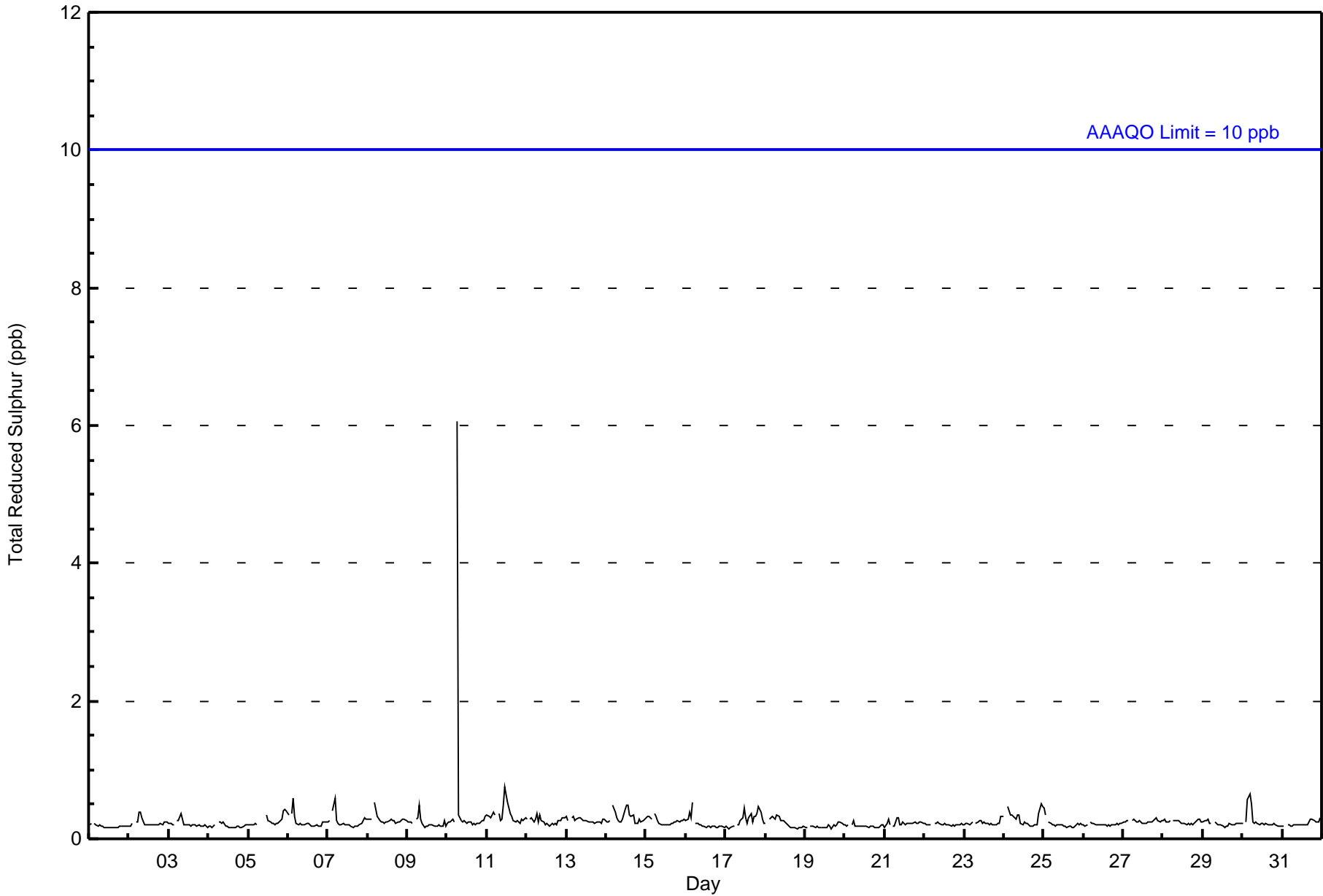
Anzac - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																									
Maximum Value: 6 ppb on Jul 10 07:00														Maximum Daily Average: 0.5 ppb on Jul 10										Hours of Data: 710															
Minimum Value: 0 ppb on Jul 18 20:00														Minimum Daily Average: 0.2 ppb on Jul 1										Hours of Missing Data: 34															
Maximum Diurnal Average: 0.5 ppb at hour 7														Minimum Diurnal Average: 0.2 ppb at hour 17										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 = 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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0													
6-Jul	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1													
7-Jul	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													
8-Jul	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													
9-Jul	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-Jul	0	0	0	0	0	Z	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	6													
11-Jul	0	0	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1													
12-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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													
17-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1													
25-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	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													
31-Jul	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	0.3	0.3	0.3	0.5	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	0.3	0.3	Diurnal Average
														0	0	0	1	1	1	6	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	99.86	99.86
3 - 4	0	0.00	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - July 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	31	13	9	4	5	18	37	42	61	44	54	49	93	145	54	47	706
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	1	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	31	13	9	4	5	18	37	42	61	45	54	49	93	145	54	47	707

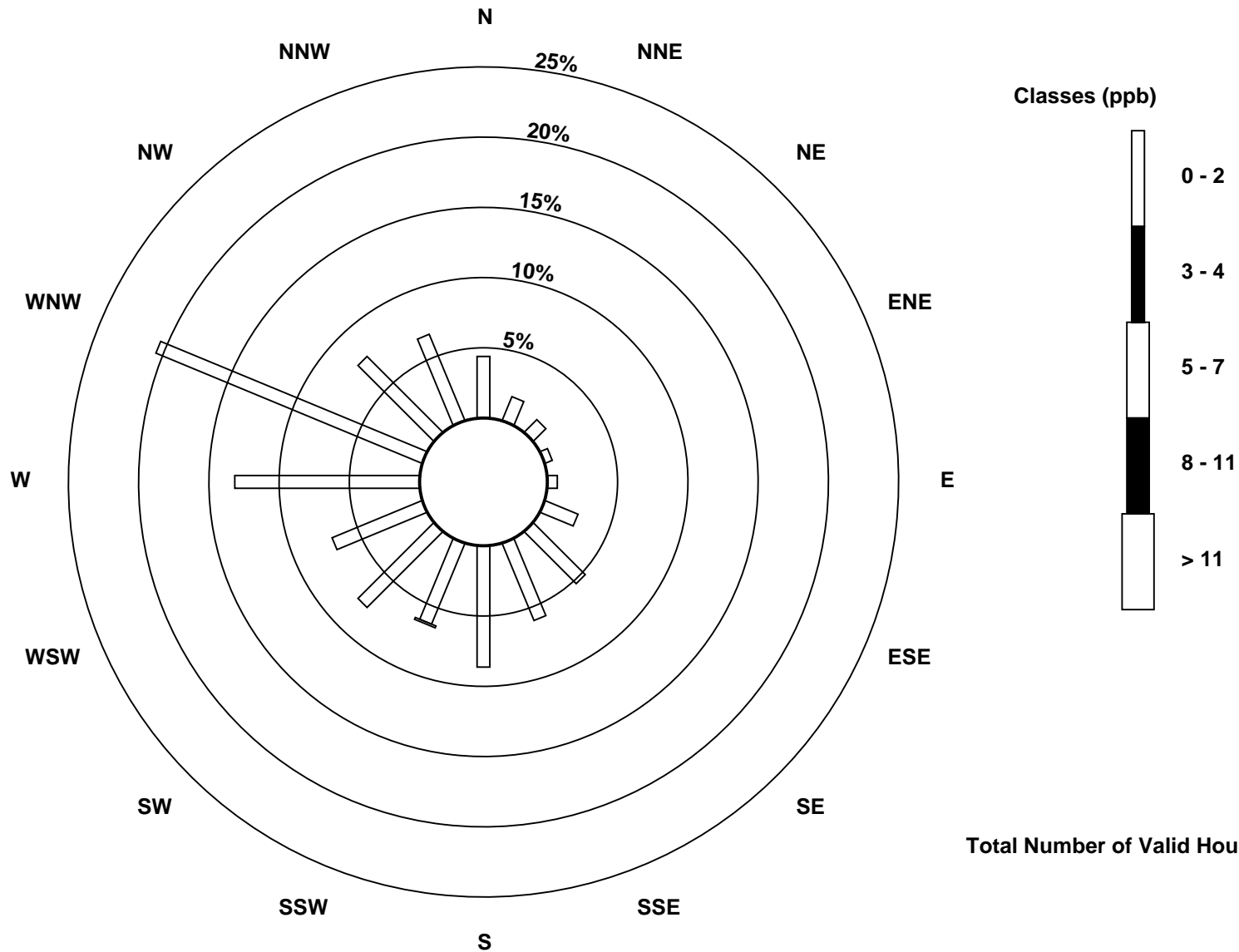
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 707

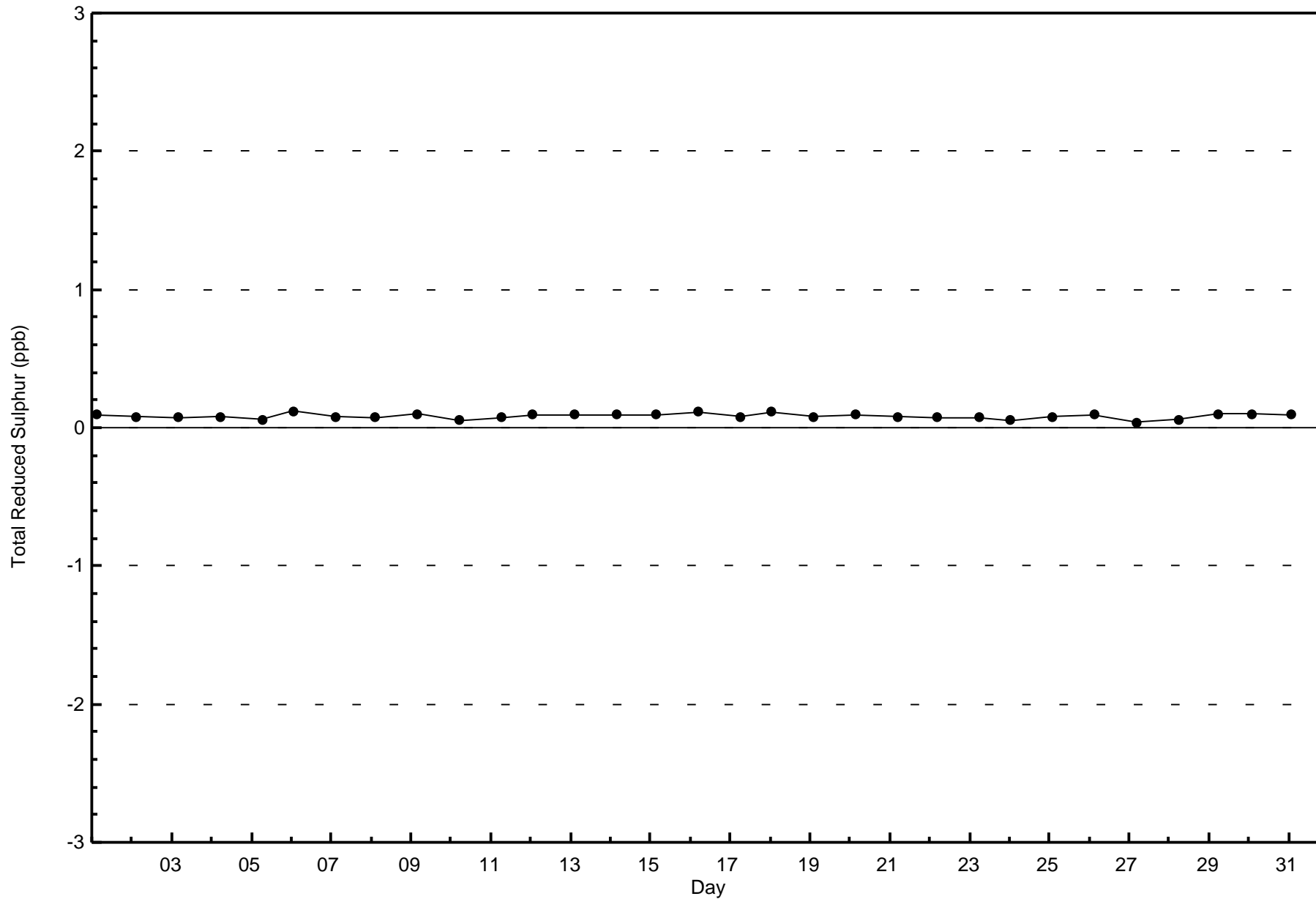


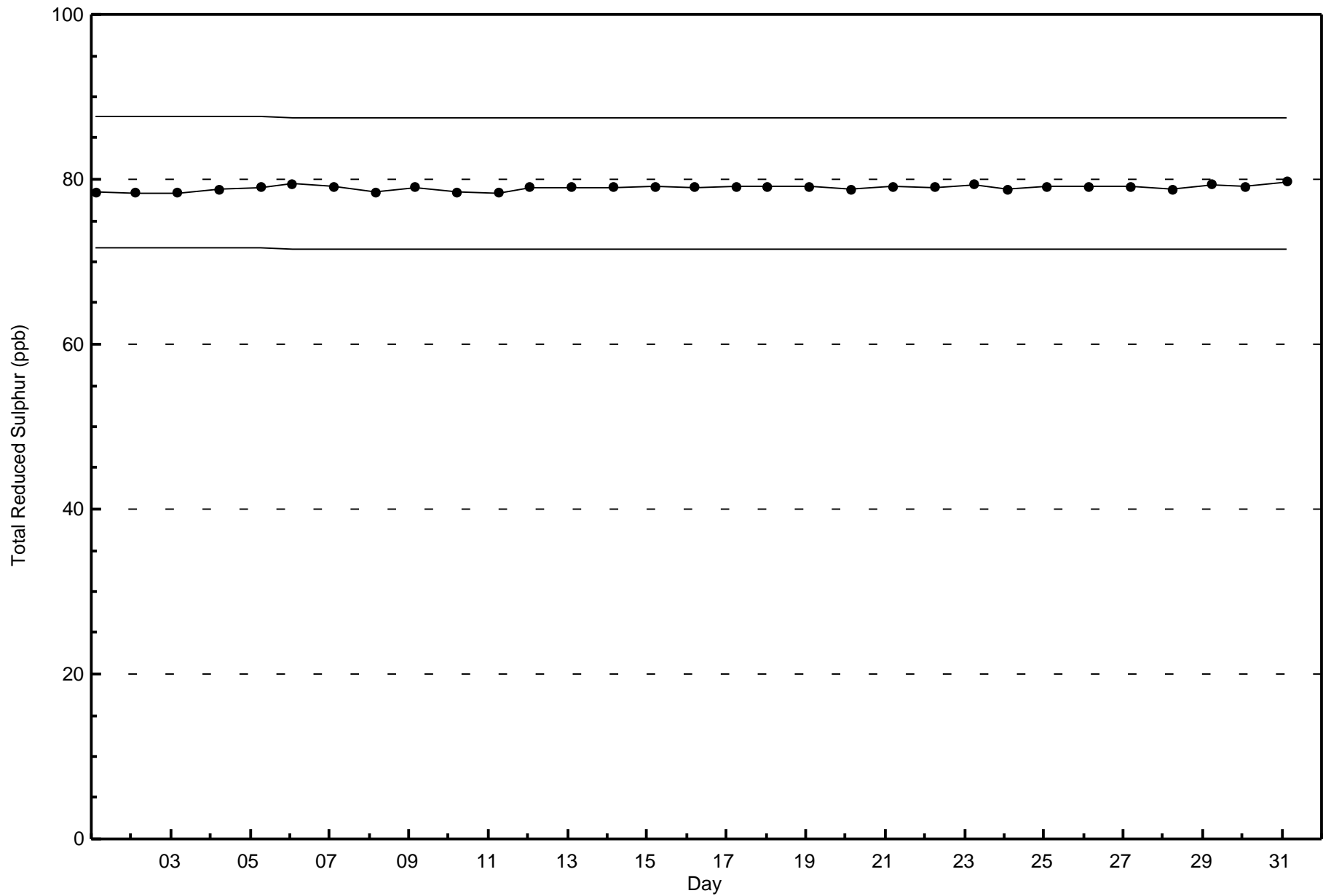
Wood Buffalo Environmental Association

Zero Responses

Total Reduced Sulphur (TRS) - ppb

Anzac - July 2017







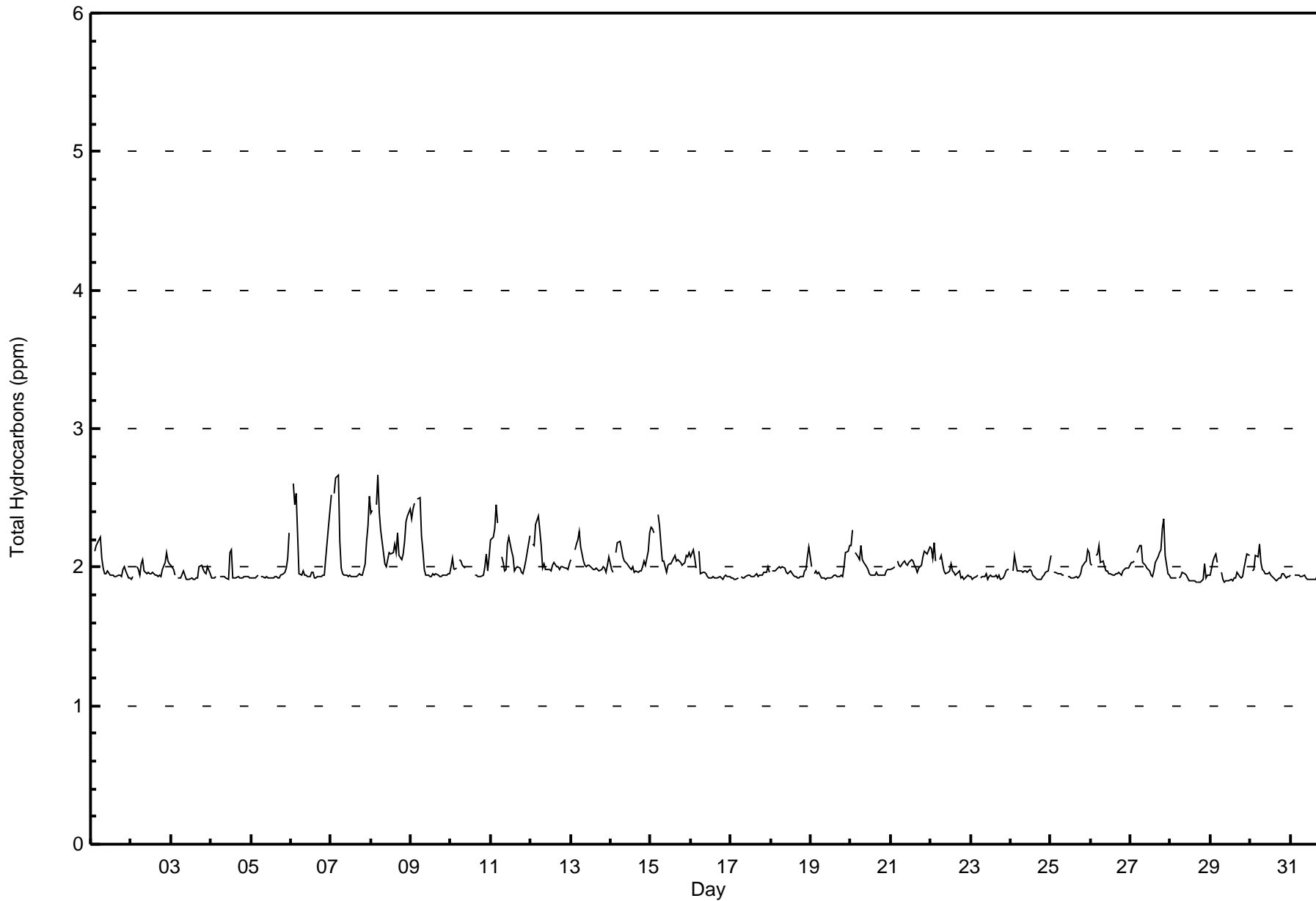
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Anzac - July 2017

Maximum Value: 2.7 ppm on Jul 8 05:00																			Maximum Daily Average: 2.2 ppm on Jul 8						Hours in Service: 744		
Minimum Value: 1.9 ppm on Jul 28 19:00																			Minimum Daily Average: 1.9 ppm on Jul 28						Hours of Data: 707		
Maximum Diurnal Average: 2.1 ppm at hour 5																			Minimum Diurnal Average: 2.0 ppm at hour 16						Hours of Missing Data: 37		
Monthly Average: 2.01 ppm																			Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.2 P ₉₉ = 2.5						Hours of Calibration: 36		
																									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-Jul	2.1	Z	2.1	2.2	2.2	2.2	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	2.0	2.0	2.0	1.9	1.9	2.0	2.2	
2-Jul	1.9	1.9	Z	2.0	2.0	1.9	2.0	2.1	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	2.1	2.0	2.0	2.0	2.1	
3-Jul	2.0	2.0	1.9	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
4-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.1	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	2.1	
5-Jul	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	2.0	2.0	2.1	2.3	2.0	2.3	
6-Jul	Z	2.6	2.5	2.5	2.2	2.0	1.9	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	2.1	2.3	2.4	2.1	2.6	
7-Jul	2.5	Z	2.5	2.6	2.7	2.2	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	2.2	2.3	2.5	2.1	2.7	
8-Jul	2.4	2.4	Z	2.5	2.7	2.4	2.3	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.2	2.7	
9-Jul	2.4	2.4	2.5	Z	2.5	2.5	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	2.0	2.0	2.1	2.5	
10-Jul	2.0	2.1	2.0	2.0	Z	2.1	2.0	2.0	2.0	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.1	2.0	2.1	
11-Jul	2.2	2.2	2.3	2.5	2.3	Z	2.1	2.0	2.0	2.0	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.5	
12-Jul	Z	2.2	2.2	2.3	2.4	2.3	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	2.1	2.4	
13-Jul	2.1	Z	2.1	2.2	2.2	2.3	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	2.1	2.0	2.3	
14-Jul	2.0	2.0	Z	2.1	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	2.0	2.0	2.1	2.2	2.0	2.2	
15-Jul	2.3	2.3	2.3	Z	2.4	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.4	
16-Jul	2.1	2.1	2.1	2.0	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	2.1	
17-Jul	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	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	
18-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.0	2.1	
19-Jul	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	2.1	2.1	2.2	2.0	2.2	
20-Jul	2.2	2.3	Z	2.1	2.1	2.1	2.2	2.1	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	2.0	2.0	2.0	2.0	2.3	
21-Jul	2.0	2.0	2.0	Z	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	2.1	2.1	2.1	2.1	2.0	2.1	
22-Jul	2.1	2.1	2.2	2.0	Z	2.1	2.1	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	2.0	2.2	
23-Jul	1.9	1.9	1.9	1.9	1.9	Z	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	2.0	2.0	1.9	2.0	
24-Jul	Z	2.0	2.1	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	2.0	2.0	2.1	
25-Jul	2.1	Z	2.0	2.0	2.0	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	2.0	2.0	2.0	2.1	2.1	2.0	2.1	
26-Jul	2.0	2.0	Z	2.1	2.1	2.2	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	2.0	2.0	2.0	2.0	2.0	2.2	
27-Jul	2.0	2.0	2.0	Z	2.1	2.2	2.2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.1	2.0	1.9	2.1	2.3	
28-Jul	1.9	1.9	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	2.0	1.9	1.9	1.9	1.9	2.0	
29-Jul	1.9	2.0	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	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.0	2.1
30-Jul	Z	2.0	2.0	2.1	2.1	2.2	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	2.2	
31-Jul	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	2.0	2.1	1.9	2.1	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	555	78.50	78.50
2.1 - 3.0	152	21.50	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - July 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	29	12	7	3	3	14	32	35	28	32	31	37	75	140	39	38	555
2.1 - 3.0	2	1	2	1	3	4	5	6	34	15	21	12	12	11	11	9	149
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	31	13	9	4	6	18	37	41	62	47	52	49	87	151	50	47	704

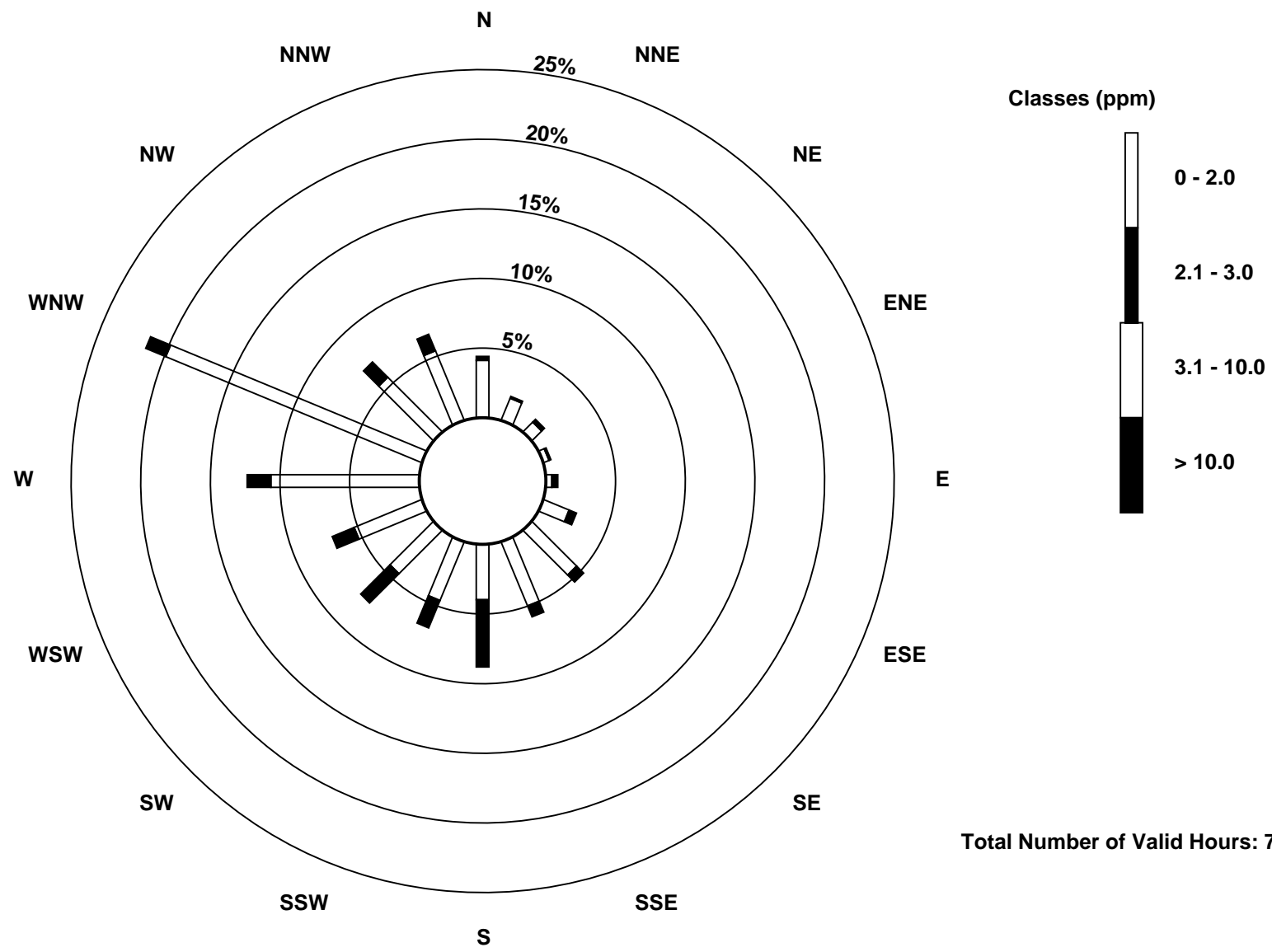
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)



Total Number of Valid Hours: 704

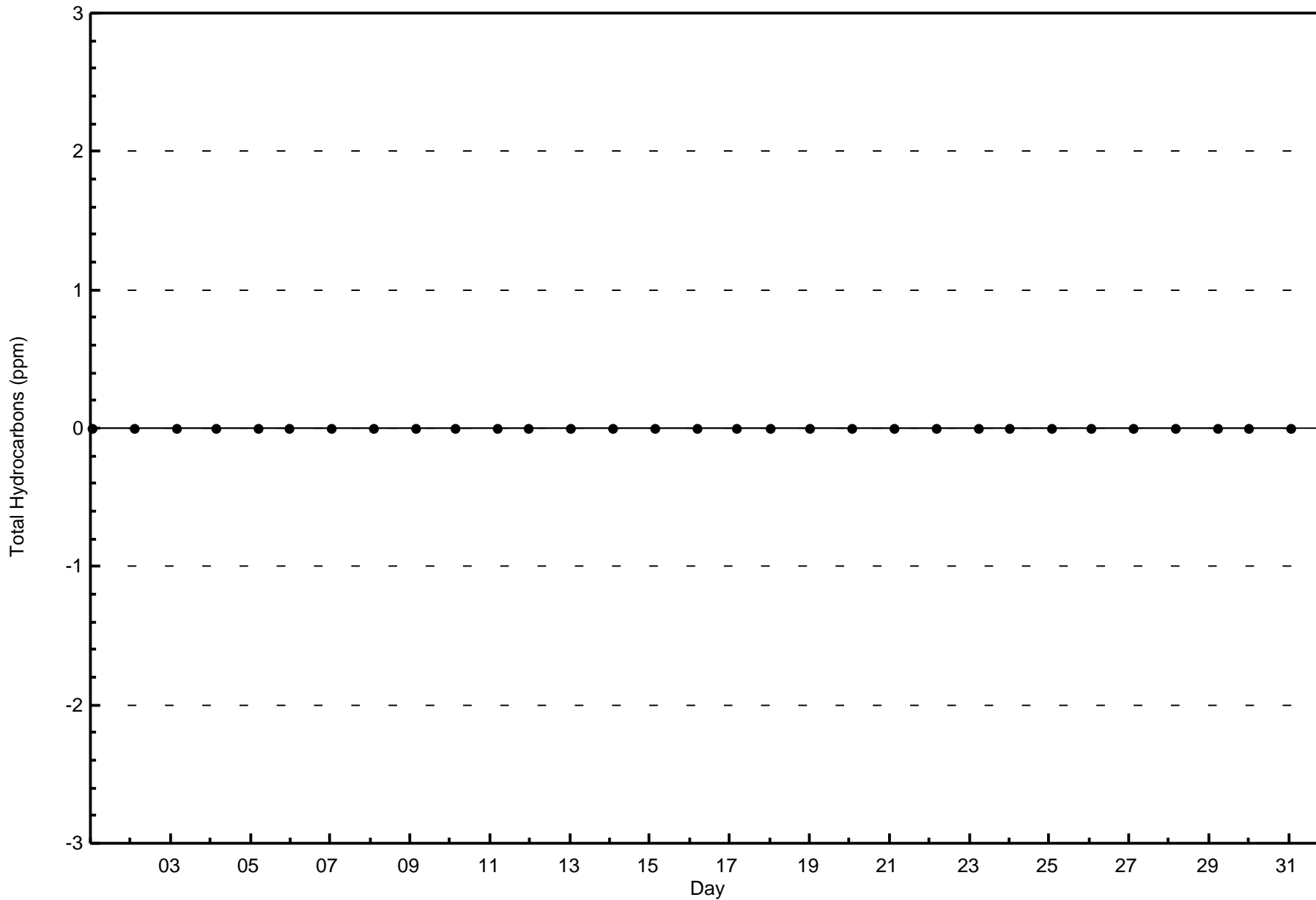


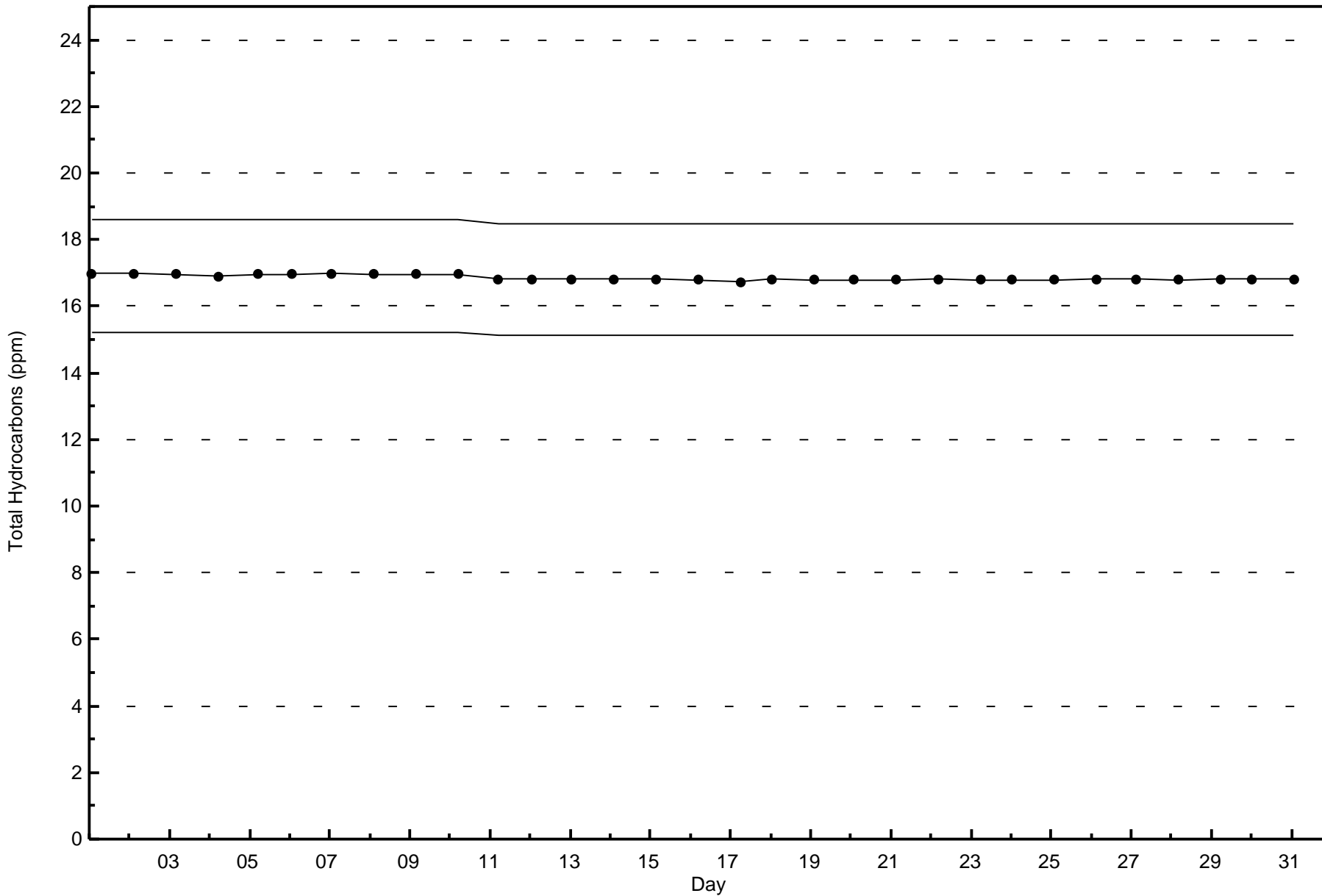
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Anzac - July 2017



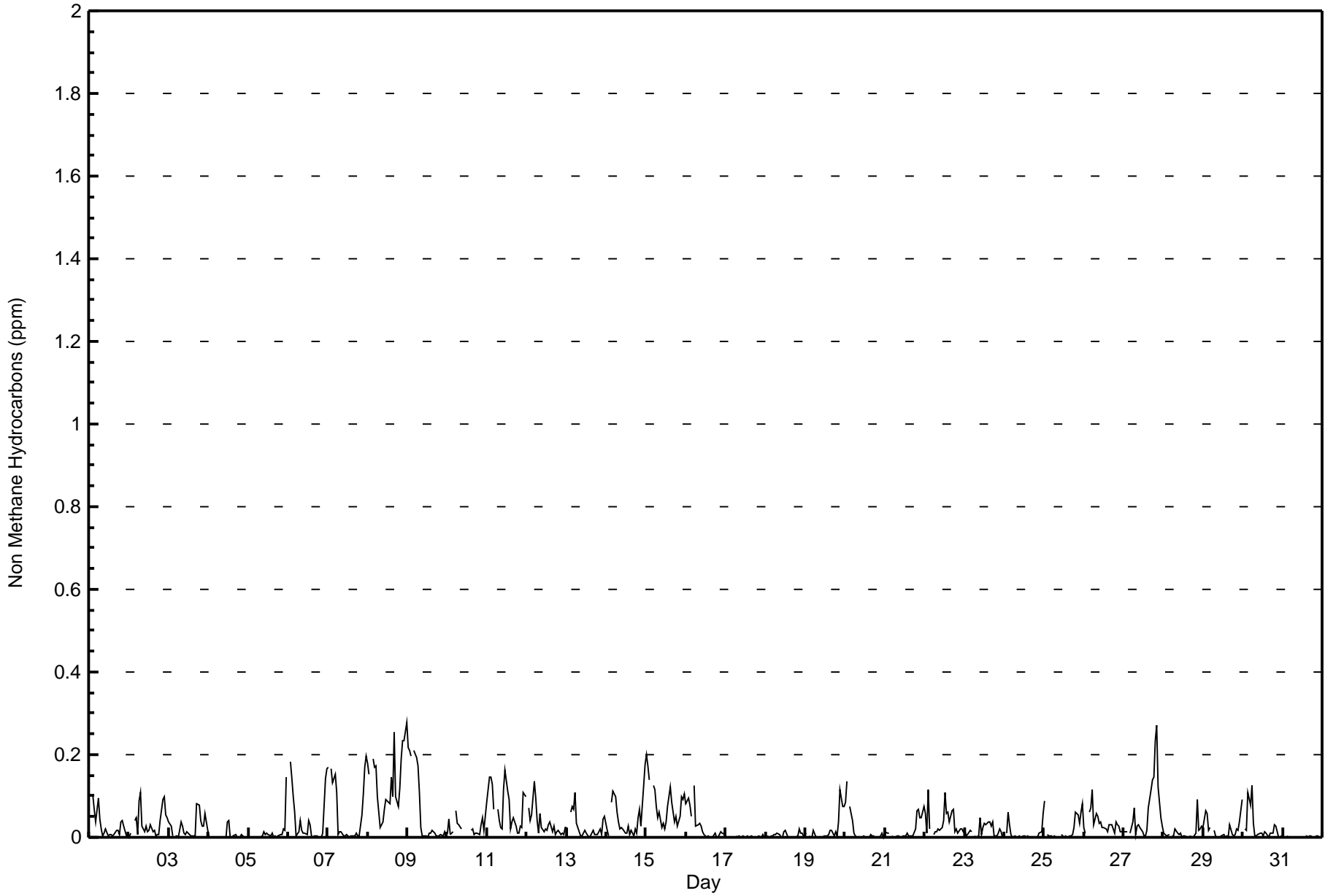




Summary of Hour Averages

Anzac - July 2017

Maximum Value: 0.279 ppm on Jul 9 00:00																				Maximum Daily Average: 0.135 ppm on Jul 8					Hours in Service:	744
Minimum Value: 0.000 ppm on Jul 4 01:00																				Minimum Daily Average: 0.001 ppm on Jul 31					Hours of Data:	707
Maximum Diurnal Average: 0.059 ppm at hour 24																				Minimum Diurnal Average: 0.013 ppm at hour 10					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 = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.2					Hours of Calibration:	36
																									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-Jul	0.087	Z	0.102	0.069	0.036	0.096	0.043	0.019	0.003	0.012	0.021	0.002	0.008	0.008	0.003	0.005	0.016	0.016	0.008	0.037	0.041	0.026	0.004	0.006	0.029	0.102
2-Jul	0.001	0.011	Z	0.041	0.046	0.006	0.088	0.109	0.026	0.014	0.028	0.014	0.017	0.031	0.012	0.017	0.004	0.007	0.006	0.042	0.092	0.097	0.053	0.047	0.035	0.109
3-Jul	0.036	0.028	0.004	Z	0.005	0.002	0.002	0.037	0.026	0.010	0.006	0.013	0.008	0.004	0.002	0.004	0.003	0.082	0.079	0.042	0.028	0.026	0.058	0.015	0.023	0.082
4-Jul	0.000	0.000	0.000	0.000	Z	0.001	0.000	0.000	0.002	0.001	0.000	0.039	0.042	0.000	0.000	0.004	0.007	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.004	0.042
5-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.002	0.014	0.006	0.010	0.005	0.002	0.009	0.000	0.002	0.001	0.004	0.005	0.006	0.021	0.018	0.144	0.011	0.144
6-Jul	Z	0.184	0.143	0.098	0.061	0.002	0.015	0.041	0.016	0.009	0.010	0.006	0.040	0.031	0.002	0.000	0.002	0.002	0.001	0.000	0.002	0.010	0.144	0.168	0.043	0.184
7-Jul	0.170	Z	0.165	0.134	0.152	0.107	0.008	0.012	0.013	0.004	0.005	0.007	0.004	0.001	0.002	0.005	0.005	0.011	0.002	0.004	0.053	0.105	0.170	0.197	0.058	0.197
8-Jul	0.180	0.153	Z	0.191	0.170	0.172	0.099	0.023	0.030	0.036	0.067	0.092	0.088	0.083	0.146	0.099	0.256	0.098	0.075	0.117	0.191	0.234	0.235	0.279	0.135	0.279
9-Jul	0.218	0.211	0.198	Z	0.210	0.192	0.171	0.107	0.023	0.004	0.004	0.003	0.001	0.012	0.010	0.016	0.009	0.002	0.004	0.005	0.008	0.002	0.014	0.005	0.062	0.218
10-Jul	0.010	0.045	0.008	0.013	Z	0.065	0.035	0.032	0.020	C	C	C	C	C	0.017	0.019	0.006	0.011	0.011	0.008	0.029	0.047	0.015	0.052	0.025	0.065
11-Jul	0.086	0.146	0.145	0.127	0.067	Z	0.068	0.042	0.024	0.022	0.115	0.164	0.112	0.093	0.019	0.037	0.048	0.029	0.011	0.010	0.027	0.022	0.107	0.097	0.070	0.164
12-Jul	Z	0.071	0.042	0.055	0.136	0.095	0.042	0.011	0.057	0.024	0.014	0.021	0.016	0.030	0.037	0.015	0.029	0.006	0.013	0.017	0.008	0.010	0.007	0.025	0.034	0.136
13-Jul	0.022	Z	0.061	0.076	0.068	0.110	0.034	0.013	0.005	0.003	0.011	0.018	0.010	0.000	0.005	0.010	0.016	0.008	0.005	0.015	0.020	0.005	0.044	0.051	0.026	0.110
14-Jul	0.018	0.003	Z	0.084	0.113	0.100	0.062	0.038	0.020	0.022	0.020	0.010	0.009	0.026	0.007	0.017	0.003	0.021	0.011	0.049	0.067	0.027	0.127	0.178	0.045	0.178
15-Jul	0.201	0.175	0.138	Z	0.125	0.116	0.073	0.049	0.060	0.022	0.033	0.022	0.037	0.075	0.123	0.086	0.061	0.036	0.049	0.029	0.050	0.097	0.091	0.105	0.081	0.201
16-Jul	0.080	0.096	0.079	0.051	Z	0.126	0.028	0.031	0.035	0.028	0.013	0.005	0.000	0.005	0.001	0.001	0.000	0.011	0.000	0.000	0.008	0.014	0.010	0.007	0.027	0.126
17-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.003	0.000	0.003	0.000	0.002	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.001	0.000	0.002	0.001	0.006	0.000	0.001	0.006
18-Jul	Z	0.004	0.001	0.005	0.005	0.007	0.006	0.009	0.006	0.001	0.001	0.014	0.019	0.001	0.000	0.001	0.000	0.000	0.001	0.004	0.019	0.009	0.010	0.002	0.005	0.019
19-Jul	0.010	Z	0.003	0.000	0.002	0.016	0.000	0.000	0.000	0.001	0.001	0.003	0.003	0.003	0.008	0.017	0.016	0.004	0.015	0.004	0.037	0.115	0.075	0.075	0.018	0.115
20-Jul	0.085	0.137	Z	0.075	0.040	0.010	0.003	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.005	0.002	0.005	0.000	0.000	0.001	0.002	0.009	0.001	0.016	0.137
21-Jul	0.012	0.009	0.009	Z	0.004	0.000	0.000	0.002	0.004	0.001	0.001	0.003	0.003	0.009	0.004	0.004	0.005	0.004	0.022	0.066	0.066	0.048	0.046	0.076	0.017	0.076
22-Jul	0.057	0.012	0.117	0.022	Z	0.006	0.012	0.014	0.019	0.016	0.024	0.042	0.109	0.059	0.062	0.039	0.065	0.067	0.014	0.021	0.010	0.020	0.020	0.014	0.037	0.117
23-Jul	0.019	0.002	0.008	0.016	0.015	Z	0.004	0.001	0.003	0.047	0.007	0.024	0.033	0.030	0.036	0.038	0.026	0.037	0.005	0.002	0.011	0.019	0.015	0.001	0.017	0.047
24-Jul	Z	0.009	0.061	0.029	0.008	0.001	0.002	0.000	0.001	0.003	0.002	0.002	0.003	0.000	0.004	0.000	0.001	0.002	0.000	0.001	0.002	0.009	0.013	0.057	0.009	0.061
25-Jul	0.089	Z	0.007	0.002	0.003	0.000	0.004	0.001	0.001	M	0.008	0.004	0.001	0.002	0.000	0.005	0.002	0.006	0.025	0.061	0.055	0.033	0.060	0.080	0.020	0.089
26-Jul	0.025	0.011	Z	0.061	0.070	0.114	0.031	0.057	0.052	0.035	0.022	0.023	0.019	0.014	0.031	0.031	0.029	0.009	0.038	0.030	0.026	0.014	0.014	0.034	0.114	
27-Jul	0.015	0.014	0.015	Z	0.009	0.038	0.072	0.007	0.028	0.031	0.023	0.014	0.004	0.004	0.018	0.071	0.115	0.140	0.147	0.234	0.270	0.123	0.046	0.027	0.064	0.270
28-Jul	0.010	0.006	0.002	0.007	Z	0.002	0.003	0.022	0.011	0.006	0.010	0.000	0.004	0.003	0.000	0.002	0.004	0.000	0.000	0.009	0.092	0.018	0.020	0.028	0.011	0.092
29-Jul	0.024	0.064	0.058	0.017	0.023	Z	0.018	0.002	0.000	0.001	0.000	0.004	0.006	0.000	0.003	0.001	0.031	0.007	0.002	0.008	0.020	0.018	0.037	0.090	0.019	0.090
30-Jul	Z	0.021	0.017	0.107	0.077	0.124	0.035	0.004	0.003	0.006	0.009	0.010	0.005	0.013	0.011	0.001	0.009	0.009	0.009	0.030	0.026	0.000	0.001	0.002	0.023	0.124
31-Jul	0.001	Z	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.004	0.002	0.000	0.000	0.003	0.002	0.002	0.001	0.001	0.004
																				0.056 0.056 0.053 0.049 0.055 0.058 0.031 0.022 0.016 0.013 0.016 0.019 0.020 0.018 0.018 0.018 0.025 0.021 0.017 0.028 0.041 0.038 0.047 0.059					Diurnal Average	
																				0.218 0.211 0.198 0.191 0.210 0.192 0.171 0.109 0.060 0.047 0.115 0.164 0.112 0.093 0.146 0.099 0.256 0.140 0.147 0.234 0.270 0.234 0.235 0.279					Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																				





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	258	36.49	36.49
0.006 - 0.05	308	43.56	80.06
0.06 - 0.1	112	15.84	95.90
> 0.1	29	4.10	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - July 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	23	7	3	0	1	12	21	4	8	4	4	13	41	74	18	25	258
0.006 - 0.05	7	5	5	4	4	4	12	28	25	29	30	24	30	66	21	14	308
0.06 - 0.1	1	1	0	0	1	2	3	9	25	9	15	7	10	9	11	8	111
> 0.1	0	0	1	0	0	0	1	0	4	5	3	5	6	2	0	0	27
Totals	31	13	9	4	6	18	37	41	62	47	52	49	87	151	50	47	704

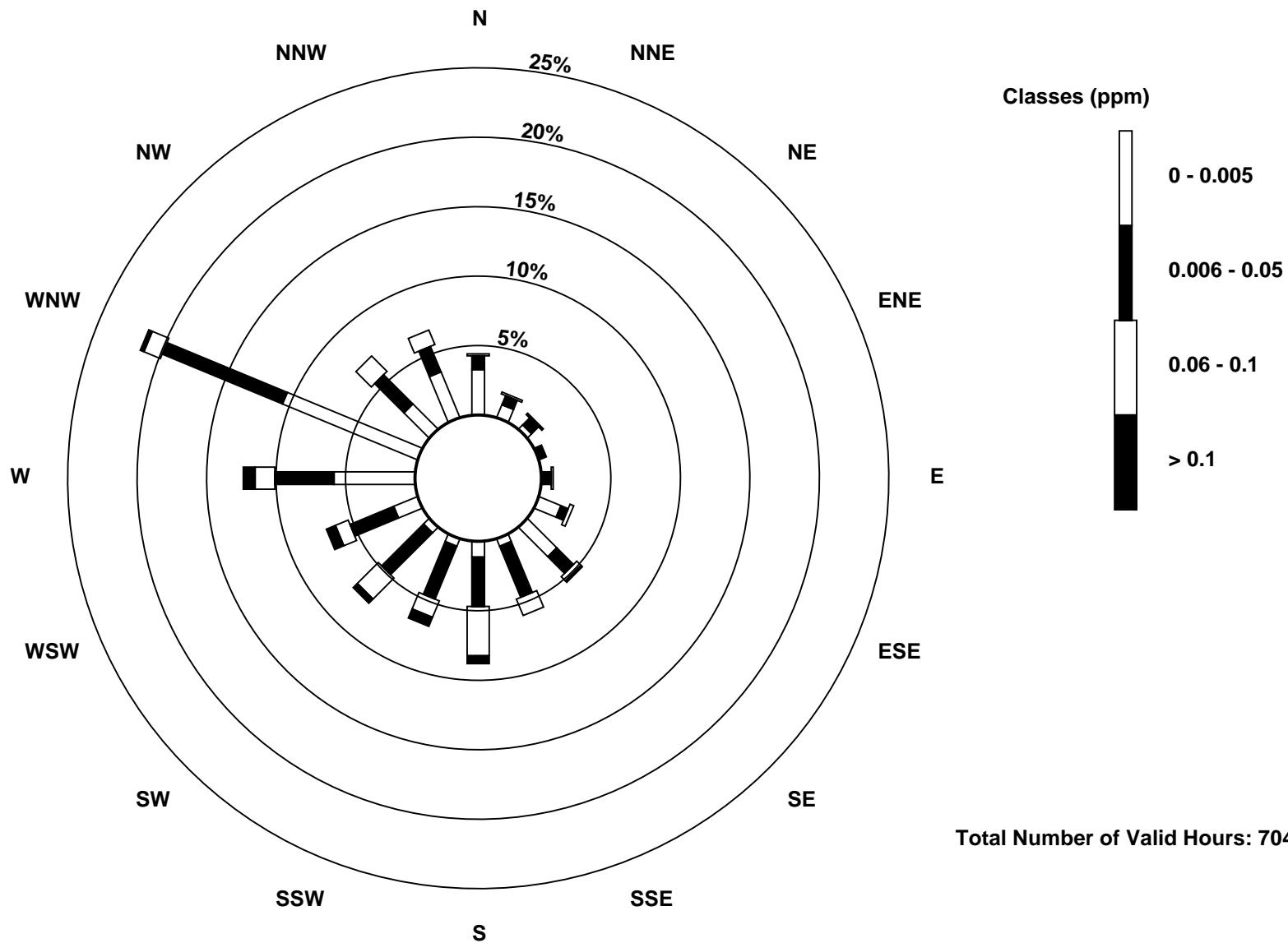
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)



Total Number of Valid Hours: 704

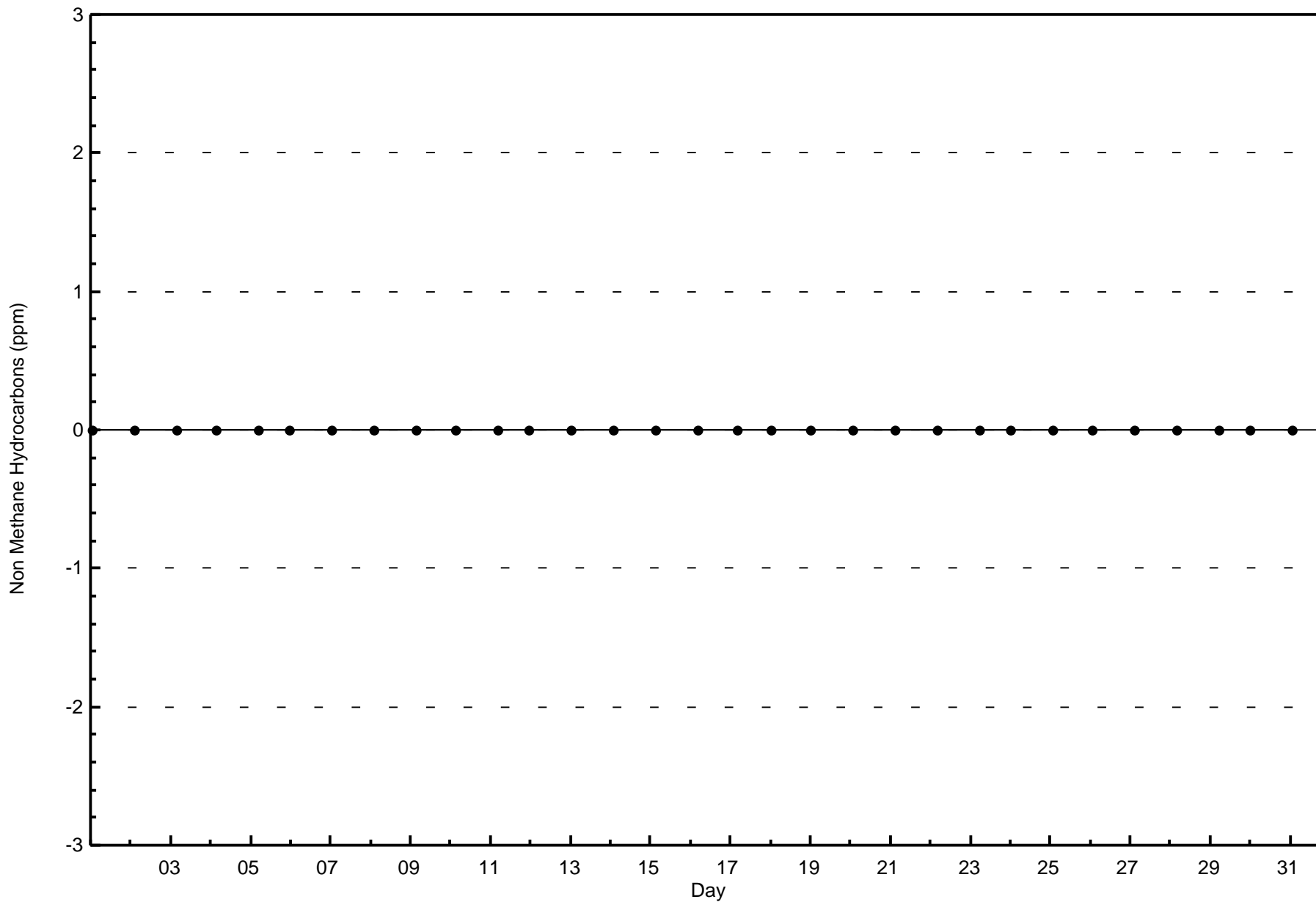


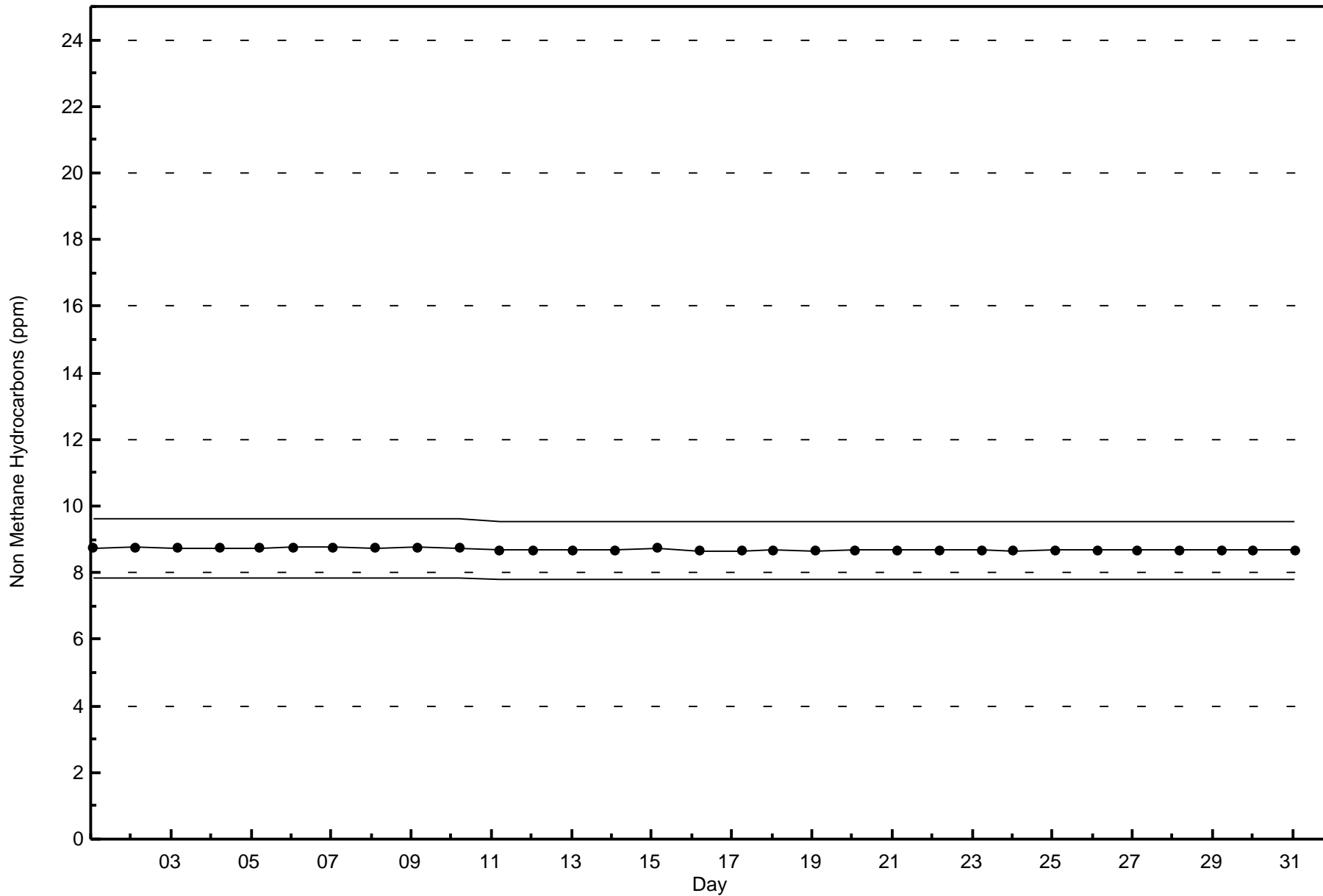
Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

Anzac - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

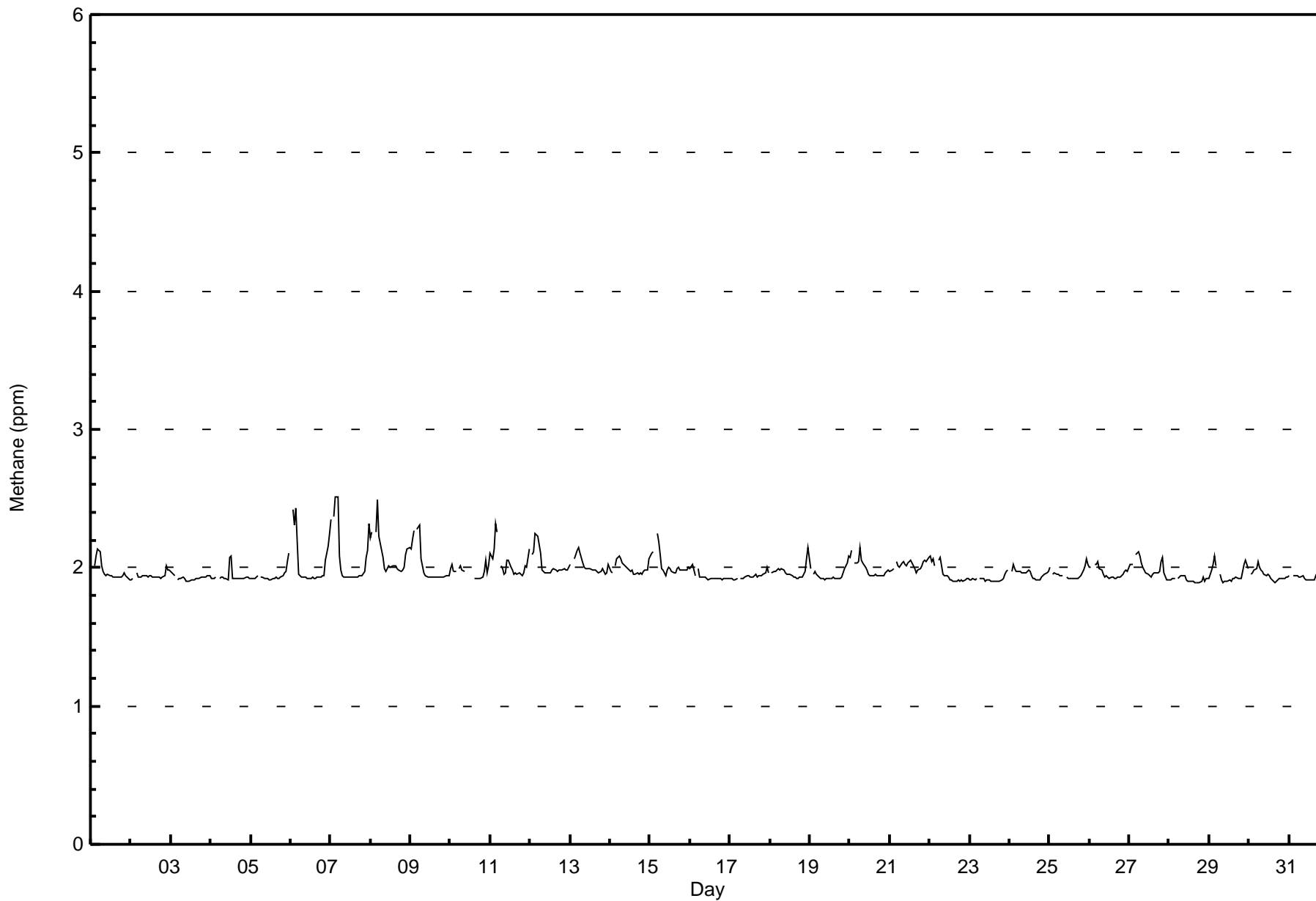
Anzac - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2.5 ppm on Jul 7 04:00 Maximum Daily Average: 2.1 ppm on Jul 8																	Hours in Service: 744 Hours of Data: 707									
Minimum Value: 1.9 ppm on Jul 28 17:00 Minimum Daily Average: 1.9 ppm on Jul 28 Maximum Diurnal Average: 2.1 ppm at hour 5 Minimum Diurnal Average: 1.9 ppm at hour 17 Monthly Average: 1.98 ppm Percentiles: P ₁ = 1.9 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 Missing Data: 37 Hours of Calibration: 36 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-Jul	2.0	Z	2.0	2.1	2.1	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	1.9	1.9	1.9	2.0	2.1
2-Jul	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	2.0	2.0	2.0	1.9	2.0
3-Jul	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	1.9	1.9	2.0
4-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.1	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	2.1
5-Jul	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	2.0	2.0	2.0	2.1	1.9	2.1
6-Jul	Z	2.4	2.3	2.4	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	1.9	2.1	2.2	2.2	2.0	2.4	
7-Jul	2.4	Z	2.4	2.5	2.5	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	2.1	2.1	2.3	2.1	2.5	
8-Jul	2.2	2.3	Z	2.3	2.5	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	2.0	2.0	2.1	2.1	2.1	2.1	2.5	
9-Jul	2.1	2.2	2.3	Z	2.3	2.3	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	2.0	2.3	
10-Jul	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	C	C	C	C	C	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.1	
11-Jul	2.1	2.1	2.1	2.3	2.3	Z	2.0	2.0	1.9	2.0	2.1	2.1	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.1	2.0	2.3	
12-Jul	Z	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	
13-Jul	2.0	Z	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	2.0	2.0	2.0	2.1	
14-Jul	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	
15-Jul	2.1	2.1	2.1	Z	2.3	2.2	2.1	2.0	2.0	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	2.3	
16-Jul	2.0	2.0	2.0	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	2.0	
17-Jul	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	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	2.0	
18-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.0	2.1	
19-Jul	2.0	Z	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	2.0	2.1	1.9	2.1	
20-Jul	2.1	2.1	Z	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	
21-Jul	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	2.1	2.0	2.1	2.0	2.1	
22-Jul	2.1	2.0	2.1	2.0	Z	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	2.0	2.1	
23-Jul	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	2.0	2.0	2.0	1.9	2.0	
24-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	
25-Jul	2.0	Z	2.0	2.0	2.0	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	2.0	2.0	2.1	2.0	2.1	
26-Jul	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	2.0	2.0	2.0	2.0	2.0	
27-Jul	2.0	2.0	2.0	Z	2.1	2.1	2.1	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	2.1	2.0	1.9	2.0	2.1	
28-Jul	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	
29-Jul	1.9	2.0	2.0	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	2.0	2.0	2.1	2.0	2.1	
30-Jul	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	
31-Jul	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	2.1	1.9	2.1	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	619	87.55	87.55
2.1 - 3.0	88	12.45	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Anzac - July 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	30	12	8	3	5	16	34	40	47	33	39	38	76	149	44	44	618
2.1 - 3.0	1	1	1	1	1	2	3	1	15	14	13	11	11	2	6	3	86
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	31	13	9	4	6	18	37	41	62	47	52	49	87	151	50	47	704

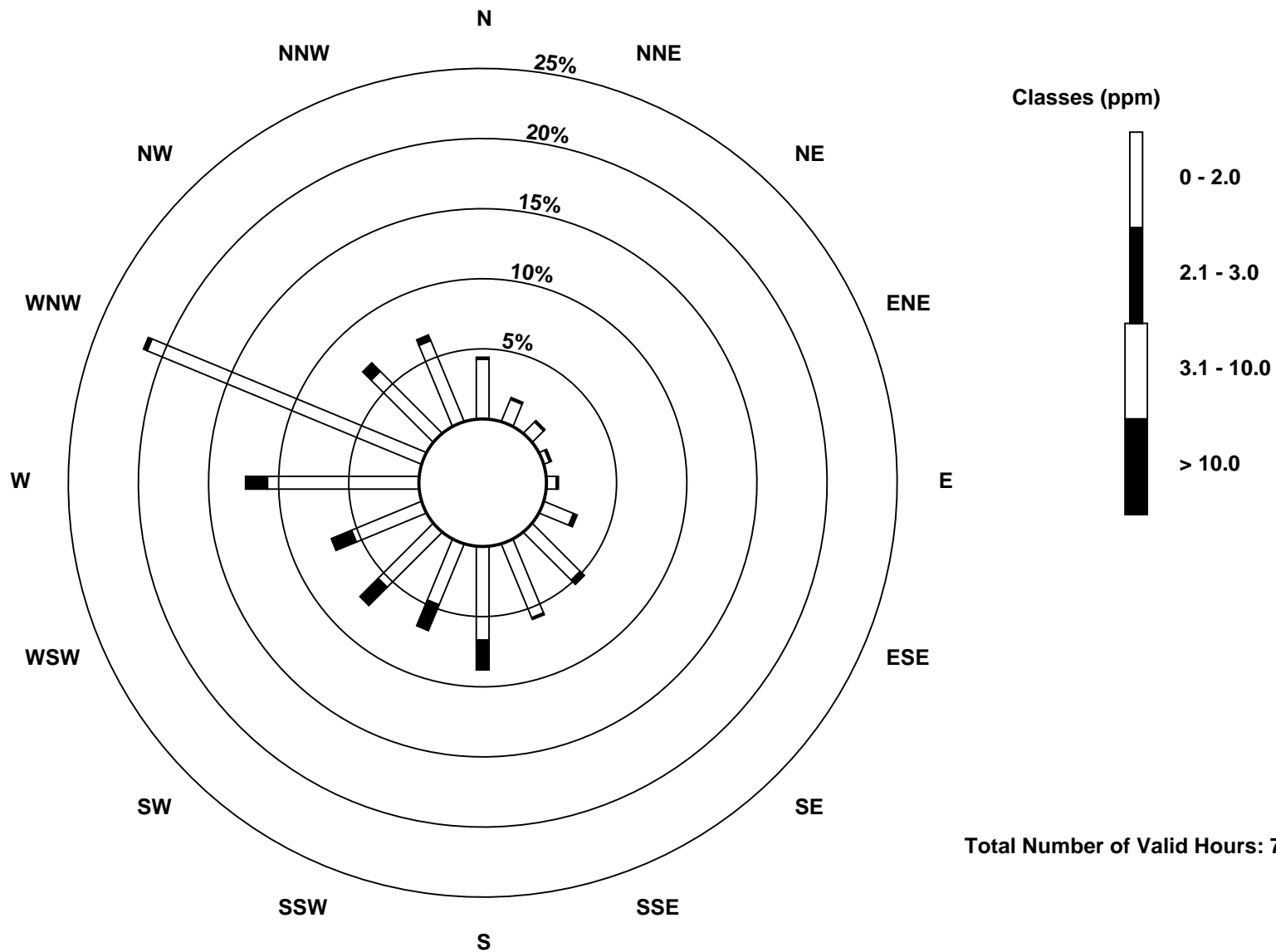
Total Number of Valid Hours: 704

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Methane (CH₄) - ppm
Anzac (AMS 14)

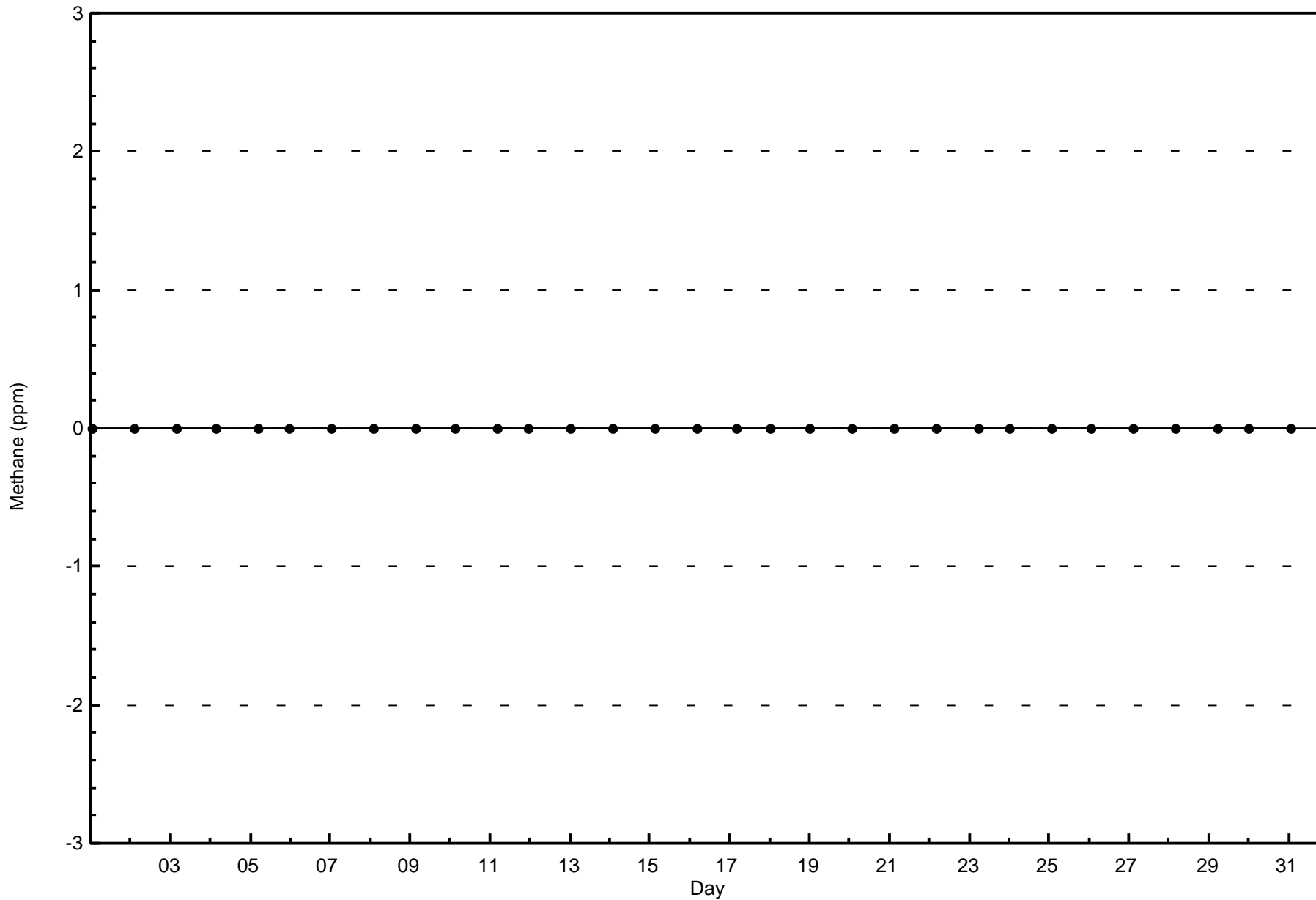


Total Number of Valid Hours: 704



Wood Buffalo Environmental Association
Zero Responses

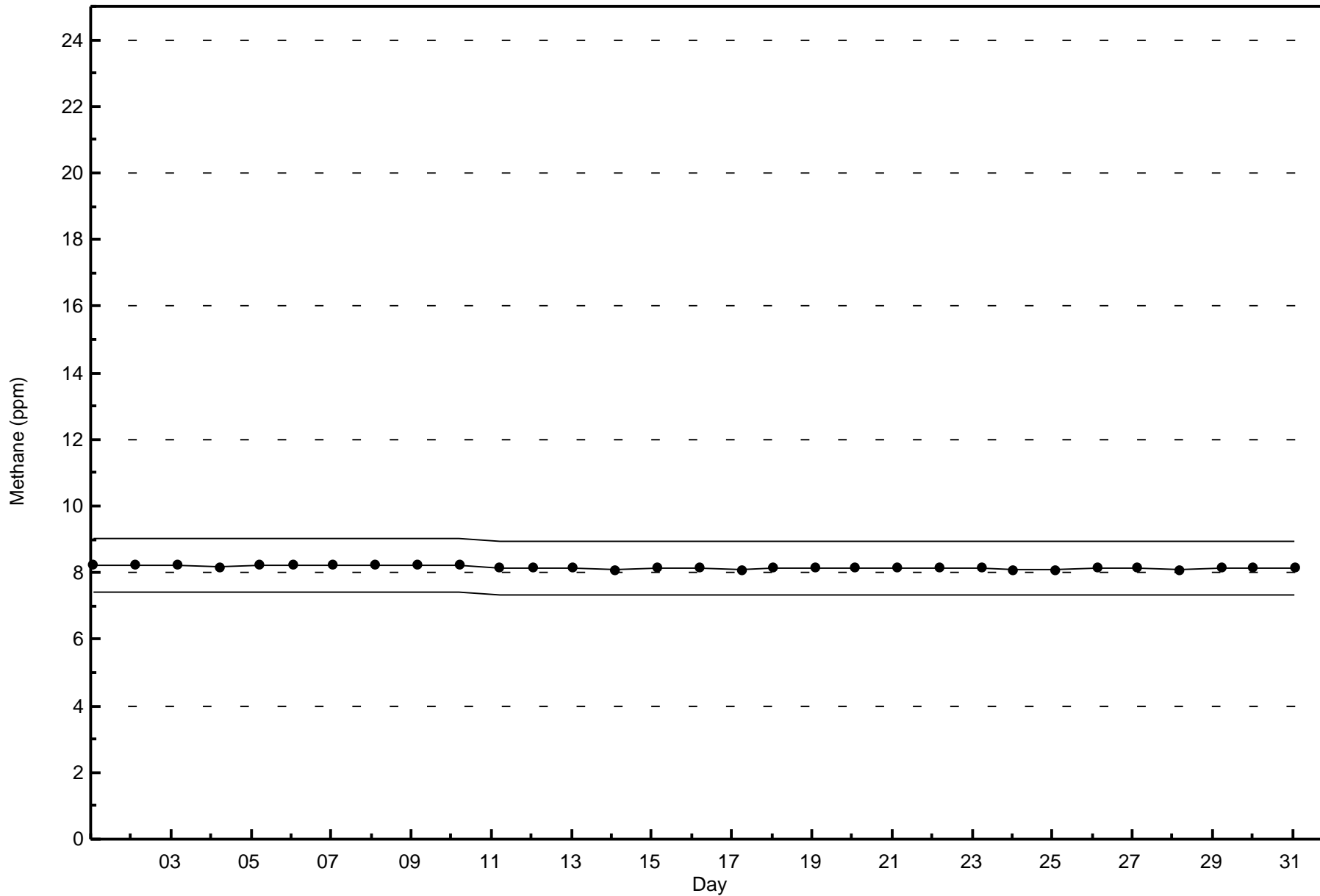
Methane (CH₄) - ppm
Anzac - July 2017





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Anzac - July 2017



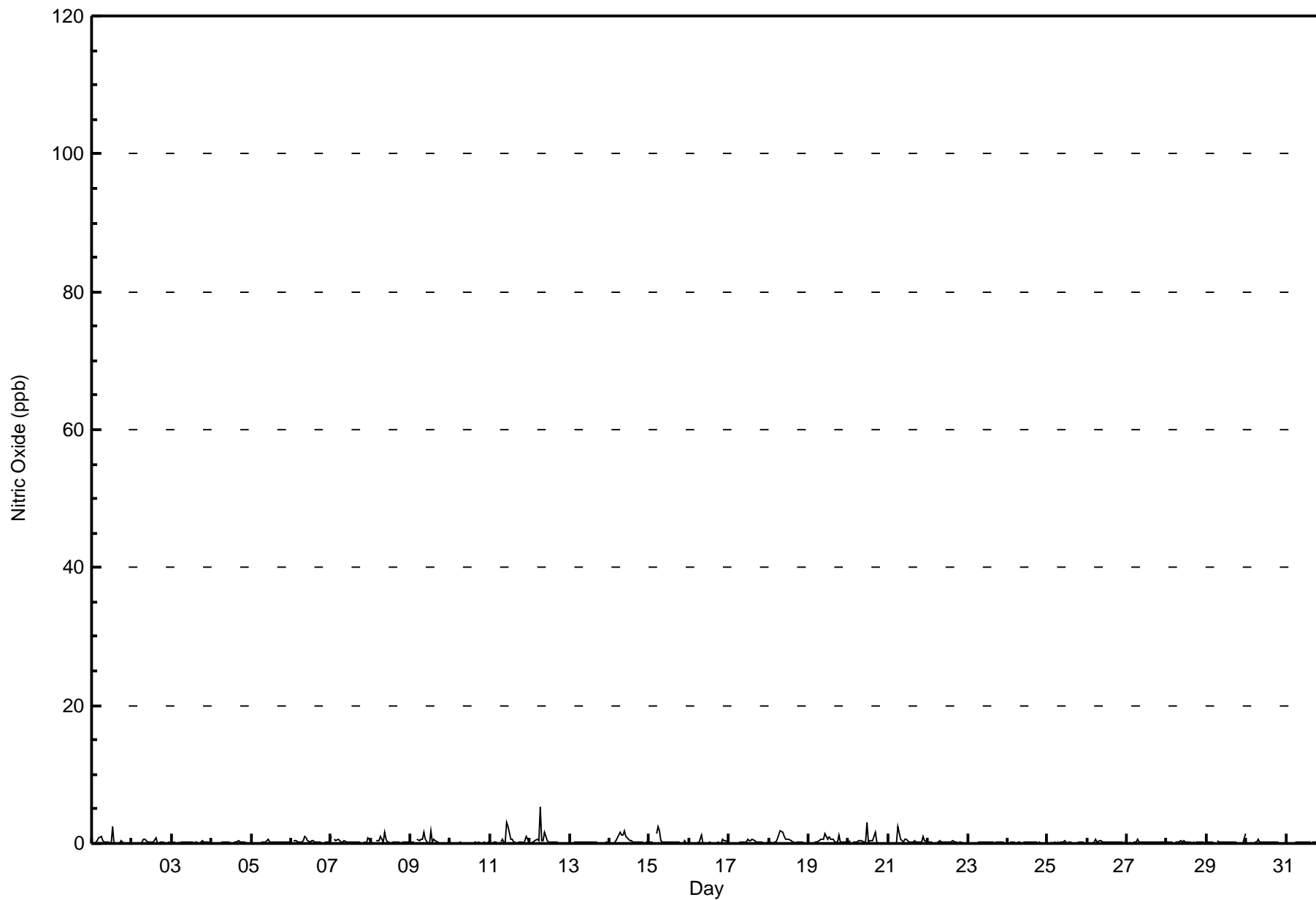


Maximum Value: 5 ppb on Jul 12 07:00		Maximum Daily Average: 0.5 ppb on Jul 14		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 10 03:00		Minimum Daily Average: 0.1 ppb on Jul 10		Hours of Data: 708																						
Maximum Diurnal Average: 0.6 ppb at hour 7		Minimum Diurnal Average: 0.1 ppb at hour 20		Hours of Missing Data: 36																						
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: 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-Jul	0	Z	0	0	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0.3	2
2-Jul	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
3-Jul	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-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
6-Jul	Z	0	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
7-Jul	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
8-Jul	0	0	Z	0	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2
9-Jul	0	0	0	Z	1	0	1	1	2	1	0	0	2	0	1	0	0	0	0	0	0	0	0	1	0.4	2
10-Jul	0	0	0	0	Z	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.1	0
11-Jul	0	0	0	0	0	Z	0	1	0	0	3	2	1	1	0	0	0	0	0	0	0	0	1	0	0.5	3
12-Jul	Z	0	0	0	1	1	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	5
13-Jul	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-Jul	0	0	Z	0	0	1	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2
15-Jul	0	0	0	Z	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
16-Jul	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
18-Jul	Z	0	0	0	0	1	1	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.5	2
19-Jul	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0.5	1
20-Jul	0	0	Z	0	0	0	0	0	0	0	0	3	0	0	0	1	2	0	0	0	0	0	0	0	0.4	3
21-Jul	0	0	0	Z	0	0	2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0.4	2
22-Jul	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
23-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
27-Jul	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
28-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
30-Jul	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
31-Jul	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	0.2	0.3	0.4	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	Diurnal Average
		1	0	1	1	1	2	5	2	2	2	3	3	2	1	1	1	2	0	1	0	1	1	1	1	Diurnal Maximum
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Anzac - July 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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705
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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705

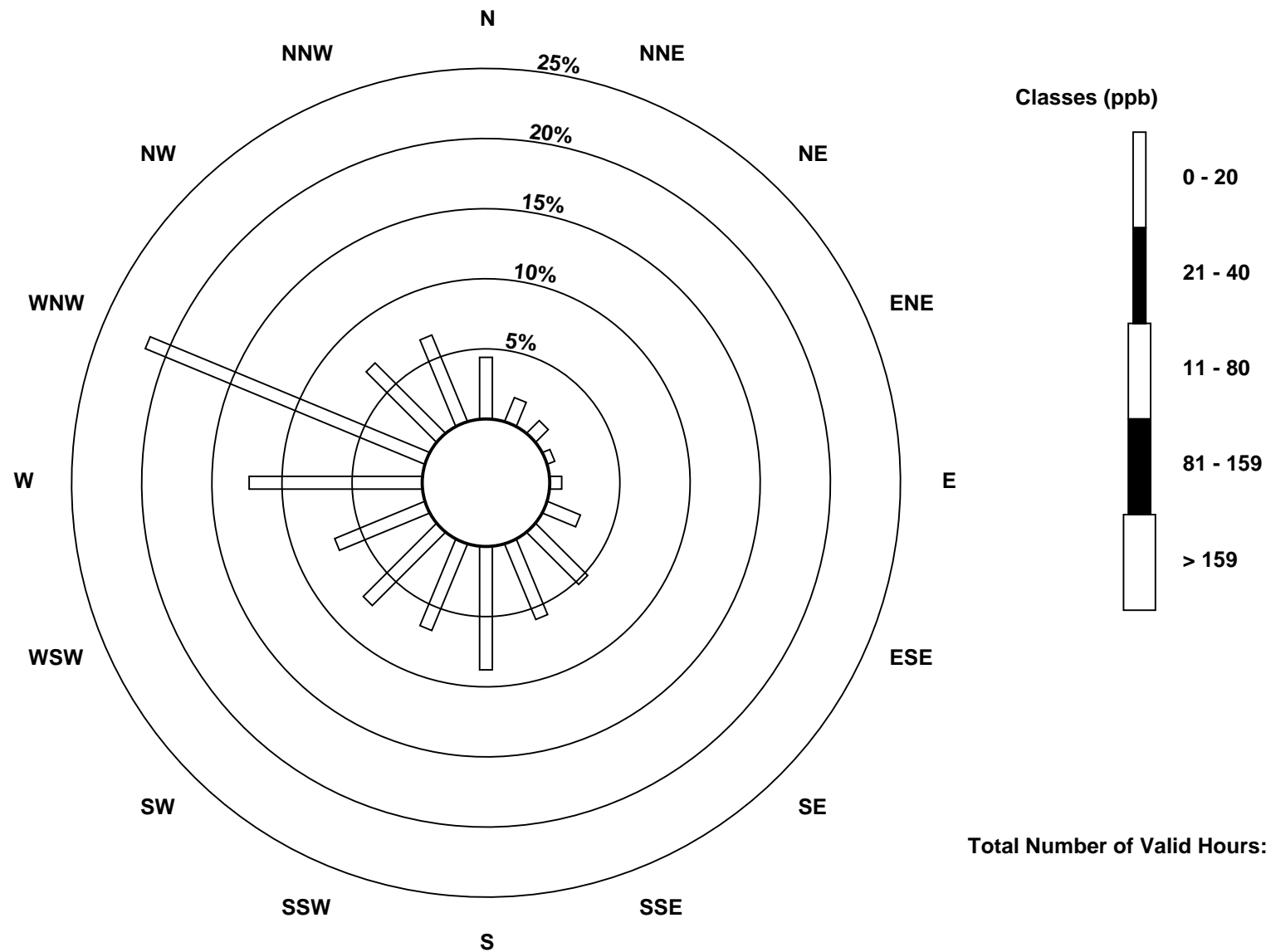
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Anzac (AMS 14)

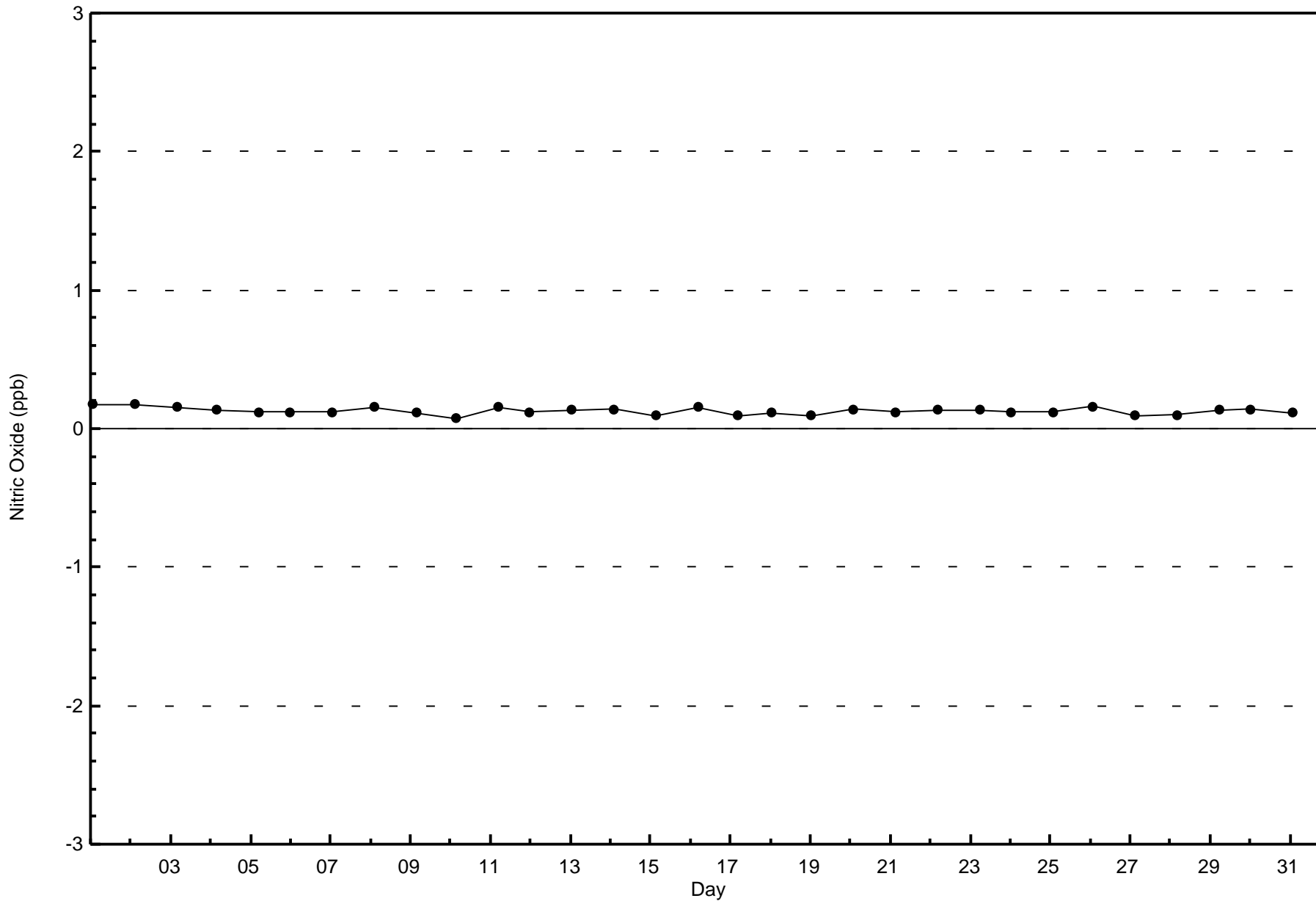


Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Zero Responses

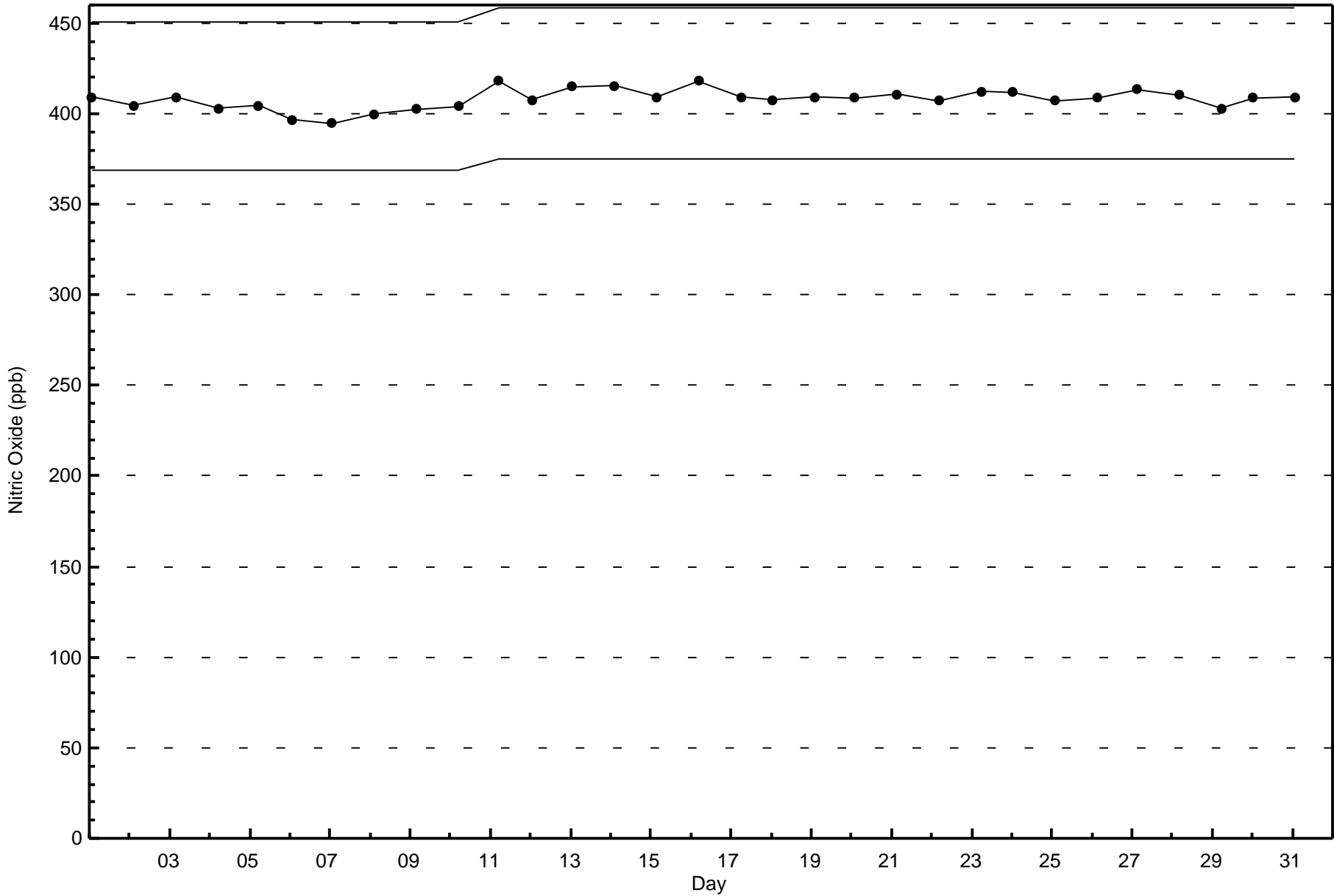
Nitric Oxide (NO) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Anzac - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 8 ppb on Jul 11 12:00	Maximum Daily Average: 2.4 ppb on Jul 11		Hours of Data:	708
Minimum Value: 0 ppb on Jul 20 20:00	Minimum Daily Average: 0.4 ppb on Jul 4		Hours of Missing Data:	36
Maximum Diurnal Average: 1.4 ppb at hour 6	Minimum Diurnal Average: 0.7 ppb at hour 18		Hours of Calibration:	36
Monthly Average: 1.0 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 1 P ₉₀ = 2 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-Jul	1	Z	1	2	1	1	1	1	1	1	1	1	2	1	0	0	1	1	1	1	1	1	1	1	0.8	2
2-Jul	0	0	Z	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
3-Jul	1	1	1	Z	1	1	2	1	1	1	0	0	0	0	0	0	0	1	2	1	1	1	1	1	0.8	2
4-Jul	0	0	0	0	Z	0	1	1	1	0	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0.4	1
5-Jul	0	0	0	0	0	Z	1	1	0	1	1	0	1	0	0	0	0	0	0	2	4	2	2	2	0.8	4
6-Jul	Z	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	0	0	1	0	0	1	1	2	0.7	2
7-Jul	3	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0.8	3
8-Jul	1	1	Z	2	2	2	2	1	3	3	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1.5	3
9-Jul	1	1	1	Z	1	1	1	2	3	1	0	0	2	1	2	2	1	0	0	0	0	0	1	1	1.0	3
10-Jul	1	1	1	1	Z	1	1	1	1	C	C	C	C	C	1	1	1	1	1	1	1	1	1	2	0.8	2
11-Jul	2	1	1	1	1	Z	2	3	1	1	7	8	5	5	3	2	2	2	1	1	1	1	4	2	2.4	8
12-Jul	Z	1	1	1	1	1	4	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1.1	4
13-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1.0	2
14-Jul	1	1	Z	3	5	6	5	3	4	5	3	3	2	3	1	1	1	1	1	1	2	1	1	1	2.3	6
15-Jul	1	2	3	Z	3	6	4	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	4	1	1.7	6
16-Jul	2	2	2	3	Z	4	2	2	2	1	1	1	1	0	1	0	0	0	0	0	1	1	1	1	1.2	4
17-Jul	0	0	0	0	0	Z	0	1	1	1	2	1	1	1	2	2	1	1	1	2	3	2	1	1	1.0	3
18-Jul	Z	2	2	2	2	2	2	2	3	2	2	2	2	1	1	1	0	0	0	1	1	0	1	0	1.3	3
19-Jul	1	Z	1	1	2	1	1	1	1	1	2	1	2	1	2	1	1	1	2	1	2	4	2	2	1.5	4
20-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	0	0	0	0	1	1	0.8	2
21-Jul	0	1	3	Z	0	0	0	4	3	1	1	1	0	1	1	1	2	1	1	1	1	3	3	1	1.2	4
22-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
23-Jul	1	0	1	1	1	Z	1	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1	2	0	0.6	2
24-Jul	Z	1	6	2	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	1	2	2	3	1.0	6
25-Jul	3	Z	1	1	1	1	1	0	1	1	1	0	0	1	1	0	0	0	0	1	1	1	1	1	0.7	3
26-Jul	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0.7	1
27-Jul	1	1	1	Z	1	1	3	1	1	1	1	1	0	1	1	1	1	1	1	2	3	1	0	1	0.9	3
28-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0.6	1
29-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	0.9	4
30-Jul	Z	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.8	2
31-Jul	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	2	2	3	1	1	1	0.7	3

0.9	1.0	1.2	1.0	1.1	1.4	1.2	1.2	1.2	1.0	1.1	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.9	1.2	1.2	1.2	1.1	Diurnal Average	
3	2	6	3	5	6	5	4	4	5	7	8	5	5	3	2	2	2	2	2	4	4	4	4	Diurnal Maximum	

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

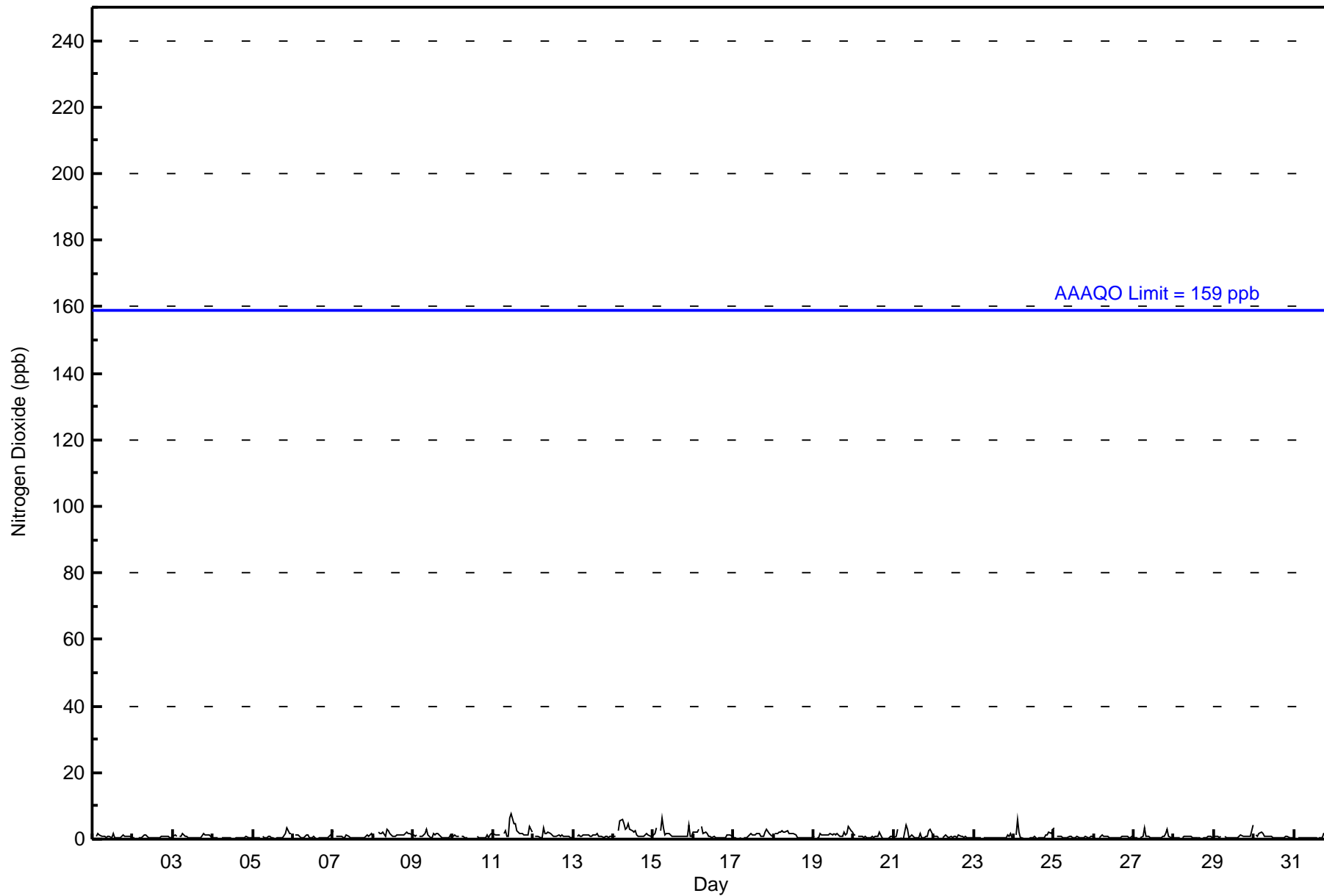


Wood Buffalo Environmental Association

Hourly Averages

Nitrogen Dioxide (NO₂) - ppb

Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - July 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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705
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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705

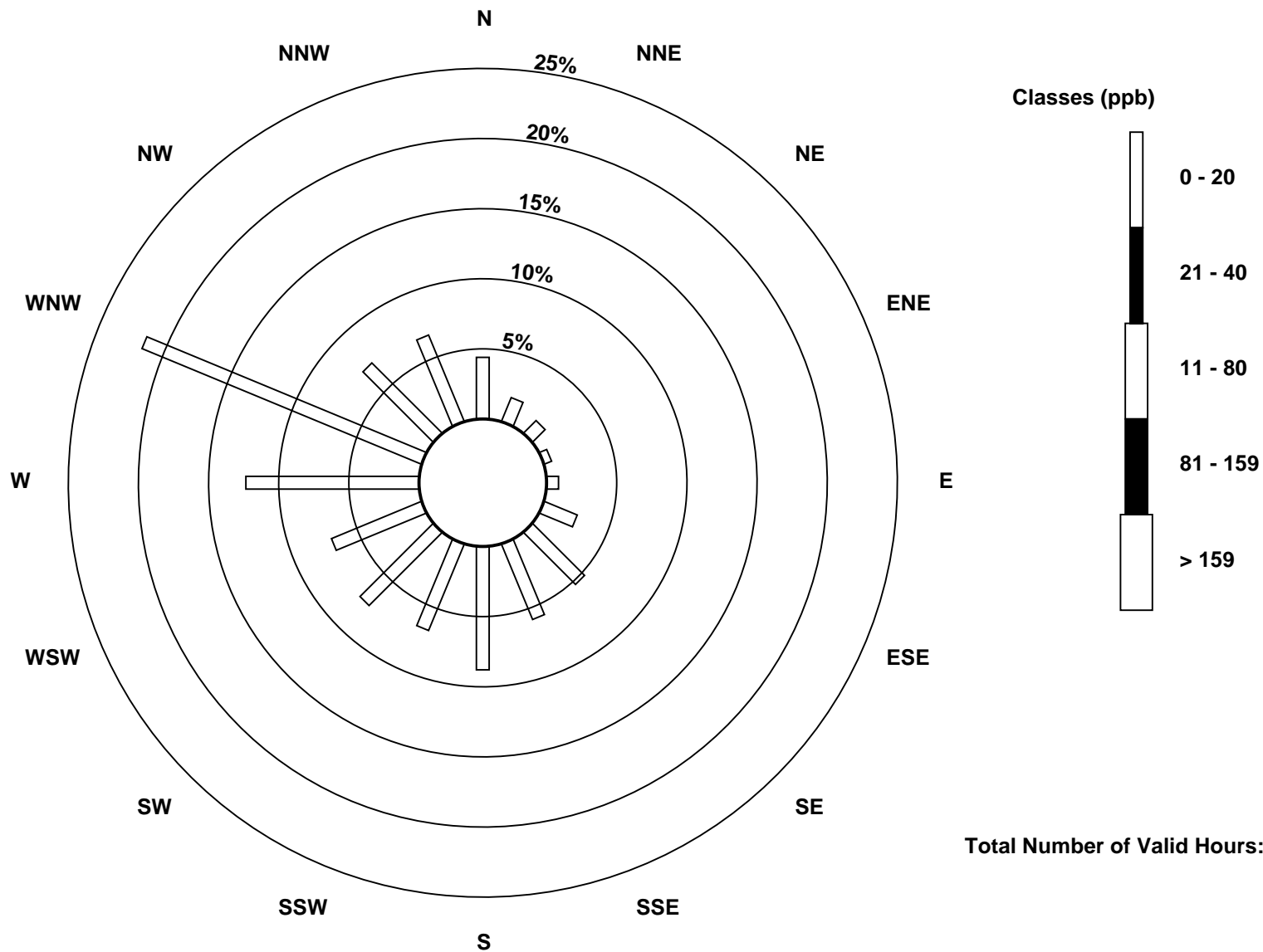
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)

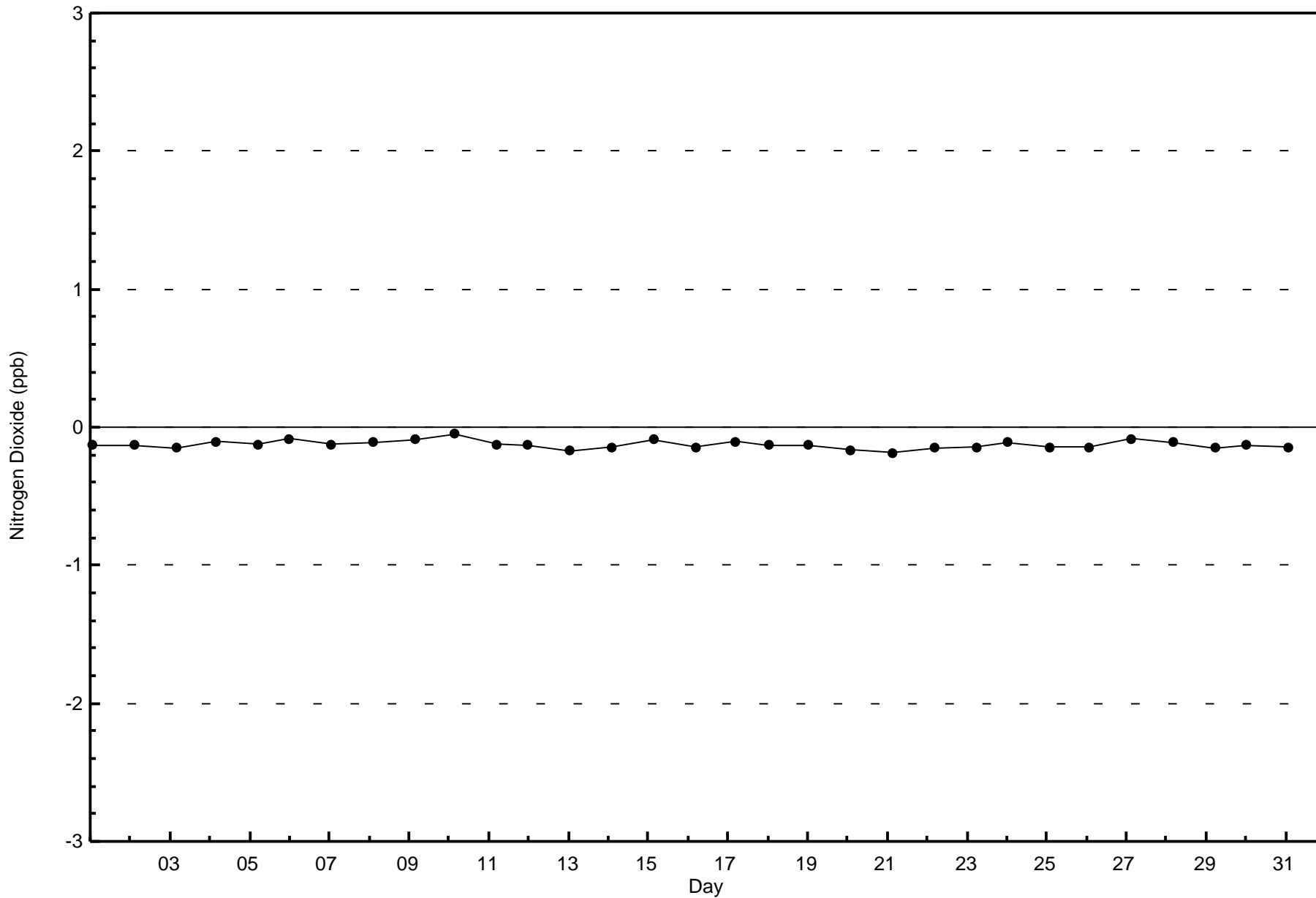


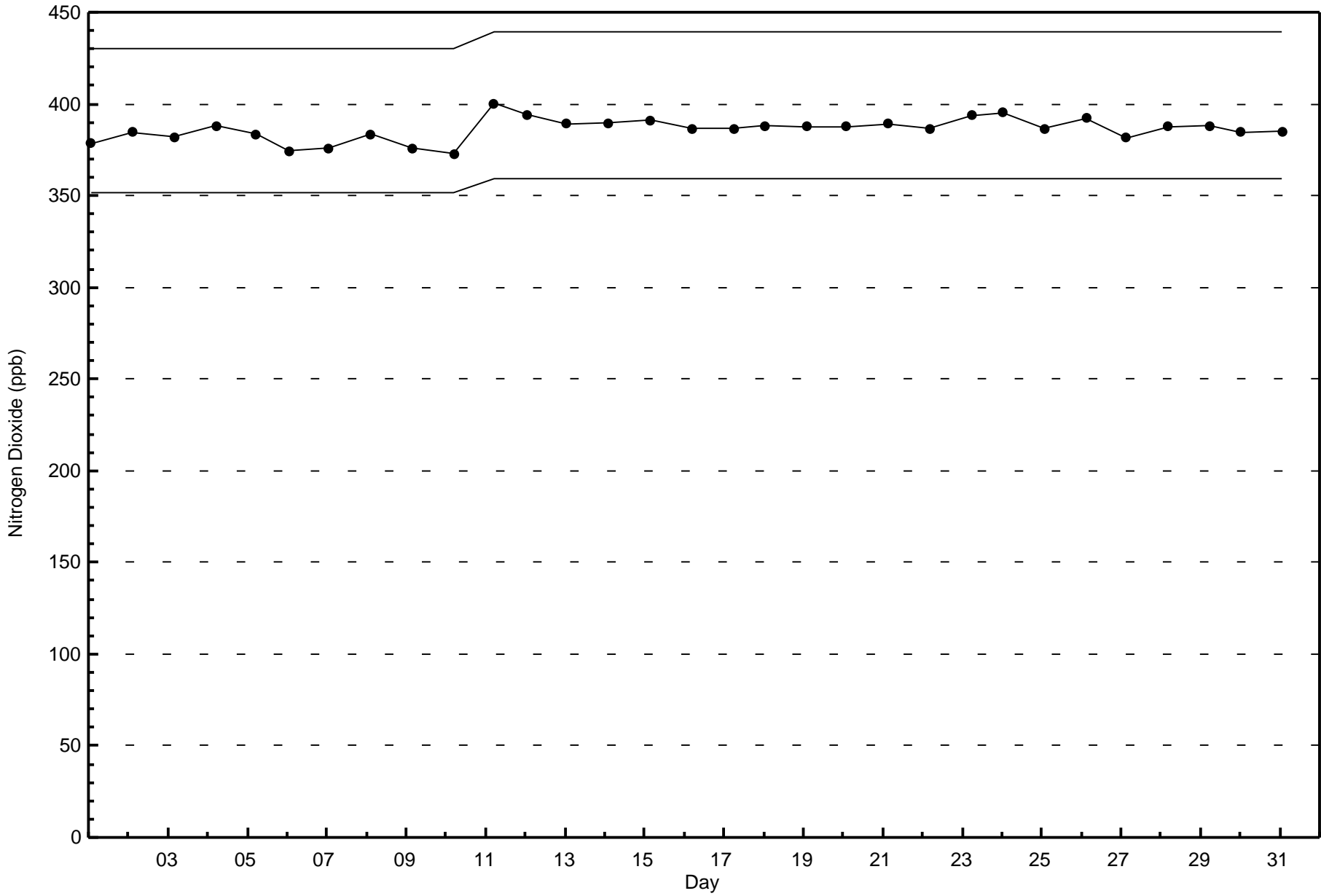
Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Anzac - July 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

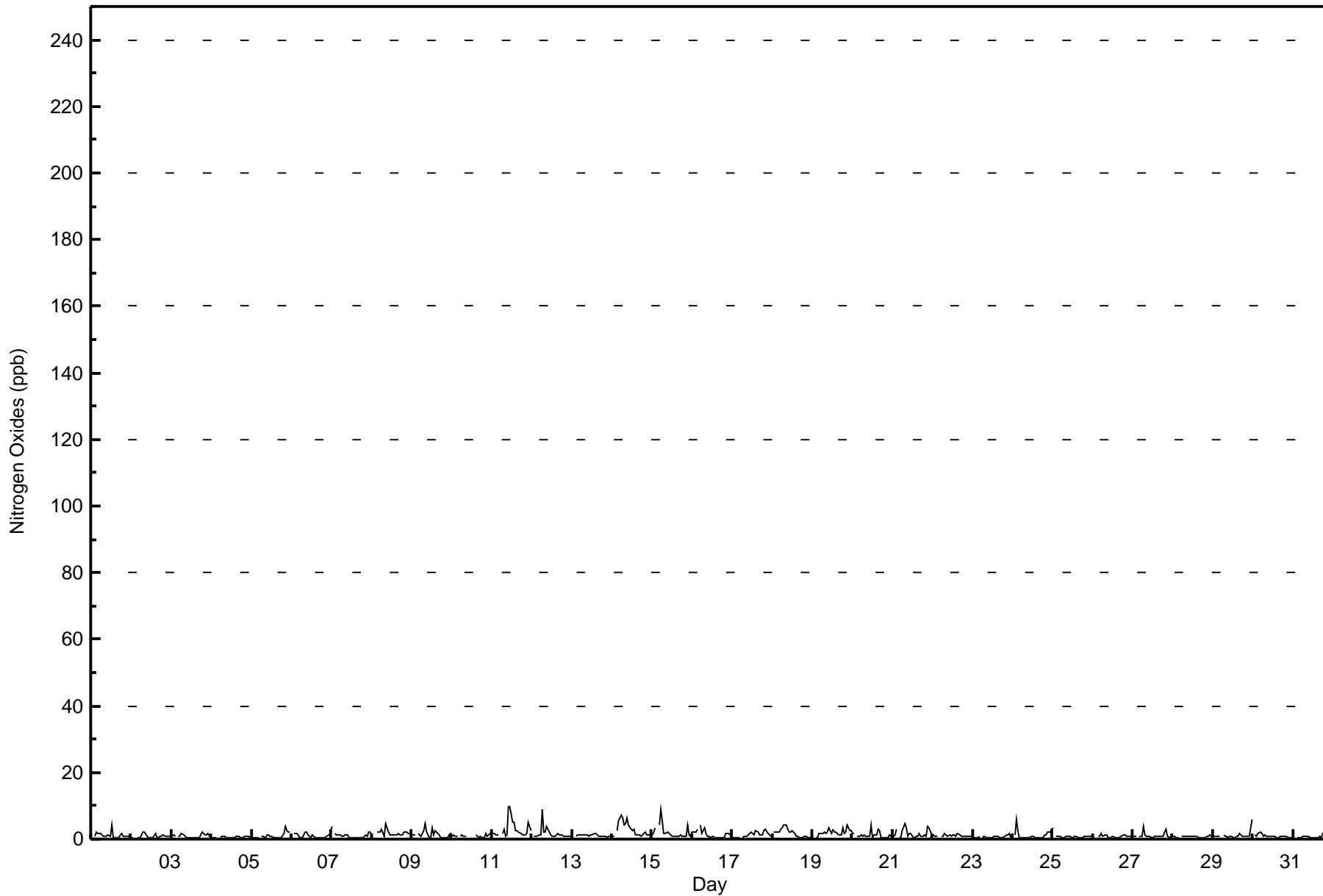
Nitrogen Oxides (NO_x) - ppb
Anzac - July 2017

Maximum Value: 10 ppb on Jul 11 12:00		Maximum Daily Average: 2.9 ppb on Jul 11		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 20 20:00		Minimum Daily Average: 0.6 ppb on Jul 4		Hours of Data: 708																						
Maximum Diurnal Average: 1.9 ppb at hour 7		Minimum Diurnal Average: 0.8 ppb at hour 18		Hours of Missing Data: 36																						
Monthly Average: 1.3 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 2 P ₉₀ = 2 P ₉₉ = 6		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-Jul	1	Z	1	2	2	2	1	1	1	1	1	4	1	1	1	1	1	2	1	1	1	1	1	1	1.1	4
2-Jul	0	1	Z	1	1	1	1	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0.9	2
3-Jul	1	1	1	Z	1	1	2	1	1	1	0	0	0	0	1	1	1	2	2	1	1	2	1	1	1.0	2
4-Jul	0	0	0	0	Z	0	1	1	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1	0	0.6	1
5-Jul	0	0	0	0	0	Z	1	1	1	1	1	1	0	0	0	1	0	1	2	4	3	2	2	1.0	4	
6-Jul	Z	2	2	2	1	1	1	1	2	2	1	1	1	0	0	0	0	1	0	0	1	1	2	1.0	2	
7-Jul	4	Z	2	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	1	1	2	2	1.1	4	
8-Jul	1	1	Z	2	2	2	3	1	5	3	2	1	1	1	1	2	1	1	2	2	2	2	2	1.9	5	
9-Jul	1	1	1	Z	1	1	2	2	5	2	0	0	3	1	2	2	1	0	0	0	0	0	1	1.4	5	
10-Jul	1	1	1	1	Z	1	1	1	1	C	C	C	C	C	1	1	1	1	1	1	2	1	1	0.9	2	
11-Jul	2	2	1	1	1	Z	2	3	1	1	10	10	5	5	3	2	2	2	1	1	1	2	5	2	2.9	10
12-Jul	Z	1	1	1	1	1	9	2	2	4	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1.6	9
13-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1.1	2
14-Jul	1	1	Z	3	6	7	6	4	5	6	4	3	3	3	1	1	1	1	1	2	2	1	1	1	2.8	7
15-Jul	1	2	3	Z	4	9	5	2	2	2	2	1	1	1	1	1	1	1	1	1	1	4	1	1	2.1	9
16-Jul	2	2	2	3	Z	4	2	4	2	1	1	1	1	1	0	0	1	0	0	2	2	2	1	1.4	4	
17-Jul	0	0	0	0	0	Z	1	1	1	1	2	2	2	1	2	2	1	1	1	2	3	2	1	1	1.3	3
18-Jul	Z	2	2	2	2	3	3	4	4	3	2	2	2	1	1	0	1	0	1	1	1	1	1	1	1.8	4
19-Jul	1	Z	1	1	2	2	2	2	2	2	3	2	3	2	2	2	1	1	3	2	2	4	3	2	1.9	4
20-Jul	2	2	Z	1	1	1	1	1	1	1	1	4	0	1	1	3	3	1	0	0	0	0	1	1	1.2	4
21-Jul	0	1	3	Z	0	0	3	5	3	1	2	2	0	1	1	1	2	1	1	1	1	4	3	1	1.6	5
22-Jul	1	1	1	1	Z	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0.9	2
23-Jul	1	1	1	1	1	Z	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	2	0	0.7	2
24-Jul	Z	1	6	2	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	1	2	2	3	1.1	6
25-Jul	3	Z	1	1	1	1	1	0	1	1	1	1	0	1	1	0	0	0	0	1	1	1	1	1	0.8	3
26-Jul	1	1	Z	1	1	2	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0.8	2
27-Jul	1	1	1	Z	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	2	3	1	1	1	1.1	4
28-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0.7	1
29-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	6	1.1	6
30-Jul	Z	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0.9	2
31-Jul	0	Z	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	2	2	3	1	1	1	0.8	3
		1.1	1.1	1.3	1.2	1.4	1.7	1.9	1.6	1.6	1.4	1.5	1.4	1.3	1.1	1.0	1.0	0.9	0.8	0.9	1.1	1.4	1.4	1.4	1.3	Diurnal Average
		4	2	6	3	6	9	9	5	5	6	10	10	5	5	3	3	3	2	3	2	4	4	5	6	Diurnal Maximum
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - July 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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705
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	31	13	9	4	6	18	37	41	62	47	52	49	87	152	50	47	705

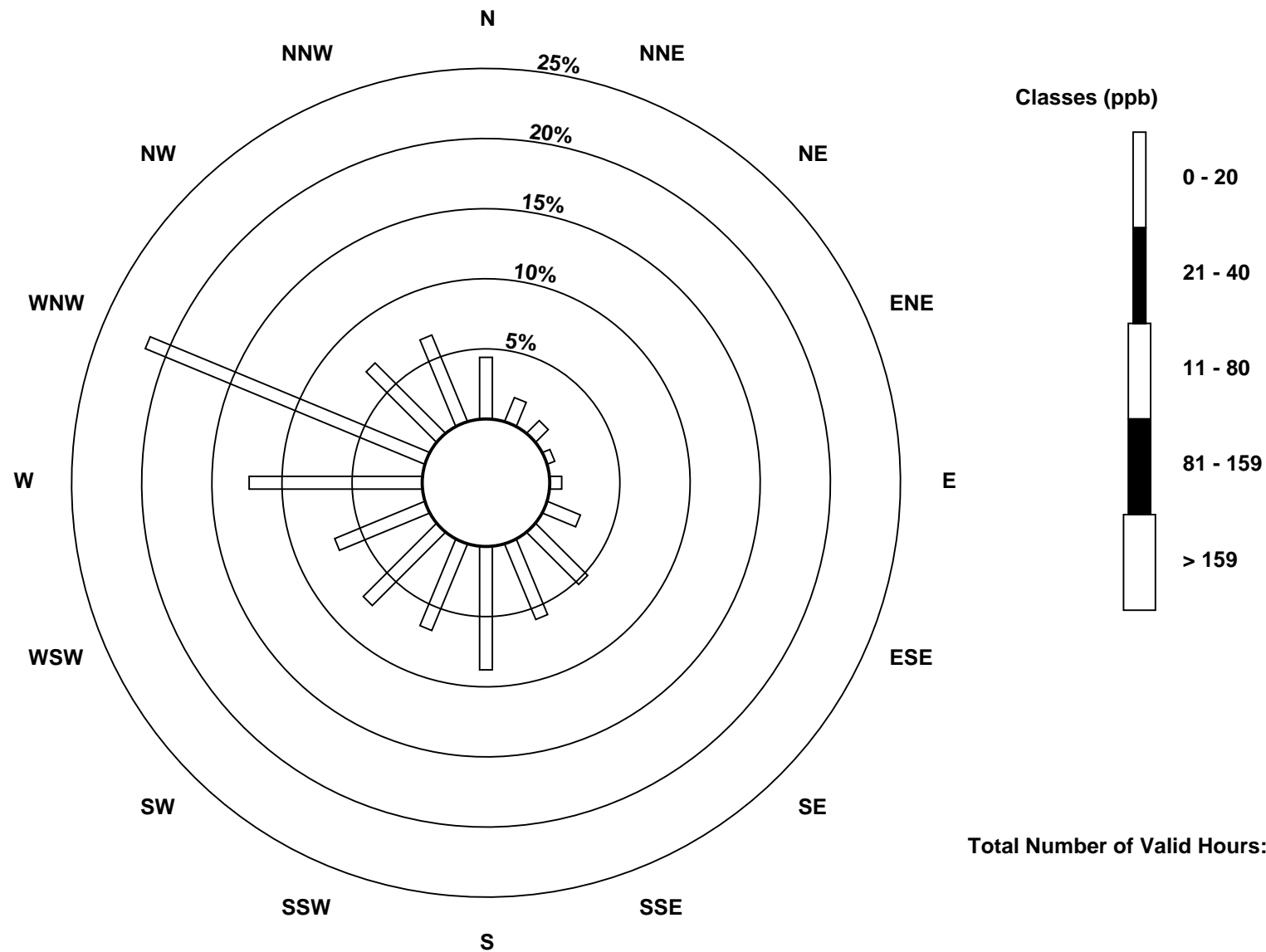
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)

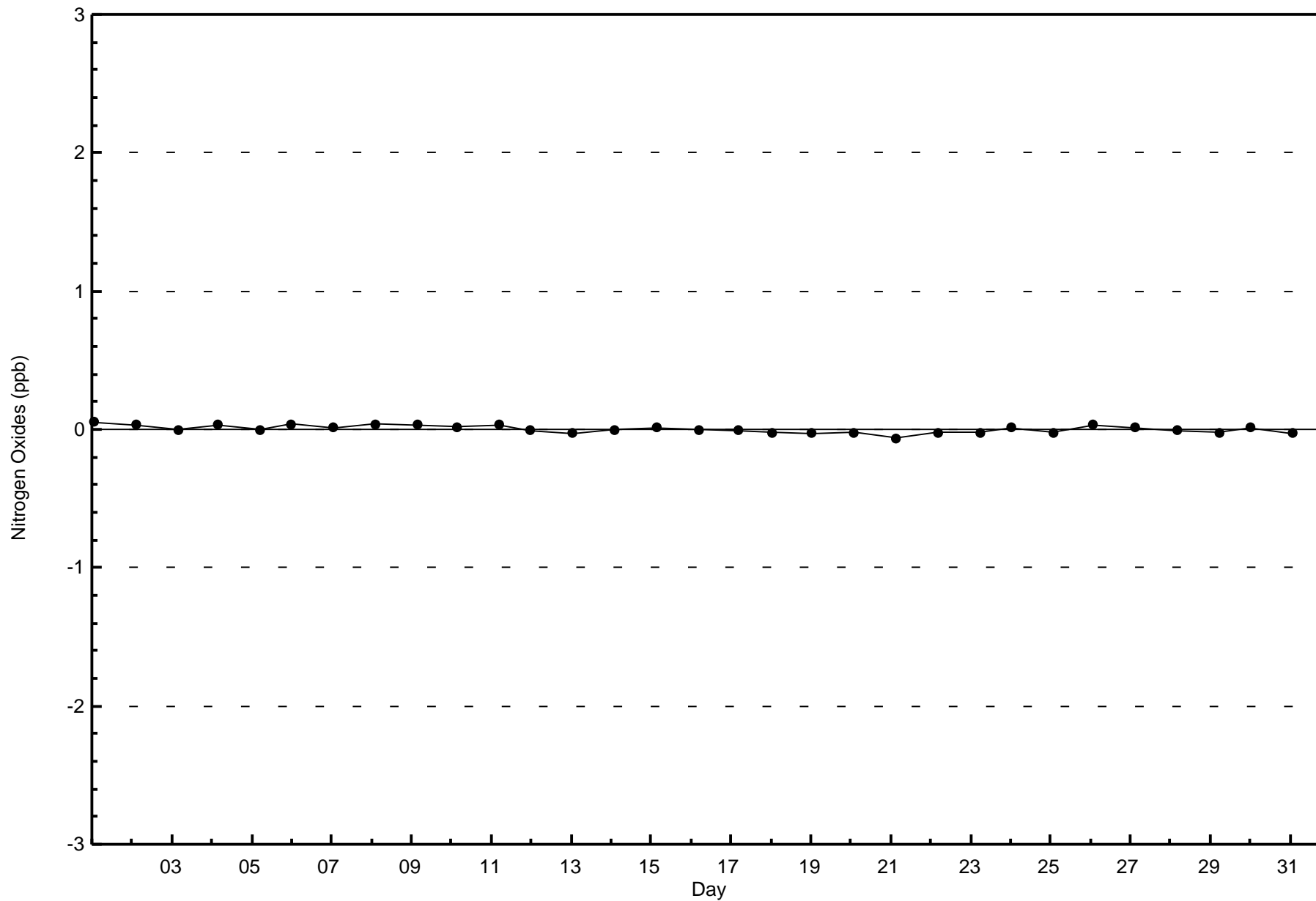


Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Zero Responses

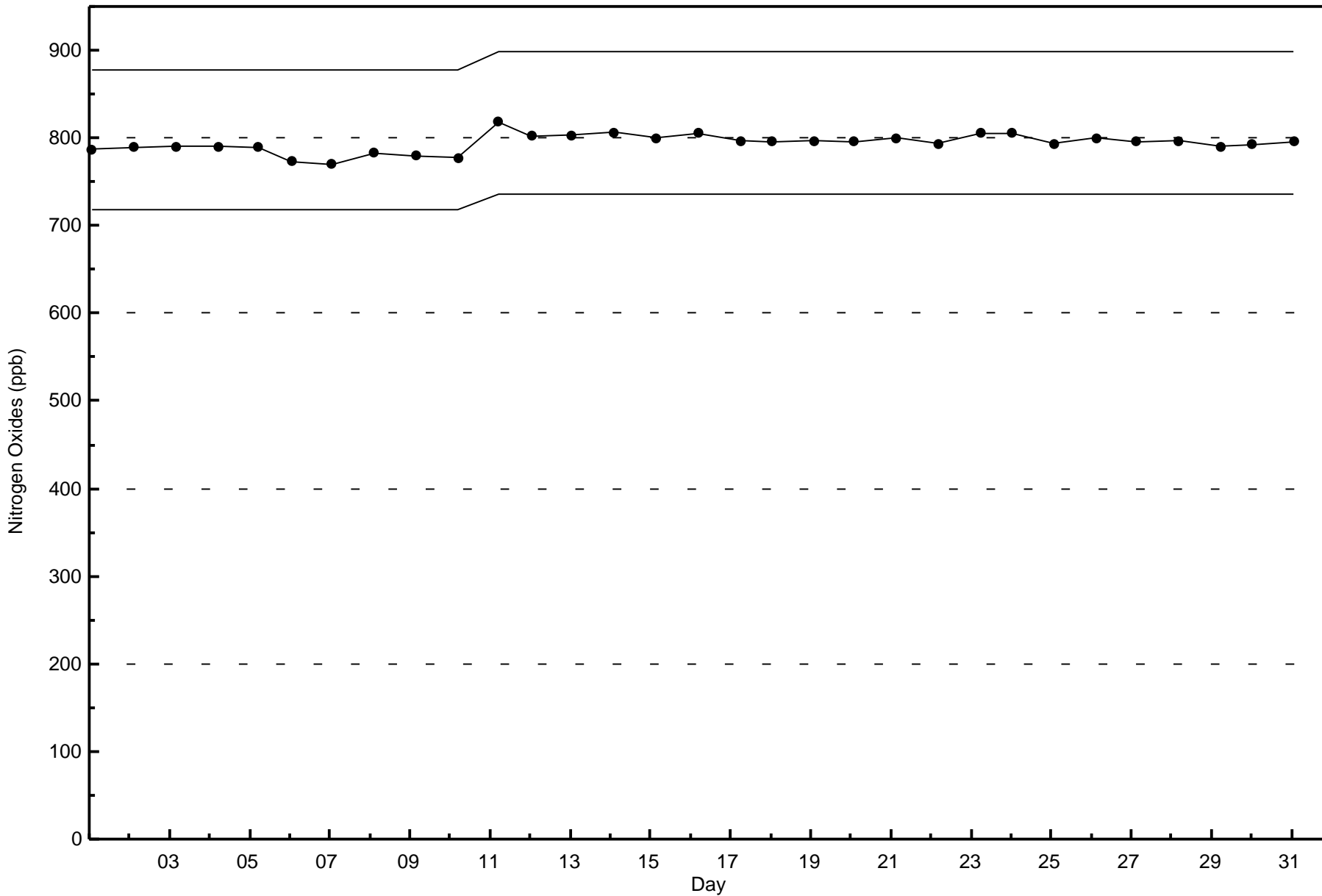
Nitrogen Oxides (NO_x) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Anzac - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 58 ppb on Jul 15 18:00	Maximum Daily Average: 37.2 ppb on Jul 3		Hours of Data:	710
Minimum Value: 3 ppb on Jul 20 03:00	Minimum Daily Average: 20.1 ppb on Jul 6		Hours of Missing Data:	34
Maximum Diurnal Average: 34.1 ppb at hour 17	Minimum Diurnal Average: 18.4 ppb at hour 6		Hours of Calibration:	34
Monthly Average: 26.7 ppb	Percentiles: P ₁ = 4 P ₁₀ = 13 Q ₁ = 21 Median = 27 Q ₃ = 33 P ₉₀ = 38 P ₉₉ = 50		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-Jul	13	8	8	Z	3	6	15	22	29	34	31	34	34	34	33	32	31	29	29	29	24	30	43	49	26.0	49
2-Jul	41	35	27	25	Z	24	25	25	24	30	34	35	36	39	42	44	44	43	44	42	36	31	33	35	34.5	44
3-Jul	35	39	37	38	37	Z	35	33	35	36	39	39	36	38	37	38	37	39	40	37	37	37	37	38	37.2	40
4-Jul	36	34	32	29	27	Z	26	27	28	29	32	34	35	35	34	34	33	34	34	34	33	33	34	36	31.9	36
5-Jul	34	33	32	30	29	27	26	Z	29	32	34	32	31	29	28	28	30	31	27	26	23	21	15	13	27.9	34
6-Jul	7	6	Z	6	12	19	21	21	21	21	21	22	23	25	26	27	28	30	33	29	27	17	11	8	20.1	33
7-Jul	5	5	5	Z	5	10	21	24	26	C	C	C	29	30	31	32	31	32	33	32	26	15	12	8	20.6	33
8-Jul	10	7	7	7	Z	8	14	21	27	35	31	26	26	19	22	27	30	29	33	30	26	17	11	8	20.4	35
9-Jul	7	6	6	5	5	Z	16	25	25	30	32	30	34	33	33	35	35	34	33	32	30	29	26	27	24.6	35
10-Jul	24	18	25	25	28	24	Z	29	29	30	33	32	37	38	38	39	39	40	39	37	28	25	30	24	30.9	40
11-Jul	18	16	11	9	15	16	17	Z	30	31	28	37	46	54	51	49	42	38	34	32	25	14	9	5	27.2	54
12-Jul	5	6	Z	4	3	4	10	25	28	30	30	29	27	25	24	24	33	35	32	35	33	29	28	25	22.9	35
13-Jul	17	11	14	Z	14	11	14	29	35	38	38	38	41	45	46	44	45	45	43	43	41	33	22	14	31.3	46
14-Jul	36	35	25	19	Z	14	17	21	23	22	28	35	41	43	38	38	37	30	33	32	31	27	21	11	28.6	43
15-Jul	10	8	7	9	6	Z	13	21	28	36	32	35	37	39	49	57	58	58	55	53	49	43	42	41	34.2	58
16-Jul	39	35	38	38	34	34	Z	36	39	36	37	32	28	26	26	26	26	27	25	24	25	26	26	25	30.7	39
17-Jul	24	25	26	23	20	18	19	Z	18	17	19	20	24	26	25	25	24	24	23	22	19	18	15	18	21.5	26
18-Jul	17	15	Z	13	12	12	14	16	18	21	25	27	28	29	28	27	27	27	26	26	22	16	13	13	20.6	29
19-Jul	15	18	22	Z	21	22	25	25	26	26	25	26	26	29	27	29	30	32	28	29	20	12	7	4	22.8	32
20-Jul	4	3	3	3	Z	11	14	16	17	18	22	28	31	30	29	26	27	28	29	31	31	27	24	25	20.7	31
21-Jul	25	22	24	24	22	Z	26	21	19	22	22	21	20	22	27	32	38	32	29	27	24	20	15	11	23.6	38
22-Jul	10	13	13	21	15	20	Z	24	25	24	24	24	27	29	30	32	32	30	28	27	28	26	25	26	24.0	32
23-Jul	27	28	28	25	24	23	Z	23	23	24	26	28	29	34	36	37	34	33	33	29	26	24	23	23	27.7	37
24-Jul	21	19	Z	15	16	15	16	17	16	15	14	16	20	24	24	27	29	30	27	25	24	26	24	24	20.7	30
25-Jul	23	23	24	Z	26	27	29	28	27	28	29	28	30	32	35	35	36	36	34	29	22	18	13	13	27.1	36
26-Jul	19	19	18	16	Z	14	19	19	25	28	29	31	32	33	35	38	37	37	41	41	41	35	35	36	29.5	41
27-Jul	32	35	35	36	27	Z	26	39	39	42	44	45	44	45	44	41	38	36	34	27	21	29	27	26	35.3	45
28-Jul	28	26	27	28	28	27	Z	23	23	24	28	28	29	31	31	29	28	26	28	28	23	23	19	16	26.0	31
29-Jul	13	7	7	10	13	14	18	Z	25	23	26	28	28	29	30	30	32	32	32	31	23	17	16	12	21.5	32
30-Jul	21	25	Z	23	21	19	28	27	22	25	28	23	25	29	28	37	37	34	31	30	30	34	37	37	28.3	37
31-Jul	37	36	35	Z	31	30	28	27	26	26	27	28	29	27	26	34	30	30	29	25	20	19	14	11	27.3	37

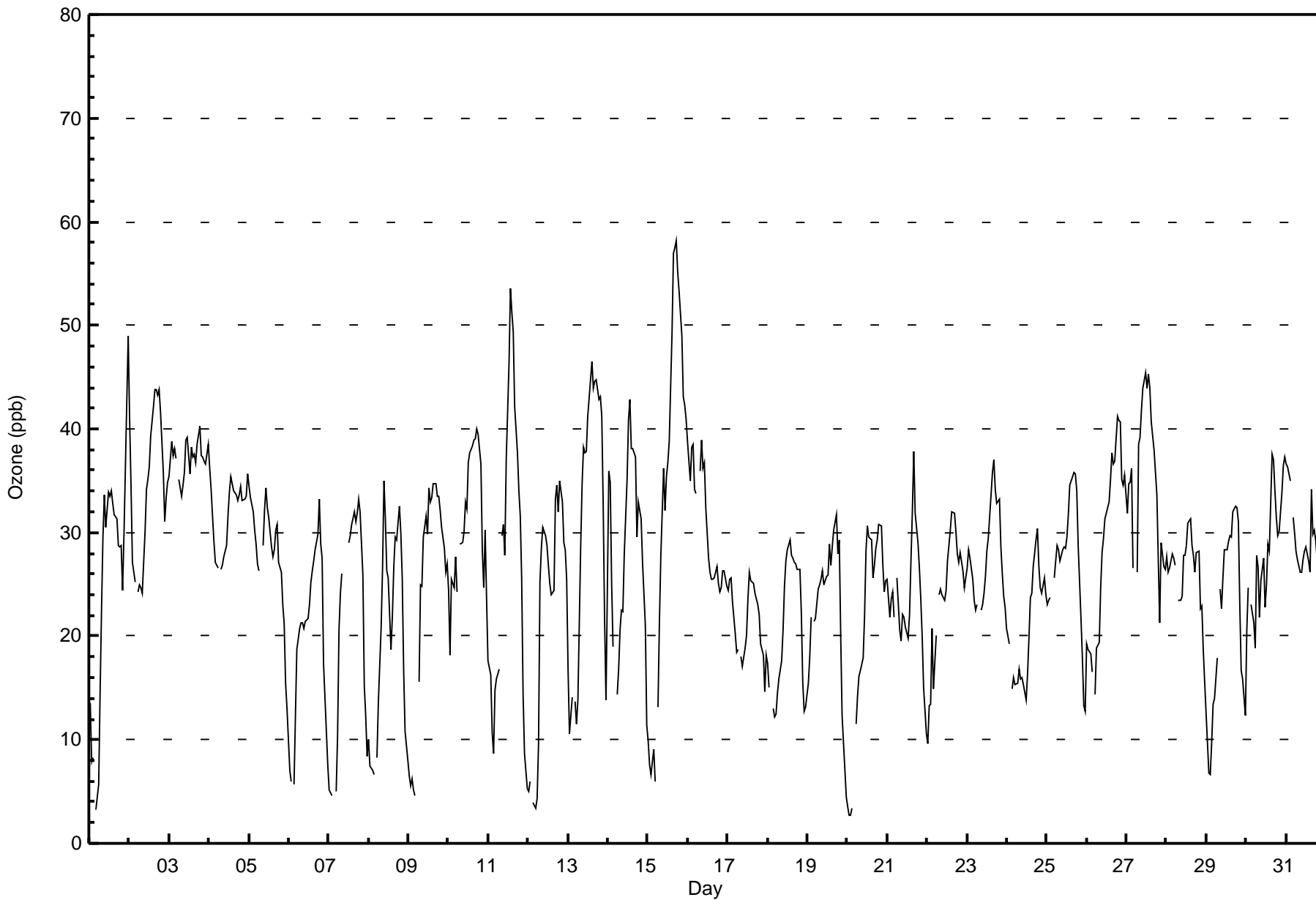
21.1	19.9	20.6	19.3	19.0	18.4	20.2	24.7	25.8	27.7	28.7	29.6	30.8	32.0	32.7	33.8	34.1	33.5	33.1	31.6	28.2	24.9	22.8	21.4	Diurnal Average
41	39	38	38	37	34	35	39	39	42	44	45	46	54	51	57	58	58	55	53	49	43	43	49	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	160	22.54	22.54
21 - 50	543	76.48	99.01
51 - 82	7	0.99	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - July 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	9	3	1	0	2	5	5	6	23	14	27	12	12	9	17	13	158
21 - 50	22	10	8	4	3	13	32	34	37	32	24	37	81	138	36	31	542
51 - 82	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	2	7
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	9	4	5	18	37	42	63	46	51	49	93	147	53	46	707

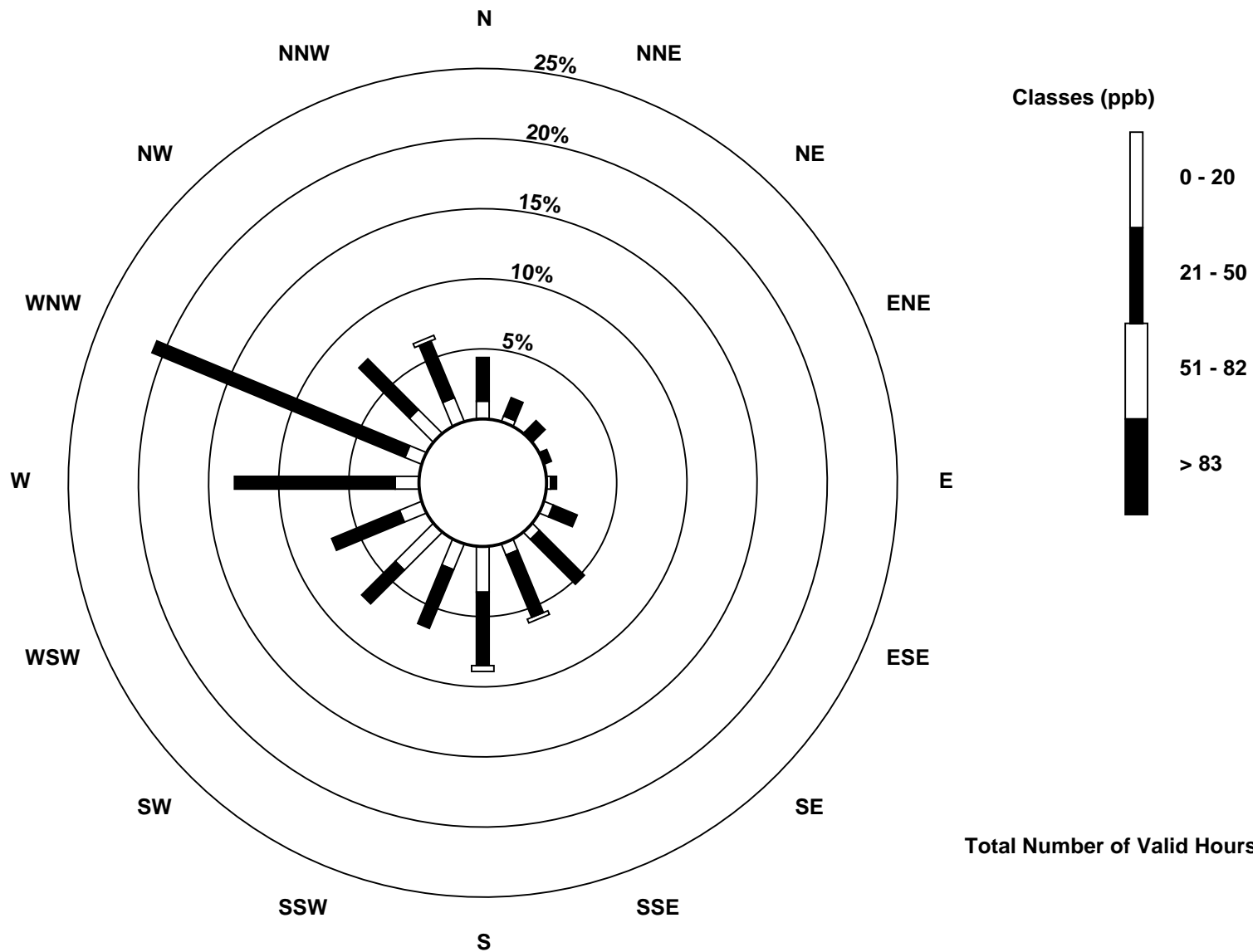
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Anzac (AMS 14)

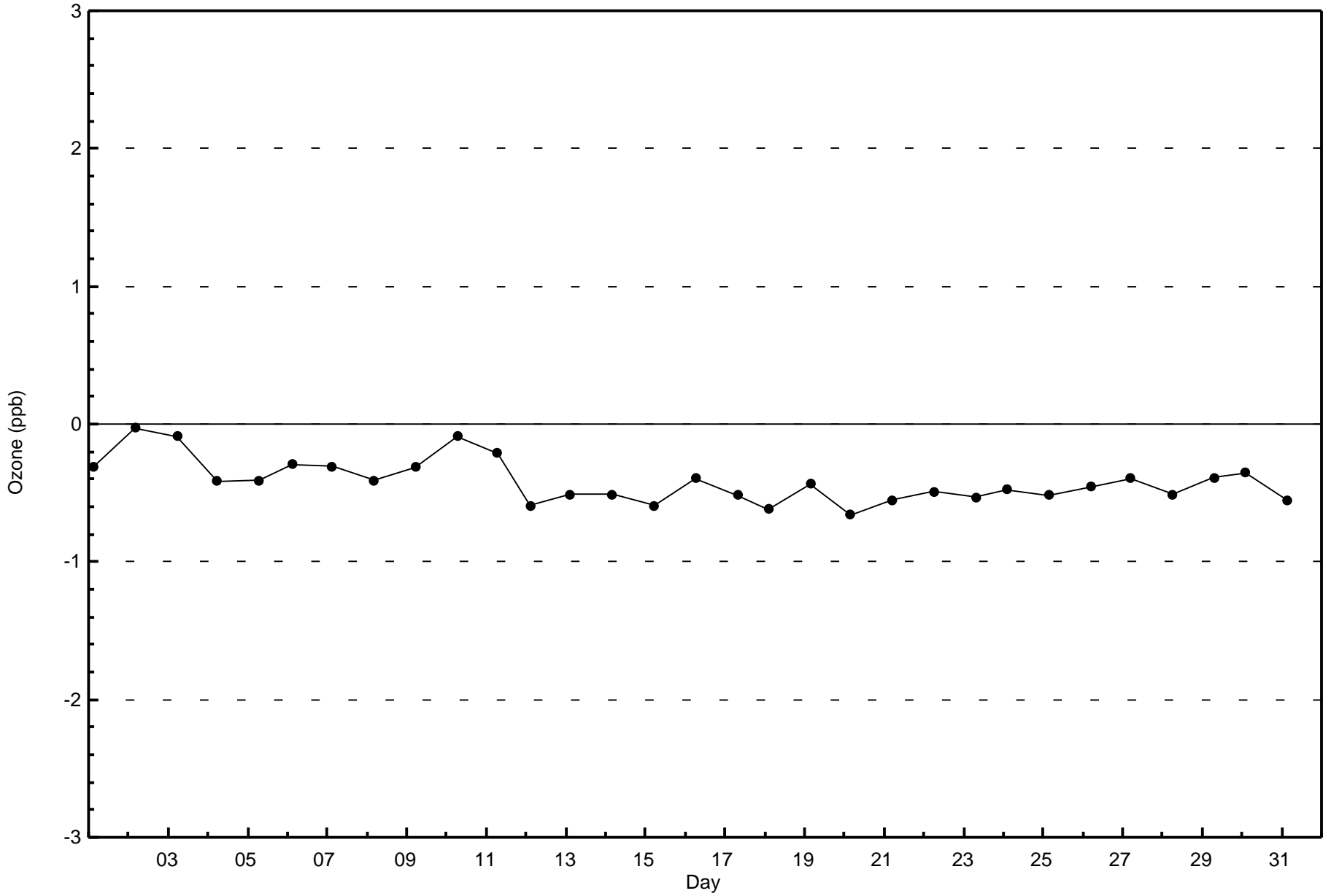


Total Number of Valid Hours: 707



Wood Buffalo Environmental Association
Zero Responses

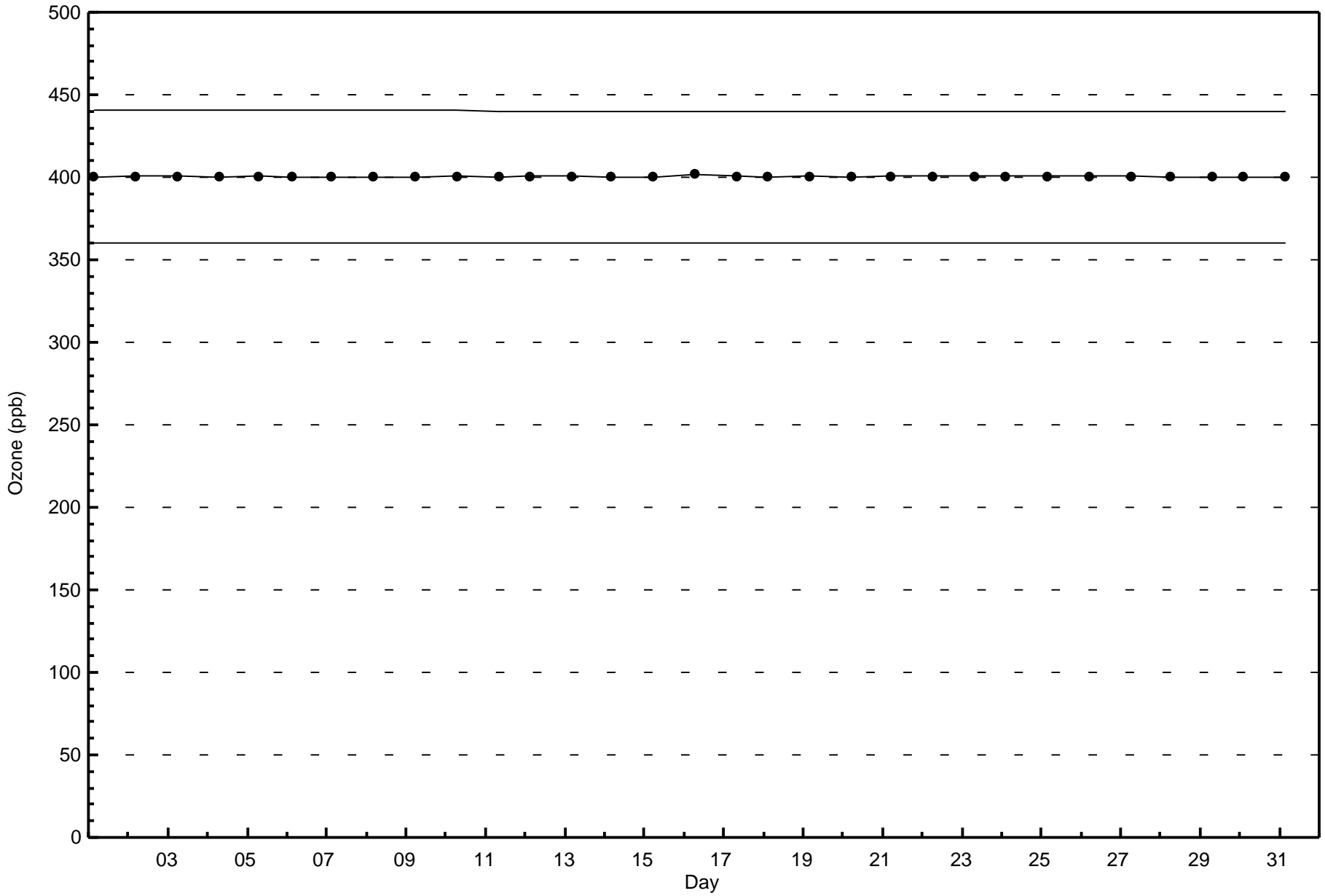
Ozone (O₃) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Anzac - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

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

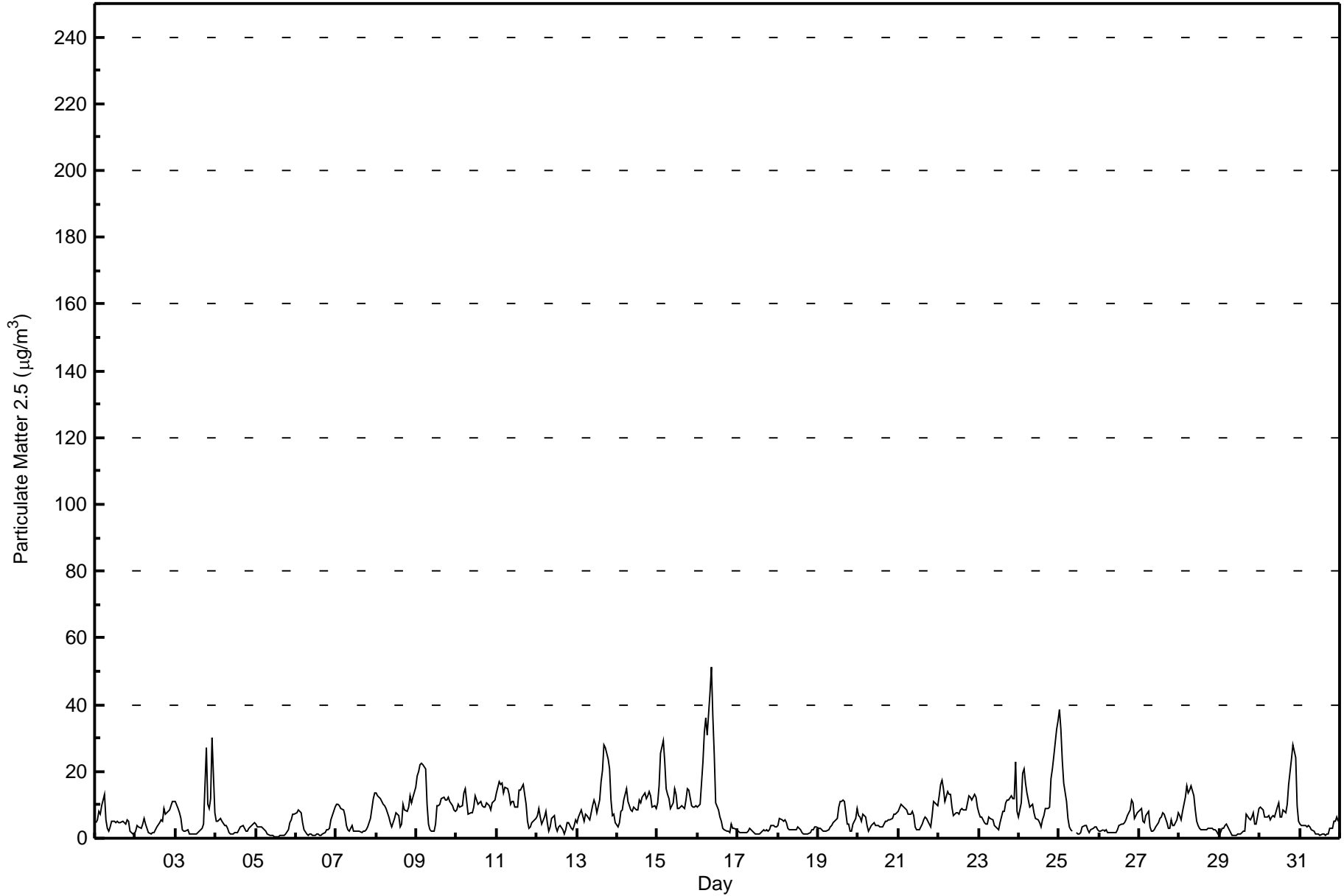
Anzac - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 51.5 µg/m ³ on Jul 16 09:00 Minimum Value: 0.5 µg/m ³ on Jul 5 12:00 Maximum Diurnal Average: 9.5 µg/m ³ at hour 3 Monthly Average: 7.16 µg/m ³		Maximum Daily Average: 15.3 µg/m ³ on Jul 16 Minimum Daily Average: 2.2 µg/m ³ on Jul 17 Minimum Diurnal Average: 4.7 µg/m ³ at hour 13 Percentiles: P ₁ = 0.7 P ₁₀ = 1.7 Q ₁ = 2.8 Median = 5.4 Q ₃ = 9.7 P ₉₀ = 13.6 P ₉₉ = 30.7		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 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-Jul	4.8	5.5	8.1	7.3	9.8	13.1	5.4	2.8	2.2	3.5	5.2	5.1	4.7	5.3	4.5	4.6	5.0	4.8	4.0	5.5	5.3	2.2	1.2	1.2	5.0	13.1																						
2-Jul	2.0	3.8	3.6	2.9	4.1	6.0	4.3	2.8	1.8	1.3	1.7	1.8	2.4	3.5	4.8	5.4	5.3	9.0	7.0	7.6	8.6	9.7	10.8	10.8	5.0	10.8																						
3-Jul	11.2	8.9	7.4	5.7	2.7	2.1	2.2	2.5	1.5	1.2	1.2	1.1	1.2	1.5	2.0	2.5	3.0	4.2	27.2	10.2	8.8	11.7	30.1	7.7	6.6	30.1																						
4-Jul	4.9	5.0	5.3	5.7	4.9	4.0	3.7	3.0	1.8	1.5	1.3	1.7	1.7	1.7	2.4	3.4	3.8	3.2	2.2	2.2	2.8	3.9	4.4	4.5	3.3	5.7																						
5-Jul	4.1	3.6	3.6	3.3	3.0	2.6	1.9	1.4	0.7	0.7	0.7	0.5	0.6	0.6	0.7	0.9	0.7	0.8	1.2	2.4	4.5	5.6	7.2	7.3	2.4	7.3																						
6-Jul	7.6	8.3	8.1	7.5	4.8	2.5	1.4	1.0	1.1	1.3	1.0	0.8	1.3	1.2	0.8	0.9	1.1	1.6	2.7	2.5	2.9	5.4	7.9	9.4	3.5	9.4																						
7-Jul	10.1	10.2	9.6	9.0	8.7	6.6	3.7	2.4	2.1	3.7	2.0	2.2	2.1	2.1	2.0	1.8	1.9	2.0	2.4	3.4	5.8	9.0	11.7	13.7	5.3	13.7																						
8-Jul	13.7	12.6	11.8	10.8	10.3	9.8	9.1	6.2	4.5	3.6	4.7	6.0	7.6	6.7	3.4	4.1	10.3	8.6	8.2	9.5	12.6	10.7	12.3	15.1	8.8	15.1																						
9-Jul	18.5	19.8	22.2	22.4	21.9	20.8	10.3	4.4	2.7	2.1	2.1	4.1	9.9	9.7	10.0	11.7	12.3	11.4	11.5	12.3	10.9	9.8	8.7	8.0	11.6	22.4																						
10-Jul	8.5	10.1	9.3	9.9	13.4	14.6	11.1	7.0	7.6	7.6	9.5	12.5	11.4	10.2	10.8	9.7	9.5	9.3	10.4	9.9	8.7	10.4	10.9	11.4	10.2	14.6																						
11-Jul	13.6	17.0	16.3	16.3	13.8	15.2	14.8	13.2	10.2	11.0	11.2	9.3	9.4	14.3	14.2	15.2	16.2	10.0	5.2	3.0	3.4	4.5	5.2	6.1	11.2	17.0																						
12-Jul	6.9	9.1	6.4	4.3	6.5	8.0	4.5	2.2	3.4	5.9	6.6	3.4	2.0	3.2	3.7	2.4	1.4	2.7	4.7	4.6	3.2	2.4	3.9	5.5	4.4	9.1																						
13-Jul	4.7	6.5	8.4	7.0	5.0	7.2	6.7	5.3	7.8	9.7	11.3	10.1	7.7	11.5	17.2	20.2	28.0	26.9	23.7	20.6	11.3	6.9	7.3	4.9	11.5	28.0																						
14-Jul	3.3	4.7	8.3	8.5	11.6	14.7	10.9	9.9	8.6	8.1	9.2	8.3	8.5	11.5	10.6	12.1	13.4	11.9	12.6	13.8	12.9	9.3	9.8	8.9	10.1	14.7																						
15-Jul	10.6	15.5	25.3	29.2	22.8	14.8	13.0	11.7	8.7	10.8	14.7	13.0	9.0	8.9	10.0	9.4	9.1	11.6	14.9	14.5	9.8	9.2	9.2	9.6	13.1	29.2																						
16-Jul	9.3	10.1	16.5	23.0	31.9	36.2	30.9	43.5	51.5	36.5	24.8	10.8	8.3	6.3	5.0	3.0	2.4	2.3	2.0	1.8	4.2	3.0	2.9	2.3	15.3	51.5																						
17-Jul	2.0	1.9	1.9	1.7	1.8	1.7	2.1	3.2	2.5	2.1	1.1	1.1	1.1	1.4	1.7	2.7	2.2	2.4	2.3	2.6	3.7	3.7	3.6	3.3	2.2	3.7																						
18-Jul	3.7	6.0	5.5	5.1	5.4	4.7	3.0	2.5	2.6	2.6	2.6	2.7	3.2	2.7	1.7	1.4	1.3	1.5	1.5	1.7	2.6	2.7	3.3	3.4	3.0	6.0																						
19-Jul	3.1	2.9	2.7	2.2	2.1	2.1	2.7	3.4	4.0	4.6	5.0	5.8	9.1	10.8	11.1	11.6	10.9	4.1	4.2	2.0	2.0	4.4	6.0	8.7	5.2	11.6																						
20-Jul	6.8	6.4	5.2	7.3	6.3	3.6	2.1	2.9	4.0	4.5	3.7	4.0	3.7	3.3	3.6	4.2	5.0	5.1	5.4	5.5	6.1	7.2	7.4	7.4	5.0	7.4																						
21-Jul	7.9	10.0	9.9	9.4	8.8	8.3	7.4	7.1	8.1	6.8	3.4	2.5	2.5	3.4	4.3	5.4	6.5	5.7	4.1	3.2	6.7	11.0	10.7	9.9	6.8	11.0																						
22-Jul	12.9	16.0	17.5	14.8	11.2	14.2	13.2	13.0	9.5	6.9	7.6	7.8	7.4	8.4	9.0	8.3	8.5	10.4	12.7	12.4	11.4	13.0	12.1	9.5	11.2	17.5																						
23-Jul	7.4	6.6	6.3	4.7	4.3	4.4	6.4	6.0	5.4	3.6	3.3	2.9	2.5	4.8	7.9	8.2	10.4	11.4	11.5	12.5	11.9	12.0	22.8	8.1	7.7	22.8																						
24-Jul	6.4	10.5	19.7	20.8	16.4	13.6	9.5	9.9	10.0	7.7	5.9	5.4	4.7	3.4	5.4	6.9	8.8	8.8	9.3	17.8	20.6	24.6	32.8	35.1	13.1	35.1																						
25-Jul	38.5	32.7	23.2	16.5	10.8	5.8	3.3	2.3	2.3	C	1.7	1.3	1.4	1.6	3.2	3.6	3.9	2.7	1.9	2.6	3.2	3.4	3.4	2.6	7.5	38.5																						
26-Jul	2.3	2.3	2.6	2.0	2.7	1.8	1.8	1.8	1.8	1.7	1.8	2.5	3.8	4.1	4.3	4.5	5.6	6.9	8.3	11.5	10.7	6.0	6.6	7.5	4.4	11.5																						
27-Jul	8.6	8.9	5.2	4.6	7.0	7.9	3.5	2.0	1.9	2.6	3.5	4.7	5.8	6.5	7.5	7.2	4.7	3.1	2.9	5.4	3.9	3.9	5.5	7.7	5.2	8.9																						
28-Jul	7.0	5.4	7.9	12.3	15.8	13.5	14.6	15.8	12.6	8.4	5.0	3.7	2.8	2.6	2.4	2.6	2.6	3.0	3.1	2.9	2.5	2.5	2.0	1.1	6.3	15.8																						
29-Jul	0.9	3.0	3.1	3.8	4.1	3.4	1.5	0.8	0.9	1.0	1.0	1.4	1.4	1.5	1.9	2.2	7.2	6.0	5.6	6.5	7.5	4.0	4.4	8.7	3.4	8.7																						
30-Jul	9.2	8.8	8.6	6.5	6.4	6.7	5.4	6.4	7.0	6.5	9.2	10.7	6.6	6.2	8.6	7.7	10.3	16.0	19.8	23.9	28.1	24.0	9.9	5.1	10.7	28.1																						
31-Jul	4.2	3.9	3.8	3.7	3.5	3.6	3.2	2.7	2.2	1.5	1.2	1.1	1.0	1.2	1.1	0.6	1.1	1.2	2.9	2.8	5.0	5.1	6.5	5.3	2.8	6.5																						
																								8.2	8.9	9.5	9.3	9.1	8.8	6.9	6.4	6.2	5.6	5.3	4.8	4.7	5.2	5.7	5.9	6.8	6.7	7.6	7.6	7.8	7.8	9.1	8.1	Diurnal Average
																								38.5	32.7	25.3	29.2	31.9	36.2	30.9	43.5	51.5	36.5	24.8	13.0	11.4	14.3	17.2	20.2	28.0	26.9	27.2	23.9	28.1	24.6	32.8	35.1	Diurnal Maximum
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}) - $\mu\text{g}/\text{m}^3$
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - July 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	359	48.32	48.32
6 - 15	311	41.86	90.17
16 - 25	37	4.98	95.15
26 - 80	16	2.15	97.31
> 81.0	0	0.00	97.31

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - July 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	16	2	1	0	0	9	18	18	30	19	26	18	55	100	27	20	359
6 - 15	15	8	8	4	5	10	18	26	32	26	24	27	34	40	19	12	308
16 - 25	1	2	0	0	1	0	1	0	2	4	5	4	3	6	0	8	37
26 - 80	0	1	0	0	0	0	0	0	0	1	0	2	4	3	5	0	16
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	13	9	4	6	19	37	44	64	50	55	51	96	149	51	40	720

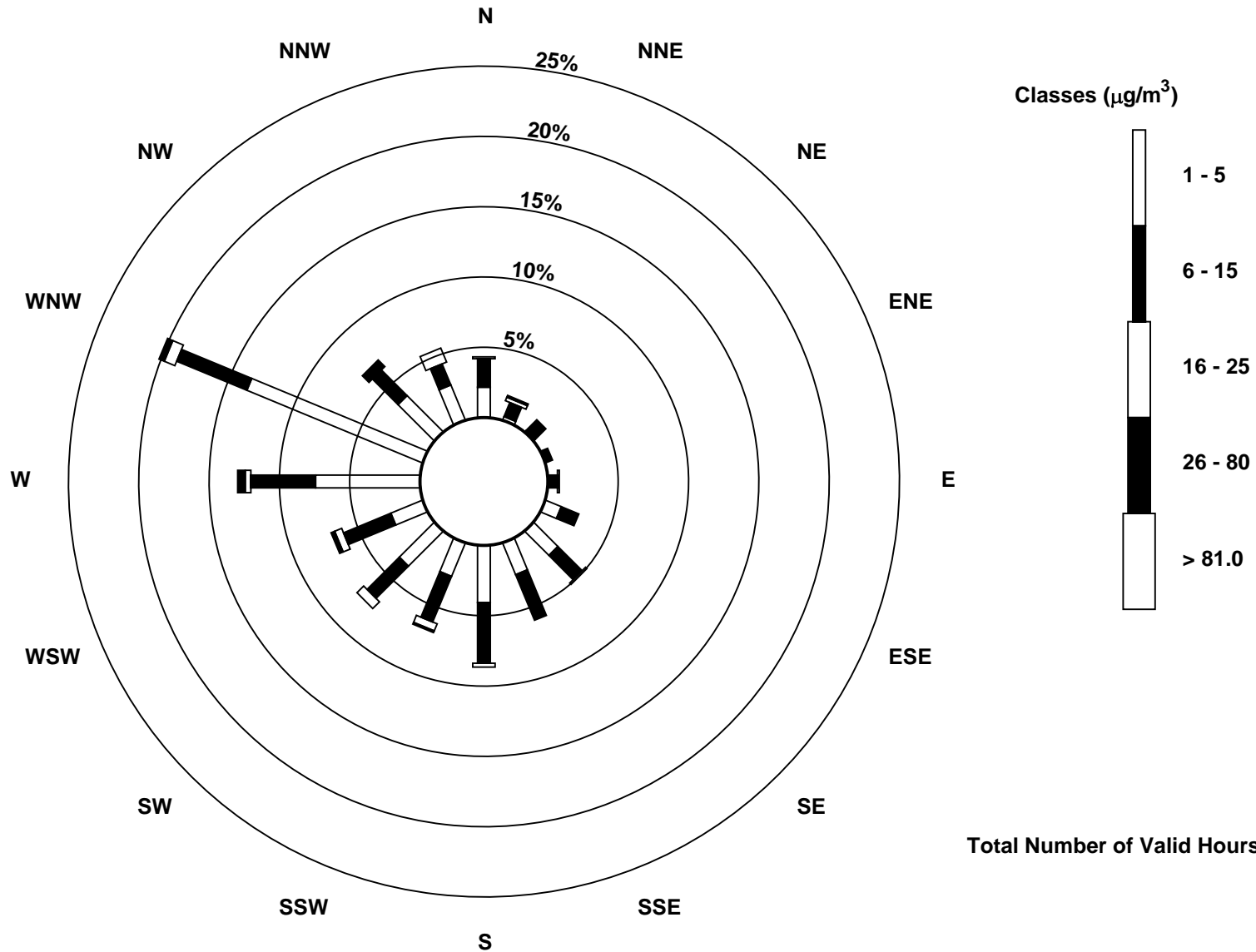
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac (AMS 14)



Total Number of Valid Hours: 740

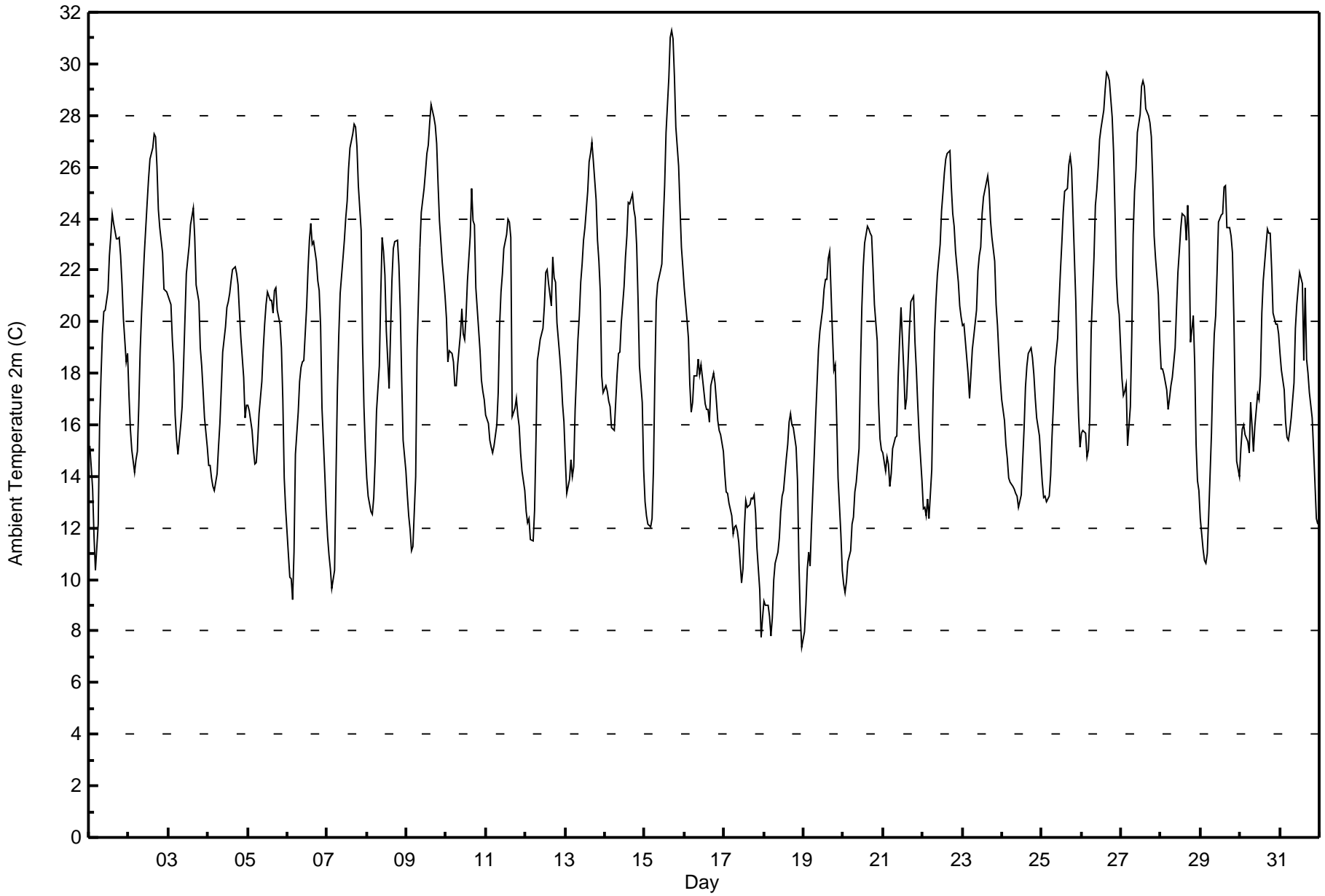


Maximum Value: 31.3 C on Jul 15 17:00 Maximum Daily Average: 23.4 C on Jul 27																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: 7.4 C on Jul 19 00:00 Minimum Daily Average: 11.9 C on Jul 18 Maximum Diurnal Average: 23.4 C at hour 16 Minimum Diurnal Average: 13.5 C at hour 5 Monthly Average: 18.70 C Percentiles: P ₁ = 8.5 P ₁₀ = 12.5 Q ₁ = 15.1 Median = 18.5 Q ₃ = 22.3 P ₉₀ = 25.0 P ₉₉ = 29.5																				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-Jul	15.2	14.4	13.5	11.6	10.4	12.2	16.0	17.9	19.5	20.4	20.4	21.2	22.6	23.3	24.2	23.8	23.2	23.2	23.3	22.6	21.5	20.1	18.5	18.7	19.1	24.2
2-Jul	17.1	15.8	15.0	14.1	14.6	14.9	16.7	18.9	20.4	22.7	23.6	24.6	25.5	26.3	26.8	27.3	27.2	26.0	24.3	23.6	22.7	21.2	21.2	21.2	21.3	27.3
3-Jul	21.0	20.7	19.3	18.4	16.4	15.4	14.9	16.0	16.7	18.3	20.0	21.9	22.9	23.8	24.1	24.4	23.3	21.4	20.8	19.0	18.3	17.3	16.3	15.1	19.4	24.4
4-Jul	14.5	14.4	13.9	13.6	13.4	14.1	15.1	16.0	17.4	18.8	19.8	20.5	20.8	21.1	21.6	22.0	22.2	21.8	21.4	20.3	19.4	17.8	16.3	16.8	18.0	22.2
5-Jul	16.8	16.5	15.8	15.0	14.5	14.6	15.4	16.4	17.7	18.9	19.9	20.7	21.2	20.8	20.8	20.3	21.2	21.3	20.4	19.9	19.0	17.0	13.9	12.7	17.9	21.3
6-Jul	11.0	10.1	10.1	9.2	11.1	14.8	16.5	17.7	18.2	18.5	18.5	20.6	22.0	23.1	23.8	23.0	23.1	22.3	21.6	21.2	19.8	16.6	14.1	12.7	17.5	23.8
7-Jul	11.7	11.0	10.4	9.6	10.4	13.9	17.3	19.5	21.1	22.5	23.2	24.0	24.7	25.9	26.7	27.3	27.6	27.5	26.8	25.3	23.5	19.2	16.7	15.1	20.0	27.6
8-Jul	13.9	13.2	12.6	12.5	13.2	14.6	16.5	18.3	21.0	23.3	22.7	21.8	19.6	17.4	19.5	21.6	22.8	23.1	23.2	22.2	20.4	17.7	15.4	14.2	18.4	23.3
9-Jul	13.3	12.5	12.0	11.1	11.3	14.0	18.9	20.9	22.9	24.3	25.2	25.8	26.5	26.9	27.7	28.4	27.9	27.6	26.9	25.3	23.9	22.3	21.7	21.0	21.6	28.4
10-Jul	20.1	18.4	18.9	18.8	18.4	17.5	17.5	18.3	19.5	20.5	19.5	19.3	20.2	21.6	23.3	25.2	23.9	23.8	21.3	19.7	18.9	17.7	17.3	17.0	19.9	25.2
11-Jul	16.4	16.1	15.4	15.2	14.9	15.2	16.0	17.2	19.9	21.2	21.9	22.8	23.4	24.0	23.9	23.3	16.3	16.7	17.1	16.4	16.0	14.9	14.2	13.4	18.0	24.0
12-Jul	12.7	12.2	12.3	11.5	11.5	12.7	15.4	18.5	18.9	19.3	19.7	20.6	21.9	22.0	21.5	20.6	22.5	21.7	21.5	20.0	18.6	17.9	16.8	16.1	17.8	22.5
13-Jul	14.6	13.3	13.9	14.7	14.0	14.4	16.6	19.3	20.2	21.5	22.2	23.2	23.7	25.1	26.2	26.5	26.9	26.3	24.7	23.2	22.4	21.1	17.9	17.2	20.4	26.9
14-Jul	17.5	17.3	16.9	16.7	15.9	15.8	16.8	18.0	18.8	18.8	20.0	21.4	22.5	23.3	24.6	24.6	25.0	24.3	24.0	22.9	20.8	18.3	16.8	14.3	19.8	25.0
15-Jul	13.0	12.5	12.2	12.0	12.4	14.3	17.8	20.7	21.5	22.0	22.3	23.8	25.3	27.3	29.5	31.0	31.3	31.0	29.5	27.5	26.0	24.4	22.9	22.1	22.2	31.3
16-Jul	21.3	20.1	19.4	17.6	16.5	16.9	17.9	17.9	18.5	18.0	18.3	17.8	16.8	16.6	16.6	16.1	17.5	18.0	17.6	16.9	16.1	15.8	15.6	14.9	17.5	21.3
17-Jul	14.1	13.4	13.3	12.9	12.5	11.8	12.0	12.1	11.9	11.4	9.9	10.4	12.0	13.1	12.8	12.9	13.2	13.1	13.3	12.6	11.2	9.6	7.8	8.5	11.9	14.1
18-Jul	9.2	9.0	9.0	8.6	7.8	8.5	10.0	10.6	11.1	11.6	12.6	13.2	13.5	14.7	15.2	16.1	16.4	16.0	15.9	15.1	13.8	10.7	8.6	7.4	11.9	16.4
19-Jul	8.0	9.0	10.4	11.1	10.5	12.1	14.9	16.3	17.6	18.9	19.6	20.5	21.3	21.7	21.6	22.4	22.7	19.5	18.1	18.4	16.3	14.0	11.8	10.4	16.1	22.7
20-Jul	9.8	9.5	9.9	10.7	11.1	12.1	12.4	13.4	13.8	15.1	18.1	20.5	22.1	23.0	23.7	23.6	23.5	23.3	22.1	20.7	19.3	16.8	15.5	15.0	16.9	23.7
21-Jul	14.9	14.2	14.8	14.5	13.6	14.1	15.1	15.5	15.5	17.8	19.3	20.6	18.1	16.6	17.0	18.4	19.7	20.8	21.0	19.2	18.1	16.7	15.6	13.8	16.9	21.0
22-Jul	12.8	12.8	12.5	13.1	12.3	14.3	17.3	19.5	20.8	21.8	23.0	24.3	25.0	25.8	26.3	26.5	26.6	25.2	24.2	23.7	22.7	21.5	20.6	20.2	20.5	26.6
23-Jul	19.9	19.9	19.2	18.0	17.0	17.9	18.9	19.4	20.4	22.0	22.6	22.9	24.2	24.8	25.4	25.7	25.1	23.9	23.2	22.4	20.7	19.9	18.7	17.7	21.2	25.7
24-Jul	17.0	16.2	15.2	14.7	14.0	13.8	13.6	13.5	13.3	13.2	12.8	13.3	14.6	15.8	17.5	18.3	18.8	19.0	18.6	18.0	17.0	16.3	15.5	14.7	15.6	19.0
25-Jul	13.8	13.2	13.2	13.0	13.2	14.1	15.6	16.8	18.2	19.4	20.7	22.0	23.0	24.2	25.0	25.1	26.1	26.4	25.9	24.2	20.8	18.1	16.3	15.1	19.3	26.4
26-Jul	15.7	15.8	15.7	14.8	15.0	16.3	19.7	22.5	24.5	25.1	26.0	27.0	27.5	28.2	29.0	29.7	29.6	29.4	27.9	26.6	24.3	21.8	20.7	20.3	23.0	29.7
27-Jul	17.8	17.1	17.3	17.5	15.2	16.7	19.4	23.4	25.0	25.9	27.4	28.0	29.1	29.3	29.1	28.2	28.0	27.7	27.2	25.5	23.3	22.4	21.0	19.3	23.4	29.3
28-Jul	18.2	18.2	18.0	17.4	16.6	17.0	17.5	17.8	19.0	20.5	21.9	22.7	23.6	24.2	24.1	23.1	24.5	23.2	19.2	20.3	18.4	15.3	13.8	13.5	19.5	24.5
29-Jul	12.4	11.2	10.7	10.6	11.0	12.5	15.7	18.0	19.5	20.2	21.9	23.9	24.1	24.2	25.2	25.3	23.6	23.6	23.3	22.7	20.2	16.8	14.6	14.0	18.5	25.3
30-Jul	15.1	15.8	16.0	15.6	15.4	14.9	16.9	16.0	15.0	16.0	17.2	17.0	17.9	20.3	21.6	22.9	23.6	23.5	23.4	22.1	20.4	19.9	19.9	19.5	18.6	23.6
31-Jul	18.8	18.1	17.4	16.1	15.5	15.4	15.8	16.3	17.6	19.7	20.6	21.3	21.9	21.5	18.5	21.3	18.5	18.0	17.3	16.3	15.0	13.7	12.3	12.2	17.5	21.9
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Anzac - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	20	2.69	2.69
10 - 20	425	57.12	59.81
> 20	299	40.19	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

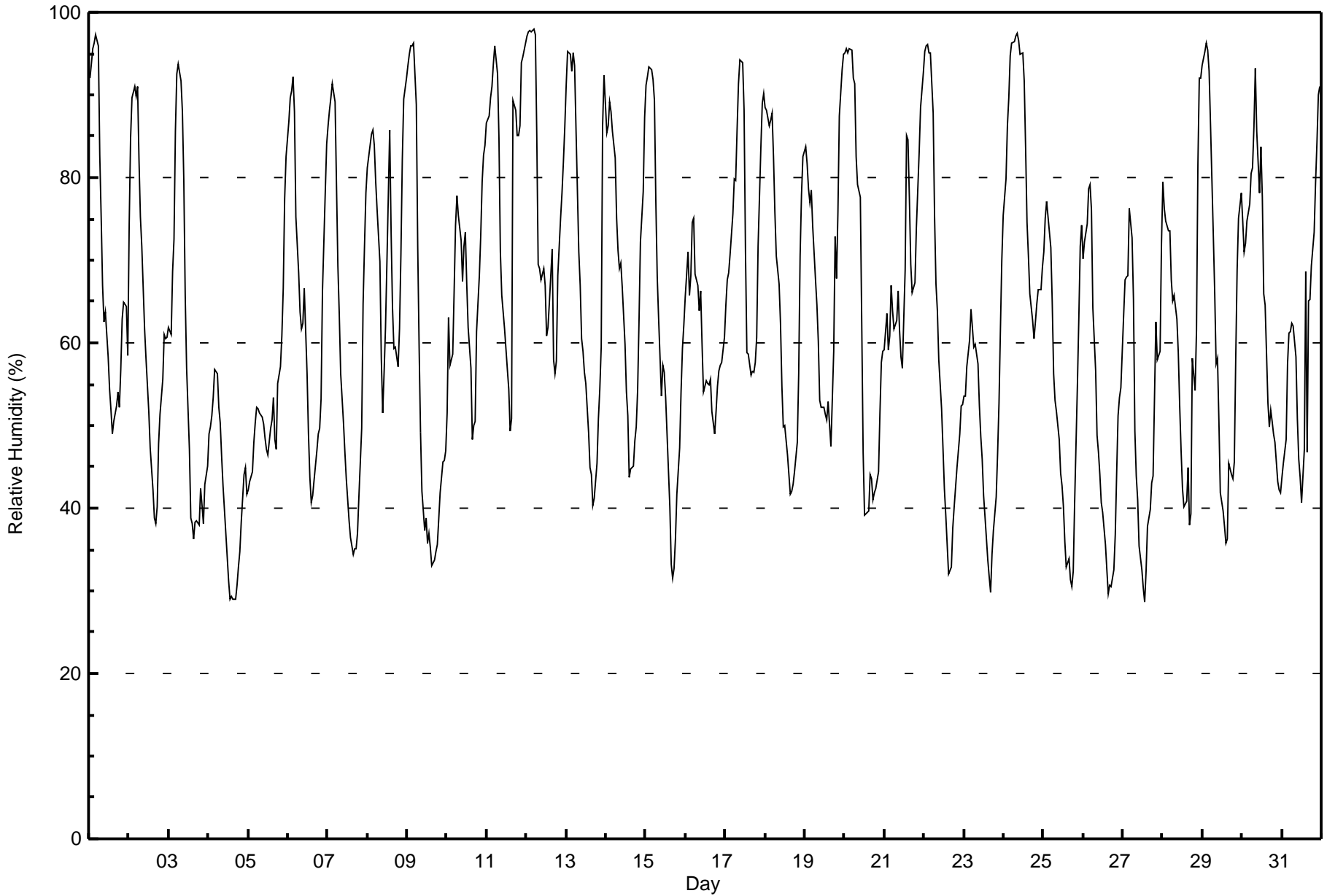
Anzac - July 2017

Maximum Value: 98 % on Jul 12 05:00		Maximum Daily Average: 80.8 % on Jul 24		Hours in Service: 744																							
Minimum Value: 29 % on Jul 27 14:00		Minimum Daily Average: 41.4 % on Jul 4		Hours of Data: 744																							
Maximum Diurnal Average: 81.7 % at hour 5		Minimum Diurnal Average: 45.6 % at hour 16		Hours of Missing Data: 0																							
Monthly Average: 63.1 %		Percentiles: P ₁ = 30 P ₁₀ = 39 Q ₁ = 48 Median = 61 Q ₃ = 78 P ₉₀ = 91 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-Jul	92	94	96	96	97	96	83	75	67	63	64	58	54	52	49	50	52	54	52	57	63	65	64	59	68.8	97	
2-Jul	74	85	90	91	90	91	82	75	72	62	58	55	52	47	42	39	38	40	48	51	56	61	61	61	63.3	91	
3-Jul	62	61	69	72	86	93	94	92	88	80	66	57	47	39	38	36	38	39	38	42	40	38	43	45	58.4	94	
4-Jul	49	50	51	53	57	56	52	50	46	43	37	34	31	29	29	29	31	33	35	38	44	45	42	41.4	57		
5-Jul	42	43	44	48	50	52	52	52	51	50	48	47	46	50	51	53	48	47	55	57	61	67	77	83	53.2	83	
6-Jul	87	90	91	92	88	75	68	64	62	62	67	56	49	44	41	42	43	47	49	50	53	66	78	84	64.5	92	
7-Jul	86	88	90	91	89	79	69	63	56	50	47	44	41	38	36	34	35	35	37	41	50	65	72	78	59.0	91	
8-Jul	81	82	85	86	84	80	76	70	58	51	56	62	70	86	73	64	59	60	57	62	71	82	89	92	72.4	92	
9-Jul	94	95	96	96	96	89	72	59	49	42	37	39	36	37	35	33	34	35	36	39	42	46	46	47	55.3	96	
10-Jul	52	63	57	59	66	74	78	75	72	68	72	73	67	62	57	48	50	50	61	68	73	80	83	84	66.4	84	
11-Jul	87	87	90	91	94	96	92	85	71	66	64	62	57	54	49	51	89	88	85	85	86	94	95	96	79.7	96	
12-Jul	97	98	98	98	98	97	85	70	69	68	69	67	61	62	65	71	58	56	58	68	75	78	82	86	76.4	98	
13-Jul	91	95	95	93	95	94	86	71	67	61	59	56	55	49	45	44	40	41	45	51	54	60	86	92	67.8	95	
14-Jul	85	86	89	88	86	82	75	71	69	70	67	60	54	51	44	45	45	48	50	54	63	72	78	87	67.5	89	
15-Jul	91	92	93	93	92	89	77	68	63	54	57	57	53	49	40	33	32	33	36	42	47	54	59	62	61.1	93	
16-Jul	66	71	66	68	75	75	68	67	64	66	60	54	55	55	55	56	52	49	52	55	57	57	58	61	60.8	75	
17-Jul	65	68	68	71	76	80	80	86	91	94	94	88	71	59	59	56	57	57	58	61	72	84	89	90	73.8	94	
18-Jul	89	88	86	87	88	82	76	70	67	62	55	50	50	47	44	42	42	43	44	48	56	70	78	82	64.5	89	
19-Jul	84	82	79	77	78	74	68	65	60	53	52	52	51	51	53	50	47	59	73	68	76	87	93	95	67.8	95	
20-Jul	95	96	95	96	95	92	91	83	79	78	62	47	39	39	40	44	44	41	42	42	44	52	58	59	64.7	96	
21-Jul	59	64	59	61	67	64	62	63	66	62	58	57	69	85	84	78	70	66	67	74	78	83	89	93	69.8	93	
22-Jul	95	96	96	95	95	88	75	67	64	58	52	47	42	39	36	32	33	38	40	42	45	49	52	52	59.6	96	
23-Jul	54	54	57	60	64	62	60	60	57	52	49	46	42	39	34	32	30	34	37	41	47	53	62	70	49.7	70	
24-Jul	75	80	86	90	95	96	96	97	97	95	95	92	84	75	71	66	63	60	63	65	66	66	69	69	80.8	97	
25-Jul	71	75	77	75	71	65	56	53	52	48	44	43	40	36	33	34	31	31	32	41	55	63	72	74	53.0	77	
26-Jul	70	72	74	79	79	76	64	57	49	47	44	41	39	36	33	30	31	30	33	37	44	51	53	55	50.9	79	
27-Jul	63	68	68	68	76	73	65	49	44	41	35	33	30	29	32	38	40	43	44	53	63	58	59	72	51.9	76	
28-Jul	79	76	75	73	74	68	65	66	63	59	52	47	42	40	41	45	38	39	58	54	62	82	92	92	61.8	92	
29-Jul	93	95	96	95	93	86	73	66	57	58	51	42	40	38	36	36	45	44	44	46	58	69	75	78	63.1	96	
30-Jul	75	71	72	75	77	81	81	86	93	86	78	84	78	66	65	53	50	52	51	49	48	43	42	42	66.5	93	
31-Jul	44	45	48	58	61	61	62	62	58	51	46	44	41	47	69	47	65	65	69	73	79	84	90	91	60.9	91	
		75.7	77.7	78.6	79.8	81.7	79.6	73.7	68.9	65.3	61.3	57.9	54.7	51.5	49.6	47.8	45.6	46.2	47.0	49.8	53.2	58.7	65.3	70.5	73.3	Diurnal Average	
		97	98	98	98	98	97	96	97	97	97	95	95	92	86	84	78	89	88	85	85	86	94	95	96	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	81	10.89	10.89
40 - 60	273	36.69	47.58
60 - 80	227	30.51	78.09
80 - 100	163	21.91	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

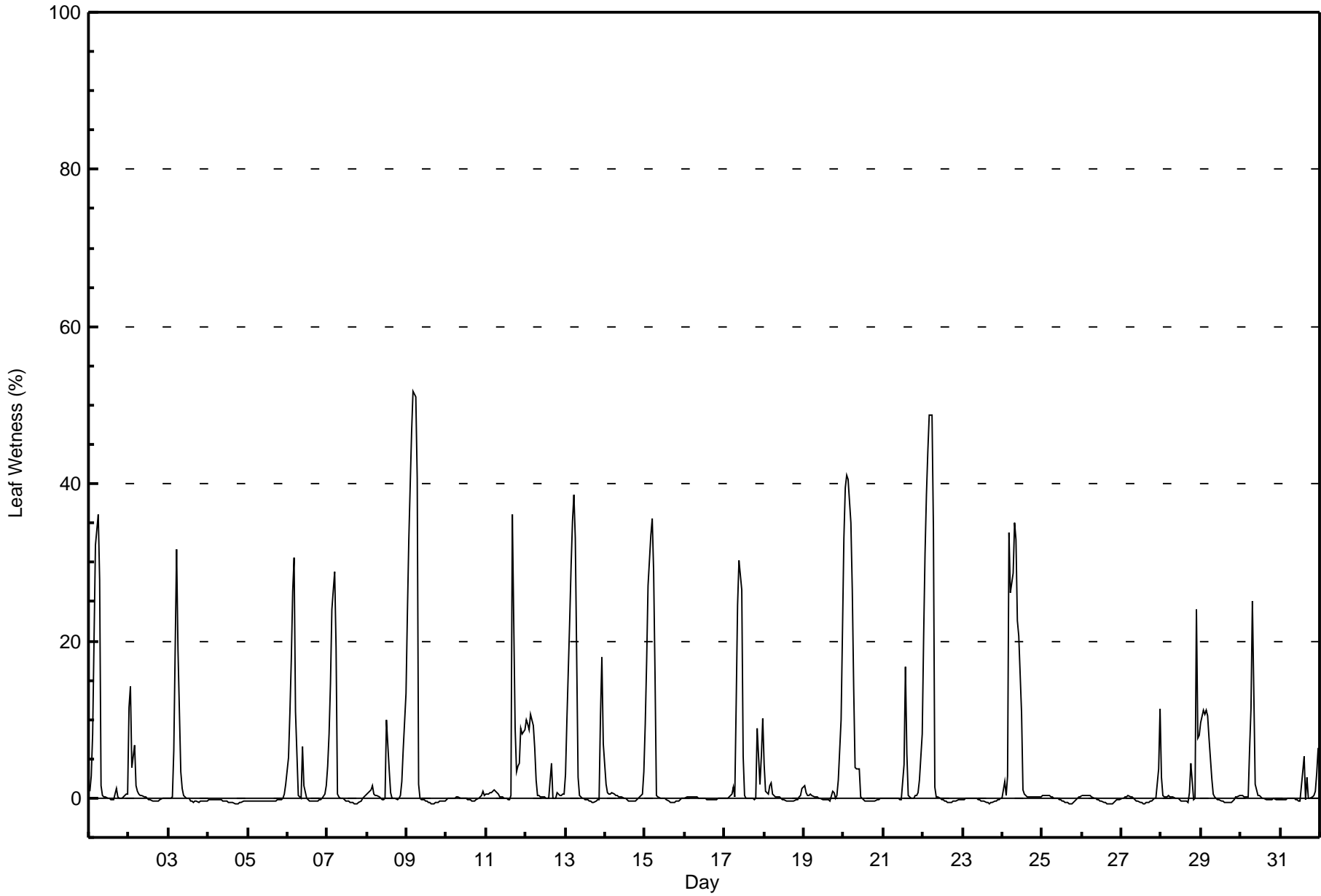
Anzac - July 2017

Maximum Value: 52 % on Jul 9 05:00 Maximum Daily Average: 11.7 % on Jul 9																	Hours in Service: 744 Hours of Data: 744									
Minimum Value: -1 % on Jul 7 19:00 Minimum Daily Average: -0.4 % on Jul 4 Maximum Diurnal Average: 12.2 % at hour 5 Minimum Diurnal Average: -0.2 % at hour 16 Monthly Average: 3.2 % Percentiles: P ₁ = -1 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 11 P ₉₉ = 38																	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-Jul	1	3	8	20	32	36	28	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5.5	36
2-Jul	12	14	4	7	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	14
3-Jul	0	0	0	6	19	32	19	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	32
4-Jul	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.4	0
5-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	-0.2	2
6-Jul	5	11	18	26	31	11	0	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0	2	4.5	31
7-Jul	4	8	15	24	29	19	1	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	3.9	29
8-Jul	0	1	1	2	1	0	0	0	0	0	0	0	10	4	1	0	0	0	0	0	0	2	6	13	1.7	13
9-Jul	24	33	40	47	52	51	41	2	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	11.7	52
10-Jul	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	1
11-Jul	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	36	9	3	4	4	9	8	9	3.7	36
12-Jul	10	9	9	11	9	6	2	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0	1	2.7	11
13-Jul	3	10	23	30	35	39	33	3	0	0	0	0	0	0	0	0	0	-1	0	0	0	10	18	7	8.6	39
14-Jul	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.3	3
15-Jul	9	17	27	33	36	29	16	0	0	0	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	6.8	36
16-Jul	0	0	0	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-Jul	0	0	0	0	0	1	0	12	25	30	27	5	0	0	0	0	0	0	0	0	9	2	5	10	5.3	30
18-Jul	4	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	4
19-Jul	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	10	21	1.6	21
20-Jul	33	40	41	41	35	26	14	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.9	41
21-Jul	0	0	0	0	0	0	0	0	0	0	0	4	17	6	0	0	0	0	0	0	0	1	2	8	1.6	17
22-Jul	20	31	39	44	49	49	34	1	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	11.0	49
23-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.3	0
24-Jul	0	2	0	3	34	26	29	35	33	23	21	11	1	0	0	0	0	0	0	0	0	0	0	0	9.1	35
25-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-0.1	0
26-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-0.2	0
27-Jul	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0	0	4	11	0.4	11	
28-Jul	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	24	8	8	1.9	24
29-Jul	10	11	11	11	10	8	2	1	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0	0	2.5	11
30-Jul	0	0	0	0	0	6	11	25	14	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	25
31-Jul	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	3	0	0	0	0	0	1	3	6	0.8	6
																	Diurnal Average									
																	Diurnal Maximum									
																	4.6		33							
																	6.2		40							
																	7.6		41							
																	9.9		47							
																	12.2		52							
																	11.1		51							
																	7.5		41							
																	2.9		35							
																	2.5		33							
																	2.1		30							
																	1.5		27							
																	0.4		11							
																	0.3		10							
																	0.5		17							
																	0.1		6							
																	-0.2		4							
																	0.9		36							
																	0.0		9							
																	0.0		4							
																	-0.1		4							
																	0.4		9							
																	1.6		24							
																	2.2		18							
																	3.3		21							



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	154	40.10	40.10
0.4 - 0.5	42	10.94	51.04
0.6 - 0.7	17	4.43	55.47
0.8 - 1.4	16	4.17	59.64
1.5 - 10	76	19.79	79.43
> 10	79	20.57	100.00

Total Number of Valid Hours: 384

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Anzac - July 2017

Maximum Speed: 26 km/h on Jul 4 14:00	Maximum Daily Speed Average: 18.2 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 8 01:00	Minimum Daily Speed Average: 1.4 km/h on Jul 13	Hours of Data: 741
Maximum Diurnal Speed Average: 6.4 km/h at hour 12	Minimum Diurnal Speed Average: 2.4 km/h at hour 21	Hours of Missing Data: 3
Monthly Average Velocity: 4.7 km/h 272.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 12 P ₉₀ = 16 P ₉₉ = 23	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-Jul	S4	SSW2	S4	S4	S3	SSW2	SW4	SSW4	S6	SSE5	SSE5	SSW8	S9	S10	S10	S9	S7	SSE5	SSE7	SSE8	SSE8	SW11	SW12	SW13	S6.0	SW13		
2-Jul	SW14	SSW9	S5	S6	SSE11	SSE8	SSE9	SE10	SE11	SSE12	S13	S13	S13	S13	SSW12	SW13	SSW12	SW10	NW8	SW2	SE5	S8	SW11	SW12	S8.3	SW14		
3-Jul	WSW9	W11	NW10	W10	WNW7	W6	ESE5	SSW3	WSW6	WNW9	W6	WNW9	WNW13	WNW12	WNW12	W13	WSW15	WSW18	W14	WSW13	WSW16	W15	W17	W18	W10.3	W18		
4-Jul	W16	WSW15	WSW15	W20	W18	W19	W19	W16	W16	W17	WSW23	W23	W25	W26	W25	W25	WSW24	W21	WNW18	W17	W12	W9	W9	W13	W18.2	W26		
5-Jul	W15	WNW17	W13	WNW15	WNW16	WNW15	WNW16	WNW15	WNW16	WNW19	WNW20	WNW19	WNW18	NW16	NNW14	NNW12	NNW10	NW11	NW12	N9	N9	N7	N6	N5	NW4	NW11.8	WNW20	
6-Jul	W4	W6	WSW6	WSW6	W7	WNW7	WNW9	WNW10	WNW9	WNW10	NNW7	NNW10	NW13	NW14	NNW13	NW12	NNW13	NNW13	NNW11	NNW11	NNW7	NW3	W3	W5	NW7.7	NW14		
7-Jul	W5	W5	WSW6	WSW5	WSW5	WSW3	WNW4	WNW7	WNW9	WNW9	WNW8	WNW8	WNW7	W8	WNW8	W9	WNW8	NW8	N5	NNE7	NE3	AF	S1	WSW4	WNW5.1	W9		
8-Jul	NE0	SW2	SW3	SSW3	SSW4	S5	E2	ENE5	NNW5	NW4	WNW9	WNW14	NW11	NNW4	NW7	WNW8	WNW6	WNW6	NW4	NW4	AF	SW4	AF	WSW5	WNW3.5	WNW14		
9-Jul	SW4	W1	WSW1	SW2	SSW2	SSW1	SE5	SE6	SSE7	SE8	SE11	SE11	SE11	SE8	S8	SE9	ESE9	SE9	SE10	ESE10	SE11	SE11	SE9	SE8	SE6.6	SE11		
10-Jul	SW3	E4	SE9	SSW9	WSW7	S6	SSW7	SW7	SSW2	NW8	NW8	W7	W6	WNW6	W5	S7	SSW7	SSW7	E10	ESE6	WNW3	NNE5	NNE6	NE3	SW2.0	E10		
11-Jul	NW2	S3	W3	WNW3	N4	NNW3	NNW3	N3	NNW7	NNW9	NNW8	WNW11	NNW8	NNW11	NNW8	NE6	E14	WNW7	NW11	WNW10	SSW5	NW2	S3	SW3	NNW3.8	E14		
12-Jul	WNW3	ESE3	NNW1	W1	SW3	S2	S4	S4	SSE5	SSE3	SE2	NW2	SSW4	WNW6	WNW7	WNW5	S9	S10	S8	SSW11	S8	SSE6	SSE9	S10	S3.5	SSW11		
13-Jul	S4	SSE3	SW8	SW6	SW6	SSW6	SSE3	W4	WNW7	WNW5	NW3	NNW2	NE6	NNE3	SE3	WNW6	W5	NNE6	NNE10	NNE10	NE10	NE9	SE2	WNW5	NNW1.4	NE10		
14-Jul	WNW14	WNW13	NW11	WNW11	NW7	NW8	NW9	NW8	WNW9	WNW9	WNW9	W10	W12	W9	WNW6	NW7	SW4	SSW9	W7	WSW7	NNE5	ENE7	ESE3	SSW3	WNW6.4	WNW14		
15-Jul	S4	S5	SSW6	SSW6	SSW5	SW4	S3	SSE7	SSE11	SSE13	SSE14	SE15	SSE19	SSE17	S16	S16	S16	S16	SSE17	SSE13	SSE9	S8	SSE8	S9	SSE10.4	SSE19		
16-Jul	S11	SW5	NNW20	NNW13	NW8	WNW9	W8	WSW6	NW12	NW14	WNW13	WNW16	WSW13	W12	W16	W17	W17	WNW20	WNW21	WNW18	W15	WNW18	W19	W19	WNW12.6	WNW21		
17-Jul	WNW22	WNW22	WNW21	W16	WNW17	W15	WNW17	WNW16	NW14	NNW13	NNW16	NNW15	NNW16	N18	NNW16	NNW15	NNW13	N10	N8	NNW8	NNW8	NW5	NW6	NW8	NW12.3	WNW22		
18-Jul	NW8	NW7	NW7	NW6	NW7	NW7	NW9	NW8	WNW7	WNW7	W7	WNW8	WNW6	WNW8	W7	WNW8	WNW9	W8	W10	WSW9	SW7	SSW6	SW5	WSW4	WNW6.4	W10		
19-Jul	SW5	SW6	WSW5	SW6	WSW6	WSW7	W10	WNW13	WNW13	W14	W15	WNW13	W16	W15	W12	W15	WNW11	NE6	SSW4	ESE4	ESE3	S5	S4	S2	W7.0	W16		
20-Jul	S2	S3	SSE3	SSE3	E4	ESE6	ESE8	SE8	SE6	ESE9	SE9	SE13	SE13	SE11	SE12	SE12	SE12	ESE11	ESE10	ESE10	SE8	SE6	SSE7	SE7	SE7.7	SE13		
21-Jul	SSE7	SE6	SSE8	ESE5	E6	ESE6	ESE8	SSE9	SSE5	ESE10	SE10	SSE11	S11	SSE7	SSE10	S10	SSW8	S9	S6	S5	S5	S7	S6	SSW4	SSE6.4	SSE11		
22-Jul	SW3	SW4	SW4	SSW6	S8	SSW7	SSW6	W5	WNW9	WNW11	WNW10	WNW10	W11	W15	WNW15	W17	W14	W11	SW10	SW12	WSW12	WSW10	SW11	WSW10	WSW8.2	W17		
23-Jul	WSW8	WSW9	W8	WSW8	WSW7	W7	W11	WNW13	WNW12	WNW13	WNW13	W13	WNW13	WNW13	WNW12	WNW13	WSW14	WSW11	WSW8	WNW6	W7	W7	N8	N8	W9.1	WSW14		
24-Jul	N7	N8	NNW8	NNW9	NNW12	N11	NNE12	NNE13	NNE12	N13	N14	N13	N13	N15	N17	N19	N21	N21	N16	NNW16	NNW14	NNW13	NW12	NW10	N12.9	N21		
25-Jul	NW8	WNW9	WNW10	WNW9	WNW11	WNW10	WNW12	WNW10	WNW9	WNW9	WNW8	WNW10	WNW9	W8	W8	NW7	WNW6	WNW6	W5	SW7	SW7	SSW4	SSW4	SSW7	WNW7.2	WNW12		
26-Jul	SW6	SW8	SW7	SW8	SW8	SW7	SSW3	W5	WNW7	WNW9	NW8	NW8	WNW6	WNW6	WNW8	WNW8	WSW10	SW10	SW9	SW9	SSW7	SSW9	SW8	WSW6.2	SW10			
27-Jul	SSW7	SSW8	SSW6	SSW6	SSW5	SW3	S4	SSE8	SSW3	NW5	SSW7	S10	S9	S10	S11	SSW6	SW4	SSW3	S4	W4	W6	WNW14	NW12	WNW12	SW4.5	WNW14		
28-Jul	WNW12	WNW12	WNW12	WNW14	W9	WNW10	WNW13	WNW16	WNW14	WNW13	WNW13	WNW15	WNW16	NW14	N10	NW9	NW12	W10	W6	NNW6	NNW13	SW4	SW8	WNW10.6	WNW16			
29-Jul	SW6	WSW5	WSW6	WSW7	W6	WSW5	WNW5	WNW6	WNW5	NNW2	NW3	WNW12	WNW12	WNW11	WNW10	WNW9	N12	NNE8	NE7	ENE4	ENE4	SE3	SE4	SSE6	WNW3.5	WNW12		
30-Jul	SSE7	SSE9	SSE8	SE9	SSE8	S5	W12	WNW12	NW4	WNW3	W1	SW5	SSW4	SSW7	WSW8	WSW10	WSW10	SW13	WSW12	WSW9	WSW11	WSW10	W13	W13	SW6.1	W13		
31-Jul	WNW16	WNW17	WNW19	WNW14	WNW15	WNW18	WNW19	WNW17	WNW15	WNW14	WNW15	WNW14	WNW15	WNW14	WNW15	WNW13	N9	NNW16	NNE14	N14	N12	N10	NNW8	NNW7	NNW5	NNW4	NW11.9	WNW19

WSW5.3	W5.1	W5.0	W5.3	W4.6	W4.6	W4.5	W4.5	WNW5.2	WNW5.6	WNW5.3	W6.4	W6.0	W6.0	W5.6	W6.0	W4.7	W4.4	WNW3.4	W2.9	WSW2.4	W3.0	WSW3.6	WSW4.9		Diurnal Average
WNW22	WNW22	WNW21	W20	W18	W19	WNW19	WNW17	WNW19	WNW20	WSW23	W23	W25	W26	W25	W25	WSW24	N21	WNW21	WNW18	WSW16	WNW18	W19	W19		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

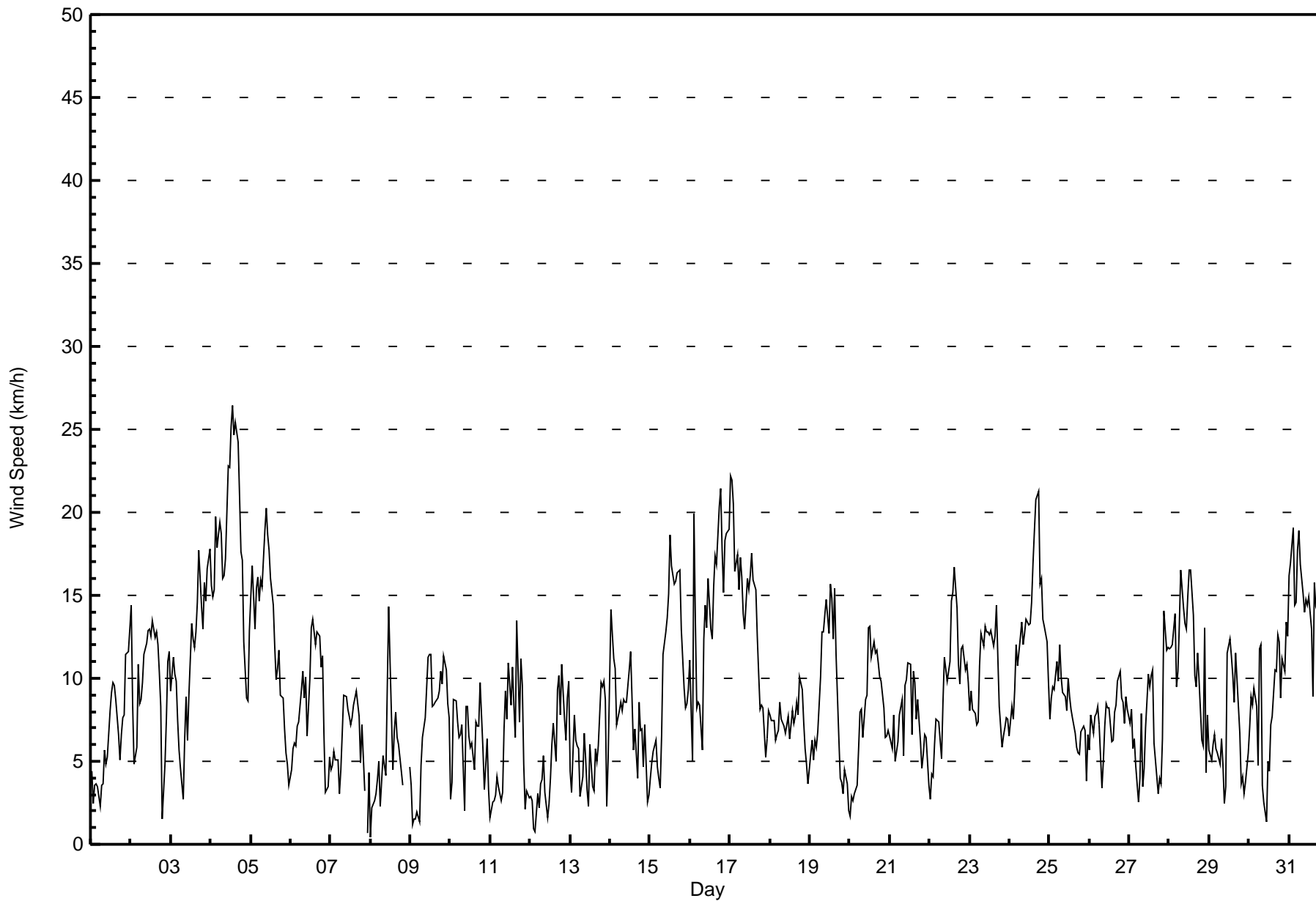
Wind Speed (WS) - km/h
Anzac - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jul 4 14:00 Minimum Value: 1 km/h on Jul 7 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6									
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-Jul	1	1	1	1	1	1	2	2	2	2	2	3	3	4	4	3	2	2	2	2	2	4	3	4	4	
2-Jul	4	3	1	2	3	3	2	2	3	3	4	4	4	5	5	5	4	4	3	1	1	2	2	3	5	
3-Jul	4	4	3	3	3	3	2	2	2	3	2	4	4	4	4	5	5	6	5	4	5	5	6	6	6	
4-Jul	5	5	5	7	7	7	7	5	5	6	8	9	8	9	9	8	7	7	6	4	3	2	4	9		
5-Jul	5	6	5	5	5	5	5	5	6	6	6	6	5	4	4	3	4	4	2	3	2	1	1	6		
6-Jul	1	1	1	1	1	2	3	3	3	4	2	4	4	4	4	4	4	4	3	4	2	1	1	4		
7-Jul	1	1	1	1	1	2	2	2	3	2	2	3	2	2	4	3	3	3	2	2	1	AF	1	4		
8-Jul	1	1	1	1	2	1	2	2	3	2	3	4	4	2	2	2	2	2	1	1	AF	2	AF	4		
9-Jul	1	2	1	1	1	2	2	2	2	2	3	4	4	4	4	3	3	3	3	2	3	3	3	4		
10-Jul	3	2	2	3	2	2	2	2	2	4	3	2	2	2	2	4	3	2	5	3	1	2	2	5		
11-Jul	1	1	1	1	1	1	1	1	2	3	3	4	3	3	3	7	7	4	4	3	2	2	1	7		
12-Jul	1	1	2	1	1	1	1	1	2	1	1	2	2	2	2	3	5	3	2	5	2	2	2	5		
13-Jul	2	1	2	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	1	3		
14-Jul	5	4	4	3	2	2	2	3	3	2	3	3	3	2	2	3	2	2	2	1	2	2	1	5		
15-Jul	2	1	2	1	2	2	1	3	3	3	4	4	5	6	5	5	5	6	5	4	3	2	2	6		
16-Jul	2	4	7	5	2	2	3	1	6	5	5	6	4	5	6	6	5	7	7	6	5	6	6	7		
17-Jul	7	7	7	6	6	5	6	5	5	5	5	5	5	4	5	4	4	4	2	3	1	1	2	7		
18-Jul	2	2	2	2	2	2	2	2	3	3	3	3	2	3	3	2	3	3	3	3	2	1	2	3		
19-Jul	2	2	2	2	2	2	4	4	4	5	5	5	5	5	4	6	4	5	2	1	1	2	1	6		
20-Jul	1	1	1	1	2	1	2	3	2	2	2	4	5	4	5	4	4	4	3	3	2	2	1	5		
21-Jul	1	2	2	1	1	1	2	3	2	3	3	3	3	2	3	3	2	3	2	1	1	2	1	3		
22-Jul	1	1	2	2	1	2	2	2	3	3	3	3	5	5	5	6	5	4	2	3	3	3	2	6		
23-Jul	2	3	3	2	2	3	3	4	3	4	4	4	4	4	4	5	5	3	3	2	2	2	2	5		
24-Jul	1	2	2	2	4	3	4	4	3	3	3	4	3	4	5	5	6	7	5	4	4	3	3	7		
25-Jul	2	2	3	2	3	3	3	3	2	3	3	3	3	3	3	2	2	2	2	1	1	1	1	3		
26-Jul	1	2	1	1	1	1	1	1	2	2	3	3	3	2	3	3	3	4	3	3	2	2	2	4		
27-Jul	2	2	2	2	1	1	2	2	3	2	3	3	3	3	3	2	2	1	1	1	2	5	4	5		
28-Jul	4	4	4	5	3	4	4	5	5	4	4	5	6	5	5	4	4	5	7	2	3	6	2	7		
29-Jul	2	1	1	1	2	1	1	2	2	3	2	4	5	4	3	3	4	3	2	1	1	1	1	5		
30-Jul	2	2	2	2	2	3	5	5	1	2	1	1	2	3	3	4	3	4	4	2	3	3	5	5		
31-Jul	5	6	6	5	5	6	6	5	5	4	5	5	5	5	2	5	5	4	3	3	2	2	1	6		
																	Diurnal Maximum									
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Anzac - July 2017

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	166	22.40	22.40
6 - 11	362	48.85	71.26
12 - 19	195	26.32	97.57
20 - 28	18	2.43	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Anzac - July 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	3	3	3	3	6	7	10	26	22	21	10	16	11	12	9	166
6 - 11	14	6	6	1	2	13	24	27	30	26	28	28	35	71	32	19	362
12 - 19	12	4	0	0	1	0	6	7	8	2	7	11	38	69	11	19	195
20 - 28	2	0	0	0	0	0	0	0	0	0	0	2	7	6	0	1	18
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	32	13	9	4	6	19	37	44	64	50	56	51	96	157	55	48	741

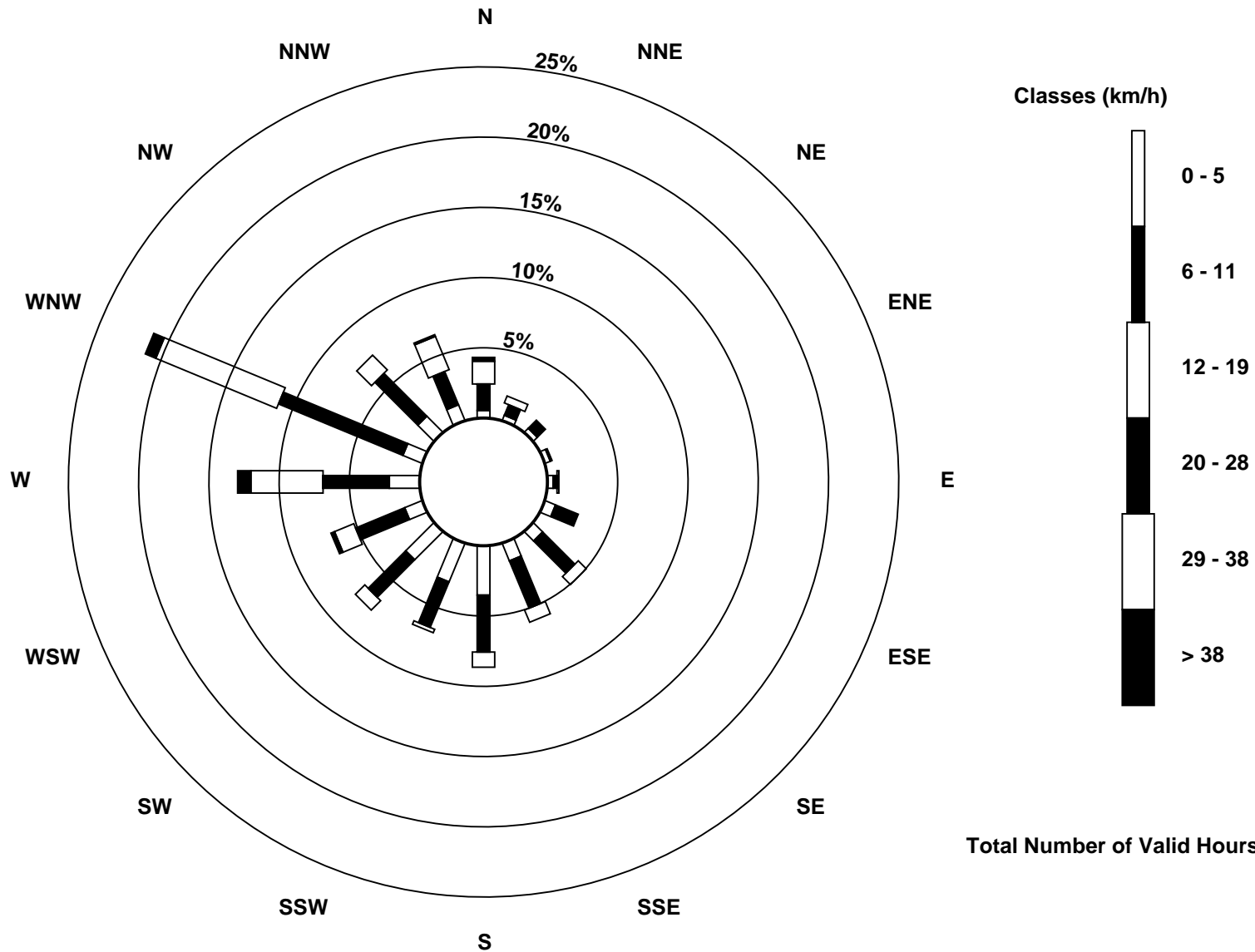
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Anzac (AMS 14)



Total Number of Valid Hours: 741



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - July 2017

Direction of Maximum Speed: 263 deg on Jul 4 14:00 Direction of Maximum Daily Speed Average: 265.3 deg on Jul 4	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3
Direction of Minimum Speed: 36 deg on Jul 8 01:00 Direction of Minimum Daily Speed Average: 1.4 deg on Jul 13	Percent Operational Time: 99.6
Monthly Average Direction: 274.5 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-Jul	191	206	183	179	191	212	214	202	183	164	168	195	182	177	187	178	170	165	155	155	160	226	226	233	189.5
2-Jul	228	206	180	182	152	150	151	140	144	158	185	180	178	186	199	214	210	235	305	222	145	188	219	226	189.5
3-Jul	251	276	304	276	297	267	120	199	257	284	272	286	288	291	283	273	257	251	272	246	252	259	262	264	268.4
4-Jul	264	253	254	266	265	270	277	273	264	261	258	263	264	263	261	260	258	261	291	276	273	279	263	269	265.3
5-Jul	281	286	279	287	290	287	284	290	297	296	296	302	309	331	337	347	315	319	2	359	1	1	352	310	305.9
6-Jul	264	261	246	248	274	289	299	296	288	300	331	327	313	310	329	320	338	345	342	340	338	324	275	262	310.1
7-Jul	266	260	241	246	249	250	286	294	296	300	300	291	291	272	291	279	286	317	349	27	39	AF	191	243	288.4
8-Jul	36	234	228	206	195	191	89	74	339	321	288	298	311	328	307	288	291	294	325	324	AF	236	AF	239	291.7
9-Jul	224	275	257	217	213	196	134	143	157	131	146	143	136	128	170	143	123	133	124	120	127	131	143	127	139.8
10-Jul	214	82	137	211	238	187	204	217	192	326	310	264	266	290	267	174	201	209	91	123	288	15	26	37	221.4
11-Jul	318	172	260	291	8	328	339	351	341	334	341	299	339	347	345	46	80	284	304	301	207	313	176	232	328.8
12-Jul	299	107	340	271	221	186	174	170	164	153	129	325	206	293	297	291	174	172	173	196	178	155	167	177	188.4
13-Jul	171	168	235	236	221	203	165	276	302	288	310	335	43	29	143	299	279	31	21	24	39	35	130	288	327.9
14-Jul	290	297	305	302	316	306	313	313	300	298	297	277	268	277	290	305	230	211	273	254	12	61	121	209	291.5
15-Jul	184	187	192	198	204	220	169	153	163	165	152	146	152	156	170	171	173	171	163	162	163	171	161	169	166.3
16-Jul	171	216	339	329	314	303	275	257	304	306	302	294	256	279	278	279	274	282	282	287	276	284	278	274	285.8
17-Jul	283	286	282	279	292	278	286	294	308	328	348	341	342	352	343	337	342	355	5	347	335	314	312	312	314.8
18-Jul	311	306	315	322	310	312	316	315	283	288	280	291	289	291	277	286	300	277	261	250	227	205	234	240	285.6
19-Jul	232	230	248	234	238	240	268	285	283	280	270	283	274	278	272	266	289	43	211	102	114	186	190	189	265.6
20-Jul	185	177	164	148	98	107	111	124	126	105	126	126	130	140	128	145	139	122	121	120	136	128	149	143	129.5
21-Jul	151	142	154	112	85	113	105	147	147	113	125	168	179	166	165	183	196	184	185	186	171	180	186	204	157.0
22-Jul	220	225	216	200	189	202	197	260	296	301	289	297	270	274	285	269	276	271	230	234	244	238	235	241	256.6
23-Jul	254	255	264	248	254	264	280	285	287	294	285	279	287	289	287	287	255	255	258	283	264	281	359	5	278.4
24-Jul	353	354	343	332	342	3	15	20	12	2	357	350	351	358	359	353	354	355	350	342	343	333	325	319	352.0
25-Jul	308	299	297	297	289	291	293	296	302	292	288	294	298	278	272	305	300	301	263	235	222	220	208	229	283.7
26-Jul	225	229	232	222	226	230	232	208	278	298	299	305	306	296	296	292	293	242	235	227	216	204	210	214	249.3
27-Jul	212	211	192	210	212	230	183	161	197	304	200	187	174	180	173	197	217	195	183	267	280	301	317	288	218.4
28-Jul	297	296	293	291	275	282	283	284	288	288	291	294	288	289	306	354	314	313	272	279	333	345	218	216	293.5
29-Jul	233	238	245	258	280	248	283	299	289	334	311	294	294	297	286	284	10	28	48	69	72	135	139	159	294.5
30-Jul	168	162	151	146	147	175	278	287	315	286	276	223	207	211	237	241	245	235	241	248	249	255	273	273	235.5
31-Jul	283	288	286	299	302	297	302	298	284	297	296	296	294	301	355	330	14	1	353	353	344	346	332	337	310.8

256.5 259.9 267.4 263.9 267.5 264.9 275.9 277.8 283.0 294.1 284.3 279.9 275.3 281.1 279.0 277.9 276.5 274.9 282.7 274.7 257.3 263.1 246.6 248.9
 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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 90 deg on Jul 8 01:00	Hours of Data: 741
Minimum Value: 5 deg on Jul 8 22:00	Hours of Missing Data: 3
	Hours of Calibration: 0
	Percent Operational Time: 99.6
Percentiles: P ₁ = 9 P ₁₀ = 15 Q ₁ = 19 Median = 23 Q ₃ = 30 P ₉₀ = 43 P ₉₉ = 78	

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-Jul	17	24	20	14	15	49	36	38	43	54	52	34	36	30	32	25	23	34	23	17	16	32	19	21	54
2-Jul	17	25	19	21	15	21	18	22	23	24	29	29	29	31	29	30	30	39	23	65	15	23	16	16	65
3-Jul	27	24	23	30	25	51	58	82	32	31	38	36	25	27	29	29	23	22	25	22	23	25	24	24	82
4-Jul	26	24	23	26	25	25	26	26	24	26	24	27	24	23	25	25	22	23	25	25	22	25	23	22	27
5-Jul	25	23	27	22	23	21	22	23	20	20	22	22	24	21	19	22	28	21	18	15	15	11	12	29	29
6-Jul	8	8	6	19	13	20	21	19	25	25	35	32	26	26	27	25	19	23	17	18	13	29	22	6	35
7-Jul	9	11	9	11	6	52	30	27	20	23	26	33	38	37	38	35	31	34	47	17	17	AF	79	14	79
8-Jul	90	65	13	39	17	32	70	24	45	57	19	18	20	33	23	27	20	22	28	17	AF	5	AF	7	90
9-Jul	14	68	83	75	60	57	23	33	31	38	26	30	33	46	44	37	39	30	21	17	17	16	21	20	83
10-Jul	61	42	28	34	19	26	26	27	78	23	21	28	31	33	48	54	35	28	59	48	37	32	16	15	78
11-Jul	75	46	33	48	14	25	38	20	24	23	33	27	36	25	31	54	39	63	20	16	43	66	34	45	75
12-Jul	26	49	81	80	22	50	27	28	21	37	65	68	55	40	21	37	56	20	22	24	21	18	18	17	81
13-Jul	25	34	12	13	16	14	21	44	22	52	72	79	34	69	70	72	62	60	16	16	17	16	64	31	79
14-Jul	21	19	18	18	17	18	17	23	23	21	24	25	25	31	48	23	64	26	42	21	44	17	56	17	64
15-Jul	10	12	14	11	27	39	48	24	20	19	19	21	20	25	24	28	22	21	20	18	19	18	14	15	48
16-Jul	15	55	23	16	16	16	31	19	21	21	22	23	23	27	24	22	23	23	22	22	22	22	24	23	55
17-Jul	20	22	21	24	22	22	22	21	19	19	16	17	19	19	17	17	19	20	21	18	16	16	14	15	24
18-Jul	16	16	18	16	14	15	20	27	33	46	39	36	37	30	41	35	36	33	25	22	16	14	25	26	46
19-Jul	17	20	42	19	20	20	26	21	23	26	25	27	25	24	27	24	27	67	45	41	27	16	10	12	67
20-Jul	32	13	17	25	33	20	23	24	20	24	21	24	27	35	34	26	25	26	21	19	16	17	16	16	35
21-Jul	14	19	17	30	19	26	27	21	28	24	25	29	19	29	24	28	26	32	26	22	16	16	17	24	32
22-Jul	24	20	25	27	11	16	21	33	26	18	24	25	35	27	24	27	25	26	16	19	18	17	15	17	35
23-Jul	20	22	23	23	20	28	22	23	23	23	26	24	26	24	25	27	25	27	27	26	19	20	21	14	28
24-Jul	13	13	24	17	20	18	17	17	16	16	17	16	17	17	18	18	19	18	18	16	15	15	15	15	24
25-Jul	16	19	22	17	16	16	15	18	24	27	31	24	29	35	36	26	31	39	33	13	12	11	18	15	39
26-Jul	22	13	15	12	13	11	14	40	38	25	27	25	31	52	55	36	30	33	22	19	19	19	17	17	55
27-Jul	14	15	22	25	25	33	26	20	75	53	39	31	29	32	26	31	34	30	19	25	16	20	17	25	75
28-Jul	20	19	22	20	24	22	22	21	21	24	23	23	24	23	32	26	28	22	35	20	37	31	68	12	68
29-Jul	10	11	11	11	18	11	21	23	37	84	72	28	23	22	29	29	27	23	25	34	27	23	24	15	84
30-Jul	15	15	17	15	15	63	29	23	37	67	82	23	39	39	34	27	29	21	19	19	20	24	25	23	82
31-Jul	23	21	20	21	20	20	19	20	21	21	22	25	23	42	25	28	20	19	17	17	14	15	11	13	42
	90	68	83	80	60	63	70	82	78	84	82	79	55	69	70	72	64	67	59	65	44	66	79	45	

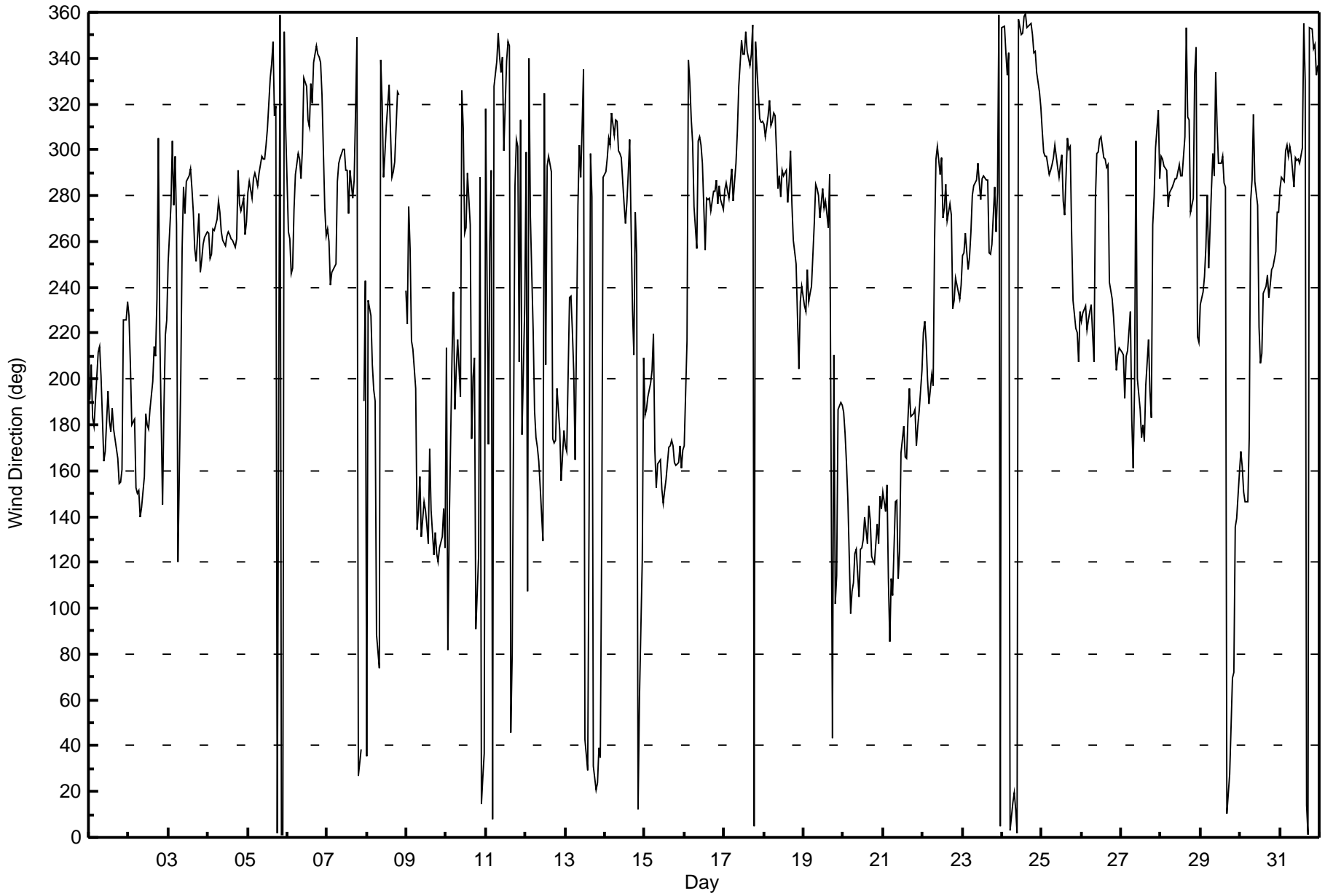
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Anzac - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

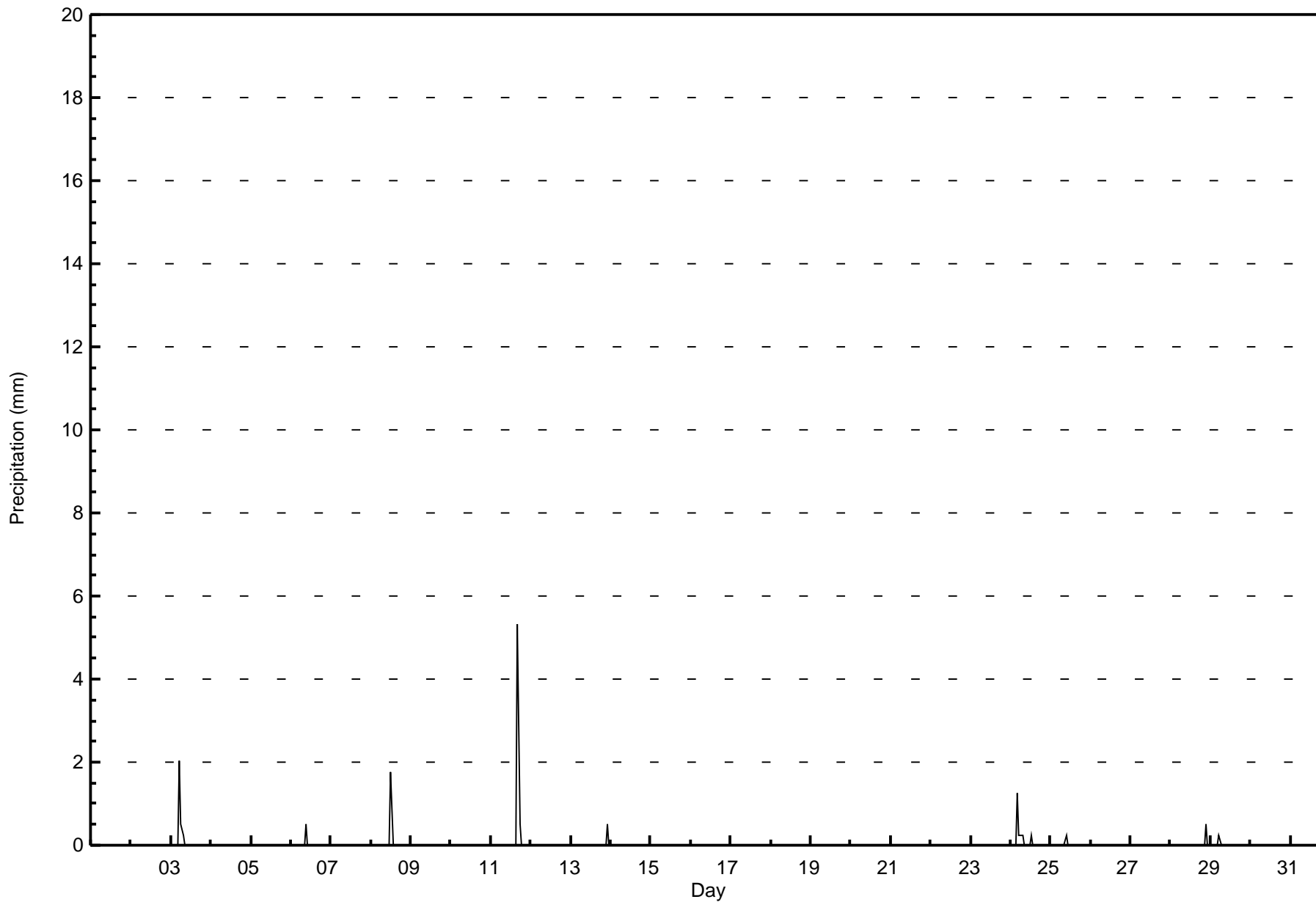
Anzac - July 2017

Maximum Value: 5.3 mm on Jul 11 17:00		Maximum Daily Total: 5.8 mm on Jul 11		Hours in Service: 744																										
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 1		Hours of Data: 744																										
Maximum Diurnal Total: 5.3 mm at hour 17		Minimum Diurnal Total: 0.0 mm at hour 1		Hours of Missing Data: 0																										
Monthly Total: 14.73 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 = 0.5		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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	2.0	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	0.0	0.0	0.0	0.0	0.0	2.8	2.0	
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	
7-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	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	0.0	0.0	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	1.8	
9-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	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	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	5.3	
12-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	0.5	0.5	
14-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	1.3	0.3	0.3	0.3	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	2.3	1.3
25-Jul	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	0.0	0.0	0.0	0.0	0.3	0.3	
26-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.5	0.5	
29-Jul	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	
30-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
31-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	2.5	0.8	0.5	0.0	0.8	0.0	0.0	2.0	0.0	0.0	5.3	0.5	0.0	0.0	0.0	0.5	0.5	0.0	Diurnal Average					
		0.0	0.0	0.0	0.0	1.3	2.0	0.5	0.3	0.0	0.5	0.0	0.0	1.8	0.0	0.0	5.3	0.5	0.0	0.0	0.0	0.5	0.5	0.0	Diurnal Maximum					



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - July 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

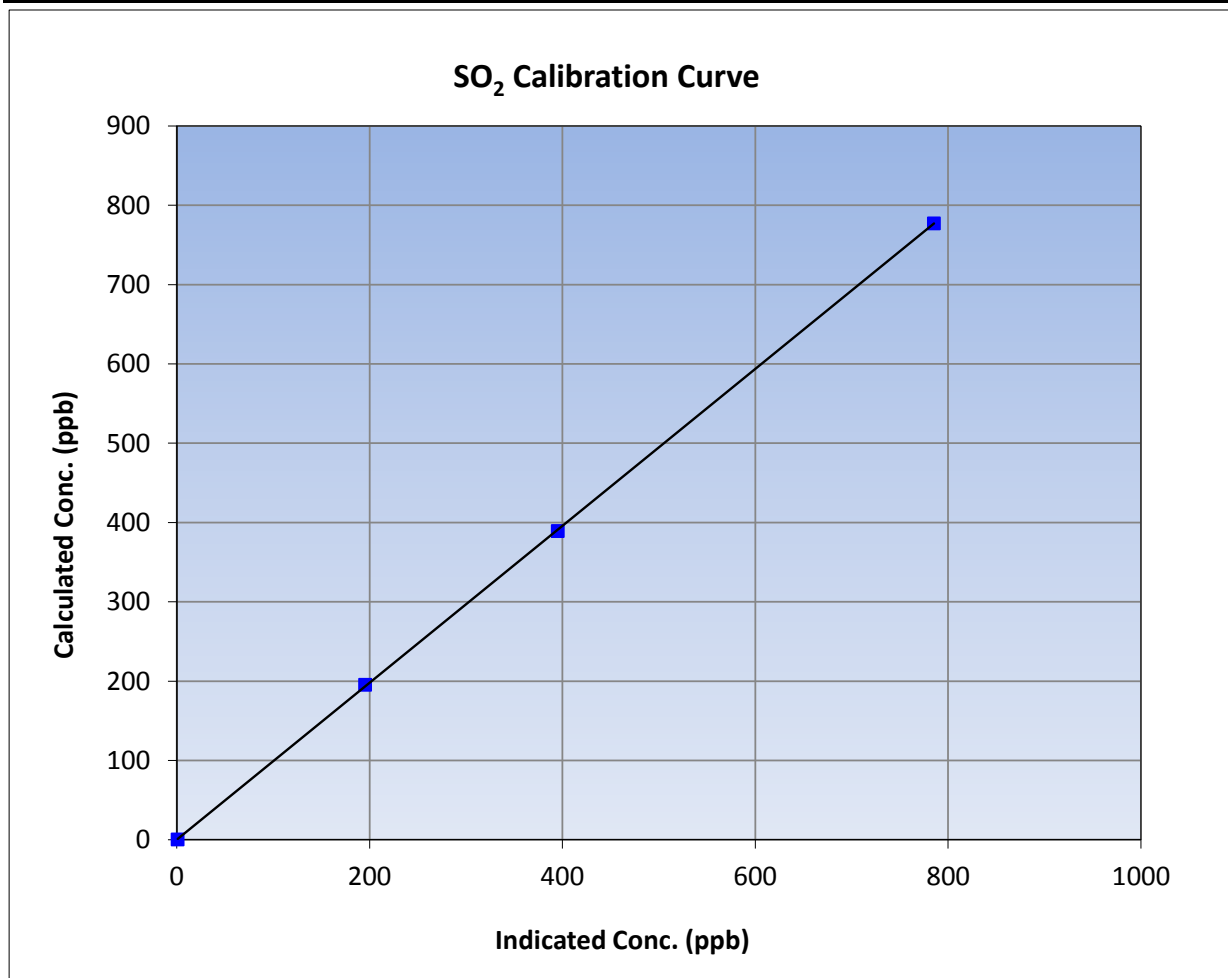
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:25	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1152430005

Calibration Data

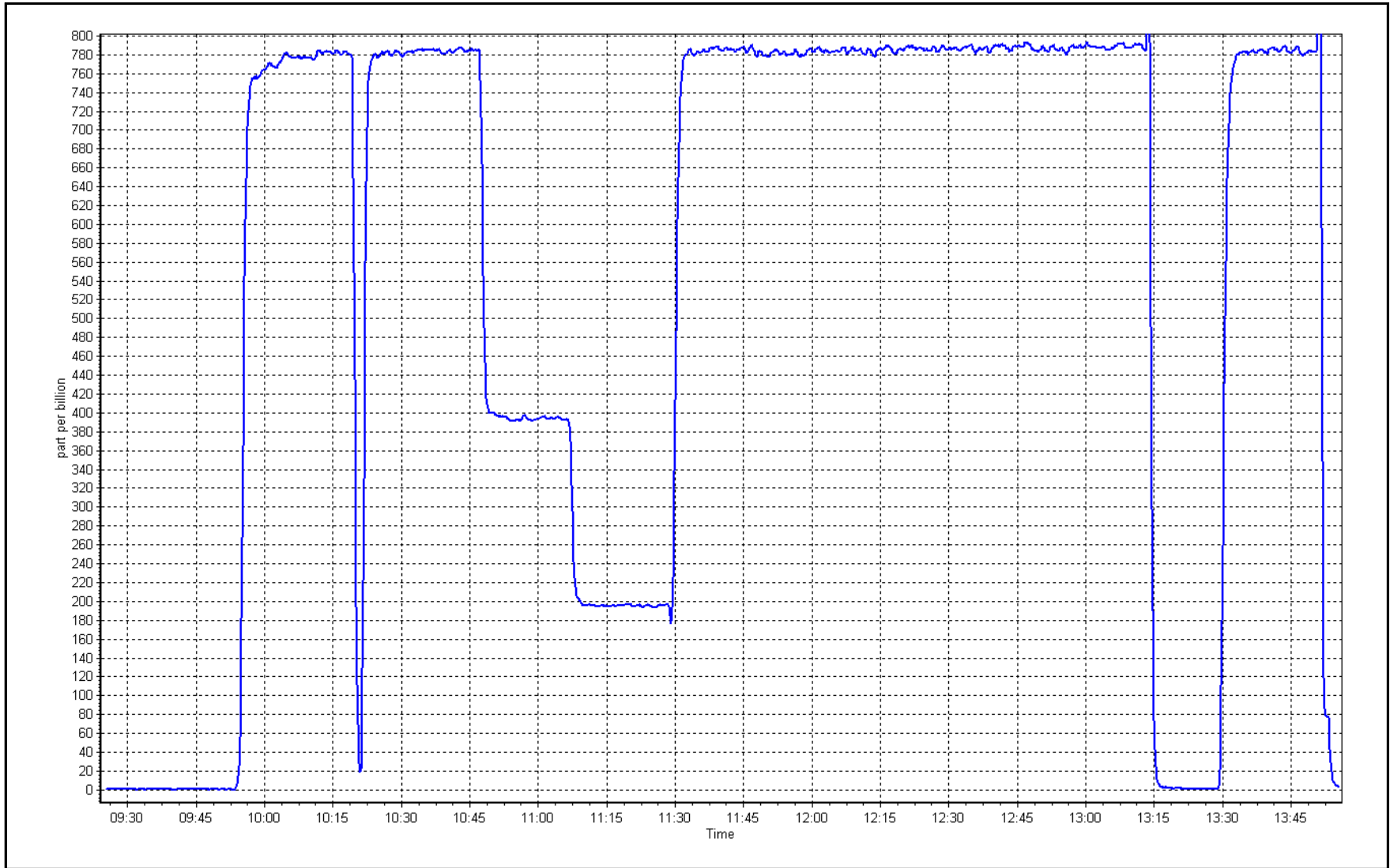
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.6	----	Correlation Coefficient	≥0.995
777.0	785.0	0.9898		
389.1	394.7	0.9858	Slope	0.90 - 1.10
195.0	195.1	0.9993		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 10, 2017

Location: Anzac





Wood Buffalo Environmental Association

TRS Calibration Summary

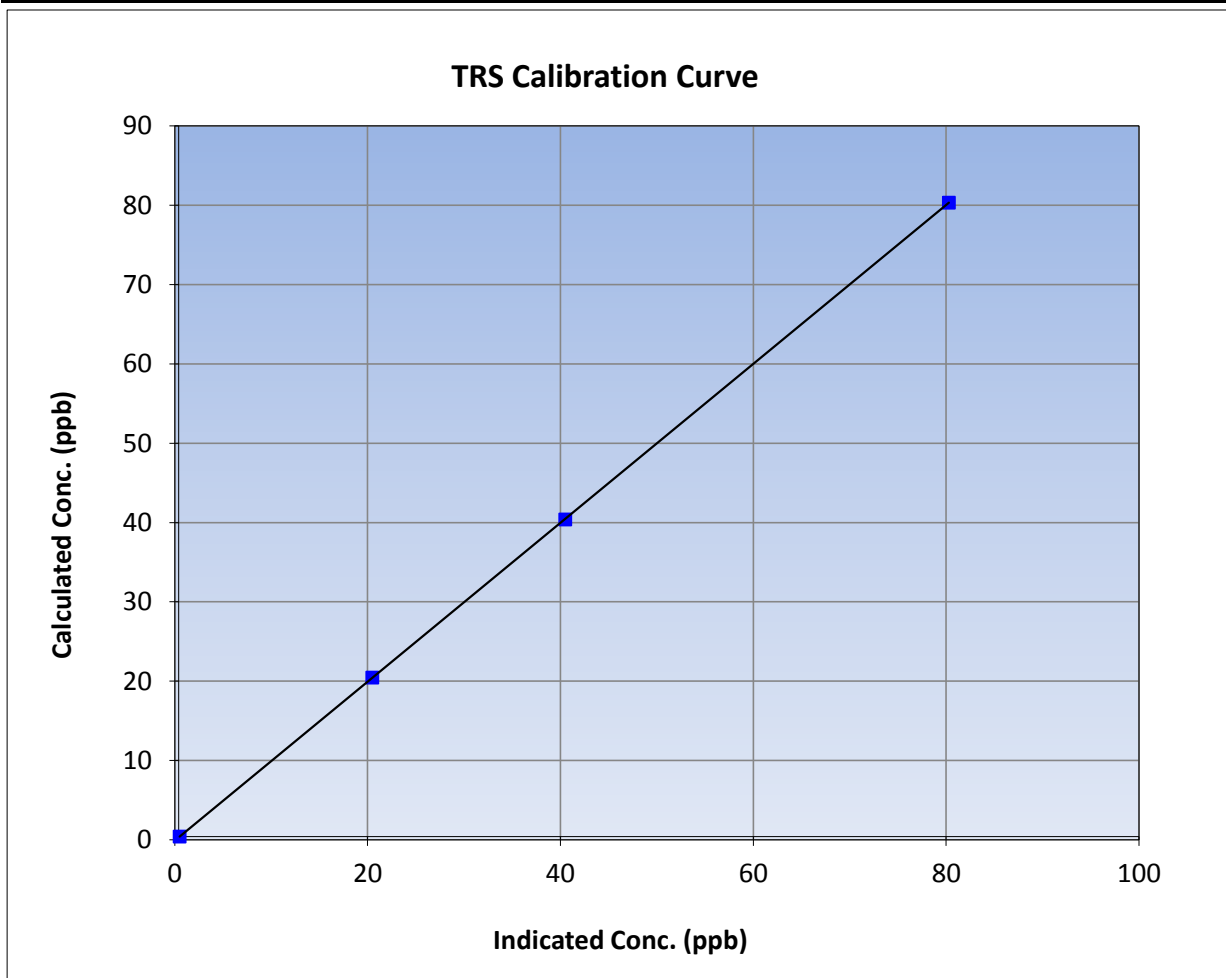
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	June 7, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	8:40	End Time (MST)	11:00
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1300156232

Calibration Data

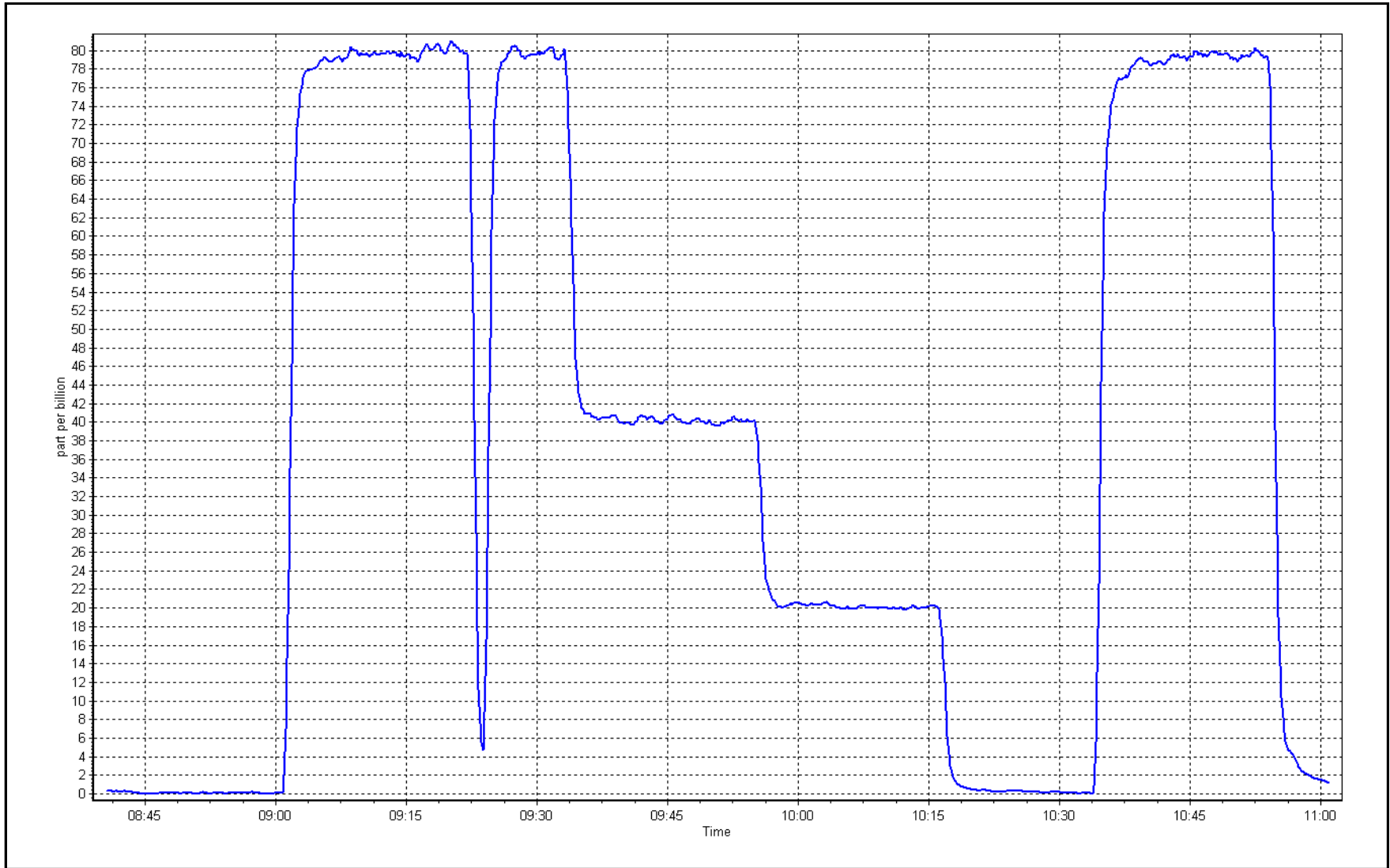
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999999	≥0.995
79.9	79.9	1.0006			
40.0	40.1	0.9974	Slope	1.001632	0.90 - 1.10
20.1	20.1	0.9976			
			Intercept	-0.109449	+/-3



TRS Calibration Plot

Date: July 5, 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:	July 10, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	9:50	End time (MST):	13:53
Reason:	Routine		

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	0.000203	0.000201	Flame Temp	405.0	405.0
CH4 Retention time	11.4	11.6	Carrier Pressure	33.4	33.4
NMHC SP Ratio	3.92E-05	3.89E-05	Fuel Pressure	48.0	47.9
NMHC Peak Area	220941	222859	Air Pressure	36.6	36.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.994376	0.998332
THC Cal Offset	0.010454	0.015534
CH4 Cal Slope	0.990210	0.996548
CH4 Cal Offset	0.024126	0.028821
NMHC Cal Slope	0.998427	1.000056
NMHC Cal Offset	-0.013262	-0.014535

Notes: Sample inlet filter replaced after as founds. Adjusted span. Replaced N2 cylinder during as left high 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	16.94	0.990
calibrator zero	5005	0.0	0.00	0.00	----
high point	4932	79.3	16.78	16.80	0.999
second point	4972	39.7	8.40	8.40	1.000
third point	4992	19.9	4.21	4.18	1.007
as left zero	5005	0.0	0.00	0.00	----
as left span	4931	79.3	16.78	16.75	1.002
Average Correction Factor					1.002
Corrected As found	16.94	Prev response	16.87	*% change	-0.5%

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	8.74	0.991
calibrator zero	5005	0	0.00	0.00	----
high point	4932	79.3	8.66	8.66	1.000
second point	4972	39.7	4.34	4.36	0.993
third point	4992	19.9	2.17	2.20	0.989
as left zero	5005	0	0.00	0.00	----
as left span	4931	79.3	8.66	8.63	1.004
Average Correction Factor					0.994
Corrected As found	8.74	Prev response	8.69	*% change	-0.6%

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	8.20	0.990
calibrator zero	5005	0.0	0.00	0.00	----
high point	4932	79.3	8.12	8.13	0.998
second point	4972	39.7	4.06	4.04	1.007
third point	4992	19.9	2.04	1.99	1.026
as left zero	5005	0.0	0.00	0.00	----
as left span	4931	79.3	8.12	8.12	1.000
Average Correction Factor					1.010
Corrected As found	8.20	Prev response	8.18	*% change	-0.3%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

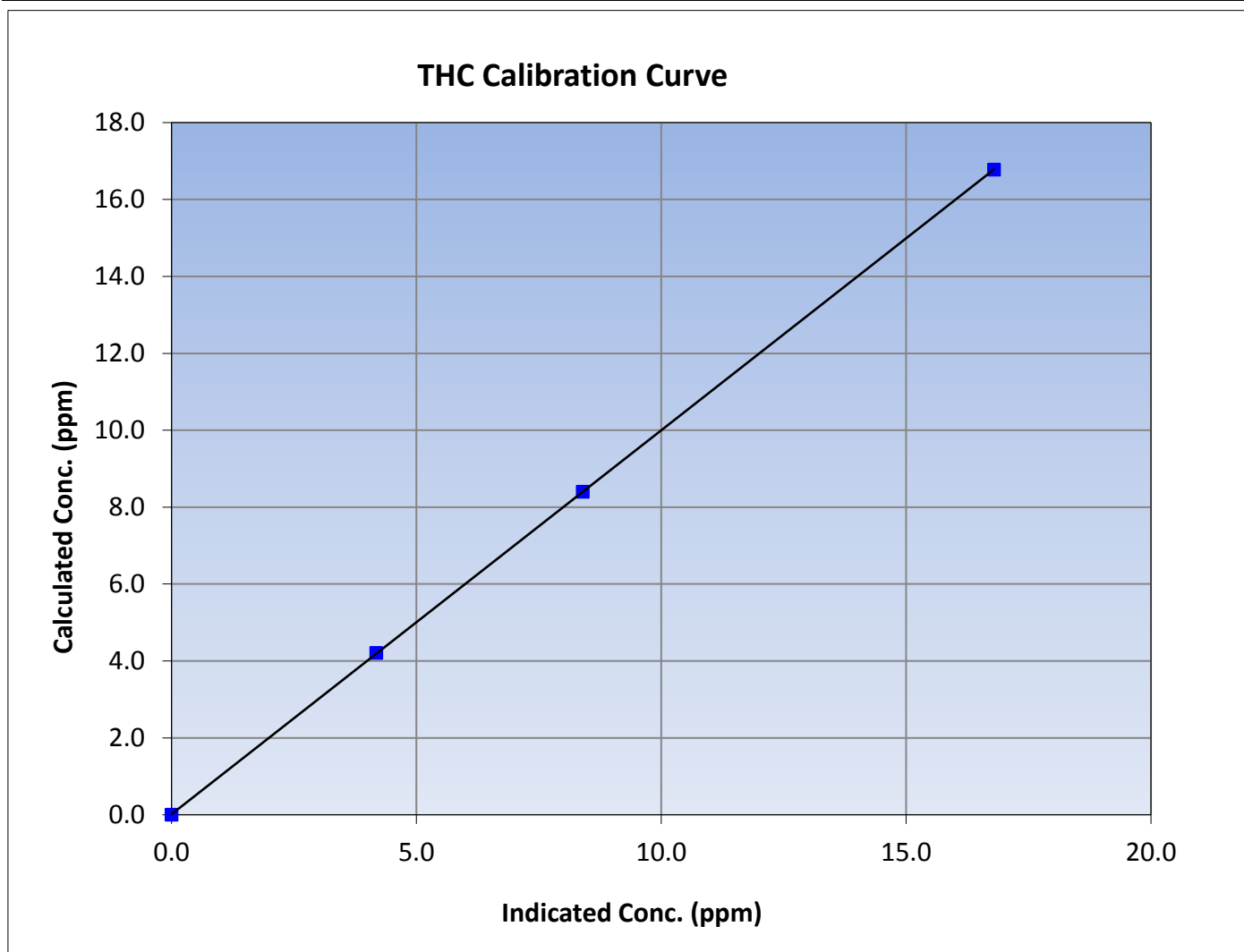
Version-02-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:50	End Time (MST)	13:53
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	16.80	0.9990						
8.40	8.40	1.0001				Slope	0.998332	0.90 - 1.10
4.21	4.18	1.0071						
			Intercept	0.015534	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

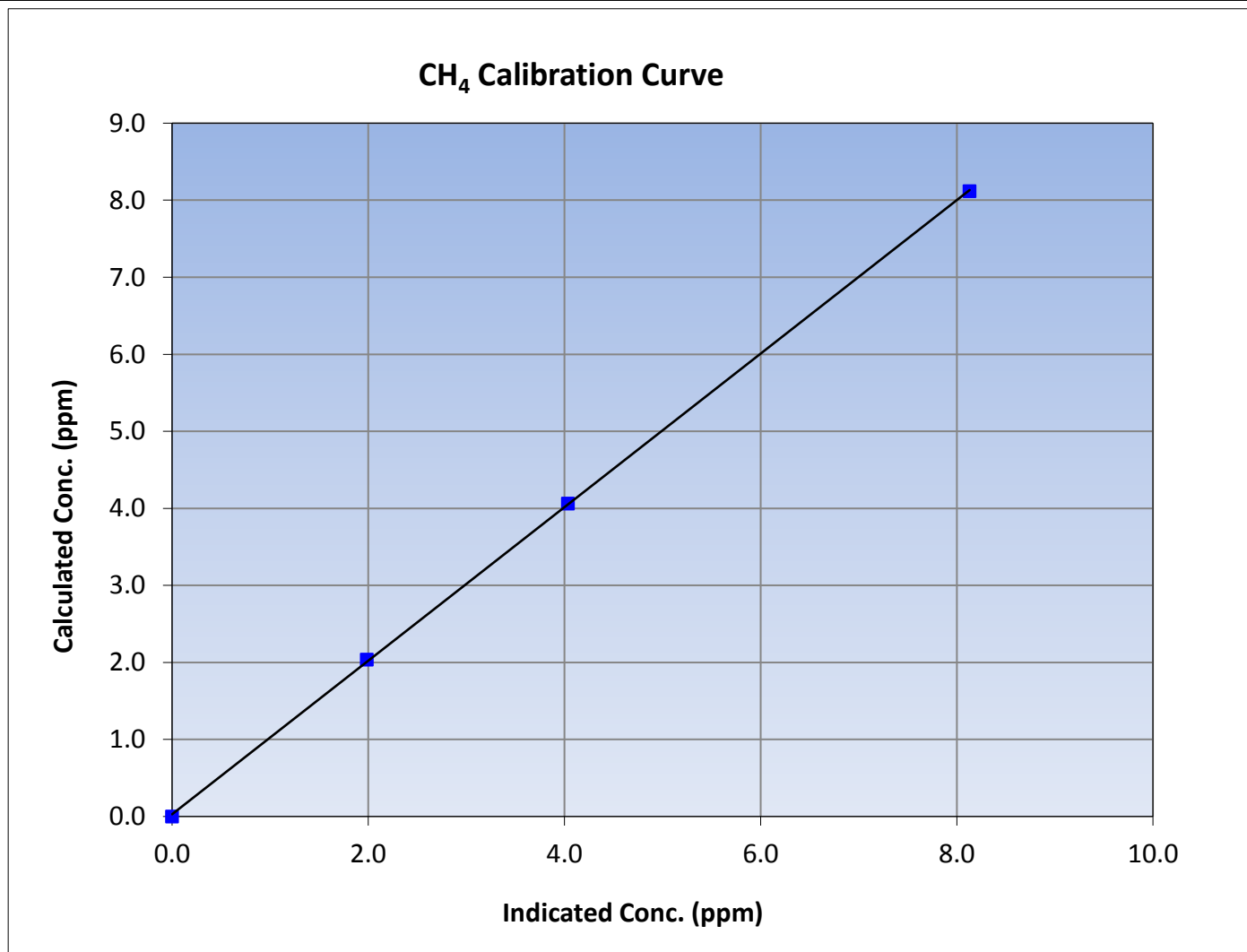
Version-02-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:50	End Time (MST)	13:53
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	0.999943	≥ 0.995			
8.12	8.13	0.9984						
4.06	4.04	1.0071				Slope	0.996548	0.90 - 1.10
2.04	1.99	1.0256						
			Intercept	0.028821	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

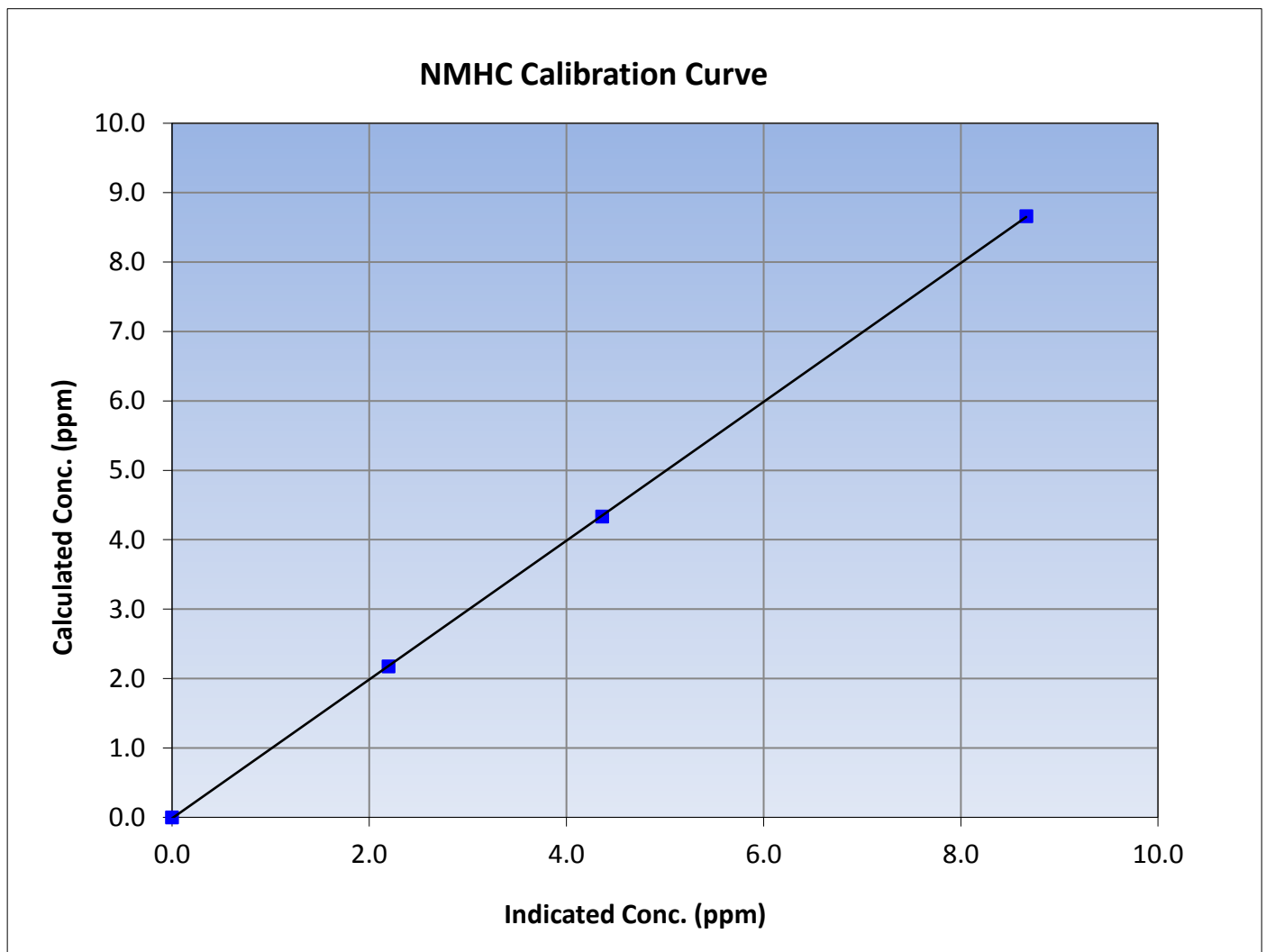
Version-02-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:50	End Time (MST)	13:53
Analyzer make	Thermo 55i	Analyzer serial #	1218153355

Calibration Data

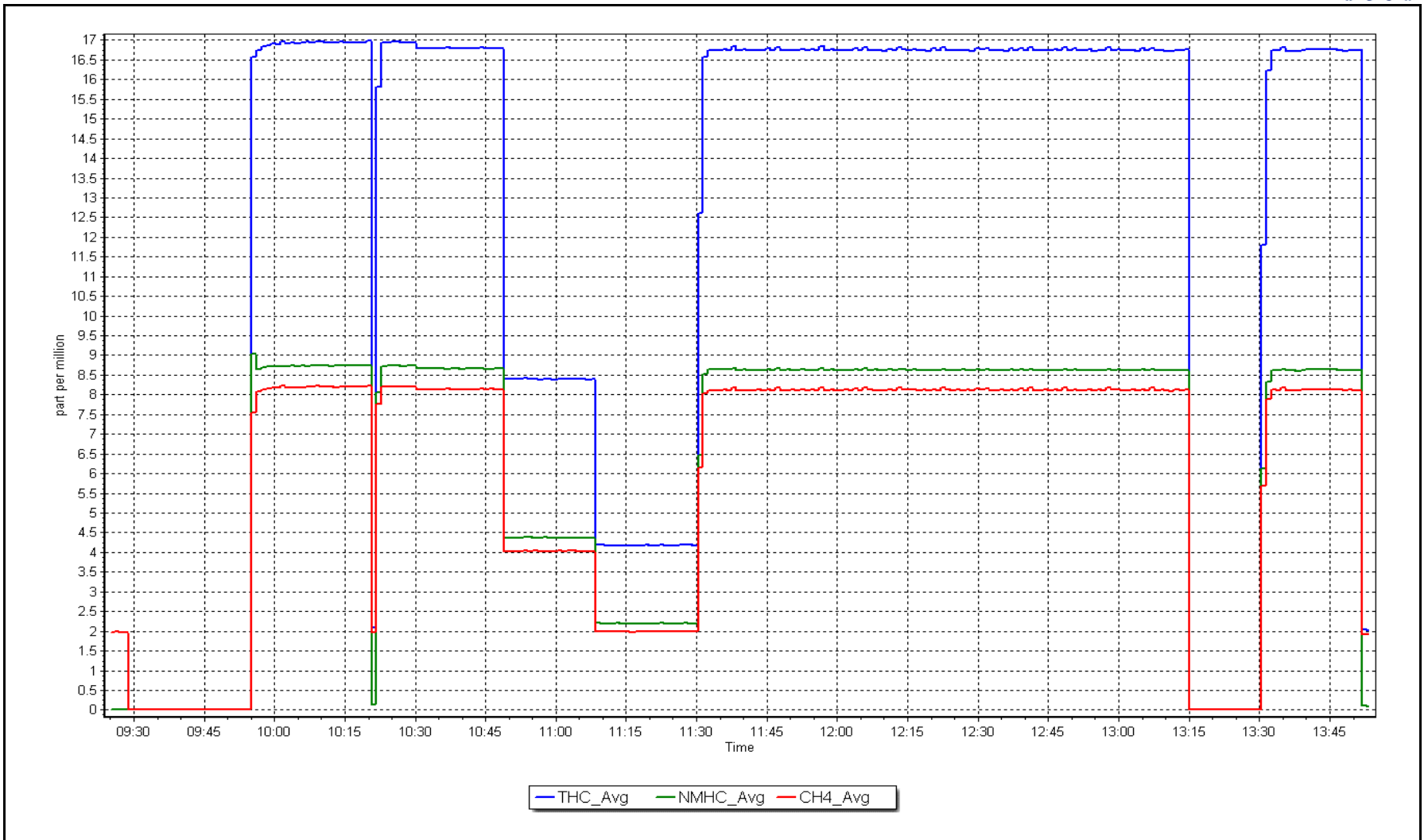
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999985	≥ 0.995
8.66	8.66	0.9995			
4.34	4.36	0.9934			
2.17	2.20	0.9890			
			Slope	1.000056	0.90 - 1.10
			Intercept	-0.014535	+/-0.5



NMHC Calibration Plot

Date: July 10, 2017

Location: Anzac





Wood Buffalo Environmental Association

O₃ Calibration Summary

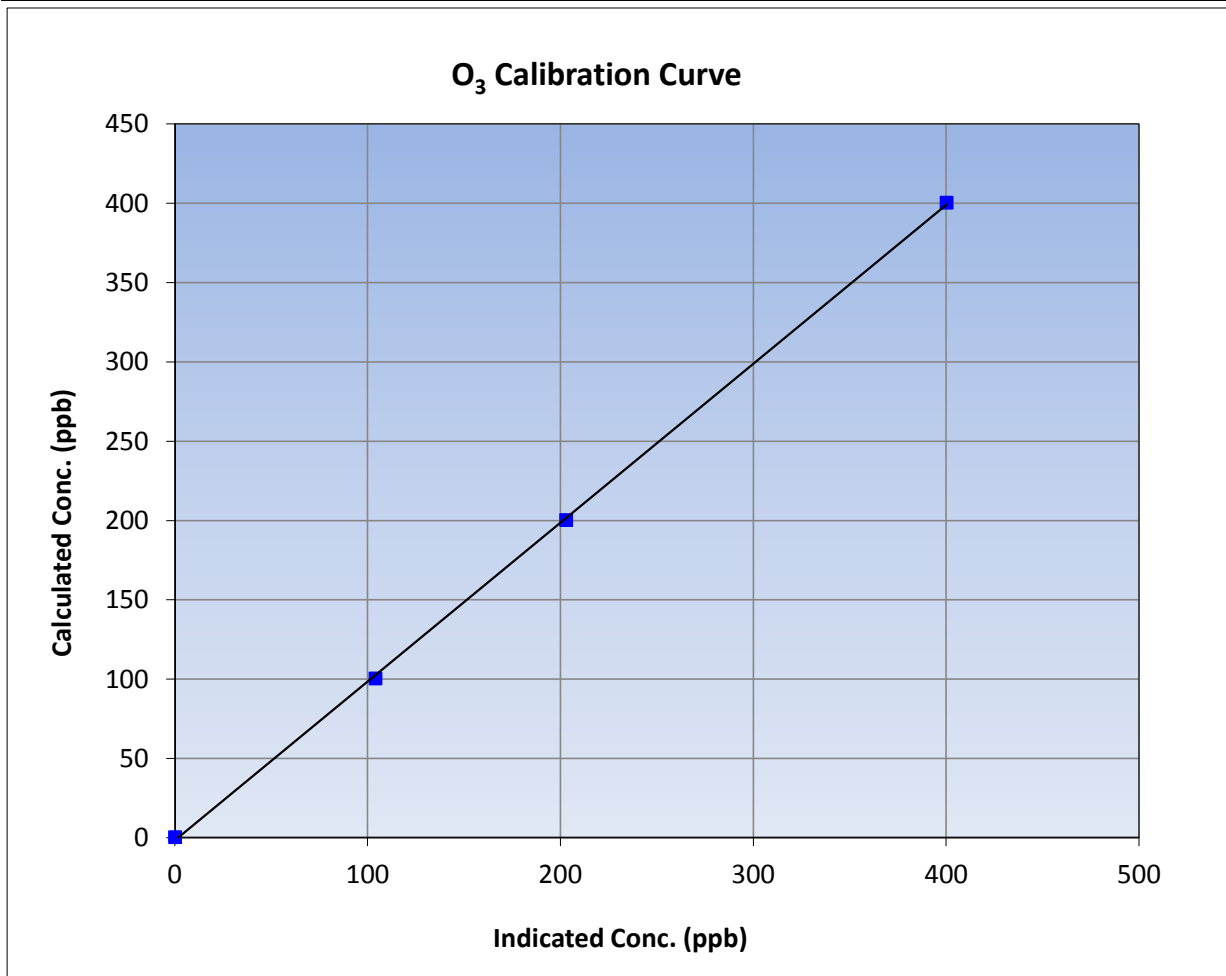
Version-03-2017

Station Information

Calibration Date	July 7, 2017	Previous Calibration	June 7, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:04	End Time (MST)	11:45
Analyzer make	Thermo 49i	Analyzer serial #	1426262595

Calibration Data

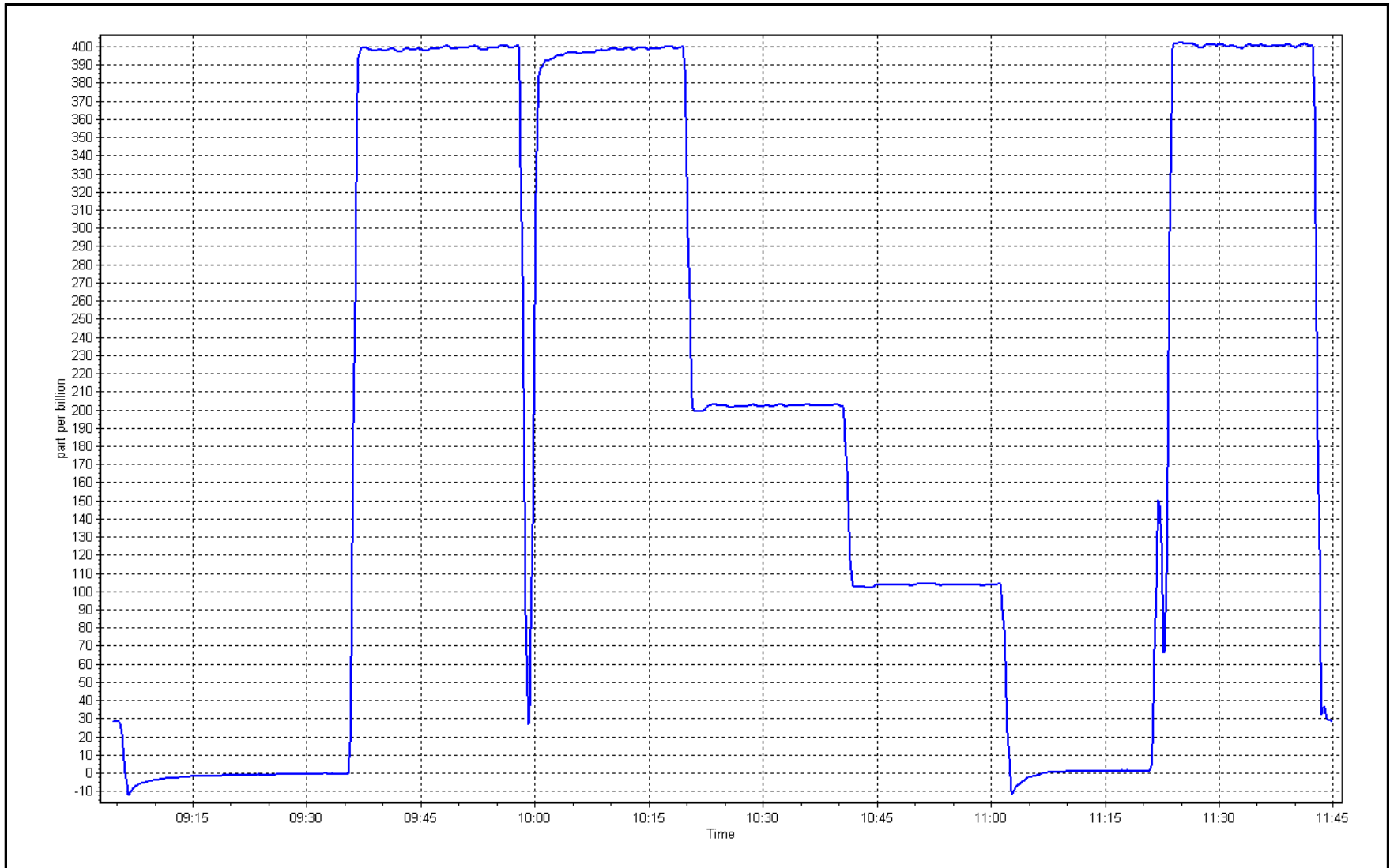
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.3	----	Correlation Coefficient	0.999868	≥0.995
400.0	399.9	1.0003			
200.0	202.6	0.9872	Slope	1.001958	0.90 - 1.10
100.0	103.7	0.9643			
			Intercept	-1.820576	+/- 10



O₃ Calibration Plot

Date: July 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:	July 10, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	9:25	End time (MST):	13:55
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	1.126	1.171	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.001	1.002	PMT Temperature	323.9	322.1
NO2 coefficient	1.000	1.000	Reaction cell Press	183.7	184.0
NO bkgrnd	4.2	4.4	Sample Flow	0.672	0.712
NOX bkgrnd	4.4	4.6	PMT Voltage	-808.1	-808.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.996492	0.992045
NO _x Cal Offset	-0.426698	-0.199896
NO Cal Slope	0.996520	0.992754
NO Cal Offset	-0.287064	-0.201751
NO ₂ Cal Slope	0.997293	1.000786
NO ₂ Cal Offset	-1.291262	0.138948



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	0.1	0.1	0.0	----	----
as found span	4932	79.3	799.1	799.1	0.0	764.0	763.0	1.0	1.0460	1.0473
calibrator zero	5005	0.0	0.0	0.0	0.0	0.1	0.1	0.0	----	----
high point	4932	79.3	799.1	799.1	0.0	804.9	804.4	0.5	0.9928	0.9934
second point	4972	39.7	400.0	400.0	0.0	405.8	405.3	0.4	0.9858	0.9870
third point	4992	19.9	200.5	200.5	0.0	200.9	200.9	0.0	0.9981	0.9981
as left zero	5005	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
as left span	4931	79.3	799.3	414.5	384.8	832.4	423.6	408.8	0.9602	0.9785
Average Correction Factor									0.9922	0.9928

Corrected As found NO_x = 763.9 ppb NO = 762.9 ppb *Percent Change NO_x = 5.0%
 Previous Response NO_x = 802.4 ppb NO = 802.2 ppb *Percent Change NO = 5.2%
 * = > +/-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	809.2	808.5	0.7	0.9875	0.9884	----	----
1st NO2 (400 ppb O3)	414.5	394.0	808.4	414.5	393.9	0.9885	----	1.0003	100.0%
2nd NO2 (200 ppb O3)	609.2	199.3	807.4	609.2	198.1	0.9897	----	1.0061	99.4%
3rd NO2 (100 ppb O3)	707.9	100.6	808.0	707.9	100.8	0.9890	----	0.9980	100.2%
2nd NO ref point	----	0.0	809.2	808.5	0.7	0.9875	0.9884	----	----
Average Correction Factor						0.9887	0.9884	1.0014	99.9%

Notes: Noticed that chamber pressure had increased from last month and is likely the reason for 5% change. Will do preventative maintenance during next routine calibration. Sample inlet filter replaced after as founds. Adjusted span. Used 2nd NO high point for GPT reference.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

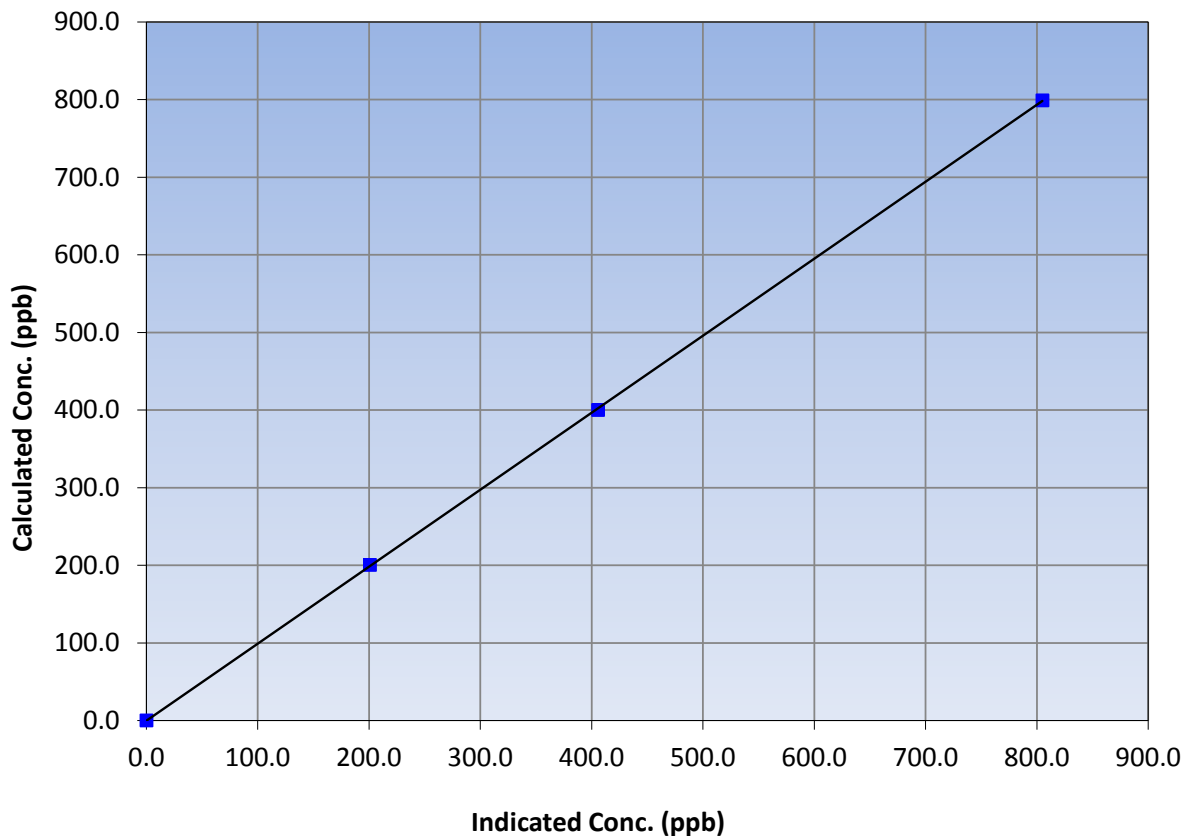
Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:25	End Time (MST)	13:55
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	0.1	----	Correlation Coefficient	≥0.995	
799.1	804.9	0.9928			
400.0	405.8	0.9858			
200.5	200.9	0.9981			
			Slope	0.992045	0.90 - 1.10
			Intercept	-0.199896	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

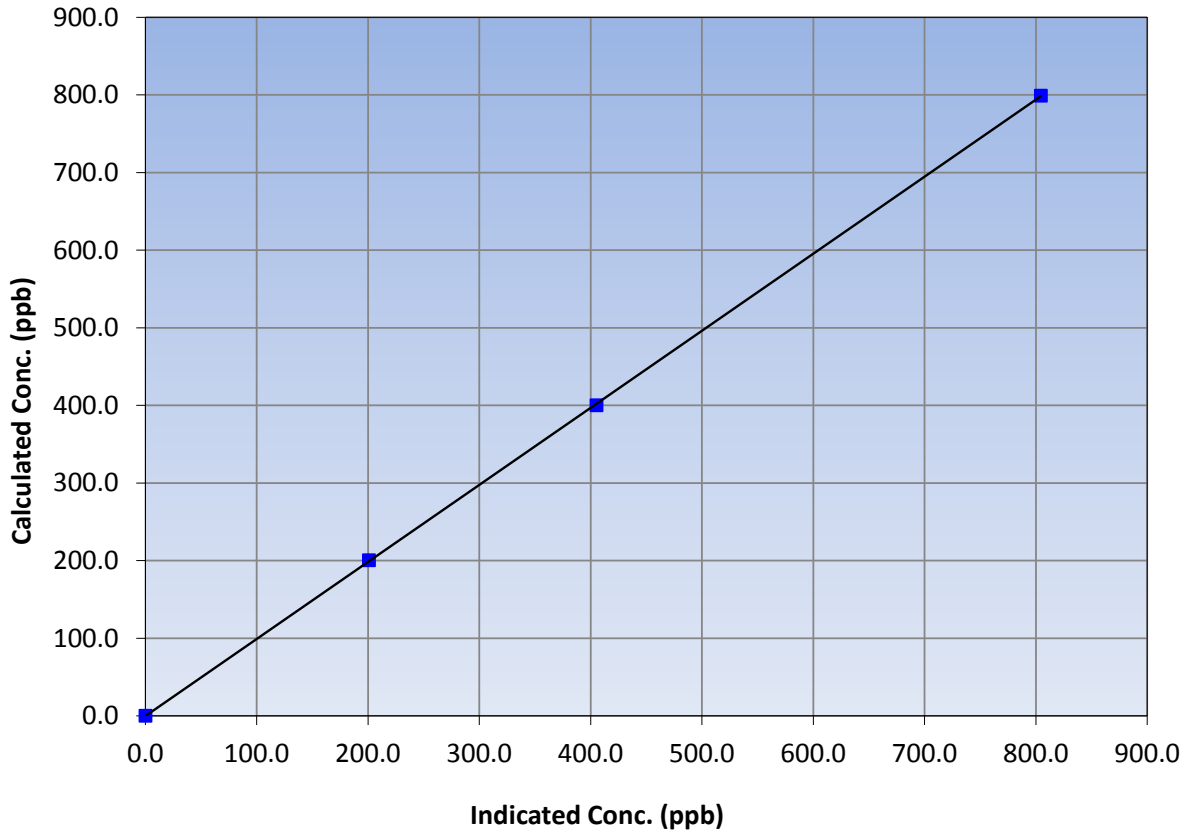
Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:25	End Time (MST)	13:55
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	0.1	----	Correlation Coefficient	≥0.995	
799.1	804.4	0.9934			
400.0	405.3	0.9870			
200.5	200.9	0.9981			
			Slope	0.992754	0.90 - 1.10
			Intercept	-0.201751	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

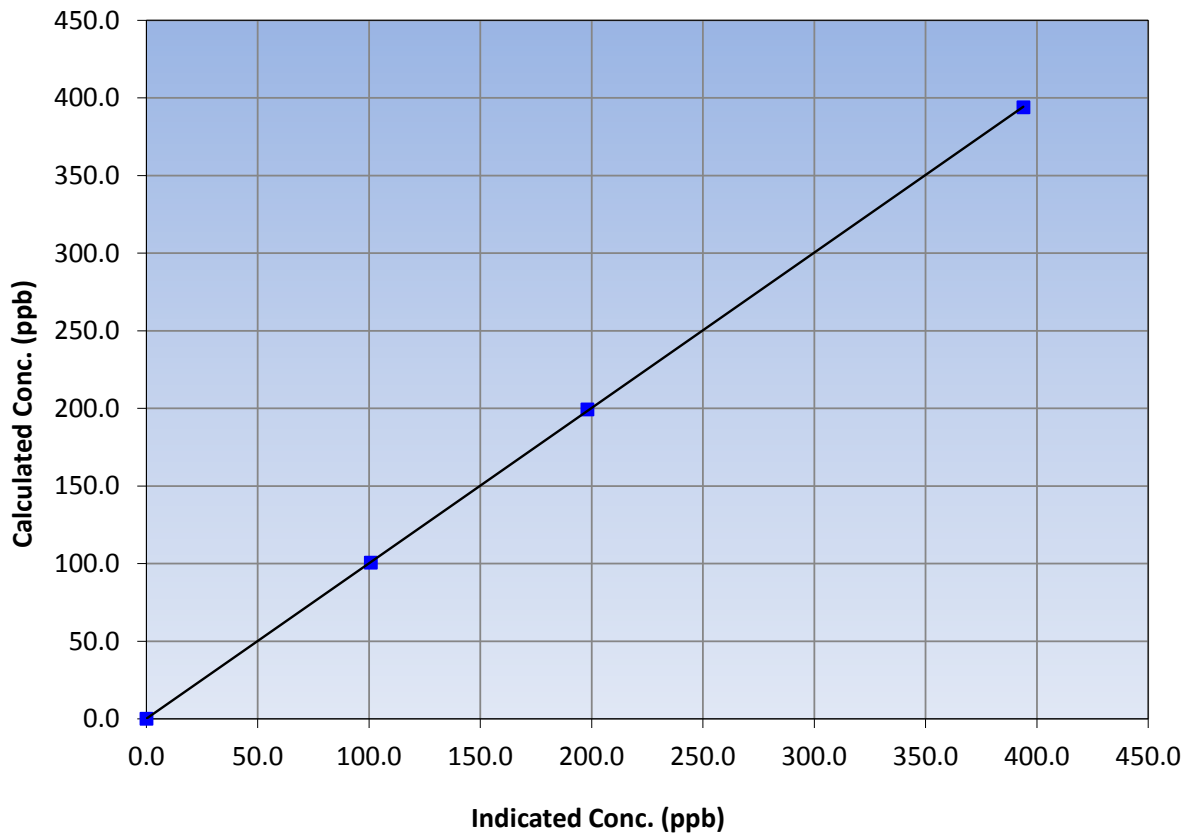
Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 2, 2017
Station Name	Anzac	Station Number	AMS 14
Start Time (MST)	9:25	End Time (MST)	13:55
Analyzer make	Thermo 42i	Analyzer serial #	1426262592

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	
394.0	393.9	1.0003			
199.3	198.1	1.0061			
100.6	100.8	0.9980			
			Slope	1.000786	0.90 - 1.10
			Intercept	0.138948	+/-20

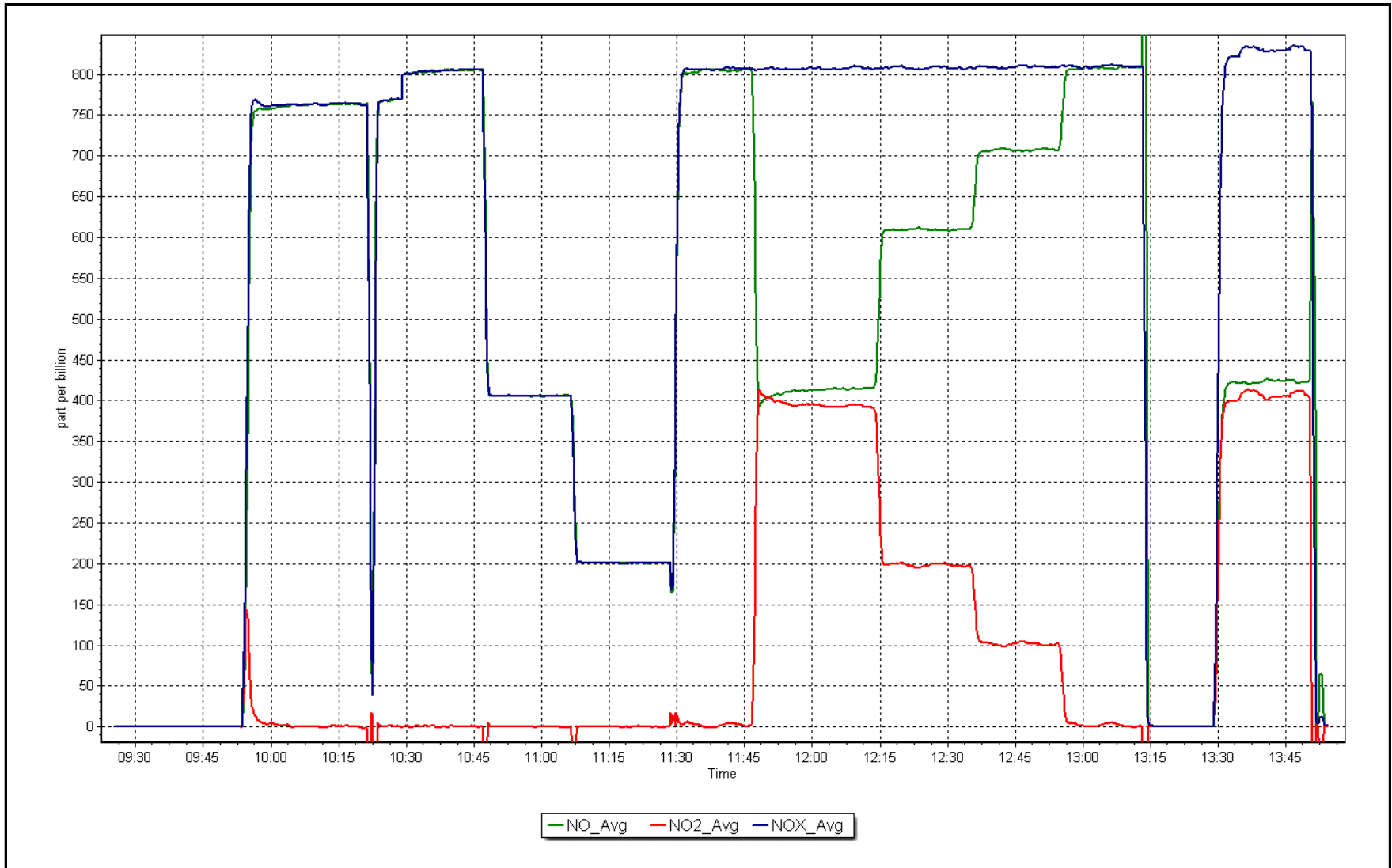
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 10, 2017

Location: Anzac





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Anzac	Station number:	AMS 14
Calibration Date:	July 25, 2017	Last Cal Date:	June 7, 2017
Start time (MST):	9:20	End time (MST):	10:07
Sharp Model:	5030	S/N:	E1093
Particulate Fraction:	PM2.5	C14 Source S/N:	4933
Flow Meter Make/Model:	Delta cal	S/N:	1019
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)	20	22.2	21	<input checked="" type="checkbox"/>	+/- 2 °C
P3 (hPa)	955	953.9	955	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1000	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.3	-----	0.3	<input 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:	<u>June 7, 2017</u>	Last Cal Date:	<u>April 5, 2017</u>
	Flow w/o adaptor:	<u>16.8</u>	Flow w/ adaptor:	<u>16.67</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: <u>2520</u>	Foil S/N: <u>2520</u>	
Foil Calibration	Foil Mass: <u>1278</u>	Foil Mass: <u>1278</u>	
	Calibration Date: <u>June 7, 2017</u>	Calibration Date: <u>October 10, 2016</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>7140</u>	Correction Factor: <u>7068</u>	1.02%

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. Adjusted T1 only.

Calibration by: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 15
HORIZON
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 JULY 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	705	38	39	99.87	17	0	3	0
TRS (ppb) Average	706	35	38	99.6	2	0	1	0
THC (ppm) Average	705	38	39	99.87	4.8	-	2.7	-
NO2 (ppb) Average	705	38	39	99.87	27	0	8	-
NO (ppb) Average	705	38	39	99.87	61	-	11	-
NOX (ppb) Average	705	38	39	99.87	87	-	19	-
PM2.5 (ug/m3) Average	741	1	3	99.73	36.8	-	16.9	0
Temperature 2 m (C) Average	742	0	2	99.73	32.4	-	24	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	28	-	18	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-
Precipitation (mm) Total	742	0	2	99.73	17	-	21.8	-
Relative Humidity (%) Average	742	0	2	99.73	99	-	75	-
Global Solar Radiation (W/m2) Average	742	0	2	99.73	914	-	354	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 JULY 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	705	0.7	1	-	0	0	0	0	1	1	17
TRS (ppb) Average	706	0.3	0	-	0	0	0	0	0	0	2
THC (ppm) Average	705	2.19	0.3	-	1.9	2	2	2.1	2.2	2.5	4.8
NO2 (ppb) Average	705	2.8	4	-	0	0	0	1	3	8	27
NO (ppb) Average	705	1.3	5	-	0	0	0	0	0	3	61
NOX (ppb) Average	705	4.1	8	-	0	0	0	1	3	12	87
PM2.5 (ug/m3) Average	741	8.09	6	-	1.3	2.4	3.9	6.5	10.5	16.1	36.8
Temperature 2 m (C) Average	742	19.3	5.4	-	6.5	12.5	15.1	18.9	23.2	26.8	32.4
Wind Speed 10 m (km/h) Average	742	9.6	5	-	0	4	6	9	12	17	28
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	742	-	-	72.14	-	-	-	-	-	-	-
Relative Humidity (%) Average	742	62.8	20	-	25	35	47	63	78	92	99
Global Solar Radiation (W/m2) Average	742	250.8	273	-	0	0	1	146	443	700	914

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -HORIZON (AMS 15)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NOX, SO2, THC	28 Jul 2017 08:00	28 Jul 2017 08:00	1	Maintenance - reinitiated daily QA check
ALL METEOROLOGICAL PARAMETERS	13 Jul 2017 10:00	13 Jul 2017 11:00	2	Maintenance on data acquisition system
PM2.5	13 Jul 2017 10:00	13 Jul 2017 11:00	2	Maintenance on data acquisition system
TRS	13 Jul 2017 10:00	13 Jul 2017 12:00	3	Maintenance on data acquisition system



Summary of Hour Averages

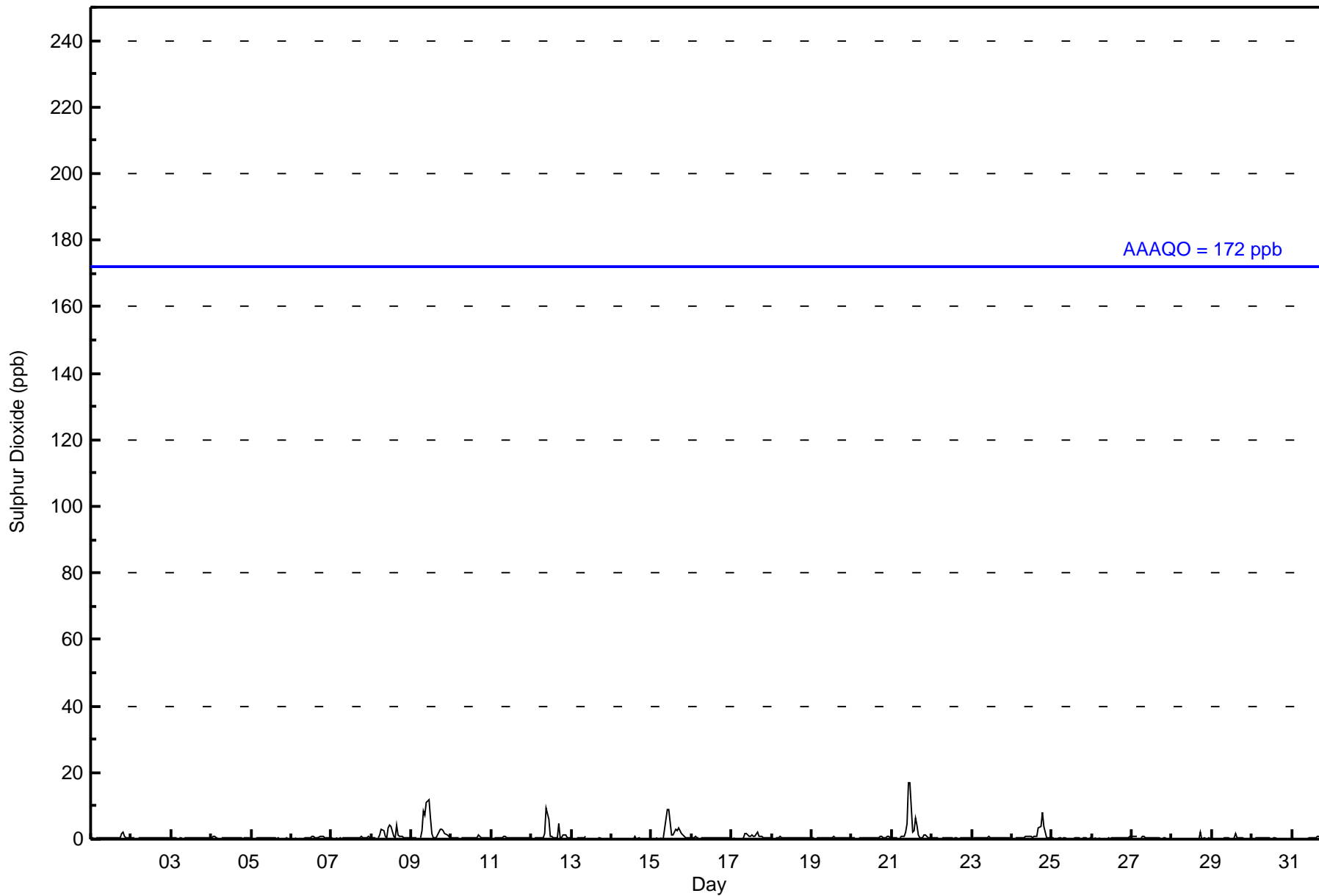
Horizon - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 ppb on Jul 21 11:00 Maximum Daily Average: 2.9 ppb on Jul 9																	Hours in Service: 744 Hours of Data: 705									
Minimum Value: 0 ppb on Jul 13 23:00 Minimum Daily Average: 0.1 ppb on Jul 14 Maximum Diurnal Average: 1.9 ppb at hour 11 Minimum Diurnal Average: 0.3 ppb at hour 5 Monthly Average: 0.7 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P ₉₉ = 9																	Hours of Missing Data: 39 Hours of Calibration: 38 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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	1	0.5	2
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0.4	1
3-Jul	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-Jul	0	1	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
5-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	0.4	1
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0.3	1
8-Jul	1	0	0	Z	0	1	3	2	1	1	3	4	4	1	0	4	1	1	1	1	0	0	0	0	1.4	4
9-Jul	0	0	0	0	Z	0	2	8	7	11	12	6	2	0	0	1	2	3	3	3	2	1	1	0	2.9	12
10-Jul	0	1	0	0	0	Z	0	0	0	0	0	0	1	0	0	1	1	1	1	0	0	1	0	0	0.5	1
11-Jul	Z	0	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	1	0.4	1
12-Jul	0	Z	0	0	0	0	0	0	2	9	6	1	1	1	0	0	5	1	1	1	1	0	0	0	1.4	9
13-Jul	0	0	Z	0	0	0	0	0	0	1	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	1
14-Jul	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
15-Jul	0	0	0	0	Z	0	0	0	3	9	9	5	1	1	3	3	3	2	2	1	0	0	0	1	2.0	9
16-Jul	0	1	1	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
17-Jul	Z	0	0	0	0	0	0	0	2	2	1	1	1	1	1	2	1	1	1	0	0	0	0	0	0.7	2
18-Jul	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	0	0.5	1
19-Jul	0	0	Z	0	0	0	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1
20-Jul	0	0	1	Z	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0.6	1
21-Jul	0	1	1	1	Z	0	1	1	2	4	17	17	2	3	7	4	1	0	0	1	1	1	1	0	2.9	17
22-Jul	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
23-Jul	Z	0	0	0	0	1	0	1	0	0	1	1	0	0	0	1	1	1	1	0	0	1	0	0	0.5	1
24-Jul	0	Z	0	0	1	0	1	1	1	1	1	1	1	1	1	4	4	8	4	2	1	0	0	0	1.4	8
25-Jul	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-Jul	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
27-Jul	1	1	1	1	Z	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
28-Jul	0	0	0	0	0	Z	0	M	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.2	2
29-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0.3	2
30-Jul	0	Z	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
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	1	1	0	0	0.4	2
																								0.3	1	
																								0.3	1	
																								0.4	1	
																								0.3	1	
																								0.3	1	
																								0.4	1	
																								0.5	3	
																								0.7	8	
																								0.8	7	
																								1.5	11	
																								1.9	17	
																								1.4	17	
																								0.7	4	
																								0.5	3	
																								0.7	7	
																								0.8	4	
																								0.9	5	
																								0.7	4	
																								0.8	8	
																								0.7	4	
																								0.5	2	
																								0.4	1	
																								0.4	1	
																								0.3	1	
																								Diurnal Average		
																								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
Horizon - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Horizon - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	701	99.43	99.43
11 - 20	4	0.57	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: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Horizon - July 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	12	71	26	11	14	11	10	16	49	136	105	92	33	66	22	27	701
11 - 20	0	0	0	0	0	3	0	0	1	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	12	71	26	11	14	14	10	16	50	136	105	92	33	66	22	27	705

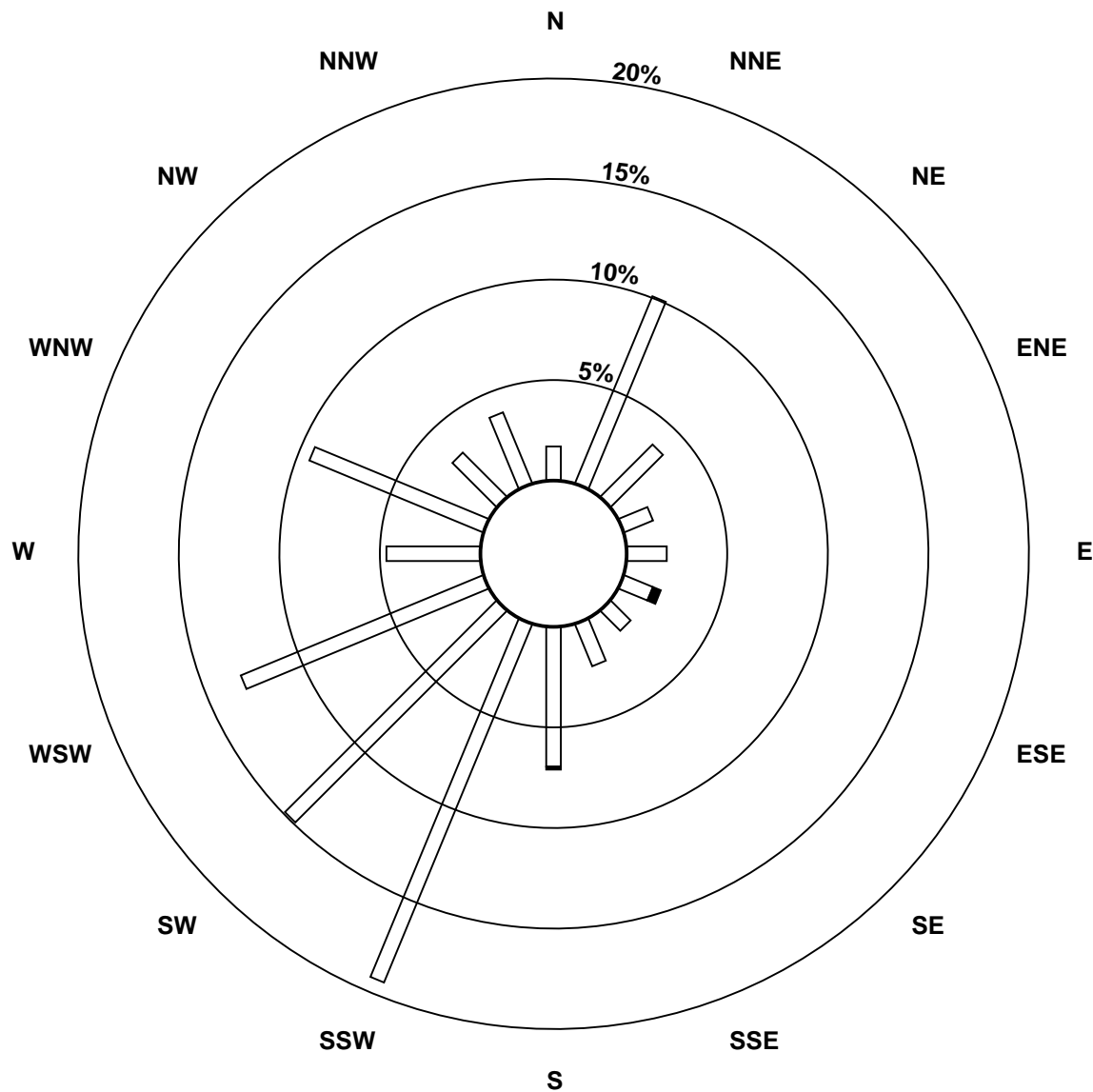
Total Number of Valid Hours: 705

Total Number of Hours: 744

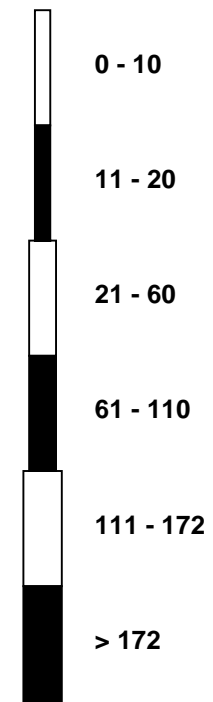


Wood Buffalo Environmental Association
Wind Rose Jul 2017

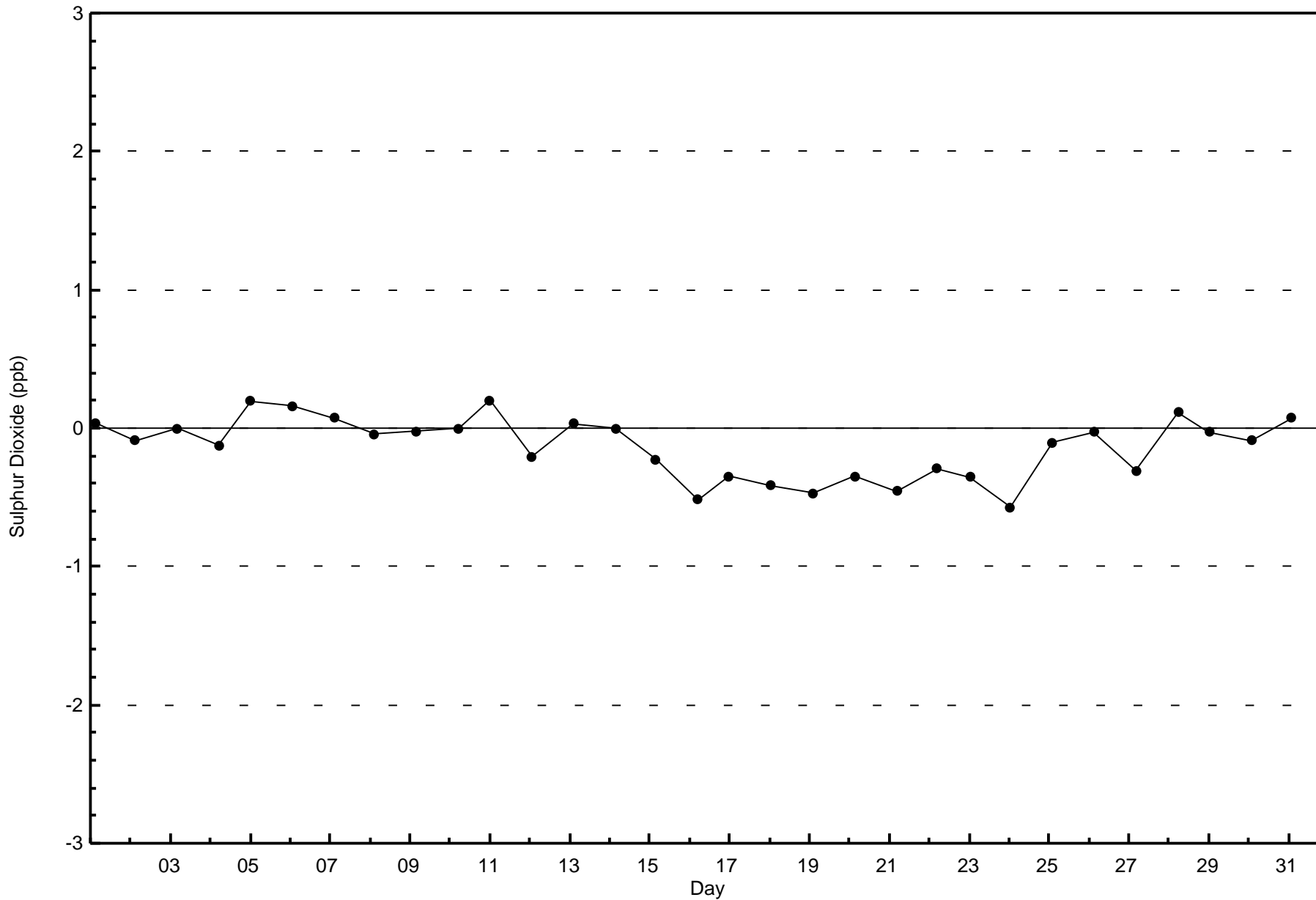
Sulphur Dioxide (SO₂) - ppb
Horizon (AMS 15)

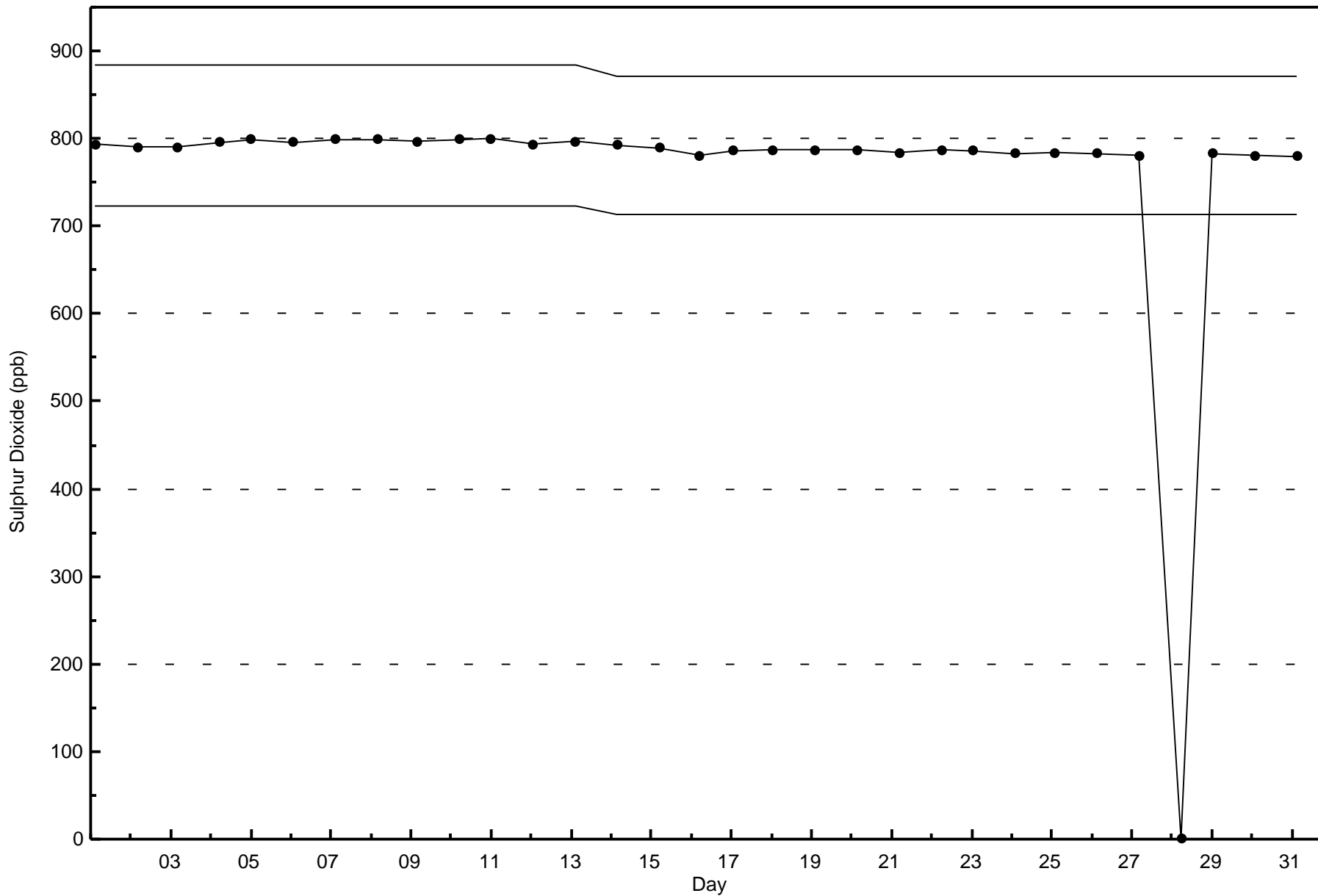


Classes (ppb)



Total Number of Valid Hours: 705







Summary of Hour Averages

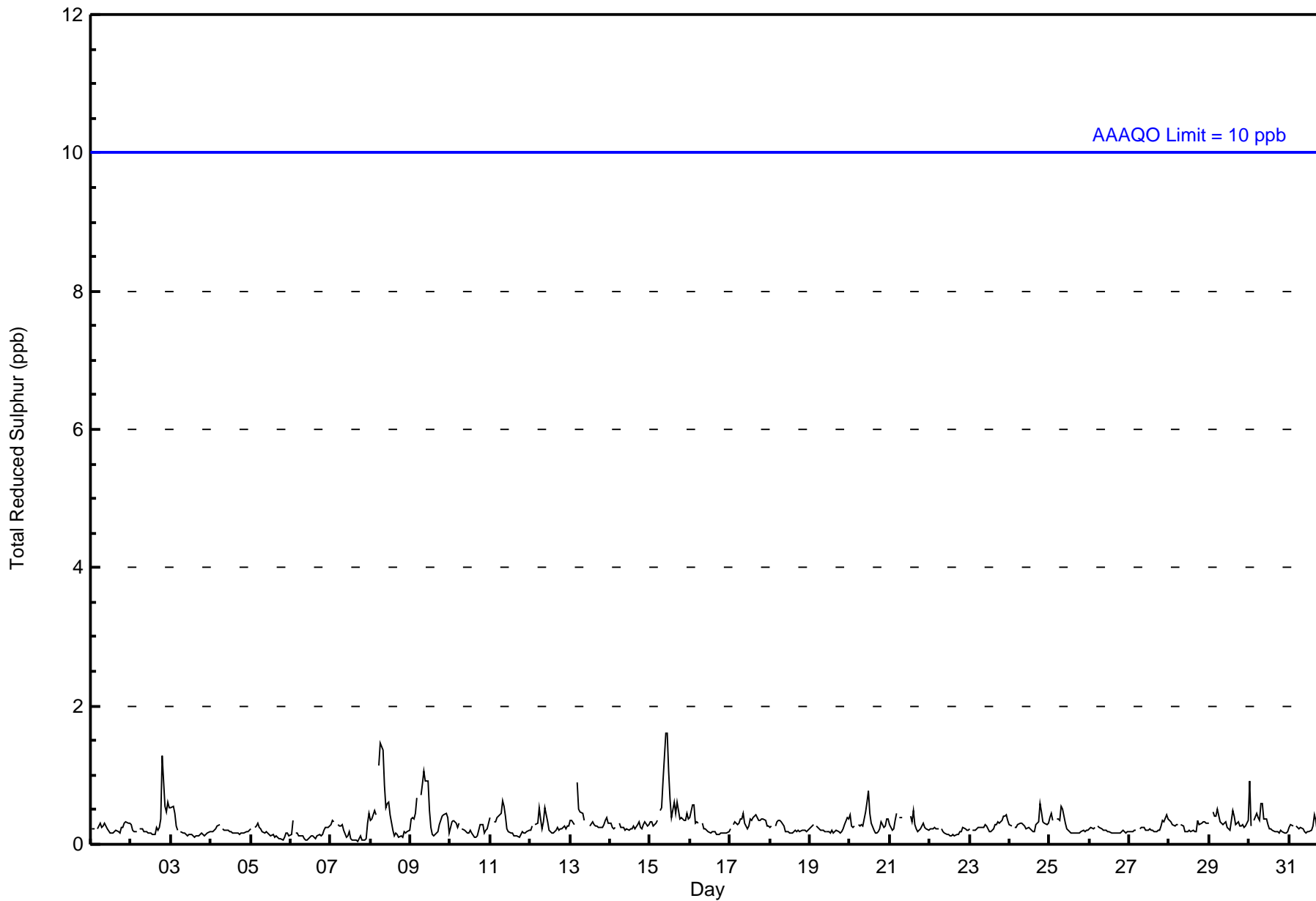
Horizon - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 15 11:00 Maximum Daily Average: 0.6 ppb on Jul 15																	Hours in Service: 744 Hours of Data: 706									
Minimum Value: 0 ppb on Jul 7 17:00 Minimum Daily Average: 0.1 ppb on Jul 6 Maximum Diurnal Average: 0.4 ppb at hour 7 Minimum Diurnal Average: 0.2 ppb at hour 14 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																	Hours of Missing Data: 38 Hours of Calibration: 35 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-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0.3	1
3-Jul	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
4-Jul	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-Jul	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-Jul	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
7-Jul	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-Jul	0	0	0	0	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
9-Jul	0	0	0	0	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1
10-Jul	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-Jul	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Jul	0	0	Z	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
13-Jul	0	0	0	Z	1	1	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jul	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-Jul	0	0	0	0	0	Z	0	1	1	2	2	1	1	0	1	0	1	0	0	0	0	0	0	0	0.6	2
16-Jul	0	1	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
17-Jul	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-Jul	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-Jul	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
20-Jul	0	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Jul	0	0	0	0	0	Z	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
22-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.3	1
25-Jul	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
26-Jul	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-Jul	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-Jul	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-Jul	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jul	1	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
31-Jul	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
0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.4 0.3 0.3 0.3 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																								Diurnal Average		
1 1 1 0 1 1 1 1 1 1 2 2 1 1 0 1 0 1 0 1 1 1 0 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
Horizon - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	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: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - July 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	11	75	27	11	14	11	10	18	51	137	103	91	32	66	21	28	706
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	11	75	27	11	14	11	10	18	51	137	103	91	32	66	21	28	706

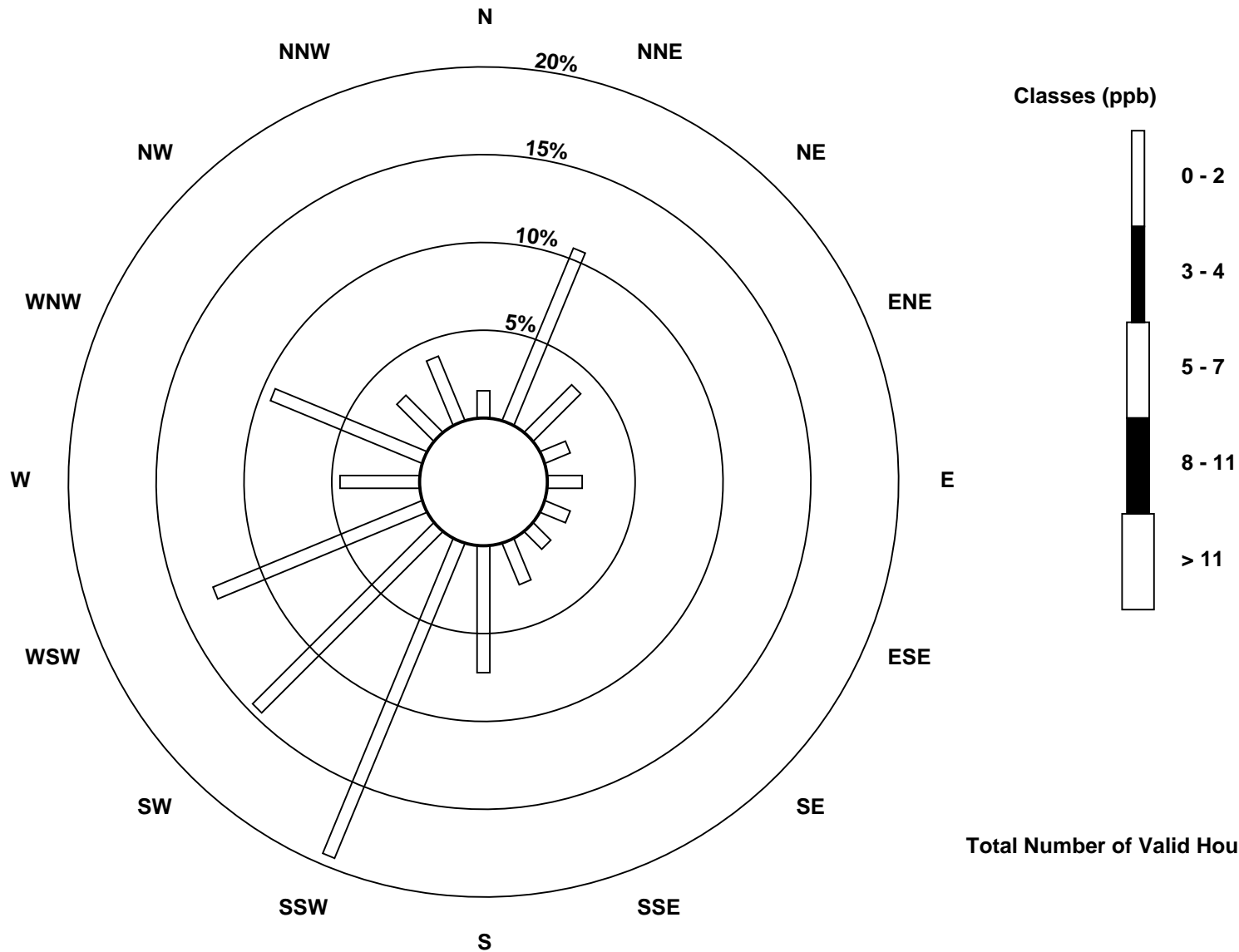
Total Number of Valid Hours: 706

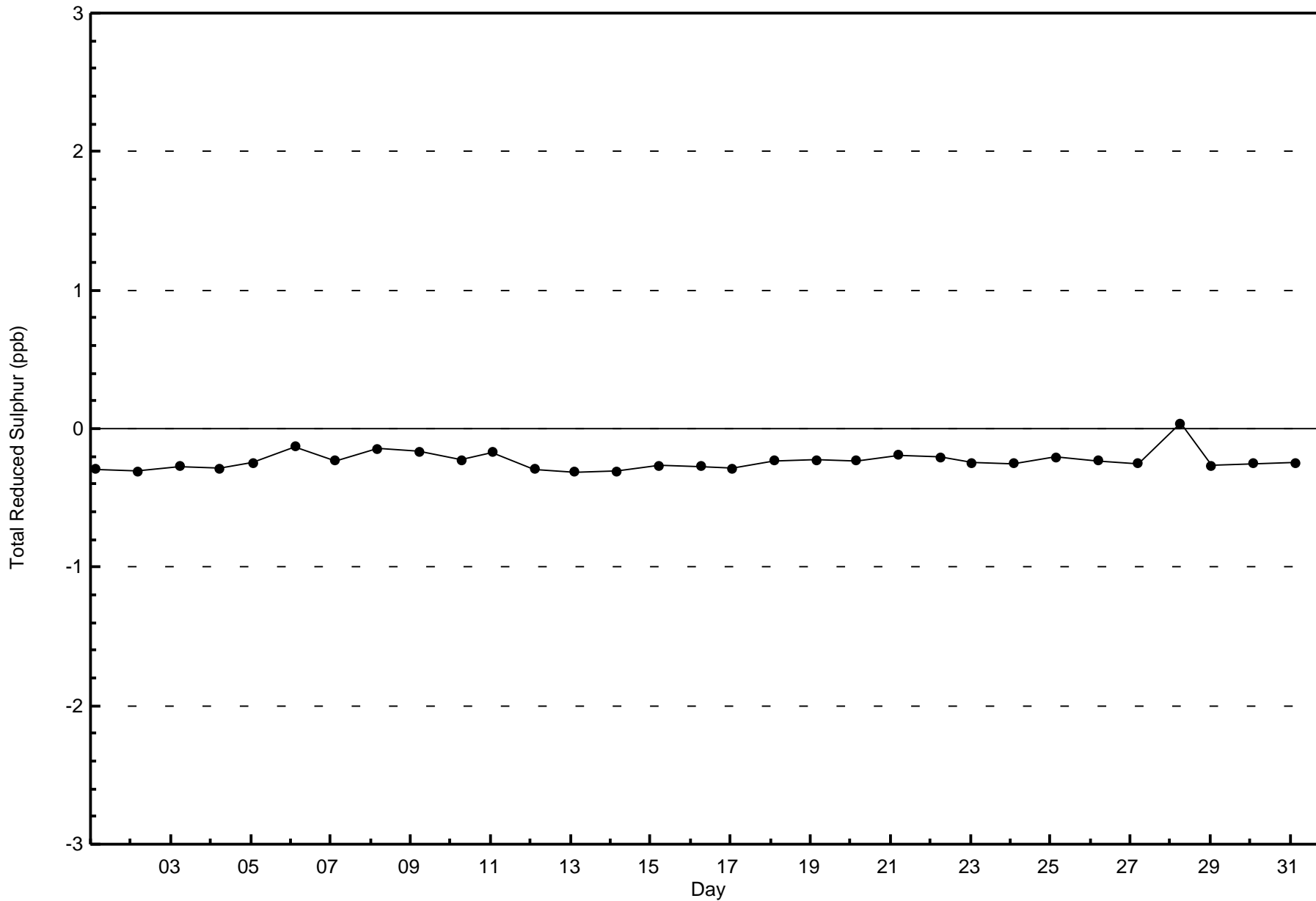
Total Number of Hours: 744

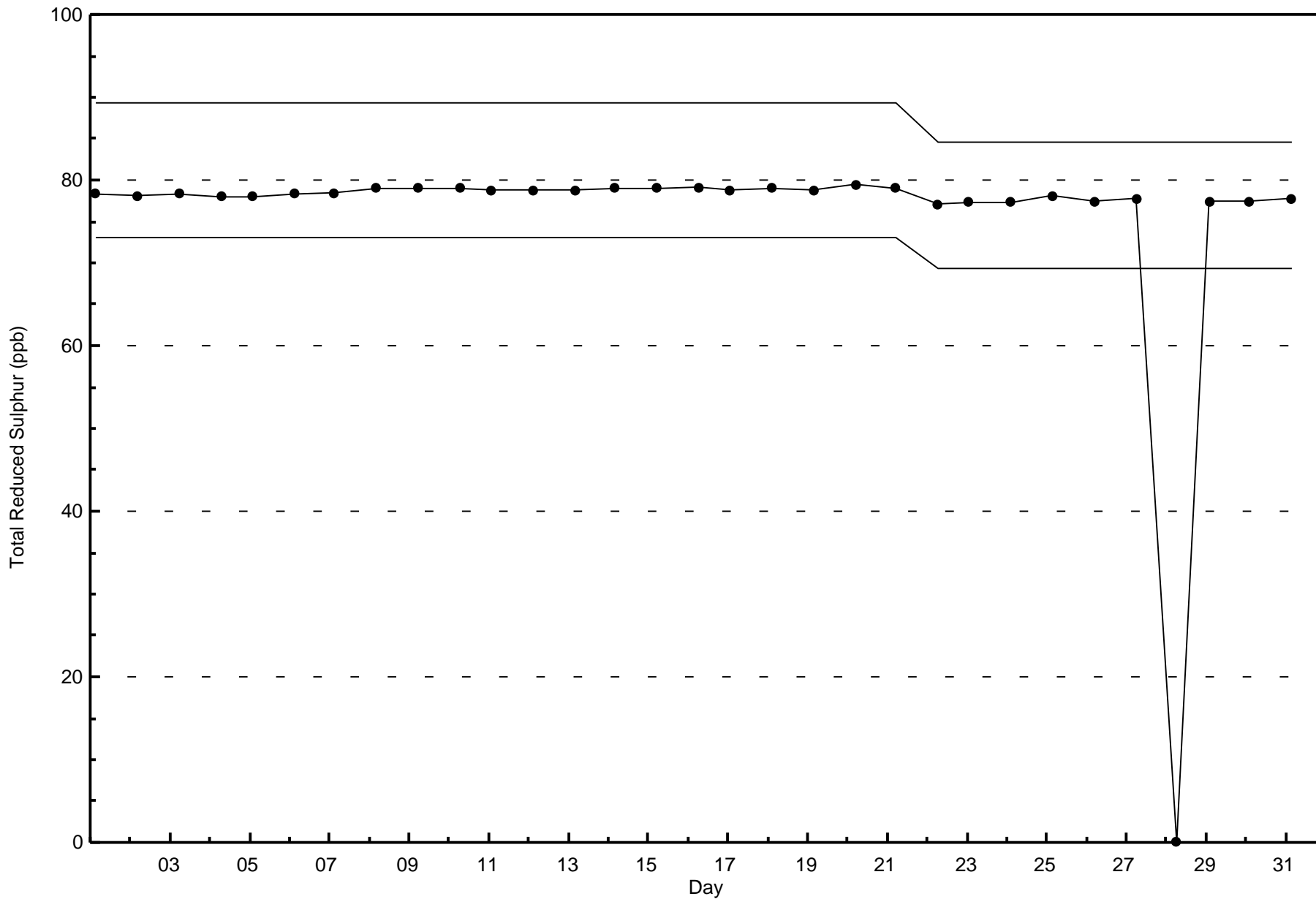


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Horizon (AMS 15)

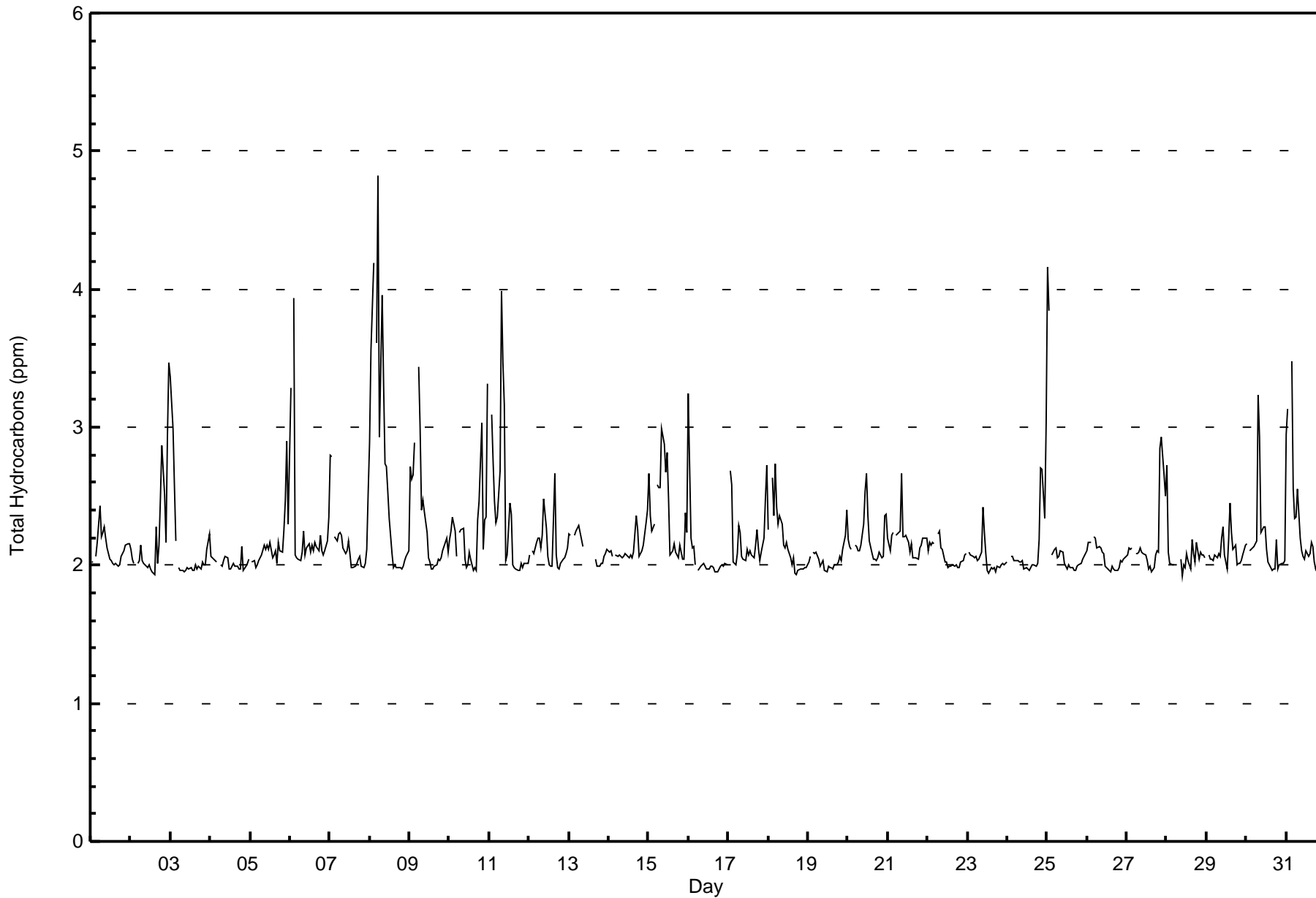








Maximum Value: 4.8 ppm on Jul 8 06:00																	Maximum Daily Average: 2.7 ppm on Jul 8										Hours in Service: 744	
Minimum Value: 1.9 ppm on Jul 28 10:00																	Minimum Daily Average: 2.0 ppm on Jul 4										Hours of Data: 705	
Maximum Diurnal Average: 2.5 ppm at hour 1																	Minimum Diurnal Average: 2.0 ppm at hour 15										Hours of Missing Data: 39	
Monthly Average: 2.19 ppm																	Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.5 P ₉₉ = 3.8										Hours of Calibration: 38	
																											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-Jul	2.0	2.0	Z	2.1	2.2	2.4	2.2	2.2	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.4		
2-Jul	2.1	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.3	2.0	2.1	2.5	2.9	2.5	2.2	2.9	3.5	2.2	3.5		
3-Jul	3.4	3.0	2.6	2.2	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	2.1	2.2	2.1	3.4		
4-Jul	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1		
5-Jul	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.0	2.2	2.1	2.1	2.3	2.5	2.9	2.3	2.1	2.9		
6-Jul	3.3	Z	3.9	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.4	2.3	3.9		
7-Jul	2.8	2.8	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.5	2.2	2.8		
8-Jul	2.9	3.6	4.2	Z	3.6	4.8	2.9	4.0	3.3	2.7	2.7	2.5	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.7	4.8		
9-Jul	2.7	2.6	2.7	2.9	Z	3.4	3.0	2.4	2.5	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.1	2.3	3.4		
10-Jul	2.2	2.3	2.3	2.2	2.1	Z	2.2	2.3	2.3	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.3	2.5	3.0	2.1	2.3	2.4	3.3	2.3	3.3		
11-Jul	Z	3.1	2.8	2.5	2.3	2.3	2.7	4.0	3.5	3.2	2.0	2.1	2.4	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4	4.0		
12-Jul	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.5	2.3	2.1	2.0	2.0	2.0	2.7	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.7		
13-Jul	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.2	2.1	C	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	--	2.3		
14-Jul	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	2.4	2.3	2.1	2.1	2.1	2.3	2.4	2.4	2.1	2.4		
15-Jul	2.7	2.4	2.2	2.3	Z	2.6	2.6	2.6	3.0	2.9	2.7	2.8	2.5	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.4	2.2	2.4	3.0		
16-Jul	3.2	2.2	2.1	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	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	3.2		
17-Jul	Z	2.7	2.6	2.0	2.0	2.1	2.3	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.0	2.1	2.2	2.5	2.7	2.2	2.7		
18-Jul	2.3	Z	2.6	2.4	2.7	2.4	2.3	2.4	2.3	2.1	2.1	2.2	2.1	2.1	2.0	2.1	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.7		
19-Jul	2.0	2.1	Z	2.1	2.1	2.1	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	2.1	2.0	2.1	2.2	2.4	2.1	2.4		
20-Jul	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.3	2.5	2.7	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.4	2.4	2.2	2.7		
21-Jul	2.2	2.1	2.2	2.2	Z	2.2	2.2	2.3	2.7	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.2	2.2	2.2	2.7		
22-Jul	2.1	2.2	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2		
23-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.4	2.2	2.1	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4		
24-Jul	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	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.7	2.7	2.3	3.0	2.1	3.0		
25-Jul	4.2	3.8	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	2.1	2.2	4.2		
26-Jul	2.1	2.2	2.2	Z	2.2	2.2	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	2.1	2.2		
27-Jul	2.1	2.1	2.1	2.1	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	2.1	2.1	2.1	2.8	2.9	2.7	2.5	2.2	2.9		
28-Jul	2.7	2.1	2.0	2.0	2.0	Z	2.0	M	2.0	1.9	2.0	2.0	2.1	2.0	2.0	2.2	2.1	2.0	2.2	2.0	2.1	2.1	2.1	2.1	2.1	2.7		
29-Jul	Z	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.1	2.0	2.2	2.5	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.5		
30-Jul	2.2	Z	2.1	2.1	2.1	2.2	2.2	3.2	2.9	2.2	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.0	2.0	2.0	2.2	3.2		
31-Jul	3.0	3.1	Z	3.5	2.6	2.3	2.4	2.5	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.2	2.7	2.5	2.8	2.4	3.5		
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration M - Maintenance																												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	278	39.43	39.43
2.1 - 3.0	405	57.45	96.88
3.1 - 10.0	22	3.12	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - July 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	5	35	8	1	3	2	4	2	17	53	64	65	9	7	1	2	278
2.1 - 3.0	7	36	17	9	10	12	6	14	33	80	38	24	21	54	19	25	405
3.1 - 10.0	0	0	1	1	1	0	0	0	0	3	3	3	3	5	2	0	22
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	12	71	26	11	14	14	10	16	50	136	105	92	33	66	22	27	705

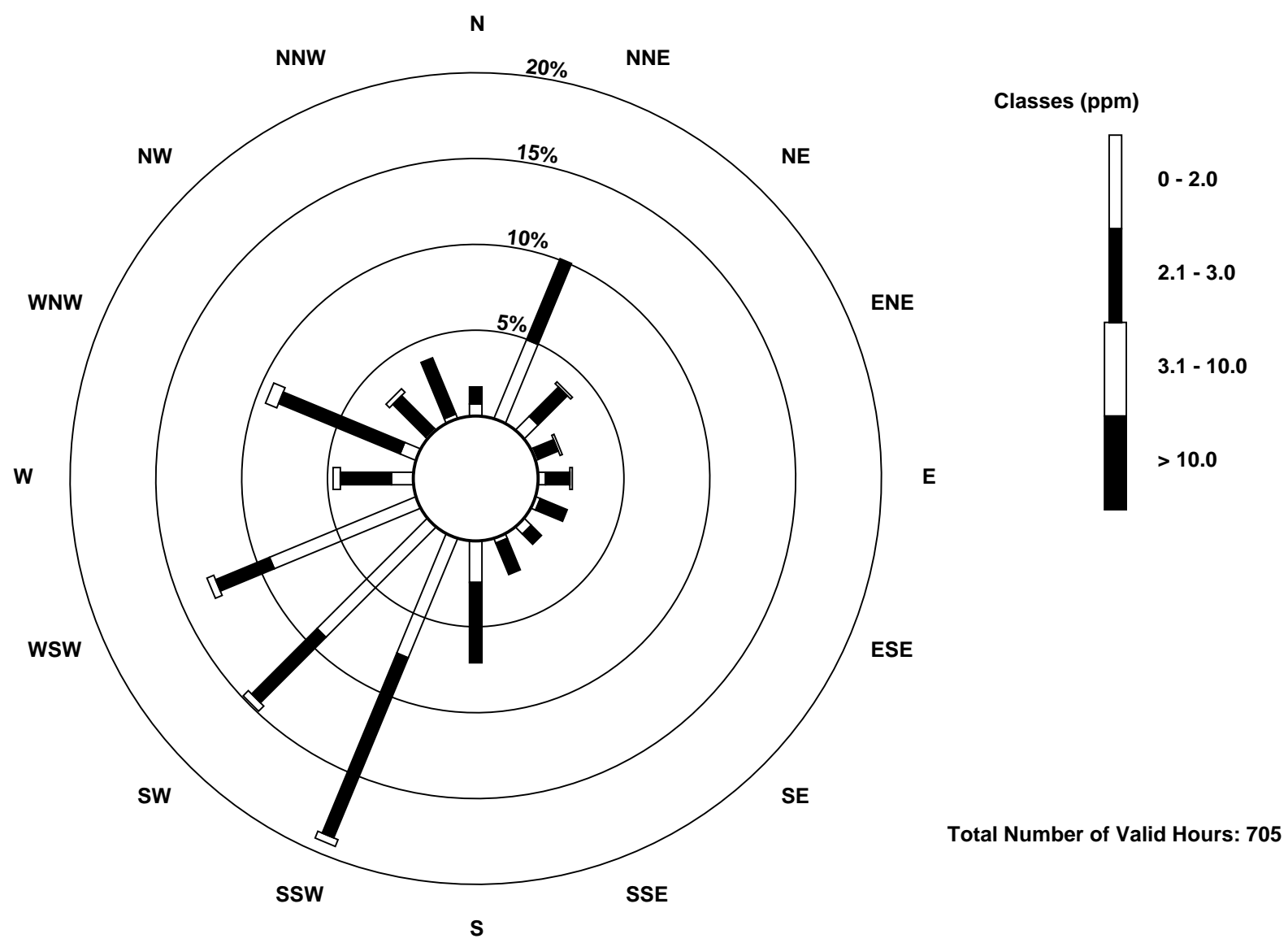
Total Number of Valid Hours: 705

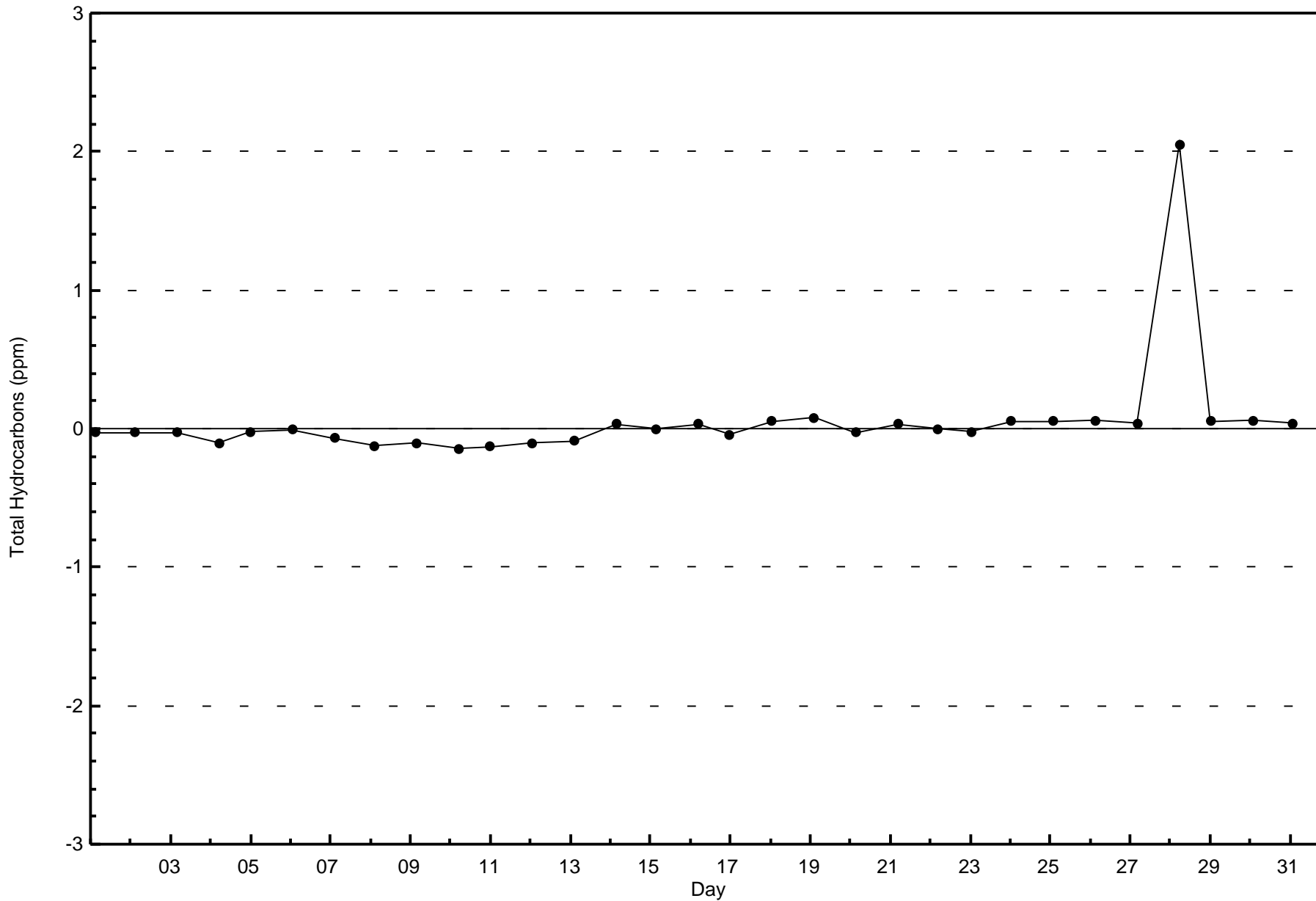
Total Number of Hours: 744

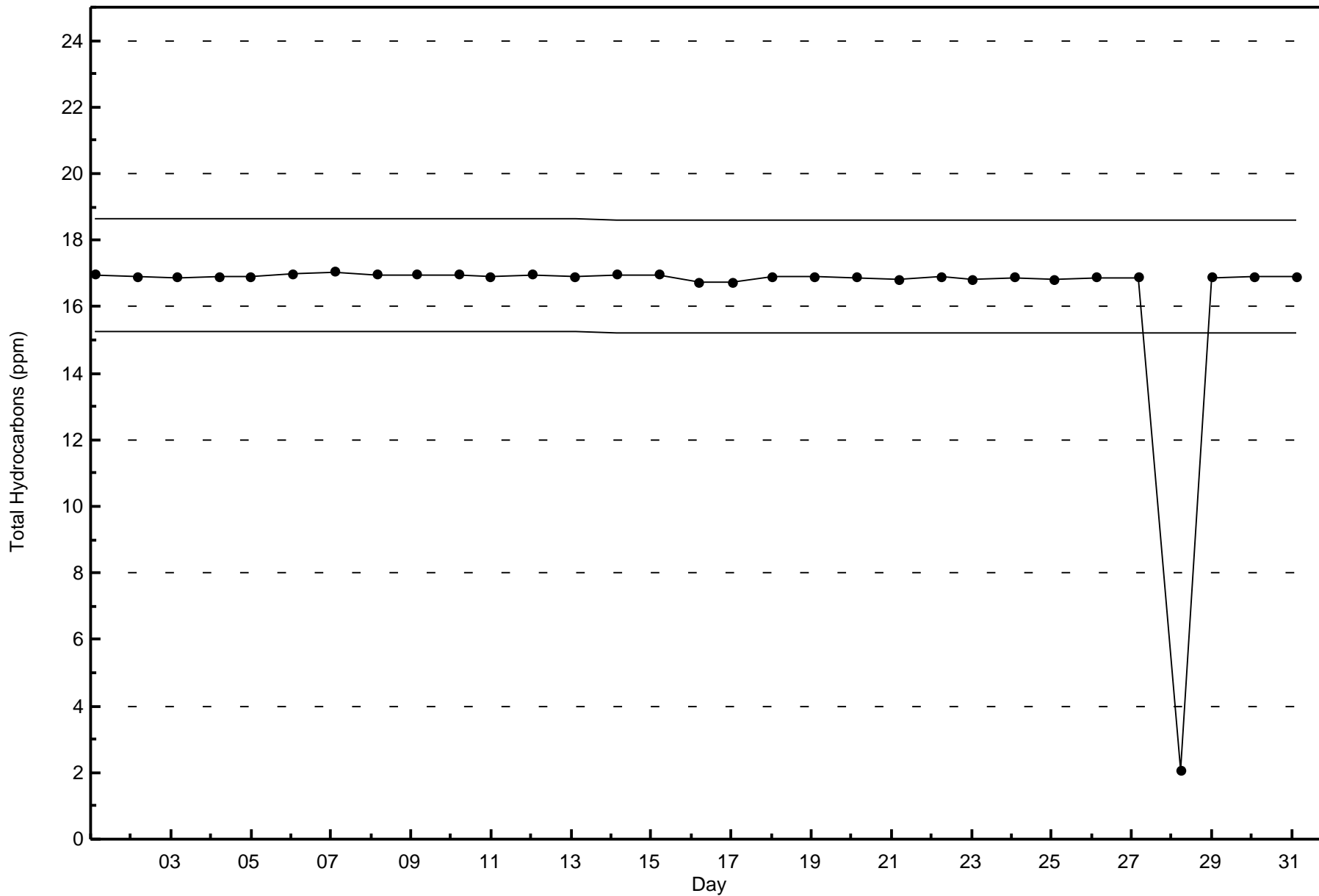


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

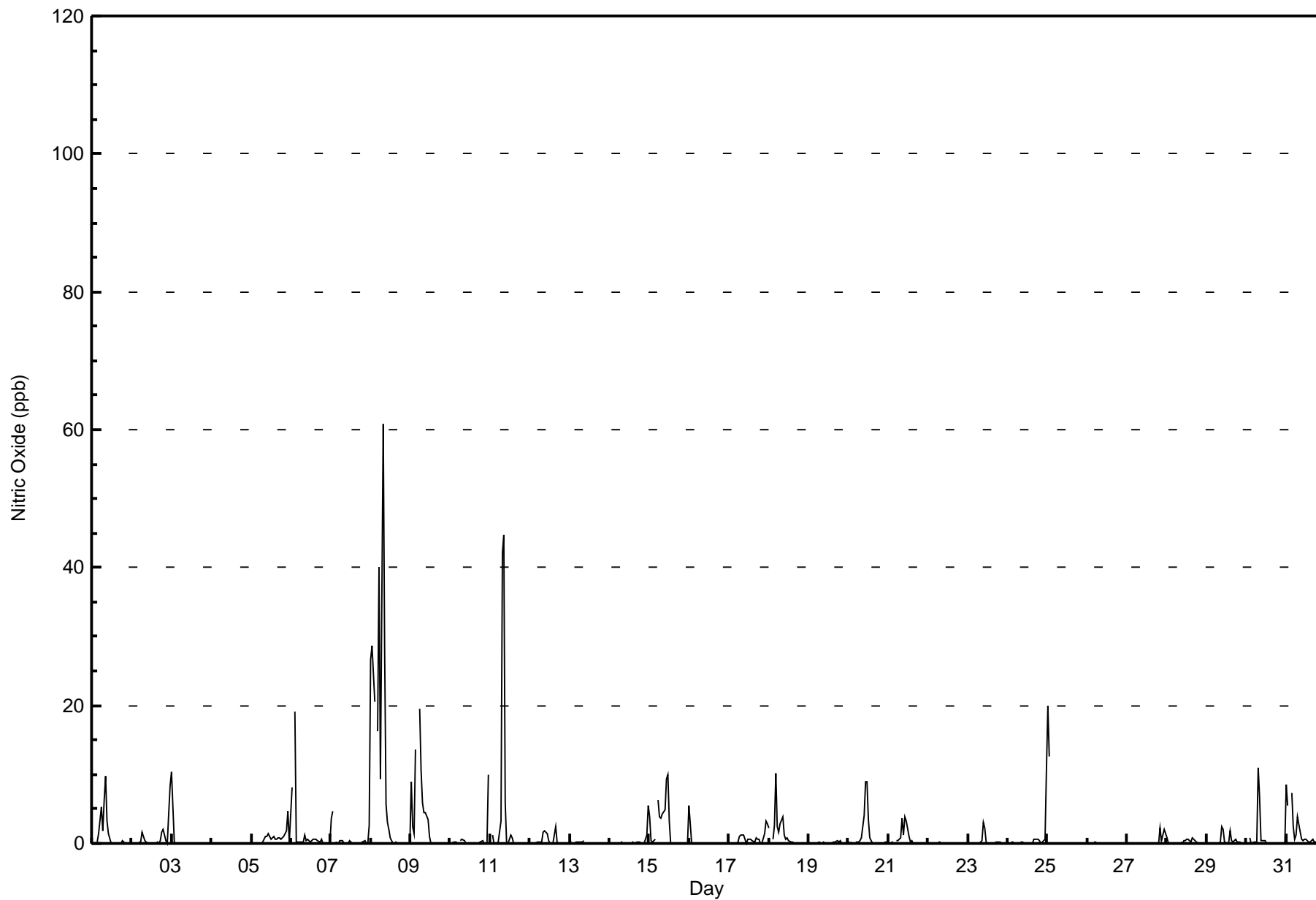
Horizon - July 2017

Maximum Value: 61 ppb on Jul 8 08:00																	Maximum Daily Average: 10.5 ppb on Jul 8																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 1 13:00																	Minimum Daily Average: 0.0 ppb on Jul 22																	Hours of Data: 705			
Maximum Diurnal Average: 4.8 ppb at hour 8																	Minimum Diurnal Average: 0.1 ppb at hour 17																	Hours of Missing Data: 39			
Monthly Average: 1.3 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 3 P ₉₉ = 26																	Hours of Calibration: 38			
																																		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-Jul	0	0	Z	0	1	5	2	6	10	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	10											
2-Jul	0	0	0	Z	0	0	2	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	4	8	0.9	8											
3-Jul	10	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	10											
4-Jul	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											
5-Jul	Z	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	5	0	0.8	5										
6-Jul	8	Z	19	0	0	0	0	0	1	0	1	0	1	1	1	1	1	0	1	0	0	0	0	0	1.5	19											
7-Jul	4	5	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.6	5											
8-Jul	27	29	21	Z	16	40	9	61	28	6	3	2	1	0	0	0	0	0	0	0	0	0	0	0	10.5	61											
9-Jul	9	2	1	14	Z	20	11	6	4	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3.3	20											
10-Jul	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0.5	10											
11-Jul	Z	1	0	0	0	0	3	42	45	6	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4.3	45											
12-Jul	0	Z	0	0	0	0	0	0	2	2	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0.4	2											
13-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0											
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0.3	5											
15-Jul	4	0	0	1	Z	6	4	4	4	5	9	10	3	0	0	0	0	0	0	0	0	0	0	0	2.2	10											
16-Jul	5	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	5											
17-Jul	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	3	3	0.7	3											
18-Jul	2	Z	1	3	10	2	2	3	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1.3	10											
19-Jul	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-Jul	0	0	0	Z	0	0	0	1	1	4	9	9	3	1	0	0	0	0	0	0	0	0	0	0	1.3	9											
21-Jul	0	0	0	0	Z	0	0	1	4	1	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0.7	4											
22-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3											
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	11	0.7	11											
25-Jul	20	13	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	20											
26-Jul	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											
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0.3	2										
28-Jul	1	0	0	0	0	Z	0	M	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0.3	1											
29-Jul	Z	0	0	0	0	0	0	0	0	2	2	0	0	0	2	0	0	1	0	0	0	0	0	0	0.4	2											
30-Jul	0	Z	1	0	0	0	0	11	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	11											
31-Jul	9	5	Z	7	2	1	1	4	2	1	0	1	1	0	0	0	1	0	0	0	0	1	13	12	2	2.8	13										
3.8 2.2 1.8 1.0 1.2 3.0 1.2 4.8 3.7 1.4 1.3 1.0 0.5 0.2 0.2 0.2 0.1 0.2 0.2 0.2 0.2 0.6 0.9 1.5																								Diurnal Average													
27 29 21 14 16 40 11 61 45 6 9 10 3 1 2 2 1 1 2 2 2 2 13 12 11																								Diurnal Maximum													
Z - zerospan			C - Calibration			M - Maintenance																															



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Horizon - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Horizon - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	697	98.87	98.87
21 - 40	5	0.71	99.57
41 - 80	3	0.43	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Horizon - July 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	12	71	25	10	13	14	10	16	50	135	104	92	33	64	21	27	697
21 - 40	0	0	0	1	1	0	0	0	0	1	1	0	0	1	0	0	5
11 - 80	0	0	1	0	0	0	0	0	0	0	0	0	0	1	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	12	71	26	11	14	14	10	16	50	136	105	92	33	66	22	27	705

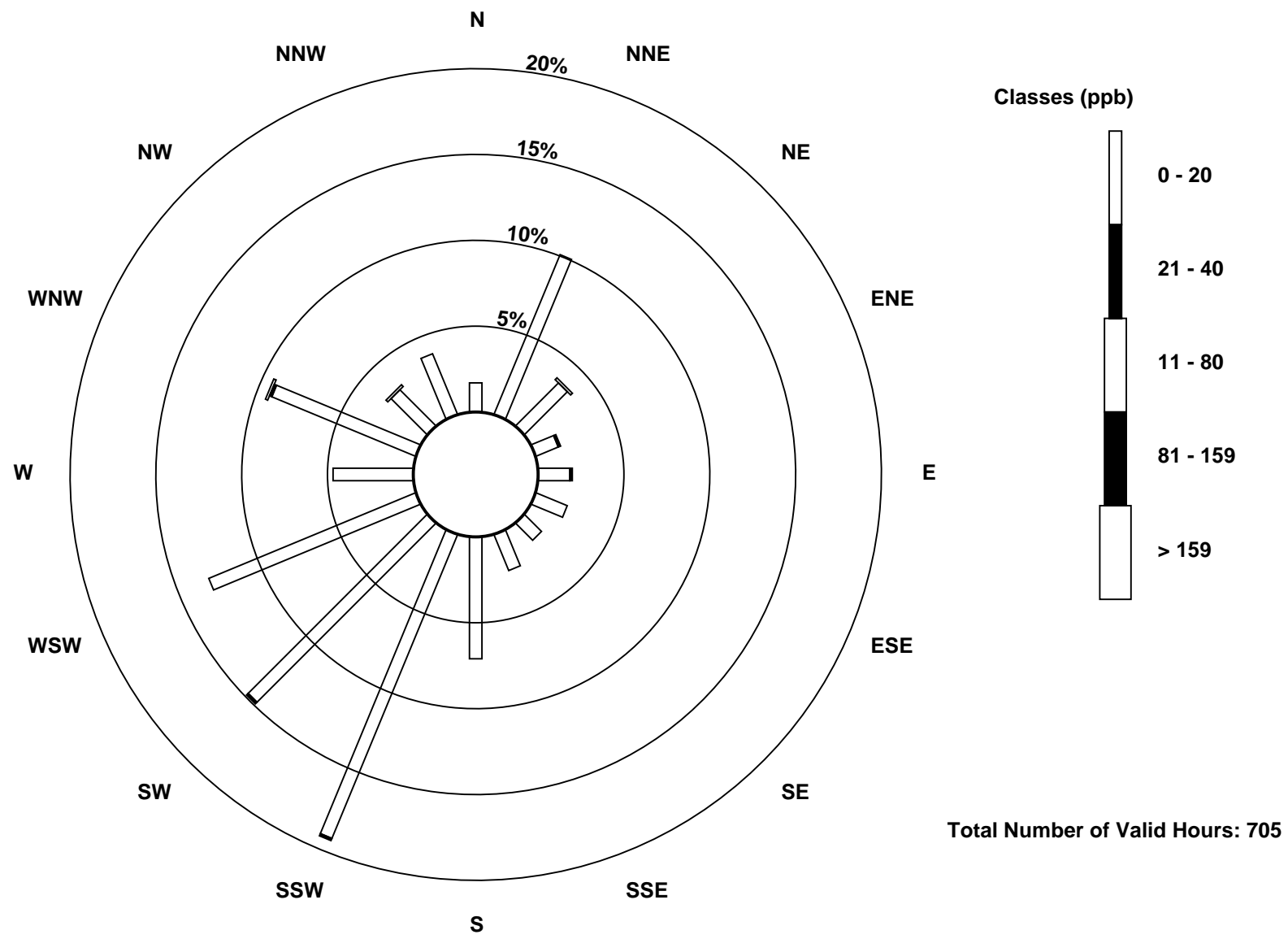
Total Number of Valid Hours: 705

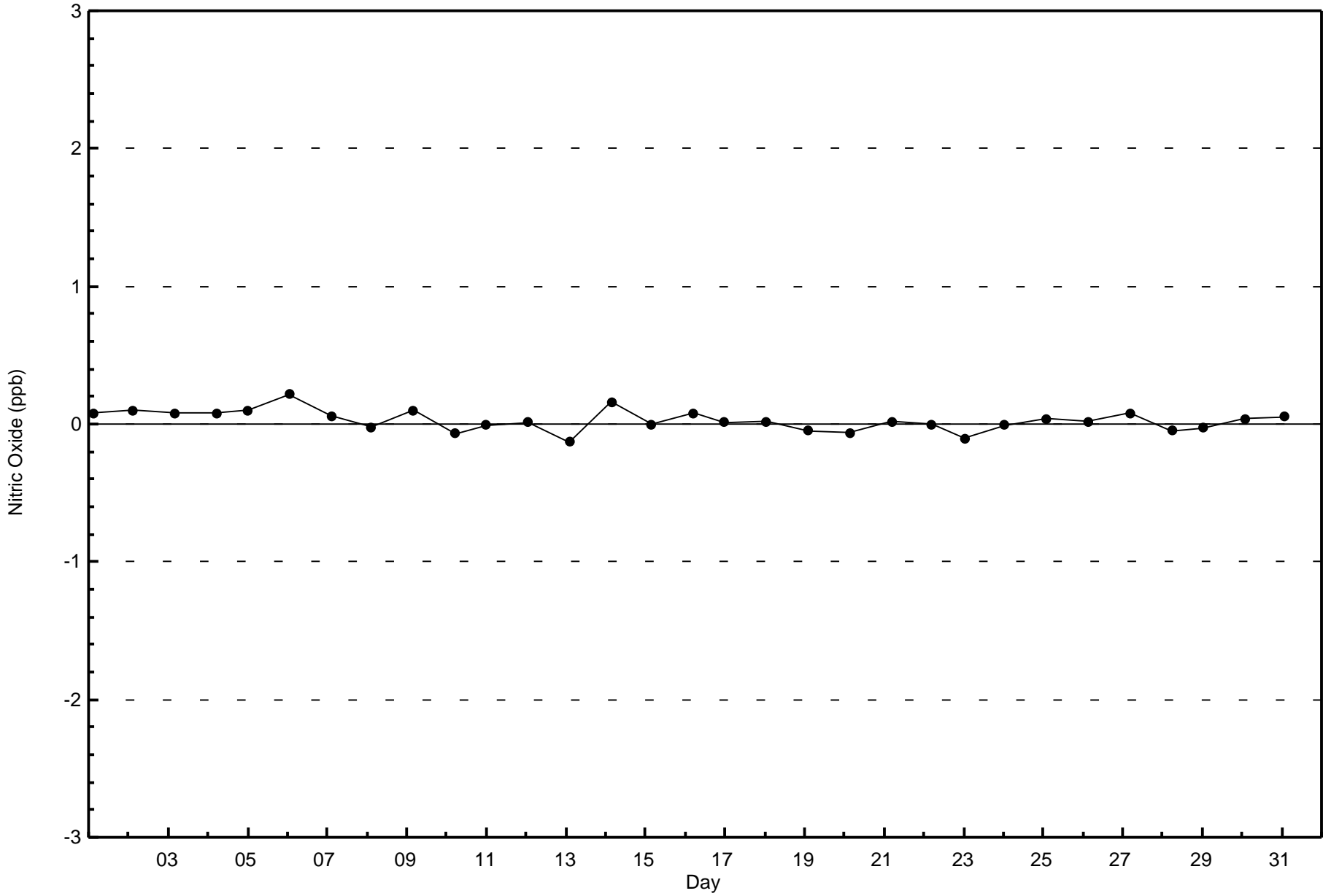
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Horizon (AMS 15)

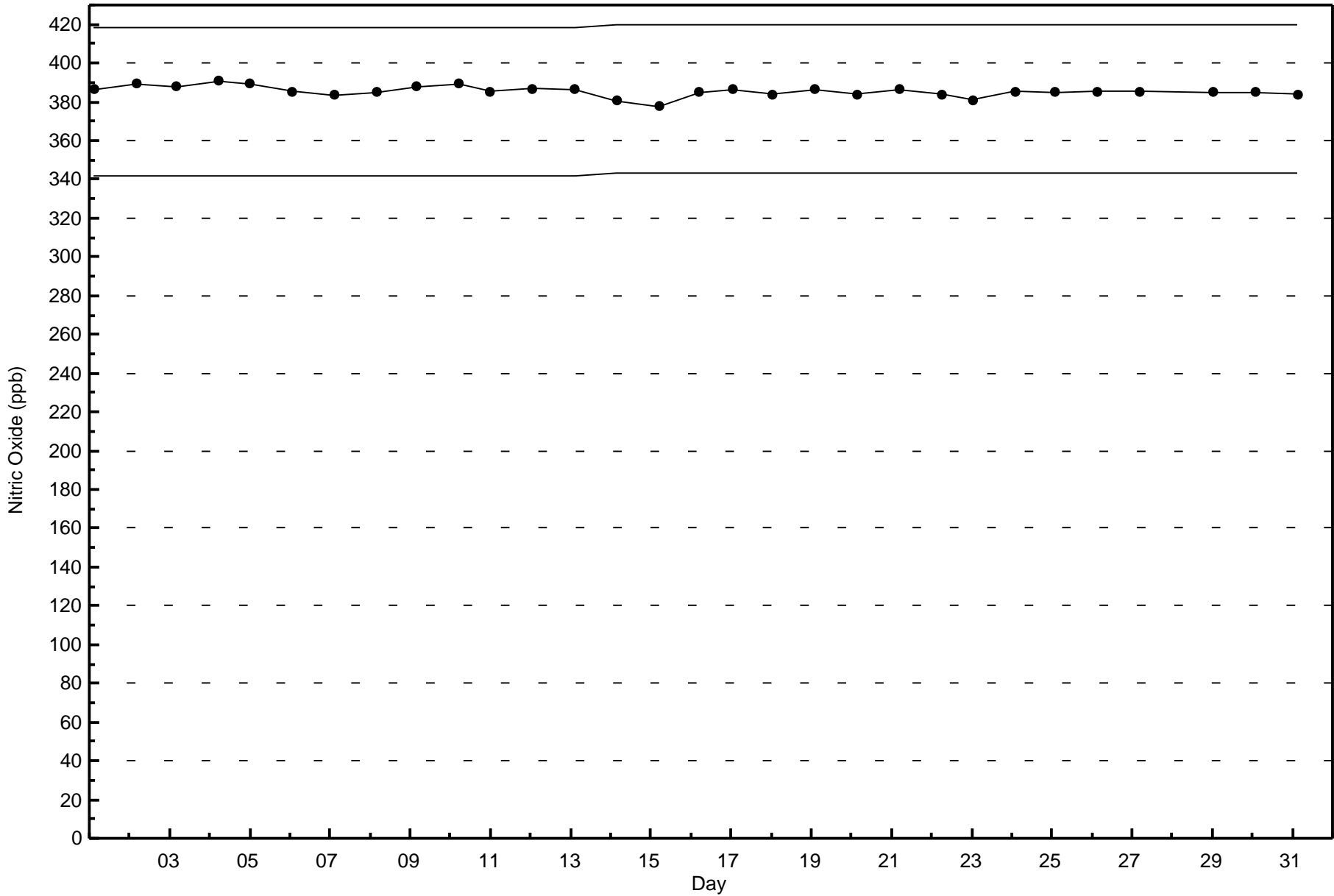






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Horizon - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

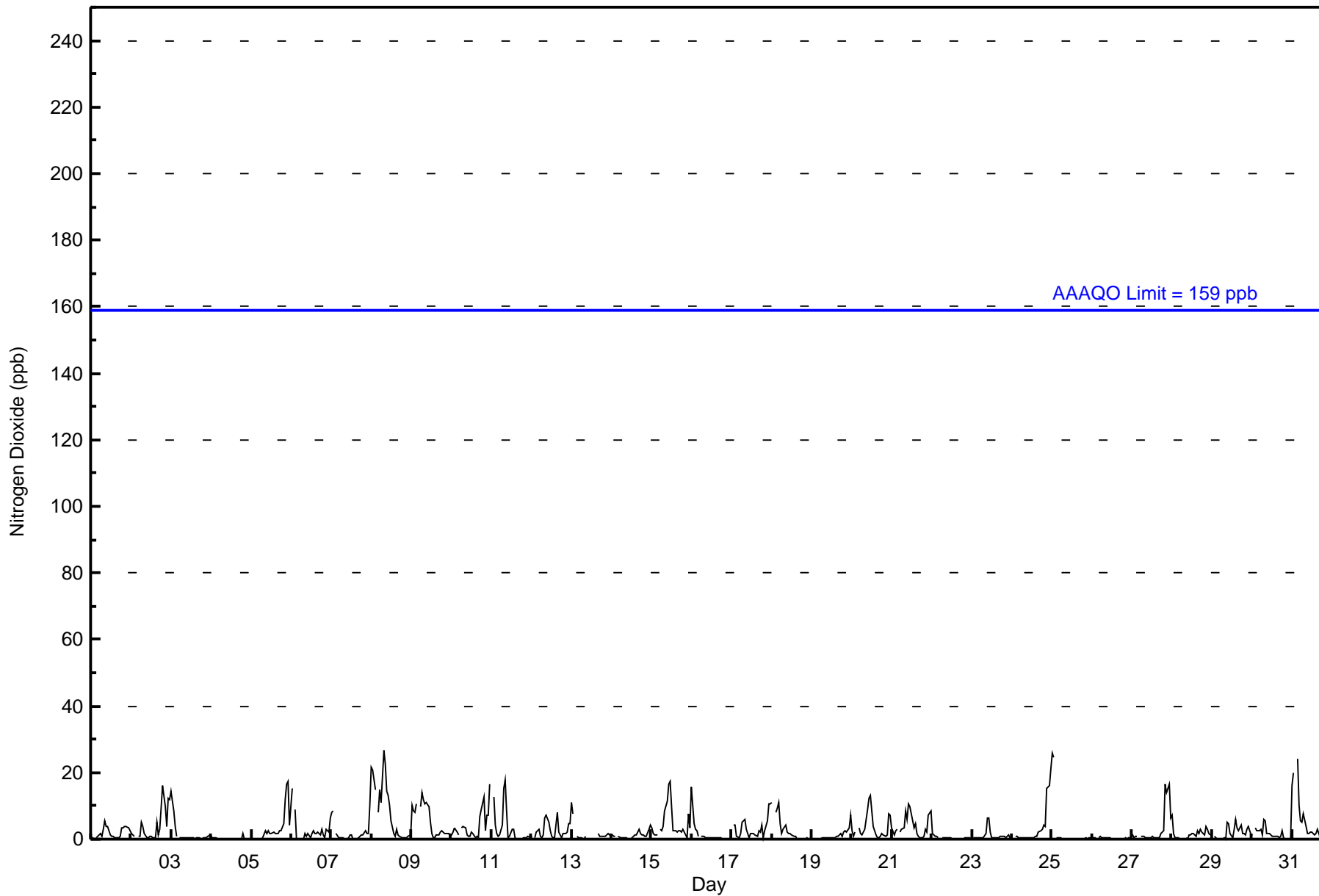
Horizon - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744									
Maximum Value: 27 ppb on Jul 8 08:00																	Maximum Daily Average: 8.4 ppb on Jul 8									
Minimum Value: 0 ppb on Jul 6 06:00																	Hours of Data: 705									
Maximum Diurnal Average: 6.8 ppb at hour 1																	Hours of Missing Data: 39									
Monthly Average: 2.8 ppb																	Hours of Calibration: 38									
Minimum Daily Average: 0.3 ppb on Jul 4																	Percent Operational Time: 99.9									
Minimum Diurnal Average: 1.1 ppb at hour 15																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 8 P ₉₉ = 21									
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-Jul	1	0	Z	0	1	2	1	3	5	4	4	1	1	1	1	1	0	1	3	3	4	4	3	3	2.0	5
2-Jul	2	1	1	Z	1	1	5	4	2	1	1	1	1	1	5	1	3	9	16	10	4	12	12	3.9	16	
3-Jul	14	8	4	1	Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1.5	14	
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0.3	2	
5-Jul	Z	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2	2	3	2	5	12	17	18	3.4	18	
6-Jul	15	Z	9	0	0	0	0	0	2	1	2	1	2	3	2	2	2	1	3	1	1	3	2	6	2.4	15
7-Jul	8	9	Z	2	0	1	1	1	0	0	0	1	1	0	0	0	0	1	1	1	3	2	2	10	1.9	10
8-Jul	22	21	15	Z	8	15	11	27	22	15	13	10	6	2	1	3	1	1	0	0	1	1	1	1	8.4	27
9-Jul	10	8	8	11	Z	10	14	12	11	11	10	5	2	1	0	1	1	2	3	2	2	2	2	1	5.5	14
10-Jul	1	2	3	2	1	Z	3	4	4	1	1	1	2	2	1	1	1	7	9	13	3	7	7	17	4.0	17
11-Jul	Z	13	4	2	1	1	4	15	18	9	0	1	3	3	0	0	0	0	0	1	0	1	1	1	3.4	18
12-Jul	1	Z	1	2	3	1	1	1	6	7	5	3	1	1	0	8	2	1	0	2	2	2	5	5	2.5	8
13-Jul	11	8	Z	1	1	0	0	0	1	C	C	C	C	C	C	C	2	1	1	1	1	1	2	1	--	11
14-Jul	1	1	1	Z	1	0	1	1	0	0	0	0	1	1	1	1	3	2	1	1	1	1	3	4	1.1	4
15-Jul	4	2	1	1	Z	3	3	4	8	12	17	17	10	2	3	2	2	2	2	3	1	1	8	3	4.8	17
16-Jul	16	5	3	3	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	16
17-Jul	Z	4	4	1	1	2	5	5	6	3	0	2	2	2	1	1	3	2	4	1	3	5	10	11	3.3	11
18-Jul	11	Z	8	9	11	5	2	3	4	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	2.7	11
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	1	2	3	2	3	7	1.1	7
20-Jul	2	1	2	Z	3	2	1	2	3	9	12	13	9	4	1	1	1	1	2	1	1	1	8	7	3.8	13
21-Jul	3	1	3	3	Z	2	3	4	9	6	11	10	5	3	5	2	1	0	1	1	3	2	7	8	4.0	11
22-Jul	2	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	2
23-Jul	Z	0	0	0	0	0	0	0	2	6	6	2	0	0	1	1	1	1	1	1	1	1	1	1	1.1	6
24-Jul	1	Z	1	1	0	0	0	0	1	1	1	0	0	1	1	1	2	2	3	4	4	15	16	21	3.3	21
25-Jul	26	24	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.4	26
26-Jul	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
27-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	17	14	16	6	3.1	17
28-Jul	7	2	0	0	0	Z	0	M	0	0	1	1	2	2	1	2	2	3	2	1	4	3	2	1	1.7	7
29-Jul	Z	1	0	0	0	0	0	0	0	5	5	2	0	3	6	4	3	4	2	2	1	3	4	1	2.0	6
30-Jul	1	Z	4	2	2	3	1	6	6	2	2	1	1	1	1	1	1	1	2	0	0	0	0	0	1.7	6
31-Jul	16	20	Z	24	10	6	5	8	4	2	2	2	2	1	2	3	2	0	1	1	3	15	19	8	6.7	24
6.8 5.1 3.0 2.6 1.8 2.1 2.1 3.4 3.8 3.3 3.3 2.7 1.9 1.2 1.1 1.4 1.1 1.4 1.8 2.2 2.5 3.5 4.9 4.6																								Diurnal Average		
26 24 15 24 11 15 14 27 22 15 17 17 10 4 6 8 3 7 9 16 17 17 19 21																								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
Horizon - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Horizon - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	697	98.87	98.87
21 - 40	8	1.13	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Horizon - July 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	12	71	25	11	13	14	10	16	50	135	105	92	33	61	22	27	697
21 - 40	0	0	1	0	1	0	0	0	0	1	0	0	0	5	0	0	8
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	12	71	26	11	14	14	10	16	50	136	105	92	33	66	22	27	705

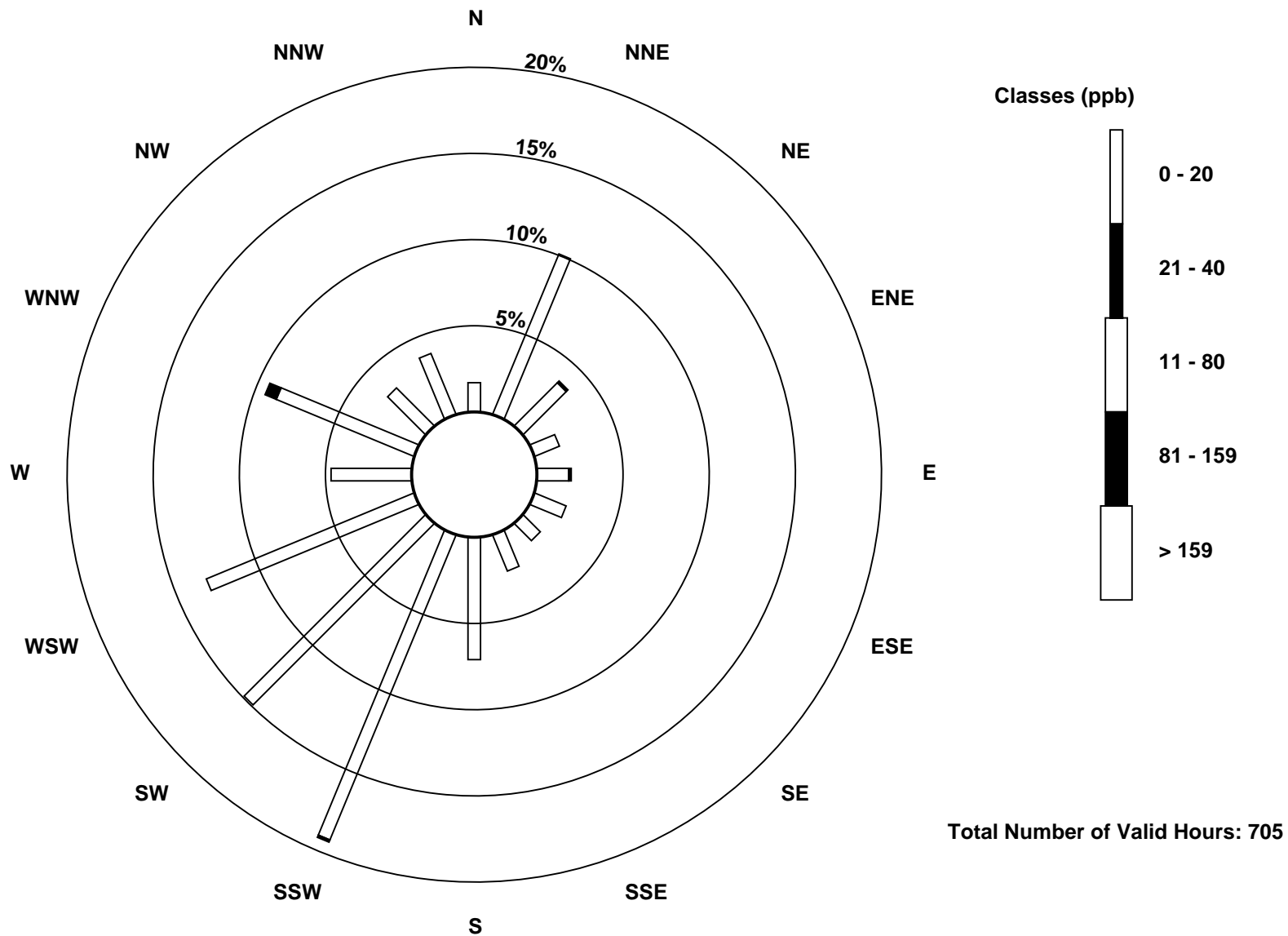
Total Number of Valid Hours: 705

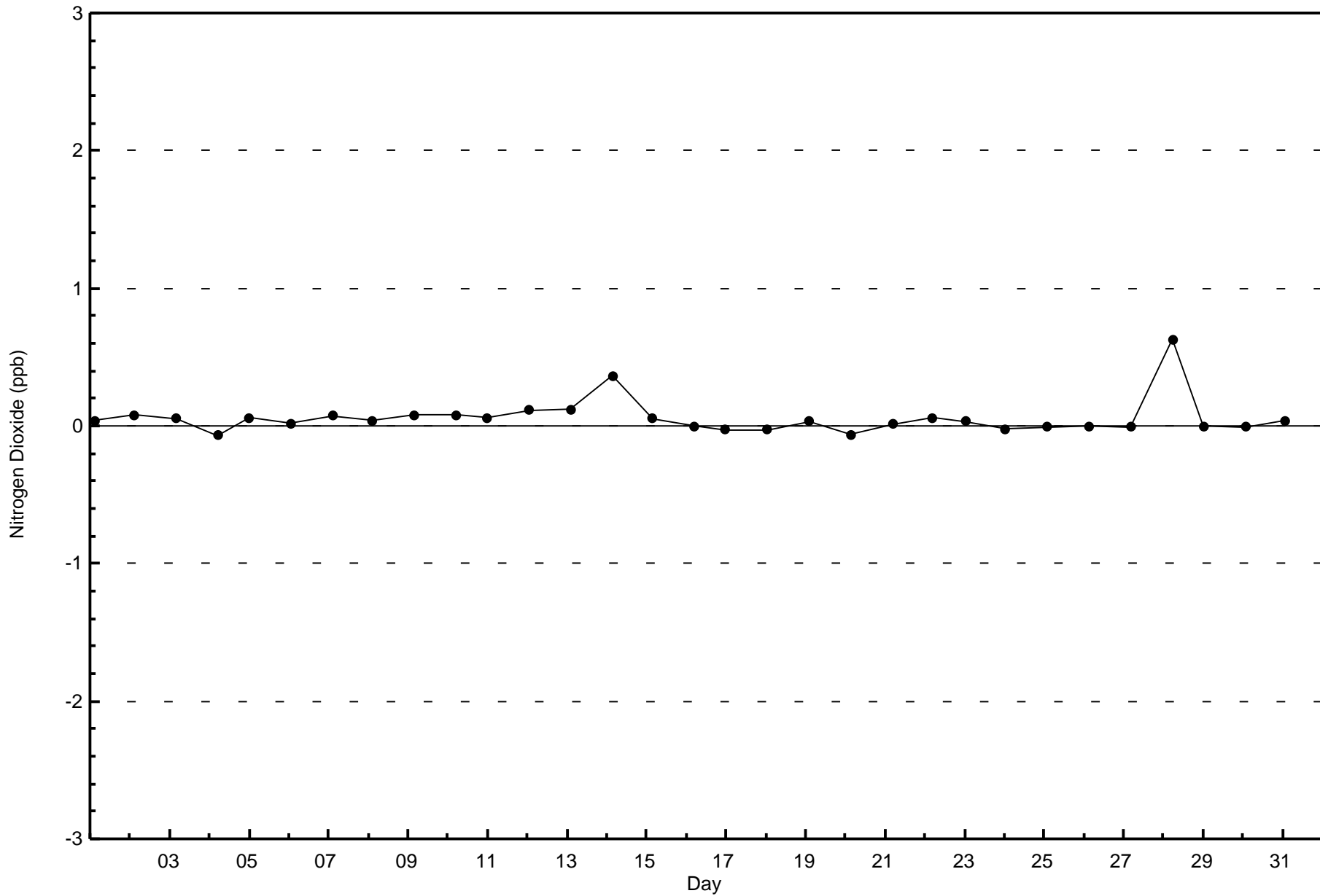
Total Number of Hours: 744

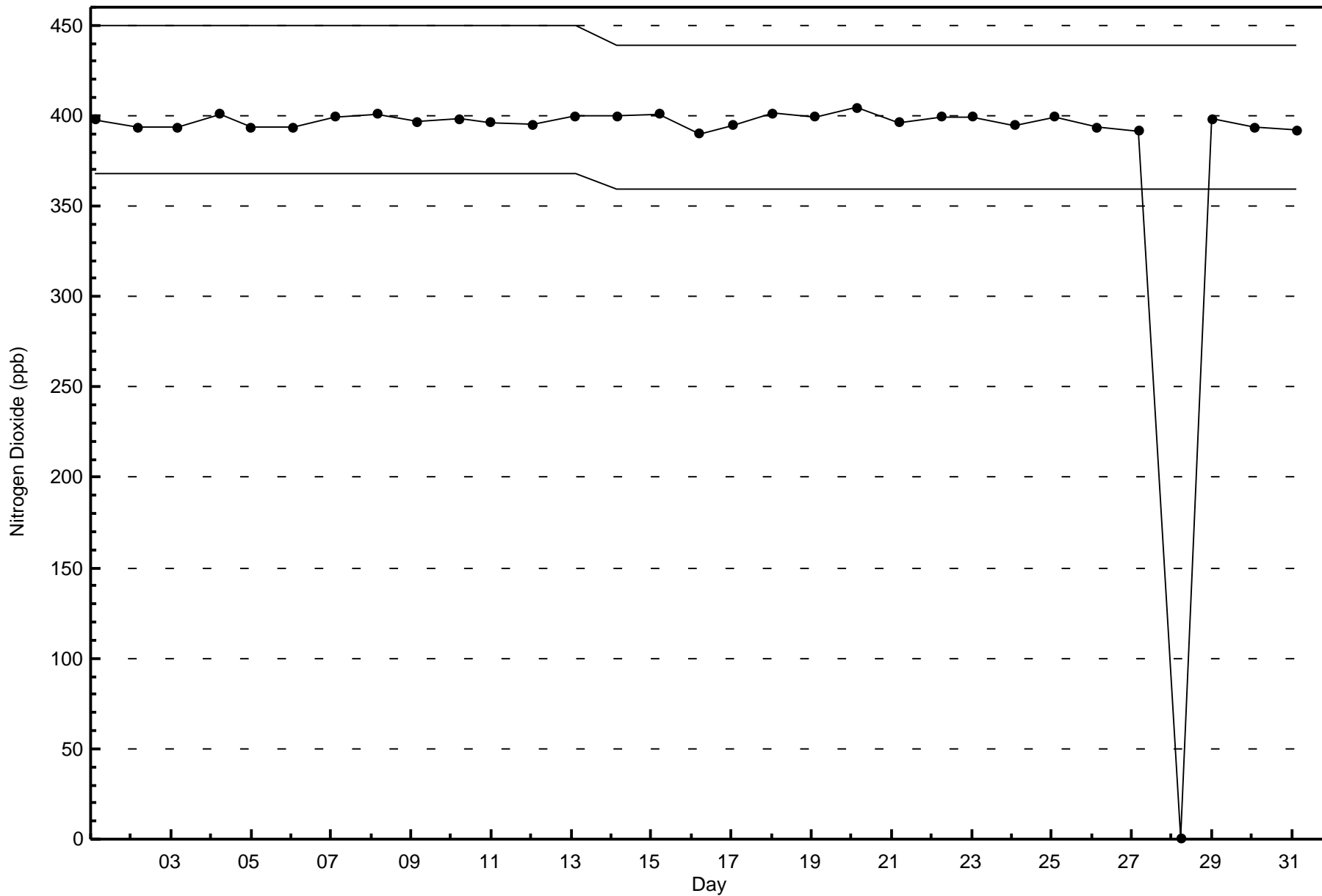


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

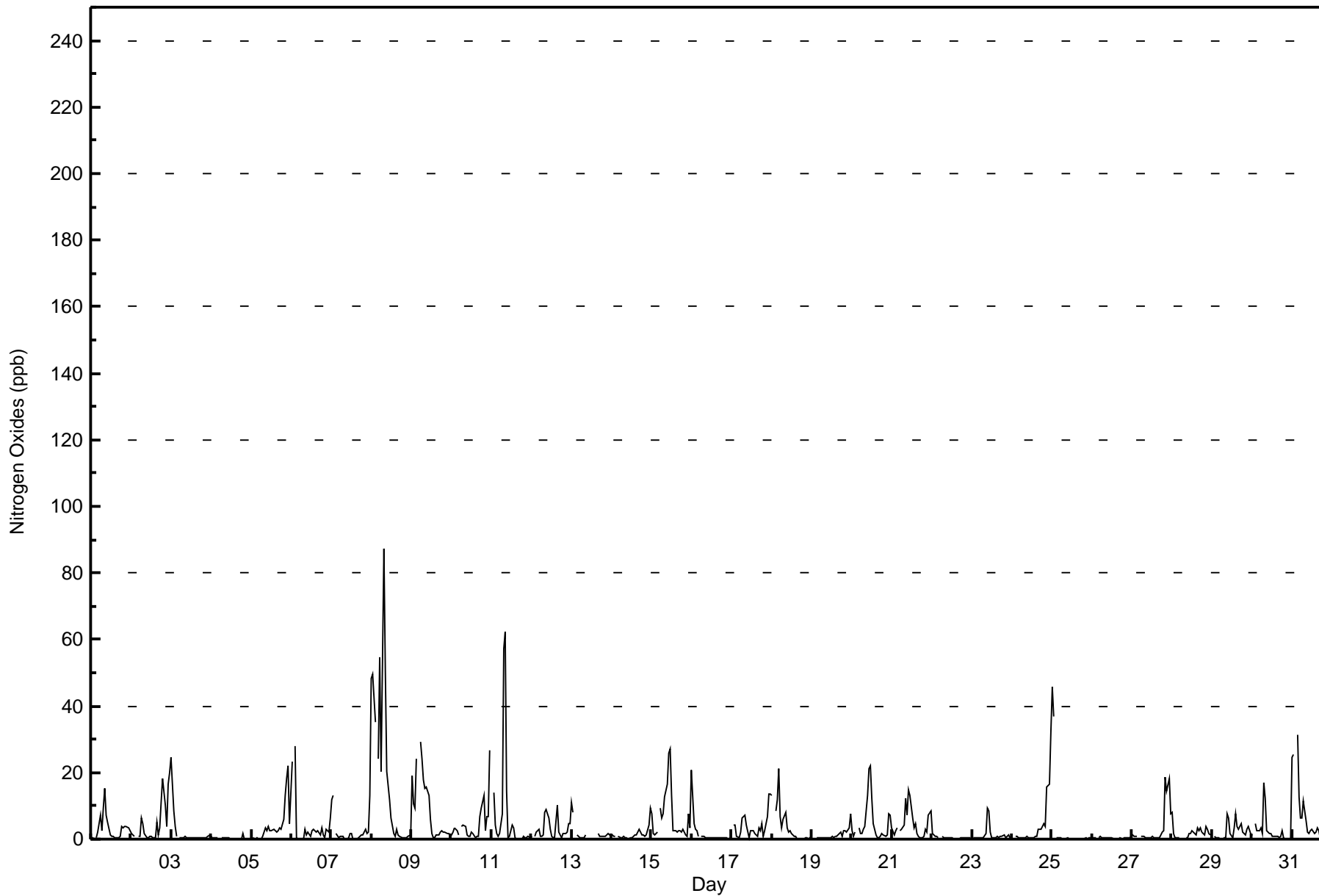
Horizon - July 2017

Maximum Value: 87 ppb on Jul 8 08:00																		Maximum Daily Average: 19.0 ppb on Jul 8						Hours in Service: 744																			
Minimum Value: 0 ppb on Jul 25 19:00																		Minimum Daily Average: 0.3 ppb on Jul 4						Hours of Data: 705																			
Maximum Diurnal Average: 10.6 ppb at hour 1																		Minimum Diurnal Average: 1.2 ppb at hour 15						Hours of Missing Data: 39																			
Monthly Average: 4.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 12 P ₉₉ = 48						Hours of Calibration: 38																			
																		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-Jul	0	0	Z	1	2	7	3	9	15	7	5	1	1	1	1	1	0	1	4	4	4	4	3	3	3.3	15																	
2-Jul	2	1	1	Z	1	1	6	5	2	1	1	1	1	1	0	5	1	3	11	18	10	4	16	20	4.8	20																	
3-Jul	25	8	4	1	Z	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	2.0	25																	
4-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0.3	2																	
5-Jul	Z	0	0	0	0	0	0	1	4	3	4	3	2	3	2	2	3	3	3	6	13	18	22	5	4.3	22																	
6-Jul	23	Z	28	0	0	0	0	0	3	1	2	1	2	3	3	2	3	1	4	1	0	3	2	6	3.9	28																	
7-Jul	12	13	Z	2	0	1	1	1	0	0	0	2	2	0	0	0	0	1	1	1	3	2	2	13	2.5	13																	
8-Jul	48	49	35	Z	24	55	20	87	50	20	16	12	7	2	1	3	1	1	0	0	0	1	1	1	19.0	87																	
9-Jul	19	11	10	24	Z	29	24	18	15	16	13	6	2	0	0	1	1	2	3	2	2	2	2	1	8.8	29																	
10-Jul	1	2	3	2	1	Z	4	4	4	1	1	1	2	2	1	1	1	7	9	13	3	7	7	27	4.5	27																	
11-Jul	Z	14	4	2	1	2	8	57	62	14	0	1	4	4	0	0	0	0	0	1	0	1	1	1	7.7	62																	
12-Jul	1	Z	1	2	3	1	1	1	8	9	6	3	1	1	0	10	2	1	0	2	2	2	5	5	2.9	10																	
13-Jul	11	8	Z	1	1	1	1	0	1	C	C	C	C	C	C	C	2	1	1	1	1	1	2	1	--	11																	
14-Jul	1	1	1	Z	1	0	1	1	0	0	0	0	1	1	1	1	3	2	1	1	1	1	4	9	1.4	9																	
15-Jul	8	2	1	2	Z	9	6	8	13	17	26	27	13	2	3	2	2	2	2	3	1	1	8	3	7.0	27																	
16-Jul	21	5	3	3	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	21																	
17-Jul	Z	4	4	1	0	2	6	7	7	4	0	2	3	2	2	1	3	3	5	1	3	7	14	13	4.1	14																	
18-Jul	13	Z	9	12	21	7	3	6	8	3	2	3	2	1	1	0	0	0	0	0	0	0	0	0	4.0	21																	
19-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	1	3	2	2	3	8	1.3	8																	
20-Jul	3	1	2	Z	3	2	2	3	4	13	21	22	12	5	1	0	0	1	2	1	1	1	8	7	5.0	22																	
21-Jul	3	1	3	3	Z	3	3	4	12	7	15	13	6	3	5	2	1	0	0	1	3	2	7	8	4.7	15																	
22-Jul	2	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2																	
23-Jul	Z	0	0	0	0	0	0	0	2	9	9	2	0	0	0	1	0	1	1	1	0	1	1	1	1.5	9																	
24-Jul	1	Z	1	1	0	0	0	0	1	1	1	0	0	1	1	1	3	3	4	5	4	16	17	32	4.0	32																	
25-Jul	46	37	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	46																	
26-Jul	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																	
27-Jul	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	0	1	1	1	2	3	19	14	18	8	3.3	19																	
28-Jul	8	2	0	0	0	Z	0	M	0	0	2	2	3	2	1	3	3	4	2	1	4	3	2	1	2.0	8																	
29-Jul	Z	1	0	0	0	0	0	0	0	8	6	2	0	3	8	4	3	5	2	2	1	3	4	1	2.3	8																	
30-Jul	1	Z	5	2	3	3	2	17	12	2	2	2	1	1	1	1	1	1	2	0	0	0	0	0	2.6	17																	
31-Jul	25	25	Z	31	13	6	6	11	5	2	2	3	3	2	2	4	2	0	1	1	4	28	31	10	9.4	31																	
																		10.6	7.3	4.7	3.6	3.0	5.1	3.3	8.2	7.5	4.8	4.6	3.7	2.3	1.4	1.2	1.6	1.3	1.6	2.0	2.4	2.7	4.0	5.8	6.1	Diurnal Average	
																		48	49	35	31	24	55	24	87	62	20	26	27	13	5	8	10	3	7	11	18	19	28	31	32	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Horizon - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Horizon - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	674	95.60	95.60
21 - 40	23	3.26	98.87
41 - 80	7	0.99	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Horizon - July 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	12	69	25	9	13	13	9	16	50	134	103	90	31	53	20	27	674
21 - 40	0	2	0	1	0	1	1	0	0	1	2	2	2	10	1	0	23
11 - 80	0	0	0	1	1	0	0	0	0	1	0	0	0	3	1	0	7
81 - 159	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	12	71	26	11	14	14	10	16	50	136	105	92	33	66	22	27	705

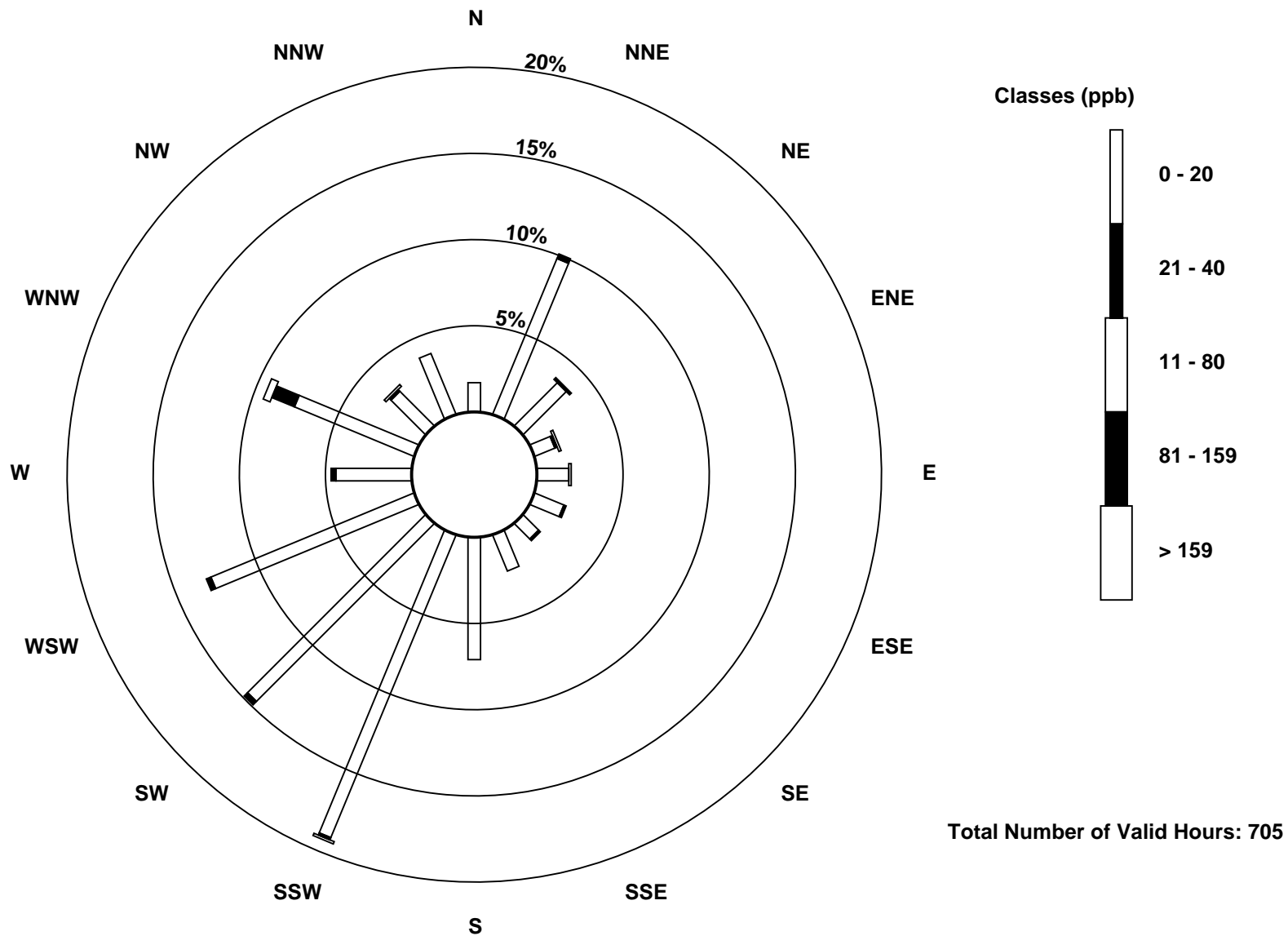
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

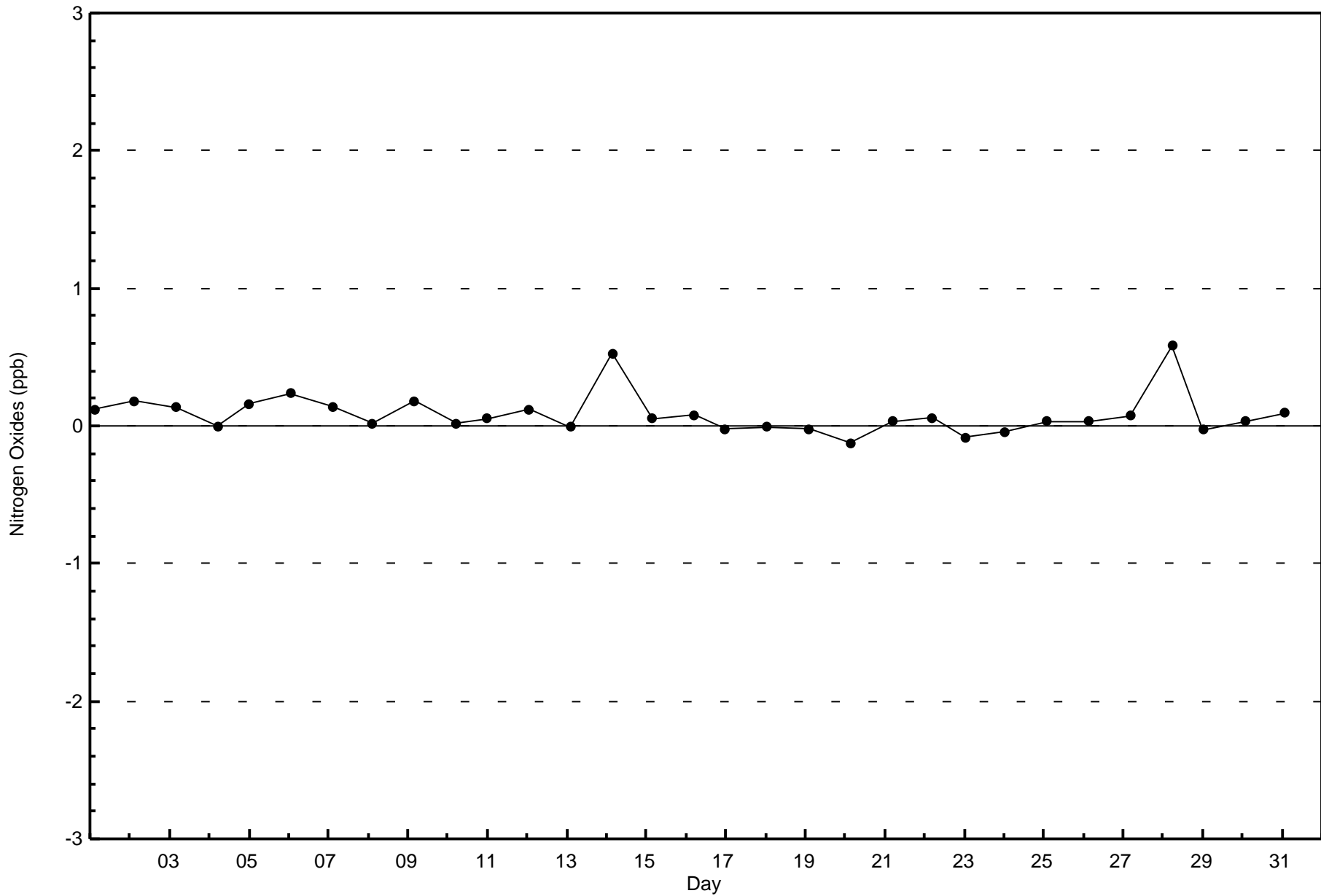
Nitrogen Oxides (NO_x) - ppb
Horizon (AMS 15)

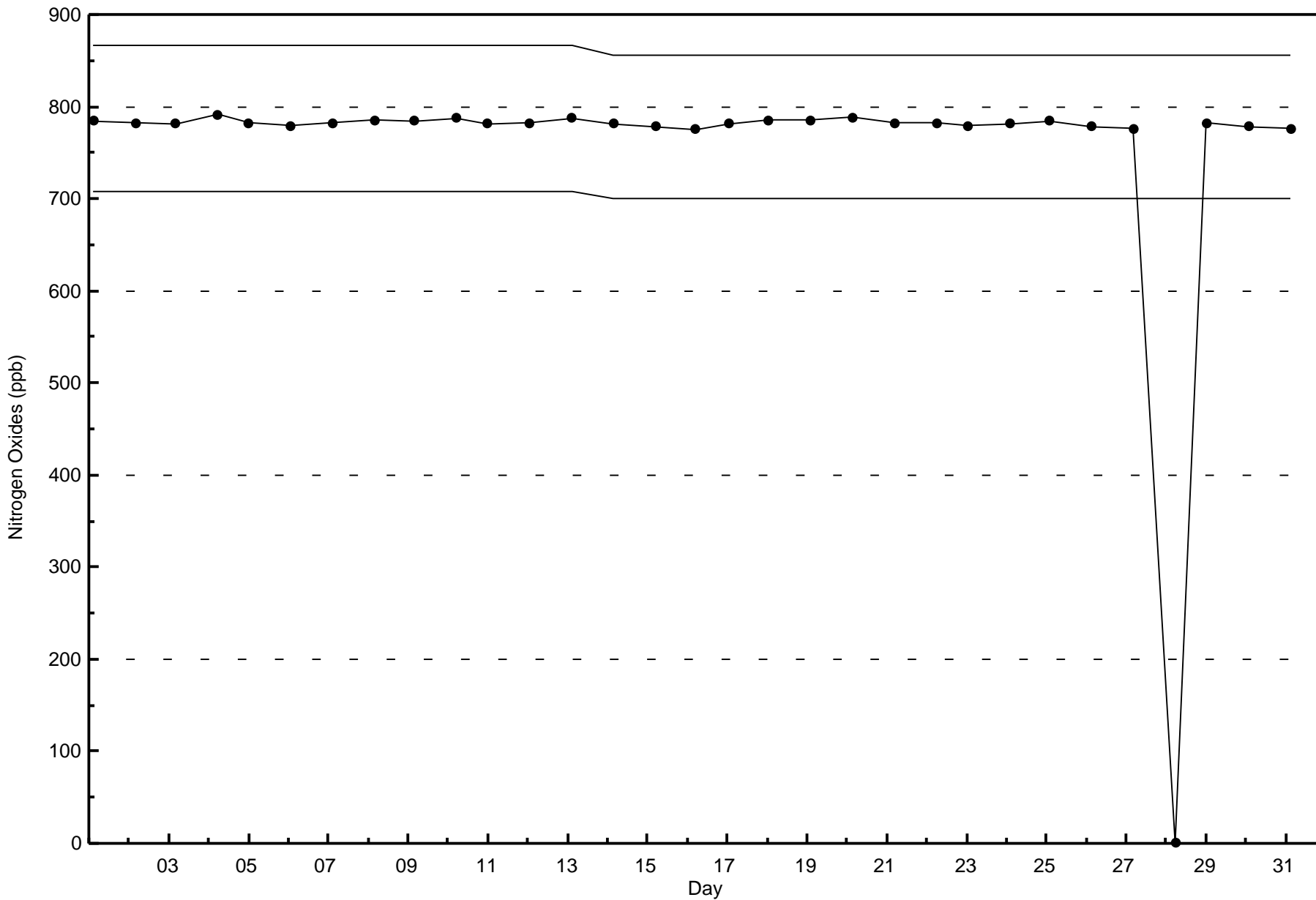




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Horizon - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

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

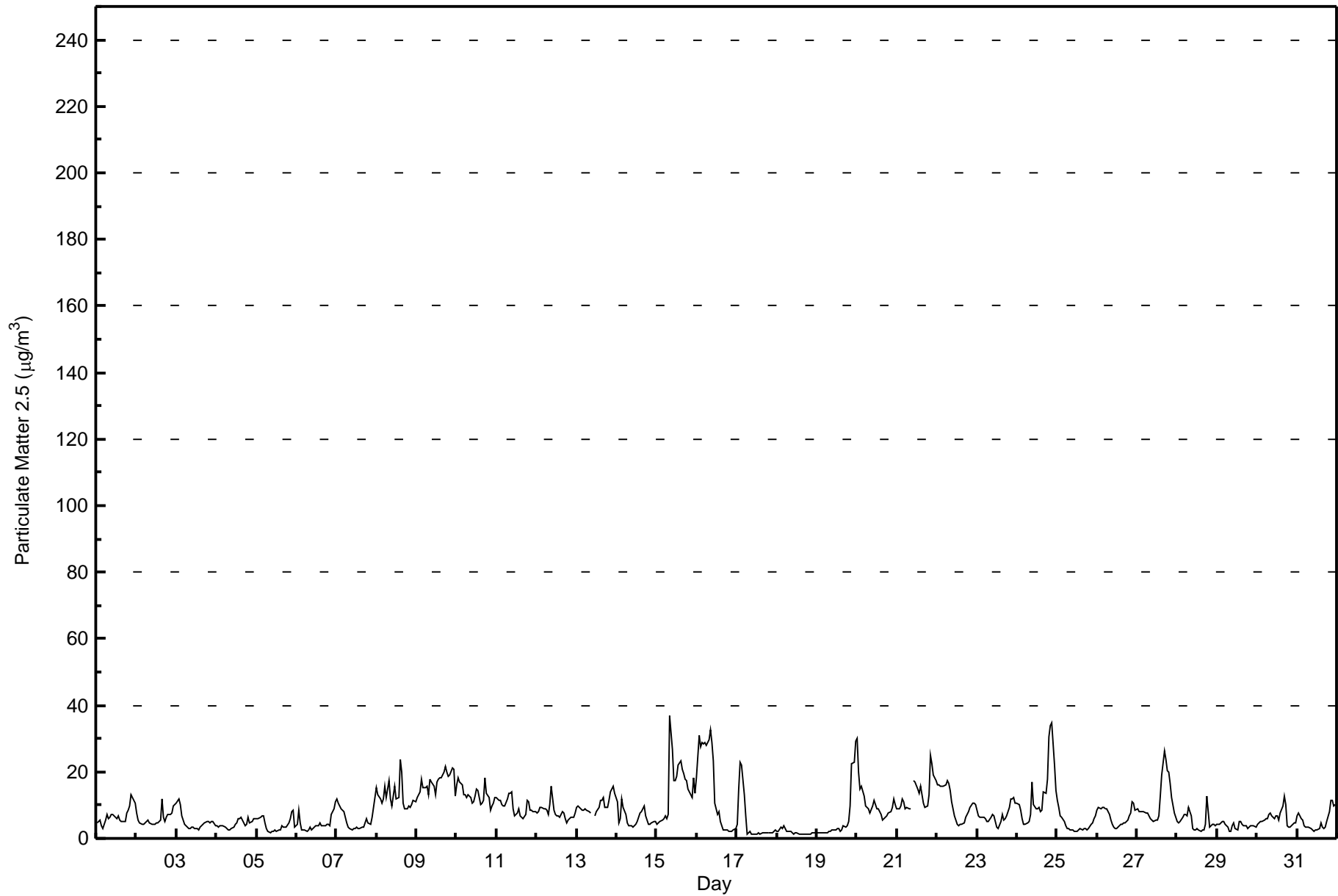
Horizon - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 36.8 µg/m ³ on Jul 15 09:00 Minimum Value: 1.3 µg/m ³ on Jul 18 16:00 Maximum Diurnal Average: 10.0 µg/m ³ at hour 22 Monthly Average: 8.09 µg/m ³		Maximum Daily Average: 16.9 µg/m ³ on Jul 9 Minimum Daily Average: 1.9 µg/m ³ on Jul 18 Minimum Diurnal Average: 6.3 µg/m ³ at hour 13 Percentiles: P ₁ = 1.4 P ₁₀ = 2.4 Q ₁ = 3.9 Median = 6.5 Q ₃ = 10.5 P ₉₀ = 16.1 P ₉₉ = 30.0		Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 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-Jul	4.8	5.3	5.3	3.6	2.9	5.4	7.0	5.9	6.5	7.2	7.1	6.5	6.0	6.6	5.6	5.1	5.0	5.2	7.5	8.6	9.6	12.9	11.6	10.5	6.7	12.9																						
2-Jul	7.6	5.6	4.8	4.1	4.2	4.7	5.1	5.4	4.7	4.2	4.2	4.3	4.5	4.7	5.5	11.8	6.6	5.2	6.3	7.2	7.2	7.8	9.7	10.3	6.1	11.8																						
3-Jul	10.7	12.0	10.4	6.9	5.5	4.4	3.7	3.2	3.1	3.3	3.3	3.1	2.9	2.7	3.3	3.7	4.4	4.6	5.2	4.9	4.5	5.0	4.9	4.0	5.0	12.0																						
4-Jul	3.7	3.6	3.6	3.9	3.8	3.4	2.8	2.6	2.5	2.8	3.4	4.0	4.5	5.9	5.9	6.5	4.6	3.9	4.1	6.2	4.5	5.2	5.9	6.1	4.3	6.5																						
5-Jul	6.1	6.0	6.5	6.8	6.6	4.6	2.8	2.1	1.8	1.9	2.2	2.6	2.2	2.5	2.6	3.7	3.6	3.2	3.3	4.5	6.0	8.1	8.5	3.5	4.2	8.5																						
6-Jul	4.4	8.6	4.8	2.7	2.6	2.6	2.3	2.5	3.2	2.7	3.1	3.8	3.6	3.8	4.6	4.0	3.7	3.9	4.4	4.3	3.8	7.4	9.0	11.1	4.5	11.1																						
7-Jul	11.9	10.6	9.9	8.9	7.9	6.3	4.5	3.3	3.0	2.7	2.8	3.1	3.4	2.9	2.8	3.3	3.5	4.5	5.9	4.5	4.4	6.2	9.5	12.1	5.7	12.1																						
8-Jul	15.1	13.3	12.0	10.5	11.7	15.6	12.3	17.3	12.0	9.9	12.7	15.6	12.0	12.2	23.6	20.1	10.6	8.9	8.9	9.6	9.3	10.1	11.3	11.1	12.7	23.6																						
9-Jul	12.3	13.1	13.9	17.7	15.4	15.3	15.5	13.2	17.9	17.0	15.8	13.0	17.0	17.8	18.4	18.3	20.1	21.7	20.0	18.5	19.2	21.1	20.7	12.7	16.9	21.7																						
10-Jul	16.1	18.2	17.1	16.0	13.0	13.1	12.4	13.2	12.2	10.7	11.2	12.5	14.7	14.6	10.3	10.7	11.3	18.2	13.4	12.4	8.4	9.8	10.7	12.3	13.0	18.2																						
11-Jul	12.2	11.4	11.6	10.1	9.6	9.8	11.9	13.7	13.4	13.9	8.9	6.7	7.6	8.9	6.7	6.2	6.0	7.2	11.4	11.0	8.4	8.6	8.2	8.1	9.6	13.9																						
12-Jul	7.8	8.0	9.1	9.5	9.1	8.9	8.3	7.4	10.2	15.7	8.4	7.3	6.8	6.6	6.4	8.2	7.6	6.0	4.6	5.6	6.2	6.6	6.5	7.5	7.9	15.7																						
13-Jul	9.3	9.6	9.0	8.4	8.3	8.8	8.5	8.1	7.6	M	M	6.7	7.9	9.5	11.6	11.5	12.4	9.2	9.2	11.6	14.0	14.6	15.5	13.5	10.2	15.5																						
14-Jul	11.0	4.6	5.8	11.8	9.3	7.1	4.5	3.8	4.0	3.6	3.5	4.1	5.2	6.4	7.7	8.3	9.9	6.9	5.6	4.1	4.2	4.6	5.1	5.0	6.1	11.8																						
15-Jul	4.4	4.5	5.0	5.3	6.0	6.6	5.9	7.1	36.8	26.5	17.3	17.6	18.8	22.2	23.5	20.6	19.4	17.8	17.2	14.8	13.0	12.4	18.4	13.7	14.8	36.8																						
16-Jul	18.2	30.9	27.7	28.7	28.3	28.7	27.9	29.5	32.8	29.0	23.3	10.7	7.0	8.2	5.0	3.7	2.6	2.4	2.5	2.2	2.1	2.2	2.6	2.9	15.0	32.8																						
17-Jul	4.1	14.8	22.8	22.1	13.0	6.6	1.4	1.5	1.9	1.5	1.3	1.4	1.4	1.6	1.4	1.5	1.6	1.8	1.9	1.8	1.8	1.8	2.1	2.3	4.7	22.8																						
18-Jul	2.1	2.2	3.2	2.8	3.9	3.1	2.1	2.1	1.9	1.6	1.5	1.6	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.6	1.6	1.9	3.9																						
19-Jul	1.6	1.6	1.7	1.7	1.7	1.8	1.9	2.1	2.3	2.4	2.4	2.7	3.0	3.0	2.2	2.5	3.9	3.5	3.8	4.9	9.8	22.6	22.8	29.2	5.6	29.2																						
20-Jul	30.2	20.1	15.0	15.7	12.7	9.9	9.1	9.0	7.7	9.6	11.2	10.1	8.9	9.0	7.1	5.5	5.8	6.3	6.9	7.5	8.2	9.2	11.9	10.4	10.7	30.2																						
21-Jul	8.8	8.9	9.7	11.7	10.8	9.0	9.1	8.8	8.7	C	17.2	16.8	14.6	13.4	15.5	13.2	10.7	9.4	9.9	13.1	24.8	22.3	18.9	17.5	13.2	24.8																						
22-Jul	16.3	16.3	15.8	15.7	15.8	16.1	17.3	16.6	14.5	11.1	6.9	5.5	4.1	3.8	4.2	4.2	4.5	6.3	7.4	7.9	9.4	10.6	10.6	10.3	10.5	17.3																						
23-Jul	8.4	6.7	6.4	6.5	6.3	5.9	5.2	5.1	6.2	7.2	6.7	5.0	3.4	2.8	5.1	7.3	5.7	5.9	6.6	9.4	12.0	12.0	12.4	10.7	7.0	12.4																						
24-Jul	10.6	10.1	8.6	6.0	4.4	4.1	4.7	5.3	7.3	16.8	10.0	8.7	8.9	9.3	8.0	8.5	14.0	13.5	17.9	30.3	33.9	34.7	21.9	14.3	13.0	34.7																						
25-Jul	11.5	9.4	6.8	6.2	5.0	4.0	3.1	3.0	2.7	2.4	2.1	1.9	1.9	2.4	2.8	2.4	2.8	2.8	2.5	2.8	4.2	4.6	6.0	7.0	4.2	11.5																						
26-Jul	8.4	9.4	8.9	9.2	9.3	9.1	8.8	7.4	5.5	4.1	3.6	3.0	3.1	3.9	4.0	4.3	4.6	4.9	5.4	6.6	7.5	10.8	10.5	8.4	6.7	10.8																						
27-Jul	9.1	8.1	7.9	8.2	8.1	7.7	7.7	6.7	5.8	5.4	5.0	5.4	5.3	6.6	12.6	19.3	26.4	23.5	20.5	19.7	16.6	12.4	7.7	6.5	10.9	26.4																						
28-Jul	5.3	4.6	5.0	6.3	7.1	7.2	6.9	9.5	6.9	2.8	2.7	2.5	2.9	2.7	2.2	2.6	2.3	4.2	12.7	3.5	4.0	4.1	4.2	4.0	4.8	12.7																						
29-Jul	4.1	4.4	4.7	5.1	4.9	4.2	3.3	2.1	2.2	3.9	4.7	3.0	2.4	5.1	5.0	4.1	3.9	4.0	3.0	3.2	3.9	3.9	3.9	3.4	3.8	5.1																						
30-Jul	4.0	4.9	5.2	5.2	5.3	5.9	6.1	7.1	7.4	6.9	6.1	6.8	6.6	5.5	7.5	9.8	12.6	10.3	4.0	3.4	3.5	4.2	4.5	4.7	6.1	12.6																						
31-Jul	6.6	7.6	6.0	5.5	4.0	3.5	3.2	3.3	2.9	2.4	2.1	2.4	2.6	3.1	4.5	3.4	3.0	3.4	5.2	8.2	11.3	11.5	9.8	10.0	5.2	11.5																						
																								9.2	9.5	9.2	9.1	8.3	7.9	7.3	7.3	8.3	7.9	7.0	6.4	6.3	6.8	7.3	7.6	7.6	7.4	7.7	8.2	8.9	10.0	9.9	9.2	Diurnal Average
																								30.2	30.9	27.7	28.7	28.3	28.7	27.9	29.5	36.8	29.0	23.3	17.6	18.8	22.2	23.6	20.6	26.4	23.5	20.5	30.3	33.9	34.7	22.8	29.2	Diurnal Maximum
C - Calibration M - Maintenance																																																
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}) - $\mu\text{g}/\text{m}^3$
Horizon - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon - July 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	317	42.78	42.78
6 - 15	338	45.61	88.39
16 - 25	69	9.31	97.71
26 - 80	17	2.29	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Horizon - July 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	3	23	16	4	4	0	1	0	16	52	56	57	16	37	14	18	317
6 - 15	9	48	10	5	8	7	5	9	29	76	47	34	16	24	5	6	338
16 - 25	1	7	1	1	2	6	4	9	8	13	5	2	2	6	2	0	69
26 - 80	0	1	0	1	0	0	0	0	1	3	3	3	0	0	1	4	17
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	79	27	11	14	13	10	18	54	144	111	96	34	67	22	28	741

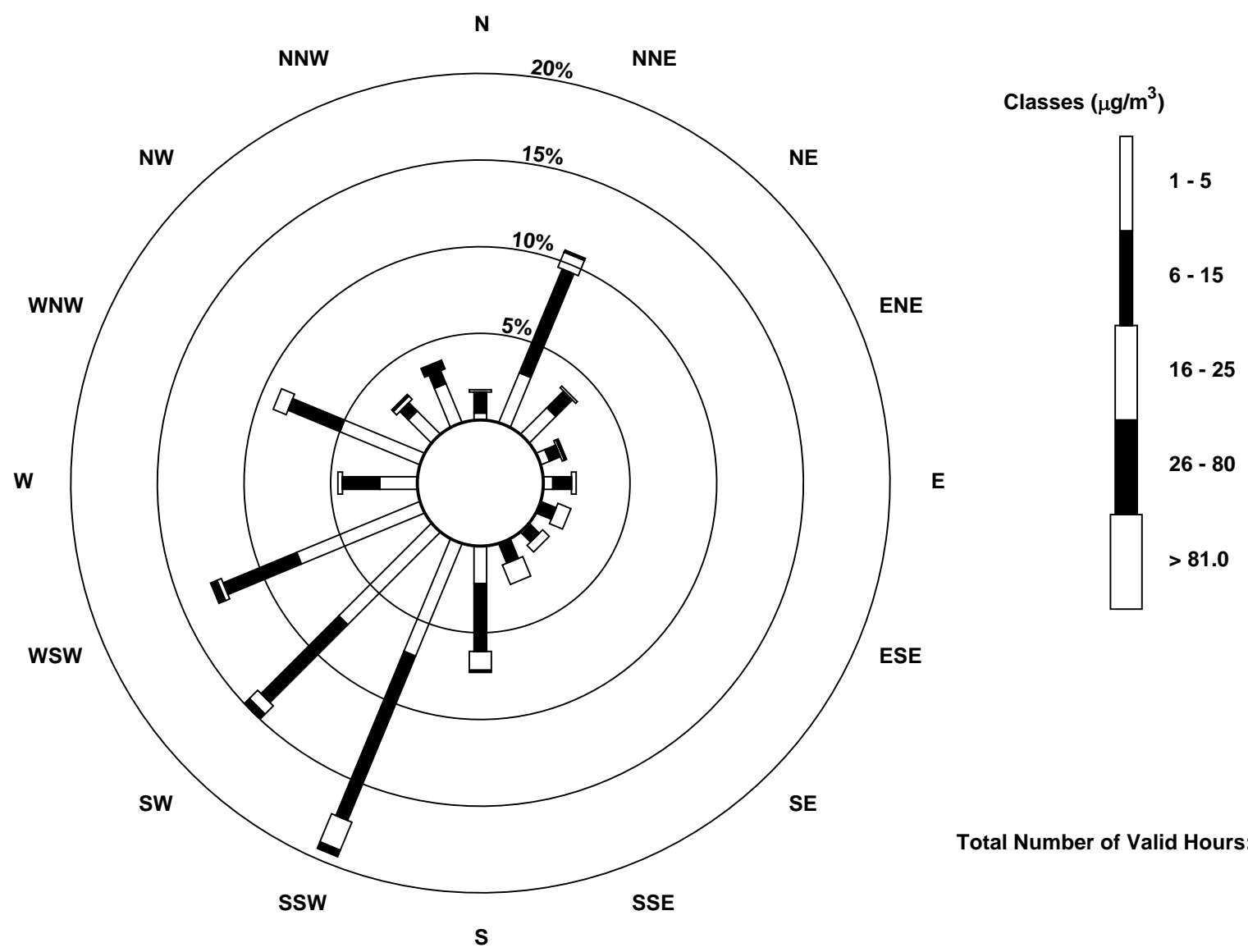
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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

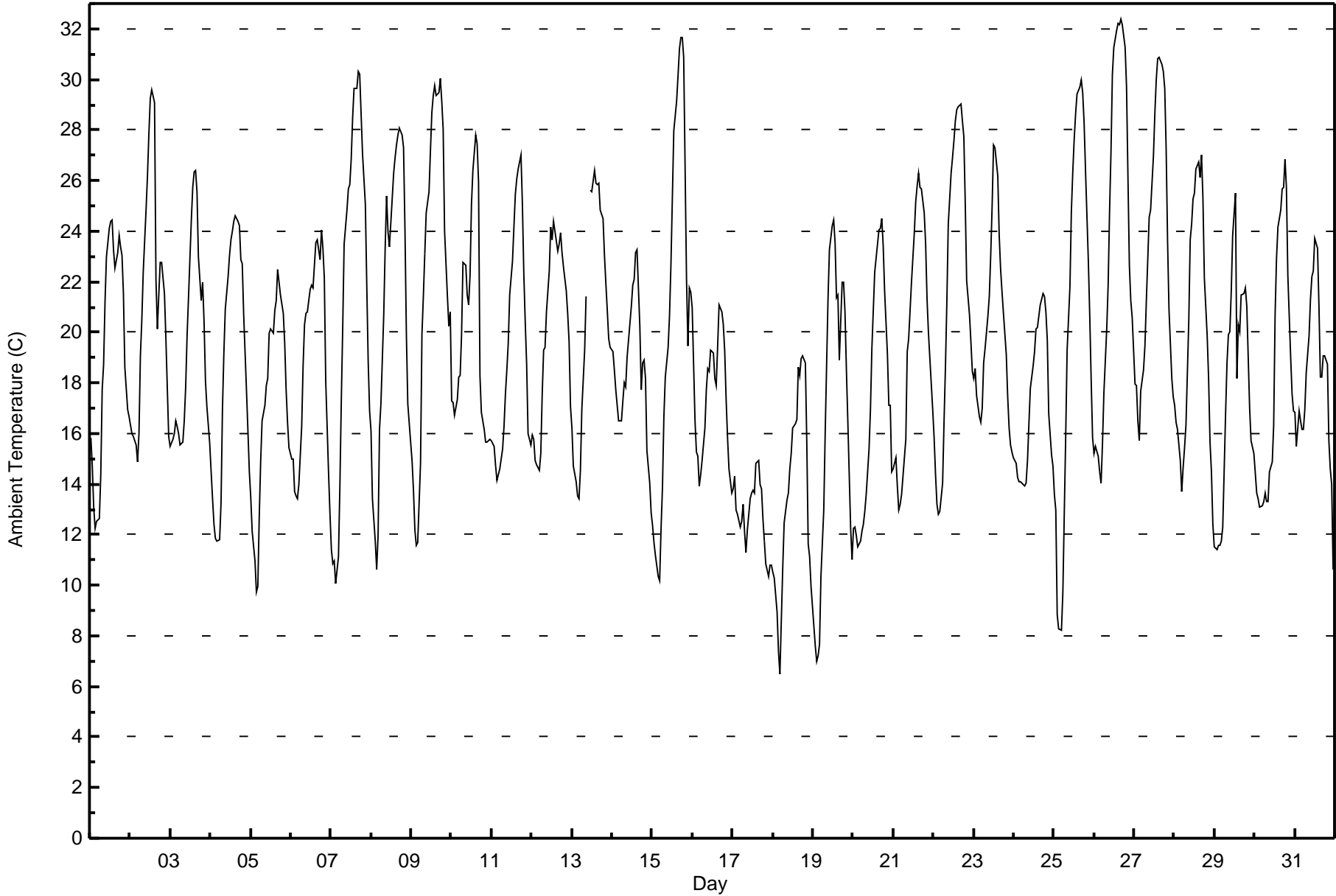
Horizon - July 2017

Maximum Value: 32.4 C on Jul 26 17:00		Maximum Daily Average: 24.0 C on Jul 26		Hours in Service: 744																																												
Minimum Value: 6.5 C on Jul 18 05:00		Minimum Daily Average: 12.8 C on Jul 17		Hours of Data: 742																																												
Maximum Diurnal Average: 24.8 C at hour 15		Minimum Diurnal Average: 13.0 C at hour 4		Hours of Missing Data: 2																																												
Monthly Average: 19.30 C		Percentiles: P ₁ = 8.2 P ₁₀ = 12.5 Q ₁ = 15.1 Median = 18.9 Q ₃ = 23.2 P ₉₀ = 26.8 P ₉₉ = 31.6		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-Jul	15.8	14.7	13.1	12.2	12.5	12.6	14.4	17.7	18.7	21.2	23.0	24.1	24.4	24.4	23.3	22.5	23.2	23.8	23.4	23.1	21.6	18.6	17.0	16.7	19.2	24.4																						
2-Jul	16.3	16.0	15.9	15.6	14.9	16.0	19.1	20.5	22.3	24.8	26.2	27.9	29.3	29.6	29.1	22.1	20.2	21.5	22.7	22.8	21.5	19.8	17.8	15.9	21.2	29.6																						
3-Jul	15.5	15.8	16.0	16.5	16.3	16.0	15.6	15.7	16.5	17.8	19.9	21.3	24.4	25.7	26.3	26.4	25.5	23.0	21.3	22.0	20.4	18.1	17.0	15.6	19.5	26.4																						
4-Jul	14.5	13.4	12.4	11.8	11.8	11.8	13.2	17.0	19.2	20.9	22.2	23.1	23.7	24.0	24.4	24.6	24.4	24.2	22.9	22.7	20.7	17.6	16.1	14.5	18.8	24.6																						
5-Jul	13.5	12.1	11.0	9.7	10.0	12.7	14.9	16.5	17.1	17.9	18.2	20.0	20.1	20.0	20.9	21.3	22.5	22.0	21.5	20.7	19.6	17.7	16.5	15.4	17.1	22.5																						
6-Jul	15.0	15.0	13.7	13.6	13.4	14.0	16.3	18.7	20.3	20.8	20.8	21.7	21.9	21.7	22.7	23.5	23.7	22.9	24.1	23.3	22.1	18.1	14.4	12.8	18.9	24.1																						
7-Jul	11.4	10.8	10.9	10.1	11.1	13.9	17.3	20.2	23.5	24.8	25.7	25.8	26.8	28.5	29.7	29.6	30.3	30.2	28.7	27.1	25.0	21.9	18.8	16.9	21.6	30.3																						
8-Jul	16.1	13.4	11.8	10.7	12.0	16.2	17.2	20.7	23.3	25.4	24.0	23.4	24.3	26.3	26.9	27.4	27.8	28.1	27.8	27.3	24.1	19.9	17.2	15.6	21.1	28.1																						
9-Jul	14.9	13.7	12.2	11.6	11.7	14.8	19.9	21.4	23.1	24.7	25.6	27.2	28.7	29.4	29.8	29.3	29.5	30.0	29.1	28.0	24.0	21.4	20.2	20.8	22.5	30.0																						
10-Jul	17.3	17.2	16.7	17.3	18.2	18.3	19.9	22.8	22.6	21.5	21.1	22.3	25.1	26.4	27.8	27.5	26.0	18.3	16.9	16.1	15.6	15.6	15.7	15.8	20.1	27.8																						
11-Jul	15.7	15.5	14.8	14.1	14.4	14.6	15.4	16.3	17.5	18.5	19.5	21.5	22.8	24.2	25.5	26.1	26.4	27.0	25.1	22.3	20.4	18.8	16.0	15.6	19.5	27.0																						
12-Jul	16.0	15.8	15.0	14.7	14.5	15.2	17.5	19.3	19.4	20.8	22.4	24.2	23.6	24.4	24.0	23.2	23.5	23.9	23.2	22.6	21.6	20.8	19.7	17.1	20.1	24.4																						
13-Jul	16.2	14.7	14.1	13.5	13.4	14.5	16.9	19.3	21.4	M	M	25.6	25.6	26.4	25.9	25.8	25.9	24.8	24.5	23.0	21.9	20.9	19.7	19.4	20.6	26.4																						
14-Jul	19.2	18.5	17.7	17.1	16.5	16.5	17.3	18.0	17.8	19.0	19.7	21.0	21.9	22.1	23.2	23.2	20.2	17.7	18.8	18.9	18.2	15.3	14.1	12.9	18.5	23.2																						
15-Jul	12.4	11.7	11.2	10.4	10.2	12.3	13.9	16.7	18.2	19.4	20.7	22.7	25.4	28.0	29.2	30.1	31.2	31.6	31.6	30.9	22.1	19.5	21.8	21.6	20.9	31.6																						
16-Jul	21.0	16.5	15.2	15.1	14.0	14.4	14.9	16.2	17.7	18.6	18.4	19.3	19.2	18.2	17.9	19.5	21.1	20.8	20.3	19.2	17.3	15.8	14.6	13.7	17.5	21.1																						
17-Jul	13.8	14.3	13.0	12.8	12.3	12.6	13.2	12.1	11.3	12.2	13.4	13.7	13.8	13.7	14.8	15.0	14.0	13.8	12.7	11.8	10.9	10.3	10.8	10.8	12.8	15.0																						
18-Jul	10.5	10.3	9.0	7.4	6.5	8.6	10.7	12.4	13.3	13.6	14.6	15.2	16.2	16.4	16.6	18.6	18.3	19.0	19.1	18.8	15.6	11.7	11.1	10.0	13.5	19.1																						
19-Jul	8.4	7.6	7.0	7.2	7.7	10.3	13.0	16.0	18.7	21.3	23.3	24.2	24.4	23.5	21.4	21.5	18.9	22.0	22.0	20.8	18.5	16.5	12.2	11.0	16.6	24.4																						
20-Jul	12.3	12.3	11.9	11.5	11.7	12.1	12.4	12.9	13.6	15.4	17.0	19.4	20.9	22.4	23.5	24.1	24.1	24.5	23.4	21.6	19.1	17.1	17.1	14.5	17.3	24.5																						
21-Jul	14.6	15.0	13.9	13.0	13.2	13.6	14.3	15.8	19.2	19.7	20.9	22.0	24.0	25.2	25.8	26.3	25.7	25.7	24.7	23.5	21.3	20.0	18.9	17.0	19.7	26.3																						
22-Jul	15.8	14.4	13.2	12.8	12.9	14.0	16.5	18.6	21.2	24.2	26.3	26.9	27.6	28.4	28.8	28.9	29.0	28.4	27.8	25.1	22.0	20.7	19.6	18.4	21.7	29.0																						
23-Jul	18.2	18.6	17.5	16.6	16.4	17.0	18.8	19.4	20.6	21.4	23.0	25.0	27.4	27.3	26.2	23.9	22.5	21.6	20.8	19.2	17.5	16.2	15.5	15.3	20.2	27.4																						
24-Jul	15.1	14.8	14.3	14.1	14.1	14.1	13.9	14.0	14.9	16.4	17.8	18.7	19.2	20.1	20.2	20.7	21.1	21.6	21.4	20.8	19.7	16.8	15.2	14.7	17.2	21.6																						
25-Jul	13.6	13.0	8.8	8.3	8.2	9.7	12.8	15.9	19.3	21.8	24.8	26.3	27.6	28.7	29.4	29.7	30.0	29.5	28.3	26.4	22.8	20.6	18.1	15.8	20.4	30.0																						
26-Jul	15.2	15.5	15.1	14.5	14.1	15.6	17.6	20.1	21.8	24.8	27.1	30.2	31.3	31.9	32.2	32.1	32.4	32.2	31.3	29.7	26.1	22.7	21.2	20.6	24.0	32.4																						
27-Jul	18.0	17.9	16.5	15.7	17.7	18.5	19.5	21.2	22.9	24.5	24.9	27.0	28.6	30.0	30.8	30.9	30.6	30.3	29.6	27.2	23.6	20.9	18.2	17.5	23.4	30.9																						
28-Jul	17.1	16.4	16.1	15.0	13.7	14.6	15.5	16.3	20.5	23.6	24.3	25.3	25.5	26.4	26.7	26.1	27.0	25.3	22.2	19.9	18.2	15.6	14.5	12.4	19.9	27.0																						
29-Jul	11.5	11.4	11.6	11.6	11.7	12.3	16.8	18.8	19.9	20.0	21.6	23.8	25.5	18.2	20.3	20.0	21.5	21.6	21.7	21.0	19.0	17.0	15.7	15.2	17.8	25.5																						
30-Jul	14.4	13.6	13.5	13.1	13.2	13.3	13.7	13.3	13.3	14.5	14.9	16.3	20.7	22.9	24.1	24.8	25.7	25.7	26.8	25.7	22.3	19.0	17.6	16.9	18.3	26.8																						
31-Jul	16.8	15.5	16.9	16.5	16.2	16.2	16.9	18.4	19.9	21.3	22.2	22.5	23.7	23.3	21.0	18.3	18.2	19.1	19.1	18.8	15.7	14.6	14.0	10.6	18.2	23.7																						
																								15.0	14.4	13.5	13.0	13.0	14.1	15.8	17.5	19.0	20.4	21.4	22.8	24.0	24.4	24.8	24.6	24.5	24.2	23.6	22.6	20.3	18.0	16.7	15.5	Diurnal Average
																								21.0	18.6	17.7	17.3	18.2	18.5	19.9	22.8	23.5	25.4	27.1	30.2	31.3	31.9	32.2	32.1	32.4	32.2	31.6	30.9	26.1	22.7	21.8	21.6	Diurnal Maximum
M - Maintenance																																																



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Horizon - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Horizon - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	16	2.16	2.16
10 - 20	402	54.18	56.33
> 20	324	43.67	100.00

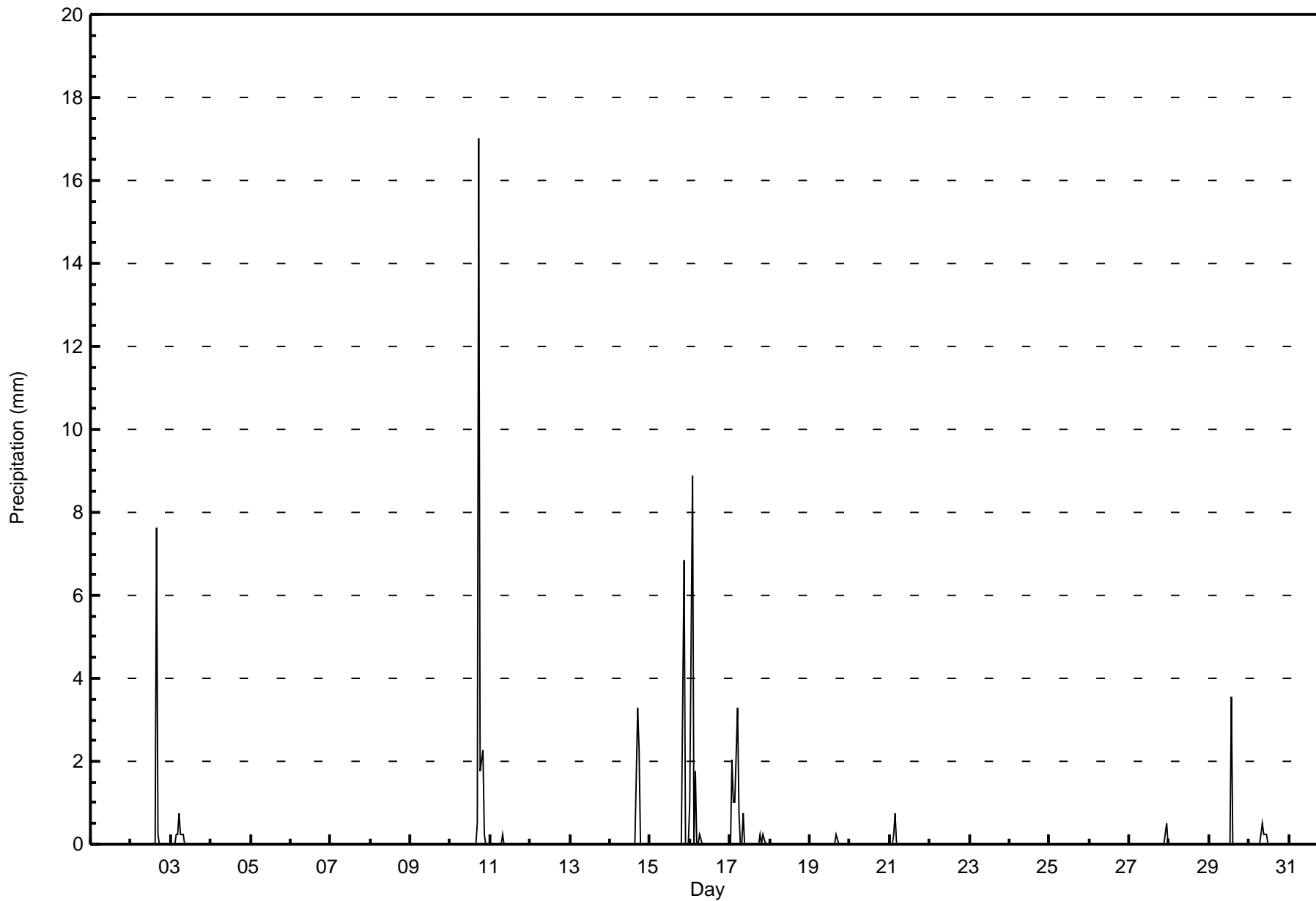
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Horizon - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

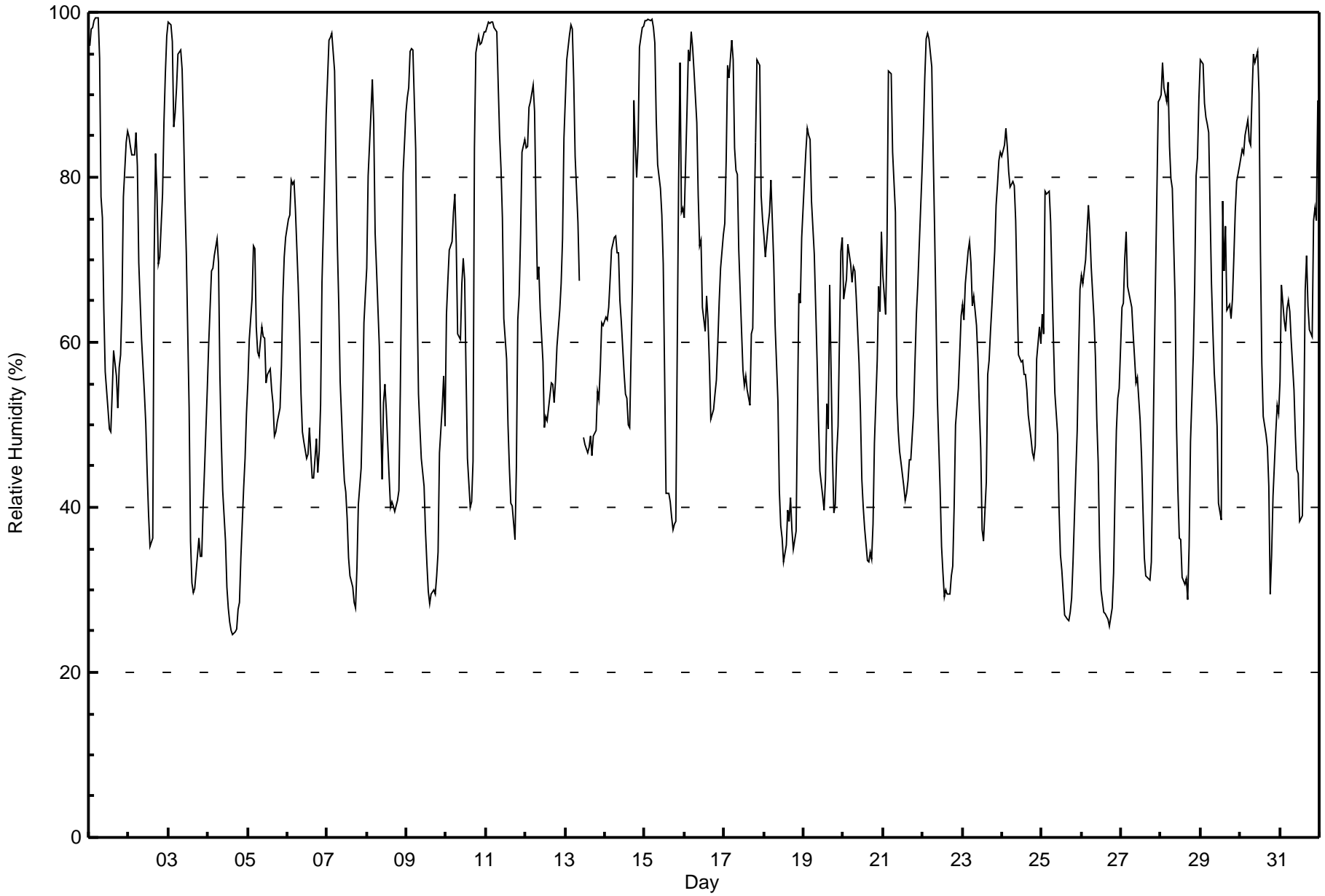
Horizon - July 2017

Maximum Value: 99 % on Jul 1 05:00																		Maximum Daily Average: 75.2 % on Jul 17																		Hours in Service: 744														
Minimum Value: 25 % on Jul 4 16:00																		Minimum Daily Average: 44.6 % on Jul 4																		Hours of Data: 742														
Maximum Diurnal Average: 84.6 % at hour 5																		Minimum Diurnal Average: 42.7 % at hour 15																		Hours of Missing Data: 2														
Monthly Average: 62.8 %																		Percentiles: P ₁ = 26 P ₁₀ = 35 Q ₁ = 47 Median = 63 Q ₃ = 78 P ₉₀ = 92 P ₉₉ = 99																		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-Jul	96	98	98	99	99	99	94	78	75	64	56	52	49	49	54	59	56	52	57	59	65	78	84	86	73.2	99																								
2-Jul	85	84	83	83	86	81	70	65	60	54	50	44	39	35	36	70	83	78	69	70	78	87	93	97	70.0	97																								
3-Jul	99	99	97	86	88	91	95	95	93	86	77	71	52	36	31	30	30	32	36	34	34	40	45	54	63.8	99																								
4-Jul	60	64	69	69	71	73	70	56	48	42	36	30	28	26	25	25	25	25	28	29	34	42	46	51	44.6	73																								
5-Jul	55	60	65	72	71	62	59	58	62	61	61	55	56	57	54	53	49	49	50	52	57	65	70	73	59.4	73																								
6-Jul	75	75	80	79	79	76	67	61	54	49	48	46	46	50	46	44	44	48	44	47	52	67	81	88	60.3	88																								
7-Jul	92	97	97	97	93	82	72	65	55	47	43	42	39	34	32	30	29	28	33	40	45	52	62	66	57.1	97																								
8-Jul	69	80	88	92	86	73	69	59	50	43	53	55	52	44	40	41	40	40	41	42	54	69	81	88	60.4	92																								
9-Jul	90	91	95	96	95	83	66	54	50	46	43	37	33	30	28	30	30	30	32	35	47	52	56	50	54.0	96																								
10-Jul	63	67	71	72	76	78	72	61	60	67	70	68	56	46	40	41	46	84	95	97	96	96	97	98	71.6	98																								
11-Jul	98	99	99	99	99	98	98	91	85	81	75	63	58	50	45	40	40	36	45	63	66	73	83	85	73.6	99																								
12-Jul	84	84	89	89	91	88	77	68	69	64	58	50	51	50	52	55	55	53	55	59	64	67	73	85	67.8	91																								
13-Jul	89	94	97	99	98	92	83	75	68	M	M	49	48	47	47	49	46	49	49	54	53	57	62	62	66.6	99																								
14-Jul	63	63	64	68	71	73	73	71	71	65	63	56	54	53	50	50	68	89	84	80	84	96	98	98	71.0	98																								
15-Jul	99	99	99	99	99	98	96	87	82	79	75	69	56	42	42	41	39	37	38	38	80	94	76	76	72.5	99																								
16-Jul	75	88	95	94	98	96	93	87	78	72	72	64	61	66	63	57	51	52	54	55	60	65	69	73	72.4	98																								
17-Jul	74	82	93	92	97	94	84	81	80	71	61	57	55	56	54	52	61	62	74	84	94	94	78	75	75.2	97																								
18-Jul	73	70	74	76	80	75	70	62	53	42	38	36	33	35	40	38	41	37	35	37	52	66	65	73	54.2	80																								
19-Jul	80	83	86	85	85	77	71	64	58	50	44	41	40	43	53	50	67	46	39	40	46	50	71	73	60.1	86																								
20-Jul	65	66	68	72	70	67	69	69	65	57	51	43	40	37	34	33	35	34	38	48	58	67	64	73	55.1	73																								
21-Jul	68	63	72	93	93	93	83	76	54	49	47	45	43	41	42	43	46	46	51	58	63	67	72	81	62.0	93																								
22-Jul	86	92	97	97	97	93	83	74	64	53	42	35	32	29	30	29	29	32	33	40	50	54	59	63	58.1	97																								
23-Jul	65	63	67	71	72	70	64	66	62	58	52	47	37	36	43	56	58	61	64	71	77	79	82	83	62.7	83																								
24-Jul	83	84	86	84	81	79	80	79	75	66	59	58	58	56	56	54	51	48	47	46	47	58	62	60	64.8	86																								
25-Jul	63	61	78	78	78	75	67	60	54	49	40	34	32	30	27	26	26	27	29	33	44	49	58	66	49.5	78																								
26-Jul	68	67	70	73	77	74	69	63	58	51	45	35	30	27	27	27	26	26	28	32	41	49	53	54	48.8	77																								
27-Jul	64	65	70	73	67	65	64	61	58	55	56	50	46	40	34	32	31	31	33	44	57	68	89	89	56.0	89																								
28-Jul	90	94	91	89	92	84	80	79	65	50	42	36	36	32	31	31	29	35	48	59	67	80	82	90	62.9	94																								
29-Jul	94	94	89	87	86	85	67	61	56	53	50	40	39	77	69	74	64	65	63	65	70	76	80	81	70.3	94																								
30-Jul	82	83	83	85	87	84	84	90	95	94	95	90	71	57	51	49	47	43	30	34	41	49	52	51	67.9	95																								
31-Jul	55	67	63	61	64	65	64	60	54	49	45	44	38	39	50	66	70	64	61	61	75	76	75	89	60.7	89																								
																								77.5	79.9	83.0	84.2	84.6	81.4	75.8	70.1	64.9	58.9	54.9	49.8	45.4	43.6	42.7	44.4	45.5	46.4	47.9	51.8	59.7	67.2	71.5	75.2	Diurnal Average		
																								99	99	99	99	99	99	98	95	95	94	95	90	90	71	77	69	74	83	89	95	97	96	96	98	98	Diurnal Maximum	
M - Maintenance																																																		



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Horizon - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Horizon - July 2017

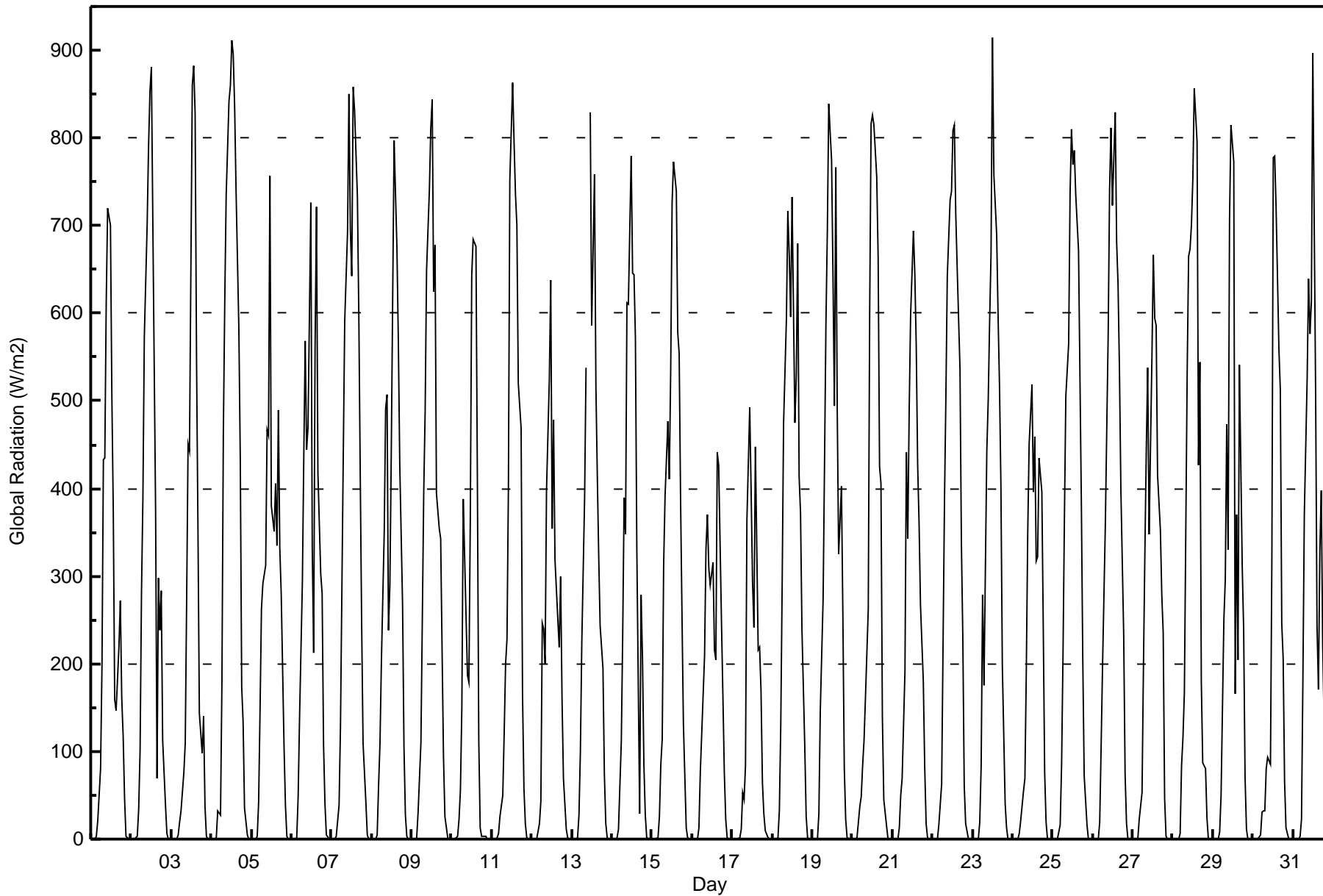
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	112	15.09	15.09
40 - 60	226	30.46	45.55
60 - 80	234	31.54	77.09
80 - 100	170	22.91	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Maximum Value: 914 W/m2 on Jul 23 13:00														Maximum Daily Average: 354.1 W/m2 on Jul 4														Hours in Service: 744	
Minimum Value: 0 W/m2 on Jul 1 01:00														Minimum Daily Average: 130.9 W/m2 on Jul 17														Hours of Data: 742	
Maximum Diurnal Average: 664.3 W/m2 at hour 13														Minimum Diurnal Average: 0.0 W/m2 at hour 1														Hours of Missing Data: 2	
Monthly Average: 250.8 W/m2														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 146 Q ₃ = 443 P ₉₀ = 700 P ₉₉ = 847														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-Jul	0	0	0	2	22	81	198	433	434	612	720	700	506	375	159	147	219	272	162	117	47	3	0	0	217.1	720			
2-Jul	0	0	0	3	34	101	282	390	573	700	791	853	880	708	373	69	298	238	283	112	39	6	0	0	280.7	880			
3-Jul	0	0	0	1	5	19	33	76	109	273	452	443	860	882	827	548	357	143	98	140	37	3	0	0	221.0	882			
4-Jul	0	0	0	1	32	28	180	464	614	734	842	860	911	895	835	741	582	433	174	134	35	4	0	0	354.1	911			
5-Jul	0	0	0	3	42	146	263	292	313	467	460	756	380	351	406	334	490	332	281	106	39	3	0	0	227.6	756			
6-Jul	0	0	0	2	48	138	294	437	568	445	470	727	332	212	561	721	419	302	280	107	40	4	0	0	254.5	727			
7-Jul	0	0	0	3	39	129	286	442	591	693	850	696	643	859	832	733	597	417	246	109	41	4	0	0	342.1	859			
8-Jul	0	0	0	5	61	110	204	349	490	507	239	290	440	797	736	675	568	428	267	104	27	3	0	0	262.5	797			
9-Jul	0	0	0	2	31	110	251	397	489	649	740	811	844	625	678	395	354	344	216	93	25	2	0	0	294.0	844			
10-Jul	0	0	0	3	22	57	150	389	253	187	178	366	642	685	676	415	113	13	4	3	3	0	0	173.3	685				
11-Jul	0	0	0	1	7	25	51	121	199	229	401	752	863	796	736	700	519	468	166	58	18	1	0	0	254.7	863			
12-Jul	0	0	0	1	17	43	246	241	199	398	525	637	355	478	319	252	220	299	160	69	11	1	0	0	186.2	637			
13-Jul	0	0	0	1	28	100	224	390	538	M	M	830	586	758	517	413	322	244	194	74	18	2	0	0	238.1	830			
14-Jul	0	0	0	1	10	111	235	389	348	612	610	780	645	645	571	330	29	278	207	85	27	2	0	0	246.4	780			
15-Jul	0	0	0	1	26	86	114	312	391	477	410	534	725	773	740	578	555	388	256	132	14	1	0	0	271.3	773			
16-Jul	0	0	0	0	12	78	121	210	331	370	309	289	315	216	204	441	426	247	163	76	23	1	0	0	159.7	441			
17-Jul	0	0	0	0	2	11	54	45	84	364	493	396	293	242	447	216	219	170	64	29	10	1	0	0	130.9	493			
18-Jul	0	0	0	1	33	131	293	474	594	717	666	595	732	475	529	679	414	371	240	107	26	2	0	0	295.0	732			
19-Jul	0	0	0	1	29	146	273	428	587	695	840	774	643	495	766	493	326	403	257	83	22	1	0	0	302.5	840			
20-Jul	0	0	0	1	37	49	84	113	162	262	602	817	826	815	756	664	424	407	140	45	15	1	0	0	259.1	826			
21-Jul	0	0	0	0	13	49	69	191	440	343	490	597	694	645	562	426	360	268	181	81	18	1	0	0	226.2	694			
22-Jul	0	0	0	0	15	63	223	385	504	642	730	738	808	815	714	652	537	337	230	61	18	0	0	0	311.4	815			
23-Jul	0	0	0	0	19	84	279	176	443	501	591	668	914	758	689	597	517	402	199	40	13	1	0	0	287.1	914			
24-Jul	0	0	0	0	6	21	54	69	193	350	450	518	396	459	318	322	435	396	243	75	20	1	0	0	180.2	518			
25-Jul	0	0	0	0	16	86	211	367	506	566	737	810	769	786	736	671	529	383	207	72	16	0	0	0	311.2	810			
26-Jul	0	0	0	1	20	105	197	359	468	574	740	811	722	829	681	632	535	400	234	75	18	0	0	0	308.4	829			
27-Jul	0	0	0	0	22	53	196	325	442	538	348	549	667	594	587	415	353	279	235	46	3	0	0	0	235.5	667			
28-Jul	0	0	0	0	7	84	116	167	535	665	673	700	754	857	795	426	545	180	87	80	23	0	0	0	279.0	857			
29-Jul	0	0	0	0	8	49	251	296	473	331	707	815	773	167	371	205	542	310	239	70	11	0	0	0	234.1	815			
30-Jul	0	0	0	0	4	30	33	32	80	94	85	321	778	779	720	559	513	246	205	66	14	0	0	0	190.0	779			
31-Jul	0	0	0	0	3	22	185	370	526	639	577	614	896	510	242	171	329	397	222	48	8	0	0	0	239.9	896			
																												Diurnal Average	
0.0														0.0														Diurnal Maximum	
0														5															
M - Maintenance																													





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Horizon - July 2017

Maximum Speed: 28 km/h on Jul 4 14:00	Maximum Daily Speed Average: 17.3 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 13 12:00	Minimum Daily Speed Average: 0.6 km/h on Jul 29	Hours of Data: 742
Maximum Diurnal Speed Average: 6.1 km/h at hour 14	Minimum Diurnal Speed Average: 1.7 km/h at hour 20	Hours of Missing Data: 2
Monthly Average Velocity: 4.1 km/h 250.1 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 12 P ₉₀ = 17 P ₉₉ = 25	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-Jul	S3	S3	SSW2	S3	SSW4	S4	SW6	SW4	N3	SW4	SSW5	S8	SSW9	SSW8	SSW8	SSW7	SSW6	S6	SSW5	SE4	E4	E3	SSW4	SSW7	SSW4.2	SSW9
2-Jul	S6	S5	SSW8	SSW7	SW7	SSW6	S10	SSW13	SSW13	SSW12	SSW14	SSW15	SSW14	SSW16	S14	W8	SSW4	E5	ESE6	E5	NE5	N5	NW4	WSW2	SSW6.3	SSW16
3-Jul	SSW5	SSW7	SW6	S11	S9	SSW8	SSW9	SW8	SSW8	SSW11	SSW12	SSW13	SW14	WSW17	SW20	WSW16	WSW17	WSW20	SW15	SW16	WSW16	WSW15	WSW17	W13	SSW11.8	WSW20
4-Jul	SW12	SW13	SW13	SW13	SW13	SW13	SW15	WSW19	WSW19	SW21	SW24	WSW26	WSW26	WSW28	WSW26	WSW27	WSW23	WSW21	W17	W16	WSW9	SW9	SW10	SW12	WSW17.3	WSW28
5-Jul	SW12	WSW7	WSW10	SW7	SW4	WSW12	WSW13	W12	WNW21	WNW20	NW18	WNW16	WNW18	WNW19	WNW17	NW17	WNW19	NW23	WNW22	WNW19	WNW11	WNW7	WNW6	W8	WNW12.7	NW23
6-Jul	W9	W9	WSW8	WSW9	SW11	WSW13	WSW13	SW10	WNW13	WNW18	WNW19	NNW11	NW5	NNW7	WNW19	WNW16	WNW5	ENE4	ENE2	E4	NE3	NNE3	WNW2	SW2	W6.6	WNW19
7-Jul	W3	SSW4	SSW5	SSW6	SSW5	SSW6	SSW6	SSW7	SSW7	WSW10	W8	W6	W6	W9	WSW10	W7	WSW10	WNW5	NE9	NNE13	NE11	NNE5	NNE4	NW5	W2.8	NNE13
8-Jul	WNW4	SSW3	SW5	WSW2	WSW1	ENE2	NE2	NE3	E2	SSE6	SW12	SW12	WSW8	S9	SW11	SW13	SW11	SW10	SW8	SW6	SW5	SSW6	SSW4	WSW3	SW5.1	SW13
9-Jul	N3	WNW2	WNW2	WNW3	S4	SW3	SE2	S6	SSW5	S4	ESE8	SE9	SE7	SE9	ESE9	ESE9	SSE6	SSW10	SSW7	S5	S4	ESE3	SE4	SSE5	SSE3.8	SSW10
10-Jul	SW4	SSE2	WSW4	S7	SW5	SSE1	WSW4	WSW7	WNW9	WSW8	WSW10	SW9	SSW9	SSW7	WSW7	SW6	SSE5	E11	NW4	WSW12	W3	E6	N1	WNW7	SW3.9	WSW12
11-Jul	SSE4	SW4	SW4	SSW4	SSW6	NE2	W4	NW6	WNW6	W8	WSW9	W9	WNW11	WNW9	W9	W6	SSW7	SW11	SW9	SSW13	WSW13	WSW5	S5	SSW5	WSW5.5	WSW13
12-Jul	SSW7	SW4	S4	S5	SSW6	SSW4	SSW4	SSE4	SSE3	SSW5	SSW5	SSW8	S10	SW7	W7	WNW7	S6	SSW11	S11	S7	S7	S8	S8	SSW7	SSW5.6	S11
13-Jul	SSW7	SW6	SSW6	SSW8	SSW9	SSW8	SSW6	SSW5	NNW2	M	M	N0	NNE4	NNE7	NNE10	NNE10	NNE10	NNE14	NNE14	NNE15	NNE12	NNE9	NNE9	NNE11	NNE3.4	NNE15
14-Jul	N15	NNE14	NNE13	NNE12	NNE11	NNE10	NNE12	NNE13	NNE15	NE14	NE11	NE9	NE7	ENE5	NE5	ENE7	NNW17	NE8	NNE6	NNE6	N3	WNW2	W3	WSW2	NNE8.3	NNW17
15-Jul	SW4	SSW5	SSW4	SW3	SSW3	SSW3	S4	SSW5	SSW3	ENE5	ENE5	NNE5	E7	SSE12	SSE12	SSE12	SSE12	SSE9	S10	WSW7	SSW8	S10	WSW7	SSW8	S5.0	SSE12
16-Jul	NW21	NNW13	S3	SW10	SSW8	SSW9	WSW10	WSW8	SW8	SW8	SSW9	SW11	SW14	SSW16	SW13	WSW14	WSW18	WSW16	WSW14	WSW14	WSW15	SW13	SW13	SW11	WSW10.4	NW21
17-Jul	WSW12	W12	W9	W12	WSW10	WNW10	NW18	NNW21	NNW21	N18	N18	NNW20	NNW18	NNW17	NNW12	NNE13	NNW17	NNW7	NNW7	NE1	SW5	W7	NW11	NW13	NW10.1	NNW21
18-Jul	NW13	NNW11	NW9	NW8	WNW7	SW1	S5	SSW5	W6	NW11	WNW7	WNW7	WNW7	WNW8	W9	WSW12	SW13	WSW14	WSW10	WSW9	SW7	SW8	SW10	WSW9	W6.8	WSW14
19-Jul	WSW9	WSW8	WSW8	SW11	SW16	SW16	SW14	SW15	SW12	SW14	SW14	WSW11	W10	NW8	NE17	NE15	ENE8	NE11	NE11	NE9	NNE6	NNE6	NW4	NNW5	WSW3.5	NE17
20-Jul	NNE7	NNE7	NE7	NNE6	NNE6	NNE6	NNE6	NNE7	NE5	ENE4	ENE8	ESE8	E8	ESE7	SSE6	SE7	SE5	E6	E6	ESE4	S5	NE3	ENE4	SSE2	ENE4.0	ENE8
21-Jul	SE4	ESE4	NNW3	NNW3	NE4	W1	NNE4	ESE1	N2	ESE5	ESE4	ESE6	SE5	SSW4	SSE7	SSW11	SSW9	SW9	SW7	SSW6	S8	S9	S10	SW9	S3.3	SSW11
22-Jul	SSW9	SSW7	SSW7	SSW7	SSW9	SSW12	SSW12	SSW13	SSW12	SW15	SW16	WSW18	SW18	WSW17	SW16	SW18	WSW17	WSW15	WSW14	SW9	SW7	SW10	SW11	WSW7	SW11.9	SW18
23-Jul	WSW8	SW12	WSW9	WSW11	SW12	WSW10	WSW8	WSW9	W10	WNW7	NNW6	SW7	SW11	WSW12	NW5	NNE16	NNE18	NNE16	NNE15	NNE16	NNE13	NNE10	NNE12	NNE14	NW4.0	NNE18
24-Jul	NNE12	NNE13	NNE12	NNE15	NNE17	NNE17	NNE17	NNE15	NNE16	NNE20	NNE20	NNE24	NNE24	NNE21	NNE20	NNE19	N21	N21	N18	NNW17	NNW14	NW9	WNW10	WNW10	N15.6	NNE24
25-Jul	WNW9	WNW5	SW7	SSW7	SSW8	SSW7	SSW7	S8	SSW10	S8	SSW12	SW14	SW13	SW13	SW12	SSW12	SSW12	S13	S11	S10	SSW9	SSW8	SSW7	SSW6	SSW8.6	SW14
26-Jul	SSW7	SSW10	SSW10	S10	SSW10	SSW10	SSW10	SSW11	SSW8	SSW11	SSW11	SW14	SW13	SSW11	SSW10	SSW9	SSW11	SSW11	SSW12	S9	SSW9	SSW10	SSW10	SW8	SSW10.1	SW14
27-Jul	ESE1	SSW7	S6	S8	S8	S8	SSW7	SSW10	SSW11	SSW12	S10	SSW11	SSW13	SW12	WSW10	WSW13	WSW10	WNW10	WNW10	WNW5	WNW15	WNW17	W5	WSW10	SW7.1	WNW17
28-Jul	WSW1	SSW9	WSW12	WSW13	SW12	SW9	SW11	SW9	SW11	WSW16	WNW20	WNW22	WNW25	WNW25	WNW23	WNW21	WNW19	NNW12	NNW17	E6	S4	SSW9	SW8	WSW6	W9.9	WNW25
29-Jul	SSW4	SW7	SSW7	SW9	SW8	SW7	SW5	WSW3	S2	NW3	E5	SW4	SW6	NNW6	NNE5	NE6	NE9	ENE8	NE7	NE6	NNE8	NNE7	NNE6	NNE7	N0.6	NE9
30-Jul	NNE6	NNE6	NNE7	NNE6	NNE6	NNE6	NNE1	SW8	SSW8	SSW4	SSW9	SSW10	S9	S12	SSW16	S15	S17	SSW10	W10	WSW7	SW9	WSW9	WSW13	WSW12	SW5.1	S17
31-Jul	WNW9	W7	WNW11	WNW12	WSW8	W11	WNW13	WNW15	WNW15	WNW13	WNW16	WNW20	WNW24	NW24	NNW25	NNW20	NNW13	NNE17	NNE13	NNE9	NW4	WNW8	WNW8	WSW4	NW11.0	NNW25

W3.5WSW3.2WSW3.9 SW4.3 SW4.8 SW4.2 SW4.3 SW4.9WSW4.5WSW4.8WSW4.8WSW5.7WSW6.0WSW6.1 W5.4 W4.7 W4.8 W2.8WNW2.6WSW1.7WSW2.7WSW2.9WSW3.8WSW4.3	Diurnal Average
NW21 NNE14 NNE13 NNE15 NNE17 NNE17 NW18 NNW21 NNW21 SW21 SW24WSW26WSW26WSW28WSW26WSW27WSW23 NW23WNW22WNW19WSW16WNW17WSW17 NNE14	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

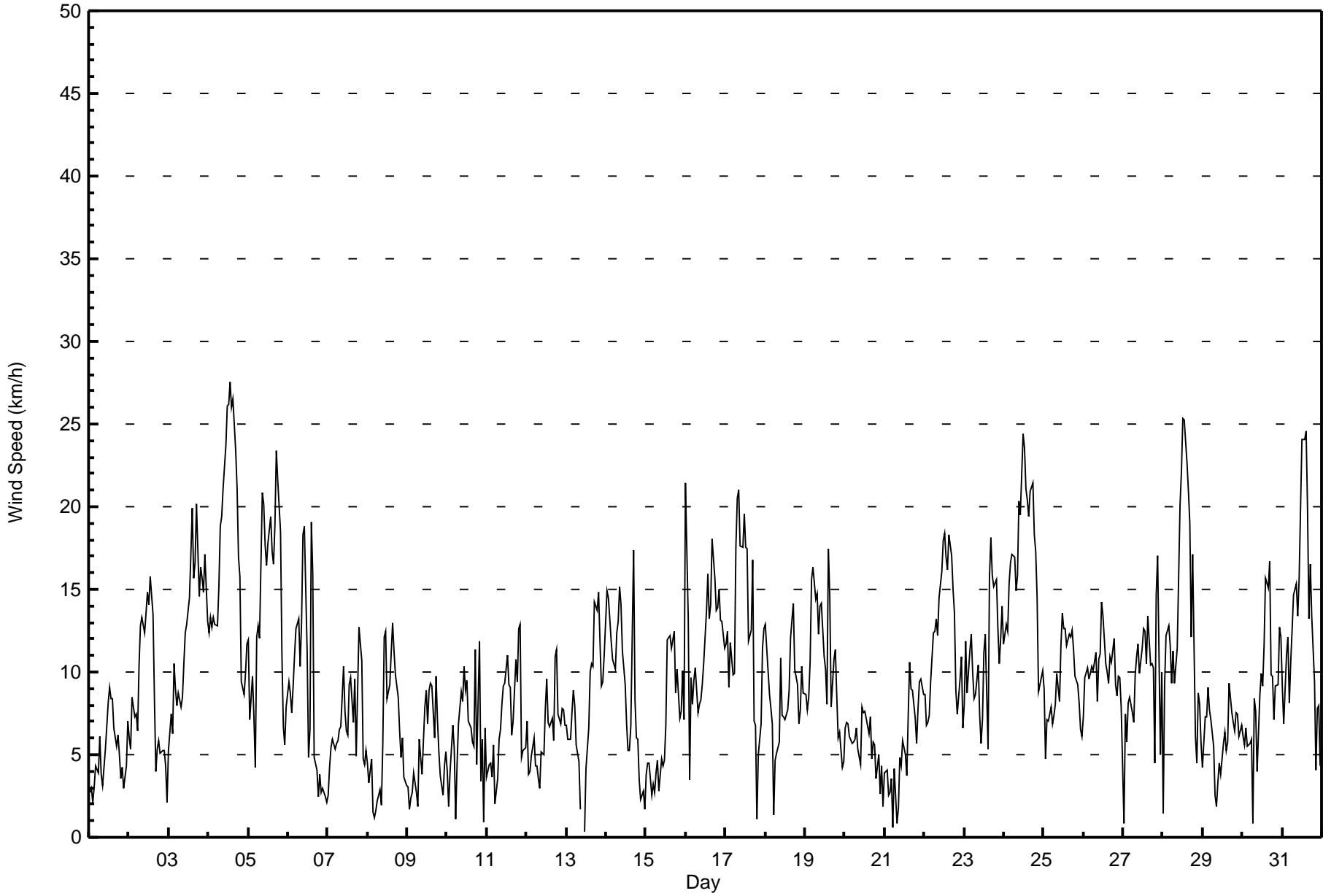
Wind Speed (WS) - km/h
Horizon - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 21 km/h on Jul 16 01:00 Minimum Value: 1 km/h on Jul 14 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	2	1	1	2	1	2	2	1	2	3	3	3	4	2	2	2	2	2	1	1	1	1	2	1	4
2-Jul	1	1	2	1	1	2	3	3	4	4	4	5	5	4	4	6	2	2	2	2	1	1	1	1	6
3-Jul	3	2	2	3	2	1	2	2	2	3	4	3	5	5	5	6	7	5	4	5	4	3	6	4	7
4-Jul	3	3	3	3	3	3	4	5	5	6	7	8	7	7	7	7	7	6	5	5	2	1	1	2	8
5-Jul	2	3	2	1	2	3	3	6	4	4	4	4	6	4	4	4	4	5	5	3	3	2	3	1	6
6-Jul	2	2	3	2	2	3	3	3	4	5	5	4	3	3	5	5	3	3	2	2	2	2	1	2	5
7-Jul	2	2	2	2	1	1	1	2	2	4	4	3	4	4	4	5	4	4	4	3	2	2	1	1	5
8-Jul	2	2	1	2	2	2	2	1	2	2	5	4	3	3	3	4	3	3	2	2	1	1	2	2	5
9-Jul	1	1	2	1	1	2	2	2	2	2	3	3	4	4	4	4	4	3	2	1	1	1	1	2	4
10-Jul	1	2	1	3	2	2	1	2	2	2	3	2	3	4	3	3	2	5	3	2	3	1	2	2	5
11-Jul	2	1	2	1	2	1	3	2	1	2	3	2	3	3	3	3	3	3	3	5	4	1	2	2	5
12-Jul	1	1	2	1	1	2	1	1	1	2	2	3	3	3	3	2	4	3	3	2	2	2	2	1	4
13-Jul	1	1	1	1	2	2	2	1	1	M	M	2	2	6	3	3	4	4	4	4	3	2	2	3	6
14-Jul	4	4	4	3	3	3	4	4	3	4	3	3	3	3	2	2	10	3	2	2	1	1	1	1	10
15-Jul	2	1	2	2	2	2	3	2	2	2	2	2	3	4	4	4	4	4	3	3	5	1	2	3	5
16-Jul	21	10	3	7	2	2	3	2	2	2	3	4	4	4	5	5	5	5	3	3	3	3	3	2	21
17-Jul	3	5	2	2	2	4	4	4	5	5	5	6	4	5	5	4	4	2	3	2	2	2	2	3	6
18-Jul	2	3	4	2	1	2	1	2	3	4	4	3	4	4	4	4	4	4	4	2	1	1	2	2	4
19-Jul	2	2	1	2	3	3	4	4	4	4	4	4	4	5	5	4	3	4	3	2	1	1	1	1	5
20-Jul	1	1	1	2	1	1	1	1	2	2	3	3	3	3	3	3	2	2	1	1	2	2	1	1	3
21-Jul	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	4	3	2	2	2	2	2	2	2	4
22-Jul	1	1	1	1	2	2	3	3	3	4	4	5	5	5	5	5	4	4	4	2	1	2	2	2	5
23-Jul	2	2	2	2	2	3	3	2	2	3	2	5	4	5	6	4	5	4	4	4	4	3	3	4	6
24-Jul	4	4	3	5	4	5	5	4	5	5	6	7	6	6	6	6	6	6	5	4	3	1	1	2	7
25-Jul	1	2	1	1	1	1	2	2	2	3	4	4	4	4	4	4	3	4	3	2	1	1	2	1	4
26-Jul	1	2	1	1	2	2	3	3	2	3	3	5	4	4	3	4	4	4	3	2	1	1	2	4	5
27-Jul	2	1	1	1	1	2	2	3	3	3	3	3	4	4	3	4	3	3	3	2	5	6	4	2	6
28-Jul	2	3	2	2	3	2	2	2	3	5	5	5	6	6	5	6	5	6	11	3	1	2	3	1	11
29-Jul	3	2	2	2	2	2	2	2	3	2	2	3	3	8	2	2	3	3	2	2	2	1	1	1	8
30-Jul	1	1	1	1	1	1	2	2	3	2	2	3	2	4	4	5	5	4	2	2	1	3	2	2	5
31-Jul	3	3	3	3	2	2	3	3	3	4	5	5	5	5	5	6	4	5	4	3	2	1	2	1	6
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Horizon - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	166	22.37	22.37
6 - 11	349	47.04	69.41
12 - 19	189	25.47	94.88
20 - 28	38	5.12	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - July 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	9	10	7	7	7	6	8	18	30	18	11	6	10	7	5	166
6 - 11	0	32	14	4	7	7	4	6	31	92	50	40	22	26	7	7	349
12 - 19	4	32	3	0	0	0	0	4	5	22	40	37	6	20	5	11	189
20 - 28	2	6	0	0	0	0	0	0	0	0	3	8	0	11	3	5	38
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	13	79	27	11	14	14	10	18	54	144	111	96	34	67	22	28	742

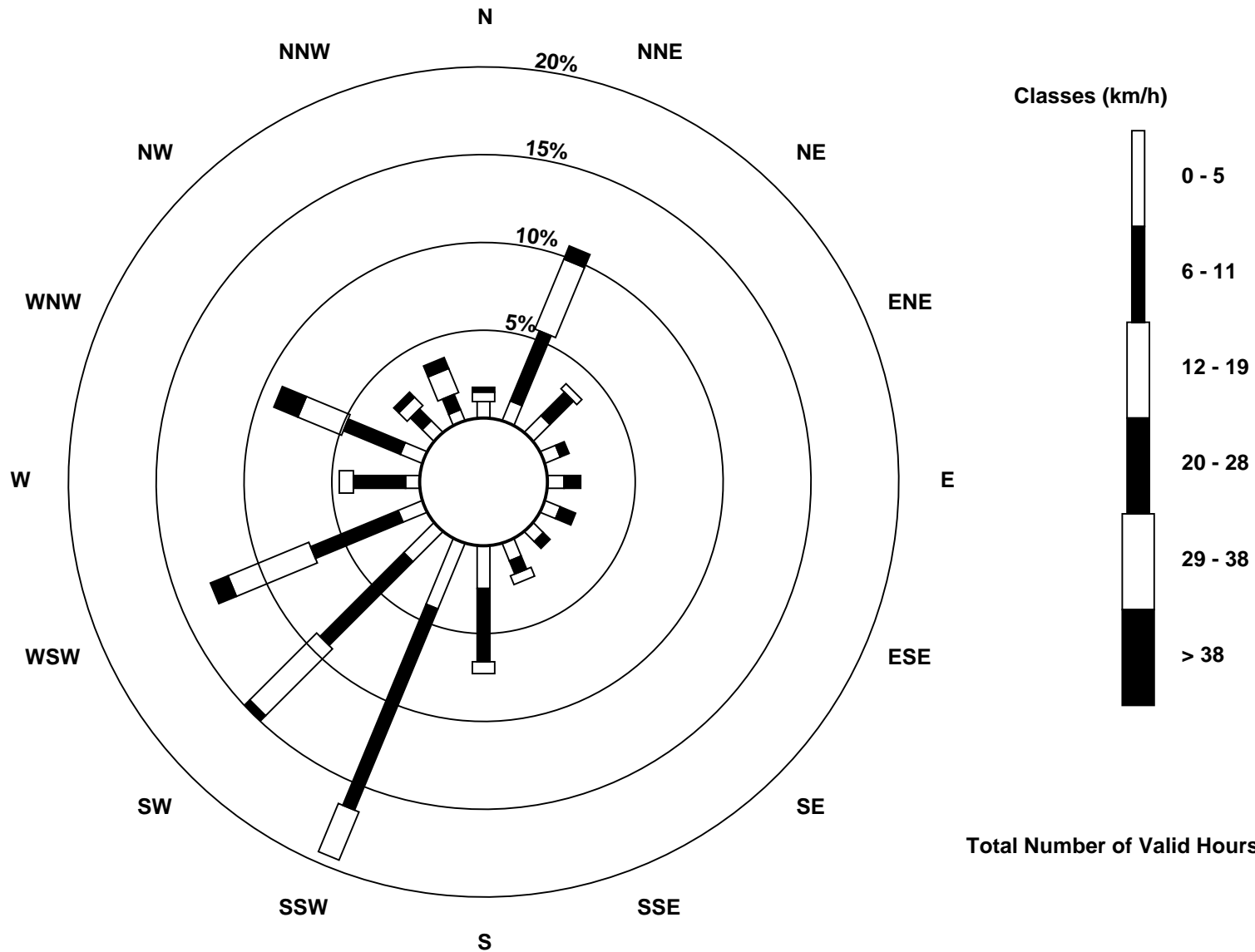
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Horizon (AMS 15)





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg
Horizon - July 2017

Direction of Maximum Speed: 254 deg on Jul 4 14:00 Direction of Maximum Daily Speed Average: 240.8 deg on Jul 4	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2
Direction of Minimum Speed: 356 deg on Jul 13 12:00 Direction of Minimum Daily Speed Average: 0.6 deg on Jul 29	Percent Operational Time: 99.7
Monthly Average Direction: 241.4 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-Jul	184	175	203	185	204	170	219	218	349	231	207	191	200	195	196	199	198	191	192	129	100	81	197	209	194.0
2-Jul	188	183	198	206	223	201	188	201	196	212	199	202	203	198	189	276	201	89	111	92	49	9	319	241	198.0
3-Jul	204	208	216	182	190	192	193	217	199	192	202	210	225	239	232	244	243	239	214	233	246	237	247	261	224.8
4-Jul	224	221	224	222	236	224	229	240	241	232	230	240	250	254	249	241	255	253	261	268	247	233	229	224	240.8
5-Jul	225	239	239	224	234	242	244	263	299	298	307	299	285	301	294	307	298	307	300	296	301	300	283	260	286.0
6-Jul	271	279	241	251	226	242	243	230	285	286	302	332	320	327	298	283	299	78	68	84	46	29	292	227	279.9
7-Jul	260	195	209	206	205	199	193	193	200	257	276	280	274	261	243	262	256	299	55	31	35	25	25	323	259.0
8-Jul	287	202	228	247	247	62	40	38	81	148	216	228	238	190	216	231	214	232	226	231	216	203	206	241	219.7
9-Jul	3	300	282	303	185	217	145	185	208	182	120	132	126	138	121	104	157	192	192	178	186	120	143	153	155.6
10-Jul	227	164	249	182	222	159	240	241	295	237	242	223	213	207	241	214	156	89	314	242	270	80	11	288	229.2
11-Jul	156	226	234	204	201	44	270	306	285	274	256	274	292	295	266	277	196	228	231	195	237	242	185	198	245.2
12-Jul	194	221	172	185	201	197	200	147	160	210	194	193	190	234	270	292	182	194	191	176	173	177	184	195	196.3
13-Jul	201	222	209	200	213	209	200	202	328	M	M	356	32	19	33	28	26	18	17	17	17	15	17	13	14.1
14-Jul	11	17	17	21	18	19	24	23	21	36	45	36	38	57	34	71	331	54	33	24	4	292	268	255	21.9
15-Jul	224	203	201	223	206	193	186	193	194	57	22	30	99	156	160	158	156	167	156	177	241	198	182	240	173.9
16-Jul	306	329	191	236	192	203	241	238	216	218	197	228	215	212	225	238	248	252	250	240	238	232	233	235	237.4
17-Jul	246	275	261	259	254	285	324	329	344	357	11	348	347	340	348	13	336	330	346	37	233	261	315	321	325.0
18-Jul	318	332	313	307	292	234	174	193	281	308	296	294	287	285	271	242	229	240	248	237	231	224	235	253	267.3
19-Jul	251	247	241	235	230	230	227	229	224	219	229	237	261	323	35	36	65	45	53	36	30	19	309	345	258.1
20-Jul	13	20	34	24	22	29	32	30	45	57	78	116	97	103	150	142	126	91	81	102	182	49	62	149	71.3
21-Jul	140	111	333	341	34	262	27	113	349	115	102	111	130	193	163	204	212	218	216	195	170	176	189	214	178.1
22-Jul	209	199	201	204	199	198	194	201	210	216	229	237	231	240	234	236	238	237	237	228	217	218	218	248	222.7
23-Jul	238	231	246	241	232	244	252	248	262	302	343	232	232	250	326	27	19	32	32	29	21	21	21	22	321.2
24-Jul	24	24	24	19	20	20	19	19	22	25	21	22	19	16	15	13	2	352	0	344	337	307	301	289	9.1
25-Jul	303	288	223	209	213	199	193	190	196	189	212	216	220	230	222	208	209	190	189	189	198	202	211	205	209.7
26-Jul	201	203	194	189	198	195	196	207	196	206	210	214	222	208	210	204	201	192	195	185	192	199	211	216	202.3
27-Jul	108	196	178	172	175	177	198	210	211	197	191	207	206	220	244	245	254	283	298	301	296	293	277	257	231.7
28-Jul	251	207	241	237	230	230	229	216	225	256	286	296	303	297	303	290	290	341	331	96	171	203	216	241	272.1
29-Jul	206	216	212	223	222	230	232	237	185	317	95	236	219	330	15	52	44	65	40	49	31	23	18	13	351.4
30-Jul	16	31	33	28	23	12	32	214	206	204	200	194	188	183	194	188	191	202	269	239	234	253	239	254	215.0
31-Jul	286	269	288	284	252	272	284	287	294	282	291	289	299	321	327	340	347	20	25	13	314	295	292	238	307.6

262.2 247.9 238.1 231.8 224.7 226.4 233.1 236.2 256.9 253.7 250.8 250.3 251.9 258.3 260.4 263.7 260.2 263.3 281.8 257.1 258.7 250.0 245.7 256.7
Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

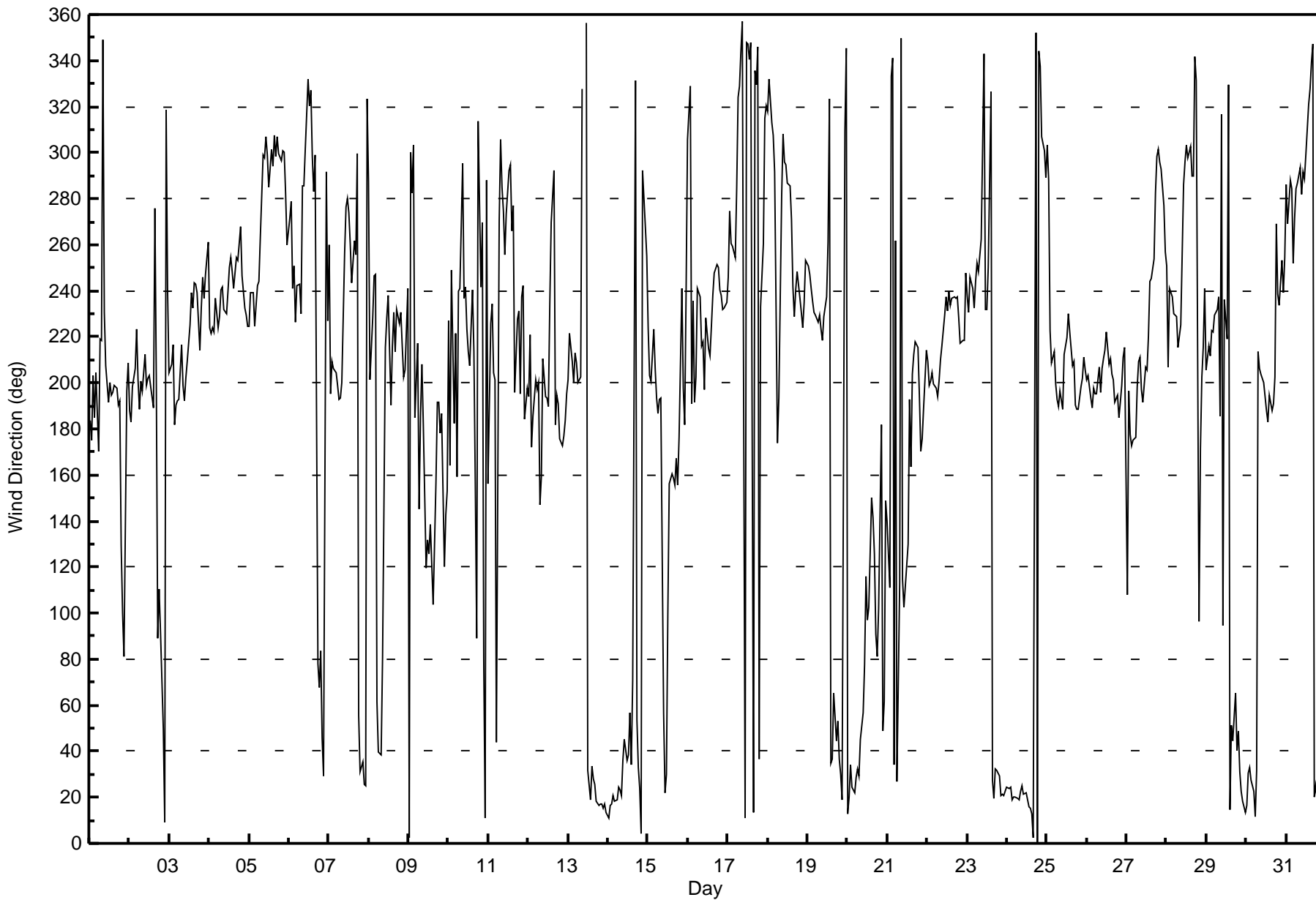
Wind Direction (WD) - deg
Horizon - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 107 deg on Jul 13 12:00 Minimum Value: 7 deg on Jul 30 04:00 Percentiles: P ₁ = 10 P ₁₀ = 13 Q ₁ = 17 Median = 22 Q ₃ = 32 P ₉₀ = 54 P ₉₉ = 85																		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	60	40	39	33	15	28	25	44	74	72	63	38	39	28	20	21	26	28	20	31	20	35	20	13	74
2-Jul	15	12	13	15	14	22	23	22	21	25	24	24	25	22	26	62	67	22	27	24	26	24	13	43	67
3-Jul	35	16	20	22	19	15	20	21	22	21	22	19	26	23	21	21	20	18	17	21	15	15	25	18	35
4-Jul	15	15	15	15	16	15	15	17	19	20	18	19	21	19	20	18	19	20	17	20	16	11	11	12	21
5-Jul	12	30	10	12	42	13	17	34	15	17	16	22	17	16	17	14	17	11	14	11	10	22	22	11	42
6-Jul	13	13	16	22	12	16	20	23	25	21	20	28	56	40	17	22	69	48	93	43	26	29	47	65	93
7-Jul	31	17	28	20	13	16	20	22	32	37	51	64	56	43	41	64	33	63	32	19	18	25	23	19	64
8-Jul	46	62	26	79	86	80	80	43	80	35	23	21	37	31	32	24	25	24	20	16	17	8	53	57	86
9-Jul	58	58	55	34	27	34	53	29	34	69	41	41	60	50	41	33	51	30	22	18	24	34	28	28	69
10-Jul	42	63	33	19	50	76	27	25	27	30	17	21	29	53	56	55	45	31	64	18	83	21	83	13	83
11-Jul	55	16	28	34	21	76	71	22	18	19	20	25	23	33	30	49	41	25	17	21	24	40	23	12	76
12-Jul	19	34	25	24	15	28	33	44	43	34	52	37	21	38	33	25	61	24	18	18	16	14	13	12	61
13-Jul	12	15	16	13	18	23	24	31	77	M	M	107	70	90	26	24	22	21	22	20	21	20	19	20	107
14-Jul	21	21	21	19	21	20	23	22	21	22	24	35	45	63	56	34	41	37	26	17	27	24	21	70	70
15-Jul	16	17	16	60	34	32	77	30	81	41	39	48	47	31	30	27	27	24	26	23	68	15	25	34	81
16-Jul	22	31	66	53	26	19	20	24	21	21	20	21	19	19	17	20	18	18	19	16	14	14	14	13	66
17-Jul	18	15	18	14	17	29	11	12	18	25	25	26	25	19	28	25	23	35	49	79	21	20	12	13	79
18-Jul	10	15	18	15	14	66	25	39	60	30	41	46	54	46	38	30	26	20	21	16	11	10	12	15	66
19-Jul	12	13	12	12	11	13	18	17	21	19	26	37	37	64	23	24	27	22	19	19	11	10	20	36	64
20-Jul	16	15	15	16	19	18	18	18	21	35	31	45	42	52	68	46	47	41	19	43	30	47	35	49	68
21-Jul	19	18	39	38	41	87	18	90	77	38	53	45	54	81	38	24	21	20	19	32	16	16	14	13	90
22-Jul	11	14	10	9	13	14	16	19	19	20	20	21	21	22	21	20	19	18	16	16	10	11	11	22	22
23-Jul	19	13	19	15	12	20	23	23	19	33	54	46	37	30	76	25	23	21	20	19	20	19	20	20	76
24-Jul	21	20	20	22	21	21	21	21	20	20	22	22	23	25	22	22	24	24	25	17	12	14	8	12	25
25-Jul	10	49	11	11	13	16	17	19	20	24	28	23	24	26	32	26	24	22	17	14	11	11	14	11	49
26-Jul	9	13	12	11	15	16	18	21	25	22	25	22	25	38	33	41	25	29	18	14	12	10	13	16	41
27-Jul	83	15	23	8	12	15	22	19	20	21	22	22	23	26	29	19	25	20	24	65	17	15	31	17	83
28-Jul	90	22	12	13	14	15	13	17	20	24	22	19	17	19	18	21	18	39	28	53	49	15	13	15	90
29-Jul	61	14	15	14	18	17	21	59	77	67	59	86	63	77	43	32	27	27	23	21	15	16	16	16	86
30-Jul	16	11	11	7	11	11	79	14	23	57	20	21	28	26	21	24	22	41	21	15	11	26	11	16	79
31-Jul	23	28	14	12	17	15	13	15	18	24	24	18	18	19	16	20	31	24	21	21	38	10	21	25	38
90 63 66 79 86 87 80 90 81 72 63 107 70 90 76 64 69 63 93 79 83 47 83 70																									
Diurnal Maximum																									
M - Maintenance																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Horizon - July 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	July 13, 2017	Last Cal Date:	June 13, 2017
Start time (MST):	11:14	End time (MST):	15:30
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	0.990847	1.002156	Lamp voltage	865	864
Calculated intercept	-0.270162	-0.841360	Pressure	708.1	710.0
Analyzer Background	19.8	20.1	Flow	0.554	0.555
Analyzer Coefficient	1.027	1.011	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	5070	0.0	0.0	0.4	----
as found span	4995	81.6	803.7	815.0	0.986
calibrator zero	5070	0.0	0.0	0.1	----
high point	4995	81.6	803.7	802.4	1.002
second point	5040	40.6	399.6	400.0	0.999
third point	5060	20.2	198.8	199.9	0.995
as left zero	5070	0.0	0.0	-0.1	----
as left span	4995	81.6	803.7	803.2	1.001
Average Correction Factor					0.998
Corrected As found	814.60	Previous response	811.38	*% change	-0.4%

* = > +/-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

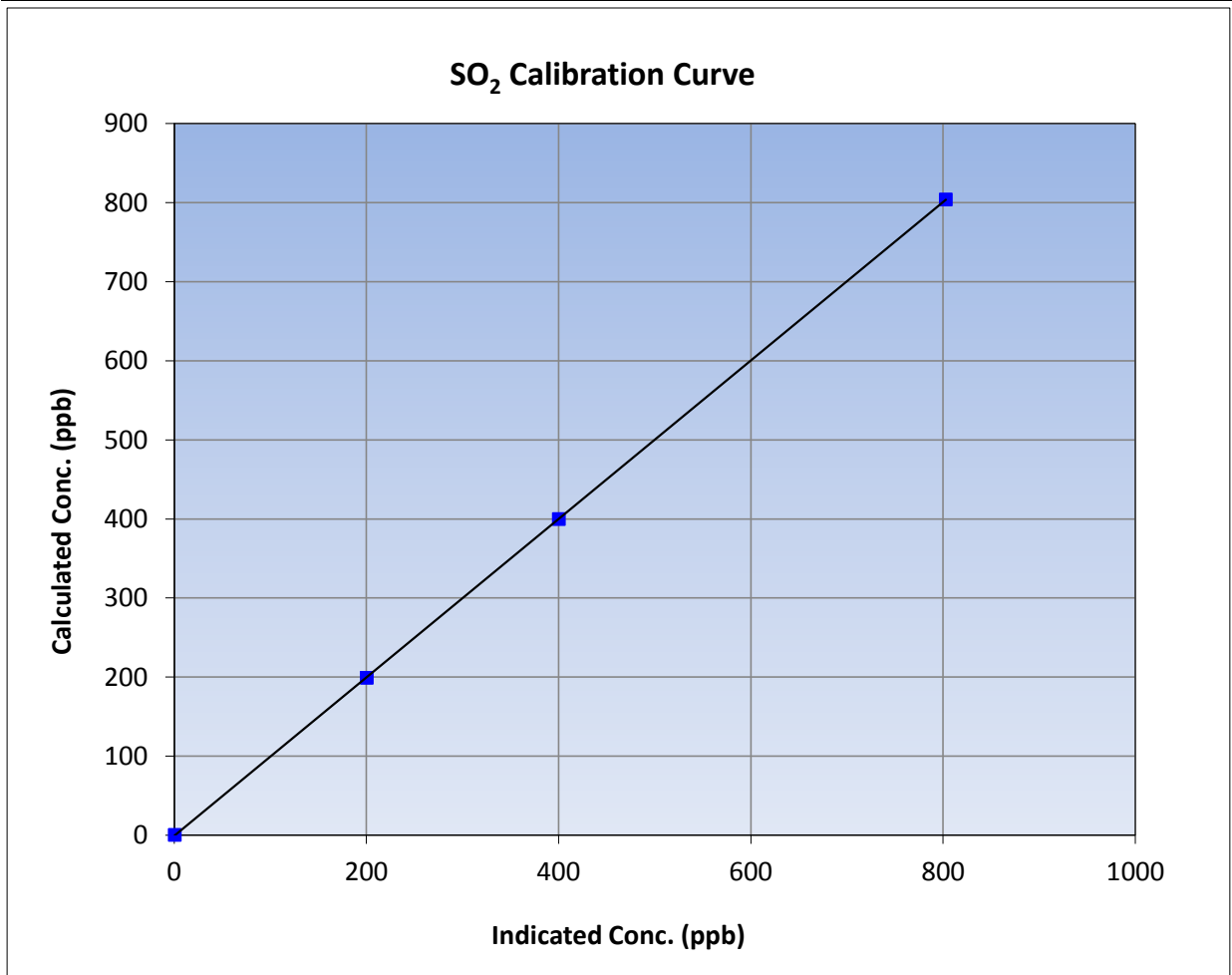
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 13, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	11:14	End Time (MST)	15:30
Analyzer make	Thermo 43i	Analyzer serial #	710321322

Calibration Data

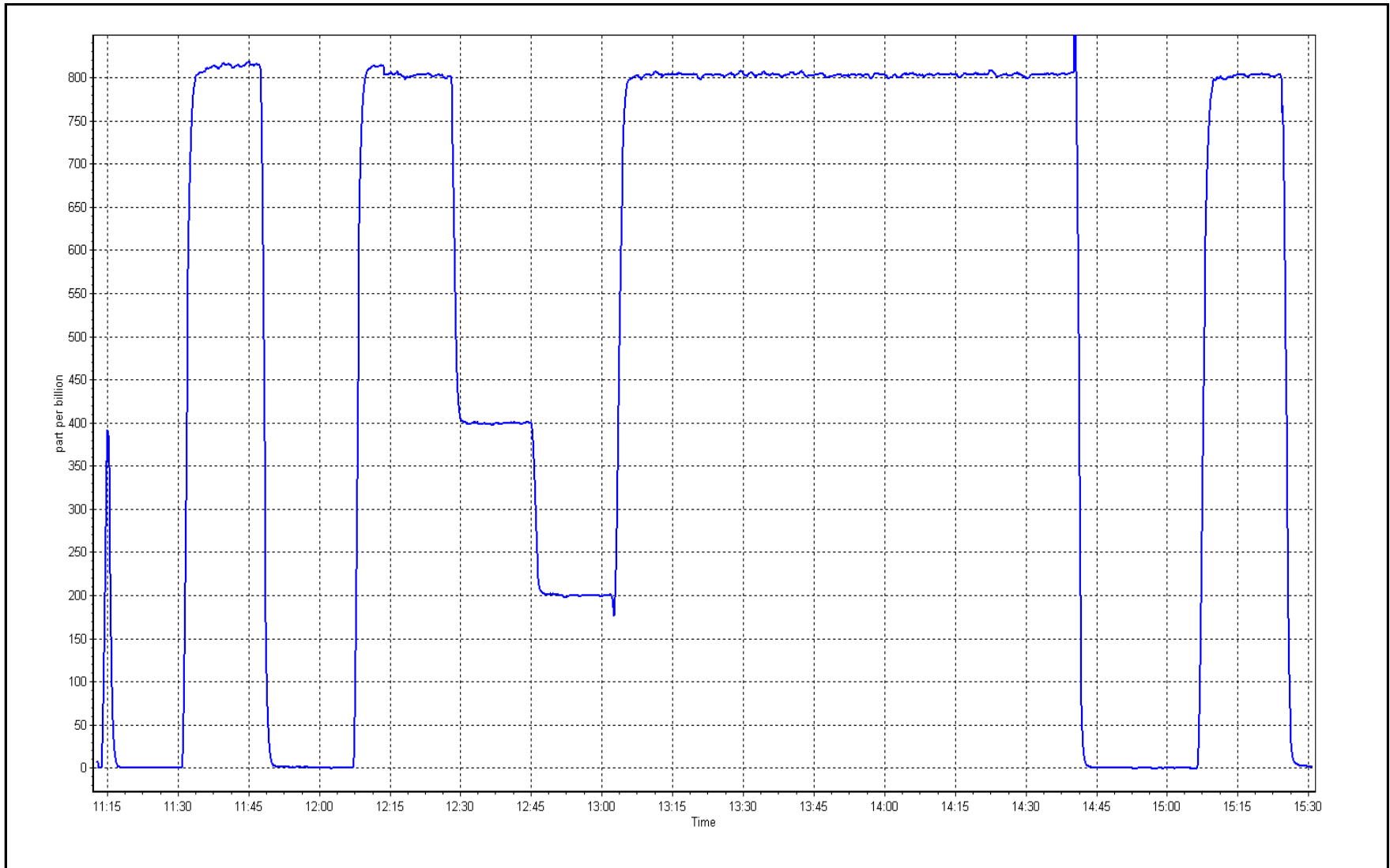
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.1	----	Correlation Coefficient	≥0.995
803.7	802.4	1.0016		
399.6	400.0	0.9989	Slope	0.90 - 1.10
198.8	199.9	0.9946		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 13, 2017

Location: Horizon





Wood Buffalo Environmental Association

TRS Calibration Summary

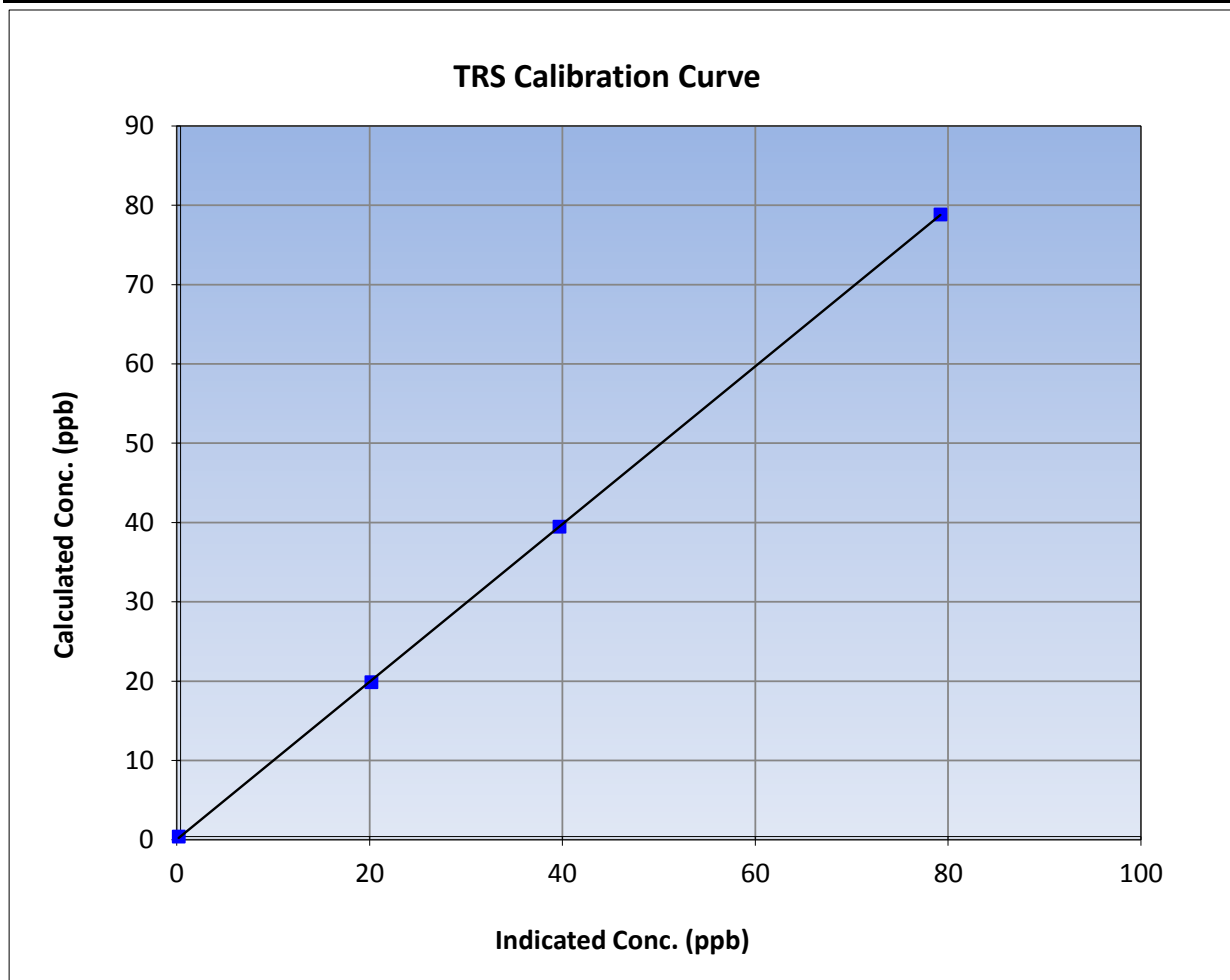
Version-03-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	June 14, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:17	End Time (MST)	11:08
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1151680032

Calibration Data

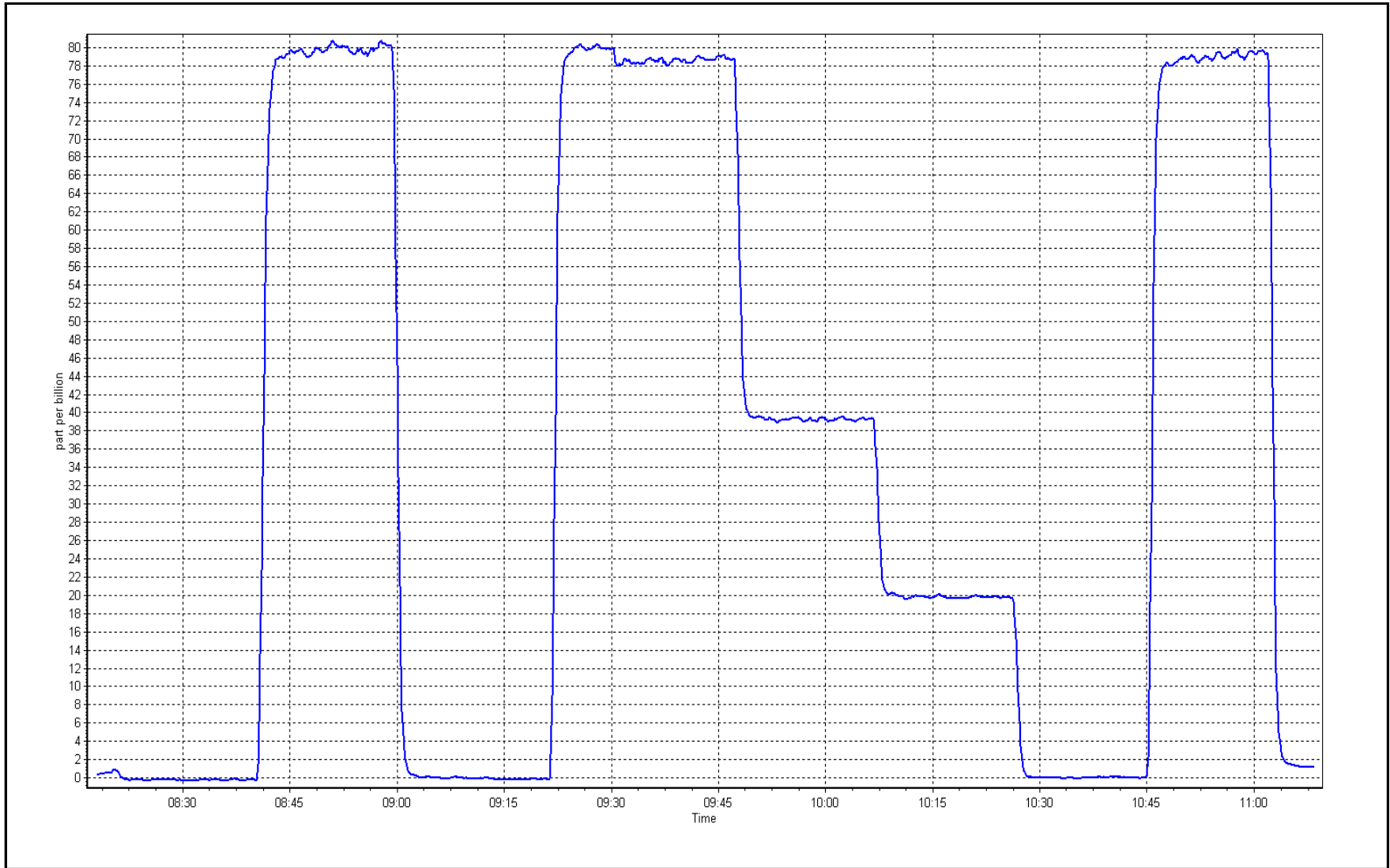
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999975	≥0.995
78.4	78.8	0.9955			
39.1	39.3	0.9944	Slope	0.994385	0.90 - 1.10
19.5	19.8	0.9844			
			Intercept	0.023419	+/-3



TRS Calibration Plot

Date: July 21, 2017

Location: Horizon





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	July 13, 2017	Last Cal Date:	June 13, 2017
Start time (MST):	11:14	End time (MST):	15:26
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> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-300 -300
Calculated slope	0.997673	Sample pressure	8.8 8.8
Calculated intercept	0.033844	Fuel pressure	26.3 26.3
Analyzer Background	2.410	Air pressure	38.0 38.0
Analyzer Coefficient	3.221	Flame temperature	155.2 155.0

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	5070	0.0	0.00	-0.17	----
as found span	5004	81.6	16.80	16.89	0.995
calibrator zero	5070	0.0	0.00	-0.02	----
high point	5004	81.6	16.80	16.87	0.996
second point	5040	40.6	8.36	8.33	1.004
third point	5060	20.2	4.16	4.16	1.001
as left zero	5070	0.0	0.00	-0.06	----
as left span	5004	81.6	16.80	16.87	0.996
Average Correction Factor					1.000
Corrected As found	17.06	Previous response	16.80	*% change	-1.5%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfound. Adjusted the zero.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

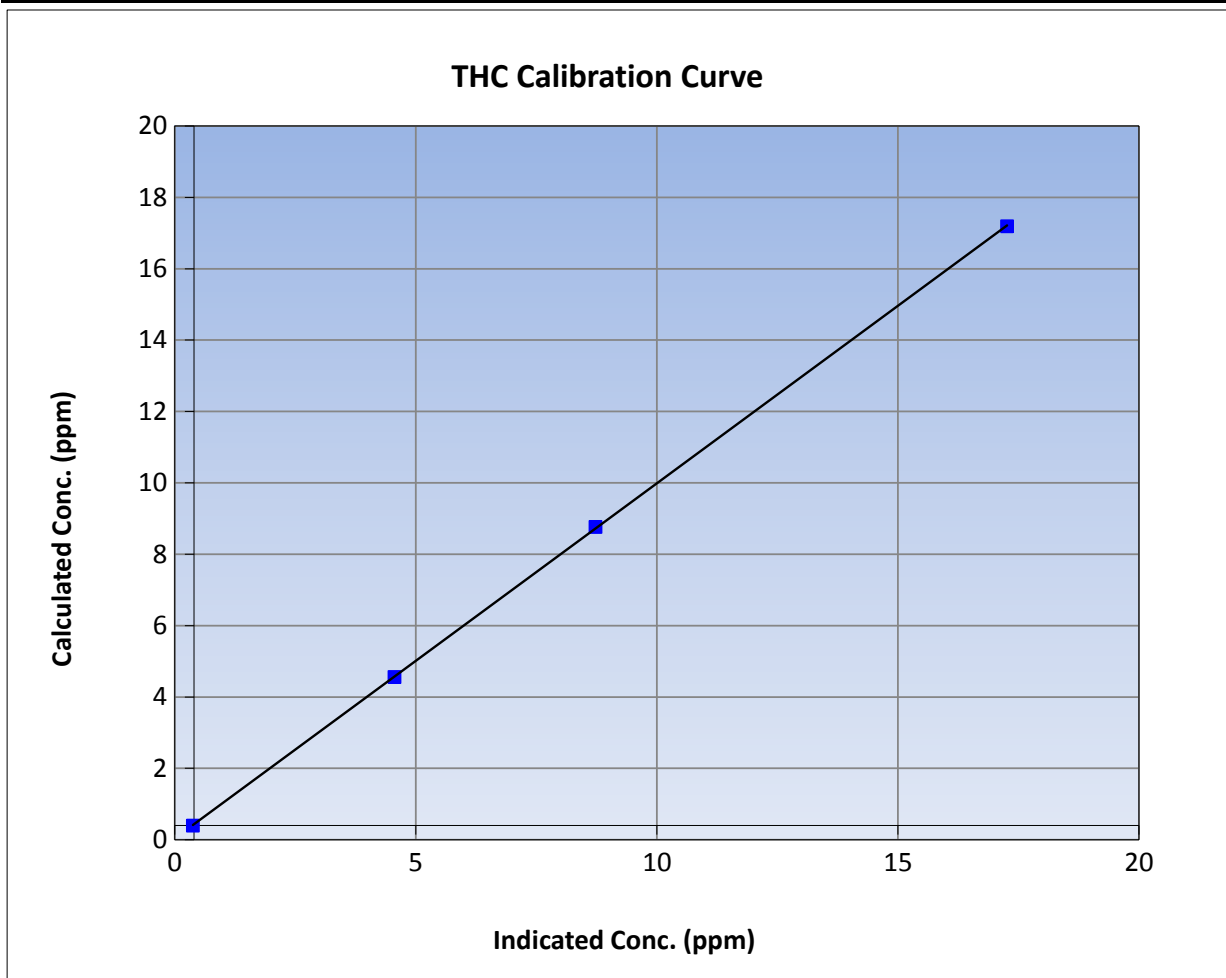
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 13, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	8:47	End Time (MST)	15:26
Analyzer make	Thermo 51-LT	Analyzer serial #	1327059295

Calibration Data

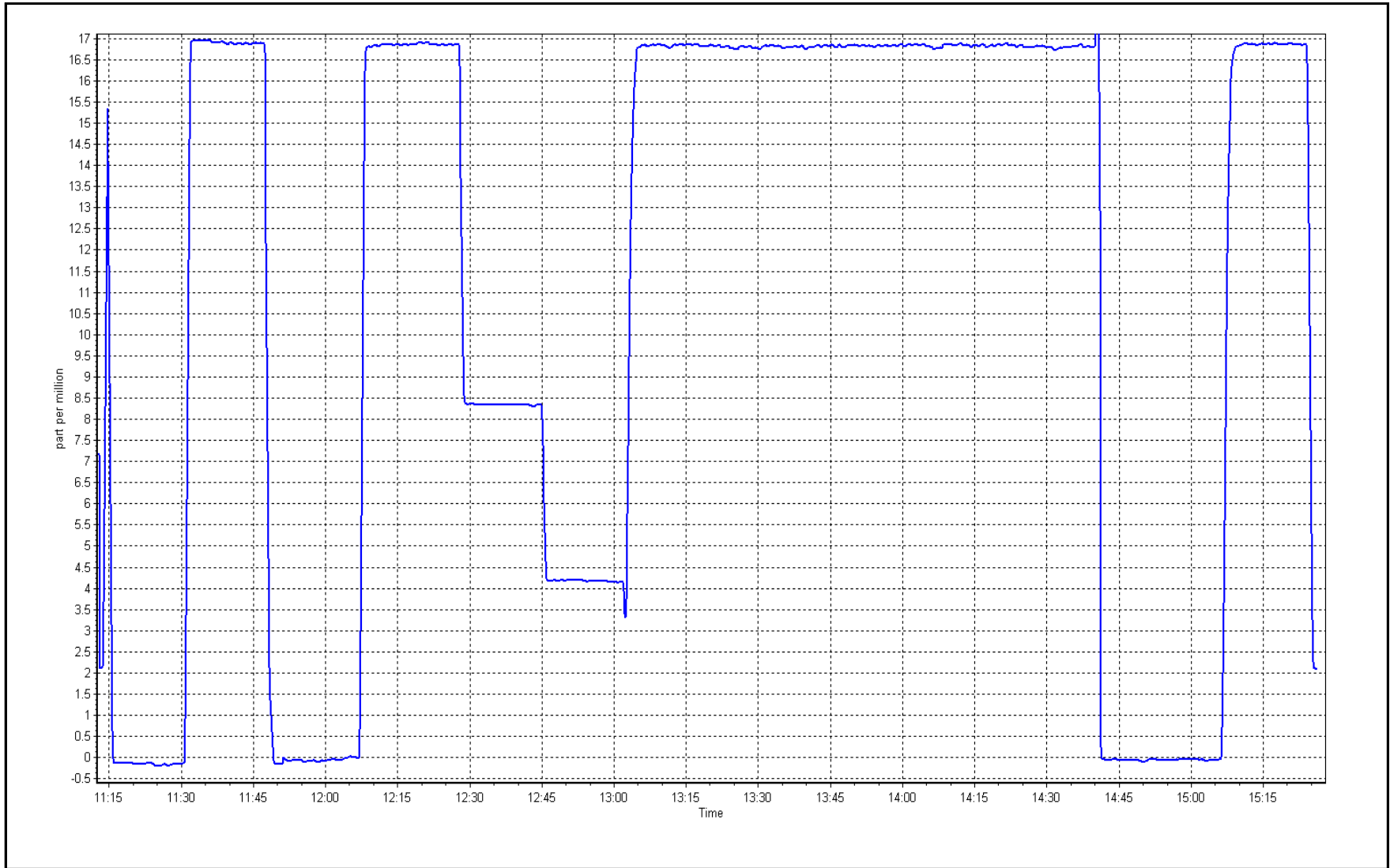
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999984	≥0.995
16.8	16.9	0.9959			
8.4	8.3	1.0043	Slope	0.994810	0.90 - 1.10
4.2	4.2	1.0010			
			Intercept	0.036378	+/-1.5



THC Calibration Plot

Date: July 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:	July 13, 2017	Last Cal Date:	June 13, 2017
Start time (MST):	11:14	End time (MST):	15:26
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	0.900	0.900	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.999	PMT Temperature	-3.0	-3.0
NO2 coefficient	1.000	1.000	Reaction cell Press	160.8	159.6
NO bkgrnd	11.1	11.0	Sample Flow	0.713	0.711
NOX bkgrnd	11.1	11.1	PMT Voltage	-779.6	-779.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.001539	1.009217
NO _x Cal Offset	-1.584318	-1.066493
NO Cal Slope	1.000909	1.006759
NO Cal Offset	-1.643585	-0.884557
NO ₂ Cal Slope	0.999558	0.997743
NO ₂ Cal Offset	-0.169841	-0.723663



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	0.1	0.0	0.1	----	----
as found span	5004	81.5	783.7	783.7	0.0	782.9	783.1	-0.2	1.0010	1.0007
calibrator zero	5070	0.0	0.0	0.0	0.0	0.1	0.0	0.1	----	----
high point	5004	81.5	783.7	783.7	0.0	777.3	779.1	-1.7	1.0082	1.0059
second point	5040	40.6	390.8	390.8	0.0	388.1	388.7	-0.7	1.0069	1.0053
third point	5060	20.2	194.4	194.4	0.0	195.1	195.4	-0.3	0.9966	0.9951
as left zero	5070	0.0	0.0	0.0	0.0	4.2	4.1	0.1	----	----
as left span	5004	81.5	783.7	382.3	401.4	777.8	383.0	394.8	1.0075	0.9982
Average Correction Factor									1.0039	1.0021

Corrected As found	NO _x = 782.8 ppb	NO = 783.1 ppb		*Percent Change	NO _x = 0.2%
Previous Response	NO _x = 784.0 ppb	NO = 784.6 ppb		*Percent Change	NO = 0.2%

* = > +/-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	777.8	776.2	1.6	1.0075	1.0096	----	----
1st NO2 (400 ppb O3)	382.3	393.9	777.4	382.3	395.0	1.0081	----	0.9972	100.3%
2nd NO2 (200 ppb O3)	570.8	205.4	778.2	570.8	207.4	1.0070	----	0.9904	101.0%
3rd NO2 (100 ppb O3)	668.8	107.4	777.5	668.8	108.7	1.0079	----	0.9880	101.2%
2nd NO ref point	----	0.0	777.2	776.3	0.9	1.0083	1.0095	----	----
Average Correction Factor						1.0078	1.0096	0.9919	100.8%

Notes: Changed inlet filter after as founds. No adjustments made.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

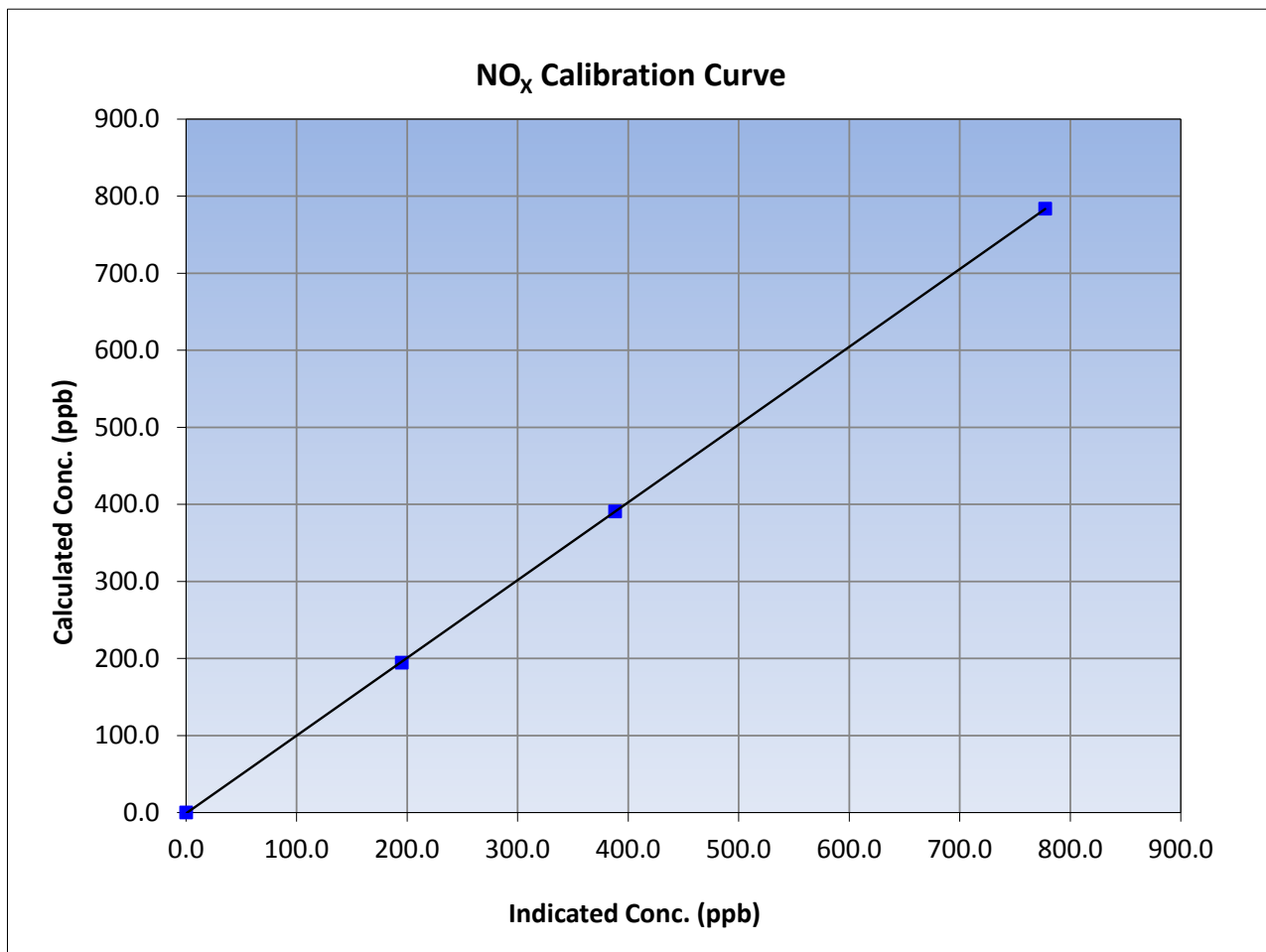
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 13, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	11:14	End Time (MST)	15:26
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	0.1	----	Correlation Coefficient	≥0.995	
783.7	777.3	1.0082			
390.8	388.1	1.0069			
194.4	195.1	0.9966			
			Slope	1.009217	0.90 - 1.10
			Intercept	-1.066493	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

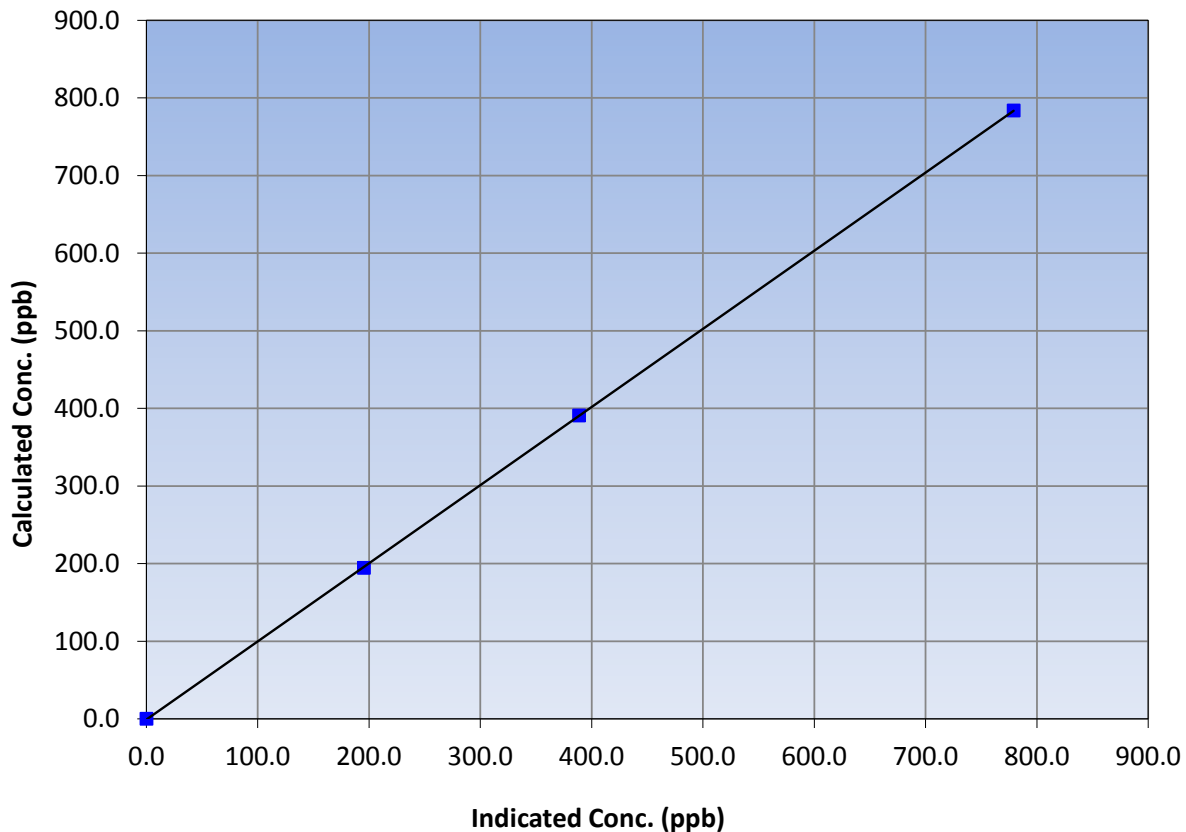
Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 13, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	11:14	End Time (MST)	15:26
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	0.0	----	Correlation Coefficient	≥0.995	
783.7	779.1	1.0059			
390.8	388.7	1.0053			
194.4	195.4	0.9951			
			Slope	1.006759	0.90 - 1.10
			Intercept	-0.884557	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

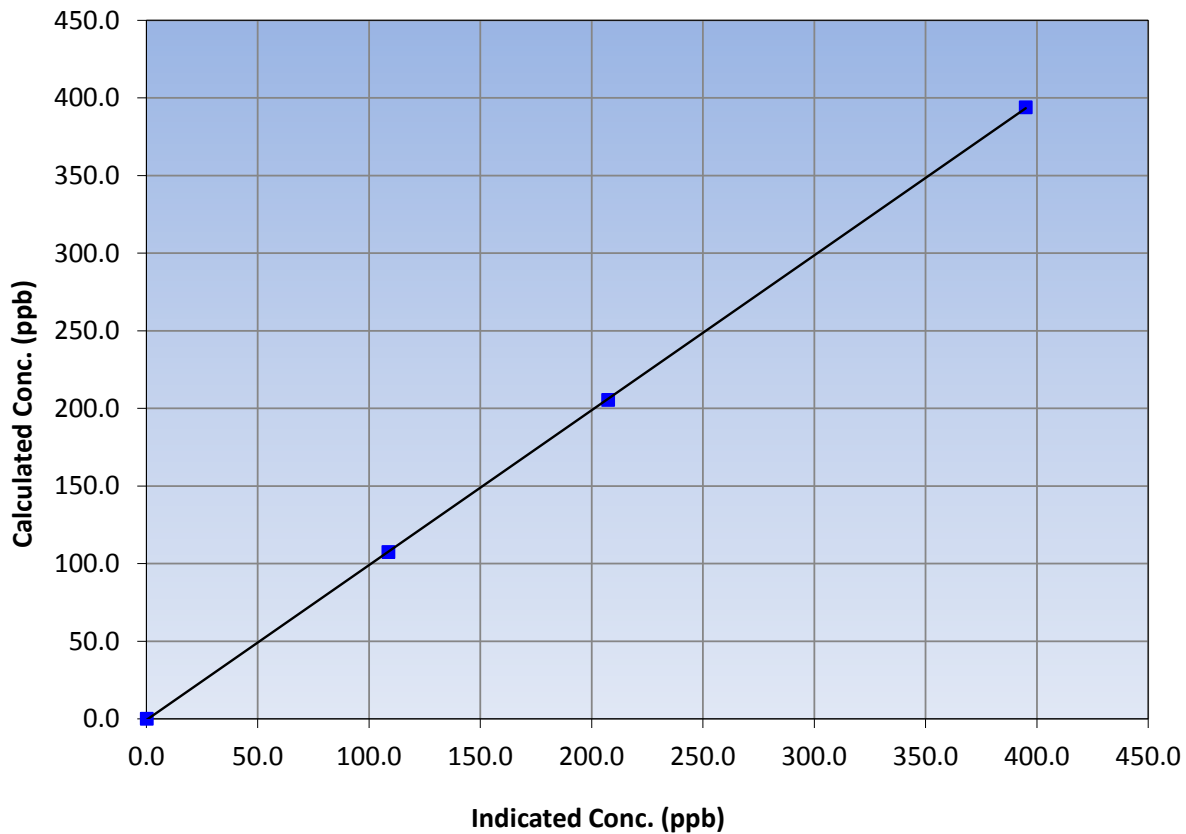
Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 13, 2017
Station Name	Horizon	Station Number	AMS 15
Start Time (MST)	11:14	End Time (MST)	15:26
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	0.1	----	Correlation Coefficient	≥0.995	
393.9	395.0	0.9972			
205.4	207.4	0.9904			
107.4	108.7	0.9880			
			Slope	0.997743	0.90 - 1.10
			Intercept	-0.723663	+/-20

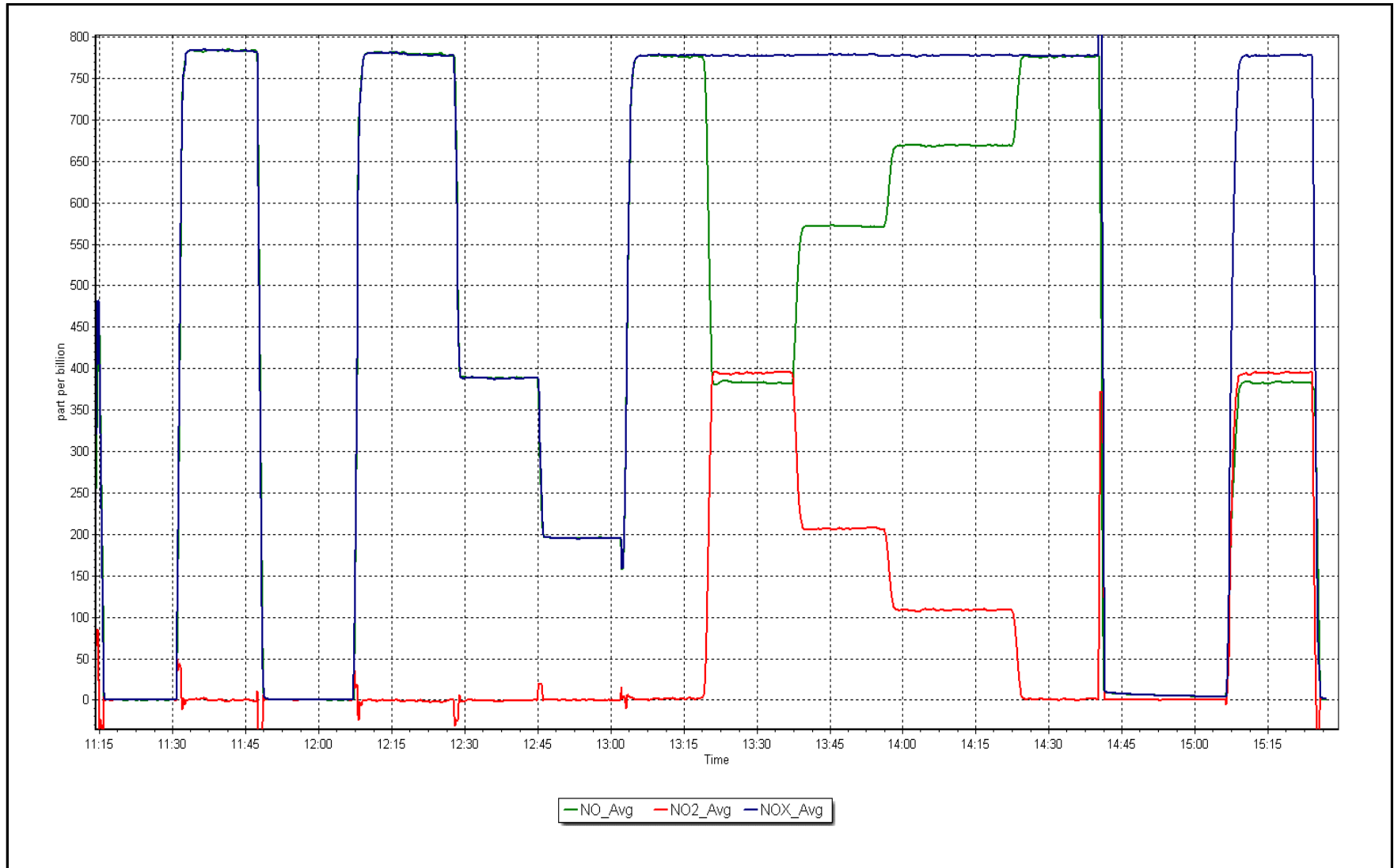
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 13, 2017

Location: Horizon





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Horizon	Station number:	AMS 15
Calibration Date:	July 21, 2017	Last Cal Date:	June 13, 2017
Start time (MST):	9:00	End time (MST):	10:11
Sharp Model:	5030	S/N:	E-2020
Particulate Fraction:	PM2.5	C14 Source S/N:	7409
Flow Meter Make/Model:	Delta cal	S/N:	1451
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)	20.7	21.2	20.7	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	972.0	973.3	972.0	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000.0	1015.0	1000.0	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.0	-----	0.0	<input 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 12, 2017
 Flow w/o adaptor: 14.97 Flow w/ adaptor: 14.89

(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>2022</u>	Foil S/N: <u>2022</u>	
Foil Calibration	Foil Mass: <u>1507</u>	Foil Mass: <u>2395</u>	
	Calibration Date: <u>July 21, 2017</u>	Calibration Date: <u>February 6, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>7016</u>	Correction Factor: <u>7041</u>	-0.36%

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 Flow. Cyclone head cleaned at site. Completed Foil test.

Calibration by: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 16
MUSKEG RIVER
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 JULY 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	706	37	38	99.87	20	0	3	0
THC (ppm) Average	701	37	43	99.19	4.6	-	2.9	-
NO2 (ppb) Average	653	35	91	92.47	34	0	13	-
NO (ppb) Average	653	35	91	92.47	99	-	21	-
NOX (ppb) Average	653	35	91	92.47	122	-	34	-
PM2.5 (ug/m3) Average	742	1	2	99.87	81.1	-	20.7	0
Temperature 2 m (C) Average	744	0	0	100	31.7	-	23.4	-
Relative Humidity (%) Average	744	0	0	100	99	-	76	-
Barometric Pressure (inHg) Average	744	0	0	100	29.2	-	29.1	-
Wind Speed 10 m (km/h) Average	743	1	1	100	36	-	24	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 JULY 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	706	0.5	2	-	0	0	0	0	0	1	20
THC (ppm) Average	701	2.33	0.4	-	1.8	1.9	2	2.2	2.6	2.9	4.6
NO2 (ppb) Average	653	5.2	5	-	0	1	1	4	8	12	34
NO (ppb) Average	653	3.2	8	-	0	0	0	0	2	10	99
NOX (ppb) Average	653	8.4	12	-	0	1	1	4	11	21	122
PM2.5 (ug/m3) Average	742	10.37	9.4	-	0.8	2.4	4.4	7.6	13.6	20.9	81.1
Temperature 2 m (C) Average	744	18.98	5.2	-	6.4	12.6	14.9	18.5	22.9	26	31.7
Relative Humidity (%) Average	744	64.3	19	-	27	38	50	63	79	92	99
Barometric Pressure (inHg) Average	744	28.82	0.1	-	28.5	28.7	28.7	28.8	28.9	29	29.2
Wind Speed 10 m (km/h) Average	743	11	6	-	1	4	6	9	15	20	36
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MUSKEG RIVER (AMS 16)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	20 Jul 2017 07:00	20 Jul 2017 07:00	1	Station power failure
THC	01 Jul 2017 13:00	01 Jul 2017 13:00	1	Unstable operation - excessive baseline drift
THC	02 Jul 2017 14:00	02 Jul 2017 16:00	3	Unstable operation - excessive baseline drift
THC	11 Jul 2017 17:00	11 Jul 2017 17:00	1	Unstable operation - excessive baseline drift
NO2, NO, NOX	16 Jul 2017 07:00	17 Jul 2017 10:00	28	Analyzer Failure - sample pump failure
NO2, NO, NOX	17 Jul 2017 11:00	17 Jul 2017 16:00	6	Maintenance - pump replacement and recalibration
NO2, NO, NOX	17 Jul 2017 17:00	18 Jul 2017 09:00	17	Analyzer Failure - sample pump failure
NO2, NO, NOX	18 Jul 2017 10:00	18 Jul 2017 13:00	4	Maintenance - pump replacement and recalibration



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

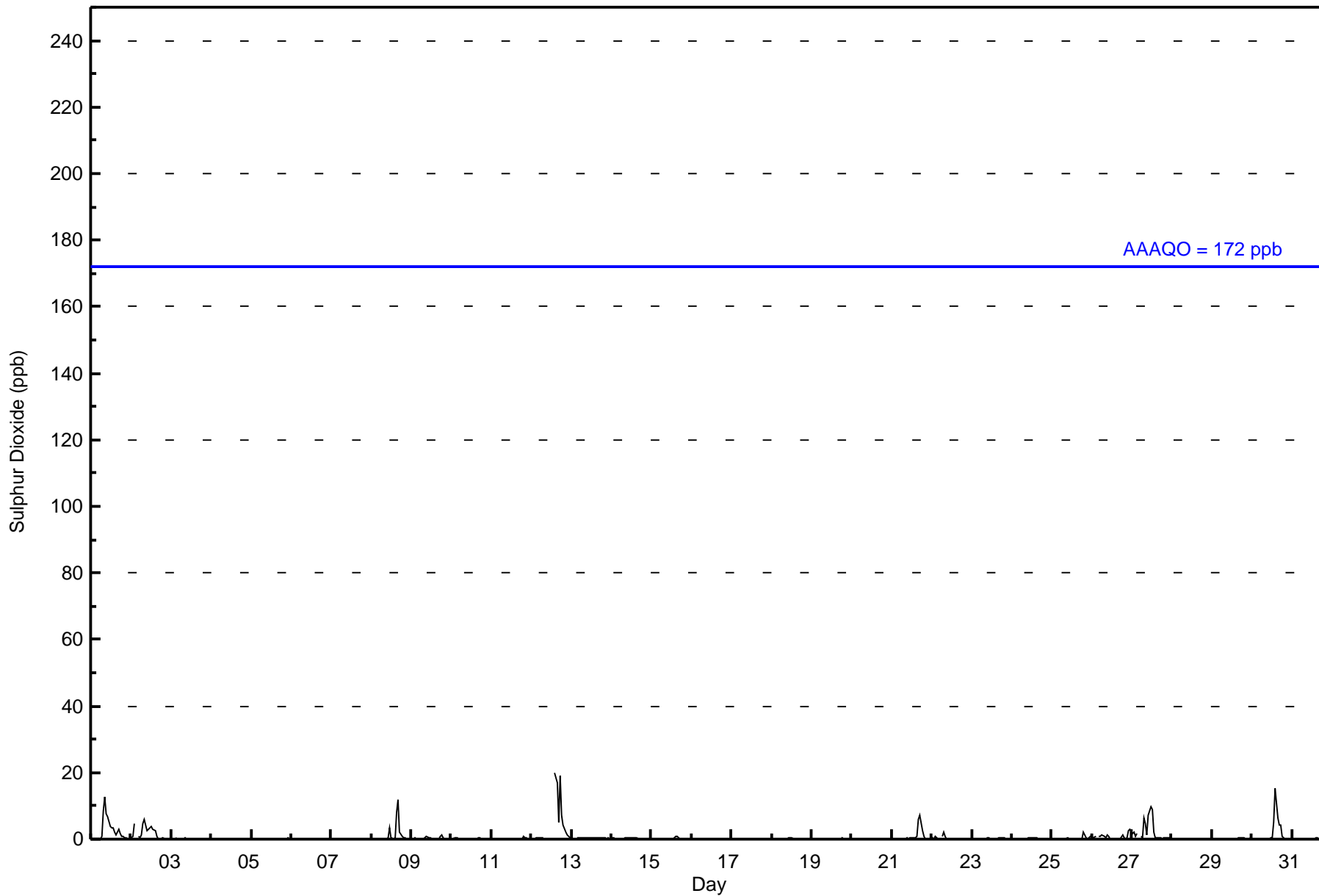
Muskeg River - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744									
Maximum Value: 20 ppb on Jul 12 15:00																	Maximum Daily Average: 2.5 ppb on Jul 1									
Minimum Value: 0 ppb on Jul 1 01:00																	Hours of Data: 706									
Maximum Diurnal Average: 1.4 ppb at hour 15																	Hours of Missing Data: 38									
Monthly Average: 0.5 ppb																	Hours of Calibration: 37									
Minimum Daily Average: 0.0 ppb on Jul 20																	Percent Operational Time: 99.9									
Minimum Diurnal Average: 0.1 ppb at hour 5																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 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-Jul	0	0	Z	0	0	0	1	8	13	8	7	4	3	3	2	1	3	2	1	1	0	0	0	0	2.5	13
2-Jul	0	1	5	Z	1	1	1	5	6	3	3	4	4	3	2	1	0	0	0	0	0	0	0	0	1.7	6
3-Jul	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-Jul	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
5-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	3	1	0	0	8	12	2	1	0	0	0	0	0	1.2	12
9-Jul	0	0	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0.3	1
10-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1
12-Jul	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	20	17	5	19	7	4	2	1	1	0	--	20
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.4	1
14-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.1	1
16-Jul	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-Jul	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-Jul	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-Jul	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
20-Jul	0	0	0	Z	0	0	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	6	7	3	1	0	0	0	0	0	0.9	7
22-Jul	0	0	1	1	0	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
23-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1
25-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0.2	2
26-Jul	1	0	1	Z	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	2	3	0.7	3
27-Jul	2	2	1	2	Z	1	1	7	5	1	7	10	9	2	1	0	0	0	0	0	0	1	1	0	2.3	10
28-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	5	15	6	4	4	1	0	0	0	0	0	1.7	15
31-Jul	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
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan 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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Muskeg River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	700	99.15	99.15
11 - 20	6	0.85	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Muskeg River - July 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	26	33	43	10	19	15	21	36	112	90	76	91	38	40	25	25	700
11 - 20	0	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	6
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	26	33	43	10	19	15	21	36	115	92	77	91	38	40	25	25	706

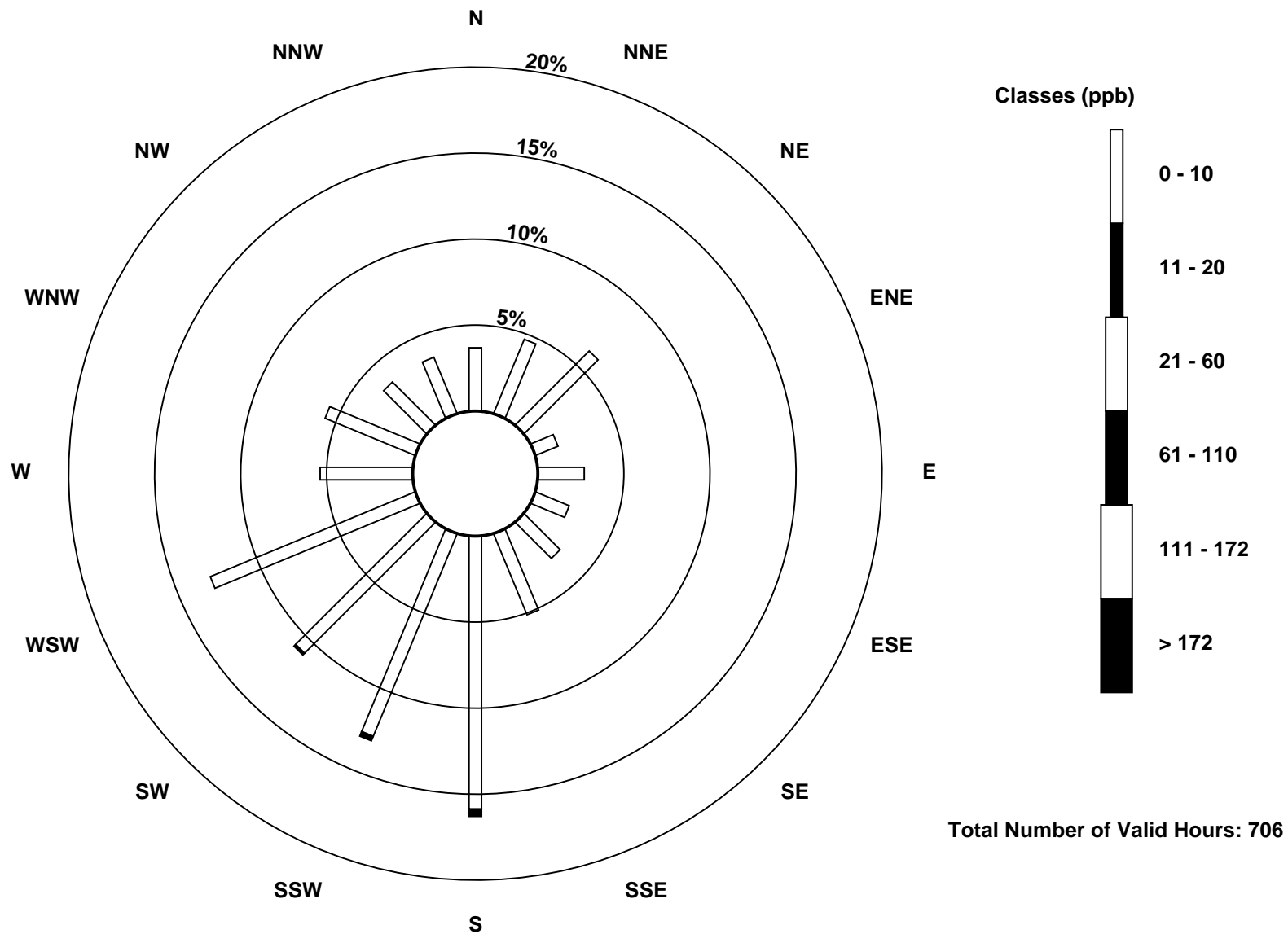
Total Number of Valid Hours: 706

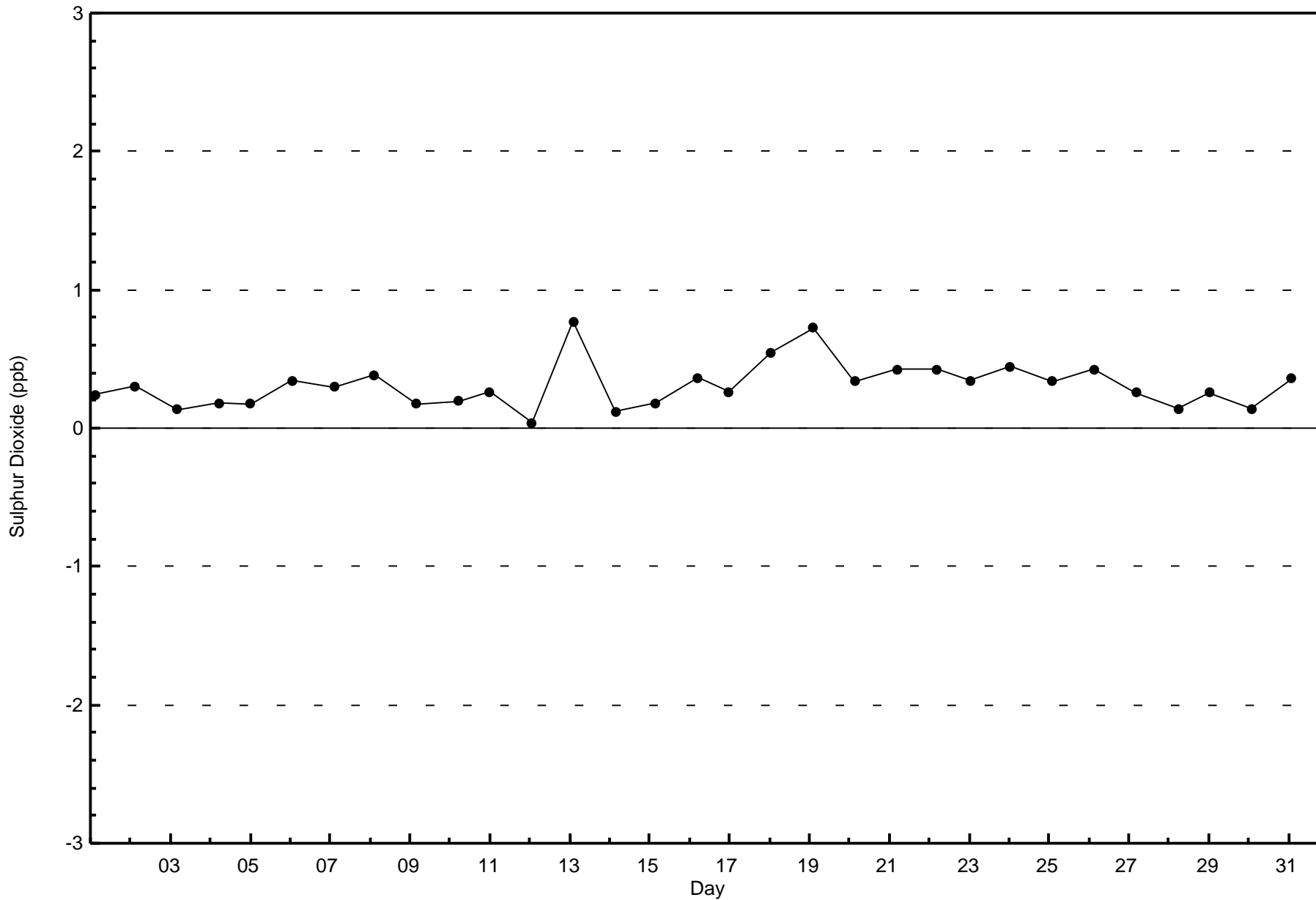
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Muskeg River (AMS 16)

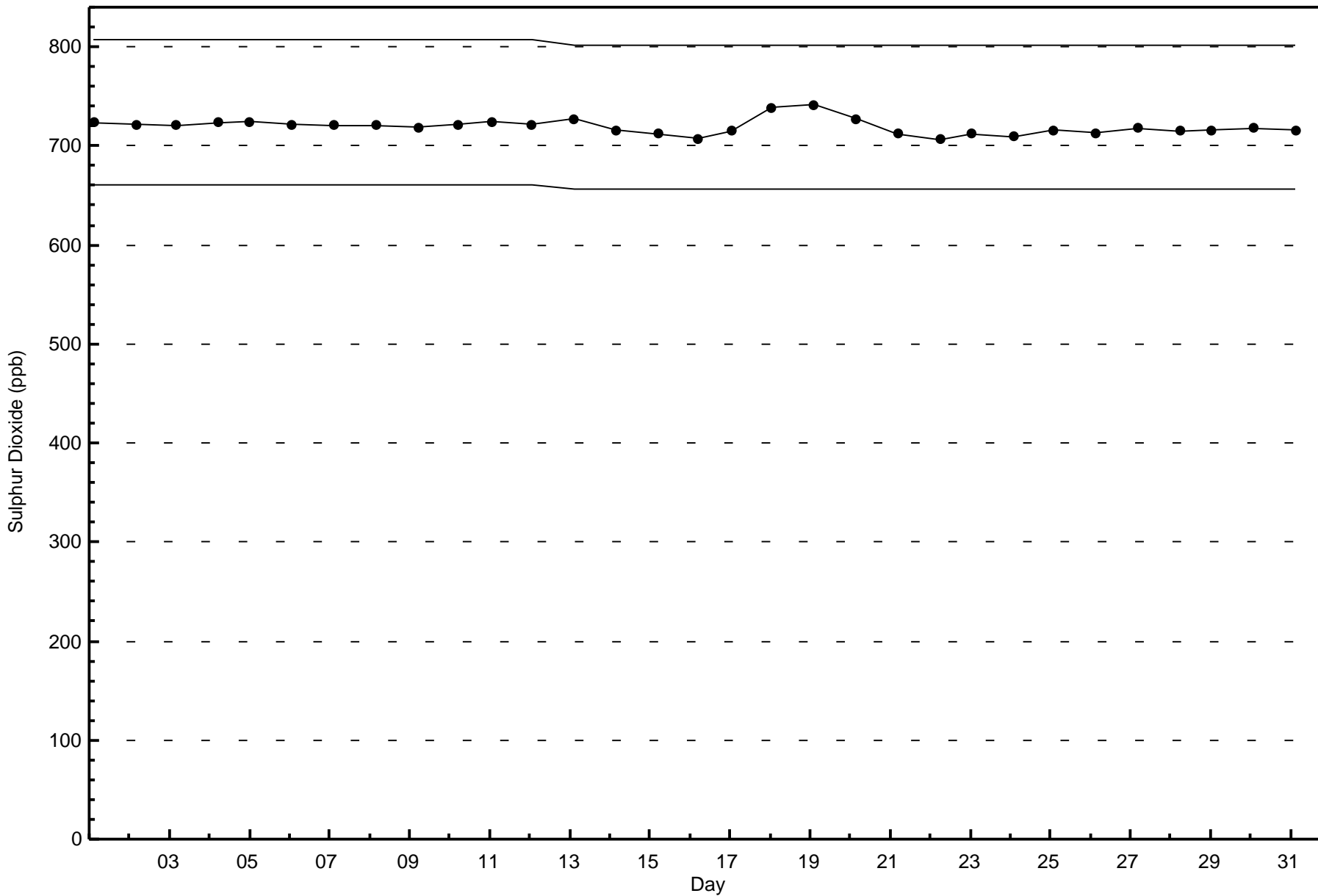






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Muskeg River - July 2017





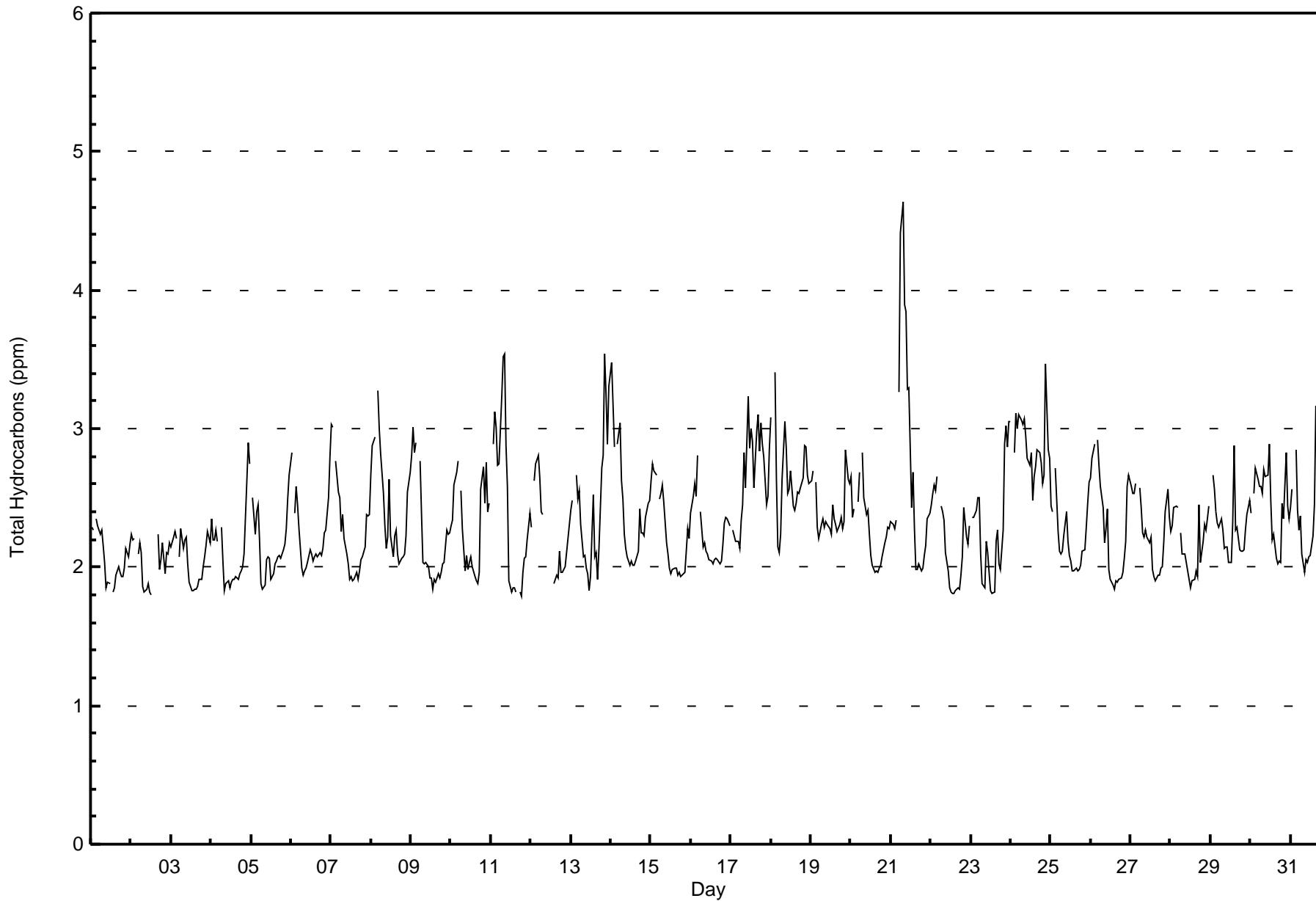
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Muskeg River - July 2017

Maximum Value: 4.6 ppm on Jul 21 08:00																				Maximum Daily Average: 2.9 ppm on Jul 24					Hours in Service: 744	
Minimum Value: 1.8 ppm on Jul 11 19:00																				Minimum Daily Average: 2.0 ppm on Jul 2					Hours of Data: 701	
Maximum Diurnal Average: 2.6 ppm at hour 4																				Minimum Diurnal Average: 2.1 ppm at hour 15					Hours of Missing Data: 43	
Monthly Average: 2.33 ppm																				Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.2 Q ₃ = 2.6 P ₉₀ = 2.9 P ₉₉ = 3.5					Hours of Calibration: 37	
																									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-Jul	2.3	2.3	Z	2.3	2.3	2.2	2.3	2.2	2.0	1.9	1.9	1.9	UO	1.8	1.8	1.9	2.0	2.0	1.9	1.9	2.0	2.1	2.1	2.2	2.1	2.3
2-Jul	2.2	2.2	2.2	Z	2.1	2.2	2.1	1.9	1.8	1.8	1.9	1.8	1.8	UO	UO	UO	2.2	2.0	2.1	2.2	2.0	2.1	2.1	2.2	2.0	2.2
3-Jul	2.1	2.2	2.3	2.2	Z	2.1	2.3	2.1	2.2	2.2	2.0	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.2	2.3	2.2	2.1	2.3
4-Jul	2.4	2.2	2.2	2.3	2.2	Z	2.3	2.0	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.6	2.9	2.7	2.1	2.9
5-Jul	Z	2.5	2.2	2.4	2.4	2.2	1.9	1.8	1.9	2.0	2.1	2.1	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.5	2.7	2.1	2.7
6-Jul	2.8	Z	2.4	2.6	2.4	2.3	2.0	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.5	2.8	2.2	2.8
7-Jul	3.0	3.0	Z	2.8	2.5	2.5	2.3	2.4	2.2	2.1	2.0	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.1	2.1	2.1	2.4	2.4	2.4	2.3	3.0
8-Jul	2.7	2.9	2.9	Z	3.3	3.0	2.8	2.5	2.3	2.1	2.2	2.6	2.2	2.1	2.2	2.3	2.1	2.0	2.1	2.1	2.1	2.2	2.5	2.7	2.4	3.3
9-Jul	2.8	3.0	2.8	2.9	Z	2.8	2.4	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.3	2.2	2.2	2.2	3.0
10-Jul	2.3	2.3	2.6	2.7	2.8	Z	2.5	2.3	2.0	2.1	2.0	2.0	2.1	2.0	1.9	1.9	1.9	2.0	2.6	2.7	2.5	2.8	2.4	2.5	2.3	2.8
11-Jul	Z	2.9	3.1	3.0	2.7	2.7	3.2	3.5	3.5	2.9	2.6	1.9	1.8	1.9	1.8	1.8	UO	1.8	1.8	2.0	2.1	2.1	2.2	2.4	2.4	3.5
12-Jul	2.3	Z	2.6	2.7	2.8	2.6	2.4	2.4	C	C	C	C	C	C	1.9	1.9	1.9	2.1	2.0	2.0	2.0	2.1	2.2	2.3	--	2.8
13-Jul	2.4	2.5	Z	2.7	2.5	2.6	2.3	2.1	2.1	2.0	2.0	1.8	1.9	2.5	2.1	2.1	1.9	2.1	2.7	2.8	3.5	3.3	2.9	3.3	2.4	3.5
14-Jul	3.5	3.2	2.9	Z	2.9	3.0	2.6	2.5	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.2	2.2	2.4	2.5	2.5	2.5	2.4	3.5
15-Jul	2.6	2.7	2.7	2.7	Z	2.5	2.5	2.6	2.5	2.2	2.1	2.0	1.9	2.0	2.0	2.0	1.9	2.0	1.9	1.9	2.0	2.1	2.3	2.2	2.2	2.7
16-Jul	2.4	2.5	2.6	2.5	2.8	Z	2.4	2.1	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.2	2.3	2.4	2.4	2.3	2.2	2.8
17-Jul	Z	2.3	2.2	2.2	2.2	2.1	2.3	2.5	2.8	2.6	3.2	2.9	3.0	2.9	2.6	3.0	3.1	2.8	3.0	2.9	2.8	2.5	2.5	2.9	2.7	3.2
18-Jul	3.1	Z	3.4	2.6	2.1	2.1	2.2	2.6	3.1	2.9	2.5	2.6	2.7	2.4	2.4	2.5	2.5	2.5	2.6	2.6	2.9	2.9	2.7	2.6	2.6	3.4
19-Jul	2.6	2.7	Z	2.6	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.5	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.9	2.6	2.6	2.4	2.9
20-Jul	2.7	2.4	2.4	Z	2.5	2.7	PF	2.8	2.5	2.4	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.3	2.8
21-Jul	2.3	2.3	2.3	2.3	Z	3.3	4.4	4.6	3.9	3.8	3.3	3.3	2.4	2.7	2.3	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.4	2.7	4.6
22-Jul	2.5	2.5	2.6	2.6	2.7	Z	2.4	2.4	2.3	2.1	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.4	2.2	2.2	2.3	2.2	2.7
23-Jul	Z	2.4	2.4	2.4	2.5	2.5	2.1	1.9	1.9	2.2	2.1	2.0	1.8	1.8	1.8	2.2	2.3	2.0	2.0	2.3	2.9	3.0	2.9	3.1	2.3	3.1
24-Jul	3.1	Z	2.8	3.1	3.0	3.1	3.1	3.0	3.1	2.9	2.8	2.7	2.8	2.5	2.7	2.7	2.8	2.8	2.8	2.6	2.7	3.5	2.9	2.8	2.9	3.5
25-Jul	2.4	2.4	Z	2.7	2.3	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.5	2.6	2.2	2.7
26-Jul	2.6	2.8	2.9	Z	2.9	2.7	2.6	2.4	2.2	2.3	2.4	2.0	1.9	1.9	1.8	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.6	2.7	2.3	2.9
27-Jul	2.6	2.5	2.5	2.6	Z	2.6	2.4	2.2	2.2	2.3	2.2	2.2	2.2	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.4	2.6	2.4	2.3	2.6
28-Jul	2.3	2.3	2.4	2.4	2.4	Z	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.0	1.9	2.5	2.0	2.2	2.3	2.3	2.4	2.4	2.2	2.5
29-Jul	Z	2.7	2.6	2.4	2.3	2.3	2.4	2.3	2.1	2.1	2.1	2.0	2.0	2.3	2.9	2.3	2.3	2.1	2.1	2.1	2.1	2.3	2.4	2.5	2.3	2.9
30-Jul	2.4	Z	2.5	2.7	2.6	2.6	2.6	2.5	2.7	2.7	2.7	2.9	2.5	2.2	2.2	2.1	2.0	2.0	2.0	2.5	2.3	2.8	2.4	2.3	2.5	2.9
31-Jul	2.4	2.6	Z	2.8	2.4	2.3	2.4	2.1	2.0	2.1	2.0	2.1	2.1	2.2	2.5	3.2	3.1	3.7	2.8	3.2	3.2	3.5	2.7	2.8	2.6	3.7
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
UO - Unstable Operation																										
PF - Power Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Muskeg River - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	193	27.53	27.53
2.1 - 3.0	473	67.48	95.01
3.1 - 10.0	35	4.99	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Muskeg River - July 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	1	9	2	4	6	7	14	19	26	28	43	15	18	1	0	193
2.1 - 3.0	13	26	33	8	15	9	14	20	95	62	48	46	22	20	23	19	473
3.1 - 10.0	13	6	1	0	0	0	0	2	0	1	1	1	1	2	1	6	35
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	33	43	10	19	15	21	36	114	89	77	90	38	40	25	25	701

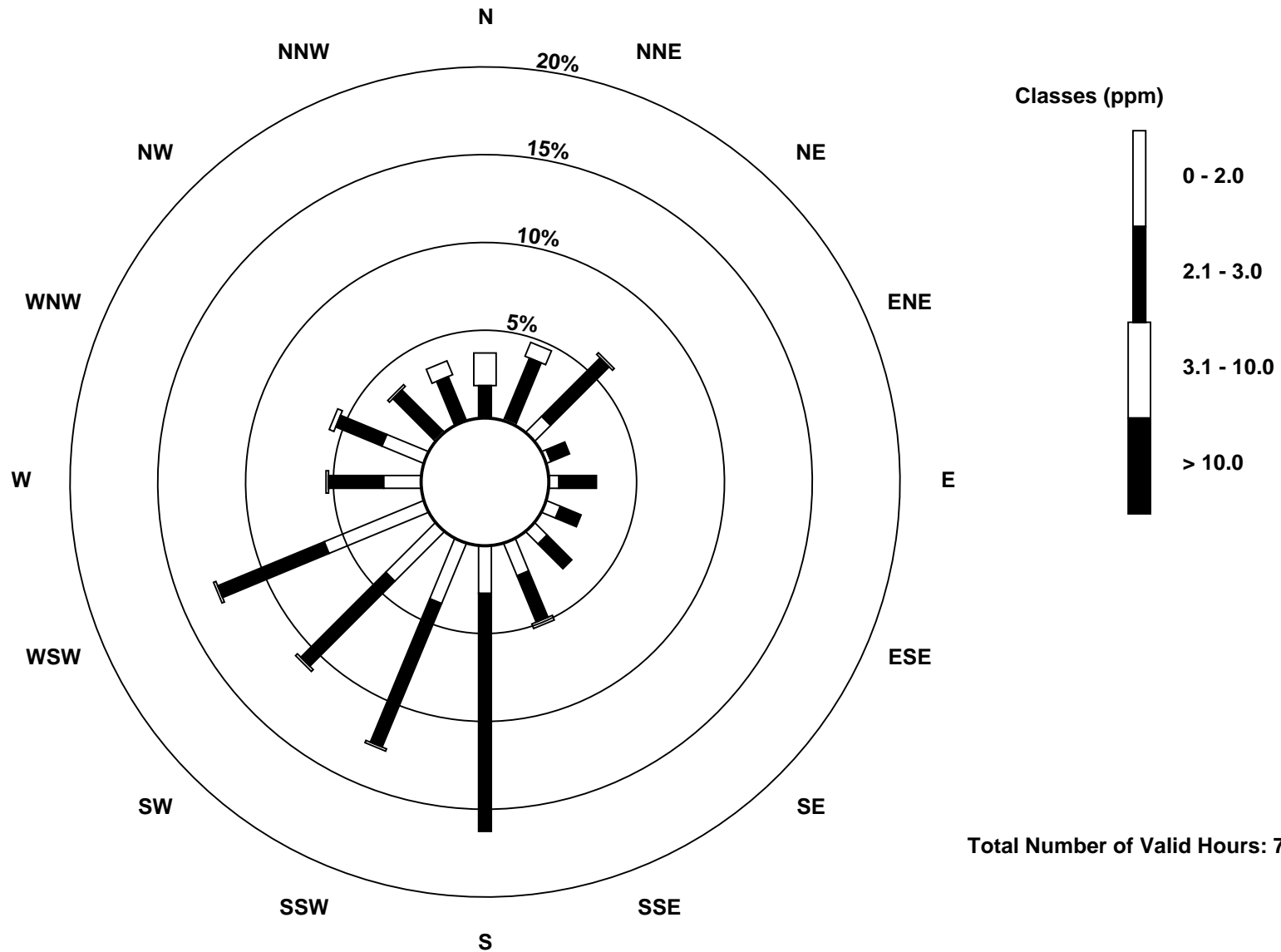
Total Number of Valid Hours: 701

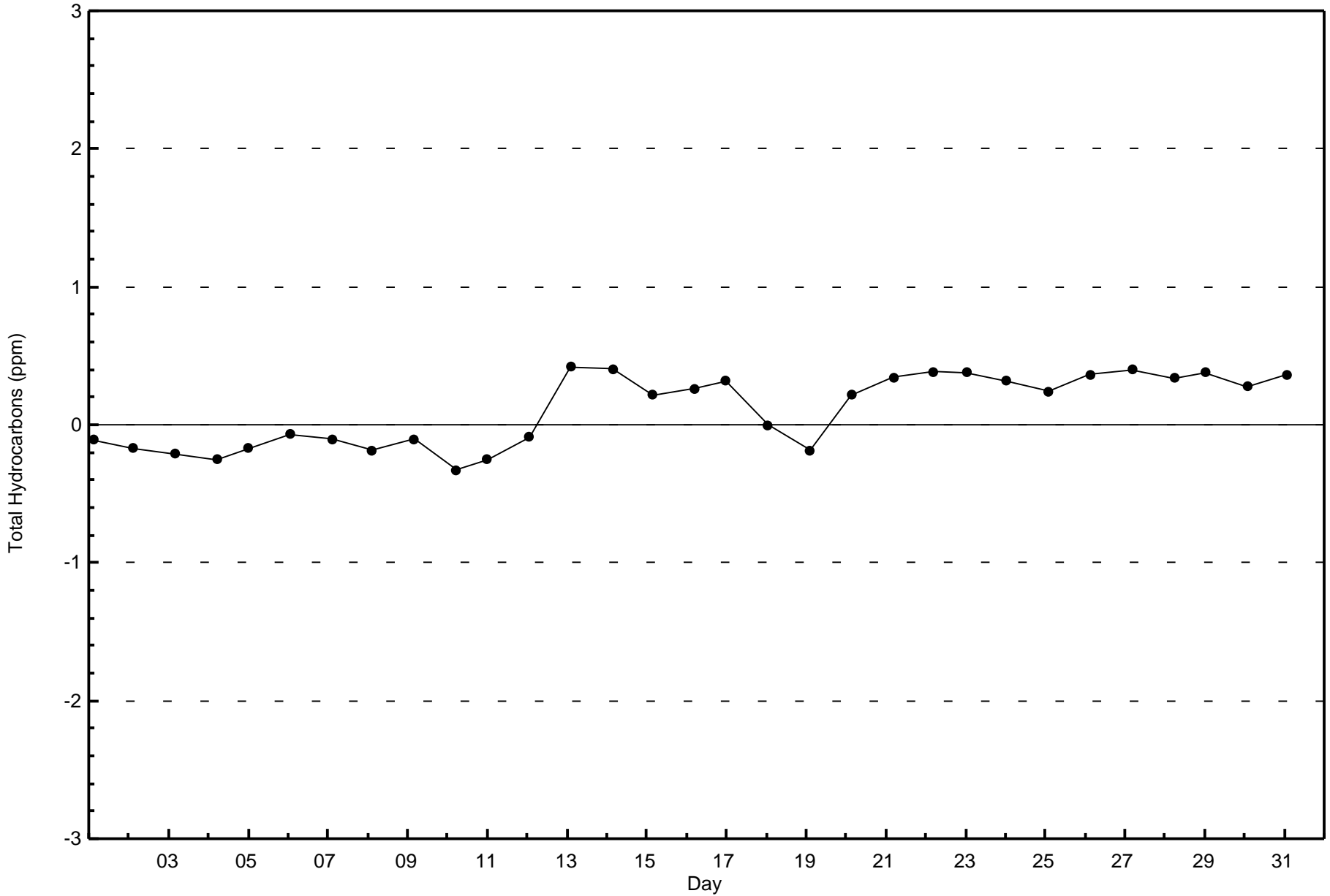
Total Number of Hours: 744

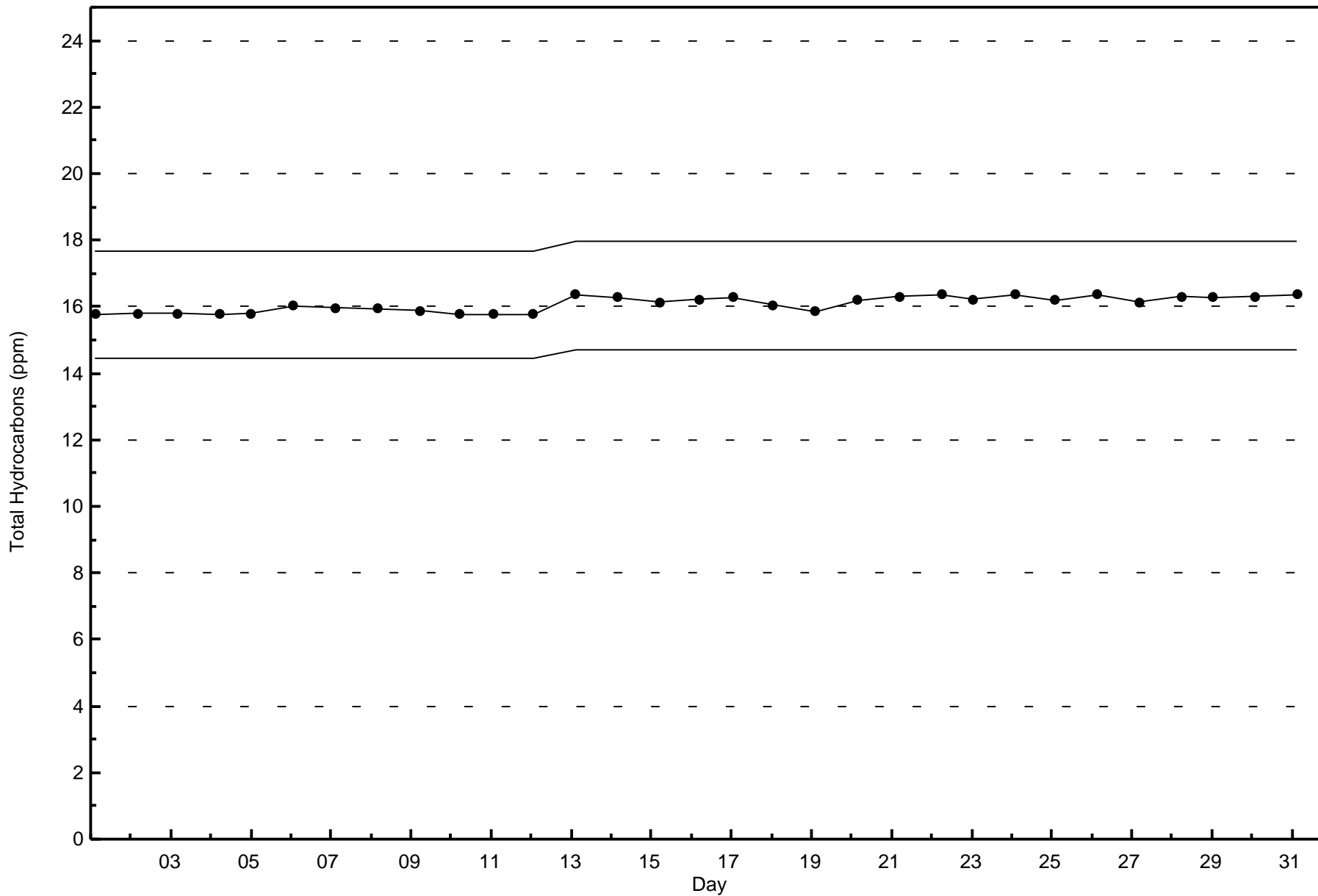


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

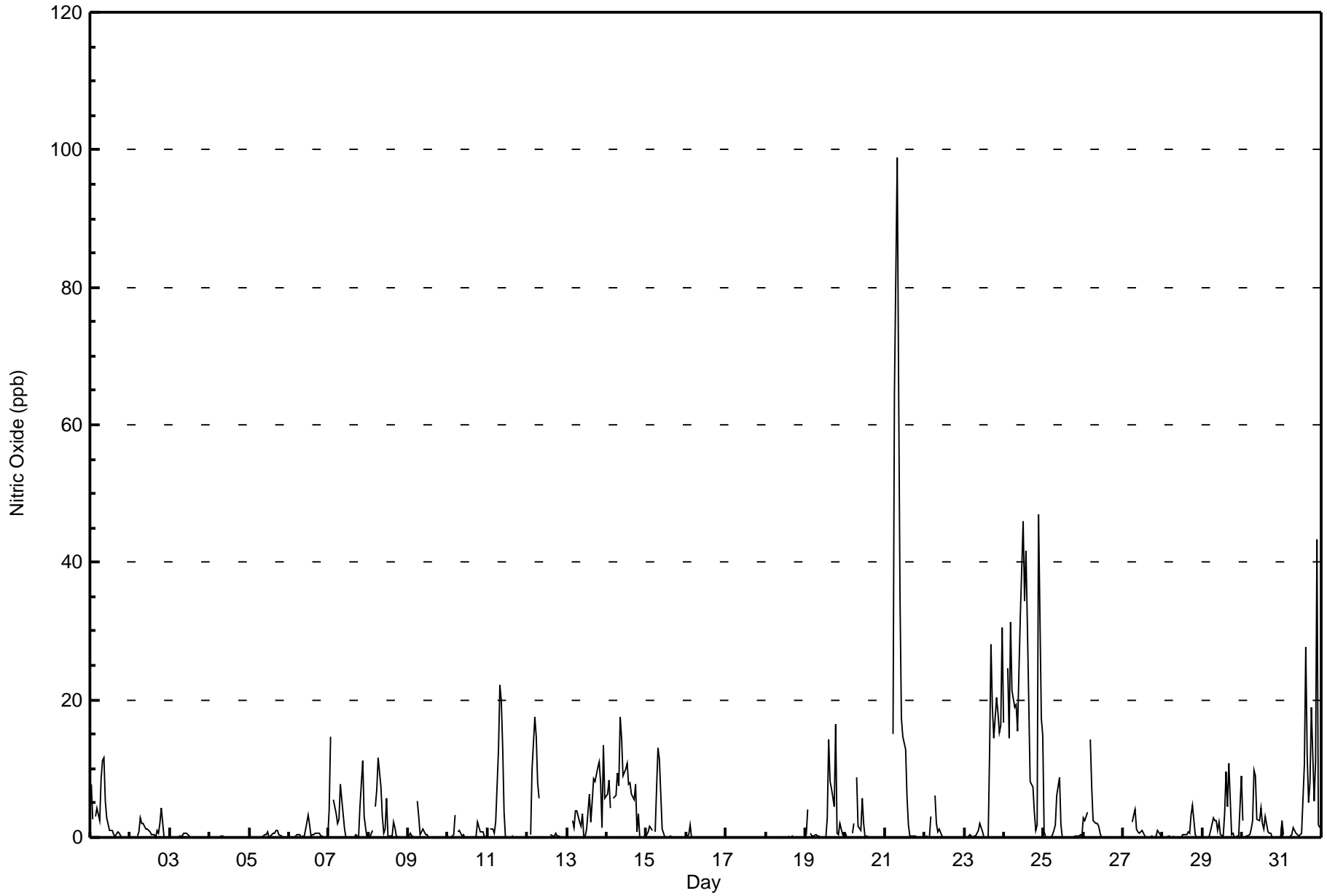
Muskeg River - July 2017

Maximum Value: 99 ppb on Jul 21 08:00														Maximum Daily Average: 21.4 ppb on Jul 24														Hours in Service: 744			
Minimum Value: 0 ppb on Jul 1 22:00														Minimum Daily Average: 0.0 ppb on Jul 4														Hours of Data: 653			
Maximum Diurnal Average: 8.3 ppb at hour 8														Minimum Diurnal Average: 1.4 ppb at hour 2														Hours of Missing Data: 91			
Monthly Average: 3.2 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 2 P ₉₀ = 10 P ₉₉ = 42														Hours of Calibration: 35			
																												Percent Operational Time: 92.5			
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-Jul	8	3	Z	3	4	2	9	11	12	5	3	1	1	1	0	0	1	1	0	0	0	0	0	0	2.8	12					
2-Jul	0	0	0	Z	0	1	3	2	2	1	1	1	1	0	0	0	1	1	2	4	0	0	0	0	0.9	4					
3-Jul	0	0	0	0	Z	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1					
4-Jul	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					
5-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	0	0	0	0	0.3	1					
6-Jul	0	Z	0	0	0	0	0	0	0	0	1	3	2	0	0	0	1	1	1	0	0	0	0	0	0.5	3					
7-Jul	4	15	Z	6	4	2	3	8	5	1	0	0	0	0	0	0	0	0	0	4	11	3	1	0	2.9	15					
8-Jul	0	0	1	Z	4	7	12	7	3	1	1	6	0	0	0	2	2	0	0	0	0	0	0	0	2.0	12					
9-Jul	0	1	0	0	Z	5	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	5					
10-Jul	0	0	0	0	3	Z	1	1	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	0	0.5	3					
11-Jul	Z	1	1	1	1	2	13	22	20	13	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3.4	22					
12-Jul	0	Z	0	10	17	15	8	6	C	C	C	C	C	C	0	0	0	1	0	0	0	0	0	0	--	17					
13-Jul	0	0	Z	3	2	4	4	2	2	3	0	0	1	6	2	5	9	8	10	11	8	1	14	6	4.4	14					
14-Jul	6	8	4	Z	6	6	9	7	18	15	9	10	11	8	8	6	5	8	1	3	0	0	0	0	6.5	18					
15-Jul	0	1	2	1	Z	1	7	13	11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	13					
16-Jul	0	0	2	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2					
17-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--					
18-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	0	0	0	0	0	0	0	0	0	0	--	0					
19-Jul	0	4	Z	1	0	0	0	0	0	0	0	0	0	3	14	8	7	5	16	1	0	2	0	0	2.8	16					
20-Jul	1	0	0	Z	1	2	PF	9	2	1	6	2	0	0	0	0	0	0	0	0	0	0	0	0	1.1	9					
21-Jul	0	0	0	0	Z	15	65	99	66	34	17	15	13	6	2	0	0	0	0	0	0	0	0	0	14.4	99					
22-Jul	0	0	0	0	3	Z	6	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6					
23-Jul	Z	0	0	0	0	0	0	0	1	2	1	1	0	0	0	12	28	19	14	20	18	15	16	31	7.9	31					
24-Jul	17	Z	25	14	31	21	19	19	15	24	32	46	34	42	31	20	8	7	4	1	2	47	17	15	21.4	47					
25-Jul	1	0	Z	0	0	0	1	2	6	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	9					
26-Jul	3	2	4	Z	14	7	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	14					
27-Jul	0	0	0	0	Z	2	3	4	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0.7	4					
28-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	3	5	0	0	0	0	0	0.5	5					
29-Jul	Z	0	0	0	0	1	3	2	2	1	2	0	0	4	10	4	11	0	1	0	0	0	0	9	2.3	11					
30-Jul	2	Z	0	0	0	1	2	10	9	3	2	4	2	1	3	1	1	1	0	0	0	0	0	0	1.9	10					
31-Jul	2	0	Z	0	0	0	1	1	1	0	0	0	1	11	28	12	5	8	19	5	11	43	2	1	6.6	43					
1.8 1.4 1.7 1.7 3.8 4.0 6.5 8.3 6.7 4.5 3.2 3.4 2.5 3.0 3.5 2.5 2.8 2.2 2.6 1.8 1.8 3.9 1.8 2.2																								Diurnal Average							
17 15 25 14 31 21 65 99 66 34 32 46 34 42 31 20 28 19 19 20 18 47 17 31																								Diurnal Maximum							
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure				PF - Power Failure																



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Muskeg River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Muskeg River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	634	97.09	97.09
21 - 40	12	1.84	98.93
41 - 80	6	0.92	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 653

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Muskeg River - July 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	23	20	42	10	19	15	21	36	115	92	68	80	31	35	18	9	634
21 - 40	0	10	1	0	0	0	0	0	0	0	0	0	1	0	0	0	12
11 - 80	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6
81 - 159	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	33	43	10	19	15	21	36	115	92	68	81	32	35	18	12	653

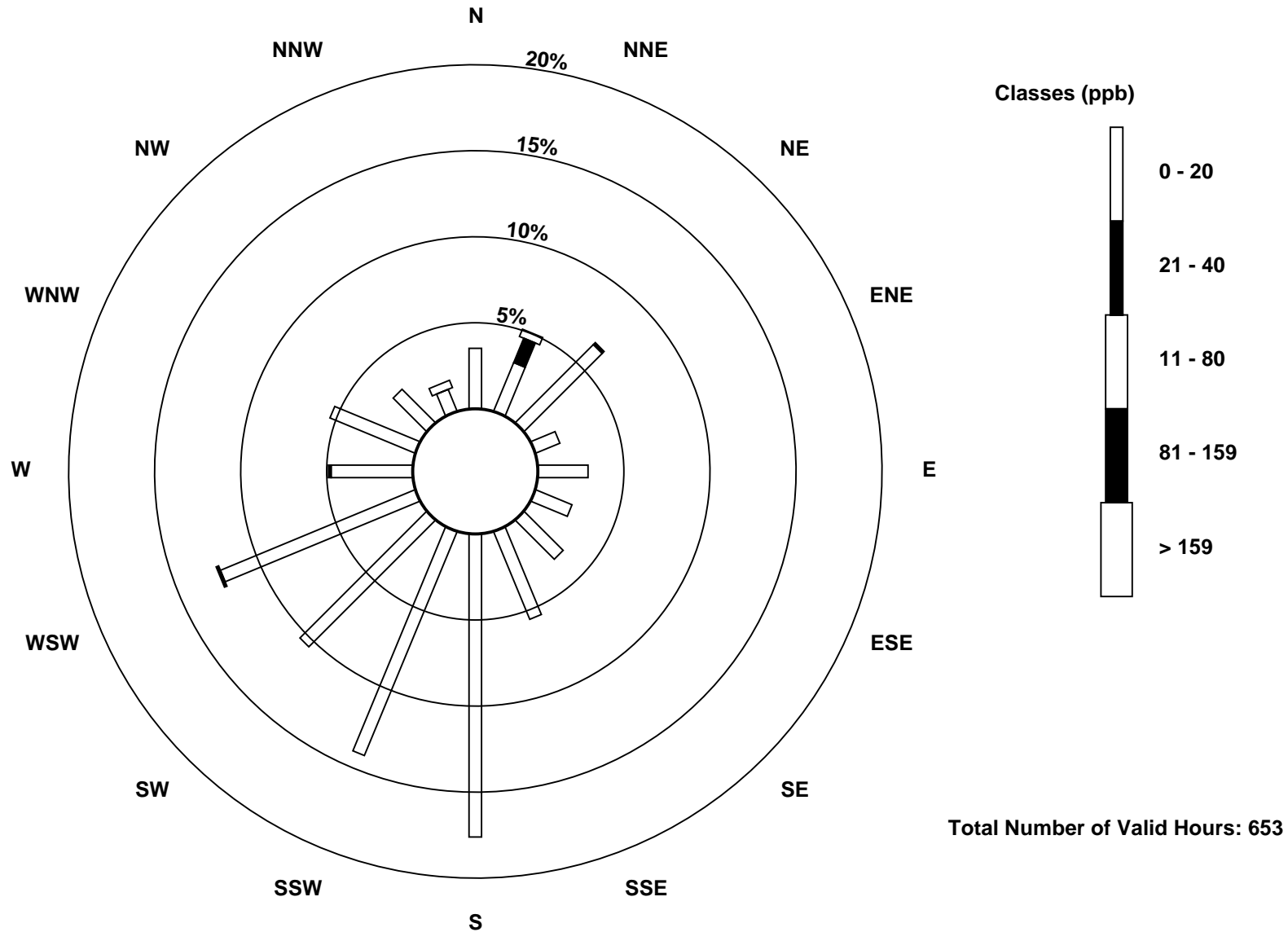
Total Number of Valid Hours: 653

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

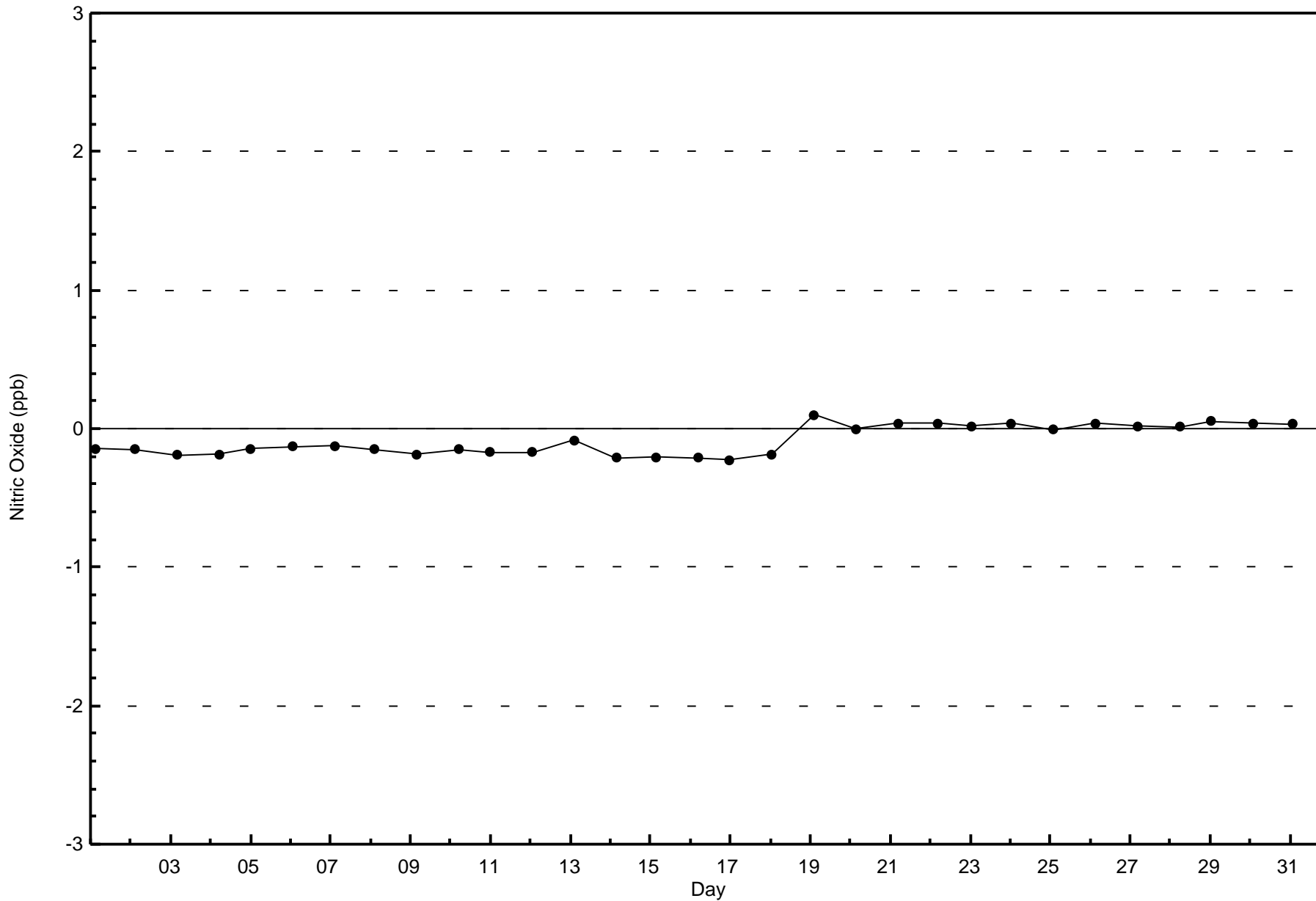
Nitric Oxide (NO) - ppb
Muskeg River (AMS 16)

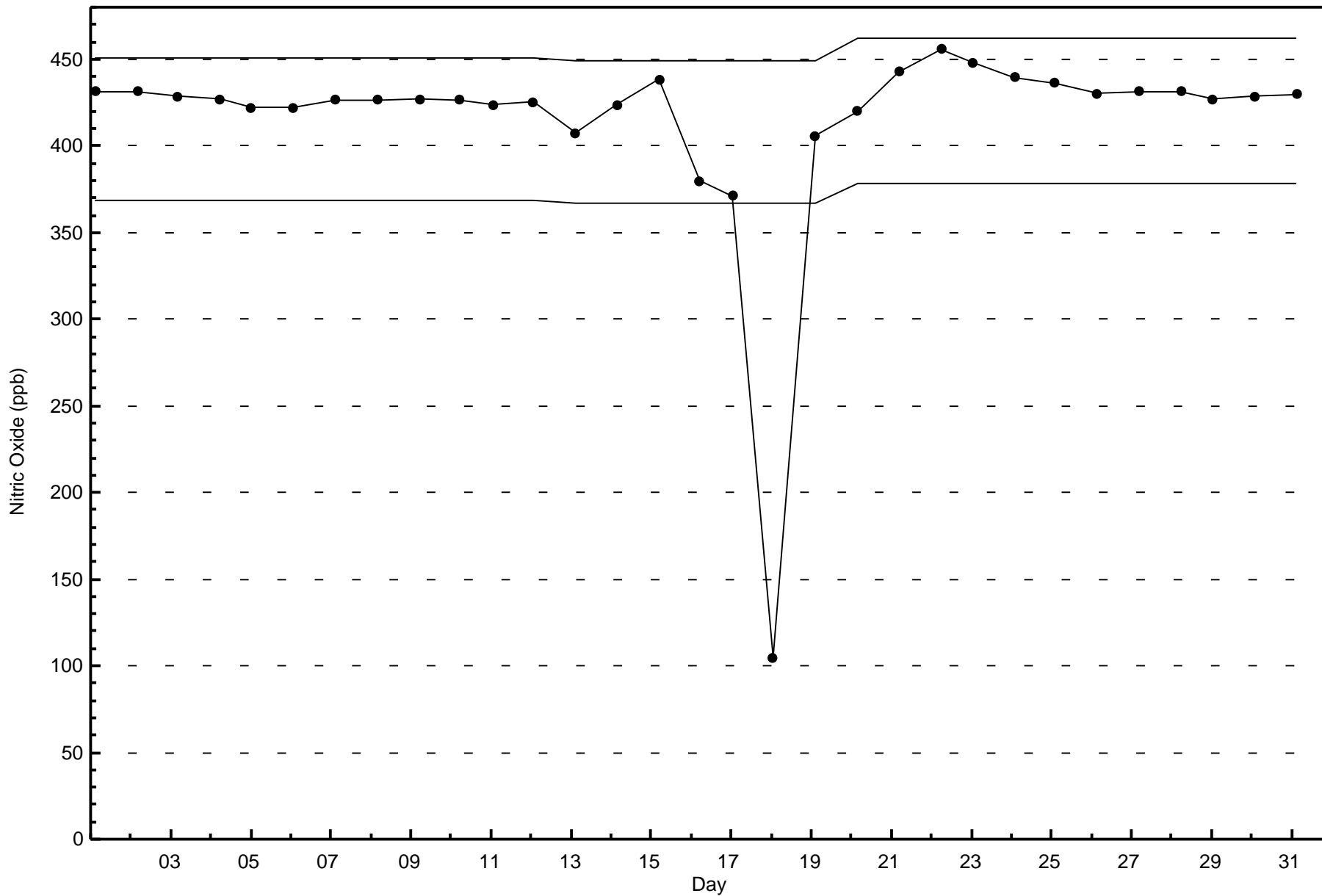




Wood Buffalo Environmental Association
Zero Responses

Nitric Oxide (NO) - ppb
Muskeg River - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

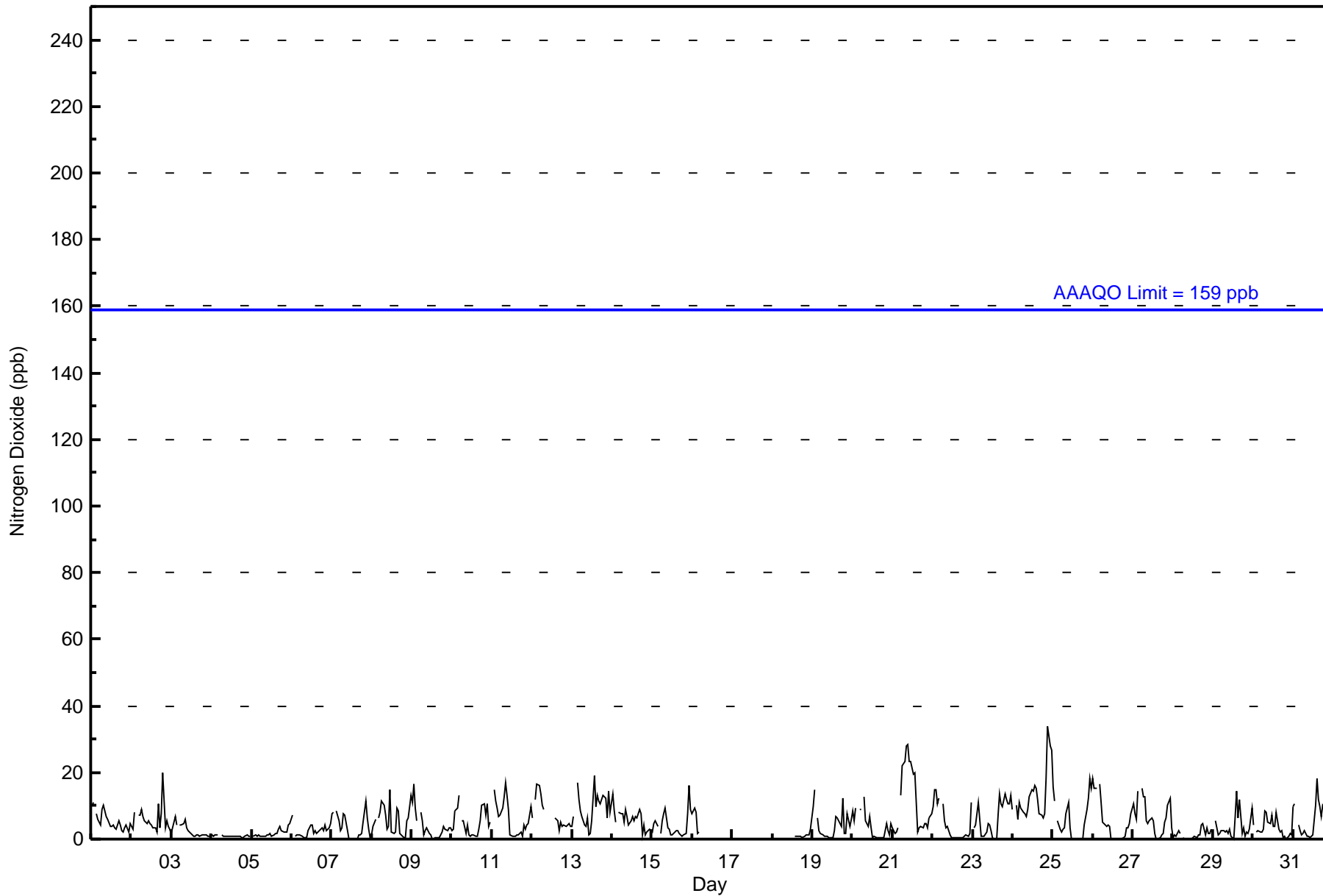
Muskeg River - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744												
Maximum Value: 34 ppb on Jul 24 22:00														Maximum Daily Average: 12.9 ppb on Jul 24												
Minimum Value: 0 ppb on Jul 7 12:00														Minimum Daily Average: 0.9 ppb on Jul 4												
Maximum Diurnal Average: 7.5 ppb at hour 2														Minimum Diurnal Average: 3.0 ppb at hour 13												
Monthly Average: 5.2 ppb														Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 4 O ₃ = 8 P ₉₀ = 12 P ₉₉ = 23												
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-Jul	10	11	Z	8	6	4	9	10	8	7	6	4	4	4	3	3	6	4	3	2	4	4	2	5	5.5	11
2-Jul	4	3	8	Z	7	7	9	7	6	5	5	5	4	4	4	2	11	4	8	20	3	6	4	3	5.9	20
3-Jul	2	5	7	4	Z	4	4	5	6	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2.5	7
4-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
5-Jul	Z	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	3	4	3	2	2	2	4	5	1.8	5
6-Jul	7	Z	1	1	1	1	1	0	1	0	3	4	4	2	2	2	2	3	3	3	4	3	3	5	2.5	7
7-Jul	8	8	Z	8	6	3	3	8	7	3	0	0	0	0	0	0	1	1	2	5	11	6	3	0	3.6	11
8-Jul	1	4	6	Z	6	8	12	10	7	3	4	15	2	2	2	9	8	2	1	0	1	6	6	13	5.6	15
9-Jul	11	16	10	6	Z	8	6	1	3	4	2	1	0	0	0	0	1	1	2	4	3	3	3	3	3.8	16
10-Jul	3	3	9	9	13	Z	6	6	2	4	1	1	1	1	1	1	3	6	10	11	7	11	4	5	5.0	13
11-Jul	Z	15	12	9	7	7	9	13	17	13	9	1	1	1	1	1	1	2	1	4	3	4	5	10	6.4	17
12-Jul	6	Z	12	17	16	14	10	9	C	C	C	C	C	C	6	5	3	5	4	4	4	4	5	4	--	17
13-Jul	4	7	Z	17	12	8	7	4	4	7	1	2	6	19	10	13	11	11	13	13	12	6	15	8	9.1	19
14-Jul	14	9	5	Z	8	8	8	5	9	7	4	6	7	5	7	6	9	8	1	4	1	2	3	3	5.9	14
15-Jul	2	5	5	4	Z	2	6	8	9	3	3	1	1	2	3	3	2	1	1	1	2	8	16	9	4.2	16
16-Jul	8	9	8	2	2	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	9
17-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--
18-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	1	1	1	1	1	1	1	1	1	3	--	3
19-Jul	10	15	Z	6	3	2	1	1	1	1	1	1	1	2	7	7	6	4	12	2	2	8	4	6	4.2	15
20-Jul	9	5	9	Z	9	9	PF	13	6	4	7	4	1	1	0	0	0	0	1	1	5	2	1	5	4.1	13
21-Jul	3	2	2	3	Z	13	22	23	28	28	23	24	20	20	11	2	4	4	3	5	5	3	6	8	11.4	28
22-Jul	10	15	15	11	12	Z	10	5	3	4	1	0	0	0	0	1	0	1	1	1	1	1	2	11	4.6	15
23-Jul	Z	4	4	11	6	1	1	1	2	5	4	3	1	0	0	7	14	11	10	14	12	11	11	13	6.2	14
24-Jul	9	Z	10	6	11	9	8	8	7	9	13	15	14	16	15	12	8	7	6	8	18	34	28	27	12.9	34
25-Jul	16	11	Z	6	3	2	3	3	8	11	4	0	0	0	0	0	0	0	4	9	12	18	15	15	5.4	18
26-Jul	18	15	15	Z	17	11	5	4	4	4	4	0	0	0	0	0	0	0	1	4	3	5	8	5.1	18	
27-Jul	11	8	6	15	Z	15	13	13	6	5	6	6	5	2	0	0	0	1	2	5	6	10	12	3	6.5	15
28-Jul	0	1	1	3	2	Z	0	0	0	0	0	0	0	1	1	1	1	4	5	1	3	2	2	3	1.4	5
29-Jul	Z	5	3	1	2	2	3	2	3	2	3	1	0	7	15	6	12	2	4	1	2	2	3	9	3.9	15
30-Jul	4	Z	2	3	2	2	3	9	8	5	5	7	4	4	8	3	2	3	0	1	0	1	2	1	3.4	9
31-Jul	10	11	Z	4	3	1	2	3	1	1	0	1	1	10	18	12	10	7	10	9	16	20	7	7	7.1	20
7.2 7.5 6.6 6.5 6.5 5.9 6.0 6.1 5.8 5.1 4.1 3.9 3.0 3.8 4.1 3.5 4.1 3.3 3.7 4.4 4.9 6.1 6.1 6.7																								Diurnal Average		
18 16 15 17 17 15 22 23 28 28 23 24 20 20 18 13 14 11 13 20 18 34 28 27																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure 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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Muskeg River - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	644	98.62	98.62
21 - 40	9	1.38	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: 653

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Muskeg River - July 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	22	32	42	10	19	15	21	36	115	92	68	80	32	34	16	10	644
21 - 40	1	1	1	0	0	0	0	0	0	0	0	1	0	1	2	2	9
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	23	33	43	10	19	15	21	36	115	92	68	81	32	35	18	12	653

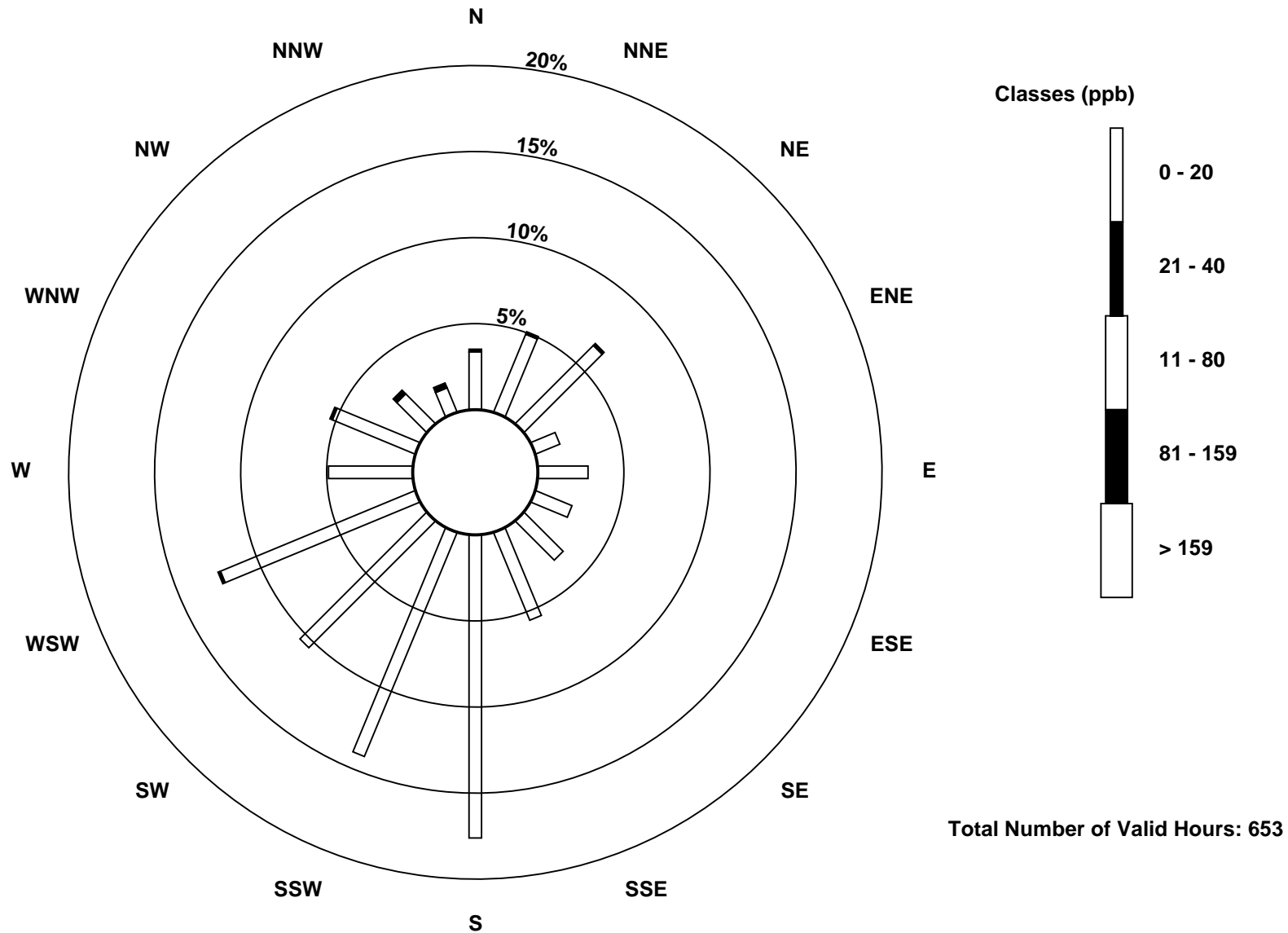
Total Number of Valid Hours: 653

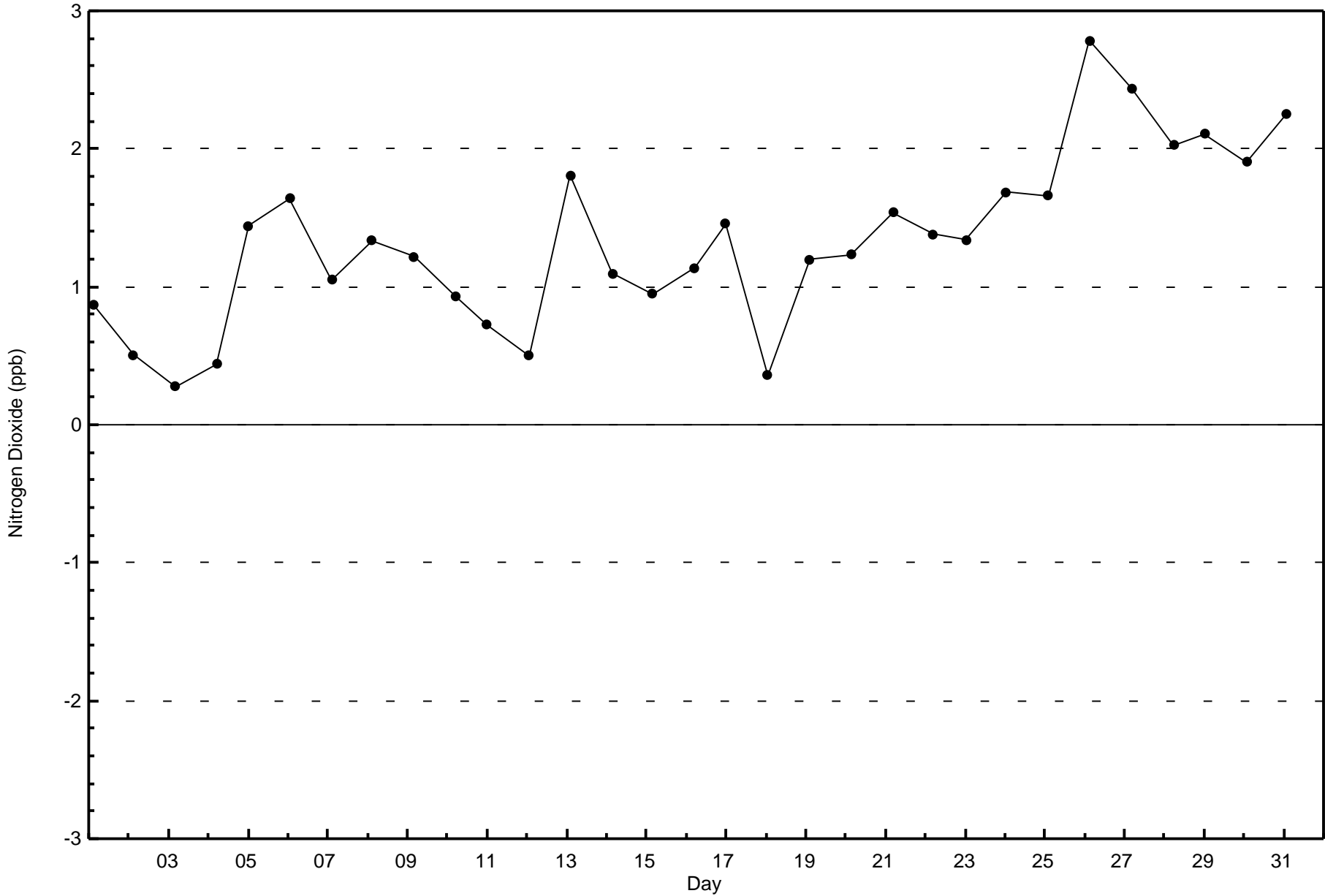
Total Number of Hours: 744

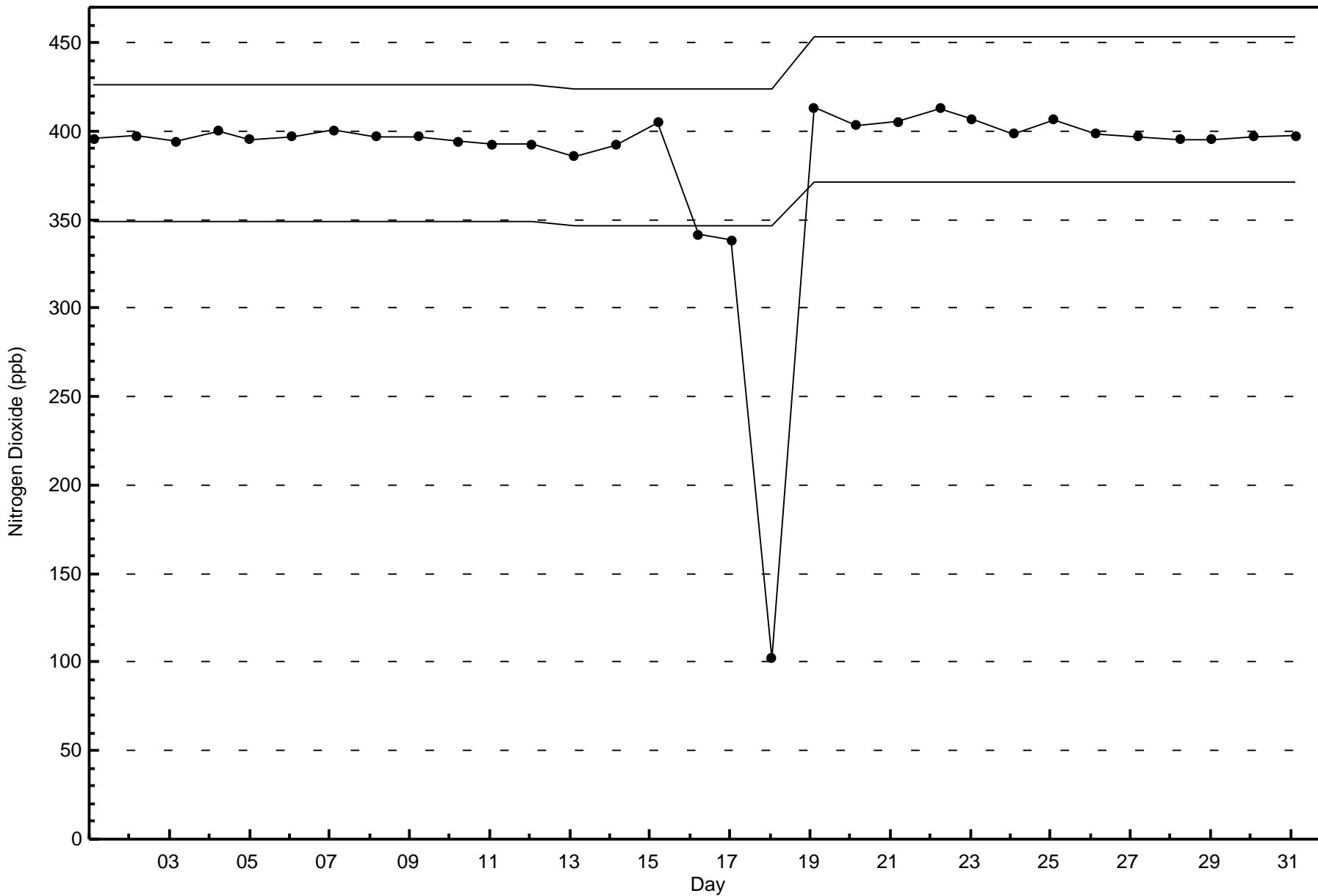


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

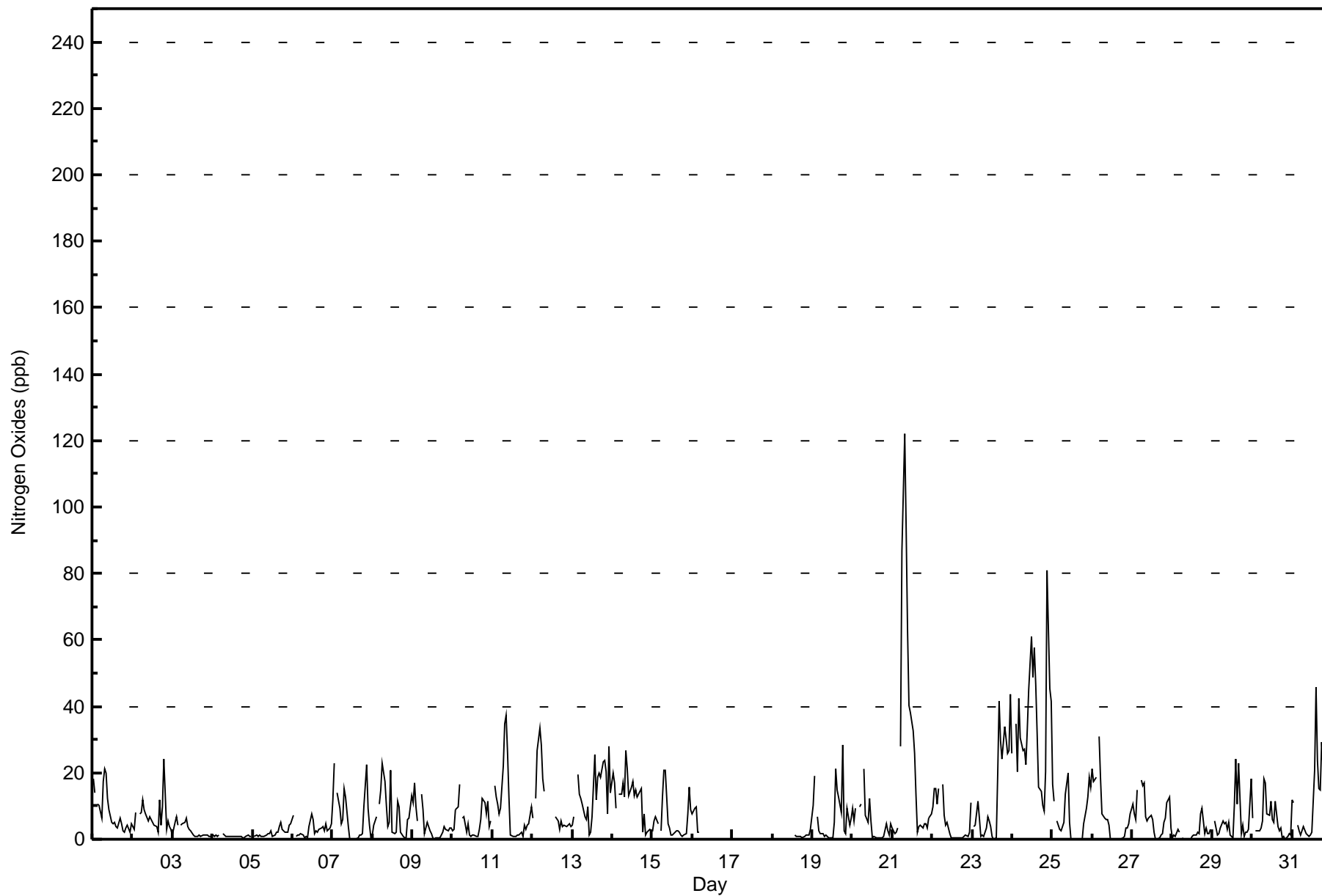
Nitrogen Oxides (NO_x) - ppb
Muskeg River - July 2017

Maximum Value: 122 ppb on Jul 21 08:00		Maximum Daily Average: 34.4 ppb on Jul 24		Hours in Service: 744																																													
Minimum Value: 0 ppb on Jul 7 12:00		Minimum Daily Average: 0.9 ppb on Jul 4		Hours of Data: 653																																													
Maximum Diurnal Average: 14.4 ppb at hour 8		Minimum Diurnal Average: 5.4 ppb at hour 13		Hours of Missing Data: 91																																													
Monthly Average: 8.4 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 4 Q ₃ = 11 P ₉₀ = 21 P ₉₉ = 61		Hours of Calibration: 35																																													
				Percent Operational Time: 92.5																																													
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-Jul	18	14	Z	11	10	7	17	21	20	12	9	5	5	5	4	3	6	5	3	2	4	4	2	5	8.3	21																							
2-Jul	4	3	8	Z	7	8	12	9	8	6	7	6	5	4	4	2	12	4	10	24	3	6	4	3	6.9	24																							
3-Jul	1	5	7	4	Z	4	4	5	6	4	3	3	1	1	1	1	1	1	1	1	1	1	1	1	2.6	7																							
4-Jul	1	1	1	1	1	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2																							
5-Jul	Z	1	1	1	1	1	1	1	1	2	2	3	1	1	2	2	4	5	3	2	2	2	4	5	2.1	5																							
6-Jul	7	Z	1	1	1	2	1	0	1	0	4	8	6	2	3	2	3	3	4	3	5	3	3	5	2.9	8																							
7-Jul	12	23	Z	14	9	5	6	15	13	4	0	0	0	0	0	0	1	1	2	10	23	9	4	0	6.6	23																							
8-Jul	1	4	7	Z	11	15	23	18	10	4	5	21	2	2	2	11	10	2	1	0	1	6	6	13	7.6	23																							
9-Jul	11	17	10	6	Z	13	9	2	3	5	2	2	0	0	0	0	0	1	2	4	3	3	3	3	4.4	17																							
10-Jul	3	3	9	10	16	Z	6	7	2	5	1	1	1	1	1	1	3	6	12	11	8	11	4	6	5.5	16																							
11-Jul	Z	16	13	10	7	10	22	35	37	26	13	1	1	1	1	1	1	2	1	4	3	4	5	10	9.8	37																							
12-Jul	7	Z	12	27	34	28	18	14	C	C	C	C	C	C	7	6	3	6	4	4	4	4	4	4	--	34																							
13-Jul	4	7	Z	20	13	12	11	7	6	10	1	2	7	25	12	18	20	19	23	24	20	8	28	14	13.5	28																							
14-Jul	20	17	9	Z	13	14	17	13	27	21	13	16	17	13	15	13	14	15	2	8	1	2	3	3	12.4	27																							
15-Jul	3	6	7	5	Z	3	13	21	21	4	3	1	1	2	3	3	2	1	1	1	2	8	16	9	5.8	21																							
16-Jul	8	9	10	2	2	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	10																							
17-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	--																							
18-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	1	1	1	1	1	1	1	1	1	3	--	3																							
19-Jul	10	19	Z	7	3	2	2	1	1	1	1	0	0	5	21	15	13	8	29	2	2	9	4	6	7.0	29																							
20-Jul	9	5	9	Z	10	11	PF	21	7	5	12	6	1	1	0	0	0	0	1	1	5	2	1	4	5.1	21																							
21-Jul	3	2	2	3	Z	28	87	122	94	63	40	38	33	26	13	2	4	4	3	5	4	3	6	8	25.8	122																							
22-Jul	10	15	15	11	15	Z	16	7	4	5	2	0	0	0	0	0	0	1	1	1	1	1	2	11	5.2	16																							
23-Jul	Z	4	4	11	6	1	1	1	3	7	6	4	1	0	0	20	42	30	24	34	30	26	27	44	14.1	44																							
24-Jul	26	Z	35	20	42	31	27	27	22	33	45	61	49	58	47	32	16	14	10	9	20	81	45	42	34.4	81																							
25-Jul	16	12	Z	6	3	3	4	5	14	20	5	0	0	0	0	0	0	0	5	9	13	18	16	16	6.4	20																							
26-Jul	21	17	19	Z	31	18	8	6	6	6	4	0	0	0	0	0	0	0	1	4	3	5	8	6.8	31																								
27-Jul	11	8	6	15	Z	18	16	17	7	6	6	7	6	2	0	0	0	1	2	5	6	11	13	3	7.2	18																							
28-Jul	0	1	1	3	2	Z	0	0	0	0	0	0	1	1	1	2	2	8	10	2	3	2	2	3	1.9	10																							
29-Jul	Z	6	3	1	2	3	6	5	5	3	5	1	0	10	24	11	23	2	4	1	2	2	3	18	6.1	24																							
30-Jul	7	Z	2	3	2	3	5	18	17	8	7	11	6	5	11	4	3	3	1	1	0	1	2	1	5.3	18																							
31-Jul	12	11	Z	4	3	1	2	4	2	1	1	1	2	21	46	24	15	15	29	14	27	64	8	9	13.7	64																							
																								9.0	9.0	8.3	8.1	10.3	10.0	12.4	14.4	12.5	9.7	7.3	7.3	5.4	6.7	7.6	6.0	6.9	5.5	6.3	6.2	6.7	10.0	7.8	8.8	Diurnal Average	
																								26	23	35	27	42	31	87	122	94	63	45	61	49	58	47	32	42	30	29	34	30	81	45	44	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				PF - Power Failure													



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Muskeg River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Muskeg River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	585	89.59	89.59
21 - 40	51	7.81	97.40
41 - 80	13	1.99	99.39
81 - 159	3	0.46	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 653

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Muskeg River - July 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	16	8	34	9	18	15	20	34	109	90	67	79	31	33	14	8	585
21 - 40	7	15	8	1	1	0	1	2	6	2	1	1	1	2	2	1	51
11 - 80	0	9	1	0	0	0	0	0	0	0	0	0	0	0	2	1	13
81 - 159	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	23	33	43	10	19	15	21	36	115	92	68	81	32	35	18	11	652

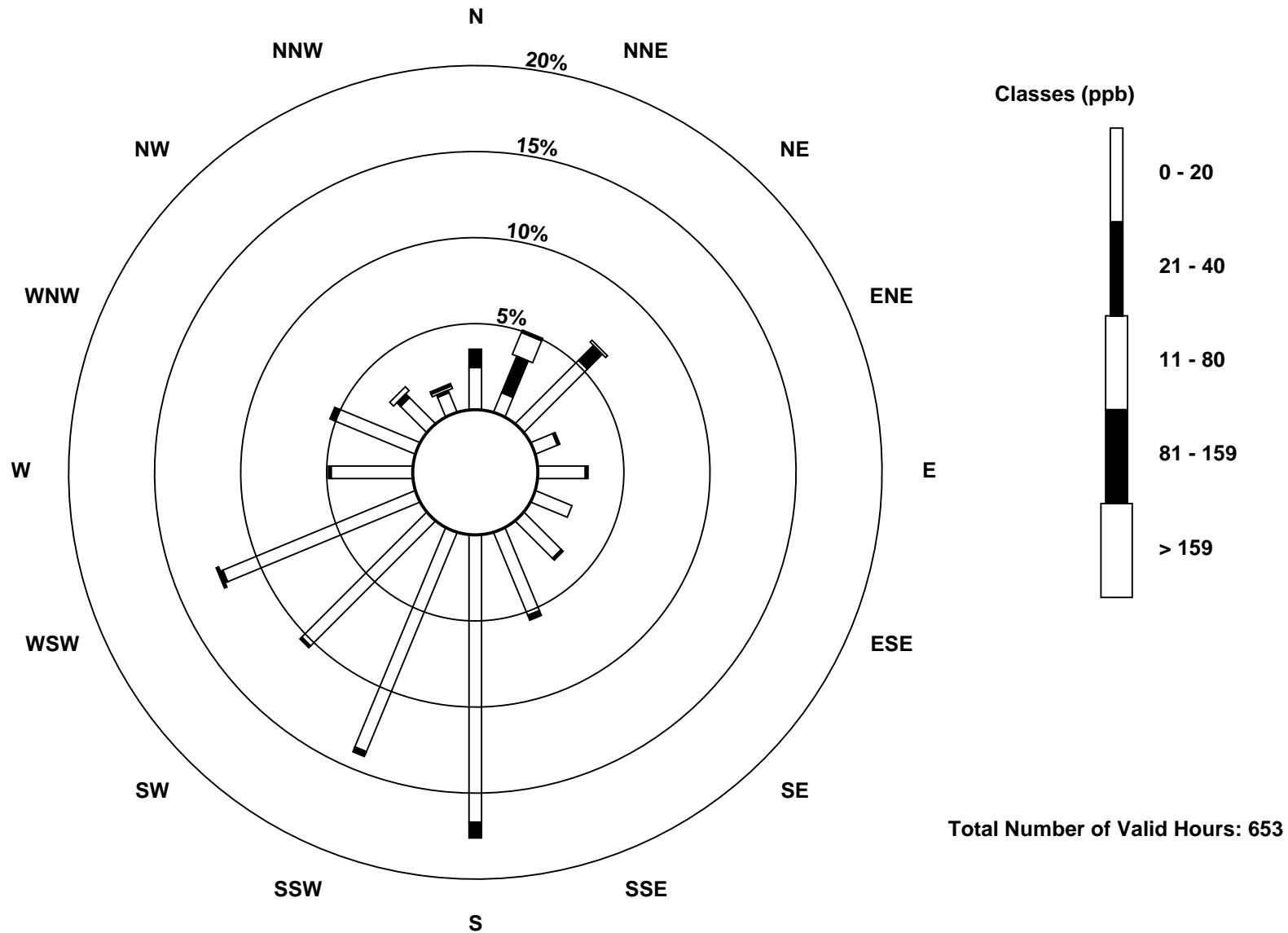
Total Number of Valid Hours: 653

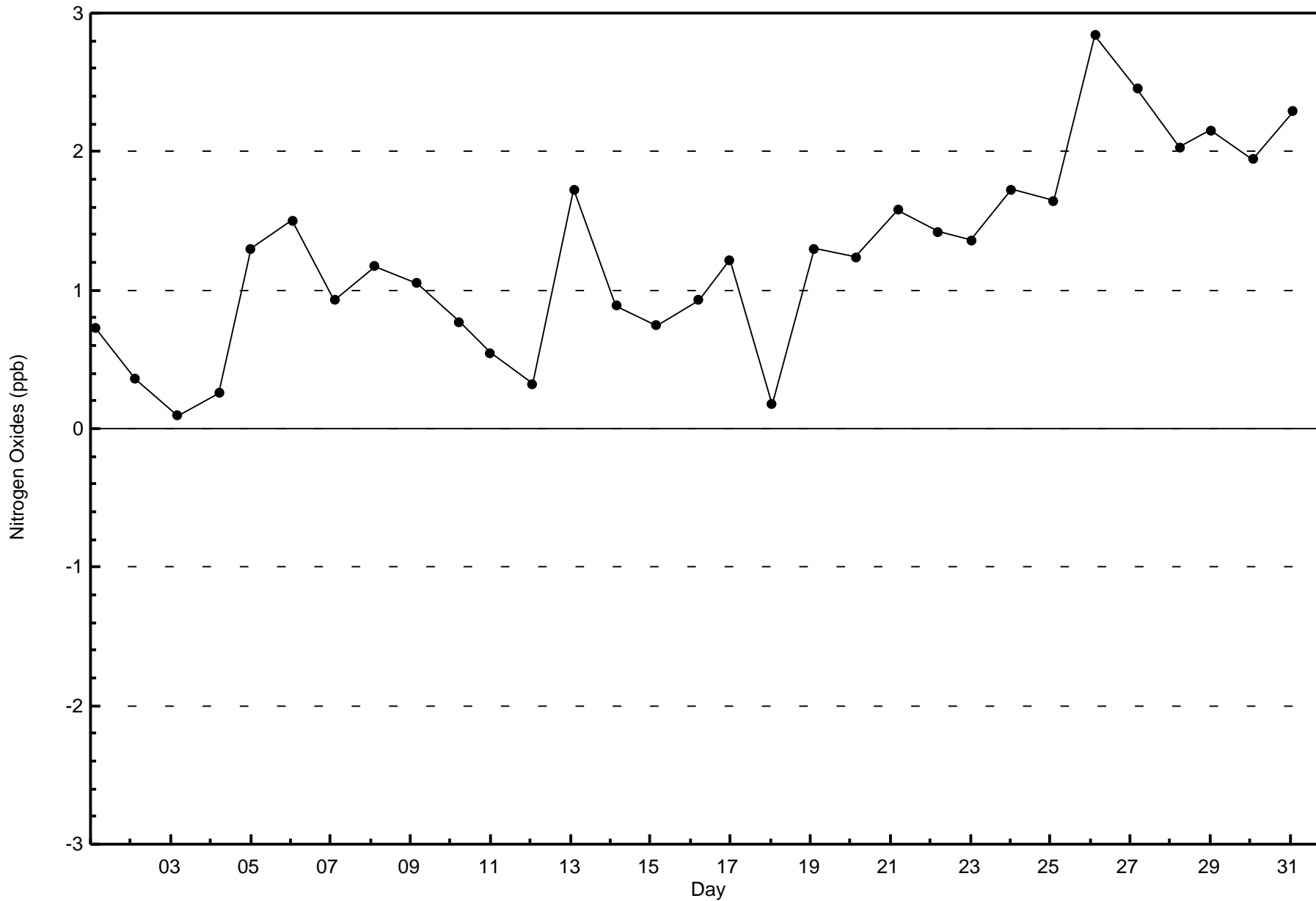
Total Number of Hours: 744

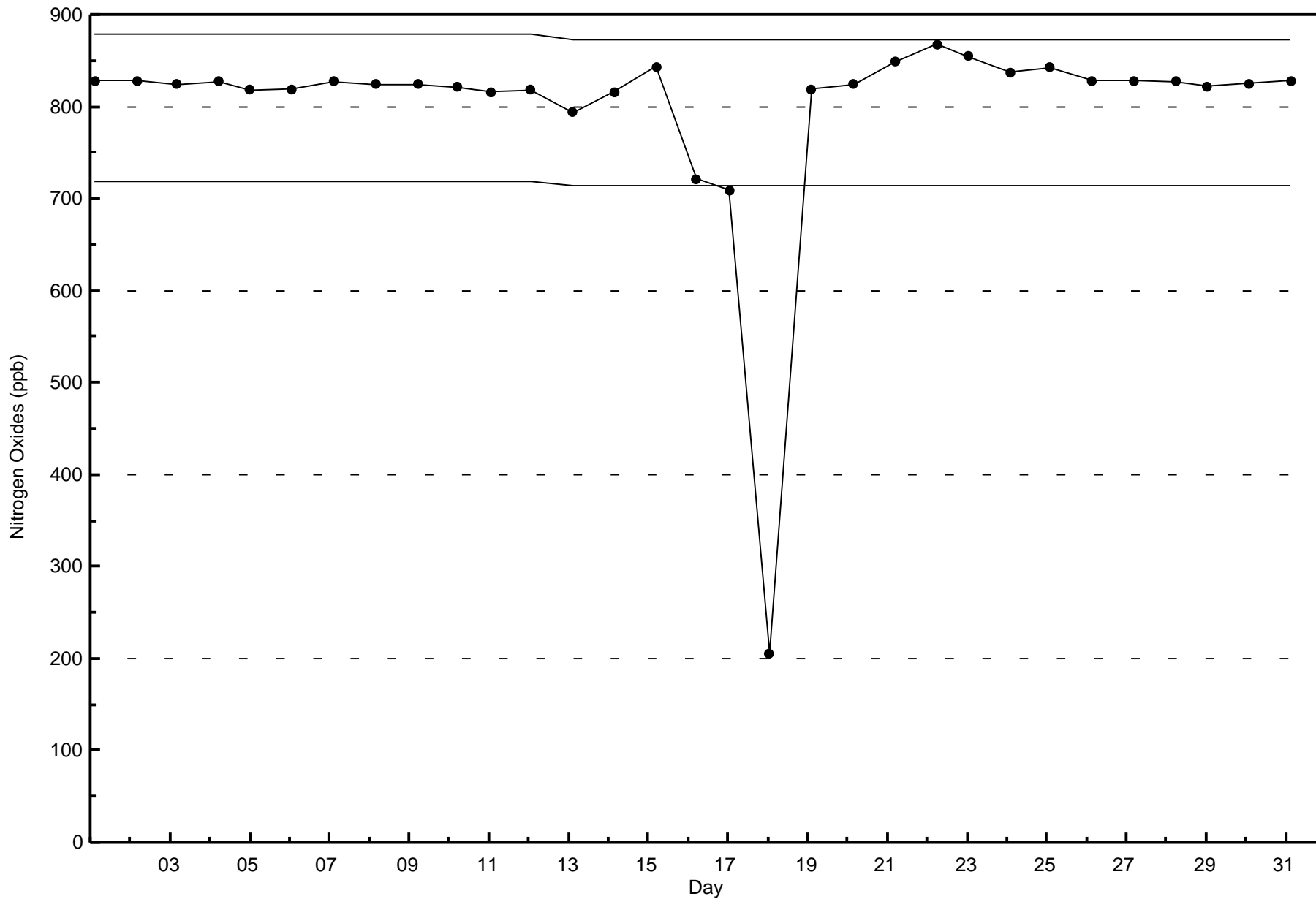


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Muskeg River (AMS 16)





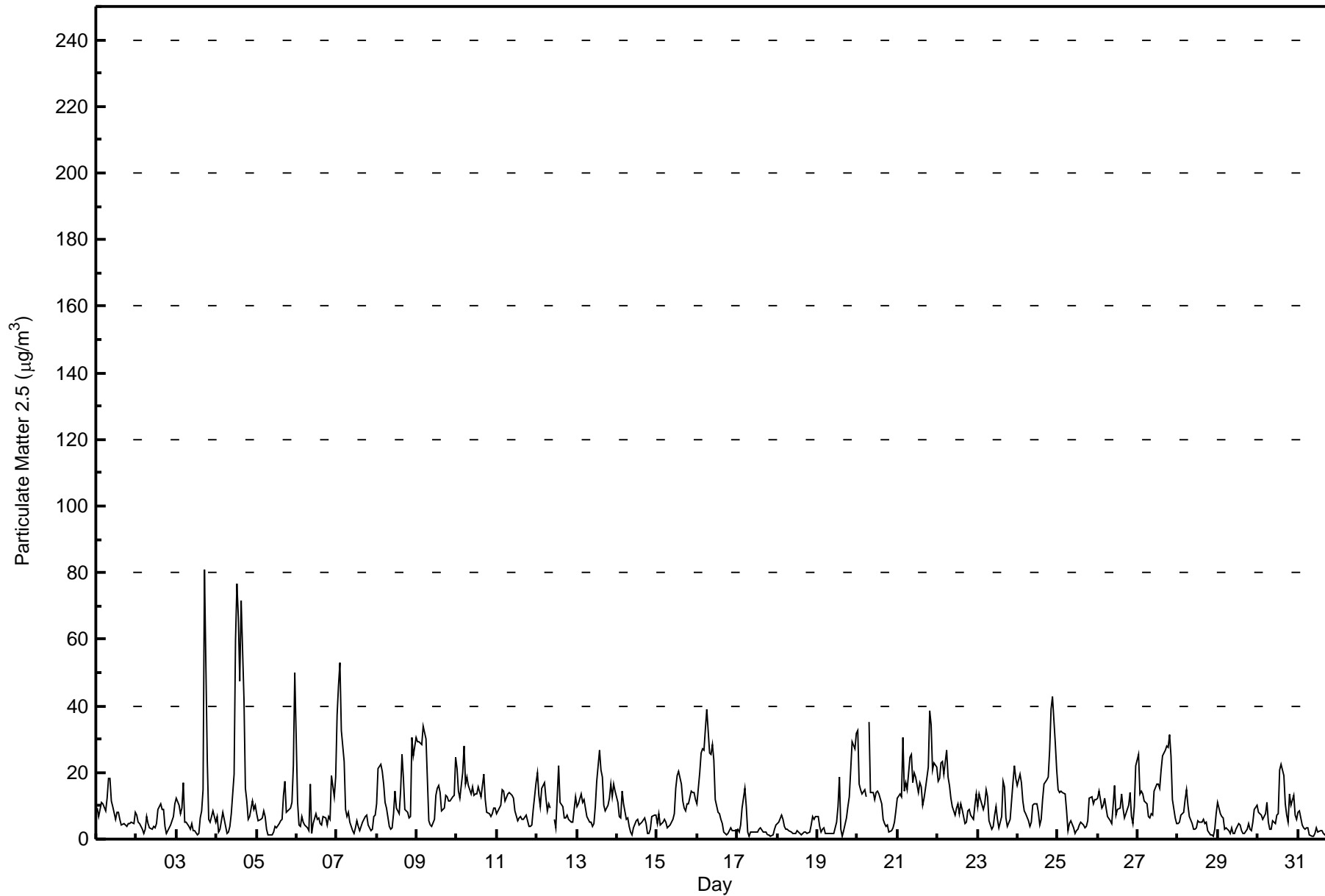




Summary of Hour Averages

Muskeg River - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 81.1 µg/m ³ on Jul 3 18:00 Maximum Daily Average: 20.7 µg/m ³ on Jul 4		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 1 Percent Operational Time: 99.9																																															
Minimum Value: 0.8 µg/m ³ on Jul 17 08:00 Maximum Diurnal Average: 14.2 µg/m ³ at hour 24 Monthly Average: 10.37 µg/m ³		Minimum Daily Average: 3.4 µg/m ³ on Jul 18 Minimum Diurnal Average: 6.7 µg/m ³ at hour 10 Percentiles: P ₁ = 1.2 P ₁₀ = 2.4 Q ₁ = 4.4 Median = 7.6 Q ₃ = 13.6 P ₉₀ = 20.9 P ₉₉ = 47.3																																															
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-Jul	9.3	6.8	8.7	10.9	10.7	8.4	12.3	18.4	18.0	11.4	9.9	5.9	8.2	8.0	5.7	4.3	4.6	4.2	3.7	4.5	4.8	4.9	4.7	8.1	8.2	18.4																							
2-Jul	7.3	5.1	4.7	3.1	1.7	2.8	6.8	4.6	3.2	3.2	3.8	3.6	4.6	9.1	10.6	8.7	8.7	3.8	1.8	2.4	4.2	5.6	6.6	10.6	5.3	10.6																							
3-Jul	12.2	10.2	7.4	9.4	16.9	5.1	5.0	3.7	3.2	4.8	2.7	2.6	1.4	1.8	6.2	8.4	15.0	81.1	23.2	6.0	5.3	6.6	8.4	5.1	10.5	81.1																							
4-Jul	6.7	2.1	2.8	5.4	8.1	3.8	1.7	2.2	3.7	7.7	19.4	59.7	76.7	66.6	47.3	71.5	41.7	15.3	11.5	6.1	6.7	11.4	8.7	10.1	20.7	76.7																							
5-Jul	7.5	5.7	6.0	6.4	8.7	6.9	3.1	1.2	1.3	1.4	2.2	3.7	3.4	4.8	5.6	5.7	13.1	17.4	8.2	8.8	9.4	10.9	22.0	50.1	8.9	50.1																							
6-Jul	11.1	4.3	3.7	6.6	5.0	4.4	3.4	2.5	16.5	1.7	4.5	7.4	6.0	6.2	4.8	4.4	6.6	6.4	4.3	6.9	6.1	18.9	12.6	18.7	7.2	18.9																							
7-Jul	37.2	46.1	53.1	32.4	23.3	8.7	6.9	8.0	5.1	2.5	1.7	3.3	5.4	3.7	2.7	5.0	5.8	6.6	7.1	4.4	2.3	2.9	6.8	7.2	12.0	53.1																							
8-Jul	10.6	21.2	22.6	20.4	16.7	11.1	9.3	3.8	2.9	3.4	7.6	14.3	9.5	7.8	14.6	25.4	18.0	9.1	8.1	6.4	6.7	30.3	24.8	30.6	14.0	30.6																							
9-Jul	29.2	29.0	28.9	28.4	34.1	29.9	17.6	5.3	4.4	3.8	5.8	13.1	15.2	16.1	13.8	8.5	9.3	13.1	12.8	11.4	11.3	12.9	13.1	24.4	16.3	34.1																							
10-Jul	21.0	14.6	12.4	20.1	27.8	16.3	18.5	16.0	13.7	15.7	13.0	13.6	13.8	15.8	12.8	16.0	19.4	12.0	8.0	7.8	6.9	7.4	9.4	9.4	14.2	27.8																							
11-Jul	7.5	9.4	10.1	14.9	14.4	11.5	13.4	14.1	13.5	13.3	12.5	8.4	5.4	6.1	6.7	5.8	5.8	7.1	5.4	3.9	3.8	4.2	9.0	16.8	9.3	16.8																							
12-Jul	19.8	13.3	9.6	15.3	17.1	12.1	8.5	10.6	9.4	C	6.0	3.3	12.9	22.0	11.0	9.9	6.2	6.2	7.3	5.9	4.9	5.1	8.8	12.7	10.4	22.0																							
13-Jul	9.6	10.5	13.4	11.1	11.9	9.3	6.6	5.0	5.0	4.0	4.5	9.6	17.3	26.8	20.9	18.5	10.3	8.6	10.1	12.4	16.7	12.7	16.4	14.5	11.9	26.8																							
14-Jul	10.9	6.8	6.5	14.2	10.5	5.9	6.2	3.9	2.0	1.4	3.3	5.6	5.8	4.0	4.5	5.1	6.3	4.8	1.7	1.7	3.2	6.7	7.2	7.3	5.6	14.2																							
15-Jul	4.8	7.5	4.2	5.0	6.1	5.0	3.4	3.9	4.4	5.7	7.5	15.2	19.2	20.2	16.6	11.6	9.5	8.6	10.7	10.6	14.5	13.9	14.1	11.8	9.7	20.2																							
16-Jul	10.6	19.9	25.9	27.1	26.5	32.9	39.2	25.7	25.5	28.2	23.5	11.9	8.1	7.8	6.0	4.5	2.2	1.2	1.8	2.6	3.3	2.4	2.5	2.7	14.3	39.2																							
17-Jul	2.9	2.3	4.4	9.5	15.3	9.6	2.2	0.8	2.0	2.2	1.9	2.1	2.3	3.1	3.3	2.2	2.3	1.9	1.2	1.3	1.1	1.4	2.9	4.4	3.4	15.3																							
18-Jul	4.8	5.0	7.0	6.0	4.0	2.8	3.1	2.6	2.0	1.8	1.7	1.5	2.6	1.5	1.3	1.8	2.3	2.3	1.8	2.1	4.2	6.9	5.8	6.7	3.4	7.0																							
19-Jul	6.9	3.6	2.3	2.8	3.3	1.6	1.7	1.6	1.8	1.8	1.9	5.3	9.8	18.7	2.9	1.0	2.5	6.5	9.7	12.8	20.9	29.3	27.1	31.9	8.6	31.9																							
20-Jul	32.5	16.6	15.0	13.6	14.7	12.5	PF	35.3	13.8	13.8	11.8	14.0	14.3	13.7	10.5	5.9	4.7	4.0	4.1	2.3	2.7	3.6	5.3	8.4	11.9	35.3																							
21-Jul	12.1	13.4	12.9	30.7	14.3	16.7	15.0	24.4	25.6	17.0	20.0	18.5	14.0	17.0	15.8	10.4	12.1	15.2	21.4	38.4	34.1	20.9	22.8	21.4	19.3	38.4																							
22-Jul	17.4	18.0	22.9	23.2	19.7	26.5	18.8	15.9	12.2	9.7	7.4	9.4	10.5	7.5	10.7	9.0	4.5	5.0	8.5	9.1	7.1	5.9	10.4	13.7	12.6	26.5																							
23-Jul	9.8	13.4	11.8	8.8	10.8	14.7	12.8	5.5	3.0	3.6	7.2	9.7	5.8	3.6	6.8	17.3	15.8	6.4	4.0	5.8	11.4	17.0	21.8	18.2	10.2	21.8																							
24-Jul	16.2	19.7	16.9	11.2	8.6	7.7	5.7	3.8	5.2	10.3	10.5	10.4	8.3	4.3	6.0	11.7	16.4	17.8	18.6	26.7	38.9	42.8	29.0	20.7	15.3	42.8																							
25-Jul	15.0	13.9	14.3	14.0	13.6	8.3	2.7	4.6	5.6	3.4	1.9	2.4	3.0	4.1	4.9	4.3	3.5	3.8	5.4	12.4	12.8	10.4	11.9	11.8	7.8	15.0																							
26-Jul	12.1	14.6	9.5	10.0	12.3	9.4	6.9	5.4	4.7	10.4	16.3	7.2	8.9	9.2	13.4	9.5	6.2	7.7	10.4	13.9	6.8	4.5	9.9	21.9	10.0	21.9																							
27-Jul	25.3	13.7	14.4	13.4	11.4	10.7	6.9	6.3	7.5	7.1	14.3	16.7	16.4	15.3	20.6	25.2	26.8	27.9	27.3	31.4	24.9	11.8	6.4	4.7	16.1	31.4																							
28-Jul	4.5	5.1	7.1	8.2	12.0	14.7	10.3	6.9	4.6	2.9	2.9	3.4	5.6	4.9	5.3	5.9	4.8	5.2	2.4	1.4	1.2	1.0	3.1	7.4	5.5	14.7																							
29-Jul	10.8	7.5	6.9	6.2	3.1	3.5	2.5	1.7	3.3	1.8	1.6	3.2	4.6	4.2	2.5	1.6	1.5	2.8	4.8	2.8	2.6	5.0	8.9	10.3	4.3	10.8																							
30-Jul	8.1	7.4	7.2	6.0	7.6	11.1	5.3	2.8	2.9	5.5	4.7	7.2	7.8	20.6	22.5	19.1	10.6	7.3	4.9	13.7	10.2	13.1	7.2	6.1	9.1	22.5																							
31-Jul	7.9	8.3	4.2	3.6	3.0	3.3	3.2	1.1	1.0	1.0	1.8	3.5	2.1	2.4	2.6	1.5	1.3	1.8	7.1	14.9	21.3	14.9	6.1	11.6	5.4	21.3																							
																								13.0	12.1	12.2	12.8	12.7	10.6	8.6	8.0	7.3	6.7	7.5	9.5	10.6	11.5	10.3	11.0	9.6	10.4	8.3	9.4	10.0	11.1	11.4	14.2	Diurnal Average	
																								37.2	46.1	53.1	32.4	34.1	32.9	39.2	35.3	25.6	28.2	23.5	59.7	76.7	66.6	47.3	71.5	41.7	81.1	27.3	38.4	38.9	42.8	29.0	50.1	Diurnal Maximum	
C - Calibration 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}) - $\mu\text{g}/\text{m}^3$
Muskeg River - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	253	34.10	34.10
6 - 15	348	46.90	81.00
16 - 25	89	11.99	92.99
26 - 80	47	6.33	99.33
> 81.0	1	0.13	99.46

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River - July 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	10	9	18	4	7	6	3	7	31	34	23	40	19	20	9	13	253
6 - 15	12	16	16	6	9	8	12	24	64	49	44	42	13	15	13	5	348
16 - 25	5	8	5	0	1	1	4	6	19	14	8	5	3	3	3	4	89
26 - 80	1	0	3	2	2	0	3	3	10	1	5	7	4	2	1	3	47
> 81.0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Totals	28	33	42	12	19	15	22	40	124	98	80	95	39	40	26	25	738

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

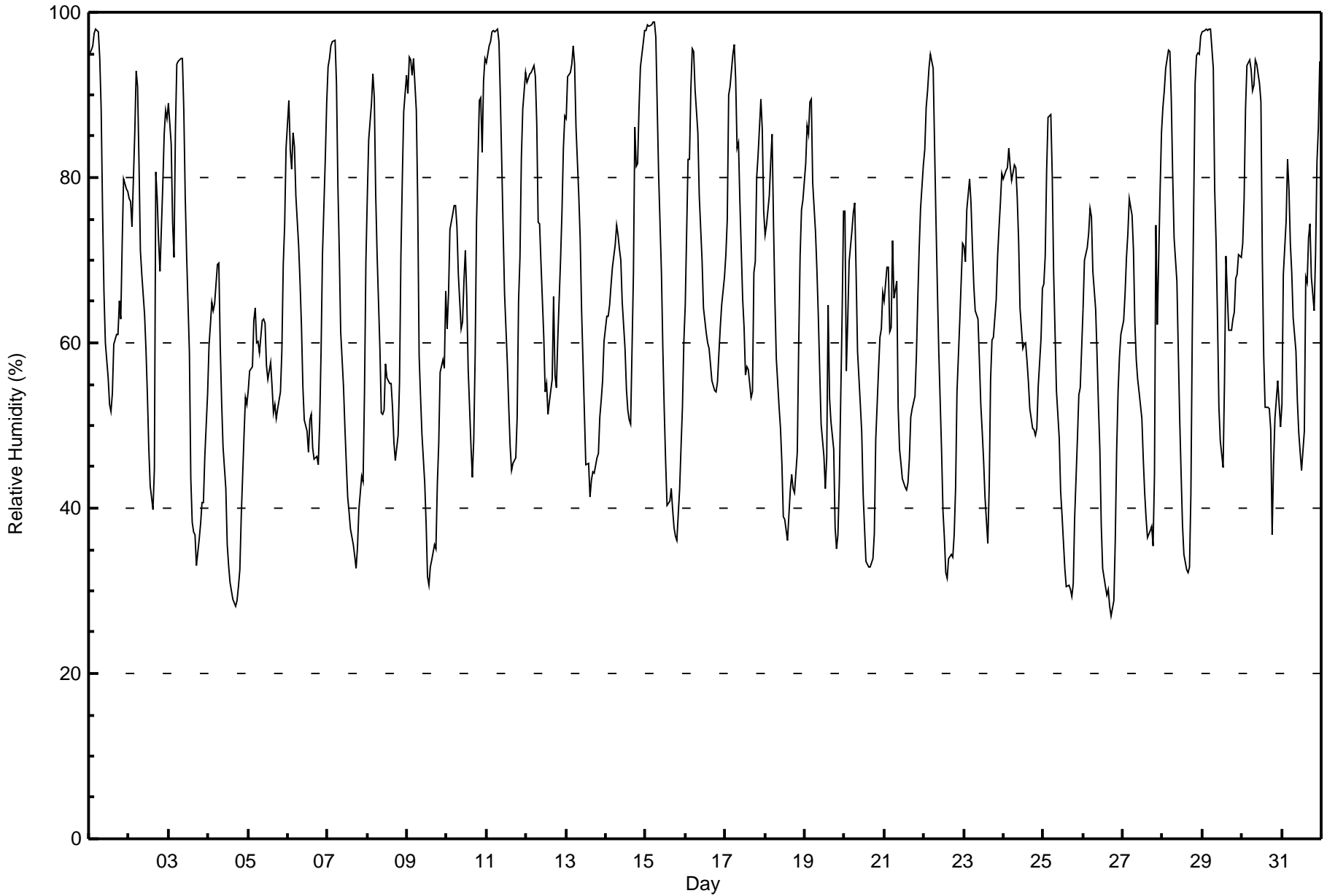
Muskeg River - July 2017

Maximum Value: 99 % on Jul 15 06:00																		Maximum Daily Average: 76.2 % on Jul 11																		Hours in Service: 744													
Minimum Value: 27 % on Jul 26 18:00																		Minimum Daily Average: 47.0 % on Jul 4																		Hours of Data: 744													
Maximum Diurnal Average: 85.9 % at hour 5																		Minimum Diurnal Average: 45.2 % at hour 16																		Hours of Missing Data: 0													
Monthly Average: 64.3 %																		Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 50 Median = 63 Q ₃ = 79 P ₉₀ = 92 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-Jul	95	95	96	98	98	98	94	88	76	66	60	56	52	52	54	60	61	61	65	63	72	80	79	78	74.9	98																							
2-Jul	77	77	74	85	93	91	82	71	68	63	59	54	47	43	40	45	81	77	72	69	79	85	88	87	71.2	93																							
3-Jul	89	84	75	70	86	94	94	94	94	88	78	71	59	44	38	37	37	33	36	38	41	41	46	54	63.3	94																							
4-Jul	60	62	65	64	65	69	70	60	53	47	42	36	33	31	30	29	28	29	30	33	39	49	53	53	47.0	70																							
5-Jul	54	57	57	63	64	60	60	59	63	63	62	57	56	58	55	51	53	51	52	54	59	70	74	83	59.8	83																							
6-Jul	89	83	81	85	84	78	72	67	62	55	51	49	47	51	51	47	46	46	45	50	59	71	82	89	64.2	89																							
7-Jul	93	94	96	96	97	91	79	71	61	55	50	45	41	40	37	36	34	33	35	40	44	43	54	70	59.8	97																							
8-Jul	78	85	89	93	90	78	71	59	52	51	52	57	56	55	55	52	48	46	49	55	70	80	88	92	66.7	93																							
9-Jul	90	95	94	92	94	88	77	58	54	49	43	38	32	31	33	34	36	35	43	48	56	58	57	66	58.4	95																							
10-Jul	62	66	74	76	77	77	74	68	62	63	68	71	66	57	48	44	48	59	75	89	90	83	92	94	70.0	94																							
11-Jul	94	96	97	98	98	98	98	97	90	82	74	66	58	52	48	45	45	46	51	65	70	82	88	93	76.2	98																							
12-Jul	92	92	92	93	94	92	87	75	74	70	61	54	55	51	53	56	66	56	55	60	70	76	84	88	72.7	94																							
13-Jul	87	92	93	94	96	94	86	78	73	64	58	52	45	45	41	43	44	44	46	47	51	53	55	60	64.2	96																							
14-Jul	63	63	65	67	69	72	74	73	71	70	65	59	54	52	51	50	68	86	81	82	89	93	96	98	71.3	98																							
15-Jul	98	98	98	99	99	99	97	89	80	68	59	52	46	40	41	42	40	38	37	36	42	47	52	60	64.9	99																							
16-Jul	65	82	82	91	96	95	91	85	78	74	70	64	61	60	59	57	55	54	54	55	59	62	65	68	70.1	96																							
17-Jul	71	75	90	91	95	96	92	84	84	77	65	62	56	57	57	53	54	68	70	80	83	89	86	76	75.5	96																							
18-Jul	73	74	78	82	85	75	65	58	52	50	45	39	39	36	39	42	44	42	42	47	60	70	76	77	58.0	85																							
19-Jul	82	86	85	89	89	79	73	69	63	57	50	46	42	46	65	53	50	47	38	35	37	43	63	76	61.1	89																							
20-Jul	76	57	63	70	74	76	77	68	59	53	49	42	38	34	33	33	33	34	37	48	57	61	62	66	54.0	77																							
21-Jul	65	69	69	61	62	72	65	68	52	47	45	43	42	42	43	46	51	52	54	58	65	71	76	82	58.5	82																							
22-Jul	83	88	90	93	95	93	84	75	67	59	47	40	36	32	32	34	34	34	37	42	54	63	67	72	60.5	95																							
23-Jul	72	70	76	80	77	72	67	64	63	58	53	49	46	41	36	43	56	60	61	65	71	74	77	80	62.8	80																							
24-Jul	80	81	81	84	81	80	82	81	78	72	64	59	60	60	58	55	52	50	49	49	50	55	60	67	66.1	84																							
25-Jul	67	71	81	87	88	80	69	61	54	48	42	39	36	33	30	31	30	29	31	39	48	54	55	59	52.6	88																							
26-Jul	64	70	71	73	76	75	69	64	59	52	47	38	33	31	29	30	28	27	29	36	47	54	58	61	50.9	76																							
27-Jul	63	66	70	73	77	75	71	62	58	56	54	51	46	42	39	37	37	38	35	44	74	62	78	85	58.1	85																							
28-Jul	88	91	93	96	95	89	80	73	67	59	51	44	38	34	33	32	33	42	62	91	95	95	95	97	69.7	97																							
29-Jul	98	98	98	98	98	98	93	79	72	63	52	48	45	55	70	66	62	61	63	64	68	68	71	70	73.2	98																							
30-Jul	72	77	88	94	94	93	91	91	94	94	91	89	70	58	52	52	52	50	37	45	51	55	53	50	70.6	94																							
31-Jul	53	68	75	82	79	72	69	63	59	53	49	47	45	49	68	67	73	74	68	64	71	82	86	94	67.0	94																							
																								77.2	79.5	81.8	84.4	85.9	83.9	79.1	72.7	67.5	62.1	56.7	52.2	47.7	45.5	45.7	45.2	47.7	48.5	49.6	54.6	61.9	66.8	71.5	75.7	Diurnal Average	
																								98	98	98	99	99	99	98	97	94	94	91	89	70	60	70	67	81	86	81	91	95	95	96	98	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Muskeg River - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Muskeg River - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	87	11.69	11.69
40 - 60	242	32.53	44.22
60 - 80	237	31.85	76.08
80 - 100	178	23.92	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

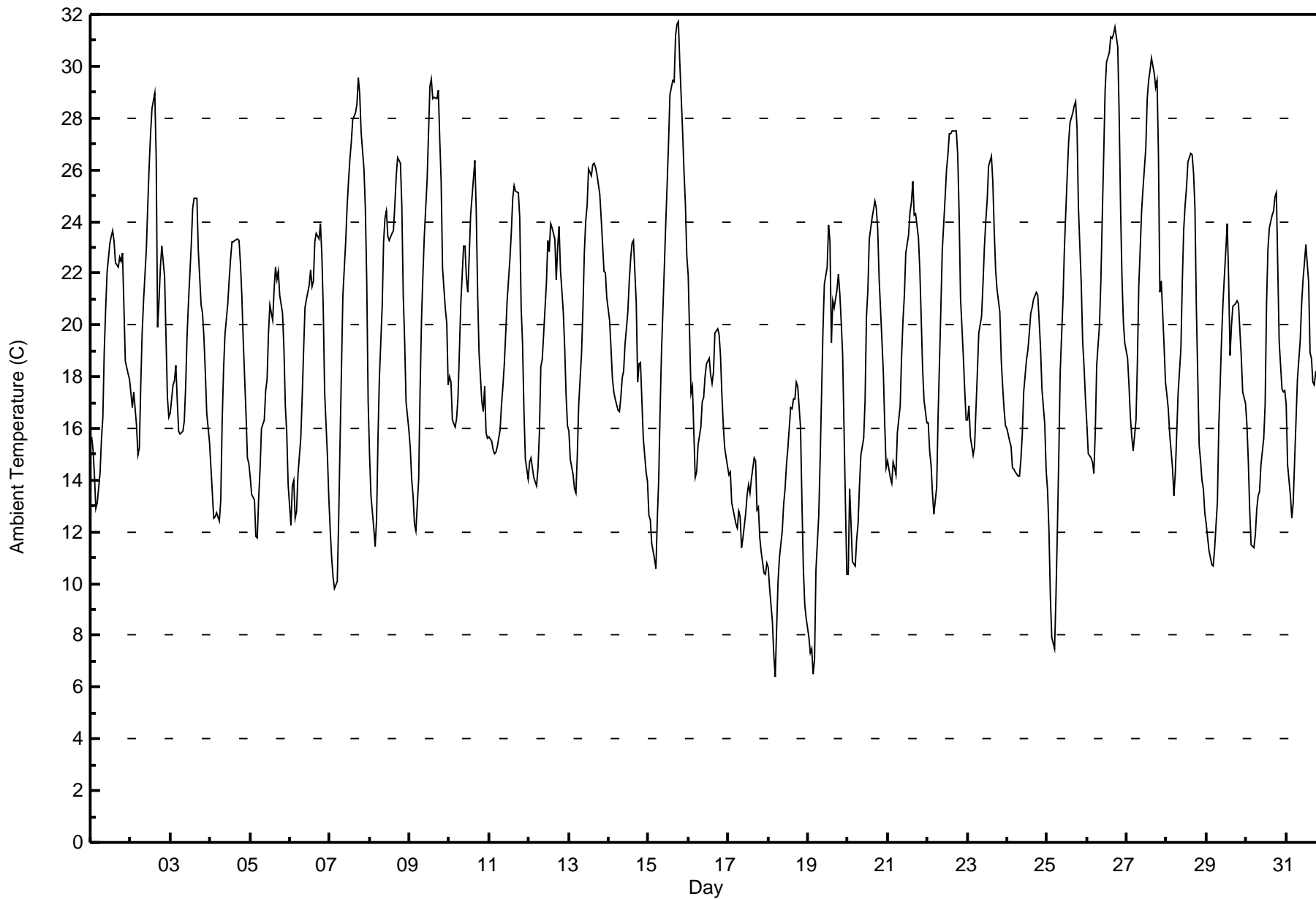
Muskeg River - July 2017

Maximum Value: 31.7 C on Jul 15 19:00 Maximum Daily Average: 23.4 C on Jul 26																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: 6.4 C on Jul 18 05:00 Minimum Daily Average: 12.6 C on Jul 18 Maximum Diurnal Average: 24.3 C at hour 16 Minimum Diurnal Average: 12.8 C at hour 5 Monthly Average: 18.98 C Percentiles: P ₁ = 7.9 P ₁₀ = 12.6 Q ₁ = 14.9 Median = 18.5 Q ₃ = 22.9 P ₉₀ = 26.0 P ₉₉ = 31.0																				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-Jul	15.7	15.2	14.2	12.9	13.1	14.3	15.6	16.4	19.0	20.6	22.0	23.2	23.5	23.7	23.2	22.4	22.2	22.6	22.4	22.8	20.7	18.6	18.1	17.9	19.2	23.7
2-Jul	17.4	16.8	17.4	16.1	15.0	15.3	17.7	19.7	20.9	22.9	24.6	26.2	27.4	28.4	28.9	26.5	19.9	20.9	22.3	23.1	21.9	19.5	17.2	16.4	20.9	28.9
3-Jul	16.6	17.7	17.8	18.4	17.1	15.9	15.8	15.9	16.3	17.6	19.6	20.9	23.1	24.5	24.9	24.9	22.9	20.8	20.5	19.5	18.2	16.6	15.5	19.4	24.9	24.9
4-Jul	14.5	13.5	12.5	12.6	12.7	12.4	13.3	16.3	18.3	19.6	20.8	21.8	22.6	23.2	23.2	23.3	23.3	23.3	22.4	21.2	19.4	16.5	14.9	14.7	18.2	23.3
5-Jul	14.1	13.4	13.2	11.8	11.8	13.3	14.4	16.0	16.3	17.5	17.9	19.7	20.8	20.2	21.4	22.3	21.8	22.1	21.1	20.4	19.1	16.8	15.8	13.8	17.3	22.3
6-Jul	12.3	13.8	14.0	12.5	12.8	14.2	15.6	17.2	19.0	20.7	21.0	21.5	22.2	21.5	21.7	23.2	23.5	23.3	23.9	22.7	20.7	17.4	14.9	13.3	18.4	23.9
7-Jul	12.1	11.0	10.2	9.8	10.1	12.5	15.5	18.3	21.1	23.2	24.6	25.5	26.4	27.1	28.0	28.2	28.5	29.5	28.9	27.4	26.0	24.5	21.6	17.0	21.1	29.5
8-Jul	15.0	13.4	12.1	11.5	12.5	15.6	17.9	20.7	23.2	24.1	24.4	23.4	23.2	23.5	23.6	24.6	25.8	26.5	26.3	24.6	21.2	19.3	17.0	16.0	20.2	26.5
9-Jul	15.2	14.1	13.4	12.3	12.0	14.0	17.5	20.2	21.9	23.4	25.6	27.4	29.2	29.5	28.7	28.8	28.7	29.1	27.2	25.6	22.2	20.6	20.1	17.7	21.9	29.5
10-Jul	18.0	17.8	16.3	16.0	16.4	17.2	19.0	20.8	23.0	23.0	21.8	21.3	22.7	24.2	25.6	26.4	24.4	21.2	18.9	17.0	16.6	17.6	15.9	15.6	19.9	26.4
11-Jul	15.7	15.5	15.2	15.0	15.1	15.3	15.9	16.9	17.6	18.5	19.7	20.9	22.5	23.6	24.9	25.4	25.2	25.1	24.1	20.7	19.3	16.7	14.8	14.0	19.1	25.4
12-Jul	14.7	14.8	14.5	14.1	13.8	14.5	15.9	18.4	18.6	19.6	21.7	23.3	22.8	23.9	23.8	23.3	21.8	23.0	23.8	22.1	20.5	19.2	17.3	16.1	19.2	23.9
13-Jul	15.9	14.8	14.2	13.7	13.5	15.0	16.9	18.9	20.6	22.8	24.0	24.6	26.0	25.8	26.2	26.2	26.1	25.8	25.1	24.1	23.1	22.1	22.0	21.1	21.2	26.2
14-Jul	20.2	19.1	17.9	17.4	17.2	16.7	16.6	17.2	17.9	18.2	19.3	20.5	21.7	22.6	23.1	23.3	20.8	17.8	18.5	18.6	17.1	15.6	14.3	13.9	18.6	23.3
15-Jul	12.6	12.5	11.5	10.9	10.6	12.5	14.1	16.8	19.0	22.2	23.9	25.4	27.0	28.9	29.5	29.4	31.2	31.6	31.7	30.1	27.5	26.0	24.7	22.7	22.2	31.7
16-Jul	21.9	17.3	17.6	15.9	14.1	14.3	15.4	16.1	17.0	17.2	18.0	18.5	18.7	18.1	17.7	18.2	19.7	19.9	19.7	18.8	17.3	16.1	15.2	14.5	17.4	21.9
17-Jul	14.2	14.3	13.1	12.9	12.3	12.2	12.8	12.6	11.4	11.8	12.7	13.4	13.8	13.5	14.0	14.9	14.7	12.9	12.9	11.8	11.2	10.4	10.4	10.8	12.7	14.9
18-Jul	10.6	9.8	8.5	7.2	6.4	8.3	10.1	11.0	12.0	13.1	13.7	14.6	15.2	16.8	16.7	17.2	17.1	17.8	17.6	16.1	13.2	10.6	9.2	8.7	12.6	17.8
19-Jul	7.9	7.3	7.5	6.5	7.1	10.5	12.6	14.8	17.3	19.8	21.6	22.2	23.9	23.2	19.3	20.9	20.7	21.4	22.0	21.2	20.1	18.9	13.1	10.4	16.3	23.9
20-Jul	10.4	13.7	12.3	10.9	10.7	11.7	12.3	13.8	14.9	15.6	17.1	20.4	21.4	23.3	24.1	24.5	24.8	24.5	23.7	21.8	19.4	18.2	16.2	14.5	17.5	24.8
21-Jul	14.7	14.1	13.9	14.7	14.5	14.2	15.8	16.9	18.8	20.2	21.1	22.8	23.5	24.3	24.7	25.5	24.3	24.3	23.4	22.1	20.2	18.3	17.1	16.2	19.4	25.5
22-Jul	16.2	15.1	14.6	13.5	12.7	13.7	16.4	18.6	20.7	22.9	24.9	26.0	26.6	27.4	27.4	27.5	27.5	27.5	26.6	24.3	21.0	18.8	17.4	16.3	21.0	27.5
23-Jul	16.3	16.9	15.6	14.9	15.3	16.8	18.2	19.7	20.3	21.6	23.0	24.0	24.8	26.1	26.5	25.5	23.6	22.1	21.4	20.5	18.7	17.6	16.7	16.1	20.1	26.5
24-Jul	16.0	15.5	15.3	14.5	14.4	14.3	14.2	14.2	14.8	15.8	17.4	18.7	19.0	19.7	20.4	20.7	21.0	21.2	21.1	20.2	19.1	17.5	16.2	14.4	17.3	21.2
25-Jul	13.6	12.0	9.5	7.9	7.5	9.5	12.1	14.9	18.2	21.0	22.9	24.4	25.8	27.1	27.8	28.2	28.5	28.6	27.6	24.5	21.6	19.4	18.4	17.2	19.5	28.6
26-Jul	16.2	15.0	14.9	14.7	14.3	15.9	18.4	20.0	21.8	24.2	26.6	29.1	30.2	30.5	31.1	31.1	31.2	31.5	30.8	28.2	24.6	21.8	20.1	19.3	23.4	31.5
27-Jul	18.7	17.7	16.5	15.7	15.1	16.4	18.5	21.5	23.0	24.4	25.3	26.8	28.8	29.4	29.8	30.3	29.7	29.2	29.4	26.6	21.3	21.7	19.2	17.8	23.0	30.3
28-Jul	17.3	16.7	15.8	14.5	13.4	14.3	15.8	17.4	19.1	21.7	23.7	24.6	25.3	26.3	26.6	26.6	25.9	24.5	20.6	15.3	14.8	14.0	13.7	12.7	19.2	26.6
29-Jul	12.3	11.3	11.0	10.7	10.7	11.3	13.2	16.1	17.8	19.5	20.9	21.9	23.9	21.7	18.8	20.0	20.7	20.8	20.9	20.8	19.8	18.8	17.4	17.0	17.4	23.9
30-Jul	16.2	14.8	12.8	11.5	11.4	11.9	12.9	13.4	13.6	14.6	15.6	16.9	20.9	22.9	23.7	24.2	24.4	24.9	25.1	22.3	19.3	17.5	17.4	17.5	17.7	25.1
31-Jul	16.9	14.6	13.4	12.6	13.1	14.7	16.3	17.9	19.4	20.8	21.7	22.4	23.1	21.7	18.9	18.7	17.8	17.7	18.2	18.4	16.9	14.9	13.1	11.0	17.3	23.1
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Muskeg River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Muskeg River - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	17	2.28	2.28
10 - 20	413	55.51	57.80
> 20	314	42.20	100.00

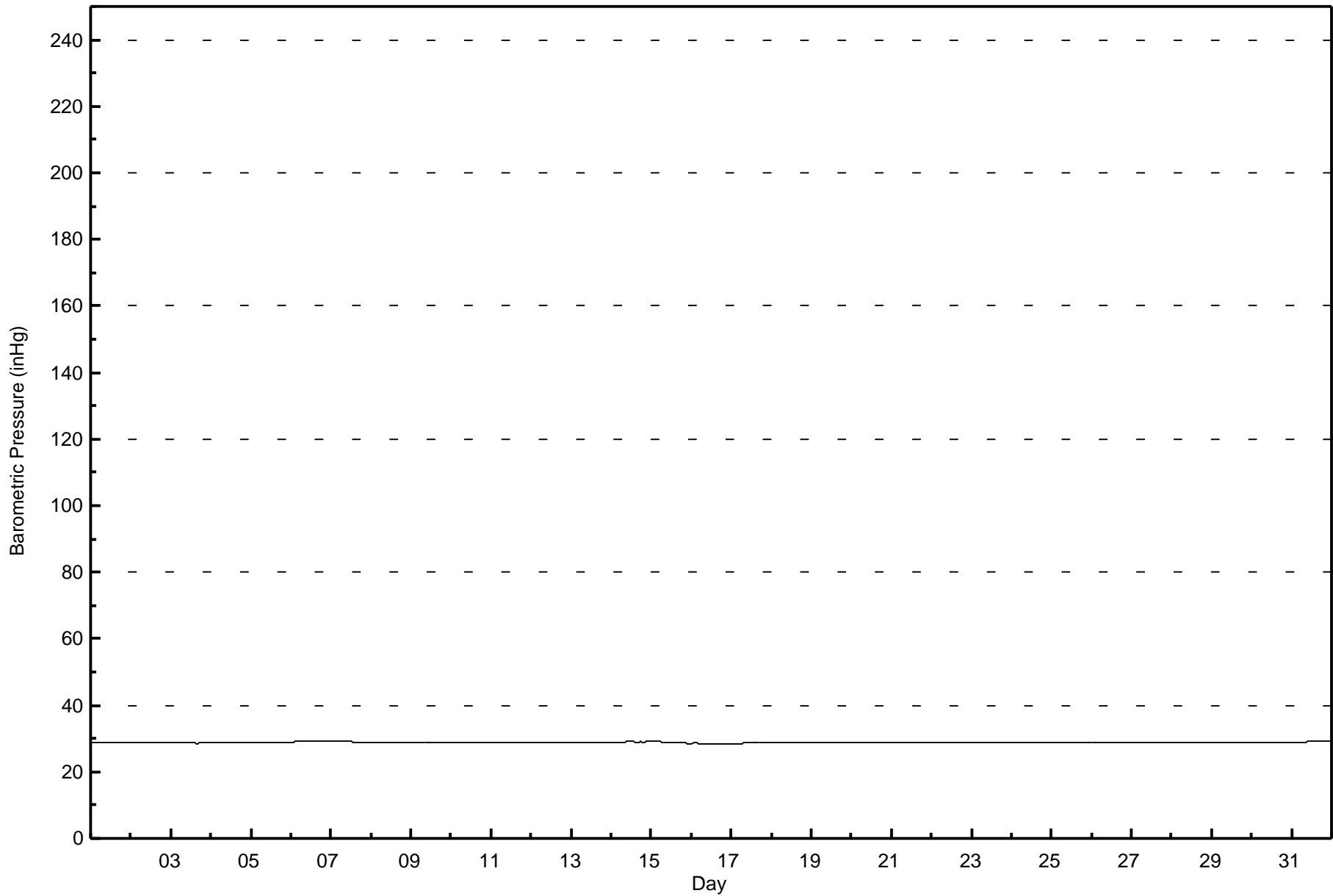
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Muskeg River - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Muskeg River - July 2017

Maximum Speed: 36 km/h on Jul 4 12:00	Maximum Daily Speed Average: 23.9 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 21 06:00	Minimum Daily Speed Average: 1.4 km/h on Jul 7	Hours of Data: 743
Maximum Diurnal Speed Average: 6.5 km/h at hour 14	Minimum Diurnal Speed Average: 1.6 km/h at hour 21	Hours of Missing Data: 1
Monthly Average Velocity: 3.8 km/h 243.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 15 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-Jul	SSE6	S5	SSE5	S6	SSE6	S5	S10	S8	S7	SSW9	SW10	S9	SSW10	SSW9	SSW7	SW7	SSW5	SSW3	S4	ESE3	ESE5	SE7	S9	S9	S6.4	SSW10
2-Jul	SSE9	S7	SSW9	S9	S9	S9	S12	S16	SSW12	SSW13	SSW12	S14	S15	SSW16	S15	SSW13	NNW11	E6	E7	ENE7	ENE6	SE5	SE6	S7	S7.6	S16
3-Jul	S8	SSW10	SSW9	S12	SSW10	S9	S8	SSW8	S9	S11	SSW11	SSW13	SW15	WSW18	SW19	SW18	SW18	WSW32	SW19	SW18	SW18	WSW21	SW21	W18	SW13.5	WSW32
4-Jul	SW18	SW14	SW14	SW20	WSW26	WSW23	WSW23	WSW26	WSW24	SW29	SW30	WSW36	WSW35	WSW34	WSW33	WSW35	WSW30	WSW28	WSW26	W21	WSW15	WSW13	WSW14	WSW15	WSW23.9	WSW36
5-Jul	WSW16	WSW16	WSW18	WSW15	SW15	WSW19	WSW21	WSW17	WNW17	WNW15	WNW18	WNW16	W16	WNW21	WNW17	WNW18	NW15	NW14	WNW19	WNW17	NW13	WNW9	WNW8	W7	W14.4	WSW21
6-Jul	WNW6	W9	W8	SW9	SW7	WSW15	WSW18	WSW17	WSW13	W16	WNW14	NNW12	NW8	WNW12	WNW8	WNW10	W10	NW7	WNW7	W8	NE3	E2	SSW1	SSE2	W7.7	WSW18
7-Jul	S3	SSE5	S5	S6	S7	S6	S7	SSW6	SSW7	WSW8	WSW9	SW9	SW8	WSW7	WSW9	W8	WNW4	S3	SE4	NE12	NNE17	NNE16	NE10	NE8	SW1.4	NNE17
8-Jul	E4	WSW3	SSW4	SSE3	SSE3	SE3	E3	E1	ENE3	E2	SW10	WSW17	SW12	S8	SW11	SW15	SW11	SW12	SW9	SW7	SSW5	S5	SE5	SE4	SSW4.9	WSW17
9-Jul	E2	SE5	S3	S4	SSE5	S4	S3	S7	SSW5	SSE1	E3	ESE6	SE9	SE7	E8	ESE6	SE8	S5	SW4	S6	SSE8	SE8	SE9	S5	SSE4.6	SE9
10-Jul	SSW9	SSE7	S4	SSE7	SSE6	SE7	WSW5	SW5	WSW7	W6	WSW13	WSW12	SW11	SW9	WSW7	SW4	ESE12	ENE16	NNE7	SW9	NE3	NE12	ESE3	ESE1	SSW2.8	ENE16
11-Jul	SSW2	W6	S2	S5	S4	ESE2	SW2	W6	WNW7	NW6	W8	W12	WNW10	WNW9	WNW8	WNW7	WSW7	S6	S8	SSW16	SSW9	S5	SSE6	S5	WSW4.2	SSW16
12-Jul	S6	SSE6	S5	SSW7	S7	SSE6	S5	S5	S5	SSW6	S6	SSW7	SSW8	SSW6	SSW8	S9	SSW9	SSW8	S10	S9	SSE6	S6	SSE7	S7	S6.6	S10
13-Jul	S8	SSE6	S7	S8	S7	SSW7	SSW7	SSW7	SW5	SSW3	SW4	WSW4	S3	NE9	NE10	NE10	NE15	NNE17	N19	N20	NNE15	N18	NNE18	N18	NNE3.8	N20
14-Jul	N24	N23	N22	N17	N20	NNE18	NNE19	N18	NNE18	NNE20	NE17	NE15	NE12	NE11	NE10	NE10	NNW5	N13	NE11	NE8	ENE5	ESE2	SE3	SSW2	NNE12.3	N24
15-Jul	S4	S5	SE5	S2	S5	S5	S6	S2	ESE5	SE6	SE11	SE13	SSE16	SSE20	SSE19	SSE18	SSE17	SSE17	SSE18	SSE16	S16	S12	S8	SSW10.3	SSE20	
16-Jul	WSW10	NNW22	NE7	SW10	SW7	S7	SW10	WSW12	SW13	SW9	SW10	SW14	SW18	SW20	SW20	SW23	WSW23	WSW23	WSW22	WSW23	WSW22	WSW20	WSW18	WSW19	WSW13.9	WSW23
17-Jul	WSW18	W16	W16	WSW15	W12	W14	NW13	NNW16	NNW21	NNW21	N24	NNW23	NNW20	NNW14	N10	NNW14	N16	NNW11	NNW10	NNW7	WNW8	W7	WNW9	NW10	NW11.5	N24
18-Jul	NW10	NNW10	NNW8	NW8	NW8	WNW9	WNW6	NW7	NNW7	W5	NWC	NNW4	WNW3	WSW9	WSW11	WSW15	WSW16	WSW18	SW14	WSW12	WSW10	SW7	SW7	SSW7	W7.0	WSW18
19-Jul	S6	SSE6	SSW6	SSE7	SSE8	S8	SSW8	SSW8	SW10	SW13	WSW12	WSW13	WSW12	WNW13	NE25	NE20	NE15	NE17	NE19	NE19	NE14	NE11	ENE2	E4	ENE1.8	NE25
20-Jul	ENE6	NE14	ENE10	ENE7	NE3	WSW2	SSW3	SE2	S2	SSW2	E7	ESE9	E8	SSE8	SE9	SE8	SSE7	ESE6	E6	ESE5	SSE4	ESE6	ESE5	SSE3	ESE4.4	NE14
21-Jul	SSW5	S4	SSW5	W6	NW3	SSW1	NNE2	WSW4	NNW5	NE1	WNW4	N6	NE10	NW5	NNW2	SSW12	SSW8	S10	S11	SSW8	S9	S9	SSW9	SSW9	SSW3.1	SSW12
22-Jul	S10	S6	SSW8	SSW8	S8	S7	S10	SSW11	SSW12	SSW12	SW17	SW20	WSW22	WSW18	WSW22	WSW23	WSW21	WSW20	WSW19	WSW16	SW11	SW9	SSW8	SW8	SW12.5	WSW23
23-Jul	SW9	SW11	SW7	S7	SW10	SSW7	WSW11	WSW12	W14	NW6	NW7	W3	W7	WSW12	WSW21	NNW12	NNE21	NE21	NE22	NNE23	NNE20	NNE18	NNE19	NNE21	NNW4.8	NNE23
24-Jul	NNE19	N19	NNE22	N24	NNE23	NNE22	NNE23	NNE23	N22	NNE22	NNE24	NNE29	NNE28	NNE28	NNE25	N27	N25	N25	N23	N20	NNW13	NNW9	NW10	NW9	N20.8	NNE29
25-Jul	NW10	NW8	SW8	SW8	SSW8	SSW6	SSW6	SSW6	S8	SSW9	SW11	SSW12	SW12	SW12	SW11	SW10	SSW9	SSW9	SSW10	S9	S7	S7	S8	S6	SSW7.4	SW12
26-Jul	S6	S8	S8	S8	S9	S9	SSW9	SSW11	SSW9	SSW10	SSW11	SW15	WSW14	WSW11	SSW10	SW12	SSW12	SSW10	SSW9	SSW9	S9	S10	S10	SSW10	SSW9.5	SW15
27-Jul	S10	S6	SSE6	S6	SSW6	SSW6	S7	SSW9	SSW11	SSW10	SSW12	SSW11	SSW11	SW15	WSW12	W14	W13	WNW12	WNW11	W7	W9	WNW21	NW10	WSW7	SW7.2	WNW21
28-Jul	WSW4	SSW7	SW5	S6	SSE7	SW11	WSW16	SW14	SW11	SW17	WSW22	W21	WNW23	WNW23	WNW23	WNW22	W18	N18	NE8	E8	S5	SSW9	SSW7	S5	W8.3	WNW23
29-Jul	WSW5	SSW6	SW7	SSW6	SSW6	S6	S5	S5	S4	WNW5	NW3	NNE5	NW1	NNW11	NE3	E5	NE9	NE13	NE14	NE13	NE13	NE19	ENE14	NE13	NE3.2	NE19
30-Jul	NE9	ENE7	E5	E1	E5	ENE3	SE5	SSW8	S6	SSW3	SSW9	SSW8	S9	S10	S16	S17	S19	S17	WSW15	WSW12	WSW13	WSW14	WSW16	WSW16	SSW6.7	S19
31-Jul	NW11	W5	W6	SW7	SW7	W11	W10	W10	W13	W15	W15	WNW19	WNW21	N17	NNE22	N21	N14	N19	NNE18	N14	NNW9	NNW7	NW7	W6	NW8.6	NNE22

SW3.1	WSW2.5	SW2.7	SSW4.1	SSW4.1	SW4.2	SW4.9	SW5.5	WSW5.0	WSW4.9	WSW6.1	WSW6.4	WSW6.2	WSW6.5	WSW5.1	WSW5.6	W4.2	WNW2.7	WNW2.1	W2.1	WSW1.6	WSW1.8	SW2.4	WSW2.9	Diurnal Average
N24	N23	N22	N24	WSW26	WSW23	NNE23	WSW26	WSW24	SW29	SW30	WSW36	WSW35	WSW34	WSW33	WSW35	WSW30	WSW32	WSW26	NNE23	WSW22	WSW21	SW21	NNE21	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

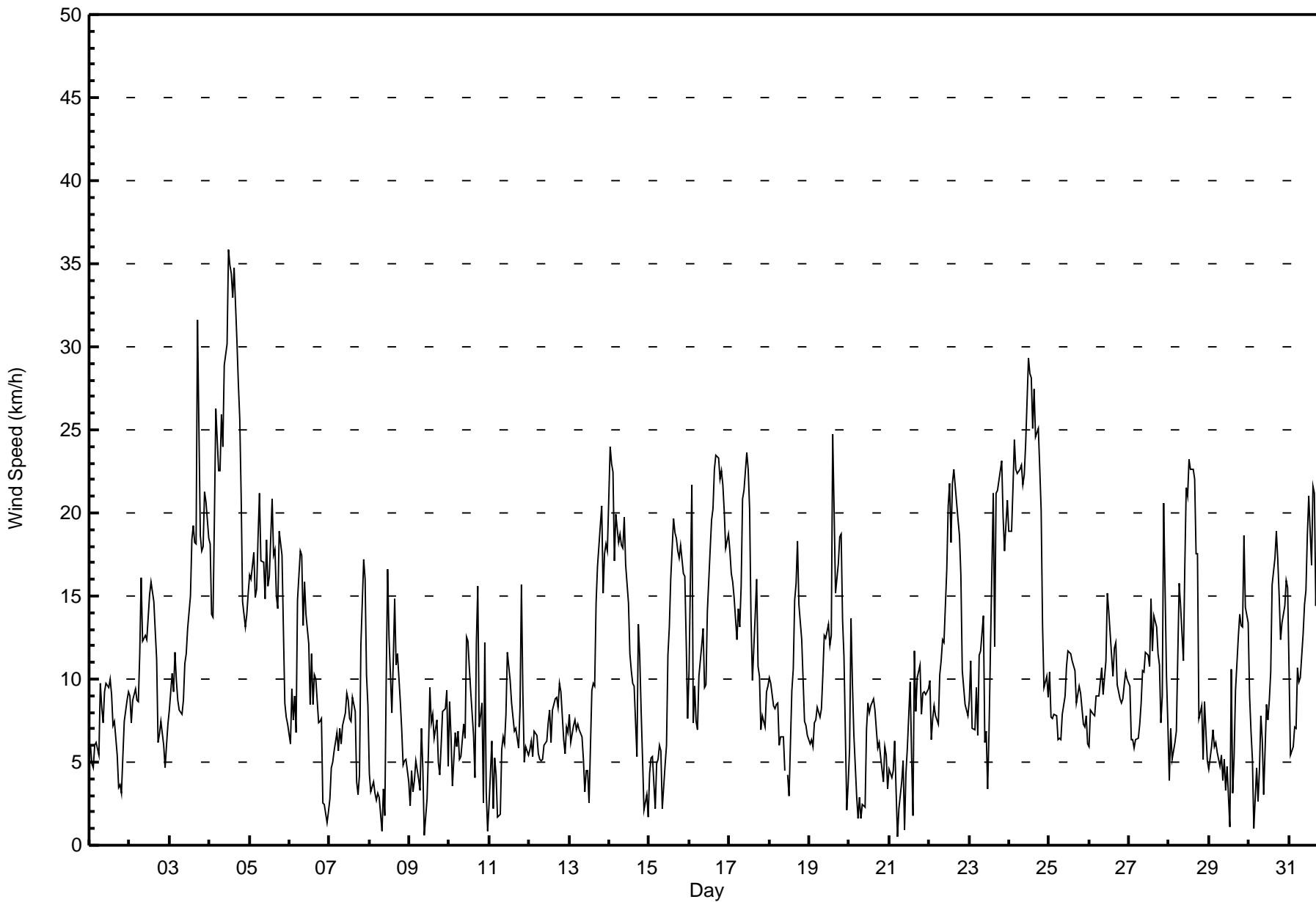
Wind Speed (WS) - km/h
Muskeg River - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jul 29 14:00 Minimum Value: 1 km/h on Jul 1 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 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-Jul	1	2	1	1	1	1	3	2	2	3	3	3	3	3	2	2	2	2	1	2	1	2	2	3	3
2-Jul	2	2	2	2	2	2	5	5	4	4	4	4	5	5	5	7	7	4	2	2	2	2	2	2	7
3-Jul	2	3	2	4	3	3	2	2	3	3	4	5	4	5	6	5	6	6	7	5	6	5	5	6	7
4-Jul	4	3	2	5	4	4	4	5	5	7	7	7	7	7	8	7	7	7	6	5	3	1	1	2	8
5-Jul	2	2	3	2	2	3	4	5	5	4	4	5	4	5	5	5	5	5	5	5	4	1	2	1	5
6-Jul	2	2	3	2	2	4	4	3	3	4	5	5	3	3	2	6	5	3	2	2	3	2	1	2	6
7-Jul	1	1	1	1	2	1	2	2	2	3	3	4	4	4	4	5	3	2	2	6	3	3	4	3	6
8-Jul	1	1	2	2	2	1	2	2	1	2	8	4	4	3	4	3	3	4	2	2	1	1	1	1	8
9-Jul	2	1	2	2	2	1	2	2	2	1	3	4	4	3	3	3	3	2	1	2	1	1	2	1	4
10-Jul	2	1	2	1	2	2	3	2	3	2	3	2	3	3	3	3	5	5	3	3	6	4	1	2	6
11-Jul	1	2	2	1	1	2	2	3	2	2	3	3	3	3	3	3	3	1	2	5	4	1	1	1	5
12-Jul	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	4	2	1	1	2	2	4
13-Jul	2	1	1	1	2	2	2	2	2	2	3	3	2	3	3	4	3	4	4	4	3	4	4	4	4
14-Jul	6	5	5	4	4	4	5	4	4	4	3	4	3	4	4	3	3	5	4	3	2	1	1	2	6
15-Jul	2	1	1	2	1	2	2	2	2	2	3	3	4	5	5	5	5	5	5	4	3	4	3	2	5
16-Jul	9	9	5	7	3	2	3	3	3	2	3	5	5	6	5	5	6	6	4	4	4	3	3	3	9
17-Jul	4	3	3	3	2	3	4	5	8	8	7	6	7	5	3	6	5	6	5	2	2	2	2	3	8
18-Jul	3	3	2	2	2	1	1	2	2	3	C	3	3	5	4	5	5	5	5	2	2	1	2	1	5
19-Jul	1	1	1	1	1	2	2	2	3	4	4	3	4	8	5	4	4	4	3	2	3	2	4	3	8
20-Jul	3	3	3	3	2	2	2	1	1	1	3	3	3	4	3	3	3	2	2	2	3	2	2	2	4
21-Jul	2	1	1	1	2	2	2	2	2	2	2	2	2	4	1	4	3	3	3	2	2	2	2	2	4
22-Jul	2	1	1	1	2	2	3	3	3	4	5	6	5	5	5	6	4	5	3	4	2	2	2	1	6
23-Jul	2	2	2	2	3	2	4	4	4	3	3	3	4	4	6	6	5	3	4	4	4	4	5	5	6
24-Jul	4	4	5	5	5	5	5	5	5	5	6	7	6	6	6	7	6	7	6	6	4	3	2	2	7
25-Jul	2	2	1	1	1	2	2	2	2	2	4	4	4	4	4	4	3	3	3	2	1	1	1	1	4
26-Jul	1	1	2	1	2	2	3	3	2	3	3	4	4	5	4	4	5	4	3	3	2	2	2	2	5
27-Jul	2	2	1	1	1	1	2	3	3	3	3	3	4	5	3	3	3	2	3	4	8	5	3	3	8
28-Jul	4	2	3	2	2	4	3	4	3	5	5	5	7	6	6	6	5	6	5	5	1	2	2	1	7
29-Jul	1	1	1	2	1	2	1	1	2	2	2	1	2	10	3	2	4	3	2	2	3	2	2	3	10
30-Jul	3	2	1	1	1	1	1	2	3	3	2	3	3	4	5	4	5	5	5	1	1	1	2	3	5
31-Jul	3	3	2	1	2	3	2	2	3	4	4	5	6	9	5	7	5	5	5	4	3	2	2	1	9
Diurnal Maximum																									
C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Muskeg River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	132	17.77	17.77
6 - 11	336	45.22	62.99
12 - 19	188	25.30	88.29
20 - 28	77	10.36	98.65
29 - 38	10	1.35	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - July 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	0	2	5	4	12	9	10	10	36	15	7	7	3	4	4	4	132
6 - 11	2	1	16	6	7	5	11	22	76	74	38	14	20	16	17	11	336
12 - 19	12	13	18	2	0	1	1	7	12	12	27	45	15	13	4	6	188
20 - 28	14	16	4	0	0	0	0	1	0	0	6	22	2	7	0	5	77
29 - 38	0	1	0	0	0	0	0	0	0	0	2	7	0	0	0	0	10
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	33	43	12	19	15	22	40	124	101	80	95	40	40	25	26	743

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Muskeg River - July 2017

Direction of Maximum Speed: 245 deg on Jul 4 12:00 Direction of Maximum Daily Speed Average: 242.3 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 205 deg on Jul 21 06:00 Direction of Minimum Daily Speed Average: 1.4 deg on Jul 7	Percent Operational Time: 100.0
Monthly Average Direction: 233.0 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-Jul	160	181	156	176	168	181	181	177	176	198	215	189	199	204	201	215	194	192	170	119	123	138	173	188	182.6
2-Jul	168	184	198	191	178	185	174	177	195	197	203	188	185	193	187	211	344	81	83	73	73	132	140	172	179.2
3-Jul	178	202	200	191	209	173	191	209	187	173	199	211	225	239	230	236	231	244	218	216	236	247	233	270	222.4
4-Jul	231	220	220	234	242	242	237	244	246	236	230	245	241	242	246	242	254	254	254	259	251	240	237	242	242.3
5-Jul	238	246	253	242	236	246	251	253	285	290	285	285	277	290	288	289	310	323	300	292	304	297	290	274	275.8
6-Jul	284	271	265	232	215	247	256	242	249	273	294	332	322	291	302	286	281	310	289	268	47	85	205	163	273.0
7-Jul	177	158	180	180	188	181	186	205	213	248	247	226	233	256	248	266	291	187	137	51	29	28	48	52	215.7
8-Jul	87	242	193	149	154	126	80	95	75	95	231	243	228	188	234	231	219	226	233	235	200	171	138	142	211.8
9-Jul	98	143	185	191	162	188	171	171	211	148	85	119	139	140	96	118	129	190	225	177	155	128	140	170	149.7
10-Jul	202	158	180	151	152	142	252	228	253	279	239	238	229	231	257	221	121	78	22	227	51	43	112	109	199.2
11-Jul	207	272	169	176	185	117	217	272	302	305	274	277	294	291	292	283	253	169	179	206	211	182	157	174	240.7
12-Jul	191	151	171	192	177	160	171	171	185	211	174	200	206	198	211	190	204	206	176	173	168	181	166	184	185.3
13-Jul	184	168	176	175	177	199	208	193	225	194	234	253	175	46	54	38	34	24	10	5	13	359	16	8	21.9
14-Jul	1	2	1	4	10	13	16	11	20	32	43	37	38	40	45	38	338	1	55	48	74	117	146	205	20.6
15-Jul	186	174	144	177	176	170	177	185	171	123	166	142	129	161	164	162	149	149	148	156	159	172	178	181	159.2
16-Jul	251	330	39	236	214	177	230	255	236	236	218	227	216	217	221	230	244	249	252	242	239	244	246	251	240.2
17-Jul	255	271	265	254	259	265	310	331	345	345	354	348	345	341	350	348	349	342	332	327	282	269	300	316	318.0
18-Jul	319	332	332	318	311	297	285	315	333	265	325	339	297	239	241	240	243	240	231	248	247	218	222	201	265.7
19-Jul	182	167	192	158	165	180	195	203	218	230	237	237	250	282	40	45	48	48	39	48	52	46	74	92	75.2
20-Jul	75	54	60	64	36	250	200	130	187	212	85	121	94	152	146	132	164	111	97	102	150	104	111	148	108.6
21-Jul	205	175	199	277	309	205	12	258	327	38	294	357	52	313	327	209	196	176	178	197	181	183	192	193	205.8
22-Jul	190	188	193	196	178	184	184	193	206	205	228	235	243	238	248	241	243	239	248	245	233	217	213	218	225.5
23-Jul	219	232	215	172	229	204	239	248	281	321	321	276	274	237	245	345	21	38	41	28	18	19	23	17	339.4
24-Jul	20	9	25	11	19	13	13	12	11	12	17	17	15	22	17	11	2	1	357	350	344	333	321	320	8.8
25-Jul	320	317	214	218	201	198	203	199	191	199	214	228	232	224	226	221	210	208	207	178	187	191	178	190	212.9
26-Jul	190	177	182	181	189	185	192	204	206	208	202	226	241	239	194	222	207	210	193	198	185	191	190	194	202.8
27-Jul	187	179	160	188	192	193	183	201	204	203	192	196	201	220	248	266	275	290	295	276	275	294	307	254	234.9
28-Jul	244	212	223	176	164	228	240	231	220	236	254	264	294	299	291	301	281	352	54	88	182	212	196	184	260.5
29-Jul	245	211	228	202	200	189	174	178	185	288	310	24	315	331	53	93	50	50	43	55	53	43	62	46	53.0
30-Jul	55	58	85	96	101	78	145	196	187	193	202	198	177	191	185	176	182	183	242	244	237	250	255	258	203.2
31-Jul	306	273	271	226	230	274	276	271	273	275	280	283	283	354	33	2	351	5	22	6	347	329	307	280	317.2

234.2 245.0 218.0 212.5 209.2 218.6 228.4 232.7 247.8 250.5 248.2 251.0 249.4 252.8 247.9 254.7 264.2 282.8 283.9 264.5 248.8 252.5 218.8 240.1
 Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

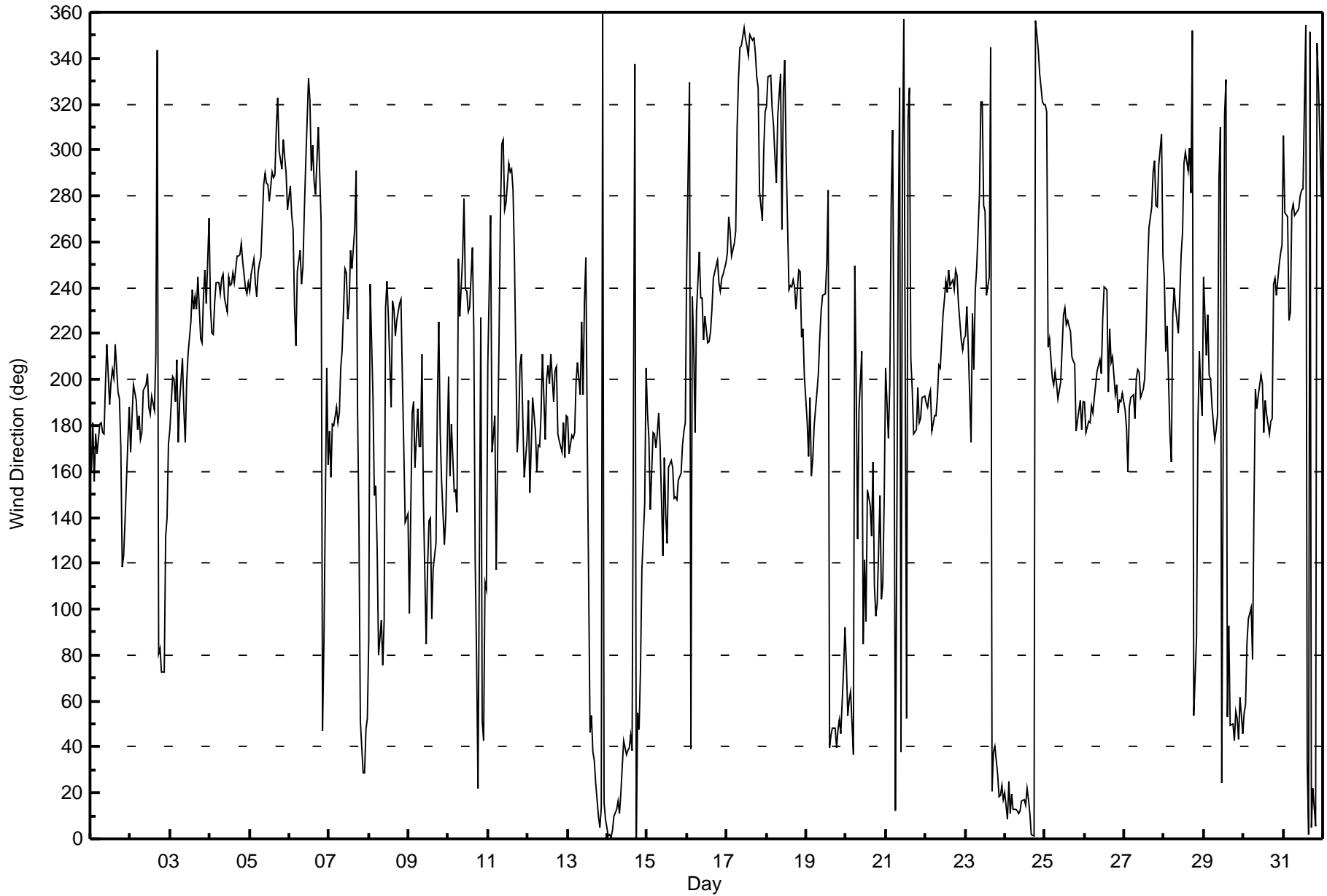
Wind Direction (WD) - deg
Muskeg River - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Jul 9 10:00 Minimum Value: 6 deg on Jul 4 22:00 Percentiles: P ₁ = 7 P ₁₀ = 12 Q ₁ = 16 Median = 21 Q ₃ = 28 P ₉₀ = 50 P ₉₉ = 94																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 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-Jul	9	18	17	17	14	17	23	23	30	29	27	30	25	27	27	21	21	30	21	22	12	19	16	19	30
2-Jul	17	21	21	19	23	22	18	20	26	26	27	30	25	25	25	36	44	59	22	23	21	36	18	17	59
3-Jul	16	22	23	20	23	19	21	23	28	23	25	25	24	19	19	23	13	18	19	21	12	13	16	28	
4-Jul	10	13	12	11	9	10	9	10	12	12	15	11	13	13	15	15	14	13	12	10	6	7	7	15	
5-Jul	8	9	11	7	8	11	11	17	17	18	18	21	21	16	22	22	26	25	17	15	14	10	9	10	26
6-Jul	25	12	17	16	26	16	12	10	18	25	28	35	35	22	25	41	39	42	26	20	79	64	60	67	79
7-Jul	32	11	13	17	14	21	23	24	26	31	33	40	57	67	40	58	74	62	56	28	11	10	20	17	74
8-Jul	33	38	30	22	54	41	51	97	52	57	25	15	23	29	26	15	21	24	22	16	16	23	24	25	97
9-Jul	74	20	46	36	23	25	32	25	35	103	95	71	36	49	29	35	20	44	25	16	13	10	11	24	103
10-Jul	22	33	59	16	21	20	40	31	39	36	17	18	17	25	41	60	24	21	51	38	91	15	37	81	91
11-Jul	66	28	79	25	42	70	67	25	26	27	27	18	27	35	34	36	42	23	21	22	26	27	16	14	79
12-Jul	22	14	36	18	15	17	22	31	24	29	30	32	24	32	26	26	23	25	22	21	14	18	15	21	36
13-Jul	18	14	14	15	14	24	20	27	36	69	70	68	94	21	32	43	21	22	17	16	17	15	18	18	94
14-Jul	16	17	16	16	15	16	18	20	18	15	12	17	22	24	26	28	58	52	22	21	23	78	41	50	78
15-Jul	50	10	15	58	14	27	23	28	71	49	43	19	20	23	18	17	17	15	12	11	16	18	20	71	
16-Jul	35	27	68	31	39	25	36	20	14	22	23	21	19	19	17	13	14	12	12	11	10	10	10	11	68
17-Jul	11	14	12	10	12	12	25	25	24	20	20	20	25	26	37	24	21	21	26	28	21	12	18	24	37
18-Jul	23	23	21	15	12	11	18	32	41	67	C	71	87	61	34	24	19	17	19	14	9	12	16	15	87
19-Jul	24	10	23	16	23	19	27	28	22	23	26	22	30	47	16	12	20	15	13	7	11	11	80	45	80
20-Jul	56	12	14	22	61	88	50	35	35	50	37	31	36	50	32	41	38	35	23	22	50	16	19	33	88
21-Jul	30	16	35	11	46	99	89	45	33	94	54	58	18	59	92	26	24	17	16	22	14	14	17	18	99
22-Jul	18	19	15	15	13	18	18	24	23	25	25	20	16	25	17	18	15	17	12	8	15	16	17	15	25
23-Jul	16	11	23	21	27	24	20	18	20	53	45	88	56	29	18	61	19	16	12	11	16	16	16	16	88
24-Jul	16	16	14	17	15	16	17	15	16	17	16	17	16	16	16	16	21	20	21	21	21	22	19	14	22
25-Jul	13	25	13	12	14	17	22	26	26	28	27	27	24	28	33	32	34	25	24	14	16	16	10	15	34
26-Jul	13	10	16	13	18	17	22	23	25	26	27	25	24	28	31	30	28	27	22	19	16	18	16	16	31
27-Jul	18	21	12	17	18	21	18	25	25	26	25	27	29	25	26	18	16	16	23	69	65	16	24	44	69
28-Jul	62	16	46	29	30	20	10	15	23	20	14	18	24	20	19	19	22	38	83	49	30	15	17	16	83
29-Jul	28	15	15	22	14	27	21	26	66	34	74	40	97	87	71	33	37	22	11	17	17	8	15	13	97
30-Jul	16	18	11	85	22	42	36	19	45	79	24	28	29	28	24	18	19	19	20	9	7	7	7	9	85
31-Jul	26	42	23	19	25	14	15	20	19	19	20	19	19	37	13	24	25	19	20	19	18	18	18	16	42
74 42 79 85 61 99 89 97 71 103 95 88 97 87 92 61 74 62 83 69 91 78 80 81																								Diurnal Maximum	
C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Muskeg River - July 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

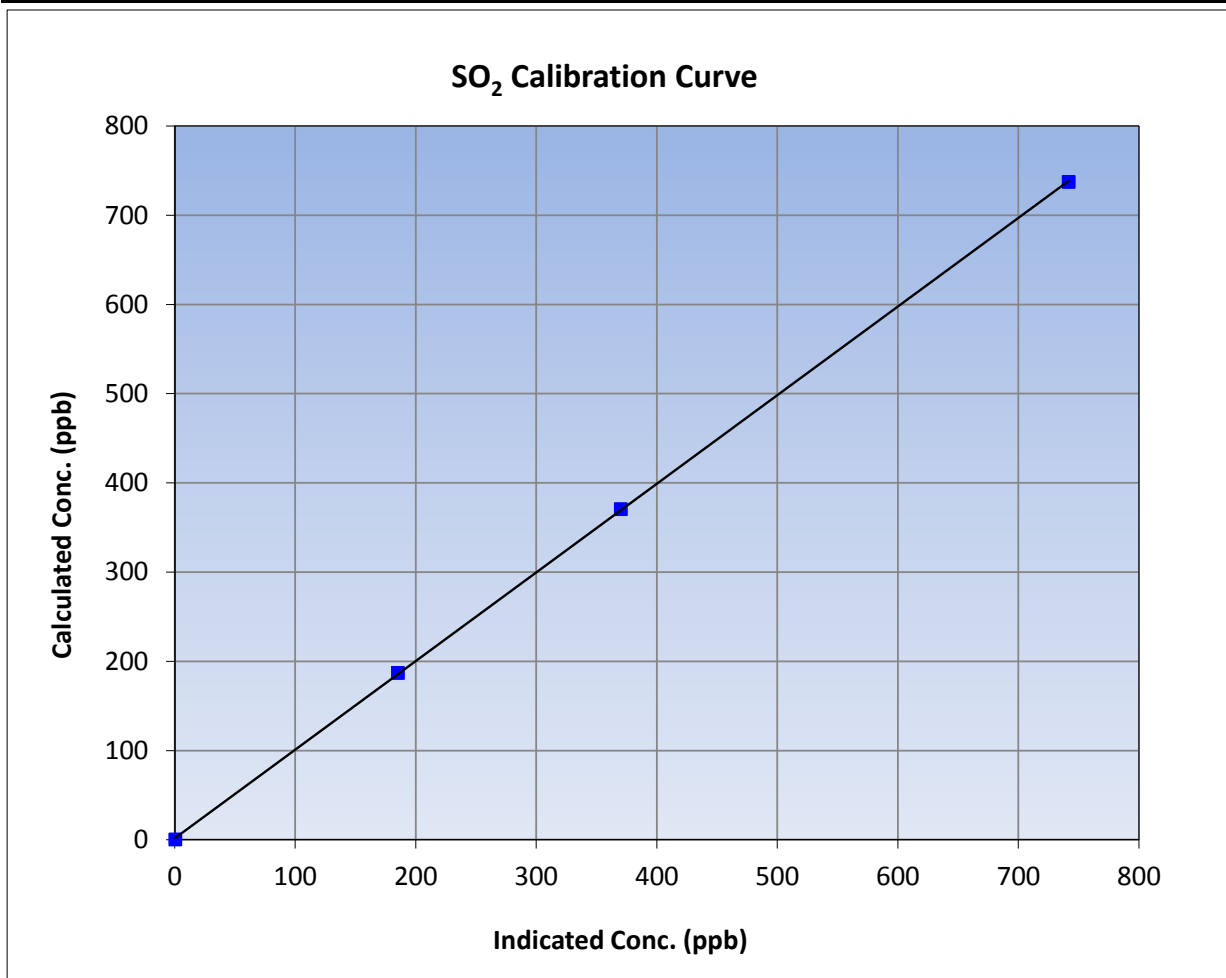
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 8, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:39	End Time (MST)	13:51
Analyzer make	Thermo 43i	Analyzer serial #	1118148498

Calibration Data

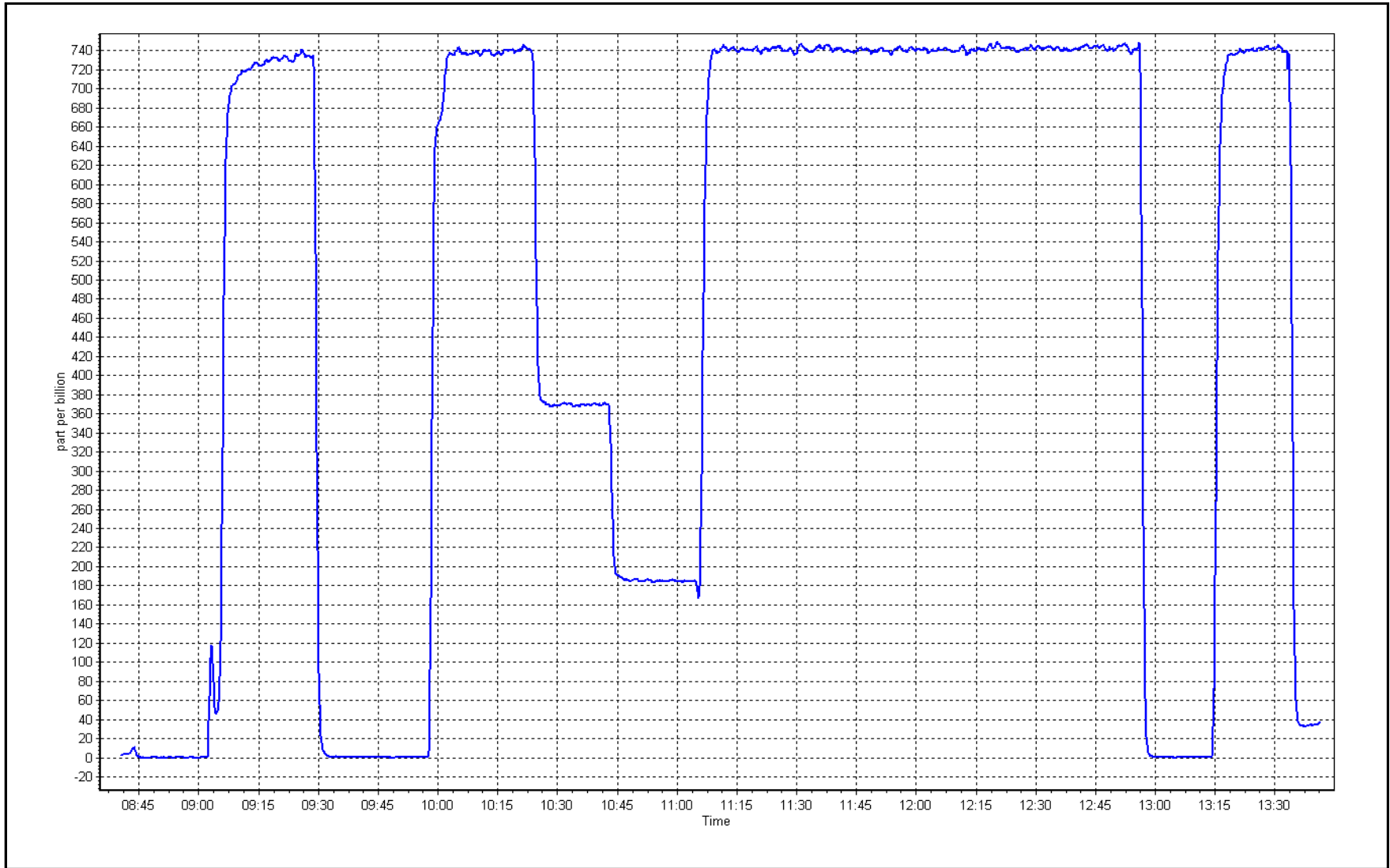
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999974	≥0.995
737.0	741.3	0.9942			
370.4	369.8	1.0015	Slope	0.993423	0.90 - 1.10
186.6	184.8	1.0095			
			Intercept	1.612115	+/-30



SO2 Calibration Plot

Date: July 12, 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:	July 12, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	8:39	End time (MST):	13:37
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	0.995678	Sample pressure	8.2
Calculated intercept	0.056037	Fuel pressure	24.2
Analyzer Background	2.50	Air pressure	34.9
Analyzer Coefficient	4.824	Flame temperature	157.0
			<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	4998	0.0	0.00	-0.49	----
as found span	4932	76.5	15.82	15.60	1.014
calibrator zero	4998	0.0	0.00	0.08	----
high point	4933	76.5	15.81	15.72	1.006
second point	4970	38.5	7.96	7.96	1.000
third point	4992	19.4	4.01	4.03	0.994
as left zero	4998	0.0	0.00	-0.11	----
as left span	4932	76.5	15.82	15.91	0.994
Average Correction Factor					1.000
Corrected As found	16.09	Previous response	15.83	*% change	-1.6%

* = > +/-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

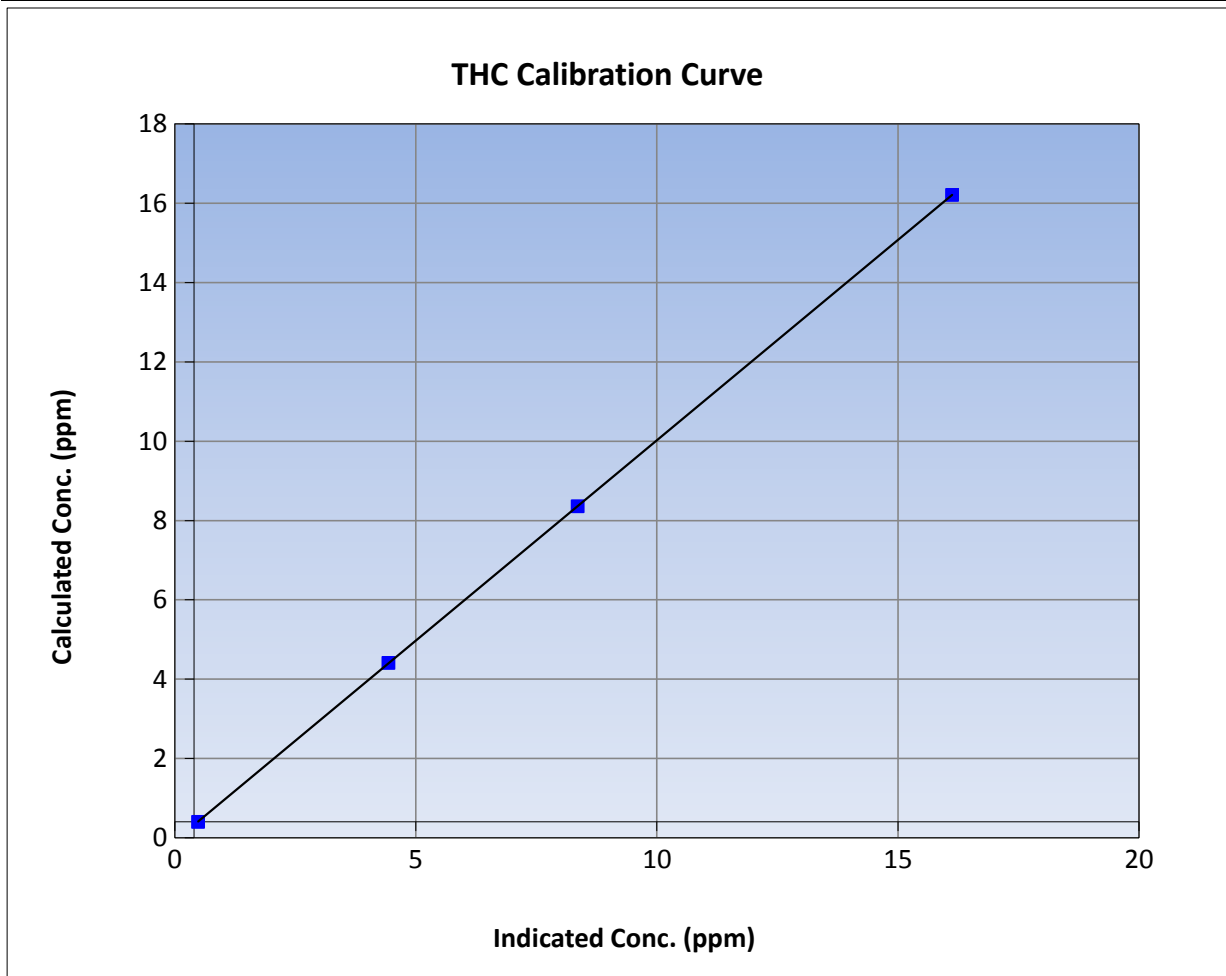
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 8, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:37	End Time (MST)	13:37
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153458

Calibration Data

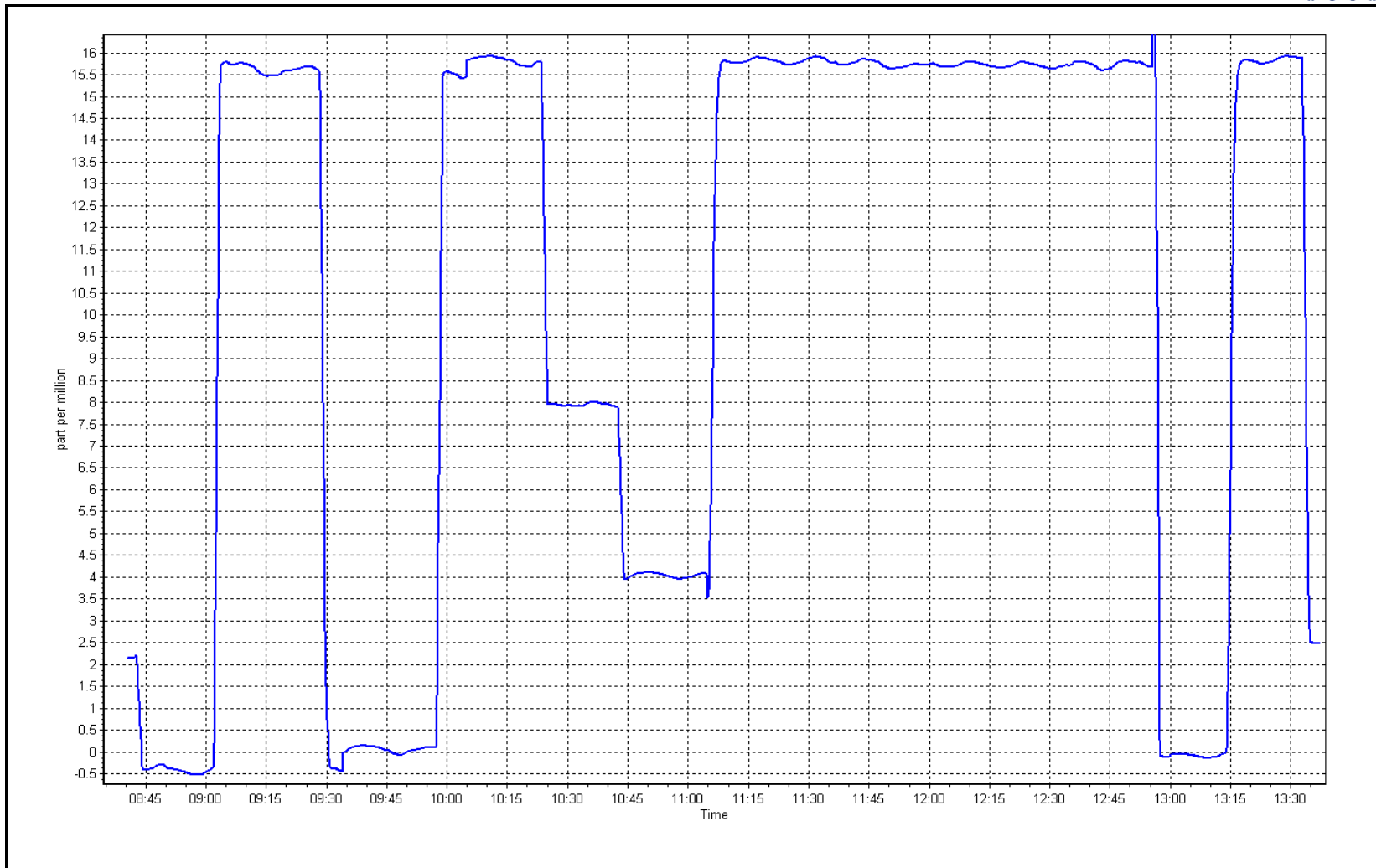
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999998	≥0.995
15.8	15.7	1.0057			
8.0	8.0	1.0004	Slope	1.010741	0.90 - 1.10
4.0	4.0	0.9944			
			Intercept	-0.078005	+/-1.5



THC Calibration Plot

Date: July 12, 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:	July 12, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	8:39	End time (MST):	13:38
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	1.082	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	162.2	162.2
NO bkgrnd	9.1	9.2	Sample Flow	0.948	0.935
NOX bkgrnd	9.8	9.4	PMT Voltage	-744.8	-744.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002355	1.001180
NO _x Cal Offset	0.934247	0.995236
NO Cal Slope	1.000436	0.999222
NO Cal Offset	1.255612	1.456311
NO ₂ Cal Slope	1.002004	0.997862
NO ₂ Cal Offset	0.862356	0.514435



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	-0.7	-0.2	-0.5	----	----
as found span	4930	76.6	801.7	801.7	0.0	808.2	808.0	0.2	0.9920	0.9922
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	799.9	801.2	-1.3	1.0017	1.0000
second point	4970	38.5	402.8	402.8	0.0	400.3	400.5	-0.2	1.0062	1.0057
third point	4993	19.4	202.8	202.8	0.0	201.2	200.6	0.6	1.0080	1.0110
as left zero	4998	0.0	0.0	0.0	0.0	0.6	-0.2	0.8	----	----
as left span	4930	76.6	801.7	420.3	381.4	796.3	404.7	391.6	1.0068	1.0385
Average Correction Factor									1.0053	1.0056

Corrected As found	NO _x = 808.9 ppb	NO = 808.2 ppb		*Percent Change	NO _x = -1.2%
Previous Response	NO _x = 798.9 ppb	NO = 800.1 ppb		*Percent Change	NO = -1.0%
<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	800.3	799.0	1.3	1.0012	1.0028	----	----
1st NO2 (400 ppb O3)	420.3	378.7	799.7	420.3	379.4	1.0019	----	0.9982	100.2%
2nd NO2 (200 ppb O3)	599.9	199.1	798.3	599.9	198.4	1.0037	----	1.0035	99.6%
3rd NO2 (100 ppb O3)	694.3	104.7	798.4	694.3	104.1	1.0035	----	1.0058	99.4%
2nd NO ref point	----	0.0	798.2	797.6	0.7	1.0038	1.0046	----	----
Average Correction Factor						1.0032	1.0037	1.0025	99.8%

Notes: Changed out inlet filter after asfinds. Adjusted the zero.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

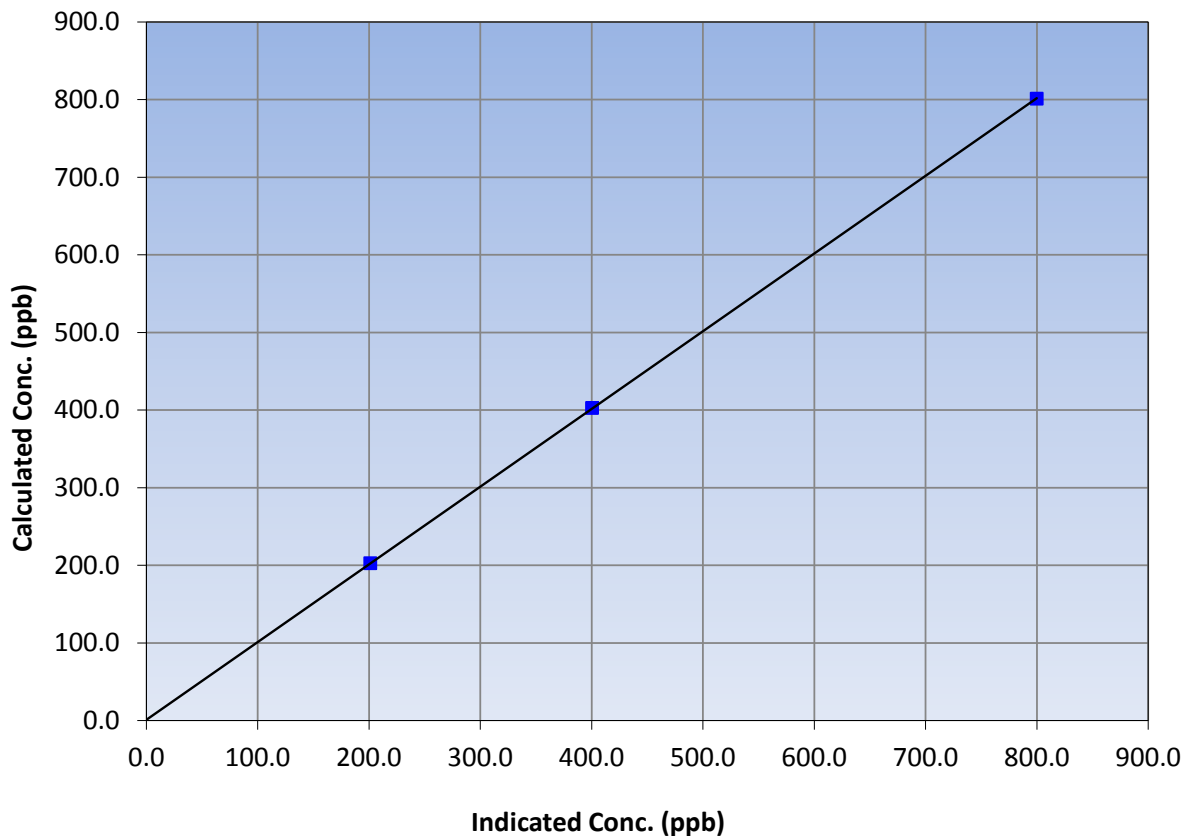
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 8, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:39	End Time (MST)	13:38
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	799.9	1.0017			
402.8	400.3	1.0062			
202.8	201.2	1.0080			
			Slope	1.001180	0.90 - 1.10
			Intercept	0.995236	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

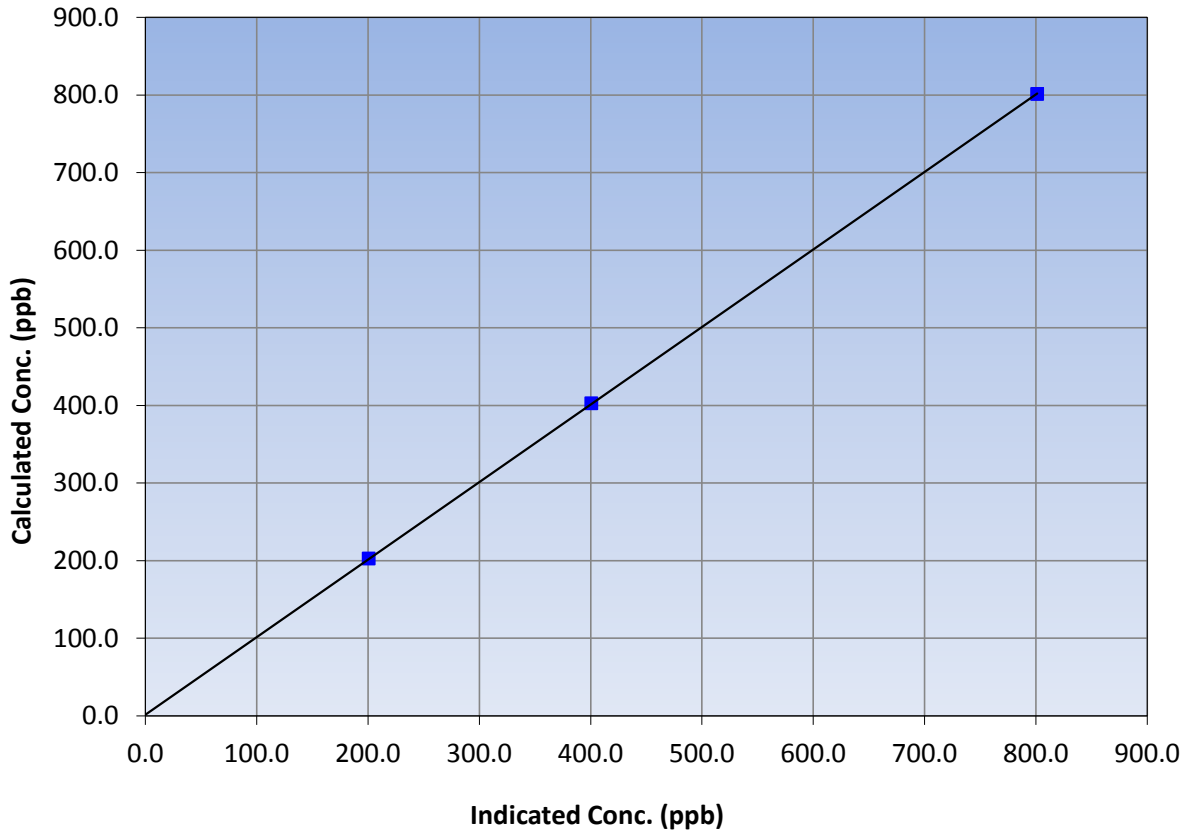
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 8, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:39	End Time (MST)	13:38
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	801.2	1.0000			
402.8	400.5	1.0057			
202.8	200.6	1.0110			
			Slope	0.999222	0.90 - 1.10
			Intercept	1.456311	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

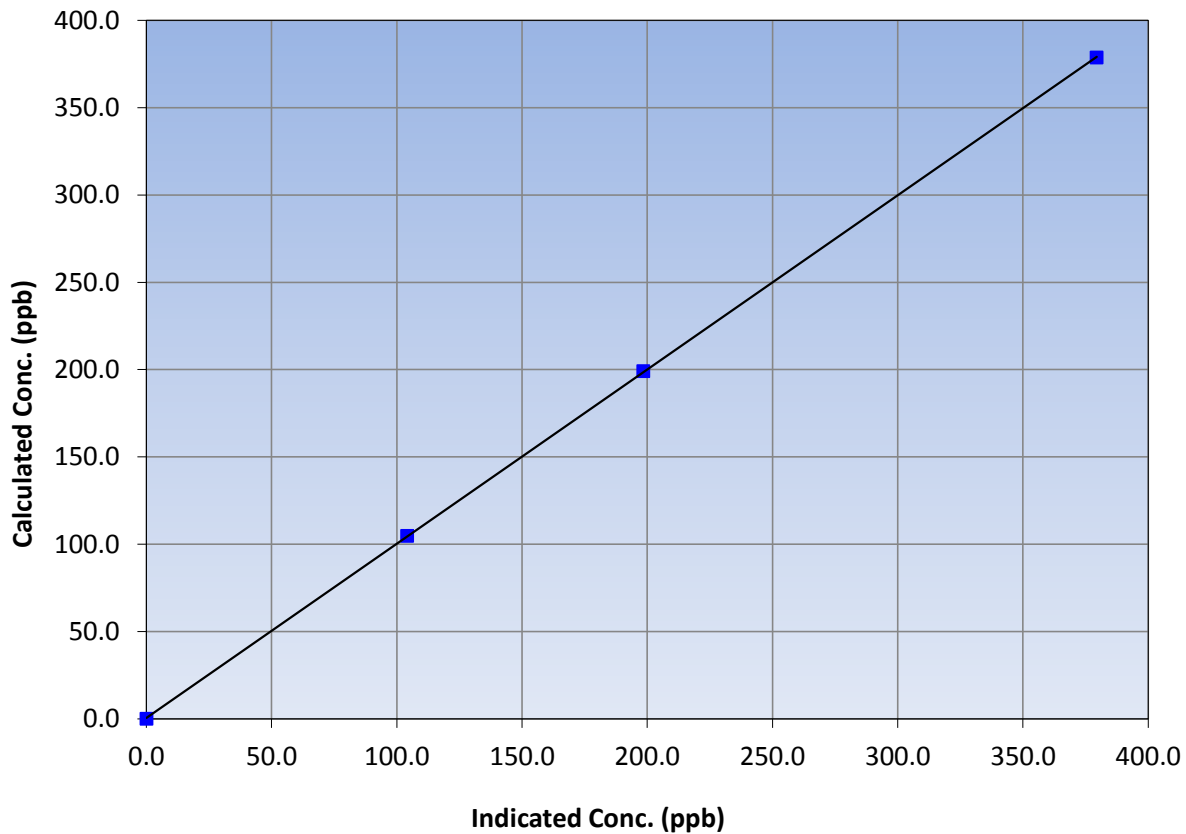
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 8, 2017
Station Name	Muskeg River	Station Number	AMS 16
Start Time (MST)	8:39	End Time (MST)	13:38
Analyzer make	Thermo 42i	Analyzer serial #	1426262593

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	
378.7	379.4	0.9982			
199.1	198.4	1.0035			
104.7	104.1	1.0058			
			Slope	0.997862	0.90 - 1.10
			Intercept	0.514435	+/-20

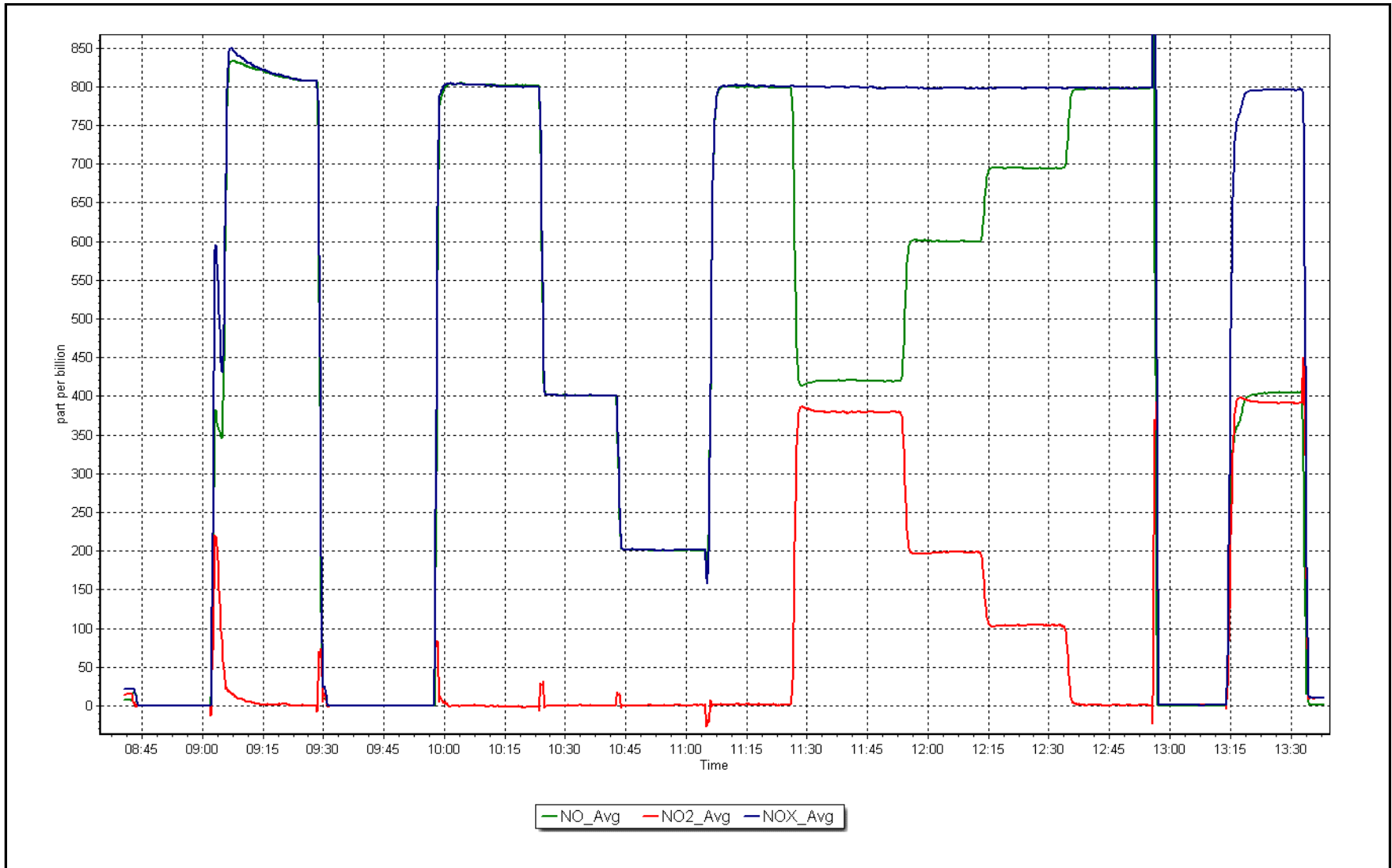
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 12, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Muskeg River	Station number:	AMS 16
Calibration Date:	July 12, 2017	Last Cal Date:	June 8, 2017
Start time (MST):	8:50	End time (MST):	10:00
Sharp Model:	Thermo/Sharp 5030	S/N:	E-798
Particulate Fraction:	PM2.5	C14 Source S/N:	4142
Flow Meter Make/Model:	DeltaCal	S/N:	141227
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)	20	19.3	19.3	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	980	980.5	980.5	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	994.8	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.7	NA	-0.1	<input 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: May 10, 2017 Last Cal Date: May 10, 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: <u>8074</u>	Foil S/N: _____	
Foil Calibration	Foil Mass: <u>1259</u>	Foil Mass: _____	
	Calibration Date: <u>July 12, 2017</u>	Calibration Date: _____	
(Limit) +/- 5% of previous	Correction Factor: <u>7151</u>	Correction Factor: <u>6936</u>	3.10%

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: Cleaned the cyclone head. Adjusted the flow.

Calibration by: Jayme Marcoux



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Muskeg River	Station Number:	AMS 16
Calibration Date:	July 18, 2017	Prev Cal Date:	August 26, 2016
Start Time (MST):	9:50	End Time (MST):	10:58
Barometric Press:	733.3	Station Temp:	23.5 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	N10022
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	39.3	1.0028
600	58.6	58.5	1.0003
800	77.8	77.7	1.0007
Average Correction Factor			1.0017

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999999	≥0.995
Calculated slope	1.001701	1.000301	0.90 - 1.10
Calculated intercept	-0.017451	0.035807	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	N12035
As Found Declination (deg west of North)	<u>14</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	0.2	n/a
90	89.3	1.0078
180	179.5	1.0028
270	271.8	0.9934
357	357.9	0.9975
Average Correction Factor		1.0004

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999983	≥0.995
Calculated slope	0.995134	0.995615	0.90 - 1.10
Calculated intercept	0.469023	0.448180	+/- 7

Notes: Declination found using compass.

Calibration Performed By: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 17
WAPASU
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 JULY 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	679	35	65	95.97	23	0	2	0
H2S (ppb) Average	684	32	60	96.24	1	0	0	0
THC (ppm) Average	681	34	63	96.1	2.8	-	2.3	-
O3 (ppb) Average	685	32	59	96.37	62	0	41	-
NO2 (ppb) Average	679	34	65	95.83	14	0	3	-
NO (ppb) Average	679	34	65	95.83	12	-	2	-
NOX (ppb) Average	679	34	65	95.83	26	-	5	-
PM2.5 (ug/m3) Average	716	1	28	96.37	32	-	14.9	0
Temperature 2 m (C) Average	729	0	15	97.98	29.6	-	23.1	-
Relative Humidity (%) Average	729	0	15	97.98	99	-	80	-
Precipitation (mm) Total	729	0	15	97.98	8.5	-	8.5	-
Wind Speed 10 m (km/h) Average	727	0	17	97.72	26	-	17	-
Wind Direction 10 m (deg) Average	727	0	17	97.72	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 JULY 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	679	0.6	2	-	0	0	0	0	0	2	23
H2S (ppb) Average	684	0.1	0	-	0	0	0	0	0	0	1
THC (ppm) Average	681	2.11	0.1	-	1.9	2	2	2.1	2.1	2.3	2.8
O3 (ppb) Average	685	27	12	-	2	12	20	27	34	42	62
NO2 (ppb) Average	679	1.5	2	-	0	0	0	1	2	4	14
NO (ppb) Average	679	0.5	1	-	0	0	0	0	0	1	12
NOX (ppb) Average	679	2	3	-	0	0	0	1	3	5	26
PM2.5 (ug/m3) Average	716	7.99	5.7	-	0.4	2.1	4.1	6.6	10.5	14.6	32
Temperature 2 m (C) Average	729	18.03	5.2	-	1	11.3	14.6	18	21.8	24.9	29.6
Relative Humidity (%) Average	729	62.8	19	-	27	38	48	61	79	92	99
Precipitation (mm) Total	729	-	-	25.25	-	-	-	-	-	-	-
Wind Speed 10 m (km/h) Average	727	9	4	-	1	4	6	9	11	14	26
Wind Direction 10 m (deg) Average	727	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL METEOROLOGICAL PARAMETERS	21 Jul 2017 17:00	22 Jul 2017 07:00	15	Station power failure
O3, PM 2.5	21 Jul 2017 17:00	22 Jul 2017 19:00	27	Station power failure
H2S	21 Jul 2017 17:00	22 Jul 2017 20:00	28	Station power failure
THC	21 Jul 2017 17:00	22 Jul 2017 21:00	29	Station power failure
SO2	21 Jul 2017 17:00	22 Jul 2017 22:00	30	Station power failure
NO2, NO, NOX	21 Jul 2017 17:00	22 Jul 2017 23:00	31	Station power failure
Wind Speed, Wind Direction	05 Jul 2017 22:00	05 Jul 2017 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	31 Jul 2017 22:00	31 Jul 2017 22:00	1	Flat line in sensor output signal



Summary of Hour Averages

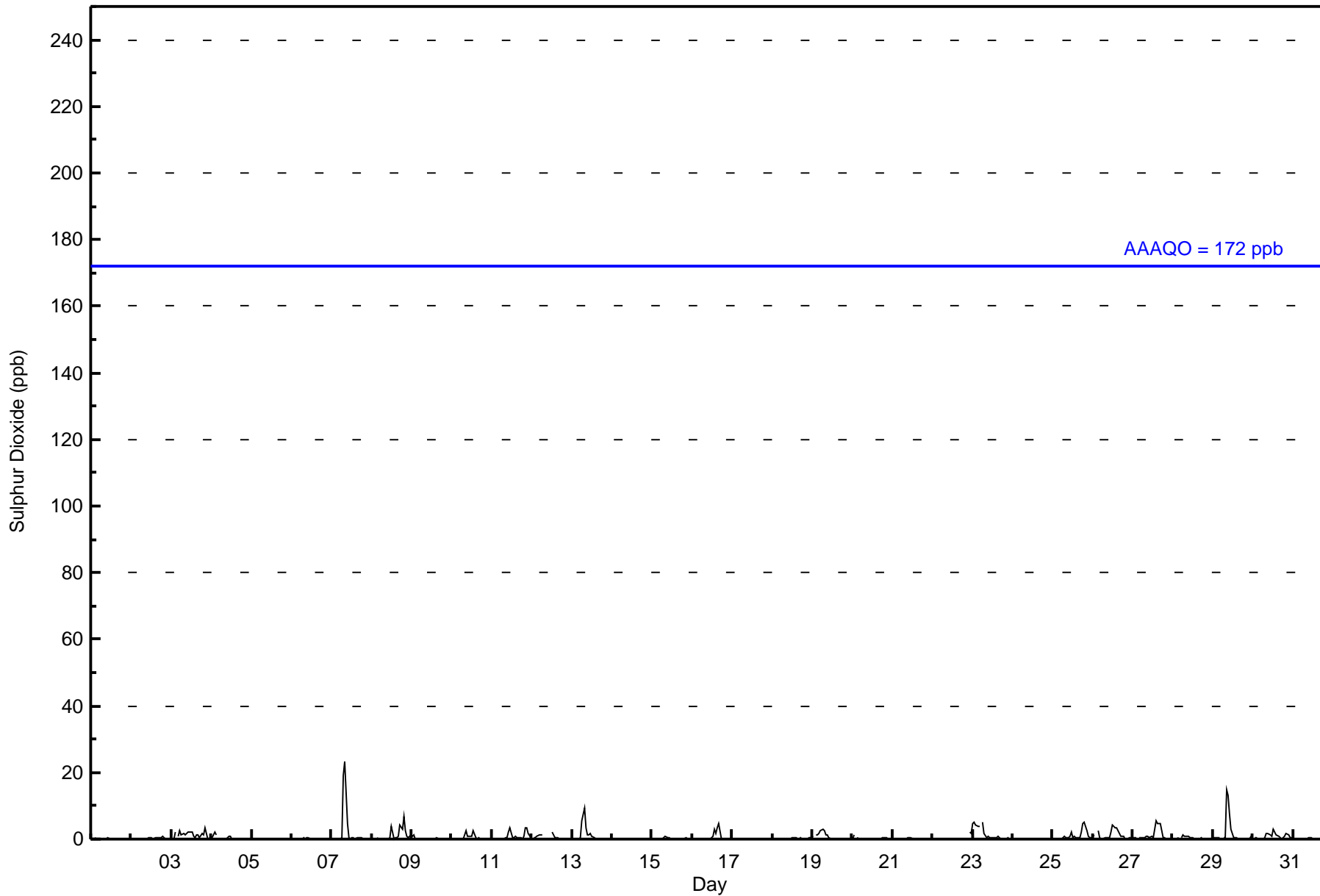
Wapasu - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																																			
Maximum Value: 23 ppb on Jul 7 09:00														Maximum Daily Average: 2.2 ppb on Jul 7										Hours of Data: 679																									
Minimum Value: 0 ppb on Jul 1 20:00														Minimum Daily Average: 0.0 ppb on Jul 5										Hours of Missing Data: 65																									
Maximum Diurnal Average: 1.9 ppb at hour 9														Minimum Diurnal Average: 0.3 ppb at hour 23										Hours of Calibration: 35																									
Monthly Average: 0.6 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 7										Percent Operational Time: 96.0																									
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-Jul	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-Jul	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																							
3-Jul	0	0	2	Z	1	2	1	2	1	2	2	2	2	1	0	1	1	1	2	1	4	2	0	0	1.3	4																							
4-Jul	0	1	2	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
5-Jul	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-Jul	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																							
7-Jul	0	Z	0	0	0	0	0	19	23	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.2	23																							
8-Jul	0	0	Z	0	0	0	0	0	0	0	0	4	0	0	0	1	4	3	7	3	1	1	1	1	1.2	7																							
9-Jul	1	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	1																							
10-Jul	0	0	0	0	Z	0	0	0	3	1	1	1	1	3	0	0	0	0	0	0	0	0	0	0	0.4	3																							
11-Jul	0	0	0	0	0	Z	0	0	0	0	2	4	0	0	1	0	0	0	0	1	3	4	2	1	0.8	4																							
12-Jul	Z	0	1	1	1	1	1	C	C	C	C	C	2	1	0	0	0	0	0	0	0	0	0	0	0.6	2																							
13-Jul	0	Z	0	0	0	0	6	9	4	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1.1	9																							
14-Jul	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-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
16-Jul	0	0	0	0	Z	0	0	0	0	0	0	1	3	2	4	5	0	0	0	0	0	0	0	0	0.7	5																							
17-Jul	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-Jul	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	1																							
19-Jul	1	Z	1	1	2	3	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	3																							
20-Jul	0	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1																							
21-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	--	0																						
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	2	2	--	2																						
23-Jul	5	5	4	4	4	Z	5	2	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1.5	5																							
24-Jul	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-Jul	0	Z	0	0	0	0	0	1	0	0	1	2	1	1	0	0	1	2	5	5	3	1	0	0	1.0	5																							
26-Jul	0	1	Z	3	0	0	0	0	0	0	0	2	4	3	3	2	2	1	1	0	0	0	0	0	1.1	4																							
27-Jul	0	0	0	Z	0	0	0	0	1	1	1	1	1	3	6	5	5	2	0	0	0	0	0	0	1.2	6																							
28-Jul	0	0	0	0	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
29-Jul	1	0	0	0	0	Z	0	1	15	13	8	3	0	0	0	0	0	0	0	0	0	0	0	1	2.0	15																							
30-Jul	Z	0	0	0	0	0	0	0	2	2	1	1	3	2	1	1	0	0	0	1	2	1	0	0	0.9	3																							
31-Jul	0	Z	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																							
																								0.4	0.5	0.5	0.5	0.4	0.4	0.7	1.4	1.9	1.0	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.4	0.3	0.3	Diurnal Average	
																								5	5	4	4	4	3	6	19	23	13	8	4	4	3	6	5	5	4	5	7	4	4	2	2	Diurnal Maximum	
Z - zerospan 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
Wapasu - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	675	99.41	99.41
11 - 20	3	0.44	99.85
21 - 60	1	0.15	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: 679

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - July 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	30	37	14	9	7	42	67	84	58	47	52	80	39	36	34	37	673
11 - 20	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
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	30	37	14	9	7	42	67	84	58	47	53	82	40	36	34	37	677

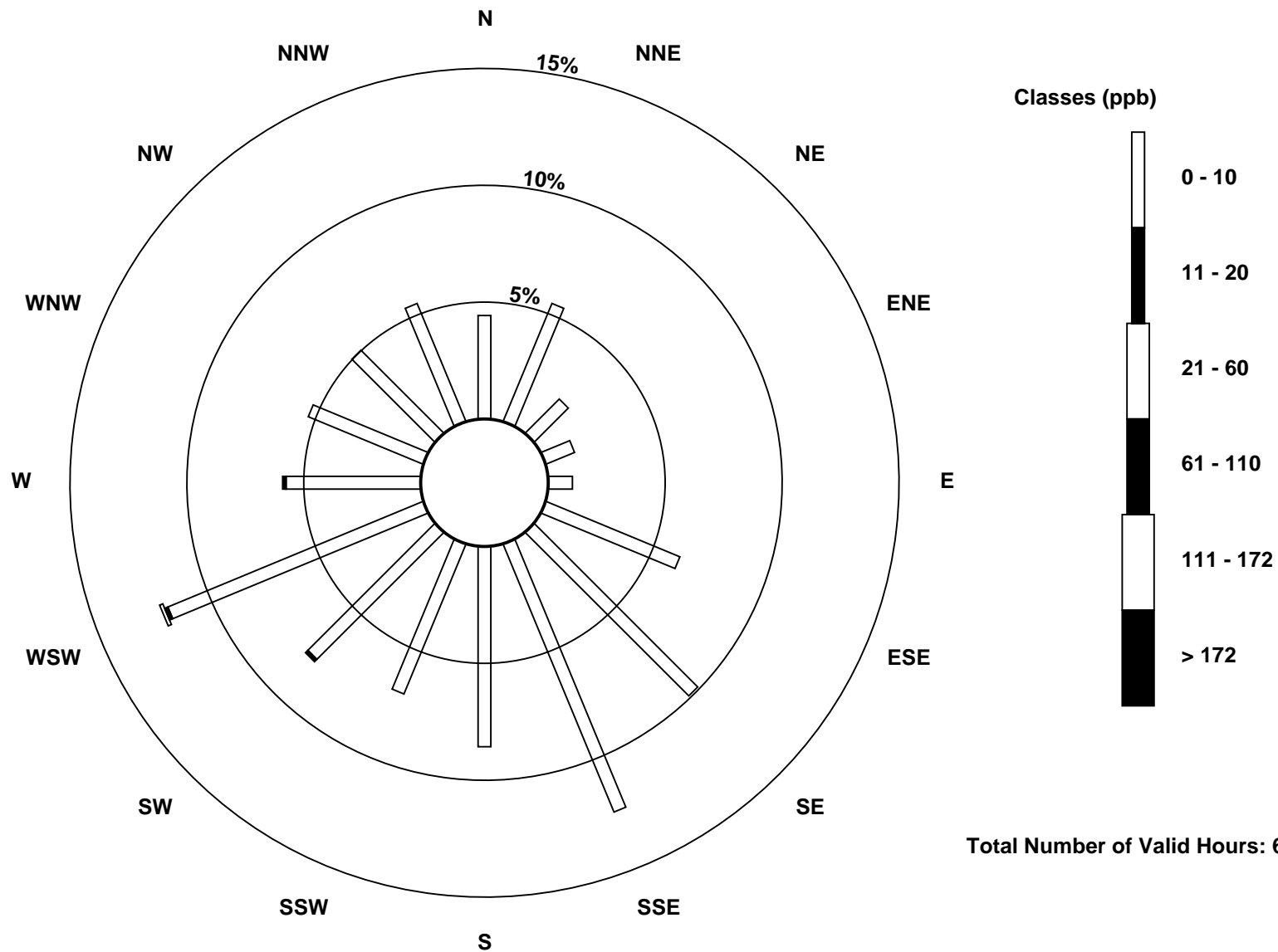
Total Number of Valid Hours: 677

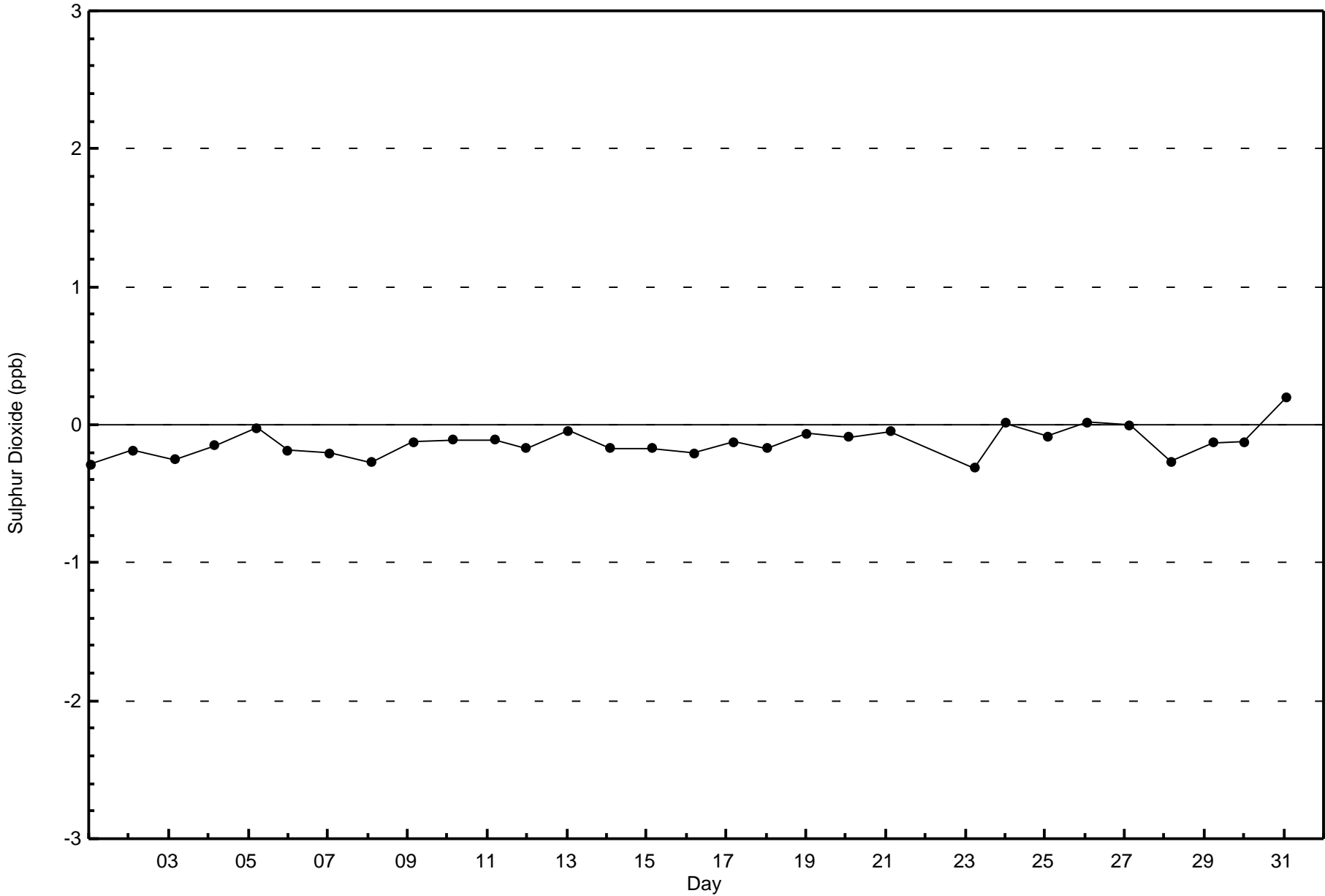
Total Number of Hours: 744

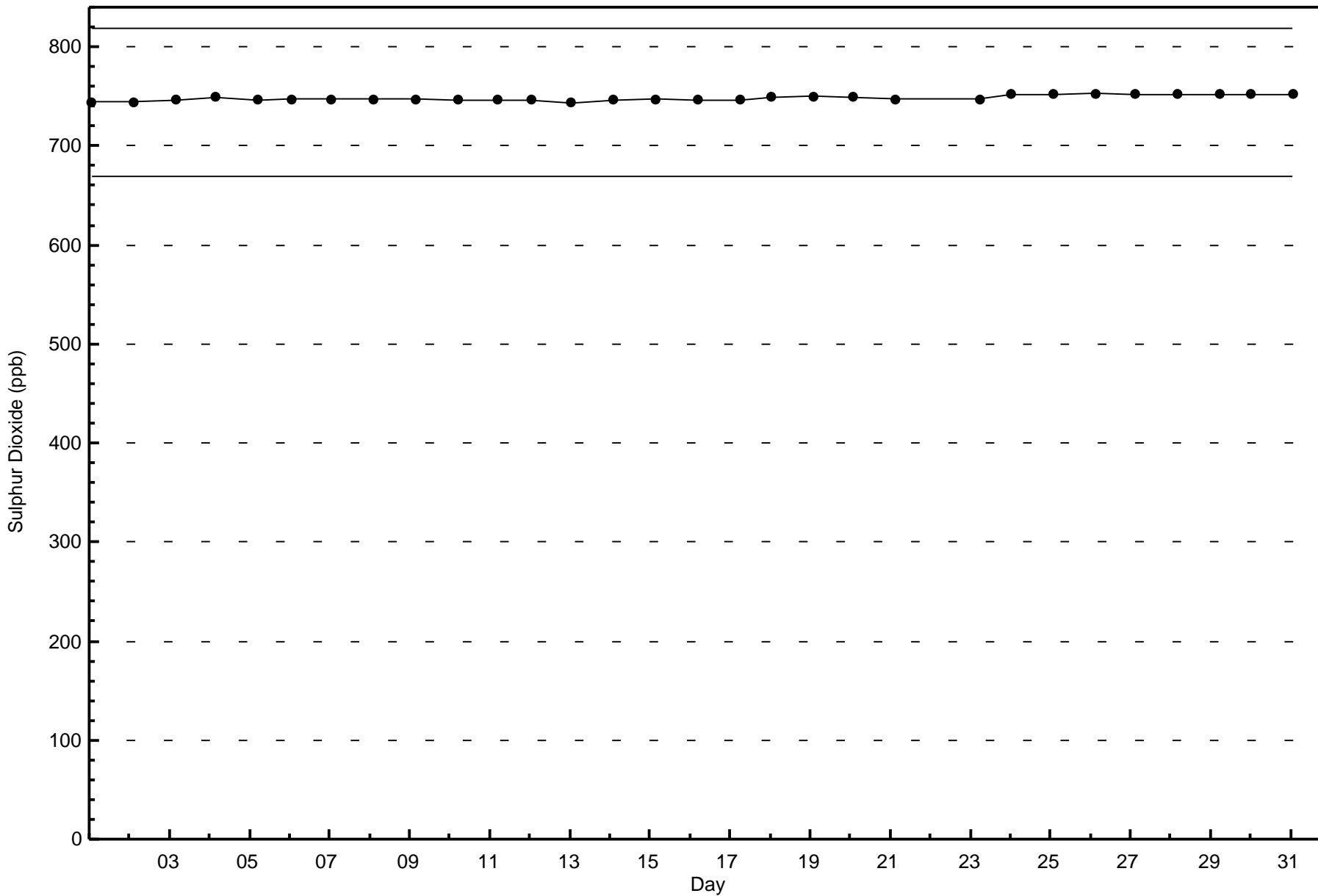


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)

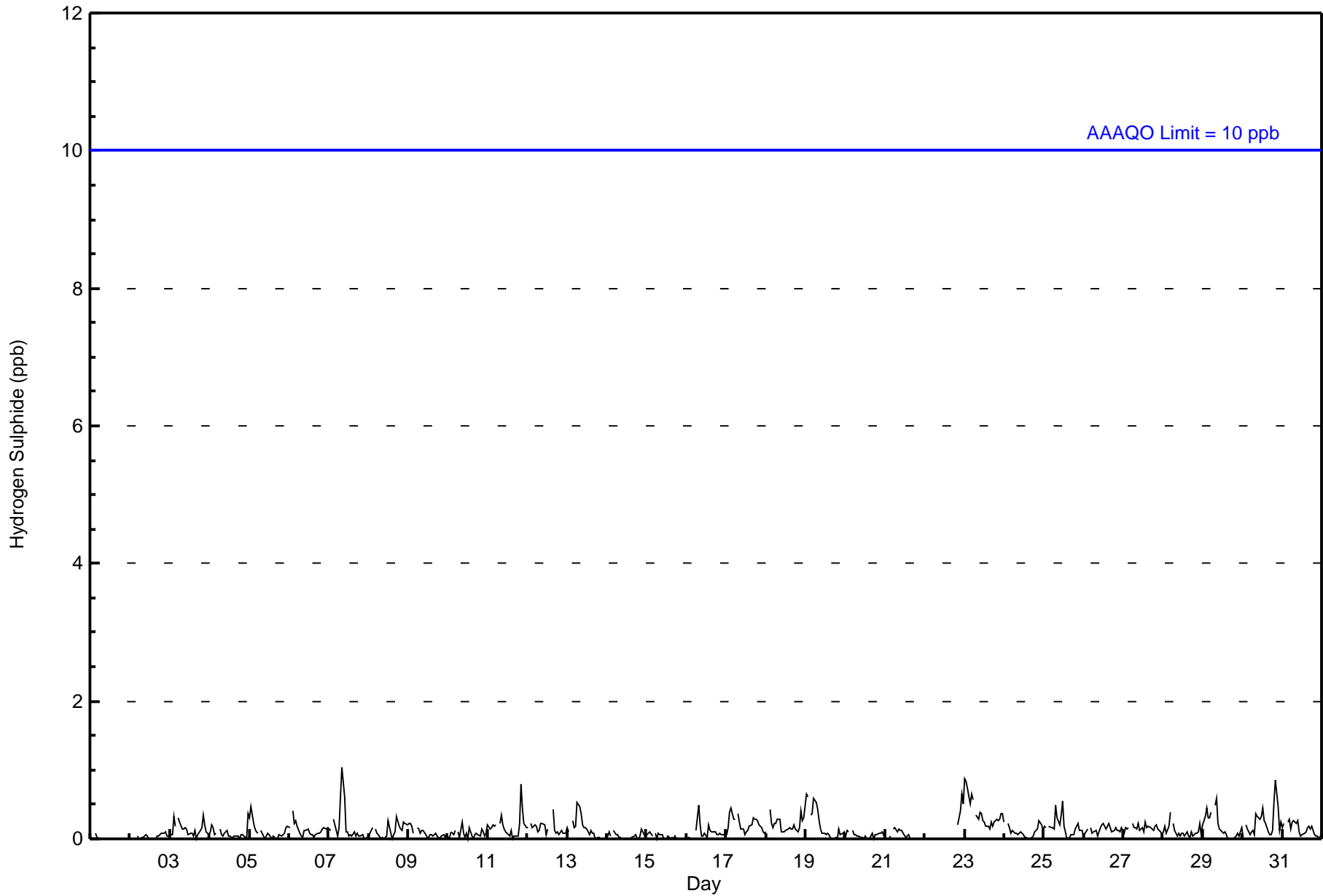








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 1 ppb on Jul 7 09:00										Maximum Daily Average: 0.4 ppb on Jul 23										Hours of Data: 684																													
Minimum Value: 0 ppb on Jul 1 01:00										Minimum Daily Average: 0.0 ppb on Jul 1										Hours of Missing Data: 60																													
Maximum Diurnal Average: 0.2 ppb at hour 3										Minimum Diurnal Average: 0.1 ppb at hour 15										Hours of Calibration: 32																													
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: 96.2																													
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-Jul	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																							
2-Jul	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																							
3-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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																							
8-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1																							
12-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	C	C	0	0	0	0	0	0	0	0	0	0.2	0																							
13-Jul	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
14-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	1	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
20-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	--	0																							
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	0	0	1	1	--	1																							
23-Jul	1	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																							
24-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
26-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
30-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.2	1																							
31-Jul	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																							
0.1																								0.2	0.2	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	0.2	0.1	0.1	0.1	Diurnal Average	
1																								1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	1	1	Diurnal Maximum
Z - zerospan C - Calibration PF - Power Failure																																																	
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 - July 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: 744



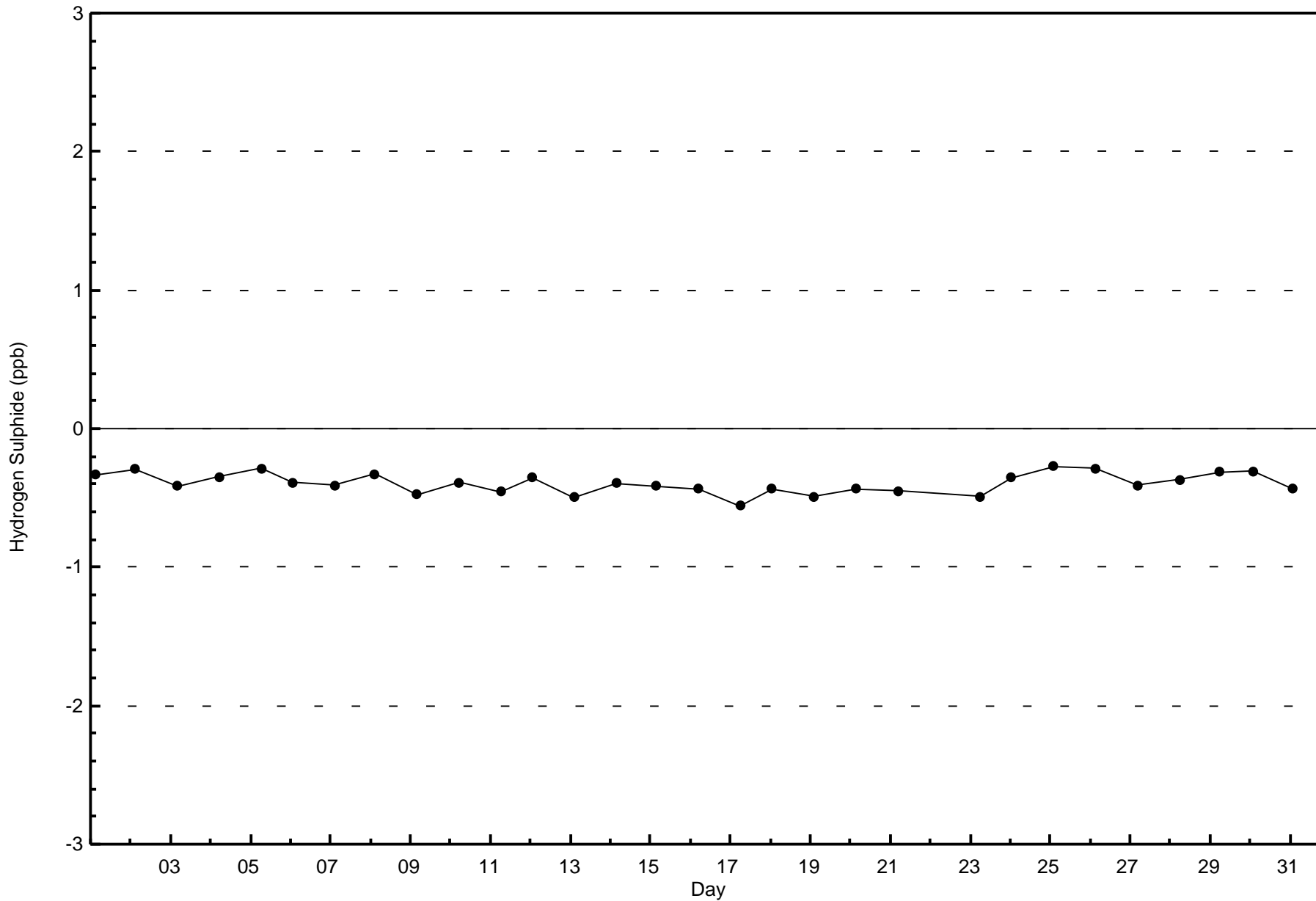
**Wood Buffalo Environmental Association
Frequency Distribution**

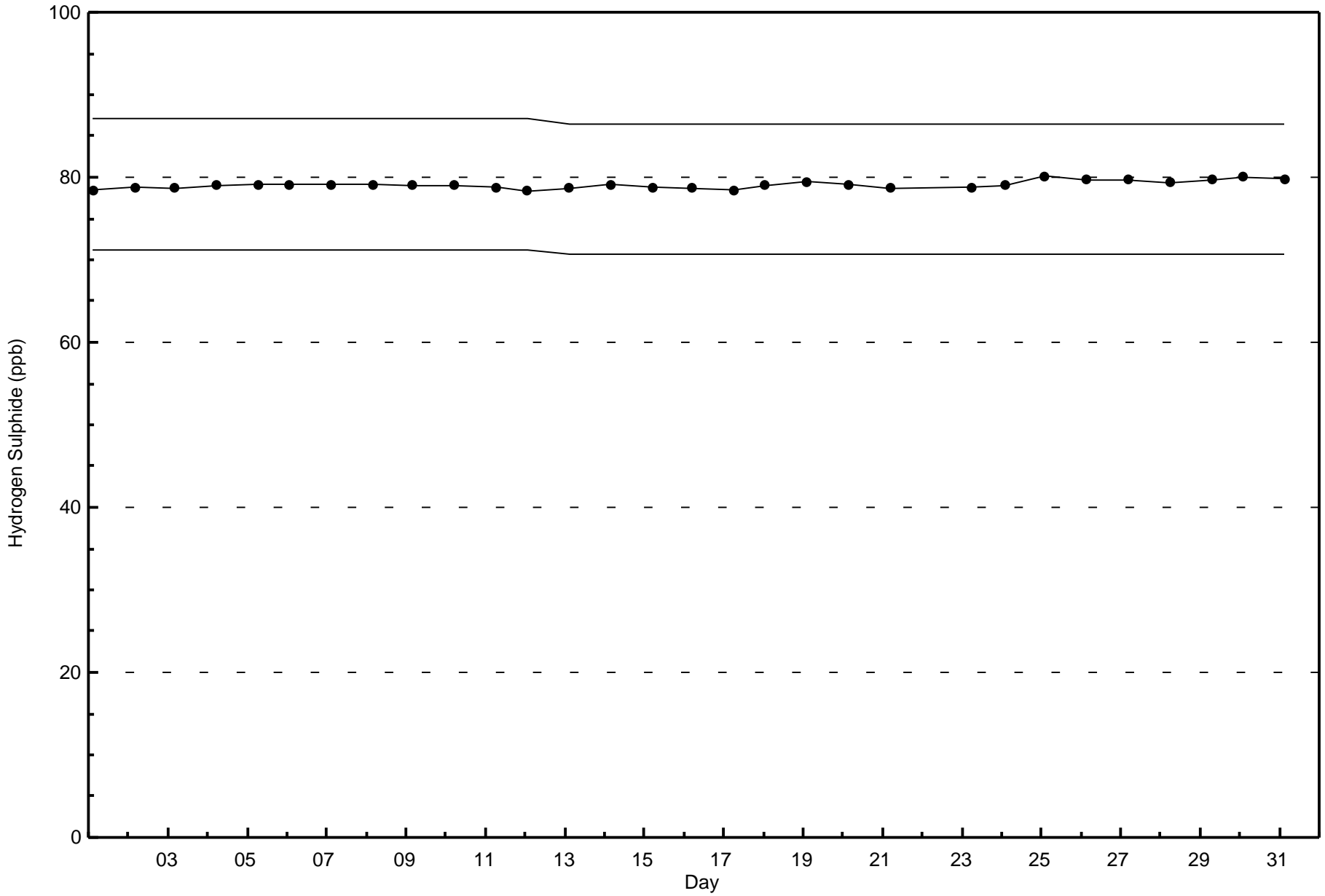
**Hydrogen Sulphide (H₂S) - ppb
Wapasu - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	30	37	14	9	8	43	65	84	61	47	53	81	41	39	34	36	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	30	37	14	9	8	43	65	84	61	47	53	81	41	39	34	36	682

Total Number of Valid Hours: 682

Total Number of Hours: 744



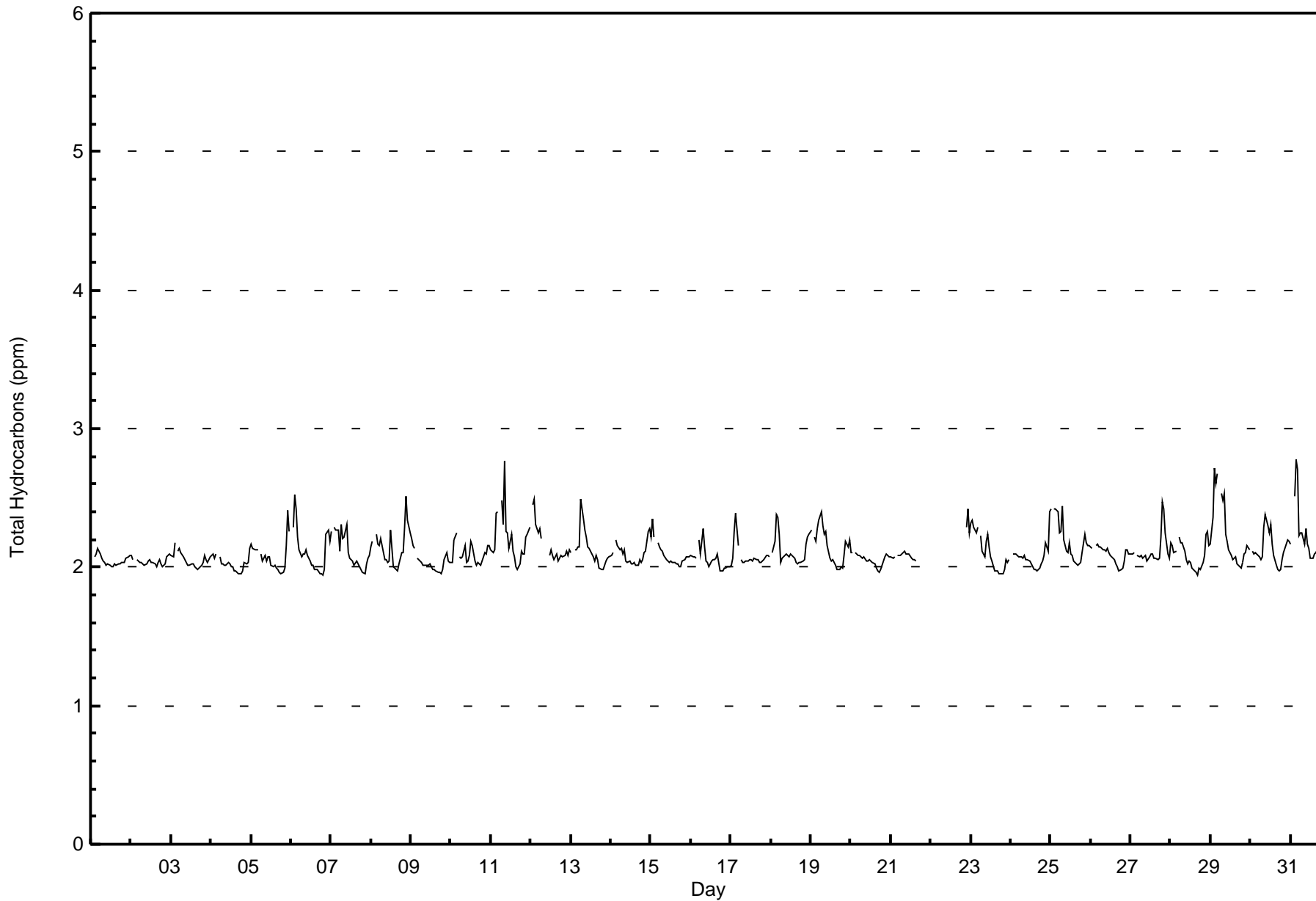




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Wapasu - July 2017

Maximum Value: 2.8 ppm on Jul 31 04:00		Maximum Daily Average: 2.3 ppm on Jul 31		Hours in Service: 744																						
Minimum Value: 1.9 ppm on Jul 6 20:00		Minimum Daily Average: 2.0 ppm on Jul 4		Hours of Data: 681																						
Maximum Diurnal Average: 2.2 ppm at hour 4		Minimum Diurnal Average: 2.0 ppm at hour 18		Hours of Missing Data: 63																						
Monthly Average: 2.11 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.3 P ₉₉ = 2.5		Hours of Calibration: 34																						
				Percent Operational Time: 96.1																						
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-Jul	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1
2-Jul	2.1	2.1	Z	2.1	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	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
3-Jul	2.1	2.1	2.2	Z	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	2.1	2.1	2.0	2.1	2.1	2.2
4-Jul	2.1	2.1	2.1	2.1	Z	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	2.1	2.0	2.1
5-Jul	2.2	2.1	2.1	2.1	2.1	Z	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.4	2.3	2.1	2.4
6-Jul	Z	2.3	2.5	2.4	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	1.9	1.9	2.0	2.2	2.3	2.2	2.1	2.5
7-Jul	2.3	Z	2.3	2.3	2.3	2.1	2.3	2.2	2.2	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	2.1	2.1	2.1	2.3
8-Jul	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.3	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.5	2.3	2.2	2.1	2.5
9-Jul	2.2	2.2	2.1	Z	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	2.0	2.0	2.0	2.2
10-Jul	2.0	2.0	2.2	2.2	Z	2.1	2.1	2.1	2.2	2.0	2.0	2.1	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.2
11-Jul	2.1	2.1	2.1	2.4	2.4	Z	2.5	2.3	2.8	2.3	2.2	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.8
12-Jul	Z	2.5	2.5	2.3	2.2	2.3	2.2	C	C	C	C	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	2.2	2.5
13-Jul	2.1	Z	2.1	2.1	2.1	2.1	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.5
14-Jul	2.1	2.1	Z	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	2.1	2.0	2.1	2.1	2.3	2.3	2.3	2.1	2.3
15-Jul	2.2	2.3	2.2	Z	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	2.1	2.1	2.1	2.1	2.1	2.3
16-Jul	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
17-Jul	2.0	2.1	2.3	2.4	2.2	Z	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4
18-Jul	Z	2.1	2.2	2.4	2.4	2.2	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	2.2	2.2	2.2	2.1	2.4
19-Jul	2.3	Z	2.2	2.2	2.3	2.3	2.4	2.3	2.2	2.3	2.2	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2	2.1	2.4
20-Jul	2.1	2.1	Z	2.1	2.1	2.1	2.1	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	2.1	2.1	2.1	2.1	2.1	2.1
21-Jul	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	2.0	PF	PF	PF	PF	PF	PF	PF	PF	PF	2.1
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	2.4
23-Jul	2.3	2.3	2.3	2.2	2.3	Z	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.1	2.0	2.1	2.1	2.3
24-Jul	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	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.4	2.1	2.4
25-Jul	2.4	Z	2.4	2.4	2.4	2.3	2.3	2.4	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	2.2	2.2	2.2	2.2	2.4
26-Jul	2.1	2.1	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2
27-Jul	2.1	2.1	2.1	Z	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	2.2	2.5	2.4	2.3	2.1	2.1	2.1	2.5
28-Jul	2.2	2.2	2.1	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.1	2.2	2.3	2.2	2.1	2.3
29-Jul	2.2	2.4	2.7	2.6	2.7	Z	2.5	2.5	2.5	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2	2.7
30-Jul	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.2	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.4
31-Jul	2.2	Z	2.5	2.8	2.7	2.2	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.4	2.4	2.3	2.8
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration PF - Power Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	244	35.83	35.83
2.1 - 3.0	437	64.17	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: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - July 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	17	19	10	2	3	17	12	16	20	18	10	42	11	17	16	14	244
2.1 - 3.0	13	18	4	7	4	25	55	68	38	29	44	40	30	19	18	23	435
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	30	37	14	9	7	42	67	84	58	47	54	82	41	36	34	37	679

Total Number of Valid Hours: 679

Total Number of Hours: 744

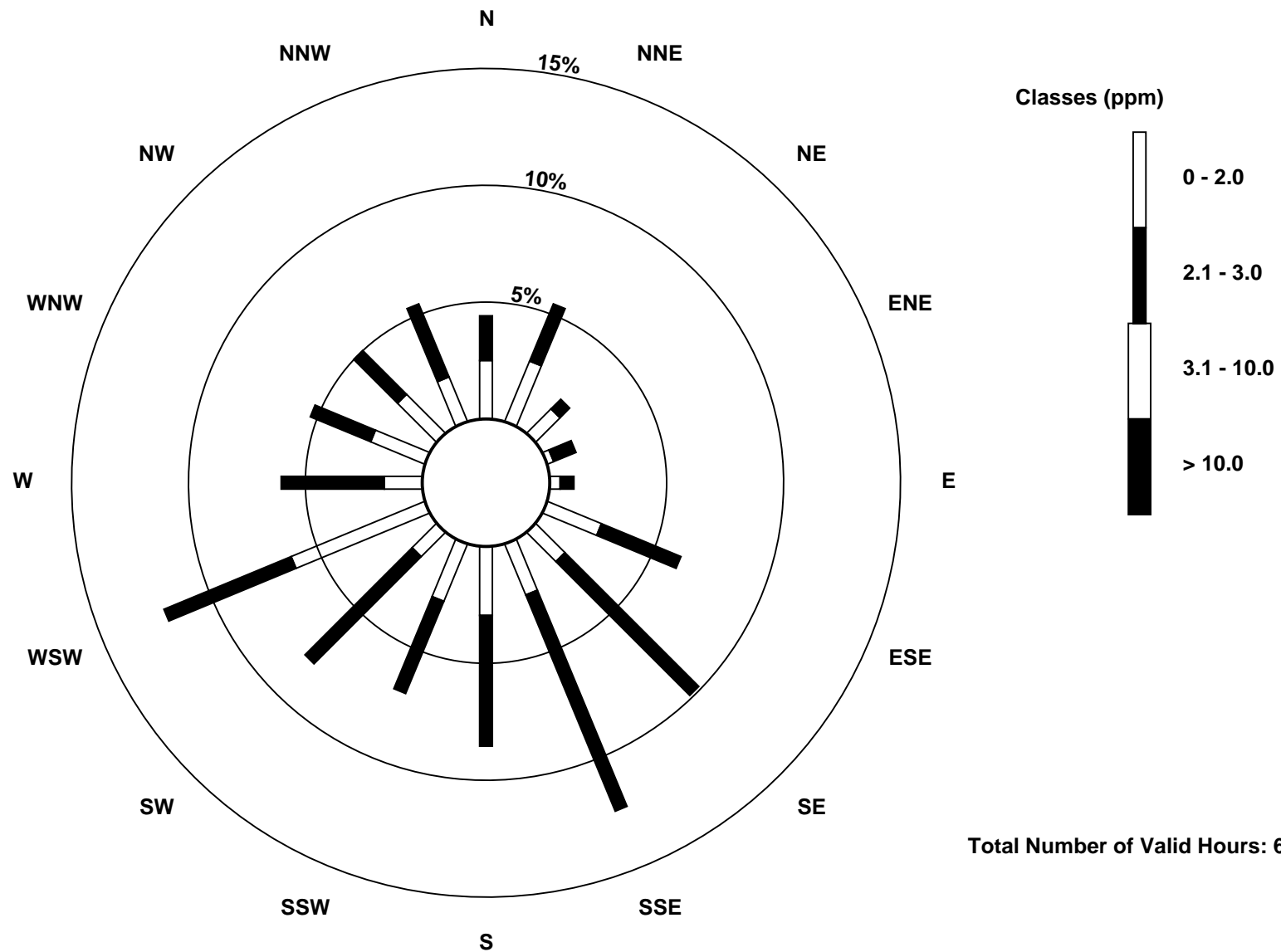


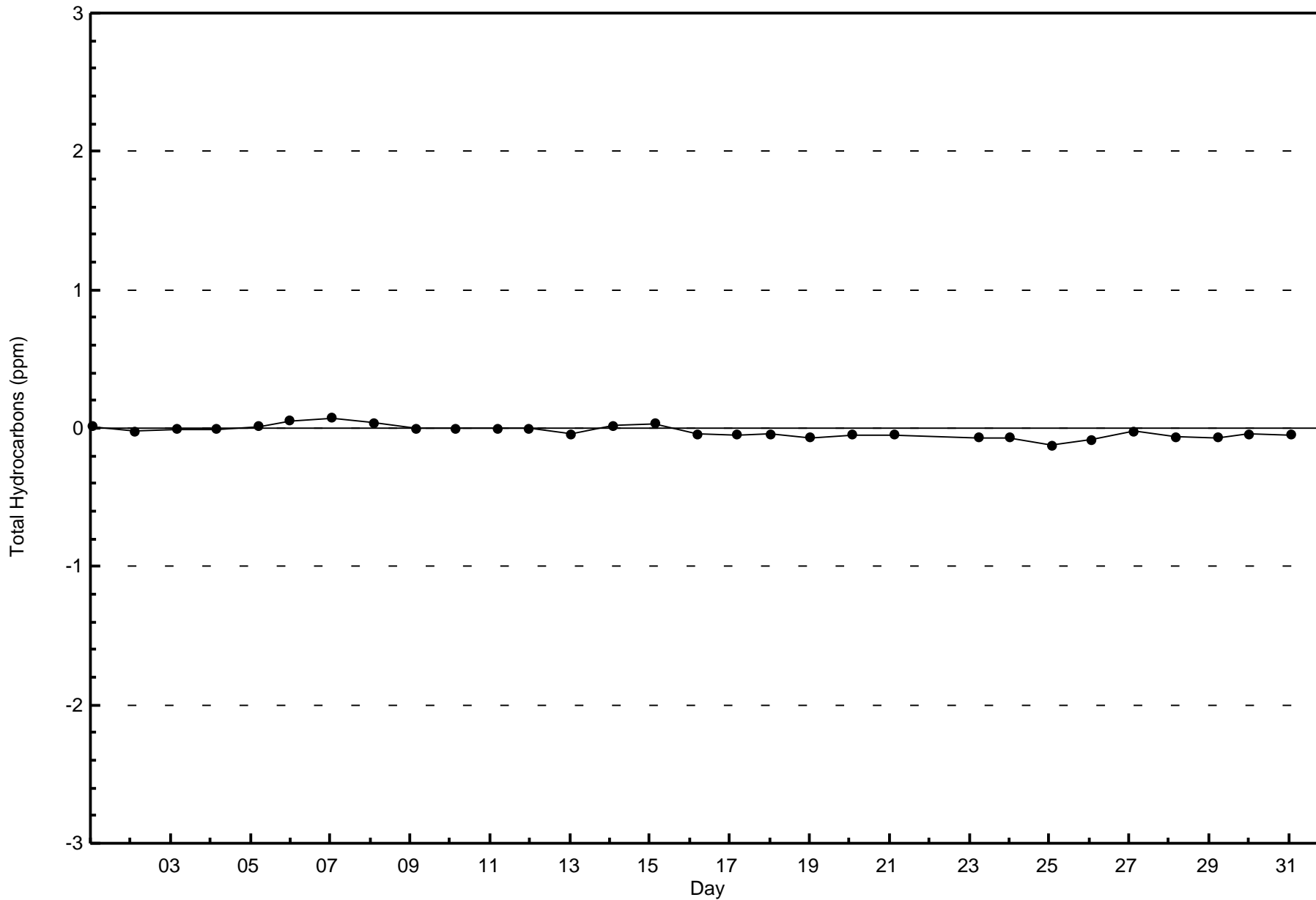
Wood Buffalo Environmental Association

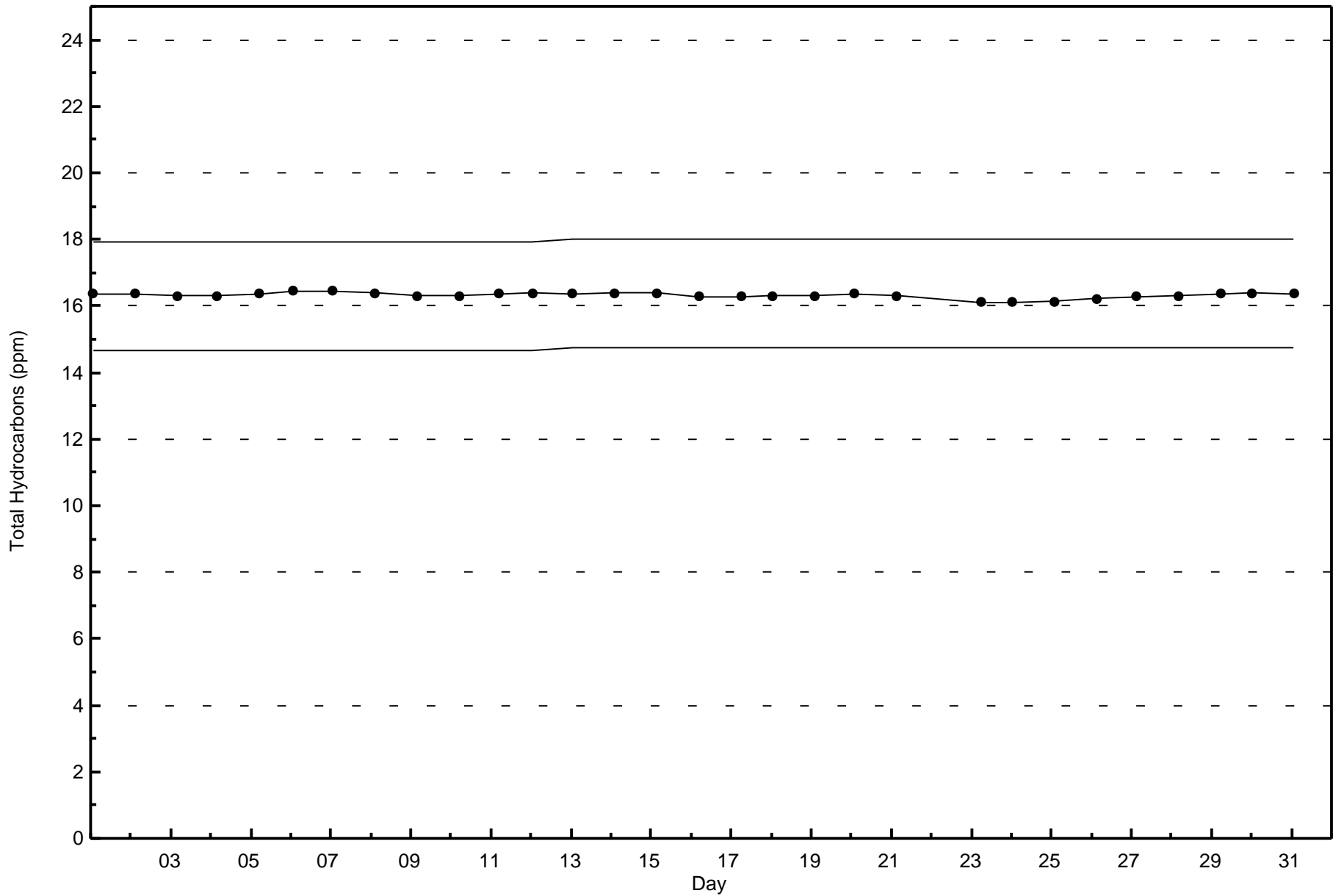
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm

Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

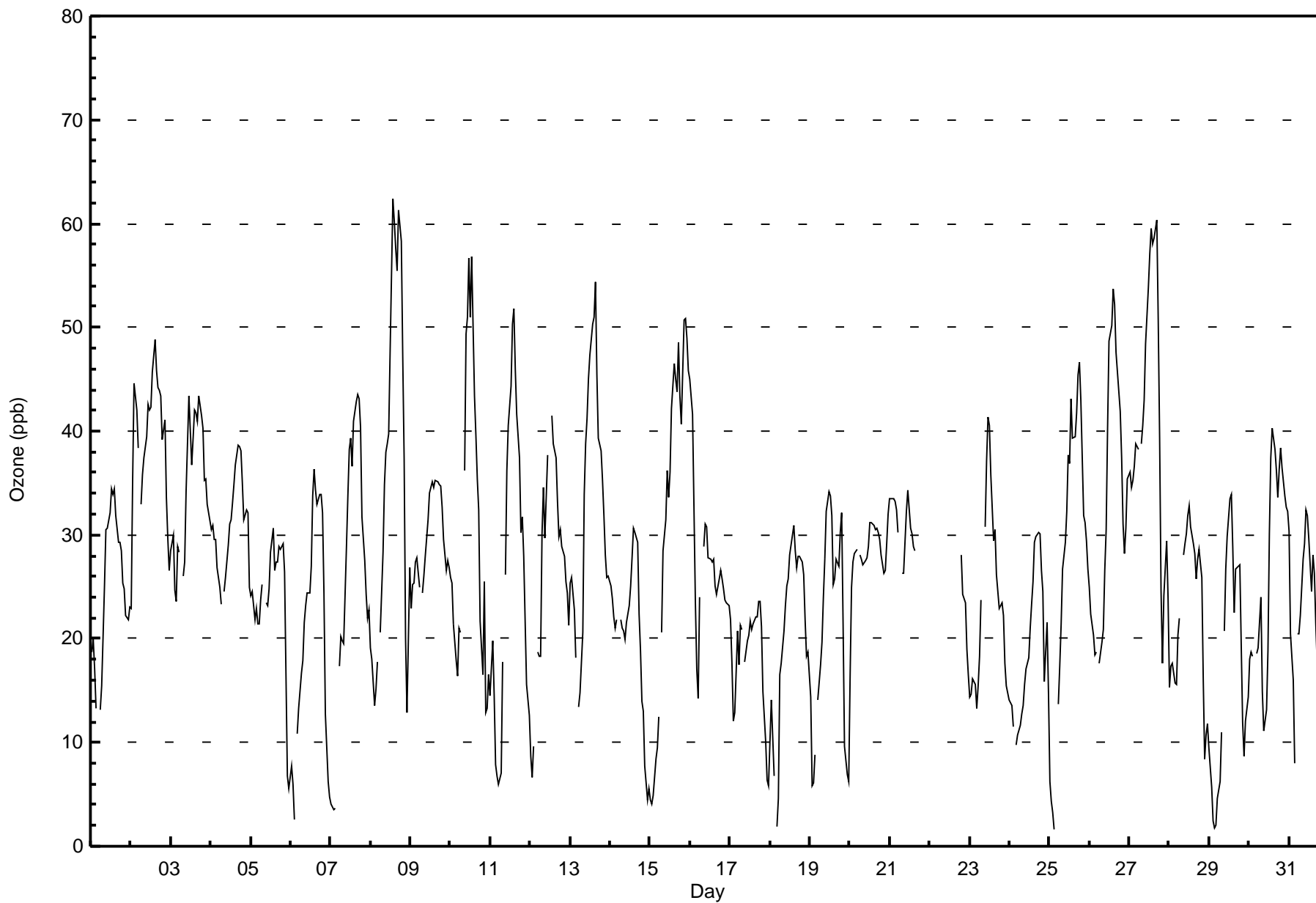
Wapasu - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 62 ppb on Jul 8 14:00 Maximum Daily Average: 41.2 ppb on Jul 27		Hours in Service: 744 Hours of Data: 685 Hours of Missing Data: 59 Hours of Calibration: 32 Percent Operational Time: 96.4																									
Minimum Value: 2 ppb on Jul 25 04:00 Maximum Diurnal Average: 37.7 ppb at hour 14 Monthly Average: 27.0 ppb		Minimum Daily Average: 16.8 ppb on Jul 29 Minimum Diurnal Average: 17.5 ppb at hour 6 Percentiles: P ₁ = 2 P ₁₀ = 12 Q ₁ = 20 Median = 27 Q ₃ = 34 P ₉₀ = 42 P ₉₉ = 58																									
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-Jul	19	20	17	13	Z	13	15	20	25	31	31	32	35	34	34	32	29	29	28	25	25	22	22	23	25.0	35	
2-Jul	23	35	45	42	38	Z	33	36	37	39	43	42	42	46	49	46	44	44	43	39	41	34	30	27	39.0	49	
3-Jul	29	30	25	24	29	28	Z	26	27	34	39	43	37	39	42	42	41	43	42	40	35	35	33	31	34.5	43	
4-Jul	30	31	30	30	27	25	Z	23	25	26	29	31	31	33	35	37	39	39	38	35	32	32	32	25	31.0	39	
5-Jul	24	24	22	23	21	21	24	25	Z	24	23	25	28	31	27	27	27	29	29	29	26	17	7	6	23.4	31	
6-Jul	8	6	3	Z	11	13	17	18	22	23	24	24	27	34	36	34	33	34	34	32	24	13	6	5	20.9	36	
7-Jul	4	4	3	4	Z	17	20	20	19	29	34	38	39	37	41	43	44	43	40	32	28	24	22	23	26.4	44	
8-Jul	19	18	14	15	18	Z	21	28	35	38	39	40	47	62	60	58	56	61	58	47	37	20	13	27	36.1	62	
9-Jul	23	25	25	27	28	25	Z	24	26	28	31	34	35	35	35	35	35	35	35	33	29	27	28	27	29.8	35	
10-Jul	26	25	21	18	16	21	21	Z	36	49	51	57	51	57	43	40	35	32	22	17	25	13	13	17	30.7	57	
11-Jul	14	20	15	8	7	6	7	18	Z	26	36	41	44	50	52	46	42	37	30	32	28	22	16	13	26.4	52	
12-Jul	9	7	10	Z	19	18	18	30	35	30	38	C	C	42	39	37	33	30	31	29	28	25	24	21	26.3	42	
13-Jul	25	26	23	18	Z	13	15	21	34	39	41	45	47	50	51	54	45	39	38	35	32	28	26	26	33.6	54	
14-Jul	25	24	22	21	22	Z	22	21	21	20	22	23	25	28	31	30	29	22	19	14	13	8	4	6	20.5	31	
15-Jul	5	4	5	8	9	13	Z	21	28	31	36	34	36	42	47	45	44	49	43	41	51	51	49	46	32.0	51	
16-Jul	45	42	33	24	17	14	24	Z	29	31	31	28	28	27	28	25	24	26	27	26	25	24	23	23	27.1	45	
17-Jul	22	18	12	13	21	17	21	21	Z	18	20	20	22	21	21	22	22	24	24	21	15	10	6	6	18.1	24	
18-Jul	10	14	7	Z	2	5	17	18	21	23	25	26	28	30	31	29	27	28	28	27	26	22	18	19	20.8	31	
19-Jul	14	6	6	9	Z	14	17	20	24	28	32	34	34	32	25	26	28	27	30	32	21	10	7	6	21.0	34	
20-Jul	16	25	27	28	29	Z	28	28	27	27	28	29	31	31	31	31	31	30	29	28	26	27	29	32	28.2	32	
21-Jul	33	33	33	33	32	30	Z	26	26	29	32	34	31	30	29	28	PF	PF	PF	PF	PF	PF	PF	PF	--	34	
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	28	24	23	19	17	--	28
23-Jul	14	15	16	16	13	15	18	24	Z	31	37	41	41	36	29	31	26	25	23	23	22	18	16	15	23.7	41	
24-Jul	14	14	12	Z	10	11	12	13	14	16	17	18	21	23	26	29	30	30	30	30	27	25	16	22	15	19.2	30
25-Jul	6	4	3	2	Z	14	17	21	27	29	32	38	37	43	39	39	42	45	47	43	32	31	29	27	28.2	47	
26-Jul	25	22	20	18	19	Z	18	20	21	27	30	40	49	50	54	52	48	46	42	37	31	28	31	35	33.2	54	
27-Jul	36	35	35	37	39	38	Z	39	41	43	48	54	57	60	58	59	60	51	39	25	18	24	29	24	41.2	60	
28-Jul	15	17	18	16	16	20	22	Z	28	29	30	32	33	31	29	28	26	28	29	26	16	8	11	12	22.5	33	
29-Jul	9	6	2	2	2	5	6	11	Z	21	27	30	33	34	29	22	27	27	27	19	12	9	12	14	16.8	34	
30-Jul	18	19	18	Z	19	19	22	24	15	11	13	19	30	37	40	38	36	34	36	38	37	34	33	32	27.1	40	
31-Jul	30	20	16	8	Z	20	20	22	28	29	32	32	30	25	28	26	21	18	14	15	8	2	2	2	19.6	32	
19.8 19.6 17.9 18.2 19.3 17.5 19.1 22.8 26.8 28.6 31.7 33.9 35.5 37.7 37.3 36.4 35.3 34.6 32.9 29.8 26.4 21.9 20.4 20.0																								Diurnal Average			
45 42 45 42 39 38 33 39 41 49 51 57 57 62 60 59 60 61 58 47 51 51 49 46																								Diurnal Maximum			
Z - zerospan C - Calibration PF - Power Failure Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Wapasu - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	187	27.30	27.30
21 - 50	474	69.20	96.50
51 - 82	24	3.50	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - July 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	15	3	5	4	16	27	36	23	13	14	3	7	1	3	10	185
21 - 50	26	21	10	4	4	27	40	48	36	32	37	75	24	35	29	26	474
51 - 82	0	0	0	0	0	0	0	2	0	2	2	5	8	3	1	1	24
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	36	13	9	8	43	67	86	59	47	53	83	39	39	33	37	683

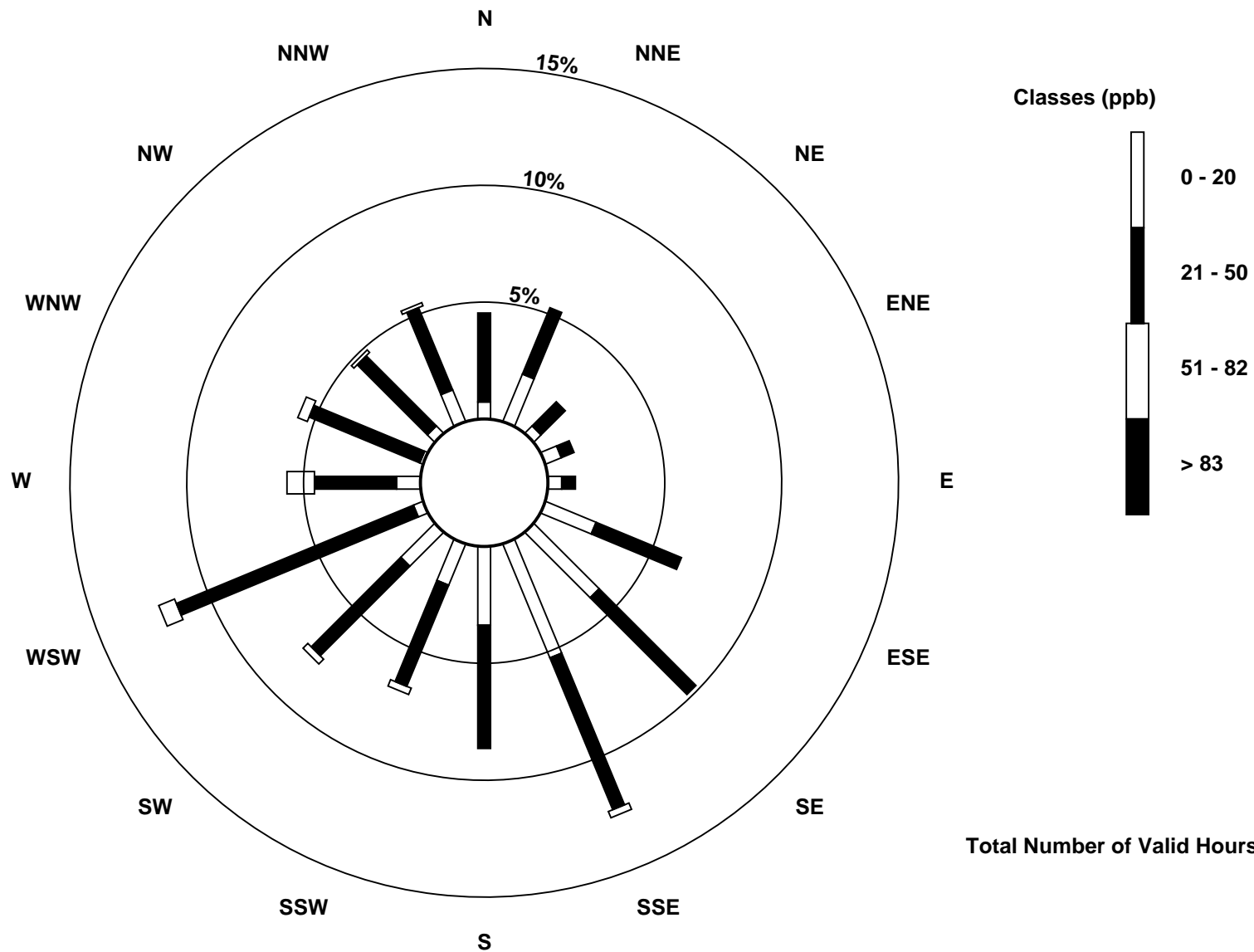
Total Number of Valid Hours: 683

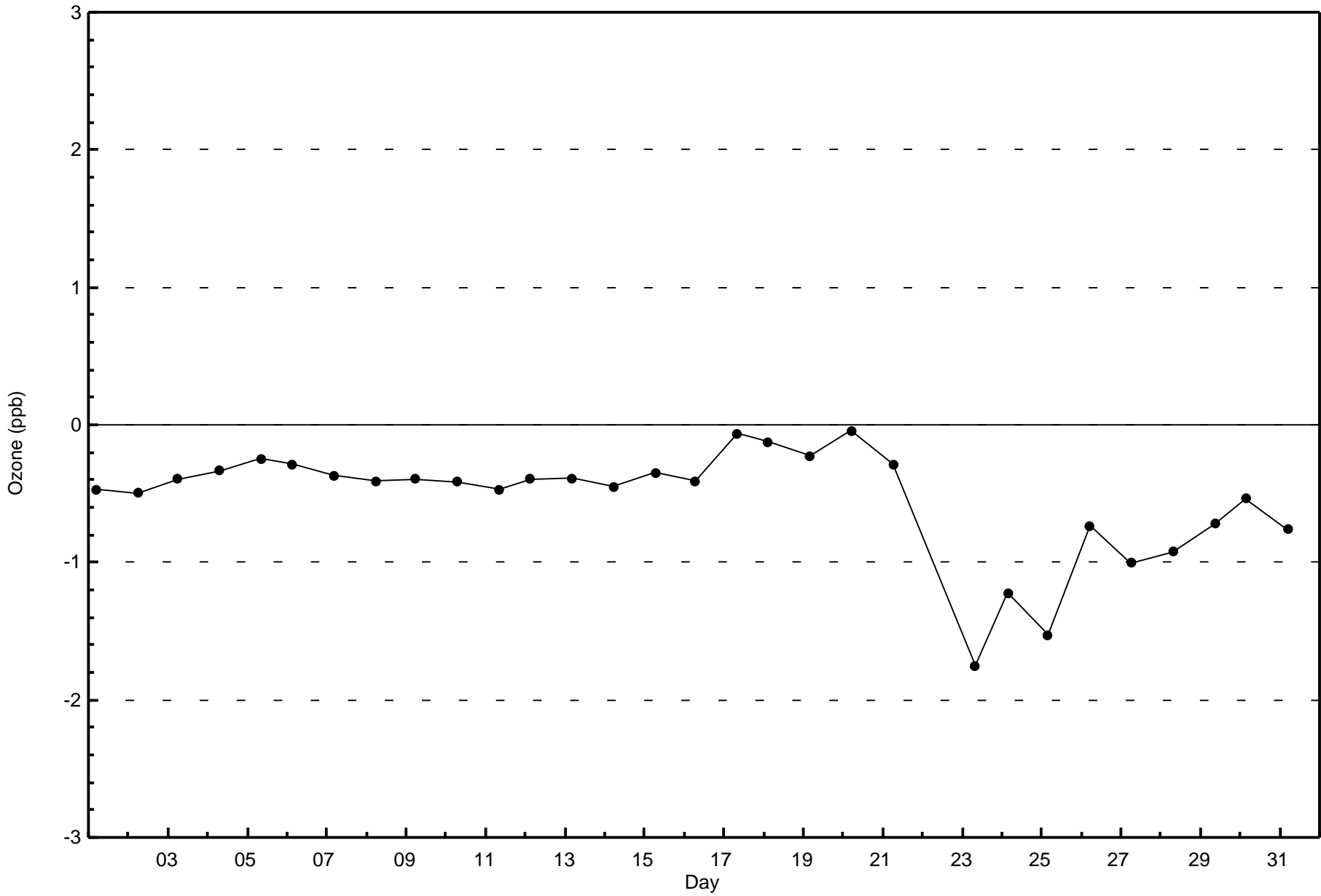
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Wapasu (AMS 17)

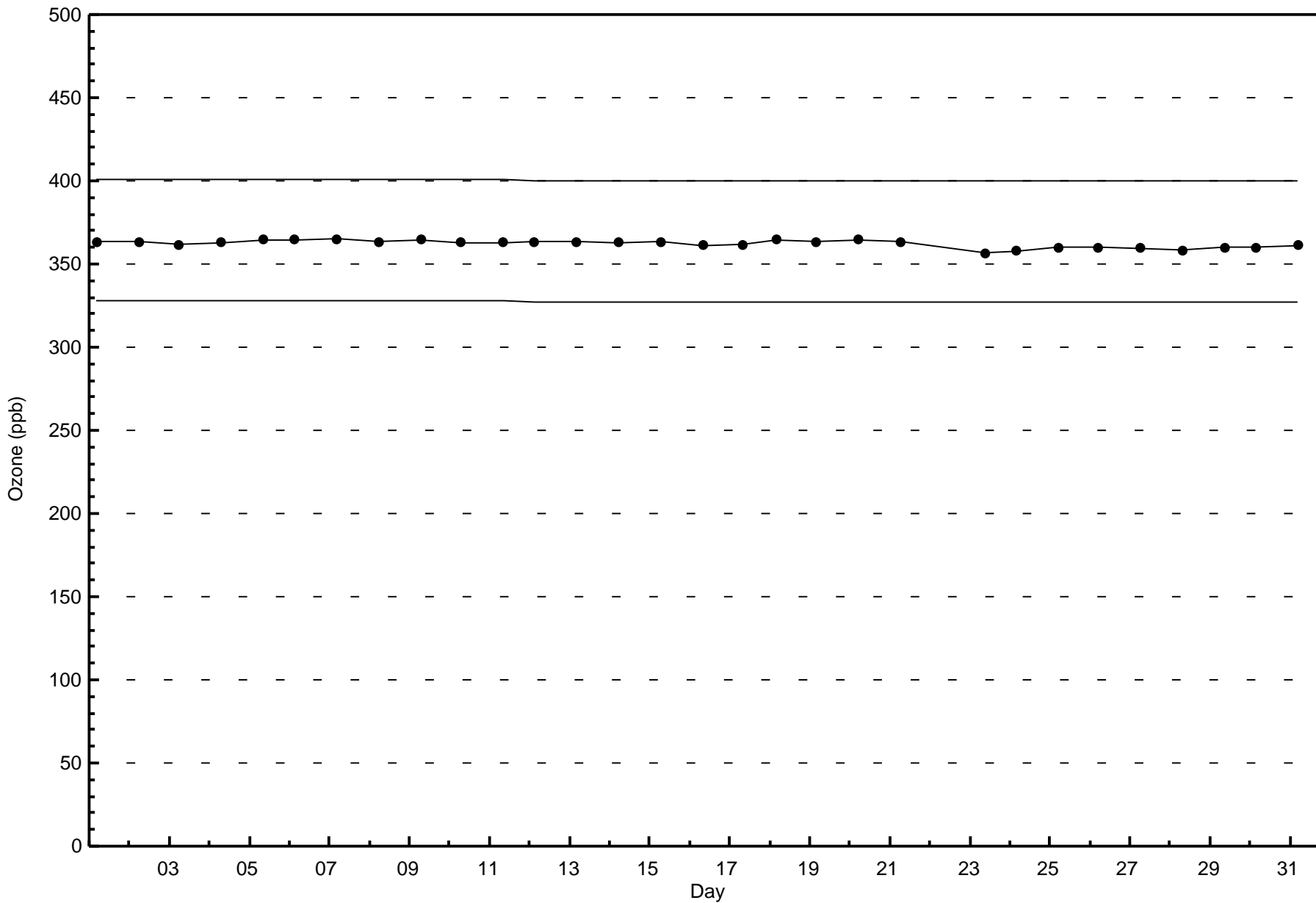






Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Wapasu - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

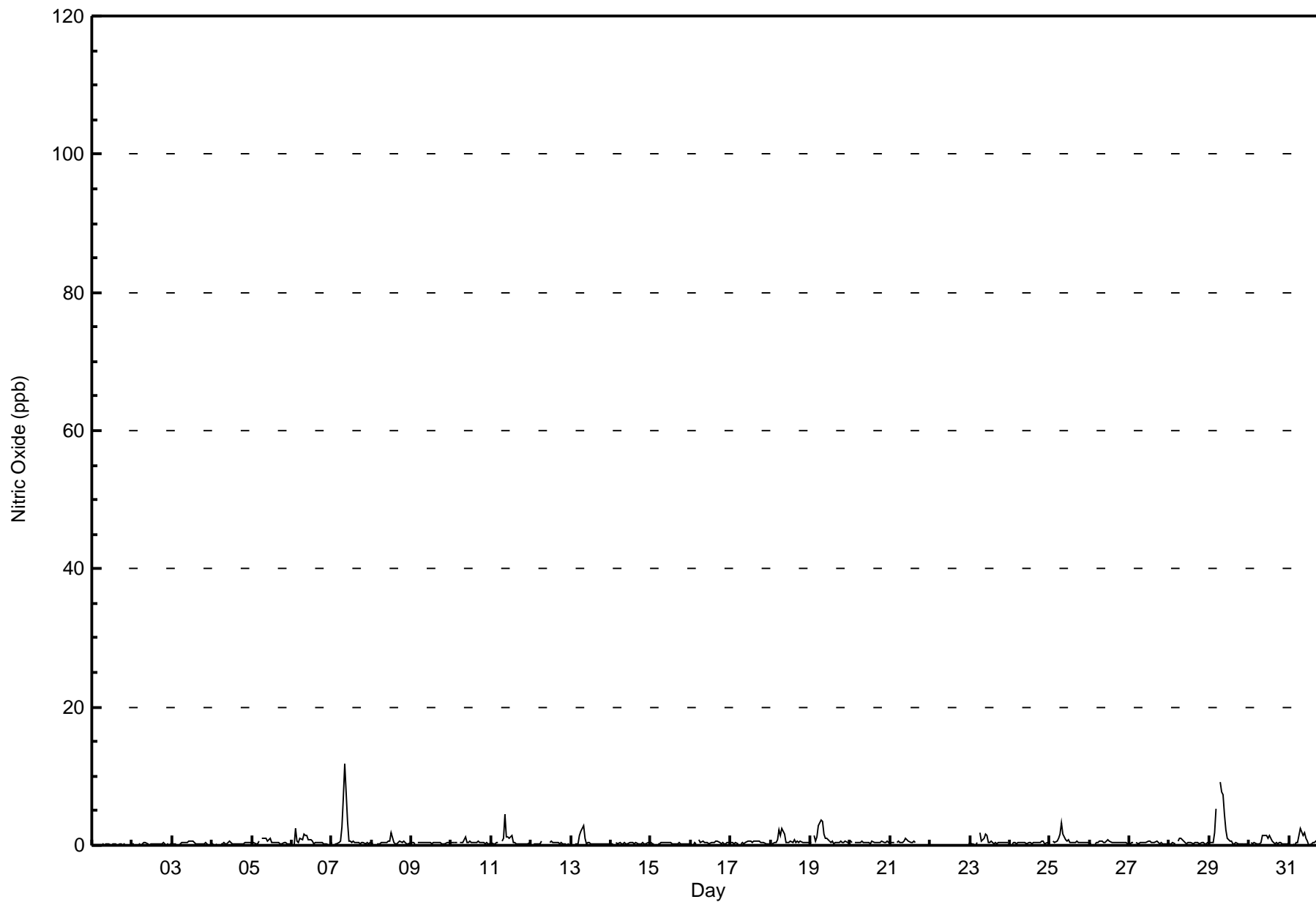
Nitric Oxide (NO) - ppb
Wapasu - July 2017

Maximum Value: 12 ppb on Jul 7 09:00		Maximum Daily Average: 1.9 ppb on Jul 29		Hours in Service: 744																																													
Minimum Value: 0 ppb on Jul 1 01:00		Minimum Daily Average: 0.1 ppb on Jul 1		Hours of Data: 679																																													
Maximum Diurnal Average: 1.5 ppb at hour 9		Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Missing Data: 65																																													
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 = 4		Hours of Calibration: 34																																													
				Percent Operational Time: 95.8																																													
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-Jul	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-Jul	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																							
3-Jul	0	0	0	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
4-Jul	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																							
5-Jul	0	0	0	0	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1																							
6-Jul	Z	0	2	1	0	1	1	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2																							
7-Jul	0	Z	0	0	0	1	3	7	12	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1.4	12																							
8-Jul	0	0	Z	0	0	0	0	0	0	0	1	1	2	0	0	0	0	1	0	1	0	0	0	0	0.4	2																							
9-Jul	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																							
10-Jul	0	0	0	0	Z	0	0	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0.4	1																							
11-Jul	0	0	0	0	0	Z	1	1	5	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.7	5																							
12-Jul	Z	0	0	0	0	0	1	C	C	C	C	0	1	0	0	0	0	0	1	0	0	0	0	0	0.3	1																							
13-Jul	0	Z	0	0	0	2	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3																							
14-Jul	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																							
15-Jul	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																							
16-Jul	0	0	0	0	Z	1	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0.4	1																							
17-Jul	0	0	0	0	0	Z	0	0	0	0	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0.4	1																							
18-Jul	Z	0	0	0	1	2	1	2	2	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0.7	2																							
19-Jul	0	Z	1	1	1	3	4	3	2	1	1	1	0	1	0	0	0	0	1	0	0	1	0	0	1.0	4																							
20-Jul	1	0	Z	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0.4	1																							
21-Jul	0	0	0	Z	0	1	0	0	1	1	1	1	0	0	1	0	PF	PF	PF	PF	PF	PF	PF	PF	--	1																							
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	0																							
23-Jul	0	0	0	0	0	Z	2	1	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0.6	2																							
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0.4	1																							
25-Jul	0	Z	1	0	1	1	2	3	2	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0.7	3																							
26-Jul	0	0	Z	0	0	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
27-Jul	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0.4	1																							
28-Jul	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
29-Jul	0	0	0	2	5	Z	9	8	7	4	2	1	1	1	0	0	0	0	0	0	0	0	0	0	1.9	9																							
30-Jul	Z	0	0	0	0	0	0	0	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.5	2																							
31-Jul	0	Z	0	0	0	0	1	2	1	2	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0.6	2																							
																								0.3	0.2	0.4	0.4	0.6	0.6	1.1	1.4	1.5	0.9	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	Diurnal Average
																								1	0	2	2	5	3	9	8	12	4	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	Diurnal Maximum
Z - zerospan C - Calibration PF - Power Failure																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	679	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: 679

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - July 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	30	37	14	9	7	42	67	84	58	46	53	82	41	36	34	37	677
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	30	37	14	9	7	42	67	84	58	46	53	82	41	36	34	37	677

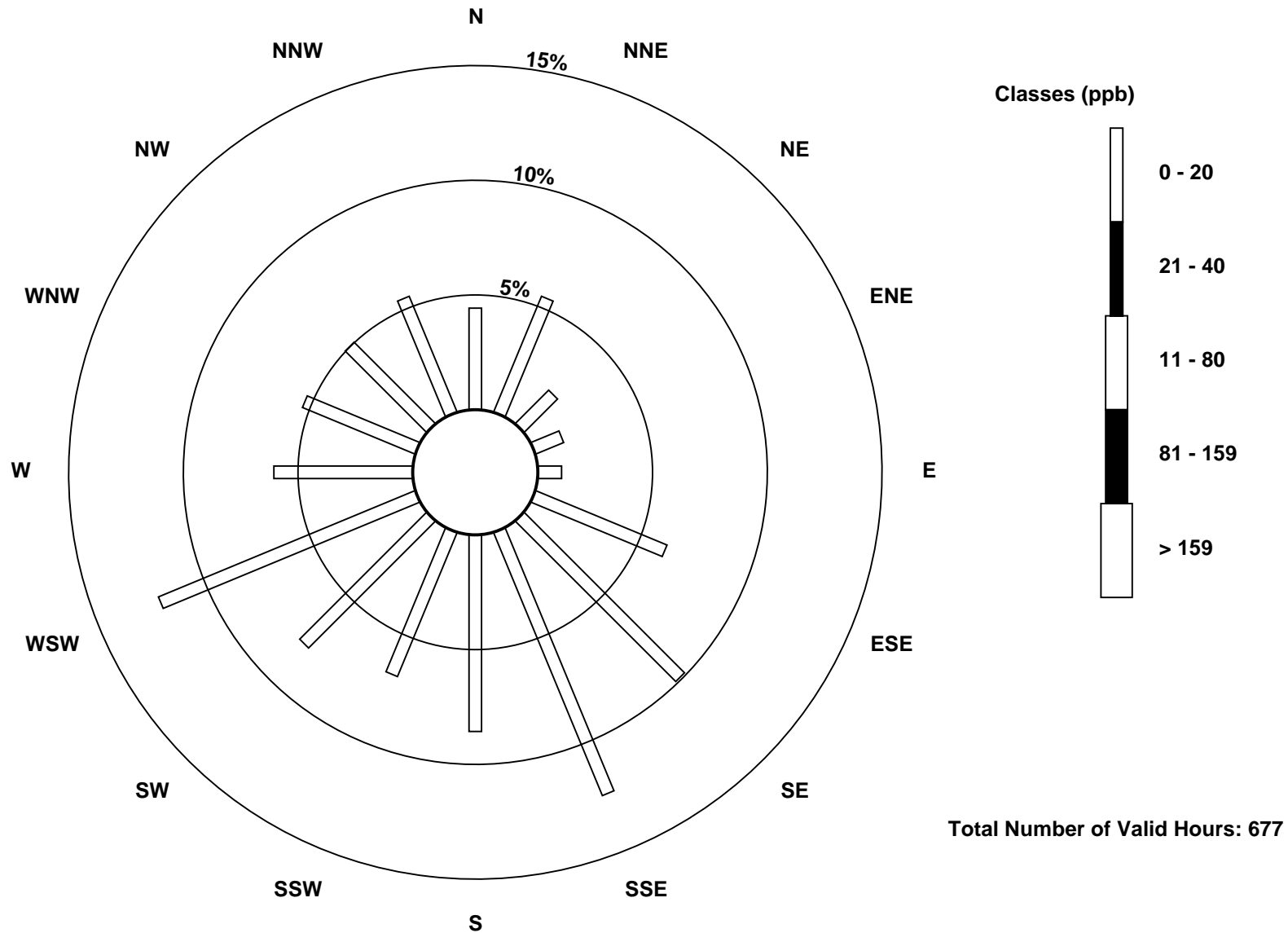
Total Number of Valid Hours: 677

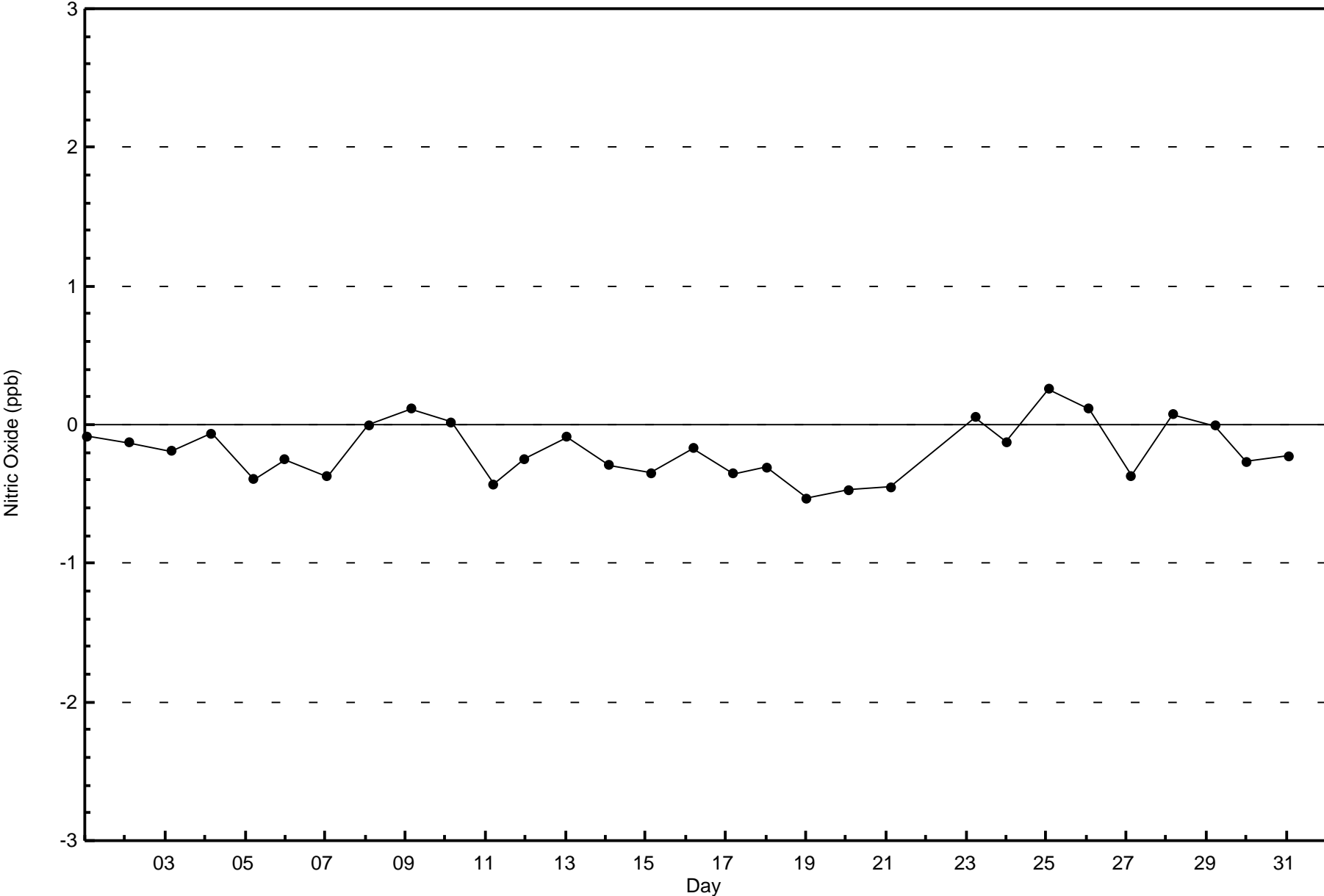
Total Number of Hours: 744

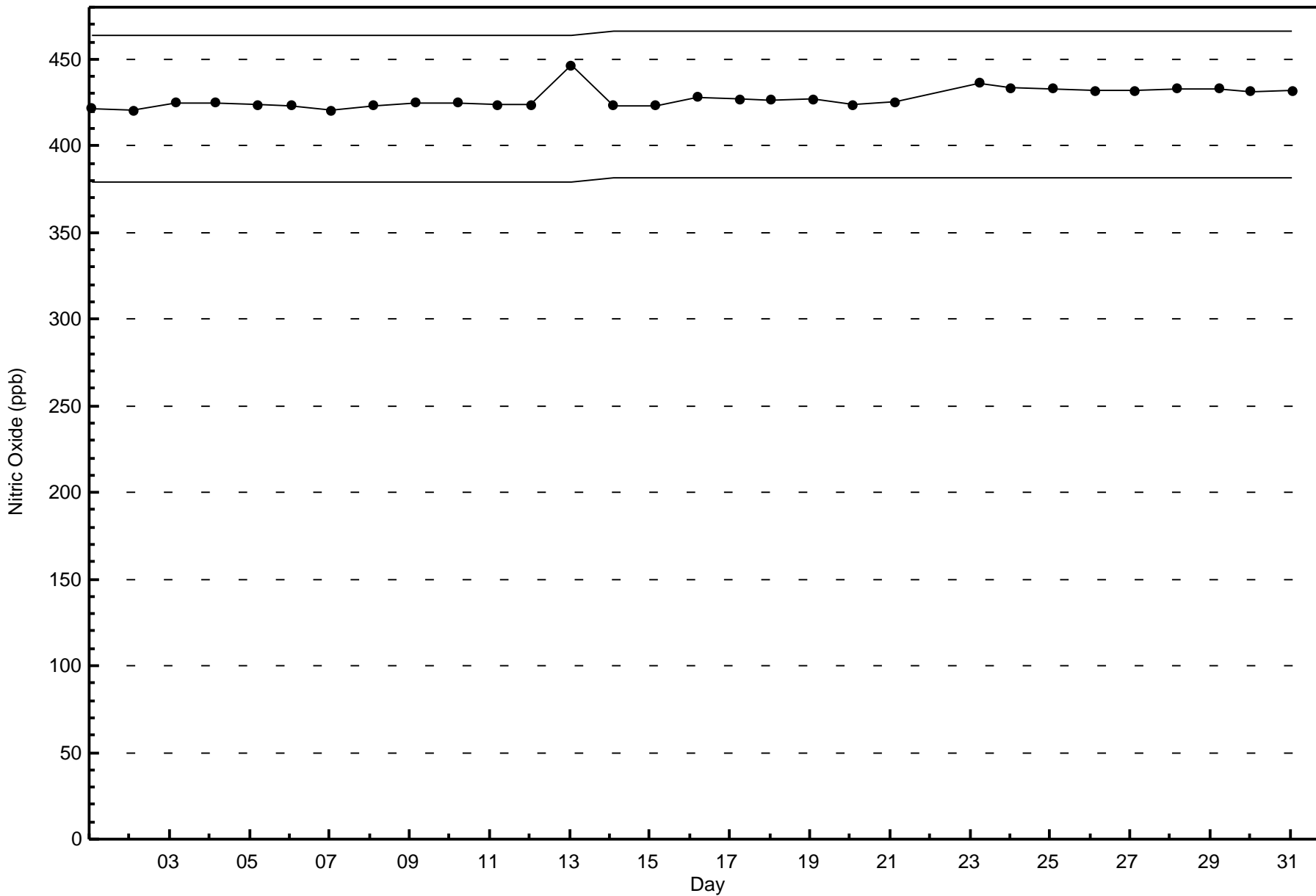


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

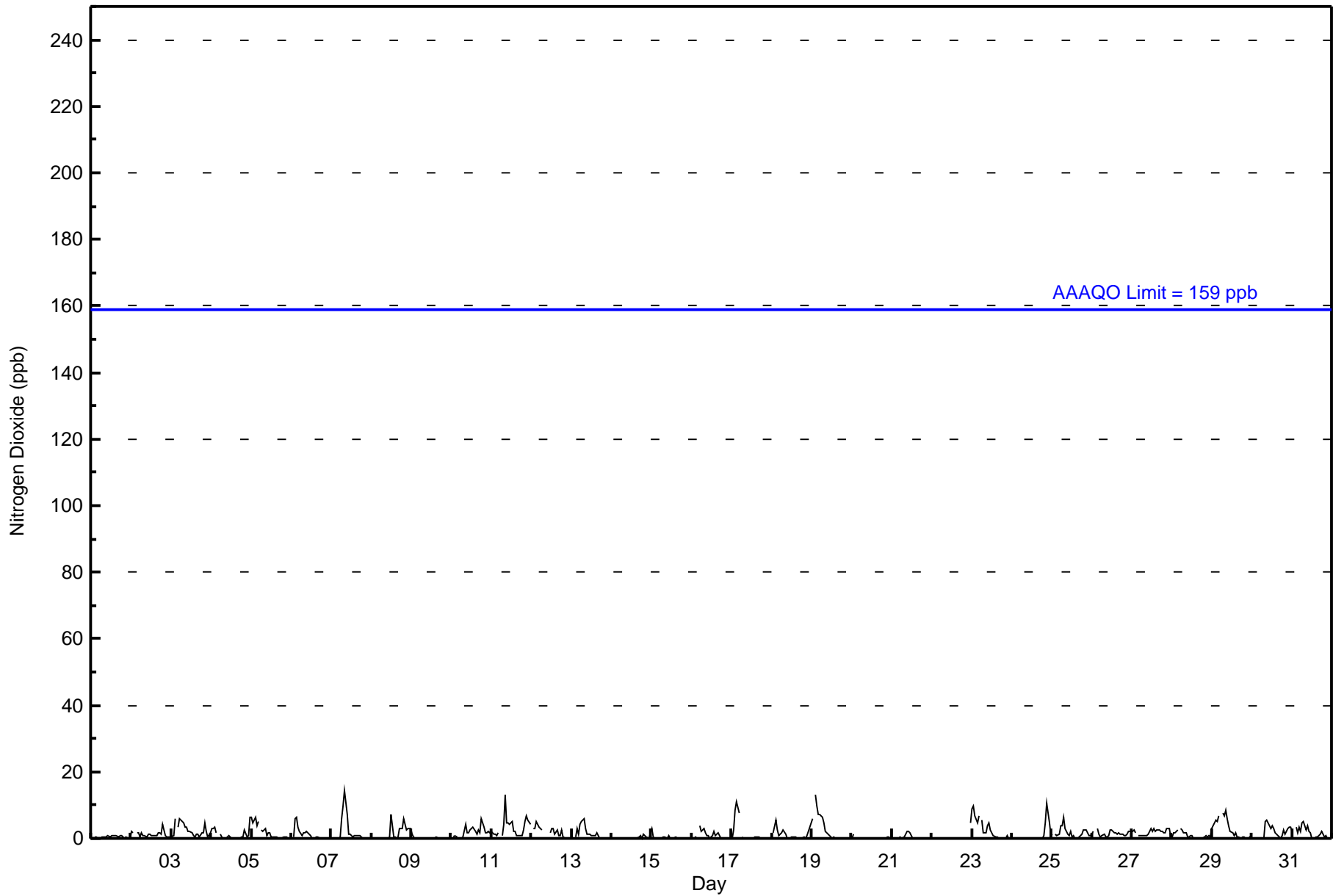
Wapasu - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																	Hours in Service: 744									
Maximum Value: 14 ppb on Jul 7 09:00																	Maximum Daily Average: 3.3 ppb on Jul 11									
Minimum Value: 0 ppb on Jul 4 09:00																	Hours of Data: 679									
Maximum Diurnal Average: 3.0 ppb at hour 3																	Hours of Missing Data: 65									
Monthly Average: 1.5 ppb																	Hours of Calibration: 34									
Minimum Daily Average: 0.1 ppb on Jul 9																	Percent Operational Time: 95.8									
Minimum Diurnal Average: 0.6 ppb at hour 18																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 10									
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-Jul	0	Z	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.5	1
2-Jul	2	2	Z	2	2	1	2	1	1	1	1	1	1	1	1	2	2	1	4	1	1	0	0	1.2	4	
3-Jul	0	1	6	Z	3	6	6	5	4	3	2	2	2	1	1	1	1	2	2	5	2	1	2	2.5	6	
4-Jul	3	3	3	2	Z	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	3	0	1	6	1.1	6
5-Jul	6	5	6	4	5	Z	3	2	3	1	2	2	0	0	1	0	0	0	0	0	1	0	0	1.8	6	
6-Jul	Z	0	6	6	3	2	1	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	1.2	6	
7-Jul	0	Z	0	0	0	0	6	10	14	7	1	1	1	1	1	1	1	1	1	0	0	0	0	2.0	14	
8-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	7	1	1	0	0	3	3	6	4	3	3	1.4	7	
9-Jul	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
10-Jul	0	0	1	0	Z	0	0	0	4	2	2	3	3	3	2	1	3	2	6	4	2	2	2	1.8	6	
11-Jul	2	1	1	1	2	Z	1	4	13	5	5	4	5	2	2	1	1	1	1	3	5	7	6	3.3	13	
12-Jul	Z	3	3	5	3	3	3	C	C	C	C	2	3	3	1	3	1	1	2	1	0	0	0	1.9	5	
13-Jul	0	Z	0	3	1	4	5	6	3	1	1	1	1	1	2	1	0	0	0	0	0	0	1.4	6		
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.2	2	
15-Jul	3	0	0	Z	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3	
16-Jul	0	0	1	0	Z	4	2	3	2	1	1	0	1	2	1	1	2	0	0	0	0	0	0	0.8	4	
17-Jul	0	2	8	11	8	Z	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1.4	11	
18-Jul	Z	2	5	3	1	1	2	3	1	0	0	0	0	1	1	0	0	0	0	0	0	1	2	1.1	5	
19-Jul	6	Z	13	10	7	7	7	5	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0	2.7	13	
20-Jul	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.1	1	
21-Jul	0	0	0	Z	0	1	0	0	1	2	2	2	0	0	0	0	0	PF	PF	PF	PF	PF	PF	PF	--	2
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	5
23-Jul	9	10	7	5	7	Z	5	2	2	4	5	2	2	1	0	0	0	0	0	0	0	1	0	2.7	10	
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	11	5	0.9	11	
25-Jul	1	Z	1	1	1	4	4	6	3	1	1	2	1	1	0	0	0	1	1	3	3	2	1	1.7	6	
26-Jul	1	2	Z	3	1	0	1	1	1	1	1	3	2	2	2	1	2	1	1	1	1	1	2	1.5	3	
27-Jul	2	2	2	Z	1	1	1	1	1	1	1	3	2	3	2	3	3	2	2	2	2	3	3	1.9	3	
28-Jul	0	2	2	3	Z	3	3	2	2	1	0	1	1	0	0	0	0	0	0	1	1	0	1	1.0	3	
29-Jul	3	5	6	5	7	Z	8	7	9	6	4	2	2	1	2	1	0	0	0	0	0	0	0	2.9	9	
30-Jul	Z	0	0	0	0	0	0	0	5	6	4	3	4	3	2	1	0	0	1	2	1	3	4	1.8	6	
31-Jul	2	Z	3	2	3	2	5	5	3	4	2	2	0	0	1	1	1	1	2	1	1	0	0	1.7	5	
1.7 1.8 3.0 2.6 2.2 1.6 2.1 2.2 2.6 1.7 1.4 1.2 1.3 0.9 0.7 0.7 0.7 0.6 0.9 1.1 1.2 1.3 1.0 1.2																								Diurnal Average		
9 10 13 11 8 7 8 10 14 7 5 4 7 3 2 3 3 3 3 6 6 5 11 6 6																								Diurnal Maximum		
Z - zerospan 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
Wapasu - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Wapasu - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	679	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: 679

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - July 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	30	37	14	9	7	42	67	84	58	46	53	82	41	36	34	37	677
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	30	37	14	9	7	42	67	84	58	46	53	82	41	36	34	37	677

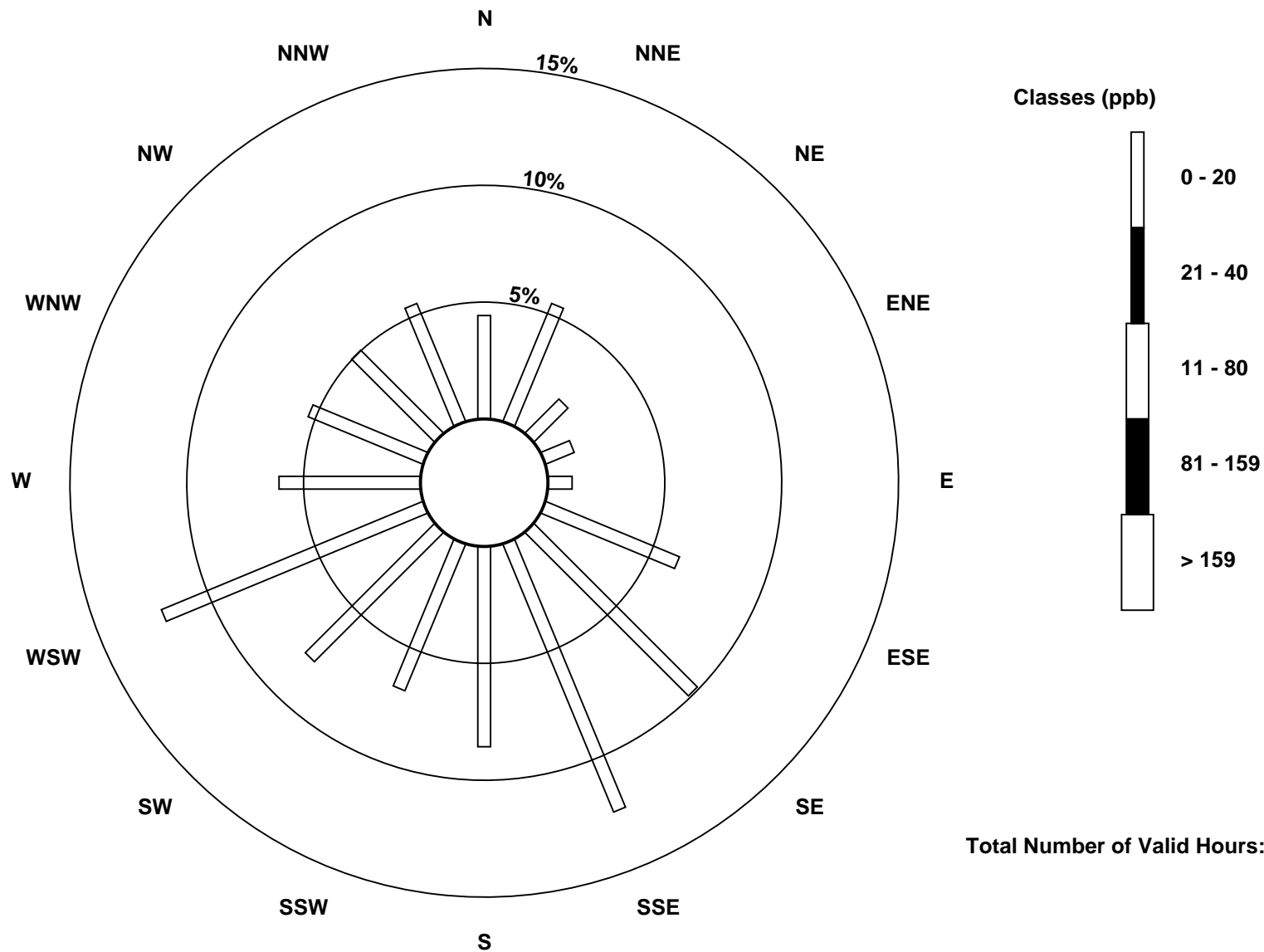
Total Number of Valid Hours: 677

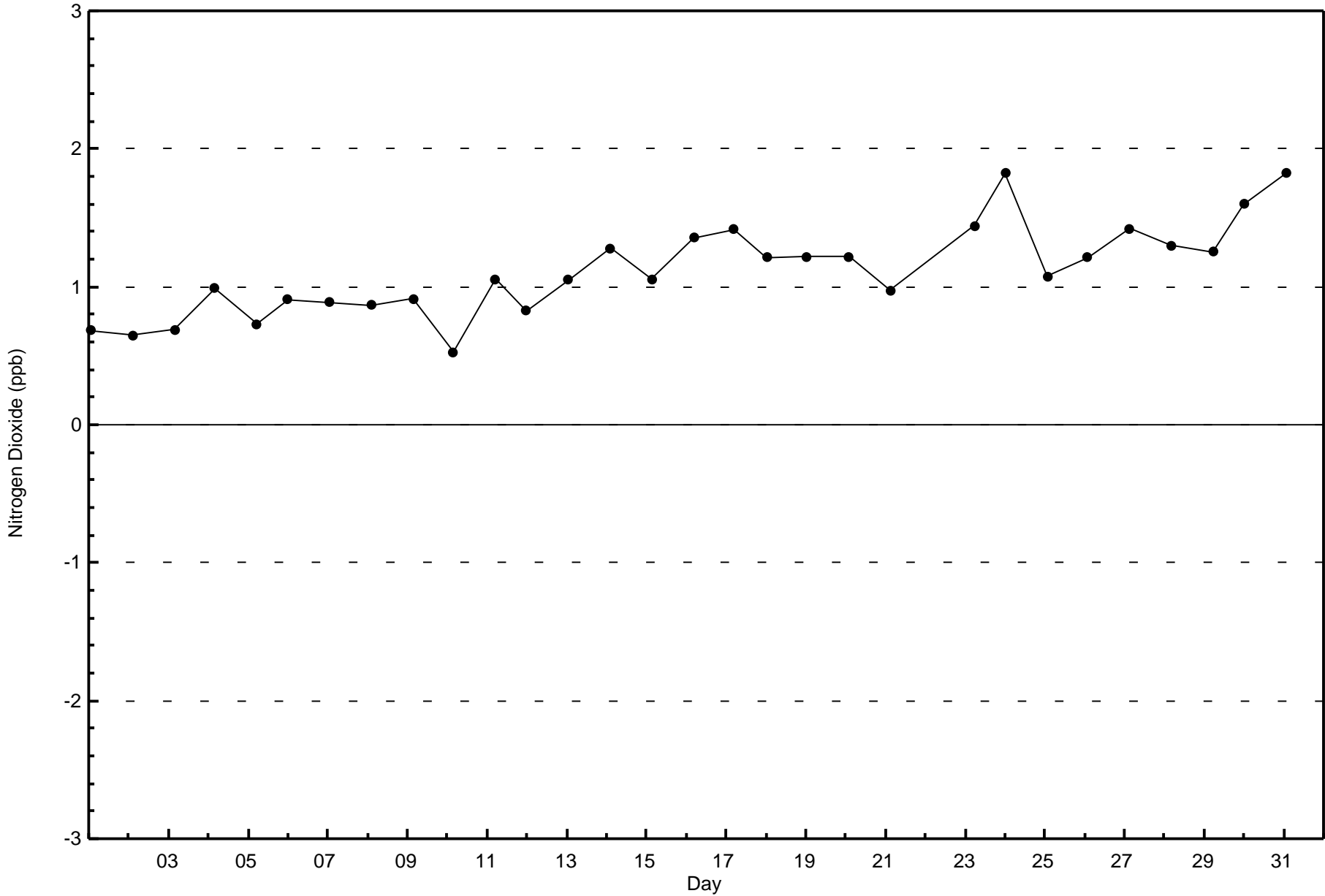
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)

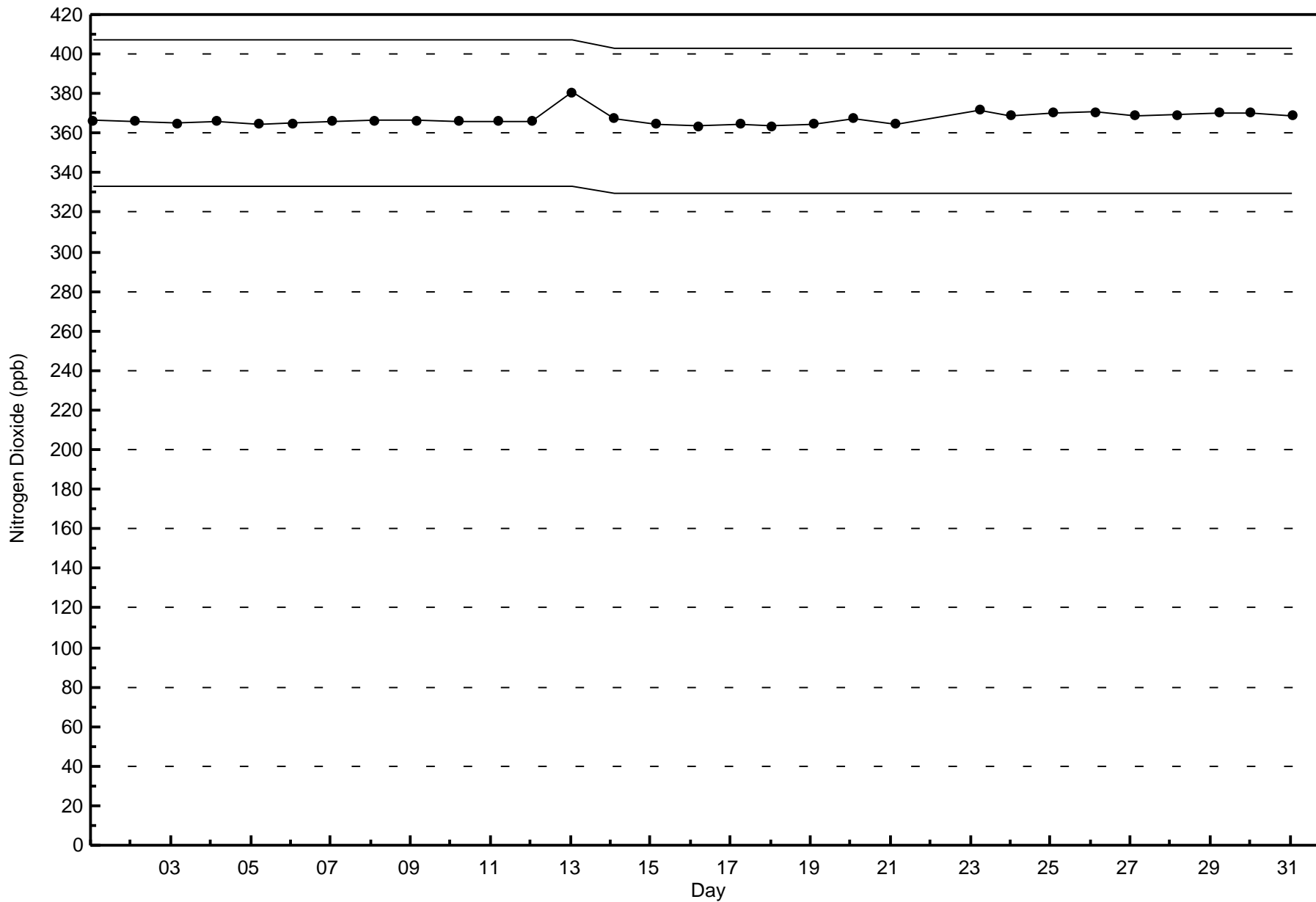






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Wapasu - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

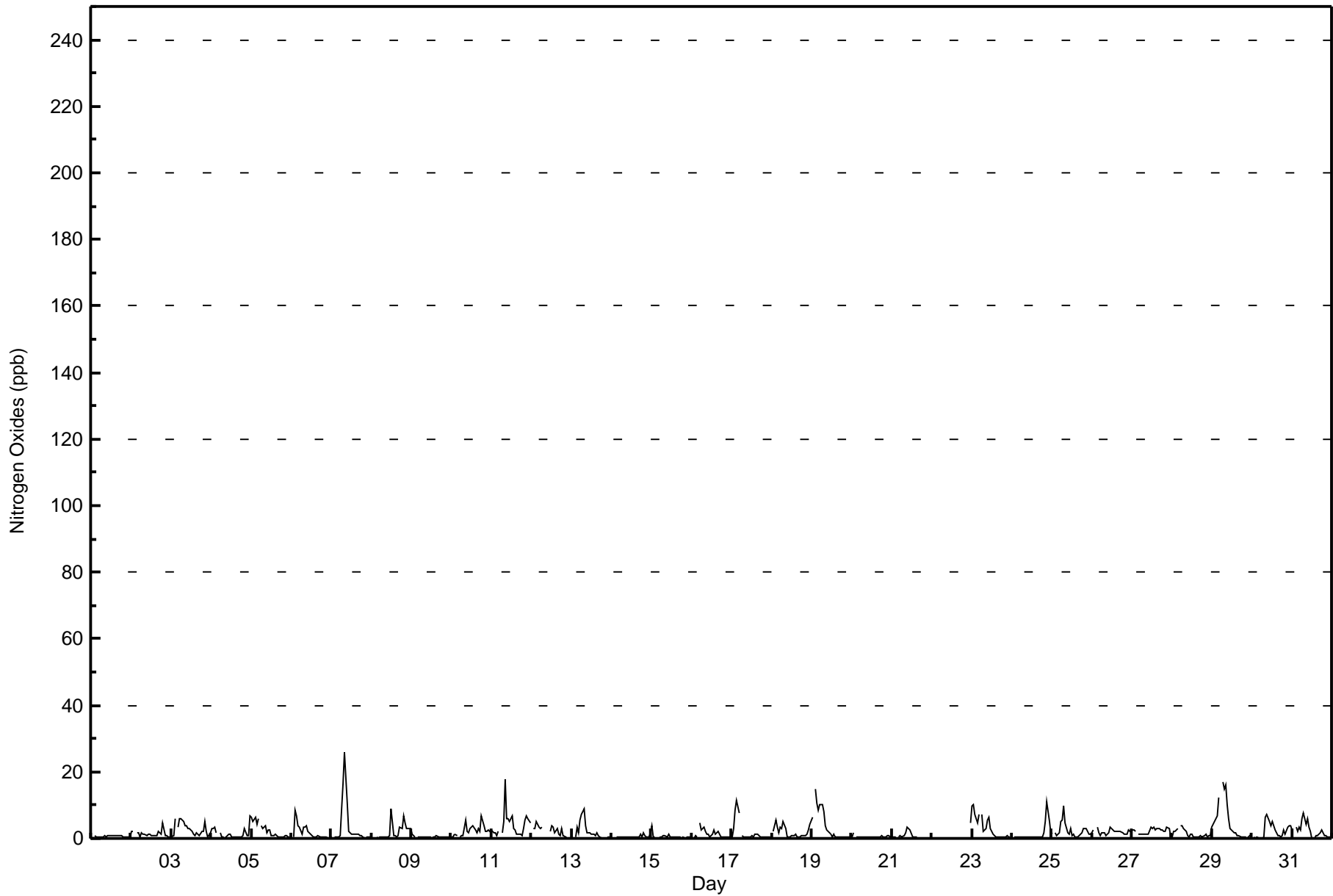
Wapasu - July 2017

Maximum Value: 26 ppb on Jul 7 09:00														Maximum Daily Average: 4.8 ppb on Jul 29														Hours in Service: 744			
Minimum Value: 0 ppb on Jul 13 00:00														Minimum Daily Average: 0.4 ppb on Jul 9														Hours of Data: 679			
Maximum Diurnal Average: 4.1 ppb at hour 9														Minimum Diurnal Average: 1.0 ppb at hour 18														Hours of Missing Data: 65			
Monthly Average: 2.0 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 15														Hours of Calibration: 34			
																												Percent Operational Time: 95.8			
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-Jul	0	Z	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.6	1					
2-Jul	2	2	Z	2	2	1	2	1	1	1	1	1	1	1	1	2	2	1	5	1	1	0	0	1.4	5						
3-Jul	0	1	6	Z	3	6	6	5	4	4	3	3	2	1	2	1	1	2	2	5	2	1	2	2.7	6						
4-Jul	3	3	3	2	Z	2	0	1	0	0	1	1	0	0	0	0	0	0	0	1	3	1	1	7	1.4	7					
5-Jul	6	5	6	4	6	Z	4	3	4	2	3	3	1	1	1	1	1	0	0	1	1	0	0	2.3	6						
6-Jul	Z	0	8	7	4	3	1	3	3	4	2	1	1	0	0	1	1	0	0	0	0	0	0	1.9	8						
7-Jul	0	Z	0	0	0	1	9	17	26	11	2	2	1	1	1	1	1	1	1	1	0	0	0	3.4	26						
8-Jul	0	0	Z	0	0	0	0	0	0	0	1	1	9	1	1	0	1	3	3	7	5	3	3	1.9	9						
9-Jul	1	1	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.4	1						
10-Jul	0	0	1	1	Z	0	1	1	5	2	2	3	3	4	3	2	3	2	7	4	2	2	2	2.3	7						
11-Jul	2	2	1	1	2	Z	2	5	18	6	6	5	7	3	3	1	1	1	1	3	5	7	6	5	4.0	18					
12-Jul	Z	3	3	5	3	3	3	C	C	C	C	2	4	3	2	3	1	1	3	1	0	0	0	2.2	5						
13-Jul	0	Z	1	3	2	6	7	9	4	1	2	2	1	1	1	2	1	0	0	0	0	0	0	1.9	9						
14-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	0.5	2						
15-Jul	4	1	0	Z	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0.6	4						
16-Jul	0	0	1	0	Z	5	3	4	2	1	1	0	1	3	1	2	2	0	0	0	0	0	0	1.2	5						
17-Jul	0	3	9	11	8	Z	1	0	0	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1.8	11						
18-Jul	Z	2	6	3	2	3	3	5	3	0	0	0	1	1	1	0	1	0	1	1	1	1	3	1.9	6						
19-Jul	6	Z	15	11	8	10	10	8	4	3	2	1	1	1	1	0	0	0	1	0	0	1	0	3.7	15						
20-Jul	1	2	Z	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0.6	2						
21-Jul	0	0	0	Z	0	1	0	1	2	3	3	2	0	0	1	0	PF	PF	PF	PF	PF	PF	PF	PF	--	3					
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	5					
23-Jul	10	10	7	5	7	Z	7	2	3	6	6	3	2	1	1	1	0	0	0	0	0	1	0	3.2	10						
24-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	11	5	1.3	11						
25-Jul	2	Z	2	1	2	5	6	10	4	2	1	3	1	1	1	1	1	1	2	3	3	2	1	2.4	10						
26-Jul	2	2	Z	3	2	1	2	2	1	1	2	4	3	2	2	2	2	2	2	1	1	1	3	1.9	4						
27-Jul	2	3	2	Z	1	1	1	1	1	1	1	4	3	3	3	3	3	3	2	2	2	3	3	2.2	4						
28-Jul	1	2	2	3	Z	4	4	3	2	1	0	1	1	1	0	1	0	1	0	1	1	1	1	1.4	4						
29-Jul	3	5	6	7	12	Z	17	15	16	10	6	3	2	1	2	1	1	0	1	0	0	0	0	4.8	17						
30-Jul	Z	0	0	0	0	0	0	1	6	7	5	4	5	4	2	1	1	0	1	3	1	3	4	2.3	7						
31-Jul	2	Z	3	2	4	3	6	8	4	6	3	2	0	0	1	1	1	2	3	1	1	0	0	2.3	8						
																								Diurnal Average							
																								Diurnal Maximum							
Z - zerospan C - Calibration PF - Power Failure																															



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	678	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: 679

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - July 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	30	37	14	9	7	42	67	84	58	46	53	81	41	36	34	37	676
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	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	30	37	14	9	7	42	67	84	58	46	53	82	41	36	34	37	677

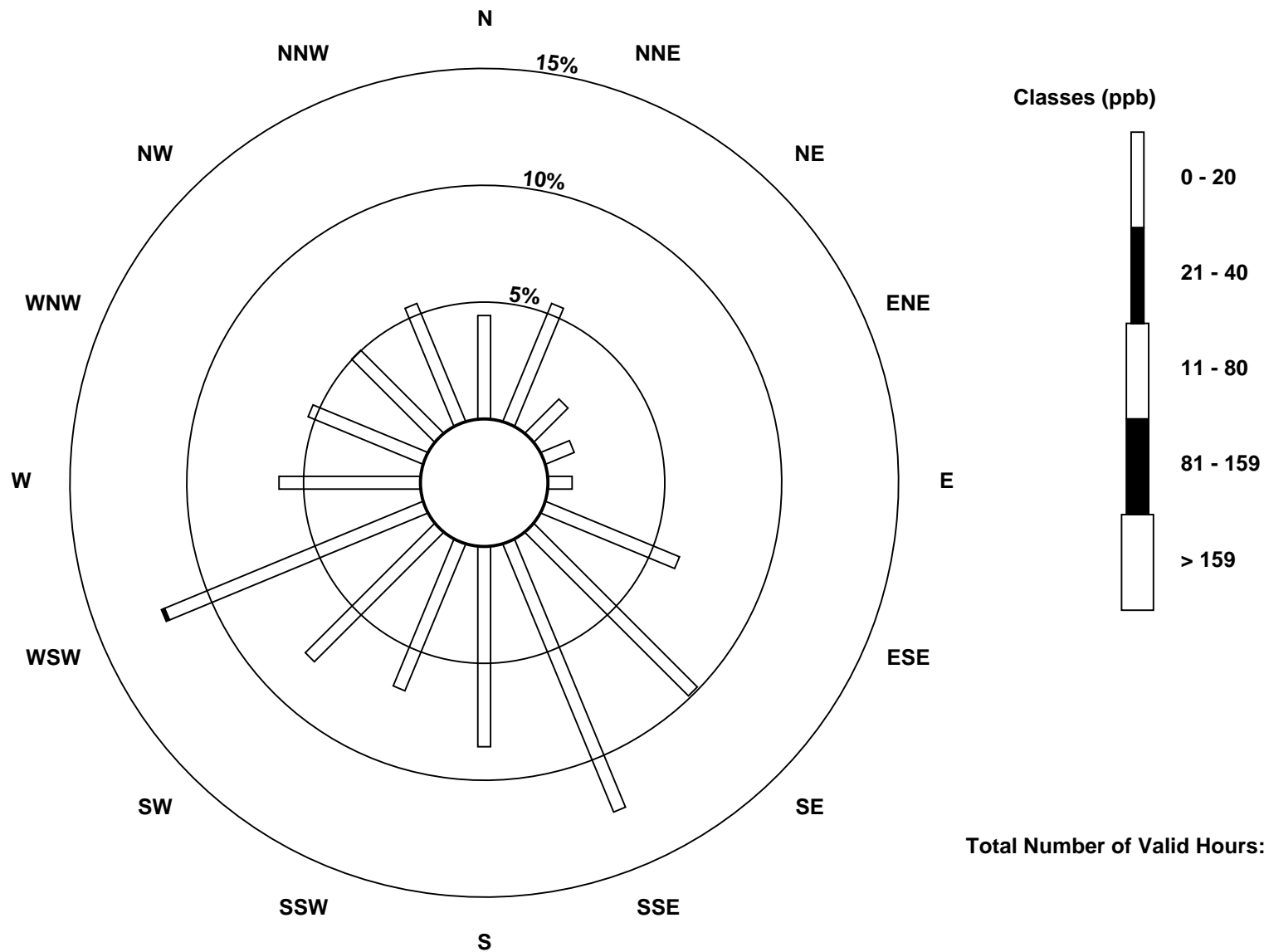
Total Number of Valid Hours: 677

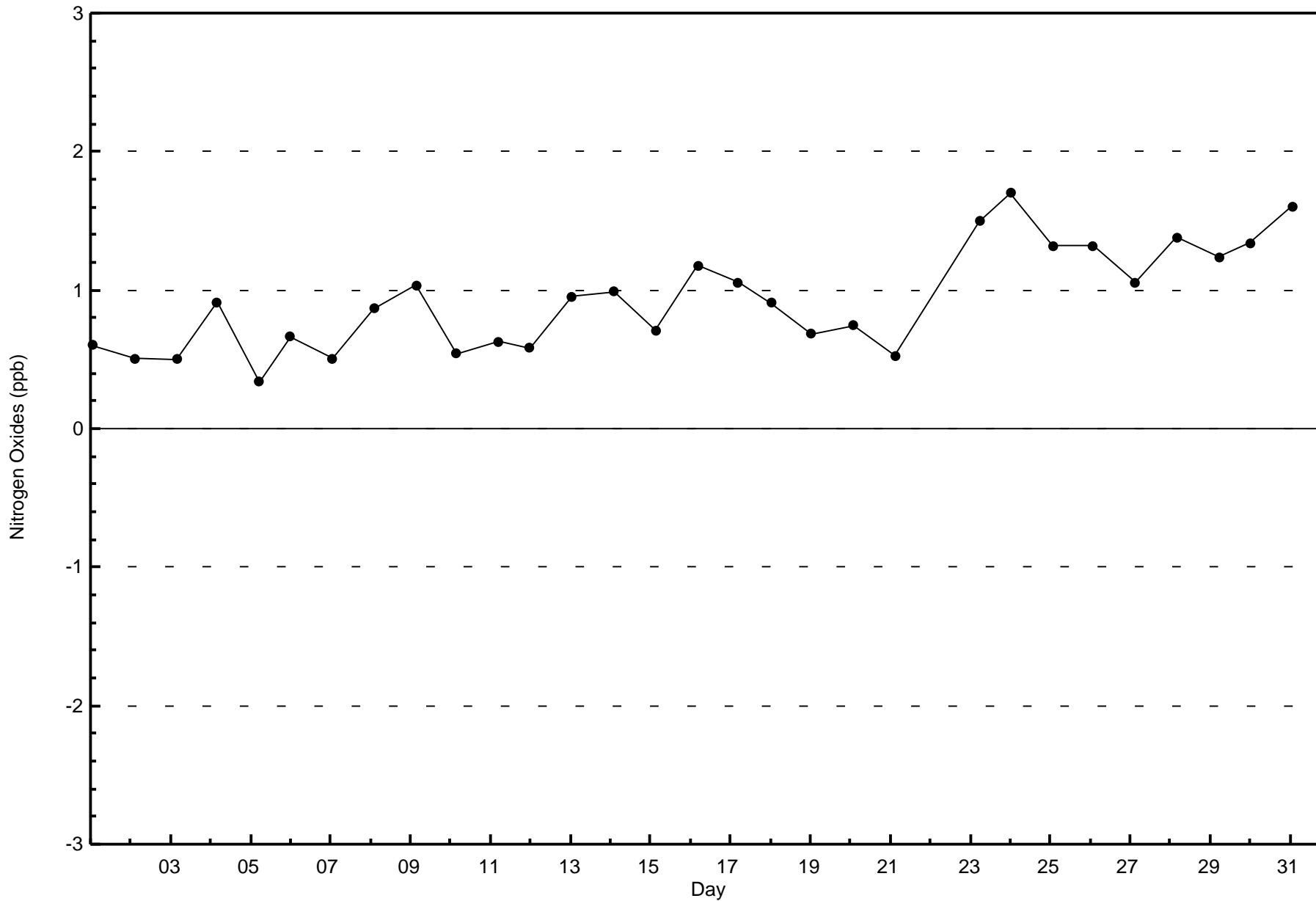
Total Number of Hours: 744

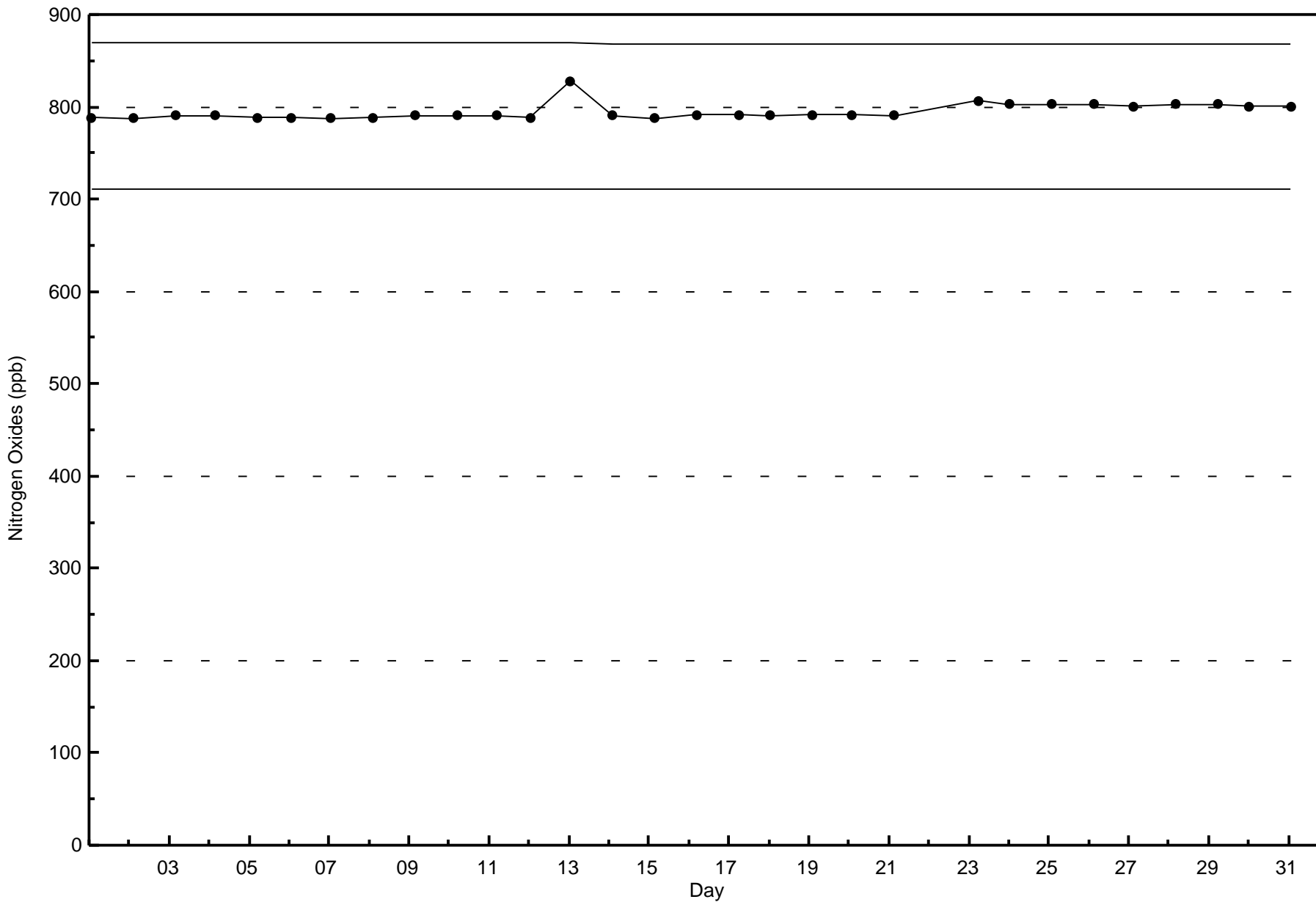


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)









Summary of Hour Averages

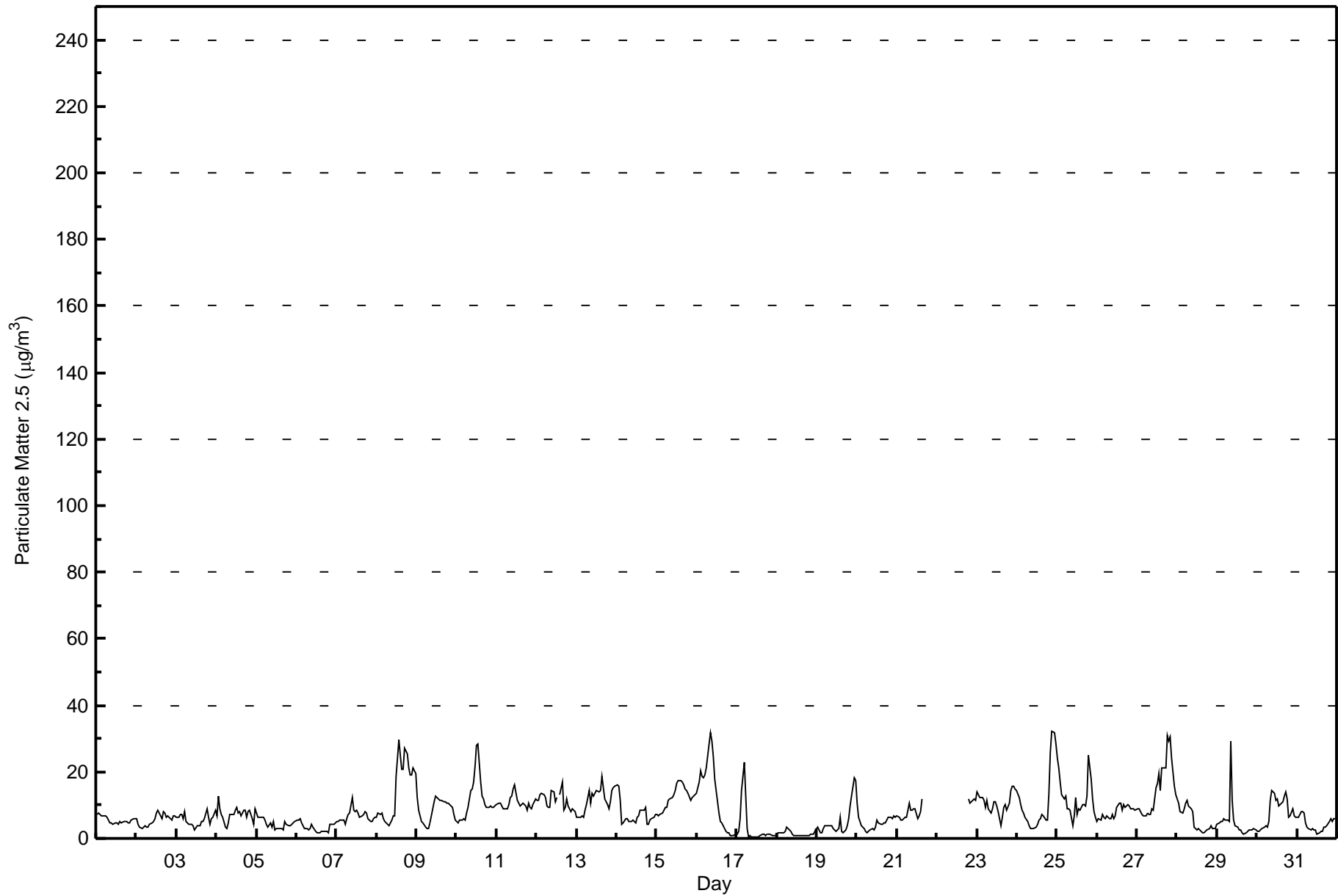
Wapasu - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 32.0 µg/m ³ on Jul 24 22:00 Minimum Value: 0.4 µg/m ³ on Jul 17 14:00 Maximum Diurnal Average: 9.0 µg/m ³ at hour 22 Monthly Average: 7.99 µg/m ³		Maximum Daily Average: 14.9 µg/m ³ on Jul 27 Minimum Daily Average: 1.4 µg/m ³ on Jul 18 Minimum Diurnal Average: 6.4 µg/m ³ at hour 7 Percentiles: P ₁ = 0.7 P ₁₀ = 2.1 Q ₁ = 4.1 Median = 6.6 Q ₃ = 10.5 P ₉₀ = 14.6 P ₉₉ = 29.2		Hours in Service: 744 Hours of Data: 716 Hours of Missing Data: 28 Hours of Calibration: 1 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-Jul	7.1	7.5	7.2	6.9	6.7	6.8	6.4	5.5	4.8	4.7	4.3	4.6	4.5	4.4	5.0	4.7	5.1	5.3	5.0	4.8	4.6	5.3	5.9	6.1	5.5	7.5	
2-Jul	5.9	4.4	3.3	2.9	3.4	3.7	3.5	3.4	4.3	4.6	5.2	5.8	7.5	8.5	6.7	5.7	8.2	7.4	6.4	6.7	6.1	5.5	6.6	6.9	5.5	8.5	
3-Jul	6.5	6.4	7.1	7.4	6.1	8.1	4.9	4.1	4.1	4.2	3.8	2.4	4.0	3.8	3.6	5.1	5.0	9.1	6.3	4.1	6.0	6.2	8.3	5.5	9.1		
4-Jul	6.6	12.5	9.0	7.1	6.3	3.5	3.1	4.7	7.4	7.1	7.3	8.5	9.4	7.7	8.0	6.6	8.6	8.4	8.1	8.6	6.1	4.2	9.0	7.3	12.5		
5-Jul	7.7	6.2	6.3	6.2	6.3	5.6	4.4	3.5	4.6	3.5	4.9	2.6	2.9	3.1	2.8	2.8	2.6	5.2	4.4	3.9	3.9	4.1	4.6	4.9	4.5	7.7	
6-Jul	5.5	5.7	6.0	4.6	3.6	3.0	2.9	2.7	2.8	4.1	3.5	2.0	1.8	1.8	1.6	2.2	2.3	2.0	2.0	1.9	4.1	4.1	4.2	4.8	3.3	6.0	
7-Jul	5.0	5.1	5.4	5.7	5.5	4.0	5.7	7.1	7.8	12.3	8.6	8.0	8.3	7.5	6.4	6.9	7.4	7.9	7.7	5.8	5.2	5.2	6.1	6.2	6.7	12.3	
8-Jul	6.4	7.6	7.3	7.4	5.9	5.1	4.7	4.0	4.4	5.4	6.9	7.0	18.4	29.7	24.9	20.8	20.8	27.0	25.4	21.2	19.1	19.2	21.1	19.4	14.1	29.7	
9-Jul	12.3	8.6	6.9	4.9	4.5	3.6	3.1	3.0	4.8	6.7	11.0	12.6	12.2	11.7	11.3	11.6	11.1	11.2	10.7	10.5	10.2	9.3	7.3	5.5	8.5	12.6	
10-Jul	4.9	4.6	5.4	5.3	5.8	5.3	7.8	9.5	14.2	14.9	16.9	21.7	28.0	28.4	16.7	12.6	11.8	10.2	9.5	9.3	9.6	9.2	9.1	9.7	11.7	28.4	
11-Jul	10.1	10.6	10.6	9.8	9.1	8.9	9.0	10.2	12.2	12.7	14.7	16.2	11.6	10.8	9.9	10.0	10.5	9.7	8.3	10.6	9.3	9.1	10.1	11.8	10.7	16.2	
12-Jul	11.4	11.6	13.3	13.7	12.9	12.4	9.6	9.4	9.2	14.5	13.8	11.2	12.1	C	13.3	16.8	8.3	9.1	11.9	9.5	8.1	8.8	8.6	8.0	11.2	16.8	
13-Jul	6.3	6.2	6.3	6.7	6.5	8.3	10.2	14.3	10.5	13.6	12.9	13.5	14.5	14.0	14.4	18.6	15.1	12.0	10.3	9.1	10.9	14.5	15.4	15.8	11.7	18.6	
14-Jul	16.3	15.8	11.4	4.3	4.8	5.8	5.8	5.1	5.2	5.2	5.6	4.8	6.2	6.8	8.5	8.6	8.4	9.3	4.2	4.4	5.6	6.0	6.3	7.2	7.1	16.3	
15-Jul	7.2	7.0	7.1	7.4	8.5	9.2	9.3	11.4	12.1	12.5	13.3	14.2	16.6	17.2	17.3	16.8	16.1	14.6	14.3	13.7	11.2	12.4	12.9	13.1	12.3	17.3	
16-Jul	13.6	17.1	20.4	18.5	18.1	19.0	21.3	28.6	31.6	29.3	24.6	18.0	11.2	7.6	5.3	4.6	3.7	2.1	1.7	1.7	1.0	1.0	1.0	1.1	12.6	31.6	
17-Jul	1.1	2.0	6.1	14.5	23.0	12.8	3.0	0.6	0.7	0.5	0.4	0.5	0.4	0.8	1.1	1.4	0.9	1.2	1.1	1.1	1.0	1.0	1.0	3.2	23.0		
18-Jul	1.3	1.6	1.6	1.9	1.5	2.1	3.2	2.8	2.1	1.4	0.7	0.7	0.9	0.8	0.8	0.7	0.7	0.8	1.0	0.9	1.1	1.1	1.2	2.0	1.4	3.2	
19-Jul	3.2	2.5	1.9	1.9	2.8	3.6	3.8	3.7	3.8	4.0	2.9	2.3	2.4	3.2	6.4	2.1	1.8	2.6	3.7	5.8	9.7	12.5	18.3	17.3	5.1	18.3	
20-Jul	10.8	6.3	5.0	3.7	3.1	2.1	1.9	1.9	2.7	2.9	2.7	3.2	5.4	4.8	4.1	4.3	4.7	4.7	5.7	6.3	6.3	6.1	6.8	6.5	4.7	10.8	
21-Jul	7.0	6.4	5.7	5.6	5.7	6.2	6.4	10.5	8.6	8.5	8.8	8.9	5.8	6.6	8.2	11.9	PF	PF	PF	PF	PF	PF	PF	PF	--	11.9	
22-Jul	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	12.0	10.5	11.6	11.7	11.6	--	12.0
23-Jul	13.9	13.2	12.4	12.4	11.4	9.5	11.5	9.1	7.8	8.8	11.1	11.0	9.5	8.0	3.9	6.2	9.3	10.1	8.5	10.6	14.6	15.6	15.6	14.7	10.8	15.6	
24-Jul	14.5	12.3	10.0	8.5	7.4	6.2	5.0	3.7	3.1	2.9	3.2	3.5	4.4	5.5	6.0	7.1	6.7	5.4	5.4	13.7	25.7	32.0	31.9	28.6	10.5	32.0	
25-Jul	24.2	21.1	16.9	13.2	11.9	12.8	8.8	8.8	8.4	3.9	6.6	12.3	7.2	9.0	8.6	10.1	10.0	9.9	12.7	24.8	17.8	11.7	7.8	6.4	11.9	24.8	
26-Jul	5.2	5.9	5.3	7.2	6.3	6.1	6.8	5.8	6.1	7.2	6.1	6.7	9.2	10.5	10.8	8.5	10.3	9.4	10.2	9.8	8.8	8.8	8.8	8.6	7.9	10.8	
27-Jul	8.8	9.0	7.8	7.2	7.0	6.6	7.7	7.1	7.0	8.7	8.3	15.1	16.7	19.3	14.4	21.1	21.0	21.3	30.8	29.4	30.6	24.3	15.6	13.1	14.9	30.8	
28-Jul	12.0	10.8	7.9	7.8	8.7	10.5	11.3	9.7	8.8	8.0	3.5	3.1	2.6	2.9	1.9	1.8	1.9	2.2	2.4	3.1	3.6	3.0	2.8	2.9	5.6	12.0	
29-Jul	4.3	4.8	4.9	5.0	5.9	5.7	5.3	5.2	29.2	11.5	5.3	3.8	3.5	2.7	2.6	1.7	1.4	1.7	2.3	2.7	2.7	2.7	2.8	2.6	5.0	29.2	
30-Jul	1.9	2.1	2.7	3.0	3.6	3.6	3.4	4.9	11.5	14.2	13.5	11.3	12.1	9.6	10.3	11.0	12.8	13.8	11.9	6.2	6.9	8.9	6.7	6.4	8.0	14.2	
31-Jul	6.2	6.2	8.1	8.0	7.6	4.7	3.5	2.9	2.5	3.2	2.7	2.8	1.2	1.6	2.0	2.0	3.3	3.5	3.7	4.9	5.8	5.3	5.7	5.9	4.3	8.1	
																								Diurnal Average			
																								Diurnal Maximum			
8.2 8.0 7.7 7.3 7.3 6.8 6.4 6.8 8.1 8.0 7.8 7.9 8.4 8.6 7.9 8.1 7.9 8.1 8.2 8.6 8.9 9.0 8.9 8.8																								Diurnal Average			
24.2 21.1 20.4 18.5 23.0 19.0 21.3 28.6 31.6 29.3 24.6 21.7 28.0 29.7 24.9 21.1 21.0 27.0 30.8 29.4 30.6 32.0 31.9 28.6																								Diurnal Maximum			
C - Calibration PF - Power Failure																											
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}) - $\mu\text{g}/\text{m}^3$
Wapasu - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	251	35.06	35.06
6 - 15	380	53.07	88.13
16 - 25	49	6.84	94.97
26 - 80	15	2.09	97.07
> 81.0	0	0.00	97.07

Total Number of Valid Hours: 716

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - July 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	15	15	8	2	1	16	28	23	28	13	11	27	11	19	16	16	249
6 - 15	14	16	4	7	6	24	39	66	31	34	42	42	19	15	15	6	380
16 - 25	0	6	2	0	0	5	3	5	3	1	3	7	7	3	1	3	49
26 - 80	1	1	0	0	1	0	1	0	0	0	1	3	4	0	0	3	15
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	38	14	9	8	45	71	94	62	48	57	79	41	37	32	28	693

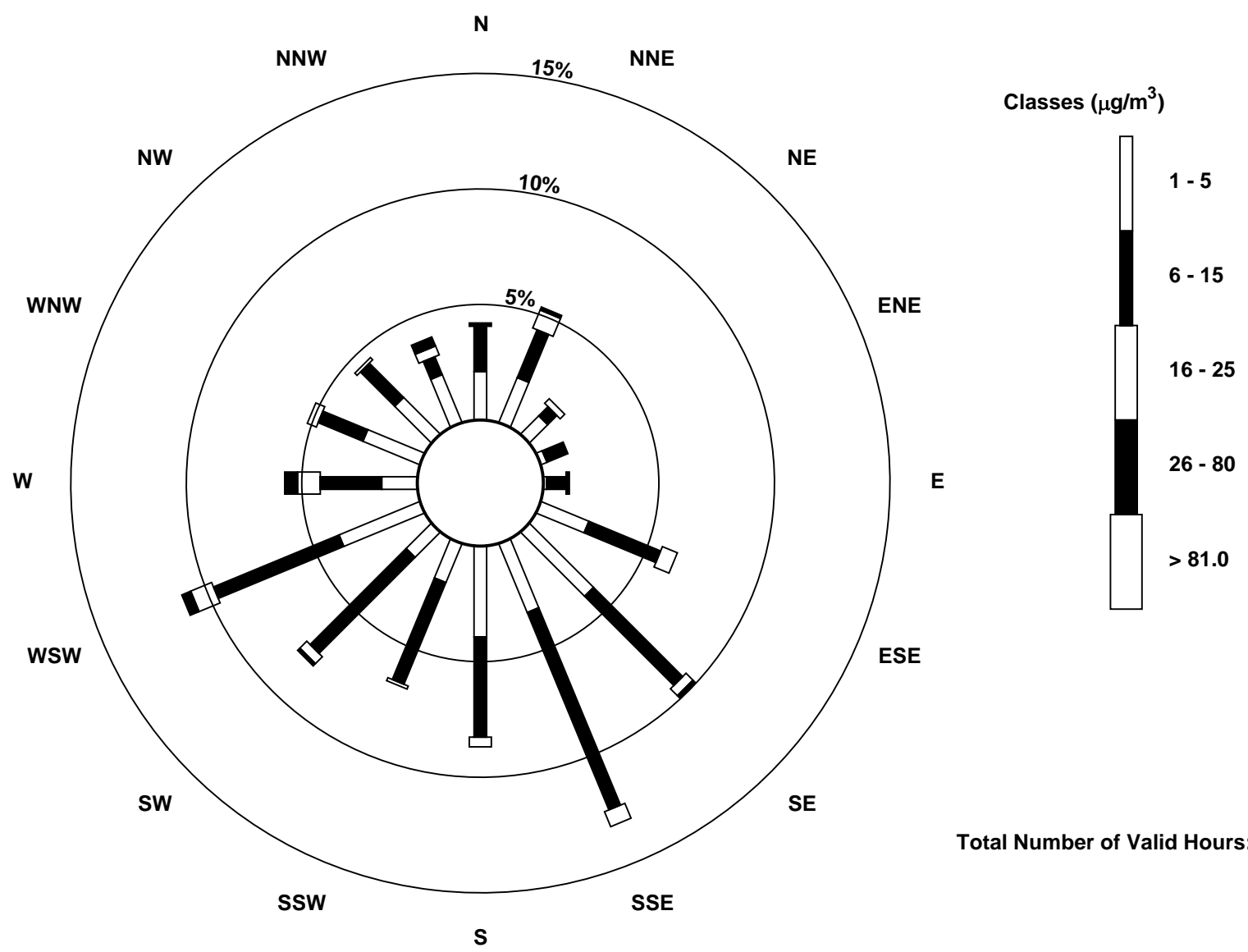
Total Number of Valid Hours: 714

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)



Total Number of Valid Hours: 714



Wood Buffalo Environmental Association
Summary of Hour Averages

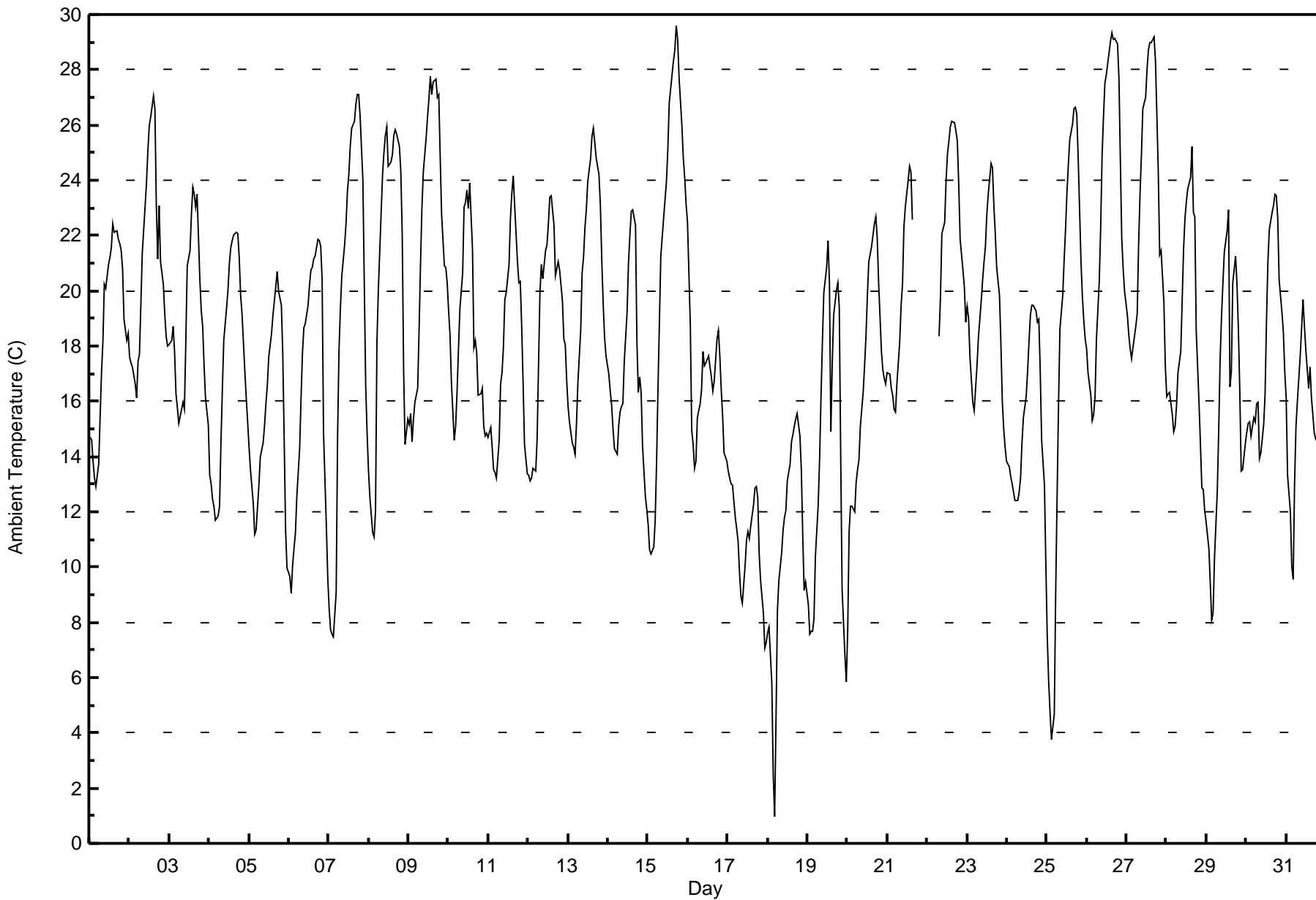
Ambient Temperature (AT) - C
Wapasu - July 2017

Maximum Value: 29.6 C on Jul 15 18:00		Maximum Daily Average: 23.1 C on Jul 27		Hours in Service: 744																						
Minimum Value: 1.0 C on Jul 18 05:00		Minimum Daily Average: 10.5 C on Jul 18		Hours of Data: 729																						
Maximum Diurnal Average: 22.5 C at hour 16		Minimum Diurnal Average: 12.5 C at hour 5		Hours of Missing Data: 15																						
Monthly Average: 18.03 C		Percentiles: P ₁ = 5.8 P ₁₀ = 11.3 Q ₁ = 14.6 Median = 18.0 Q ₃ = 21.8 P ₉₀ = 24.9 P ₉₉ = 29.0		Hours of Calibration: 0																						
				Percent Operational Time: 98.0																						
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-Jul	14.7	14.6	13.8	13.2	12.9	13.7	15.4	17.1	18.1	20.3	20.1	21.0	21.2	21.6	22.4	22.1	22.2	21.9	21.7	21.4	20.8	19.0	18.2	18.5	18.6	22.4
2-Jul	17.6	17.4	17.2	16.6	16.1	17.4	17.7	19.5	21.4	23.0	23.9	25.1	26.0	26.3	27.0	26.6	23.1	21.2	23.1	21.1	20.2	19.2	18.4	18.0	21.0	27.0
3-Jul	18.0	18.2	18.7	17.8	16.3	15.8	15.2	15.7	16.0	15.7	18.1	20.9	21.4	22.8	23.7	23.5	23.0	23.5	20.4	19.3	18.7	17.3	16.1	15.2	18.8	23.7
4-Jul	13.3	13.0	12.5	12.2	11.7	11.8	12.2	14.5	16.4	18.2	19.4	20.0	21.0	21.6	21.8	22.0	22.1	22.1	21.2	19.8	19.2	17.1	16.1	15.2	17.3	22.1
5-Jul	14.3	13.5	12.3	11.2	11.3	12.2	12.9	14.0	14.5	15.1	15.9	16.6	17.6	18.5	19.1	19.6	20.1	20.7	20.0	19.5	17.7	14.6	11.3	10.0	15.5	20.7
6-Jul	9.7	9.0	10.1	10.7	11.2	12.6	14.3	16.1	17.7	18.6	18.8	19.5	20.2	20.7	20.8	21.1	21.3	21.9	21.8	21.6	20.4	14.9	11.5	9.6	16.4	21.9
7-Jul	8.5	7.7	7.6	7.5	9.1	14.7	17.8	19.3	20.5	21.7	22.4	23.6	24.2	25.2	25.9	26.2	26.7	27.1	27.1	26.4	24.0	20.2	16.6	14.8	19.4	27.1
8-Jul	13.5	12.5	11.2	11.1	12.0	18.2	20.0	22.9	24.2	25.0	25.6	25.9	24.5	24.7	24.9	25.6	25.8	25.7	25.2	24.3	22.0	17.1	14.4	15.4	20.5	25.9
9-Jul	15.2	15.6	14.5	15.4	15.9	16.5	18.6	20.9	23.0	24.3	25.5	26.3	26.9	27.8	27.1	27.5	27.7	27.0	27.1	24.9	22.8	20.9	20.8	20.3	22.2	27.8
10-Jul	19.3	18.4	16.7	14.6	15.1	16.3	17.8	19.3	20.6	23.0	23.2	23.6	23.0	23.9	21.5	18.0	18.2	17.7	16.2	16.3	16.5	15.1	14.8	14.8	18.5	23.9
11-Jul	14.7	15.1	14.4	13.5	13.4	13.2	14.6	16.6	17.0	17.9	19.7	19.9	21.0	22.6	23.6	24.1	23.1	21.0	20.3	20.3	18.7	16.7	14.4	13.4	17.9	24.1
12-Jul	13.3	13.1	13.2	13.6	13.4	14.6	17.3	19.9	21.0	20.5	21.5	21.7	22.4	23.4	23.5	22.4	20.6	20.8	21.1	20.8	19.6	18.3	18.1	16.8	18.8	23.5
13-Jul	15.8	15.3	14.5	14.4	14.1	15.2	16.7	18.6	20.6	21.2	22.3	22.9	23.9	24.8	25.6	25.9	25.4	24.8	24.2	23.1	21.1	19.5	18.3	17.7	20.2	25.9
14-Jul	17.0	16.4	15.9	15.0	14.3	14.1	15.1	15.6	15.8	15.9	17.4	19.2	21.0	22.0	22.9	22.9	22.4	18.2	16.3	16.9	16.3	14.4	12.6	12.1	17.1	22.9
15-Jul	11.5	10.6	10.5	10.7	11.7	13.8	16.5	18.9	21.2	22.6	23.3	23.9	25.1	26.8	27.8	28.3	28.7	29.6	29.1	27.7	26.0	24.8	24.1	23.1	21.5	29.6
16-Jul	22.5	18.8	14.9	14.4	13.6	13.8	15.4	15.9	16.4	17.8	17.3	17.4	17.6	17.2	16.9	16.4	16.7	18.3	18.5	17.6	16.4	15.5	14.1	13.8	16.6	22.5
17-Jul	13.5	13.2	13.0	13.0	11.8	11.4	10.9	9.8	9.0	8.7	10.1	11.0	11.3	11.0	11.5	12.3	12.8	12.9	12.5	10.5	9.5	8.4	7.1	7.2	10.9	13.5
18-Jul	7.6	7.8	5.8	2.5	1.0	4.6	8.4	9.5	10.5	11.4	11.8	12.1	13.1	13.7	14.6	14.8	15.1	15.4	15.6	14.8	13.5	11.1	9.1	9.5	10.5	15.6
19-Jul	8.7	7.6	7.7	7.7	8.1	10.4	12.3	13.9	16.2	18.2	19.9	20.8	21.8	20.3	14.9	17.4	19.1	20.0	20.3	19.4	14.1	9.2	6.8	5.8	14.2	21.8
20-Jul	7.7	11.3	12.2	12.2	12.0	13.1	13.5	13.9	15.1	16.3	17.3	18.4	19.9	21.1	21.6	22.0	22.4	22.7	21.9	20.3	17.8	17.1	16.8	16.7	16.8	22.7
21-Jul	17.0	17.0	16.5	16.2	15.7	15.6	16.6	18.2	19.5	20.2	22.3	23.0	24.0	24.5	24.3	22.6	PF	PF	PF	PF	PF	PF	PF	PF	--	24.5
22-Jul	PF	PF	PF	PF	PF	PF	PF	18.3	19.8	22.0	22.5	24.0	25.0	25.4	25.9	26.1	26.1	25.8	25.4	23.9	21.9	20.7	20.1	18.9	--	26.1
23-Jul	19.4	19.0	17.6	16.0	15.6	16.5	17.3	18.3	19.6	20.4	21.0	21.6	22.8	23.5	24.6	24.4	23.1	22.1	20.8	19.8	18.1	16.0	15.0	14.4	19.5	24.6
24-Jul	13.9	13.6	13.3	13.0	12.7	12.4	12.4	12.7	13.2	14.5	15.4	16.2	17.1	18.1	19.1	19.5	19.5	19.3	18.9	18.9	17.1	14.6	13.0	10.1	15.3	19.5
25-Jul	7.5	5.9	4.7	3.7	4.7	9.1	12.6	15.8	18.6	19.9	21.1	22.2	23.5	24.6	25.5	26.0	26.6	26.6	26.4	24.8	21.0	19.8	18.9	18.3	17.8	26.6
26-Jul	17.9	17.0	16.2	15.3	15.5	16.2	18.2	20.4	22.3	24.9	26.3	27.5	27.8	28.6	29.0	29.3	29.1	29.1	28.9	27.7	24.7	21.9	20.8	20.0	23.1	29.3
27-Jul	19.1	18.4	17.9	17.5	18.0	18.7	19.2	21.7	23.5	24.9	26.6	27.0	28.0	28.7	29.0	29.0	29.2	28.3	26.4	24.3	21.3	21.5	19.6	17.3	23.1	29.2
28-Jul	16.1	16.3	16.3	15.5	14.9	15.1	15.9	17.1	17.8	19.7	21.5	22.6	23.2	23.7	24.1	25.2	22.8	22.7	18.6	15.9	14.4	12.9	12.8	12.0	18.2	25.2
29-Jul	11.7	10.7	9.4	8.1	8.3	10.3	12.8	14.9	17.5	19.1	20.3	21.4	22.2	22.9	16.5	17.1	20.3	21.3	20.3	18.6	16.4	13.5	13.5	14.5	15.9	22.9
30-Jul	14.9	15.2	15.2	14.8	15.4	15.2	15.9	16.0	13.9	14.1	15.1	16.3	18.9	21.1	22.2	22.8	23.1	23.5	23.4	22.6	20.4	19.2	18.5	17.1	18.1	23.5
31-Jul	16.1	13.3	12.0	10.0	9.5	13.1	15.1	16.0	17.6	18.7	19.7	18.7	17.9	16.5	17.2	16.1	15.5	14.8	14.7	14.9	13.5	10.5	8.1	6.6	14.4	19.7
																								Diurnal Average		
																								Diurnal Maximum		
PF - Power Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Wapasu - July 2017

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	47	6.45	6.45
10 - 20	413	56.65	63.10
> 20	269	36.90	100.00

Total Number of Valid Hours: 729

Total Number of Hours: 744



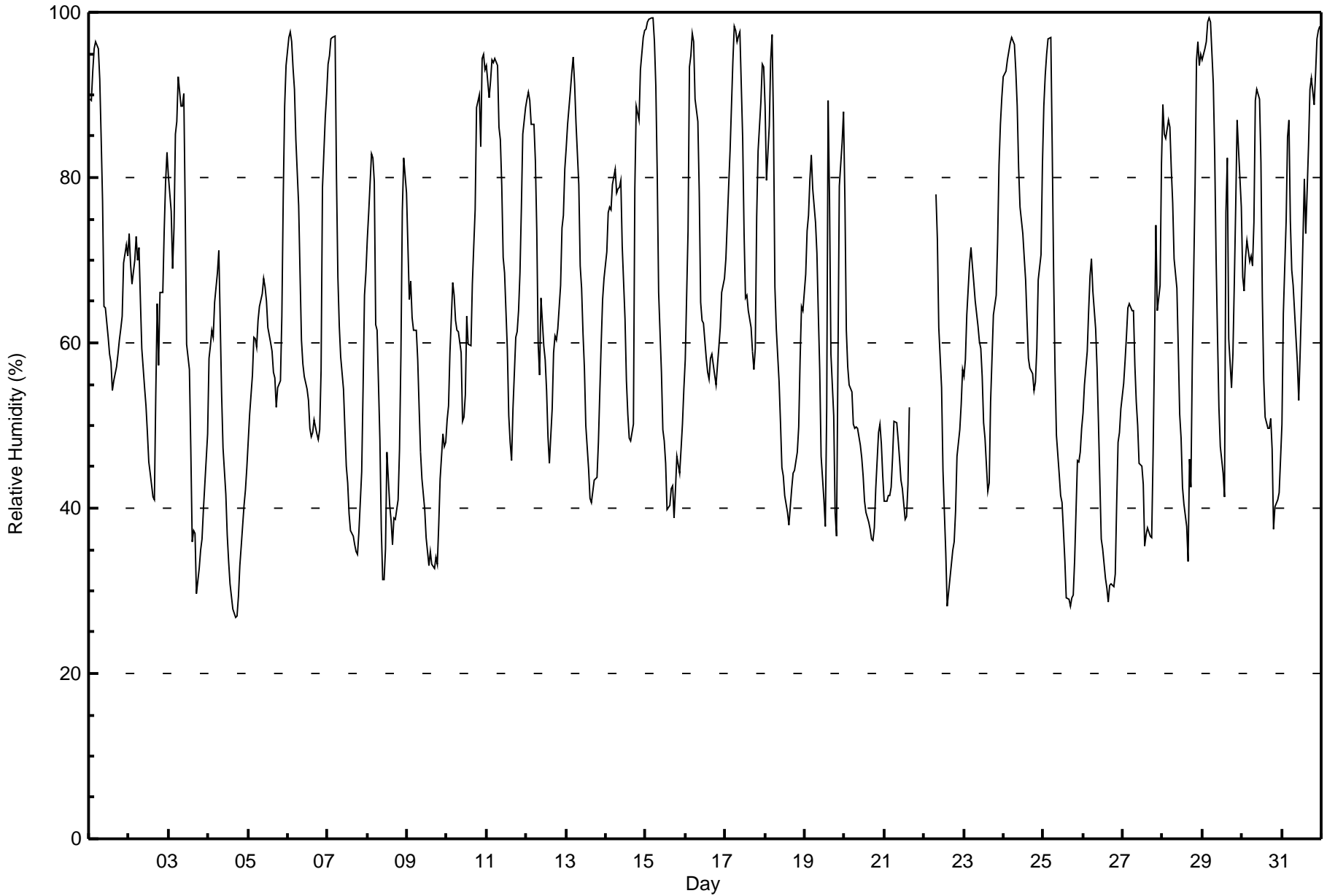
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Wapasu - July 2017

Maximum Value: 99 % on Jul 15 04:00																		Maximum Daily Average: 79.7 % on Jul 17																		Hours in Service: 744													
Minimum Value: 27 % on Jul 4 17:00																		Minimum Daily Average: 45.3 % on Jul 4																		Hours of Data: 729													
Maximum Diurnal Average: 81.2 % at hour 5																		Minimum Diurnal Average: 47.0 % at hour 15																		Hours of Missing Data: 15													
Monthly Average: 62.8 %																		Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 48 Median = 61 Q ₃ = 79 P ₉₀ = 92 P ₉₉ = 99																		Hours of Calibration: 0													
																																				Percent Operational Time: 98.0													
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-Jul	89	89	93	96	97	96	92	85	77	64	64	61	59	58	54	55	57	59	60	62	63	70	72	71	72.6	97																							
2-Jul	73	69	67	70	73	70	72	65	59	55	52	49	46	44	41	41	54	65	57	66	66	73	80	83	62.1	83																							
3-Jul	80	76	69	74	85	87	92	89	89	90	76	60	57	47	36	37	37	30	33	35	36	40	43	49	60.2	92																							
4-Jul	58	60	61	61	65	68	71	63	54	47	42	37	33	31	29	28	27	27	29	33	35	40	42	45	45.3	71																							
5-Jul	48	51	56	61	61	59	63	64	66	68	67	65	62	60	59	56	56	52	54	55	63	78	89	94	62.8	94																							
6-Jul	97	98	96	93	91	85	77	68	60	57	56	54	53	50	49	49	51	49	48	49	57	79	87	90	68.5	98																							
7-Jul	94	95	97	97	97	80	68	62	58	54	50	45	43	39	37	37	36	35	34	37	44	55	66	68	59.5	97																							
8-Jul	73	76	83	82	79	62	61	48	37	31	31	35	47	40	38	36	39	39	41	47	58	76	82	78	55.1	83																							
9-Jul	72	65	67	63	61	62	58	52	47	44	40	36	35	33	35	33	33	34	33	38	44	49	48	48	47.0	72																							
10-Jul	51	52	59	67	66	63	61	61	59	50	51	54	63	60	60	67	72	76	89	90	84	94	95	93	68.2	95																							
11-Jul	94	90	92	94	94	94	94	86	85	79	70	68	59	51	48	46	52	61	61	64	68	76	85	88	75.0	94																							
12-Jul	90	90	89	86	86	82	74	60	56	65	60	58	54	49	45	52	59	61	60	62	67	74	75	81	68.2	90																							
13-Jul	84	86	91	93	95	91	87	79	69	67	61	57	50	45	41	41	42	43	44	48	54	60	65	68	65.0	95																							
14-Jul	71	76	77	76	79	81	78	79	79	80	72	63	56	51	48	48	50	79	89	88	87	93	97	98	74.7	98																							
15-Jul	98	99	99	99	99	96	91	80	66	56	50	48	45	40	40	42	43	39	42	46	44	47	50	54	63.2	99																							
16-Jul	58	74	93	95	97	96	90	87	78	65	63	62	58	57	56	58	59	56	55	57	60	62	66	68	69.5	97																							
17-Jul	70	75	79	83	94	98	98	96	97	98	85	73	65	66	64	62	59	57	59	75	83	89	94	93	79.7	98																							
18-Jul	89	80	86	94	97	87	67	62	55	50	45	44	42	40	38	40	42	44	45	47	50	58	64	64	59.5	97																							
19-Jul	68	74	75	80	83	79	75	71	64	57	46	41	38	52	89	77	59	51	40	37	57	79	84	88	65.1	89																							
20-Jul	77	62	57	55	54	50	50	50	50	48	46	44	41	39	38	37	36	36	38	42	49	50	48	44	47.6	77																							
21-Jul	41	41	42	42	43	46	50	50	48	46	43	42	39	39	43	52	PF	PF	PF	PF	PF	PF	PF	PF	--	52																							
22-Jul	PF	PF	PF	PF	PF	PF	PF	78	73	62	55	44	39	35	28	30	33	35	36	40	46	50	53	57	--	78																							
23-Jul	56	58	63	70	71	69	67	65	62	60	59	56	50	48	42	43	53	58	63	66	72	82	86	90	63.0	90																							
24-Jul	92	93	94	95	96	97	96	93	89	81	76	73	70	68	63	58	57	56	54	55	59	68	71	81	76.5	97																							
25-Jul	89	92	95	97	97	84	68	57	49	44	42	41	37	34	29	29	28	29	30	34	46	46	47	50	53.8	97																							
26-Jul	52	55	59	64	68	70	66	62	57	50	43	36	35	32	30	29	31	31	31	32	40	48	49	52	46.8	70																							
27-Jul	55	58	61	64	65	64	64	57	53	50	45	45	43	35	37	38	37	36	47	59	74	64	67	82	54.1	82																							
28-Jul	89	85	85	87	86	81	77	70	67	59	51	49	43	40	38	34	46	43	58	79	94	96	94	95	68.5	96																							
29-Jul	94	96	96	99	99	99	91	83	70	61	52	48	44	41	76	82	61	55	59	67	77	87	83	76	74.8	99																							
30-Jul	68	66	70	72	70	71	69	75	89	91	90	82	66	56	51	50	50	51	47	37	40	41	42	46	62.0	91																							
31-Jul	50	64	75	85	87	75	69	67	61	58	53	59	65	80	73	79	84	91	92	89	93	97	98	98	76.6	98																							
																								73.9	74.8	77.6	79.8	81.2	78.1	74.5	69.8	65.2	60.9	56.0	52.6	49.6	47.1	47.0	47.3	48.0	49.2	50.9	54.6	60.4	67.3	70.7	73.1	Diurnal Average	
																								98	99	99	99	99	99	98	96	97	98	90	82	70	80	89	82	84	91	92	90	94	97	98	98	Diurnal Maximum	
PF - Power Failure																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	91	12.48	12.48
40 - 60	265	36.35	48.83
60 - 80	210	28.81	77.64
80 - 100	163	22.36	100.00

Total Number of Valid Hours: 729

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

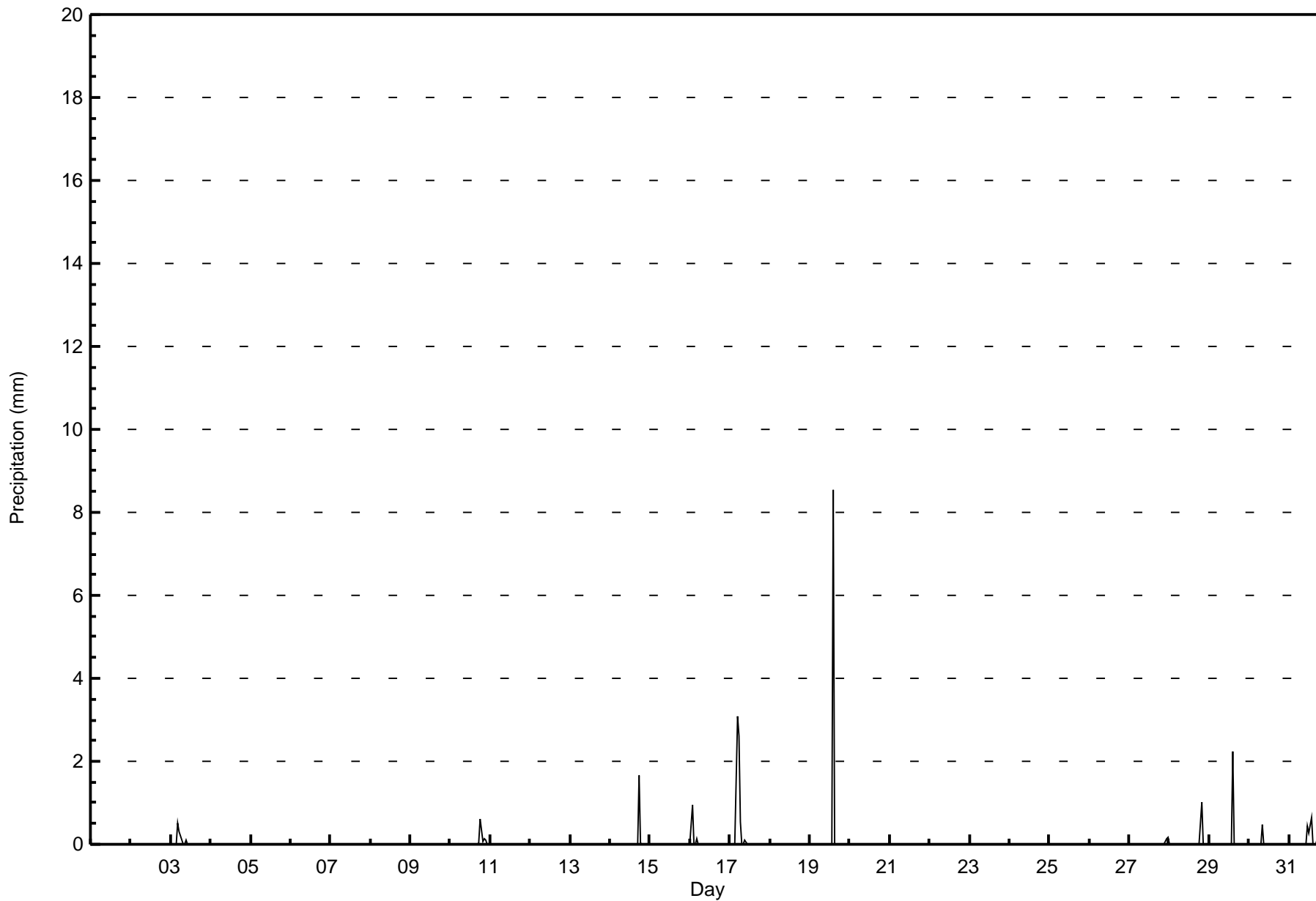
Wapasu - July 2017

Maximum Value: 8.5 mm on Jul 19 15:00		Maximum Daily Total: 8.5 mm on Jul 19		Hours in Service: 744																																														
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 1		Hours of Data: 729																																														
Maximum Diurnal Total: 10.8 mm at hour 15		Minimum Diurnal Total: 0.0 mm at hour 1		Hours of Missing Data: 15																																														
Monthly Total: 25.25 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 = 0.9		Hours of Calibration: 0																																														
				Percent Operational Time: 98.0																																														
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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.5	0.3	0.2	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	1.1	0.5																					
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.1	0.1	0.0	0.0	0.0	0.0	1.0	0.6																						
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																					
16-Jul	0.0	0.9	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	0.0	1.1	0.9																					
17-Jul	0.0	0.0	0.0	0.0	3.1	2.6	0.5	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	6.3	3.1																					
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	8.5																					
20-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	--	0.0																					
22-Jul	PF	PF	PF	PF	PF	PF	PF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2																					
28-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0																					
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	2.3																					
30-Jul	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5																					
31-Jul	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	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.7	0.7																					
																								0.0	0.9	0.0	0.0	3.7	2.9	0.8	0.0	0.5	0.2	0.0	0.4	0.3	0.7	10.8	0.0	0.0	1.8	0.7	1.1	0.1	0.1	0.1	0.1	0.2	Diurnal Average	
																								0.0	0.9	0.0	0.0	3.1	2.6	0.5	0.0	0.5	0.1	0.0	0.4	0.3	0.7	8.5	0.0	0.0	1.7	0.6	1.0	0.1	0.1	0.1	0.1	0.2	Diurnal Maximum	
PF - Power Failure																																																		



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Wapasu - July 2017

Maximum Speed: 26 km/h on Jul 4 14:00	Maximum Daily Speed Average: 16.6 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 1 km/h on Jul 10 21:00	Minimum Daily Speed Average: 0.2 km/h on Jul 29	Hours of Data: 727
Maximum Diurnal Speed Average: 6.4 km/h at hour 13	Minimum Diurnal Speed Average: 1.6 km/h at hour 19	Hours of Missing Data: 17
Monthly Average Velocity: 3.0 km/h 223.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 O ₁ = 6 Median = 9 O ₃ = 11 P ₉₀ = 14 P ₉₉ = 20	Percent Operational Time: 97.7

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-Jul	SSE6	SSE6	SE6	SE5	SSE6	SSE7	SSE8	S10	S8	SSE10	SSW10	SSW9	SSW7	S10	S11	S8	S8	S6	S6	SSE7	SSE9	SSE10	SSE12	SSE11	S7.7	SSE12	
2-Jul	SSE8	S11	S11	SSW7	S7	SSE10	S12	S13	SSW12	SSW12	SSW14	SSW12	SSW13	SSW13	S13	S11	W9	NNW3	E7	ESE13	SE13	SE13	SE11	SE11	S8.9	SSW14	
3-Jul	SSE11	S10	SSW9	S8	SW9	SSW9	S6	SSW6	SW9	SSW8	S9	SW16	WSW16	WSW14	WSW14	WSW14	SW14	WSW22	SW19	SW19	SW16	WSW13	SW14	WSW15	SW11.4	WSW22	
4-Jul	SW10	SW13	SW13	SW14	WSW14	WSW14	WSW16	WSW16	WSW17	WSW17	WSW24	WSW25	WSW25	WSW26	WSW26	WSW26	WSW26	WSW21	W19	W16	W12	WSW9	WSW9	WSW10	WSW11	WSW16.6	WSW26
5-Jul	WSW12	WSW11	WSW9	SW9	WSW11	WSW13	WSW12	W13	W10	NNW11	WNNW12	WNNW12	NW12	WNNW13	WNNW13	NW13	WNNW14	NNW11	NNW11	NNW7	AF	SE4	SSE5	W9.1	WSW14		
6-Jul	SSE6	SSE4	S4	SSE4	SSW6	SW7	WSW10	W10	NNW12	WNNW11	NW12	NNW14	NNW11	NW10	NW10	WNNW9	WNNW9	NW8	NNW8	NW7	WNNW3	SE2	SE4	SE3	WNNW4.6	NNW14	
7-Jul	SE4	SE4	SSE5	SSE6	SE6	SSE5	SW6	WSW7	WSW9	W9	W10	NNW10	NNW10	W10	NNW9	WNNW9	WNNW7	WNNW5	NNW5	NNE7	NNE7	NE5	ENE4	E5	W2.6	WNNW10	
8-Jul	ESE5	ESE5	SSE5	SE5	ESE4	ESE4	ESE4	SE4	SE6	ESE5	E3	WSW6	WSW17	WSW15	WSW9	WSW10	W10	W10	W8	WSW7	WSW2	ESE3	ESE4	ESE6	SSW2.9	WSW17	
9-Jul	SE7	SE8	SE9	SE9	SE11	SSE8	SSE9	SSE9	S8	SSE8	SE8	ESE9	SE8	ESE9	ESE9	ESE9	ESE10	SE7	ESE10	ESE7	SE7	SE7	SE10	SE11	SE8.3	SE11	
10-Jul	SE11	SSE7	SSE4	SE5	S6	SSE7	SSE5	SW4	WSW5	NW4	WNNW2	W5	W10	W11	NNE3	SE11	ESE7	ENE4	ENE5	SE4	WSW1	ENE2	ESE4	SE4	SSE2.2	SE11	
11-Jul	E5	SE3	ENE3	SSE3	SE2	E2	ESE2	NNW2	NW5	NW5	NW9	NNW10	NW12	NW10	WNNW9	N6	E5	SW5	WSW2	SW8	SW8	S4	SSE5	SE3	WNNW1.6	NW12	
12-Jul	SSE4	SSE4	SSE4	SSE6	SSE6	SSE5	ESE4	ESE3	W2	WNNW6	WNNW8	W7	SW8	WSW9	SW13	SW10	SSE8	S5	SSE4	SSE6	SSE6	SE7	SSE8	SSE7	S3.9	SW13	
13-Jul	SSE8	SSE7	SSE7	S6	SSE6	S7	SSW7	SSW6	WSW1	W6	W6	WNNW8	WNNW6	NW6	NW5	NNW8	N10	N9	N9	NNE8	NE6	NE6	NE6	NE6	NNW1.0	N10	
14-Jul	NNE5	NNE6	N7	N9	N9	NNE8	N11	N10	N12	NNE10	NNE10	NNE8	NNE8	N8	N8	NNW7	N7	NNW9	NE6	ESE5	SE5	ENE1	S3	S4	NNE6.0	N12	
15-Jul	SSE5	SSE6	SE6	SSE6	SSE6	SSE6	SE6	SSE9	SSE11	SSE11	SSE10	SSE11	SE13	SSE17	S16	S15	SSE15	S15	SSE16	SE14	SSE12	SSE13	SSE12	SSE12	SSE10.7	SSE17	
16-Jul	SSE11	NNW10	NNE8	NNW3	SSE5	SSE5	SSE8	WSW10	WSW12	W9	WSW11	SW12	SW18	SW19	SW17	WSW18	WSW15	WSW15	WSW14	WSW13	WSW14	WSW14	WSW13	WSW11	WSW9.6	SW19	
17-Jul	WSW12	W8	W6	W7	W10	W10	NNW17	NNW19	NNW18	NNW16	N16	NNW16	NNW16	NNW16	NNW14	NNW11	NNW14	NNW14	NNW12	NW6	W3	NW3	NNW3	NW3	NNW9.7	NNW19	
18-Jul	NNW4	NNW7	N4	NE2	SE3	S1	NNW5	NNW6	NNW8	NW9	WNNW9	WNNW8	NNW6	NW8	W9	WSW10	WSW11	WSW12	WSW12	WSW9	SW7	SSW5	S5	S6	W4.3	WSW12	
19-Jul	S6	S7	S8	S7	S7	SSW9	SW12	SW12	SW12	WSW13	WSW14	WSW12	W11	NNE7	NE11	NE9	NE7	NNE8	NNE9	NNE6	ENE3	ESE3	ESE4	ESE4	SW2.0	WSW14	
20-Jul	ESE7	ESE10	ESE11	ESE12	ESE12	ESE11	SE11	SE10	SE9	SE6	ESE7	SE9	SE9	ESE9	ESE10	ESE10	ESE10	ESE9	ESE9	ESE8	ESE8	ESE9	SE11	SE11	ESE9.4	ESE12	
21-Jul	SE11	SE12	SE12	SE11	SE11	SE11	SE9	SE9	W4	NNW6	W2	S4	SSE10	S10	S9	SSE9	PF	PF	PF	PF	PF	PF	PF	PF	PF	----	SE12
22-Jul	PF	PF	PF	PF	PF	PF	PF	S9	SSW9	SSW12	SW15	WSW14	SW16	WSW20	SW19	WSW19	WSW17	WSW14	WSW14	WSW10	SW7	SW8	SSW7	SSW7	----	WSW20	
23-Jul	SW10	SSW9	SSW7	S6	SSW6	SSW7	SW14	WSW13	W10	WNNW9	NW8	NW8	NW9	WNNW5	WSW11	WNNW7	N13	N12	NNE12	NNE11	NNE8	NNE7	NNE6	NNE8	WNNW3.8	SW14	
24-Jul	NNE9	NNE10	NNE10	NNE9	NNE10	NNE11	NNE11	NNE13	NNE15	NNE15	N17	N16	N17	N18	N19	N20	N17	N15	NNW15	NNW11	NNW7	NNW6	N3	N12.4	N20		
25-Jul	NE2	SE4	SE4	SE5	SSE7	SSE6	S6	SW6	WSW7	WSW10	W9	WSW9	WSW9	WSW10	WSW8	WSW9	WSW8	SW8	SSW7	SSW4	S4	SSE6	SSE7	SSE7	SW4.8	WSW10	
26-Jul	SSE7	SSE7	SSE7	SSE7	SSE9	SSE9	S8	S8	SSW9	SSW10	SW12	SW13	SW13	WSW10	SSW10	SW10	SSW9	SSW8	SSW9	S6	S6	S6	S7	S8	SSW7.7	SW13	
27-Jul	S8	SSE8	SSE8	SSE9	SSE10	S10	S11	S11	SSW10	SSW11	SSW12	SSW10	WSW11	SW15	WSW11	W9	WNNW7	W5	NNE1	SE1	E2	W8	NW9	NNW3	SSW5.5	SW15	
28-Jul	SSE4	SW4	SW7	SW8	SW8	SW10	SW13	SW12	WSW13	WSW13	WSW14	W15	W15	NW12	NW11	NW13	NE7	N7	NE10	WNNW2	SE6	SSE4	S5	SSE5	WSW5.3	W15	
29-Jul	S5	SSW5	S4	SSE4	SSE5	SSE5	SSE5	S5	SW7	W8	WNNW7	WNNW7	WNNW9	NNW10	NNW12	SE7	NNE5	NNE6	NNE6	NE6	ENE4	ENE5	E7	ESE10	ENE0.2	NNW12	
30-Jul	ESE13	SE13	SE12	SE12	SE12	SE12	SSE12	S13	SW11	SSW3	S6	SW7	WSW5	SSW6	SSW13	SSW13	SSW14	SSW13	SSW11	SW9	SW8	SW8	SW9	SW8	S7.9	SSW14	
31-Jul	W4	SW1	W2	SSW3	SSW3	SW6	W7	W8	W10	NNW10	NNW12	W12	NW11	NNW9	N16	N14	N13	N11	N10	NNW6	NW1	AF	ESE3	SE3	NW5.2	N16	

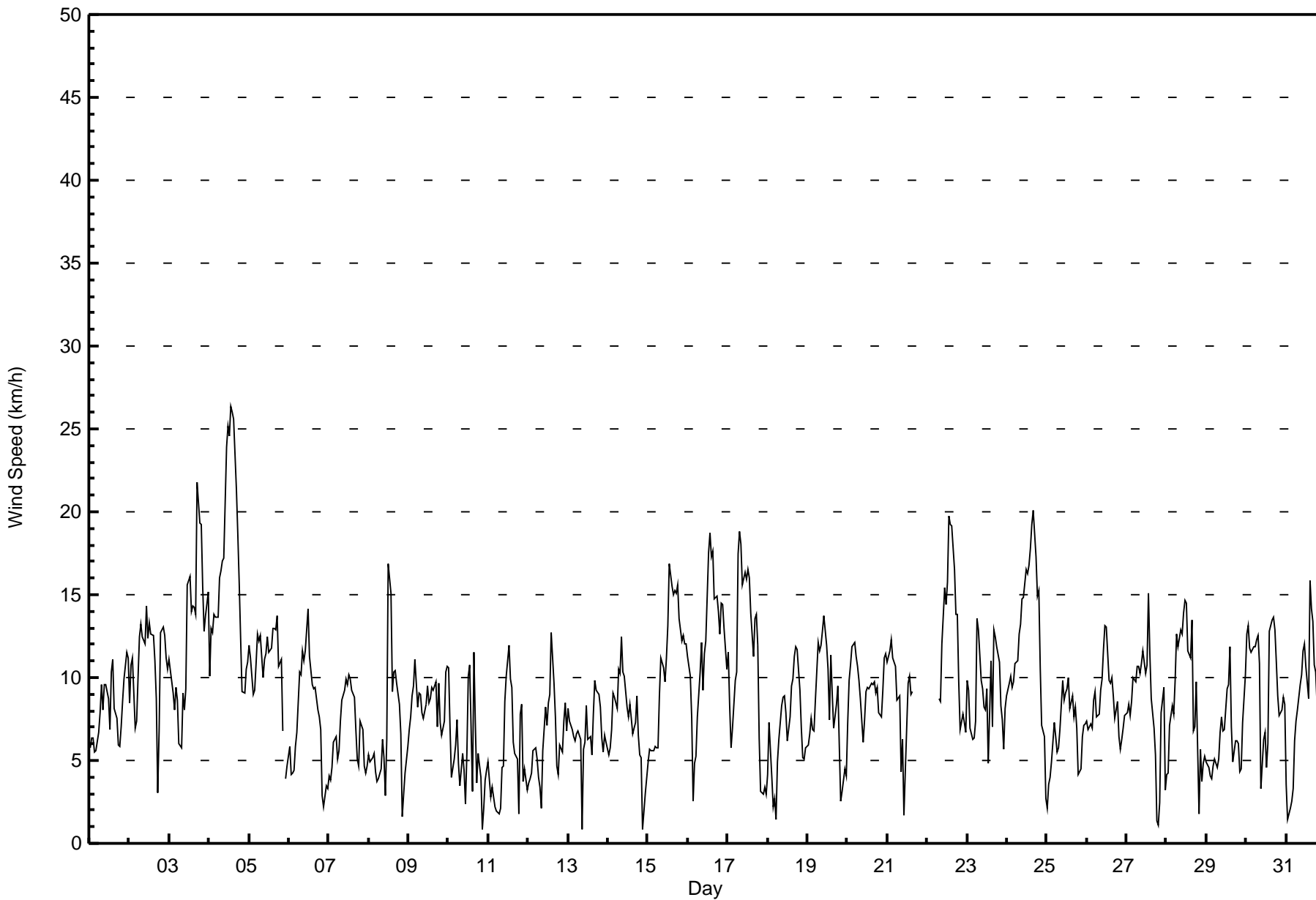
SSE4.5 SSE3.8 SSE3.7 SSE4.1 SSE4.7 S4.6 SSW4.0 SW4.2 WSW4.9 WSW4.7 WSW5.4 W6.0 W6.4 W5.7 W5.2 WSW4.8 W3.4 W4.1 WNNW1.6 WSW1.6 SSW2.1 S2.7 SSE3.4 SSE3.8 ESE13 SE13 SW13 SW14 WSW14 WSW14 NNW17 NNW19 NNW18 WSW17 WSW24 WSW25 WSW25 WSW26 WSW26 WSW26 WSW21 WSW22 SW19 SW19 SW16 WSW14 SW14 WSW15	Diurnal Average
	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Wapasu - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	145	19.94	19.95
6 - 11	408	56.12	76.07
12 - 19	164	22.56	98.62
20 - 28	10	1.38	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 727

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - July 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	4	3	9	6	17	22	25	13	6	4	6	8	5	8	7	145
6 - 11	15	28	11	0	2	24	38	60	43	32	29	35	27	27	20	17	408
12 - 19	13	6	0	0	0	4	11	9	7	12	27	41	7	7	6	14	164
20 - 28	1	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	10
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	31	38	14	9	8	45	71	94	63	50	60	91	42	39	34	38	727

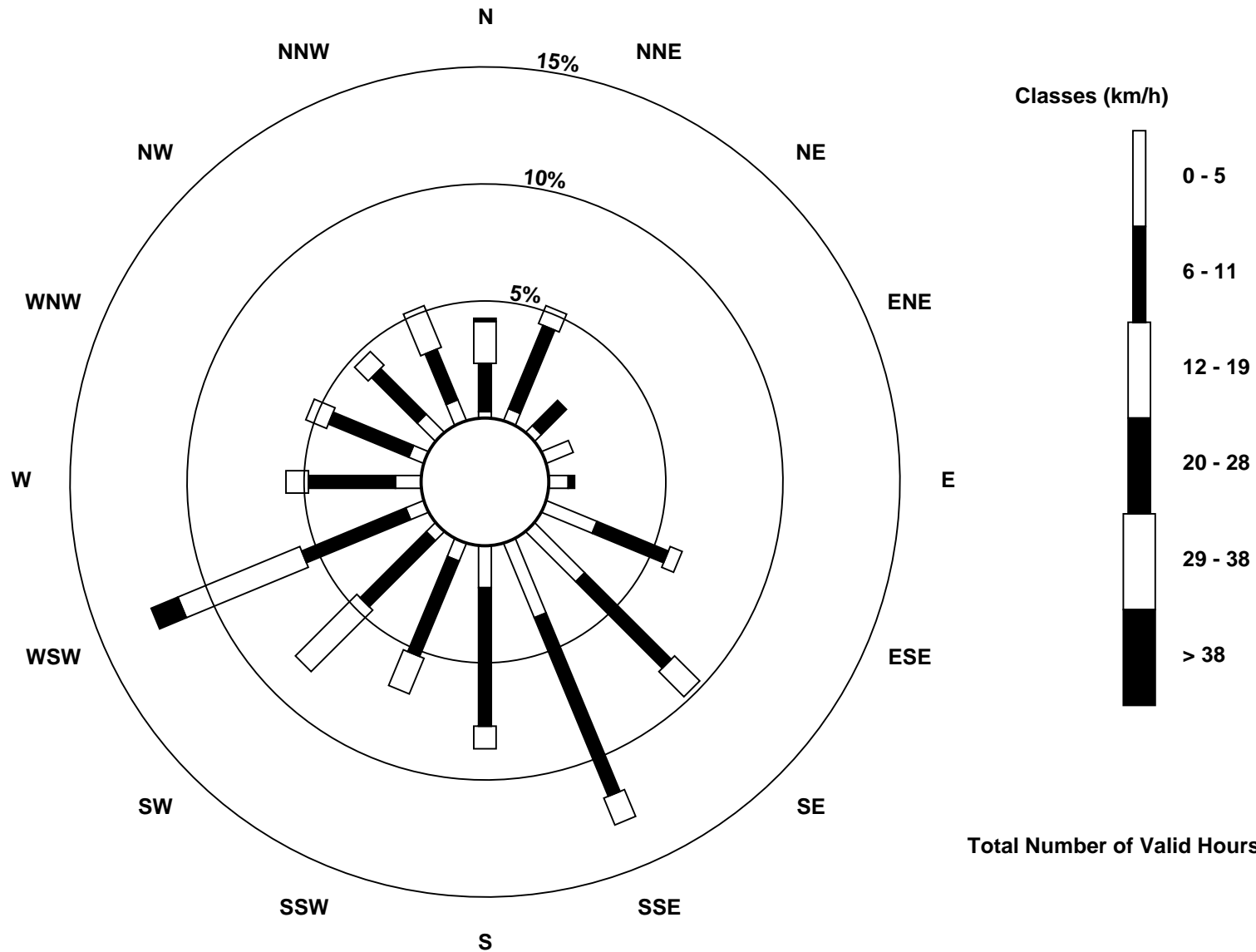
Total Number of Valid Hours: 727

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jul 16 02:00 Minimum Value: 0 km/h on Jul 7 05:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 727 Hours of Missing Data: 17 Hours of Calibration: 0 Percent Operational Time: 97.7								
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-Jul	1	1	1	1	2	2	2	3	3	4	3	3	2	4	4	3	2	2	2	2	2	3	3	4	
2-Jul	2	4	3	2	3	3	4	4	4	4	5	5	5	4	4	4	6	3	4	3	3	3	3	2	
3-Jul	2	3	3	3	4	3	2	2	3	4	4	5	5	4	5	5	5	6	7	6	4	3	3	7	
4-Jul	3	3	3	3	3	3	4	5	6	6	7	7	8	7	7	7	6	6	4	3	2	2	3	8	
5-Jul	2	3	2	2	3	3	4	4	3	3	3	4	3	4	4	3	4	3	4	2	AF	1	1	4	
6-Jul	1	1	1	1	2	3	3	3	4	4	4	4	4	3	3	3	3	3	3	2	1	1	1	4	
7-Jul	1	1	1	1	0	1	2	2	2	3	4	4	4	3	4	4	4	3	2	2	2	1	1	4	
8-Jul	1	1	1	1	1	1	1	1	2	2	2	4	5	4	3	3	3	3	2	3	1	1	1	5	
9-Jul	1	1	2	2	2	3	2	3	2	3	3	4	3	3	3	4	3	3	3	2	1	2	2	4	
10-Jul	2	2	2	1	2	1	2	3	2	2	2	3	3	3	4	4	3	3	2	1	3	3	1	4	
11-Jul	2	1	2	2	2	2	1	1	2	2	3	3	4	3	3	3	2	3	3	3	2	1	1	4	
12-Jul	1	1	1	1	1	1	1	1	2	2	2	3	3	3	4	3	2	2	1	3	1	2	2	4	
13-Jul	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	2	1	1	3	
14-Jul	2	2	3	3	3	3	3	3	4	3	3	3	3	4	3	3	3	3	3	1	1	1	1	4	
15-Jul	1	1	1	1	1	1	1	3	4	3	3	3	4	5	6	5	5	5	5	4	3	4	3	6	
16-Jul	3	9	4	2	1	2	3	5	3	3	3	3	5	5	5	5	4	4	4	4	3	3	3	9	
17-Jul	3	3	2	2	3	4	6	6	5	4	5	5	4	4	4	3	4	4	4	3	1	1	1	6	
18-Jul	2	2	2	1	1	1	2	2	3	3	3	3	3	3	3	4	4	5	5	2	2	1	1	5	
19-Jul	1	1	1	2	2	4	4	3	3	4	4	4	5	3	6	3	2	3	3	3	1	1	1	6	
20-Jul	2	2	2	3	3	3	3	2	2	2	2	3	3	3	3	3	4	3	3	2	1	2	3	4	
21-Jul	2	3	3	3	3	3	2	2	2	2	3	4	4	4	3	4	PF	PF	PF	PF	PF	PF	PF	4	
22-Jul	PF	PF	PF	PF	PF	PF	PF	3	3	4	4	4	5	5	6	5	5	4	4	4	2	2	2	6	
23-Jul	3	3	2	2	2	2	4	4	3	3	3	3	4	4	5	5	4	4	4	4	3	3	2	5	
24-Jul	3	3	3	3	4	4	4	4	5	5	5	6	5	6	6	6	5	5	4	3	2	2	1	6	
25-Jul	1	1	1	1	1	1	2	2	2	3	3	3	4	4	4	3	3	3	2	2	1	1	1	4	
26-Jul	1	1	1	1	2	2	2	3	3	3	4	4	4	4	4	5	3	3	3	2	1	1	1	5	
27-Jul	2	2	2	2	3	3	3	3	3	4	4	4	4	5	4	3	3	2	2	2	2	4	3	5	
28-Jul	2	2	2	2	2	2	3	3	3	4	4	4	5	5	4	5	4	6	3	3	2	1	1	6	
29-Jul	1	1	1	1	1	1	1	2	2	3	3	3	4	4	9	3	2	2	2	1	1	1	2	9	
30-Jul	3	3	3	3	3	3	3	4	4	2	2	2	3	3	4	5	4	5	4	3	2	2	2	5	
31-Jul	2	2	1	1	1	2	2	2	3	3	4	5	7	6	5	4	4	3	3	3	1	AF	1	7	
Diurnal Maximum																									
AF - Analyzer Failure PF - Power Failure																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - July 2017

Direction of Maximum Speed: 243 deg on Jul 4 14:00 Direction of Maximum Daily Speed Average: 246.0 deg on Jul 4	Hours in Service: 744 Hours of Data: 727 Hours of Missing Data: 17
Direction of Minimum Speed: 248 deg on Jul 10 21:00 Direction of Minimum Daily Speed Average: 0.2 deg on Jul 29	Percent Operational Time: 97.7
Monthly Average Direction: 239.1 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-Jul	156	151	145	138	156	154	168	171	173	163	213	195	193	176	183	182	191	189	169	159	158	148	147	162	169.0
2-Jul	168	173	182	192	170	167	175	175	196	203	213	208	199	197	188	188	267	338	97	122	128	134	140	143	176.2
3-Jul	150	174	205	185	217	205	188	209	223	206	179	231	239	246	240	238	235	240	235	227	226	241	236	257	224.7
4-Jul	233	225	229	233	241	242	245	253	255	246	241	241	249	243	243	243	257	262	268	259	258	245	245	241	246.0
5-Jul	240	243	241	233	242	247	257	268	276	293	288	291	287	306	300	299	313	297	306	298	309	AF	144	149	277.0
6-Jul	151	166	188	165	203	215	247	266	290	283	306	346	335	313	310	288	295	315	329	320	299	131	138	126	290.0
7-Jul	142	134	150	148	145	162	217	249	257	275	268	282	290	281	308	295	300	302	324	14	26	54	77	94	279.0
8-Jul	115	112	148	138	121	110	116	124	134	118	98	255	252	240	240	250	260	269	261	244	258	112	103	108	209.4
9-Jul	124	138	141	129	131	149	155	160	173	160	143	104	131	119	102	120	116	125	114	120	135	131	138	134	132.5
10-Jul	134	158	168	146	172	148	155	227	254	321	301	266	271	274	17	142	103	73	72	145	248	76	107	124	161.1
11-Jul	95	132	73	153	142	80	112	329	322	321	310	298	307	320	300	357	92	228	246	220	223	176	156	127	289.7
12-Jul	150	150	148	151	155	149	110	118	279	296	297	265	233	238	234	224	166	183	151	159	156	142	152	154	188.1
13-Jul	161	166	165	171	162	171	199	198	243	280	263	289	303	310	324	348	352	9	10	16	35	46	53	49	340.1
14-Jul	31	24	5	0	8	16	5	358	0	18	16	22	21	356	10	347	353	322	41	103	128	65	188	184	11.3
15-Jul	149	149	145	148	155	156	145	148	166	158	161	154	142	154	177	172	162	171	149	145	165	168	168	163	158.9
16-Jul	161	331	22	348	158	164	162	258	254	266	239	233	230	229	231	237	237	246	252	243	242	244	242	245	238.6
17-Jul	242	266	273	265	262	281	338	339	339	340	350	347	342	339	342	340	341	338	336	314	272	308	336	322	326.3
18-Jul	327	337	350	55	129	177	339	340	332	321	302	302	347	318	269	242	243	244	245	238	231	208	191	186	277.2
19-Jul	172	169	169	174	188	208	219	223	234	237	251	248	260	21	35	51	43	15	13	18	57	116	103	113	221.0
20-Jul	110	118	117	120	119	123	126	127	133	139	120	127	132	118	111	120	122	108	106	112	110	119	126	131	120.7
21-Jul	134	132	135	133	126	130	130	133	272	331	280	175	148	171	181	158	PF	PF	PF	PF	PF	PF	PF	PF	--
22-Jul	PF	PF	PF	PF	PF	PF	PF	181	192	211	228	247	235	239	232	246	247	253	238	240	226	216	203	193	--
23-Jul	215	212	201	190	199	202	226	240	276	292	312	313	319	288	255	284	4	1	19	16	13	18	28	13	296.6
24-Jul	28	31	26	25	30	19	18	18	17	12	13	11	8	8	5	359	356	355	353	343	342	336	341	354	6.8
25-Jul	38	131	145	142	148	155	180	216	237	243	266	252	258	248	245	250	257	230	201	205	178	167	164	164	214.7
26-Jul	162	158	158	156	163	163	170	186	198	206	218	229	227	240	205	233	202	208	193	188	181	169	175	173	194.2
27-Jul	172	166	164	164	166	170	170	180	198	202	196	209	251	233	257	281	284	265	28	137	79	278	317	339	210.8
28-Jul	158	217	232	228	214	223	232	232	238	244	257	260	269	310	319	306	35	351	44	303	140	166	182	167	252.8
29-Jul	184	200	185	149	152	154	161	178	228	271	295	294	297	332	338	138	28	17	33	45	69	77	96	114	63.4
30-Jul	121	124	129	132	131	142	154	185	214	194	173	228	242	209	209	212	206	198	200	221	218	226	232	219	184.2
31-Jul	263	215	280	208	197	236	261	259	278	285	282	277	316	344	351	349	349	353	349	347	321	AF	113	135	311.2

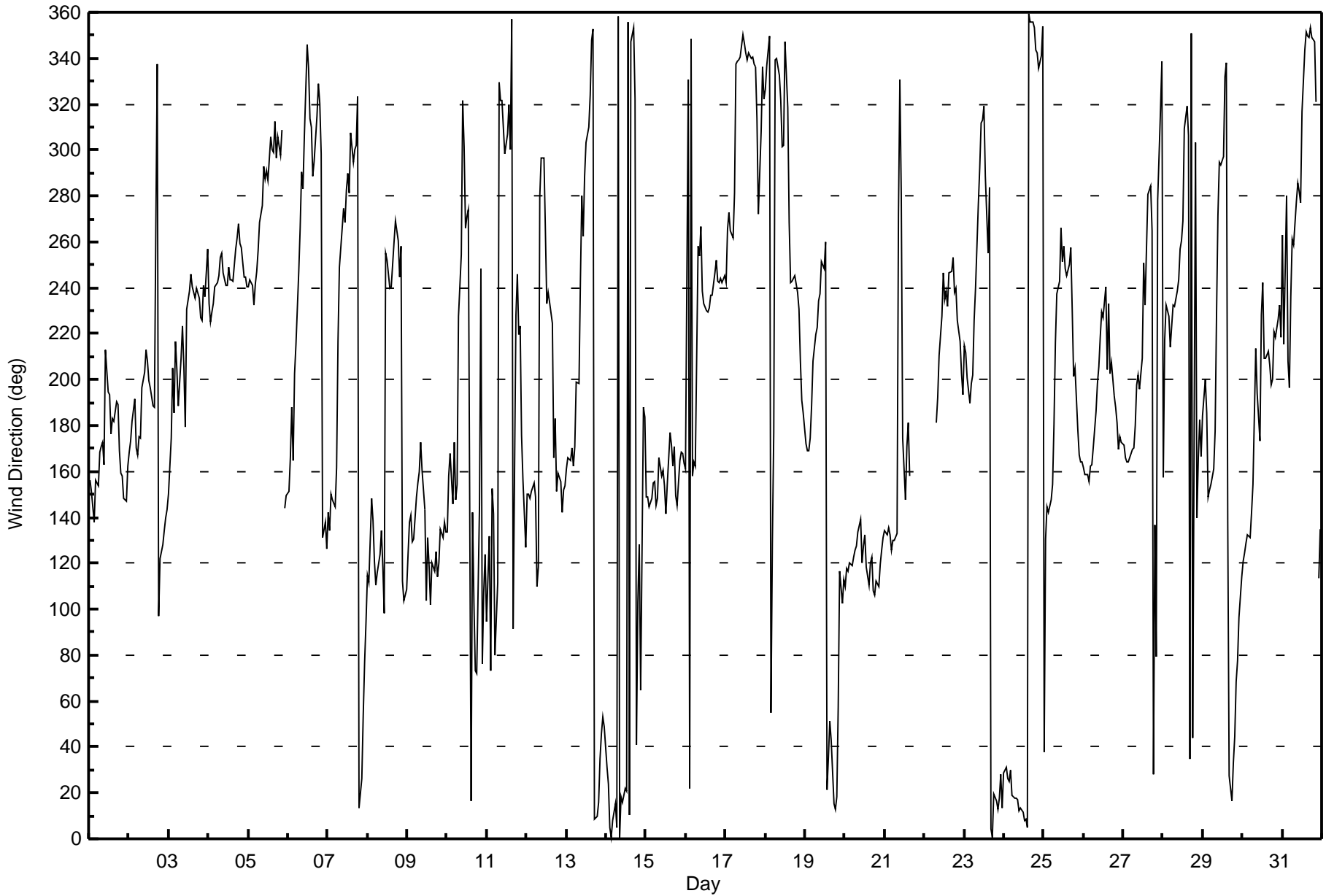
159.1 165.1 164.3 162.6 167.6 176.7 196.0 217.1 245.0 257.0 257.4 260.7 263.0 261.9 262.0 252.6 276.3 279.0 289.3 237.3 194.0 176.5 165.4 162.0
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Wapasu - July 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Jul 13 09:00 Minimum Value: 5 deg on Jul 7 05:00 Percentiles: P ₁ = 9 P ₁₀ = 16 Q ₁ = 19 Median = 27 Q ₃ = 33 P ₉₀ = 48 P ₉₉ = 86																			Hours in Service: 744 Hours of Data: 727 Hours of Missing Data: 17 Hours of Calibration: 0 Percent Operational Time: 97.7						
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-Jul	19	16	14	13	18	18	27	29	31	34	32	34	35	30	34	32	30	29	26	19	20	16	17	22	35
2-Jul	23	26	30	30	23	25	28	29	31	32	29	32	33	33	32	32	58	82	31	20	18	18	16	17	82
3-Jul	17	28	25	26	25	27	29	33	21	49	36	25	24	29	27	26	24	21	19	17	18	20	17	30	49
4-Jul	19	17	16	17	18	18	20	26	25	27	22	20	25	23	22	22	29	27	28	26	25	19	19	17	29
5-Jul	17	20	17	16	18	21	25	31	32	29	30	29	33	30	29	31	27	30	26	28	30	AF	14	11	33
6-Jul	8	15	25	28	22	29	24	29	29	38	31	28	38	38	34	32	33	35	38	25	24	49	11	10	49
7-Jul	10	17	12	5	5	16	29	28	32	34	33	44	36	42	40	50	58	65	68	38	28	24	9	13	68
8-Jul	11	14	15	18	23	23	26	23	23	32	66	65	24	22	28	26	32	32	29	29	55	23	17	18	66
9-Jul	17	12	13	15	17	27	20	24	33	33	33	43	46	40	28	40	30	28	25	15	14	12	17	16	46
10-Jul	15	29	49	34	33	15	42	53	52	79	79	65	31	33	86	19	36	66	35	36	91	69	33	20	91
11-Jul	21	62	53	51	65	44	39	64	51	37	33	33	31	38	40	62	54	56	95	23	20	24	21	29	95
12-Jul	21	11	19	10	14	11	29	48	92	50	33	45	38	34	22	25	27	32	21	19	19	14	17	15	92
13-Jul	18	21	20	21	18	25	30	33	101	48	54	44	55	56	69	54	33	30	29	32	23	19	15	17	101
14-Jul	27	26	27	26	30	31	29	28	29	33	34	44	51	50	54	59	49	23	45	22	17	83	28	12	83
15-Jul	9	6	9	13	10	17	19	19	26	28	28	27	25	25	30	29	29	28	20	19	22	24	25	23	30
16-Jul	20	85	35	71	24	20	23	35	24	31	18	17	17	18	17	21	20	22	23	19	19	18	18	19	85
17-Jul	17	31	30	28	25	36	20	20	19	20	22	25	20	18	21	28	22	20	19	31	28	37	16	22	37
18-Jul	25	16	39	37	28	57	38	38	35	44	43	39	63	44	42	41	30	29	27	19	16	20	17	18	63
19-Jul	14	15	15	18	26	28	24	22	21	23	29	39	42	59	35	25	29	31	32	32	35	10	11	24	59
20-Jul	14	14	17	19	19	18	20	19	21	29	26	26	31	37	33	29	33	27	24	17	12	14	17	16	37
21-Jul	16	17	18	17	18	19	17	19	61	42	95	77	32	37	32	42	PF	PF	PF	PF	PF	PF	PF	PF	95
22-Jul	PF	PF	PF	PF	PF	PF	PF	28	28	26	20	25	24	21	21	24	25	26	21	18	17	20	26	28	28
23-Jul	26	25	25	24	27	28	19	22	33	36	46	43	40	83	34	70	31	28	32	31	30	30	28	31	83
24-Jul	29	27	30	30	29	32	31	31	31	31	32	32	30	31	29	29	27	24	23	19	15	11	13	21	32
25-Jul	60	17	18	10	6	13	23	26	33	27	35	40	41	37	46	37	44	30	31	25	19	14	13	13	60
26-Jul	12	11	13	11	17	20	26	30	30	28	27	28	27	35	36	41	38	41	33	25	19	14	18	22	41
27-Jul	23	19	18	21	22	24	25	28	31	28	32	30	33	23	35	37	45	45	78	60	82	28	27	79	82
28-Jul	39	39	15	15	19	17	17	19	20	26	27	29	31	35	36	40	50	67	25	86	16	24	30	14	86
29-Jul	15	19	22	28	19	12	21	33	31	37	61	53	40	47	65	29	37	32	27	21	17	14	14	18	65
30-Jul	19	19	18	18	18	17	19	29	24	67	26	26	64	63	29	27	28	31	30	21	17	15	17	17	67
31-Jul	43	80	72	42	32	17	27	26	34	35	32	30	36	26	24	24	22	25	22	31	76	AF	21	8	80
Diurnal Maximum																									
AF - Analyzer Failure PF - Power Failure																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

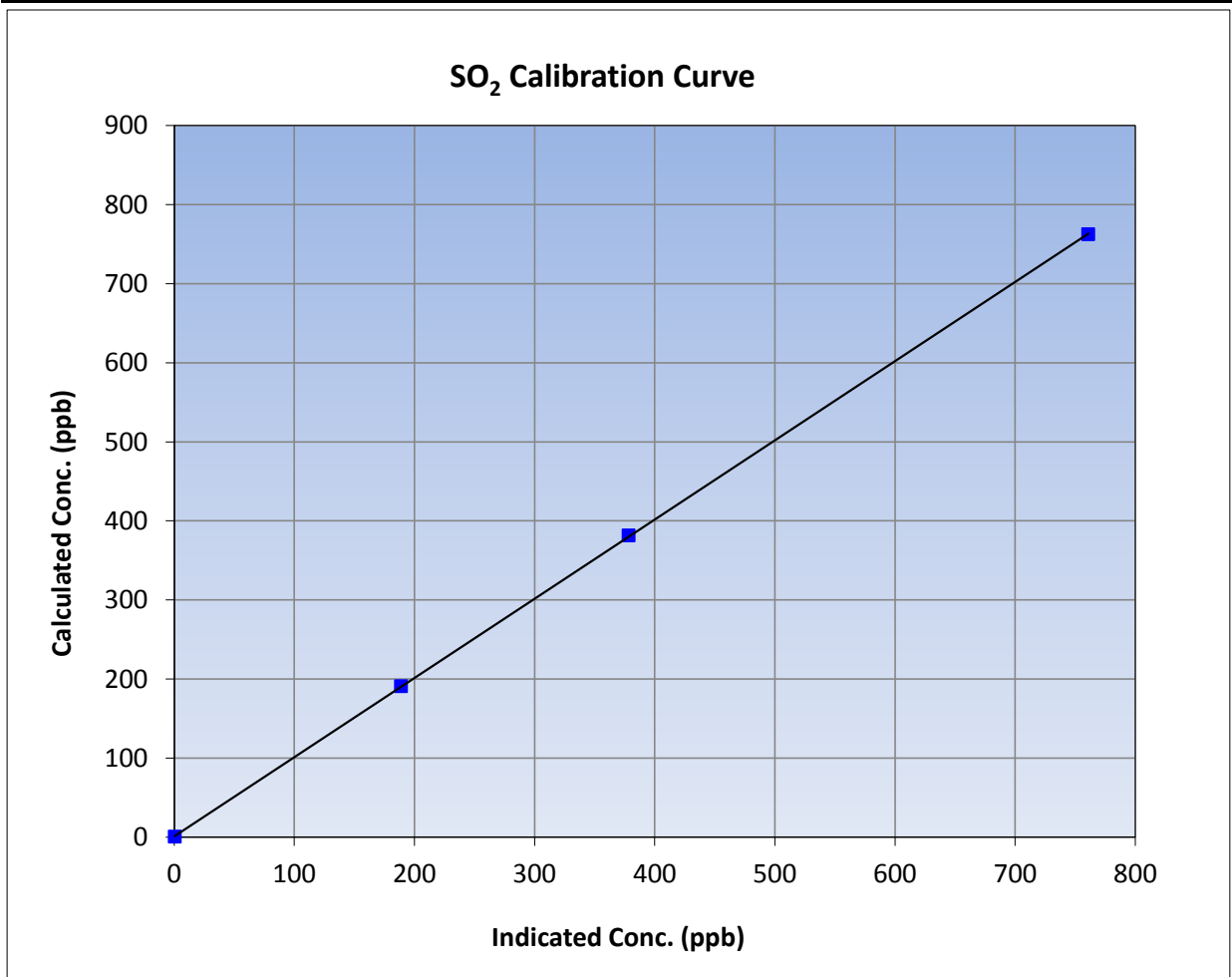
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 20, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:03
Analyzer make	Routine	Analyzer serial #	1218153459

Calibration Data

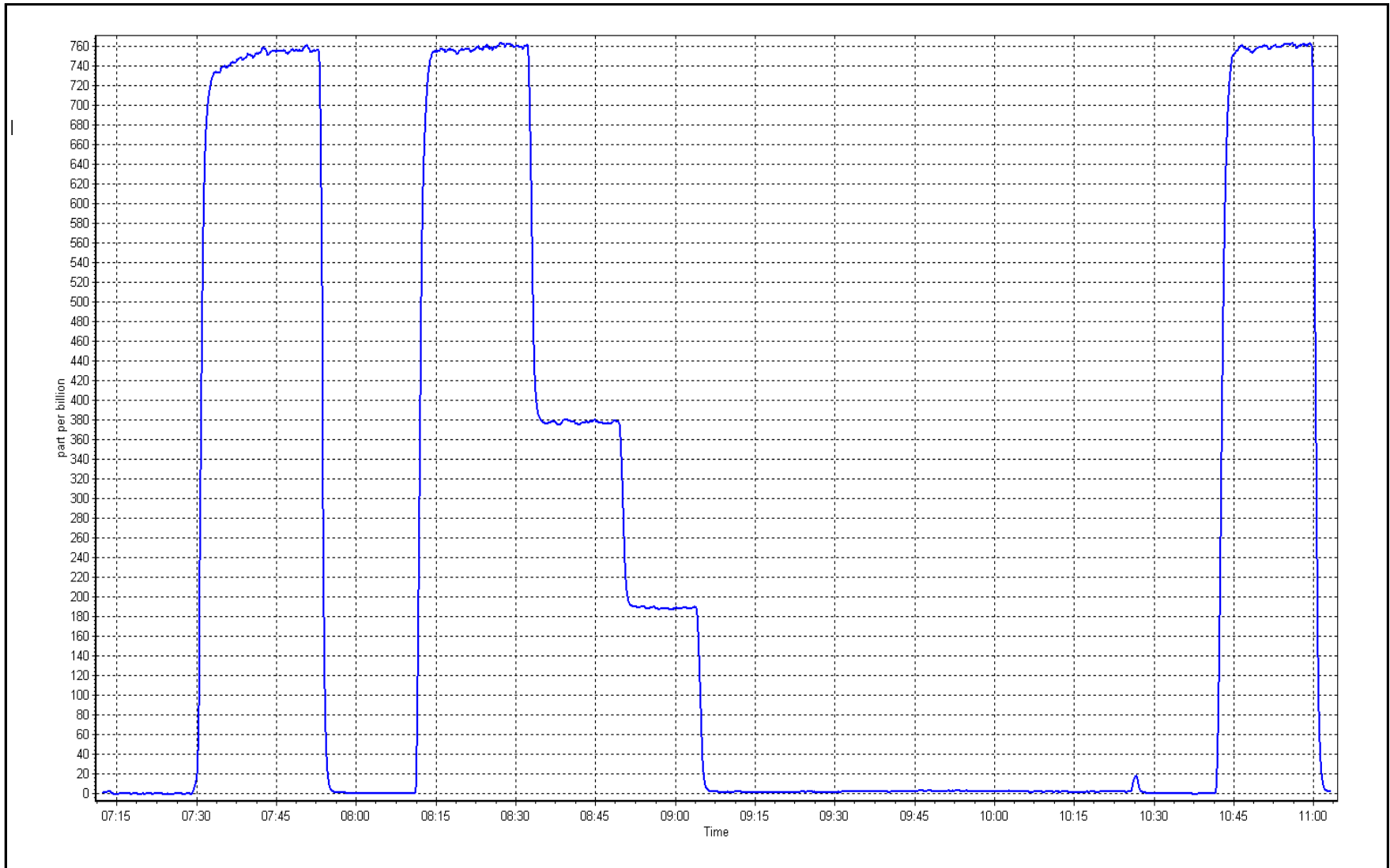
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999984	≥0.995
762.0	760.5	1.0019	Slope	1.001703	0.90 - 1.10
381.1	377.9	1.0084	Intercept	1.076818	+/-30
190.5	188.4	1.0113			



SO2 Calibration Plot

Date: July 12, 2017

Location: Wapasu





Wood Buffalo Environmental Association

H₂S Calibration Summary

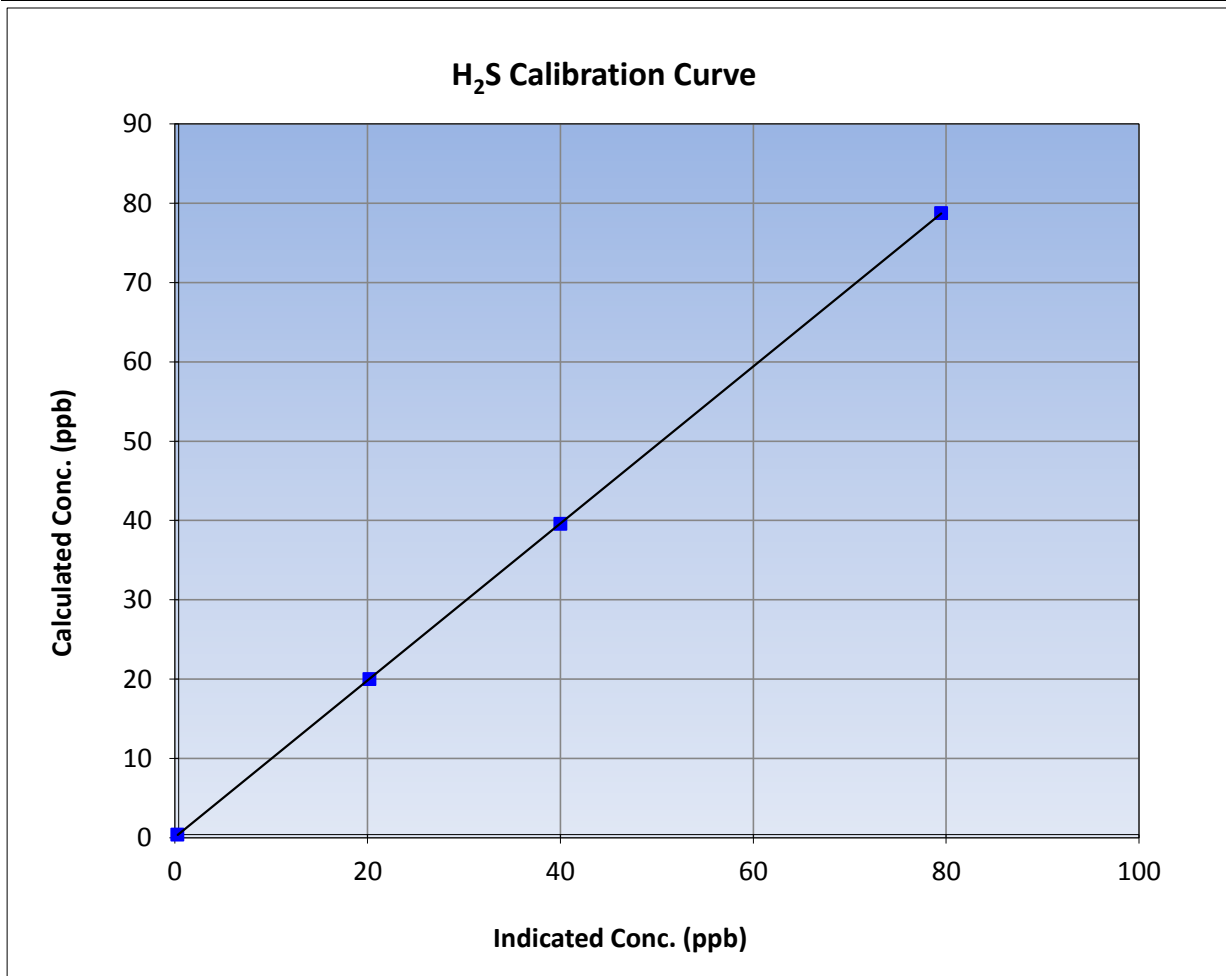
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 21, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	12:49	End Time (MST)	15:08
Analyzer make	Thermo 450i	Analyzer serial #	1218153583

Calibration Data

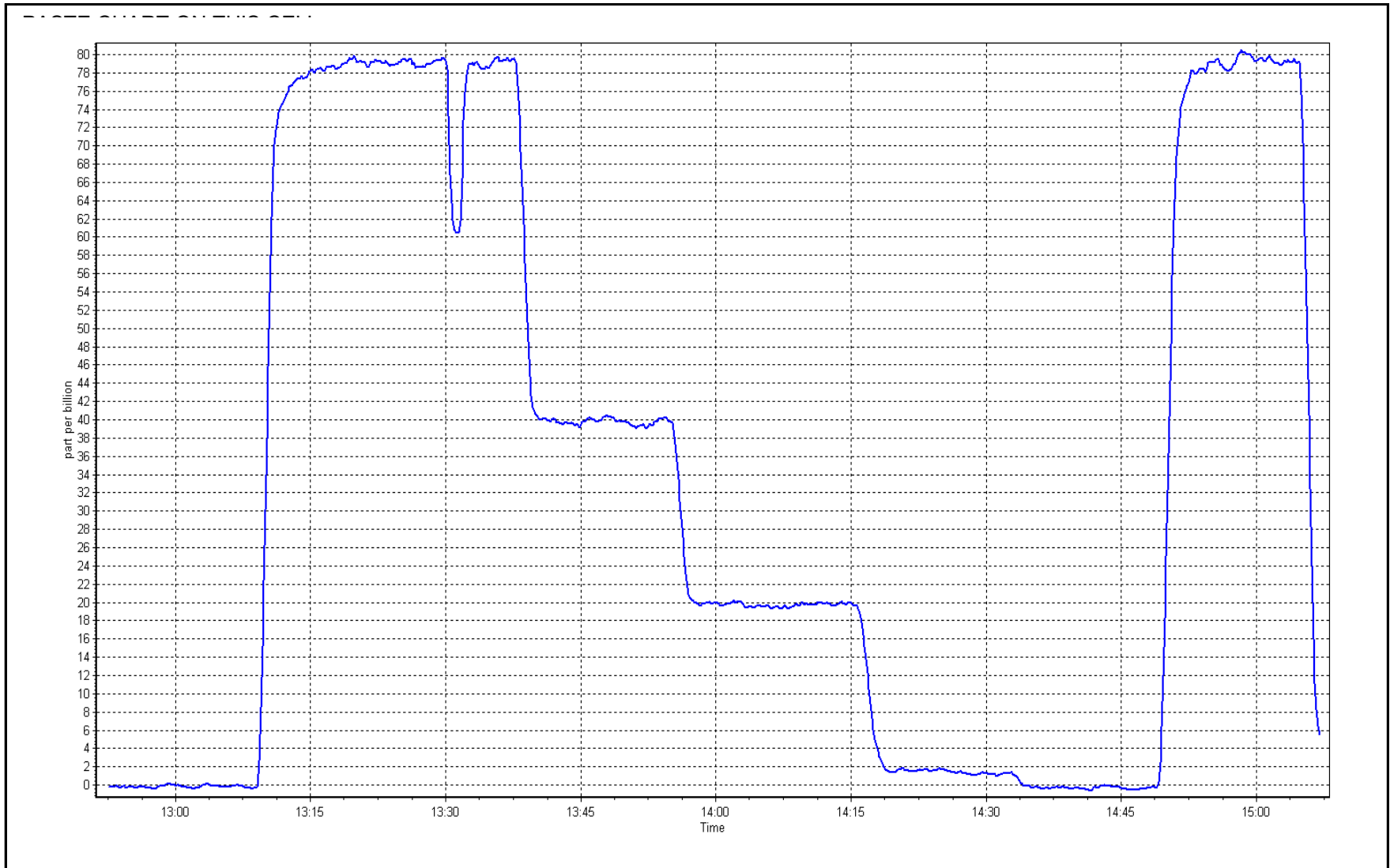
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
78.3	79.1	0.9905		
39.2	39.6	0.9895	Slope	0.90 - 1.10
19.6	19.8	0.9894		
			Intercept	+/-3



H₂S Calibration Plot

Date: July 12, 2017

Location: Wapasu





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	July 12, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	7:00	End time (MST):	11:00
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>	<u>Finish</u>
Analyzer Range	0 - 25 ppm		Bias voltage supply	-296.5
Calculated slope	0.995843	0.994896	Sample pressure	8.5
Calculated intercept	0.009614	-0.027180	Fuel pressure	24.8
Analyzer Background	4.348	4.348	Air pressure	40.5
Analyzer Coefficient	3.110	3.110	Flame temperature	160.2

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	5097	0.0	0.00	0.01	----
as found span	5025	78.4	16.21	16.37	0.990
calibrator zero	5097	0.0	0.00	0.04	----
high point	5025	78.4	16.21	16.33	0.992
second point	5063	39.2	8.11	8.15	0.995
third point	5083	19.6	4.05	4.10	0.988
as left zero	5097	0.0	0.00	0.00	----
as left span	5025	78.4	16.21	16.32	0.993
Average Correction Factor					0.992
Corrected As found	16.36	Previous response	16.27	*% change	-0.6%

* = > +/-5% change initiates investigation

Notes: no maintenance or adjustments done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

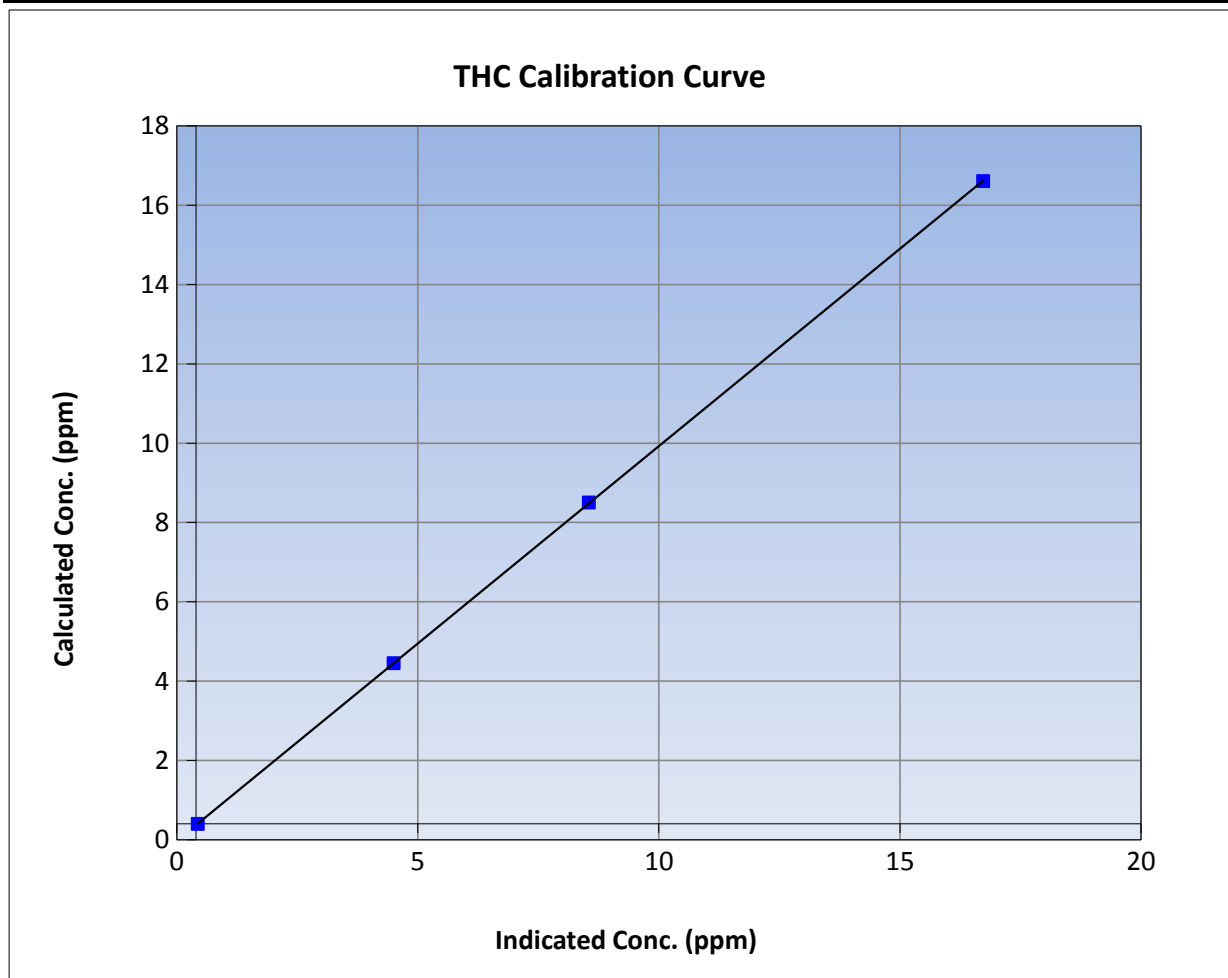
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 20, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	7:00	End Time (MST)	11:00
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153352

Calibration Data

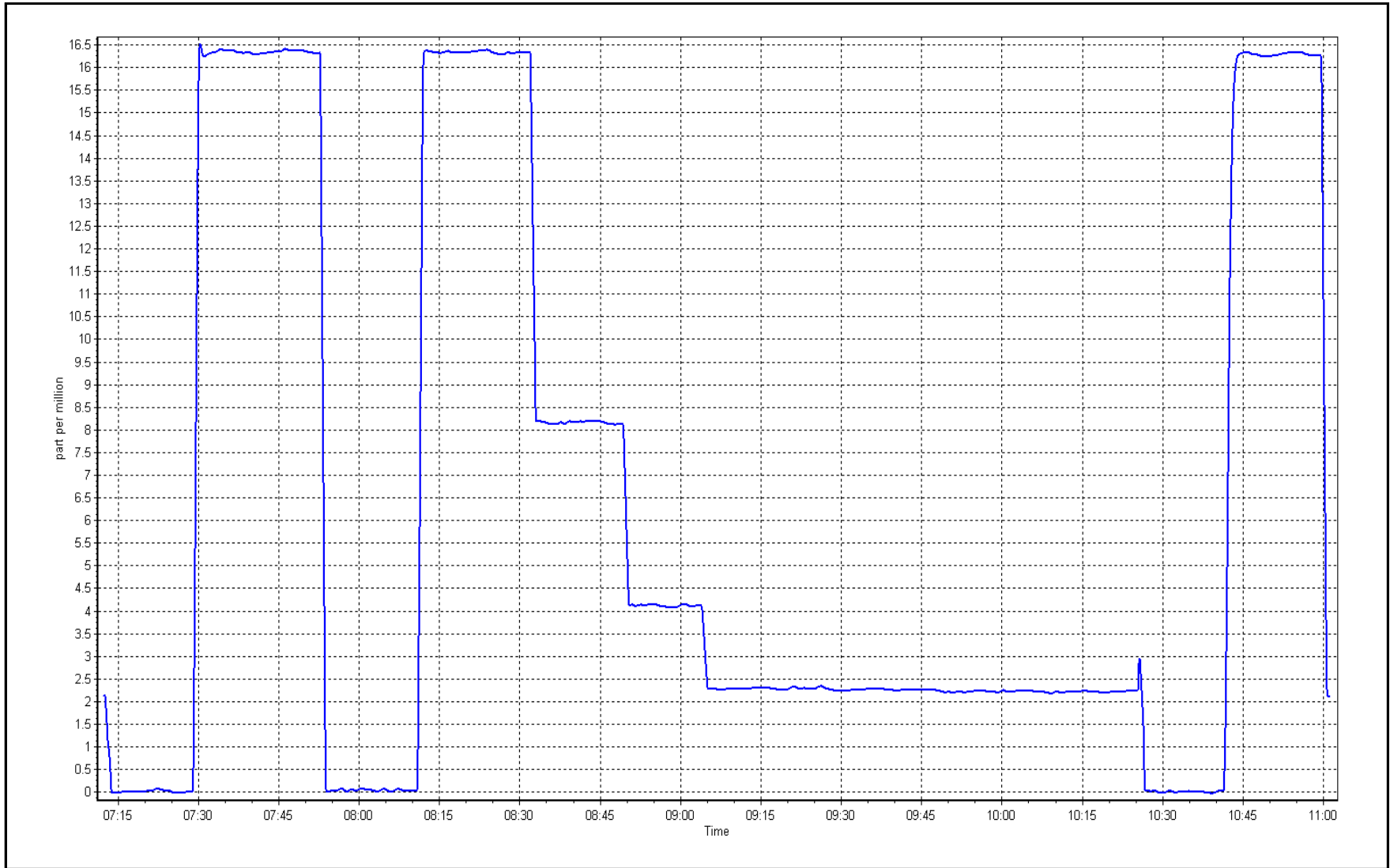
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999994	≥0.995
16.2	16.3	0.9925			
8.1	8.2	0.9945	Slope	0.994896	0.90 - 1.10
4.1	4.1	0.9884			
			Intercept	-0.027180	+/-1.5



THC Calibration Plot

Date: July 12, 2017

Location: Wapasu





Wood Buffalo Environmental Association

O₃ Calibration Summary

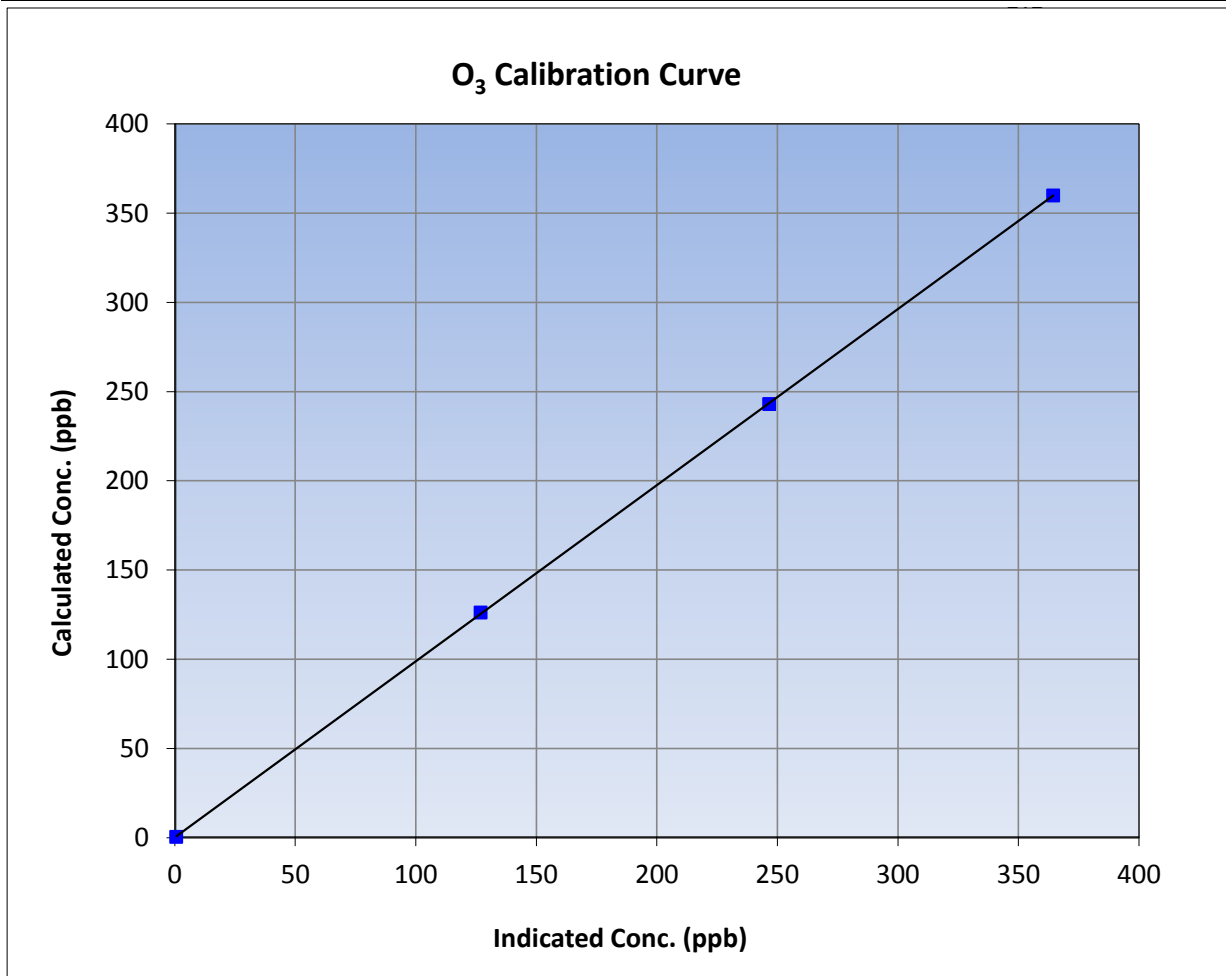
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 21, 2017
Station Name	Wapasu	Station Number	AMS 17
Start Time (MST)	8:30	End Time (MST)	12:51
Analyzer make	Teledyne T400	Analyzer serial #	824

Calibration Data

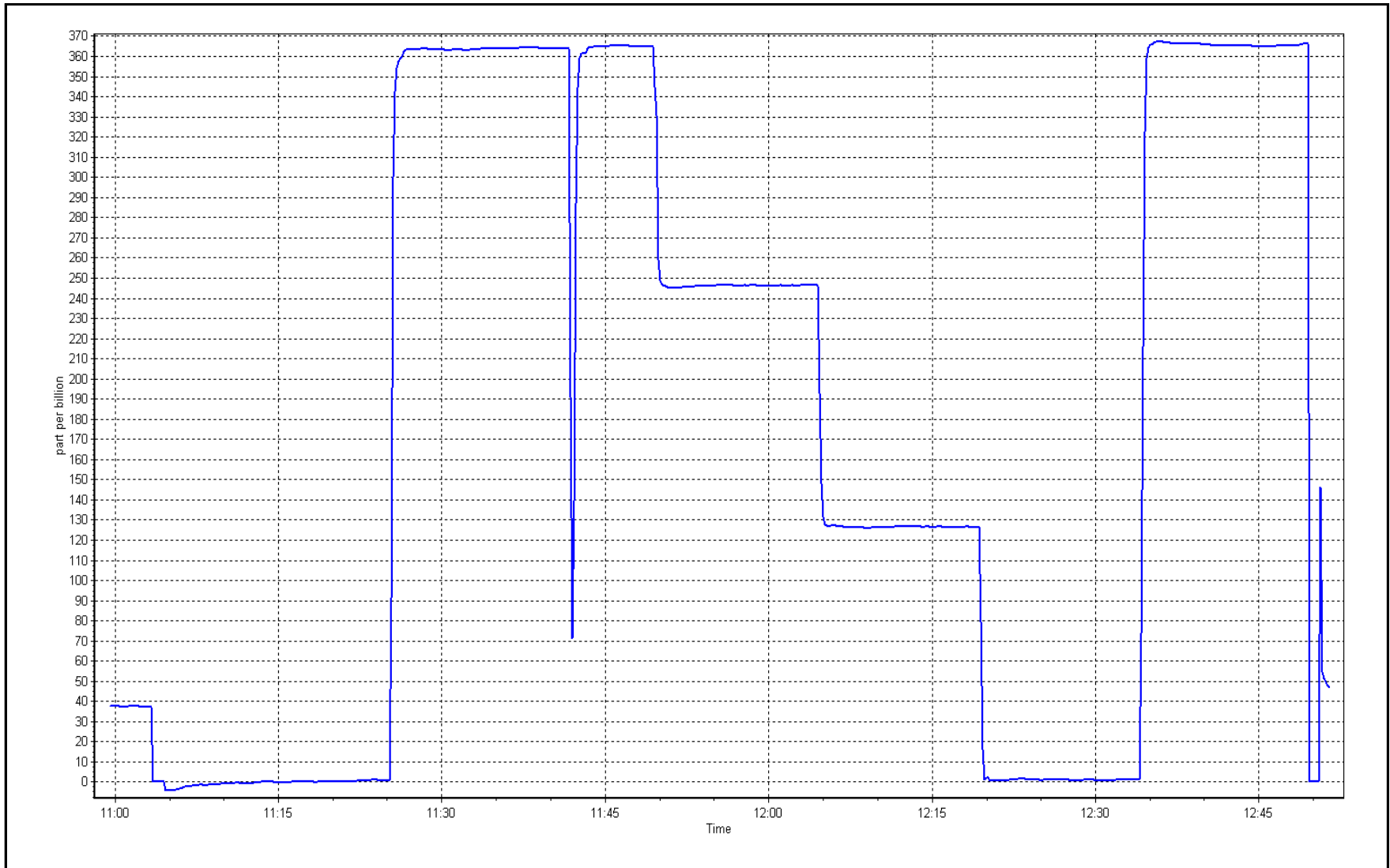
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.3	----	Correlation Coefficient	0.999983	≥0.995
359.5	364.1	0.9874	Slope	0.986904	0.90 - 1.10
242.6	246.3	0.9850	Intercept	0.088545	+/- 10
125.8	126.5	0.9945			



O₃ Calibration Plot

Date: July 12, 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:	July 12, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	7:00	End time (MST):	11:01
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	0.946	0.946	NOX Range (ppb) 0 - 1000 ppb
NOX coefficient	0.946	0.946	PMT Temperature 7.0 7.0
NO2 coefficient	1.000	1.000	Reaction cell Press 3.2 3.2
NO bkgrnd	0.0	0.0	Sample Flow 445 445
NOX bkgrnd	0.1	0.1	HVPS Voltage 781 781

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.989952	0.987749
NO _x Cal Offset	1.763802	1.559656
NO Cal Slope	0.993897	0.987983
NO Cal Offset	1.249369	2.219715
NO ₂ Cal Slope	1.000835	1.009537
NO ₂ Cal Offset	-0.051066	-0.246435



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	0.7	-0.1	0.9	----	----
as found span	5025	78.4	783.5	783.5	0.0	792.7	790.2	2.5	0.9884	0.9915
calibrator zero	5097	0.0	0.0	0.0	0.0	0.2	0.1	0.2	----	----
high point	5025	78.4	783.5	783.5	0.0	792.4	792.3	0.2	0.9887	0.9889
second point	5063	39.2	391.8	391.8	0.0	394.5	392.0	2.5	0.9932	0.9996
third point	5083	19.6	195.9	195.9	0.0	194.8	194.5	0.2	1.0056	1.0072
as left zero	5097	0.0	0.0	0.0	0.0	0.1	0.2	-0.1	----	----
as left span	5025	78.4	783.5	431.7	351.8	784.2	429.3	354.9	0.9991	1.0056
Average Correction Factor									0.9959	0.9985

Corrected As found	NO _x = 792.0 ppb	NO = 790.3 ppb		*Percent Change	NO _x = -0.3%
Previous Response	NO _x = 789.7 ppb	NO = 787.0 ppb		*Percent Change	NO = -0.4%
<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	791.4	791.2	0.3	0.9900	0.9902	----	----
1st NO2 (400 ppb O3)	431.7	359.5	787.9	431.7	356.2	0.9944	----	1.0093	99.1%
2nd NO2 (200 ppb O3)	548.6	242.6	789.4	548.6	240.8	0.9925	----	1.0075	99.3%
3rd NO2 (100 ppb O3)	665.4	125.8	790.0	665.4	124.8	0.9917	----	1.0080	99.2%
2nd NO ref point	----	0.0	790.9	788.9	2.1	0.9906	0.9931	----	----
Average Correction Factor						0.9923	0.9917	1.0083	99.2%

Notes: no maintenance or adjustments done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

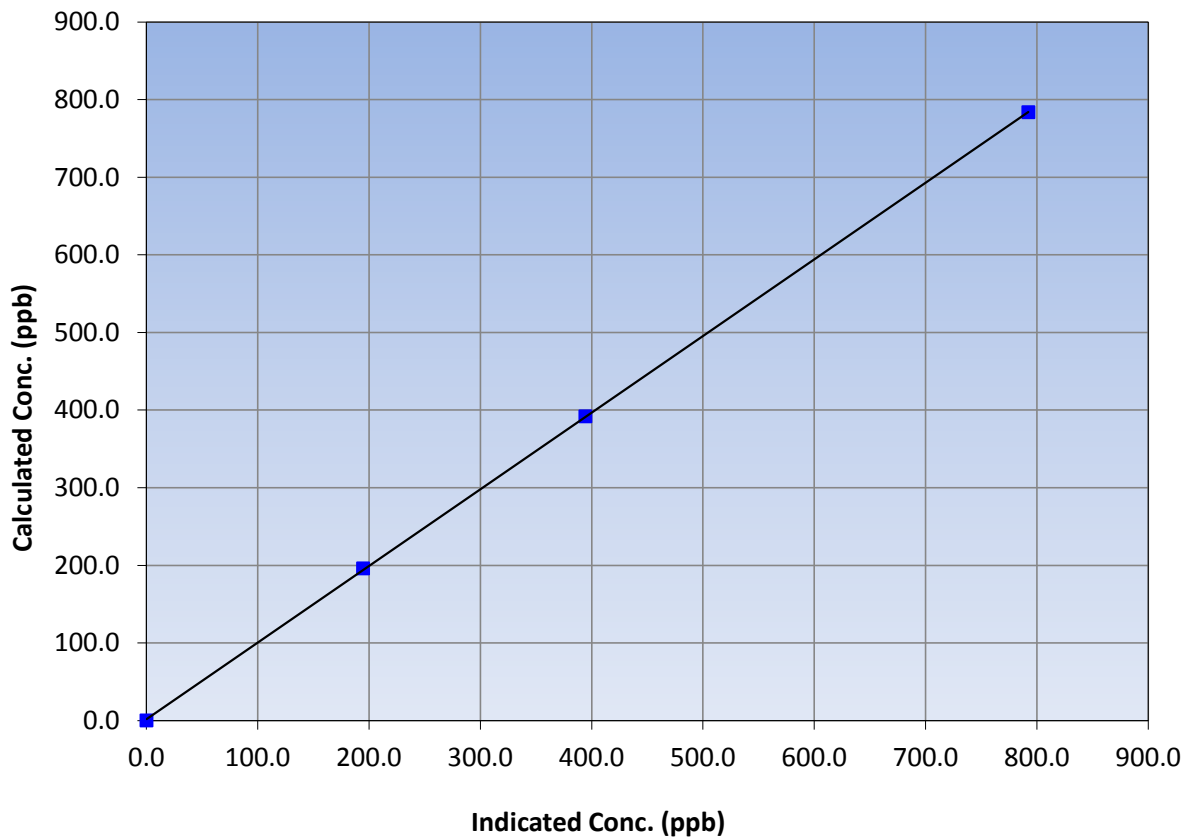
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 20, 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	0.2	----	Correlation Coefficient	≥0.995	
783.5	792.4	0.9887			
391.8	394.5	0.9932			
195.9	194.8	1.0056			
			Slope	0.987749	0.90 - 1.10
			Intercept	1.559656	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

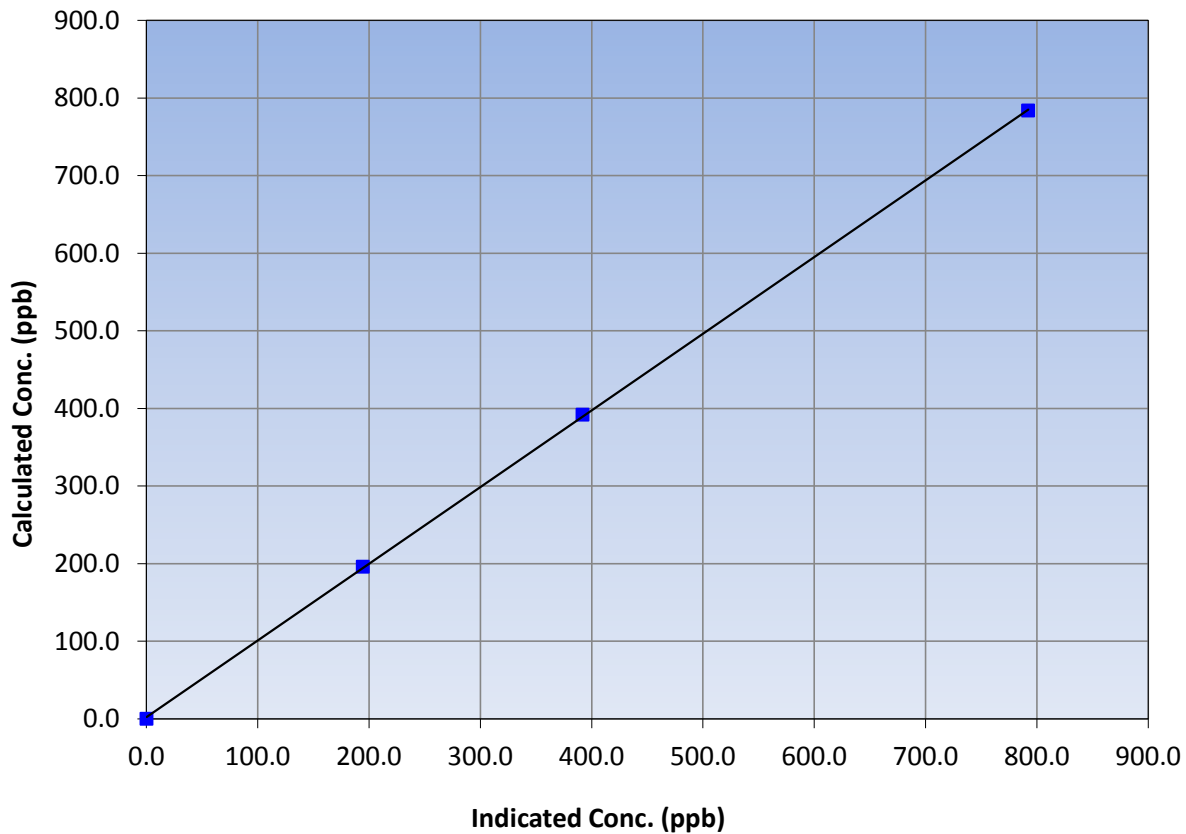
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 20, 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	0.1	----	Correlation Coefficient	≥0.995	
783.5	792.3	0.9889			
391.8	392.0	0.9996			
195.9	194.5	1.0072			
			Slope	0.987983	0.90 - 1.10
			Intercept	2.219715	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

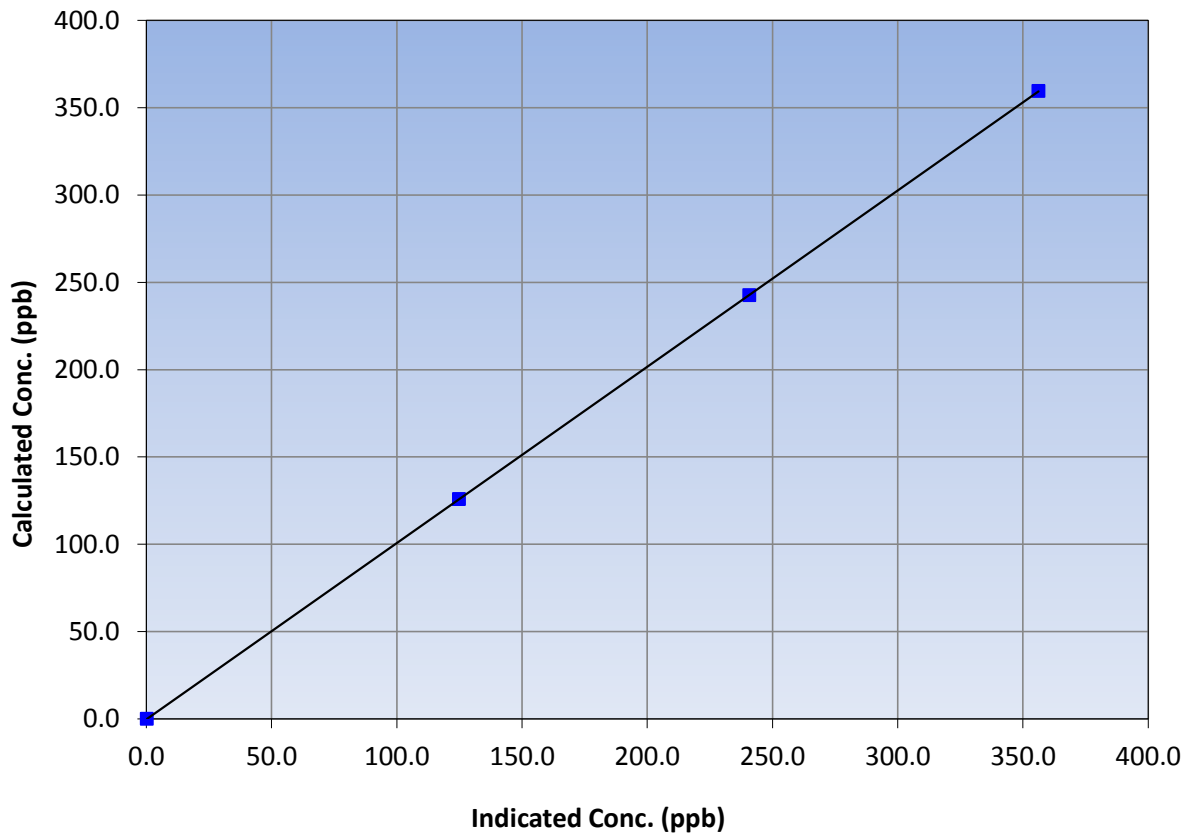
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 20, 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	0.2	----	Correlation Coefficient	≥0.995	
359.5	356.2	1.0093			
242.6	240.8	1.0075			
125.8	124.8	1.0080			
			Slope	1.009537	0.90 - 1.10
			Intercept	-0.246435	+/-20

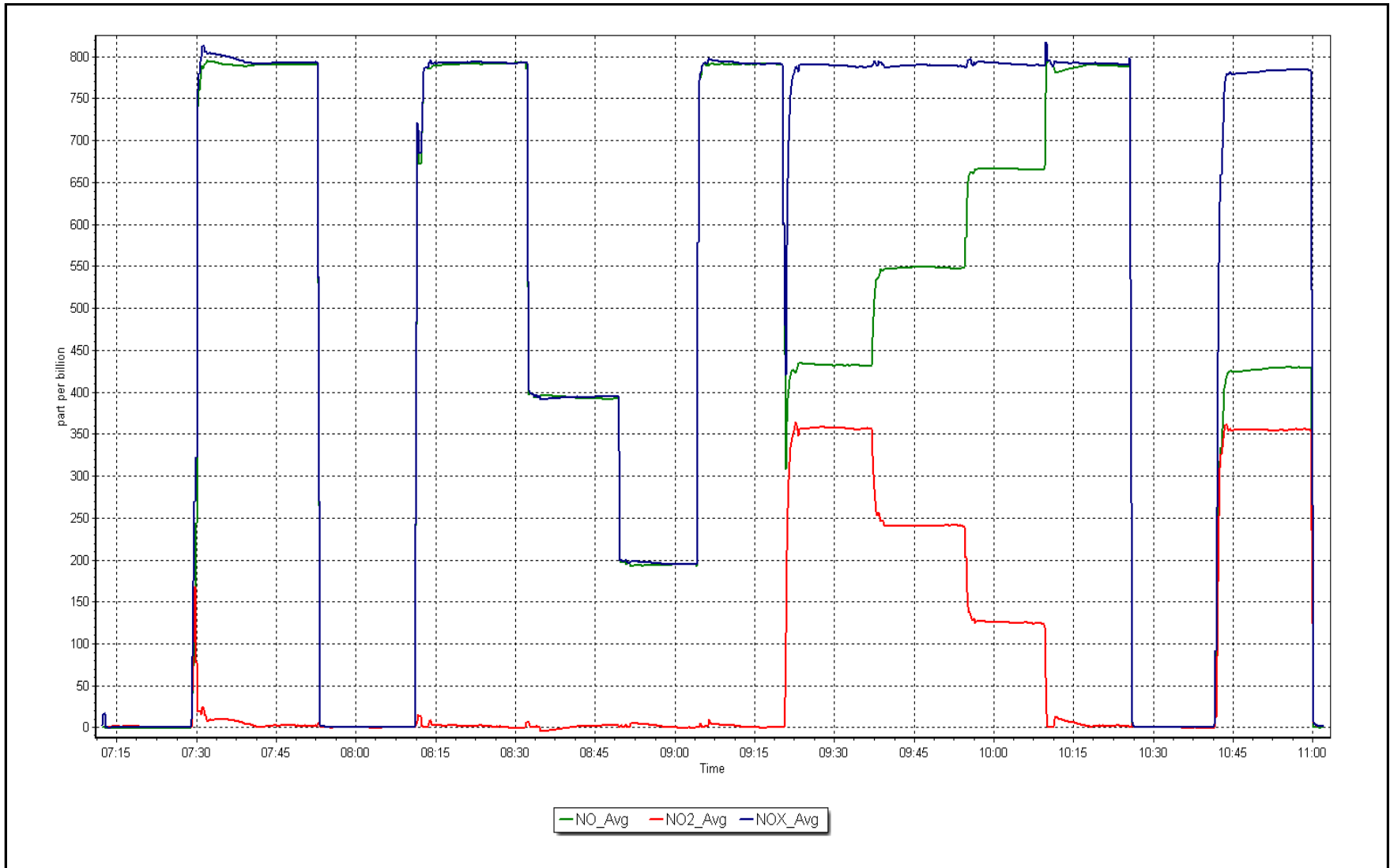
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 12, 2017

Location: Wapasu





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

Station Name:	Wapasu	Station number:	AMS 17
Calibration Date:	July 12, 2017	Last Cal Date:	May 25, 2017
Start time (MST):	12:52	End time (MST):	13:49
Sharp Model:	5030	S/N:	CM-2390
Particulate Fraction:	PM2.5	C14 Source S/N:	10391
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)	23	23.5	23	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	953	955	953	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1000	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	0.6	-----	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: July 12, 2017 Last Cal Date: April 13, 2017
 Flow w/o adaptor: 16.73 Flow w/ adaptor: 16.33

(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>2519</u>	Foil S/N: <u>2519</u>	
Foil Calibration	Foil Mass: <u>1326</u>	Foil Mass: <u>1326</u>	
	Calibration Date: <u>July 12, 2017</u>	Calibration Date: <u>April 13, 2017</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>6949</u>	Correction Factor: <u>7090</u>	-1.99%

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

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
STONY MOUNTAIN
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 JULY 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	707	37	37	100	1	0	0	0
TRS(ppb) Average	708	35	36	99.87	0	0	0	0
THC(ppm) Average	707	37	37	100	2.3	-	2.1	-
NMHC(ppm) Average	707	37	37	100	0.34	-	0.178	-
CH4(ppm) Average	707	37	37	100	2.1	-	2	-
O3 (ppb) Average	709	35	35	100	63	0	47	-
NO2 (ppb) Average	707	37	37	100	4	0	1	-
NO (ppb) Average	707	37	37	100	1	-	0	-
NOX (ppb) Average	707	37	37	100	4	-	1	-
PM2.5 (ug/m3) Average	742	2	2	100	28.3	-	14.2	0
Wind Speed 10 m (km/h) Average	743	0	1	99.87	19	-	13	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	0	-	-
Temperature 2 m (C) Average	744	0	0	100	28.7	-	21.5	-
Relative Humidity (%) Average	744	0	0	100	100	-	96.0	-
Precipitation (mm) Total	744	0	0	100	6.6	-	26.1	-
Leaf Wetness (% of range) Average	744	0	0	100	44	-	18.0	-
Global Solar Radiation (W/m2) Average	744	0	0	100	1008	-	348.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 JULY 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	707	0.2	0	-	0	0	0	0	0	0	0	1
TRS (ppb) Average	708	0.3	0	-	0	0	0	0	0	0	0	0
THC (ppm) Average	707	1.99	0.1	-	1.8	1.9	1.9	2	2	2.1	2.3	
NMHC(ppm) Average	707	0.087	0.049	-	0	0	0.1	0.1	0.1	0.1	0.1	0.34
CH4(ppm) Average	707	1.9	0	-	1.8	1.9	1.9	1.9	1.9	2	2.1	
O3 (ppb) Average	709	34.1	8	-	15	25	28	33	39	45	63	
NO2 (ppb) Average	707	0.6	0	-	0	0	0	1	1	1	4	
NO (ppb) Average	707	0.1	0	-	0	0	0	0	0	0	1	
NOX (ppb) Average	707	0.7	0	-	0	0	0	1	1	1	4	
PM2.5 (ug/m3) Average	742	7.26	4.9	-	1	2.3	3.3	6	9.9	14.7	28.3	
Wind Speed 10 m (km/h) Average	743	6.2	3	-	0	2	4	6	8	11	19	
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	17.39	4.6	-	7.4	12	13.9	16.7	21.1	23.8	28.7	
Relative Humidity (%) Average	744	71.1	19	-	33	44	55	72	87	97	100	
Precipitation (mm) Total	744	-	-	104.41	-	-	-	-	-	-	-	
Surface Wetness (% of range) Average	744	5	8	-	0	1	1	2	4	18	44	
Global Solar Radiation (W/m2) Average	744	242.7	298	-	0	0	1	73	460	759	1008	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	28 Jul 2017 09:00	28 Jul 2017 09:00	1	Maintenance - verify daily QA response
Wind Speed, Wind Direction	07 Jul 2017 21:00	07 Jul 2017 21:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

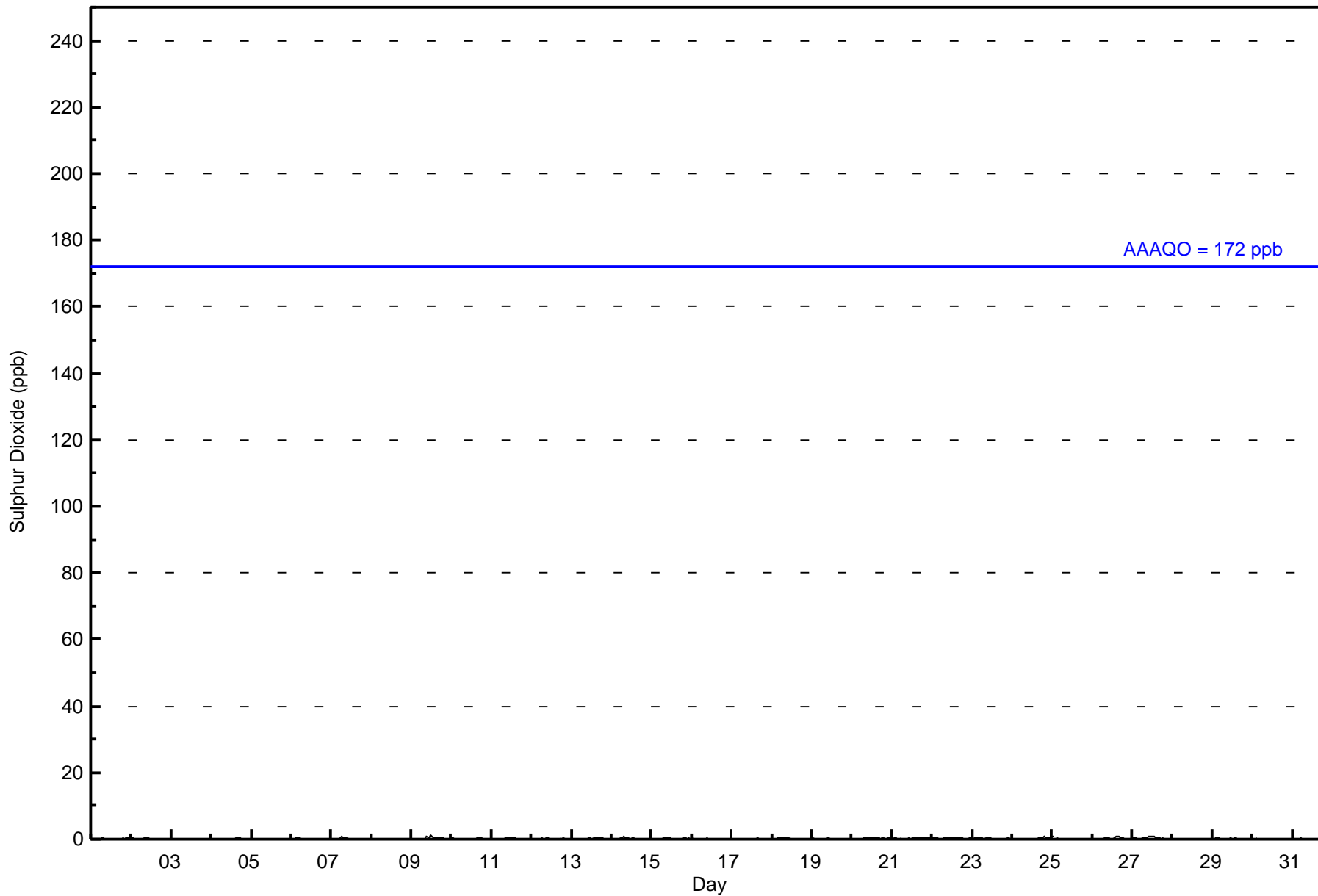
Stony Mountain - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 1 ppb on Jul 9 12:00										Maximum Daily Average: 0.4 ppb on Jul 27										Hours of Data: 707						
Minimum Value: 0 ppb on Jul 3 02:00										Minimum Daily Average: 0.0 ppb on Jul 3										Hours of Missing Data: 37						
Maximum Diurnal Average: 0.2 ppb at hour 10										Minimum Diurnal Average: 0.1 ppb at hour 5										Hours of Calibration: 37						
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: 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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
8-Jul	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-Jul	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
10-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0
13-Jul	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-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
15-Jul	0	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
16-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Jul	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
22-Jul	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
23-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1
25-Jul	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
26-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0.3	1
27-Jul	0	0	0	0	Z	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1
28-Jul	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-Jul	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
30-Jul	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
31-Jul	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
0.2																								Diurnal Average		
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
Stony Mountain - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - July 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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

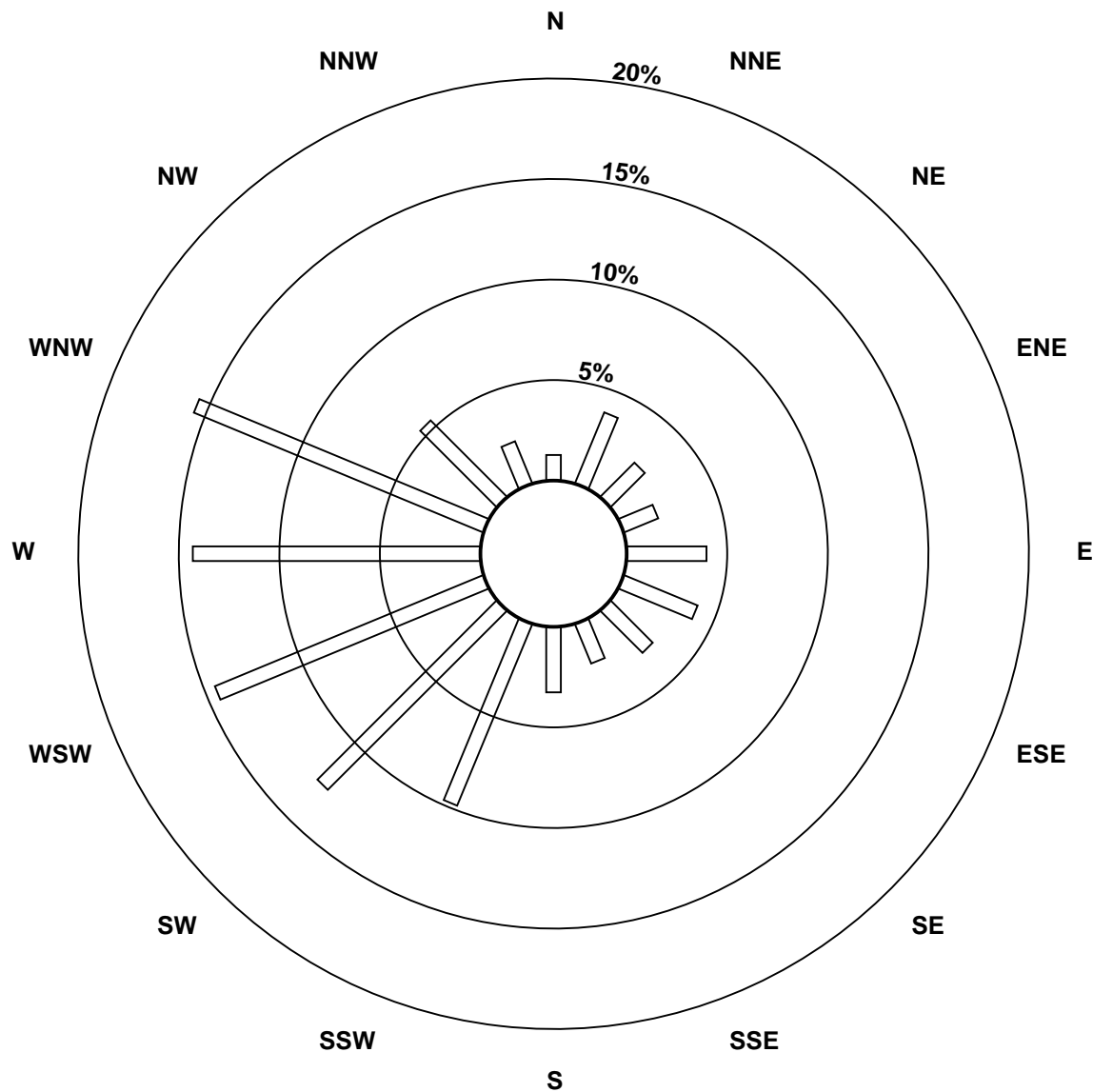
Total Number of Valid Hours: 706

Total Number of Hours: 744

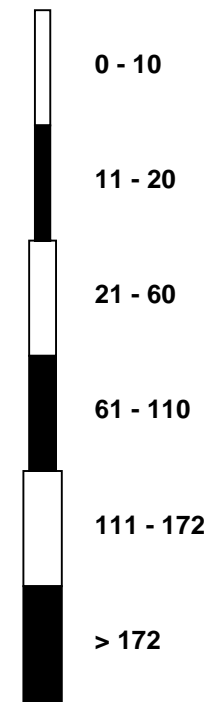


Wood Buffalo Environmental Association
Wind Rose Jul 2017

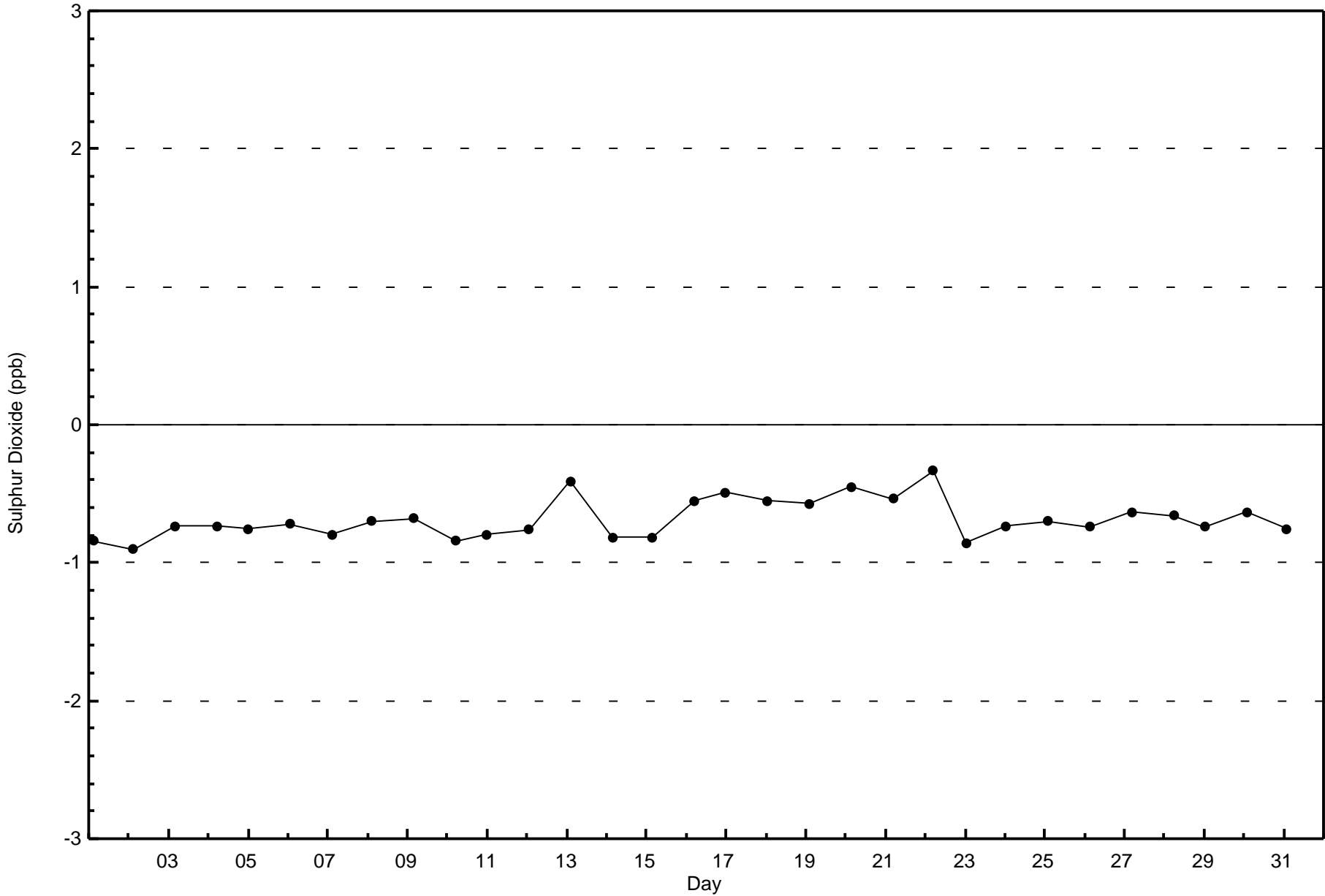
Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)

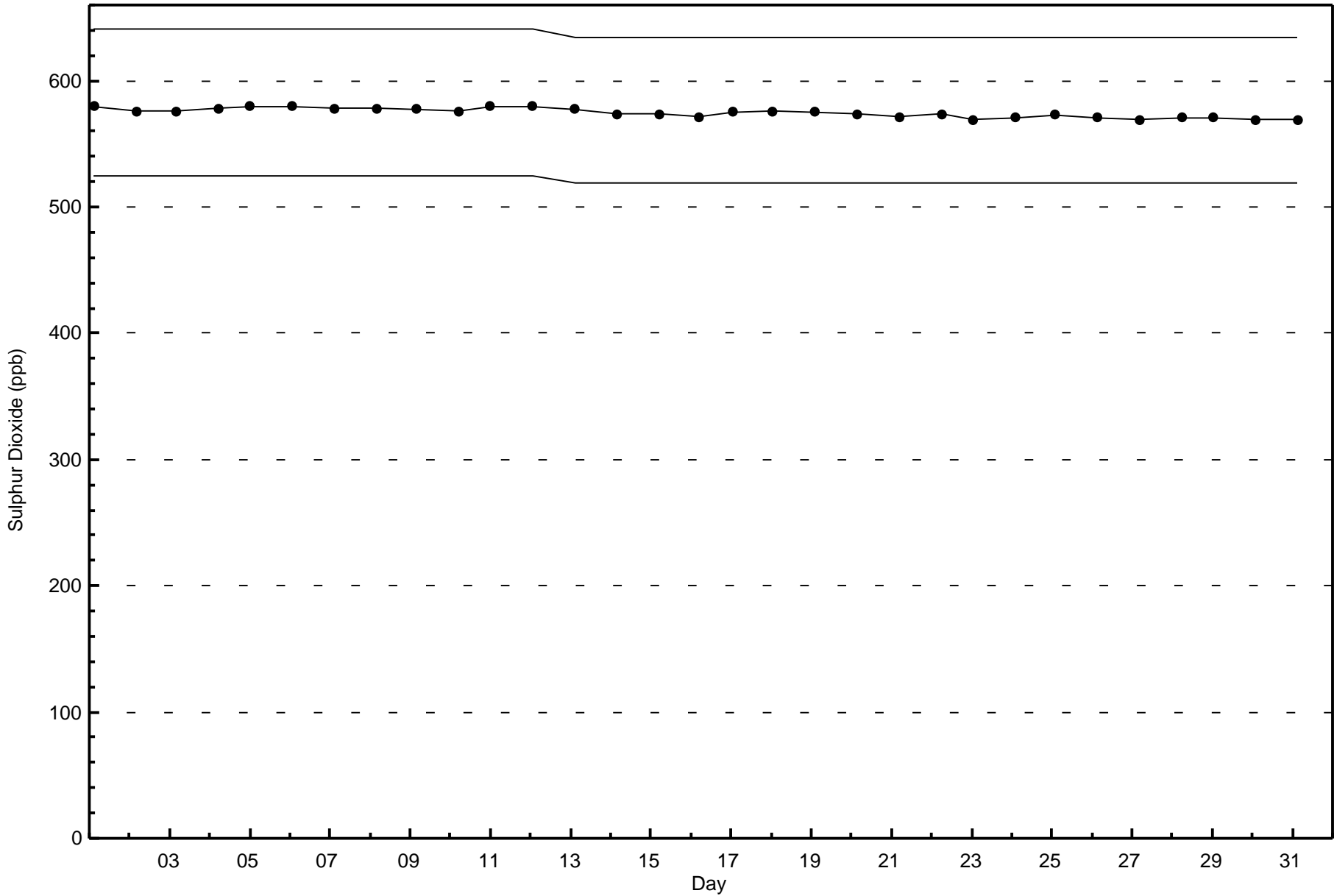


Classes (ppb)



Total Number of Valid Hours: 706





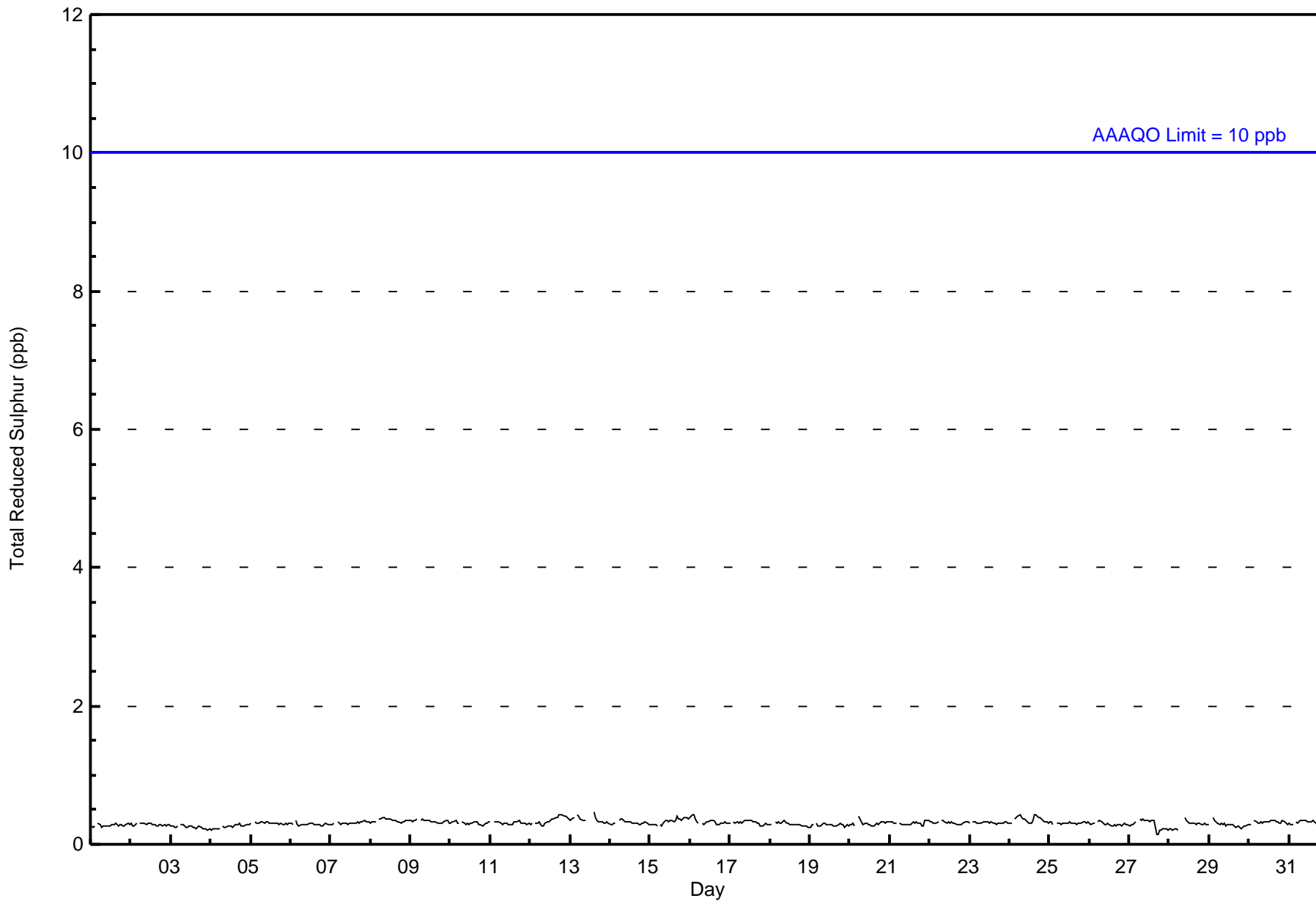


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 0 ppb on Jul 13 15:00										Maximum Daily Average: 0.4 ppb on Jul 24										Hours of Data: 708						
Minimum Value: 0 ppb on Jul 27 17:00										Minimum Daily Average: 0.2 ppb on Jul 3										Hours of Missing Data: 36						
Maximum Diurnal Average: 0.3 ppb at hour 7										Minimum Diurnal Average: 0.3 ppb at hour 20										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 = 0 P ₉₉ = 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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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
9-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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
14-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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
25-Jul	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-Jul	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
27-Jul	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-Jul	0	0	0	0	0	0	Z	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
29-Jul	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-Jul	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
31-Jul	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
0.3																								Diurnal Average		
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
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - July 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	9	27	17	11	27	27	20	20	24	70	88	100	100	114	37	16	707
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	9	27	17	11	27	27	20	20	24	70	88	100	100	114	37	16	707

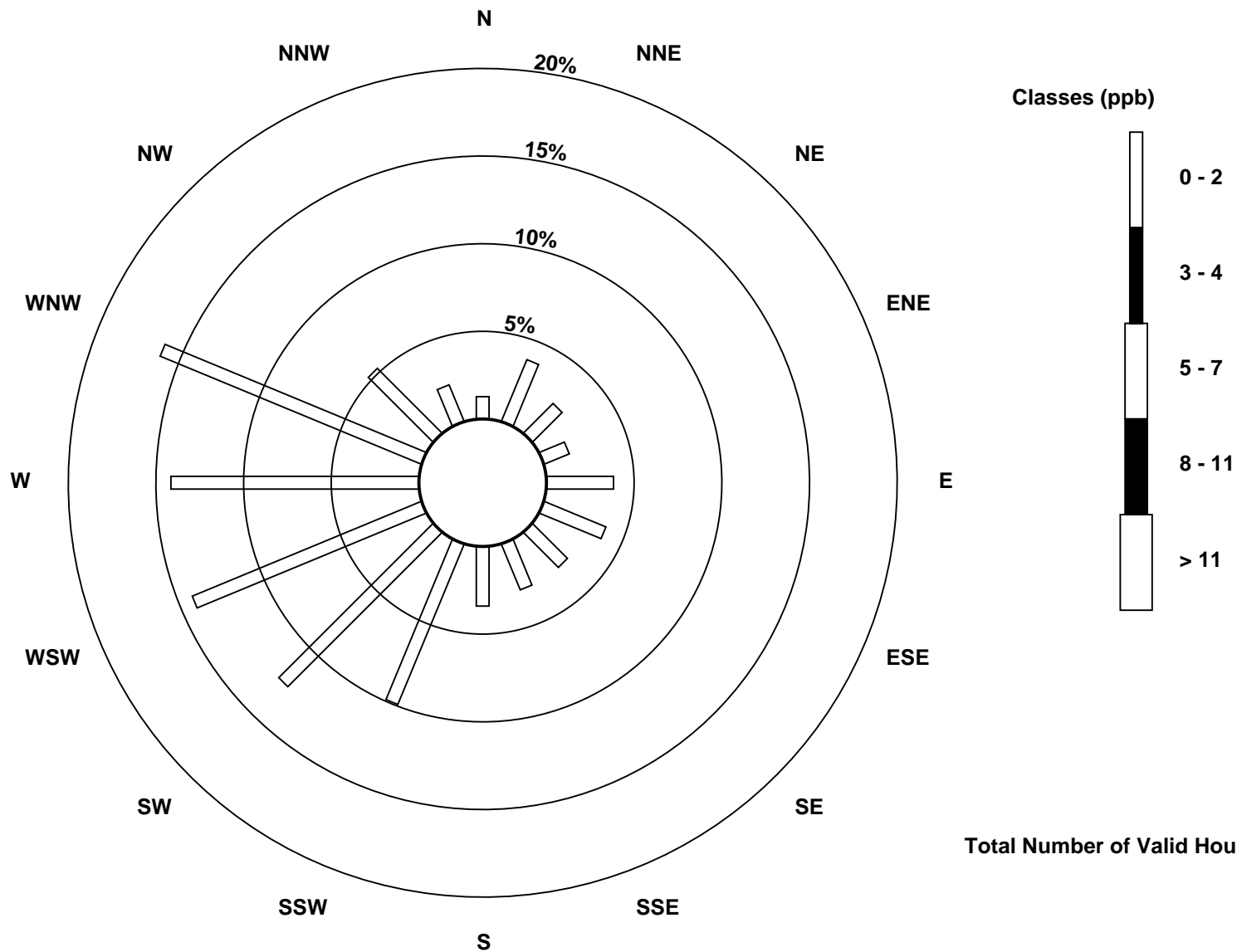
Total Number of Valid Hours: 707

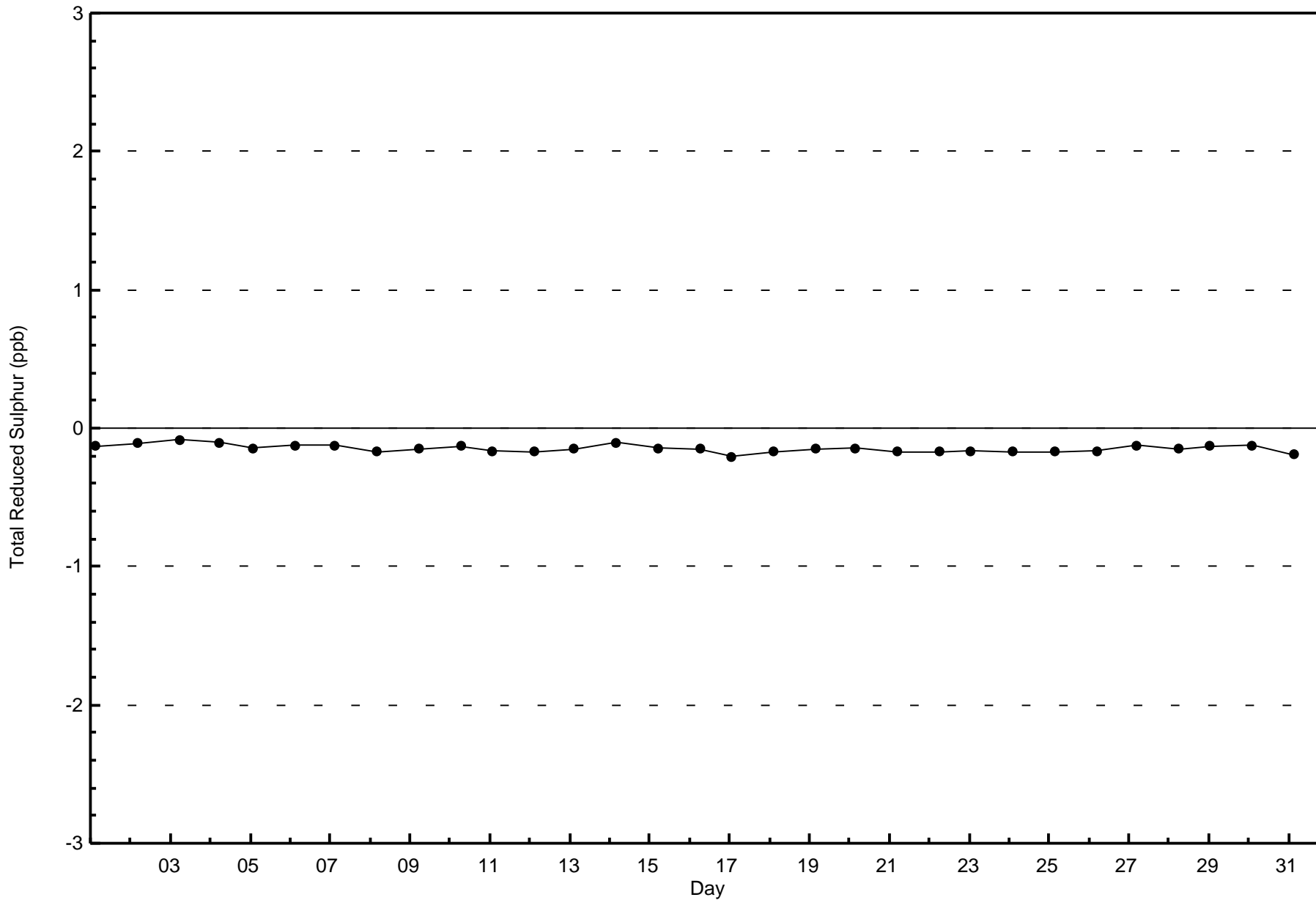
Total Number of Hours: 744

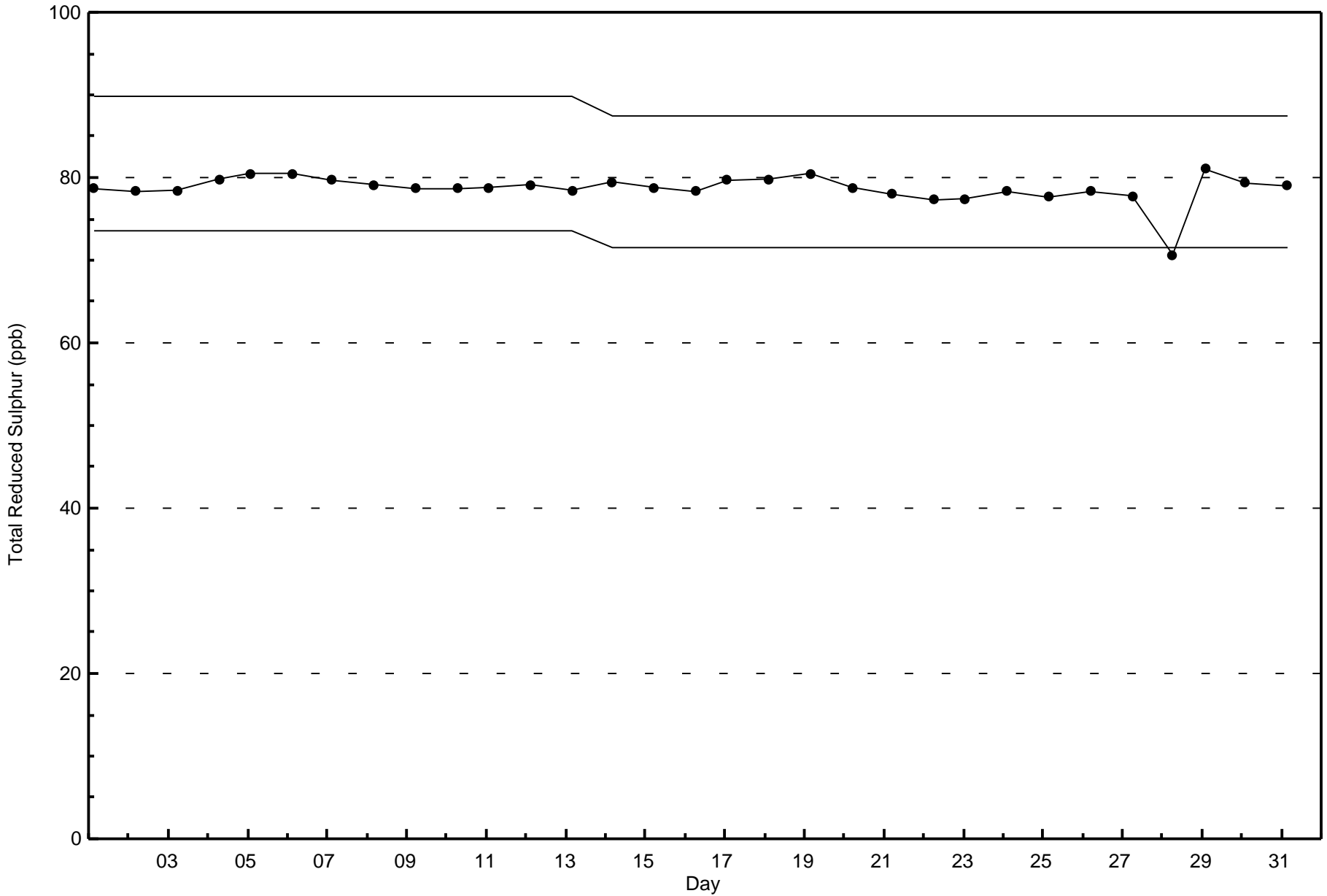


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Stony Mountain (AMS 18)







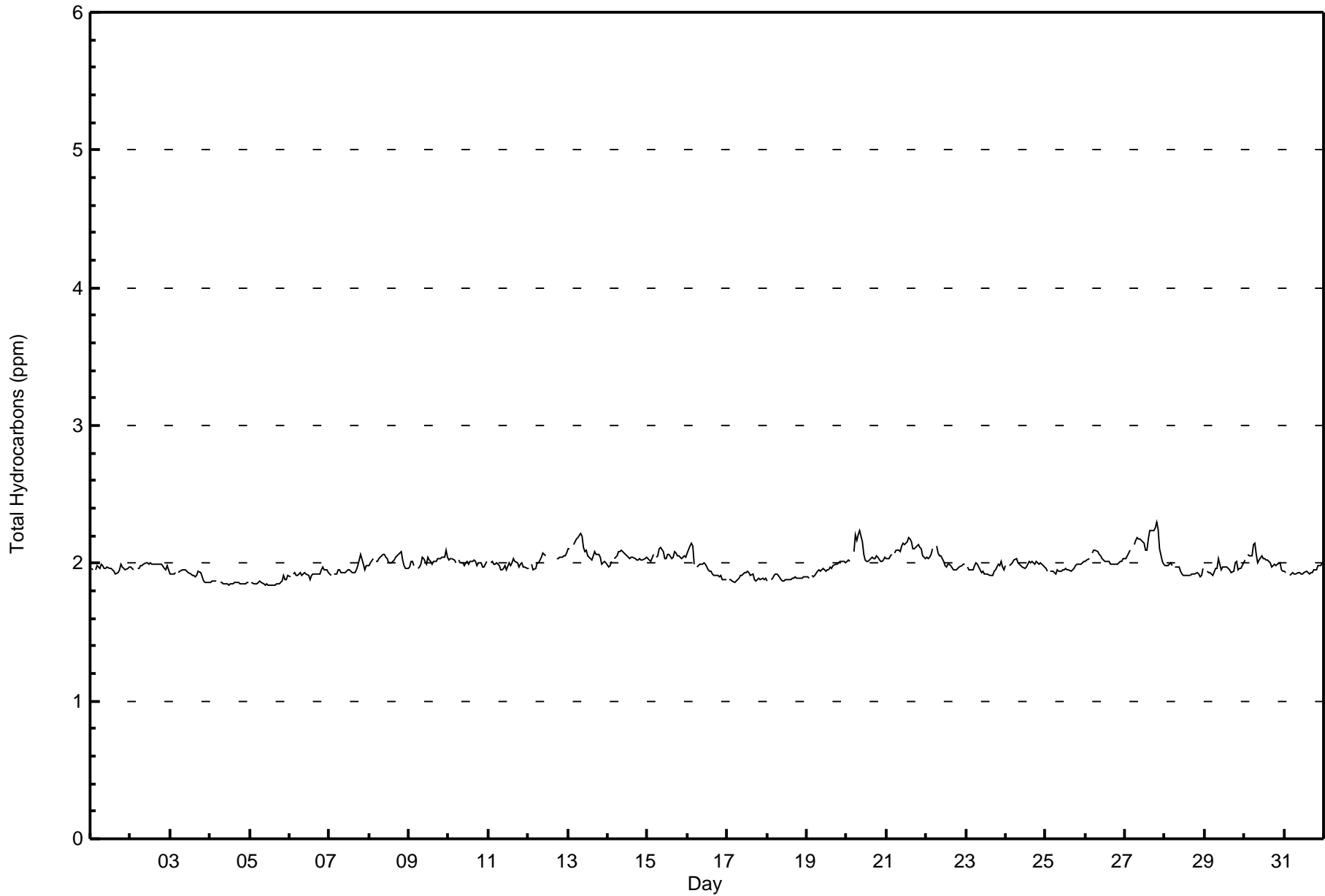


Maximum Value: 2.3 ppm on Jul 27 20:00		Maximum Daily Average: 2.1 ppm on Jul 27		Hours in Service: 744																								
Minimum Value: 1.8 ppm on Jul 5 13:00		Minimum Daily Average: 1.9 ppm on Jul 4		Hours of Data: 707																								
Maximum Diurnal Average: 2.0 ppm at hour 7		Minimum Diurnal Average: 2.0 ppm at hour 23		Hours of Missing Data: 37																								
Monthly Average: 1.99 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.2		Hours of Calibration: 37																								
				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-Jul	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
2-Jul	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	2.0		
3-Jul	1.9	1.9	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	1.9	1.9	1.9		
4-Jul	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	1.8	1.9	1.9	1.9	1.9	1.9		
5-Jul	Z	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	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9		
6-Jul	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	2.0	2.0	1.9	1.9		
7-Jul	1.9	1.9	Z	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0		
8-Jul	2.0	2.0	2.0	Z	2.0	2.0	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0		
9-Jul	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	2.1	2.0	2.0	2.1		
10-Jul	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		
11-Jul	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
12-Jul	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	C	C	C	C	C	C	2.0	2.0	2.0	2.0	2.1	2.1	2.1	--	2.1		
13-Jul	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	
14-Jul	2.0	2.0	2.0	Z	2.0	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	
15-Jul	2.0	2.0	2.0	2.1	Z	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	
16-Jul	2.1	2.1	2.1	2.1	2.0	Z	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	2.0	2.1
17-Jul	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
18-Jul	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	1.9
19-Jul	1.9	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	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
20-Jul	2.0	2.0	2.0	Z	2.1	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2
21-Jul	2.0	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	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	2.0	2.1	2.2	
22-Jul	2.0	2.0	2.0	2.1	2.1	Z	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	2.0	2.0	2.0	2.0	2.0	2.1
23-Jul	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	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
24-Jul	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	2.0	2.0	2.0	2.0	2.0
25-Jul	2.0	1.9	Z	1.9	1.9	1.9	1.9	2.0	1.9	1.9	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	2.0	2.0	2.0	2.0
26-Jul	2.0	2.0	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Jul	2.0	2.1	2.1	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.0	2.0	2.1	2.3	
28-Jul	2.0	2.0	2.0	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	2.0	2.0
29-Jul	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Jul	2.0	Z	2.1	2.1	2.1	2.1	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	2.0	2.0	2.0	2.0	1.9	2.0	2.1
31-Jul	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	591	83.59	83.59
2.1 - 3.0	116	16.41	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - July 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	18	9	7	23	17	17	10	14	43	82	98	96	99	35	14	590
2.1 - 3.0	1	9	8	6	5	11	4	5	9	26	7	4	5	11	3	2	116
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

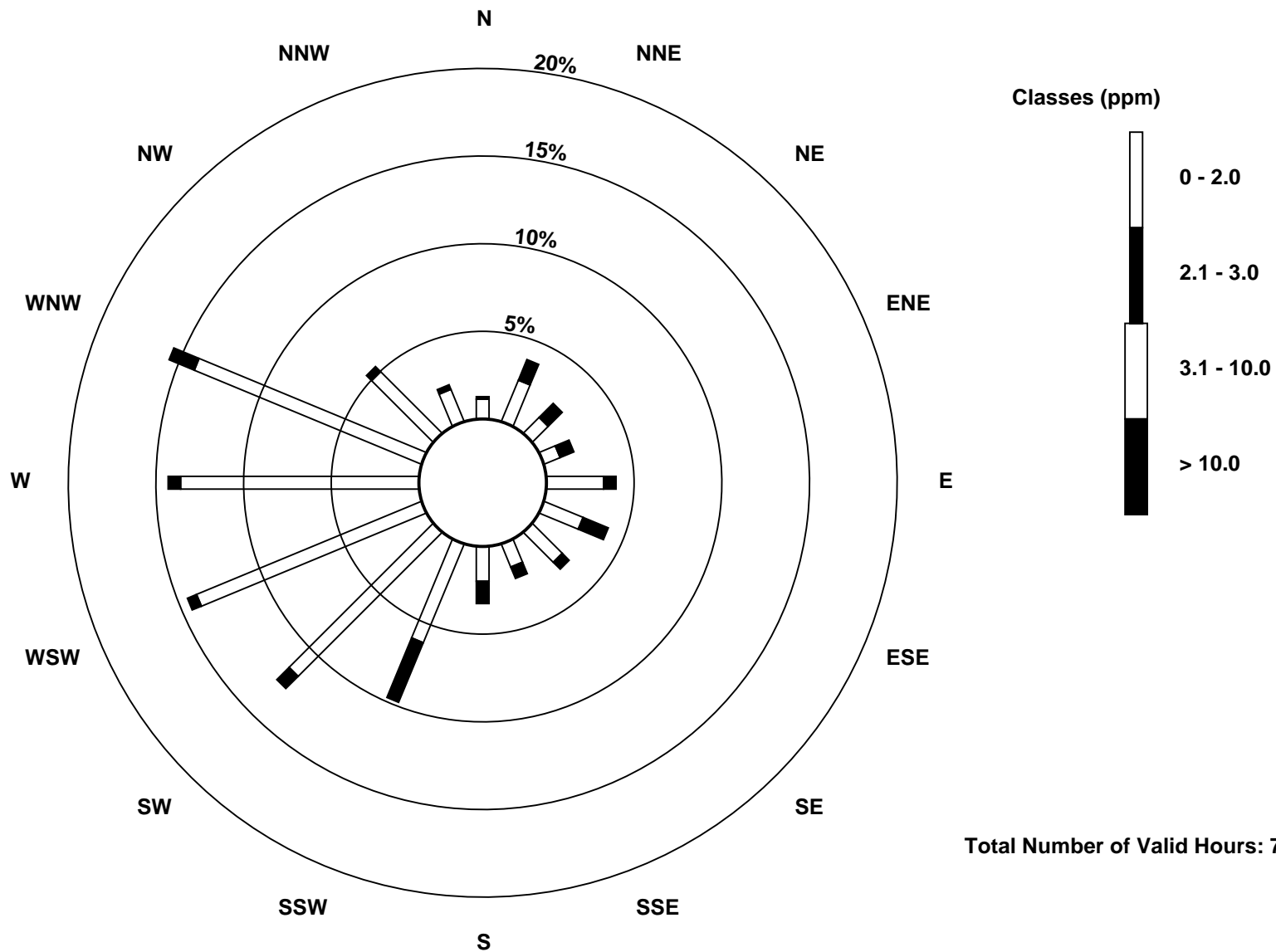
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

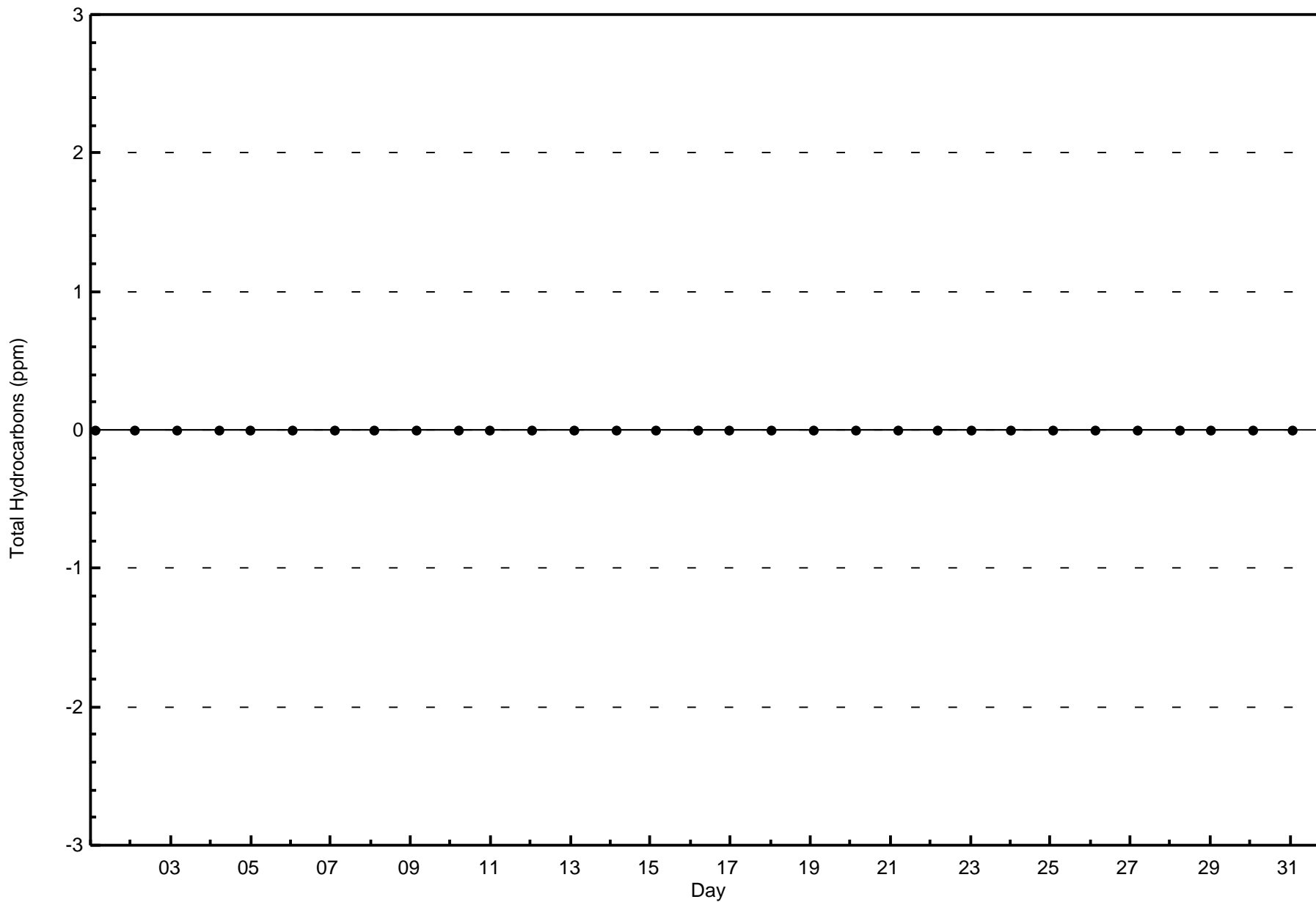
Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Zero Responses

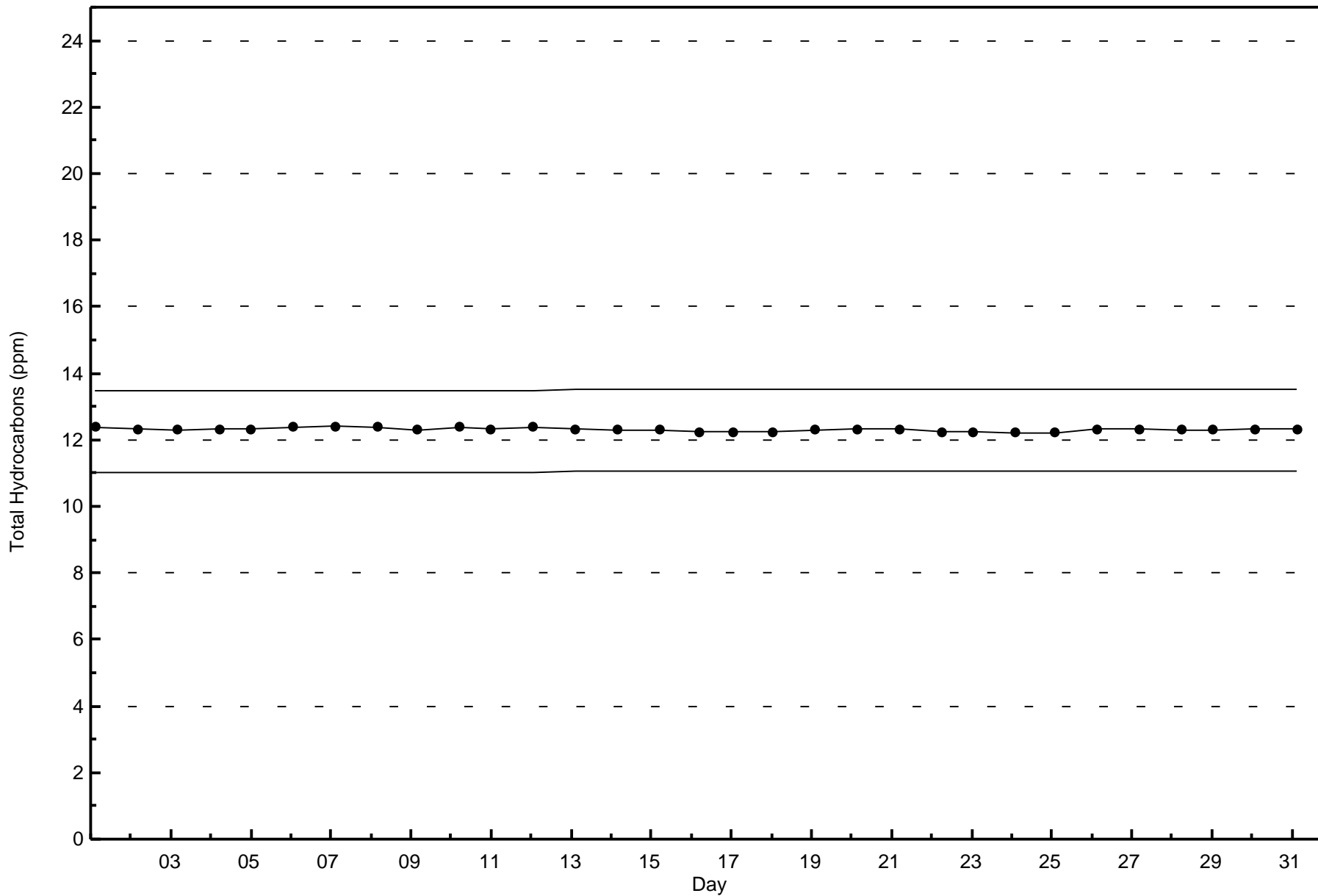
Total Hydrocarbons (THC) - ppm
Stony Mountain - July 2017





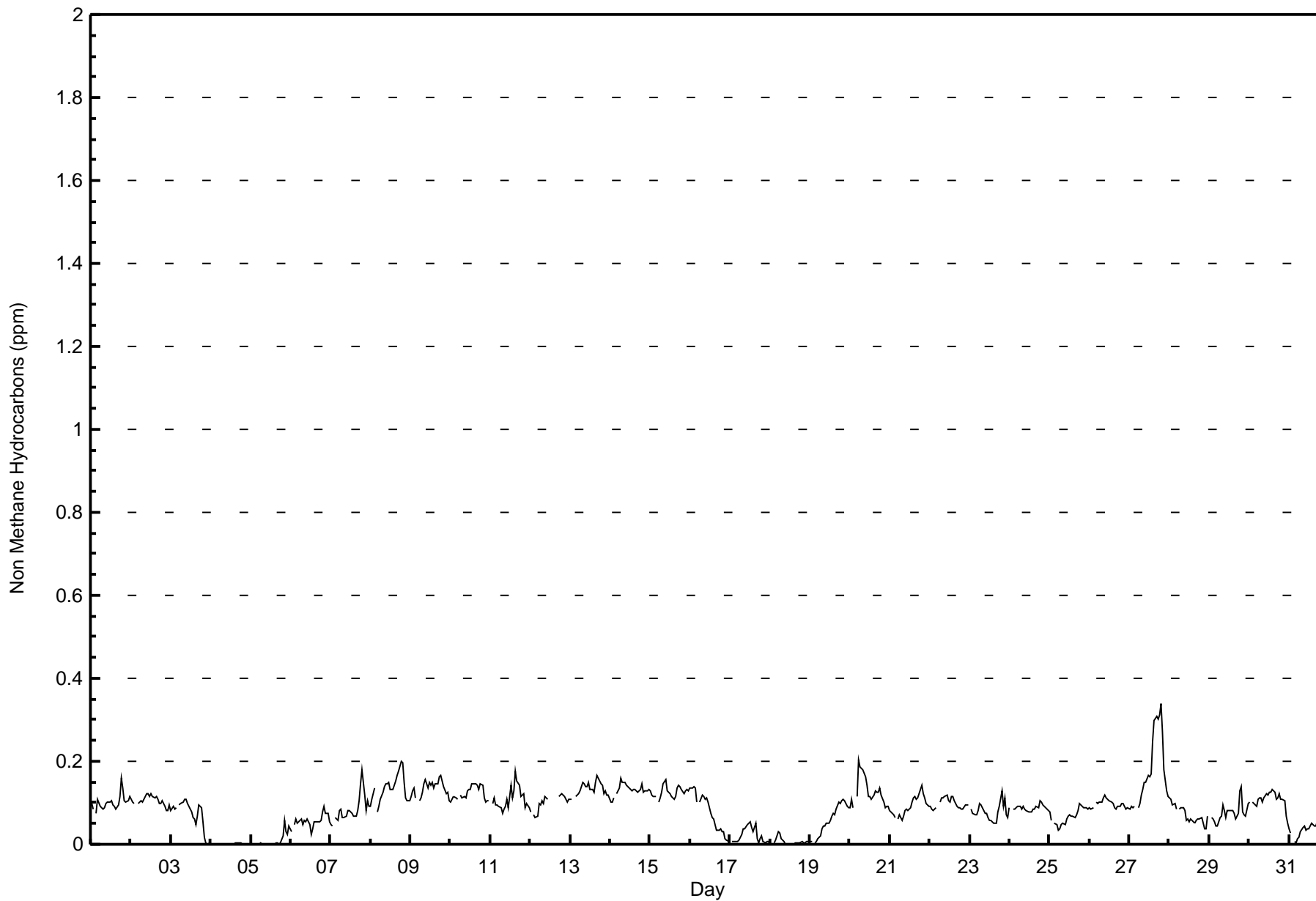
Wood Buffalo Environmental Association
Span Responses

Total Hydrocarbons (THC) - ppm
Stony Mountain - July 2017





Maximum Value: 0.340 ppm on Jul 27 20:00		Maximum Daily Average: 0.178 ppm on Jul 27		Hours in Service: 744																						
Minimum Value: 0.000 ppm on Jul 4 01:00		Minimum Daily Average: 0.001 ppm on Jul 4		Hours of Data: 707																						
Maximum Diurnal Average: 0.109 ppm at hour 20		Minimum Diurnal Average: 0.068 ppm at hour 4		Hours of Missing Data: 37																						
Monthly Average: 0.087 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.2		Hours of Calibration: 37																						
				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-Jul	0.099	0.083	Z	0.076	0.107	0.092	0.088	0.085	0.088	0.098	0.101	0.101	0.106	0.094	0.090	0.084	0.095	0.115	0.160	0.135	0.105	0.101	0.106	0.115	0.101	0.160
2-Jul	0.109	0.103	0.099	Z	0.098	0.102	0.104	0.103	0.108	0.121	0.123	0.117	0.121	0.116	0.114	0.114	0.108	0.098	0.099	0.105	0.091	0.081	0.083	0.094	0.105	0.123
3-Jul	0.081	0.091	0.084	0.089	Z	0.095	0.098	0.103	0.109	0.108	0.097	0.091	0.078	0.064	0.060	0.049	0.066	0.095	0.087	0.055	0.018	0.003	0.002	0.003	0.071	0.109
4-Jul	0.000	0.000	0.000	0.001	0.000	Z	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.005	0.003	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.005
5-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.002	0.004	0.001	0.004	0.019	0.057	0.030	0.025	0.044	0.008	0.057
6-Jul	0.030	Z	0.047	0.062	0.052	0.055	0.063	0.049	0.058	0.055	0.062	0.046	0.024	0.036	0.053	0.055	0.053	0.055	0.058	0.077	0.091	0.076	0.075	0.056	0.056	0.091
7-Jul	0.048	0.044	Z	0.064	0.056	0.083	0.085	0.064	0.066	0.068	0.082	0.082	0.079	0.075	0.067	0.068	0.080	0.103	0.147	0.179	0.120	0.080	0.105	0.092	0.084	0.179
8-Jul	0.093	0.110	0.134	Z	0.079	0.093	0.108	0.124	0.141	0.147	0.147	0.150	0.131	0.133	0.142	0.153	0.166	0.176	0.202	0.197	0.149	0.113	0.106	0.106	0.135	0.202
9-Jul	0.114	0.128	0.135	0.113	Z	0.107	0.113	0.126	0.147	0.155	0.134	0.149	0.144	0.149	0.135	0.147	0.146	0.164	0.166	0.152	0.140	0.123	0.126	0.104	0.136	0.166
10-Jul	0.101	0.107	0.117	0.111	0.108	Z	0.117	0.113	0.114	0.111	0.129	0.133	0.132	0.145	0.147	0.145	0.143	0.131	0.144	0.143	0.113	0.101	0.105	0.104	0.122	0.147
11-Jul	Z	0.098	0.111	0.095	0.094	0.093	0.088	0.075	0.085	0.093	0.108	0.088	0.141	0.112	0.130	0.176	0.153	0.142	0.117	0.120	0.120	0.089	0.099	0.090	0.109	0.176
12-Jul	0.079	Z	0.070	0.065	0.066	0.098	0.096	0.104	0.098	0.116	0.108	C	C	C	C	C	C	0.116	0.117	0.123	0.117	0.110	0.102	0.109	--	0.123
13-Jul	0.107	0.107	Z	0.114	0.118	0.121	0.130	0.149	0.147	0.138	0.138	0.149	0.132	0.132	0.126	0.148	0.167	0.159	0.145	0.143	0.121	0.128	0.120	0.118	0.133	0.167
14-Jul	0.101	0.102	0.113	Z	0.124	0.134	0.159	0.151	0.150	0.148	0.141	0.135	0.134	0.129	0.133	0.131	0.125	0.129	0.131	0.145	0.127	0.129	0.127	0.131	0.132	0.159
15-Jul	0.127	0.120	0.115	0.117	Z	0.102	0.111	0.127	0.146	0.155	0.129	0.125	0.123	0.117	0.109	0.115	0.137	0.144	0.139	0.133	0.122	0.129	0.131	0.128	0.126	0.155
16-Jul	0.137	0.135	0.139	0.137	0.101	Z	0.102	0.118	0.114	0.109	0.111	0.103	0.076	0.064	0.060	0.049	0.033	0.033	0.038	0.030	0.031	0.014	0.009	0.007	0.076	0.139
17-Jul	Z	0.008	0.008	0.007	0.007	0.009	0.016	0.025	0.036	0.038	0.049	0.049	0.053	0.042	0.031	0.052	0.014	0.003	0.012	0.020	0.007	0.003	0.008	0.005	0.022	0.053
18-Jul	0.002	Z	0.002	0.009	0.019	0.029	0.028	0.013	0.005	0.002	0.000	0.002	0.000	0.001	0.001	0.003	0.004	0.003	0.002	0.006	0.004	0.005	0.005	0.008	0.007	0.029
19-Jul	0.007	0.006	Z	0.005	0.007	0.015	0.021	0.038	0.045	0.044	0.051	0.051	0.058	0.067	0.074	0.072	0.086	0.102	0.098	0.106	0.110	0.105	0.091	0.087	0.058	0.110
20-Jul	0.090	0.109	0.090	Z	0.115	0.205	0.187	0.184	0.181	0.162	0.141	0.115	0.114	0.109	0.119	0.128	0.125	0.124	0.135	0.117	0.101	0.090	0.090	0.091	0.127	0.205
21-Jul	0.083	0.074	0.070	0.063	Z	0.062	0.070	0.059	0.066	0.081	0.084	0.080	0.089	0.101	0.113	0.115	0.109	0.113	0.131	0.141	0.121	0.111	0.097	0.091	0.092	0.141
22-Jul	0.090	0.085	0.082	0.085	0.089	Z	0.101	0.112	0.111	0.114	0.119	0.105	0.102	0.114	0.114	0.106	0.091	0.089	0.090	0.086	0.086	0.095	0.096	0.093	0.098	0.119
23-Jul	Z	0.086	0.075	0.072	0.071	0.083	0.098	0.096	0.082	0.076	0.076	0.065	0.057	0.059	0.051	0.052	0.050	0.079	0.093	0.128	0.092	0.114	0.071	0.064	0.078	0.128
24-Jul	0.087	Z	0.083	0.084	0.088	0.092	0.091	0.086	0.091	0.086	0.081	0.078	0.078	0.079	0.086	0.083	0.091	0.089	0.105	0.102	0.095	0.093	0.086	0.081	0.088	0.105
25-Jul	0.077	0.059	Z	0.050	0.046	0.035	0.038	0.047	0.051	0.047	0.059	0.067	0.072	0.067	0.068	0.065	0.070	0.082	0.100	0.094	0.088	0.089	0.087	0.083	0.067	0.100
26-Jul	0.089	0.085	0.090	Z	0.100	0.098	0.101	0.102	0.112	0.119	0.114	0.110	0.105	0.101	0.100	0.089	0.083	0.091	0.090	0.098	0.097	0.090	0.084	0.088	0.097	0.119
27-Jul	0.083	0.091	0.087	0.092	Z	0.087	0.097	0.119	0.131	0.151	0.149	0.167	0.161	0.170	0.247	0.299	0.308	0.301	0.312	0.340	0.271	0.179	0.130	0.116	0.178	0.340
28-Jul	0.113	0.110	0.096	0.098	0.084	Z	0.084	0.087	0.089	0.080	0.059	0.060	0.056	0.060	0.053	0.051	0.057	0.062	0.060	0.064	0.051	0.037	0.037	0.067	0.070	0.113
29-Jul	Z	0.064	0.061	0.055	0.046	0.044	0.064	0.069	0.094	0.082	0.066	0.082	0.082	0.080	0.083	0.074	0.062	0.073	0.130	0.139	0.080	0.071	0.068	0.097	0.077	0.139
30-Jul	0.101	Z	0.102	0.097	0.093	0.108	0.113	0.113	0.101	0.111	0.124	0.118	0.124	0.126	0.132	0.126	0.107	0.114	0.122	0.110	0.107	0.104	0.067	0.050	0.107	0.132
31-Jul	0.037	0.027	Z	0.007	0.005	0.012	0.016	0.030	0.040	0.045	0.035	0.037	0.039	0.050	0.046	0.045	0.044	0.053	0.077	0.081	0.094	0.086	0.077	0.089	0.047	0.094
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	65	9.19	9.19
0.006 - 0.05	102	14.43	23.62
0.06 - 0.1	503	71.15	94.77
> 0.1	37	5.23	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - July 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	0	0	0	0	0	0	0	0	0	0	0	13	24	16	10	2	0	65
0.006 - 0.05	0	0	0	0	0	0	0	0	0	0	0	12	24	30	27	6	3	102
0.06 - 0.1	9	24	14	12	22	20	19	15	22	69	64	54	54	67	27	10	502	
> 0.1	0	3	3	1	6	8	2	0	1	0	0	0	0	1	6	3	3	37
Totals	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706	

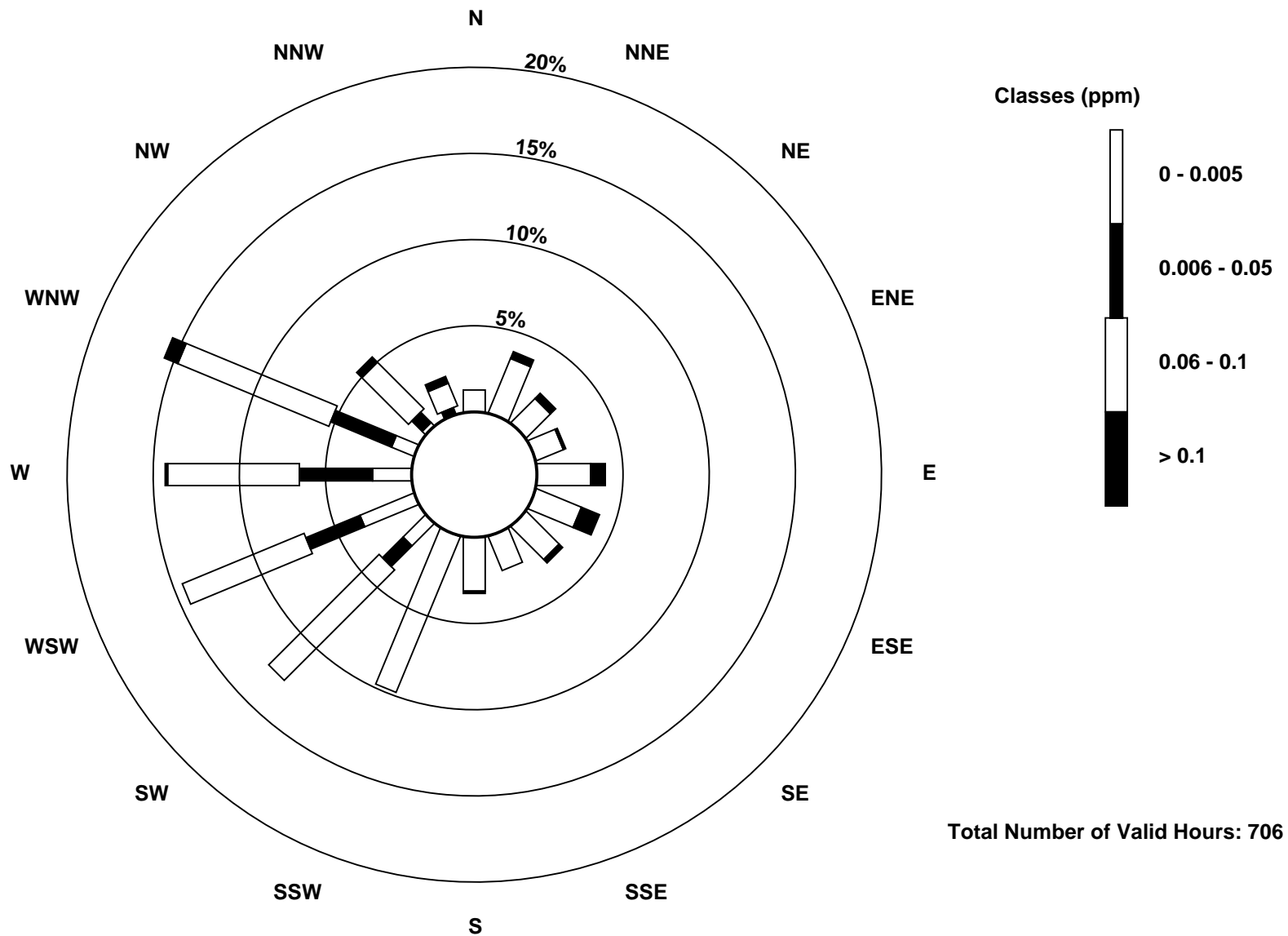
Total Number of Valid Hours: 706

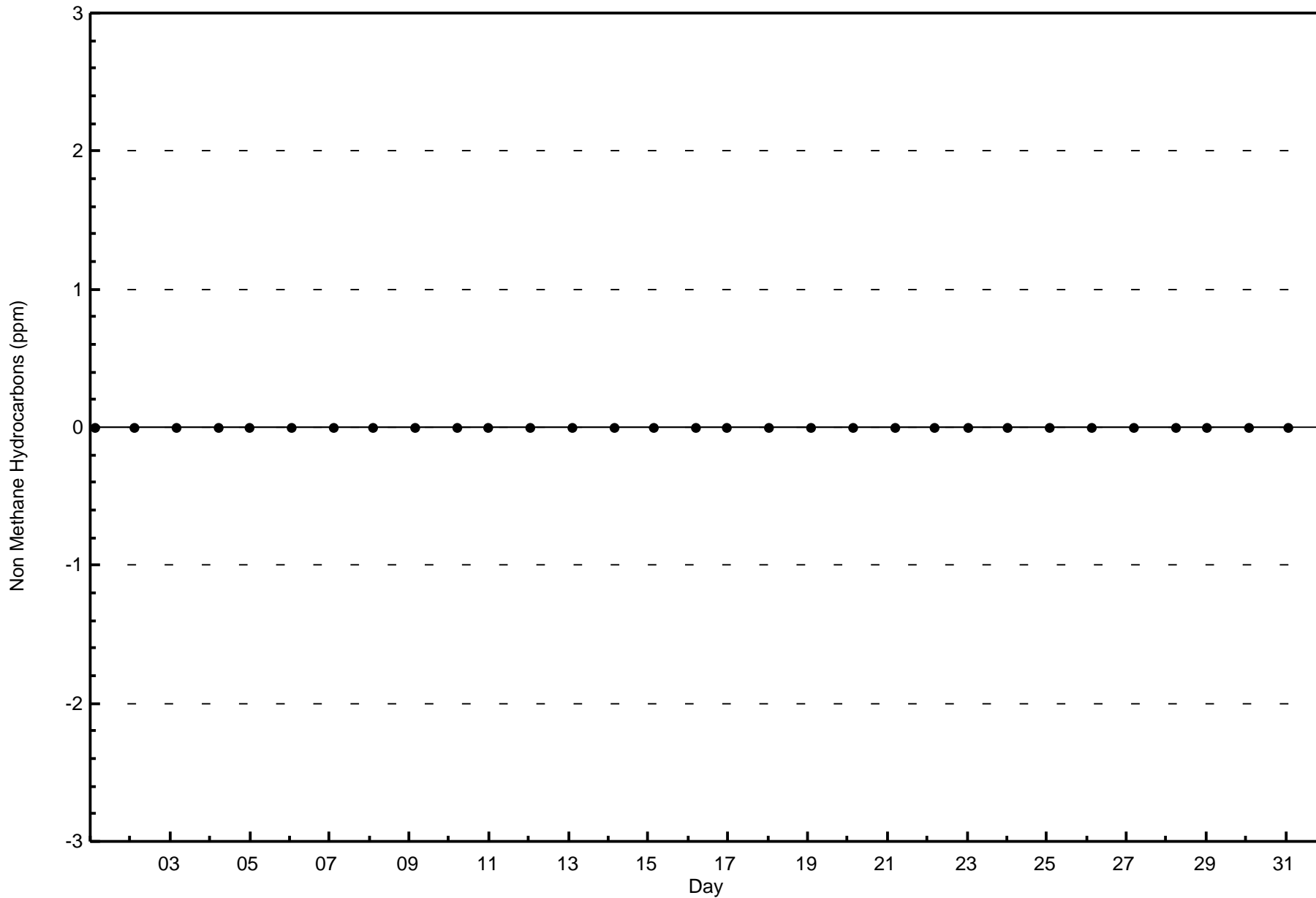
Total Number of Hours: 744

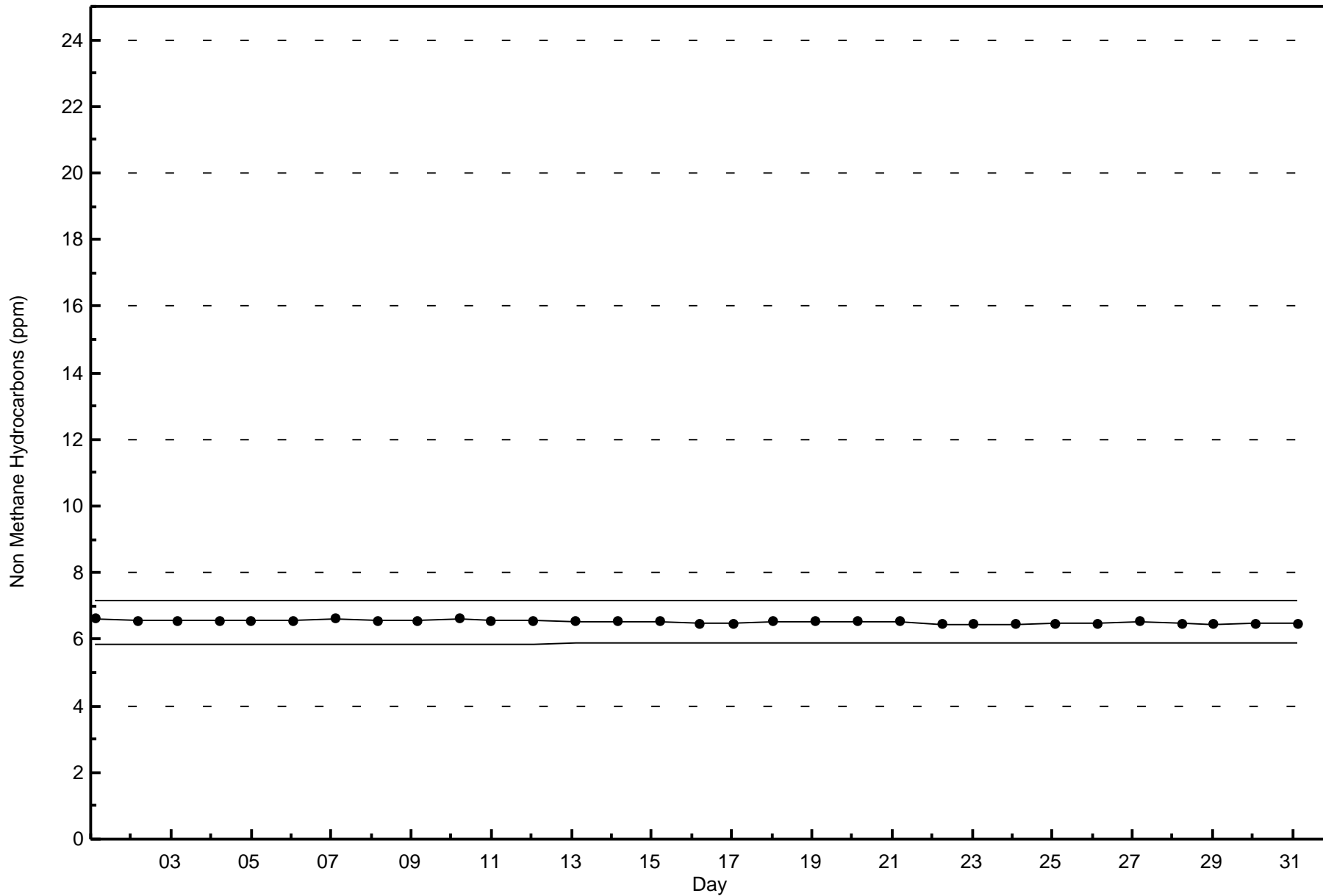


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain (AMS 18)



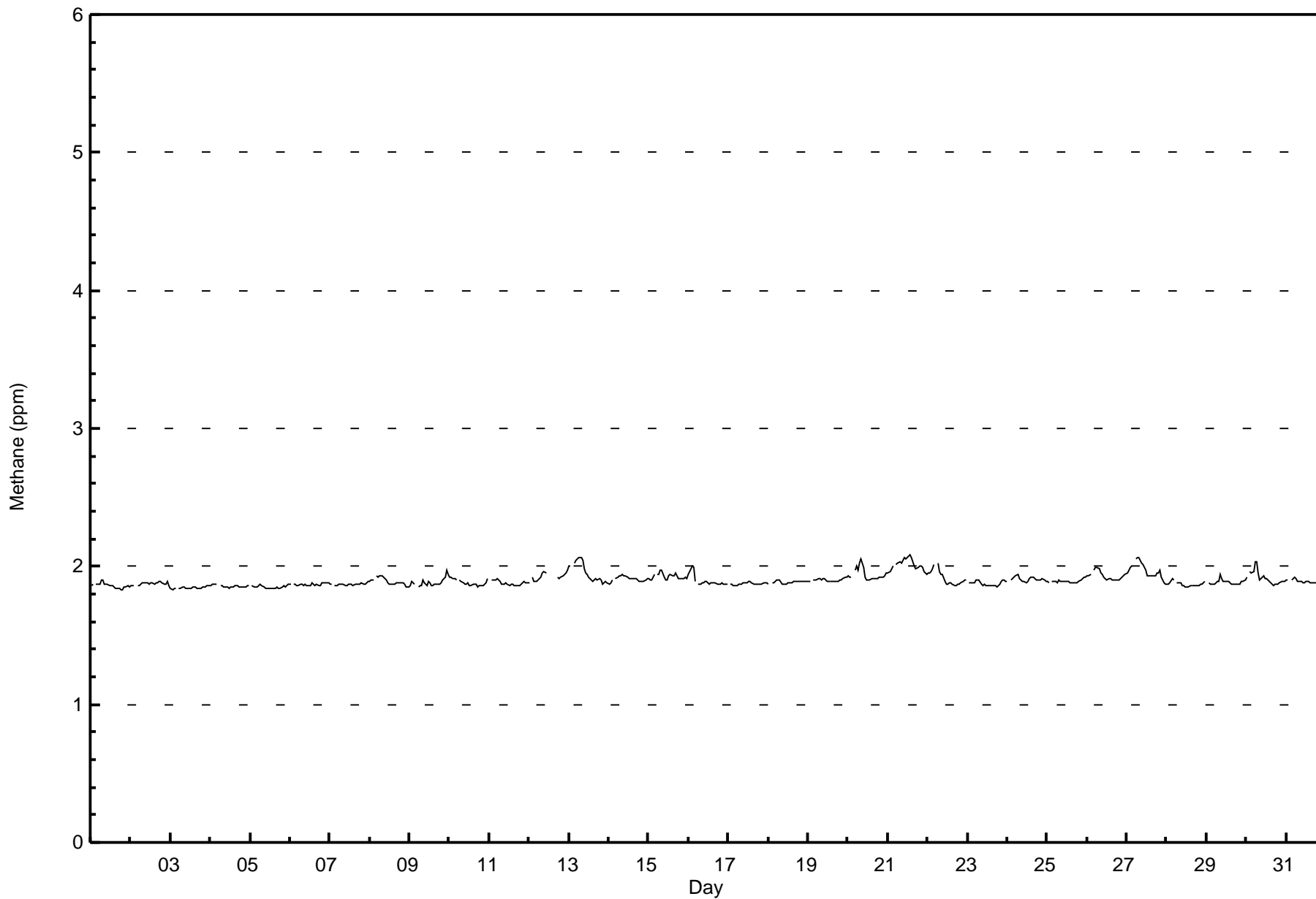






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	695	98.30	98.30
2.1 - 3.0	12	1.70	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - July 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	26	15	12	28	27	20	15	21	66	89	102	101	110	38	16	694
2.1 - 3.0	1	1	2	1	0	1	1	0	2	3	0	0	0	0	0	0	12
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

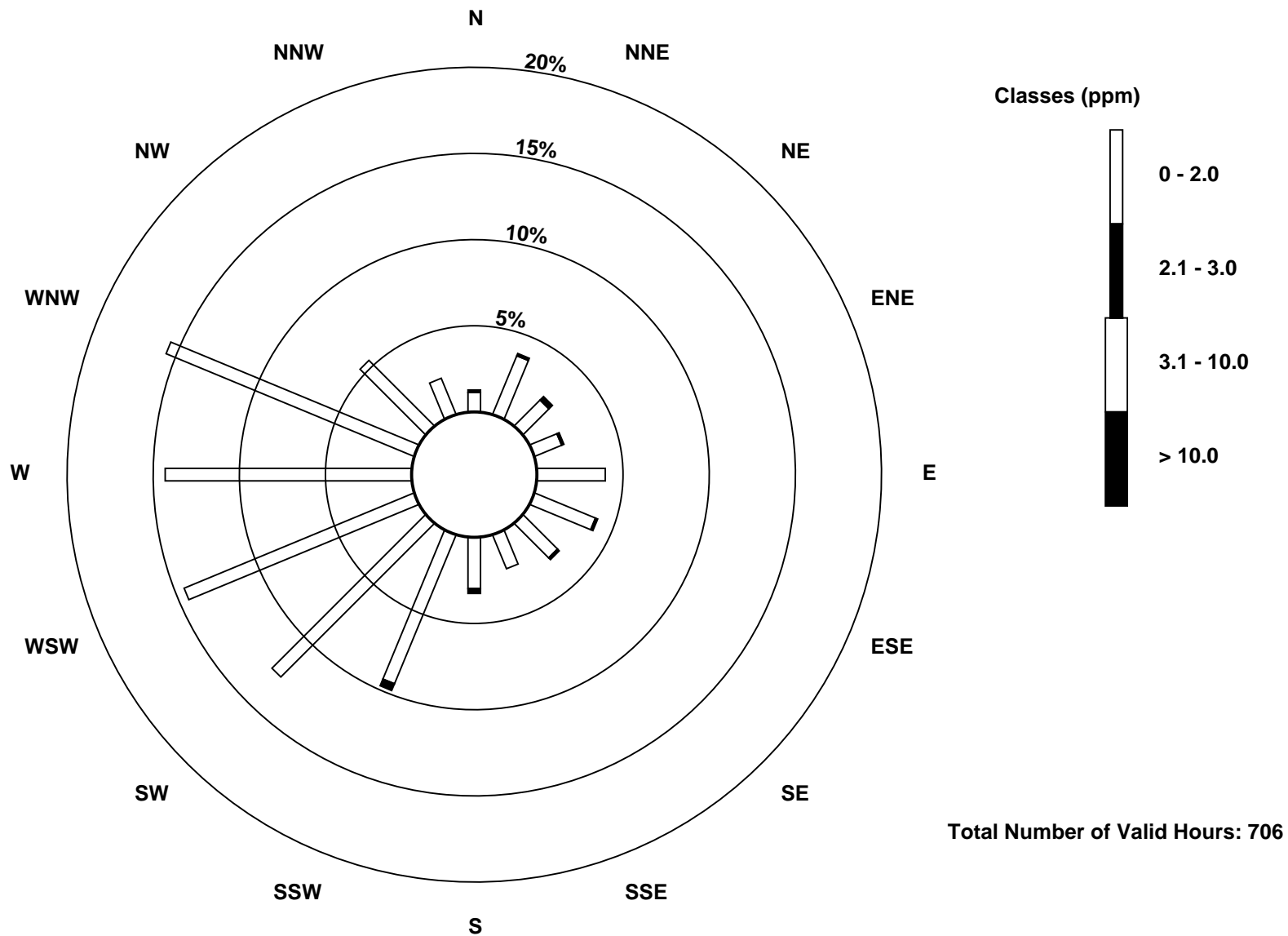
Total Number of Valid Hours: 706

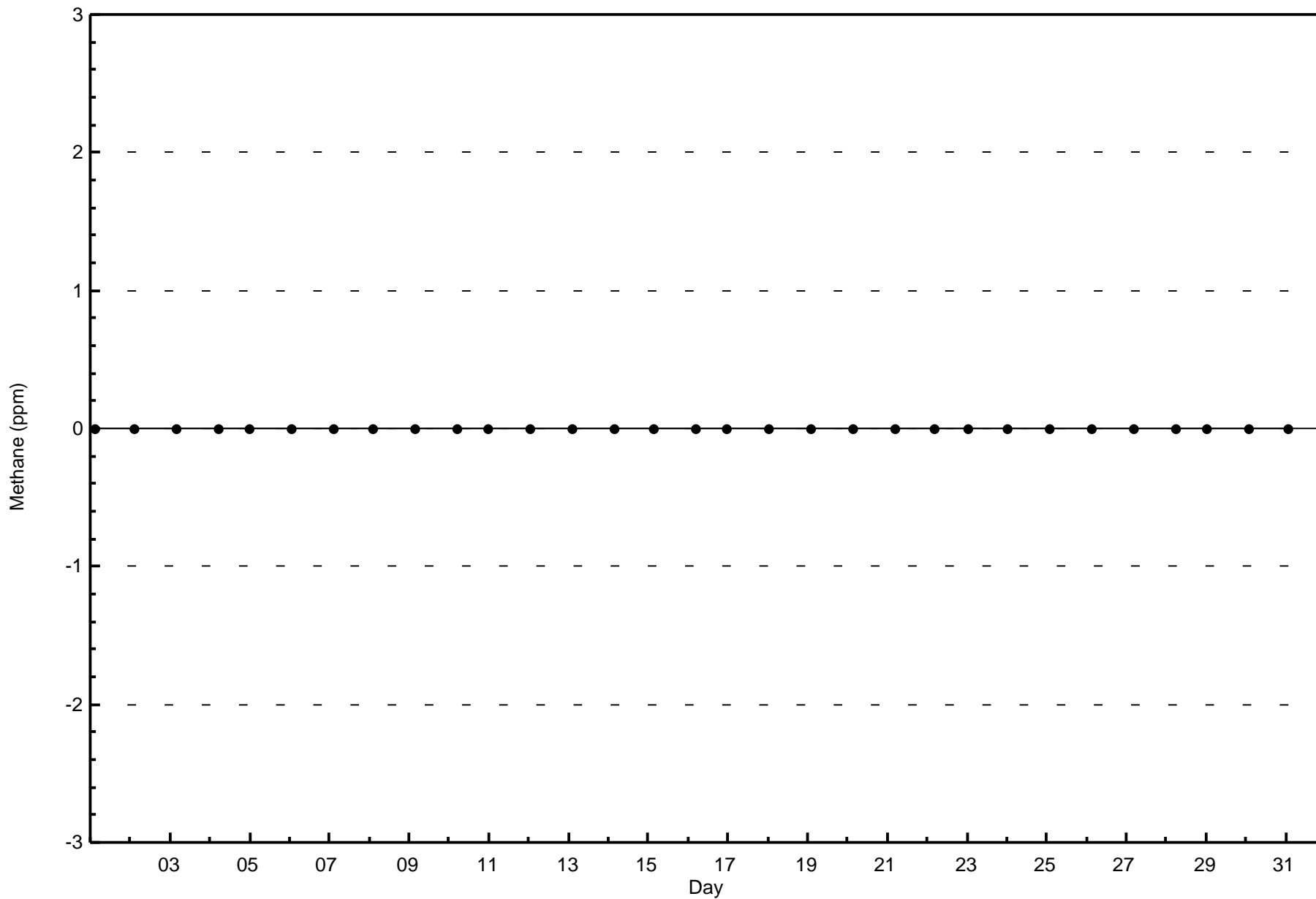
Total Number of Hours: 744

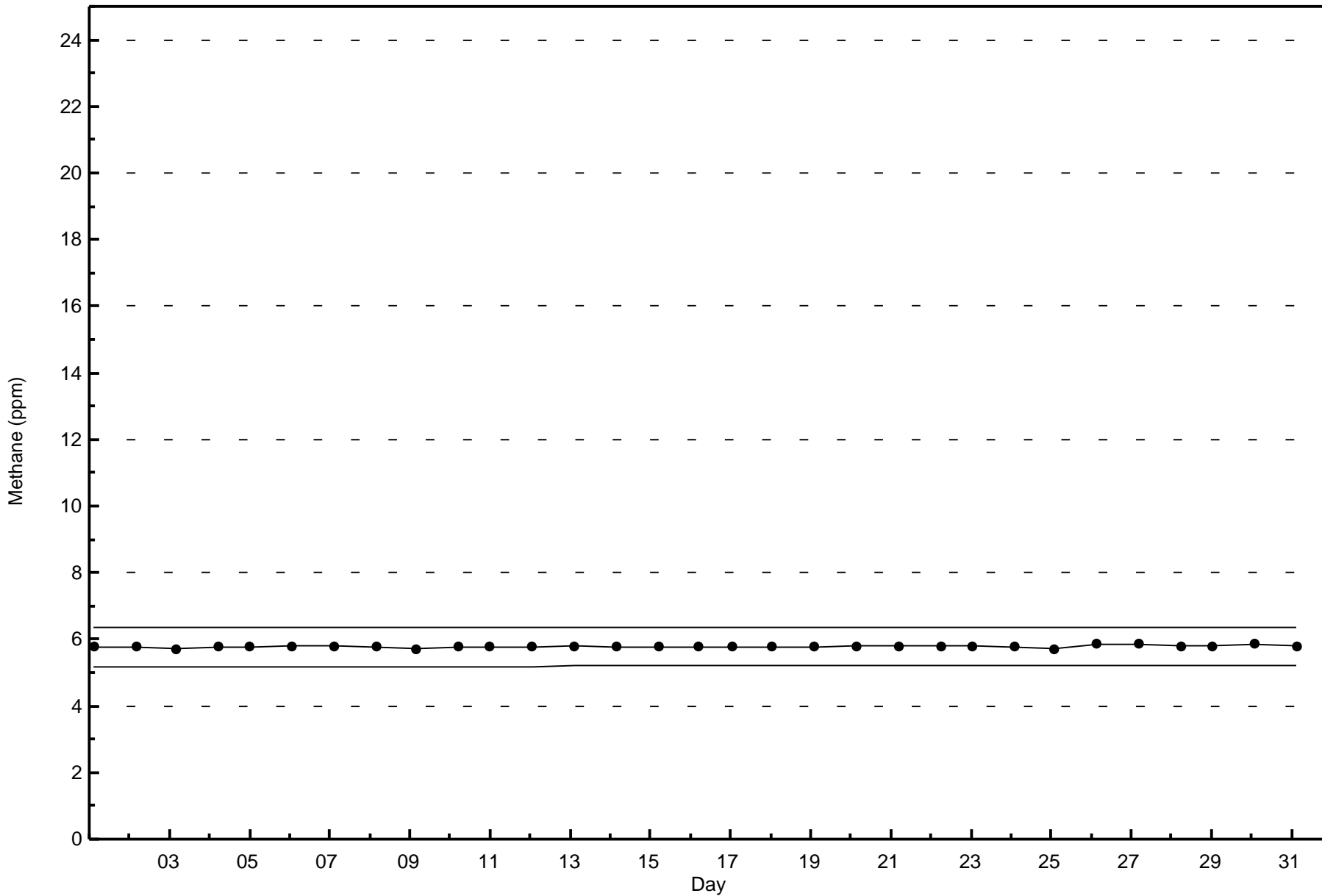


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Methane (CH₄) - ppm
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association
Summary of Hour Averages

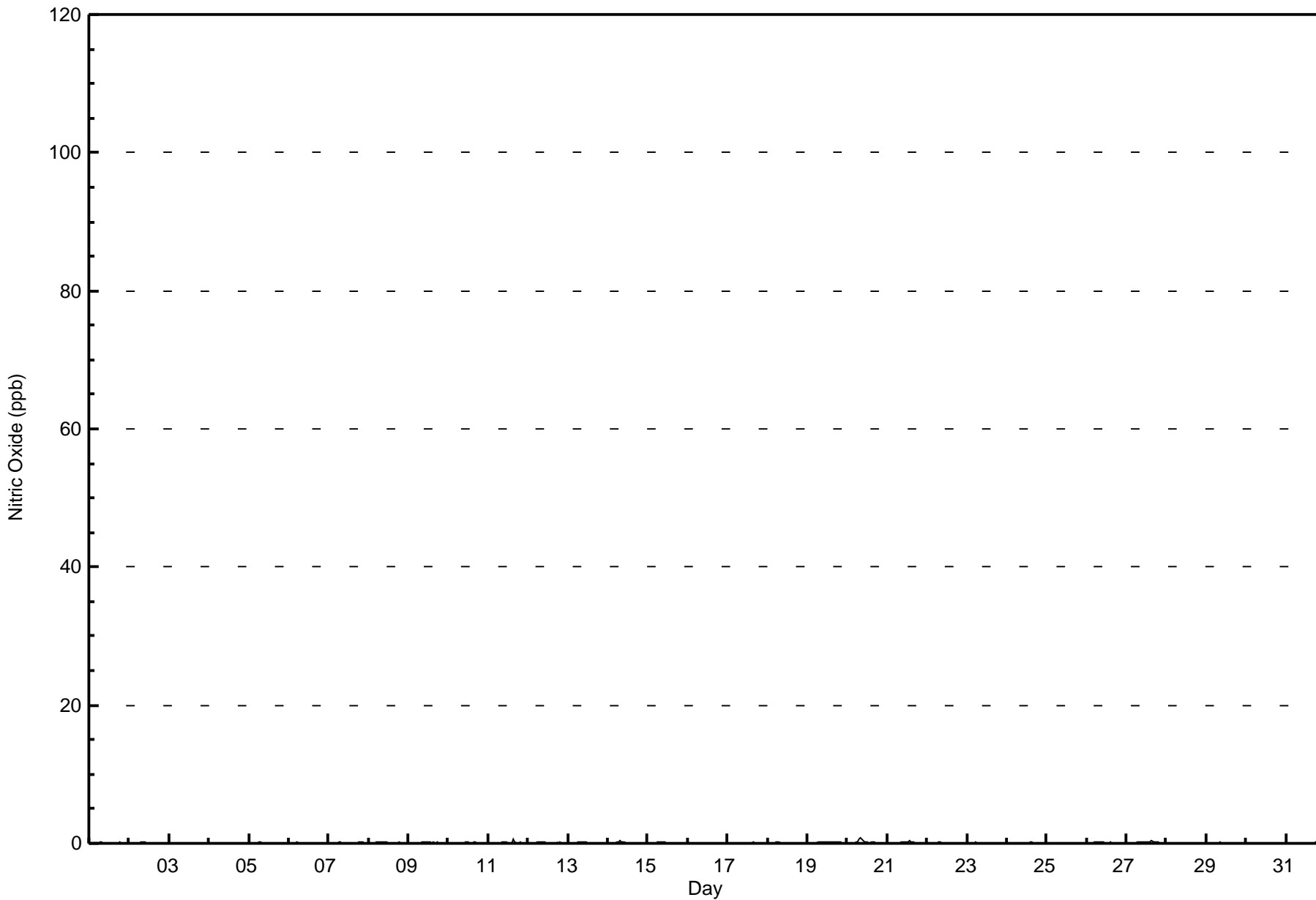
Nitric Oxide (NO) - ppb
Stony Mountain - July 2017

Maximum Value: 1 ppb on Jul 20 09:00		Maximum Daily Average: 0.2 ppb on Jul 20		Hours in Service: 744																																														
Minimum Value: 0 ppb on Jul 29 22:00		Minimum Daily Average: 0.0 ppb on Jul 29		Hours of Data: 707																																														
Maximum Diurnal Average: 0.1 ppb at hour 9		Minimum Diurnal Average: 0.0 ppb at hour 4		Hours of Missing Data: 37																																														
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: 37																																														
				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-Jul	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-Jul	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-Jul	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-Jul	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																								
5-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1	1																								
12-Jul	0	Z	0	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	0	0	0	--	0																								
13-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																								
21-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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																								
30-Jul	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																								
31-Jul	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																								
																								0.0	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	Diurnal Average	
																								0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	Diurnal Maximum
Z - zerospan																								C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - July 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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

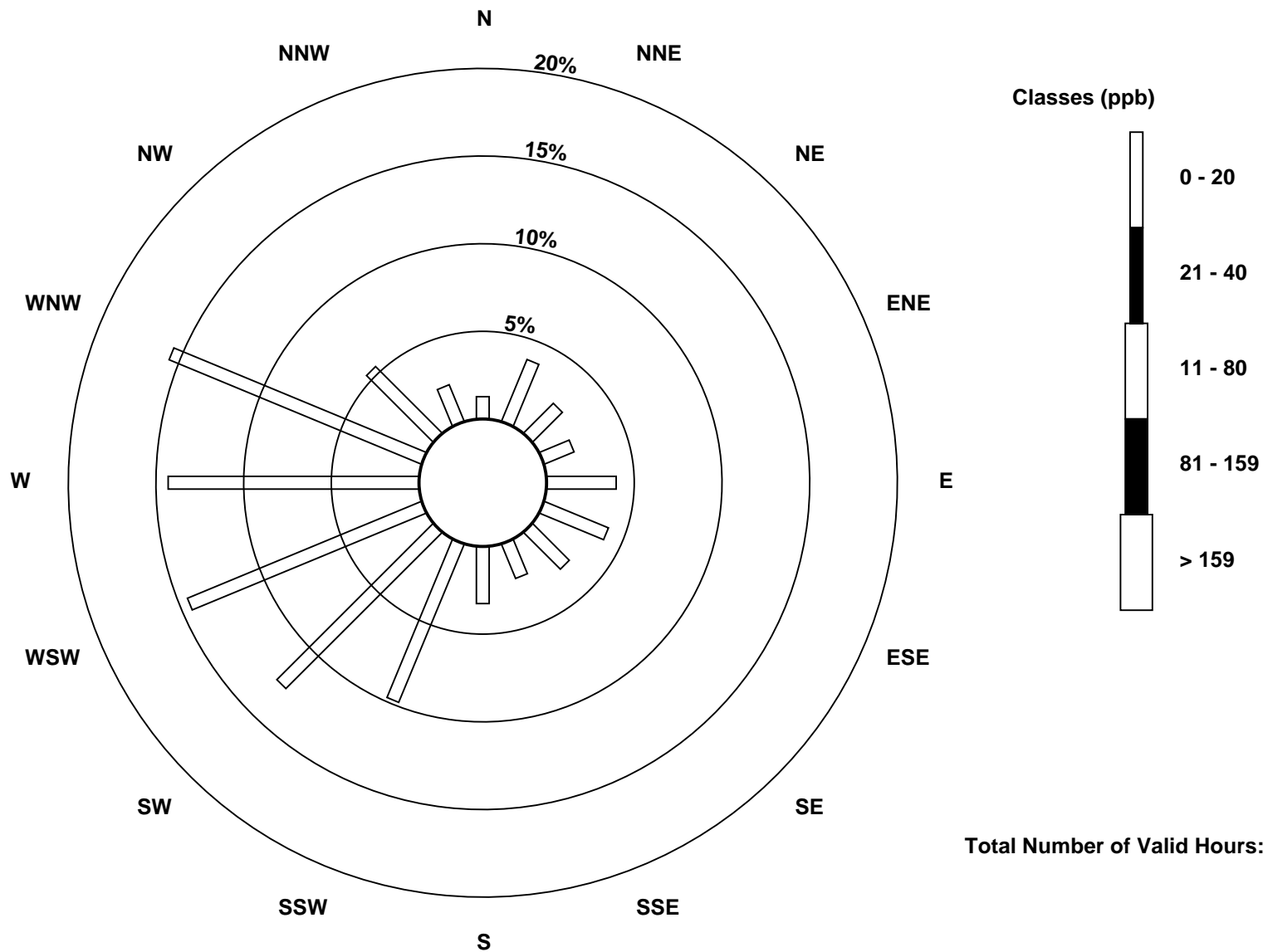
Total Number of Valid Hours: 706

Total Number of Hours: 744

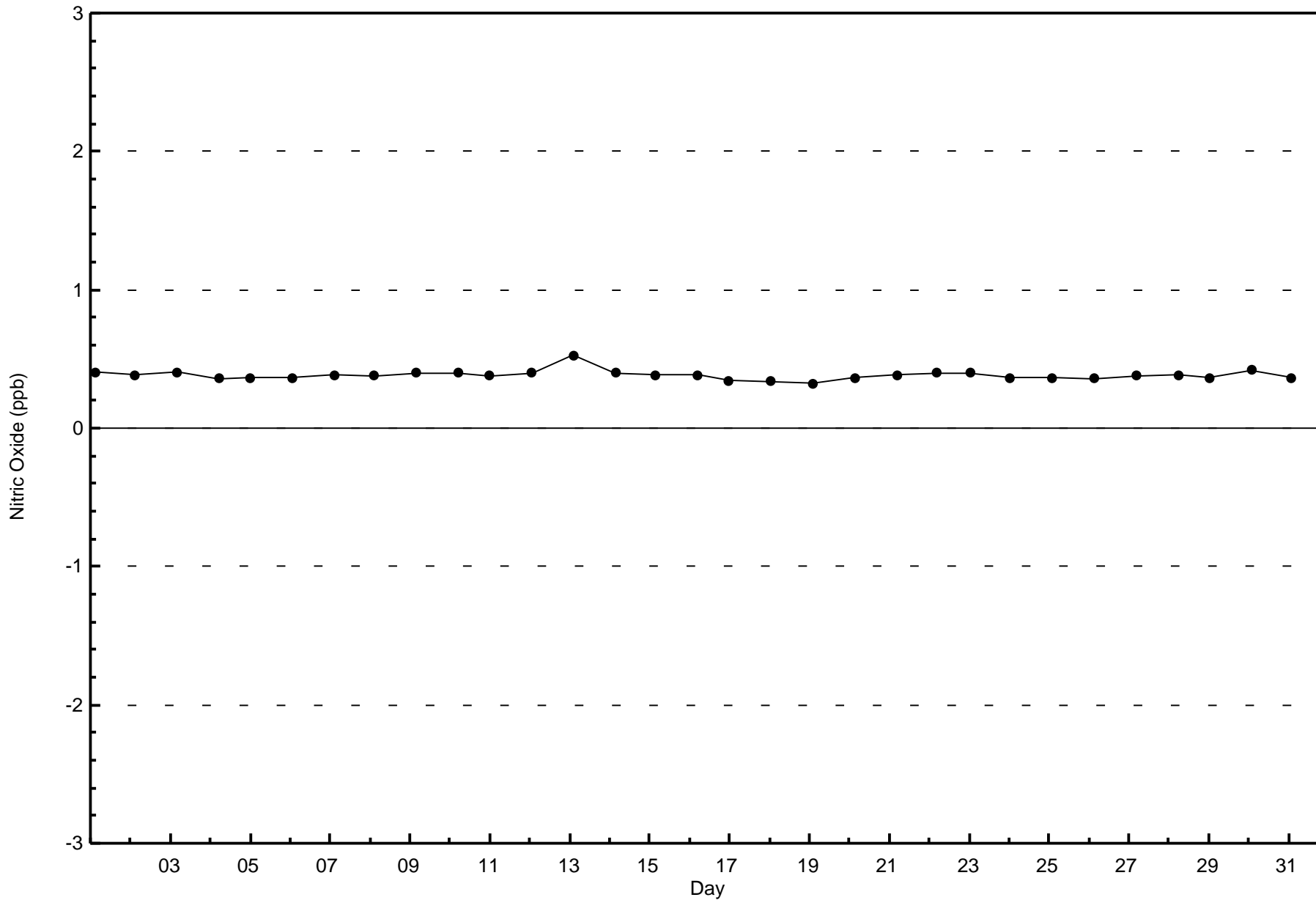


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Stony Mountain (AMS 18)



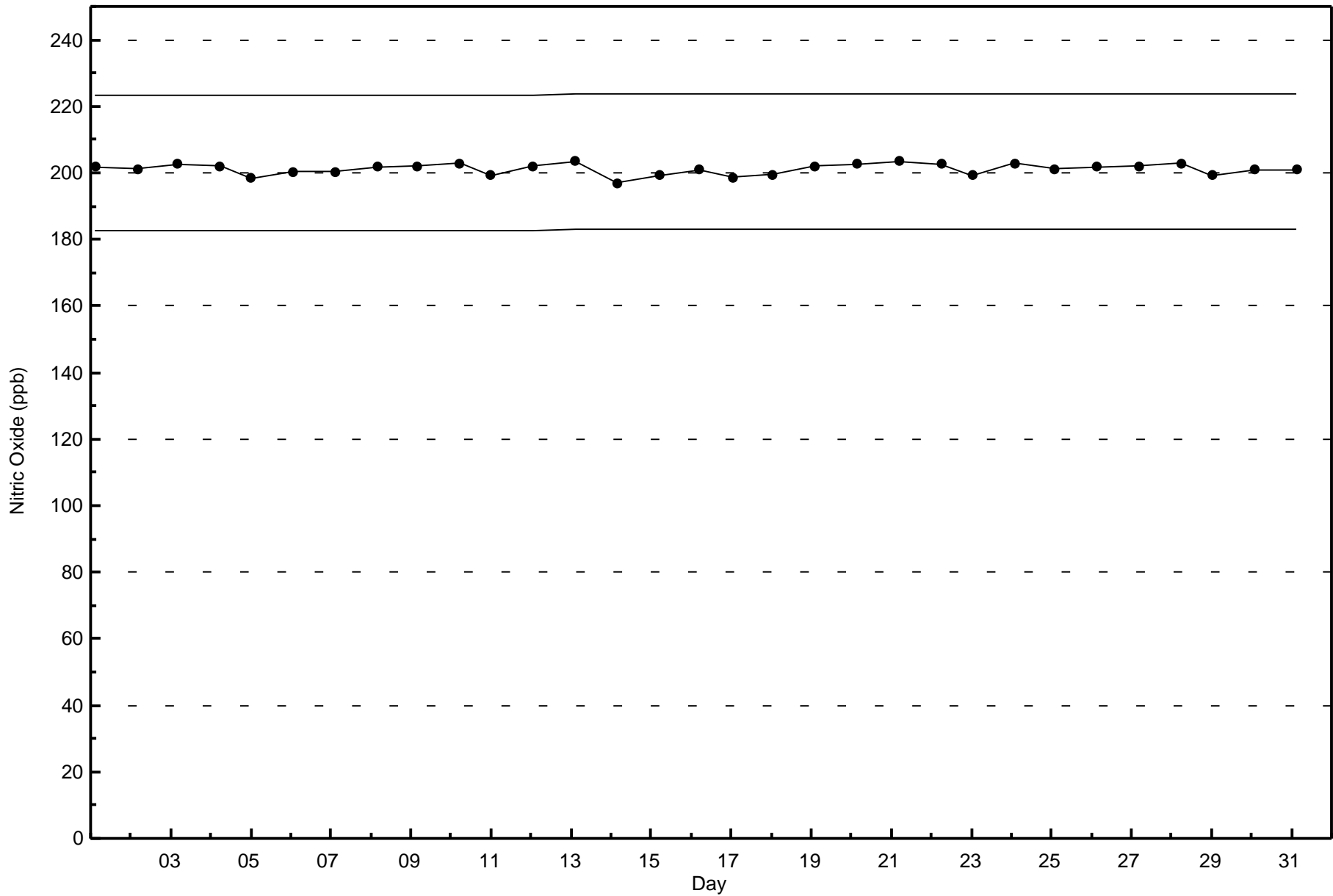
Total Number of Valid Hours: 706





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Stony Mountain - July 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 4 ppb on Jul 16 01:00	Maximum Daily Average: 1.2 ppb on Jul 27		Hours of Data:	707
Minimum Value: 0 ppb on Jul 18 11:00	Minimum Daily Average: 0.2 ppb on Jul 18		Hours of Missing Data:	37
Maximum Diurnal Average: 0.8 ppb at hour 3	Minimum Diurnal Average: 0.4 ppb at hour 19		Hours of Calibration:	37
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:	100.0

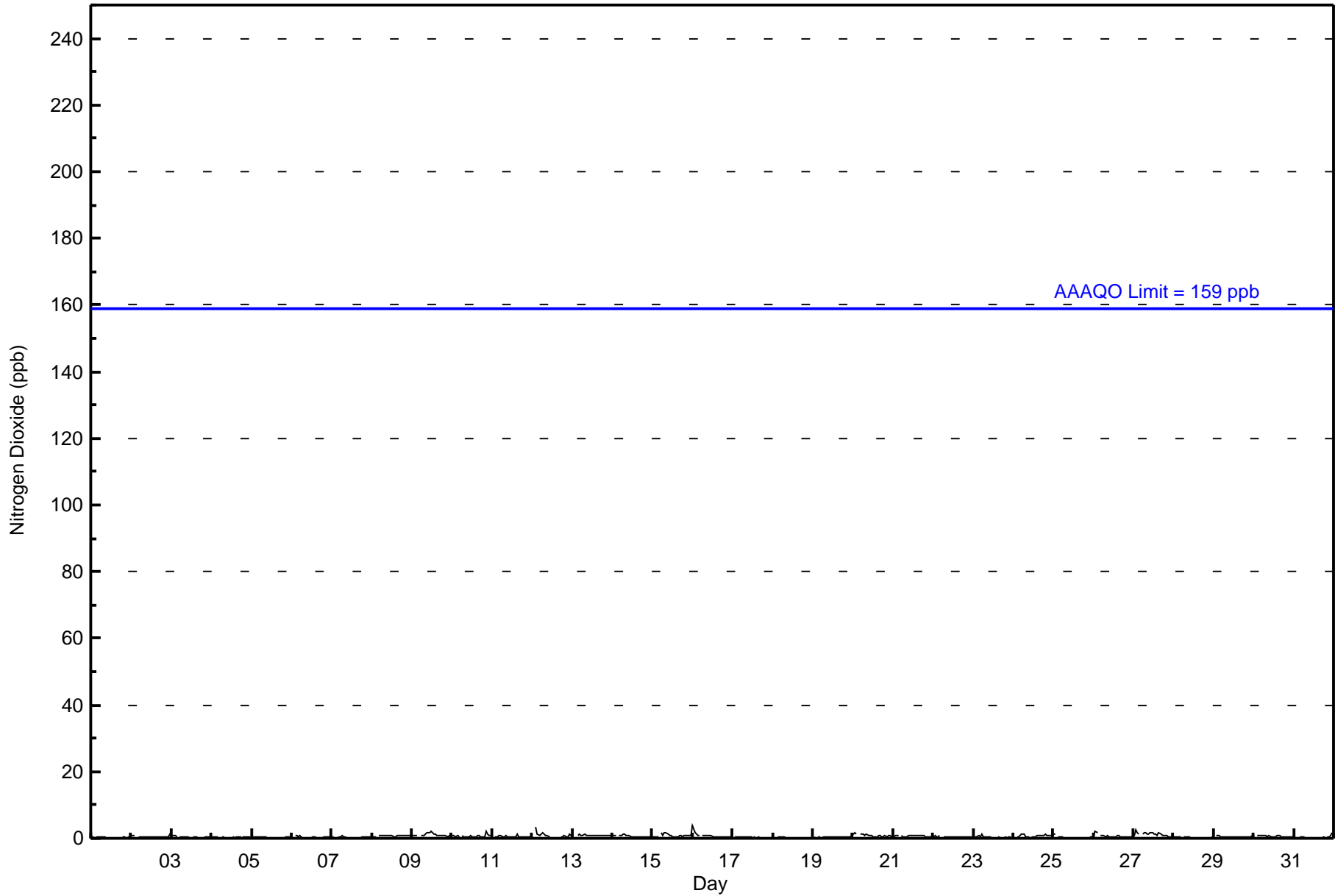
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	Z	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
2-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	1	1	1	0.5	1
3-Jul	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Jul	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-Jul	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
6-Jul	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
7-Jul	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1
8-Jul	0	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
9-Jul	1	1	1	1	Z	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1.0	2
10-Jul	1	1	1	1	1	Z	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	2	1	1	0.7	2
11-Jul	Z	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0.6	1
12-Jul	1	Z	3	1	1	1	2	1	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	--	3
13-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1
14-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0.7	1
15-Jul	0	0	1	1	Z	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2
16-Jul	4	2	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4
17-Jul	Z	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
18-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	1	1	0.4	1
20-Jul	1	2	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0.8	2
21-Jul	0	1	1	1	Z	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	1
22-Jul	1	1	1	1	1	Z	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.5	1
23-Jul	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Jul	0	Z	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.7	1
25-Jul	1	1	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
26-Jul	1	2	2	Z	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	0.7	2
27-Jul	1	3	2	1	Z	1	2	2	1	1	2	2	1	1	1	2	1	1	1	1	1	1	0	1	1.2	3
28-Jul	1	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
29-Jul	Z	1	1	1	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0.5	1
30-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0.6	1
31-Jul	1	1	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	2

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - July 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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

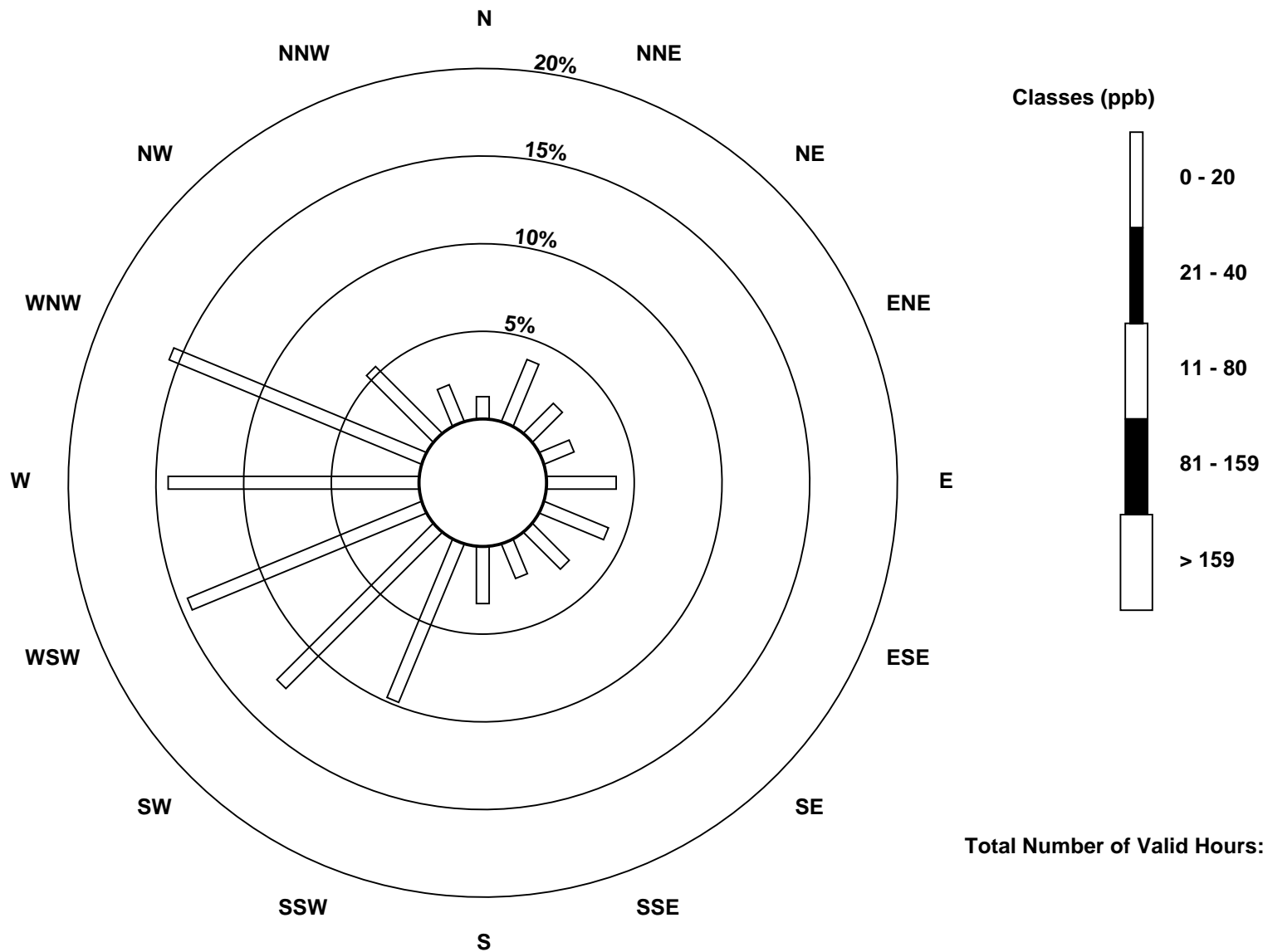
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

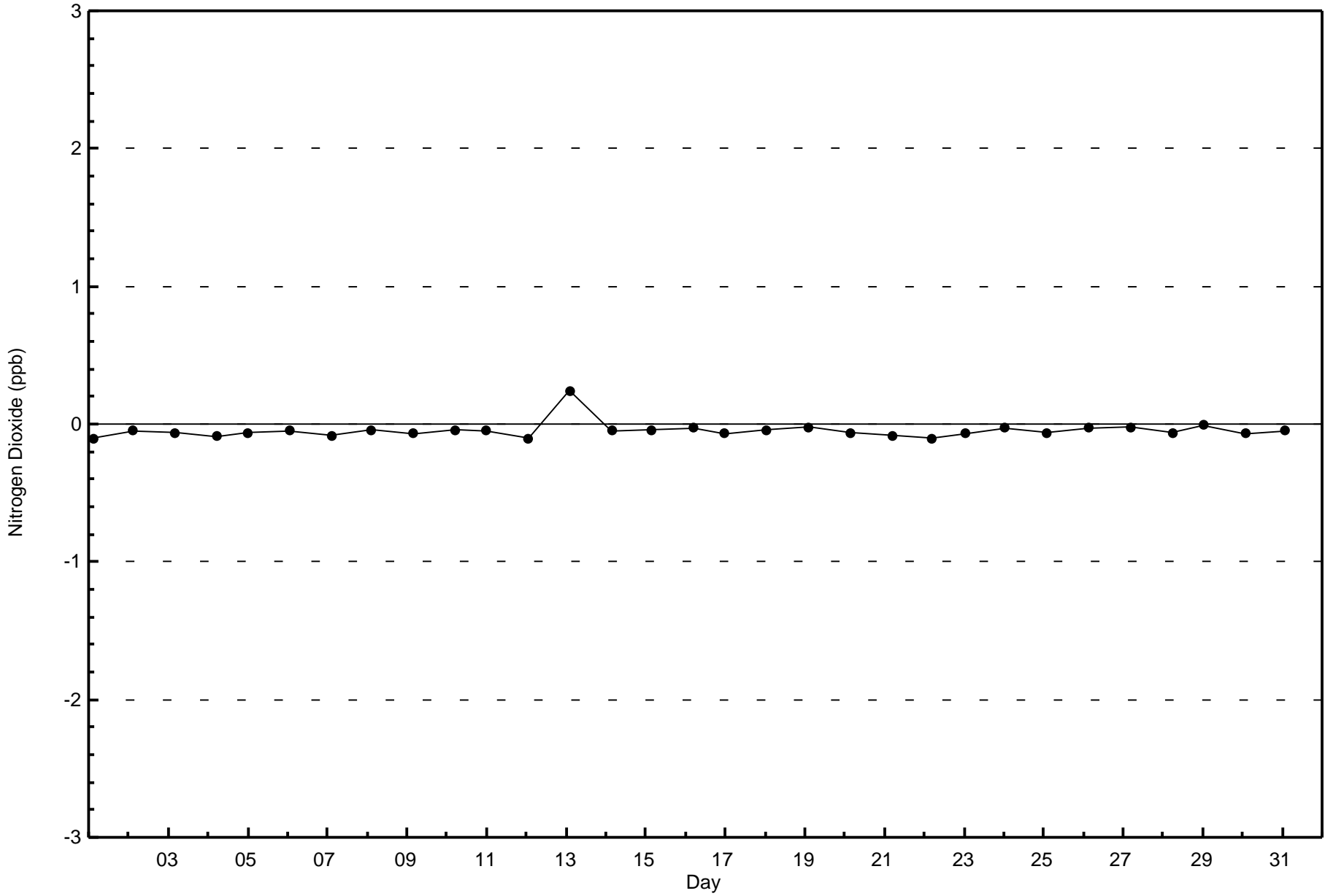
Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)

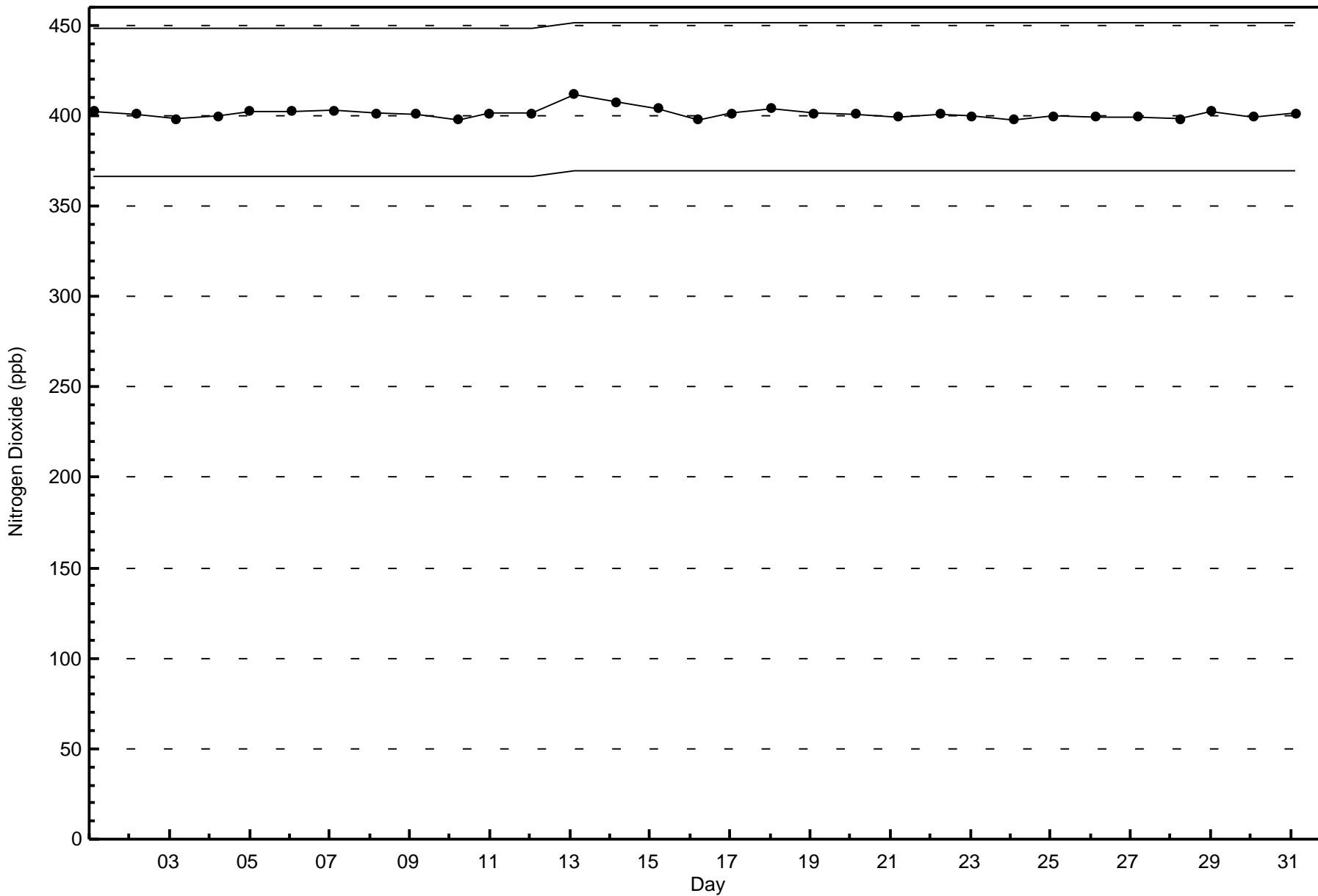




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - July 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

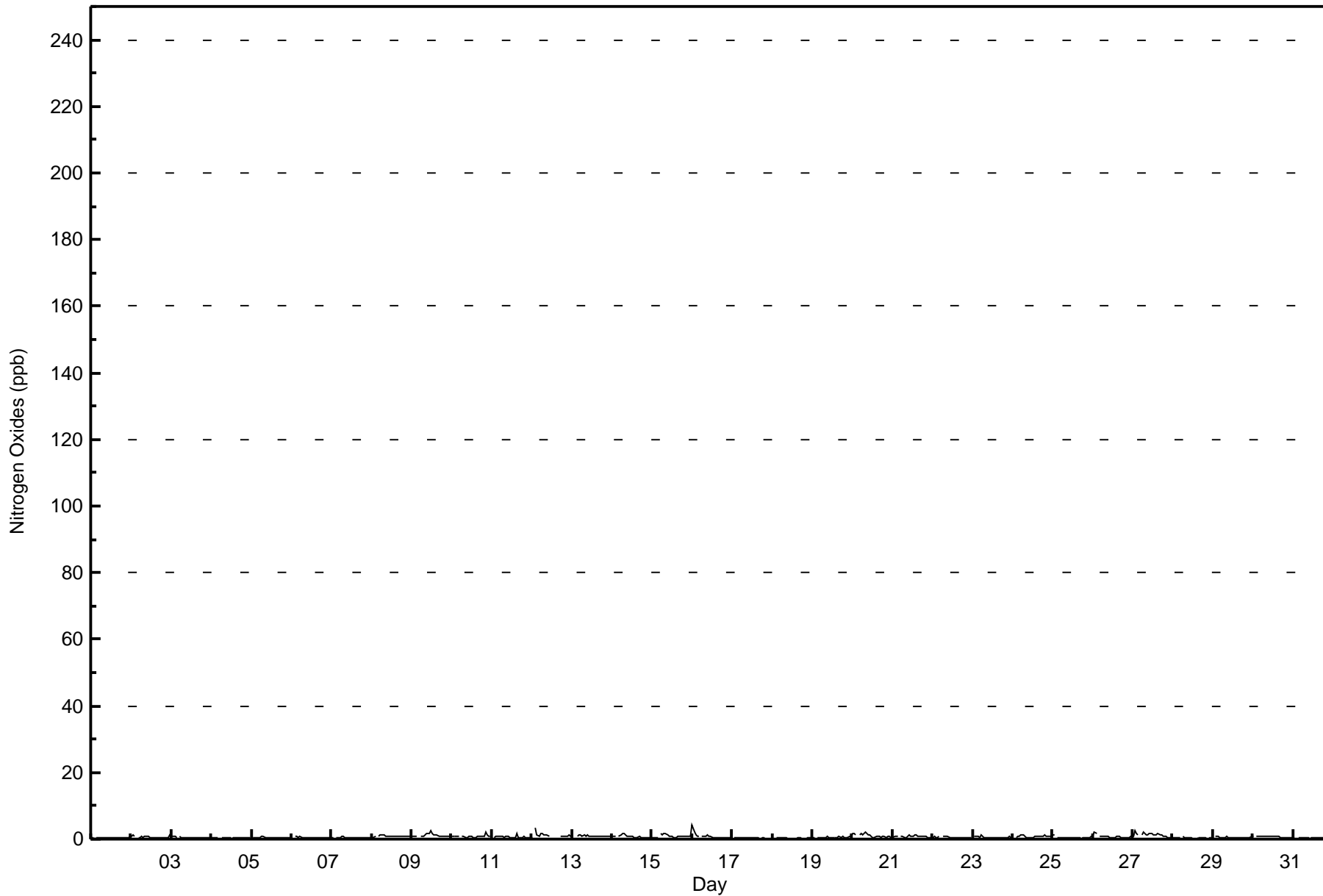
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - July 2017

Maximum Value: 4 ppb on Jul 16 01:00		Maximum Daily Average: 1.3 ppb on Jul 27		Hours in Service: 744																																													
Minimum Value: 0 ppb on Jul 18 13:00		Minimum Daily Average: 0.3 ppb on Jul 18		Hours of Data: 707																																													
Maximum Diurnal Average: 0.9 ppb at hour 3		Minimum Diurnal Average: 0.5 ppb at hour 19		Hours of Missing Data: 37																																													
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 Calibration: 37																																													
				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-Jul	0	0	Z	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																							
2-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	1	0.6	1																							
3-Jul	1	1	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
4-Jul	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-Jul	Z	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
6-Jul	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
7-Jul	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1																							
8-Jul	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	1																							
9-Jul	1	1	1	1	Z	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1.1	2																							
10-Jul	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0.8	2																							
11-Jul	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0	0	1	1	1	1	1	1	1	0.7	2																							
12-Jul	1	Z	3	1	1	1	2	1	1	1	1	C	C	C	C	C	C	1	1	1	1	1	1	1	--	3																							
13-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1																							
14-Jul	1	1	1	Z	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.8	2																							
15-Jul	0	0	1	1	Z	2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	2																							
16-Jul	4	2	1	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	4																							
17-Jul	Z	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
18-Jul	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
19-Jul	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	0.5	1																							
20-Jul	1	2	1	Z	1	2	1	2	2	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1.0	2																							
21-Jul	0	1	1	1	Z	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1																							
22-Jul	1	1	1	0	1	Z	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	0.5	1																							
23-Jul	Z	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	1																							
24-Jul	0	Z	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0.8	1																							
25-Jul	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1																							
26-Jul	1	2	2	Z	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0.8	2																							
27-Jul	1	3	2	1	Z	1	2	2	1	1	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1.3	3																							
28-Jul	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																							
29-Jul	Z	1	1	1	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0.5	1																							
30-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0.7	1																							
31-Jul	0	1	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	2																							
																								0.8	0.9	0.9	0.7	0.7	0.9	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	Diurnal Average	
																								4	3	3	1	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2	1	1	2	Diurnal Maximum	
Z - zerospan		C - Calibration																																															



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - July 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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706
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	9	27	17	13	28	28	21	15	23	69	89	102	101	110	38	16	706

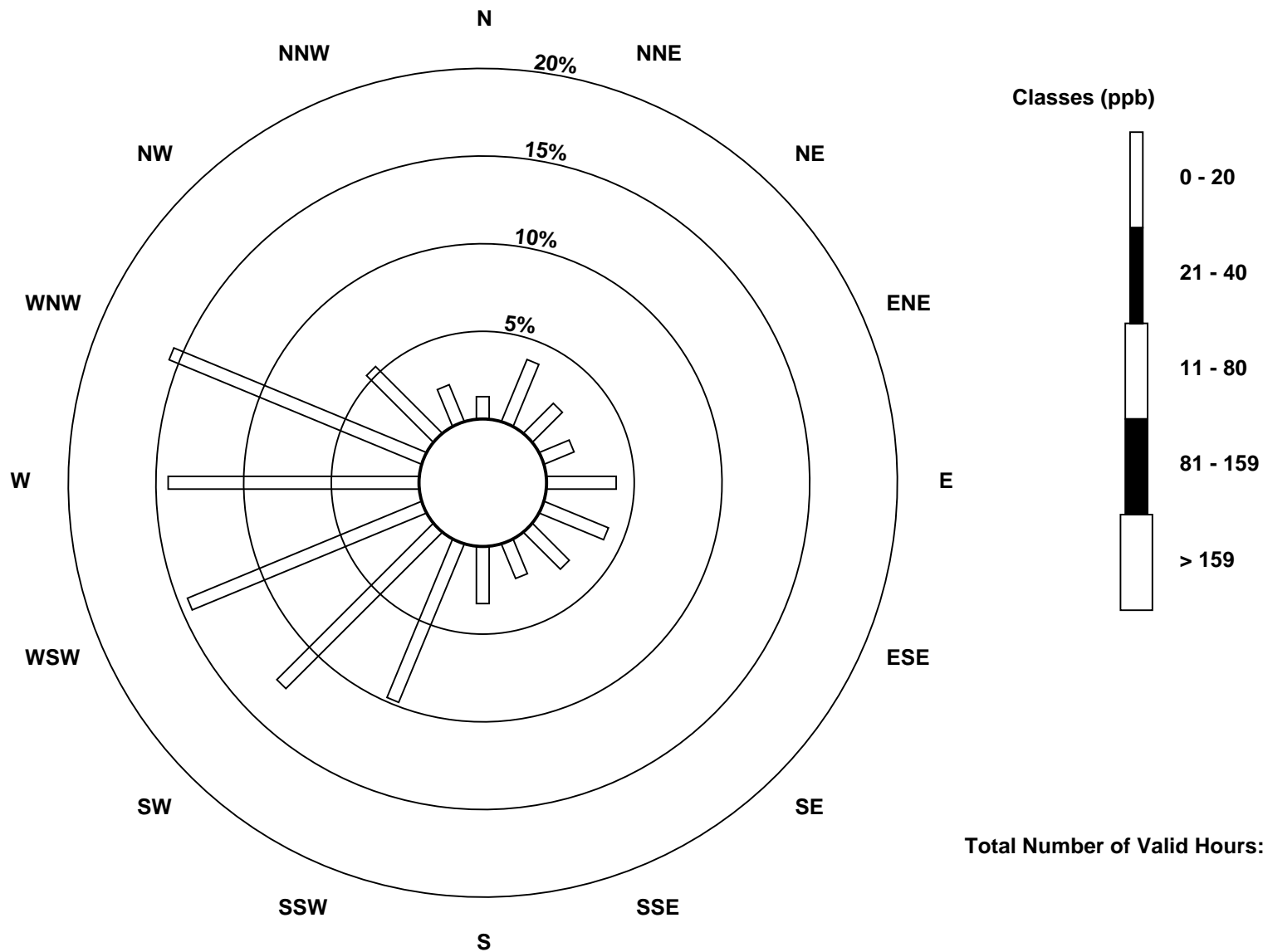
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

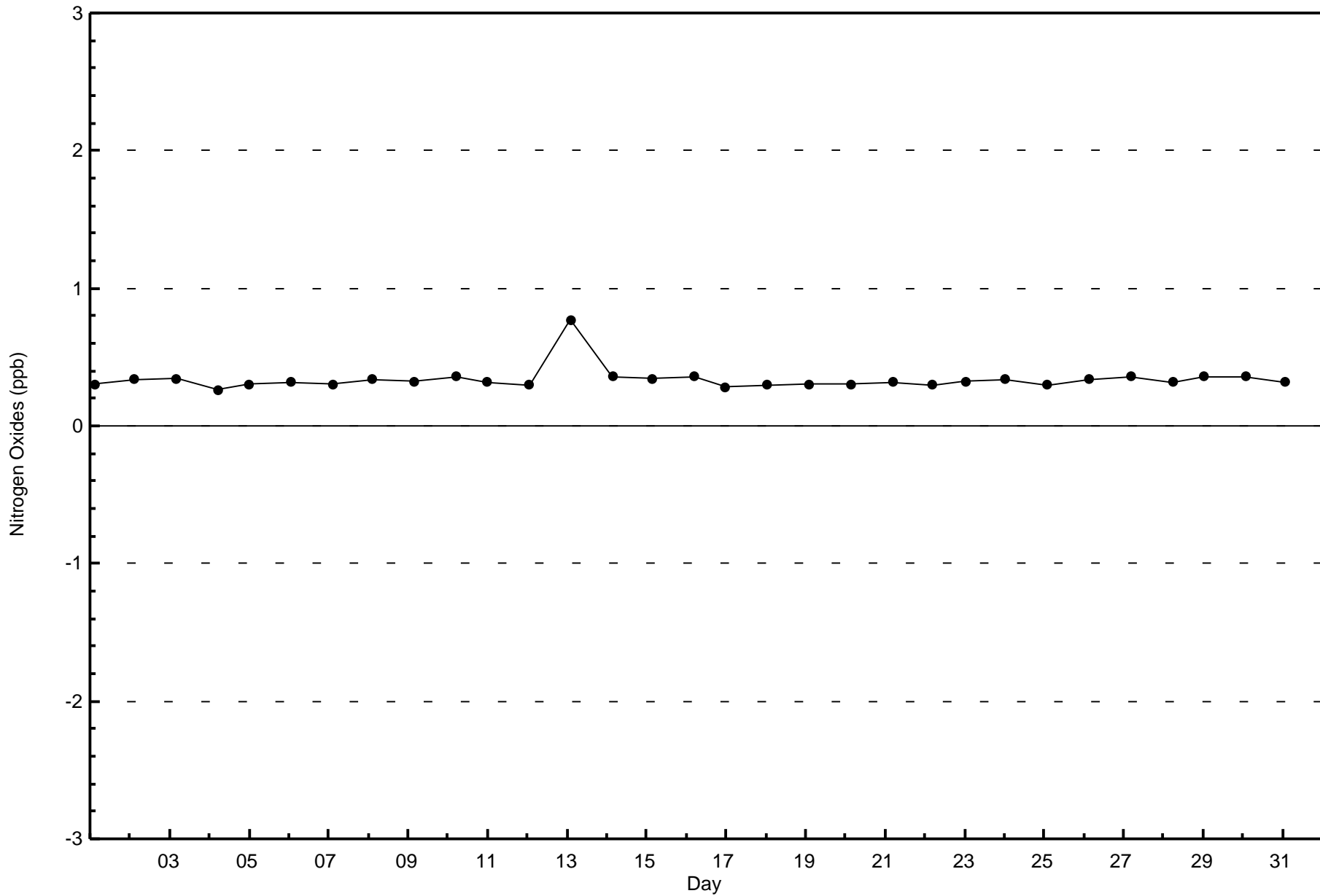
Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)

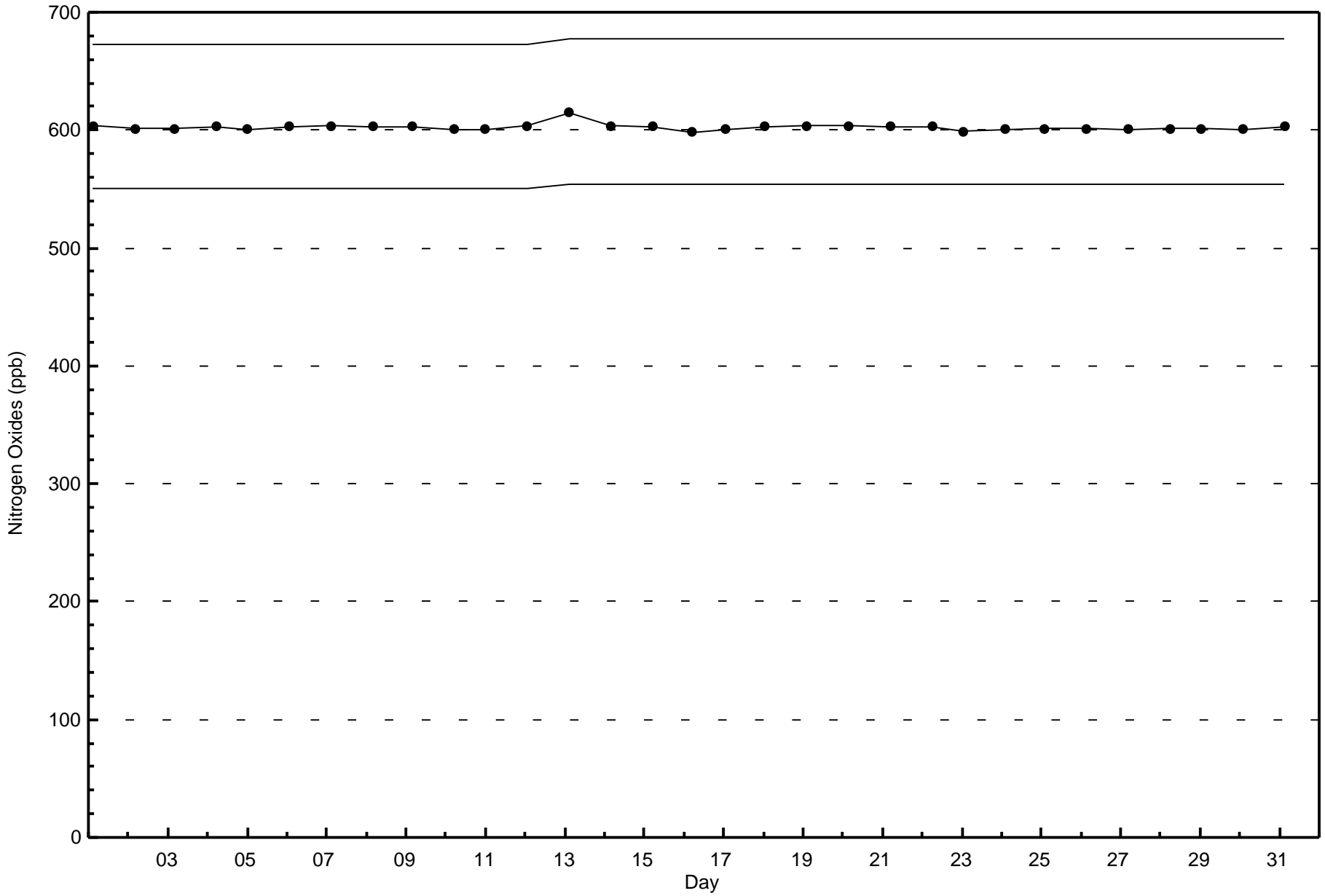




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - July 2017







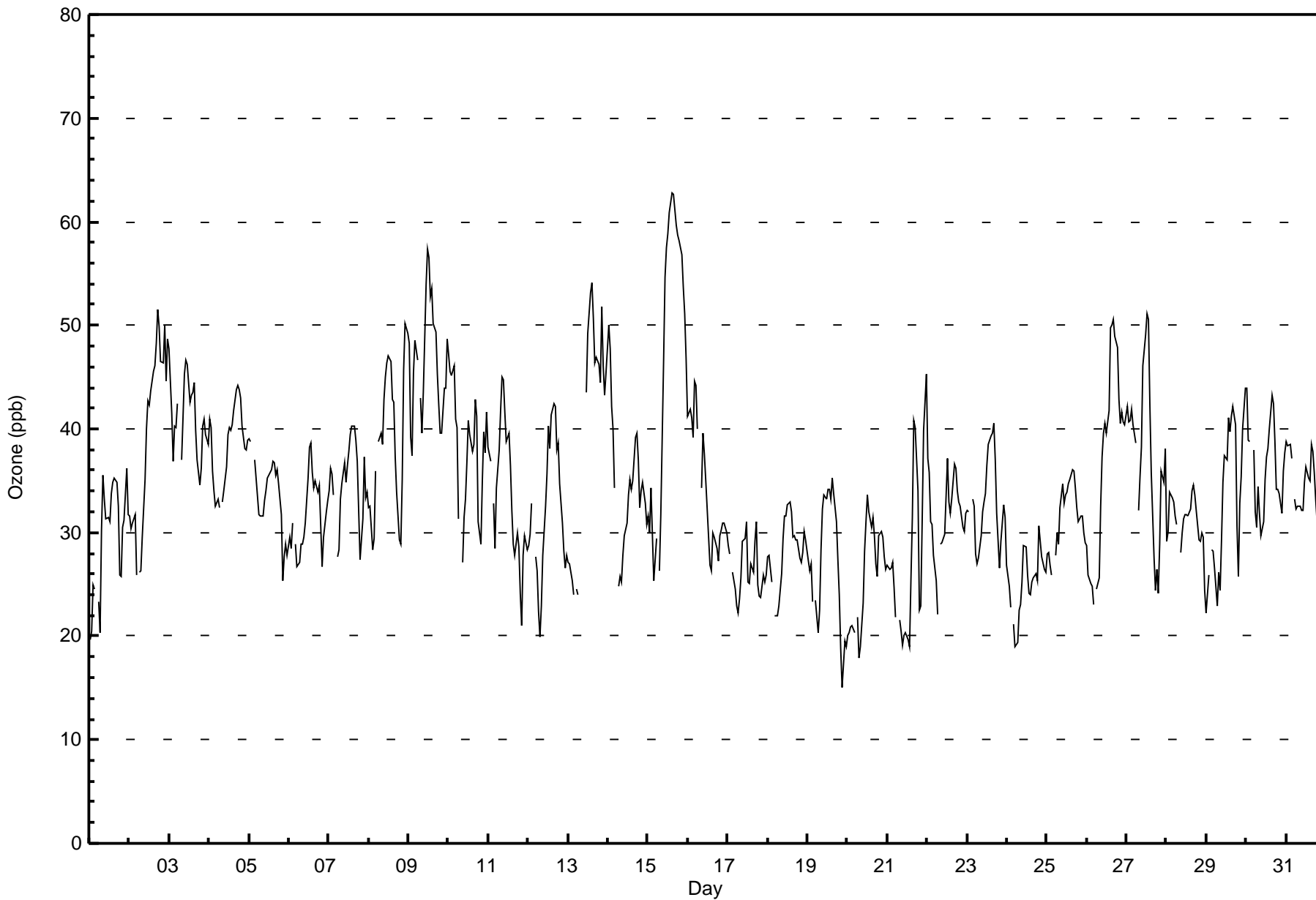
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Stony Mountain - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 63 ppb on Jul 15 15:00										Maximum Daily Average: 47.2 ppb on Jul 15										Hours of Data: 709																													
Minimum Value: 15 ppb on Jul 19 22:00										Minimum Daily Average: 25.2 ppb on Jul 24										Hours of Missing Data: 35																													
Maximum Diurnal Average: 38.4 ppb at hour 16										Minimum Diurnal Average: 27.3 ppb at hour 7										Hours of Calibration: 35																													
Monthly Average: 34.1 ppb										Percentiles: P ₁ = 19 P ₁₀ = 25 Q ₁ = 28 Median = 33 Q ₃ = 39 P ₉₀ = 45 P ₉₉ = 59										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-Jul	20	20	25	25	Z	23	20	30	36	33	31	31	31	34	35	35	35	33	26	26	30	31	36	32	29.5	36																							
2-Jul	32	30	31	32	26	Z	26	26	30	35	40	43	42	44	46	46	48	51	50	47	46	50	45	49	39.7	51																							
3-Jul	48	41	37	40	40	42	Z	37	41	45	47	46	43	43	44	44	40	37	35	36	40	41	39	38	41.1	48																							
4-Jul	41	40	36	34	33	33	32	Z	33	34	36	40	40	40	40	42	44	44	44	43	40	38	38	39	38.4	44																							
5-Jul	39	39	Z	37	35	33	32	32	32	33	34	35	36	36	37	37	36	36	35	32	25	28	29	28	33.6	39																							
6-Jul	30	28	31	Z	29	27	27	29	29	30	31	35	38	39	36	34	35	34	35	31	27	30	32	33	31.6	39																							
7-Jul	34	36	36	34	Z	28	28	33	35	37	35	36	38	39	40	40	39	37	32	27	31	37	33	34	34.8	40																							
8-Jul	32	32	28	29	36	Z	39	40	38	43	45	46	47	47	43	43	37	34	29	29	35	46	50	49	39.1	50																							
9-Jul	48	39	37	45	49	47	Z	43	40	44	54	57	57	53	54	50	49	45	42	40	40	44	44	49	46.5	57																							
10-Jul	47	45	45	46	41	40	31	Z	27	32	33	37	41	40	38	39	43	41	31	29	35	40	38	42	38.2	47																							
11-Jul	38	37	Z	33	28	34	38	42	45	45	42	39	40	36	32	29	28	30	29	24	21	28	30	28	33.7	45																							
12-Jul	29	30	33	Z	28	26	22	20	23	28	33	36	40	38	41	43	42	38	39	35	31	28	27	28	32.0	43																							
13-Jul	27	27	25	24	Z	25	24	C	C	C	C	44	49	53	54	51	46	47	46	45	52	46	43	45	40.7	54																							
14-Jul	50	48	42	40	34	Z	25	26	25	28	30	31	34	35	34	35	39	40	37	32	34	35	33	31	34.7	50																							
15-Jul	32	30	34	25	27	Z	29	26	32	47	55	58	59	61	63	63	61	60	59	58	57	54	51	47	47.2	63																							
16-Jul	41	42	41	39	45	44	40	Z	34	40	38	35	30	27	26	30	30	29	27	30	30	31	31	30	34.3	45																							
17-Jul	29	28	Z	26	24	23	22	24	26	29	29	31	25	25	27	26	29	31	25	24	24	26	25	26	26.3	31																							
18-Jul	28	28	25	Z	22	22	22	23	26	29	32	32	33	33	32	30	30	29	29	27	27	28	30	29	28.1	33																							
19-Jul	27	26	27	23	Z	23	20	22	28	32	34	33	34	34	33	35	34	31	27	24	19	15	20	19	27.1	35																							
20-Jul	20	20	21	21	20	Z	22	18	19	23	28	31	34	32	30	31	30	27	26	30	30	30	28	26	26.0	34																							
21-Jul	27	26	27	27	25	22	Z	22	20	19	20	20	20	19	25	31	41	40	34	23	23	31	40	45	27.3	45																							
22-Jul	37	36	31	31	28	25	22	Z	29	29	30	34	37	33	32	33	37	36	34	33	33	30	30	32	31.8	37																							
23-Jul	32	32	Z	33	32	28	27	28	30	32	33	34	36	38	39	40	41	37	32	27	29	31	33	31	32.8	41																							
24-Jul	27	25	23	Z	21	19	19	23	23	25	29	29	26	24	24	25	26	26	25	31	29	28	26	26	25.2	31																							
25-Jul	28	28	27	26	Z	28	30	29	32	35	33	34	34	35	35	36	36	34	32	31	32	32	30	29	31.5	36																							
26-Jul	29	26	25	25	23	Z	25	26	33	37	40	40	40	42	50	50	51	49	48	43	41	42	41	40	37.5	51																							
27-Jul	42	41	41	42	40	39	Z	32	35	38	46	49	51	51	42	36	27	24	26	24	29	36	35	38	37.6	51																							
28-Jul	29	30	34	33	33	32	31	Z	28	30	31	32	32	32	32	34	35	34	32	29	29	30	30	24	31.1	35																							
29-Jul	22	26	Z	28	28	27	23	26	24	29	35	37	37	41	40	41	42	40	31	26	33	35	40	44	32.9	44																							
30-Jul	44	39	39	Z	38	32	30	34	32	30	31	35	37	38	40	43	42	39	34	34	34	32	36	38	36.2	44																							
31-Jul	39	38	39	37	Z	33	32	32	33	32	32	35	36	35	35	38	38	36	33	29	22	22	22	22	32.7	39																							
																								33.8	32.8	32.3	32.2	31.4	30.2	27.3	28.9	30.6	33.4	35.5	37.2	37.9	37.9	38.1	38.4	38.4	37.1	34.3	32.1	32.5	34.0	34.3	34.6	Diurnal Average	
																								50	48	45	46	49	47	40	43	45	47	55	58	59	61	63	63	61	60	59	58	57	54	51	49	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	22	3.10	3.10
21 - 50	661	93.23	96.33
51 - 82	26	3.67	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Stony Mountain - July 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	1	3	3	2	0	3	2	1	4	0	2	0	0	1	0	0	22
21 - 50	7	23	15	11	23	20	14	10	15	75	85	99	100	111	37	15	660
51 - 82	0	3	0	0	5	2	3	8	3	0	2	0	0	0	0	0	26
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	29	18	13	28	25	19	19	22	75	89	99	100	112	37	15	708

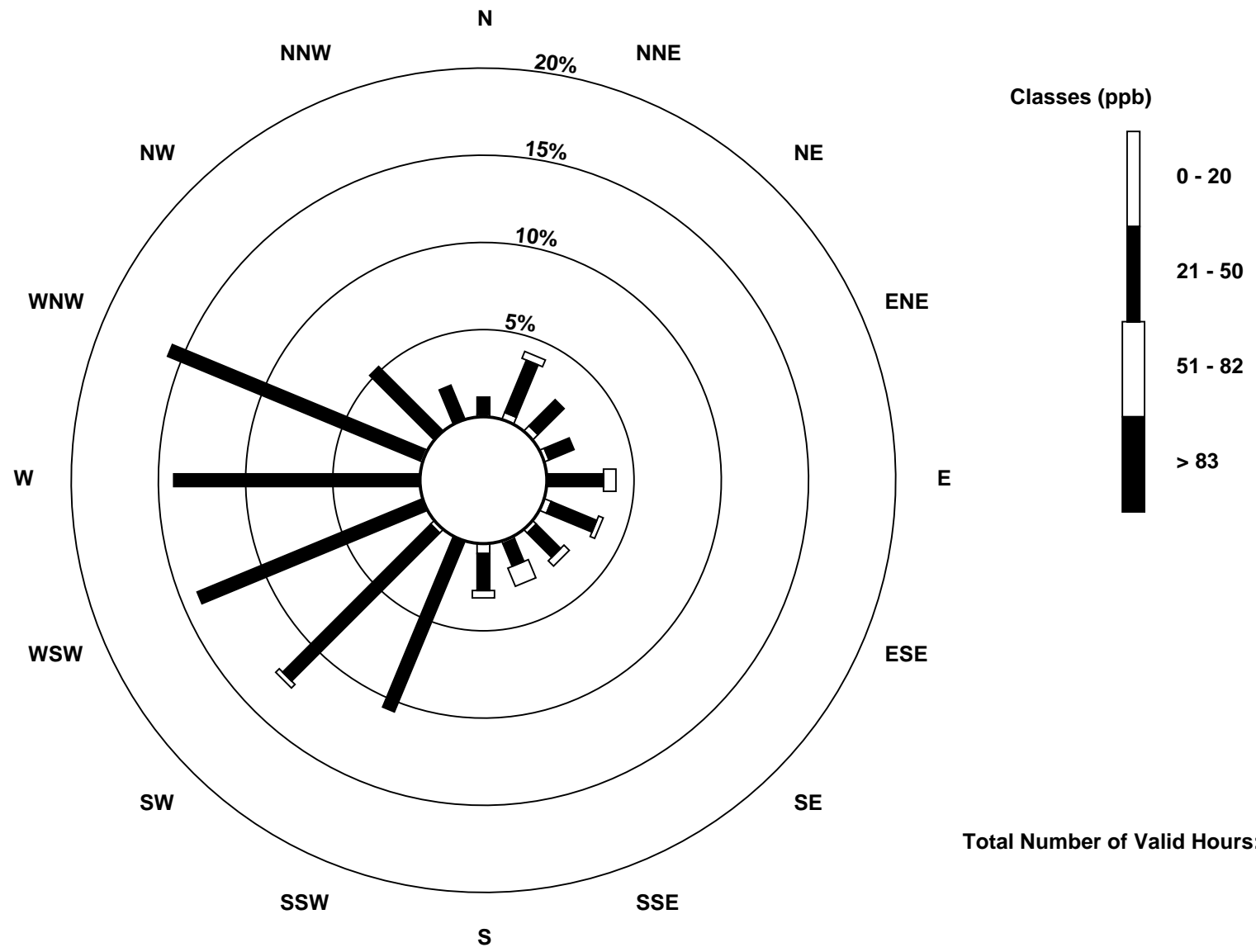
Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Stony Mountain (AMS 18)

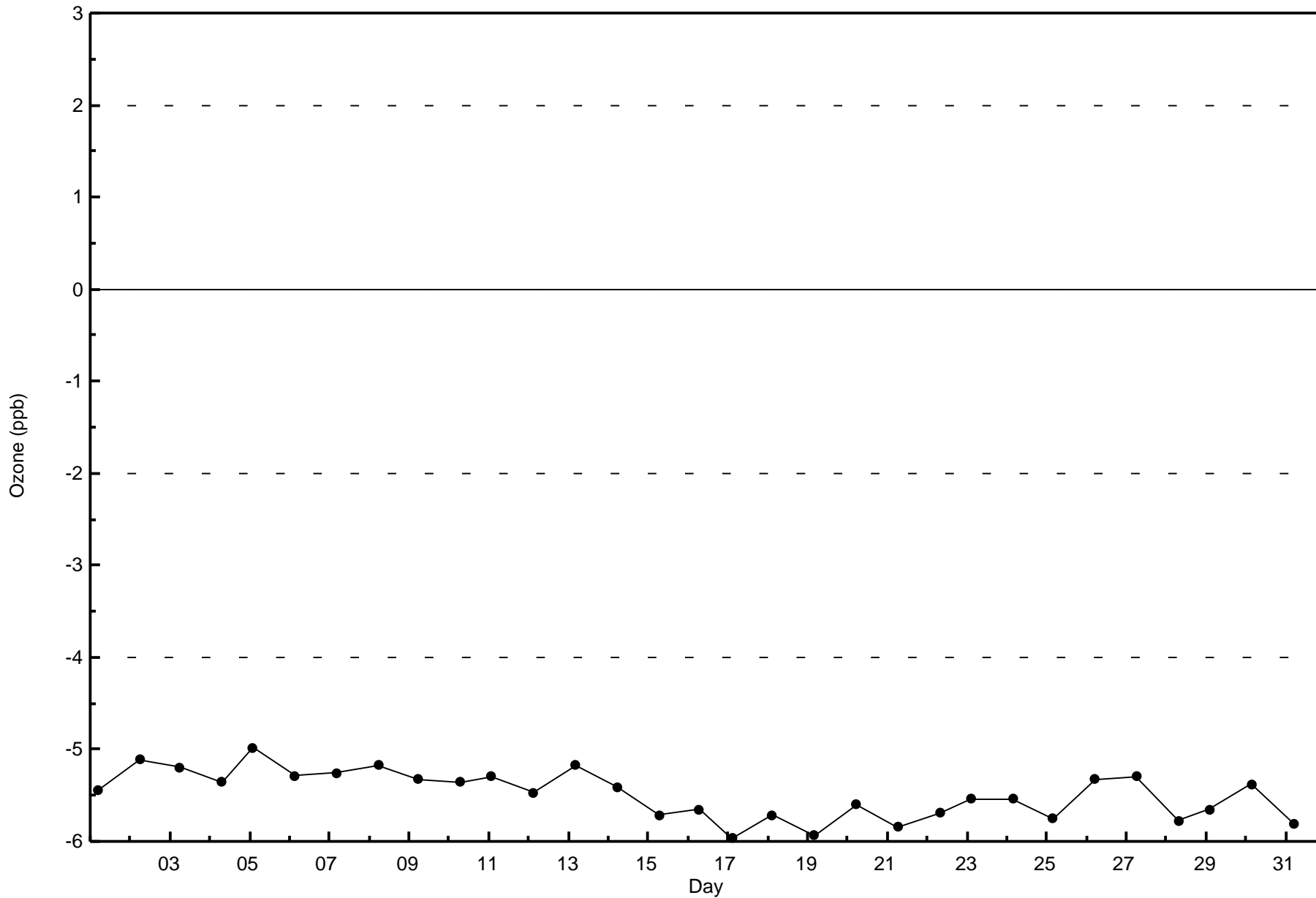


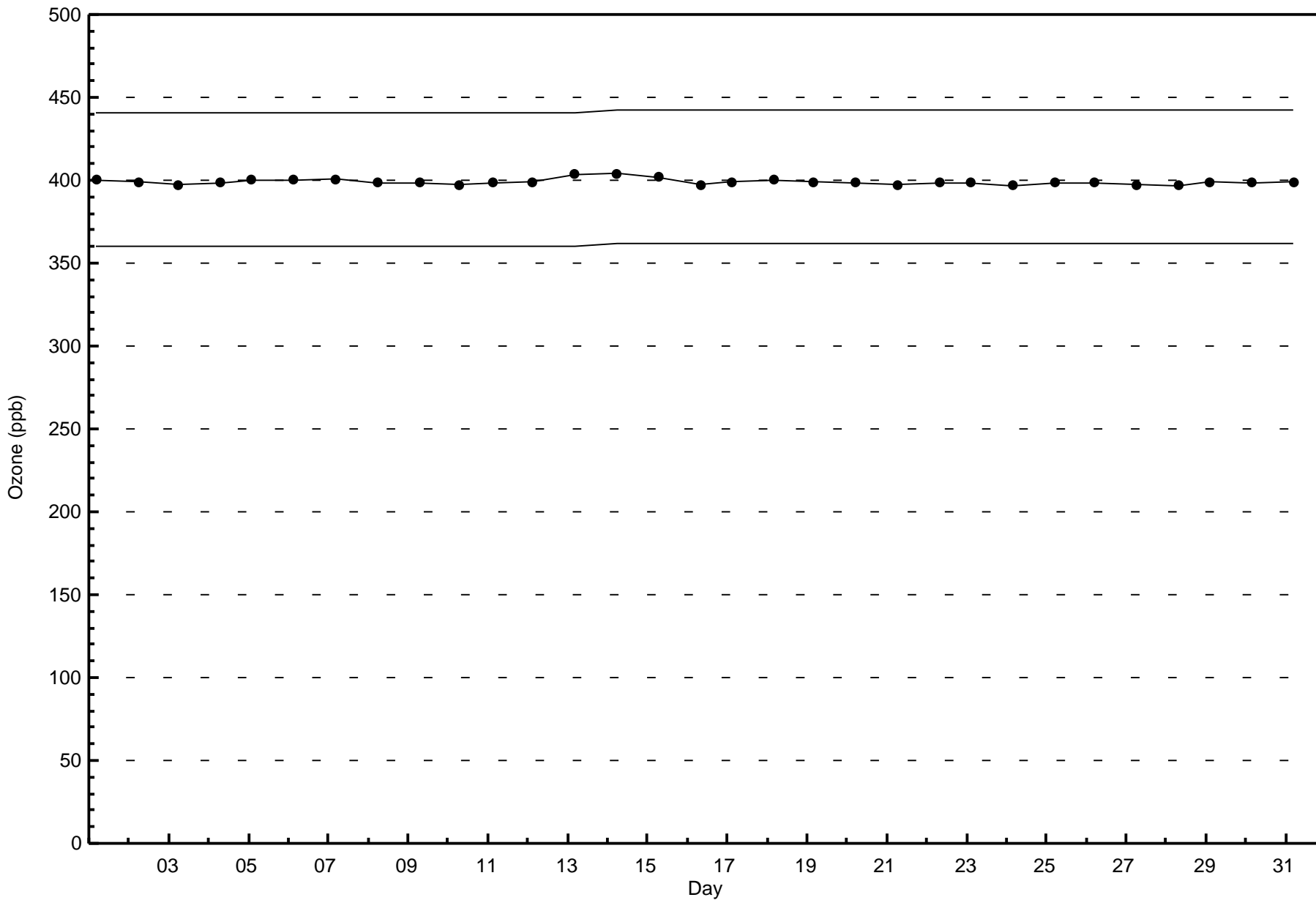
Total Number of Valid Hours: 708



Wood Buffalo Environmental Association
Zero Responses

Ozone (O₃) - ppb
Stony Mountain - July 2017







Summary of Hour Averages

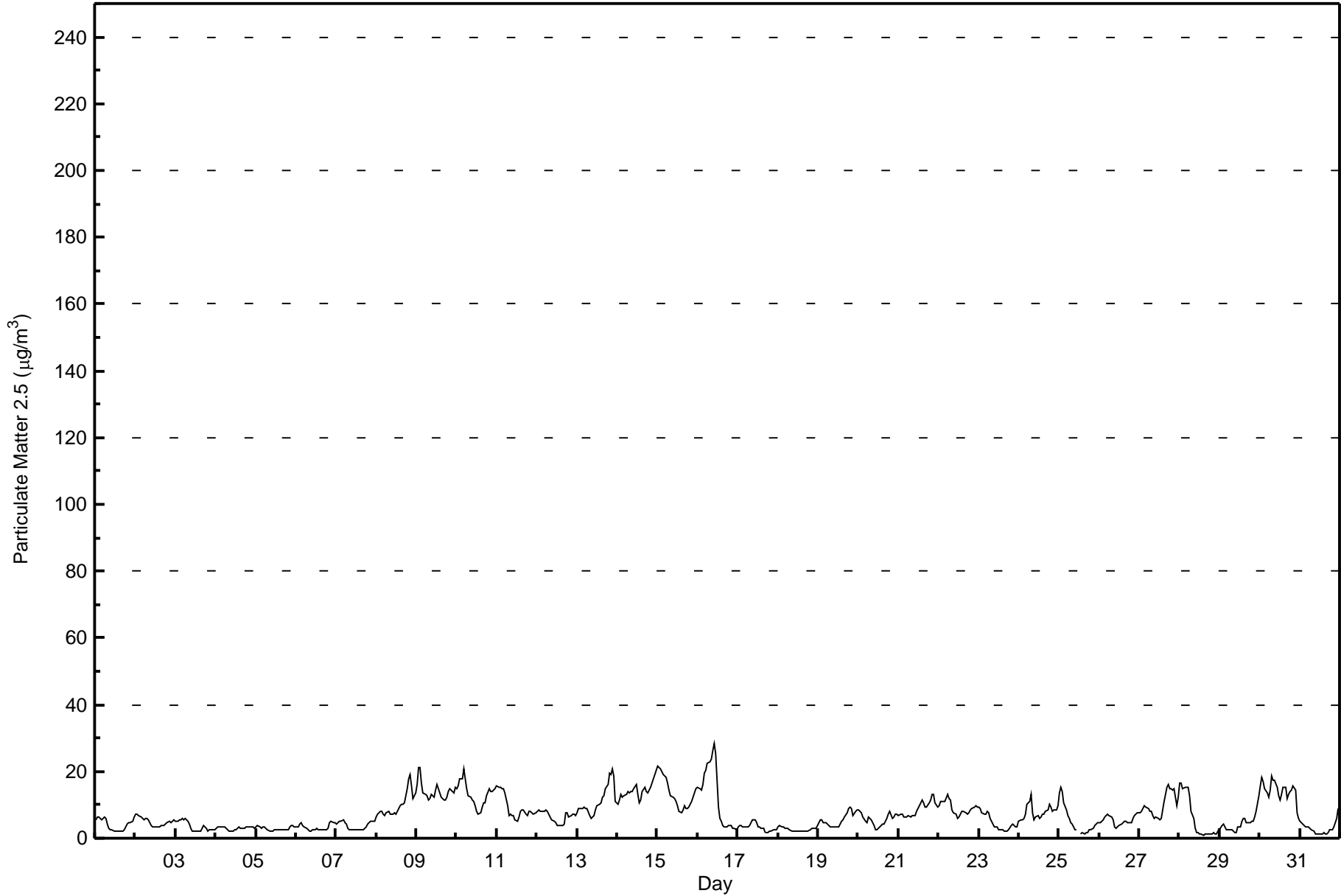
Stony Mountain - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 28.3 µg/m ³ on Jul 16 11:00 Minimum Value: 1.0 µg/m ³ on Jul 28 15:00 Maximum Diurnal Average: 9.1 µg/m ³ at hour 2 Monthly Average: 7.26 µg/m ³		Maximum Daily Average: 14.2 µg/m ³ on Jul 9 Minimum Daily Average: 2.6 µg/m ³ on Jul 18 Minimum Diurnal Average: 5.3 µg/m ³ at hour 14 Percentiles: P ₁ = 1.2 P ₁₀ = 2.3 Q ₁ = 3.3 Median = 6.0 Q ₃ = 9.9 P ₉₀ = 14.7 P ₉₉ = 20.8		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 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-Jul	5.5	6.2	6.3	6.0	5.7	6.3	5.9	4.2	2.9	2.5	2.5	2.3	2.3	2.1	2.1	2.2	2.2	2.4	3.2	4.1	4.7	4.5	5.1	6.5	4.1	6.5																						
2-Jul	7.1	7.1	6.6	6.2	5.9	5.6	5.8	5.8	5.5	3.8	3.3	3.3	3.5	3.6	3.5	4.0	3.9	3.8	4.1	4.7	5.0	4.7	5.1	5.5	4.9	7.1																						
3-Jul	4.9	5.0	5.4	5.3	5.7	5.7	5.9	5.0	4.1	2.8	2.3	2.0	2.0	2.1	2.1	2.1	2.8	4.0	3.0	2.3	2.5	2.7	2.5	2.5	3.5	5.9																						
4-Jul	3.1	3.5	3.5	3.5	3.4	3.2	2.9	2.4	2.2	2.1	2.1	2.3	2.7	3.0	3.2	3.0	3.0	3.1	3.3	3.3	3.2	3.3	3.2	3.0	3.0	3.5																						
5-Jul	3.2	3.7	3.4	3.1	3.2	3.3	3.1	2.6	2.3	2.2	2.1	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.5	2.7	3.4	3.9	3.8	3.6	2.9	3.9																						
6-Jul	3.5	3.6	4.4	4.5	4.0	3.3	3.1	2.3	2.2	2.2	2.5	2.7	2.9	2.7	2.6	2.5	2.5	2.5	2.5	2.9	4.8	5.1	4.8	4.6	3.3	5.1																						
7-Jul	4.4	4.5	5.0	5.2	5.3	4.8	4.3	2.9	2.5	2.7	2.7	2.6	2.6	2.5	2.5	2.6	2.7	3.0	3.4	4.1	5.1	5.3	5.3	5.2	3.8	5.3																						
8-Jul	6.1	7.0	7.9	8.2	7.1	6.7	7.4	8.1	7.3	7.0	7.2	7.7	7.3	8.9	9.8	10.3	10.2	10.6	14.6	17.7	18.9	15.7	11.9	13.4	9.9	18.9																						
9-Jul	15.9	21.4	21.3	16.7	13.6	13.0	12.8	11.6	12.0	13.0	12.1	14.2	16.0	14.6	13.5	12.1	11.5	11.4	12.5	14.2	15.0	14.2	13.5	15.4	14.2	21.4																						
10-Jul	15.0	15.8	17.9	17.9	20.6	17.9	14.8	12.7	12.3	11.5	10.8	9.6	8.2	7.2	7.5	9.2	10.7	10.4	12.8	15.0	14.0	14.0	14.6	15.0	13.1	20.6																						
11-Jul	15.7	15.2	15.2	15.0	14.7	13.4	9.8	6.7	7.4	6.8	6.6	5.4	5.1	6.2	8.2	8.6	8.5	7.2	6.6	8.1	8.2	7.8	7.4	7.7	9.2	15.7																						
12-Jul	8.2	8.3	8.1	8.2	8.1	8.6	8.2	7.2	6.4	5.6	4.9	4.7	3.7	3.9	3.6	3.9	4.4	7.4	7.7	6.4	6.6	7.3	7.2	6.9	6.5	8.6																						
13-Jul	7.8	8.8	9.0	9.0	9.2	9.1	8.9	6.6	5.8	6.4	6.9	8.5	9.6	10.3	10.8	12.3	12.9	14.7	16.3	19.4	19.1	20.7	18.5	11.0	11.3	20.7																						
14-Jul	10.3	11.6	13.0	12.5	12.6	13.1	14.0	13.7	13.8	14.1	15.0	16.1	13.3	10.4	11.5	14.1	15.3	14.0	13.4	14.5	15.2	16.6	19.0	20.5	14.1	20.5																						
15-Jul	21.5	21.3	20.6	19.2	18.5	18.3	16.5	14.5	12.9	12.4	11.7	10.9	9.9	7.9	7.8	8.3	9.6	9.0	8.9	9.4	11.0	12.1	13.5	14.8	13.3	21.5																						
16-Jul	15.4	14.9	14.2	16.1	19.3	20.4	22.3	23.1	23.5	26.4	28.3	25.3	9.4	6.0	5.2	3.8	3.4	3.5	3.7	3.8	3.7	3.1	2.8	2.7	12.5	28.3																						
17-Jul	3.3	3.7	3.6	3.5	3.3	3.3	3.2	3.7	4.5	5.6	5.4	4.6	3.6	3.2	3.0	2.8	1.9	1.7	1.7	2.0	2.3	2.5	2.6	2.6	3.2	5.6																						
18-Jul	3.2	3.7	3.6	3.5	3.2	3.1	2.9	2.5	2.3	2.1	2.0	2.0	1.9	2.0	2.0	2.1	2.1	2.1	2.2	2.7	2.9	3.0	3.0	3.0	2.6	3.7																						
19-Jul	4.8	5.6	5.5	4.8	4.5	4.5	4.0	3.4	3.4	3.3	3.2	3.2	3.4	4.2	5.3	5.4	6.2	7.5	9.1	9.5	8.9	6.9	8.0	8.4	5.5	9.5																						
20-Jul	8.3	8.0	7.6	6.3	5.1	4.8	6.4	6.1	5.6	4.0	2.6	2.6	2.9	3.5	4.3	4.4	5.1	6.0	7.4	8.0	5.9	6.4	7.0	7.1	5.6	8.3																						
21-Jul	6.9	7.2	7.1	6.5	6.4	6.5	6.7	6.5	6.6	6.6	6.9	8.2	9.5	10.5	11.4	10.6	9.3	9.5	10.7	11.3	13.0	12.9	10.6	9.2	8.8	13.0																						
22-Jul	9.9	10.9	11.0	10.8	10.9	13.0	12.0	11.3	8.7	7.6	7.1	6.0	6.3	7.3	7.8	7.9	7.8	7.4	7.8	8.5	8.7	9.3	9.6	9.4	9.0	13.0																						
23-Jul	9.5	8.9	7.8	7.1	7.4	8.2	7.7	6.0	4.2	3.3	3.5	3.2	2.7	2.6	2.3	2.3	2.3	2.6	3.6	4.1	3.9	3.5	3.5	4.7	9.5																							
24-Jul	4.9	5.5	5.6	5.7	7.3	10.1	11.0	13.3	7.8	5.7	6.2	6.9	5.9	6.3	7.0	7.3	7.9	8.3	10.0	9.3	7.9	8.4	8.4	9.9	7.8	13.3																						
25-Jul	13.6	15.5	14.1	10.6	8.4	6.7	6.0	4.8	4.1	2.7	2.4	C	C	1.5	1.5	1.4	1.7	1.8	2.5	2.5	2.9	3.7	4.3	4.7	5.3	15.5																						
26-Jul	4.6	4.9	5.5	6.3	6.9	7.1	6.6	6.2	5.4	3.5	2.9	3.3	4.0	4.2	4.7	4.9	5.0	4.5	4.6	4.7	5.9	6.9	7.3	7.7	5.3	7.7																						
27-Jul	7.7	8.2	9.0	9.6	9.4	8.8	8.2	8.1	6.9	6.1	6.4	6.0	5.5	5.9	8.4	11.1	15.2	16.3	14.9	14.7	14.2	14.7	10.0	12.5	9.9	16.3																						
28-Jul	16.4	16.5	15.0	15.3	15.2	15.1	12.8	8.2	5.7	2.9	1.7	1.5	1.3	1.1	1.0	1.2	1.4	1.1	1.2	1.4	1.5	1.4	1.4	1.9	5.9	16.5																						
29-Jul	2.7	3.9	4.1	3.5	2.7	2.5	2.7	2.5	2.2	1.7	1.8	3.3	3.6	5.2	5.9	5.9	4.8	4.8	4.5	5.3	5.2	6.2	8.2	12.5	4.4	12.5																						
30-Jul	15.8	18.2	17.1	15.0	13.8	12.2	14.5	18.5	17.5	17.3	15.4	12.8	11.5	13.0	15.3	15.4	11.9	13.2	14.0	14.6	15.6	14.4	7.7	6.0	14.2	18.5																						
31-Jul	5.2	4.5	3.7	3.4	3.3	3.2	2.9	2.4	2.0	1.4	1.1	1.2	1.3	1.4	1.5	1.2	1.2	1.7	2.5	2.4	3.4	4.8	5.8	9.0	2.9	9.0																						
																								8.5	9.1	9.1	8.7	8.5	8.4	8.2	7.5	6.8	6.3	6.1	6.2	5.5	5.3	5.7	6.0	6.1	6.4	6.9	7.5	7.8	7.9	7.6	7.9	Diurnal Average
																								21.5	21.4	21.3	19.2	20.6	20.4	22.3	23.1	23.5	26.4	28.3	25.3	16.0	14.6	15.3	15.4	15.3	16.3	16.3	19.4	19.1	20.7	19.0	20.5	Diurnal Maximum
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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - July 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	341	45.96	45.96
6 - 15	352	47.44	93.40
16 - 25	47	6.33	99.73
26 - 80	2	0.27	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - July 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	1	2	5	3	7	5	1	4	3	23	56	66	82	62	17	3	340
6 - 15	8	24	12	10	19	22	18	17	20	43	32	37	17	45	19	9	352
16 - 25	0	3	1	0	2	1	2	0	2	10	6	2	2	9	3	4	47
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	9	29	18	13	28	28	21	21	25	76	94	105	102	117	39	16	741

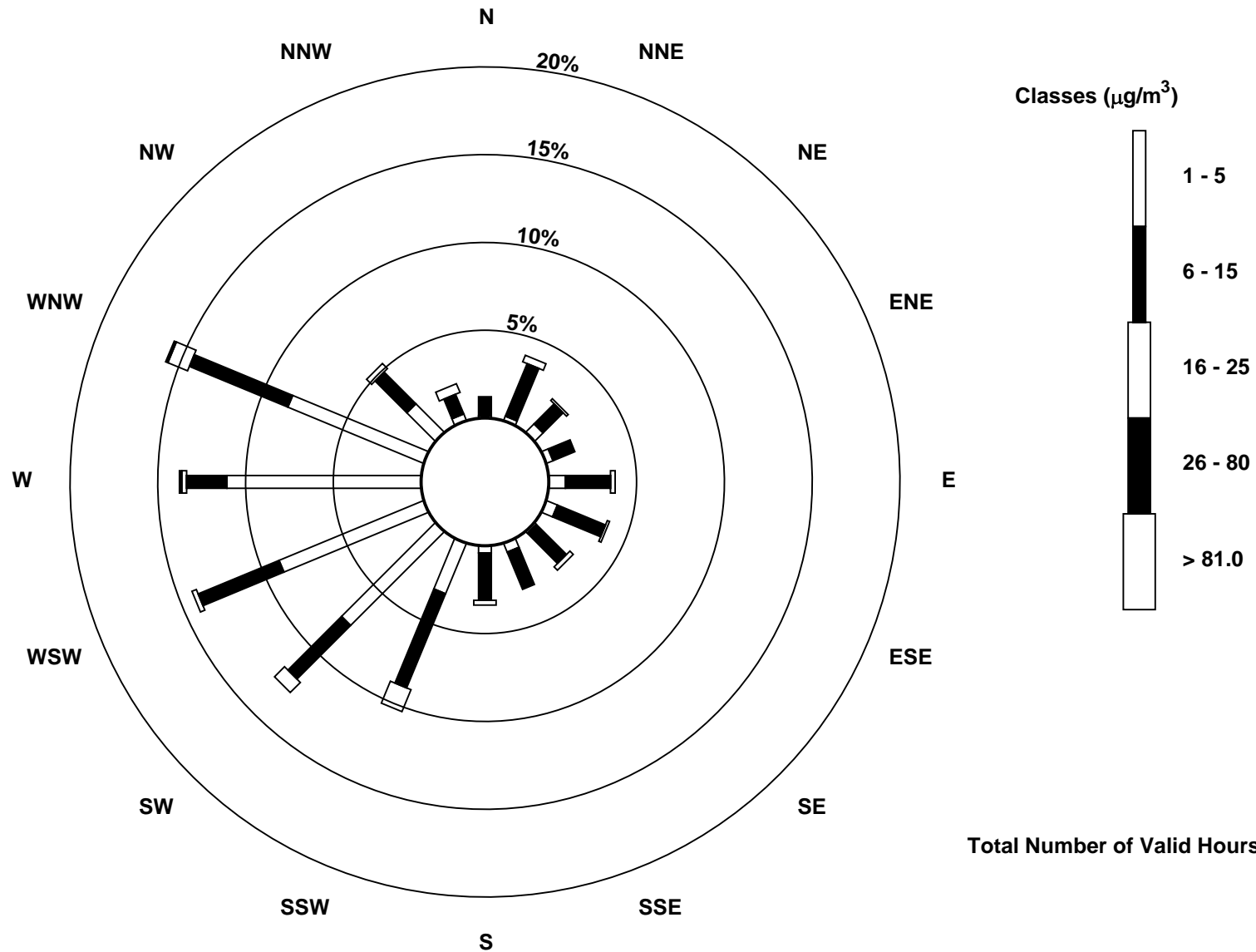
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain (AMS 18)



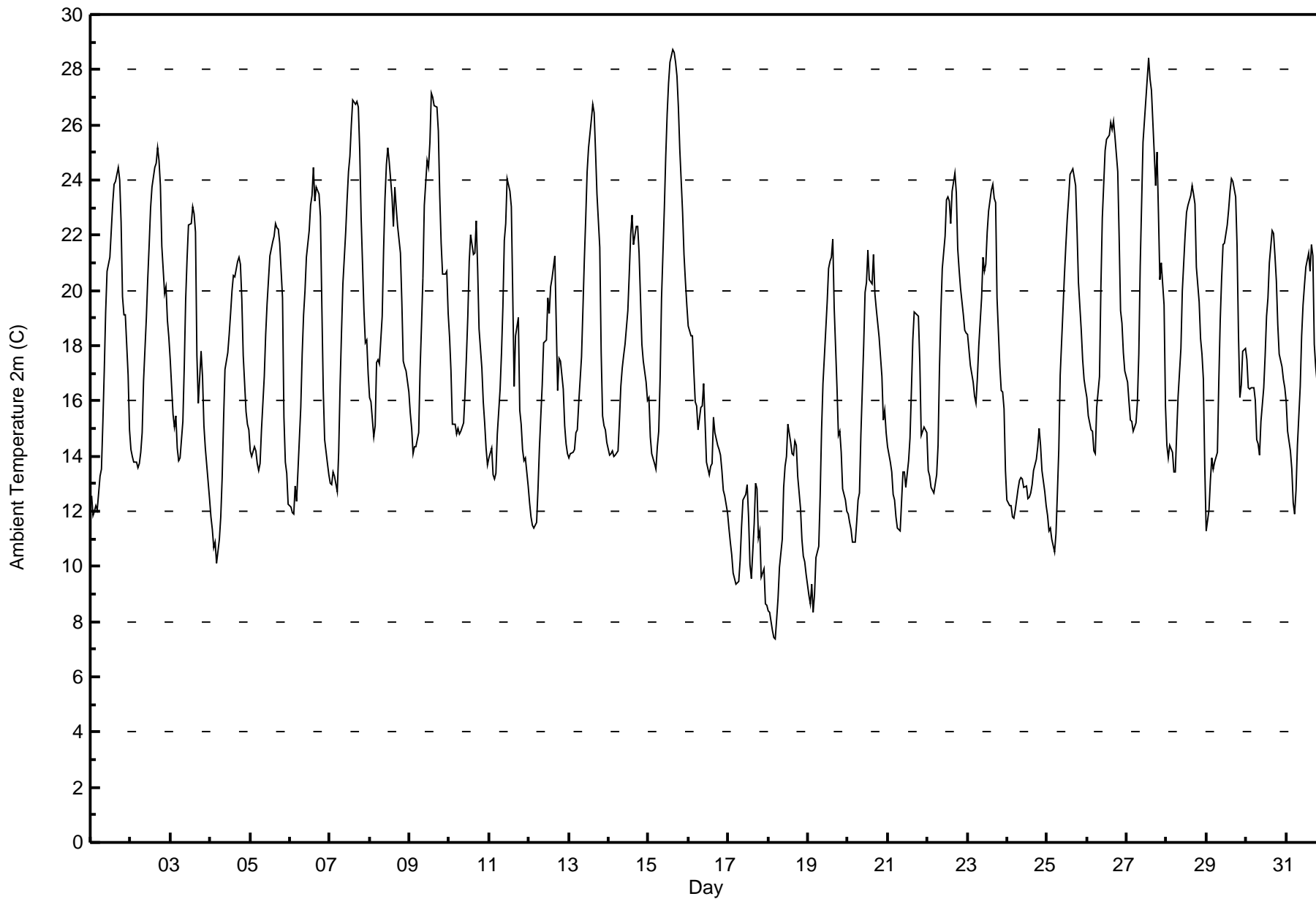


Maximum Value: 28.7 C on Jul 15 15:00 Maximum Daily Average: 21.5 C on Jul 15																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: 7.4 C on Jul 18 05:00 Minimum Daily Average: 10.8 C on Jul 17 Maximum Diurnal Average: 22.0 C at hour 16 Minimum Diurnal Average: 13.0 C at hour 5 Monthly Average: 17.39 C Percentiles: P ₁ = 8.6 P ₁₀ = 12.0 Q ₁ = 13.9 Median = 16.7 Q ₃ = 21.1 P ₉₀ = 23.8 P ₉₉ = 27.6																				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-Jul	12.6	11.8	12.0	12.2	12.0	13.3	13.5	15.2	17.1	19.2	20.7	21.2	22.2	23.1	23.8	23.9	24.5	24.0	22.5	19.8	19.1	19.1	16.9	14.9	18.1	24.5
2-Jul	14.2	14.0	13.8	13.8	13.6	13.7	14.1	14.8	16.7	19.0	20.4	21.6	23.0	23.8	24.5	24.6	25.2	24.7	23.8	21.6	19.9	20.1	18.9	18.3	19.1	25.2
3-Jul	17.5	15.5	15.1	15.5	14.3	13.8	13.9	15.3	17.2	19.7	21.2	22.4	22.4	23.0	22.8	22.1	17.6	15.9	17.8	16.9	15.1	14.3	13.7	12.4	17.3	23.0
4-Jul	11.8	11.3	10.7	10.9	10.1	11.0	11.8	13.2	15.3	17.1	17.7	18.4	19.2	20.0	20.5	20.5	21.0	21.2	21.0	19.7	17.6	15.6	15.2	15.0	16.1	21.2
5-Jul	14.2	14.0	14.4	14.2	13.7	13.5	13.7	15.0	16.9	18.4	19.5	20.4	21.3	21.8	22.0	22.4	22.3	22.2	21.7	19.7	15.4	13.8	13.4	12.3	17.3	22.4
6-Jul	12.2	12.0	11.9	12.9	12.3	13.5	15.8	17.7	19.1	20.0	21.2	22.2	23.1	23.4	24.4	23.3	23.8	23.5	22.7	19.5	16.4	14.6	13.7	13.3	18.0	24.4
7-Jul	13.0	13.0	13.4	13.3	12.7	14.2	16.5	18.5	20.2	22.1	23.3	24.3	24.8	26.0	26.9	26.8	26.8	26.7	25.0	22.6	19.3	18.1	18.2	17.0	20.1	26.9
8-Jul	16.1	16.0	14.7	15.1	17.4	17.5	17.3	19.0	21.5	23.4	24.5	25.1	24.7	23.4	22.3	23.8	23.0	22.3	21.4	19.6	17.4	17.2	17.1	16.3	19.8	25.1
9-Jul	15.5	15.0	14.1	14.4	14.4	14.8	17.1	18.7	20.4	23.1	24.7	24.5	25.4	27.2	27.0	26.7	26.7	25.8	23.4	21.7	20.6	20.6	20.7	19.2	20.9	27.2
10-Jul	18.3	17.1	15.2	15.1	14.8	15.0	14.8	14.9	15.2	16.3	17.6	19.0	21.1	22.0	21.3	21.4	22.5	20.8	18.6	17.2	16.0	15.2	14.3	13.7	17.4	22.5
11-Jul	14.0	14.3	13.3	13.2	13.4	14.8	16.4	17.8	19.4	21.8	22.4	24.1	23.6	23.1	19.9	16.5	18.4	19.0	15.7	15.2	14.2	13.9	13.9	12.9	17.1	24.1
12-Jul	12.3	11.8	11.5	11.4	11.6	12.8	14.3	15.5	16.6	18.1	18.2	19.7	19.1	20.1	20.4	21.3	18.8	16.4	17.5	17.5	16.4	15.1	14.4	14.1	16.0	21.3
13-Jul	13.9	14.1	14.1	14.2	14.8	15.0	15.9	17.6	19.3	21.1	22.7	24.3	25.2	26.2	26.7	26.4	25.0	23.5	21.6	17.8	15.4	15.1	14.9	14.5	19.1	26.7
14-Jul	14.0	14.1	14.2	14.0	14.0	14.2	15.3	16.5	17.2	17.6	18.0	19.3	20.6	22.0	22.7	21.6	22.3	22.3	21.3	19.7	18.1	17.4	16.7	16.0	17.9	22.7
15-Jul	16.1	14.7	14.1	13.7	13.5	14.4	14.9	16.8	19.7	23.0	24.9	26.4	27.5	28.3	28.7	28.6	28.3	27.8	26.7	25.1	22.8	21.3	20.4	19.5	21.5	28.7
16-Jul	18.7	18.3	18.4	17.1	16.0	15.8	15.0	15.8	15.8	16.6	15.2	13.8	13.3	13.6	13.7	15.4	14.9	14.4	14.2	14.1	13.5	12.7	12.6	11.9	15.0	18.7
17-Jul	11.4	10.9	10.4	9.8	9.3	9.4	9.4	10.2	11.4	12.4	12.6	13.0	11.8	10.1	9.6	11.6	13.0	12.8	11.0	11.3	9.6	9.9	8.6	8.6	10.8	13.0
18-Jul	8.4	8.3	7.7	7.4	7.4	8.1	8.8	9.9	11.0	12.9	13.6	14.0	15.1	14.5	14.1	14.0	14.5	14.4	13.3	12.1	11.0	10.4	10.2	9.7	11.3	15.1
19-Jul	9.0	8.6	9.4	8.4	9.0	10.3	10.7	12.6	14.9	16.6	17.6	19.6	20.8	21.1	21.2	21.8	19.4	16.5	14.8	14.9	14.1	12.8	12.4	12.0	14.5	21.8
20-Jul	11.9	11.6	11.3	10.9	10.9	11.6	12.4	12.7	14.7	18.0	19.9	20.3	21.5	20.4	20.2	21.3	19.9	19.3	18.8	18.3	16.9	15.3	15.7	14.9	16.2	21.5
21-Jul	14.4	13.8	13.4	12.6	12.4	11.8	11.4	11.3	12.4	13.4	13.4	12.8	13.9	14.6	16.4	18.2	19.2	19.2	19.1	17.4	14.8	14.9	15.1	14.9	14.6	19.2
22-Jul	13.5	13.3	12.8	12.8	12.6	13.3	14.4	17.2	19.2	20.8	22.0	23.3	23.4	23.2	22.4	23.6	24.3	23.5	21.5	20.8	20.1	19.1	18.6	18.5	18.9	24.3
23-Jul	18.4	17.9	17.3	16.7	16.2	15.9	16.8	18.0	19.7	21.2	20.7	20.9	22.1	22.9	23.7	23.8	23.3	23.2	19.7	17.2	16.3	16.3	15.7	13.5	19.1	23.8
24-Jul	12.4	12.2	12.2	11.8	11.7	12.1	12.8	13.1	13.2	13.2	12.9	12.9	12.5	12.5	12.6	13.0	13.5	13.9	14.3	15.0	14.4	13.5	12.7	12.2	12.9	15.0
25-Jul	11.8	11.3	11.4	11.0	10.5	11.2	12.7	14.2	16.9	19.3	20.5	21.6	22.6	23.3	24.2	24.4	24.1	23.8	22.2	20.3	18.5	17.5	16.8	16.4	17.8	24.4
26-Jul	16.1	15.5	14.9	14.9	14.2	14.1	15.7	16.9	20.1	22.6	23.9	25.0	25.5	25.6	26.1	25.8	26.2	25.6	24.3	21.9	19.3	18.8	17.8	17.1	20.3	26.2
27-Jul	16.7	16.0	15.3	15.3	14.9	15.2	15.9	17.7	20.9	23.2	25.3	26.9	27.6	28.4	27.7	27.3	25.0	23.8	25.0	22.8	20.4	21.0	19.5	15.8	21.1	28.4
28-Jul	14.4	13.9	14.4	14.2	13.4	13.4	14.8	16.2	17.9	20.0	21.0	22.0	22.8	23.1	23.4	23.8	23.5	23.1	20.9	19.6	18.3	17.7	16.8	13.6	18.4	23.8
29-Jul	11.3	12.1	13.1	13.9	13.5	13.8	14.1	16.7	18.9	20.4	21.6	21.7	22.4	23.0	23.6	24.1	23.9	23.4	21.6	18.4	16.1	16.6	17.8	17.9	18.3	24.1
30-Jul	17.5	16.5	16.4	16.5	16.5	16.0	14.6	14.4	14.0	15.2	16.5	17.7	19.1	19.7	21.0	22.2	22.1	21.3	20.3	18.7	17.7	17.2	16.8	16.5	17.7	22.2
31-Jul	16.0	14.9	14.2	13.5	12.3	11.9	12.8	14.4	16.5	18.4	19.5	20.2	20.9	21.3	20.7	21.7	21.3	18.0	17.2	16.1	13.8	12.5	11.6	11.1	16.3	21.7
14.1 13.7 13.4 13.2 13.0 13.4 14.1 15.4 17.1 18.8 19.8 20.6 21.2 21.6 21.8 22.0 21.7 21.0 20.0 18.5 16.7 16.1 15.5 14.6																								Diurnal Average		
18.7 18.3 18.4 17.1 17.4 17.5 17.3 19.0 21.5 23.4 25.3 26.9 27.6 28.4 28.7 28.6 28.3 27.8 26.7 25.1 22.8 21.3 20.7 19.5																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	23	3.09	3.09
10 - 20	493	66.26	69.35
> 20	228	30.65	100.00

Total Number of Valid Hours: 744

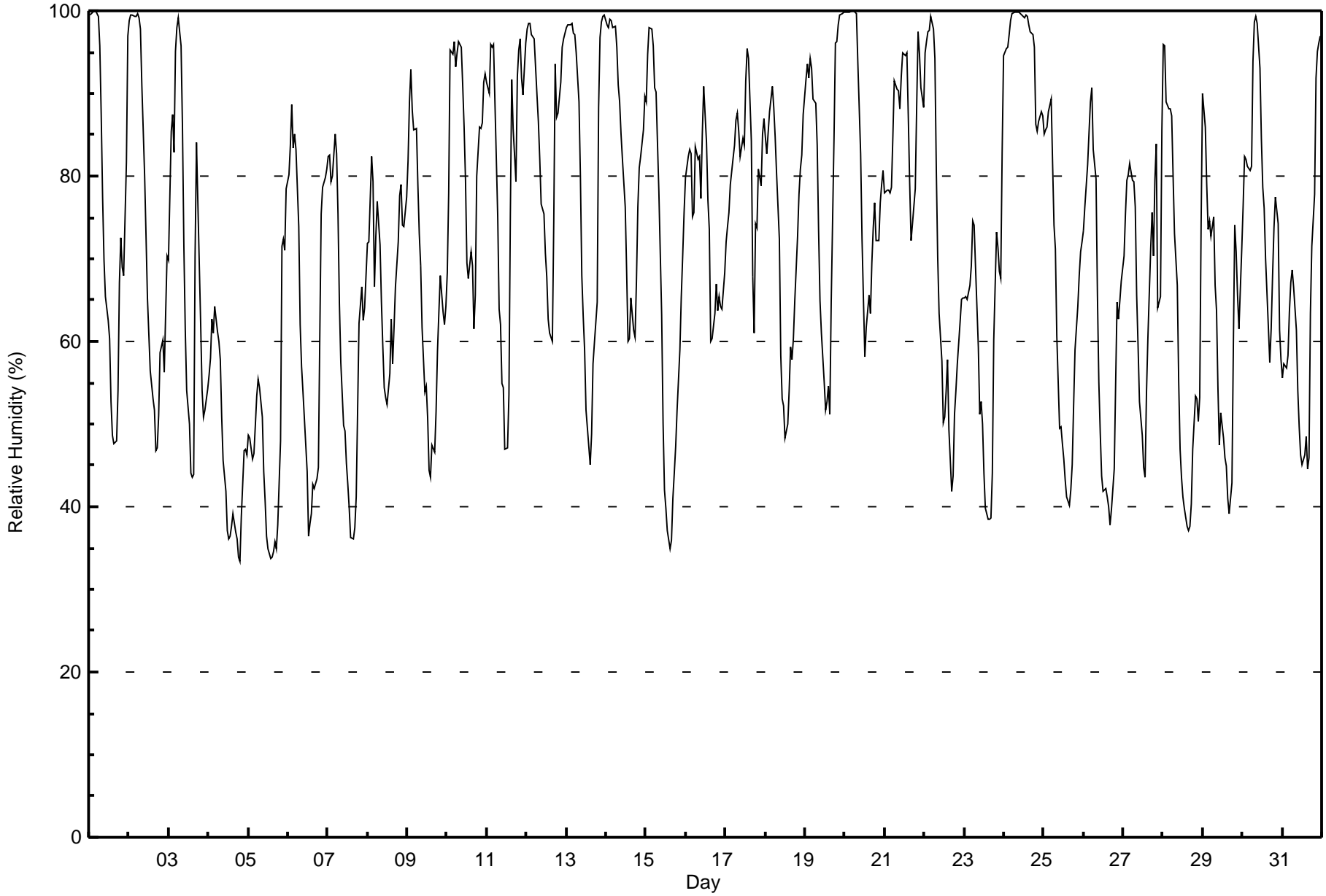
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Stony Mountain - July 2017

Maximum Value: 100 % on Jul 1 04:00																	Maximum Daily Average: 95.8 % on Jul 24																	Hours in Service: 744	
Minimum Value: 33 % on Jul 4 20:00																	Minimum Daily Average: 46.9 % on Jul 4																	Hours of Data: 744	
Maximum Diurnal Average: 86.0 % at hour 5																	Minimum Diurnal Average: 54.2 % at hour 16																	Hours of Missing Data: 0	
Monthly Average: 71.1 %																	Percentiles: P ₁ = 35 P ₁₀ = 44 Q ₁ = 55 Median = 72 Q ₃ = 87 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-Jul	99	100	100	100	100	99	96	87	78	70	65	63	60	53	49	48	48	54	67	73	69	68	82	97	76.0	100									
2-Jul	99	100	99	99	99	100	99	98	91	80	73	65	61	56	53	52	47	47	51	59	60	56	63	70	74.1	100									
3-Jul	70	85	87	83	95	98	99	96	86	72	61	54	50	44	44	44	70	84	69	62	54	51	52	54	69.4	99									
4-Jul	56	58	63	61	64	61	60	58	51	46	42	37	36	36	38	39	37	36	34	33	39	47	47	46	46.9	64									
5-Jul	49	48	46	47	50	53	55	54	51	44	41	36	35	34	34	34	36	35	38	48	71	72	71	79	48.4	79									
6-Jul	80	84	89	83	85	83	74	62	57	54	51	44	36	38	39	43	42	43	45	60	75	79	80	81	62.8	89									
7-Jul	82	83	79	80	85	83	75	65	57	50	49	45	43	40	36	36	37	41	52	62	67	63	64	68	60.1	85									
8-Jul	72	72	82	79	67	73	77	72	65	59	54	53	52	56	63	57	62	67	72	78	79	74	74	78	68.2	82									
9-Jul	82	89	93	88	86	86	79	73	69	62	54	55	51	44	44	47	47	52	59	63	68	64	62	64	65.8	93									
10-Jul	68	78	95	95	96	93	95	96	96	91	86	79	70	68	71	69	61	66	80	86	86	86	91	92	83.1	96									
11-Jul	91	90	96	96	96	89	75	64	62	55	54	47	47	54	75	92	86	79	92	95	97	92	90	96	79.6	97									
12-Jul	98	98	99	97	97	93	90	87	82	77	75	71	68	63	61	60	75	94	87	88	91	96	97	97	84.9	99									
13-Jul	98	98	98	98	97	97	95	89	80	68	63	59	52	47	45	49	57	60	65	88	97	99	99	100	79.1	100									
14-Jul	98	98	99	99	98	98	96	91	89	85	82	76	68	60	60	65	61	61	67	76	81	82	86	90	82.0	99									
15-Jul	89	95	98	98	96	91	90	84	78	63	50	42	40	37	35	36	41	44	47	52	59	65	70	76	65.7	98									
16-Jul	80	82	83	83	75	76	84	82	82	77	85	91	84	77	74	60	60	63	67	64	65	64	64	68	74.6	91									
17-Jul	72	74	76	79	82	84	87	88	85	82	85	84	91	96	94	84	68	61	74	74	81	79	85	87	81.3	96									
18-Jul	85	83	88	89	91	88	85	80	72	58	53	52	48	50	54	59	58	60	65	73	78	81	83	88	71.7	91									
19-Jul	92	94	92	94	93	89	89	84	73	65	61	55	52	53	55	51	65	85	96	96	98	99	100	100	80.4	100									
20-Jul	100	100	100	100	100	100	100	100	94	83	72	65	58	62	66	63	69	74	77	72	72	77	79	81	81.8	100									
21-Jul	78	78	78	78	79	85	92	91	90	88	92	95	95	95	87	79	72	74	78	89	97	95	91	88	86.0	97									
22-Jul	95	96	97	98	99	98	94	81	70	63	58	50	51	54	58	49	42	44	51	54	57	62	65	65	68.9	99									
23-Jul	65	65	65	67	69	75	74	69	59	51	53	50	44	40	39	38	39	44	60	73	71	68	68	83	59.6	83									
24-Jul	95	95	96	97	99	100	100	100	100	100	100	99	99	99	99	98	97	97	96	86	85	87	88	87	95.8	100									
25-Jul	85	86	86	88	89	82	74	71	61	49	50	48	46	43	41	40	42	45	52	59	64	68	71	72	63.0	89									
26-Jul	73	76	81	85	89	91	83	80	66	55	49	44	42	42	41	40	38	40	45	55	65	63	65	67	61.4	91									
27-Jul	70	75	80	80	81	79	79	76	66	60	53	49	45	44	54	60	71	76	70	80	84	64	65	86	68.6	86									
28-Jul	96	96	89	88	88	87	80	73	67	55	47	44	41	40	38	37	38	40	47	53	53	50	53	74	61.4	96									
29-Jul	90	86	79	74	75	73	75	67	64	54	48	51	48	46	45	41	39	43	59	74	71	66	62	71	62.5	90									
30-Jul	76	82	82	81	81	81	94	99	99	98	93	85	79	76	70	62	58	62	68	74	77	74	61	58	77.9	99									
31-Jul	56	57	57	58	64	67	69	67	61	54	50	46	45	46	48	45	46	63	72	78	92	95	96	97	63.7	97									
																	Diurnal Average		79.3																
																	Diurnal Maximum		100																





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

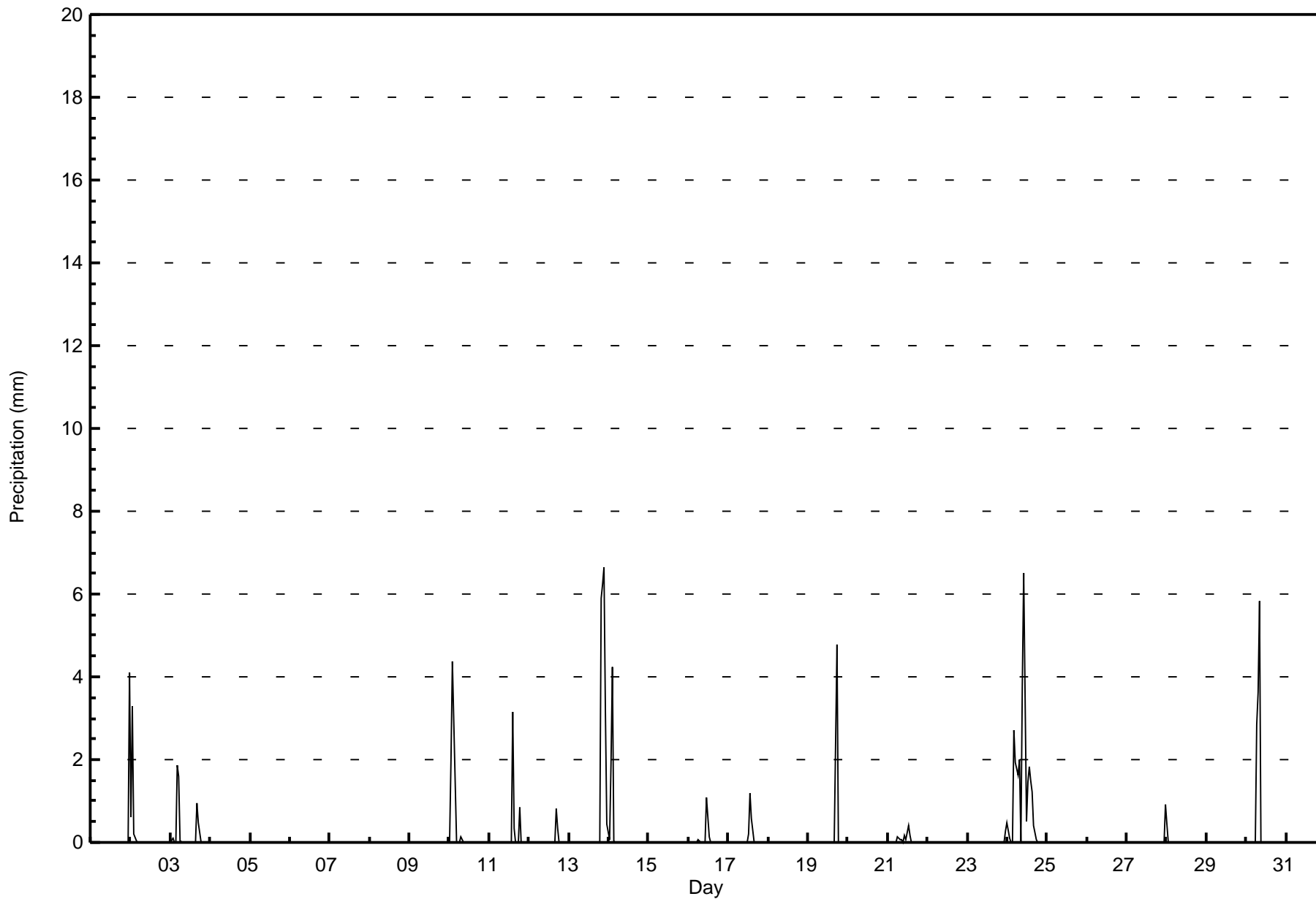
Stony Mountain - July 2017

Maximum Value: 6.6 mm on Jul 13 22:00		Maximum Daily Total: 26.1 mm on Jul 24		Hours in Service: 744																																												
Minimum Value: 0.0 mm on Jul 1 01:00		Minimum Daily Total: 0.0 mm on Jul 4		Hours of Data: 744																																												
Maximum Diurnal Total: 8.8 mm at hour 3		Minimum Diurnal Total: 0.9 mm at hour 19		Hours of Missing Data: 0																																												
Monthly Total: 104.41 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 = 4.0		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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	4.1	4.1																						
2-Jul	0.6	3.3	0.2	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	4.2	3.3																						
3-Jul	0.0	0.1	0.0	0.0	1.9	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	1.9																						
4-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	2.0	4.4	1.5	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	0.0	0.0	0.0	0.0	7.9	4.4																						
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.3	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	4.3	3.2																						
12-Jul	0.0	0.0	0.0	0.0	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	1.2	0.8																						
13-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	6.2	6.6	3.2	0.5	22.4	6.6																						
14-Jul	0.1	1.9	4.2	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	6.3	4.2																						
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
16-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.1																						
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.2																						
18-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8																						
20-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.4																						
22-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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																						
24-Jul	0.5	0.1	0.0	0.0	2.7	1.9	1.6	2.0	0.0	3.8	6.5	0.5	1.5	1.8	1.5	1.2	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	26.1	6.5																						
25-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.9																						
28-Jul	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4																						
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Jul	0.0	0.0	0.0	0.0	0.0	0.0	2.8	3.6	5.8	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	12.3	5.8																						
31-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	7.4	8.8	1.6	4.6	3.5	4.7	5.8	5.9	3.8	6.7	1.7	2.2	3.2	5.2	1.6	2.2	5.6	0.9	5.9	6.2	6.6	3.2	5.7	Diurnal Average
																								0.6	3.3	4.4	1.5	2.7	1.9	2.8	3.6	5.8	3.8	6.5	1.1	1.5	1.8	3.2	1.2	1.0	4.8	0.9	5.9	6.2	6.6	3.2	4.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - July 2017

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	701	94.22	94.22
0.4 - 0.5	7	0.94	95.16
0.6 - 0.7	2	0.27	95.43
0.8 - 1.4	7	0.94	96.37
1.5 - 10	24	3.23	99.60
> 10	0	0.00	99.60

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

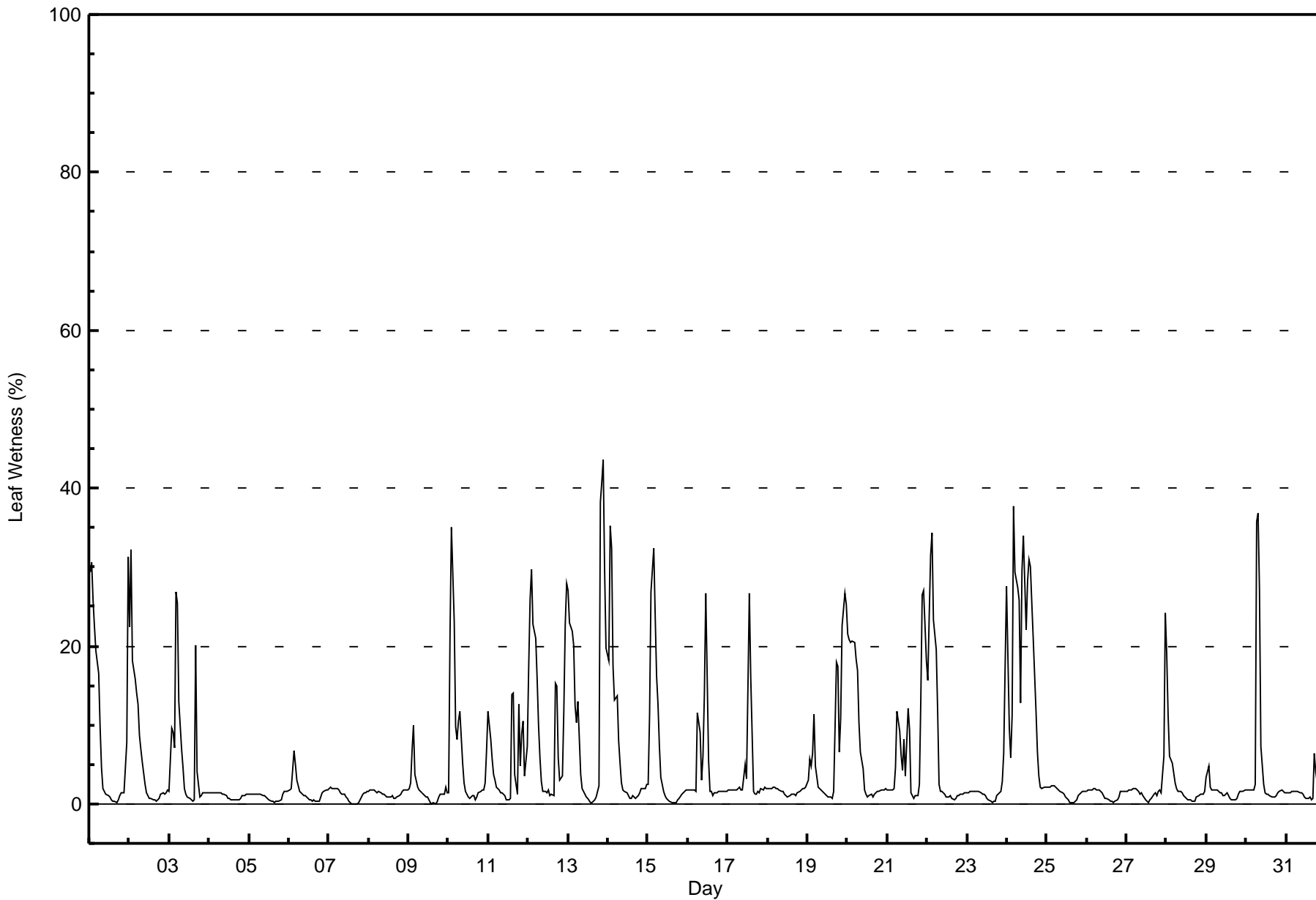
Stony Mountain - July 2017

Maximum Value: 44 % on Jul 13 22:00														Maximum Daily Average: 18.3 % on Jul 24														Hours in Service: 744	
Minimum Value: 0 % on Jul 7 17:00														Minimum Daily Average: 0.9 % on Jul 5														Hours of Data: 744	
Maximum Diurnal Average: 10.0 % at hour 3														Minimum Diurnal Average: 1.8 % at hour 16														Hours of Missing Data: 0	
Monthly Average: 5.0 %														Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 18 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-Jul	29	31	26	22	19	16	10	5	2	2	1	1	1	1	0	0	0	1	1	1	1	1	8	31	8.8	31			
2-Jul	22	32	18	16	14	13	9	7	5	2	1	1	1	1	1	1	0	1	1	1	1	1	1	2	6.4	32			
3-Jul	2	10	9	7	27	26	13	7	5	2	1	1	1	1	0	1	20	4	1	1	1	1	1	1	5.9	27			
4-Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1.0	1		
5-Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	2	2	0.9	2			
6-Jul	2	2	4	7	5	3	2	1	1	1	1	1	0	0	0	0	0	0	0	1	1	2	2	2	1.7	7			
7-Jul	2	2	2	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	2	1.1	2			
8-Jul	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1.3	2			
9-Jul	2	3	7	10	4	2	2	2	1	1	1	1	0	0	0	0	0	0	1	1	1	1	2	1	1.8	10			
10-Jul	1	21	35	23	10	8	10	12	5	3	1	1	1	1	1	1	1	1	1	2	2	2	3	7	6.4	35			
11-Jul	12	8	6	4	3	2	2	1	1	1	1	1	1	14	14	4	1	13	5	9	10	4	7	5.1	14				
12-Jul	17	26	30	23	21	16	10	6	3	2	2	1	2	1	1	15	15	6	3	4	12	23	28	11.1	30				
13-Jul	27	23	22	20	12	10	13	4	2	2	1	1	0	0	0	1	1	2	38	41	44	30	20	13.1	44				
14-Jul	18	35	32	17	13	14	8	5	3	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	6.9	35			
15-Jul	3	11	27	32	24	16	13	7	3	2	1	1	0	0	0	0	0	0	1	1	1	2	2	2	6.2	32			
16-Jul	2	2	2	2	2	2	12	9	3	6	14	27	5	2	2	1	1	1	2	2	2	2	2	2	4.3	27			
17-Jul	2	2	2	2	2	2	2	2	2	2	5	3	15	27	16	2	1	1	2	1	2	2	2	2	4.1	27			
18-Jul	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1.6	2			
19-Jul	3	6	5	6	11	5	2	2	2	2	1	1	1	1	1	2	18	17	7	11	23	27	25	7.4	27				
20-Jul	21	21	20	21	20	18	17	10	7	5	2	1	1	1	1	1	1	1	2	2	2	2	2	2	7.5	21			
21-Jul	2	2	2	2	2	5	12	9	6	4	8	4	12	9	1	1	1	1	1	2	13	27	27	18	7.1	27			
22-Jul	16	24	32	34	23	19	12	2	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1	1	7.5	34			
23-Jul	1	1	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	1	1	2	3	6	17	2.1	17				
24-Jul	28	10	6	11	38	29	27	26	13	30	34	22	28	31	30	25	21	12	6	4	2	2	2	2	18.3	38			
25-Jul	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0	1	1	1	2	2	2	2	1.3	2			
26-Jul	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	1	2	2	2	2	2	1.2	2			
27-Jul	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	1	1	1	1	2	2	1	6	24	2.4	24			
28-Jul	19	11	6	5	4	3	2	2	2	1	1	1	1	0	0	0	0	0	1	1	1	1	1	2	2.8	19			
29-Jul	3	5	2	2	2	2	2	2	1	1	1	1	1	1	0	0	0	1	1	2	2	2	2	2	1.5	5			
30-Jul	2	2	2	2	2	3	36	37	27	7	2	1	1	1	1	1	1	1	1	2	2	2	1	1	5.7	37			
31-Jul	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	6	4	2	2	10	20	30	3.9	30			
8.0 9.7 10.0 9.2 8.9 7.4 7.4 5.6 3.5 2.9 3.1 2.6 2.6 2.8 2.5 1.8 2.5 2.4 2.3 2.9 3.8 5.3 6.0 7.8																								Diurnal Average					
29 35 35 34 38 29 36 37 27 30 34 27 28 31 30 25 21 18 17 38 41 44 30 31																								Diurnal Maximum					



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (LW) - %
Stony Mountain - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Leaf Wetness (LW) - %
Stony Mountain - July 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	43	5.80	5.80
0.4 - 0.5	34	4.58	10.38
0.6 - 0.7	37	4.99	15.36
0.8 - 1.4	197	26.55	41.91
1.5 - 10	285	38.41	80.32
> 10	122	16.44	96.77

Total Number of Valid Hours: 742

Total Number of Hours: 744



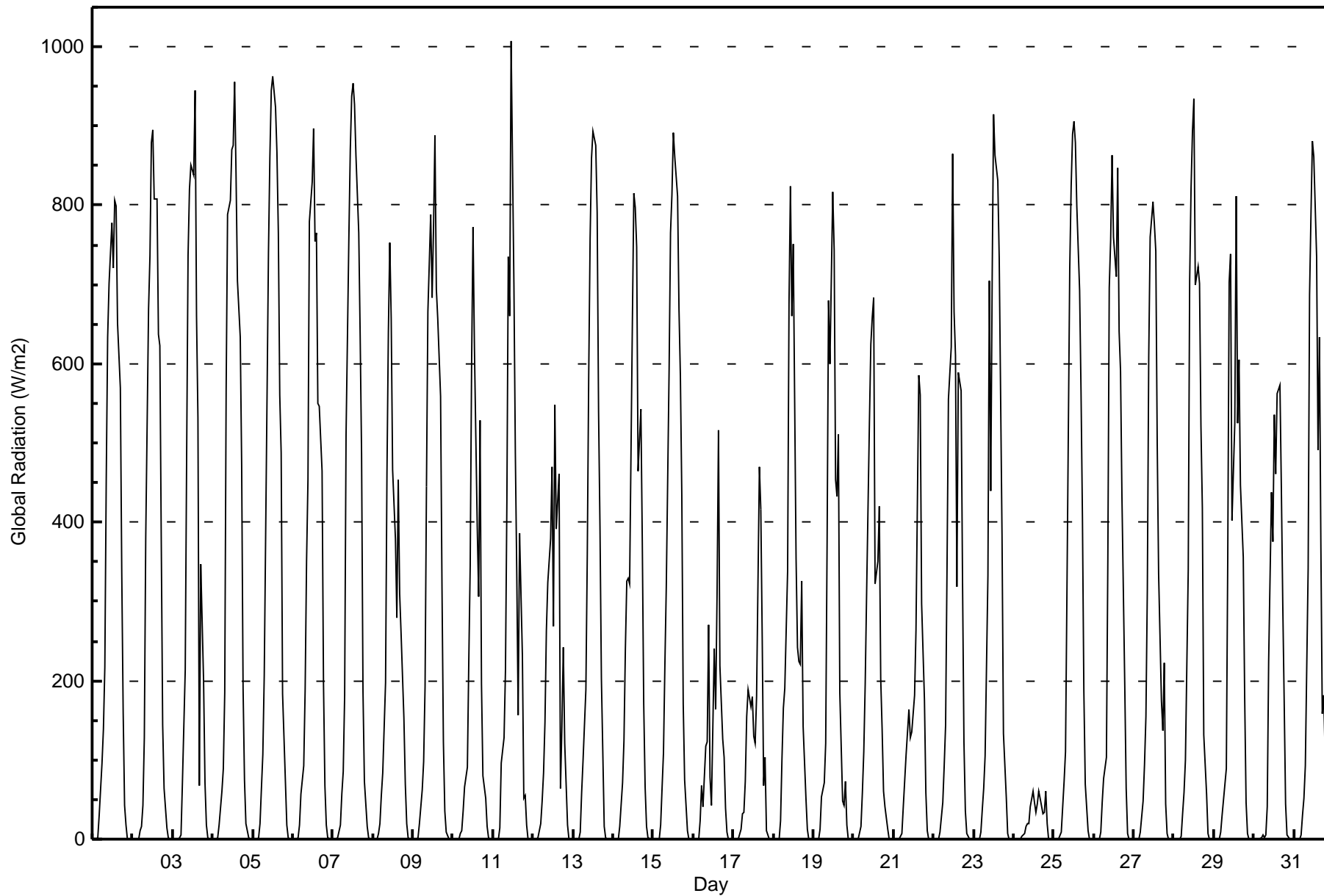
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Stony Mountain - July 2017

Maximum Value: 1008 W/m2 on Jul 11 12:00		Maximum Daily Average: 348.0 W/m2 on Jul 5		Hours in Service: 744																						
Minimum Value: 0 W/m2 on Jul 2 01:00		Minimum Daily Average: 23.0 W/m2 on Jul 24		Hours of Data: 744																						
Maximum Diurnal Average: 689.5 W/m2 at hour 13		Minimum Diurnal Average: 0.0 W/m2 at hour 3		Hours of Missing Data: 0																						
Monthly Average: 242.7 W/m2		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 73 Q ₃ = 460 P ₉₀ = 759 P ₉₉ = 931		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-Jul	1	0	0	2	30	96	138	218	454	634	701	779	721	806	799	652	570	336	160	43	18	1	0	0	298.3	806
2-Jul	0	0	0	1	11	16	42	128	382	669	737	879	895	808	808	638	622	378	145	63	14	1	0	0	301.6	895
3-Jul	0	0	0	1	2	5	71	214	485	736	820	851	838	946	660	532	67	348	200	71	18	2	0	0	286.1	946
4-Jul	0	0	0	2	18	61	89	186	568	789	807	870	876	956	839	704	634	472	191	76	20	3	0	0	340.0	956
5-Jul	0	0	0	2	20	64	108	206	561	739	862	945	962	924	866	765	560	489	184	73	19	2	0	1	348.0	962
6-Jul	0	0	0	2	18	57	92	189	351	454	780	830	897	755	766	550	546	464	198	67	17	2	0	0	293.2	897
7-Jul	0	0	0	2	18	57	85	181	510	761	870	938	954	928	863	765	635	485	186	72	16	3	0	0	347.1	954
8-Jul	0	1	0	7	20	55	84	197	463	640	753	656	466	380	279	454	309	260	153	70	20	2	0	0	219.6	753
9-Jul	1	1	0	2	19	62	98	193	446	666	789	683	771	889	694	657	558	319	122	36	9	0	0	0	292.3	889
10-Jul	0	0	0	0	6	12	35	66	90	225	346	599	772	619	393	307	529	197	79	51	16	1	0	0	181.1	772
11-Jul	0	0	0	0	14	95	129	213	425	735	659	1008	697	488	337	157	387	232	51	56	17	1	0	0	237.6	1008
12-Jul	0	0	0	1	20	47	84	147	264	324	379	469	268	549	392	461	64	142	243	121	17	1	0	0	166.4	549
13-Jul	0	0	0	1	10	58	100	189	360	584	758	859	893	876	789	540	393	204	17	1	0	0	0	0	276.3	893
14-Jul	0	0	0	0	16	71	124	240	326	329	322	659	815	797	748	464	543	374	170	66	16	1	0	0	253.4	815
15-Jul	0	0	0	1	18	65	109	218	318	593	765	813	891	862	811	668	584	434	172	74	10	1	0	0	308.7	891
16-Jul	0	0	0	1	24	67	40	118	124	271	79	43	241	163	309	517	219	127	104	39	9	1	0	0	104.0	517
17-Jul	0	0	0	1	13	32	34	73	156	188	167	180	130	121	180	469	417	255	67	104	10	1	0	0	108.3	469
18-Jul	0	0	0	0	24	101	166	191	338	676	824	660	752	354	241	224	221	326	142	52	13	1	0	0	221.0	824
19-Jul	0	0	0	1	12	53	70	120	375	679	600	817	744	454	433	510	185	49	43	73	18	1	0	0	218.2	817
20-Jul	0	0	0	0	15	58	110	195	310	528	626	658	683	323	350	420	203	139	61	42	12	0	0	0	197.3	683
21-Jul	0	0	0	0	4	7	40	107	136	164	128	135	182	263	425	585	561	298	175	58	11	0	0	0	136.7	585
22-Jul	0	0	0	0	9	46	92	145	343	556	622	865	666	611	319	590	567	325	124	35	8	0	0	0	246.7	865
23-Jul	0	0	0	0	10	38	65	105	333	706	439	704	914	863	831	733	558	383	133	53	7	0	0	0	286.5	914
24-Jul	0	0	0	0	1	3	7	16	20	20	42	60	46	33	45	61	52	32	34	60	20	0	0	0	23.0	61
25-Jul	0	0	0	0	10	41	73	111	310	720	824	890	905	879	799	692	564	406	188	69	10	0	0	0	312.1	905
26-Jul	0	0	0	0	8	45	76	104	353	696	756	863	760	710	847	641	590	432	195	64	8	0	0	0	297.8	863
27-Jul	0	0	0	0	10	49	95	155	316	611	760	805	776	743	501	335	174	137	223	45	7	0	0	0	239.3	805
28-Jul	0	0	0	0	4	32	58	100	339	704	823	893	935	699	722	701	522	419	131	57	8	0	0	1	297.9	935
29-Jul	0	0	0	0	9	31	69	89	354	702	738	403	524	811	525	605	446	355	180	46	7	0	0	0	245.6	811
30-Jul	0	0	0	0	2	5	2	6	41	224	437	376	536	462	562	573	443	297	174	45	5	0	0	0	174.6	573
31-Jul	0	0	0	0	6	30	52	92	342	686	788	881	862	734	492	634	373	158	181	37	5	0	0	0	264.8	881
		0.1	0.1	0.0	0.9	12.9	47.1	78.7	145.5	328.8	548.7	613.0	679.7	689.5	638.8	568.6	535.7	422.4	299.0	142.8	58.7	12.4	0.8	0.1	0.1	Diurnal Average
		1	1	0	7	30	101	166	240	568	789	870	1008	962	956	866	765	635	489	243	121	20	3	0	1	Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Stony Mountain - July 2017

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	290	38.98	38.98
21 - 100	103	13.84	52.82
101 - 300	100	13.44	66.26
301 - 600	115	15.46	81.72
601 - 900	124	16.67	98.39
> 900	12	1.61	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

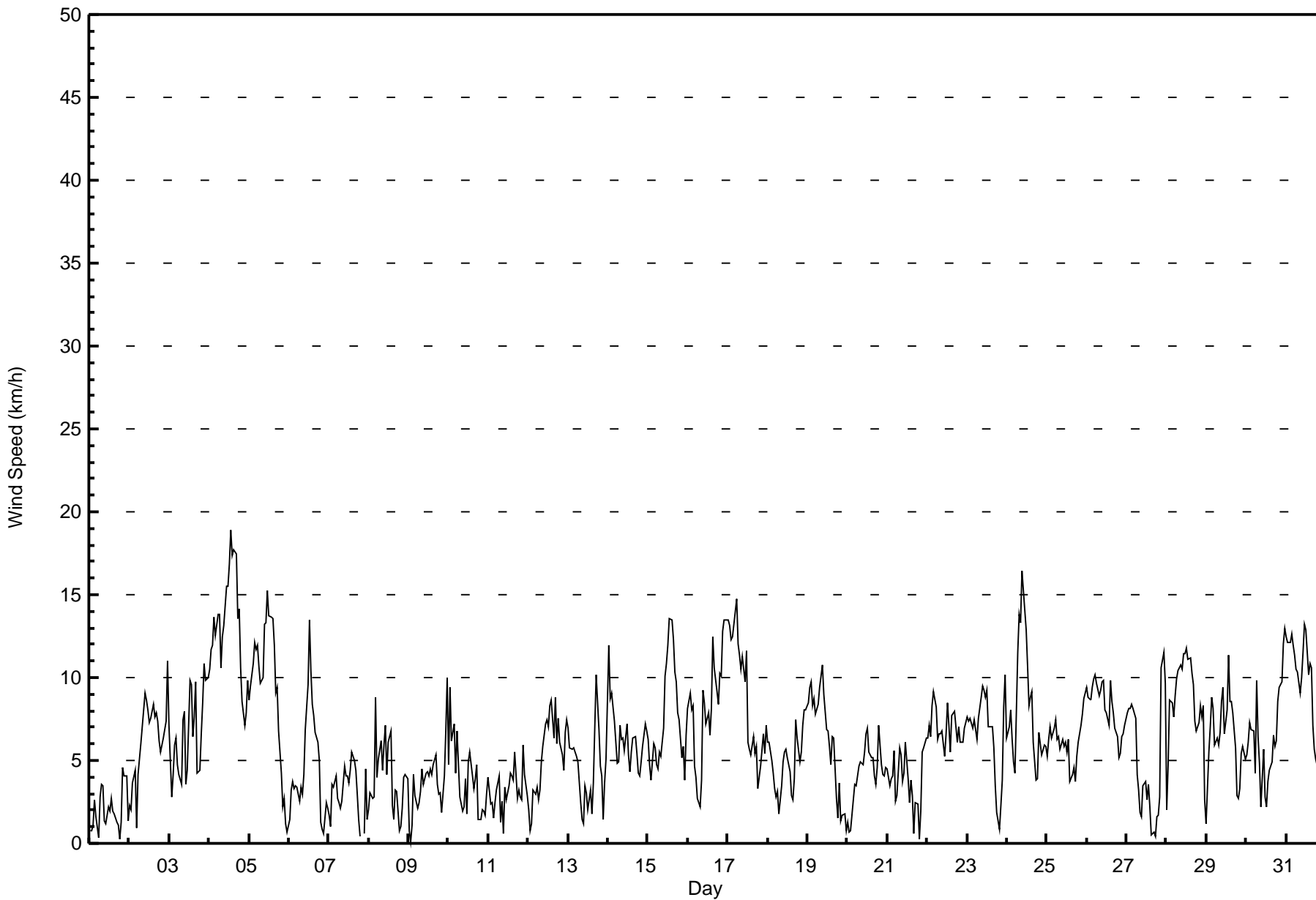
Wind Speed (WS) - km/h
Stony Mountain - July 2017

Maximum Speed: 19 km/h on Jul 4 14:00	Maximum Daily Speed Average: 13.0 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 9 02:00	Minimum Daily Speed Average: 0.6 km/h on Jul 13	Hours of Data: 743
Maximum Diurnal Speed Average: 4.9 km/h at hour 24	Minimum Diurnal Speed Average: 2.3 km/h at hour 19	Hours of Missing Data: 1
Monthly Average Velocity: 3.7 km/h 250.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 15	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-Jul	WNW1	SW1	SSW1	SW3	NW2	E0	S3	SSW4	SSW4	W1	SW1	SW2	NE2	SSW3	SSW2	W2	NE1	NE1	ENE0	E1	SSW5	W4	NW4	NW1	SW1.0	SSW5
2-Jul	NE2	E2	SE4	SSE4	E1	SE4	S5	SSE6	S7	SSW9	SW9	SSW8	SSW7	S8	SSW8	SSW8	SW8	SW7	SW6	SW5	SSW6	SW7	SW7	WSW11	SSW5.3	WSW11
3-Jul	W7	SW3	SSW4	WNW6	WNW6	NW5	ESE4	ESE4	WNW7	WNW8	NW4	NW4	WNW10	WNW10	WNW6	W8	WNW10	WNW4	W4	W7	WSW8	WSW11	WSW10	WSW10	W5.5	WSW11
4-Jul	SW11	SW12	SW12	WSW14	SW13	SW14	SW14	WSW11	WSW12	WSW13	WSW15	WSW15	WSW17	WSW19	WSW17	SW18	WSW17	WSW14	WSW14	W11	W9	WSW7	WSW8	WSW10	WSW13.0	WSW19
5-Jul	WSW9	WSW9	WSW11	WSW12	WSW12	WSW12	W11	W10	W10	W13	W13	W15	W14	WNW14	W14	WNW12	WNW9	WNW9	WNW7	W4	W2	W3	W1	W1	W9.1	W15
6-Jul	WNW1	WNW3	SW4	W3	WNW3	WNW3	WSW3	W3	WNW3	W4	SW7	WSW10	W13	WNW10	WNW8	WNW8	WNW7	WNW6	WNW5	WSW1	WSW1	SW1	NW2	NW2	W4.3	W13
7-Jul	NW2	SW1	WNW4	WNW3	WNW4	WNW3	WNW2	W2	W3	WNW5	NW4	WNW4	WNW4	WNW6	WNW5	W4	W3	NNE1	NE0	AF	ENE1	NE5	SE1	WNW2.4	WNW6	
8-Jul	WNW2	NW3	NW3	WNW3	W9	WNW4	W5	WNW6	WNW4	WNW6	WNW7	NW4	W6	WNW7	NW2	NNW1	NE3	ESE3	E1	S1	SSW2	WSW4	WNW4	WNW4	WNW3.1	W9
9-Jul	NW1	NNW0	SSW1	WNW4	NW3	NW2	N2	NNE3	NE5	E4	E4	E4	E4	E5	E4	E5	E5	ESE4	E3	SE3	S2	SSW4	WSW7	W10	E0.9	W10
10-Jul	W5	WNW9	WNW6	WNW7	WNW4	NNE7	NE5	ESE3	S2	NNE2	N4	ENE2	ENE5	ENE5	E4	ESE3	ESE4	ESE5	SE1	ESE1	SE2	SE2	S2	SSE3	NE0.9	WNW9
11-Jul	S4	SW2	WNW2	SE2	SW2	SSW3	SSW4	SSW1	WSW3	NNW1	WNW3	ENE3	NNE3	NNE4	NNE4	NNW4	WNW6	NNW3	N3	NNW3	NW3	WSW6	WNW4	WNW3	WNW1.4	WSW6
12-Jul	NW2	NE1	ENE1	SSE3	SE3	S3	S3	S3	SSW5	SSW6	SSW7	S7	SSE7	SSE8	SSE9	SSE6	SSW9	SSW6	SSE8	SSE6	S5	S4	SSW7	SSW7	S4.8	SSW9
13-Jul	SSW7	SW6	SSW6	SSW6	SW5	SSW5	SSW5	S2	SW1	S1	SSE3	ENE3	S2	SE3	NNE2	NNE4	NNE7	NE10	NE7	E5	NNE4	NNW1	WNW4	WNW5	SSE0.6	NE10
14-Jul	WNW12	WNW9	WNW9	WNW8	WNW7	WNW5	WNW5	W7	WNW6	W6	W6	W7	W5	W4	WSW6	WSW6	WSW6	WSW5	WSW4	WSW4	SW5	SW6	SW7	SW7	W5.8	WNW12
15-Jul	SW6	SW5	SSW4	SSW6	SSW6	SSW5	SE4	SE5	ESE5	SE7	SSE10	S11	SSE12	SSE14	SSE12	SSE10	S10	SSE8	SSE7	SE5	SE6	S4	SSW7	SSE7.0	SSE14	
16-Jul	SSW8	SSW9	WSW8	NW8	NNW5	WNW4	NNE3	WNW2	W4	WNW9	W8	WSW7	WNW8	WNW7	W8	W12	W11	WSW9	WSW8	W10	WSW10	WSW13	WSW13	WSW13	W7.3	WSW13
17-Jul	WSW13	WSW13	WSW12	WSW12	WSW14	WSW15	W12	W11	W10	W11	W10	W12	NW6	NNW6	NW5	WNW6	NW5	NW6	WNW3	W4	WSW5	W7	W5	WNW7	W8.2	WSW15
18-Jul	W6	WNW6	WNW5	WNW4	NW3	NW3	NNW2	NW4	W5	WSW6	WNW6	WNW5	WNW4	SW3	W3	W4	SW7	SW6	SW5	SW6	SW7	SW8	SW8	W4.2	SW8	
19-Jul	SW8	SW9	SW10	SW8	SW9	SW8	SW8	SW9	SW10	WSW11	WSW9	WSW7	WSW7	W6	W5	WSW6	NNE6	N3	E2	SSW4	NNE1	SE2	SE2	SSE1	SW5.0	WSW11
20-Jul	S1	S1	SE1	SSE2	ESE4	ESE3	ESE4	ESE5	ESE5	E5	E6	E7	ESE7	ESE6	E5	E5	E4	ESE4	ESE5	ESE7	ESE5	ESE4	E4	E5	ESE4.1	ESE7
21-Jul	ESE4	E3	NE4	ENE4	NNE6	NNE3	NNW3	NNE6	NE5	ENE4	NNE4	NE6	ENE4	NE2	N4	ENE3	SSW1	NNE2	ENE2	SE0	S2	SSW5	SW6	SW6	NE1.8	SW6
22-Jul	SSW6	SW7	SSW6	SSW8	SSW9	SSW8	SSW6	WSW7	W7	W7	WSW5	WSW7	WSW8	WSW7	SW5	SW8	WSW8	WSW7	SW6	WSW7	SW6	SW6	SW7	SW7	SW6.6	SSW9
23-Jul	SW8	WSW7	WSW8	WSW7	WSW7	SW7	WSW6	W8	W9	W9	W9	W9	W9	W7	W7	WNW7	WNW6	NW3	W2	W1	W2	WNW4	WNW8	WNW10	W6.3	WNW10
24-Jul	WNW6	WNW7	WNW8	NW6	NW5	N4	NNE12	NNE14	NNE13	NE16	NNE15	NNE13	NNE11	N8	NW9	NW9	NNW6	NNW4	N4	NW7	NW6	WNW5	WNW6	WNW6	N6.6	NE16
25-Jul	WNW5	WNW6	WNW7	WNW6	WNW7	WNW7	WNW6	WNW6	WNW6	W6	W6	WNW6	WNW5	W6	WNW4	W4	WSW5	WSW4	SW5	SSW6	SSW7	SSW8	SSW9	SW9	W5.1	SW9
26-Jul	SW9	SW9	SW9	SW9	SW10	SW10	SSW9	SSW9	SSW10	SW10	SW8	SW8	SW7	SSW10	SW9	SW8	SW7	SW6	SW5	SSW5	SSW6	SSW7	SSW7	SSW7	SW8.2	SW10
27-Jul	SSW8	SSW8	SSW8	SSW8	SSW8	SSW8	S4	SE3	ESE2	NNW2	NE3	E4	ESE3	ESE4	E2	NNE1	NNE1	NW0	NW2	WNW2	WNW3	WNW11	WNW11	WSW10	SW2.2	WNW11
28-Jul	SSW2	WNW5	W9	W8	WSW8	SW9	WSW10	WSW10	WSW11	W10	W11	W11	W12	W11	W11	WNW10	WNW10	W7	W7	WSW7	WSW8	WSW8	W8	NW3	W8.2	W12
29-Jul	W1	SSW5	SW7	SW9	SW8	WSW6	SW6	WSW6	SSW7	SW9	SW9	WSW7	WSW8	SW11	WSW9	WSW9	WSW8	W6	W3	W3	WSW3	SSW5	SW6	SW5	SW6.2	SW11
30-Jul	SSW5	SSW6	SSW7	SSW7	SSW7	WSW4	WNW10	WNW6	ESE5	SE2	NNE6	NNE3	SE2	SSW4	SSW4	W5	WSW6	WSW6	SW6	SW9	SW9	WSW10	WSW12	W13	WSW4.6	WSW13
31-Jul	W12	W12	WSW12	W13	W12	W11	W11	W10	W9	W10	W12	W13	WNW13	WNW10	WNW11	WNW11	WNW7	WNW6	WNW5	W4	N2	WSW1	SW2	NW1	W8.5	W13

WSW4.4WSW4.5WSW4.7WSW4.9WSW4.7WSW4.0WSW3.2WSW2.9WSW3.1 W3.9 W3.9 W3.8 W3.8 W3.6WSW3.7 W4.0 W3.5 W2.7WSW2.3 SW2.7 SW3.1WSW4.1WSW4.4WSW4.9
 WSW13WSW13WSW12WSW14WSW14WSW15 SW14 NNE14 NNE13 NE16 WSW15WSW15WSW17WSW19WSW17 SW18WSW17WSW14WSW14 W11WSW10WSW13WSW13WSW13
 Diurnal Average
 Diurnal Maximum

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	342	46.03	46.03
6 - 11	339	45.63	91.66
12 - 19	62	8.34	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: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - July 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	17	14	13	26	25	19	6	20	28	21	17	35	48	31	14	342
6 - 11	1	7	3	0	2	3	2	11	5	48	67	62	51	67	8	2	339
12 - 19	0	5	1	0	0	0	0	4	0	0	6	26	16	4	0	0	62
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	9	29	18	13	28	28	21	21	25	76	94	105	102	119	39	16	743

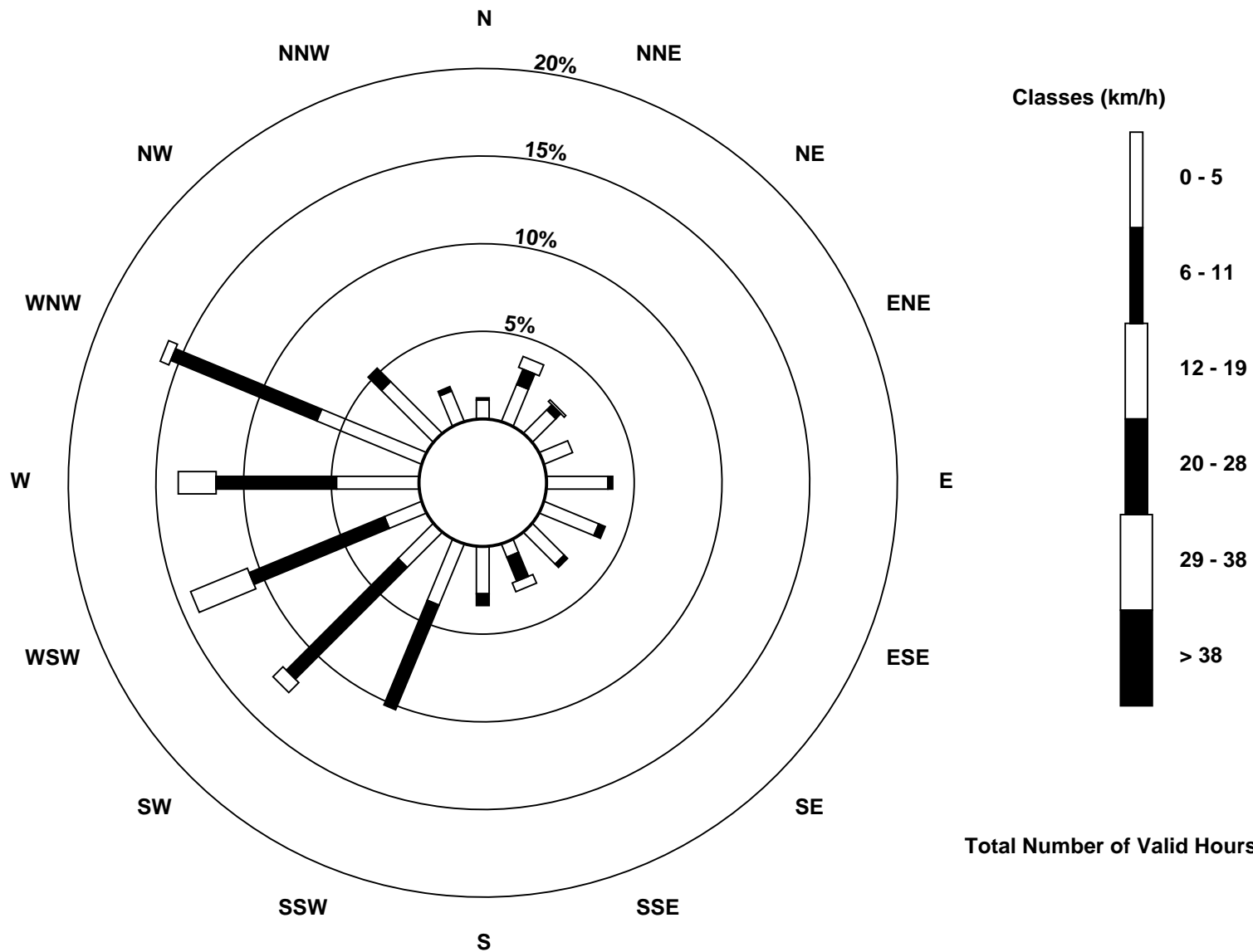
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)



Total Number of Valid Hours: 743



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jul 4 14:00 Minimum Value: 0 km/h on Jul 9 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 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-Jul	1	1	1	2	1	1	2	1	2	2	2	2	1	2	2	2	2	1	1	1	2	2	2	1	2	
2-Jul	1	1	1	3	1	1	2	2	3	3	3	3	2	3	3	3	3	3	2	1	1	1	3	5		
3-Jul	3	2	2	2	3	3	2	2	3	3	3	2	4	4	3	3	7	2	2	3	3	4	4	4		
4-Jul	3	3	4	4	4	4	5	4	4	5	6	6	7	7	7	6	5	6	4	3	2	3	3	7		
5-Jul	3	3	3	5	4	4	4	3	4	6	5	6	6	6	5	5	4	4	3	3	1	1	1	1		
6-Jul	1	1	1	1	1	1	1	1	1	1	3	4	6	5	4	3	4	3	2	1	1	1	1	1		
7-Jul	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	AF	2	1	2		
8-Jul	1	1	1	1	5	3	2	3	2	2	3	2	2	3	2	2	1	1	1	1	1	1	1	1		
9-Jul	1	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	2	4	4		
10-Jul	2	3	3	3	2	3	2	1	1	2	2	2	2	2	2	1	2	2	1	1	1	1	1	1		
11-Jul	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4	1	2	2	1	1	1	3	2	1		
12-Jul	1	1	1	1	1	1	2	1	2	3	3	3	3	4	4	3	5	2	3	3	2	2	2	2		
13-Jul	2	1	1	1	2	1	1	1	1	1	2	1	2	2	1	2	3	4	3	3	3	2	2	3		
14-Jul	4	5	3	3	3	2	2	3	2	2	2	2	2	2	2	3	2	2	1	1	1	1	2	2		
15-Jul	2	1	1	1	1	1	2	2	2	4	4	5	5	5	6	5	5	4	4	3	2	2	2	2		
16-Jul	2	2	3	4	2	2	2	1	2	4	3	4	4	2	3	5	4	3	3	4	4	4	5	5		
17-Jul	5	4	4	4	5	5	5	4	4	4	3	4	3	3	2	3	3	3	2	2	1	3	2	3		
18-Jul	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	1	2	3	2	1	1	2	2	2		
19-Jul	2	2	3	2	2	2	2	3	3	4	3	3	3	3	2	3	3	3	2	1	2	1	1	1		
20-Jul	2	2	1	1	1	1	1	2	2	2	2	3	3	3	2	2	1	1	2	2	2	1	1	2		
21-Jul	2	1	1	2	2	2	1	2	2	1	2	3	2	1	2	2	1	1	1	1	1	1	1	1		
22-Jul	1	1	1	2	2	2	2	2	2	2	2	3	3	2	3	3	3	3	2	2	2	1	2	2		
23-Jul	2	2	3	3	2	2	2	3	3	4	3	4	4	3	3	3	3	2	1	1	1	2	3	4		
24-Jul	3	3	3	2	2	2	4	5	5	7	6	6	5	4	4	4	3	3	2	3	2	2	2	2		
25-Jul	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	1	1	2	2	2		
26-Jul	2	2	2	2	2	3	2	2	3	3	4	3	4	3	4	3	3	2	2	1	1	1	1	1		
27-Jul	2	2	2	2	2	2	2	1	1	1	2	2	2	2	1	1	1	1	1	1	3	4	4	6		
28-Jul	2	2	3	3	2	3	4	4	4	4	4	4	4	4	5	4	4	3	3	3	3	3	3	2		
29-Jul	1	2	1	2	2	2	2	2	2	3	3	3	4	4	4	3	3	3	1	1	1	1	1	1		
30-Jul	1	2	2	2	2	2	4	3	3	3	2	2	1	2	2	2	2	2	2	2	3	3	4	5		
31-Jul	4	4	4	4	4	4	4	4	4	4	6	5	5	4	5	5	3	3	2	1	1	1	1	1		
																	Diurnal Maximum									
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Averages

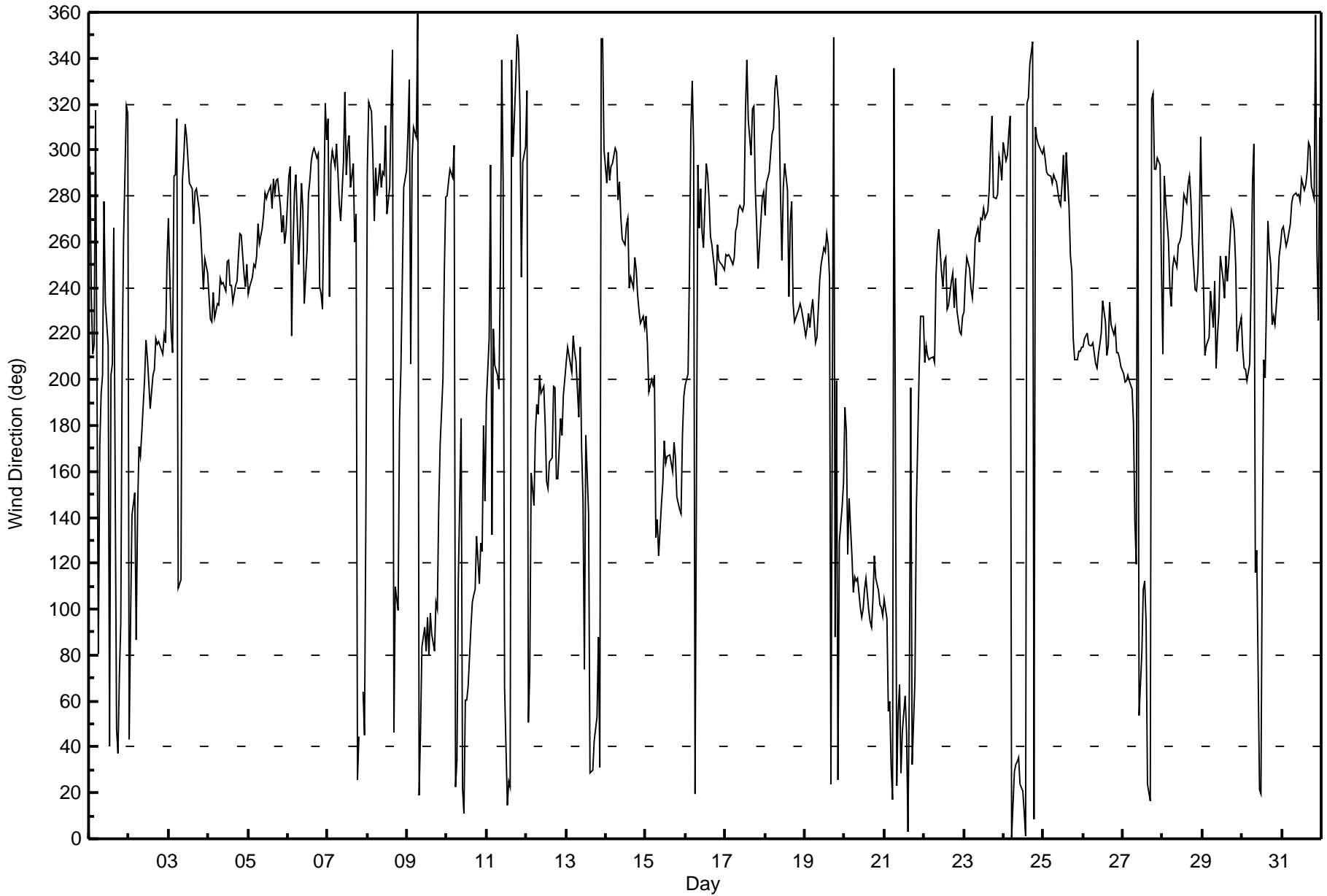
Wind Direction (WD) - deg
Stony Mountain - July 2017

Direction of Maximum Speed: 241 deg on Jul 4 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 241.5 deg on Jul 4	Hours of Data: 743
Direction of Minimum Speed: 331 deg on Jul 9 02:00	Direction of Minimum Daily Speed Average: 0.6 deg on Jul 13
Direction of Minimum Speed: 331 deg on Jul 9 02:00	Hours of Missing Data: 1
Monthly Average Direction: 259.1 deg	Percent Operational Time: 99.9

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-Jul	293	235	211	216	317	80	171	194	202	277	234	215	40	202	207	266	48	37	71	94	208	261	319	316	229.9
2-Jul	43	95	141	151	87	143	171	167	177	200	217	209	199	187	202	204	218	216	216	214	211	220	216	252	201.1
3-Jul	270	220	212	288	289	314	109	113	286	297	311	306	285	284	283	268	282	283	274	266	252	239	253	247	271.5
4-Jul	236	226	225	238	227	233	233	244	242	239	252	252	241	241	234	241	243	254	264	263	246	240	250	250	241.5
5-Jul	237	240	245	250	249	254	268	260	266	272	281	279	281	284	275	287	282	287	288	275	264	271	260	265	268.5
6-Jul	289	293	219	259	282	289	250	265	286	274	233	257	281	287	296	299	301	296	298	240	237	231	320	304	279.2
7-Jul	313	236	293	299	293	303	291	277	269	295	325	289	301	306	284	294	260	272	26	44	AF	64	45	142	297.0
8-Jul	291	321	316	297	269	293	280	294	284	290	289	311	272	284	319	343	47	110	99	182	205	243	284	291	287.7
9-Jul	307	331	207	296	310	305	359	19	47	84	92	82	96	80	98	89	82	103	100	144	171	200	247	279	79.6
10-Jul	280	286	292	288	302	23	34	113	183	22	11	60	60	67	92	103	106	109	132	111	129	125	180	147	37.4
11-Jul	190	218	294	132	222	206	202	196	248	339	286	66	14	25	23	339	297	331	350	344	318	244	295	301	295.0
12-Jul	326	51	73	159	145	177	189	185	202	194	197	181	156	152	164	166	197	196	157	157	183	176	193	200	177.5
13-Jul	207	214	207	203	219	212	208	183	214	170	147	74	175	141	29	29	30	43	53	88	31	348	348	300	152.6
14-Jul	286	299	287	293	294	301	299	278	286	271	261	259	267	271	240	245	240	253	248	237	230	224	228	222	266.0
15-Jul	228	215	195	200	197	202	131	139	123	146	155	173	164	166	167	163	160	173	166	149	144	142	176	193	167.8
16-Jul	198	203	248	309	330	300	20	293	266	283	264	258	294	289	279	263	259	247	241	259	252	251	250	248	260.5
17-Jul	254	254	255	253	250	253	265	267	274	276	273	277	317	339	313	298	318	319	283	266	248	269	279	282	271.4
18-Jul	271	285	290	299	307	309	326	332	317	280	252	284	294	282	236	269	278	233	225	229	231	233	231	227	263.1
19-Jul	219	222	229	222	230	235	216	219	231	244	250	258	255	264	259	244	24	349	88	199	25	129	145	155	235.0
20-Jul	188	178	124	148	123	107	114	112	114	101	96	100	109	113	99	94	92	105	123	113	108	102	101	97	107.9
21-Jul	104	96	56	60	31	17	335	23	55	67	29	47	63	46	3	67	197	32	69	144	174	204	228	227	53.0
22-Jul	208	215	210	209	209	210	207	244	259	265	246	241	252	253	231	233	243	247	232	244	230	221	219	227	231.1
23-Jul	230	244	253	249	240	235	245	261	266	260	271	270	274	270	273	283	302	315	279	279	281	297	293	287	266.4
24-Jul	303	295	298	307	315	1	29	32	33	35	24	21	12	1	320	323	338	347	9	310	305	303	300	299	351.7
25-Jul	301	296	290	289	289	286	289	287	286	277	276	285	298	277	299	275	254	247	218	209	208	212	212	214	264.5
26-Jul	214	218	220	216	215	215	216	207	205	211	215	221	234	225	211	215	234	224	220	223	212	212	209	206	216.2
27-Jul	203	199	199	202	200	196	181	138	120	348	54	81	108	112	95	24	17	322	324	292	292	297	294	248	218.5
28-Jul	211	289	277	260	240	232	249	253	249	259	260	263	270	280	277	285	289	278	259	239	239	247	267	306	262.1
29-Jul	270	211	215	217	218	238	223	243	205	220	229	254	244	235	254	243	251	273	270	265	250	212	221	227	233.8
30-Jul	213	205	204	200	207	242	286	302	116	126	21	20	131	208	201	269	256	250	224	227	224	241	254	259	236.5
31-Jul	265	266	258	260	264	268	277	280	281	280	280	278	287	282	285	290	303	301	284	279	359	255	226	314	277.0

243.1 243.7 244.9 246.9 247.8 247.6 248.7 253.2 251.5 261.1 260.2 262.9 268.3 259.8 255.6 259.6 265.7 259.1 240.8 233.0 232.7 236.3 248.6 247.5
 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
Stony Mountain - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Jul 21 17:00																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Minimum Value: 9 deg on Jul 7 01:00																									
Percentiles: P ₁ = 14 P ₁₀ = 20 Q ₁ = 27 Median = 36 Q ₃ = 45 P ₉₀ = 64 P ₉₉ = 88																									
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-Jul	16	51	71	50	23	82	33	37	56	99	95	82	90	71	82	75	98	69	67	22	45	51	53	73	99
2-Jul	42	60	35	83	57	28	31	34	36	34	37	36	42	43	40	38	35	30	21	15	16	19	25	36	83
3-Jul	40	63	25	35	42	58	27	84	34	40	89	61	37	37	43	41	30	38	36	31	36	32	35	32	89
4-Jul	32	26	26	33	27	31	32	37	34	36	34	36	38	36	35	35	33	37	36	36	33	31	30	34	38
5-Jul	31	31	32	36	35	37	36	35	37	36	36	37	37	39	35	41	40	43	40	43	22	22	45	24	45
6-Jul	20	18	22	39	21	19	47	41	46	35	40	42	35	44	52	45	59	55	54	87	43	55	23	14	87
7-Jul	9	26	20	16	14	16	23	73	68	59	73	72	81	78	51	55	53	52	81	40	AF	76	13	54	81
8-Jul	49	15	19	25	31	72	37	37	49	42	40	60	37	43	77	79	37	27	78	53	22	27	19	23	79
9-Jul	24	31	58	15	19	18	35	37	29	42	38	57	61	45	50	38	40	40	25	42	28	24	34	29	61
10-Jul	40	26	38	28	32	29	30	29	39	75	45	91	53	36	39	38	40	22	49	50	40	36	19	28	91
11-Jul	14	61	14	81	35	20	19	72	66	102	62	82	75	51	65	42	24	72	38	39	22	35	25	21	102
12-Jul	20	17	42	37	28	42	45	37	25	39	35	42	38	43	46	50	44	31	41	45	32	39	23	19	50
13-Jul	20	18	17	16	22	19	22	46	89	90	62	62	91	60	89	43	28	22	34	50	67	76	55	38	91
14-Jul	29	54	37	34	31	29	31	39	38	37	43	38	53	60	50	36	40	34	26	19	16	18	20	20	60
15-Jul	23	13	10	14	15	21	28	32	25	41	43	41	41	42	40	41	43	43	46	40	33	30	44	19	46
16-Jul	19	20	39	51	58	58	61	54	42	32	38	42	42	35	33	37	38	33	33	35	35	35	34	35	61
17-Jul	35	35	34	35	36	36	34	33	33	31	38	33	61	61	55	49	68	67	44	31	23	34	30	29	68
18-Jul	30	27	24	21	21	33	39	86	57	52	58	45	57	51	48	76	45	35	25	20	21	24	25	24	86
19-Jul	22	22	27	22	26	31	22	25	33	37	38	47	45	44	35	66	54	85	79	48	83	42	38	57	85
20-Jul	76	80	69	45	17	26	27	30	31	32	37	33	37	28	33	37	31	27	22	23	24	23	24	28	80
21-Jul	24	24	22	24	23	74	45	25	24	30	39	62	38	59	57	76	104	43	38	83	26	17	20	23	104
22-Jul	14	16	16	18	19	19	24	37	37	35	35	43	36	38	39	38	36	32	25	31	24	21	20	24	43
23-Jul	24	33	33	35	31	31	36	35	34	39	35	39	40	48	45	47	48	56	39	51	49	35	32	32	56
24-Jul	37	31	32	33	33	42	27	25	26	25	32	39	48	60	60	57	61	75	72	64	45	48	35	32	75
25-Jul	38	34	28	25	26	25	25	28	34	42	50	48	60	40	64	56	39	34	21	16	15	16	19	20	64
26-Jul	20	20	20	20	21	21	21	19	21	27	33	41	40	40	34	32	32	27	22	16	15	16	15	16	41
27-Jul	17	16	17	17	17	17	32	37	82	75	56	46	73	45	56	98	62	91	44	22	15	33	33	50	98
28-Jul	73	25	28	35	30	29	36	35	33	35	39	37	37	38	39	40	38	38	30	28	28	38	32	31	73
29-Jul	47	20	15	20	21	30	30	34	32	32	34	39	37	35	40	38	36	31	37	18	25	13	15	16	47
30-Jul	18	17	19	20	20	53	39	44	66	90	41	67	74	47	51	50	36	33	23	25	25	33	36	36	90
31-Jul	35	32	34	34	34	32	31	32	37	40	38	35	39	41	39	41	55	56	33	32	42	64	54	63	64
																			76 80 71 83 58 82 61 86 89 102 95 91 91 78 89 98 104 91 81 87 83 76 55 73						
Diurnal Maximum																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

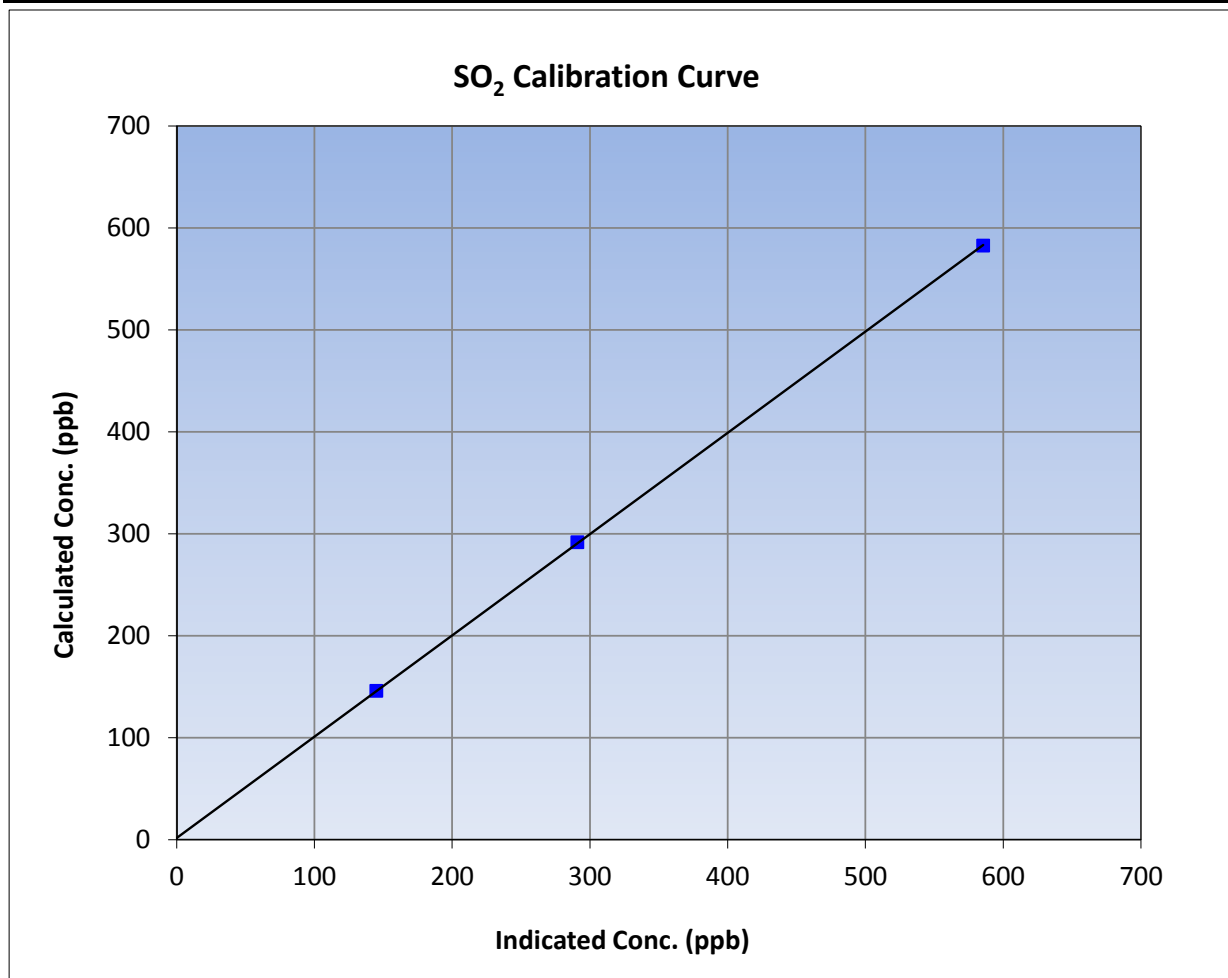
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 14, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:55	End Time (MST)	17:15
Analyzer make	Thermo 43i	Analyzer serial #	JC1501301453

Calibration Data

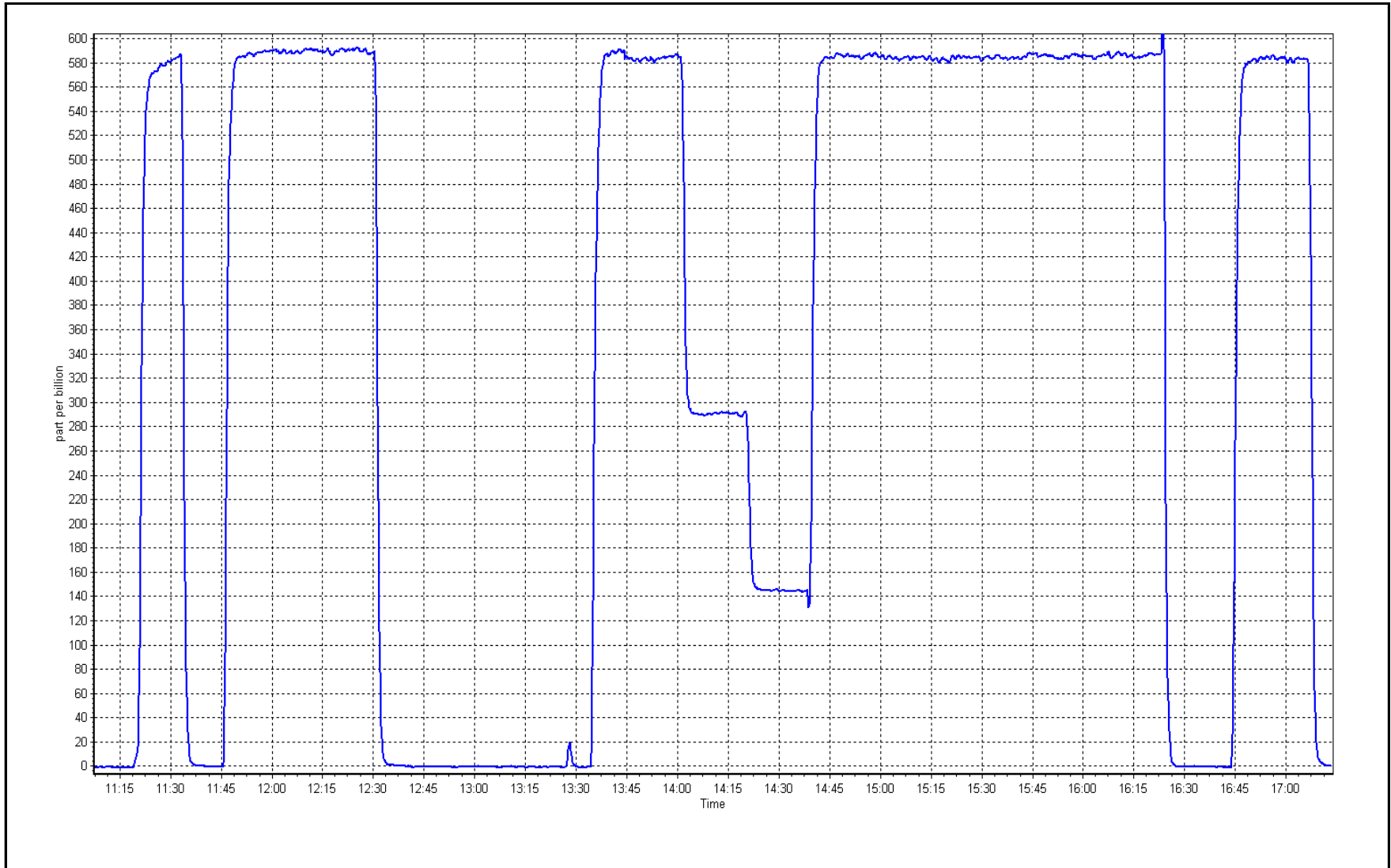
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.9	----	Correlation Coefficient	≥0.995
582.3	585.1	0.9952		
291.4	290.5	1.0032	Slope	0.90 - 1.10
145.8	144.6	1.0082		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 12, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

TRS Calibration Summary

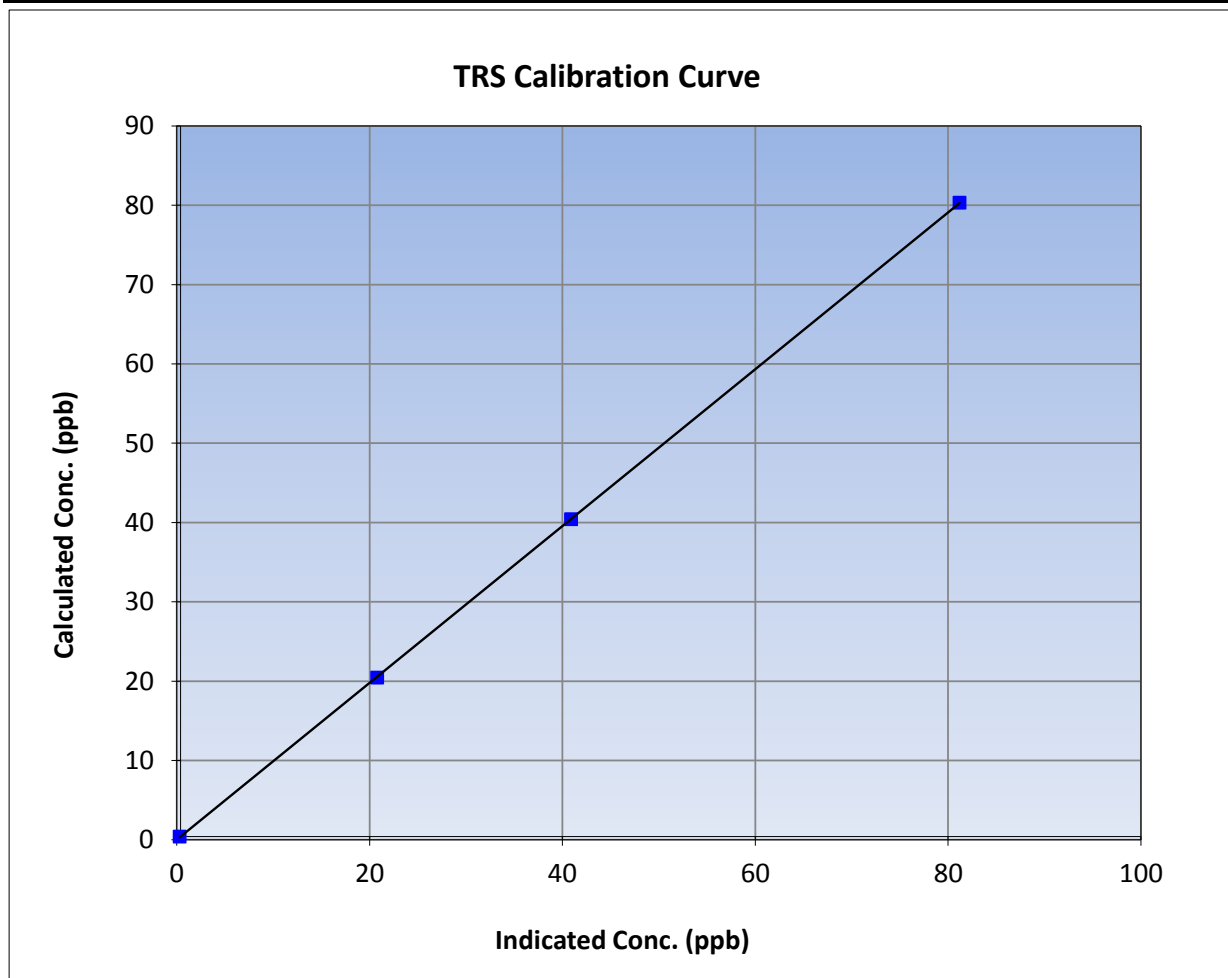
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 26, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:36	End Time (MST)	13:11
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1336160090

Calibration Data

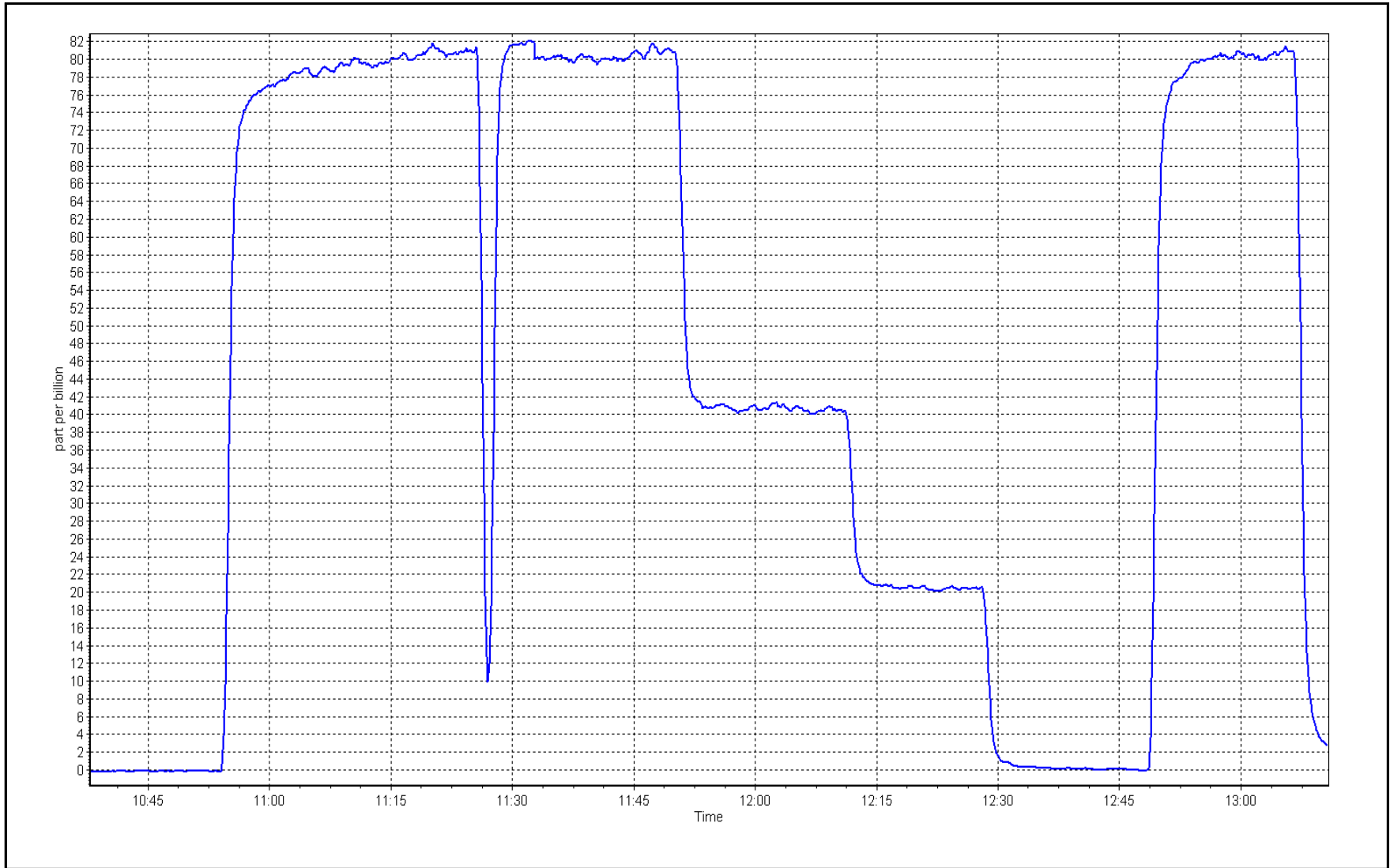
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999993	≥0.995
79.9	80.8	0.9892			
40.0	40.5	0.9882	Slope	0.988635	0.90 - 1.10
20.1	20.4	0.9832			
			Intercept	0.003709	+/-3



TRS Calibration Plot

Date: July 13, 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:	July 12, 2017	Last Cal Date:	June 14, 2017
Start time (MST):	10:58	End time (MST):	17:15
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	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	175.0	175.1
CH4 SP Ratio	0.000199	0.000199	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.0	Carrier Pressure	31.5	31.5
NMHC SP Ratio	4.55E-05	4.51E-05	Fuel Pressure	44.3	44.3
NMHC Peak Area	142471	143800	Air Pressure	34.4	34.5

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.000284	1.000421
THC Cal Offset	0.018830	0.008341
CH4 Cal Slope	1.005300	1.015346
CH4 Cal Offset	0.015450	-0.006410
NMHC Cal Slope	0.995838	1.000625
NMHC Cal Offset	0.003469	-0.002150

Notes: Nitrogen cylinder being replaced and H2 generator being installed after as founds. Span adjusted slightly.

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	12.35	0.994
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	12.27	12.26	1.000
second point	4988	29.6	6.14	6.12	1.004
third point	5000	14.8	3.07	3.06	1.004
as left zero	5010	0.0	0.00	0.00	----
as left span	4833	59.0	12.55	12.28	1.023
Average Correction Factor					1.003
Corrected As found	12.35	Prev response	12.25	*% change	-0.8%

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	6.58	0.985
calibrator zero	5009	0	0.00	0.00	----
high point	4955	59.1	6.48	6.48	1.000
second point	4988	29.6	3.24	3.25	1.000
third point	5000	14.8	1.62	1.63	0.998
as left zero	5010	0	0.00	0.00	----
as left span	4833	59	6.63	6.50	1.021
Average Correction Factor					0.999
Corrected As found	6.58	Prev response	6.51	*% change	-1.1%

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	5009	0.0	0.00	0.00	----
as found span	4955	59.1	5.79	5.76	1.004
calibrator zero	5009	0.0	0.00	0.00	----
high point	4955	59.1	5.79	5.70	1.015
second point	4988	29.6	2.90	2.87	1.009
third point	5000	14.8	1.45	1.43	1.011
as left zero	5010	0.0	0.00	0.00	----
as left span	4833	59.0	5.92	5.78	1.025
Average Correction Factor					1.012
Corrected As found	5.76	Prev response	5.74	*% change	-0.4%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

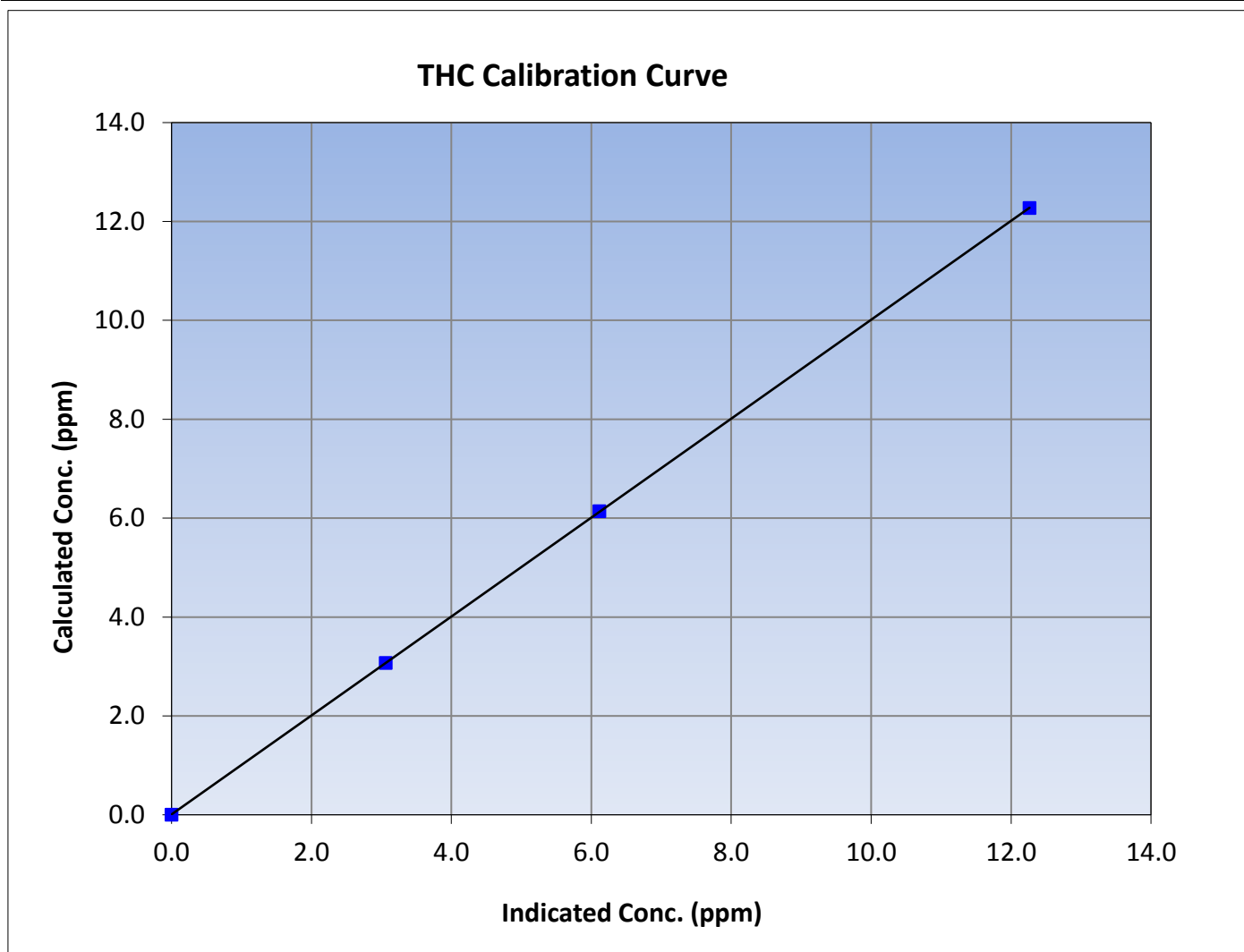
Version-02-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 14, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
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	0.999996	≥ 0.995			
12.27	12.26	1.0005						
6.14	6.12	1.0041				Slope	1.000421	0.90 - 1.10
3.07	3.06	1.0037						
			Intercept	0.008341	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

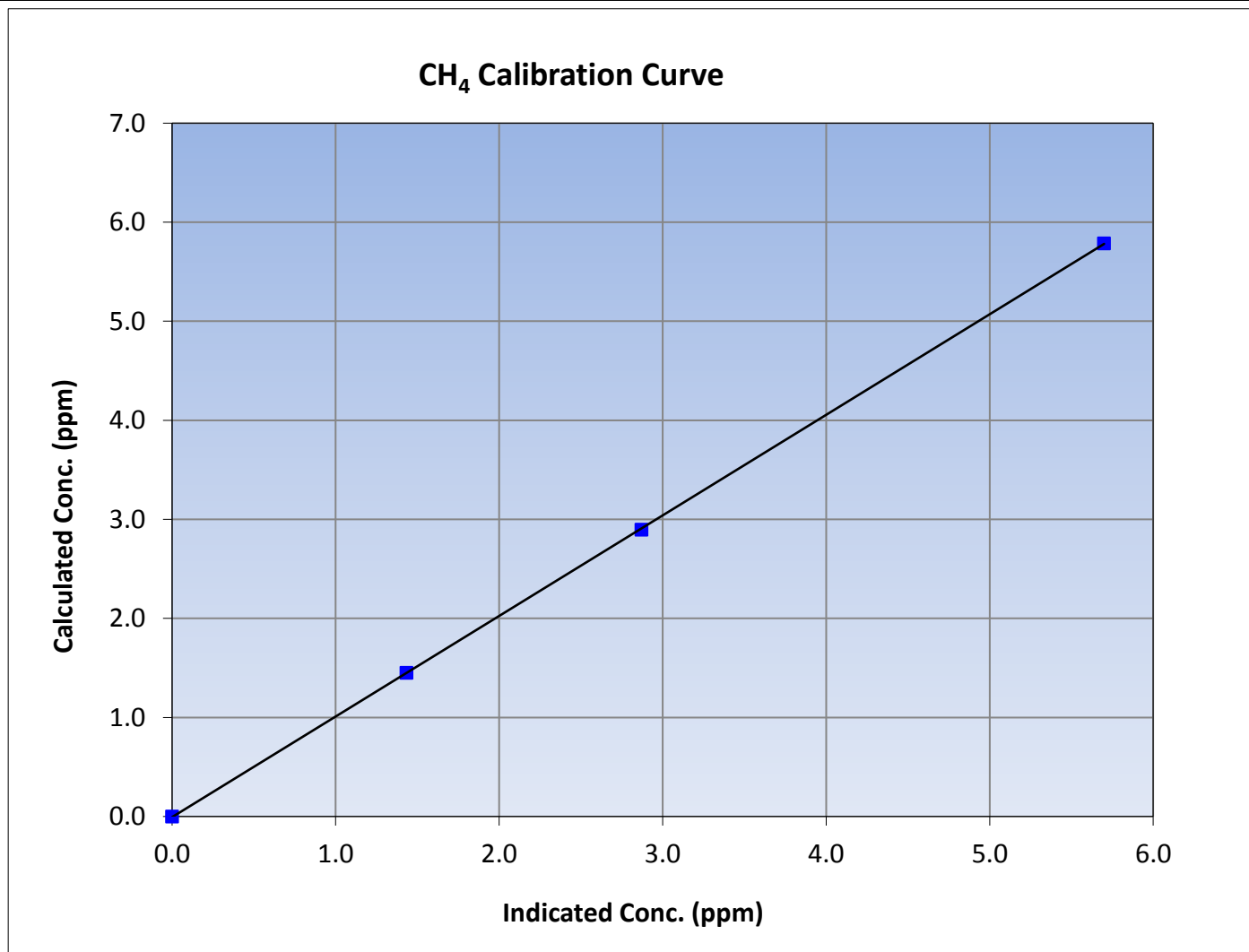
Version-02-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 14, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
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	0.999988	≥ 0.995			
5.79	5.70	1.0153						
2.90	2.87	1.0089				Slope	1.015346	0.90 - 1.10
1.45	1.43	1.0105						
			Intercept	-0.006410	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

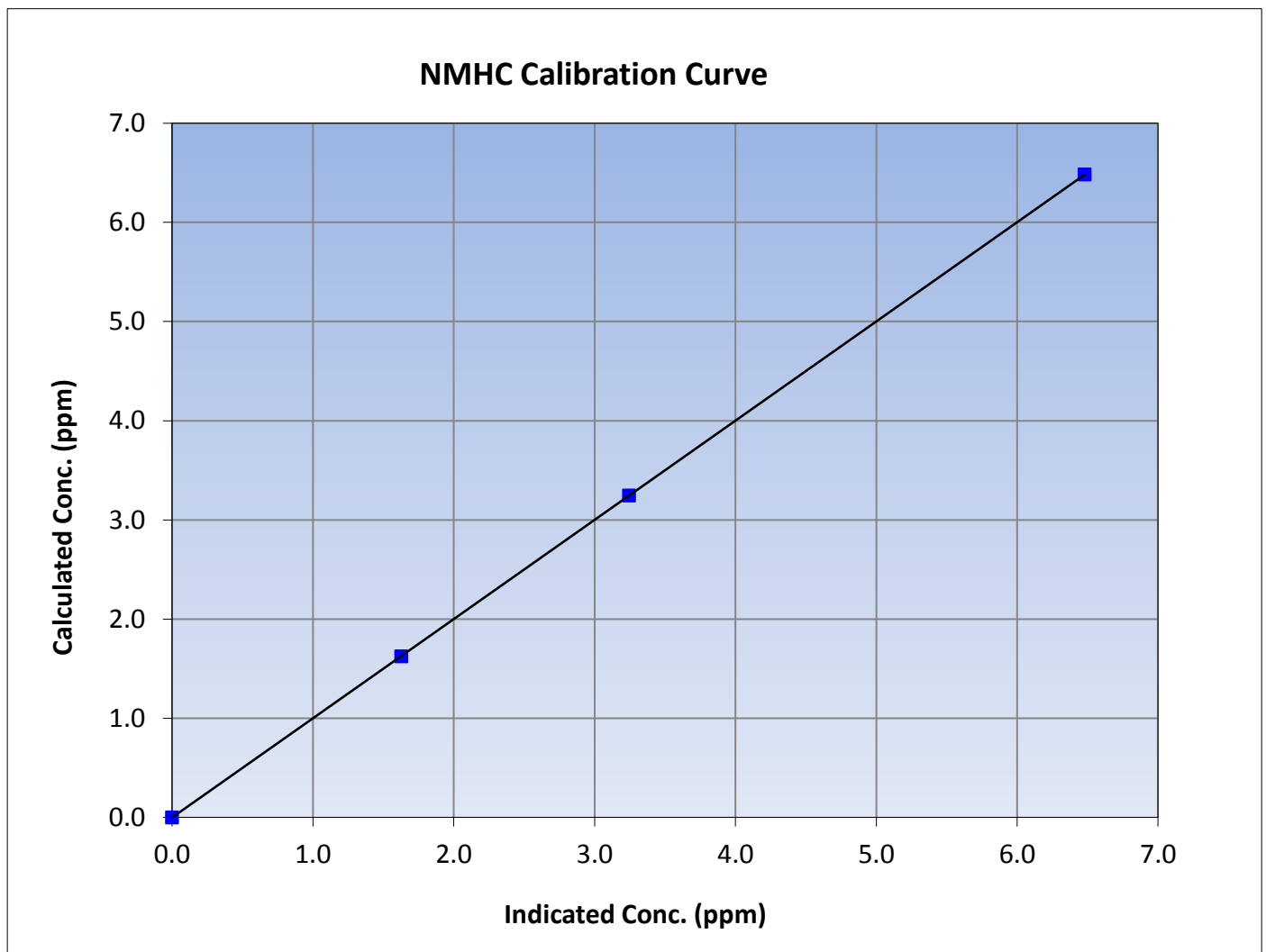
Version-02-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 14, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
Analyzer make	Thermo 55i	Analyzer serial #	1505164831

Calibration Data

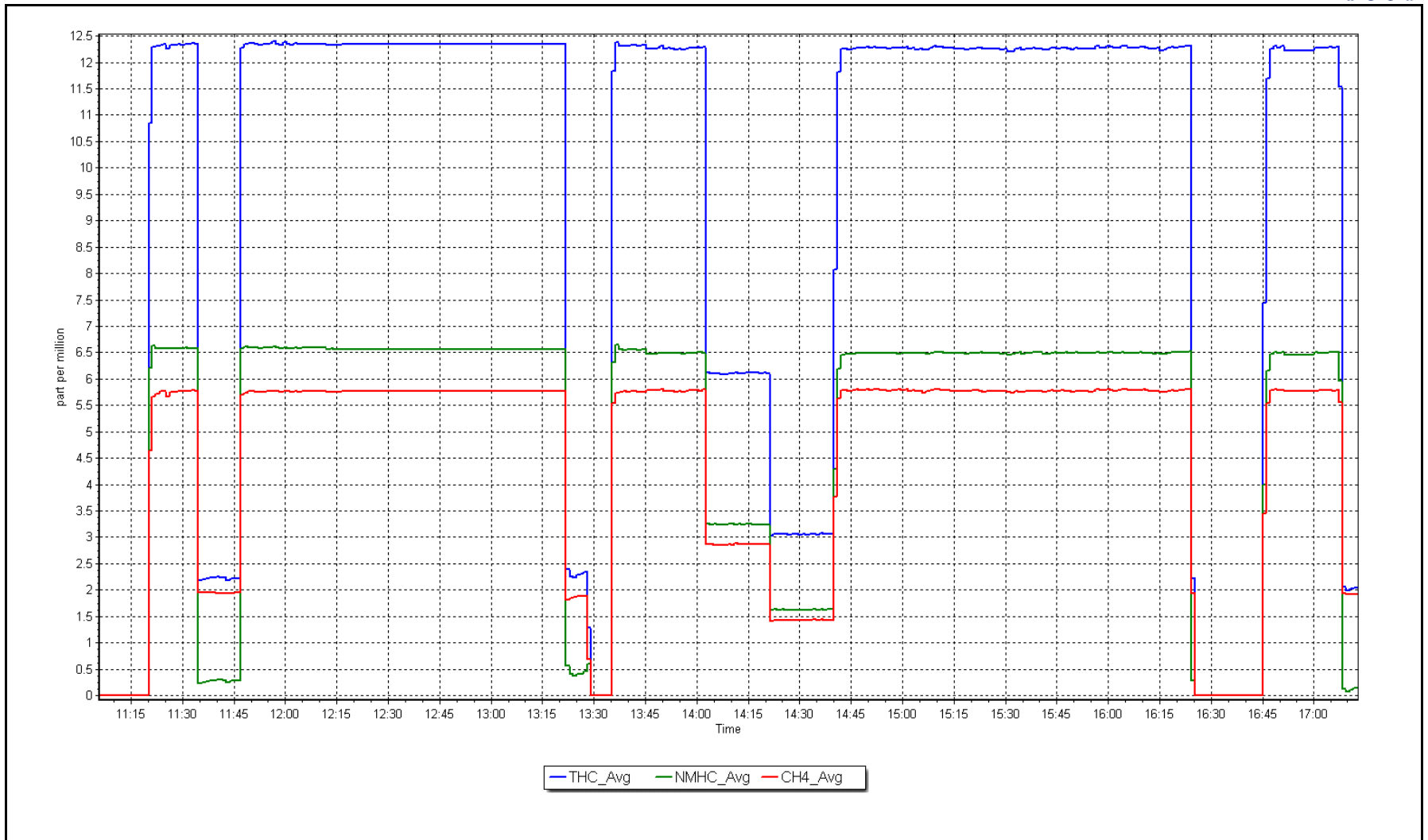
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>
0.00	0.00	----	Correlation Coefficient	0.999999	≥ 0.995
6.48	6.48	1.0004			
3.24	3.25	0.9999			
1.62	1.63	0.9977			
			Slope	1.000625	0.90 - 1.10
			Intercept	-0.002150	+/-0.5



NMHC Calibration Plot

Date: July 12, 2017

Location: Stony Mountain





Wood Buffalo Environmental Association

O₃ Calibration Summary

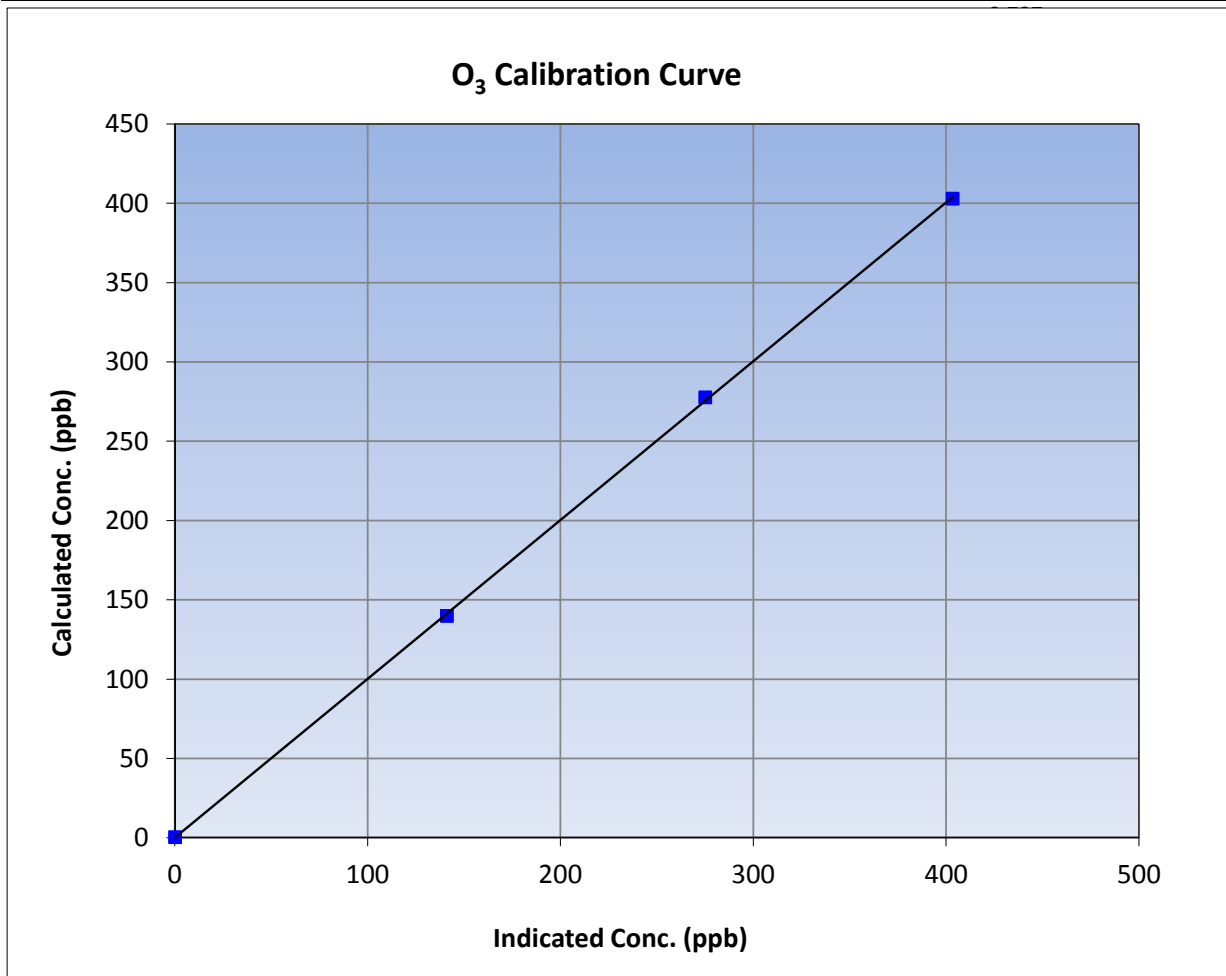
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 27, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	7:32	End Time (MST)	10:32
Analyzer make	Thermo 49i	Analyzer serial #	1501663733

Calibration Data

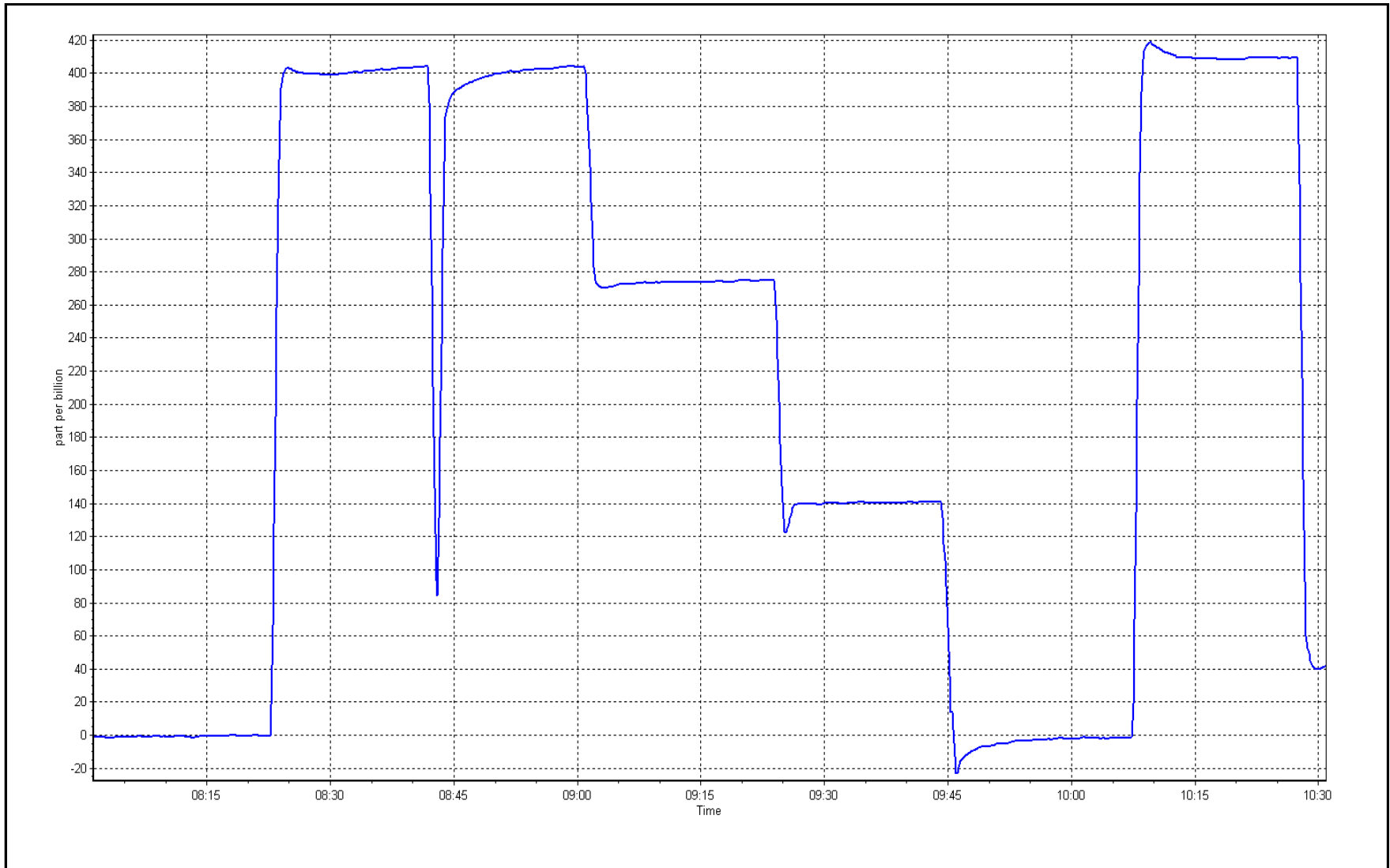
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	-0.3	----	Correlation Coefficient	0.999915	≥0.995
402.6	403.0	0.9990	Slope	1.001301	0.90 - 1.10
277.2	274.7	1.0091	Intercept	0.008833	+/- 10
139.4	140.7	0.9908			



O₃ Calibration Plot

Date: July 13, 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:	July 12, 2017	Last Cal Date:	June 27, 2017
Start time (MST):	10:58	End time (MST):	17:15
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	0.973	0.973	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.998	0.998	PMT Temperature	-2.8	-2.7
NO2 coefficient	0.999	0.999	Reaction cell Press	199.3	198.1
NO bkgrnd	1.7	1.7	Sample Flow	0.723	0.719
NOX bkgrnd	1.8	1.8	PMT Voltage	-850.6	-850.6

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.995818	0.998939
NO _x Cal Offset	0.403014	-1.065914
NO Cal Slope	0.994422	0.999538
NO Cal Offset	0.464729	-1.223978
NO ₂ Cal Slope	1.001357	1.000772
NO ₂ Cal Offset	0.382501	0.392350



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	0.4	0.4	0.0	----	----
as found span	4955	59.1	599.9	599.9	0.0	601.0	600.6	0.4	0.9982	0.9989
calibrator zero	5009	0.0	0.0	0.0	0.0	0.4	0.4	0.0	----	----
high point	4955	59.1	599.9	599.9	0.0	601.0	600.6	0.4	0.9982	0.9989
second point	4985	29.6	300.5	300.5	0.0	303.1	303.5	-0.4	0.9913	0.9900
third point	5000	14.8	150.2	150.2	0.0	151.5	151.5	-0.1	0.9915	0.9915
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	205.7	407.6	610.0	198.8	411.6	1.0054	1.0347
Average Correction Factor									0.9937	0.9935

Corrected As found	NO _x = 600.6 ppb	NO = 600.2 ppb		*Percent Change	NO _x = 0.2%
Previous Response	NO _x = 602.1 ppb	NO = 602.8 ppb		*Percent Change	NO = 0.4%
<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	609.8	608.3	1.5	0.9838	0.9863	----	----
1st NO2 (400 ppb O3)	205.7	402.6	610.0	205.7	404.3	0.9835	----	0.9958	100.4%
2nd NO2 (200 ppb O3)	331.1	277.2	604.5	331.1	272.2	0.9925	----	1.0184	98.2%
3rd NO2 (100 ppb O3)	468.9	139.4	609.5	468.9	140.5	0.9843	----	0.9922	100.8%
2nd NO ref point	----	0.0	609.6	610.5	-1.0	0.9842	0.9827	----	----
Average Correction Factor						0.9861	0.9845	1.0021	99.8%

Notes: No adjustments made.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

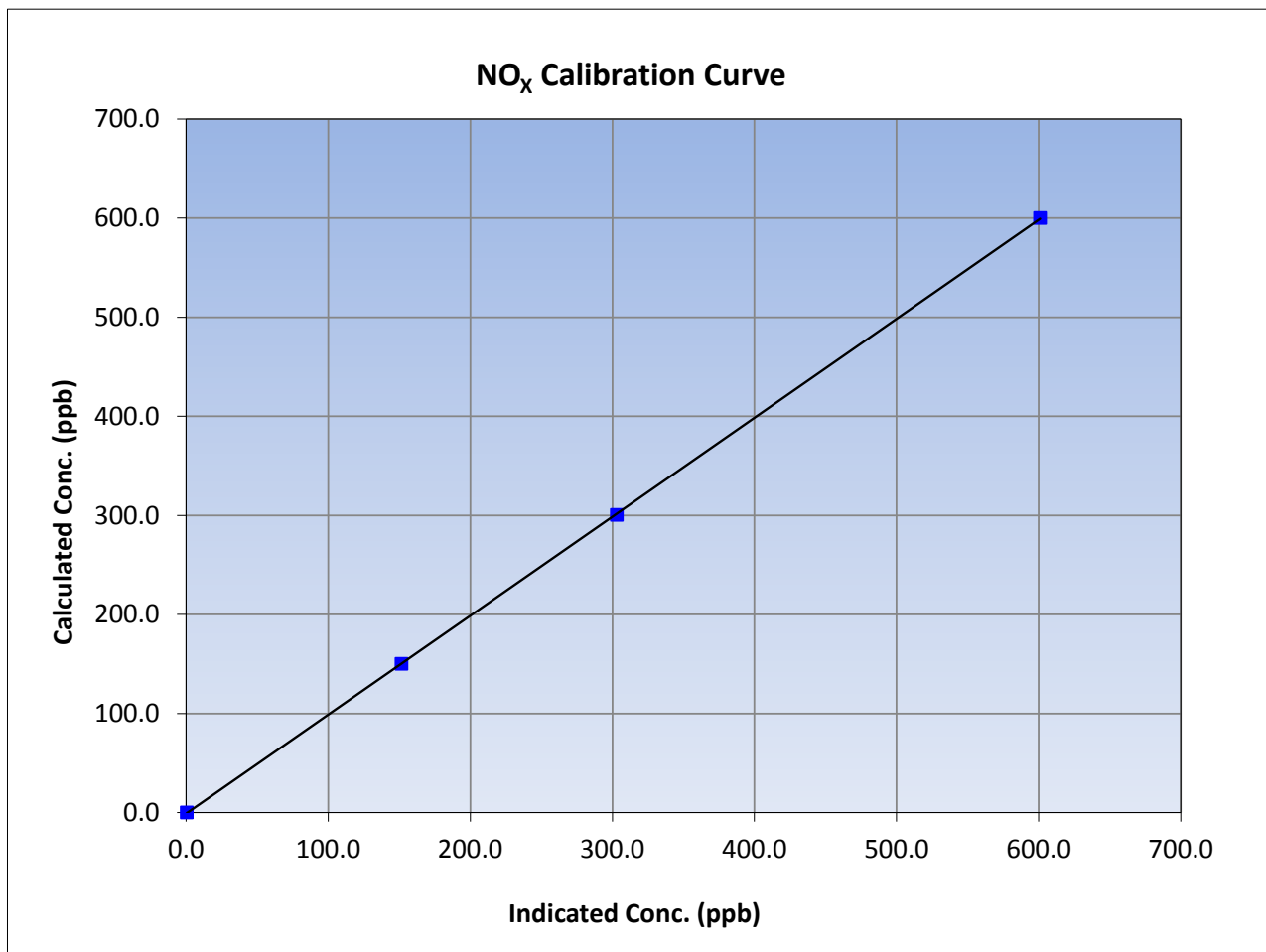
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 27, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
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	0.4	----	Correlation Coefficient	≥0.995	
599.9	601.0	0.9982			
300.5	303.1	0.9913	Slope	0.90 - 1.10	
150.2	151.5	0.9915			
			Intercept	-1.065914	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

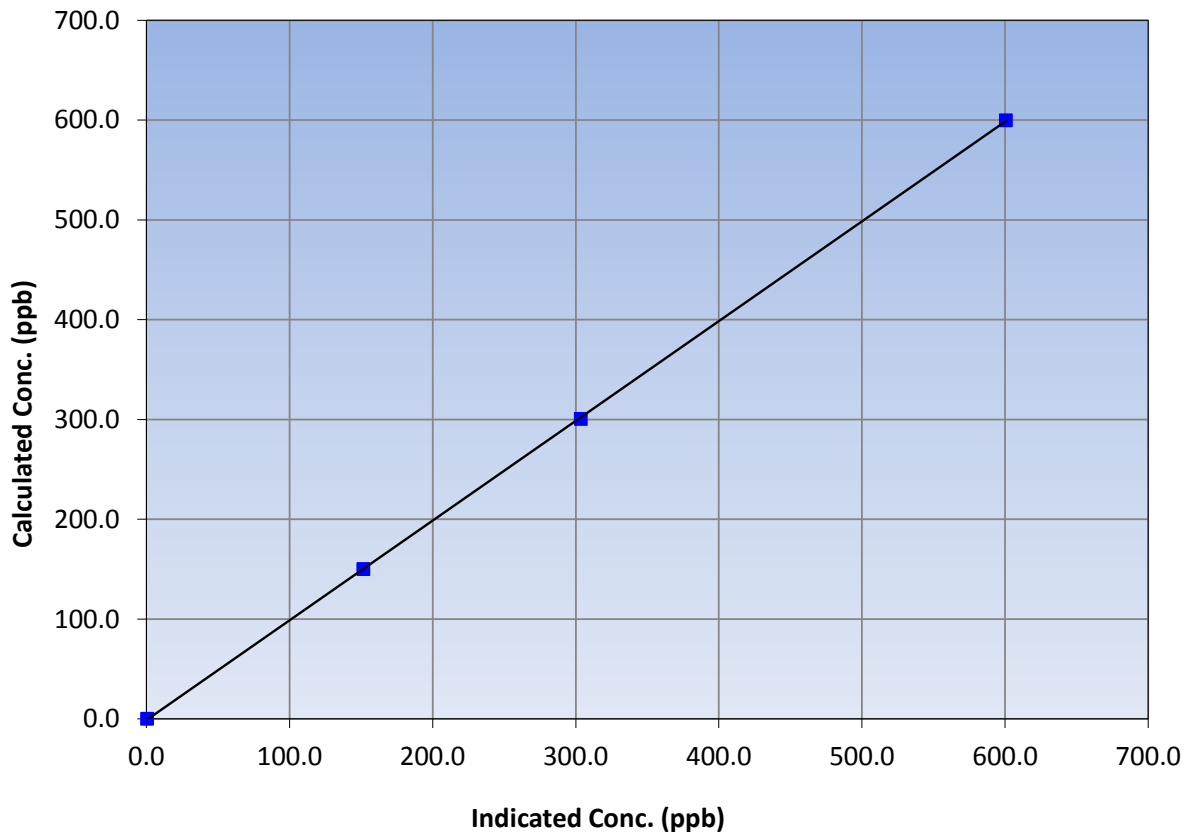
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 27, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
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	0.4	----	Correlation Coefficient	0.999978	≥0.995
599.9	600.6	0.9989			
300.5	303.5	0.9900	Slope	0.999538	0.90 - 1.10
150.2	151.5	0.9915			
			Intercept	-1.223978	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

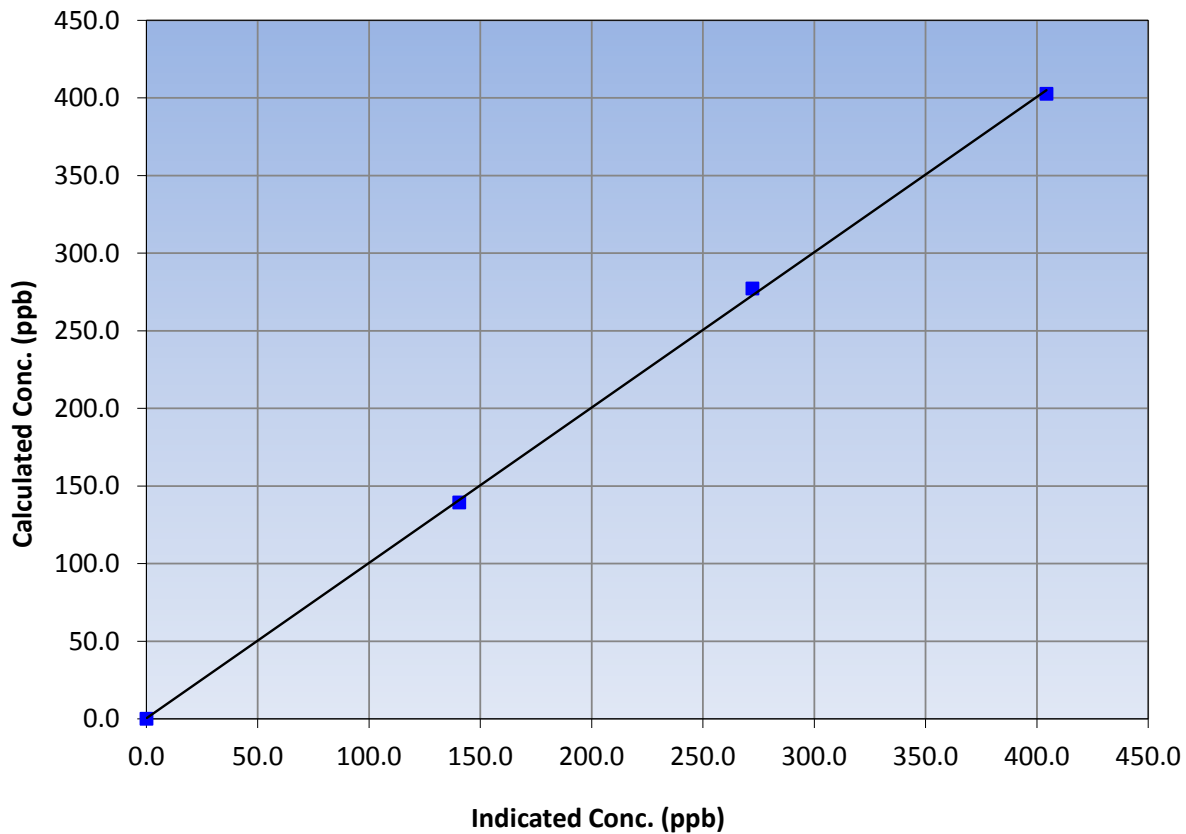
Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 27, 2017
Station Name	Stony Mountain	Station Number	AMS 18
Start Time (MST)	10:58	End Time (MST)	17:15
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	
402.6	404.3	0.9958			
277.2	272.2	1.0184			
139.4	140.5	0.9922			
			Slope	1.000772	0.90 - 1.10
			Intercept	0.392350	+/-20

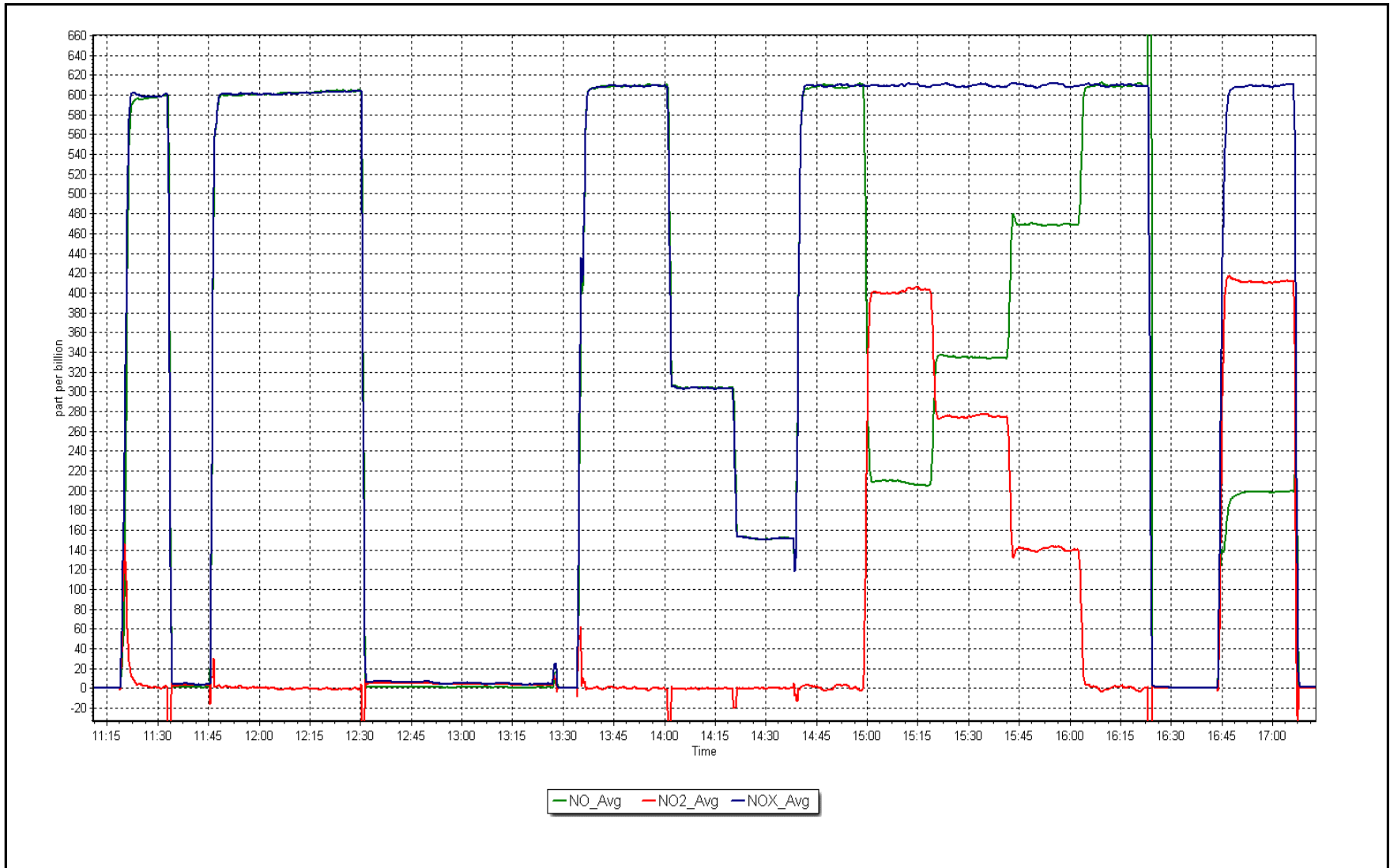
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 12, 2017

Location: Stony Mountain





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 19 FIREBAG JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 JULY 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	705	37	39	99.73	9	0	2	0
H2S (ppb) Average	708	34	36	99.73	3	0	0	0
THC (ppm) Average	706	36	38	99.73	2.8	-	2.3	-
NO2 (ppb) Average	705	36	39	99.6	16	0	4	-
NO (ppb) Average	705	36	39	99.6	8	-	2	-
NOX (ppb) Average	705	36	39	99.6	24	-	6	-
Temperature 2 m (C) Average	744	0	0	100	28.7	-	23.2	-
Relative Humidity (%) Average	744	0	0	100	100	-	82	-
Wind Speed 10 m (km/h) Average	743	1	1	100	37	-	23	-
Wind Direction 10 m (deg) Average	743	1	1	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 JULY 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	705	0.7	1	-	0	0	0	0	1	2	9
H2S (ppb) Average	708	0.2	0	-	0	0	0	0	0	0	3
THC (ppm) Average	706	2.2	0.1	-	2	2.1	2.1	2.2	2.2	2.3	2.8
NO2 (ppb) Average	705	1.9	2	-	0	0	1	1	2	4	16
NO (ppb) Average	705	0.4	1	-	0	0	0	0	0	1	8
NOX (ppb) Average	705	2.3	3	-	0	0	1	1	3	5	24
Temperature 2 m (C) Average	744	17.57	4.6	-	4.3	11.7	14.4	17.4	20.9	23.9	28.7
Relative Humidity (%) Average	744	63.4	18	-	26	39	49	61	78	90	100
Wind Speed 10 m (km/h) Average	743	12.9	6	-	0	6	9	12	16	21	37
	6 743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX	27 Jul 2017 12:00	27 Jul 2017 14:00	3	Maintenance - WBEA internal audit
SO2	28 Jul 2017 09:00	28 Jul 2017 10:00	2	Maintenance - WBEA internal audit
H2S	27 Jul 2017 15:00	27 Jul 2017 16:00	2	Maintenance - WBEA internal audit
THC	28 Jul 2017 11:00	28 Jul 2017 12:00	2	Maintenance - WBEA internal audit



Summary of Hour Averages

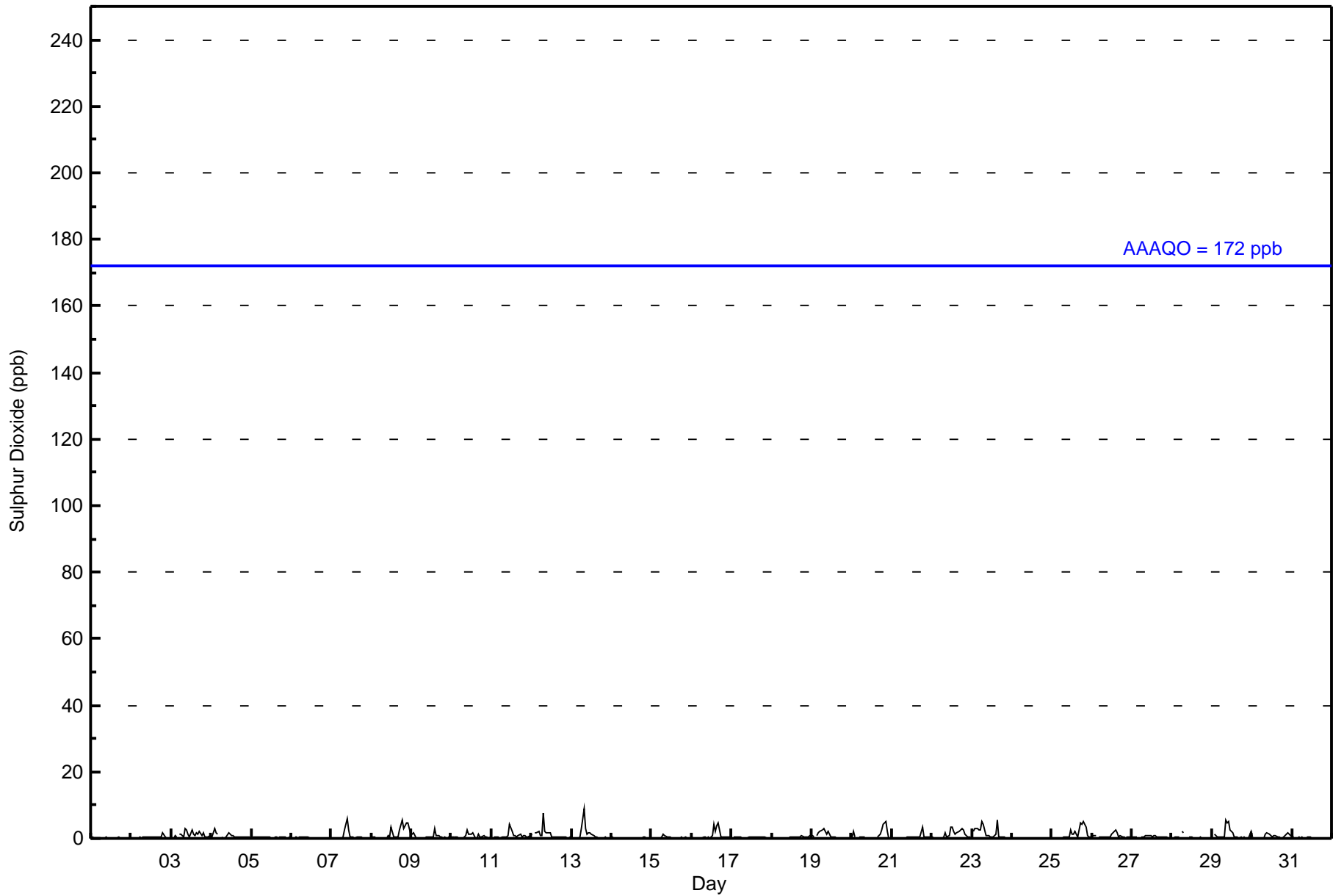
Firebag - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																																		
Maximum Value: 9 ppb on Jul 13 08:00														Maximum Daily Average: 1.5 ppb on Jul 23										Hours of Data: 705																								
Minimum Value: 0 ppb on Jul 24 05:00														Minimum Daily Average: 0.0 ppb on Jul 24										Hours of Missing Data: 39																								
Maximum Diurnal Average: 1.1 ppb at hour 8														Minimum Diurnal Average: 0.4 ppb at hour 1										Hours of Calibration: 37																								
Monthly Average: 0.7 ppb														Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5										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-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0.3	2																						
3-Jul	0	0	1	0	Z	1	1	1	3	2	1	1	2	1	1	2	1	2	1	2	0	0	0	1	1.1	3																						
4-Jul	0	2	3	2	1	Z	0	0	0	0	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0.8	3																						
5-Jul	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																						
6-Jul	0	Z	0	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-Jul	0	0	Z	0	0	0	0	0	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	6																						
8-Jul	0	0	0	Z	0	0	0	0	0	1	1	3	0	0	0	1	2	5	3	4	4	5	1	1.4	5																							
9-Jul	1	2	1	0	Z	0	0	0	0	0	0	0	1	3	1	1	0	0	0	0	0	0	0	0.5	3																							
10-Jul	0	0	0	0	0	Z	0	0	1	2	1	1	2	0	0	1	0	1	1	1	0	0	0	0.6	2																							
11-Jul	Z	0	0	0	0	0	0	0	0	1	4	2	1	1	0	1	1	1	1	1	1	1	0	0.8	4																							
12-Jul	1	Z	2	2	2	1	1	8	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	1.1	8																							
13-Jul	0	0	Z	0	0	1	3	9	3	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1.1	9																							
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.2	1																							
15-Jul	0	0	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
16-Jul	0	0	0	0	0	Z	0	1	0	0	0	1	4	2	4	5	1	0	0	0	0	0	0	0.9	5																							
17-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.3	1																							
19-Jul	1	1	Z	1	2	2	3	3	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0.9	3																							
20-Jul	0	2	0	Z	1	0	0	0	0	C	C	C	C	C	C	1	1	1	2	4	5	2	0	--	5																							
21-Jul	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0.4	3																							
22-Jul	0	0	0	0	0	Z	0	0	2	0	1	4	3	2	1	2	2	3	3	3	1	1	1	1.2	4																							
23-Jul	Z	2	3	3	2	3	5	4	1	1	1	1	0	0	1	6	0	0	0	0	0	0	0	1.5	6																							
24-Jul	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																							
25-Jul	0	0	Z	0	0	0	0	0	1	0	1	2	1	1	2	1	3	5	4	5	3	1	0	1.4	5																							
26-Jul	0	1	1	Z	0	0	0	0	0	0	0	1	2	2	2	1	1	0	0	0	0	0	1	0.6	2																							
27-Jul	1	0	0	0	Z	1	0	0	1	1	1	1	1	1	1	0	0	1	0	1	0	0	0	0.5	1																							
28-Jul	0	0	0	1	0	Z	2	2	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
29-Jul	Z	1	1	1	0	1	1	1	6	5	5	2	2	0	0	0	0	0	0	0	0	0	2	1.2	6																							
30-Jul	0	Z	0	0	0	0	0	0	1	2	1	1	1	1	1	1	0	0	0	1	1	2	1	0.6	2																							
31-Jul	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	1																							
																								0.4	0.6	0.6	0.5	0.5	0.5	0.7	1.1	1.0	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.9	0.8	0.7	0.5	0.4	0.4	Diurnal Average
																								1	2	3	3	2	3	5	9	6	6	5	4	3	4	3	6	5	5	5	5	5	4	5	2	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
Firebag - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - July 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	42	5	8	15	33	44	38	46	73	74	101	53	46	42	52	705
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	33	42	5	8	15	33	44	38	46	73	74	101	53	46	42	52	705

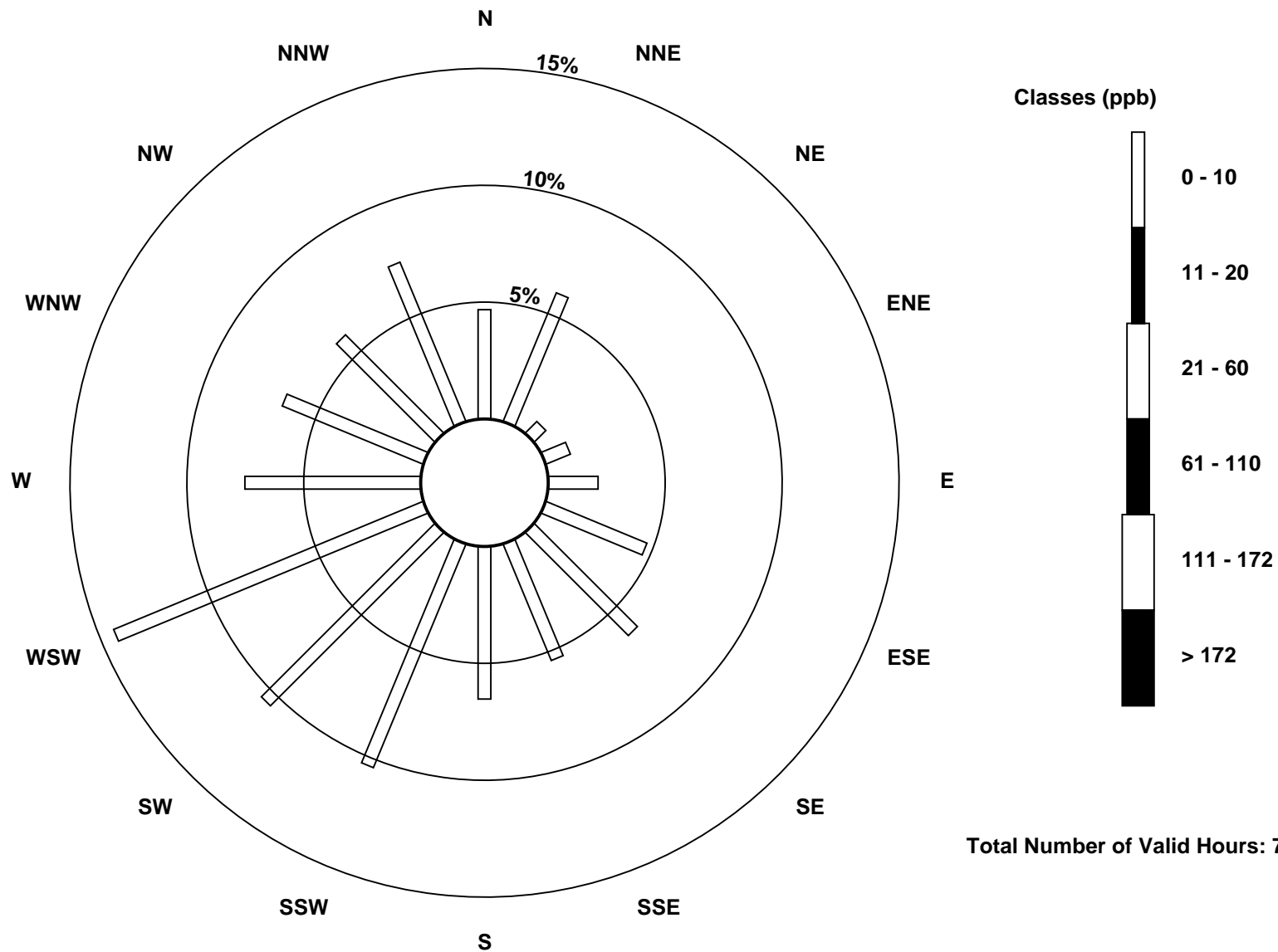
Total Number of Valid Hours: 705

Total Number of Hours: 744

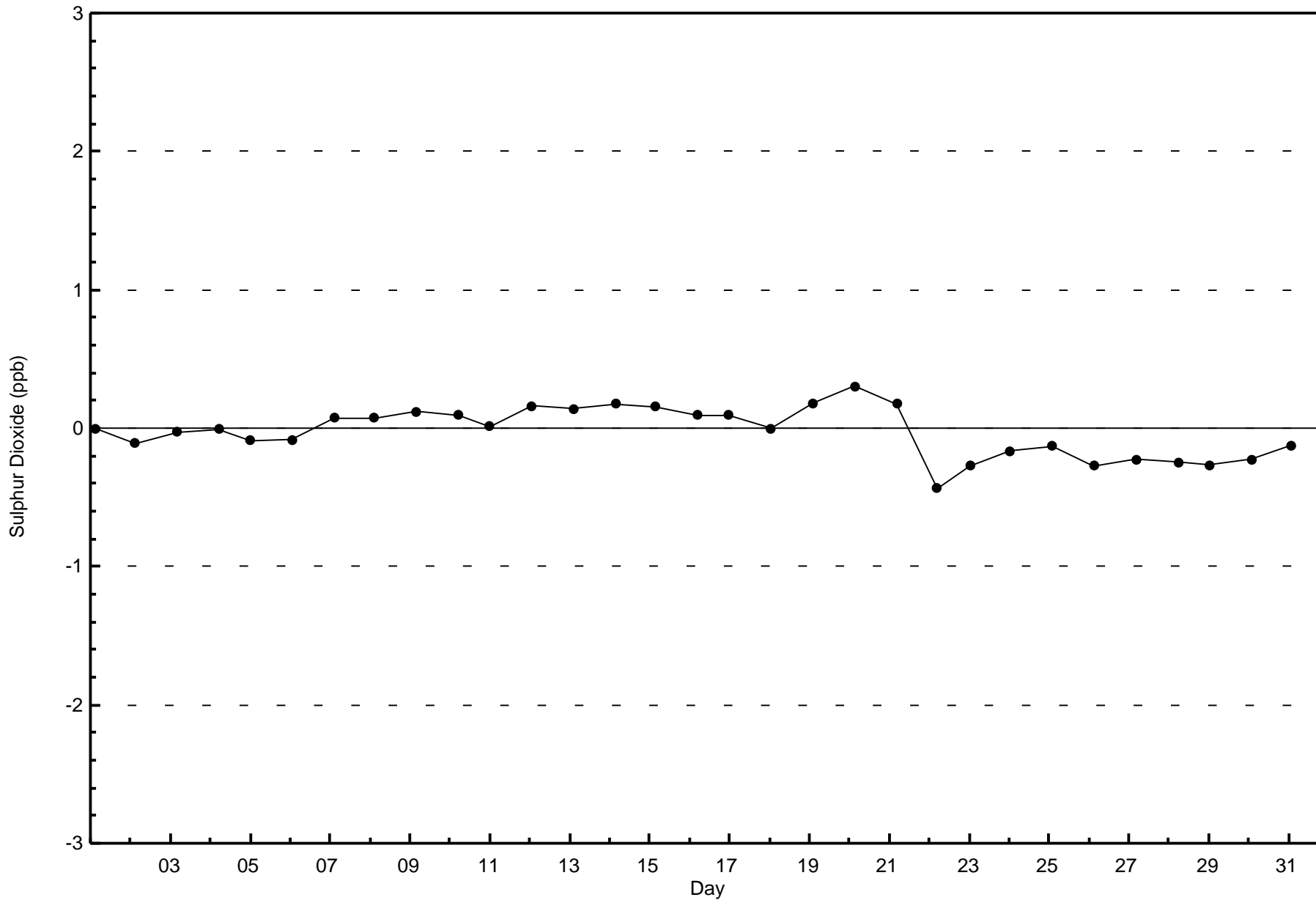


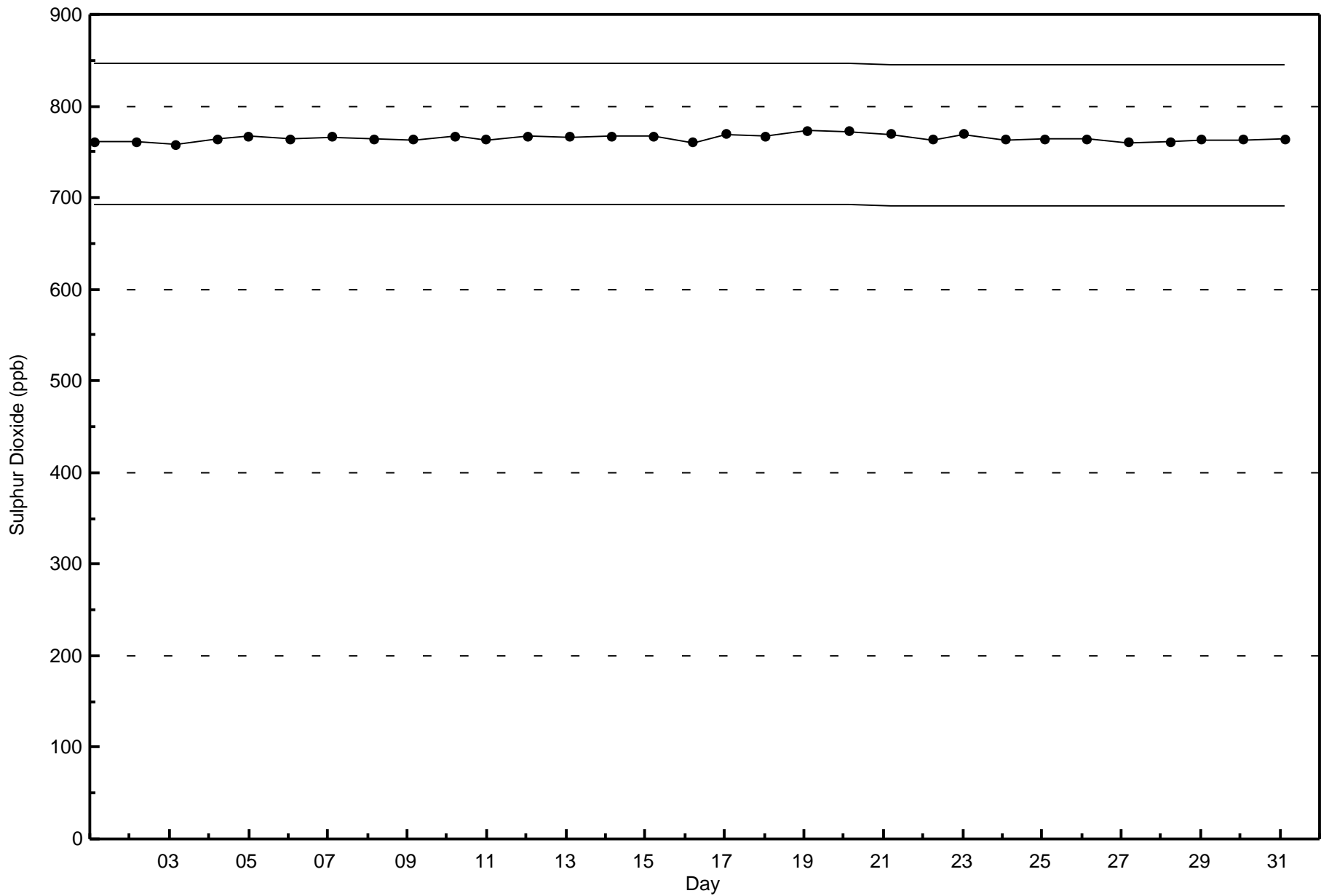
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 705





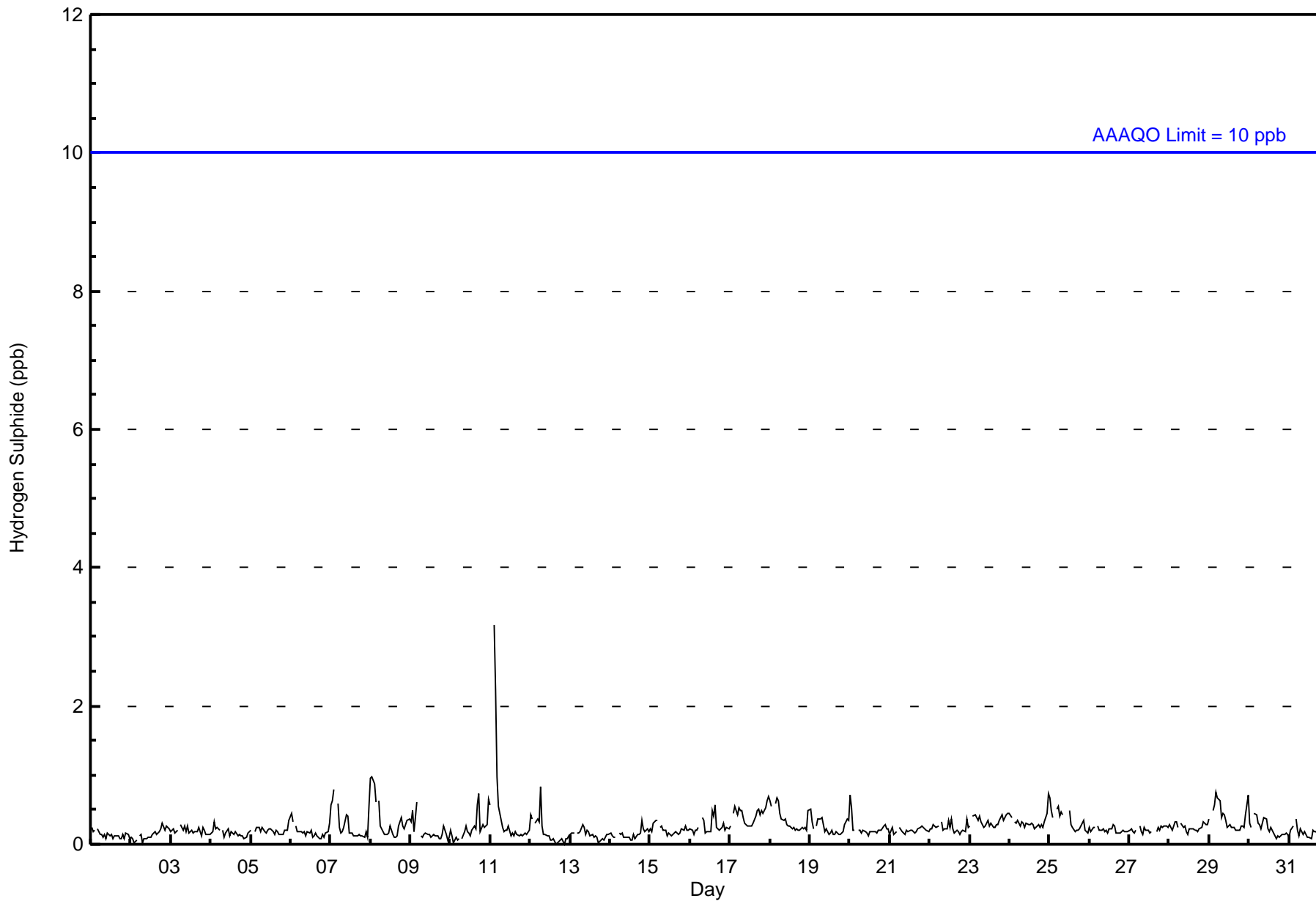


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																						
Maximum Value: 3 ppb on Jul 11 03:00										Maximum Daily Average: 0.5 ppb on Jul 11										Hours of Data: 708												
Minimum Value: 0 ppb on Jul 12 16:00										Minimum Daily Average: 0.1 ppb on Jul 1										Hours of Missing Data: 36												
Maximum Diurnal Average: 0.4 ppb at hour 3										Minimum Diurnal Average: 0.2 ppb at hour 19										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 = 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-Jul	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						
2-Jul	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						
3-Jul	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-Jul	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-Jul	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-Jul	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-Jul	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	1						
8-Jul	1	1	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1						
9-Jul	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						
10-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0.2	1						
11-Jul	1	Z	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3						
12-Jul	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1						
13-Jul	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						
14-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1						
17-Jul	0	Z	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0.4	1						
18-Jul	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1						
19-Jul	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						
20-Jul	1	1	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						
21-Jul	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						
22-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1						
25-Jul	1	0	0	Z	1	1	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1						
26-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	M	M	0	0	0	0	0	0	0	0	0.2	0						
28-Jul	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-Jul	0	Z	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1						
30-Jul	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						
31-Jul	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	0.4	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	0.2	0.2	0.2	0.2	0.2	0.2	0.3	Diurnal Average							
	1	1	3	2	1	1	1	0	0	0	0	0	0	0	0	1	1	1	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

Hydrogen Sulphide (H₂S) - ppb
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.86	99.86
3 - 4	1	0.14	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: 708

Total Number of Hours: 744



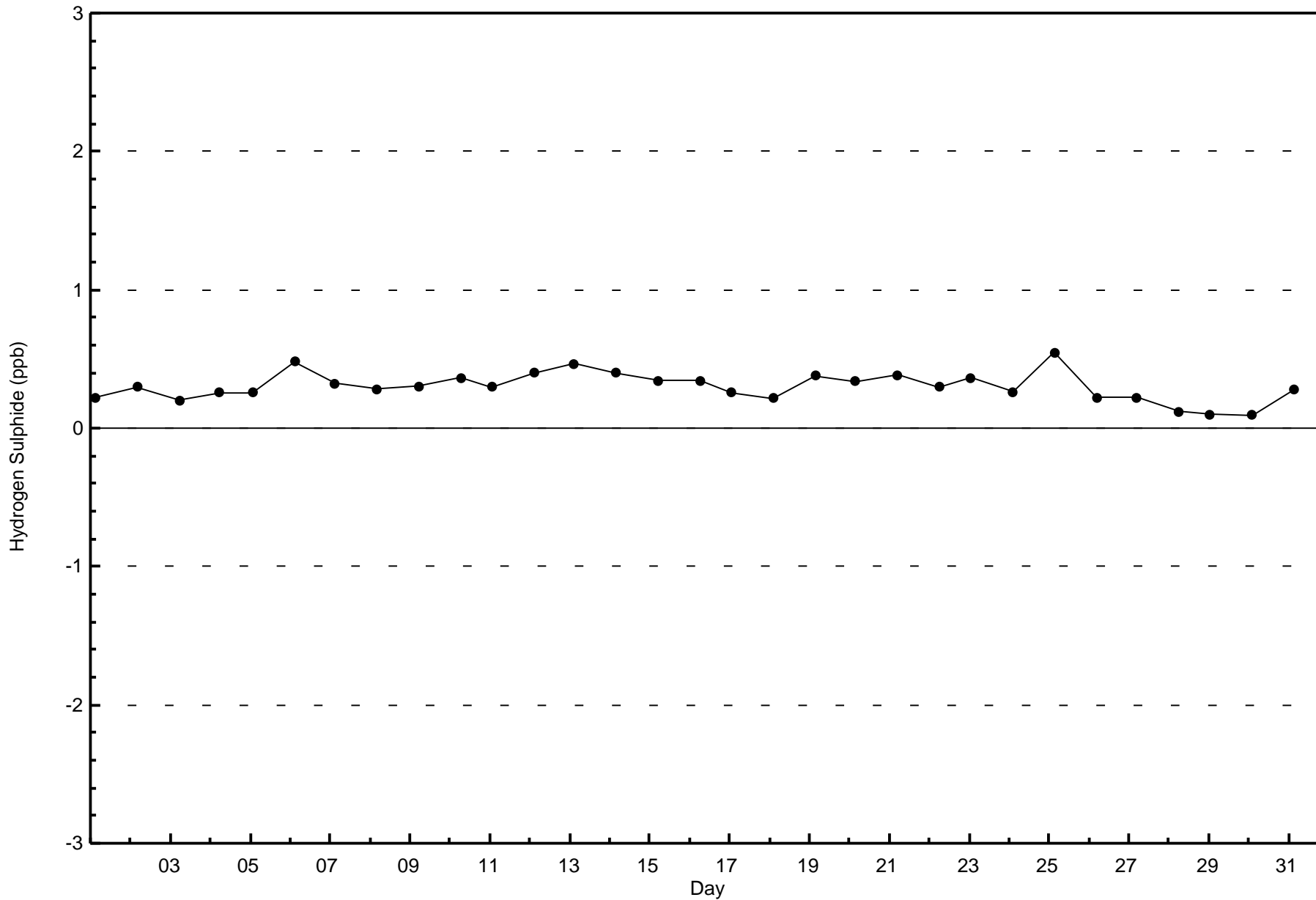
**Wood Buffalo Environmental Association
Frequency Distribution**

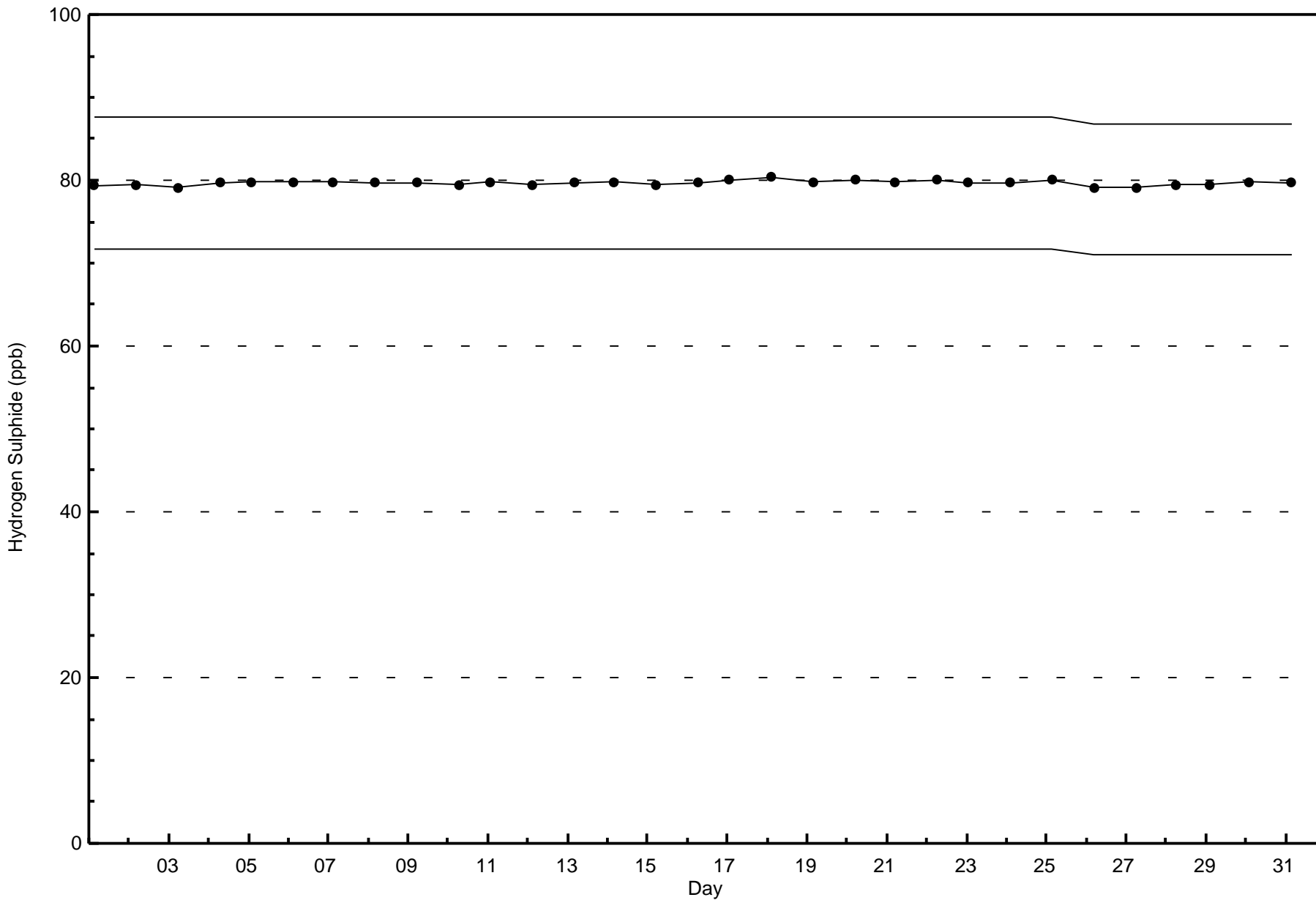
**Hydrogen Sulphide (H₂S) - ppb
Firebag - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	33	42	5	9	13	37	44	39	47	72	77	97	52	45	42	52	706
3 - 4	0	0	0	0	1	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	33	42	5	9	14	37	44	39	47	72	77	97	52	45	42	52	707

Total Number of Valid Hours: 707

Total Number of Hours: 744

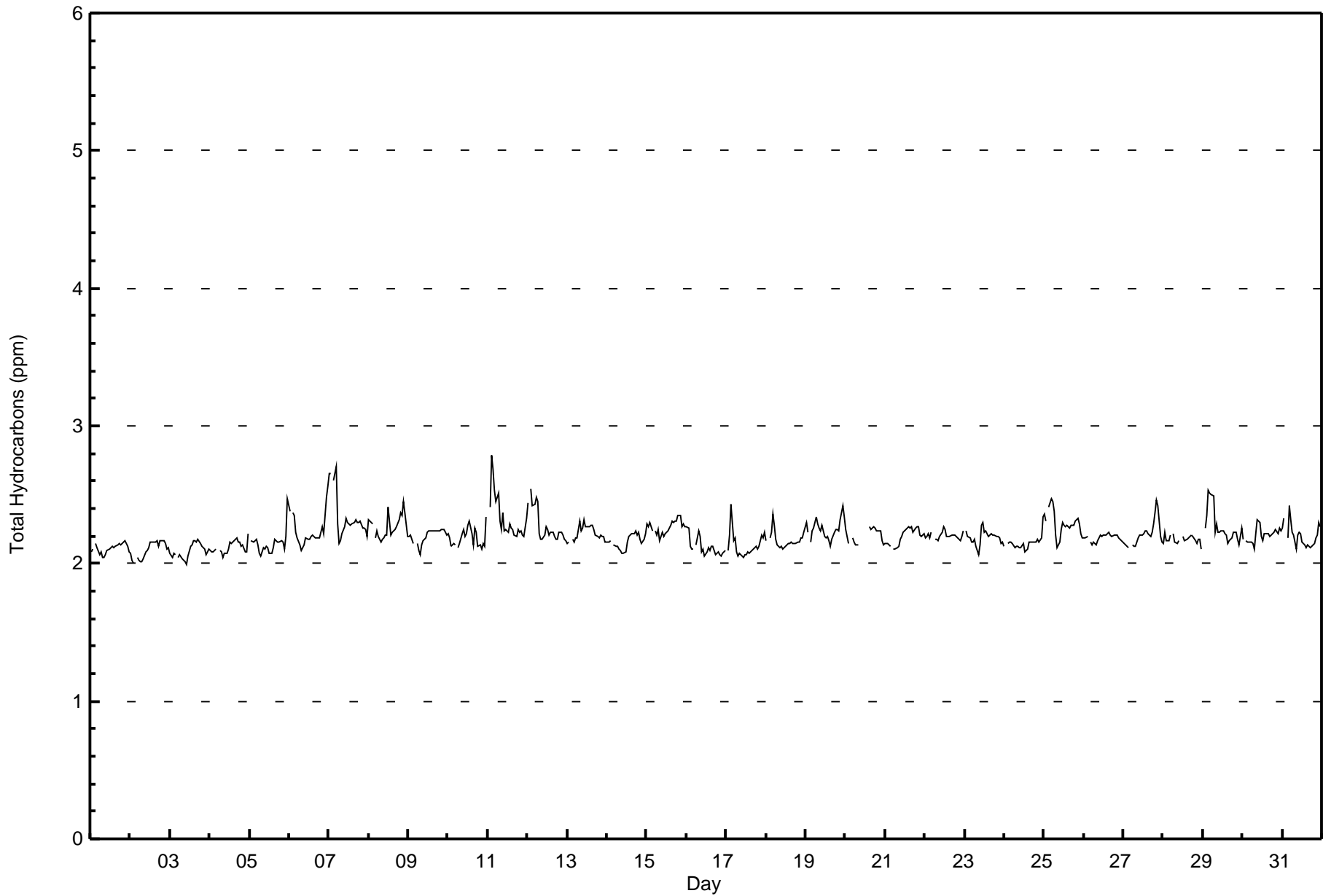






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Firebag - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	17	2.41	2.41
2.1 - 3.0	689	97.59	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - July 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	1	0	0	0	0	0	0	1	5	5	3	1	1	0	0	0	17
2.1 - 3.0	32	42	5	8	15	33	45	37	41	68	71	100	52	46	42	52	689
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	33	42	5	8	15	33	45	38	46	73	74	101	53	46	42	52	706

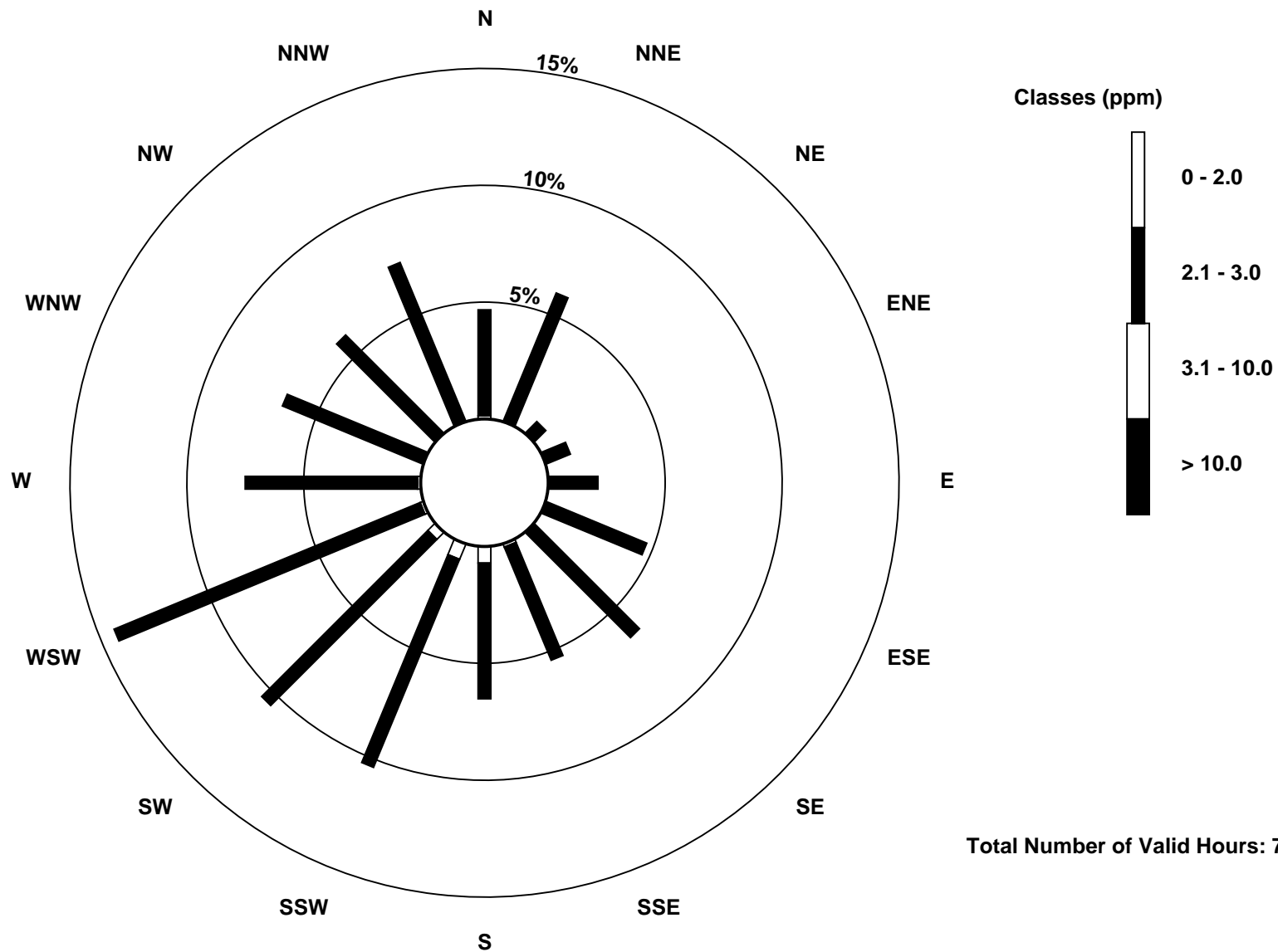
Total Number of Valid Hours: 706

Total Number of Hours: 744

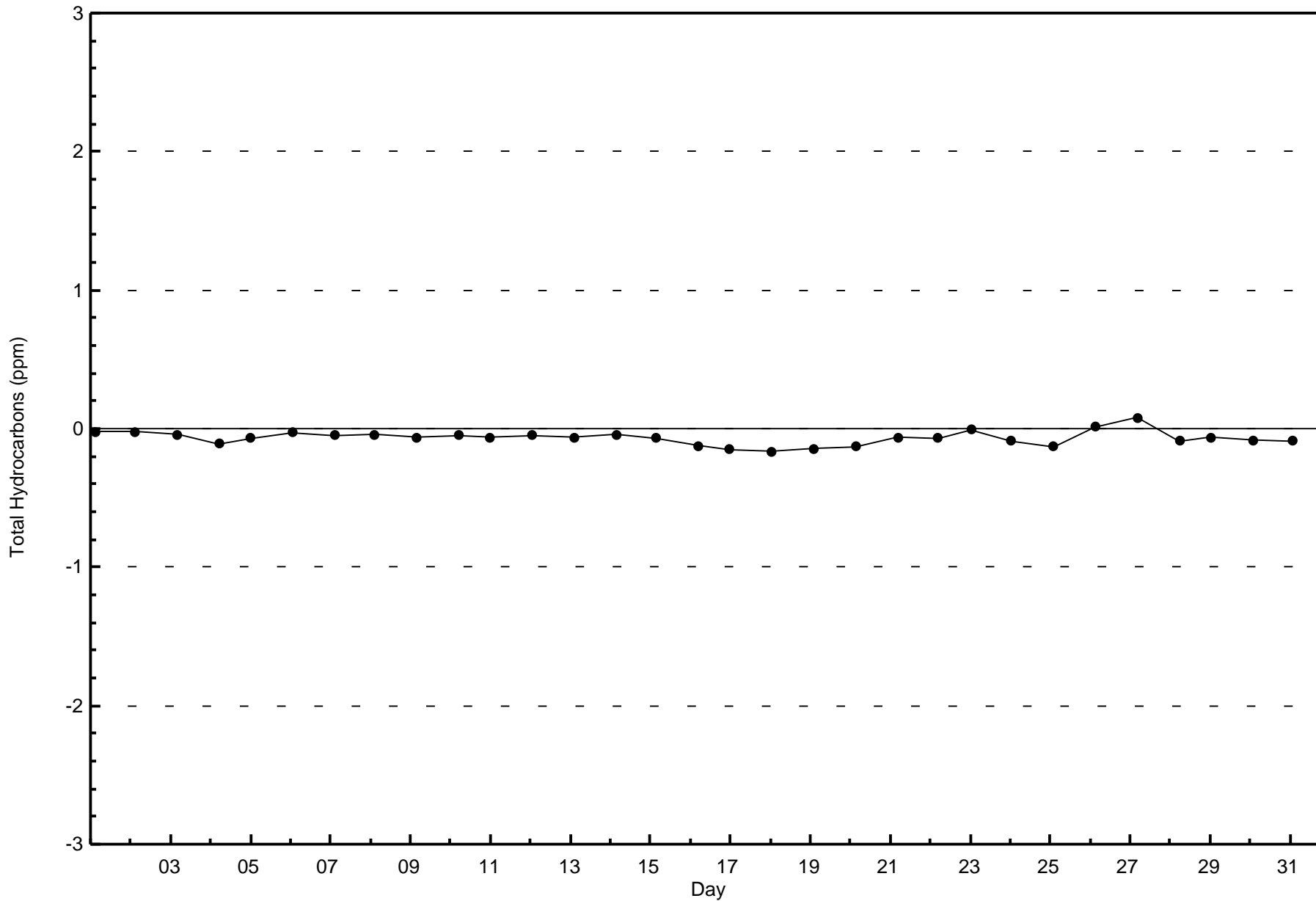


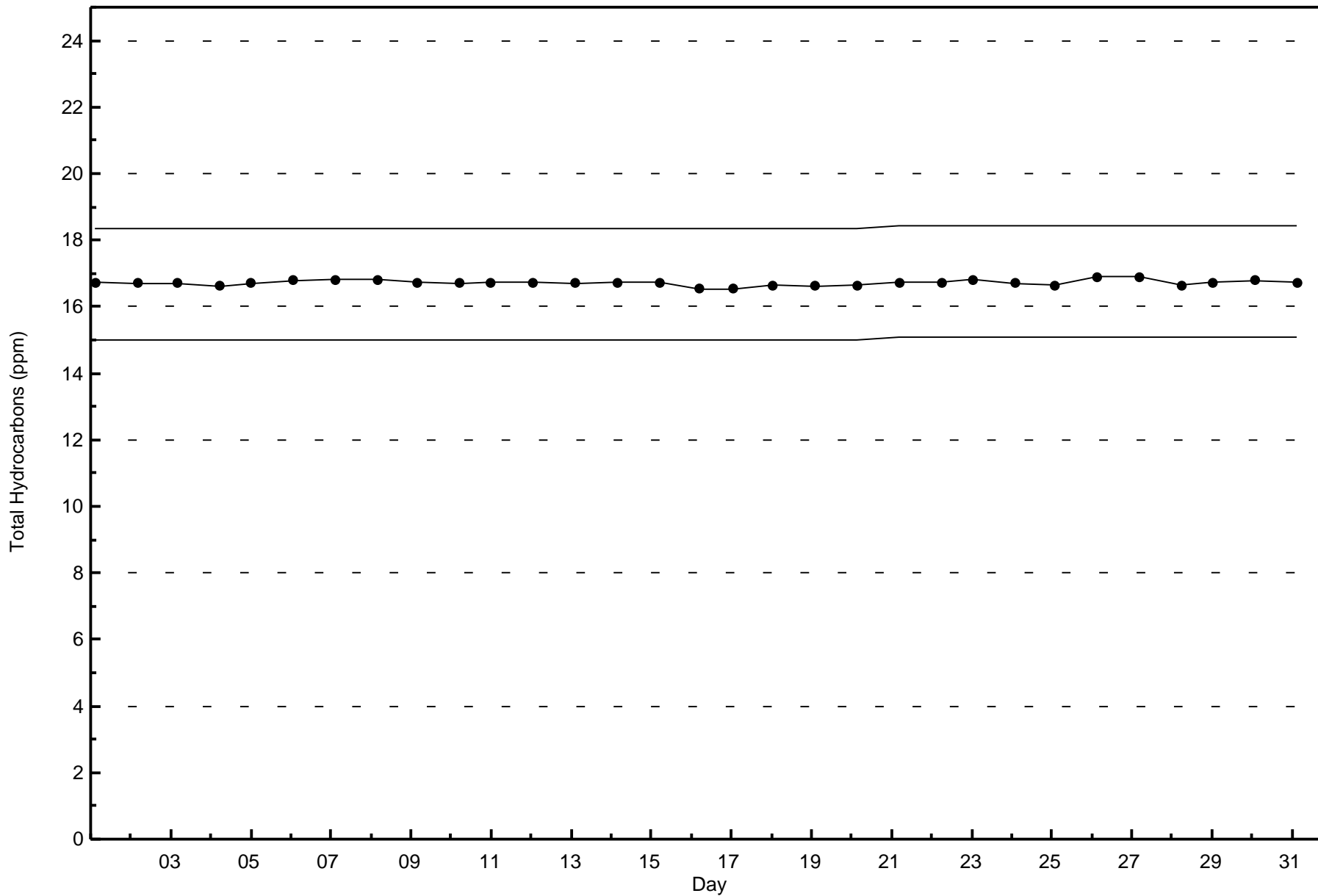
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

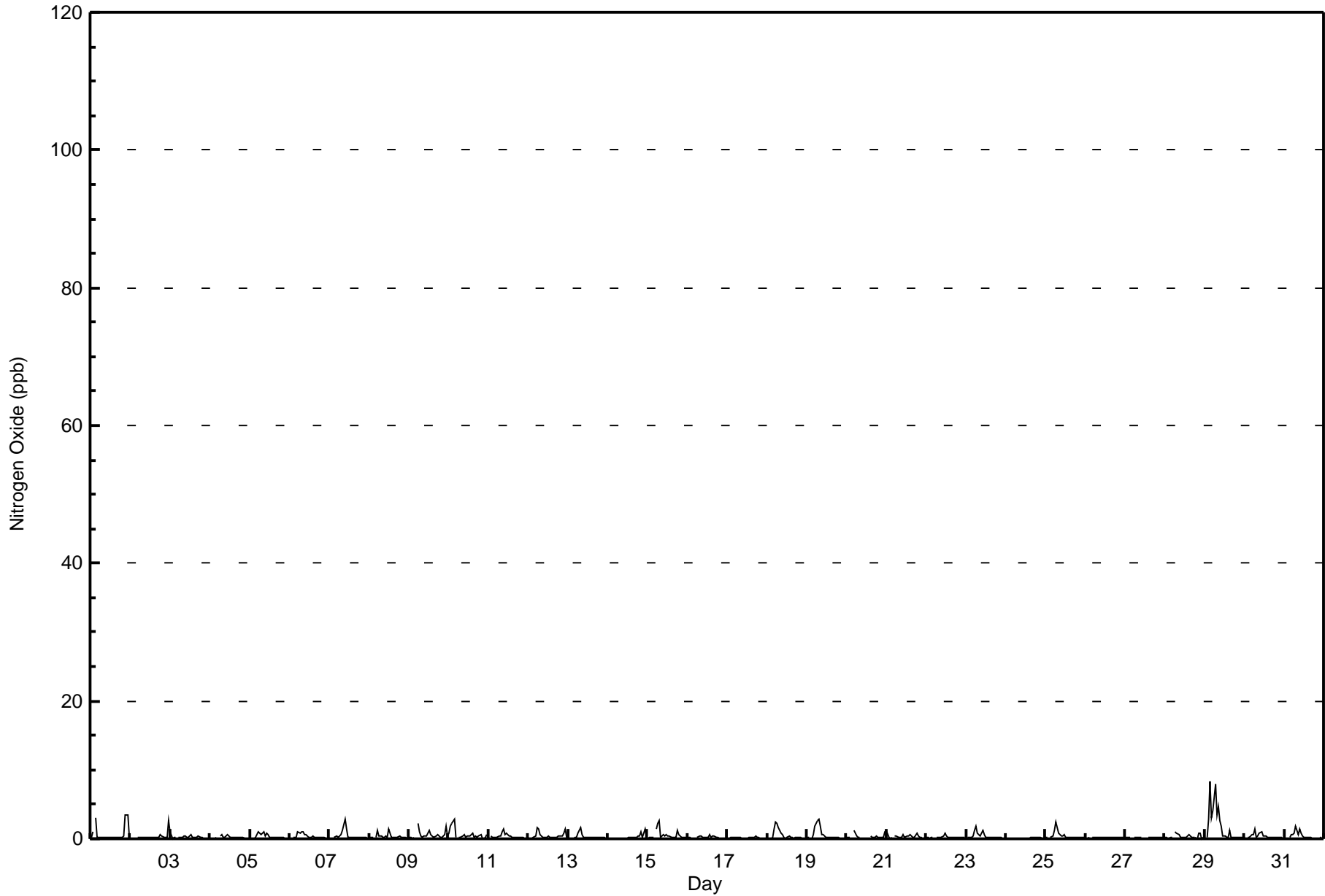
Firebag - July 2017

Maximum Value: 8 ppb on Jul 29 04:00		Maximum Daily Average: 1.8 ppb on Jul 29		Hours in Service: 744																													
Minimum Value: 0 ppb on Jul 3 23:00		Minimum Daily Average: 0.1 ppb on Jul 24		Hours of Data: 705																													
Maximum Diurnal Average: 1.0 ppb at hour 7		Minimum Diurnal Average: 0.2 ppb at hour 18		Hours of Missing Data: 39																													
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		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-Jul	0	1	Z	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0.6	3							
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0.3	3							
3-Jul	1	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1							
4-Jul	0	0	0	0	0	Z	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1							
5-Jul	Z	0	0	0	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1							
6-Jul	0	Z	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1							
7-Jul	0	0	Z	0	0	0	0	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3							
8-Jul	0	0	0	Z	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1							
9-Jul	0	0	0	0	Z	2	1	0	0	0	1	1	1	0	0	0	1	0	0	0	1	2	0	0.6	2								
10-Jul	1	2	2	3	0	Z	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0.6	3								
11-Jul	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1							
12-Jul	0	Z	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.5	2							
13-Jul	0	0	Z	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2							
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.2	1							
15-Jul	0	0	0	0	Z	1	2	3	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0.6	3							
16-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1							
17-Jul	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-Jul	0	Z	0	0	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2							
19-Jul	0	0	Z	0	1	2	3	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	3							
20-Jul	0	0	0	Z	1	1	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	0	1	0.4	1								
21-Jul	1	0	0	0	Z	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0.3	1							
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1							
23-Jul	Z	0	0	0	0	1	2	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2							
24-Jul	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-Jul	0	0	Z	0	0	1	2	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2							
26-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	M	M	M	0	0	0	0	0	0	0	0	0	0	0.2	0							
28-Jul	0	0	0	0	0	Z	1	1	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0.3	1							
29-Jul	Z	0	3	8	3	4	8	3	5	3	2	1	0	0	0	1	0	0	0	0	0	0	0	0	1.8	8							
30-Jul	0	Z	0	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1							
31-Jul	0	0	Z	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2							
		0.2	0.2	0.3	0.7	0.5	0.9	1.0	0.8	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.4	0.3	Diurnal Average							
		1	2	3	8	3	4	8	3	5	3	2	1	1	1	1	1	1	0	1	1	1	1	3	3	3	Diurnal Maximum						
Z - zerospan		C - Calibration			M - Maintenance																												



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - July 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	42	5	8	15	33	45	38	46	71	74	100	55	46	42	52	705
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	42	5	8	15	33	45	38	46	71	74	100	55	46	42	52	705

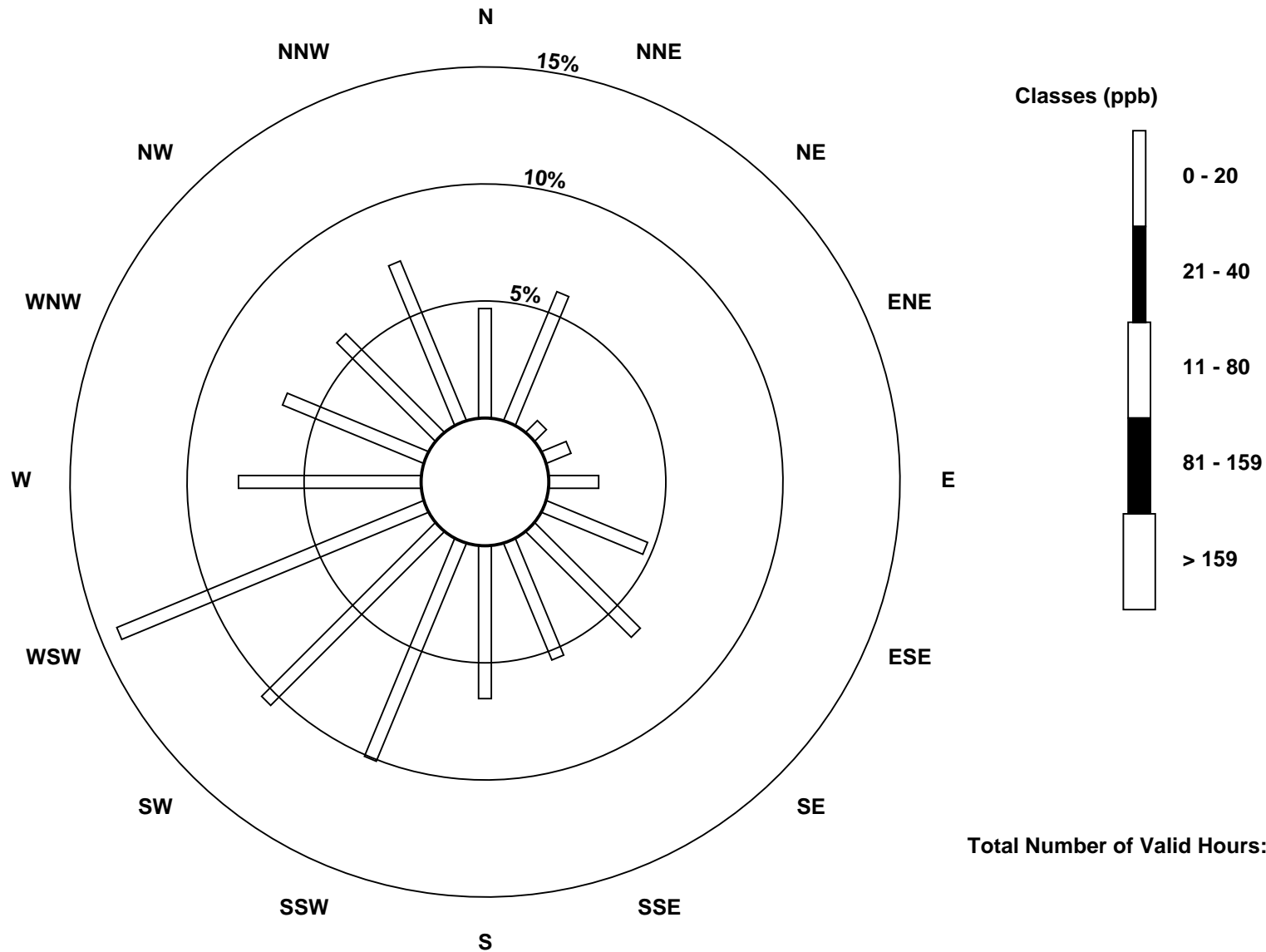
Total Number of Valid Hours: 705

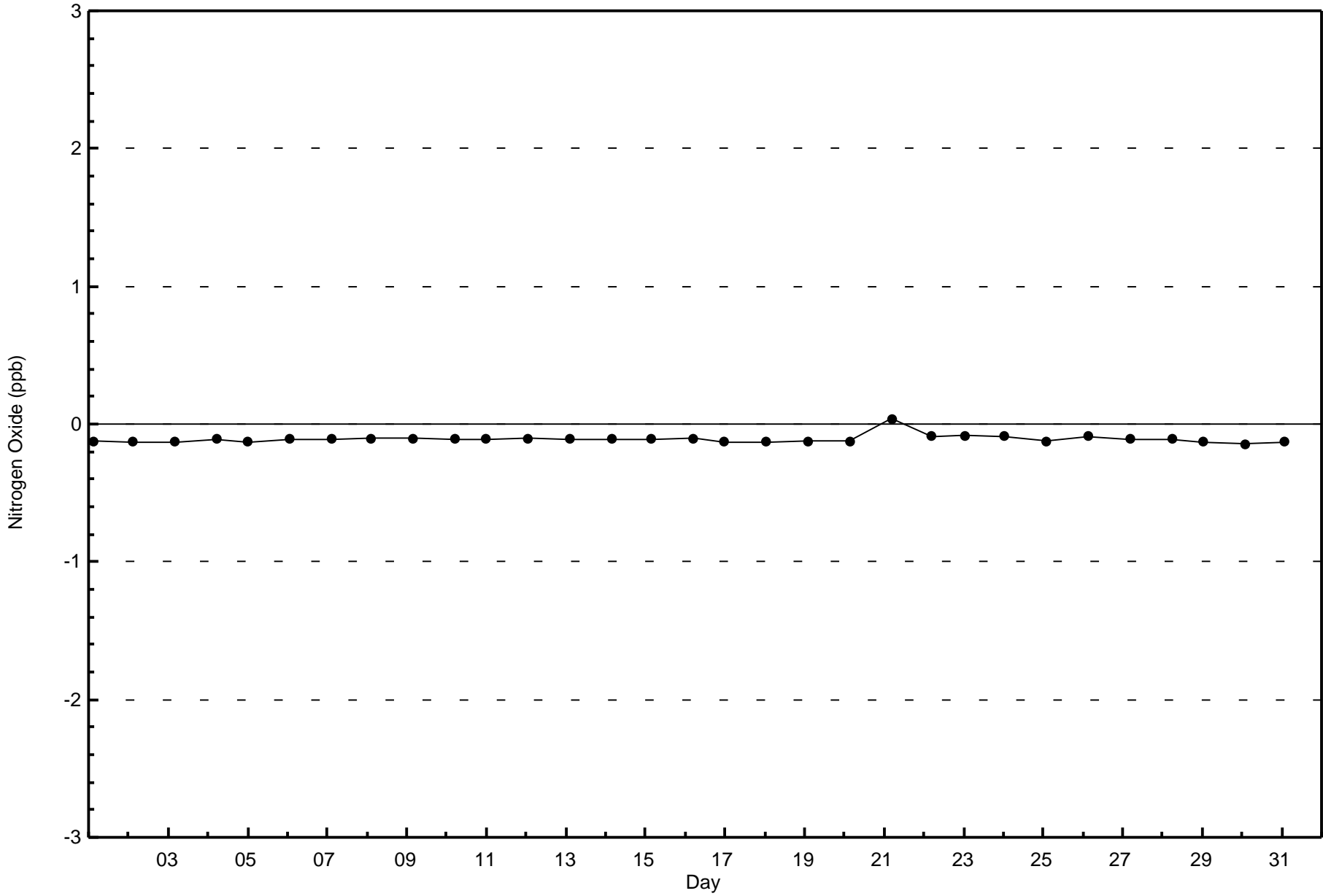
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)

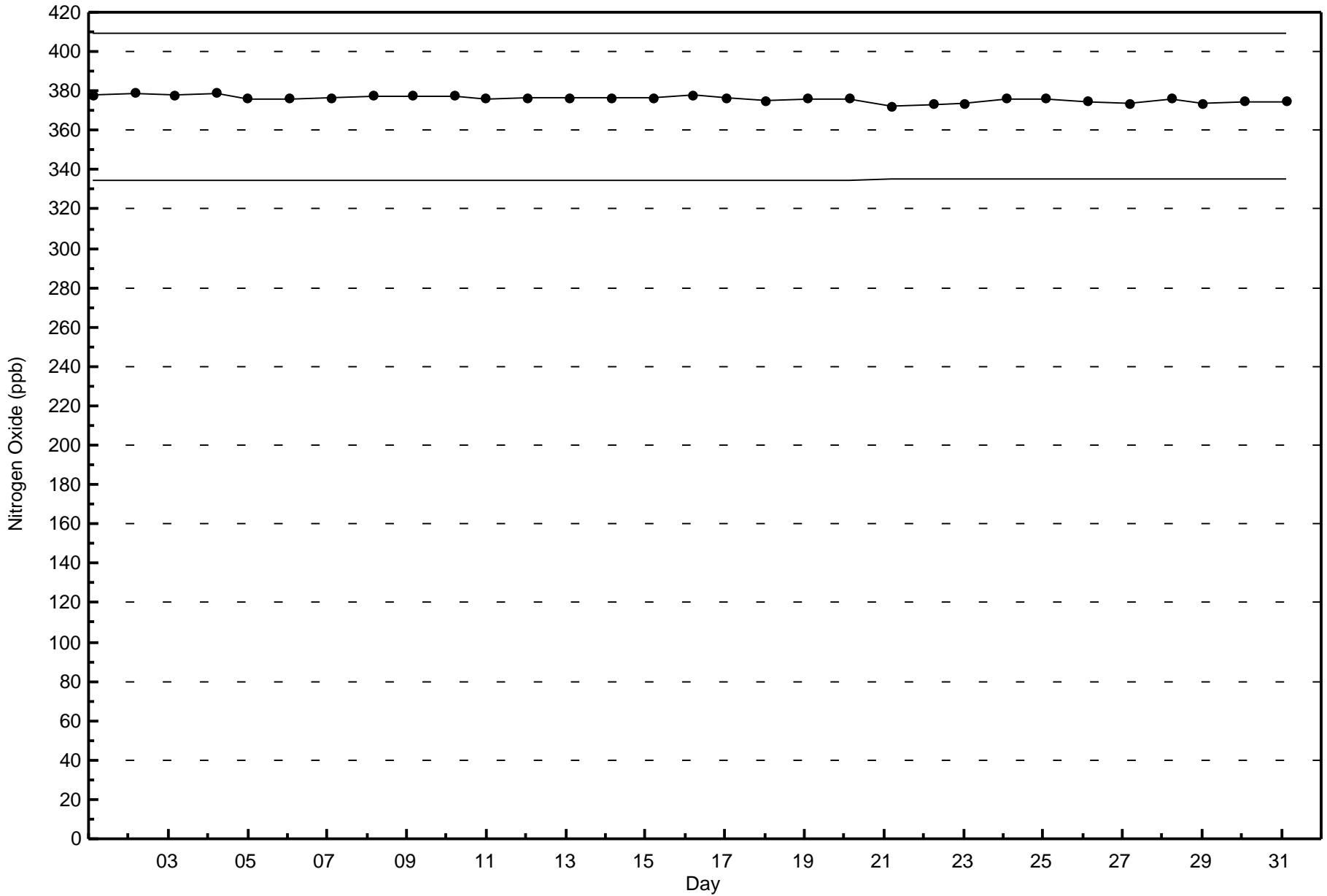






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxide (NO) - ppb
Firebag - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Firebag - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Jul 29 04:00	Maximum Daily Average: 4.3 ppb on Jul 29		Hours of Data:	705
Minimum Value: 0 ppb on Jul 17 11:00	Minimum Daily Average: 0.8 ppb on Jul 14		Hours of Missing Data:	39
Maximum Diurnal Average: 3.6 ppb at hour 5	Minimum Diurnal Average: 0.9 ppb at hour 18		Hours of Calibration:	36
Monthly Average: 1.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 10		Percent Operational Time:	99.6

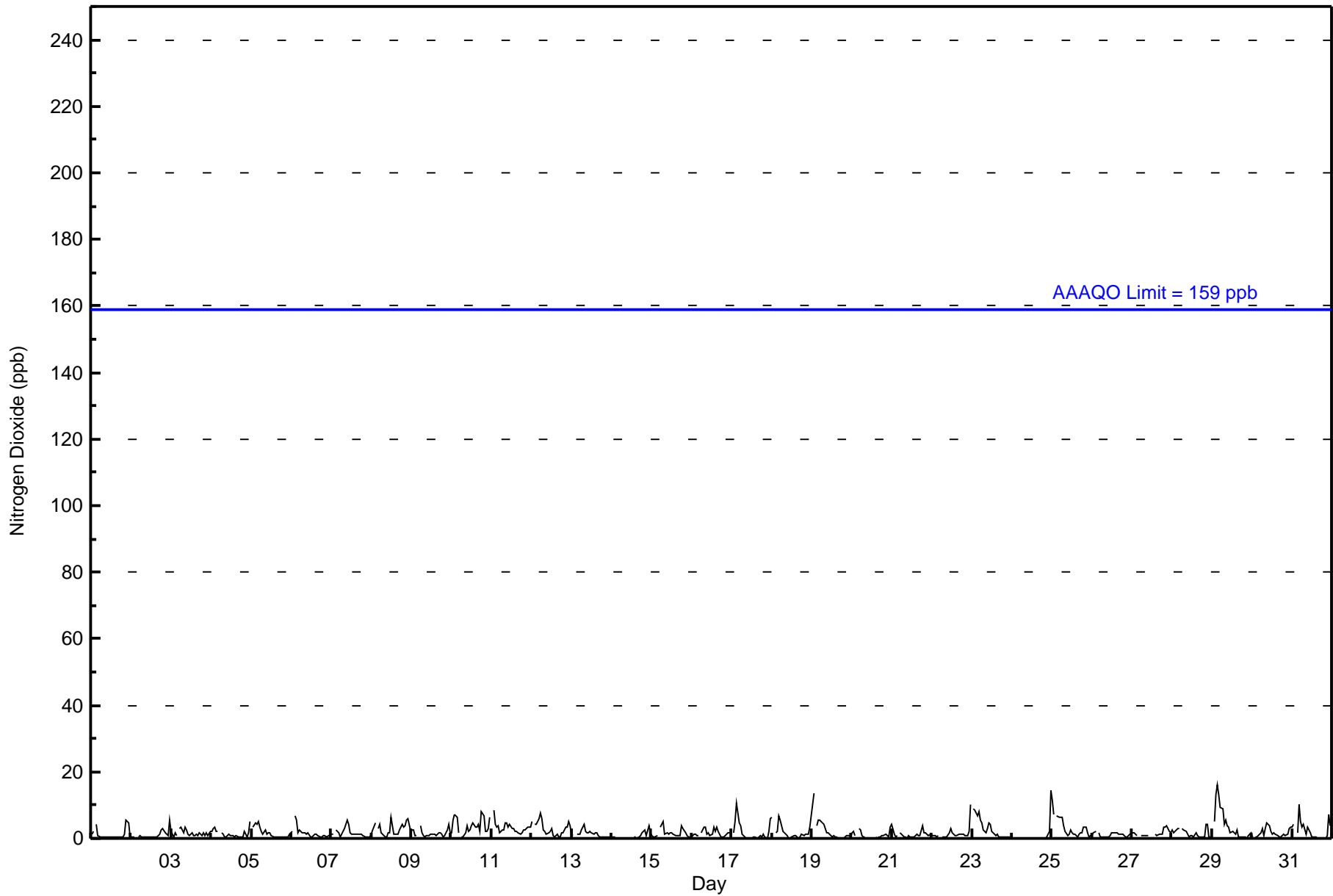
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	1	2	Z	4	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	6	5	0	1.1	6
2-Jul	0	1	0	Z	1	1	1	0	0	0	1	1	1	1	1	1	1	1	3	3	2	1	1	6	1.1	6
3-Jul	2	1	2	1	Z	3	3	2	3	2	1	1	2	1	1	1	1	2	1	2	1	2	1	2	1.6	3
4-Jul	2	3	4	2	2	Z	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	5	1.5	5
5-Jul	Z	3	5	4	5	4	2	1	3	1	2	2	1	0	1	1	0	0	0	1	1	0	1	1.6	5	
6-Jul	2	Z	7	6	2	2	2	2	2	1	2	1	1	1	1	1	1	0	0	1	1	0	1	1.6	7	
7-Jul	1	1	Z	2	2	0	1	2	3	5	4	2	1	1	1	1	1	1	1	1	0	0	0	1.5	5	
8-Jul	1	3	5	Z	3	4	2	1	0	0	2	2	6	1	1	1	3	4	3	4	5	6	2	2.6	6	
9-Jul	3	3	1	1	Z	4	2	1	0	1	1	1	1	1	1	2	2	1	1	1	2	4	2	1.6	4	
10-Jul	2	6	7	6	2	Z	0	0	2	4	2	3	4	5	3	3	4	2	8	7	2	2	3	6	3.7	8
11-Jul	Z	8	4	4	4	2	2	3	5	5	3	4	3	3	2	2	2	1	2	3	3	3	4	4	3.2	8
12-Jul	5	Z	4	4	6	8	6	3	2	1	2	2	3	1	1	1	1	1	2	2	4	3	5	4	3.0	8
13-Jul	1	1	Z	1	1	1	2	4	2	2	2	2	2	1	2	2	1	1	1	0	0	0	0	1.3	4	
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	3	1	4	2	0.8	4
15-Jul	1	1	1	1	Z	3	4	5	1	2	1	2	2	1	1	1	1	1	4	3	2	1	1	1	1.6	5
16-Jul	1	1	1	1	1	Z	2	3	3	1	2	1	1	3	2	3	2	1	0	0	1	1	2	2	1.5	3
17-Jul	Z	2	5	11	5	4	1	1	1	0	0	0	0	1	0	0	0	1	1	1	0	0	2	6	1.8	11
18-Jul	6	Z	2	2	7	5	4	2	1	1	0	0	1	1	1	0	0	1	1	1	1	1	1	3	1.9	7
19-Jul	10	14	Z	4	6	5	5	4	3	2	2	1	1	1	1	0	0	0	0	0	0	1	1	1	2.6	14
20-Jul	2	2	1	Z	3	2	1	1	0	C	C	C	C	C	1	0	1	1	1	1	1	1	0	3	1.2	3
21-Jul	4	1	1	1	Z	2	1	0	0	0	1	0	1	1	1	1	1	1	4	2	2	1	1	1	1.2	4
22-Jul	1	1	1	0	1	Z	1	1	1	0	2	3	2	1	1	1	1	1	1	1	1	1	2	10	1.5	10
23-Jul	Z	9	8	7	8	6	5	3	2	3	5	4	2	2	1	1	1	1	0	0	0	0	0	0	3.0	9
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0.9	15
25-Jul	12	7	Z	7	6	6	6	4	2	1	1	2	2	1	1	1	1	2	2	4	4	2	1	1	3.2	12
26-Jul	1	2	2	Z	2	1	1	0	0	0	0	1	2	2	2	2	1	1	1	1	1	1	1	1	1.0	2
27-Jul	2	2	1	1	Z	1	1	1	1	1	1	M	M	M	1	1	1	1	1	3	3	4	2	2	1.6	4
28-Jul	3	2	2	3	3	Z	3	2	2	1	0	1	1	1	2	1	0	0	0	1	4	4	1	1	1.6	4
29-Jul	Z	5	13	16	13	9	9	4	6	4	3	2	2	2	1	3	0	1	1	1	0	0	1	2	4.3	16
30-Jul	0	Z	0	1	1	2	3	1	3	5	4	2	1	2	1	1	1	0	1	1	1	1	3	3	1.6	5
31-Jul	4	4	Z	2	10	5	4	4	1	3	3	2	1	0	0	0	0	0	0	0	0	1	7	4	2.4	10
																								Diurnal Average		
																								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
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - July 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	42	5	8	15	33	45	38	46	71	74	100	55	46	42	52	705
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	42	5	8	15	33	45	38	46	71	74	100	55	46	42	52	705

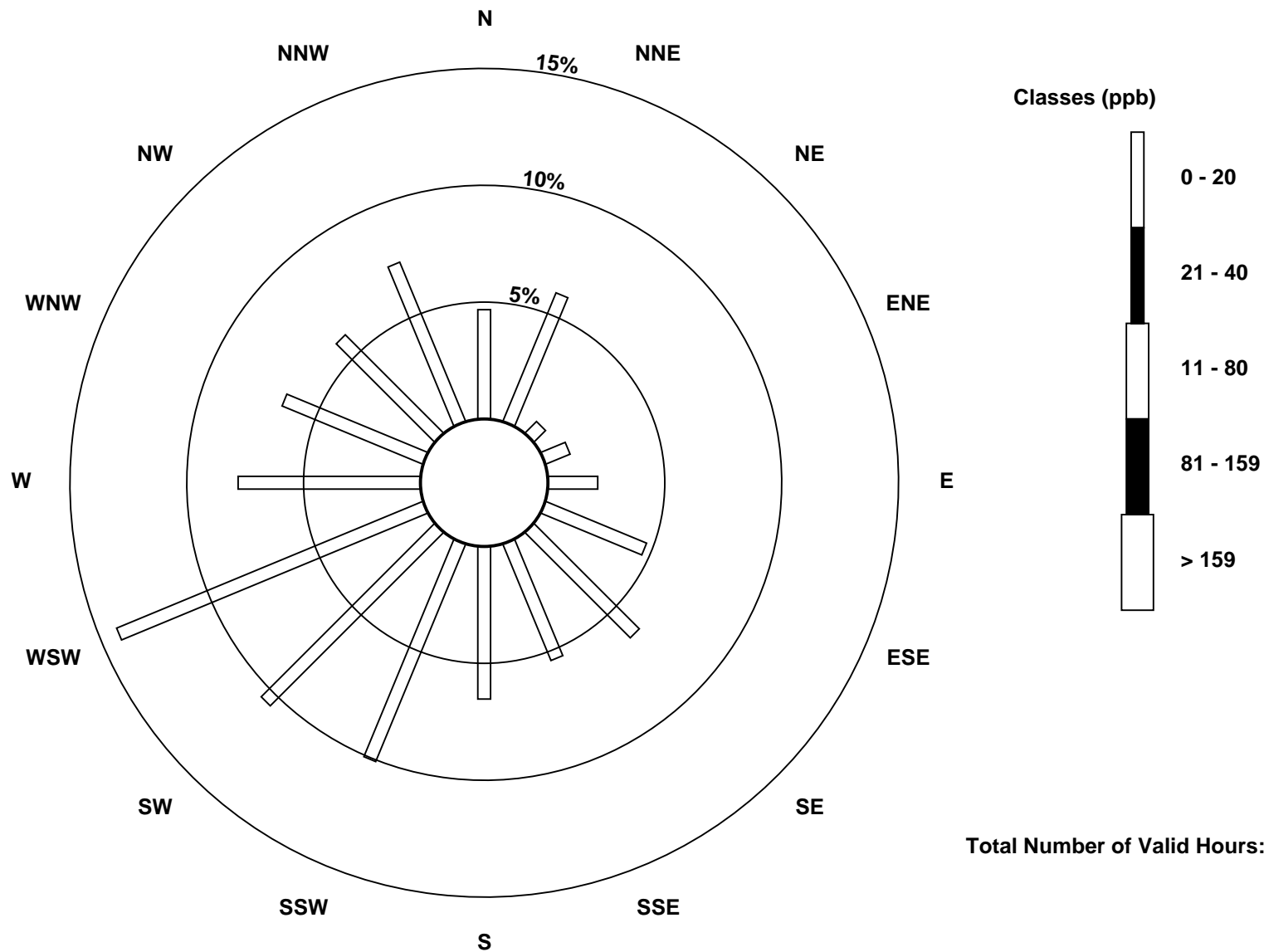
Total Number of Valid Hours: 705

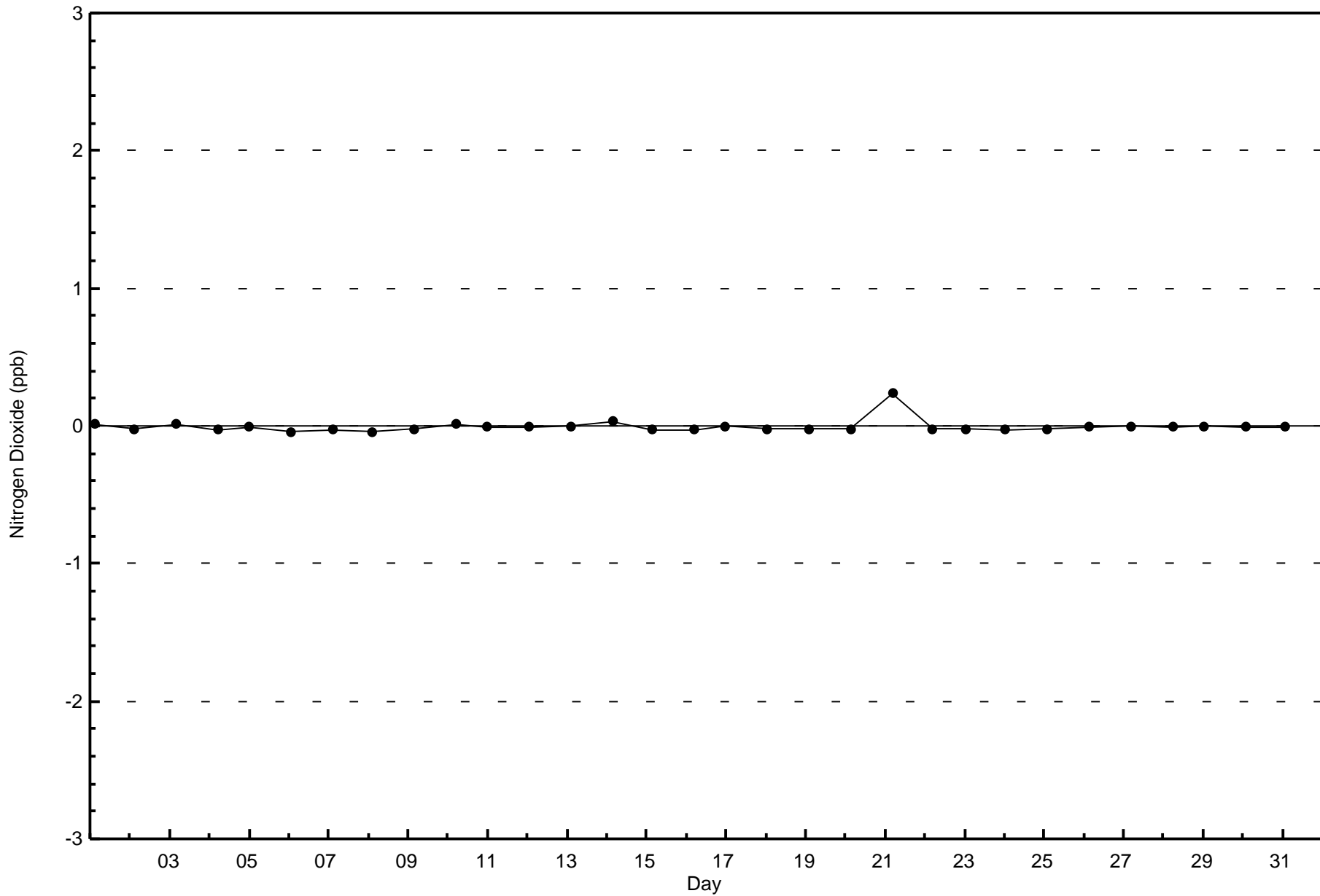
Total Number of Hours: 744

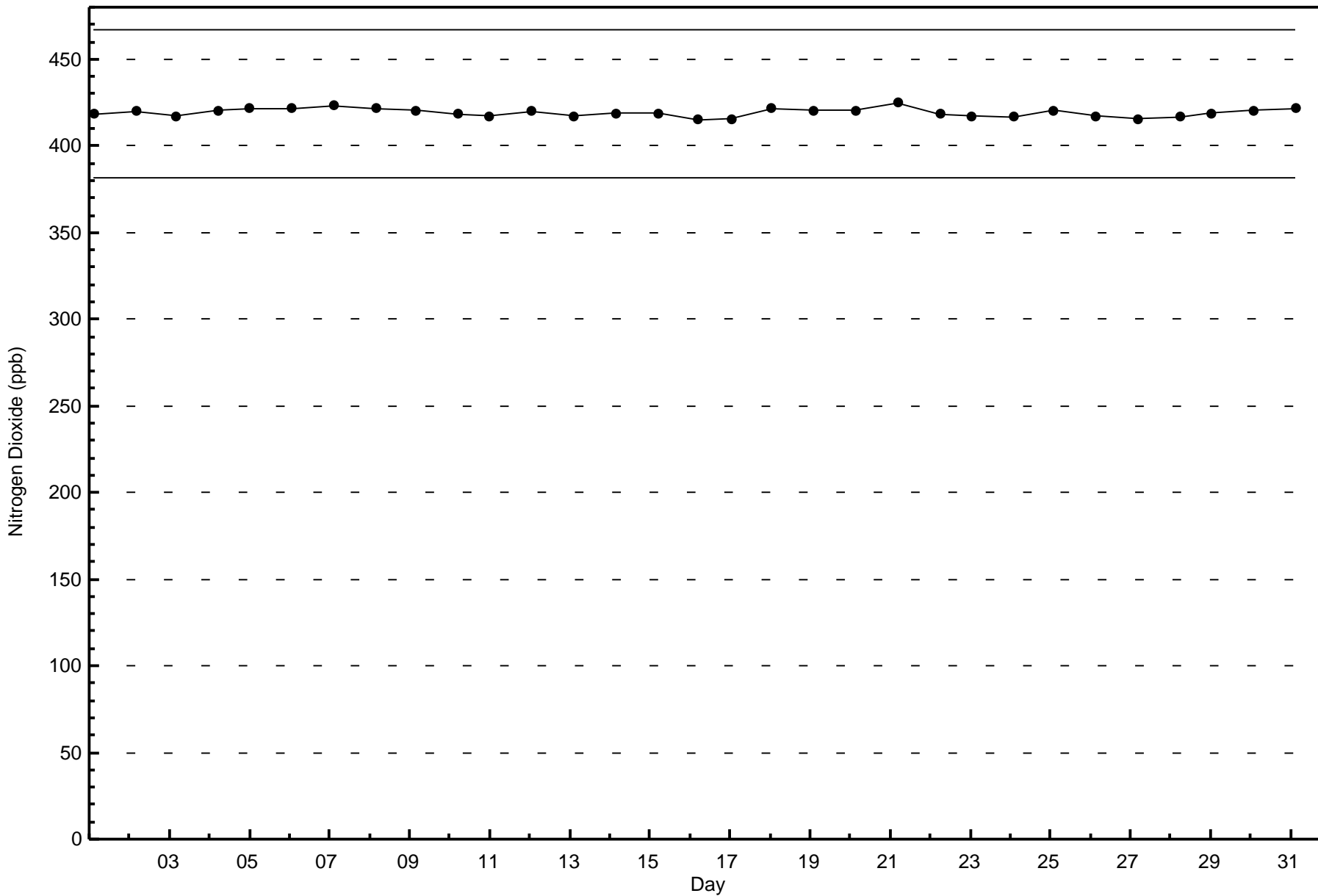


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

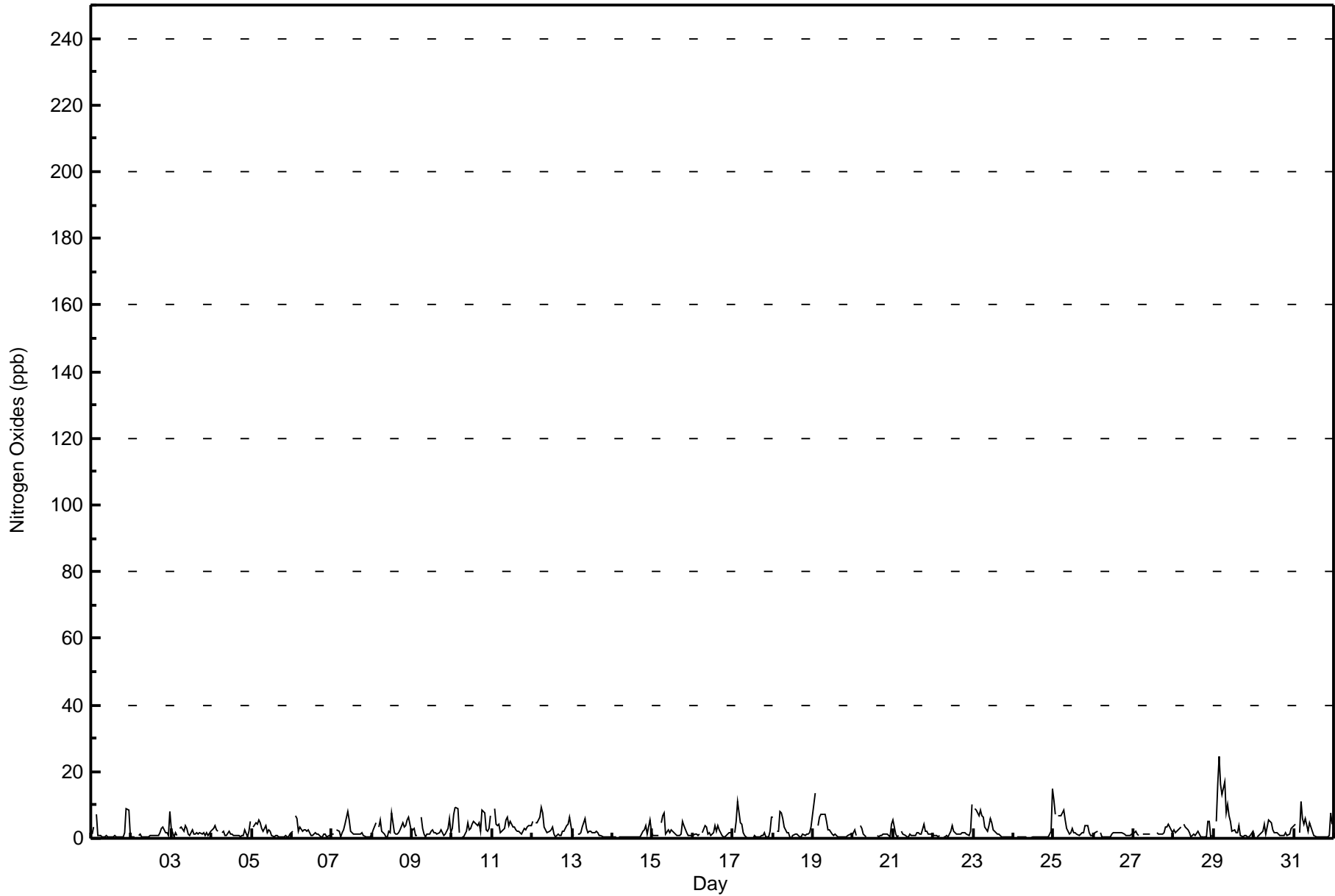
Firebag - July 2017

Maximum Value: 24 ppb on Jul 29 04:00																		Maximum Daily Average: 6.1 ppb on Jul 29						Hours in Service: 744					
Minimum Value: 0 ppb on Jul 17 13:00																		Minimum Daily Average: 1.0 ppb on Jul 24						Hours of Data: 705					
Maximum Diurnal Average: 4.2 ppb at hour 4																		Minimum Diurnal Average: 1.1 ppb at hour 18						Hours of Missing Data: 39					
Monthly Average: 2.3 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 3 P ₉₀ = 5 P ₉₉ = 13						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-Jul	1	3	Z	7	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	2	9	8	1	1.8	9				
2-Jul	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3	2	2	1	8	1.4	8				
3-Jul	3	1	2	1	Z	3	3	2	4	3	1	1	2	1	1	2	1	2	1	2	1	2	2	1.8	4				
4-Jul	2	3	4	2	2	Z	2	2	1	1	2	1	1	1	1	1	1	1	1	3	1	2	5	1.7	5				
5-Jul	Z	3	5	4	5	5	3	2	4	2	3	2	1	1	1	1	0	0	0	1	1	0	1	2.0	5				
6-Jul	2	Z	7	6	2	4	2	3	3	2	3	1	1	1	2	1	1	0	1	1	1	1	1	2.0	7				
7-Jul	1	1	Z	2	2	1	2	3	4	8	6	2	2	1	1	1	1	1	2	1	0	0	0	2.0	8				
8-Jul	1	3	5	Z	3	5	2	1	1	1	2	2	8	2	1	1	2	3	5	4	4	6	6	3.0	8				
9-Jul	3	3	1	1	Z	6	3	1	1	1	1	2	3	2	2	1	2	2	2	1	1	3	6	2.1	6				
10-Jul	3	7	9	9	2	Z	0	0	2	5	3	3	4	5	4	4	5	2	9	8	2	2	3	4.3	9				
11-Jul	Z	9	4	4	4	2	3	3	6	6	4	5	3	3	3	2	2	1	2	3	3	3	4	3.6	9				
12-Jul	5	Z	4	4	6	9	7	3	3	2	2	3	4	1	1	1	1	1	2	2	4	4	6	3.5	9				
13-Jul	1	1	Z	1	1	2	3	6	3	2	2	2	2	2	2	2	1	1	1	0	0	0	0	1.6	6				
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	4	1	5	1.0	5				
15-Jul	1	1	1	1	Z	5	7	8	1	2	2	2	2	2	1	1	1	1	5	4	2	1	1	2.2	8				
16-Jul	1	1	1	1	1	Z	2	4	4	1	2	1	2	4	2	4	2	1	0	0	1	1	2	1.7	4				
17-Jul	Z	2	5	11	5	4	1	1	1	0	0	0	0	1	1	0	1	1	1	2	0	0	2	1.9	11				
18-Jul	6	Z	2	2	8	8	6	4	2	2	0	0	1	1	1	1	0	1	1	1	1	2	3	2.4	8				
19-Jul	10	14	Z	4	6	7	7	7	5	2	3	1	1	1	1	0	0	0	0	0	0	1	1	3.2	14				
20-Jul	2	2	1	Z	4	3	1	1	1	C	C	C	C	C	1	0	1	1	1	1	1	1	4	1.5	4				
21-Jul	6	1	1	1	Z	2	1	1	0	0	1	1	1	1	2	2	1	1	4	2	2	1	1	1.5	6				
22-Jul	1	1	1	1	1	Z	1	1	1	1	2	4	2	2	1	1	1	2	2	2	1	1	2	1.7	10				
23-Jul	Z	9	8	7	9	7	6	3	2	4	6	5	2	2	1	1	1	1	0	0	0	0	0	3.4	9				
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	15	1.0	15				
25-Jul	12	7	Z	7	7	8	9	6	3	1	2	3	2	2	1	1	1	2	2	4	4	2	1	3.7	12				
26-Jul	1	2	2	Z	2	1	1	1	1	1	0	1	2	2	2	2	2	2	1	1	1	1	1	1.2	2				
27-Jul	2	2	1	1	Z	1	1	1	1	1	1	M	M	M	2	1	1	1	1	2	4	4	4	1.8	4				
28-Jul	3	2	2	3	3	Z	4	3	3	2	1	1	1	1	2	1	0	1	0	1	5	5	1	2.0	5				
29-Jul	Z	5	16	24	16	13	17	8	10	7	5	2	3	2	2	4	1	1	1	1	0	0	1	6.1	24				
30-Jul	0	Z	1	1	2	2	4	1	3	5	5	3	2	2	2	1	1	1	1	1	1	1	3	2.0	5				
31-Jul	4	4	Z	2	11	6	4	6	2	5	3	2	1	1	0	0	0	0	0	0	0	1	7	2.8	11				
2.8 3.4 3.4 4.2 4.0 4.0 3.4 2.7 2.3 2.2 2.1 1.8 1.8 1.5 1.3 1.3 1.1 1.1 1.7 1.7 1.7 1.8 2.4 3.2																								Diurnal Average					
12 14 16 24 16 13 17 8 10 8 6 5 8 5 4 4 5 3 9 8 5 9 8 15																								Diurnal Maximum					
Z - zerospan			C - Calibration						M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.86	99.86
21 - 40	1	0.14	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - July 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	42	5	8	15	33	45	38	46	71	73	100	55	46	42	52	704
21 - 40	0	0	0	0	0	0	0	0	0	0	1	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	33	42	5	8	15	33	45	38	46	71	74	100	55	46	42	52	705

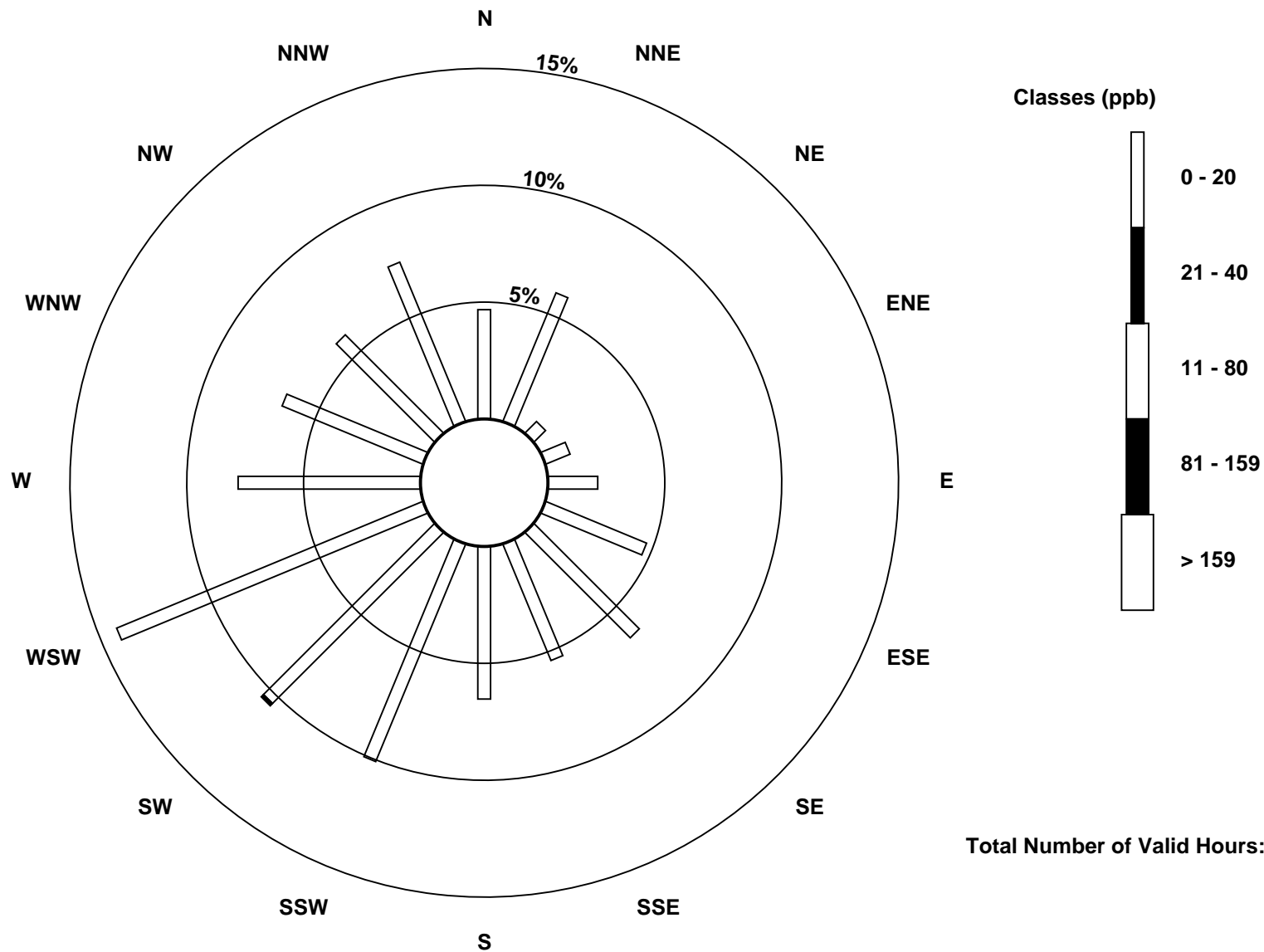
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

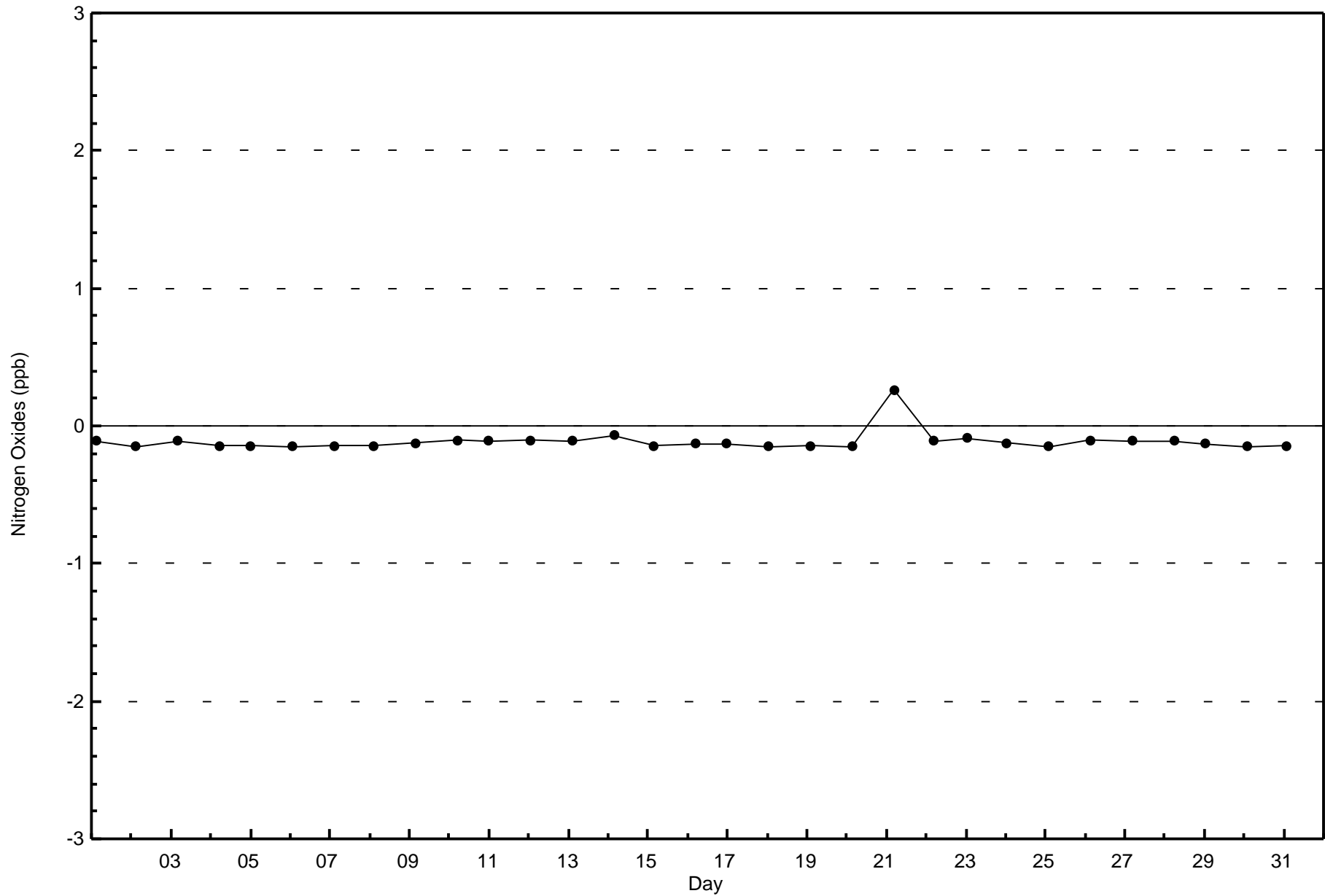
Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)

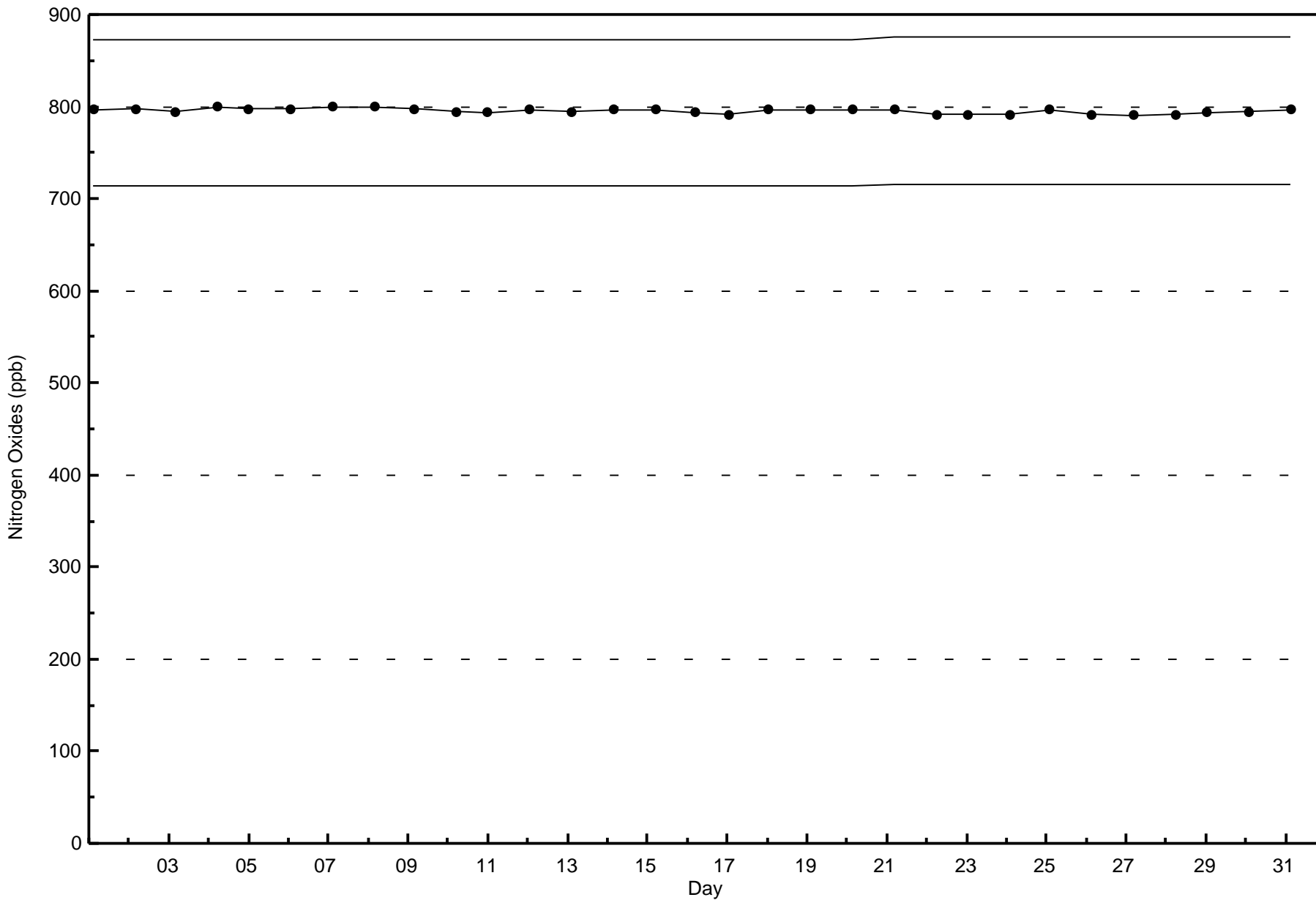




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - July 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

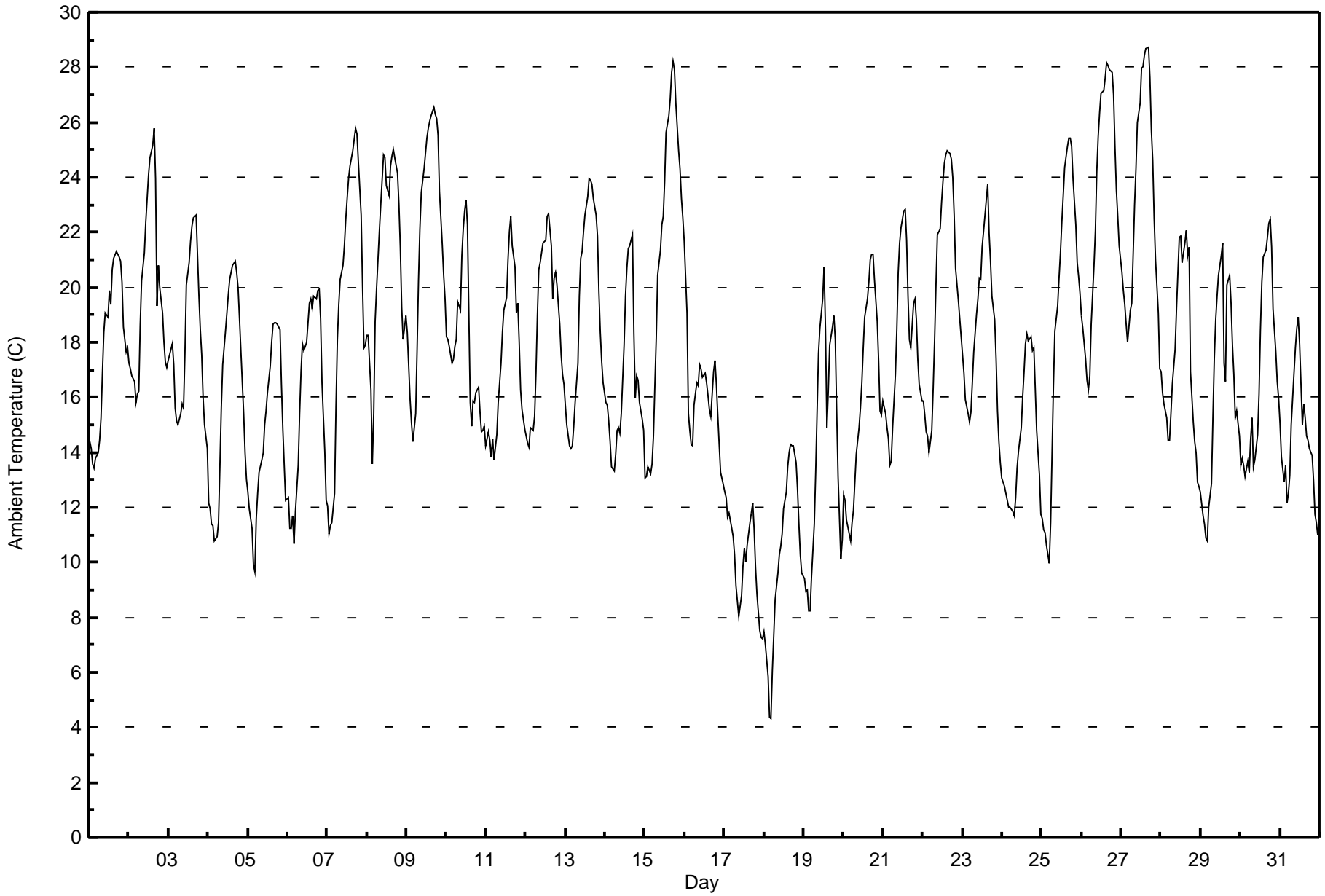
Ambient Temperature (AT) - C
Firebag - July 2017

Maximum Value: 28.7 C on Jul 27 17:00 Maximum Daily Average: 23.2 C on Jul 27																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: 4.3 C on Jul 18 05:00 Minimum Daily Average: 10.1 C on Jul 17 Maximum Diurnal Average: 21.2 C at hour 17 Minimum Diurnal Average: 13.1 C at hour 5 Monthly Average: 17.57 C Percentiles: P ₁ = 7.3 P ₁₀ = 11.7 Q ₁ = 14.4 Median = 17.4 Q ₃ = 20.9 P ₉₀ = 23.9 P ₉₉ = 28.0																				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-Jul	14.4	14.1	13.6	13.4	13.8	14.0	14.5	15.3	16.9	18.4	19.0	18.9	19.9	19.4	20.7	21.1	21.3	21.2	21.1	20.9	20.2	18.6	17.6	17.8	17.7	21.3
2-Jul	17.2	17.0	16.8	16.6	15.8	16.1	16.2	18.6	20.2	21.2	22.4	23.2	24.1	24.7	25.2	25.8	23.9	19.3	20.8	20.0	19.1	18.0	17.3	17.1	19.9	25.8
3-Jul	17.3	17.7	18.0	17.2	15.6	15.1	15.0	15.4	15.8	15.6	17.6	20.1	20.9	21.7	22.2	22.5	22.6	22.6	19.7	18.4	17.6	16.0	15.0	14.1	18.1	22.6
4-Jul	12.2	11.9	11.4	11.3	10.8	11.0	11.4	13.5	15.6	17.2	18.4	19.1	19.8	20.3	20.6	20.8	20.9	20.5	20.0	18.8	17.7	15.4	14.0	13.0	16.1	20.9
5-Jul	12.5	11.9	11.2	9.9	9.6	11.6	12.5	13.3	13.7	14.0	15.0	15.5	16.2	17.1	18.0	18.7	18.7	18.7	18.6	18.5	16.5	14.9	13.5	12.2	14.7	18.7
6-Jul	12.3	11.3	11.3	11.7	10.7	11.8	13.5	15.4	16.9	18.0	17.7	18.0	18.7	19.4	19.6	19.2	19.7	19.6	19.9	19.9	18.9	16.5	14.0	12.3	16.1	19.9
7-Jul	12.1	11.1	11.4	11.4	12.5	15.7	18.1	19.4	20.3	20.8	21.5	22.5	23.2	23.9	24.4	24.9	25.4	25.8	25.6	24.5	22.6	20.0	17.8	17.9	19.7	25.8
8-Jul	18.2	18.2	16.3	13.6	15.4	18.7	19.9	22.0	23.0	23.9	24.8	24.7	23.7	23.3	24.4	24.8	25.0	24.7	24.1	23.0	21.4	19.3	18.1	19.0	21.2	25.0
9-Jul	18.4	17.1	15.9	15.1	14.4	15.4	17.8	20.2	22.1	23.5	24.3	24.9	25.4	25.8	26.0	26.3	26.5	26.3	26.1	25.5	23.5	21.6	20.4	19.6	21.8	26.5
10-Jul	18.2	18.1	17.9	17.2	17.4	17.8	18.1	19.5	19.2	21.2	22.1	22.8	23.2	22.3	15.8	14.9	15.8	15.8	16.2	16.4	15.5	14.7	14.8	14.9	17.9	23.2
11-Jul	14.2	14.8	14.4	13.8	14.5	13.7	14.7	15.8	16.5	17.3	18.3	19.2	19.6	21.0	22.0	22.6	21.5	20.8	19.1	19.4	18.0	16.3	15.5	14.8	17.4	22.6
12-Jul	14.6	14.4	14.2	14.9	14.8	15.3	16.9	19.0	20.7	20.9	21.6	21.7	21.7	22.6	22.7	21.5	19.6	20.3	20.5	20.1	18.7	17.6	16.9	16.5	18.6	22.7
13-Jul	15.7	15.0	14.3	14.1	14.2	14.9	15.8	17.3	19.7	21.0	21.3	22.0	22.6	23.3	23.9	23.8	23.2	22.6	21.9	19.8	18.4	17.3	16.5	19.3	23.9	23.9
14-Jul	15.8	15.7	15.2	14.4	13.5	13.3	13.9	14.8	14.9	14.7	15.4	17.9	19.7	20.7	21.4	21.5	21.9	18.4	16.0	16.8	16.6	15.8	15.2	14.8	16.6	21.9
15-Jul	13.1	13.1	13.5	13.2	13.6	14.6	16.4	18.2	20.5	21.3	22.3	22.6	23.8	25.6	26.2	26.8	27.8	28.2	27.9	26.7	25.0	24.3	23.2	22.5	21.3	28.2
16-Jul	21.7	19.1	15.4	14.8	14.3	14.2	15.7	16.5	16.4	17.2	17.0	16.7	16.9	16.5	16.1	15.6	15.3	16.9	17.3	16.5	15.3	14.3	13.3	12.8	16.1	21.7
17-Jul	12.5	12.4	11.7	11.8	11.2	10.9	10.3	9.1	8.6	8.0	8.8	9.9	10.5	10.0	10.6	11.4	11.8	12.1	11.2	9.8	8.8	7.5	7.3	7.2	10.1	12.5
18-Jul	7.5	7.0	5.8	4.4	4.3	6.1	7.3	8.6	9.6	10.2	10.6	11.0	11.9	12.5	13.5	14.0	14.3	14.2	14.3	13.7	12.7	11.4	10.2	9.6	10.2	14.3
19-Jul	9.4	8.9	9.0	8.2	8.3	9.5	11.4	13.3	15.5	17.6	18.5	19.6	20.7	18.5	14.9	16.2	17.9	18.5	19.0	18.1	15.5	13.1	10.1	10.8	14.3	20.7
20-Jul	12.5	12.3	11.6	11.3	10.8	11.4	11.9	12.9	13.9	14.9	15.6	16.5	17.8	18.9	19.6	20.2	21.0	21.2	21.2	20.3	18.8	17.3	15.5	15.3	15.9	21.2
21-Jul	15.8	15.4	14.9	14.5	13.5	13.7	14.9	16.8	18.4	20.5	21.6	22.2	22.8	22.8	21.7	19.7	18.1	17.8	19.4	19.6	18.8	17.4	16.5	15.9	18.0	22.8
22-Jul	15.9	15.4	14.7	14.6	14.0	14.8	16.3	18.1	20.1	21.9	22.1	23.1	23.8	24.5	24.8	24.9	24.9	24.7	24.0	22.6	20.7	19.5	18.8	18.2	20.1	24.9
23-Jul	17.6	16.9	15.9	15.4	15.1	15.4	16.6	17.7	19.0	19.6	20.3	20.3	21.5	22.0	23.2	23.8	22.0	20.9	19.7	18.8	17.4	15.5	14.4	13.7	18.4	23.8
24-Jul	13.0	12.8	12.5	12.2	12.0	12.0	11.9	11.7	12.4	13.4	14.0	14.9	16.0	17.0	18.0	18.3	18.1	18.2	17.7	17.8	16.3	14.8	13.2	11.8	14.6	18.3
25-Jul	11.6	11.2	11.1	10.6	10.0	11.4	13.9	16.4	18.4	19.3	20.3	21.3	22.4	23.3	24.3	25.1	25.4	25.4	25.1	23.9	22.3	20.9	20.4	19.8	18.9	25.4
26-Jul	19.0	18.5	17.4	16.6	16.3	16.8	18.7	20.8	22.1	24.2	25.5	26.4	27.1	27.2	27.6	28.2	28.1	27.9	27.8	27.0	25.1	23.6	22.6	21.5	23.1	28.2
27-Jul	20.5	19.9	19.4	18.7	18.0	19.2	19.4	21.2	23.0	24.3	26.0	26.7	27.9	28.0	28.4	28.7	28.7	27.6	25.7	24.6	22.5	21.0	19.1	17.0	23.2	28.7
28-Jul	16.9	16.2	15.8	15.3	14.4	14.5	15.4	16.5	17.8	19.2	20.5	21.8	21.9	20.9	21.6	22.0	21.2	21.5	17.0	15.1	14.4	14.0	12.9	12.7	17.5	22.0
29-Jul	12.6	11.7	11.4	10.9	10.8	12.0	12.9	15.2	17.4	18.8	19.7	20.5	21.2	21.6	17.2	16.6	20.1	20.4	19.4	17.9	16.9	15.3	15.5	14.6	16.3	21.6
30-Jul	13.5	13.8	13.5	13.1	13.7	13.3	14.5	15.3	13.5	13.7	14.6	16.1	18.5	20.2	21.1	21.4	21.8	22.3	22.5	21.5	19.2	17.7	16.6	16.0	17.0	22.5
31-Jul	15.0	13.8	12.9	13.5	12.2	12.5	13.2	15.0	16.9	17.8	18.5	18.9	18.0	15.0	15.8	15.3	14.6	14.4	14.1	13.9	13.0	11.7	11.4	11.0	14.5	18.9
14.9 14.4 13.8 13.4 13.1 13.8 14.8 16.2 17.4 18.4 19.2 20.0 20.7 21.0 21.0 21.2 21.2 21.0 20.4 19.7 18.3 16.8 15.8 15.2																								Diurnal Average		
21.7 19.9 19.4 18.7 18.0 19.2 19.9 22.0 23.0 24.3 26.0 26.7 27.9 28.0 28.4 28.7 28.7 28.2 27.9 27.0 25.1 24.3 23.2 22.5																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	30	4.03	4.03
10 - 20	488	65.59	69.62
> 20	226	30.38	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



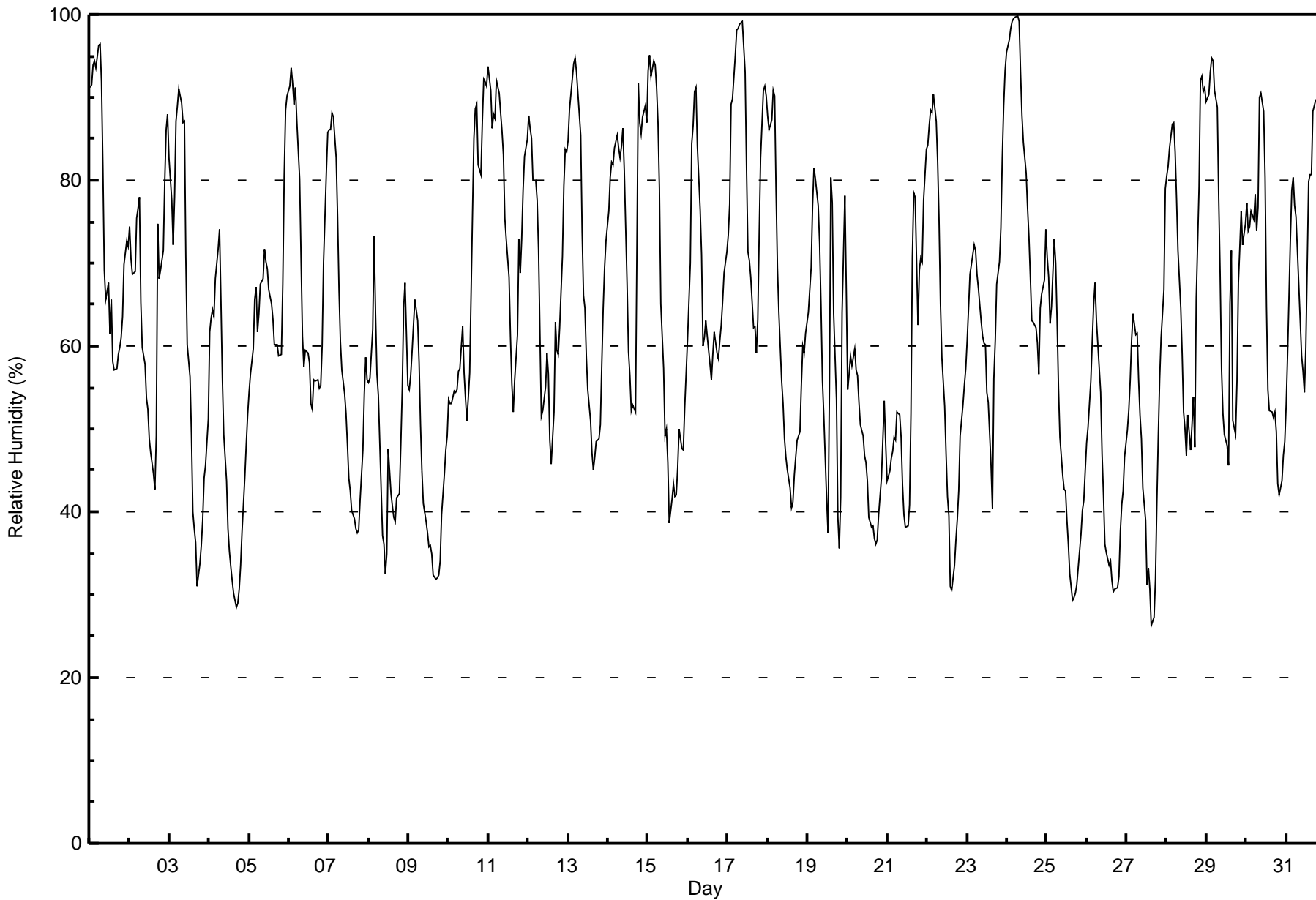
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Firebag - July 2017

Maximum Value: 100 % on Jul 24 07:00																		Maximum Daily Average: 82.4 % on Jul 17																		Hours in Service: 744							
Minimum Value: 26 % on Jul 27 16:00																		Minimum Daily Average: 44.7 % on Jul 26																		Hours of Data: 744							
Maximum Diurnal Average: 79.2 % at hour 5																		Minimum Diurnal Average: 49.9 % at hour 15																		Hours of Missing Data: 0							
Monthly Average: 63.4 %																		Percentiles: P ₁ = 30 P ₁₀ = 39 Q ₁ = 49 Median = 61 Q ₃ = 78 P ₉₀ = 90 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-Jul	91	92	94	94	94	96	96	92	81	69	66	68	62	66	58	57	57	59	60	61	64	70	73	72	74.6	96																	
2-Jul	74	70	69	69	75	77	78	65	60	58	54	52	49	47	45	43	49	75	68	69	72	80	86	88	65.5	88																	
3-Jul	83	78	72	78	87	89	91	89	87	87	71	60	56	49	40	38	36	31	34	36	39	44	46	51	61.3	91																	
4-Jul	62	63	64	64	68	72	74	65	56	49	44	38	35	33	32	30	28	29	31	34	38	44	48	52	48.1	74																	
5-Jul	54	57	60	66	67	62	64	67	68	72	70	69	67	65	63	60	60	60	59	59	67	80	88	90	66.5	90																	
6-Jul	91	94	92	89	91	87	80	70	61	57	60	59	58	53	52	56	56	56	55	55	60	70	81	86	69.6	94																	
7-Jul	86	86	88	88	83	76	67	60	57	54	52	48	44	43	40	39	38	37	38	41	47	54	59	56	57.6	88																	
8-Jul	56	56	62	73	64	57	54	43	37	36	33	35	48	42	41	39	39	42	42	48	55	65	68	55	49.5	73																	
9-Jul	55	56	59	63	66	63	58	51	45	41	39	37	36	36	35	32	32	32	32	34	40	45	47	49	45.1	66																	
10-Jul	54	53	53	55	54	55	57	57	62	57	54	51	54	57	76	85	89	89	82	81	87	92	92	91	68.2	92																	
11-Jul	94	91	86	88	87	92	91	88	86	83	75	73	68	61	55	52	56	61	73	69	73	79	83	85	77.1	94																	
12-Jul	88	86	85	80	80	78	72	61	52	52	55	59	57	49	46	52	63	60	59	62	71	79	84	83	67.2	88																	
13-Jul	85	89	92	94	95	93	91	85	74	66	65	59	55	51	47	45	47	48	49	51	58	65	69	73	68.5	95																	
14-Jul	76	80	82	82	84	85	84	83	84	86	81	68	59	56	52	53	52	72	92	87	86	88	89	87	77.0	92																	
15-Jul	93	95	92	94	94	91	87	79	65	57	49	50	46	39	42	43	42	42	45	50	48	47	53	57	62.5	95																	
16-Jul	61	70	84	87	91	91	84	77	71	60	61	63	59	58	56	59	62	59	58	61	63	65	69	71	68.3	91																	
17-Jul	73	77	89	90	95	98	98	99	99	99	93	81	71	70	68	62	62	59	63	74	83	91	91	90	82.4	99																	
18-Jul	88	86	87	91	90	79	69	64	56	53	49	47	45	43	40	41	44	47	49	50	55	60	59	62	60.6	91																	
19-Jul	64	67	69	77	81	80	77	72	65	56	52	41	38	55	80	77	64	54	39	36	42	64	78	67	62.3	81																	
20-Jul	55	57	59	58	60	57	56	53	51	49	47	46	44	39	38	38	37	36	37	40	44	49	53	48	47.9	60																	
21-Jul	44	45	46	47	49	49	52	52	49	43	40	38	38	41	52	71	78	78	63	69	71	70	78	84	56.1	84																	
22-Jul	84	87	89	88	90	87	82	75	65	59	53	47	42	40	31	31	34	37	39	43	49	53	55	57	59.0	90																	
23-Jul	61	65	69	71	72	71	69	67	63	61	60	60	54	53	46	40	56	61	67	70	74	83	89	93	65.7	93																	
24-Jul	95	97	98	99	100	100	100	99	93	88	85	81	77	73	68	63	63	62	60	57	65	66	68	74	80.4	100																	
25-Jul	71	68	63	65	73	70	63	55	49	44	43	43	39	36	32	29	30	30	31	33	37	40	41	45	47.1	73																	
26-Jul	48	50	56	61	65	68	63	57	54	47	42	36	35	34	34	32	30	31	31	32	38	41	43	47	44.7	68																	
27-Jul	50	52	56	61	64	61	62	56	52	49	43	39	31	33	31	26	27	32	41	49	56	61	67	79	49.1	79																	
28-Jul	80	82	84	87	87	83	78	72	65	59	52	50	47	52	47	50	54	48	66	79	92	93	91	91	70.3	93																	
29-Jul	90	90	93	95	94	91	89	78	69	57	52	49	48	46	65	72	51	49	56	68	72	76	72	75	70.7	95																	
30-Jul	77	74	74	76	75	78	74	77	90	91	88	80	65	55	52	52	51	52	50	43	42	44	47	48	64.8	91																	
31-Jul	53	59	73	79	80	77	76	71	63	59	57	54	60	80	81	81	88	89	90	90	93	98	99	99	77.0	99																	
																		72.1	73.3	75.5	77.6	79.2	77.8	75.3	70.3	65.4	61.3	57.5	54.3	51.1	50.1	49.9	50.0	50.8	52.1	53.5	55.8	60.6	66.3	69.9	71.1	Diurnal Average	
																		95	97	98	99	100	100	100	99	99	99	93	81	77	80	81	85	89	89	92	90	93	98	99	99	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	83	11.16	11.16
40 - 60	266	35.75	46.91
60 - 80	219	29.44	76.34
80 - 100	176	23.66	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 37 km/h on Jul 4 12:00	Maximum Daily Speed Average: 23.1 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 19 22:00	Minimum Daily Speed Average: 2.2 km/h on Jul 13	Hours of Data: 743
Maximum Diurnal Speed Average: 9.0 km/h at hour 13	Minimum Diurnal Speed Average: 2.2 km/h at hour 20	Hours of Missing Data: 1
Monthly Average Velocity: 4.8 km/h 242.5 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 12 Q ₃ = 16 P ₉₀ = 21 P ₉₉ = 30	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-Jul	S7	SSE9	SE9	SE10	SSE9	S13	S14	S14	S12	S14	SSW12	SW12	S12	S14	S17	SSW14	S14	SSW13	S13	SSE14	SSE14	SSE12	SSE14	SSE16	\$12.0	S17
2-Jul	S13	SSW17	SSW21	S18	SSE16	S18	S21	SSW22	SSW21	S20	SSW20	S19	SSW18	SSW19	S21	S23	SW18	NNW5	E12	ESE14	SE14	SE15	SE13	SE13	\$14.7	S23
3-Jul	SSE14	S16	SW15	SSW17	SW17	SW14	SSW12	SW9	SW11	WSW15	S12	SW21	WSW22	WSW17	W17	WSW21	SW23	WSW30	WSW27	SW23	SW19	WSW17	WSW17	WSW22	SW16.5	WSW30
4-Jul	WSW12	WSW15	WSW16	WSW19	WSW19	WSW21	WSW22	W23	W22	WSW24	WSW31	WSW37	WSW37	WSW34	WSW36	WSW34	W32	W29	W25	W21	W14	WSW11	WSW13	WSW13	WSW23.1	WSW37
5-Jul	WSW14	WSW14	WSW14	WSW13	WSW14	W18	W22	W22	W20	NNW19	NNW18	NNW18	NNW16	NNW15	NNW18	NNW17	NNW17	NNW15	NNW16	NNW16	NNW11	NNW3	NNW2	S3	NNW13.7	W22
6-Jul	S4	SW7	WSW7	SSW5	SW9	SW10	WSW13	W15	NNW20	NNW18	NNW17	NNW15	NNW15	NW14	NW13	NNW12	NW9	NW10	NNW11	NNW9	NNW7	NNW3	SSW2	S1	NNW7.9	NNW20
7-Jul	SSE3	SSE3	S4	S4	SSW6	SW6	WSW9	W10	W12	NNW13	W12	W10	NNW11	W12	NNW11	NNW11	NNW9	NNW7	NNE10	NNE11	NNE9	NE9	ENE7	ENE7	NNW4.5	NNW13
8-Jul	E8	ESE8	SE5	SSE3	E5	ESE5	ESE6	ESE7	SE8	SE5	SW3	SW8	W20	WSW21	WSW12	WSW13	W13	W13	NNW11	W8	W7	W1	ENE7	E9	SW3.1	WSW21
9-Jul	ESE9	ESE9	ESE13	SE11	SE11	SE13	SSE14	SSE15	S13	SE13	SE13	ESE11	ESE11	ESE12	E15	E15	E15	SE12	ESE13	SE12	SE10	SE9	SE11	SE12	SE11.5	E15
10-Jul	SE11	SSE11	SSE12	SE10	S11	S11	SSW9	SSW5	W10	NNW3	WSW3	WSW3	NNW6	SE4	NNE8	SE4	E10	N5	ENE6	SSE8	SW2	N5	E4	SSW3	SSE3.0	SSE12
11-Jul	ENE2	SE4	E5	E5	NNW1	NNW5	NW4	NNW4	NW7	NW9	NW11	NW12	NW12	NNW13	NNW12	NNE10	ENE11	WSW5	NNW7	SW10	WSW10	WSW7	SW6	WSW1	NNW3.6	NNW13
12-Jul	S2	SW3	WSW3	S4	S4	SSE3	E6	ESE6	S6	WSW5	NW8	NNW9	SW12	SSW12	SSW17	SW14	SW9	SW8	SSE7	SSE12	SSE8	SE10	SSE12	SSE12	SSW5.6	SSW17
13-Jul	S11	S9	S9	S11	SSW10	SSW12	SW12	SW8	WSW3	WSW6	NNW10	NNW9	NW9	NNW8	NW7	NNW10	NNE11	NNE13	NNE13	NNE14	NNE10	NNE9	NNE9	NNE9	NW2.2	NNE14
14-Jul	NNE9	N11	N13	N13	N14	N15	N15	N13	N16	N16	N15	N11	NNE9	N8	NNE6	NNW9	NNW8	NNW14	N9	E7	SE8	ESE7	SE6	SSE5	N8.3	N16
15-Jul	SW5	SSW5	S5	SSE6	SSE5	S7	SSE6	SSE11	S17	SSE18	SSE19	SSE17	SSE20	SSE25	S26	S27	S26	SSE24	SSE18	SE3	SSE15	S19	S18	S17	SSE14.9	S27
16-Jul	S15	NNW14	N18	NNW8	SW2	SSW7	SSW12	WSW16	W20	NNW15	WSW15	WSW14	SW22	SW25	WSW24	WSW25	WSW22	WSW22	W21	WSW17	WSW20	WSW21	WSW20	WSW16	WSW14.7	SW25
17-Jul	WSW16	W15	NNW10	W11	W16	W18	NW24	NW27	NNW25	NNW25	N22	NNW20	NNW21	NNW19	NNW19	NNW21	NNW20	NW18	NNW16	NW12	W7	NNW7	NW5	NW7	NNW15.0	NW27
18-Jul	NW8	NW8	NNW9	NNW8	NW4	NNW8	NNW10	NNW10	NW12	NW13	NW13	NW12	NNW10	NW10	NNW8	WSW14	WSW15	WSW16	WSW13	WSW13	SW9	SW9	SW11	SW12	NNW7.9	WSW16
19-Jul	SW12	SSW13	SSW14	SSW13	SW14	SW16	SW20	WSW19	WSW17	WSW17	WSW18	W16	W16	NNE14	NNE17	NE13	NE11	NNE12	N17	N12	N6	NNW0	ENE2	E5	W5.2	SW20
20-Jul	E10	ESE11	ESE12	ESE14	ESE13	ESE12	ESE12	ESE12	SE12	ESE12	ESE14	ESE14	C	SE12	SE13	ESE14	ESE12	ESE13	ESE14	ESE12	ESE11	ESE12	SE11	SE13	ESE12.2	ESE14
21-Jul	SE13	SE13	SE12	SE11	ESE12	SE13	ESE11	ESE14	SE14	ESE14	SE17	SE17	SE15	S15	S13	ESE3	NNW7	N6	SE10	SSE8	S9	S11	S12	SSW14	SE9.7	SE17
22-Jul	SSW15	SSW14	SSW14	SSW14	SSW14	SSW15	SSW15	SSW16	SSW16	SW19	SW20	WSW21	WSW21	WSW23	WSW25	WSW24	WSW22	WSW20	WSW17	WSW13	SW9	SW10	SW11	SW12	SW15.2	WSW25
23-Jul	SW13	SW11	SW11	SW12	SW13	SW13	SW18	WSW17	W16	NNW15	NNW13	NNW13	NNW10	NNW6	W12	W18	NNE15	N18	NNE18	NNE18	NNE14	NNE12	NNE11	NNE15	NNW6.6	SW18
24-Jul	NNE18	NNE19	NNE18	NNE17	NNE18	NNE20	NNE23	NNE23	NNE23	NNE23	NNE24	N25	N24	N25	N25	N26	N22	N18	N13	NNW14	NNW10	NNW8	NNW10	NNW10	N19.5	N26
25-Jul	NNW10	NNW10	NNW9	NNW6	SW4	SW5	WSW6	W7	W10	W13	NNW11	W12	W12	WSW14	WSW11	WSW12	WSW11	SW11	SW10	SW9	SSW9	SSW10	SSW11	SSW11	WSW7.6	WSW14
26-Jul	SSW10	SSW11	SSW11	SSW8	SSW13	SSW15	SSW14	SSW14	SSW13	SW16	SW17	SW16	WSW14	WSW12	WSW10	WSW10	SW12	SW13	SW12	SW9	SSW10	SSW12	SSW14	SSW14	SW12.0	SW17
27-Jul	SSW15	SSW15	SSW15	SSW14	SSW14	SSW16	SSW17	SSW19	SSW17	SSW17	SSW17	SSW21	SSW23	WSW18	WSW17	SW17	SW17	WSW13	W5	NW1	NNW6	NNW10	NNW16	NNW8	SW12.0	SSW23
28-Jul	SW2	WSW8	W12	WSW11	WSW13	SW14	WSW17	WSW17	W18	W17	W19	W21	W22	NW16	NNW14	NNE14	NE9	N9	NNE13	NW8	SSE7	SSW5	SW10	SW10	W8.2	W22
29-Jul	SW8	WSW8	SW9	SW7	SW6	SW6	SW6	WSW9	WSW9	W10	NNW10	NNW11	NNW12	NW12	NW20	S8	NNW7	NE8	NNE9	NNE10	ENE8	ENE10	E13	ESE13	NNW2.9	NW20
30-Jul	SE13	SE14	SE13	SE12	SE13	SE11	SSE13	SSW21	SW20	WSW7	SW10	WSW10	NNW9	SSW5	SW18	SSW20	SSW20	SSW21	SSW18	SW12	SW10	WSW10	WSW12	WSW11	SSW9.7	SSW21
31-Jul	W10	W8	NNW9	NNW10	W9	W8	W8	NNW11	NNW13	NNW16	NNW17	NNW20	NNW18	NNW10	NNW20	NNW20	N17	N15	N14	NNW11	NNW7	NNW6	NNW8	NNW7	NNW10.6	NNW20

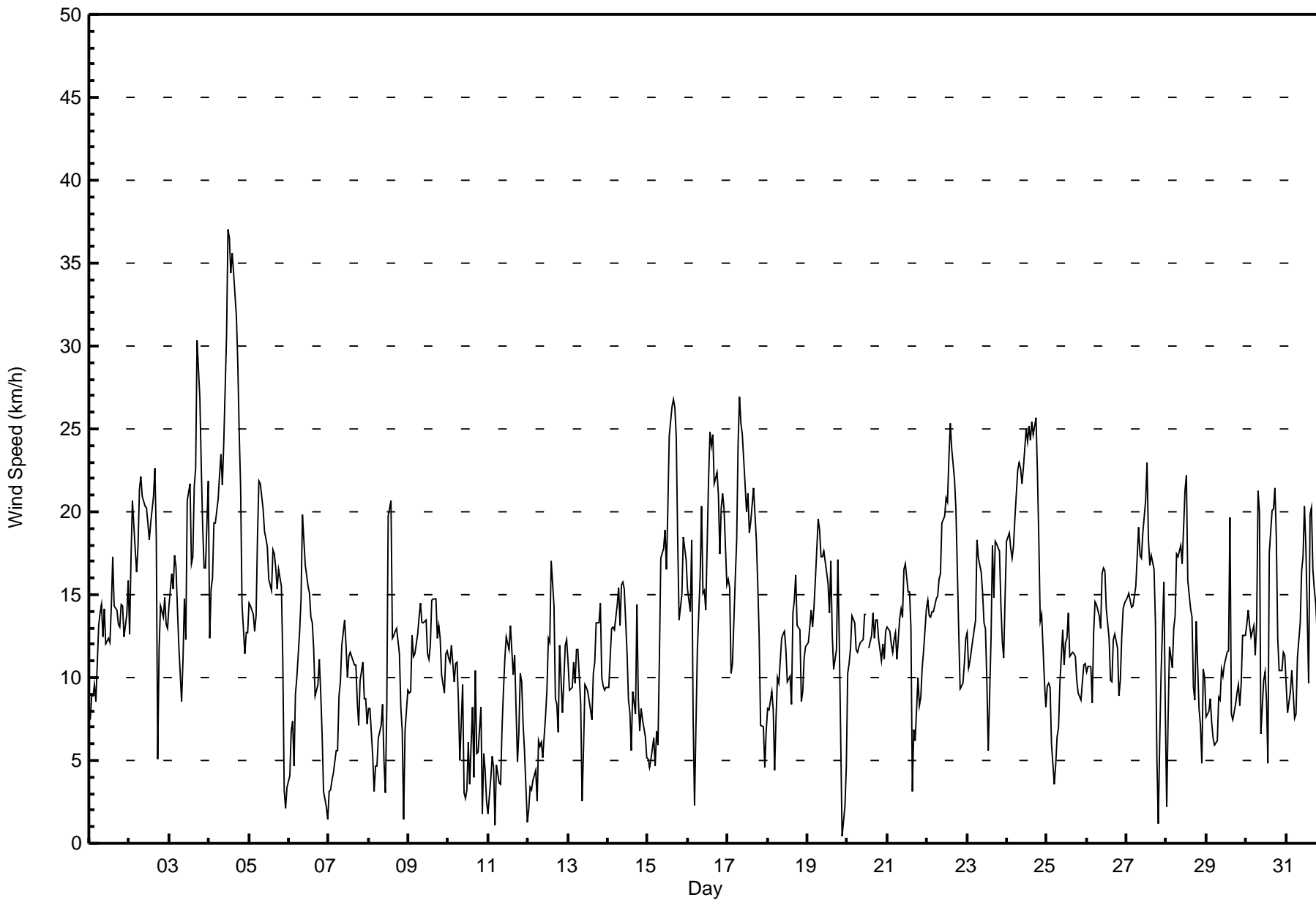
S4.6 SSW4.5 SSW3.9 SSW4.4 SSW5.4 SSW6.1 SW6.3 SW6.9 SSW7.6 SSW7.2 SSW7.2 W8.0 W9.0 W6.6 W7.1 WSW6.6 W5.0 NNW6.0 NNW3.6 W2.2 SW2.5 SSW2.7 SSW3.3 SSW4.1	Diurnal Average
NNE18 NNE19 SSW21 WSW19 WSW19 WSW21 NW24 NW27 NNW25 NNW25 WSW31 WSW37 WSW37 WSW34 WSW36 WSW34 W32 WSW30 WSW27 SW23 WSW20 WSW21 WSW20 WSW22	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Firebag - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	68	9.15	9.15
6 - 11	242	32.57	41.72
12 - 19	334	44.95	86.68
20 - 28	90	12.11	98.79
29 - 38	9	1.21	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - July 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	0	0	3	4	2	5	7	8	7	8	7	2	4	4	5	68
6 - 11	7	16	4	6	6	12	17	11	12	13	33	21	15	22	18	29	242
12 - 19	18	19	1	0	5	24	27	19	23	48	31	47	24	19	18	11	334
20 - 28	7	8	0	0	0	0	0	3	7	10	8	22	12	2	3	8	90
29 - 38	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	43	5	9	15	38	49	40	50	78	80	104	55	47	43	53	743

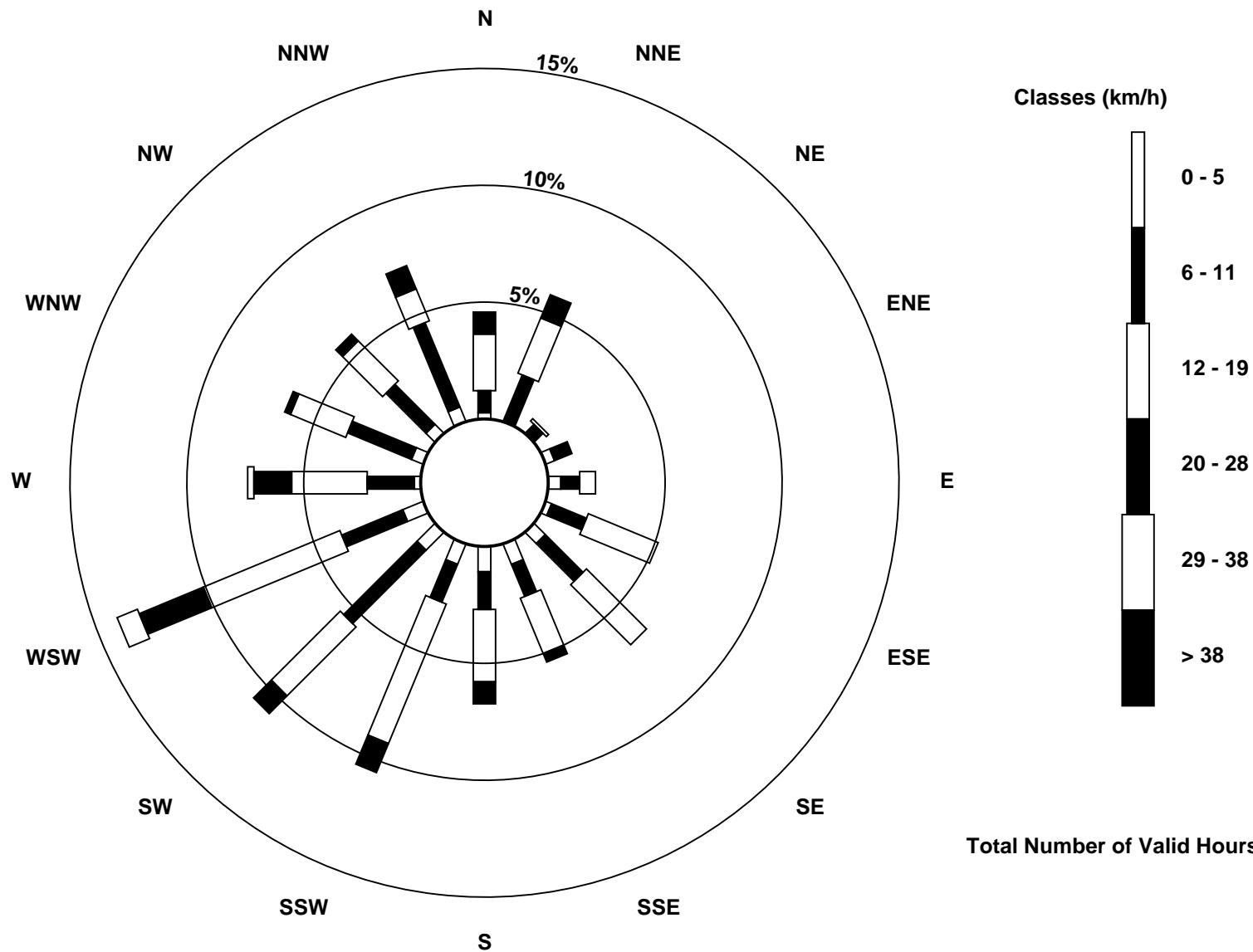
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Firebag (AMS 19)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Jul 16 02:00 Minimum Value: 0 km/h on Jul 7 04:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 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-Jul	1	1	2	2	1	3	2	3	2	3	3	3	4	3	3	3	3	2	2	3	3	2	2	2	4		
2-Jul	2	3	3	3	3	3	3	4	4	3	4	5	5	5	5	5	7	3	7	3	2	3	2	2	7		
3-Jul	3	2	2	3	3	2	3	3	2	4	3	4	5	5	5	5	5	8	8	4	5	5	3	7	8		
4-Jul	3	2	3	4	3	4	5	5	5	5	7	6	8	8	8	8	8	7	6	6	3	1	2	2	8		
5-Jul	2	2	2	2	2	4	5	5	4	4	4	4	4	4	4	4	4	3	3	4	3	2	1	1	5		
6-Jul	1	3	2	1	1	2	3	4	5	5	4	4	5	4	4	3	4	3	3	2	1	2	0	2	5		
7-Jul	1	1	1	0	1	1	2	2	3	4	4	4	4	4	4	5	3	5	3	2	3	1	1	1	5		
8-Jul	1	2	1	1	1	2	1	2	1	2	2	3	7	5	4	3	3	3	2	3	1	1	3	2	7		
9-Jul	2	3	3	2	2	2	2	2	2	3	3	4	4	4	3	4	4	3	3	2	2	1	2	2	4		
10-Jul	2	2	1	1	2	2	2	2	3	1	1	2	4	4	9	6	2	2	2	3	6	3	2	2	9		
11-Jul	2	2	3	3	2	2	1	1	2	2	3	3	3	4	4	5	5	3	1	2	1	2	1	2	5		
12-Jul	1	2	2	1	2	1	1	1	3	2	3	3	3	4	3	4	4	2	3	2	2	2	2	1	4		
13-Jul	1	2	1	2	1	1	2	2	2	4	3	4	3	3	3	4	4	3	3	4	1	1	1	1	4		
14-Jul	1	2	2	2	2	3	3	3	3	4	3	4	4	4	3	3	3	4	3	1	1	2	2	1	4		
15-Jul	1	1	1	2	1	2	2	3	3	3	3	3	4	4	5	4	5	5	4	4	2	3	3	3	5		
16-Jul	2	11	6	3	2	3	3	8	5	3	3	3	5	5	5	5	4	5	4	4	4	4	4	3	11		
17-Jul	3	3	2	2	4	4	6	6	6	6	5	5	4	4	4	5	4	5	3	4	1	1	2	1	6		
18-Jul	1	1	2	1	1	2	2	2	4	4	4	3	4	4	4	5	4	5	5	4	1	1	1	1	5		
19-Jul	1	2	2	2	2	2	4	3	4	4	5	5	6	4	6	2	3	4	4	4	2	1	1	2	6		
20-Jul	3	2	2	2	2	2	2	2	2	2	2	3	C	3	3	3	4	3	2	2	2	2	2	2	4		
21-Jul	3	2	2	2	2	2	2	2	3	3	4	4	5	5	5	2	4	3	3	1	1	2	1	1	5		
22-Jul	2	1	1	2	1	2	2	2	2	3	4	4	5	6	6	6	5	5	4	4	1	1	1	2	6		
23-Jul	1	2	1	1	2	2	3	3	4	3	4	3	5	4	5	5	4	4	3	4	3	2	2	3	5		
24-Jul	3	4	4	3	3	4	4	5	5	5	5	5	5	5	6	5	6	6	5	4	3	2	2	1	6		
25-Jul	1	1	1	1	1	1	2	1	3	3	3	4	4	4	5	4	4	3	3	1	1	1	1	1	5		
26-Jul	1	1	1	3	1	2	2	2	2	3	3	3	4	4	4	4	4	3	3	2	2	1	2	2	4		
27-Jul	2	2	2	2	1	2	2	3	3	2	4	4	5	4	5	4	3	3	1	2	2	6	5	3	6		
28-Jul	2	3	2	2	2	2	3	3	4	4	5	6	6	5	5	4	4	10	4	3	2	2	3	1	10		
29-Jul	1	1	1	2	2	2	2	2	2	3	3	3	4	5	9	4	4	3	2	1	1	1	3	2	9		
30-Jul	2	2	2	2	2	2	3	4	5	3	2	2	3	4	4	4	4	4	4	2	1	1	1	1	5		
31-Jul	2	2	2	1	1	1	2	3	3	4	5	5	6	4	4	4	4	4	3	3	1	1	1	1	6		
																		Diurnal Maximum									
C - Calibration																											



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Firebag - July 2017

Direction of Maximum Speed: 248 deg on Jul 4 12:00 Direction of Maximum Daily Speed Average: 252.6 deg on Jul 4	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1
Direction of Minimum Speed: 282 deg on Jul 19 22:00 Direction of Minimum Daily Speed Average: 2.2 deg on Jul 13	Percent Operational Time: 100.0
Monthly Average Direction: 255.2 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-Jul	175	159	141	139	165	180	176	186	191	183	197	226	187	175	183	196	191	196	173	167	159	147	149	167	176.6
2-Jul	188	193	196	185	165	171	183	193	199	187	197	190	194	192	190	184	215	348	80	111	125	131	132	143	178.5
3-Jul	162	186	219	200	232	226	205	228	232	250	186	221	253	245	265	237	233	242	242	228	225	240	245	257	230.7
4-Jul	242	232	239	246	248	250	253	259	260	249	239	248	248	251	254	253	261	273	268	264	261	253	250	248	252.6
5-Jul	250	256	256	249	250	263	272	275	279	288	285	284	295	305	307	291	309	317	308	303	300	337	298	178	283.3
6-Jul	184	222	243	200	219	234	257	277	290	293	293	337	327	310	323	337	317	312	331	332	334	328	199	173	295.8
7-Jul	161	162	174	174	204	214	237	266	275	283	268	271	282	281	298	301	341	305	313	25	18	32	39	76	294.5
8-Jul	98	105	134	157	101	117	117	123	139	146	221	232	262	252	250	247	274	279	282	269	269	268	62	79	232.5
9-Jul	105	102	115	128	128	143	159	161	169	133	131	121	118	104	100	101	96	124	123	124	132	133	139	130	125.9
10-Jul	130	149	154	144	172	169	194	206	275	291	240	240	286	126	23	142	100	9	57	152	227	355	79	199	154.4
11-Jul	65	131	99	82	294	334	308	333	314	320	316	318	306	331	346	21	76	240	290	234	243	238	215	245	313.8
12-Jul	169	233	238	178	185	157	91	111	170	245	312	286	235	208	205	226	224	222	163	165	154	140	159	161	194.4
13-Jul	174	177	183	190	201	200	219	222	249	241	287	301	322	330	313	329	18	14	15	19	24	27	29	25	319.5
14-Jul	23	6	2	1	3	3	358	352	358	357	8	11	20	10	24	344	339	328	354	94	133	121	140	161	7.3
15-Jul	215	210	191	168	160	183	157	154	173	167	165	153	148	162	173	182	183	168	150	134	164	176	171	175	167.8
16-Jul	182	301	358	340	226	205	205	257	273	284	256	240	235	235	241	244	254	254	259	251	252	255	257	255	253.2
17-Jul	254	269	283	278	269	278	321	324	333	335	349	346	341	330	330	337	331	325	328	314	280	291	323	312	317.9
18-Jul	308	318	336	329	311	327	336	339	325	317	304	312	295	313	286	241	248	250	253	248	234	215	214	215	283.2
19-Jul	214	210	210	213	216	226	231	237	245	258	257	262	266	22	13	41	45	15	8	360	353	282	72	81	263.9
20-Jul	91	112	115	109	112	115	116	123	125	118	121	123	C	124	130	106	116	109	117	119	114	118	127	140	117.6
21-Jul	141	137	134	125	116	125	120	121	124	123	126	126	133	173	174	117	329	360	132	153	181	190	189	193	141.2
22-Jul	198	193	193	198	195	194	203	206	205	219	234	250	258	241	250	257	256	254	247	246	233	226	218	214	228.4
23-Jul	220	226	225	225	224	224	235	252	273	286	288	290	305	336	266	265	17	10	15	17	19	17	26	18	296.0
24-Jul	25	25	23	22	21	23	15	21	19	17	13	17	13	11	4	2	359	357	356	358	354	347	327	324	9.6
25-Jul	340	339	333	322	234	224	241	263	279	265	286	273	268	244	257	256	252	232	232	225	209	208	207	206	256.0
26-Jul	205	211	206	202	199	200	200	204	211	216	224	231	240	256	250	247	230	224	228	221	201	203	205	209	217.3
27-Jul	205	207	205	197	193	198	196	202	213	213	206	205	205	244	247	234	225	245	278	307	332	289	313	337	221.5
28-Jul	233	257	266	249	242	235	247	249	260	261	273	270	276	322	336	21	46	2	33	322	158	203	226	217	272.2
29-Jul	225	239	234	235	235	222	236	238	249	261	286	293	299	312	323	184	339	36	26	30	58	67	87	112	289.3
30-Jul	125	125	128	129	128	126	152	197	236	247	219	253	301	210	217	210	205	208	212	221	228	239	250	238	200.3
31-Jul	272	275	295	302	272	263	272	283	292	297	291	286	313	332	347	341	353	352	1	348	332	329	331	333	314.5

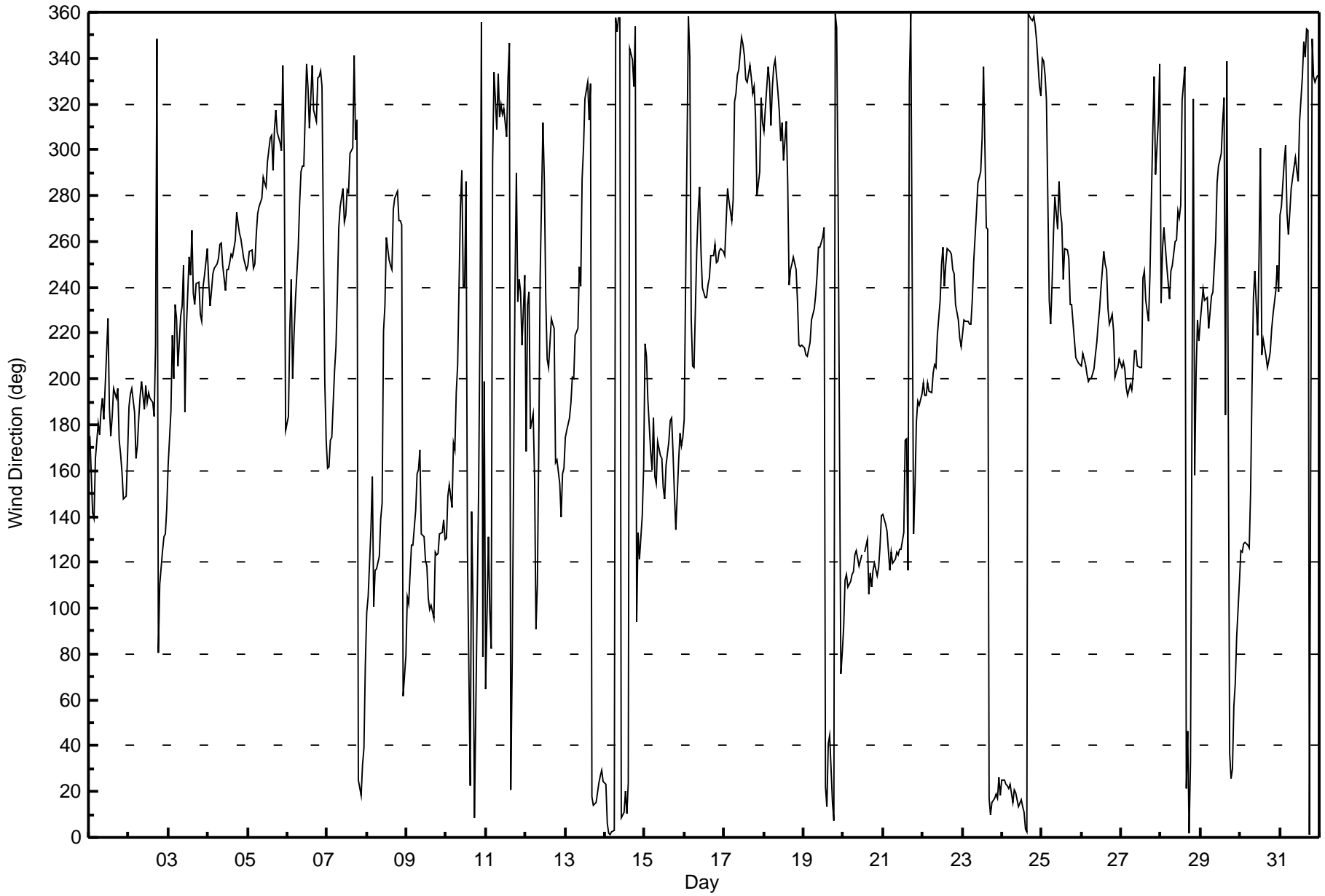
190.8 205.6 208.8 200.1 204.7 210.1 223.1 235.5 252.4 258.7 256.4 261.2 266.8 262.8 269.4 258.6 270.2 282.3 295.8 262.4 223.5 211.8 200.5 195.7
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Firebag - July 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Jul 10 21:00 Minimum Value: 4 deg on Aug 1 00:00 Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 11 Median = 14 Q ₃ = 21 P ₉₀ = 35 P ₉₉ = 84																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 1 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-Jul	10	11	10	11	12	8	9	10	13	18	22	12	22	15	19	15	11	11	13	10	10	10	10	13	22
2-Jul	8	8	8	10	9	10	11	9	13	15	15	17	20	18	14	20	47	47	34	15	13	12	11	11	47
3-Jul	11	16	12	10	13	11	10	22	11	16	21	15	16	24	19	16	13	13	11	10	10	17	13	17	24
4-Jul	16	9	10	10	10	10	11	13	15	16	16	13	14	14	15	15	16	15	17	12	10	9	7	8	17
5-Jul	8	10	10	8	8	12	14	15	14	13	16	15	17	19	17	18	19	15	14	17	22	33	66	22	66
6-Jul	14	21	12	17	10	12	19	15	16	19	18	19	28	21	20	17	26	17	20	13	9	14	30	79	79
7-Jul	23	9	7	7	8	11	11	21	18	20	23	38	28	35	29	51	29	46	32	12	8	14	9	15	51
8-Jul	8	11	22	37	19	41	26	17	17	56	78	24	18	14	22	19	24	18	18	10	9	89	40	10	89
9-Jul	16	14	12	12	12	14	11	10	15	21	22	34	32	34	21	17	19	24	14	13	10	10	10	13	34
10-Jul	13	14	10	13	14	12	15	31	19	51	76	73	60	90	94	85	22	35	51	34	104	56	50	76	104
11-Jul	85	41	18	68	102	21	16	28	18	15	17	17	22	21	28	32	13	71	22	9	8	8	22	84	102
12-Jul	62	40	59	25	15	62	17	26	48	50	38	35	22	25	25	26	21	12	37	14	13	12	12	7	62
13-Jul	10	9	8	6	9	7	13	15	81	80	27	34	32	41	38	24	26	15	13	10	9	8	6	7	81
14-Jul	6	12	13	12	12	13	14	16	16	17	16	25	43	52	74	33	31	19	35	19	12	15	18	14	74
15-Jul	20	16	16	14	18	18	21	10	13	14	13	16	14	13	14	12	13	13	13	10	8	10	9	9	21
16-Jul	11	72	16	37	76	24	12	21	14	16	14	14	11	11	10	12	13	12	12	11	11	10	11	10	76
17-Jul	11	13	14	12	12	16	14	12	12	12	14	15	13	15	16	14	17	16	13	15	11	15	30	11	30
18-Jul	11	14	9	11	7	11	12	20	25	27	28	29	45	31	47	35	24	15	17	12	10	9	8	7	47
19-Jul	8	9	9	8	8	9	10	11	15	16	21	24	25	39	24	14	20	14	17	12	12	70	32	24	70
20-Jul	12	11	11	11	10	11	12	14	14	13	19	17	C	21	25	17	26	14	15	12	11	11	14	11	26
21-Jul	13	11	11	12	10	12	15	13	14	16	25	17	26	23	35	75	63	52	17	20	13	14	10	6	75
22-Jul	7	6	6	8	6	6	10	9	11	13	15	14	18	18	16	15	16	15	13	9	9	9	8	8	18
23-Jul	8	11	8	9	9	9	13	13	17	18	21	21	42	69	37	28	17	17	14	13	11	10	10	10	69
24-Jul	11	10	11	11	10	11	12	12	12	13	13	14	13	17	17	16	15	15	15	15	14	9	14	8	17
25-Jul	6	6	5	11	41	12	13	18	20	20	27	28	29	23	36	28	26	19	17	12	9	9	9	8	41
26-Jul	7	9	7	6	5	6	7	9	13	14	18	17	23	27	31	40	25	18	19	17	7	7	9	9	40
27-Jul	8	9	9	8	7	9	8	9	12	14	16	13	15	19	22	17	18	13	38	76	43	12	18	21	76
28-Jul	70	19	10	11	11	9	11	11	14	15	18	18	17	40	20	27	21	68	11	56	17	19	14	11	70
29-Jul	9	6	9	11	18	19	12	14	22	23	31	26	30	32	21	34	42	27	16	8	15	8	11	12	42
30-Jul	12	11	12	12	13	12	15	18	14	36	11	14	29	73	17	15	15	12	12	11	7	8	7	8	73
31-Jul	18	11	9	11	8	13	18	16	19	19	19	18	25	18	13	12	16	13	15	15	7	4	7	4	25
																	85 72 59 68 102 62 26 31 81 80 78 73 60 90 94 85 63 71 51 76 104 89 66 84								
Diurnal Maximum																									
C - Calibration																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

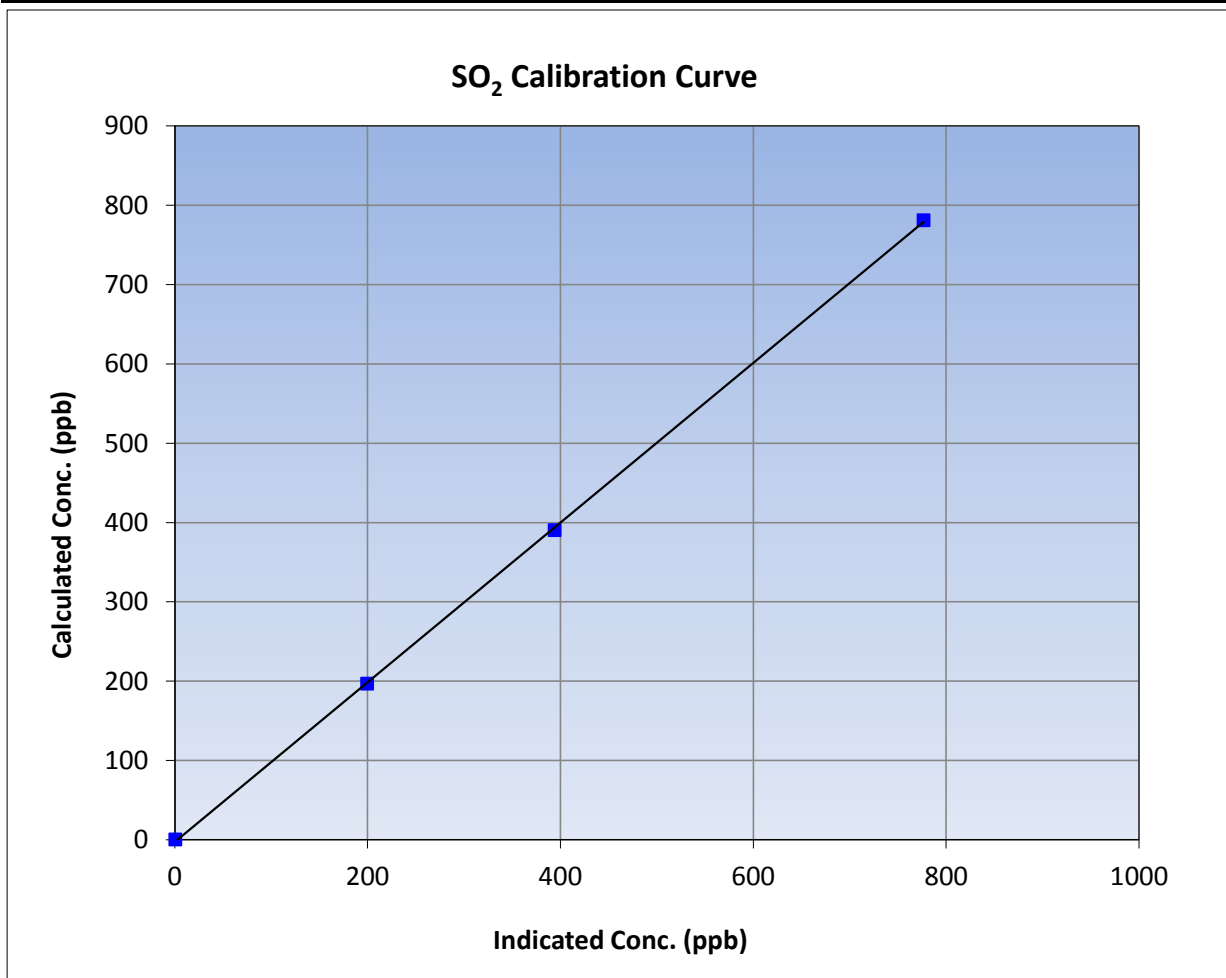
Version-03-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:31	End Time (MST)	14:06
Analyzer make	Thermo 43i	Analyzer serial #	1410661308

Calibration Data

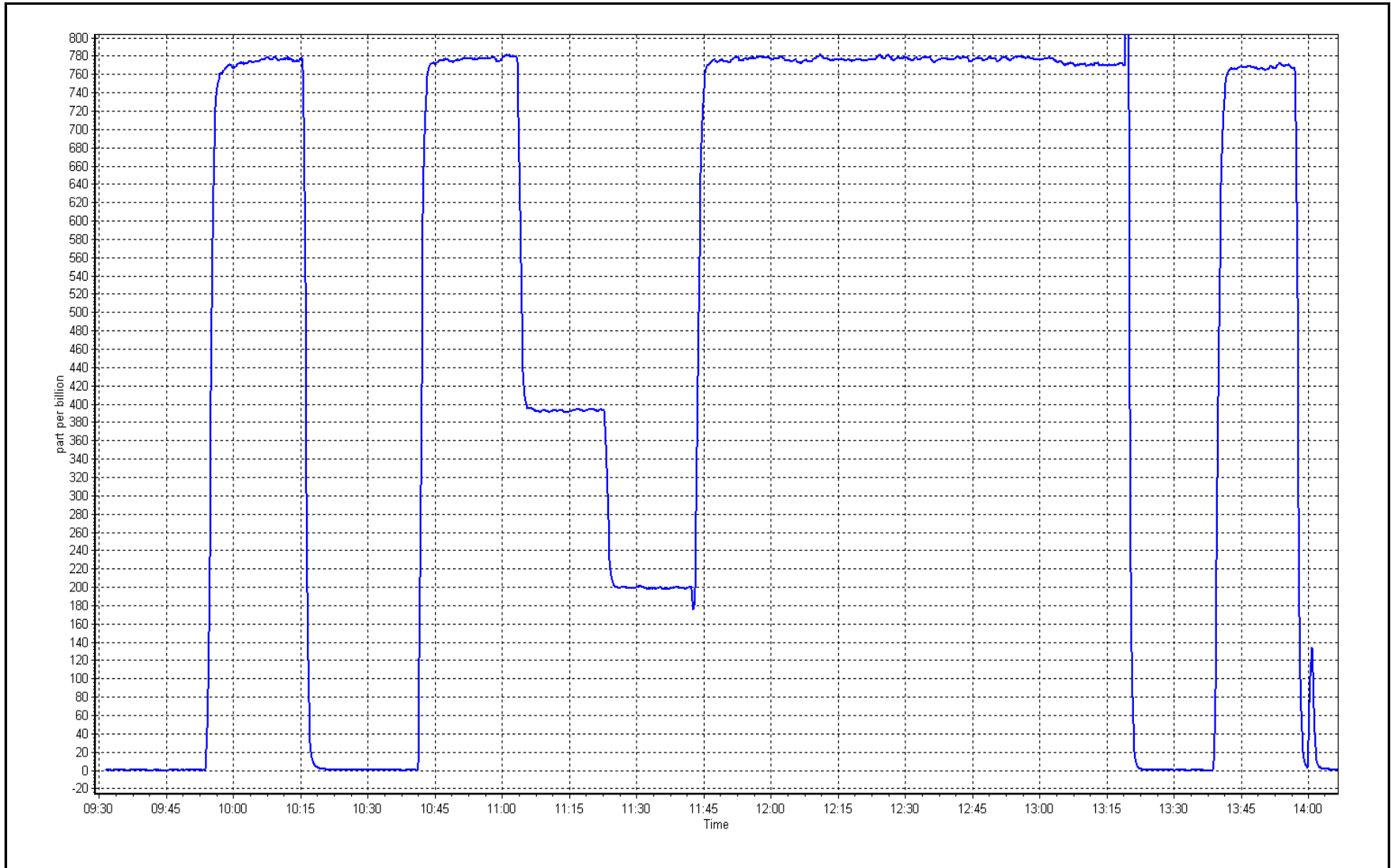
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.3	----	Correlation Coefficient	0.999933	≥0.995
780.7	776.2	1.0058	Slope	1.006797	0.90 - 1.10
390.1	393.5	0.9913	Intercept	-2.776175	+/-30
196.5	199.1	0.9872			



SO2 Calibration Plot

Date: July 20, 2017

Location: Firebag





Wood Buffalo Environmental Association

H₂S Calibration Summary

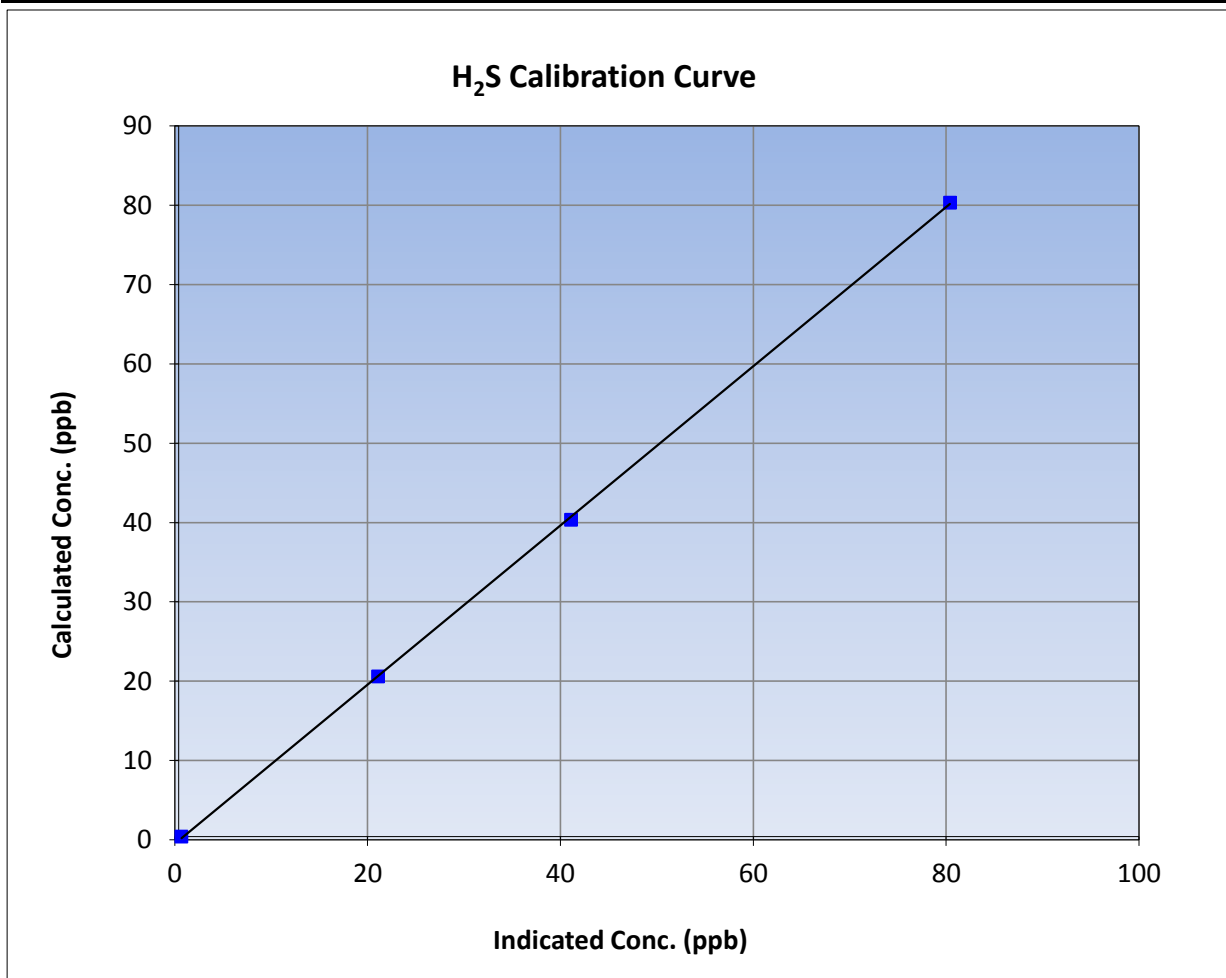
Version-03-2017

Station Information

Calibration Date	July 25, 2017	Previous Calibration	June 15, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	8:54	End Time (MST)	12:02
Analyzer make	Thermo 450i	Analyzer serial #	815129098

Calibration Data

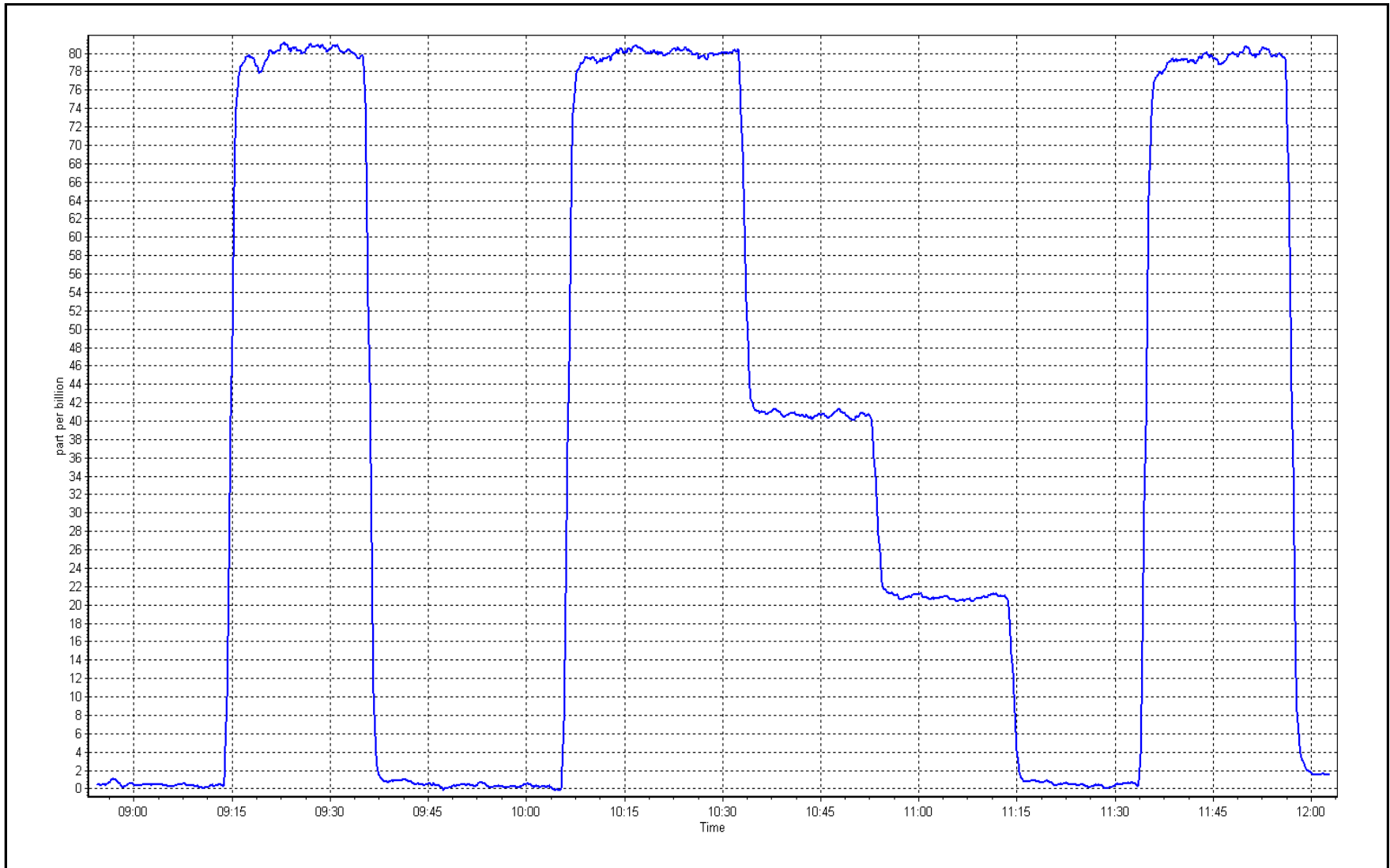
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	0.3	----	Correlation Coefficient	≥0.995
80.0	80.0	0.9994		
40.0	40.7	0.9820	Slope	0.90 - 1.10
20.2	20.7	0.9753		
			Intercept	+/-3



H₂S Calibration Plot

Date: July 25, 2017

Location: Firebag





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Firebag	Station number:	AMS 19
Calibration Date:	July 20, 2017	Last Cal Date:	June 16, 2017
Start time (MST):	9:31	End time (MST):	14:02
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000652	Cal Gas Expiry Date	November 4, 2019
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	1.002249	Sample pressure	8.6 8.6
Calculated intercept	-0.076574	Fuel pressure	23.0 23.0
Analyzer Background	1.71	Air pressure	34.9 34.9
Analyzer Coefficient	3.598	Flame temperature	156.2 156.9

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	-0.02	----
as found span	4930	79.8	16.84	16.76	1.005
calibrator zero	4999	0.0	0.00	-0.02	----
high point	4929	79.8	16.85	16.90	0.997
second point	4972	39.9	8.42	8.52	0.988
third point	4991	20.1	4.24	4.37	0.972
as left zero	4999	0.0	0.00	0.09	----
as left span	4930	79.8	16.84	16.86	0.999
Average Correction Factor					0.986
Corrected As found	16.79	Previous response	16.88	*% change	0.6%

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

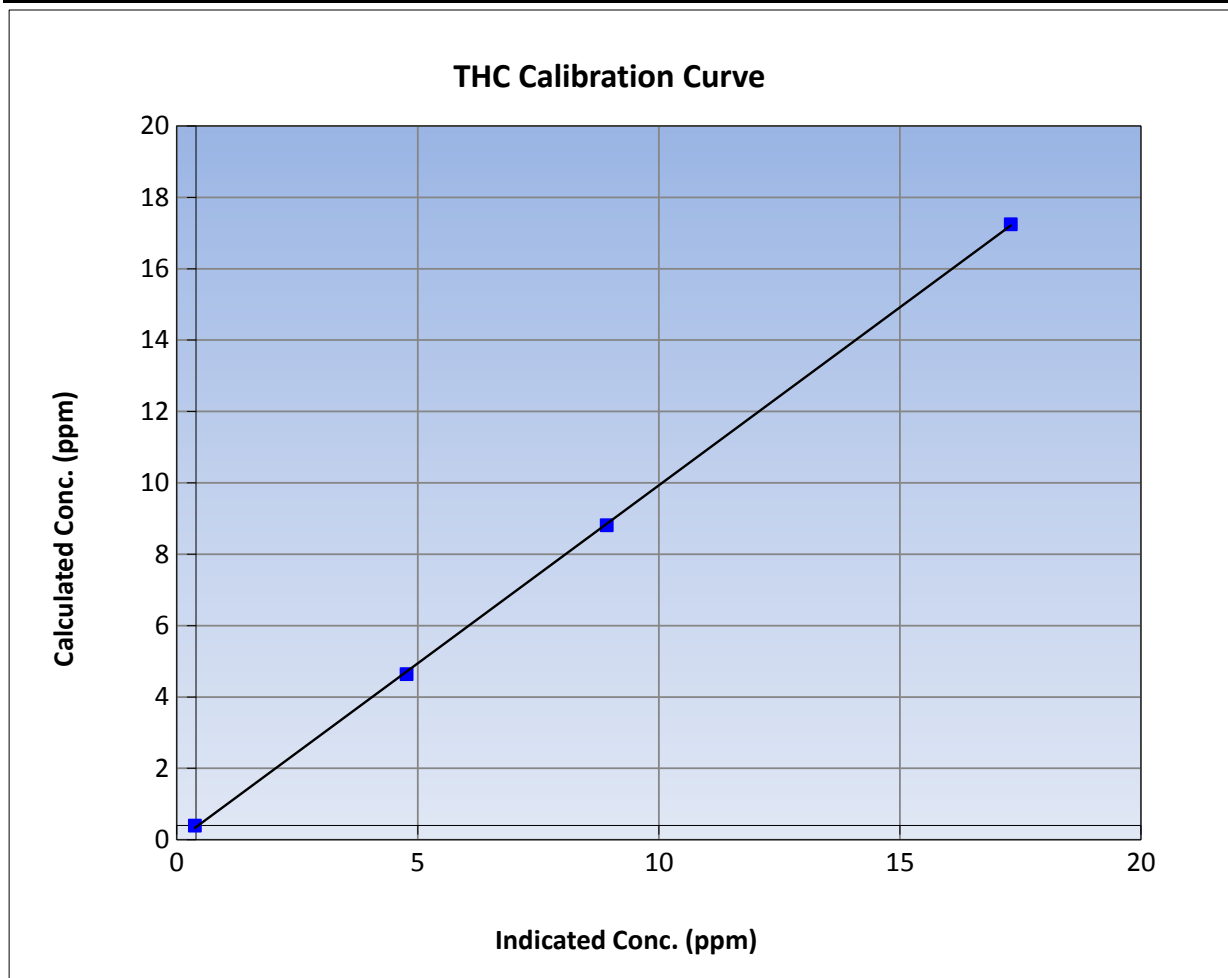
Version-03-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:31	End Time (MST)	14:02
Analyzer make	Thermo 51i-LT	Analyzer serial #	1336160089

Calibration Data

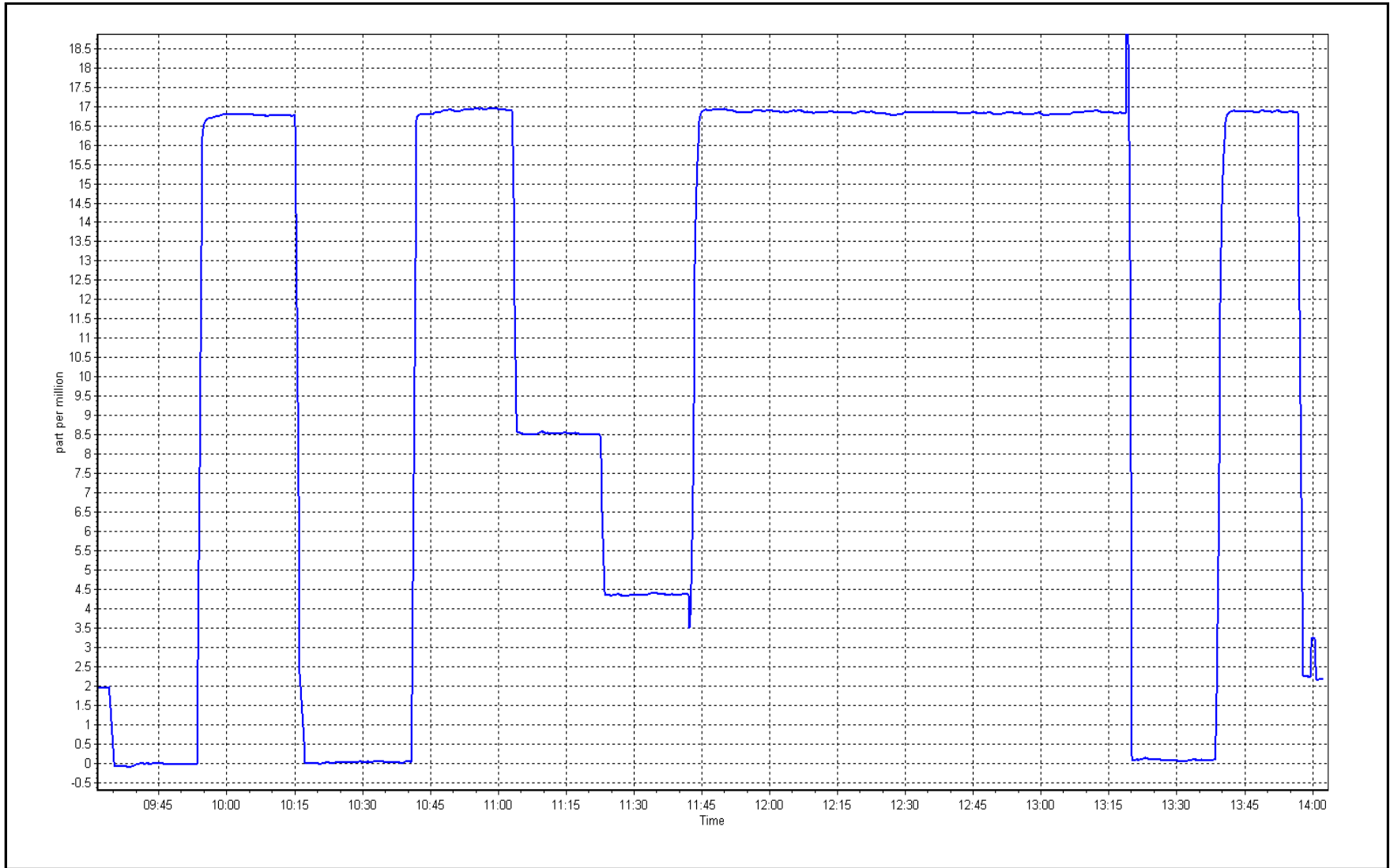
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999924	
16.8	16.9	0.9969			≥0.995
8.4	8.5	0.9879	Slope	0.997462	
4.2	4.4	0.9718			0.90 - 1.10
			Intercept	-0.044966	+/-1.5



THC Calibration Plot

Date: July 20, 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:	July 20, 2017	Last Cal Date:	June 16, 2017
Start time (MST):	9:31	End time (MST):	14:04
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	-3.0	-2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	164.2	163.3
NO bkgrnd	4.2	4.2	Sample Flow	0.631	0.622
NOX bkgrnd	4.2	4.2	PMT Voltage	-780.3	-780.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002315	0.997803
NO _x Cal Offset	-2.473207	-2.107609
NO Cal Slope	1.001873	0.998650
NO Cal Offset	-2.492975	-2.306888
NO ₂ Cal Slope	0.998509	0.994256
NO ₂ Cal Offset	0.300809	-0.980414



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	-0.1	-0.1	0.0	----	----
as found span	4930	79.8	799.6	799.6	0.0	802.2	801.6	0.6	0.9968	0.9975
calibrator zero	4999	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	----	----
high point	4929	79.8	799.8	799.8	0.0	802.2	801.6	0.6	0.9970	0.9977
second point	4971	39.9	399.7	399.7	0.0	404.8	404.8	0.1	0.9875	0.9875
third point	4991	20.1	201.4	201.4	0.0	205.5	205.7	-0.2	0.9798	0.9789
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	378.8	421.0	791.8	369.9	421.9	1.0101	1.0241
Average Correction Factor									0.9881	0.9880

Corrected As found	NO _x = 802.3 ppb	NO = 801.7 ppb		*Percent Change	NO _x = -0.3%
Previous Response	NO _x = 800.3 ppb	NO = 800.6 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	799.0	798.4	0.6	1.0010	1.0017	----	----
1st NO2 (400 ppb O3)	378.8	419.6	801.0	378.8	422.3	0.9985	----	0.9936	100.6%
2nd NO2 (200 ppb O3)	588.0	210.4	801.7	588.0	213.7	0.9976	----	0.9846	101.6%
3rd NO2 (100 ppb O3)	691.7	106.7	800.5	691.7	108.9	0.9991	----	0.9798	102.1%
2nd NO ref point	----	0.0	799.1	798.5	0.6	1.0009	1.0016	----	----
Average Correction Factor						0.9990	1.0017	0.9860	101.4%

Notes: Changed inlet filter after asfound. No adjustments made.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

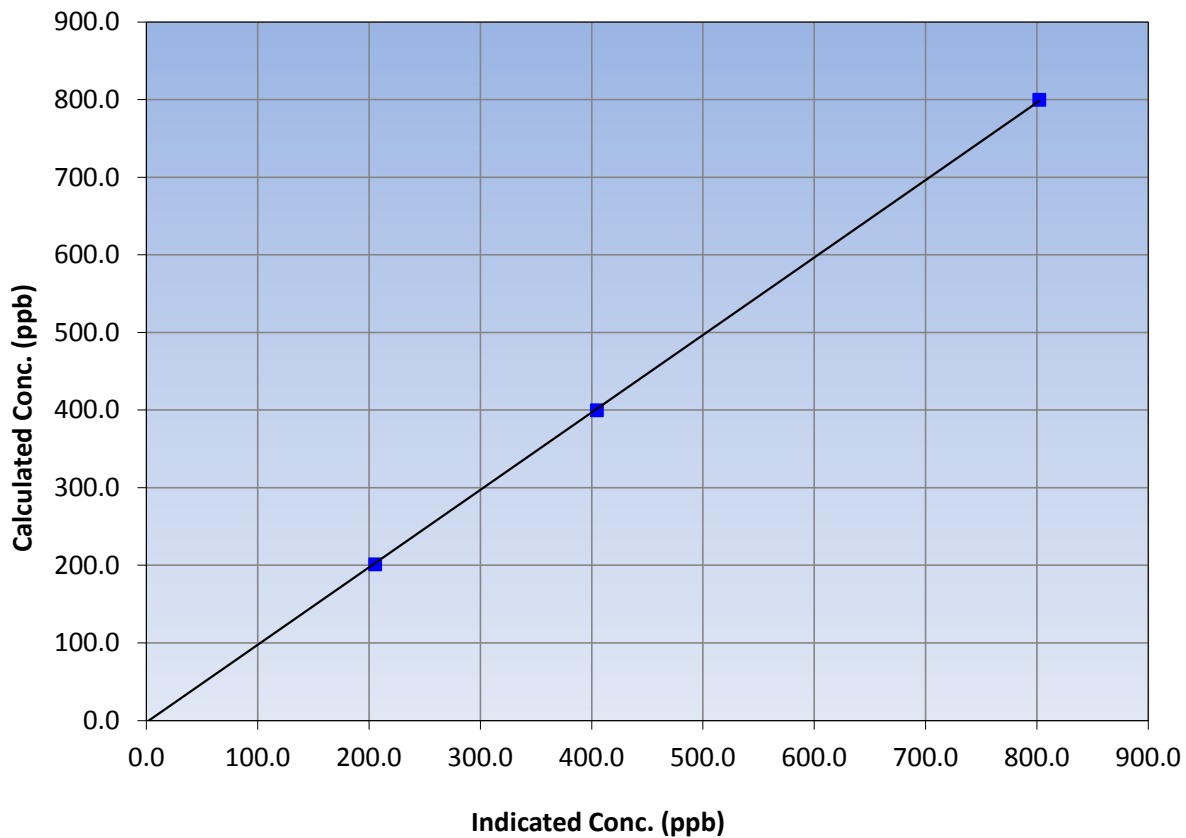
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:31	End Time (MST)	14:04
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	
799.8	802.2	0.9970			
399.7	404.8	0.9875			
201.4	205.5	0.9798			
			Slope	0.997803	0.90 - 1.10
			Intercept	-2.107609	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

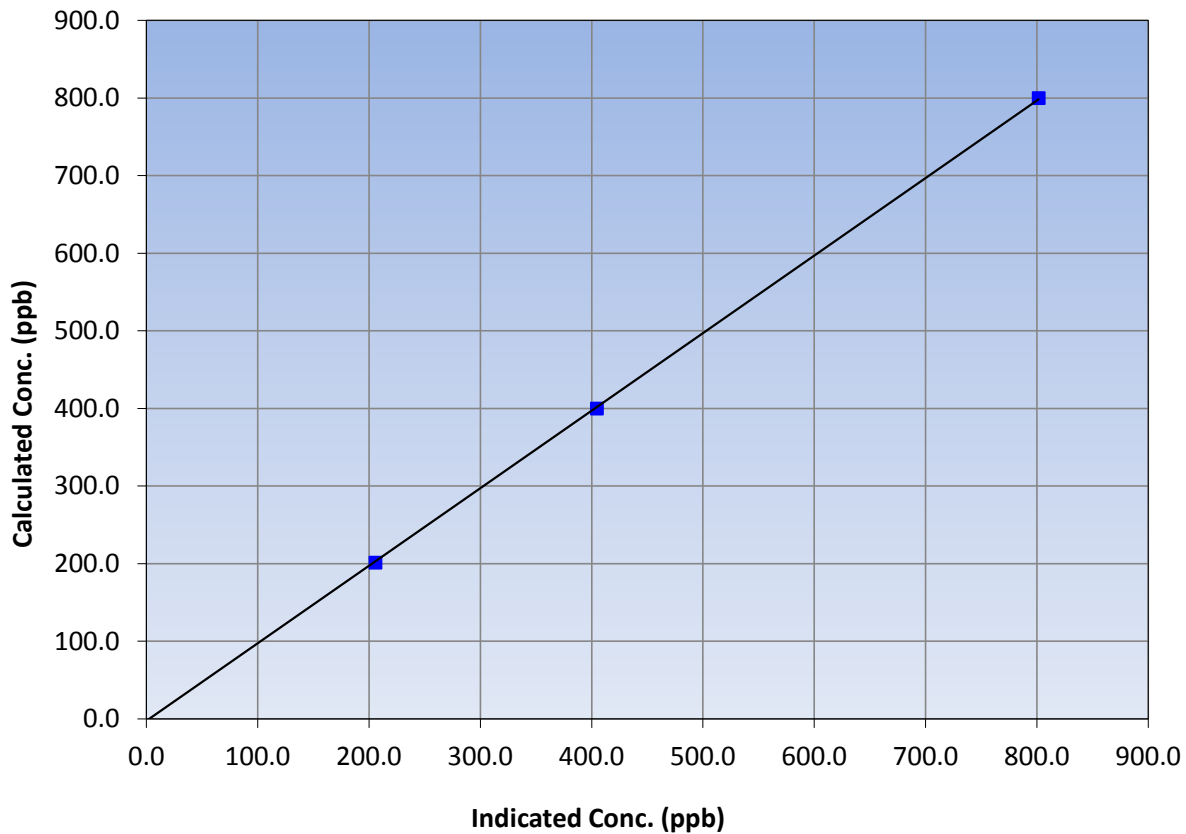
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:31	End Time (MST)	14:04
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	801.6	0.9977			
399.7	404.8	0.9875			
201.4	205.7	0.9789			
			Slope	0.998650	0.90 - 1.10
			Intercept	-2.306888	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

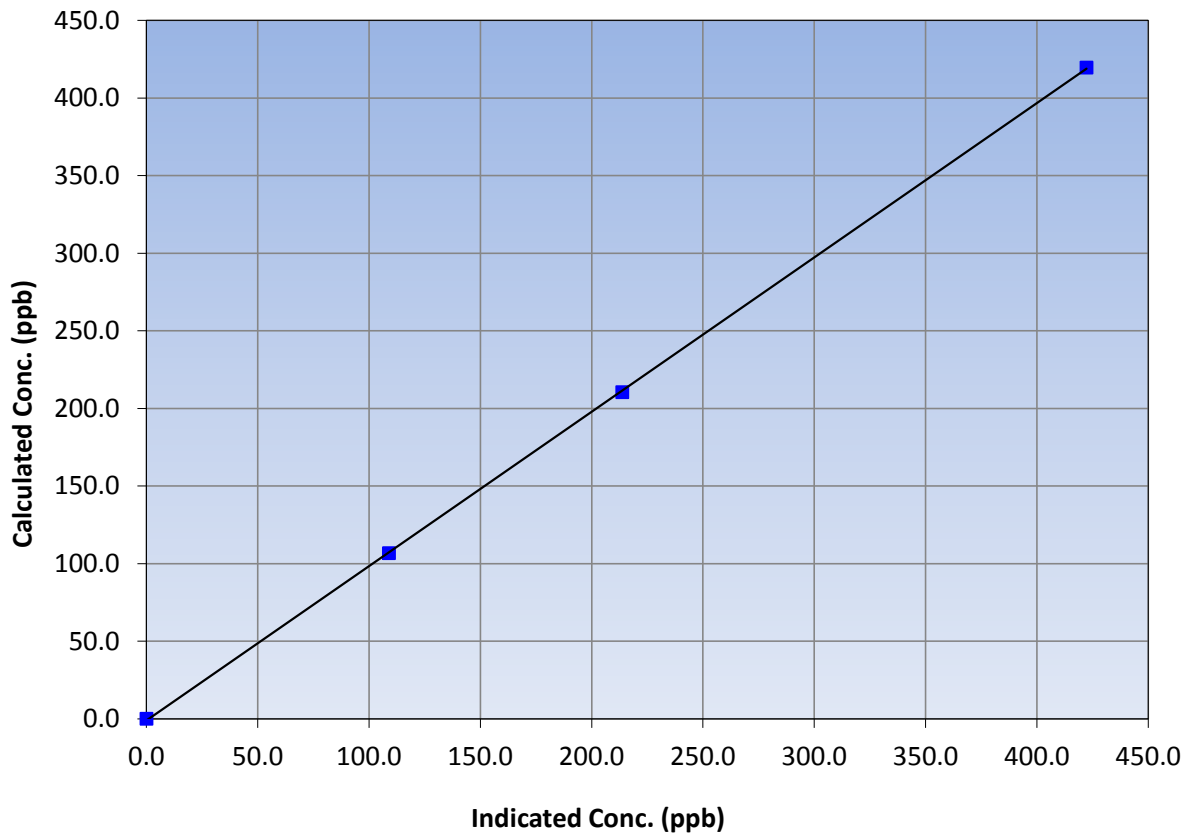
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 16, 2017
Station Name	Firebag	Station Number	AMS 19
Start Time (MST)	9:31	End Time (MST)	14:04
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	0.0	----	Correlation Coefficient	≥0.995	
419.6	422.3	0.9936			
210.4	213.7	0.9846			
106.7	108.9	0.9798			
			Slope	0.994256	0.90 - 1.10
			Intercept	-0.980414	+/-20

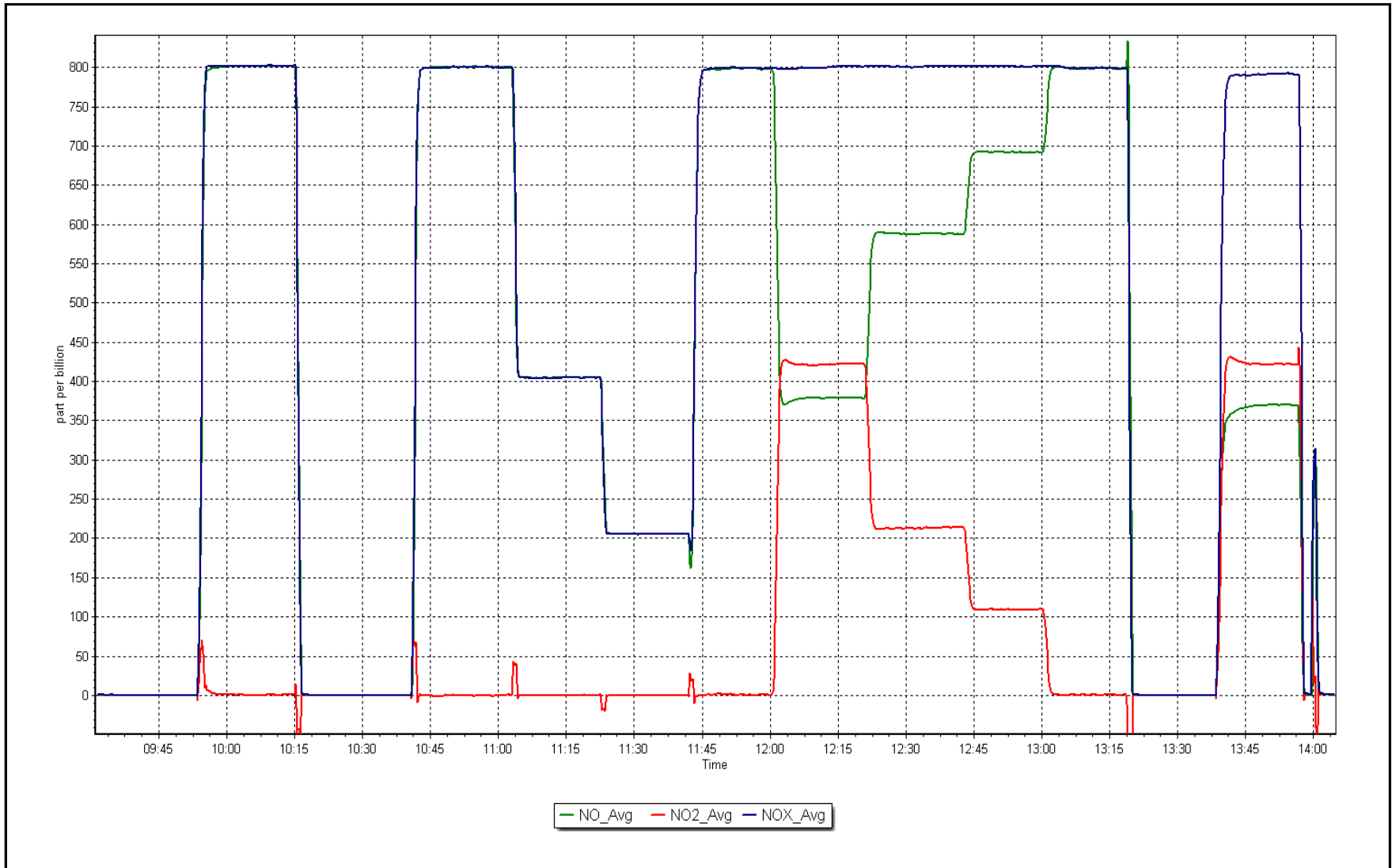
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 20, 2017

Location: Firebag





Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Firebag	Station Number:	AMS 19
Calibration Date:	July 20, 2017	Prev Cal Date:	August 19, 2016
Start Time (MST):	12:00	End Time (MST):	13:00
Barometric Press:	NA	Station Temp:	23 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	K13090
WS Calibrator:	MetOne 053	Serial Number:	P22394

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	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9994
Average Correction Factor			1.0003

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999999	≥0.995
Calculated slope	0.998167	0.999319	0.90 - 1.10
Calculated intercept	-0.024448	0.022277	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P22885
As Found Declination (deg west of North)	<u>14</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	1.8	n/a
90	87.2	1.0321
180	180.0	0.9999
270	271.1	0.9959
357	359.0	0.9944
Average Correction Factor		1.0056

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999917	≥0.995
Calculated slope	0.991623	0.995029	0.90 - 1.10
Calculated intercept	0.614368	0.473810	+/- 7

Notes: Checked declination with Compass. Replaced wind vane.

Calibration Performed By: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 20
MACKAY RIVER
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)

JULY 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	709	35	35	100	7	0	1	0
H2S (ppb) Average	702	33	42	98.79	2	0	0	0
THC (ppm) Average	709	35	35	100	2.9	-	2.3	-
NO2 (ppb) Average	709	35	35	100	11	0	2	-
NO (ppb) Average	709	35	35	100	1	-	0	-
NOX (ppb) Average	709	35	35	100	12	-	2	-
Temperature 2 m (C) Average	744	0	0	100	31.8	-	22.7	-
Relative Humidity (%) Average	744	0	0	100	99	-	80	-
Precipitation (mm) Total	744	0	0	100	5.9	-	6.8	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	19	-	12	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)
 JULY 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	709	0.2	0	-	0	0	0	0	0	0	0	7
H2S (ppb) Average	702	0.2	0	-	0	0	0	0	0	0	0	2
THC (ppm) Average	709	2.12	0.2	-	1.9	2	2	2.1	2.2	2.3	2.9	
NO2 (ppb) Average	709	0.7	1	-	0	0	0	0	1	1	11	
NO (ppb) Average	709	0.1	0	-	0	0	0	0	0	0	1	
NOX (ppb) Average	709	0.7	1	-	0	0	0	0	1	2	12	
Temperature 2 m (C) Average	744	17.96	5.3	-	3.2	11.1	14.3	17.9	21.9	24.8	31.8	
Relative Humidity (%) Average	744	63.4	20	-	24	37	48	62	82	91	99	
Precipitation (mm) Total	744	-	-	25.34	-	-	-	-	-	-	-	
Wind Speed 10 m (km/h) Average	742	7	4	-	0	2	4	7	9	12	19	
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS 20)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	02 Jul 2017 15:00	02 Jul 2017 16:00	2	Unstable operation - excessive baseline drift
H2S	06 Jul 2017 10:00	06 Jul 2017 11:00	2	Unstable operation - excessive baseline drift
H2S	08 Jul 2017 14:00	08 Jul 2017 15:00	2	Unstable operation - excessive baseline drift
H2S	25 Jul 2017 11:00	25 Jul 2017 12:00	2	Unstable operation - excessive baseline drift
H2S	26 Jul 2017 12:00	26 Jul 2017 12:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	14 Jul 2017 23:00	14 Jul 2017 23:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	01 Aug 2017 00:00	01 Aug 2017 00:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 7 ppb on Jul 29 21:00	Maximum Daily Average: 0.8 ppb on Jul 14		Hours of Data:	709
Minimum Value: 0 ppb on Jul 1 01:00	Minimum Daily Average: 0.0 ppb on Jul 3		Hours of Missing Data:	35
Maximum Diurnal Average: 0.4 ppb at hour 21	Minimum Diurnal Average: 0.1 ppb at hour 2		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 = 2		Percent Operational Time:	100.0

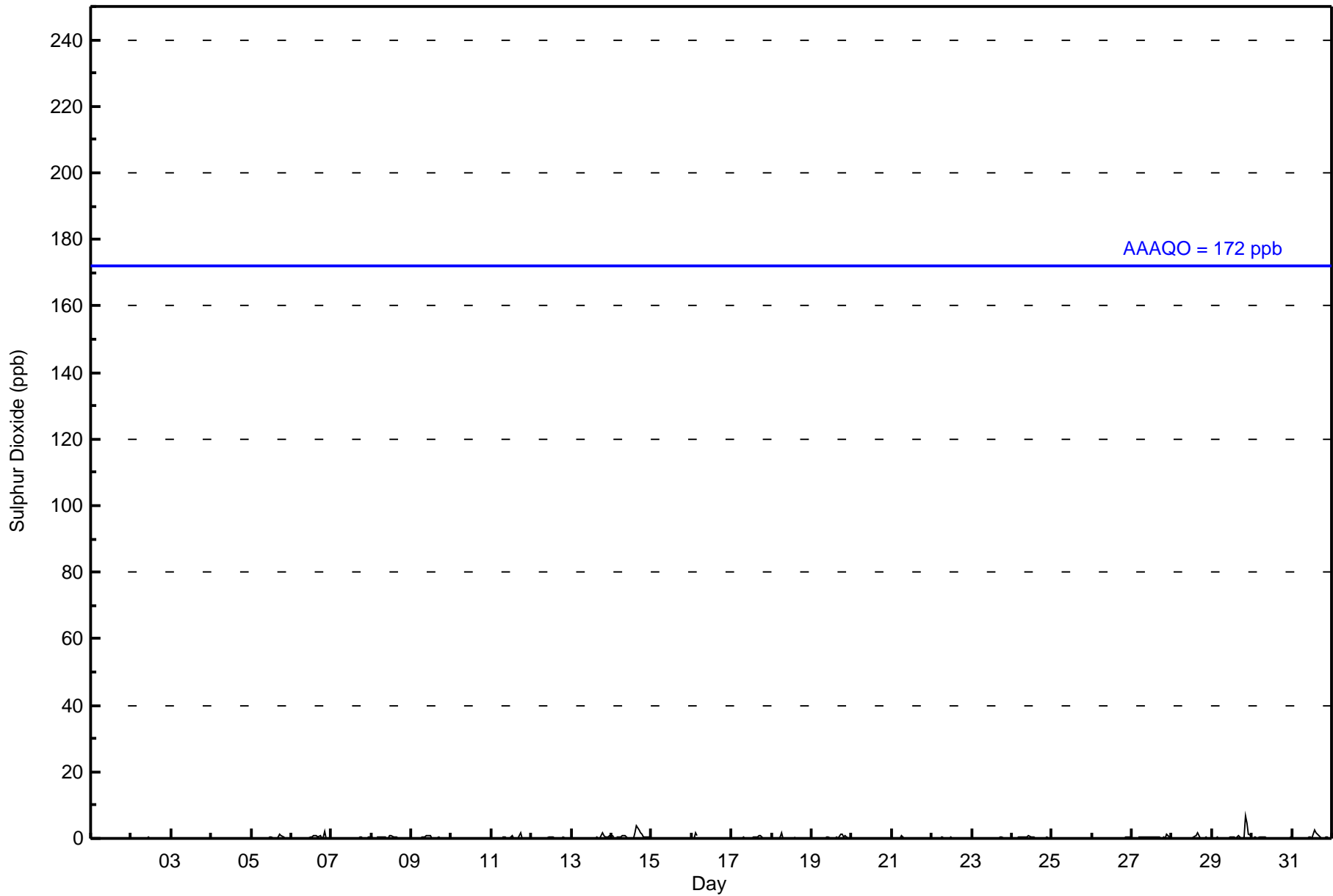
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
2-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
3-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
4-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0.2	1
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	2	0	0	0	0	0.3	2
7-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.3	1
9-Jul	0	0	0	Z	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
10-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0.2	2
12-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0.3	2
14-Jul	1	0	Z	0	0	1	1	1	1	0	0	0	0	0	2	4	3	2	1	0	0	1	0	0	0.8	4
15-Jul	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-Jul	0	0	2	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1
18-Jul	Z	0	0	0	0	1	2	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	2
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0.3	1
20-Jul	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-Jul	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
22-Jul	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
23-Jul	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
24-Jul	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
25-Jul	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-Jul	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
27-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0.3	2
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	7	4	1	1	0.8	7	
30-Jul	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
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0.4	2
																								Diurnal Average		
																								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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mackay River - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mackay River - July 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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707
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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707

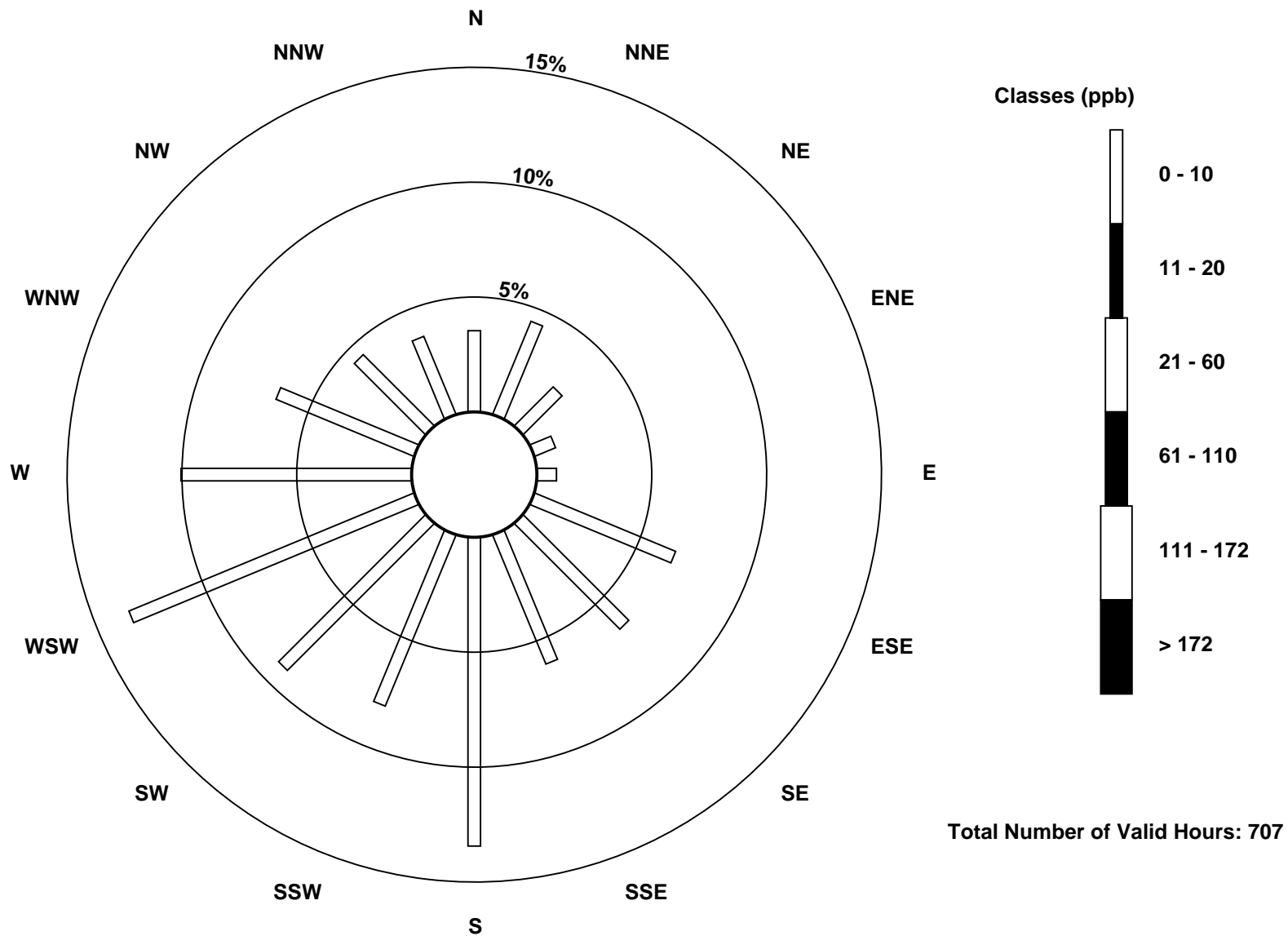
Total Number of Valid Hours: 707

Total Number of Hours: 744

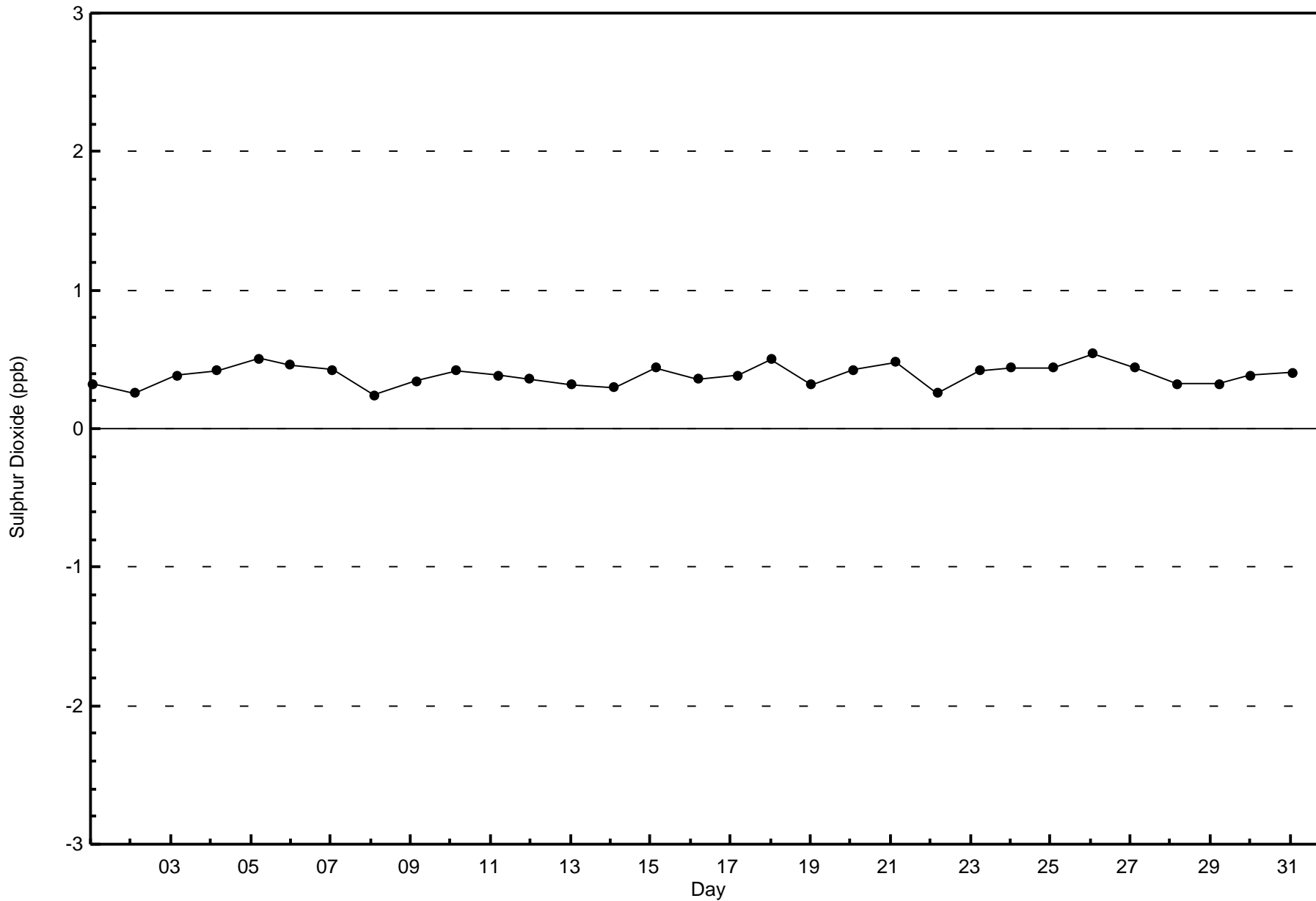


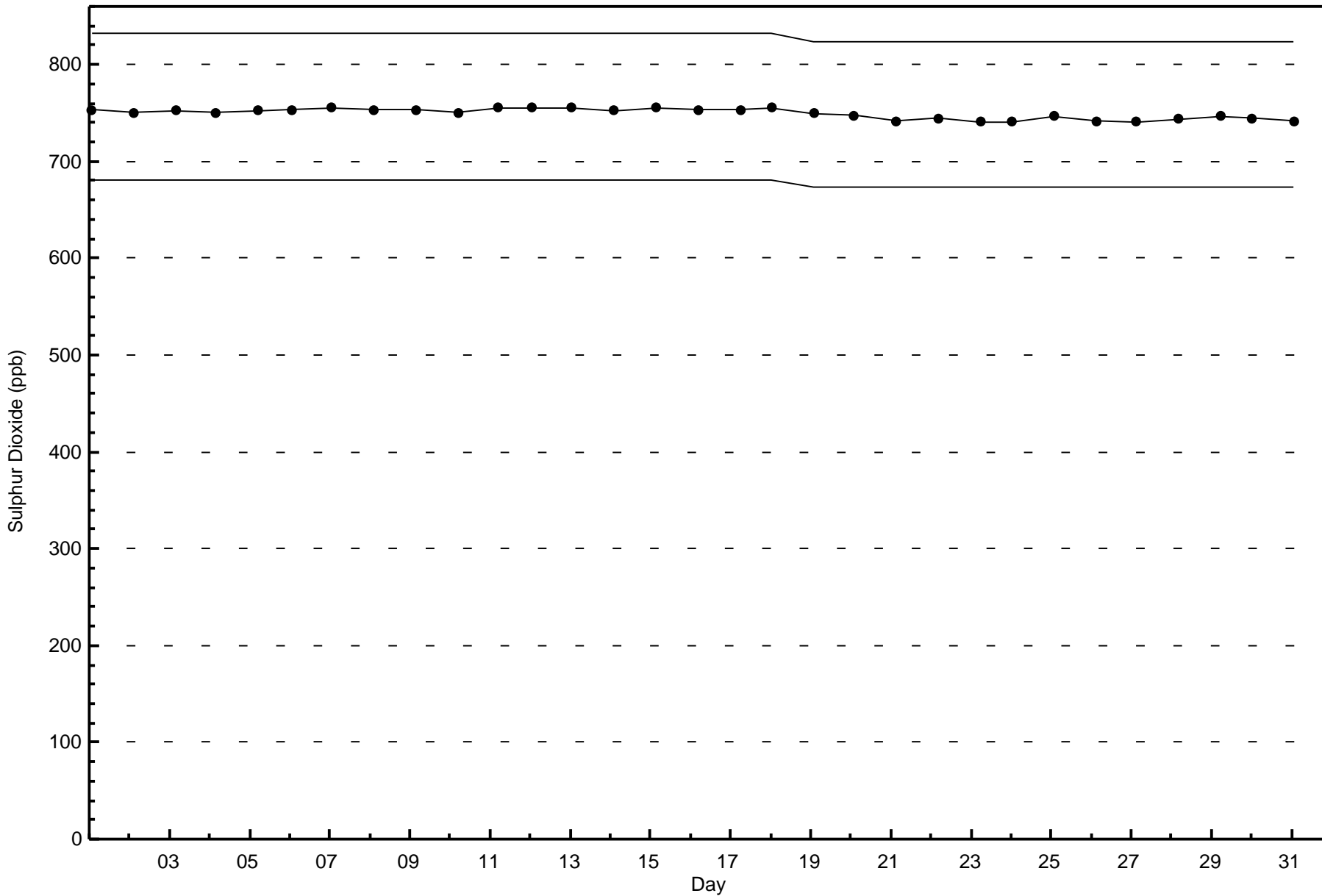
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Mackay River (AMS 20)



Total Number of Valid Hours: 707







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2 ppb on Jul 14 03:00	Maximum Daily Average: 0.4 ppb on Jul 24		Hours of Data:	702
Minimum Value: 0 ppb on Jul 6 07:00	Minimum Daily Average: 0.1 ppb on Jul 9		Hours of Missing Data:	42
Maximum Diurnal Average: 0.3 ppb at hour 3	Minimum Diurnal Average: 0.2 ppb at hour 4		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:	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-Jul	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	
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0.2	0
3-Jul	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-Jul	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	
5-Jul	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	0.1	0	
6-Jul	0	Z	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	
7-Jul	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	
8-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0.2	0	
9-Jul	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	
10-Jul	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-Jul	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-Jul	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	
13-Jul	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	0.3	0	
14-Jul	0	1	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	
15-Jul	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	
16-Jul	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	
17-Jul	0	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	
18-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	C	C	0	0	0	0	0	0	0	0	0	0.2	0	
19-Jul	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	0.3	0	
20-Jul	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	0.3	1	
21-Jul	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-Jul	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	
23-Jul	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	1	
24-Jul	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	0.4	1	
25-Jul	0	0	Z	0	0	0	0	0	0	0	UO	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
26-Jul	0	0	0	Z	0	0	0	0	0	0	0	UO	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	
27-Jul	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-Jul	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	
29-Jul	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	0.2	1	
30-Jul	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	0.3	1	
31-Jul	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	0.3	0	

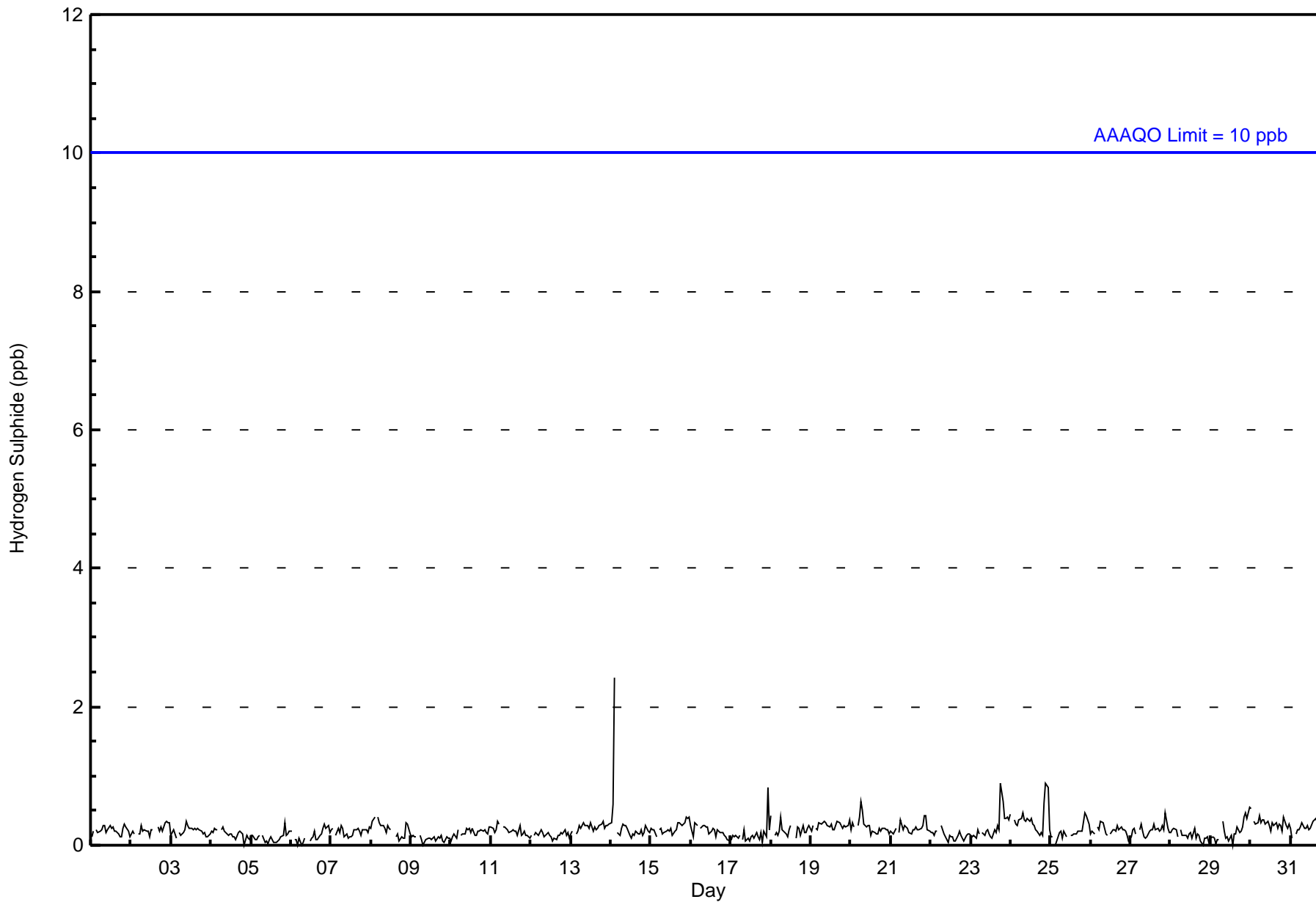
0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	Diurnal Average		
1	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	Diurnal Maximum

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
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	702	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: 702

Total Number of Hours: 744



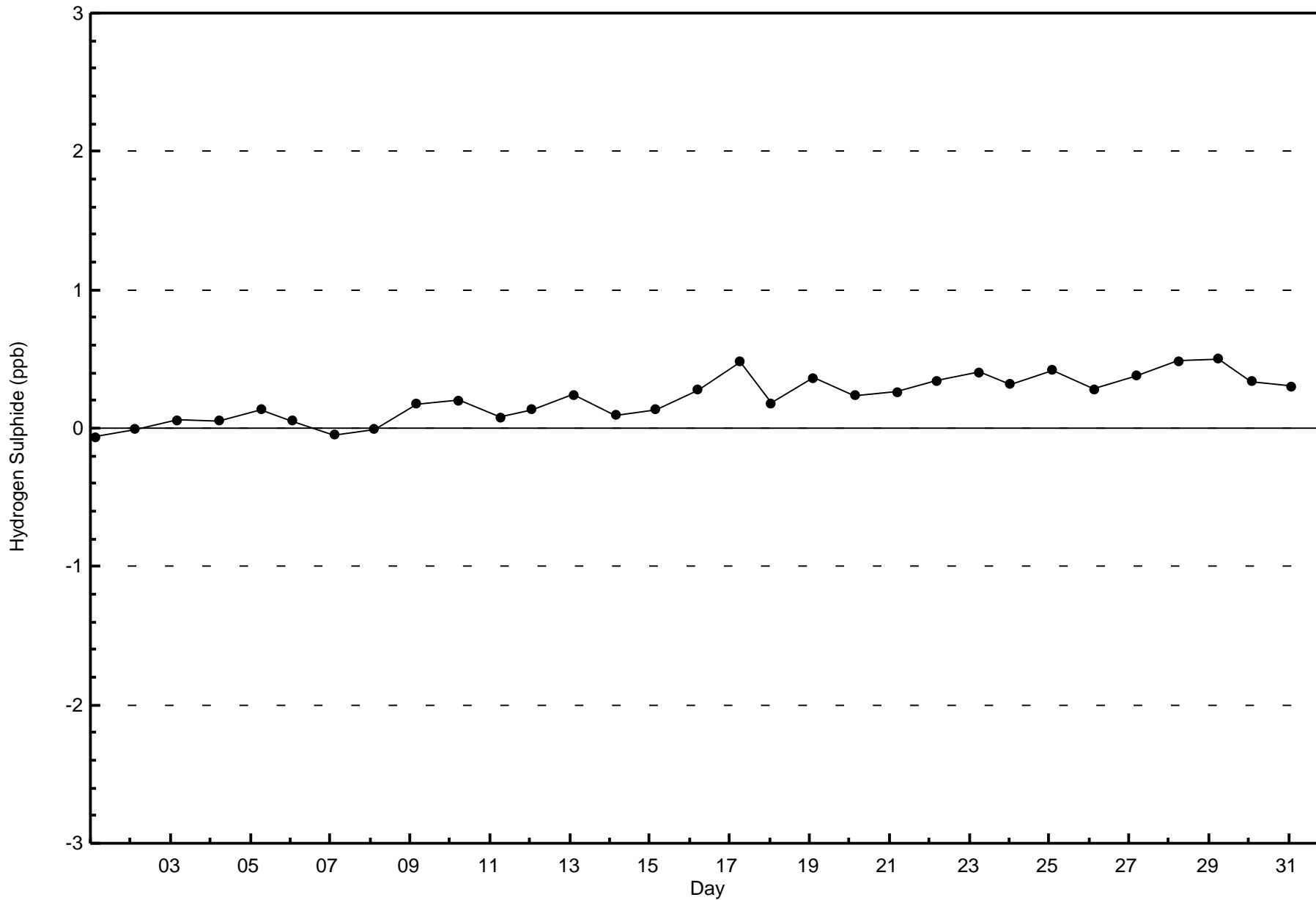
**Wood Buffalo Environmental Association
Frequency Distribution**

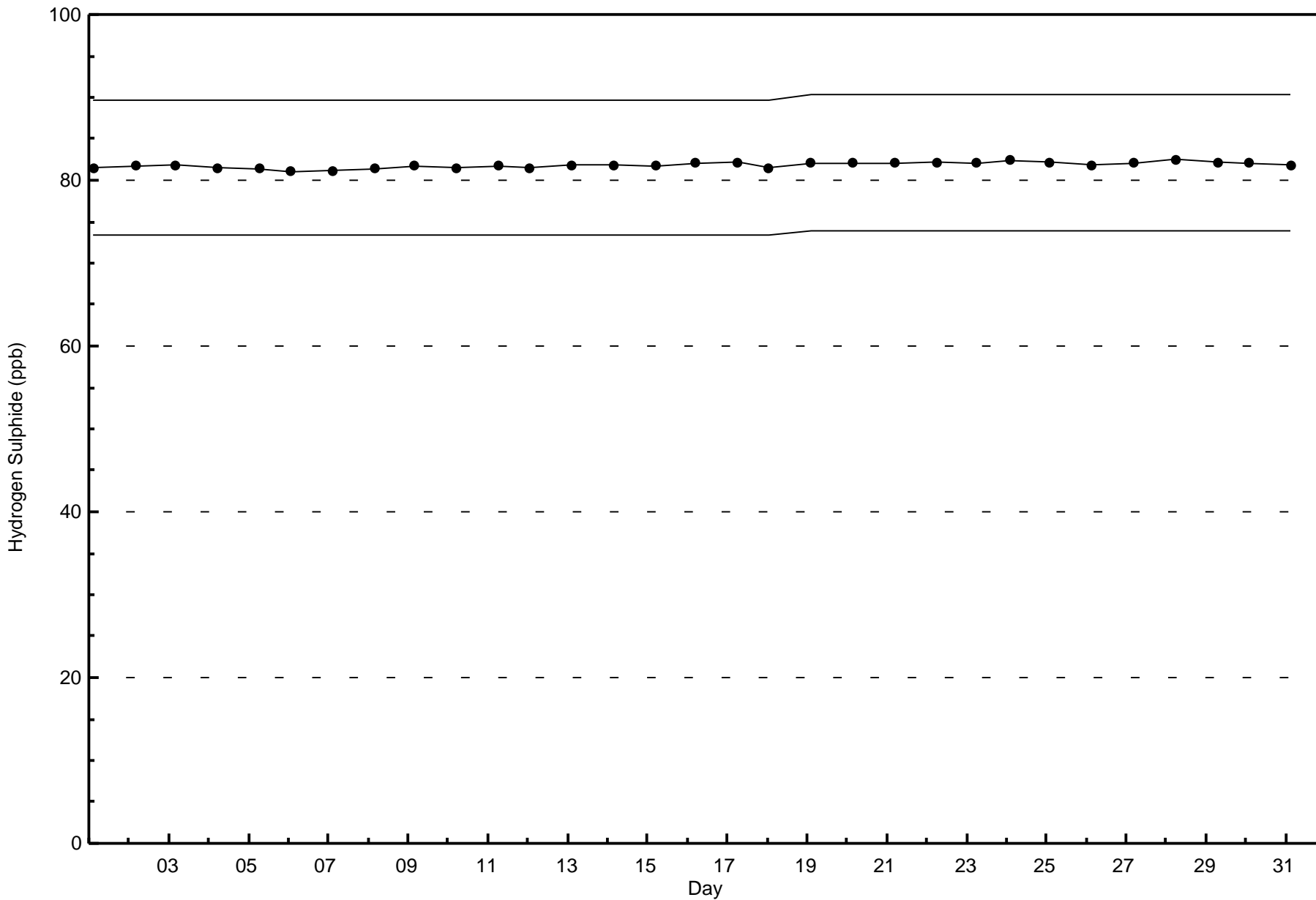
**Hydrogen Sulphide (H₂S) - ppb
Mackay River - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	25	32	16	8	7	46	44	45	93	56	63	93	66	46	33	27	700
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	25	32	16	8	7	46	44	45	93	56	63	93	66	46	33	27	700

Total Number of Valid Hours: 700

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

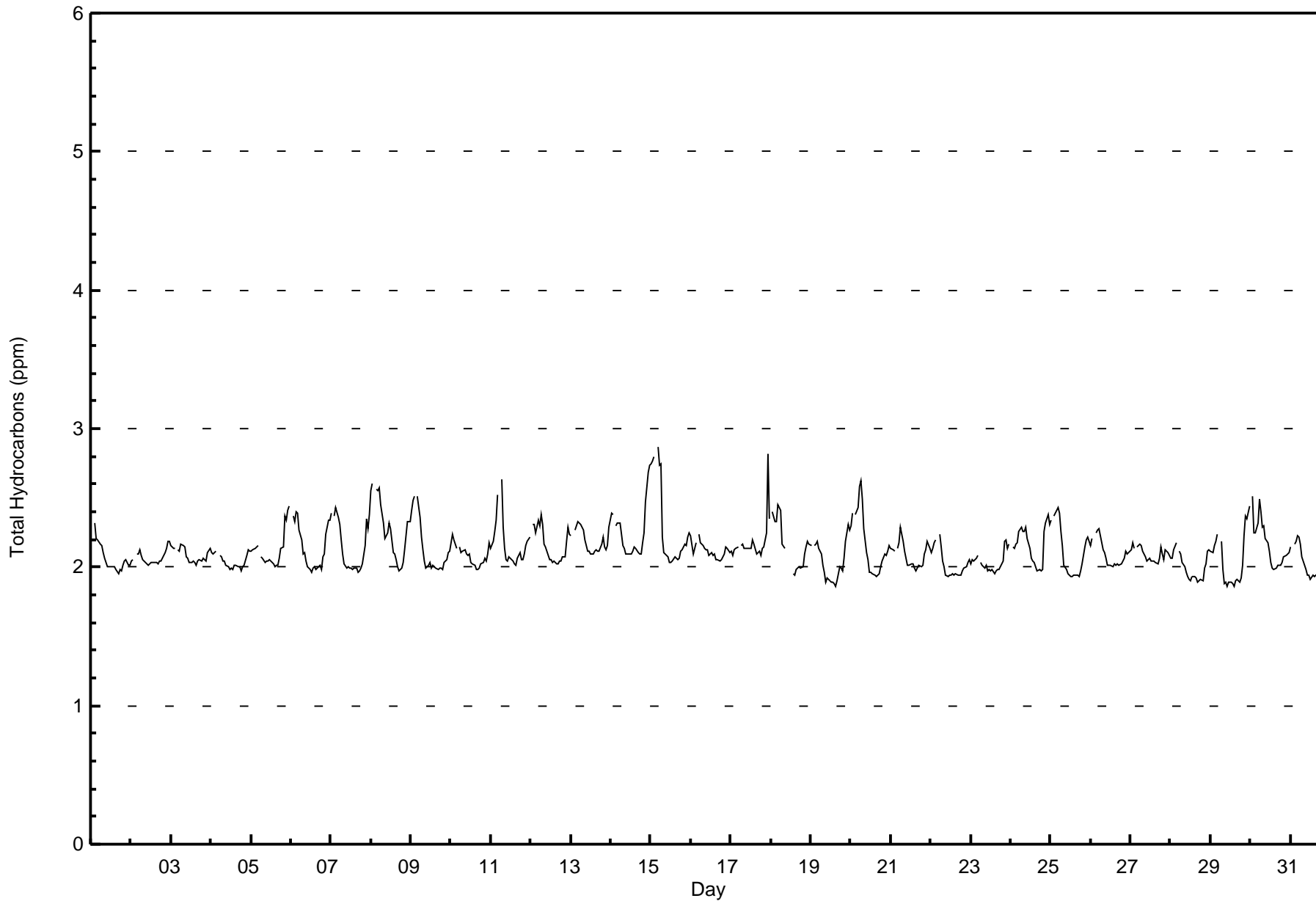
Total Hydrocarbons (THC) - ppm
Mackay River - July 2017

Maximum Value: 2.9 ppm on Jul 15 05:00		Maximum Daily Average: 2.3 ppm on Jul 15		Hours in Service: 744																																												
Minimum Value: 1.9 ppm on Jul 29 15:00		Minimum Daily Average: 2.0 ppm on Jul 28		Hours of Data: 709																																												
Maximum Diurnal Average: 2.3 ppm at hour 5		Minimum Diurnal Average: 2.0 ppm at hour 17		Hours of Missing Data: 35																																												
Monthly Average: 2.12 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.7		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-Jul	2.3	Z	2.3	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	2.1	2.0	2.0	2.1	2.3																						
2-Jul	2.0	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	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.2																						
3-Jul	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.2																						
4-Jul	2.1	2.1	2.1	2.1	Z	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	2.1	2.1	2.1	2.1																						
5-Jul	2.1	2.1	2.1	2.1	2.2	Z	2.1	2.1	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	2.4	2.3	2.4	2.4	2.1																						
6-Jul	Z	2.4	2.3	2.4	2.4	2.3	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	2.1	2.1	2.2	2.3	2.3	2.1	2.4																						
7-Jul	2.4	Z	2.4	2.4	2.4	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	2.2	2.3	2.3	2.4	2.1	2.4																						
8-Jul	2.6	2.6	Z	2.6	2.6	2.6	2.5	2.3	2.2	2.2	2.2	2.3	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3	2.6																						
9-Jul	2.4	2.5	2.5	Z	2.5	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.5																						
10-Jul	2.2	2.2	2.2	2.1	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	2.1	2.0	2.1	2.2	2.1	2.2																						
11-Jul	2.1	2.2	2.3	2.3	2.5	Z	2.6	2.3	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.6																						
12-Jul	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.3	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	2.2	2.3	2.2	2.2	2.4																						
13-Jul	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.3																						
14-Jul	2.4	2.4	Z	2.3	2.3	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	2.2	2.3	2.5	2.7	2.7	2.2																						
15-Jul	2.7	2.8	2.8	Z	2.9	2.7	2.7	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.9																						
16-Jul	2.2	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																						
17-Jul	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.8	2.3	2.2	2.8																						
18-Jul	Z	2.4	2.3	2.3	2.4	2.4	2.4	2.2	2.1	C	C	C	C	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.4																						
19-Jul	2.2	Z	2.2	2.2	2.2	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	2.0	2.0	2.0	2.1	2.2	2.3	2.3																						
20-Jul	2.3	2.4	Z	2.4	2.4	2.6	2.6	2.5	2.3	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.6																						
21-Jul	2.1	2.1	2.1	Z	2.1	2.2	2.3	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	2.1	2.1	2.2	2.1	2.1	2.3																						
22-Jul	2.1	2.1	2.2	2.2	Z	2.2	2.1	2.0	2.0	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	2.0	2.0	2.0	2.2																						
23-Jul	2.0	2.1	2.0	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	2.2	2.2	2.1	2.2	2.0	2.2																						
24-Jul	Z	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.3	2.2	2.4																					
25-Jul	2.3	Z	2.4	2.4	2.4	2.4	2.3	2.2	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	2.1	2.2	2.2	2.2	2.1	2.4																					
26-Jul	2.2	2.2	Z	2.2	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	2.1	2.1	2.1	2.1	2.3																					
27-Jul	2.1	2.2	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.1	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	2.1	2.1	2.1	2.2																					
28-Jul	2.1	2.1	2.1	2.2	Z	2.1	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	2.1	2.1	2.0	2.2																						
29-Jul	2.1	2.1	2.2	2.2	2.2	Z	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	2.0	2.2	2.4	2.3	2.4	2.1	2.4																					
30-Jul	Z	2.5	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.5																						
31-Jul	2.1	Z	2.2	2.2	2.2	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	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.3																						
																								2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	Diurnal Average
																								2.7	2.8	2.8	2.6	2.9	2.7	2.7	2.5	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.4	2.5	2.8	2.7	Diurnal Maximum
Z - zerospan		C - Calibration																																														



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mackay River - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	273	38.50	38.50
2.1 - 3.0	436	61.50	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



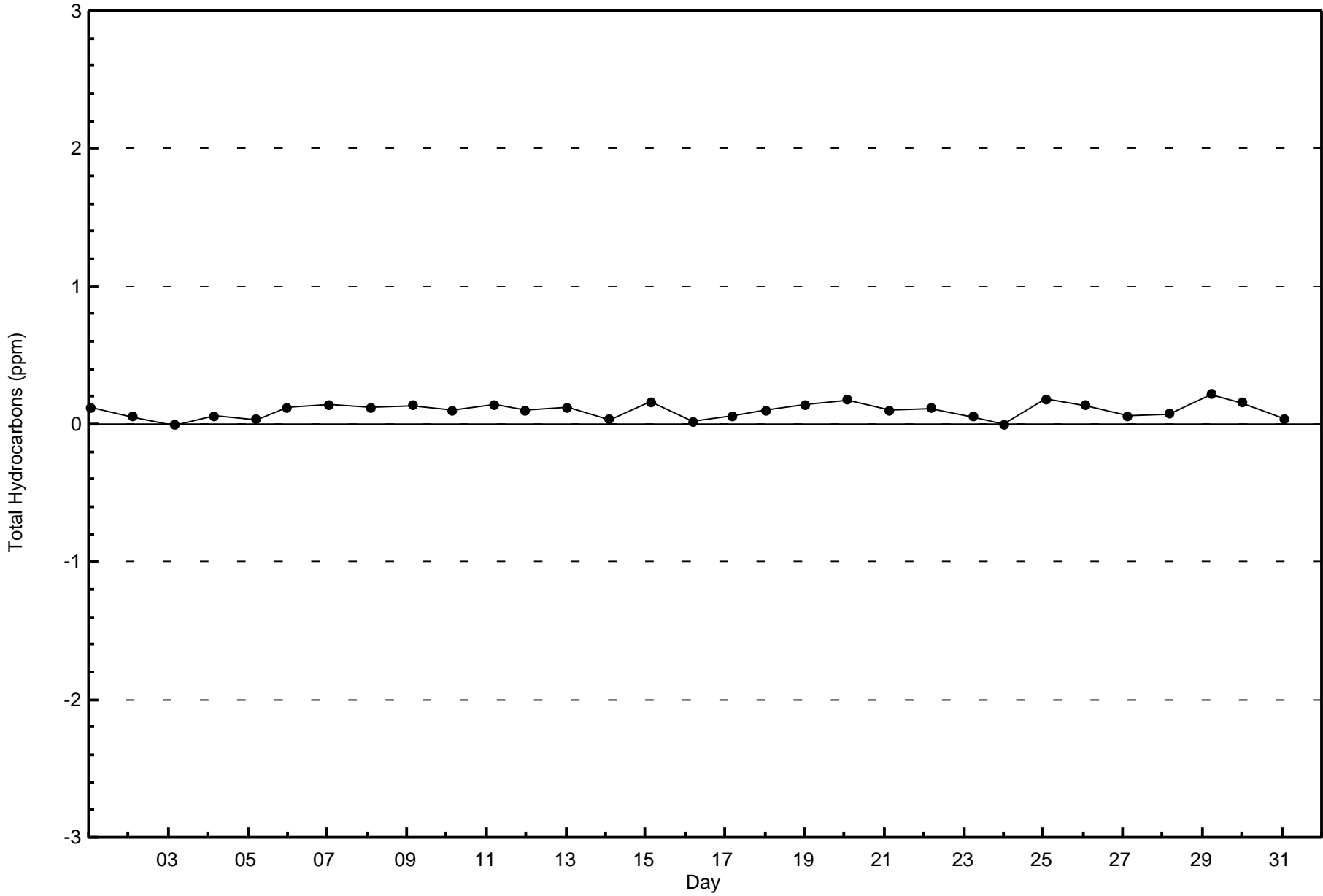
Wood Buffalo Environmental Association
Frequency Distribution

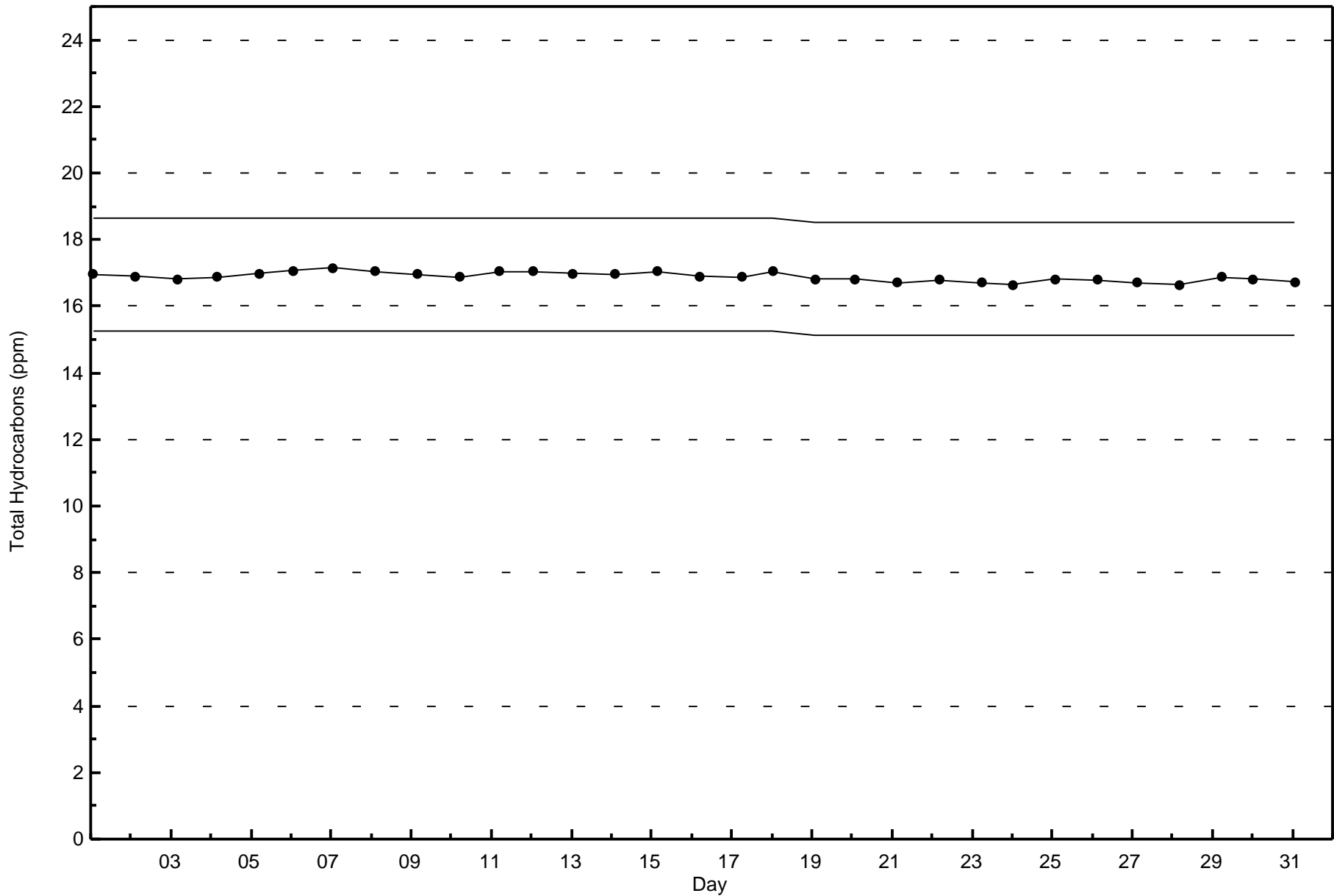
Total Hydrocarbons (THC) - ppm
Mackay River - July 2017

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	3	7	0	2	24	9	11	23	19	18	56	42	31	12	10	273
2.1 - 3.0	19	28	10	7	4	23	37	32	72	38	46	39	29	15	19	16	434
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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707

Total Number of Valid Hours: 707

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

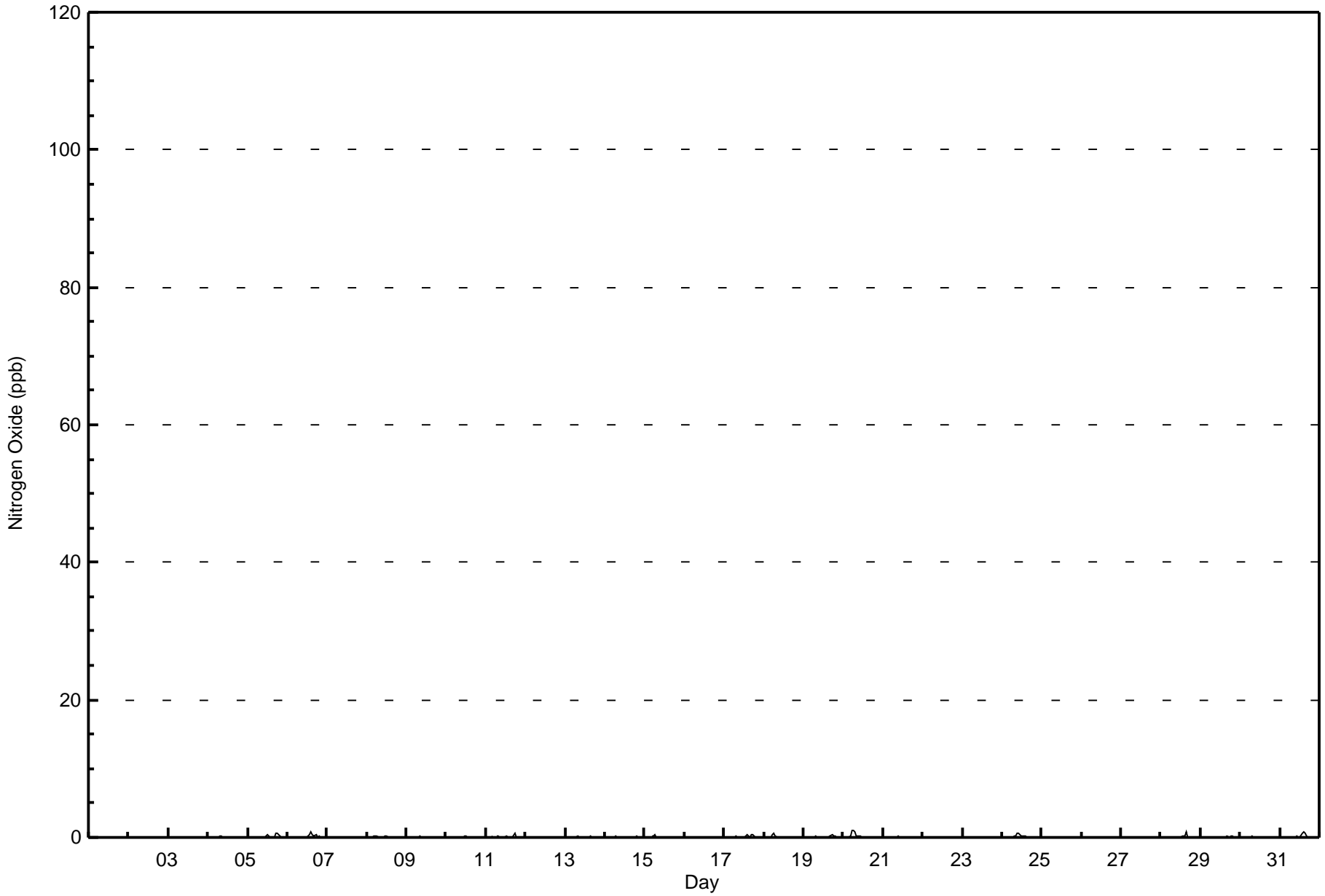
Nitrogen Oxide (NO) - ppb
Mackay River - July 2017

Maximum Value: 1 ppb on Jul 20 06:00																	Maximum Daily Average: 0.2 ppb on Jul 20																	Hours in Service: 744															
Minimum Value: 0 ppb on Jul 1 17:00																	Minimum Daily Average: 0.0 ppb on Jul 16																	Hours of Data: 709															
Maximum Diurnal Average: 0.1 ppb at hour 7																	Minimum Diurnal Average: 0.0 ppb at hour 24																	Hours of Missing Data: 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																	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-Jul	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-Jul	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																							
3-Jul	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-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0.1	1																							
6-Jul	Z	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	1																							
7-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.1	1																							
12-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	1	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
19-Jul	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-Jul	0	0	Z	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																							
21-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1																							
25-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.1	1																							
29-Jul	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-Jul	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																							
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0.1	1																							
																								0.0	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	0.0	0.0	0.0	0.0	Diurnal Average	
																								0	0	0	0	0	1	1	1	0	1	1	0	0	1	1	1	0	1	1	0	0	0	0	0	0	Diurnal Maximum
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Mackay River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	709	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Mackay River - July 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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707
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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707

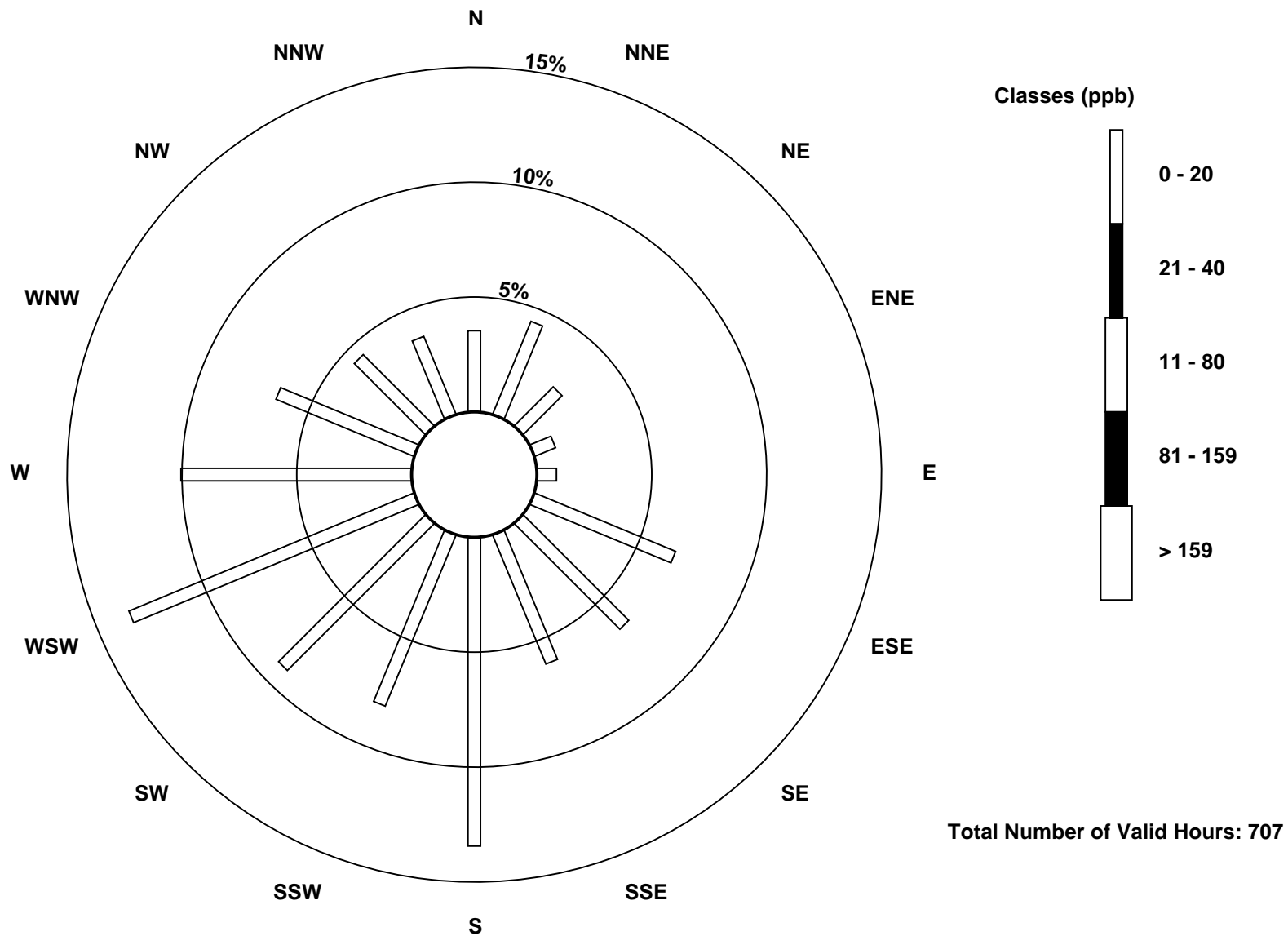
Total Number of Valid Hours: 707

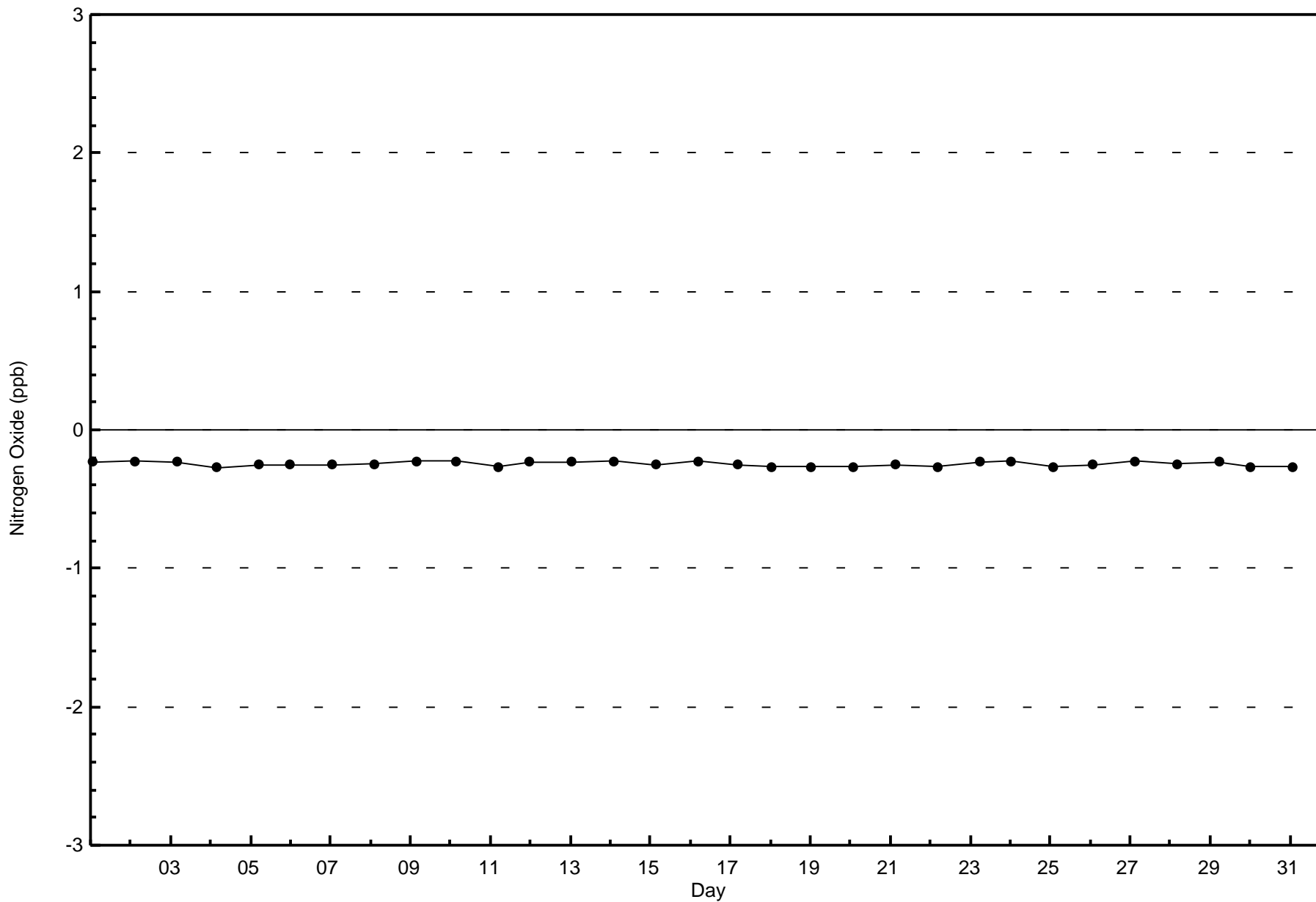
Total Number of Hours: 744

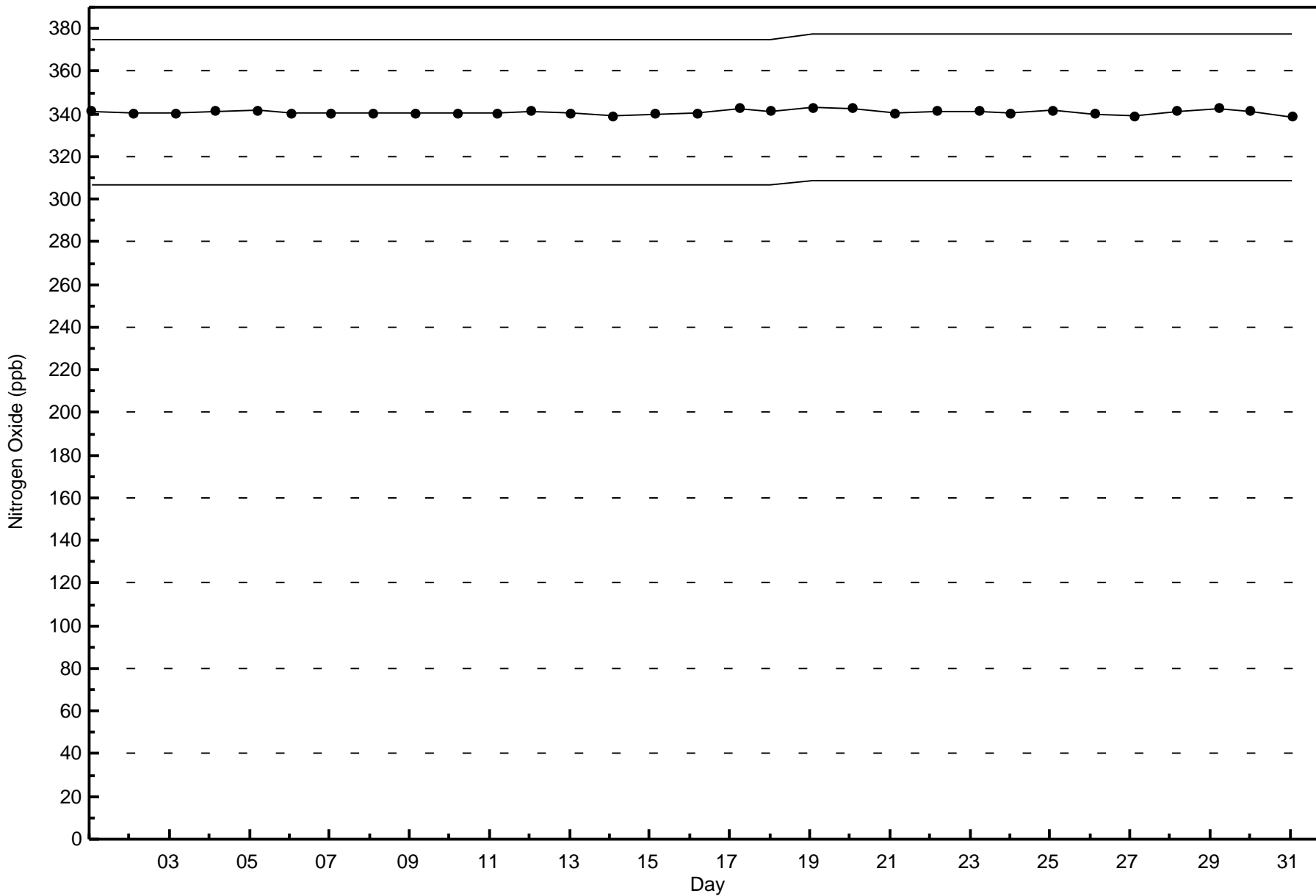


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxide (NO) - ppb
Mackay River (AMS 20)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Mackay River - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 11 ppb on Jul 20 07:00	Maximum Daily Average: 2.0 ppb on Jul 20		Hours of Data:	709
Minimum Value: 0 ppb on Jul 1 01:00	Minimum Daily Average: 0.2 ppb on Jul 25		Hours of Missing Data:	35
Maximum Diurnal Average: 1.1 ppb at hour 7	Minimum Diurnal Average: 0.5 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P ₉₉ = 3		Percent Operational Time:	100.0

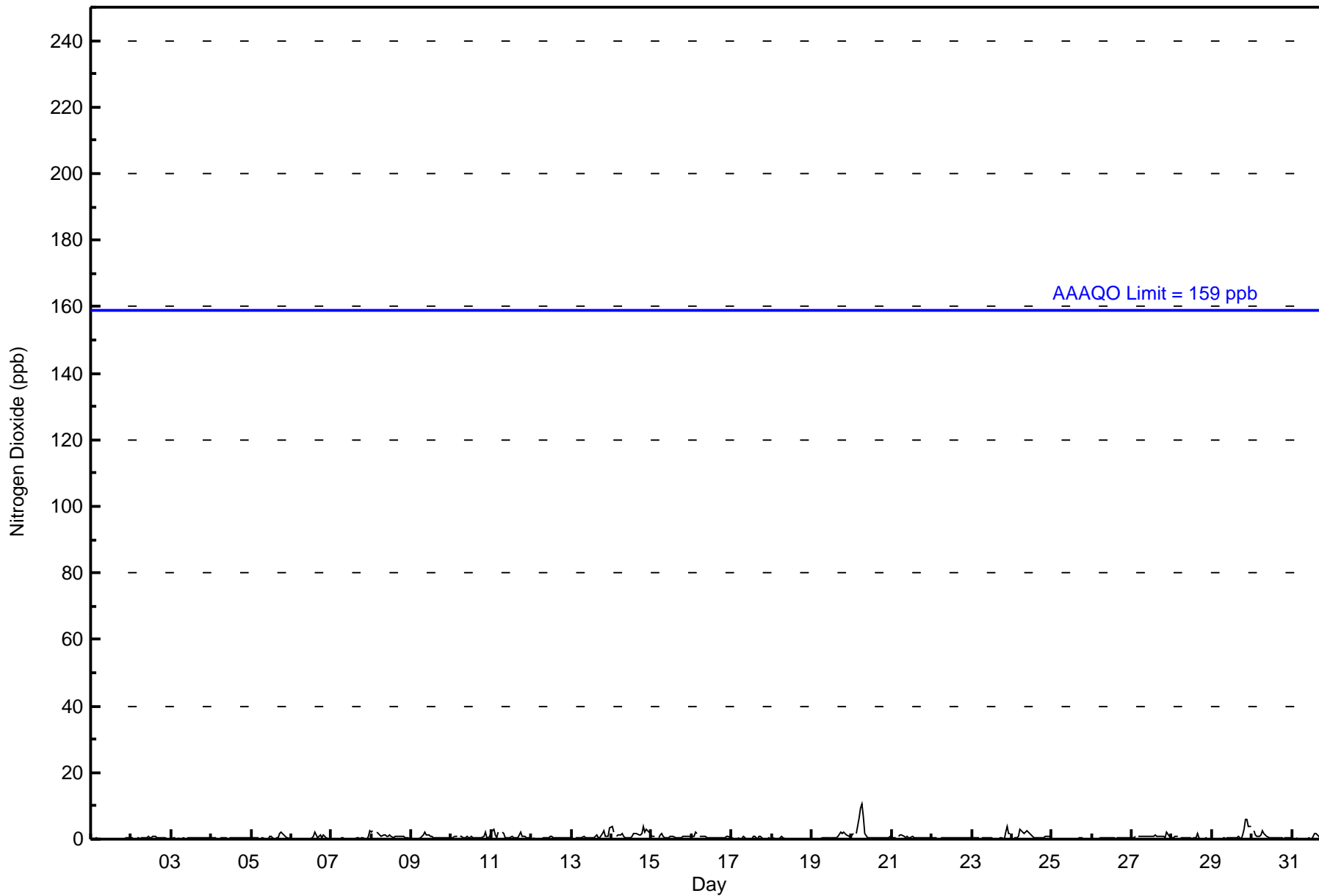
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1
2-Jul	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.4	1
3-Jul	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
4-Jul	0	0	0	1	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.4	1
5-Jul	1	1	1	1	1	Z	0	0	0	0	1	1	0	0	0	0	0	2	2	1	1	0	0	0	0.6	2
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	0	1	1	0	0	0	0.5	2
7-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.3	2
8-Jul	2	3	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1.1	3
9-Jul	0	0	0	Z	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	2
10-Jul	1	1	1	1	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	2	1	0	1	0.7	2
11-Jul	2	3	1	1	2	Z	2	2	1	0	0	0	1	1	1	1	1	2	1	1	1	1	0	0	1.0	3
12-Jul	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1
13-Jul	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	3	1	1	1	3	0.8	3
14-Jul	4	2	Z	1	1	1	2	1	1	0	0	1	1	2	2	2	2	1	2	4	2	3	2	2	1.7	4
15-Jul	1	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7	2
16-Jul	1	1	2	2	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.7	2
17-Jul	0	0	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0.4	1
18-Jul	Z	0	0	0	0	1	1	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	1
19-Jul	0	Z	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1	2	2	2	2	1	1	1	0.7	2
20-Jul	1	2	Z	2	7	9	11	7	2	1	1	0	0	1	0	1	0	0	0	1	0	0	1	1	2.0	11
21-Jul	0	0	0	Z	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	1	0.6	1
22-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.4	1
23-Jul	0	0	0	1	1	Z	1	1	1	1	1	1	0	0	0	0	0	0	1	0	2	4	2	2	0.7	4
24-Jul	Z	0	0	0	1	3	2	2	2	3	2	1	1	1	1	0	0	0	0	0	1	1	1	0	1.0	3
25-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.3	1
27-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0	0.8	2
28-Jul	1	1	1	1	Z	1	1	1	1	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0.5	2
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	1	3	6	6	4	4	1.2	6
30-Jul	Z	3	1	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.8	3
31-Jul	1	Z	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	1	1	1	1	0.5	2
	0.7	0.8	0.5	0.5	0.8	1.0	1.1	0.9	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.6	0.8	0.9	0.9	0.7	0.7	Diurnal Average	
	4	3	2	2	7	9	11	7	2	3	2	1	1	2	2	2	1	2	2	4	6	6	4	4	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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	709	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - July 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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707
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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707

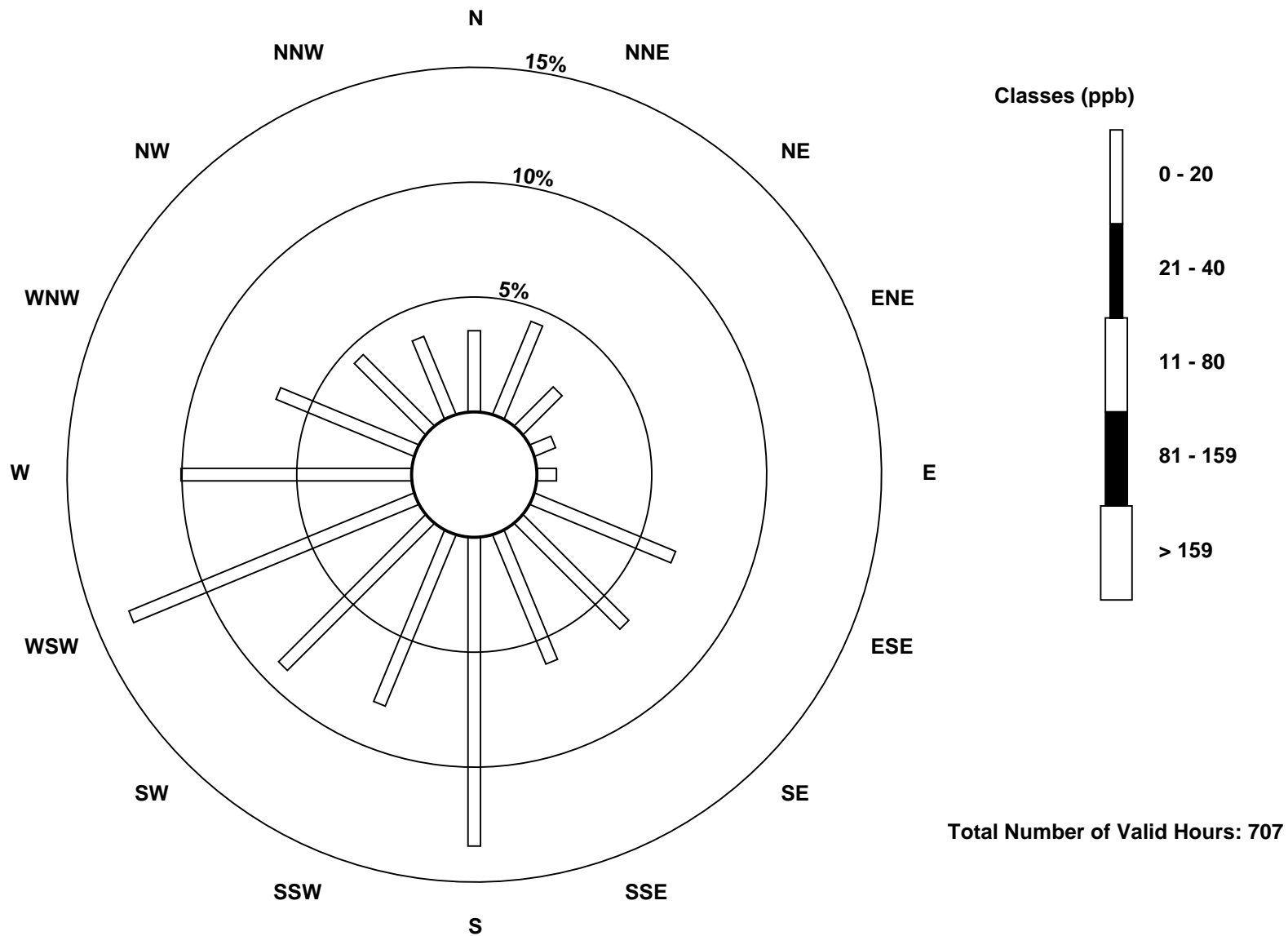
Total Number of Valid Hours: 707

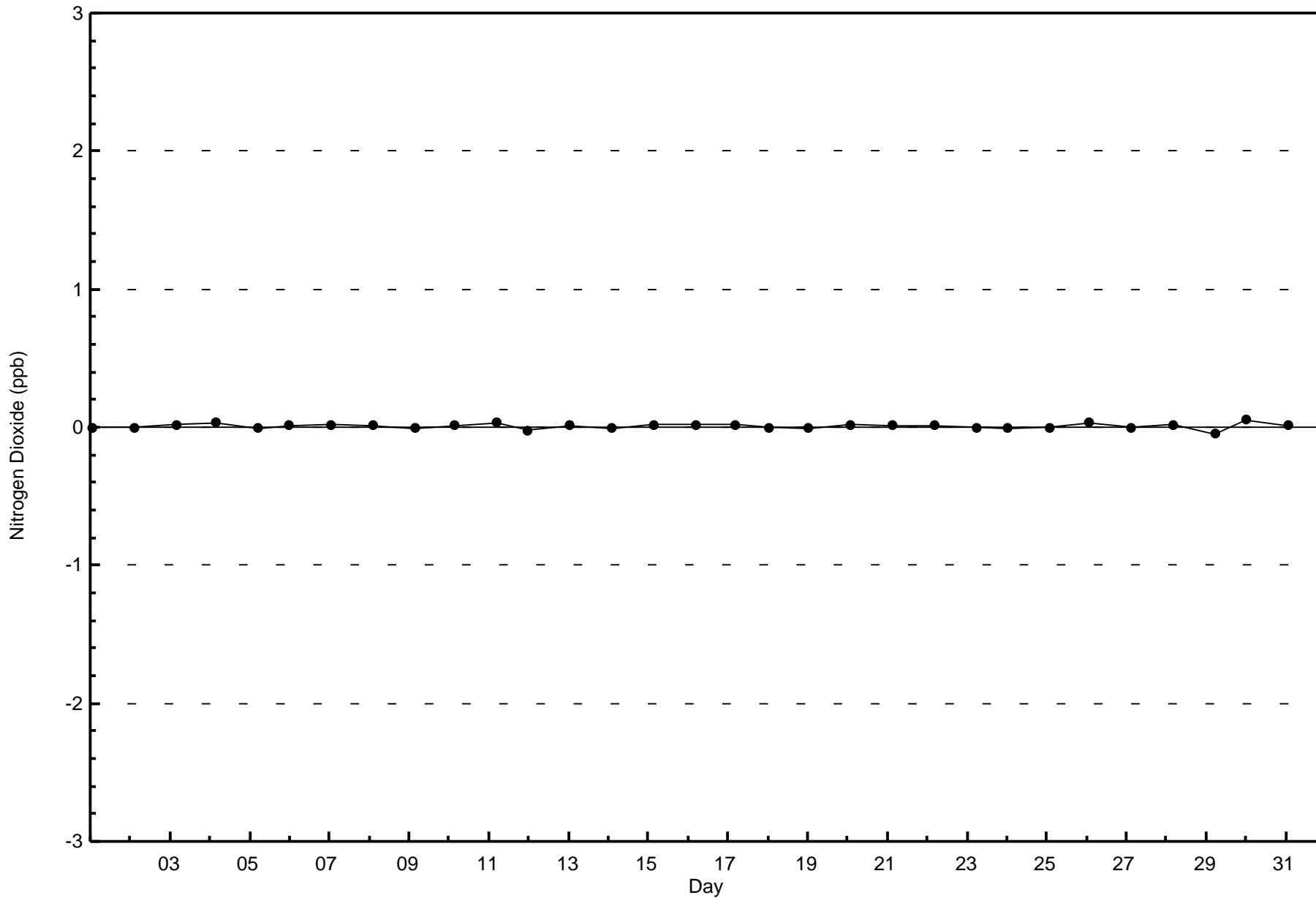
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Mackay River (AMS 20)

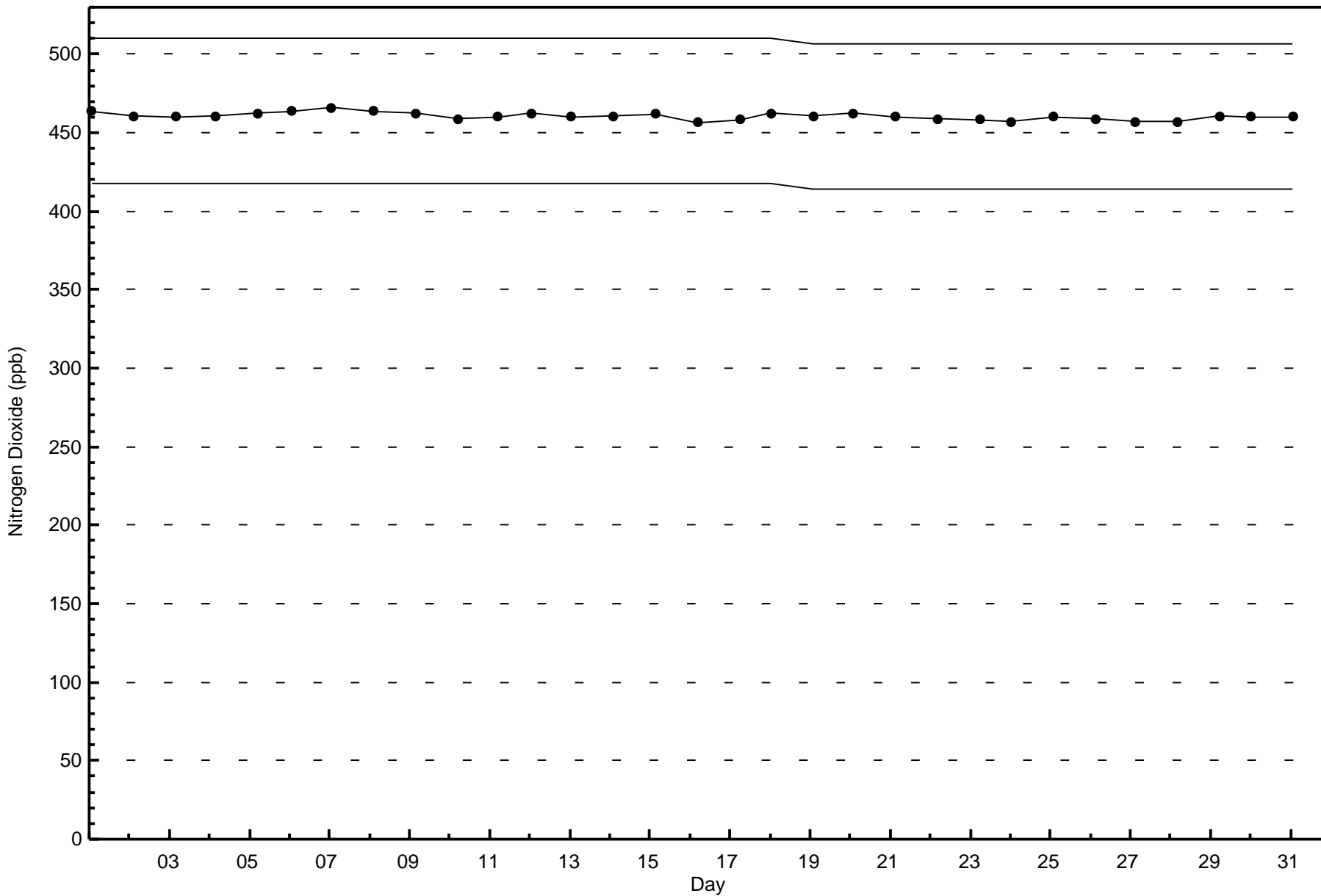






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Mackay River - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

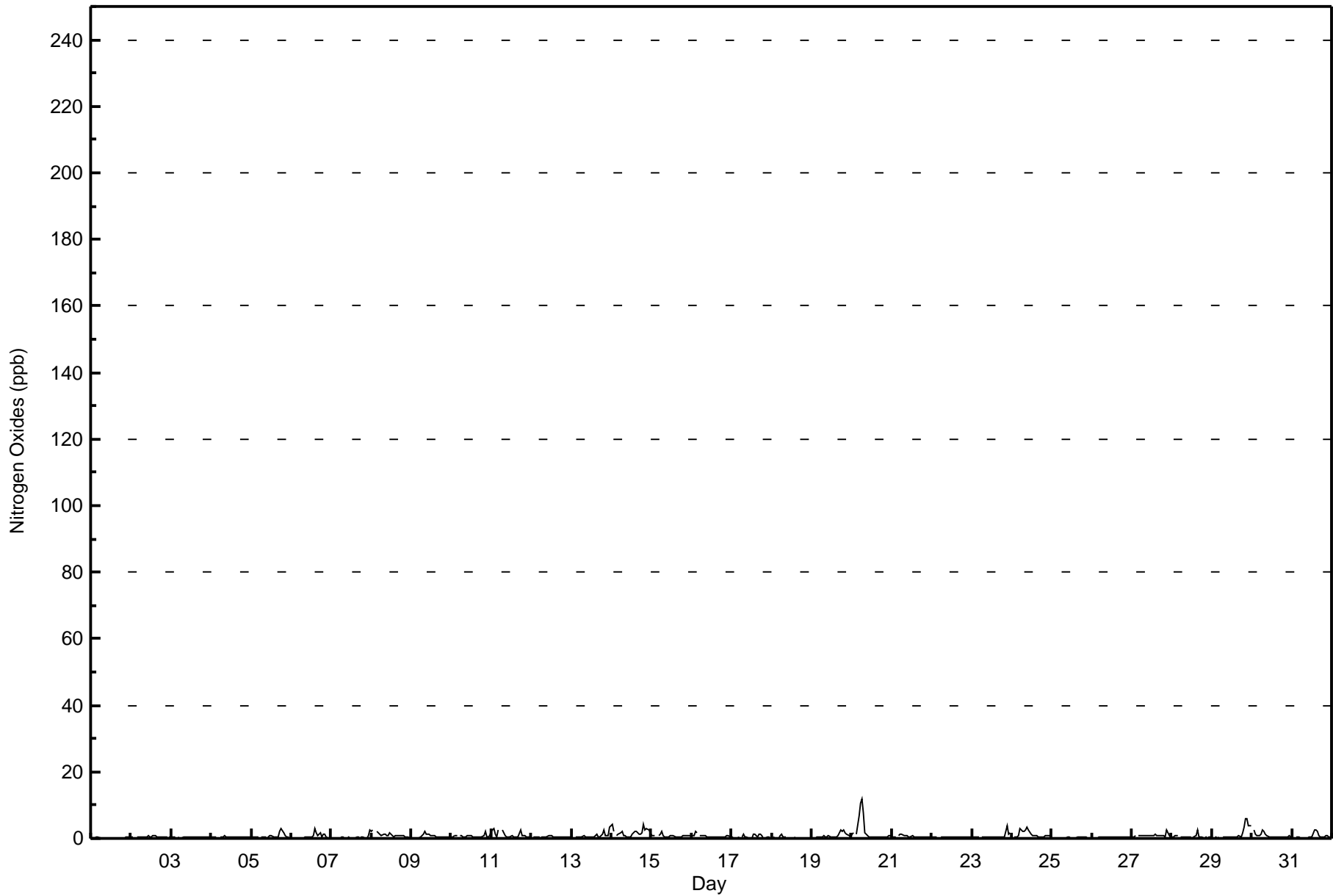
Mackay River - July 2017

Maximum Value: 12 ppb on Jul 20 07:00																	Maximum Daily Average: 2.2 ppb on Jul 20																	Hours in Service: 744			
Minimum Value: 0 ppb on Jul 7 05:00																	Minimum Daily Average: 0.2 ppb on Jul 25																	Hours of Data: 709			
Maximum Diurnal Average: 1.2 ppb at hour 7																	Minimum Diurnal Average: 0.5 ppb at hour 3																	Hours of Missing Data: 35			
Monthly Average: 0.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 3																	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-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.2	1											
2-Jul	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1											
3-Jul	0	0	1	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1											
4-Jul	0	0	0	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.4	1											
5-Jul	0	1	0	0	0	Z	0	0	0	0	0	1	1	0	0	0	0	2	3	2	1	0	0	0	0.7	3											
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	2	0	1	1	0	0	0	0.6	3											
7-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0.3	2											
8-Jul	2	3	Z	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	0	0	0	1.1	3											
9-Jul	0	0	0	Z	0	1	1	1	2	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0.7	2											
10-Jul	0	1	1	1	Z	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	2	0	0	1	0.7	2											
11-Jul	2	3	1	1	2	Z	2	2	1	0	0	0	1	0	1	1	0	3	1	1	1	1	0	0	1.1	3											
12-Jul	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.4	1											
13-Jul	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	3	0.8	3											
14-Jul	4	2	Z	1	1	2	2	1	1	0	0	0	1	2	2	2	1	1	2	4	2	3	2	2	1.7	4											
15-Jul	1	1	1	Z	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	2											
16-Jul	1	1	2	2	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.7	2											
17-Jul	0	0	0	0	0	Z	0	1	0	0	0	0	0	1	1	0	1	1	1	0	0	0	0	0	0.5	1											
18-Jul	Z	0	0	0	0	1	1	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.3	1											
19-Jul	0	Z	0	0	0	0	0	1	0	1	1	0	0	0	0	1	1	3	2	2	2	1	1	1	0.8	3											
20-Jul	1	2	Z	1	7	11	12	7	2	1	1	0	1	1	0	1	0	0	0	0	0	0	1	1	2.2	12											
21-Jul	0	0	0	Z	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0.6	1											
22-Jul	0	0	0	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1											
23-Jul	0	0	0	0	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	1	0	2	4	1	2	0.7	4											
24-Jul	Z	0	0	0	1	3	2	2	3	3	3	1	1	1	1	1	0	0	0	1	1	1	0	0	1.1	3											
25-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1											
27-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0	0.9	2											
28-Jul	1	1	1	1	Z	1	1	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0.5	3											
29-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	2	3	6	6	4	4	1.3	6											
30-Jul	Z	3	1	1	1	1	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0.8	3											
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	0	0	0	1	1	1	0	0.6	3											
																	0.7																	Diurnal Average			
																	4																	Diurnal Maximum			
Z - zerospan																	C - Calibration																				



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	709	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - July 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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707
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	25	31	17	7	6	47	46	43	95	57	64	95	71	46	31	26	707

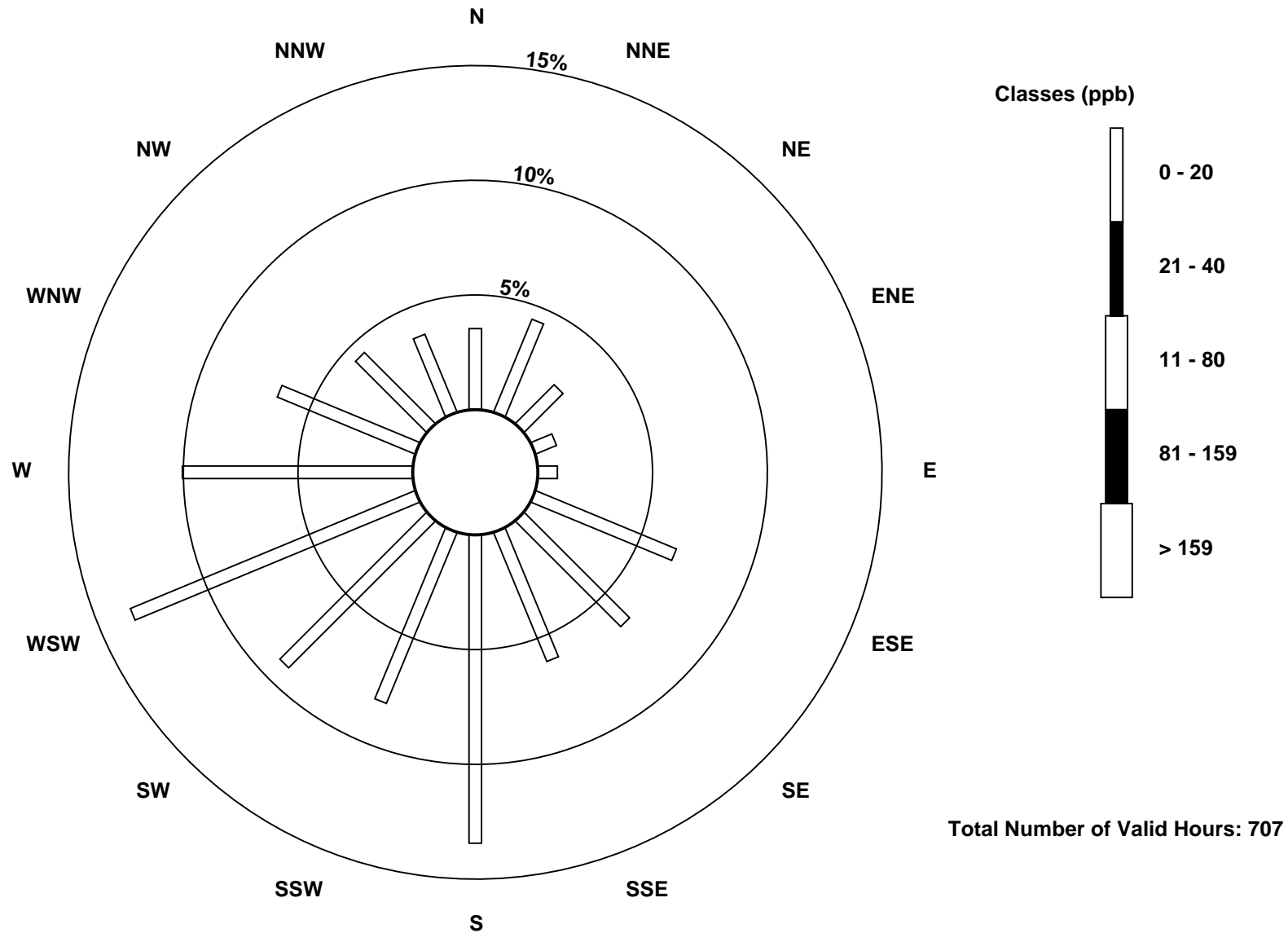
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

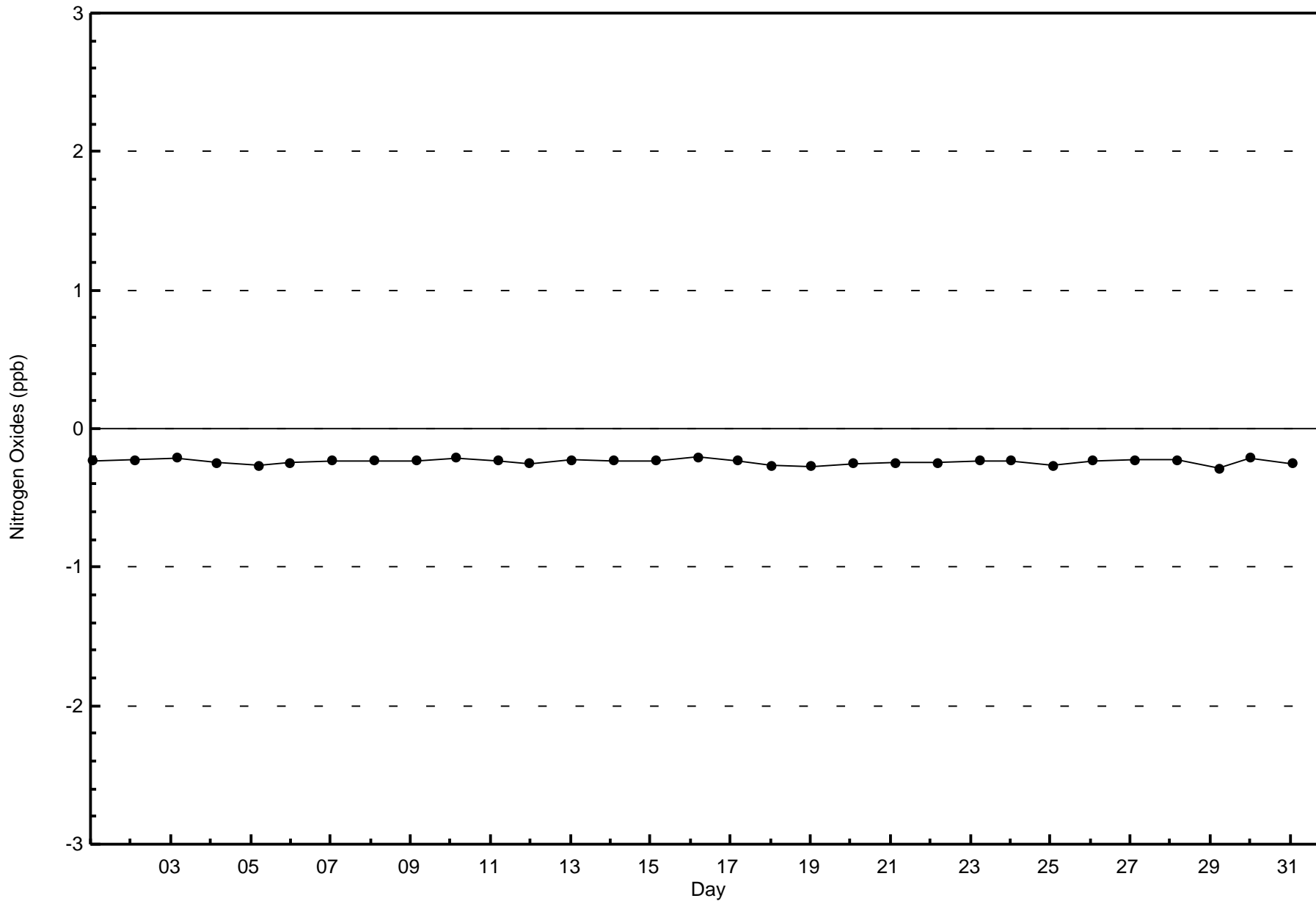
Nitrogen Oxides (NO_x) - ppb
Mackay River (AMS 20)





Wood Buffalo Environmental Association
Zero Responses

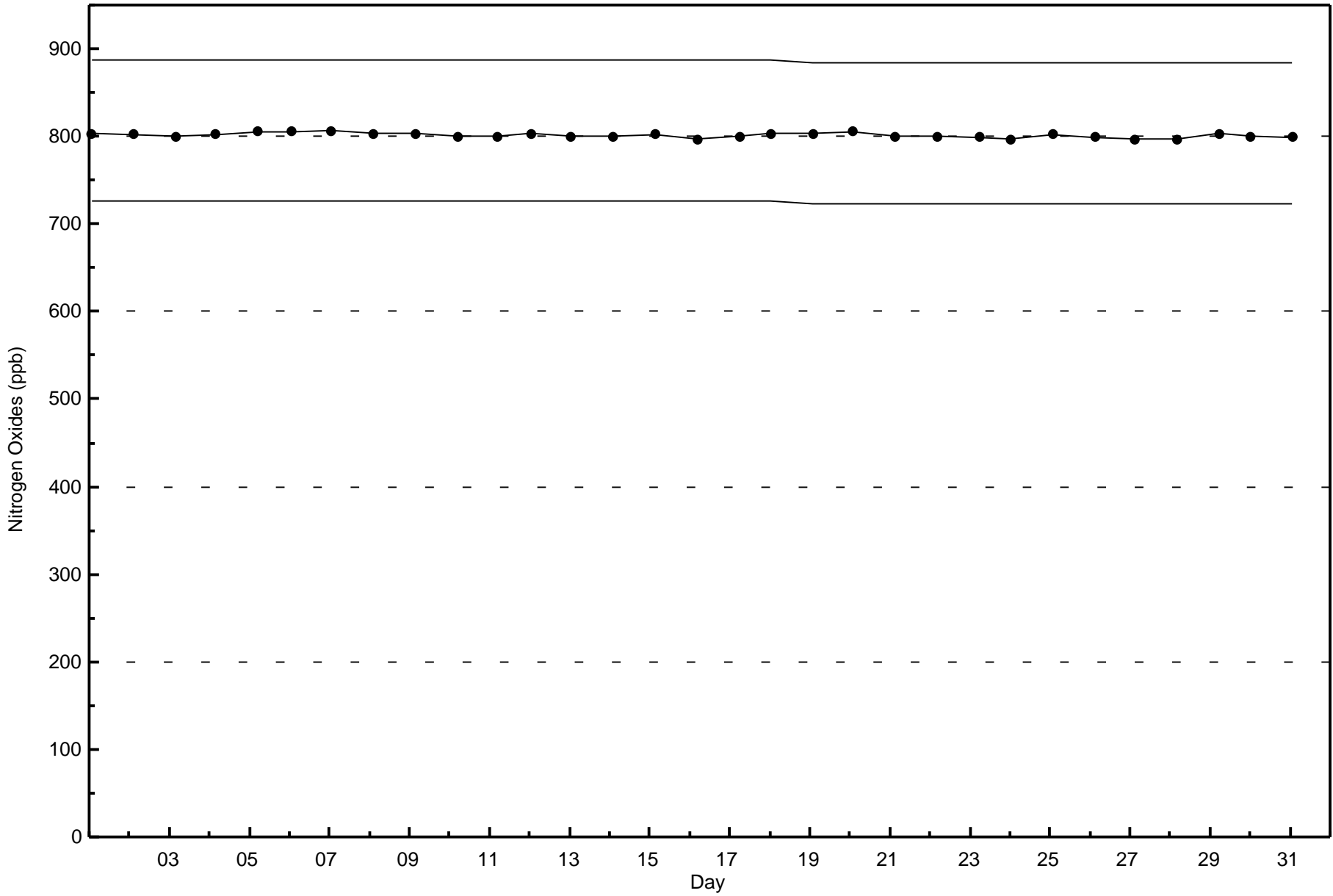
Nitrogen Oxides (NO_x) - ppb
Mackay River - July 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Mackay River - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

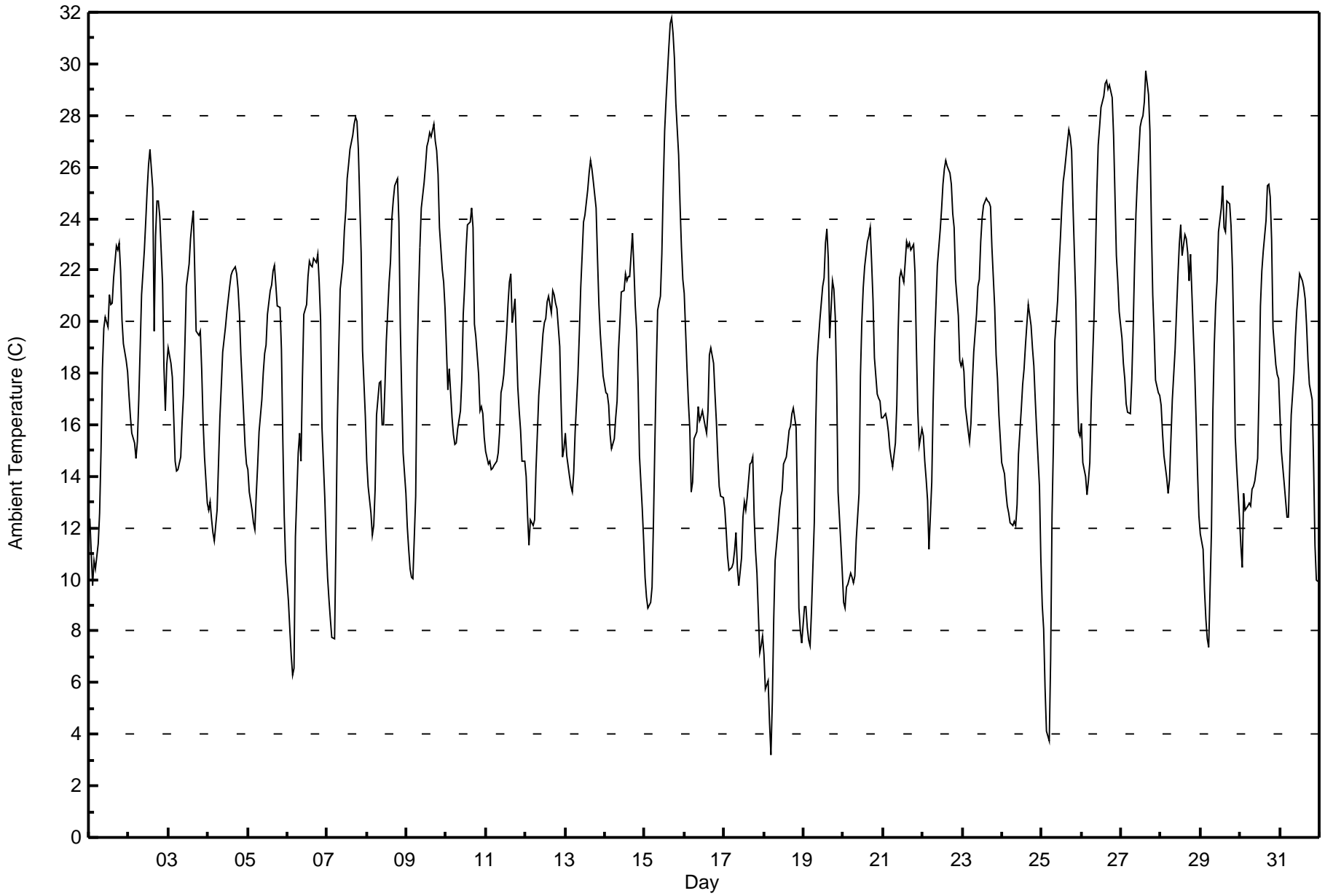
Mackay River - July 2017

Maximum Value: 31.8 C on Jul 15 17:00 Maximum Daily Average: 22.7 C on Jul 26																				Hours in Service: 744																												
Minimum Value: 3.2 C on Jul 18 05:00 Minimum Daily Average: 11.0 C on Jul 18																				Hours of Data: 744																												
Maximum Diurnal Average: 23.4 C at hour 17 Minimum Diurnal Average: 11.6 C at hour 5																				Hours of Missing Data: 0																												
Monthly Average: 17.96 C Percentiles: P₁ = 6.1 P₁₀ = 11.1 Q₁ = 14.3 Median = 17.9 Q₃ = 21.9 P₉₀ = 24.8 P₉₉ = 28.9																				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-Jul	12.4	11.1	9.7	10.7	10.4	11.4	12.6	14.9	18.2	19.8	20.2	19.8	21.1	20.7	20.7	21.7	22.9	22.8	23.1	21.9	20.0	19.1	18.5	18.1	17.6	23.1																						
2-Jul	17.1	16.3	15.7	15.3	14.7	15.4	17.0	19.0	21.0	22.8	23.9	25.1	26.1	26.7	25.2	19.7	23.3	24.7	24.7	24.1	21.5	18.2	16.5	18.3	20.5	26.7																						
3-Jul	19.0	18.4	17.8	16.3	14.6	14.2	14.2	14.8	16.1	17.2	19.1	21.4	22.2	23.2	23.8	24.3	22.0	19.6	19.5	19.7	18.1	16.1	14.8	13.0	18.3	24.3																						
4-Jul	12.7	13.0	12.4	11.8	11.5	12.7	14.5	16.3	17.5	18.8	19.8	20.4	20.9	21.3	21.8	22.0	22.1	21.9	21.3	20.3	18.7	16.4	15.2	14.5	17.4	22.1																						
5-Jul	14.3	13.4	12.7	12.2	11.9	13.3	14.4	15.7	17.0	18.0	18.8	19.1	20.3	21.2	21.4	22.0	22.2	21.4	20.6	20.5	18.9	15.4	12.5	10.7	17.0	22.2																						
6-Jul	9.2	8.1	7.1	6.3	6.5	11.7	14.9	15.7	14.6	17.8	20.3	20.6	21.7	22.4	22.2	22.1	22.4	22.3	22.6	21.5	20.1	15.9	13.2	11.4	16.3	22.6																						
7-Jul	10.1	9.2	8.5	7.8	7.7	11.6	16.1	18.9	21.2	22.3	23.5	24.3	25.5	26.1	26.7	27.2	27.7	27.9	27.8	26.7	22.7	18.9	17.6	16.3	19.7	27.9																						
8-Jul	14.6	13.6	12.6	11.7	12.1	13.5	16.4	17.6	17.7	16.0	16.0	17.5	19.2	21.5	22.3	24.0	24.7	25.3	25.5	23.9	19.8	17.2	14.9	13.3	18.0	25.5																						
9-Jul	12.1	11.2	10.4	10.1	10.1	13.2	18.4	20.9	22.9	24.4	25.4	26.0	26.8	27.0	27.3	27.1	27.7	27.0	26.6	25.7	23.6	22.0	21.5	20.5	21.2	27.7																						
10-Jul	18.9	17.3	18.2	16.3	15.6	15.3	15.3	15.8	16.5	17.8	20.3	21.4	22.8	23.7	23.9	24.4	23.6	19.9	19.4	18.0	16.6	16.7	16.4	15.5	18.7	24.4																						
11-Jul	15.0	14.5	14.6	14.3	14.3	14.4	14.6	14.9	15.7	17.2	17.5	18.0	19.6	20.7	21.5	21.9	19.9	20.9	19.2	17.5	16.5	15.8	14.6	14.6	17.0	21.9																						
12-Jul	14.0	12.4	11.3	12.3	12.1	12.3	14.3	15.7	17.2	17.9	19.5	20.0	20.1	20.8	21.0	20.4	21.2	21.1	20.7	20.5	19.0	16.7	14.8	15.1	17.1	21.2																						
13-Jul	15.7	14.8	14.0	13.6	13.4	14.2	15.7	17.9	19.5	21.3	22.6	23.9	24.1	25.1	25.7	26.2	25.9	25.4	24.4	22.5	20.7	19.5	18.7	17.9	20.1	26.2																						
14-Jul	17.3	17.2	16.8	15.6	15.1	15.4	16.3	16.9	18.9	20.0	21.1	21.2	21.9	21.6	21.8	21.8	23.4	22.1	20.6	19.6	17.6	14.8	12.7	11.5	18.4	23.4																						
15-Jul	10.1	9.3	8.9	9.1	9.7	12.2	15.2	18.1	20.5	21.0	22.6	25.2	27.4	28.6	30.6	31.6	31.8	31.2	30.2	28.5	26.4	24.6	22.9	21.6	21.6	31.8																						
16-Jul	21.1	18.2	16.9	15.9	13.4	13.8	15.5	15.7	16.7	16.1	16.3	16.5	16.0	15.7	16.5	18.7	19.0	18.4	17.2	16.1	14.8	13.6	13.2	13.2	16.2	21.1																						
17-Jul	12.7	11.9	10.9	10.3	10.5	10.6	11.1	11.8	10.5	9.8	10.8	12.4	13.0	12.7	13.2	14.5	14.5	14.7	12.5	11.1	10.2	7.2	7.4	7.8	11.3	14.7																						
18-Jul	7.1	5.8	6.1	4.5	3.2	5.2	8.5	10.7	11.9	12.6	13.2	13.5	14.5	14.7	15.3	15.8	16.0	16.5	16.6	15.9	12.8	8.9	8.0	7.5	11.0	16.6																						
19-Jul	9.0	9.0	8.1	7.7	7.4	8.8	12.2	15.9	18.4	19.3	20.0	21.4	21.7	23.0	23.6	22.4	19.4	21.6	21.3	20.2	17.5	13.4	11.4	10.3	16.0	23.6																						
20-Jul	9.1	8.9	9.7	9.8	10.2	10.1	9.8	10.2	11.6	13.3	17.9	20.0	21.3	22.1	23.1	23.3	23.6	22.3	20.8	18.6	17.2	17.0	16.9	16.3	16.0	23.6																						
21-Jul	16.3	16.4	16.1	15.7	15.1	14.7	14.4	15.3	16.8	19.7	21.7	21.9	21.5	22.3	23.1	22.9	23.1	22.8	23.0	21.9	19.0	16.5	15.2	15.8	18.8	23.1																						
22-Jul	15.6	14.6	13.9	13.1	11.2	13.8	16.9	19.2	20.7	22.2	23.6	24.3	25.4	25.9	26.3	26.0	25.8	25.3	24.2	23.6	21.6	20.2	18.5	18.3	20.4	26.3																						
23-Jul	18.5	18.0	16.7	15.8	15.3	16.1	17.6	18.8	20.3	21.4	21.6	23.1	24.0	24.5	24.8	24.7	24.6	24.5	22.9	20.6	18.7	17.8	16.4	15.5	20.1	24.8																						
24-Jul	14.5	14.1	13.4	12.9	12.6	12.2	12.1	12.3	12.1	12.9	14.8	16.6	17.6	18.2	19.1	19.9	20.6	19.9	19.0	18.3	17.0	15.8	13.6	10.8	15.4	20.6																						
25-Jul	9.0	8.1	5.8	4.1	3.7	6.9	12.5	15.3	19.3	20.8	22.2	23.2	24.4	25.4	25.9	27.0	27.4	27.2	26.6	24.4	20.8	17.6	15.8	15.5	17.9	27.4																						
26-Jul	16.0	14.5	14.0	13.3	13.8	14.5	16.9	20.2	22.4	25.0	26.8	27.6	28.3	28.7	29.2	29.3	29.0	29.2	28.7	27.2	24.9	22.6	21.6	20.4	22.7	29.3																						
27-Jul	19.3	18.4	17.8	16.8	16.5	16.4	17.7	19.7	22.2	24.2	25.5	27.5	27.8	28.0	28.5	29.7	28.8	27.4	23.9	21.1	19.5	17.7	17.3	17.1	22.0	29.7																						
28-Jul	16.7	15.7	14.8	13.9	13.3	13.9	15.4	17.0	18.9	20.4	21.8	23.0	23.7	22.6	23.4	23.2	22.7	21.6	22.6	19.6	18.1	16.2	14.2	12.5	18.6	23.7																						
29-Jul	11.8	11.2	9.6	8.4	7.7	7.4	12.0	16.5	19.1	20.7	21.6	23.5	24.4	25.3	23.6	23.5	24.7	24.5	23.7	22.0	19.3	15.5	14.4	12.4	17.6	25.3																						
30-Jul	11.3	10.4	13.3	12.7	12.8	12.9	12.9	13.5	13.6	13.9	14.7	17.3	20.6	21.9	22.7	23.9	25.3	25.3	24.8	23.2	19.7	18.3	18.0	17.8	17.5	25.3																						
31-Jul	16.3	15.0	13.7	13.1	12.4	12.4	14.5	16.4	18.0	19.4	20.5	21.1	21.8	21.6	21.3	20.9	19.8	18.5	17.6	17.0	14.5	11.3	10.0	9.9	16.5	21.8																						
																								14.1	13.2	12.6	12.0	11.6	12.6	14.5	16.2	17.6	18.8	20.1	21.2	22.1	22.7	23.1	23.3	23.4	23.0	22.3	21.0	18.9	16.7	15.4	14.6	Diurnal Average
																								21.1	18.4	18.2	16.8	16.5	16.4	18.4	20.9	22.9	25.0	26.8	27.6	28.3	28.7	30.6	31.6	31.8	31.2	30.2	28.5	26.4	24.6	22.9	21.6	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Mackay River - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	51	6.85	6.85
10 - 20	413	55.51	62.37
> 20	280	37.63	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

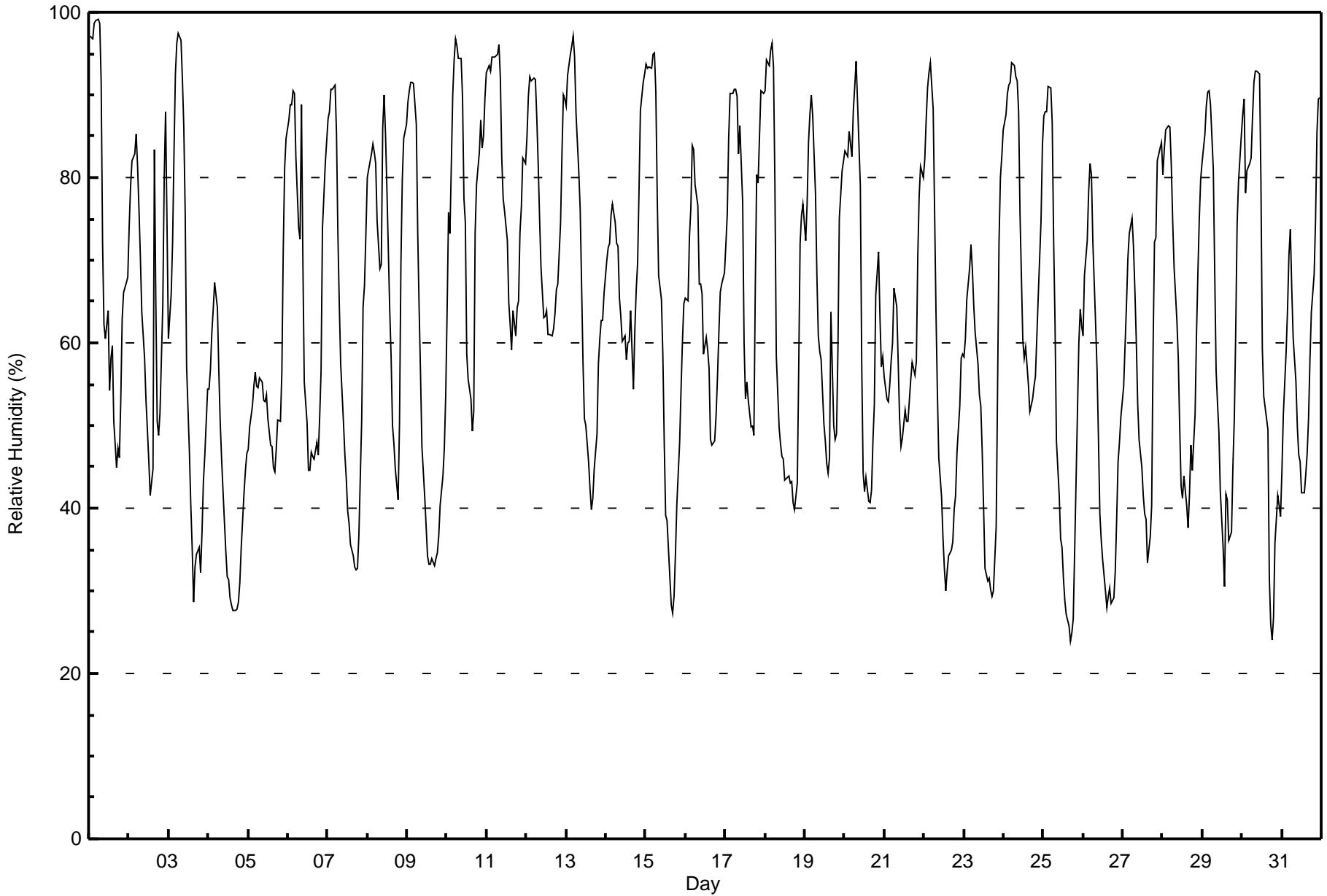
Mackay River - July 2017

Maximum Value: 99 % on Jul 1 06:00																		Maximum Daily Average: 79.5 % on Jul 11																		Hours in Service: 744							
Minimum Value: 24 % on Jul 25 17:00																		Minimum Daily Average: 42.9 % on Jul 4																		Hours of Data: 744							
Maximum Diurnal Average: 85.1 % at hour 5																		Minimum Diurnal Average: 43.4 % at hour 17																		Hours of Missing Data: 0							
Monthly Average: 63.4 %																		Percentiles: P ₁ = 27 P ₁₀ = 37 Q ₁ = 48 Median = 62 Q ₃ = 82 P ₉₀ = 91 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-Jul	97	97	97	99	99	99	99	92	72	62	60	64	54	58	60	50	45	47	46	53	63	66	67	68	71.4	99																	
2-Jul	74	79	82	83	85	81	76	70	64	58	53	50	46	41	45	83	65	51	49	52	65	80	88	74	66.4	88																	
3-Jul	60	66	72	83	93	96	97	97	92	86	76	57	47	40	35	29	33	34	35	32	37	43	46	54	60.1	97																	
4-Jul	54	57	61	64	67	64	57	50	46	42	35	32	31	29	28	28	28	28	29	31	35	42	45	47	42.9	67																	
5-Jul	47	50	52	55	57	55	55	56	55	53	53	54	51	48	48	45	44	47	51	50	56	71	81	85	54.9	85																	
6-Jul	87	89	89	91	90	83	74	73	89	70	55	50	45	45	47	46	46	48	46	51	57	74	82	84	67.1	91																	
7-Jul	87	88	91	91	91	85	73	65	57	50	46	44	40	38	36	34	33	32	33	37	51	64	67	73	58.6	91																	
8-Jul	80	81	83	84	83	82	75	69	69	86	90	85	79	64	58	50	48	45	41	50	69	80	85	86	71.8	90																	
9-Jul	89	91	92	92	91	86	73	64	56	47	41	38	34	33	33	34	33	34	35	37	40	44	47	54	55.0	92																	
10-Jul	64	76	73	90	94	97	96	94	94	90	77	75	59	56	53	49	52	73	79	83	87	84	85	90	77.9	97																	
11-Jul	93	93	93	95	95	95	95	96	92	82	77	76	72	65	62	59	64	61	64	65	73	76	82	82	79.5	96																	
12-Jul	85	90	92	92	92	92	87	82	75	69	63	63	64	61	61	61	62	64	66	67	75	83	90	89	76.1	92																	
13-Jul	89	92	95	96	97	95	88	81	76	67	58	51	50	46	42	40	41	45	49	57	60	63	63	66	66.9	97																	
14-Jul	70	72	72	76	77	74	72	72	65	63	60	61	58	60	60	64	54	61	66	70	79	88	92	93	69.9	93																	
15-Jul	94	93	93	93	95	95	90	78	68	65	59	48	39	38	32	28	27	29	34	40	48	54	60	65	61.2	95																	
16-Jul	65	65	73	76	84	83	79	77	67	67	66	59	61	59	57	48	48	48	51	56	61	66	67	69	64.7	84																	
17-Jul	72	76	85	90	90	91	91	90	83	86	77	60	53	55	53	50	50	49	67	80	79	90	90	90	74.9	91																	
18-Jul	90	94	94	95	96	93	79	58	50	48	46	46	43	44	44	43	43	41	40	43	57	72	75	77	63.0	96																	
19-Jul	72	77	84	88	90	87	78	68	61	59	58	50	48	45	44	46	64	50	48	49	59	75	81	82	65.2	90																	
20-Jul	83	83	83	86	82	88	91	94	89	79	57	44	42	44	41	41	42	48	52	66	71	63	57	58	66.0	94																	
21-Jul	56	53	53	55	58	60	67	64	58	51	48	49	52	51	50	53	56	58	56	58	70	78	81	80	58.9	81																	
22-Jul	82	87	91	93	94	88	76	64	54	46	41	37	33	30	32	34	35	36	40	42	47	52	58	59	56.3	94																	
23-Jul	58	60	65	69	72	69	64	61	57	54	52	47	40	33	31	31	30	29	30	38	55	72	80	82	53.4	82																	
24-Jul	86	88	90	91	91	94	94	92	92	88	76	60	58	60	57	55	52	53	55	56	61	66	75	84	73.8	94																	
25-Jul	87	88	88	91	91	87	72	62	48	42	36	35	31	29	27	26	24	25	27	35	52	60	64	62	53.7	91																	
26-Jul	61	68	72	78	82	80	72	62	57	49	39	36	34	30	28	29	30	28	29	32	39	46	48	51	49.2	82																	
27-Jul	55	60	65	70	73	75	72	66	60	53	48	45	42	39	39	33	37	40	59	72	73	82	84	84	59.4	84																	
28-Jul	80	83	86	86	86	81	75	69	63	58	50	43	41	44	40	38	42	48	45	51	61	68	75	80	62.2	86																	
29-Jul	82	85	89	90	91	89	81	69	57	53	49	42	35	31	42	41	36	37	45	51	61	74	79	85	62.2	91																	
30-Jul	88	89	78	81	82	82	87	92	93	93	92	80	59	54	52	50	32	26	24	27	36	42	40	39	63.2	93																	
31-Jul	45	51	59	64	71	74	67	61	55	50	46	46	42	42	44	47	51	58	64	68	75	85	90	90	60.1	90																	
																		75.3	78.1	80.4	83.4	85.1	83.9	79.1	73.8	68.2	63.4	57.7	52.4	47.8	45.5	44.6	44.1	43.4	44.3	46.9	51.6	59.7	67.9	71.8	73.6	Diurnal Average	
																		97	97	97	99	99	99	99	97	94	93	92	85	79	65	62	83	65	73	79	83	87	90	92	93	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Mackay River - July 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	95	12.77	12.77
40 - 60	249	33.47	46.24
60 - 80	201	27.02	73.25
80 - 100	199	26.75	100.00

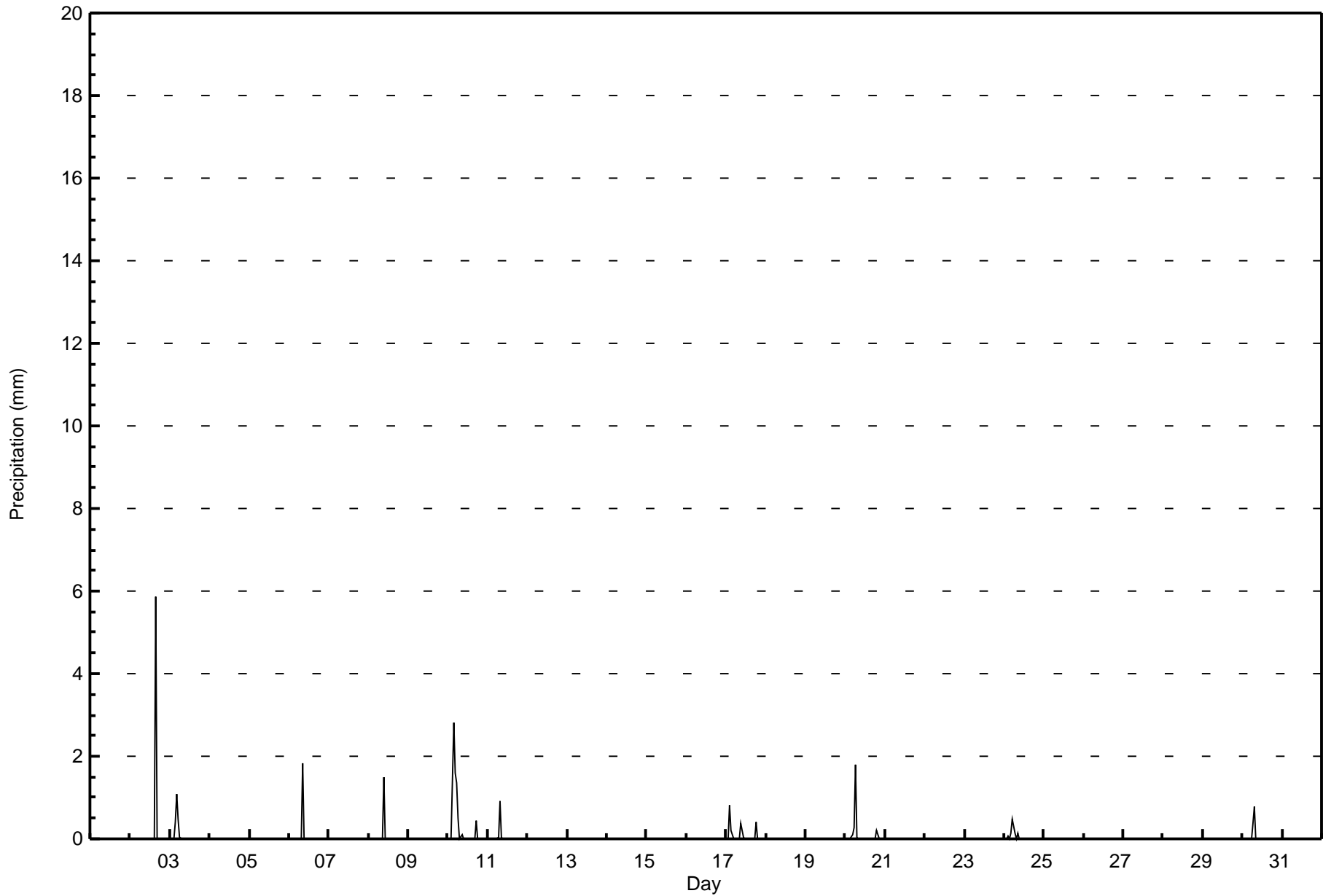
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Mackay River - July 2017**

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	725	97.45	97.45
0.4 - 0.5	8	1.08	98.52
0.6 - 0.7	0	0.00	98.52
0.8 - 1.4	5	0.67	99.19
1.5 - 10	5	0.67	99.87
> 10	0	0.00	99.87

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Mackay River - July 2017

Maximum Speed: 19 km/h on Jul 24 12:00	Maximum Daily Speed Average: 12.0 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 11 04:00	Minimum Daily Speed Average: 0.3 km/h on Jul 10	Hours of Data: 742
Maximum Diurnal Speed Average: 4.6 km/h at hour 16	Minimum Diurnal Speed Average: 0.9 km/h at hour 20	Hours of Missing Data: 2
Monthly Average Velocity: 2.6 km/h 240.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 18	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-Jul	S3	SSW3	S2	SW4	S3	SSE4	S5	SSE4	SSW4	SW5	SSW7	S7	SE6	S5	S6	S6	SSE6	SSE8	ESE9	SE6	SE5	S8	S11	S12	S5.2	S12
2-Jul	S11	S10	S8	S7	S7	S11	S12	SSW13	SSW10	SSW9	SSW11	S11	S10	S12	SSW8	SSE4	S8	S10	SSE10	S6	S5	S4	SSE4	SSW6	S8.4	SSW13
3-Jul	SSW7	SSW8	SSW9	SSW10	W4	SSE3	ESE4	SSW4	S7	SSW9	SW9	WSW9	WSW10	WSW11	WSW13	WSW13	WSW14	SW10	SW12	SW12	WSW12	SW10	WSW10	SW6	SW8.0	WSW14
4-Jul	SW9	SSW9	SW11	WSW10	SW9	SW10	WSW11	WSW11	WSW13	WSW17	WSW18	WSW17	WSW18	WSW16	WSW15	WSW17	W16	W15	W11	WSW8	SW7	SW8	SW9	WSW12.0	WSW18	
5-Jul	SW9	SW8	WSW8	WSW8	WSW9	WSW10	W11	W12	WNNW14	WNNW14	WNNW13	WNNW12	WNNW11	WNNW14	WNNW14	WNNW13	WNNW13	NW12	NW12	NW10	NW7	NW1	S2	SSW2	WNNW8.8	WNNW14
6-Jul	S1	SW2	S2	SW3	SW3	WSW4	W4	WNNW7	SW2	W8	W10	WNNW10	WNNW10	NW12	NW13	NW14	NW11	NW11	NW10	NNW7	NW4	S1	S2	S2	WNNW5.2	NW14
7-Jul	SSW2	SSE2	SW2	SW1	SW1	W3	W4	W4	W6	W6	WSW5	W7	WSW7	W7	WNNW5	WNNW6	NW6	NNW4	NE2	E2	ESE4	ESE3	ENE3	N2	W2.3	W7
8-Jul	ENE1	SE1	SSE1	SE2	SE2	ESE3	SE3	SSE4	SSE2	WSW3	SSW2	NW5	NNE3	ESE6	SSE5	WSW4	W5	W4	WNNW3	W2	SE2	SSE3	SSE3	SE3	S1.1	ESE6
9-Jul	SE3	SE2	SE4	SE4	SE4	SE5	SE6	SE8	SE8	SE7	ESE9	ESE11	ESE10	ESE12	ESE9	ESE9	ESE8	ESE9	ESE9	ESE9	ESE7	ESE7	SE7	SSE4	ESE7.0	ESE12
10-Jul	SSE4	S1	SW2	N8	NNE3	SE3	SSW3	S2	ESE2	SW3	W4	N6	WSW4	WNNW4	WSW3	WSW5	S5	SE6	ESE4	NE6	ENE5	SE6	SW1	N5	SSE0.3	N8
11-Jul	NE3	SE3	SE3	S0	W1	NNW2	NNW5	NNW5	WNNW5	W3	W5	WNNW6	NW7	WNNW7	WNNW7	W7	WNNW5	WNNW3	SSE10	S7	WSW2	SSW2	SSE2	S4	W2.1	SSE10
12-Jul	SSE4	SSE4	SSE3	SSW3	SE2	SE3	S3	S4	SSE5	S4	SSW5	SSW4	S5	NE1	SSE9	SSE11	S11	S10	SSE8	SSE9	SE6	SE3	SE3	S5	SSE4.9	S11
13-Jul	S6	S6	S5	S6	S7	SSW4	SSW4	SSW3	S5	SW1	SW4	SSE4	E5	ENE4	N2	N1	NNE5	NE7	NNE9	NNE11	NNE9	NNE7	NNE7	NNE7	ENE1.2	NNE11
14-Jul	NNW4	WNNW6	NW6	N5	NNW4	NNW6	N9	NNE8	NNE4	N6	NNE7	NE7	ENE7	NNE7	NNE6	NNE5	SSE1	NNE5	NNE9	NE7	NE2	SE2	AF	S1	NNE4.4	NNE9
15-Jul	ENE0	ESE2	SE3	SE3	SE2	SE2	SE4	SE8	SE9	SE10	ESE12	SE14	SSE15	SSE15	S13	S12	S11	SSW8	SSE10	SSE12	SSE9	SSE6	SE4	SSE5	SSE7.2	SSE15
16-Jul	WNNW7	NNW16	WNNW11	NW7	SSE2	S6	SW7	W10	W10	WSW7	W7	WSW9	SW11	SW11	SW11	WSW13	WSW14	WSW14	WSW13	WSW9	WSW7	SW7	WSW9	WSW10	WSW8.0	NNW16
17-Jul	W9	W9	WSW7	WSW7	W7	W7	W7	WNNW9	NW15	NNW12	NNW14	NNW15	NNW16	NW15	NW14	NNW10	NW11	NW11	NW11	N6	NNW5	SW1	NW6	NNW3	NW8.3	NNW16
18-Jul	WNNW4	WSW3	WNNW3	SW2	W2	WNNW4	NW4	N5	N3	N6	NNW8	NW5	WSW6	WSW6	WNNW8	WSW6	WSW6	WSW8	WSW8	WSW5	SW2	S4	S5	S6	W3.3	WSW8
19-Jul	S7	S7	SSW6	SSW5	S6	SSW7	SSW6	SW8	WSW9	WSW11	WSW11	WSW12	WSW11	W12	W11	WNNW8	NNW3	NNE9	NE9	NE7	E2	ESE2	ESE2	SE3	WSW3.8	WSW12
20-Jul	SE4	ESE2	E1	NE1	NNE3	NNE3	NNE5	E3	ESE6	ESE8	ESE10	ESE13	ESE11	ESE12	ESE9	ESE9	ESE10	ESE8	E4	ESE4	ESE4	ESE6	SE7	ESE5	ESE5.6	ESE13
21-Jul	ESE7	ESE9	SE8	ESE9	ESE7	ESE4	NNW5	NE5	E6	ESE8	ESE10	ESE13	ESE9	SE6	SSE9	S6	WSW6	W3	SW4	SSW4	SSE3	SSE4	SSE5	S6	SE4.5	ESE13
22-Jul	S7	S7	S7	S6	SSE4	SSW5	SW6	WSW8	WSW8	WSW9	WSW10	SW10	W10	SW13	SW12	SW12	WSW11	WSW10	SW7	SW8	SSW6	SSW6	S6	SSW7	SW7.3	SW13
23-Jul	SW7	SW6	SSW6	SW6	SW7	SW8	W8	W9	W9	WSW9	W9	WSW9	W10	W10	W11	W11	W9	WNNW10	WNNW10	WNNW4	NNE5	NNE7	NNE8	NNE7	W5.9	W11
24-Jul	NNE10	NNE11	N12	NNE12	NNE13	NNE8	N8	N11	N11	N12	N16	N19	NNE18	N18	N18	N17	N17	NNW18	NNW14	NNW10	NW7	NW5	WNNW4	W3	N11.5	N19
25-Jul	SW2	WSW3	S2	SW2	WSW3	W4	WSW4	WSW5	WSW5	W8	W7	W8	W7	W6	WSW5	WNNW7	W7	WSW5	WSW4	SSW3	S4	S4	S5	S6	WSW4.1	W8
26-Jul	S7	S7	S6	S6	S8	S8	SSW7	SW6	SSW7	SW7	SW8	SW7	SSW8	SSW7	S10	SSW8	S9	S9	SSW8	SSW7	S6	S6	S7	S7	SSW7.0	S10
27-Jul	S7	S6	S7	S6	S7	S6	S8	S7	WSW7	W5	SSE7	SSW6	WSW6	WNNW5	WNNW5	SW4	WNNW6	W3	W4	W5	W11	NW7	SW5	WSW5	SW4.2	W11
28-Jul	WSW6	W5	WSW7	SW7	SW7	WSW7	W8	WSW8	W9	W10	W11	W13	W11	WNNW11	WNNW9	WNNW11	W10	SW7	NW3	NNW5	WSW4	WSW2	SSE2	SSW2	W6.5	W13
29-Jul	SSW5	SSW5	SSW3	SW3	SSE2	SE3	S2	S5	S6	SSW7	SSW7	WSW7	W10	W9	NNW12	NNW9	NNW6	N6	NE8	NE6	NE4	NE3	NE2	ENE2	W1.1	NNW12
30-Jul	ENE2	SE2	SE6	SE4	SSE3	WSW4	SW8	WNNW5	S2	S5	SSW4	S6	S7	S9	SSW11	SW9	W12	WSW11	W9	WSW6	SW6	SW7	WSW8	WSW9	SW4.8	W12
31-Jul	W7	W6	WSW6	WSW6	W7	WSW6	W7	W8	W9	W8	WNNW11	WNNW12	WNNW13	NW17	NW18	NW17	NW15	N13	NNW11	N8	NNE3	S1	W2	AF	WNNW7.8	NW18

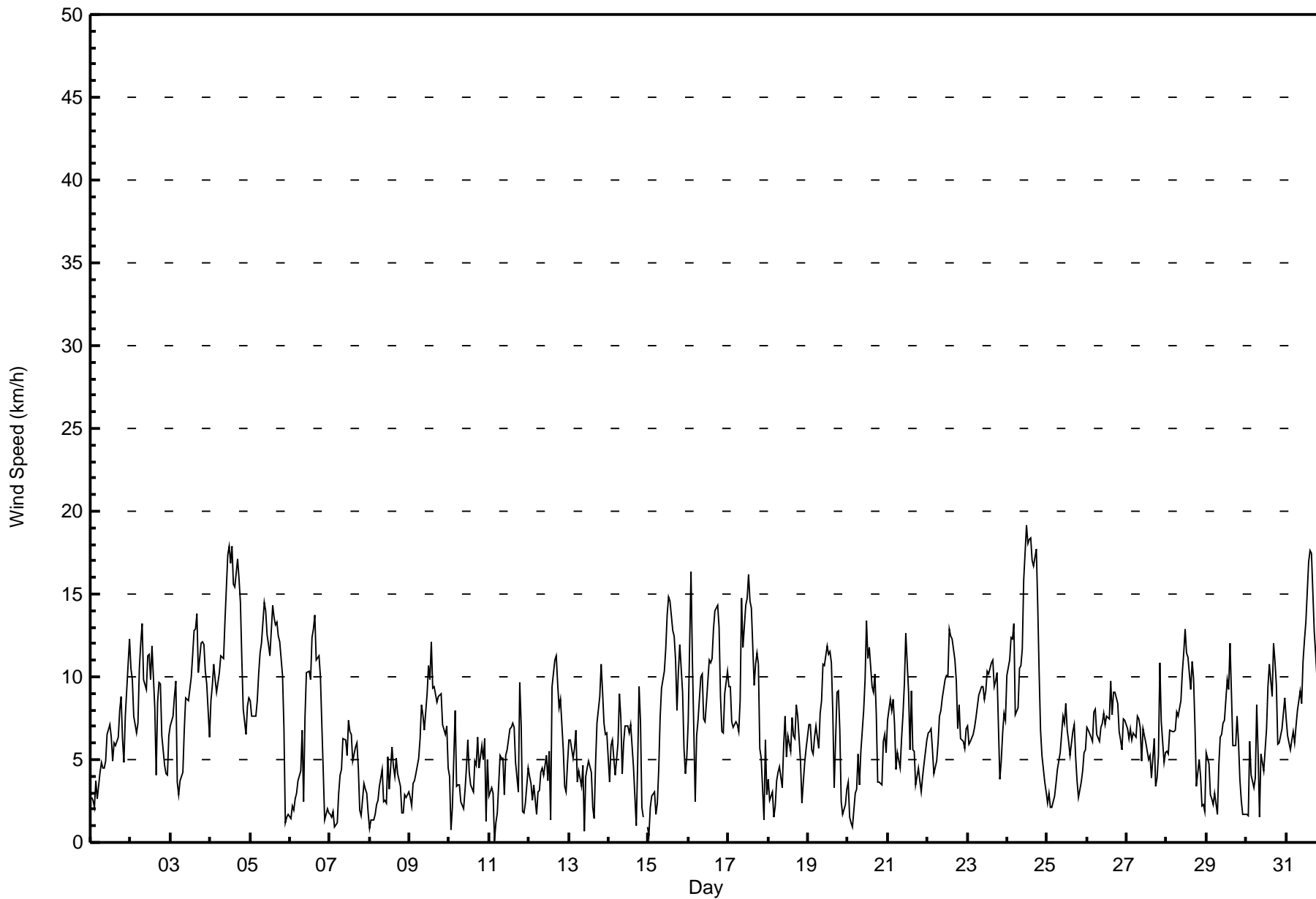
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S11	NNW16	N12	NNE12	NNE13	S11	S12	SSW13	NW15	WNNW14	WSW17	N19	NNE18	NNE18	N18	NW17	WSW17	NNW18	W15	SW12	WSW12	SW10	S11	S12			Diurnal Maximum

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
Mackay River - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	275	37.06	37.06
6 - 11	382	51.48	88.54
12 - 19	85	11.46	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: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - July 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	11	9	7	6	14	31	31	37	24	22	24	19	15	6	12	275
6 - 11	11	18	8	1	1	29	17	14	59	34	39	58	48	22	15	8	382
12 - 19	8	4	0	0	0	5	1	3	5	1	6	16	6	10	12	8	85
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	26	33	17	8	7	48	49	48	101	59	67	98	73	47	33	28	742

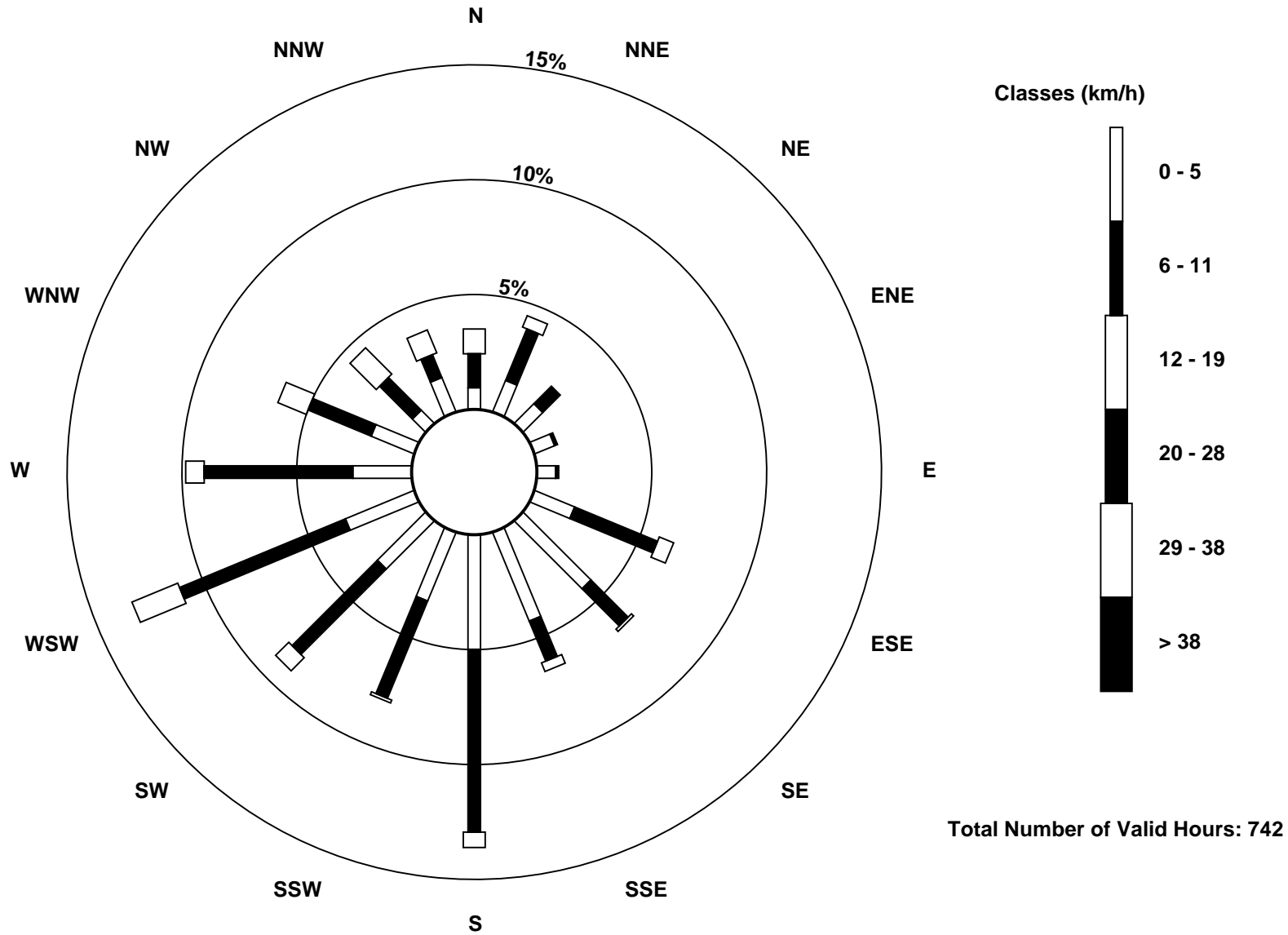
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jul 16 01:00 Minimum Value: 0 km/h on Jul 6 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	2	2	2	1	4	4	4	4	
2-Jul	3	3	2	2	2	3	4	4	4	3	4	4	4	4	4	3	3	3	2	1	1	1	2	4	
3-Jul	2	2	3	3	3	2	2	2	2	3	3	4	4	5	5	6	7	4	5	5	5	4	5	2	7
4-Jul	3	3	4	4	4	4	4	5	4	5	7	8	7	7	7	8	7	7	5	4	2	3	3	8	
5-Jul	3	3	3	3	4	4	5	5	5	5	5	4	4	5	5	5	4	4	4	3	2	1	1	5	
6-Jul	1	1	1	1	1	1	1	2	1	3	5	4	4	4	4	4	4	3	3	3	2	1	0	1	5
7-Jul	1	1	1	1	1	1	2	2	2	3	3	3	3	3	3	3	4	3	2	1	1	1	2	1	4
8-Jul	1	1	1	1	2	1	2	1	1	2	1	2	2	3	2	2	2	2	2	1	1	0	1	0	3
9-Jul	1	1	1	1	1	1	2	2	2	3	4	4	4	4	4	3	4	3	3	3	2	2	2	2	4
10-Jul	1	1	1	2	2	2	2	2	1	1	1	2	2	2	2	2	5	4	1	3	2	2	2	1	5
11-Jul	1	2	1	1	1	1	1	1	2	1	2	2	3	2	3	3	2	2	5	3	2	1	2	1	5
12-Jul	1	1	1	1	1	1	1	1	1	1	2	2	2	1	4	4	4	3	3	3	2	1	1	1	4
13-Jul	2	1	1	1	2	1	2	1	2	2	2	3	2	2	2	2	2	3	3	3	3	2	2	2	3
14-Jul	1	3	2	2	1	2	3	3	2	2	3	3	3	3	3	3	4	5	3	2	2	1	2	1	5
15-Jul	1	1	1	1	1	2	1	2	3	3	4	4	5	5	5	4	4	3	4	4	3	2	1	2	5
16-Jul	9	6	4	3	1	2	3	4	4	3	3	4	4	4	5	6	6	6	5	4	2	2	4	4	9
17-Jul	4	4	3	2	3	3	2	4	4	3	4	4	5	5	5	3	4	4	5	2	3	1	2	2	5
18-Jul	1	1	2	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	2	1	1	1	1	3
19-Jul	1	2	1	1	2	2	2	3	4	5	5	5	5	5	4	3	3	4	3	3	1	1	1	1	5
20-Jul	1	1	1	1	1	1	2	2	2	3	3	5	4	4	3	3	4	3	1	1	2	2	2	1	5
21-Jul	2	2	2	2	2	3	2	2	2	2	3	4	3	3	3	3	2	2	2	1	1	1	1	1	4
22-Jul	1	1	2	1	1	1	2	3	3	4	4	4	4	5	5	5	5	4	3	3	2	2	1	2	5
23-Jul	2	2	2	2	2	3	4	3	3	4	4	4	4	5	5	4	5	4	4	2	3	3	3	2	5
24-Jul	3	4	4	4	4	3	3	4	3	4	5	6	6	6	6	6	6	5	4	3	1	1	1	1	6
25-Jul	1	1	1	1	1	1	2	2	2	3	3	4	3	3	3	3	3	2	1	1	1	1	1	1	4
26-Jul	1	1	2	1	2	2	2	2	2	3	3	3	3	4	4	4	4	3	3	2	2	2	2	2	4
27-Jul	2	1	2	2	2	2	2	2	3	3	3	3	3	3	2	3	3	2	4	2	6	4	2	2	6
28-Jul	2	2	3	2	2	3	3	3	3	4	4	5	5	5	4	4	5	3	2	2	2	1	1	1	5
29-Jul	2	2	1	1	1	1	1	2	2	3	3	3	4	5	4	3	3	3	3	2	1	1	2	1	5
30-Jul	1	2	1	1	1	2	3	3	3	3	2	2	3	3	4	4	5	5	4	3	2	2	3	4	5
31-Jul	3	2	2	2	2	3	3	3	4	3	5	5	6	6	6	5	5	4	3	3	2	1	1	1	6
Diurnal Maximum																									
9 6 4 4 4 4 5 5 5 5 7 8 7 7 7 7 8 7 7 5 6 4 5 4																									
AF - Analyzer Failure																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mackay River - July 2017

Direction of Maximum Speed: 5 deg on Jul 24 12:00 Direction of Maximum Daily Speed Average: 242.4 deg on Jul 4	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2
Direction of Minimum Speed: 173 deg on Jul 11 04:00 Direction of Minimum Daily Speed Average: 0.3 deg on Jul 10	Percent Operational Time: 99.7
Monthly Average Direction: 242.4 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-Jul	184	206	177	229	180	166	183	163	195	222	203	179	142	173	186	180	158	149	120	125	136	179	184	185	172.7
2-Jul	188	184	180	171	174	187	187	192	204	194	201	185	189	177	198	165	171	174	167	172	174	169	163	205	183.9
3-Jul	211	205	199	209	260	151	118	201	176	199	223	242	246	258	241	252	250	225	220	230	244	229	252	224	228.1
4-Jul	220	212	232	237	235	231	243	249	240	230	240	242	246	243	247	251	255	259	270	266	243	223	223	225	242.4
5-Jul	233	228	240	248	239	254	272	276	289	287	291	302	297	289	291	290	301	309	317	322	322	334	170	199	284.0
6-Jul	170	219	179	225	224	257	270	298	229	265	262	292	293	310	313	316	324	317	324	329	305	170	175	190	295.0
7-Jul	211	159	225	214	223	259	274	263	275	278	257	275	255	273	291	301	324	341	34	92	122	121	60	5	278.2
8-Jul	78	135	149	144	139	112	127	159	167	254	201	306	29	108	166	247	272	260	295	280	124	155	147	144	177.4
9-Jul	136	144	127	139	132	125	128	132	132	128	122	122	105	102	122	112	104	106	102	109	109	112	135	150	118.6
10-Jul	149	179	219	357	17	142	197	186	115	225	281	3	254	299	250	255	185	143	103	37	73	128	231	3	146.5
11-Jul	53	126	133	173	281	329	327	331	292	279	281	289	305	291	284	274	282	292	168	169	256	198	167	183	268.7
12-Jul	149	164	156	202	136	146	178	175	166	177	196	194	179	35	156	168	178	169	152	150	143	135	146	178	165.2
13-Jul	186	182	180	180	186	210	194	203	173	232	223	159	94	71	353	11	24	39	33	27	23	25	22	12	77.0
14-Jul	335	285	315	350	328	348	8	23	27	5	15	34	67	13	14	31	163	18	33	35	47	134	AF	176	12.6
15-Jul	57	117	145	130	138	143	141	145	134	128	115	130	159	161	176	188	191	202	165	166	164	153	146	148	155.7
16-Jul	294	332	302	324	161	186	227	271	270	255	263	242	217	225	222	252	251	258	253	252	237	231	239	254	255.0
17-Jul	269	264	256	256	260	265	280	294	325	330	335	335	337	325	321	327	315	319	318	353	334	227	318	327	311.9
18-Jul	303	248	284	234	266	289	307	351	357	355	333	321	258	258	286	240	255	245	251	247	215	185	191	186	269.8
19-Jul	189	190	194	203	191	193	213	235	256	245	258	246	251	260	260	282	327	23	45	47	84	117	113	136	238.0
20-Jul	130	111	89	48	21	25	17	83	112	107	103	103	106	108	107	111	114	103	98	121	105	121	132	119	104.2
21-Jul	115	117	128	114	117	112	337	52	100	103	107	111	114	135	161	173	256	260	229	204	166	164	162	183	131.3
22-Jul	186	177	182	184	166	209	222	248	255	256	247	234	265	221	233	230	245	246	227	232	210	192	191	208	225.3
23-Jul	216	215	210	216	222	231	259	264	264	257	259	253	267	259	270	272	281	290	300	295	31	19	21	18	267.3
24-Jul	19	20	11	16	16	12	3	6	4	3	5	5	20	11	359	353	359	343	348	334	318	311	297	265	0.8
25-Jul	230	243	175	227	249	266	256	242	255	265	268	262	266	267	254	283	279	252	239	200	172	176	179	188	246.4
26-Jul	183	177	181	177	182	187	199	214	203	233	229	228	204	208	187	194	180	186	192	192	183	177	184	185	194.1
27-Jul	181	179	176	174	178	176	189	191	240	260	156	207	250	282	287	220	283	278	271	277	276	307	232	254	226.9
28-Jul	238	260	255	233	232	246	263	257	263	259	266	261	269	295	292	303	264	228	306	345	239	238	149	213	264.0
29-Jul	196	204	202	229	162	145	173	170	173	197	207	242	262	267	343	335	336	350	43	48	56	51	47	64	263.4
30-Jul	77	125	126	134	154	250	230	293	171	172	197	188	180	191	192	224	265	249	262	256	216	233	237	255	220.8
31-Jul	268	267	258	256	259	254	261	267	268	267	290	292	287	307	313	320	324	349	339	355	16	191	259	AF	297.9

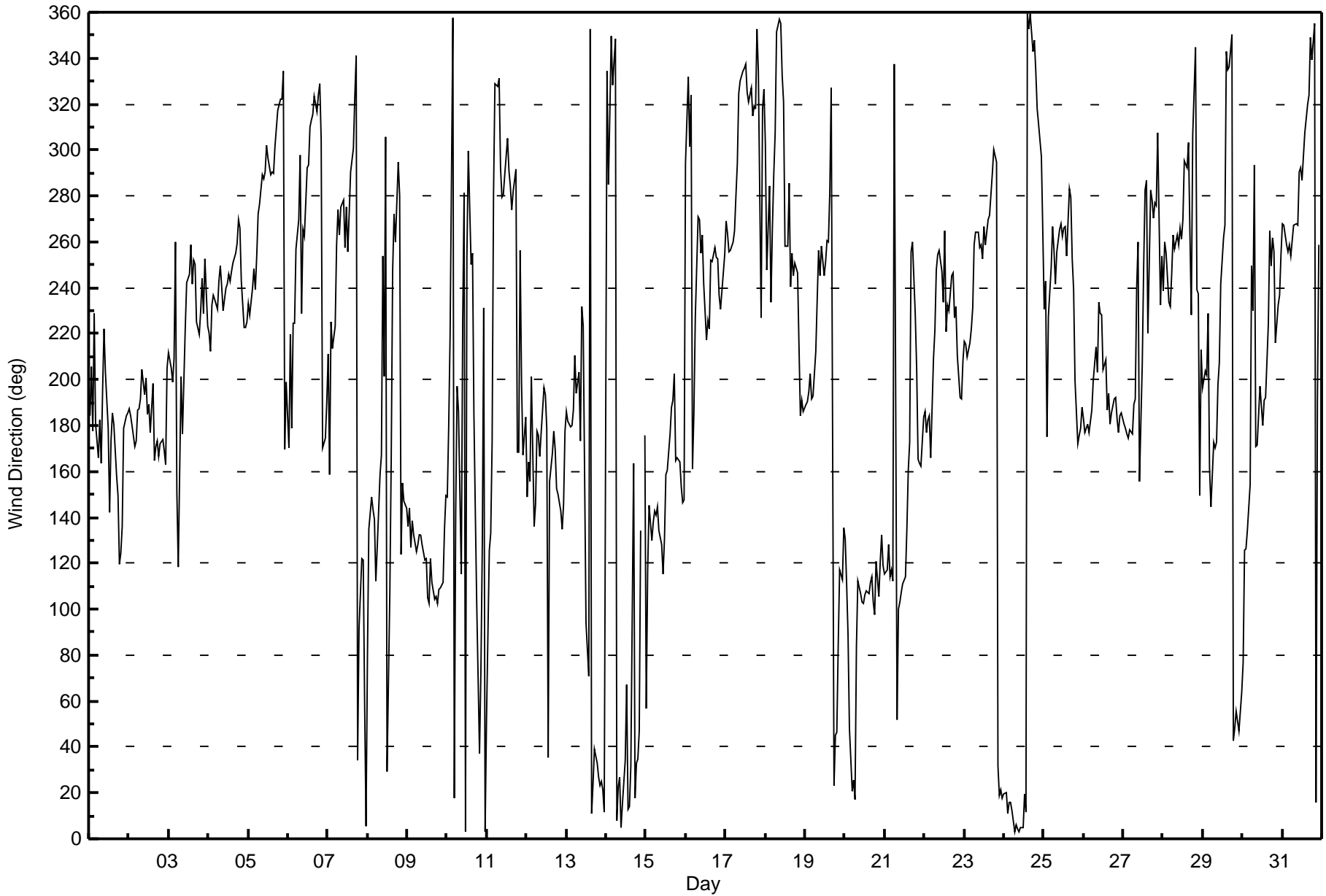
206.1 209.4 207.3 213.2 206.5 213.8 239.4 244.5 243.4 247.3 250.8 252.8 250.8 260.6 259.9 265.9 267.7 272.3 279.2 270.4 212.4 180.5 192.5 202.5
 Diurnal Average

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
Mackay River - July 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mackay River - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 14 17:00 Minimum Value: 11 deg on Jul 25 22:00 Percentiles: P ₁ = 14 P ₁₀ = 20 Q ₁ = 26 Median = 36 Q ₃ = 47 P ₉₀ = 59 P ₉₉ = 85																			Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 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-Jul	29	44	30	29	38	24	28	39	60	58	50	36	42	28	31	40	44	32	22	18	27	26	24	23	60
2-Jul	24	22	24	26	26	23	24	25	33	39	35	36	38	31	49	67	27	27	26	23	17	16	16	27	67
3-Jul	24	25	23	29	64	84	60	56	27	29	39	50	50	51	42	50	47	35	32	38	40	34	47	33	84
4-Jul	28	26	39	37	33	33	41	45	42	37	40	44	43	44	46	49	44	46	50	47	47	26	26	31	50
5-Jul	35	32	41	50	42	45	44	42	33	37	39	31	39	37	34	36	28	25	22	21	16	78	22	55	78
6-Jul	40	30	33	33	22	41	45	33	66	44	48	37	40	34	28	27	29	28	27	28	25	40	22	30	66
7-Jul	36	38	32	51	30	39	43	47	45	52	65	50	55	61	70	61	63	60	87	65	12	21	49	55	87
8-Jul	79	42	47	23	59	34	44	44	56	61	57	32	56	45	49	57	47	47	54	40	48	25	14	13	79
9-Jul	27	30	31	14	14	16	19	22	32	38	37	34	35	31	37	32	35	28	24	19	17	19	27	27	38
10-Jul	20	94	74	29	56	63	59	68	42	36	51	48	70	74	71	59	82	32	23	47	42	27	81	27	94
11-Jul	37	53	50	90	94	55	23	33	29	57	40	51	45	42	43	45	46	83	34	27	61	70	74	15	94
12-Jul	18	17	35	27	38	19	24	23	32	30	42	51	37	81	35	27	27	30	27	24	25	20	25	18	81
13-Jul	19	17	20	16	19	36	33	54	59	98	64	72	45	68	81	98	34	32	24	23	23	23	23	22	98
14-Jul	47	42	24	23	27	22	28	25	62	51	46	49	51	33	45	60	102	77	32	23	38	20	AF	74	102
15-Jul	65	45	43	29	61	76	25	28	25	22	24	29	31	29	31	31	33	30	29	27	28	28	28	28	76
16-Jul	58	24	27	24	43	25	36	43	46	53	47	46	30	31	36	49	47	46	46	48	37	33	39	47	58
17-Jul	47	48	45	46	53	47	41	36	21	21	24	25	26	24	26	36	29	30	32	30	21	57	18	39	57
18-Jul	30	27	47	37	21	22	31	48	77	62	45	66	59	51	49	53	47	45	48	56	41	20	16	13	77
19-Jul	15	16	17	19	16	18	31	39	51	43	49	43	45	49	45	45	71	37	29	32	36	42	29	18	71
20-Jul	25	63	59	60	41	37	38	49	30	20	31	27	33	29	32	32	29	24	29	16	39	18	18	15	63
21-Jul	17	19	22	17	20	70	35	33	24	30	31	25	27	68	36	56	48	57	45	28	12	23	19	15	70
22-Jul	16	14	17	16	19	26	31	51	43	49	44	41	44	37	43	40	44	46	37	35	24	19	17	22	51
23-Jul	26	23	23	23	27	36	50	44	44	45	47	48	45	47	46	46	50	40	27	46	54	30	25	23	54
24-Jul	25	26	25	27	25	29	26	25	26	24	26	27	26	27	28	29	29	26	25	22	17	18	21	20	29
25-Jul	27	34	34	44	22	28	52	39	45	49	49	47	53	63	68	58	48	56	43	27	14	11	12	15	68
26-Jul	14	13	15	15	17	18	29	33	33	41	45	52	47	49	40	41	35	32	31	24	20	22	21	20	52
27-Jul	21	19	22	23	20	20	22	29	42	68	59	60	66	59	47	72	42	48	45	47	40	28	44	43	72
28-Jul	42	47	51	34	33	48	45	44	47	44	44	44	46	34	38	27	46	41	62	27	43	36	24	51	62
29-Jul	21	23	40	32	43	25	54	32	38	61	49	52	46	51	30	27	62	49	31	33	28	30	79	33	79
30-Jul	37	60	16	18	35	43	37	47	81	29	36	34	39	35	29	49	47	50	46	50	20	38	44	48	81
31-Jul	47	45	51	47	44	48	53	43	45	47	40	35	36	28	24	23	28	27	23	27	41	35	27	AF	53
79 94 74 90 94 84 60 68 81 98 65 72 70 81 81 98 102 83 87 65 61 78 81 74																								Diurnal Maximum	
AF - Analyzer Failure																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

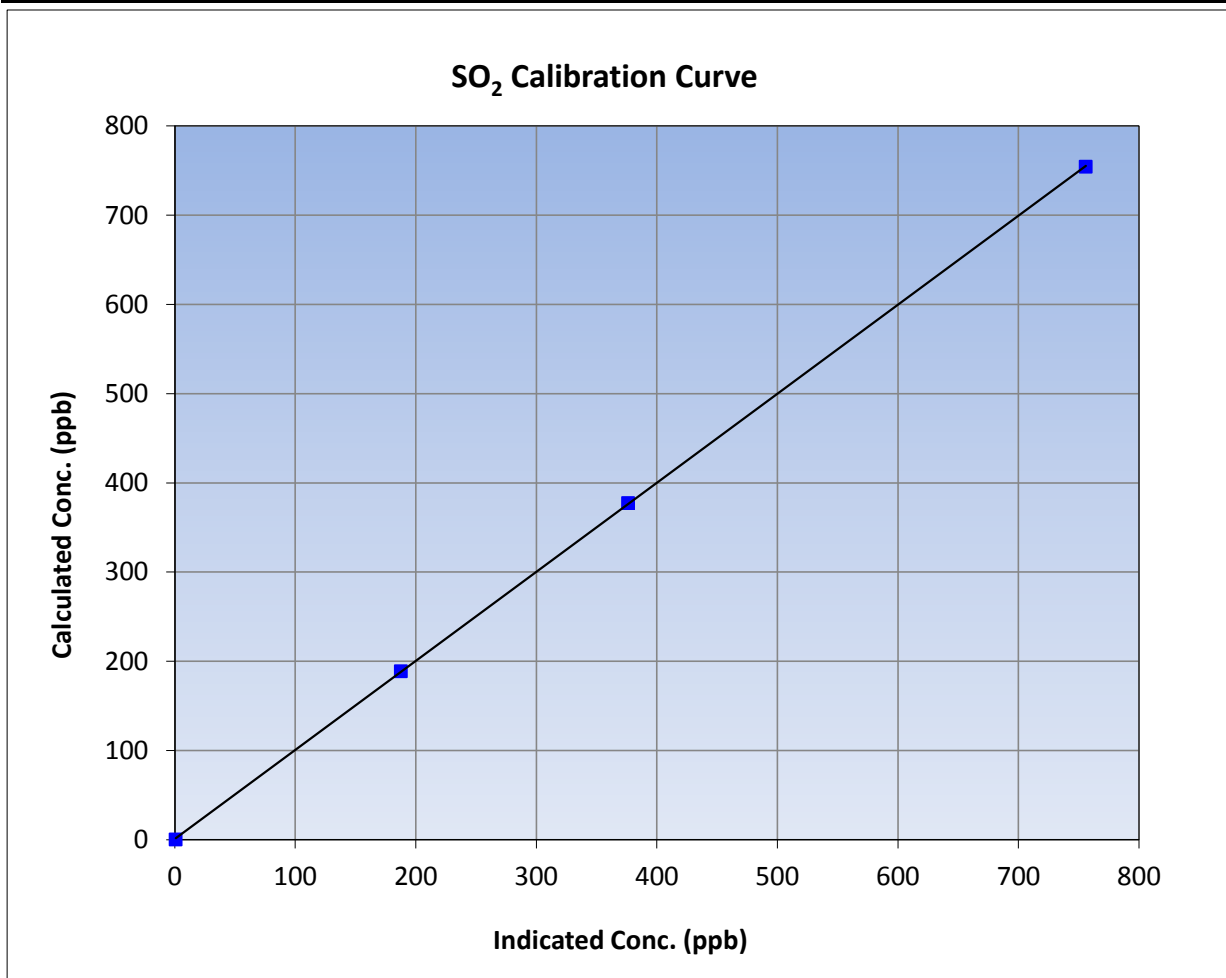
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 28, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	9:17	End Time (MST)	13:05
Analyzer make	Thermo 43i	Analyzer serial #	1501301450

Calibration Data

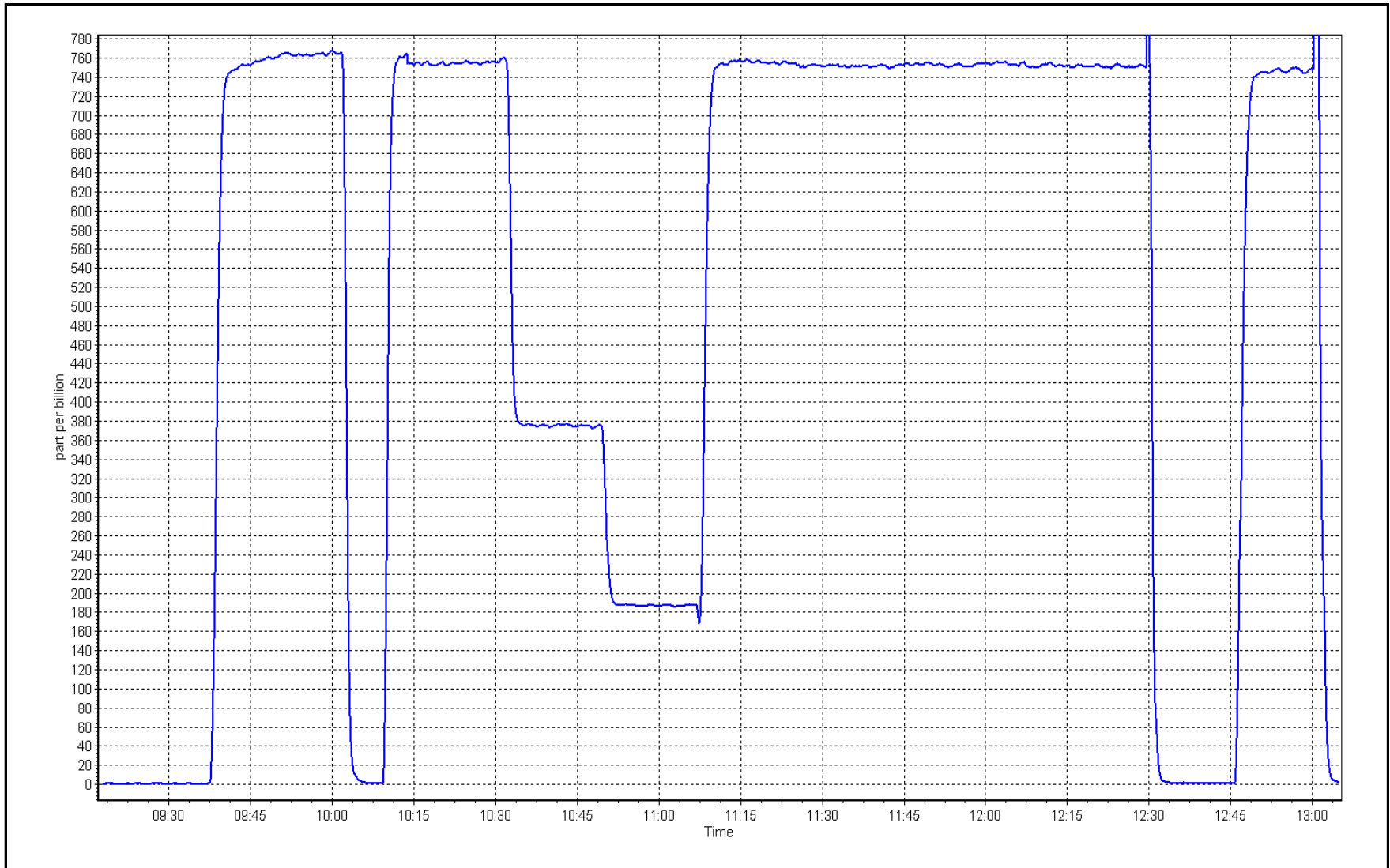
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.4	----	Correlation Coefficient	0.999985	≥0.995
754.2	755.5	0.9983			
377.2	375.7	1.0039	Slope	0.998250	0.90 - 1.10
188.6	187.2	1.0073			
			Intercept	0.858732	+/-30



SO2 Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 29, 2017
Start time (MST):	13:00	End time (MST):	15:05
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	0.995907	0.997142	Lamp voltage	2356	2341
Calculated intercept	0.153778	-0.159455	Pressure	21.4	21.0
Analyzer Background	27.0	27.0	Flow	0.555	0.541
Analyzer Coefficient	0.974	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	0.1	----
as found span	4935	75.6	80.7	81.1	0.995
calibrator zero	5005	0.0	0.0	0.1	----
high point	4935	75.6	80.7	81.1	0.995
second point	4975	37.9	40.4	40.7	0.994
third point	4992	19.0	20.3	20.6	0.985
as left zero	5005	0.0	0.0	0.3	----
as left span	4935	75.6	80.7	81.0	0.997

SO₂ Scrubber Check

				Average Correction Factor	0.991
Corrected As found	81.00	Previous response	80.90	*% change	-0.1%

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

H₂S Calibration Summary

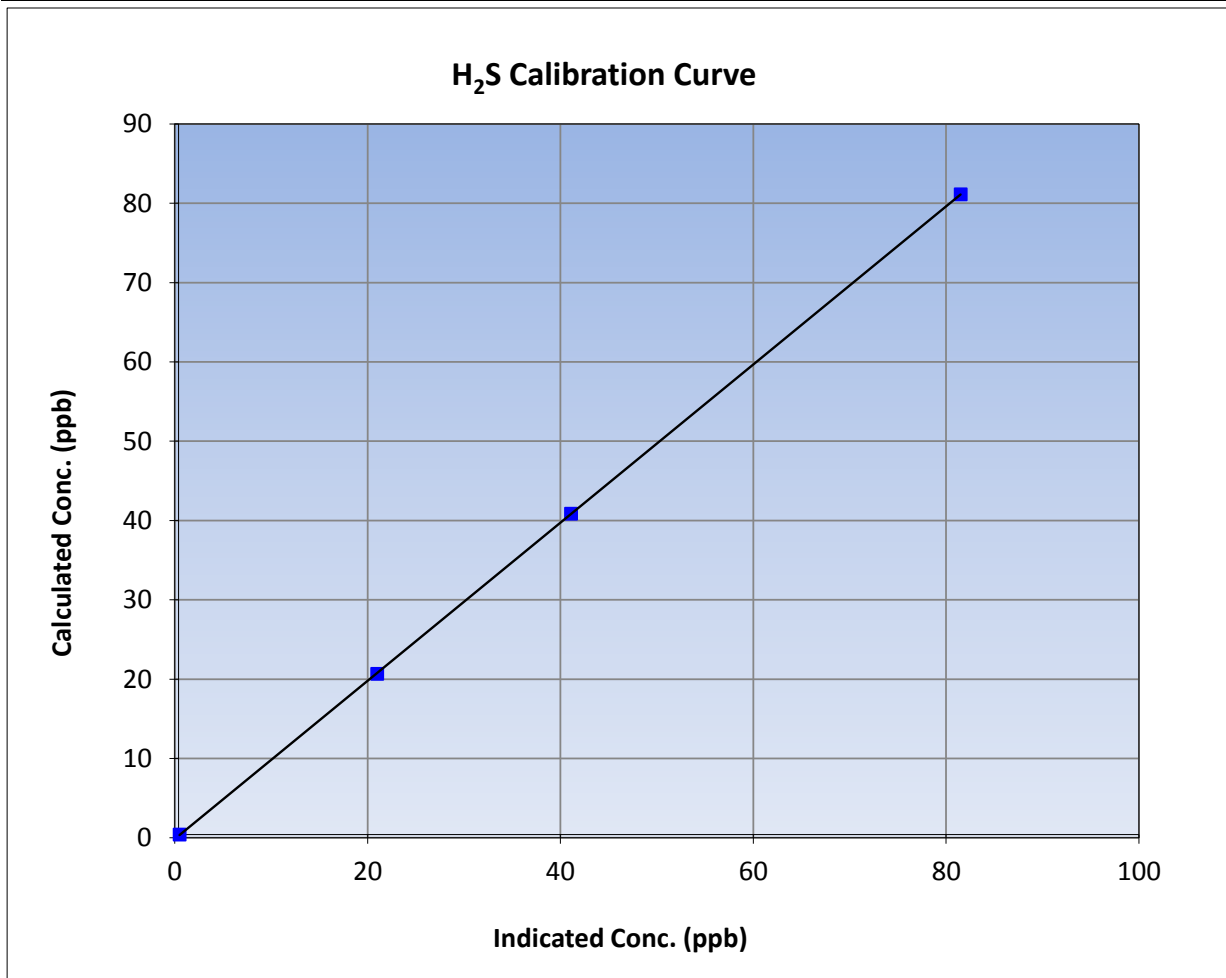
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 29, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	13:00	End Time (MST)	15:05
Analyzer make	Teledyne API T101	Analyzer serial #	196

Calibration Data

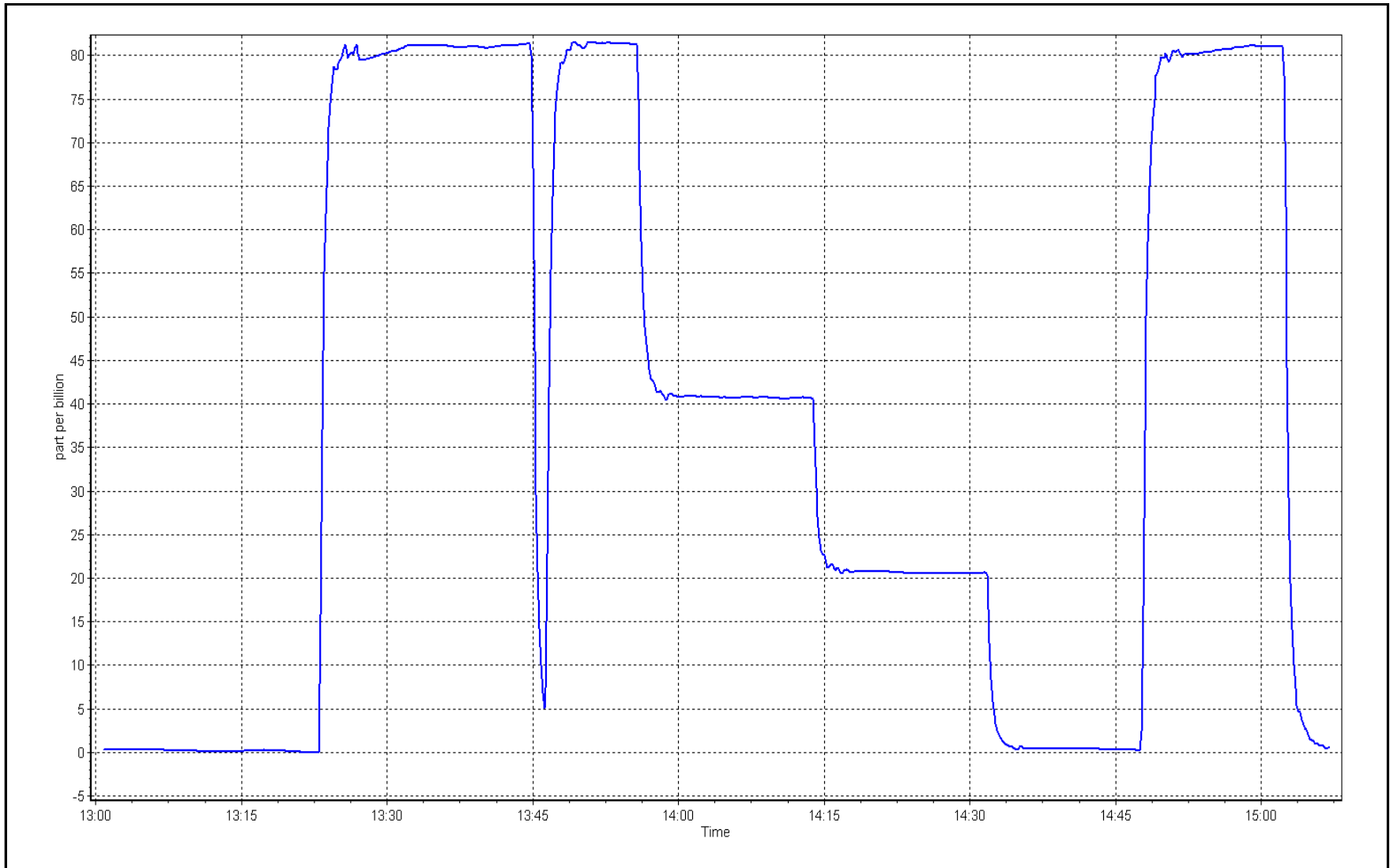
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999996	≥0.995
80.7	81.1	0.9953			
40.4	40.7	0.9938	Slope	0.997142	0.90 - 1.10
20.3	20.6	0.9847			
			Intercept	-0.159455	+/-3



H₂S Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 28, 2017
Start time (MST):	9:17	End time (MST):	13:05
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	0.989394	Sample pressure	8.6
Calculated intercept	0.021967	Fuel pressure	23.9
Analyzer Background	2.280	Air pressure	34.3
Analyzer Coefficient	4.448	Flame temperature	148.3

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	0.10	----
as found span	4930	78.7	16.66	16.96	0.982
calibrator zero	5005	0.0	0.00	0.10	----
high point	4930	78.7	16.66	16.68	0.999
second point	4975	39.4	8.33	8.34	0.999
third point	4995	19.7	4.17	4.19	0.995
as left zero	5005	0.0	0.00	-0.03	----
as left span	4930	78.7	16.66	16.61	1.003
Average Correction Factor					0.998
Corrected As found	16.86	Previous response	16.82	*% change	-0.3%

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

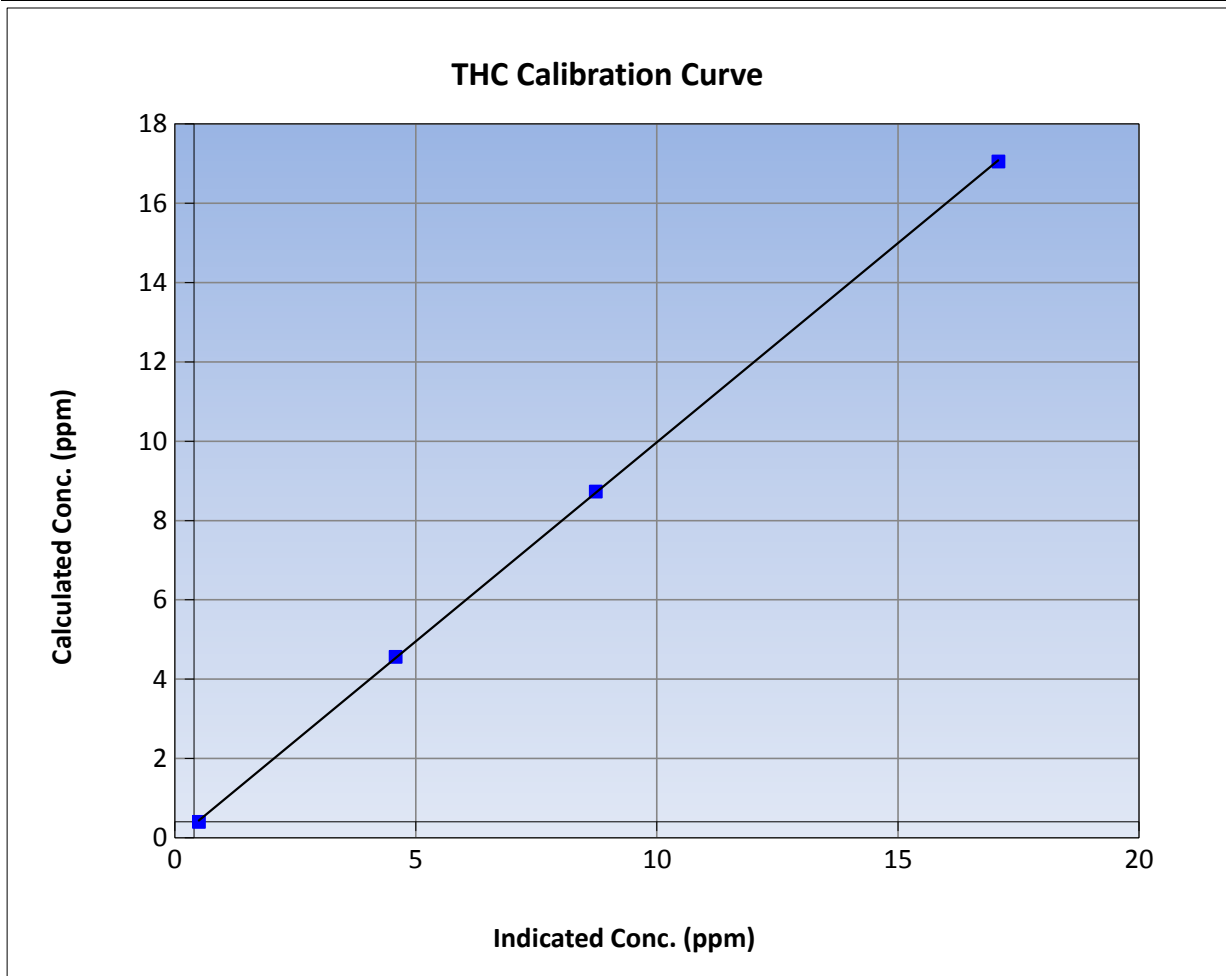
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 28, 2017
Station Name	MacKay River	Station Number	AMS 20
Start Time (MST)	9:17	End Time (MST)	13:05
Analyzer make	Thermo 51i-LT	Analyzer serial #	1501663727

Calibration Data

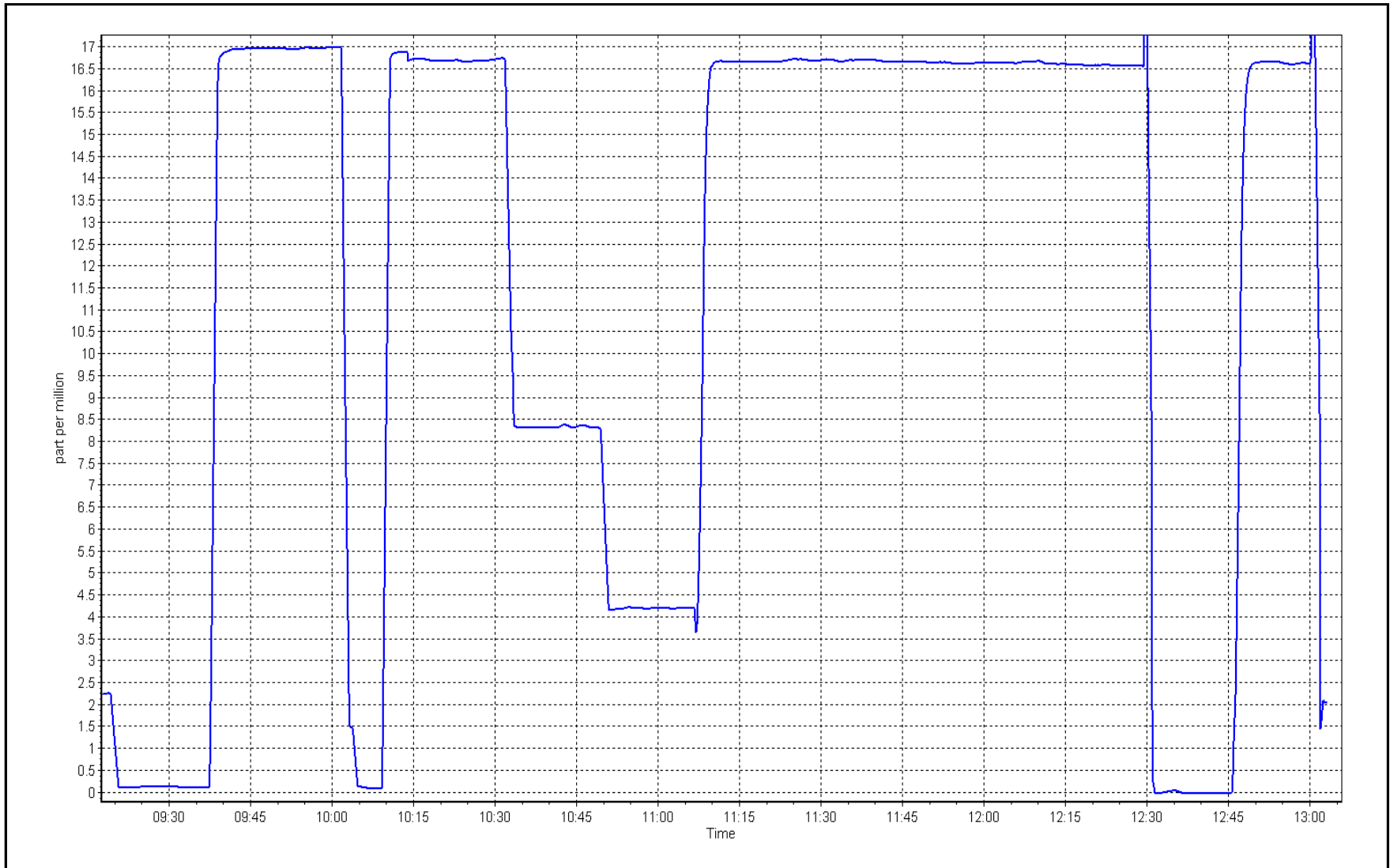
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999977	≥0.995
16.7	16.7	0.9985			
8.3	8.3	0.9995	Slope	1.003651	0.90 - 1.10
4.2	4.2	0.9953			
			Intercept	-0.063927	+/-1.5



THC Calibration Plot

Date: July 18, 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:	July 18, 2017	Last Cal Date:	June 28, 2017
Start time (MST):	9:17	End time (MST):	13:05
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	327.4 322.6
NO2 coefficient	0.995	0.995	Reaction cell Press	168.7 167.0
NO bkgrnd	3.1	3.1	Sample Flow	0.832 0.831
NOX bkgrnd	3.1	3.1	PMT Voltage	-767.4 -767.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.995521	0.996982
NO _x Cal Offset	0.714375	0.774931
NO Cal Slope	0.996239	0.996747
NO Cal Offset	1.334285	1.455538
NO ₂ Cal Slope	0.991050	0.991741
NO ₂ Cal Offset	-0.672732	-0.065138



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	-0.3	-0.3	0.0	----	----
as found span	4930	78.7	799.8	799.8	0.0	802.3	801.4	0.9	0.9969	0.9980
calibrator zero	5005	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	----	----
high point	4930	78.7	799.8	799.8	0.0	801.8	801.7	0.1	0.9975	0.9976
second point	4975	39.4	399.9	399.9	0.0	399.7	398.6	1.1	1.0006	1.0034
third point	4995	19.7	200.0	200.0	0.0	199.6	198.4	1.2	1.0018	1.0079
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	343.9	455.9	798.2	340.7	457.5	1.0020	1.0094
Average Correction Factor									1.0000	1.0029

Corrected As found NO_x = 802.6 ppb NO = 801.7 ppb *Percent Change NO_x = 0.0%
 Previous Response NO_x = 802.7 ppb NO = 801.5 ppb *Percent Change NO = 0.0%
 * = > +/-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	801.8	799.0	2.7	0.9975	1.0010	----	----
1st NO2 (400 ppb O3)	343.9	455.1	802.7	343.9	458.8	0.9964	----	0.9919	100.8%
2nd NO2 (200 ppb O3)	565.3	233.7	801.4	565.3	236.1	0.9980	----	0.9898	101.0%
3rd NO2 (100 ppb O3)	678.8	120.2	799.8	678.8	121.1	1.0000	----	0.9926	100.7%
2nd NO ref point	----	0.0	798.0	795.9	2.1	1.0022	1.0049	----	----
Average Correction Factor						0.9991	1.0029	0.9914	100.9%

Notes: Sample inlet filter replaced after as founds. No adjustment made, took new average for the high point.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

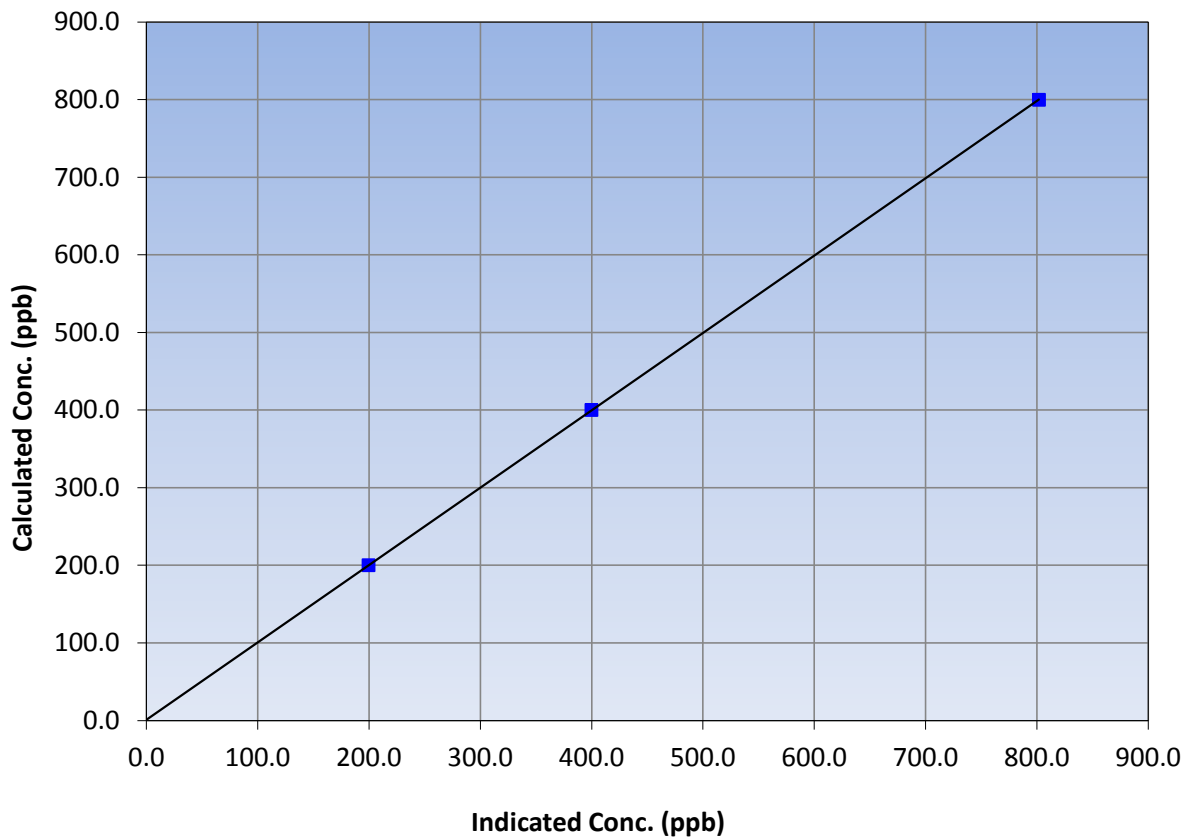
Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 28, 2017
Station Name	MackKay River	Station Number	AMS 20
Start Time (MST)	9:17	End Time (MST)	13:05
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	-0.3	----	Correlation Coefficient	≥0.995
799.8	801.8	0.9975		
399.9	399.7	1.0006	Slope	0.90 - 1.10
200.0	199.6	1.0018		
			Intercept	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

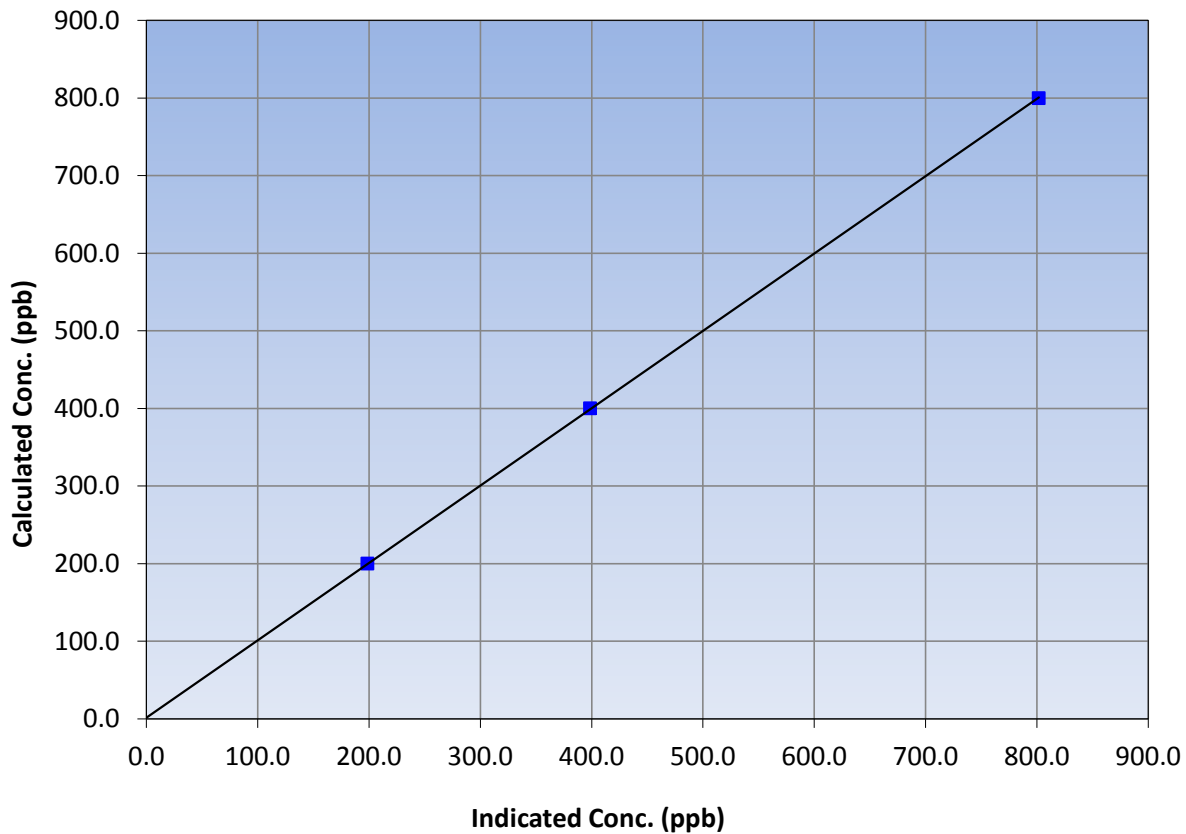
Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 28, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	9:17	End Time (MST)	13:05
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	≥0.995
799.8	801.7	0.9976		
399.9	398.6	1.0034	Slope	0.90 - 1.10
200.0	198.4	1.0079		
			Intercept	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

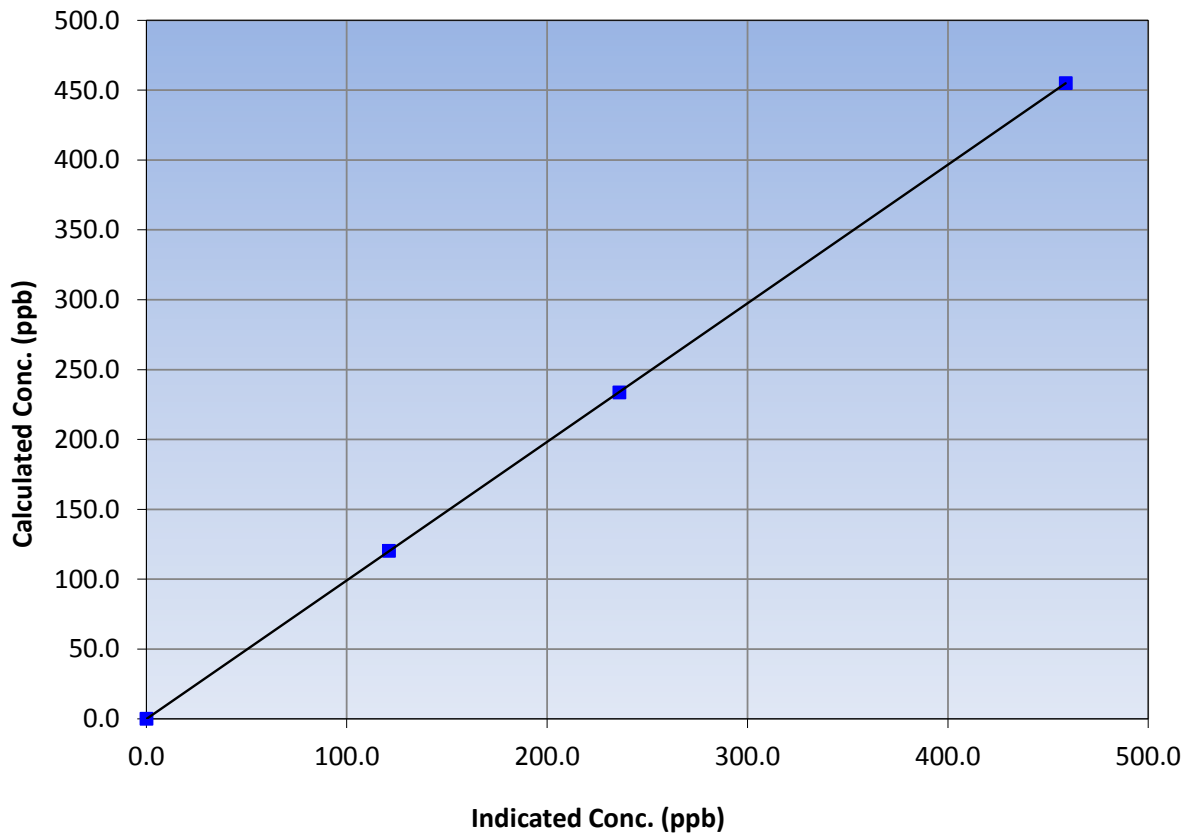
Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 28, 2017
Station Name	Mackay River	Station Number	AMS 20
Start Time (MST)	9:17	End Time (MST)	13:05
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	
455.1	458.8	0.9919			
233.7	236.1	0.9898			
120.2	121.1	0.9926			
			Slope	0.991741	0.90 - 1.10
			Intercept	-0.065138	+/-20

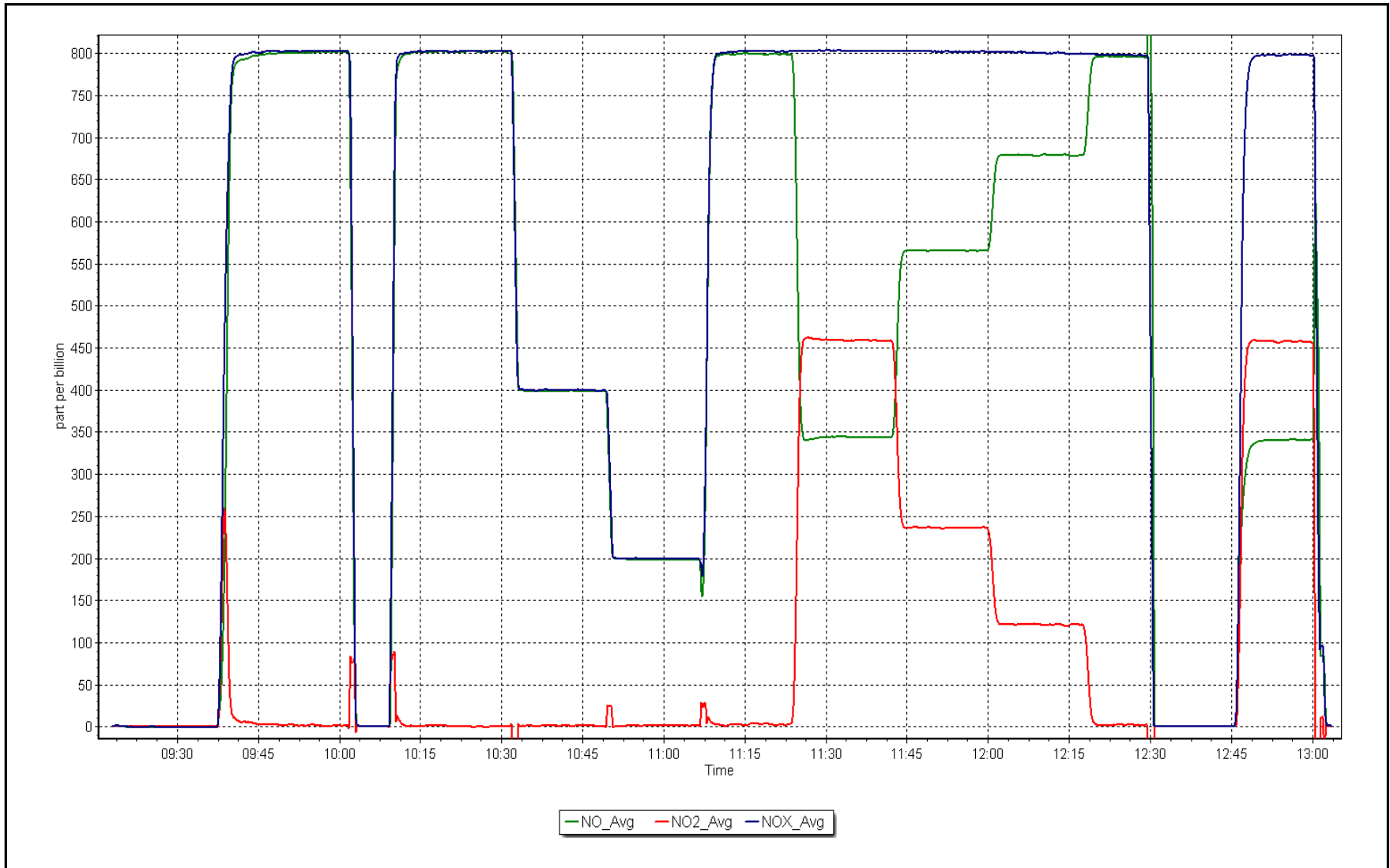
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 18, 2017

Location: MacKay River





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 21
CONKLIN COMMUNITY
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 JULY 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	709	34	35	99.87	2	0	1	0
TRS(ppb) Average	709	34	35	99.87	1	0	0	0
THC(ppm) Average	687	33	57	96.77	2.8	-	2.1	-
NMHC(ppm) Average	687	33	57	96.77	0.28	-	0.052	-
CH4(ppm) Average	687	33	57	96.77	2.8	-	2.1	-
O3 (ppb) Average	709	35	35	100	62	0	38	-
NO2 (ppb) Average	696	35	48	98.25	14	0	5	-
NO (ppb) Average	696	35	48	98.25	25	-	5	-
NOX (ppb) Average	696	35	48	98.25	32	-	8	-
PM2.5 (ug/m3) Average	742	2	2	100	125.9	-	24	0
Wind Speed 10 m (km/h) Average	740	3	4	99.87	23	-	14	-
Wind Direction 10 m (deg) Average	740	3	4	99.87	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100	30.1	-	21.0	-
Relative Humidity (%) Average	744	0	0	100	99	-	95.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 JULY 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	709	0.2	0	-	0	0	0	0	0	0	0	2
TRS (ppb) Average	709	0.4	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	687	1.97	0.2	-	1.8	1.8	1.9	1.9	2	2.2	2.2	2.8
NMHC(ppm) Average	687	0.009	0.031	-	0	0	0	0	0	0	0	0.28
CH4(ppm) Average	687	1.96	0.2	-	1.8	1.8	1.9	1.9	2	2.2	2.2	2.8
O3 (ppb) Average	709	25.7	12	-	4	8	16	26	34	41	41	62
NO2 (ppb) Average	696	2.4	2	-	0	1	1	2	4	6	6	14
NO (ppb) Average	696	1.6	3	-	0	0	0	0	2	5	5	25
NOX (ppb) Average	696	4	4	-	0	0	1	2	6	10	10	32
PM2.5 (ug/m3) Average	742	9.01	10.7	-	0.5	1.5	3	5.9	12	17.7	17.7	125.9
Wind Speed 10 m (km/h) Average	740	6.2	4	-	0	2	3	6	9	11	11	23
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	744	17.33	5.4	-	7	10.5	13.1	16.7	21.9	24.6	24.6	30.1
Relative Humidity (%) Average	744	70.2	21	-	31	40	52	72	92	97	97	99

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, NOx, THC	12 Jul 2017 12:00	12 Jul 2017 12:00		1 Maintenance - sample manifold cleaned
NMHC, CH4, THC	21 Jul 2017 13:00	22 Jul 2017 11:00		23 Maintenance - replaced carrier gas
NO2, NO, NOX	01 Jul 2017 01:00	01 Jul 2017 12:00		12 Analyzer Failure - pump failure
Wind Speed, Wind Direction	21 Jul 2017 22:00	21 Jul 2017 22:00		1 Flat line in sensor output signal

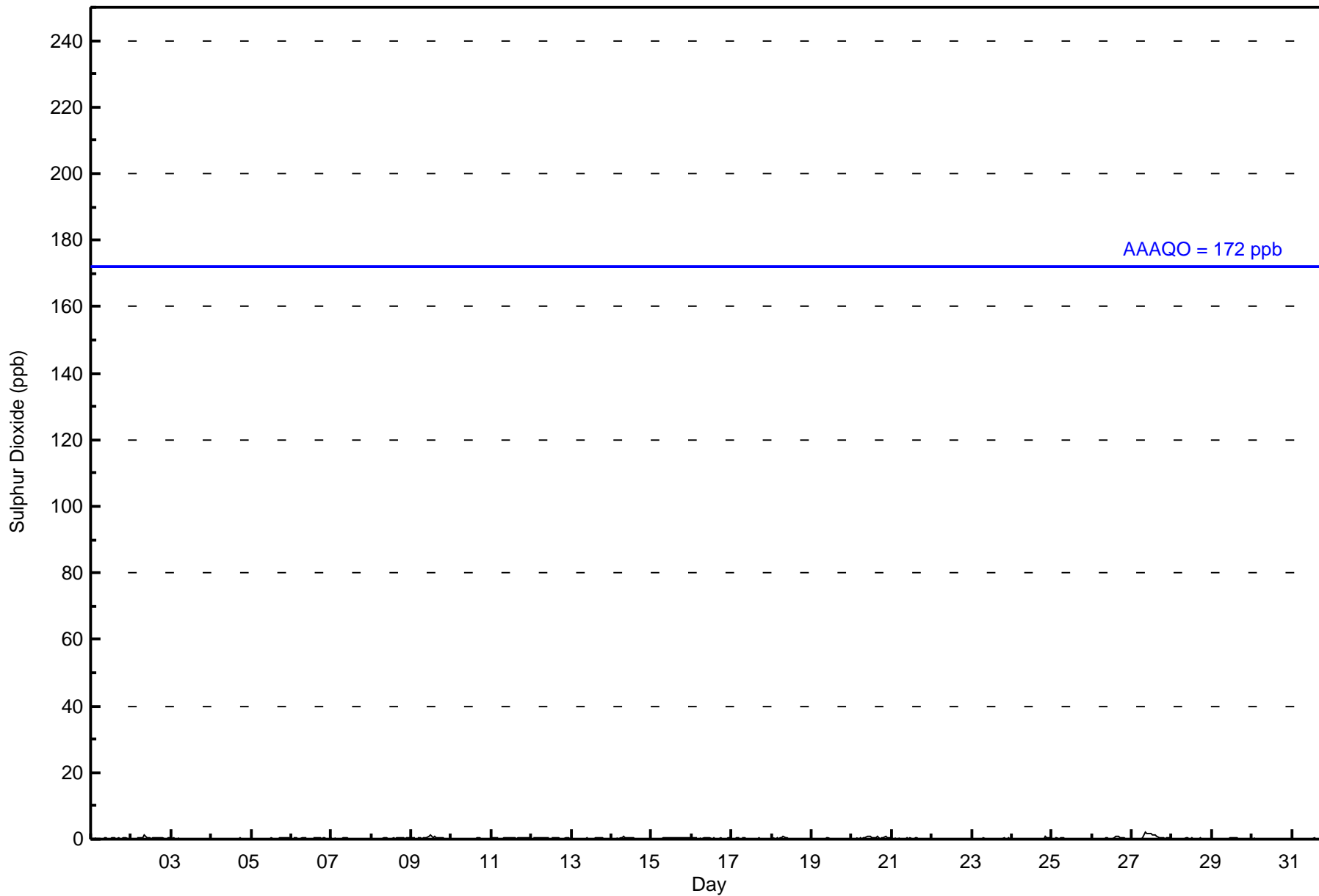


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																																					
Maximum Value: 2 ppb on Jul 27 09:00														Maximum Daily Average: 0.7 ppb on Jul 27										Hours of Data: 709																											
Minimum Value: 0 ppb on Jul 3 20:00														Minimum Daily Average: 0.1 ppb on Jul 4										Hours of Missing Data: 35																											
Maximum Diurnal Average: 0.3 ppb at hour 9														Minimum Diurnal Average: 0.2 ppb at hour 1										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 = 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-Jul	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-Jul	0	0	Z	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																									
3-Jul	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-Jul	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-Jul	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																									
6-Jul	Z	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0																									
7-Jul	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																									
8-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.4	1																									
10-Jul	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-Jul	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																									
12-Jul	Z	0	0	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0																									
13-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1																									
14-Jul	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																									
15-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																									
16-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																									
19-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	1	0	0	0.4	1																									
21-Jul	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-Jul	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-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.1	1																									
25-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0.3	1																									
27-Jul	0	0	0	Z	0	0	0	1	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0.7	2																									
28-Jul	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-Jul	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																									
30-Jul	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																									
31-Jul	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	0.3	0.3	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	
																								0	0	0	0	0	0	1	1	2	2	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	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
Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Conklin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



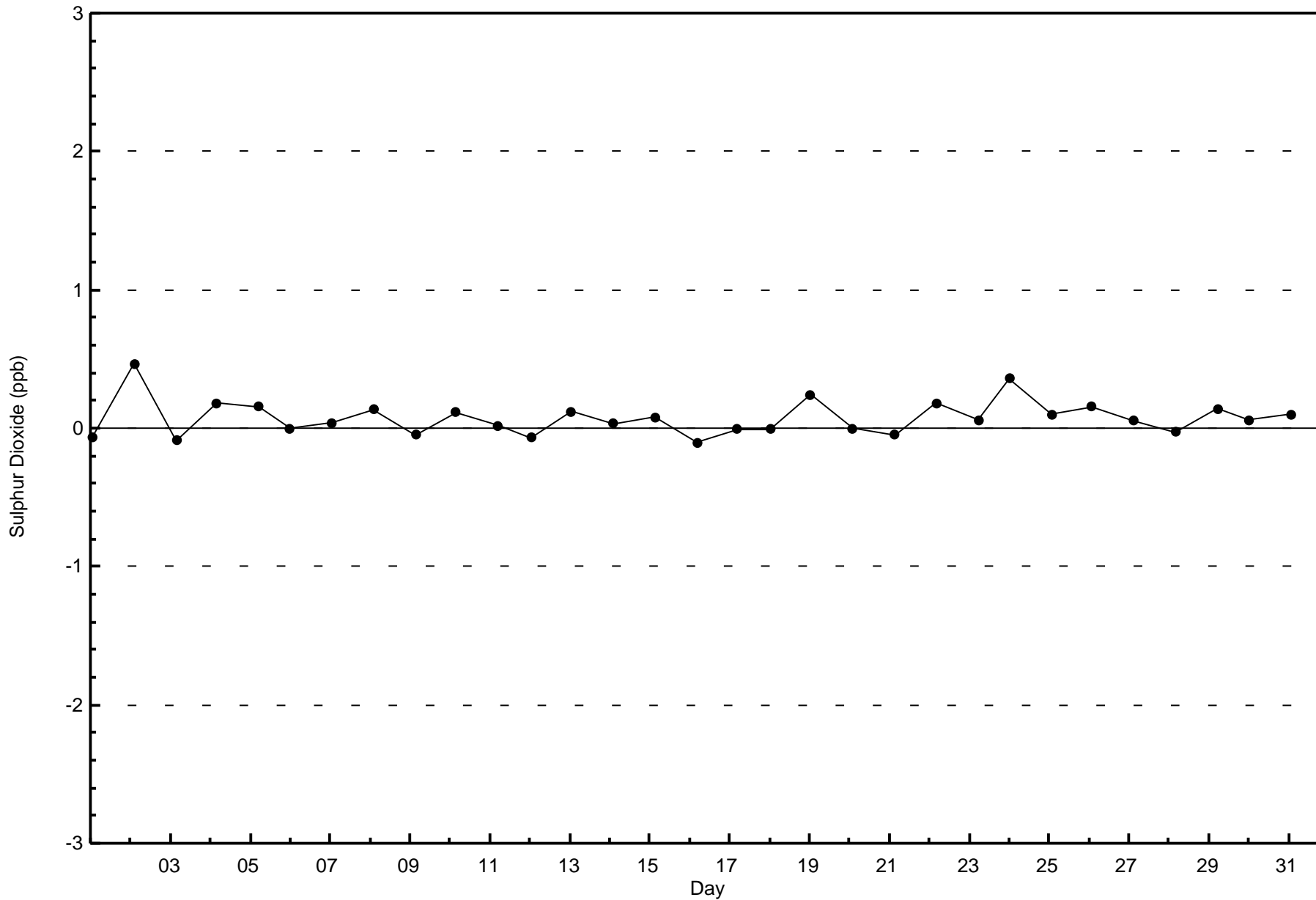
**Wood Buffalo Environmental Association
Frequency Distribution**

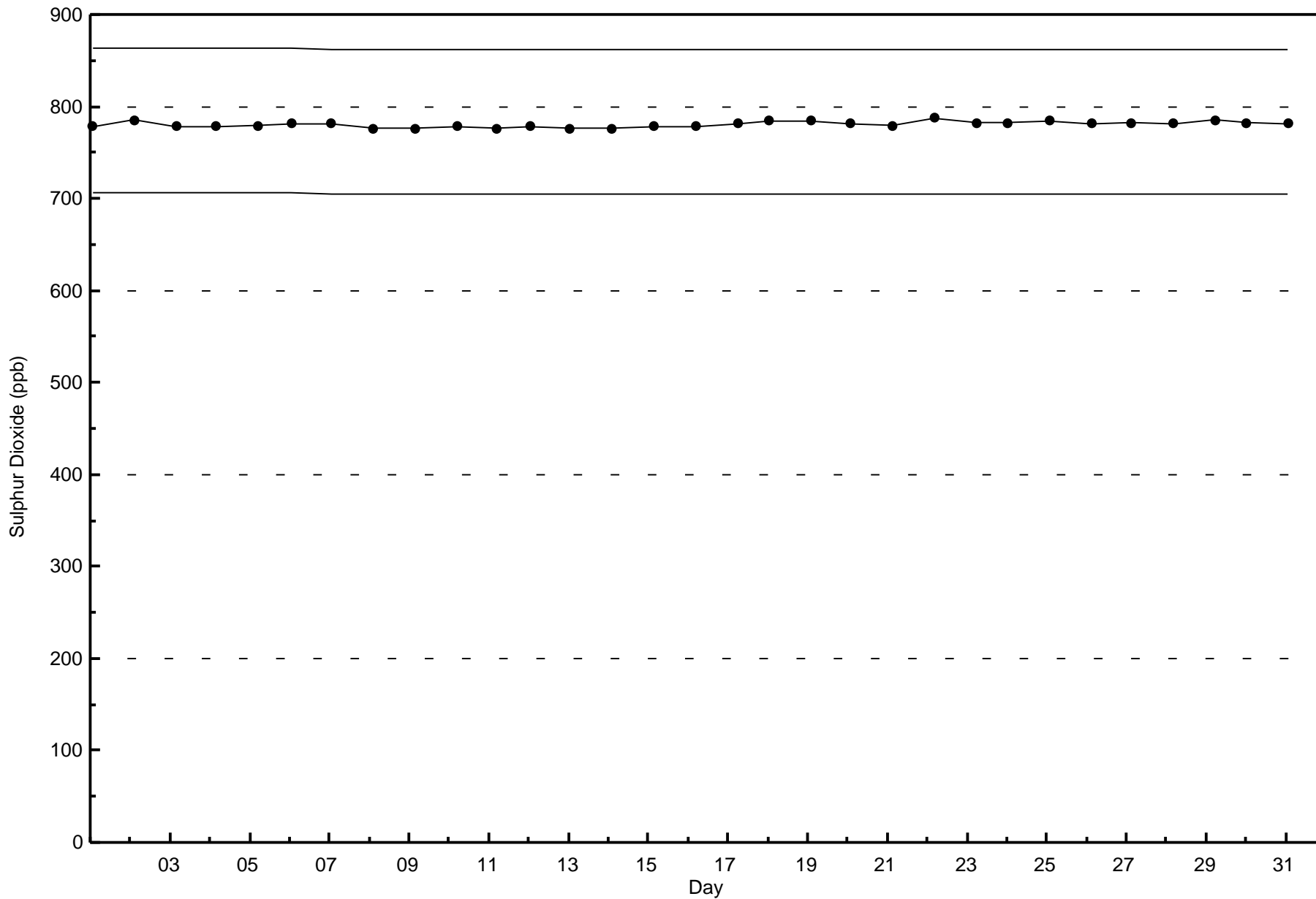
**Sulphur Dioxide (SO₂) - ppb
Conklin - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	24	16	5	3	9	33	19	29	61	80	64	85	74	69	64	73	708
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	24	16	5	3	9	33	19	29	61	80	64	85	74	69	64	73	708

Total Number of Valid Hours: 708

Total Number of Hours: 744





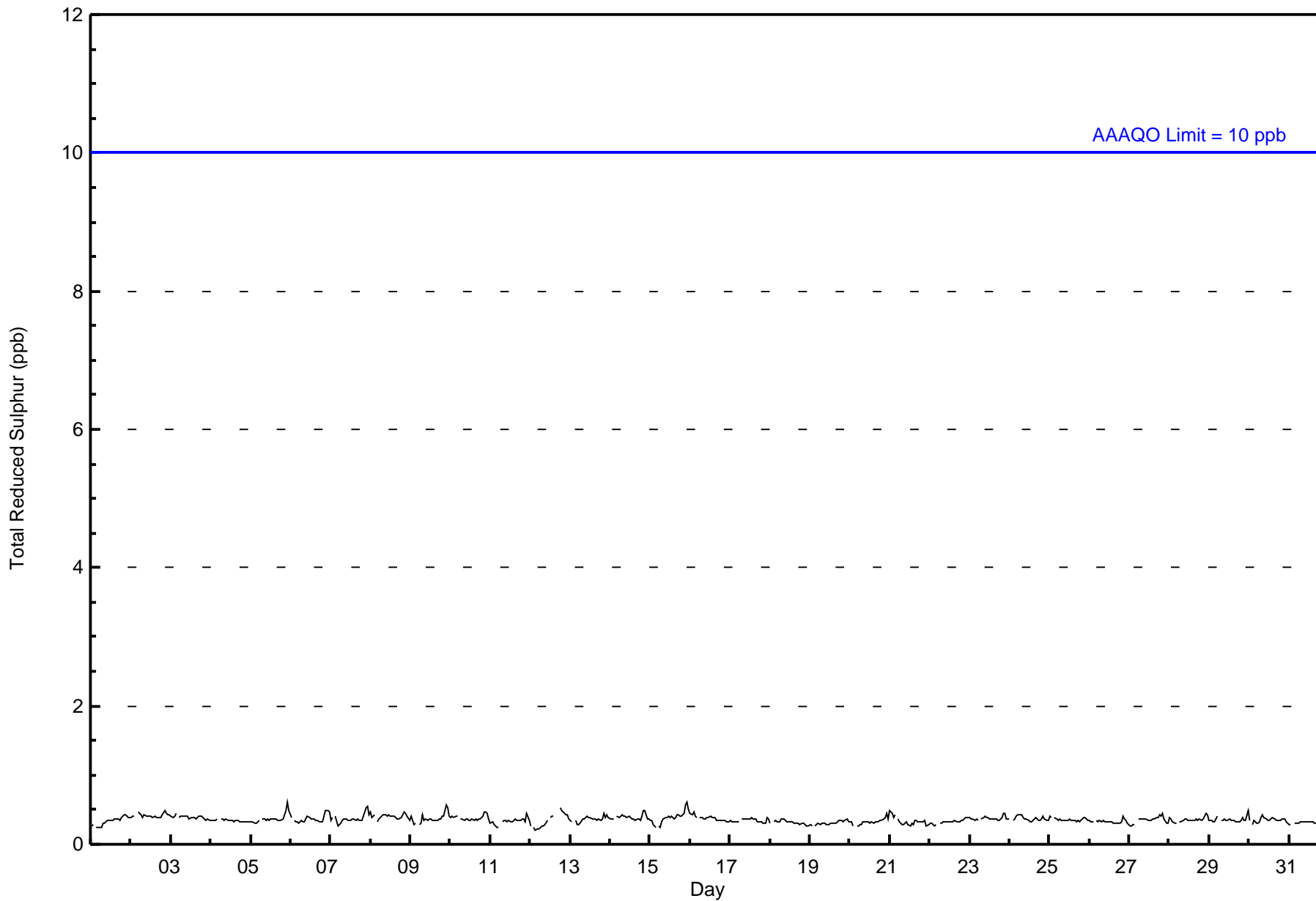


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1 ppb on Jul 5 23:00 Maximum Daily Average: 0.4 ppb on Jul 2		Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9																								
Minimum Value: 0 ppb on Jul 12 04:00 Maximum Diurnal Average: 0.4 ppb at hour 22 Monthly Average: 0.4 ppb		Minimum Daily Average: 0.3 ppb on Jul 19 Minimum Diurnal Average: 0.3 ppb at hour 6 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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
6-Jul	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
7-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1
8-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.4	1
10-Jul	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
11-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	M	0	0	0	C	C	C	1	0	0	0	0	0	0	0.3	1
13-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0.4	0
14-Jul	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
15-Jul	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
16-Jul	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
17-Jul	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-Jul	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-Jul	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
20-Jul	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
21-Jul	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-Jul	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
23-Jul	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
24-Jul	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
25-Jul	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
26-Jul	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-Jul	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-Jul	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
29-Jul	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
30-Jul	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
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.3	1
0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.4 0.4																								Diurnal Average		
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 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
Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Conklin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Conklin - July 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	23	16	5	3	9	33	18	25	63	82	63	85	73	69	64	74	705
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	23	16	5	3	9	33	18	25	63	82	63	85	73	69	64	74	705

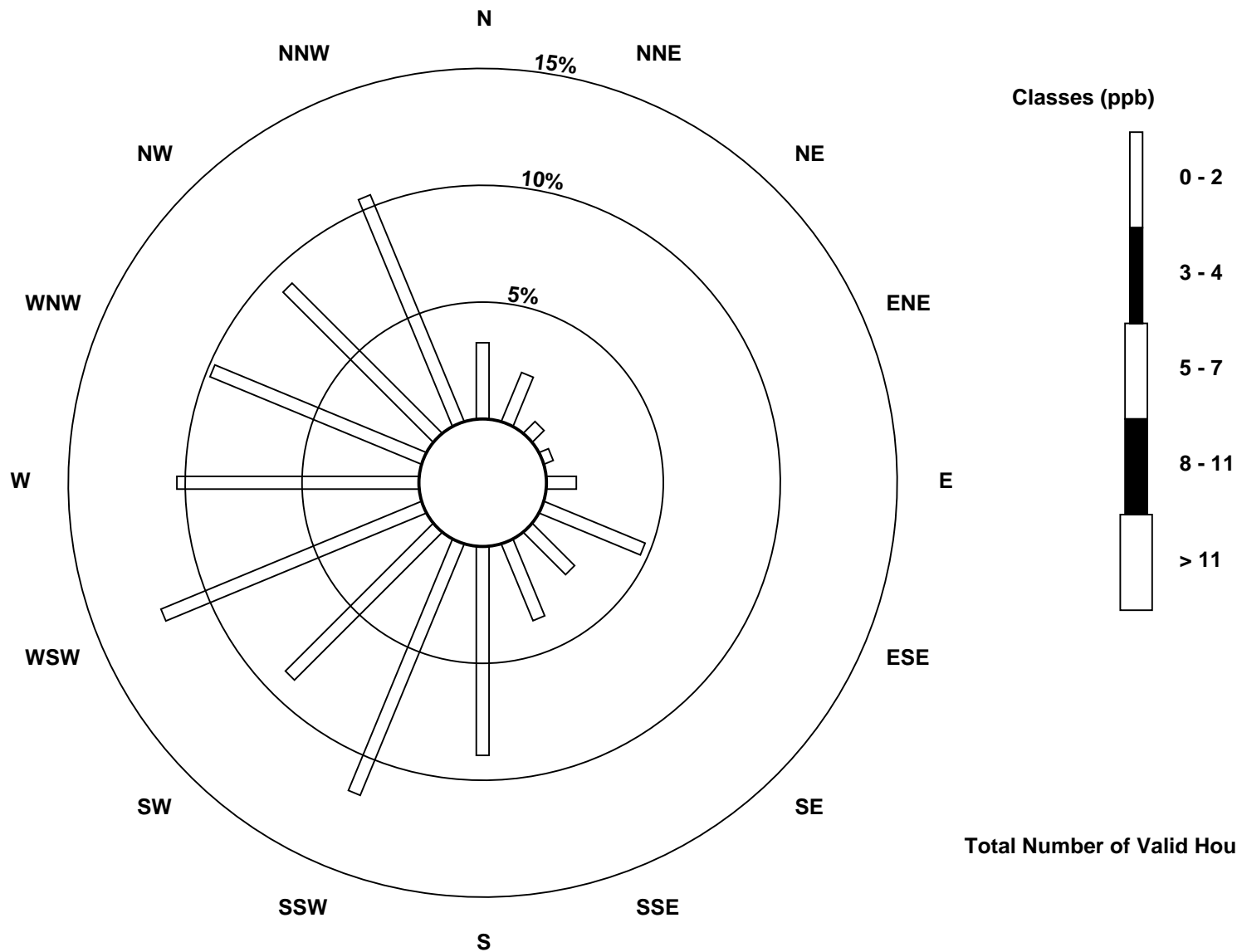
Total Number of Valid Hours: 705

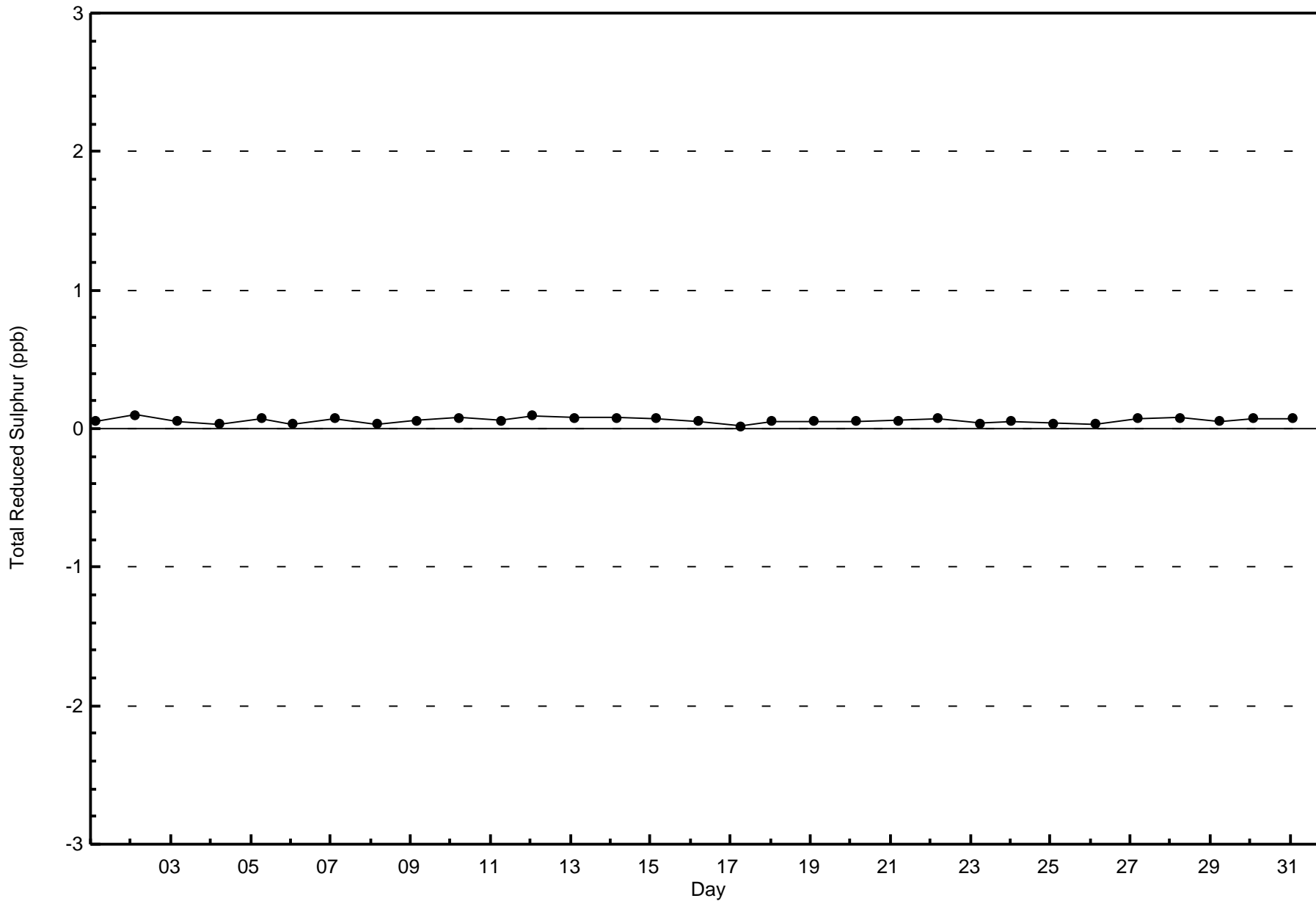
Total Number of Hours: 744

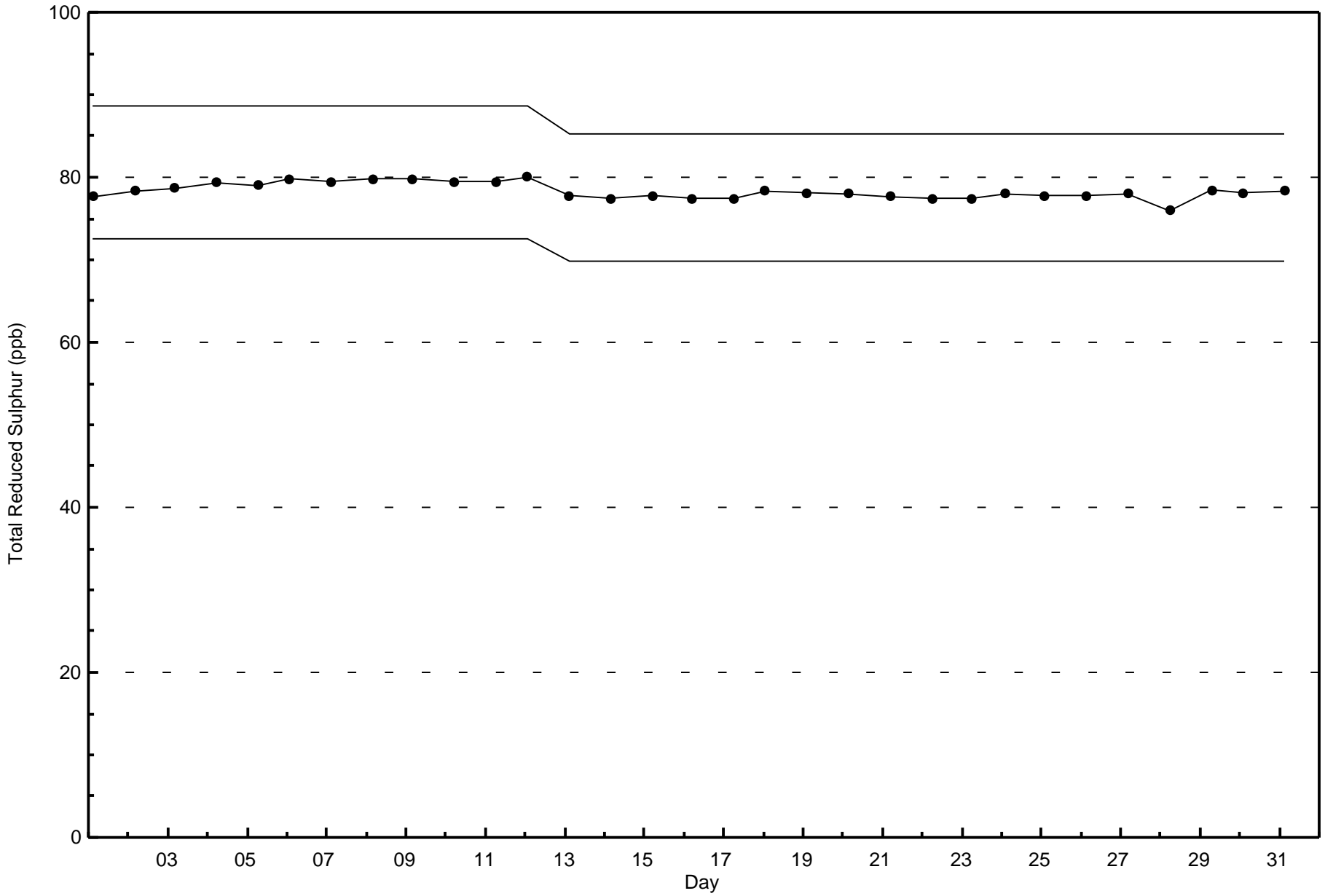


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Conklin (AMS 21)





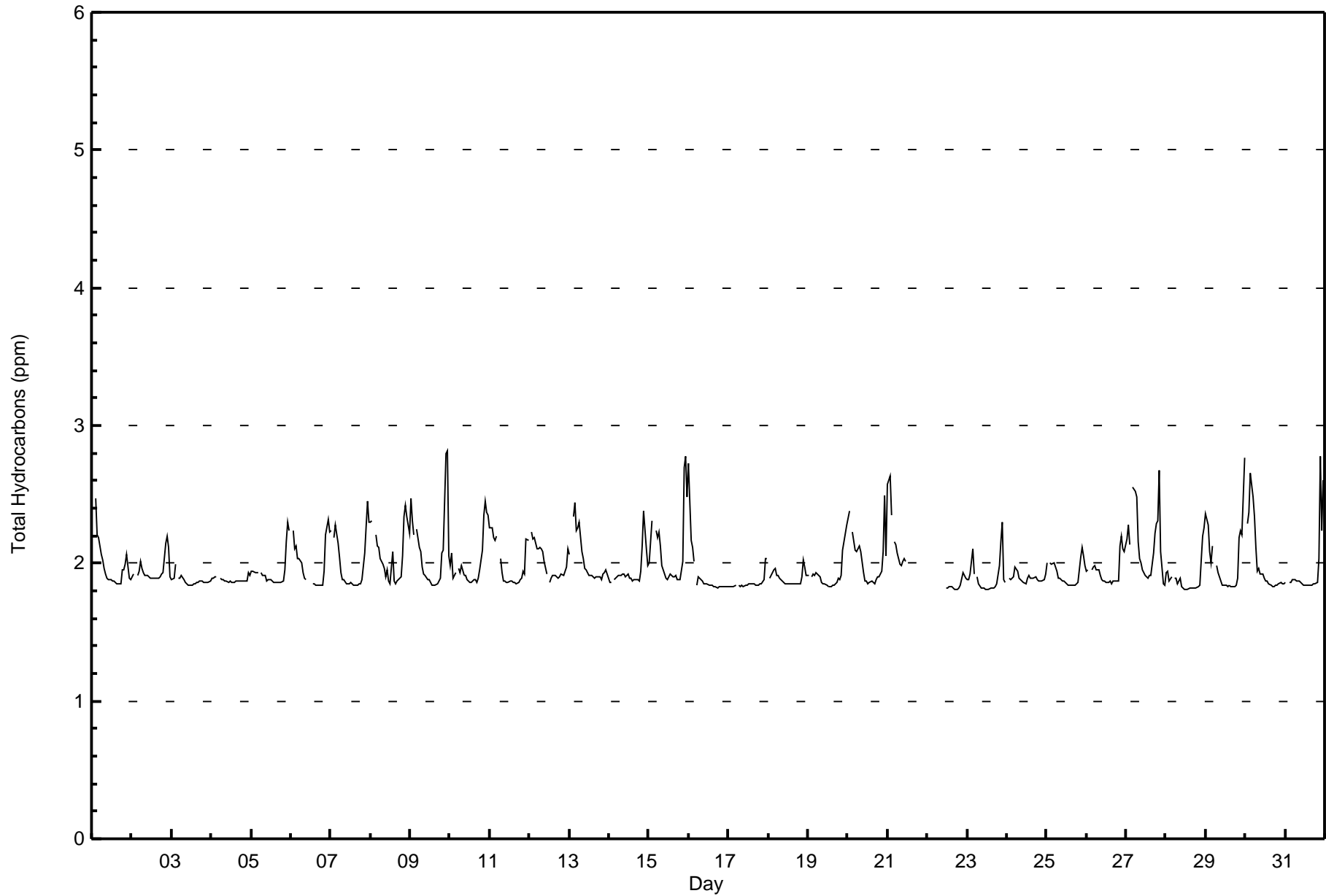




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Conklin - July 2017

Maximum Value: 2.8 ppm on Jul 9 23:00																			Maximum Daily Average: 2.1 ppm on Jul 27						Hours in Service: 744		
Minimum Value: 1.8 ppm on Jul 22 18:00																			Minimum Daily Average: 1.9 ppm on Jul 17						Hours of Data: 687		
Maximum Diurnal Average: 2.1 ppm at hour 22																			Minimum Diurnal Average: 1.9 ppm at hour 16						Hours of Missing Data: 57		
Monthly Average: 1.97 ppm																			Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.2 P ₉₉ = 2.7						Hours of Calibration: 33		
																									Percent Operational Time: 96.8		
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-Jul	2.3	Z	2.5	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	1.8	1.9	2.0	1.9	2.0	2.1	1.9	1.9	2.0	2.5	
2-Jul	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	2.1	2.2	2.1	1.9	1.9	2.2	
3-Jul	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	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	2.0	
4-Jul	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-Jul	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	2.0	2.2	2.3	2.2	1.9	2.3	
6-Jul	Z	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	C	C	C	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	2.2	2.3	2.2	2.0	2.3	
7-Jul	2.2	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	1.9	1.9	2.1	2.3	2.5	2.3	2.0	2.5	
8-Jul	2.3	2.3	Z	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.8	2.1	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.4	2.3	2.2	2.1	2.4	
9-Jul	2.5	2.3	2.2	Z	2.2	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.1	2.8	2.8	2.1	2.1	2.8	
10-Jul	2.0	2.1	1.9	1.9	Z	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	2.0	2.1	2.3	2.4	2.4	2.3	2.0	2.4	
11-Jul	2.3	2.3	2.2	2.2	2.2	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	2.2	2.2	2.0	2.3	
12-Jul	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	1.9	M	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	2.2	
13-Jul	2.1	Z	2.3	2.4	2.2	2.3	2.3	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	1.9	2.0	1.9	2.4	
14-Jul	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	2.4	2.1	2.0	1.9	2.4	
15-Jul	2.0	2.2	2.3	Z	2.2	2.2	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	2.0	2.7	2.8	2.5	2.1	2.8	
16-Jul	2.7	2.2	2.1	2.0	Z	1.8	1.9	1.9	1.9	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	1.9	2.7	
17-Jul	1.8	1.8	1.8	1.8	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	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	2.0	
18-Jul	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.9	1.8	1.8	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0	
19-Jul	1.9	Z	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	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.2	2.3	1.9	2.3	
20-Jul	2.3	2.4	Z	2.2	2.1	2.1	2.1	2.1	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	2.1	2.5	2.1	2.0	2.5	
21-Jul	2.6	2.6	2.4	Z	2.2	2.1	2.1	2.0	2.0	2.0	2.0	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.6
22-Jul	M	M	M	M	M	M	M	M	M	M	M	M	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	
23-Jul	1.9	1.9	1.9	2.1	1.9	Z	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	2.0	2.2	2.3	1.9	1.9	1.9	2.3	
24-Jul	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	1.9	2.0	2.0
25-Jul	2.0	Z	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.1	2.1	2.0	1.9	2.1	
26-Jul	1.9	1.9	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	2.1	2.2	2.1	2.1	1.9	2.2	
27-Jul	2.2	2.3	2.1	Z	2.6	2.5	2.5	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.2	2.3	2.3	2.7	2.1	1.9	1.8	2.7	
28-Jul	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.2	2.3	1.9	1.9	2.3	
29-Jul	2.4	2.3	2.1	2.0	2.1	Z	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.2	2.2	2.2	2.8	2.0	2.8	
30-Jul	Z	2.3	2.4	2.7	2.5	2.3	2.1	1.9	2.0	1.9	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	1.8	2.0	2.7	
31-Jul	1.9	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	1.8	1.8	1.8	1.9	1.9	2.0	2.8	2.2	2.6	2.0	2.8	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	534	77.73	77.73
2.1 - 3.0	153	22.27	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - July 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	20	15	5	2	6	29	14	14	28	37	56	68	68	61	56	55	534
2.1 - 3.0	4	0	0	1	1	4	5	15	26	41	7	14	5	7	8	15	153
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	24	15	5	3	7	33	19	29	54	78	63	82	73	68	64	70	687

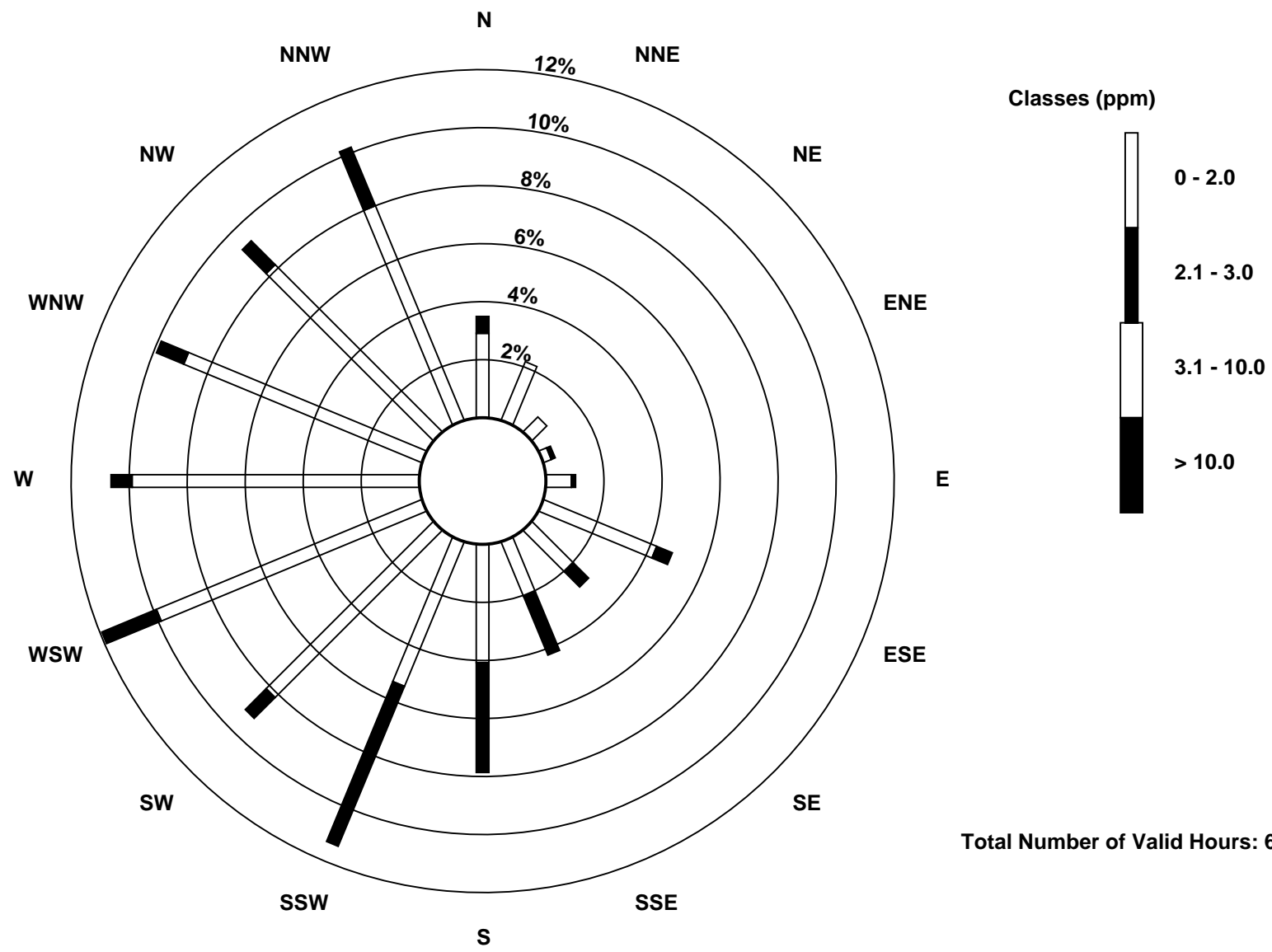
Total Number of Valid Hours: 687

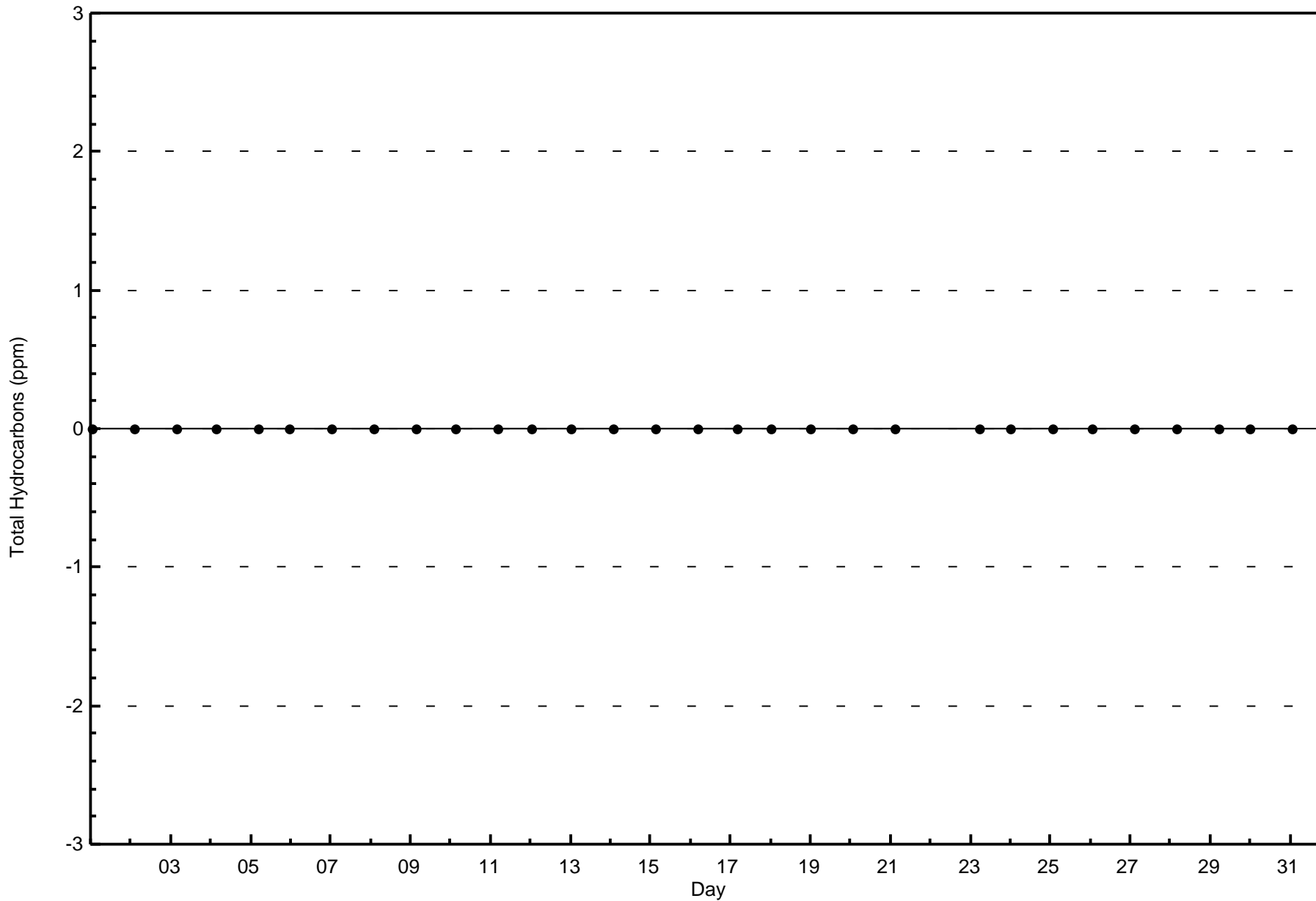
Total Number of Hours: 744

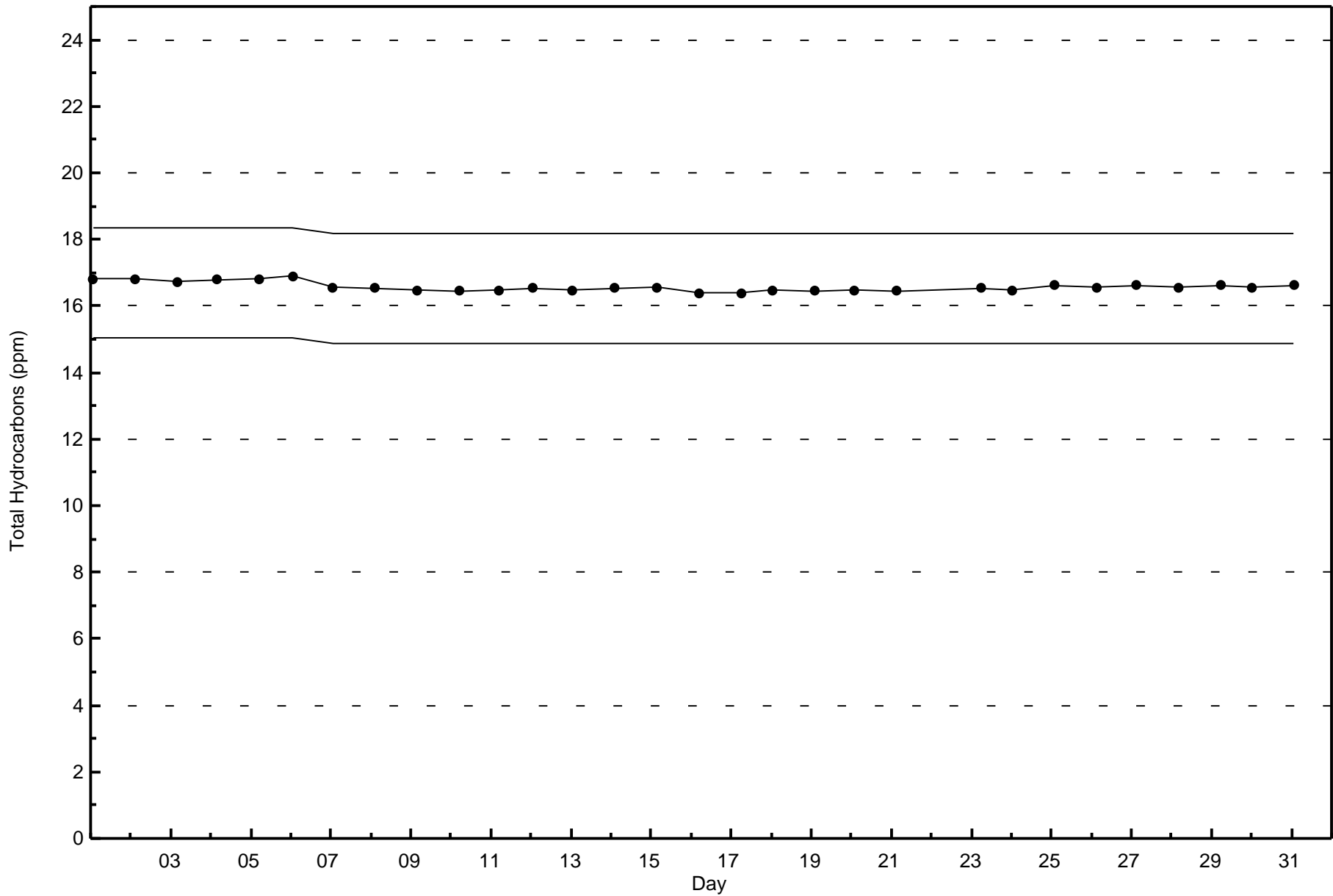


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Conklin (AMS 21)





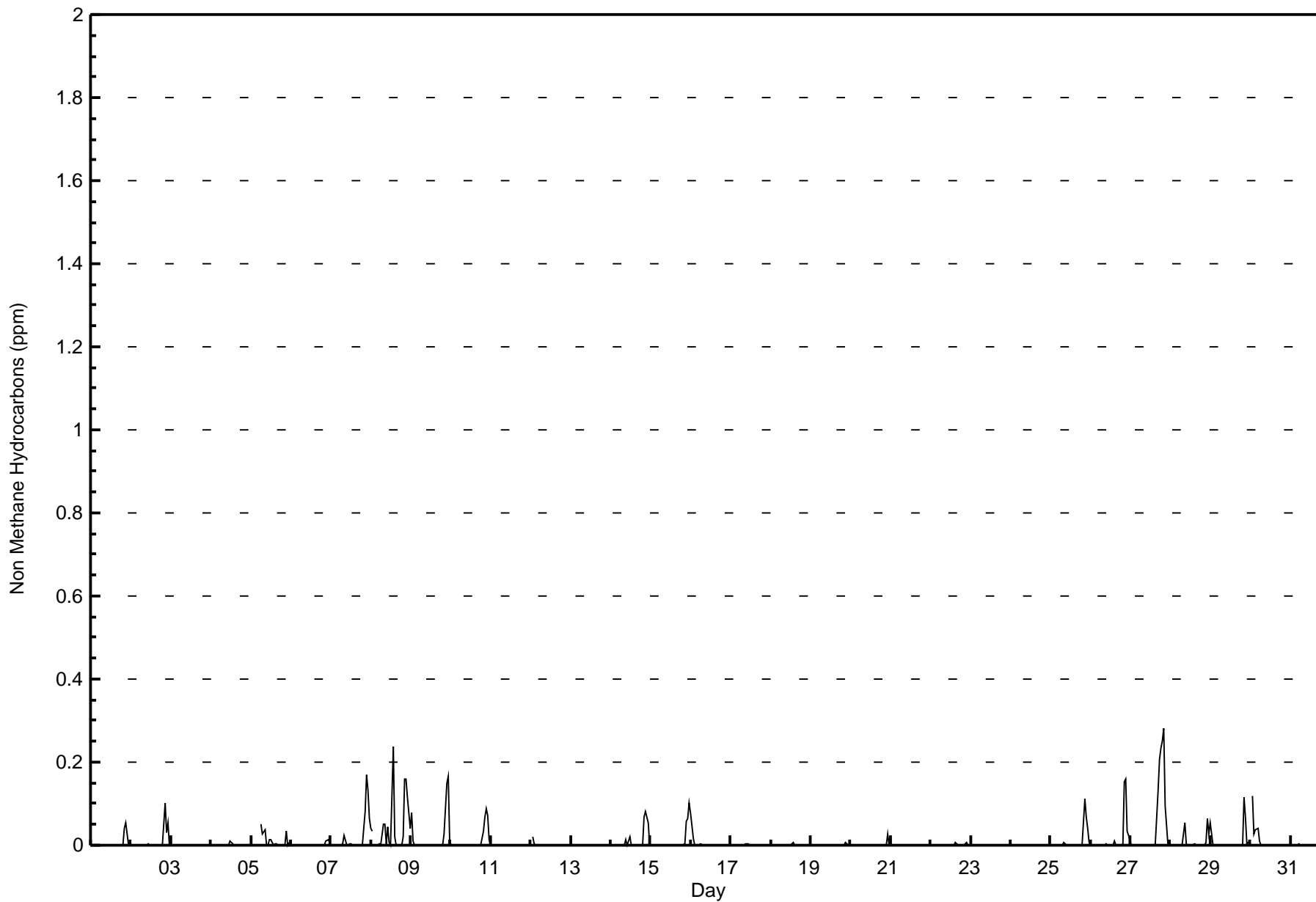




Summary of Hour Averages

Conklin - July 2017

Maximum Value: 0.280 ppm on Jul 27 21:00		Maximum Daily Average: 0.052 ppm on Jul 27		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Jul 1 01:00		Minimum Daily Average: 0.000 ppm on Jul 13		Hours of Data: 687																							
Maximum Diurnal Average: 0.041 ppm at hour 22		Minimum Diurnal Average: 0.000 ppm at hour 16		Hours of Missing Data: 57																							
Monthly Average: 0.009 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: 33																							
				Percent Operational Time: 96.8																							
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-Jul	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	0.041	0.054	0.000	0.000	0.004	0.054	
2-Jul	0.000	0.000	Z	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	0.100	0.031	0.055	0.001	0.008	0.100	
3-Jul	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	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
4-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.007	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.011
5-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.050	0.026	0.036	0.000	0.000	0.015	0.014	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.001	0.005	0.008	0.050
6-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	C	C	C	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.014	0.003	0.001	0.014	
7-Jul	0.000	Z	0.001	0.001	0.000	0.000	0.000	0.002	0.025	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082	0.170	0.133	0.065	0.021	0.170	
8-Jul	0.041	0.035	Z	0.000	0.000	0.003	0.000	0.051	0.052	0.004	0.043	0.007	0.000	0.237	0.020	0.000	0.000	0.000	0.000	0.020	0.158	0.159	0.115	0.041	0.043	0.237	
9-Jul	0.077	0.011	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	0.027	0.149	0.167	0.009	0.019	0.167	
10-Jul	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	0.035	0.069	0.087	0.072	0.015	0.012	0.087	
11-Jul	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
12-Jul	Z	0.020	0.002	0.000	0.000	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	0.000	0.000	0.000	0.000	0.000	0.001	0.020	
13-Jul	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
14-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.083	0.056	0.000	0.010	0.083	
15-Jul	0.000	0.000	0.000	Z	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	0.002	0.058	0.064	0.101	0.010	0.101	
16-Jul	0.077	0.017	0.000	0.000	Z	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.077	
17-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.002	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	0.000	0.000	0.000	0.004
18-Jul	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	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.007
19-Jul	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	0.008	0.000	0.002	0.000	0.008	
20-Jul	0.000	0.000	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	0.029	0.001	0.029	
21-Jul	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	M	M	M	M	M	M	M	M	M	M	M	--	0.000	
22-Jul	M	M	M	M	M	M	M	M	M	M	M	M	0.002	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.006	0.002	0.000	--	0.007	
23-Jul	0.000	0.000	0.000	0.000	0.000	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	0.001	0.001
24-Jul	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
25-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.111	0.069	0.040	0.006	0.010	0.111	
26-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.009	0.001	0.000	0.000	0.000	0.002	0.151	0.158	0.032	0.024	0.017	0.017	0.158	
27-Jul	0.001	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	0.132	0.207	0.233	0.250	0.280	0.095	0.000	0.000	0.052	0.052	0.280	
28-Jul	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.053	0.005	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.063	0.028	0.007	0.007	0.063	
29-Jul	0.055	0.000	0.000	0.000	0.000	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	0.002	0.117	0.068	0.004	0.011	0.011	0.011	0.117	
30-Jul	Z	0.118	0.027	0.036	0.042	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.010	0.010	0.118	
31-Jul	0.000	Z	0.000	0.000	0.000	0.004	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	0.004	0.004
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan		C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	599	87.19	87.19
0.006 - 0.05	51	7.42	94.61
0.06 - 0.1	26	3.78	98.40
> 0.1	11	1.60	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Conklin - July 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	24	15	5	3	6	31	18	24	46	50	59	73	62	57	58	68	599
0.006 - 0.05	0	0	0	0	1	0	0	2	5	13	3	5	10	7	4	1	51
0.06 - 0.1	0	0	0	0	0	1	1	1	3	11	1	4	1	1	1	1	26
> 0.1	0	0	0	0	0	1	0	2	0	4	0	0	0	3	1	0	11
Totals	24	15	5	3	7	33	19	29	54	78	63	82	73	68	64	70	687

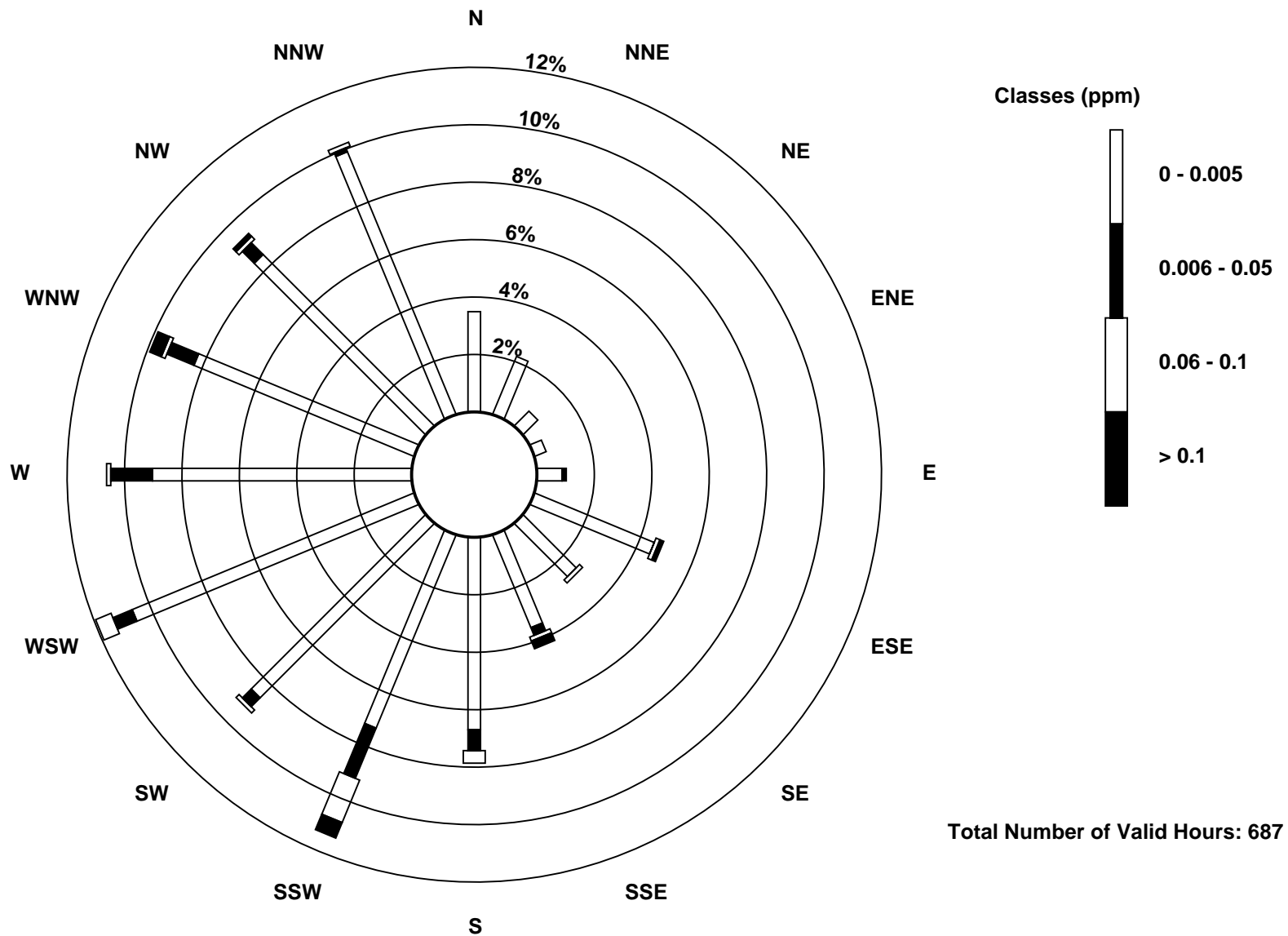
Total Number of Valid Hours: 687

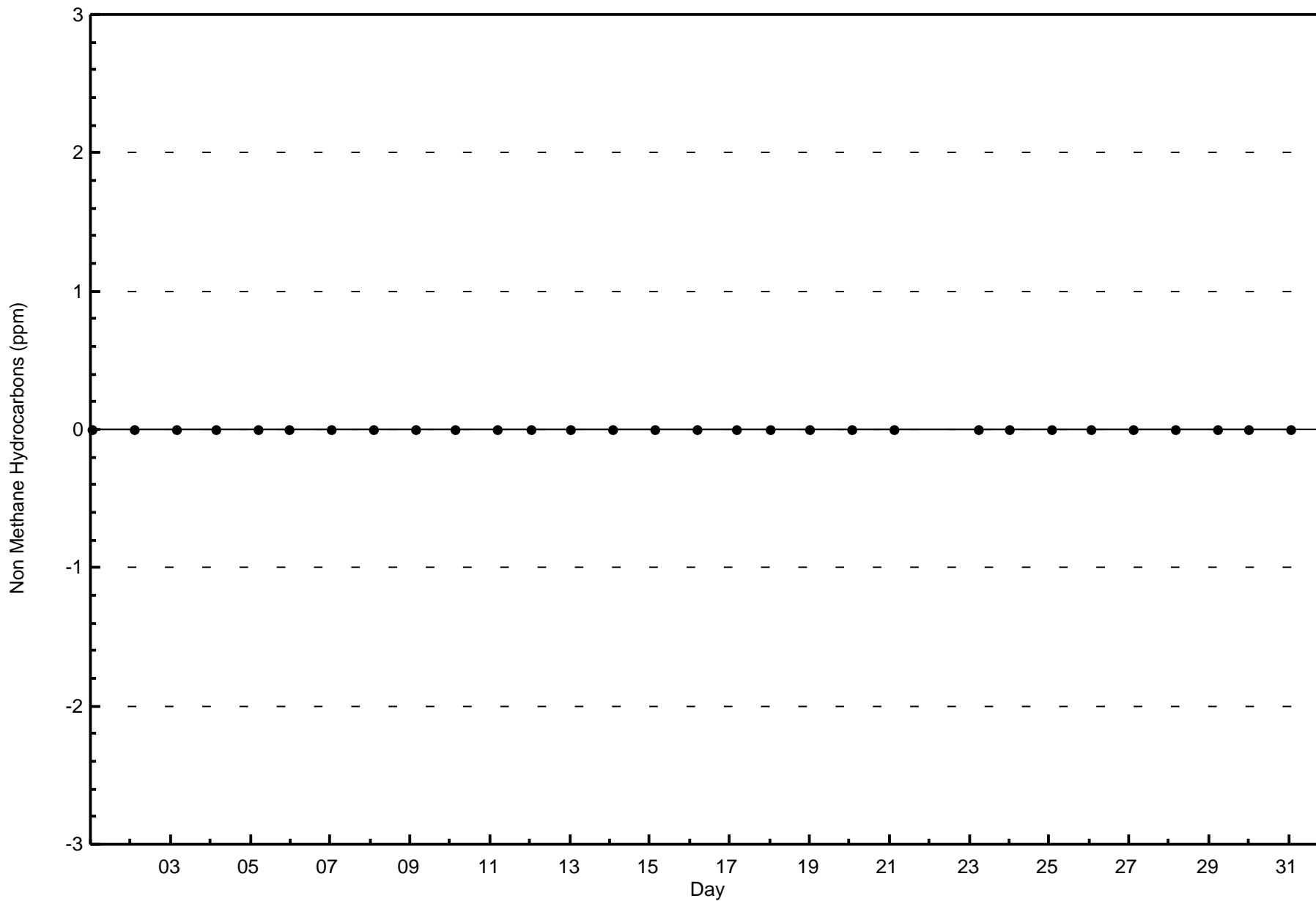
Total Number of Hours: 744

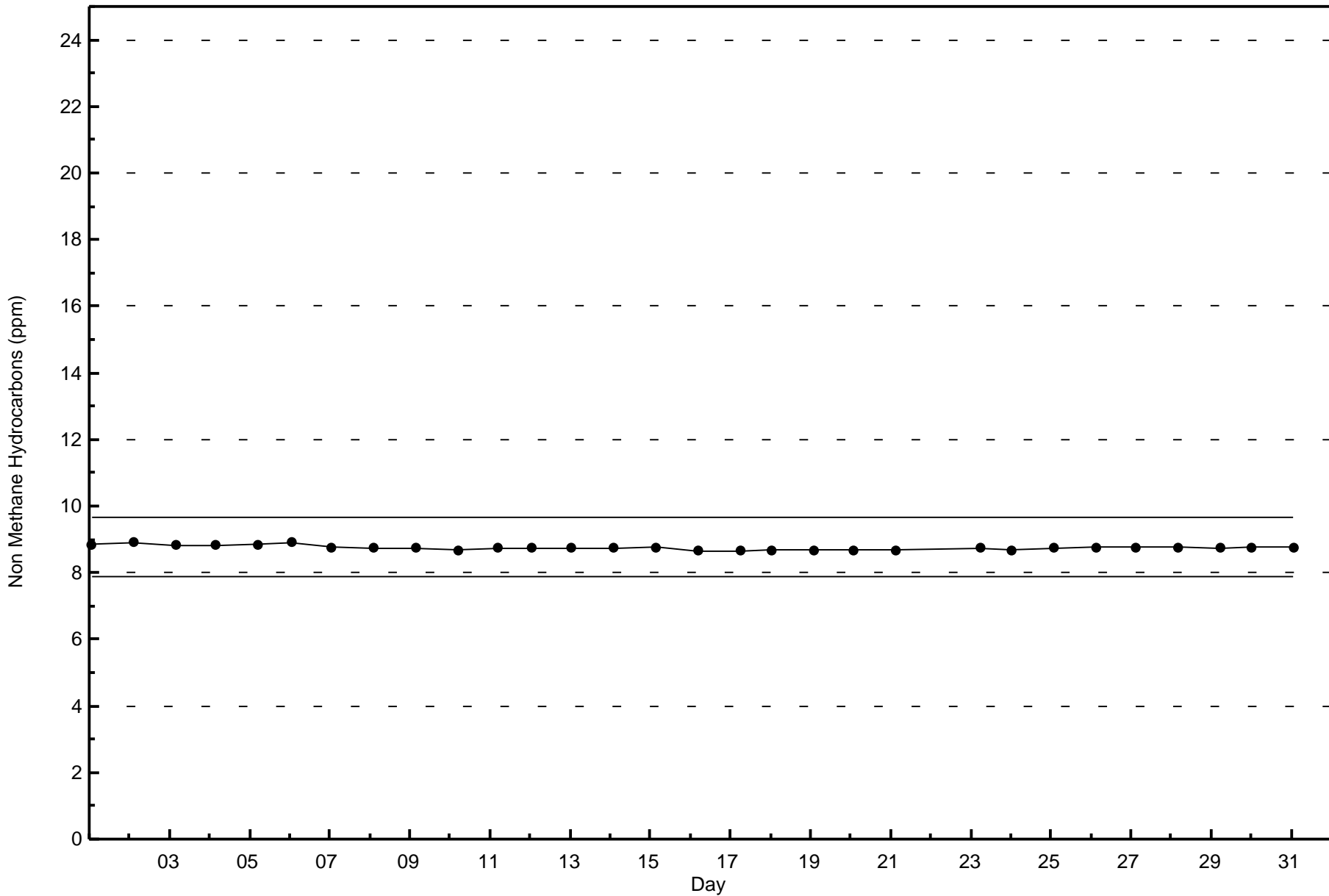


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Non Methane Hydrocarbons (NMHC) - ppm
Conklin (AMS 21)









Wood Buffalo Environmental Association
Summary of Hour Averages

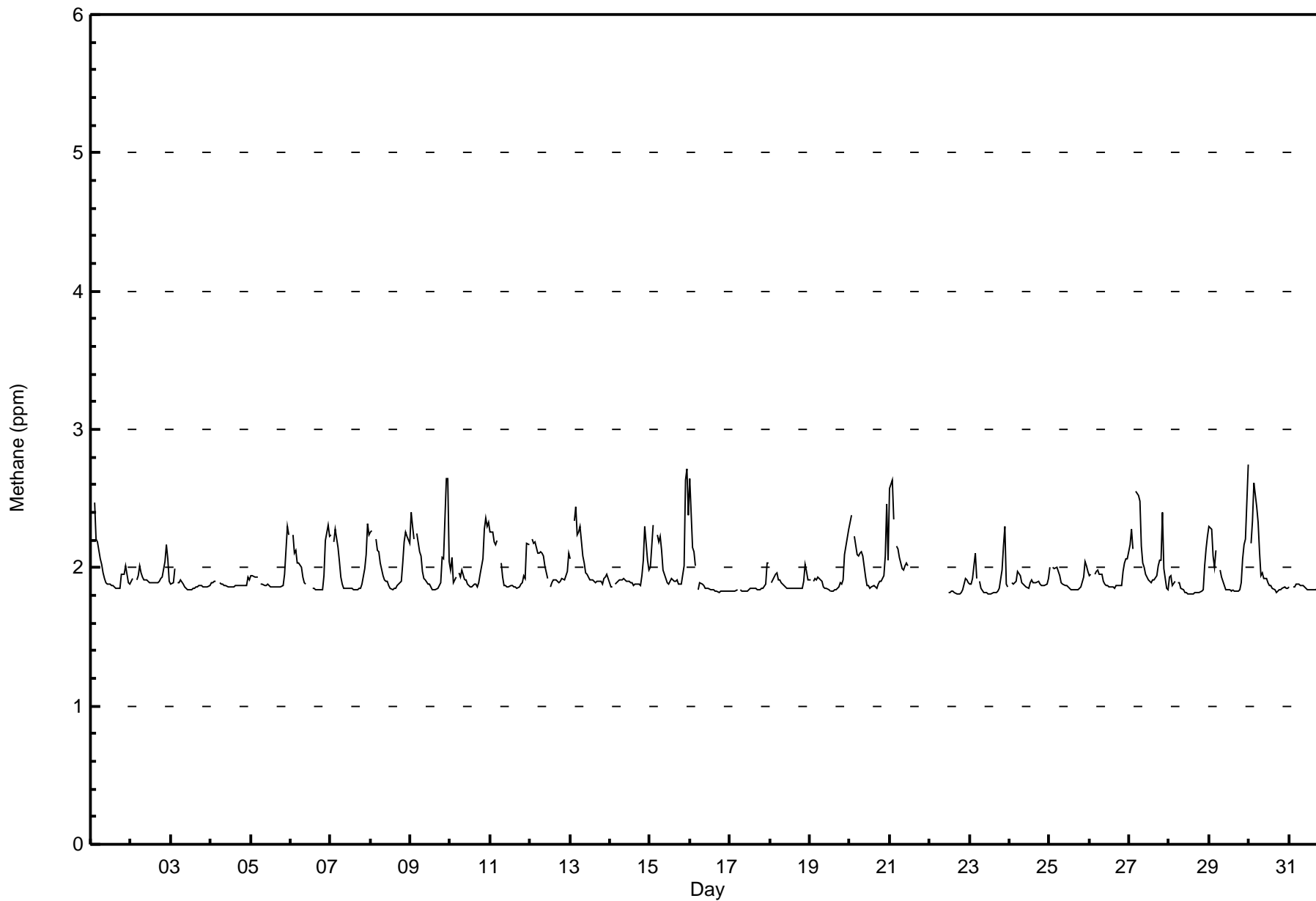
Methane (CH₄) - ppm
Conklin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744																																			
Maximum Value: 2.8 ppm on Jul 31 22:00														Maximum Daily Average: 2.1 ppm on Jul 27																																			
Minimum Value: 1.8 ppm on Jul 22 18:00														Minimum Daily Average: 1.9 ppm on Jul 17																																			
Maximum Diurnal Average: 2.1 ppm at hour 23														Minimum Diurnal Average: 1.9 ppm at hour 16																																			
Monthly Average: 1.96 ppm														Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.2 P ₉₉ = 2.6																																			
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-Jul	2.3	Z	2.5	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	1.8	1.9	2.0	1.9	2.0	2.0	1.9	1.9	2.0	2.5																							
2-Jul	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	2.0	2.2	2.1	1.9	1.9	2.2																							
3-Jul	1.9	1.9	2.0	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.8	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	2.0																							
4-Jul	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-Jul	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	2.0	2.1	2.3	2.2	1.9	2.3																							
6-Jul	Z	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.9	C	C	C	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9	2.2	2.3	2.2	2.0	2.3																							
7-Jul	2.2	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	1.9	1.9	2.0	2.1	2.3	2.2	2.0	2.3																							
8-Jul	2.3	2.3	Z	2.2	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.2	2.3	2.2	2.2	2.0	2.3																							
9-Jul	2.4	2.3	2.2	Z	2.2	2.1	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.1	2.6	2.6	2.0	2.1	2.6																							
10-Jul	2.0	2.1	1.9	1.9	Z	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	2.0	2.1	2.3	2.4	2.3	2.3	2.0	2.4																							
11-Jul	2.3	2.3	2.2	2.2	2.2	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	2.2	2.2	2.0	2.3																							
12-Jul	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	1.9	M	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	2.2																							
13-Jul	2.1	Z	2.3	2.4	2.2	2.3	2.3	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	1.9	2.0	1.9	2.4																							
14-Jul	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	2.3	2.1	2.0	1.9	2.3																							
15-Jul	2.0	2.2	2.3	Z	2.2	2.2	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	2.0	2.6	2.7	2.4	2.1	2.7																							
16-Jul	2.6	2.1	2.1	2.0	Z	1.8	1.9	1.9	1.9	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	1.9	2.6																							
17-Jul	1.8	1.8	1.8	1.8	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	1.8	1.8	1.8	1.8	1.9	2.0	2.0	1.9	2.0																							
18-Jul	Z	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	1.9	2.0	2.0	1.9	1.9	1.9	2.0																							
19-Jul	1.9	Z	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	1.8	1.8	1.8	1.9	1.9	1.9	2.1	2.2	2.3	1.9	2.3																							
20-Jul	2.3	2.4	Z	2.2	2.1	2.1	2.1	2.1	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	2.1	2.5	2.1	2.0	2.5																							
21-Jul	2.6	2.6	2.4	Z	2.2	2.1	2.1	2.0	2.0	2.0	2.0	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.6																							
22-Jul	M	M	M	M	M	M	M	M	M	M	M	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																							
23-Jul	1.9	1.9	1.9	2.1	1.9	Z	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	2.0	2.2	2.3	1.9	1.9	1.9	2.3																							
24-Jul	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	1.9	2.0																							
25-Jul	2.0	Z	2.0	2.0	2.0	2.0	2.0	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	2.0	2.0	2.0	1.9	2.0																							
26-Jul	1.9	1.9	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	2.0	2.0	2.1	2.1	1.9	2.1																							
27-Jul	2.2	2.3	2.1	Z	2.6	2.5	2.5	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.4	2.0	1.9	1.8	2.6																							
28-Jul	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	1.8	1.8	1.8	2.0	2.1	2.2	1.9	1.9	2.2																							
29-Jul	2.3	2.3	2.1	2.0	2.1	Z	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.2	2.2	2.8	2.0	2.8																							
30-Jul	Z	2.2	2.3	2.6	2.4	2.3	2.1	1.9	2.0	1.9	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	1.8	2.0	2.6																							
31-Jul	1.9	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	1.8	1.8	1.9	1.9	1.9	2.0	2.8	2.2	2.6	2.0	2.8																							
2.1																								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	2.1	2.1	2.1	Diurnal Average		
2.6																								2.6	2.5	2.6	2.6	2.5	2.5	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.4	2.8	2.7	2.8	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																																											



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Conklin - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	547	79.62	79.62
2.1 - 3.0	140	20.38	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 744



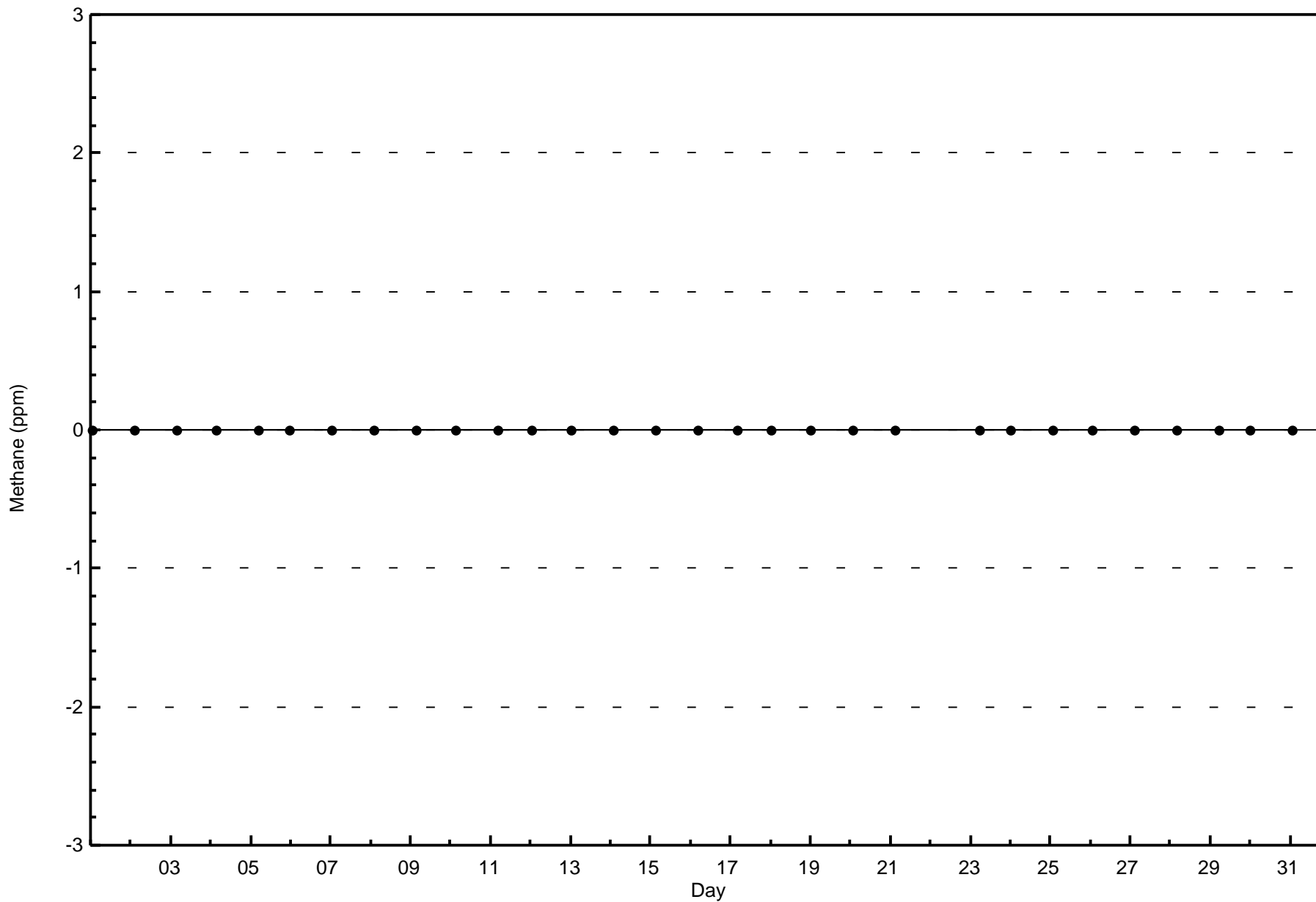
**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin - July 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	20	15	5	2	6	31	14	14	29	43	58	68	68	62	57	55	547
2.1 - 3.0	4	0	0	1	1	2	5	15	25	35	5	14	5	6	7	15	140
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	24	15	5	3	7	33	19	29	54	78	63	82	73	68	64	70	687

Total Number of Valid Hours: 687

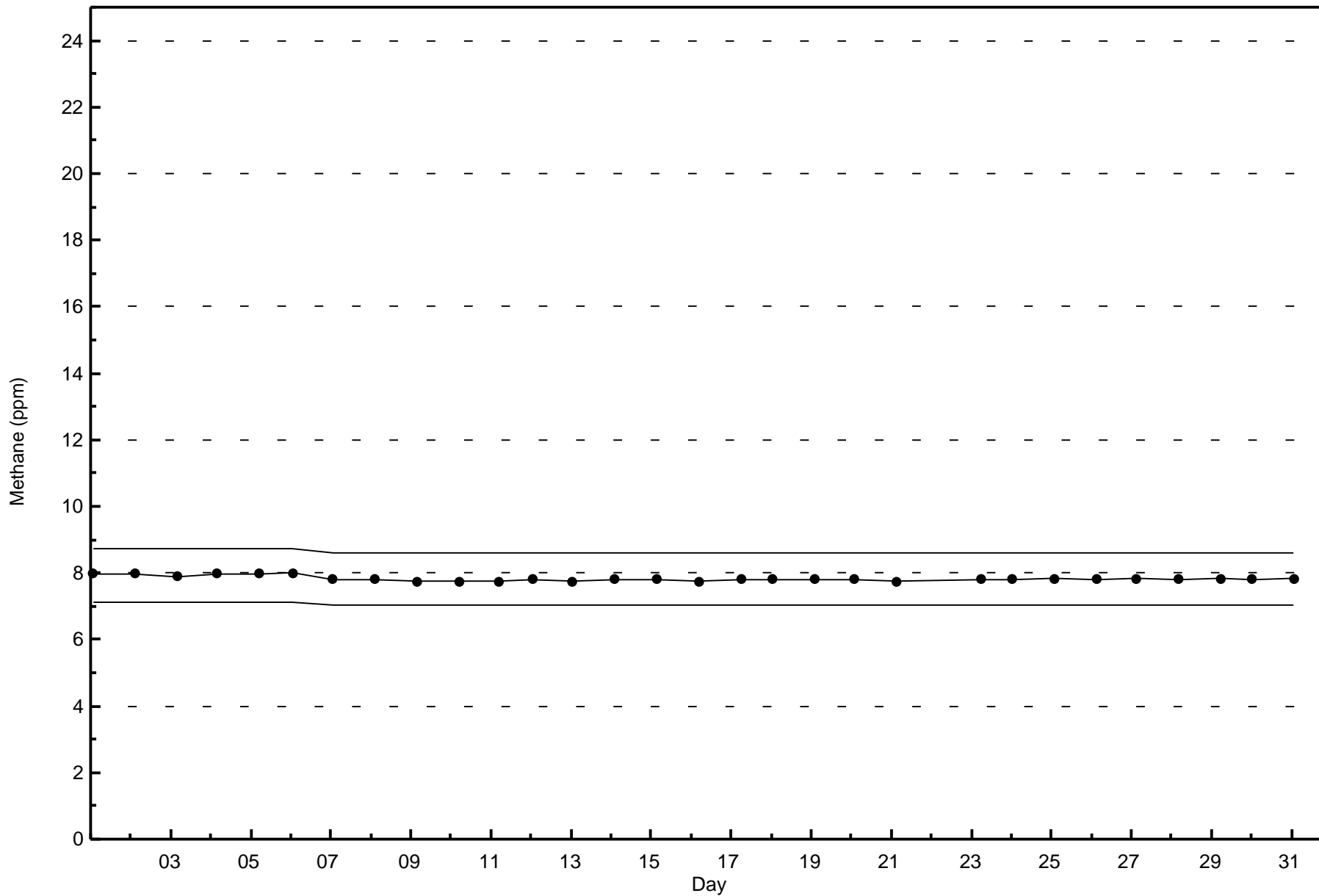
Total Number of Hours: 744





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Conklin - July 2017





Maximum Value: 25 ppb on Jul 12 06:00																		Maximum Daily Average: 5.2 ppb on Jul 12						Hours in Service: 744		
Minimum Value: 0 ppb on Jul 1 23:00																		Minimum Daily Average: 0.3 ppb on Jul 2						Hours of Data: 696		
Maximum Diurnal Average: 2.9 ppb at hour 2																		Minimum Diurnal Average: 0.2 ppb at hour 20						Hours of Missing Data: 48		
Monthly Average: 1.6 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 2 P ₉₀ = 5 P ₉₉ = 11						Hours of Calibration: 35		
																		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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	0	0	0	1	2	0	3	--	3
2-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0.3	2
3-Jul	0	4	1	Z	0	0	0	0	0	0	1	4	2	2	4	1	0	0	2	0	0	0	5	1.2	5	
4-Jul	0	0	0	0	Z	0	1	1	1	3	4	2	4	3	1	2	1	2	3	0	0	1	0	1.3	4	
5-Jul	0	1	1	0	1	Z	5	7	6	3	4	3	4	3	1	3	3	2	0	1	0	3	1	8	2.6	8
6-Jul	Z	9	5	7	4	2	1	1	1	2	2	3	2	3	1	1	1	0	0	0	0	1	5	3	2.3	9
7-Jul	7	Z	2	0	5	3	2	4	4	1	1	3	1	8	4	3	4	1	0	0	3	12	4	5	3.3	12
8-Jul	0	9	Z	5	1	2	2	2	4	2	2	2	2	2	0	0	0	0	0	0	4	2	5	4	2.2	9
9-Jul	4	5	6	Z	9	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1.5	9
10-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	4	0.5	4
11-Jul	6	11	11	5	9	Z	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	4	2.3	11
12-Jul	Z	15	14	10	8	25	10	11	6	5	7	M	0	0	0	0	0	1	0	0	0	0	0	0	5.2	25
13-Jul	0	Z	6	2	6	12	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3	12
14-Jul	0	0	Z	0	0	0	0	1	1	0	0	8	0	0	0	0	0	0	0	0	2	0	1	2	0.7	8
15-Jul	0	0	7	Z	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	10
16-Jul	1	0	0	0	Z	0	1	4	3	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0.9	4
17-Jul	0	0	0	0	0	Z	3	9	4	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	1.1	9
18-Jul	Z	0	0	0	0	0	0	2	1	2	3	3	2	3	2	2	4	3	1	0	3	2	0	0	1.5	4
19-Jul	4	Z	0	0	0	1	3	8	8	1	4	2	2	3	4	1	0	1	0	0	0	1	3	6	2.3	8
20-Jul	3	2	Z	8	3	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1.4	8
21-Jul	0	0	0	Z	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	4	6	6	0	0.9	6
22-Jul	0	0	0	0	Z	0	1	1	2	3	4	3	2	5	1	5	2	3	0	0	0	0	0	0	1.4	5
23-Jul	7	6	0	0	3	Z	5	8	3	7	6	4	4	4	6	5	0	0	0	0	0	0	0	0	3.2	8
24-Jul	Z	0	0	0	7	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0.5	7
25-Jul	0	Z	0	0	0	0	8	10	7	2	5	1	1	2	1	1	1	0	0	0	1	0	0	0	1.8	10
26-Jul	0	2	Z	0	0	0	1	1	1	1	1	2	3	2	1	0	0	0	0	0	1	2	1	0	0.8	3
27-Jul	1	5	2	Z	1	1	2	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0.7	5
28-Jul	0	0	1	0	Z	0	3	1	3	5	5	3	6	5	4	6	5	5	3	0	0	1	3	4	2.7	6
29-Jul	8	3	2	0	1	Z	1	1	4	1	2	1	8	2	2	3	3	5	2	0	2	7	3	0	2.6	8
30-Jul	Z	2	1	0	2	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	2
31-Jul	0	Z	0	0	0	3	4	3	2	1	3	3	4	9	3	2	2	3	1	0	0	0	0	0	1.9	9
1.7 2.9 2.3 1.5 2.5 2.8 2.0 2.9 2.2 1.6 2.0 1.7 1.7 1.8 1.3 1.4 1.2 0.9 0.4 0.2 0.8 1.6 1.4 1.6																		Diurnal Average								
8 15 14 10 9 25 10 11 8 7 7 8 8 9 4 6 5 5 3 2 4 12 6 8																		Diurnal Maximum								
Z - zerospan			C - Calibration			M - Maintenance			AF - Analyzer Failure																	

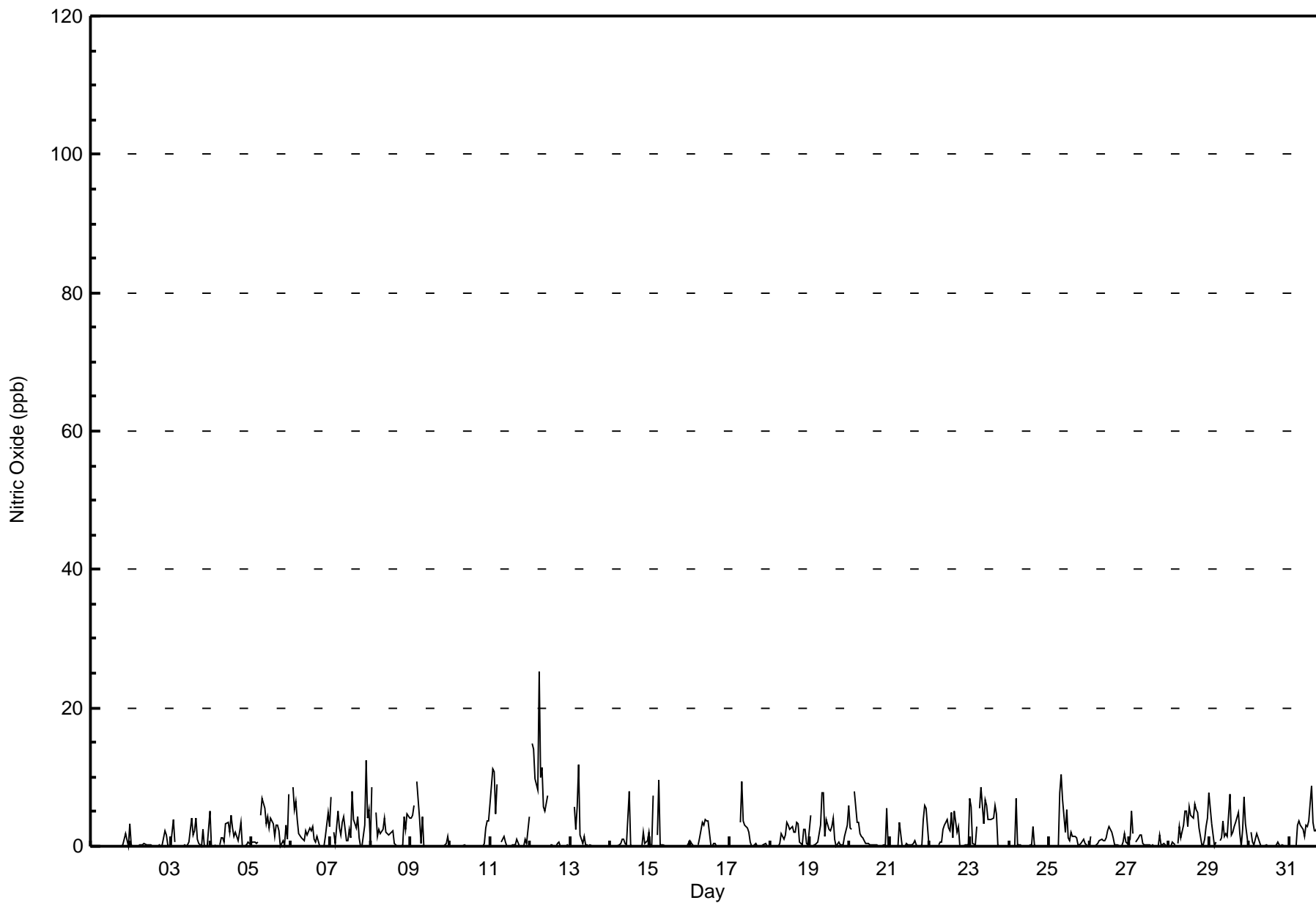


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Conklin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	695	99.86	99.86
21 - 40	1	0.14	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 696

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - July 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	24	16	4	3	8	32	18	27	61	77	62	83	72	69	63	72	691
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	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	24	16	4	3	8	32	18	27	61	77	62	84	72	69	63	72	692

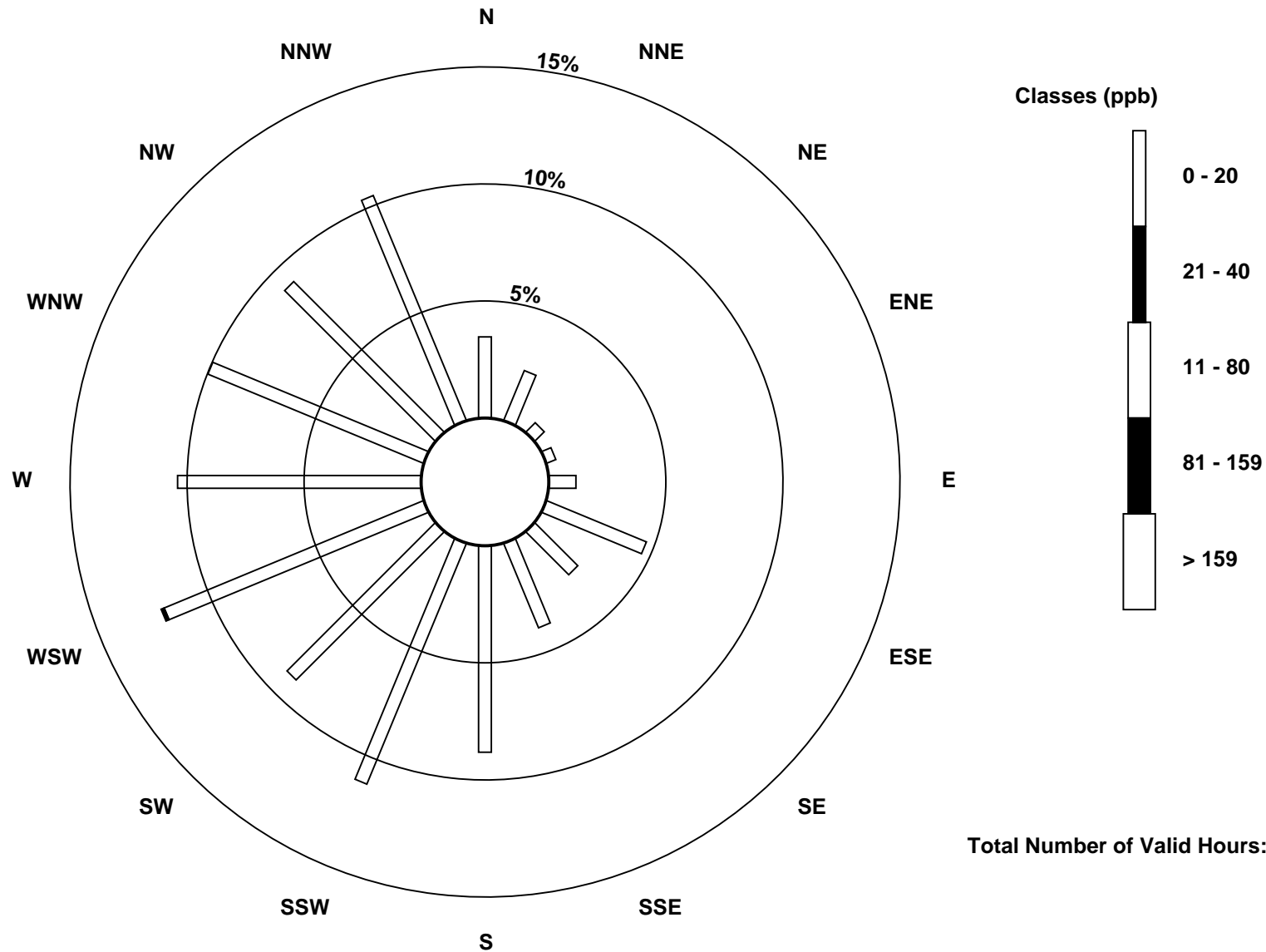
Total Number of Valid Hours: 692

Total Number of Hours: 744

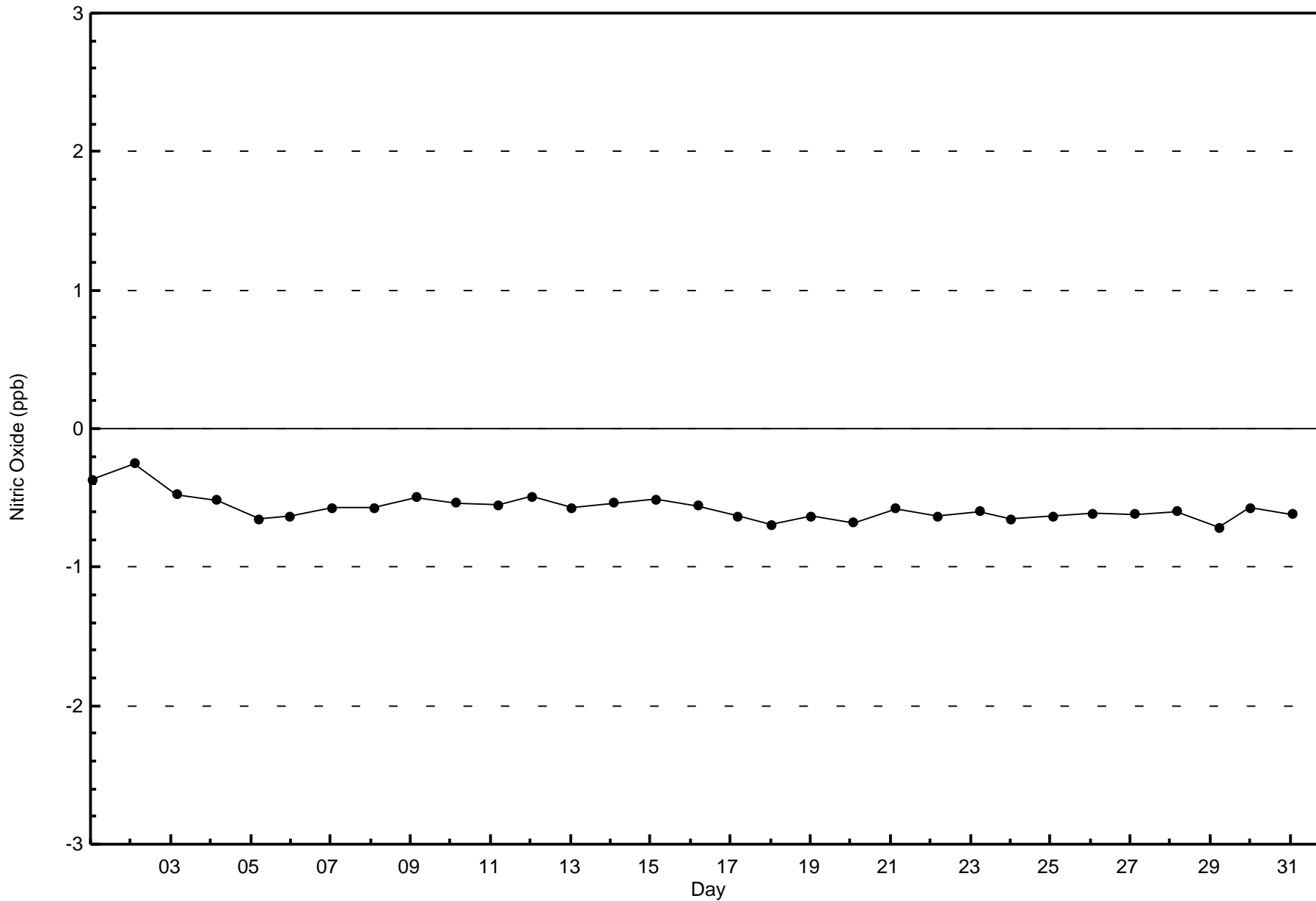


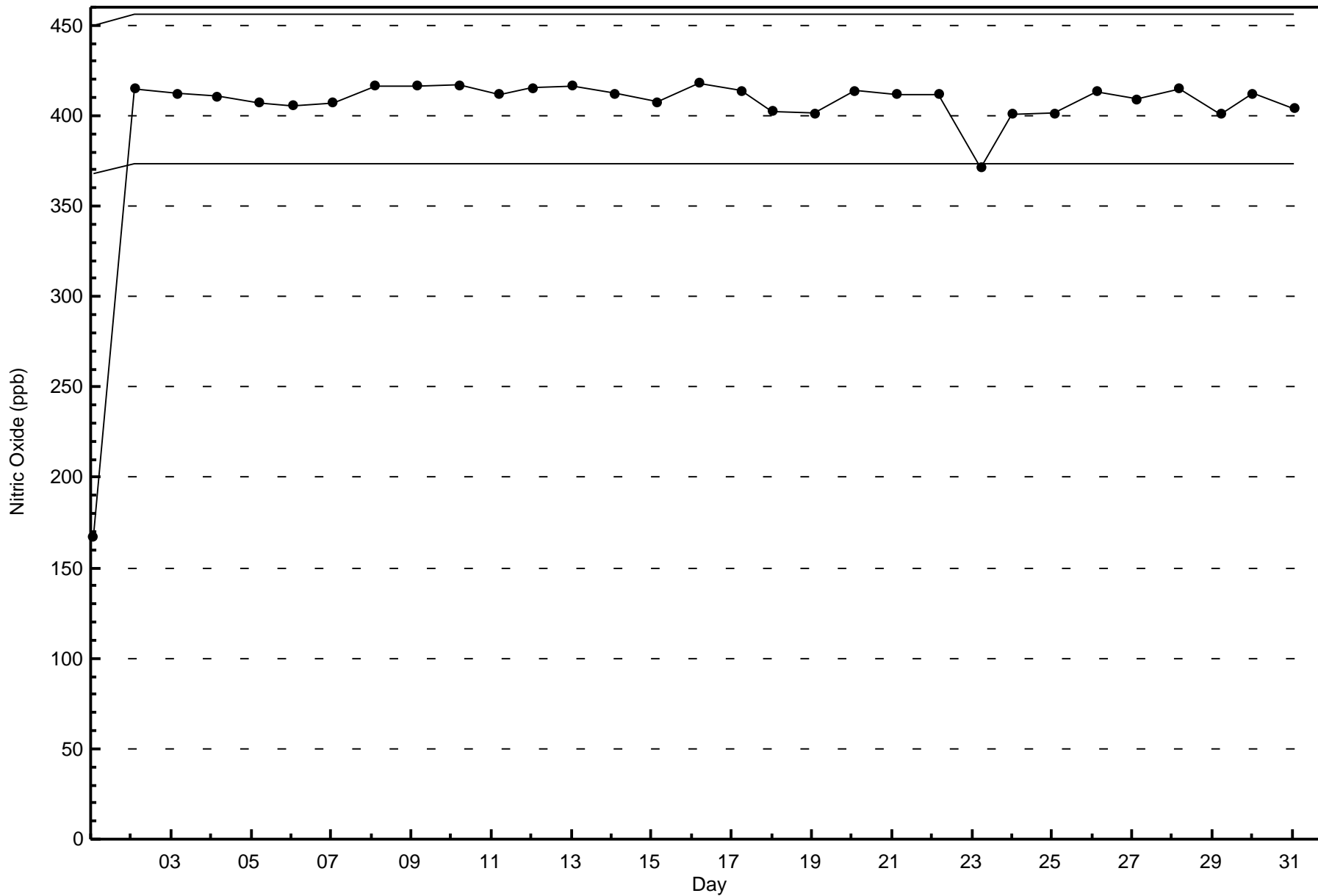
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Conklin (AMS 21)



Total Number of Valid Hours: 692







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14 ppb on Jul 7 22:00	Maximum Daily Average: 5.0 ppb on Jul 8		Hours of Data:	696
Minimum Value: 0 ppb on Jul 17 17:00	Minimum Daily Average: 0.8 ppb on Jul 24		Hours of Missing Data:	48
Maximum Diurnal Average: 3.6 ppb at hour 22	Minimum Diurnal Average: 1.0 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 2.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 9		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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	1	1	3	4	6	1	5	--	6
2-Jul	5	2	Z	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3	11	9	3	1	2.2	11
3-Jul	1	4	7	Z	1	1	1	1	1	1	1	2	6	3	4	7	3	1	0	1	0	1	0	1	2.0	7
4-Jul	5	1	1	2	Z	1	1	1	1	2	3	2	4	3	2	2	1	3	3	0	0	2	8	7	2.4	8
5-Jul	6	7	6	5	4	Z	5	6	5	4	4	3	5	4	2	4	4	4	0	2	3	7	4	8	4.3	8
6-Jul	Z	8	7	8	5	2	2	1	2	3	2	3	3	4	2	1	3	0	0	0	0	4	7	7	3.2	8
7-Jul	8	Z	4	1	4	2	2	5	4	2	1	3	2	6	4	4	5	3	0	1	8	14	10	9	4.5	14
8-Jul	2	7	Z	5	3	3	5	6	8	4	5	5	6	9	3	2	1	1	1	4	11	9	9	7	5.0	11
9-Jul	5	6	8	Z	6	5	2	9	1	2	2	2	2	1	1	1	1	1	1	2	1	4	6	2	3.0	9
10-Jul	7	3	1	1	Z	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	3	4	4	3	1.6	7
11-Jul	4	4	6	4	4	Z	1	3	4	2	1	0	0	1	1	1	2	0	0	0	1	3	1	3	1.9	6
12-Jul	Z	5	5	4	4	7	4	5	4	5	7	M	1	1	1	1	2	2	1	0	1	1	4	1	2.8	7
13-Jul	1	Z	6	4	6	6	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.9	6
14-Jul	1	1	Z	1	1	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	4	2	1	4	1.4	4
15-Jul	1	1	4	Z	1	5	0	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4	1.4	5
16-Jul	4	7	2	1	Z	1	5	9	7	7	6	4	1	1	1	1	1	0	0	0	0	0	0	0	2.7	9
17-Jul	0	0	0	1	0	Z	4	5	4	4	4	3	1	0	0	1	0	0	0	0	1	2	0	0	1.3	5
18-Jul	Z	0	0	0	1	0	1	3	1	2	3	3	3	3	3	2	4	4	1	1	5	4	2	2	2.1	5
19-Jul	2	Z	1	1	1	1	2	3	3	2	4	3	3	3	4	2	0	2	1	1	1	2	2	2	2.0	4
20-Jul	1	1	Z	1	2	2	1	1	1	1	1	1	0	1	1	1	1	0	1	1	3	1	5	0	1.2	5
21-Jul	0	0	0	Z	1	1	3	1	0	1	1	1	1	1	1	2	1	1	1	1	5	3	3	1	1.2	5
22-Jul	0	0	0	0	Z	1	1	1	3	3	5	3	4	7	2	6	3	4	1	0	2	3	2	2	2.3	7
23-Jul	5	2	4	2	5	Z	4	7	4	6	6	5	4	5	5	7	7	1	0	0	0	1	0	3.4	7	
24-Jul	Z	1	0	1	1	2	1	1	0	0	0	0	1	2	2	1	1	1	1	1	1	1	1	1	0.8	2
25-Jul	1	Z	1	1	0	1	5	7	6	3	5	2	1	3	2	2	2	2	1	1	2	5	3	1	2.3	7
26-Jul	1	3	Z	1	1	1	2	2	2	2	2	3	4	3	3	1	1	1	1	1	7	8	5	3	2.5	8
27-Jul	3	5	5	Z	2	2	3	3	3	2	2	2	2	1	2	1	1	1	6	3	2	2	1	1	2.3	6
28-Jul	0	1	1	2	Z	1	3	2	3	5	4	3	5	5	4	6	6	6	1	1	1	4	5	3	3.1	6
29-Jul	4	4	3	1	1	Z	1	2	4	2	2	3	7	3	4	5	6	9	3	1	4	9	6	1	3.6	9
30-Jul	Z	2	1	1	3	2	3	2	1	1	1	1	1	1	1	1	1	3	1	1	2	1	1	1	1.2	3
31-Jul	1	Z	1	1	1	4	5	4	3	2	3	3	4	5	4	3	4	4	3	2	1	1	1	1	2.5	5

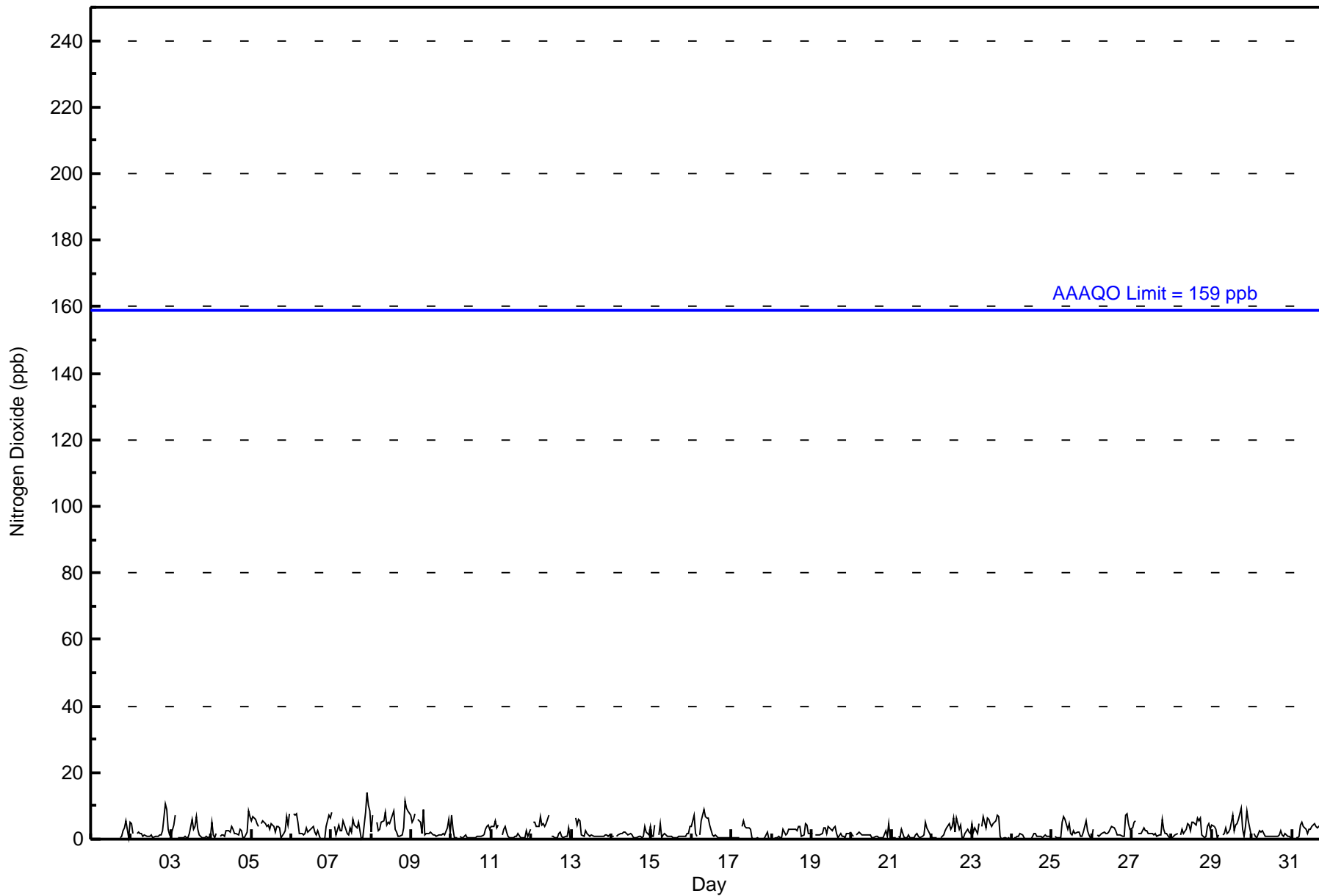
2.8	3.0	3.0	1.9	2.4	2.1	2.3	3.1	2.7	2.3	2.6	2.2	2.5	2.5	2.0	2.2	2.1	1.9	1.0	1.1	2.8	3.6	3.0	2.5	Diurnal Average	
8	8	8	8	6	7	5	9	8	7	7	5	7	9	5	7	7	9	6	4	11	14	10	9	Diurnal Maximum	

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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	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: 696

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - July 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	24	16	4	3	8	32	18	27	61	77	62	84	72	69	63	72	692
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	24	16	4	3	8	32	18	27	61	77	62	84	72	69	63	72	692

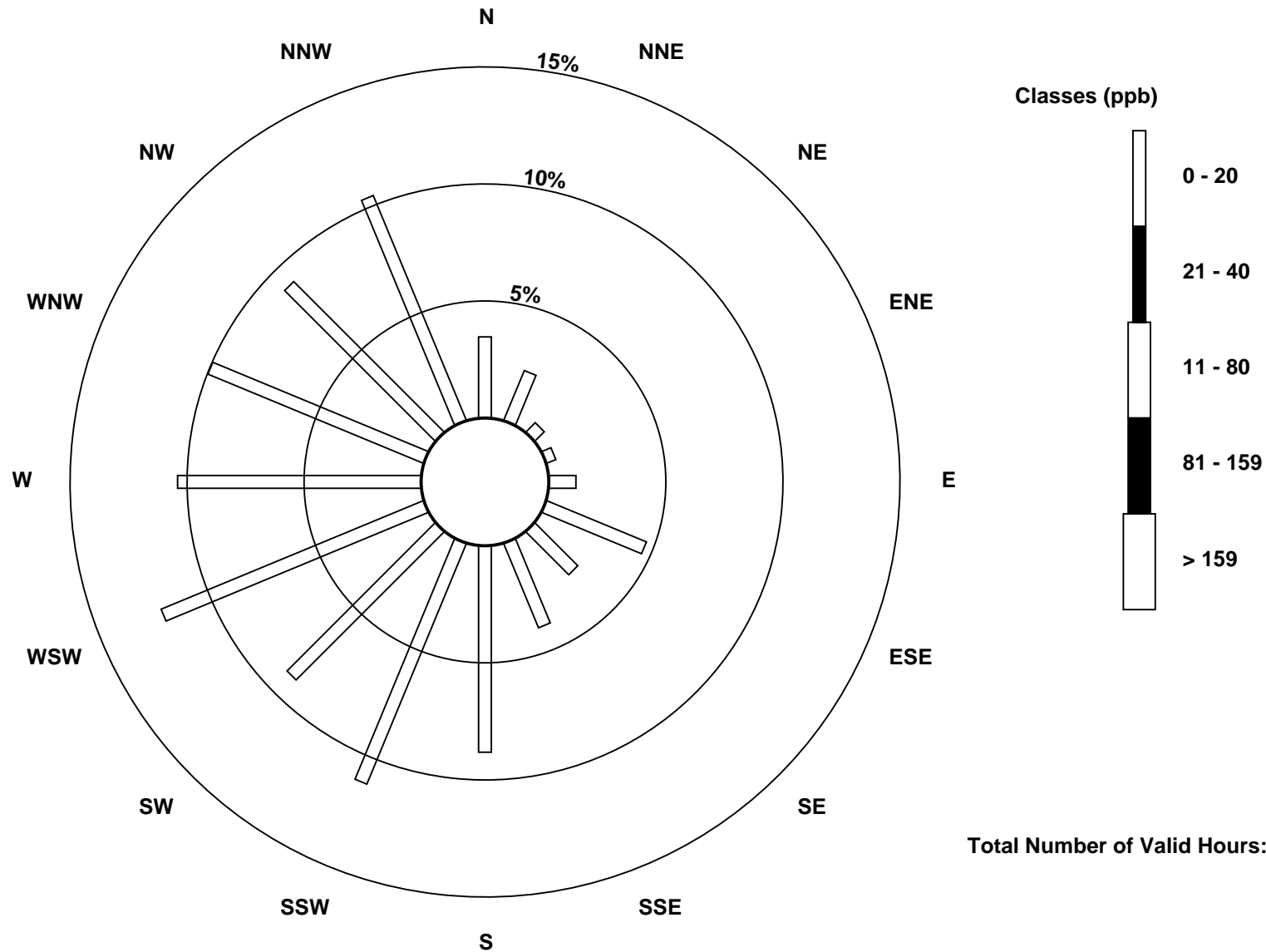
Total Number of Valid Hours: 692

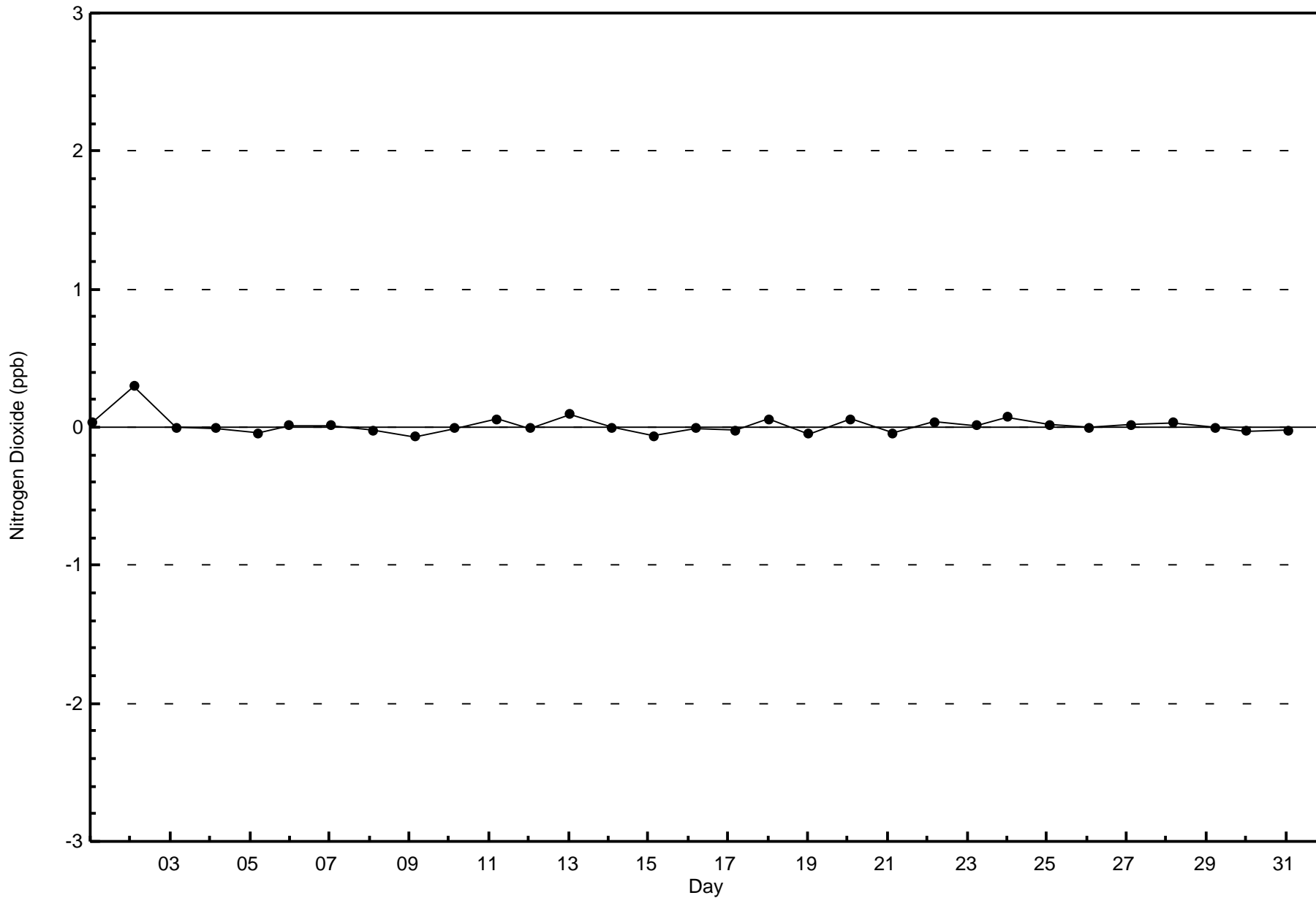
Total Number of Hours: 744

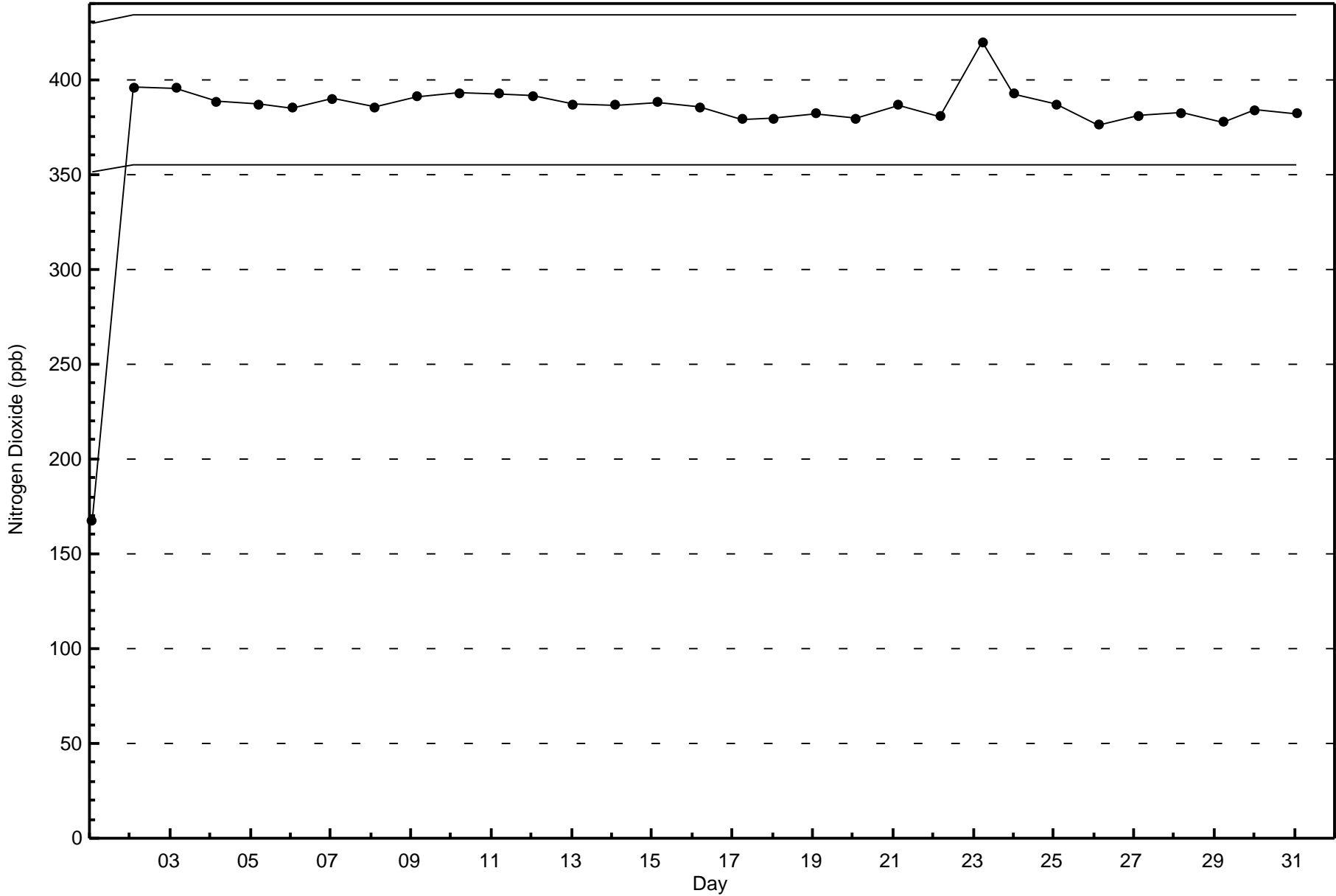


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Conklin (AMS 21)









Wood Buffalo Environmental Association
Summary of Hour Averages

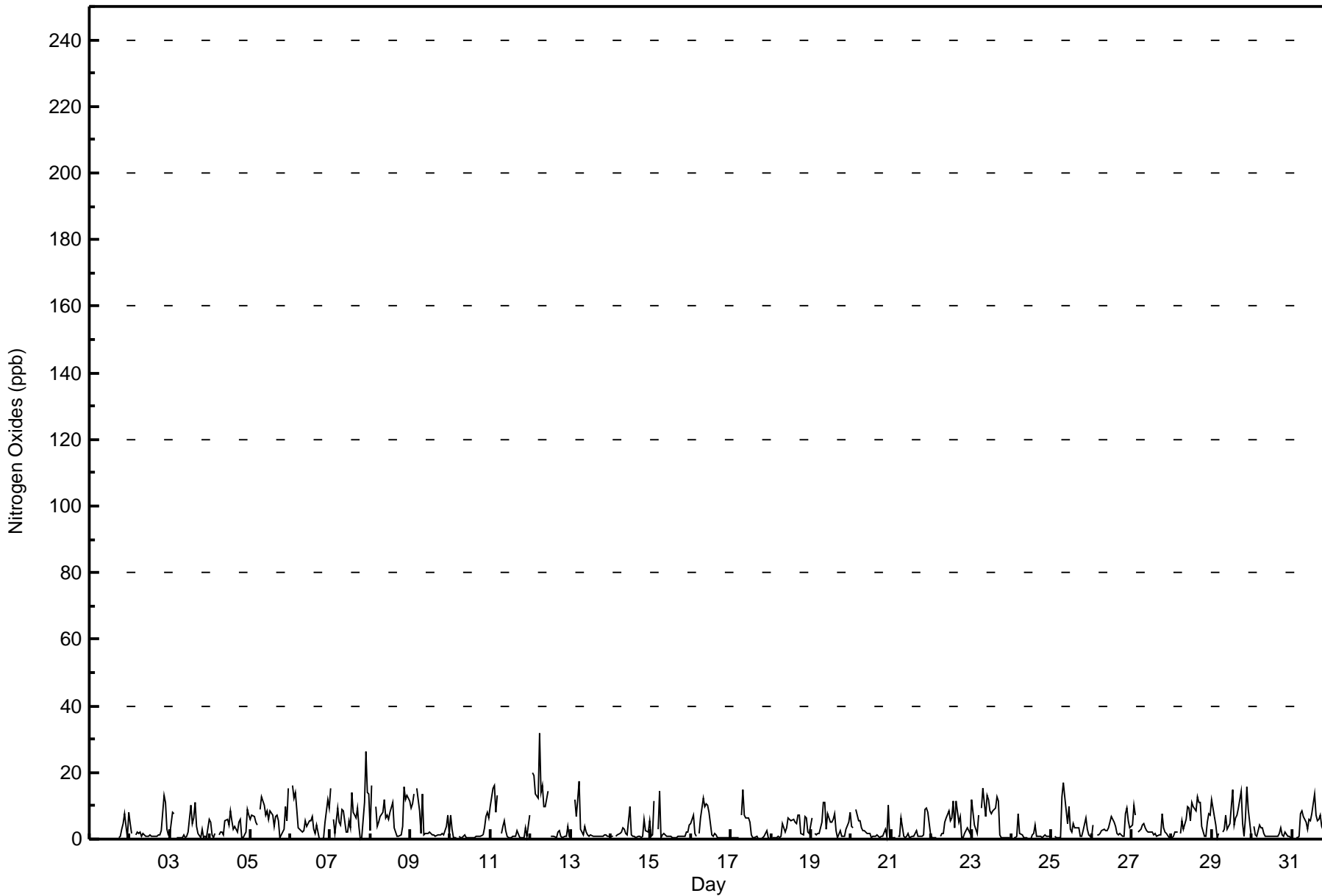
Nitrogen Oxides (NO_x) - ppb
Conklin - July 2017

Maximum Value: 32 ppb on Jul 12 06:00 Maximum Daily Average: 8.0 ppb on Jul 12																		Hours in Service: 744 Hours of Data: 696 Hours of Missing Data: 48 Hours of Calibration: 35 Percent Operational Time: 98.3									
Minimum Value: 0 ppb on Jul 6 19:00 Minimum Daily Average: 1.3 ppb on Jul 24 Maximum Diurnal Average: 5.9 ppb at hour 8 Minimum Diurnal Average: 1.3 ppb at hour 20 Monthly Average: 4.0 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 6 P ₉₀ = 10 P ₉₉ = 16																											
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-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	0	1	3	5	8	1	8	--	8	
2-Jul	5	2	Z	1	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	3	13	11	3	1	2.5	13	
3-Jul	1	8	8	Z	1	1	1	1	1	1	1	2	10	5	6	11	4	2	0	3	0	1	0	6	3.2	11	
4-Jul	5	1	1	2	Z	1	2	2	1	6	6	4	8	6	3	4	2	5	6	0	0	2	9	7	3.7	9	
5-Jul	6	7	7	5	4	Z	9	13	10	7	8	6	9	7	4	7	7	6	1	2	3	10	5	15	6.8	15	
6-Jul	Z	16	12	14	9	3	3	2	2	6	4	6	5	7	3	2	4	0	0	0	0	5	12	9	5.5	16	
7-Jul	15	Z	6	2	10	5	4	9	9	2	2	6	3	14	8	6	9	4	0	0	11	26	14	14	7.8	26	
8-Jul	2	16	Z	10	4	5	7	8	12	6	7	6	8	11	3	2	1	1	1	4	15	12	13	11	7.2	16	
9-Jul	9	11	14	Z	15	9	2	13	1	1	2	2	2	1	1	1	1	1	1	1	1	4	7	1	4.5	15	
10-Jul	7	3	1	1	Z	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	3	7	8	6	2.0	8	
11-Jul	10	15	16	8	13	Z	2	4	5	3	1	0	0	1	1	1	3	0	0	0	1	4	1	7	4.2	16	
12-Jul	Z	20	19	13	12	32	14	16	10	10	14	M	1	1	1	1	2	3	1	1	1	4	1	8.0	32		
13-Jul	1	Z	12	7	12	17	3	1	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3.2	17	
14-Jul	1	1	Z	1	1	2	2	3	3	2	1	10	1	1	1	1	1	1	1	1	6	3	2	6	2.2	10	
15-Jul	1	1	11	Z	3	14	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4	2.3	14	
16-Jul	5	7	2	1	Z	2	7	12	10	10	10	8	1	1	2	1	1	0	0	0	0	0	0	0	3.6	12	
17-Jul	0	0	0	0	0	Z	7	15	7	7	6	5	1	0	0	1	0	0	0	0	1	3	0	0	2.5	15	
18-Jul	Z	0	0	0	1	0	1	5	2	3	7	6	5	6	5	5	7	7	2	1	7	6	2	2	3.5	7	
19-Jul	6	Z	2	1	2	2	5	11	11	3	8	5	5	6	8	3	0	3	1	1	1	3	5	8	4.3	11	
20-Jul	4	3	Z	9	5	5	3	3	3	2	2	1	1	1	1	1	1	0	1	1	3	1	10	0	2.6	10	
21-Jul	0	0	0	Z	1	1	6	1	0	1	1	1	1	1	2	2	1	1	1	1	9	9	8	1	2.1	9	
22-Jul	1	0	0	0	Z	1	2	2	5	7	8	5	6	11	4	11	5	7	1	0	2	3	2	2	3.7	11	
23-Jul	12	8	4	2	7	Z	9	15	7	13	12	9	8	8	9	13	11	1	0	0	0	0	0	0	6.5	15	
24-Jul	Z	0	0	1	8	2	1	1	0	0	0	0	1	2	4	1	1	1	1	1	1	1	1	1	1.3	8	
25-Jul	1	Z	1	1	0	1	13	17	13	5	10	3	2	5	3	4	3	1	1	3	6	3	1	1	4.1	17	
26-Jul	1	4	Z	1	1	2	2	3	3	3	3	5	7	5	4	2	1	2	1	1	8	9	5	3	3.3	9	
27-Jul	4	10	7	Z	2	3	4	5	3	3	2	2	2	1	2	1	1	1	8	3	2	2	0	1	3.0	10	
28-Jul	0	1	2	2	Z	2	6	3	6	10	9	5	11	10	8	13	11	11	4	1	1	5	8	7	5.8	13	
29-Jul	12	7	4	0	2	Z	2	3	7	3	4	4	15	4	7	7	9	14	5	1	6	16	9	1	6.2	16	
30-Jul	Z	4	1	1	4	3	3	2	1	1	1	1	1	1	1	1	2	3	1	1	2	1	1	0	1.6	4	
31-Jul	1	Z	1	1	1	7	9	7	5	3	6	6	8	13	7	6	6	7	4	2	1	1	1	1	4.4	13	
4.4 5.9 5.3 3.4 4.8 4.9 4.4 5.9 4.9 4.0 4.6 3.9 4.2 4.4 3.3 3.6 3.3 2.8 1.5 1.3 3.6 5.1 4.4 4.1																								Diurnal Average			
15 20 19 14 15 32 14 17 13 13 14 10 15 14 9 13 11 14 8 4 15 26 14 15																								Diurnal Maximum			
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Conklin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	694	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: 696

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - July 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	24	16	4	3	8	32	18	27	61	76	62	83	72	69	63	72	690
21 - 40	0	0	0	0	0	0	0	0	0	1	0	1	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	24	16	4	3	8	32	18	27	61	77	62	84	72	69	63	72	692

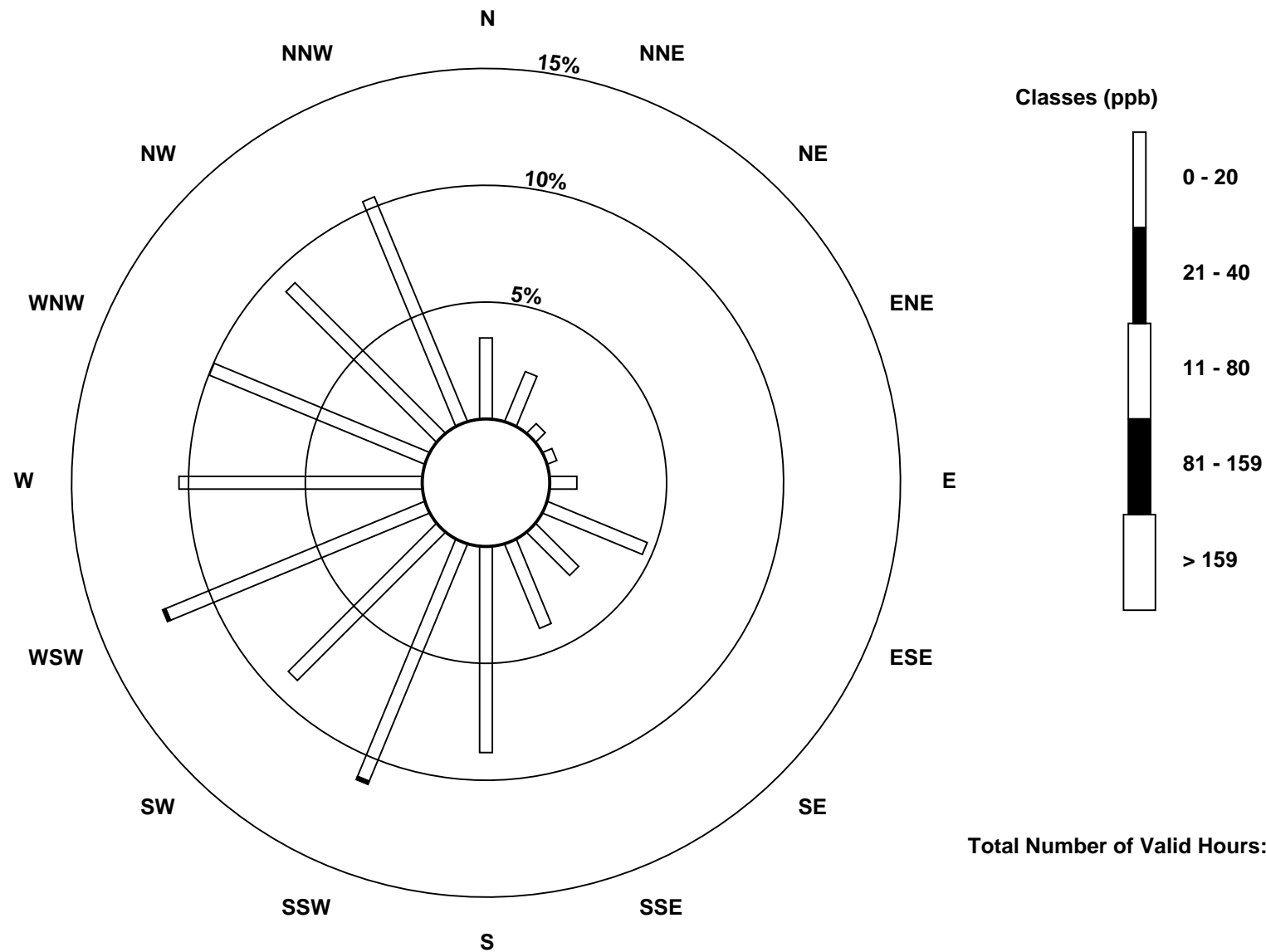
Total Number of Valid Hours: 692

Total Number of Hours: 744

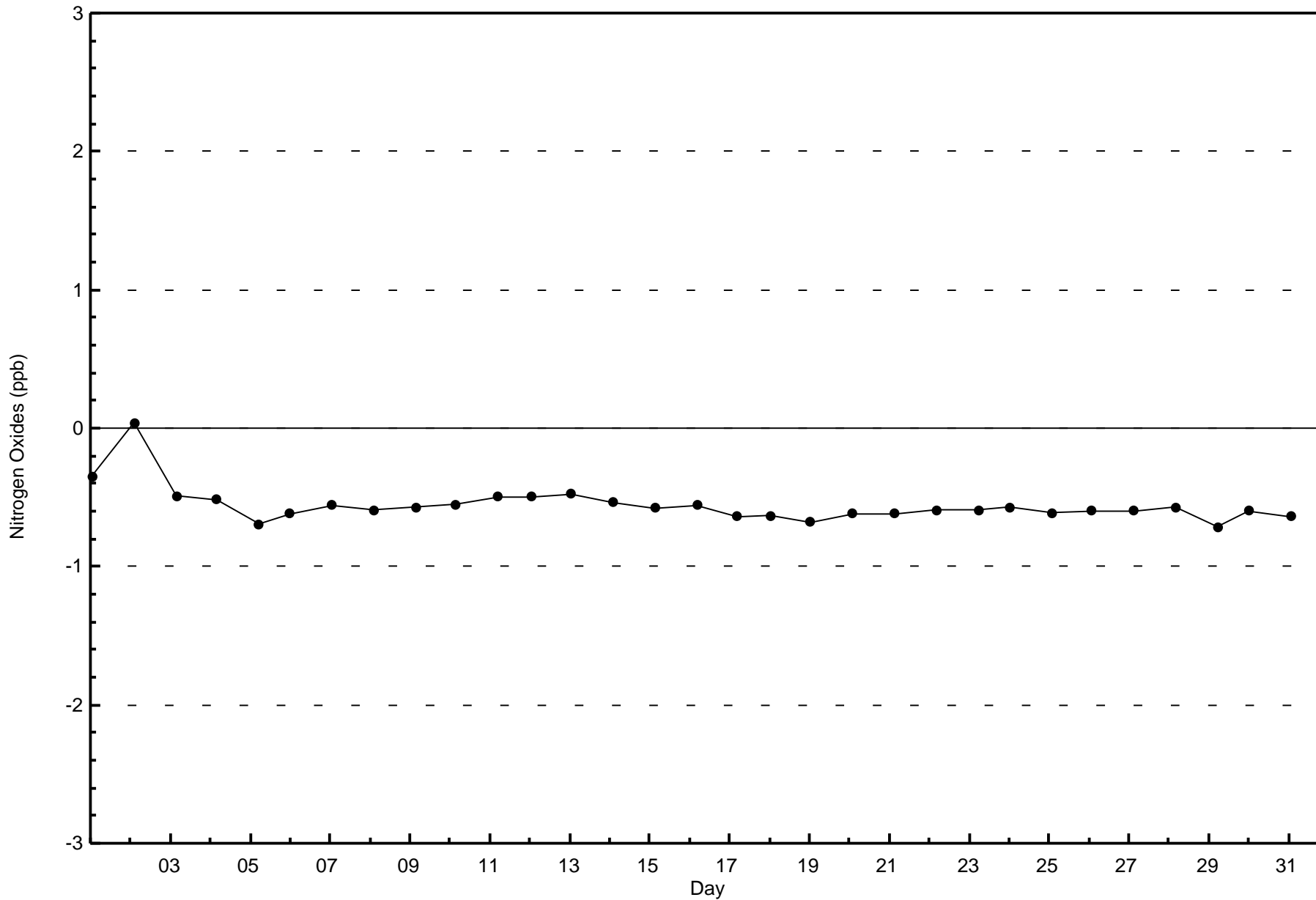


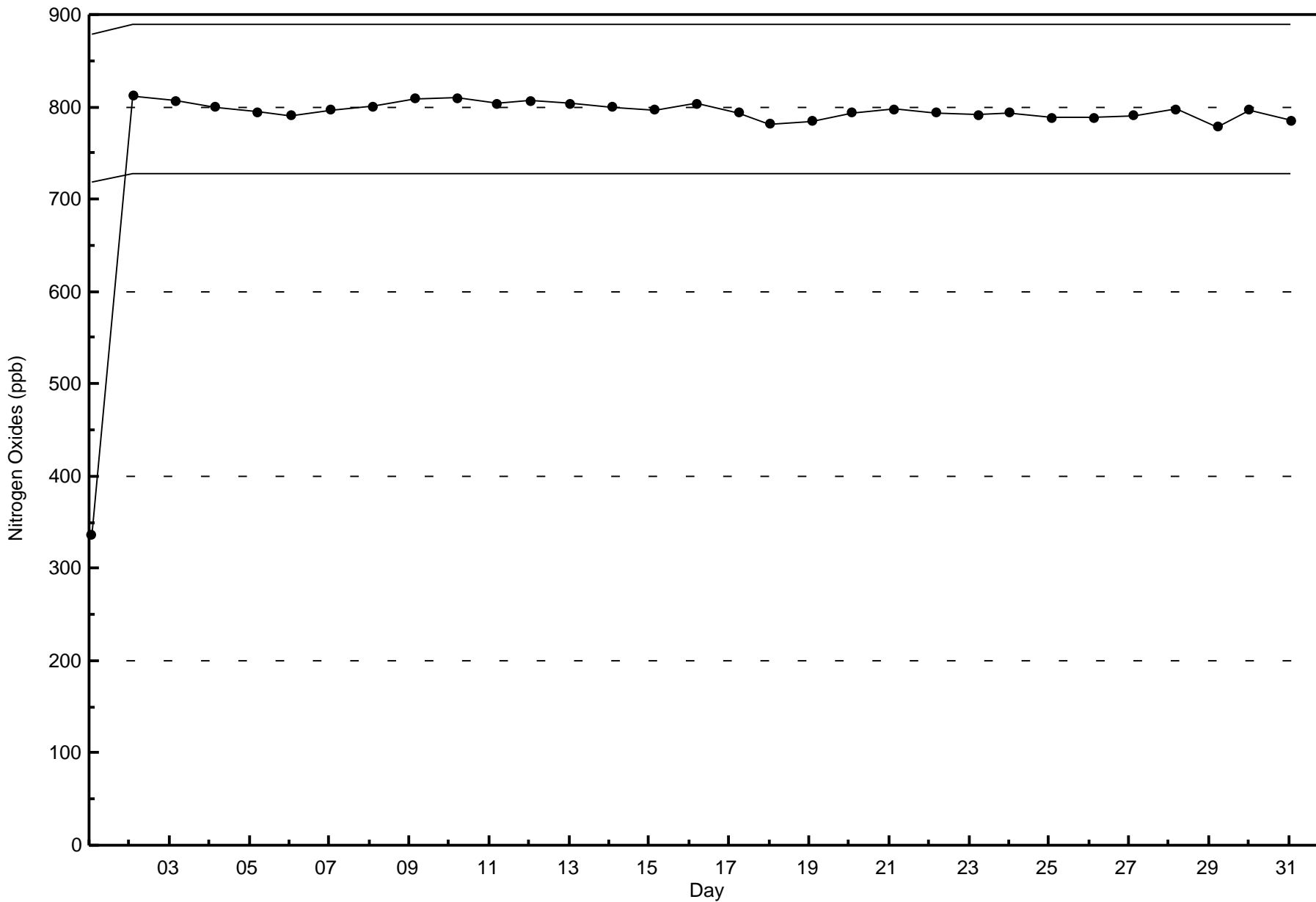
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Conklin (AMS 21)



Total Number of Valid Hours: 692







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

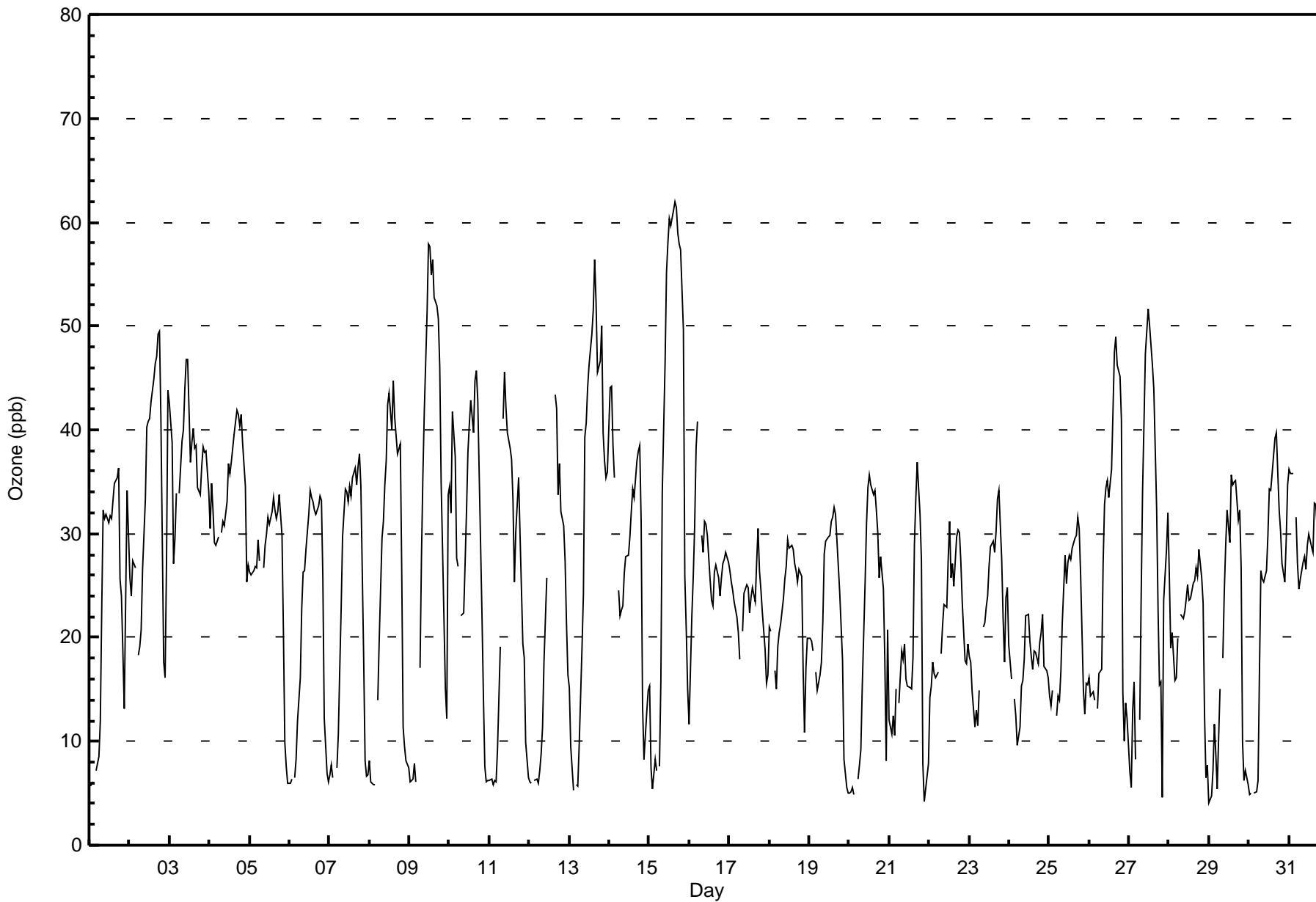
Conklin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 62 ppb on Jul 15 16:00										Maximum Daily Average: 37.7 ppb on Jul 3										Hours of Data: 709																													
Minimum Value: 4 ppb on Jul 29 01:00										Minimum Daily Average: 17.1 ppb on Jul 21										Hours of Missing Data: 35																													
Maximum Diurnal Average: 36.2 ppb at hour 17										Minimum Diurnal Average: 15.5 ppb at hour 5										Hours of Calibration: 35																													
Monthly Average: 25.7 ppb										Percentiles: P ₁ = 5 P ₁₀ = 8 Q ₁ = 16 Median = 26 Q ₃ = 34 P ₉₀ = 41 P ₉₉ = 57										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-Jul	6	6	6	Z	7	9	12	23	32	31	32	31	32	31	33	35	35	36	26	24	19	13	34	30	23.6	36																							
2-Jul	26	24	27	Z	Z	18	19	21	27	33	40	41	41	43	45	46	47	49	49	41	18	16	27	44	33.5	49																							
3-Jul	43	39	27	30	34	Z	Z	34	39	40	44	47	47	37	39	40	38	39	34	34	37	38	38	34	37.7	47																							
4-Jul	31	35	32	29	29	30	Z	Z	30	31	31	33	37	36	37	38	40	42	41	40	41	39	35	25	27	34.3	42																						
5-Jul	26	26	26	27	27	29	Z	Z	27	27	29	30	32	31	32	34	32	31	32	34	30	21	10	8	6	26.4	34																						
6-Jul	6	6	Z	7	8	12	16	23	26	26	28	32	34	34	33	32	32	33	34	33	26	12	7	6	22.0	34																							
7-Jul	7	8	6	Z	7	11	17	23	30	34	34	33	35	34	35	36	35	36	38	35	18	8	7	7	23.2	38																							
8-Jul	8	6	6	6	Z	14	20	30	31	35	37	42	43	40	45	41	39	38	39	27	11	9	8	7	25.3	45																							
9-Jul	6	6	6	8	6	Z	17	28	35	42	51	58	58	55	56	53	52	51	46	35	28	15	12	34	33.0	58																							
10-Jul	35	32	42	37	28	27	Z	Z	22	22	27	32	38	41	43	40	45	46	43	36	22	14	8	6	6	30.0	46																						
11-Jul	6	6	6	6	6	9	19	Z	41	46	42	40	38	37	33	25	30	35	30	25	19	18	10	7	23.3	46																							
12-Jul	6	6	Z	6	6	6	7	9	11	18	26	C	C	C	C	43	42	34	37	32	31	27	21	16	20.3	43																							
13-Jul	15	10	5	Z	6	6	10	19	24	39	41	44	46	49	52	56	52	46	47	50	40	37	35	36	33.2	56																							
14-Jul	44	44	39	35	Z	25	22	23	23	26	28	28	30	32	34	33	37	38	38	31	13	8	13	15	28.7	44																							
15-Jul	15	7	5	8	7	Z	Z	8	16	34	47	55	58	60	60	61	62	61	59	58	57	50	26	21	15	37.0	62																						
16-Jul	12	22	26	31	38	41	Z	30	28	31	31	30	26	24	23	26	27	26	24	26	27	28	28	27	27.4	41																							
17-Jul	26	25	25	24	22	20	18	Z	21	24	25	25	22	24	25	23	27	30	26	25	22	19	16	16	23.1	30																							
18-Jul	21	21	Z	17	15	19	20	21	24	26	27	29	29	29	29	27	26	25	27	26	17	11	17	20	22.7	29																							
19-Jul	20	20	19	Z	17	15	16	18	21	28	29	30	30	31	32	33	32	27	24	21	18	8	6	5	21.7	33																							
20-Jul	5	5	6	5	Z	6	8	9	15	25	31	35	36	35	34	34	32	30	26	28	25	18	8	21	20.7	36																							
21-Jul	12	11	13	11	15	Z	14	19	18	19	16	15	15	15	18	29	33	37	32	27	8	4	5	8	17.1	37																							
22-Jul	14	15	18	17	16	17	Z	19	21	23	23	28	31	26	27	25	30	30	30	27	23	18	17	19	22.4	31																							
23-Jul	18	18	15	11	13	12	15	Z	21	21	23	24	27	29	29	28	30	33	34	28	22	18	24	25	22.5	34																							
24-Jul	19	16	Z	14	13	10	11	15	16	18	22	22	20	18	17	19	19	18	20	20	22	17	17	16	17.3	22																							
25-Jul	14	13	15	Z	13	14	14	17	21	28	25	27	28	28	29	30	30	32	31	26	15	13	16	16	21.4	32																							
26-Jul	16	14	15	14	Z	13	16	17	27	33	34	35	33	36	42	47	49	46	45	41	15	10	14	12	27.2	49																							
27-Jul	7	6	13	16	8	Z	12	24	34	41	47	52	50	48	46	44	32	23	15	16	5	24	28	32	27.1	52																							
28-Jul	26	19	20	16	16	20	Z	22	22	23	24	25	24	24	25	25	27	26	28	26	23	13	7	8	21.2	28																							
29-Jul	4	5	7	12	9	5	15	Z	18	24	29	32	29	36	35	35	35	31	32	27	10	6	7	6	19.5	36																							
30-Jul	5	5	Z	5	5	6	17	26	26	25	26	30	34	34	36	39	40	36	32	30	27	25	29	35	25.0	40																							
31-Jul	36	36	36	Z	32	27	25	26	27	28	27	29	30	29	28	33	33	30	29	31	24	11	16	10	27.5	36																							
																								17.3	16.5	17.7	16.7	15.5	16.2	16.5	21.8	25.7	29.8	32.1	34.2	34.2	34.3	35.1	36.0	36.2	35.0	33.6	30.4	22.2	16.8	17.0	18.2	Diurnal Average	
																								44	44	42	37	38	41	34	39	41	47	55	58	60	60	61	62	61	59	58	57	50	38	38	44	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Conklin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	247	34.84	34.84
21 - 50	440	62.06	96.90
51 - 82	22	3.10	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Conklin - July 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	13	4	0	1	0	1	4	12	45	59	28	16	9	6	18	30	246
21 - 50	11	10	5	2	8	23	14	11	12	20	38	68	63	64	46	42	437
51 - 82	0	1	0	0	1	9	1	3	7	0	0	0	0	0	0	0	22
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	15	5	3	9	33	19	26	64	79	66	84	72	70	64	72	705

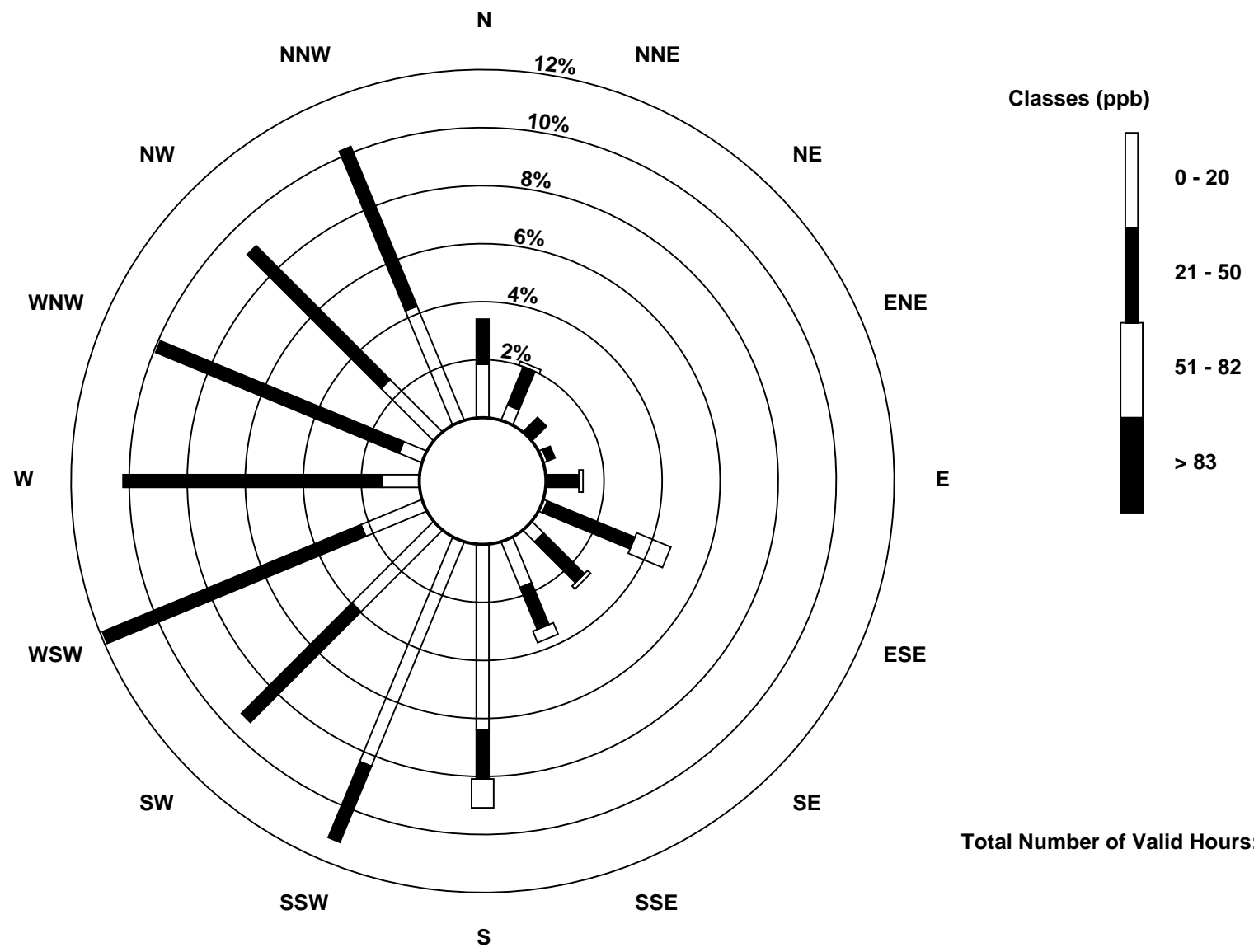
Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

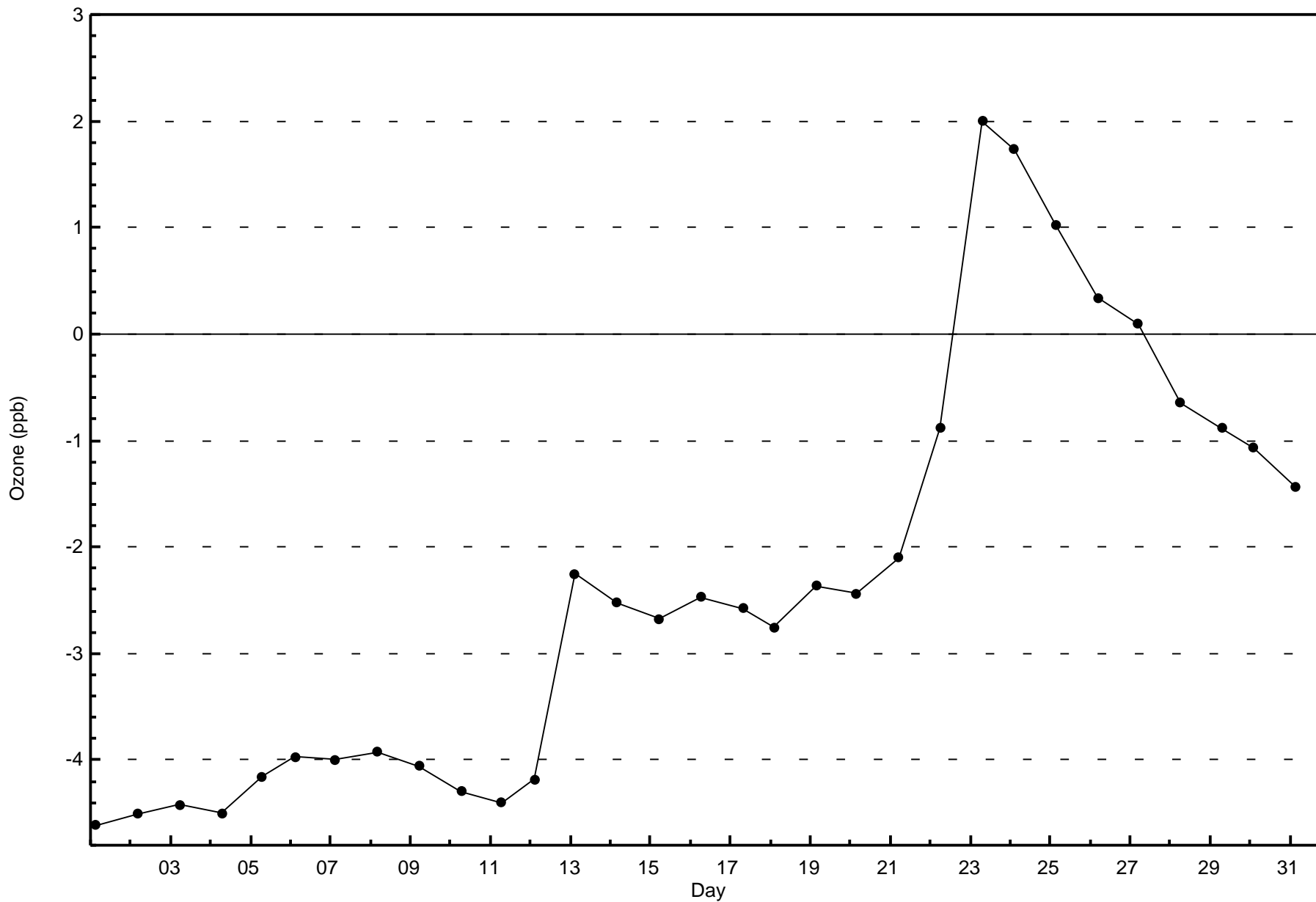
Ozone (O₃) - ppb
Conklin (AMS 21)





Wood Buffalo Environmental Association
Zero Responses

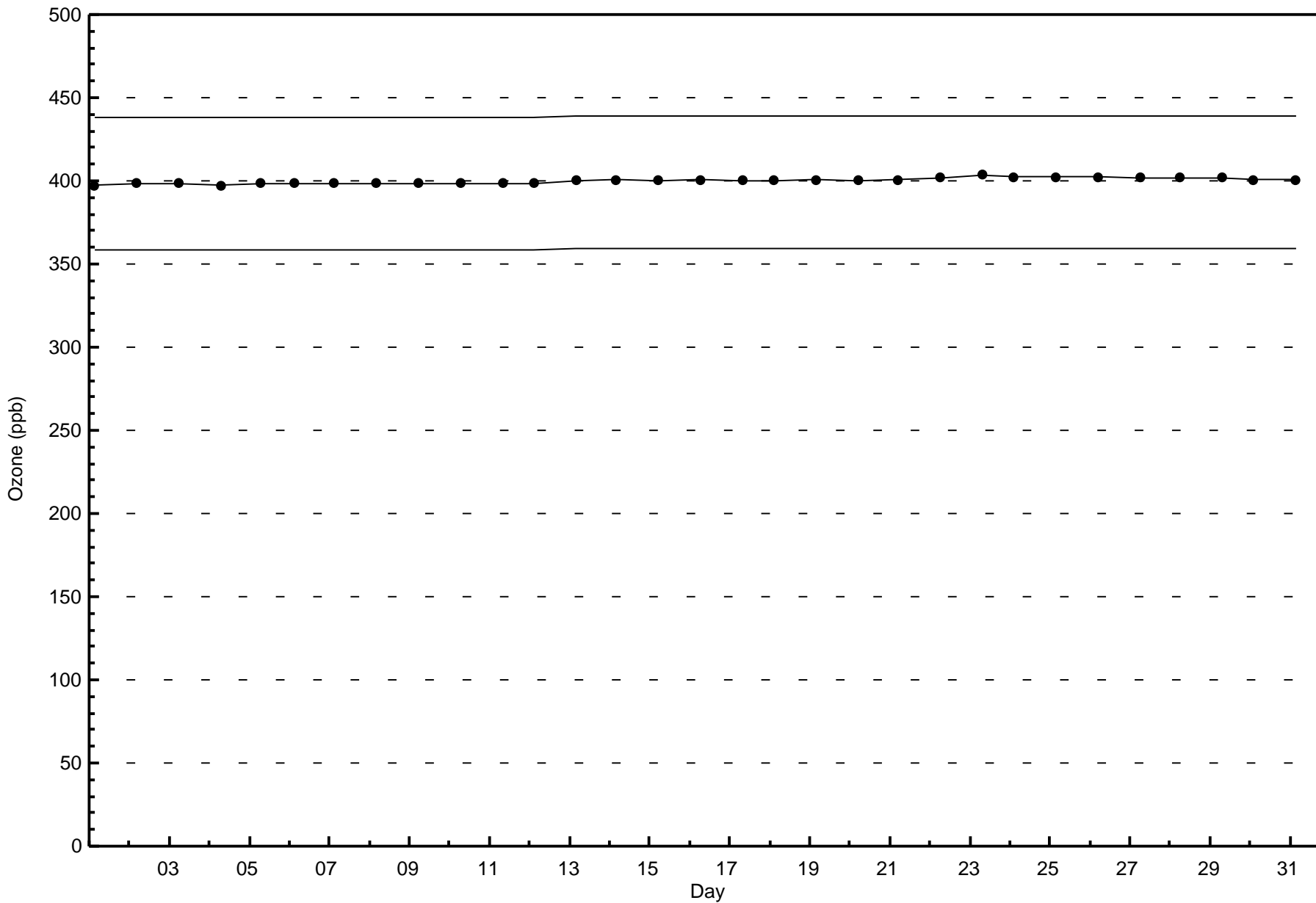
Ozone (O₃) - ppb
Conklin - July 2017





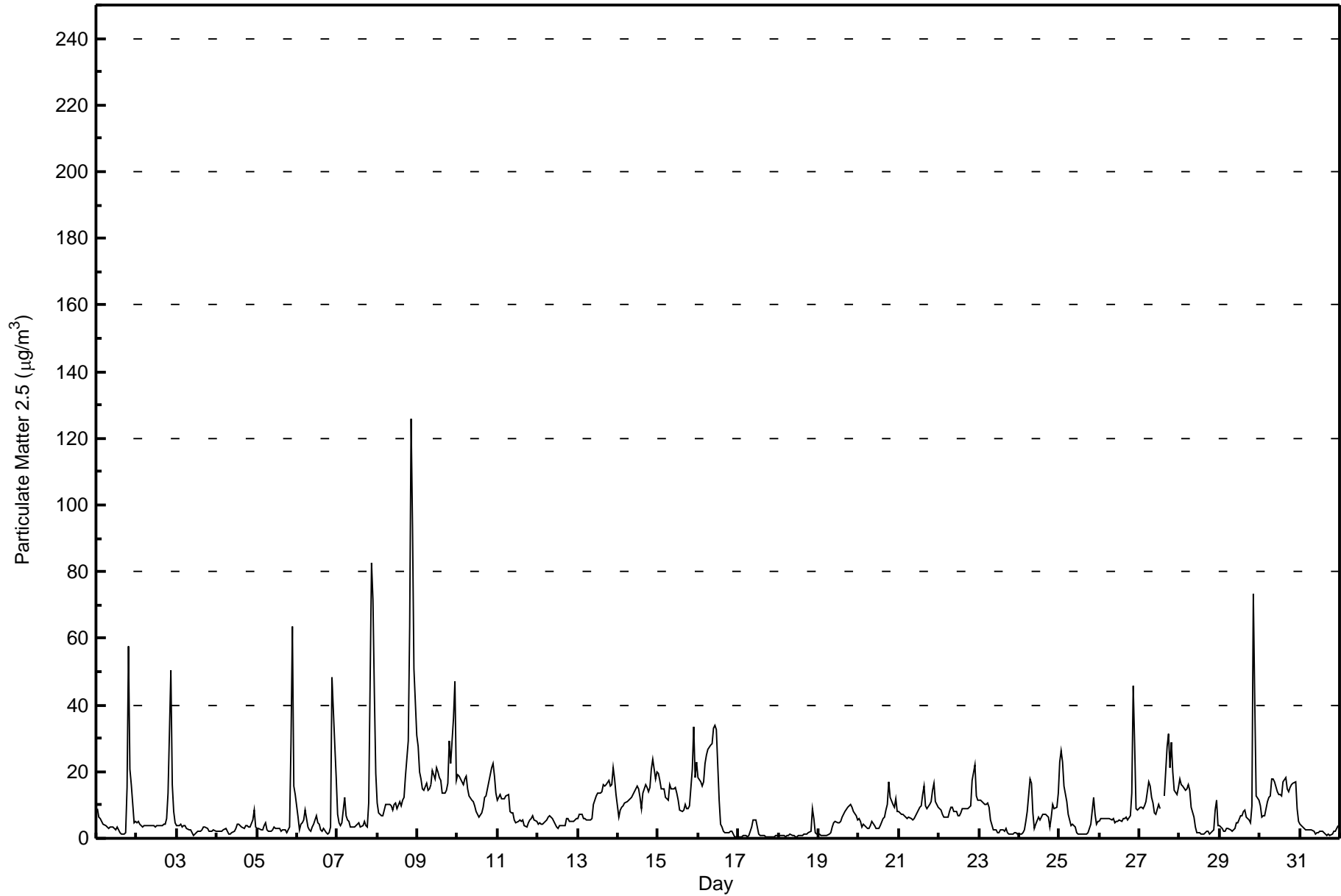
Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Conklin - July 2017





Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 125.9 µg/m ³ on Jul 8 21:00 Minimum Value: 0.5 µg/m ³ on Jul 17 19:00 Maximum Diurnal Average: 21.8 µg/m ³ at hour 21 Monthly Average: 9.01 µg/m ³		Maximum Daily Average: 24.0 µg/m ³ on Jul 8 Minimum Daily Average: 1.4 µg/m ³ on Jul 17 Minimum Diurnal Average: 5.8 µg/m ³ at hour 14 Percentiles: P ₁ = 0.6 P ₁₀ = 1.5 Q ₁ = 3.0 Median = 5.9 Q ₃ = 12.0 P ₉₀ = 17.7 P ₉₉ = 63.3		Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 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-Jul	8.7	6.5	5.8	5.2	4.4	3.6	3.3	3.0	3.4	3.4	3.4	2.6	3.3	2.5	1.8	1.3	1.3	1.8	15.4	57.8	20.6	15.9	4.8	4.9	7.7	57.8																						
2-Jul	4.7	5.1	4.3	3.5	3.6	3.9	3.6	3.6	3.9	3.8	3.8	3.5	3.6	3.7	3.9	3.6	4.1	4.2	5.9	13.4	50.2	16.2	8.2	4.9	7.1	50.2																						
3-Jul	3.8	3.9	4.2	3.3	4.0	3.6	3.1	2.7	2.6	1.7	1.0	1.3	2.2	2.0	2.0	2.4	3.5	3.3	2.8	2.3	2.1	2.3	2.6	2.1	2.7	4.2																						
4-Jul	2.0	2.0	2.2	2.0	2.6	2.8	2.2	1.5	1.3	1.5	2.0	2.9	4.1	4.4	3.8	3.6	3.1	3.6	4.0	3.5	3.2	5.4	8.3	3.6	3.1	8.3																						
5-Jul	2.9	3.2	2.5	2.4	3.8	4.6	2.5	2.3	2.2	2.4	3.3	2.8	3.0	2.9	2.2	2.5	2.8	2.6	1.8	3.2	28.5	63.4	15.5	13.0	7.3	63.4																						
6-Jul	6.4	2.7	4.1	4.6	5.7	8.3	3.5	2.6	2.1	3.2	4.4	6.8	4.8	4.1	2.7	2.1	2.8	1.5	1.3	1.7	3.6	48.3	27.8	18.1	7.2	48.3																						
7-Jul	7.2	4.8	3.7	4.6	12.3	6.6	5.7	5.2	3.3	3.4	3.4	3.8	4.1	4.6	3.4	3.8	4.9	3.8	3.3	10.4	82.8	71.8	43.5	19.6	13.3	82.8																						
8-Jul	10.4	7.6	6.9	6.8	8.7	10.2	10.3	10.0	9.9	8.5	10.4	10.4	8.9	11.2	9.9	11.5	12.4	18.6	29.3	63.4	125.9	93.7	51.0	31.0	24.0	125.9																						
9-Jul	27.5	19.9	17.8	14.6	14.3	16.7	14.4	14.9	16.1	20.5	17.7	21.1	19.8	18.1	17.5	13.6	13.5	14.2	16.5	29.2	22.5	35.8	47.2	17.6	20.0	47.2																						
10-Jul	19.1	18.6	17.8	16.1	18.0	18.7	14.9	12.8	11.3	11.0	9.6	7.9	7.4	6.4	7.8	9.4	12.2	12.8	14.9	19.2	21.2	22.5	18.6	13.7	14.2	22.5																						
11-Jul	11.6	13.1	11.9	11.9	11.8	12.8	13.2	8.3	7.7	7.5	5.5	4.8	5.0	5.6	5.3	5.5	4.0	3.3	4.5	5.7	6.1	6.6	5.5	5.1	7.6	13.2																						
12-Jul	4.3	4.8	4.4	4.3	5.1	5.4	6.2	6.7	6.3	5.8	4.4	3.5	2.8	3.7	3.9	3.7	3.9	5.9	6.1	5.1	5.1	5.1	5.5	5.8	4.9	6.7																						
13-Jul	6.0	7.0	7.1	5.8	5.7	5.5	5.5	5.9	10.1	11.3	12.6	13.6	13.6	14.0	16.0	15.5	16.3	17.5	15.7	16.0	21.0	17.6	13.3	11.6	11.6	21.0																						
14-Jul	6.3	8.4	9.4	9.6	10.4	10.9	11.4	12.0	12.4	13.1	14.1	15.6	14.9	12.4	8.8	13.6	16.3	15.1	13.9	15.1	20.6	23.7	17.7	19.9	13.6	23.7																						
15-Jul	19.6	17.3	14.9	14.9	12.1	12.1	11.6	15.9	15.0	14.7	15.1	13.4	11.3	8.7	8.0	8.5	10.1	9.0	8.8	9.8	20.8	33.3	18.4	23.1	14.4	33.3																						
16-Jul	18.4	16.9	15.5	16.8	22.6	24.9	26.6	27.9	28.6	33.2	34.0	32.8	11.4	4.1	3.5	2.0	1.6	1.6	1.9	1.9	2.2	1.1	0.6	0.6	13.8	34.0																						
17-Jul	0.6	0.6	0.5	0.8	0.7	0.6	0.8	1.9	3.4	5.4	5.4	3.5	1.3	0.7	0.7	0.5	0.5	0.5	0.5	0.6	0.6	1.0	1.0	1.4	1.4	5.4																						
18-Jul	1.0	0.9	0.8	0.7	0.6	0.7	0.8	1.1	0.9	0.7	0.6	0.6	0.6	0.8	0.8	1.5	1.2	1.1	1.7	2.2	8.9	5.8	1.8	1.3	1.5	8.9																						
19-Jul	1.4	1.1	0.9	0.9	0.8	1.1	1.2	1.8	3.2	4.9	5.2	4.9	4.5	5.1	6.2	7.2	8.0	9.2	9.9	10.1	9.2	8.2	6.7	5.6	4.9	10.1																						
20-Jul	5.8	5.2	3.4	4.3	3.3	3.0	2.8	3.7	5.2	3.7	3.2	3.1	3.1	4.0	6.0	6.2	8.3	10.3	17.1	12.1	10.4	9.3	12.0	8.2	6.4	17.1																						
21-Jul	8.2	7.4	7.2	6.6	6.4	6.1	6.3	5.9	5.6	5.9	6.9	7.7	9.3	9.6	13.0	15.6	9.6	9.1	10.1	10.9	14.6	16.4	11.0	9.4	9.1	16.4																						
22-Jul	8.8	8.4	7.1	6.5	6.2	6.5	8.1	9.3	9.5	8.1	8.2	7.0	6.6	7.5	9.0	8.7	9.0	8.8	9.5	9.8	17.2	21.9	12.8	11.5	9.4	21.9																						
23-Jul	11.6	11.5	10.9	10.3	10.2	10.4	9.2	5.4	2.6	2.3	2.4	1.9	1.7	2.5	2.7	2.3	3.0	1.6	1.2	1.3	1.5	1.7	1.7	1.3	4.6	11.6																						
24-Jul	1.4	1.4	1.7	2.7	5.1	7.9	17.8	16.6	7.4	3.1	4.4	6.5	5.4	6.5	7.2	7.4	7.4	6.3	3.4	6.4	10.1	9.0	9.2	13.6	7.0	17.8																						
25-Jul	22.8	26.4	23.1	15.8	11.1	7.2	5.3	3.7	4.4	3.3	1.6	1.4	1.3	1.4	1.4	1.4	1.5	1.8	3.1	4.2	12.1	7.0	4.3	5.0	7.1	26.4																						
26-Jul	5.2	6.1	5.8	6.1	6.1	6.1	5.9	5.6	5.8	4.8	4.9	5.1	5.4	5.3	6.1	5.9	6.3	5.7	6.9	13.7	45.6	28.4	9.0	8.6	8.9	45.6																						
27-Jul	9.2	9.3	9.0	9.9	10.9	16.8	15.5	12.2	10.6	7.7	7.3	10.2	8.7	C	C	12.9	27.5	31.5	21.1	28.6	19.8	14.4	13.2	15.4	14.6	31.5																						
28-Jul	17.7	16.2	15.7	14.3	14.6	16.1	14.6	9.2	6.3	3.4	1.7	1.5	1.7	1.5	1.4	1.6	2.0	2.3	1.2	2.1	2.6	8.6	11.4	4.0	7.1	17.7																						
29-Jul	3.8	2.8	2.1	2.2	3.1	2.8	2.5	2.2	2.5	2.9	4.5	4.8	6.9	6.6	8.0	8.7	6.6	5.7	4.7	9.9	73.4	41.3	12.9	11.5	9.7	73.4																						
30-Jul	9.8	6.4	6.8	7.0	11.1	12.1	12.7	17.7	17.6	17.0	14.1	13.1	13.1	12.8	16.8	18.4	14.8	13.9	15.2	16.2	16.7	17.0	9.1	5.3	13.1	18.4																						
31-Jul	4.4	3.7	2.8	2.6	2.6	2.7	2.7	2.5	2.2	1.4	1.8	1.7	2.3	2.1	1.6	1.2	1.0	1.1	1.1	1.1	2.0	2.2	2.9	3.7	2.2	4.4																						
																								8.7	8.0	7.4	7.0	7.7	8.1	7.9	7.5	7.1	7.0	7.0	7.1	6.2	5.8	6.0	6.5	7.1	7.3	8.2	12.5	21.8	21.2	13.3	9.7	Diurnal Average
																								27.5	26.4	23.1	16.8	22.6	24.9	26.6	27.9	28.6	33.2	34.0	32.8	19.8	18.1	17.5	18.4	27.5	31.5	29.3	63.4	125.9	93.7	51.0	31.0	Diurnal Maximum
C - Calibration																																																
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}) - $\mu\text{g}/\text{m}^3$
Conklin - July 2017**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	307	41.37	41.37
6 - 15	286	38.54	79.92
16 - 25	79	10.65	90.57
26 - 80	31	4.18	94.74
> 81.0	3	0.40	95.15

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Conklin - July 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	4	4	2	0	1	9	2	7	18	31	31	43	41	48	35	29	305
6 - 15	17	8	2	2	6	14	10	16	43	36	26	28	18	8	23	28	285
16 - 25	3	4	1	0	2	6	5	4	7	9	7	8	5	4	5	8	78
26 - 80	0	0	0	1	0	2	2	2	1	10	0	4	2	5	1	1	31
> 81.0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	3
Totals	24	16	5	3	9	31	19	30	69	87	65	83	66	65	64	66	702

Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

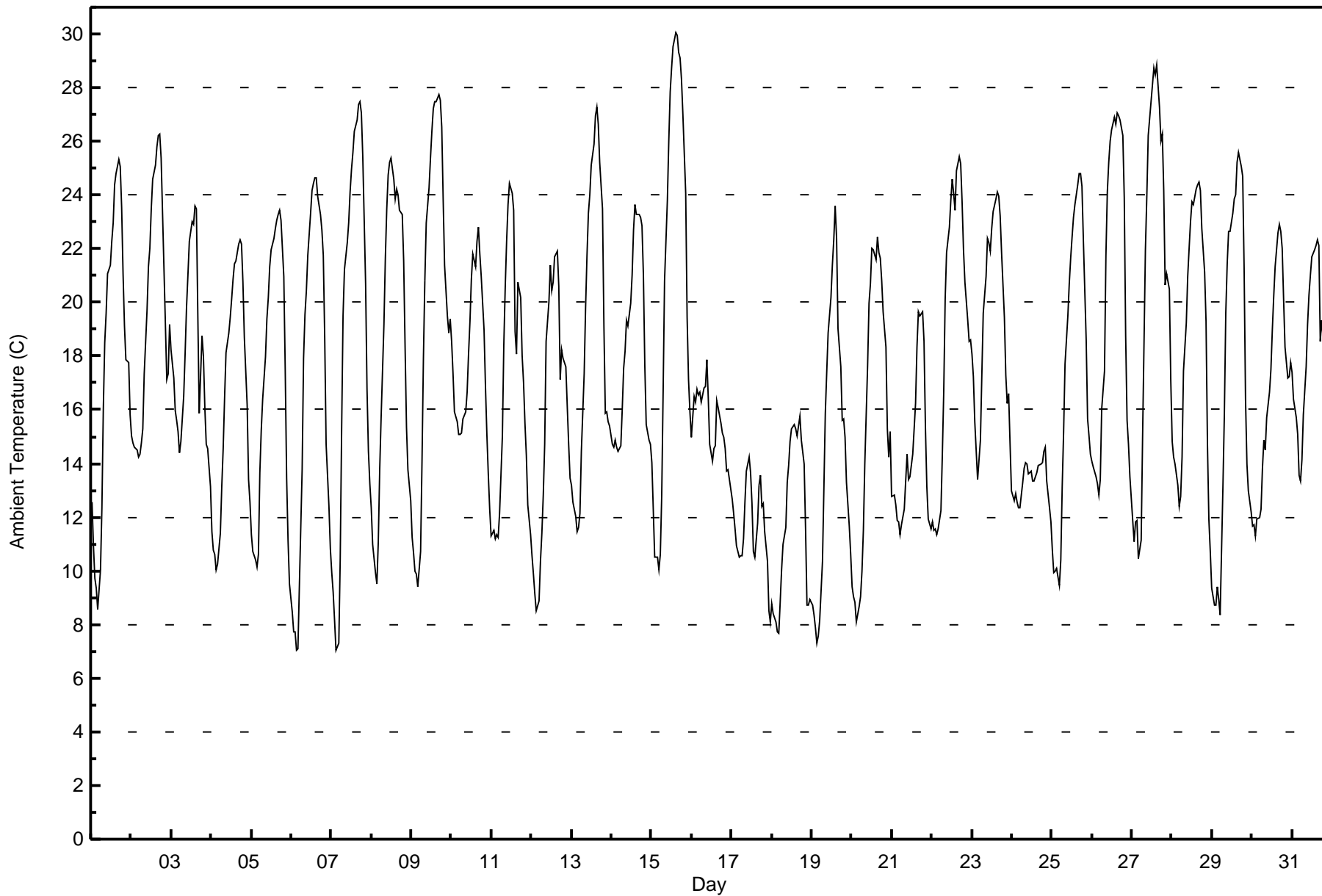
Ambient Temperature (AT) - C
Conklin - July 2017

Maximum Value: 30.1 C on Jul 15 15:00 Maximum Daily Average: 21.0 C on Jul 15		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																																														
Minimum Value: 7.0 C on Jul 7 04:00 Maximum Diurnal Average: 22.9 C at hour 16 Monthly Average: 17.33 C		Minimum Daily Average: 11.7 C on Jul 17 Minimum Diurnal Average: 11.1 C at hour 5 Percentiles: P ₁ = 7.7 P ₁₀ = 10.5 Q ₁ = 13.1 Median = 16.7 Q ₃ = 21.9 P ₉₀ = 24.6 P ₉₉ = 28.7																																														
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-Jul	12.6	10.9	9.7	9.3	8.6	10.0	12.3	16.0	18.5	19.6	21.1	21.4	22.3	23.0	24.4	24.8	25.3	25.1	23.6	21.1	19.1	17.9	17.8	15.8	17.9	25.3																						
2-Jul	15.1	14.8	14.6	14.5	14.3	14.3	14.8	15.3	17.4	19.7	21.3	22.0	23.5	24.6	25.1	25.8	26.2	26.3	25.4	23.3	19.2	17.1	17.3	19.2	19.6	26.3																						
3-Jul	18.2	17.2	16.0	15.6	15.2	14.4	14.8	16.5	18.1	19.8	21.0	22.3	23.0	22.9	23.6	23.5	19.6	15.9	18.8	18.0	16.1	14.7	14.5	13.1	18.0	23.6																						
4-Jul	11.4	10.8	10.6	10.0	10.2	11.4	13.1	14.6	16.5	18.1	18.8	19.4	20.1	20.9	21.4	21.5	22.1	22.3	22.2	20.7	18.7	16.2	13.4	12.5	16.6	22.3																						
5-Jul	11.3	10.7	10.4	10.2	10.6	13.7	15.2	16.4	18.0	19.4	20.2	21.3	21.9	22.4	22.7	23.1	23.3	23.4	23.1	21.0	17.5	13.5	11.1	9.5	17.1	23.4																						
6-Jul	8.5	7.7	7.7	7.0	7.1	9.4	13.8	17.9	19.5	20.4	21.7	23.4	24.2	24.4	24.7	24.6	24.0	23.3	22.7	21.7	18.7	14.7	12.4	10.8	17.1	24.7																						
7-Jul	9.9	9.2	8.2	7.0	7.3	10.4	15.2	19.5	21.2	22.2	23.0	24.1	24.9	25.6	26.4	26.8	27.4	27.5	27.1	25.4	20.7	16.8	14.5	13.2	18.9	27.5																						
8-Jul	12.3	11.0	10.0	9.5	11.1	13.7	15.7	19.2	21.7	23.5	24.7	25.2	25.4	24.6	23.9	24.2	24.0	23.4	23.3	21.6	18.4	15.4	13.8	12.6	18.7	25.4																						
9-Jul	11.2	10.7	10.0	9.9	9.4	10.7	14.1	17.9	20.8	22.9	24.3	25.4	26.4	27.2	27.5	27.5	27.7	27.5	26.5	23.9	21.4	19.5	18.9	19.4	20.0	27.7																						
10-Jul	18.6	17.3	15.9	15.5	15.1	15.1	15.1	15.7	15.9	16.7	18.1	19.3	20.8	21.8	21.3	22.3	22.8	21.8	21.0	19.0	16.9	15.1	13.6	12.3	17.8	22.8																						
11-Jul	11.3	11.5	11.2	11.3	11.2	12.1	15.0	18.4	20.5	22.3	23.6	24.5	24.1	23.4	18.9	18.1	20.8	20.2	18.0	17.0	15.5	14.3	12.5	11.3	17.0	24.5																						
12-Jul	10.6	9.9	9.1	8.5	8.9	10.3	11.4	12.8	14.7	18.5	20.0	21.4	20.5	20.8	21.7	21.9	20.6	17.2	18.2	17.9	17.6	16.2	14.7	13.5	15.7	21.9																						
13-Jul	13.2	12.6	12.1	11.5	11.6	12.1	14.5	17.3	19.8	21.8	23.3	24.0	25.1	25.9	26.9	27.2	26.6	25.2	23.5	19.1	15.9	15.9	15.6	15.4	19.0	27.2																						
14-Jul	14.7	14.6	14.9	14.6	14.5	14.7	16.1	17.5	18.2	19.3	19.1	20.0	21.0	22.7	23.7	23.3	23.3	23.2	22.9	21.0	17.6	15.5	14.9	14.7	18.4	23.7																						
15-Jul	14.0	12.3	10.5	10.5	10.1	10.6	12.8	16.7	20.8	23.8	26.0	27.8	28.7	29.6	30.1	30.0	29.3	29.1	28.3	27.0	24.1	19.5	17.2	15.9	21.0	30.1																						
16-Jul	15.0	16.5	16.3	16.8	16.5	16.6	16.3	16.8	16.9	17.8	16.4	14.7	14.1	14.5	14.7	16.4	16.1	15.5	15.1	15.0	14.5	13.7	13.8	13.0	15.5	17.8																						
17-Jul	12.6	12.2	11.6	10.9	10.5	10.6	10.5	11.2	12.5	13.7	14.2	13.7	12.5	10.7	10.5	11.7	13.2	13.6	12.4	12.5	11.4	10.4	8.5	8.1	11.7	14.2																						
18-Jul	8.8	8.4	8.1	7.7	7.7	8.8	10.1	11.0	11.6	13.3	13.9	14.8	15.3	15.5	15.3	15.0	15.4	15.8	14.8	14.0	11.6	8.7	8.7	8.9	11.8	15.8																						
19-Jul	8.7	8.3	7.9	7.3	7.6	8.2	10.3	13.1	15.8	17.4	18.8	20.2	21.4	22.3	23.6	22.4	19.0	17.6	15.6	15.7	15.0	13.3	11.7	10.6	14.7	23.6																						
20-Jul	9.4	9.0	8.8	8.1	8.7	9.0	10.0	11.5	14.0	17.7	20.0	20.7	22.0	21.9	21.6	22.5	21.9	21.6	20.8	19.7	18.3	15.3	14.3	15.2	15.9	22.5																						
21-Jul	12.8	12.8	12.5	11.9	11.8	11.3	11.7	12.3	13.3	14.4	13.4	13.5	14.3	15.3	16.2	18.4	19.6	19.5	19.6	18.5	15.4	13.1	12.0	11.6	14.4	19.6																						
22-Jul	11.8	11.5	11.6	11.4	11.6	12.2	14.3	16.7	20.1	21.9	22.8	23.8	24.6	24.1	23.5	24.9	25.4	25.2	23.8	21.9	20.7	19.3	18.6	18.6	19.2	25.4																						
23-Jul	18.1	17.2	15.5	13.4	14.1	14.9	17.3	19.6	21.0	22.4	22.2	21.9	22.8	23.4	23.8	24.1	24.0	23.2	21.8	19.4	17.3	16.3	16.6	14.8	19.4	24.1																						
24-Jul	13.0	12.6	12.9	12.6	12.3	12.4	13.3	13.8	14.1	14.0	13.6	13.7	13.3	13.4	13.5	13.6	13.9	14.0	14.0	14.4	14.6	13.4	12.3	11.8	13.4	14.6																						
25-Jul	10.8	9.9	10.0	10.1	9.5	10.4	13.2	15.2	17.7	19.5	20.7	21.7	22.5	23.1	23.7	24.4	24.8	24.8	24.4	22.3	18.6	15.6	15.0	14.3	17.6	24.8																						
26-Jul	14.1	13.9	13.5	13.2	12.8	13.4	16.0	17.5	21.7	24.1	25.2	26.0	26.4	26.9	26.7	27.0	26.9	26.8	26.2	23.9	18.8	15.6	14.7	13.5	20.2	27.0																						
27-Jul	11.9	11.1	11.8	11.9	10.4	11.1	15.0	18.4	22.0	23.9	26.2	27.5	28.1	28.8	28.5	28.8	27.3	26.0	26.3	24.2	20.7	21.1	20.5	17.1	20.8	28.8																						
28-Jul	14.8	14.2	14.0	13.2	12.4	12.8	14.2	17.4	19.2	21.0	22.0	23.0	23.7	23.6	24.2	24.4	24.5	24.2	22.7	21.1	19.3	14.7	11.9	10.7	18.5	24.5																						
29-Jul	9.4	8.7	8.7	9.4	8.9	8.3	13.2	15.8	19.6	21.4	22.6	22.6	23.3	23.9	24.0	25.2	25.6	25.1	24.7	21.3	16.4	14.0	13.0	12.2	17.4	25.6																						
30-Jul	11.7	11.7	11.3	11.9	12.0	12.3	13.8	14.8	14.5	15.7	16.7	17.5	19.0	20.2	21.3	22.6	22.9	22.7	22.0	20.1	18.3	17.2	17.2	17.8	16.9	22.9																						
31-Jul	17.4	16.4	15.7	15.1	13.6	13.3	14.2	15.8	17.6	19.2	20.3	21.0	21.7	22.0	22.1	22.3	22.1	18.6	19.3	18.0	14.8	12.7	12.0	10.3	17.3	22.3																						
																								12.7	12.1	11.6	11.3	11.1	11.9	13.8	15.9	17.8	19.5	20.5	21.2	21.8	22.2	22.4	22.9	22.8	22.1	21.6	20.0	17.5	15.4	14.3	13.5	Diurnal Average
																								18.6	17.3	16.3	16.8	16.5	16.6	17.3	19.6	22.0	24.1	26.2	27.8	28.7	29.6	30.1	30.0	29.3	29.1	28.3	27.0	24.1	21.1	20.5	19.4	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Conklin - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin - July 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	7.53	7.53
10 - 20	433	58.20	65.73
> 20	255	34.27	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

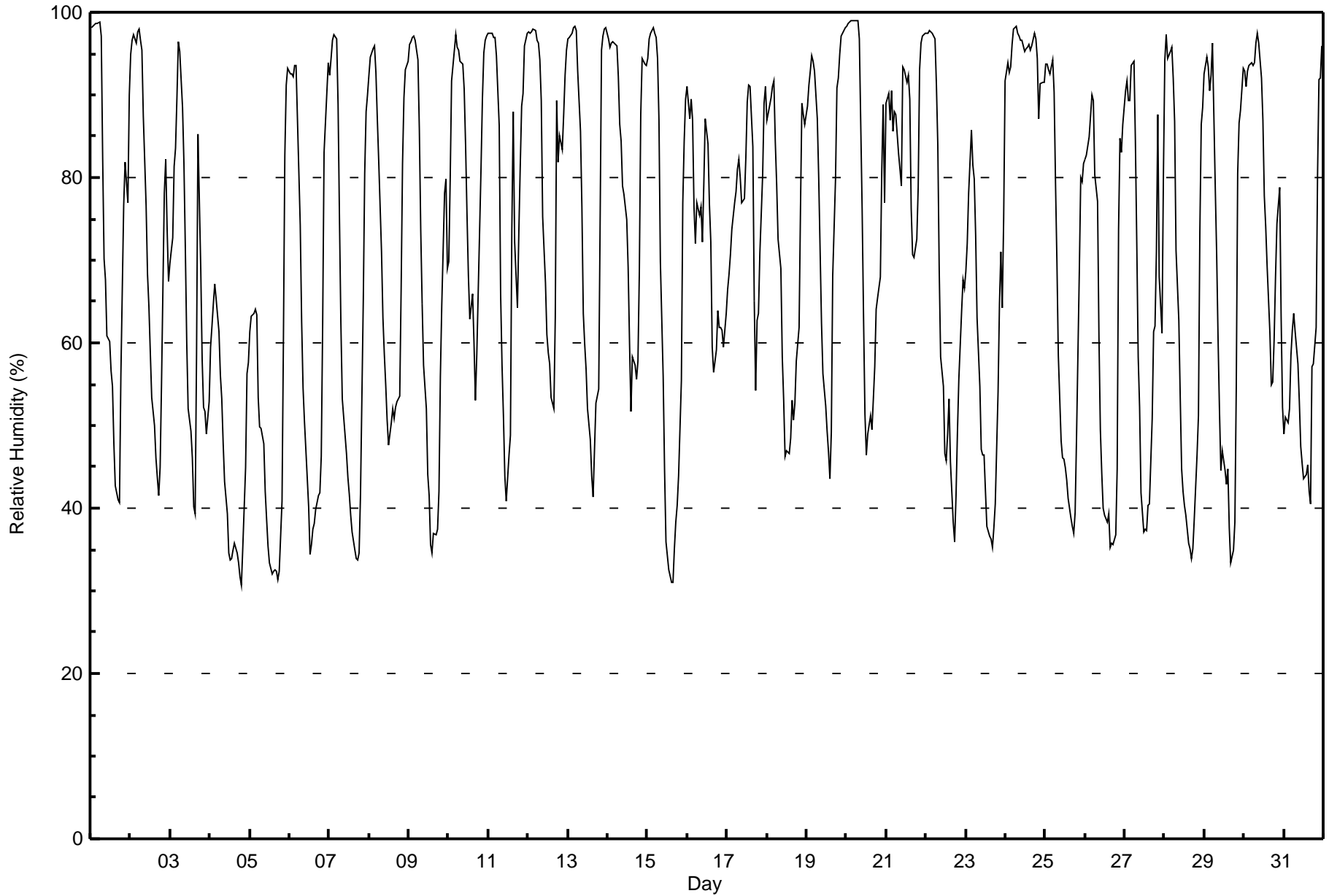
Conklin - July 2017

Maximum Value: 99 % on Jul 20 06:00																	Maximum Daily Average: 94.8 % on Jul 24																	Hours in Service: 744								
Minimum Value: 31 % on Jul 4 20:00																	Minimum Daily Average: 46.5 % on Jul 4																	Hours of Data: 744								
Maximum Diurnal Average: 90.2 % at hour 5																	Minimum Diurnal Average: 49.1 % at hour 17																	Hours of Missing Data: 0								
Monthly Average: 70.2 %																	Percentiles: P ₁ = 32 P ₁₀ = 40 Q ₁ = 52 Median = 72 Q ₃ = 92 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-Jul	98	98	98	99	99	99	97	82	70	68	61	60	57	55	48	43	41	41	56	66	77	82	77	90	73.4	99																
2-Jul	95	97	97	96	98	98	97	95	88	77	68	64	59	53	50	46	44	42	45	55	78	82	74	68	73.5	98																
3-Jul	70	73	81	84	90	96	95	88	82	71	60	52	49	46	40	39	59	85	69	58	52	52	49	53	66.4	96																
4-Jul	60	62	65	67	65	61	56	53	48	43	39	35	34	34	35	36	34	33	32	31	35	45	56	58	46.5	67																
5-Jul	61	63	63	64	63	53	50	50	48	42	39	35	33	32	32	33	32	31	32	41	60	83	91	93	51.2	93																
6-Jul	93	93	92	94	94	87	74	62	55	51	47	40	34	36	37	38	40	42	42	46	62	83	90	94	63.5	94																
7-Jul	92	94	97	97	97	89	75	62	53	49	47	44	42	39	37	35	34	34	35	42	65	80	88	90	63.2	97																
8-Jul	92	95	96	96	93	87	82	71	63	59	55	51	48	50	52	51	52	53	54	66	82	90	93	94	71.8	96																
9-Jul	96	96	97	97	97	94	86	74	65	57	52	44	41	36	35	37	37	37	42	56	65	78	80	69	65.3	97																
10-Jul	70	80	92	95	97	96	95	94	94	91	84	76	68	63	66	60	53	59	66	81	89	95	97	97	81.5	97																
11-Jul	98	97	97	97	97	95	86	66	57	51	44	41	46	49	74	88	72	64	73	81	89	90	96	98	77.0	98																
12-Jul	98	97	98	98	98	97	96	94	89	75	67	61	59	57	53	52	63	89	82	85	83	88	92	96	82.0	98																
13-Jul	97	97	98	98	98	98	93	86	76	64	60	57	52	48	44	41	47	53	54	74	95	97	98	98	76.0	98																
14-Jul	97	96	96	96	96	96	92	87	84	79	78	75	69	60	52	58	57	56	58	69	88	94	94	94	80.0	97																
15-Jul	94	97	97	98	98	97	94	87	70	56	45	36	34	32	31	31	35	38	40	44	55	77	84	89	65.1	98																
16-Jul	91	87	89	87	77	72	77	75	76	72	79	87	84	77	72	59	56	59	64	62	62	62	59	64	72.9	91																
17-Jul	67	68	71	74	77	78	81	82	80	77	77	82	89	91	91	84	65	54	63	64	71	80	89	91	76.9	91																
18-Jul	87	88	90	91	92	84	79	73	69	58	53	46	47	47	48	53	51	53	58	62	76	89	88	86	69.5	92																
19-Jul	89	91	93	95	94	93	87	80	71	62	56	52	49	47	44	49	68	80	91	92	95	97	98	98	78.0	98																
20-Jul	98	99	99	99	99	99	99	99	97	76	63	51	46	49	51	50	53	57	64	65	68	81	89	77	76.2	99																
21-Jul	89	90	87	91	86	88	88	83	81	79	93	93	92	92	90	76	71	70	73	79	93	96	97	98	86.4	98																
22-Jul	97	98	98	98	97	97	91	84	69	58	55	47	46	49	53	46	38	36	42	49	56	64	68	67	66.7	98																
23-Jul	69	72	78	86	82	80	73	63	55	47	46	46	42	38	37	36	35	38	41	54	65	71	64	75	58.0	86																
24-Jul	92	94	93	93	96	98	98	98	97	97	97	95	96	96	96	95	96	98	97	94	87	91	92	92	94.8	98																
25-Jul	94	94	93	93	94	90	79	70	59	48	46	46	45	43	41	39	38	37	40	49	69	80	80	82	64.4	94																
26-Jul	82	83	85	87	90	89	80	77	61	49	44	40	39	38	39	35	36	36	37	45	74	85	83	86	62.5	90																
27-Jul	90	92	89	89	94	94	84	72	58	52	42	37	37	37	40	40	51	61	62	71	88	68	61	80	66.3	94																
28-Jul	94	97	94	95	96	92	87	71	63	53	45	42	40	39	36	35	34	35	39	46	51	73	86	88	63.9	97																
29-Jul	93	95	93	91	92	96	79	71	61	52	45	47	45	43	45	38	33	35	38	55	81	87	88	93	66.4	96																
30-Jul	93	91	93	94	94	94	94	96	98	96	92	87	78	74	69	61	55	55	60	68	74	79	63	52	79.6	98																
31-Jul	49	51	50	52	58	61	64	61	57	53	47	45	43	44	45	42	41	57	58	62	80	92	92	96	58.4	96																
																	86.6	87.9	89.0	90.0	90.2	88.7	84.2	77.6	70.7	63.3	58.9	55.3	53.0	51.5	51.1	49.3	49.1	52.2	55.0	61.7	73.1	81.0	82.4	84.0	Diurnal Average	
																	98	99	99	99	99	99	99	99	98	97	97	95	96	96	96	95	96	98	97	94	95	97	98	98	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Conklin - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Conklin - July 2017

Maximum Speed: 23 km/h on Jul 4 14:00	Maximum Daily Speed Average: 13.4 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 27 18:00	Minimum Daily Speed Average: 0.6 km/h on Jul 10	Hours of Data: 740
Maximum Diurnal Speed Average: 4.3 km/h at hour 14	Minimum Diurnal Speed Average: 2.3 km/h at hour 20	Hours of Missing Data: 4
Monthly Average Velocity: 3.1 km/h 258.6 deg	Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 9 P ₉₀ = 11 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-Jul	SW1	S2	SE2	SSE2	NW2	SSE2	SSW4	SSW3	W2	WSW2	ESE4	NE0	E7	NNW3	SSW3	SW3	W3	W3	NNE1	ENE2	SW2	SW3	NNW7	NNW3	SW0.7	NNW7
2-Jul	NE2	SSW2	SSE4	SSE4	NNW3	SSE3	S5	S5	S7	SSW8	WSW10	WSW8	WSW7	SSW10	SSW9	SW9	SW9	WSW9	SW7	SW3	SSW3	S4	SSW6	WSW7	SW4.9	WSW10
3-Jul	WNN4	SW2	S3	NW3	NNW3	NNE2	ESE3	ESE8	NW7	NW8	NNW8	WNN6	WNN9	NW11	WNN8	WNN8	WNN10	NW4	W3	W7	W9	WSW9	WSW12	WSW10	WNN4.7	WSW12
4-Jul	SW8	SW11	SW14	SW9	SSW11	SW12	WSW15	WSW14	WSW15	WSW16	WSW17	WSW19	WSW19	WSW23	WSW21	WSW21	WSW19	WSW18	WSW15	W9	W7	WSW6	SW7	SW7	WSW13.4	WSW23
5-Jul	SSW7	SSW7	SSW8	SSW8	SW8	WSW12	W11	W11	W10	WNN12	W14	WNN13	WNN13	WNN14	WNN13	WNN12	WNN11	WNN9	WNN8	NW4	WNN1	WSW1	NNW0	WSW0	W7.5	WNN14
6-Jul	SSW1	S2	SSW2	SSW3	SSW3	SSE3	S3	SW2	NW3	W5	C	C	C	NW11	NW11	NNW12	NNW11	NNW12	NNW9	NNW8	NW2	WSW1	SSW1	SSW2	NW3.4	NNW12
7-Jul	S2	SW2	SSW1	WSW1	S2	S2	S3	S1	W5	NW6	NW7	WNN7	NW7	WNN8	NW7	W6	W4	NW4	NNW4	NNW1	SW1	SSW1	SSW1	SSW2	WNN2.5	WNN8
8-Jul	W0	S2	SW1	S1	S3	SE3	SSW3	WNN3	WNN5	NW6	NW7	NW7	WNN7	WNN8	NNW7	NNE6	E5	SE7	SE4	S1	SSW1	SSE1	SSW2	SSW2	W1.1	WNN8
9-Jul	WSW1	SSW2	SSW2	S3	SSW2	SSW2	S2	NNE2	ESE3	SE6	ESE6	ESE7	ESE7	ESE8	ESE8	ESE7	ESE8	ESE7	SE6	SE3	WNN1	WNN1	SSE2	SSW3	SE3.2	ESE8
10-Jul	SW4	W2	WNN7	NNW4	NW2	N4	NW1	S3	SW2	NE2	N5	N5	N6	E6	SE5	SE5	ESE9	SE6	SSE2	E1	W1	WSW1	SSW1	SSW2	ENE0.6	ESE9
11-Jul	SSW2	S2	WSW1	SSW2	SW2	S3	S4	WSW2	NNW2	SSW1	SE2	SE5	NNE7	N5	NNE4	NNW7	WNN5	NNW9	NNW6	NNW5	NW2	SW5	NNW2	SW1	NW1.3	NNW9
12-Jul	SSW3	SSW2	SSW2	SSW3	S3	WSW1	NNW3	NNW2	N4	W1	SW6	SSW10	S11	S11	S12	SSE12	S10	SW6	S9	SSE7	S7	S6	SSW3	S4	S4.7	S12
13-Jul	S4	SSW4	SSE5	SSE5	NNW2	SSW1	SSE2	SSE4	WSW3	SSE3	ESE4	NNE6	N3	NE2	SE5	E2	NNE7	NNE10	NNE7	NNE5	NW3	W2	N7	NW4	NE0.9	NNE10
14-Jul	NW7	NW10	NW9	NW5	NW6	NNW6	NW5	W5	W6	W7	WSW9	W7	W6	W5	W5	WSW10	WSW9	WSW7	WSW6	WSW2	WSW1	S3	SSW5	S5	W4.8	WSW10
15-Jul	S4	S2	S3	S5	SSE4	S2	S3	SE4	SE7	SSE11	SSE15	S15	S15	S18	S17	S18	S18	S15	S14	SSE11	SSE6	SSE4	NNW3	WSW2	S8.4	S18
16-Jul	S5	S6	NNW2	NNW9	NNW9	NW5	NW0	WNN3	W3	WNN5	W9	WSW8	NW5	NW5	S7	W12	W11	WSW11	WSW9	W9	WSW10	WSW13	WSW15	WSW15	W6.6	WSW15
17-Jul	W17	W15	W14	W14	WSW16	W16	W11	W10	W9	WNN10	W11	WNN8	NNW13	NNW13	NNW10	NW6	NNW12	NNW12	NNW6	WNN3	WSW5	W3	NW2	NW3	WNN8.5	W17
18-Jul	WNN3	NW4	NNW2	NNW2	NW1	NNW4	NNW4	WNN2	NNW4	WNN4	W8	W8	WNN6	WNN6	W6	SW7	WSW5	W7	WSW8	SW6	SW4	SSW5	SSW6	SSW6	W3.7	WSW8
19-Jul	SW8	SW8	SW6	SW7	SW6	SSW4	SW9	WSW11	WSW11	WSW11	WSW11	W7	WNN7	W7	W8	WSW4	NNE7	SW1	E2	SW3	NNW3	SW1	WSW1	SW1	WSW4.8	WSW11
20-Jul	WNN1	WSW1	S1	WSW1	SSW1	NNW1	SW1	NNW2	ESE4	ESE7	ESE9	ESE11	ESE12	ESE9	ESE9	ESE9	ESE7	ESE5	SSE5	SE8	ESE4	N1	WNN1	ENE3	ESE3.9	ESE12
21-Jul	N2	N1	NNW4	NNW4	NW3	NNW5	NNW5	N7	N3	ENE3	N4	N6	NNE2	NNW4	NNW5	WSW1	E3	NNW4	E1	WSW1	S2	AF	SSW4	S3	NNW2.0	N7
22-Jul	S4	S3	S4	S5	S6	S5	SSW7	SW8	WSW7	WNN6	W6	WSW9	W11	W8	SW8	WSW9	WSW11	WSW10	WSW7	WSW7	SW4	SSW5	SW5	SW7	SW5.9	WSW11
23-Jul	SW7	SW8	SSW6	SSW5	SW6	SW7	SW8	W8	W11	W10	W11	W10	WNN9	W10	WNN9	NW8	WNN8	NNW7	NNW7	NNW5	NNW4	NNW5	NW7	NW6	W5.9	W11
24-Jul	NNW7	NNW6	NNW8	NNW8	NW5	NNW5	N11	N14	NNE12	NNE15	N18	N20	N21	N16	NNW17	NNW18	N7	N2	N2	NW7	NNW10	NW6	NW5	NW3	N9.5	N21
25-Jul	NW2	NNW3	NNW3	NNW4	NNW5	NNW3	NNW3	NW5	NW4	WNN6	NW7	WNN6	NW6	WNN6	WNN6	WNN5	NW5	W5	W5	SSW5	SSW4	SSW5	SSW6	SSW7	WNN3.2	NW7
26-Jul	SSW7	SSW7	SSW6	SSW7	S7	SSW7	SSW10	SSW8	SW10	SW10	SW12	SW12	WSW9	SW9	SW9	SSW11	SSW11	SSW10	SSW8	SW4	SSW3	SSW5	SSW5	SSW6	SSW7.7	SW12
27-Jul	SSW5	S4	S5	SSW5	SSE5	SSE3	SSE2	ESE0	SE2	NNW1	ESE6	ESE7	ESE7	ESE7	ESE5	E5	ESE3	ESE0	WNN1	WNN1	NW1	NW9	NW11	W7	SSE1.2	NW11
28-Jul	SSE2	WNN3	W4	SSW5	S4	SW8	SW8	WSW10	W11	W10	W12	WNN10	WNN10	WNN9	WNN11	WNN10	WNN9	WNN9	W8	WSW8	WSW7	SW1	SE0	W1	W6.1	W12
29-Jul	SSW2	S2	S3	S5	WSW1	WSW1	SW6	SSW5	SW6	SW10	SW10	SW8	WSW9	WSW12	WSW9	WSW11	W8	WNN6	WNN5	W1	SSW2	SSW5	SSW4	W1	WSW4.9	WSW12
30-Jul	S2	S3	S3	SSE4	S2	NW3	NW6	NNW6	SE6	NE1	N9	NNW5	NNW2	S3	WSW7	SW6	W8	WSW6	WSW6	WSW8	SW8	WSW10	WSW11	W13	WSW3.5	W13
31-Jul	W11	W11	W13	W14	WNN9	WNN9	WNN7	WNN8	WNN9	NW9	NW10	WNN12	WNN12	WNN11	NW10	NW12	NW12	NNW9	NW4	NNW4	N2	NW3	NW2	NNW1	WNN8.1	W14

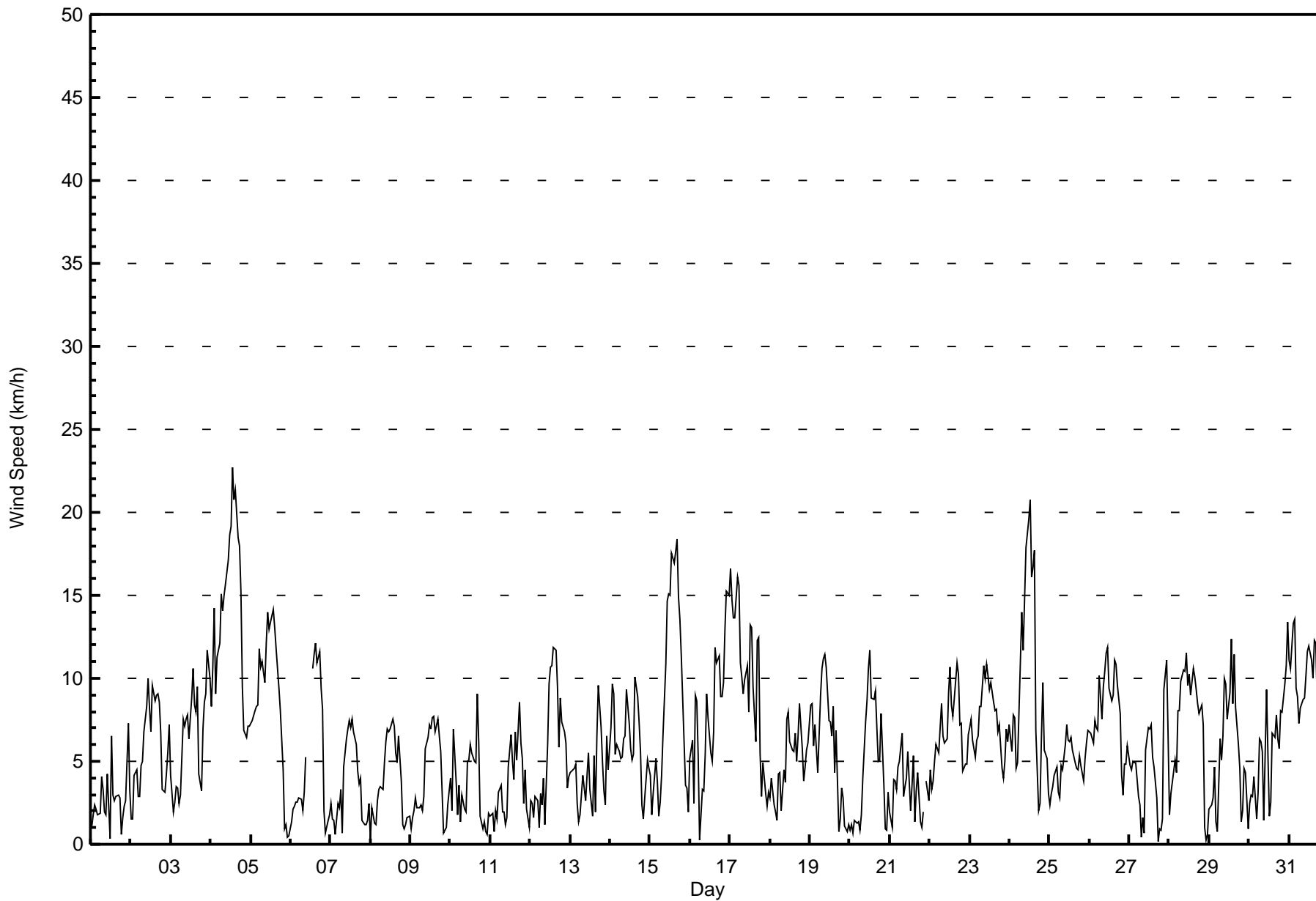
SW2.9	SW2.9	WSW2.8	SW2.7	WSW2.9	WSW2.9	WSW3.0	W3.0	W3.4	W3.6	W4.3	W4.1	WNN4.1	W4.3	W4.1	W4.2	W3.5	W3.4	WSW2.7	WSW2.3	WSW2.3	WSW2.7	WSW2.8	WSW3.2	Diurnal Average
W17	W15	SW14	W14	WSW16	W16	WSW15	WSW14	WSW15	WSW16	N18	N20	N21	WSW23	WSW21	WSW21	WSW19	WSW18	WSW15	SSE11	WSW10	WSW13	WSW15	WSW15	Diurnal Maximum

C - Calibration 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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	363	49.05	49.05
6 - 11	306	41.35	90.41
12 - 19	66	8.92	99.32
20 - 28	5	0.68	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - July 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	13	6	5	3	7	11	12	23	52	58	25	24	22	21	35	46	363
6 - 11	7	7	0	0	2	21	7	4	9	29	39	43	44	41	30	23	306
12 - 19	2	3	0	0	0	1	0	3	8	0	4	17	10	8	2	8	66
20 - 28	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	5
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	24	16	5	3	9	33	19	30	69	87	68	87	76	70	67	77	740

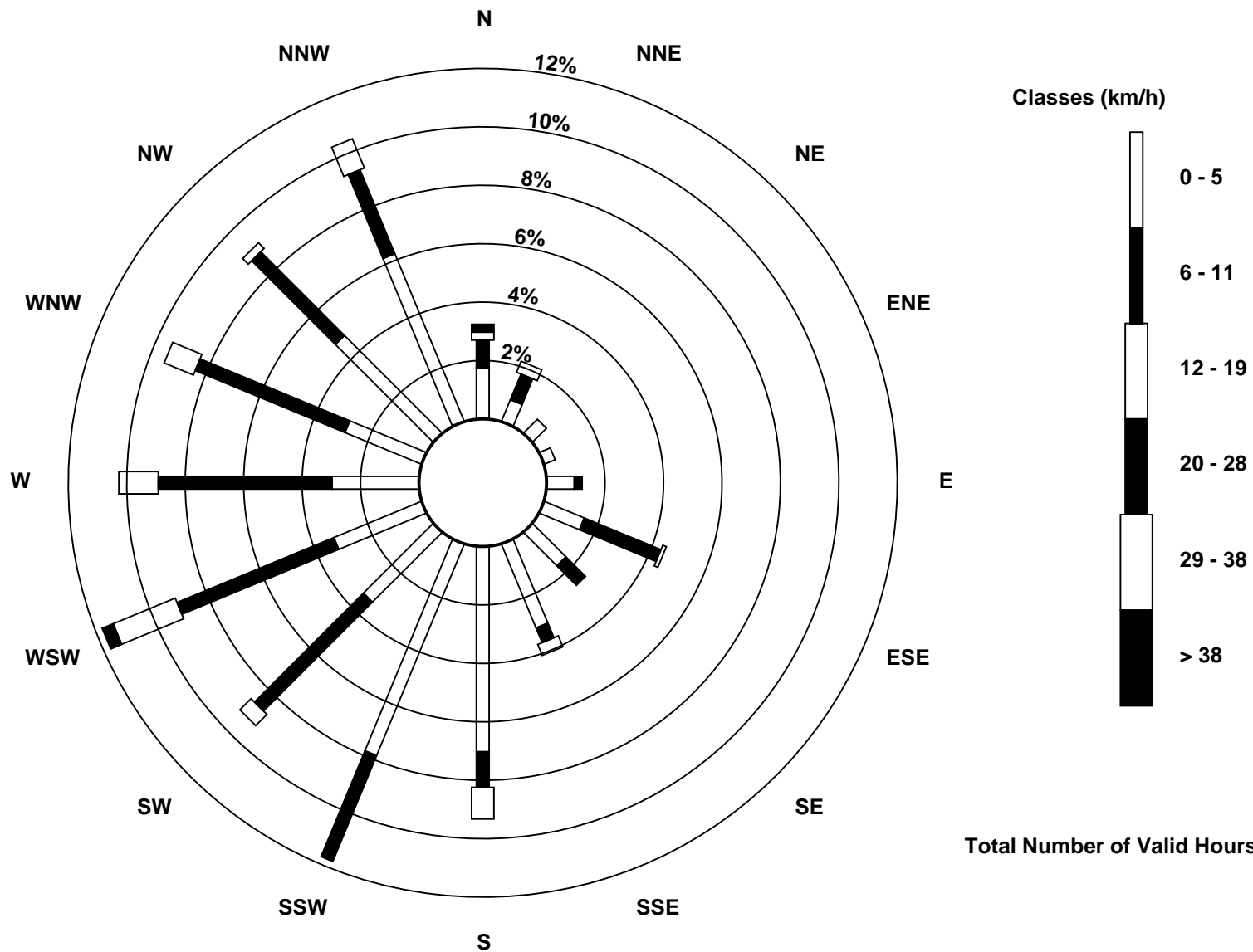
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Conklin (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Jul 4 13:00 Minimum Value: 1 km/h on Jul 6 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 3 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-Jul	1	1	1	1	1	1	1	1	2	2	2	3	2	3	2	2	2	1	1	2	2	3	1	3	3
2-Jul	1	2	1	2	1	2	1	1	2	3	3	3	3	3	4	3	3	3	2	1	1	1	2	4	4
3-Jul	3	2	2	2	2	2	2	3	3	4	4	4	4	4	3	6	3	2	2	3	3	4	2	6	
4-Jul	2	3	4	3	3	4	4	4	5	5	6	7	7	7	7	6	6	6	6	5	3	2	1	7	
5-Jul	2	1	2	2	2	4	5	5	5	5	6	5	6	6	6	4	5	4	3	3	1	1	1	6	
6-Jul	1	1	1	1	1	1	1	1	2	3	C	C	C	5	5	6	5	4	3	3	1	1	1	6	
7-Jul	1	1	1	1	1	1	1	1	2	3	3	4	3	4	3	3	3	2	2	1	1	2	1	4	
8-Jul	1	1	1	1	2	3	2	2	2	2	3	3	3	3	4	3	2	1	2	1	1	1	1	4	
9-Jul	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	3	3	2	1	1	1	2	3	
10-Jul	1	3	3	3	1	1	1	1	1	1	2	2	3	2	2	2	3	2	2	1	1	1	1	3	
11-Jul	1	1	1	1	1	1	1	1	1	2	2	3	3	2	6	2	2	3	3	2	1	3	1	6	
12-Jul	1	1	1	2	1	1	1	1	1	2	2	4	5	4	4	3	4	3	3	2	2	2	1	5	
13-Jul	1	1	1	1	2	1	1	1	2	2	2	2	2	3	2	2	3	3	3	3	2	1	3	3	
14-Jul	3	3	4	3	2	2	1	2	2	3	2	3	2	3	3	3	3	3	2	2	1	2	1	4	
15-Jul	1	1	1	1	1	1	1	1	2	5	5	4	5	5	5	6	5	4	4	4	2	1	1	6	
16-Jul	1	1	3	3	2	2	2	2	2	4	4	4	3	2	3	5	5	3	3	3	3	4	5	5	
17-Jul	5	5	4	4	5	5	5	4	4	5	5	3	5	4	3	3	4	5	3	2	1	2	1	5	
18-Jul	1	2	1	1	1	2	2	1	2	2	3	3	3	3	3	2	2	3	2	2	1	1	2	3	
19-Jul	2	2	2	2	2	3	2	3	3	4	4	3	3	3	3	4	5	2	2	2	3	1	2	5	
20-Jul	2	2	1	1	1	1	1	1	2	3	3	3	4	2	2	3	2	2	2	2	1	1	1	4	
21-Jul	1	1	1	1	1	2	2	2	1	1	2	2	1	2	2	2	2	2	1	1	1	AF	1	2	
22-Jul	1	1	1	2	1	1	2	2	2	3	3	3	4	3	3	3	4	3	2	2	1	1	2	4	
23-Jul	2	2	1	2	1	2	2	3	4	4	4	4	4	4	3	3	4	2	1	1	1	3	3	4	
24-Jul	3	2	3	2	2	4	4	4	5	5	6	5	5	5	5	5	5	2	2	4	3	2	2	6	
25-Jul	1	1	1	1	1	1	1	2	2	2	3	2	3	3	3	3	3	2	1	1	1	1	1	3	
26-Jul	1	1	1	1	1	2	3	2	3	3	3	4	4	3	3	3	3	3	2	2	1	1	1	4	
27-Jul	1	1	1	1	1	1	1	1	1	1	3	2	3	2	2	2	1	1	1	1	1	4	4	5	
28-Jul	3	1	1	1	1	3	2	3	4	4	4	4	5	4	4	4	4	4	3	3	3	1	1	5	
29-Jul	1	1	1	1	2	2	3	2	3	3	3	3	4	4	4	4	4	3	2	1	2	1	2	4	
30-Jul	1	1	1	1	1	2	4	3	3	4	3	2	1	2	2	2	3	2	2	2	2	3	4	5	
31-Jul	5	5	5	5	4	4	3	3	4	4	5	5	5	5	5	6	5	6	2	2	2	1	2	6	
																	Diurnal Maximum								
																	5 5 5 5 5 5 5 5 5 5 6 7 7 7 7 7 6 6 6 5 3 4 5 5								
C - Calibration																	AF - Analyzer Failure								



Wood Buffalo Environmental Association
Summary of Hour Averages

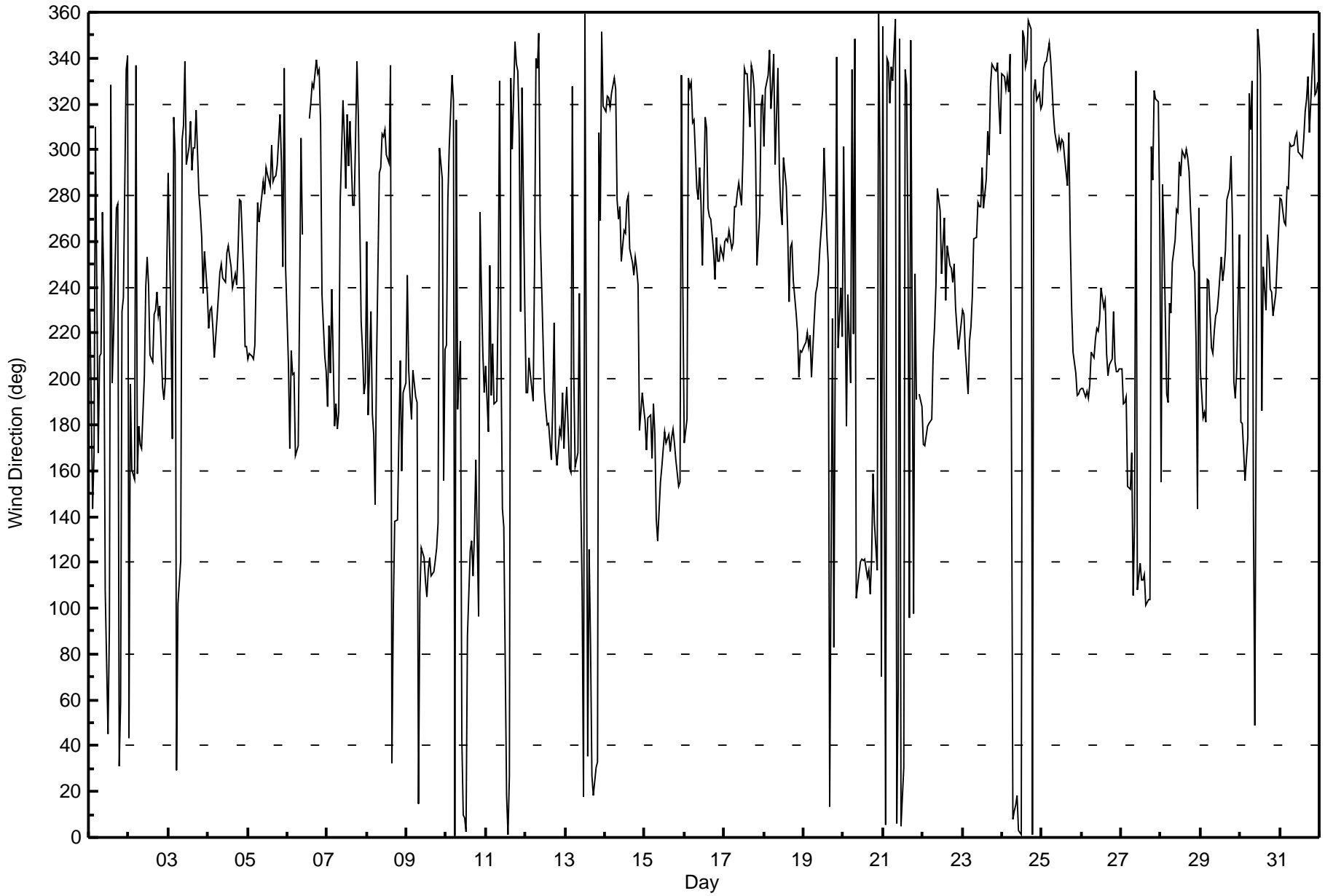
Wind Direction (WD) - deg
Conklin - July 2017

Direction of Maximum Speed: 253 deg on Jul 4 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 243.1 deg on Jul 4	Hours of Data: 740
Direction of Minimum Speed: 104 deg on Jul 27 18:00	Hours of Missing Data: 4
Direction of Minimum Daily Speed Average: 0.6 deg on Jul 10	Percent Operational Time: 99.9
Monthly Average Direction: 267.5 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-Jul	230	190	144	167	310	168	210	211	273	240	108	45	92	328	198	220	275	276	31	58	229	235	335	341	234.5
2-Jul	43	198	161	156	337	159	180	171	170	201	240	253	241	210	208	228	230	238	227	232	196	191	200	248	214.7
3-Jul	290	226	174	314	299	29	102	121	305	310	339	293	301	312	291	301	301	317	281	273	262	238	256	238	286.3
4-Jul	222	230	232	222	209	227	237	246	250	244	242	255	258	253	249	240	246	241	257	278	278	245	214	214	243.1
5-Jul	209	211	210	209	215	248	277	269	280	286	281	292	289	284	302	286	288	289	293	316	295	249	335	248	271.9
6-Jul	207	170	212	202	203	167	171	234	305	263	C	C	C	314	320	329	327	339	333	335	311	237	210	203	309.6
7-Jul	188	224	203	239	179	189	178	186	277	321	306	283	315	293	312	276	276	305	339	314	225	212	193	199	281.7
8-Jul	260	184	229	185	176	145	206	290	292	307	306	309	298	294	337	32	100	138	138	175	208	160	194	198	280.7
9-Jul	245	204	192	183	204	192	190	15	107	126	122	111	105	116	122	114	116	121	126	137	301	287	156	213	130.2
10-Jul	215	278	301	333	322	1	313	186	216	43	10	8	3	88	125	129	114	132	165	96	273	238	211	194	70.1
11-Jul	206	177	249	193	216	189	190	237	330	210	143	135	19	1	27	331	300	347	337	334	308	229	327	232	318.7
12-Jul	194	194	209	202	190	250	340	336	351	266	218	195	187	180	181	165	188	225	170	162	178	175	194	170	187.2
13-Jul	186	196	161	159	328	204	162	168	237	152	107	18	359	36	125	85	27	19	31	33	308	269	351	319	44.5
14-Jul	316	323	323	318	324	331	326	278	270	275	251	265	264	277	280	257	251	246	253	248	241	177	194	187	276.6
15-Jul	182	169	183	184	165	189	176	139	129	155	161	170	177	172	176	169	175	178	172	164	153	155	333	241	169.6
16-Jul	172	182	332	327	329	312	313	283	278	292	277	249	314	309	274	271	270	256	244	262	251	251	257	252	268.4
17-Jul	260	261	260	265	257	260	275	275	281	285	276	297	336	333	333	310	337	334	327	299	250	272	319	324	288.1
18-Jul	302	326	332	343	318	328	341	294	335	291	274	267	296	283	264	234	257	259	243	229	220	201	213	212	267.4
19-Jul	215	216	220	214	219	201	227	238	241	246	257	274	301	281	262	250	13	226	83	216	341	214	240	218	244.1
20-Jul	301	240	180	237	198	335	220	348	104	115	120	122	121	121	113	116	106	122	159	137	116	359	294	70	120.6
21-Jul	354	5	340	338	320	336	330	357	6	66	349	5	31	335	328	258	96	348	98	246	191	AF	194	188	347.6
22-Jul	172	171	175	179	180	182	211	223	241	283	273	246	259	271	234	258	249	248	242	250	231	213	218	224	234.3
23-Jul	230	228	212	193	217	223	236	261	262	277	275	275	292	275	288	308	298	328	338	335	335	338	320	307	276.3
24-Jul	333	332	327	332	325	342	8	11	14	18	3	1	352	349	336	339	356	353	1	325	331	322	325	318	349.6
25-Jul	319	336	338	339	346	339	328	315	308	300	305	301	305	303	297	284	308	263	231	212	202	193	194	195	287.1
26-Jul	196	196	192	195	191	198	212	210	217	222	221	226	240	231	234	211	202	206	209	230	207	203	203	205	212.2
27-Jul	204	189	190	192	153	152	168	106	137	334	108	119	112	113	115	101	104	104	301	287	326	322	321	271	147.1
28-Jul	155	285	261	194	190	233	229	251	260	274	273	295	289	299	296	300	296	291	274	249	246	215	143	275	269.2
29-Jul	204	183	186	181	244	243	214	211	221	228	230	236	253	243	248	256	278	283	297	268	199	192	203	263	236.4
30-Jul	181	181	169	155	174	324	309	330	140	49	352	346	332	186	249	230	263	255	239	238	228	238	251	266	254.2
31-Jul	279	278	269	268	284	283	303	301	302	306	308	299	299	296	305	317	322	332	308	335	351	324	325	329	298.5

233.9 234.0 239.1 231.6 242.0 247.6 248.0 261.1 266.0 269.2 271.7 272.8 289.8 277.1 269.8 263.6 271.0 271.3 255.3 255.7 248.8 237.1 254.5 240.6
 Diurnal Average

C - Calibration 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
Conklin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Jul 13 14:00 Minimum Value: 11 deg on Jul 27 00:00 Percentiles: P ₁ = 13 P ₁₀ = 19 Q ₁ = 23 Median = 37 Q ₃ = 51 P ₉₀ = 69 P ₉₉ = 91																	Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 3 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-Jul	68	65	53	69	49	77	28	56	81	92	64	101	47	67	88	74	67	44	65	70	49	54	25	43	101
2-Jul	65	77	39	69	62	83	20	20	31	38	27	32	46	34	41	32	34	32	25	34	30	13	22	46	83
3-Jul	48	77	83	40	66	81	77	57	42	43	61	50	44	36	45	41	44	47	53	29	29	20	21	20	83
4-Jul	19	21	20	22	20	22	20	21	22	25	29	28	31	23	27	23	25	21	27	40	38	26	15	15	40
5-Jul	15	16	16	16	18	27	38	35	43	41	39	41	44	40	41	41	41	40	41	29	35	59	20	76	76
6-Jul	73	54	60	49	49	48	59	77	63	41	C	C	C	41	39	39	36	22	21	18	24	65	59	47	77
7-Jul	24	36	53	56	32	27	25	92	43	47	48	54	51	51	53	49	68	64	53	47	23	70	56	61	92
8-Jul	84	33	48	74	48	62	46	65	43	41	44	43	40	46	37	59	52	17	21	61	23	58	44	50	84
9-Jul	63	23	35	36	48	38	35	84	63	34	39	41	50	50	49	34	34	31	23	23	53	40	60	56	84
10-Jul	23	72	44	74	51	31	63	21	46	67	33	40	56	53	30	45	25	23	72	83	63	75	83	46	83
11-Jul	37	52	66	26	36	18	29	66	72	94	100	74	58	63	99	23	42	29	27	23	42	53	39	67	100
12-Jul	20	21	31	17	20	63	27	49	24	80	40	35	20	24	24	23	36	31	24	22	18	15	25	13	80
13-Jul	17	13	27	16	46	60	52	29	49	81	68	51	84	102	71	89	54	26	40	61	60	68	24	35	102
14-Jul	41	35	40	46	26	21	26	40	36	41	22	44	40	59	46	31	28	27	26	48	52	67	15	22	67
15-Jul	20	24	25	19	23	54	25	30	34	28	21	23	24	23	23	24	21	22	22	17	13	25	52	61	61
16-Jul	20	17	87	25	19	34	92	54	59	54	41	33	45	40	37	35	35	18	18	27	20	19	20	19	92
17-Jul	21	21	23	23	21	27	36	38	44	44	36	43	23	21	23	43	25	22	24	37	19	56	26	40	56
18-Jul	37	29	47	37	62	43	52	62	41	79	42	44	47	54	53	25	41	42	21	20	18	13	21	23	79
19-Jul	22	22	25	26	26	63	22	23	24	25	33	48	52	49	44	79	40	99	79	49	76	80	63	75	99
20-Jul	76	68	93	60	63	64	76	57	51	34	32	23	24	24	24	28	33	39	19	20	42	86	58	54	93
21-Jul	51	79	21	19	29	21	30	30	56	55	30	42	78	69	33	85	66	40	64	48	24	AF	14	50	85
22-Jul	24	22	20	19	17	20	20	21	29	46	39	29	34	37	30	34	28	22	21	16	17	18	21	19	46
23-Jul	17	17	17	27	19	22	17	31	30	44	39	38	46	41	45	39	43	36	22	13	19	12	29	49	49
24-Jul	36	33	30	23	42	20	23	23	25	25	22	22	20	20	21	20	51	83	76	33	20	23	25	41	83
25-Jul	38	34	39	29	20	58	53	46	43	46	48	44	58	52	53	54	48	48	21	18	18	11	15	16	58
26-Jul	19	19	19	19	20	24	19	19	21	27	29	27	27	33	28	26	25	23	22	21	18	17	13	11	33
27-Jul	11	11	11	13	17	25	23	89	88	94	47	34	40	32	38	40	44	91	63	59	36	30	30	65	94
28-Jul	91	31	30	22	27	23	21	20	35	41	38	47	47	46	44	41	44	44	33	21	35	80	97	75	97
29-Jul	30	63	31	16	72	77	23	34	35	27	28	34	35	27	42	31	41	38	38	38	55	14	46	44	77
30-Jul	21	17	18	23	77	73	42	43	61	86	23	32	87	80	30	32	33	28	21	18	20	16	22	26	87
31-Jul	43	39	27	29	39	42	50	44	49	45	42	43	44	43	45	37	37	39	43	48	39	28	46	55	55
	91	79	93	74	77	83	92	92	88	94	100	101	87	102	99	89	68	99	79	83	76	86	97	76	
	Diurnal Maximum																								
C - Calibration																								AF - Analyzer Failure	



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Conklin	Station number:	AMS 21
Calibration Date:	July 6, 2017	Last Cal Date:	June 27, 2017
Start time (MST):	9:52	End time (MST):	12:38
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>51.4</u>	ppm	Cal Gas Exp Date	February 9, 2018
Cal Gas Cylinder #	<u>EY0000359</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	2658
ZAG Make/Model	Teledyne API 701		Serial Number	5611

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 1428701363

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-655	-656
Calculated slope	0.996227	0.995218	Lamp voltage	848	848
Calculated intercept	0.371479	0.172108	Pressure	664.6	665.7
Analyzer Background	21.4	21.3	Flow	0.488	0.489
Analyzer Coefficient	0.872	0.872	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	5005	0.0	0.0	0.2	----
as found span	4934	76.5	784.8	785.0	1.000
calibrator zero	5005	0.0	0.0	0.2	----
high point	4934	76.5	784.8	788.6	0.995
second point	4975	38.4	393.7	395.1	0.996
third point	4990	19.2	197.0	197.5	0.998
as left zero	5005	0.0	0.0	0.2	----
as left span	4934	76.5	784.8	788.9	0.995
Average Correction Factor					0.996
Corrected As found	784.80	Previous response	787.37	*% change	0.3%

* = > +/-5% change initiates investigation

Notes: Sample inlet filter replaced after as founds. No adjustments made but took a new average of the "high point" after replacing the filter.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

SO₂ Calibration Summary

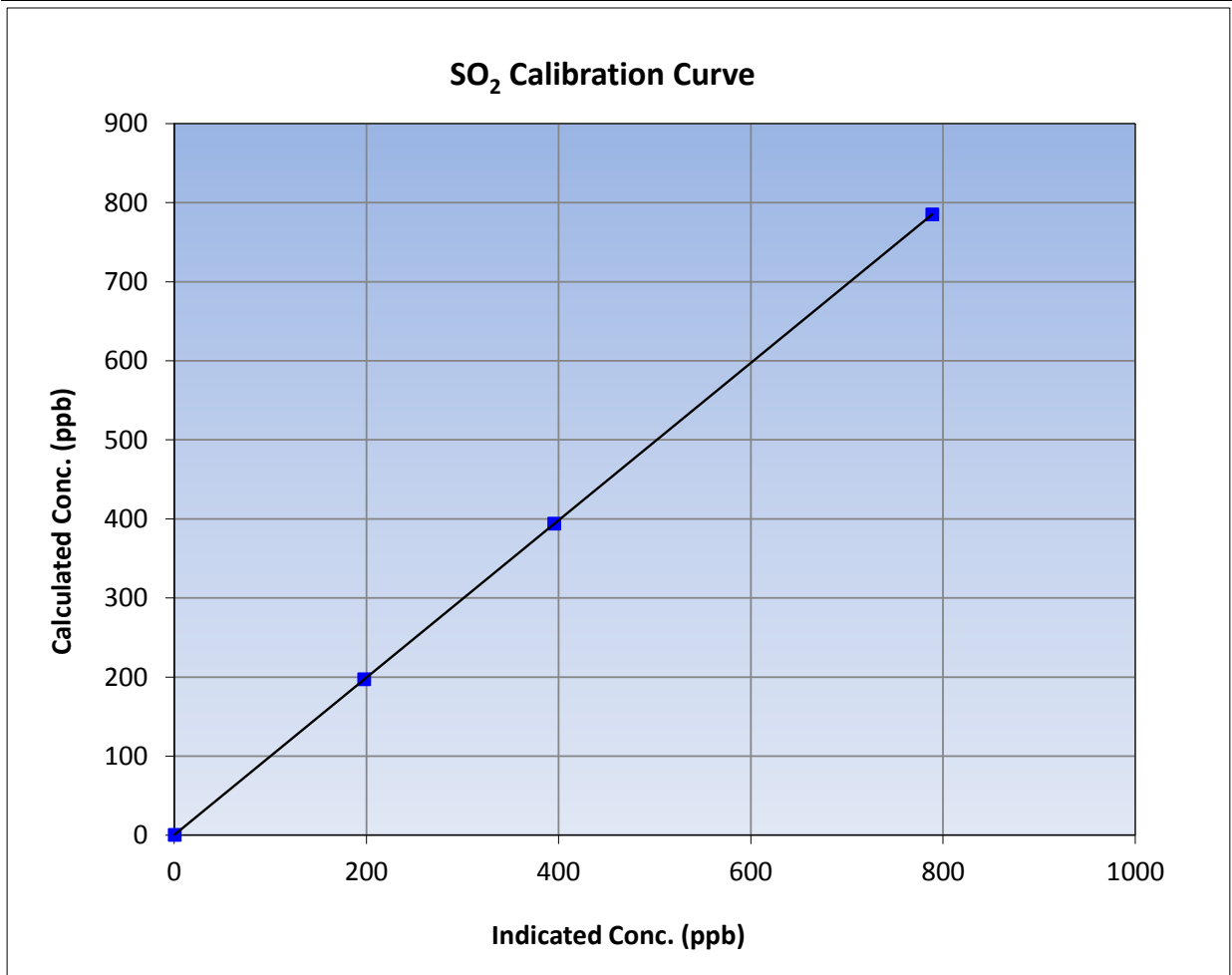
Version-03-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	9:52	End Time (MST)	12:38
Analyzer make	Thermo 43i	Analyzer serial #	1428701363

Calibration Data

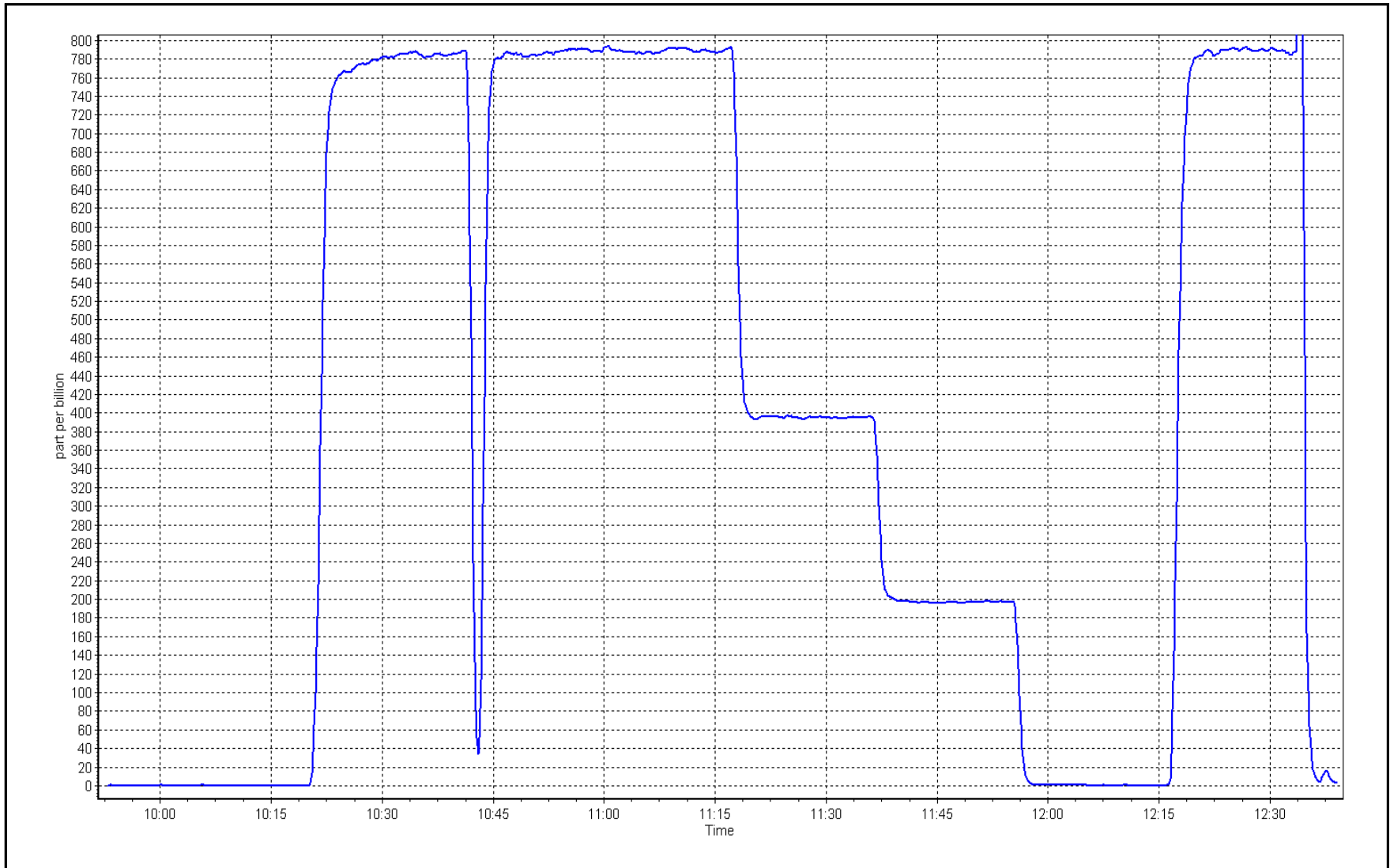
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999999	≥0.995
784.8	788.6	0.9951			
393.7	395.1	0.9964	Slope	0.995218	0.90 - 1.10
197.0	197.5	0.9975			
			Intercept	0.172108	+/-30



SO2 Calibration Plot

Date: July 6, 2017

Location: Conklin





Wood Buffalo Environmental Association

TRS Calibration Summary

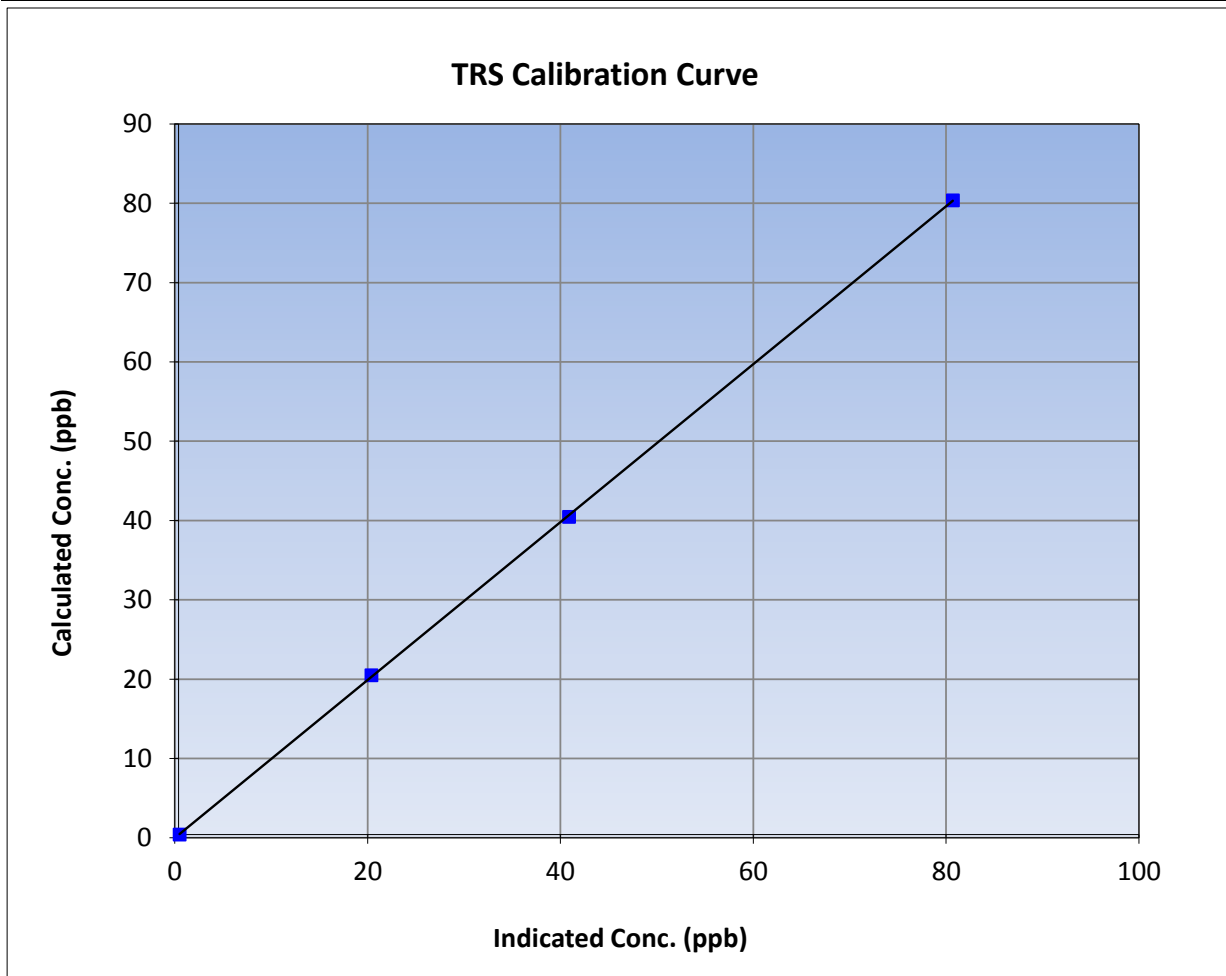
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 19, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	15:10	End Time (MST)	17:40
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1236656116

Calibration Data

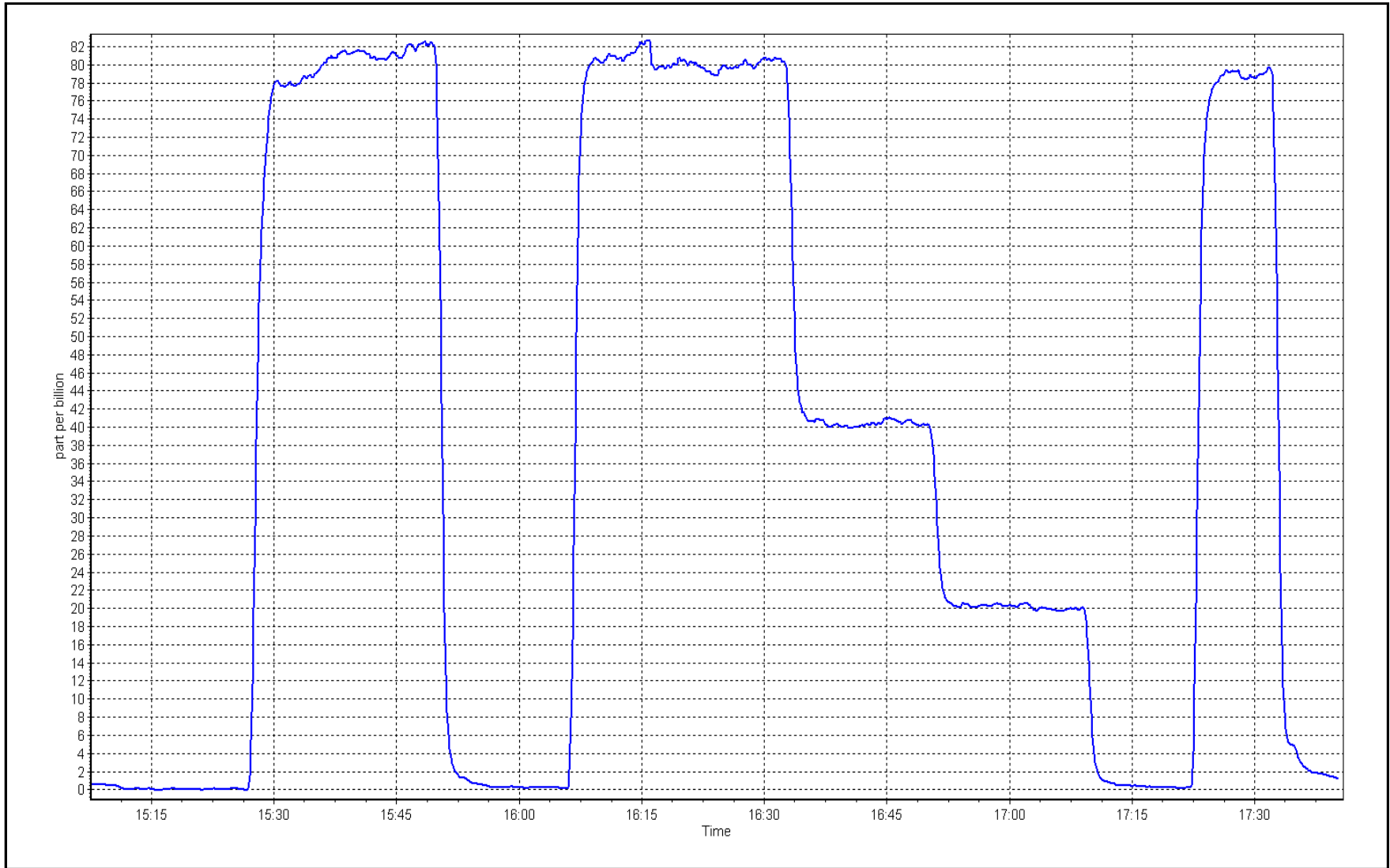
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.1	----	Correlation Coefficient	0.999970	≥0.995
80.0	80.3	0.9960			
40.1	40.5	0.9897	Slope	0.995753	0.90 - 1.10
20.1	20.0	1.0055			
			Intercept	-0.033380	+/-3



TRS Calibration Plot

Date: July 12, 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:	July 6, 2017	Last Cal Date:	June 27, 2017
Start time (MST):	9:52	End time (MST):	12:38
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	1.69E-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	4.09E-05	Fuel Pressure	49.7	49.7
NMHC Peak Area	210163	213591	Air Pressure	34.3	34.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.994498	0.996491
THC Cal Offset	0.041472	0.057675
CH4 Cal Slope	0.990088	0.996643
CH4 Cal Offset	0.025748	0.027921
NMHC Cal Slope	0.998466	0.996392
NMHC Cal Offset	0.015718	0.029358

Notes: Sample inlet filter replaced after as founds. Nitrogen cylinder 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	4934	76.5	16.55	16.89	0.980
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	16.55	16.58	0.998
second point	4974	38.3	8.28	8.21	1.009
third point	4990	19.2	4.15	4.06	1.022
as left zero	5005	0.0	0.00	0.00	----
as left span	4934	76.5	16.55	16.62	0.996
Average Correction Factor					1.010
Corrected As found	16.89	Prev response	16.60	*% change	-1.7%

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	8.90	0.981
calibrator zero	5005	0	0.00	0.00	----
high point	4934	76.5	8.73	8.75	0.998
second point	4974	38.3	4.37	4.34	1.007
third point	4990	19.2	2.19	2.14	1.023
as left zero	5005	0	0.00	0.00	----
as left span	4934	76.5	8.73	8.77	0.996
Average Correction Factor					1.009
Corrected As found	8.90	Prev response	8.73	*% change	-1.9%

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	7.99	0.979
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	7.82	7.83	0.998
second point	4974	38.3	3.91	3.87	1.010
third point	4990	19.2	1.96	1.92	1.022
as left zero	5005	0.0	0.00	0.00	----
as left span	4934	76.5	7.82	7.85	0.996
Average Correction Factor					1.010
Corrected As found	7.99	Prev response	7.87	*% change	-1.5%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

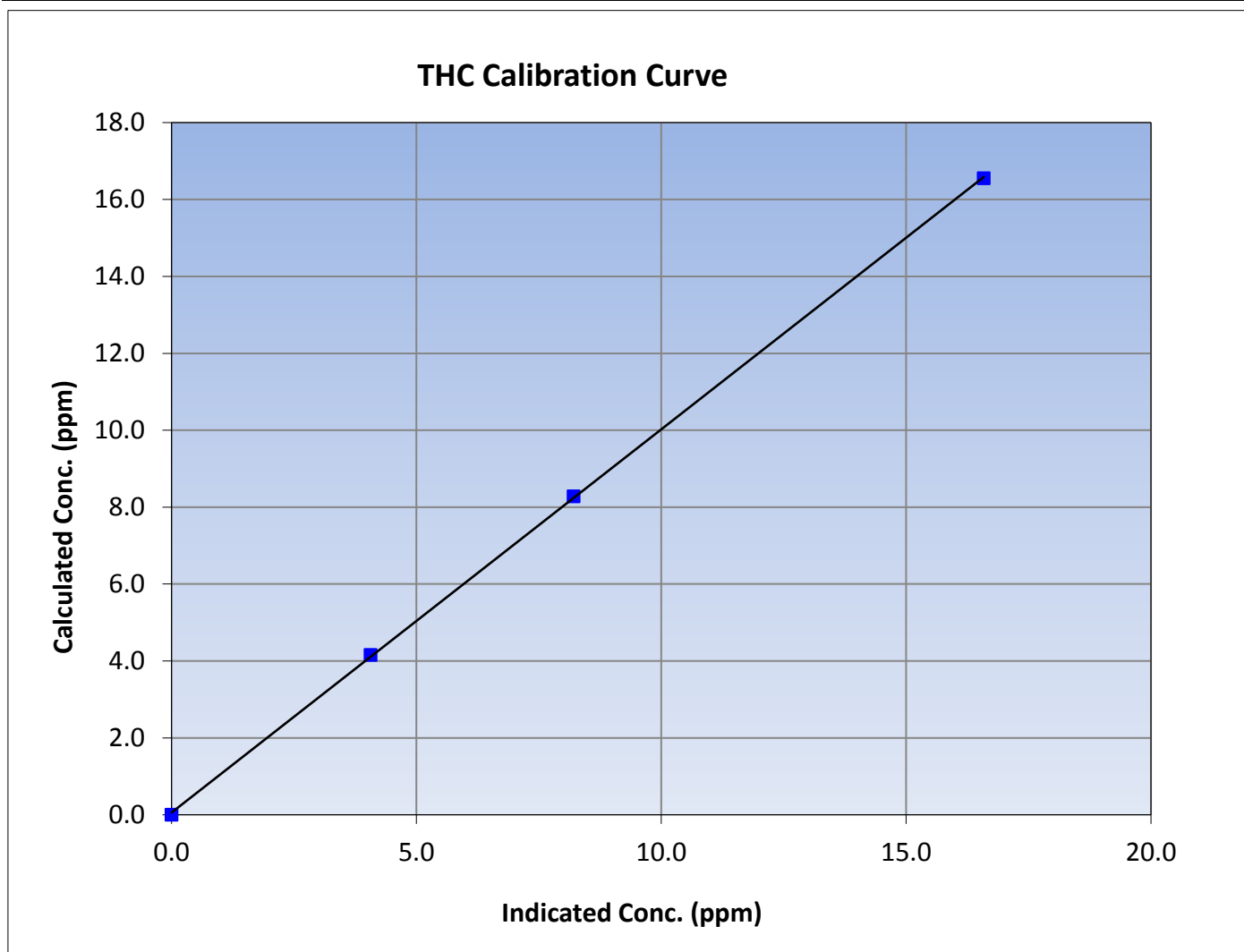
Version-02-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	9:52	End Time (MST)	12:38
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	0.999943	≥ 0.995			
16.55	16.58	0.9980						
8.28	8.21	1.0088				Slope	0.996491	0.90 - 1.10
4.15	4.06	1.0224						
			Intercept	0.057675	± 0.5			





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CH₄ Calibration Summary

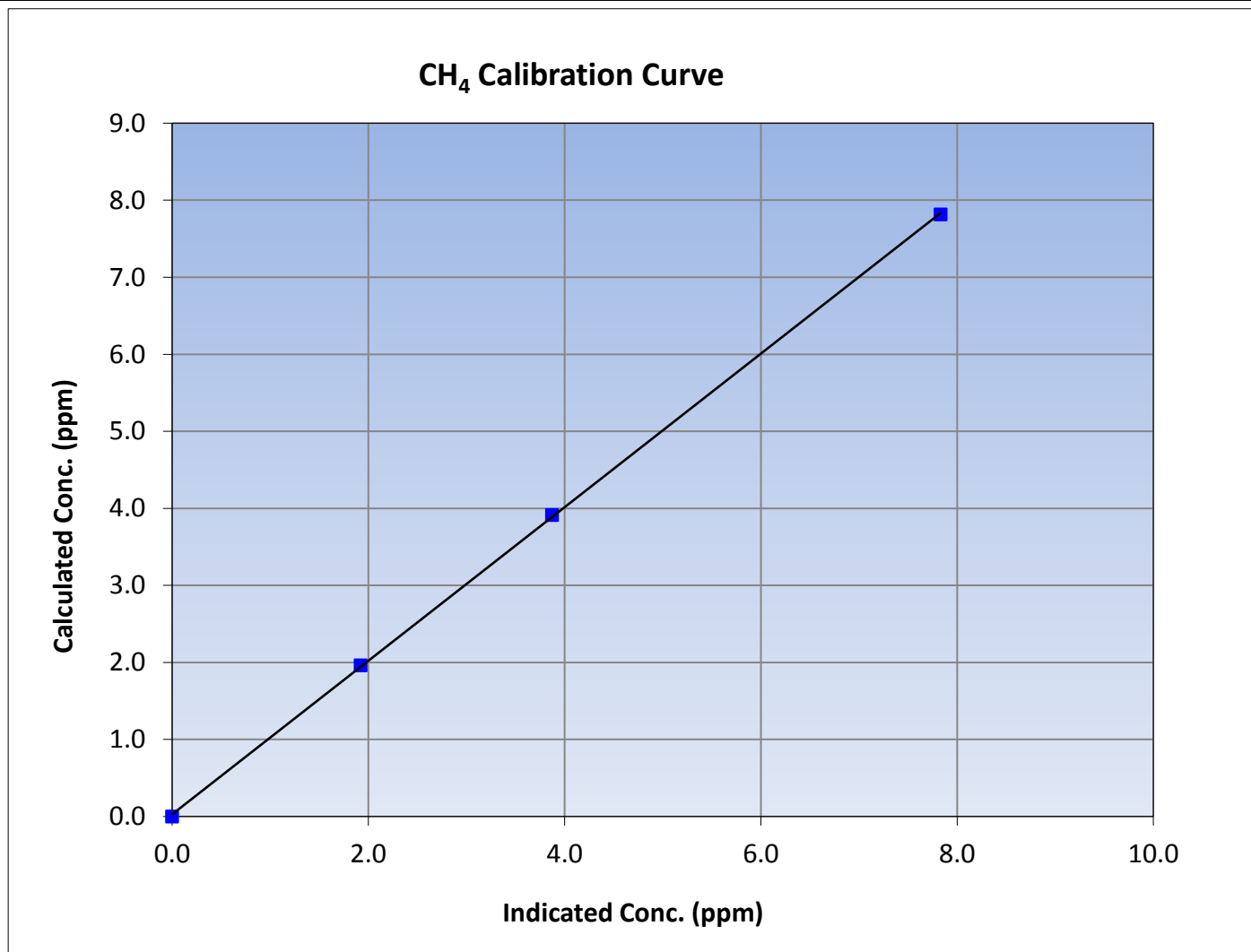
Version-02-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	9:52	End Time (MST)	12:38
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	0.999936	≥ 0.995			
7.82	7.83	0.9980						
3.91	3.87	1.0104				Slope	0.996643	0.90 - 1.10
1.96	1.92	1.0216						
			Intercept	0.027921	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

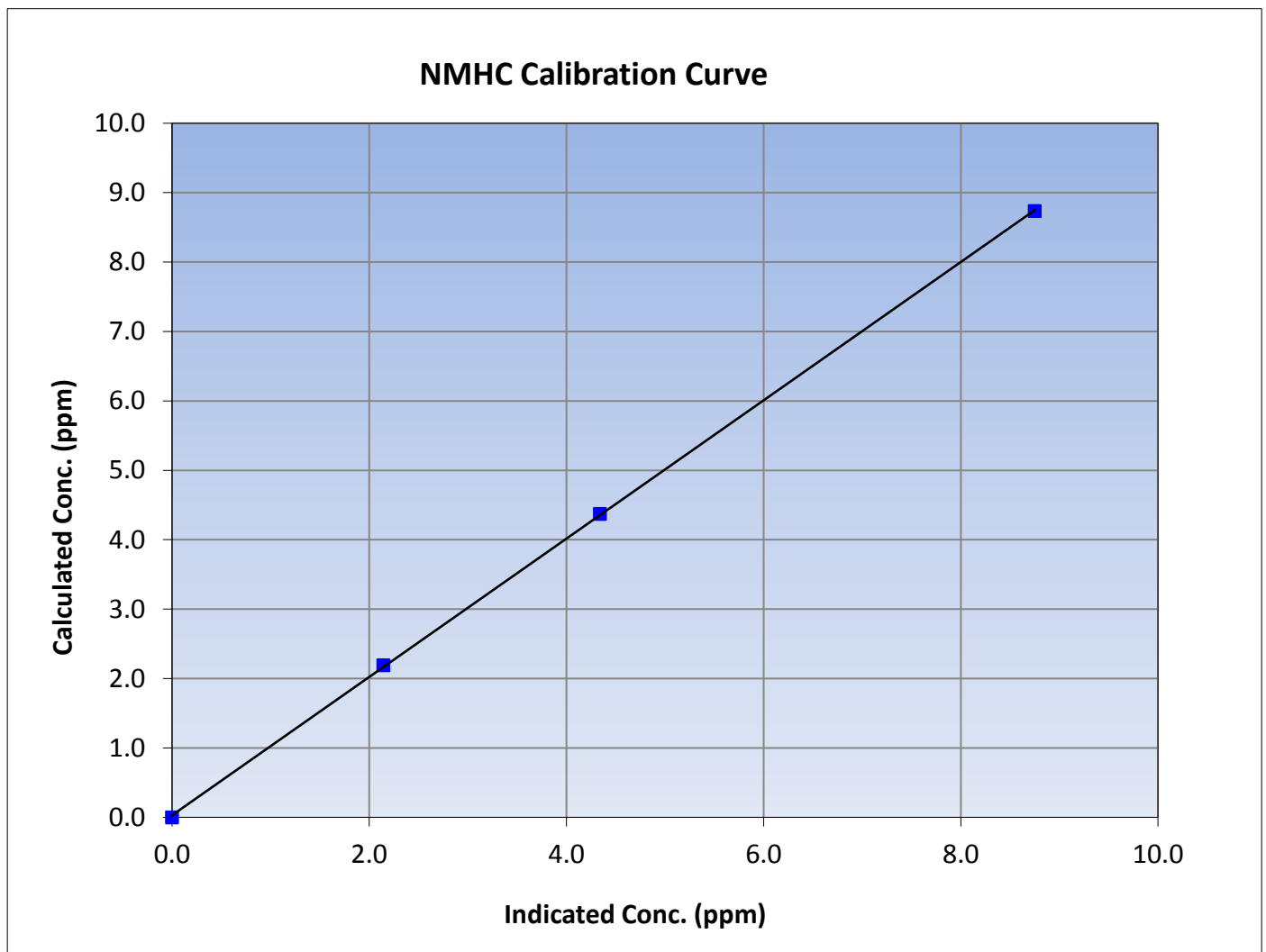
Version-02-2017

Station Information

Calibration Date	July 6, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	9:52	End Time (MST)	12:38
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

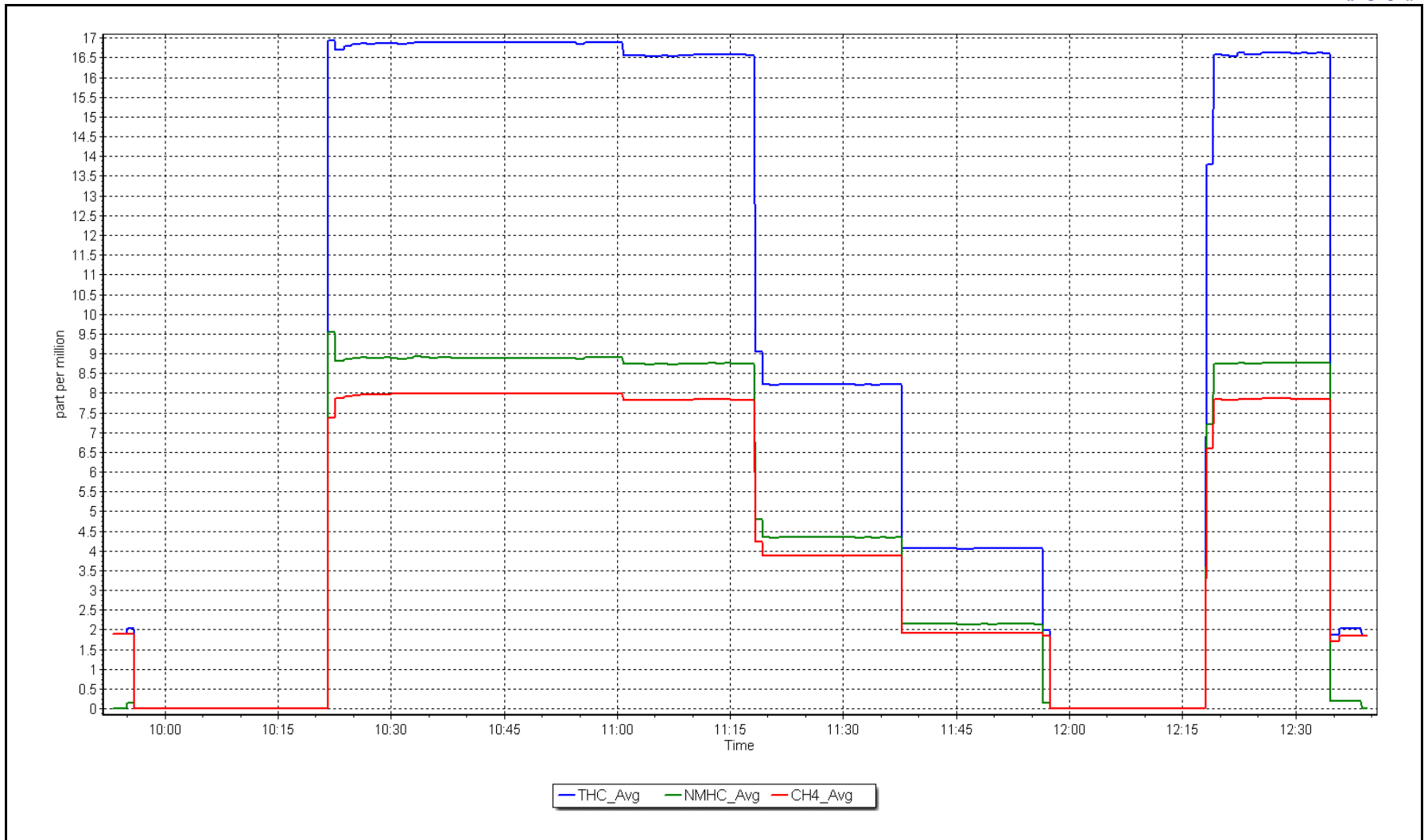
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999948	≥ 0.995			
8.73	8.75	0.9980						
4.37	4.34	1.0073				Slope	0.996392	0.90 - 1.10
2.19	2.14	1.0226						
			Intercept	0.029358	± 0.5			



NMHC Calibration Plot

Date: July 6, 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:	July 21, 2017	Last Cal Date:	July 6, 2017
Start time (MST):	12:00	End time (MST):	7/22/2017 22:40
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	1.69E-04	1.70E-04	Flame Temp	405.0	405.0
CH4 Retention time	12.0	12.0	Carrier Pressure	37.0	37.0
NMHC SP Ratio	4.09E-05	4.10E-05	Fuel Pressure	49.7	49.7
NMHC Peak Area	213591	213276	Air Pressure	34.3	34.3

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	0.996491	0.999387
THC Cal Offset	0.057675	0.023213
CH4 Cal Slope	0.996643	0.998515
CH4 Cal Offset	0.027921	0.037468
NMHC Cal Slope	0.996392	1.000104
NMHC Cal Offset	0.029358	-0.014546

Notes: N2 cylinder replaced after as founds. Somehow caused baseline zero to shift up after the change. Zero adjusted but baseline dropped down to 1.55 ppm. On July 22, remotely, chromatograms showed that methane peak after air peak had disappeared. Adjusted zero and 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	4934	76.5	16.55	16.40	1.009
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	16.55	16.55	1.000
second point	4975	38.4	8.30	8.27	1.004
third point	4992	19.3	4.17	4.13	1.010
as left zero					
as left span					
Average Correction Factor					1.005
Corrected As found	16.40	Prev response	16.55	*% 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	5005	0	0.00	0.00	----
as found span	4934	76.5	8.73	8.65	1.010
calibrator zero	5005	0	0.00	0.00	----
high point	4934	76.5	8.73	8.74	0.999
second point	4975	38.4	4.38	4.41	0.994
third point	4992	19.3	2.20	2.23	0.988
as left zero					
as left span					
Average Correction Factor					0.994
Corrected As found	8.65	Prev response	8.74	*% 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	5005	0.0	0.00	0.00	----
as found span	4934	76.5	7.82	7.76	1.008
calibrator zero	5005	0.0	0.00	0.00	----
high point	4934	76.5	7.82	7.81	1.001
second point	4975	38.4	3.92	3.86	1.015
third point	4992	19.3	1.97	1.91	1.035
as left zero					
as left span					
Average Correction Factor					1.017
Corrected As found	7.76	Prev response	7.82	*% change	0.8%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

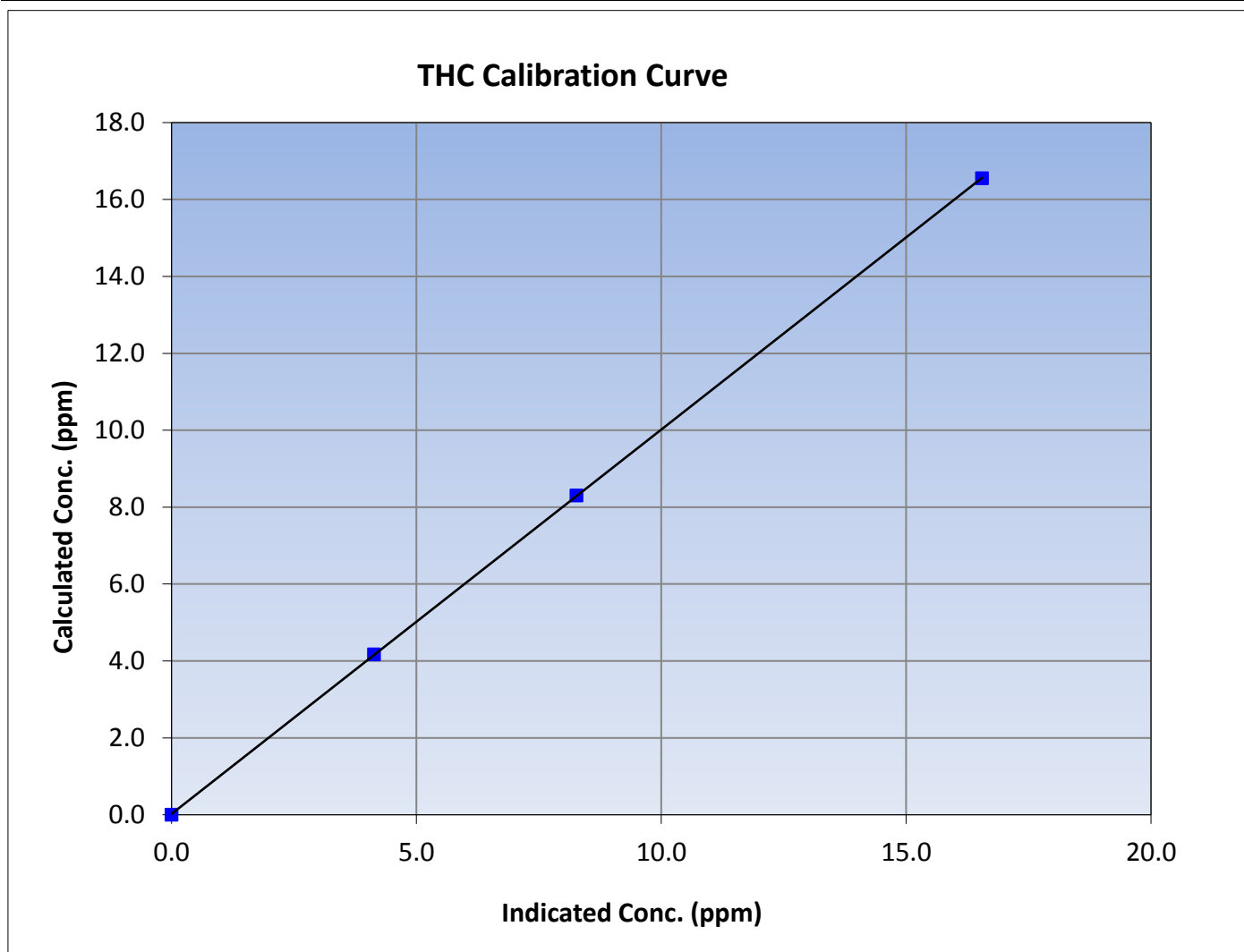
Version-02-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	July 6, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	12:00	End Time (MST)	22:40
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	0.999991	≥ 0.995			
16.55	16.55	1.0000						
8.30	8.27	1.0040				Slope	0.999387	0.90 - 1.10
4.17	4.13	1.0101						
			Intercept	0.023213	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

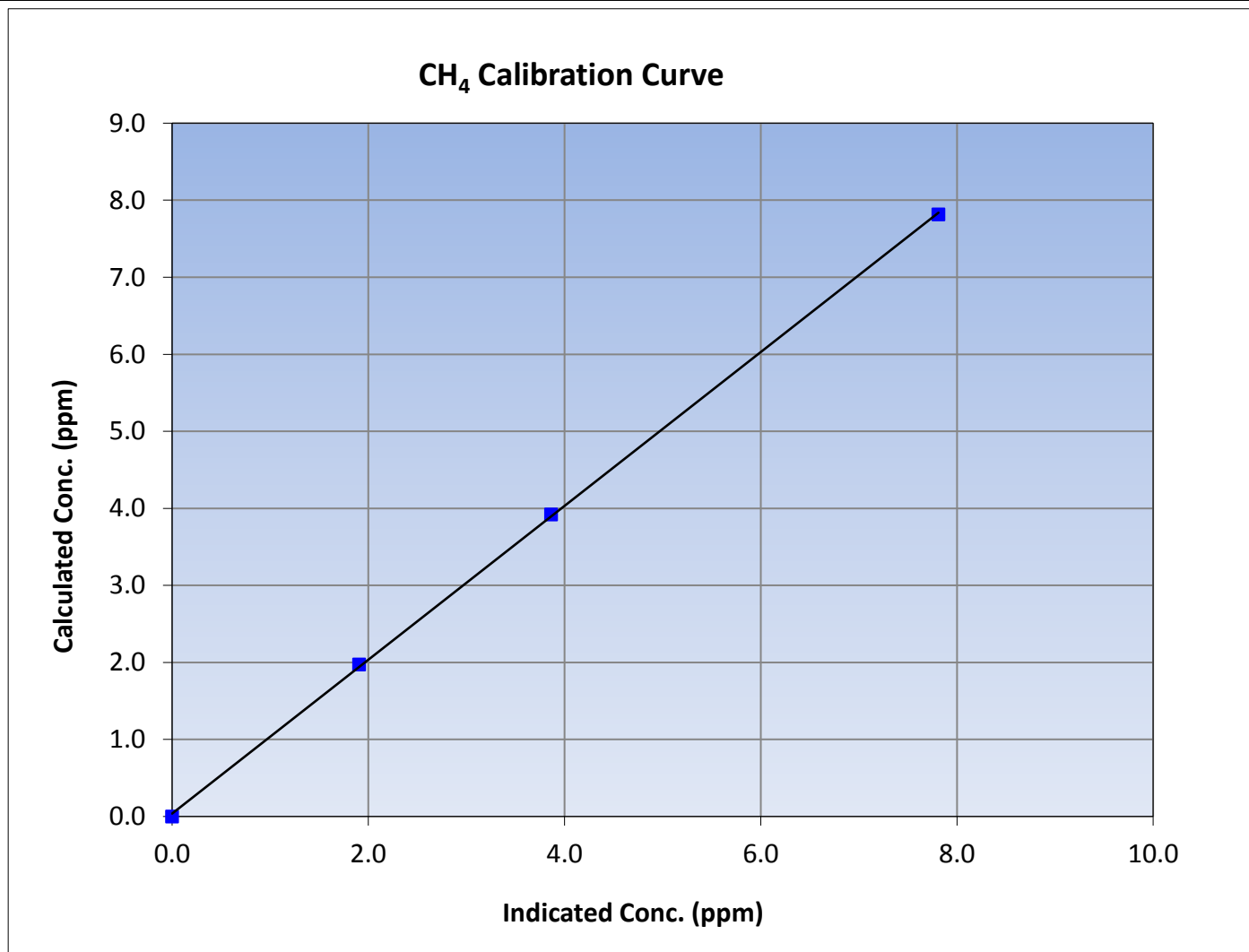
Version-02-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	July 6, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	12:00	End Time (MST)	22:40
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	0.999894	≥ 0.995			
7.82	7.81	1.0007						
3.92	3.86	1.0149				Slope	0.998515	0.90 - 1.10
1.97	1.91	1.0351						
			Intercept	0.037468	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

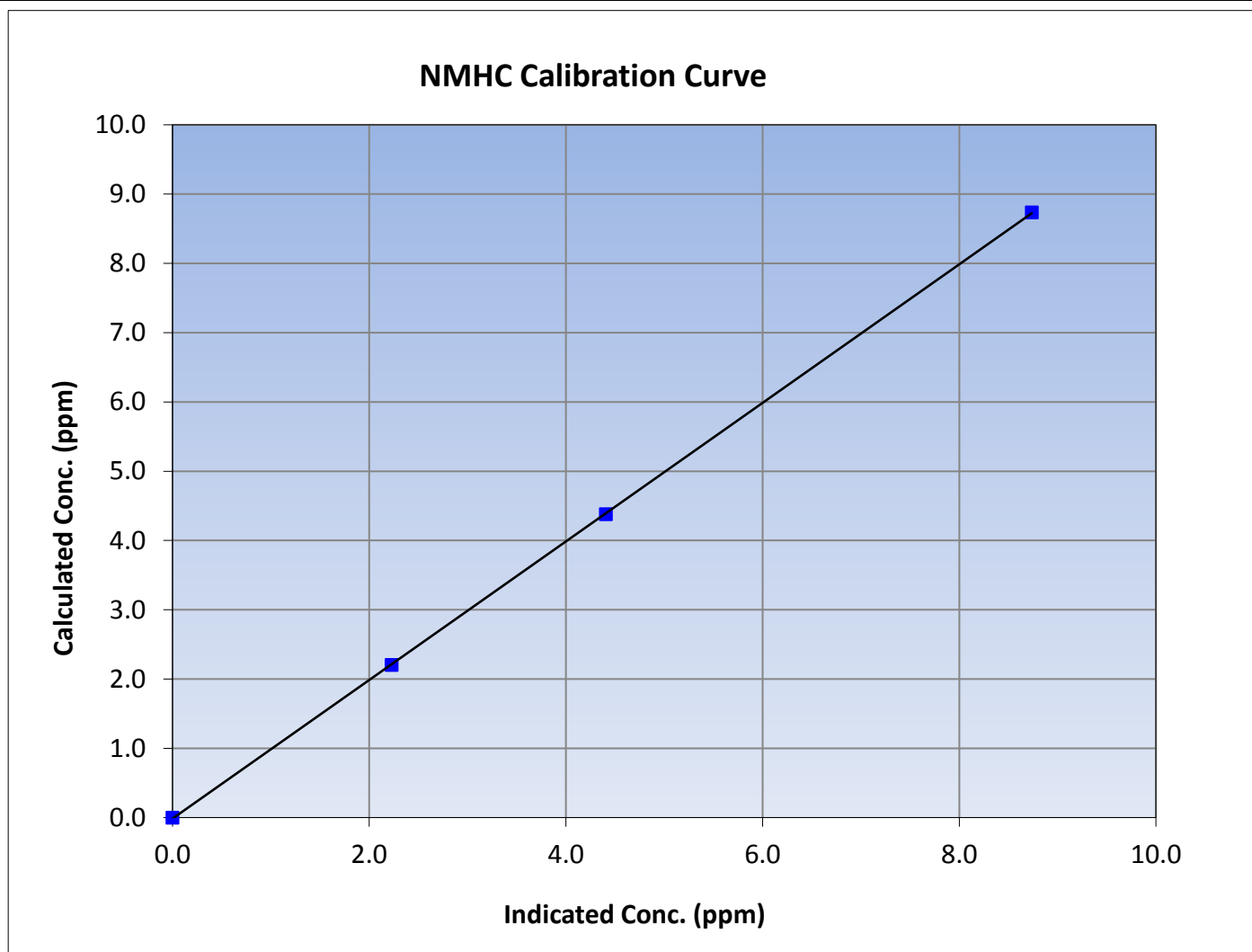
Version-02-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	July 6, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	12:00	End Time (MST)	22:40
Analyzer make	Thermo 55i	Analyzer serial #	1152430011

Calibration Data

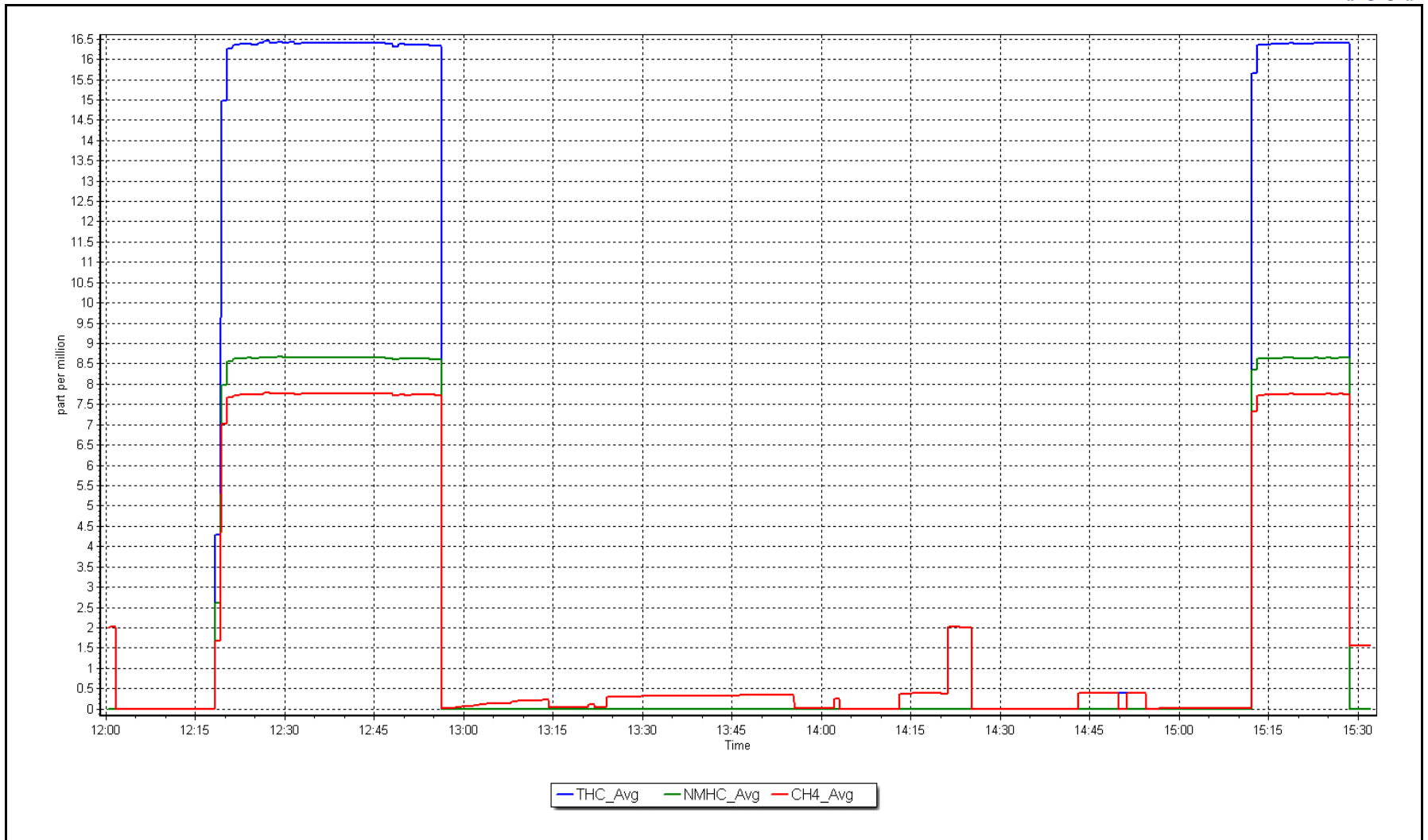
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999986	≥ 0.995			
8.73	8.74	0.9995						
4.38	4.41	0.9941				Slope	1.000104	0.90 - 1.10
2.20	2.23	0.9883						
			Intercept	-0.014546	± 0.5			



NMHC Calibration Plot

Date: July 21, 2017

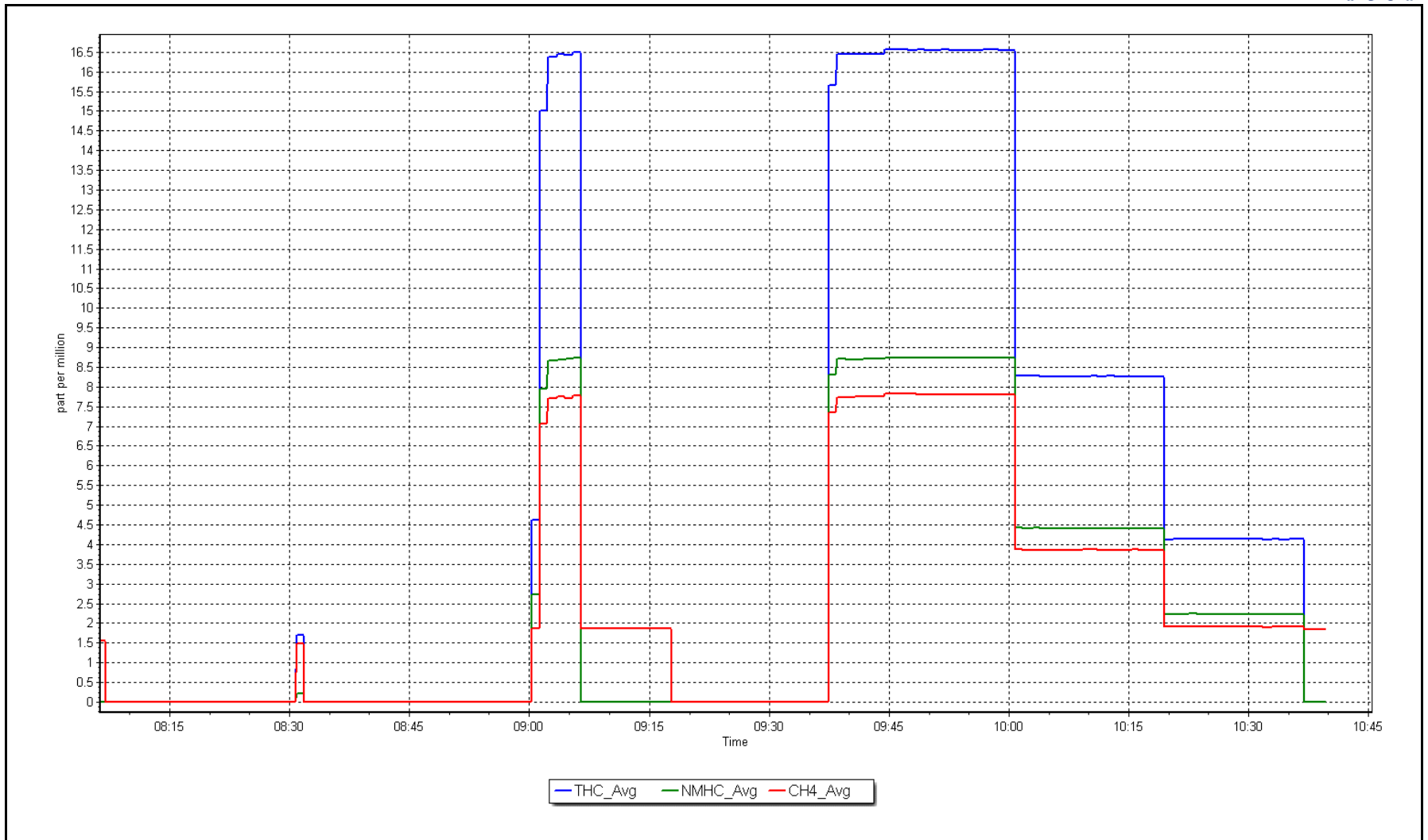
Location: Conklin



NMHC Calibration Plot

Date: July 22, 2017

Location: Conklin





Wood Buffalo Environmental Association

O₃ Calibration Summary

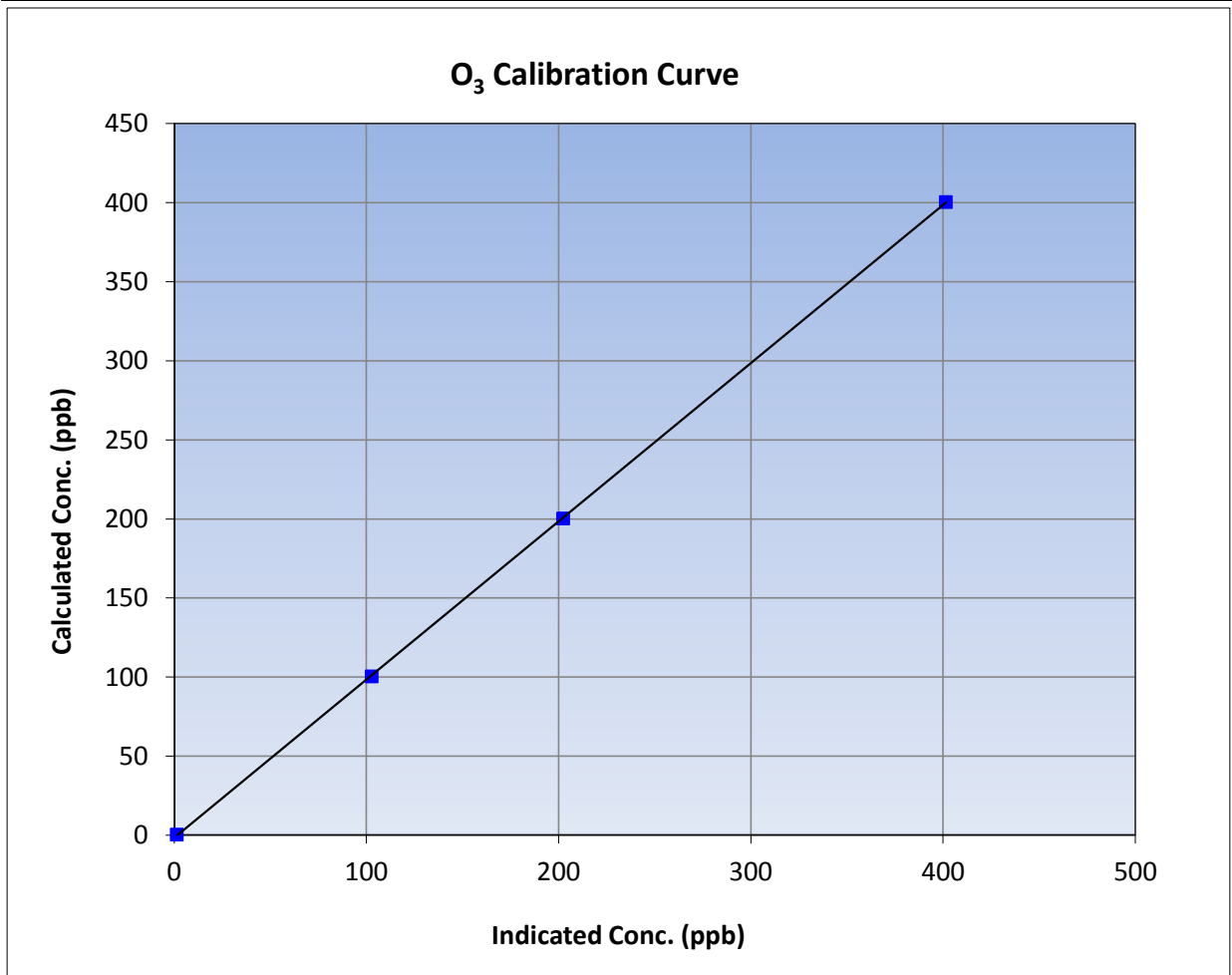
Version-03-2017

Station Information

Calibration Date	July 12, 2017	Previous Calibration	June 22, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	10:45	End Time (MST)	15:10
Analyzer make	Thermo 49i	Analyzer serial #	1501663734

Calibration Data

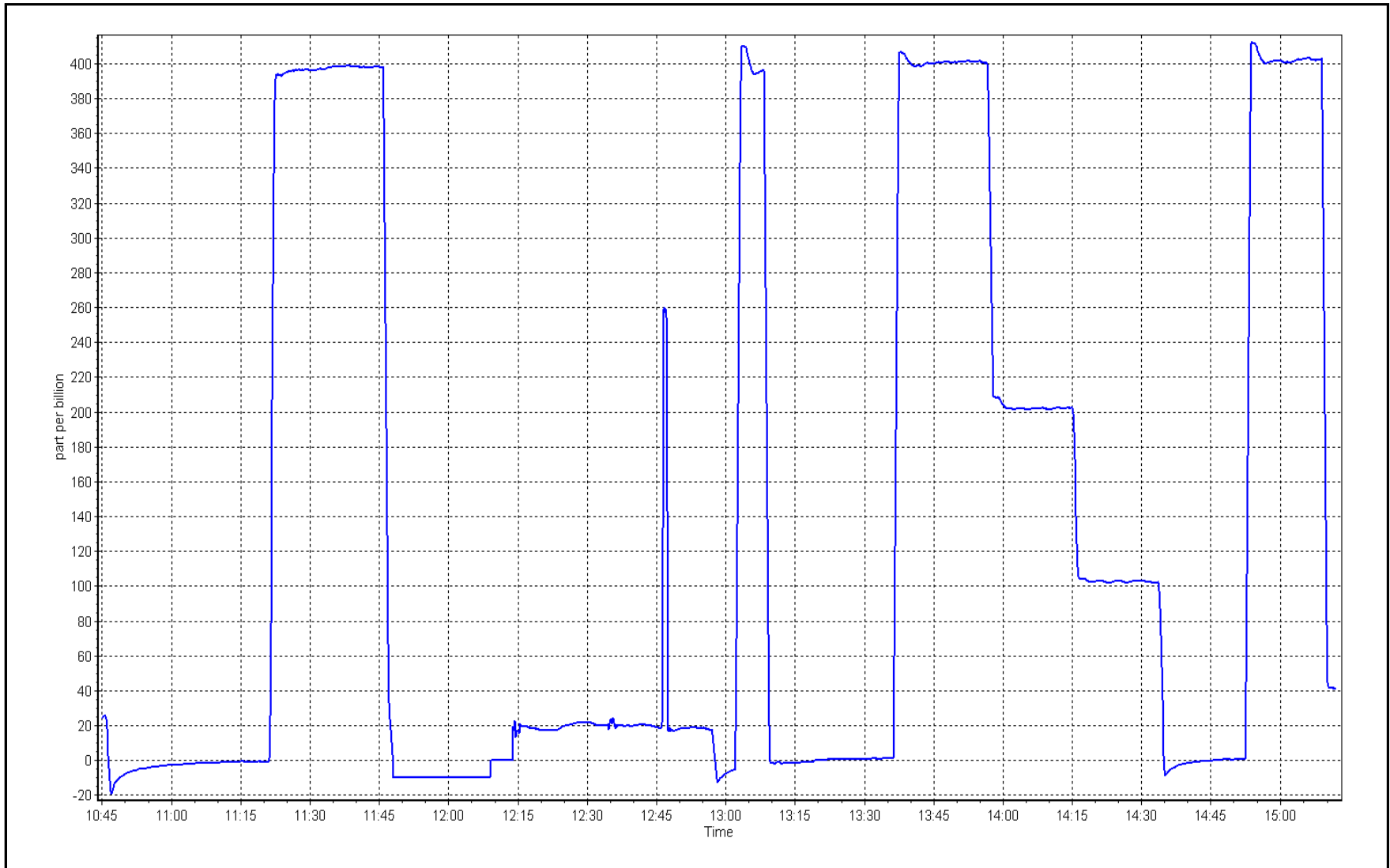
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	<u>Limits</u>	
0.0	0.9	----	Correlation Coefficient	0.999984	
400.0	401.0	0.9975			≥0.995
200.0	201.9	0.9906	Slope	1.000642	
100.0	102.3	0.9775			0.90 - 1.10
			Intercept	-1.638310	+/- 10



O₃ Calibration Plot

Date: July 12, 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:	July 1, 2017	Last Cal Date:	June 27, 2017
Start time (MST):	11:30	End time (MST):	16:40
Reason:	Maintenance Nightly spans were 58 % out of limits.		

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	0.999	1.013	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.999	0.998	PMT Temperature	-3.0	-2.9
NO2 coefficient	1.000	1.000	Reaction cell Press	442.9	126.5
NO bkgrnd	10.4	10.3	Sample Flow	0.211	0.834
NOX bkgrnd	10.4	10.4	PMT Voltage	-892.4	-892.4

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.999132	0.999297
NO _x Cal Offset	-0.618759	-1.651009
NO Cal Slope	0.999519	0.999061
NO Cal Offset	-0.279751	-1.393165
NO ₂ Cal Slope	0.998246	0.990373
NO ₂ Cal Offset	-1.569747	-1.530642



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	-0.4	0.0	----	----
as found span	4934	76.5	800.0	800.0	0.0	322.7	322.2	0.5	2.4792	2.4831
calibrator zero	5005	0.0	0.0	0.0	0.0	-0.4	-0.4	0.0	----	----
high point	4934	76.5	800.0	800.0	0.0	801.0	801.0	0.1	0.9988	0.9988
second point	4975	38.3	400.3	400.3	0.0	403.9	403.8	0.1	0.9911	0.9914
third point	4990	19.2	200.8	200.8	0.0	204.3	203.7	0.6	0.9831	0.9860
as left zero	5005	0.0	0.0	0.0	0.0	-0.2	-0.2	0.1	----	----
as left span	4934	76.5	800.0	416.0	384.0	815.2	411.1	404.2	0.9814	1.0119
Average Correction Factor									0.9910	0.9921

Corrected As found	NO _x = 323.1 ppb	NO = 322.6 ppb		*Percent Change	NO _x = 148.0%
Previous Response	NO _x = 801.4 ppb	NO = 800.7 ppb		*Percent Change	NO = 148.2%

* = > +/-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	813.7	813.0	0.7	0.9832	0.9841	----	----
1st NO2 (400 ppb O3)	416.0	397.0	817.3	416.0	401.3	0.9789	----	0.9893	101.1%
2nd NO2 (200 ppb O3)	616.2	196.8	818.1	616.2	202.0	0.9779	----	0.9743	102.6%
3rd NO2 (100 ppb O3)	715.7	97.3	816.4	715.7	100.7	0.9800	----	0.9662	103.5%
2nd NO ref point	----	0.0	816.5	815.5	1.1	0.9798	0.9810	----	----
Average Correction Factor						0.9792	0.9826	0.9766	102.4%

Notes: Sample inlet filter changed out and pump replaced after as founds. Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

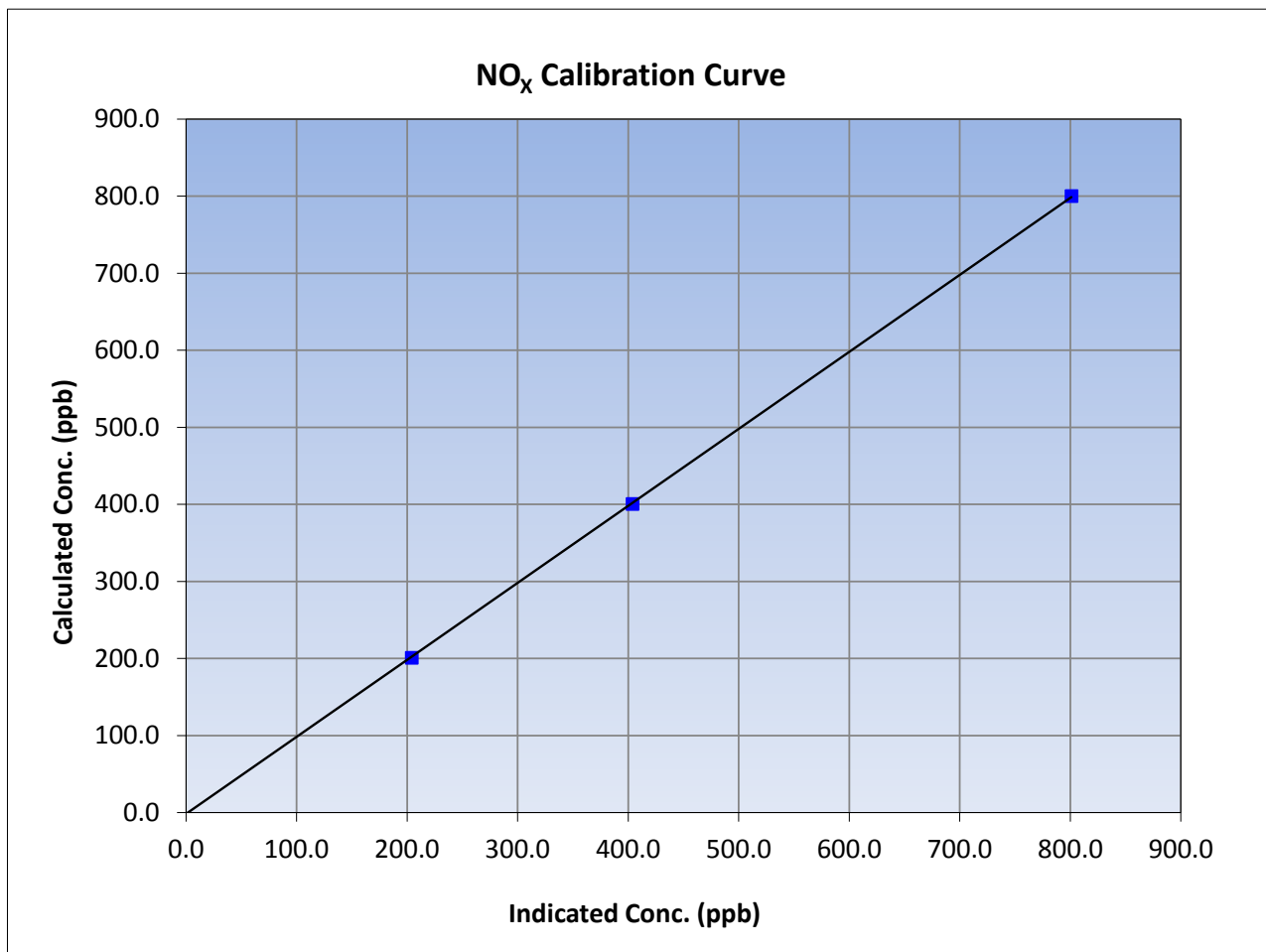
Version-03-2017

Station Information

Calibration Date	July 1, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:30	End Time (MST)	16:40
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	-0.4	----	Correlation Coefficient	≥0.995	
800.0	801.0	0.9988			
400.3	403.9	0.9911			
200.8	204.3	0.9831			
			Slope	0.999297	0.90 - 1.10
			Intercept	-1.651009	+/-20





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

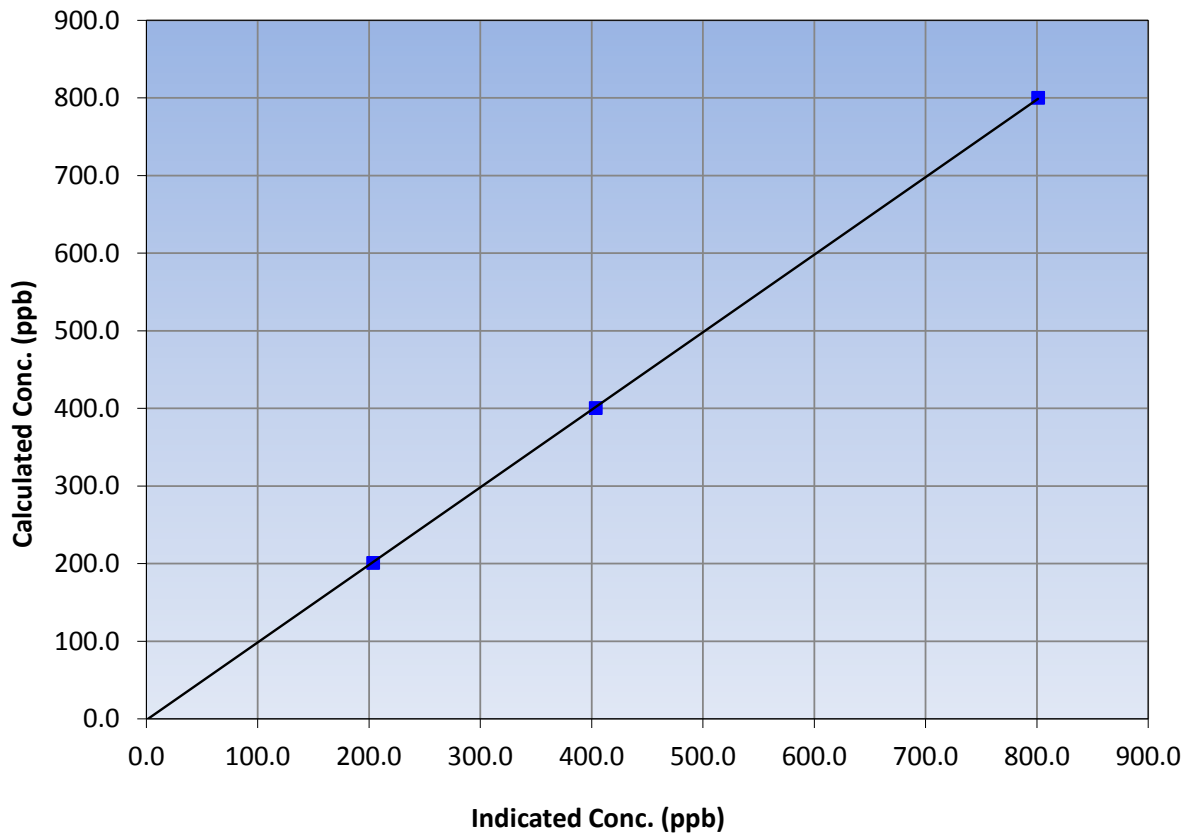
Station Information

Calibration Date	July 1, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:30	End Time (MST)	16:40
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	801.0	0.9988			
400.3	403.8	0.9914	Slope	0.90 - 1.10	
200.8	203.7	0.9860			
			Intercept	-1.393165	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

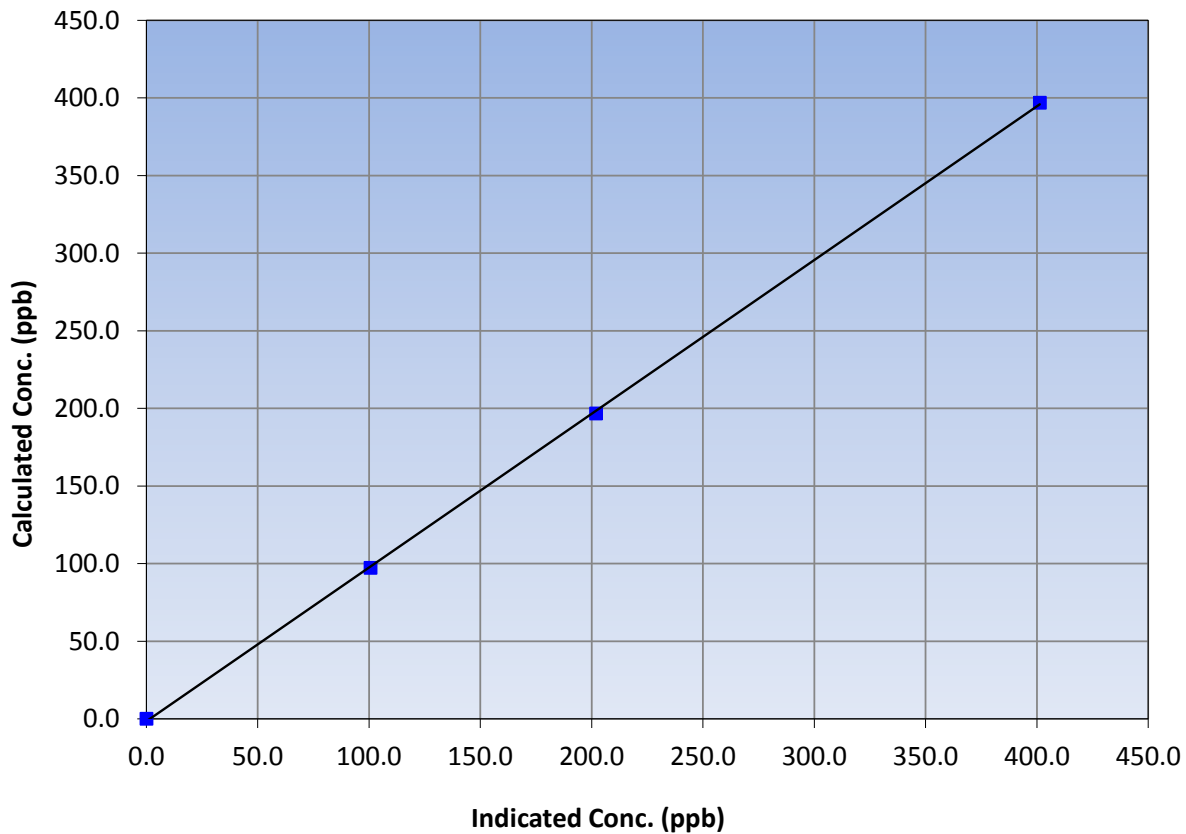
Station Information

Calibration Date	July 1, 2017	Previous Calibration	June 27, 2017
Station Name	Conklin	Station Number	AMS 21
Start Time (MST)	11:30	End Time (MST)	16:40
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	
397.0	401.3	0.9893			
196.8	202.0	0.9743			
97.3	100.7	0.9662			
			Slope	0.990373	0.90 - 1.10
			Intercept	-1.530642	+/-20

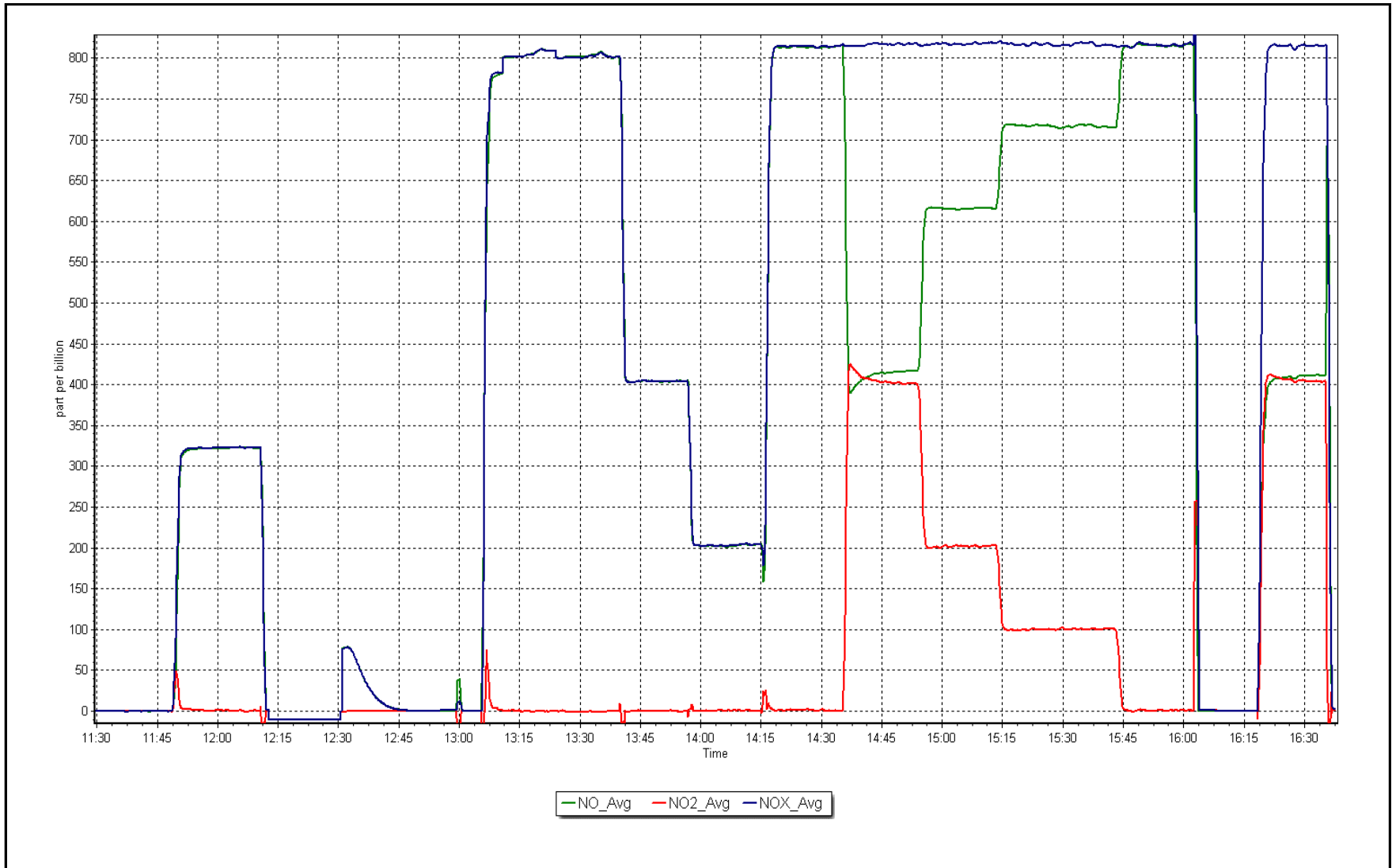
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 1, 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:	July 27, 2017	Last Cal Date:	June 27, 2017
Start time (MST):	12:55	End time (MST):	14:17
Sharp Model:	5030	S/N:	7494
Particulate Fraction:	PM2.5	C14 Source S/N:	CM-0404
Flow Meter Make/Model:	Delta Cal	S/N:	1451
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)	27	27.1	27	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	944	941	944	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1004	1009	1004	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	-0.2	-----	-0.2	<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: July 27, 2017 Last Cal Date: May 16, 2017
 Flow w/o adaptor: 16.93 Flow w/ adaptor: 16.86

(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>July 27, 2017</u>	Calibration Date: <u>October 12, 2016</u>	
(Limit) +/- 5% of previous	Correction Factor: <u>6929</u>	Correction Factor: <u>7119</u>	-2.67%

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. Foil Mass completed, did not adjust the factor. Leak check passed. No adjustments made.

Calibration by: Asad Hidayat



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Conklin	Station Number:	AMS 21
Calibration Date:	Thursday, July 06, 2017	Prev Cal Date:	Wednesday, March 23, 2016
Start Time (MST):	10:40	End Time (MST):	12:20
Barometric Press:	NA	Station Temp:	21 Deg C
Reason:	Routine		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	A1406
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	20.1	1.0026
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9989
Average Correction Factor			1.0002

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	NA	0.999999	≥0.995
Calculated slope	0.988691	0.998909	0.90 - 1.10
Calculated intercept	0.240824	0.030357	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	P22886
As Found Declination (deg west of North)	<u>15</u>	As Left Declination (deg west of North)	<u>15</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.7	n/a
90	90.8	0.9917
180	180.5	0.9975
270	270.3	0.9991
357	358.0	0.9972
Average Correction Factor		0.9964

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	NA	0.999998	≥0.995
Calculated slope	0.986794	0.999897	0.90 - 1.10
Calculated intercept	-0.255746	-0.613476	+/- 7

Notes: No issues.

Calibration Performed By: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 22
JANVIER
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 JULY 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	705	39	39	100	1	0	0	0
TRS(ppb) Average	668	33	76	94.22	1	0	0	0
THC(ppm) Average	667	34	77	94.22	2.4	-	2.1	-
NMHC(ppm) Average	667	34	77	94.22	0.31	-	0.095	-
CH4(ppm) Average	667	34	77	94.22	2.4	-	2.1	-
O3 (ppb) Average	709	35	35	100	68	0	44	-
NO2 (ppb) Average	708	36	36	100	2	0	1	-
NO (ppb) Average	708	36	36	100	4	-	0	-
NOX (ppb) Average	708	36	36	100	6	-	1	-
PM2.5 (ug/m3) Average	696	2	48	93.82	39	-	14.2	0
Wind Speed 10 m (km/h) Average	744	0	0	100	17	-	12	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-
Temperature 2 m (C) Average	744	0	0	100	29.9	-	21.6	-
Relative Humidity (%) Average	744	0	0	100	99	-	94.0	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 JULY 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	705	0.1	0	-	0	0	0	0	0	0	0	1
TRS (ppb) Average	668	0.2	0	-	0	0	0	0	0	0	0	1
THC (ppm) Average	667	1.93	0.1	-	1.8	1.9	1.9	1.9	2	2	2	2.4
NMHC(ppm) Average	667	0.006	0.028	-	0	0	0	0	0	0	0	0.31
CH4(ppm) Average	667	1.92	0.1	-	1.8	1.9	1.9	1.9	1.9	2	2	2.4
O3 (ppb) Average	709	31.8	10	-	11	19	24	32	38	44	68	
NO2 (ppb) Average	708	0.5	0	-	0	0	0	0	1	1	2	
NO (ppb) Average	708	0.1	0	-	0	0	0	0	0	0	4	
NOX (ppb) Average	708	0.6	0	-	0	0	0	0	1	1	6	
PM2.5 (ug/m3) Average	696	6.27	5.7	-	0.1	0.7	1.6	4.7	9.6	14.2	39	
Wind Speed 10 m (km/h) Average	744	5.2	3	-	0	2	3	4	7	9	17	
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-	
Temperature 2 m (C) Average	744	17.75	5	-	4.6	11.7	13.9	16.9	21.9	24.5	29.9	
Relative Humidity (%) Average	744	71.2	20	-	31	41	54	74	90	97	99	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	17 Jul 2017 11:00	17 Jul 2017 12:00	2	Maintenance - reinitiated daily QA check
TRS	27 Jul 2017 06:00	28 Jul 2017 11:00	30	Analyzer Failure - TRS converter
TRS	28 Jul 2017 12:00	28 Jul 2017 16:00	5	Maintenance - replace TRS converter
TRS	31 Jul 2017 12:00	31 Jul 2017 17:00	6	Maintenance on daily zero and span system
NMHC, CH4, THC	18 Jul 2017 18:00	20 Jul 2017 12:00	43	Analyzer Failure - H2 cylinder depleted
PM2.5	03 Jul 2017 12:00	03 Jul 2017 12:00	1	Unstable operation - excessive baseline drift
PM2.5	05 Jul 2017 14:00	05 Jul 2017 19:00	6	Unstable operation - excessive baseline drift
PM2.5	18 Jul 2017 07:00	18 Jul 2017 12:00	6	Analyzer Failure - pump stalled
PM2.5	18 Jul 2017 20:00	18 Jul 2017 20:00	1	Unstable operation - excessive baseline drift
PM2.5	20 Jul 2017 14:00	20 Jul 2017 16:00	3	Analyzer Failure - pump stalled
PM2.5	21 Jul 2017 01:00	22 Jul 2017 05:00	29	Unstable operation - excessive baseline shifts



Summary of Hour Averages

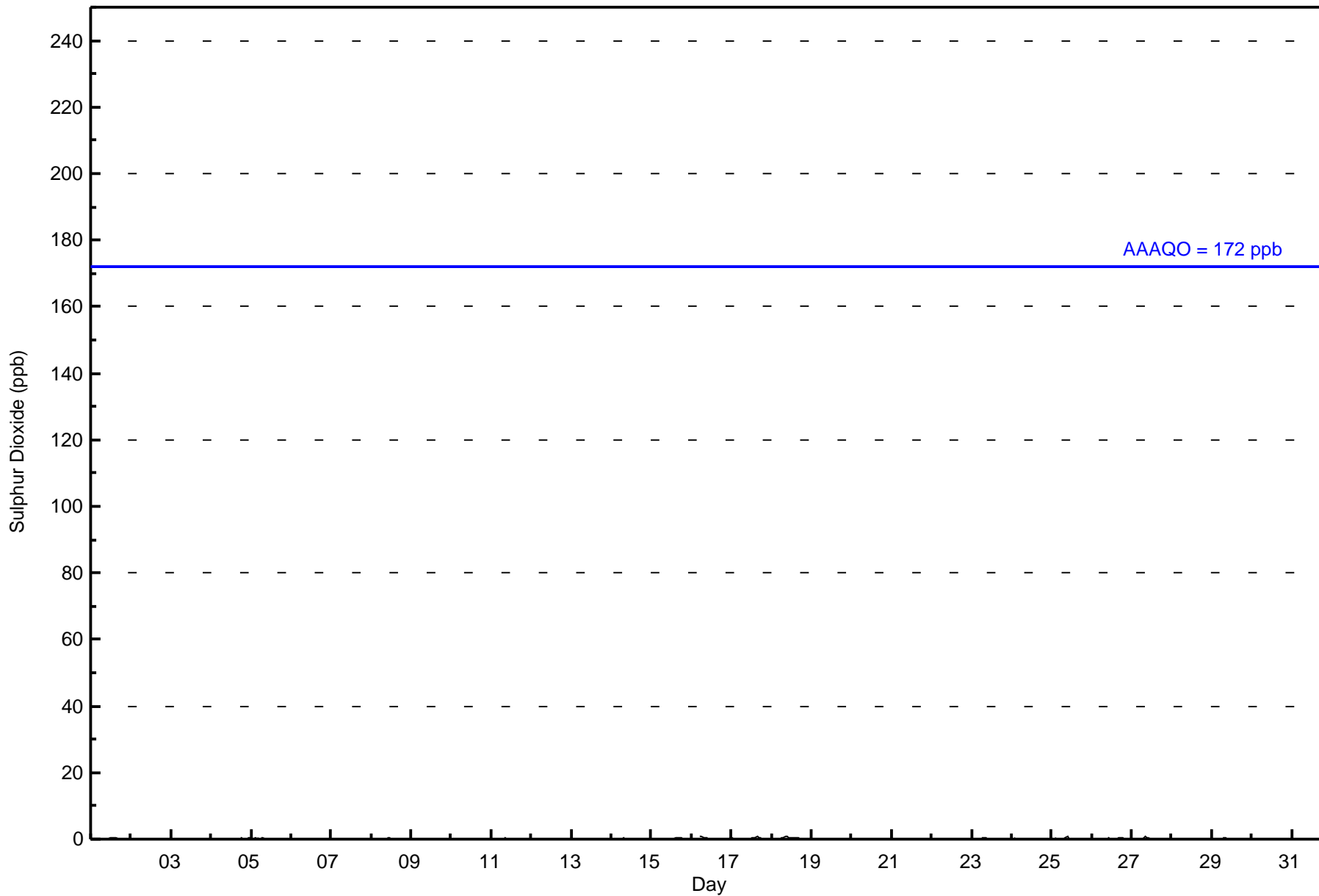
Janvier - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 1 ppb on Jul 18 09:00										Maximum Daily Average: 0.3 ppb on Jul 18										Hours of Data: 705																												
Minimum Value: 0 ppb on Jul 1 01:00										Minimum Daily Average: 0.0 ppb on Jul 30										Hours of Missing Data: 39																												
Maximum Diurnal Average: 0.2 ppb at hour 9										Minimum Diurnal Average: 0.1 ppb at hour 1										Hours of Calibration: 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 = 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-Jul	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0.1	1																						
2-Jul	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																						
3-Jul	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-Jul	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-Jul	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																						
6-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
17-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1																						
18-Jul	Z	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																						
19-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	--	0																						
21-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
26-Jul	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																						
27-Jul	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1																						
28-Jul	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-Jul	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-Jul	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																						
31-Jul	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	0.2	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	Diurnal Average
																								0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	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: 705

Total Number of Hours: 744



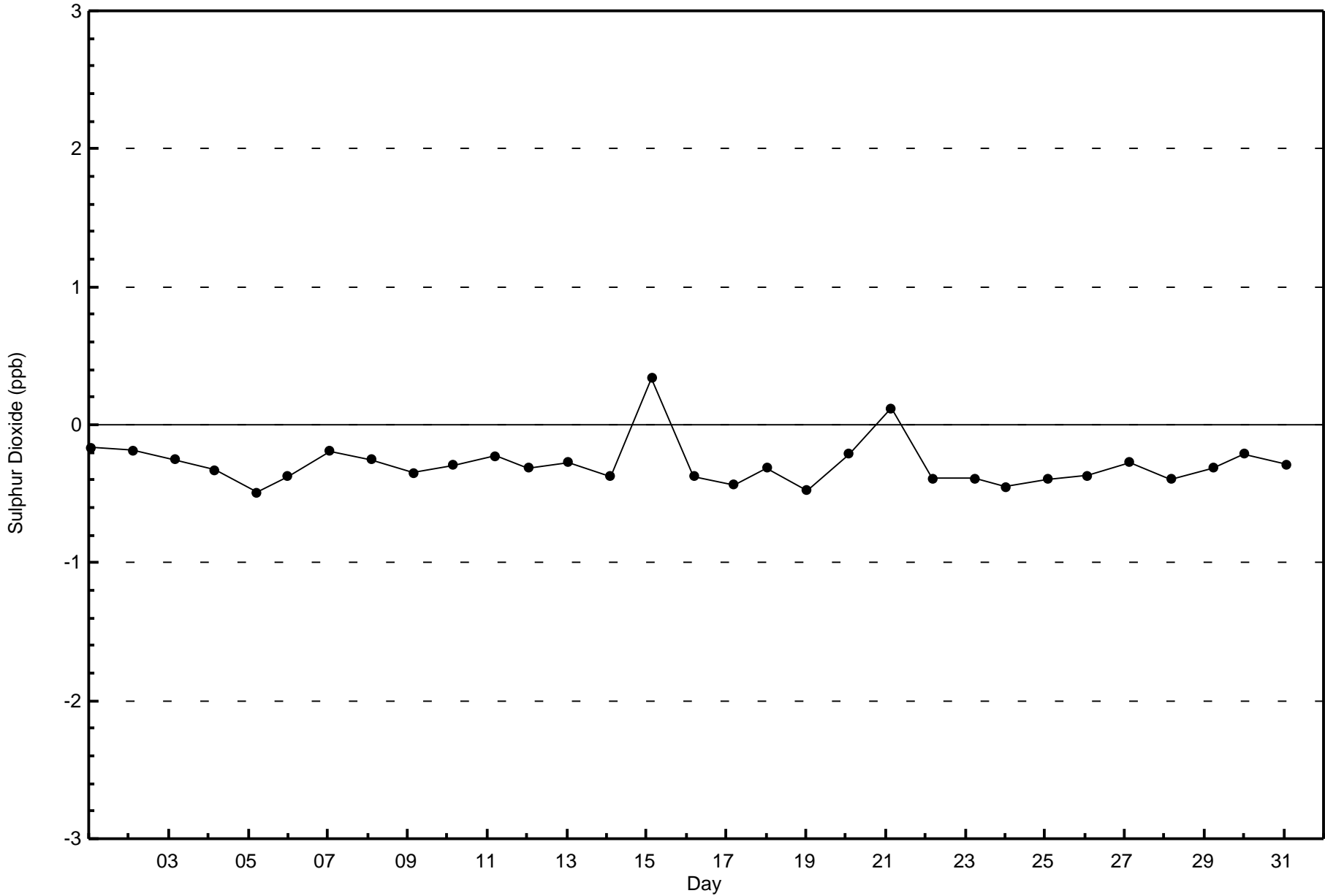
Wood Buffalo Environmental Association
Frequency Distribution

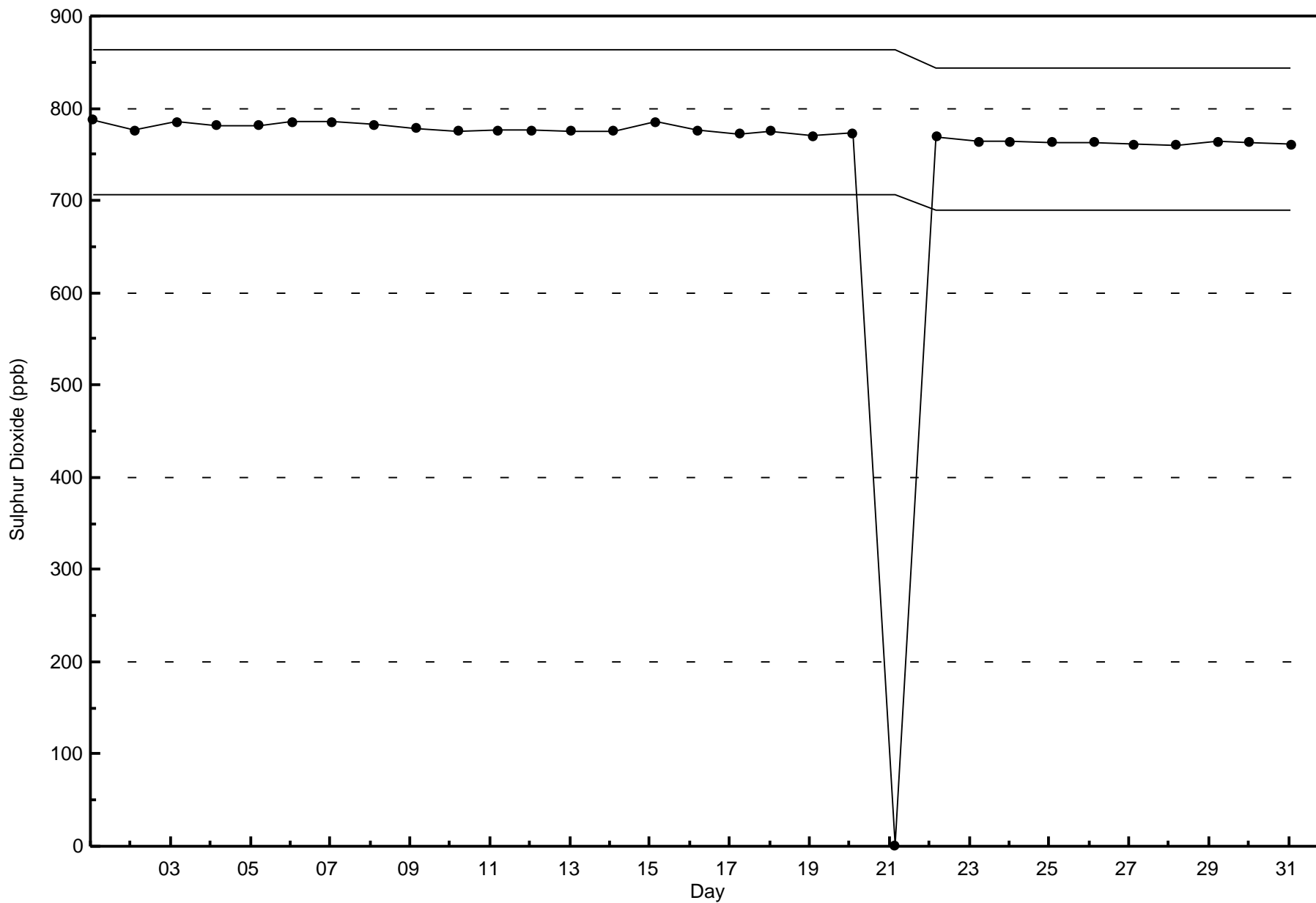
Sulphur Dioxide (SO₂) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	26	42	32	22	13	32	64	66	91	94	90	65	34	11	9	14	705
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	26	42	32	22	13	32	64	66	91	94	90	65	34	11	9	14	705

Total Number of Valid Hours: 705

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

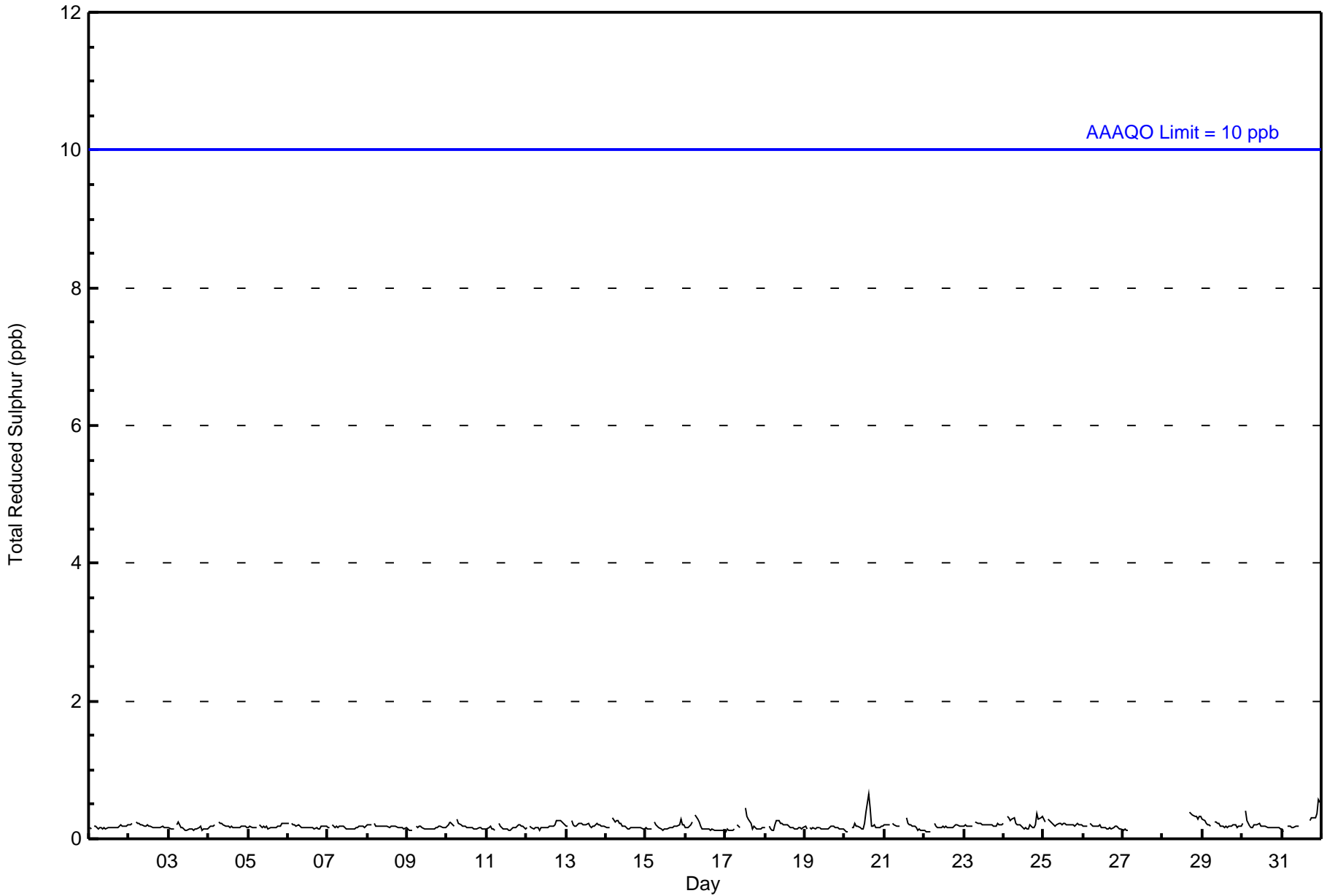
Janvier - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744												
Maximum Value: 1 ppb on Jul 20 15:00														Maximum Daily Average: 0.2 ppb on Jul 24												
Minimum Value: 0 ppb on Jul 22 02:00														Minimum Daily Average: 0.2 ppb on Jul 3												
Maximum Diurnal Average: 0.2 ppb at hour 7														Minimum Diurnal Average: 0.2 ppb at hour 2												
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												
														Hours of Service: 744												
														Hours of Data: 668												
														Hours of Missing Data: 76												
														Hours of Calibration: 33												
														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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	M	M	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
18-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	1
21-Jul	0	0	0	0	Z	0	0	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0.2	0
22-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0
28-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	0	0	0	0	0	0	0	0	--	0
29-Jul	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-Jul	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
31-Jul	0	0	Z	0	0	0	0	0	0	0	0	M	M	M	M	M	0	0	0	0	0	0	0	0	--	1
																								Diurnal Average		
0.2																								0.2		
0																								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
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Janvier - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	668	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: 668

Total Number of Hours: 744



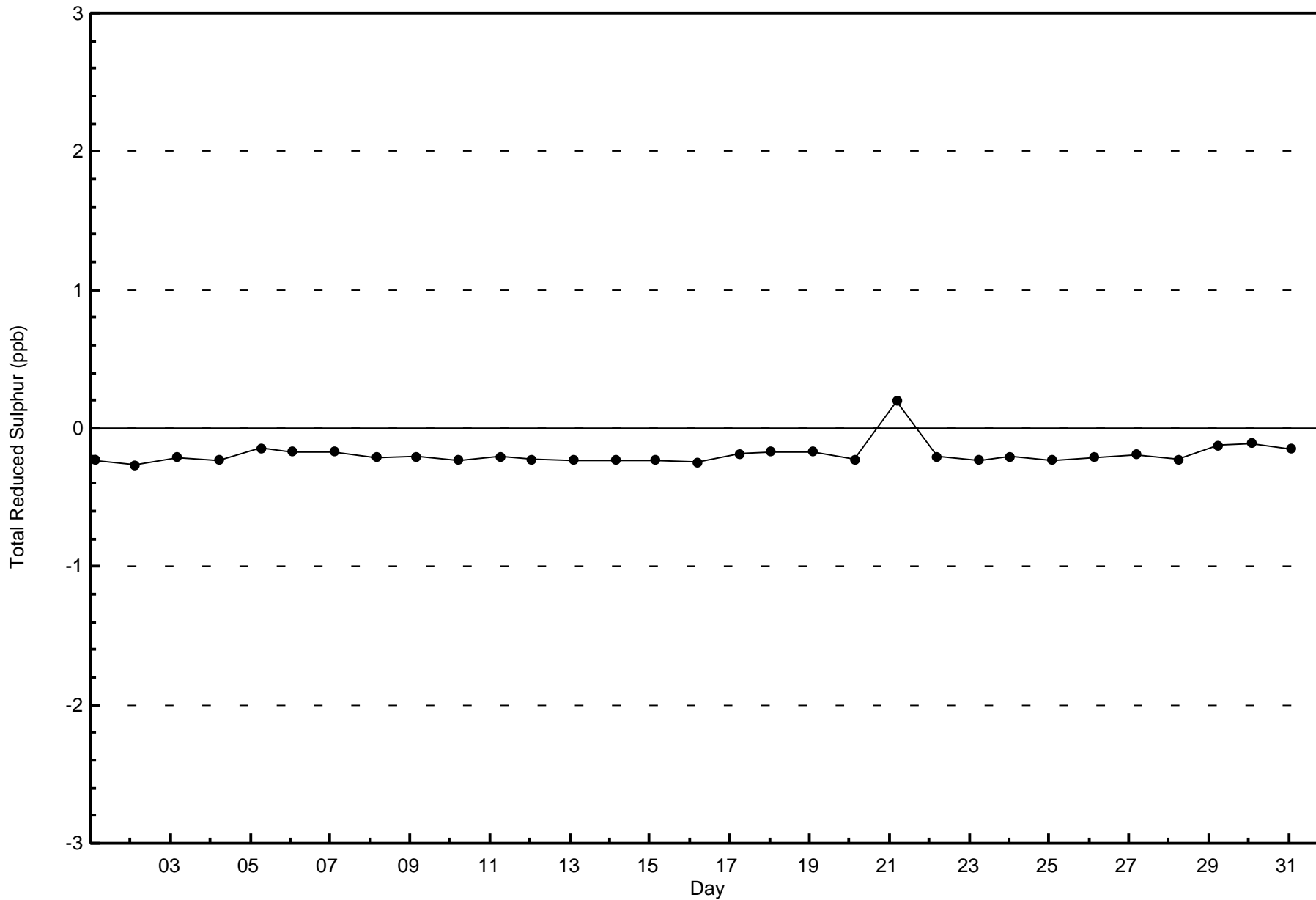
Wood Buffalo Environmental Association
Frequency Distribution

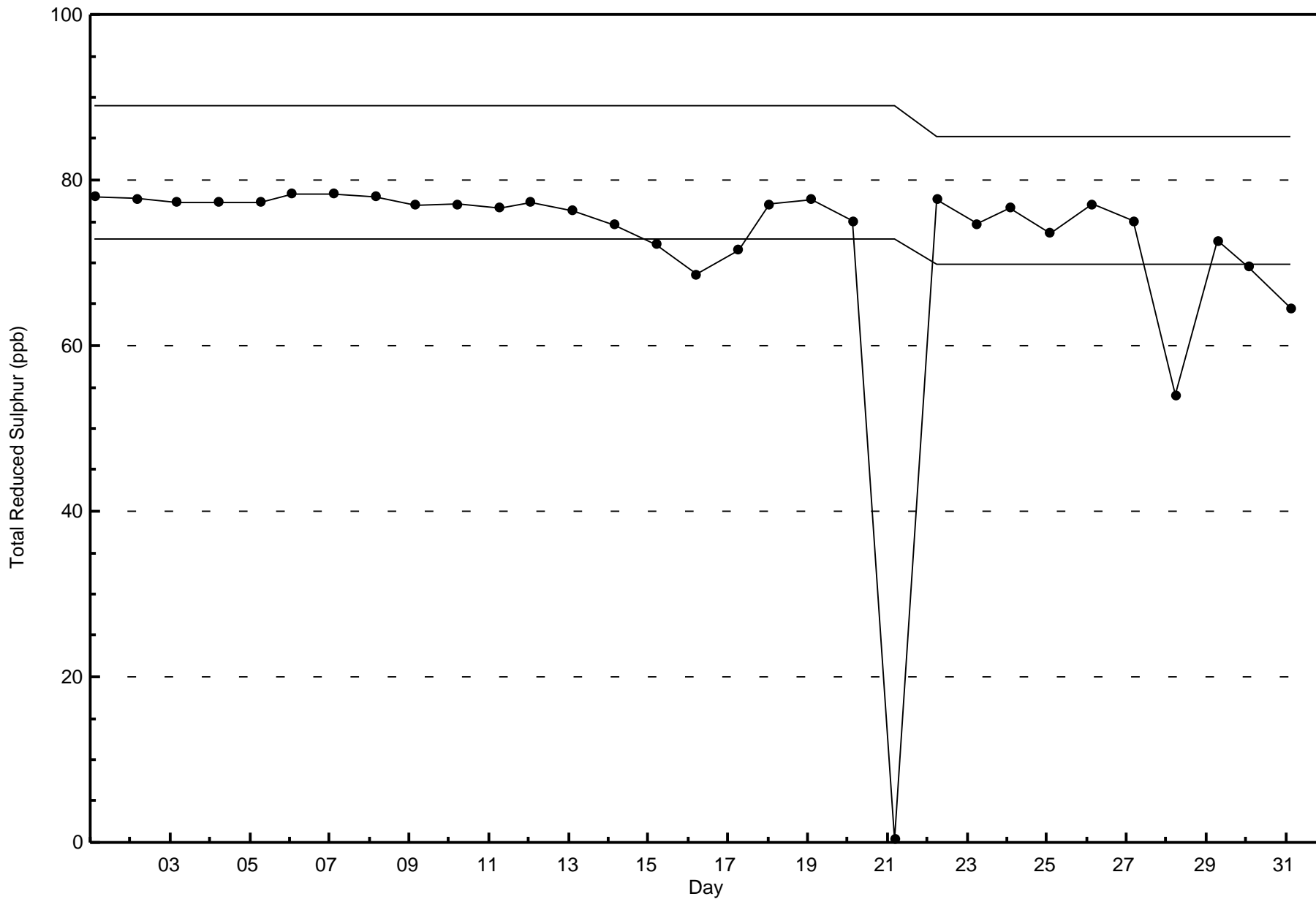
Total Reduced Sulphur (TRS) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	26	36	32	21	17	28	62	66	91	88	84	58	28	9	8	14	668
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	26	36	32	21	17	28	62	66	91	88	84	58	28	9	8	14	668

Total Number of Valid Hours: 668

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

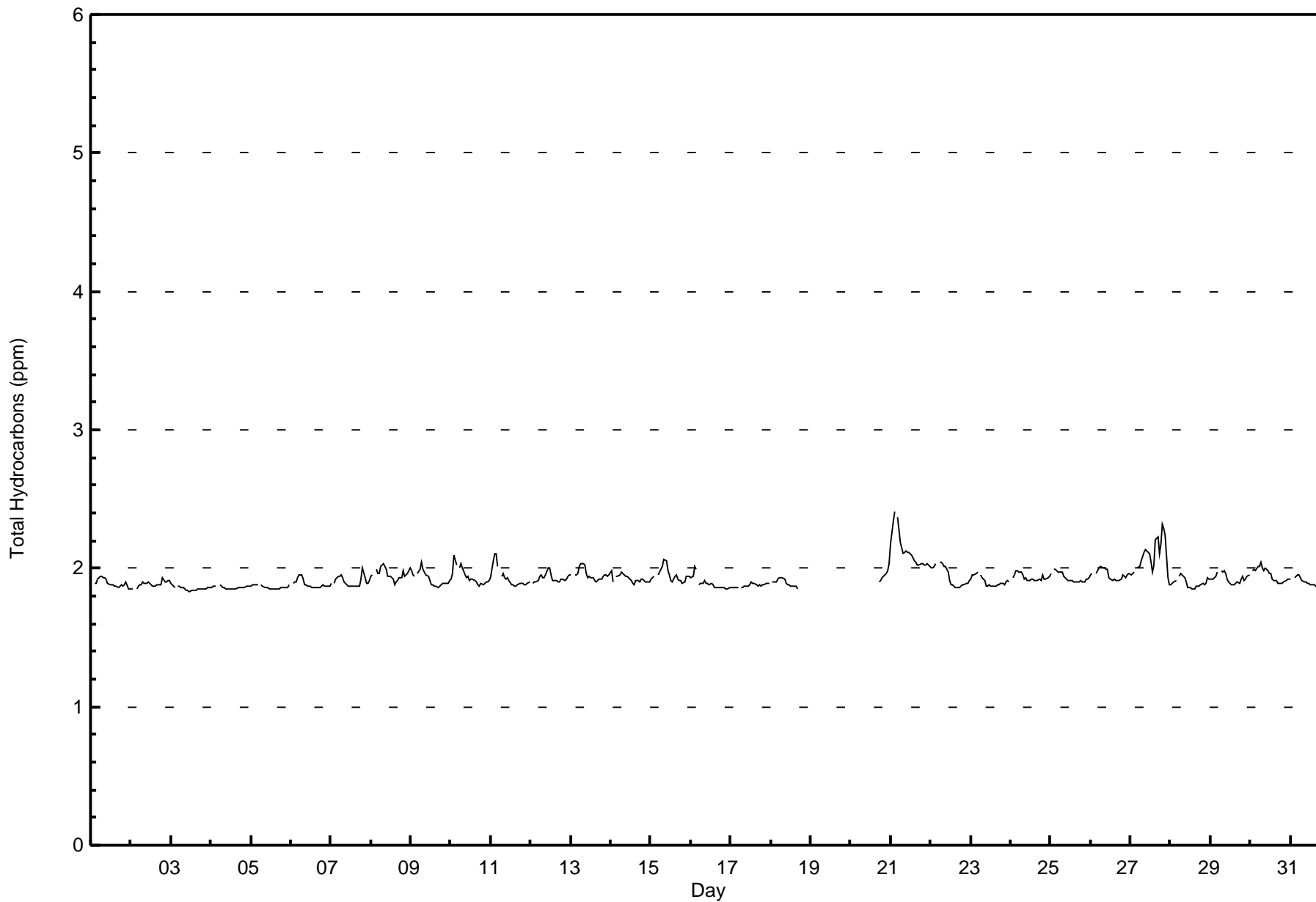
Total Hydrocarbons (THC) - ppm
Janvier - July 2017

Maximum Value: 2.4 ppm on Jul 21 03:00		Maximum Daily Average: 2.1 ppm on Jul 21		Hours in Service: 744																								
Minimum Value: 1.8 ppm on Jul 3 12:00		Minimum Daily Average: 1.9 ppm on Jul 3		Hours of Data: 667																								
Maximum Diurnal Average: 2.0 ppm at hour 6		Minimum Diurnal Average: 1.9 ppm at hour 15		Hours of Missing Data: 77																								
Monthly Average: 1.93 ppm		Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.2		Hours of Calibration: 34																								
				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-Jul	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	
2-Jul	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	1.9
3-Jul	1.9	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	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
4-Jul	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	1.9
5-Jul	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	1.8	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	1.9
6-Jul	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	1.9	1.9	1.9	2.0
7-Jul	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	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
8-Jul	1.9	2.0	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	1.9	1.9	1.9	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9-Jul	2.0	2.0	1.9	Z	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	2.0
10-Jul	1.9	2.0	2.1	2.0	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	1.9	1.9	2.1
11-Jul	1.9	2.1	2.1	2.1	2.0	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	2.1
12-Jul	Z	1.9	1.9	1.9	1.9	1.9	2.0	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	1.9	1.9	1.9	1.9	1.9	2.0
13-Jul	2.0	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	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0
14-Jul	2.0	1.9	Z	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
15-Jul	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.1	2.1	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	2.1
16-Jul	1.9	1.9	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0
17-Jul	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	1.9
18-Jul	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	AF	AF	AF	AF	AF	AF	AF	AF	1.9
19-Jul	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	AF	AF	--
20-Jul	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	AF	AF	2.0
21-Jul	2.2	2.3	2.4	Z	2.4	2.3	2.2	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	2.4
22-Jul	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	1.9	1.9	1.9	1.9	2.0
23-Jul	1.9	1.9	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	2.0
24-Jul	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	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0
25-Jul	2.0	Z	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	1.9	2.0
26-Jul	1.9	2.0	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	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0
27-Jul	1.9	2.0	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.2	2.2	2.1	2.2	2.3	2.3	2.2	1.9	1.9	1.9	1.9	2.3	
28-Jul	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	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	1.9	1.9	2.0
29-Jul	1.9	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	1.9	2.0
30-Jul	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	1.9	1.9	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
31-Jul	1.9	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration AF - Analyzer Failure																												



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Janvier - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	634	95.05	95.05
2.1 - 3.0	33	4.95	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 667

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - July 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	22	32	27	20	13	28	57	61	84	79	86	62	33	10	9	11	634
2.1 - 3.0	4	10	3	1	0	3	3	2	1	3	1	0	0	0	0	2	33
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	26	42	30	21	13	31	60	63	85	82	87	62	33	10	9	13	667

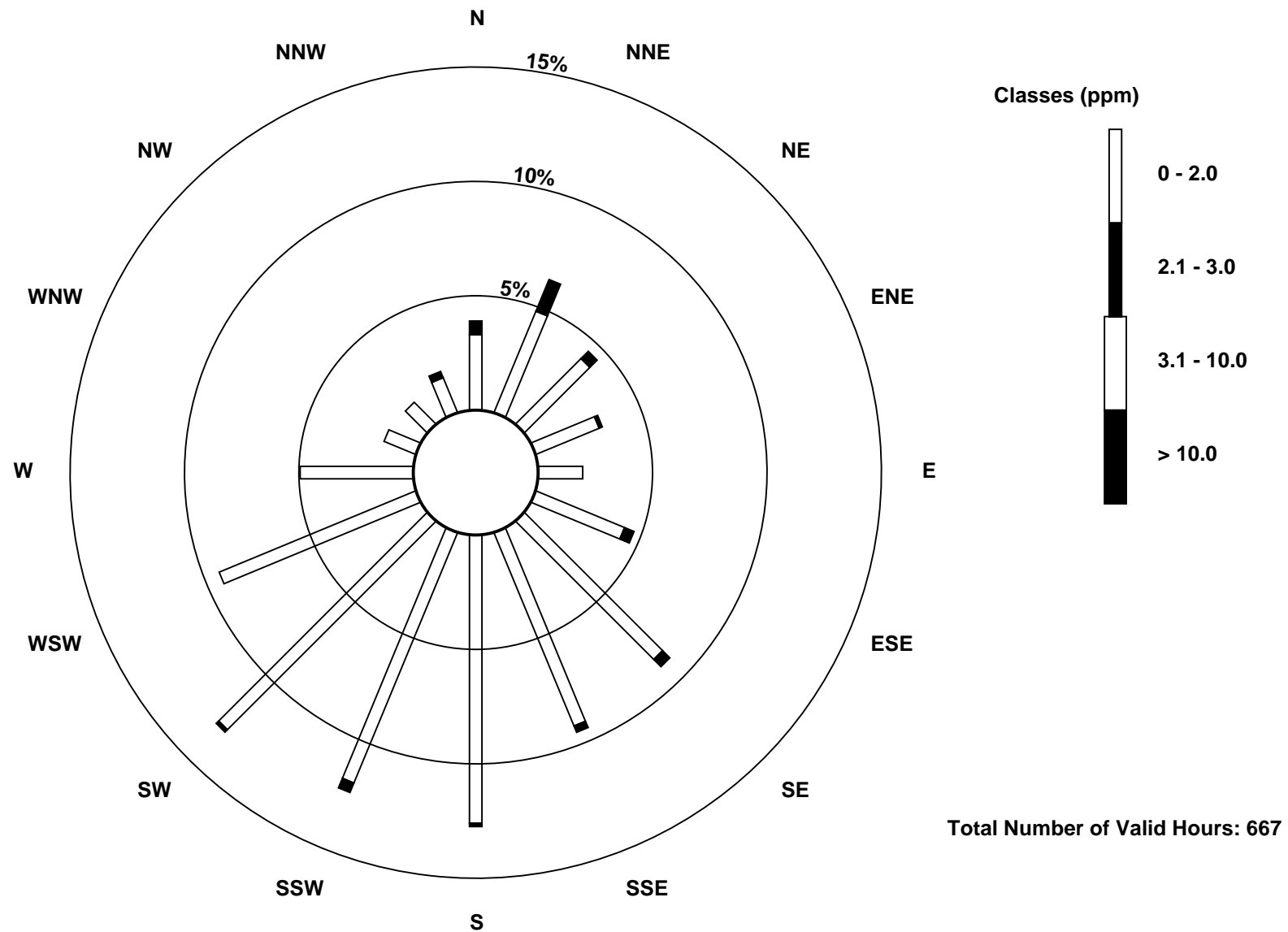
Total Number of Valid Hours: 667

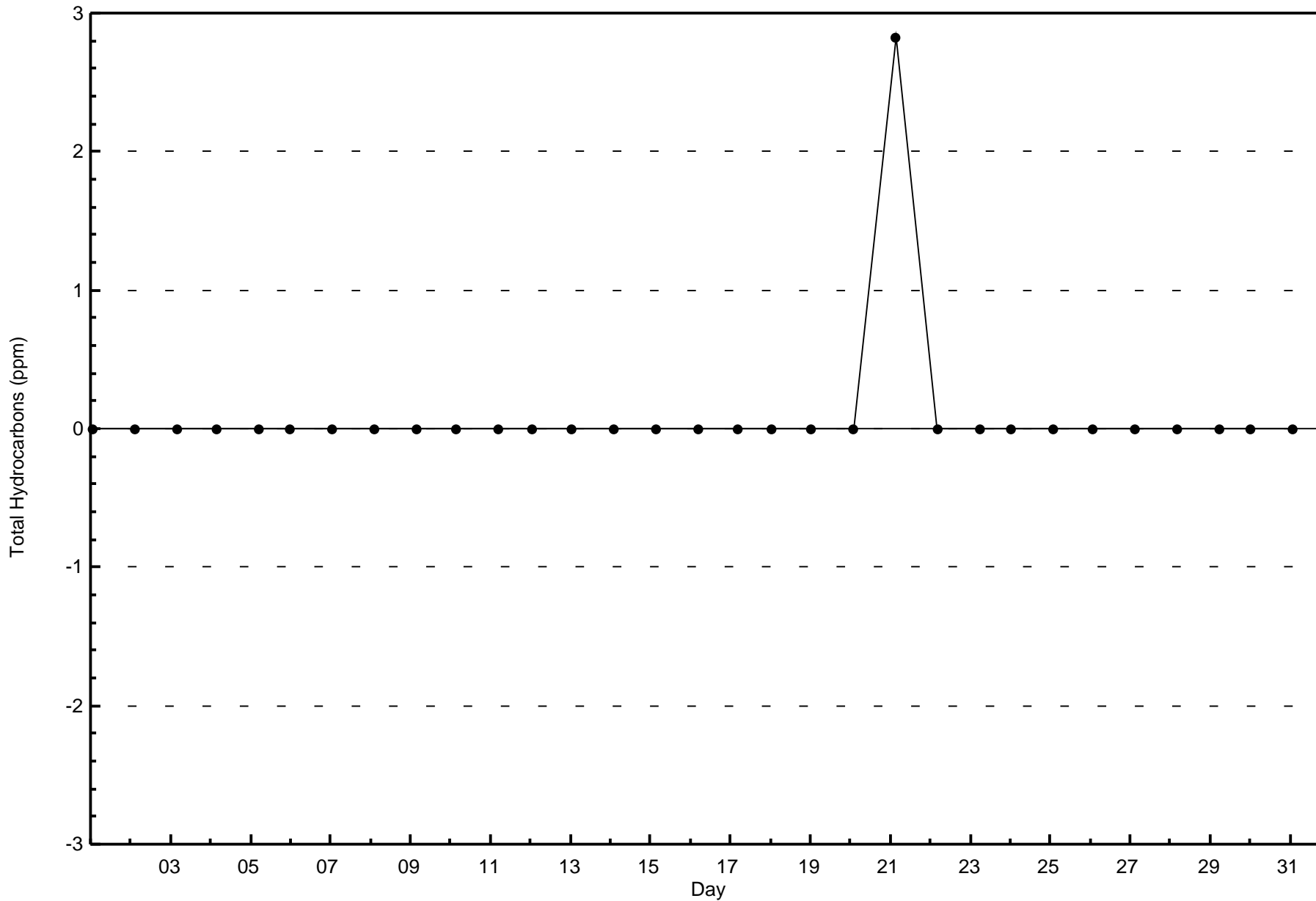
Total Number of Hours: 744

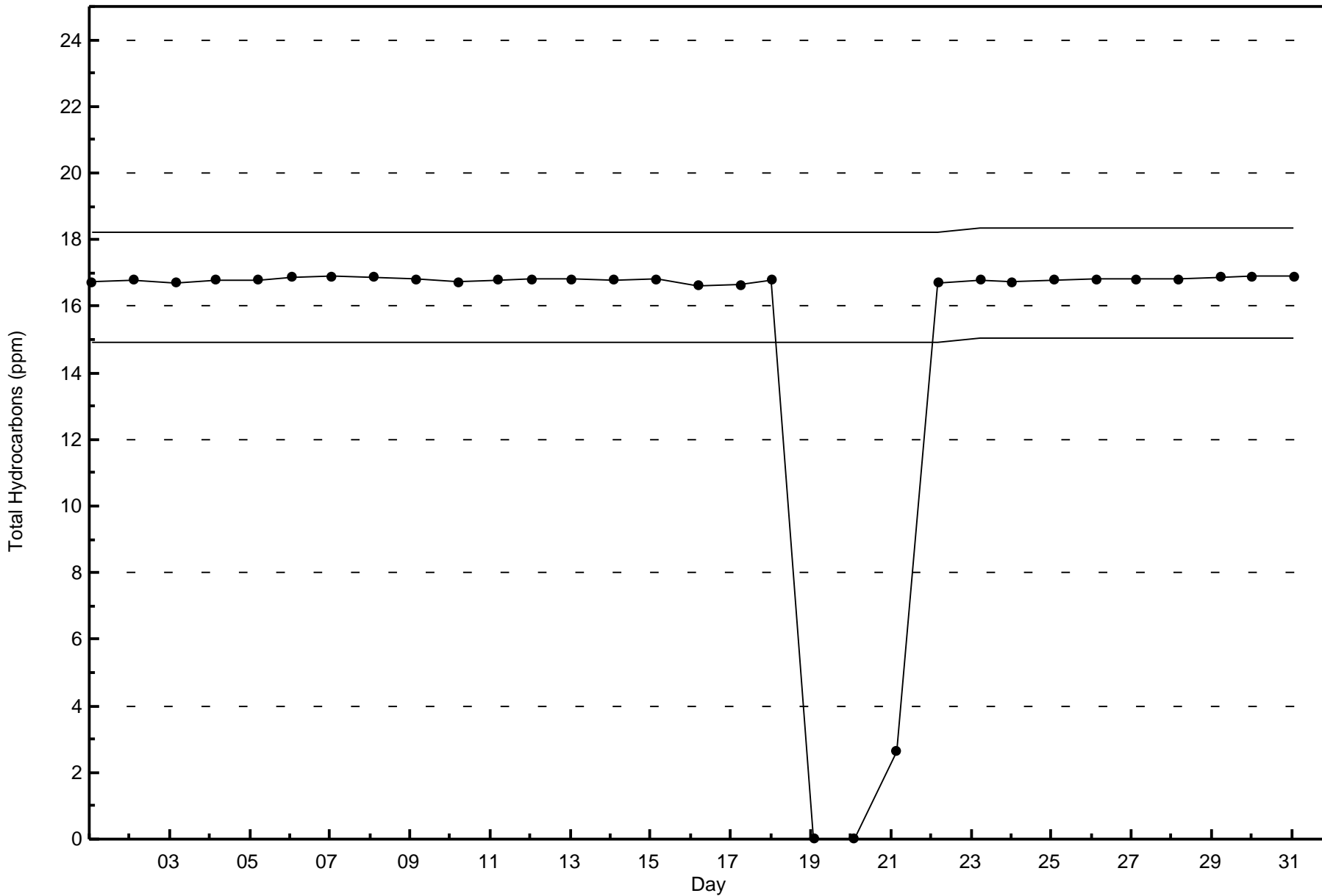


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Janvier (AMS 22)





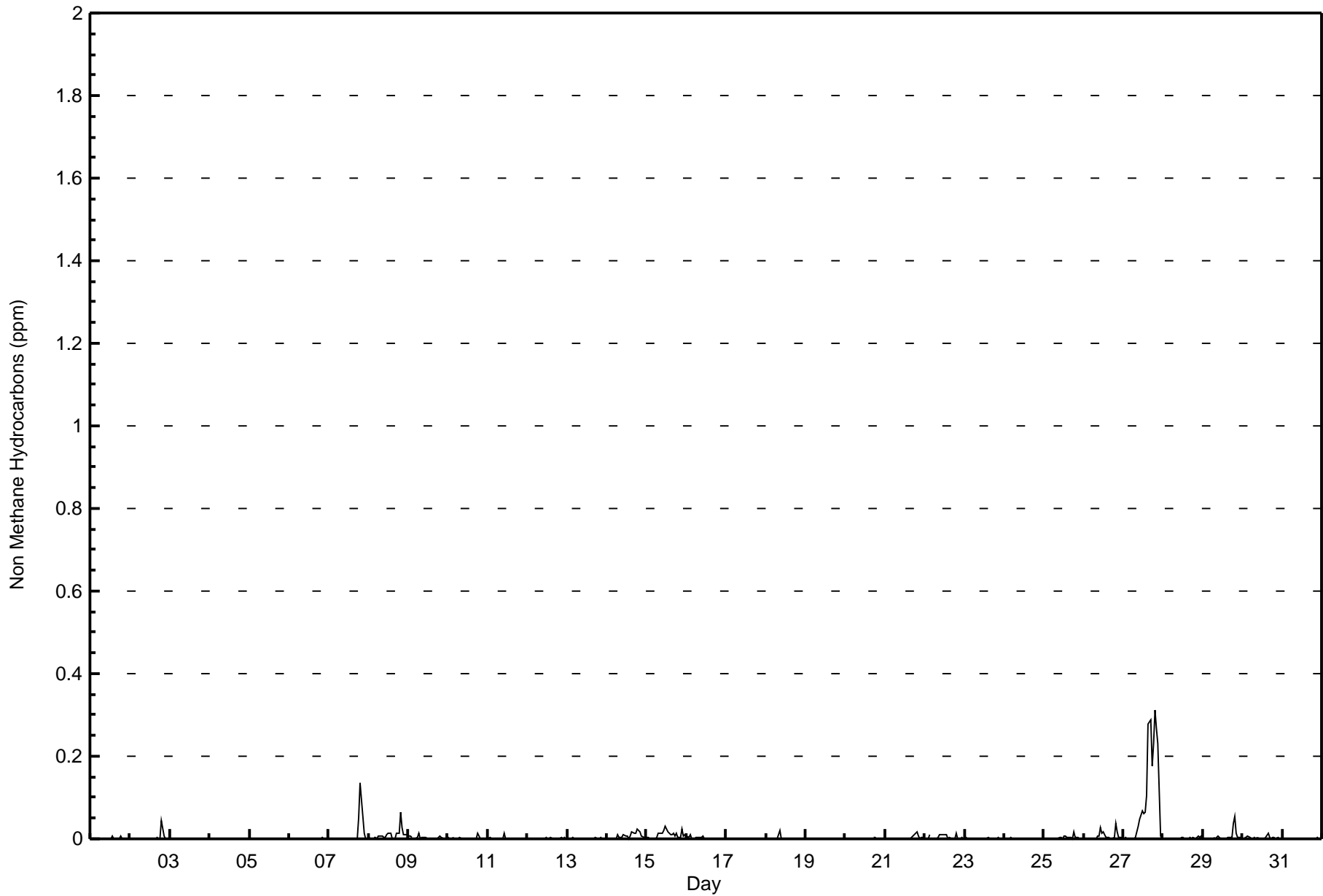




Summary of Hour Averages

Janvier - July 2017

Maximum Value: 0.310 ppm on Jul 27 20:00																				Maximum Daily Average: 0.095 ppm on Jul 27					Hours in Service:	744
Minimum Value: 0.000 ppm on Jul 1 01:00																				Minimum Daily Average: 0.000 ppm on Jul 5					Hours of Data:	667
Maximum Diurnal Average: 0.025 ppm at hour 20																				Minimum Diurnal Average: 0.000 ppm at hour 6					Hours of Missing Data:	77
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:	34
																									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-Jul	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	0.006	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.002	0.000	0.000	0.001	0.006
2-Jul	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	0.001	0.000	0.002	0.000	0.002	0.045	0.006	0.001	0.000	0.000	0.003	0.045	
3-Jul	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	
4-Jul	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	
5-Jul	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	
6-Jul	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	0.003	0.000	0.000	0.000	0.003	
7-Jul	0.000	Z	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	0.000	0.000	0.001	0.050	0.136	0.054	0.014	0.001	0.011	0.136	
8-Jul	0.002	0.002	Z	0.002	0.003	0.000	0.006	0.007	0.006	0.003	0.003	0.009	0.012	0.014	0.000	0.000	0.002	0.013	0.013	0.064	0.026	0.010	0.010	0.009	0.064	
9-Jul	0.008	0.008	0.003	Z	0.001	0.005	0.015	0.000	0.003	0.005	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.003	0.001	0.000	0.000	0.003	0.015	
10-Jul	0.004	0.002	0.000	0.003	Z	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.012	0.000	0.000	0.000	0.000	0.001	0.012		
11-Jul	0.000	0.002	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.014	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014		
12-Jul	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.004	0.001	0.002	0.002	0.000	0.000	0.001	0.000	0.000	0.003	0.000	0.001	0.004		
13-Jul	0.000	Z	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.001	0.003	0.000	0.001	0.002	0.002	0.001	0.003		
14-Jul	0.001	0.000	Z	0.000	0.000	0.001	0.009	0.003	0.005	0.005	0.009	0.008	0.008	0.001	0.006	0.016	0.014	0.013	0.024	0.019	0.016	0.006	0.007	0.024		
15-Jul	0.004	0.002	0.002	Z	0.001	0.000	0.002	0.012	0.012	0.015	0.020	0.031	0.025	0.017	0.009	0.010	0.013	0.007	0.013	0.005	0.003	0.023	0.010	0.031		
16-Jul	0.007	0.002	0.010	0.000	Z	0.000	0.004	0.003	0.005	0.003	0.006	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.010		
17-Jul	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		
18-Jul	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	AF	AF	AF	AF	AF	--	0.021		
19-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--		
20-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	C	C	C	C	C	0.003	0.003	0.001	0.000	0.000	--	0.003		
21-Jul	0.001	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.003	0.006	0.012	0.016	0.007	0.000	0.002	0.016		
22-Jul	0.002	0.000	0.000	0.011	Z	0.000	0.000	0.000	0.004	0.009	0.012	0.011	0.010	0.011	0.001	0.002	0.000	0.001	0.001	0.012	0.000	0.000	0.004	0.012		
23-Jul	0.002	0.002	0.001	0.000	0.000	Z	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.001	0.004	0.000	0.001	0.004		
24-Jul	Z	0.000	0.001	0.000	0.003	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	0.001	0.000	0.001	0.000	0.000	0.003		
25-Jul	0.000	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.004	0.002	0.001	0.007	0.008	0.003	0.003	0.003	0.001	0.016	0.003	0.004	0.001	0.002	0.016		
26-Jul	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.006	0.008	0.026	0.014	0.016	0.002	0.005	0.003	0.000	0.000	0.005	0.036	0.016	0.003	0.006	0.036		
27-Jul	0.002	0.002	0.000	Z	0.000	0.001	0.000	0.004	0.017	0.029	0.047	0.068	0.061	0.064	0.106	0.278	0.288	0.175	0.230	0.310	0.268	0.231	0.095	0.310		
28-Jul	0.000	0.000	0.000	0.001	Z	0.000	0.000	0.001	0.002	0.001	0.000	0.003	0.003	0.000	0.000	0.000	0.002	0.000	0.002	0.002	0.003	0.005	0.002	0.008		
29-Jul	0.000	0.000	0.000	0.000	0.000	Z	0.004	0.000	0.003	0.007	0.005	0.001	0.000	0.000	0.000	0.003	0.004	0.005	0.037	0.055	0.015	0.003	0.006	0.055		
30-Jul	Z	0.002	0.005	0.006	0.003	0.000	0.000	0.002	0.000	0.002	0.001	0.002	0.002	0.000	0.003	0.012	0.003	0.000	0.004	0.002	0.001	0.002	0.002	0.012		
31-Jul	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	0.004	0.001	0.000	0.004		
																				0.001 0.001 0.001 0.001 0.000 0.000 0.001 0.001 0.003 0.003 0.005 0.005 0.005 0.004 0.005 0.011 0.012 0.008 0.015 0.025 0.015 0.011 0.002 0.001					Diurnal Average	
																				0.008 0.008 0.010 0.011 0.003 0.005 0.015 0.012 0.021 0.029 0.047 0.068 0.061 0.064 0.106 0.278 0.288 0.175 0.230 0.310 0.268 0.231 0.010 0.010					Diurnal Maximum	
Z - zerospan		C - Calibration					AF - Analyzer Failure																			





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Janvier - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	568	85.16	85.16
0.006 - 0.05	86	12.89	98.05
0.06 - 0.1	6	0.90	98.95
> 0.1	7	1.05	100.00

Total Number of Valid Hours: 667

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Janvier - July 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	25	36	25	19	10	18	44	48	75	74	77	57	32	8	9	11	568
0.006 - 0.05	1	4	5	0	2	10	13	14	9	8	10	5	1	2	0	2	86
0.06 - 0.1	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	6
> 0.1	0	0	0	0	0	3	3	1	0	0	0	0	0	0	0	0	7
Totals	26	42	30	21	13	31	60	63	85	82	87	62	33	10	9	13	667

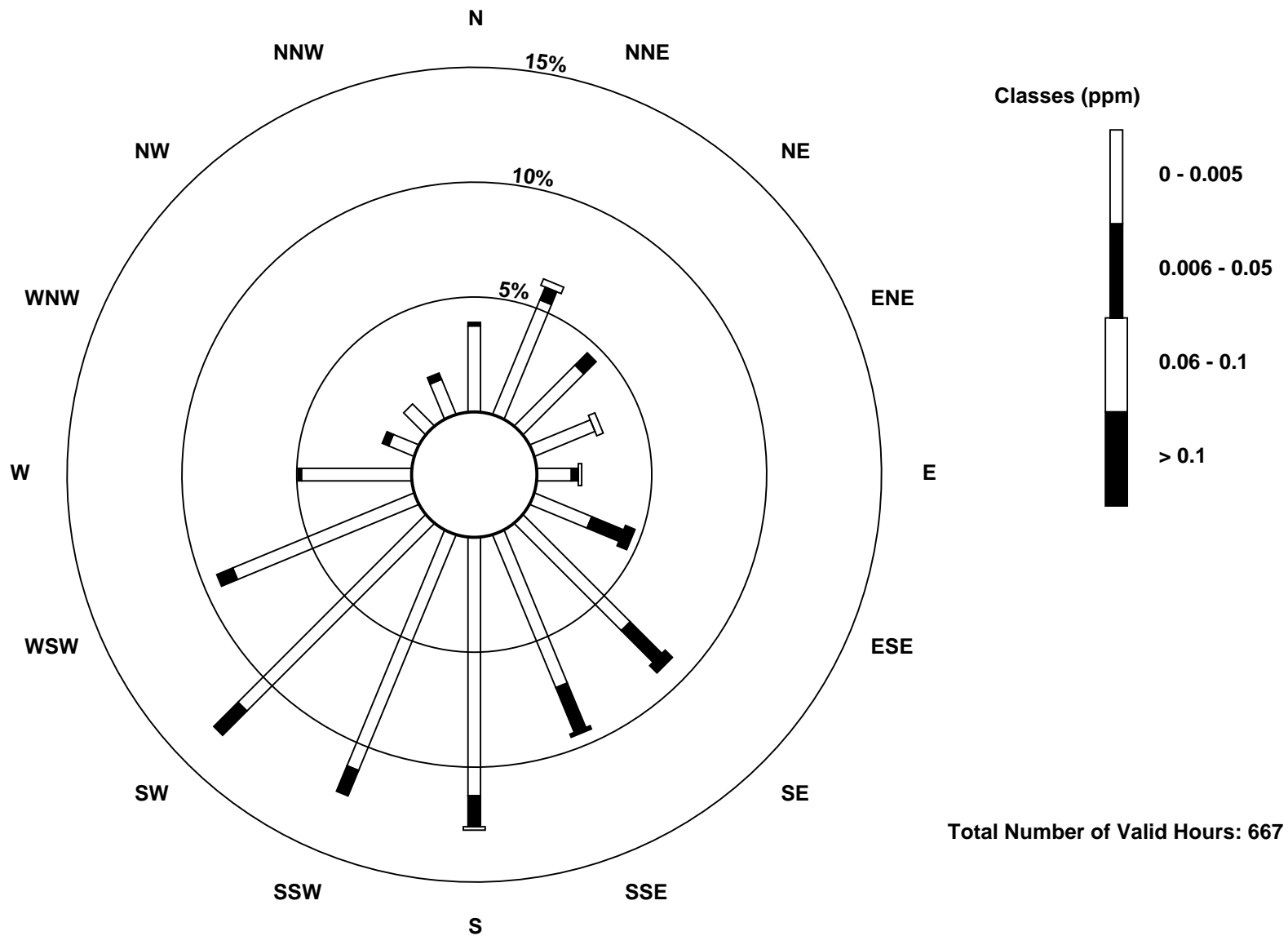
Total Number of Valid Hours: 667

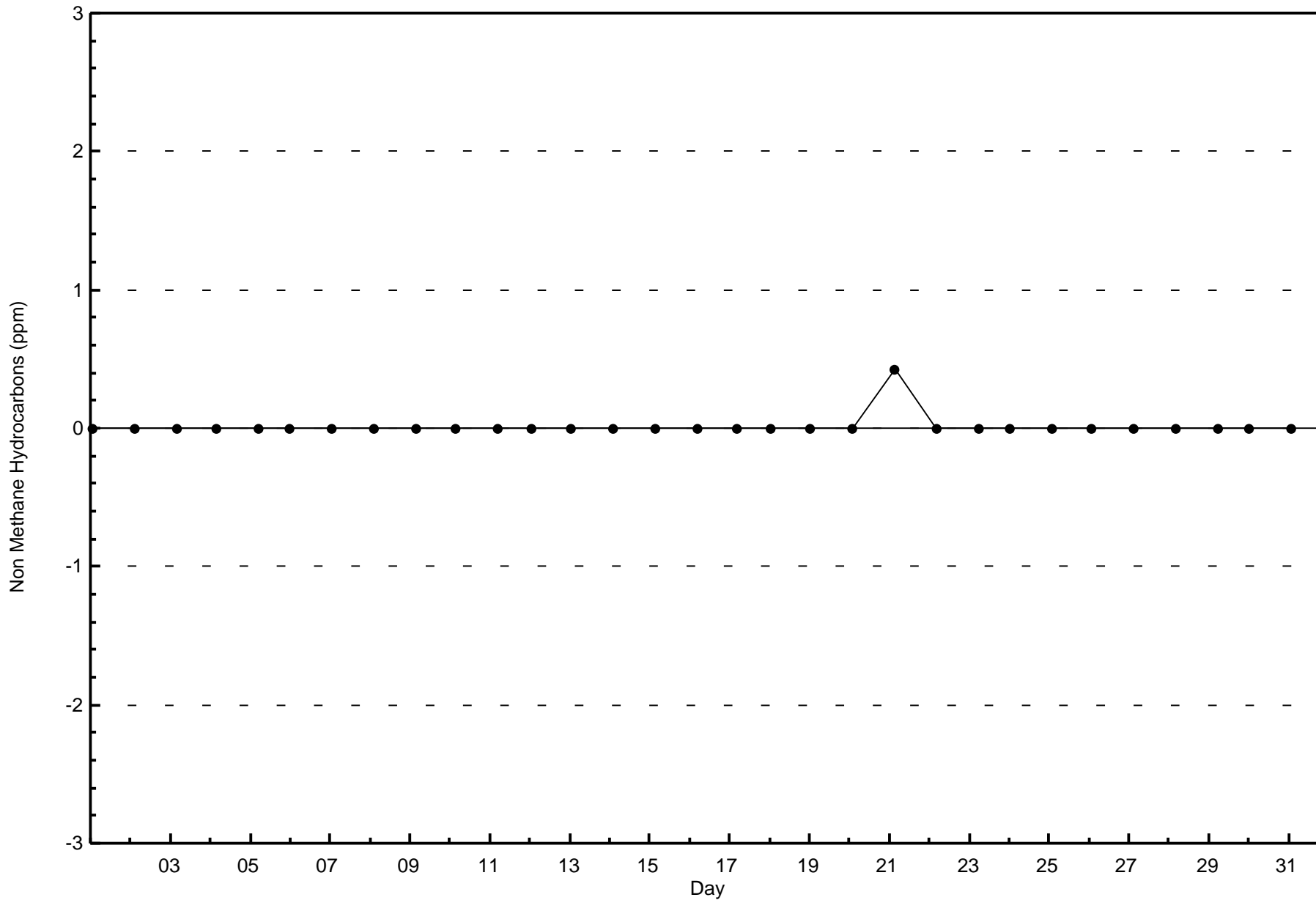
Total Number of Hours: 744

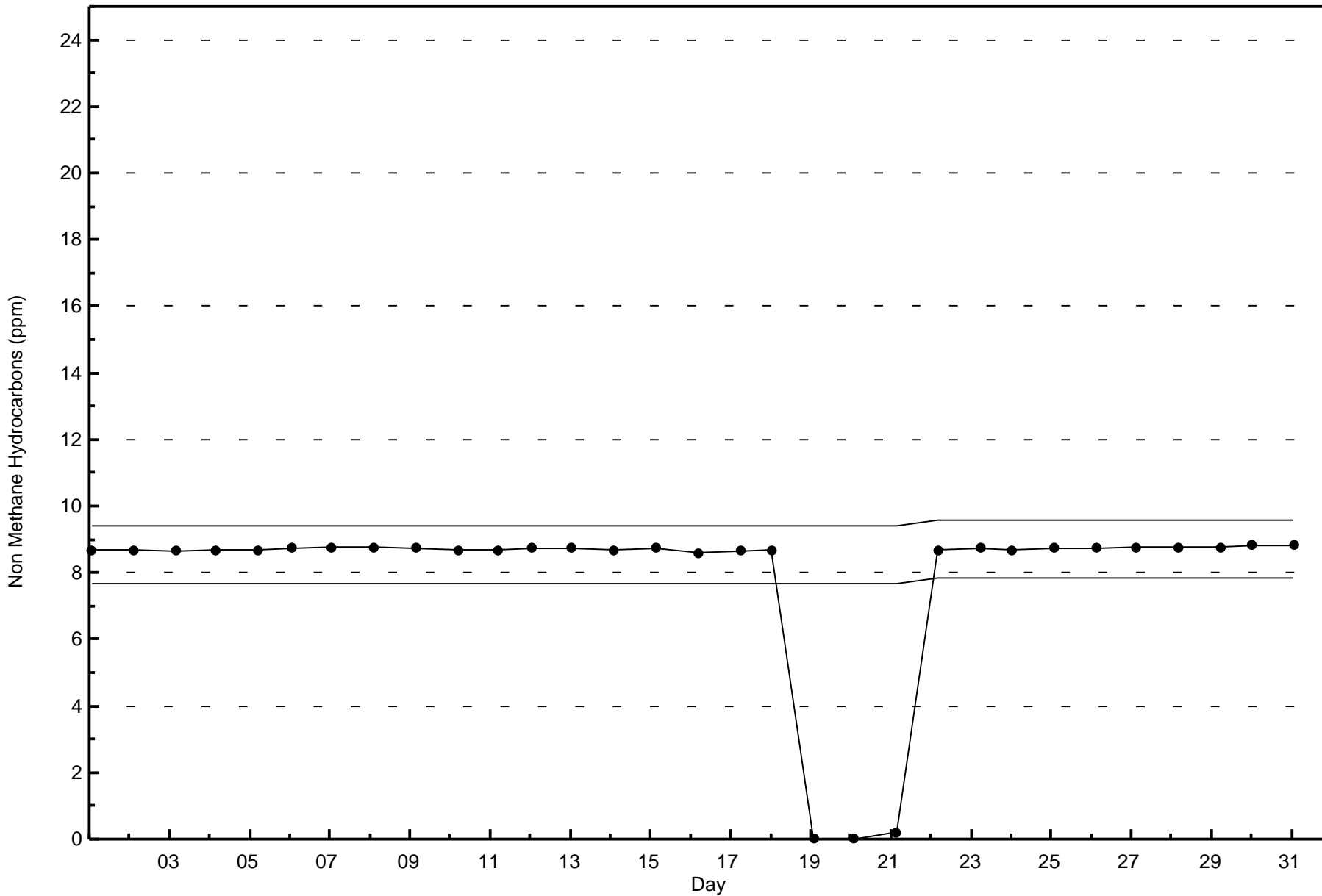


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Non Methane Hydrocarbons (NMHC) - ppm
Janvier (AMS 22)



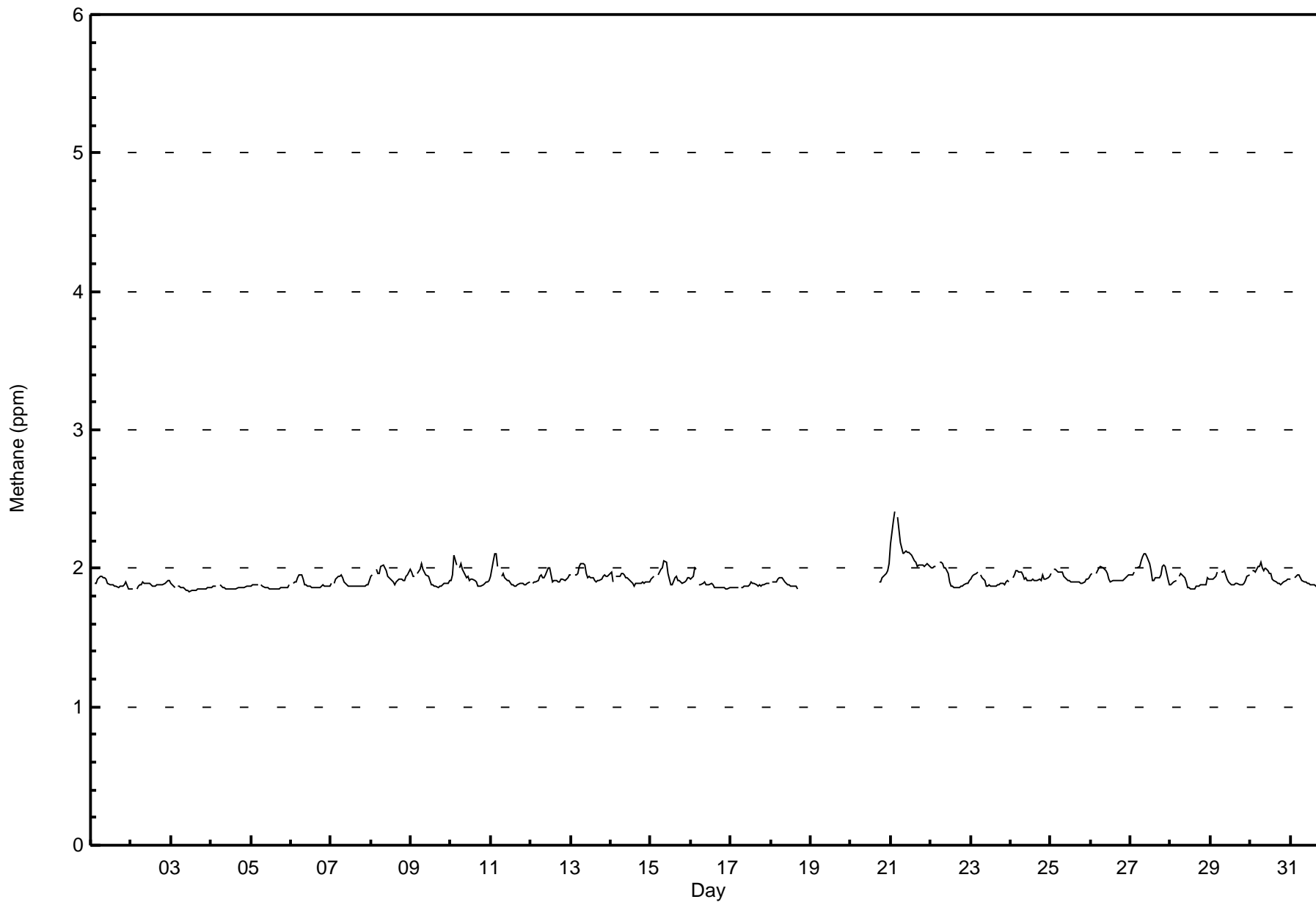






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Janvier - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Janvier - July 2017**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	644	96.55	96.55
2.1 - 3.0	23	3.45	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 667

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Janvier - July 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	22	34	28	20	13	31	60	62	84	79	86	62	33	10	9	11	644
2.1 - 3.0	4	8	2	1	0	0	0	1	1	3	1	0	0	0	0	2	23
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	26	42	30	21	13	31	60	63	85	82	87	62	33	10	9	13	667

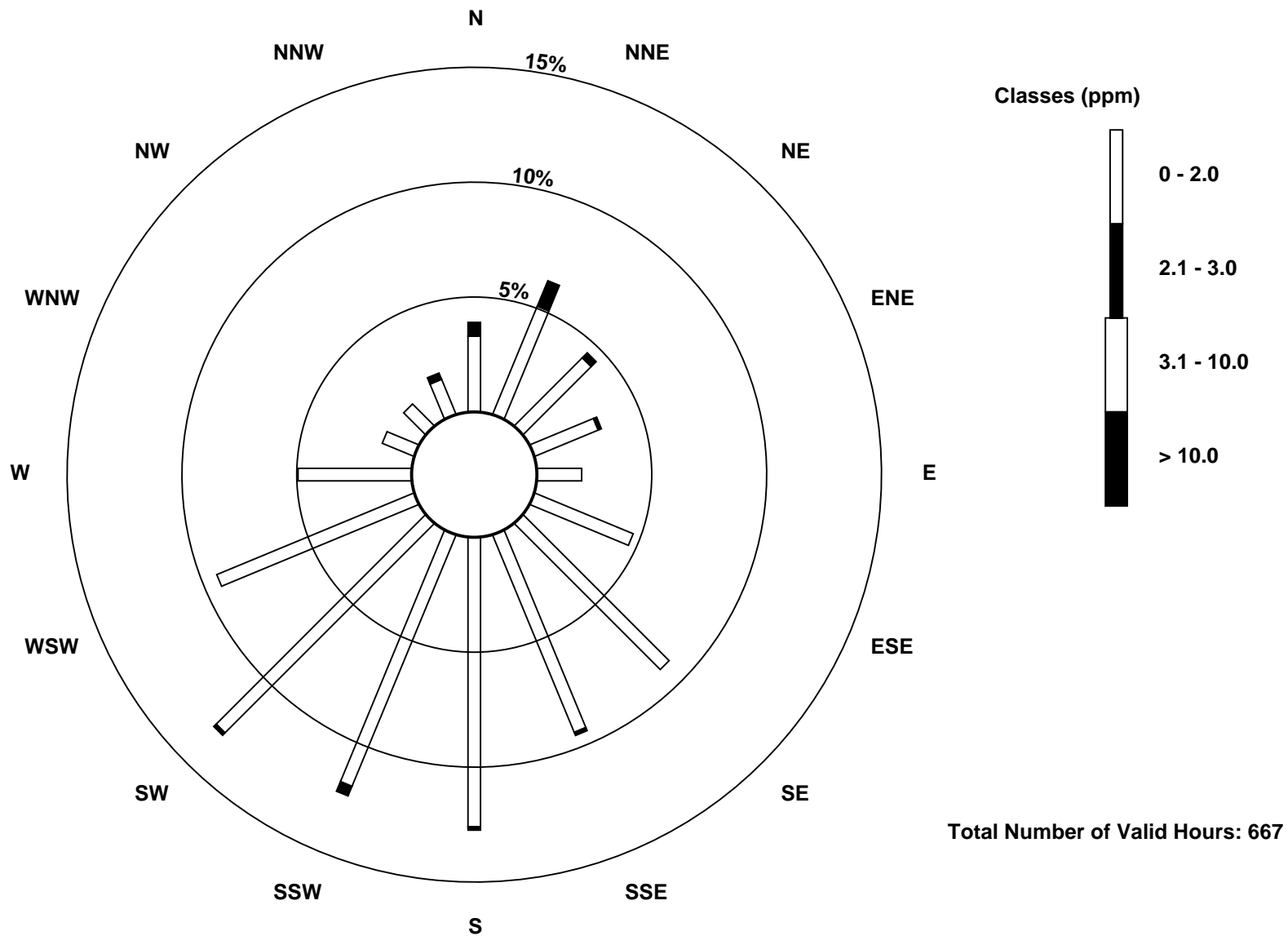
Total Number of Valid Hours: 667

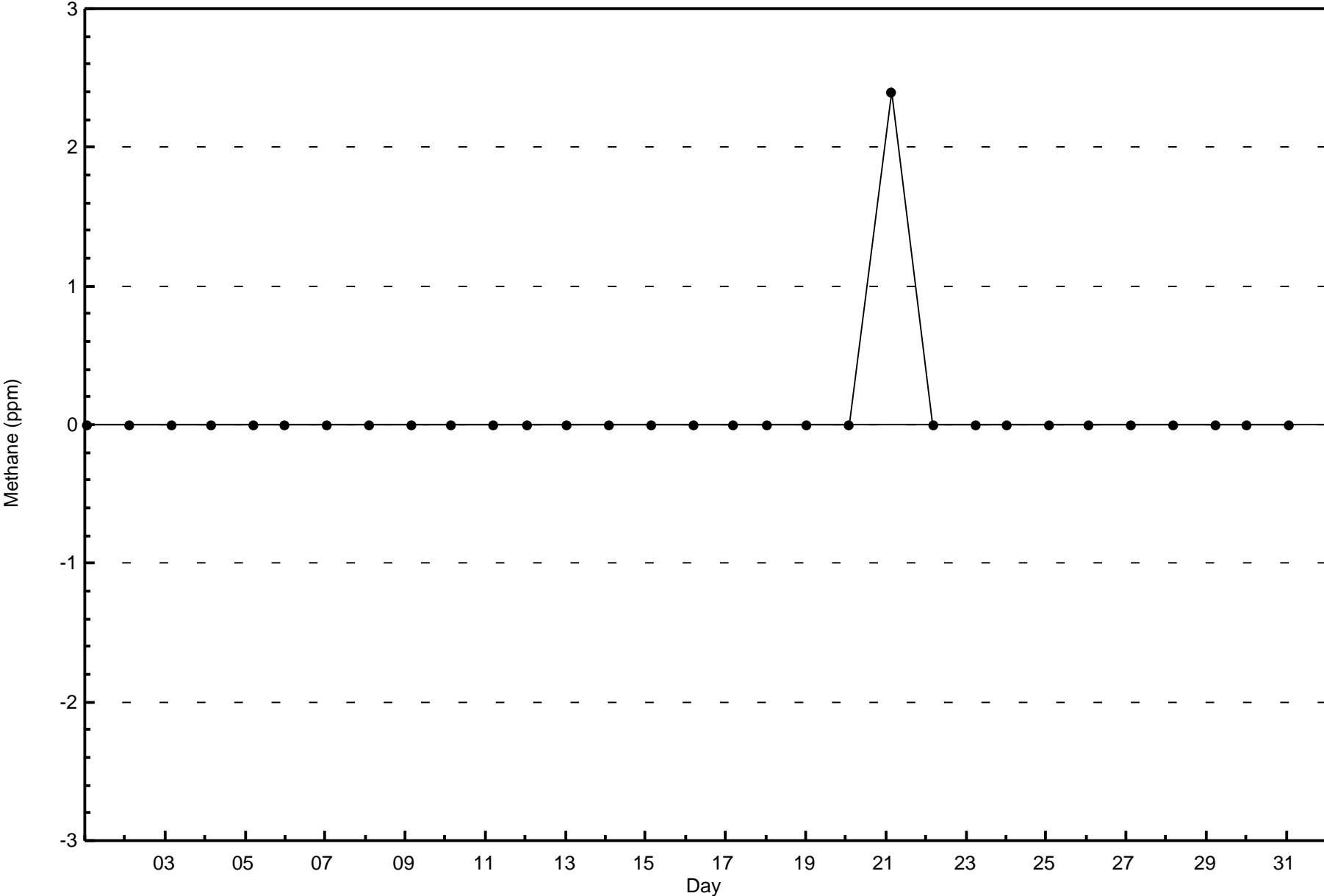
Total Number of Hours: 744

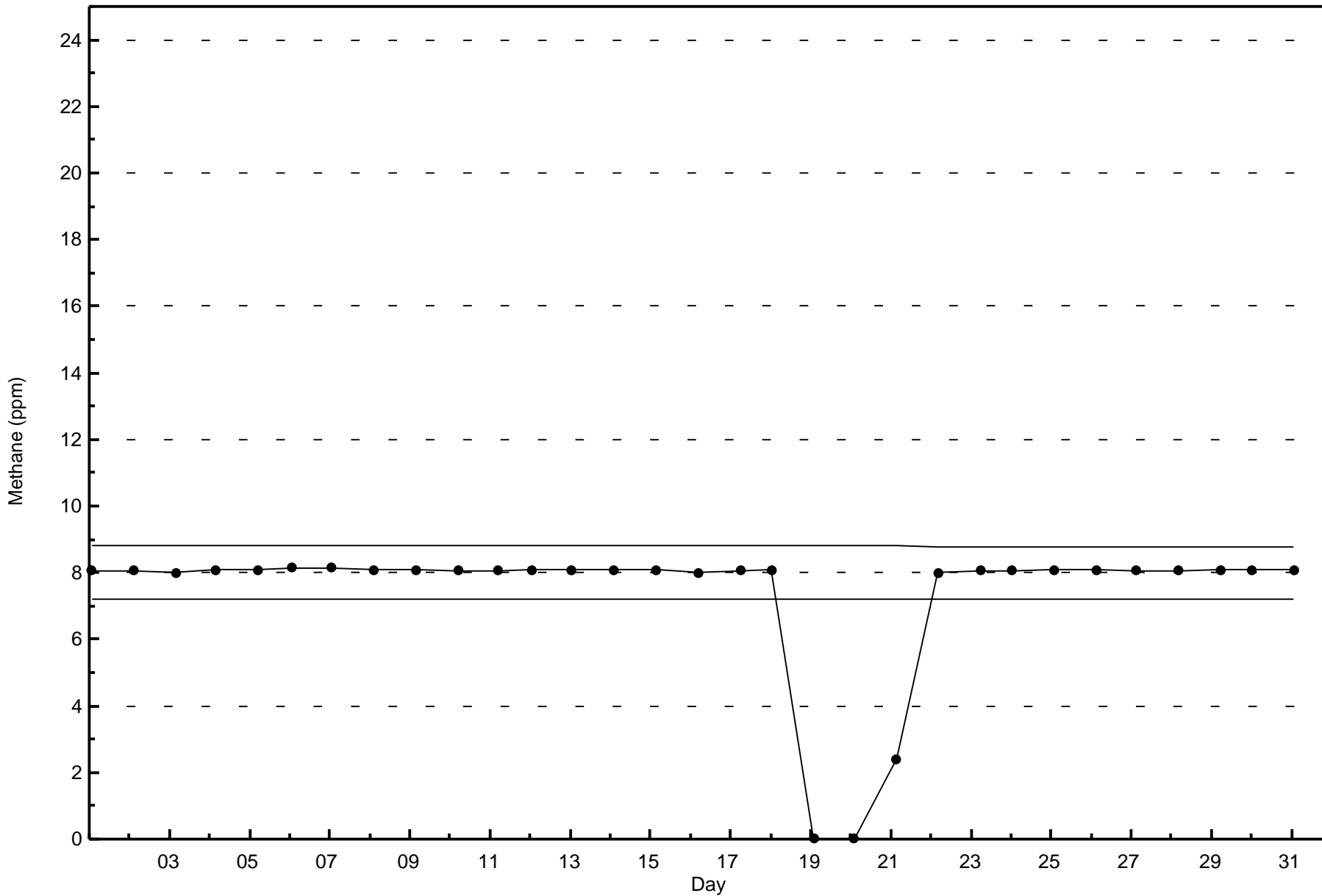


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Methane (CH₄) - ppm
Janvier (AMS 22)



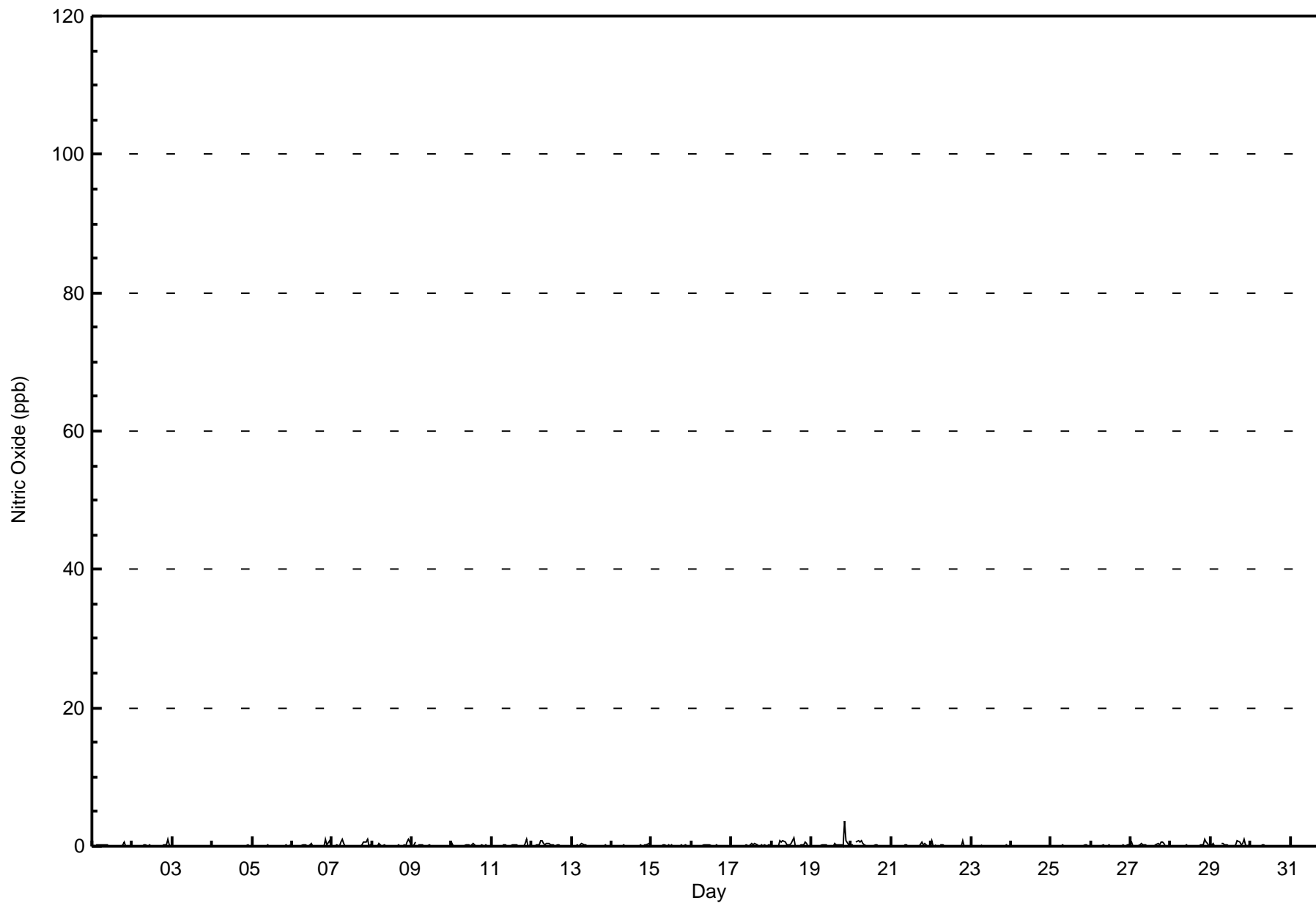






Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Janvier - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Janvier - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



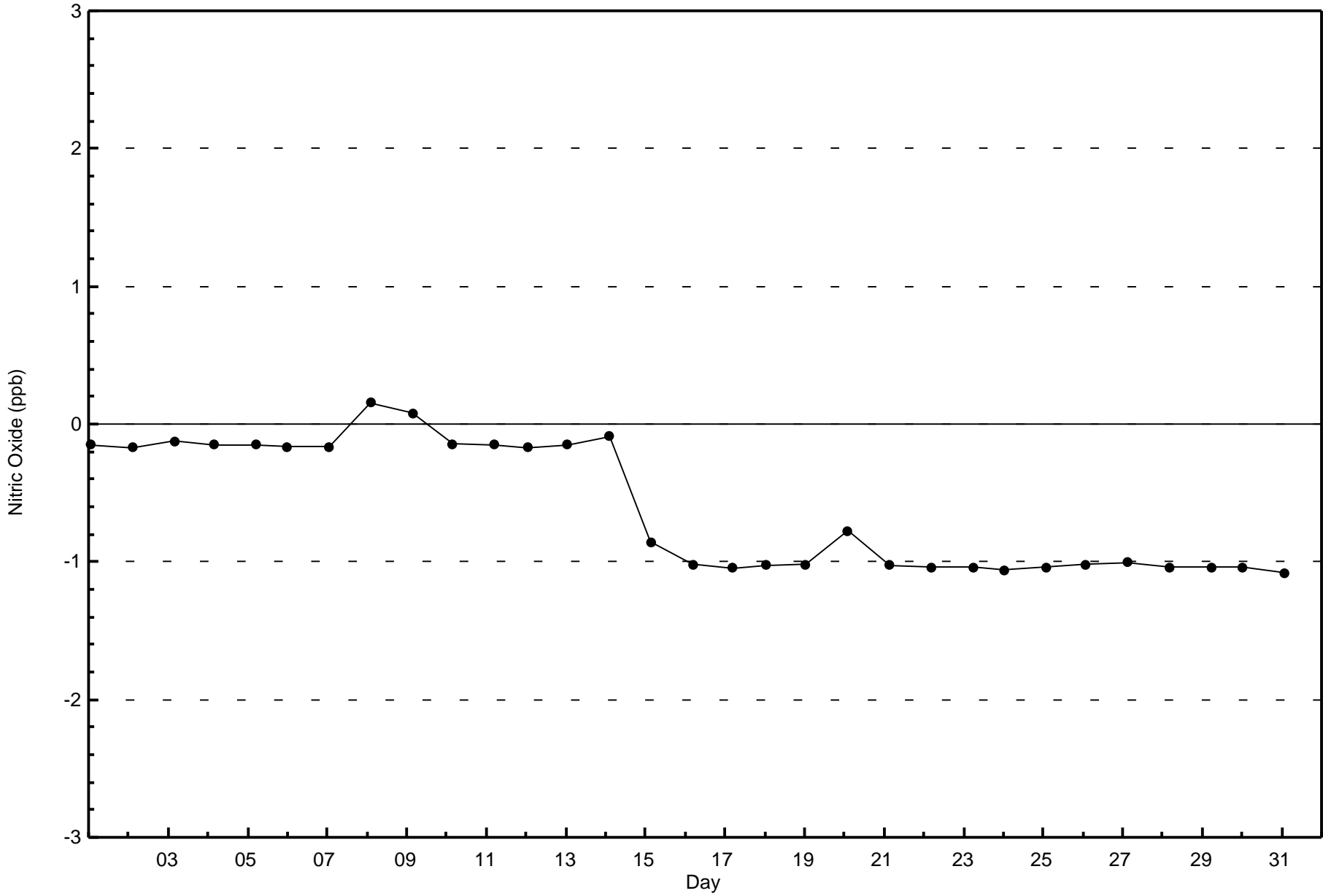
**Wood Buffalo Environmental Association
Frequency Distribution**

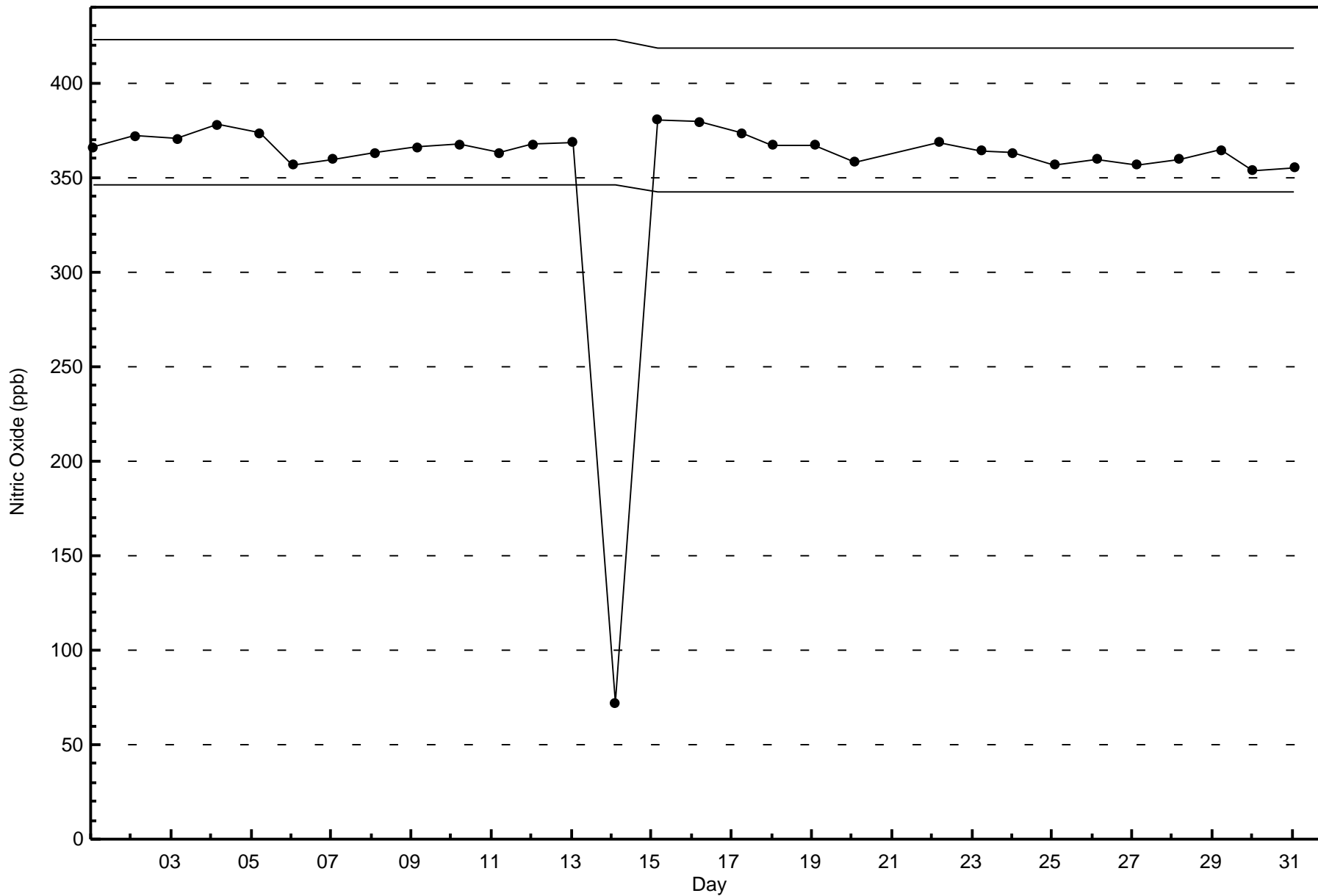
**Nitric Oxide (NO) - ppb
Janvier - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708
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	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708

Total Number of Valid Hours: 708

Total Number of Hours: 744







Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2 ppb on Jul 19 21:00	Maximum Daily Average: 0.9 ppb on Jul 27		Hours of Data:	708
Minimum Value: 0 ppb on Jul 5 11:00	Minimum Daily Average: 0.2 ppb on Jul 5		Hours of Missing Data:	36
Maximum Diurnal Average: 0.6 ppb at hour 21	Minimum Diurnal Average: 0.3 ppb at hour 17		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-Jul	1	Z	1	1	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0.5	1
2-Jul	0	0	Z	1	0	1	1	1	1	0	1	1	0	1	0	0	0	0	1	1	1	2	1	0	0.5	2
3-Jul	1	1	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
4-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1
5-Jul	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
6-Jul	Z	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1	1	0.4	2
7-Jul	1	Z	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	1	0.4	2
8-Jul	1	0	Z	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0.6	1
9-Jul	0	0	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
10-Jul	2	0	0	0	Z	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0	1	0	1	0	0.5	2
11-Jul	0	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0.5	1
12-Jul	Z	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	0.7	1
13-Jul	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0.6	1
14-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	0	1	0	0	0.2	1
15-Jul	1	2	0	Z	0	0	0	1	0	1	1	0	1	0	0	1	0	0	0	0	1	1	0	0	0.5	2
16-Jul	0	0	1	1	Z	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0.6	2
17-Jul	1	0	0	0	0	Z	1	1	1	1	0	1	2	2	1	1	1	1	1	1	0	0	1	1	0.6	2
18-Jul	Z	1	0	0	0	0	1	1	1	1	1	1	1	2	0	0	0	0	1	1	1	1	0	0	0.6	2
19-Jul	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	1	0	0.6	2
20-Jul	0	0	Z	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	0.4	1
21-Jul	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.2	1
22-Jul	0	0	0	0	Z	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.3	1
23-Jul	0	1	1	1	1	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
24-Jul	Z	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	0.4	1
25-Jul	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	0.7	1
27-Jul	1	0	1	Z	2	1	2	2	2	2	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0.9	2
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0.4	1
29-Jul	1	1	0	0	1	Z	1	1	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	1	0.5	1
30-Jul	Z	1	0	0	0	0	0	1	1	0	1	0	0	1	1	1	1	1	0	0	0	0	0	1	0.4	1
31-Jul	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	0.5	2

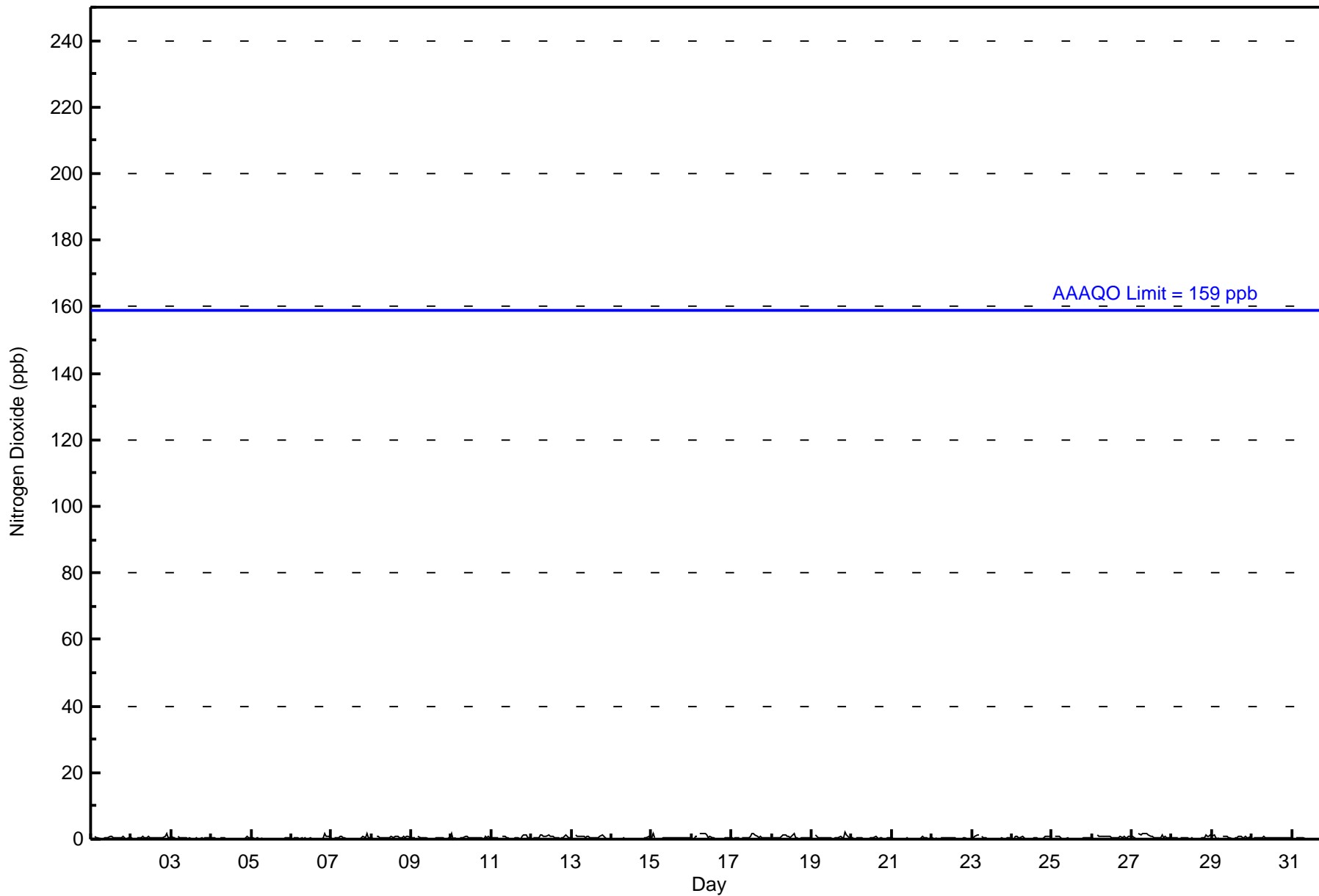
0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.6	0.6	0.5	0.5	Diurnal Average
2	2	1	1	2	2	2	2	2	2	1	1	2	2	1	1	1	1	1	1	2	2	2	2	Diurnal Maximum

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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Janvier - July 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	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708
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	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708

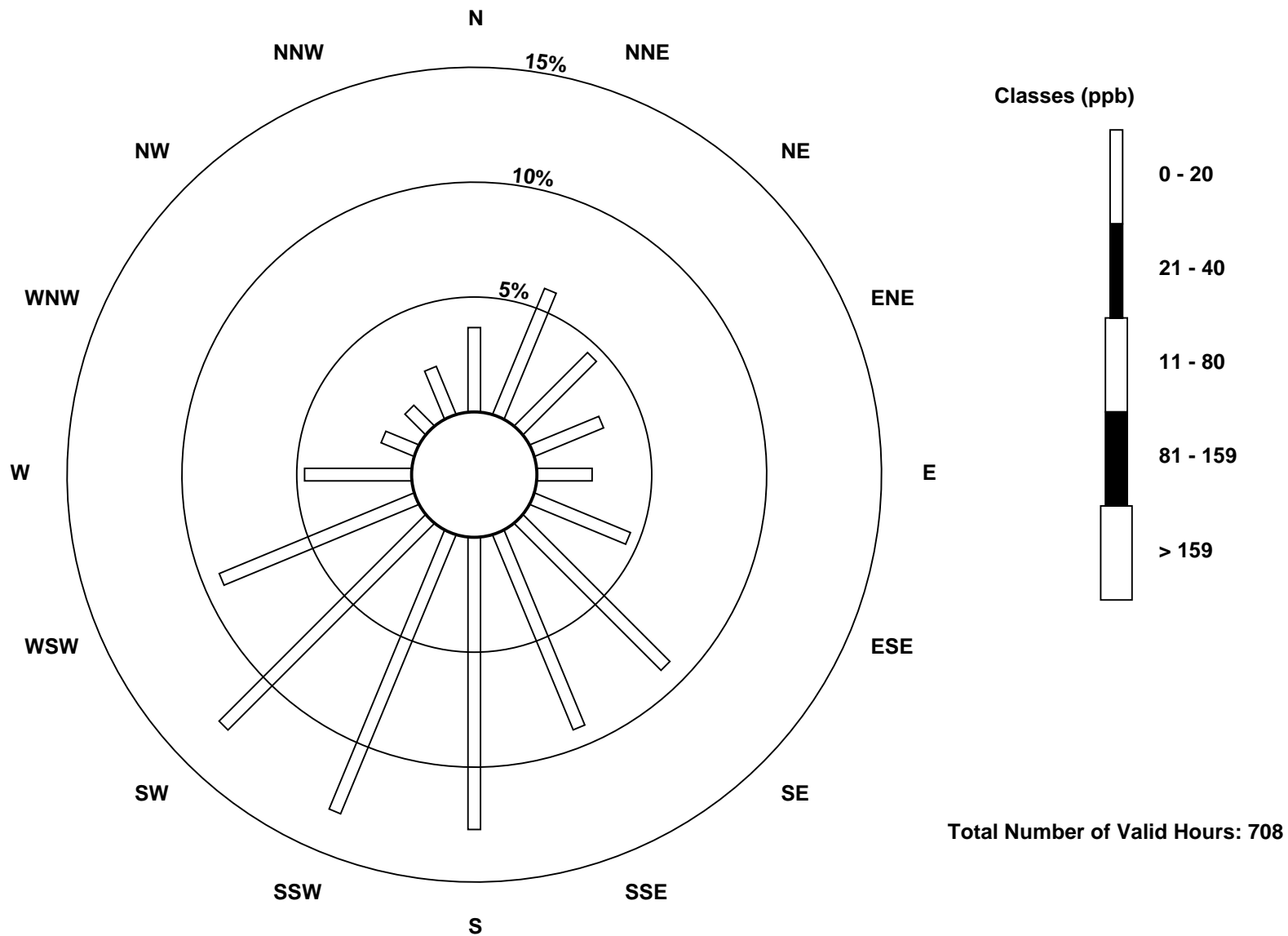
Total Number of Valid Hours: 708

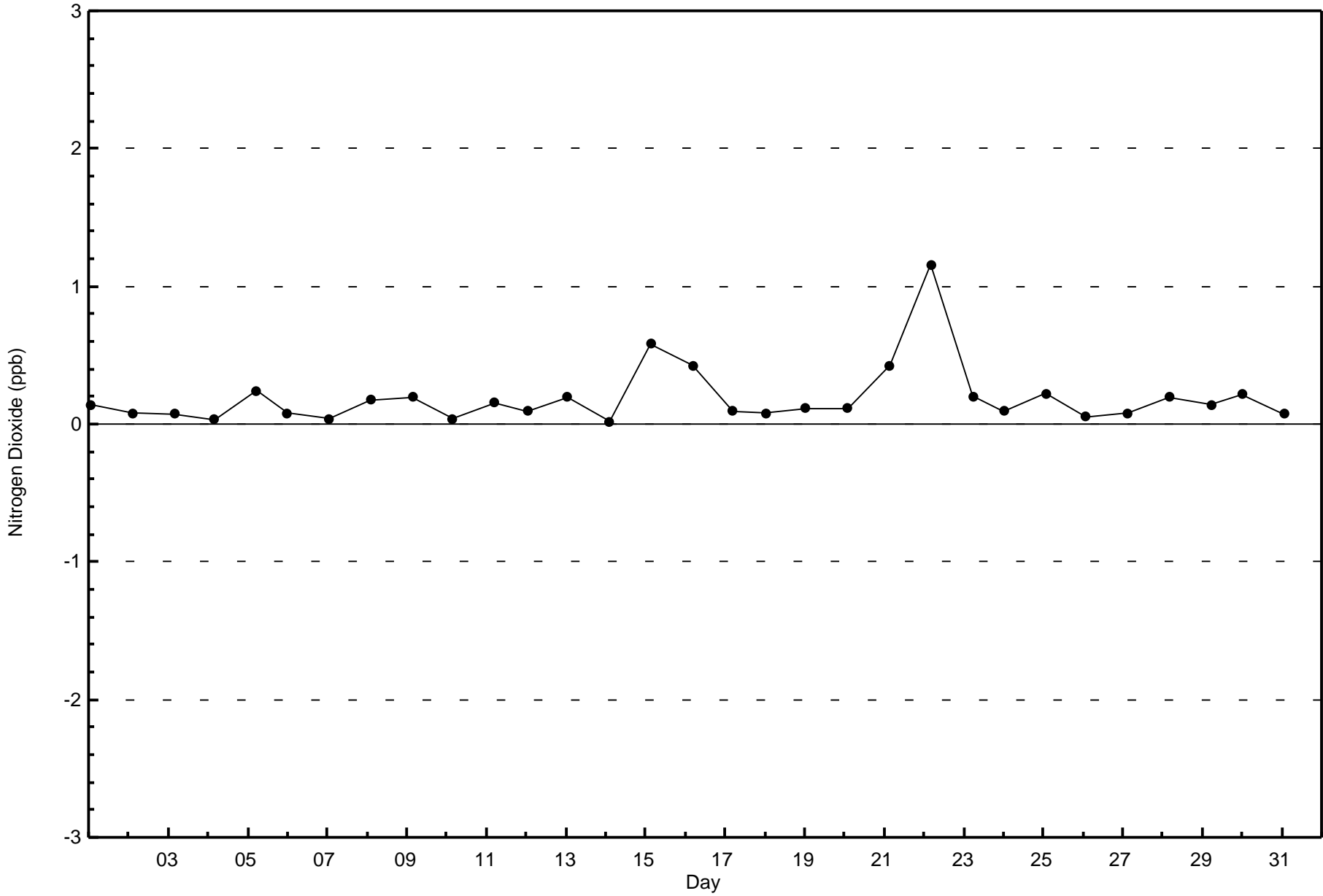
Total Number of Hours: 744

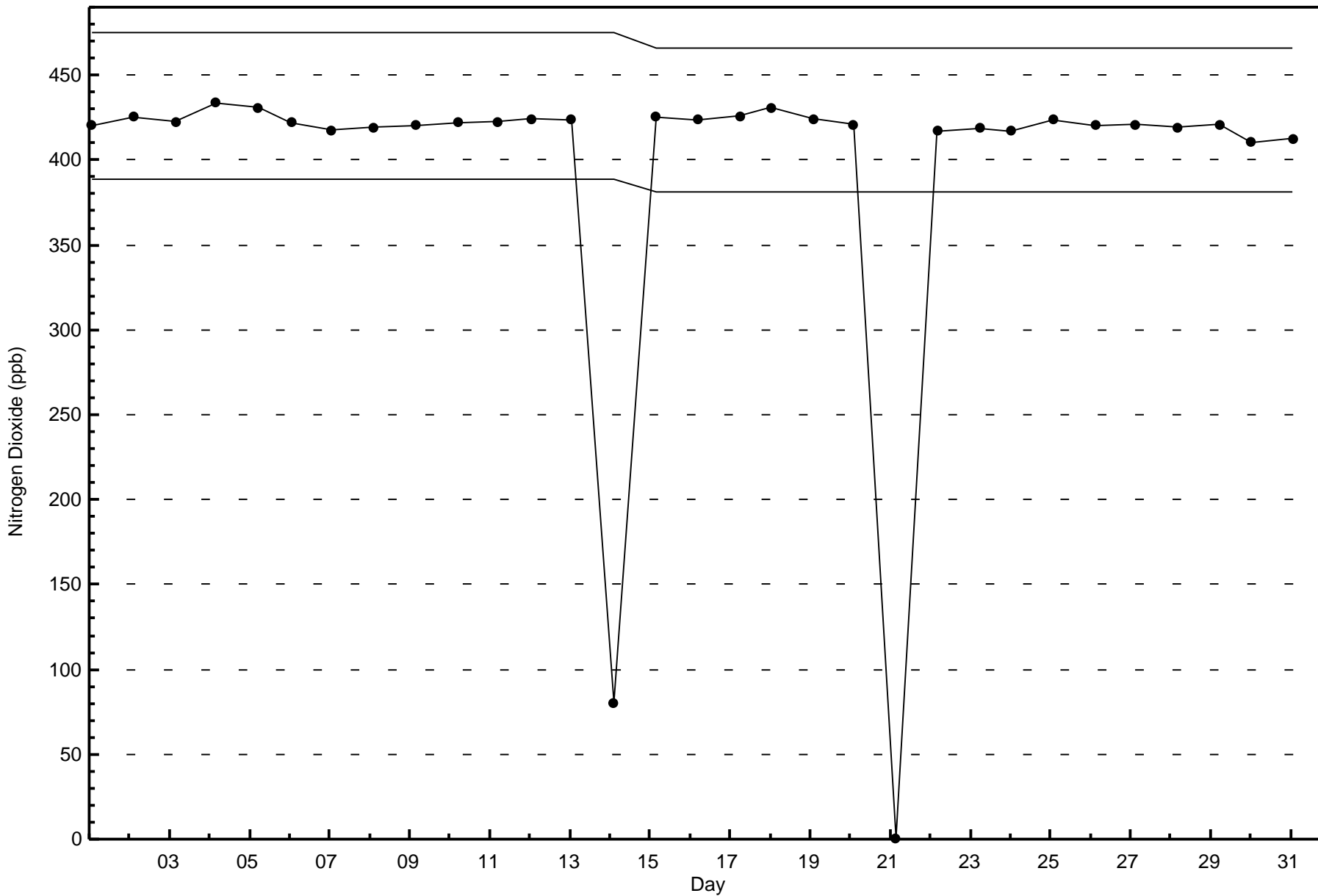


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Janvier (AMS 22)







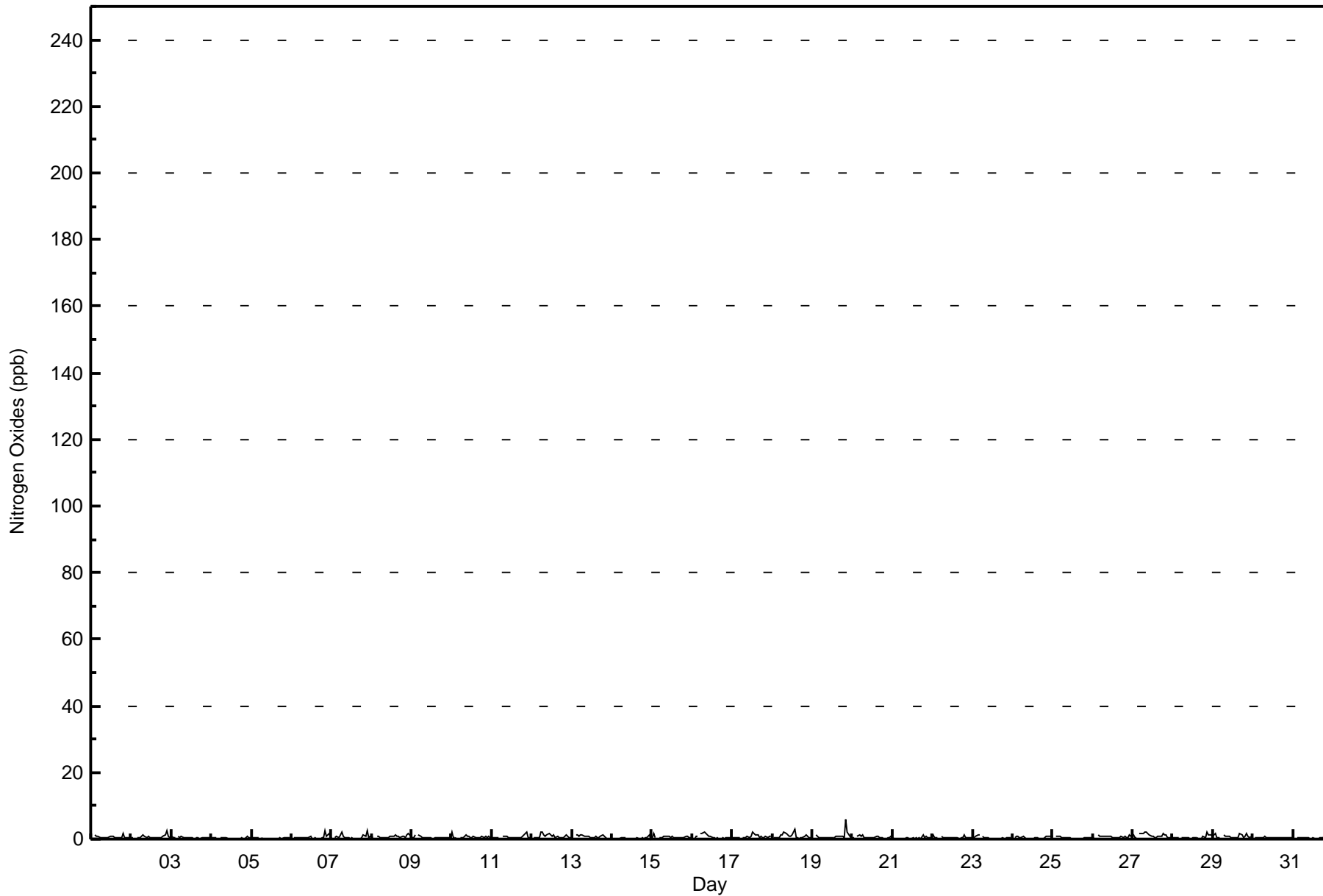


Maximum Value: 6 ppb on Jul 19 21:00		Maximum Daily Average: 1.1 ppb on Jul 27		Hours in Service: 744																						
Minimum Value: 0 ppb on Jul 5 12:00		Minimum Daily Average: 0.2 ppb on Jul 5		Hours of Data: 708																						
Maximum Diurnal Average: 1.0 ppb at hour 21		Minimum Diurnal Average: 0.4 ppb at hour 17		Hours of Missing Data: 36																						
Monthly Average: 0.6 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2		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-Jul	1	Z	1	1	1	0	0	0	0	0	1	1	1	1	1	0	0	0	1	2	0	0	1	1	0.6	2
2-Jul	0	0	Z	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	3	1	0	0.7	3
3-Jul	1	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
4-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.3	1
5-Jul	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2	1
6-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1	2	0.5	2
7-Jul	1	Z	0	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	1	0.7	3
8-Jul	1	0	Z	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2	1	0.7	2
9-Jul	0	1	1	Z	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.5	1
10-Jul	2	0	0	0	Z	0	0	1	1	1	1	0	0	1	0	0	0	0	1	0	1	1	1	0	0.6	2
11-Jul	0	0	0	0	0	Z	1	1	1	1	0	0	0	0	0	1	0	0	1	1	2	2	1	0	0.7	2
12-Jul	Z	0	0	1	0	2	2	1	1	1	2	1	1	1	1	1	1	0	0	0	1	1	1	1	0.9	2
13-Jul	0	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0.7	1
14-Jul	0	0	Z	0	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	0	1	0	1	0	0.3	1
15-Jul	1	2	0	Z	0	0	0	1	1	1	1	0	1	1	0	1	0	0	1	0	1	1	0	0	0.6	2
16-Jul	0	0	1	1	Z	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.7	2
17-Jul	1	0	0	0	0	Z	1	1	0	1	1	1	2	2	1	1	1	1	1	1	0	1	0	1	0.7	2
18-Jul	Z	1	0	0	0	1	1	2	2	1	1	1	1	3	0	0	0	0	1	1	1	1	0	0	0.9	3
19-Jul	0	Z	1	1	0	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1	6	2	1	0	0.9	6
20-Jul	0	0	Z	1	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0.6	1
21-Jul	0	0	0	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0.3	1
22-Jul	1	0	0	0	Z	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.4	1
23-Jul	0	1	1	1	1	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
24-Jul	Z	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	0.4	1
25-Jul	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
26-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	1	1	0.7	1
27-Jul	1	0	0	Z	2	2	2	2	2	2	1	1	1	0	0	1	1	1	2	1	1	1	0	0	1.1	2
28-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0.5	2
29-Jul	1	2	0	0	1	Z	1	1	1	1	1	0	0	0	0	1	2	1	0	1	2	1	0	1	0.8	2
30-Jul	Z	1	0	0	0	0	0	1	1	0	0	0	0	1	1	1	1	0	0	1	0	0	0	1	0.5	1
31-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	0.5	2
		0.6	0.5	0.5	0.6	0.6	0.7	0.8	0.7	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.6	1.0	0.9	0.7	0.6	Diurnal Average
		2	2	1	1	2	2	2	2	2	2	2	1	2	3	1	1	2	1	2	2	6	3	2	2	Diurnal Maximum
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Janvier - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - July 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	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708
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	26	42	32	23	17	32	64	65	90	93	90	65	33	11	9	16	708

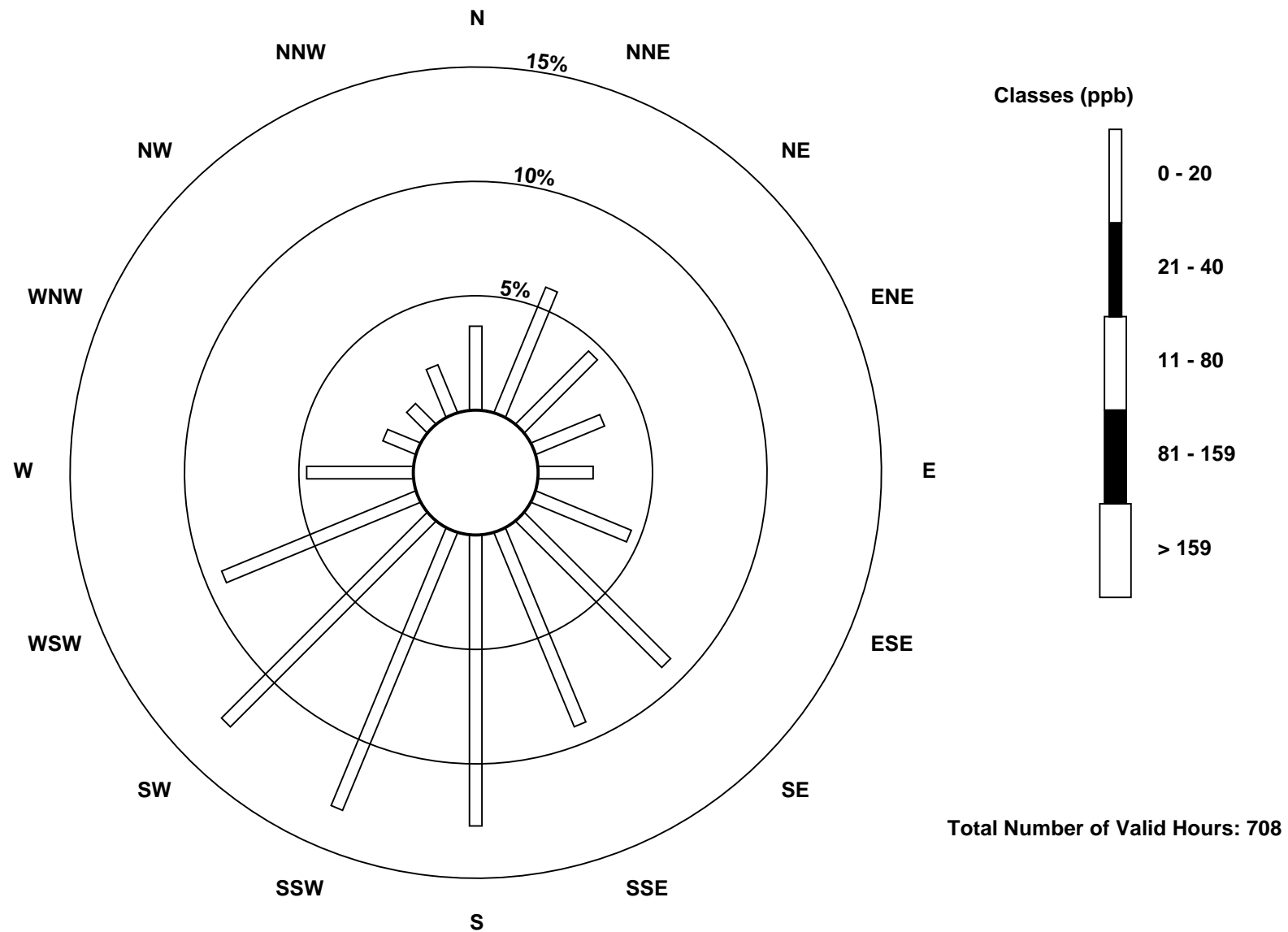
Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

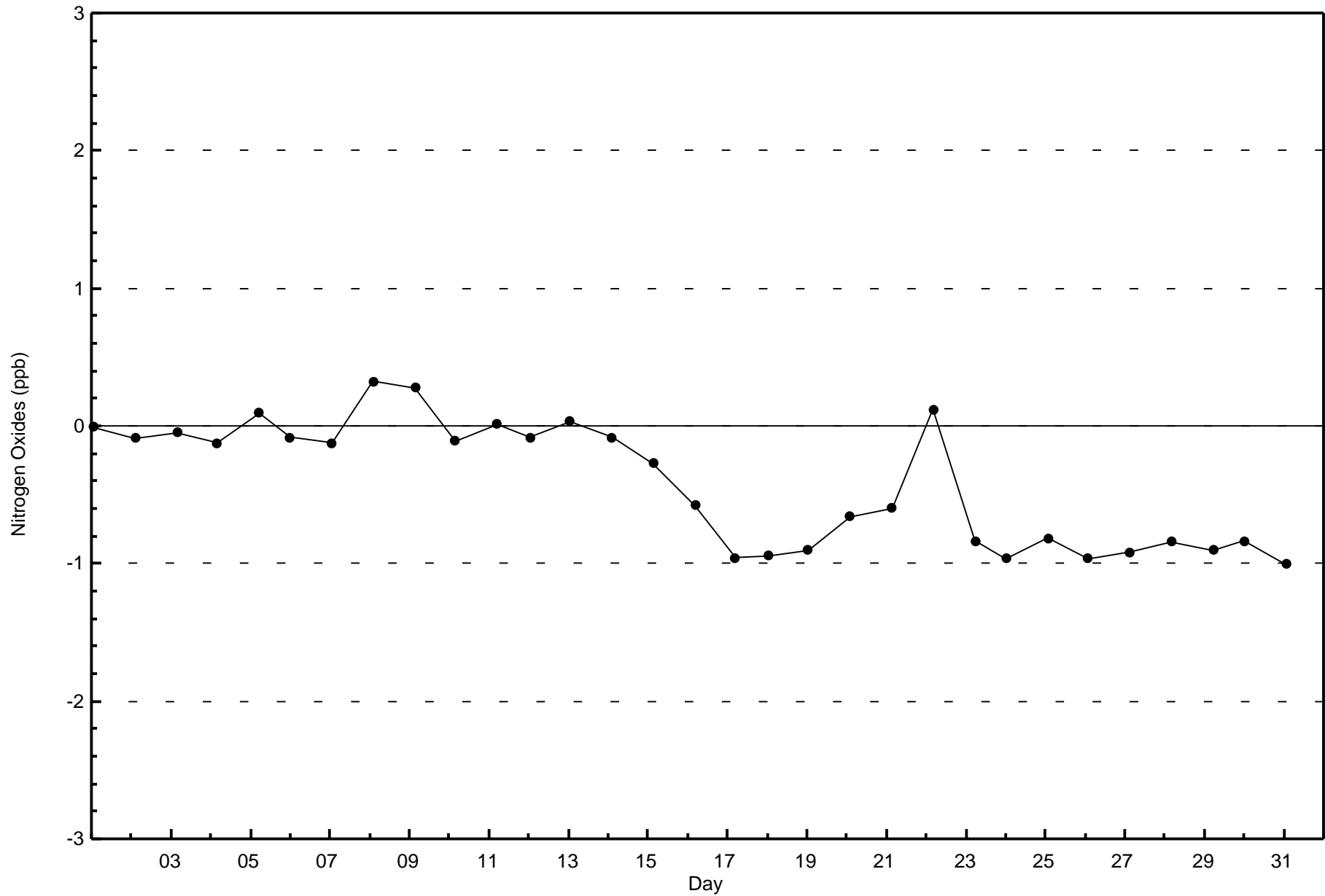
Nitrogen Oxides (NO_x) - ppb
Janvier (AMS 22)

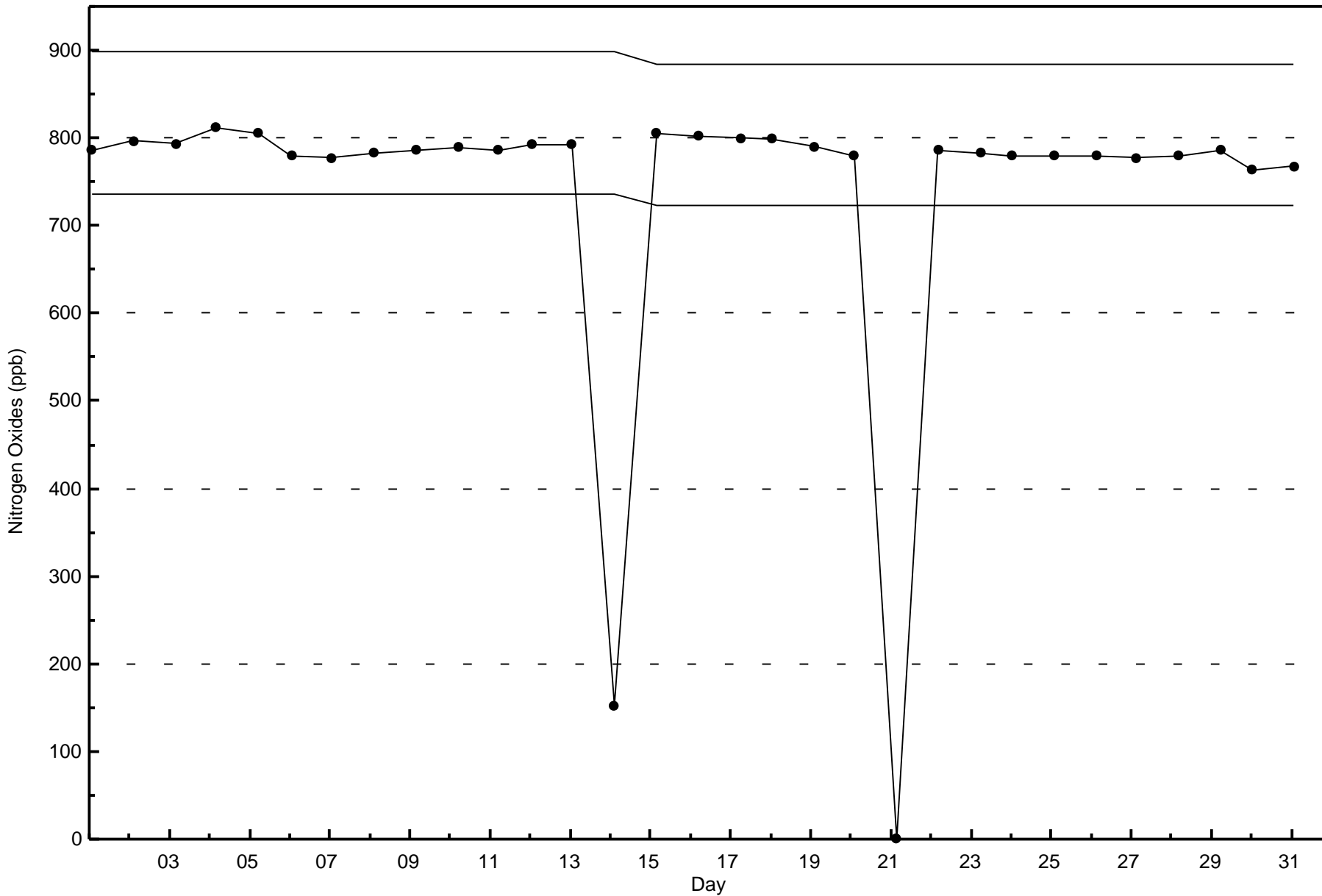




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Janvier - July 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

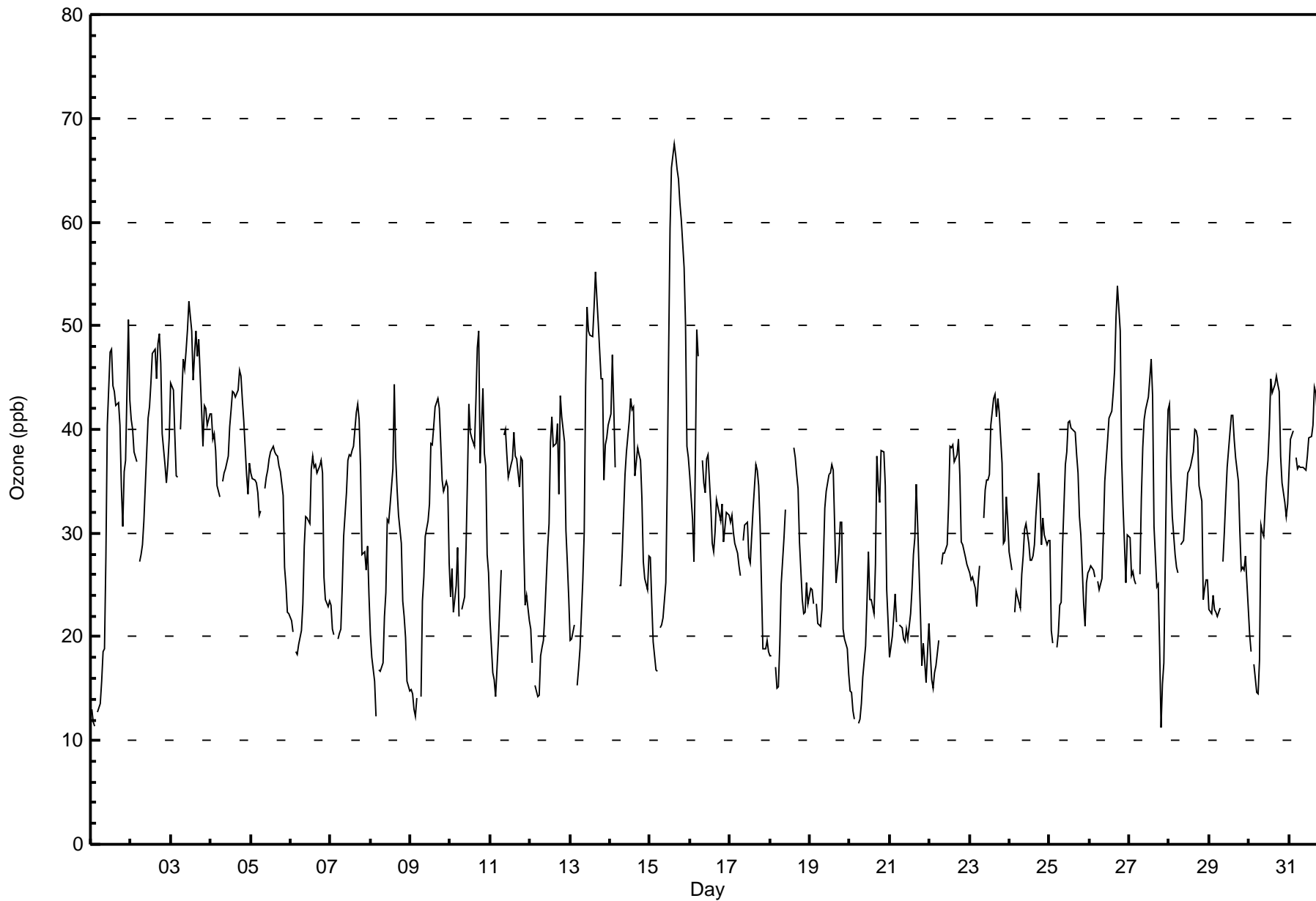
Janvier - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																							
Maximum Value: 68 ppb on Jul 15 15:00										Maximum Daily Average: 44.1 ppb on Jul 3										Hours of Data: 709																													
Minimum Value: 11 ppb on Jul 27 20:00										Minimum Daily Average: 22.2 ppb on Jul 21										Hours of Missing Data: 35																													
Maximum Diurnal Average: 40.2 ppb at hour 17										Minimum Diurnal Average: 22.9 ppb at hour 6										Hours of Calibration: 35																													
Monthly Average: 31.8 ppb										Percentiles: P ₁ = 12 P ₁₀ = 19 Q ₁ = 24 Median = 32 Q ₃ = 38 P ₉₀ = 44 P ₉₉ = 59										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-Jul	13	12	11	Z	13	14	16	19	19	28	40	48	48	44	44	42	43	40	34	31	36	37	51	43	31.5	51																							
2-Jul	41	40	38	Z	37	Z	27	28	29	31	38	41	42	45	47	48	45	48	49	46	40	37	35	37	39	39.4	49																						
3-Jul	45	44	40	35	35	Z	40	47	46	48	50	52	49	45	47	49	47	49	42	38	42	42	40	41	44.1	52																							
4-Jul	42	39	40	38	35	33	Z	35	36	36	37	40	42	44	44	43	44	46	45	43	41	36	34	37	39.5	46																							
5-Jul	36	35	35	35	34	32	32	Z	34	35	36	37	38	38	38	38	37	37	36	34	27	25	22	22	33.6	38																							
6-Jul	22	20	Z	19	18	19	21	23	29	32	31	31	36	37	36	37	36	36	37	36	26	24	23	23	28.3	37																							
7-Jul	23	21	20	Z	20	20	21	25	30	34	37	38	37	38	38	42	42	41	36	28	28	26	29	24	30.4	42																							
8-Jul	20	18	16	12	Z	17	17	17	22	24	31	31	33	36	44	37	34	32	29	23	22	20	16	15	24.7	44																							
9-Jul	15	15	13	12	14	Z	14	23	26	30	31	33	39	39	40	42	43	42	39	35	34	35	34	27	29.4	43																							
10-Jul	24	27	22	25	29	22	Z	23	24	29	35	42	40	39	38	43	48	50	37	44	38	36	28	26	33.4	50																							
11-Jul	22	17	16	14	17	20	26	Z	40	40	38	35	37	37	40	37	37	34	37	37	29	23	24	22	29.5	40																							
12-Jul	21	18	Z	15	14	14	18	19	20	22	29	31	39	41	38	39	40	34	43	41	39	30	27	24	28.5	43																							
13-Jul	20	20	21	Z	15	17	19	25	30	44	52	50	49	49	52	55	53	50	45	45	35	39	39	40	37.6	55																							
14-Jul	41	47	42	36	Z	25	25	28	32	36	38	41	43	42	42	36	38	38	37	33	27	26	25	28	35.0	47																							
15-Jul	28	23	20	17	17	Z	21	21	22	25	35	47	59	65	68	67	65	64	62	60	56	50	38	37	42.0	68																							
16-Jul	36	31	27	37	50	47	Z	37	35	34	37	38	33	29	28	30	33	32	31	33	29	31	32	32	33.9	50																							
17-Jul	31	32	30	29	28	27	26	Z	29	31	31	28	27	30	32	37	36	35	31	25	19	19	20	19	28.2	37																							
18-Jul	18	18	Z	17	15	15	19	25	30	32	C	C	C	C	38	37	36	34	29	24	22	22	25	23	25.3	38																							
19-Jul	25	24	23	Z	23	21	21	23	27	32	34	36	36	37	36	31	25	28	31	31	21	20	19	16	27.0	37																							
20-Jul	15	15	13	12	Z	12	12	14	16	19	23	28	24	24	22	27	37	35	33	38	38	35	25	21	23.3	38																							
21-Jul	18	20	22	24	21	Z	21	21	20	20	21	20	22	25	28	29	35	31	22	17	19	18	16	21	22.2	35																							
22-Jul	19	16	15	17	17	20	Z	27	28	28	29	33	38	38	39	37	38	39	36	29	29	28	27	27	28.3	39																							
23-Jul	26	25	26	25	23	25	27	Z	31	34	35	35	36	40	43	43	41	43	42	37	29	29	33	31	33.1	43																							
24-Jul	28	26	Z	22	24	24	23	26	28	30	31	29	27	27	28	29	32	36	33	29	31	30	29	29	28.4	36																							
25-Jul	29	21	19	Z	19	20	23	23	29	37	38	41	41	40	40	40	38	36	32	30	23	21	25	26	30.0	41																							
26-Jul	26	27	26	26	Z	25	25	26	30	35	37	39	41	42	43	46	51	54	50	37	33	29	25	30	34.9	54																							
27-Jul	30	26	26	25	25	Z	26	33	38	41	42	43	45	47	43	31	25	25	19	11	15	18	37	42	31.0	47																							
28-Jul	42	35	32	28	27	26	Z	29	29	31	34	36	36	37	38	40	40	39	35	33	24	25	26	25	32.4	42																							
29-Jul	23	22	24	23	22	22	23	Z	27	30	33	36	40	41	41	39	37	35	30	26	27	26	28	23	29.6	41																							
30-Jul	20	19	Z	17	15	15	18	31	30	30	35	37	40	45	43	44	45	44	44	37	35	33	32	33	32.3	45																							
31-Jul	36	39	40	Z	37	36	36	36	36	36	36	37	39	39	40	44	44	41	42	39	32	30	28	26	37.0	44																							
																								26.9	25.5	25.3	23.9	23.4	22.9	23.0	26.3	29.1	32.3	35.3	37.1	38.6	39.4	40.0	39.8	40.2	39.6	36.9	33.7	30.4	28.9	28.8	28.2	Diurnal Average	
																								45	47	42	38	50	47	40	47	46	48	52	52	59	65	68	67	65	64	62	60	56	50	51	43	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Janvier - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Janvier - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	101	14.25	14.25
21 - 50	591	83.36	97.60
51 - 82	17	2.40	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Janvier - July 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	1	3	0	0	0	4	19	22	33	5	3	4	3	1	0	3	101
21 - 50	23	39	30	20	17	27	44	40	61	87	80	61	30	10	9	13	591
51 - 82	0	1	1	1	0	1	1	6	3	0	1	1	1	0	0	0	17
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	43	31	21	17	32	64	68	97	92	84	66	34	11	9	16	709

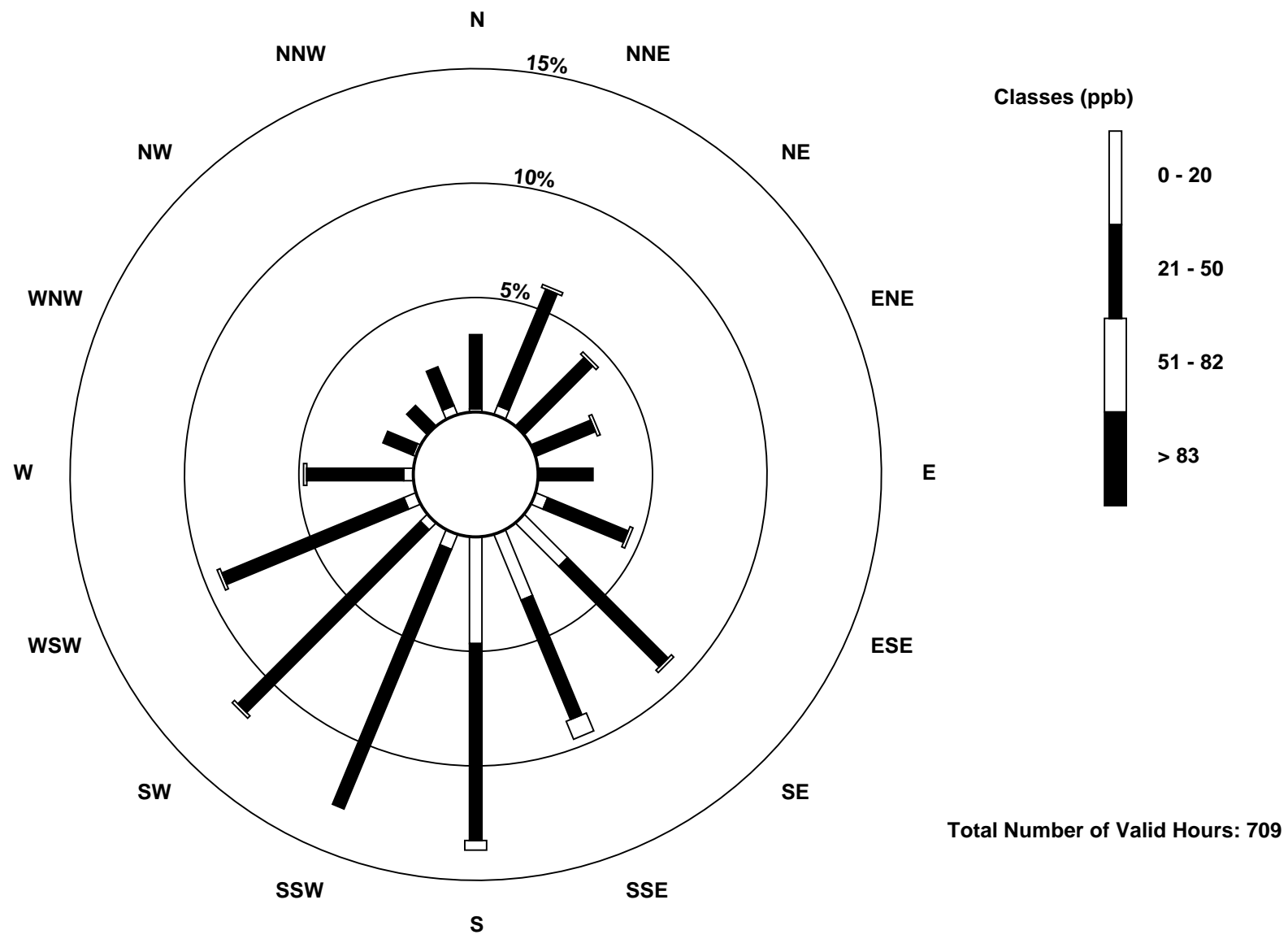
Total Number of Valid Hours: 709

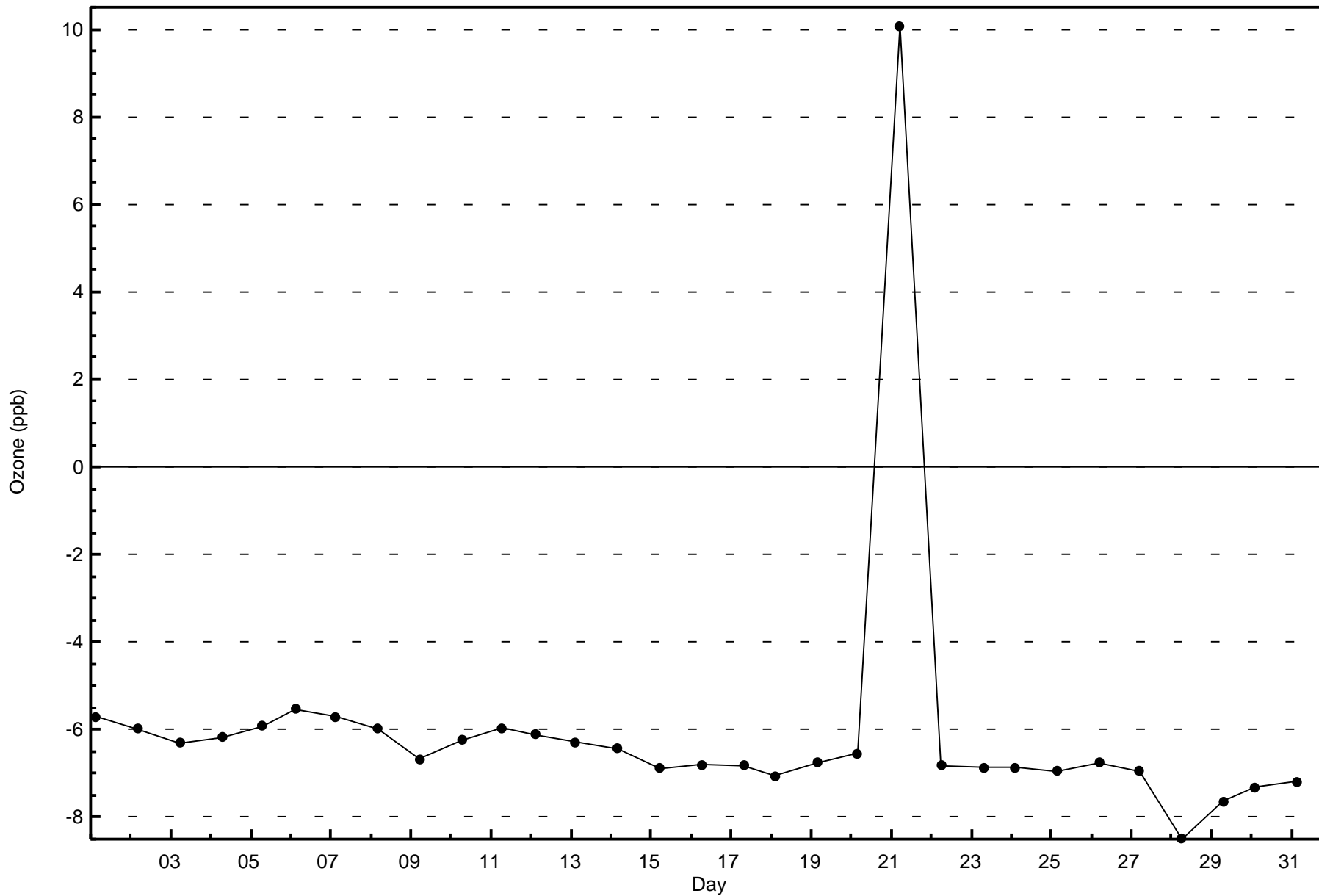
Total Number of Hours: 744

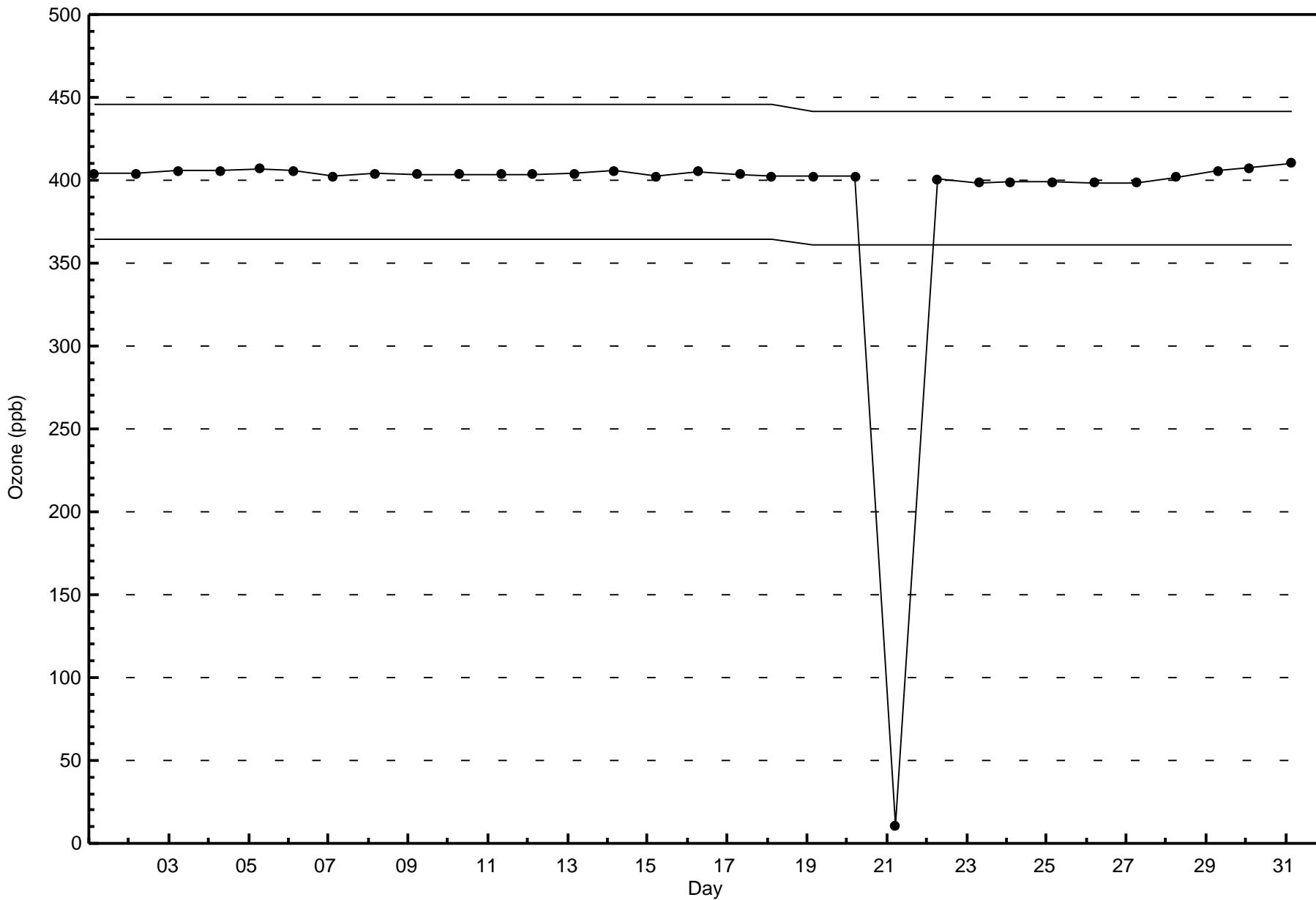


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Ozone (O₃) - ppb
Janvier (AMS 22)









Summary of Hour Averages

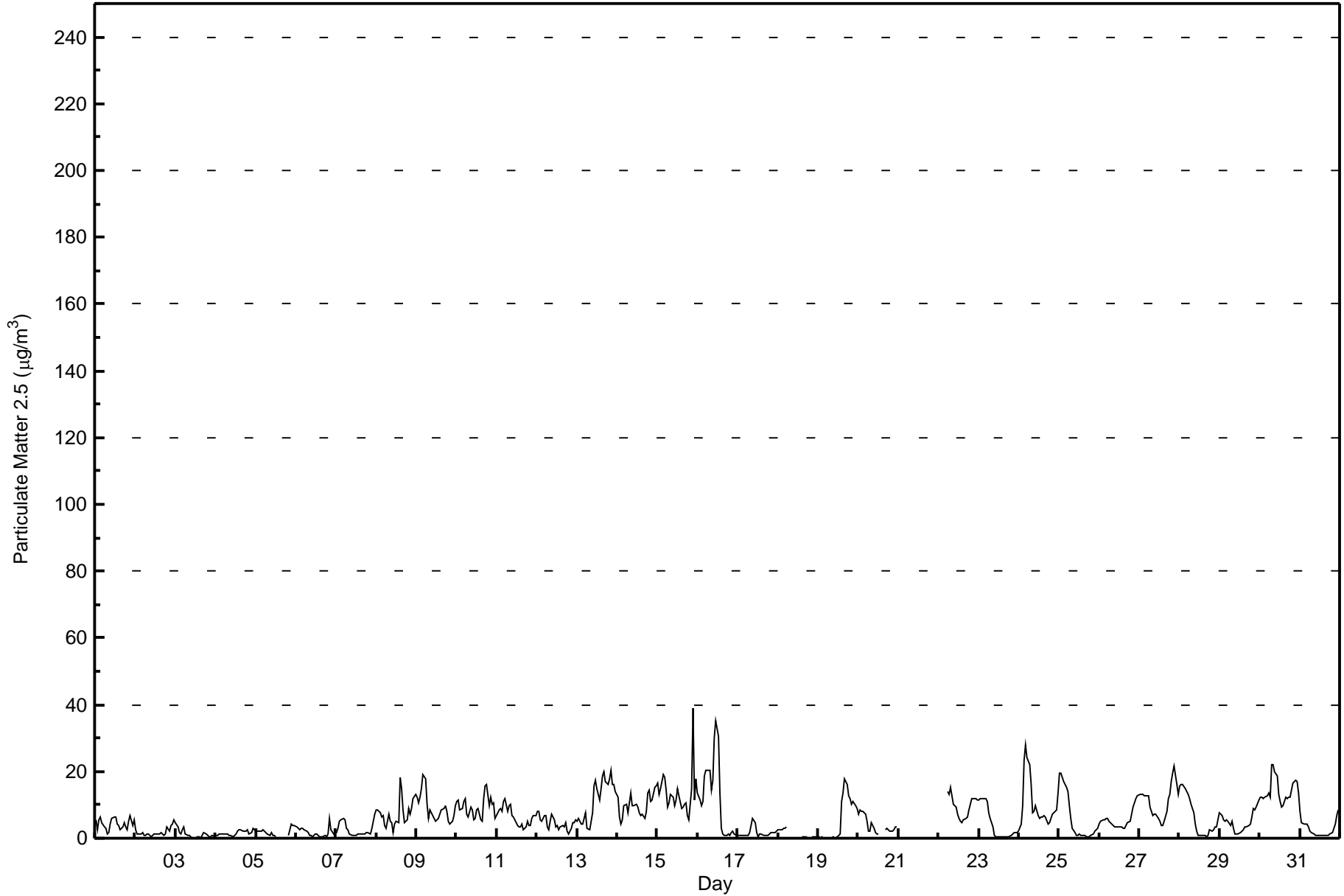
Janvier - July 2017

Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 39.0 µg/m ³ on Jul 15 22:00 Minimum Value: 0.1 µg/m ³ on Jul 19 08:00 Maximum Diurnal Average: 8.6 µg/m ³ at hour 5 Monthly Average: 6.27 µg/m ³		Maximum Daily Average: 14.2 µg/m ³ on Jul 30 Minimum Daily Average: 1.2 µg/m ³ on Jul 3 Minimum Diurnal Average: 4.3 µg/m ³ at hour 14 Percentiles: P ₁ = 0.2 P ₁₀ = 0.7 Q ₁ = 1.6 Median = 4.7 Q ₃ = 9.6 P ₉₀ = 14.2 P ₉₉ = 22.7		Hours in Service: 744 Hours of Data: 696 Hours of Missing Data: 48 Hours of Calibration: 2 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-Jul	5.6	2.5	5.5	6.2	4.6	3.6	2.8	1.3	1.7	4.2	5.8	6.2	6.3	4.2	3.8	2.7	3.3	4.5	3.4	2.7	4.9	7.0	3.7	5.7	4.3	7.0	
2-Jul	2.4	1.4	1.4	1.4	1.5	0.7	0.8	1.1	1.3	0.4	0.8	1.4	1.1	1.4	1.1	1.6	1.2	1.0	1.5	3.6	2.0	3.8	4.4	5.4	1.8	5.4	
3-Jul	4.7	3.4	1.5	1.4	2.6	3.3	1.3	0.7	0.7	0.4	0.2	UO	0.5	0.4	0.3	0.1	0.9	1.6	1.3	0.7	0.2	0.4	0.7	0.5	1.2	4.7	
4-Jul	0.7	1.0	1.1	1.1	1.2	1.3	1.4	1.3	0.8	0.7	0.6	0.8	1.1	1.9	2.5	2.4	2.1	1.9	1.9	2.6	1.2	1.6	3.0	2.4	1.5	3.0	
5-Jul	2.1	2.2	2.2	1.9	2.6	1.9	1.6	1.1	0.8	1.6	0.7	0.6	0.5	UO	UO	UO	UO	UO	UO	0.9	2.4	4.1	3.7	3.8	1.9	4.1	
6-Jul	3.3	3.0	2.7	3.0	3.1	2.3	2.2	1.6	0.8	0.6	0.4	1.1	1.2	0.9	0.6	0.5	0.5	0.7	0.5	1.4	6.1	2.5	1.4	1.9	1.8	6.1	
7-Jul	1.9	3.1	5.1	5.4	6.1	5.7	3.1	2.4	1.4	0.7	0.7	1.0	1.1	1.2	1.2	1.3	1.2	1.4	1.6	1.8	1.2	3.1	5.1	7.3	2.7	7.3	
8-Jul	8.3	8.3	7.6	6.3	7.0	3.7	2.9	7.1	4.9	4.6	1.8	4.3	5.0	4.6	18.4	14.7	8.5	4.7	5.7	9.1	7.1	9.0	11.8	13.0	7.4	18.4	
9-Jul	12.1	10.4	12.3	15.0	19.1	17.8	10.2	5.9	8.6	7.7	6.0	5.0	5.4	6.1	7.0	8.5	8.9	9.6	7.9	5.2	4.1	4.9	6.6	9.8	8.9	19.1	
10-Jul	11.0	11.3	8.3	8.9	10.9	11.7	7.1	6.4	9.2	8.5	5.5	5.9	8.5	9.0	5.7	5.0	11.9	15.6	16.2	9.7	12.5	10.0	10.7	6.0	9.4	16.2	
11-Jul	6.6	8.6	8.8	7.9	10.9	12.0	8.3	9.7	10.2	6.6	6.2	5.5	3.9	3.6	3.6	4.1	2.6	3.2	5.2	3.7	4.0	5.8	6.7	6.7	6.4	12.0	
12-Jul	7.9	8.0	5.4	5.3	6.9	6.9	3.6	2.5	5.1	7.3	5.6	3.5	3.6	2.7	3.3	3.9	3.5	4.7	2.0	1.3	3.0	4.7	4.6	5.6	4.6	8.0	
13-Jul	5.0	6.1	4.4	4.4	6.1	7.7	3.2	2.7	4.9	7.7	15.5	17.4	14.9	11.4	14.8	18.8	19.9	16.9	16.1	17.9	20.4	16.2	16.1	14.2	11.8	20.4	
14-Jul	12.3	6.4	4.3	5.4	9.8	10.2	7.7	10.6	13.4	9.6	9.9	10.1	9.3	7.7	6.9	7.2	5.8	7.9	13.4	14.3	10.9	11.4	15.1	15.8	9.8	15.8	
15-Jul	16.4	13.2	14.9	18.9	18.0	14.4	9.2	10.8	13.3	12.2	9.6	11.5	14.6	12.7	9.0	9.4	10.1	10.7	6.7	5.4	15.0	39.0	11.6	17.6	13.5	39.0	
16-Jul	13.6	11.3	9.7	10.8	18.8	20.5	20.5	20.3	14.5	17.2	30.1	35.3	30.7	13.7	3.1	1.3	0.9	1.0	1.4	0.8	1.5	1.9	1.2	1.0	11.7	35.3	
17-Jul	1.0	1.0	0.9	0.9	0.8	0.8	1.1	1.7	4.0	6.1	4.7	1.5	0.4	1.1	1.2	1.0	0.7	0.9	1.0	1.4	1.8	1.9	1.6	2.3	1.7	6.1	
18-Jul	2.5	2.7	2.7	3.1	3.1	3.4	AF	AF	AF	AF	AF	AF	C	C	0.5	0.4	0.2	0.3	0.2	UO	0.3	0.4	0.3	0.3	--	3.4	
19-Jul	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.5	0.8	1.2	11.0	13.6	17.9	16.2	12.8	11.9	10.4	11.1	9.7	8.9	5.3	17.9	
20-Jul	7.4	8.3	8.1	7.8	7.0	5.0	2.1	2.3	4.8	3.1	1.9	1.4	1.2	AF	AF	AF	2.5	2.8	2.7	2.3	2.3	2.5	3.3	3.4	3.9	8.3	
21-Jul	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	--	--
22-Jul	UO	UO	UO	UO	UO	14.0	13.2	15.3	12.7	10.3	9.1	7.2	5.9	5.1	4.8	5.5	6.0	6.6	8.4	10.0	12.0	12.0	12.0	11.5	9.6	15.3	
23-Jul	11.6	11.7	11.7	11.8	11.9	10.8	7.7	5.9	3.3	0.9	0.6	0.6	0.4	0.4	0.4	0.6	0.5	0.6	0.5	0.8	1.3	1.7	1.8	1.8	4.1	11.9	
24-Jul	2.0	4.3	9.7	23.1	27.9	24.0	21.9	16.3	7.8	7.9	9.9	6.7	5.9	6.2	6.3	6.6	6.2	4.4	4.5	6.1	7.2	7.6	8.6	13.6	10.2	27.9	
25-Jul	19.7	19.7	18.3	17.1	15.5	14.0	9.8	6.1	3.0	1.7	0.9	0.7	1.1	1.0	0.8	0.8	0.5	0.5	0.5	0.7	1.4	2.2	2.5	3.1	5.9	19.7	
26-Jul	4.4	5.3	5.3	5.6	5.8	5.9	5.0	4.3	3.8	3.5	3.2	3.3	3.2	3.2	3.1	3.0	3.7	4.5	5.2	7.1	9.2	10.8	11.8	12.6	5.5	12.6	
27-Jul	13.1	13.3	13.3	12.7	12.8	12.5	9.2	8.2	6.8	7.2	7.2	6.0	5.1	3.8	3.9	5.2	8.0	11.8	13.2	17.1	19.5	21.7	16.1	13.0	10.9	21.7	
28-Jul	15.8	16.3	16.1	15.0	13.8	13.3	12.0	10.3	7.4	4.2	2.2	1.0	0.7	0.7	0.7	0.6	0.6	0.7	2.5	2.1	2.4	3.3	3.2	5.6	6.3	16.3	
29-Jul	7.8	7.0	5.6	5.2	5.4	5.1	3.7	5.2	2.9	1.5	1.2	1.3	1.7	2.3	2.6	3.4	3.5	3.8	4.4	6.2	8.8	8.7	9.4	11.3	4.9	11.3	
30-Jul	12.4	12.2	11.9	12.2	12.6	13.5	12.5	22.2	21.9	19.9	18.5	13.1	10.9	9.3	9.6	12.3	11.9	12.4	12.4	14.3	16.7	17.5	17.1	13.6	14.2	22.2	
31-Jul	7.9	4.6	4.2	4.4	4.0	3.5	2.2	1.6	1.3	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.6	0.7	1.3	1.9	2.9	4.3	7.0	8.6	2.8	8.6	
																								Diurnal Average			
																								Diurnal Maximum			
7.6 7.1 7.0 7.7 8.6 8.3 6.4 6.4 5.9 5.4 5.5 5.5 5.0 4.3 4.5 4.8 5.0 5.2 5.3 5.6 6.4 7.7 7.0 7.5 19.7 19.7 18.3 23.1 27.9 24.0 21.9 22.2 21.9 19.9 30.1 35.3 30.7 13.7 18.4 18.8 19.9 16.9 16.2 17.9 20.4 39.0 17.1 17.6																											
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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - July 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	278	39.94	39.94
6 - 15	254	36.49	76.44
16 - 25	49	7.04	83.48
26 - 80	5	0.72	84.20
> 81.0	0	0.00	84.20

Total Number of Valid Hours: 696

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Janvier - July 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	9	8	10	11	8	11	23	24	40	42	39	29	10	3	2	9	278
6 - 15	7	17	16	9	4	14	35	30	42	33	25	9	4	1	4	4	254
16 - 25	2	9	3	0	1	2	6	5	7	8	3	2	0	1	0	0	49
26 - 80	0	1	0	0	0	0	1	0	0	0	2	0	0	1	0	0	5
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	35	29	20	13	27	65	59	89	83	69	40	14	6	6	13	586

Total Number of Valid Hours: 696

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

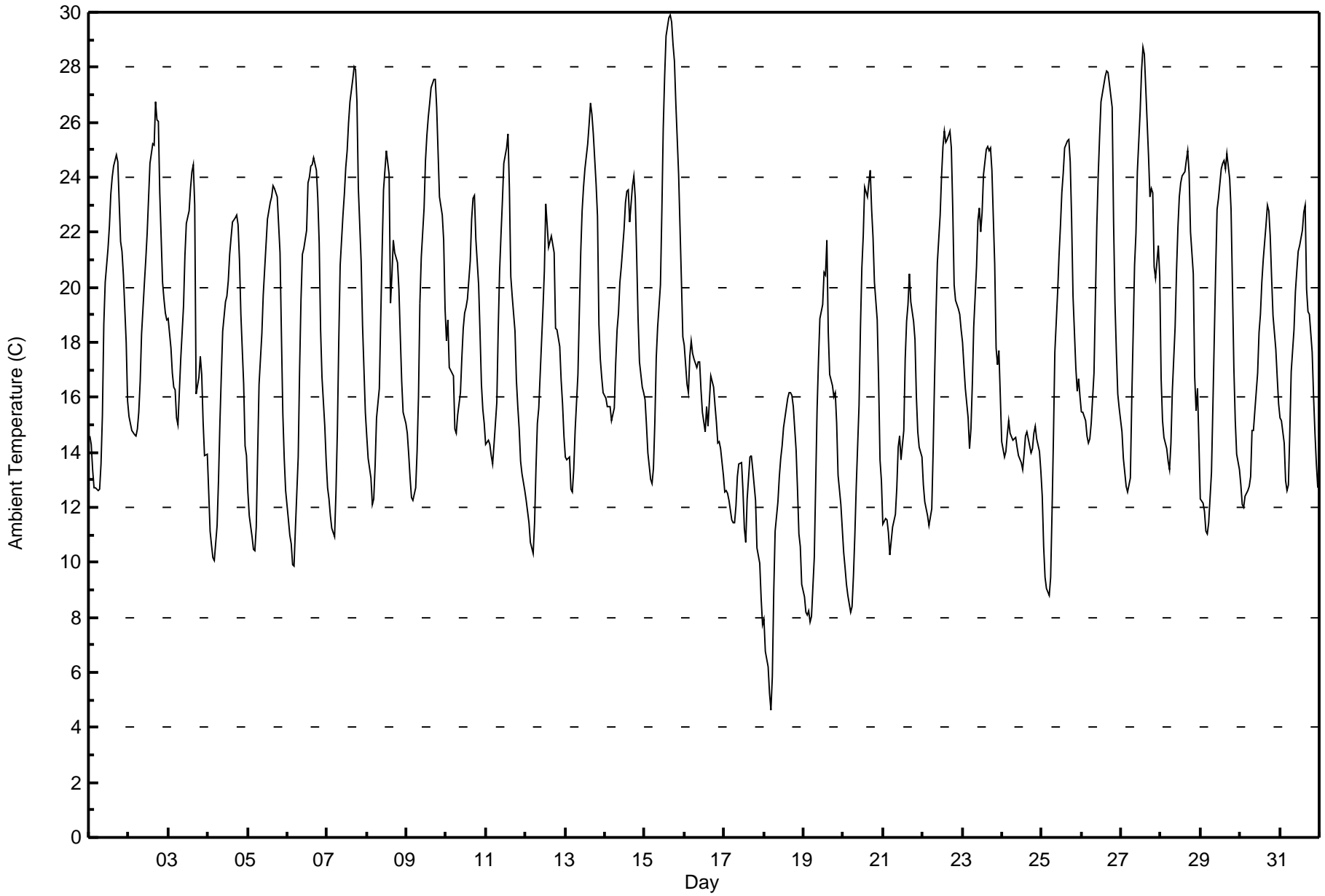
Ambient Temperature (AT) - C
Janvier - July 2017

Maximum Value: 29.9 C on Jul 15 16:00 Maximum Daily Average: 21.6 C on Jul 15																						Hours in Service: 744																									
Minimum Value: 4.6 C on Jul 18 05:00 Minimum Daily Average: 11.6 C on Jul 18																						Hours of Data: 744																									
Maximum Diurnal Average: 22.9 C at hour 17 Minimum Diurnal Average: 12.2 C at hour 5																						Hours of Missing Data: 0																									
Monthly Average: 17.75 C Percentiles: P₁ = 7.9 P₁₀ = 11.7 Q₁ = 13.9 Median = 16.9 Q₃ = 21.9 P₉₀ = 24.5 P₉₉ = 28.2																						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-Jul	14.6	14.3	13.4	12.7	12.7	12.6	12.6	13.6	15.4	18.7	20.2	21.4	22.2	23.4	24.0	24.4	24.8	24.6	23.1	21.7	21.3	20.5	18.0	15.9	18.6	24.8																					
2-Jul	15.3	15.0	14.8	14.7	14.6	14.8	15.4	16.6	18.3	20.2	21.0	22.0	23.2	24.5	25.2	25.1	26.8	26.1	26.0	23.5	20.2	19.6	19.1	18.8	20.0	26.8																					
3-Jul	18.8	17.8	16.9	16.4	16.3	15.3	15.0	17.4	18.4	19.3	21.2	22.3	22.8	23.6	24.2	24.4	23.0	16.1	16.7	17.5	16.8	15.1	13.9	13.9	18.5	24.4																					
4-Jul	12.6	11.1	10.6	10.2	10.1	11.3	12.9	15.0	16.8	18.4	19.5	19.7	20.2	21.2	21.8	22.3	22.5	22.6	22.3	21.0	19.0	16.5	14.2	13.9	16.9	22.6																					
5-Jul	12.6	11.7	10.9	10.5	10.4	11.3	13.9	16.5	18.3	19.7	20.6	21.5	22.5	23.1	23.3	23.7	23.6	23.4	23.3	21.3	18.2	15.4	13.8	12.6	17.6	23.7																					
6-Jul	11.5	11.0	10.7	9.9	9.9	11.2	13.8	17.0	19.6	21.2	21.4	22.1	23.8	24.0	24.4	24.4	24.7	24.3	23.2	21.6	18.5	16.7	15.0	13.7	18.1	24.7																					
7-Jul	12.7	12.3	11.7	11.3	11.0	12.5	14.8	18.1	20.8	22.6	23.4	24.3	25.0	26.0	26.7	27.5	28.0	27.9	26.7	23.6	20.9	18.6	17.0	15.5	20.0	28.0																					
8-Jul	14.6	13.8	13.1	12.1	12.3	13.5	15.3	16.3	18.9	21.3	23.6	24.3	25.0	24.1	19.4	20.4	21.7	21.2	20.9	19.9	18.2	16.6	15.5	15.1	18.2	25.0																					
9-Jul	14.7	13.9	13.1	12.4	12.2	12.7	14.0	16.0	19.4	21.1	22.9	24.6	25.5	26.2	26.7	27.3	27.6	27.5	26.6	24.9	23.3	22.6	21.7	19.2	20.7	27.6																					
10-Jul	18.0	18.8	17.1	16.9	16.8	14.8	14.7	15.3	16.2	17.4	18.5	19.0	19.3	19.6	21.0	22.5	23.2	23.4	21.7	20.1	18.4	16.5	15.5	15.0	18.3	23.4																					
11-Jul	14.3	14.4	14.3	13.9	13.6	14.3	15.8	18.4	20.6	21.9	23.1	24.5	25.1	25.6	23.6	20.4	19.7	18.4	16.6	15.6	14.8	13.7	13.2	12.6	17.9	25.6																					
12-Jul	12.3	11.8	11.4	10.7	10.3	11.4	13.4	15.1	15.6	16.8	19.2	20.6	23.1	22.3	21.5	21.9	21.6	21.2	18.5	18.5	17.8	16.6	15.8	14.6	16.8	23.1																					
13-Jul	13.8	13.7	13.8	12.7	12.6	13.4	14.8	16.8	19.1	21.2	22.8	23.6	24.3	25.2	26.0	26.7	26.3	25.6	23.7	22.6	18.7	17.4	16.7	16.2	19.5	26.7																					
14-Jul	16.0	15.6	15.7	15.6	15.2	15.6	17.2	18.5	19.1	20.2	20.8	22.1	23.1	23.5	23.6	22.4	23.7	24.0	23.2	21.2	18.9	17.3	16.4	16.2	19.4	24.0																					
15-Jul	15.9	15.0	14.0	13.0	12.9	13.4	15.1	17.5	18.6	20.1	22.7	25.8	27.7	29.1	29.8	29.9	29.7	28.8	28.2	26.7	24.1	22.1	20.2	18.2	21.6	29.9																					
16-Jul	17.9	16.5	16.1	17.5	18.1	17.6	17.4	17.1	17.3	17.3	16.3	15.5	14.8	15.7	14.9	15.8	16.8	16.4	15.7	15.1	14.3	14.4	14.1	13.2	16.1	18.1																					
17-Jul	12.5	12.6	12.5	12.2	11.6	11.4	11.4	12.1	13.1	13.6	13.6	12.6	11.2	10.7	12.3	13.8	13.9	13.4	12.8	12.2	10.5	10.0	8.7	7.7	11.9	13.9																					
18-Jul	7.9	6.8	6.2	5.2	4.6	5.8	8.9	11.1	12.2	13.1	13.8	14.2	14.9	15.6	16.0	16.1	16.2	16.1	15.7	14.1	12.6	11.0	10.6	9.2	11.6	16.2																					
19-Jul	8.8	8.2	8.1	8.2	7.8	8.1	10.2	12.9	15.6	17.3	18.9	19.4	20.6	20.4	21.7	18.4	16.8	16.4	16.0	16.2	15.1	13.2	12.1	11.3	14.2	21.7																					
20-Jul	10.4	9.8	9.2	8.8	8.2	8.4	9.5	11.0	12.8	15.7	18.5	20.7	21.9	23.7	23.3	23.8	24.3	22.8	21.8	20.2	18.8	16.6	13.8	12.9	16.1	24.3																					
21-Jul	11.4	11.6	11.6	11.1	10.2	10.8	11.3	11.7	12.7	14.2	14.6	13.8	14.8	17.4	18.8	19.4	20.5	19.5	18.8	18.1	16.0	14.7	14.2	13.8	14.6	20.5																					
22-Jul	12.8	12.2	12.0	11.7	11.3	11.9	14.1	16.7	19.0	20.9	22.7	24.0	25.1	25.7	25.3	25.4	25.7	25.1	22.9	20.1	19.5	19.2	19.0	18.5	19.2	25.7																					
23-Jul	18.0	17.2	16.3	15.3	14.1	14.9	16.5	18.6	20.7	22.4	22.9	22.0	22.7	24.1	25.0	25.1	25.0	25.0	24.3	20.9	17.8	17.2	17.7	16.1	20.0	25.1																					
24-Jul	14.4	13.8	14.0	14.6	15.2	14.7	14.5	14.5	14.5	14.2	13.9	13.6	13.4	13.9	14.6	14.8	14.5	14.0	14.2	14.7	14.9	14.5	14.0	13.3	14.3	15.2																					
25-Jul	12.4	10.6	9.5	9.0	8.8	9.5	11.8	14.6	17.7	19.8	21.1	22.2	23.5	24.2	25.1	25.3	25.4	24.6	22.5	19.7	17.1	16.2	16.7	16.0	17.6	25.4																					
26-Jul	15.5	15.4	15.1	14.6	14.4	14.5	15.0	16.9	19.6	22.2	24.1	25.5	26.7	27.3	27.7	27.9	27.8	27.4	26.6	22.4	19.4	17.7	16.1	15.6	20.6	27.9																					
27-Jul	14.7	13.8	13.3	12.8	12.6	13.1	15.9	18.3	20.8	21.9	24.2	26.4	27.9	28.7	28.5	27.3	24.8	23.3	23.6	23.5	20.8	20.3	21.5	20.4	20.8	28.7																					
28-Jul	16.7	15.1	14.6	14.2	13.7	13.4	14.4	16.2	18.6	20.6	22.2	23.3	23.8	24.0	24.2	24.6	24.9	24.2	22.0	20.5	16.7	15.5	16.3	14.4	18.9	24.9																					
29-Jul	12.3	12.2	11.8	11.1	11.0	11.4	13.2	15.6	18.1	20.7	22.8	23.2	24.3	24.5	24.6	24.3	24.8	23.9	22.8	20.0	17.1	15.1	13.9	13.4	18.0	24.8																					
30-Jul	12.8	12.1	12.0	12.4	12.6	12.8	13.1	14.8	14.8	15.5	16.9	18.4	19.0	20.2	21.0	22.3	23.0	22.8	21.9	20.3	19.0	17.7	16.7	15.7	17.0	23.0																					
31-Jul	15.2	15.2	14.4	13.0	12.6	12.8	14.8	16.9	18.5	19.8	20.6	21.3	21.5	22.1	22.8	23.0	19.9	19.1	19.0	17.6	16.0	14.7	13.6	12.7	17.4	23.0																					
																						13.9	13.3	12.8	12.4	12.2	12.6	13.9	15.7	17.4	19.0	20.3	21.1	21.9	22.6	22.8	22.9	22.9	22.2	21.3	19.8	17.9	16.6	15.6	14.7	Diurnal Average	
																						18.8	18.8	17.1	17.5	18.1	17.6	17.4	18.6	20.8	22.6	24.2	26.4	27.9	29.1	29.8	29.9	29.7	28.8	28.2	26.7	24.1	22.6	21.7	20.4	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Janvier - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Janvier - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	29	3.90	3.90
10 - 20	455	61.16	65.05
> 20	260	34.95	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



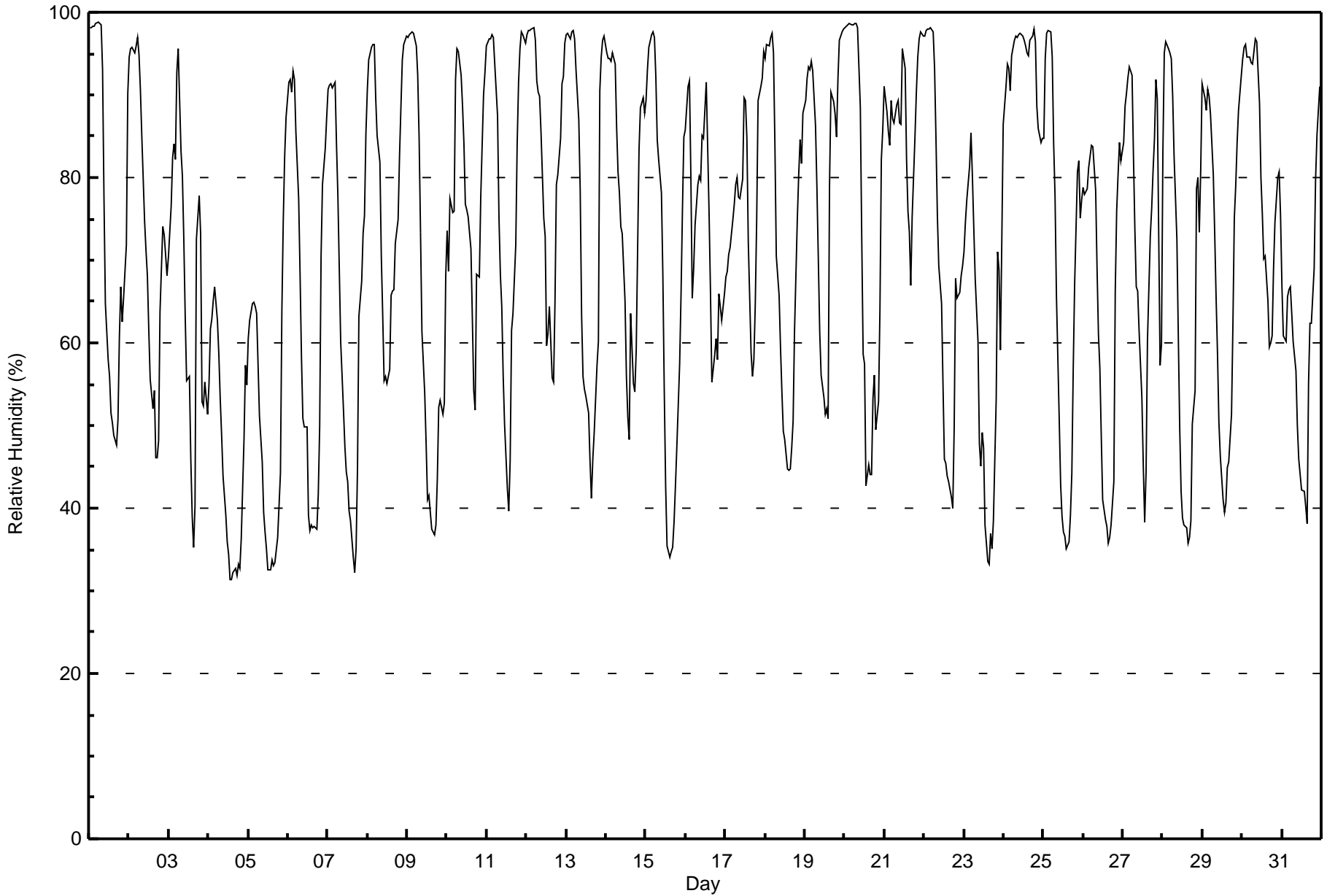
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Janvier - July 2017

Maximum Value: 99 % on Jul 1 06:00 Maximum Daily Average: 93.6 % on Jul 24																		Hours in Service: 744 Hours of Data: 744								
Minimum Value: 31 % on Jul 4 14:00 Minimum Daily Average: 46.3 % on Jul 4 Maximum Diurnal Average: 89.0 % at hour 5 Minimum Diurnal Average: 49.7 % at hour 15 Monthly Average: 71.2 % Percentiles: P ₁ = 33 P ₁₀ = 41 Q ₁ = 54 Median = 74 Q ₃ = 90 P ₉₀ = 97 P ₉₉ = 98																		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-Jul	98	98	98	98	99	99	99	98	93	78	65	58	56	51	50	49	48	51	61	67	63	65	72	90	75.1	99
2-Jul	95	96	96	95	96	97	95	91	85	75	71	68	61	56	52	54	46	46	48	64	74	73	71	68	73.8	97
3-Jul	70	77	82	84	82	93	96	83	80	73	63	55	56	46	39	35	40	73	78	73	53	52	55	51	66.3	96
4-Jul	55	62	63	65	67	63	59	53	49	44	39	36	34	31	31	32	33	32	33	33	36	48	57	55	46.3	67
5-Jul	60	63	65	65	64	63	57	51	46	40	37	35	33	32	34	33	33	35	36	44	64	75	83	87	51.5	87
6-Jul	91	92	90	93	92	86	78	68	58	51	50	50	39	37	38	38	38	37	42	50	71	79	84	87	64.1	93
7-Jul	91	91	91	91	92	84	78	69	60	52	47	44	43	40	38	34	32	35	45	63	67	73	75	85	63.4	92
8-Jul	90	94	96	96	96	90	85	82	71	63	55	56	55	57	66	66	67	72	75	83	88	94	96	97	78.8	97
9-Jul	97	97	97	98	97	96	92	85	73	61	54	48	41	41	39	38	37	38	44	52	53	51	53	68	64.6	98
10-Jul	74	69	77	76	76	92	96	95	92	89	84	77	76	75	71	63	54	52	68	68	78	84	90	93	77.9	96
11-Jul	96	97	97	97	97	94	87	75	68	64	56	50	42	40	46	62	63	72	84	92	96	98	97	96	77.8	98
12-Jul	97	98	98	98	98	97	92	90	90	86	75	73	60	61	64	56	55	65	79	80	85	91	92	96	82.3	98
13-Jul	97	98	97	98	98	97	93	87	78	63	56	54	54	52	46	41	46	49	57	60	91	95	97	97	75.0	98
14-Jul	95	94	94	94	95	94	86	81	78	74	73	65	56	51	48	64	55	54	59	71	83	88	90	88	76.3	95
15-Jul	89	93	96	97	98	97	92	85	82	78	68	54	43	36	34	35	35	38	43	47	57	66	76	85	67.7	98
16-Jul	86	91	92	80	65	69	74	79	80	80	85	85	92	84	76	66	55	58	60	58	66	64	63	66	74.0	92
17-Jul	68	69	71	71	75	77	79	80	78	78	80	90	89	85	72	59	56	58	65	75	89	91	92	95	76.7	95
18-Jul	94	96	96	97	97	95	84	71	66	59	54	49	48	45	45	45	47	51	61	75	80	84	82	88	71.2	97
19-Jul	89	92	93	93	94	93	86	79	70	61	56	53	51	52	51	79	90	89	88	85	92	97	98	98	80.4	98
20-Jul	98	98	98	99	99	99	99	99	98	88	73	59	57	43	45	44	44	53	56	49	53	64	82	86	74.3	99
21-Jul	91	88	86	84	89	87	87	89	89	87	87	96	93	82	76	73	67	75	85	90	95	97	98	97	86.9	98
22-Jul	97	98	98	98	98	98	93	85	75	69	65	55	46	45	44	43	41	40	50	68	65	66	68	69	69.8	98
23-Jul	71	75	77	81	86	80	74	68	60	48	45	49	47	38	34	33	37	35	39	53	71	69	59	72	58.4	86
24-Jul	86	91	94	93	90	95	97	97	97	97	97	97	96	95	95	97	97	98	96	89	86	84	85	85	93.6	98
25-Jul	85	94	97	98	98	94	84	78	66	51	43	39	37	37	35	36	39	44	57	67	81	82	75	77	66.4	98
26-Jul	79	78	79	81	83	84	84	78	69	61	57	49	41	39	38	36	37	38	43	66	76	80	84	82	64.2	84
27-Jul	84	89	90	92	93	92	83	74	67	66	62	53	45	38	44	60	73	76	81	85	92	90	57	60	72.8	93
28-Jul	83	95	96	96	95	94	90	83	73	61	50	42	39	38	38	36	36	38	50	54	79	80	73	81	66.7	96
29-Jul	91	90	88	91	90	88	80	73	65	59	50	46	41	40	41	45	46	51	62	75	79	84	88	92	69.0	92
30-Jul	94	96	96	95	95	94	94	95	97	96	89	80	76	70	71	65	59	60	61	69	75	80	81	75	81.8	97
31-Jul	67	61	60	66	66	67	64	60	57	50	46	44	42	42	40	38	55	62	62	69	80	85	88	91	60.9	91
85.9 87.7 88.7 89.0 89.0 88.6 85.0 80.0 74.5 67.8 62.4 58.4 54.6 50.9 49.7 50.1 50.4 54.1 60.3 67.2 74.8 78.5 79.4 82.6																								Diurnal Average		
98 98 98 99 99 99 99 99 98 97 97 97 97 96 95 95 97 97 97 98 96 96 96 98 98																								Diurnal Maximum		





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Janvier - July 2017

Maximum Speed: 17 km/h on Jul 4 14:00	Maximum Daily Speed Average: 11.1 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 27 22:00	Minimum Daily Speed Average: 0.8 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 3.4 km/h at hour 9	Minimum Diurnal Speed Average: 1.0 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 2.3 km/h 212.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 O ₁ = 3 Median = 4 O ₃ = 7 P ₉₀ = 9 P ₉₉ = 15	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-Jul	S3	SE2	SSE1	SW1	SW3	SSW4	SSW4	S4	SE4	S2	S3	S2	SSE2	SSE3	SSE2	SSW3	ENE3	ENE5	E4	ESE3	SE6	SE3	W4	SW5	SSE2.1	SE6	
2-Jul	SW5	SSE3	SSE5	SSE4	SSW4	SE2	SSW2	SSW5	SSW6	S9	SSW8	SW6	SW7	SSW5	SSW5	S4	SW6	SW6	SW5	SSE3	SSE4	S4	S5	SSW7	SSW4.6	S9	
3-Jul	SSW7	SSW3	SE3	S3	SSW5	SW1	E4	ESE7	W7	SW5	NNW2	ESE4	E3	WSW9	W7	WSW8	WSW9	WSW12	S6	SW6	SW9	SW6	SW7	SW9	SW4.1	WSW12	
4-Jul	SSW9	SSW10	SSW9	SSW9	SSW8	SSW9	SW11	SW12	SW12	SW12	SW14	SW15	WSW15	WSW17	WSW17	WSW16	WSW17	WSW17	SW13	W13	W8	SW4	SSW5	SSW7	SW11.1	WSW17	
5-Jul	SSW8	SSW8	S8	SSW8	SSW8	SSW7	WSW8	WSW9	WSW12	W15	W17	W15	W15	W15	W14	W14	W15	W12	W9	WNNW8	NW3	ESE2	ESE3	SE3	SE2	WSW7.5	W17
6-Jul	SSE2	S4	S5	S4	S5	S5	S4	S4	SSE3	SSE4	WSW5	SW3	WNNW9	W9	WNNW7	WNNW7	WNNW6	N7	NNE7	NNE5	SE2	SE2	SE2	SE2	SW1.6	W9	
7-Jul	S3	S4	S5	S4	S5	S5	S5	SSE4	SSE3	ESE2	SE2	ESE4	SSE5	SSE3	ESE4	N3	NNW4	E2	ESE3	E3	SE3	SE2	ESE2	SE2	SSE2.5	S5	
8-Jul	SSE1	S2	SE1	SSE1	SSE2	S3	WSW2	SW3	WSW5	SW4	SSW3	NNE5	NE4	NNE5	NNE8	NNE2	SE3	ESE5	SE3	S2	ESE3	ESE2	SE2	S3	SE0.8	NNE8	
9-Jul	S3	SSE1	SSW2	S2	S2	SSE1	WSW2	W2	NE2	ENE4	NE6	ENE5	NE5	NE7	ENE7	NE8	NE7	NE7	NE6	NE4	NE6	ENE7	ENE5	SE1	ENE3.2	NE8	
10-Jul	NNE3	ENE3	SSW2	WSW5	N3	SSW2	N2	SSW3	SSE2	ESE5	E7	ENE6	ESE3	E4	ESE4	ESE5	ESE5	SE4	E3	ESE5	ENE2	E2	SE1	NNE1	ESE2.2	E7	
11-Jul	ESE1	SSE1	S1	SSW2	S3	S3	SSW4	SSW4	SW2	NE4	NE4	ENE4	NE6	NE7	SSE8	ENE1	N3	N5	N3	NW2	SSE2	SSE3	SSW4	SSE2	ESE1.0	SSE8	
12-Jul	SE2	SSE2	SE2	SE2	SSE2	SSW2	W1	SSE2	WSW2	SSW2	WSW3	N1	ESE3	SW5	SSW4	SSE7	SSE6	S3	SW7	SSW6	SSE3	SSE4	SSE3	SE3	S2.4	SSE7	
13-Jul	SE2	SSE3	SE2	SE2	SSE1	S1	S4	S5	S5	SSW3	S3	WSW4	SE4	E6	ENE4	NE4	NNE7	NNE8	NNE7	NE7	SSE3	SSW4	SSW6	NW2	ESE1.3	NNE8	
14-Jul	WSW7	W8	WSW6	WSW4	SW3	WSW2	NNW1	N4	NW3	W3	SSW4	S3	NE2	SSE6	WSW3	SSW3	SSW5	SW6	SW5	S3	SE3	SSE3	S4	S6	SW2.7	W8	
15-Jul	S6	S6	SSE2	SSE2	S3	S4	SSE2	ESE1	NE3	NNE6	NE6	ESE6	SSE8	SSE11	S13	S12	SSE12	SSE12	SSE9	SSE8	SE4	SE3	SE1	ESE2	SSE4.8	S13	
16-Jul	SE3	SSE2	SW2	N6	NNE9	NNE5	SE3	SSW1	SSW4	WSW5	WNNW4	SW7	SW2	WSW4	WSW6	WSW7	WSW10	SW9	SW9	SW7	SSW6	SW8	SW10	SW9	SW3.8	WSW10	
17-Jul	WSW9	WSW12	WSW11	WSW13	WSW10	WSW9	WSW9	WSW9	W10	WSW10	W10	NNW5	N9	NNW5	NW5	NNW7	N7	NNW5	NNW2	S2	S3	S2	S2	SSE2	W4.6	WSW13	
18-Jul	SE2	SE3	SE3	SE2	SSE2	S3	SE1	SW2	S4	NE2	ENE2	N3	ENE3	N2	SW4	WSW4	SW3	S3	S2	S2	SSE3	S4	SSW7	S5	S1.8	SSW7	
19-Jul	SSW8	SSW8	SSW9	SSW8	SSW8	SSW8	SSW8	SSW8	SW9	SSW11	SSW11	SW9	WSW8	WSW9	SW6	SSE3	S3	SSW4	SSW4	NE5	ENE2	SE2	SE1	ESE1	SSW5.4	SSW11	
20-Jul	SSE2	SE1	S1	SE1	NE0	WSW1	WNNW1	NNW3	W3	NNW3	ENE6	NE7	NNW2	E5	E5	E5	E4	ENE4	NE4	E6	ENE5	ENE3	NE1	NNE3	ENE2.2	NE7	
21-Jul	NNE1	N2	NNE3	N3	NNE2	N3	N2	NNE3	NNW1	NNE2	NNE3	NNE4	NE4	ENE6	NE7	SE3	WSW2	WSW3	SSE1	ESE2	SE3	SSE2	SSE3	SSE4	NE1.4	NE7	
22-Jul	S2	S2	SSE2	SSE3	S2	S5	SSW6	SSW7	SSW7	S9	SSW7	SW8	SW9	SW10	SW11	SW10	SW9	SW6	SSW4	SSE3	S5	S5	S5	S6	SSW5.7	SW11	
23-Jul	SSW6	S7	SSW7	S7	S6	SSW7	SSW7	SW8	SW8	WSW11	WSW11	WSW9	SW8	WSW10	WSW8	WSW8	WSW6	WNNW4	N3	NE2	SE2	E1	NE2	SSW3	SW4.9	WSW11	
24-Jul	S4	N2	NE0	NNE3	NNE6	N5	N6	NNE11	NNE14	NNE12	NNE14	NNE12	NNE12	N10	NNE9	NNE8	NNE7	N4	WNNW2	NW1	NNW3	NNW3	NW3	NNE2	N5.9	NNE14	
25-Jul	SW0	SSE3	SE3	SE3	SSE3	S5	S6	S6	SW5	SW4	W5	W5	W3	SSW2	SSE2	S4	SW6	SW6	SSE3	SE3	SE2	SSW4	S6	S6	SSW3.2	S6	
26-Jul	S6	S8	S9	S8	SSW8	SSW9	SSW8	SSW7	SSW9	SW8	SW7	SSW6	SSW9	SSW9	SSW9	SW8	SW8	WSW7	SW4	SE3	SE3	SSE3	S3	S4	SSW6.3	SSW9	
27-Jul	SE3	SE3	SE3	SE3	ESE3	SE2	SSW2	SW2	NNW2	NNE4	N4	NNE5	NNE6	ENE4	ENE4	ESE2	SE3	ESE3	SE2	ESE2	SE2	SSE0	WNNW6	WNNW7	ENE1.0	WNNW7	
28-Jul	S7	SSW1	SW5	S7	SSW7	SSW8	SW7	SW9	SW9	WSW10	WSW11	WSW12	WSW14	WSW13	WSW11	WSW12	WSW9	WSW9	WSW5	NNW2	SE2	SE2	N3	ESE1	WSW6.2	WSW14	
29-Jul	SSE3	S5	S6	S5	S7	S6	SSW5	SSW6	SSW6	SSW5	SW9	SSW10	SW10	SW9	SW7	SW5	SW3	SW4	S3	SE3	SE3	SE2	SE2	E1	SSW4.6	SSW10	
30-Jul	SE1	S2	SSE2	SE1	W1	S2	SW4	SW2	SE6	NNE6	NE7	NNE2	N3	SW5	SW7	WSW7	SW7	SSW7	SSW7	SSW6	SSW5	SSW5	SSW8	SSW7	SSW2.7	SSW8	
31-Jul	SW7	WSW7	SW7	SSW7	SW6	SW7	WSW6	W8	W9	W10	W11	W11	W12	W11	W12	W11	NW7	NW5	NNE8	N4	NNE2	NNE2	NE2	NNE4	W5.3	W12	

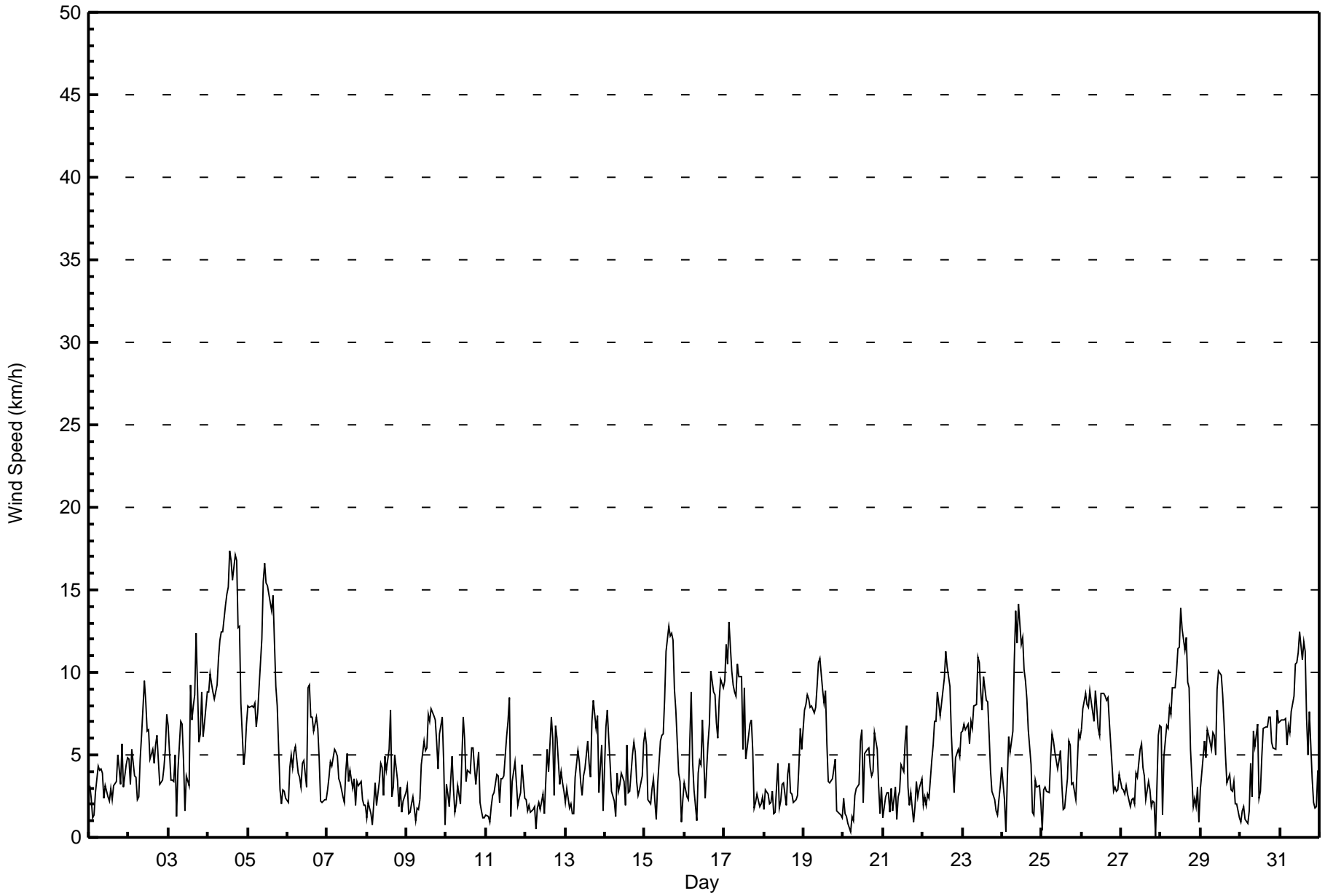
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	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Janvier - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	457	61.42	61.42
6 - 11	247	33.20	94.62
12 - 19	40	5.38	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: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - July 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	22	23	19	18	14	30	68	61	74	41	33	18	9	4	8	15	457
6 - 11	6	15	14	5	3	2	2	8	24	58	51	36	14	7	1	1	247
12 - 19	0	5	0	0	0	0	0	2	2	0	6	14	11	0	0	0	40
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	28	43	33	23	17	32	70	71	100	99	90	68	34	11	9	16	744

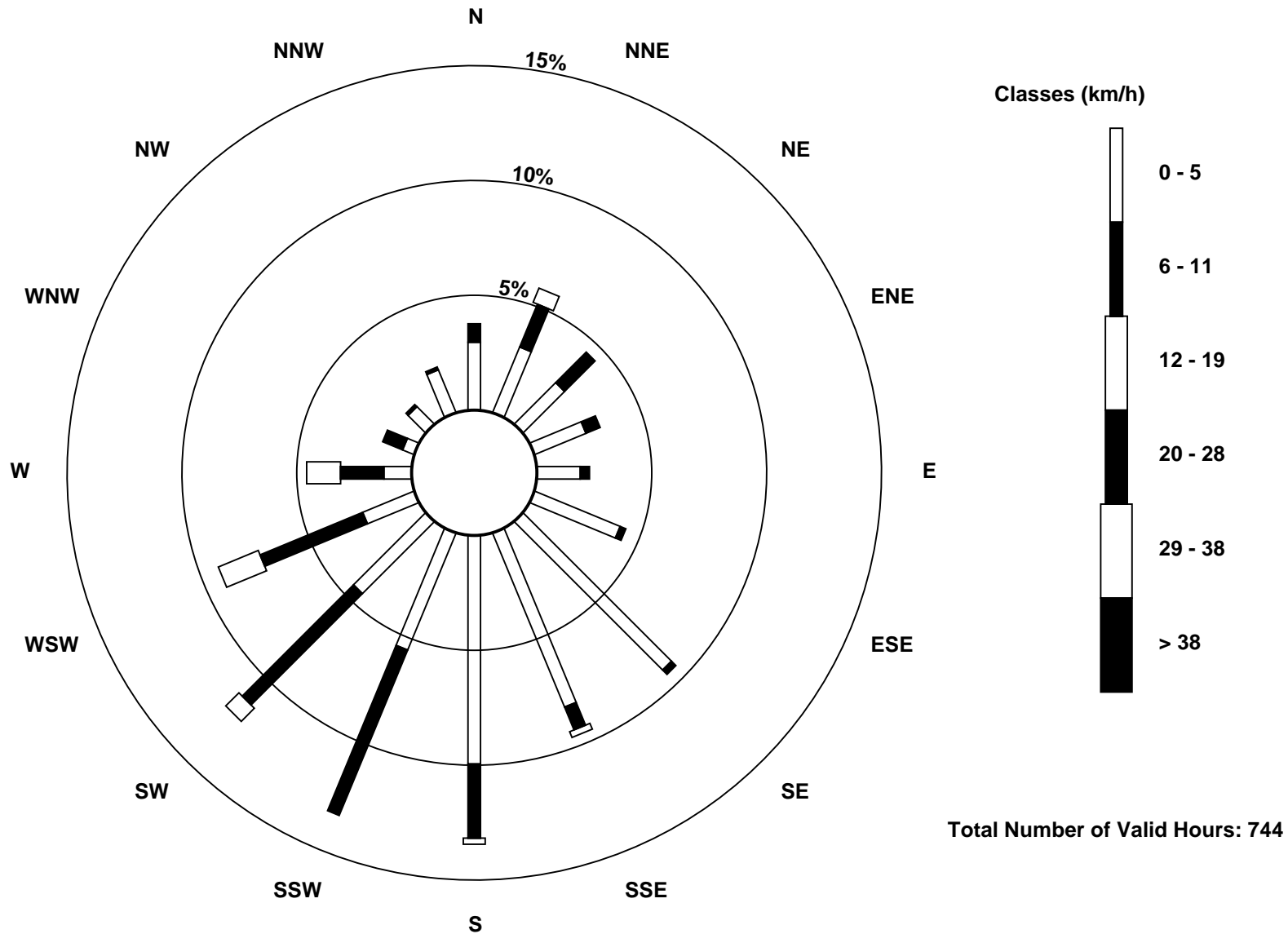
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Janvier (AMS 22)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Janvier - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Jul 3 18:00 Minimum Value: 0 km/h on Jul 6 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 744 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-Jul	1	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2
2-Jul	3	2	2	2	3	1	2	1	2	3	3	2	2	3	3	2	3	2	2	1	1	1	1	1	3	3
3-Jul	2	3	2	2	2	1	2	3	3	2	3	2	2	3	3	3	3	10	2	2	4	2	2	3	10	
4-Jul	2	3	3	3	2	3	4	4	5	4	5	6	5	7	7	6	6	6	6	5	5	3	1	1	2	7
5-Jul	2	1	2	2	2	2	3	3	5	6	7	6	6	6	7	5	6	5	4	4	2	1	1	1	7	
6-Jul	1	1	2	2	2	1	1	1	1	2	3	2	4	4	3	4	3	3	2	2	0	0	1	1	4	
7-Jul	1	1	1	1	1	2	1	1	1	1	2	2	2	3	2	3	3	2	1	1	1	1	1	1	3	
8-Jul	1	1	1	1	1	3	1	2	1	2	2	1	2	5	4	2	1	2	1	1	1	1	1	2	5	
9-Jul	2	1	1	1	1	1	1	1	2	1	2	2	2	2	3	2	2	2	2	1	2	2	2	1	3	
10-Jul	2	2	1	2	2	1	1	1	1	2	2	2	1	1	2	2	2	1	2	2	2	2	1	1	2	
11-Jul	1	1	1	1	1	1	1	1	1	2	2	2	2	3	4	3	2	2	3	2	1	2	2	1	4	
12-Jul	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	2	3	2	2	1	1	3	
13-Jul	1	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	3	1	2	2	1	3	
14-Jul	3	4	3	2	1	1	1	1	1	1	2	2	2	2	2	1	2	2	1	1	1	1	2	2	4	
15-Jul	1	1	2	1	1	1	1	1	1	2	2	3	3	4	4	4	5	5	4	3	1	1	1	1	5	
16-Jul	1	2	2	5	4	2	2	1	2	2	3	2	2	2	2	2	4	3	4	2	2	3	3	3	5	
17-Jul	3	4	4	4	3	3	3	3	4	3	3	3	4	3	3	3	3	3	1	1	1	1	1	1	4	
18-Jul	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	1	2	
19-Jul	2	2	2	2	3	2	2	2	3	3	4	3	3	3	2	2	2	2	2	2	1	1	1	1	4	
20-Jul	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	1	1	2	2	2	1	1	1	2	
21-Jul	1	1	2	1	2	2	2	1	1	1	2	2	1	2	2	2	1	1	1	1	1	1	1	1	2	
22-Jul	1	1	1	1	1	2	1	2	2	3	2	2	3	3	4	3	3	2	2	1	1	1	1	1	4	
23-Jul	1	1	1	1	2	2	2	2	3	4	4	3	4	3	3	3	2	2	1	1	1	1	1	1	4	
24-Jul	2	2	1	2	2	2	2	4	5	4	5	4	4	4	4	3	3	2	2	2	2	2	2	1	5	
25-Jul	1	1	1	1	1	2	1	1	1	2	2	3	2	2	2	2	2	2	1	1	1	1	1	1	3	
26-Jul	1	1	2	1	2	2	2	2	3	3	2	3	3	3	3	3	3	2	2	0	1	1	1	1	3	
27-Jul	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	2	3	4	4	
28-Jul	5	2	1	1	2	2	2	3	3	3	4	4	5	5	4	4	3	3	2	3	0	1	2	1	5	
29-Jul	1	1	1	2	1	1	2	2	2	2	3	4	3	3	2	2	1	1	1	1	1	2	1	1	4	
30-Jul	1	2	1	1	1	1	3	2	3	2	2	2	1	2	2	2	2	3	2	1	2	2	2	2	3	
31-Jul	2	2	2	2	1	2	2	3	3	4	4	4	5	4	5	6	5	4	3	2	1	1	1	1	6	
Diurnal Maximum																										



Wood Buffalo Environmental Association
Summary of Hour Averages

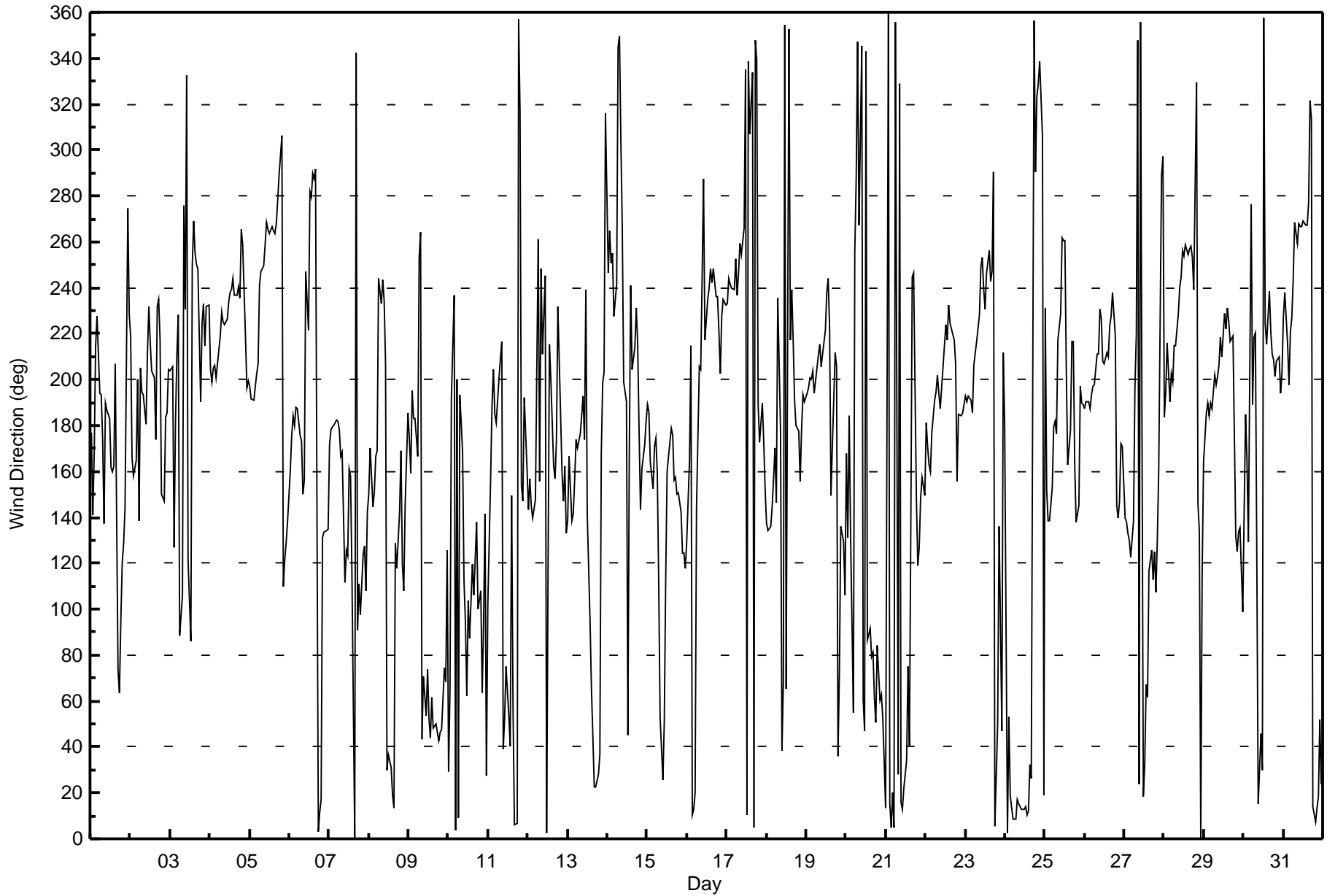
Wind Direction (WD) - deg
Janvier - July 2017

Direction of Maximum Speed: 239 deg on Jul 4 14:00 Direction of Maximum Daily Speed Average: 228.6 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 161 deg on Jul 27 22:00 Direction of Minimum Daily Speed Average: 0.8 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 209.2 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-Jul	177	141	168	215	228	194	193	175	137	190	186	183	162	160	162	207	74	63	95	120	129	144	275	228	165.2
2-Jul	219	166	158	165	200	139	205	194	193	181	212	232	216	204	201	174	232	235	218	150	147	184	185	205	196.9
3-Jul	204	205	127	181	211	228	88	106	276	230	333	122	86	250	269	255	250	248	190	224	233	215	232	232	226.3
4-Jul	204	199	205	206	201	213	219	229	225	224	226	234	238	239	244	237	237	240	235	265	259	218	197	199	228.6
5-Jul	197	192	191	197	203	207	241	247	250	259	269	265	264	266	265	264	268	278	289	306	110	121	129	138	248.4
6-Jul	160	176	184	180	188	188	176	174	150	156	247	221	282	280	290	288	292	3	12	17	131	134	134	135	235.1
7-Jul	171	178	179	180	182	182	178	167	168	111	126	123	161	158	115	0	342	91	111	97	124	128	108	142	149.5
8-Jul	150	170	145	151	167	169	244	233	243	234	207	30	37	31	19	14	129	118	142	169	120	108	146	186	131.3
9-Jul	174	159	195	183	183	167	253	264	44	71	54	74	53	44	61	48	50	46	43	46	47	75	68	126	61.3
10-Jul	29	65	192	237	4	200	9	193	168	112	95	62	104	87	120	106	122	138	100	108	63	95	141	28	103.9
11-Jul	102	157	188	204	185	181	201	209	216	39	53	75	54	41	150	57	6	7	357	317	154	147	192	161	109.7
12-Jul	143	157	145	140	148	206	261	156	248	211	245	2	117	215	200	162	157	174	232	208	159	147	162	133	179.2
13-Jul	139	167	138	142	156	174	170	176	184	193	174	239	141	94	65	44	23	22	28	37	167	199	203	316	119.7
14-Jul	246	265	251	255	227	241	345	350	304	266	199	190	45	167	241	204	214	231	215	178	144	161	171	182	223.1
15-Jul	189	186	164	152	171	175	159	112	53	25	51	113	160	167	179	176	156	157	150	150	142	124	124	118	153.8
16-Jul	129	165	215	10	13	20	144	205	204	244	287	217	235	240	248	242	248	236	236	221	202	228	235	233	236.2
17-Jul	233	244	242	240	239	252	237	246	259	255	266	335	10	339	307	334	5	348	339	189	173	190	172	152	263.2
18-Jul	137	134	136	145	157	170	146	236	178	38	68	355	66	352	217	239	217	191	180	178	155	178	193	190	175.5
19-Jul	194	197	201	200	204	194	205	211	215	205	211	222	238	244	223	150	172	212	206	36	72	136	129	106	205.9
20-Jul	168	131	184	132	55	256	287	347	267	345	60	47	343	87	92	79	81	61	51	84	60	63	53	33	63.1
21-Jul	14	359	15	5	20	5	355	28	329	16	13	22	34	75	40	136	245	246	148	119	127	148	158	150	48.6
22-Jul	181	171	163	160	177	191	195	202	194	187	206	215	224	217	232	224	220	217	207	155	185	184	185	189	203.7
23-Jul	193	190	193	191	186	206	212	217	228	249	253	240	231	246	256	243	247	291	6	50	136	94	47	212	227.2
24-Jul	180	2	53	19	13	9	9	17	15	14	13	13	14	10	12	33	26	357	291	323	329	339	306	19	11.0
25-Jul	231	152	139	139	153	179	182	177	217	229	262	260	260	204	163	178	217	217	164	138	145	197	190	189	193.9
26-Jul	187	191	191	188	193	197	198	211	211	231	226	208	207	212	210	223	227	238	219	145	140	147	172	171	203.8
27-Jul	140	138	133	130	123	138	196	220	348	24	356	18	33	67	61	117	126	113	125	107	130	161	289	297	77.0
28-Jul	184	194	216	191	202	199	215	215	229	240	244	256	254	258	255	257	258	253	239	330	146	133	0	116	236.4
29-Jul	164	186	190	184	190	188	202	198	202	206	218	210	229	222	231	225	217	219	176	132	125	134	135	99	200.8
30-Jul	144	185	165	130	277	189	218	221	125	15	46	30	358	225	215	238	221	211	209	201	208	210	194	203	205.0
31-Jul	227	238	216	197	221	227	243	268	259	268	267	267	269	267	267	277	321	314	14	8	13	18	52	24	266.6

191.7 193.0 191.7 193.6 198.1 199.9 208.1 214.1 224.5 236.0 247.5 245.6 249.2 237.2 236.5 234.9 236.8 241.4 210.1 149.6 151.8 164.5 191.4 193.8
 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 (WD) - deg
Janvier - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 107 deg on Jul 25 01:00 Minimum Value: 1 deg on Jul 12 04:00 Percentiles: P ₁ = 10 P ₁₀ = 16 Q ₁ = 25 Median = 33 Q ₃ = 54 P ₉₀ = 72 P ₉₉ = 94																			Hours in Service: 744 Hours of Data: 744 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-Jul	17	35	64	17	30	20	21	29	42	89	72	73	93	71	76	75	60	35	27	21	26	72	59	35	93
2-Jul	40	57	25	60	47	51	52	34	30	31	39	44	43	56	52	38	57	25	29	25	21	18	17	22	60
3-Jul	24	71	51	51	46	87	56	32	42	58	90	71	72	33	50	38	30	51	27	25	24	23	30	24	90
4-Jul	20	19	21	21	20	26	26	27	30	30	31	31	32	32	31	32	30	28	30	32	25	24	16	19	32
5-Jul	16	14	14	17	19	24	28	29	28	32	34	35	35	36	38	31	38	44	58	77	48	26	10	21	77
6-Jul	34	19	22	22	17	14	16	37	59	53	57	56	50	56	58	60	63	51	34	28	27	8	10	16	63
7-Jul	17	17	13	13	10	14	10	20	36	76	78	64	60	82	68	88	80	91	24	22	10	25	31	27	91
8-Jul	39	29	52	88	41	59	50	28	28	47	64	16	67	72	38	68	37	18	26	34	30	30	52	55	88
9-Jul	34	65	18	15	19	54	53	58	73	41	35	44	49	29	35	32	29	27	21	23	22	28	33	84	84
10-Jul	71	80	59	25	68	65	64	47	50	28	30	33	40	42	70	44	38	25	28	29	87	69	89	27	89
11-Jul	44	14	59	37	26	30	33	54	73	69	73	64	49	44	44	85	56	44	82	71	44	40	18	27	85
12-Jul	19	17	22	1	50	59	86	79	53	66	68	90	70	39	47	26	27	45	26	28	26	22	27	18	90
13-Jul	15	21	51	54	29	84	54	19	50	59	83	67	53	41	49	81	15	15	19	57	61	35	38	70	84
14-Jul	37	46	35	37	48	70	77	46	63	49	48	59	87	42	65	36	35	33	23	32	14	23	18	12	87
15-Jul	13	12	37	39	28	17	41	84	32	19	31	47	30	28	27	25	30	27	29	28	22	24	95	45	95
16-Jul	16	46	71	89	42	59	67	81	43	32	63	29	83	52	39	29	27	26	29	26	25	26	25	24	89
17-Jul	25	24	27	27	29	30	28	24	27	28	31	64	40	75	63	66	64	71	61	49	37	52	46	30	75
18-Jul	48	20	16	17	28	14	69	89	61	103	83	75	66	85	60	45	61	38	37	27	24	23	16	15	103
19-Jul	16	18	19	19	23	17	26	25	31	27	34	29	37	30	41	58	51	62	64	40	60	58	53	53	64
20-Jul	27	51	69	75	85	57	84	57	53	66	45	35	96	47	29	33	32	22	33	26	26	34	45	40	96
21-Jul	9	37	54	53	75	53	56	29	87	55	61	34	41	46	34	75	85	40	72	18	15	34	28	29	87
22-Jul	38	18	19	27	33	27	22	28	32	26	28	30	32	31	32	30	28	25	28	16	17	13	13	11	38
23-Jul	14	11	15	13	10	21	24	24	32	31	31	25	30	35	46	38	34	69	61	46	25	67	60	42	69
24-Jul	36	74	104	27	25	34	31	23	23	26	27	30	31	40	42	36	31	57	90	103	94	90	84	89	104
25-Jul	107	28	14	15	21	17	12	12	28	51	55	56	80	102	92	54	33	30	31	13	17	13	10	11	107
26-Jul	10	11	14	12	14	18	19	26	26	28	29	32	34	34	35	36	28	25	24	15	14	19	12	18	36
27-Jul	16	16	13	10	20	17	26	55	66	32	63	34	30	31	20	31	16	19	68	38	25	92	60	64	92
28-Jul	77	84	27	15	19	18	24	24	30	30	28	32	31	33	31	32	35	26	26	93	13	14	52	82	93
29-Jul	31	14	15	15	11	14	26	27	34	36	29	29	31	28	31	33	54	38	33	39	12	39	33	29	54
30-Jul	51	52	34	56	74	57	30	81	35	45	28	75	62	44	34	31	31	26	21	21	22	21	16	20	81
31-Jul	25	23	27	21	24	21	27	38	30	35	38	38	34	40	38	56	67	62	33	68	50	59	59	19	68
	107	84	104	89	85	87	86	89	87	103	90	90	96	102	92	88	85	91	90	103	94	92	95	89	
	Diurnal Maximum																								



Wood Buffalo Environmental Association

SO₂ Calibration Summary

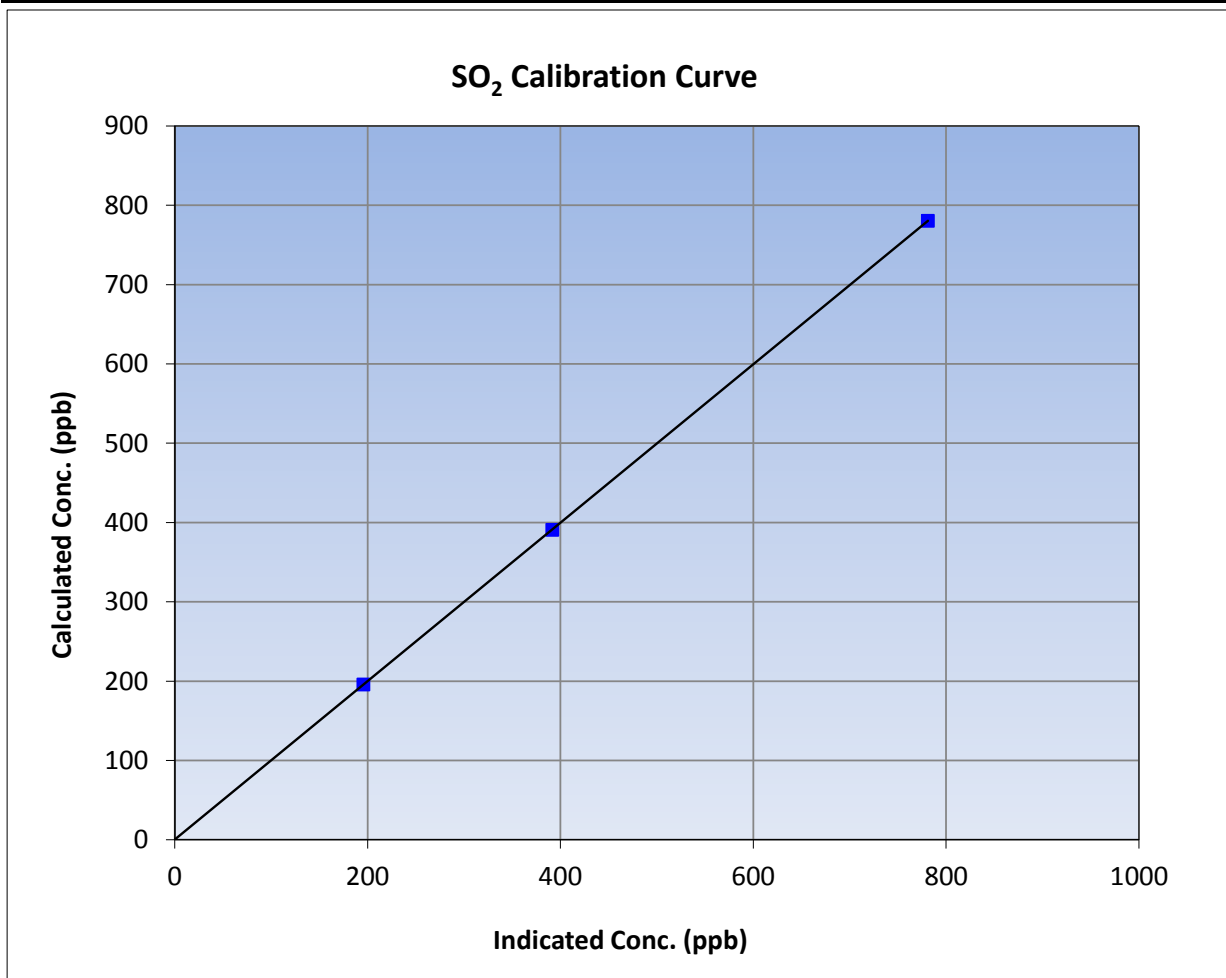
Version-03-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	9:15	End Time (MST)	16:50
Analyzer make	Thermo 43i	Analyzer serial #	1152430006

Calibration Data

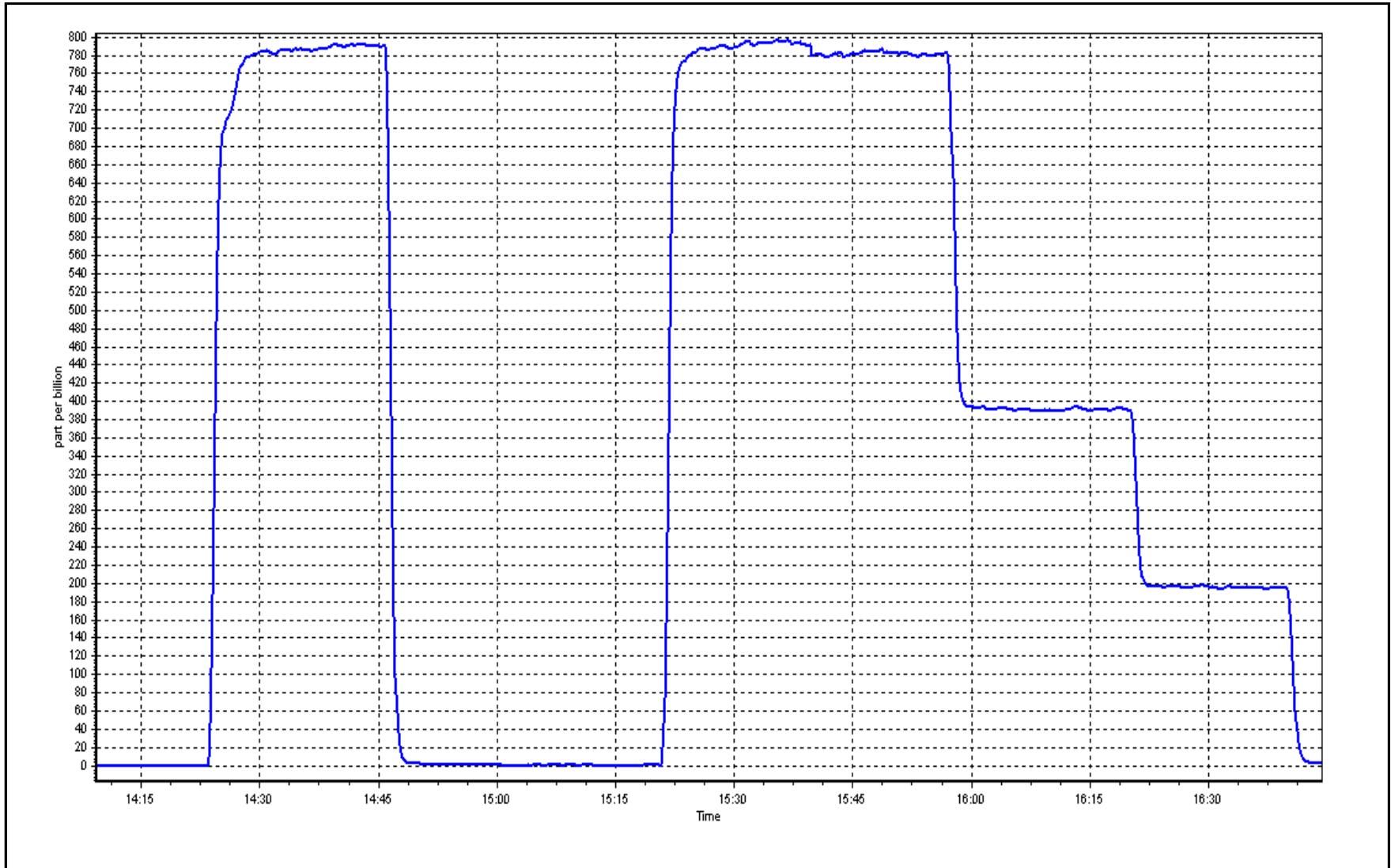
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.5	----	Correlation Coefficient	0.999999	≥0.995
780.3	780.8	0.9994			
390.4	391.1	0.9981	Slope	0.998705	0.90 - 1.10
195.3	195.3	1.0001			
			Intercept	0.260993	+/-30



SO2 Calibration Plot

Date: July 20, 2017

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Report

Version-03-2017

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	July 21, 2017	Last Cal Date:	June 2, 2017
Start time (MST):	9:52	End time (MST):	12:18
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>5.35</u>	ppm	Cal Gas Exp Date	February 13, 2018
Cal Gas Cylinder #	<u>LL36481</u>			
Calibrator Make/Model	API T700		Serial Number	2657
ZAG Make/Model	API T701		Serial Number	135

Analyzer Information

Analyzer make: Thermo 43i- TLE

Analyzer serial #: 1151680031

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 100 ppb		PMT voltage	-647.5	-647.9
Calculated slope	0.997135	0.997415	Lamp voltage	991	991
Calculated intercept	0.030098	0.169883	Pressure	671.6	668.0
Analyzer Background	3.44	3.44	Flow	0.425	0.424
Analyzer Coefficient	1.164	1.164	Intensity	92	92

TRS 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	5009	0.0	0.0	-0.2	----
as found span	4940	74.9	79.9	79.9	1.000
calibrator zero	5007	0.0	0.0	-0.2	----
high point	4939	74.9	79.9	79.9	1.000
second point	4975	37.5	40.0	40.1	0.998
third point	4992	18.8	20.1	19.9	1.009
as left zero	5010	0.0	0.0	-0.1	----
as left span	4939	74.9	79.9	79.8	1.002

Average Correction Factor				1.002
Corrected As found	80.10	Previous response	80.10	*% change 0.0%

* = > +/-5% change initiates investigation

Notes:

No adjustments needed.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

TRS Calibration Summary

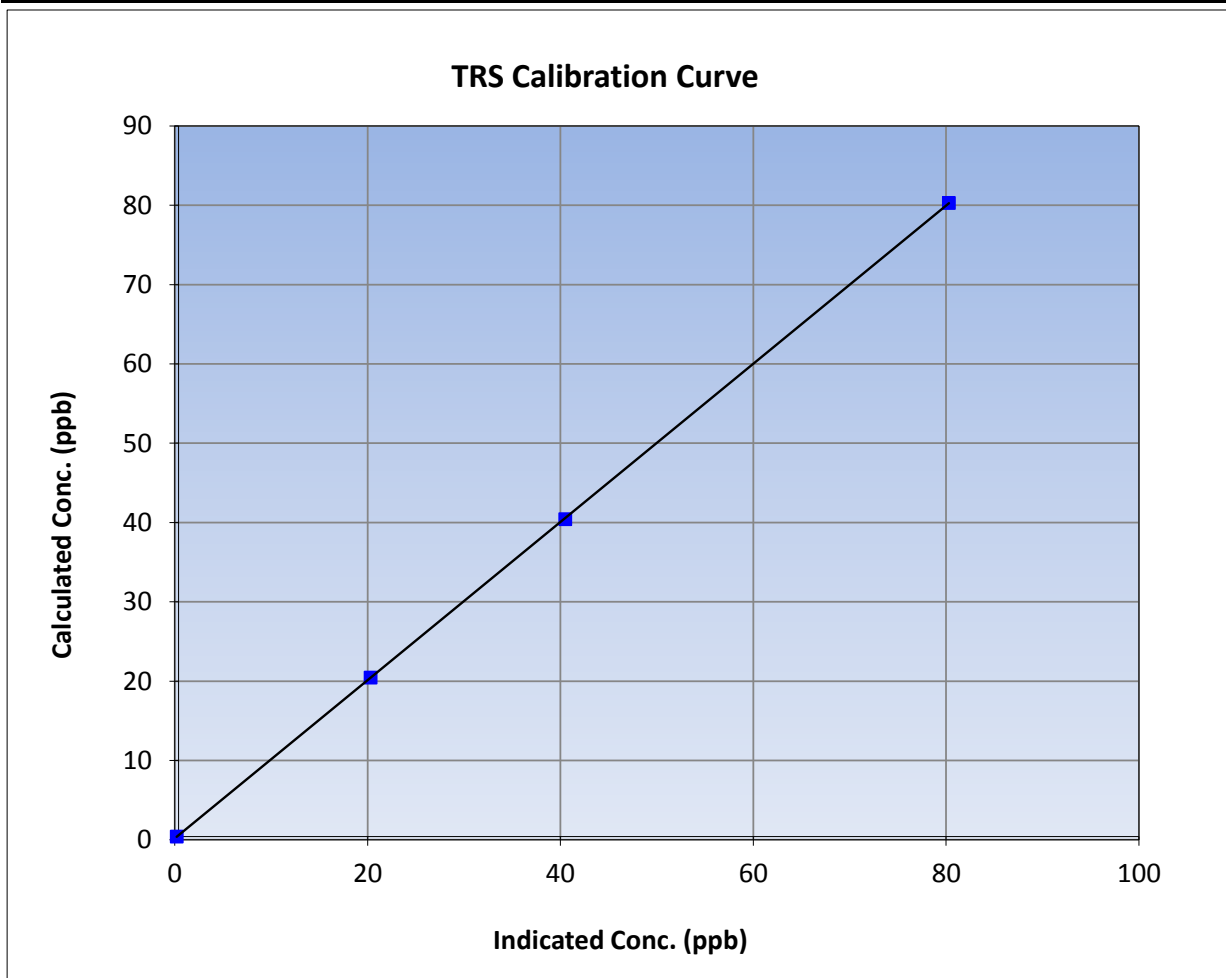
Version-03-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	June 2, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	9:52	End Time (MST)	12:18
Analyzer make	Thermo 43i- TLE	Analyzer serial #	1151680031

Calibration Data

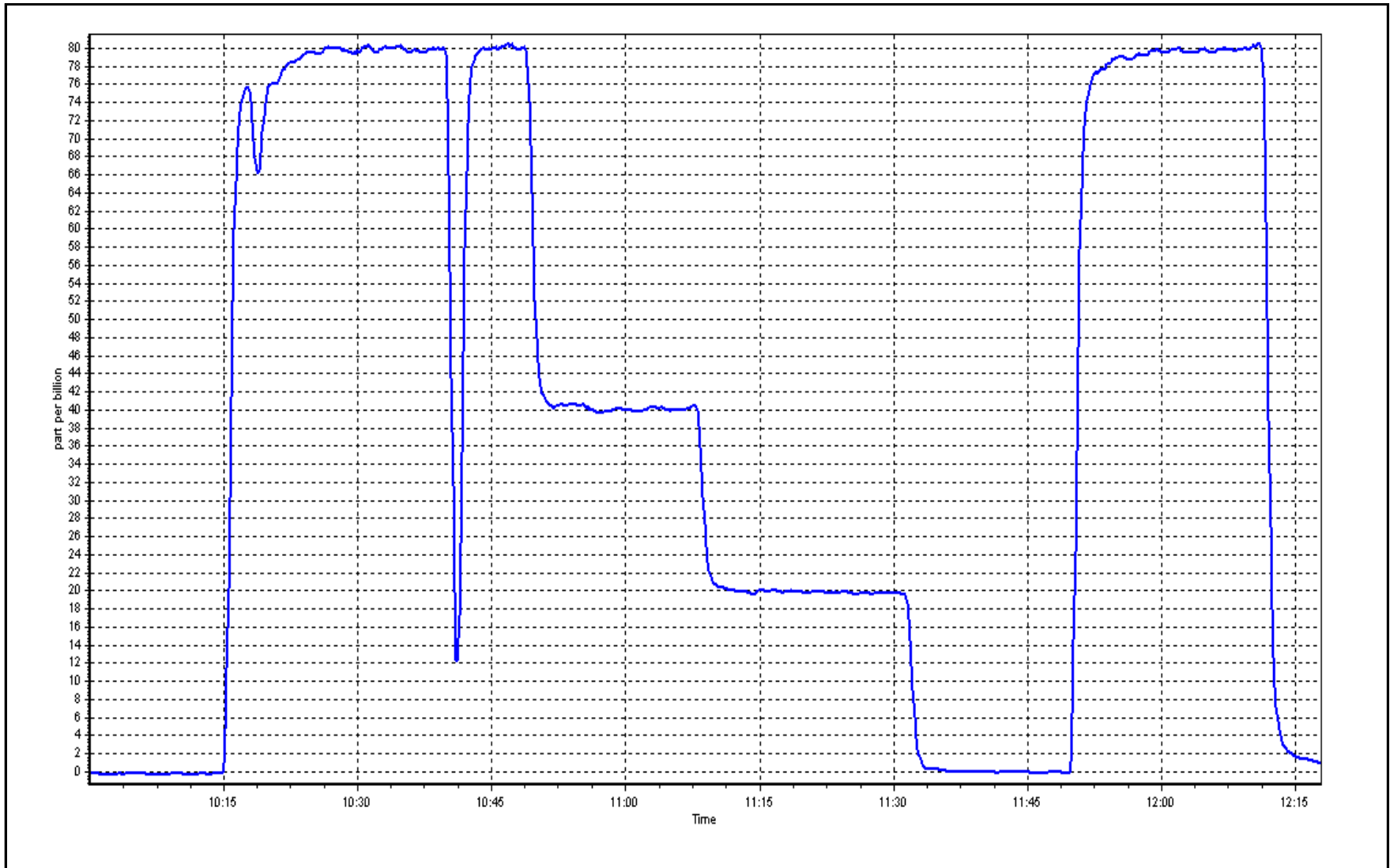
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999992	≥0.995
79.9	79.9	1.0003			
40.0	40.1	0.9981	Slope	0.997415	0.90 - 1.10
20.1	19.9	1.0087			
			Intercept	0.169883	+/-3



TRS Calibration Plot

Date: July 21, 2017

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Summary

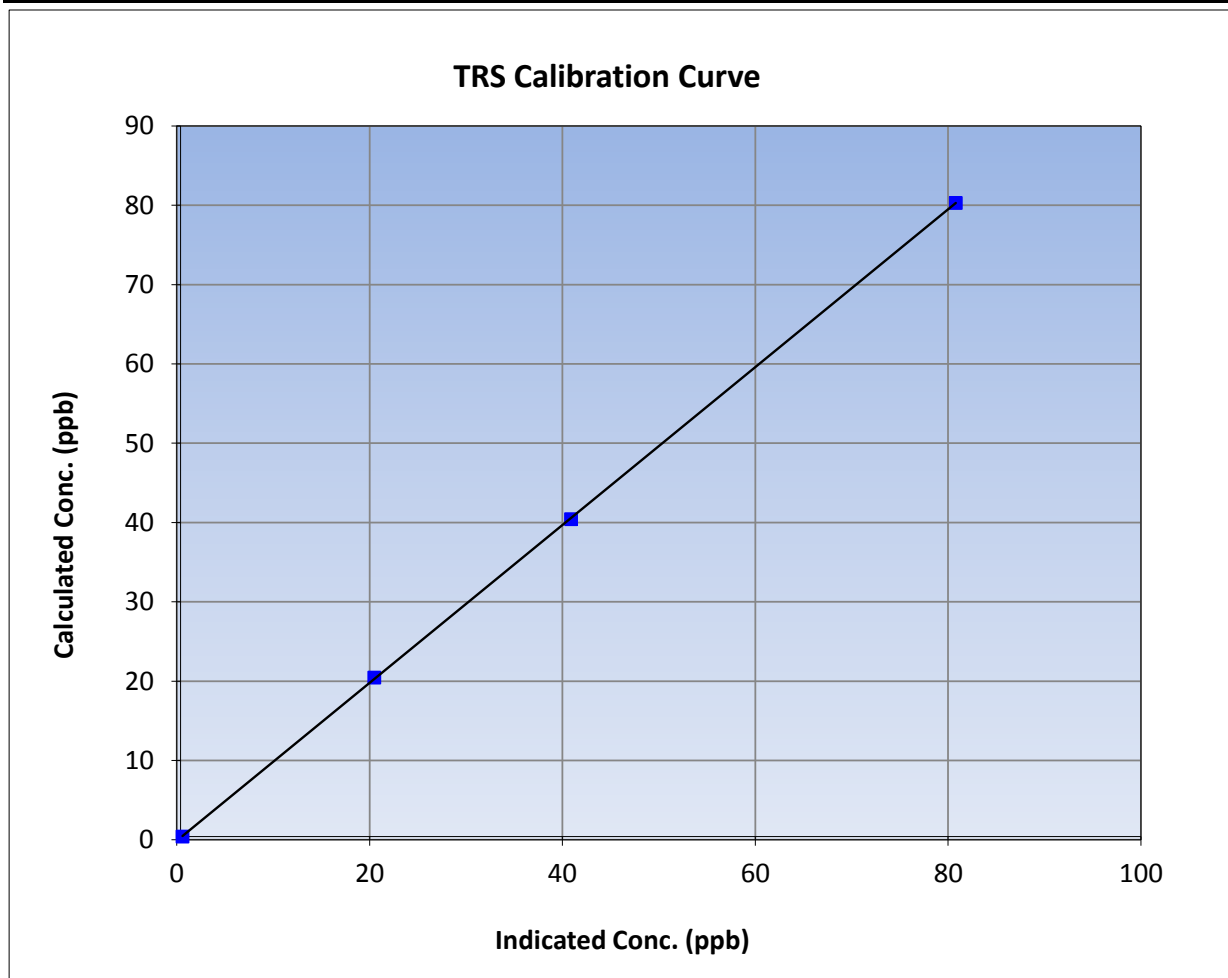
Version-03-2017

Station Information

Calibration Date	July 28, 2017	Previous Calibration	July 21, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:00	End Time (MST)	15:05
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1151680031

Calibration Data

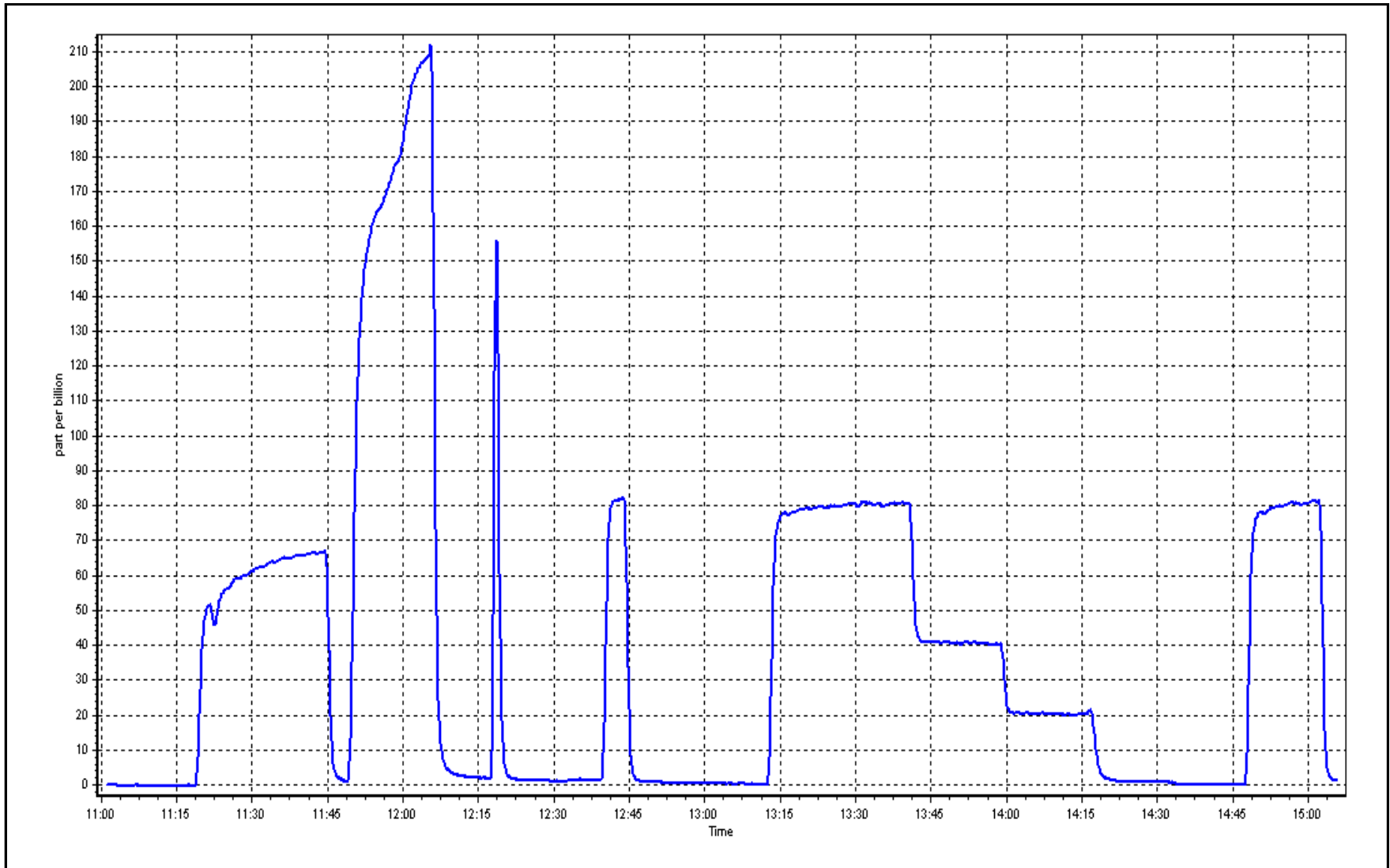
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999980	≥0.995
79.9	80.4	0.9940			
40.0	40.5	0.9883	Slope	0.995277	0.90 - 1.10
20.1	20.1	0.9986			
			Intercept	-0.128666	+/-3



TRS Calibration Plot

Date: July 28, 2017

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Summary

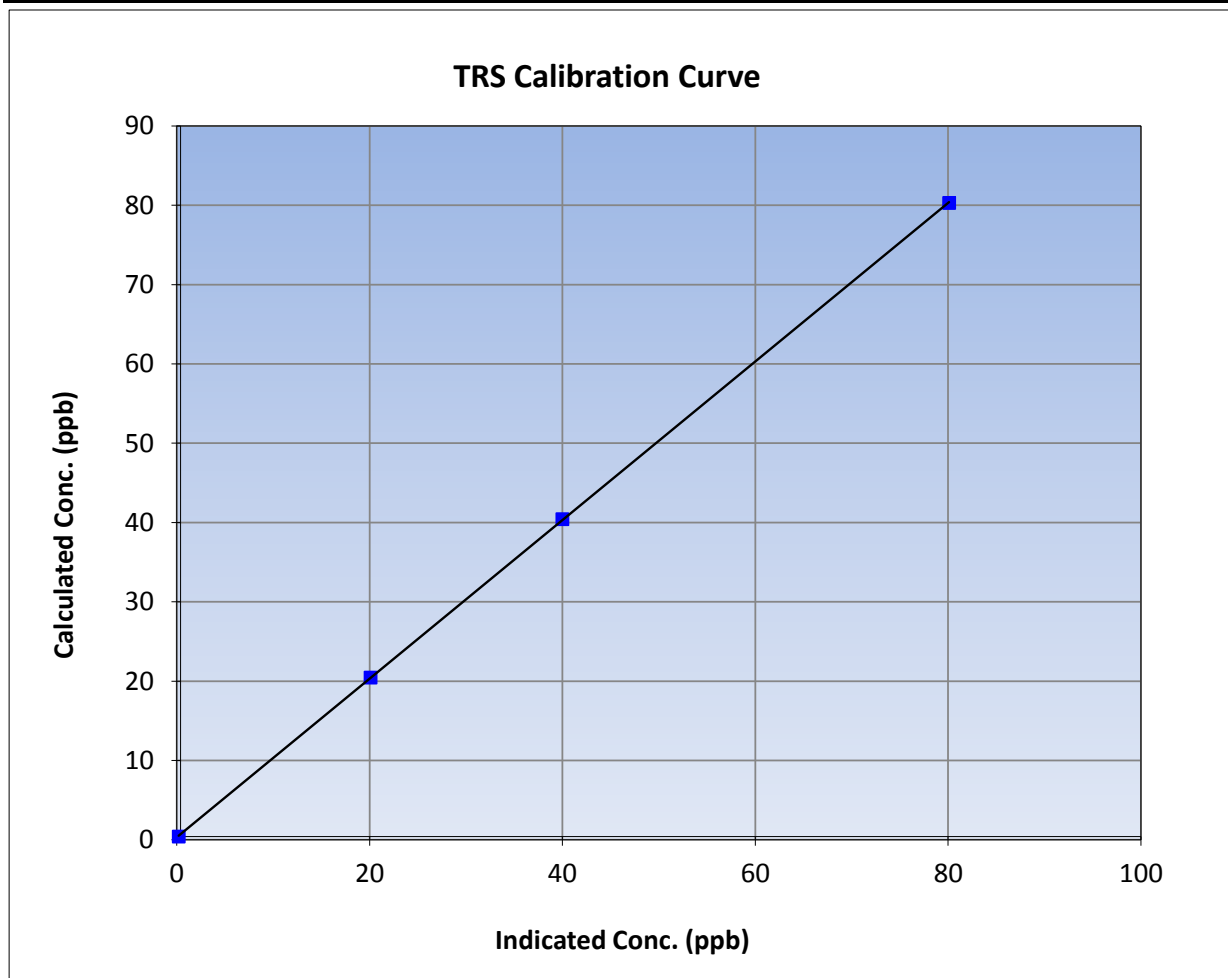
Version-03-2017

Station Information

Calibration Date	July 31, 2017	Previous Calibration	July 28, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	11:36	End Time (MST)	16:40
Analyzer make	Thermo 43i-TLE	Analyzer serial #	1151680031

Calibration Data

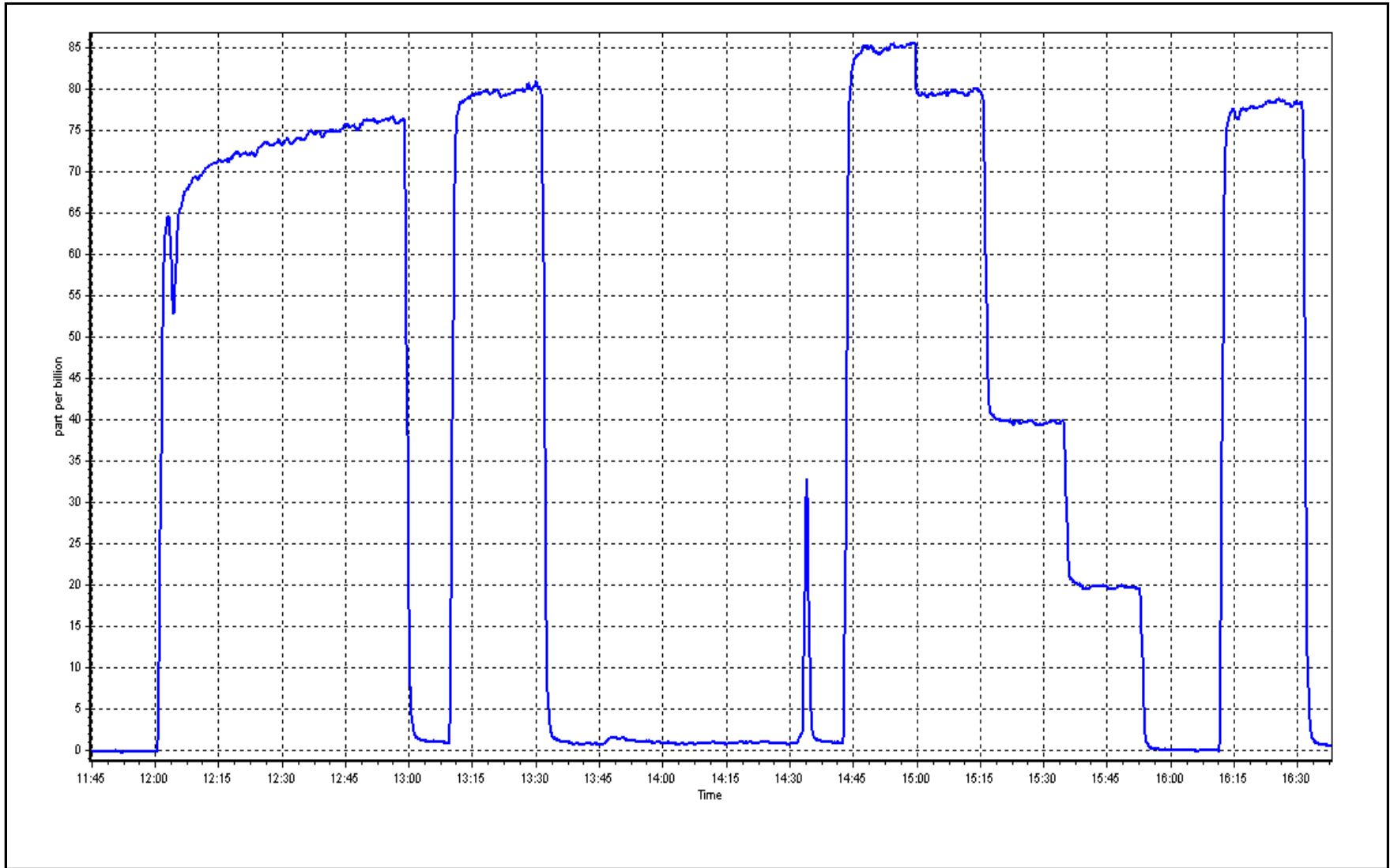
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999989	≥0.995
79.9	79.7	1.0028			
40.0	39.6	1.0107	Slope	0.999842	0.90 - 1.10
20.1	19.7	1.0189			
			Intercept	0.310071	+/-3



TRS Calibration Plot

Date: July 31, 2017

Location: Janvier





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

Station Name:	Janvier	Station number:	AMS 22
Calibration Date:	July 20, 2017	Last Cal Date:	June 1, 2017
Start time (MST):	14:18	End time (MST):	16:50
Reason:	Cylinder Change Hydrogen and nitrogen cylinders being replaced.		

Calibration Standards

Gas Cert Reference	LL107937	Cal Gas Expiry Date	September 8, 2018
CH4 Cal Gas Conc.	<u>509.0</u> ppm	CH4 Equiv Conc.	1056.3 ppm
C3H8 Cal Gas Conc.	<u>199.0</u> ppm	Station temp.	21 Deg C
Calibrator Model	Teledyne API 700	Serial Number	2447
ZAG make/model	Teledyne API 701	Serial Number	135

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1501663728

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
THC Range (ppm)	0 - 50 ppm		Column Temp	NA	74.9
NMHC Range (ppm)	0 - 25 ppm		Detector Temp	NA	175.5
CH4 SP Ratio	0.000186	0.000186	Flame Temp	NA	405.0
CH4 Retention time	12.4	12.4	Carrier Pressure	36.7	36.7
NMHC SP Ratio	4.30E-05	4.30E-05	Fuel Pressure	NA	44.9
NMHC Peak Area	199968	199968	Air Pressure	33.8	33.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
THC Cal Slope	1.002758	0.994513
THC Cal Offset	0.046498	0.028230
CH4 Cal Slope	1.004677	0.997068
CH4 Cal Offset	0.046918	0.024200
NMHC Cal Slope	1.001855	0.992205
NMHC Cal Offset	0.001389	0.005354

Notes: Nitrogen cylinder and hydrogen being replaced. No as founds done due to hydrogen cylinder running empty. No as lefts done in the interest of time.

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					
as found span					
calibrator zero	5009	0.0	0.00	0.00	----
high point	4933	78.7	16.59	16.67	0.995
second point	4976	39.4	8.30	8.28	1.002
third point	4993	19.7	4.15	4.13	1.005
as left zero					
as left span					
Average Correction Factor					1.001
Corrected As found	NA	Prev response	NA	*% change	NA

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					
as found span					
calibrator zero	5009	0	0.00	0.00	----
high point	4933	78.7	8.59	8.66	0.992
second point	4976	39.4	4.30	4.32	0.995
third point	4993	19.7	2.15	2.16	0.996
as left zero					
as left span					
Average Correction Factor					0.994
Corrected As found	NA	Prev response	NA	*% change	NA

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					
as found span					
calibrator zero	5009	0.0	0.00	0.00	----
high point	4933	78.7	7.99	8.01	0.998
second point	4976	39.4	4.00	3.96	1.011
third point	4993	19.7	2.00	1.97	1.015
as left zero					
as left span					
Average Correction Factor					1.008
Corrected As found	NA	Prev response	NA	*% change	NA

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

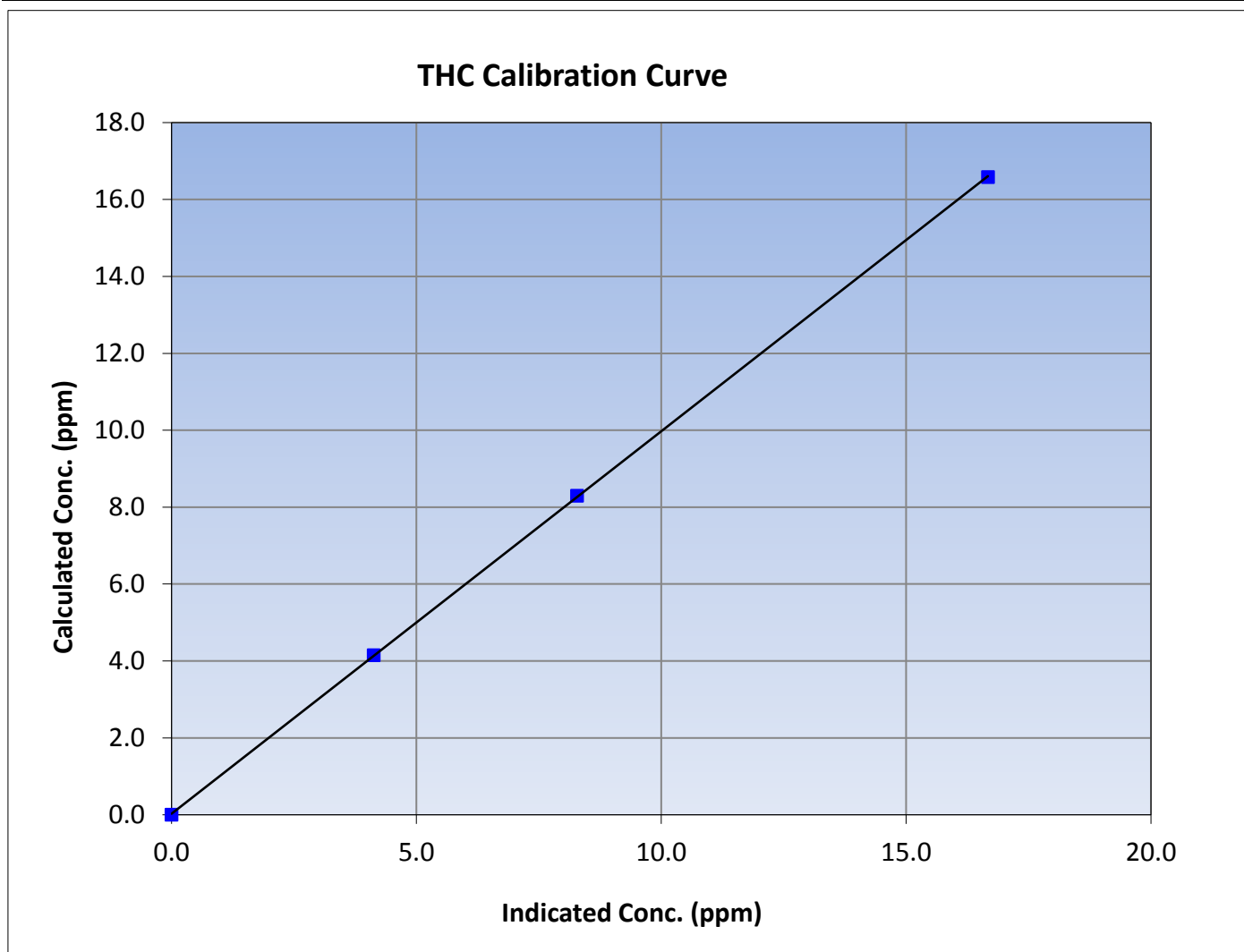
Version-02-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	14:18	End Time (MST)	16:50
Analyzer make	Thermo 55i	Analyzer serial #	1501663728

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	0.999983	≥ 0.995			
16.59	16.67	0.9950						
8.30	8.28	1.0019				Slope	0.994513	0.90 - 1.10
4.15	4.13	1.0051						
			Intercept	0.028230	± 0.5			





Wood Buffalo Environmental Association

CH₄ Calibration Summary

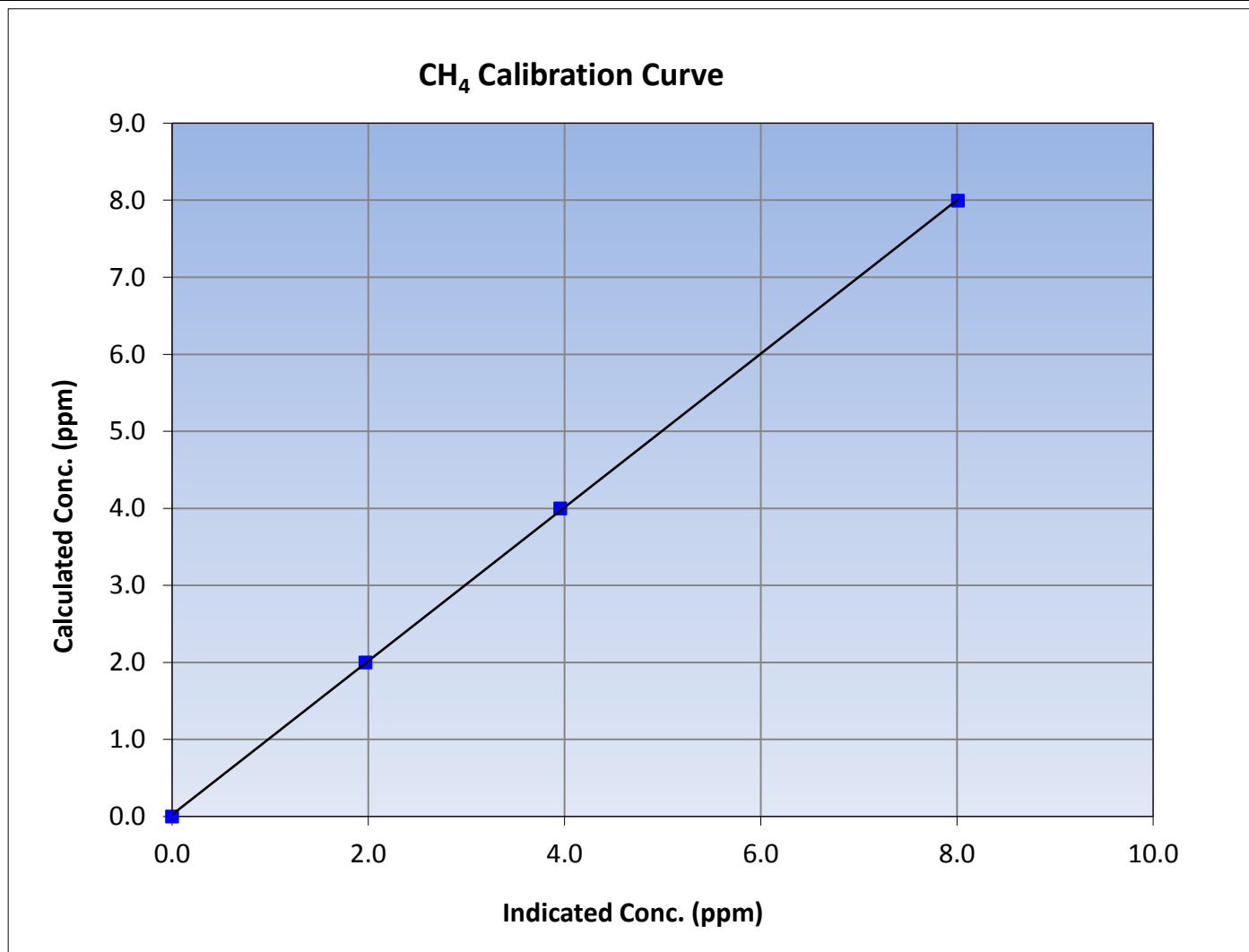
Version-02-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	14:18	End Time (MST)	16:50
Analyzer make	Thermo 55i	Analyzer serial #	1501663728

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	0.999944	≥ 0.995			
7.99	8.01	0.9979						
4.00	3.96	1.0108				Slope	0.997068	0.90 - 1.10
2.00	1.97	1.0154						
			Intercept	0.024200	± 0.5			





Wood Buffalo Environmental Association

NMHC Calibration Summary

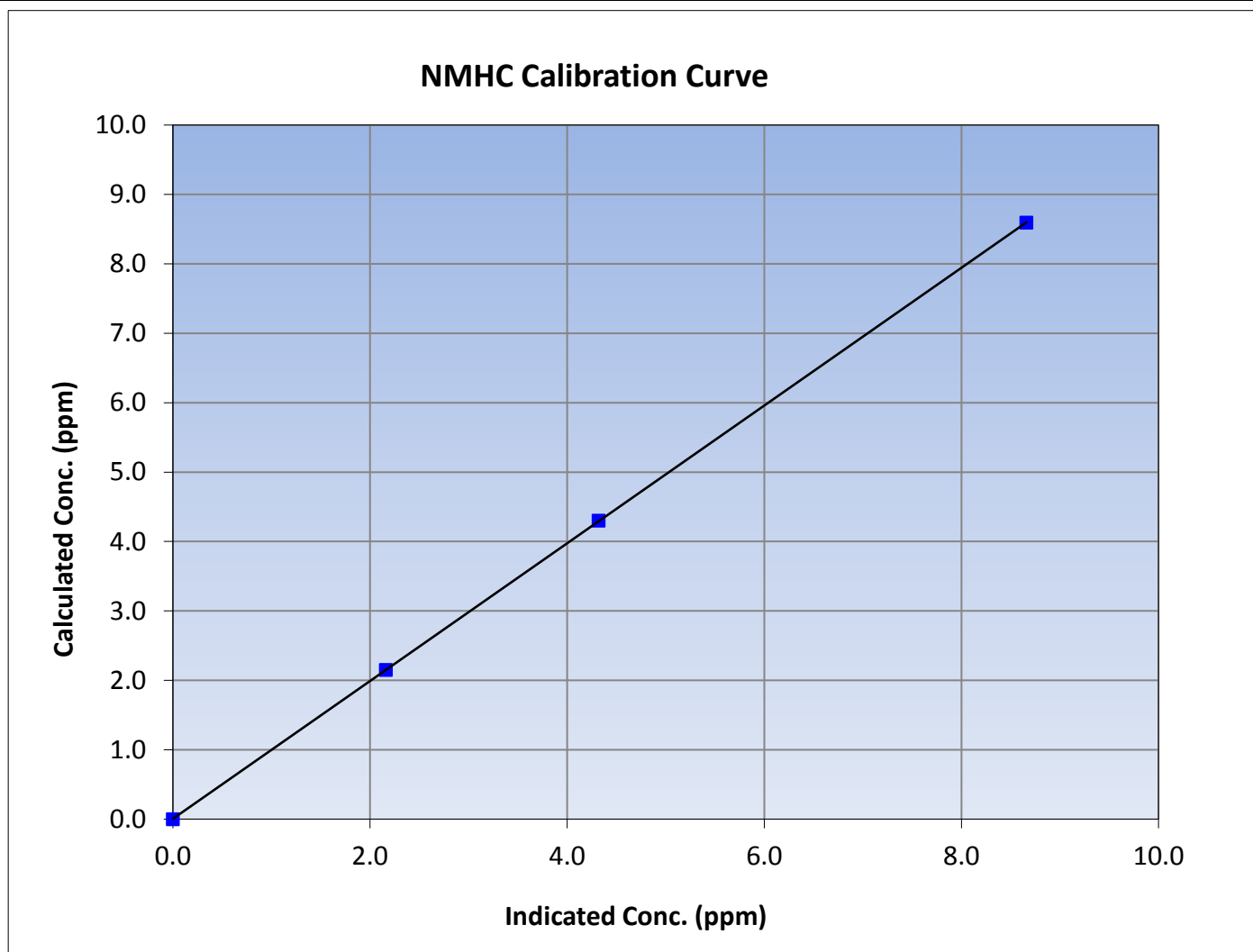
Version-02-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	14:18	End Time (MST)	16:50
Analyzer make	Thermo 55i	Analyzer serial #	1501663728

Calibration Data

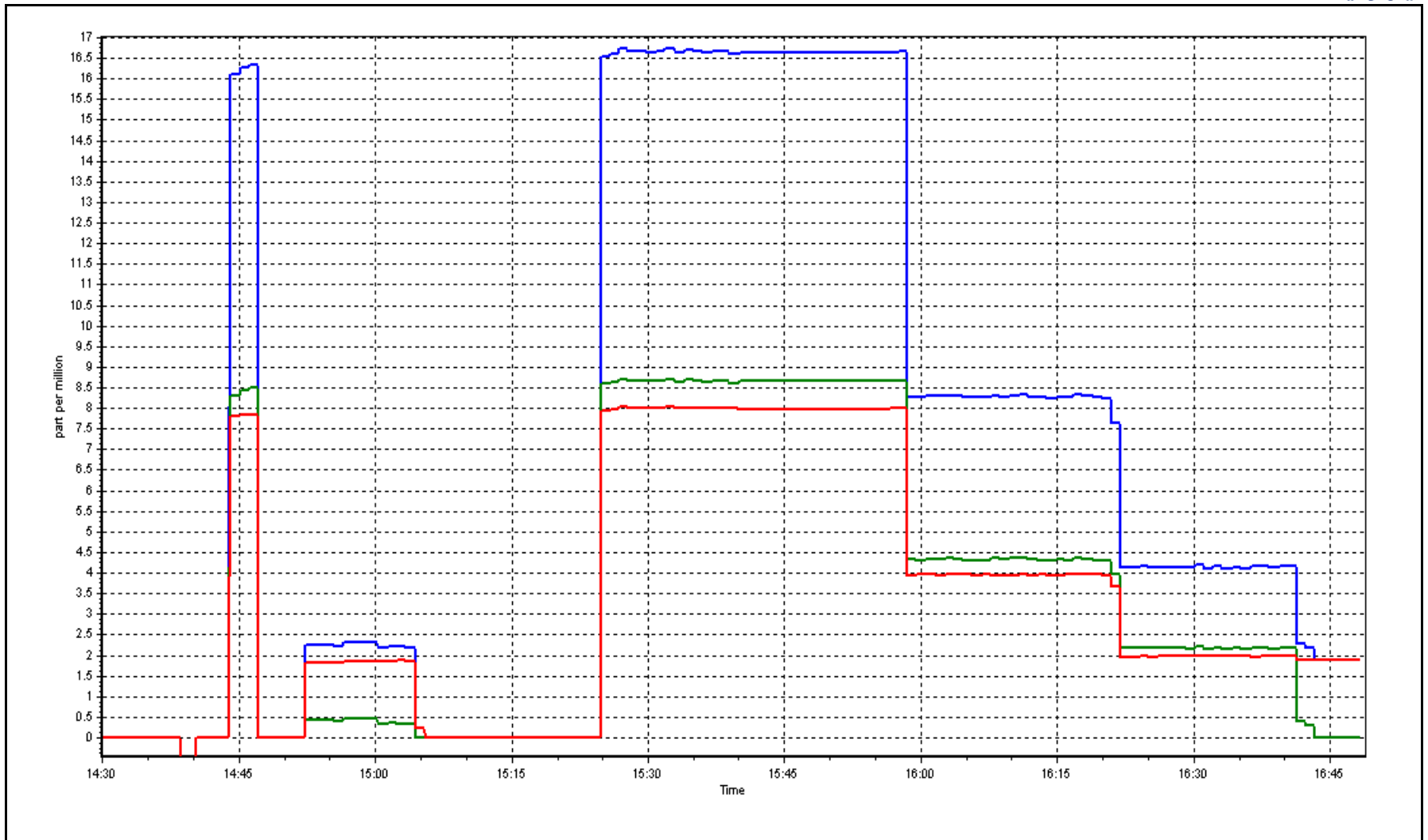
Calculated concentration (ppm) (Cc)	Indicated concentration (ppm) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation		<u>Limits</u>			
0.00	0.00	----	Correlation Coefficient	0.999997	≥ 0.995			
8.59	8.66	0.9923						
4.30	4.32	0.9952				Slope	0.992205	0.90 - 1.10
2.15	2.16	0.9957						
			Intercept	0.005354	± 0.5			



NMHC Calibration Plot

Date: July 20, 2017

Location: Janvier





Wood Buffalo Environmental Association

O₃ Calibration Summary

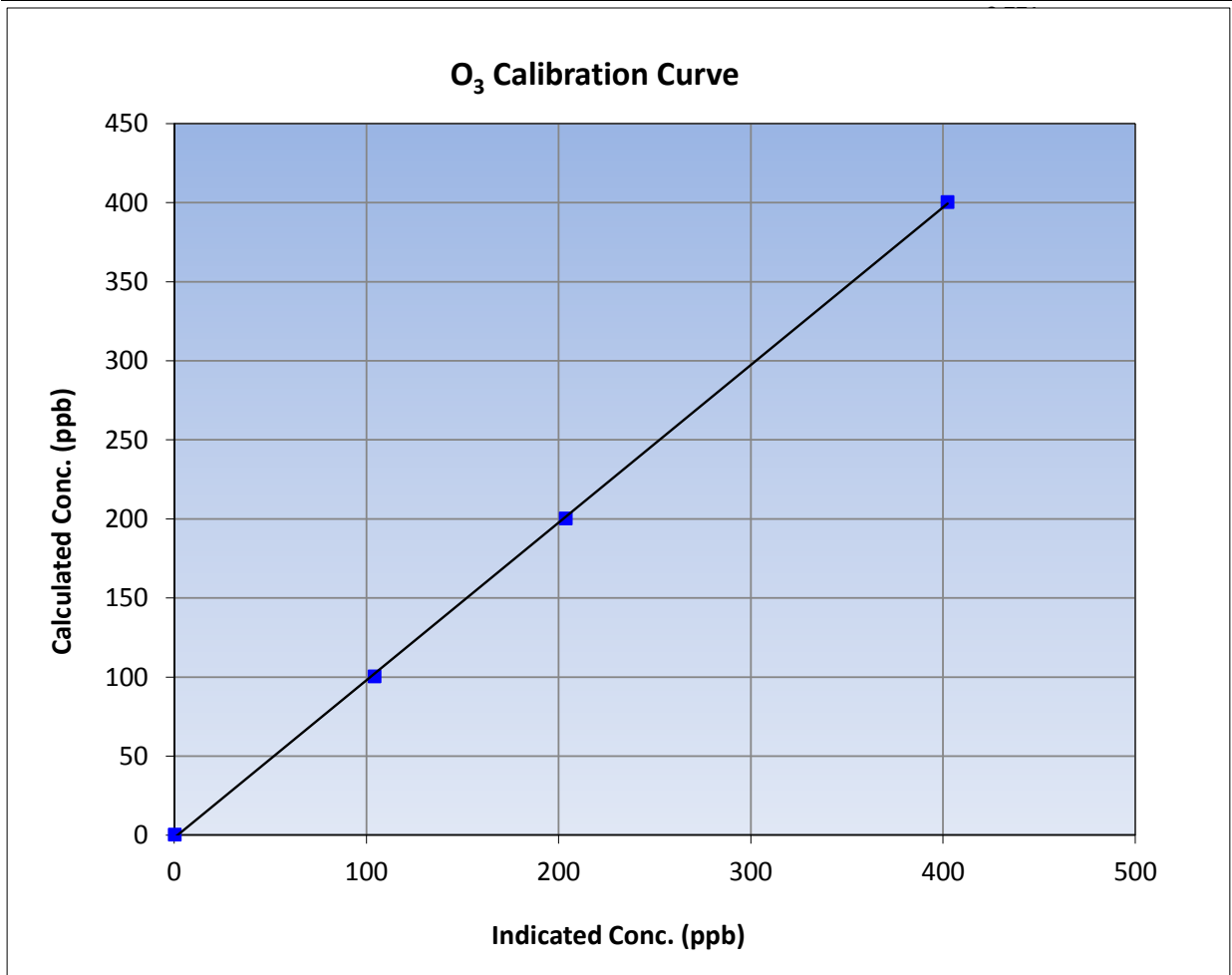
Version-03-2017

Station Information

Calibration Date	July 18, 2017	Previous Calibration	June 19, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	10:17	End Time (MST)	14:03
Analyzer make	Thermo 49i	Analyzer serial #	1227254861

Calibration Data

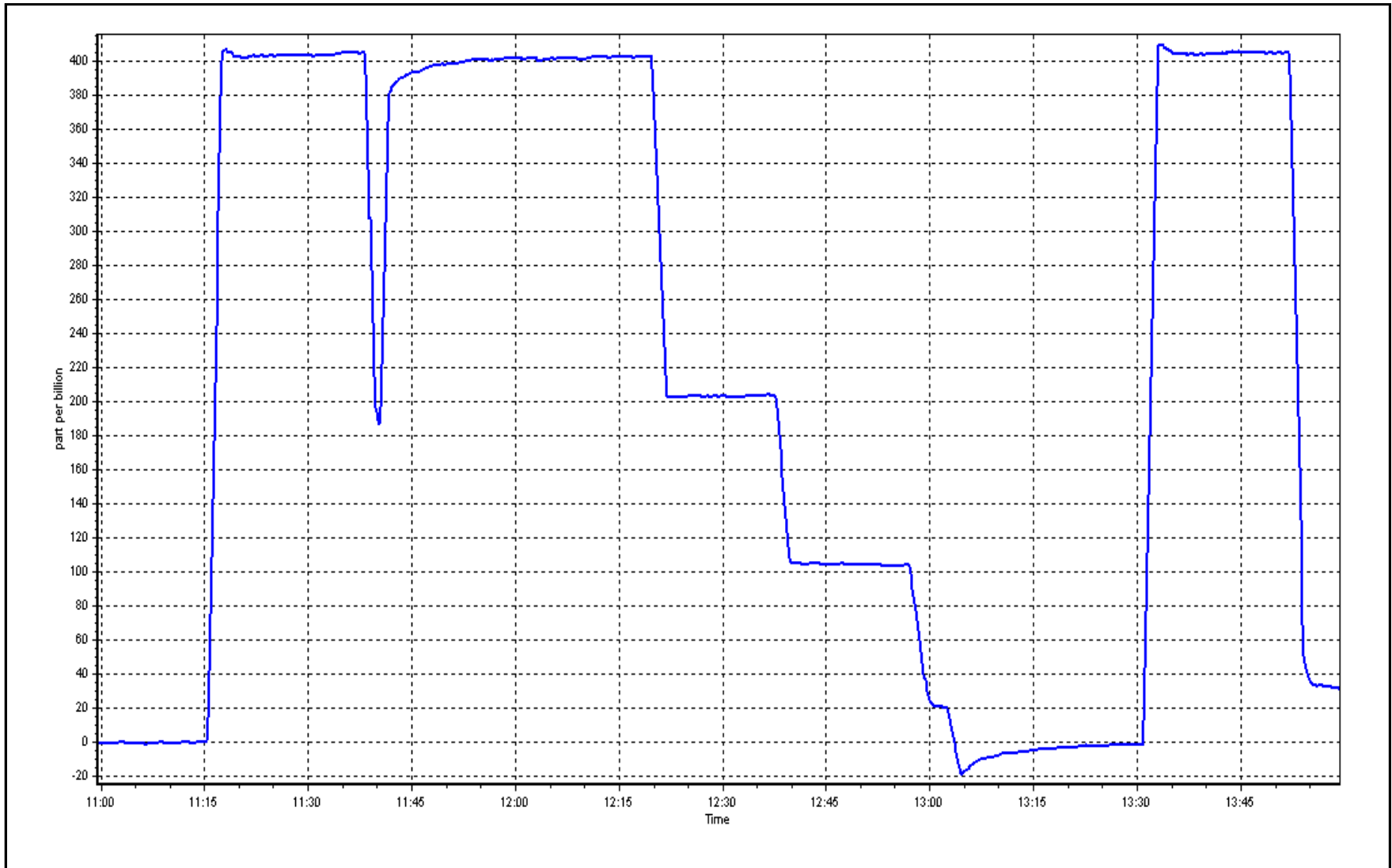
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
400.0	402.0	0.9950		
200.0	203.3	0.9838	Slope	0.90 - 1.10
100.0	103.9	0.9625		
			Intercept	+/- 10



O₃ Calibration Plot

Date: July 18, 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:	July 14, 2017	Last Cal Date:	June 1, 2017
Start time (MST):	9:32	End time (MST):	13:49
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	0.680	1.003	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	0.995	0.997	PMT Temperature	-3.0	-2.9
NO ₂ coefficient	0.995	1.000	Reaction cell Press	394.3	160.6
NO bkgrnd	2.1	3.0	Sample Flow	0.345	1.046
NOX bkgrnd	2.1	3.1	PMT Voltage	-762.6	-727.8

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.996863	0.992568
NO _x Cal Offset	3.690160	3.486085
NO Cal Slope	0.992266	0.990309
NO Cal Offset	5.085550	4.992127
NO ₂ Cal Slope	0.999884	1.001167
NO ₂ Cal Offset	1.650769	-1.917211



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										
as found span										
calibrator zero	5009	0.0	0.0	0.0	0.0	0.1	-0.1	0.2	----	----
high point	4935	78.7	799.0	799.0	0.0	804.0	805.0	-1.2	0.9938	0.9925
second point	4976	39.4	399.9	399.9	0.0	395.1	393.6	0.3	1.0120	1.0159
third point	4993	19.7	200.0	200.0	0.0	196.1	193.9	2.2	1.0201	1.0317
as left zero	5011	0.0	0.0	0.0	0.0	-0.8	-0.9	0.1	----	----
as left span	4828	78.7	816.4	388.7	427.7	811.5	389.4	422.1	1.0060	0.9982
Average Correction Factor									1.0086	1.0134

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	810.5	809.3	1.1	0.9858	0.9872	----	----
1st NO2 (400 ppb O3)	388.7	420.6	808.9	388.7	420.2	0.9877	----	1.0010	99.9%
2nd NO2 (200 ppb O3)	600.5	208.8	814.5	600.5	214.1	0.9809	----	0.9752	102.5%
3rd NO2 (100 ppb O3)	701.0	108.3	811.0	701.0	110.0	0.9852	----	0.9845	101.6%
2nd NO ref point	----	0.0	811.6	811.6	-0.1	0.9844	0.9844	----	----
Average Correction Factor						0.9846	0.9858	0.9869	101.3%

Notes: Could not complete asfound as pump was dead on arrival. Replaced pump and flows returned to normal. Adjusted the span. Reset to coefficient values to 1 and adjusted the PMT voltage. Generated zero again to confirm zero value before proceeding.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

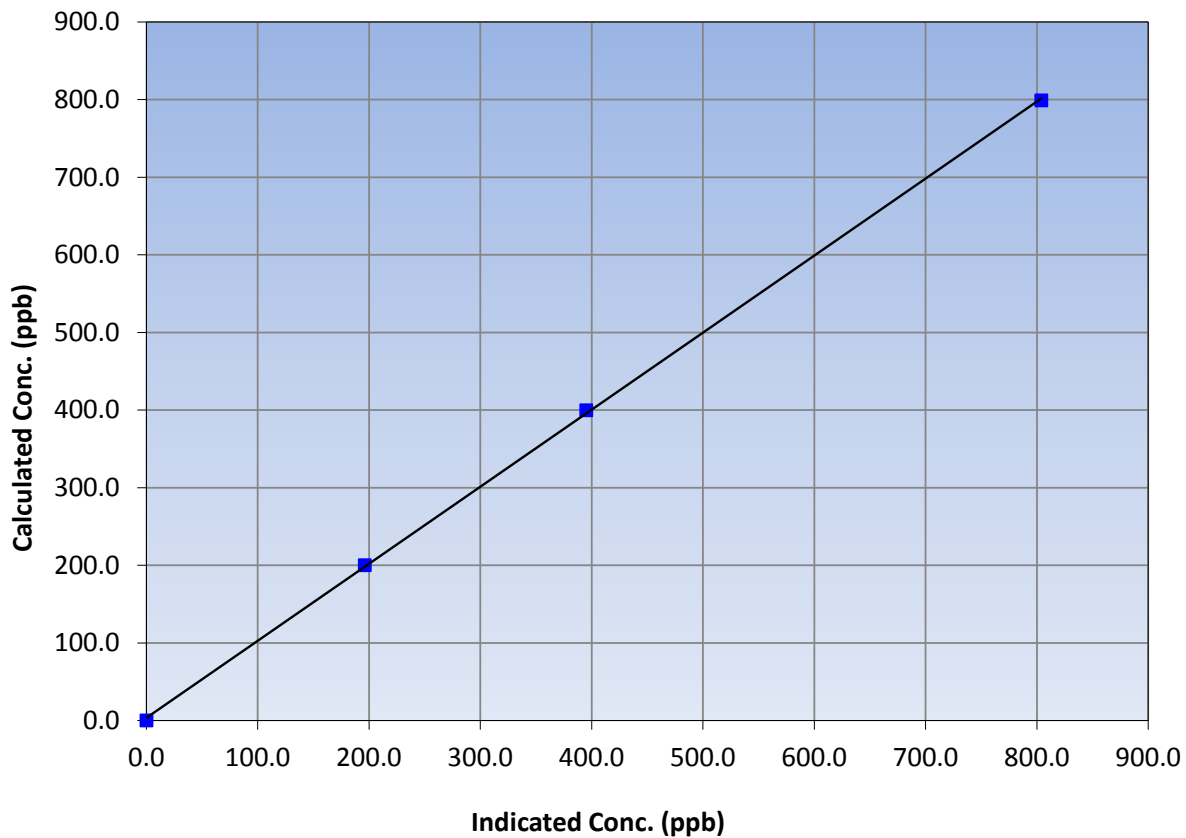
Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	9:32	End Time (MST)	13:49
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	0.1	----	Correlation Coefficient	≥0.995	
799.0	804.0	0.9938			
399.9	395.1	1.0120			
200.0	196.1	1.0201			
			Slope	0.992568	0.90 - 1.10
			Intercept	3.486085	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

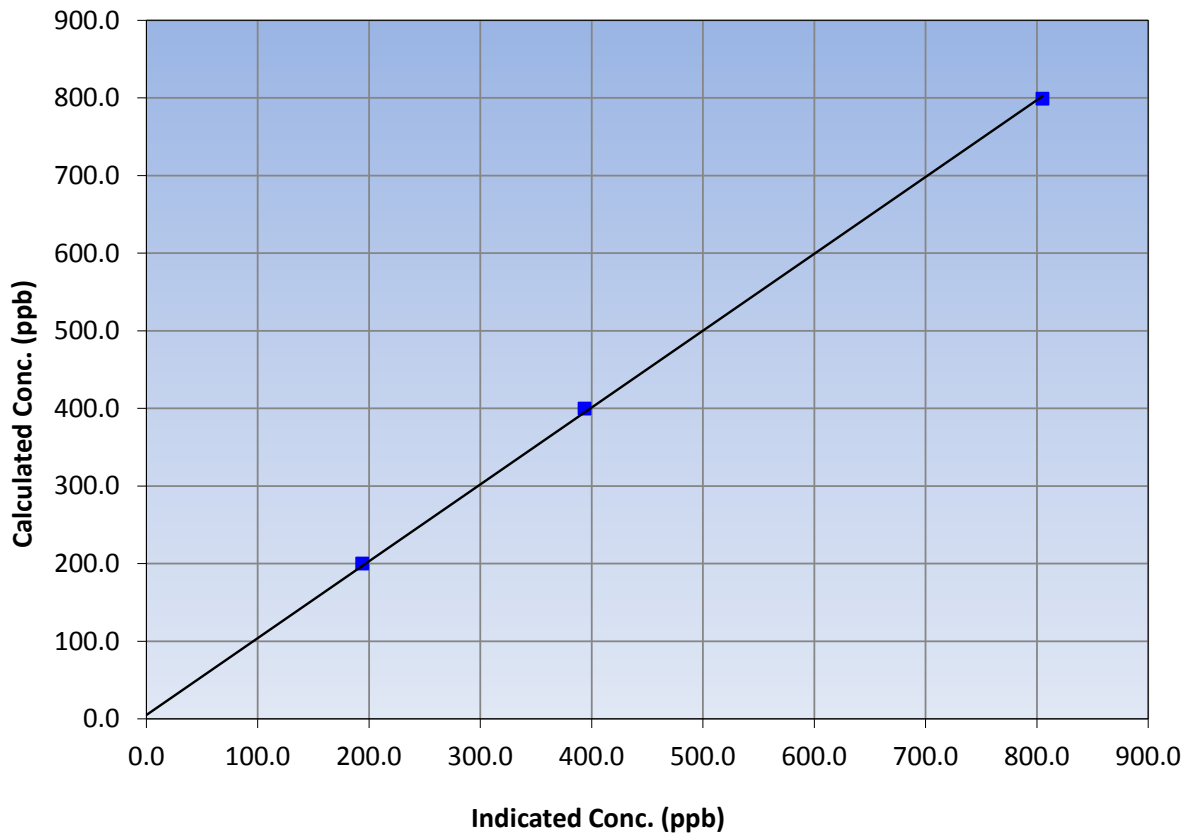
Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	9:32	End Time (MST)	13:49
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	-0.1	----	Correlation Coefficient	0.999802	≥0.995
799.0	805.0	0.9925			
399.9	393.6	1.0159	Slope	0.990309	0.90 - 1.10
200.0	193.9	1.0317			
			Intercept	4.992127	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

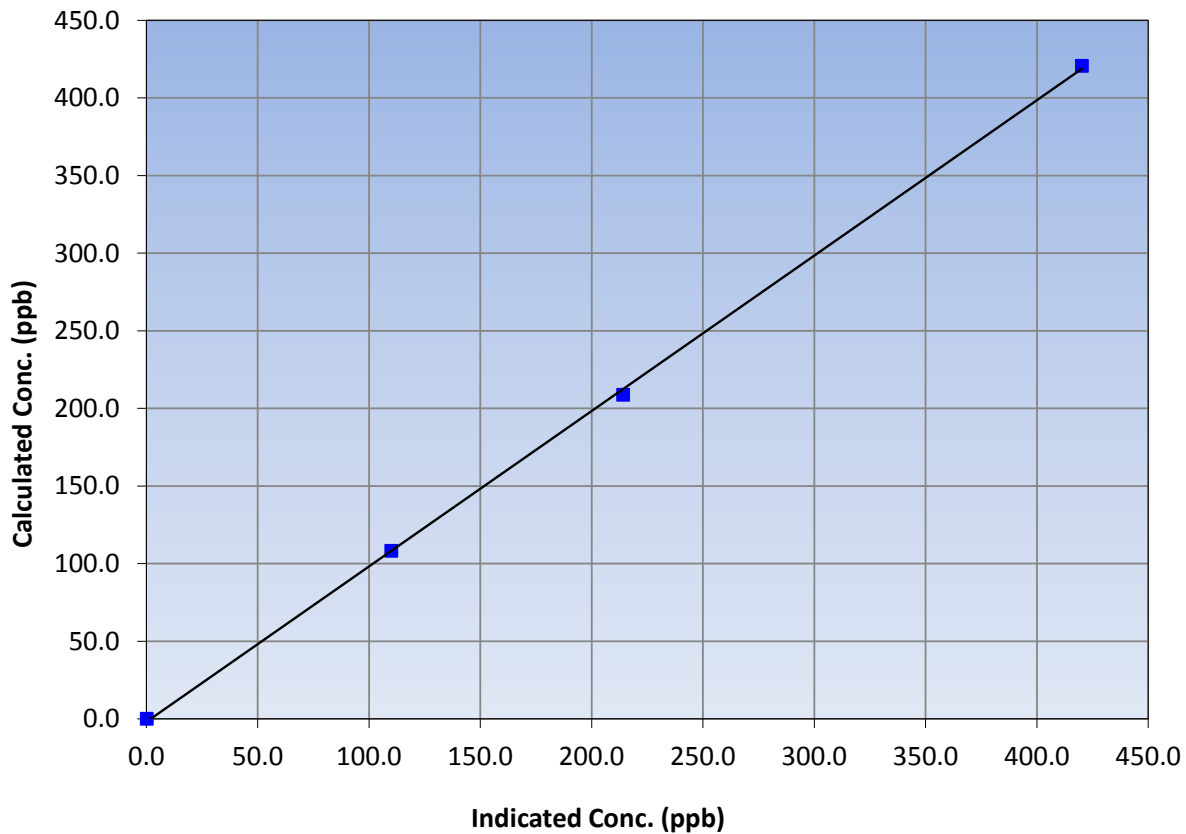
Station Information

Calibration Date	July 14, 2017	Previous Calibration	June 1, 2017
Station Name	Janvier	Station Number	AMS 22
Start Time (MST)	9:32	End Time (MST)	13:49
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	0.2	----	Correlation Coefficient	≥0.995	
420.6	420.2	1.0010			
208.8	214.1	0.9752			
108.3	110.0	0.9845			
			Slope	1.001167	0.90 - 1.10
			Intercept	-1.917211	+/-20

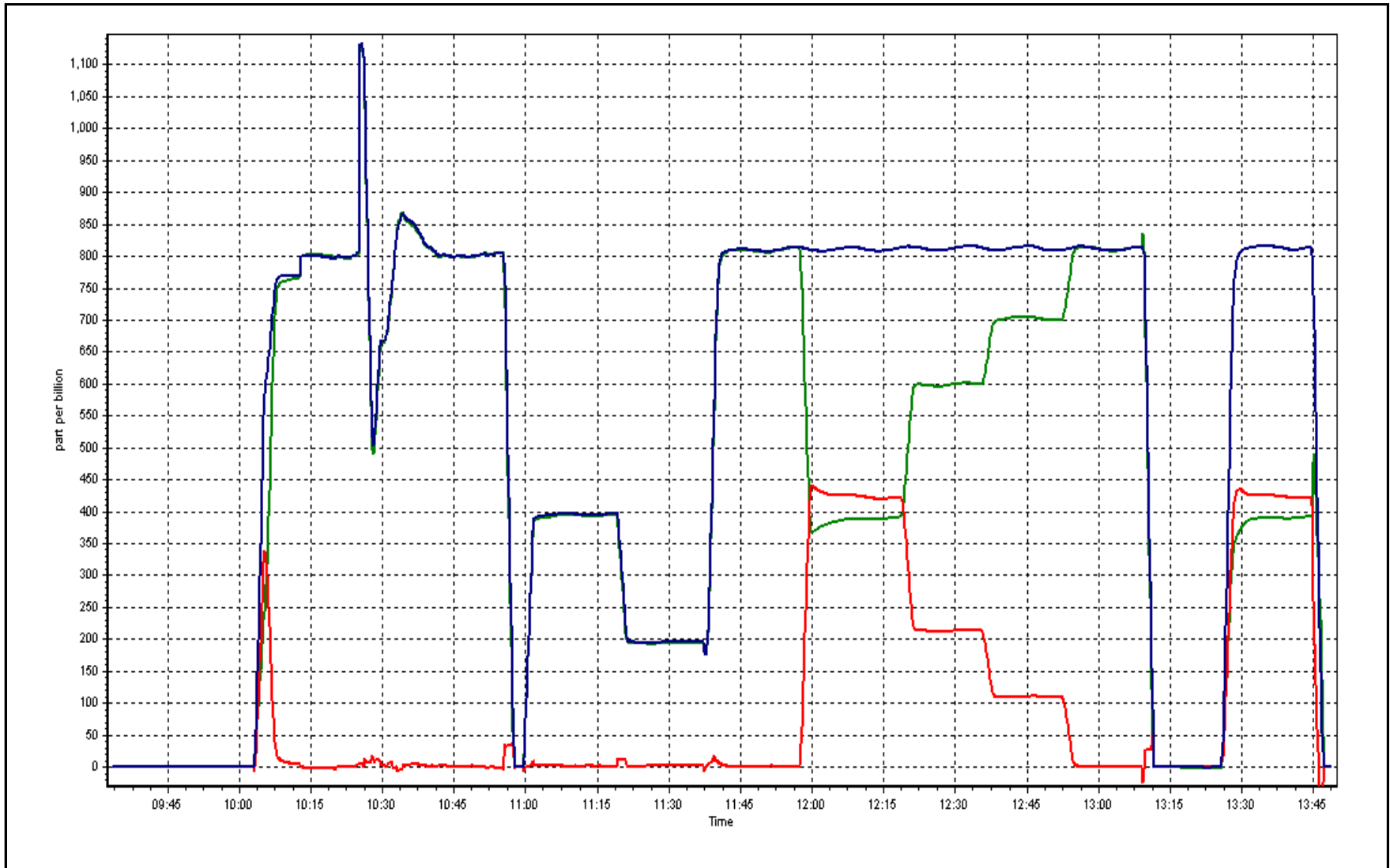
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 14, 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:	July 18, 2017	Last Cal Date:	June 19, 2017
Start time (MST):	11:30	End time (MST):	14:13
Sharp Model:	Thermo 5030 SHARP	S/N:	E-1333
Particulate Fraction:	PM2.5	C14 Source S/N:	5341
Flow Standard Model:	Delta-Cal	S/N:	14227
Temp/RH standard:	Delta-Cal	S/N:	14227

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)	16	14	21	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	945	957	960	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1026	1000	<input type="checkbox"/>	+/- 50 LPH
Nephelometer zero	1.4	-0.6	-0.6	<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"/>		
Filter Tape Installed:	<input type="checkbox"/>				

Quarterly Calibration Test

			<u>Tolerance</u>
Leak Test:	Date of check: _____	Last Cal Date: _____	
	Flow w/o adaptor: _____	Flow w/ adaptor: _____	0.4 LPM

Annual Calibration Test

Foil Calibration	Foil Mass: _____	S/N: _____
	Date of check: _____	Last Cal Date: _____
	New Correction Factor: _____	7036 _____

<u>Parameter</u>	<u>As found</u>	<u>Measured</u>	<u>As left</u>	<u>Adjusted</u>	<u>Tolerance</u>
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%

Notes: SHARP replaced. Nephelometer zero adjusted multiple times but would not reach the specified limits.

Calibration by: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 23 FORT HILLS JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 JULY 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	707	37	37	100	19	0	3	0
TRS(ppb) Average	708	35	36	99.87	3	0	1	0
THC(ppm) Average	703	37	41	99.46	4	-	2	-
NO2 (ppb) Average	707	37	37	100	29	0	9	-
NO (ppb) Average	707	37	37	100	46	-	6	-
NOX (ppb) Average	707	37	37	100	75	-	13	-
PM2.5 (ug/m3) Average	717	3	27	96.77	122	-	21	0
Temperature 2 m (C) Average	744	0	0	100	31	-	24	-
Relative Humidity (%) Average	744	0	0	100	99	-	72	-
Wind Speed 10 m (km/h) Average	734	0	10	98.66	34	-	22	-
Wind Direction 10 m (deg) Average	734	0	10	98.66	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 JULY 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	707	0.4	2	-	0	0	0	0	0	1	19
TRS (ppb) Average	708	0.3	0	-	0	0	0	0	0	1	3
THC (ppm) Average	703	2.1	0	-	2	2	2	2	2	2	4
NO2 (ppb) Average	707	3.7	4	-	0	0	1	2	5	10	29
NO (ppb) Average	707	1.6	4	-	0	0	0	0	1	4	46
NOX (ppb) Average	707	5.3	8	-	0	1	1	2	6	14	75
PM2.5 (ug/m3) Average	717	10.8	9	-	0	2	5	9	15	21	122
Wind Speed 10 m (km/h) Average	744	19.7	5	-	7	14	16	19	23	26	31
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	734	11.2	6	-	0	4	6	10	15	20	34
Relative Humidity (%) Average	734	0	0	-	0						0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	11 Jul 2017 11:00	11 Jul 2017 11:00	1	Maintenance - manifold cleaning
THC	11 Jul 2017 18:00	11 Jul 2017 18:00	1	Unstable operation - excessive baseline drift
THC	13 Jul 2017 14:00	13 Jul 2017 16:00	3	Unstable operation - excessive baseline drift
PM2.5	07 Jul 2017 14:00	07 Jul 2017 21:00	8	Unstable operation - excessive baseline drift
PM2.5	14 Jul 2017 02:00	14 Jul 2017 02:00	1	Unstable operation - excessive baseline drift
PM2.5	16 Jul 2017 18:00	16 Jul 2017 23:00	6	Unstable operation - excessive baseline drift
PM2.5	17 Jul 2017 07:00	17 Jul 2017 08:00	2	Unstable operation - excessive baseline drift
PM2.5	17 Jul 2017 10:00	17 Jul 2017 13:00	4	Unstable operation - excessive baseline drift
PM2.5	18 Jul 2017 11:00	18 Jul 2017 13:00	3	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	06 Jul 2017 23:00	07 Jul 2017 00:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	07 Jul 2017 23:00	08 Jul 2017 05:00	7	Flat line in sensor output signal
Wind Speed, Wind Direction	15 Jul 2017 02:00	15 Jul 2017 02:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19 ppb on Jul 12 11:00	Maximum Daily Average: 2.9 ppb on Jul 12		Hours of Data:	707
Minimum Value: 0 ppb on Jul 3 02:00	Minimum Daily Average: 0.0 ppb on Jul 19		Hours of Missing Data:	37
Maximum Diurnal Average: 1.8 ppb at hour 11	Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Calibration:	37
Monthly Average: 0.4 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 8		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-Jul	0	Z	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	1	1	1	1	1	1	0	0.7	2
2-Jul	0	0	Z	0	1	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3
3-Jul	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-Jul	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
5-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0.3	1
8-Jul	0	0	Z	0	0	0	0	0	0	0	1	7	3	1	0	0	3	1	0	0	0	0	0	0	0.8	7
9-Jul	0	0	0	Z	0	0	0	2	10	7	8	2	0	0	0	0	0	2	1	1	1	1	0	0	1.5	10
10-Jul	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
11-Jul	0	0	0	0	0	Z	0	0	0	C	C	C	C	C	C	2	1	0	0	0	0	0	0	--	2	
12-Jul	Z	0	0	0	0	0	0	2	4	10	19	7	2	0	0	0	4	3	0	8	2	1	1	1	2.9	19
13-Jul	1	Z	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Jul	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-Jul	0	0	0	Z	0	0	0	0	14	15	11	5	0	0	1	2	2	1	0	1	1	0	1	1	2.5	15
16-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	1	1	0	3	0	0	0	2	4	1	0	2	3	0	1	0	0	0.8	4
22-Jul	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	1
23-Jul	0	0	0	0	0	Z	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
24-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	1	3	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	6
28-Jul	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
29-Jul	0	0	0	0	0	Z	0	0	1	3	9	3	0	0	1	1	0	0	0	0	0	0	0	0	0.9	9
30-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	2	3	1	0	0	0	0	0	0.6	4
31-Jul	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

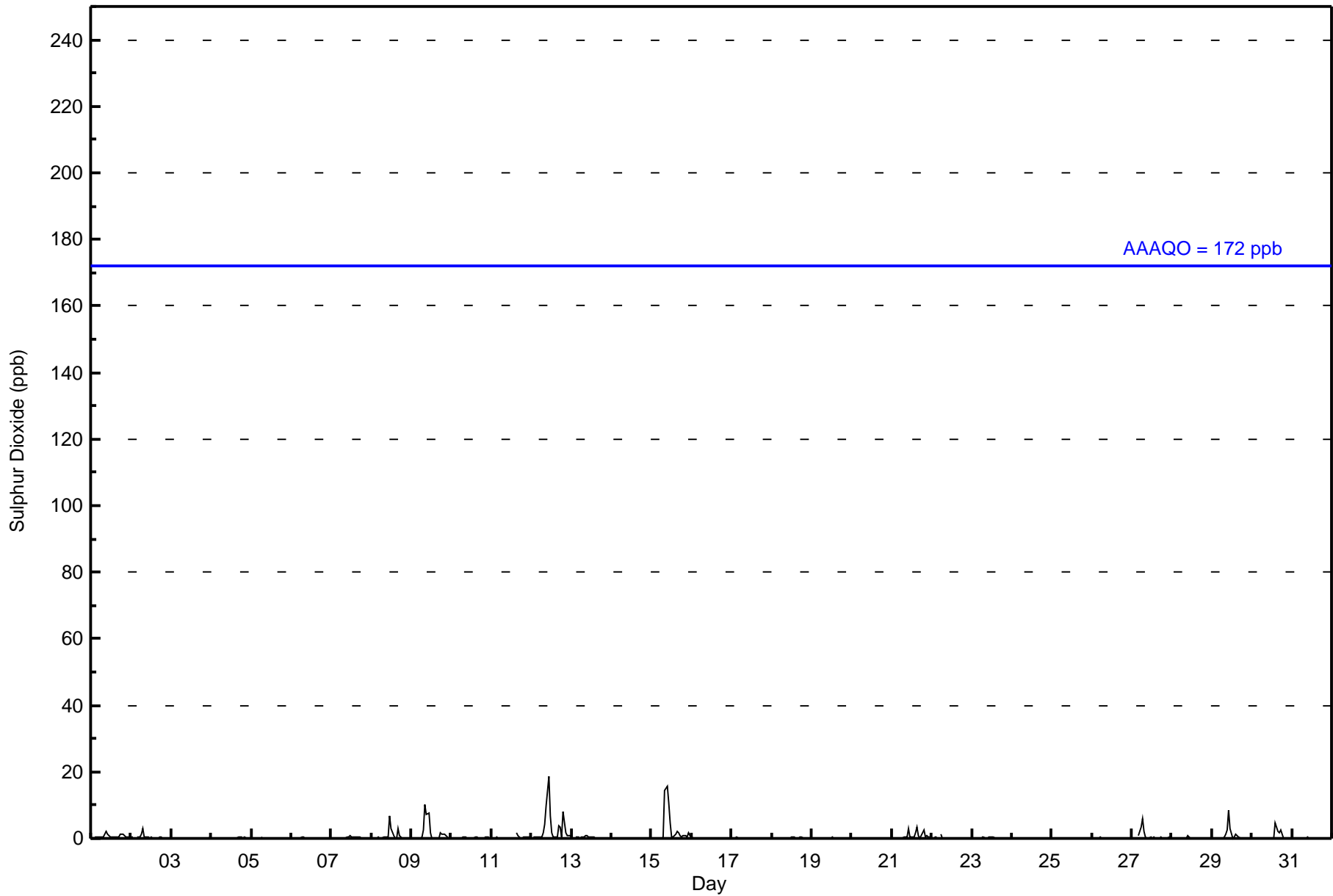
0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	1.1	1.4	1.8	0.9	0.3	0.2	0.4	0.4	0.5	0.4	0.3	0.5	0.2	0.2	0.2	0.2	Diurnal Average
1	0	0	0	1	3	6	3	14	15	19	7	3	1	4	4	4	4	3	2	8	2	1	1	Diurnal Maximum

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
Fort Hills - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Hills - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	703	99.43	99.43
11 - 20	4	0.57	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - July 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	57	66	18	4	7	10	15	47	87	106	94	56	28	40	25	34	694
11 - 20	1	1	0	0	0	0	0	0	1	1	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	58	67	18	4	7	10	15	47	88	107	94	56	28	40	25	34	698

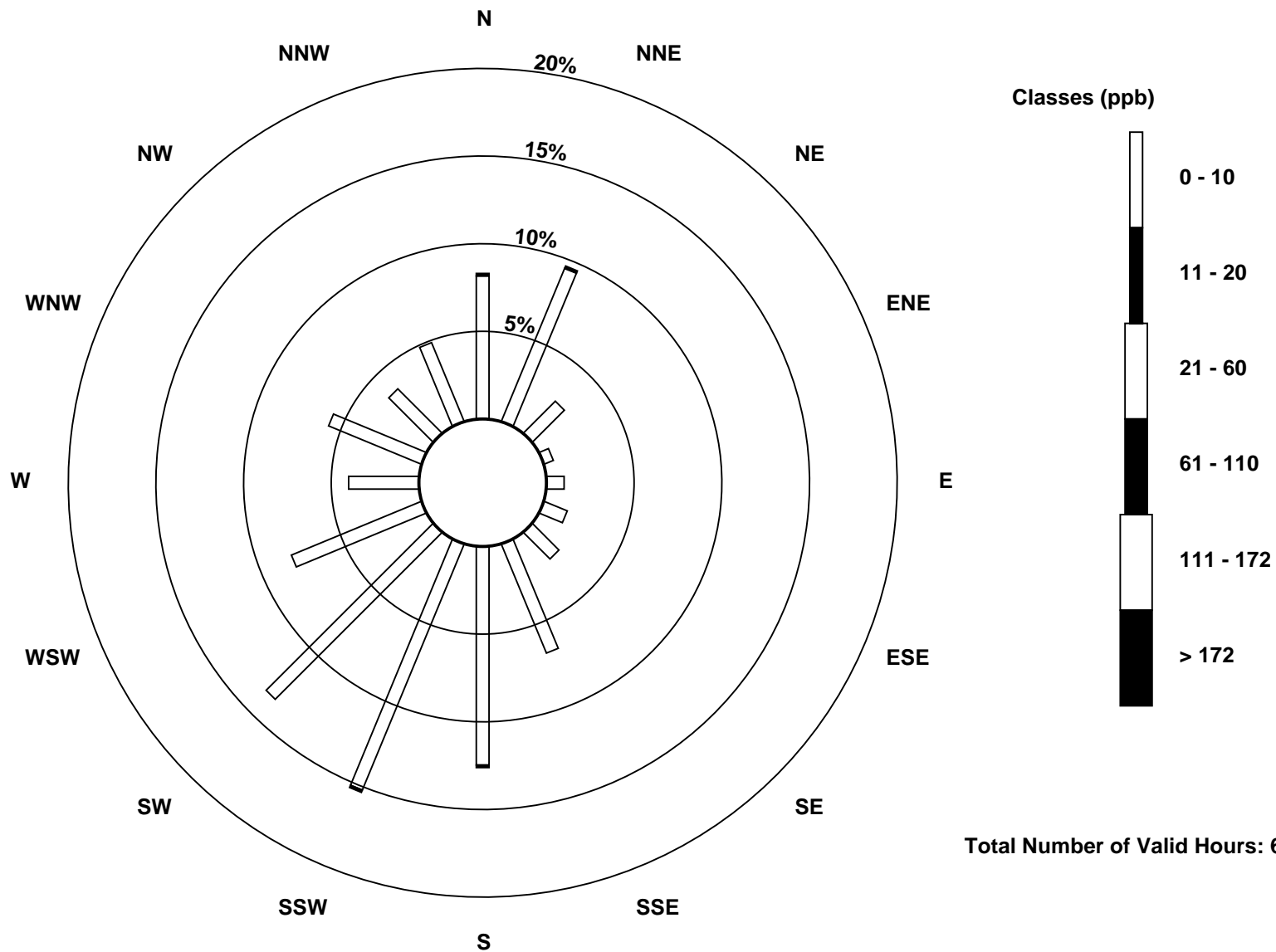
Total Number of Valid Hours: 698

Total Number of Hours: 744

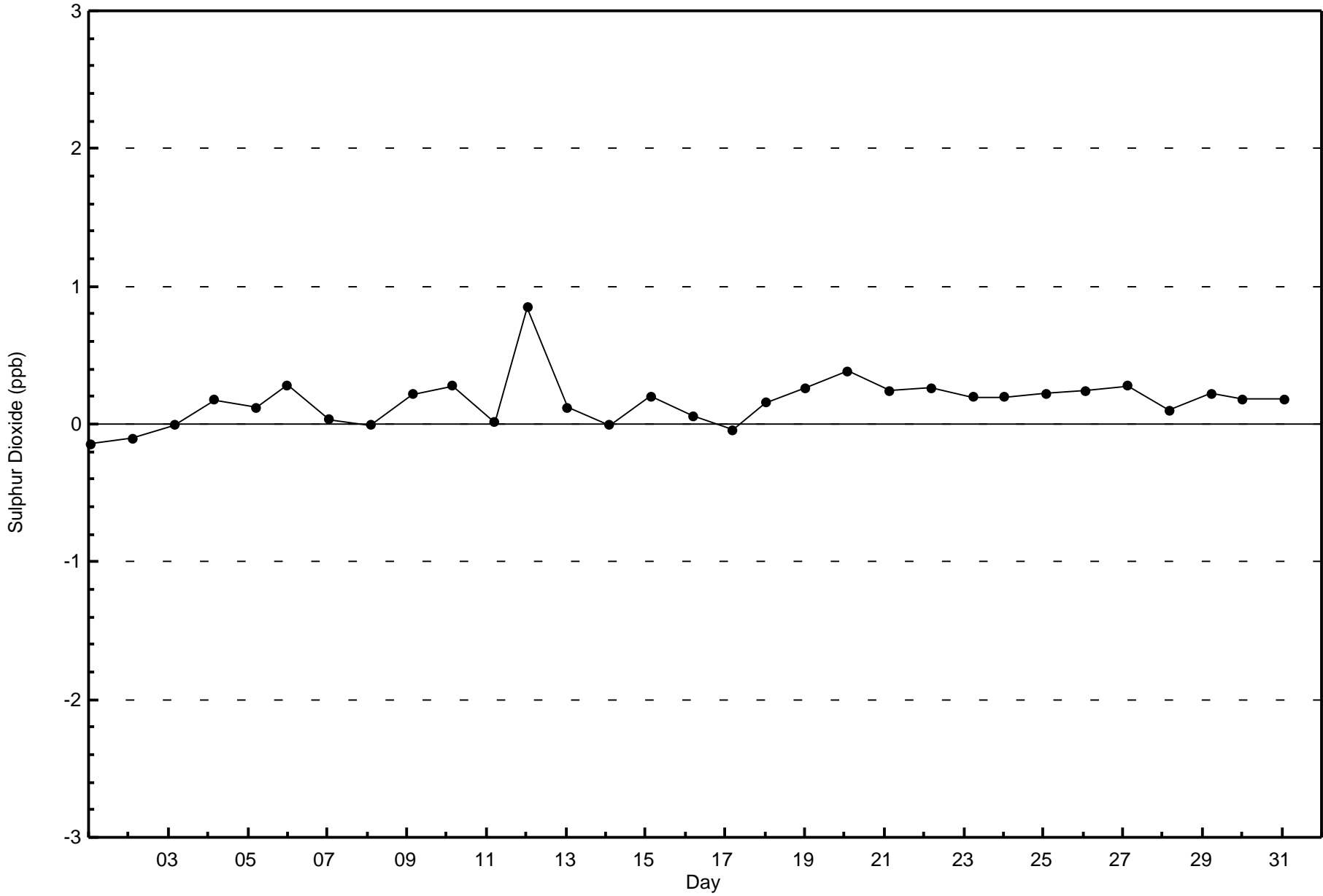


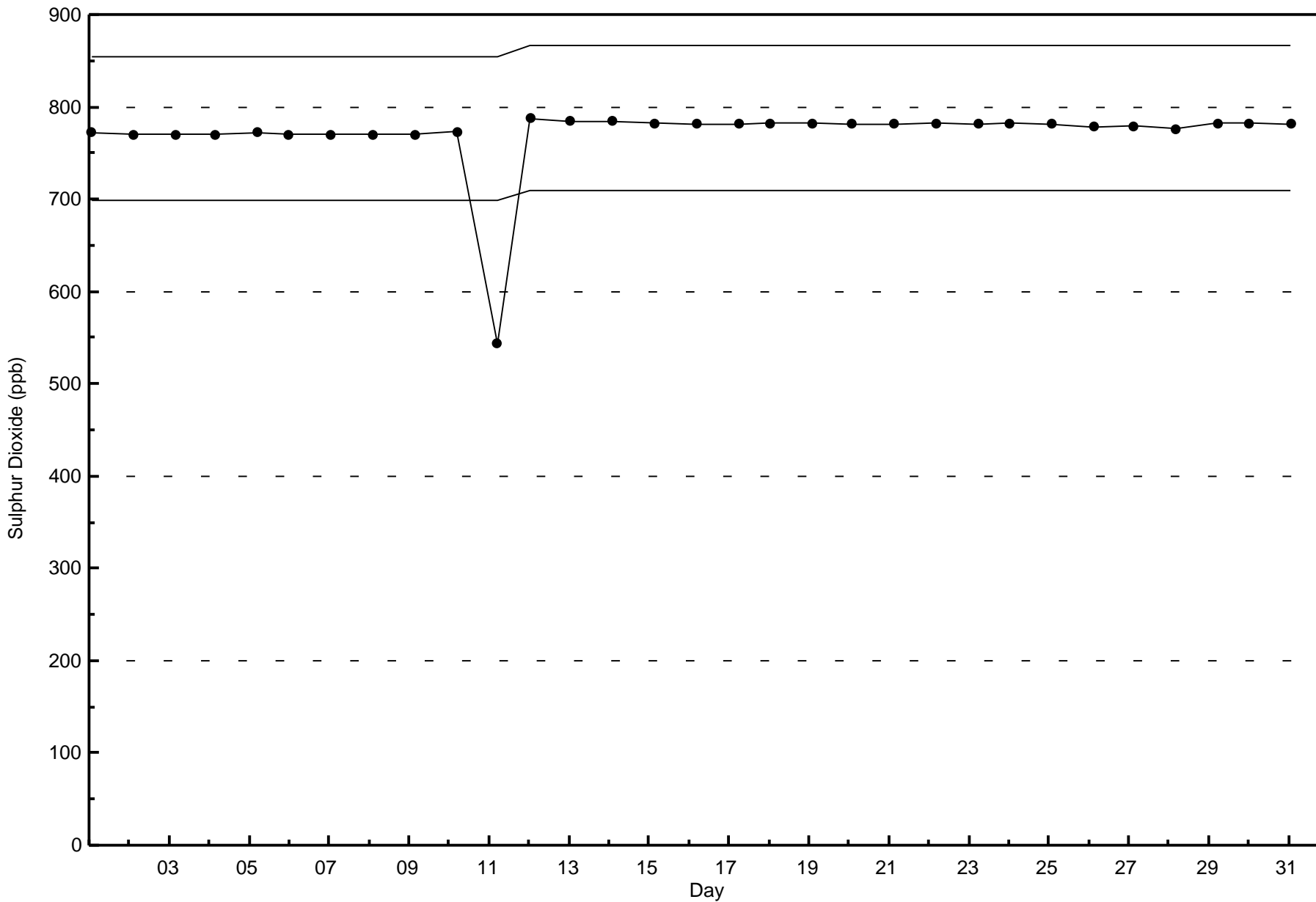
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Fort Hills (AMS 23)



Total Number of Valid Hours: 698





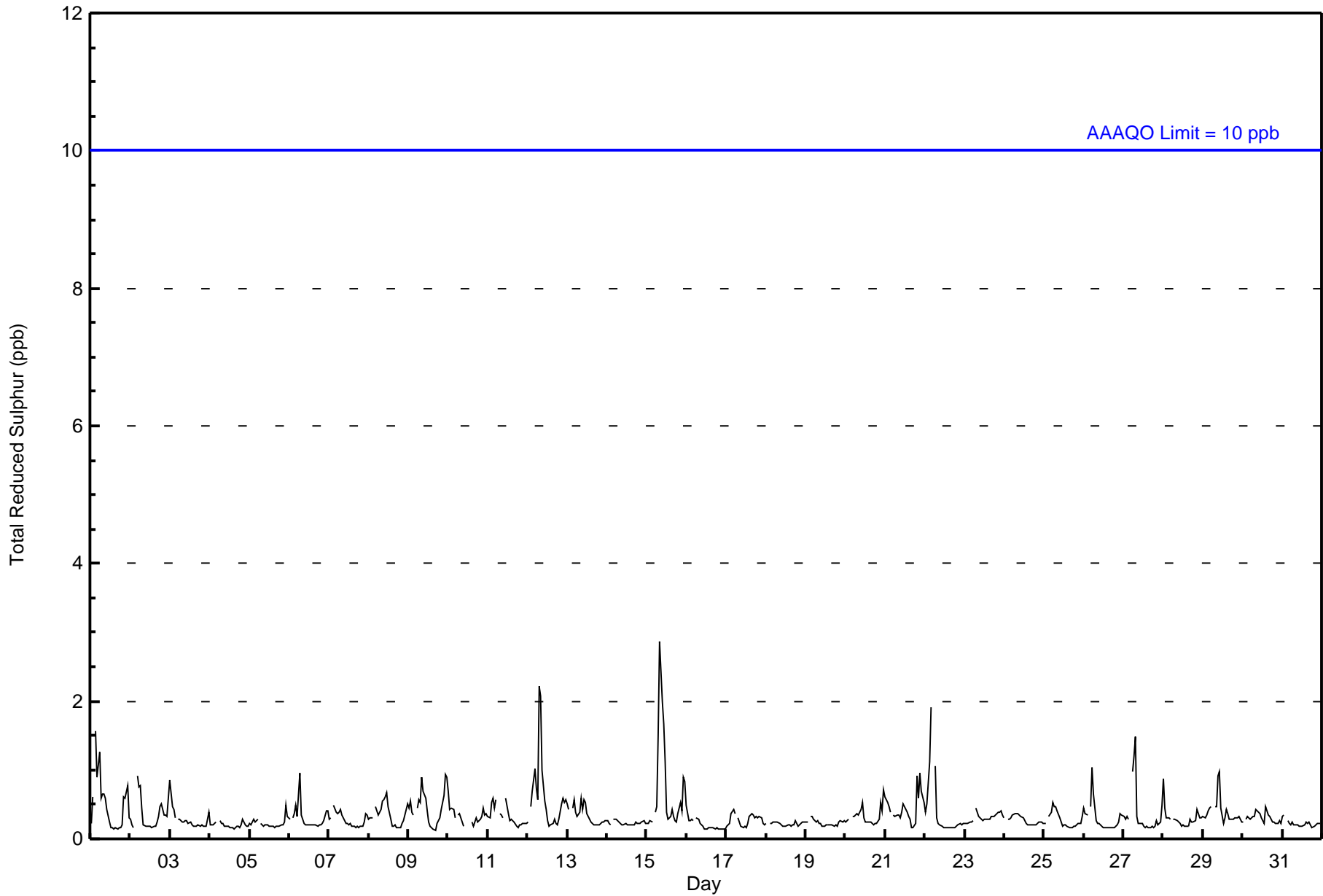


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744										Daily	Daily																												
Maximum Value: 3 ppb on Jul 15 09:00										Maximum Daily Average: 0.7 ppb on Jul 15										Hours of Data: 708	Hours of Missing Data: 36	Hours of Calibration: 35	Percent Operational Time: 99.9																										
Minimum Value: 0 ppb on Jul 9 17:00										Minimum Daily Average: 0.2 ppb on Jul 4																																							
Maximum Diurnal Average: 0.5 ppb at hour 8										Minimum Diurnal Average: 0.2 ppb at hour 18																																							
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																																							
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-Jul	0	1	Z	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0.5	2																							
2-Jul	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.4	1																							
3-Jul	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																							
4-Jul	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-Jul	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-Jul	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
7-Jul	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																							
8-Jul	0	0	0	Z	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1																							
9-Jul	0	1	0	0	Z	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.5	1																							
10-Jul	1	0	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.3	1																							
11-Jul	0	0	1	1	0	1	Z	0	0	0	M	1	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
12-Jul	0	Z	0	1	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0.6	2																							
13-Jul	1	0	Z	0	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
14-Jul	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-Jul	0	0	0	0	Z	0	0	2	3	2	2	1	0	0	0	0	0	0	0	0	1	0	1	1	0.7	3																							
16-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0.3	1																							
21-Jul	1	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1																							
22-Jul	0	1	1	1	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2																							
23-Jul	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-Jul	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-Jul	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																							
26-Jul	0	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1																							
27-Jul	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
28-Jul	1	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	1																							
29-Jul	0	0	0	0	0	0	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1																							
30-Jul	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																							
31-Jul	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																							
																								0.4	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	Diurnal Average	
																								1	1	1	2	2	1	1	2	3	2	2	1	0	0	0	0	0	0	0	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 Hills - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	707	99.86	99.86
3 - 4	1	0.14	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: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - July 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	60	66	17	4	6	10	15	50	87	107	88	54	31	44	26	33	698
3 - 4	0	0	0	0	0	0	0	0	1	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	60	66	17	4	6	10	15	50	88	107	88	54	31	44	26	33	699

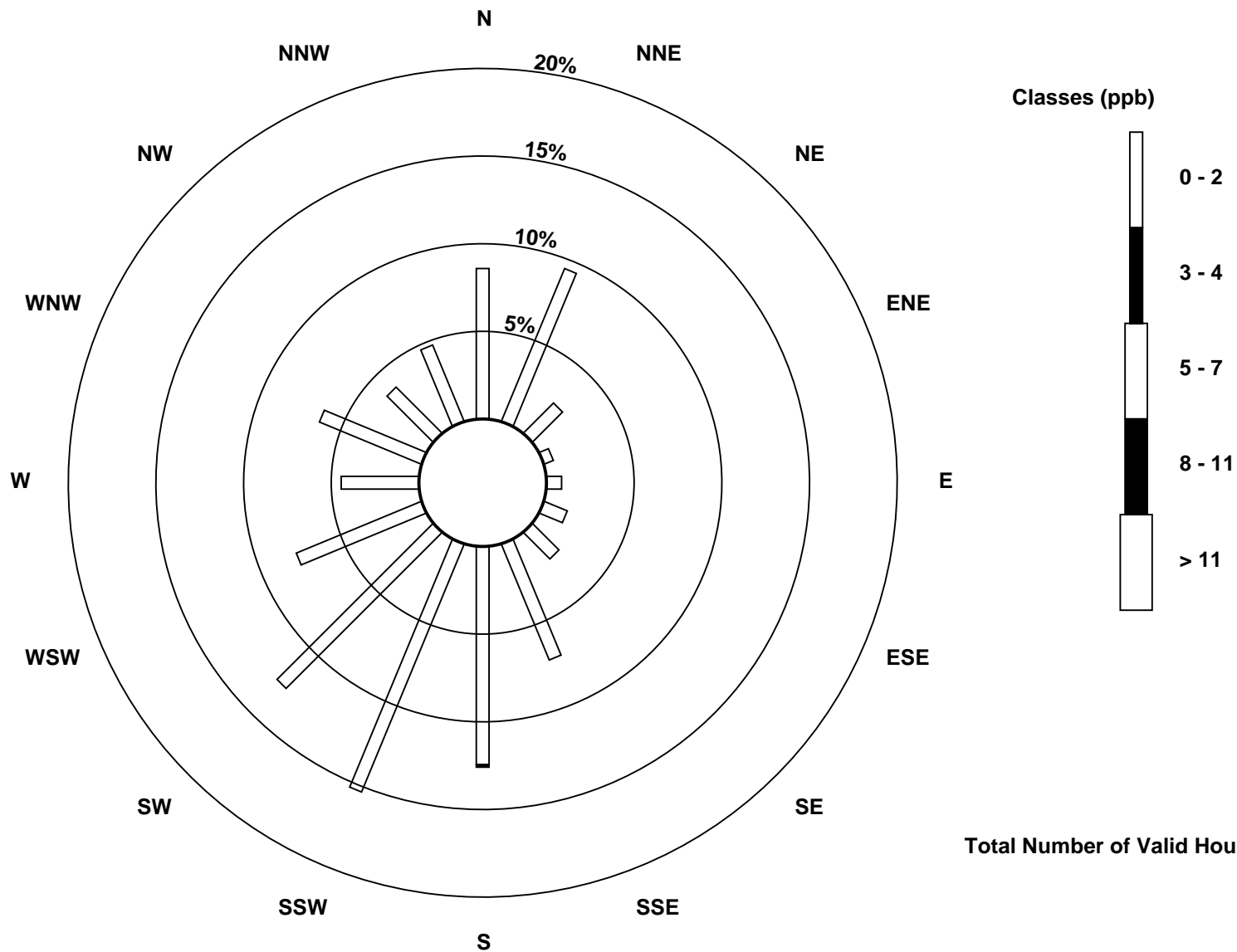
Total Number of Valid Hours: 699

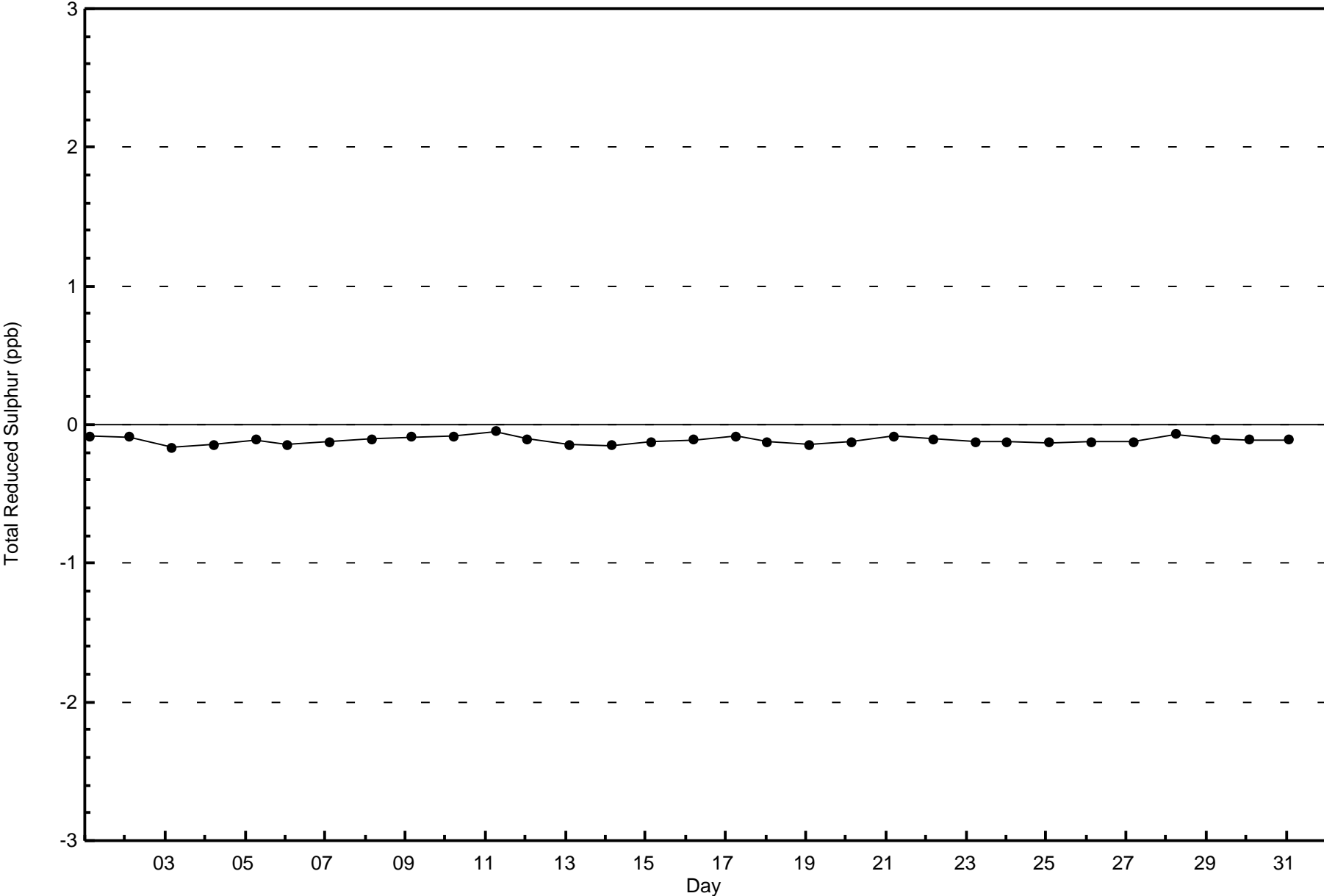
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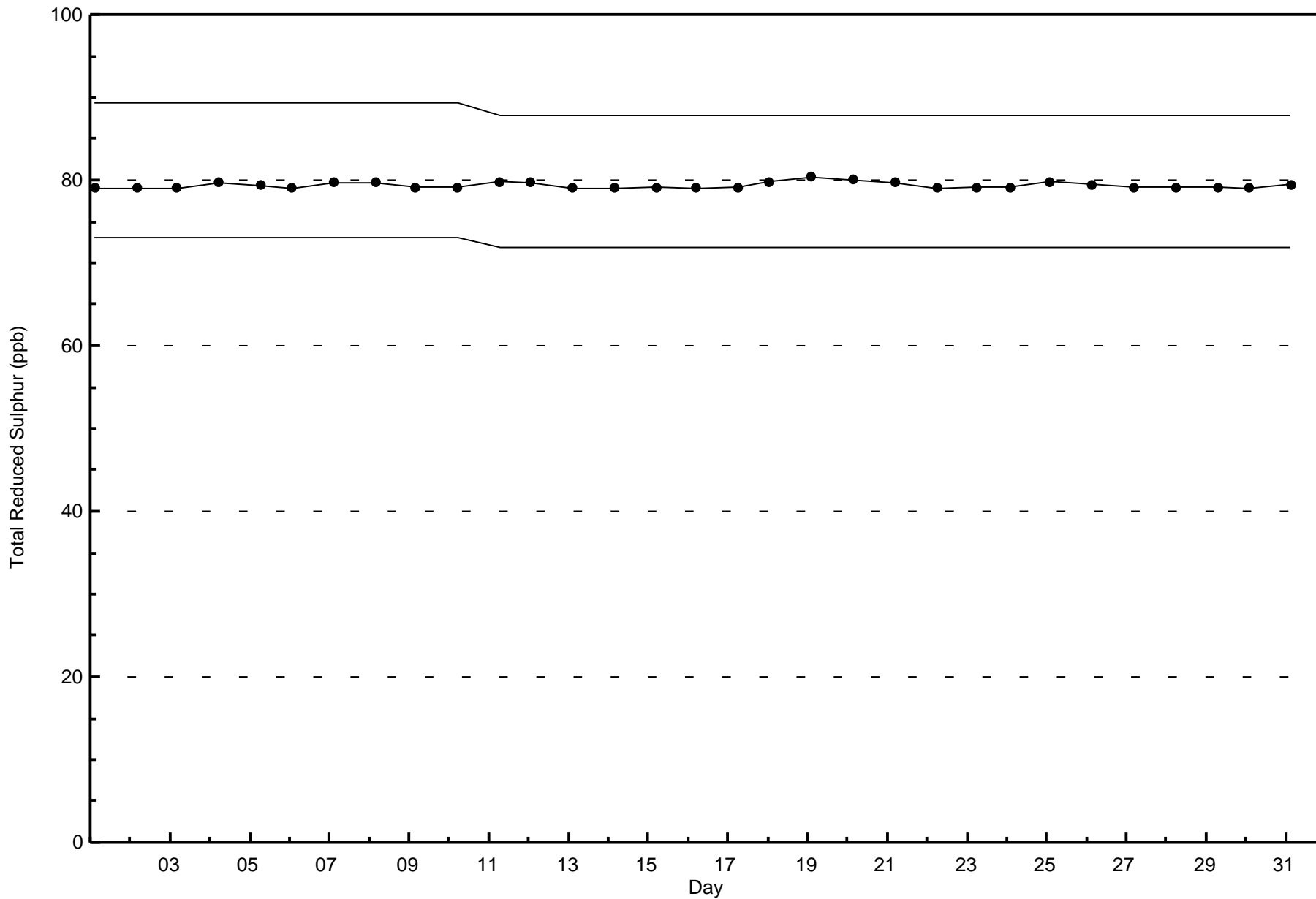


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Reduced Sulphur (TRS) - ppb
Fort Hills (AMS 23)

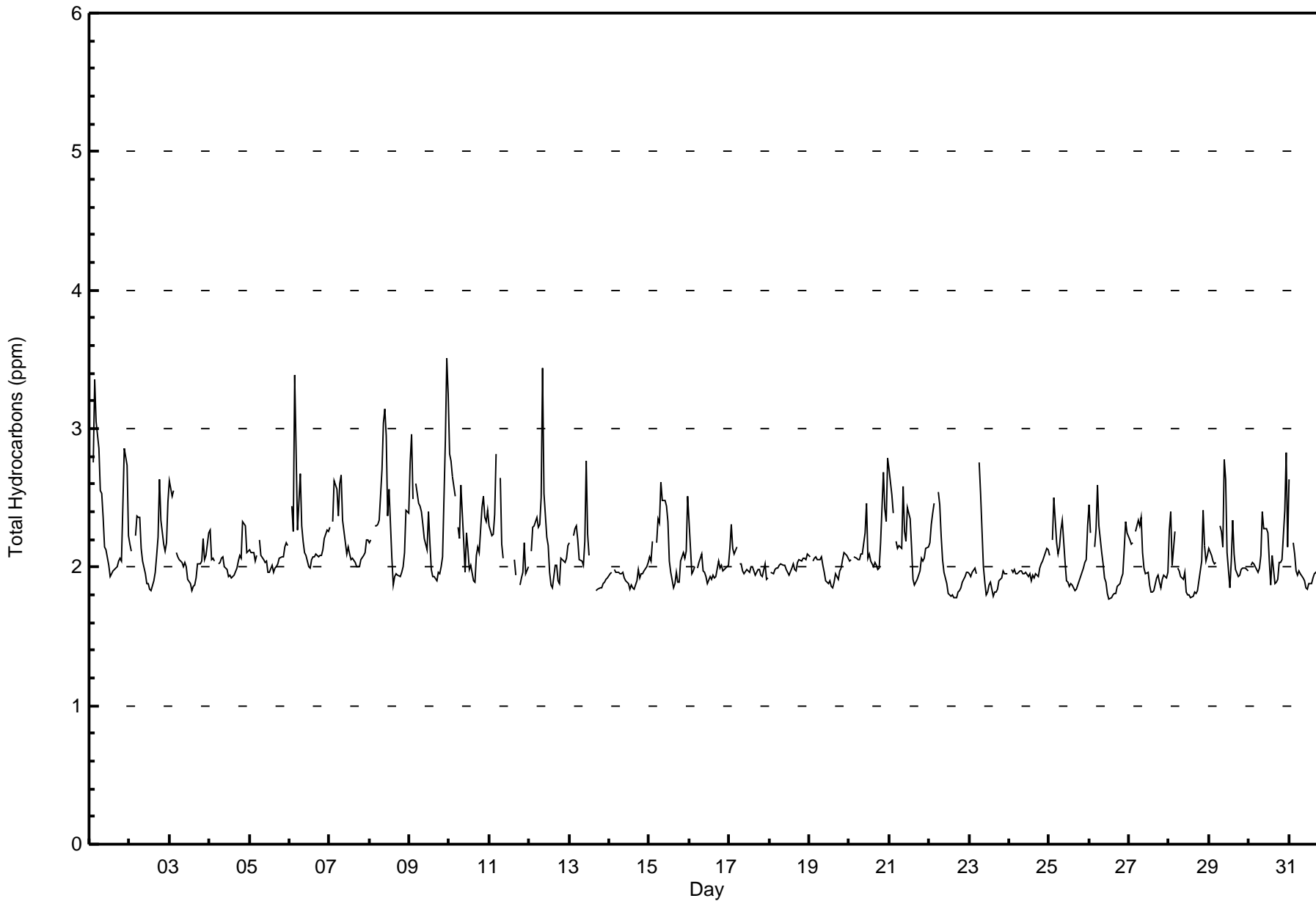








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4 ppm on Jul 9 23:00 Maximum Daily Average: 2.4 ppm on Jul 9		Hours in Service: 744 Hours of Data: 703 Hours of Missing Data: 41 Hours of Calibration: 37 Percent Operational Time: 99.5																								
Minimum Value: 2 ppm on Jul 26 13:00 Maximum Diurnal Average: 2.3 ppm at hour 4 Monthly Average: 2.1 ppm		Minimum Daily Average: 1.9 ppm on Jul 14 Minimum Diurnal Average: 1.9 ppm at hour 16 Percentiles: P ₁ = 2 P ₁₀ = 2 Q ₁ = 2 Median = 2 Q ₃ = 2 P ₉₀ = 2 P 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-Jul	2	Z	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2.4	3
2-Jul	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2.1	3
3-Jul	3	3	3	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	3
4-Jul	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
5-Jul	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-Jul	Z	2	2	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.3	3
7-Jul	2	Z	2	3	3	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
8-Jul	2	2	Z	2	2	2	2	3	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2.3	3
9-Jul	3	3	2	Z	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	4	3	2.4	4
10-Jul	3	3	3	3	Z	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2.3	3
11-Jul	2	2	2	2	3	Z	3	2	2	C	C	C	C	C	C	2	2	UO	2	2	2	2	2	2	--	3
12-Jul	Z	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
13-Jul	2	Z	2	2	2	2	2	2	2	3	2	2	2	UO	UO	UO	2	2	2	2	2	2	2	2	2.1	3
14-Jul	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1.9	2
15-Jul	2	2	2	Z	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2.2	3
16-Jul	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
17-Jul	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-Jul	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-Jul	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
20-Jul	2	2	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2	2.2	3
21-Jul	3	3	2	Z	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.2	3
22-Jul	2	2	2	2	Z	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	3
23-Jul	2	2	2	2	2	Z	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	3
24-Jul	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
25-Jul	2	Z	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	3
26-Jul	2	2	Z	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0	3
27-Jul	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
28-Jul	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
29-Jul	2	2	2	2	2	Z	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2.1	3
30-Jul	Z	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2.1	3
31-Jul	3	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	3
																								2.3	3	
																								2.2	3	
																								2.2	3	
																								2.3	3	
																								2.3	3	
																								2.2	3	
																								2.2	3	
																								2.2	3	
																								2.2	3	
																								2.1	3	
																								2.1	3	
																								2.0	2	
																								2.0	3	
																								2.0	2	
																								1.9	2	
																								1.9	2	
																								1.9	2	
																								1.9	2	
																								2.0	2	
																								2.0	3	
																								2.0	2	
																								2.1	3	
																								2.1	3	
																								2.2	4	
																								2.2	3	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
UO - Unstable Operation																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	377	53.63	53.63
2.1 - 3.0	319	45.38	99.00
3.1 - 10.0	7	1.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - July 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	33	57	10	2	2	2	5	14	25	64	57	34	11	24	15	21	376
2.1 - 3.0	22	10	8	2	5	7	7	31	63	43	36	21	17	16	10	13	311
3.1 - 10.0	0	0	0	0	0	1	3	2	0	0	0	1	0	0	0	0	7
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	55	67	18	4	7	10	15	47	88	107	93	56	28	40	25	34	694

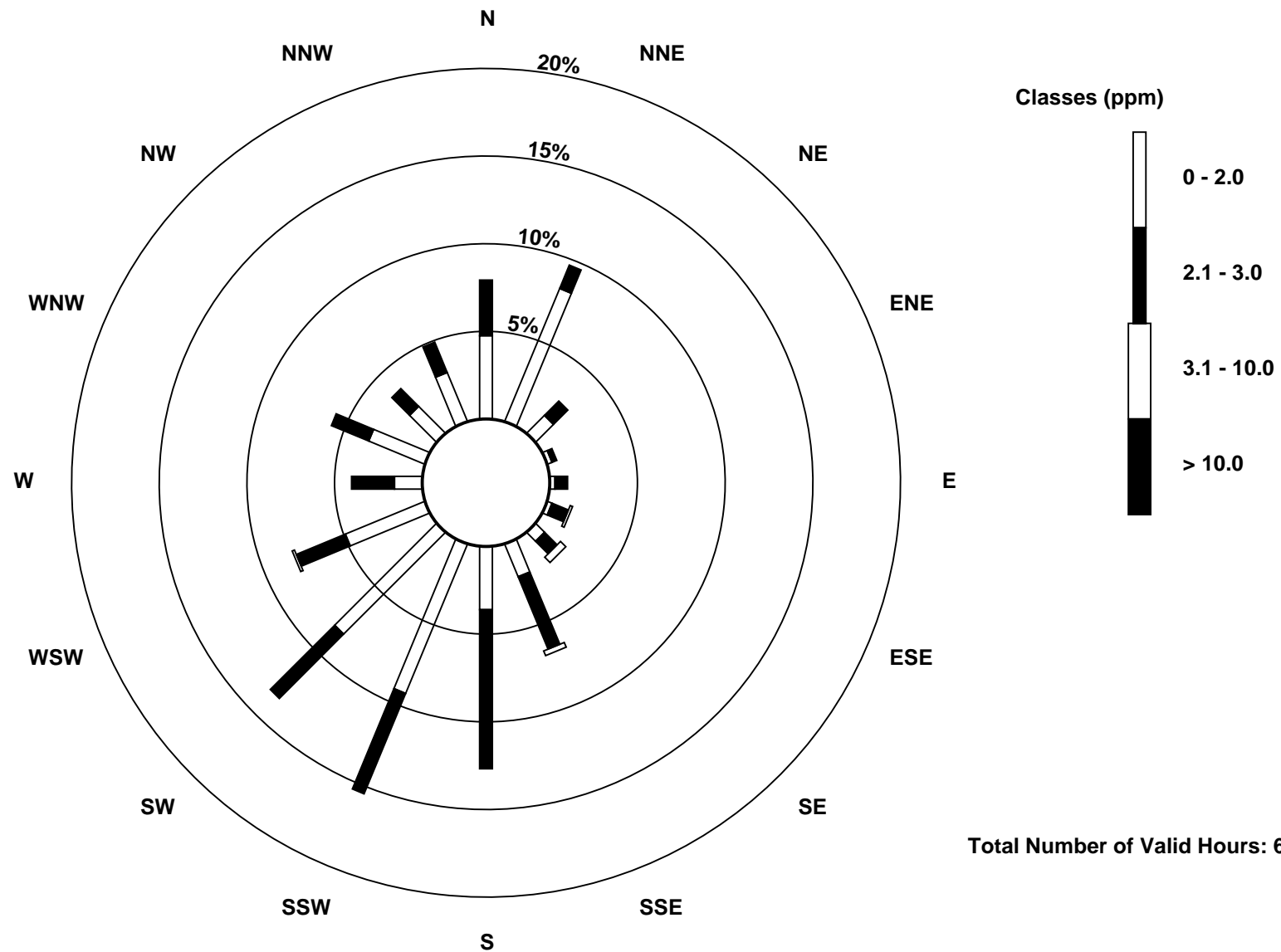
Total Number of Valid Hours: 694

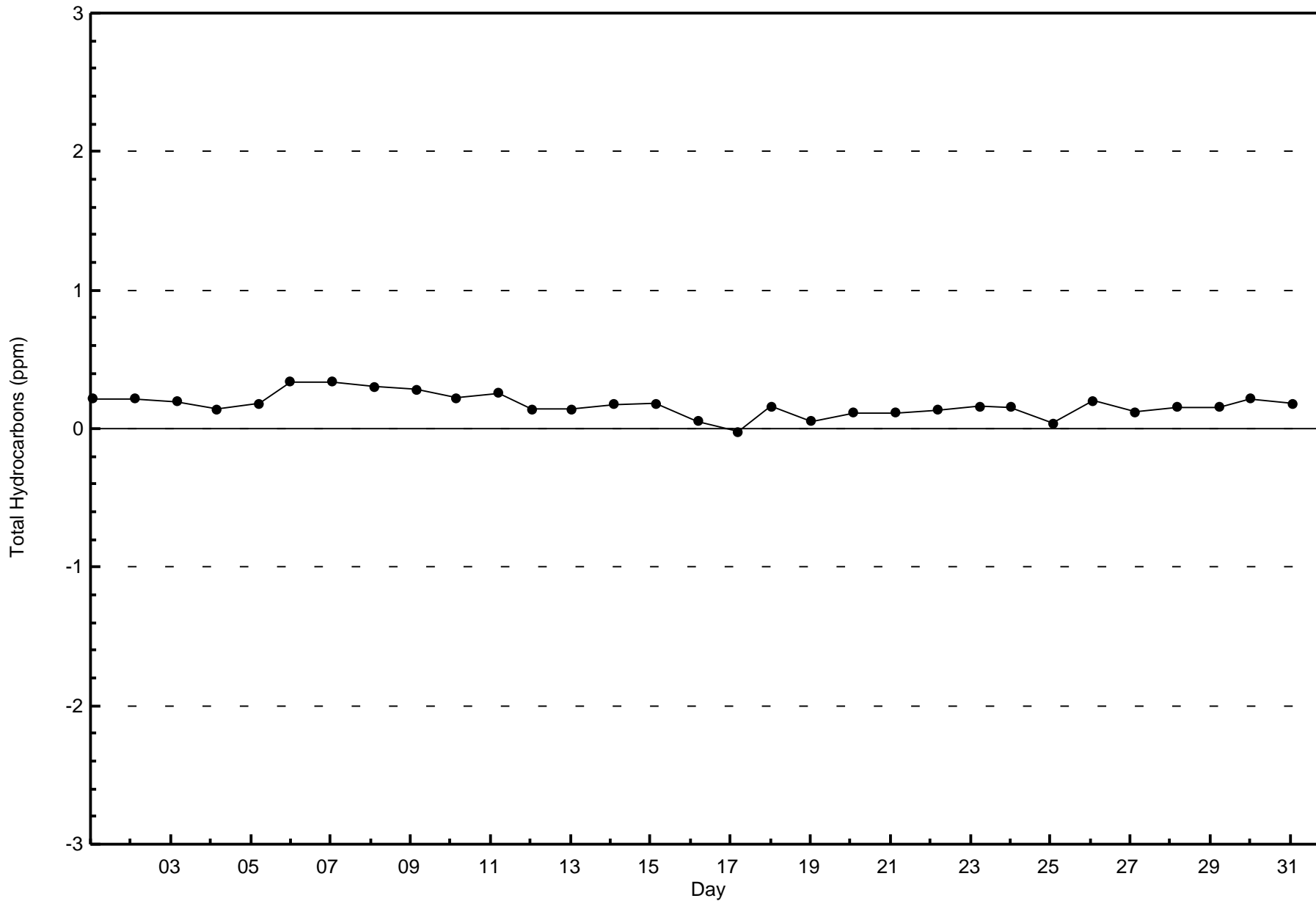
Total Number of Hours: 744

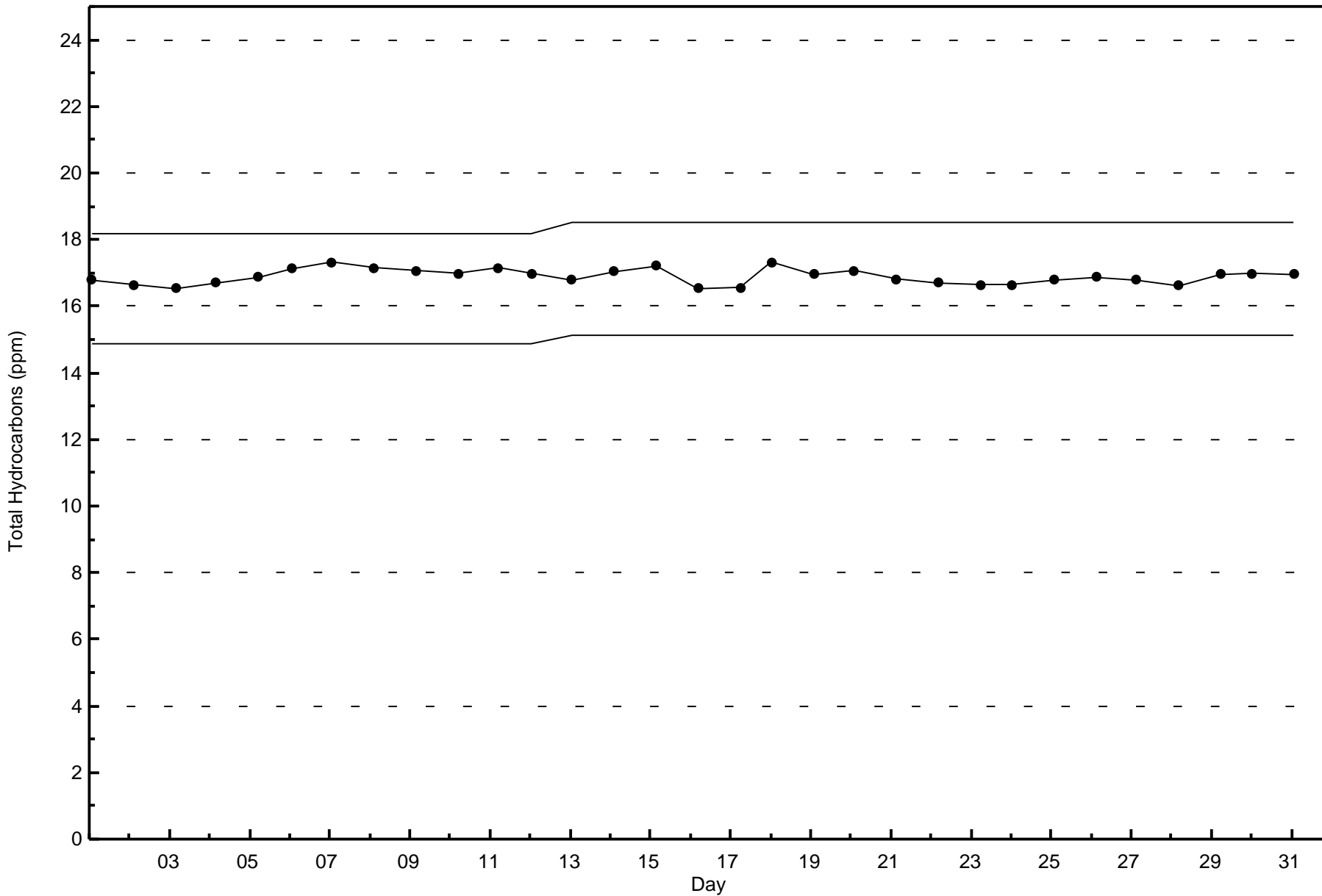


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Fort Hills - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 46 ppb on Jul 12 09:00	Maximum Daily Average: 5.6 ppb on Jul 8		Hours of Data:	707
Minimum Value: 0 ppb on Jul 4 03:00	Minimum Daily Average: 0.1 ppb on Jul 16		Hours of Missing Data:	37
Maximum Diurnal Average: 4.3 ppb at hour 9	Minimum Diurnal Average: 0.2 ppb at hour 18		Hours of Calibration:	37
Monthly Average: 1.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 4 P ₉₉ = 23		Percent Operational Time:	100.0

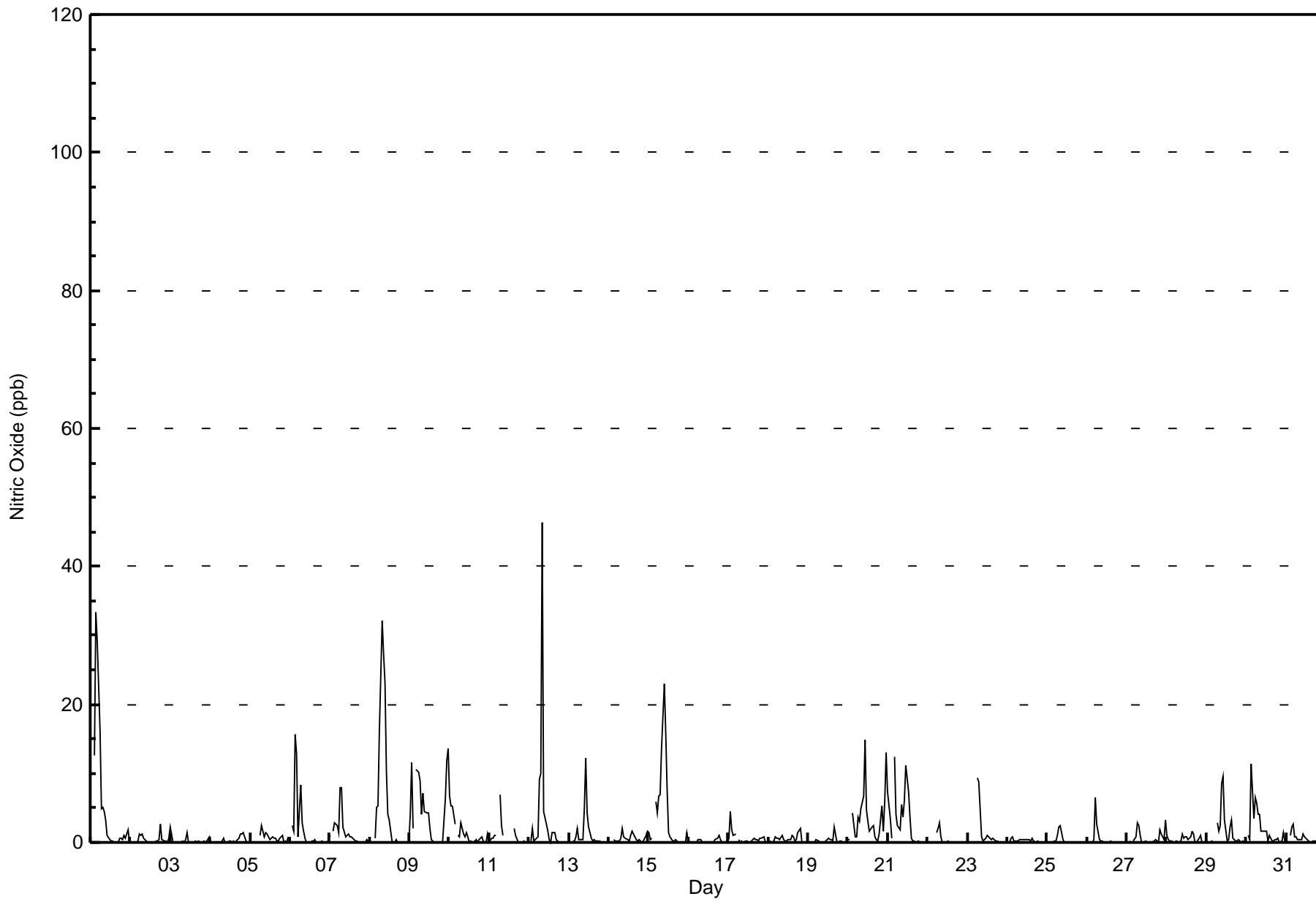
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Jul	0	Z	13	33	29	16	5	5	5	3	1	1	0	0	0	0	0	1	1	0	1	1	2	0	5.1	33																							
2-Jul	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0.4	3																							
3-Jul	2	0	0	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.3	2																							
4-Jul	0	0	0	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0.3	1																							
5-Jul	0	0	0	0	0	Z	1	2	1	1	1	1	0	1	1	1	0	0	1	1	0	0	1	0.6	2																								
6-Jul	Z	2	2	16	13	1	8	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2.1	16																							
7-Jul	1	Z	2	3	2	1	8	8	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1.5	8																							
8-Jul	0	0	Z	1	5	5	16	32	27	23	10	4	3	0	0	0	0	0	0	0	0	0	0	0	5.6	32																							
9-Jul	4	12	2	Z	11	10	9	4	7	4	4	4	2	0	0	0	0	0	0	0	0	6	12	14	4.6	14																							
10-Jul	7	5	5	3	Z	1	1	3	1	1	1	1	0	0	0	0	0	0	0	1	0	0	0	1	1.4	7																							
11-Jul	0	1	1	1	1	Z	7	2	1	C	C	C	C	C	C	2	1	0	0	0	0	0	0	0	--	7																							
12-Jul	Z	0	2	0	1	1	9	10	46	4	3	2	1	0	2	1	0	0	0	0	0	0	0	0	3.6	46																							
13-Jul	0	Z	0	0	1	2	0	0	0	5	12	4	2	1	0	0	0	0	0	0	0	0	0	0	1.3	12																							
14-Jul	0	0	Z	0	0	0	0	1	2	1	1	0	0	1	2	1	0	0	0	0	0	0	1	2	0.6	2																							
15-Jul	1	0	1	Z	6	4	7	7	14	23	16	7	1	1	0	0	0	0	0	0	0	0	0	1	3.9	23																							
16-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0.1	1																							
17-Jul	1	4	2	1	1	Z	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0.6	4																							
18-Jul	Z	0	0	0	1	1	1	0	1	0	0	0	0	1	1	1	0	0	1	2	0	0	0	0	0.5	2																							
19-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0.3	2																							
20-Jul	0	0	Z	4	1	1	4	3	5	7	15	5	3	2	2	2	1	0	0	1	5	2	6	13	3.6	15																							
21-Jul	7	3	1	Z	12	4	3	2	5	4	6	11	7	4	1	0	0	0	0	0	0	0	0	0	3.1	12																							
22-Jul	0	0	0	0	Z	1	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	3																							
23-Jul	0	0	0	0	0	Z	9	9	1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1.1	9																							
24-Jul	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1																							
25-Jul	0	Z	0	0	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2																							
26-Jul	0	0	Z	0	0	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	7																							
27-Jul	0	0	0	Z	0	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0.7	3																							
28-Jul	1	0	0	0	Z	0	0	0	0	1	1	1	1	0	1	2	1	0	0	1	1	0	0	0	0.5	2																							
29-Jul	0	0	0	0	0	Z	3	2	3	8	10	3	0	0	2	3	1	0	0	0	0	0	0	0	1.6	10																							
30-Jul	Z	1	0	11	4	6	6	4	4	2	2	2	2	0	1	0	0	0	0	1	0	0	1	0	2.1	11																							
31-Jul	0	Z	1	2	3	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0.6	3																							
																								1.0	1.2	1.2	3.0	3.5	2.6	3.5	3.5	4.3	3.1	2.9	1.7	0.9	0.5	0.5	0.6	0.4	0.2	0.3	0.3	0.4	0.4	0.8	1.3	Diurnal Average	
																								7	12	13	33	29	16	16	32	46	23	16	11	7	4	2	3	2	1	3	2	5	6	12	14	Diurnal Maximum	

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Hills - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	99.01	99.01
21 - 40	6	0.85	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - July 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	58	66	18	3	7	9	14	45	88	107	94	56	28	39	25	34	691
21 - 40	0	1	0	1	0	1	0	2	0	0	0	0	0	1	0	0	6
11 - 80	0	0	0	0	0	0	1	0	0	0	0	0	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	58	67	18	4	7	10	15	47	88	107	94	56	28	40	25	34	698

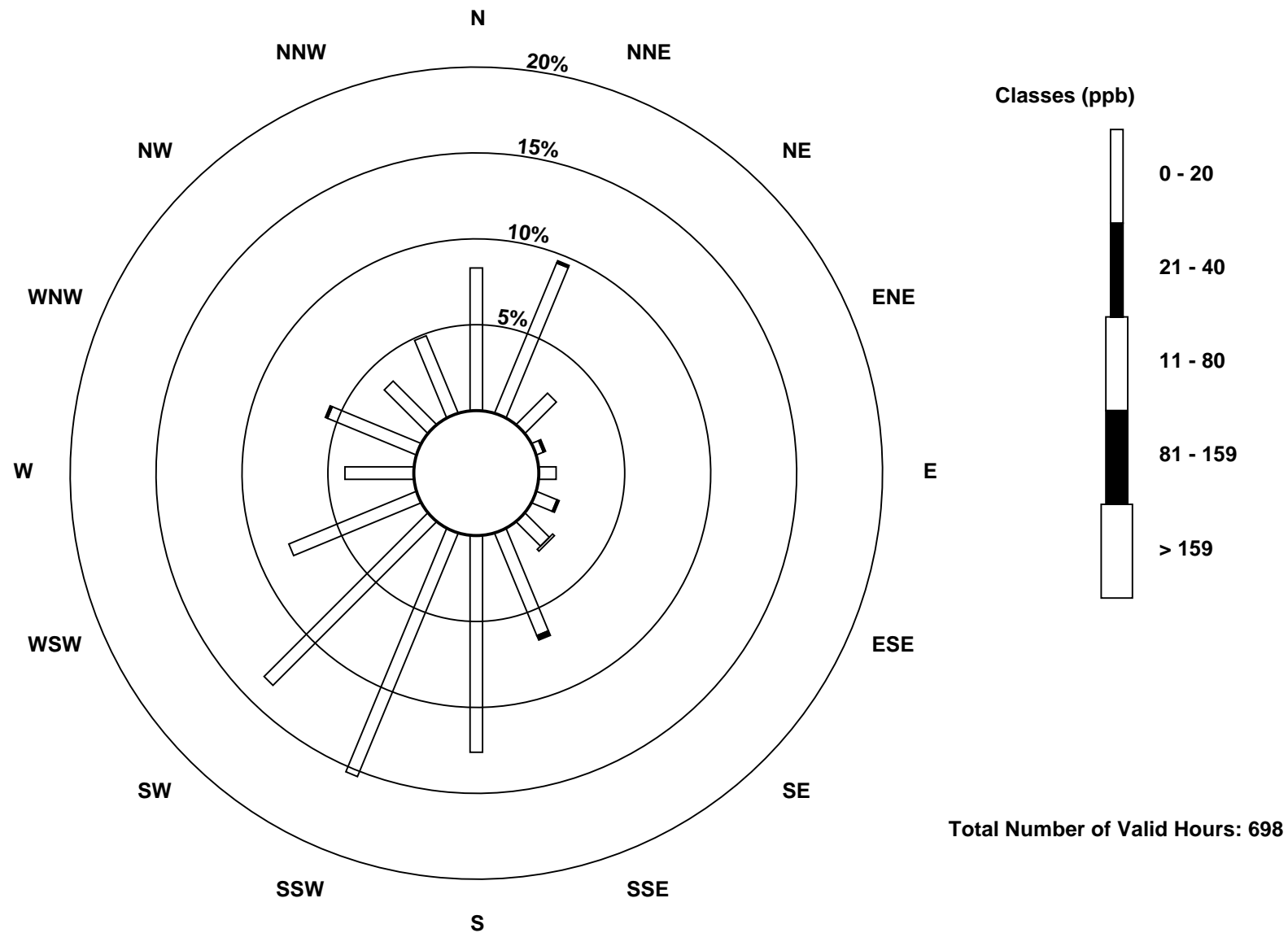
Total Number of Valid Hours: 698

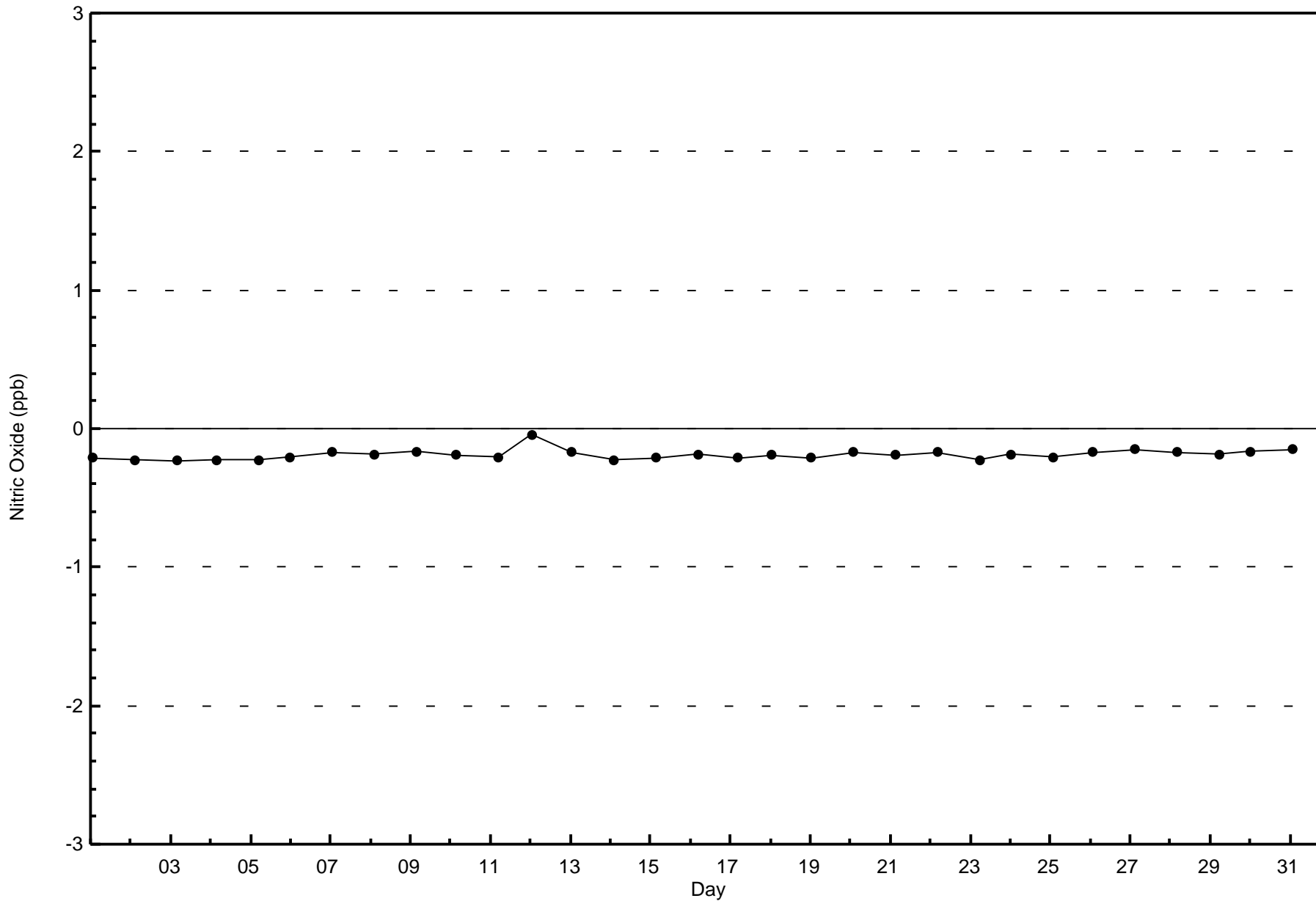
Total Number of Hours: 744

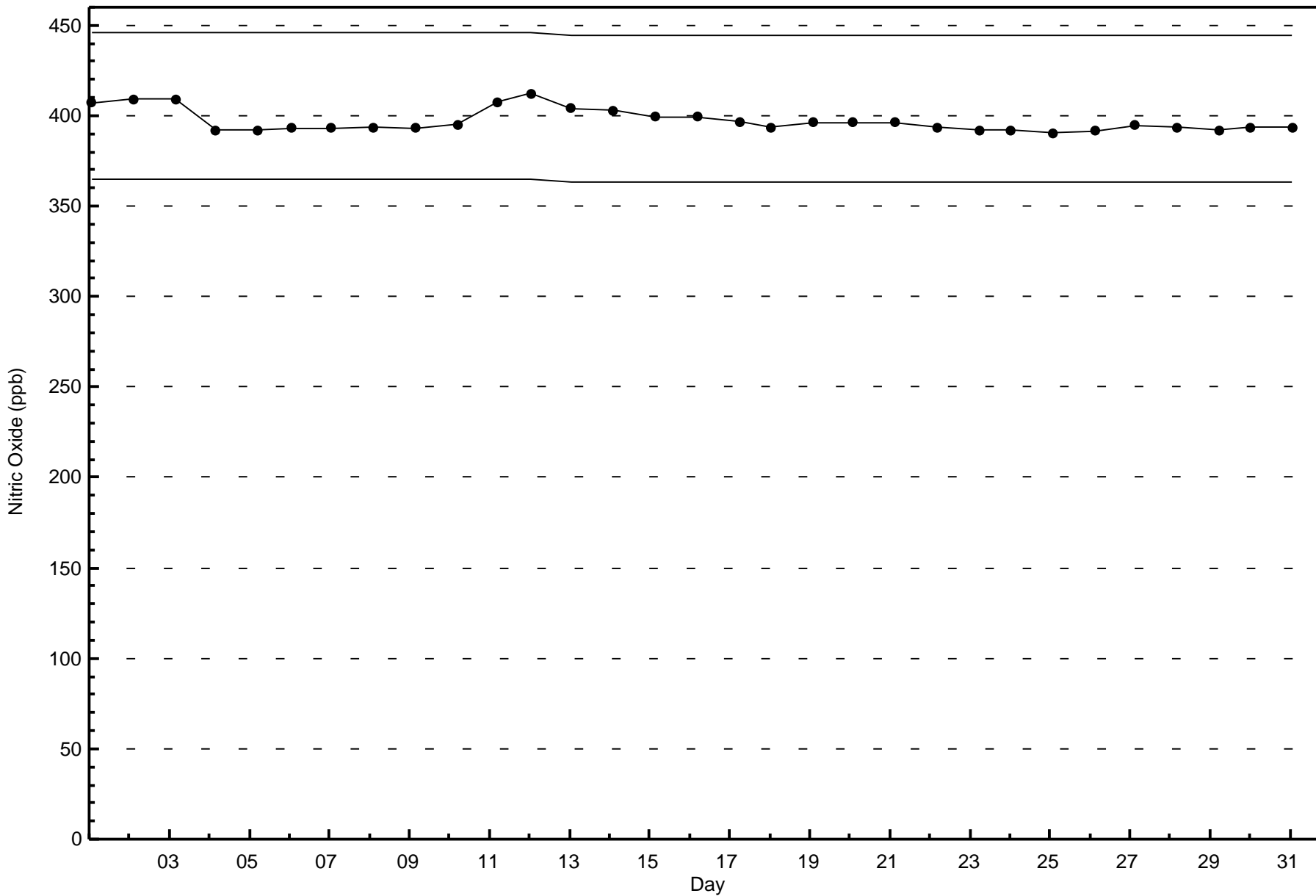


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitric Oxide (NO) - ppb
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Hills - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 29 ppb on Jul 12 09:00	Maximum Daily Average: 8.7 ppb on Jul 9		Hours of Data:	707
Minimum Value: 0 ppb on Jul 4 10:00	Minimum Daily Average: 1.0 ppb on Jul 24		Hours of Missing Data:	37
Maximum Diurnal Average: 5.6 ppb at hour 1	Minimum Diurnal Average: 1.5 ppb at hour 18		Hours of Calibration:	37
Monthly Average: 3.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 5 P ₉₀ = 10 P ₉₉ = 20		Percent Operational Time:	100.0

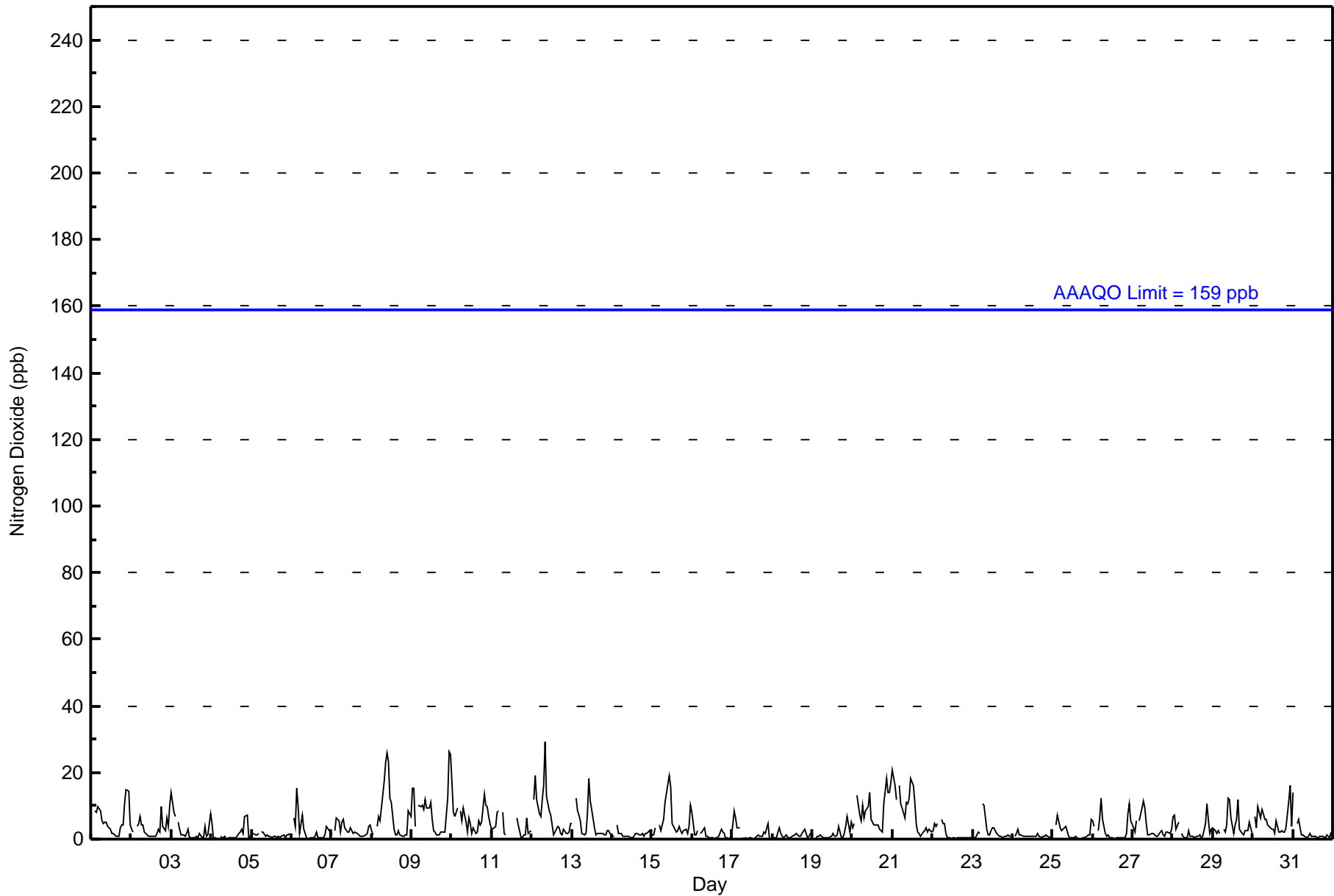
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	2	Z	8	8	10	9	5	5	5	5	4	3	2	2	1	1	1	3	4	4	11	15	14	4	5.5	15
2-Jul	3	2	Z	4	5	7	4	4	2	1	1	1	1	1	1	2	3	2	10	4	3	6	4	10	3.5	10
3-Jul	14	8	7	Z	5	3	1	1	1	2	3	0	0	0	0	1	1	2	1	1	4	1	1	8	2.8	14
4-Jul	5	0	0	1	Z	1	0	1	1	0	0	1	1	0	1	1	2	2	3	2	7	7	1	1	1.5	7
5-Jul	2	2	1	1	2	Z	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	1.1	2
6-Jul	Z	6	4	15	10	2	7	3	2	1	0	0	1	0	1	2	1	0	1	1	1	4	2	3	2.8	15
7-Jul	1	Z	3	6	5	2	5	6	3	2	2	3	2	2	2	2	1	1	1	1	1	2	4	4	2.7	6
8-Jul	3	1	Z	4	7	5	9	17	23	26	23	12	11	3	1	1	3	1	1	1	1	1	9	7	7.4	26
9-Jul	15	15	4	Z	10	10	10	9	12	10	10	11	6	3	2	1	1	2	2	2	2	12	26	25	8.7	26
10-Jul	17	8	7	9	Z	9	6	9	5	2	6	5	2	3	2	2	5	4	5	14	10	10	7	5	6.6	17
11-Jul	3	3	4	8	8	Z	8	2	1	C	C	C	C	C	C	6	4	0	1	1	1	6	2	2	--	8
12-Jul	Z	12	19	12	8	7	12	16	29	13	8	7	4	1	2	4	3	2	1	3	2	2	2	5	7.5	29
13-Jul	5	Z	12	9	7	5	2	1	2	8	18	12	9	3	1	2	2	2	2	1	1	2	3	2	4.7	18
14-Jul	1	1	Z	4	2	2	1	1	1	1	1	0	1	2	2	1	1	2	1	2	1	2	3	1	1.4	4
15-Jul	1	1	3	Z	4	3	4	6	11	17	19	16	5	4	2	3	4	2	2	3	3	2	4	10	5.5	19
16-Jul	8	1	1	3	Z	2	2	3	1	1	1	0	1	0	0	0	1	3	2	2	0	0	0	1	1.5	8
17-Jul	4	9	6	4	3	Z	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	5	0	0	1.8	9
18-Jul	Z	1	0	2	4	2	1	1	1	1	0	0	1	1	2	1	1	1	2	3	2	1	1	2	1.2	4
19-Jul	1	Z	0	1	1	1	1	0	0	0	0	1	2	1	1	1	4	1	1	2	4	7	2	5	1.6	7
20-Jul	4	5	Z	13	7	6	10	6	9	10	14	6	5	4	4	4	3	2	2	11	18	14	14	17	8.1	18
21-Jul	21	16	12	Z	16	11	9	7	11	11	12	18	16	11	5	2	2	1	2	3	3	2	3	2	8.5	21
22-Jul	3	5	4	5	Z	6	5	5	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.7	6
23-Jul	1	1	1	2	2	Z	11	10	3	1	1	3	4	4	2	1	1	1	1	1	1	1	1	1	2.2	11
24-Jul	Z	1	2	3	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1.0	3
25-Jul	1	Z	4	7	4	2	3	4	4	1	0	0	0	1	1	0	0	0	0	1	1	1	1	6	1.8	7
26-Jul	6	4	Z	3	6	12	6	2	1	1	1	0	0	0	0	0	0	0	0	1	2	8	11	5	3.0	12
27-Jul	3	2	5	Z	6	9	12	9	5	1	1	2	2	1	1	1	2	3	1	1	2	2	2	3	3.3	12
28-Jul	7	7	3	5	Z	2	1	1	1	2	1	1	1	1	1	1	1	1	1	5	11	6	2	3	2.6	11
29-Jul	3	3	2	2	2	Z	3	2	4	12	12	6	2	4	6	12	3	2	1	3	3	3	5	2	4.1	12
30-Jul	Z	7	4	10	7	9	8	6	6	4	3	3	3	2	6	2	2	3	2	2	4	11	16	4	5.3	16
31-Jul	14	Z	5	6	3	1	1	1	1	1	2	1	1	1	1	0	1	1	1	1	1	1	1	2	1.9	14
	5.6	4.8	4.7	5.6	5.5	4.9	4.8	4.5	4.8	4.5	4.9	3.9	2.7	1.9	1.6	1.9	1.7	1.5	1.7	2.4	3.3	4.4	4.6	4.6		Diurnal Average
	21	16	19	15	16	12	12	17	29	26	23	18	16	11	6	12	5	4	10	14	18	15	26	25		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 - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	99.01	99.01
21 - 40	7	0.99	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - July 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	58	67	18	3	7	9	12	47	87	106	94	56	28	40	25	34	691
21 - 40	0	0	0	1	0	1	3	0	1	1	0	0	0	0	0	0	7
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	58	67	18	4	7	10	15	47	88	107	94	56	28	40	25	34	698

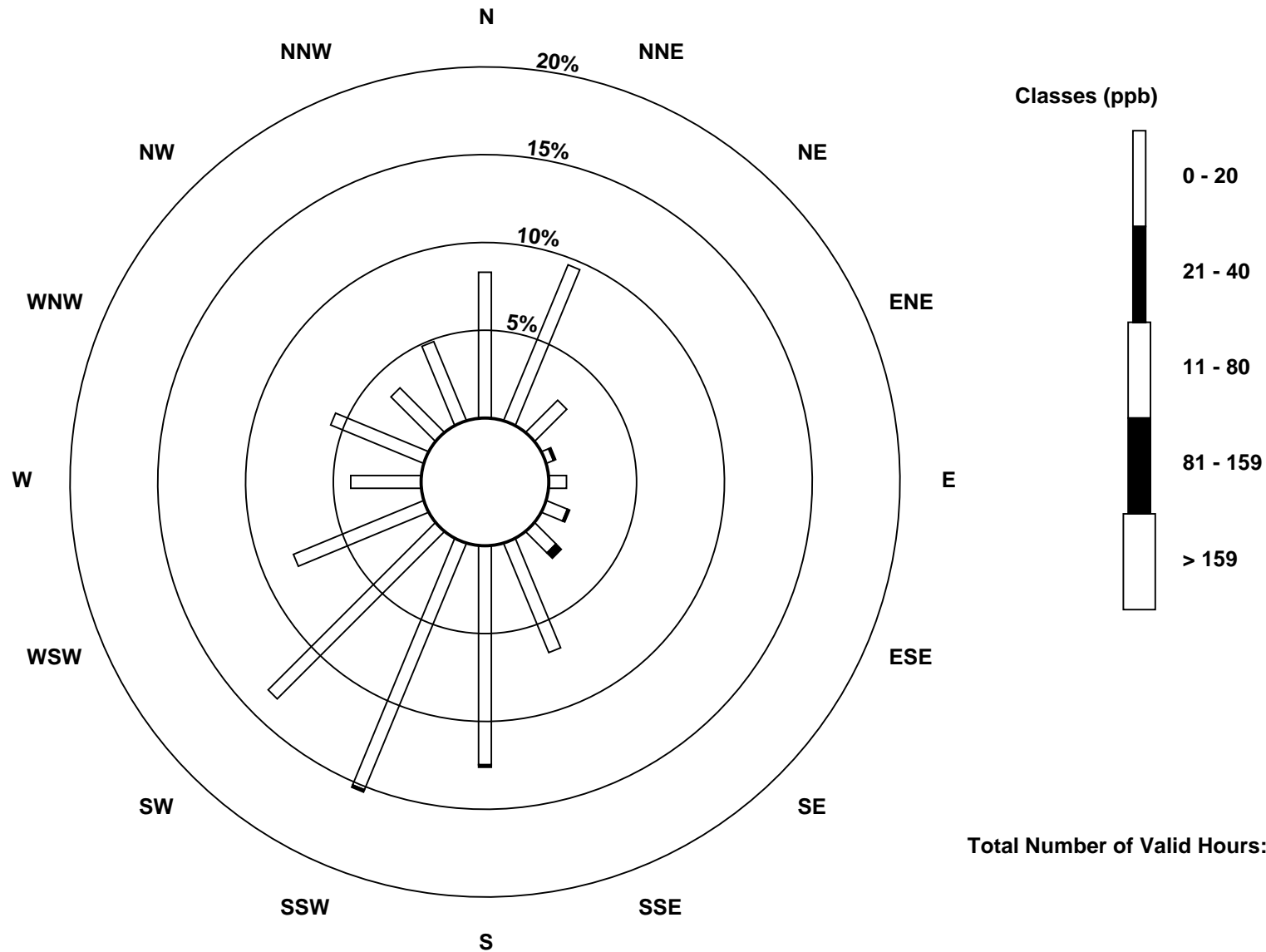
Total Number of Valid Hours: 698

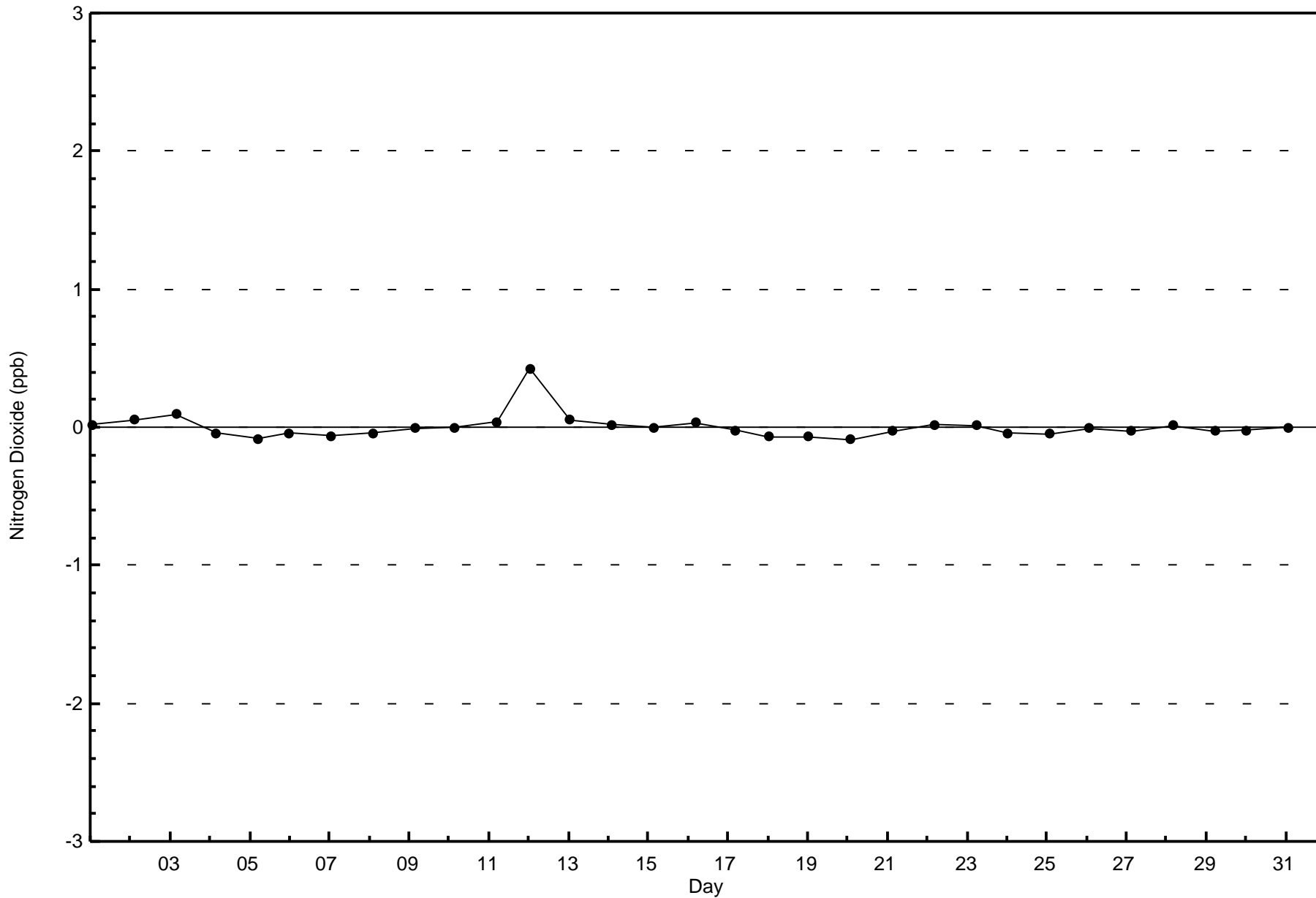
Total Number of Hours: 744

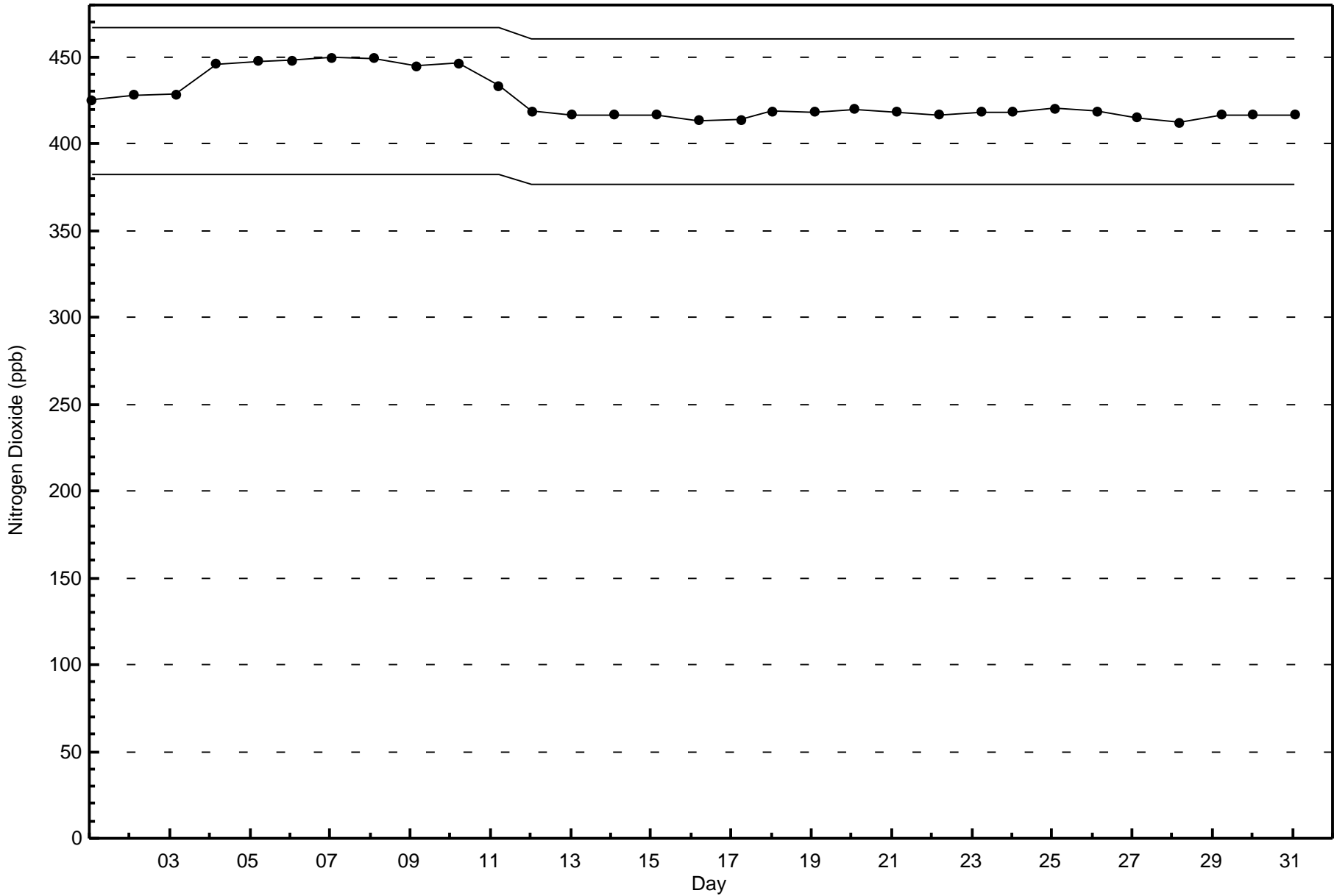


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

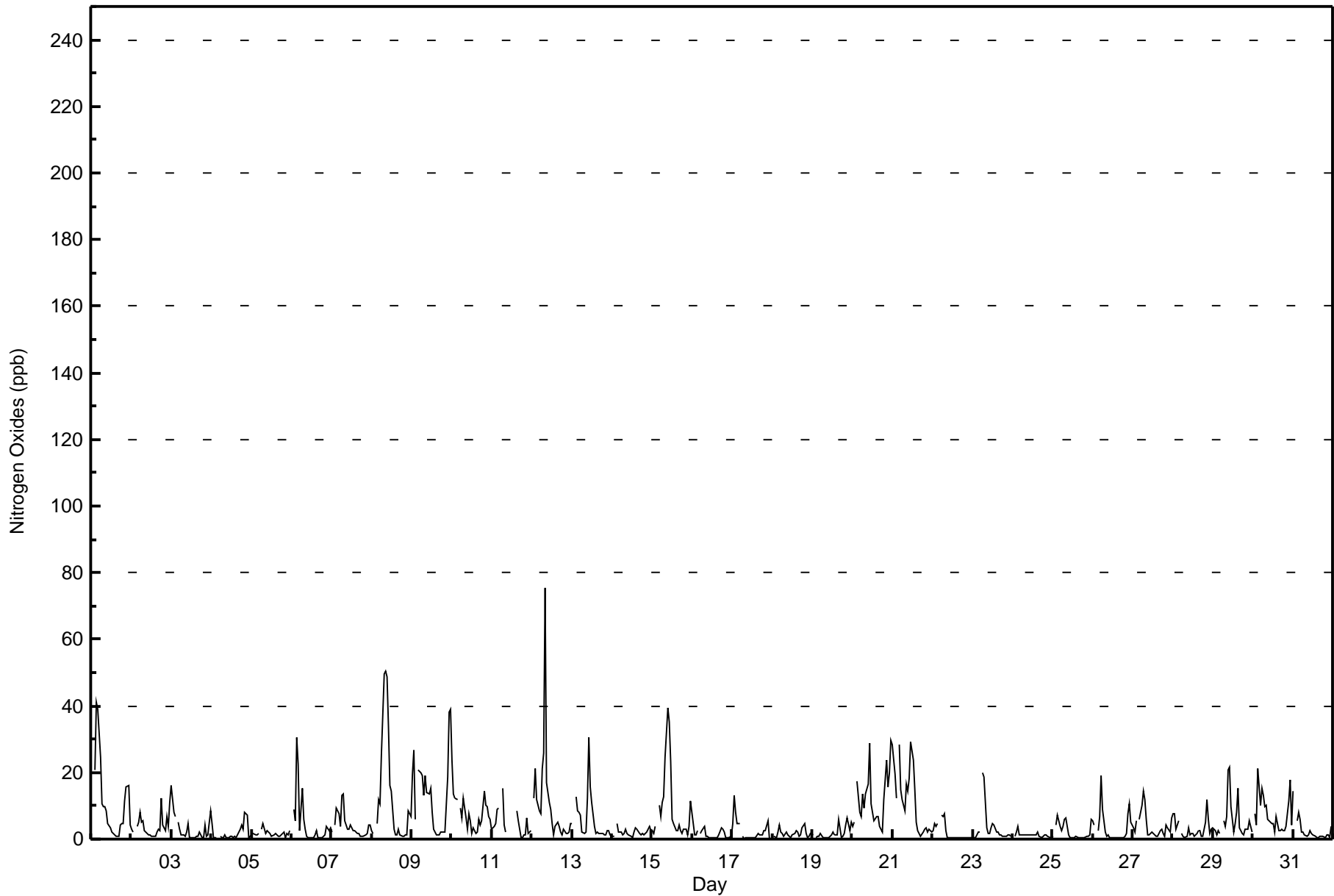
Fort Hills - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																																						
Maximum Value: 75 ppb on Jul 12 09:00										Maximum Daily Average: 13.3 ppb on Jul 9										Hours of Data: 707																												
Minimum Value: 0 ppb on Jul 18 00:00										Minimum Daily Average: 1.3 ppb on Jul 24										Hours of Missing Data: 37																												
Maximum Diurnal Average: 9.1 ppb at hour 9										Minimum Diurnal Average: 1.7 ppb at hour 18										Hours of Calibration: 37																												
Monthly Average: 5.3 ppb										Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 O ₃ = 6 P ₉₀ = 14 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-Jul	2	Z	21	41	39	25	10	10	10	9	5	4	2	2	1	1	1	4	5	5	12	16	16	4	10.6	41																						
2-Jul	3	2	Z	4	5	8	5	5	3	2	1	1	1	1	1	2	3	3	12	4	3	7	4	11	3.9	12																						
3-Jul	16	8	7	Z	5	3	1	1	1	2	4	0	0	0	0	1	1	2	0	0	4	1	1	8	3.1	16																						
4-Jul	5	0	0	1	Z	1	0	1	1	0	0	1	1	0	1	0	2	3	4	3	8	7	1	1	1.8	8																						
5-Jul	1	2	1	1	2	Z	3	5	2	2	2	1	1	1	1	1	1	1	1	2	0	1	1	2	1.7	5																						
6-Jul	Z	9	6	31	23	3	15	6	3	1	0	0	1	1	1	2	1	0	1	1	1	4	2	3	4.9	31																						
7-Jul	2	Z	4	9	8	4	13	14	6	3	3	4	3	3	3	2	1	1	1	1	1	2	4	4	4.2	14																						
8-Jul	3	2	Z	5	12	11	26	49	50	49	34	16	14	3	1	1	3	1	1	1	1	1	9	7	13.0	50																						
9-Jul	19	27	6	Z	21	20	19	13	19	14	14	15	8	3	2	1	1	2	2	2	2	19	38	39	13.3	39																						
10-Jul	24	13	12	12	Z	10	6	12	7	3	8	5	2	4	2	2	6	4	5	15	10	10	7	6	8.0	24																						
11-Jul	3	4	5	9	9	Z	15	4	2	C	C	C	C	C	C	8	5	0	1	1	1	6	2	2	--	15																						
12-Jul	Z	12	21	12	8	7	21	26	75	17	11	9	5	1	4	5	4	2	1	3	2	2	2	4	11.1	75																						
13-Jul	5	Z	13	9	8	7	2	2	2	12	30	16	11	4	2	2	2	2	2	1	1	3	3	1	6.0	30																						
14-Jul	1	1	Z	5	2	2	1	2	3	2	1	1	1	2	3	3	2	1	2	1	2	2	4	3	2.0	5																						
15-Jul	2	2	4	Z	10	7	11	13	24	39	35	23	6	5	2	3	4	2	2	3	3	1	4	11	9.5	39																						
16-Jul	8	1	1	3	Z	2	2	4	1	1	1	0	1	0	0	0	1	4	3	2	0	0	0	1	1.6	8																						
17-Jul	5	13	8	4	5	Z	1	0	1	0	0	0	0	0	0	2	1	1	1	3	3	5	0	0	2.4	13																						
18-Jul	Z	1	0	2	4	2	2	1	2	1	1	0	1	2	3	2	1	1	3	5	2	0	1	2	1.7	5																						
19-Jul	1	Z	0	1	1	2	1	0	0	0	0	1	2	1	1	1	6	1	1	2	4	7	2	5	1.8	7																						
20-Jul	4	5	Z	17	8	7	14	9	13	16	29	11	8	6	7	7	4	3	2	12	24	16	20	30	11.7	30																						
21-Jul	28	19	12	Z	28	15	12	8	17	14	18	29	24	15	5	3	2	1	2	3	3	2	3	2	11.6	29																						
22-Jul	3	4	4	5	Z	7	7	7	3	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	2.0	7																						
23-Jul	1	0	1	2	2	Z	20	19	3	2	2	3	5	4	2	2	1	1	1	1	1	1	1	1	3.3	20																						
24-Jul	Z	1	2	4	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	0	1.3	4																						
25-Jul	1	Z	4	7	4	3	4	6	6	1	0	0	0	1	1	0	0	0	0	1	1	1	1	6	2.1	7																						
26-Jul	6	4	Z	3	7	19	9	2	1	1	1	0	0	0	1	0	0	0	0	1	2	7	11	5	3.5	19																						
27-Jul	3	2	6	Z	6	10	14	12	6	1	1	2	2	1	1	1	2	3	2	1	4	3	2	6	4.0	14																						
28-Jul	8	7	3	5	Z	2	1	1	1	4	1	2	2	1	2	3	2	1	1	5	12	6	2	3	3.2	12																						
29-Jul	3	3	1	3	2	Z	6	4	7	21	21	10	2	5	8	15	4	2	1	3	3	3	5	2	5.7	21																						
30-Jul	Z	7	4	21	10	15	13	10	10	6	5	5	4	2	7	3	2	3	3	3	4	12	18	4	7.4	21																						
31-Jul	14	Z	6	8	6	2	2	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1	0	4	2.5	14																						
																								6.6	6.0	5.9	8.5	9.0	7.4	8.3	8.0	9.1	7.6	7.8	5.5	3.7	2.3	2.1	2.5	2.1	1.7	2.0	2.7	3.8	4.8	5.3	5.8	Diurnal Average
																								28	27	21	41	39	25	26	49	75	49	35	29	24	15	8	15	6	4	12	15	24	19	38	39	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Hills - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	672	95.05	95.05
21 - 40	30	4.24	99.29
41 - 80	5	0.71	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - July 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	55	64	17	3	5	8	11	42	84	105	92	53	28	39	24	33	663
21 - 40	3	3	1	0	2	1	3	4	4	2	2	3	0	0	1	1	30
11 - 80	0	0	0	1	0	1	1	1	0	0	0	0	0	1	0	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	58	67	18	4	7	10	15	47	88	107	94	56	28	40	25	34	698

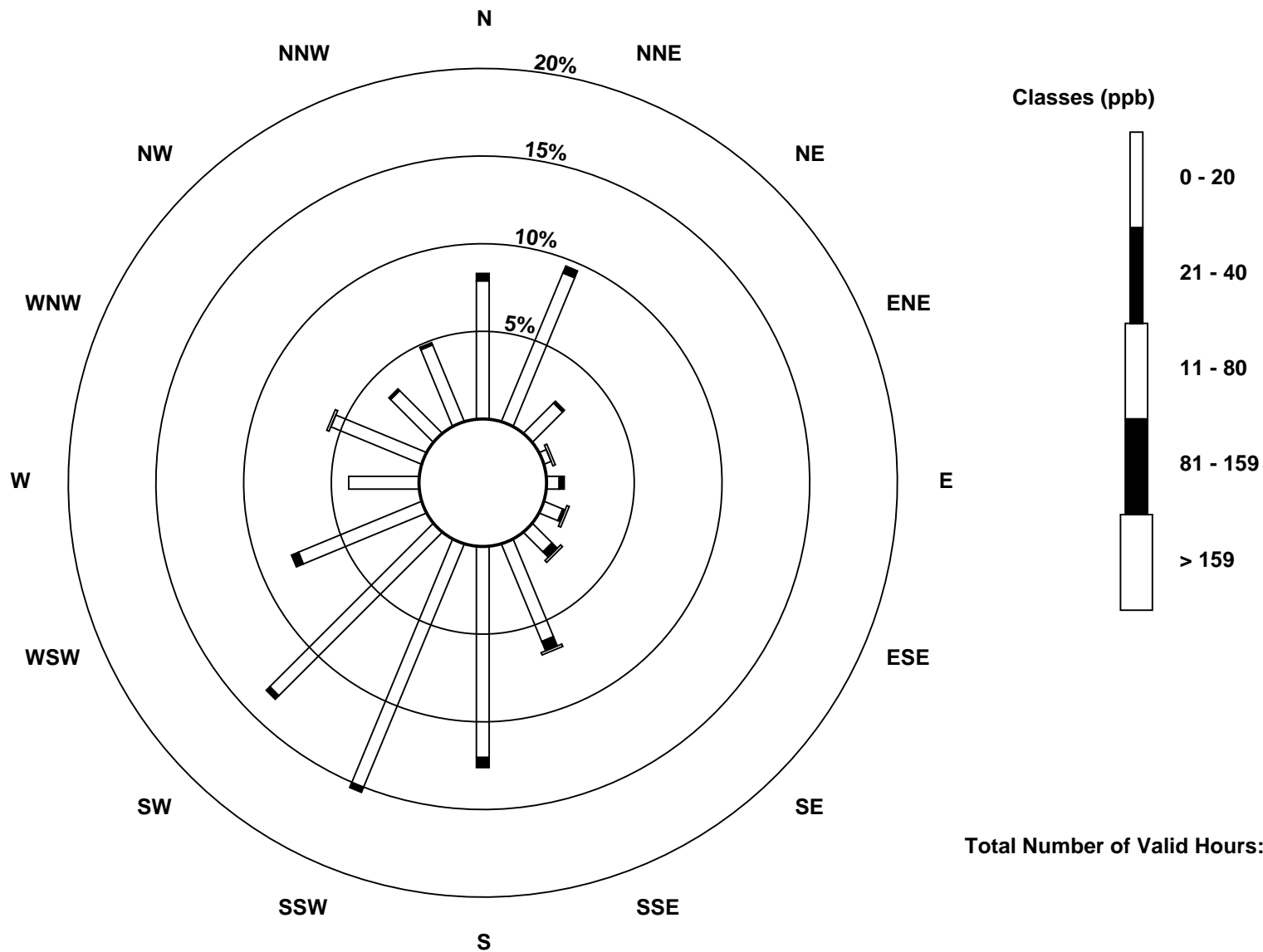
Total Number of Valid Hours: 698

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Fort Hills (AMS 23)

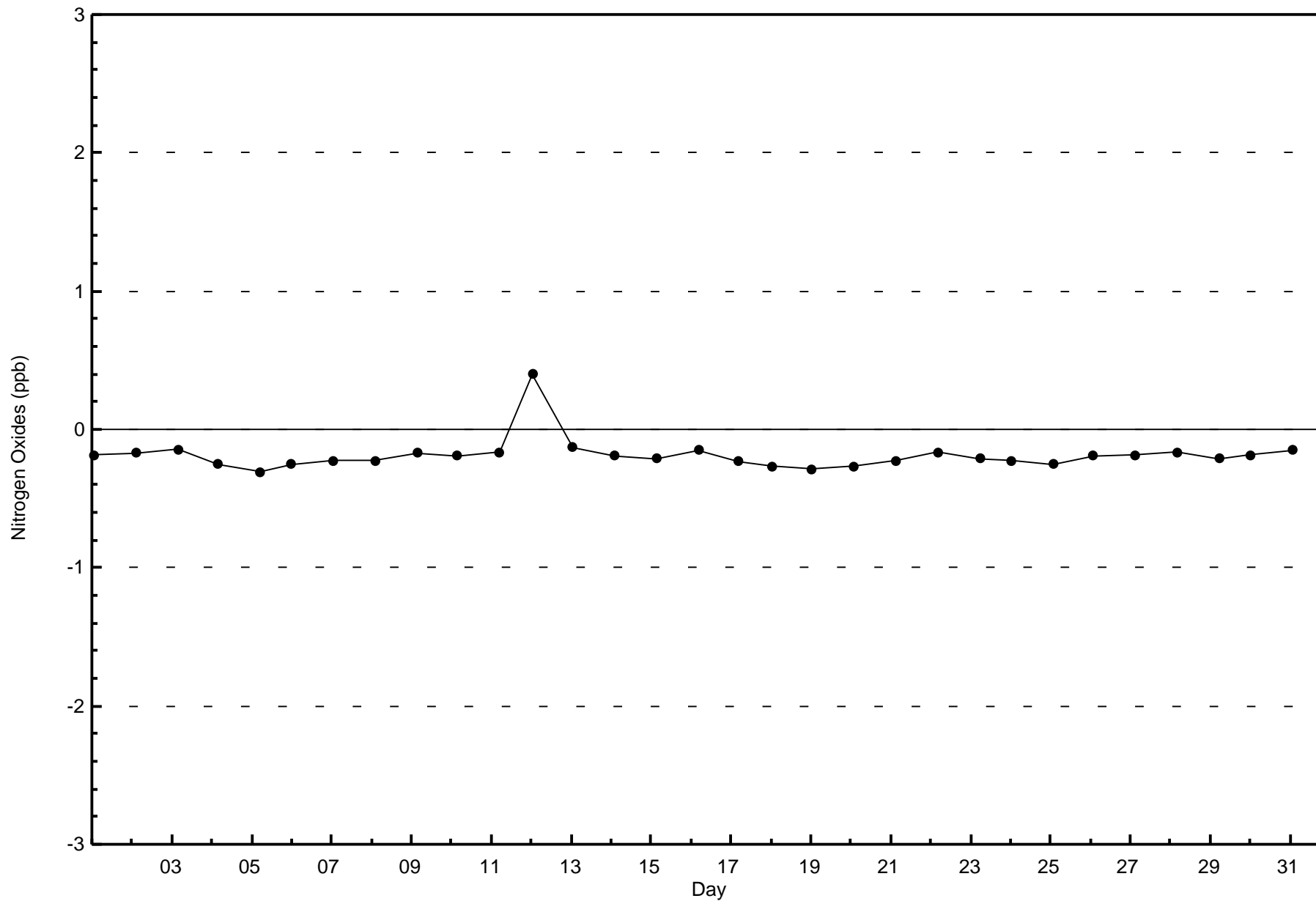


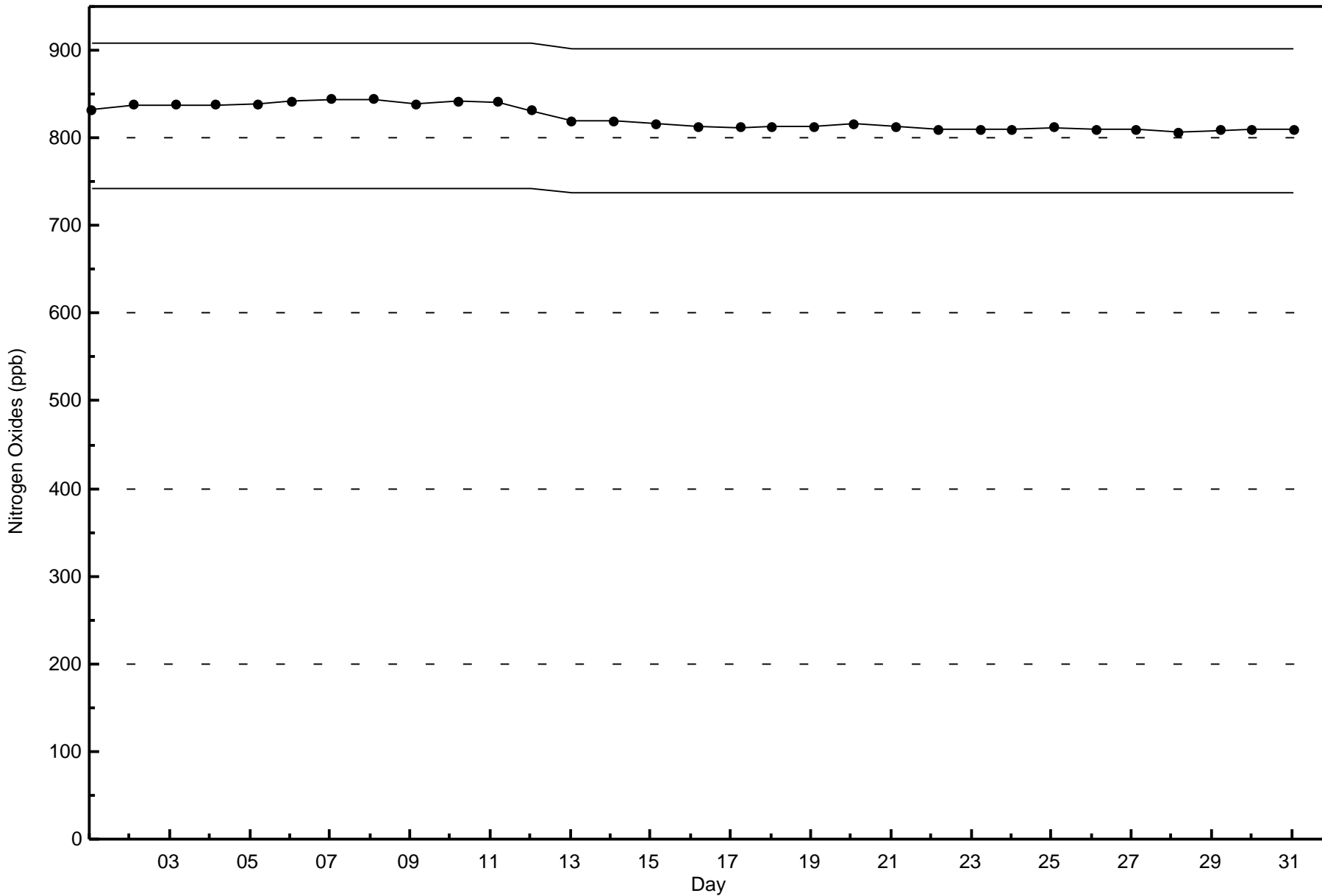
Total Number of Valid Hours: 698



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Fort Hills - July 2017





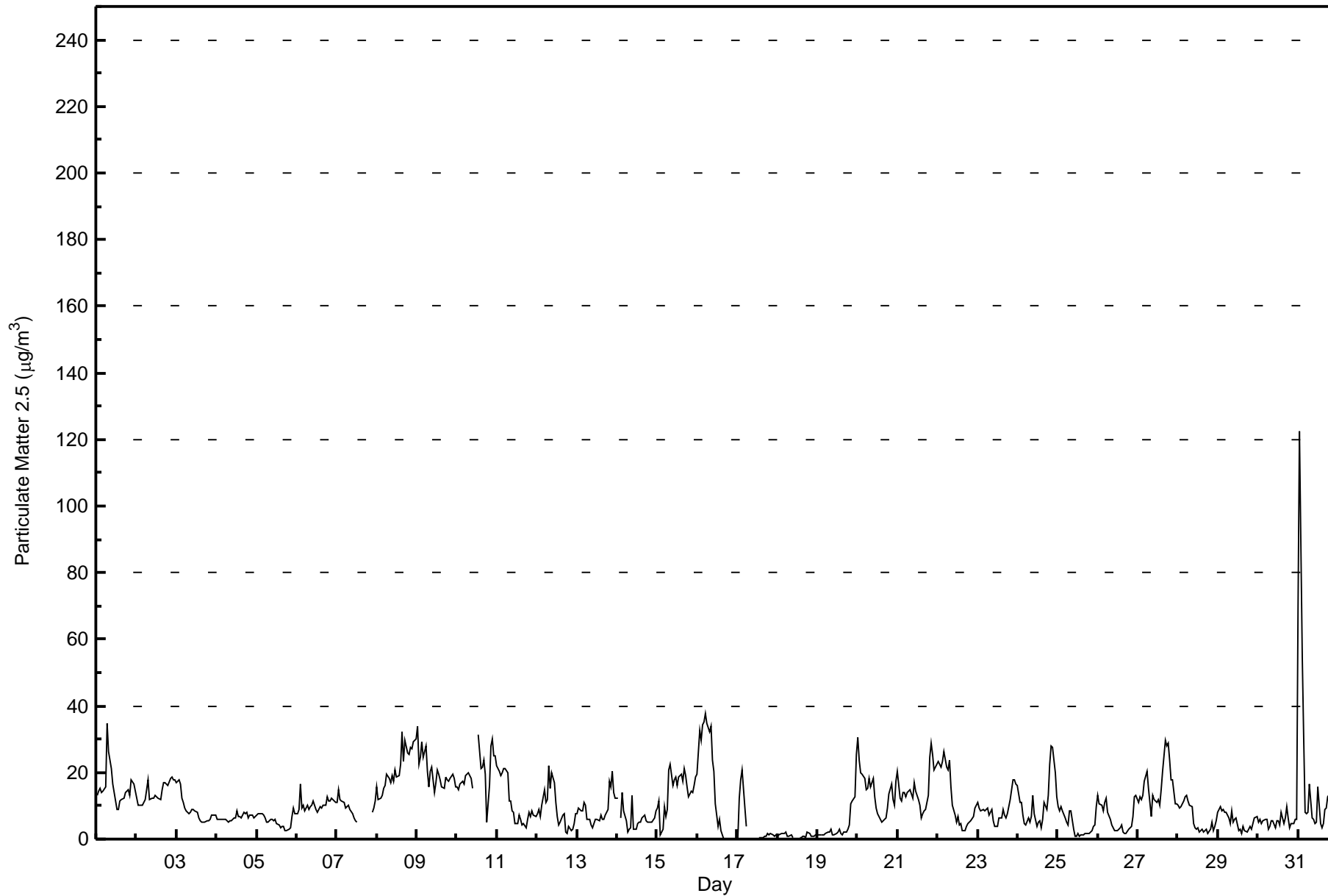


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 122 µg/m ³ on Jul 31 02:00	Maximum Daily Average: 21.1 µg/m ³ on Jul 8
Minimum Value: 0 µg/m ³ on Jul 17 09:00	Hours of Data: 717
Maximum Diurnal Average: 16.1 µg/m ³ at hour 2	Hours of Missing Data: 27
Monthly Average: 10.8 µg/m ³	Hours of Calibration: 3
Minimum Daily Average: 1.1 µg/m ³ on Jul 18	Percent Operational Time: 96.8
Minimum Diurnal Average: 7.4 µg/m ³ at hour 15	
Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 5 Median = 9 Q ₃ = 15 P ₉₀ = 21 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-Jul	13	14	15	14	14	16	35	26	24	21	16	11	9	9	11	12	12	14	14	15	13	18	16	15	15.8	35	
2-Jul	12	10	10	10	11	12	15	18	12	12	12	13	13	12	12	15	17	17	17	17	16	18	19	18	18	14.1	19
3-Jul	17	18	17	12	11	9	9	7	8	9	9	8	8	6	6	5	5	5	6	6	6	7	7	7	7	8.6	18
4-Jul	6	6	6	6	6	6	6	5	6	6	6	6	8	7	6	8	8	8	8	6	7	7	7	7	7	6.5	8
5-Jul	7	8	8	8	7	6	5	5	6	6	6	6	5	4	3	4	4	2	2	3	4	7	9	8	5.5	9	
6-Jul	8	9	16	9	10	9	10	9	10	10	11	9	8	9	10	9	10	10	13	12	11	12	12	11	10.3	16	
7-Jul	11	15	12	12	11	9	10	10	9	7	7	6	5	UO	UO	UO	UO	UO	UO	UO	UO	8	9	11	--	15	
8-Jul	16	12	12	13	15	16	20	18	17	19	17	21	19	19	22	32	23	30	26	26	28	27	29	30	21.1	32	
9-Jul	34	23	25	29	25	28	20	16	20	22	14	17	21	20	18	16	15	19	18	17	18	20	18	16	20.3	34	
10-Jul	16	15	16	18	17	19	19	20	18	15	C	C	C	31	21	22	24	20	5	16	28	30	25	25	19.9	31	
11-Jul	22	20	19	20	21	21	20	12	11	9	8	4	5	7	6	4	5	3	6	8	7	8	7	7	10.8	22	
12-Jul	8	9	7	10	15	11	12	22	15	20	17	11	7	4	5	7	7	2	2	4	3	3	5	8	8.9	22	
13-Jul	8	9	9	8	11	10	6	6	4	3	5	6	6	5	7	6	6	7	9	17	16	20	14	12	8.8	20	
14-Jul	12	UO	6	14	9	5	2	3	3	13	3	3	5	5	6	7	6	5	5	5	5	6	8	8	6.2	14	
15-Jul	9	11	1	3	10	7	9	21	23	16	18	18	16	19	20	17	21	19	16	13	15	14	16	19	14.6	23	
16-Jul	19	32	30	34	35	38	35	32	34	24	20	11	4	6	3	1	0	UO	UO	UO	UO	UO	UO	0	19.9	38	
17-Jul	1	12	18	21	9	4	UO	UO	0	UO	UO	UO	UO	0	0	0	1	1	2	1	2	1	1	1	4.2	21	
18-Jul	1	1	2	2	2	2	1	1	1	0	UO	UO	UO	0	1	1	1	0	2	2	1	1	1	1	1.1	2	
19-Jul	1	1	1	1	1	2	2	2	3	1	1	2	2	3	2	1	2	2	3	4	11	11	13	25	4.1	25	
20-Jul	31	24	20	20	18	15	15	18	16	18	13	9	8	7	5	5	6	6	9	13	16	12	10	17	13.9	31	
21-Jul	20	12	11	14	14	13	14	15	14	12	17	14	12	10	6	8	8	9	13	25	29	25	21	23	15.0	29	
22-Jul	24	22	22	23	26	21	21	24	16	10	7	5	7	4	5	2	2	4	5	5	5	7	9	10	11.9	26	
23-Jul	11	9	8	9	9	9	9	7	9	5	4	4	4	6	6	9	7	6	8	12	15	18	18	17	9.1	18	
24-Jul	16	11	11	7	5	4	6	5	7	13	8	4	5	5	4	6	11	9	13	22	28	28	20	13	10.8	28	
25-Jul	10	9	10	8	7	5	4	9	9	3	1	1	2	1	1	1	2	2	2	2	3	4	4	10	4.4	10	
26-Jul	13	10	10	8	11	12	8	6	4	3	2	2	2	3	4	2	2	2	3	3	4	7	13	13	6.3	13	
27-Jul	11	13	12	13	17	20	15	11	7	13	12	11	12	10	15	20	30	28	29	24	18	18	10	11	15.8	30	
28-Jul	10	9	10	12	13	13	12	10	10	5	4	3	3	2	3	2	3	3	2	3	5	3	4	6	6.1	13	
29-Jul	8	10	8	9	8	8	6	5	8	5	6	6	2	3	2	4	3	2	3	4	3	5	6	7	5.5	10	
30-Jul	5	6	5	5	6	6	3	4	5	5	4	5	5	4	8	5	6	10	6	4	5	5	6	6	5.4	10	
31-Jul	69	122	55	31	8	8	8	16	6	6	5	5	16	5	4	5	9	9	13	14	13	13	12	13	19.4	122	

14.5	16.1	13.3	13.0	12.3	11.8	11.9	12.1	10.8	10.5	9.0	7.9	7.8	7.6	7.4	7.8	8.6	8.8	8.9	10.4	11.5	12.1	11.6	12.0	Diurnal Average
69	122	55	34	35	38	35	32	34	24	20	21	21	31	22	32	30	30	29	26	29	30	29	30	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 - July 2017

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
1 - 5	184	25.66	25.66
6 - 15	340	47.42	73.08
16 - 25	135	18.83	91.91
26 - 80	35	4.88	96.79
> 81.0	1	0.14	96.93

Total Number of Valid Hours: 717

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - July 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	13	20	7	2	2	0	4	2	24	29	23	14	10	15	10	9	184
6 - 15	23	33	5	1	2	2	6	24	44	58	50	25	17	23	6	12	331
16 - 25	13	12	4	1	3	7	4	22	20	19	9	2	2	5	8	3	134
26 - 80	3	2	2	0	0	1	1	1	3	4	5	5	3	0	3	2	35
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Totals	52	67	18	4	7	10	15	49	91	110	87	46	33	43	27	26	685

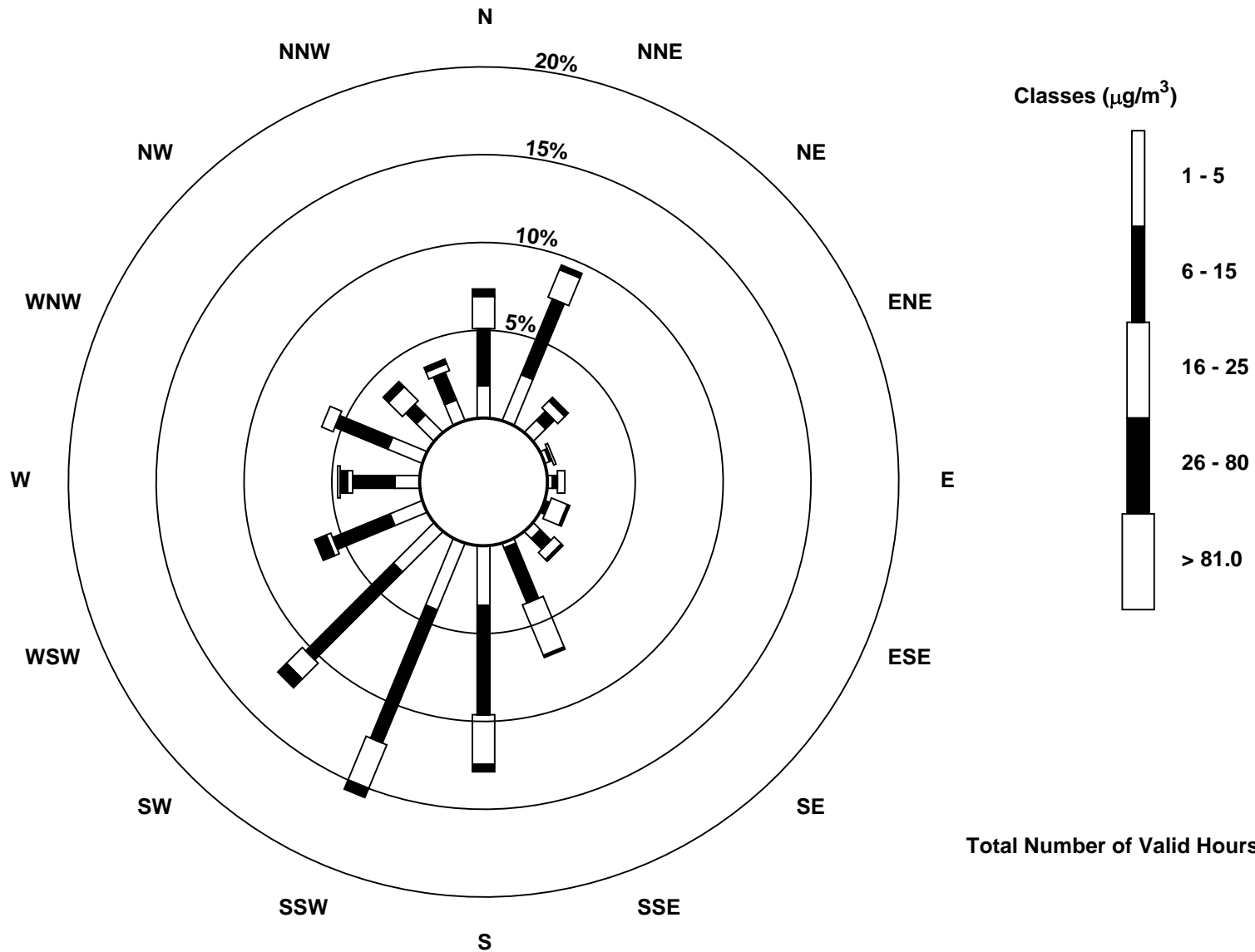
Total Number of Valid Hours: 707

Total Number of Hours: 744



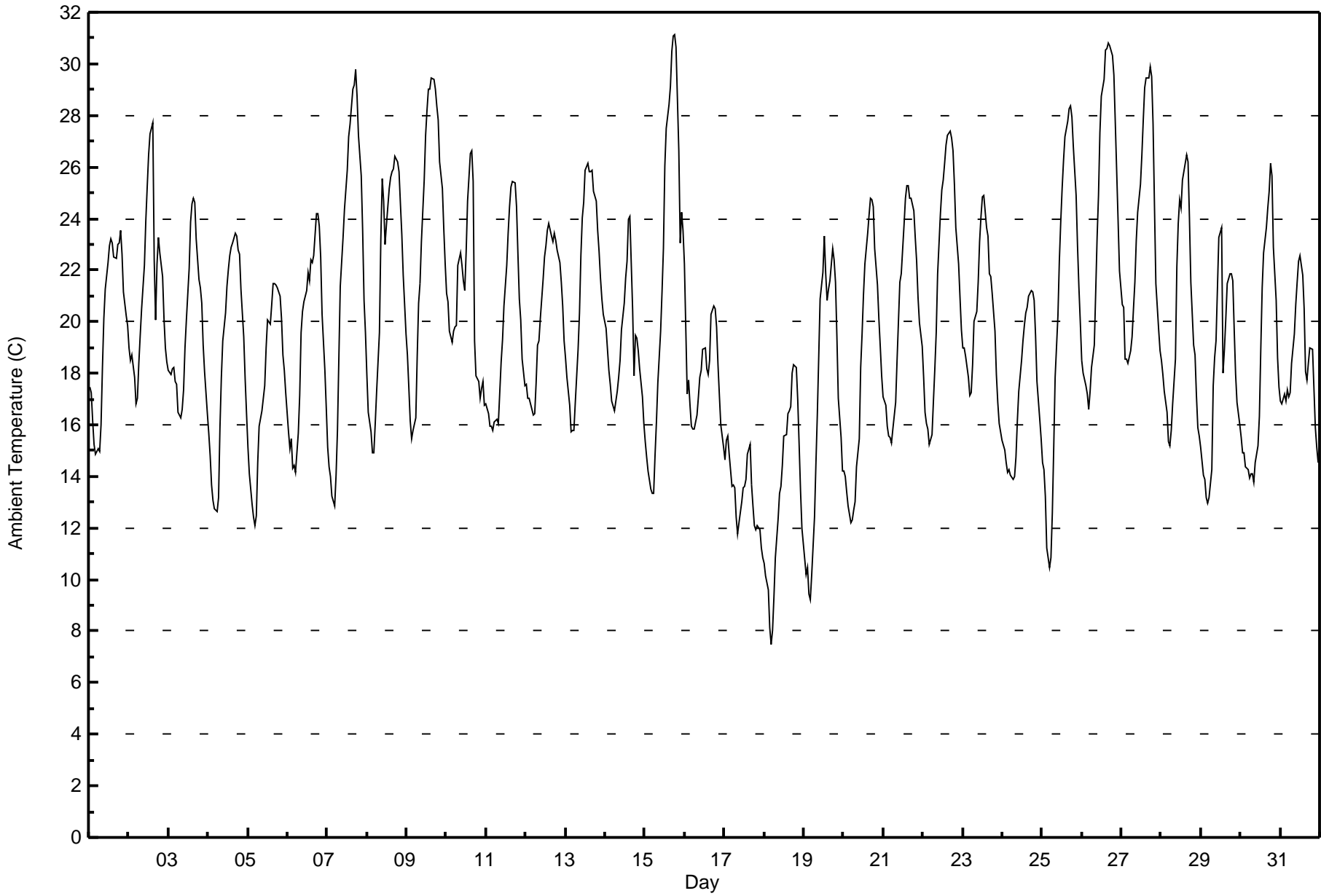
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills (AMS 23)





Maximum Value: 31 C on Jul 15 19:00 Maximum Daily Average: 24.1 C on Jul 26																		Hours in Service: 744 Hours of Data: 744																																																	
Minimum Value: 7 C on Jul 18 05:00 Minimum Daily Average: 13.3 C on Jul 17 Maximum Diurnal Average: 24.0 C at hour 16 Minimum Diurnal Average: 14.7 C at hour 5 Monthly Average: 19.7 C Percentiles: P ₁ = 10 P ₁₀ = 14 Q ₁ = 16 Median = 19 Q ₃ = 23 P ₉₀ = 26 P ₉₉ = 30																		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-Jul	17	17	16	15	15	15	15	16	18	20	21	22	23	23	23	22	22	23	23	24	23	21	20	20	19.9	24																																									
2-Jul	19	19	19	18	17	17	18	19	20	22	24	25	26	27	28	22	20	22	23	23	22	20	19	18	21.2	28																																									
3-Jul	18	18	18	18	18	18	16	16	17	17	19	20	22	24	25	25	25	23	22	21	21	19	18	16	19.7	25																																									
4-Jul	16	15	14	13	13	13	13	16	18	19	20	21	22	23	23	23	23	23	23	23	21	19	18	16	18.7	23																																									
5-Jul	15	14	13	12	12	12	15	16	17	17	17	19	20	20	21	21	22	21	21	21	20	19	18	17	17.6	22																																									
6-Jul	16	15	15	14	14	14	16	17	20	20	21	21	22	22	22	22	23	24	24	24	23	20	18	17	19.3	24																																									
7-Jul	15	14	14	13	13	14	16	19	21	23	24	25	26	27	28	29	29	30	29	27	26	24	21	20	21.9	30																																									
8-Jul	18	16	16	15	15	16	17	20	23	26	25	23	24	25	26	26	26	26	26	26	25	23	22	20	21.8	26																																									
9-Jul	19	17	16	15	16	16	19	21	21	23	26	27	28	29	29	29	29	29	28	28	26	25	24	22	23.5	29																																									
10-Jul	21	21	20	19	20	20	20	22	23	22	22	21	23	25	27	27	25	19	18	18	17	17	18	17	20.8	27																																									
11-Jul	17	16	16	16	16	16	16	16	17	18	19	21	22	23	24	25	25	25	24	23	21	20	19	18	19.8	25																																									
12-Jul	18	17	17	17	16	16	18	19	19	20	22	22	23	24	24	23	23	23	23	23	22	22	21	19	20.5	24																																									
13-Jul	19	18	17	16	16	16	17	19	20	23	24	25	26	26	26	26	26	25	25	24	23	22	21	20	21.5	26																																									
14-Jul	20	19	18	18	17	17	17	17	18	18	20	21	22	22	24	24	20	18	19	19	19	18	17	16	19.1	24																																									
15-Jul	15	15	14	14	13	13	15	16	18	20	21	23	26	28	28	29	30	31	31	31	27	23	24	24	22.0	31																																									
16-Jul	22	17	18	17	16	16	16	16	17	18	18	19	19	18	18	18	20	21	21	20	18	17	16	15	18.0	22																																									
17-Jul	15	15	16	15	14	14	14	12	12	12	13	14	14	14	15	15	14	13	12	12	12	12	11	11	13.3	16																																									
18-Jul	11	10	10	8	7	8	9	11	12	13	14	14	16	16	16	17	17	18	18	18	17	15	13	12	13.4	18																																									
19-Jul	11	10	10	9	9	10	12	15	16	19	21	22	23	22	21	21	22	23	22	22	19	17	16	14	16.9	23																																									
20-Jul	14	14	13	13	12	12	13	13	14	15	18	20	21	22	23	24	25	25	24	23	21	20	19	18	18.3	25																																									
21-Jul	17	17	16	16	16	15	16	17	18	20	22	22	24	25	25	25	25	25	24	23	22	21	20	19	20.4	25																																									
22-Jul	18	17	16	16	15	16	17	18	20	22	24	25	25	26	27	27	27	27	27	25	24	22	21	20	21.7	27																																									
23-Jul	19	19	19	18	17	17	18	20	20	22	23	24	25	25	24	23	22	22	21	20	18	17	16	16	20.2	25																																									
24-Jul	15	15	15	14	14	14	14	14	15	16	17	18	19	20	20	21	21	21	21	21	19	18	16	15	17.3	21																																									
25-Jul	15	14	13	11	10	11	13	15	18	20	22	24	25	26	27	28	28	28	28	28	27	25	23	21	20	20.6	28																																								
26-Jul	19	18	18	17	17	17	18	19	21	23	25	27	29	29	31	31	31	31	30	30	28	26	24	22	24.1	31																																									
27-Jul	21	21	19	19	18	19	19	20	22	23	24	25	26	28	29	29	29	30	30	28	24	21	20	19	23.5	30																																									
28-Jul	19	18	17	17	15	15	16	17	19	22	24	25	24	26	26	26	26	24	22	19	19	17	16	16	20.1	26																																									
29-Jul	15	14	14	13	13	13	14	17	19	19	21	23	24	18	19	20	22	22	22	22	20	18	17	16	18.1	24																																									
30-Jul	15	15	15	14	14	14	14	14	14	15	15	16	19	21	23	24	24	25	26	26	23	21	19	17	18.5	26																																									
31-Jul	17	17	17	17	17	17	17	18	20	21	22	22	23	22	20	18	18	18	19	19	17	16	15	15	18.4	23																																									
																		16.9		16.2		15.7		15.1		14.7		14.9		15.7		17.0		18.3		19.7		20.9		21.9		22.9		23.4		23.9		24.0		23.9		23.8		23.5		22.7		21.3		19.8		18.6		17.6		Diurnal Average	
																		22		21		20		19		20		20		20		22		23		26		26		27		29		29		31		31		31		31		31		31		28		26		24		24		Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort Hills - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	7	0.94	0.94
10 - 20	398	53.49	54.44
> 20	339	45.56	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

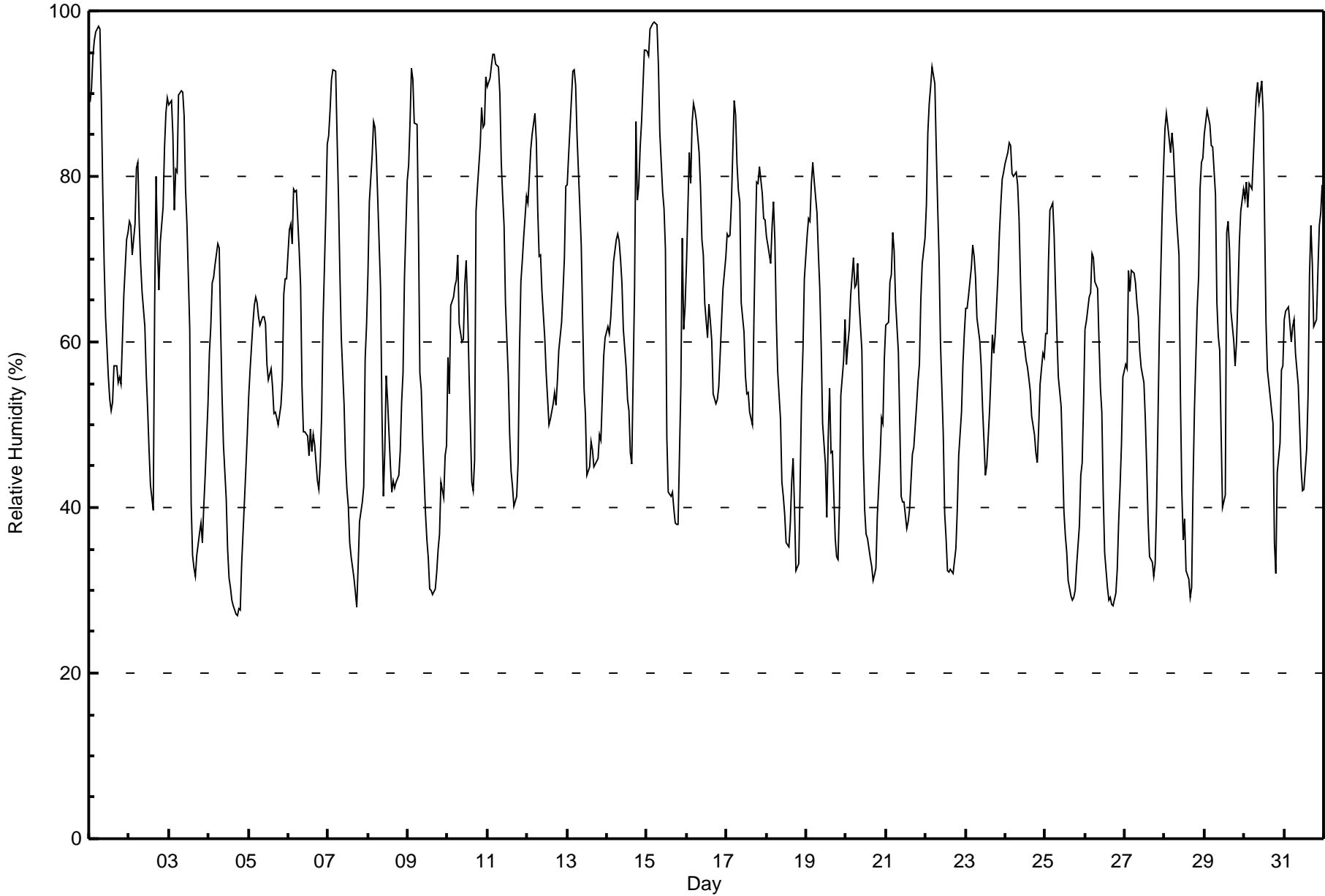
Fort Hills - July 2017

Maximum Value: 99 % on Jul 15 05:00																		Maximum Daily Average: 72.0 % on Jul 1																		Hours in Service: 744	
Minimum Value: 27 % on Jul 4 18:00																		Minimum Daily Average: 45.9 % on Jul 4																		Hours of Data: 744	
Maximum Diurnal Average: 80.5 % at hour 5																		Minimum Diurnal Average: 44.2 % at hour 15																		Hours of Missing Data: 0	
Monthly Average: 61.2 %																		Percentiles: P ₁ = 28 P ₁₀ = 36 Q ₁ = 47 Median = 61 Q ₃ = 75 P ₉₀ = 86 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-Jul	89	91	95	96	97	98	98	89	78	69	63	56	53	52	53	57	57	55	56	55	60	66	72	73	72.0	98											
2-Jul	75	74	70	74	81	82	74	70	66	62	56	52	47	43	40	65	80	71	66	72	76	83	88	90	69.0	90											
3-Jul	89	89	85	76	81	81	90	90	90	87	79	74	61	40	34	33	32	34	37	38	36	40	44	53	62.2	90											
4-Jul	59	62	67	68	69	72	71	62	53	48	41	35	32	30	29	28	27	27	28	28	33	41	45	49	45.9	72											
5-Jul	53	57	62	64	65	65	63	62	63	63	62	57	55	57	55	51	51	51	50	52	55	66	68	68	59.0	68											
6-Jul	74	74	72	78	78	78	71	67	55	49	49	49	46	49	47	49	48	43	42	45	51	62	76	84	59.9	84											
7-Jul	85	88	92	93	93	85	77	68	61	52	46	42	40	36	34	32	30	28	33	38	41	43	58	62	56.5	93											
8-Jul	68	77	82	87	86	82	77	66	51	41	47	56	53	45	42	43	42	43	44	47	53	56	68	80	59.9	87											
9-Jul	81	87	93	92	86	86	74	56	54	48	39	36	34	30	30	29	30	32	35	37	43	41	46	47	52.9	93											
10-Jul	58	54	64	66	67	67	71	62	60	60	67	70	64	57	43	42	46	76	79	84	88	86	86	92	67.0	92											
11-Jul	91	92	93	95	95	94	93	90	82	78	74	65	56	49	44	43	40	41	45	59	67	70	73	78	71.1	95											
12-Jul	77	80	83	85	88	84	76	70	70	66	61	56	53	50	51	53	54	52	55	59	62	66	70	79	66.7	88											
13-Jul	79	83	89	93	93	91	85	76	72	63	54	51	44	45	48	47	45	45	46	49	48	53	58	60	63.2	93											
14-Jul	62	61	63	66	70	72	73	72	70	67	61	57	53	52	47	45	66	87	77	79	83	87	95	95	69.2	95											
15-Jul	95	95	98	98	99	99	98	93	85	78	76	71	49	42	41	42	40	38	38	38	55	73	62	64	69.4	99											
16-Jul	69	83	79	86	89	88	87	83	79	72	70	65	60	65	63	60	54	53	53	55	59	63	66	70	69.6	89											
17-Jul	73	73	73	77	89	87	81	78	77	65	61	56	54	54	51	50	62	72	79	79	81	78	75	75	70.9	89											
18-Jul	73	72	69	74	77	72	63	56	51	43	41	39	36	35	38	43	46	40	32	33	43	53	59	68	52.4	77											
19-Jul	73	75	75	79	82	80	76	71	66	60	50	45	39	48	54	47	47	36	34	34	40	54	58	63	57.7	82											
20-Jul	57	60	62	66	70	67	67	69	65	59	46	40	37	36	34	33	31	32	33	39	46	51	50	58	50.3	70											
21-Jul	62	62	67	68	73	71	65	59	50	41	41	41	37	38	40	43	47	47	52	55	57	65	69	73	55.2	73											
22-Jul	77	85	89	91	93	91	83	76	70	60	49	39	36	32	32	33	32	34	35	40	46	52	57	61	58.1	93											
23-Jul	64	64	66	69	72	70	68	63	60	57	52	48	44	45	52	56	61	59	61	68	73	77	80	81	62.8	81											
24-Jul	82	83	84	84	80	80	80	79	75	68	61	59	58	57	56	54	51	49	47	45	50	55	59	58	64.7	84											
25-Jul	61	61	70	76	77	73	66	61	56	52	46	39	37	35	31	29	29	29	30	33	38	44	45	53	48.8	77											
26-Jul	62	63	65	66	71	70	67	66	60	54	52	41	35	30	29	29	28	28	30	33	38	42	48	56	48.5	71											
27-Jul	57	57	69	66	69	68	67	65	63	59	57	55	51	45	38	34	33	32	33	40	50	61	76	81	55.3	81											
28-Jul	86	88	86	83	85	83	79	76	71	54	42	36	39	32	31	29	30	43	52	64	68	78	82	82	62.5	88											
29-Jul	85	88	87	86	84	84	78	65	61	59	49	40	42	73	75	71	64	60	57	60	66	72	76	78	69.1	88											
30-Jul	77	79	76	79	78	82	86	90	91	89	92	88	75	62	57	53	52	50	36	32	44	48	57	57	67.9	92											
31-Jul	63	64	64	62	60	62	63	59	55	50	45	42	42	47	54	68	74	69	62	63	69	74	76	79	61.0	79											
	72.7	74.7	77.1	78.8	80.5	79.5	76.4	71.3	66.4	60.5	55.8	51.6	47.1	45.5	44.2	44.9	46.1	47.0	47.0	50.1	55.5	61.3	65.8	69.8	Diurnal Average												
	95	95	98	98	99	99	98	93	91	89	92	88	75	73	75	71	80	87	79	84	88	87	95	95	Diurnal Maximum												



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Hills - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Fort Hills - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	104	13.98	13.98
40 - 60	244	32.80	46.77
60 - 80	271	36.42	83.20
80 - 100	125	16.80	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Fort Hills - July 2017

Maximum Speed: 34 km/h on Jul 4 14:00	Maximum Daily Speed Average: 21.7 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 21 13:00	Minimum Daily Speed Average: 0.9 km/h on Jul 29	Hours of Data: 734
Maximum Diurnal Speed Average: 6.6 km/h at hour 12	Minimum Diurnal Speed Average: 1.6 km/h at hour 2	Hours of Missing Data: 10
Monthly Average Velocity: 3.7 km/h 242.8 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 20 P ₉₉ = 29	Percent Operational Time: 98.7

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-Jul	SSW1	SSE3	NE0	SSE3	SSE5	SSE10	S11	S7	SSE9	SSE9	SSW7	SSW11	SSW10	SSW11	SW11	SSW12	SSW8	SSW7	SW5	S5	SE4	ESE5	SSE7	S12	S6.4	SSW12	
2-Jul	S9	S11	SSW16	SSW11	S9	S12	S19	SSW19	SSW19	SSW16	SSW16	SSW16	SSW18	SSW18	SSW19	W9	SSW2	E6	SE6	ESE8	NE5	NNW4	N4	NE1	SSW9.2	SSW19	
3-Jul	S7	S10	SSW12	S14	SSW14	SSW8	S11	SSW12	SSW12	S14	SSW18	SSW16	SW16	SW20	SW21	WSW22	WSW21	WSW23	SW21	SW21	WSW19	WSW19	WSW22	W17	WSW14.9	WSW23	
4-Jul	SW18	SW20	SW15	SW16	WSW17	SW17	SW17	WSW23	WSW25	WSW26	WSW31	WSW31	WSW33	WSW34	WSW32	WSW32	WSW29	WSW27	W21	W22	W13	WSW11	SW11	SW12	WSW21.7	WSW34	
5-Jul	SW13	SW9	SW9	SW13	SW13	SW15	WSW16	WNW17	WNW15	WNW16	WNW17	WNW12	NW16	WNW17	W12	NW15	NW15	NW18	NNW17	WNW12	NNW9	W3	WSW6	WNW7	WNW10.9	NW18	
6-Jul	WNW6	W9	WNW5	WSW11	WSW11	SW15	WSW12	SW14	W16	WNW16	NNW18	NNE12	NNE7	N7	N5	N9	N3	SSW4	N3	NNW6	N7	N4	AF	AF	WNW5.3	NNW18	
7-Jul	WNW3	WNW3	W2	SSE3	S5	S7	SSE7	SSE6	S5	SW7	W8	SW9	SW10	WSW8	WSW3	SSE5	SW5	N3	NNE14	NNE17	NNE13	NE6	AF	AF	SW1.0	NNE17	
8-Jul	AF	AF	AF	AF	AF	N2	NW3	WNW2	ENE1	ESE3	SSW12	SW20	SW13	SSW12	SSW15	SW15	SW15	SW12	SW11	SW7	SSW4	SE2	ESE3	N1	SW7.0	SW20	
9-Jul	NE3	N2	WNW3	NW2	E2	WSW2	SSW2	S7	SW7	SW6	S7	SSE6	SSE7	SE8	SSE11	SSE12	S12	SSW12	SW11	SSW8	S4	ESE5	SE7	SE9	S4.9	S12	
10-Jul	SW6	SE7	SSW5	SSE7	S4	SW5	SSW6	SSW4	WNW7	WNW7	WSW11	SW12	SW9	SW6	NE1	NE4	E10	ESE14	NNW6	WSW11	NNE1	NE6	N1	NW6	SW2.2	ESE14	
11-Jul	S2	WNW4	N2	SSE1	S4	NNE5	NW5	WNW6	WNW6	WNW7	W9	W11	W12	W11	W10	W5	WSW7	SW10	SW11	SSW18	SW18	SSW9	S7	SSE7	WSW5.8	SW18	
12-Jul	S8	S5	SSE7	S8	S7	SSE6	S8	SE7	SE6	S5	SSW4	SSW9	SSW11	SW8	W9	WNW9	S4	SSW16	SSW13	S11	S10	S9	S8	S7	S6.9	SSW16	
13-Jul	SSW9	SSW5	SSW4	SSE7	S6	SSW9	SSW6	SSE4	SW3	SSE4	SE4	SW2	S4	N11	N16	N13	N16	NNE18	NNE20	NNE21	NNE16	N12	N14	N16	N4.5	NNE21	
14-Jul	N20	NNE22	NNE20	NNE20	NNE19	NNE15	NNE18	NNE21	NNE20	NNE17	NNE15	N12	N11	N9	E5	NE7	NNW16	NE9	NNE9	N6	NNW5	NNW3	WNW4	WNW3	NNE12.0	NNE22	
15-Jul	WNW3	AF	W1	WNW2	WSW2	S5	S7	S8	S6	NE3	N5	N7	ESE11	SSE16	SSE22	SSE20	SSE20	S22	SSE21	SSE17	SSW13	S8	S15	SW6	S8.3	SSE22	
16-Jul	NW13	N22	NNE5	WSW13	SSW10	SSW14	WSW13	WSW13	SSW13	SSW10	SSW14	SW16	SW20	SSW25	SW20	SW18	WSW22	WSW20	WSW15	WSW18	SW18	SW17	SW14	SW13	SW12.7	SSW25	
17-Jul	WSW13	WNW10	W9	W11	W11	WNW11	NNW17	NNW20	N22	N28	N25	N26	N18	NNW17	N16	N20	NNW14	NNW4	NNE10	N4	W7	WNW6	NNW9	NW8	NNW11.6	N28	
18-Jul	NNW9	NNW10	NNW10	NNW6	NNW4	NW5	W3	WNW2	NNE4	WNW6	NNW7	NNW3	SSE3	NNW3	SW9	WSW12	SW13	WSW17	W15	WNW8	WSW8	SW9	SW9	SSW11	W5.0	WSW17	
19-Jul	SSW10	SSW10	SSW12	SSW14	SW15	SW12	SW17	SSW14	SSW14	SSW15	SW13	SW12	WSW14	N19	NNE21	NE17	E7	NE15	NE14	NNE12	NNE6	N5	NNW5	N9	SW2.1	NNE21	
20-Jul	N12	NNE12	NNE12	NNE9	NNE10	NNE9	N6	N7	N4	N7	E5	SE10	SE9	SE8	SE7	SE10	S6	SSE4	ESE5	ENE7	ESE3	E5	ESE6	S4	ENE3.7	NNE12	
21-Jul	S3	S2	NNW3	N5	NNE6	NNW5	NNE8	N4	NNW4	NE5	S4	SSW3	NNW0	SW5	SW9	SW12	SW13	SSW13	SSW13	S14	S15	SSE13	S12	SSW10	SSW4.1	S15	
22-Jul	SSE5	SSE9	SSE9	S10	SSE11	S13	S15	SSW16	SSW16	SSW18	SW19	SW23	SW23	WSW21	WSW20	WSW19	WSW21	SW22	SW18	SW13	SSW11	SSW9	SW8	SSW8	SW13.3	SW23	
23-Jul	SSW11	SSW8	SW8	SW13	SW10	WSW14	WSW13	W5	N4	NW4	S2	SSW7	SW3	NNE7	NNE19	NNE23	N24	NNE20	NNE20	NNE22	NNE19	NNE19	NNE19	NNE22	N6.1	NNE24	
24-Jul	NNE18	NNE20	NNE20	NNE20	NNE24	NNE25	NNE25	NNE24	NNE24	NNE27	NNE29	NNE30	NNE27	N25	N24	N26	N26	N24	N17	NNW10	NNW9	NNW9	NW8	N21.0	NNE30		
25-Jul	NW6	NW3	SW5	S4	S7	S8	S9	SSE10	S10	S9	SSW11	SSW14	SSW15	SW16	SW15	SSW14	SSW14	SSW14	S17	S12	S10	S9	S5	SSE10	SSW9.2	S17	
26-Jul	SSE9	SSE10	SSE10	S9	SSE8	SSE10	S13	SSW13	SSW10	SSW12	SSW12	SW17	SW15	SSW14	SSW10	SSW12	SSW10	SSW12	SSW12	SSW14	SSW13	S11	S13	SSW10	SSW8	SSW10.9	SW17
27-Jul	S3	SSE6	SSE9	SSE13	SSE13	SSE15	S13	SSW14	SSW14	S14	S14	SSW16	SW14	SW15	WSW13	WSW14	WSW12	W8	NW10	NNW6	NW12	NW14	NW7	WNW5	SW7.1	SSW16	
28-Jul	NW1	SSW7	SW9	SSW8	SW10	SW12	SW12	SSW12	SSW13	WSW16	W22	WNW22	WNW20	NW20	WNW18	WNW21	WNW16	NNE16	N20	SE7	SSE7	SSW9	S4	S4	W7.4	W22	
29-Jul	SSW5	SSW6	SW7	SSW5	SSE6	SSW8	SW5	S3	WSW1	WSW2	SW3	SSW3	SSW4	WSW7	NE4	N6	NE10	ENE9	NE9	ENE9	NE9	NNE9	NNE8	NNE9	ENE0.9	NE10	
30-Jul	N10	NNE9	NNE9	NNE7	NNE5	N4	WNW2	S9	S12	S7	S12	S11	S13	S16	S19	S22	S24	S17	WSW9	W8	SW8	SW6	SSW8	SW5	S6.1	S24	
31-Jul	NW1	W7	W4	W8	WNW13	WNW16	WNW8	NW12	W9	W12	WNW13	WNW18	NW19	N19	N23	NNW19	N16	NNE19	NNE18	NNW11	NNW6	NW7	NW6	W5	NNW9.9	N23	

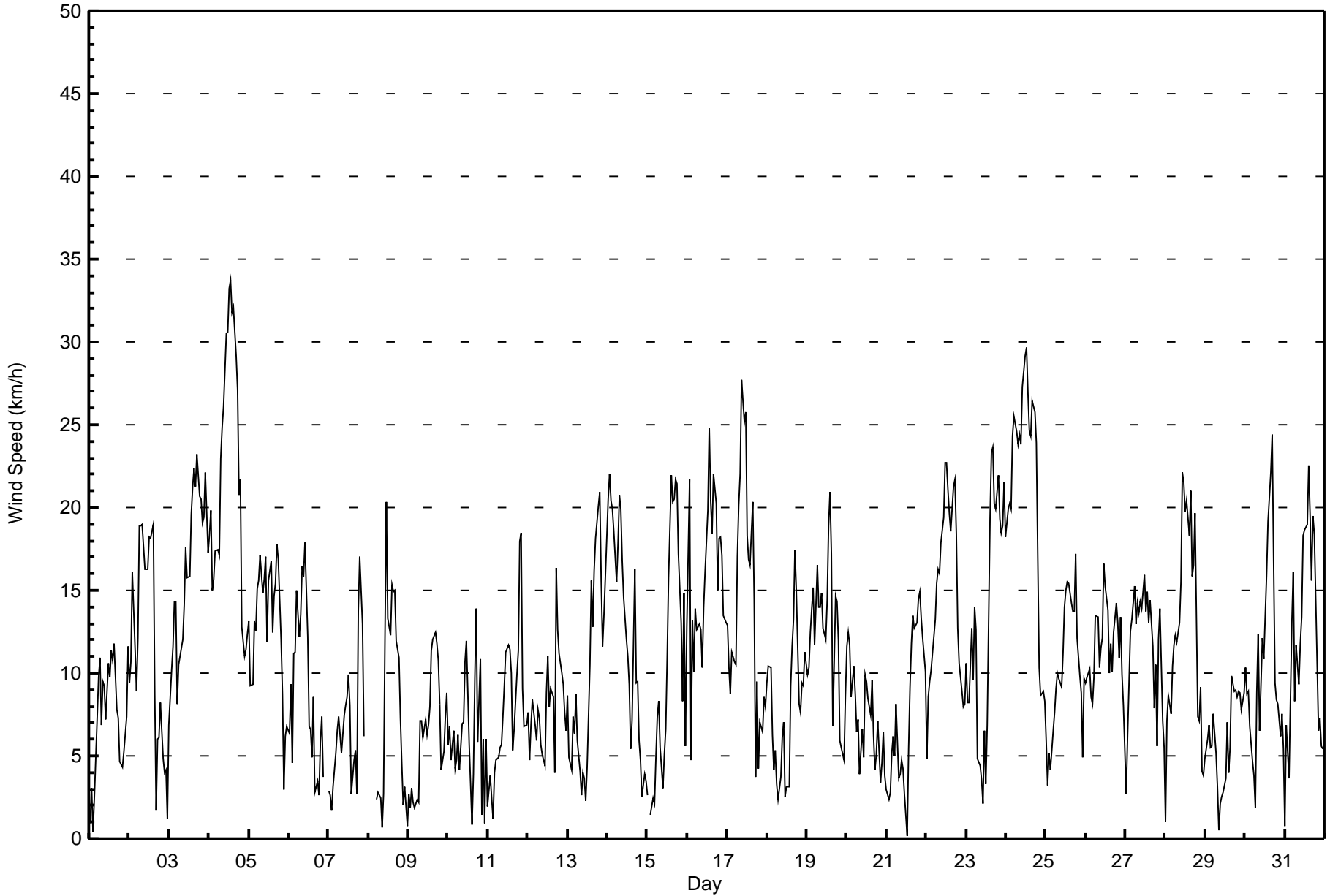
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 N20 NNE22 NNE20 NNE20 NNE24 NNE25 NNE25 NNE24 WSW25 N28 WSW31WSW31WSW33WSW34WSW32WSW32WSW29WSW27 N24 NNE22 NNE19 WSW19WSW22 NNE22
 Diurnal Average
 Diurnal Maximum

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
Fort Hills - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	153	20.84	20.84
6 - 11	263	35.83	56.68
12 - 19	230	31.34	88.01
20 - 28	79	10.76	98.77
29 - 38	9	1.23	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 734

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - July 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	18	6	8	1	4	6	3	11	23	16	10	5	8	13	7	14	153
6 - 11	14	16	7	3	3	3	12	29	40	40	31	11	16	15	9	14	263
12 - 19	14	22	3	0	0	1	0	7	25	55	44	22	7	14	10	6	230
20 - 28	14	25	0	0	0	0	0	4	3	1	11	13	3	3	1	1	79
29 - 38	0	2	0	0	0	0	0	0	0	0	0	7	0	0	0	0	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	60	71	18	4	7	10	15	51	91	112	96	58	34	45	27	35	734

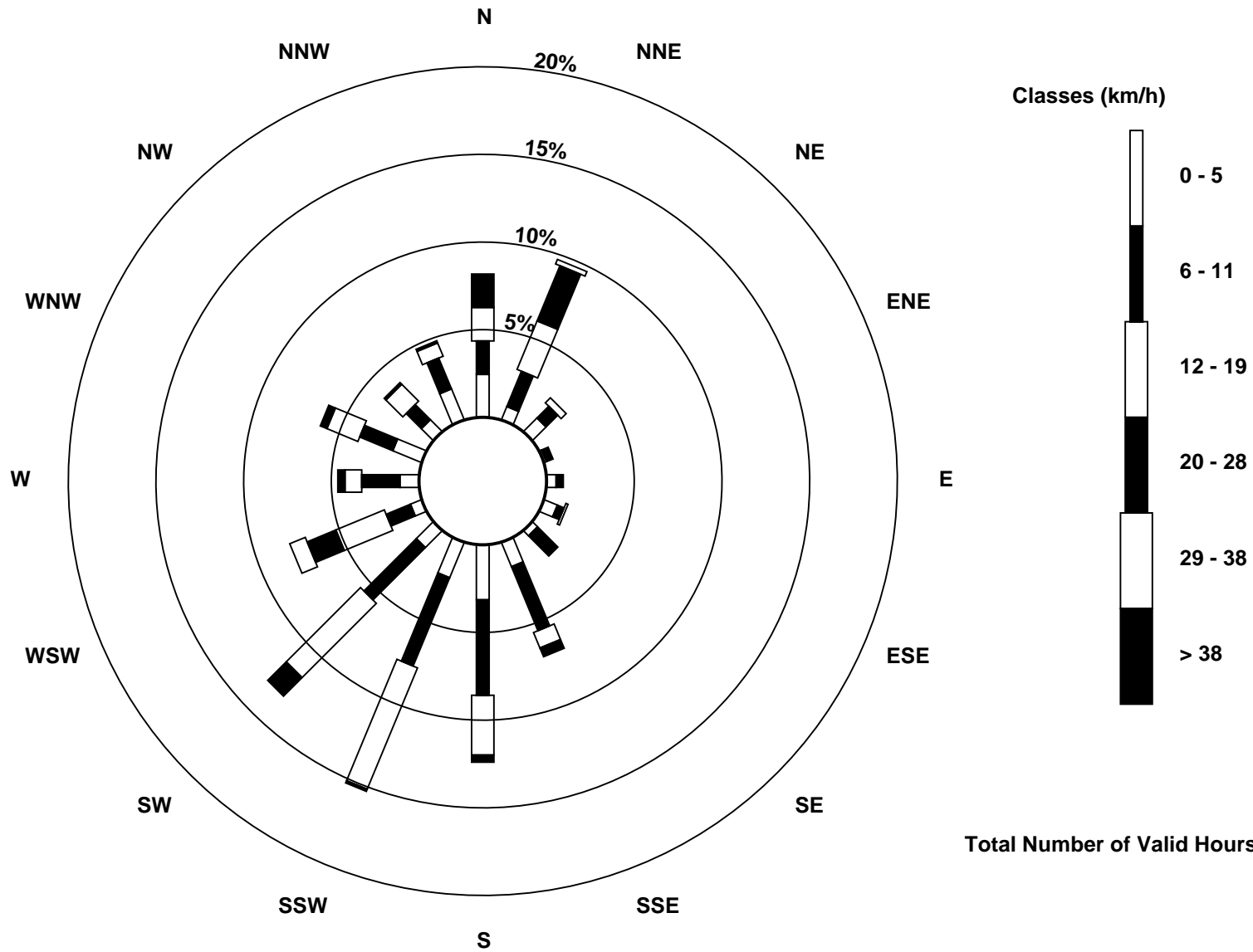
Total Number of Valid Hours: 734

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 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 - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 16 km/h on Jul 16 01:00	Hours in Service: 744 Hours of Data: 734 Hours of Missing Data: 10 Hours of Calibration: 0 Percent Operational Time: 98.7
Minimum Value: 1 km/h on Jul 25 03:00	
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 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-Jul	1	1	1	2	1	1	2	3	2	3	3	4	3	4	2	2	2	1	1	1	1	1	2	1	4
2-Jul	1	1	2	2	2	2	4	4	3	3	4	4	5	4	4	9	2	2	3	3	2	2	1	1	9
3-Jul	3	2	2	3	4	1	2	2	1	3	3	3	3	5	5	5	5	4	4	4	4	3	5	4	5
4-Jul	3	3	3	3	3	2	3	4	4	4	6	6	6	6	7	6	6	6	5	5	4	2	2	2	7
5-Jul	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	3	4	5	5	3	2	2	1	1	5
6-Jul	2	2	2	3	3	2	2	2	4	4	5	4	4	3	4	3	3	3	2	3	2	2	AF	AF	5
7-Jul	2	2	2	2	1	1	1	2	2	4	4	4	4	5	4	3	4	3	5	3	3	3	AF	AF	5
8-Jul	AF	AF	AF	AF	AF	2	2	2	2	3	6	3	3	3	3	3	3	2	2	1	3	2	2	2	6
9-Jul	2	2	2	1	2	2	2	2	2	2	3	3	5	4	4	4	3	3	3	1	1	2	2	2	5
10-Jul	2	2	2	4	2	2	1	2	2	1	3	2	2	3	2	2	6	6	4	4	2	3	2	2	6
11-Jul	2	1	1	2	2	2	2	1	2	1	2	2	3	2	3	2	2	3	2	7	4	2	3	2	7
12-Jul	2	1	1	1	1	1	1	1	2	2	2	3	3	3	2	2	6	3	2	2	2	1	1	1	6
13-Jul	1	1	2	1	1	1	1	1	1	2	2	2	2	7	4	3	4	4	4	4	3	2	2	2	7
14-Jul	4	4	4	4	4	3	4	4	4	4	3	3	4	3	3	3	5	4	2	2	1	1	1	1	5
15-Jul	1	AF	1	1	2	2	2	1	3	2	1	2	4	6	4	4	3	3	3	3	6	2	2	4	6
16-Jul	16	7	4	8	2	2	2	2	2	2	3	3	4	4	3	3	4	4	3	4	3	2	2	2	16
17-Jul	2	2	2	3	2	3	4	4	4	6	6	6	4	4	4	5	7	1	5	1	1	1	1	2	7
18-Jul	2	2	2	2	1	1	2	2	2	4	3	3	2	3	6	4	5	3	5	2	3	1	1	2	6
19-Jul	2	1	2	2	2	2	3	2	3	3	5	3	4	10	5	6	3	4	3	3	2	1	2	3	10
20-Jul	2	2	2	2	2	2	1	1	2	1	2	3	3	4	3	4	4	3	2	1	2	2	2	2	4
21-Jul	1	3	1	1	2	1	1	2	2	3	4	3	2	3	3	4	2	2	2	2	2	2	1	2	4
22-Jul	2	1	1	1	1	2	3	3	2	3	4	4	5	5	5	4	5	4	4	2	1	1	2	2	5
23-Jul	1	1	2	1	2	3	2	3	2	2	2	4	3	6	4	4	4	4	4	4	3	3	4	4	6
24-Jul	4	4	4	5	5	5	4	4	5	4	5	6	6	6	5	5	5	5	5	4	2	2	1	2	6
25-Jul	1	2	1	1	1	1	1	1	2	2	3	3	4	4	4	4	4	4	2	2	1	2	1	2	4
26-Jul	2	1	1	1	1	1	3	2	2	3	3	4	4	4	5	5	5	5	3	2	1	2	2	1	5
27-Jul	1	2	2	1	1	2	2	3	3	3	2	3	3	3	3	3	2	2	3	4	5	4	4	3	5
28-Jul	2	2	1	2	2	2	2	2	2	4	5	5	6	5	5	5	5	6	9	3	2	1	2	1	9
29-Jul	2	1	2	1	1	1	2	1	1	2	1	3	5	6	2	2	3	3	2	2	2	1	1	2	6
30-Jul	2	2	1	1	1	1	2	2	3	2	3	3	2	3	4	4	4	4	2	2	2	1	1	2	4
31-Jul	2	1	1	3	2	5	3	4	3	4	4	5	5	5	6	7	5	4	4	4	1	1	1	1	7
	16	7	4	8	5	5	4	4	5	6	6	6	6	10	7	9	7	6	9	7	6	4	5	4	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Hills - July 2017

Direction of Maximum Speed: 241 deg on Jul 4 14:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 243.4 deg on Jul 4	Hours of Data: 734
Direction of Minimum Speed: 343 deg on Jul 21 13:00	Hours of Missing Data: 10
Direction of Minimum Daily Speed Average: 0.9 deg on Jul 29	Percent Operational Time: 98.7
Monthly Average Direction: 241.2 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-Jul	199	152	41	160	152	162	185	176	156	163	199	198	206	209	221	213	212	200	228	172	137	117	159	185	185.8
2-Jul	173	190	206	194	173	174	179	193	204	205	204	207	197	204	192	265	200	88	129	118	46	339	9	53	191.8
3-Jul	171	188	205	183	196	210	178	207	203	186	204	207	221	234	235	239	237	248	218	228	246	241	244	267	222.4
4-Jul	231	226	229	223	237	228	229	238	243	238	241	245	246	241	245	245	253	257	271	277	267	241	232	232	243.4
5-Jul	229	230	219	228	231	233	248	288	302	291	291	285	310	302	275	310	324	318	304	303	312	273	257	291	281.6
6-Jul	285	281	288	245	238	236	238	231	271	293	346	13	30	352	1	11	2	213	8	342	350	3	AF	AF	296.0
7-Jul	300	293	270	162	174	181	163	165	181	228	261	226	236	252	252	167	214	350	24	29	33	37	AF	AF	230.0
8-Jul	AF	AF	AF	AF	AF	9	319	287	70	112	211	224	229	197	210	232	215	228	220	217	210	146	123	9	218.0
9-Jul	47	358	282	315	87	256	208	187	225	217	171	152	154	141	154	156	179	209	217	195	178	114	145	142	175.7
10-Jul	226	141	210	157	191	215	206	210	289	292	245	233	227	215	54	55	92	108	347	255	22	47	353	325	218.5
11-Jul	171	300	352	155	191	25	304	293	297	286	267	271	275	268	269	277	254	218	226	206	234	208	174	165	247.1
12-Jul	177	181	168	178	175	165	175	146	146	181	207	213	207	229	270	296	191	195	195	180	176	180	174	172	189.9
13-Jul	196	194	192	159	183	198	195	164	228	154	137	221	190	6	353	358	7	12	14	12	12	5	3	9	8.6
14-Jul	10	13	14	16	13	12	21	19	24	14	14	3	357	9	97	49	340	51	24	1	336	330	299	297	12.6
15-Jul	284	AF	260	286	253	178	173	191	186	34	356	352	120	150	163	164	158	170	159	167	198	183	185	223	169.8
16-Jul	320	353	30	244	199	200	246	237	205	213	199	219	215	205	225	230	241	248	258	243	236	233	228	231	233.1
17-Jul	253	283	278	272	269	299	342	340	353	355	3	4	352	334	358	3	345	338	21	350	268	289	328	320	336.6
18-Jul	338	347	345	333	336	310	278	283	23	297	328	335	158	342	219	245	232	247	273	283	243	217	219	206	272.0
19-Jul	204	196	201	213	221	215	225	209	209	210	215	227	253	7	29	48	88	40	37	22	26	6	343	9	234.3
20-Jul	2	16	19	13	13	13	8	352	7	11	80	133	134	137	127	142	169	153	120	75	107	101	108	178	65.4
21-Jul	182	177	336	349	15	348	21	349	348	53	189	205	343	233	228	224	214	199	193	184	178	167	172	194	197.9
22-Jul	159	160	167	169	160	169	180	194	203	211	223	233	232	237	243	243	237	233	235	228	212	203	222	206	215.0
23-Jul	210	211	216	219	223	240	239	278	3	318	188	207	233	21	27	17	11	23	29	20	14	15	13	17	1.4
24-Jul	14	15	19	15	15	14	15	14	17	15	16	16	12	15	10	10	357	356	360	356	345	330	329	325	8.6
25-Jul	319	316	233	185	191	171	181	157	171	190	208	208	204	214	219	212	203	200	188	181	190	172	158		196.6
26-Jul	161	156	161	177	168	166	189	200	193	196	210	215	221	213	213	212	206	212	203	194	178	181	197	207	195.0
27-Jul	173	153	161	156	158	165	180	199	213	191	189	192	214	220	246	246	255	278	324	330	318	305	309	288	216.5
28-Jul	326	199	232	199	220	219	219	213	213	246	270	283	302	316	299	287	287	22	1	135	155	209	190	180	265.2
29-Jul	198	196	215	206	163	211	217	182	239	249	214	194	201	245	49	11	45	63	54	60	35	24	16	12	67.8
30-Jul	7	17	19	21	25	353	290	187	180	174	187	171	172	169	186	180	178	180	239	270	230	233	206	216	188.6
31-Jul	316	275	270	280	288	303	283	304	270	271	295	299	324	352	352	347	4	15	18	344	336	316	326	278	323.7

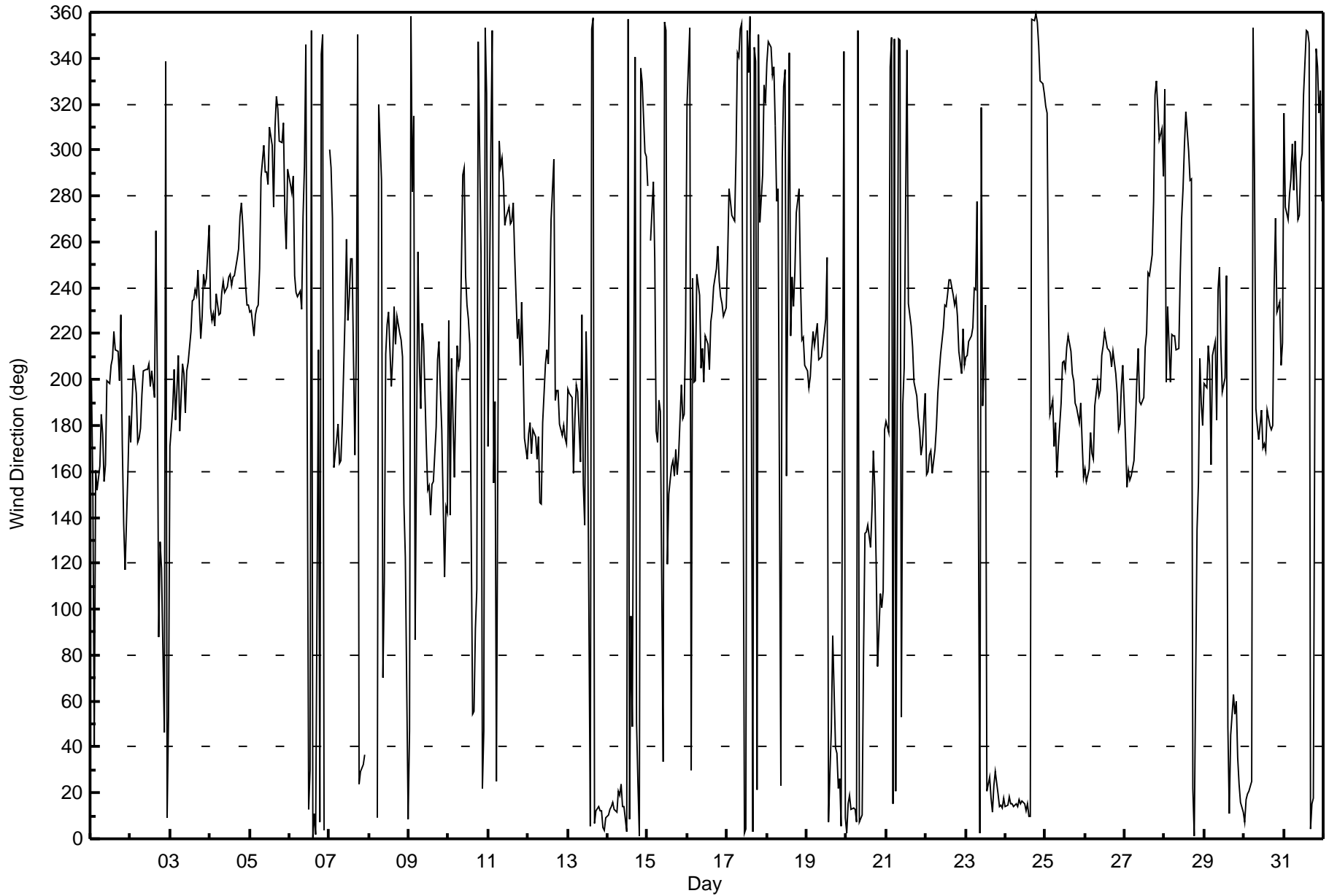
256.7 260.2 235.6 217.2 214.4 220.7 220.8 228.6 235.8 246.2 246.4 242.0 241.2 250.0 250.3 262.0 253.0 248.4 289.2 260.8 256.0 239.9 231.0 247.3
 Diurnal Average

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
Fort Hills - July 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Hills - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 105 deg on Jul 10 15:00	Hours of Data: 734
Minimum Value: 5 deg on Jul 27 04:00	Hours of Missing Data: 10
Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 12 Median = 17 Q ₃ = 30 P ₉₀ = 56 P ₉₉ = 91	Hours of Calibration: 0
	Percent Operational Time: 98.7

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-Jul	92	29	85	72	19	12	23	47	21	22	40	25	23	24	13	8	11	22	19	17	32	16	24	8	92
2-Jul	11	16	6	12	8	13	10	18	13	17	20	23	19	21	15	80	91	25	47	28	37	44	17	79	91
3-Jul	21	21	10	9	14	13	17	22	17	11	14	11	23	19	16	15	13	12	9	12	10	8	19	15	23
4-Jul	12	8	8	10	9	9	10	10	11	12	12	14	14	14	13	11	13	13	16	13	20	8	8	9	20
5-Jul	7	10	10	9	14	8	16	17	15	16	17	26	17	15	23	21	15	16	13	13	11	36	16	19	36
6-Jul	11	14	50	14	21	8	15	12	16	26	20	24	37	34	85	22	51	29	69	31	10	17	AF	AF	85
7-Jul	19	43	53	40	23	14	18	14	26	41	27	40	33	57	90	55	66	73	19	10	10	15	AF	AF	90
8-Jul	AF	AF	AF	AF	AF	38	43	46	82	65	34	10	14	22	19	21	15	16	13	9	53	59	54	92	92
9-Jul	55	80	32	63	75	30	33	40	17	29	25	49	76	38	31	28	26	21	11	13	18	23	19	15	80
10-Jul	33	31	42	24	58	43	23	41	40	19	32	10	17	38	105	67	32	31	63	17	94	40	100	23	105
11-Jul	70	26	49	90	65	39	17	15	19	19	20	17	19	17	26	55	36	20	9	10	13	22	27	16	90
12-Jul	13	32	12	15	16	20	13	17	28	22	41	26	18	40	19	19	73	18	11	9	7	8	16	11	73
13-Jul	10	25	55	9	28	16	17	36	39	50	67	77	40	69	20	18	19	15	12	12	10	12	13	12	77
14-Jul	11	12	10	10	11	13	14	14	15	17	17	22	23	33	63	43	34	43	14	27	12	22	17	17	63
15-Jul	32	AF	74	43	51	39	27	23	34	65	25	20	51	29	12	12	12	10	8	6	22	20	6	57	74
16-Jul	56	20	75	50	27	14	20	11	13	12	10	18	11	10	9	10	13	12	22	16	8	8	8	8	75
17-Jul	14	11	22	12	12	31	12	13	15	17	18	17	19	16	23	19	34	36	32	38	25	33	10	12	38
18-Jul	13	12	13	20	26	13	42	66	67	64	52	89	80	88	64	30	20	18	15	21	11	9	8	10	89
19-Jul	9	9	9	8	7	9	9	12	11	10	19	20	23	25	16	19	42	20	16	13	12	13	35	11	42
20-Jul	13	9	9	9	12	13	14	16	33	17	54	24	29	38	45	34	65	71	34	12	55	33	31	69	71
21-Jul	36	74	69	16	12	36	11	43	40	49	71	82	103	57	38	21	12	13	12	8	7	6	8	12	103
22-Jul	24	6	8	9	7	8	9	14	11	10	13	13	16	20	19	14	16	10	10	8	6	8	7	11	24
23-Jul	8	8	10	6	8	10	13	68	59	69	87	72	92	63	16	15	15	13	11	12	12	11	11	11	92
24-Jul	13	11	11	13	11	11	12	11	11	13	13	15	14	15	17	16	18	17	17	15	10	10	8	8	18
25-Jul	17	38	15	18	16	15	11	11	21	23	17	16	16	19	18	21	20	16	8	8	5	11	17	5	38
26-Jul	7	5	7	11	10	9	11	10	13	14	17	13	18	19	46	27	46	17	13	9	5	6	19	9	46
27-Jul	33	30	8	5	5	8	14	12	11	17	13	14	21	13	17	15	13	29	24	69	43	18	41	72	72
28-Jul	88	42	8	15	13	8	8	9	11	29	17	17	17	18	21	16	30	15	23	56	25	10	39	32	88
29-Jul	28	14	11	23	23	11	20	28	90	56	54	65	88	68	69	24	24	25	12	14	13	7	8	10	90
30-Jul	12	9	9	9	18	30	46	18	12	33	15	18	14	16	14	13	15	10	40	13	8	21	11	48	48
31-Jul	96	22	46	21	12	12	23	25	28	24	18	15	22	32	19	18	20	14	15	12	14	12	18	15	96
	96	80	85	90	75	43	46	68	90	69	87	89	103	88	105	80	91	73	69	69	94	59	100	92	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

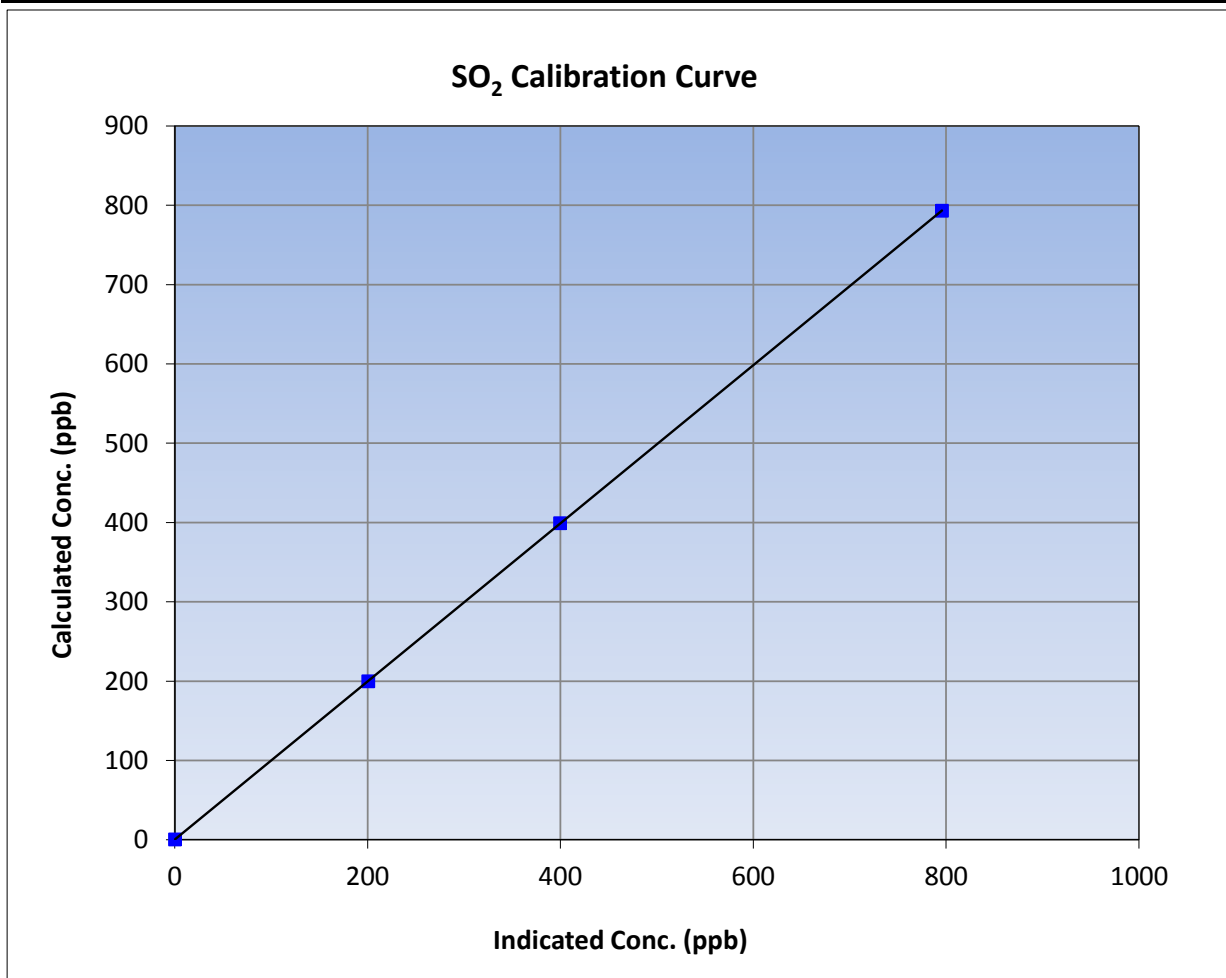
Version-03-2017

Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:22	End Time (MST)	14:15
Analyzer make	Thermo 43i	Analyzer serial #	1160290012

Calibration Data

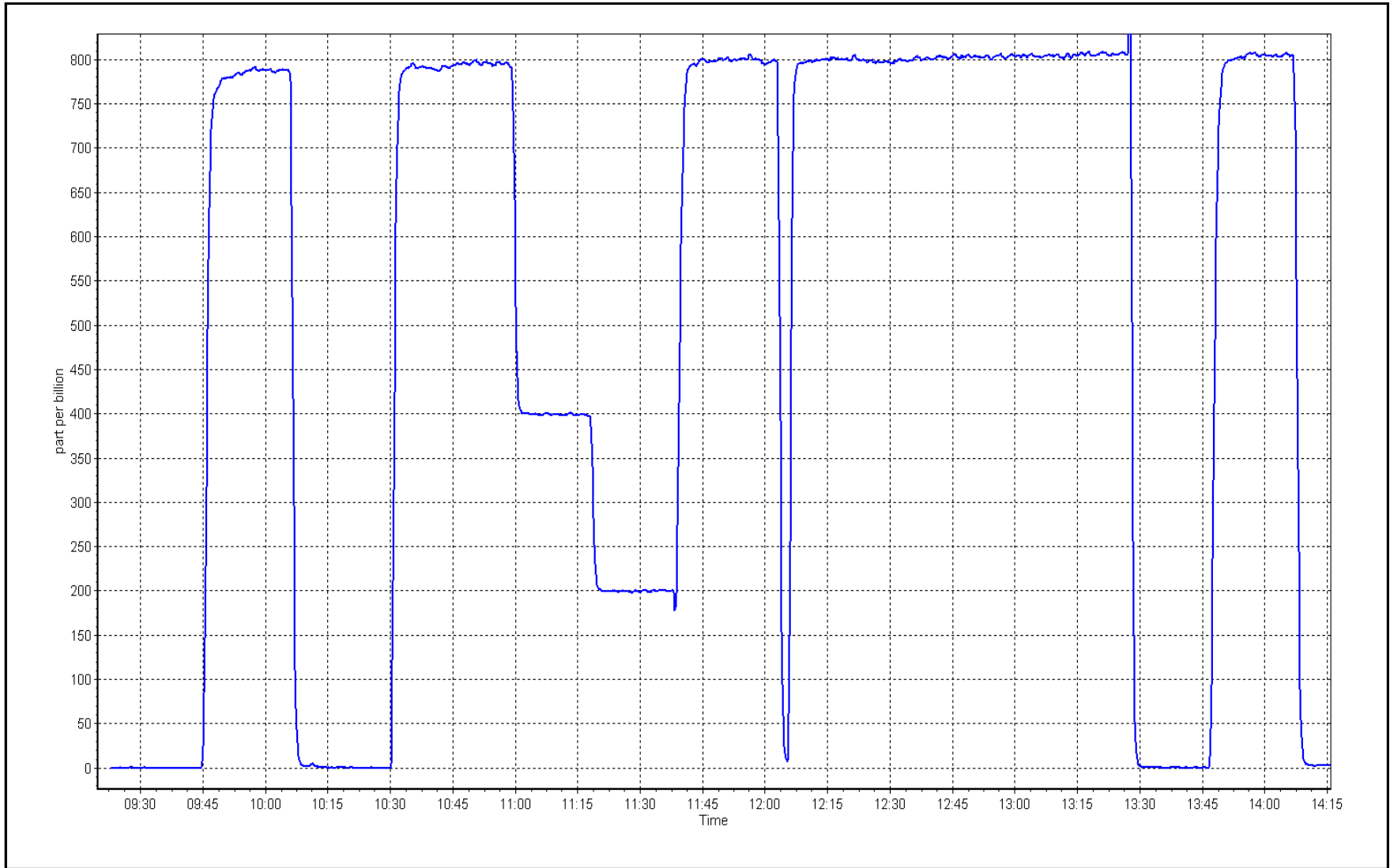
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999998	≥0.995
792.7	795.3	0.9968			
398.8	399.2	0.9991	Slope	0.996871	0.90 - 1.10
199.6	200.2	0.9970			
			Intercept	0.205035	+/-30



SO2 Calibration Plot

Date: July 11, 2017

Location: Fort Hills



Replaced inlet filter after asfounds. Adjusted the span.



Wood Buffalo Environmental Association

TRS Calibration Summary

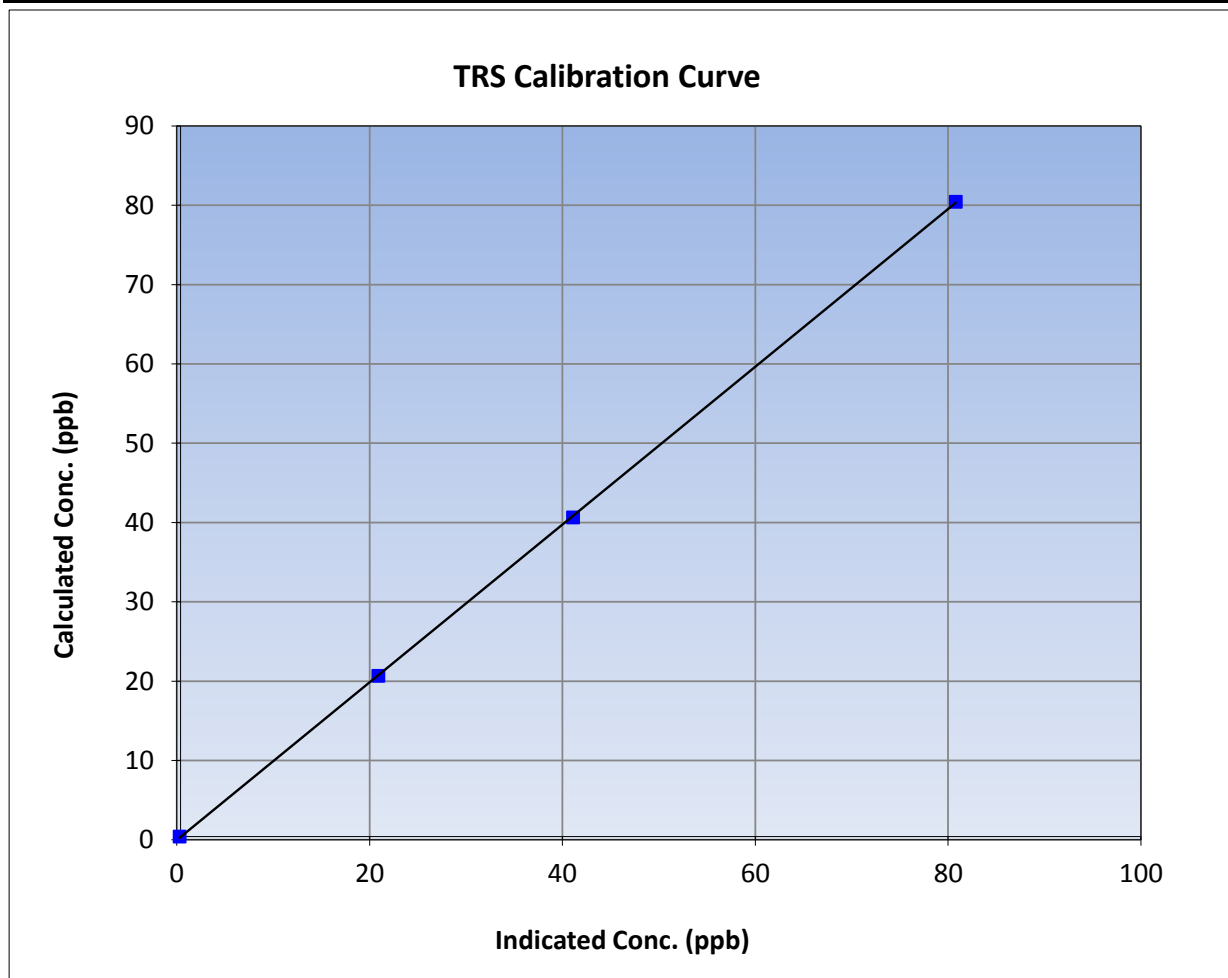
Version-03-2017

Station Information

Calibration Date	July 10, 2017	Previous Calibration	June 5, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	10:00	End Time (MST)	13:13
Analyzer make	Thermo 43iTLE	Analyzer serial #	1150840012

Calibration Data

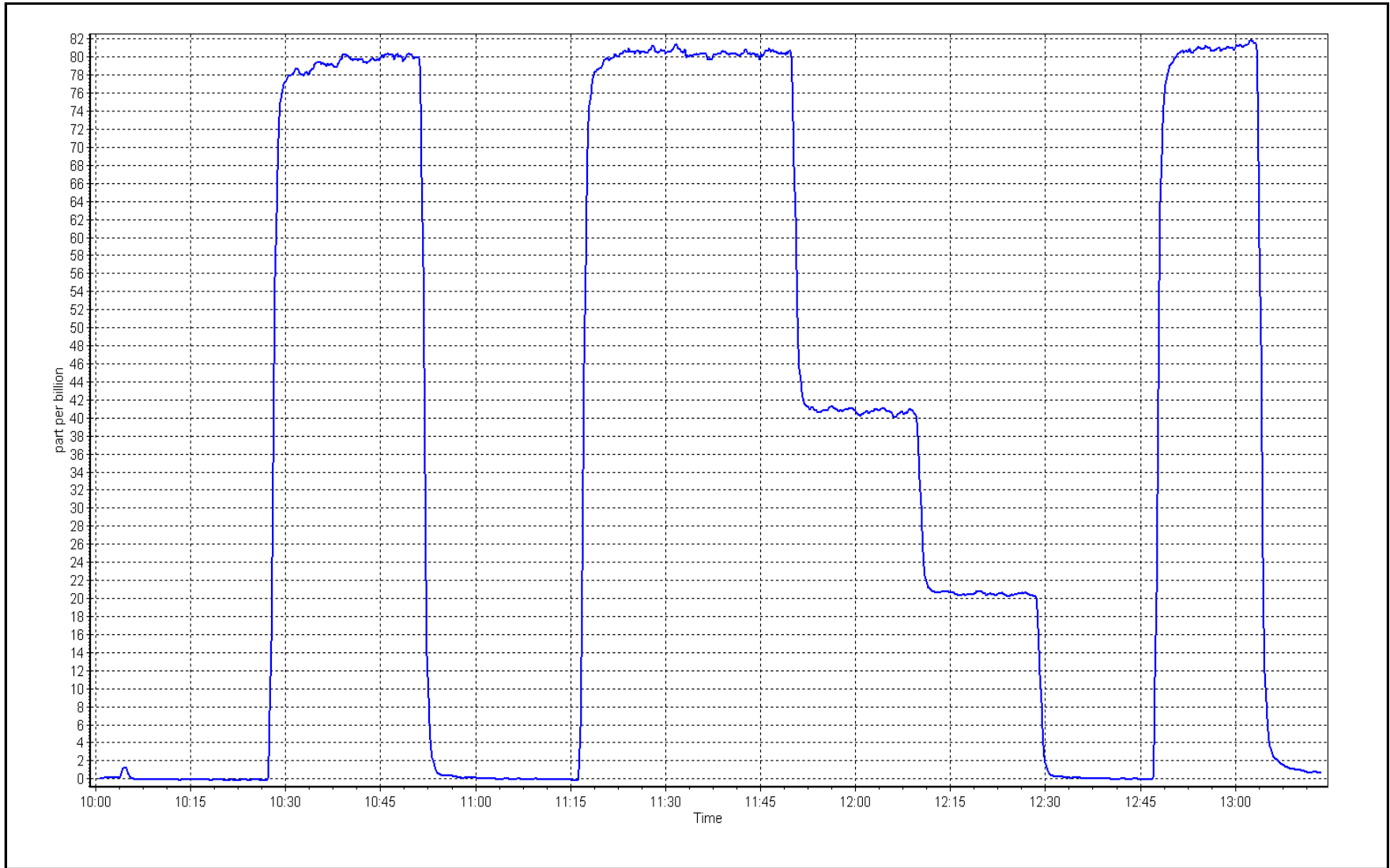
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.1	----	Correlation Coefficient	0.999977	≥0.995
80.0	80.4	0.9956			
40.2	40.7	0.9886	Slope	0.994779	0.90 - 1.10
20.3	20.5	0.9887			
			Intercept	-0.052055	+/-3



TRS Calibration Plot

Date: July 10, 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:	July 11, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	9:22	End time (MST):	14:10
Reason:	Routine		

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	2.400	Air pressure	37.8
Analyzer Coefficient	5.068	Flame temperature	159.3

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	0.13	----
as found span	4935	80.5	17.03	17.34	0.982
calibrator zero	5011	0.0	0.00	0.02	----
high point	4936	80.5	17.03	17.19	0.991
second point	4977	40.5	8.57	8.64	0.991
third point	4997	20.4	4.31	4.34	0.995
as left zero	5009	0.0	0.00	-0.08	----
as left span	4928	80.5	17.06	17.40	0.980
Average Correction Factor					0.992
Corrected As found	17.22	Previous response	17.01	*% change	-1.2%

* = > +/-5% change initiates investigation

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

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

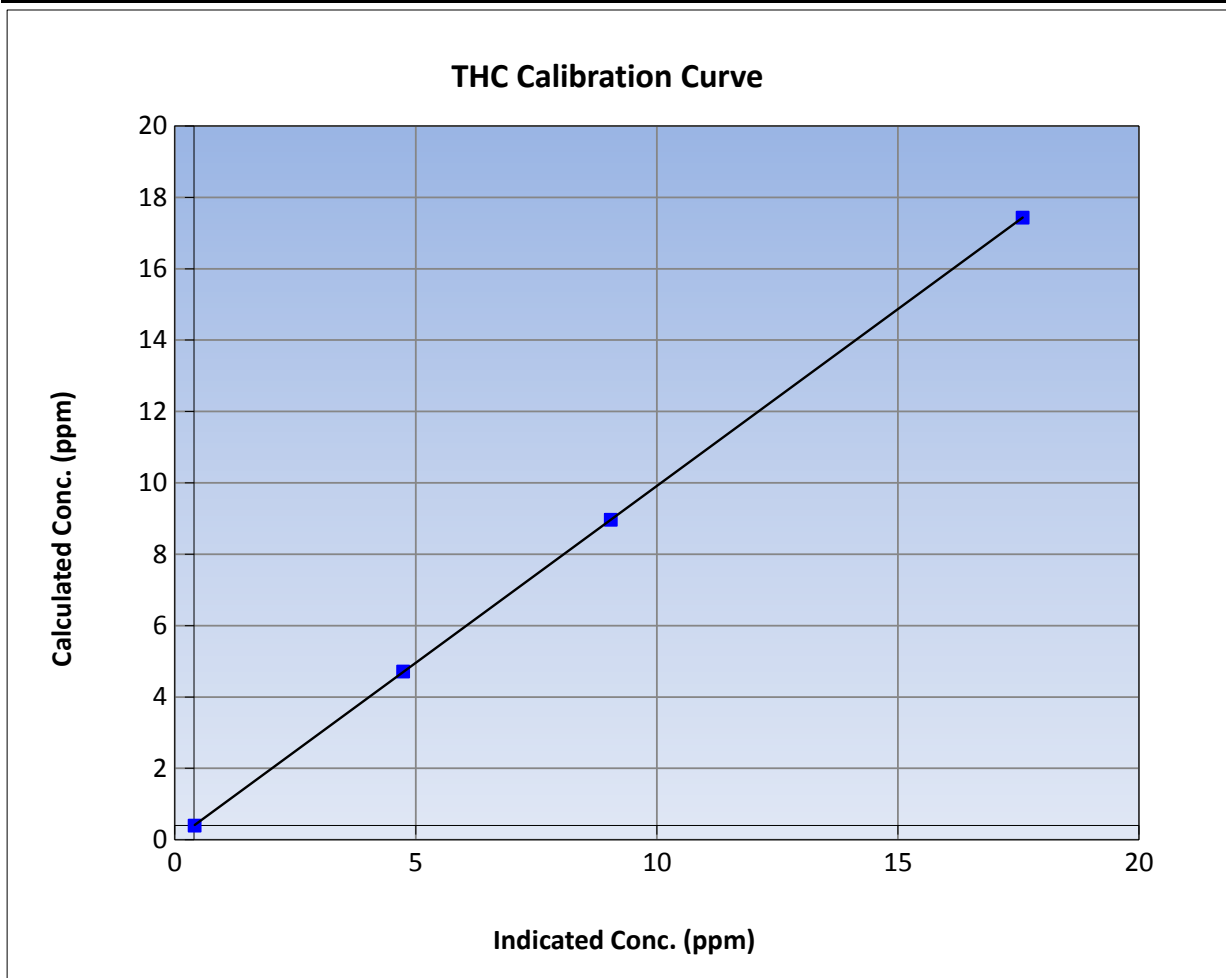
Version-03-2017

Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:22	End Time (MST)	14:10
Analyzer make	Thermo 51i-LT	Analyzer serial #	1218153580

Calibration Data

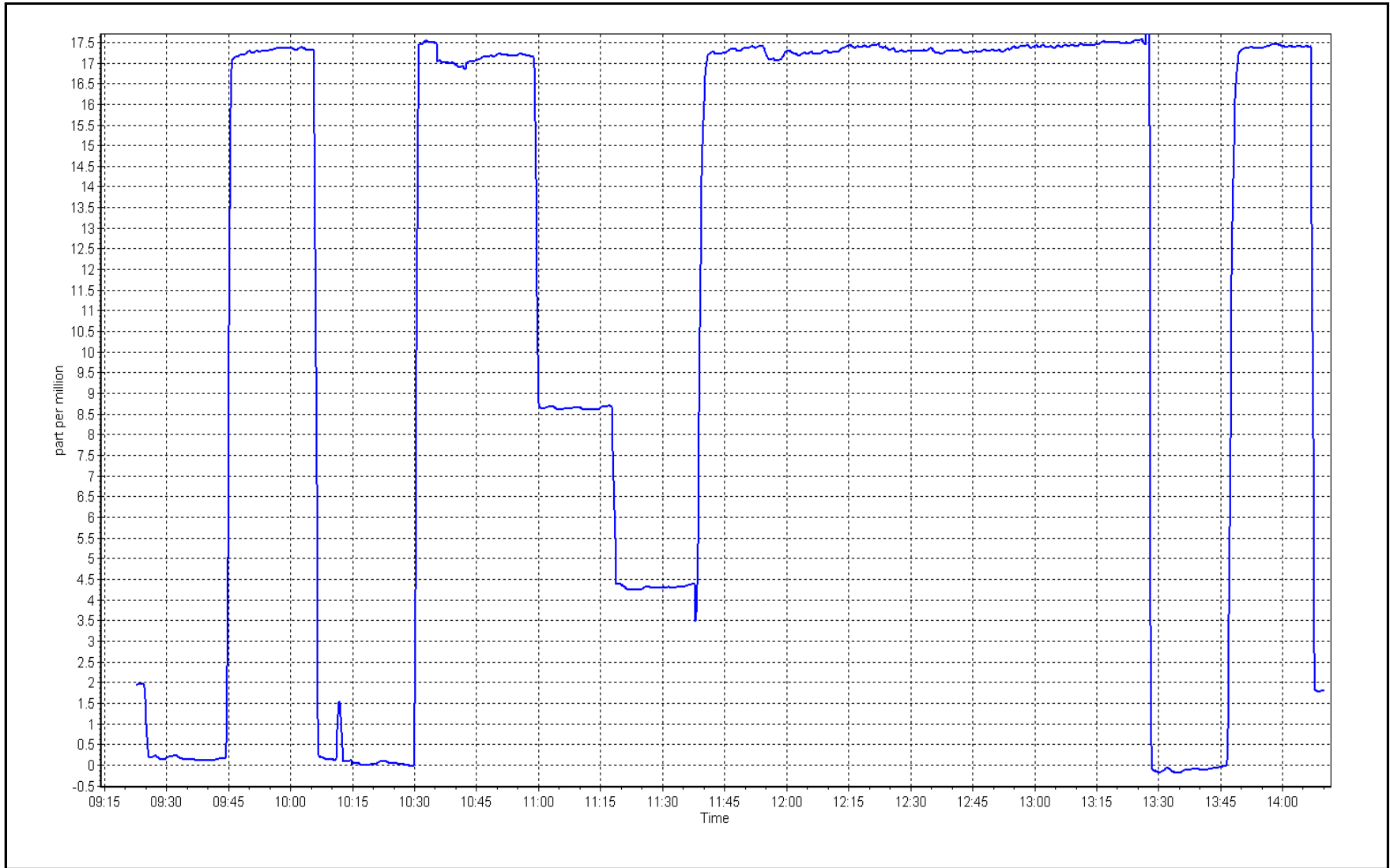
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999996	≥0.995
17.0	17.2	0.9907			
8.6	8.6	0.9910	Slope	0.991056	0.90 - 1.10
4.3	4.3	0.9954			
			Intercept	-0.000522	+/-1.5



THC Calibration Plot

Date: July 11, 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:	July 11, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	9:22	End time (MST):	14:11
Reason:	Routine		

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	1.071	1.021	NOX Range (ppb)	0 - 1000 ppb
NOX coefficient	0.999	1.000	PMT Temperature	-3.1 -2.8
NO2 coefficient	1.000	1.000	Reaction cell Press	168.1 166.0
NO bkgrnd	1.7	1.6	Sample Flow	0.772 0.766
NOX bkgrnd	1.8	1.7	PMT Voltage	-802.9 -802.9

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.996537	0.997803
NO _x Cal Offset	-1.185475	-1.738547
NO Cal Slope	0.995660	0.997986
NO Cal Offset	-1.045303	-1.579622
NO ₂ Cal Slope	1.019384	0.999467
NO ₂ Cal Offset	-1.439422	-1.226430



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	-0.2	-0.2	0.0	----	----
as found span	4937	80.5	813.6	813.6	0.0	848.8	848.7	0.1	0.9586	0.9587
calibrator zero	5008	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	----	----
high point	4937	80.5	813.6	813.6	0.0	815.6	815.3	0.4	0.9976	0.9980
second point	4976	40.5	406.1	406.1	0.0	411.5	411.4	0.2	0.9870	0.9872
third point	4997	20.4	203.7	203.7	0.0	206.7	206.2	0.5	0.9856	0.9879
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	418.9	393.9	836.5	419.4	417.1	0.9717	0.9988
Average Correction Factor									0.9900	0.9910

Corrected As found	NO _x = 849.0 ppb	NO = 848.9 ppb		*Percent Change	NO _x = -3.7%
Previous Response	NO _x = 817.7 ppb	NO = 818.2 ppb		*Percent Change	NO = -3.6%
<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	840.7	837.7	3.0	0.9678	0.9713	----	----
1st NO2 (400 ppb O3)	418.9	418.8	838.6	418.9	419.7	0.9702	----	0.9979	100.2%
2nd NO2 (200 ppb O3)	628.5	209.2	839.4	628.5	210.9	0.9693	----	0.9919	100.8%
3rd NO2 (100 ppb O3)	731.1	106.6	840.3	731.1	109.3	0.9683	----	0.9753	102.5%
2nd NO ref point	----	0.0	840.7	837.7	3.0	0.9678	0.9713	----	----
Average Correction Factor						0.9689	0.9713	0.9884	101.2%

Notes: Changed inlet filter after asfound. Adjusted the span. Hit Standby on the calibrator during first No ref point. Used second NO ref point due to drift

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

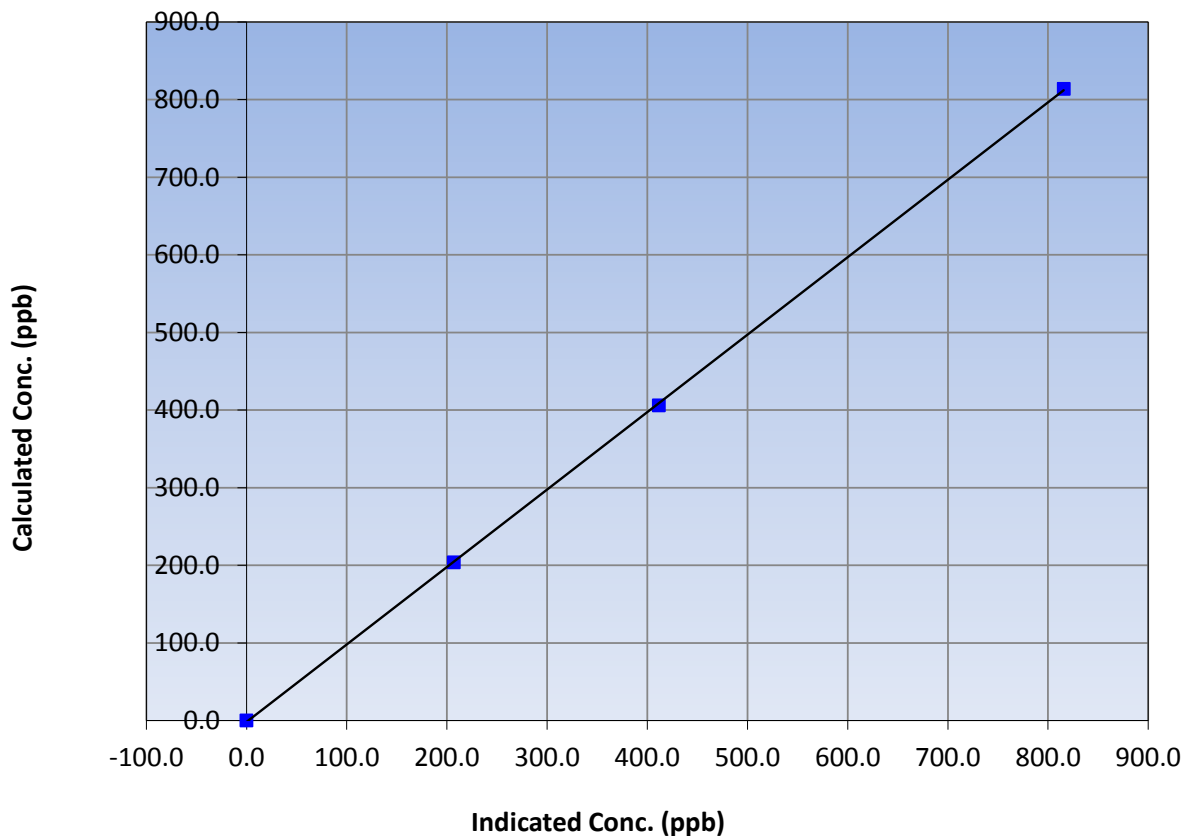
Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:11
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	≥0.995	
813.6	815.6	0.9976			
406.1	411.5	0.9870			
203.7	206.7	0.9856			
			Slope	0.997803	0.90 - 1.10
			Intercept	-1.738547	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

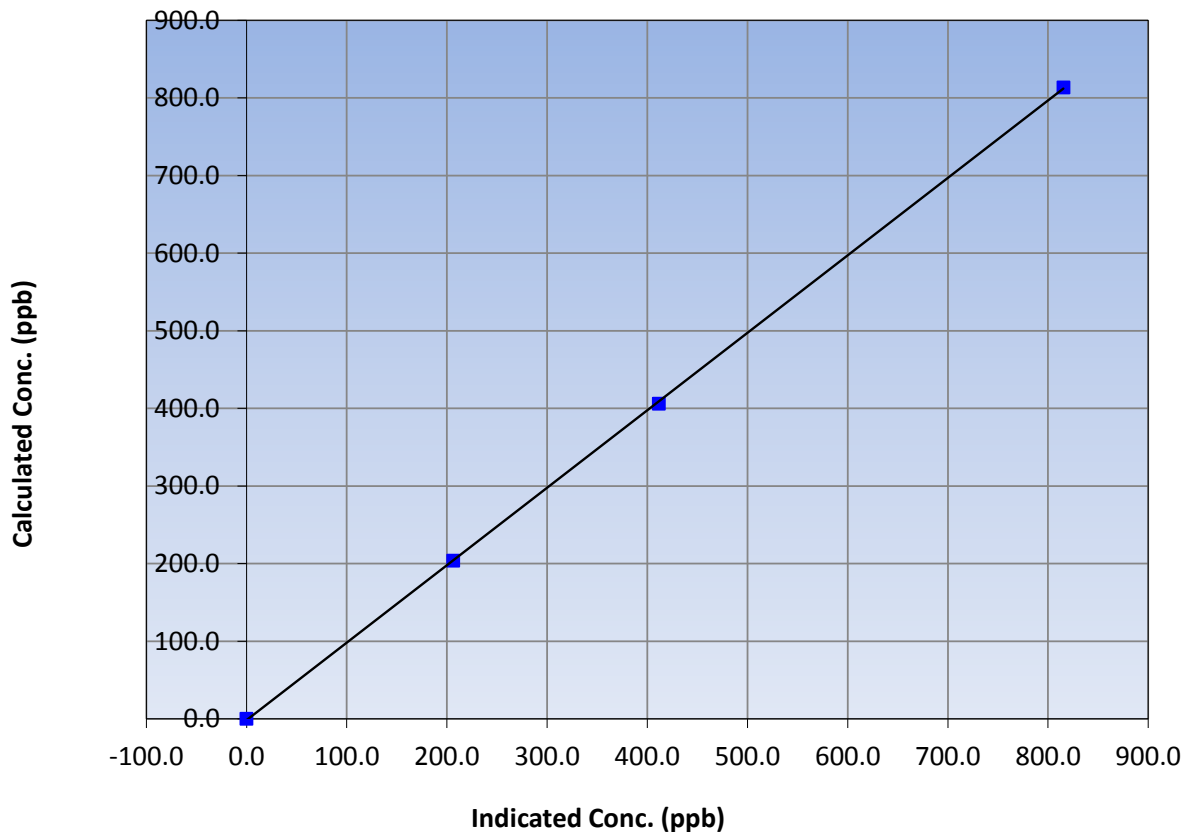
Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:11
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	≥0.995	
813.6	815.3	0.9980			
406.1	411.4	0.9872			
203.7	206.2	0.9879			
			Slope	0.997986	0.90 - 1.10
			Intercept	-1.579622	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

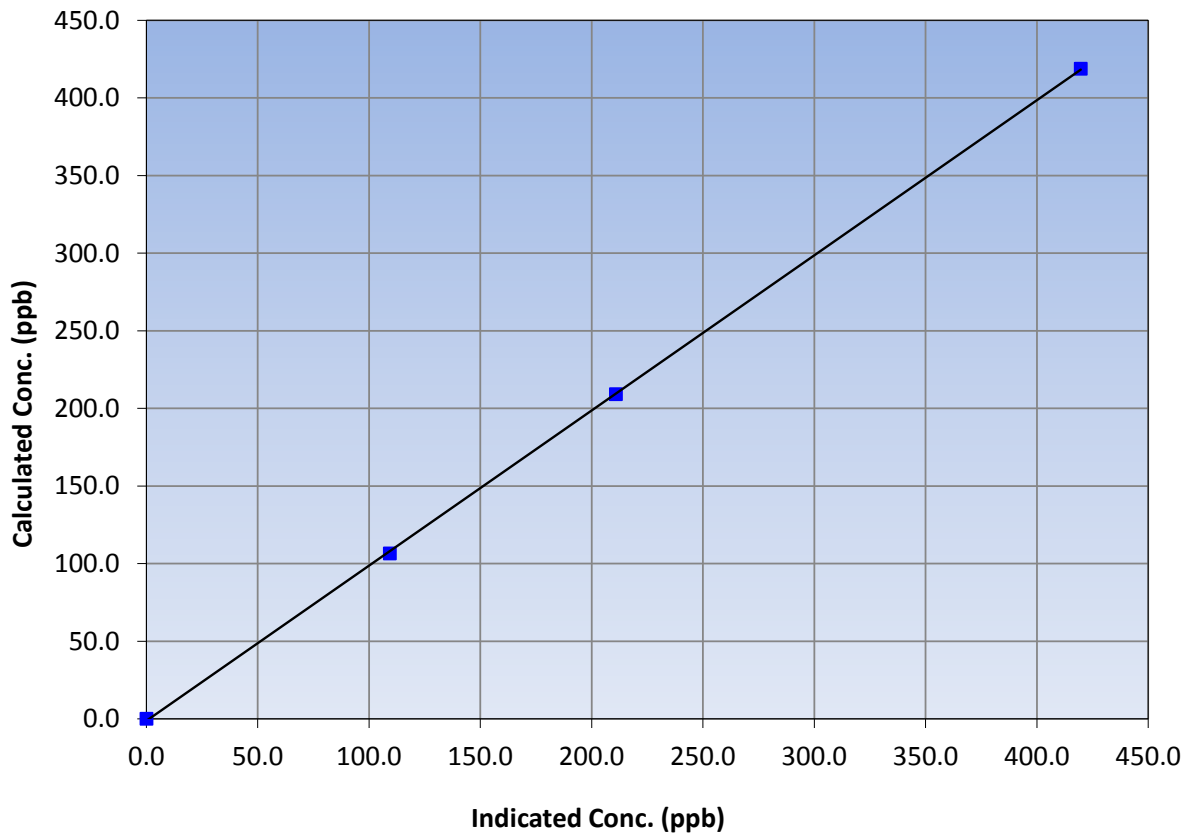
Station Information

Calibration Date	July 11, 2017	Previous Calibration	June 6, 2017
Station Name	Fort Hills	Station Number	AMS 23
Start Time (MST)	9:13	End Time (MST)	14:11
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	
418.8	419.7	0.9979			
209.2	210.9	0.9919			
106.6	109.3	0.9753			
			Slope	0.999467	0.90 - 1.10
			Intercept	-1.226430	+/-20

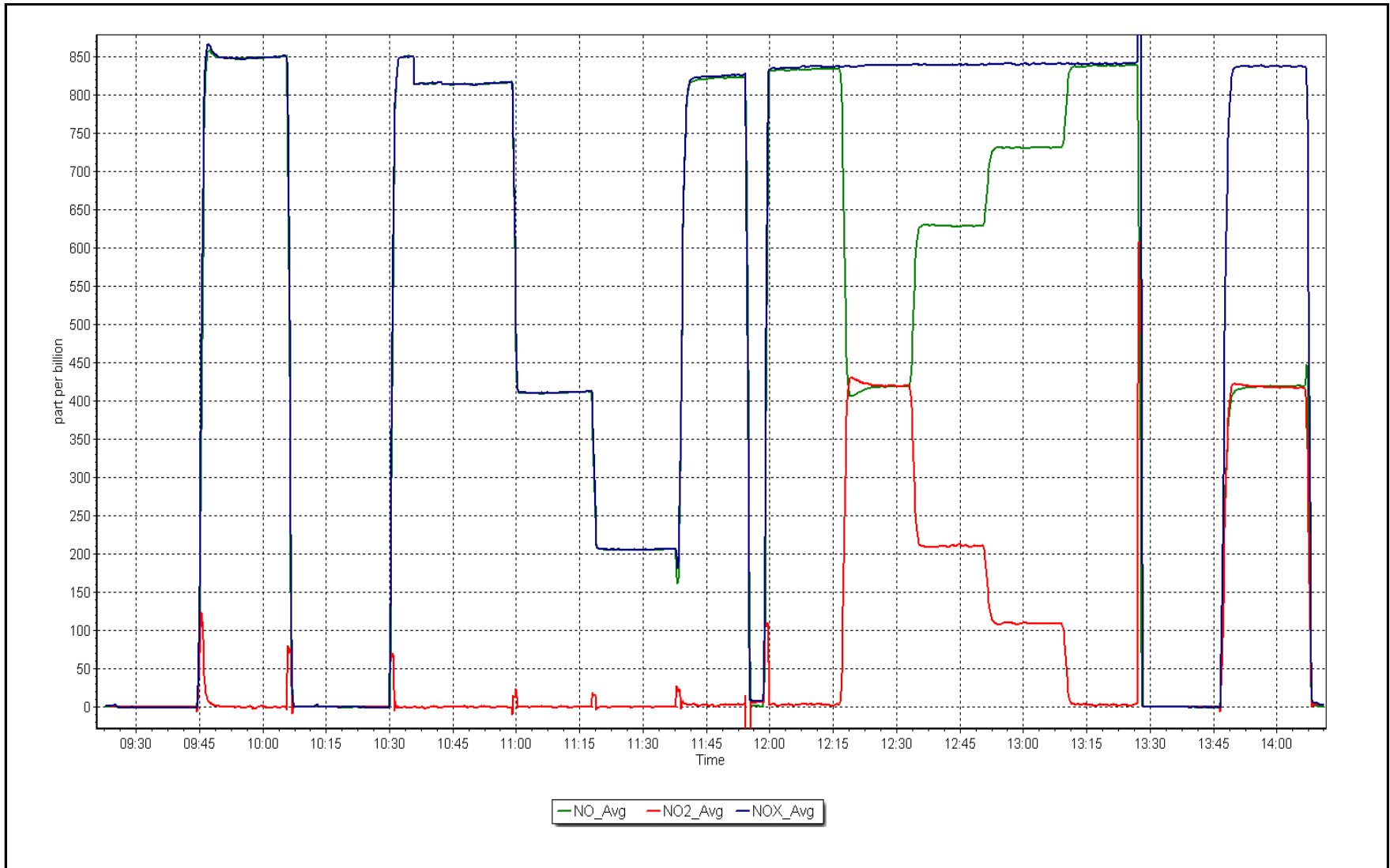
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 11, 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:	July 10, 2017	Last Cal Date:	June 6, 2017
Start time (MST):	10:00	End time (MST):	12:24
Sharp Model:	5030	S/N:	E-802
Particulate Fraction:	PM2.5	C14 Source S/N:	4153
Flow Meter Make/Model:	DeltaCAL	S/N:	1451
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)	22	22.3	22	<input type="checkbox"/>	+/- 2 °C
P3 (hPa)	975	973.9	975	<input type="checkbox"/>	+/- 13 hPa
flow (LPH)	1000	1068	1000	<input checked="" type="checkbox"/>	+/- 50 LPH
Nephelometer zero	17.1	-----	-0.1	<input checked="" type="checkbox"/>	+/- 0.5 ug/m3
Instrument Clock:	Verified <input type="checkbox"/>				
Cyclone cleaning :	PM10 Cyclone <input type="checkbox"/>		PM2.5 Cyclone <input type="checkbox"/>		
Date Filter Tape Installed:					

Quarterly Calibration Test

Leak Test:	Date of check:	<u>July 10, 2017</u>	Last Cal Date:	<u>May 5, 2017</u>
	Flow w/o adaptor:	<u>17.8</u>	Flow w/ adaptor:	<u>17.66</u>

(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: Completed leak check. Adjusted the the flow. Nephelometer check was high, checked inside the nephelometer and there was nothing in there. Completed leak check again after nephelometer chamber was open. Flow w/o adaptor 16.69, Flow w/adaptor 16.49. Checked nephelometer again and it was reading 17.1. Adjusted the nephelometer

Calibration by: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 25
WASKŌW OHCI PIMÂTISIWIN
JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OCHI PIMATISIWIN (AMS 25)
 JULY 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	602	28	36	98.75	19	0	4	0
H2S(ppb) Average	592	29	43	97.8	2	0	1	0
Temperature 2 m (C) Average	630	0	4	99.37	17	-	12	-
Relative Humidity (%) Average	630	0	4	99.37	0	-	0	-
Wind Speed 10 m (km/h) Average	630	0	4	99.37	31.8	-	24.2	-
Wind Direction 10 m (deg) Average	630	0	4	99.37	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)
 JULY 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	602	0.6	2	-	0	0	0	0	0	1	19
H2S (ppb) Average	592	0.4	0	-	0	0	0	0	0	1	2
Wind Speed 10 m (km/h) Average	630	5.3	3	-	0	2	3	5	7	10	17
Wind Direction 10 m (deg) Average	630	-	-	-	-	-	-	-	-	-	-
Temperature 2 m (C) Average	630	19.5	5.3	-	6.2	12.9	15.3	19.2	23.5	26.9	31.8
Relative Humidity (%) Average	630	62.4	20	-	0	36	46	61	79	90	98

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL METEOROLOGICAL PARAMETERS	21 Jul 2017 23:00	22 Jul 2017 02:00	4	Station power failure
SO2, H2S	21 Jul 2017 20:00	22 Jul 2017 03:00	8	Station power failure
H2S	14 Jul 2017 11:00	14 Jul 2017 16:00	6	Maintenance - analyzer recalibration



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	638
Maximum Value: 19 ppb on Jul 9 11:00	Maximum Daily Average: 3.6 ppb on Jul 21		Hours of Data:	602
Minimum Value: 0 ppb on Jul 6 05:00	Minimum Daily Average: 0.0 ppb on Jul 7		Hours of Missing Data:	36
Maximum Diurnal Average: 2.0 ppb at hour 11	Minimum Diurnal Average: 0.1 ppb at hour 5		Hours of Calibration:	28
Monthly Average: 0.6 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 11		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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	0	0	0	0	0	0	0	0	0	0	0	--	0
6-Jul	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
7-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	4	1	0	0	0	5	1	1	0	0	0	0	0	0	0.6	5
9-Jul	0	0	0	Z	0	0	0	1	3	7	19	2	1	1	1	2	2	1	2	2	2	2	1	0	2.2	19
10-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0.4	2
11-Jul	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-Jul	Z	0	0	0	0	0	0	0	1	5	6	12	2	4	1	6	11	0	4	1	0	0	0	0	2.4	12
13-Jul	1	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
14-Jul	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-Jul	0	0	0	Z	0	0	0	1	8	9	3	2	1	4	1	3	4	2	1	1	1	3	3	2	2.1	9
16-Jul	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
17-Jul	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-Jul	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-Jul	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-Jul	0	0	Z	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1
21-Jul	0	0	0	Z	0	0	0	0	0	0	17	14	5	3	10	8	1	5	1	PF	PF	PF	PF	PF	3.6	17
22-Jul	PF	PF	PF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
23-Jul	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-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.1	1
25-Jul	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-Jul	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-Jul	0	0	0	Z	0	1	3	3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
28-Jul	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-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0.2	1
30-Jul	Z	0	0	0	0	0	0	0	0	0	0	0	0	17	7	3	5	2	0	0	0	0	0	0	1.6	17
31-Jul	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

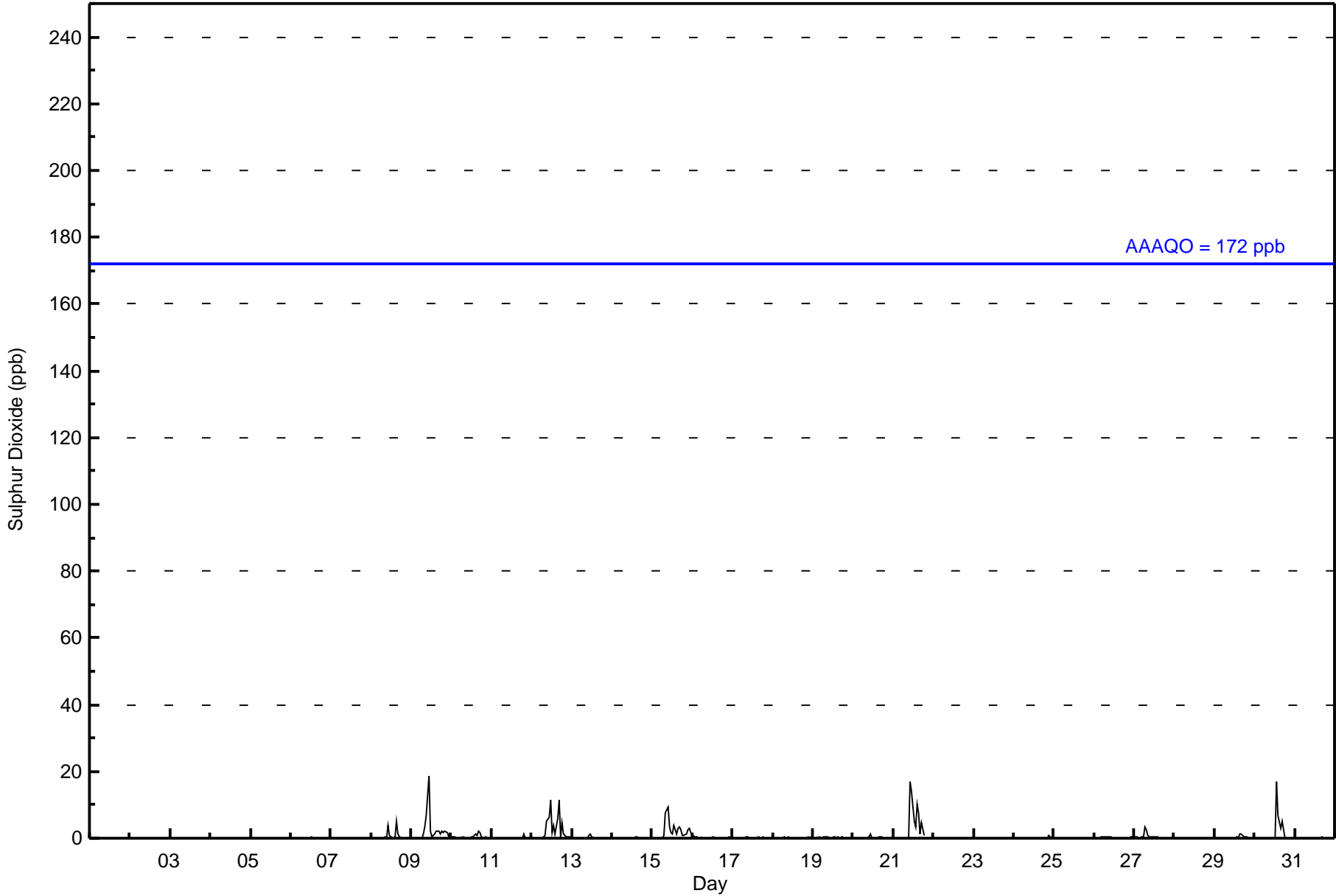
0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.6	0.9	2.0	1.3	0.5	1.2	0.9	1.2	1.1	0.6	0.4	0.3	0.2	0.3	0.2	0.2	Diurnal Average	
1	0	0	0	0	1	3	3	8	9	19	14	5	17	10	8	11	5	4	2	2	3	3	2	Diurnal Maximum	

Z - zerospan C - Calibration PF - Power Failure NS - Not in Service
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	596	99.00	99.00
11 - 20	6	1.00	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: 602

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - July 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	47	21	13	4	5	5	11	61	71	51	59	41	64	59	47	36	595
11 - 20	0	0	0	0	1	0	1	3	1	0	0	0	0	0	0	0	6
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	47	21	13	4	6	5	12	64	72	51	59	41	64	59	47	36	601

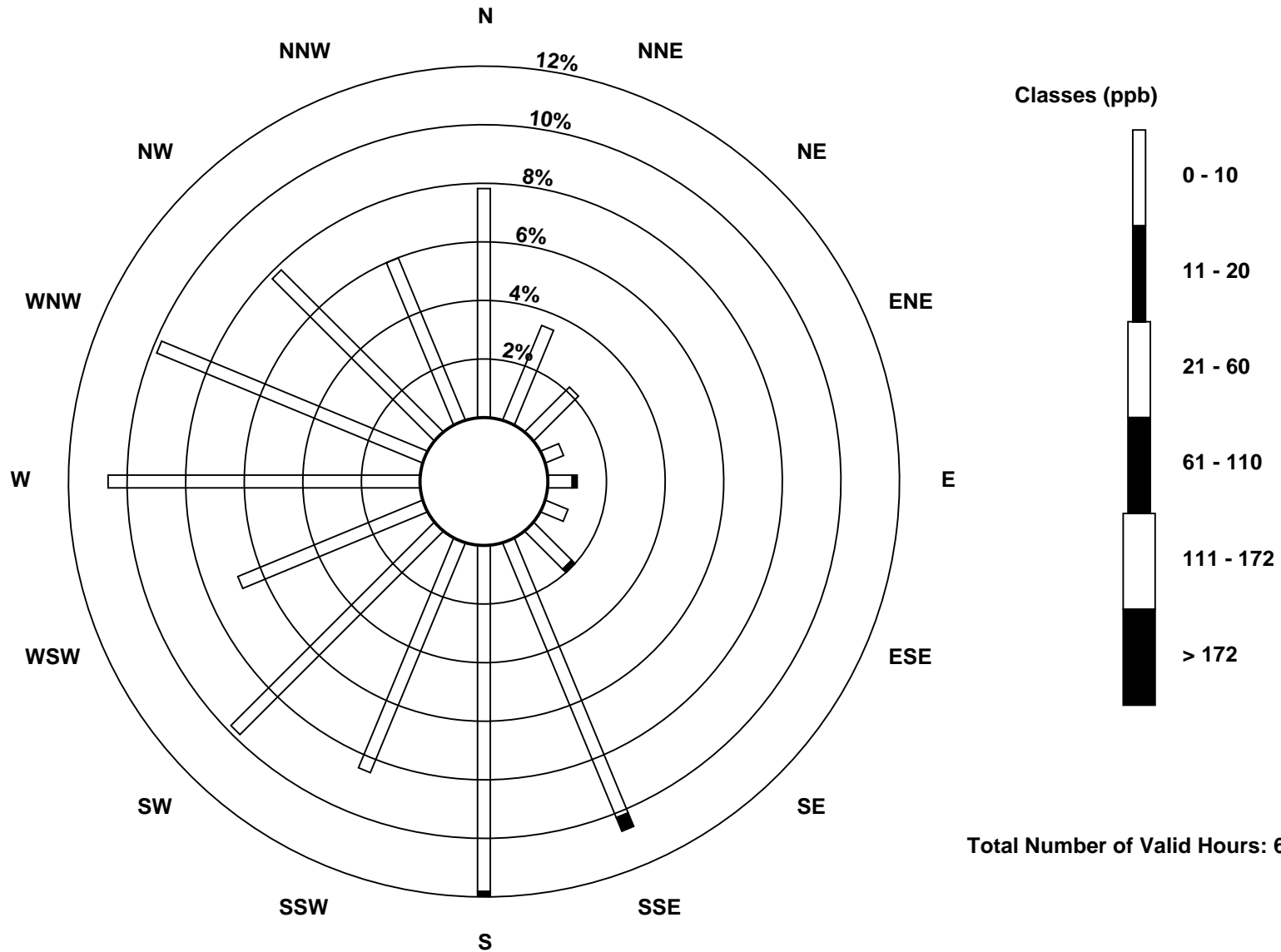
Total Number of Valid Hours: 601

Total Number of Hours: 744

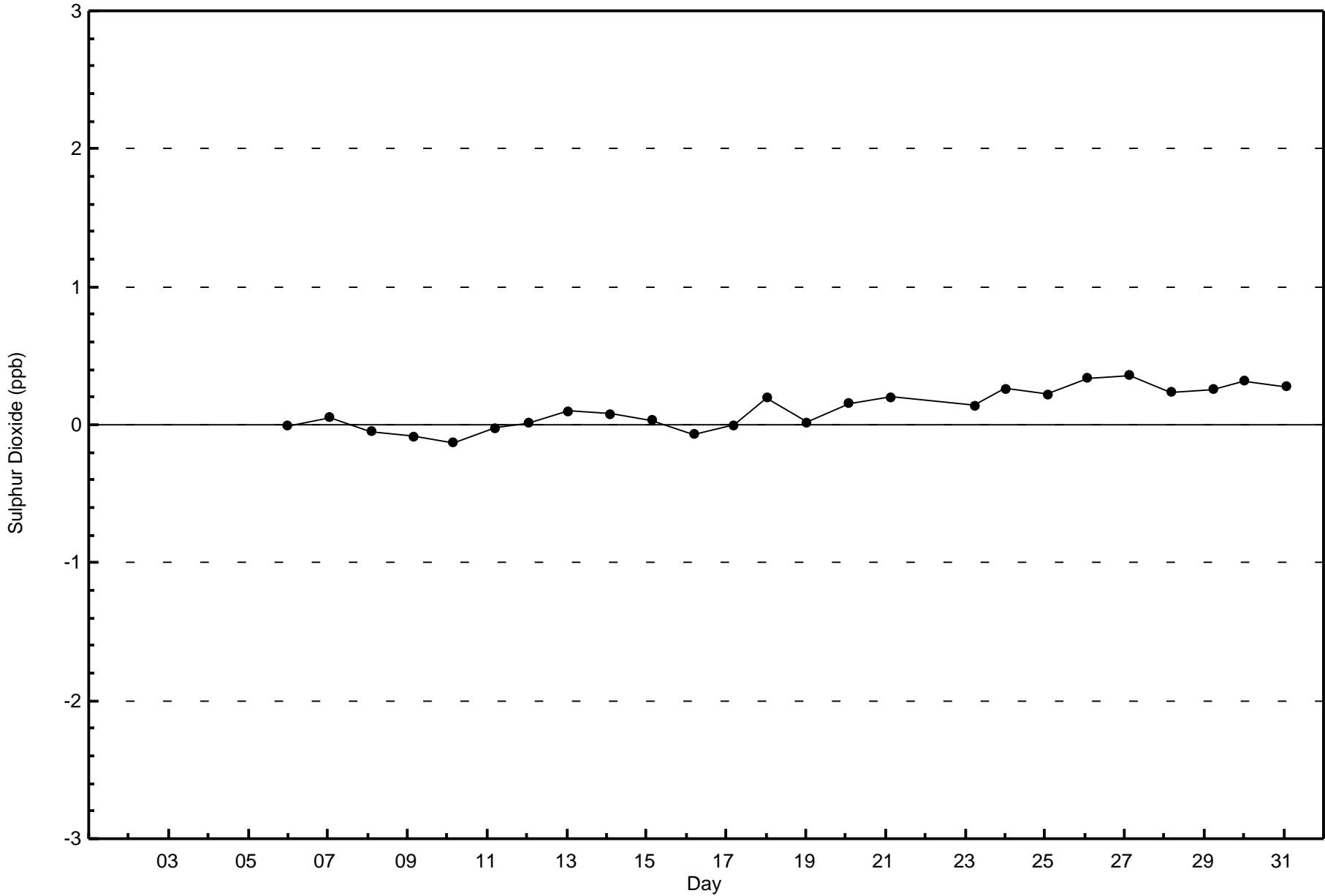


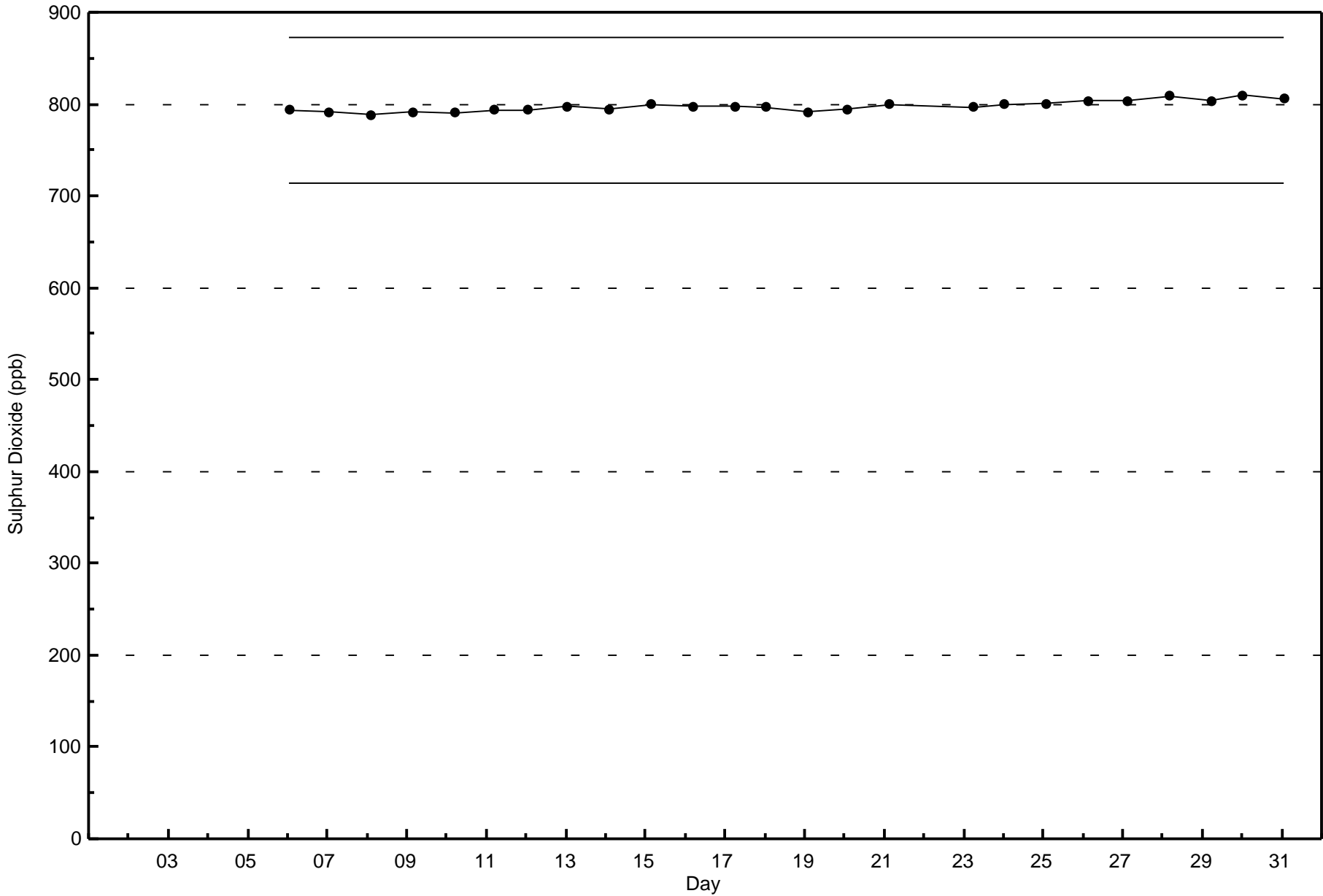
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin (AMS 25)



Total Number of Valid Hours: 601





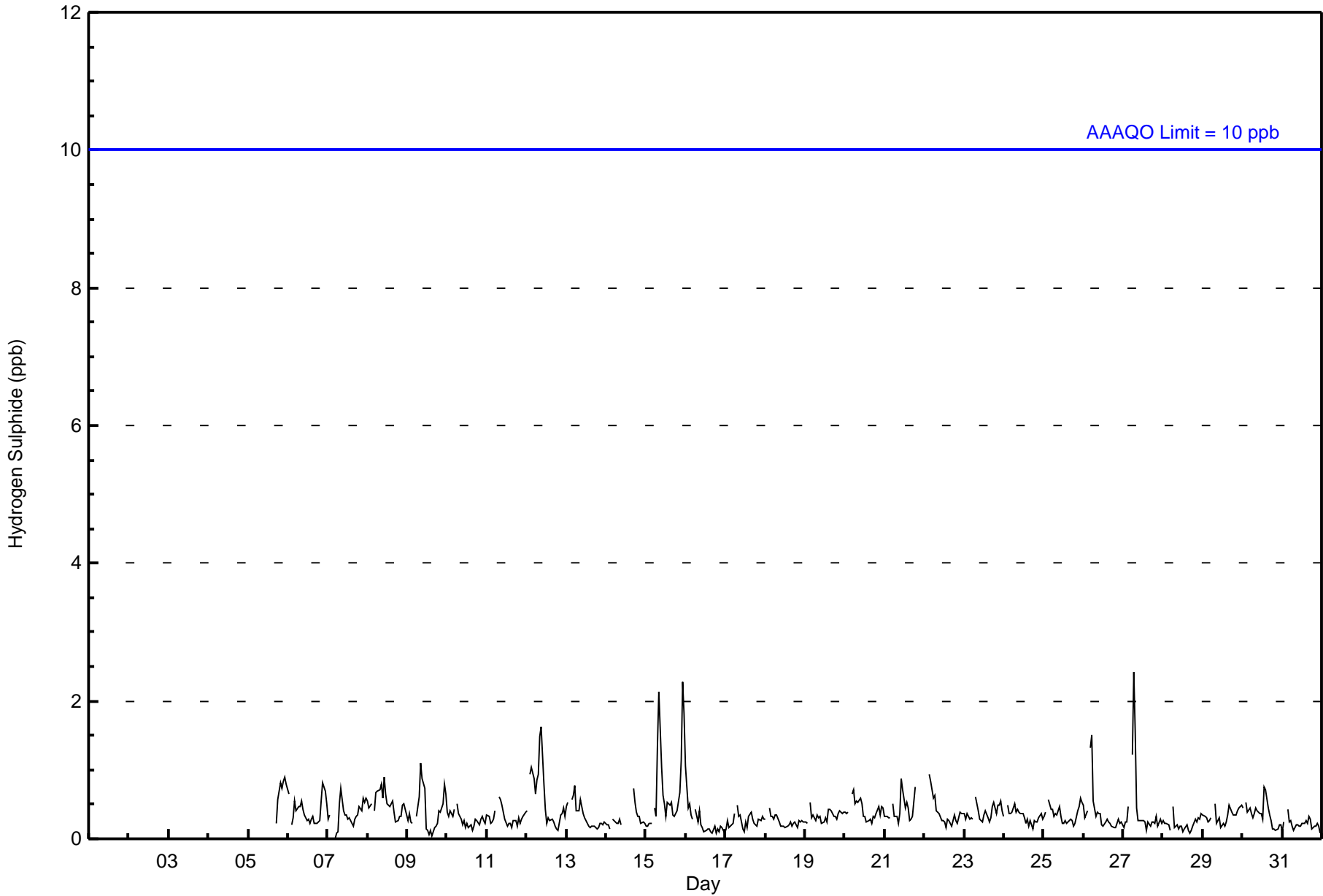


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Jul 27 07:00 Maximum Daily Average: 0.7 ppb on Jul 15																	Hours in Service: 635 Hours of Data: 592									
Minimum Value: 0 ppb on Jul 7 04:00 Minimum Daily Average: 0.2 ppb on Jul 28 Maximum Diurnal Average: 0.5 ppb at hour 9 Minimum Diurnal Average: 0.3 ppb at hour 13 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																	Hours of Missing Data: 43 Hours of Calibration: 29 Percent Operational Time: 97.8									
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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	C	C	C	C	0	1	1	1	1	1	1	--	1
6-Jul	1	Z	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
7-Jul	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.3	1
8-Jul	1	0	1	Z	0	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	0.5	1
9-Jul	0	0	0	0	Z	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
10-Jul	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
11-Jul	0	0	0	0	0	0	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
12-Jul	0	Z	1	1	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	2
13-Jul	0	1	Z	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
14-Jul	0	0	0	Z	0	0	0	0	0	0	M	M	M	M	M	M	1	1	0	0	0	0	0	0	--	1
15-Jul	0	0	0	0	Z	0	0	1	2	1	1	1	0	1	0	1	0	0	0	0	1	1	2	2	0.7	2
16-Jul	1	0	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
17-Jul	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-Jul	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-Jul	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
20-Jul	0	0	0	Z	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
21-Jul	0	0	0	0	Z	1	0	0	0	0	1	1	0	1	0	0	0	0	0	1	PF	PF	PF	PF	0.4	1
22-Jul	PF	PF	PF	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
23-Jul	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0.4	1
24-Jul	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-Jul	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.4	1
26-Jul	0	0	0	Z	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
27-Jul	0	0	0	0	Z	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
28-Jul	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-Jul	0	0	0	0	0	0	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jul	0	Z	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0.4	1
31-Jul	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
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure NS - Not in Service Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	592	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: 592

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - July 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	19	9	4	6	5	12	64	69	54	59	40	65	61	43	35	592
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	19	9	4	6	5	12	64	69	54	59	40	65	61	43	35	592

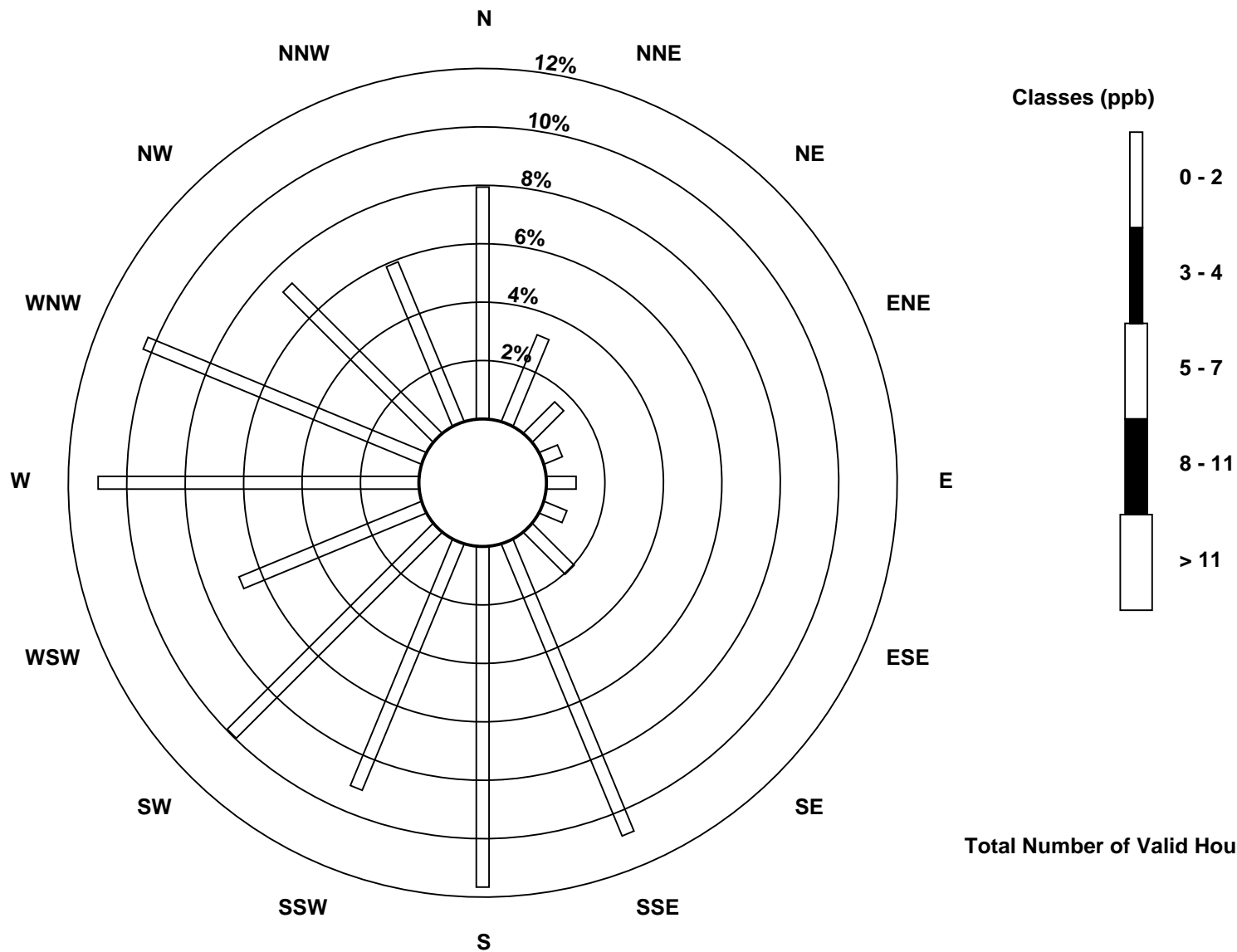
Total Number of Valid Hours: 592

Total Number of Hours: 744

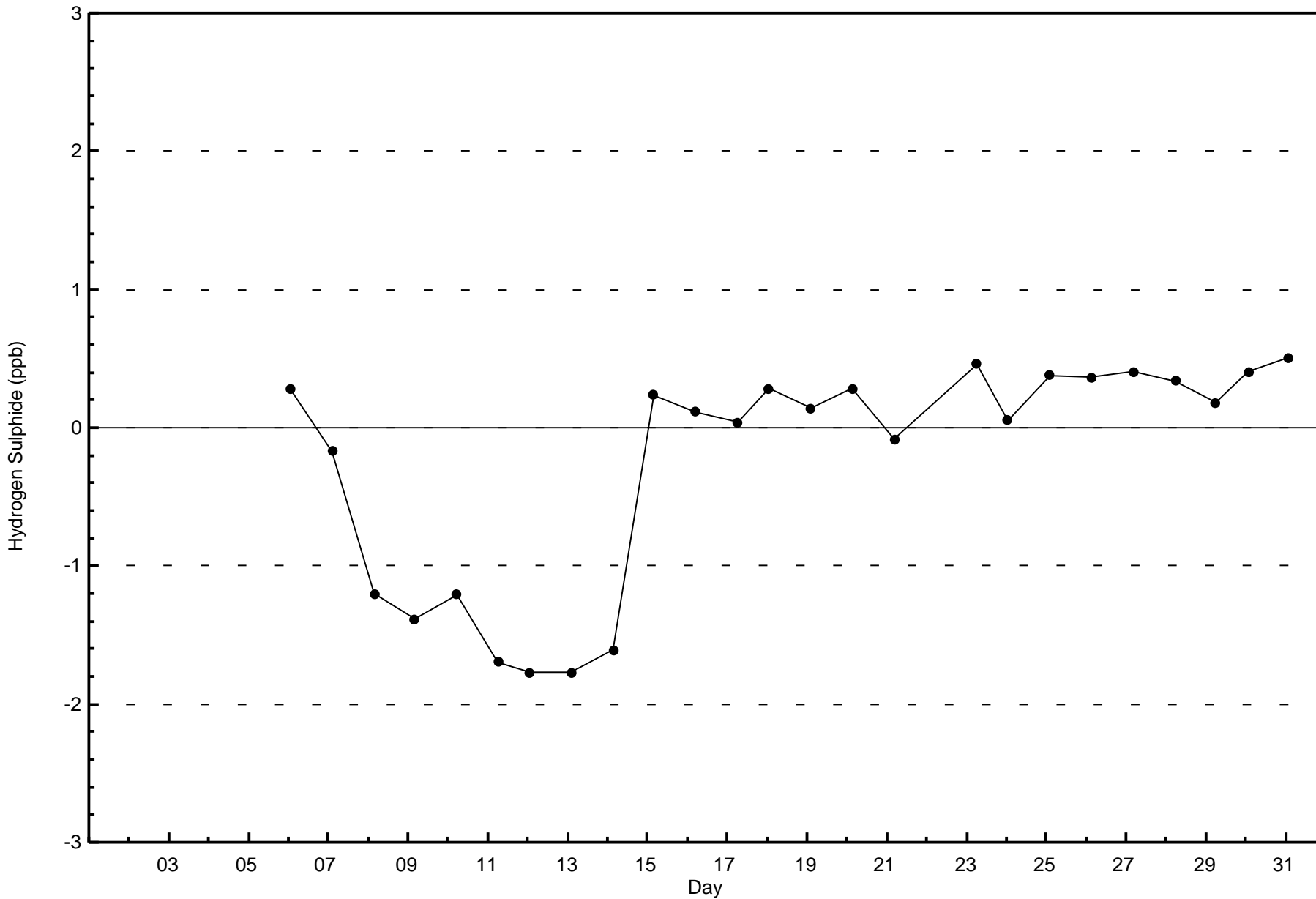


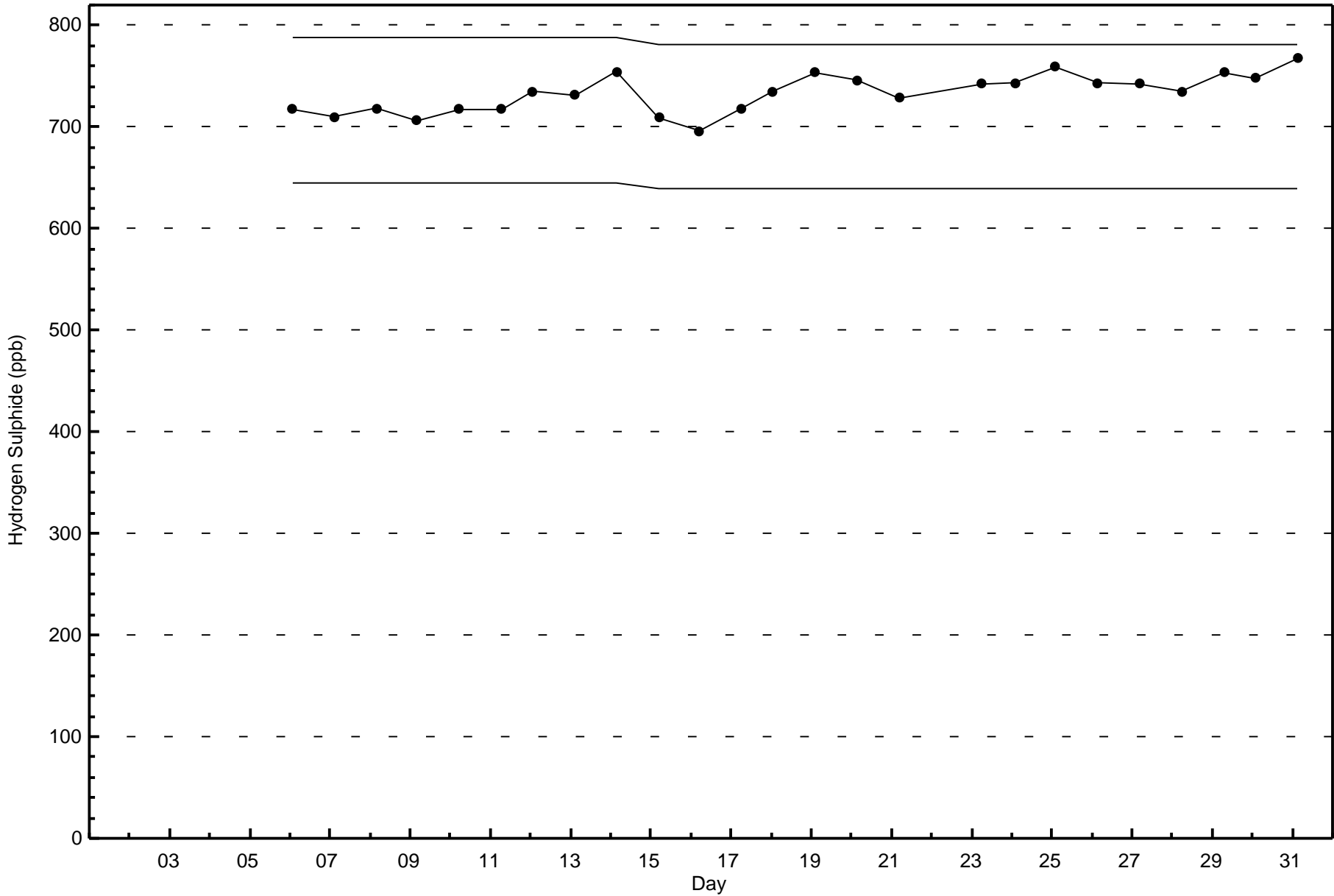
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin (AMS 25)



Total Number of Valid Hours: 592





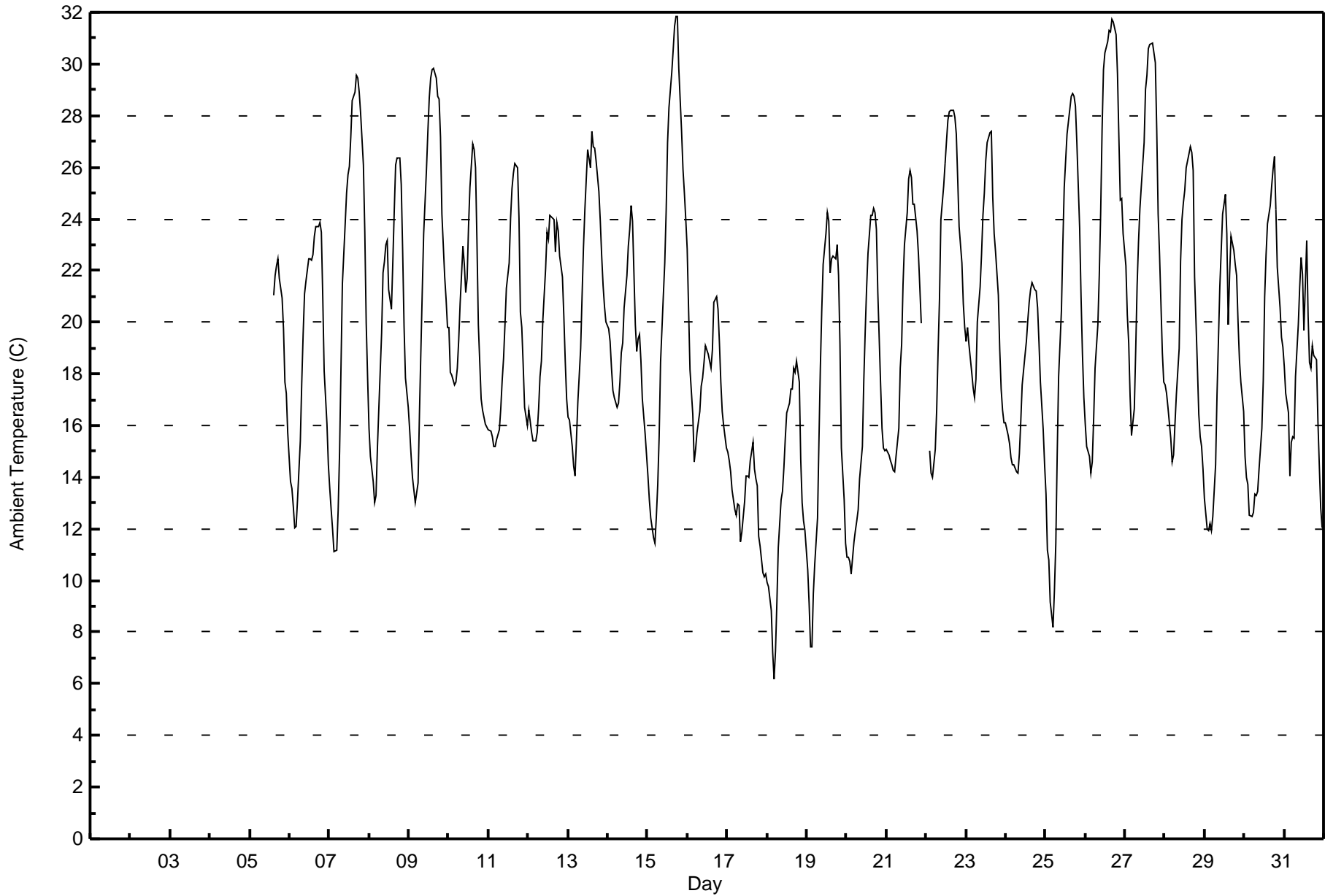


Maximum Value: 31.8 C on Jul 15 19:00 Maximum Daily Average: 24.2 C on Jul 26																								Hours in Service: 634 Hours of Data: 630		
Minimum Value: 6.2 C on Jul 18 05:00 Minimum Daily Average: 13.0 C on Jul 17 Maximum Diurnal Average: 24.8 C at hour 16 Minimum Diurnal Average: 13.4 C at hour 5 Monthly Average: 19.53 C Percentiles: P ₁ = 8.8 P ₁₀ = 12.9 Q ₁ = 15.3 Median = 19.2 Q ₃ = 23.5 P ₉₀ = 26.9 P ₉₉ = 31.2																								Hours of Missing Data: 4 Hours of Calibration: 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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	21.0	21.8	22.2	22.5	21.7	21.0	19.8	17.7	17.3	15.8	--	22.5
6-Jul	13.9	13.5	12.9	12.1	12.1	13.1	15.4	17.6	19.5	21.1	21.6	22.4	22.4	22.6	23.3	23.7	23.7	23.9	23.5	21.0	18.1	16.1	14.5	18.8	23.9	
7-Jul	13.6	12.7	12.0	11.1	11.2	12.7	14.9	18.2	21.5	23.8	25.0	25.7	26.0	27.2	28.6	28.9	29.5	29.4	28.9	28.1	26.1	23.5	20.0	17.8	21.5	29.5
8-Jul	15.9	14.8	13.8	13.0	13.3	15.1	16.7	19.6	21.9	22.3	23.0	23.2	21.3	20.5	22.4	24.3	26.1	26.3	26.4	25.3	22.8	19.9	17.8	16.7	20.1	26.4
9-Jul	15.8	14.8	14.0	13.5	13.0	13.8	16.5	18.9	21.2	23.4	25.9	27.4	28.7	29.4	29.8	29.8	29.4	28.7	28.6	27.2	24.2	21.7	20.9	19.8	22.4	29.8
10-Jul	19.8	18.1	17.9	17.6	17.7	18.2	19.3	20.7	23.0	22.2	21.2	21.7	23.7	25.2	26.9	26.7	26.0	23.2	19.9	17.0	16.6	16.3	16.1	16.0	20.5	26.9
11-Jul	15.8	15.8	15.6	15.2	15.2	15.4	15.8	16.7	17.7	18.6	19.9	21.3	22.3	24.0	25.2	25.7	26.1	26.0	24.0	20.4	19.8	18.3	16.7	16.0	19.5	26.1
12-Jul	16.6	16.2	15.7	15.4	15.4	15.7	16.6	17.9	18.5	20.1	22.1	23.5	23.2	24.2	24.1	24.0	22.7	23.8	23.5	22.6	21.7	20.3	18.5	17.0	20.0	24.2
13-Jul	16.3	16.2	15.2	14.4	14.0	15.5	16.9	19.0	21.0	22.9	24.4	25.5	26.7	26.0	27.4	26.8	26.3	25.1	23.9	22.6	21.4	20.6	20.0	21.5	27.4	
14-Jul	19.8	19.3	18.2	17.3	17.1	16.7	16.9	17.7	18.8	19.2	20.6	21.8	22.9	23.6	24.5	23.9	19.9	18.9	19.4	19.5	18.5	17.0	15.7	14.9	19.3	24.5
15-Jul	14.0	13.1	12.4	11.7	11.4	12.5	13.7	15.6	18.5	21.0	22.3	24.3	26.9	28.3	29.7	30.5	31.4	31.8	31.8	29.9	27.4	25.9	25.0	24.0	22.2	31.8
16-Jul	22.9	18.2	17.3	16.4	14.6	15.1	15.7	16.5	17.5	17.8	18.4	19.1	18.8	18.5	18.2	18.9	20.8	21.0	20.5	19.2	17.7	16.5	16.0	15.1	18.0	22.9
17-Jul	14.9	14.7	14.2	13.5	12.8	12.5	13.0	12.9	11.5	11.9	13.1	14.0	14.1	14.0	14.7	15.3	14.3	14.0	13.7	11.7	11.3	10.3	10.2	10.2	13.0	15.3
18-Jul	9.9	9.7	8.9	7.2	6.2	7.3	9.1	11.3	13.1	13.4	14.4	15.5	16.5	16.8	17.4	17.4	18.2	18.1	18.5	17.7	14.7	13.0	12.3	11.9	13.3	18.5
19-Jul	10.4	9.1	7.4	7.4	9.5	10.6	12.4	15.4	18.2	20.4	22.2	23.4	24.3	23.9	21.9	22.4	22.6	22.5	23.0	21.8	19.2	15.2	13.1	11.5	17.0	24.3
20-Jul	10.9	10.9	10.7	10.3	11.5	11.9	12.3	12.8	13.9	15.2	17.7	19.7	21.3	22.6	24.2	24.1	24.4	24.2	23.6	21.2	17.6	15.9	15.1	15.0	17.0	24.4
21-Jul	15.1	14.9	14.7	14.5	14.3	14.2	14.8	15.9	18.2	19.2	21.5	23.0	24.2	25.5	25.9	25.6	24.6	24.6	23.5	22.6	21.3	20.0	PF	PF	19.9	25.9
22-Jul	PF	PF	15.0	14.2	14.0	15.1	16.6	18.9	20.9	24.0	25.3	26.1	27.0	27.8	28.1	28.2	28.2	27.9	27.3	25.5	23.7	22.3	20.7	19.8	22.6	28.2
23-Jul	19.3	19.8	19.2	18.0	17.5	17.1	17.8	20.0	21.4	22.6	24.1	25.0	26.3	27.0	27.3	27.4	24.8	23.4	22.7	21.0	18.9	17.4	16.6	16.1	21.3	27.4
24-Jul	16.1	15.6	15.3	14.7	14.5	14.5	14.2	14.2	14.9	16.1	17.6	18.7	19.2	20.1	20.8	21.3	21.5	21.3	21.2	20.6	19.2	17.7	15.9	14.5	17.5	21.5
25-Jul	13.3	11.2	10.8	9.2	8.2	9.6	11.4	14.9	17.9	20.4	23.0	25.2	26.2	27.3	27.8	28.7	28.8	28.7	28.3	26.9	23.6	21.0	18.8	17.1	19.9	28.8
26-Jul	16.0	15.2	14.8	14.2	14.6	16.3	18.2	19.9	21.8	24.2	27.4	29.8	30.4	30.9	31.3	31.2	31.7	31.6	31.2	29.6	27.1	24.7	24.8	23.4	24.2	31.7
27-Jul	22.2	20.3	19.2	17.1	15.6	16.6	18.9	21.5	23.1	24.4	25.3	26.9	29.0	29.5	30.6	30.8	30.8	30.4	30.0	27.4	24.2	22.6	18.8	17.7	23.9	30.8
28-Jul	17.6	17.3	16.7	15.5	14.6	14.9	16.0	17.2	19.0	22.4	24.0	24.6	25.1	26.0	26.5	26.8	26.6	25.9	21.7	18.3	16.4	15.6	15.2	14.3	19.9	26.8
29-Jul	13.2	12.0	11.9	12.2	11.9	12.4	14.5	17.2	19.2	21.4	22.8	24.2	24.9	23.4	19.9	21.9	23.3	22.8	22.3	21.8	20.0	18.5	17.7	16.5	18.6	24.9
30-Jul	14.8	14.0	13.7	12.5	12.5	12.6	13.3	13.3	13.5	14.3	15.9	17.8	21.0	22.6	23.8	24.5	25.3	25.9	26.4	24.3	22.1	20.6	19.4	19.0	18.5	26.4
31-Jul	18.3	17.2	16.5	14.0	15.3	15.5	15.5	17.9	19.9	21.4	22.5	21.9	19.7	23.2	20.2	18.4	18.2	19.1	18.7	18.6	16.2	14.5	12.8	12.0	17.8	23.2
15.9 15.0 14.4 13.6 13.4 14.0 15.3 17.0 18.7 20.1 21.6 22.8 23.6 24.2 24.5 24.8 24.7 24.5 23.9 22.5 20.5 18.7 17.4 16.4																								Diurnal Average		
22.9 20.3 19.2 18.0 17.7 18.2 19.3 21.5 23.1 24.4 27.4 29.8 30.4 30.9 31.3 31.2 31.7 31.8 31.8 29.9 27.4 25.9 25.0 24.0																								Diurnal Maximum		
PF - Power Failure			NS - Not in Service																							



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Waskow ohci Pimatisiwin - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Waskow ohci Pimatisiwin - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	14	2.22	2.22
10 - 20	336	53.33	55.56
> 20	280	44.44	100.00

Total Number of Valid Hours: 630

Total Number of Hours: 744



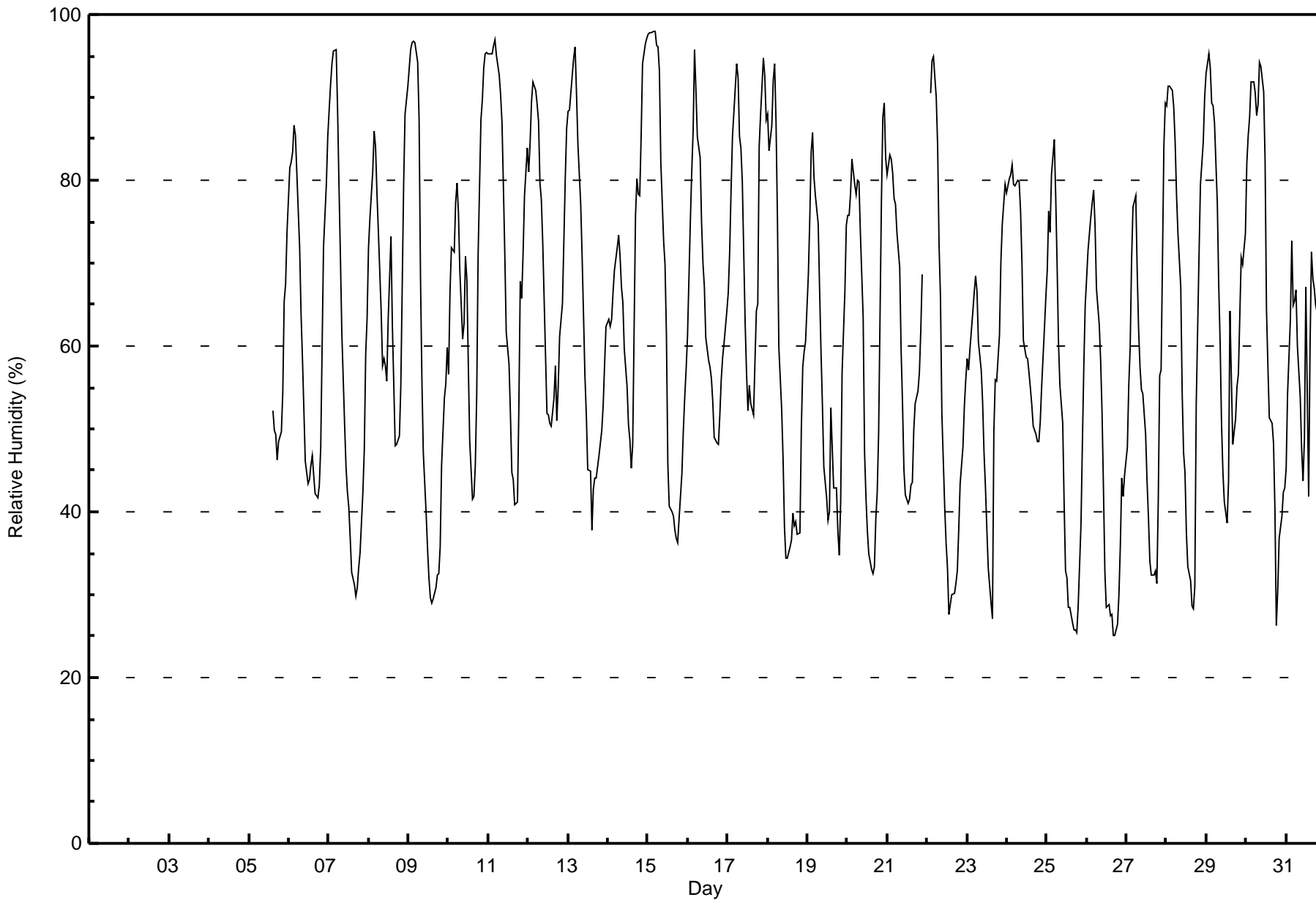
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Waskow ohci Pimatisiwin - July 2017

Maximum Value: 98 % on Jul 15 04:00																	Maximum Daily Average: 74.8 % on Jul 17										Hours in Service: 634																																							
Minimum Value: 25 % on Jul 26 18:00																	Minimum Daily Average: 47.7 % on Jul 26										Hours of Data: 630																																							
Maximum Diurnal Average: 85.6 % at hour 5																	Minimum Diurnal Average: 42.7 % at hour 16										Hours of Missing Data: 4																																							
Monthly Average: 62.4 %																	Percentiles: P ₁ = 26 P ₁₀ = 36 Q ₁ = 46 Median = 61 Q ₃ = 79 P ₉₀ = 90 P ₉₉ = 97										Hours of Calibration: 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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--																																								
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--																																								
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--																																								
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	--																																								
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	52	50	49	46	48	50	54	65	68	74	--	74																																								
6-Jul	81	82	83	87	85	81	72	64	58	52	46	43	44	46	47	44	42	42	43	48	60	72	79	85	62.0	87																																								
7-Jul	89	91	94	96	96	88	79	71	62	51	45	42	41	37	33	31	30	31	33	35	42	47	59	63	57.8	96																																								
8-Jul	72	75	81	86	84	78	74	64	58	58	58	56	63	73	62	55	48	48	49	55	67	79	88	91	67.7	91																																								
9-Jul	94	96	97	97	97	94	87	68	56	47	40	36	32	30	29	29	31	32	33	36	46	54	55	60	57.2	97																																								
10-Jul	57	67	72	71	77	80	76	69	61	63	71	68	58	49	42	42	46	54	71	87	90	94	95	96	68.9	96																																								
11-Jul	95	95	95	96	97	95	93	90	87	79	71	62	58	52	45	44	41	41	53	68	66	71	78	84	73.2	97																																								
12-Jul	81	85	89	92	91	89	87	80	78	72	59	52	52	51	50	54	58	51	55	61	65	72	80	86	70.4	92																																								
13-Jul	88	88	93	95	96	91	84	77	71	64	56	52	45	45	38	43	44	44	47	48	50	53	58	62	63.8	96																																								
14-Jul	63	62	63	67	69	72	73	71	67	65	60	55	51	49	45	48	76	80	78	78	85	94	96	97	69.4	97																																								
15-Jul	98	98	98	98	98	96	96	93	82	73	70	61	46	41	40	40	38	37	36	39	45	50	54	57	65.9	98																																								
16-Jul	61	75	81	86	96	91	85	83	75	70	67	61	58	57	56	53	49	48	48	52	56	59	60	64	66.3	96																																								
17-Jul	66	71	79	85	91	94	92	85	84	80	63	57	52	55	53	52	58	64	65	84	88	95	93	87	74.8	95																																								
18-Jul	88	83	87	92	94	87	75	60	52	46	38	34	34	36	37	40	38	39	37	37	50	57	59	60	56.8	94																																								
19-Jul	69	75	83	86	80	78	75	67	59	53	45	42	39	40	53	48	43	43	38	35	41	57	67	75	57.9	86																																								
20-Jul	76	76	78	82	79	78	80	80	74	63	47	42	38	35	33	33	33	39	42	49	78	88	89	83	62.3	89																																								
21-Jul	81	83	83	81	78	77	74	69	59	53	45	42	41	41	43	44	50	53	55	57	62	69	PF	PF	60.8	83																																								
22-Jul	PF	PF	90	94	95	90	84	72	66	52	41	36	33	28	29	30	30	31	33	38	43	48	53	56	53.3	95																																								
23-Jul	58	57	60	64	67	69	67	61	57	53	47	43	38	33	29	27	50	56	56	61	70	75	77	79	56.4	79																																								
24-Jul	79	80	81	82	79	79	80	80	76	70	61	59	58	57	55	53	50	49	48	48	51	55	62	66	65.0	82																																								
25-Jul	69	76	74	81	85	78	70	60	55	51	41	33	32	28	29	27	26	26	25	29	38	48	57	65	50.1	85																																								
26-Jul	68	71	76	77	79	75	67	63	58	52	43	33	29	29	27	28	25	25	26	30	36	44	42	44	47.7	79																																								
27-Jul	48	55	60	70	77	78	69	62	57	55	54	49	44	39	34	32	32	33	31	42	56	57	84	89	54.6	89																																								
28-Jul	89	91	91	91	89	85	78	74	67	54	47	45	37	33	32	29	28	31	53	71	80	82	85	90	64.7	91																																								
29-Jul	93	95	94	89	89	87	77	68	61	51	45	41	39	44	64	56	48	51	55	57	64	71	70	74	65.9	95																																								
30-Jul	82	85	88	92	92	91	88	89	94	94	91	82	64	58	51	51	48	40	26	30	37	40	42	43	66.6	94																																								
31-Jul	45	54	63	73	65	65	67	60	54	48	44	49	67	42	60	71	68	67	65	63	76	83	89	91	63.8	91																																								
																	75.6		78.8		82.0		85.0		85.6		83.3		78.8		72.3		66.5		60.3		53.6		49.0		45.9		43.3		43.2		42.7		43.7		44.5		46.3		51.4		59.1		65.9		70.8		73.9		Diurnal Average	
																	98		98		98		98		98		96		96		93		94		94		91		82		67		73		64		71		76		80		78		87		90		95		96		97		Diurnal Maximum	
PF - Power Failure			NS - Not in Service																																																															





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Waskow ohci Pimatisiwin - July 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	94	14.92	14.92
40 - 60	214	33.97	48.89
60 - 80	174	27.62	76.51
80 - 100	148	23.49	100.00

Total Number of Valid Hours: 630

Total Number of Hours: 744



Maximum Speed: 17 km/h on Jul 24 17:00	Maximum Daily Speed Average: 11.8 km/h on Jul 24	Hours in Service: 634
Minimum Speed Value: 0 km/h on Jul 9 07:00	Minimum Daily Speed Average: 0.4 km/h on Jul 20	Hours of Data: 630
Maximum Diurnal Speed Average: 2.5 km/h at hour 13	Minimum Diurnal Speed Average: 1.0 km/h at hour 20	Hours of Missing Data: 4
Monthly Average Velocity: 1.7 km/h 269.4 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 7 P ₉₀ = 10 P ₉₉ = 15	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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	----	----
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	----	----
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	----	----
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	----	----
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NW13	NW11	NW12	NW15	NW16	NW12	NW8	WNW2	WNW3	NNW0	----	NW16
6-Jul	W2	W5	W3	WNW2	W4	WSW5	W6	WSW4	WSW4	W6	NW12	N10	N7	NW4	NNW6	NW10	WNW7	NNW6	N3	ENE1	W2	W1	SW1	W2	WNW3.7	NW12	
7-Jul	WNW2	W2	WSW1	SSW1	S2	S4	SSE5	SSE4	SSE5	SW4	WNW3	SW4	NW2	WNW5	WNW3	W4	NW3	S3	SSE5	SW1	NNE5	N5	NW3	WNW2	WSW1.2	WNW5	
8-Jul	W2	W3	NW2	W2	W2	NNW2	NW1	NNE3	SSE1	SW3	WSW6	WSW6	SSW5	SSE4	SW3	SW4	SSW5	SW6	SSW4	S4	SSW2	SSE1	W1	WNW2	SW2.2	WSW6	
9-Jul	WNW1	W2	W3	W3	WSW2	NW1	SSW0	SSE5	SSE5	SSE6	SSE5	SSE7	SSE9	SSE9	SSE9	SSE10	SSE7	S6	SSE6	S5	S1	S1	SE2	S1	S3.7	SSE10	
10-Jul	SSW2	S2	NW2	S2	SSE1	SSE3	WNW1	W2	W5	WSW5	WSW4	WSW4	SW5	SSW5	SSW3	SE5	SE5	E5	NNW6	WSW5	S1	N5	WNW2	W3	SW1.5	NNW6	
11-Jul	W2	WNW3	W1	S1	W1	WNW2	WNW4	NW4	NW5	NNW6	WNW4	WNW6	WNW7	WNW5	W5	W4	SSW3	SSW6	SSW5	SSW9	WSW5	S4	SSW1	S2	W2.8	SSW9	
12-Jul	S3	SSE2	S3	S3	SSW2	WNW1	SSE3	SSE5	SSE4	SSE3	SE4	SE4	SW5	SSE5	SSW4	SSE5	SSE7	SSE8	SSE6	SSE5	SSE3	S1	S1	SSW2	SSE3.3	SSE8	
13-Jul	SSW1	SSW3	S2	S1	S2	SSW3	SSW4	S3	SSE4	ESE4	SE5	ESE5	ESE5	NE3	E2	N7	N8	N8	N10	N11	N8	NNW6	NNW7	NNW7	NNE1.8	N11	
14-Jul	NNW11	N10	N9	N6	N7	N7	N7	N9	N10	NNE11	NNE8	NE5	NE4	NE4	NNE5	NW7	N9	NNW6	NNW5	NW4	NW2	W3	W3	W3	N5.9	NNE11	
15-Jul	W2	W2	W2	W2	W3	W1	S3	S5	SE4	SE2	NNE4	NE3	SE6	SSE11	SSE11	SSE10	SE10	SSE8	SSE7	SSE4	SSW4	S5	S5	S3	SSE3.6	SSE11	
16-Jul	WNW8	NNW14	W2	W3	SSW3	S4	WSW5	WNW4	WSW3	WSW3	SSW5	SW6	SSW10	SSW10	SSW10	SW9	WSW10	WSW7	WSW9	SW8	WSW8	WSW8	W8	WSW7	WSW5.5	NNW14	
17-Jul	W8	WNW7	WNW6	WSW6	WNW5	WNW6	WNW7	NW12	NNW13	NNW11	N14	N14	N13	NNW10	NW10	N8	NW7	NNW6	NNW6	NNW4	W2	W3	WNW4	NW3	NW6.9	N14	
18-Jul	NW4	NW5	WNW4	WNW3	WNW3	WNW3	WNW4	NW2	ENE3	NNW5	NW5	WNW5	SSW7	SW6	SW8	SW8	SW7	SW8	SW5	WSW4	SSW3	SW4	SW4	WSW4	WSW3.4	SW8	
19-Jul	WSW2	SSW2	S2	S3	SSW5	SSW5	SW6	SW7	SW6	SW8	SW8	SW8	W6	WNW7	NNE11	NE8	NNE10	NNE6	NNE5	NE5	NNE2	W3	W1	WNW3	W1.6	NNE11	
20-Jul	WNW4	NW3	W2	NW2	WNW3	NW2	NNW2	WNW3	NNW2	ENE1	E4	E3	SSE4	SSE7	SE4	S5	SSE2	E2	E0	WSW1	SSW3	W2	WSW1	SSW1	S0.4	SSE7	
21-Jul	S1	NW1	WNW2	NW3	NNW1	W2	NW3	WNW3	NE2	SE3	E2	S1	WNW1	SSE8	S9	S8	S4	SSE4	SSE7	SSE4	SSE4	S4	PF	PF	S2.1	S9	
22-Jul	PF	PF	S2	SSE1	SSE2	S6	S6	S8	S6	SSW6	SW8	SW11	WSW9	SW10	SW10	SW10	SW10	SW9	SW8	SW4	SSW4	SW5	SW5	SSW5	SW6.2	SW11	
23-Jul	SW4	SW5	SW5	SW5	WSW6	WSW6	W5	W5	W6	WNW4	W3	W7	WSW7	SW10	SW10	W8	N13	NNE11	NE8	NNE8	N10	N7	N7	N10	WNW3.3	N13	
24-Jul	N10	N9	NNE11	N12	N12	N12	N14	N12	N13	NNE12	N15	N16	N15	N15	N15	N16	NNW17	N17	NNW15	NNW11	NW9	NW7	NNW3	N3	N11.8	NNW17	
25-Jul	NNW3	WNW2	NW2	S1	S2	S3	S4	S4	SSE6	SSE7	SSW6	WSW6	WSW6	SW6	SSW5	SSW6	SSW7	S7	SSW6	S5	SSE2	S3	S2	SW1	SSW3.5	SSW7	
26-Jul	W2	SSE2	S3	S2	S3	S5	S7	S6	S6	S8	SSW8	SW8	W7	SSW6	SSW6	S6	S7	S7	SSW7	S6	S4	SSE5	SSW7	SSW6	S5.1	S8	
27-Jul	SSE4	S3	SSW2	SSW2	SSW1	SSE2	SSE7	S6	SSW7	S8	SSE8	SW6	SSW8	SW7	WSW6	W7	WNW6	WNW5	NW7	W3	WNW6	WNW11	NW1	WSW3	SW3.4	WNW11	
28-Jul	WNW3	SW3	W4	W1	SW5	SW4	SW5	SW5	SW5	WSW8	WSW9	W9	NW11	NW13	NW12	WNW13	WNW9	NW8	WNW7	NE6	SSE3	SSW3	S2	SW1	W4.5	WNW13	
29-Jul	N1	W1	SW1	WSW1	SE1	SSE1	S3	S4	SSE2	NW1	NNE3	ESE4	S2	NW12	N5	NNE5	NNE6	NNE8	NNE7	NE6	NE4	NNE3	N4	NNW5	NNE2.0	NW12	
30-Jul	WNW2	NW3	NNW3	WNW3	WNW3	W3	WSW2	S4	ESE1	S2	S3	S6	SSE6	SSE9	SSE10	SSE11	SSE11	S8	SW8	SW5	SW5	WSW6	W6	W7	SSW3.2	SSE11	
31-Jul	WNW8	WNW6	WNW2	SW3	W6	W6	W6	W7	WNW7	WNW8	WNW10	NW10	NW8	NW14	NNW8	NNW7	NNW11	N11	N9	NNW7	WNW3	W2	W1	WNW1	NW5.7	NW14	

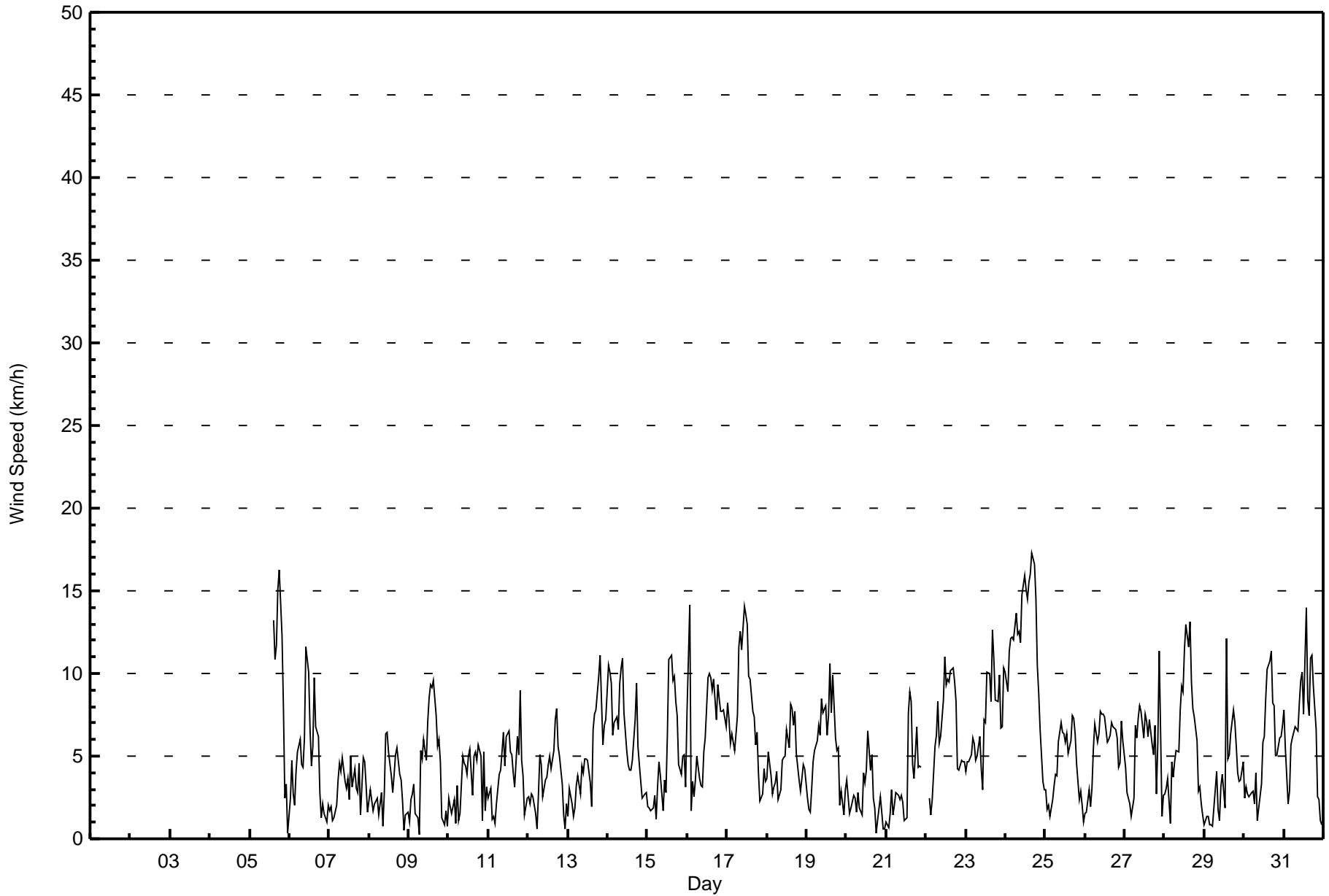
WNW2.3	WNW2.4	NNW1.4	W1.3	W1.6	WSW1.6	WSW1.9	WSW1.7	WSW1.2	WSW1.5	W1.8	W2.4	WSW2.5	WSW2.5	WSW2.0	W2.0	NNW1.9	NW1.3	NNW1.7	NNW1.0	W1.4	W1.9	W1.7	W1.8	Diurnal Average
NNW11	NNW14	NNE11	N12	N12	N12	N14	N12	N13	NNE12	N15	N16	N15	N15	N15	N16	NNW17	N17	NW16	NW12	N10	WNW11	W8	N10	Diurnal Maximum

PF - Power Failure NS - Not in Service
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	370	58.73	58.73
6 - 11	226	35.87	94.60
12 - 19	34	5.40	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: 630

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin - July 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	9	9	4	6	5	11	39	57	35	31	22	52	44	26	13	370
6 - 11	26	11	4	0	0	0	1	29	19	20	29	20	17	19	13	18	226
12 - 19	16	1	0	0	0	0	0	0	0	0	0	0	0	1	11	5	34
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	49	21	13	4	6	5	12	68	76	55	60	42	69	64	50	36	630

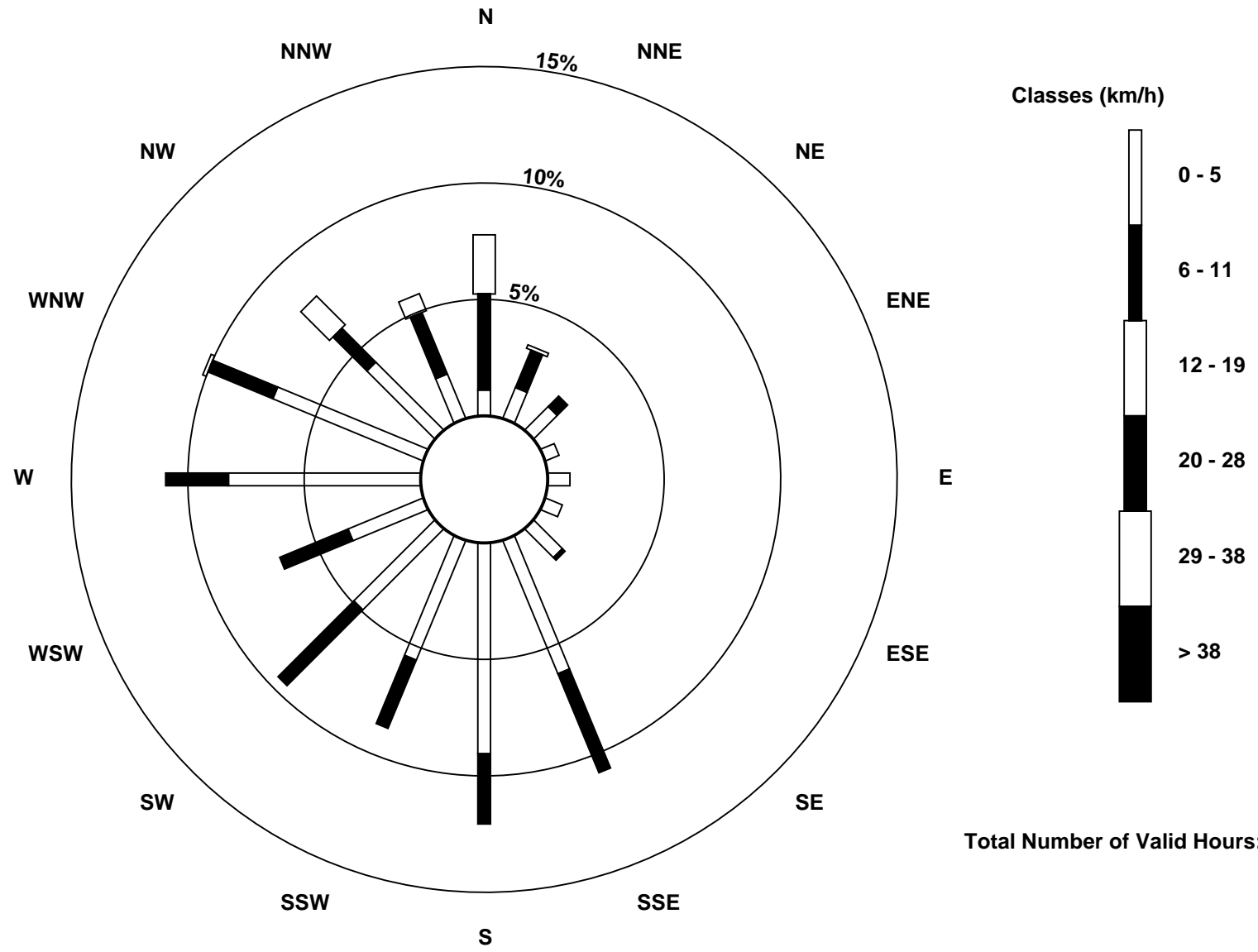
Total Number of Valid Hours: 630

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin (AMS 25)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Waskow ohci Pimatisiwin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 634
Maximum Value: 10 km/h on Jul 16 01:00	Hours of Data: 630
Minimum Value: 1 km/h on Jul 31 21:00	Hours of Missing Data: 4
Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 5	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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4	4	4	4	4	5	4	3	1	1	2	5
6-Jul	1	2	2	1	2	2	3	3	2	2	4	4	3	3	3	4	3	3	2	1	1	1	1	1	4	
7-Jul	1	1	1	1	1	1	1	1	2	3	3	3	2	3	2	2	2	2	2	2	2	2	1	1	3	
8-Jul	1	1	1	1	1	1	1	1	1	1	3	3	2	2	1	2	2	2	1	1	1	1	1	1	3	
9-Jul	1	1	1	1	1	1	1	2	2	2	2	3	3	4	3	3	3	2	2	1	1	1	1	1	4	
10-Jul	1	1	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1	3	
11-Jul	1	1	1	2	1	1	1	1	2	2	2	2	3	2	3	2	2	2	3	4	2	1	1	1	4	
12-Jul	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	2	2	1	1	1	1	3	
13-Jul	1	1	1	1	2	2	2	2	2	2	2	2	1	1	3	3	3	3	3	4	3	1	2	2	4	
14-Jul	3	3	3	2	2	3	2	3	4	4	3	2	2	2	2	4	4	4	2	1	1	1	1	1	4	
15-Jul	1	1	1	1	1	1	1	2	2	2	1	1	3	4	4	3	4	3	3	2	1	2	2	2	4	
16-Jul	10	8	1	3	2	2	2	2	2	2	2	2	4	3	4	4	4	4	4	3	3	3	3	3	10	
17-Jul	3	3	2	3	2	3	2	4	4	4	5	5	4	4	4	3	4	2	3	1	2	1	1	2	5	
18-Jul	2	2	1	1	1	1	2	2	2	3	3	3	3	3	3	3	3	4	2	2	1	1	2	2	4	
19-Jul	1	1	1	1	2	2	3	3	2	4	3	4	3	3	4	3	4	3	3	2	2	1	1	1	4	
20-Jul	1	1	1	1	1	1	1	1	1	1	2	2	2	3	2	3	1	1	1	2	2	1	1	1	3	
21-Jul	1	1	1	1	1	1	1	2	1	1	2	2	2	4	3	3	2	1	2	1	1	1	PF	PF	4	
22-Jul	PF	PF	1	1	1	2	2	2	2	3	4	4	4	5	4	5	5	4	4	2	1	2	2	2	5	
23-Jul	2	2	2	2	2	3	2	3	2	3	3	3	4	4	4	5	5	4	3	3	4	2	2	3	5	
24-Jul	4	3	4	4	4	4	4	4	4	5	6	5	5	5	5	5	5	4	4	2	2	2	1	1	6	
25-Jul	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	2	1	1	1	1	1	3	
26-Jul	1	1	1	1	1	2	3	2	2	2	3	3	3	3	3	3	3	3	2	2	1	2	2	2	3	
27-Jul	2	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	2	2	2	3	5	2	2	5	
28-Jul	2	2	2	1	2	2	2	2	2	3	4	4	5	5	5	6	4	4	5	4	1	1	1	1	6	
29-Jul	1	1	1	1	1	1	1	2	2	1	2	2	3	7	2	2	2	3	2	2	2	1	1	1	7	
30-Jul	1	1	2	1	1	1	1	1	1	2	2	2	3	3	3	4	4	3	3	2	2	2	2	3	4	
31-Jul	3	2	2	2	2	2	2	3	3	3	4	4	5	5	4	5	3	4	4	3	1	1	1	1	5	
	10	8	4	4	4	4	4	4	4	5	5	6	5	7	5	6	5	5	5	4	4	5	3	3		
	Diurnal Maximum																									

PF - Power Failure NS - Not in Service



Wood Buffalo Environmental Association
Summary of Hour Averages

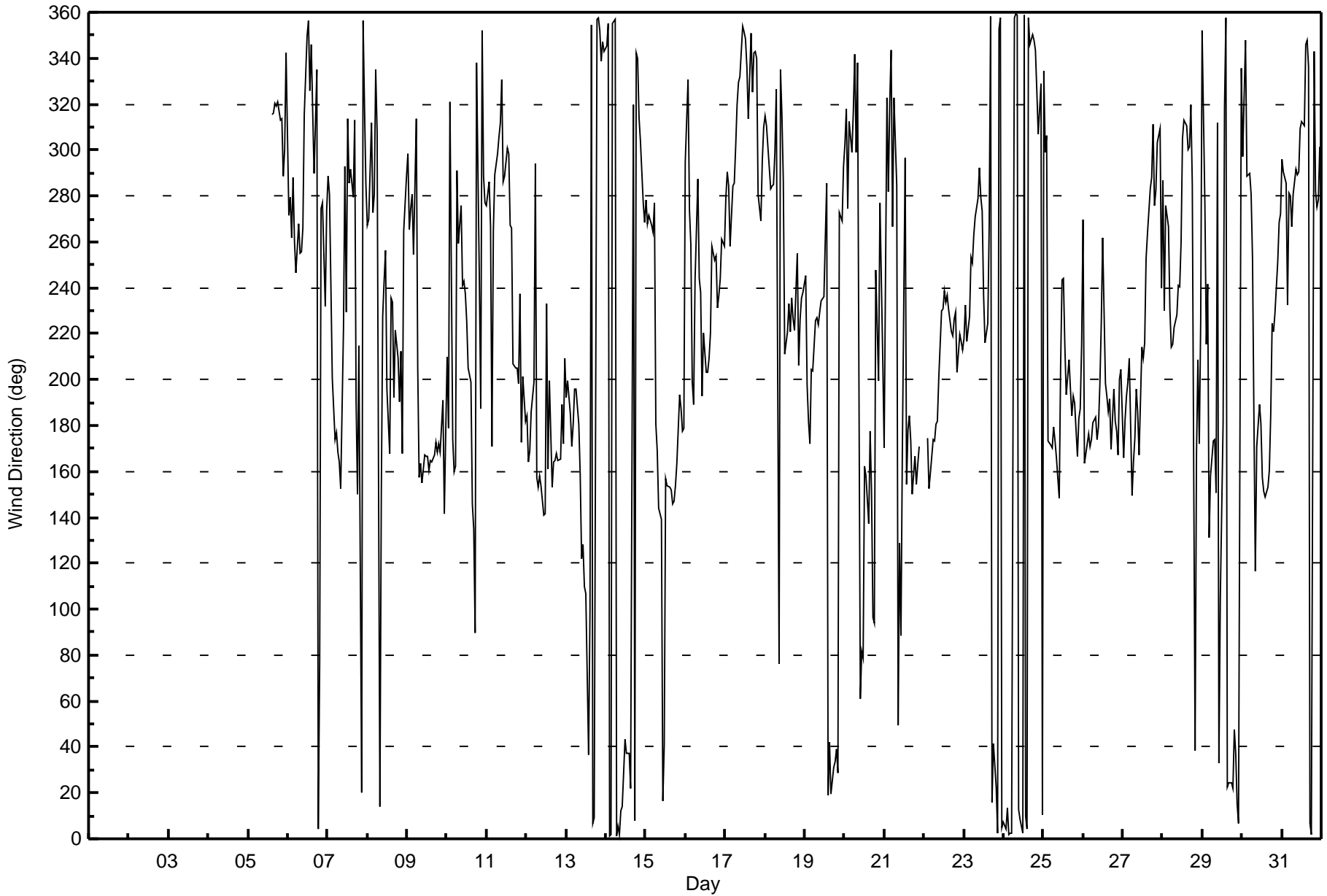
Wind Direction (WD) - deg
Waskow ohci Pimatisiwin - July 2017

Direction of Maximum Speed: 346 deg on Jul 24 17:00	Hours in Service: 634
Direction of Maximum Daily Speed Average: 357.7 deg on Jul 24	Hours of Data: 630
Direction of Minimum Speed: 206 deg on Jul 9 07:00	Direction of Minimum Daily Speed Average: 0.4 deg on Jul 20
Direction of Minimum Speed: 206 deg on Jul 9 07:00	Hours of Missing Data: 4
Monthly Average Direction: 262.4 deg	Percent Operational Time: 99.4

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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--	
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	316	316	321	319	321	313	314	289	300	343	--
6-Jul	272	280	262	288	261	247	268	255	256	266	315	350	356	326	346	318	290	335	4	77	275	277	232	274	302.0	
7-Jul	289	280	242	201	174	177	168	164	153	222	293	230	314	286	292	280	313	190	150	215	20	356	319	285	245.1	
8-Jul	267	270	312	273	281	335	308	14	150	228	243	257	196	168	235	234	192	222	209	190	212	168	265	289	235.1	
9-Jul	298	266	275	281	254	314	206	157	164	155	167	167	167	160	165	164	167	173	168	172	169	191	141	178	171.9	
10-Jul	210	179	321	174	160	162	291	259	276	241	243	238	225	205	199	146	135	90	338	243	187	352	288	277	226.6	
11-Jul	276	286	267	171	265	289	298	306	312	331	286	288	301	298	267	266	207	205	205	198	237	172	201	182	261.8	
12-Jul	184	164	169	186	199	294	157	153	158	154	141	142	233	161	200	153	164	165	168	164	165	189	172	209	168.7	
13-Jul	192	200	185	171	181	196	196	181	159	122	128	110	107	37	100	355	7	9	357	358	352	338	347	343	16.7	
14-Jul	346	355	1	2	355	357	1	5	2	12	14	43	37	37	37	22	320	8	342	340	314	304	277	269	359.2	
15-Jul	279	268	272	268	264	277	181	169	144	139	17	41	157	154	153	152	146	147	154	163	193	187	178	179	162.8	
16-Jul	295	331	274	259	199	189	243	287	244	238	193	220	203	203	210	221	258	252	254	232	237	244	261	258	242.6	
17-Jul	279	290	284	258	284	286	302	320	330	332	354	351	349	336	314	351	325	342	343	340	281	269	296	310	321.7	
18-Jul	315	311	292	283	284	285	299	326	76	335	316	287	211	221	233	221	236	226	222	255	206	226	236	238	255.2	
19-Jul	245	198	182	172	204	204	226	227	224	230	235	236	262	285	19	42	20	31	33	39	29	273	269	293	268.5	
20-Jul	303	318	275	312	299	317	342	299	338	61	82	79	162	158	137	177	151	96	94	248	199	277	243	209	185.6	
21-Jul	171	323	282	321	344	267	323	285	50	129	88	169	296	154	178	184	174	150	166	155	163	171	PF	PF	173.0	
22-Jul	PF	PF	175	152	159	174	173	180	182	201	230	231	239	234	236	231	221	219	226	230	203	220	216	213	215.0	
23-Jul	218	233	217	227	253	251	263	271	279	292	279	273	237	216	225	267	358	16	41	23	2	353	358	5	298.2	
24-Jul	7	4	14	2	2	3	358	359	359	13	9	3	359	9	4	358	346	351	348	344	326	307	329	10	357.7	
25-Jul	334	299	306	173	172	170	179	173	166	148	206	243	244	215	193	208	196	184	193	190	166	183	187	216	196.7	
26-Jul	270	164	172	176	171	174	181	184	174	179	198	224	262	198	193	186	191	169	196	182	177	167	200	204	191.2	
27-Jul	166	182	193	199	210	149	164	174	196	186	167	214	209	216	253	263	283	288	311	276	282	303	309	240	227.1	
28-Jul	287	230	276	267	231	214	215	223	229	241	240	260	305	313	310	300	301	320	285	38	167	209	172	226	275.6	
29-Jul	352	276	216	242	131	158	173	174	151	312	33	105	181	318	358	22	24	24	22	48	37	15	7	336	15.0	
30-Jul	297	324	348	289	290	281	253	183	117	171	189	181	158	151	149	153	161	185	225	221	229	251	269	272	199.7	
31-Jul	296	291	285	233	281	280	267	280	292	289	291	309	312	311	346	348	336	7	2	343	282	275	278	302	311.0	

294.5 298.8 288.8 267.9 267.3 251.9 246.6 241.5 244.4 251.5 272.4 269.7 254.6 242.1 254.2 260.0 286.1 316.3 297.7 287.0 272.4 270.7 269.9 276.4
 Diurnal Average

PF - Power Failure NS - Not in Service
 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
Waskow ohci Pimatisiwin - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 107 deg on Jul 28 04:00	Hours in Service: 634 Hours of Data: 630 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.4
Minimum Value: 11 deg on Jul 7 00:00	
Percentiles: P ₁ = 16 P ₁₀ = 22 Q ₁ = 30 Median = 42 Q ₃ = 56 P ₉₀ = 72 P ₉₉ = 98	

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-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--
2-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--
3-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--
4-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	--
5-Jul	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	24	30	25	21	18	22	18	31	23	80	80
6-Jul	39	33	69	79	44	50	57	63	64	54	29	36	48	62	50	54	49	53	80	69	30	63	74	11	80
7-Jul	35	24	48	68	31	24	21	36	35	76	87	79	88	71	86	69	81	83	38	81	33	25	21	62	88
8-Jul	45	35	60	41	47	45	71	42	105	52	45	57	52	55	58	59	45	42	32	17	50	67	50	58	105
9-Jul	69	34	48	25	63	54	92	28	42	33	46	41	37	36	32	30	34	30	26	22	57	73	42	88	92
10-Jul	55	49	94	44	81	37	88	92	52	50	59	57	54	48	78	36	42	52	56	50	94	22	78	27	94
11-Jul	60	26	75	88	52	41	27	31	29	24	57	47	51	63	61	72	75	42	36	43	55	23	62	35	88
12-Jul	36	22	26	24	77	72	38	29	35	72	65	56	47	52	38	37	30	35	38	29	22	56	82	33	82
13-Jul	66	33	35	57	18	52	44	62	46	54	48	49	44	53	80	34	26	33	25	21	21	20	21	20	80
14-Jul	21	22	20	22	22	24	28	27	35	30	47	58	61	71	70	43	34	32	31	22	13	19	16	13	71
15-Jul	27	34	45	31	22	77	30	31	51	88	40	67	45	37	34	37	39	43	36	29	41	28	29	32	88
16-Jul	36	34	91	69	56	35	52	67	65	62	39	38	34	32	34	48	52	58	54	43	44	50	55	55	91
17-Jul	50	37	41	50	47	46	26	18	19	22	26	26	26	31	34	31	36	37	29	24	80	41	28	24	80
18-Jul	24	22	18	17	14	45	45	75	75	59	72	71	67	67	55	49	62	45	37	56	19	30	32	42	75
19-Jul	55	57	48	39	47	47	54	49	52	43	55	54	63	40	37	41	31	48	60	34	67	13	52	21	67
20-Jul	17	26	58	44	36	19	57	33	53	55	50	67	70	43	78	63	68	52	88	61	71	53	78	63	88
21-Jul	49	58	38	16	67	65	53	53	51	34	83	103	90	36	36	31	30	39	25	29	22	22	PF	PF	103
22-Jul	PF	PF	33	28	33	21	23	29	36	43	52	44	56	55	52	51	47	41	44	43	20	32	27	30	56
23-Jul	36	51	40	46	50	66	60	56	51	69	104	54	59	42	47	63	33	29	37	30	24	23	22	23	104
24-Jul	24	22	25	22	22	22	21	22	21	30	27	26	26	27	25	26	23	24	23	22	15	19	39	35	39
25-Jul	40	52	79	48	21	21	28	36	30	29	54	58	63	53	73	49	35	33	27	22	26	19	21	54	79
26-Jul	50	34	26	33	21	20	26	31	31	33	47	50	53	65	68	58	41	40	27	24	21	33	31	36	68
27-Jul	33	32	30	41	71	30	24	30	35	38	34	44	43	50	59	51	55	48	32	66	38	29	95	64	95
28-Jul	76	46	63	107	44	56	39	37	51	50	50	58	43	32	37	40	35	41	53	54	47	32	59	68	107
29-Jul	75	80	87	94	94	87	47	65	91	106	77	72	100	40	45	45	38	33	28	38	35	23	39	16	106
30-Jul	38	27	63	25	21	21	40	34	75	84	46	30	45	31	34	34	33	46	40	30	32	51	46	50	84
31-Jul	32	33	70	54	59	53	48	50	51	45	40	37	40	29	39	55	26	28	27	23	24	65	87	85	87
76 80 94 107 94 87 92 92 105 106 104 103 100 71 86 72 81 83 88 81 94 73 95 88																									
Diurnal Maximum																									

PF - Power Failure NS - Not in Service



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Waskow Ochi Pimatisiwin	Station number:	AMS 25
Calibration Date:	July 5, 2017	Last Cal Date:	NA
Start time (MST):	10:26	End time (MST):	12:40
Reason:	Install		

Calibration Standards

Cal Gas Concentration	<u>50.2</u>	ppm	Cal Gas Exp Date	April 19, 2021
Cal Gas Cylinder #	<u>EY0000817</u>			
Calibrator Make/Model	API T700		Serial Number	747
ZAG Make/Model	API 701		Serial Number	261

Analyzer Information

Analyzer make:	Thermo 43i	Analyzer serial #:	1160290014	
	<u>Start</u>	<u>Finish</u>	<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb	PMT voltage	-610	-610
Calculated slope	0.997721	Lamp voltage	840	844
Calculated intercept	0.042305	Pressure	722.7	723.0
Analyzer Background	15.3	Flow	0.434	0.438
Analyzer Coefficient	0.745	Intensity	93	90

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					
as found span					
calibrator zero	4999	0.0	0.0	-0.1	----
high point	4931	79.8	799.5	800.7	0.998
second point	4972	39.8	398.7	401.1	0.994
third point	4991	20.0	200.4	199.8	1.003
as left zero	4999	0.0	0.0	0.1	----
as left span	4931	79.8	799.5	800.1	0.999
Average Correction Factor					0.998
Corrected As found	NA	Previous response	NA	*% change	NA

* = > +/-5% change initiates investigation

Notes:

As founds were not completed as it is an install calibration. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

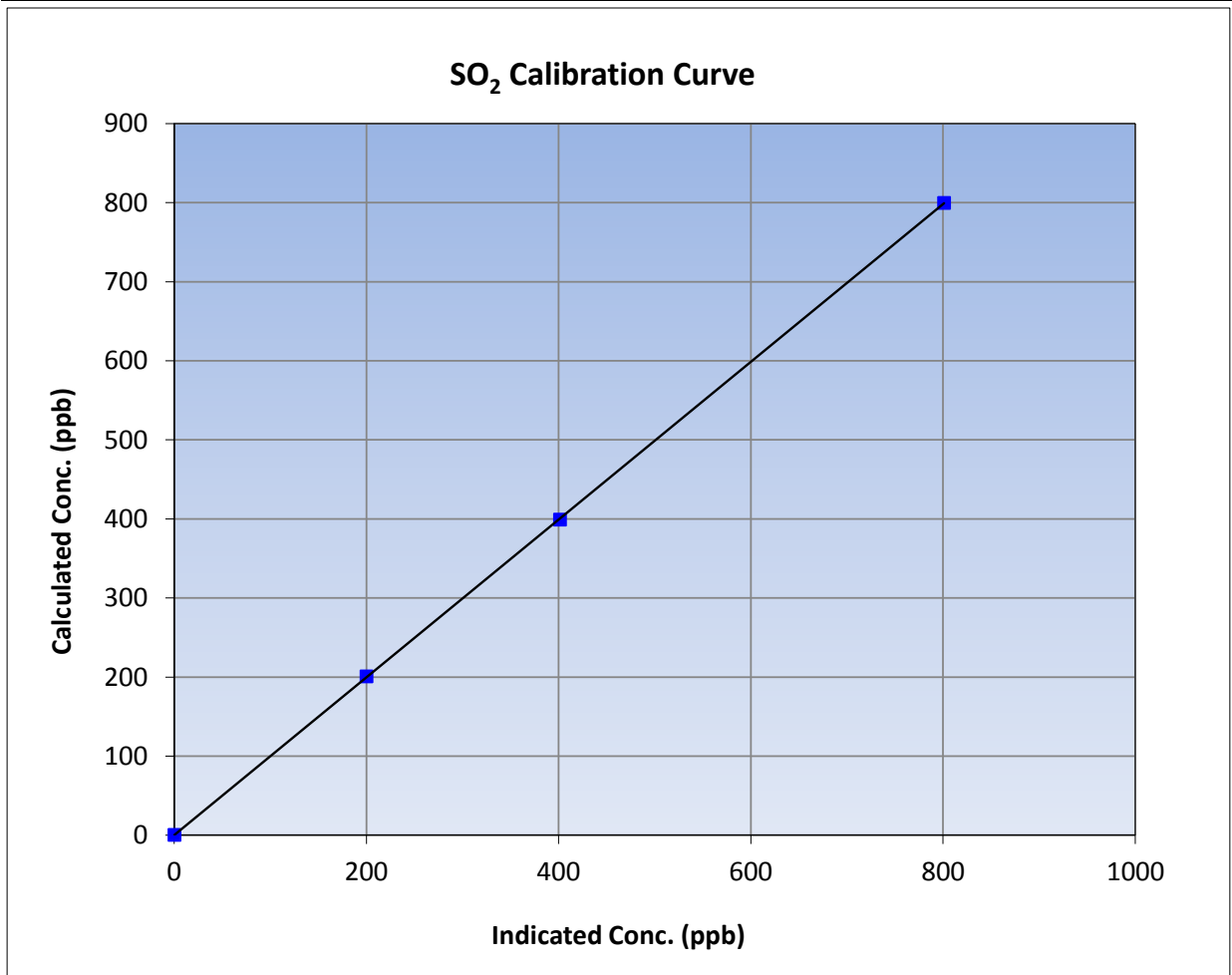
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	NA
Station Name	Waskow Ochi Pimatisiwin	Station Number	AMS 25
Start Time (MST)	10:26	End Time (MST)	12:40
Analyzer make	Thermo 43i	Analyzer serial #	1160290014

Calibration Data

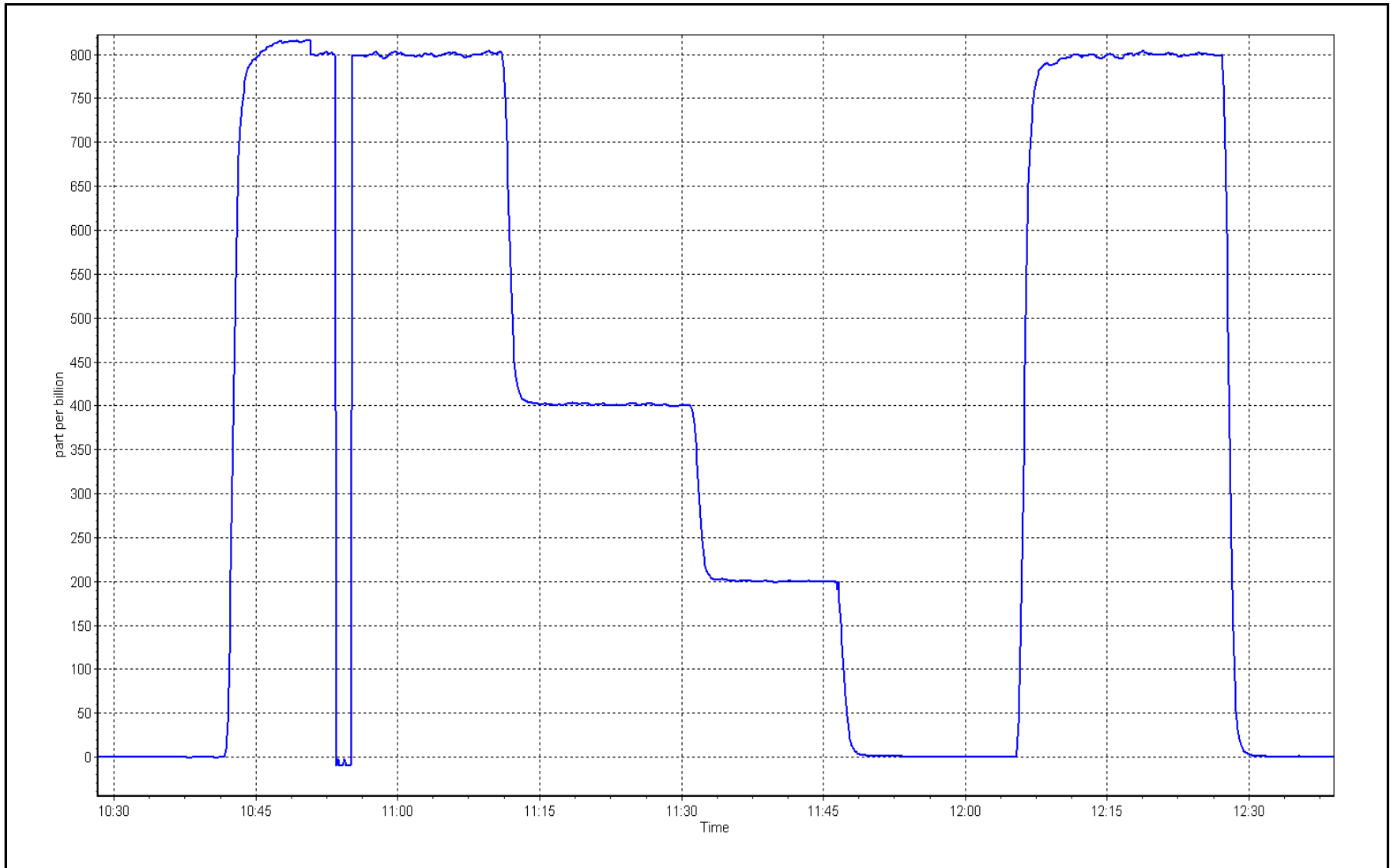
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.1	----	Correlation Coefficient	≥0.995
799.5	800.7	0.9985		
398.7	401.1	0.9939	Slope	0.90 - 1.10
200.4	199.8	1.0028		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 5, 2017

Location: Waskow Ochi Pimatisiwin





Wood Buffalo Environmental Association

H₂S Calibration Summary

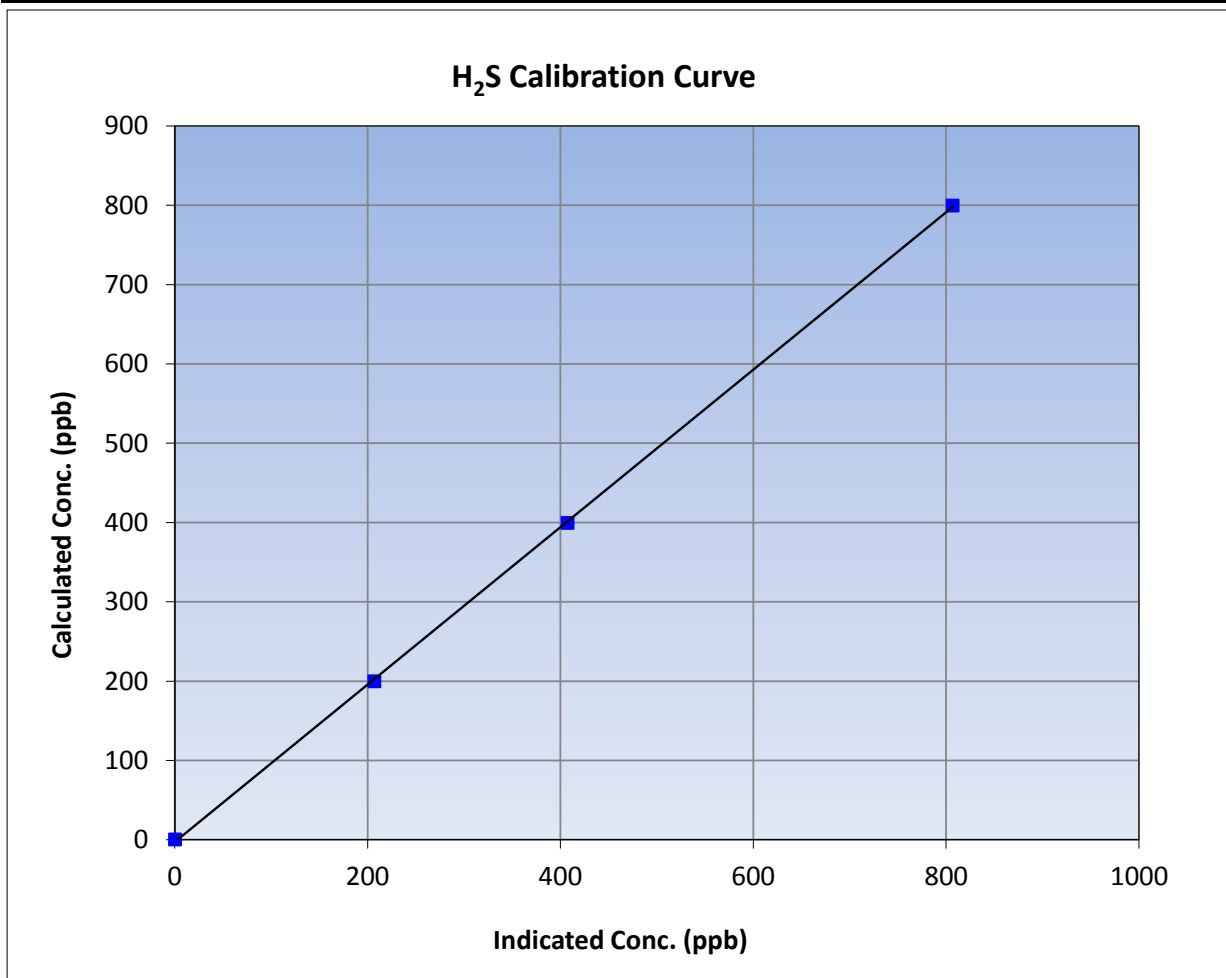
Version-03-2017

Station Information

Calibration Date	July 5, 2017	Previous Calibration	NA
Station Name	Waskow Ochi Pimatisiwin	Station Number	AMS 25
Start Time (MST)	12:26	End Time (MST)	16:13
Analyzer make	Thermo 450i	Analyzer serial #	822436967

Calibration Data

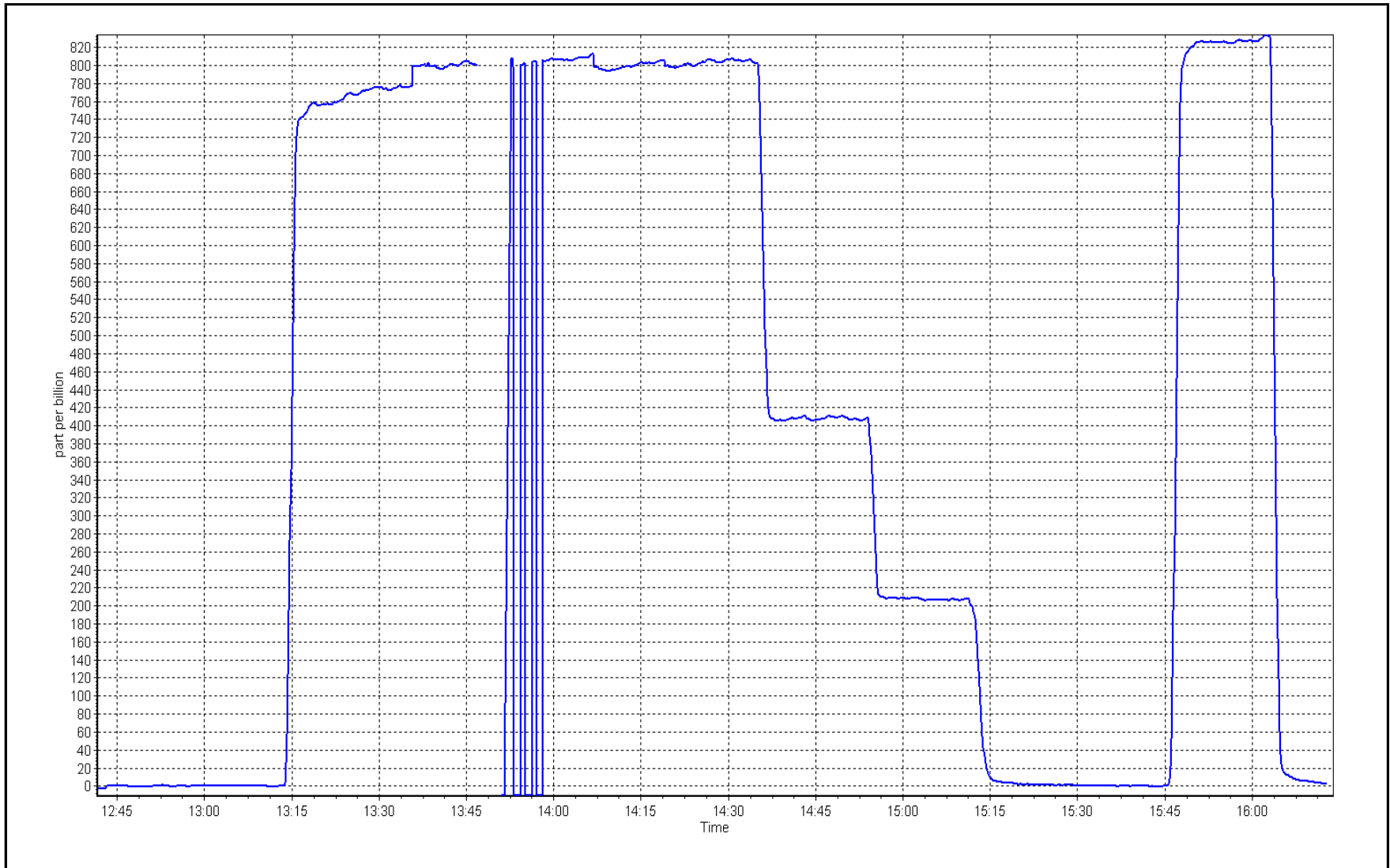
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999938	≥0.995
799.3	806.5	0.9911	Slope	0.992583	0.90 - 1.10
399.1	407.0	0.9806	Intercept	-2.890455	+/-3
199.5	206.5	0.9661			



H₂S Calibration Plot

Date: July 5, 2017

Location: Waskow Ochi Pimatisiwin





Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Waskow Ochi Pimatisiwin	Station Number:	AMS 25
Calibration Date:	July 5, 2017	Prev Cal Date:	NA
Start Time (MST):	11:55	End Time (MST):	13:02
Barometric Press:	NA	Station Temp:	23 Deg C
Reason:	Install		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	W15276
WS Calibrator:	MetOne 053	Serial Number:	WK13090

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	20.2	0.9981
400	39.4	39.3	1.0015
600	58.6	58.5	1.0003
800	77.8	77.7	1.0008
Average Correction Factor			1.0002

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999999	≥0.995
Calculated slope		1.000908	0.90 - 1.10
Calculated intercept		-0.015963	+/- 2

Wind Direction Information

Sensor make/model:	Met One 020C-1	Serial Number:	W16100
As Found Declination (deg west of North)	<u>NA</u>	As Left Declination (deg west of North)	<u>Solar Noon</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	89.6	1.0045
180	178.8	1.0067
270	268.8	1.0045
357	358.7	0.9953
Average Correction Factor		1.0027

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)		0.999973	≥0.995
Calculated slope		0.995762	0.90 - 1.10
Calculated intercept		1.098833	+/- 7

Notes: Install Calibration. New sensors. Marked declination using Solar noon.

Calibration Performed By: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 JULY 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	707	37	37	100	43	0	6	0
H2S (ppb) Average	709	34	35	99.87	2	0	0	0
NO2 (ppb) Average	670	36	74	94.89	19	0	4	-
NO (ppb) Average	670	36	74	94.89	32	-	5	-
NOX (ppb) Average	670	36	74	94.89	51	-	7	-
Temperature 2 m (C) Average	744	0	0	100	29.2	-	22.4	-
Relative Humidity (%) Average	744	0	0	100	99	-	91	-
Wind Speed 10 m (km/h) Average	744	0	0	100	27	-	17	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 JULY 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	707	1.4	4	-	0	0	0	0	1	4	43
H2S (ppb) Average	709	0.1	0	-	0	0	0	0	0	0	2
NO2 (ppb) Average	670	1.7	2	-	0	0	0	1	2	4	19
NO (ppb) Average	670	1.1	3	-	0	0	0	0	1	3	32
NOX (ppb) Average	670	2.8	5	-	0	0	0	1	3	7	51
Temperature 2 m (C) Average	744	18.07	4.9	-	8.4	11.7	14.2	17.7	22	24.5	29.2
Relative Humidity (%) Average	744	66.8	19	-	30	40	50	67	85	93	99
Wind Speed 10 m (km/h) Average	744	9.2	5	-	0	3	5	8	12	17	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	20 Jul 2017 15:00	20 Jul 2017 15:00	1	Maintenance - sample manifold cleaned
NO2, NO, NOX	23 Jul 2017 03:00	24 Jul 2017 13:00	35	Analyzer Failure - sample pump failure
NO2, NO, NOX	24 Jul 2017 14:00	24 Jul 2017 16:00	3	Maintenance - pump replacement and recalibration



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Christina Lake - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 43 ppb on Jul 25 02:00	Maximum Daily Average: 5.6 ppb on Jul 25
Minimum Value: 0 ppb on Jul 1 01:00	Hours of Data: 707
Maximum Diurnal Average: 2.5 ppb at hour 17	Hours of Missing Data: 37
Monthly Average: 1.4 ppb	Hours of Calibration: 37
Minimum Daily Average: 0.1 ppb on Jul 4	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.4 ppb at hour 7	
Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 4 P ₉₉ = 12	

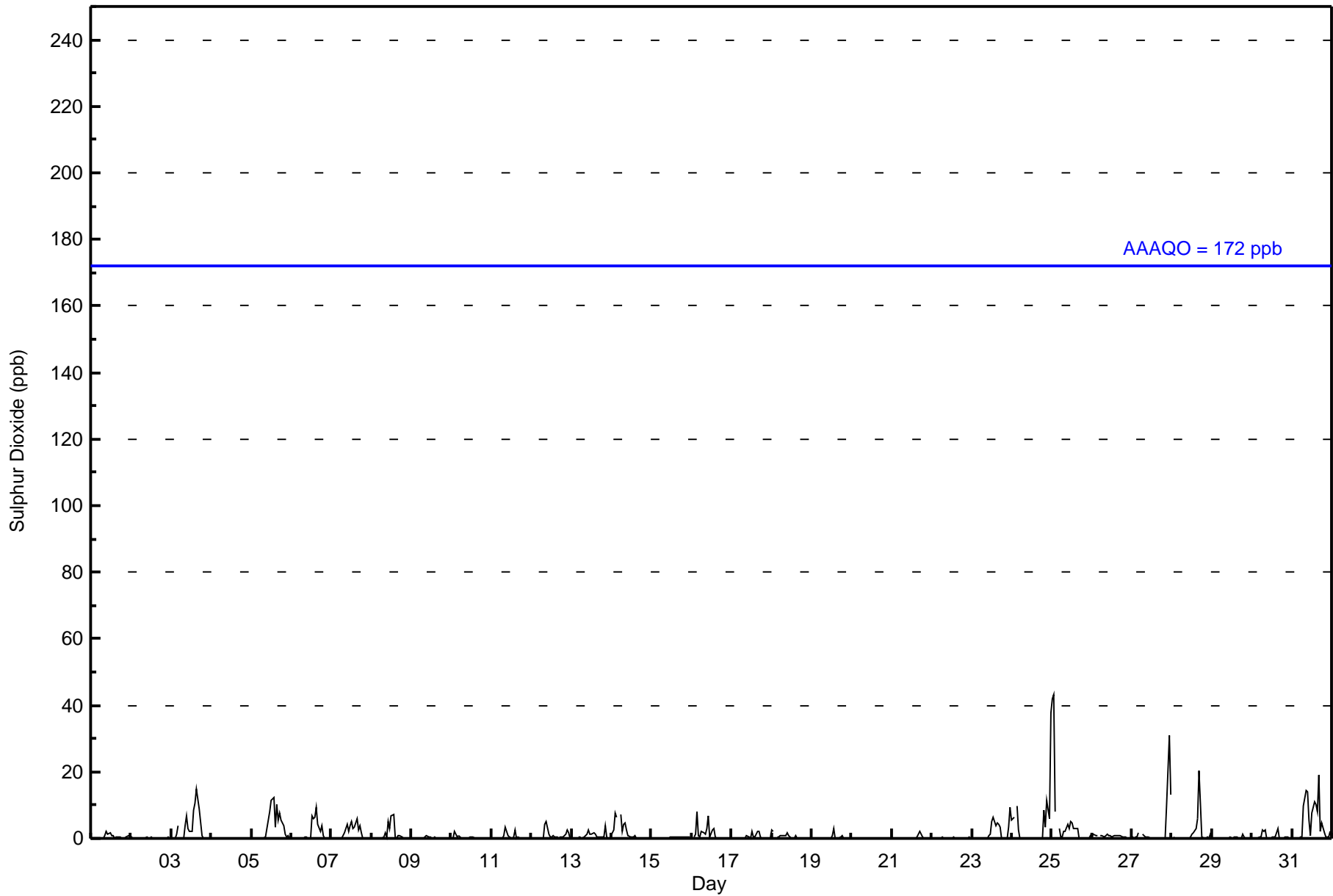
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	0	Z	0	0	0	0	1	2	1	2	1	1	0	0	1	1	0	0	0	0	1	1	0.5	2
2-Jul	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
3-Jul	0	0	0	1	4	Z	0	0	4	7	3	2	2	9	11	15	12	9	1	0	0	0	0	3.4	15	
4-Jul	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
5-Jul	0	Z	0	0	0	0	0	0	0	0	3	6	8	11	12	3	10	5	8	6	4	1	0	3.5	12	
6-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	7	6	7	9	4	2	4	1	0	0	0	1.8	9	
7-Jul	0	0	0	Z	0	0	0	1	2	4	2	4	5	3	3	6	2	4	2	0	0	0	0	1.7	6	
8-Jul	0	0	0	0	Z	0	0	1	2	0	5	3	7	7	1	0	1	1	0	0	0	0	0	1.2	7	
9-Jul	0	0	0	0	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
10-Jul	Z	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
11-Jul	0	Z	0	0	0	0	0	1	3	2	1	1	0	0	2	0	1	0	0	0	0	0	0	0.5	3	
12-Jul	0	0	Z	0	0	0	0	0	4	5	1	0	0	1	0	0	0	0	0	1	1	3	2	0.9	5	
13-Jul	0	0	0	Z	0	0	0	0	1	1	2	1	1	2	1	0	0	0	0	0	4	0	0	0.8	4	
14-Jul	2	2	8	6	Z	7	2	4	5	2	1	0	1	0	1	0	0	0	0	0	0	0	0	1.9	8	
15-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0.2	1	
16-Jul	Z	0	1	8	1	1	2	2	1	3	7	0	2	3	1	0	0	0	0	0	0	0	0	1.4	8	
17-Jul	0	Z	0	0	0	0	0	0	0	1	0	0	2	0	1	2	2	0	0	0	0	0	0	0.4	2	
18-Jul	3	2	Z	1	0	1	1	1	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0.6	3	
19-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0.3	3	
20-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	C	C	C	C	C	C	0	0	0	0	0	--	0	
21-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0.2	2	
22-Jul	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	
23-Jul	0	Z	0	0	0	0	0	0	0	0	1	1	5	6	4	5	4	3	0	0	0	3	9	1.9	9	
24-Jul	6	6	Z	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	9	3	12	6	38	4.0	38	
25-Jul	42	43	8	Z	3	1	1	2	2	4	3	5	5	3	3	3	0	0	0	0	0	0	1	5.6	43	
26-Jul	0	1	1	1	Z	1	1	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0.7	1	
27-Jul	0	0	0	0	2	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	10	31	13	2.6	31	
28-Jul	Z	0	0	0	0	0	0	0	0	0	0	1	2	3	6	20	10	0	0	0	1	0	1	2.0	20	
29-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0.2	1	
30-Jul	0	0	Z	0	0	0	2	2	3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0.6	3	
31-Jul	0	0	0	Z	0	0	1	10	15	14	6	1	8	11	10	8	19	2	5	2	0	0	1	2	4.9	19
2.1 2.2 0.8 1.1 0.5 0.4 0.4 0.8 1.5 1.8 1.4 1.0 2.1 2.4 1.8 2.4 2.5 1.5 0.7 0.6 0.4 0.9 1.5 2.2																								Diurnal Average		
42 43 8 10 4 7 2 10 15 14 7 8 11 12 11 15 20 10 6 9 4 12 31 38																								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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	691	97.74	97.74
11 - 20	12	1.70	99.43
21 - 60	4	0.57	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: 707

Total Number of Hours: 744



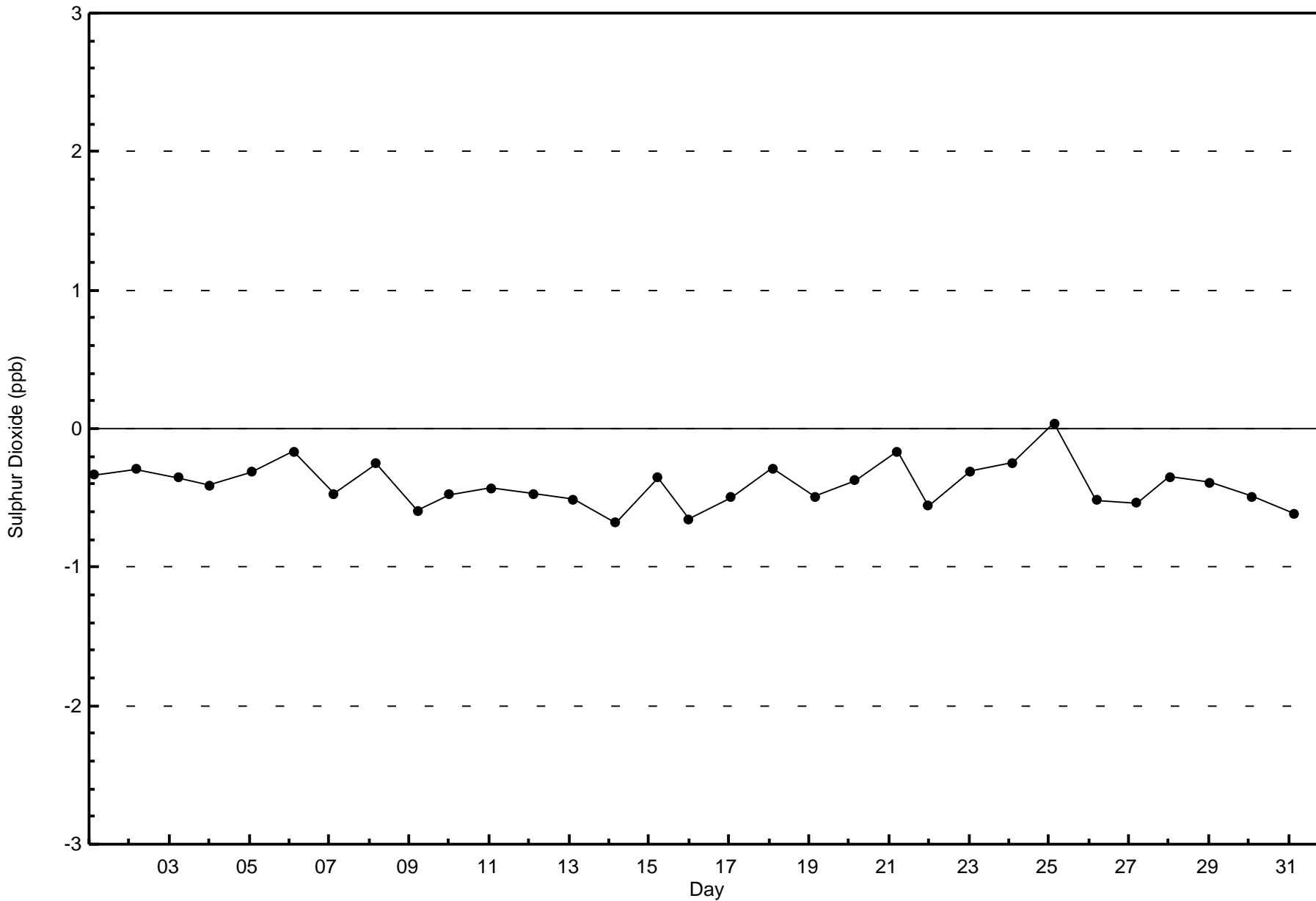
Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - July 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	17	23	19	23	18	31	32	58	81	53	86	90	53	48	40	19	691
11 - 20	0	0	0	0	0	0	0	0	0	0	0	1	1	10	0	0	12
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
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	17	23	19	23	18	31	32	58	81	53	86	91	54	62	40	19	707

Total Number of Valid Hours: 707

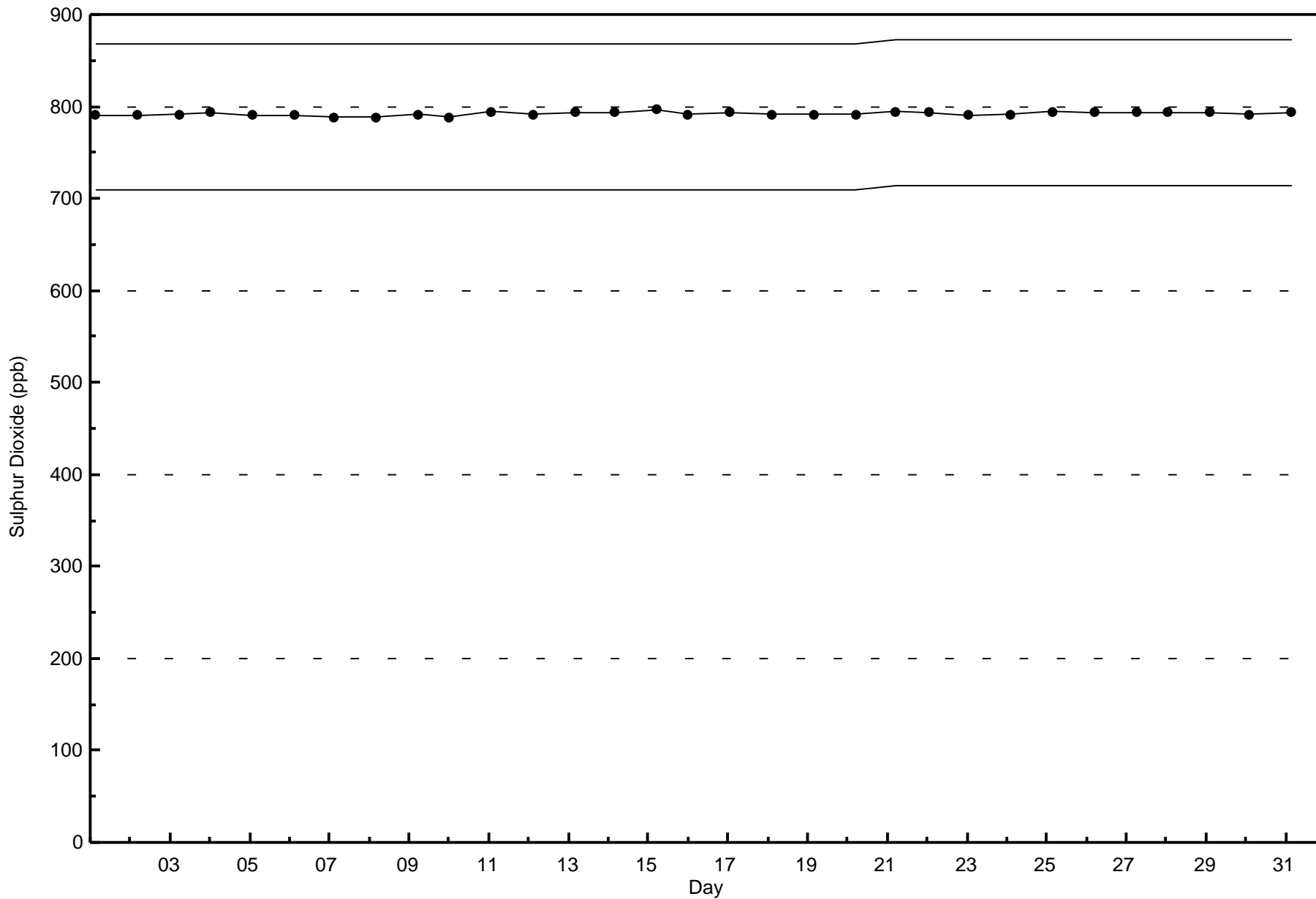
Total Number of Hours: 744





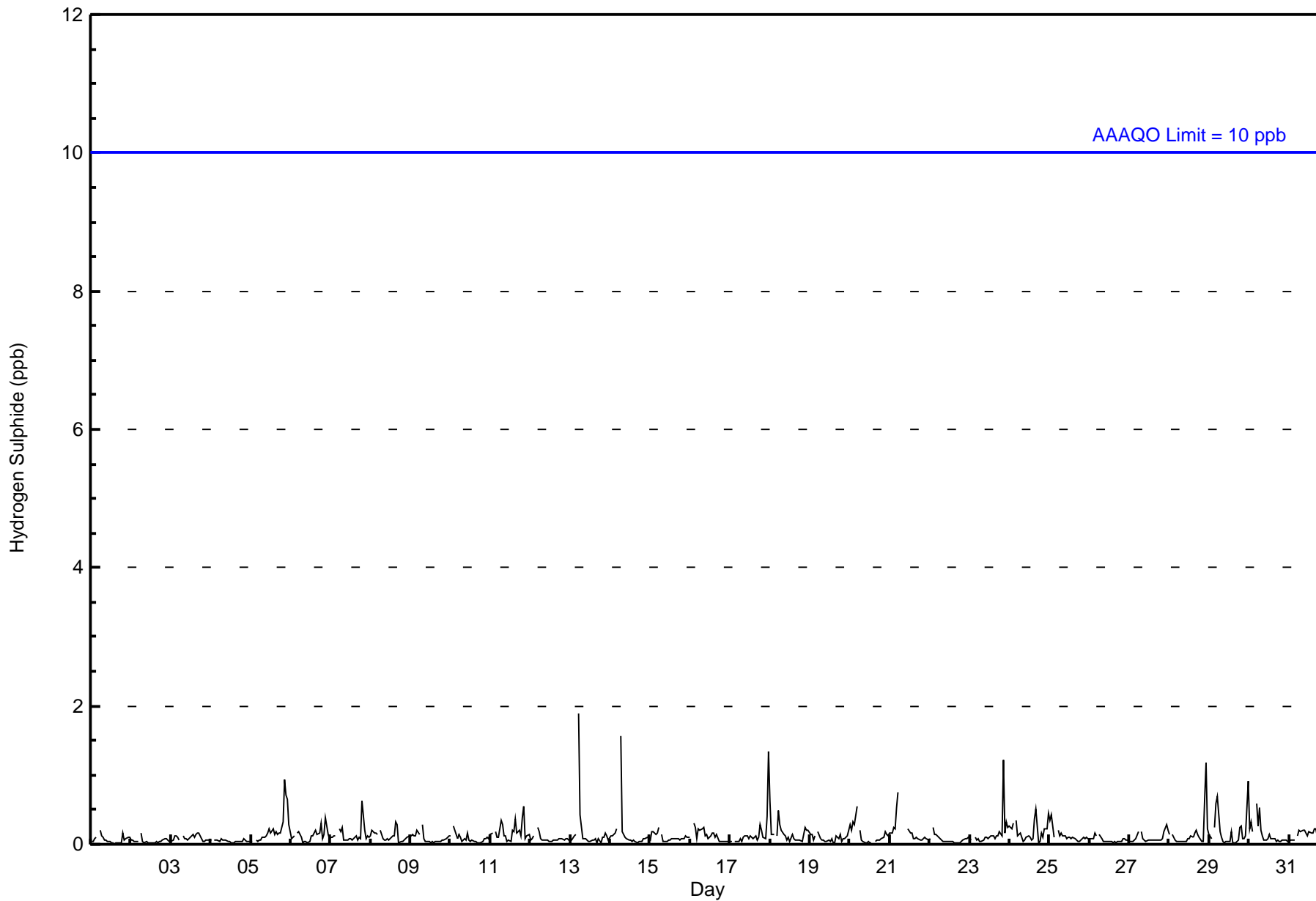
Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Christina Lake - July 2017





Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744														
Maximum Value: 2 ppb on Jul 13 06:00														Maximum Daily Average: 0.2 ppb on Jul 5														
Minimum Value: 0 ppb on Jul 1 15:00														Minimum Daily Average: 0.0 ppb on Jul 4														
Maximum Diurnal Average: 0.3 ppb at hour 6														Minimum Diurnal Average: 0.1 ppb at hour 11														
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 Data: 709														
														Hours of Missing Data: 35														
														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-Jul	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	
2-Jul	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	0	
3-Jul	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	0.1	0	
4-Jul	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	0	
5-Jul	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	0.2	1	
6-Jul	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	
7-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.1	1	
8-Jul	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	
9-Jul	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	0.1	0	
10-Jul	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	
11-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
12-Jul	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	
13-Jul	0	0	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
14-Jul	0	0	0	0	0	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
15-Jul	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	0.1	0	
16-Jul	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	
17-Jul	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	0.2	1	
18-Jul	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	0.2	1	
19-Jul	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	
20-Jul	0	0	0	0	1	Z	0	0	0	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0.1	1	
21-Jul	0	0	0	0	1	1	Z	0	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
22-Jul	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	
23-Jul	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
24-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.2	1	
25-Jul	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	
26-Jul	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	
27-Jul	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	0.1	0	
28-Jul	0	Z	0	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
29-Jul	0	0	Z	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1	
30-Jul	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	0.1	1	
31-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1	
0.1 0.1 0.2 0.1 0.2 0.3 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 0.2 0.2 0.2																								Diurnal Average				
1 0 0 0 1 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	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: 709

Total Number of Hours: 744



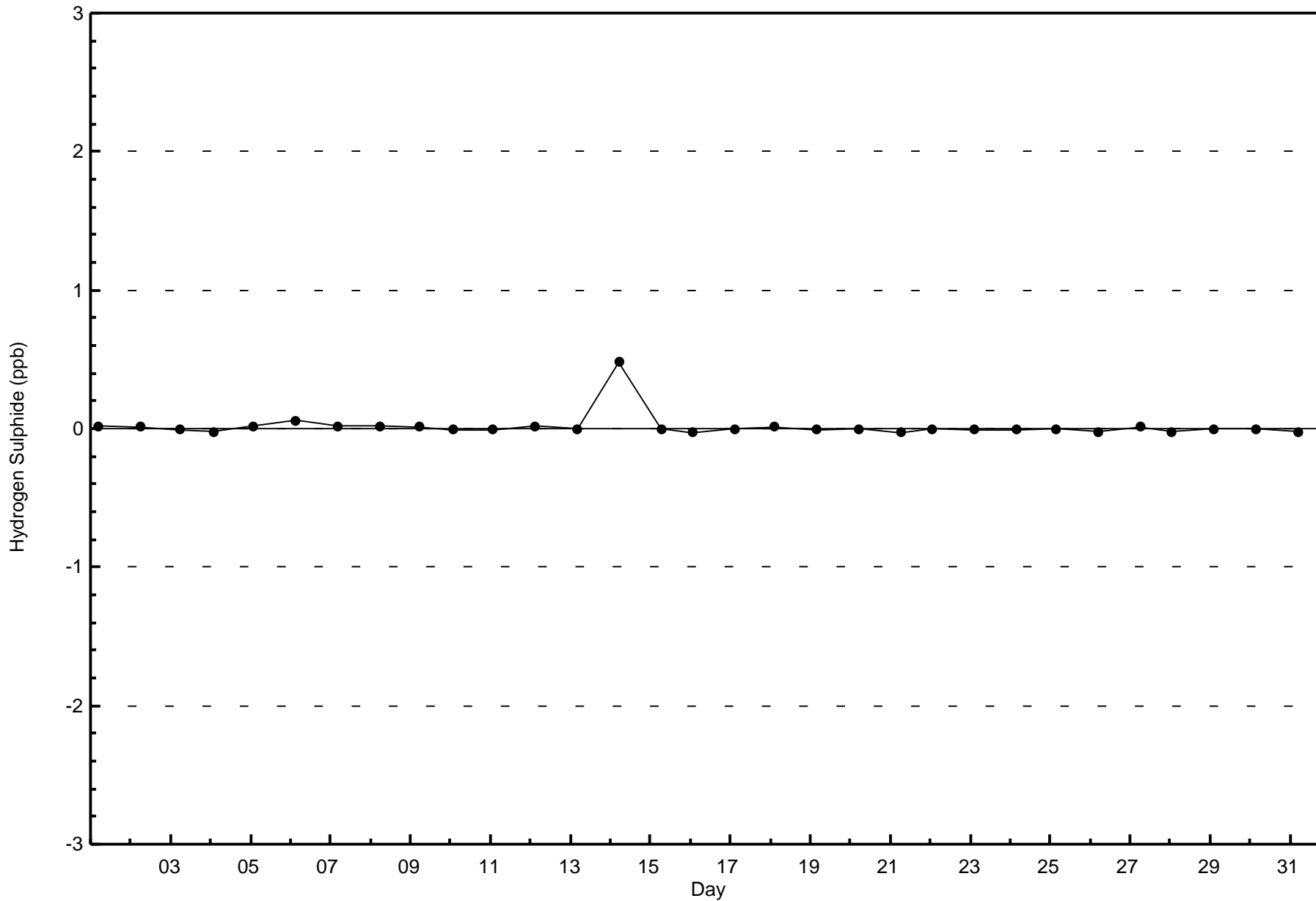
**Wood Buffalo Environmental Association
Frequency Distribution**

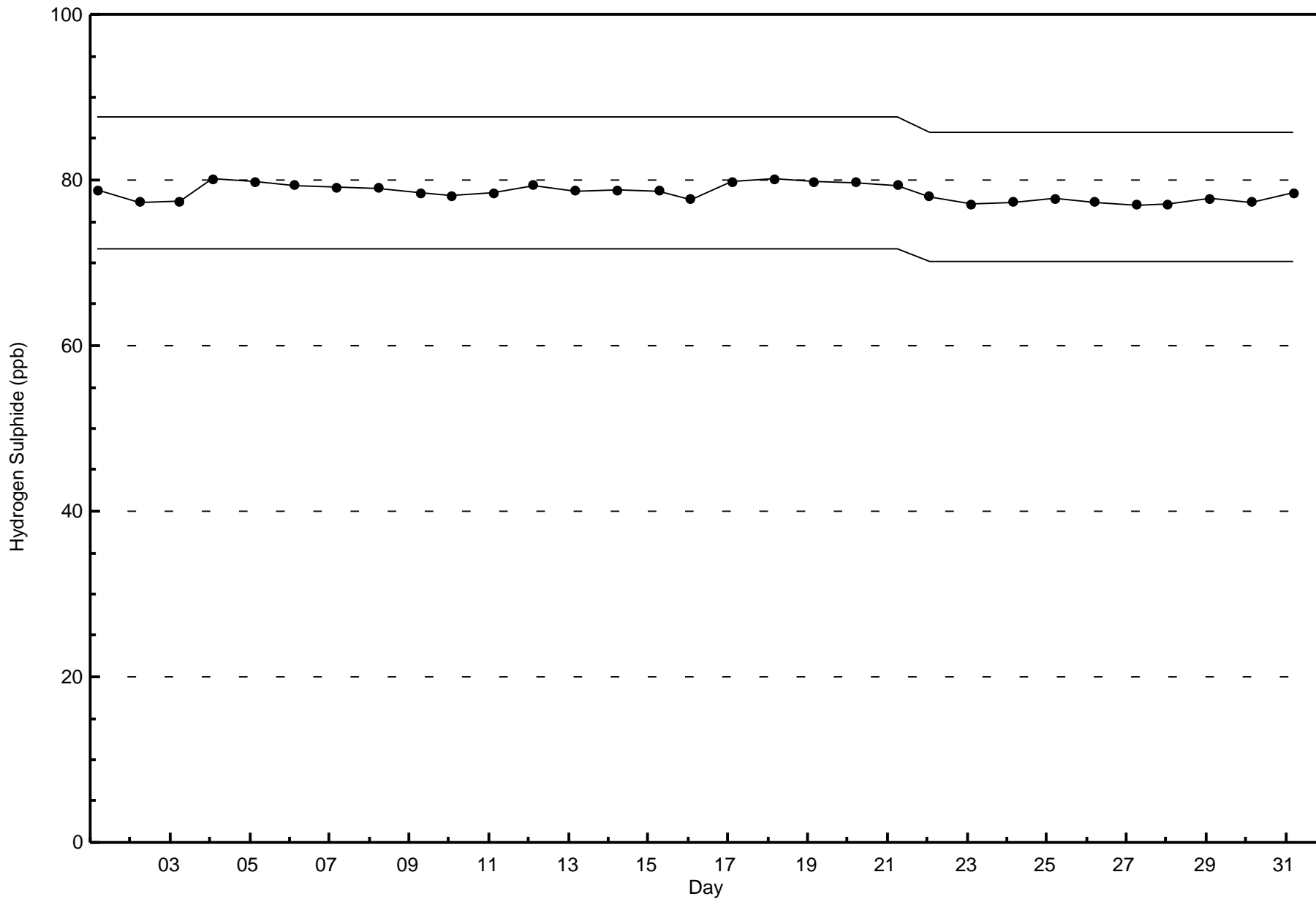
**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	16	23	17	24	18	36	30	60	81	51	88	90	54	62	39	20	709
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	16	23	17	24	18	36	30	60	81	51	88	90	54	62	39	20	709

Total Number of Valid Hours: 709

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

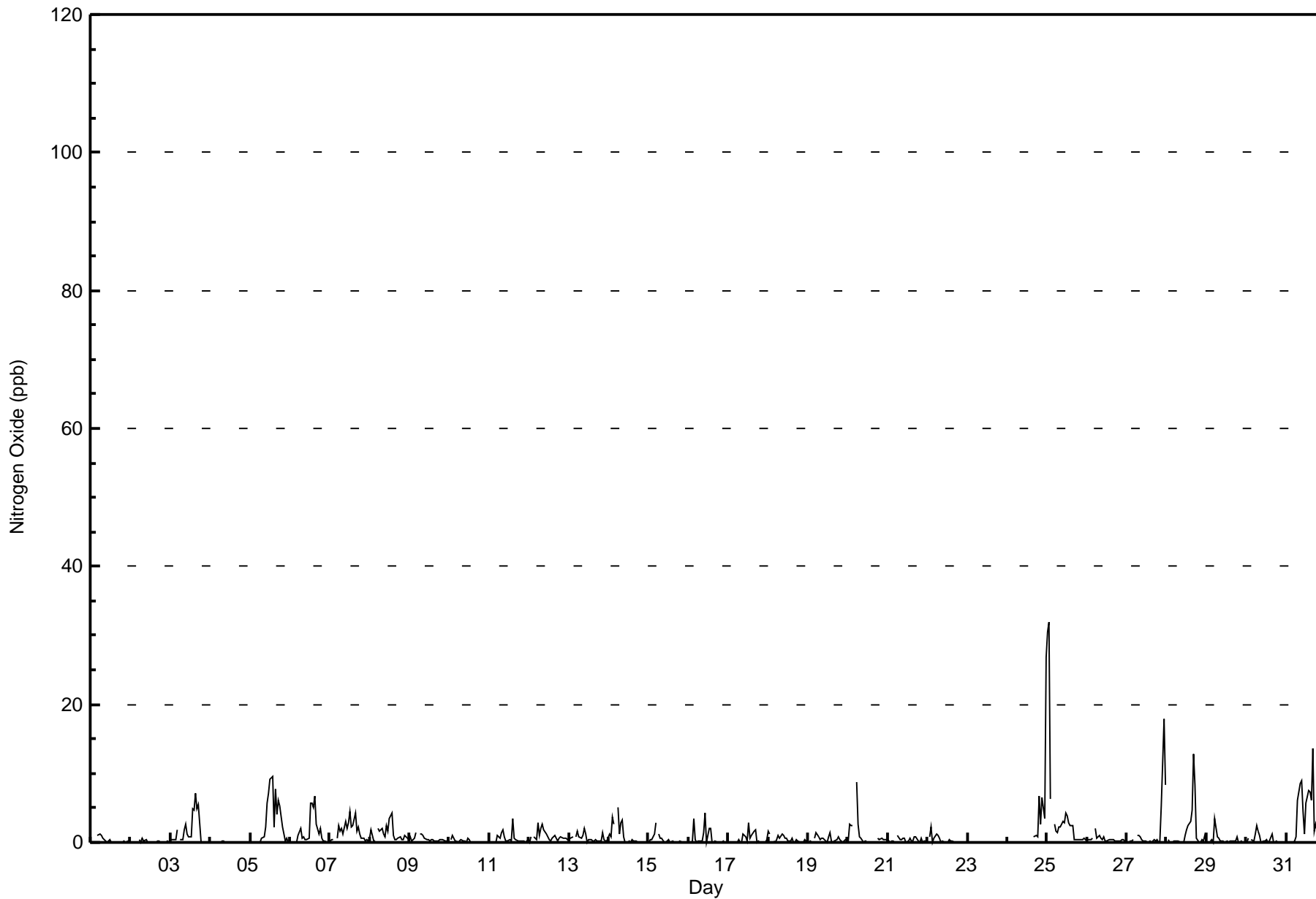
Nitrogen Oxide (NO) - ppb
Christina Lake - July 2017

Maximum Value: 32 ppb on Jul 25 02:00																	Maximum Daily Average: 4.5 ppb on Jul 25																	Hours in Service: 744	
Minimum Value: 0 ppb on Jul 1 01:00																	Minimum Daily Average: 0.0 ppb on Jul 4																	Hours of Data: 670	
Maximum Diurnal Average: 1.8 ppb at hour 2																	Minimum Diurnal Average: 0.3 ppb at hour 21																	Hours of Missing Data: 74	
Monthly Average: 1.1 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 3 P ₉₉ = 9																	Hours of Calibration: 36	
																																		Percent Operational Time: 94.9	
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-Jul	0	0	0	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1									
2-Jul	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									
3-Jul	0	0	0	0	2	Z	0	0	2	3	1	1	5	5	7	5	6	0	0	0	0	0	0	1.7	7										
4-Jul	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										
5-Jul	0	Z	0	0	0	0	0	1	1	2	6	7	9	10	2	8	4	6	5	2	1	0	1	0	2.8	10									
6-Jul	0	0	Z	0	0	1	2	1	1	0	0	1	6	6	5	7	3	1	2	1	0	0	0	1.6	7										
7-Jul	0	0	0	Z	1	2	2	2	1	3	2	3	4	2	2	4	2	2	1	1	1	0	0	1.6	4										
8-Jul	1	2	0	0	Z	2	2	2	1	1	2	2	3	4	1	0	0	1	1	0	0	1	1	0	1.3	4									
9-Jul	1	0	0	1	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	1										
10-Jul	Z	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1										
11-Jul	0	Z	0	0	0	1	1	1	2	1	0	0	0	4	1	1	0	0	0	0	0	0	0	0.6	4										
12-Jul	0	1	Z	1	0	3	1	2	3	2	1	1	0	0	1	1	1	0	1	1	1	1	1	0	0.9	3									
13-Jul	0	1	1	Z	1	2	1	1	1	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0.6	2										
14-Jul	1	1	4	3	Z	5	1	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	5										
15-Jul	0	0	0	1	3	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	3										
16-Jul	Z	0	0	3	0	0	0	0	0	1	4	0	2	2	0	0	0	0	0	0	0	0	0	0.7	4										
17-Jul	0	Z	0	0	0	0	1	0	0	1	1	0	3	1	1	2	2	0	0	0	0	0	0	0.5	3										
18-Jul	2	1	Z	0	0	0	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0.5	2										
19-Jul	0	0	0	Z	1	2	1	0	1	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0.5	2										
20-Jul	0	3	2	3	Z	9	3	1	1	0	0	0	C	C	C	C	C	C	1	0	1	0	0	--	9										
21-Jul	0	0	0	0	0	Z	1	0	1	1	1	0	0	1	0	0	1	1	0	0	1	0	0	0.4	1										
22-Jul	Z	1	2	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2										
23-Jul	0	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0										
24-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	1	1	1	7	3	7	4	27	--	27									
25-Jul	30	32	6	Z	3	2	1	2	2	3	3	4	4	3	3	2	0	0	0	0	0	0	1	0	4.5	32									
26-Jul	0	0	0	1	Z	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.5	2										
27-Jul	0	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	18	8	1.7	18									
28-Jul	Z	0	0	0	0	0	0	0	0	0	1	2	2	3	5	13	8	1	0	0	0	0	1	1.6	13										
29-Jul	0	Z	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	3										
30-Jul	0	1	Z	0	0	1	3	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.5	3										
31-Jul	0	0	0	Z	0	0	1	6	9	9	5	1	6	7	7	6	14	2	3	1	0	0	0	3.3	14										
1.5 1.8 0.8 0.6 0.6 1.6 0.9 1.1 1.2 1.2 1.1 0.8 1.6 1.7 1.3 1.6 1.6 1.1 0.6 0.5 0.3 0.6 0.9 1.3																								Diurnal Average											
30 32 6 3 3 9 3 6 9 9 6 7 9 10 7 8 14 8 5 7 3 7 18 27																								Diurnal Maximum											
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure																								



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Christina Lake - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	667	99.55	99.55
21 - 40	3	0.45	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 670

Total Number of Hours: 744



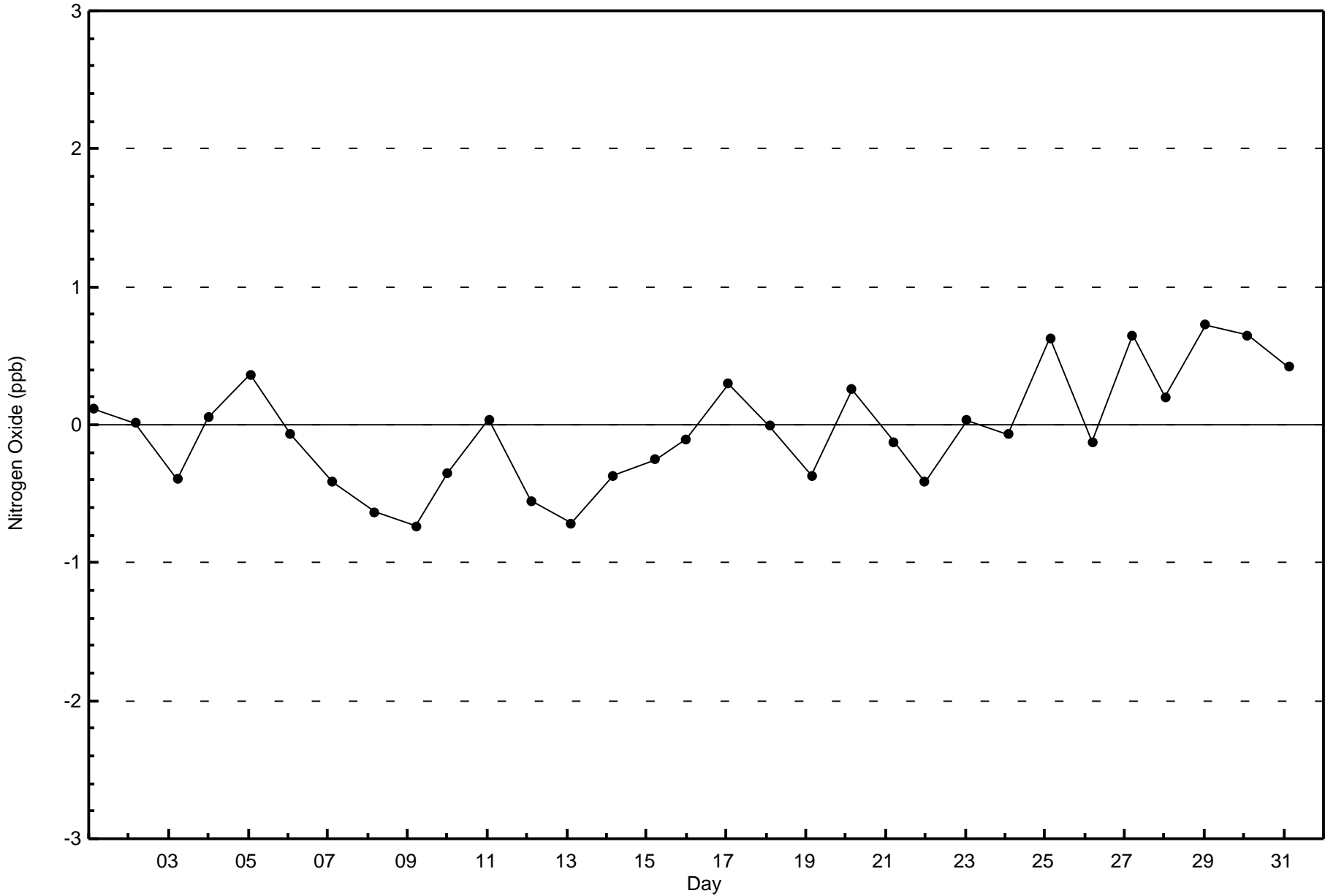
**Wood Buffalo Environmental Association
Frequency Distribution**

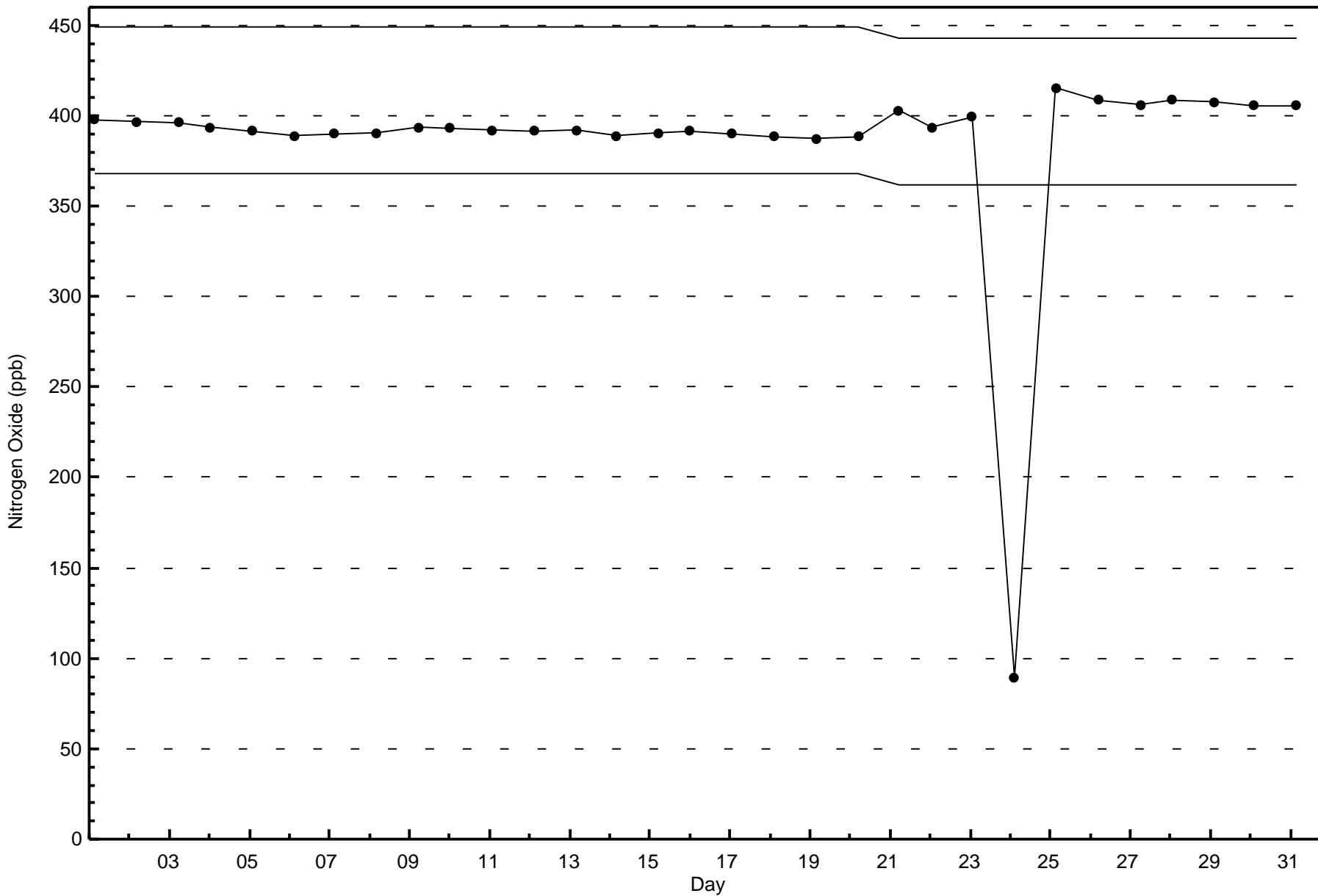
**Nitrogen Oxide (NO) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	12	19	19	23	18	31	32	58	81	53	82	88	49	53	34	15	667
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	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	12	19	19	23	18	31	32	58	81	53	82	88	49	56	34	15	670

Total Number of Valid Hours: 670

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Christina Lake - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19 ppb on Jul 25 02:00	Maximum Daily Average: 3.6 ppb on Jul 5		Hours of Data:	670
Minimum Value: 0 ppb on Jul 1 02:00	Minimum Daily Average: 0.2 ppb on Jul 4		Hours of Missing Data:	74
Maximum Diurnal Average: 2.1 ppb at hour 2	Minimum Diurnal Average: 0.9 ppb at hour 20		Hours of Calibration:	36
Monthly Average: 1.7 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 11		Percent Operational Time:	94.9

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-Jul	0	0	0	Z	2	2	1	2	2	2	1	1	1	0	0	0	0	0	0	1	3	3	3	2	1.1	3
2-Jul	2	0	1	2	Z	1	1	2	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0.7	2
3-Jul	1	1	2	5	4	Z	0	1	4	5	3	2	2	6	7	11	8	9	1	0	0	0	0	3.1	11	
4-Jul	Z	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.2	1
5-Jul	0	Z	0	0	0	0	1	1	2	3	6	7	8	8	4	8	5	7	8	4	3	2	4	2	3.6	8
6-Jul	0	0	Z	1	1	2	3	2	1	1	1	1	5	6	6	7	3	2	3	1	0	1	0	0	2.0	7
7-Jul	0	0	0	Z	0	2	2	3	3	4	3	4	5	3	3	6	3	4	2	0	0	1	2	2	2.2	6
8-Jul	2	4	0	0	Z	4	5	5	3	1	6	4	7	8	2	0	2	2	1	0	2	2	2	3	2.8	8
9-Jul	2	0	0	0	2	Z	1	3	3	2	1	1	1	0	0	1	0	0	1	1	1	1	2	2	1.1	3
10-Jul	Z	1	5	2	2	1	1	2	3	1	1	2	2	1	0	0	0	0	0	0	1	1	2	2	1.3	5
11-Jul	2	Z	1	1	1	1	3	4	6	4	1	1	1	1	7	2	2	1	1	1	1	1	1	2	1.9	7
12-Jul	1	2	Z	1	2	5	2	3	4	4	2	1	1	1	1	1	1	1	1	3	3	3	3	0	1.9	5
13-Jul	0	0	1	Z	3	2	1	1	2	3	2	0	1	1	1	0	0	0	0	0	6	0	0	0	1.0	6
14-Jul	4	6	9	7	Z	8	2	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	9
15-Jul	0	5	4	3	4	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1.2	5
16-Jul	Z	1	2	8	2	1	3	4	3	3	8	1	4	3	1	0	0	0	0	0	0	0	0	0	1.8	8
17-Jul	0	Z	0	0	0	0	1	0	0	3	2	1	4	1	2	3	2	1	1	0	0	1	3	2	1.1	4
18-Jul	4	2	Z	2	1	2	2	2	2	2	1	1	0	1	1	0	0	1	0	0	0	0	0	0	1.0	4
19-Jul	1	1	0	Z	0	2	1	0	0	0	0	0	0	2	0	0	0	1	1	1	0	0	0	1	0.5	2
20-Jul	0	3	4	4	Z	3	2	0	0	0	0	0	C	C	C	C	C	C	0	0	0	1	3	1	--	4
21-Jul	0	1	4	0	0	Z	1	0	1	0	0	0	0	0	1	2	3	0	1	1	0	0	0	0	0.7	4
22-Jul	Z	1	2	1	2	3	2	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	1.4	3
23-Jul	2	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2
24-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	0	1	1	7	3	7	3	17	--	17
25-Jul	17	19	4	Z	2	1	0	2	2	3	2	3	3	2	2	2	0	0	0	0	0	0	0	1	2.8	19
26-Jul	0	1	1	2	Z	3	1	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0.7	3
27-Jul	0	0	1	1	3	Z	4	4	3	2	1	1	0	0	1	0	2	2	4	1	2	7	19	10	2.9	19
28-Jul	Z	3	0	0	0	2	1	0	0	0	0	1	2	3	3	5	11	8	1	0	0	3	2	2	2.0	11
29-Jul	1	Z	1	0	0	2	1	1	0	0	0	0	1	1	0	0	0	2	1	0	0	0	0	0	0.6	2
30-Jul	0	2	Z	1	2	4	5	4	4	1	1	1	1	1	3	0	0	0	0	0	0	1	0	0	1.4	5
31-Jul	0	0	0	Z	0	0	2	6	7	7	4	2	5	7	6	6	12	2	5	1	0	1	2	2	3.2	12

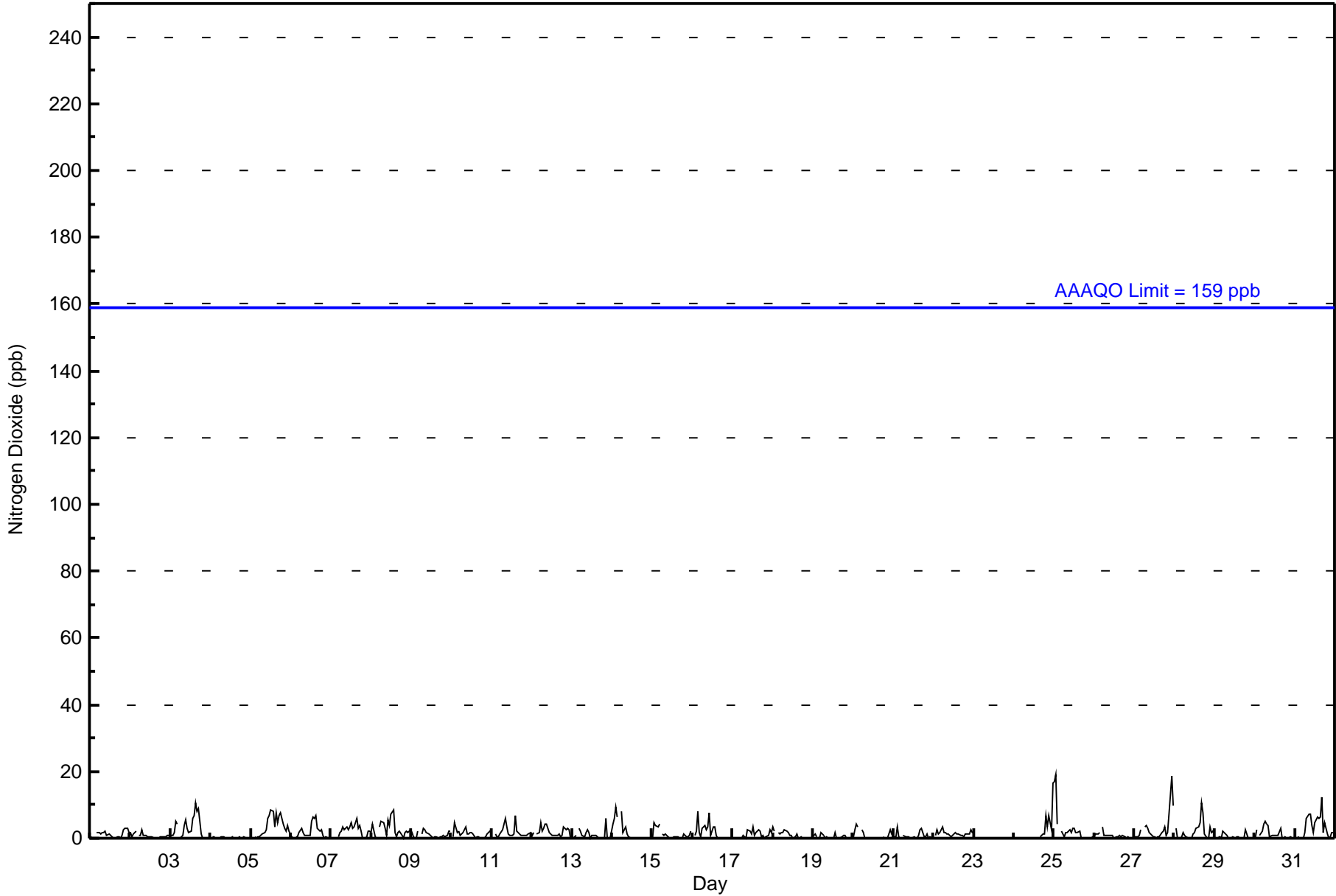
1.6	2.1	1.7	1.7	1.4	2.1	1.6	2.0	2.1	1.9	1.6	1.2	1.9	2.1	1.8	2.1	1.9	1.6	1.1	0.9	0.9	1.3	1.8	1.8	Diurnal Average	
17	19	9	8	4	8	5	6	7	7	8	7	8	8	7	11	12	9	8	7	6	7	19	17	Diurnal Maximum	

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
Christina Lake - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	670	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: 670

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - July 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	12	19	19	23	18	31	32	58	81	53	82	88	49	56	34	15	670
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	12	19	19	23	18	31	32	58	81	53	82	88	49	56	34	15	670

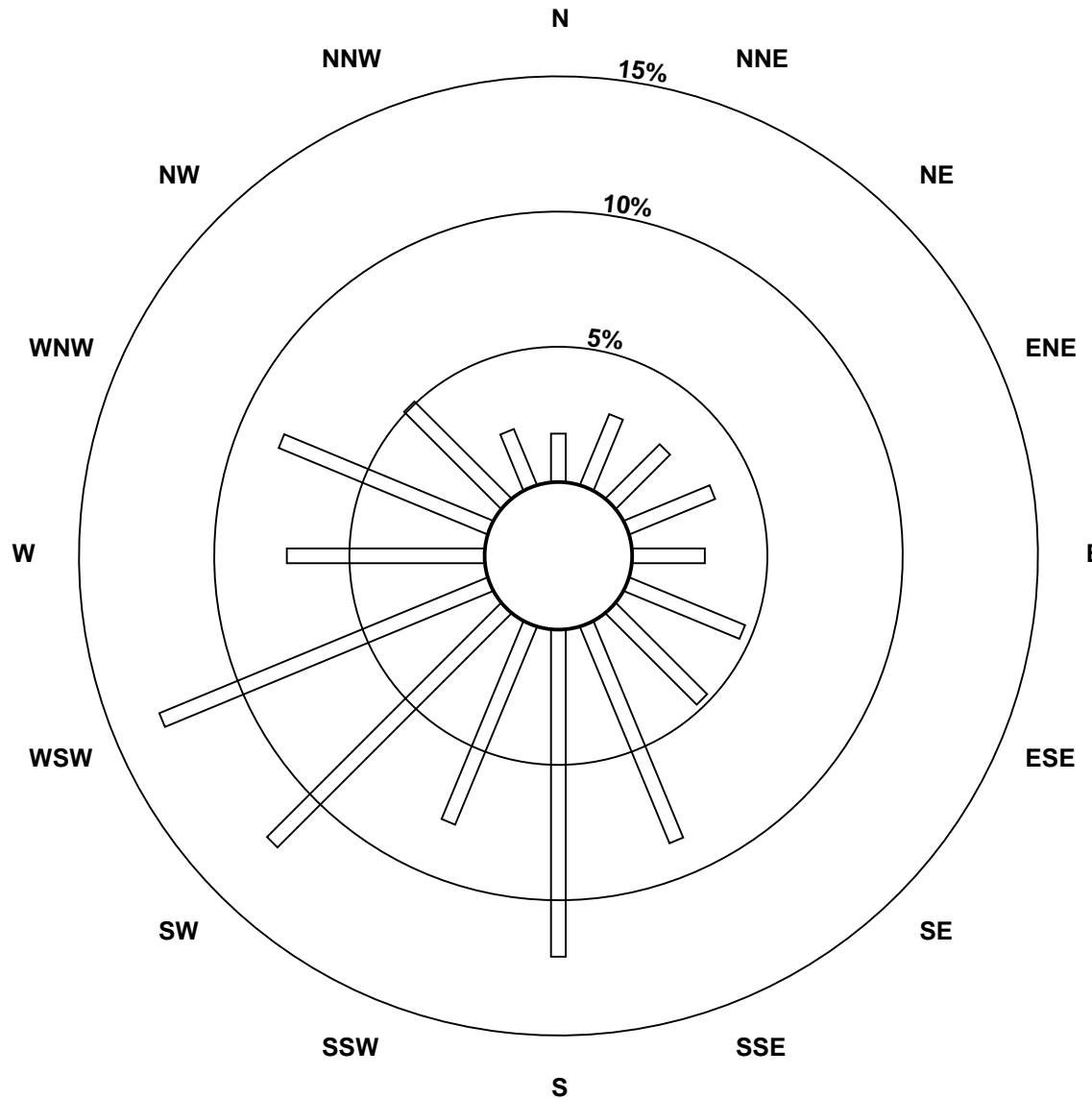
Total Number of Valid Hours: 670

Total Number of Hours: 744

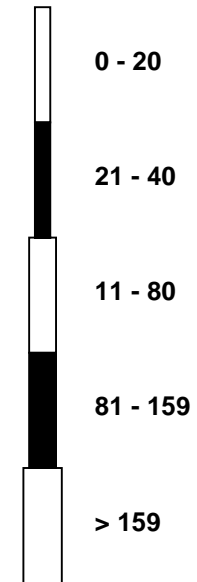


Wood Buffalo Environmental Association
Wind Rose Jul 2017

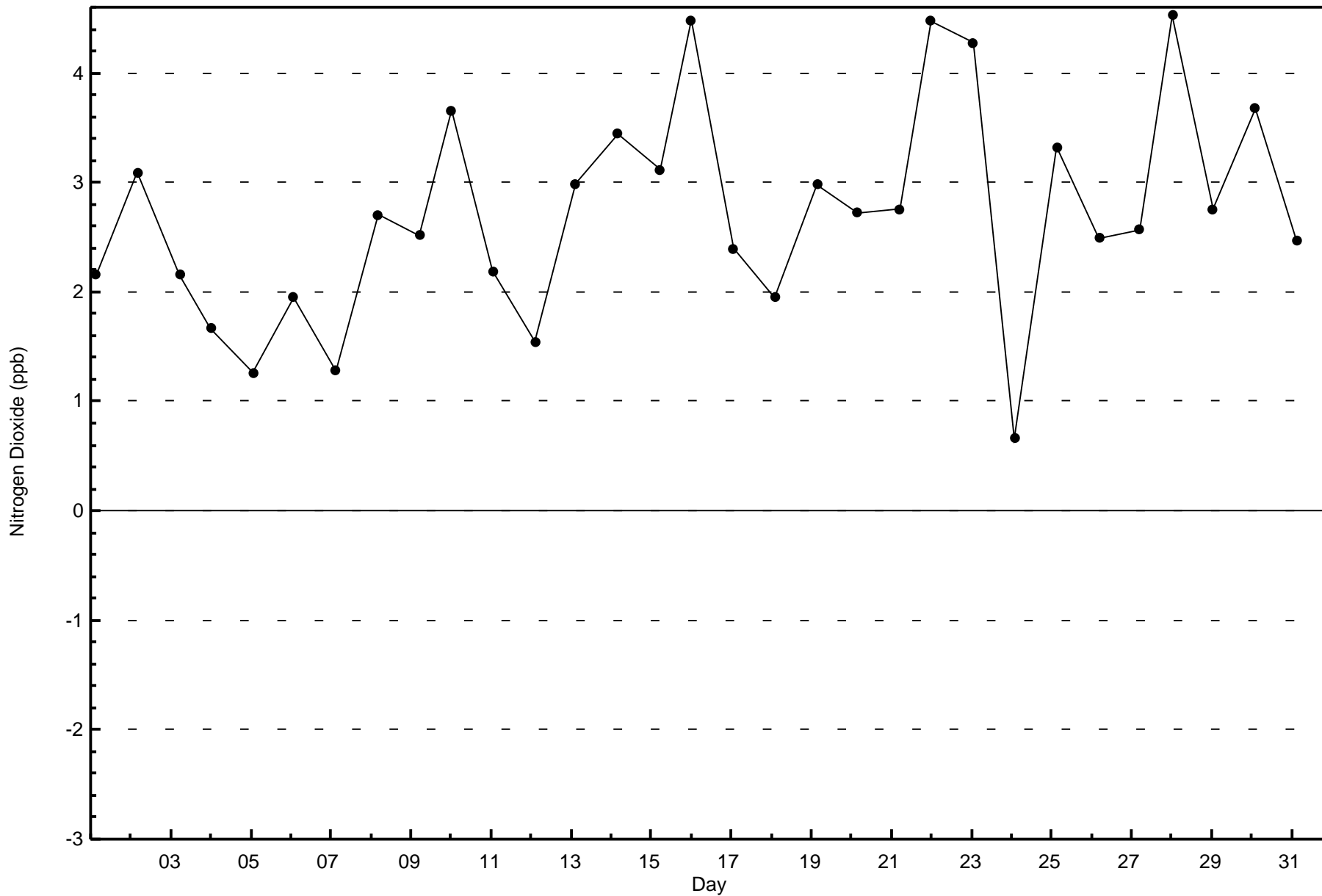
Nitrogen Dioxide (NO₂) - ppb
Christina Lake (AMS 500)

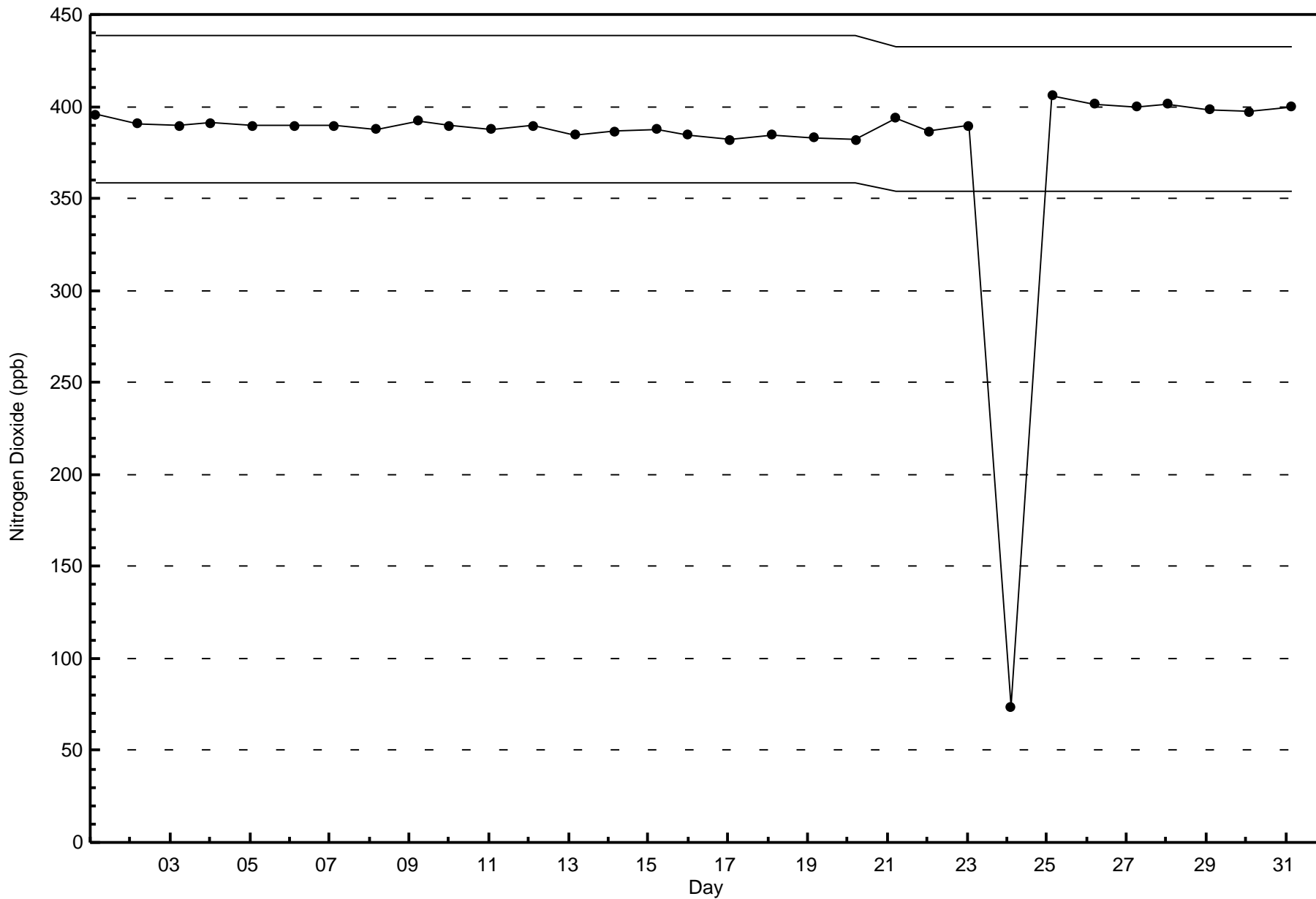


Classes (ppb)



Total Number of Valid Hours: 670







Wood Buffalo Environmental Association
Summary of Hour Averages

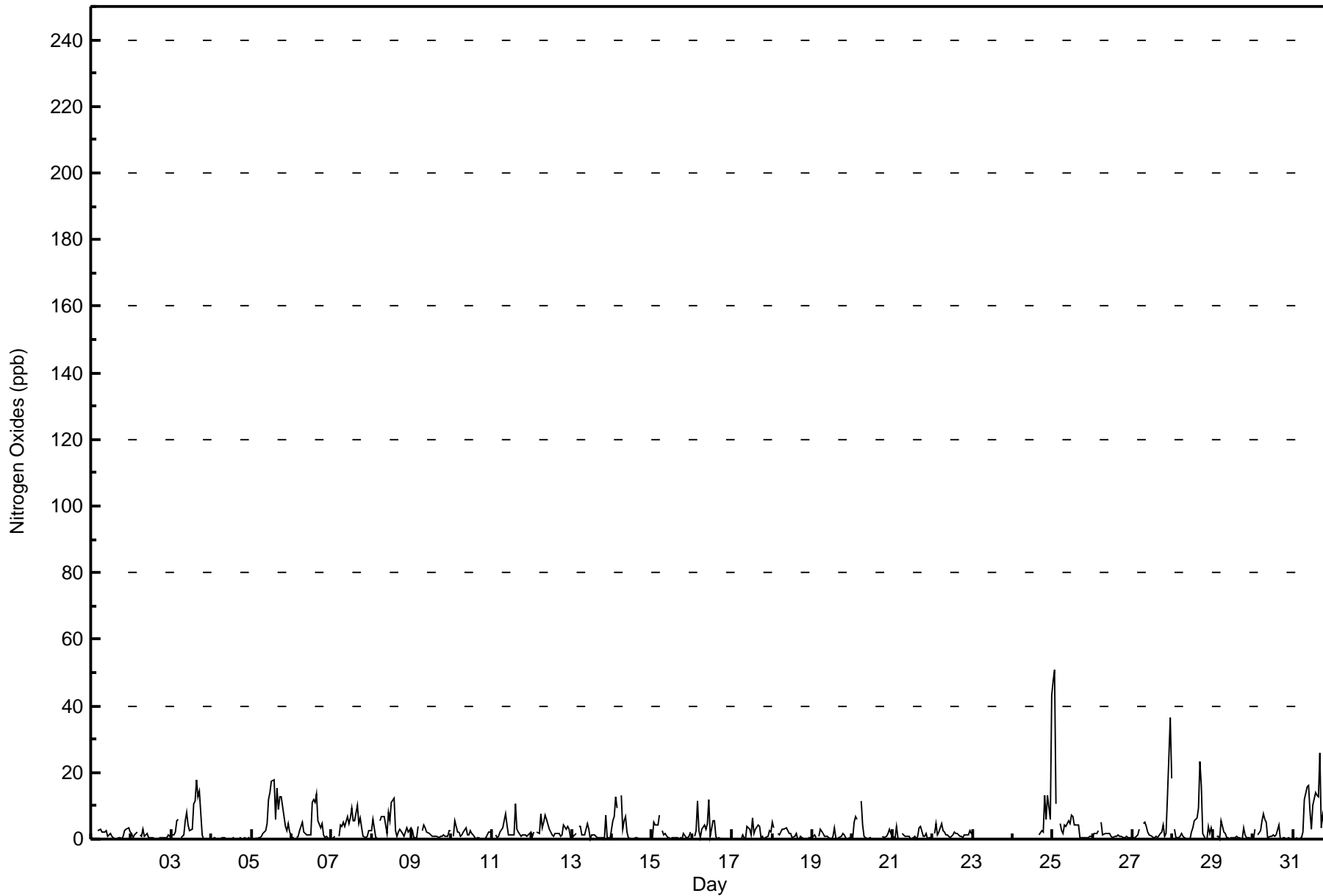
Nitrogen Oxides (NO_x) - ppb
Christina Lake - July 2017

Maximum Value: 51 ppb on Jul 25 02:00																	Maximum Daily Average: 7.3 ppb on Jul 25							Hours in Service: 744																		
Minimum Value: 0 ppb on Jul 1 02:00																	Minimum Daily Average: 0.2 ppb on Jul 4							Hours of Data: 670																		
Maximum Diurnal Average: 3.9 ppb at hour 2																	Minimum Diurnal Average: 1.3 ppb at hour 21							Hours of Missing Data: 74																		
Monthly Average: 2.8 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 3 P ₉₀ = 7 P ₉₉ = 17							Hours of Calibration: 36																		
																	Percent Operational Time: 94.9																									
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-Jul	0	0	0	Z	2	3	2	2	2	2	1	2	1	0	0	0	0	0	0	1	3	3	3	2	1.3	3																
2-Jul	2	0	1	2	Z	1	1	3	1	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0.8	3																
3-Jul	1	1	2	5	6	Z	1	1	6	8	4	3	3	11	11	18	13	14	1	0	0	0	0	4.8	18																	
4-Jul	Z	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2	1																	
5-Jul	0	Z	0	0	0	0	1	2	2	5	12	14	18	18	6	15	9	13	13	7	4	2	5	2	6.4	18																
6-Jul	0	0	Z	1	1	3	5	2	2	1	1	1	11	12	11	14	6	3	5	1	0	1	0	0	3.5	14																
7-Jul	0	0	1	Z	1	4	4	5	4	7	5	6	9	5	6	10	5	6	3	1	1	1	3	2	3.8	10																
8-Jul	2	6	1	0	Z	5	7	7	4	2	8	5	11	12	3	1	2	3	2	1	2	3	2	3	4.0	12																
9-Jul	3	1	0	1	4	Z	2	4	4	2	2	1	1	1	1	1	0	1	1	1	1	1	3	2	1.6	4																
10-Jul	Z	1	6	2	2	1	1	2	3	1	1	3	2	1	0	0	0	0	0	0	0	1	2	2	1.5	6																
11-Jul	2	Z	1	0	1	2	3	6	8	4	1	1	1	10	3	2	1	1	1	1	1	1	1	2	2.5	10																
12-Jul	1	2	Z	2	2	8	3	5	7	6	3	2	1	1	2	2	2	1	1	4	3	4	3	1	2.8	8																
13-Jul	1	1	2	Z	4	4	1	1	3	5	3	0	1	1	0	0	0	0	0	0	7	0	0	0	1.6	7																
14-Jul	6	7	13	9	Z	13	3	5	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.9	13																
15-Jul	0	5	4	4	7	Z	2	1	2	1	0	0	1	0	0	0	0	0	0	2	1	1	1	2	1.5	7																
16-Jul	Z	1	2	11	2	1	3	4	3	5	12	1	5	5	1	0	0	0	0	0	0	0	0	0	2.5	12																
17-Jul	0	Z	0	0	0	0	1	0	0	4	3	1	6	2	3	4	4	1	1	0	0	1	3	2	1.6	6																
18-Jul	5	4	Z	2	1	2	3	3	3	3	2	2	0	1	2	0	0	1	0	0	0	0	0	0	1.5	5																
19-Jul	1	1	0	Z	1	3	2	1	1	1	0	0	1	3	0	0	0	1	2	1	0	0	0	1	0.9	3																
20-Jul	0	5	7	6	Z	11	4	1	1	0	0	0	C	C	C	C	C	C	1	0	1	2	3	2	--	11																
21-Jul	1	1	4	1	0	Z	2	1	1	1	1	0	0	1	0	1	3	4	1	1	2	0	1	0	1.1	4																
22-Jul	Z	2	5	1	2	5	2	2	1	1	1	1	1	2	2	2	1	1	0	1	1	1	2	2	1.7	5																
23-Jul	2	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	2																
24-Jul	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	43																
25-Jul	48	51	11	Z	5	3	2	4	4	6	5	7	7	4	4	4	0	0	0	0	0	0	1	1	7.3	51																
26-Jul	1	2	2	2	Z	5	1	2	2	2	2	1	0	1	1	1	1	1	1	0	1	1	0	0	1.2	5																
27-Jul	0	0	1	1	3	Z	5	5	4	2	1	0	0	1	0	2	2	4	1	2	13	37	18	4.5	37																	
28-Jul	Z	3	0	0	1	2	1	0	0	0	0	2	4	5	6	9	23	16	2	0	0	4	2	3	3.7	23																
29-Jul	1	Z	1	1	0	6	2	2	0	0	0	0	0	0	1	0	0	0	3	1	0	0	0	0	0.9	6																
30-Jul	0	3	Z	1	3	5	7	6	5	1	1	1	1	1	1	4	0	0	0	0	0	1	0	0	1.8	7																
31-Jul	0	0	0	Z	0	0	2	12	16	16	8	3	10	14	13	13	26	3	7	2	0	1	2	2	6.5	26																
																	3.1	3.9	2.5	2.4	2.0	3.6	2.6	3.1	3.3	3.1	2.7	2.1	3.5	3.7	3.1	3.7	3.5	2.6	1.7	1.4	1.3	1.8	2.7	3.2	Diurnal Average	
																	48	51	13	11	7	13	7	12	16	16	12	14	18	18	13	18	26	16	13	13	7	13	37	43	Diurnal Maximum	
Z - zerospan			C - Calibration				M - Maintenance				AF - Analyzer Failure																															



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Christina Lake - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Christina Lake - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	664	99.10	99.10
21 - 40	3	0.45	99.55
41 - 80	3	0.45	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 670

Total Number of Hours: 744



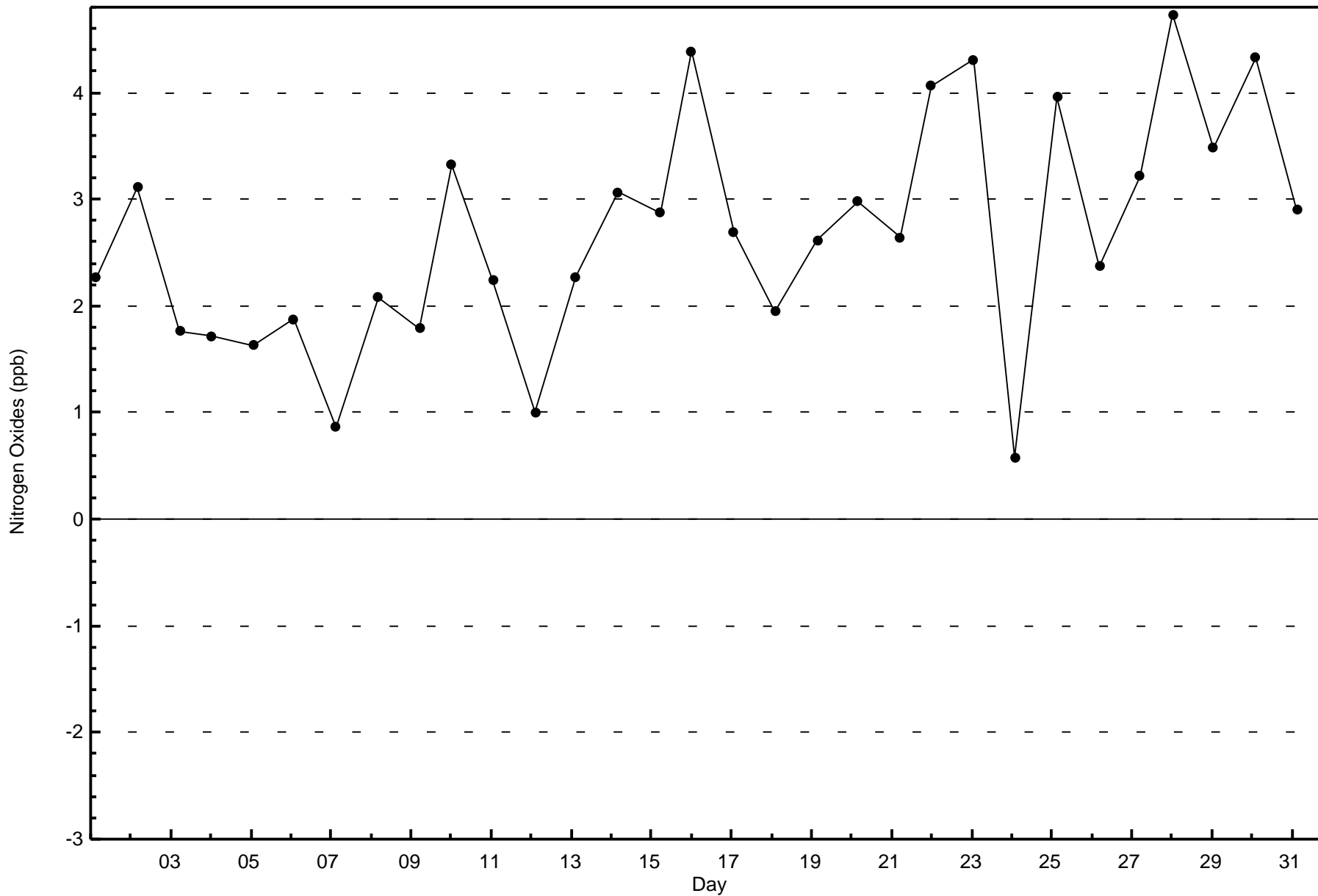
**Wood Buffalo Environmental Association
Frequency Distribution**

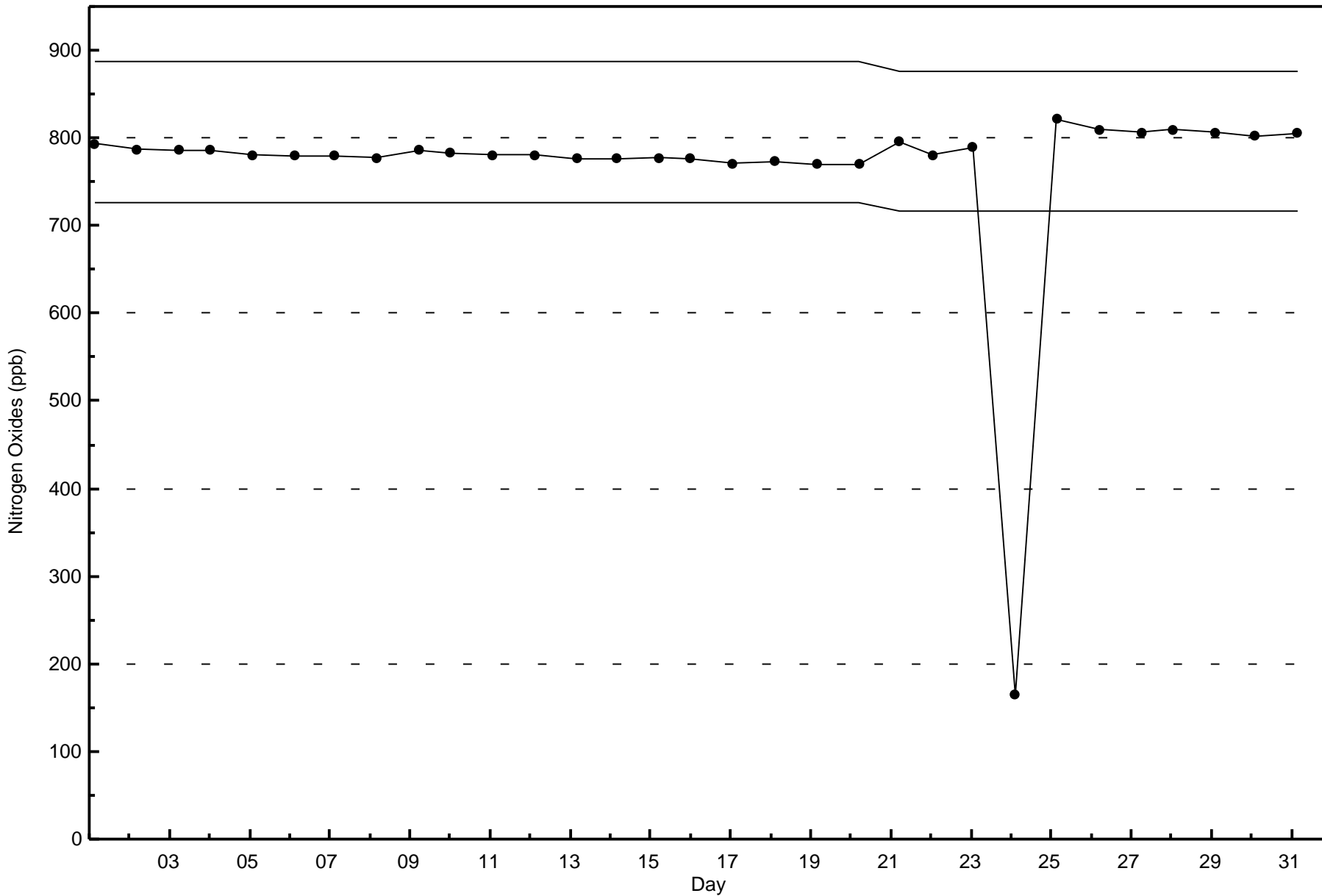
**Nitrogen Oxides (NO_x) - ppb
Christina Lake - July 2017**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	12	19	19	23	18	31	32	58	81	53	82	88	49	50	34	15	664
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	3	0	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	12	19	19	23	18	31	32	58	81	53	82	88	49	56	34	15	670

Total Number of Valid Hours: 670

Total Number of Hours: 744







Wood Buffalo Environmental Association
Summary of Hour Averages

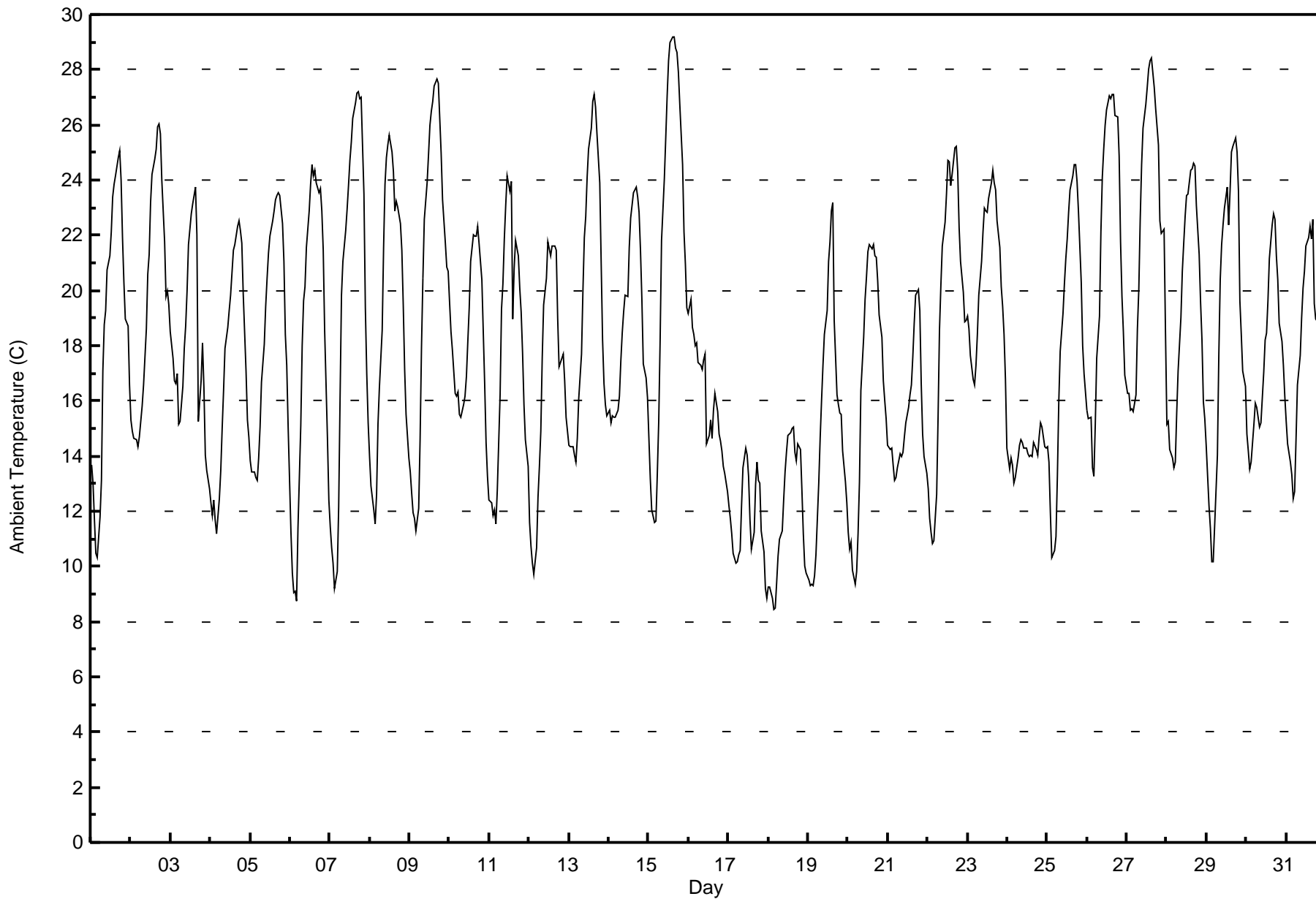
Ambient Temperature (AT) - C
Christina Lake - July 2017

Maximum Value: 29.2 C on Jul 15 16:00 Maximum Daily Average: 22.4 C on Jul 27																						Hours in Service: 744																											
Minimum Value: 8.4 C on Jul 18 04:00 Minimum Daily Average: 11.7 C on Jul 17																						Hours of Data: 744																											
Maximum Diurnal Average: 22.7 C at hour 17 Minimum Diurnal Average: 12.5 C at hour 5																						Hours of Missing Data: 0																											
Monthly Average: 18.07 C Percentiles: P₁ = 9.2 P₁₀ = 11.7 Q₁ = 14.2 Median = 17.7 Q₃ = 22.0 P₉₀ = 24.5 P₉₉ = 28.3																						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-Jul	13.7	13.0	11.7	10.5	10.3	11.8	13.1	17.1	18.8	19.3	20.8	21.3	22.1	23.4	23.9	24.1	24.8	25.1	24.0	21.9	20.3	19.0	18.7	16.6	18.5	25.1																							
2-Jul	15.3	14.9	14.7	14.6	14.3	14.7	15.2	15.8	16.6	18.6	20.6	21.3	23.2	24.2	24.8	25.1	25.9	26.0	25.7	24.0	21.7	19.8	20.0	19.4	19.9	26.0																							
3-Jul	18.5	17.5	16.8	16.6	17.0	15.1	15.2	16.5	17.9	18.7	20.0	21.7	22.8	23.1	23.4	23.8	22.0	15.3	16.7	18.1	16.5	14.0	13.5	12.8	18.1	23.8																							
4-Jul	12.3	11.9	12.4	11.7	11.2	12.5	13.5	15.0	16.4	17.9	18.7	19.3	19.9	20.6	21.5	21.7	22.3	22.5	22.2	21.7	19.9	17.1	15.3	14.7	17.2	22.5																							
5-Jul	13.8	13.4	13.4	13.2	13.1	13.9	15.1	16.7	18.1	19.4	20.5	21.3	22.0	22.5	22.9	23.3	23.4	23.6	23.5	22.4	21.1	18.4	17.3	15.0	18.6	23.6																							
6-Jul	11.2	9.8	9.0	9.1	8.8	11.4	15.1	18.0	19.6	20.1	21.5	22.9	23.9	24.5	24.1	24.4	23.9	23.5	23.7	22.9	21.4	18.5	14.6	12.4	18.1	24.5																							
7-Jul	11.5	10.7	10.1	9.2	9.8	12.1	16.1	19.8	21.1	22.1	22.9	23.8	24.7	25.4	26.2	26.8	27.2	27.2	26.9	27.0	23.5	19.4	17.0	15.2	19.8	27.2																							
8-Jul	14.0	12.9	12.0	11.5	12.6	15.1	16.5	18.5	21.6	23.9	24.8	25.3	25.6	25.0	24.3	22.9	23.2	23.0	22.4	21.4	19.5	17.1	15.5	13.9	19.3	25.6																							
9-Jul	13.4	12.7	12.0	11.7	11.3	12.1	14.6	18.0	20.5	22.6	23.9	24.9	26.0	26.5	26.8	27.4	27.6	27.5	26.2	25.0	23.3	21.7	20.9	20.7	20.7	27.6																							
10-Jul	19.6	18.5	17.8	16.3	16.2	16.3	15.5	15.4	15.9	16.2	16.9	18.2	19.4	21.1	22.0	22.0	21.9	22.3	21.7	20.4	18.5	16.6	14.5	13.3	18.2	22.3																							
11-Jul	12.4	12.3	11.8	12.1	11.6	12.8	16.2	19.3	20.3	21.9	23.1	24.1	23.6	23.9	19.0	20.8	21.8	21.2	20.1	19.2	17.8	15.9	14.6	13.6	17.9	24.1																							
12-Jul	11.6	10.7	10.1	9.7	10.7	12.5	13.6	14.9	17.5	19.5	20.4	21.8	21.5	21.2	21.6	21.6	21.5	19.0	17.2	17.4	17.7	16.7	15.4	14.9	16.6	21.8																							
13-Jul	14.4	14.4	14.3	14.0	13.8	14.6	16.1	17.7	20.0	21.9	22.7	24.1	25.1	25.9	26.9	27.1	26.6	25.7	23.9	21.0	18.2	16.6	15.9	15.5	19.8	27.1																							
14-Jul	15.6	15.2	15.5	15.4	15.4	15.7	16.1	17.5	18.5	19.2	19.8	19.8	21.6	22.6	23.1	23.5	23.7	23.4	22.8	21.5	19.7	17.3	16.8	16.1	19.0	23.7																							
15-Jul	14.7	13.2	12.0	11.6	11.6	13.4	15.2	18.2	21.8	24.1	25.5	27.1	28.3	29.0	29.2	29.2	28.8	28.6	27.9	26.8	24.5	22.1	20.9	19.4	21.8	29.2																							
16-Jul	19.2	19.7	18.6	18.4	18.0	18.1	17.4	17.3	17.1	17.5	17.7	14.4	14.7	15.3	14.6	15.7	16.3	15.6	14.8	14.5	14.2	13.6	13.3	12.7	16.2	19.7																							
17-Jul	12.2	11.8	11.2	10.5	10.1	10.2	10.4	10.6	12.2	13.6	14.3	14.0	13.3	11.7	10.6	11.2	12.9	13.8	13.1	13.0	11.3	10.5	9.2	8.9	11.7	14.3																							
18-Jul	9.2	9.3	8.9	8.4	8.5	9.4	10.4	11.0	11.3	12.4	13.4	14.1	14.7	14.8	15.0	15.1	14.1	13.8	14.4	14.3	12.8	11.2	10.0	9.7	11.9	15.1																							
19-Jul	9.5	9.3	9.3	9.3	9.6	10.4	13.0	14.7	16.0	17.3	18.4	19.3	21.1	21.8	22.9	23.2	18.9	16.2	15.9	15.6	15.5	14.2	13.1	12.3	15.3	23.2																							
20-Jul	11.3	10.6	10.9	9.9	9.3	9.8	11.2	13.1	16.4	18.3	19.7	20.5	21.4	21.7	21.5	21.7	21.2	21.2	20.3	19.1	18.3	16.7	16.0	15.4	16.5	21.7																							
21-Jul	14.4	14.2	14.3	13.7	13.1	13.2	13.6	14.1	14.0	14.1	14.7	15.2	15.8	16.2	16.6	17.6	18.8	19.8	20.0	19.3	16.6	14.8	14.0	13.4	15.5	20.0																							
22-Jul	12.8	11.8	11.2	10.9	10.9	12.6	15.4	18.6	20.2	21.6	22.5	23.5	24.7	24.7	23.8	24.2	25.2	25.2	24.3	22.3	21.1	19.9	18.9	18.9	19.4	25.2																							
23-Jul	19.1	18.6	17.6	16.8	16.6	17.3	18.4	19.9	21.1	22.1	23.0	22.9	22.8	23.3	23.9	24.4	23.9	23.6	22.5	21.6	20.2	19.4	18.4	16.8	20.6	24.4																							
24-Jul	14.3	13.5	13.9	13.7	13.0	13.2	13.9	14.4	14.6	14.5	14.3	14.3	14.1	14.0	14.0	14.0	14.5	14.2	14.1	14.7	15.2	15.0	14.3	14.3	14.2	15.2																							
25-Jul	14.3	13.8	11.9	10.3	10.6	11.1	13.2	15.9	17.8	19.2	20.2	21.1	21.8	22.8	23.6	24.1	24.6	24.6	24.0	22.9	20.3	18.0	17.0	16.3	18.3	24.6																							
26-Jul	15.7	15.4	15.4	13.6	13.3	15.2	17.6	19.1	22.1	24.1	25.1	26.0	26.6	27.1	27.0	27.1	27.1	26.4	26.3	24.8	21.8	19.8	18.5	16.9	21.3	27.1																							
27-Jul	16.3	16.3	15.7	15.7	15.6	16.2	18.6	20.0	22.6	24.5	25.9	26.7	27.3	28.0	28.3	28.4	27.4	26.6	25.9	25.3	22.5	22.1	22.2	18.5	22.4	28.4																							
28-Jul	15.1	15.2	14.2	13.9	13.6	13.8	15.6	17.1	19.0	20.7	21.7	22.7	23.4	23.5	24.3	24.4	24.6	24.5	23.1	21.3	19.6	18.2	16.0	15.3	19.2	24.6																							
29-Jul	14.4	12.2	11.4	10.2	10.2	11.5	14.0	17.7	20.4	21.7	22.4	23.0	23.7	22.4	23.6	25.0	25.2	25.5	25.0	23.6	19.6	18.4	17.1	16.5	18.9	25.5																							
30-Jul	14.8	14.2	13.5	13.8	15.1	15.9	15.8	15.4	15.1	15.2	17.0	18.2	18.4	19.6	21.2	22.4	22.8	22.6	21.3	20.4	18.8	18.2	17.3	16.2	17.6	22.8																							
31-Jul	15.3	14.4	13.8	13.3	12.4	12.7	14.6	16.6	17.7	19.0	20.1	20.7	21.6	21.9	22.3	21.9	22.6	19.5	19.0	18.8	17.0	16.2	15.4	14.6	17.6	22.6																							
																								14.2	13.6	13.1	12.6	12.5	13.4	14.8	16.6	18.1	19.4	20.4	21.1	21.8	22.2	22.4	22.7	22.7	22.2	21.6	20.7	19.0	17.3	16.2	15.2	Diurnal Average	
																								19.6	19.7	18.6	18.4	18.0	18.1	18.6	20.0	22.6	24.5	25.9	27.1	28.3	29.0	29.2	29.2	28.8	28.6	27.9	27.0	24.5	22.1	22.2	20.7	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Christina Lake - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Christina Lake - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	25	3.36	3.36
10 - 20	447	60.08	63.44
> 20	272	36.56	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

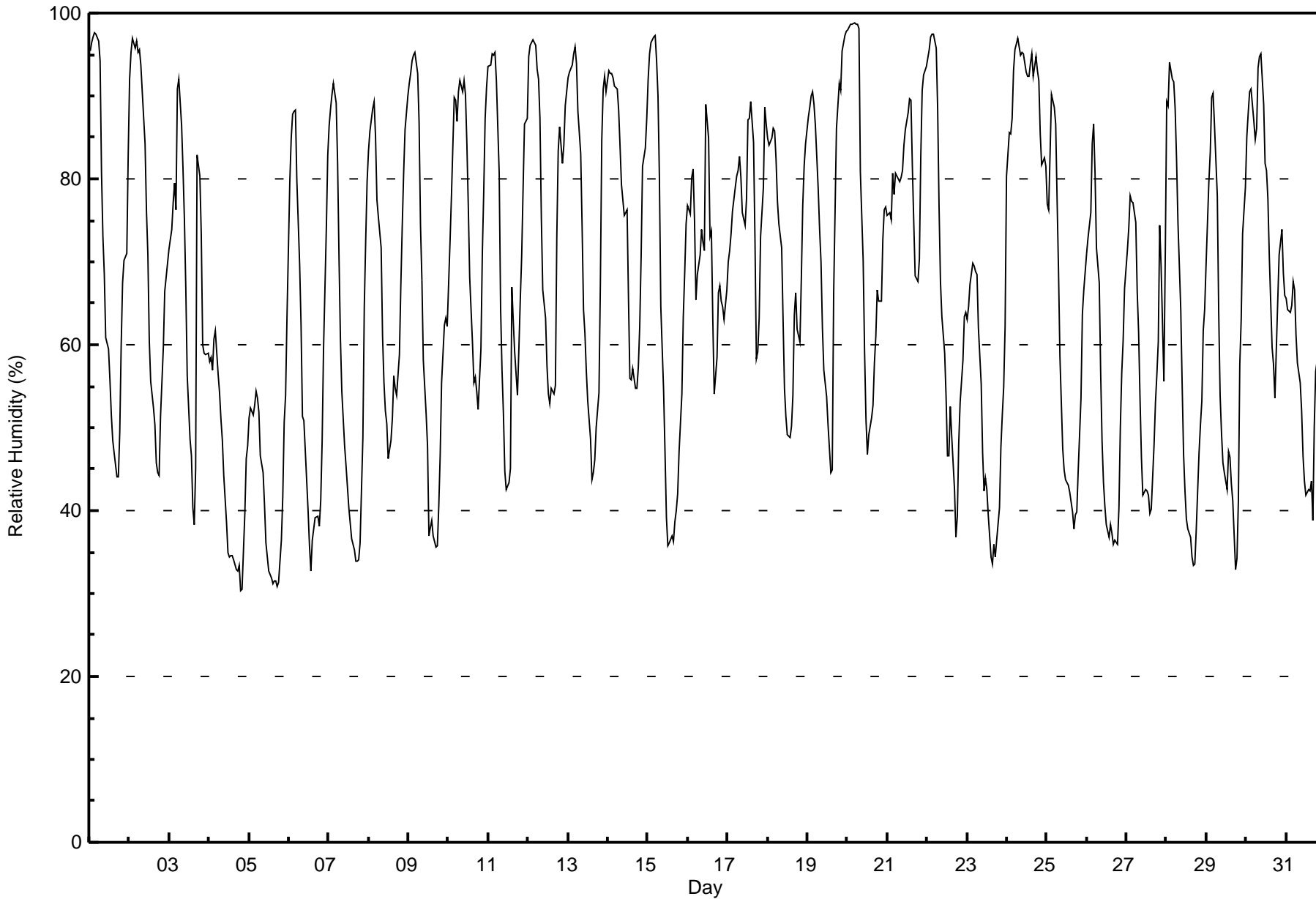
Christina Lake - July 2017

Maximum Value: 99 % on Jul 20 05:00																	Maximum Daily Average: 90.6 % on Jul 24																	Hours in Service: 744								
Minimum Value: 30 % on Jul 4 20:00																	Minimum Daily Average: 43.2 % on Jul 5																	Hours of Data: 744								
Maximum Diurnal Average: 86.2 % at hour 4																	Minimum Diurnal Average: 49.2 % at hour 17																	Hours of Missing Data: 0								
Monthly Average: 66.8 %																	Percentiles: P ₁ = 32 P ₁₀ = 40 Q ₁ = 50 Median = 67 Q ₃ = 85 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-Jul	95	96	97	98	97	97	94	81	73	68	61	60	56	52	49	47	44	44	49	60	67	70	71	83	71.2	98																
2-Jul	92	95	97	96	97	95	96	94	91	84	76	71	60	56	52	50	46	45	44	51	60	66	68	70	73.0	97																
3-Jul	72	74	77	79	76	91	92	86	81	75	67	56	49	47	40	38	45	83	80	73	60	59	59	59	67.5	92																
4-Jul	58	58	57	61	62	56	54	51	48	44	38	35	34	35	35	34	33	33	33	30	30	40	46	48	43.9	62																
5-Jul	51	52	52	53	54	54	52	47	45	41	36	34	33	32	31	32	32	31	31	36	42	51	54	63	43.2	63																
6-Jul	80	85	88	88	88	80	70	62	51	51	47	40	36	33	36	38	39	39	38	41	48	59	74	83	58.2	88																
7-Jul	86	88	90	91	89	82	71	61	54	48	45	43	40	38	37	35	34	34	34	36	49	64	73	80	58.5	91																
8-Jul	83	86	89	89	85	77	75	72	61	55	52	50	46	48	51	56	55	54	59	67	74	81	86	90	68.5	90																
9-Jul	92	93	94	95	95	93	87	74	68	58	52	48	37	38	39	37	36	36	41	47	55	62	63	62	62.5	95																
10-Jul	67	72	78	90	89	87	91	92	90	92	90	84	77	68	60	55	56	54	52	59	71	78	87	91	76.4	92																
11-Jul	94	94	95	95	95	92	81	64	57	52	45	42	43	45	67	63	59	54	60	65	71	79	87	87	70.2	95																
12-Jul	95	96	96	97	96	93	92	87	75	67	63	57	54	53	55	54	55	73	83	86	82	84	89	91	78.1	97																
13-Jul	92	93	94	95	96	94	88	83	74	64	61	57	53	49	44	45	46	50	54	68	85	91	92	91	73.3	96																
14-Jul	93	93	93	92	91	91	88	84	79	77	76	76	66	56	56	57	55	55	57	62	71	81	84	87	75.8	93																
15-Jul	92	95	97	97	97	94	90	80	65	54	47	39	36	36	37	36	39	40	42	47	54	63	69	75	63.4	97																
16-Jul	77	76	80	81	75	65	69	71	74	72	71	89	85	73	74	63	54	59	66	67	65	65	63	67	70.9	89																
17-Jul	70	71	73	76	79	80	81	83	80	76	74	78	87	87	89	84	73	58	59	63	73	79	89	87	77.1	89																
18-Jul	85	84	85	86	86	82	77	75	72	63	55	51	49	49	50	54	64	66	62	60	68	77	82	84	69.4	86																
19-Jul	87	89	90	90	89	86	79	74	70	62	57	54	50	47	45	45	66	86	89	92	91	95	97	98	76.2	98																
20-Jul	98	98	99	99	99	99	99	98	81	70	59	51	47	49	51	53	58	61	67	65	65	73	76	77	74.6	99																
21-Jul	76	76	75	81	78	81	80	80	80	81	84	86	88	90	90	82	75	68	68	70	83	91	93	94	81.1	94																
22-Jul	95	96	97	98	98	96	88	77	68	63	59	54	47	47	53	49	42	37	39	48	53	58	63	64	66.1	98																
23-Jul	63	65	67	70	70	69	69	62	55	47	42	44	43	40	34	34	36	34	36	40	48	52	55	62	51.5	70																
24-Jul	80	86	85	87	93	96	97	96	95	95	95	93	92	92	94	95	92	95	93	92	85	82	83	82	90.6	97																
25-Jul	77	76	83	90	89	87	78	69	59	47	45	44	43	43	42	40	38	40	40	45	54	64	67	69	59.4	90																
26-Jul	71	73	76	84	87	81	72	67	57	48	43	41	38	37	38	37	36	36	36	40	50	57	61	67	55.5	87																
27-Jul	71	74	78	77	77	75	66	61	54	46	42	42	42	42	40	40	48	53	56	60	74	70	56	71	59.1	78																
28-Jul	89	89	94	92	92	88	82	75	64	55	47	42	39	38	37	34	33	34	38	47	50	53	62	64	60.0	94																
29-Jul	70	80	83	90	90	86	78	64	54	49	46	45	43	47	46	43	41	33	34	41	58	63	73	79	59.8	90																
30-Jul	85	88	91	91	87	85	86	93	95	95	89	82	81	78	71	60	58	54	60	65	71	74	69	66	77.9	95																
31-Jul	66	64	64	65	68	67	61	58	55	52	47	44	42	43	42	44	39	50	57	59	69	73	77	80	57.6	80																
																	80.7	82.4	84.3	86.2	85.9	83.8	80.1	74.9	68.5	63.1	58.5	55.9	52.8	51.1	51.1	49.5	49.2	51.2	53.5	57.6	63.7	69.5	73.0	76.4	Diurnal Average	
																	98	98	99	99	99	99	99	98	95	95	95	93	92	92	94	95	92	95	93	92	91	95	97	98	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Christina Lake - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Christina Lake - July 2017**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	79	10.62	10.62
40 - 60	219	29.44	40.05
60 - 80	209	28.09	68.15
80 - 100	237	31.85	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

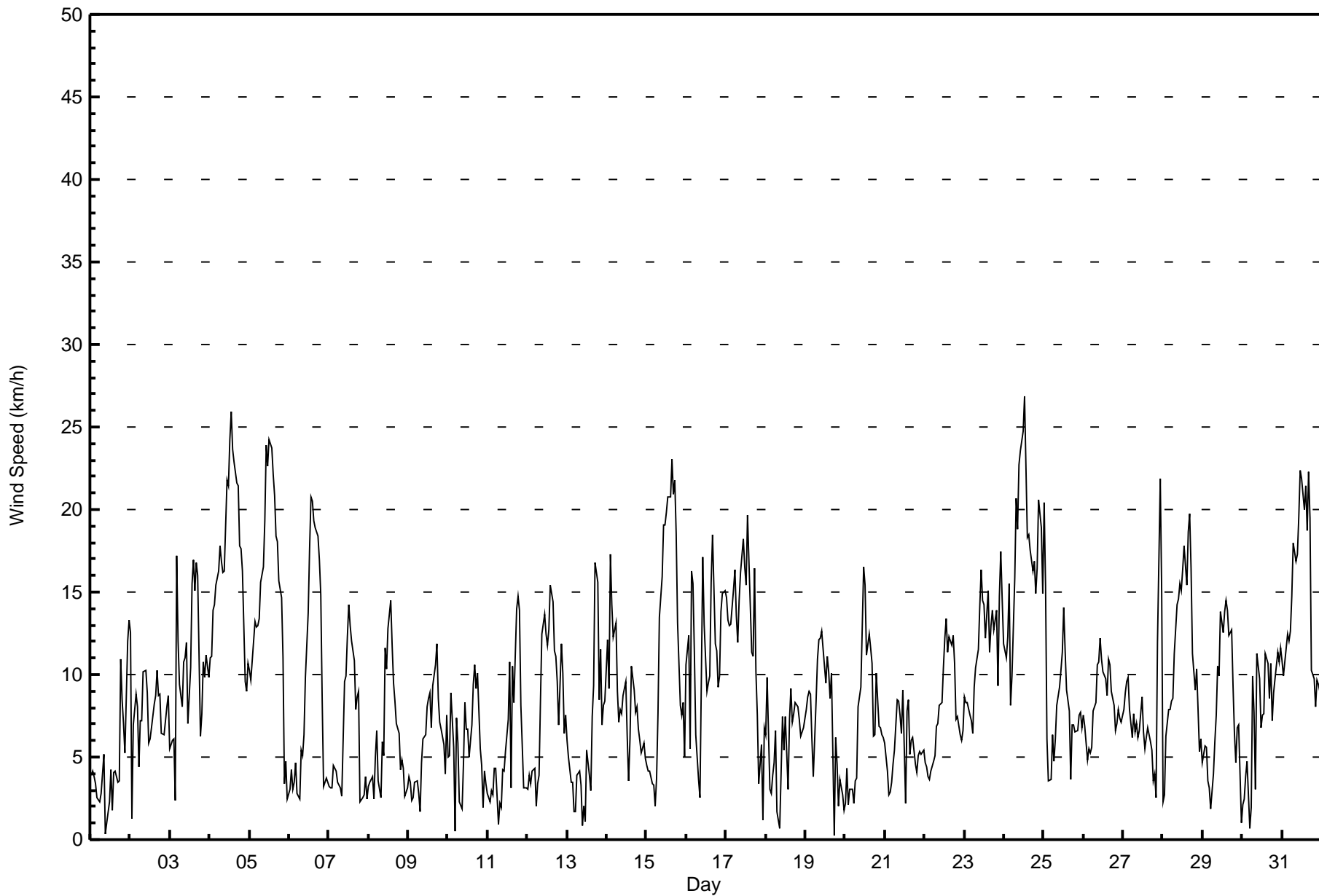
Christina Lake - July 2017

Maximum Speed: 27 km/h on Jul 24 13:00	Maximum Daily Speed Average: 17.0 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 19 18:00	Minimum Daily Speed Average: 1.6 km/h on Jul 8	Hours of Data: 744
Maximum Diurnal Speed Average: 6.5 km/h at hour 14	Minimum Diurnal Speed Average: 1.9 km/h at hour 20	Hours of Missing Data: 0
Monthly Average Velocity: 3.9 km/h 250.0 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 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-Jul	SSE4	S4	S4	SSE3	SSE3	SSW2	SE3	ENE4	ENE5	NNW0	ENE1	SSE2	SW4	SW2	SSW4	S4	SSE3	ESE4	ESE11	ESE8	SSE7	SSE5	NW12	NW13	SSE1.7	NW13
2-Jul	NW13	WSW1	ESE7	SE9	ESE8	SSE4	SSE7	SSE7	SSE10	S10	S9	SSW6	SW6	SSW7	SSW8	SSW9	S10	SW9	SSW9	SSW6	S6	S7	S8	SW9	S5.8	NW13
3-Jul	SSW6	S6	SSE6	SW2WNW17	NNW12	NNE9	ESE8WNW11	WNW11	NW12	NNW7	W10WNW15	WNW17	WNW15	W17WNW16	WSW6	SW8WSW11	SW10WSW11	SW10	WSW17.0	WSW18	W16WSW10	SW9	SW11	WSW17.0	WSW26	
4-Jul	SW11	SW11	SW14	SW14	SW15	SW16	SW18WSW17	WSW16	WSW16	WSW22	WSW21	WSW24	WSW26	WSW24	WSW23	WSW22	WSW21	WSW18	WSW18	W16WSW10	SW9	SW11	WSW17.0	WSW26		
5-Jul	WSW10	SW10	WSW12	WSW13	WSW13	WSW13	WSW13	W16	W17	W19	W24	W23	WNW24	W24	W22	W21	W18	W18	W16WNW15	WNW11	SW3	W5	SW2	W14.3	WNW24	
6-Jul	S3	SSW4	S3	SSW3	SSE5	SE3	S2	S5	SW5	WSW6	WSW10	WSW14	W18	W21	WNW21	NW19	NW19	NW18	NW17	NW15	N8	NE3	S4	S3	W6.5	W21
7-Jul	S3	S3	S3	SSE4	SSE4	S3	S3	NE3	ESE3	WNW10	WNW10	NW12	NW14	NW13	WNW12	WNW11	WNW8	WNW9	NW9	NNE2	SE3	SE3	S4	SSW2	WNW3.5	NW14
8-Jul	SSE3	SSE3	SSW4	S2	S5	SSE7	SW4	WSW3	W6	WSW5	WNW12	W10	WNW13	W14	NNW12	N10	NNE8	E7	ENE6	E4	SE5	S4	SSE3	ESE3	W1.6	W14
9-Jul	SSW4	S3	SSW2	SSE3	S3	SSE4	SSE3	ENE2	ENE5	ENE6	ENE6	ENE8	E9	ENE9	ENE7	SE9	SE11	ESE12	ESE9	ESE7	SE7	SE6	SSE4	SSW8	ESE4.7	ESE12
10-Jul	SSW5	S5	W9	SW6	SSE1	N7	NE6	SE2	S2	NE5	NNE8	NE7	NE7	ENE5	ENE7	ESE9	SE11	ESE9	E10	ESE5	ESE5	SSE2	ESE4	S3	E2.9	ESE11
11-Jul	S3	SE2	S3	S3	S4	S4	SSE1	NNE2	SSE2	NE4	ENE4	NNE5	ENE7	NNE11	N3	NW10	NW8	NNW14	NW15	N14	N8	WSW6	S3	S3	N2.5	NW15
12-Jul	SSE3	S4	SSE3	S4	S4	SE2	ESE3	SSE4	S8	S12	SSE14	SSE12	SSW12	S13	SSE15	SE14	SSE11	SW11	S10	SSE7	S12	S10	S6	S8	S8.0	SSE15
13-Jul	S6	S5	SSE3	SSE3	SE2	NE2	SSE4	S4	SE3	NNE1	SE2	W1	ENE5	NE4	NNE3	NNE7	NE9	NNE17	NNE16	NE8	NW12	NE7	NNW8	NNW8	NE2.8	NNE17
14-Jul	WNW12	W9	WNW17	WNW14	WNW12	WNW13	NW9	WNW7	WNW8	WSW8	WSW9	SW10	SW6	S4	SW6	WSW10	SW9	SW8	SW8	SW7	SSW6	S5	SSW6	S5	W6.8	WNW17
15-Jul	SSE4	ESE4	SSE4	SSE3	SSE3	ESE2	E4	ESE8	SE14	SSE16	SE19	SSE19	SSE20	SSE21	SSE21	SSE23	SSE21	SSE22	SSE19	SE13	SE8	SE8	SE8	SSE5	SSE11.6	SSE23
16-Jul	S11	S12	SW5	WNW16	NW16	NW11	NW6	NW4	SSW3	W10	W17	WSW13	W9	WNW10	WSW10	WSW16	WSW18	WSW12	SW11	SW9	SW10	WSW14	WSW15	WSW15	WSW9.1	WSW18
17-Jul	WSW15	WSW13	WSW13	WSW13	WSW15	WSW16	WSW14	WSW12	W14	W16	W18	W17	NW15	NNW20	NW17	NW11	NW11	NNW16	NNW10	NNE8	S3	WSW6	SW1	W7	W9.9	NNW20
18-Jul	W6	NW10	WSW3	SSW3	SW4	WNW5	N7	NE2	SSW1	NW4	WSW7	W5	SSW7	W3	WSW7	WSW9	SSW7	S8	SW8	SW8	SSW7	SSW6	SSW7	SSW7	WSW4.4	NW10
19-Jul	SSW8	SSW9	SW9	SSW9	SSW6	S4	SW8	SW11	SW12	SW12	WSW13	WSW10	WSW9	WNW11	SW10	WSW9	N10	SSW0	N6	SSE5	NNE2	SSW4	S3	SSE2	SW5.6	WSW13
20-Jul	ESE2	S4	ESE2	S3	ESE3	SE2	ESE4	ENE4	ESE8	E9	E13	ESE17	ESE15	ESE11	E12	E12	ENE11	E6	SE6	ESE10	E7	ENE7	ENE6	ENE6	E7.0	ESE17
21-Jul	E6	E4	NE3	NE3	NNE3	NNE5	N5	NE8	NE8	NE8	NE6	NNE9	N2	NNE8	NNE8	ENE5	NNE6	ENE6	ENE5	E4	S5	S5	S5	S5	NE3.7	NNE9
22-Jul	S5	SE4	SE4	SE4	SSE4	S5	S5	SW7	SW7	SW8	SW8	SW10	WSW12	WSW13	SW11	SW12	SW12	SW12	SW11	SW7	SW7	SSW6	S6	SSW7	SW6.9	WSW13
23-Jul	SW9	SW8	SW8	SW8	SW7	SW6	WSW9	WSW10	WSW12	W14	W16	W15	W14	WNW12	WNW15	WNW11	WNW13	NW14	NNW13	NW14	N9	NW15	NW17	W15	W9.6	NW17
24-Jul	NW12	WNW11	WNW12	NW15	WNW8	NNW10	NNE16	NNE21	NNE19	NNE23	N24	N25	N27	NNW23	NNW18	N18	NNW18	NW16	NW17	NW15	NW16	WNW21	WNW19	WNW15	NNW15.1	N27
25-Jul	WNW20	WNW15	W6	SW4	WSW4	SW6	WSW5	W6	WNW8	WNW9	WNW10	WNW11	NW14	WNW11	WNW9	WNW8	SW4	WSW7	SW7	SSW7	SSW7	S8	S8	S7	W6.3	WNW20
26-Jul	S8	S7	SSW5	SSE6	SSE5	SSW6	SSW8	SSW8	SSW11	SSW11	SW12	SW11	SW10	SW10	SW9	SSW11	SW11	SW9	SW8	SSW7	S7	S8	S7	S7	SSW7.9	SW12
27-Jul	S8	S9	S10	S10	SSE8	SSE6	SE8	SE6	SE7	ESE6	SE7	E9	E7	E6	ESE6	ESE7	E6	E5	S4	SSW4	SSW3	WNW12	WNW22	WSW15	SSE3.6	WNW22
28-Jul	NE2	WNW3	SSW6	SSW8	SW8	SW8	WSW9	WSW11	WSW14	WSW15	WSW16	WSW15	W16	W18	W15	W19	WNW20	W16	WSW11	SW9	SW10	W8	WSW5	WSW6	WSW10.3	WNW20
29-Jul	SW5	SSW6	SSW6	SSE4	SSE3	SSE2	SSE4	SW6	WSW8	SW10	SW10	SW14	WSW13	SW14	SSW14	SW14	SW12	WSW13	W9	W6	S5	SSW7	SSW7	SSE1	SW7.1	SSW14
30-Jul	SSE2	ESE2	SE4	E5	SE1	E2	W10	WNW8	ESE3	ESE11	NNW10	N7	WNW8	WSW8	WSW11	W11	WSW9	WSW11	SW7	SW9	SW10	SW11	WSW11	WSW12	WSW4.2	WSW12
31-Jul	WSW11	WSW10	WSW12	WSW13	WSW12	WSW13	W15	WNW18	WNW17	WNW17	W20	W22	W22	WNW20	WNW21	WNW19	WNW22	NW20	W10	NNW10	N8	NNW10	NW9	NNW9	WNW13.2	W22

SW4.1 SW4.2 SW4.2 SW3.8 SW3.5	WSW2.9 WSW2.5 WSW2.6 SW3.4	WSW4.1 W5.4 W5.4 W6.3 W6.5 W5.8 W5.4 W4.9 W4.5	WSW3.4 WSW1.9 SW2.7 SW3.6	WSW3.9 WSW4.4	Diurnal Average
WNW20 WNW15 WNW17 WNW16	WNW17 WSW16 WSW18 NNE21 NNE19 NNE23 W24 N25 N27	WSW26 WSW24 SSE23 WNW22 SSE22 SSE19 WSW18	NW16 WNW21 WNW22 WSW15		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 - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	211	28.36	28.36
6 - 11	320	43.01	71.37
12 - 19	173	23.25	94.62
20 - 28	40	5.38	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - July 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	8	10	11	7	15	17	42	52	17	13	7	4	2	2	2	211
6 - 11	10	10	10	13	11	18	13	11	29	37	63	35	17	24	10	9	320
12 - 19	2	4	0	0	3	3	4	6	4	2	14	44	25	28	27	7	173
20 - 28	3	2	0	0	0	0	0	6	0	0	0	8	8	10	1	2	40
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	17	24	20	24	21	36	34	65	85	56	90	94	54	64	40	20	744

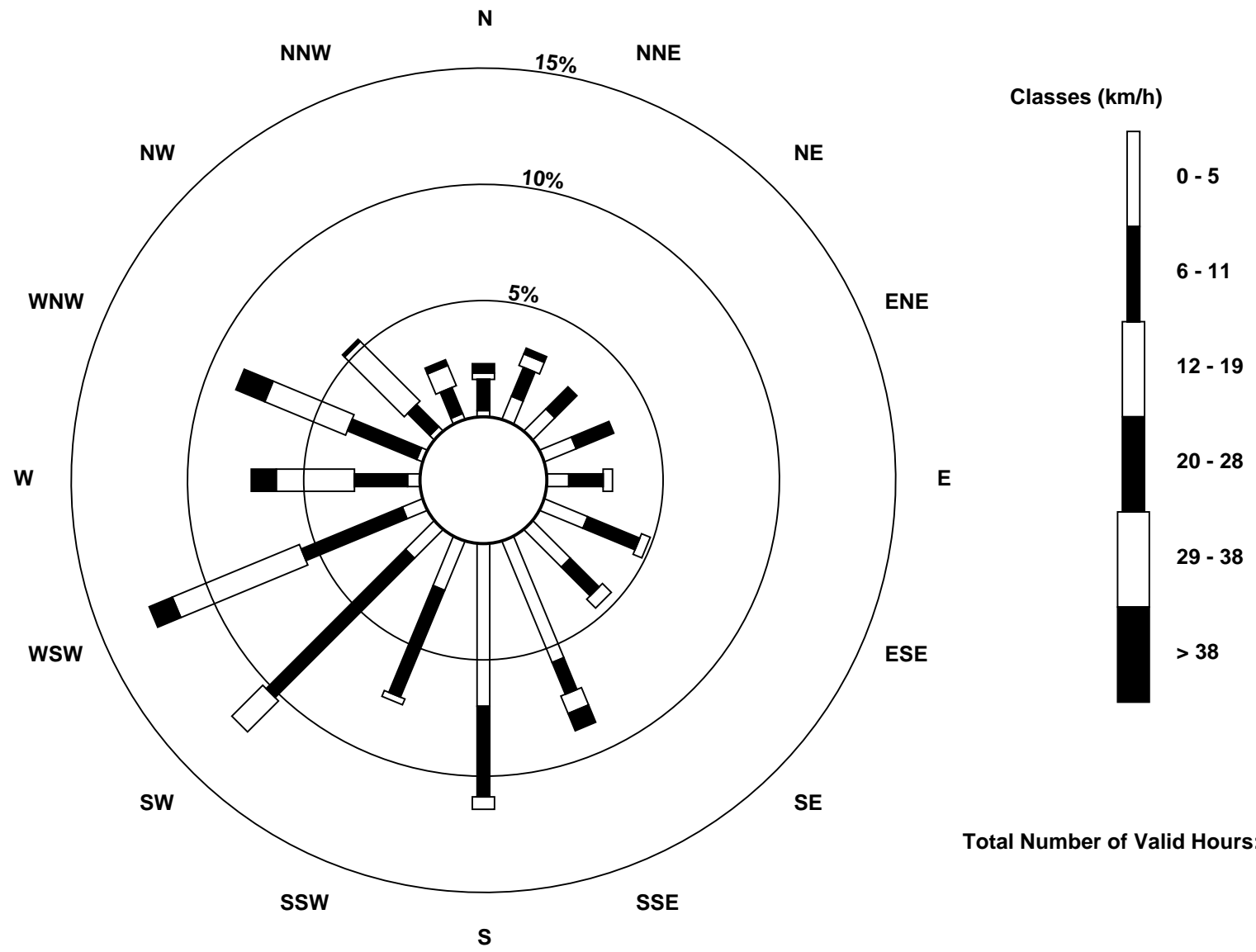
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Christina Lake (AMS 500)



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Christina Lake - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Jul 27 22:00 Minimum Value: 1 km/h on Jul 29 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: 744 Hours of Data: 744 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-Jul	1	2	2	1	1	1	1	1	2	2	2	2	3	3	2	2	3	3	2	1	1	7	3	7	
2-Jul	2	3	2	3	2	2	2	2	3	3	3	2	3	3	3	3	4	3	2	1	1	1	1	5	5
3-Jul	2	2	1	4	5	4	3	3	5	5	4	3	5	5	5	5	8	6	2	2	3	2	3	3	8
4-Jul	3	3	4	4	4	5	6	5	5	6	7	7	8	8	8	8	8	7	6	5	5	3	2	3	8
5-Jul	3	2	3	4	4	4	4	5	5	6	7	7	7	6	6	6	5	5	5	4	3	2	2	1	7
6-Jul	1	1	1	1	1	1	2	2	2	2	4	5	6	5	5	5	4	4	4	3	3	2	1	1	6
7-Jul	2	2	1	1	1	1	1	1	2	4	4	5	5	5	5	4	3	3	4	2	2	2	1	2	5
8-Jul	2	1	1	2	2	2	2	2	2	3	3	4	4	4	5	3	2	1	2	2	1	1	2	1	5
9-Jul	2	1	2	2	1	2	1	1	1	2	2	3	3	4	3	4	4	3	2	1	1	1	1	2	4
10-Jul	2	2	3	3	3	2	1	2	1	2	2	2	2	2	3	2	3	3	2	2	2	1	1	1	3
11-Jul	1	2	1	1	1	1	1	1	1	2	3	3	3	6	5	3	3	4	3	3	2	2	1	1	6
12-Jul	1	1	1	2	1	1	1	1	3	3	3	4	4	4	4	3	3	4	5	2	3	3	1	1	5
13-Jul	1	1	1	1	1	1	2	1	1	1	2	2	3	3	3	3	3	4	3	4	4	4	5	2	5
14-Jul	4	3	5	5	3	5	3	2	3	3	3	2	2	3	3	3	3	2	2	1	1	1	1	1	5
15-Jul	1	1	1	1	1	2	1	2	4	4	4	5	5	6	6	5	5	5	5	3	2	1	1	1	6
16-Jul	3	4	3	5	4	4	4	4	3	4	5	4	4	4	4	5	6	4	3	3	3	4	4	5	6
17-Jul	5	4	4	4	5	5	4	4	4	5	5	5	6	5	4	4	4	5	4	2	2	3	1	3	6
18-Jul	3	5	3	2	2	2	2	2	2	3	3	3	3	3	3	3	2	1	2	2	1	1	1	1	5
19-Jul	2	2	2	2	3	1	3	4	4	4	4	4	4	5	3	4	4	4	2	3	4	2	2	1	5
20-Jul	1	2	1	2	1	1	1	1	3	2	4	3	3	3	3	3	3	2	2	2	1	1	1	1	4
21-Jul	1	1	2	2	3	2	1	2	2	5	4	3	2	2	3	2	3	2	3	2	1	1	1	2	5
22-Jul	1	1	1	1	1	1	1	3	2	2	3	3	4	4	4	4	4	4	3	2	2	1	1	1	4
23-Jul	2	2	1	1	1	2	3	3	4	4	5	5	5	5	5	5	5	3	3	3	2	3	5	4	5
24-Jul	4	5	5	4	4	2	5	4	4	6	6	6	6	6	7	4	4	3	3	4	4	4	4	4	7
25-Jul	4	5	4	2	2	3	2	2	2	3	4	4	5	4	4	4	3	2	2	1	1	1	1	1	5
26-Jul	1	1	1	1	1	2	2	2	3	3	4	3	4	3	4	4	3	3	2	1	1	1	1	1	4
27-Jul	1	1	2	2	3	1	2	1	2	2	2	3	3	2	2	2	1	2	1	1	2	8	5	6	8
28-Jul	5	2	2	2	2	2	3	4	5	5	4	5	6	5	5	6	5	5	3	3	3	3	2	2	6
29-Jul	2	2	2	1	1	2	1	2	3	3	4	4	5	5	5	5	4	4	3	3	2	1	1	2	5
30-Jul	1	1	1	1	2	1	5	4	4	4	3	3	3	2	3	4	3	3	2	3	2	3	3	3	5
31-Jul	3	3	3	4	3	4	4	5	5	5	6	6	6	6	5	6	5	6	3	3	2	2	2	3	6
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Christina Lake - July 2017

Direction of Maximum Speed: 354 deg on Jul 24 13:00 Direction of Maximum Daily Speed Average: 239.0 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 210 deg on Jul 19 18:00 Direction of Minimum Daily Speed Average: 1.6 deg on Jul 8	Percent Operational Time: 100.0
Monthly Average Direction: 242.6 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-Jul	160	184	173	162	158	205	142	63	78	330	58	167	220	227	205	191	166	112	109	110	147	167	315	314	155.1
2-Jul	311	237	117	135	103	154	160	157	153	175	184	203	214	203	202	203	175	221	203	197	190	184	189	234	185.4
3-Jul	206	173	163	235	302	329	33	117	284	300	316	339	279	285	292	290	277	299	242	236	245	224	239	231	278.1
4-Jul	235	222	224	229	227	233	236	242	245	239	237	242	242	244	246	237	241	237	240	256	259	240	221	234	239.0
5-Jul	237	233	237	242	246	253	254	263	262	271	275	277	287	281	272	280	271	276	277	300	301	215	276	217	268.9
6-Jul	178	196	171	194	162	145	181	190	225	240	237	254	273	280	298	304	307	308	308	321	1	36	181	181	280.9
7-Jul	176	187	187	162	163	179	187	42	113	296	298	306	310	313	300	303	301	302	316	12	144	146	172	203	291.0
8-Jul	167	158	199	187	189	158	226	253	260	247	290	274	298	281	331	1	20	82	78	92	143	170	161	116	272.1
9-Jul	199	171	192	151	173	158	154	68	63	70	68	63	94	78	71	135	124	105	104	114	125	131	148	197	113.9
10-Jul	193	190	259	230	162	10	42	124	169	52	25	42	39	58	78	122	124	102	97	103	112	160	116	185	95.2
11-Jul	174	129	177	191	176	184	157	29	149	44	63	17	62	23	349	321	319	345	319	0	349	243	177	169	351.4
12-Jul	147	183	167	170	172	144	118	162	172	176	167	166	195	181	147	136	154	217	185	156	173	174	185	181	169.7
13-Jul	184	187	150	154	140	43	150	180	144	16	137	274	73	39	18	29	49	25	33	51	309	53	347	341	38.4
14-Jul	291	271	300	301	301	303	305	291	295	252	246	230	228	190	230	242	231	224	232	216	208	185	197	190	260.8
15-Jul	165	113	148	155	157	118	87	112	144	158	143	158	167	164	162	153	151	151	159	140	127	125	134	168	150.2
16-Jul	173	182	235	302	322	320	320	318	211	274	281	253	267	284	250	258	258	242	229	236	230	237	244	241	258.0
17-Jul	245	241	241	247	240	249	257	249	259	267	268	262	311	330	317	305	307	337	343	29	186	241	231	267	276.2
18-Jul	280	306	242	202	216	295	351	36	211	314	240	259	210	272	249	241	210	187	214	228	211	208	200	207	237.5
19-Jul	209	212	217	207	205	172	226	225	228	231	243	238	254	282	235	240	358	210	9	162	22	192	179	156	231.4
20-Jul	122	171	114	177	108	131	106	64	113	101	83	105	107	122	98	92	75	96	130	104	91	68	78	74	100.3
21-Jul	95	87	55	51	12	20	4	34	50	54	42	21	359	12	30	58	19	67	57	96	173	180	187	175	50.9
22-Jul	181	144	125	138	150	181	170	223	231	222	219	224	249	250	233	228	234	231	228	219	217	192	179	199	216.8
23-Jul	215	220	220	220	220	214	240	248	252	259	265	268	279	284	291	297	297	305	327	325	351	319	307	276	277.6
24-Jul	305	299	296	309	301	331	16	17	25	18	10	359	354	346	343	357	333	318	317	304	309	301	300	303	336.9
25-Jul	300	296	279	235	250	218	241	278	283	294	289	297	308	303	296	298	214	240	218	207	196	188	191	191	269.6
26-Jul	190	188	192	149	168	194	199	203	203	207	221	230	225	220	218	212	229	218	215	199	180	185	183	176	204.3
27-Jul	175	179	175	173	167	163	145	139	125	118	138	101	101	84	109	117	87	100	185	192	201	284	293	256	162.8
28-Jul	44	303	208	210	232	230	245	240	239	251	251	254	267	271	266	281	292	280	253	235	234	268	237	248	256.5
29-Jul	222	207	198	164	149	148	158	225	242	231	226	215	239	228	195	225	227	244	261	280	183	196	192	159	220.2
30-Jul	159	115	129	92	139	98	273	303	106	117	347	358	292	252	258	271	246	251	236	228	222	233	241	254	251.2
31-Jul	246	241	247	251	249	253	261	283	290	288	276	268	278	285	291	291	296	324	281	348	358	337	321	338	284.8

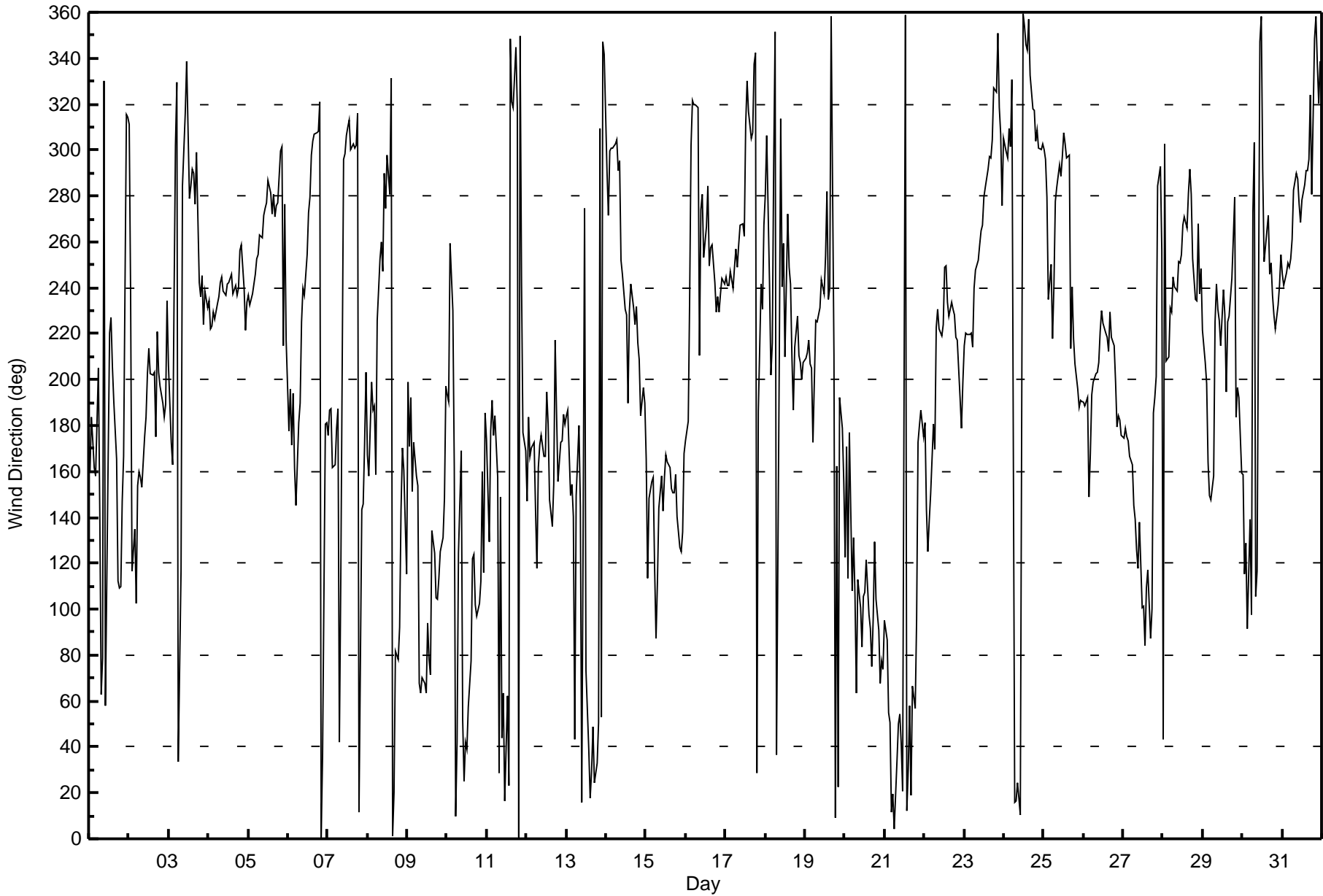
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 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Christina Lake - July 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Christina Lake - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Jul 1 11:00 Minimum Value: 6 deg on Jul 26 21:00 Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 18 Median = 24 Q ₃ = 35 P ₉₀ = 58 P ₉₉ = 95																		Hours in Service: 744 Hours of Data: 744 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-Jul	29	28	31	41	40	56	31	39	53	98	103	87	59	102	76	71	81	83	24	11	17	13	64	20	103
2-Jul	14	83	33	28	14	54	14	15	14	24	31	34	47	40	33	26	22	23	19	15	9	13	11	33	83
3-Jul	18	51	24	58	24	47	31	32	40	33	28	45	37	26	27	23	27	24	39	20	19	16	20	19	58
4-Jul	21	18	20	20	20	21	23	22	22	26	24	24	23	22	23	22	25	22	23	21	17	17	14	19	26
5-Jul	20	18	19	20	20	20	20	18	19	25	19	21	19	20	21	21	22	21	18	13	17	52	63	54	63
6-Jul	31	21	31	43	18	24	60	35	43	37	30	26	26	23	21	15	14	13	17	12	29	55	22	20	60
7-Jul	25	22	14	19	28	15	32	39	72	43	38	39	22	27	35	30	45	42	30	67	64	52	52	69	72
8-Jul	48	42	20	73	30	34	51	92	42	69	26	32	26	22	41	23	26	11	16	29	29	28	60	19	92
9-Jul	16	34	44	45	47	37	31	71	22	20	33	34	42	40	54	32	36	19	12	13	12	27	49	32	71
10-Jul	60	44	29	55	96	32	28	63	45	45	20	30	36	56	47	22	20	25	17	14	36	58	44	34	96
11-Jul	45	58	32	27	11	16	80	45	72	66	67	59	36	32	75	30	28	26	22	17	27	41	57	48	80
12-Jul	25	12	15	26	14	36	24	29	17	19	17	25	23	17	15	18	28	26	17	14	14	12	11	12	36
13-Jul	13	20	23	15	52	68	28	32	52	98	93	99	45	77	91	36	19	14	12	56	27	52	45	31	99
14-Jul	24	28	20	20	19	28	16	30	37	35	33	22	44	79	45	28	31	27	24	13	15	13	11	16	79
15-Jul	14	17	19	17	20	36	19	16	17	16	16	16	16	18	17	16	17	15	14	14	10	10	10	21	36
16-Jul	12	15	52	16	14	35	71	89	82	41	26	19	32	33	24	22	20	24	20	22	20	21	21	22	89
17-Jul	21	22	21	21	21	22	21	21	19	20	19	19	31	17	15	29	38	23	27	27	58	49	89	33	89
18-Jul	38	34	75	71	37	45	35	89	98	82	38	60	38	79	36	26	32	16	25	20	16	12	11	14	98
19-Jul	15	17	17	15	28	33	21	23	26	27	27	29	36	37	29	59	36	93	57	57	96	51	65	65	96
20-Jul	62	45	61	43	33	45	28	31	27	18	17	18	19	24	17	14	12	24	33	16	21	14	9	19	62
21-Jul	16	28	45	25	82	35	29	14	21	35	47	23	71	19	20	30	43	34	33	52	15	20	18	18	82
22-Jul	19	14	15	22	25	23	28	25	34	30	30	30	27	25	25	23	28	23	21	15	15	14	7	13	34
23-Jul	16	15	14	14	16	17	22	24	25	25	22	28	29	37	28	35	26	16	16	11	24	13	12	21	37
24-Jul	32	26	22	18	36	24	15	16	13	15	19	20	21	20	33	21	20	11	14	16	15	10	10	11	36
25-Jul	11	13	33	62	60	30	43	34	26	31	33	25	23	34	42	69	89	32	24	14	12	11	12	9	89
26-Jul	10	10	16	18	11	18	18	18	18	24	24	27	33	30	31	26	24	20	19	16	6	9	10	10	33
27-Jul	9	11	10	10	23	14	16	22	24	30	31	34	37	45	30	20	16	18	19	12	75	43	14	52	75
28-Jul	82	84	36	18	19	21	23	21	22	24	22	28	23	21	27	22	19	20	19	19	21	28	20	35	84
29-Jul	38	13	16	18	39	82	19	28	29	28	28	22	27	24	23	27	25	25	25	31	49	9	8	89	89
30-Jul	53	29	18	10	86	65	26	58	88	19	22	30	36	33	22	24	26	20	21	18	19	20	21	19	88
31-Jul	19	18	21	19	18	19	19	19	21	22	19	18	23	19	17	21	16	20	28	33	17	17	18	26	33
82 84 75 73 96 82 80 92 98 98 103 99 71 102 91 71 89 93 57 67 96 58 89 89																									
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Summary

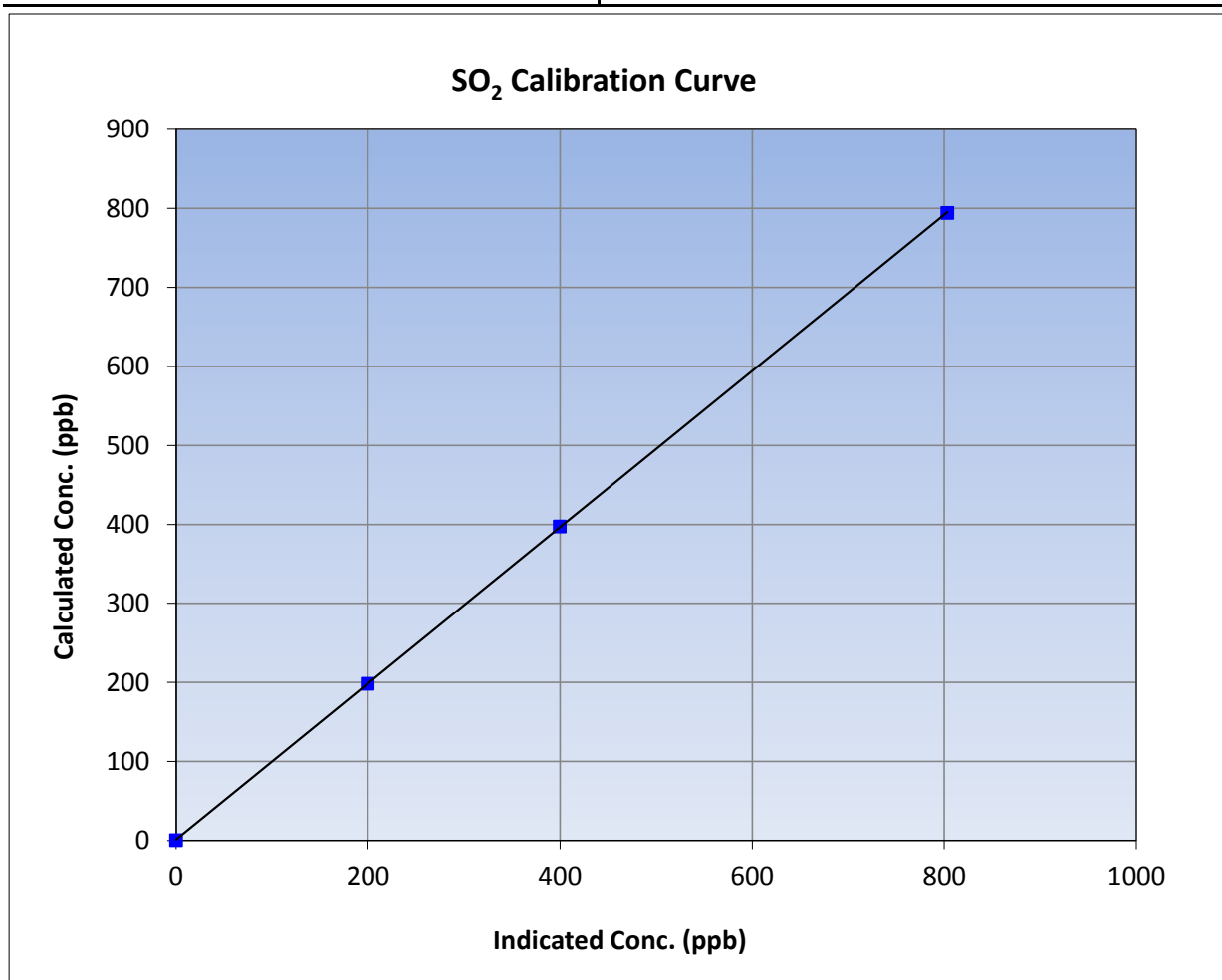
Version-03-2017

Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 21, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:15	End Time (MST)	17:16
Analyzer make	Thermo 43i	Analyzer serial #	1118148497

Calibration Data

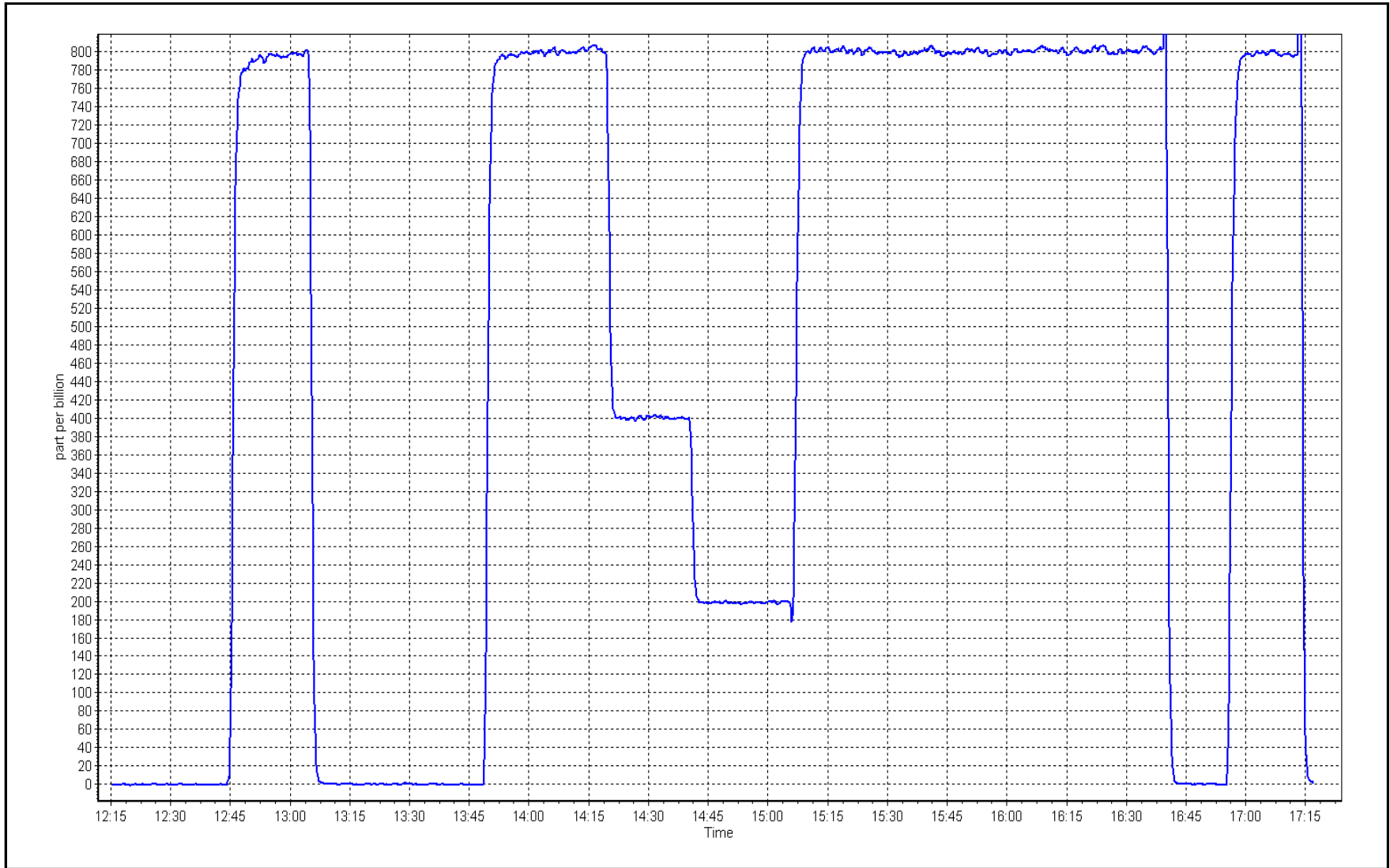
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits
0.0	-0.3	----	Correlation Coefficient	≥0.995
794.1	802.8	0.9892		
397.0	399.2	0.9945	Slope	0.90 - 1.10
198.0	199.0	0.9950		
			Intercept	+/-30



SO2 Calibration Plot

Date: July 20, 2017

Location: Christina Lake





Wood Buffalo Environmental Association

H₂S Calibration Summary

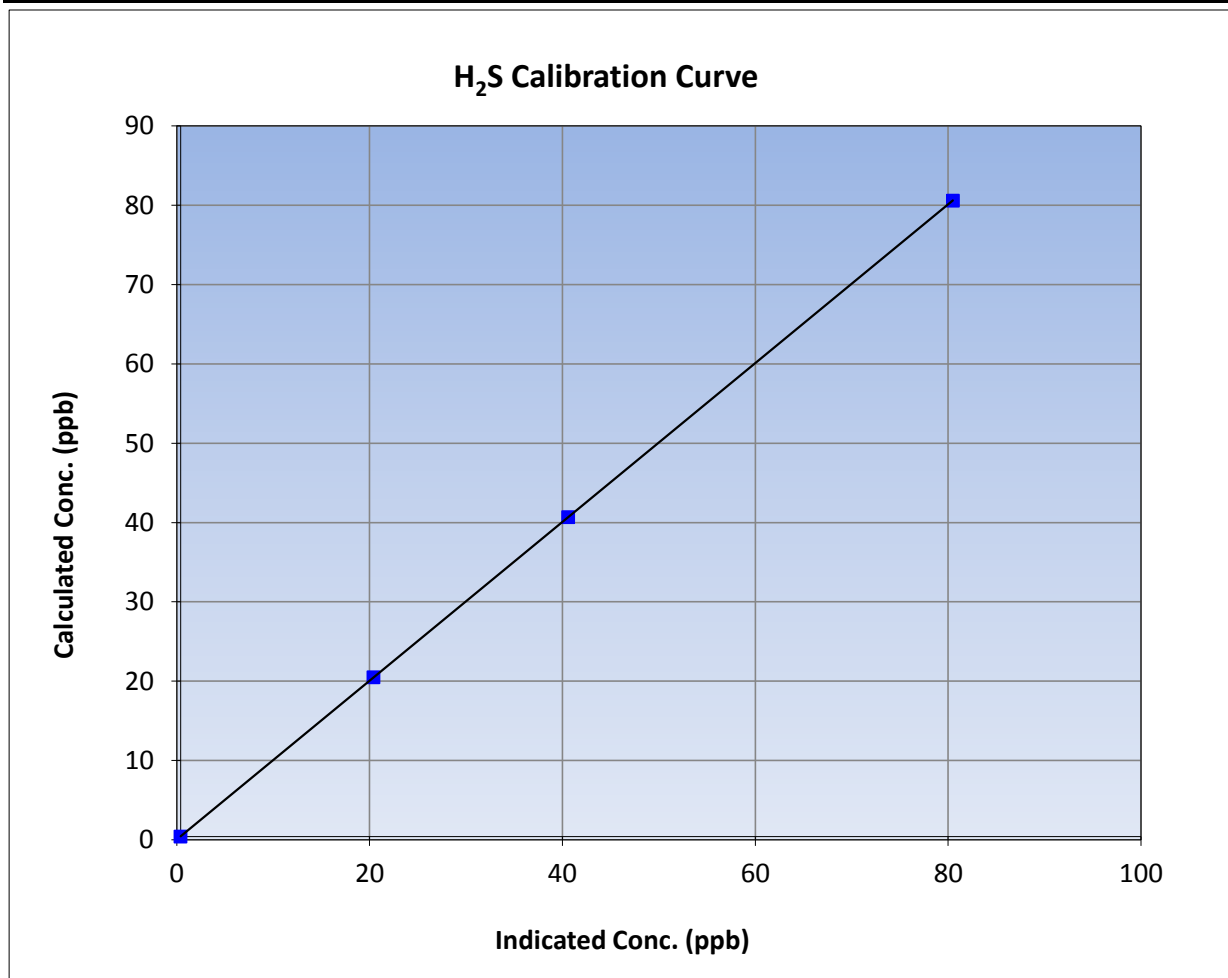
Version-03-2017

Station Information

Calibration Date	July 21, 2017	Previous Calibration	June 21, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	8:00	End Time (MST)	10:50
Analyzer make	Thermo 43i- TLE	Analyzer serial #	1008841400

Calibration Data

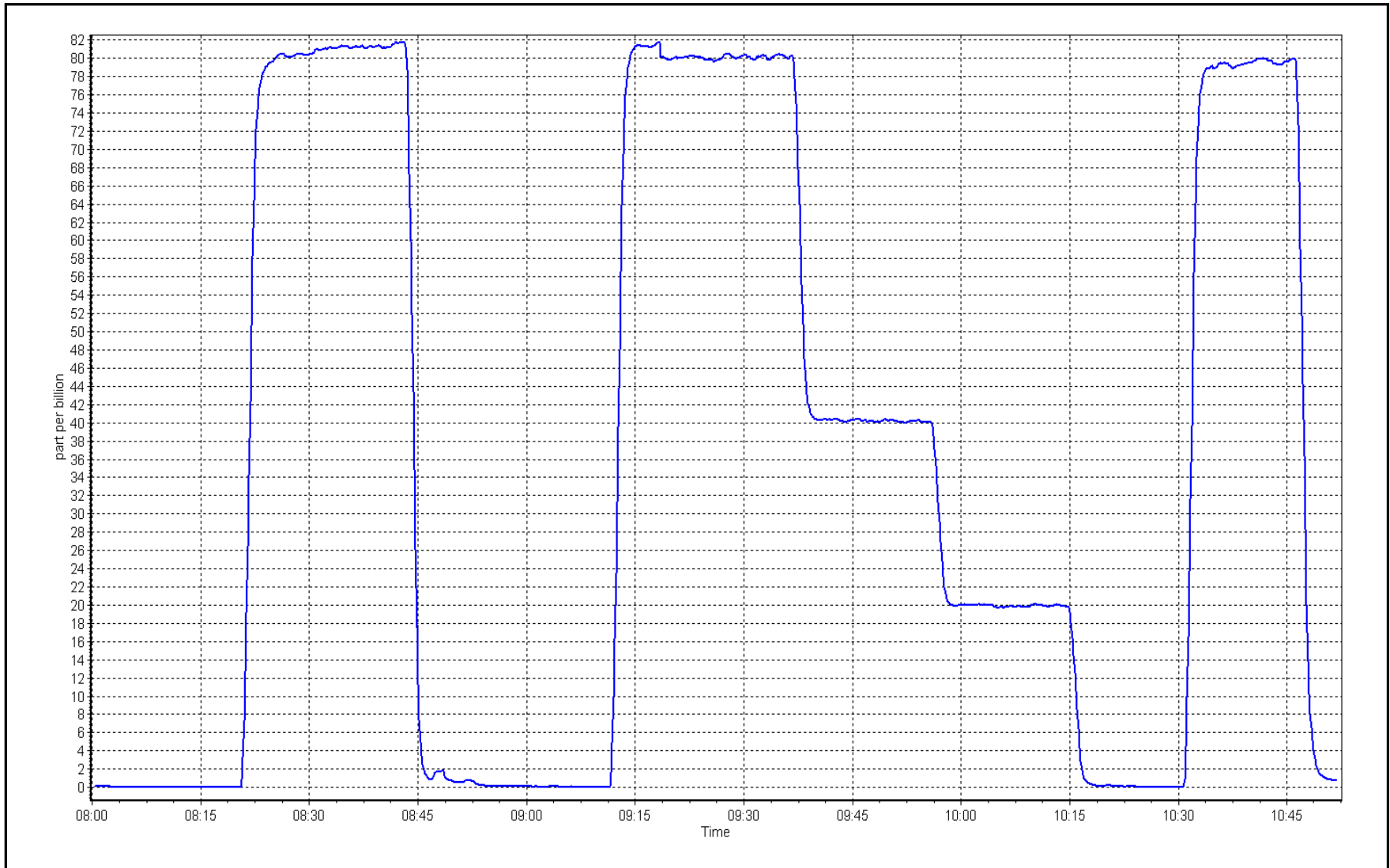
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999999	≥0.995
80.2	80.1	1.0012			
40.3	40.2	1.0023	Slope	1.000940	0.90 - 1.10
20.1	20.0	1.0048			
			Intercept	0.037961	+/-3



H₂S Calibration Plot

Date: July 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:	July 20, 2017	Last Cal Date:	June 21, 2017
Start time (MST):	12:15	End time (MST):	17:15
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	1.238	1.222	NOX Range (ppb)	0 - 1000	ppb
NOX coefficient	1.247	1.228	Moly Temperature	314.8	314.9
NO ₂ coefficient	1.000	1.000	Reaction cell Press	7.2	5.5
NO bkgrnd	0.4	0.4	Sample Flow	0.489	0.495
NOX bkgrnd	1.4	1.4	PMT Voltage	826.0	827.0

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	0.996195	0.997745
NO _x Cal Offset	0.982161	1.008468
NO Cal Slope	0.996846	0.997919
NO Cal Offset	1.584333	0.609850
NO ₂ Cal Slope	0.993211	1.012025
NO ₂ Cal Offset	0.257455	0.320599



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	-0.1	0.8	----	----
as found span	4925	79.4	806.0	801.2	4.8	773.1	766.6	6.5	1.0425	1.0452
calibrator zero	5000	0.0	0.0	0.0	0.0	0.1	0.1	0.1	----	----
high point	4920	79.4	806.8	802.0	4.8	807.8	803.0	4.8	0.9988	0.9988
second point	4960	39.7	403.4	401.0	2.4	403.8	402.2	1.7	0.9990	0.9970
third point	4980	19.8	201.2	200.0	1.2	198.8	198.2	0.6	1.0120	1.0090
as left zero	6000	0.0	0.0	0.0	0.0	0.0	0.6	-0.6	----	----
as left span	4927	79.4	805.7	397.9	407.8	771.9	397.2	374.6	1.0438	1.0018
Average Correction Factor									1.0032	1.0016

Corrected As found	NO _x = 772.5 ppb	NO = 766.7 ppb		*Percent Change	NO _x = 4.6%
Previous Response	NO _x = 808.1 ppb	NO = 802.2 ppb		*Percent Change	NO = 4.6%
<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		4.8	779.7	775.7	4.0	1.0348	1.0340	----	----
1st NO2 (400 ppb O3)	397.9	382.6	775.9	397.9	377.1	1.0398	----	1.0145	98.6%
2nd NO2 (200 ppb O3)	586.9	193.6	780.0	586.9	193.1	1.0344	----	1.0024	99.8%
3rd NO2 (100 ppb O3)	681.1	99.4	777.0	681.1	95.9	1.0384	----	1.0361	96.5%
2nd NO ref point	----	4.8	778.6	773.8	4.8	1.0362	1.0365	----	----
Average Correction Factor						1.0372	1.0352	1.0177	98.3%

Notes: Sample inlet filter replaced after as founds. Sample pump replaced after as founds for preventative maintenance. Adjusted span only. Reaction chamber pressure increased throughout the calibration causing as left to be almost 5% lower than target value.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

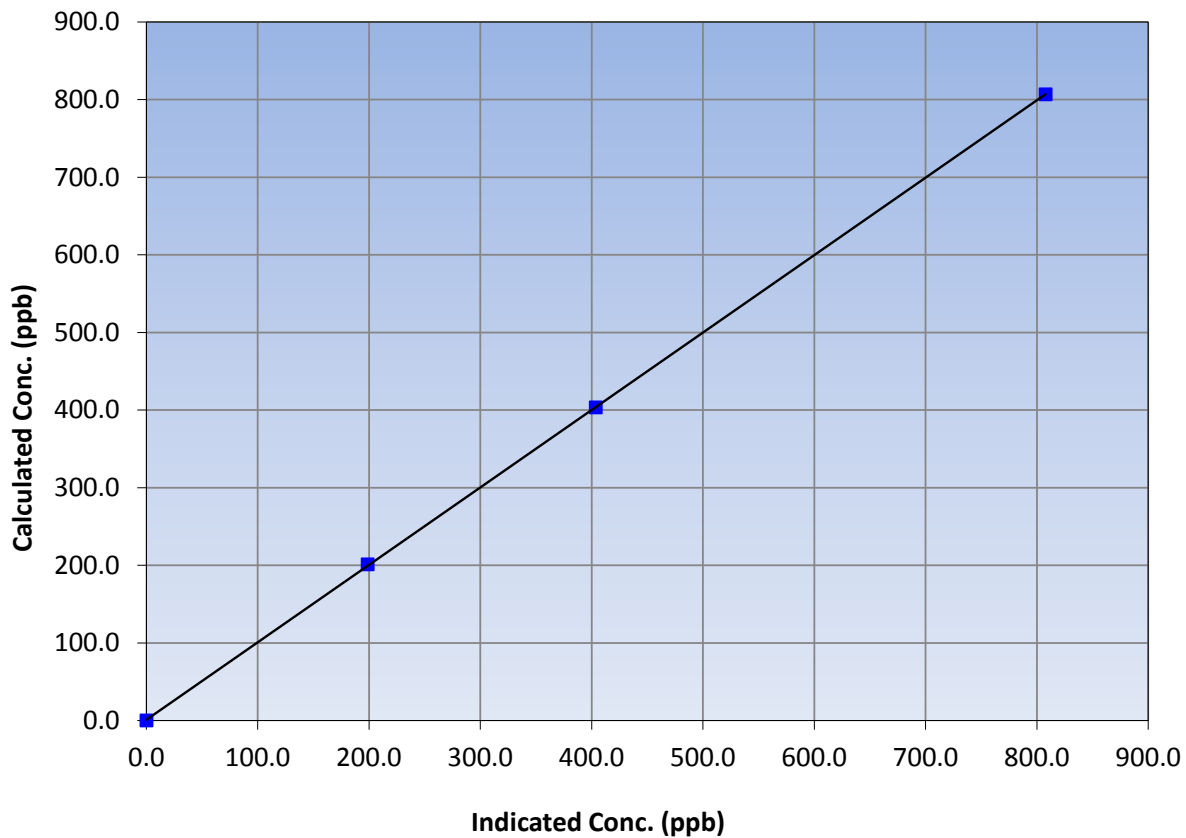
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 21, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:15	End Time (MST)	17:15
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	0.1	----	Correlation Coefficient	≥0.995	
806.8	807.8	0.9988			
403.4	403.8	0.9990			
201.2	198.8	1.0120			
			Slope	0.997745	0.90 - 1.10
			Intercept	1.008468	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

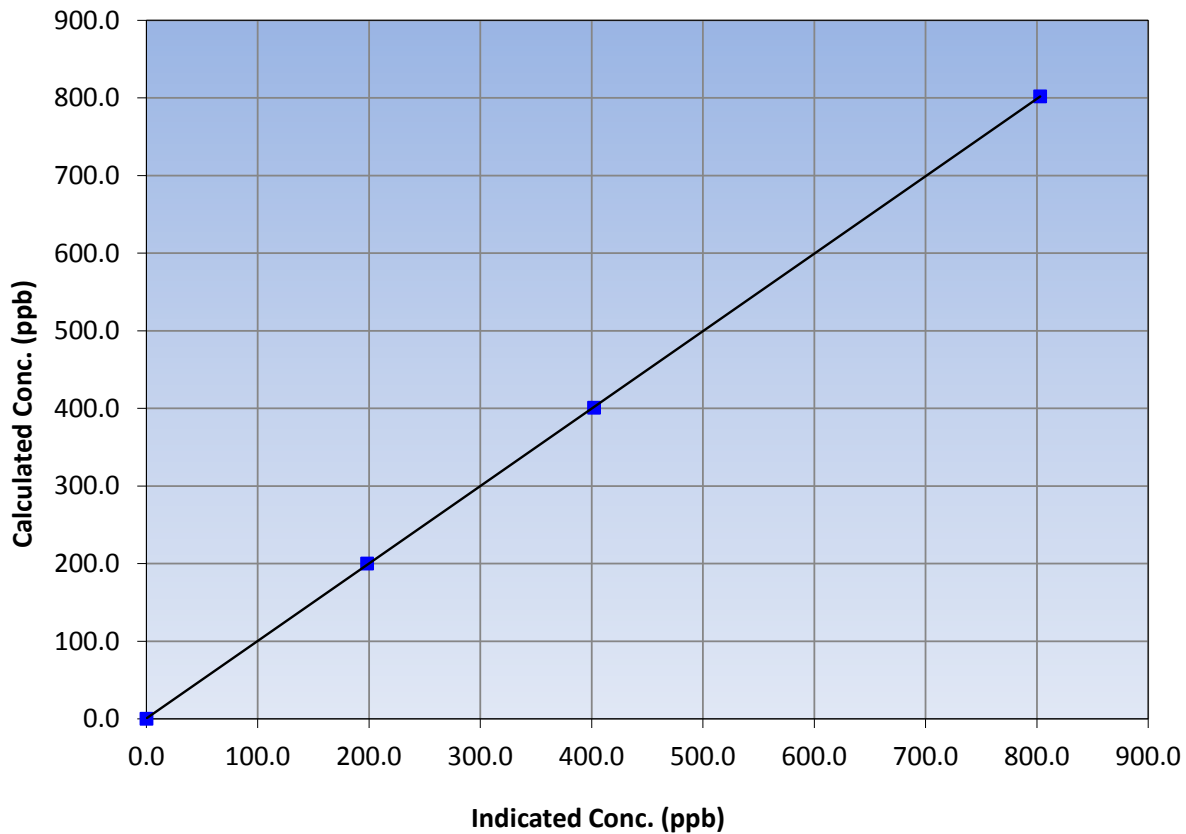
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 21, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:15	End Time (MST)	17:15
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	0.1	----	Correlation Coefficient	≥0.995	
802.0	803.0	0.9988			
401.0	402.2	0.9970			
200.0	198.2	1.0090			
			Slope	0.997919	0.90 - 1.10
			Intercept	0.609850	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

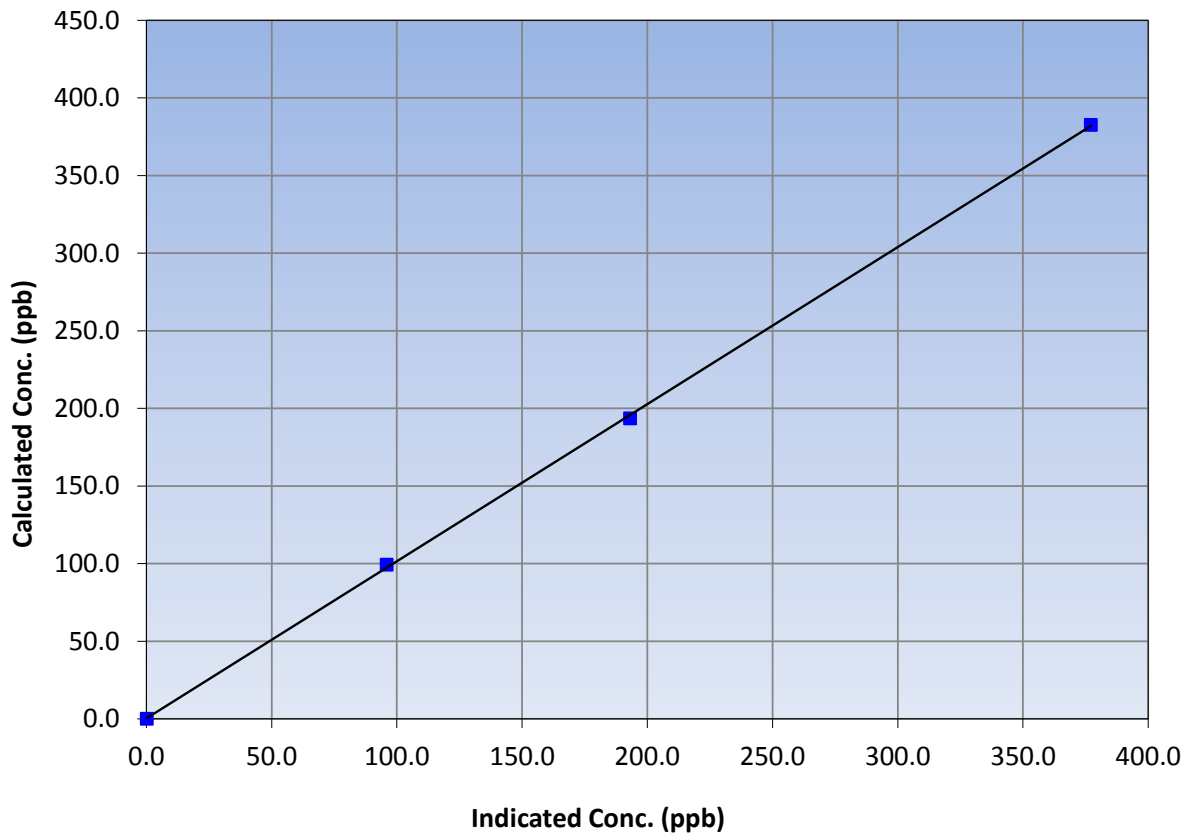
Station Information

Calibration Date	July 20, 2017	Previous Calibration	June 21, 2017
Station Name	Christina Lake	Station Number	AMS 500
Start Time (MST)	12:15	End Time (MST)	17:15
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	0.1	----	Correlation Coefficient	≥0.995	
382.6	377.1	1.0145			
193.6	193.1	1.0024			
99.4	95.9	1.0361			
			Slope	1.012025	0.90 - 1.10
			Intercept	0.320599	+/-20

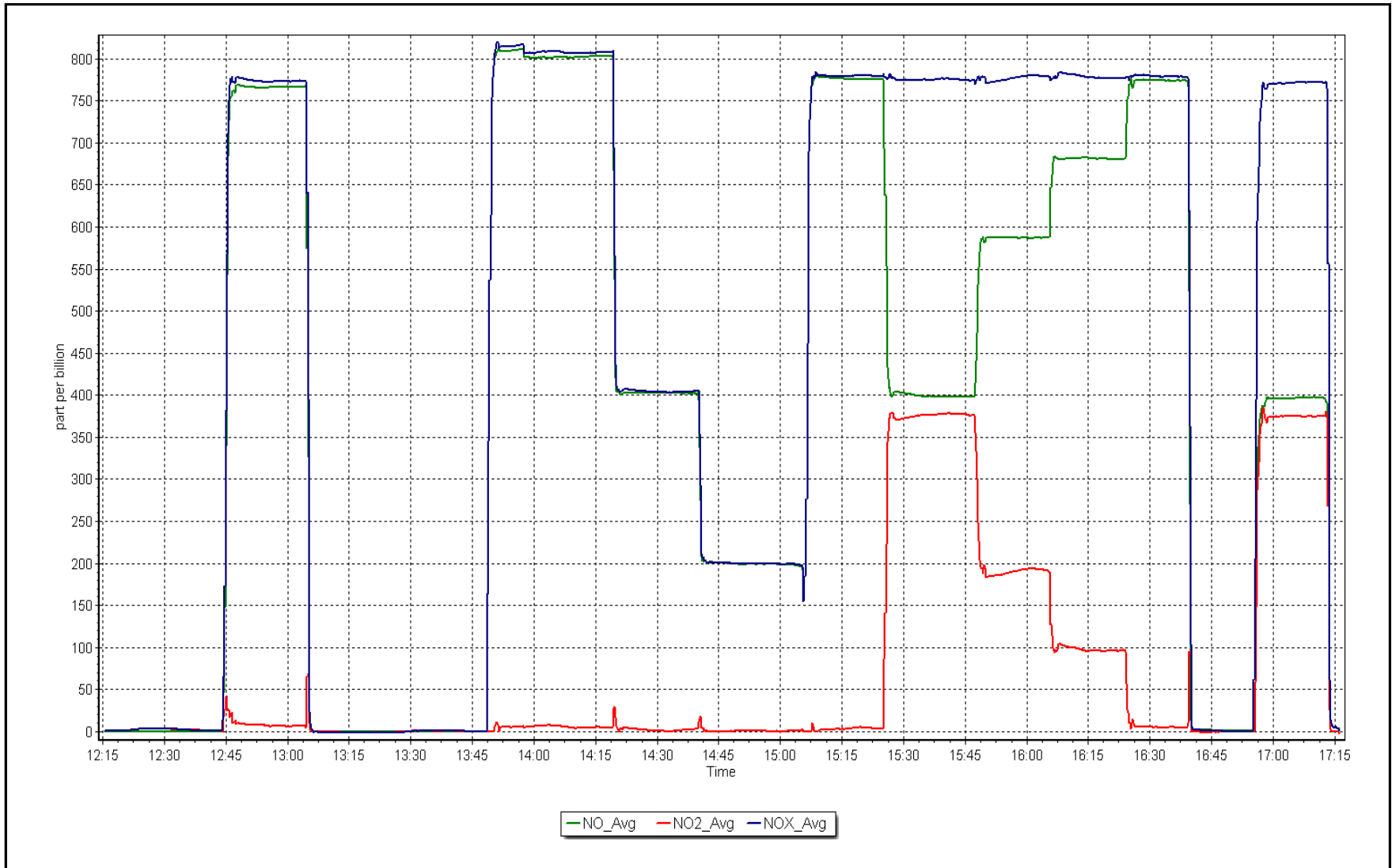
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 20, 2017

Location: Christina Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 502 SURMONT JULY 2017

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 JULY 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	707	36	37	99.87	16	0	4	0
H2S (ppb) Average	706	34	38	99.46	3	0	2	0
NO2 (ppb) Average	707	36	37	99.87	32	0	8	-
NO (ppb) Average	707	36	37	99.87	92	-	22	-
NOX (ppb) Average	707	36	37	99.87	111	-	30	-
Temperature 2 m (C) Average	744	0	0	100	29	-	22.6	-
Relative Humidity (%) Average	744	0	0	100	100	-	86	-
Wind Speed 10 m (km/h) Average	731	0	13	98.25	34	-	23	-
Wind Direction 10 m (deg) Average	731	0	13	98.25	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 JULY 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	707	0.9	1	-	0	0	0	1	1	2	16
H2S (ppb) Average	706	0.5	0	-	0	0	0	0	1	1	3
NO2 (ppb) Average	707	4.8	5	-	0	1	1	3	7	11	32
NO (ppb) Average	707	7.1	11	-	0	1	1	3	8	18	92
NOX (ppb) Average	707	11.9	15	-	0	1	3	7	14	29	111
Temperature 2 m (C) Average	744	18.22	4.1	-	6.4	13.1	15.3	18.1	21.3	23.5	29
Relative Humidity (%) Average	744	63.9	17	-	32	42	51	63	77	88	100
Wind Speed 10 m (km/h) Average	731	12.1	6	-	0	5	8	10	16	22	34
Wind Direction 10 m (deg) Average	731	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, NO, NOX, SO2	28 Jul 2017 13:00	28 Jul 2017 13:00	1	Maintenance - sample manifold cleaned
H2S	09 Jul 2017 19:00	09 Jul 2017 19:00	1	Unstable operation - excessive baseline drift
H2S	18 Jul 2017 16:00	18 Jul 2017 17:00	2	Unstable operation - excessive baseline drift
H2S	27 Jul 2017 15:00	27 Jul 2017 15:00	1	Unstable operation - excessive baseline drift
Wind Speed, Wind Direction	07 Jul 2017 22:00	08 Jul 2017 03:00	6	Flat line in sensor output signal
Wind Speed, Wind Direction	08 Jul 2017 08:00	08 Jul 2017 09:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction	11 Jul 2017 01:00	11 Jul 2017 01:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	11 Jul 2017 03:00	11 Jul 2017 03:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	12 Jul 2017 02:00	12 Jul 2017 04:00	3	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16 ppb on Jul 24 20:00	Maximum Daily Average: 3.6 ppb on Jul 24		Hours of Data:	707
Minimum Value: 0 ppb on Jul 2 21:00	Minimum Daily Average: 0.2 ppb on Jul 1		Hours of Missing Data:	37
Maximum Diurnal Average: 1.5 ppb at hour 15	Minimum Diurnal Average: 0.6 ppb at hour 2		Hours of Calibration:	36
Monthly Average: 0.9 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O 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-Jul	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-Jul	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
3-Jul	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	1
4-Jul	1	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.4	1
5-Jul	1	1	0	1	1	Z	1	0	0	0	0	1	3	3	3	2	4	4	1	0	0	1	1	1	1.2	4
6-Jul	Z	1	0	0	0	0	0	1	2	2	2	2	0	5	4	6	5	1	1	1	1	1	1	1	1.6	6
7-Jul	0	Z	1	0	1	0	0	0	1	1	2	2	4	3	5	2	2	0	0	0	0	1	1	1	1.3	5
8-Jul	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0.8	1
9-Jul	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0.6	1
10-Jul	0	0	0	1	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
11-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	3	5	3	0	1	1	1	1	0	0	1	0.9	5	
12-Jul	Z	0	0	0	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0.4	1	
13-Jul	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-Jul	0	0	Z	0	0	1	2	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0.5	2	
15-Jul	0	0	0	Z	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0.5	1	
16-Jul	0	0	1	2	Z	4	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	4	
17-Jul	1	1	1	1	1	Z	1	1	1	1	2	2	3	5	7	6	4	3	2	4	1	2	1	2.3	7	
18-Jul	Z	1	1	1	1	1	2	2	3	3	2	2	3	2	2	2	1	1	1	1	1	1	1	1.5	3	
19-Jul	1	Z	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.8	1	
20-Jul	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1	
21-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1	
23-Jul	1	1	1	1	1	Z	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0.8	2	
24-Jul	Z	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	5	16	12	8	12	3.6	16	
25-Jul	9	Z	2	2	1	1	1	2	2	3	6	4	7	3	2	1	1	1	1	1	1	1	1	2.3	9	
26-Jul	1	1	Z	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0.5	1	
27-Jul	0	1	0	Z	1	0	0	0	0	0	C	C	C	C	C	0	0	0	0	0	1	0	1	0.5	1	
28-Jul	1	1	1	1	Z	1	1	1	1	1	0	0	M	1	1	1	1	1	4	1	1	1	1	0.9	4	
29-Jul	1	1	1	1	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0.7	1	
30-Jul	Z	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0.6	1	
31-Jul	1	Z	1	0	1	1	1	1	1	1	1	2	3	1	4	5	3	1	2	1	2	2	1	1.6	5	

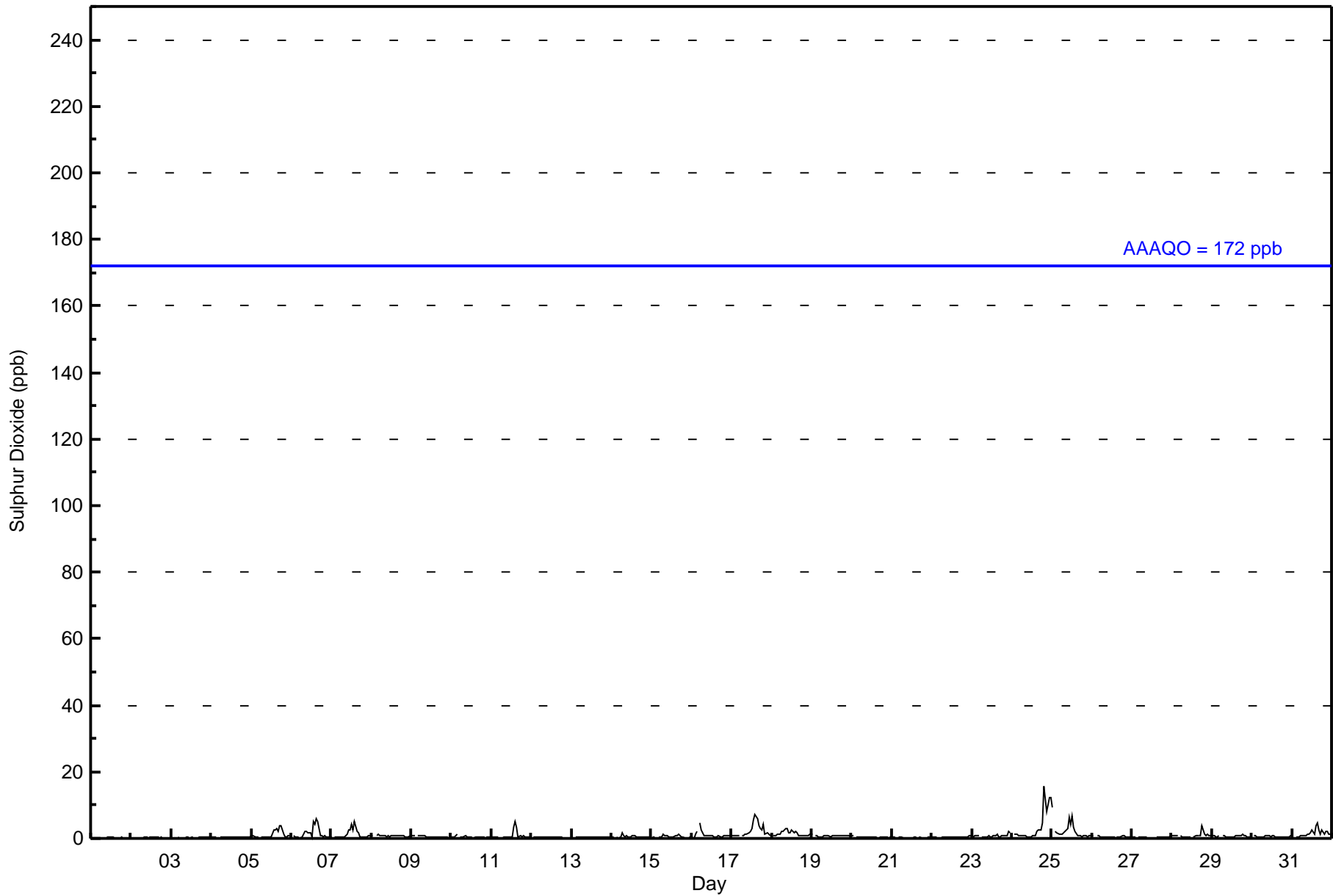
0.8	0.6	0.6	0.7	0.6	0.7	0.7	0.6	0.7	0.8	0.9	0.8	1.1	1.2	1.5	1.3	1.0	0.8	1.0	1.2	0.9	0.8	1.0	1.0	Diurnal Average
9	1	2	2	1	4	3	2	3	3	6	4	7	5	7	6	5	4	5	16	12	8	12	12	Diurnal Maximum

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
Surmont - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	703	99.43	99.43
11 - 20	4	0.57	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: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont - July 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	18	18	7	8	13	29	51	25	32	28	43	129	127	81	36	46	691
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	18	18	7	8	13	29	51	25	32	28	43	129	127	81	40	46	695

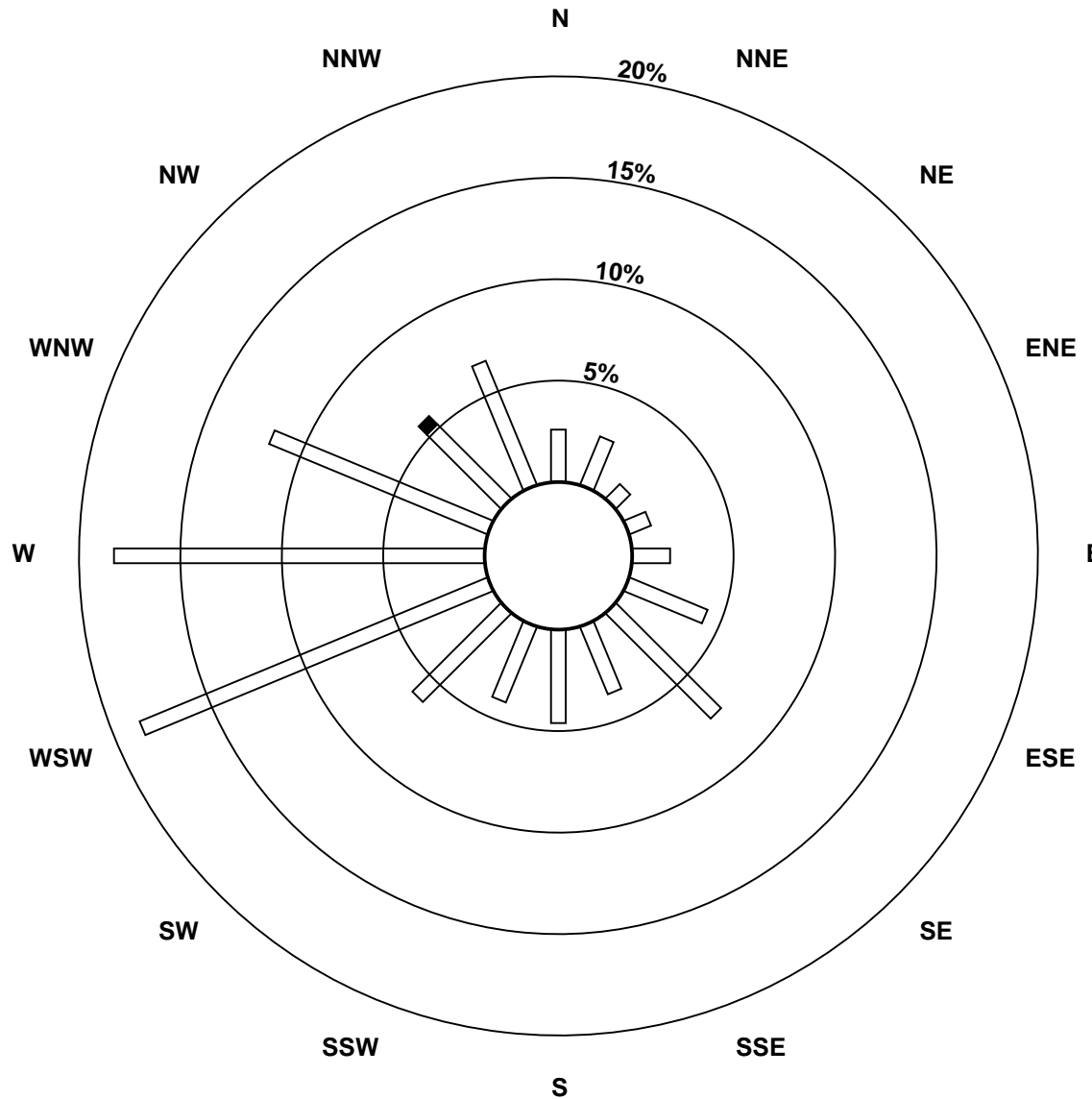
Total Number of Valid Hours: 695

Total Number of Hours: 744

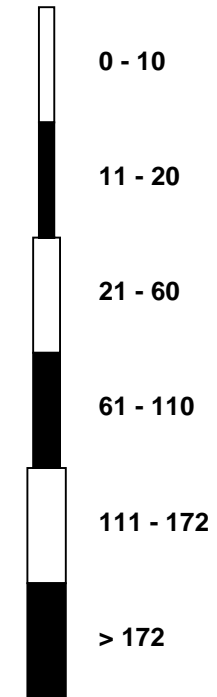


Wood Buffalo Environmental Association
Wind Rose Jul 2017

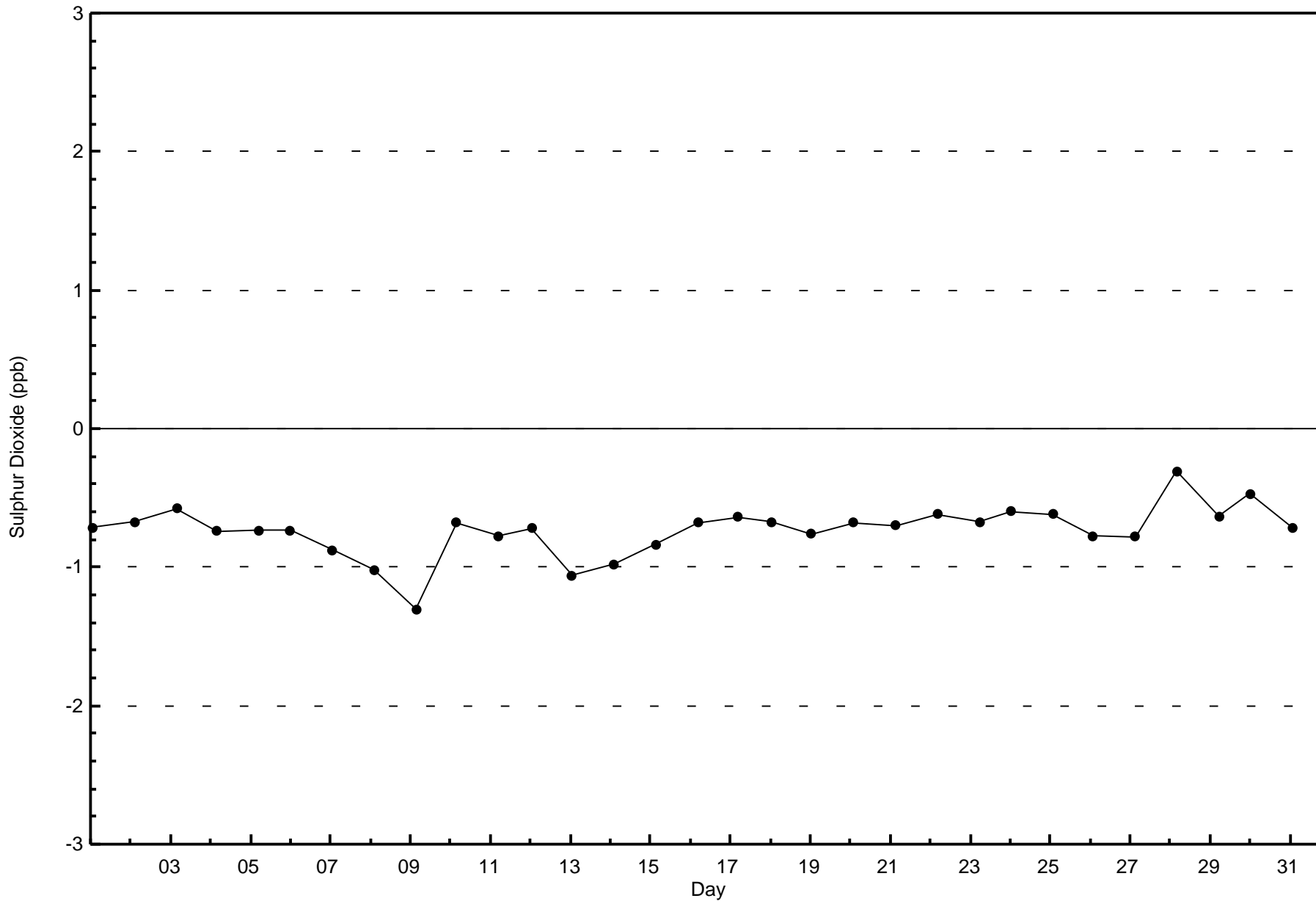
Sulphur Dioxide (SO₂) - ppb
Surmont (AMS 502)



Classes (ppb)



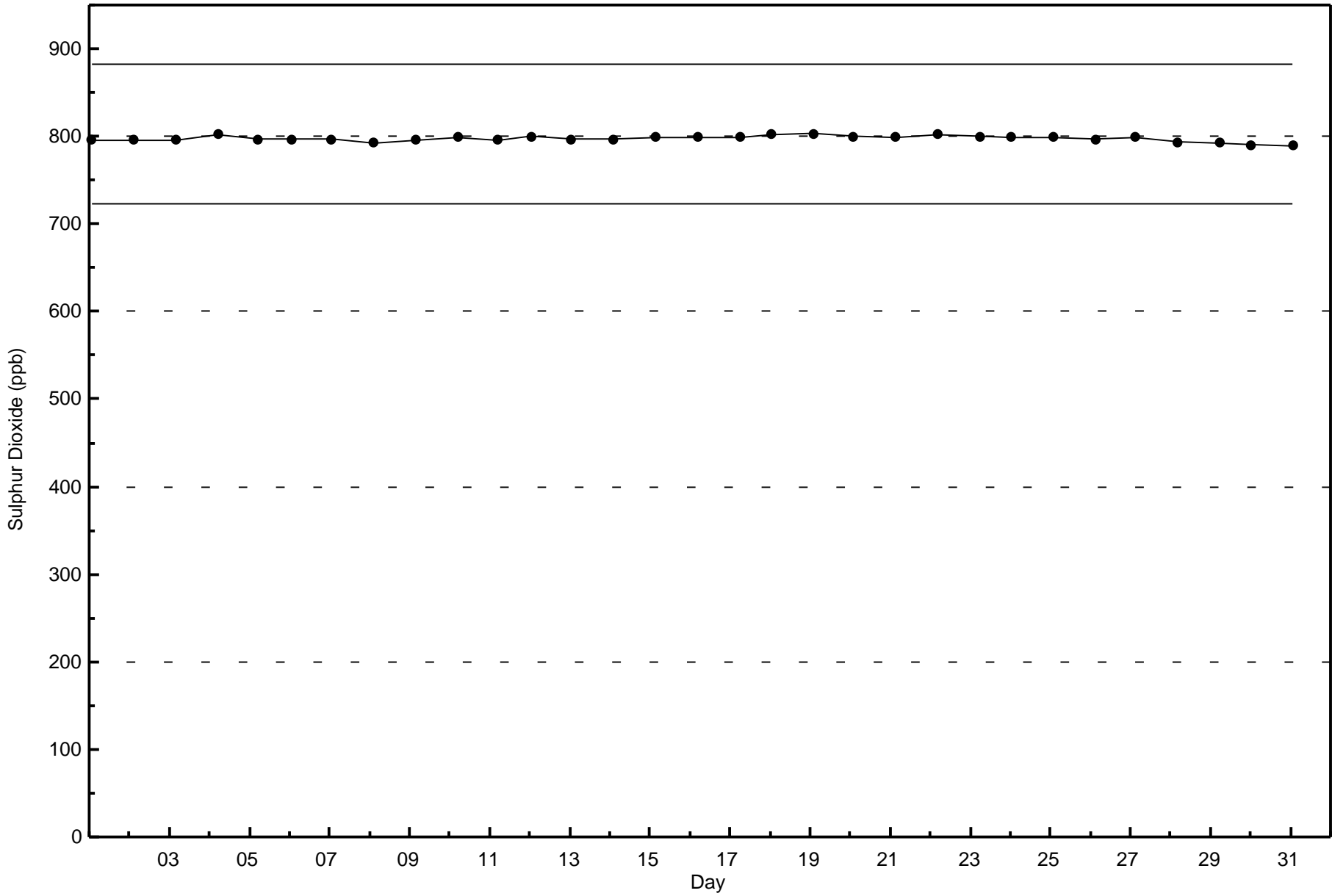
Total Number of Valid Hours: 695





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Surmont - July 2017



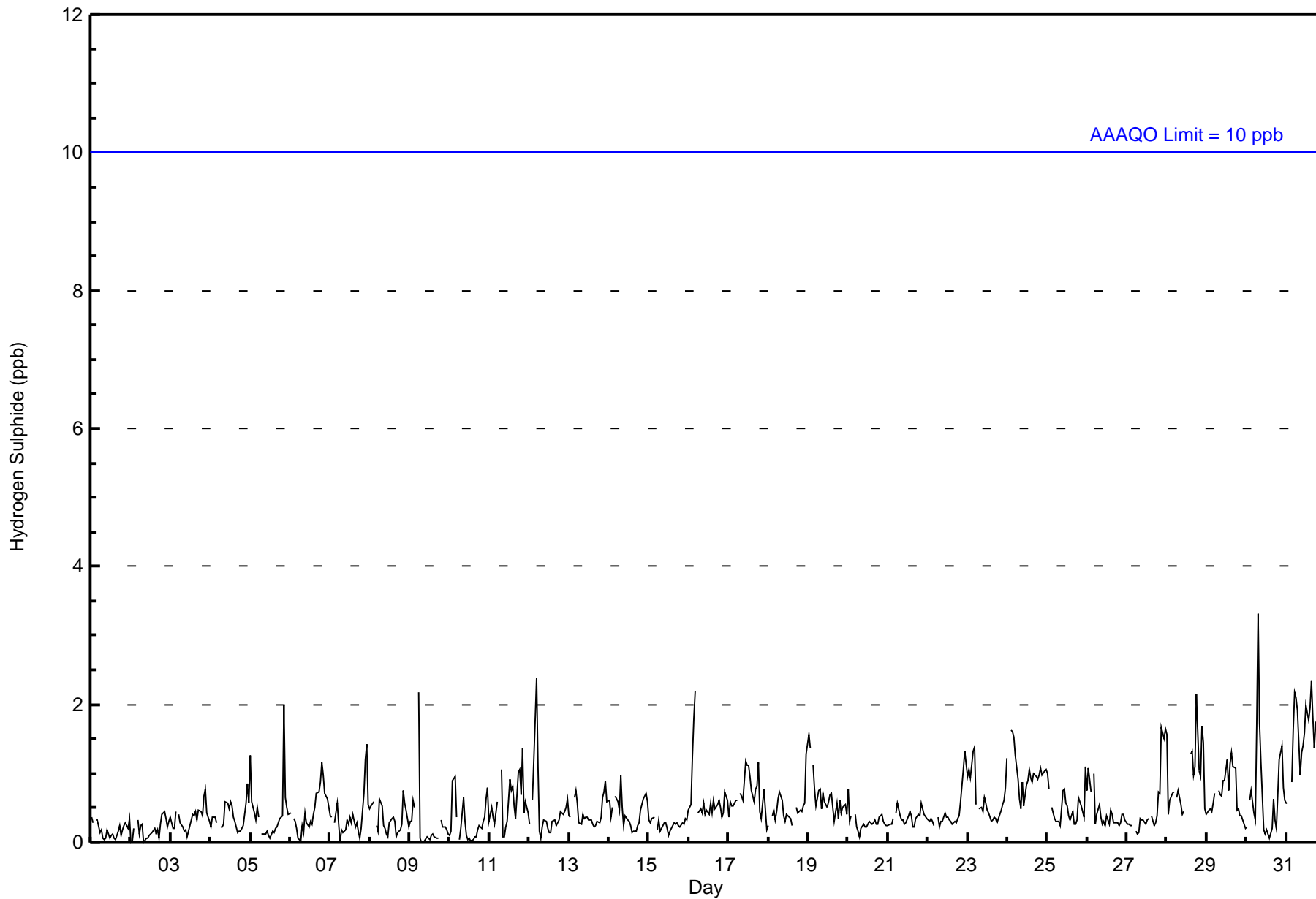


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Jul 30 08:00 Maximum Daily Average: 1.6 ppb on Jul 31																	Hours in Service: 744 Hours of Data: 706									
Minimum Value: 0 ppb on Jul 2 09:00 Minimum Daily Average: 0.2 ppb on Jul 1 Maximum Diurnal Average: 0.7 ppb at hour 5 Minimum Diurnal Average: 0.4 ppb at hour 12 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																	Hours of Missing Data: 38 Hours of Calibration: 34 Percent Operational Time: 99.5									
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-Jul	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-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.4	1
4-Jul	0	0	0	0	0	Z	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1	0.4	1
5-Jul	1	1	0	0	1	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0.4	2
6-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0.5	1
7-Jul	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
8-Jul	0	1	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.3	1
9-Jul	0	0	1	1	Z	2	0	0	0	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	0.3	2
10-Jul	0	0	1	1	0	Z	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
11-Jul	0	1	0	0	0	1	Z	1	0	0	0	0	1	1	1	1	0	1	1	1	1	0	1	0	0.6	1
12-Jul	0	Z	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.5	2
13-Jul	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
14-Jul	1	0	1	Z	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.4	1
15-Jul	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-Jul	0	1	1	2	2	Z	0	0	0	1	0	0	0	1	0	1	0	1	1	1	0	0	1	1	0.7	2
17-Jul	0	1	1	1	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0.7	1
18-Jul	0	Z	0	0	0	0	1	1	1	0	0	0	0	0	0	UO	UO	1	0	0	0	1	1	1	0.5	1
19-Jul	2	1	Z	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	0	1	1	0	0.7	2
20-Jul	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
21-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.4	1
22-Jul	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0.4	1
23-Jul	1	1	1	1	1	1	Z	0	1	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0.6	1
24-Jul	1	Z	2	2	2	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	2
25-Jul	1	1	Z	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0.5	1
26-Jul	1	1	1	Z	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
27-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	UO	0	0	0	0	0	1	1	2	2	0.5	2
28-Jul	2	0	1	1	1	Z	1	1	1	0	0	C	C	C	1	1	1	1	2	1	1	2	1	0	1.0	2
29-Jul	0	0	0	0	1	1	Z	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0.7	1
30-Jul	0	Z	1	1	0	0	2	3	2	1	0	0	0	0	0	0	1	0	0	1	1	1	1	1	0.7	3
31-Jul	1	1	Z	1	2	2	2	2	1	1	1	2	2	2	2	2	2	1	2	2	2	1	1	2	1.6	2
																								Diurnal Average		
																								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 - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Surmont - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	705	99.86	99.86
3 - 4	1	0.14	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: 706

Total Number of Hours: 744



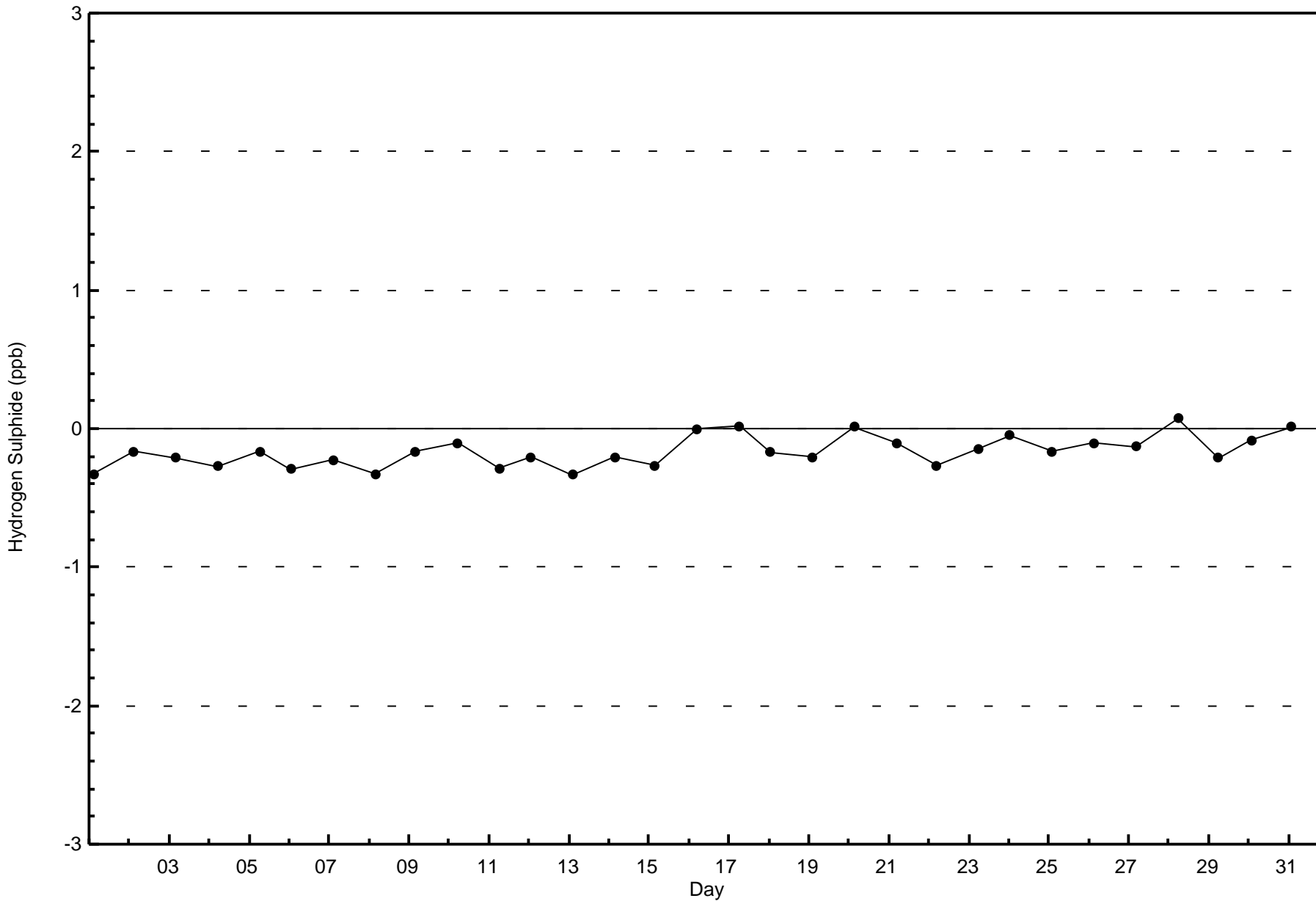
**Wood Buffalo Environmental Association
Frequency Distribution**

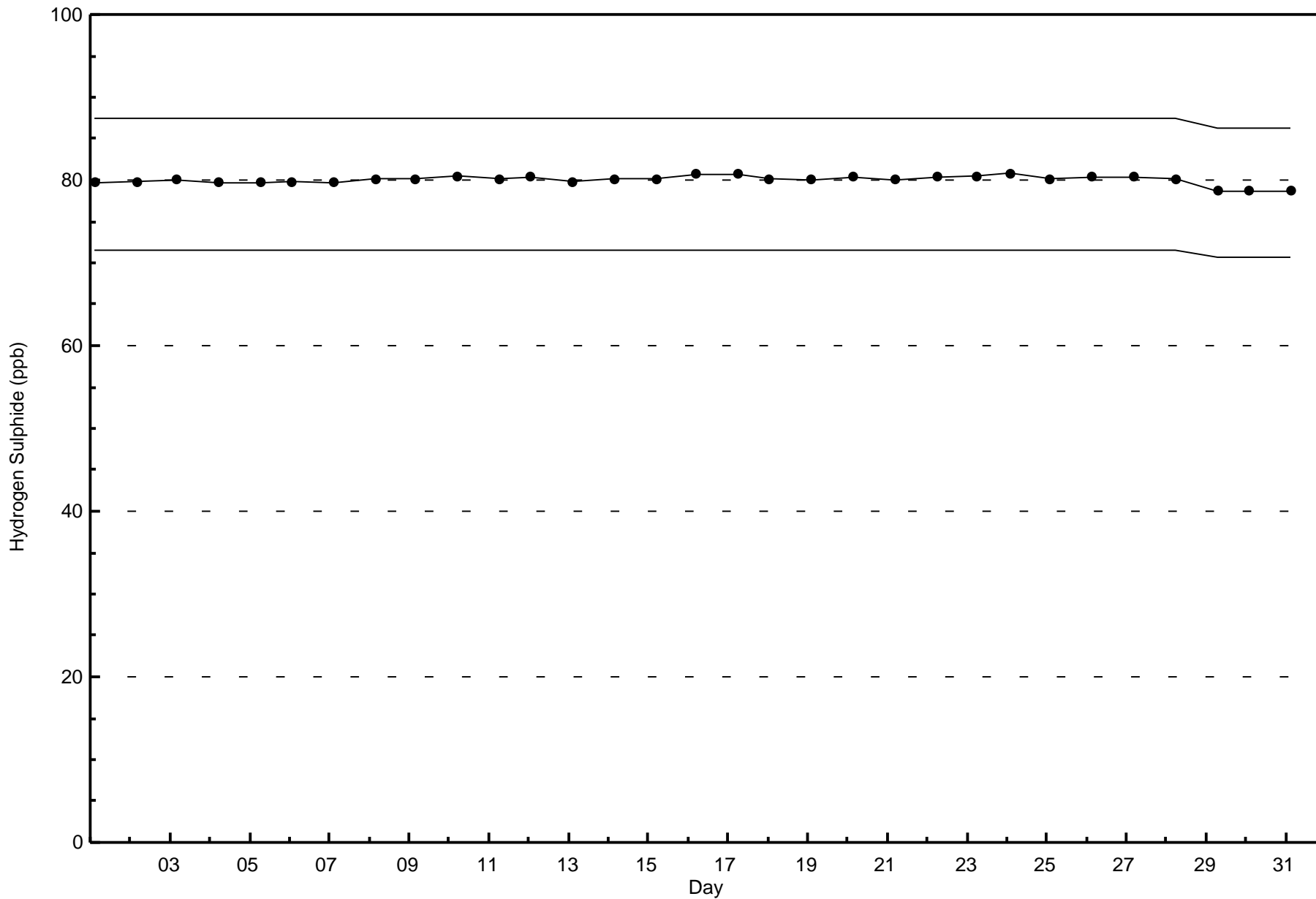
**Hydrogen Sulphide (H₂S) - ppb
Surmont - July 2017**

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	18	7	8	12	28	54	27	30	28	45	129	124	78	40	46	693
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	1	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	19	18	7	8	12	28	54	27	30	28	45	129	125	78	40	46	694

Total Number of Valid Hours: 694

Total Number of Hours: 744







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

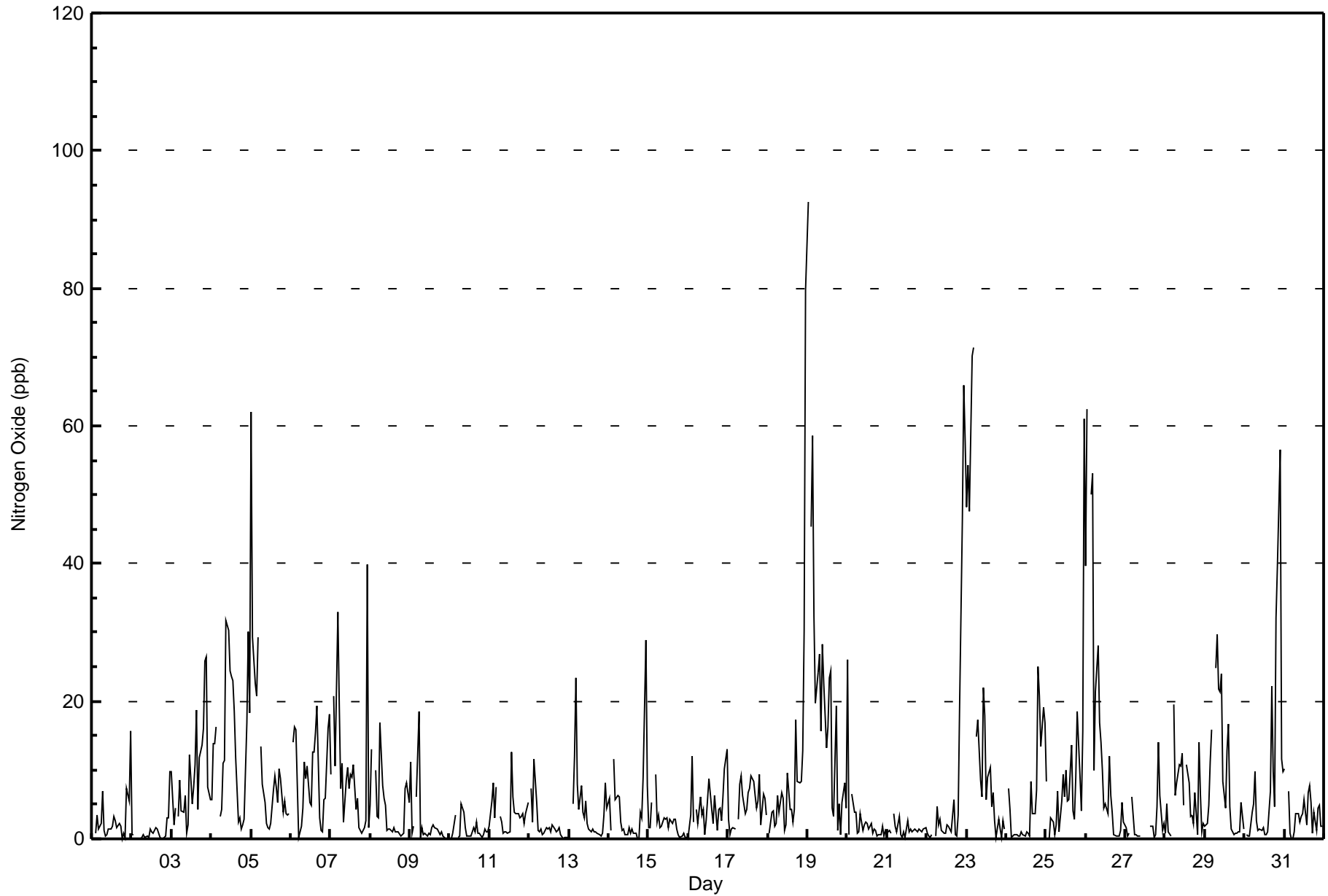
Surmont - July 2017

Maximum Value: 92 ppb on Jul 19 01:00																		Maximum Daily Average: 21.6 ppb on Jul 19																		Hours in Service: 744			
Minimum Value: 0 ppb on Jul 1 19:00																		Minimum Daily Average: 1.1 ppb on Jul 2																		Hours of Data: 707			
Maximum Diurnal Average: 13.8 ppb at hour 1																		Minimum Diurnal Average: 2.8 ppb at hour 19																		Hours of Missing Data: 37			
Monthly Average: 7.1 ppb																		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 O ₃ = 8 P ₉₀ = 18 P ₉₉ = 62																		Hours of Calibration: 36			
																																				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-Jul	11	Z	1	4	2	2	7	1	0	1	1	1	2	3	3	2	2	2	0	1	0	7	6	16	3.2	16													
2-Jul	1	1	Z	0	0	0	0	1	0	0	0	1	1	1	2	1	1	0	0	0	0	3	3	10	1.1	10													
3-Jul	10	2	5	Z	3	8	4	4	6	1	2	12	5	8	11	19	4	12	14	16	26	26	8	6	9.2	26													
4-Jul	6	14	14	16	Z	3	4	11	11	32	30	24	24	23	19	12	2	3	1	2	3	17	30	18	13.9	32													
5-Jul	62	29	23	21	29	Z	13	8	5	2	2	1	2	7	9	7	5	10	9	4	5	4	4	4	11.6	62													
6-Jul	Z	14	16	16	8	0	2	4	11	9	10	5	5	13	13	15	19	3	1	1	6	6	16	18	9.2	19													
7-Jul	9	Z	21	11	33	19	7	11	3	8	10	7	9	9	11	4	6	2	1	1	2	3	40	2	9.9	40													
8-Jul	5	13	Z	10	3	3	17	8	6	5	1	1	1	1	2	1	1	1	0	1	1	7	8	5	4.4	17													
9-Jul	11	1	2	Z	6	19	0	2	1	1	0	1	1	2	2	2	1	1	1	1	1	0	0	0	2.3	19													
10-Jul	0	0	1	4	Z	0	0	5	4	2	0	0	0	0	2	1	2	1	1	0	1	1	1	1	1.2	5													
11-Jul	2	6	8	3	8	Z	3	2	1	1	1	1	1	13	6	4	4	4	3	3	4	2	4	5	3.8	13													
12-Jul	Z	7	2	12	5	1	1	1	1	1	2	1	2	1	2	2	1	1	2	1	0	0	0	0	2.0	12													
13-Jul	0	Z	5	12	23	8	4	8	4	3	6	2	1	1	1	1	1	1	1	0	1	3	8	4	4.3	23													
14-Jul	6	1	Z	12	6	6	6	2	1	2	1	1	2	1	1	1	0	0	4	3	9	29	8	8	4.4	29													
15-Jul	2	2	5	Z	9	2	3	2	2	3	3	3	2	3	2	3	3	2	1	0	0	1	0	0	2.3	9													
16-Jul	0	3	12	2	Z	4	2	6	3	4	1	3	9	6	4	2	6	1	4	5	3	6	10	13	4.8	13													
17-Jul	3	1	2	2	1	Z	3	8	9	6	4	4	7	7	9	8	6	4	6	9	2	7	6	3	5.1	9													
18-Jul	Z	1	4	4	2	2	6	4	7	6	1	2	10	4	4	2	4	17	8	8	8	13	30	80	9.9	80													
19-Jul	92	Z	45	59	32	20	24	27	16	28	23	13	16	23	24	5	3	19	1	5	1	5	8	4	21.6	92													
20-Jul	26	1	Z	6	4	4	1	1	4	1	2	2	2	1	2	1	1	1	0	1	1	2	0	1	2.9	26													
21-Jul	1	1	1	Z	4	2	1	3	1	0	1	0	3	1	1	1	1	1	1	2	1	1	2	2	1.4	4													
22-Jul	1	0	0	1	Z	0	5	2	3	1	1	1	2	2	1	1	6	1	0	3	19	46	66	58	9.6	66													
23-Jul	48	54	48	70	71	Z	15	17	9	6	22	18	6	9	10	5	7	3	0	3	1	0	3	1	18.5	71													
24-Jul	Z	7	4	0	0	1	1	0	0	1	1	1	1	0	8	4	4	7	25	21	13	19	17	17	5.9	25													
25-Jul	8	Z	0	3	2	1	2	7	1	5	9	6	10	5	6	14	4	3	9	18	9	4	16	61	8.9	61													
26-Jul	40	62	Z	50	53	10	21	28	17	14	10	4	5	4	12	6	4	1	0	0	0	1	5	3	15.3	62													
27-Jul	2	0	1	Z	6	1	1	0	0	0	C	C	C	C	C	2	2	0	1	5	14	6	1	2	2.5	14													
28-Jul	1	5	1	1	Z	20	6	8	11	11	12	5	M	11	8	3	4	2	7	1	14	7	1	2	6.3	20													
29-Jul	2	2	5	11	16	Z	25	30	22	21	24	8	4	13	17	5	2	1	1	1	1	1	5	1	9.4	30													
30-Jul	Z	1	0	0	4	5	10	3	1	1	1	2	1	1	1	7	22	10	5	32	40	56	12	10	9.7	56													
31-Jul	10	Z	7	1	0	0	1	4	4	2	3	4	6	2	7	8	5	1	4	1	4	5	2	2	3.6	10													
																		13.8																		Diurnal Average			
																		92																		Diurnal Maximum			
Z - zerospan																		C - Calibration																		M - Maintenance			



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Surmont - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Surmont - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	649	91.80	91.80
21 - 40	40	5.66	97.45
41 - 80	17	2.40	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont - July 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	18	18	7	8	13	29	51	24	32	28	43	80	122	81	38	46	638
21 - 40	0	0	0	0	0	0	0	1	0	0	0	31	5	0	2	0	39
41 - 80	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	17
81 - 159	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	18	7	8	13	29	51	25	32	28	43	129	127	81	40	46	695

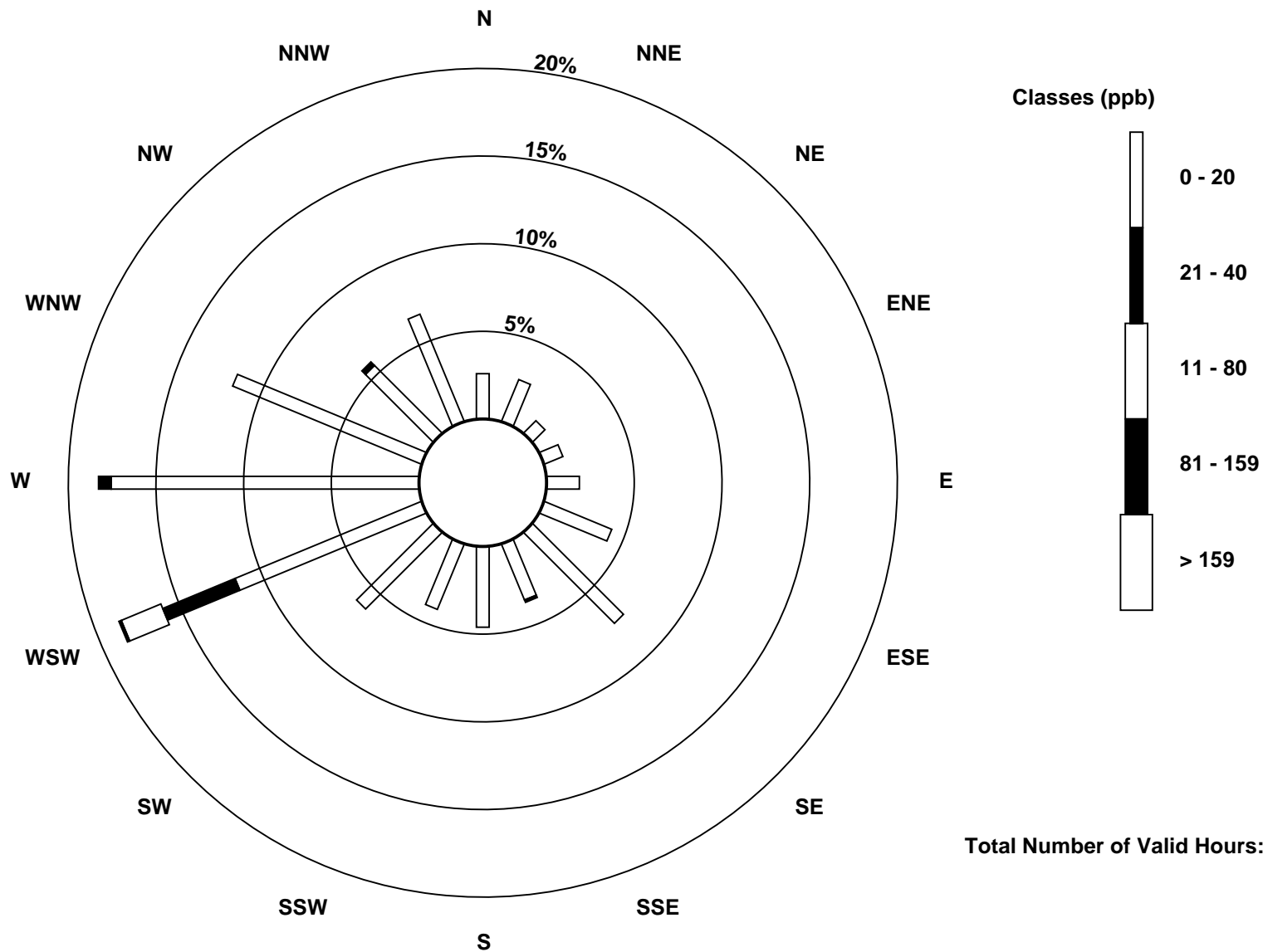
Total Number of Valid Hours: 695

Total Number of Hours: 744

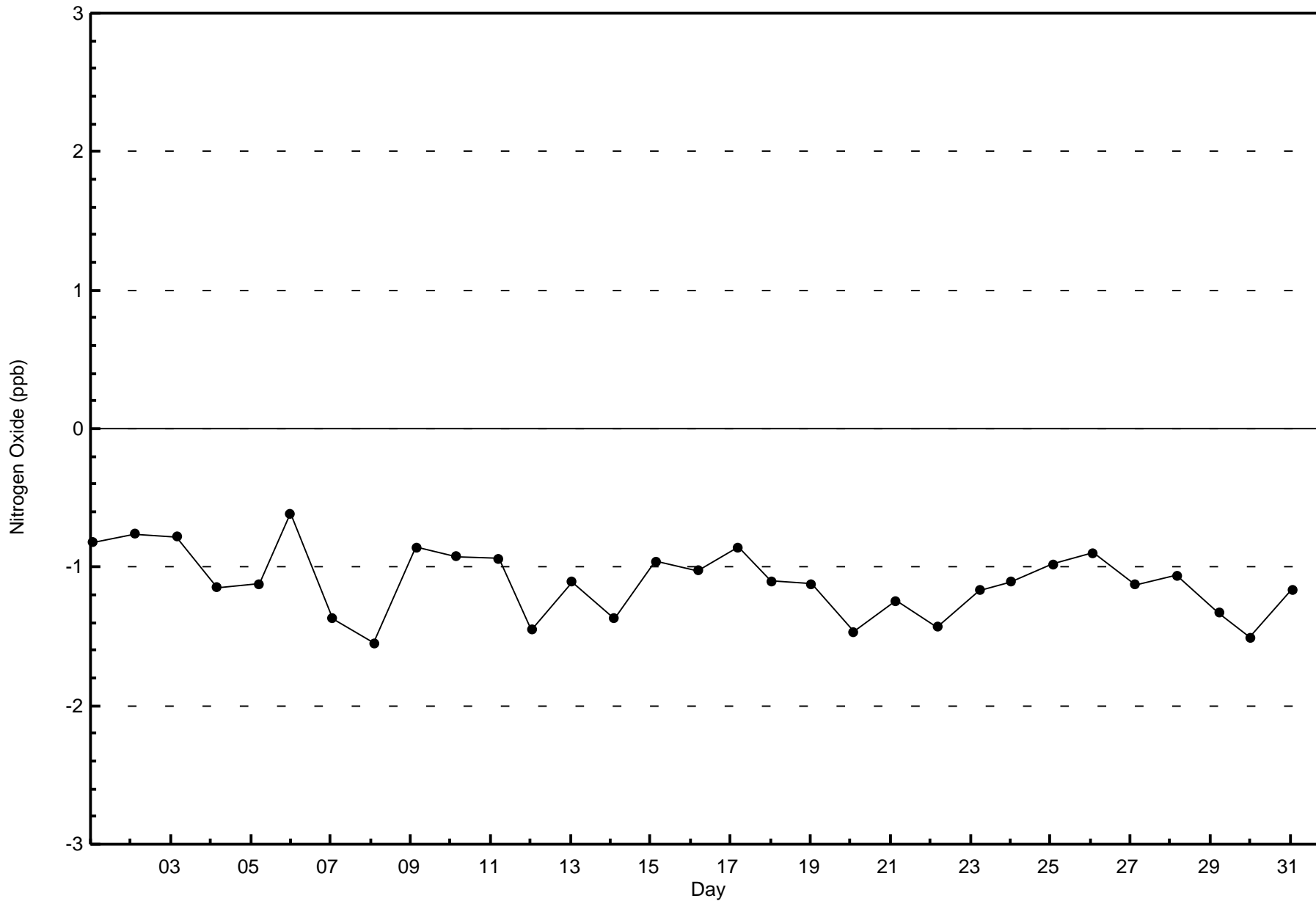


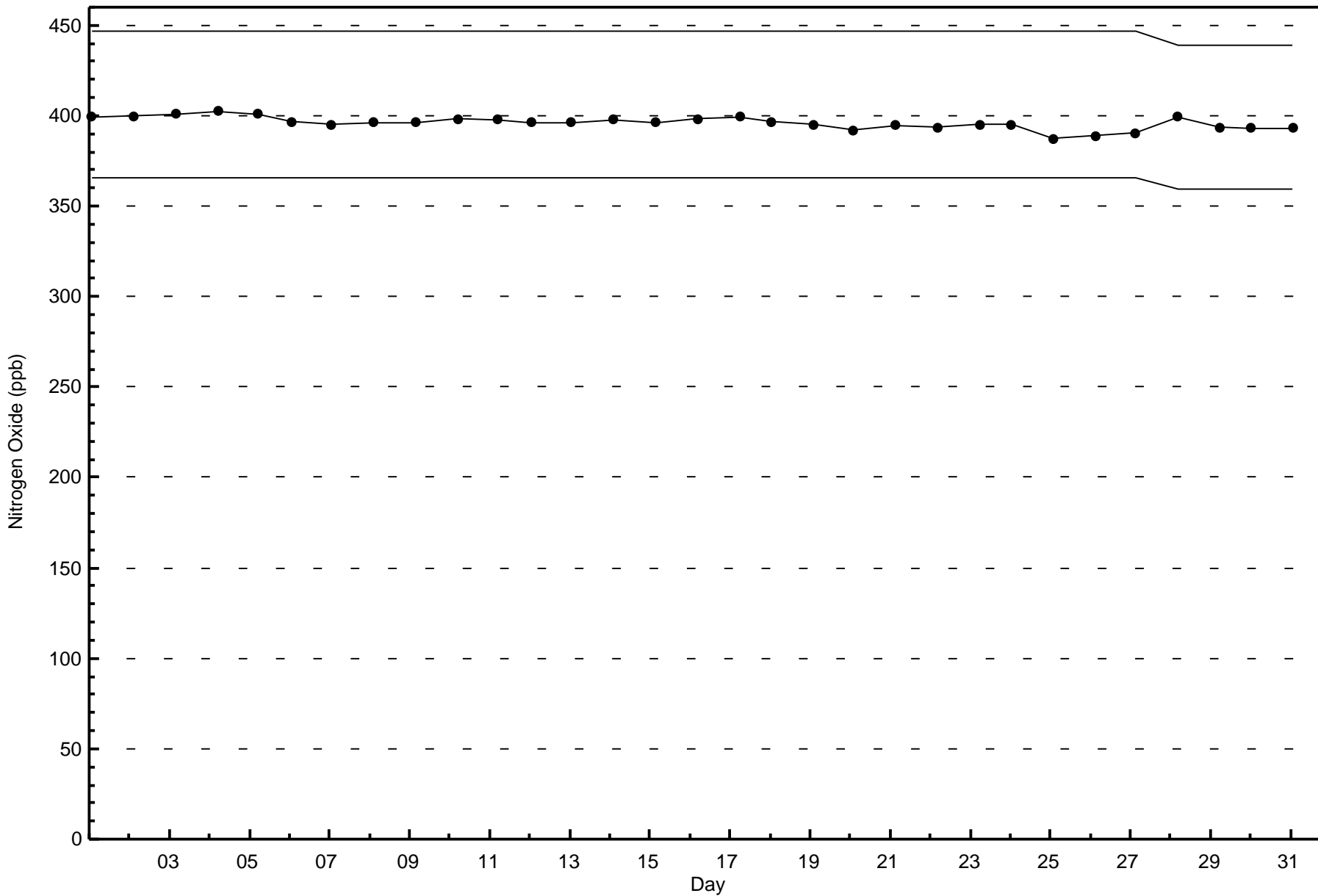
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxide (NO) - ppb
Surmont (AMS 502)



Total Number of Valid Hours: 695







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Surmont - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 32 ppb on Jul 7 23:00	Maximum Daily Average: 8.1 ppb on Jul 19		Hours of Data:	707
Minimum Value: 0 ppb on Jul 6 06:00	Minimum Daily Average: 1.5 ppb on Jul 21		Hours of Missing Data:	37
Maximum Diurnal Average: 9.0 ppb at hour 5	Minimum Diurnal Average: 2.4 ppb at hour 19		Hours of Calibration:	36
Monthly Average: 4.8 ppb	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 7 P ₉₀ = 11 P ₉₉ = 22		Percent Operational Time:	99.9

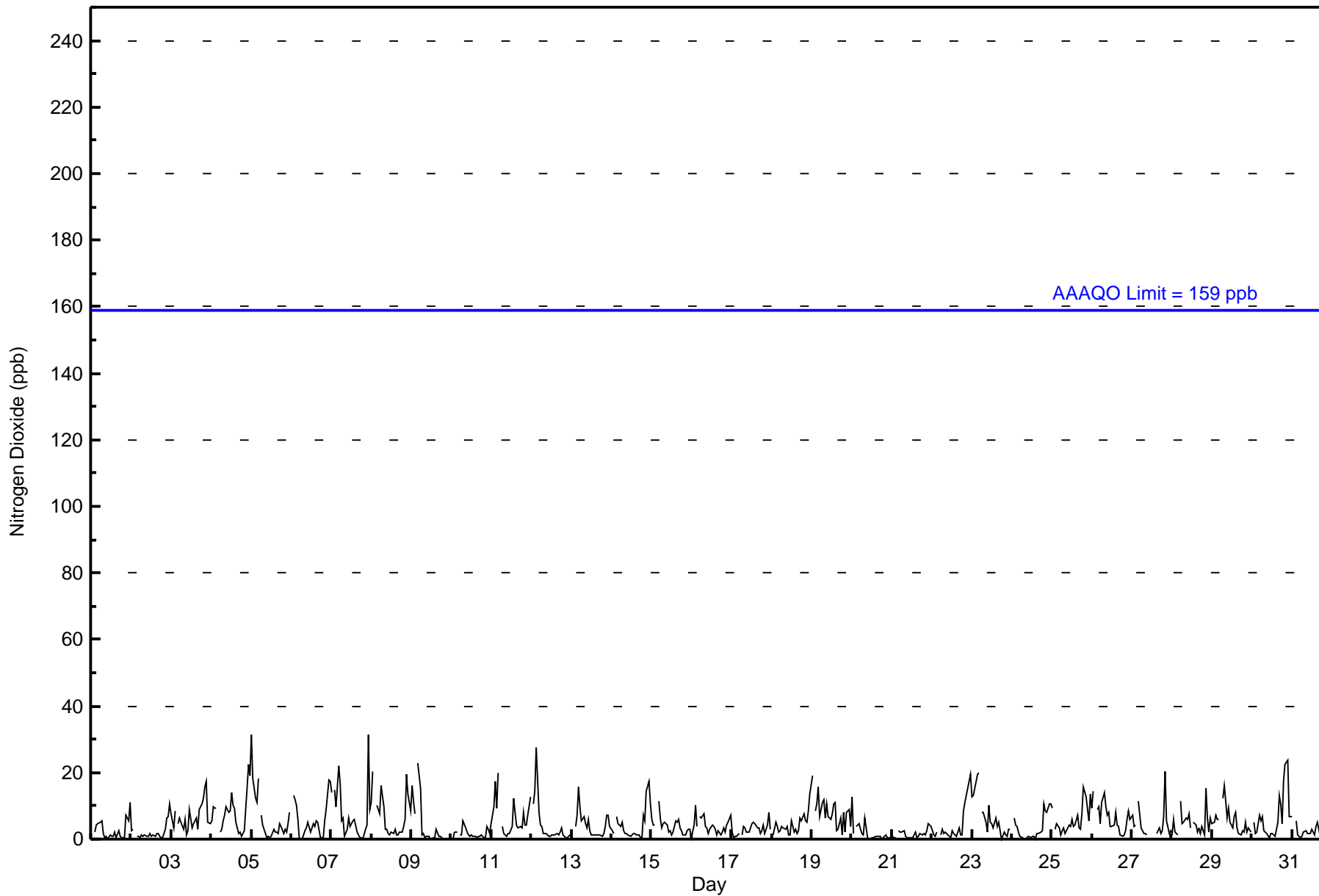
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	8	Z	2	4	5	5	6	2	1	1	0	1	1	1	2	1	3	1	0	0	1	7	6	11	2.9	11
2-Jul	3	3	Z	1	1	0	1	1	1	1	1	2	1	1	1	2	2	1	0	1	3	6	7	11	2.2	11
3-Jul	8	3	9	Z	5	7	5	3	6	1	3	9	4	5	5	6	3	9	11	12	16	17	5	5	6.7	17
4-Jul	6	10	9	10	Z	2	3	6	7	10	8	9	14	10	9	5	2	2	1	2	2	16	23	19	8.0	23
5-Jul	32	18	12	11	18	Z	7	4	2	1	1	0	1	3	2	2	2	5	4	2	3	2	5	8	6.3	32
6-Jul	Z	13	12	10	6	0	0	1	3	4	5	2	3	5	4	5	5	0	1	1	5	9	18	18	5.6	18
7-Jul	14	Z	15	10	22	17	5	7	1	3	6	4	5	6	6	2	1	1	0	0	3	4	32	9	7.4	32
8-Jul	11	20	Z	10	9	8	16	10	3	3	2	1	2	2	3	1	1	2	2	4	6	19	14	9	6.8	20
9-Jul	16	11	8	Z	23	15	1	2	1	1	1	0	0	1	0	3	1	1	0	0	0	0	0	0	3.7	23
10-Jul	0	0	2	2	Z	1	1	5	3	2	1	1	1	1	1	0	1	1	1	0	1	4	3	2	1.5	5
11-Jul	5	10	17	9	20	Z	4	2	1	1	2	2	4	12	8	4	3	4	4	8	4	4	7	13	6.4	20
12-Jul	Z	11	14	28	8	4	4	2	2	2	1	1	1	1	1	2	1	2	3	1	1	1	1	1	4.0	28
13-Jul	1	Z	4	7	16	10	6	7	5	4	6	3	1	1	1	1	1	1	1	2	4	7	7	4	4.3	16
14-Jul	3	2	Z	7	5	4	5	2	2	2	1	1	1	2	2	1	1	1	1	7	6	15	17	11	4.2	17
15-Jul	6	4	4	Z	12	7	3	5	5	4	2	3	1	2	5	5	6	4	3	1	1	3	3	3	4.0	12
16-Jul	1	4	10	4	Z	7	6	8	4	3	2	3	4	4	3	1	3	1	2	3	2	4	5	7	4.0	10
17-Jul	2	1	1	1	2	Z	1	4	3	2	2	3	5	5	5	3	4	2	3	4	2	4	8	3	3.0	8
18-Jul	Z	1	5	4	2	2	4	3	3	4	1	1	5	2	3	2	3	6	5	8	6	5	9	14	4.3	14
19-Jul	19	Z	9	11	16	7	11	12	6	11	7	6	8	11	11	3	3	7	1	8	2	8	9	4	8.1	19
20-Jul	13	2	Z	4	5	3	2	1	6	1	0	0	1	0	1	1	1	1	0	0	1	0	0	0	1.9	13
21-Jul	1	1	0	Z	2	2	2	2	1	1	0	0	0	1	2	1	1	2	1	2	1	2	5	4	1.5	5
22-Jul	3	1	1	2	Z	1	3	2	2	2	1	1	2	2	1	1	3	1	1	9	11	15	18	19	4.4	19
23-Jul	13	13	15	20	20	Z	8	8	5	2	10	5	5	4	7	4	5	3	0	2	1	1	3	3	6.8	20
24-Jul	Z	6	4	4	2	1	0	0	0	1	1	0	1	1	0	2	2	2	3	11	9	8	11	11	3.4	11
25-Jul	10	Z	3	5	4	1	3	4	2	3	4	4	6	4	4	7	3	3	8	16	13	9	6	14	5.8	16
26-Jul	9	14	Z	9	10	5	11	14	10	7	8	4	4	4	8	4	4	1	1	1	3	6	8	6	6.6	14
27-Jul	7	4	4	Z	11	3	3	2	2	1	C	C	C	C	C	2	3	2	3	7	20	5	2	3	4.5	20
28-Jul	2	6	2	1	Z	11	5	5	6	6	8	3	M	5	4	2	4	2	4	1	15	6	2	6	4.8	15
29-Jul	5	5	7	6	6	Z	12	16	11	7	9	5	3	7	8	3	2	1	2	2	5	2	3	2	5.7	16
30-Jul	Z	5	2	2	7	6	7	2	2	2	1	2	2	1	1	5	13	11	5	18	22	24	7	7	6.6	24
31-Jul	7	Z	6	1	1	1	1	2	2	2	2	2	3	1	4	5	3	1	3	2	6	7	4	2	2.9	7
	7.7	6.7	6.8	7.0	9.0	5.0	4.7	4.6	3.5	3.0	3.2	2.6	3.0	3.5	3.8	2.8	2.8	2.5	2.4	4.3	5.6	7.2	7.9	7.3	Diurnal Average	
	32	20	17	28	23	17	16	16	11	11	10	9	14	12	11	7	13	11	11	18	22	24	32	19	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
Surremont - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	98.87	98.87
21 - 40	8	1.13	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont - July 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	18	18	7	8	13	29	51	25	32	28	43	124	127	81	40	45	689
21 - 40	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	6
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	18	18	7	8	13	29	51	25	32	28	43	129	127	81	40	46	695

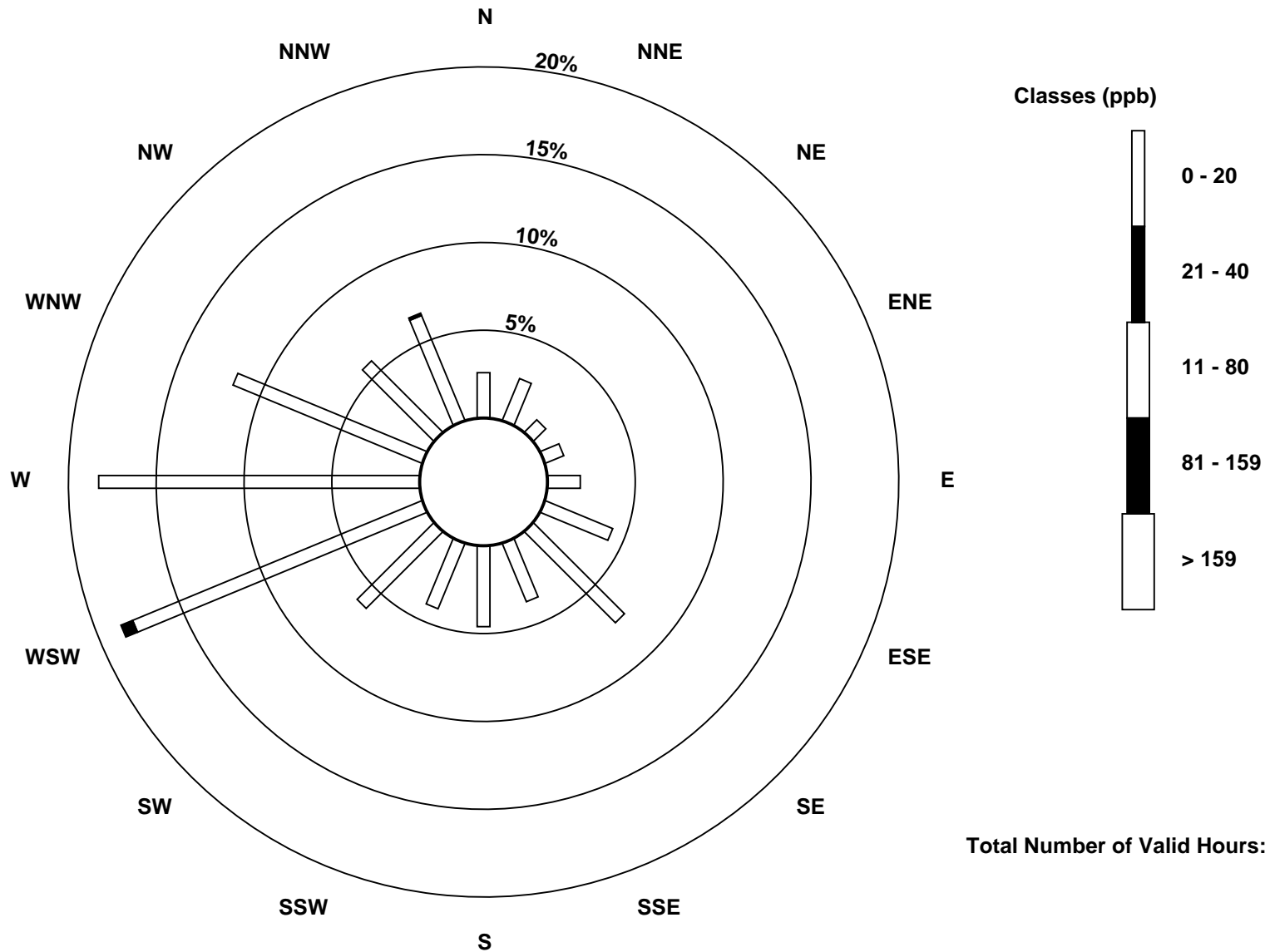
Total Number of Valid Hours: 695

Total Number of Hours: 744

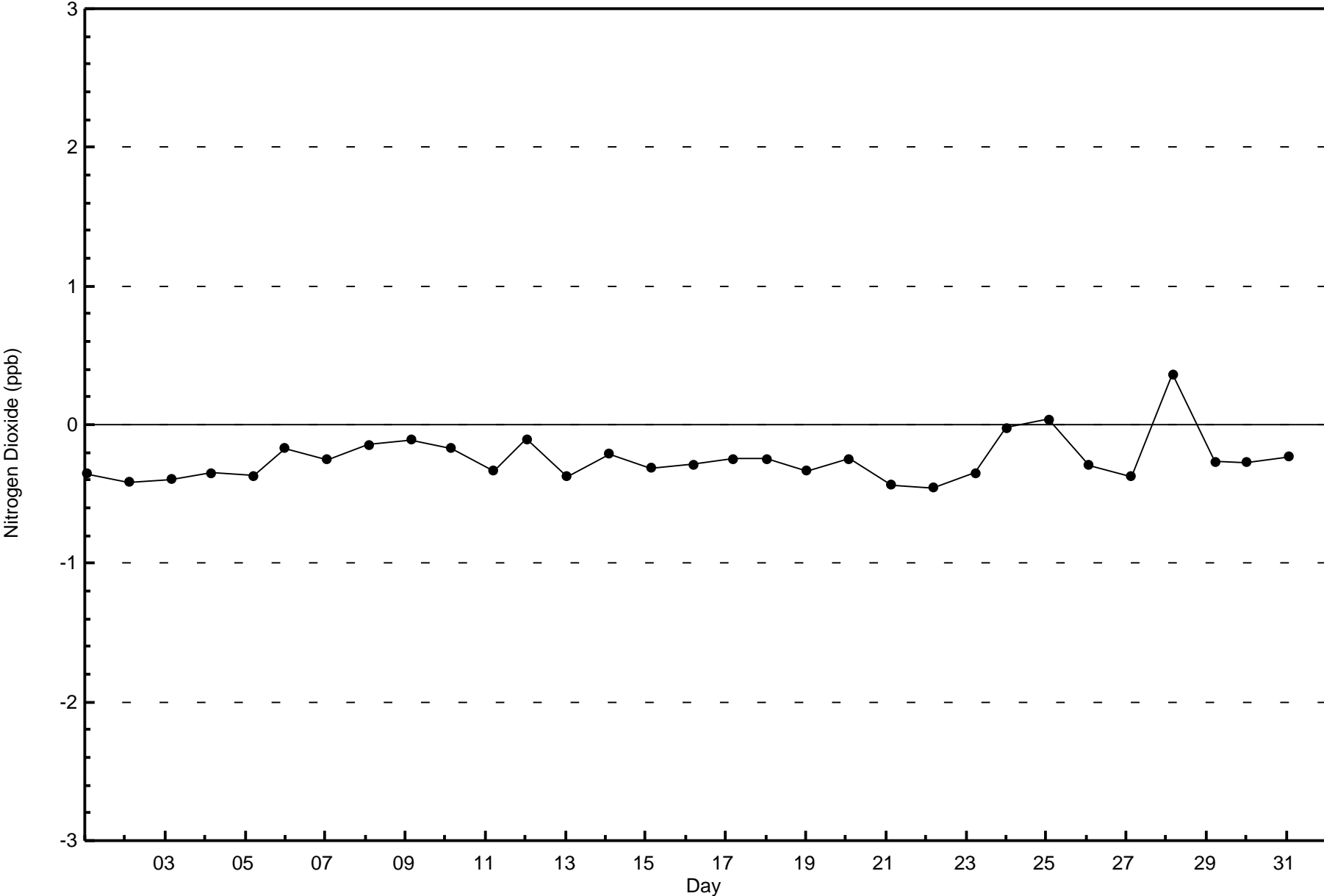


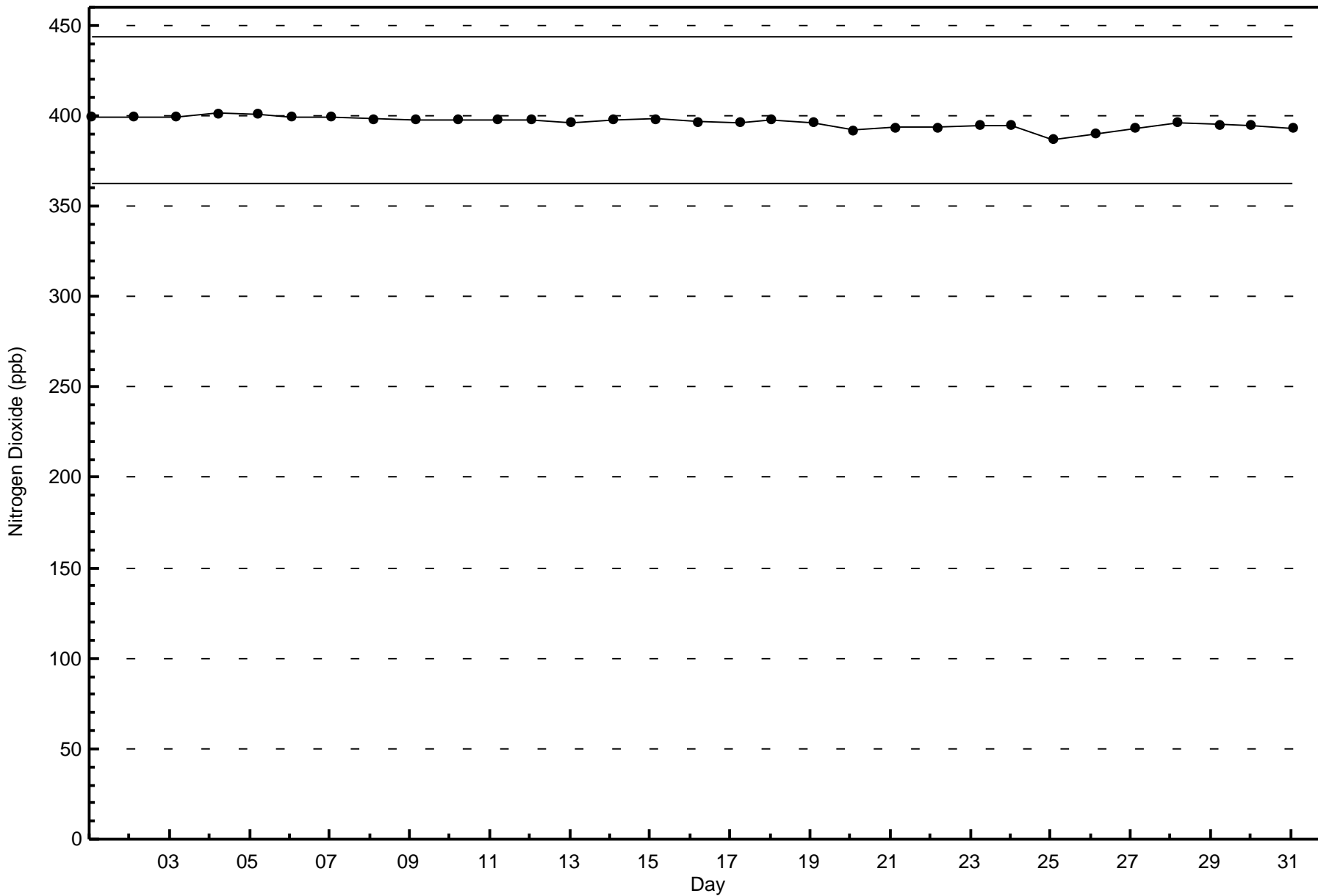
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Surmont (AMS 502)



Total Number of Valid Hours: 695





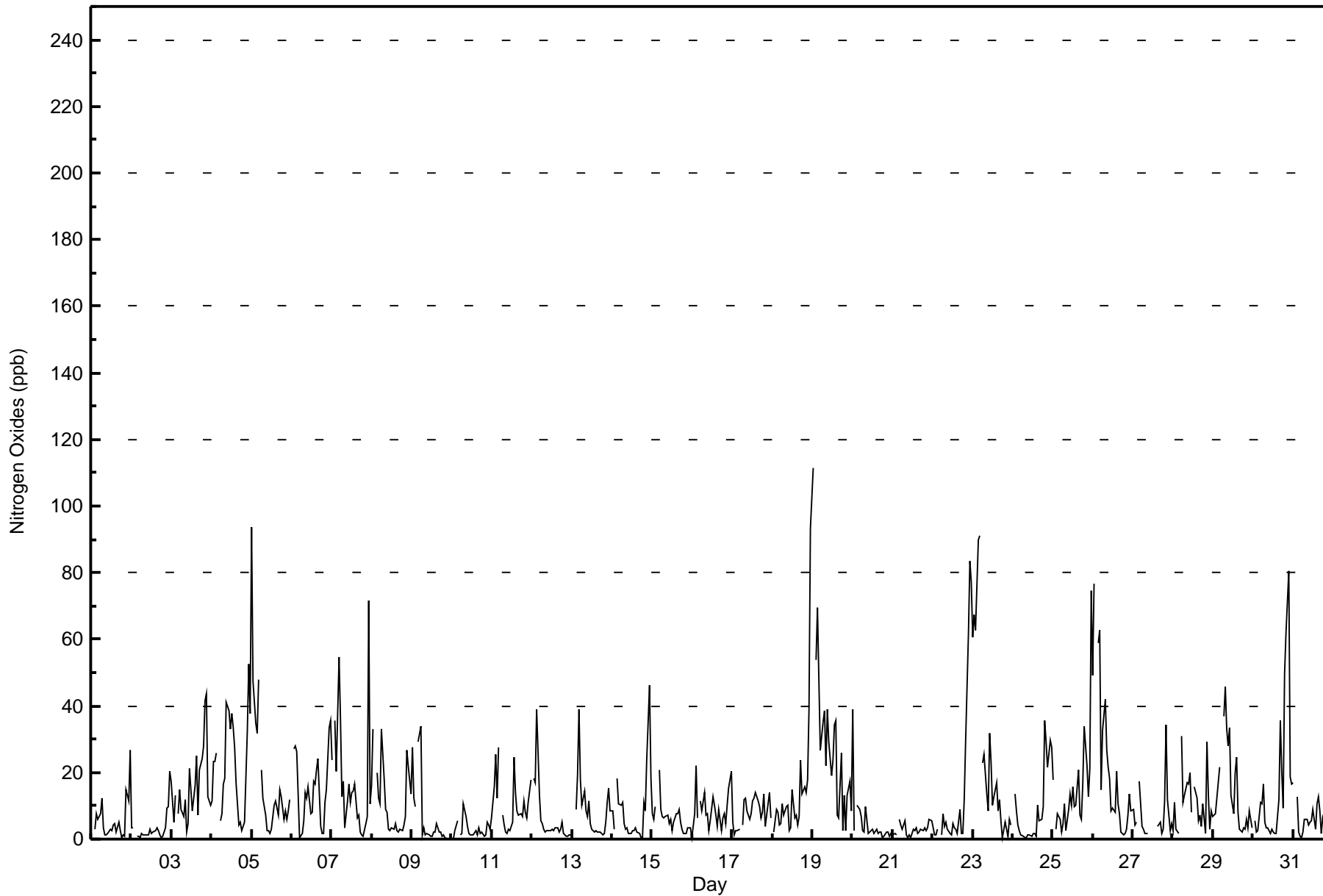


Maximum Value: 111 ppb on Jul 19 01:00		Maximum Daily Average: 29.7 ppb on Jul 19		Hours in Service: 744																							
Minimum Value: 0 ppb on Jul 9 22:00		Minimum Daily Average: 2.7 ppb on Jul 10		Hours of Data: 707																							
Maximum Diurnal Average: 21.8 ppb at hour 5		Minimum Diurnal Average: 5.2 ppb at hour 19		Hours of Missing Data: 37																							
Monthly Average: 11.9 ppb		Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 14 P ₉₀ = 29 P ₉₉ = 79		Hours of Calibration: 36																							
				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-Jul	19	Z	3	8	6	8	12	3	1	1	2	3	3	4	5	2	5	3	0	1	1	15	11	27	6.1	27	
2-Jul	3	3	Z	1	1	0	2	1	1	1	1	3	2	2	3	3	2	1	0	1	3	9	10	20	3.3	20	
3-Jul	17	5	13	Z	8	15	9	7	12	2	5	21	8	12	16	25	7	21	24	28	42	44	13	10	15.9	44	
4-Jul	11	23	23	26	Z	6	7	16	18	41	38	33	38	33	28	17	4	5	2	4	5	32	53	38	21.9	53	
5-Jul	94	47	35	32	48	Z	21	12	7	3	2	2	3	10	11	9	7	15	13	6	8	6	8	12	17.9	94	
6-Jul	Z	27	28	26	14	0	2	5	14	12	16	8	8	17	17	21	24	4	2	2	11	15	34	36	14.8	36	
7-Jul	24	Z	36	20	55	36	13	18	3	11	17	11	14	14	17	6	7	2	1	1	4	7	71	10	17.4	71	
8-Jul	16	33	Z	20	12	11	33	18	9	8	3	3	4	3	5	2	2	3	3	4	7	27	22	14	11.3	33	
9-Jul	27	12	10	Z	29	34	1	3	1	2	1	1	1	2	2	5	2	2	1	1	1	0	0	0	6.0	34	
10-Jul	0	0	3	6	Z	1	2	10	7	4	2	1	1	1	2	1	3	2	2	1	1	5	4	3	2.7	10	
11-Jul	6	16	25	12	27	Z	7	4	2	2	3	3	5	25	14	8	7	7	7	11	8	6	11	18	10.3	27	
12-Jul	Z	18	17	39	13	5	5	3	2	2	3	3	3	2	3	3	2	3	5	2	1	1	1	1	6.0	39	
13-Jul	1	Z	9	19	39	18	10	15	9	7	11	5	3	2	3	2	2	2	1	2	5	11	15	8	8.6	39	
14-Jul	8	3	Z	18	10	10	11	5	3	3	2	2	3	3	3	2	2	1	1	11	9	24	46	18	8.6	46	
15-Jul	8	6	10	Z	21	9	7	6	7	7	5	6	3	5	8	8	9	5	3	2	2	3	3	3	6.3	21	
16-Jul	1	8	22	6	Z	11	9	14	7	8	3	6	13	10	7	4	9	3	7	8	5	10	15	20	8.8	22	
17-Jul	5	1	2	2	3	Z	4	12	12	9	6	8	12	12	14	12	10	6	8	14	4	11	14	6	8.1	14	
18-Jul	Z	2	9	8	4	5	10	7	10	10	2	3	15	7	7	4	7	24	14	16	14	18	39	93	14.3	93	
19-Jul	111	Z	54	69	48	27	35	39	22	39	29	19	24	34	36	7	6	26	2	13	3	13	17	8	29.7	111	
20-Jul	39	2	Z	10	9	7	3	2	10	2	2	2	3	2	3	2	2	2	0	1	2	2	1	2	4.8	39	
21-Jul	1	2	1	Z	6	4	3	6	1	1	1	1	3	2	4	2	2	3	2	3	2	3	6	6	2.9	6	
22-Jul	3	1	1	3	Z	1	7	4	5	3	2	1	4	4	3	2	9	2	2	12	30	62	83	77	14.0	83	
23-Jul	61	67	63	90	91	Z	23	25	13	8	32	23	10	13	17	9	12	5	0	5	3	1	6	4	25.3	91	
24-Jul	Z	13	8	4	3	1	1	1	0	1	1	1	2	2	1	10	5	6	10	36	29	22	30	28	9.4	36	
25-Jul	18	Z	3	8	6	2	5	10	3	9	13	10	16	10	10	21	7	6	17	34	22	13	21	75	14.7	75	
26-Jul	49	77	Z	59	63	15	32	42	27	21	18	8	9	8	20	11	8	2	1	2	3	7	14	8	21.9	77	
27-Jul	9	4	5	Z	17	4	3	2	2	2	C	C	C	C	C	4	5	2	3	11	34	12	3	5	7.0	34	
28-Jul	3	11	3	2	Z	31	11	13	17	17	20	8	M	16	12	5	7	4	11	2	29	13	3	9	11.2	31	
29-Jul	7	7	12	17	22	Z	37	46	33	28	33	13	8	20	25	8	3	2	3	3	6	3	9	3	15.1	46	
30-Jul	Z	6	2	3	11	11	17	5	3	3	2	3	2	2	2	12	35	20	9	50	62	80	18	17	16.3	80	
31-Jul	17	Z	13	2	1	0	2	6	6	4	5	5	9	3	11	13	8	2	7	3	10	11	6	4	6.4	17	
		21.5	15.9	15.8	19.6	21.8	10.4	11.1	11.6	8.7	8.8	9.3	7.2	7.8	9.3	10.2	7.7	7.2	6.1	5.2	9.3	11.8	15.7	18.9	18.8	Diurnal Average	
		111	77	63	90	91	36	37	46	33	41	38	33	38	34	36	25	35	26	24	50	62	80	83	93	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Surmont - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	590	83.45	83.45
21 - 40	84	11.88	95.33
41 - 80	27	3.82	99.15
81 - 159	6	0.85	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont - July 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	18	18	7	8	13	29	51	24	32	28	41	52	105	79	33	44	582
21 - 40	0	0	0	0	0	0	0	1	0	0	2	45	22	2	7	2	81
11 - 80	0	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	26
81 - 159	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	18	7	8	13	29	51	25	32	28	43	129	127	81	40	46	695

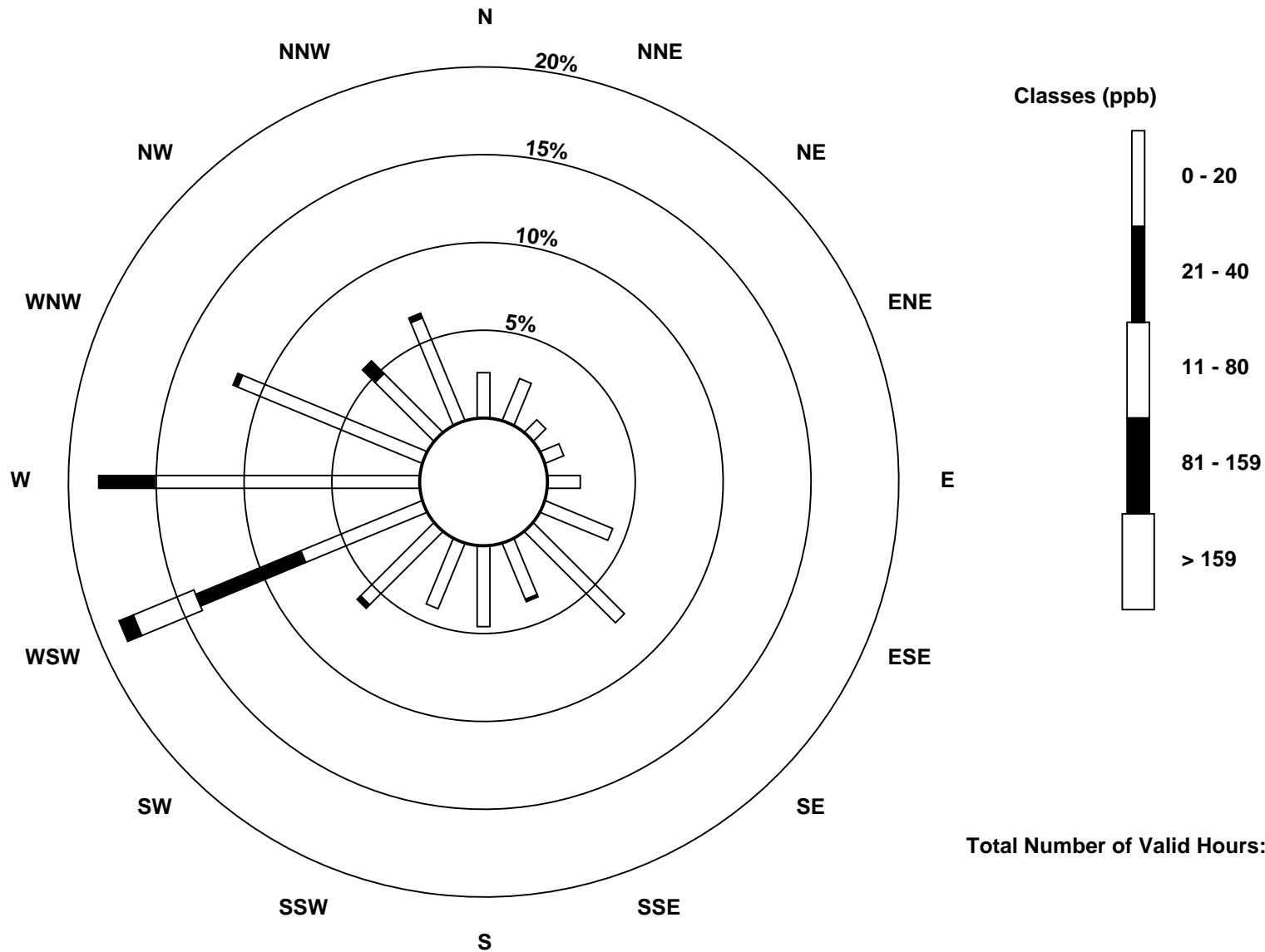
Total Number of Valid Hours: 695

Total Number of Hours: 744

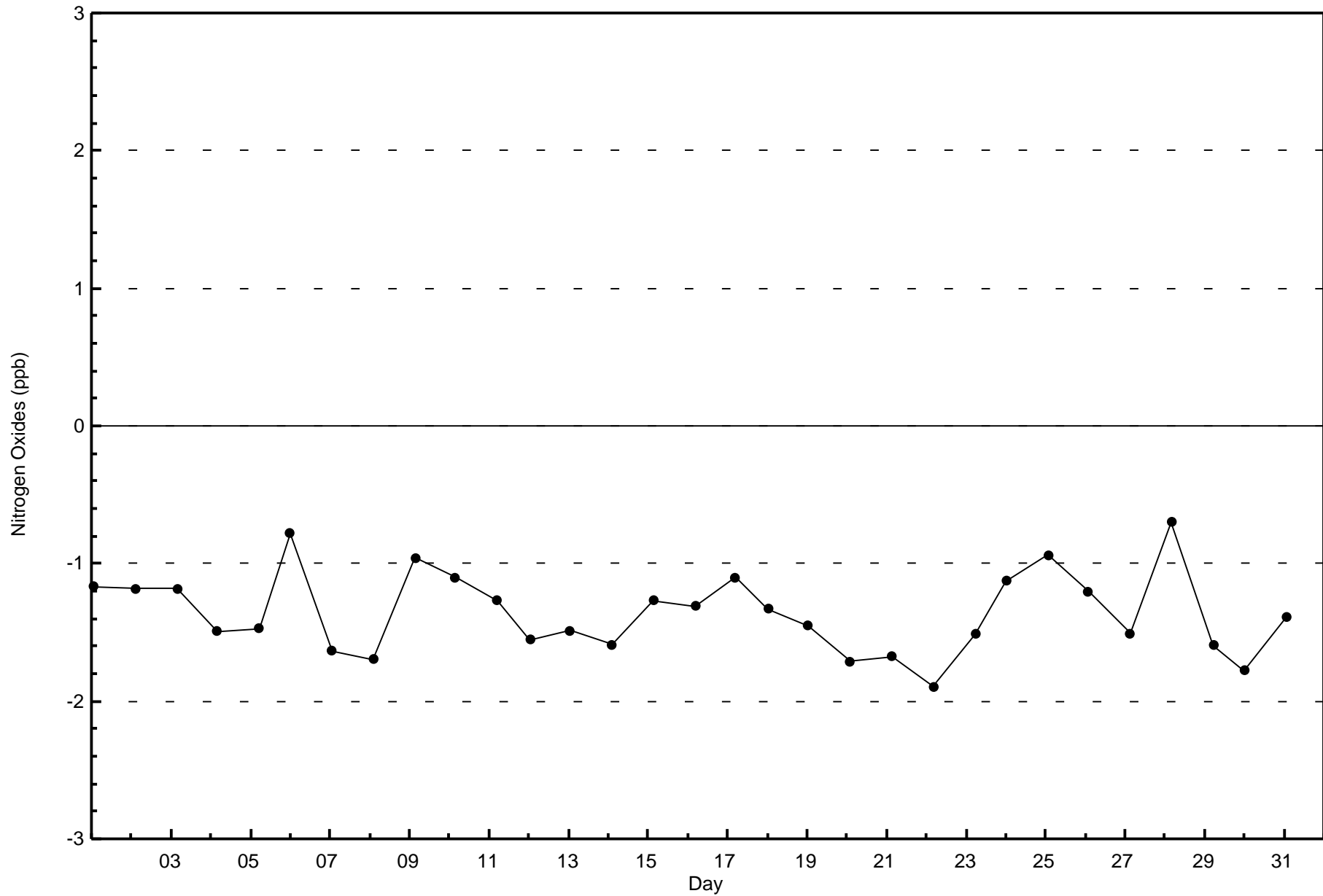


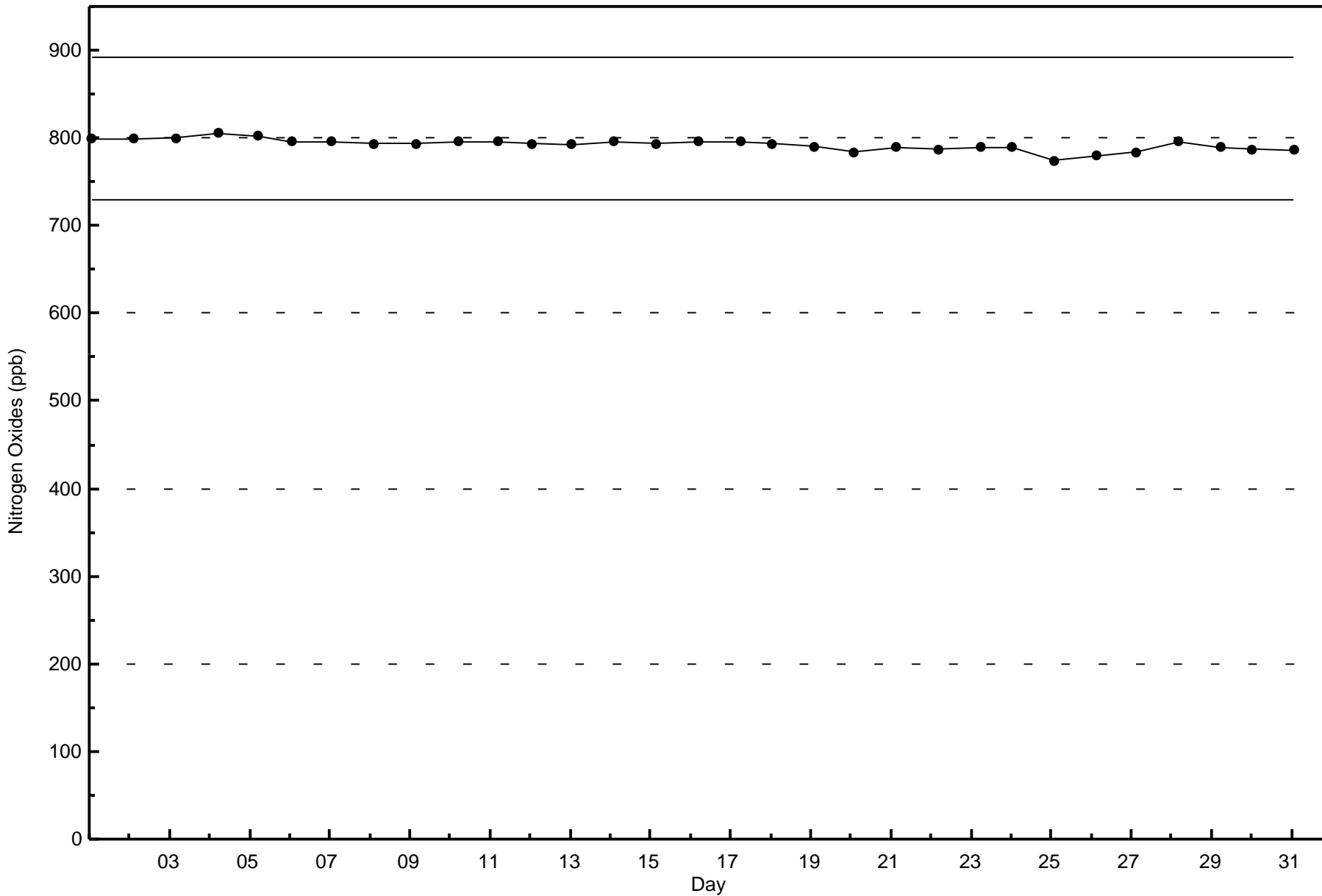
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Surmont (AMS 502)



Total Number of Valid Hours: 695







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

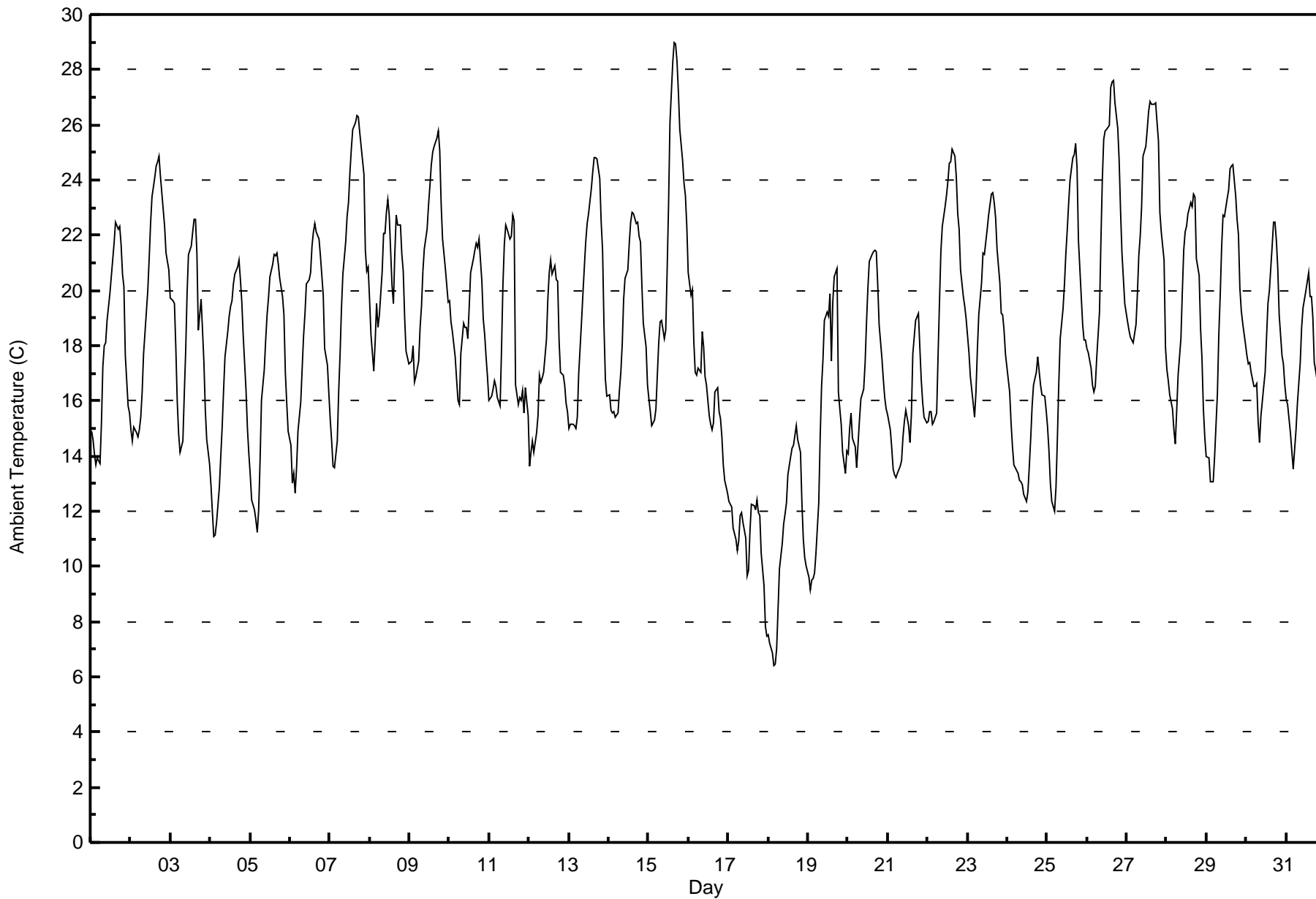
Surmont - July 2017

Maximum Value: 29.0 C on Jul 15 16:00																				Maximum Daily Average: 22.6 C on Jul 27					Hours in Service: 744																							
Minimum Value: 6.4 C on Jul 18 04:00																				Minimum Daily Average: 11.0 C on Jul 18					Hours of Data: 744																							
Maximum Diurnal Average: 22.0 C at hour 16																				Minimum Diurnal Average: 14.4 C at hour 5					Hours of Missing Data: 0																							
Monthly Average: 18.22 C																				Percentiles: P ₁ = 7.8 P ₁₀ = 13.1 Q ₁ = 15.3 Median = 18.1 Q ₃ = 21.3 P ₉₀ = 23.5 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-Jul	14.9	14.6	14.1	13.7	13.9	13.7	15.2	17.2	18.0	18.1	18.9	19.9	20.5	21.1	21.7	22.5	22.2	22.3	21.7	20.6	20.2	17.6	15.8	15.5	18.1	22.5																						
2-Jul	15.0	14.5	15.0	14.9	14.7	14.9	15.4	16.3	17.7	19.2	20.0	21.1	22.4	23.4	24.1	24.5	24.7	24.9	24.2	23.6	22.3	21.4	21.0	20.7	19.8	24.9																						
3-Jul	19.8	19.6	19.5	17.9	16.0	14.8	14.1	14.6	16.2	17.8	19.9	21.3	21.6	22.1	22.6	22.6	21.4	18.6	19.7	18.6	17.4	15.6	14.6	13.7	18.3	22.6																						
4-Jul	12.9	12.0	11.1	11.1	11.6	12.9	14.0	15.1	16.4	17.6	18.5	19.1	19.4	19.6	20.3	20.6	20.8	21.1	20.4	19.6	18.4	16.4	15.0	14.1	16.6	21.1																						
5-Jul	13.3	12.4	12.0	11.7	11.2	12.0	13.9	16.0	17.1	18.2	19.1	19.7	20.5	21.0	21.3	21.2	21.3	20.9	20.5	19.8	19.1	17.0	15.9	14.9	17.1	21.3																						
6-Jul	14.4	13.0	13.4	12.7	13.6	14.9	16.0	17.2	18.3	19.2	20.2	20.4	20.6	21.6	22.1	22.4	22.1	21.8	21.3	20.5	19.8	17.9	17.3	16.3	18.2	22.4																						
7-Jul	15.3	14.5	13.7	13.6	14.5	16.3	17.7	19.4	20.6	21.7	22.7	23.2	24.3	25.1	25.8	26.1	26.3	26.3	25.8	25.2	24.2	21.5	20.7	20.8	21.0	26.3																						
8-Jul	19.7	18.4	17.1	18.2	19.5	18.6	19.1	20.7	22.1	22.1	22.9	23.3	22.7	20.2	19.5	21.4	22.7	22.4	22.4	21.3	20.7	19.0	17.8	17.4	20.4	23.3																						
9-Jul	17.4	17.4	18.0	16.7	16.9	17.5	18.6	19.4	20.7	21.5	22.2	23.1	23.8	24.5	25.0	25.2	25.5	25.8	25.0	23.2	21.8	20.8	20.2	19.6	21.2	25.8																						
10-Jul	19.6	18.9	18.5	17.6	16.8	16.0	15.9	17.7	18.8	18.7	18.7	18.3	19.4	20.7	21.2	21.4	21.7	21.5	21.9	20.3	18.9	18.4	17.6	16.9	19.0	21.9																						
11-Jul	16.0	16.2	16.4	16.8	16.5	16.1	15.8	17.8	20.2	21.6	22.4	22.2	21.9	22.0	22.7	22.5	16.6	15.9	16.1	16.0	16.4	15.6	16.5	15.5	18.2	22.7																						
12-Jul	13.6	14.1	14.6	14.1	14.8	15.5	16.9	16.7	16.8	17.0	18.2	19.7	20.7	21.1	20.6	20.9	20.4	20.3	18.2	17.0	16.9	16.6	15.9	15.6	17.3	21.1																						
13-Jul	15.0	15.2	15.2	15.1	15.0	15.4	17.0	18.9	19.9	20.8	21.8	22.4	22.8	23.7	24.3	24.8	24.8	24.8	24.0	22.5	21.5	18.7	16.8	16.2	19.9	24.8																						
14-Jul	16.2	15.7	15.6	15.6	15.4	15.6	16.4	17.0	18.1	19.7	20.5	20.7	21.7	22.5	22.9	22.8	22.4	22.5	22.0	21.7	20.2	18.8	18.0	16.6	19.1	22.9																						
15-Jul	16.1	15.6	15.1	15.3	15.7	16.9	18.1	18.9	18.9	18.3	18.6	20.7	23.1	26.1	28.3	29.0	28.9	28.3	27.2	25.8	24.7	23.9	23.4	22.3	21.6	29.0																						
16-Jul	20.7	19.8	20.1	18.2	17.0	16.9	17.2	17.0	18.5	17.9	16.9	16.6	15.5	15.1	14.9	15.2	16.3	16.5	15.6	15.3	14.7	13.7	13.1	12.7	16.5	20.7																						
17-Jul	12.3	12.3	12.1	11.4	11.0	10.6	10.9	11.9	11.9	11.6	11.0	9.7	9.9	11.3	12.2	12.2	12.1	12.4	12.0	11.8	10.5	9.3	7.8	7.5	11.1	12.4																						
18-Jul	7.5	7.2	6.9	6.4	6.5	7.0	8.5	9.9	10.8	11.5	11.9	12.3	13.3	14.0	14.3	14.4	14.7	15.1	14.6	14.1	12.3	11.0	10.3	10.0	11.0	15.1																						
19-Jul	9.6	9.1	9.5	9.6	9.8	10.5	12.3	14.6	16.5	17.5	18.9	19.2	19.1	19.9	17.4	19.6	20.5	20.8	16.3	15.7	15.1	14.1	13.4	14.2	15.1	20.8																						
20-Jul	14.1	15.0	15.6	14.6	14.3	13.6	14.5	15.3	16.1	16.4	17.3	18.8	20.1	21.1	21.3	21.4	21.4	21.4	20.2	18.8	17.5	16.8	16.1	15.7	17.4	21.4																						
21-Jul	15.5	14.9	14.3	13.5	13.3	13.2	13.4	13.6	13.8	14.7	15.2	15.7	15.1	14.5	15.5	17.7	18.3	18.9	19.2	18.0	16.8	16.0	15.4	15.2	15.5	19.2																						
22-Jul	15.3	15.6	15.6	15.2	15.3	15.6	17.7	19.6	21.4	22.3	23.0	23.5	23.9	24.6	24.7	25.1	24.8	24.1	22.8	22.2	20.8	19.8	19.4	19.0	20.5	25.1																						
23-Jul	18.4	17.8	16.9	15.9	15.4	16.3	17.9	19.1	20.3	21.3	21.3	21.8	22.2	22.7	23.5	23.6	23.2	22.6	21.5	20.3	19.2	19.1	18.6	17.7	19.9	23.6																						
24-Jul	17.3	16.3	15.2	14.3	13.7	13.6	13.4	13.1	13.1	13.0	12.6	12.3	12.7	13.6	14.7	15.8	16.6	17.0	17.6	17.1	16.6	16.2	16.2	15.6	14.9	17.6																						
25-Jul	15.0	14.2	13.0	12.4	12.0	12.9	14.7	16.6	18.3	19.3	20.2	21.3	22.2	23.1	24.0	24.8	24.9	25.3	24.5	21.8	19.8	18.8	18.2	18.2	19.0	25.3																						
26-Jul	17.9	17.8	17.2	16.6	16.3	16.5	17.5	19.2	21.8	24.0	25.5	25.8	25.8	26.0	27.3	27.6	27.6	26.8	25.9	24.7	22.9	21.3	20.4	19.5	22.2	27.6																						
27-Jul	18.9	18.5	18.3	18.2	18.1	18.8	19.9	21.3	22.0	23.0	24.9	25.2	25.8	26.5	26.8	26.7	26.8	26.8	26.1	25.4	22.8	22.1	21.1	17.9	22.6	26.8																						
28-Jul	17.1	16.8	16.2	15.7	14.9	14.4	15.7	16.9	18.3	19.9	21.4	22.1	22.3	22.8	23.2	23.0	23.5	23.4	21.1	20.5	18.6	17.5	15.7	14.7	19.0	23.5																						
29-Jul	14.0	13.9	13.1	13.1	13.1	14.0	16.3	18.4	19.8	21.6	22.7	22.7	23.4	23.6	24.4	24.5	24.6	23.5	22.6	22.0	20.1	19.2	18.8	18.0	19.5	24.6																						
30-Jul	17.7	17.4	17.4	17.0	16.5	16.5	16.6	15.3	14.5	15.4	16.5	17.0	18.3	19.5	20.0	21.6	22.5	22.5	21.8	20.8	19.1	17.7	17.4	16.6	18.1	22.5																						
31-Jul	16.1	15.9	14.8	14.2	13.5	14.2	15.0	15.9	17.4	18.7	19.4	19.7	20.0	20.6	19.8	19.8	19.0	17.4	17.1	16.4	15.2	14.1	13.3	13.1	16.7	20.6																						
																								15.7	15.3	15.0	14.6	14.4	14.7	15.7	16.8	17.9	18.7	19.5	20.0	20.5	21.1	21.5	22.0	21.9	21.7	20.9	20.0	18.9	17.6	16.8	16.2	Diurnal Average
																								20.7	19.8	20.1	18.2	19.5	18.8	19.9	21.3	22.1	24.0	25.5	25.8	25.8	26.5	28.3	29.0	28.9	28.3	27.2	25.8	24.7	23.9	23.4	22.3	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Surmont - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Surmont - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	18	2.42	2.42
10 - 20	470	63.17	65.59
> 20	256	34.41	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

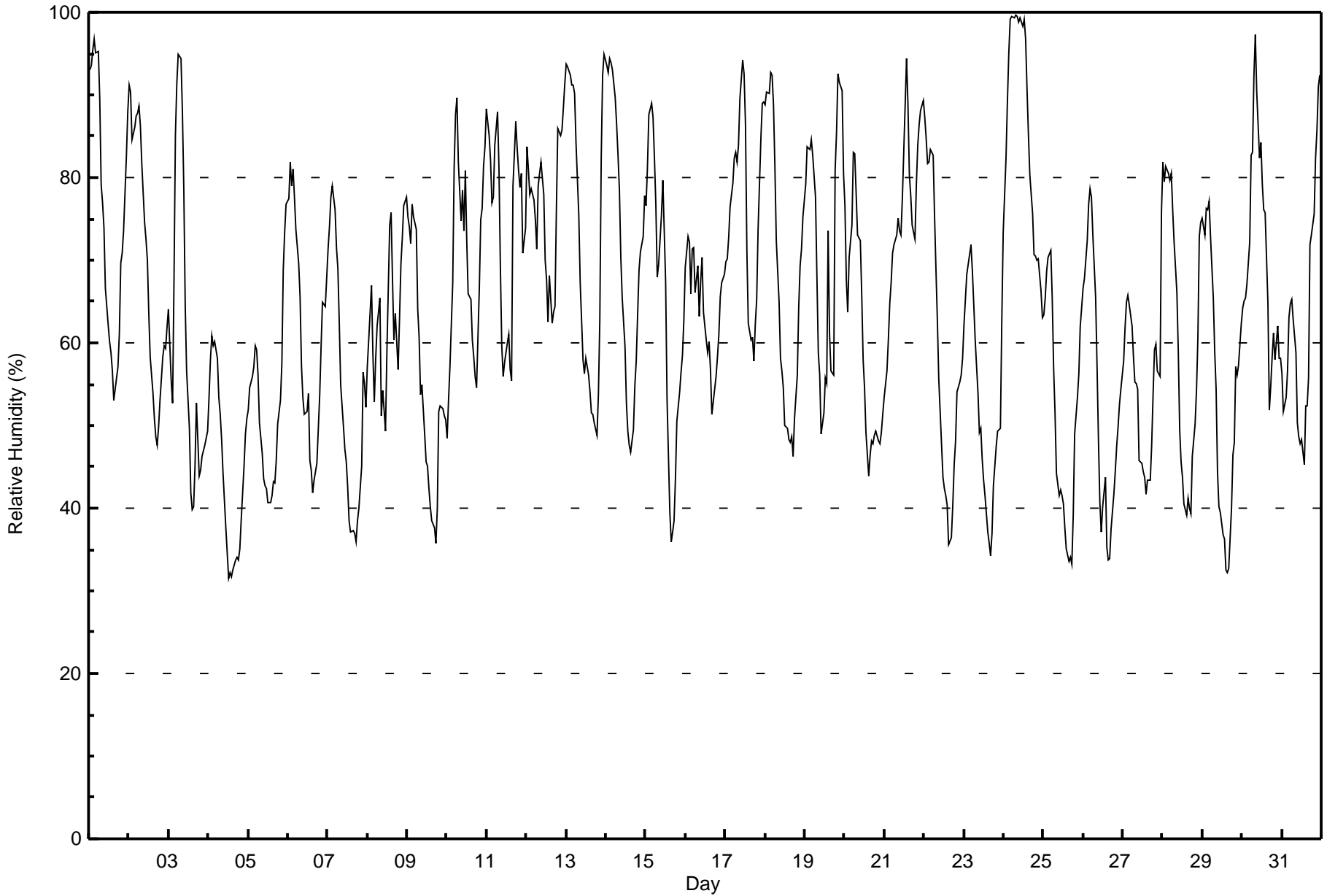
Surmont - July 2017

Maximum Value: 100 % on Jul 24 08:00																	Maximum Daily Average: 86.3 % on Jul 24																	Hours in Service: 744								
Minimum Value: 32 % on Jul 4 13:00																	Minimum Daily Average: 44.5 % on Jul 4																	Hours of Data: 744								
Maximum Diurnal Average: 77.9 % at hour 6																	Minimum Diurnal Average: 49.3 % at hour 16																	Hours of Missing Data: 0								
Monthly Average: 63.9 %																	Percentiles: P ₁ = 33 P ₁₀ = 42 Q ₁ = 51 Median = 63 Q ₃ = 77 P ₉₀ = 88 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-Jul	93	94	95	97	95	95	90	79	77	74	67	62	60	59	57	53	56	57	61	70	71	74	83	88	75.2	97																
2-Jul	91	90	85	86	88	88	89	86	82	75	72	70	63	58	54	51	49	48	50	53	58	60	59	62	69.4	91																
3-Jul	64	55	53	68	85	91	95	94	88	79	65	57	50	42	40	40	45	53	44	45	46	47	48	49	60.1	95																
4-Jul	53	58	61	60	60	58	53	51	48	44	38	35	32	32	32	33	34	34	34	35	39	45	49	51	44.5	61																
5-Jul	52	55	56	57	60	59	56	50	47	43	43	42	41	41	42	43	43	46	50	53	57	69	73	77	52.3	77																
6-Jul	77	82	79	81	78	74	70	66	57	53	51	52	54	46	45	42	43	45	50	54	60	65	64	68	60.6	82																
7-Jul	71	74	78	79	76	72	69	62	55	50	47	46	42	38	37	37	37	36	38	40	45	56	55	52	53.9	79																
8-Jul	57	60	67	59	53	58	62	65	51	54	52	49	59	74	76	68	60	64	57	63	69	73	77	78	62.7	78																
9-Jul	75	74	72	77	75	74	64	61	54	55	49	46	45	42	40	38	38	36	40	52	52	52	51	51	54.7	77																
10-Jul	48	53	57	67	81	88	90	82	75	78	74	81	72	66	65	60	58	56	55	67	75	76	81	84	70.4	90																
11-Jul	88	85	82	77	78	84	88	81	69	60	56	58	60	61	57	55	79	87	84	81	79	81	71	74	73.9	88																
12-Jul	84	81	78	79	77	75	71	79	81	82	78	70	68	63	68	62	64	64	76	86	85	86	88	91	76.5	91																
13-Jul	94	93	92	91	91	90	84	75	67	63	58	56	58	56	54	52	51	50	49	54	63	82	92	95	71.3	95																
14-Jul	94	93	94	94	93	90	86	83	78	70	65	60	53	49	48	47	49	55	58	63	69	71	73	78	71.4	94																
15-Jul	77	81	88	89	87	82	77	68	69	75	80	74	67	53	39	36	37	38	44	50	54	56	58	63	64.3	89																
16-Jul	69	73	72	66	71	72	66	69	63	67	70	64	60	59	60	57	51	54	56	58	61	66	67	68	64.2	73																
17-Jul	70	70	73	77	79	82	83	82	84	89	94	93	86	71	62	60	61	58	62	65	74	85	89	89	76.6	94																
18-Jul	89	90	90	93	92	89	81	72	65	58	57	55	50	50	48	48	49	46	51	56	64	69	71	75	67.0	93																
19-Jul	79	84	84	83	85	83	78	68	59	56	49	51	56	55	74	61	57	56	81	86	93	92	91	81	72.4	93																
20-Jul	77	68	64	70	74	83	83	78	73	72	66	58	55	49	44	46	48	48	49	49	48	48	49	51	60.4	83																
21-Jul	53	57	60	65	67	71	72	73	75	74	73	77	89	94	89	80	78	74	73	79	84	86	88	89	75.9	94																
22-Jul	87	85	82	82	83	83	75	69	63	56	48	44	42	41	40	36	36	40	45	48	54	55	56	58	58.7	87																
23-Jul	62	65	68	71	72	69	65	60	54	49	50	46	43	42	37	36	34	37	43	47	49	49	50	63	52.5	72																
24-Jul	73	82	89	95	99	99	99	100	99	99	99	98	99	97	91	85	80	76	71	71	70	70	66	63	86.3	100																
25-Jul	63	65	69	70	71	65	57	51	44	41	42	42	40	38	35	34	34	33	39	49	53	56	62	64	50.8	71																
26-Jul	67	68	72	77	79	78	73	65	57	48	41	37	40	44	35	34	34	37	42	44	47	50	53	54	53.2	79																
27-Jul	58	62	65	66	65	62	58	55	55	54	46	45	44	44	42	43	43	48	54	59	60	57	56	76	54.9	76																
28-Jul	82	80	81	80	80	81	76	72	66	59	49	46	44	41	39	41	40	39	46	50	54	61	73	75	60.6	82																
29-Jul	75	73	76	76	77	73	65	59	54	44	40	40	37	36	33	32	33	40	46	48	57	56	57	62	53.8	77																
30-Jul	64	65	65	67	72	83	83	92	97	90	82	84	79	76	76	65	52	55	58	61	58	62	58	58	71.0	97																
31-Jul	56	52	53	57	63	65	65	63	59	50	49	48	48	45	52	52	56	72	73	76	82	86	91	92	62.7	92																
																	72.4	73.1	74.2	75.9	77.7	77.9	75.0	71.4	66.7	63.4	59.6	57.5	56.1	53.6	51.9	49.3	49.3	51.0	54.1	58.5	62.3	65.8	67.8	70.3	Diurnal Average	
																	94	94	95	97	99	99	99	100	99	99	99	99	98	99	91	85	80	87	84	86	93	92	92	95	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Surmont - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Surmont - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	52	6.99	6.99
40 - 60	284	38.17	45.16
60 - 80	258	34.68	79.84
80 - 100	150	20.16	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

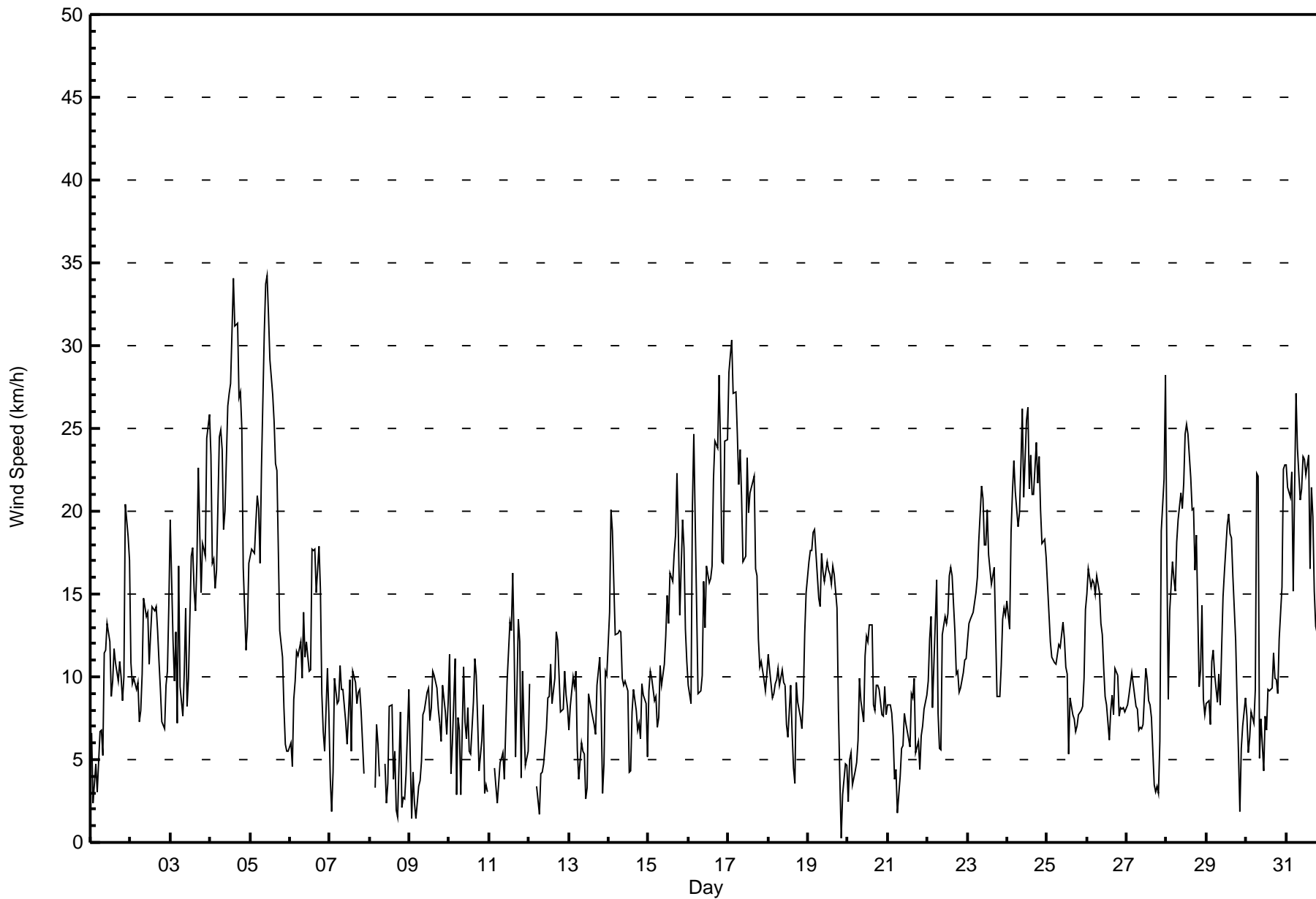
Wind Speed (WS) - km/h
Surmont - July 2017

Maximum Speed: 34 km/h on Jul 5 11:00	Maximum Daily Speed Average: 22.6 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 19 21:00	Minimum Daily Speed Average: 1.3 km/h on Jul 8	Hours of Data: 731
Maximum Diurnal Speed Average: 9.7 km/h at hour 3	Minimum Diurnal Speed Average: 4.3 km/h at hour 20	Hours of Missing Data: 13
Monthly Average Velocity: 6.9 km/h 267.4 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 10 Q ₃ = 16 P ₉₀ = 22 P ₉₉ = 31	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-Jul	WSW7	SW2	S4	SW5	SSW3	WSW7	WSW7	SE5	SE11	SE12	SE13	SE12	SSE9	SSE10	SE12	SE11	SSE10	SE11	SE10	SE9	SE10	W20	W18	WSW17	S5.9	W20
2-Jul	SW11	SW10	SSW10	S9	SSW10	SSW7	SSW8	S10	S15	S14	S14	S11	S13	SSE14	S14	SSE14	S13	S11	S9	S7	SW7	SW10	SW10	WSW14	SSW10.1	S15
3-Jul	WSW20	SW12	WSW10	NW13	NNW7	W17	SSE9	SSW8	W10	NNW14	W8	WSW10	W17	W18	W15	W14	W17	WSW23	WSW15	WSW18	WSW18	WSW17	W24	W26	W13.9	W26
4-Jul	W23	WSW17	WSW17	WSW15	W16	W24	W25	W24	WSW19	WSW20	WSW26	WSW27	WSW28	WSW31	W34	W31	W31	W27	W27	W25	W17	WSW12	WSW13	W17	W22.6	W34
5-Jul	WSW17	WSW18	WSW17	WSW19	WSW21	WSW20	W17	W23	W31	NNW34	NNW34	NNW32	NNW29	NNW27	NNW25	NNW23	NNW22	NNW18	NNW13	NNW11	NNW8	NW6	NW5	W6	W18.7	NNW34
6-Jul	W6	WSW5	W9	WSW10	W12	W11	NNW12	NNW10	NNW14	NNW11	NNW12	NNW10	NNW10	NNW18	NNW18	NNW18	NNW15	NNW18	NNW15	N9	NNW7	W6	W11	W8	NNW10.0	NNW18
7-Jul	WSW4	WSW2	WSW4	WSW10	WSW8	WSW9	W11	W9	NNW9	W7	NW6	NNW8	NNW10	NNW5	NNW10	N10	N8	NNE9	NNE9	NNE8	N4	AF	AF	AF	WNN5.1	W11
8-Jul	AF	AF	AF	WSW3	SW7	SW6	WSW4	AF	AF	ESE5	SSE2	ENE4	NNE8	NNE8	NNE4	NNW6	W2	SSE2	W8	ENE2	NNW3	W3	WSW4	WSW9	W1.3	WSW9
9-Jul	WSW5	NNW1	NW4	NW2	NNW1	NNW3	NNE4	ESE5	SE8	ESE8	ESE9	ESE9	ESE7	SE8	SE10	SE10	SE9	SE8	ESE7	ESE6	ESE9	ESE8	ESE7	SE8	ESE5.0	SE10
10-Jul	SE11	E4	NNW6	NW11	WSW3	SSW8	SW7	WSW3	NW11	ESE7	NE6	SE8	ENE5	E5	SE8	SE11	SSE10	S7	SSW4	E6	SE8	SSW3	NW3	N3	SE2.1	SE11
11-Jul	AF	W3	AF	WSW5	WSW3	N2	NNW5	NNW5	NE5	ENE4	NNE7	NNE10	N13	NNW13	NNW16	NNE12	WSW5	NW13	NW12	WNN4	NW10	WNN7	NW5	WSW5	NNW5.4	NNW16
12-Jul	WSW10	AF	AF	AF	NW3	NW3	NE2	E4	S4	SSW5	S7	S9	SSE9	SSE11	SSE8	S10	SE13	SE12	SW10	SSW8	SSW8	S10	S9	S8	S6.2	SE13
13-Jul	SW7	SW8	WSW10	WSW9	WSW10	WSW6	SW4	WSW6	WSW5	WSW5	WSW3	SSW3	ESE9	E8	ESE8	E7	E7	NE9	NE11	NE8	N3	WSW5	WSW10	W10	SW1.7	NE11
14-Jul	NNW14	W20	W19	NNW16	NNW13	NNW13	NW13	N13	N10	N10	NNE9	NNE4	ESE4	ESE8	SSW9	S8	SSW7	S7	WSW6	W10	WSW9	WSW8	W5	WSW8	WNN5.8	W5
15-Jul	WSW9	WSW10	WSW10	WSW9	SW9	SSW7	SSW8	S11	S10	SSE11	SE12	SE15	SE13	SE16	SSE16	SSE17	SSE19	SSE22	SE19	SE14	SSE19	SSE18	SSE13	S11	SSE11.1	SSE22
16-Jul	SSW9	SSW8	NNW20	NNW25	NNW19	NW14	W9	W9	NNW10	NNW16	NNW13	W17	W16	NNW16	NNW17	W22	W24	W24	W28	W24	W17	W17	W24	W24	W15.8	W28
17-Jul	W28	W29	W30	W27	W27	W25	W22	W24	NNW21	NNW17	NNW17	NNW23	NNW20	NNW21	NNW21	NNW22	NNW17	NNW16	NNW12	NNW11	W11	NNW10	W9	W10	WNN17.1	W30
18-Jul	NNW11	NNW10	W9	NNW9	NNW10	NNW10	NNW11	NNW10	NNW10	NW10	NNE10	NNW7	NNW6	NNW9	NNW7	NW5	W4	W10	W8	W8	WSW7	WSW9	WSW13	WSW15	WNN7.2	WSW15
19-Jul	WSW17	WSW18	WSW18	WSW19	WSW19	WSW17	WSW15	W14	W17	WSW16	W16	W17	W16	W16	W16	W17	W16	WSW14	N8	SW4	E0	WSW3	SW5	S5	WSW12.7	WSW19
20-Jul	SSE2	SSE5	SE5	ESE3	ESE4	ESE5	ESE6	ESE10	SE9	ESE7	SE11	ESE12	SE12	SE13	SE13	ESE8	ESE8	E10	E9	ESE9	SE8	SE8	SE9	SE8	ESE8.0	SE13
21-Jul	SE8	SE8	SE8	ESE6	E4	NNE4	NE2	ENE4	ENE6	ENE6	ESE8	E7	E6	SE6	SE9	ESE9	SSE10	SSW5	SSW6	S4	SSW6	SW7	SW8	SW9	SE4.0	SSE10
22-Jul	WSW10	WSW12	WSW14	SW8	SW11	WSW16	W8	W6	WSW6	WSW13	W14	W13	WSW14	WSW16	WSW17	WSW16	WSW13	WSW10	WSW10	WSW9	WSW9	WSW10	WSW11	WSW11	WSW11.3	WSW17
23-Jul	WSW12	WSW13	WSW13	WSW14	WSW15	W15	W16	W18	W22	W21	W18	W18	NNW20	NNW17	W16	W16	W17	W13	W9	W9	W11	NNW14	NW14	NW14	W14.5	W22
24-Jul	NNW15	NNW13	NNW19	NNW21	NNW23	NNW21	N19	NNE20	NNE23	N26	N21	NNW25	NNW26	NNW21	NNW23	NNW21	NNW24	NNW22	NNW23	NNW20	NW18	NW18	NW17	NW17	NNW20.1	NNW26
25-Jul	NNW16	NNW14	NNW12	NNW11	W11	W11	NNW11	W12	NNW12	NNW13	NW12	NW11	NW10	NW5	W9	W8	W7	W7	WSW7	WSW8	SW8	SW8	WSW10	WSW14	W9.2	NW16
26-Jul	WSW15	WSW17	WSW15	WSW16	WSW16	WSW15	WSW16	WSW15	WSW13	WSW13	WSW11	SW9	SSW8	SE6	WSW8	SW9	SW8	SSW10	SSW8	SW8	SW8	SW8	SW8	WSW8	SW10.5	WSW17
27-Jul	SW8	SW9	SW10	SW10	SW10	SW8	SW8	SSW7	SSW7	SSW7	S7	SSE11	SE10	SE9	SE8	ESE8	ESE3	NNW3	NNW3	NNW3	W6	NNW19	NNW22	NNW28	SW5.1	NNW28
28-Jul	NNW17	SW9	W14	W17	W16	W15	W18	W20	W21	W20	W22	W25	W25	W25	NNW22	NNW20	W20	W16	NNW19	NNW9	W10	NNW14	NNW9	SW8	W16.3	W25
29-Jul	SW8	SW9	WSW7	WSW11	WSW12	WSW10	WSW8	WSW10	WSW8	WSW12	WSW15	W16	W19	W20	W19	W18	W16	NNW12	N9	NNE5	SE2	SE6	SE7	SE9	W8.1	W20
30-Jul	SSE8	S5	S6	SSW8	SW7	SW9	W22	W22	NNE5	N7	ENE4	SE8	S7	S9	S9	SW9	WSW11	WSW10	SW10	WSW9	WSW12	WSW15	W23	W23	WSW7.7	W23
31-Jul	W23	W21	W21	W22	W15	NNW21	NNW27	NNW24	NNW21	NNW21	NNW23	NNW23	NNW22	NNW23	NNW17	NNW21	NW20	N15	NNW13	NNW12	NW12	NW13	NW13	NNW13	WNN17.8	WNN27

WSW9.3	WSW8.7	W9.7	W9.2	W8.7	W9.4	W8.7	W7.5	W6.8	W6.7	W5.6	W5.9	W6.0	W5.9	W6.0	W5.9	W6.3	W5.3	NNW4.9	W4.3	W4.5	W6.7	W8.1	WSW9.0	Diurnal Average
W28	W29	W30	W27	W27	W25	NNW27	NNW24	W31	NNW34	NNW34	NNW32	NNW29	WSW31	W34	W31	W31	W27	W28	W25	NW20	W20	W24	NNW28	Diurnal Maximum

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	98	13.41	13.41
6 - 11	320	43.78	57.18
12 - 19	204	27.91	85.09
20 - 28	98	13.41	98.50
29 - 38	11	1.50	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - July 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	6	3	6	5	7	3	4	5	6	5	19	5	7	9	4	98
6 - 11	9	9	4	2	8	22	37	13	23	23	41	52	33	21	12	11	320
12 - 19	4	1	0	0	0	1	15	9	5	0	1	57	49	27	19	16	204
20 - 28	2	2	0	0	0	0	0	1	0	0	0	8	42	24	2	17	98
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	6	4	0	0	11
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	19	18	7	8	13	30	55	27	33	29	47	137	135	83	42	48	731

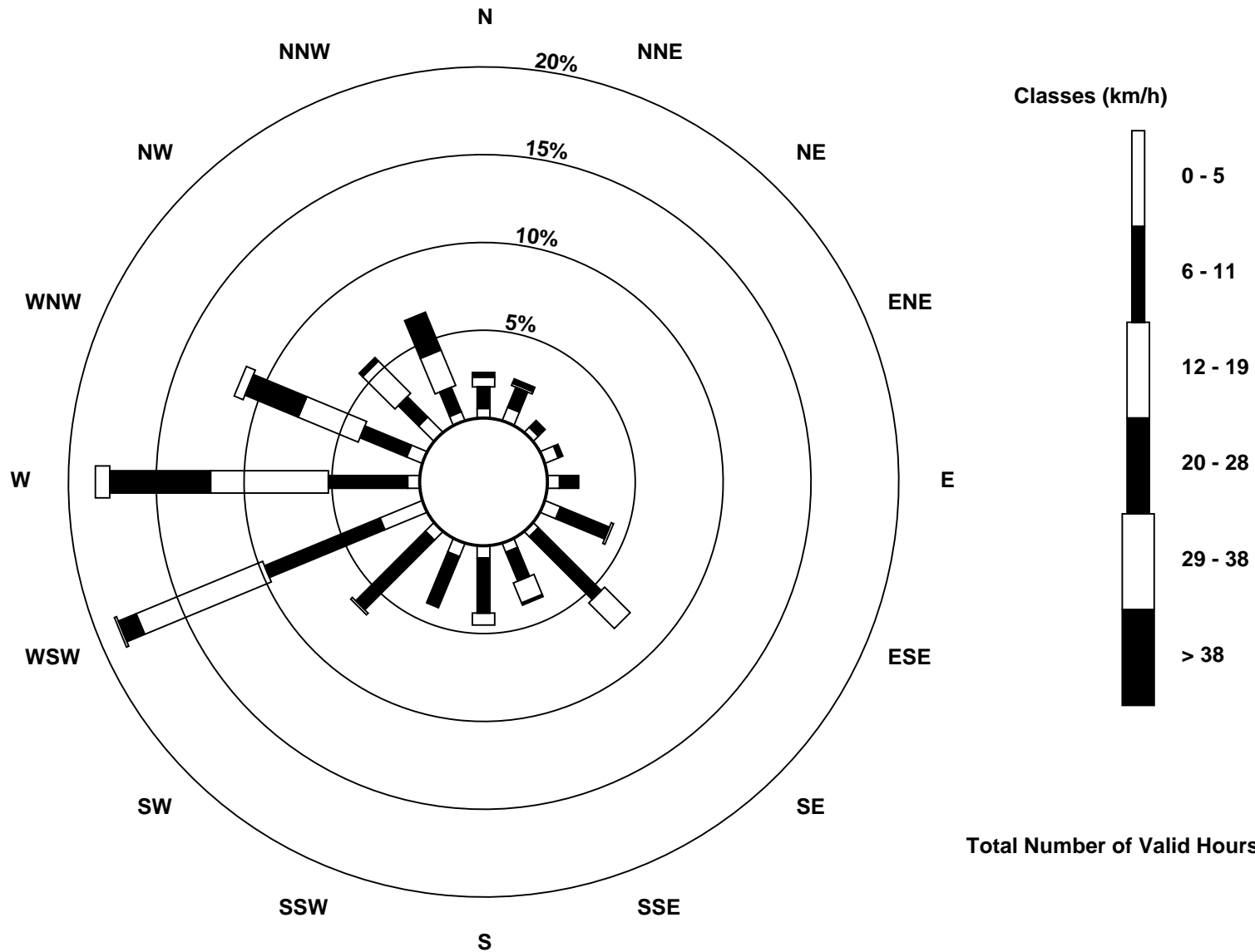
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Surmont (AMS 502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Surmont - July 2017

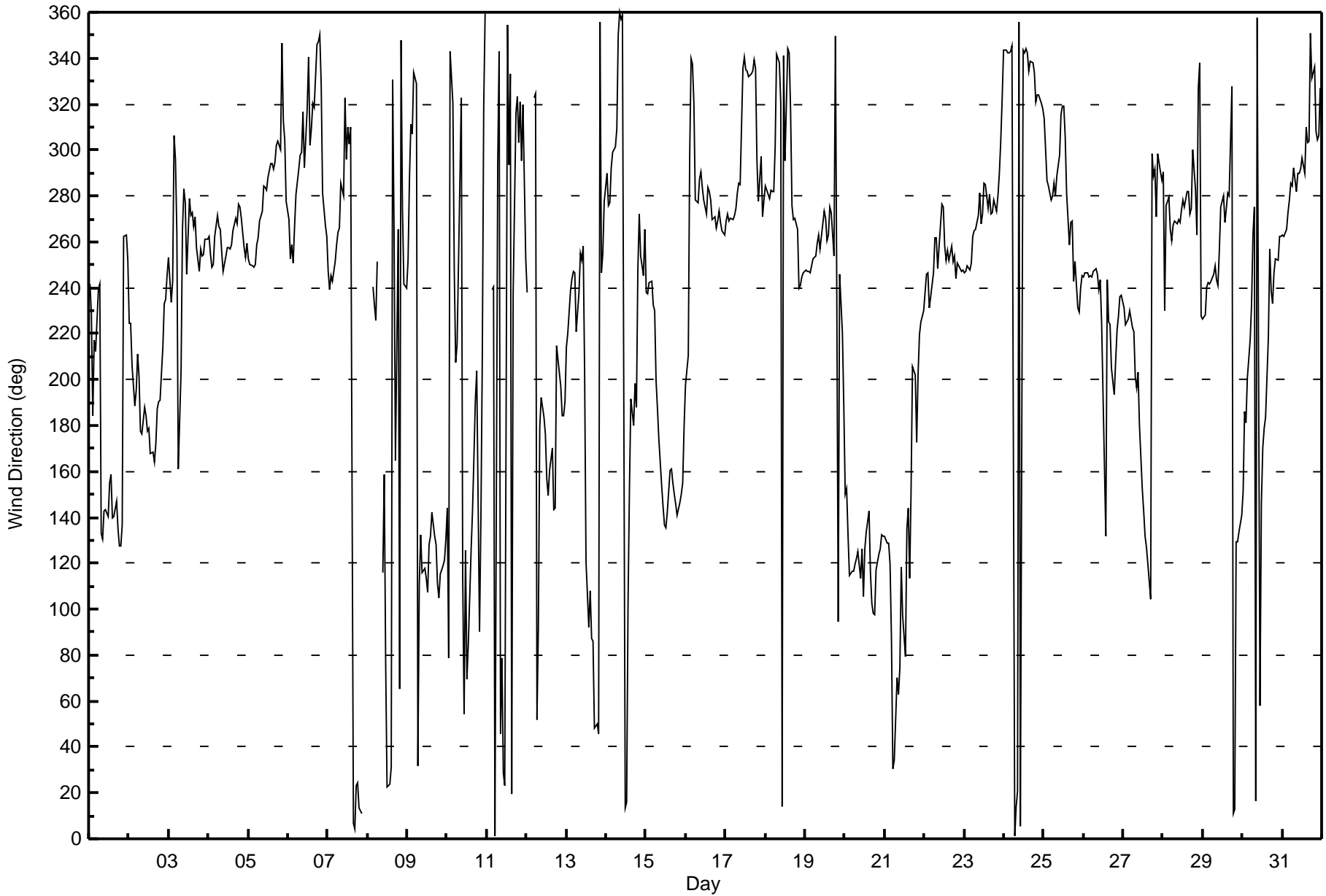
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Jul 4 15:00 Minimum Value: 1 km/h on Jul 6 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3									
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-Jul	2	2	1	2	1	1	1	2	2	2	3	3	3	3	2	4	2	2	2	1	1	7	5	4	7	
2-Jul	3	2	3	3	3	2	2	4	3	4	4	3	4	5	4	3	4	4	3	2	2	2	2	5	5	
3-Jul	4	5	3	3	5	6	4	3	2	3	5	4	4	5	4	4	6	5	4	5	4	3	6	5	6	
4-Jul	5	4	4	4	5	5	6	6	5	6	6	6	7	9	9	8	7	6	7	5	5	3	2	3	9	
5-Jul	2	2	2	3	3	4	3	5	7	8	8	7	7	6	6	5	5	4	3	3	2	2	1	2	8	
6-Jul	2	3	1	2	2	2	2	2	3	3	5	8	4	5	4	5	4	4	3	3	2	2	1	2	8	
7-Jul	3	2	4	1	1	1	2	2	3	4	3	4	4	3	3	4	4	3	2	2	2	AF	AF	AF	4	
8-Jul	AF	AF	AF	3	1	3	3	AF	AF	1	2	2	5	4	2	2	2	2	2	2	2	1	2	2	5	
9-Jul	4	2	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	2	2	1	1	2	4	
10-Jul	2	2	3	4	4	2	2	3	2	3	2	2	2	3	3	3	3	2	2	2	2	2	2	3	4	
11-Jul	AF	2	AF	2	2	2	2	2	2	2	3	4	4	4	4	4	3	2	3	4	3	2	1	3	4	
12-Jul	1	AF	AF	AF	2	1	1	1	2	1	2	3	3	3	2	4	3	2	3	2	2	3	2	2	4	
13-Jul	2	2	2	2	2	3	2	2	2	3	2	3	3	3	3	3	1	2	3	2	2	3	2	2	3	
14-Jul	4	4	3	3	2	2	2	2	2	2	3	2	3	2	3	3	2	2	2	2	1	2	1	2	4	
15-Jul	2	2	2	2	1	1	3	3	2	3	2	3	3	4	4	4	5	4	4	3	3	3	4	2	5	
16-Jul	2	3	8	5	4	3	2	2	2	4	4	4	4	5	6	6	6	6	6	6	4	4	4	4	8	
17-Jul	6	5	6	5	5	4	4	5	5	4	5	5	5	5	5	5	4	4	3	2	1	5	2	2	6	
18-Jul	2	1	1	1	1	1	2	2	3	3	3	3	4	4	3	3	3	3	2	2	1	2	3	2	4	
19-Jul	2	2	3	3	3	3	2	3	4	4	4	4	4	4	4	3	3	4	8	2	2	1	2	2	8	
20-Jul	1	1	1	1	1	1	2	2	2	3	2	3	3	4	3	1	2	2	2	2	2	2	2	2	4	
21-Jul	2	1	1	2	1	1	2	1	1	1	2	2	1	3	2	2	3	2	2	2	2	2	1	2	3	
22-Jul	3	3	2	3	4	3	5	2	3	3	3	3	4	4	4	5	4	3	2	2	1	1	1	2	5	
23-Jul	2	2	2	2	2	3	3	4	5	4	5	4	5	4	5	5	4	2	1	2	2	2	2	3	5	
24-Jul	3	2	3	3	4	4	4	5	5	6	6	5	5	4	4	4	4	5	5	5	4	3	4	3	6	
25-Jul	3	2	1	1	1	1	2	2	2	3	3	4	4	3	4	3	3	2	2	1	1	1	2	2	4	
26-Jul	3	3	2	3	2	2	2	2	3	3	3	3	3	3	4	3	3	3	3	2	2	2	2	2	4	
27-Jul	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2	1	1	2	2	1	1	5	4	6	6	
28-Jul	5	3	4	3	3	3	4	4	4	5	5	5	6	6	5	4	6	4	7	2	1	5	5	1	7	
29-Jul	2	1	2	2	2	2	2	2	2	3	4	4	5	5	6	4	4	4	2	2	2	1	2	1	6	
30-Jul	2	2	2	2	2	3	6	6	2	2	2	2	2	3	3	3	3	3	3	2	2	3	4	4	6	
31-Jul	4	3	3	4	4	6	5	5	4	5	5	6	5	5	4	6	5	3	3	2	2	2	2	3	6	
	6	5	8	5	5	6	6	6	7	8	8	8	7	9	9	8	7	6	8	6	5	7	6	6		
Diurnal Maximum																										
AF - Analyzer Failure																										



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Surmont - July 2017

Direction of Maximum Speed: 284 deg on Jul 5 11:00																				Hours in Service: 744					
Direction of Maximum Daily Speed Average: 261.8 deg on Jul 4																				Hours of Data: 731					
Direction of Minimum Speed: 95 deg on Jul 19 21:00										Direction of Minimum Daily Speed Average: 1.3 deg on Jul 8										Hours of Missing Data: 13					
Monthly Average Direction: 268.1 deg																				Percent Operational Time: 98.3					
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-Jul	242	229	185	217	212	239	242	133	130	143	143	140	155	158	140	140	147	135	128	128	137	262	263	252	174.8
2-Jul	225	225	206	188	195	211	201	178	176	188	184	177	179	168	169	164	172	187	191	191	214	233	235	245	193.4
3-Jul	253	234	243	306	296	263	161	204	265	283	277	246	279	272	273	267	271	257	247	257	254	254	261	261	260.7
4-Jul	262	255	249	250	262	271	267	265	256	247	254	258	257	259	265	270	268	277	275	270	258	253	259	259	261.8
5-Jul	253	250	250	249	250	258	262	269	273	285	284	283	288	294	294	292	295	302	304	300	346	312	305	278	279.4
6-Jul	270	253	259	251	267	281	292	298	299	317	293	318	341	302	310	320	319	346	347	350	329	281	267	263	303.9
7-Jul	247	239	246	243	252	258	264	266	285	280	323	296	310	302	310	7	5	23	24	13	11	AF	AF	AF	303.7
8-Jul	AF	AF	AF	240	232	226	251	AF	AF	116	159	78	23	24	31	331	265	165	265	66	348	274	242	240	277.6
9-Jul	252	288	311	307	334	329	32	110	133	116	118	113	107	128	132	142	132	128	111	105	115	119	121	130	121.1
10-Jul	144	79	343	320	247	208	215	251	323	114	54	126	70	85	125	143	166	190	204	91	139	211	319	359	140.7
11-Jul	AF	271	AF	239	240	1	294	343	45	78	29	23	355	294	333	20	237	316	324	303	321	295	320	253	328.3
12-Jul	238	AF	AF	AF	323	324	52	92	179	192	184	177	157	150	161	170	143	144	215	209	197	184	185	191	177.2
13-Jul	214	220	239	244	247	246	221	238	255	252	258	204	121	92	108	87	86	48	50	46	356	247	255	277	226.6
14-Jul	290	276	277	292	299	301	309	350	360	357	359	13	16	102	153	192	180	198	188	248	272	254	245	266	288.3
15-Jul	238	237	242	243	232	230	200	187	174	153	145	137	135	142	160	161	155	150	146	141	147	150	155	179	165.3
16-Jul	198	211	298	340	337	320	278	277	287	290	284	278	272	284	282	278	270	271	266	269	273	268	265	263	280.0
17-Jul	269	272	269	271	270	271	274	281	286	285	335	340	335	335	332	333	334	339	336	295	278	297	271	278	296.6
18-Jul	284	282	279	283	282	282	301	342	338	321	14	341	295	344	342	318	276	270	270	266	240	241	245	246	291.2
19-Jul	248	247	247	247	250	252	254	259	263	257	262	274	270	260	263	275	273	254	349	236	95	246	220	188	258.2
20-Jul	150	152	132	115	117	116	120	122	125	114	126	106	127	133	143	116	102	98	98	117	124	126	133	132	122.0
21-Jul	132	129	129	120	88	31	34	70	63	74	118	97	79	135	144	114	152	206	202	173	202	220	225	230	138.4
22-Jul	238	246	247	231	236	246	262	262	248	258	276	275	258	252	256	252	258	251	254	244	251	249	247	248	252.5
23-Jul	246	247	249	248	251	262	265	265	272	281	268	272	285	285	275	281	272	273	278	274	280	290	304	322	272.9
24-Jul	343	343	342	342	343	345	1	14	20	356	6	343	342	344	342	334	339	338	334	321	324	324	320	318	342.9
25-Jul	313	300	287	284	278	280	285	280	288	297	315	319	319	306	281	259	268	269	243	252	232	230	240	245	281.2
26-Jul	244	247	246	245	245	245	247	248	246	239	243	225	194	132	243	225	224	205	194	208	221	227	236	237	234.1
27-Jul	231	224	225	226	230	223	221	201	197	203	180	153	143	132	127	119	104	299	288	292	271	298	291	287	232.8
28-Jul	291	230	276	279	265	261	267	269	268	270	268	274	278	275	282	282	272	275	300	283	263	327	338	228	276.0
29-Jul	226	228	241	242	242	243	246	249	243	241	256	275	280	268	275	281	280	328	11	13	130	130	134	141	261.1
30-Jul	151	186	181	201	217	232	263	275	16	358	58	146	170	179	184	218	257	238	233	247	253	252	262	262	239.5
31-Jul	263	262	266	273	278	285	284	292	282	290	290	292	297	290	310	303	304	351	331	336	308	304	307	327	292.9
253.8 251.3 259.7 266.2 264.3 267.3 267.2 271.2 274.3 275.2 277.4 279.3 285.1 272.7 270.9 272.6 265.1 275.5 281.8 274.0 259.2 261.3 260.9 258.2																									
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
Surmont - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 95 deg on Jul 7 03:00	Hours of Data: 731
Minimum Value: 7 deg on Jul 6 23:00	Hours of Missing Data: 13
Percentiles: P ₁ = 8 P ₁₀ = 10 Q ₁ = 12 Median = 17 Q ₃ = 27 P ₉₀ = 43 P ₉₉ = 84	Hours of Calibration: 0
	Percent Operational Time: 98.3

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-Jul	16	73	37	28	48	12	15	54	19	17	14	22	35	29	17	23	20	13	11	10	9	32	15	15	73
2-Jul	18	17	23	30	24	23	24	21	16	26	22	28	31	25	23	22	23	25	22	21	22	19	18	16	31
3-Jul	14	33	18	32	54	16	49	40	16	15	47	29	17	14	21	21	12	14	16	13	12	11	11	54	
4-Jul	11	12	14	13	15	11	12	13	15	18	16	16	17	16	15	13	14	12	12	12	11	10	9	18	
5-Jul	8	9	9	9	9	10	11	12	12	12	13	13	14	14	15	16	15	18	17	25	20	23	22	29	
6-Jul	33	83	9	11	11	10	11	23	17	34	41	74	48	20	23	24	23	15	16	26	27	26	7	22	83
7-Jul	72	83	95	9	8	8	12	15	19	36	55	48	39	60	36	34	40	23	19	10	31	AF	AF	AF	95
8-Jul	AF	AF	AF	46	12	23	57	AF	AF	20	54	60	37	44	58	46	86	84	17	71	48	49	69	11	86
9-Jul	36	85	35	47	42	31	30	29	18	23	24	22	44	31	26	22	21	19	16	10	11	11	13	12	85
10-Jul	9	58	31	26	80	23	23	89	21	48	34	15	37	51	33	20	27	30	36	26	38	54	47	64	89
11-Jul	AF	35	AF	34	16	56	24	30	40	65	44	30	19	35	24	42	71	18	26	78	26	17	30	31	78
12-Jul	11	AF	AF	AF	31	55	79	29	40	26	24	29	31	28	25	27	14	15	29	25	24	18	17	21	79
13-Jul	21	20	17	15	12	18	21	20	31	44	82	72	27	43	33	33	29	17	14	18	50	40	13	26	82
14-Jul	12	11	12	12	9	8	13	15	19	22	21	21	66	55	44	26	31	26	18	32	7	15	11	28	66
15-Jul	14	13	13	11	12	16	24	20	22	18	12	13	15	15	19	20	17	11	11	10	10	10	15	20	24
16-Jul	20	38	32	14	13	17	23	16	12	12	12	11	15	15	13	13	13	13	11	11	10	10	10	10	38
17-Jul	10	10	10	10	10	10	11	11	11	11	21	14	17	17	19	17	21	19	21	14	10	31	11	11	31
18-Jul	9	9	9	7	9	9	18	28	31	38	33	48	70	44	57	69	84	24	12	17	13	13	11	10	84
19-Jul	10	10	10	10	9	9	11	14	16	18	21	19	16	15	15	13	13	17	66	32	84	37	21	31	84
20-Jul	64	13	15	16	17	18	23	18	20	37	18	22	26	28	15	17	18	15	13	13	14	10	10	20	64
21-Jul	11	11	10	21	41	38	83	16	16	20	19	27	17	34	19	19	23	33	32	44	31	20	17	16	83
22-Jul	17	11	11	22	19	11	51	33	41	14	16	20	17	16	16	18	19	16	13	14	9	10	10	10	51
23-Jul	10	10	9	11	11	10	11	12	14	16	14	22	14	19	20	16	13	13	10	8	9	10	11	19	22
24-Jul	12	10	10	10	12	13	16	15	18	19	21	13	12	13	11	14	14	14	15	12	12	13	12	12	21
25-Jul	13	10	8	9	8	10	9	11	13	19	27	37	36	60	29	34	30	26	17	9	10	14	15	11	60
26-Jul	12	11	10	11	11	11	11	11	13	19	27	29	41	58	34	24	34	28	24	23	18	17	17	17	58
27-Jul	18	17	19	18	18	18	20	26	24	26	33	26	21	24	20	12	43	60	35	47	12	12	13	13	60
28-Jul	13	37	10	9	12	10	11	10	12	13	13	12	17	15	16	13	15	13	22	10	9	37	39	9	39
29-Jul	15	14	18	12	14	12	13	14	20	22	19	15	16	16	22	16	14	38	16	27	73	15	14	10	73
30-Jul	23	33	27	24	22	24	17	17	46	29	52	18	31	33	28	31	21	19	19	13	11	9	9	9	52
31-Jul	9	9	9	9	11	11	10	11	13	14	15	15	15	13	23	18	24	18	29	22	14	10	13	17	29
	72	85	95	47	80	56	83	89	46	65	82	74	70	60	58	69	86	84	66	78	84	54	69	64	

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	July 20, 2016	Last Calibration	June 28, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	12:10	End Time (MST)	16:25
Gas Cert Reference	LL104215	Station temp.	21 Deg C
Cal Gas Concentration	48.3 ppm	Cal Gas Exp Date	12-Feb-18
Calibrator Make/Model	API T700	Serial Number	622
ZAG Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	DACS serial No.	9035

Analyzer Information

	Before	After		Before	After
Analyzer Range	0 - 1000 ppb		PMT voltage	518	518
Analyzer IP address	192.168.1.43		Lamp voltage	1795	1759
Calculated slope	1.000499	1.003170	Chamber temp	50.0	50.0
Calculated intercept	0.328797	0.872999	Pressure	21.6	21.3
Analyzer Background	22.5	22.5	Flow	0.537	0.524
Analyzer Coefficient	1.003	1.003	Intensity	44	43
Analyzer make	API T100		Analyzer serial #	598	

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.4	----
as found span	5000	83.2	803.7	795.2	1.011
calibrator zero	5000	0.0	0.0	0.4	----
high point	5000	83.2	803.7	800.9	1.004
second point	5000	41.6	401.9	399.3	1.006
third point	5000	20.8	200.9	198.0	1.015
as left zero	5000	0.0	0.0	0.9	----
as left span	5000	83.2	803.7	789.7	1.018
Average Correction Factor					1.008

Corrected As found 794.8 Previous response 803.0 % change 1.0%

Notes:

Sample inlet filter replaced after as founds. Used new average for "high point" as it had slightly changed when compared to "as founds span". No adjustments made.

Calibration Performed By:

Asad Hidayat



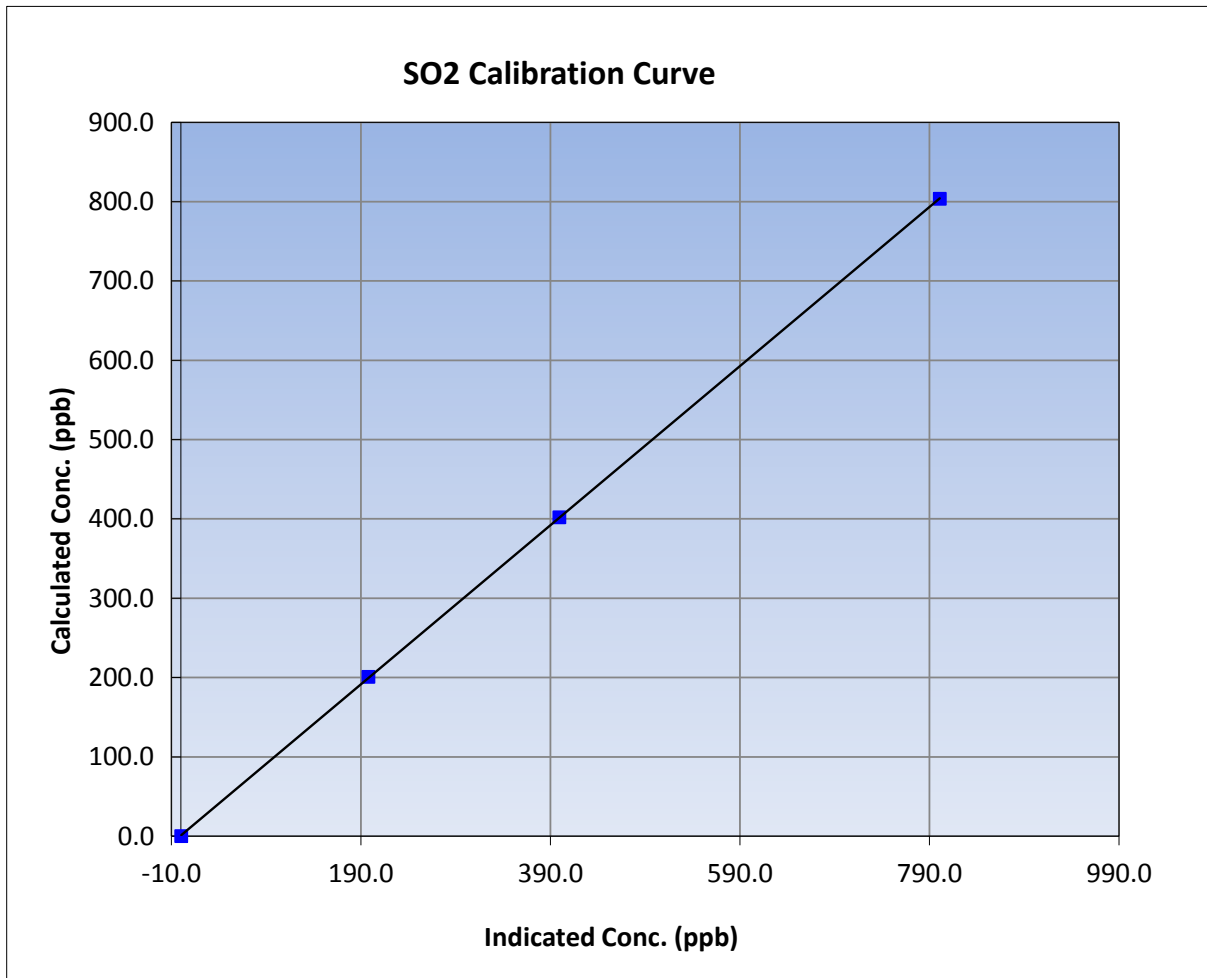
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

Calibration Date	July 20, 2016	Previous Calibration	June 28, 2016
Station Name	ConocoPhillips - Surmont	Station Number	AMS 502
Start Time (MST)	12:10	End Time (MST)	16:25
Analyzer make	API T100	Analyzer serial #	598

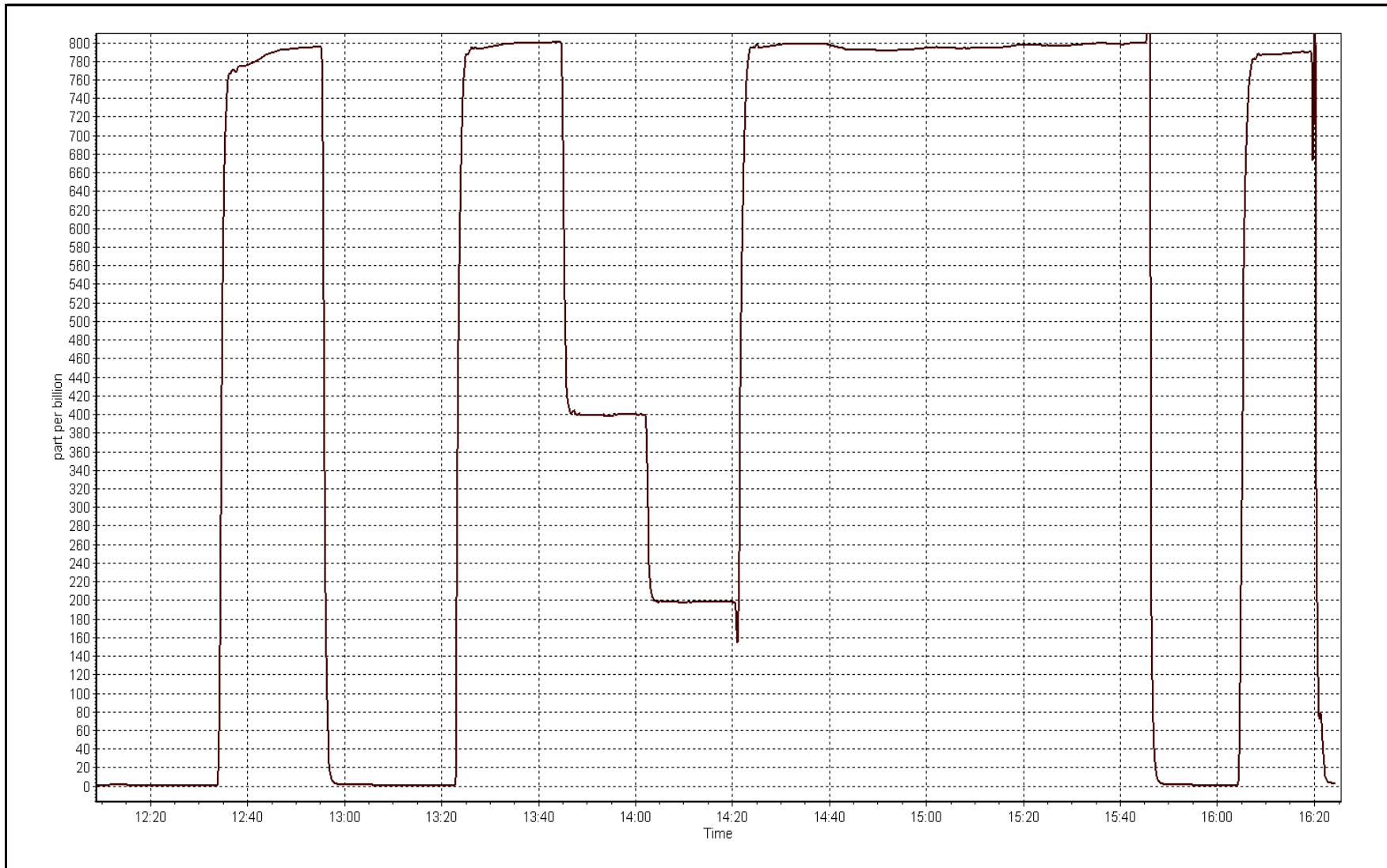
Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.4	----	Correlation Coefficient	0.999988
803.7	800.9	1.0036		
401.9	399.3	1.0063	Slope	1.003170
200.9	198.0	1.0150		
			Intercept	0.872999



SO2 Calibration Plot

Date: July 20, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

Calibration Date	July 19, 2016	Last Calibration	June 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	9:50	End Time (MST)	14:15
Gas Cert Reference	LL34303	Station temp.	21 Deg C
Cal Gas Concentration	10.4 ppm	Cal Gas Exp Date	30/05/2016
Calibrator Make/Model	API T700	Serial Number	622
ZAG air Make/Model	API 701	Serial Number	4865
DACS make/model	Campbell Scientific CR3000	Serial Number	7882
SO2 gas concentration	48.3 ppm	SO2 gas cert/exp	LL104215 12-Feb-18

Analyzer Information

	Before	After		Before	After
Analyzer Range (ppb)	0 - 100 ppb		PMT voltage	497	497
Analyzer IP address	192.168.1.75		Lamp voltage	2420	2410
Calculated slope	0.995396	0.999825	Chamber temp	50.0	50.0
Calculated intercept	0.080731	-0.143129	Pressure	23.5	23.1
Analyzer Background	19.2	19.2	Flow (SLPM)	0.639	0.614
Analyzer Coefficient	0.969	0.95	Intensity	54	53
			Converter temp.	315	315

Analyzer make/model	API T101	Analyzer serial #	197
Converter make/model	N/A	Converter serial #	N/A

Calibration Data

Set Point	Total flow rate (cc/min)	Source gas flow rate (cc/min)	Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)
as found zero	5000	0.0	0.0	0.3	----
as found span	5000	38.5	80.1	81.1	0.988
SO2 scrubber check	5000	20.7	200.0	3.8	----
calibrator zero	5000	0.0	0.0	0.3	----
high point	5000	38.5	80.1	80.3	0.997
second point	5000	19.3	40.1	40.1	1.000
third point	5000	12.1	25.2	25.3	0.996
as left zero	5000	0.0	0.0	0.3	----
as left span	5000	38.5	80.1	79.8	1.004
Average Correction Factor					0.998

Corrected As found	80.8	Previous response	80.4	% change	-0.5%
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Notes:

Sample inlet filter replaced after as founds. MFC on calibrator done after as founds. Adjusted span. Scrubber check completed after 3rd point.

Calibration Performed By: Asad Hidayat



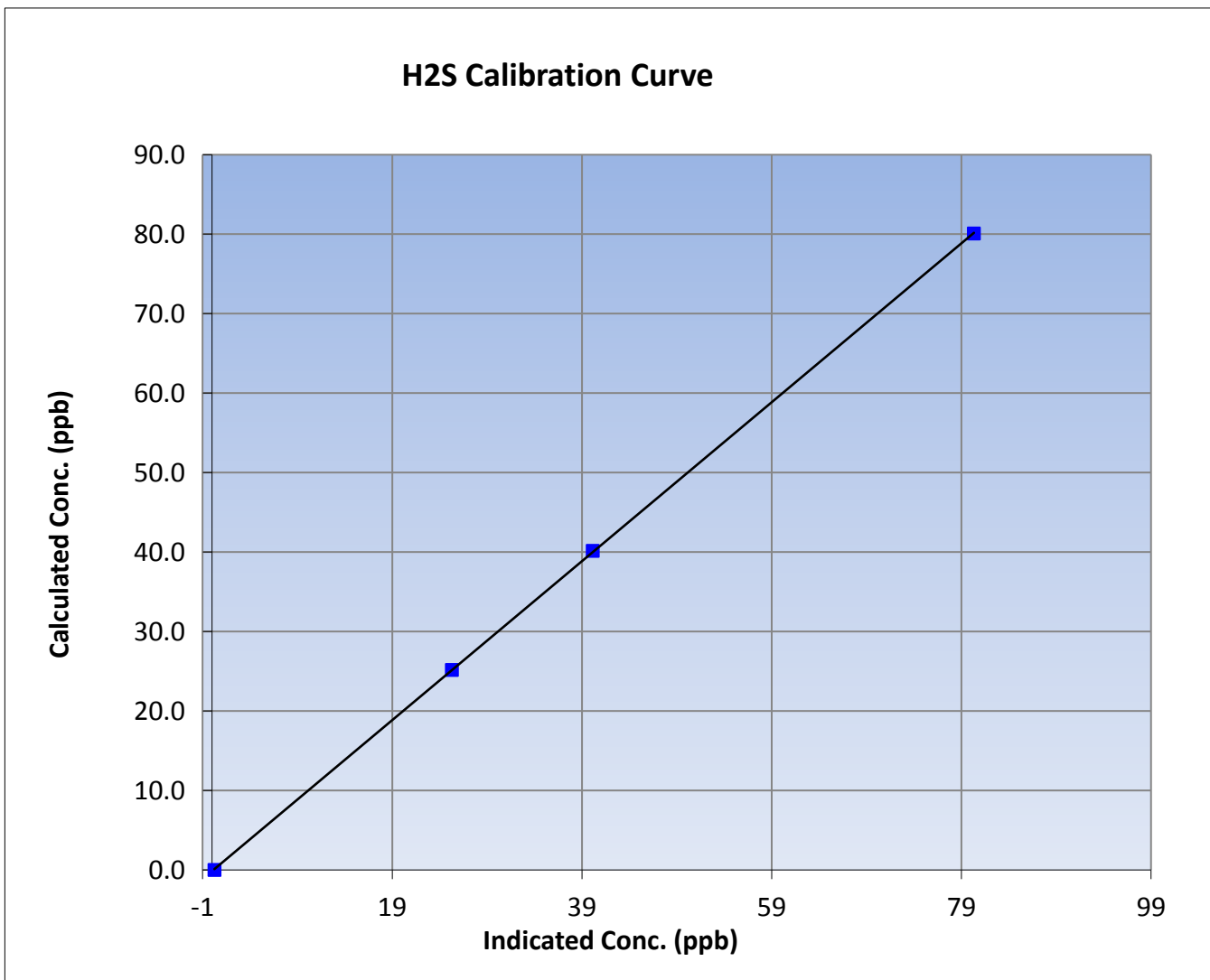
Wood Buffalo Environmental Association H2S Calibration Report

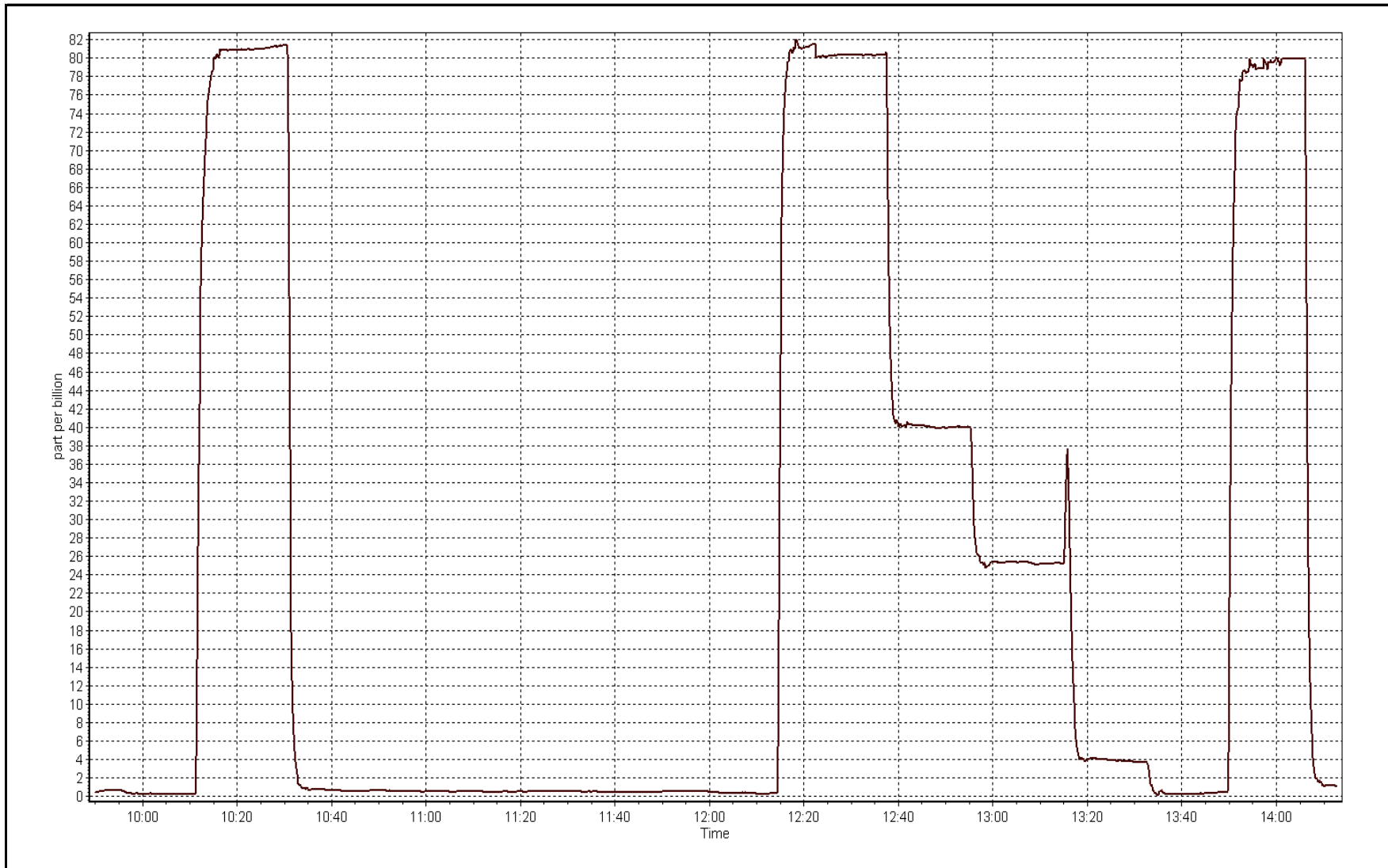
Station Information

Calibration Date	July 19, 2016	Previous Calibration	June 27, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	9:50	End Time (MST)	14:15
Analyzer make	API T101	Analyzer serial #	197

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	0.3	----	Correlation Coefficient	0.999986
80.1	80.3	0.9969		
40.1	40.1	1.0003	Slope	0.999825
25.2	25.3	0.9956		
			Intercept	-0.143129







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

Calibration Date	July 20, 2016	Previous Calibration	June 28, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Reason:	Routine		
Start Time (MST)	12:10	End Time (MST)	16:25
NO Cal Gas Conc	48.1 ppm	Gas Cert Reference	LL104215
NOX Cal Gas Conc	48.1 ppm	Cal Gas Expiry Date	12-Feb-18
Calibrator	API T700	Serial Number	622
Zero air Generator	Teledyne API T701	Serial Number	4865

DACS Information

DACS make & model	Campbell Scientific CR3000	DACS serial No.	9035
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Calibration Statistics

Parameter		NOx	NO	NO2
As Found (last calibration results)	Data Slope	0.992112	0.992369	0.994480
	Data Offset	1.502614	1.466982	-0.765034
Current Calibration	Data Slope	0.996911	0.997842	0.996772
	Data Offset	1.697928	1.285008	-0.004355

Analyzer Information

Analyzer make/model	Thermo 42i	Analyzer serial #	1218153356
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Test Point	before		after	
		ppb		ppb
Concentration range	0-1000		0-1000	
Analyzer IP	192.168.1.42		192.168.1.42	
NO coefficient	1.091		1.084	
NOX coefficient	1.001		1.001	
NO2 coefficient	1.000		1.000	
NO bkgrnd	6.3		5.9	
NOX bkgrnd	6.5		7.1	
Chamber Temp	50.3	Deg C	50.2	Deg C
Moly Temp	324.5	Deg C	324.5	Deg C
PMT voltage	-867.3	V	-866.6	V
PMT Temp	-2.7	Deg C	-3	Deg C
O3 flow	ok	ccm	ok	ccm
R Cell press NO	163.8	mmHg	162.9	mmHg
R Cell Press Nox	163.5	mmHg	162.7	mmHg
NO sample flow	0.666	lpm	0.66	lpm
Nox sample Flow	0.670	lpm	0.661	lpm

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

July 20, 2016

Station Number:

AMS 502

Calibration Data

Set Point	Total flow rate (ccm)	Source gas flow rate (ccm)	Calculated NOx conc (ppb)	Calculated NO conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor
as found zero	5000	0.0	0.0	0.0	0.0	0.1	-0.3	0.4	----	----
as found span	5000	83.2	800.4	800.4	0.0	805.1	803.3	1.8	0.9942	0.9964
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.1	----	----
high point	5000	83.2	800.4	800.4	0.0	801.5	800.9	0.5	0.9987	0.9993
second point	5000	41.6	400.2	400.2	0.0	400.1	400.4	-0.3	1.0004	0.9996
third point	5000	20.8	200.1	200.1	0.0	197.2	197.6	-0.5	1.0149	1.0125
as left zero	5000	0.0	0.0	0.0	0.0	-1.4	-0.3	-1.1	----	----
as left span	5000	83.2	800.4	493.6	306.7	805.1	494.7	310.4	0.9941	0.9978
Average Correction Factor									1.0047	1.0038

Corrected As found
Previous Response

NO_x= 805.0
NO_x= 805.2

NO= 803.5
NO= 805.1

Percent Change

NO_x= 0.0%

NO= 0.2%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 83.20 ccm NOx ref calc conc = 800.4 ppb NO ref calc conc = 800.4 ppb

O3 Setpoint (ppb)	Indicated NO drop conc (ppb)	Calculated NO2 conc (ppb)	Indicated NOx conc (ppb)	Indicated NO conc (ppb)	Indicated NO2 conc (ppb)	NOx Correction factor	NO Correction factor	NO2 Correction factor	Converter Efficiency
1st NO ref point		0.0	801.5	800.2	-0.1	0.9986	1.0003	----	----
1st NO2 (300)	493.6	306.5	801.5	493.6	307.8	0.9987	----	0.9958	100.4%
2nd NO2 (200)	588.0	212.2	800.2	588.0	212.3	1.0002	----	0.9999	100.0%
3rd NO2 (100)	688.3	111.9	801.0	688.3	112.8	0.9992	----	0.9926	100.8%
2nd NO ref point		0.0	801.6	800.9	0.7	0.9985	0.9993	----	----
Average Correction Factor						0.9991		0.9961	100.4%

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

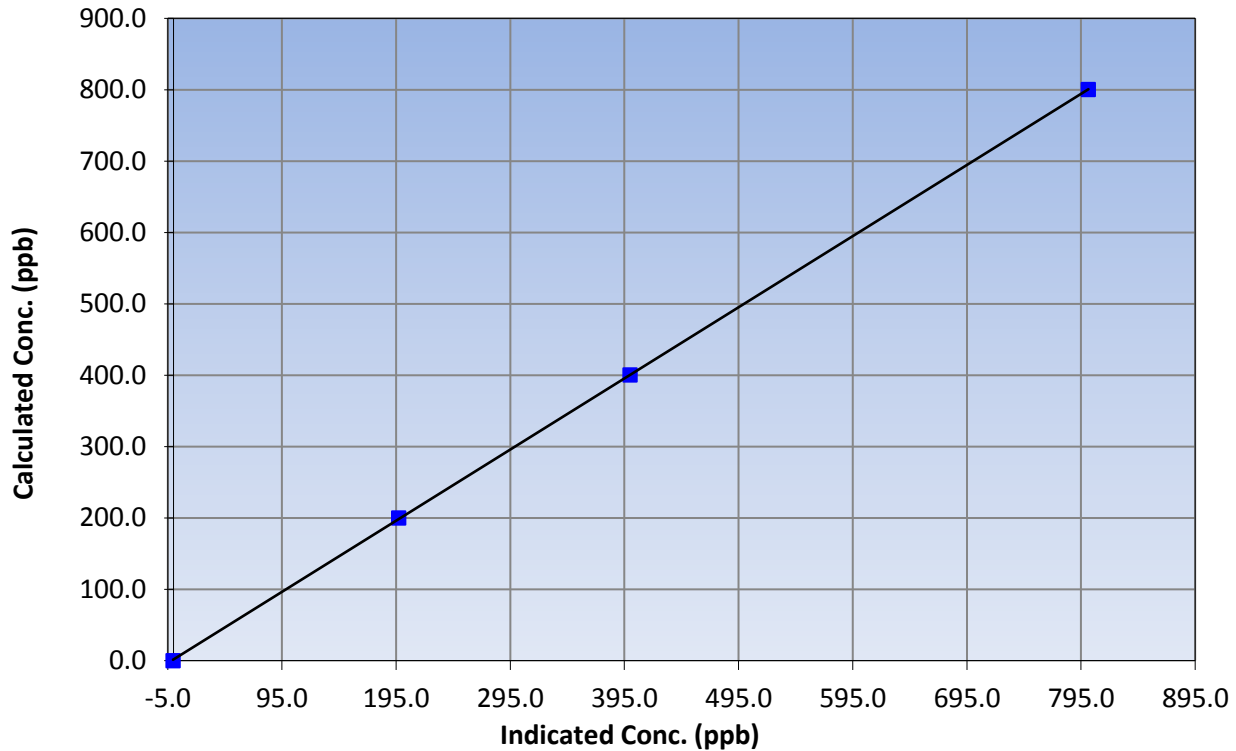
Station Information

Calibration Date	July 20, 2016	Previous Calibration	June 28, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	12:10	End Time (MST)	16:25
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.5	----	Correlation Coefficient	0.999985
800.4	801.5	0.9987		
400.2	400.1	1.0004	Slope	0.996911
200.1	197.2	1.0149		
			Intercept	1.697928

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

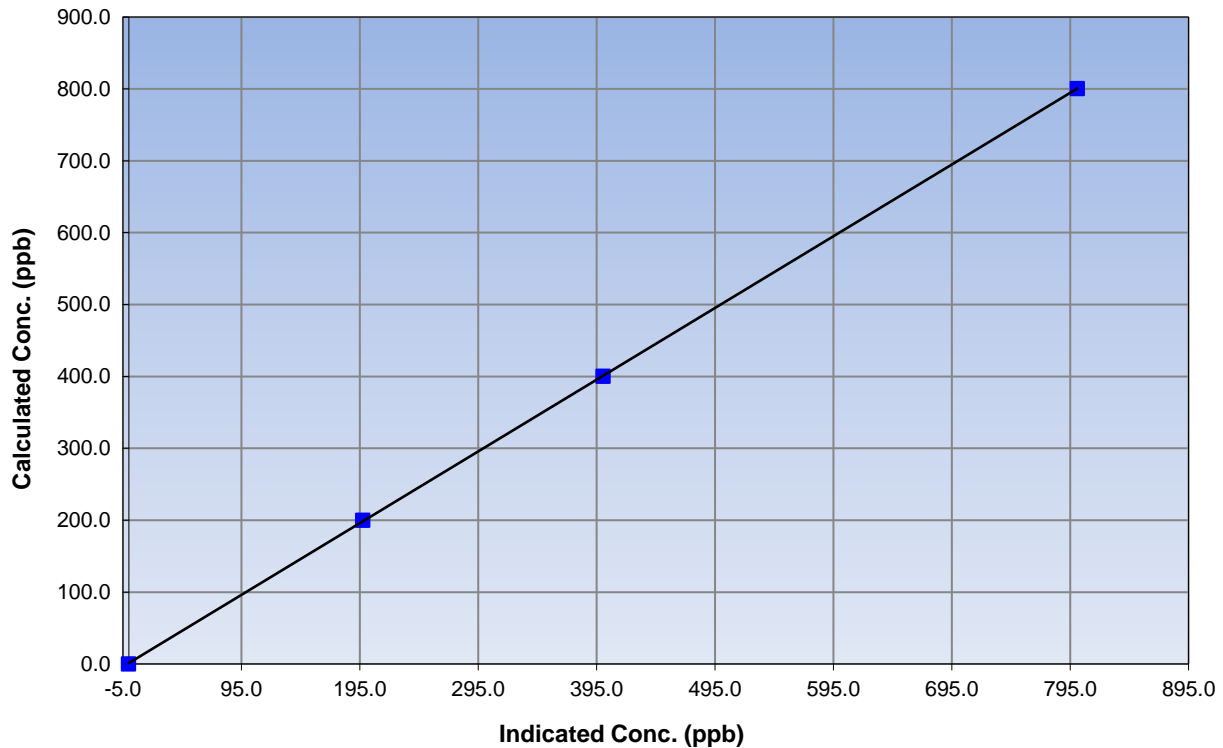
Station Information

Calibration Date	July 20, 2016	Previous Calibration	June 28, 2016
Station Name	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	12:10	End Time (MST)	16:25
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.4	N/A	Correlation Coefficient	0.999989
800.4	800.9	0.9993		
400.2	400.4	0.9996	Slope	0.997842
200.1	197.6	1.0125		
			Intercept	1.285008

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

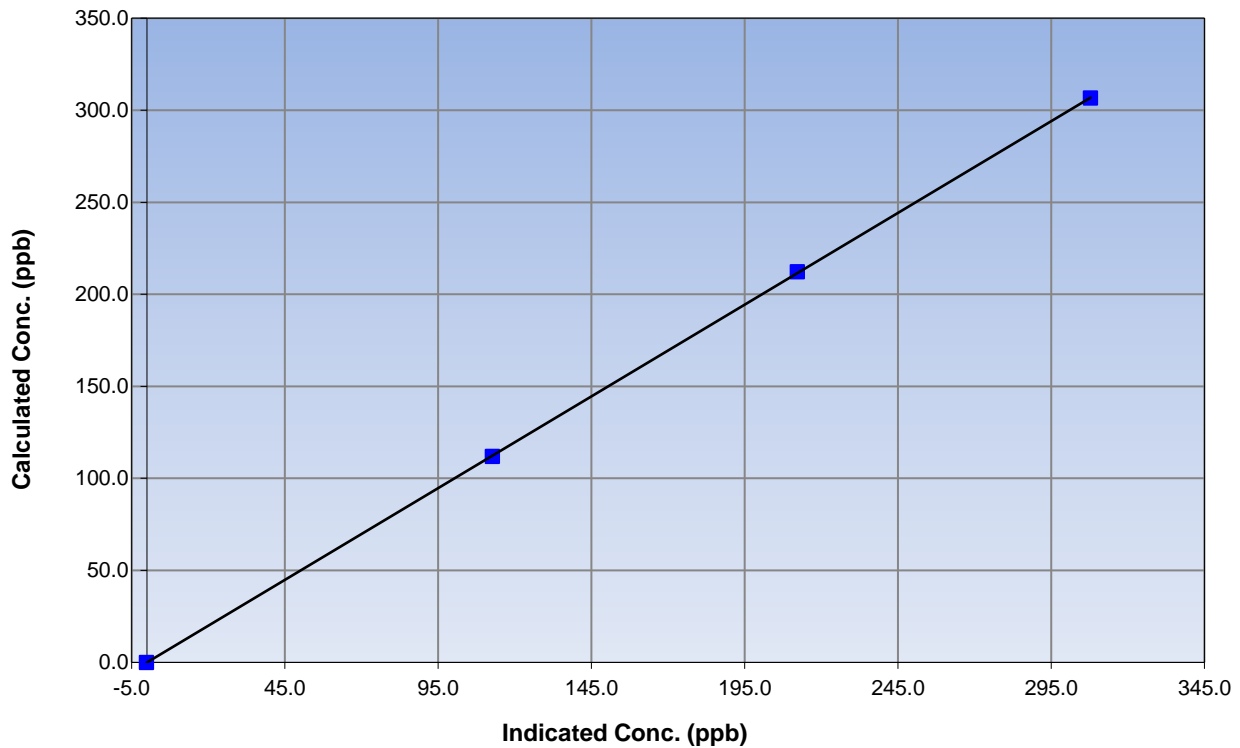
Station Information

Calibration Date	July 20, 2016	Previous Calibration	June 28, 2016
Station Number	ConocoPhillips	Station Number	AMS 502
Start Time (MST)	12:10	End Time (MST)	16:25
Analyzer make	Thermo 42i	Analyzer serial #	1218153356

Calibration Information

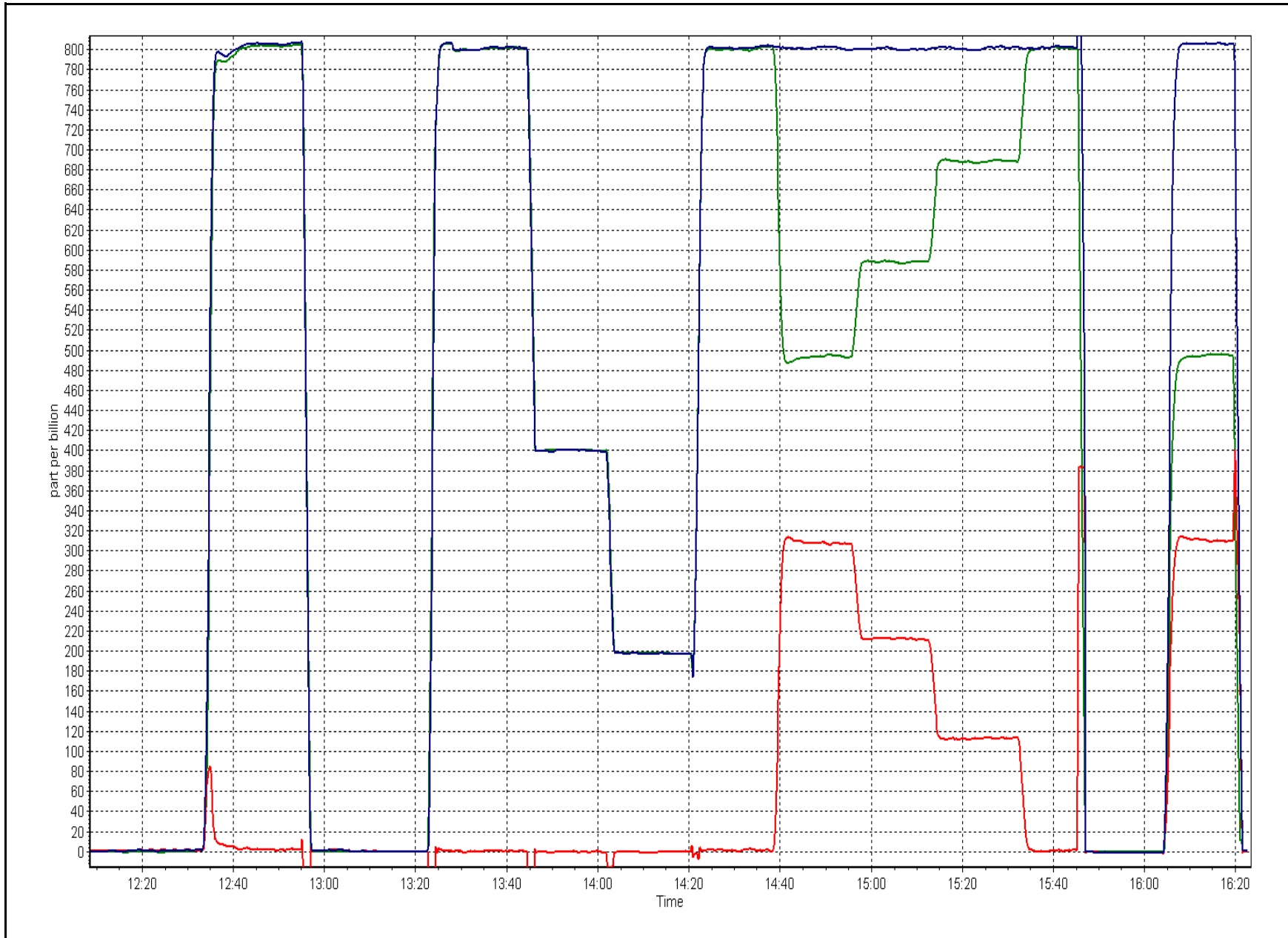
Calculated conc (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	
0.0	-0.1	N/A	Correlation Coefficient	0.999986
306.5	307.8	0.9958		
212.2	212.3	0.9999	Slope	0.996772
111.9	112.8	0.9926		
			Intercept	-0.004355

NO₂ Calibration Curve



NOX Calibration Plot

Date: July 20, 2016





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 505
SAWBONES BAY
JULY 2017**

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

August 30, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)
 JULY 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	706	37	38	99.87	23	0	4	0
H2S (ppb) Average	707	35	37	99.73	3	0	1	0
THC(ppm) Average	706	36	38	99.73	7.9	-	2.9	-
NO2 (ppb) Average	707	36	37	99.87	15	0	6	-
NO (ppb) Average	707	36	37	99.87	15	-	6	-
NOX (ppb) Average	707	36	37	99.87	27	-	12	-
Temperature 2 m (C) Average	744	0	0	100	29.4	-	22.4	-
Relative Humidity (%) Average	744	0	0	100	98	-	93	-
Wind Speed 10 m (km/h) Average	744	0	0	100	31	-	21	-
Wind Direction 10 m (deg) Average	744	0	0	100	0	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 505)
JULY 2017

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S, NO2,	28 Jul 2017 01:00	28 Jul 2017 01:00	1	Station power failure
THC	28 Jul 2017 01:00	28 Jul 2017 02:00	2	Station power failure.
H2S	13 Jul 2017 10:00	13 Jul 2017 10:00	1	Maintenance - manifold cleaning



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Sawbones Bay - July 2017

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 23 ppb on Jul 31 04:00	Maximum Daily Average: 4.3 ppb on Jul 17		Hours of Data:	706
Minimum Value: 0 ppb on Jul 1 06:00	Minimum Daily Average: 0.1 ppb on Jul 9		Hours of Missing Data:	38
Maximum Diurnal Average: 1.8 ppb at hour 6	Minimum Diurnal Average: 0.7 ppb at hour 1		Hours of Calibration:	37
Monthly Average: 1.2 ppb	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 3 P ₉₉ = 15		Percent Operational Time:	99.9

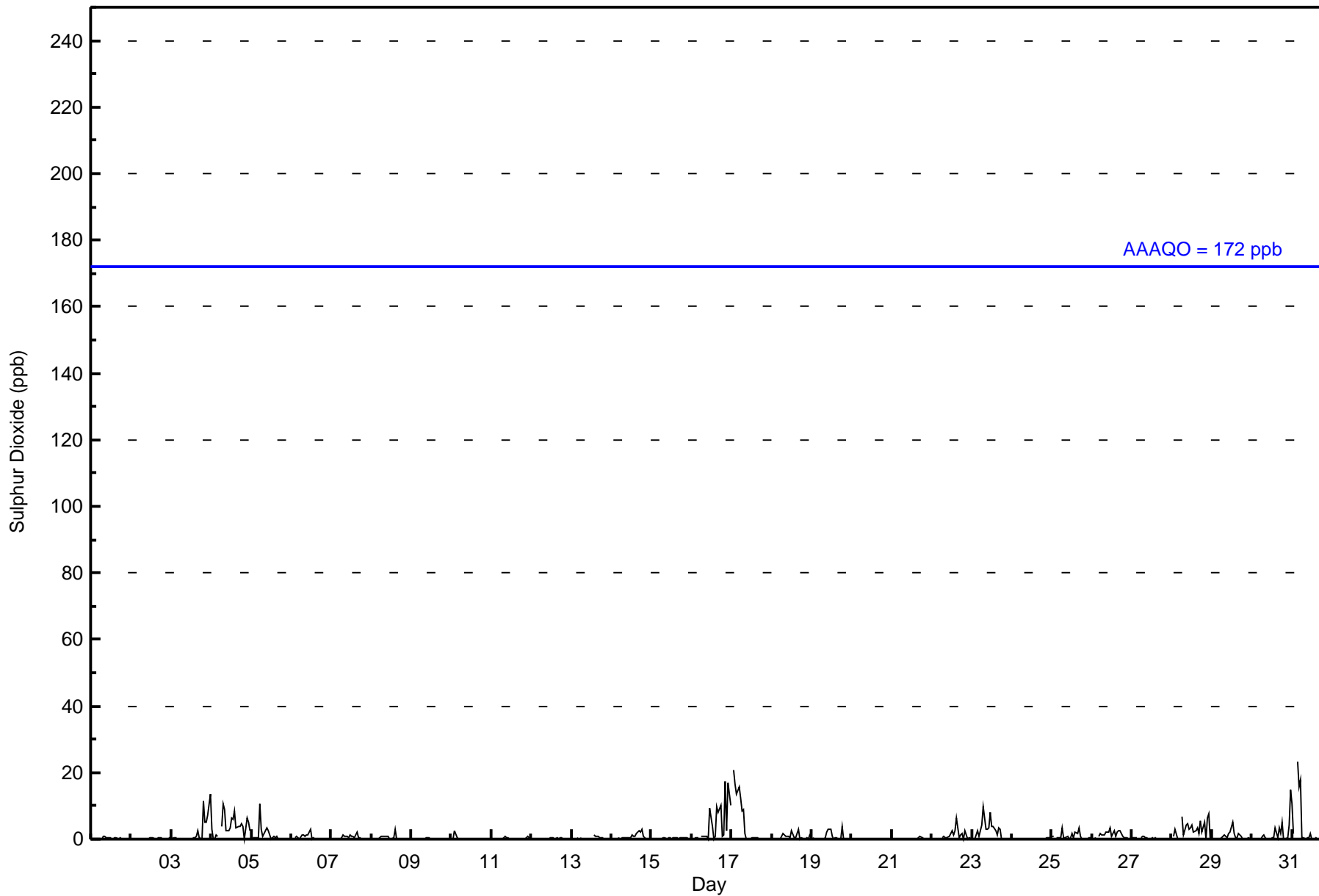
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Jul	0	0	Z	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1
2-Jul	0	0	0	Z	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	1
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	1	3	0	0	12	5	5	7	14	2.1	14
4-Jul	3	0	0	1	1	Z	4	11	9	2	3	3	7	6	8	3	4	4	5	4	0	7	5	3	4.0	11
5-Jul	Z	0	0	1	0	11	3	1	3	3	3	1	0	1	0	1	0	0	0	0	0	0	0	0	1.2	11
6-Jul	0	Z	0	1	0	0	1	1	1	1	1	3	0	1	0	0	0	0	0	0	0	0	0	0	0.5	3
7-Jul	0	0	Z	0	0	0	1	1	1	1	0	1	1	1	0	2	0	1	0	0	0	0	0	0	0.5	2
8-Jul	0	0	0	Z	0	0	1	1	1	1	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0.4	3
9-Jul	0	0	0	0	Z	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1
10-Jul	0	0	3	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	3
11-Jul	Z	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
12-Jul	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-Jul	0	0	Z	0	0	0	0	C	C	C	C	C	C	1	1	1	1	0	0	0	0	0	0	0	--	1
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	1	2	3	2	3	1	1	0	0	0	0.7	3
15-Jul	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-Jul	0	0	1	0	1	Z	1	1	1	1	0	9	4	0	1	10	8	10	1	1	17	2	17	10	4.2	17
17-Jul	Z	21	17	13	16	12	9	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3	21
18-Jul	0	Z	0	0	0	0	1	2	1	1	1	1	2	0	1	2	3	0	0	0	0	1	0	1	0.7	3
19-Jul	0	0	Z	0	0	0	0	0	1	2	3	3	1	0	1	0	0	0	4	0	0	0	0	0	0.7	4
20-Jul	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-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.2	1
22-Jul	0	0	0	0	0	Z	1	1	0	0	1	2	3	1	3	6	0	1	2	0	3	0	1	1	1.1	6
23-Jul	Z	0	0	3	1	2	4	10	3	3	3	8	4	4	3	1	3	3	0	0	0	0	0	0	2.4	10
24-Jul	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	1
25-Jul	1	1	Z	1	0	1	3	0	0	1	0	1	2	1	2	2	3	1	0	0	0	0	0	0	0.9	3
26-Jul	0	0	0	Z	1	2	1	1	2	2	2	3	1	3	1	2	3	3	1	0	0	0	0	0	1.3	3
27-Jul	0	0	0	0	Z	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
28-Jul	PF	1	3	0	0	Z	7	1	4	4	3	3	4	2	2	3	2	5	2	5	0	6	8	0	3.1	8
29-Jul	Z	0	0	0	0	0	1	1	1	1	1	2	5	2	1	0	2	1	0	0	0	0	0	0	0.8	5
30-Jul	0	Z	0	0	0	0	1	1	0	0	0	0	0	1	3	0	3	2	5	0	0	0	4	15	1.7	15
31-Jul	10	2	Z	23	16	18	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	3.3	23
0.7 1.0 1.0 1.7 1.4 1.8 1.3 1.6 1.1 0.9 0.8 1.5 1.2 0.9 1.1 1.3 1.3 1.2 0.8 0.8 0.9 0.8 1.5 1.5																								Diurnal Average		
10 21 17 23 16 18 9 11 9 4 3 9 7 6 8 10 8 10 5 12 17 7 17 15																								Diurnal Maximum		

Z - zerospan 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
Sawbones Bay - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	691	97.88	97.88
11 - 20	13	1.84	99.72
21 - 60	2	0.28	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - July 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	26	14	10	19	20	26	40	65	63	35	48	77	57	91	60	40	691
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	13
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	2	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	26	14	10	19	20	26	40	65	63	35	48	77	72	91	60	40	706

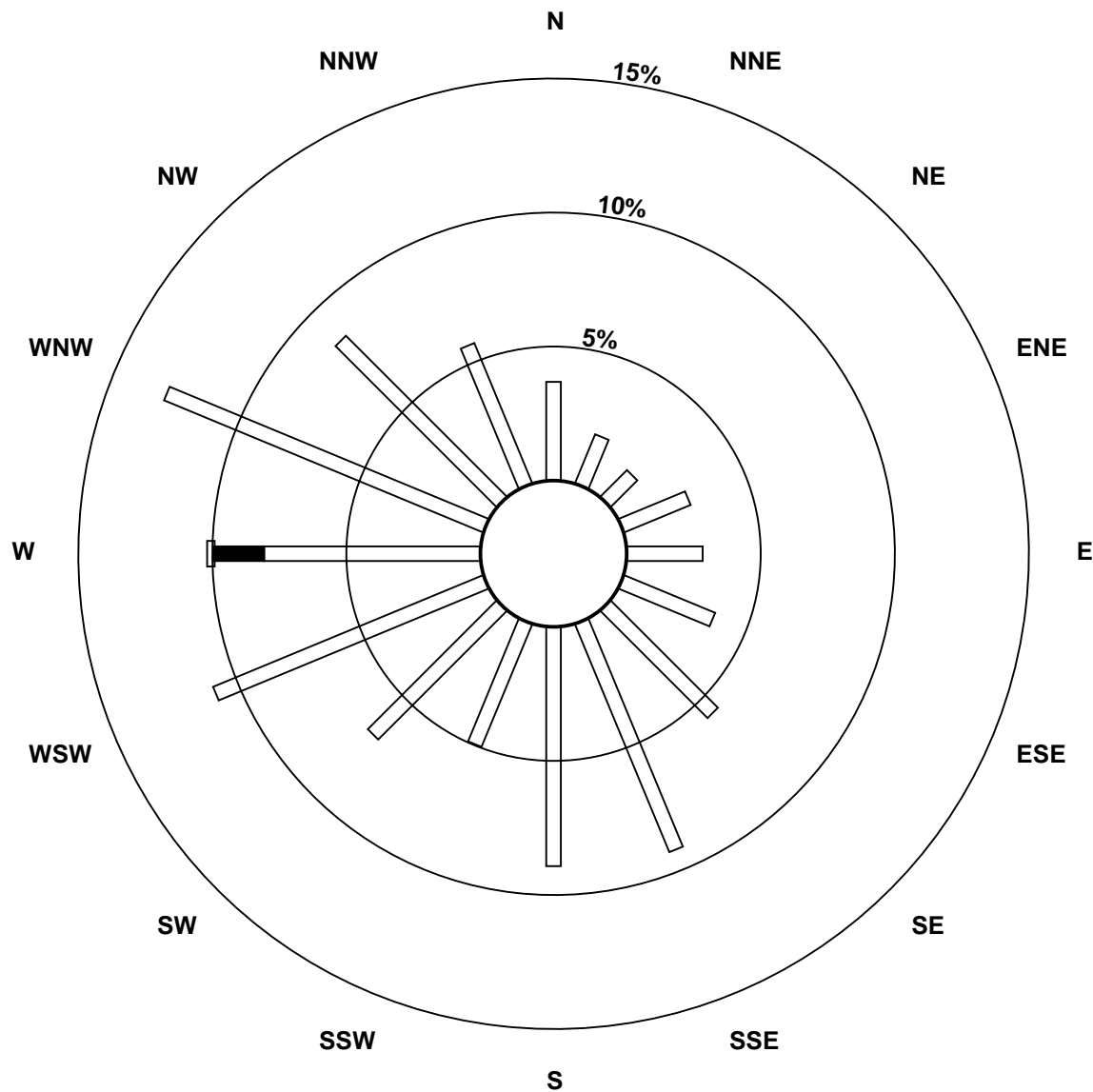
Total Number of Valid Hours: 706

Total Number of Hours: 744

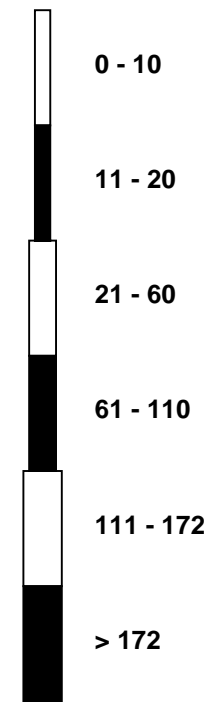


Wood Buffalo Environmental Association
Wind Rose Jul 2017

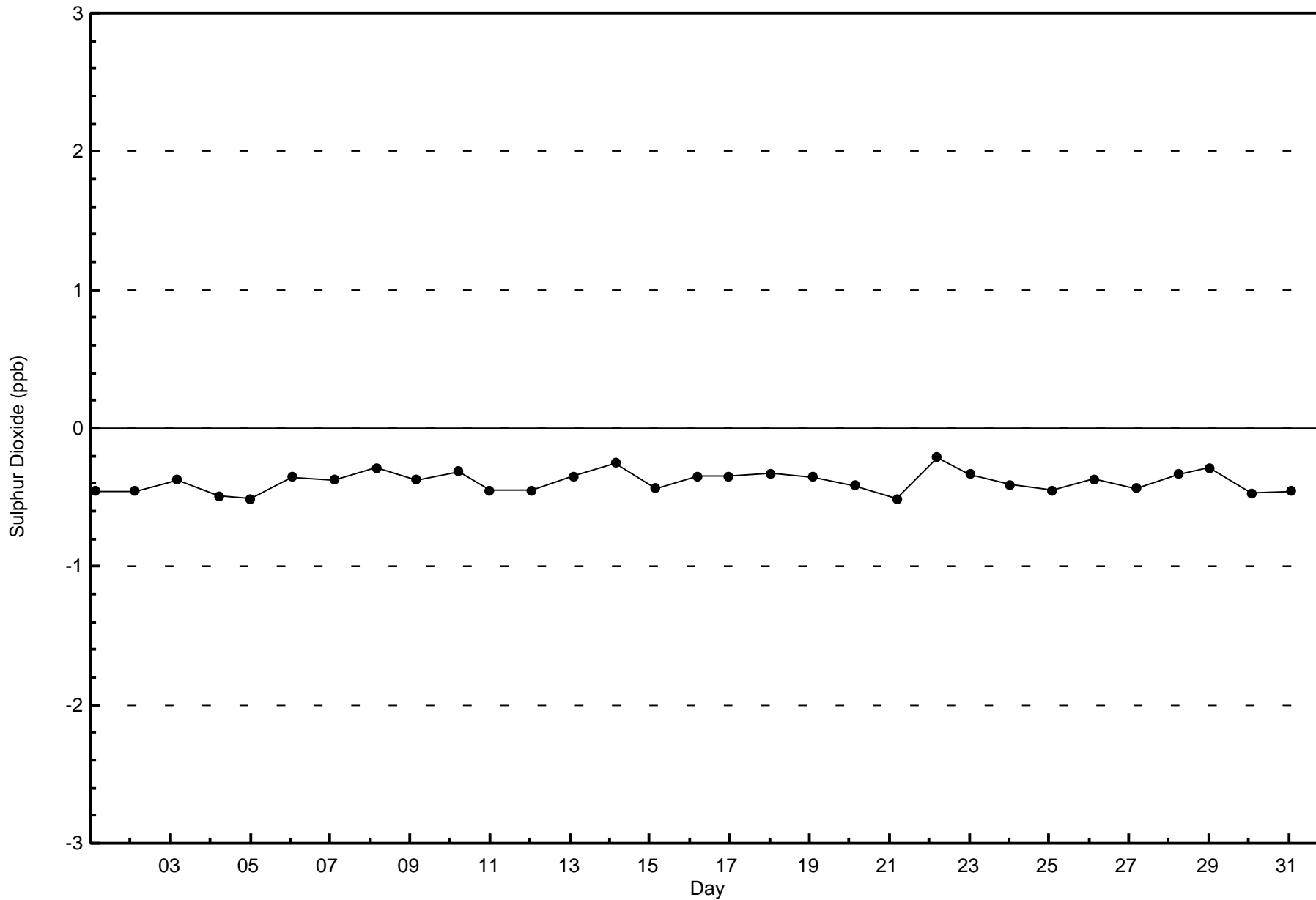
Sulphur Dioxide (SO₂) - ppb
Sawbones Bay (AMS 505)

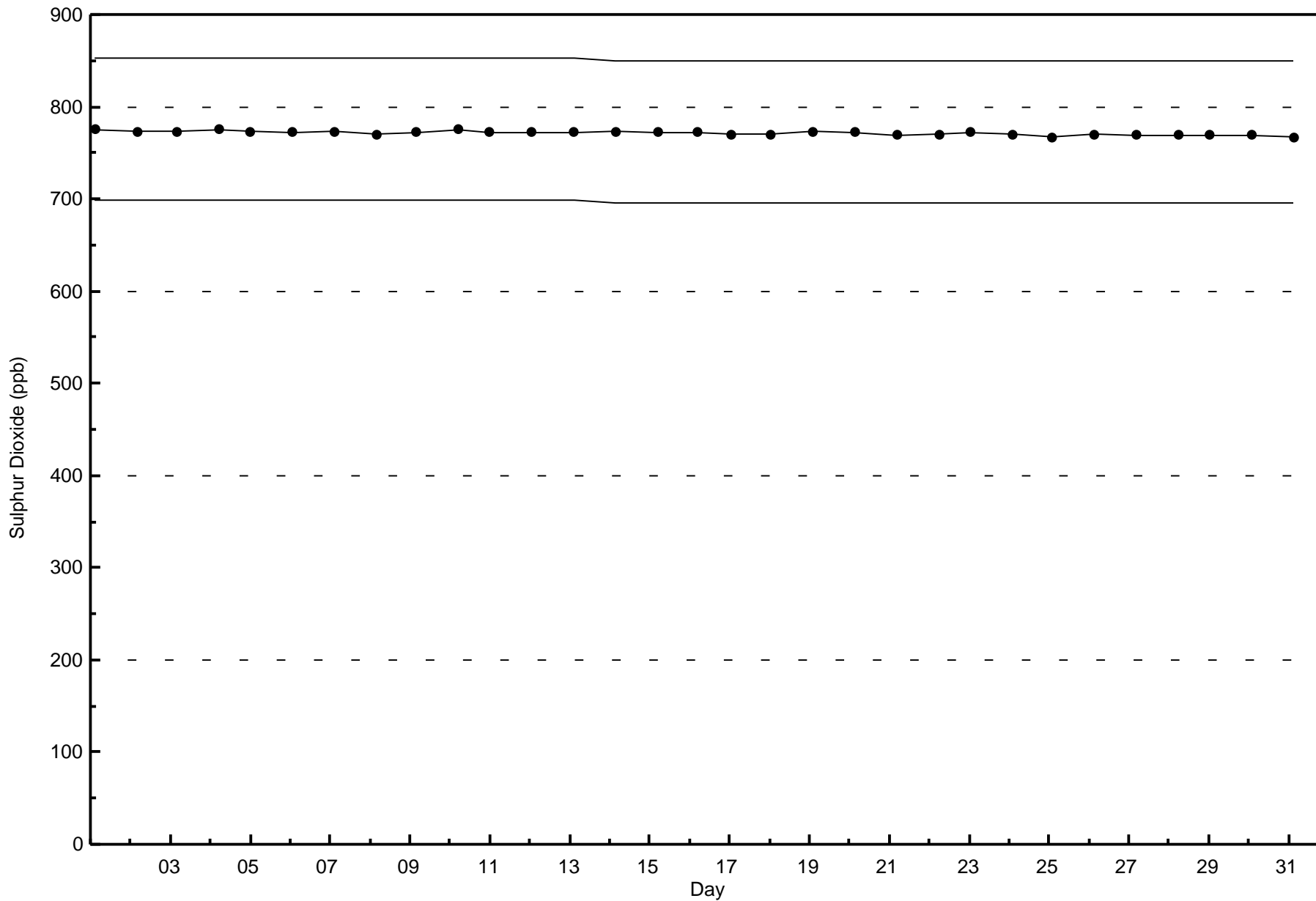


Classes (ppb)



Total Number of Valid Hours: 706





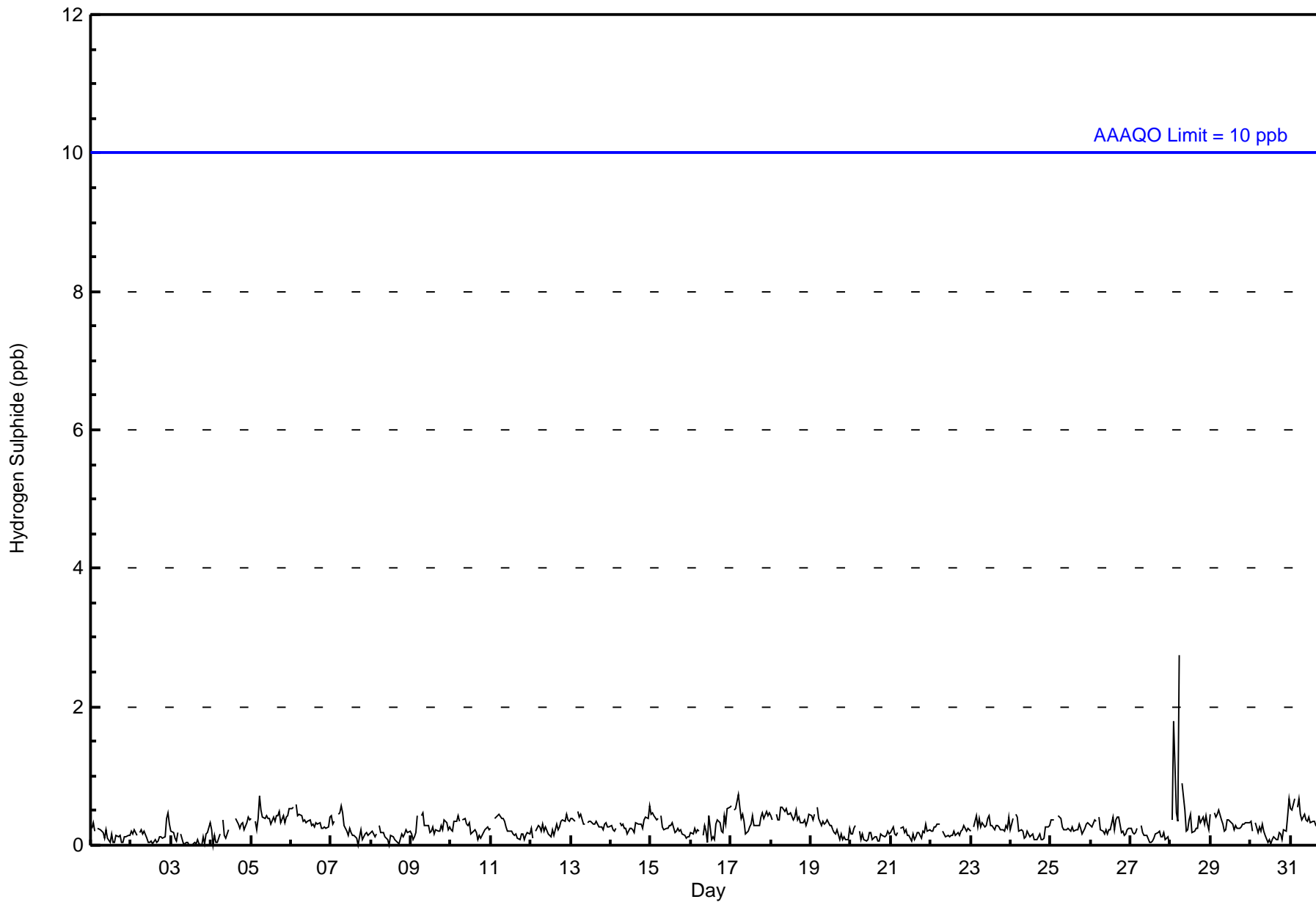


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 3 ppb on Jul 28 06:00										Maximum Daily Average: 0.5 ppb on Jul 28										Hours of Data: 707						
Minimum Value: 0 ppb on Jul 3 12:00										Minimum Daily Average: 0.1 ppb on Jul 3										Hours of Missing Data: 37						
Maximum Diurnal Average: 0.5 ppb at hour 6										Minimum Diurnal Average: 0.2 ppb at hour 15										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 = 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-Jul	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
2-Jul	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
3-Jul	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
4-Jul	0	0	0	0	0	0	Z	0	0	0	0	C	C	C	C	0	0	0	0	0	0	0	0	0	0.2	0
5-Jul	0	Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.4	1
6-Jul	1	1	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
7-Jul	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
8-Jul	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
9-Jul	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-Jul	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-Jul	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-Jul	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-Jul	0	0	0	Z	0	0	0	0	0	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
14-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.3	1
15-Jul	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-Jul	0	0	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.3	1
17-Jul	1	Z	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	1
18-Jul	0	0	Z	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.4	1
19-Jul	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
20-Jul	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
21-Jul	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
22-Jul	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-Jul	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-Jul	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-Jul	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-Jul	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
27-Jul	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-Jul	PF	0	2	0	0	3	Z	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3
29-Jul	0	Z	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	1
30-Jul	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
31-Jul	1	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
0.3 0.3 0.4 0.3 0.4 0.5 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 0.2 0.2 0.2 0.3 0.3 0.3																								Diurnal Average		
1 1 2 1 1 3 1 1 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 1 1																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	99.86	99.86
3 - 4	1	0.14	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - July 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	27	16	10	18	21	26	40	62	64	38	47	74	71	93	60	39	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	1	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	27	16	10	18	21	26	40	62	64	38	47	75	71	93	60	39	707

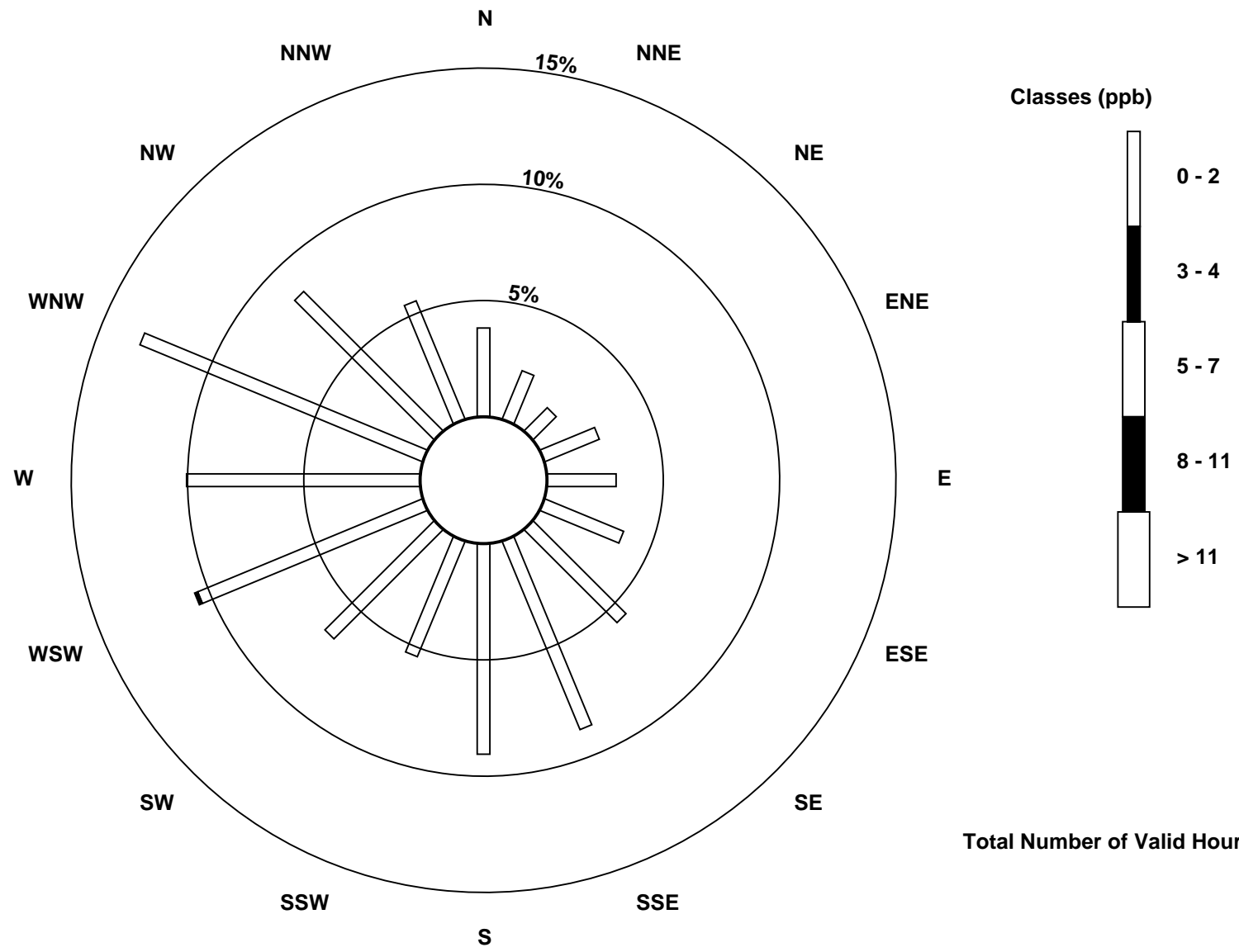
Total Number of Valid Hours: 707

Total Number of Hours: 744

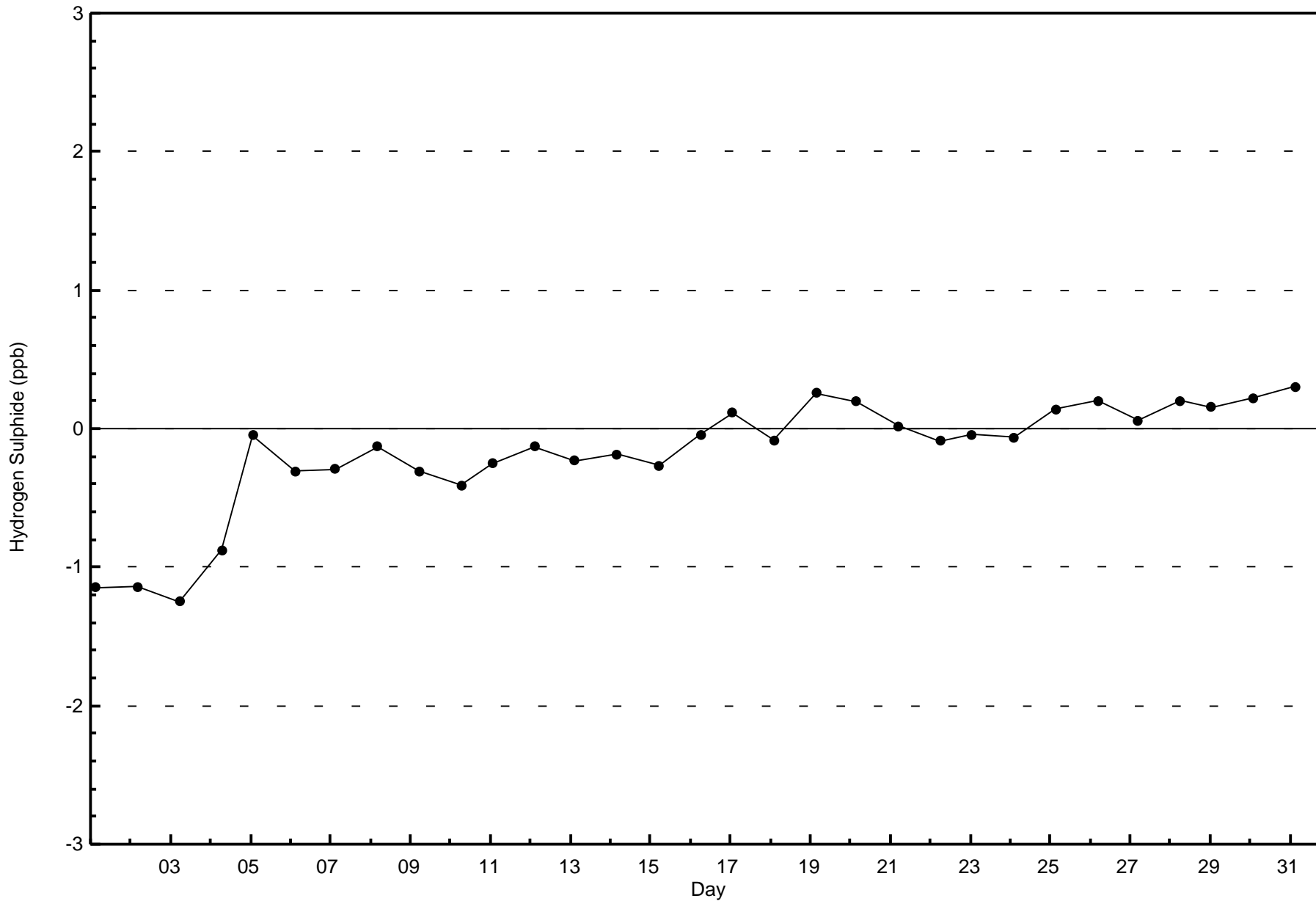


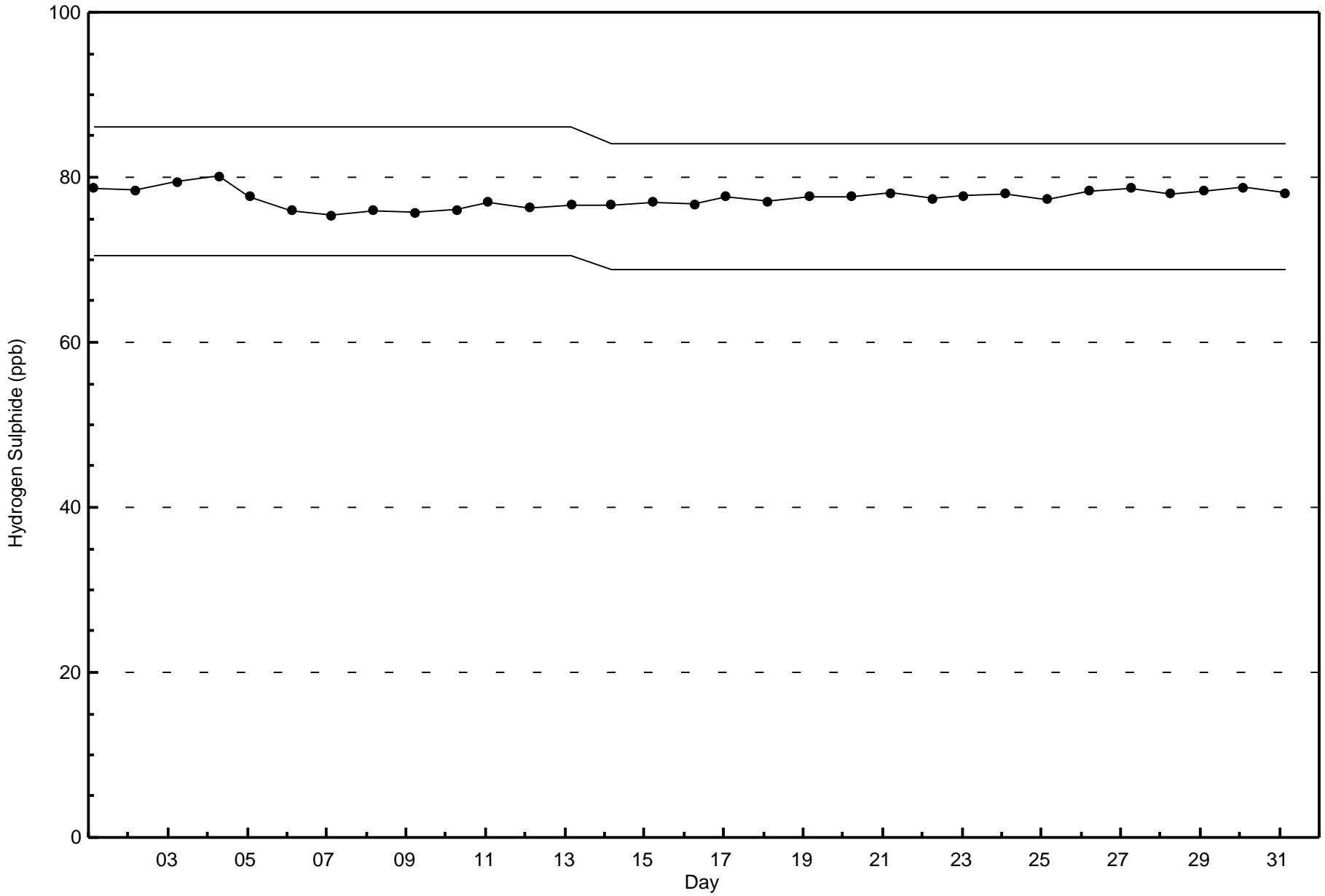
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 707

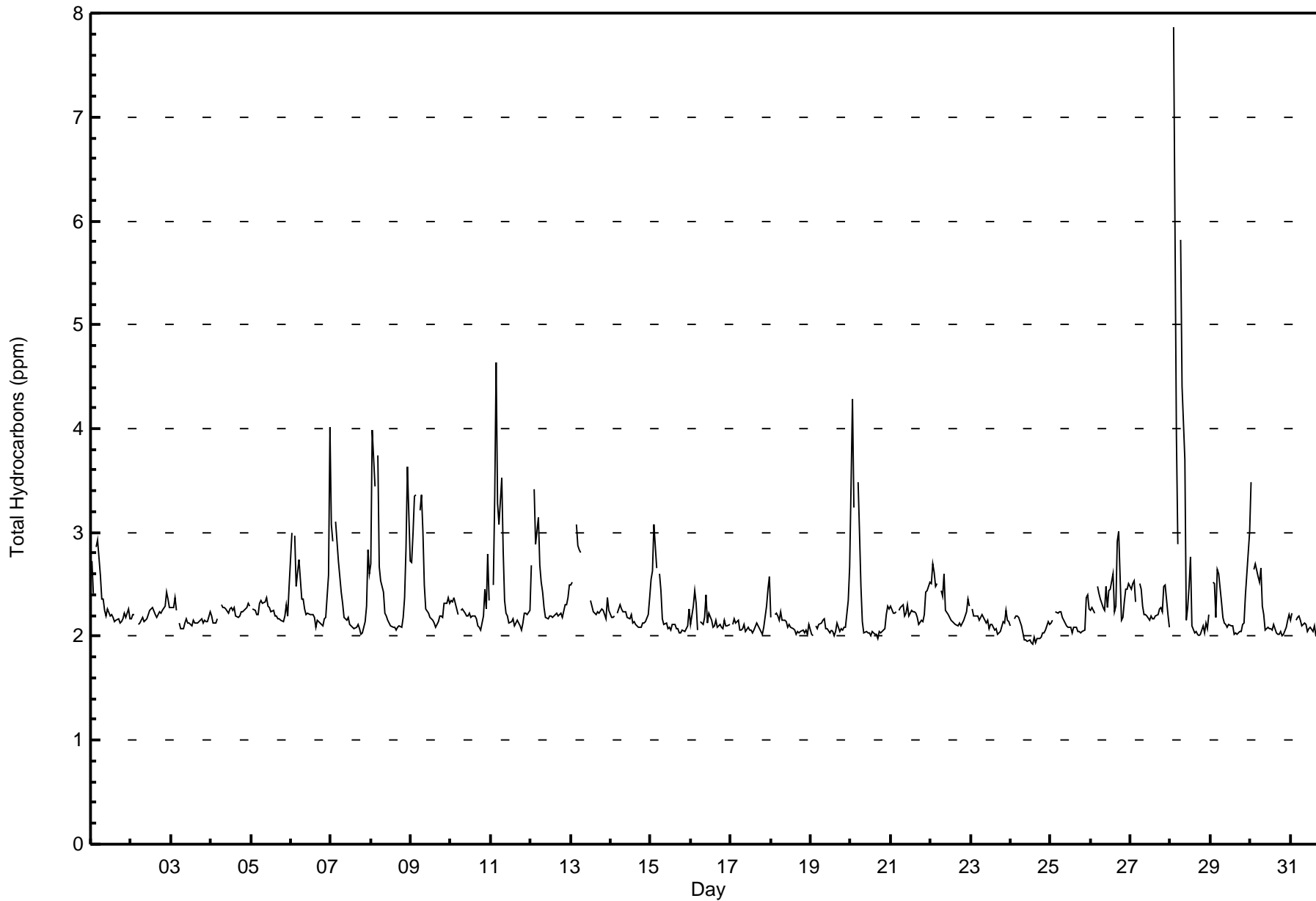






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Sawbones Bay - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Sawbones Bay - July 2017

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	70	9.92	9.92
2.1 - 3.0	606	85.84	95.75
3.1 - 10.0	30	4.25	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Sawbones Bay - July 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	9	6	0	0	0	3	5	4	0	1	9	2	7	13	6	5	70
2.1 - 3.0	17	9	10	18	19	21	33	51	57	33	38	73	62	78	53	34	606
3.1 - 10.0	0	0	0	1	1	2	2	10	6	1	1	2	3	0	0	1	30
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	15	10	19	20	26	40	65	63	35	48	77	72	91	59	40	706

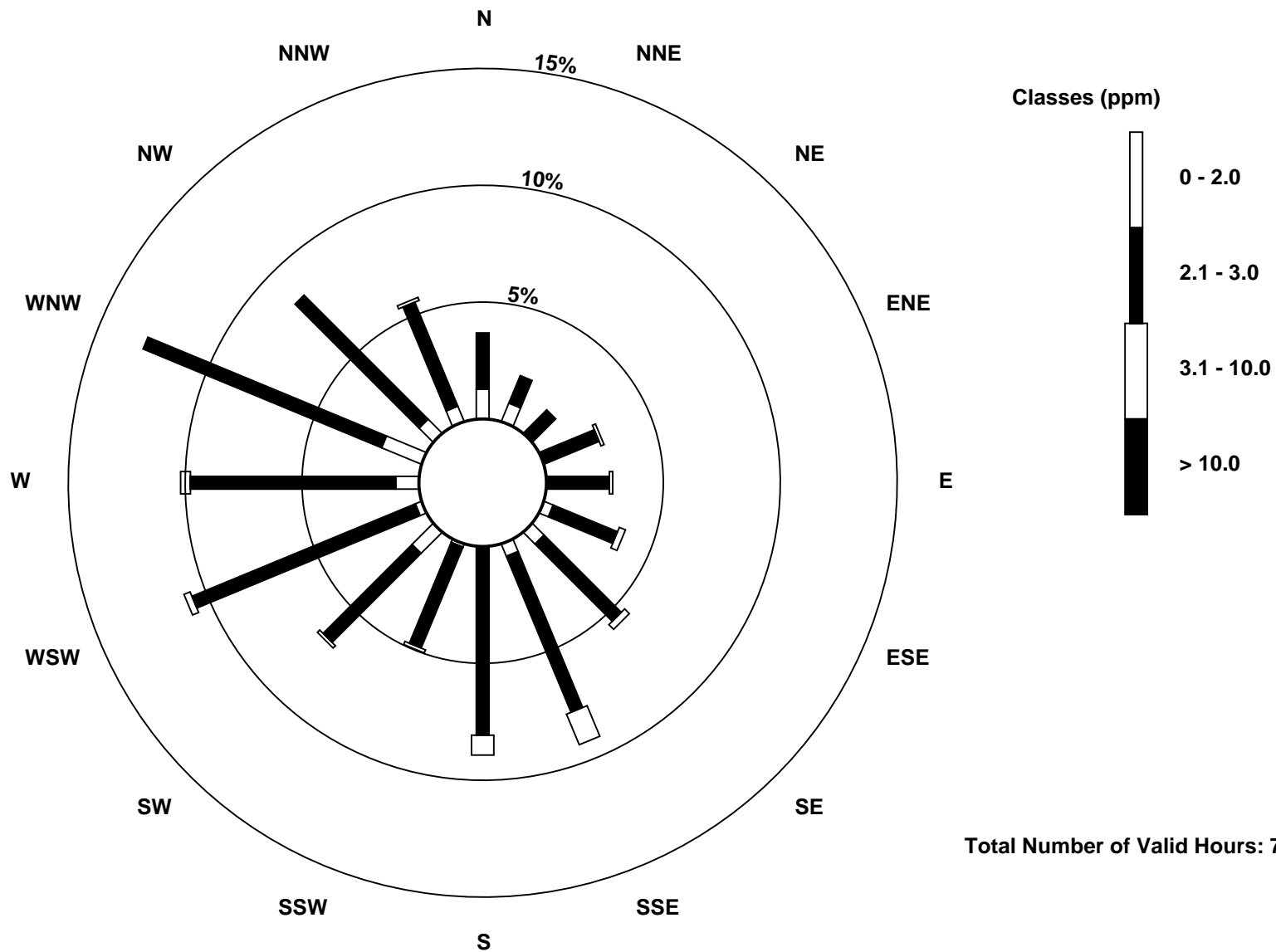
Total Number of Valid Hours: 706

Total Number of Hours: 744

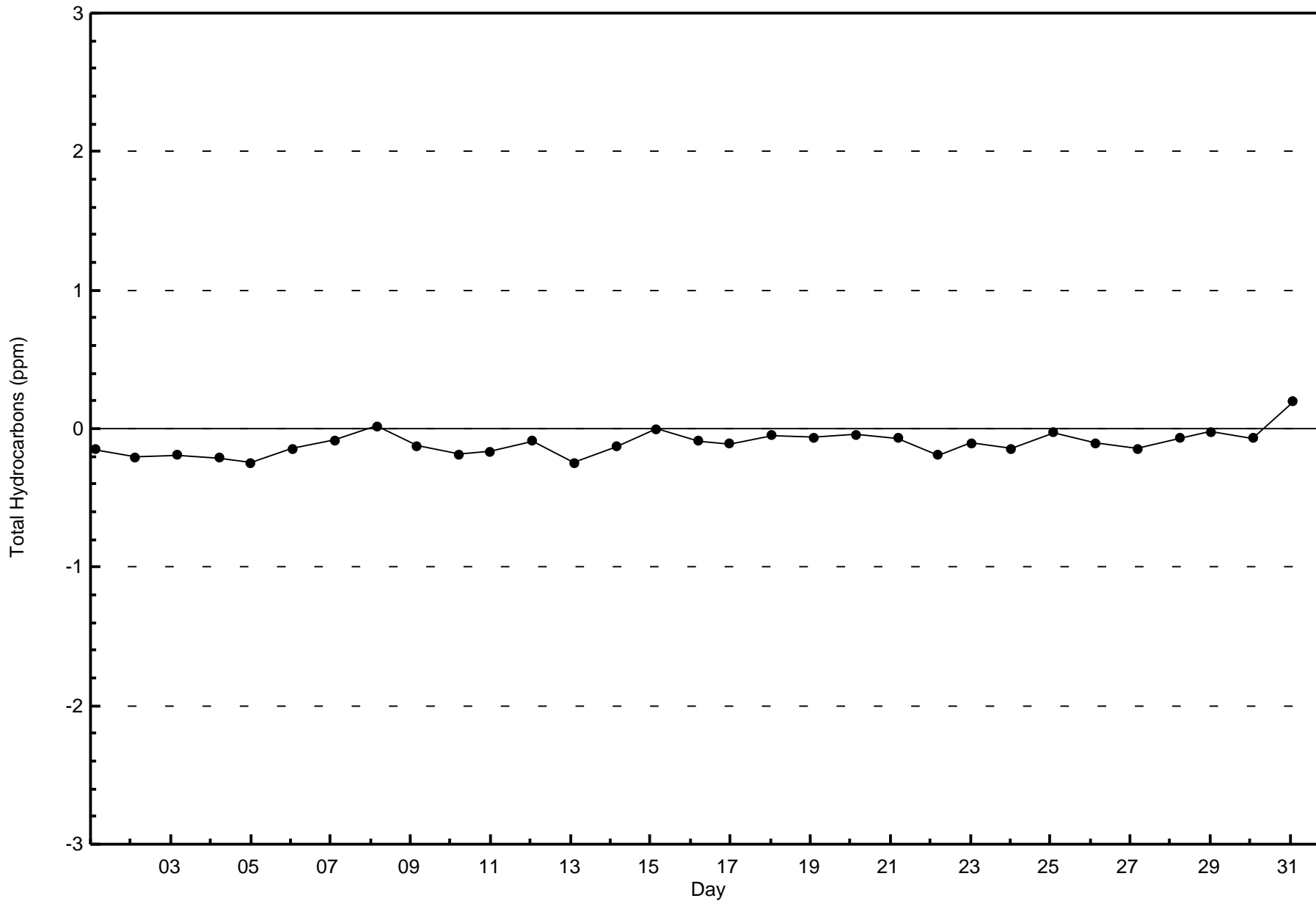


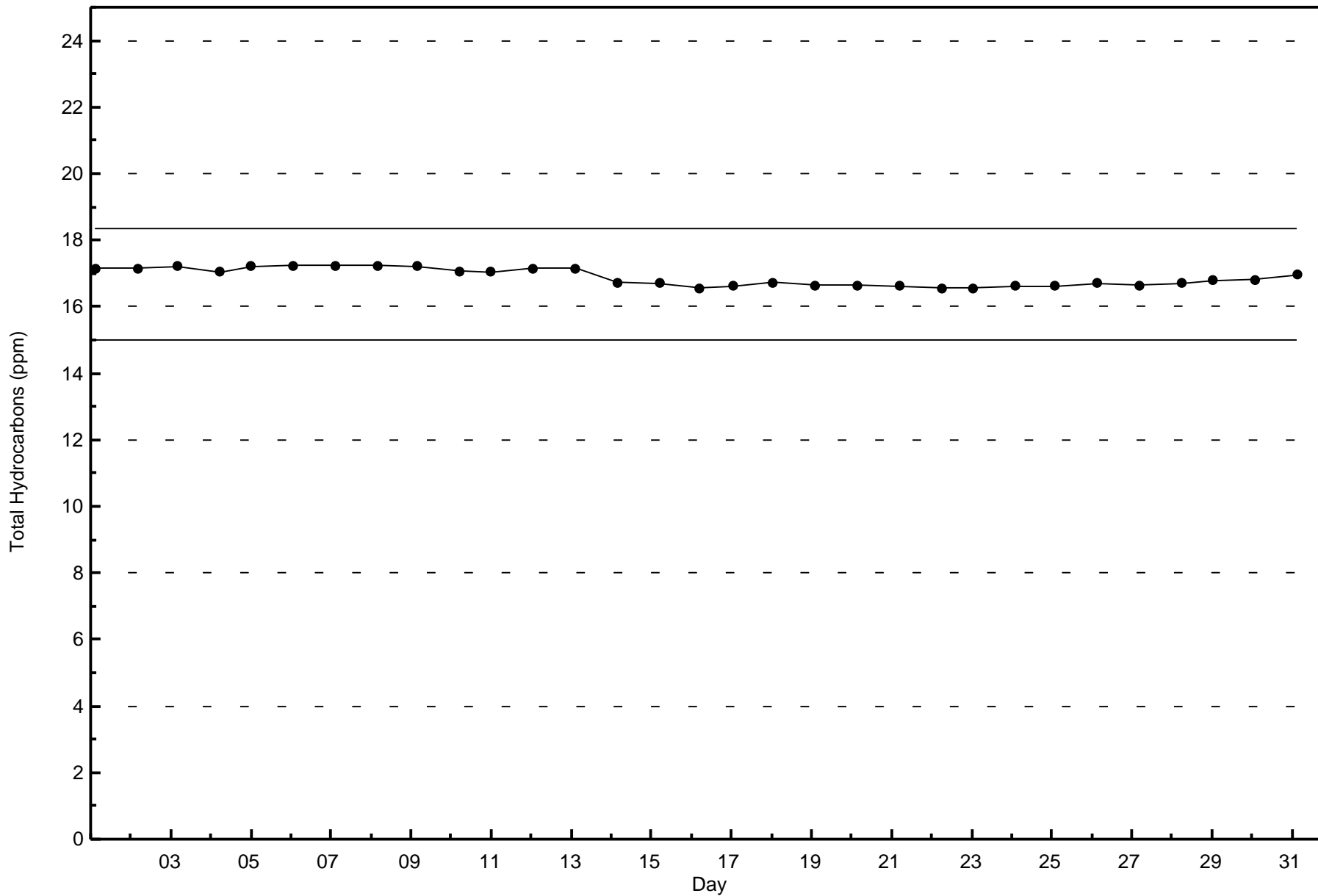
Wood Buffalo Environmental Association
Wind Rose Jul 2017

Total Hydrocarbons (THC) - ppm
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb
Sawbones Bay - July 2017

Maximum Value: 15 ppb on Jul 2 09:00		Maximum Daily Average: 5.8 ppb on Jul 4		Hours in Service: 744																							
Minimum Value: 0 ppb on Jul 1 19:00		Minimum Daily Average: 0.0 ppb on Jul 24		Hours of Data: 707																							
Maximum Diurnal Average: 1.9 ppb at hour 7		Minimum Diurnal Average: 0.3 ppb at hour 1		Hours of Missing Data: 37																							
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 = 11		Hours of Calibration: 36																							
				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-Jul	0	0	Z	0	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	2	
2-Jul	0	0	0	Z	0	0	4	12	15	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9	15	
3-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	1	0	1	1	0	0	5	2	4	4	6	1.1	6		
4-Jul	3	0	0	4	2	Z	11	11	8	5	8	6	11	13	11	8	10	8	7	3	0	3	2	2	5.8	13	
5-Jul	Z	0	0	1	1	9	2	1	2	2	2	1	0	1	0	1	0	0	0	0	0	0	0	0	1.0	9	
6-Jul	0	Z	0	0	0	1	2	1	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0.5	3	
7-Jul	0	0	Z	0	0	1	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0.3	1	
8-Jul	0	0	0	Z	1	1	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.3	2	
9-Jul	0	0	0	0	Z	1	2	3	0	1	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0.5	3	
10-Jul	0	0	1	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
11-Jul	Z	0	0	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2	
12-Jul	0	Z	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	1	
13-Jul	0	0	Z	0	0	0	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
14-Jul	0	0	0	Z	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0	0.3	1	
15-Jul	0	0	0	0	Z	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
16-Jul	0	0	0	0	0	Z	0	0	0	0	0	4	1	0	0	5	4	6	2	1	8	3	9	6	2.1	9	
17-Jul	Z	10	8	7	15	7	5	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.7	15	
18-Jul	0	Z	0	0	0	1	1	1	1	1	1	0	1	0	0	1	2	0	0	0	0	0	0	0	0.4	2	
19-Jul	0	0	Z	0	0	0	1	0	1	3	3	2	1	0	0	0	0	0	2	0	0	0	0	0	0.6	3	
20-Jul	0	0	0	Z	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	1	
21-Jul	0	0	0	0	Z	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0.1	1	
22-Jul	0	0	0	0	0	Z	0	1	1	1	1	1	3	1	2	4	0	1	1	0	1	0	0	0	0.7	4	
23-Jul	Z	0	0	1	0	2	4	5	2	2	2	4	2	3	2	1	2	1	0	0	0	0	0	0	1.4	5	
24-Jul	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-Jul	0	0	Z	0	0	1	2	0	0	0	0	0	1	0	2	2	2	1	0	0	0	0	0	0	0.5	2	
26-Jul	0	0	0	Z	0	1	1	1	1	1	1	1	1	2	0	1	1	1	0	0	0	0	0	0	0.5	2	
27-Jul	0	0	0	0	Z	0	1	1	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0.4	1	
28-Jul	PF	1	3	0	0	Z	9	3	5	4	3	3	5	2	1	2	1	3	1	2	0	3	3	0	2.5	9	
29-Jul	Z	0	0	0	0	1	5	2	1	1	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0.9	5	
30-Jul	1	Z	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0.8	6	
31-Jul	4	0	Z	8	6	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1.2	8	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerspan																								C - Calibration		PF - Power Failure	

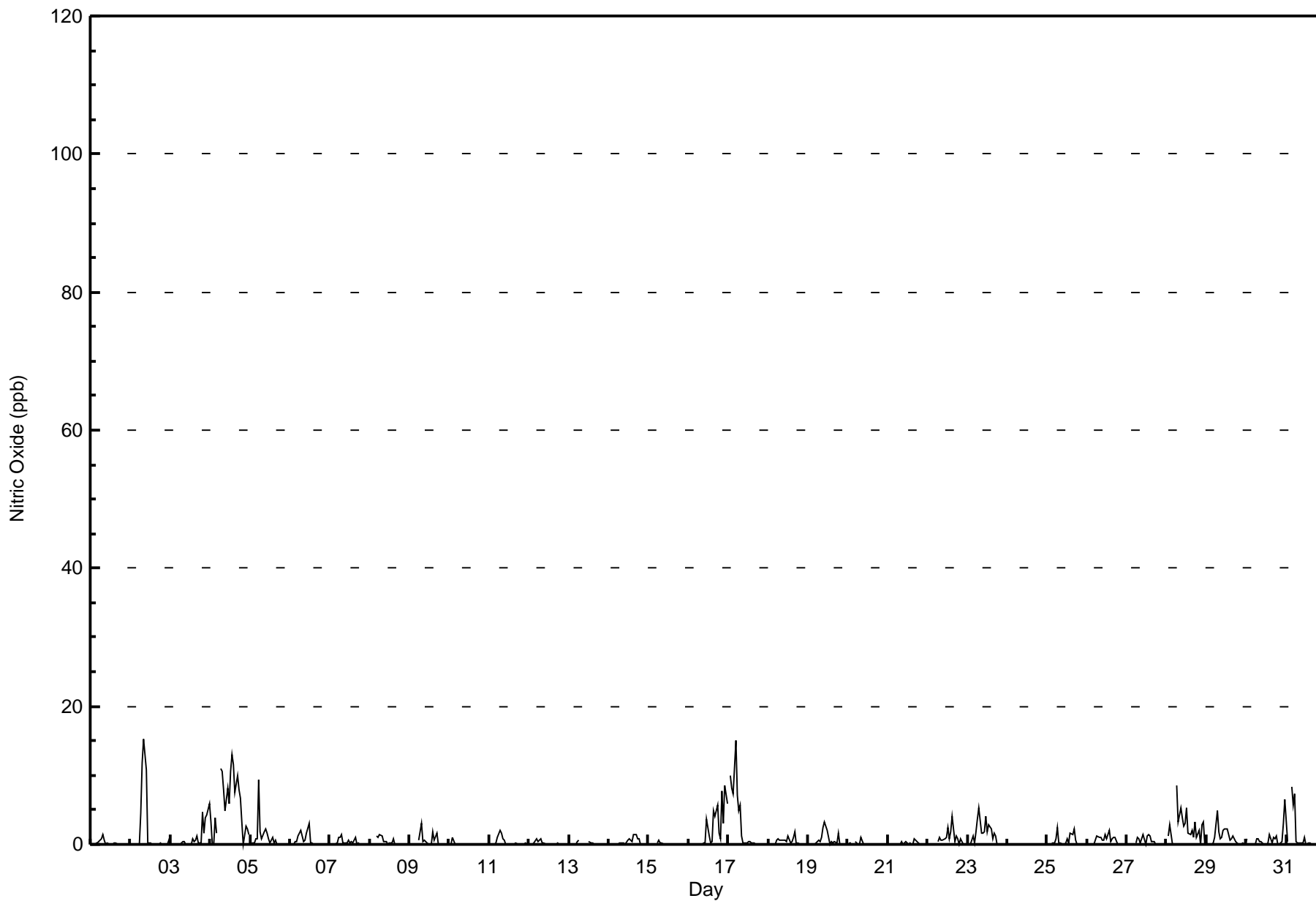


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Sawbones Bay - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Sawbones Bay - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



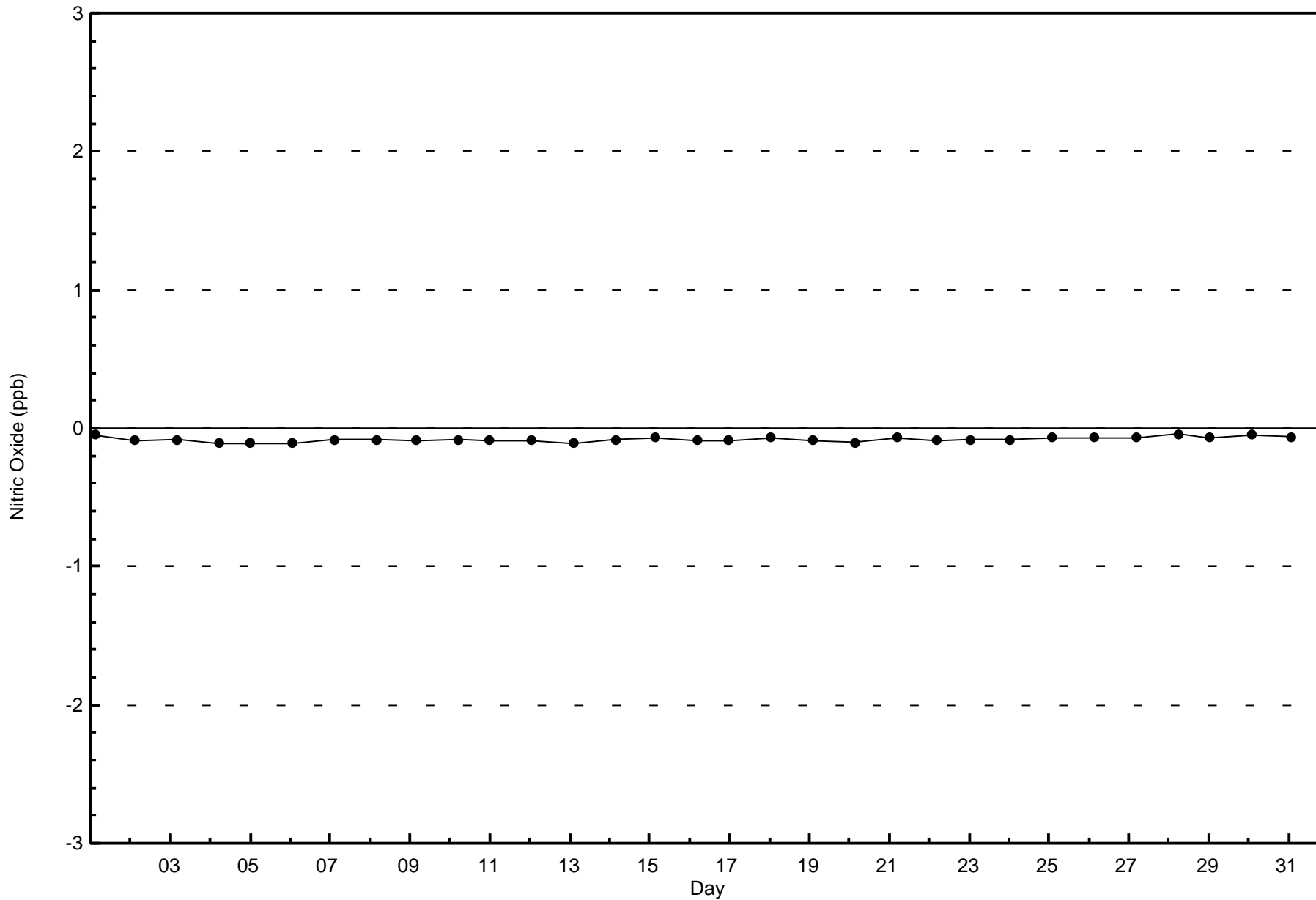
**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Sawbones Bay - July 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	26	15	10	19	20	26	40	65	63	35	48	77	72	91	60	40	707
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	26	15	10	19	20	26	40	65	63	35	48	77	72	91	60	40	707

Total Number of Valid Hours: 707

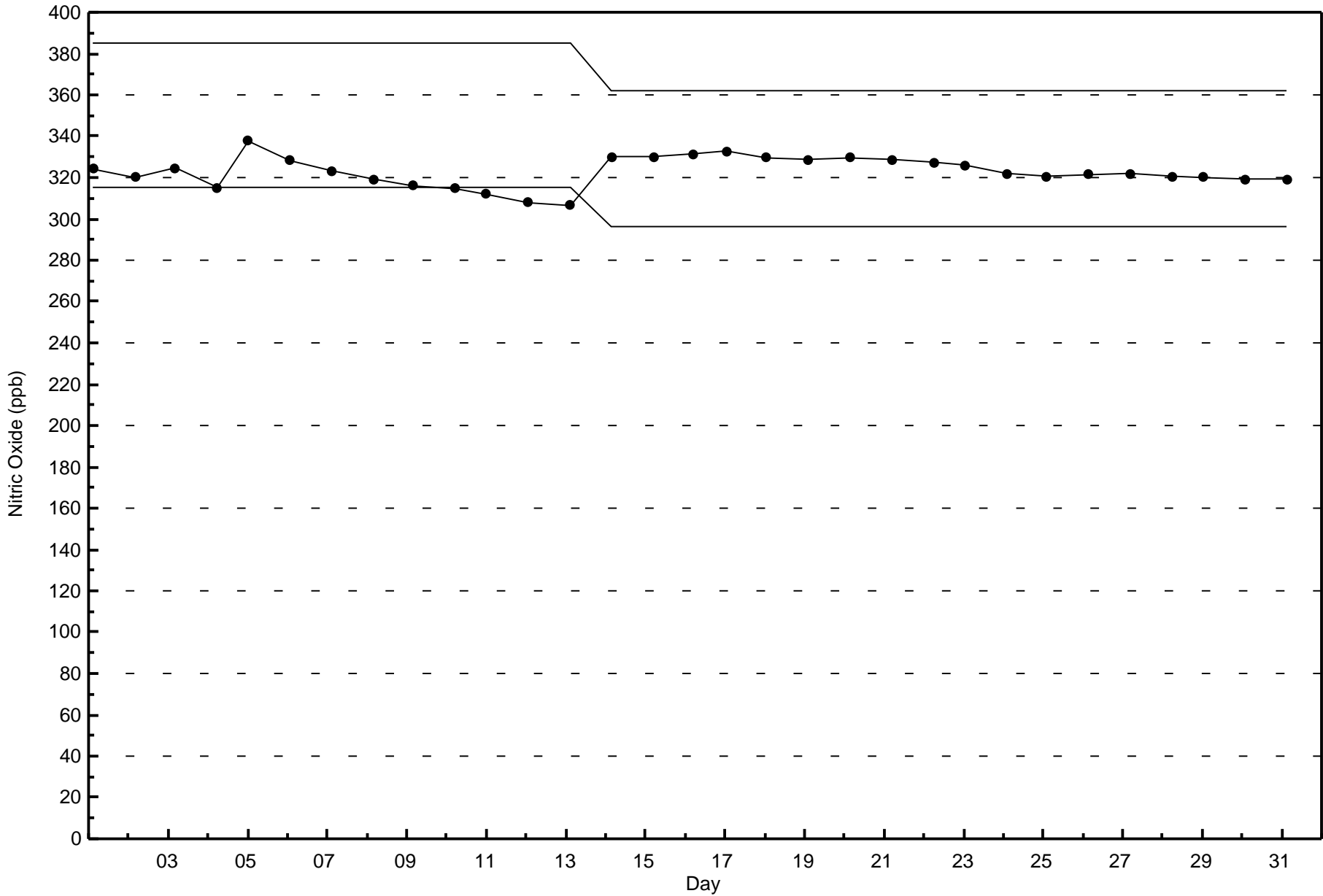
Total Number of Hours: 744





Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Sawbones Bay - July 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

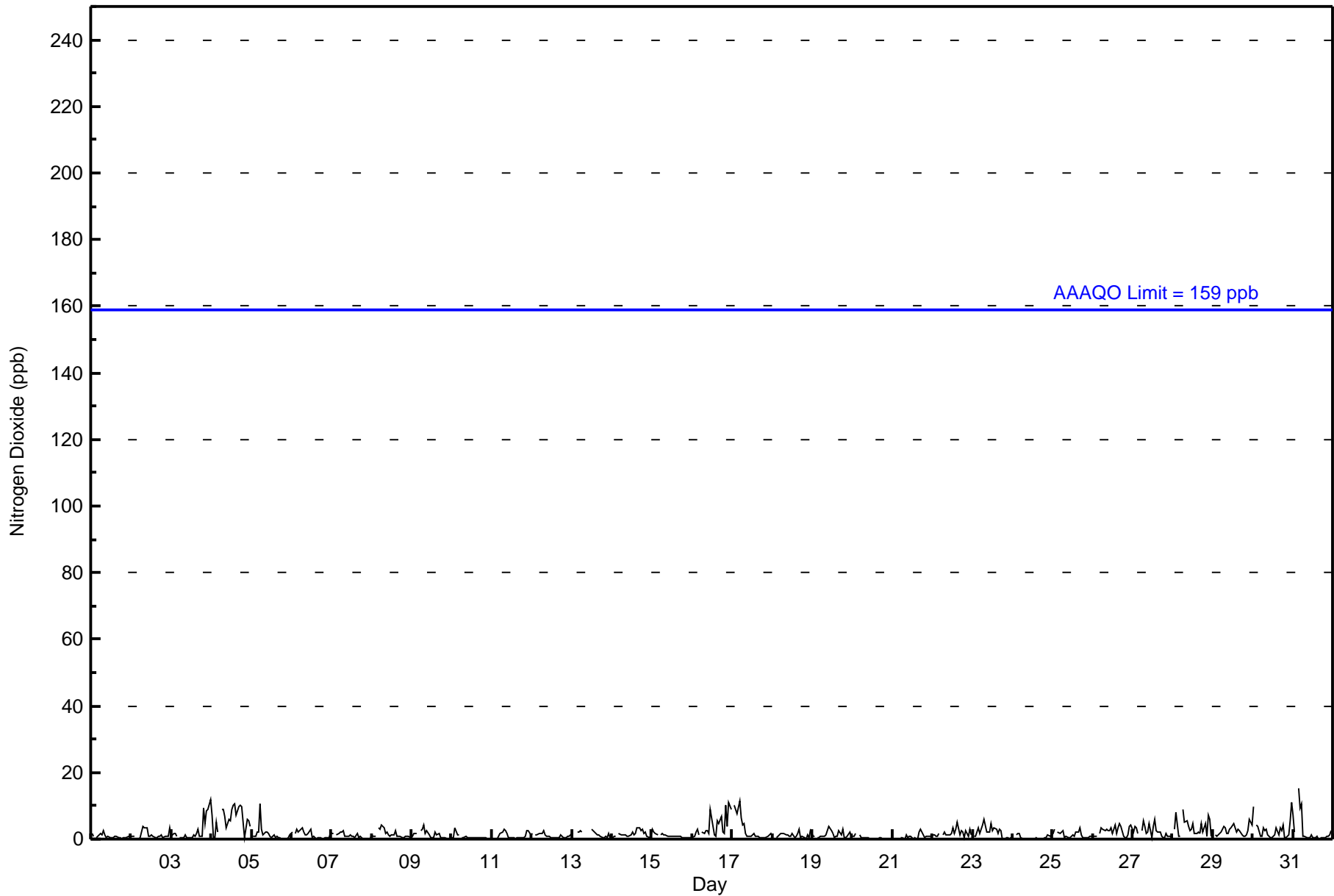
Sawbones Bay - July 2017

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																		
Maximum Value: 15 ppb on Jul 31 04:00		Maximum Daily Average: 6.2 ppb on Jul 4		Minimum Daily Average: 0.4 ppb on Jul 20		Hours of Data:		707																		
Minimum Value: 0 ppb on Jul 6 19:00		Minimum Diurnal Average: 2.6 ppb at hour 7		Minimum Diurnal Average: 1.1 ppb at hour 20		Hours of Missing Data:		37																		
Monthly Average: 1.8 ppb		Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 11				Hours of Calibration:		36																		
						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-Jul	2	1	Z	1	1	2	1	2	1	1	1	1	0	1	1	1	0	0	0	0	1	1	1	0.8	2	
2-Jul	1	1	1	Z	0	0	2	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1.3	4	
3-Jul	1	2	2	1	Z	1	0	1	1	1	1	0	1	1	2	3	1	1	9	5	9	9	12	2.6	12	
4-Jul	7	1	0	5	2	Z	9	9	7	4	6	5	9	10	10	7	10	10	10	5	1	6	6	4	6.2	10
5-Jul	Z	1	1	2	2	11	3	1	2	2	2	1	0	1	1	0	0	0	0	0	0	0	1	1.5	11	
6-Jul	2	Z	2	3	2	2	3	2	1	1	2	3	1	1	0	0	0	0	0	0	0	0	2	1.3	3	
7-Jul	2	2	Z	1	2	2	2	3	1	1	1	1	1	1	2	1	1	1	0	0	0	0	0	1.0	3	
8-Jul	1	1	1	Z	3	3	4	3	2	2	1	1	1	3	1	1	1	1	1	1	1	1	0	1.4	4	
9-Jul	1	2	2	2	Z	3	3	4	2	3	1	1	1	2	1	2	0	0	0	0	0	0	0	1.3	4	
10-Jul	0	0	3	1	1	Z	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0.6	3	
11-Jul	Z	0	0	0	1	2	2	3	3	2	0	0	0	0	0	1	0	0	1	1	3	2	1	1.0	3	
12-Jul	2	Z	1	1	2	2	2	3	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1.0	3	
13-Jul	2	2	Z	2	2	2	2	C	C	C	C	C	3	2	2	1	1	1	1	1	1	2	1	1.5	3	
14-Jul	1	1	1	Z	2	1	1	1	1	1	1	1	2	1	2	3	3	3	2	2	1	1	1	1.5	3	
15-Jul	3	2	2	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	3	
16-Jul	1	1	2	3	1	Z	2	2	3	2	2	9	4	1	1	5	5	7	2	2	10	4	11	9	3.8	11
17-Jul	Z	10	9	8	12	7	4	5	2	1	1	1	1	2	1	1	1	0	1	0	0	1	1	2	2.9	12
18-Jul	1	Z	1	1	1	2	2	2	1	1	1	1	2	1	1	2	3	0	1	1	0	1	1	3	1.2	3
19-Jul	1	1	Z	1	1	1	1	1	1	2	4	3	2	0	1	1	2	1	3	1	0	1	2	1	1.3	4
20-Jul	1	1	2	Z	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2
21-Jul	0	0	0	0	Z	0	0	0	1	1	1	1	0	1	0	0	2	3	1	0	1	1	1	1	0.7	3
22-Jul	1	1	1	1	2	Z	1	2	1	1	1	2	3	2	3	5	1	2	2	0	2	1	3	1	1.8	5
23-Jul	Z	1	1	4	2	3	4	6	2	2	2	5	3	3	2	3	3	0	0	0	1	0	0	2.1	6	
24-Jul	1	Z	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0.5	2	
25-Jul	2	3	Z	2	2	2	2	1	1	1	0	1	1	1	2	2	3	1	1	0	1	1	1	1	1.4	3
26-Jul	1	1	1	Z	2	3	3	3	3	3	3	4	2	4	2	3	5	4	1	1	1	1	4	4	2.4	5
27-Jul	2	4	3	2	Z	3	6	4	2	2	5	0	4	6	3	2	2	1	0	0	2	1	1	1	2.3	6
28-Jul	PF	3	8	1	1	Z	9	5	6	4	3	3	5	2	2	2	2	5	2	5	1	7	6	1	3.6	9
29-Jul	Z	1	1	1	2	2	4	3	2	2	3	3	5	3	2	3	3	1	1	1	1	3	6	4	2.5	6
30-Jul	10	Z	4	4	1	1	4	3	3	1	1	1	1	1	3	1	4	3	4	1	0	1	6	11	2.9	11
31-Jul	7	2	Z	15	9	11	1	1	1	1	0	1	0	1	1	0	0	0	0	1	1	1	1	3	2.5	15
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan 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
Sawbones Bay - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - July 2017**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - July 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	26	15	10	19	20	26	40	65	63	35	48	77	72	91	60	40	707
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	26	15	10	19	20	26	40	65	63	35	48	77	72	91	60	40	707

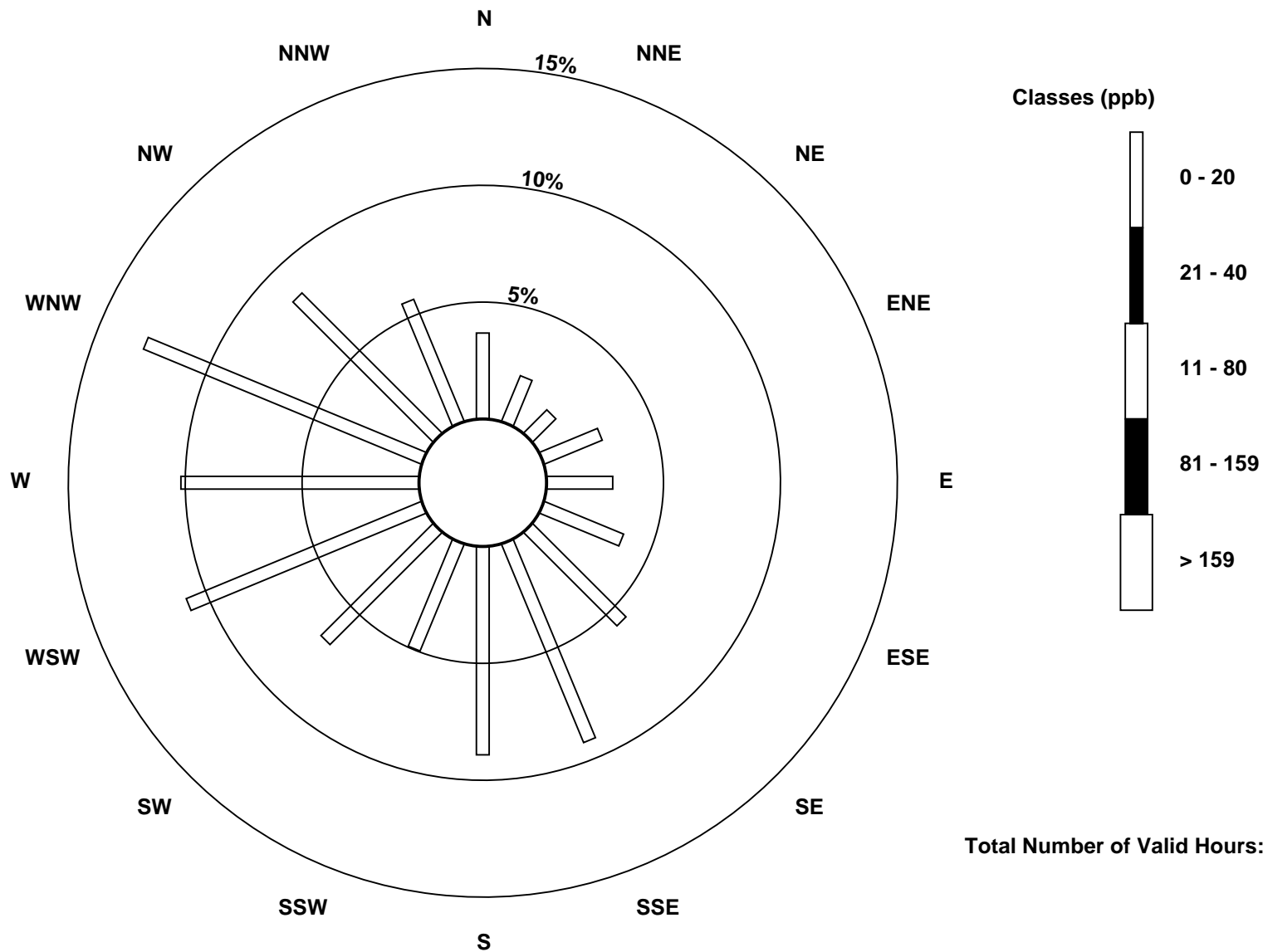
Total Number of Valid Hours: 707

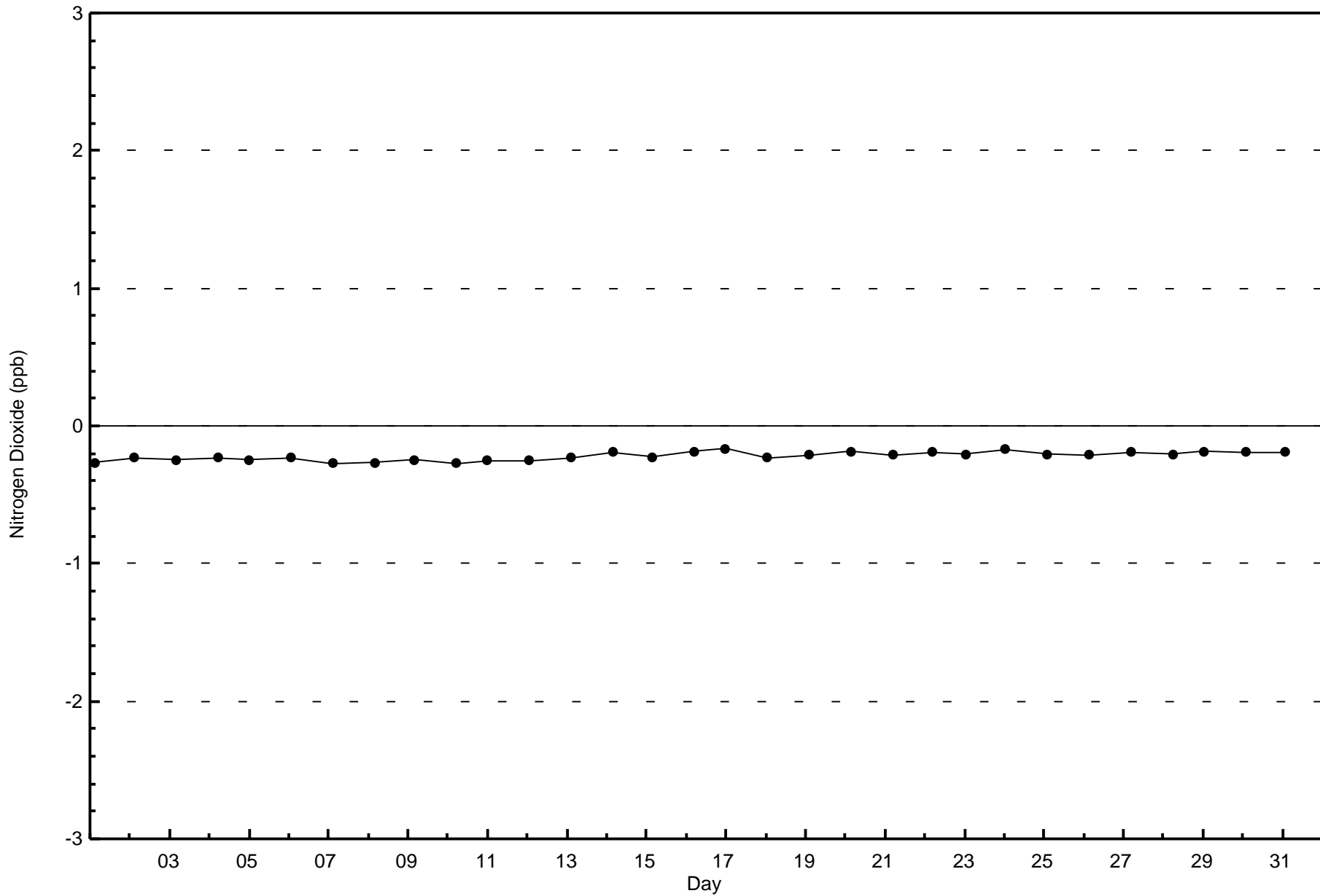
Total Number of Hours: 744

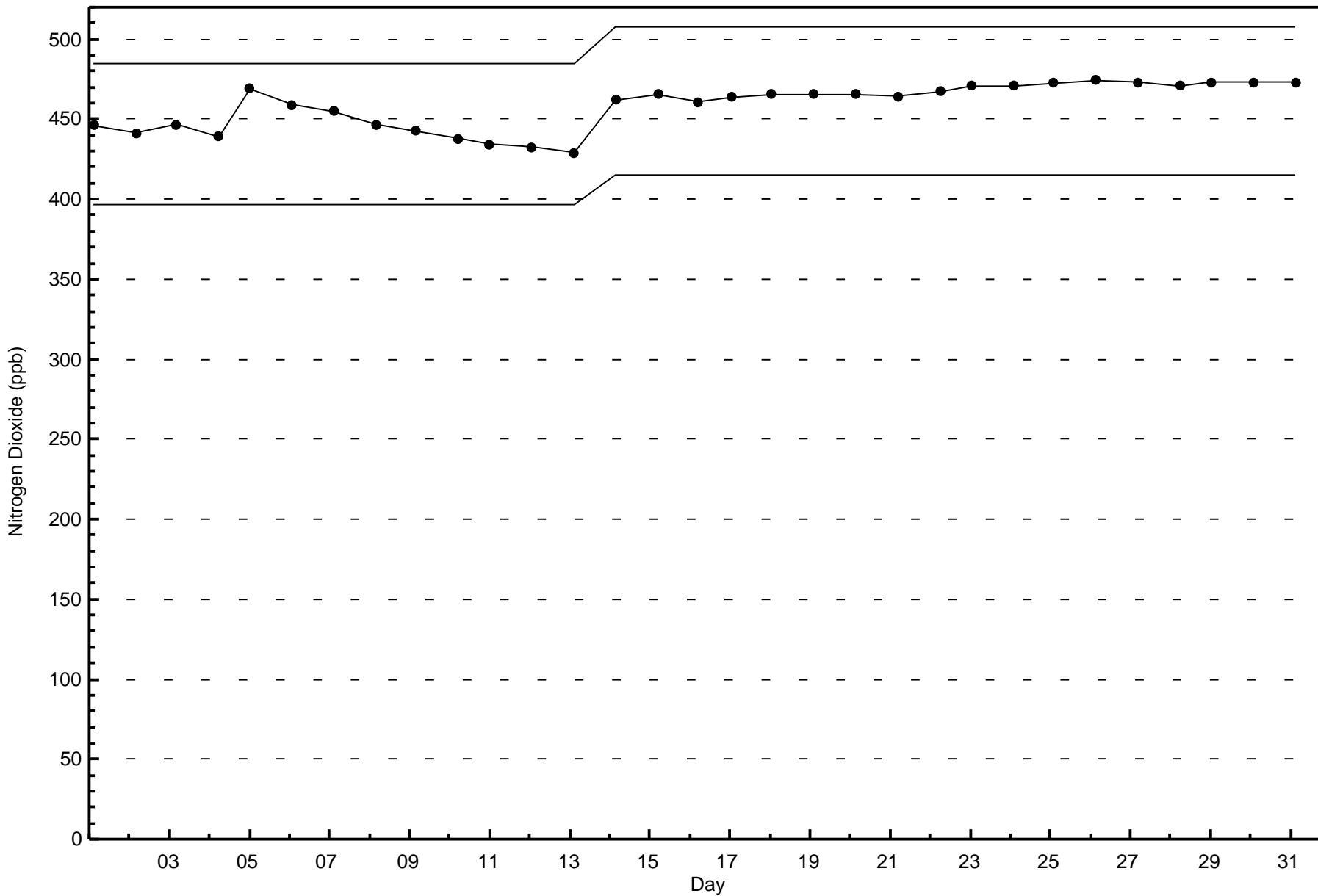


Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay (AMS 505)









Wood Buffalo Environmental Association
Summary of Hour Averages

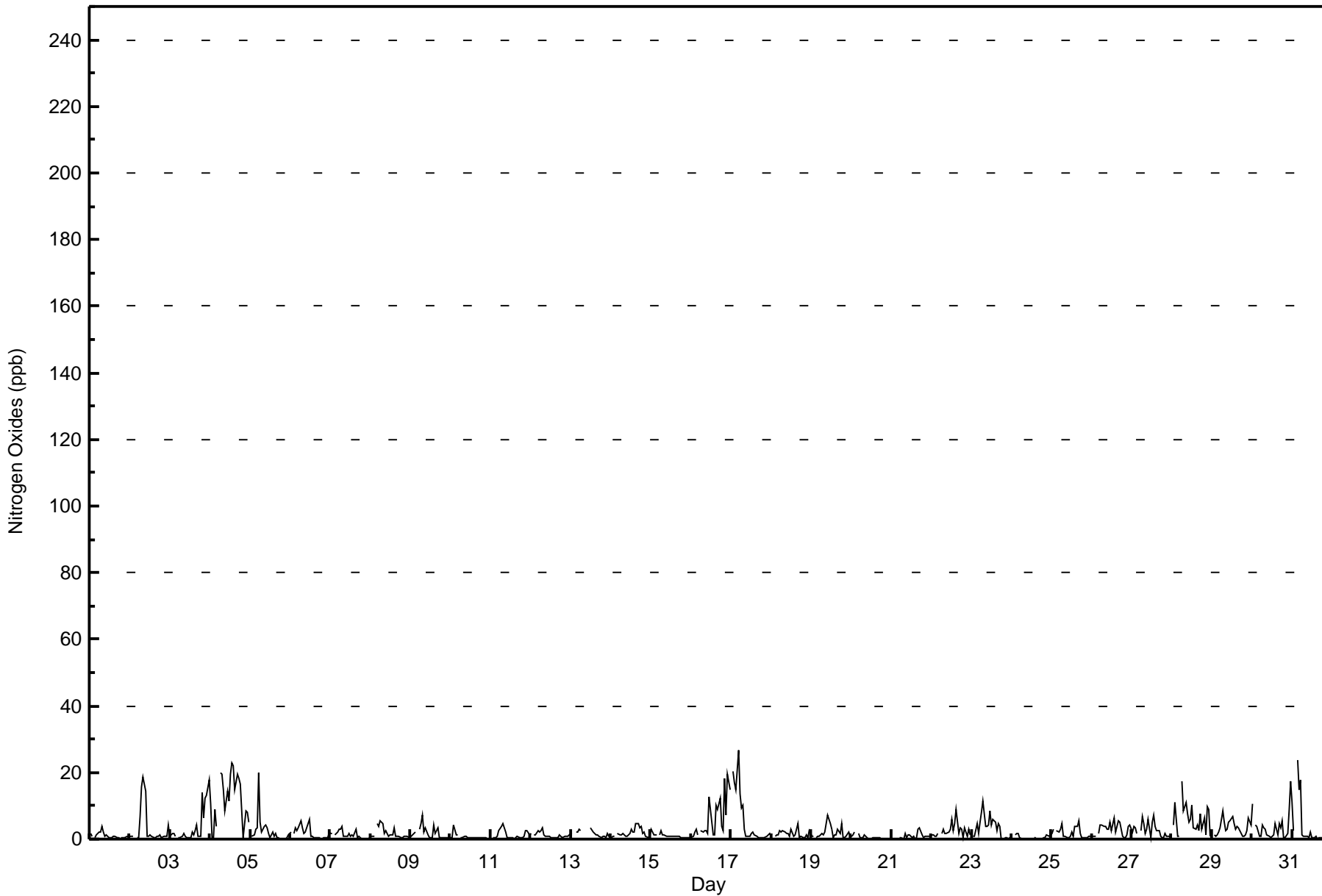
Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - July 2017

Maximum Value: 27 ppb on Jul 17 05:00																	Maximum Daily Average: 12.0 ppb on Jul 4							Hours in Service: 744																							
Minimum Value: 0 ppb on Jul 21 04:00																	Minimum Daily Average: 0.5 ppb on Jul 20							Hours of Data: 707																							
Maximum Diurnal Average: 4.5 ppb at hour 7																	Minimum Diurnal Average: 1.4 ppb at hour 20							Hours of Missing Data: 37																							
Monthly Average: 2.7 ppb																	Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 3 P ₉₀ = 6 P ₉₉ = 20							Hours of Calibration: 36																							
																	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-Jul	1	1	Z	1	1	2	2	4	2	1	1	1	0	0	1	1	1	0	0	0	0	1	1	1																							
2-Jul	1	1	1	Z	0	0	7	16	19	14	1	1	1	1	1	1	1	1	1	1	1	1	1	4																							
3-Jul	1	1	2	1	Z	0	0	1	2	1	1	0	0	2	1	2	4	1	1	14	6	12	13	18																							
4-Jul	11	0	0	9	4	Z	20	20	15	8	14	11	19	23	22	15	19	18	16	8	1	9	8	5																							
5-Jul	Z	1	1	3	3	20	5	2	4	4	4	2	1	2	1	2	0	0	0	0	0	0	1	20																							
6-Jul	2	Z	2	4	2	4	5	3	2	2	4	6	1	1	0	0	0	0	0	0	0	0	2	6																							
7-Jul	2	2	Z	1	2	3	3	4	1	1	1	2	1	1	1	3	1	1	1	0	0	0	0	4																							
8-Jul	1	1	1	Z	5	4	6	5	2	3	2	1	1	1	3	1	1	1	0	0	1	1	0	6																							
9-Jul	1	1	1	2	Z	3	5	7	2	3	1	1	1	0	4	2	3	0	0	0	0	0	0	7																							
10-Jul	0	0	4	1	1	Z	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	4																							
11-Jul	Z	0	0	0	1	3	4	5	3	2	0	0	0	0	0	0	1	0	0	0	1	3	3	5																							
12-Jul	2	Z	1	1	3	2	2	3	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	3																							
13-Jul	2	2	Z	2	2	3	2	C	C	C	C	C	4	2	2	1	1	1	1	1	0	2	1	4																							
14-Jul	1	1	1	Z	2	1	1	2	1	1	1	1	2	3	2	2	5	5	3	4	2	2	1	5																							
15-Jul	3	2	1	1	Z	1	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	3																							
16-Jul	0	1	2	3	1	Z	2	2	3	3	2	13	5	1	1	10	9	12	4	2	18	7	20	20																							
17-Jul	Z	20	17	15	27	14	9	10	3	1	1	1	2	2	1	1	1	0	1	0	0	1	2	27																							
18-Jul	1	Z	1	1	1	2	2	2	2	2	1	1	3	1	1	3	5	1	1	1	0	1	2	5																							
19-Jul	1	1	Z	1	1	1	2	1	2	5	7	5	3	1	1	1	3	2	5	0	0	1	2	7																							
20-Jul	1	1	2	Z	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2																							
21-Jul	0	0	0	0	Z	0	0	0	2	0	1	1	0	1	0	0	3	3	1	0	1	1	1	3																							
22-Jul	1	1	1	1	1	Z	2	3	2	2	2	3	6	3	5	9	2	4	3	0	3	1	3	9																							
23-Jul	Z	1	1	5	2	5	8	11	4	4	4	9	4	6	5	2	5	4	0	0	0	0	0	11																							
24-Jul	1	Z	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2																							
25-Jul	2	3	Z	3	2	3	5	1	1	1	0	1	2	1	4	4	6	2	1	0	1	1	1	6																							
26-Jul	1	1	1	Z	2	4	4	4	4	3	3	5	3	6	2	4	5	5	1	1	1	1	4	6																							
27-Jul	2	4	3	2	Z	3	7	5	2	3	6	0	5	7	4	2	2	1	0	0	2	1	1	7																							
28-Jul	PF	4	11	1	1	Z	17	8	11	8	5	6	10	4	3	4	2	8	3	7	1	10	9	17																							
29-Jul	Z	1	1	1	2	3	8	5	3	3	5	5	7	5	3	4	4	2	1	1	1	2	6	8																							
30-Jul	10	Z	4	4	1	1	4	3	3	1	1	0	1	1	5	1	5	3	6	1	0	2	9	18																							
31-Jul	11	3	Z	24	15	18	1	1	1	1	0	2	0	1	1	0	0	0	0	0	1	1	1	3	24																						
2.3																								2.1	2.4	3.4	3.3	3.9	4.5	4.3	3.3	2.7	2.4	2.7	2.7	2.5	2.5	2.6	2.9	2.5	1.7	1.4	1.5	2.0	2.9	2.9	Diurnal Average
11																								20	17	24	27	20	20	20	19	14	14	13	19	23	22	15	19	18	16	14	18	12	20	18	Diurnal Maximum
Z - zerspan			C - Calibration			PF - Power Failure																																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - July 2017

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.43	99.43
21 - 40	4	0.57	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: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - July 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	26	15	10	19	20	26	40	65	63	35	48	75	70	91	60	40	703
21 - 40	0	0	0	0	0	0	0	0	0	0	0	2	2	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	26	15	10	19	20	26	40	65	63	35	48	77	72	91	60	40	707

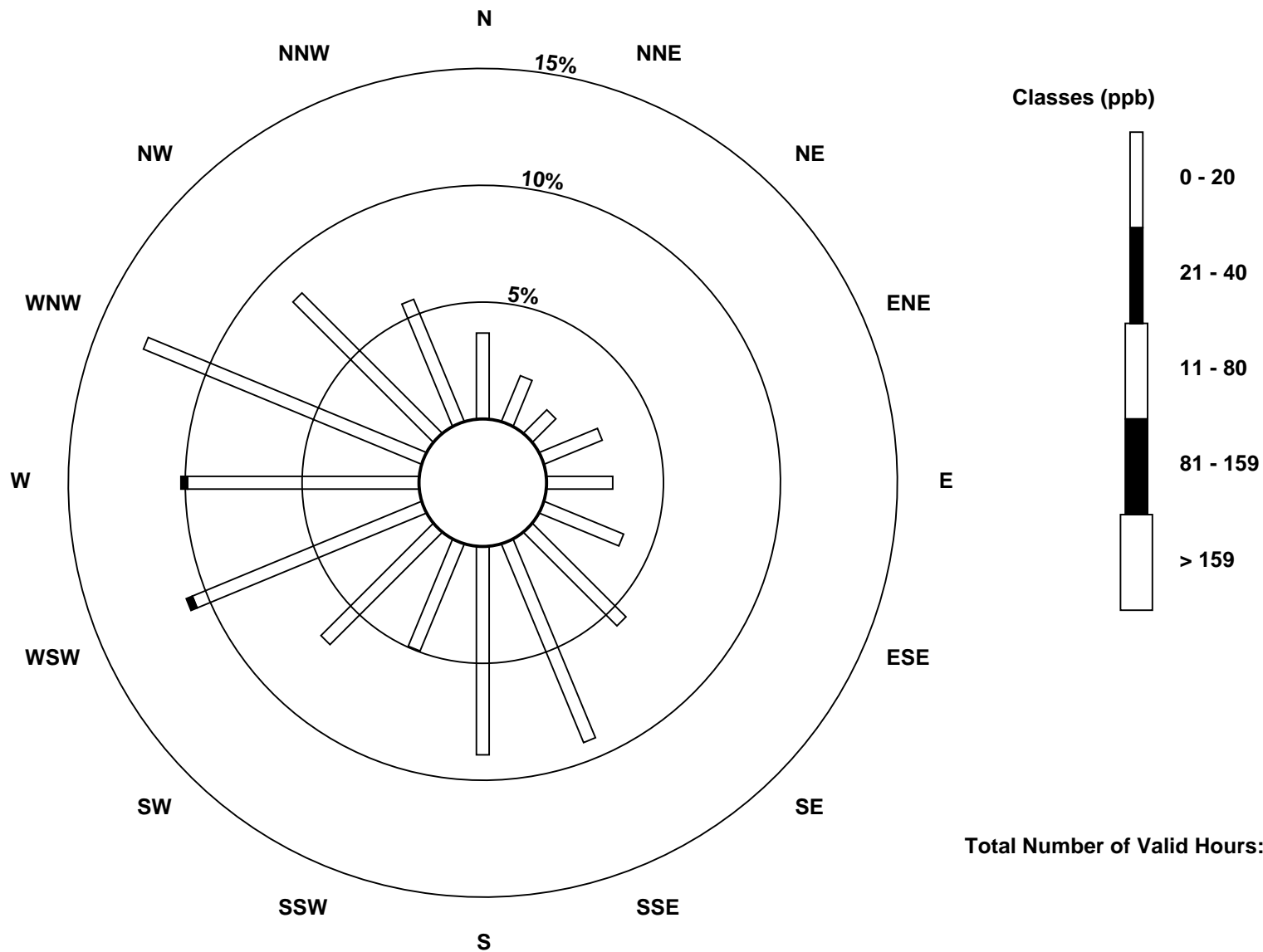
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay (AMS 505)

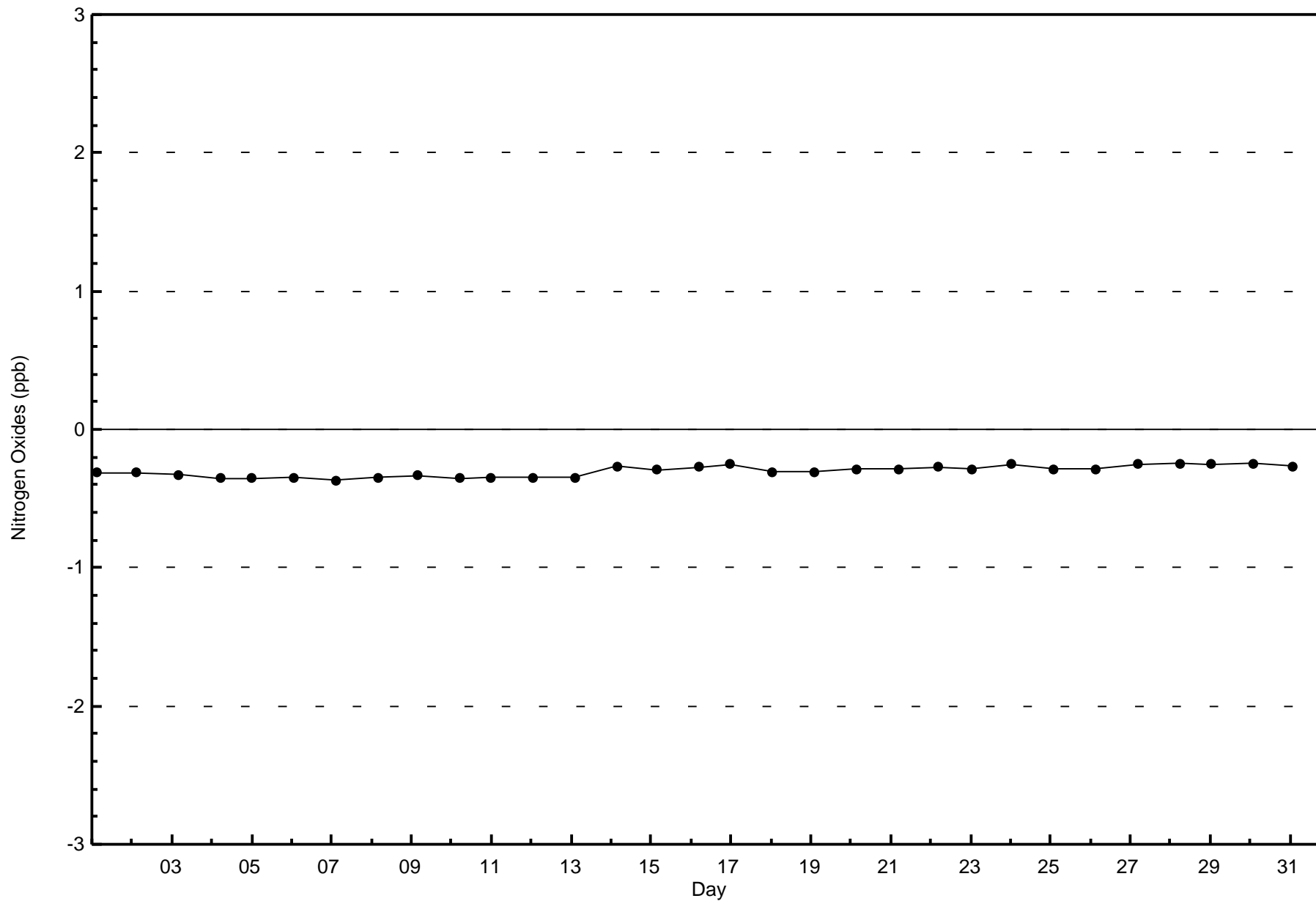


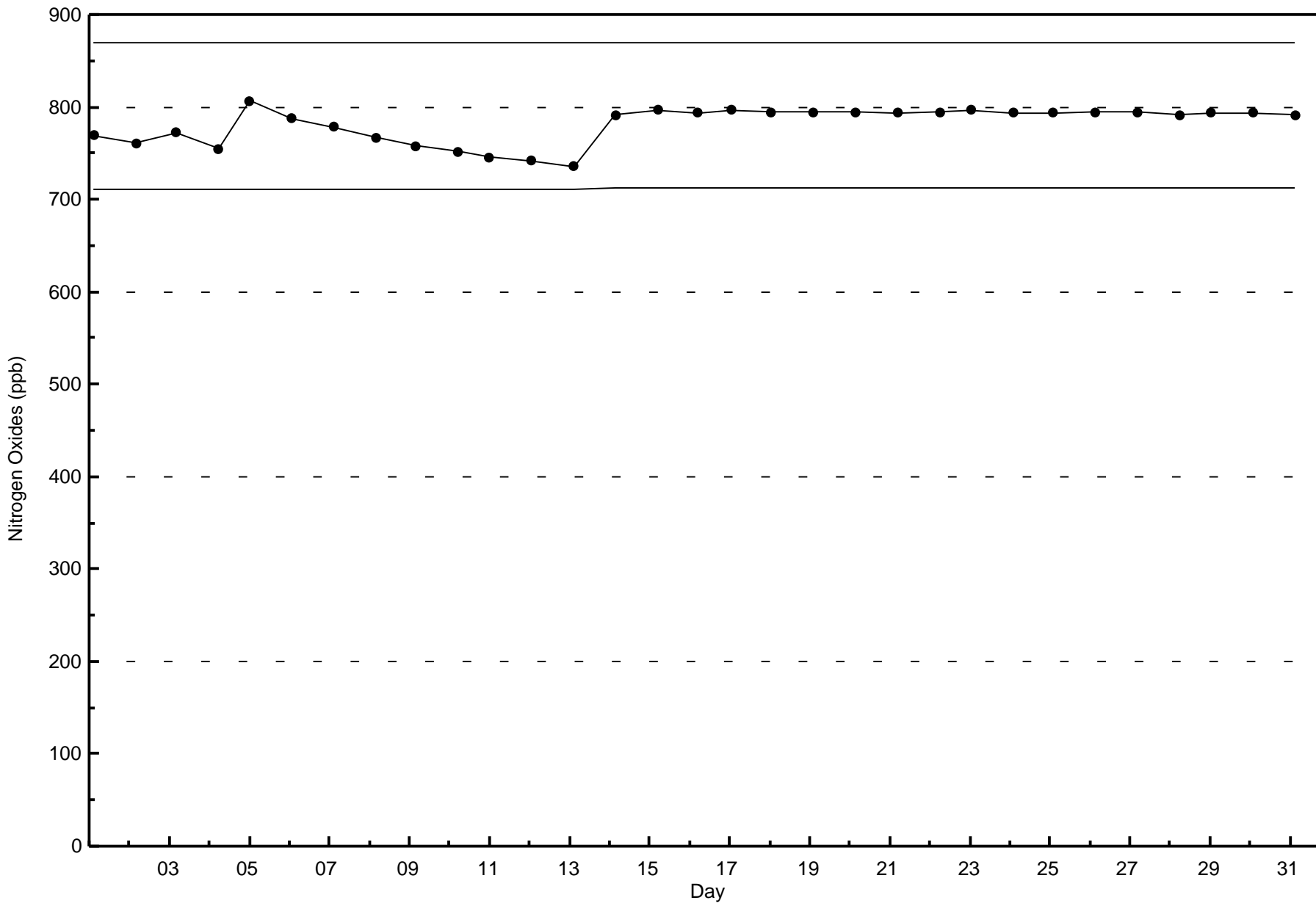
Total Number of Valid Hours: 707



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - July 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

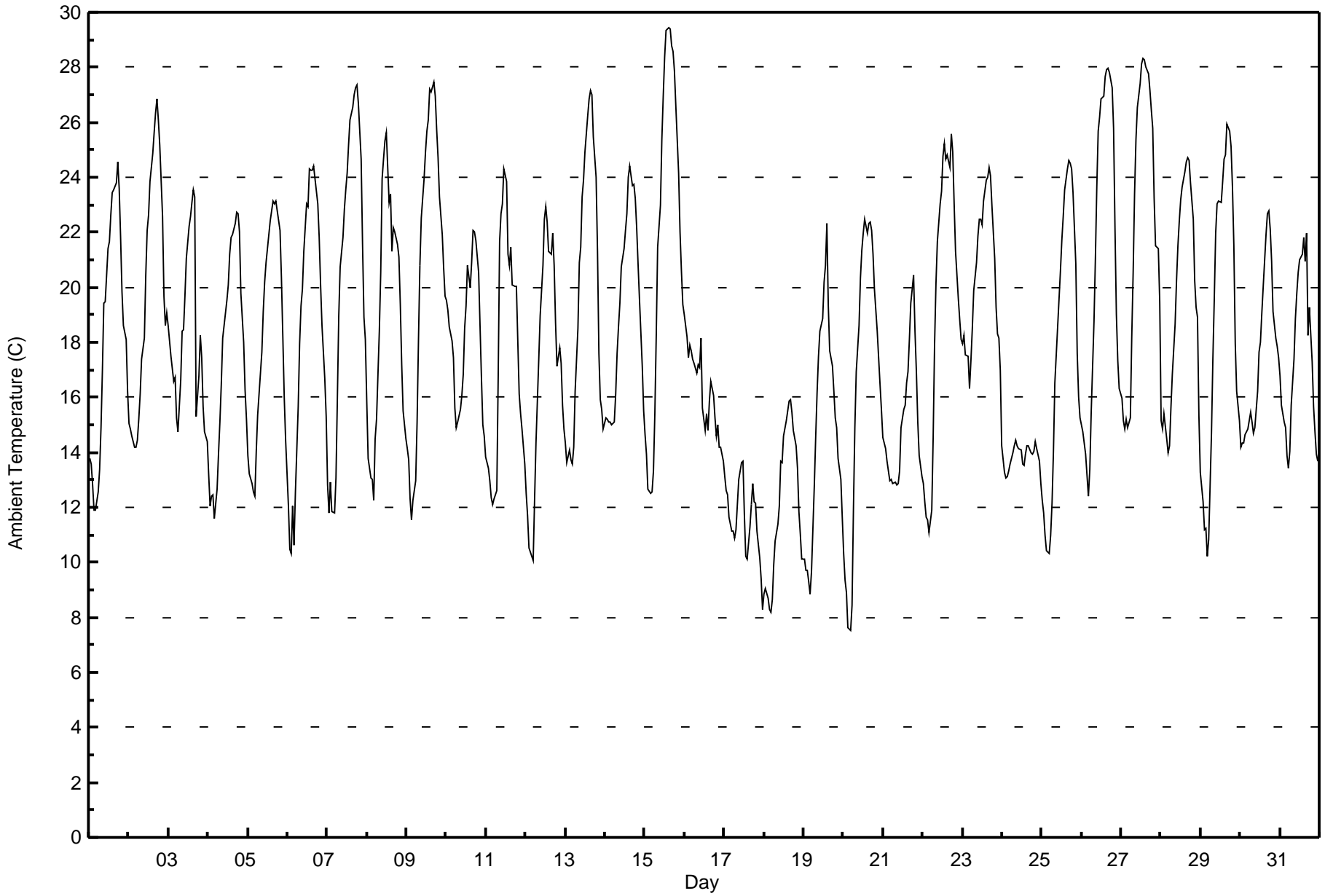
Ambient Temperature (AT) - C
Sawbones Bay - July 2017

Maximum Value: 29.4 C on Jul 15 15:00 Maximum Daily Average: 22.4 C on Jul 27																						Hours in Service: 744																									
Minimum Value: 7.5 C on Jul 20 05:00 Minimum Daily Average: 11.6 C on Jul 17																						Hours of Data: 744																									
Maximum Diurnal Average: 22.7 C at hour 17 Minimum Diurnal Average: 12.7 C at hour 5																						Hours of Missing Data: 0																									
Monthly Average: 18.07 C Percentiles: P₁ = 8.7 P₁₀ = 12.2 Q₁ = 14.2 Median = 17.6 Q₃ = 22.0 P₉₀ = 24.7 P₉₉ = 28.3																						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-Jul	13.8	13.6	12.8	11.9	11.9	12.5	13.4	14.9	17.0	19.4	19.5	21.4	21.7	22.6	23.4	23.5	23.8	24.5	23.6	21.8	19.8	18.6	18.1	16.2	18.3	24.5																					
2-Jul	15.1	14.9	14.6	14.2	14.2	14.4	15.2	16.1	17.4	18.2	20.4	22.1	22.6	23.9	24.9	25.6	26.3	26.8	26.1	25.2	22.6	19.7	18.6	19.1	19.9	26.8																					
3-Jul	18.6	17.5	17.0	16.6	16.7	15.3	14.7	16.6	18.4	18.5	19.7	21.0	22.2	22.6	23.1	23.6	23.3	15.3	16.8	18.2	17.4	15.6	14.8	14.4	18.2	23.6																					
4-Jul	13.2	12.0	12.4	12.4	11.6	12.7	13.9	15.1	16.5	18.1	19.1	19.5	20.1	21.2	21.8	21.9	22.3	22.7	22.7	22.0	19.8	18.0	16.3	15.2	17.5	22.7																					
5-Jul	13.9	13.2	12.9	12.5	12.4	14.0	15.4	16.1	17.7	19.1	20.2	20.9	21.4	22.4	22.8	23.1	23.1	23.1	22.8	22.1	20.4	18.2	16.0	14.4	18.3	23.1																					
6-Jul	12.0	10.5	10.3	12.1	10.6	12.5	15.6	18.0	19.3	19.9	21.3	23.1	22.9	24.3	24.3	24.3	24.4	23.5	23.0	21.8	20.1	18.6	16.7	15.3	18.5	24.4																					
7-Jul	12.8	11.8	12.9	11.9	11.8	13.0	16.0	19.0	20.8	21.8	22.8	23.5	24.2	25.2	26.1	26.6	27.0	27.3	27.3	26.7	24.7	21.5	18.9	18.1	20.5	27.3																					
8-Jul	15.8	13.8	13.1	13.0	12.3	14.5	15.2	18.4	20.5	23.9	24.6	25.3	25.6	23.1	23.4	21.3	22.2	22.0	21.6	21.1	19.4	17.2	15.5	14.5	19.1	25.6																					
9-Jul	14.1	13.7	12.3	11.5	12.3	13.0	15.1	18.1	20.8	22.5	24.0	24.9	25.7	26.1	27.2	27.1	27.4	26.9	25.8	24.7	23.3	21.9	20.7	19.7	20.8	27.4																					
10-Jul	19.5	19.2	18.6	18.0	17.4	15.6	14.9	15.1	15.6	16.1	16.8	18.5	19.3	20.8	20.0	20.9	22.1	22.0	21.7	20.6	18.6	16.7	15.0	14.6	18.2	22.1																					
11-Jul	13.8	13.4	13.0	12.3	12.1	12.3	12.6	16.8	21.6	22.7	23.0	24.3	23.8	21.2	20.8	21.5	20.1	20.0	20.0	18.0	16.1	15.4	14.8	13.6	17.6	24.3																					
12-Jul	12.5	11.7	10.5	10.4	10.1	12.2	14.4	15.9	17.4	19.0	20.8	22.5	22.9	22.4	21.3	21.2	21.9	20.8	18.7	17.1	17.8	17.2	15.7	14.9	17.1	22.9																					
13-Jul	14.3	13.6	14.1	13.8	13.6	14.2	16.2	18.5	20.9	21.4	23.3	23.9	24.9	26.2	26.8	27.1	27.0	25.5	24.0	21.3	17.6	15.9	15.5	14.9	19.8	27.1																					
14-Jul	15.2	15.2	15.1	15.1	15.0	15.1	16.1	17.6	18.6	19.4	20.7	21.4	22.1	22.7	24.0	24.4	23.7	23.8	23.2	22.2	20.8	19.6	17.1	15.5	19.3	24.4																					
15-Jul	14.6	13.9	12.6	12.5	12.6	13.3	15.4	18.3	21.5	23.0	25.4	27.0	28.4	29.3	29.4	29.4	28.8	28.6	27.9	26.6	24.1	22.0	20.6	19.4	21.9	29.4																					
16-Jul	19.0	18.2	17.5	17.9	17.7	17.4	17.2	16.9	17.2	17.1	18.1	15.6	14.8	15.4	14.8	15.9	16.6	16.1	15.2	14.6	15.0	14.2	14.2	13.7	16.3	19.0																					
17-Jul	13.1	12.6	12.5	11.7	11.1	11.1	10.9	11.2	12.1	13.0	13.6	13.7	11.8	10.2	10.1	11.3	12.1	12.9	12.2	12.2	11.1	10.2	9.4	8.3	11.6	13.7																					
18-Jul	8.8	9.0	8.7	8.3	8.2	8.6	9.9	10.8	11.4	12.0	13.7	13.6	14.6	15.1	15.5	15.8	15.9	15.5	14.8	14.2	13.4	11.9	11.0	10.1	12.1	15.9																					
19-Jul	10.1	9.7	9.7	9.3	8.9	9.6	12.8	14.6	16.2	17.5	18.4	18.9	20.2	20.8	22.3	19.4	17.7	17.2	16.2	15.3	14.9	13.8	13.0	11.6	14.9	22.3																					
20-Jul	10.3	9.4	8.9	7.6	7.5	8.4	11.9	14.9	16.9	18.6	20.3	21.3	22.0	22.5	21.9	22.3	22.4	22.1	21.2	19.9	18.4	17.5	16.5	15.6	16.6	22.5																					
21-Jul	14.5	14.1	13.7	13.3	13.0	13.0	12.9	12.9	12.8	12.9	13.3	14.9	15.5	15.7	16.5	16.9	18.1	19.4	20.4	18.4	16.9	15.1	13.9	13.1	15.1	20.4																					
22-Jul	12.9	12.2	11.7	11.5	11.1	11.9	14.5	17.9	20.1	21.7	23.0	23.5	24.7	25.2	24.7	24.8	24.4	25.6	24.9	23.0	21.3	19.6	18.8	18.1	19.5	25.6																					
23-Jul	17.9	18.3	17.5	17.5	16.3	17.3	18.5	19.9	20.9	21.9	22.5	22.3	23.2	23.9	24.0	24.4	24.0	24.0	23.0	21.1	19.3	18.3	18.1	17.0	20.4	24.4																					
24-Jul	14.2	13.3	13.1	13.1	13.3	13.6	14.0	14.2	14.5	14.2	14.1	14.1	13.6	13.5	14.0	14.2	14.2	14.0	14.0	14.1	14.4	14.2	13.7	12.9	13.8	14.5																					
25-Jul	12.3	11.8	11.0	10.4	10.3	11.0	12.2	14.1	16.5	18.6	19.6	20.6	21.7	22.6	23.6	24.3	24.6	24.5	24.3	23.4	20.9	17.6	16.0	15.2	17.8	24.6																					
26-Jul	15.0	14.7	13.9	13.2	12.4	13.4	15.5	18.8	21.1	23.6	25.7	26.2	26.9	27.0	27.7	27.9	28.0	27.8	27.3	25.8	22.2	19.0	17.3	16.3	21.1	28.0																					
27-Jul	16.0	15.2	14.8	15.2	14.9	15.3	18.2	20.5	23.4	25.4	26.5	27.4	28.1	28.3	28.2	28.0	27.7	27.1	26.4	25.8	23.2	21.5	21.4	19.5	22.4	28.3																					
28-Jul	15.1	14.9	15.4	14.5	14.0	14.2	15.6	16.8	18.7	20.3	21.5	22.4	23.2	23.6	24.2	24.5	24.7	24.6	23.8	22.5	20.2	19.3	18.9	15.3	19.5	24.7																					
29-Jul	13.3	12.2	11.2	11.2	10.2	10.9	14.7	17.4	19.6	21.9	23.0	23.1	23.1	23.8	24.7	24.8	25.9	25.7	25.1	23.7	21.5	18.0	16.2	15.2	19.0	25.9																					
30-Jul	14.2	14.3	14.3	14.6	14.8	15.1	15.5	15.1	14.7	14.9	16.2	17.7	18.0	19.1	20.0	21.9	22.7	22.8	22.1	21.0	19.1	18.2	17.9	17.5	17.6	22.8																					
31-Jul	16.8	15.7	15.1	14.9	13.9	13.4	14.0	15.7	17.4	18.9	19.8	20.5	21.0	21.2	21.8	21.0	22.0	18.3	19.3	17.3	15.7	14.7	13.9	13.7	17.3	22.0																					
																						14.3	13.7	13.3	13.0	12.7	13.2	14.6	16.3	18.0	19.2	20.4	21.1	21.6	22.0	22.4	22.5	22.7	22.3	21.8	20.7	19.0	17.4	16.3	15.2	Diurnal Average	
																						19.5	19.2	18.6	18.0	17.7	17.4	18.5	20.5	23.4	25.4	26.5	27.4	28.4	29.3	29.4	29.4	28.8	28.6	27.9	26.7	24.7	22.0	21.4	19.7	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Sawbones Bay - July 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Sawbones Bay - July 2017**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	0	0.00	0.00
0 - 10	19	2.55	2.55
10 - 20	452	60.75	63.31
> 20	273	36.69	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

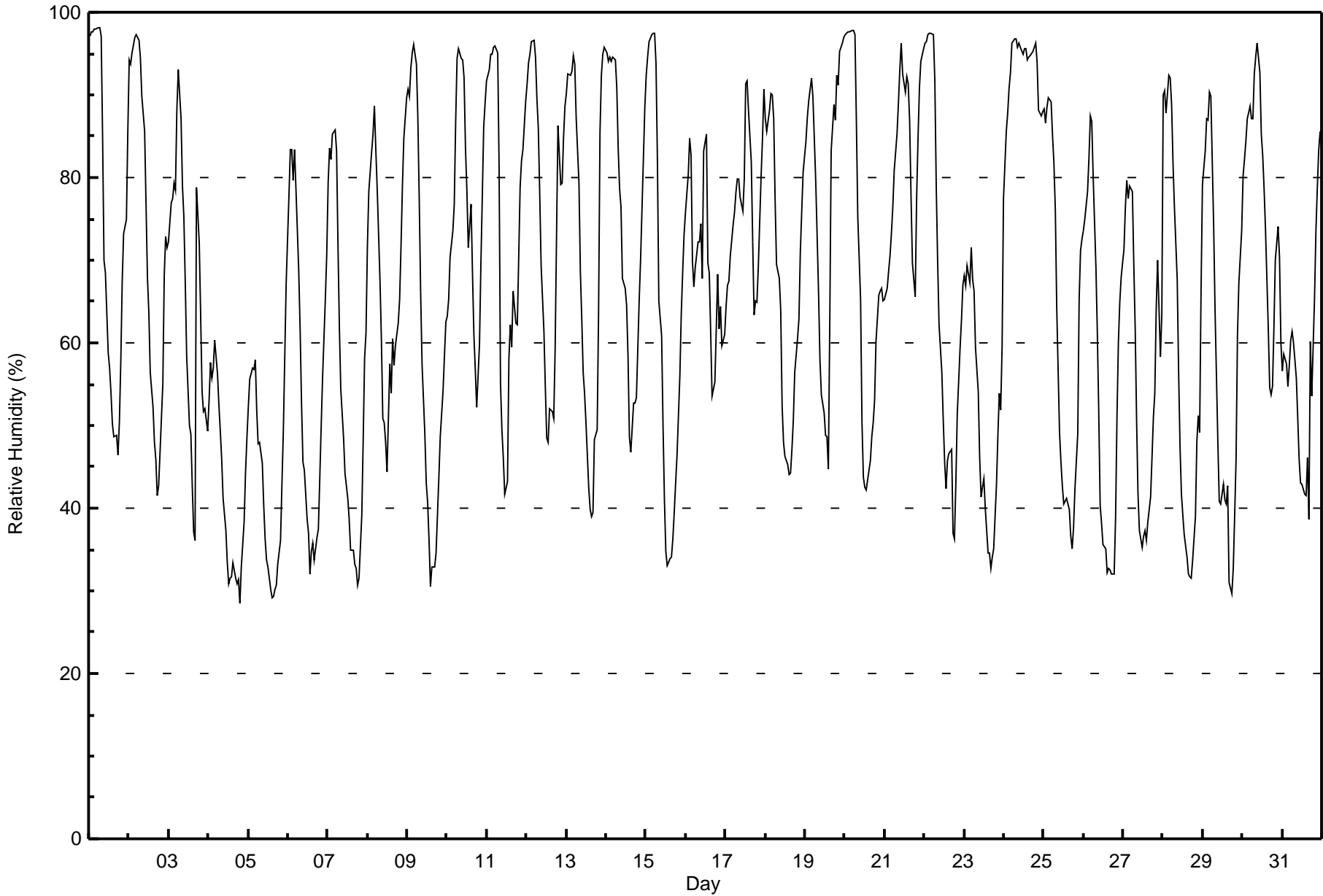
Sawbones Bay - July 2017

Maximum Value: 98 % on Jul 1 06:00																		Maximum Daily Average: 92.8 % on Jul 24																		Hours in Service: 744								
Minimum Value: 29 % on Jul 4 20:00																		Minimum Daily Average: 42.2 % on Jul 4																		Hours of Data: 744								
Maximum Diurnal Average: 85.3 % at hour 5																		Minimum Diurnal Average: 47.7 % at hour 17																		Hours of Missing Data: 0								
Monthly Average: 66.0 %																		Percentiles: P ₁ = 31 P ₁₀ = 37 Q ₁ = 49 Median = 66 Q ₃ = 85 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-Jul	97	98	98	98	98	98	98	97	85	70	68	59	57	54	50	49	49	46	50	58	67	73	75	86	74.1	98																		
2-Jul	94	94	95	97	97	97	97	94	90	86	77	68	64	56	52	48	46	41	43	47	55	68	73	72	72.9	97																		
3-Jul	72	77	77	79	78	88	93	87	79	75	67	59	50	49	43	37	36	79	72	63	54	52	52	49	65.4	93																		
4-Jul	53	58	56	57	60	56	53	49	46	41	37	33	31	32	32	33	32	31	31	29	33	38	44	48	42.2	60																		
5-Jul	52	56	57	57	58	52	48	48	45	40	36	34	33	30	29	29	30	31	33	36	43	49	58	67	43.8	67																		
6-Jul	78	83	83	80	83	79	69	62	53	46	45	39	37	32	35	36	34	36	37	43	50	56	65	71	55.4	83																		
7-Jul	79	84	82	85	86	83	72	62	54	48	44	43	41	39	35	35	33	33	31	32	39	48	58	61	54.5	86																		
8-Jul	72	78	83	85	89	83	79	68	60	51	50	48	44	57	54	60	57	60	62	65	72	79	85	90	68.0	90																		
9-Jul	91	90	93	95	96	94	87	77	66	58	49	43	41	36	30	33	33	35	39	44	49	54	58	63	60.5	96																		
10-Jul	63	65	70	74	77	87	94	96	94	94	92	84	79	71	77	68	61	57	52	60	69	78	86	89	76.5	96																		
11-Jul	92	93	95	95	96	96	95	81	55	49	46	42	43	58	62	59	66	62	62	70	79	82	83	89	73.0	96																		
12-Jul	91	94	95	96	97	95	89	86	78	69	61	55	48	48	52	52	51	59	73	86	79	79	85	89	75.3	97																		
13-Jul	90	92	92	93	95	94	87	79	69	63	56	54	50	42	40	39	39	48	49	64	85	92	95	96	71.1	96																		
14-Jul	95	94	95	94	95	94	91	84	79	77	68	67	65	58	49	47	53	53	53	59	65	70	82	89	73.9	95																		
15-Jul	92	95	96	97	98	97	94	82	65	61	50	41	35	33	34	34	36	40	43	46	56	63	68	73	63.8	98																		
16-Jul	76	80	85	83	70	67	69	72	72	74	68	83	85	70	68	61	54	55	62	68	62	64	60	61	69.6	85																		
17-Jul	64	67	67	71	74	76	78	80	80	78	76	80	91	92	88	82	72	63	65	65	69	80	85	91	76.4	92																		
18-Jul	87	86	88	90	90	87	77	70	68	64	52	48	46	45	44	44	47	51	56	61	63	71	76	81	66.3	90																		
19-Jul	84	87	89	91	92	90	79	73	66	58	54	52	49	49	45	62	83	89	87	92	91	95	96	97	77.1	97																		
20-Jul	97	97	98	98	98	98	97	87	75	65	50	44	43	42	45	46	49	50	53	60	66	66	67	65	69.0	98																		
21-Jul	65	67	69	70	73	76	81	85	89	93	96	92	90	92	91	87	78	70	66	77	85	91	94	96	82.2	96																		
22-Jul	96	96	97	97	98	97	92	79	70	62	56	51	46	42	46	47	47	37	36	43	51	59	63	67	65.7	98																		
23-Jul	68	67	69	67	72	68	66	59	54	46	41	43	44	40	35	35	33	34	35	43	49	54	52	59	51.3	72																		
24-Jul	77	86	88	91	93	96	97	97	96	96	96	95	96	96	94	95	95	95	96	96	94	88	87	88	92.8	97																		
25-Jul	88	87	88	90	89	85	82	76	64	49	46	43	41	41	41	40	37	35	38	42	49	65	71	73	60.8	90																		
26-Jul	73	75	78	82	87	87	80	69	61	52	40	38	36	35	32	33	33	32	32	39	51	60	65	68	55.8	87																		
27-Jul	71	76	80	77	79	78	69	62	51	42	37	35	37	37	36	38	41	46	51	54	64	70	58	63	56.5	80																		
28-Jul	90	91	88	92	92	89	82	76	68	57	47	42	39	37	34	32	32	32	34	39	48	51	49	66	58.6	92																		
29-Jul	79	83	87	87	90	90	74	64	56	48	41	40	43	41	41	43	31	30	33	39	46	61	67	74	57.8	90																		
30-Jul	80	82	84	87	89	87	87	93	95	96	93	85	83	79	74	62	55	54	55	62	70	74	70	60	77.3	96																		
31-Jul	57	59	57	55	57	60	61	60	56	51	46	43	43	42	41	46	39	60	54	65	74	79	83	86	57.2	86																		
																		79.6	81.8	83.3	84.2	85.3	84.7	81.2	75.9	69.0	63.2	57.7	54.2	52.5	50.8	49.3	48.8	47.7	49.8	51.1	56.4	62.1	68.1	71.4	75.0	Diurnal Average		
																		97	98	98	98	98	98	98	97	96	96	96	96	96	96	94	95	95	95	95	96	96	94	95	96	97	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Sawbones Bay - July 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Sawbones Bay - July 2017

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	95	12.77	12.77
40 - 60	212	28.49	41.26
60 - 80	210	28.23	69.49
80 - 100	227	30.51	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

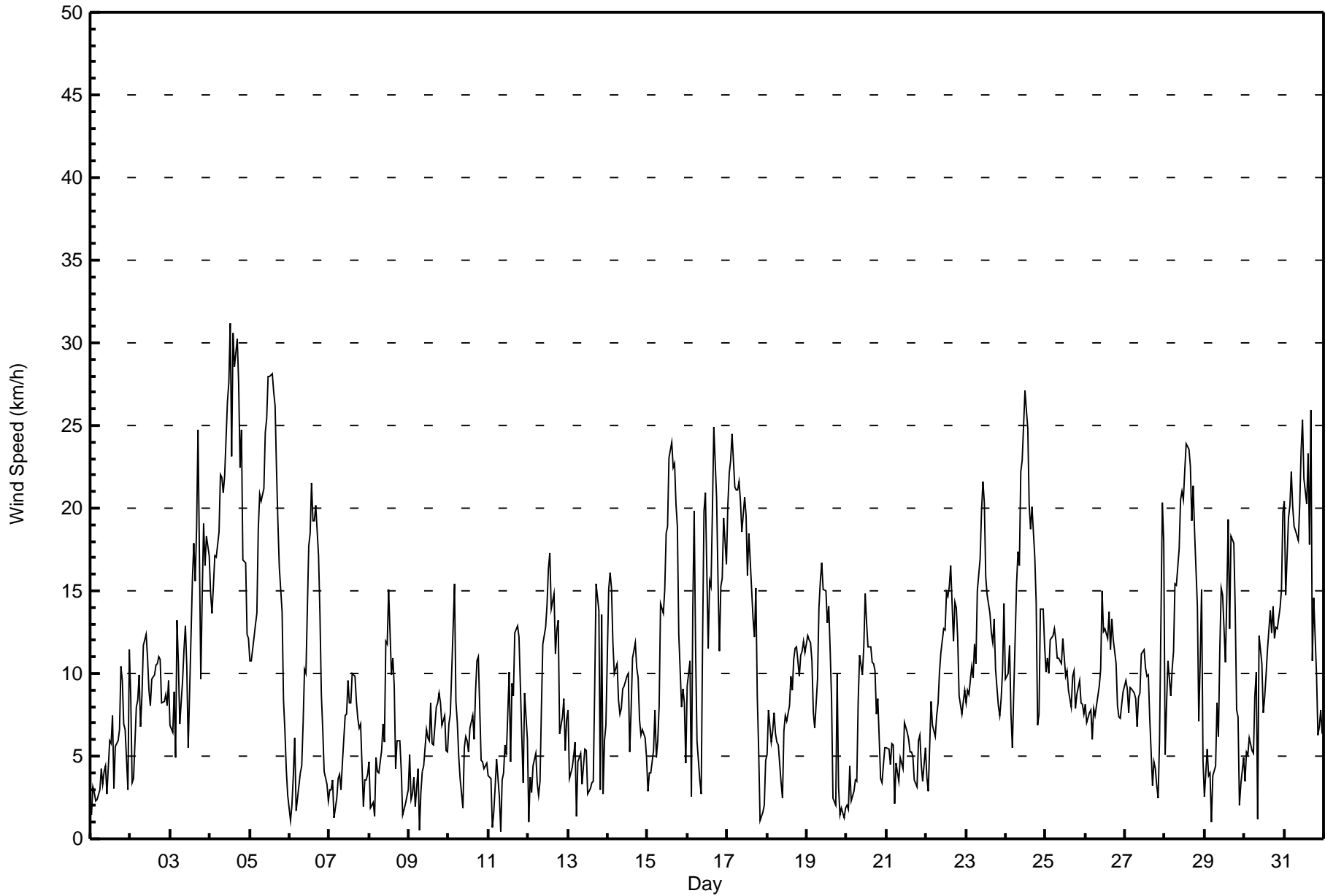
Wind Speed (WS) - km/h
Sawbones Bay - July 2017

Maximum Speed: 31 km/h on Jul 4 13:00	Maximum Daily Speed Average: 20.8 km/h on Jul 4	Hours in Service: 744
Minimum Speed Value: 0 km/h on Jul 11 08:00	Minimum Daily Speed Average: 1.3 km/h on Jul 13	Hours of Data: 744
Maximum Diurnal Speed Average: 7.4 km/h at hour 15	Minimum Diurnal Speed Average: 2.8 km/h at hour 21	Hours of Missing Data: 0
Monthly Average Velocity: 4.9 km/h 263.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 9 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 28	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-Jul	SSW1	SSW3	SE3	SE2	SSE2	SW3	S4	SSE3	SE4	SE4	NNW3	SSE6	S6	SSW7	S3	SE6	SE6	S7	SSE10	SE10	SE7	SSE7	NW3	NW11	SSE3.3	NW11
2-Jul	NW9	NNW3	SSW4	SE8	SE8	SE10	S7	SSE9	S12	S12	SSW11	SW9	SW8	SSW10	SSW10	SSW11	SSW11	SW11	SW11	SW8	SSW8	SSW9	SSW8	SW10	SSW7.2	S12
3-Jul	SW7	SSE6	SSE9	SSE5	NW13	NNW11	ENE7	SE10	NNW11	NW13	NW10	NW5	NW12	NNW16	NNW18	NNW16	NNW19	NNW25	NW10	W15	W19	WSW17	WSW18	W17	WNW9.4	WNW25
4-Jul	WSW15	SW14	SW15	WSW17	WSW17	WSW19	WSW22	W22	W21	WSW22	WSW26	WSW28	W31	WSW23	WSW31	WSW29	WSW30	WSW28	WSW22	W25	NNW17	NNW17	WSW12	WSW12	WSW20.8	W31
5-Jul	WSW11	WSW11	WSW12	WSW13	WSW14	W19	W21	NNW20	NNW21	NNW25	W25	NNW28	NNW28	NNW28	NNW27	NNW26	NW22	NW19	NNW16	NW14	NNW8	NNW6	N4	NW3	WNW16.1	WNW28
6-Jul	SW1	SW2	SW4	W6	SW2	WSW2	WSW4	W4	NNW7	NNW10	W10	W18	NW18	NNW21	NW19	NW19	NW20	NNW17	NNW14	N9	N7	N4	NNW3	NNW2	NW7.9	WNW21
7-Jul	S3	SSW3	W4	W1	SW2	S4	NNW4	WSW3	NW5	NW7	W8	NNW10	NW8	NNW8	NNW10	NNW10	NW8	W7	NW7	NW7	ENE2	ENE4	E4	ENE4	WNW3.8	NW10
8-Jul	SSE5	SE2	SSE2	W1	SSW5	SSE4	S4	W5	NNW7	WSW6	NNW12	NNW12	NNW15	NNW10	NNW11	NE9	NE4	E6	ESE6	SSE4	S1	SSE2	ESE2	SE3	WNW1.4	WNW15
9-Jul	SSW5	SSE2	SSE3	S4	NNW2	S4	SE0	S3	E4	ENE4	E7	ESE6	ESE6	ESE8	SE6	SE6	SSE8	E8	ESE9	ESE8	ESE7	ESE7	E5	SSE5	SE4.4	ESE9
10-Jul	SE7	SSE8	WSW10	NNW15	NW8	NNE7	ENE5	NNW4	WSW2	NNE6	ENE6	ENE6	NE5	ENE7	E7	ESE6	SE9	ESE11	ESE11	E5	E5	ESE4	ESE4	SE5	E2.7	WNW15
11-Jul	SE4	SE4	ENE1	E2	SSE3	S5	SSE3	SE0	SW4	WSW4	NNW6	NNE5	NNE10	NE5	NNE9	NNW9	NNW12	N13	NNW12	N9	N6	W3	WNW9	NW6	N3.3	N13
12-Jul	S1	S4	SSE3	S4	S5	S3	SE3	S3	SSE8	S12	S13	S14	S16	S17	S14	S15	S11	SW13	SW13	S6	S7	S9	S5	S7	S8.4	S17
13-Jul	S8	SSE4	SSE4	SSE5	S6	S1	SSE5	SSW5	SW3	NNW4	SSW5	NNW5	NNE3	WSW3	ENE3	ENE4	NE9	NE15	NE14	ENE3	N14	ENE3	NW6	NNW7	NE1.3	NE15
14-Jul	WNW15	WNW16	NW15	NW12	NNW10	NW11	NW8	NNW8	NW8	SW14	NNW9	NNW9	W10	WSW10	NNW5	SW8	WSW11	W12	WSW10	W10	WSW7	WNW6	WSW7	SSW6	WNW7.8	WNW16
15-Jul	S3	S4	SSE4	SSE5	S8	SSE5	SSE6	SSE8	SE14	SSE14	SSE15	SSE18	S19	S23	S24	S22	SSE23	SSE20	SSE19	SSE12	SE8	SE9	SE8	SE5	SSE12.1	S24
16-Jul	SSE9	S11	W3	NW14	N20	N11	NW6	N4	NW3	NNW12	NNW20	W21	NNW11	NNW16	NNW15	W20	W25	W21	WSW16	WSW11	W15	WSW16	W19	WSW17	W10.8	W25
17-Jul	W20	W22	W23	W25	W21	W21	W21	W22	NNW20	NNW19	NNW21	NNW20	NNW16	N18	NNW17	NNW13	NNW12	NNW15	N9	N5	NW1	ESE2	S2	NW5	WNW12.9	W25
18-Jul	NW5	NNW8	NW6	NNW7	NNW8	NNW6	NNW6	NNW6	N3	NW2	W6	NW7	W7	NNW8	NNW10	W9	WSW11	SW12	SSW12	SW10	SW11	SW11	SW12	SW11	W5.9	SW12
19-Jul	SW12	SW12	SW12	SW11	SW8	SSW7	WSW10	SW14	WSW16	WSW17	WSW15	W15	NNW13	NW14	NNW11	NNW8	E2	ENE2	WSW10	NE3	WSW1	WSW2	NNW1	S2	WSW7.5	WSW17
20-Jul	SSE2	ESE2	S4	E2	SSE3	ESE4	ESE3	ESE8	SE11	SE10	ESE12	SE15	SE13	SSE12	SSE12	SE11	ESE11	ESE10	SE8	SE8	E4	E3	E5	ESE5	SE7.0	SE15
21-Jul	E5	ESE5	E4	E6	E6	E2	NNE5	NNE3	NE5	E5	ENE4	ENE7	E6	ENE6	ENE5	ESE5	N5	ESE4	SSE3	SE6	SSE6	S4	SSE4	SSE6	E3.5	ENE7
22-Jul	S4	S3	S6	S8	S7	S6	S7	SW8	SW10	SW11	SW13	WSW13	WSW15	W15	W15	WSW17	SW12	WSW14	WSW14	SW12	SW9	SSW8	SSW8	SSW9	SW8.9	WSW17
23-Jul	SSW8	SW9	WSW9	WSW10	WSW10	WSW12	WSW11	W15	NNW17	W20	NNW22	W20	W16	W15	W14	W12	NNW12	W13	NW10	NNW8	N7	NNW8	NNW10	NNW14	W11.0	WNW22
24-Jul	NW10	NNW10	NNW12	NW8	NNW5	N9	NNE15	NNE17	NNE17	NNE22	NNE23	NNE27	N26	N25	N20	N19	N20	NNW17	NNW14	NNW7	N8	NNW14	NW14	NW12	N13.7	NNE27
25-Jul	NW10	NW11	NNW10	NNW12	NNW13	NNW12	NNW11	NNW11	NNW11	NNW11	NNW11	NW12	NW11	NNW10	NNW10	W9	W8	W10	NNW10	NW8	SW9	SW10	SSW8	SSW8	WNW8.3	WNW13
26-Jul	SSW8	SSW7	S8	S8	S6	SSW8	S7	SSW9	SSW9	SW10	SW15	WSW13	WSW13	WSW12	SW14	WSW11	WSW13	WSW12	SW11	SSW8	S7	S7	S8	S9	SW9.0	SW15
27-Jul	SSE10	S9	SSE8	SSE9	SSE9	SSE9	S8	SSE7	SSE9	SSE9	S11	SE11	SSE10	SSE10	SSE10	SSE7	SSE3	SE5	SSE4	SSE3	NNW2	NW6	NNW20	NNW18	S5.2	NW20
28-Jul	SW5	NW8	W11	SW9	WSW10	WSW11	W15	WSW15	WSW18	W21	W21	W20	W22	NNW24	NNW24	NNW23	NNW19	W21	W19	W14	NNW7	W11	W15	NNW5	W14.6	WNW24
29-Jul	SW3	SW5	SSW4	SSW4	NE1	S4	SW4	WSW8	W6	WSW11	WSW15	WSW15	WSW11	WSW15	SW19	SW13	W18	NNW18	NNW14	NW8	NNW7	SE2	SSE3	S5	WSW7.2	SW19
30-Jul	SSE4	SSE5	SSE5	SE6	SE5	SE5	NNW9	NNW10	NNW1	SE12	N11	NNE8	NNW9	NW10	W11	NNW14	W12	WSW14	WSW12	SW13	SW13	WSW14	WSW15	W20	W5.3	W20
31-Jul	W20	W15	W19	W20	W22	W20	NNW19	NNW19	NNW18	NNW20	NNW23	NNW25	NNW22	NNW20	NNW23	NW18	NW26	NNW11	NNW15	N10	N6	NNW7	N8	NNW6	WNW15.7	NW26

SW4.2	SW4.2	WSW4.8	WSW4.5	WSW4.2	WSW3.9	W4.2	W4.6	W5.0	W5.9	W7.1	W7.2	W7.0	W7.1	W7.4	W6.5	W6.9	W6.2	W4.5	WSW3.0	W2.8	WSW3.0	W3.8	WSW4.1	Diurnal Average
W20	W22	W23	W25	W22	W21	WSW22	W22	NNW21	NNW25	WSW26	NNW28	W31	NNW28	WSW31	WSW29	WSW30	WSW28	WSW22	W25	W19	NNW17	NW20	W20	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
Sawbones Bay - July 2017**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	194	26.08	26.08
6 - 11	293	39.38	65.46
12 - 19	176	23.66	89.11
20 - 28	77	10.35	99.46
29 - 38	4	0.54	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Sawbones Bay - July 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	4	6	13	15	11	17	32	29	11	11	8	7	6	9	9	194
6 - 11	12	6	2	6	7	14	23	26	25	27	23	24	15	33	31	19	293
12 - 19	4	3	2	0	0	1	3	8	10	1	18	38	25	32	18	13	176
20 - 28	5	3	0	0	0	0	0	2	3	0	0	7	28	25	4	0	77
29 - 38	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	16	10	19	22	26	43	68	67	39	52	80	76	96	62	41	744

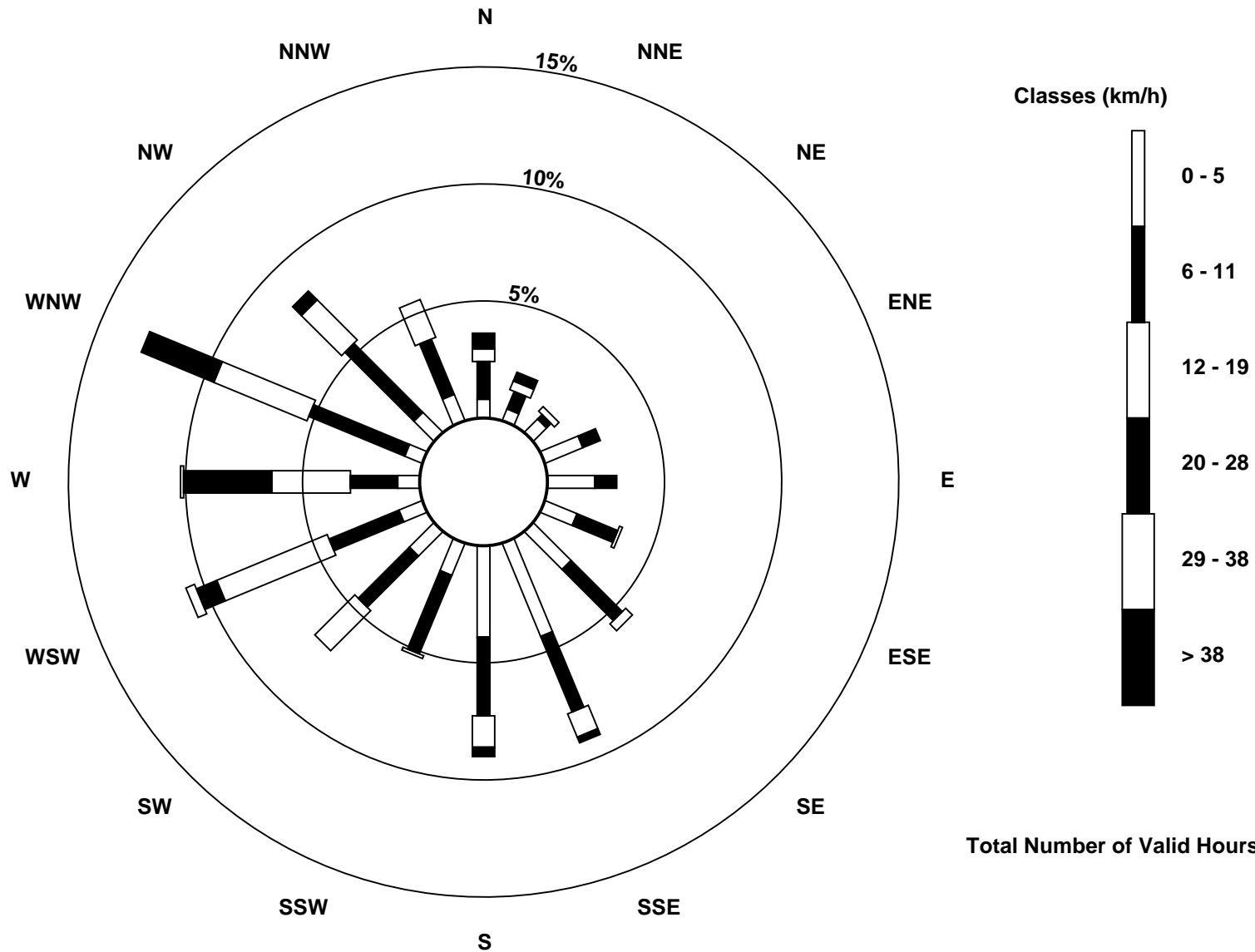
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2017

Wind Speed (WS) - km/h
Sawbones Bay (AMS 505)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Sawbones Bay - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 17 km/h on Jul 4 14:00 Minimum Value: 1 km/h on Jul 26 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: 744 Hours of Data: 744 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-Jul	2	1	1	1	2	2	1	2	2	2	2	3	3	3	3	2	2	3	3	3	1	1	5	3	5
2-Jul	2	2	2	3	1	2	2	2	2	2	3	3	3	4	3	4	4	3	3	2	2	1	1	5	5
3-Jul	3	3	1	2	5	3	5	2	6	5	3	3	5	5	5	5	8	13	2	4	4	4	5	4	13
4-Jul	3	3	3	4	4	4	5	5	5	5	6	6	8	17	7	7	7	7	6	6	5	3	3	3	17
5-Jul	2	2	2	2	2	4	4	4	4	5	5	6	6	6	7	6	4	5	4	4	2	1	1	1	7
6-Jul	1	1	1	3	2	1	1	2	3	3	4	6	4	5	6	5	5	4	4	2	1	1	1	1	6
7-Jul	1	1	2	1	1	1	1	1	2	3	4	4	4	5	4	4	4	4	2	2	2	1	1	1	5
8-Jul	2	1	1	1	3	3	3	2	2	3	3	4	4	6	6	5	2	2	1	1	1	1	2	1	6
9-Jul	3	3	1	1	2	2	1	1	2	2	2	3	4	4	3	4	3	3	3	2	2	3	2	2	4
10-Jul	1	2	4	3	4	3	1	2	1	1	2	2	2	3	2	3	3	4	3	3	1	2	1	1	4
11-Jul	1	2	1	1	1	1	1	1	1	2	3	4	4	4	2	2	3	4	3	2	3	2	3	2	4
12-Jul	1	1	1	2	2	1	1	1	2	2	3	4	4	5	3	5	3	4	4	2	2	2	1	1	5
13-Jul	1	2	1	2	1	1	2	2	1	2	3	3	3	3	3	2	3	3	4	3	3	4	3	3	4
14-Jul	3	4	4	2	3	2	2	2	2	3	3	4	3	3	3	4	3	3	3	3	3	2	3	2	4
15-Jul	2	2	1	1	1	1	1	2	4	3	4	5	4	5	5	5	5	4	5	4	1	1	3	1	5
16-Jul	2	1	4	4	5	3	4	3	2	4	6	5	3	3	4	6	6	5	3	4	4	4	5	4	6
17-Jul	4	5	5	5	5	5	4	4	4	4	4	4	4	4	4	3	3	4	3	1	1	1	1	4	5
18-Jul	1	2	1	1	1	1	2	2	2	2	4	4	4	3	3	3	3	3	2	2	2	1	1	2	4
19-Jul	2	2	2	2	2	1	3	3	3	4	4	4	4	3	5	4	1	3	4	5	2	1	1	2	5
20-Jul	1	1	2	1	2	1	1	2	2	2	3	4	4	4	3	3	2	3	2	2	2	1	2	2	4
21-Jul	2	2	2	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2
22-Jul	2	1	2	1	1	1	1	2	2	2	3	4	4	5	4	4	3	4	3	2	3	2	1	1	5
23-Jul	1	2	2	3	2	4	2	4	4	5	5	4	4	4	4	4	4	3	1	1	2	2	3	5	
24-Jul	4	4	2	2	2	2	3	4	4	6	6	6	6	6	5	5	4	4	3	3	3	2	2	6	
25-Jul	1	1	2	2	2	3	2	2	2	2	3	3	4	4	4	3	4	3	3	2	1	1	1	1	4
26-Jul	1	1	1	1	1	1	1	2	2	4	4	4	4	4	4	4	4	3	2	2	1	1	1	1	4
27-Jul	1	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	1	2	1	2	2	6	4	6	6
28-Jul	6	3	2	2	2	3	4	3	4	4	5	5	5	5	6	5	5	5	4	4	3	3	4	3	6
29-Jul	1	2	2	2	1	2	3	2	2	3	4	4	3	5	5	3	5	4	3	1	1	2	3	2	5
30-Jul	2	2	1	2	3	1	8	6	4	5	3	2	2	2	3	3	3	4	4	3	2	3	4	4	8
31-Jul	4	4	4	4	4	4	4	4	3	4	5	5	5	5	5	5	6	4	4	3	1	1	2	2	6
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

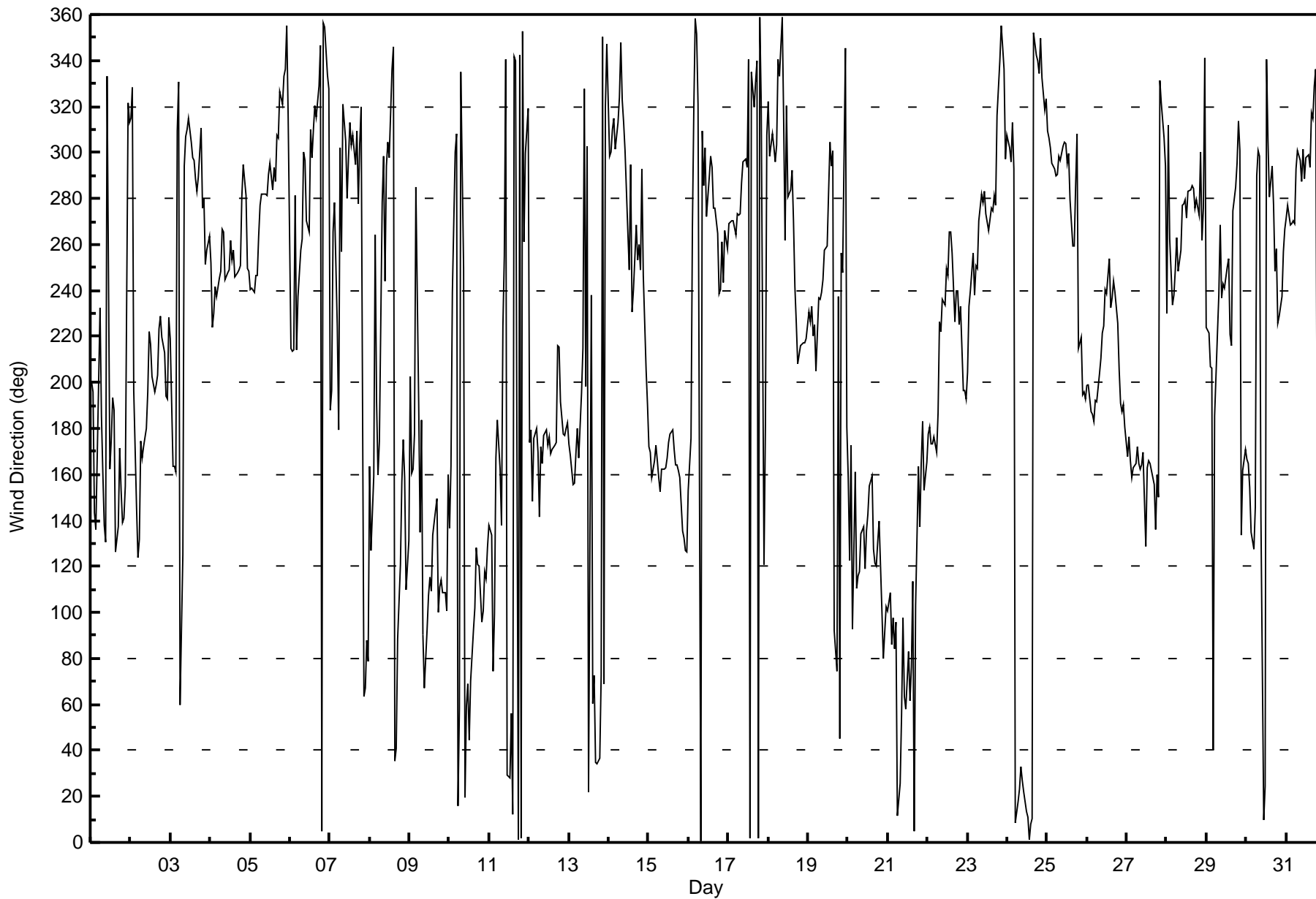
Wind Direction (WD) - deg
Sawbones Bay - July 2017

Direction of Maximum Speed: 262 deg on Jul 4 13:00 Direction of Maximum Daily Speed Average: 253.5 deg on Jul 4	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 138 deg on Jul 11 08:00 Direction of Minimum Daily Speed Average: 1.3 deg on Jul 13	Percent Operational Time: 100.0
Monthly Average Direction: 264.5 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-Jul	200	196	144	136	168	232	186	160	138	131	333	162	175	193	188	126	137	172	153	139	141	155	322	313	163.2
2-Jul	315	329	196	146	124	132	174	167	172	180	196	222	217	202	196	199	203	223	229	220	213	194	193	228	197.0
3-Jul	219	164	163	161	309	331	60	125	294	307	310	315	305	298	296	289	283	289	311	276	280	252	257	263	283.7
4-Jul	252	224	230	241	238	245	249	266	266	245	248	249	262	253	257	246	248	249	251	281	295	282	250	248	253.5
5-Jul	241	241	239	246	247	264	277	282	282	282	281	291	295	284	294	287	307	306	327	321	333	336	355	316	286.2
6-Jul	215	214	214	281	214	237	258	262	300	297	270	266	310	298	310	320	315	329	347	5	356	354	334	328	306.6
7-Jul	188	197	265	278	225	180	302	257	321	305	280	298	313	303	307	295	309	278	304	320	63	67	88	78	298.1
8-Jul	163	127	159	264	192	160	175	278	298	244	294	304	298	336	346	36	41	88	121	157	175	159	110	131	302.0
9-Jul	203	161	162	177	285	191	135	184	90	67	93	108	116	110	134	139	149	100	111	114	109	108	100	160	124.3
10-Jul	137	163	239	301	308	16	58	335	250	20	59	69	45	70	92	102	128	121	120	96	100	118	115	128	91.8
11-Jul	138	134	74	100	167	184	162	138	224	255	340	29	28	56	12	341	340	1	342	2	353	261	300	319	351.1
12-Jul	174	180	149	176	180	169	141	172	165	177	179	172	176	169	171	173	174	216	215	191	178	177	180	183	179.2
13-Jul	173	168	155	156	169	180	167	195	215	328	198	303	22	238	60	73	35	34	37	73	350	69	320	347	40.5
14-Jul	298	300	310	315	301	313	324	348	323	313	301	266	249	295	231	240	268	253	260	249	293	246	206	190	284.3
15-Jul	172	170	159	166	172	166	159	153	163	162	163	167	174	177	179	171	164	164	162	159	136	133	127	127	163.8
16-Jul	153	176	268	319	358	352	321	1	310	285	302	272	289	298	293	276	276	265	238	241	261	244	266	258	278.7
17-Jul	269	270	270	270	264	273	273	273	287	296	297	294	340	2	335	320	331	340	2	359	322	121	181	307	294.9
18-Jul	322	299	308	302	296	303	341	333	359	314	262	320	281	284	292	270	241	226	208	216	217	217	217	219	262.5
19-Jul	231	227	233	220	225	205	237	236	239	245	258	259	283	304	294	301	92	74	237	45	256	248	345	181	249.9
20-Jul	159	122	173	93	161	110	116	118	135	137	119	135	143	155	159	127	122	120	131	140	101	80	91	102	131.0
21-Jul	101	108	86	98	84	96	12	25	56	98	63	58	83	62	76	113	5	103	164	137	165	183	153	165	94.6
22-Jul	178	180	174	173	176	170	187	226	222	236	234	250	246	265	265	256	226	240	240	225	233	197	197	193	227.2
23-Jul	204	233	240	256	238	251	250	270	282	279	283	273	270	266	276	275	282	277	316	340	355	346	336	297	276.9
24-Jul	307	302	296	313	293	8	18	23	33	27	22	14	11	1	8	10	352	342	340	334	350	333	319	323	356.7
25-Jul	309	306	302	295	293	290	290	299	297	303	305	304	295	300	279	259	259	285	308	215	220	194	196	193	282.3
26-Jul	199	199	187	186	183	192	191	204	211	221	224	240	239	254	232	237	244	239	226	206	191	187	191	181	216.2
27-Jul	168	177	166	158	163	165	172	165	162	164	169	129	163	166	165	162	156	136	160	150	331	321	306	294	174.6
28-Jul	230	312	263	234	238	249	263	248	258	277	278	279	272	283	284	285	284	276	279	273	300	262	276	341	273.2
29-Jul	224	221	207	207	40	185	221	238	269	237	243	241	250	254	221	216	275	285	296	313	301	134	162	171	248.2
30-Jul	166	165	154	135	127	146	290	301	298	141	10	24	341	306	281	294	277	248	258	226	229	237	257	267	260.0
31-Jul	271	277	269	269	271	269	293	301	296	287	301	289	298	299	293	317	315	329	336	11	352	348	349	329	297.1

235.2 235.1 239.4 248.2 249.5 251.2 263.2 263.7 264.0 264.5 273.8 272.0 279.7 279.7 274.6 269.7 276.8 273.1 269.0 255.6 271.5 236.9 259.5 256.6
 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
Sawbones Bay - July 2017

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Jul 11 08:00 Minimum Value: 5 deg on Jul 27 02:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 14 Median = 20 Q ₃ = 35 P ₉₀ = 59 P ₉₉ = 92																			Hours in Service: 744 Hours of Data: 744 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-Jul	80	19	29	33	53	39	28	46	63	69	91	46	53	44	87	54	41	43	22	14	14	19	87	24	91
2-Jul	13	74	38	29	10	13	20	12	12	18	22	27	32	37	26	28	27	22	15	12	12	10	8	35	74
3-Jul	28	45	12	46	30	21	58	16	55	16	24	65	33	18	17	25	18	17	12	18	15	13	16	13	65
4-Jul	14	12	11	14	12	16	13	14	15	16	15	18	17	15	16	15	14	14	16	17	11	16	14	16	18
5-Jul	13	11	11	11	11	12	13	14	15	15	16	15	15	15	14	17	14	17	17	15	10	9	9	22	22
6-Jul	68	48	36	30	68	53	30	36	42	28	36	25	18	18	25	20	22	17	23	15	12	8	16	39	68
7-Jul	15	24	39	62	44	27	27	42	69	42	65	41	40	46	42	39	49	60	42	17	60	27	29	32	69
8-Jul	27	62	46	70	49	53	55	46	17	34	23	25	19	41	61	30	45	33	18	22	93	67	68	23	93
9-Jul	28	62	42	34	65	24	92	24	42	56	42	67	61	42	71	65	37	28	19	14	19	21	32	33	92
10-Jul	27	21	32	13	26	25	32	45	67	21	39	41	50	47	29	40	32	27	15	45	35	32	26	13	67
11-Jul	15	77	82	39	21	9	55	97	42	55	56	85	35	64	19	27	27	24	19	15	50	73	26	34	97
12-Jul	77	17	21	18	13	25	35	41	16	14	17	17	18	20	14	12	15	35	19	19	20	15	13	10	77
13-Jul	6	65	13	32	13	93	32	34	49	65	57	59	94	77	83	61	42	14	16	90	17	75	58	28	94
14-Jul	10	14	17	12	12	10	13	21	25	23	24	40	32	74	46	30	32	33	22	21	22	32	33	50	74
15-Jul	56	34	23	15	6	21	11	15	14	16	16	17	17	15	17	15	14	15	14	16	14	11	13	27	56
16-Jul	11	8	78	24	16	19	51	77	78	57	18	12	25	12	13	15	14	17	14	17	16	18	13	15	78
17-Jul	12	11	11	11	12	13	13	12	14	11	11	12	28	18	15	15	13	19	18	17	90	62	83	74	90
18-Jul	14	12	13	9	9	17	34	31	79	94	58	49	55	46	34	34	25	19	16	17	10	8	8	11	94
19-Jul	12	12	12	14	14	16	14	13	19	22	24	26	35	21	33	39	70	67	40	74	68	56	72	68	74
20-Jul	44	49	34	46	50	21	39	16	20	21	21	19	24	25	22	17	15	17	20	26	47	36	40	29	50
21-Jul	36	34	37	40	34	82	28	64	32	56	39	30	34	30	44	38	33	70	65	18	11	33	60	20	82
22-Jul	79	41	20	7	8	10	14	23	19	16	17	25	22	31	27	20	19	19	19	12	24	21	8	8	79
23-Jul	11	13	10	23	11	13	17	14	17	16	15	16	25	26	35	31	30	22	15	11	11	11	14	15	35
24-Jul	50	22	9	13	39	19	14	15	13	14	15	16	16	18	18	18	16	13	14	58	25	12	11	10	58
25-Jul	12	8	9	8	10	12	12	10	10	15	20	25	33	31	37	48	34	28	22	14	7	9	7	8	48
26-Jul	9	9	7	9	12	11	11	13	16	26	20	30	26	27	25	24	17	18	14	11	7	6	7	7	30
27-Jul	7	5	8	9	9	8	8	15	20	24	20	25	30	27	21	16	32	20	15	53	73	32	11	41	73
28-Jul	87	41	19	13	10	13	12	15	17	14	16	19	18	17	17	19	19	15	15	16	40	14	18	59	87
29-Jul	45	17	72	39	95	36	55	23	34	17	20	19	27	34	21	19	26	17	16	9	19	78	53	17	95
30-Jul	49	31	11	16	22	16	59	43	96	19	30	22	21	19	21	21	27	22	20	12	11	14	14	11	96
31-Jul	10	12	10	10	9	12	11	12	12	14	16	15	16	13	17	15	18	19	27	14	12	10	15	21	27
87 77 82 70 95 93 92 97 96 94 91 85 94 77 87 65 70 70 65 90 93 78 87 74																									
Diurnal Maximum																									



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	June 20, 2017	Last Cal Date:	NA
Start time (MST):	10:30	End time (MST):	14:00
Reason:	Install		

Calibration Standards

Cal Gas Concentration	<u>49.6</u>	ppm	Cal Gas Exp Date	February 22, 2020
Cal Gas Cylinder #	<u>EY0000793</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	621
ZAG Make/Model	Teledyne API 701		Serial Number	4428

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 710321323

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-628	-629
Calculated slope	NA	0.996578	Lamp voltage	785	786
Calculated intercept	NA	1.216359	Pressure	672.8	671.9
Analyzer Background	15.9	16.0	Flow	0.407	0.406
Analyzer Coefficient	1.015	1.015	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					
as found span					
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4930	78.8	780.3	782.8	0.997
second point	4967	39.5	391.3	389.4	1.005
third point	4990	19.8	196.0	195.5	1.003
as left zero	5000	0.0	0.0	0.4	----
as left span	4930	78.8	780.3	783.0	0.997
Average Correction Factor					1.002
Corrected As found	NA	Previous response	NA	*% change	NA

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced prior to the calibration. No adjustments made.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

SO₂ Calibration Summary

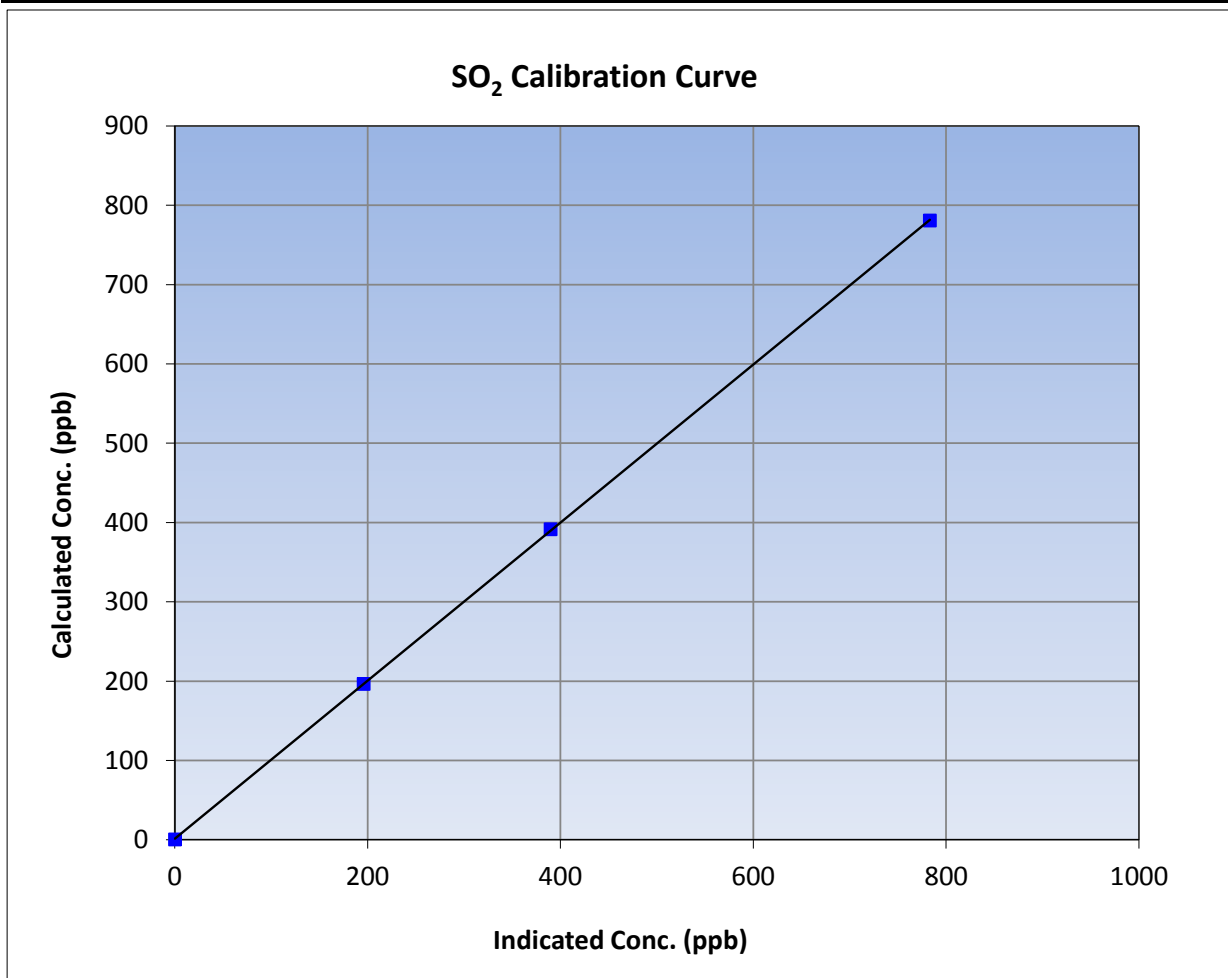
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	NA
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 43i	Analyzer serial #	710321323

Calibration Data

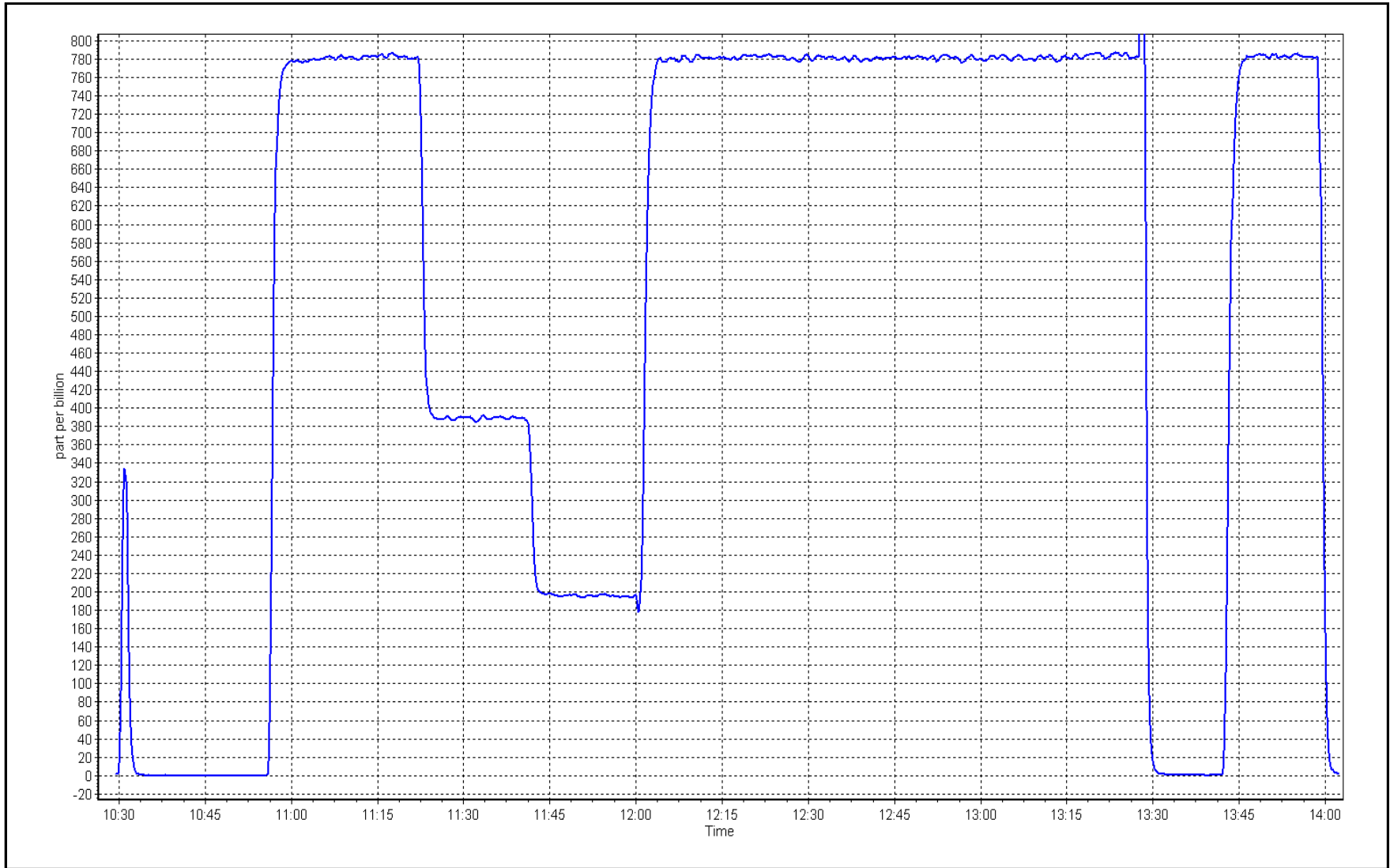
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999981	≥0.995
780.3	782.8	0.9968			
391.3	389.4	1.0050	Slope	0.996578	0.90 - 1.10
196.0	195.5	1.0027			
			Intercept	1.216359	+/-30



SO2 Calibration Plot

Date: June 20, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	June 20, 2017	Last Cal Date:	NA
Start time (MST):	10:30	End time (MST):	14:00
Reason:	Install		

Calibration Standards

Gas Cert Reference	EY0000793	Cal Gas Expiry Date	February 22, 2020
CH4 Cal Gas Conc.	<u>504.0</u> ppm	CH4 Equiv Conc.	1054.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	621
ZAG Make/Model	Teledyne API 701	Serial Number	4428

Analyzer Information

Analyzer make:	Thermo 51i	Analyzer serial #:	1327059297
	<u>Start</u>	<u>Finish</u>	<u>Start</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-288
Calculated slope	NA	Sample pressure	8.0
Calculated intercept	NA	Fuel pressure	23.3
Analyzer Background	3.380	Air pressure	34.5
Analyzer Coefficient	5.060	Flame temperature	153.1
			<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					
as found span					
calibrator zero	5000	0.0	0.00	-0.04	----
high point	4930	78.8	16.58	16.59	1.000
second point	4967	39.5	8.32	8.27	1.006
third point	4990	19.8	4.17	4.18	0.997
as left zero	5000	0.0	0.00	-0.04	----
as left span	4930	78.8	16.58	16.62	0.998
Average Correction Factor					1.001
Corrected As found	NA	Previous response	NA	*% change	NA

* = > +/-5% change initiates investigation

Notes: Sample inlet filter was replaced prior to the calibration. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

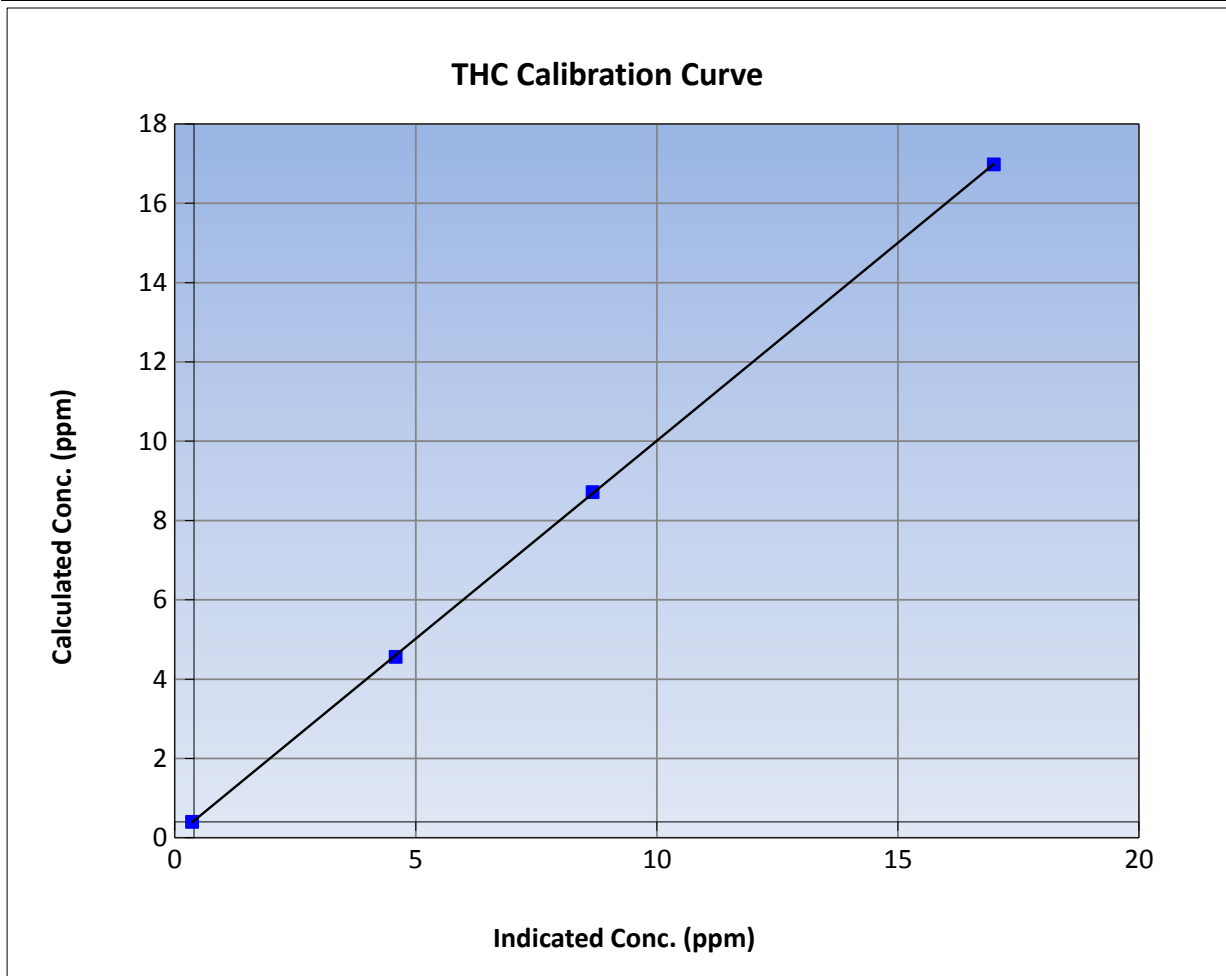
Version-03-2017

Station Information

Calibration Date	June 20, 2017	Previous Calibration	NA
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 51i	Analyzer serial #	1327059297

Calibration Data

Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999984	≥0.995
16.6	16.6	0.9995			
8.3	8.3	1.0055	Slope	0.998164	0.90 - 1.10
4.2	4.2	0.9966			
			Intercept	0.029143	+/-1.5



THC Calibration Plot

Date: June 20, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	June 20, 2017	Last Cal Date:	NA
Start time (MST):	10:30	End time (MST):	14:00
Reason:	Install		

Calibration Standards

NO Gas Cylinder #	EY0000793	Cal Gas Expiry Date	February 22, 2020
NOX Cal Gas Conc.	<u>50.8</u> ppm	NO Cal Gas Conc.	<u>50.8</u> ppm
Calibrator Model	Teledyne API T700	Serial Number	621
ZAG make/model	Teledyne API 701	Serial Number	4428

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1152430008		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.039	1.041	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	1.000	PMT Temperature	322.6	327.1
NO2 coefficient	0.999	0.998	Reaction cell Press	161.8	161.8
NO bkgrnd	2.8	2.8	Sample Flow	0.586	0.587
NOX bkgrnd	3.0	3.0	PMT Voltage	-760.0	-761.1

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	NA	1.002435
NO _x Cal Offset	NA	1.797299
NO Cal Slope	NA	1.001983
NO Cal Offset	NA	1.879209
NO ₂ Cal Slope	NA	0.998987
NO ₂ Cal Offset	NA	-0.605380



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										
as found span										
calibrator zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	----	----
high point	4930	78.8	799.2	799.2	0.0	796.4	796.8	-0.4	1.0035	1.0030
second point	4967	39.5	400.8	400.8	0.0	397.0	397.0	0.0	1.0096	1.0096
third point	4990	19.8	200.8	200.8	0.0	196.8	196.5	0.2	1.0202	1.0218
as left zero	5000	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	----	----
as left span	4930	78.8	799.2	363.3	435.9	795.3	359.6	435.8	1.0049	1.0103
Average Correction Factor									1.0111	1.0114

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	796.1	795.0	1.1	1.0039	1.0053	----	----
1st NO2 (400 ppb O3)	363.3	431.7	795.9	363.3	432.5	1.0041	----	0.9982	100.2%
2nd NO2 (200 ppb O3)	573.4	221.6	795.7	573.4	222.3	1.0044	----	0.9969	100.3%
3rd NO2 (100 ppb O3)	683.1	111.9	796.9	683.1	113.8	1.0029	----	0.9833	101.7%
2nd NO ref point	----	0.0	796.0	794.4	1.7	1.0040	1.0060	----	----
Average Correction Factor						1.0039	1.0057	0.9928	100.7%

Notes: Sample inlet filter was replaced prior to the calibration. Slightly adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

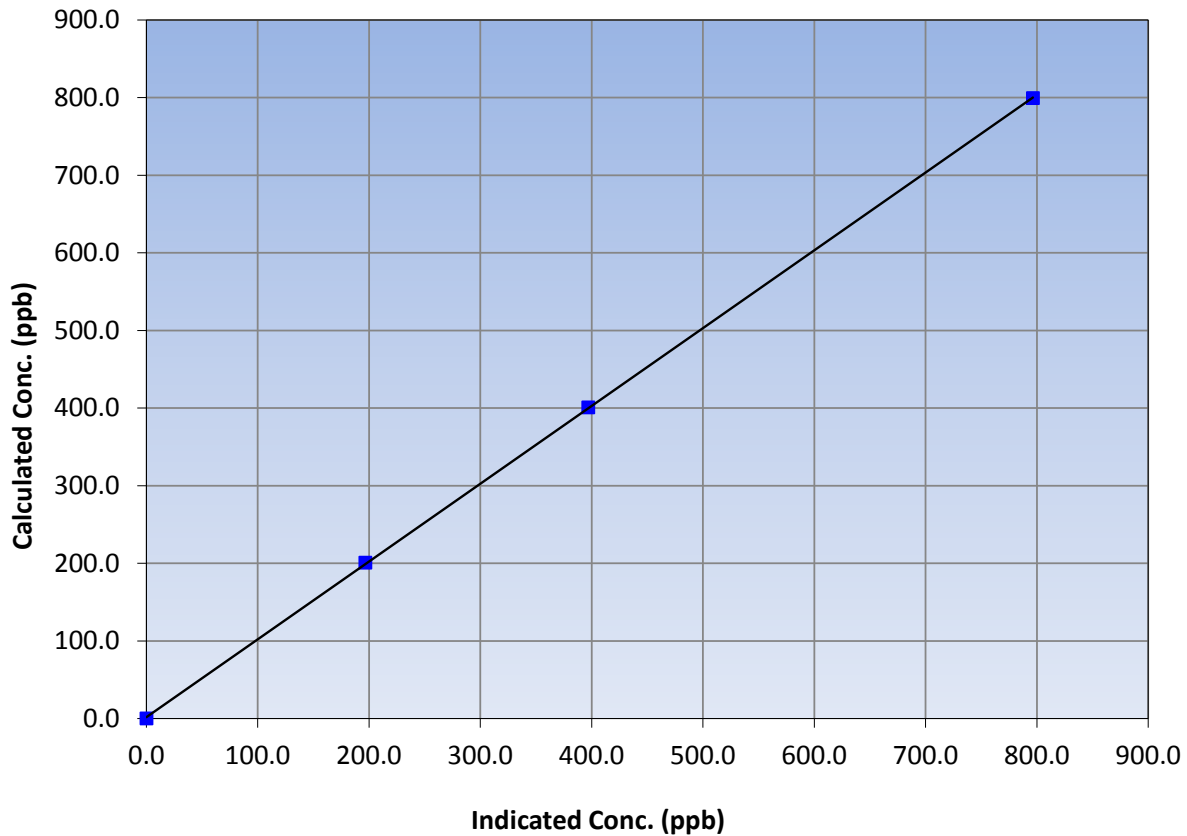
Station Information

Calibration Date	June 20, 2017	Previous Calibration	NA
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

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	
799.2	796.4	1.0035			
400.8	397.0	1.0096			
200.8	196.8	1.0202			
			Slope	1.002435	0.90 - 1.10
			Intercept	1.797299	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

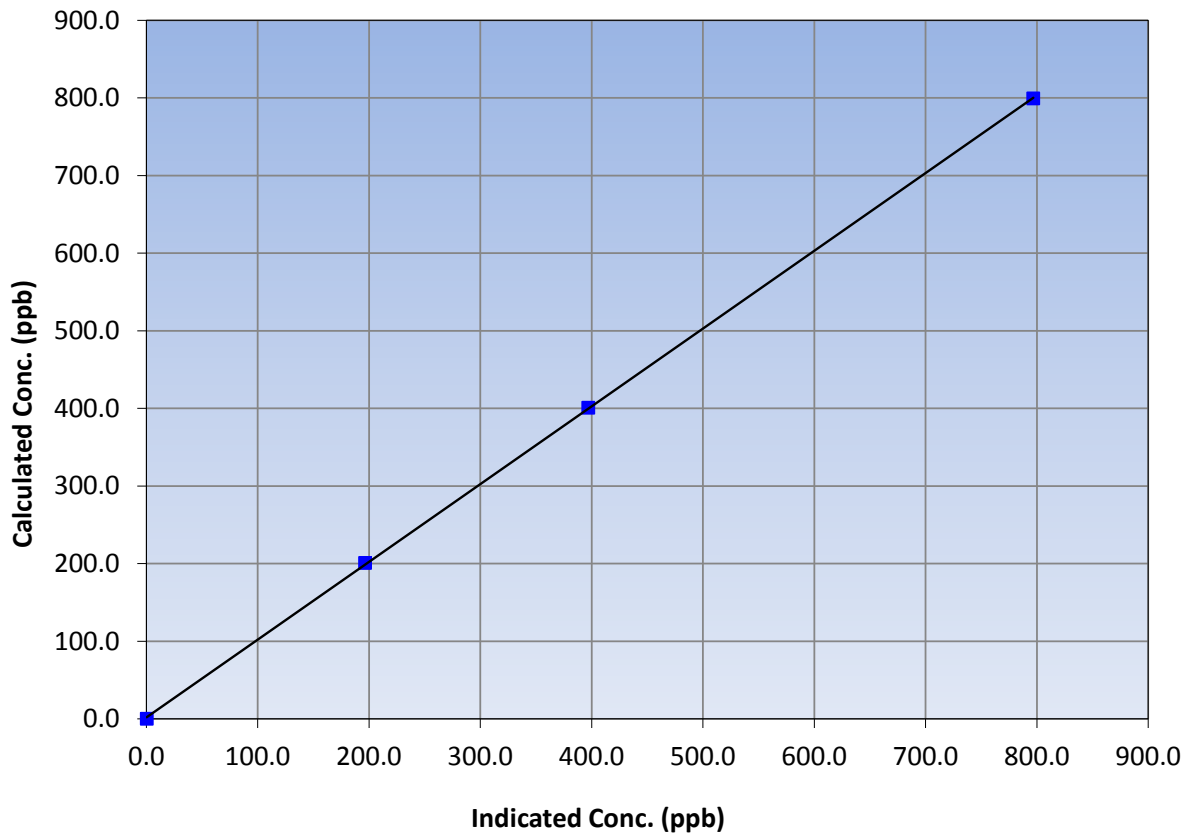
Station Information

Calibration Date	June 20, 2017	Previous Calibration	NA
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.2	----	Correlation Coefficient	0.999969	≥0.995
799.2	796.8	1.0030			
400.8	397.0	1.0096	Slope	1.001983	0.90 - 1.10
200.8	196.5	1.0218			
			Intercept	1.879209	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

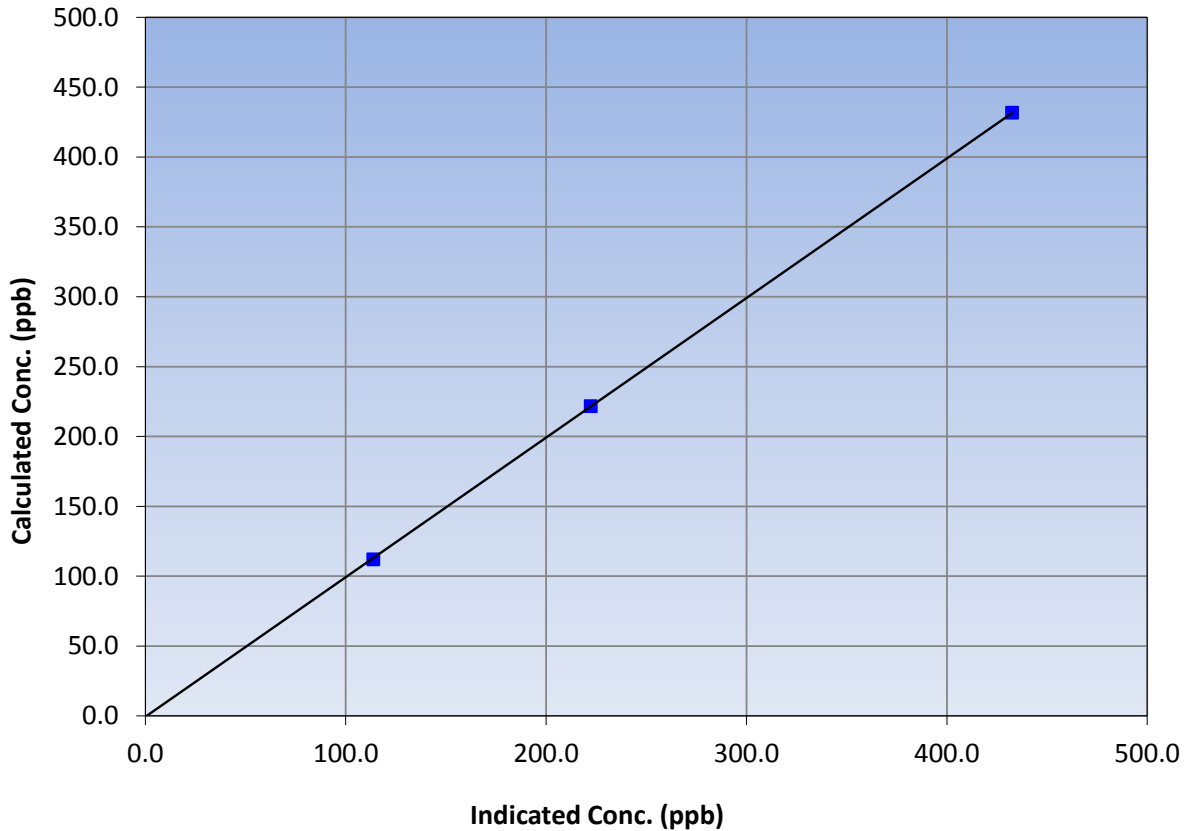
Station Information

Calibration Date	June 20, 2017	Previous Calibration	NA
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	10:30	End Time (MST)	14:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

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	
431.7	432.5	0.9982			
221.6	222.3	0.9969			
111.9	113.8	0.9833			
			Slope	0.998987	0.90 - 1.10
			Intercept	-0.605380	+/-20

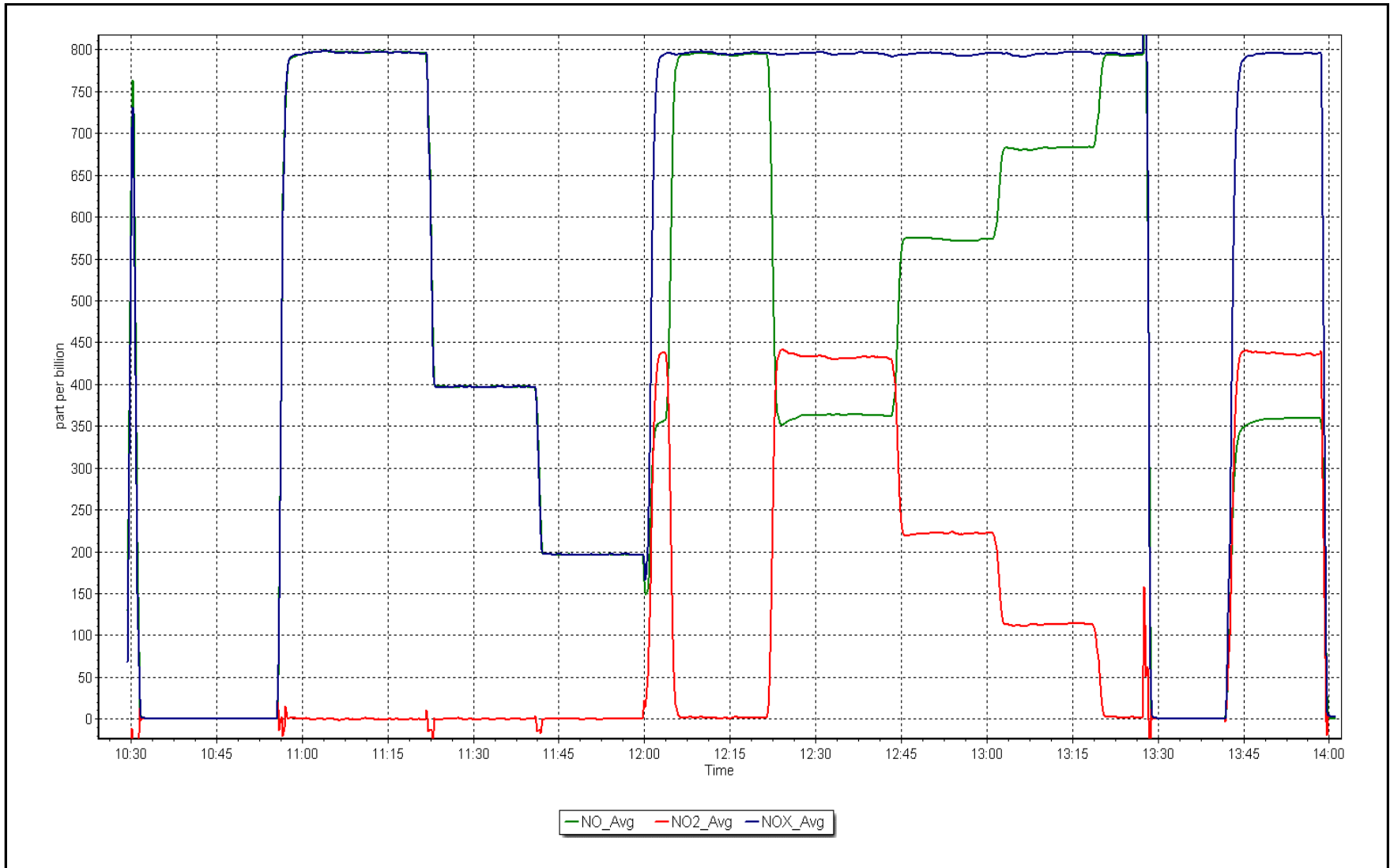
NO₂ Calibration Curve



NO_x Calibration Plot

Date: June 20, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station Number:	AMS 505
Calibration Date:	June-20-17	Prev Cal Date:	NA
Start Time (MST):	11:30	End Time (MST):	13:40
Barometric Press:	707	Station Temp:	22 Deg C
Reason:	Install		

Wind Speed Information

Sensor make/model:	Met One 010C-1	Serial Number:	P10040
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	20.3	0.9957
400	39.4	39.4	0.9990
600	58.6	58.5	1.0003
800	77.8	77.8	0.9989
Average Correction Factor			0.9984

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	NA	0.999999	<i>≥0.995</i>
Calculated slope	NA	0.999615	<i>0.90 - 1.10</i>
Calculated intercept	NA	-0.025296	<i>+/- 2</i>

Wind Direction Information

Sensor make/model:	Met One 020C-1	R14655	
As Found Declination (deg west of North)	<u>NA</u>	As Left Declination (deg west of North)	<u>16</u>

Physical Direction (Degrees) (Cv)	Indicated Direction (Degrees) (Iv)	Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i>
0	0.8	n/a
90	90.9	0.9904
180	180.4	0.9976
270	270.0	1.0000
357	358.1	0.9969
Average Correction Factor		0.9962

	<u>Start</u>	<u>Finish</u>	<u>Limits</u>
Correl Coeff (r ²)	NA	0.999995	<i>≥0.995</i>
Calculated slope	NA	1.000245	<i>0.90 - 1.10</i>
Calculated intercept	NA	-0.680083	<i>+/- 7</i>

Notes: Both WS and WD were calibrated on different dates because MET cal kit had missing few items that caused a delay for WS check. WD on June 20, 2017 and WS on July 04, 2017.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	July 13, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	7:30	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Cal Gas Concentration	<u>49.6</u>	ppm	Cal Gas Exp Date	February 22, 2020
Cal Gas Cylinder #	<u>EY0000793</u>			
Calibrator Make/Model	Teledyne API T700		Serial Number	621
ZAG Make/Model	Teledyne API 701		Serial Number	4428

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 710321323

	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
Analyzer Range	0 - 1000 ppb		PMT voltage	-628	-629
Calculated slope	0.996578	0.999093	Lamp voltage	781	783
Calculated intercept	1.216359	0.356660	Pressure	679.9	676.8
Analyzer Background	16.0	16.0	Flow	0.409	0.407
Analyzer Coefficient	1.015	1.015	Intensity	90	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	5000	0.0	0.0	-0.2	----
as found span	4930	78.8	780.3	781.2	0.999
calibrator zero	5000	0.0	0.0	-0.2	----
high point	4930	78.8	780.3	781.2	0.999
second point	4967	39.5	391.3	389.9	1.004
third point	4990	19.8	196.0	196.6	0.997
as left zero	5000	0.0	0.0	0.1	----
as left span	4930	78.8	780.3	781.6	0.998
Average Correction Factor					1.000
Corrected As found	781.40	Previous response	781.79	*% change	0.0%

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. No adjustments made.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

SO₂ Calibration Summary

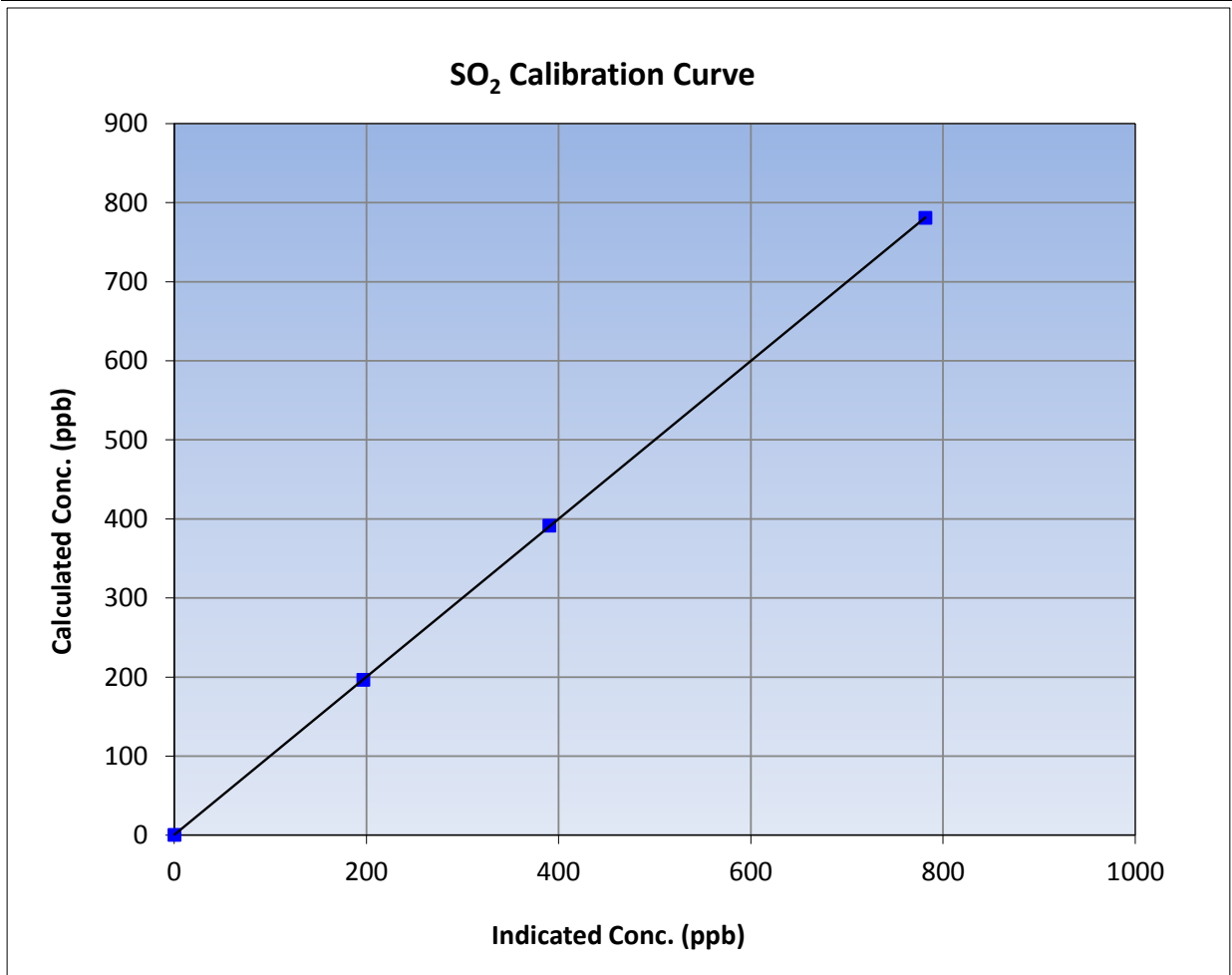
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 20, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	7:30	End Time (MST)	12:00
Analyzer make	Thermo 43i	Analyzer serial #	710321323

Calibration Data

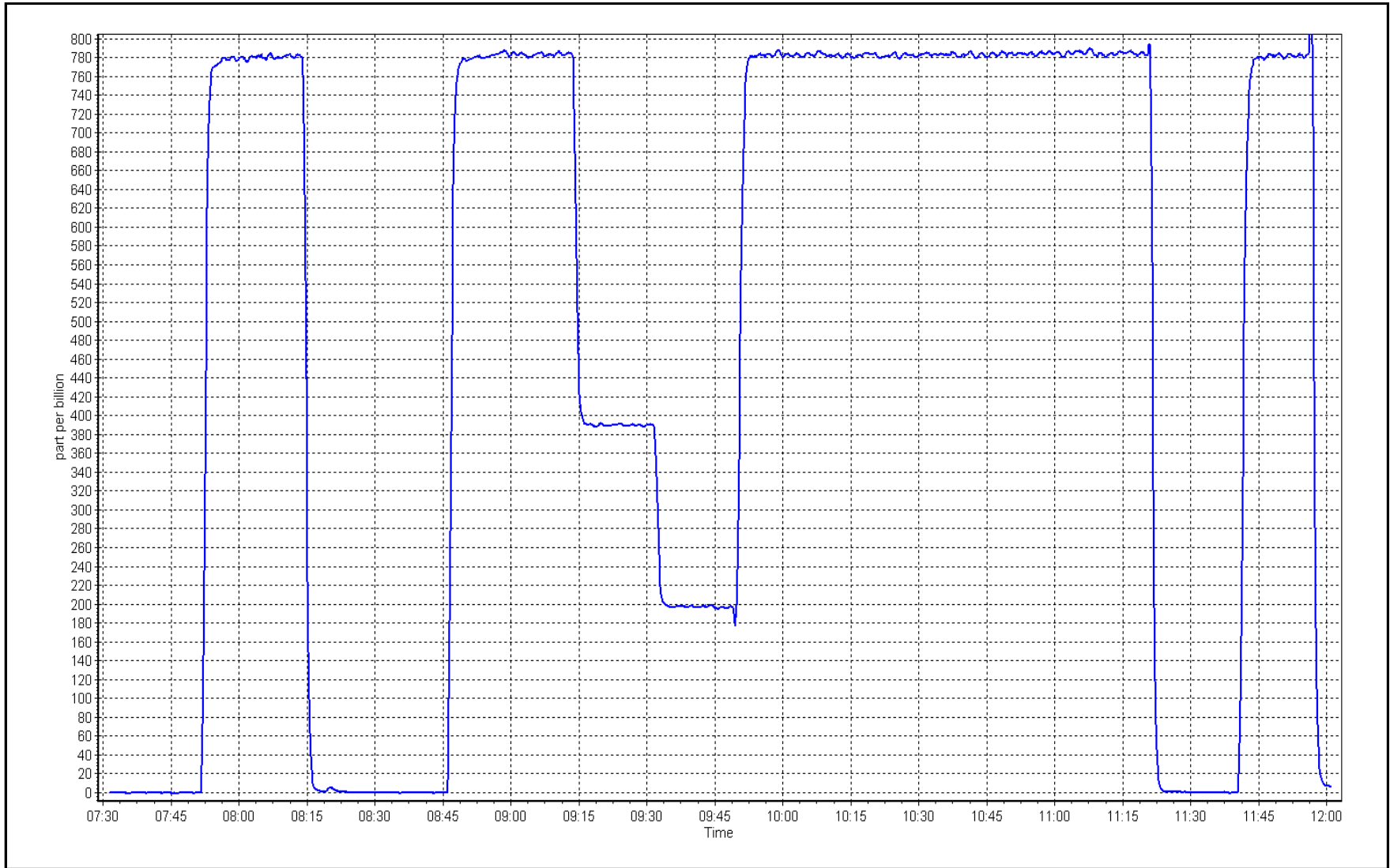
Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	-0.2	----	Correlation Coefficient	0.999991	≥0.995
780.3	781.2	0.9989			
391.3	389.9	1.0037	Slope	0.999093	0.90 - 1.10
196.0	196.6	0.9971			
			Intercept	0.356660	+/-30



SO2 Calibration Plot

Date: July 13, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	July 13, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	7:30	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

Gas Cert Reference	EY0000793	Cal Gas Expiry Date	February 22, 2020
CH4 Cal Gas Conc.	<u>504.0</u> ppm	CH4 Equiv Conc.	1054.0 ppm
C3H8 Cal Gas Conc.	<u>200.0</u> ppm	Station temp.	22 Deg C
Calibrator Make/Model	Teledyne API T700	Serial Number	621
ZAG Make/Model	Teledyne API 701	Serial Number	4428

Analyzer Information

Analyzer make:	Thermo 51i	Analyzer serial #:	1327059297
	<u>Start</u>	<u>Finish</u>	<u>Start</u> <u>Finish</u>
Analyzer Range	0 - 25 ppm	Bias voltage supply	-288 -288
Calculated slope	0.998164	Sample pressure	8.0 8.0
Calculated intercept	0.029143	Fuel pressure	23.3 23.3
Analyzer Background	3.230	Air pressure	34.5 34.5
Analyzer Coefficient	5.298	Flame temperature	153.8 152.7

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	-0.13	----
as found span	4930	78.8	16.58	17.08	0.971
calibrator zero	5000	0.0	0.00	0.04	----
high point	4930	78.8	16.58	16.58	1.000
second point	4967	39.5	8.32	8.30	1.002
third point	4990	19.8	4.17	4.14	1.007
as left zero	5000	0.0	0.00	-0.04	----
as left span	4930	78.8	16.58	16.74	0.990
Average Correction Factor					1.003
Corrected As found	17.21	Previous response	16.58	*% change	-3.6%

* = > +/-5% change initiates investigation

Notes: Sample inlet filter was replaced after as founds. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

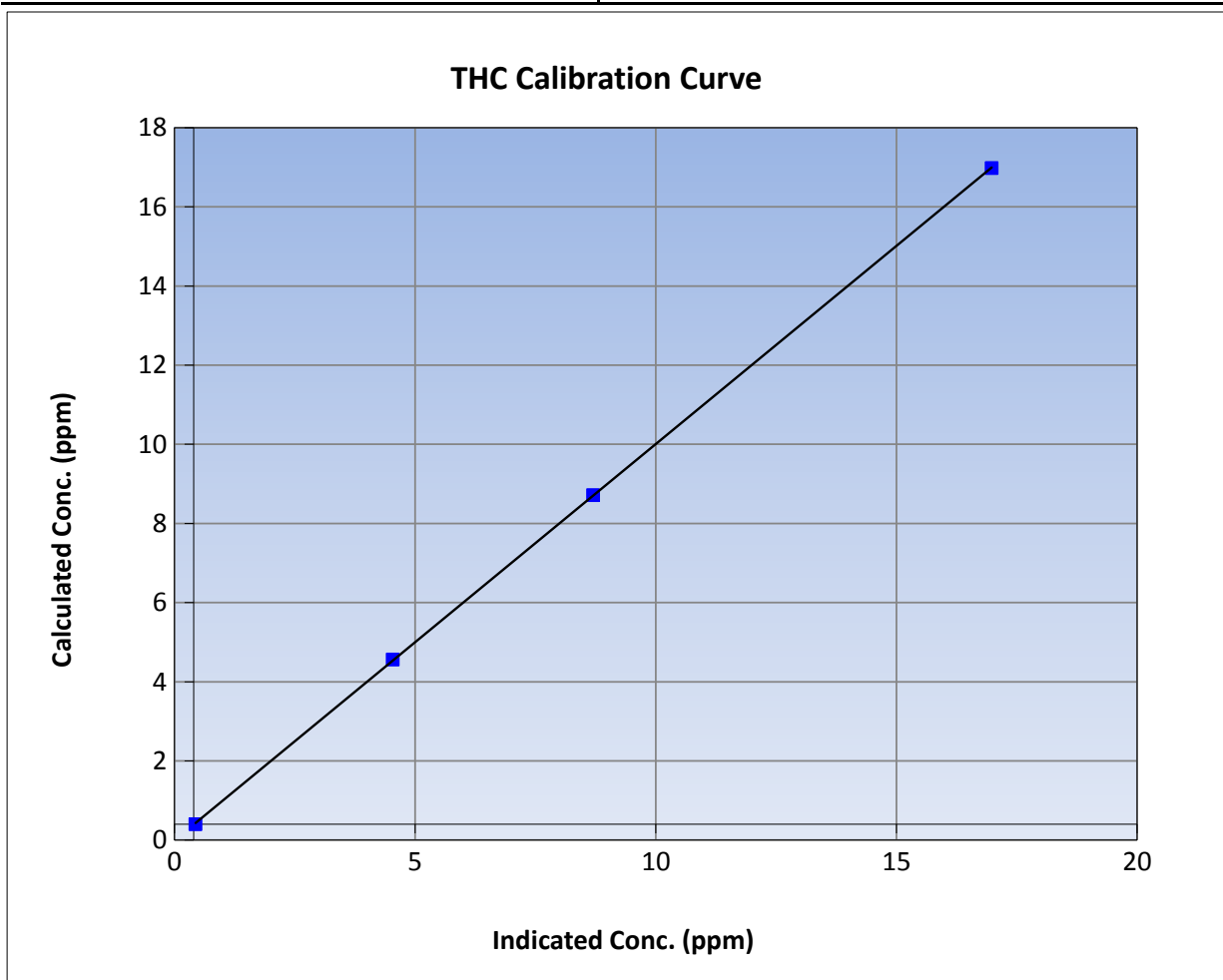
Version-03-2017

Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 20, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	7:30	End Time (MST)	12:00
Analyzer make	Thermo 51i	Analyzer serial #	1327059297

Calibration Data

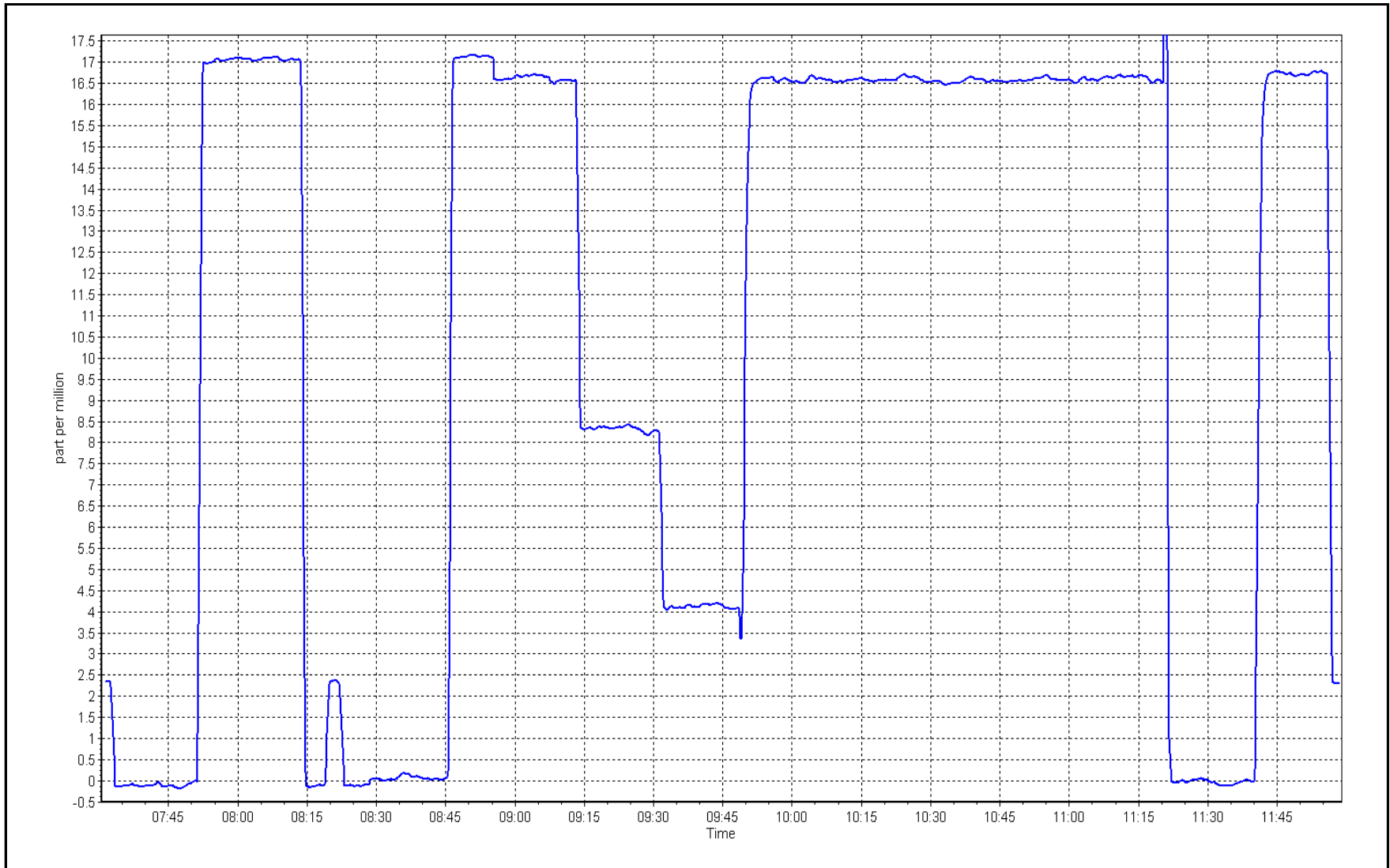
Calculated Concentration (ppm) (Cc)	Indicated Concentration (ppm) (lc)	Correction factor (Cc/lc)	Statistical Evaluation	<u>Limits</u>	
0.0	0.0	----	Correlation Coefficient	0.999985	
16.6	16.6	1.0002			≥0.995
8.3	8.3	1.0020	Slope	1.001555	
4.2	4.1	1.0072			0.90 - 1.10
			Intercept	-0.008712	+/-1.5



THC Calibration Plot

Date: July 13, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

Station Name:	Sawbones Bay	Station number:	AMS 505
Calibration Date:	July 13, 2017	Last Cal Date:	June 20, 2017
Start time (MST):	7:30	End time (MST):	12:00
Reason:	Routine		

Calibration Standards

NO Gas Cylinder #	EY0000793	Cal Gas Expiry Date	February 22, 2020
NOX Cal Gas Conc.	<u>50.8</u> ppm	NO Cal Gas Conc.	<u>50.8</u> ppm
Calibrator Model	Teledyne API T700	Serial Number	621
ZAG make/model	Teledyne API 701	Serial Number	4428

Analyzer Information

Analyzer make: Thermo 42i			Analyzer serial #: 1152430008		
	<u>Start</u>	<u>Finish</u>		<u>Start</u>	<u>Finish</u>
NO coefficient	1.041	0.885	NOX Range (ppb)	0 - 1000 ppb	
NOX coefficient	1.000	0.999	PMT Temperature	326.6	327.1
NO ₂ coefficient	1.000	1.000	Reaction cell Press	181.0	150.3
NO bkgrnd	2.8	2.4	Sample Flow	0.509	0.675
NOX bkgrnd	3.0	2.6	PMT Voltage	-760.4	-760.7

Calibration Statistics

	<u>Start</u>	<u>Finish</u>
NO _x Cal Slope	1.002435	0.999557
NO _x Cal Offset	1.797299	1.873062
NO Cal Slope	1.001983	0.999880
NO Cal Offset	1.879209	1.935384
NO ₂ Cal Slope	0.998987	0.996260
NO ₂ Cal Offset	-0.605380	-0.908000



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	-0.2	0.0	-0.2	----	----
as found span	4930	78.8	799.2	799.2	0.0	735.1	735.5	-0.4	1.0872	1.0866
calibrator zero	5000	0.0	0.0	0.0	0.0	-0.2	0.0	-0.2	----	----
high point	4930	78.8	799.2	799.2	0.0	798.6	798.4	0.2	1.0008	1.0010
second point	4967	39.5	400.8	400.8	0.0	398.0	397.7	0.3	1.0070	1.0078
third point	4990	19.8	200.8	200.8	0.0	197.5	197.1	0.3	1.0166	1.0186
as left zero	5000	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	----	----
as left span	4930	78.8	799.2	335.5	463.7	797.9	334.8	463.0	1.0016	1.0021
Average Correction Factor									1.0081	1.0091

Corrected As found	NO _x = 735.3 ppb	NO = 735.5 ppb		*Percent Change	NO _x = 8.2%
Previous Response	NO _x = 795.5 ppb	NO = 795.7 ppb		*Percent Change	NO = 8.2%
<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	797.1	795.3	1.8	1.0026	1.0049	----	----
1st NO2 (400 ppb O3)	335.5	459.8	797.3	335.5	461.8	1.0024	----	0.9957	100.4%
2nd NO2 (200 ppb O3)	560.4	234.9	797.8	560.4	237.4	1.0018	----	0.9895	101.1%
3rd NO2 (100 ppb O3)	676.4	118.9	797.7	676.4	121.3	1.0019	----	0.9802	102.0%
2nd NO ref point	----	0.0	797.0	794.4	2.6	1.0028	1.0060	----	----
Average Correction Factor						1.0022	1.0055	0.9885	101.2%

Notes: Low as founds span response was from pump wearing out slowly. Chamber pressure had increased from significantly from last cal. Sample pump replaced after as founds. Made major adjustment to span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

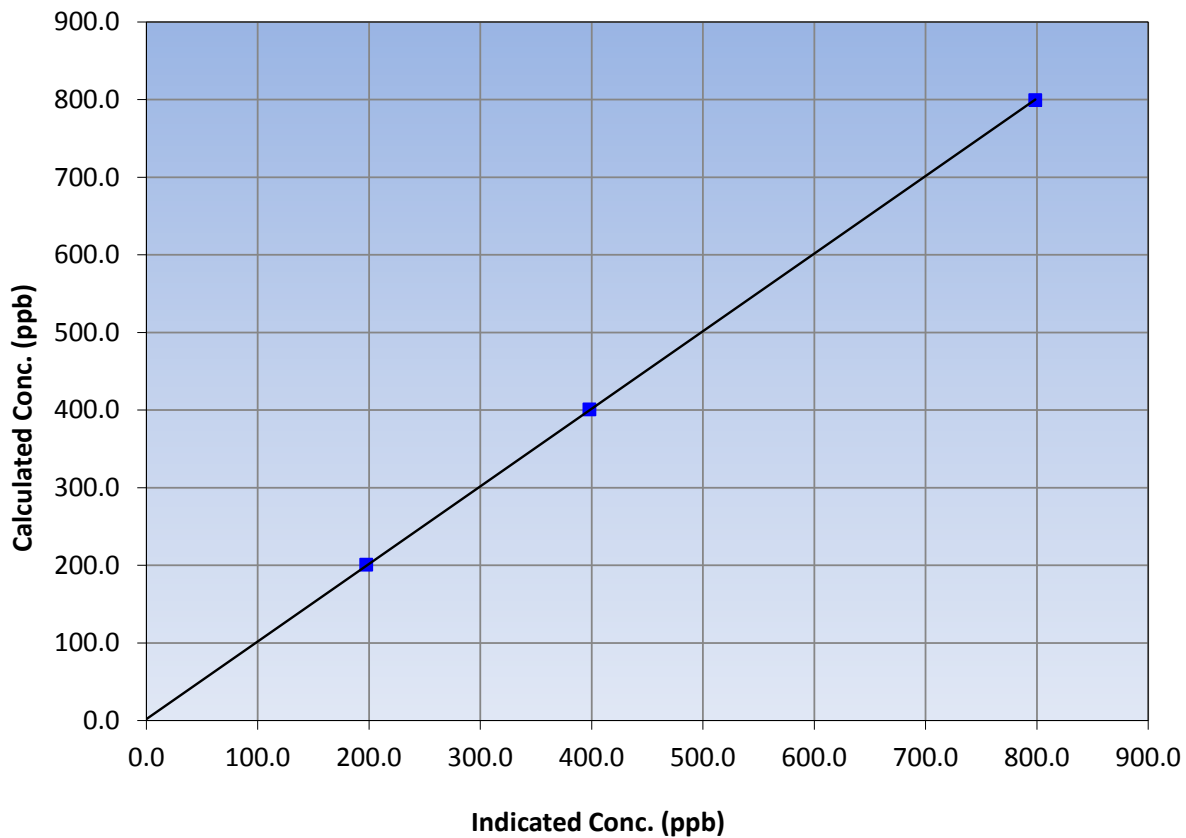
Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 20, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	7:30	End Time (MST)	12:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

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	
799.2	798.6	1.0008			
400.8	398.0	1.0070			
200.8	197.5	1.0166			
			Slope	0.999557	0.90 - 1.10
			Intercept	1.873062	+/-20

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

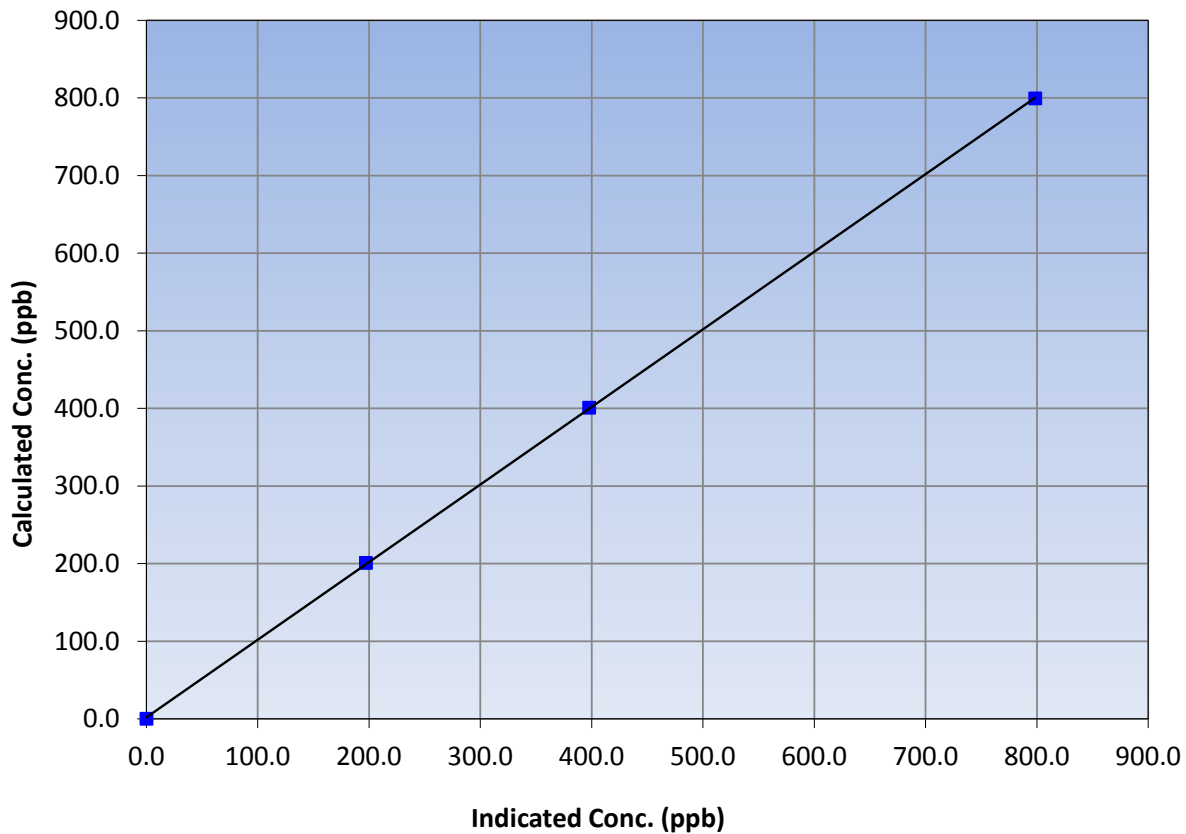
Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 20, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	7:30	End Time (MST)	12:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

Calibration Data

Calculated concentration (ppb) (Cc)	Indicated concentration (ppb) (Ic)	Correction factor (Cc/Ic)	Statistical Evaluation	Limits	
0.0	0.0	----	Correlation Coefficient	0.999973	≥0.995
799.2	798.4	1.0010			
400.8	397.7	1.0078	Slope	0.999880	0.90 - 1.10
200.8	197.1	1.0186			
			Intercept	1.935384	+/-20

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

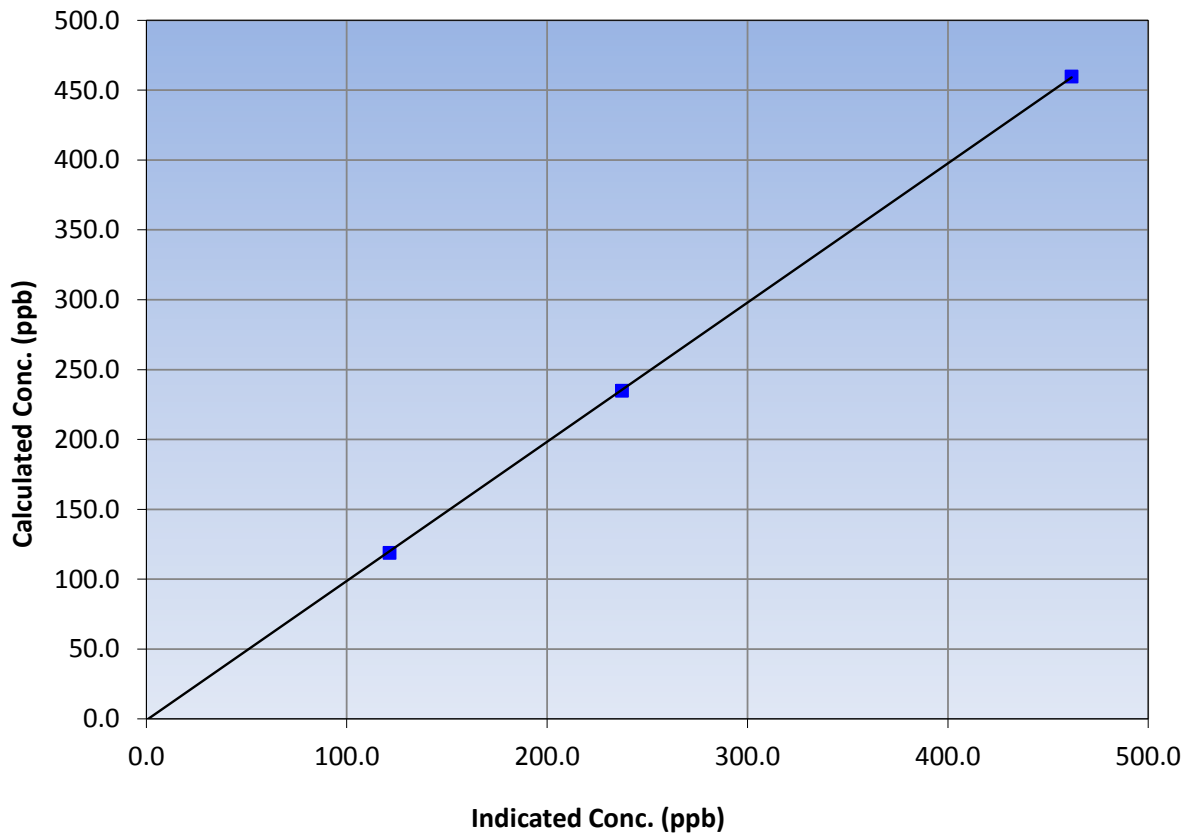
Station Information

Calibration Date	July 13, 2017	Previous Calibration	June 20, 2017
Station Name	Sawbones Bay	Station Number	AMS 505
Start Time (MST)	7:30	End Time (MST)	12:00
Analyzer make	Thermo 42i	Analyzer serial #	1152430008

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	
459.8	461.8	0.9957			
234.9	237.4	0.9895			
118.9	121.3	0.9802			
			Slope	0.996260	0.90 - 1.10
			Intercept	-0.908000	+/-20

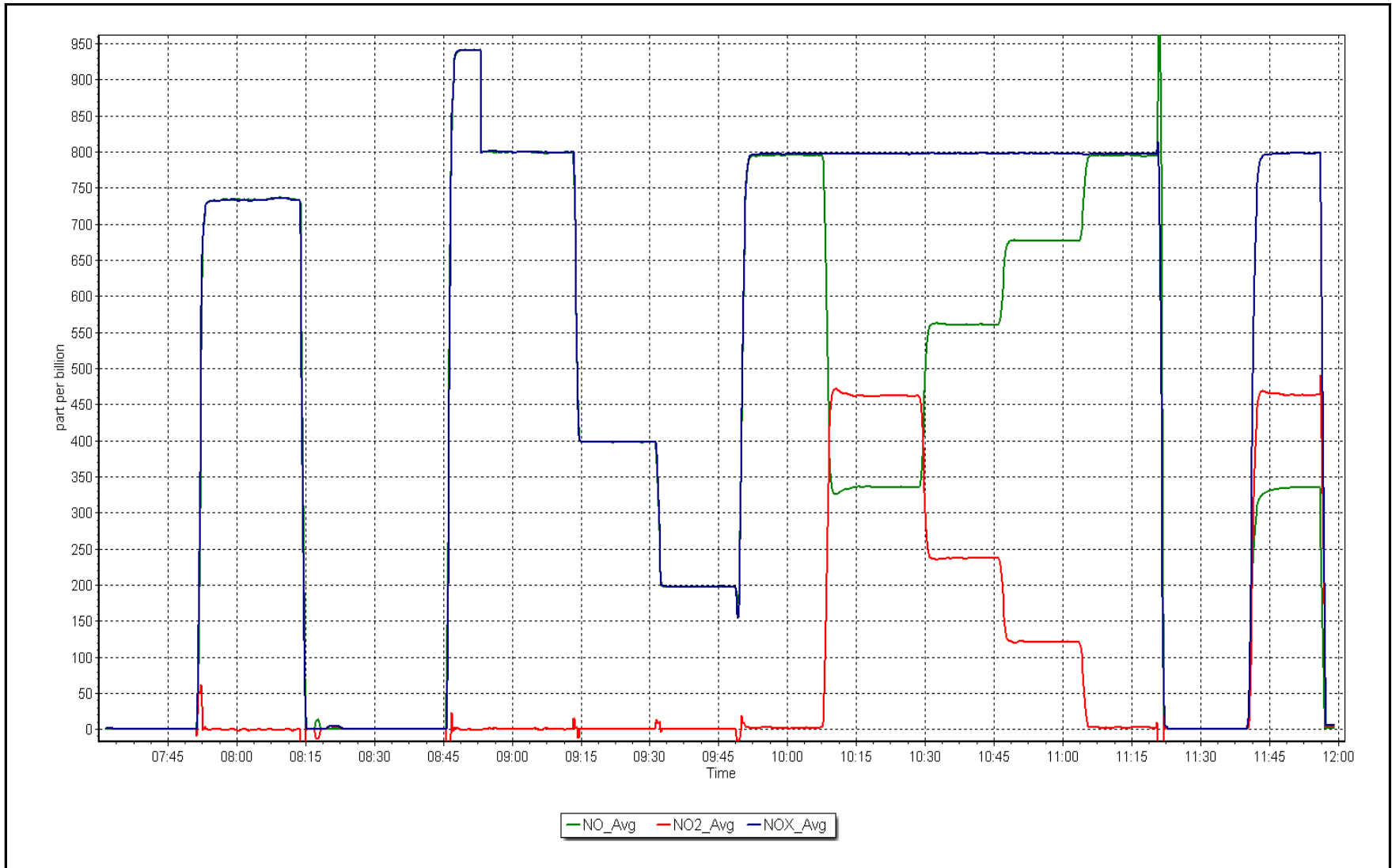
NO₂ Calibration Curve



NO_x Calibration Plot

Date: July 13, 2017

Location: Sawbones Bay





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

DATA SUMMARY JUNE 2017

Prepared
August 30, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

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

VOLATILE ORGANIC COMPOUNDS DATA SUMMARY JUNE 2017

Prepared
August 30, 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 06-Jun			Patricia McInnes AMS 6 06-Jun	
	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
	Compound Name				
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.03	V0	0	V1
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0.03	V0
2,2-Dimethylbutane	0.01	0.06	V0	0	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.08	V0	0	V1
2,3-Dimethylpentane	0.02	0.04	V0	0.03	V0
2,4-Dimethylpentane	0.01	0.01	V0	0.01	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.08	V0	0	V1
2-Methylhexane	0.01	0.12	V0	0.04	V0
2-Methylpentane	0.01	0.36	V0	0.05	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.04	V0	0	V1
3-Methylhexane	0.02	0.09	V0	0.04	V0
3-Methylpentane	0.01	0.2	V0	0.03	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	7	V0	0	V1
Acetone	0.4	4.7	V0	4.5	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.12	V0	0.04	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.04	V0	0	V1
Cyclopentane	0.01	0.07	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	2.8	V0	2.9	V0
Ethylbenzene	0.01	0.01	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.48	V0	0.17	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.63	V0	0.31	V0
Isoprene	0.01	0.41	V0	0.42	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0	V1	0	V1
Methanol	3	10	V0	9	V0
Methylcyclohexane	0.01	0.12	V0	0.02	V0
Methylcyclopentane	0.02	0.11	V0	0	V1
Methylethylketone	0.3	0.3	V0	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.21	V0	0.34	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.16	V0	0.03	V0
n-Hexane	0.01	0.23	V0	0.07	V0
n-Nonane	0.01	0.03	V0	0	V1
n-Octane	0.02	0.11	V0	0	V1
n-Pentane	0.1	0.6	V0	0.1	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.01	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.11	V0	0.07	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 06-Jun			Anzac AMS 14 06-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0.02	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0	V1	0	V1
2,3-Dimethylpentane	0.02	0.08	V0	0.05	V0
2,4-Dimethylpentane	0.01	0.03	V0	0.02	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.09	V0	0.04	V0
2-Methylhexane	0.01	0.25	V0	0.2	V0
2-Methylpentane	0.01	0.21	V0	0.15	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.04	V0	0.02	V0
3-Methylhexane	0.02	0.23	V0	0.18	V0
3-Methylpentane	0.01	0.13	V0	0.11	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	6	V0	8	V0
Acetone	0.4	5.1	V0	5.2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.09	V0	0.07	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.02	V0	0	V1
Cyclopentane	0.01	0.01	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	2.6	V0	2.4	V0
Ethylbenzene	0.01	0.02	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.74	V0	0.82	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.38	V0	0.42	V0
Isoprene	0.01	0.36	V0	0.39	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.06	V0	0	V1
Methanol	3	9	V0	9	V0
Methylcyclohexane	0.01	0.31	V0	0.21	V0
Methylcyclopentane	0.02	0.07	V0	0.06	V0
Methylethylketone	0.3	0	V1	0.3	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.69	V0	0.58	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.46	V0	0.28	V0
n-Hexane	0.01	0.57	V0	0.42	V0
n-Nonane	0.01	0.04	V0	0	V1
n-Octane	0.02	0.11	V0	0.03	V0
n-Pentane	0.1	0.2	V0	0.2	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.02	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.21	V0	0.21	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Barge Landing AMS 9 06-Jun	Fort McKay South AMS 13 06-Jun			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0	V1
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.07	V0	0	V1
2,2-Dimethylbutane	0.01	0.17	V0	0.05	V0
2,3,4-Trimethylpentane	0.01	0.01	V0	0.01	V0
2,3-Dimethylbutane	0.02	0.25	V0	0.09	V0
2,3-Dimethylpentane	0.02	0.06	V0	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0	0.02	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.15	V0	0.11	V0
2-Methylhexane	0.01	0.15	V0	0.2	V0
2-Methylpentane	0.01	1.25	V0	0.61	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.05	V0	0.05	V0
3-Methylhexane	0.02	0.15	V0	0.2	V0
3-Methylpentane	0.01	0.63	V0	0.34	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	6	V0	5	V0
Acetone	0.4	4.6	V0	3.7	V0
alpha-Pinene	0.3	0	V1	0.4	V0
Benzene	0.01	0.16	V0	0.18	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.08	V0	0.12	V0
Cyclopentane	0.01	0.19	V0	0.08	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.7	V0	2	V0
Ethylbenzene	0.01	0.03	V0	0.02	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.43	V0	0.36	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	1.52	V0	0.91	V0
Isoprene	0.01	0.99	V0	1.08	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.06	V0	0.05	V0
Methanol	3	8	V0	10	V0
Methylcyclohexane	0.01	0.19	V0	0.32	V0
Methylcyclopentane	0.02	0.2	V0	0.26	V0
Methylethylketone	0.3	0.4	V0	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.19	V0	0	V1
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.3	V0	0.5	V0
n-Hexane	0.01	0.51	V0	1.12	V0
n-Nonane	0.01	0.05	V0	0.04	V0
n-Octane	0.02	0.17	V0	0.17	V0
n-Pentane	0.1	1.6	V0	1.6	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.34	V0	0.25	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Horizon AMS 15 06-Jun		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1
1,3-Butadiene	0.02	0	V1
1-Butene	0.02	0	V1
1-Pentene	0.01	0	V1
2,2,4-Trimethylpentane	0.01	0	V1
2,2-Dimethylbutane	0.01	0.03	V0
2,3,4-Trimethylpentane	0.01	0.01	V0
2,3-Dimethylbutane	0.02	0.06	V0
2,3-Dimethylpentane	0.02	0.06	V0
2,4-Dimethylpentane	0.01	0.02	V0
2-Methyl-1-pentene	0.3	0	V1
2-Methyl-2-butene	0.3	0	V1
2-Methylheptane	0.01	0.05	V0
2-Methylhexane	0.01	0.16	V0
2-Methylpentane	0.01	0.28	V0
3-Methyl-1-butene	0.3	0	V1
3-Methylheptane	0.02	0.02	V0
3-Methylhexane	0.02	0.13	V0
3-Methylpentane	0.01	0.22	V0
4-Methyl-1-pentene	0.3	0	V1
Acetaldehyde	3	3	V0
Acetone	0.4	4.7	V0
alpha-Pinene	0.3	0	V1
Benzene	0.01	0.1	V0
beta-Pinene	0.3	0	V1
cis-2-Butene	0.02	0	V1
cis-2-Hexene	0.3	0	V1
cis-2-Pentene	0.02	0	V1
Cyclohexane	0.02	0.12	V0
Cyclopentane	0.01	0.04	V0
Cyclopentene	0.3	0	V1
Ethanol	0.3	3	V0
Ethylbenzene	0.01	0.03	V0
Formaldehyde	3	0	V1
Isobutane	0.02	0.15	V0
Isobutylene	0.3	0	V1
Isopentane	0.03	0.73	V0
Isoprene	0.01	0.43	V0
Isopropylalcohol	0.4	0.5	V0
Isopropylbenzene	0.01	0	V1
m,p-Xylene	0.03	0.04	V0
Methanol	3	8	V0
Methylcyclohexane	0.01	0.22	V0
Methylcyclopentane	0.02	0.17	V0
Methylethylketone	0.3	1	V0
Methylisobutylketone	0.4	0	V1
Methylvinylketone	0.3	0	V1
n-Butane	0.03	0	V1
n-Decane	0.06	0	V1
n-Dodecane	0.4	0	V1
n-Heptane	0.01	0.26	V0
n-Hexane	0.01	0.62	V0
n-Nonane	0.01	0.02	V0
n-Octane	0.02	0.06	V0
n-Pentane	0.1	0.5	V0
n-Propylbenzene	0.05	0	V1
n-Undecane	0.5	0	V1
Naphthalene	0.5	0	V1
o-Xylene	0.01	0.01	V0
Styrene	0.04	0	V1
Toluene	0.01	0.21	V0
trans-2-Butene	0.01	0	V1
trans-2-Hexene	0.3	0	V1
trans-2-Pentene	0.02	0	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	AMS 1			AMS 6	
	12-Jun			12-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.04	V0	0	V1
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0.07	V0
2,2-Dimethylbutane	0.01	0.03	V0	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0.01	V0
2,3-Dimethylbutane	0.02	0.04	V0	0.03	V0
2,3-Dimethylpentane	0.02	0	V1	0.08	V0
2,4-Dimethylpentane	0.01	0	V1	0.03	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.02	V0	0.04	V0
2-Methylhexane	0.01	0	V1	0.19	V0
2-Methylpentane	0.01	0.17	V0	0.27	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0.02	V0
3-Methylhexane	0.02	0.05	V0	0.18	V0
3-Methylpentane	0.01	0.1	V0	0.18	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	8	V0	3	V0
Acetone	0.4	4.9	V0	3.8	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.05	V0	0.13	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0.06	V0
Cyclopentane	0.01	0.03	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	3.5	V0	2.1	V0
Ethylbenzene	0.01	0.03	V0	0.01	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.52	V0	0.25	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.54	V0	0.55	V0
Isoprene	0.01	0.33	V0	0.12	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.04	V0	0.04	V0
Methanol	3	12	V0	8	V0
Methylcyclohexane	0.01	0.03	V0	0.26	V0
Methylcyclopentane	0.02	0.05	V0	0.15	V0
Methylethylketone	0.3	0.7	V0	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.26	V0	0.57	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.06	V0	0.3	V0
n-Hexane	0.01	0.11	V0	0.72	V0
n-Nonane	0.01	0.01	V0	0.01	V0
n-Octane	0.02	0.02	V0	0.05	V0
n-Pentane	0.1	0.3	V0	0.4	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.02	V0	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.09	V0	0.25	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 12-Jun			Anzac AMS 14 12-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.03	V0	0.02	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.03	V0	0	V1
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.03	V0	0.02	V0
2,3-Dimethylpentane	0.02	0.02	V0	0	V1
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0	V1	0	V1
2-Methylhexane	0.01	0.06	V0	0.04	V0
2-Methylpentane	0.01	0.05	V0	0.03	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.04	V0	0.02	V0
3-Methylpentane	0.01	0.03	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	5	V0	5	V0
Acetone	0.4	4.8	V0	4.2	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.04	V0	0.02	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	3.9	V0	2.2	V0
Ethylbenzene	0.01	0.01	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.15	V0	0.33	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.41	V0	0.33	V0
Isoprene	0.01	0.13	V0	0.15	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0	V1
Methanol	3	11	V0	7	V0
Methylcyclohexane	0.01	0.01	V0	0	V1
Methylcyclopentane	0.02	0.02	V0	0	V1
Methylethylketone	0.3	0.6	V0	0.4	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.31	V0	0.33	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.03	V0	0.02	V0
n-Hexane	0.01	0.06	V0	0.04	V0
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0	V1	0	V1
n-Pentane	0.1	0.1	V0	0.1	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.02	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.07	V0	0.06	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Barge Landing AMS 9 12-Jun	Fort McKay South AMS 13 12-Jun			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0.02	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.03	V0	0.02	V0
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.06	V0	0.03	V0
2,3-Dimethylpentane	0.02	0	V1	0.03	V0
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0	V1	0.04	V0
2-Methylhexane	0.01	0.03	V0	0.07	V0
2-Methylpentane	0.01	0.07	V0	0.13	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.03	V0	0.07	V0
3-Methylpentane	0.01	0.04	V0	0.06	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	4	V0	3	V0
Acetone	0.4	3.8	V0	3.3	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.03	V0	0.04	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0.02	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	2	V0	1.2	V0
Ethylbenzene	0.01	0	V1	0.01	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.26	V0	0.28	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.28	V0	0.36	V0
Isoprene	0.01	0.25	V0	0.48	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0	V1	0.04	V0
Methanol	3	7	V0	8	V0
Methylcyclohexane	0.01	0.01	V0	0.06	V0
Methylcyclopentane	0.02	0.02	V0	0.07	V0
Methylethylketone	0.3	0	V1	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.14	V0	0.25	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.03	V0	0.12	V0
n-Hexane	0.01	0.06	V0	0.17	V0
n-Nonane	0.01	0	V1	0.02	V0
n-Octane	0.02	0	V1	0.05	V0
n-Pentane	0.1	0.1	V0	0.2	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0	V1	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.02	V0	0.08	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Horizon AMS 15 12-Jun		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1
1,3-Butadiene	0.02	0	V1
1-Butene	0.02	0.04	V0
1-Pentene	0.01	0	V1
2,2,4-Trimethylpentane	0.01	0	V1
2,2-Dimethylbutane	0.01	0.08	V0
2,3,4-Trimethylpentane	0.01	0.01	V0
2,3-Dimethylbutane	0.02	0.14	V0
2,3-Dimethylpentane	0.02	0.04	V0
2,4-Dimethylpentane	0.01	0	V1
2-Methyl-1-pentene	0.3	0	V1
2-Methyl-2-butene	0.3	0	V1
2-Methylheptane	0.01	0.04	V0
2-Methylhexane	0.01	0.08	V0
2-Methylpentane	0.01	0.41	V0
3-Methyl-1-butene	0.3	0	V1
3-Methylheptane	0.02	0.03	V0
3-Methylhexane	0.02	0.06	V0
3-Methylpentane	0.01	0.26	V0
4-Methyl-1-pentene	0.3	0	V1
Acetaldehyde	3	5	V0
Acetone	0.4	3.9	V0
alpha-Pinene	0.3	0	V1
Benzene	0.01	0.1	V0
beta-Pinene	0.3	0	V1
cis-2-Butene	0.02	0	V1
cis-2-Hexene	0.3	0	V1
cis-2-Pentene	0.02	0	V1
Cyclohexane	0.02	0.09	V0
Cyclopentane	0.01	0.13	V0
Cyclopentene	0.3	0	V1
Ethanol	0.3	2.3	V0
Ethylbenzene	0.01	0.02	V0
Formaldehyde	3	0	V1
Isobutane	0.02	0.58	V0
Isobutylene	0.3	0	V1
Isopentane	0.03	1.08	V0
Isoprene	0.01	0.35	V0
Isopropylalcohol	0.4	0	V1
Isopropylbenzene	0.01	0	V1
m,p-Xylene	0.03	0.04	V0
Methanol	3	9	V0
Methylcyclohexane	0.01	0.06	V0
Methylcyclopentane	0.02	0.12	V0
Methylethylketone	0.3	0.3	V0
Methylisobutylketone	0.4	0	V1
Methylvinylketone	0.3	0	V1
n-Butane	0.03	0.23	V0
n-Decane	0.06	0	V1
n-Dodecane	0.4	0	V1
n-Heptane	0.01	0.11	V0
n-Hexane	0.01	0.25	V0
n-Nonane	0.01	0.02	V0
n-Octane	0.02	0.06	V0
n-Pentane	0.1	0.8	V0
n-Propylbenzene	0.05	0	V1
n-Undecane	0.5	0	V1
Naphthalene	0.5	0	V1
o-Xylene	0.01	0.02	V0
Styrene	0.04	0	V1
Toluene	0.01	0.08	V0
trans-2-Butene	0.01	0	V1
trans-2-Hexene	0.3	0	V1
trans-2-Pentene	0.02	0	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	AMS 1			AMS 6	
	18-Jun			18-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.02	V0	0.02	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0.75	V0
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0.01	V0
2,3-Dimethylbutane	0.02	0.02	V0	0.03	V0
2,3-Dimethylpentane	0.02	0	V1	0.04	V0
2,4-Dimethylpentane	0.01	0	V1	0.01	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.02	V0	0.02	V0
2-Methylhexane	0.01	0.04	V0	0.13	V0
2-Methylpentane	0.01	0.03	V0	0.04	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0.02	V0
3-Methylhexane	0.02	0.04	V0	0.12	V0
3-Methylpentane	0.01	0.03	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	3	V0
Acetone	0.4	2.9	V0	3.5	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.02	V0	0.04	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.4	V0	4.5	V0
Ethylbenzene	0.01	0	V1	0.08	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.11	V0	0.16	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.2	V0	0.28	V0
Isoprene	0.01	0.69	V0	0.32	V0
Isopropylalcohol	0.4	0	V1	0.5	V0
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0	V1	0.11	V0
Methanol	3	7	V0	7	V0
Methylcyclohexane	0.01	0.04	V0	0.01	V0
Methylcyclopentane	0.02	0.02	V0	0.02	V0
Methylethylketone	0.3	0	V1	0.7	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.18	V0	0.31	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.08	V0	0.07	V0
n-Hexane	0.01	0.05	V0	0.04	V0
n-Nonane	0.01	0.01	V0	0	V1
n-Octane	0.02	0.02	V0	0	V1
n-Pentane	0.1	0	V1	0	V1
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0	V1	0.04	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.07	V0	0.89	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Athabasca Valley AMS 7 18-Jun			Anzac AMS 14 18-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0.04	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.03	V0	0.03	V0
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.04	V0	0	V1
2,3-Dimethylpentane	0.02	0.03	V0	0.03	V0
2,4-Dimethylpentane	0.01	0.01	V0	0.01	V0
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0	V1	0.01	V0
2-Methylhexane	0.01	0.05	V0	0.04	V0
2-Methylpentane	0.01	0.04	V0	0.03	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.02	V0	0.03	V0
3-Methylpentane	0.01	0.03	V0	0.02	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	7	V0	3	V0
Acetone	0.4	3.4	V0	3	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.02	V0	0.03	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	5.4	V0	1.5	V0
Ethylbenzene	0.01	0.01	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.43	V0	0.37	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.25	V0	0.21	V0
Isoprene	0.01	0.31	V0	0.29	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0	V1
Methanol	3	11	V0	6	V0
Methylcyclohexane	0.01	0.01	V0	0.02	V0
Methylcyclopentane	0.02	0.03	V0	0	V1
Methylethylketone	0.3	0.4	V0	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.2	V0	0.27	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.02	V0	0.07	V0
n-Hexane	0.01	0.05	V0	0.06	V0
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0	V1	0	V1
n-Pentane	0.1	0	V1	0.1	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.02	V0	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.08	V0	0.13	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Barge Landing AMS 9 18-Jun	Fort McKay South AMS 13 18-Jun			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0.07	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.02	V0	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.05	V0	0	V1
2,3-Dimethylpentane	0.02	0	V1	0	V1
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.03	V0	0.01	V0
2-Methylhexane	0.01	0.04	V0	0	V1
2-Methylpentane	0.01	0.04	V0	0.02	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.04	V0	0	V1
3-Methylpentane	0.01	0.03	V0	0.01	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	0	V1	0	V1
Acetone	0.4	2.7	V0	2.7	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.03	V0	0	V1
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	1.1	V0	0.6	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.11	V0	0.07	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.19	V0	0.11	V0
Isoprene	0.01	0.46	V0	0.66	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0	V1	0	V1
Methanol	3	6	V0	8	V0
Methylcyclohexane	0.01	0.05	V0	0.02	V0
Methylcyclopentane	0.02	0.03	V0	0	V1
Methylethylketone	0.3	0	V1	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.17	V0	0.09	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.08	V0	0.01	V0
n-Hexane	0.01	0.06	V0	0.02	V0
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0.03	V0	0	V1
n-Pentane	0.1	0	V1	0	V1
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0	V1	0	V1
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.06	V0	0.03	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Horizon AMS 15 18-Jun		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1
1,3-Butadiene	0.02	0	V1
1-Butene	0.02	0	V1
1-Pentene	0.01	0	V1
2,2,4-Trimethylpentane	0.01	0	V1
2,2-Dimethylbutane	0.01	0.02	V0
2,3,4-Trimethylpentane	0.01	0	V1
2,3-Dimethylbutane	0.02	0.03	V0
2,3-Dimethylpentane	0.02	0.02	V0
2,4-Dimethylpentane	0.01	0	V1
2-Methyl-1-pentene	0.3	0	V1
2-Methyl-2-butene	0.3	0	V1
2-Methylheptane	0.01	0	V1
2-Methylhexane	0.01	0.03	V0
2-Methylpentane	0.01	0	V1
3-Methyl-1-butene	0.3	0	V1
3-Methylheptane	0.02	0	V1
3-Methylhexane	0.02	0	V1
3-Methylpentane	0.01	0.05	V0
4-Methyl-1-pentene	0.3	0	V1
Acetaldehyde	3	3	V0
Acetone	0.4	2.9	V0
alpha-Pinene	0.3	0	V1
Benzene	0.01	0	V1
beta-Pinene	0.3	0	V1
cis-2-Butene	0.02	0	V1
cis-2-Hexene	0.3	0	V1
cis-2-Pentene	0.02	0	V1
Cyclohexane	0.02	0.04	V0
Cyclopentane	0.01	0	V1
Cyclopentene	0.3	0	V1
Ethanol	0.3	1.1	V0
Ethylbenzene	0.01	0	V1
Formaldehyde	3	0	V1
Isobutane	0.02	0.23	V0
Isobutylene	0.3	0	V1
Isopentane	0.03	0.36	V0
Isoprene	0.01	0.57	V0
Isopropylalcohol	0.4	0	V1
Isopropylbenzene	0.01	0	V1
m,p-Xylene	0.03	0	V1
Methanol	3	4	V0
Methylcyclohexane	0.01	0.02	V0
Methylcyclopentane	0.02	0.04	V0
Methylethylketone	0.3	0	V1
Methylisobutylketone	0.4	0	V1
Methylvinylketone	0.3	0	V1
n-Butane	0.03	0.06	V0
n-Decane	0.06	0	V1
n-Dodecane	0.4	0	V1
n-Heptane	0.01	0.02	V0
n-Hexane	0.01	0.01	V0
n-Nonane	0.01	0	V1
n-Octane	0.02	0	V1
n-Pentane	0.1	0	V1
n-Propylbenzene	0.05	0	V1
n-Undecane	0.5	0	V1
Naphthalene	0.5	0	V1
o-Xylene	0.01	0	V1
Styrene	0.04	0	V1
Toluene	0.01	0.02	V0
trans-2-Butene	0.01	0	V1
trans-2-Hexene	0.3	0	V1
trans-2-Pentene	0.02	0	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	AMS 1			AMS 6	
	24-Jun			24-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.07	V0	0.08	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.02	V0	0.02	V0
2,2-Dimethylbutane	0.01	0.08	V0	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.13	V0	0.03	V0
2,3-Dimethylpentane	0.02	0	V1	0.02	V0
2,4-Dimethylpentane	0.01	0.01	V0	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0	V1	0.01	V0
2-Methylhexane	0.01	0.06	V0	0	V1
2-Methylpentane	0.01	0.47	V0	0.1	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.03	V0	0.04	V0
3-Methylpentane	0.01	0.25	V0	0.07	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	6	V0	8	V0
Acetone	0.4	4.4	V0	5.1	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.11	V0	0.07	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0.03	V0
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.04	V0	0.02	V0
Cyclopentane	0.01	0.1	V0	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	2.7	V0	5.2	V0
Ethylbenzene	0.01	0.01	V0	0.02	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.31	V0	0.4	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.93	V0	0.58	V0
Isoprene	0.01	0.6	V0	0.21	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0.05	V0
Methanol	3	7	V0	12	V0
Methylcyclohexane	0.01	0.03	V0	0.02	V0
Methylcyclopentane	0.02	0.08	V0	0.05	V0
Methylethylketone	0.3	0	V1	0.4	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.21	V0	0.77	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.03	V0	0.06	V0
n-Hexane	0.01	0.2	V0	0.11	V0
n-Nonane	0.01	0	V1	0.01	V0
n-Octane	0.02	0.02	V0	0.04	V0
n-Pentane	0.1	0.9	V0	0.2	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.08	V0	0.1	V0
trans-2-Butene	0.01	0.03	V0	0.06	V0
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0.03	V0



Station Name Station # Sample Date	Athabasca Valley AMS 7 24-Jun			Anzac AMS 14 24-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0	V1	0.05	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,2-Dimethylbutane	0.01	0	V1	0	V1
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.1	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.02	V0	0	V1
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.02	V0	0	V1
2-Methylhexane	0.01	0	V1	0.03	V0
2-Methylpentane	0.01	0.08	V0	0.06	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.03	V0	0	V1
3-Methylpentane	0.01	0.05	V0	0.04	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	4	V0	5	V0
Acetone	0.4	5.4	V0	3.5	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.05	V0	0.04	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0.02	V0	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	2.5	V0	2.1	V0
Ethylbenzene	0.01	0.02	V0	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.03	V0	0.17	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.34	V0	0.33	V0
Isoprene	0.01	0.47	V0	0.22	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.05	V0	0	V1
Methanol	3	13	V0	9	V0
Methylcyclohexane	0.01	0.01	V0	0.01	V0
Methylcyclopentane	0.02	0.03	V0	0.03	V0
Methylethylketone	0.3	0	V1	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0	V1	0.16	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.04	V0	0.02	V0
n-Hexane	0.01	0.08	V0	0.06	V0
n-Nonane	0.01	0	V1	0	V1
n-Octane	0.02	0.03	V0	0	V1
n-Pentane	0.1	0.2	V0	0.2	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.08	V0	0.1	V0
trans-2-Butene	0.01	0.04	V0	0.02	V0
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Barge Landing AMS 9 24-Jun	Fort McKay South AMS 13 24-Jun			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.07	V0	0.06	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.23	V0	0.11	V0
2,3,4-Trimethylpentane	0.01	0	V1	0	V1
2,3-Dimethylbutane	0.02	0.31	V0	0.16	V0
2,3-Dimethylpentane	0.02	0	V1	0	V1
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.01	V0	0	V1
2-Methylhexane	0.01	0.05	V0	0	V1
2-Methylpentane	0.01	1.32	V0	0.63	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.03	V0	0.03	V0
3-Methylpentane	0.01	0.69	V0	0.38	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	4	V0	3	V0
Acetone	0.4	5.1	V0	3.5	V0
alpha-Pinene	0.3	0	V1	0	V1
Benzene	0.01	0.19	V0	0.13	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.07	V0	0.05	V0
Cyclopentane	0.01	0.27	V0	0.15	V0
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	0.9	V0	1.7	V0
Ethylbenzene	0.01	0	V1	0	V1
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.14	V0	0.15	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	1.74	V0	1.13	V0
Isoprene	0.01	1.04	V0	0.67	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0	V1	0	V1
Methanol	3	7	V0	10	V0
Methylcyclohexane	0.01	0.04	V0	0.04	V0
Methylcyclopentane	0.02	0.15	V0	0.1	V0
Methylethylketone	0.3	0	V1	0	V1
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.15	V0	0.09	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.08	V0	0.04	V0
n-Hexane	0.01	0.51	V0	0.25	V0
n-Nonane	0.01	0	V1	0.01	V0
n-Octane	0.02	0	V1	0.02	V0
n-Pentane	0.1	2.4	V0	1.3	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.01	V0	0.01	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.07	V0	0.05	V0
trans-2-Butene	0.01	0.02	V0	0.03	V0
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Horizon AMS 15 24-Jun		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1
1,3-Butadiene	0.02	0	V1
1-Butene	0.02	0.09	V0
1-Pentene	0.01	0	V1
2,2,4-Trimethylpentane	0.01	0	V1
2,2-Dimethylbutane	0.01	0	V1
2,3,4-Trimethylpentane	0.01	0	V1
2,3-Dimethylbutane	0.02	0.06	V0
2,3-Dimethylpentane	0.02	0	V1
2,4-Dimethylpentane	0.01	0	V1
2-Methyl-1-pentene	0.3	0	V1
2-Methyl-2-butene	0.3	0	V1
2-Methylheptane	0.01	0	V1
2-Methylhexane	0.01	0	V1
2-Methylpentane	0.01	0	V1
3-Methyl-1-butene	0.3	0	V1
3-Methylheptane	0.02	0	V1
3-Methylhexane	0.02	0	V1
3-Methylpentane	0.01	0.05	V0
4-Methyl-1-pentene	0.3	0	V1
Acetaldehyde	3	4	V0
Acetone	0.4	4	V0
alpha-Pinene	0.3	0	V1
Benzene	0.01	0.02	V0
beta-Pinene	0.3	0	V1
cis-2-Butene	0.02	0	V1
cis-2-Hexene	0.3	0	V1
cis-2-Pentene	0.02	0	V1
Cyclohexane	0.02	0.05	V0
Cyclopentane	0.01	0	V1
Cyclopentene	0.3	0	V1
Ethanol	0.3	1.3	V0
Ethylbenzene	0.01	0	V1
Formaldehyde	3	0	V1
Isobutane	0.02	0.03	V0
Isobutylene	0.3	0	V1
Isopentane	0.03	0.35	V0
Isoprene	0.01	0.59	V0
Isopropylalcohol	0.4	0	V1
Isopropylbenzene	0.01	0	V1
m,p-Xylene	0.03	0	V1
Methanol	3	10	V0
Methylcyclohexane	0.01	0.02	V0
Methylcyclopentane	0.02	0.03	V0
Methylethylketone	0.3	0	V1
Methylisobutylketone	0.4	0	V1
Methylvinylketone	0.3	0	V1
n-Butane	0.03	0.12	V0
n-Decane	0.06	0	V1
n-Dodecane	0.4	0	V1
n-Heptane	0.01	0	V1
n-Hexane	0.01	0.02	V0
n-Nonane	0.01	0	V1
n-Octane	0.02	0	V1
n-Pentane	0.1	0	V1
n-Propylbenzene	0.05	0	V1
n-Undecane	0.5	0	V1
Naphthalene	0.5	0	V1
o-Xylene	0.01	0	V1
Styrene	0.04	0	V1
Toluene	0.01	0.03	V0
trans-2-Butene	0.01	0.08	V0
trans-2-Hexene	0.3	0	V1
trans-2-Pentene	0.02	0	V1



Station Name Station # Sample Date	Bertha Ganter -			Patricia McInnes	
	Fort McKay			AMS 6	
	AMS 1			AMS 6	
	30-Jun			30-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.05	V0	0	V1
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.01	V0	0.03	V0
2,2-Dimethylbutane	0.01	0.02	V0	0	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.04	V0	0.04	V0
2,3-Dimethylpentane	0.02	0.04	V0	0.03	V0
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.05	V0	0	V1
2-Methylhexane	0.01	0.08	V0	0.04	V0
2-Methylpentane	0.01	0.09	V0	0.11	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.03	V0	0	V1
3-Methylhexane	0.02	0.05	V0	0.03	V0
3-Methylpentane	0.01	0.07	V0	0.08	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	10	V0	7	V0
Acetone	0.4	12.6	V0	6.1	V0
alpha-Pinene	0.3	0.5	V0	0	V1
Benzene	0.01	0.07	V0	0.06	V0
beta-Pinene	0.3	0.4	V0	0	V1
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.05	V0	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	5.7	V0	3	V0
Ethylbenzene	0.01	0.03	V0	0.02	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.42	V0	0.34	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.6	V0	0.58	V0
Isoprene	0.01	2.1	V0	0.71	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.06	V0	0.08	V0
Methanol	3	17	V0	20	V0
Methylcyclohexane	0.01	0.06	V0	0.02	V0
Methylcyclopentane	0.02	0.07	V0	0.07	V0
Methylethylketone	0.3	0.6	V0	0.4	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.23	V0	0.36	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.11	V0	0.04	V0
n-Hexane	0.01	0.12	V0	0.17	V0
n-Nonane	0.01	0.03	V0	0	V1
n-Octane	0.02	0.08	V0	0	V1
n-Pentane	0.1	0.2	V0	0.4	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.04	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.14	V0	0.21	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name	Athabasca Valley			Anzac	
Station #	AMS 7			AMS 14	
Sample Date	30-Jun			30-Jun	
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.02	V0	0.04	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0.03	V0	0.02	V0
2,2-Dimethylbutane	0.01	0.03	V0	0.01	V0
2,3,4-Trimethylpentane	0.01	0	V1	0.01	V0
2,3-Dimethylbutane	0.02	0.08	V0	0	V1
2,3-Dimethylpentane	0.02	0.03	V0	0.02	V0
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0	V1	0.01	V0
2-Methylhexane	0.01	0.08	V0	0.07	V0
2-Methylpentane	0.01	0.2	V0	0.08	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0	V1	0	V1
3-Methylhexane	0.02	0.05	V0	0.03	V0
3-Methylpentane	0.01	0.12	V0	0.05	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	16	V0	12	V0
Acetone	0.4	7.2	V0	6.6	V0
alpha-Pinene	0.3	0	V1	0.4	V0
Benzene	0.01	0.1	V0	0.09	V0
beta-Pinene	0.3	0	V1	0	V1
cis-2-Butene	0.02	0	V1	0.03	V0
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0	V1	0	V1
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	8	V0	5.7	V0
Ethylbenzene	0.01	0.02	V0	0.02	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.59	V0	0.4	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.72	V0	0.53	V0
Isoprene	0.01	0.44	V0	0.65	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.07	V0	0.04	V0
Methanol	3	17	V0	14	V0
Methylcyclohexane	0.01	0.02	V0	0.02	V0
Methylcyclopentane	0.02	0.05	V0	0.04	V0
Methylethylketone	0.3	0.5	V0	0.5	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.51	V0	0.39	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.11	V0	0.03	V0
n-Hexane	0.01	0.11	V0	0.07	V0
n-Nonane	0.01	0	V1	0.01	V0
n-Octane	0.02	0	V1	0.02	V0
n-Pentane	0.1	0.4	V0	0.2	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.02	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.12	V0	0.16	V0
trans-2-Butene	0.01	0	V1	0.01	V0
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0.02	V0



Station Name Station # Sample Date	Barge Landing AMS 9 30-Jun	Fort McKay South AMS 13 30-Jun			
Compound Name	MDL (ppbv)	Results (ppbv)	Flag	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1	0	V1
1,3,5-Trimethylbenzene	0.02	0	V1	0	V1
1,3-Butadiene	0.02	0	V1	0	V1
1-Butene	0.02	0.04	V0	0.05	V0
1-Pentene	0.01	0	V1	0	V1
2,2,4-Trimethylpentane	0.01	0	V1	0	V1
2,2-Dimethylbutane	0.01	0.04	V0	0	V1
2,3,4-Trimethylpentane	0.01	0.01	V0	0	V1
2,3-Dimethylbutane	0.02	0.07	V0	0.03	V0
2,3-Dimethylpentane	0.02	0.03	V0	0.03	V0
2,4-Dimethylpentane	0.01	0	V1	0	V1
2-Methyl-1-pentene	0.3	0	V1	0	V1
2-Methyl-2-butene	0.3	0	V1	0	V1
2-Methylheptane	0.01	0.06	V0	0.06	V0
2-Methylhexane	0.01	0.12	V0	0.06	V0
2-Methylpentane	0.01	0.17	V0	0.05	V0
3-Methyl-1-butene	0.3	0	V1	0	V1
3-Methylheptane	0.02	0.03	V0	0.02	V0
3-Methylhexane	0.02	0.08	V0	0.05	V0
3-Methylpentane	0.01	0.11	V0	0.06	V0
4-Methyl-1-pentene	0.3	0	V1	0	V1
Acetaldehyde	3	15	V0	12	V0
Acetone	0.4	6.2	V0	13.3	V0
alpha-Pinene	0.3	0.4	V0	1	V0
Benzene	0.01	0.07	V0	0.05	V0
beta-Pinene	0.3	0.3	V0	0.6	V0
cis-2-Butene	0.02	0	V1	0	V1
cis-2-Hexene	0.3	0	V1	0	V1
cis-2-Pentene	0.02	0	V1	0	V1
Cyclohexane	0.02	0.04	V0	0.04	V0
Cyclopentane	0.01	0	V1	0	V1
Cyclopentene	0.3	0	V1	0	V1
Ethanol	0.3	5.8	V0	1.8	V0
Ethylbenzene	0.01	0.04	V0	0.02	V0
Formaldehyde	3	0	V1	0	V1
Isobutane	0.02	0.52	V0	0.37	V0
Isobutylene	0.3	0	V1	0	V1
Isopentane	0.03	0.5	V0	0.29	V0
Isoprene	0.01	1.99	V0	2.53	V0
Isopropylalcohol	0.4	0	V1	0	V1
Isopropylbenzene	0.01	0	V1	0	V1
m,p-Xylene	0.03	0.08	V0	0.05	V0
Methanol	3	18	V0	10	V0
Methylcyclohexane	0.01	0.1	V0	0.07	V0
Methylcyclopentane	0.02	0.08	V0	0.06	V0
Methylethylketone	0.3	0.6	V0	0.5	V0
Methylisobutylketone	0.4	0	V1	0	V1
Methylvinylketone	0.3	0	V1	0	V1
n-Butane	0.03	0.19	V0	0.14	V0
n-Decane	0.06	0	V1	0	V1
n-Dodecane	0.4	0	V1	0	V1
n-Heptane	0.01	0.19	V0	0.09	V0
n-Hexane	0.01	0.17	V0	0.09	V0
n-Nonane	0.01	0.03	V0	0.03	V0
n-Octane	0.02	0.1	V0	0.08	V0
n-Pentane	0.1	0.3	V0	0.1	V0
n-Propylbenzene	0.05	0	V1	0	V1
n-Undecane	0.5	0	V1	0	V1
Naphthalene	0.5	0	V1	0	V1
o-Xylene	0.01	0.03	V0	0.03	V0
Styrene	0.04	0	V1	0	V1
Toluene	0.01	0.16	V0	0.11	V0
trans-2-Butene	0.01	0	V1	0	V1
trans-2-Hexene	0.3	0	V1	0	V1
trans-2-Pentene	0.02	0	V1	0	V1



Station Name Station # Sample Date	Horizon AMS 15 30-Jun		
Compound Name	MDL (ppbv)	Results (ppbv)	Flag
1,2,4-Trimethylbenzene	0.03	0	V1
1,3,5-Trimethylbenzene	0.02	0.02	V0
1,3-Butadiene	0.02	0	V1
1-Butene	0.02	0.02	V0
1-Pentene	0.01	0	V1
2,2,4-Trimethylpentane	0.01	0.02	V0
2,2-Dimethylbutane	0.01	0.16	V0
2,3,4-Trimethylpentane	0.01	0.04	V0
2,3-Dimethylbutane	0.02	0.31	V0
2,3-Dimethylpentane	0.02	0.13	V0
2,4-Dimethylpentane	0.01	0	V1
2-Methyl-1-pentene	0.3	0	V1
2-Methyl-2-butene	0.3	0	V1
2-Methylheptane	0.01	0.08	V0
2-Methylhexane	0.01	0.1	V0
2-Methylpentane	0.01	0.08	V0
3-Methyl-1-butene	0.3	0	V1
3-Methylheptane	0.02	0.04	V0
3-Methylhexane	0.02	0.09	V0
3-Methylpentane	0.01	0.54	V0
4-Methyl-1-pentene	0.3	0	V1
Acetaldehyde	3	11	V0
Acetone	0.4	6.3	V0
alpha-Pinene	0.3	0.7	V0
Benzene	0.01	0.05	V0
beta-Pinene	0.3	0.3	V0
cis-2-Butene	0.02	0	V1
cis-2-Hexene	0.3	0	V1
cis-2-Pentene	0.02	0	V1
Cyclohexane	0.02	0.6	V0
Cyclopentane	0.01	0.1	V0
Cyclopentene	0.3	0	V1
Ethanol	0.3	4.1	V0
Ethylbenzene	0.01	0.03	V0
Formaldehyde	3	0	V1
Isobutane	0.02	2.1	V0
Isobutylene	0.3	0	V1
Isopentane	0.03	2.86	V0
Isoprene	0.01	1.43	V0
Isopropylalcohol	0.4	0	V1
Isopropylbenzene	0.01	0	V1
m,p-Xylene	0.03	0.06	V0
Methanol	3	18	V0
Methylcyclohexane	0.01	0.28	V0
Methylcyclopentane	0.02	0.36	V0
Methylethylketone	0.3	0.5	V0
Methylisobutylketone	0.4	0	V1
Methylvinylketone	0.3	0	V1
n-Butane	0.03	0.36	V0
n-Decane	0.06	0	V1
n-Dodecane	0.4	0	V1
n-Heptane	0.01	0.16	V0
n-Hexane	0.01	0.06	V0
n-Nonane	0.01	0.07	V0
n-Octane	0.02	0.12	V0
n-Pentane	0.1	0.2	V0
n-Propylbenzene	0.05	0	V1
n-Undecane	0.5	0	V1
Naphthalene	0.5	0	V1
o-Xylene	0.01	0.04	V0
Styrene	0.04	0	V1
Toluene	0.01	0.11	V0
trans-2-Butene	0.01	0	V1
trans-2-Hexene	0.3	0	V1
trans-2-Pentene	0.02	0	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 Jun 06 - Jun 30 Average	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30 Std Dev	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30 Total Samples (#)	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30 Total ≥ MDL (#)
	ppbv	ppbv		
Compound Name				
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.04	0.02	5	5
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.01	0.01	5	2
2,2-Dimethylbutane	0.04	0.03	5	4
2,3,4-Trimethylpentane	0.00	0.01	5	2
2,3-Dimethylbutane	0.06	0.04	5	5
2,3-Dimethylpentane	0.02	0.02	5	2
2,4-Dimethylpentane	0.00	0.01	5	2
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.03	0.03	5	4
2-Methylhexane	0.06	0.04	5	4
2-Methylpentane	0.22	0.19	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.01	0.02	5	2
3-Methylhexane	0.05	0.02	5	5
3-Methylpentane	0.13	0.09	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	6.20	3.77	5	4
Acetone	5.90	3.83	5	5
alpha-Pinene	0.10	0.22	5	1
Benzene	0.07	0.04	5	5
beta-Pinene	0.08	0.18	5	1
cis-2-Butene	0.00	0.00	5	0
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.03	0.02	5	3
Cyclopentane	0.04	0.04	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	3.22	1.58	5	5
Ethylbenzene	0.02	0.01	5	4
Formaldehyde	0.00	0.00	5	0
Isobutane	0.37	0.16	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.58	0.26	5	5
Isoprene	0.83	0.73	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.03	0.03	5	3
Methanol	10.60	4.16	5	5
Methylcyclohexane	0.06	0.04	5	5
Methylcyclopentane	0.07	0.03	5	5
Methylethylketone	0.32	0.33	5	3
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.22	0.03	5	5
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.09	0.05	5	5
n-Hexane	0.14	0.07	5	5
n-Nonane	0.02	0.01	5	4
n-Octane	0.05	0.04	5	5
n-Pentane	0.40	0.35	5	4
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	0.02	0.01	5	4
Styrene	0.00	0.00	5	0
Toluene	0.10	0.03	5	5
trans-2-Butene	0.01	0.01	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
 Volatile Organic Compounds (VOCs) - Summary

2017
 Indicated Sites and Dates

Station Name Station # Sample Date	Patricia McInnes AMS 6 Jun 06 - Jun 30 Average	Patricia McInnes AMS 6 Jun 06 - Jun 30 Std Dev	Patricia McInnes AMS 6 Jun 06 - Jun 30 Total Samples (#)	Patricia McInnes AMS 6 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.02	0.03	5	2
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.18	0.32	5	5
2,2-Dimethylbutane	0.00	0.00	5	0
2,3,4-Trimethylpentane	0.00	0.01	5	2
2,3-Dimethylbutane	0.03	0.02	5	4
2,3-Dimethylpentane	0.04	0.02	5	5
2,4-Dimethylpentane	0.01	0.01	5	3
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.01	0.02	5	3
2-Methylhexane	0.08	0.08	5	4
2-Methylpentane	0.11	0.09	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.01	0.01	5	2
3-Methylhexane	0.08	0.07	5	5
3-Methylpentane	0.08	0.06	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	4.20	3.27	5	4
Acetone	4.60	1.04	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.07	0.04	5	5
beta-Pinene	0.00	0.00	5	0
cis-2-Butene	0.01	0.01	5	1
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.02	0.03	5	2
Cyclopentane	0.00	0.00	5	0
Cyclopentene	0.00	0.00	5	0
Ethanol	3.54	1.27	5	5
Ethylbenzene	0.03	0.03	5	4
Formaldehyde	0.00	0.00	5	0
Isobutane	0.26	0.11	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.46	0.15	5	5
Isoprene	0.36	0.23	5	5
Isopropylalcohol	0.10	0.22	5	1
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.06	0.04	5	4
Methanol	11.20	5.26	5	5
Methylcyclohexane	0.07	0.11	5	5
Methylcyclopentane	0.06	0.06	5	4
Methylethylketone	0.30	0.30	5	3
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.47	0.20	5	5
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.10	0.11	5	5
n-Hexane	0.22	0.28	5	5
n-Nonane	0.00	0.01	5	2
n-Octane	0.02	0.02	5	2
n-Pentane	0.22	0.18	5	4
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	0.02	0.02	5	4
Styrene	0.00	0.00	5	0
Toluene	0.30	0.34	5	5
trans-2-Butene	0.01	0.03	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.01	0.01	5	1



Station Name Station # Sample Date	Athabasca Valley AMS 7 Jun 06 - Jun 30 Average	Athabasca Valley AMS 7 Jun 06 - Jun 30 Std Dev	Athabasca Valley AMS 7 Jun 06 - Jun 30 Total Samples (#)	Athabasca Valley AMS 7 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.01	0.01	5	2
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.02	0.01	5	4
2,2-Dimethylbutane	0.01	0.01	5	1
2,3,4-Trimethylpentane	0.00	0.00	5	1
2,3-Dimethylbutane	0.05	0.04	5	4
2,3-Dimethylpentane	0.04	0.03	5	5
2,4-Dimethylpentane	0.01	0.01	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	0.04	5	2
2-Methylhexane	0.09	0.10	5	4
2-Methylpentane	0.12	0.08	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.01	0.02	5	1
3-Methylhexane	0.07	0.09	5	5
3-Methylpentane	0.07	0.05	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	7.60	4.83	5	5
Acetone	5.18	1.36	5	5
alpha-Pinene	0.00	0.00	5	0
Benzene	0.06	0.03	5	5
beta-Pinene	0.00	0.00	5	0
cis-2-Butene	0.00	0.01	5	1
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.00	0.01	5	1
Cyclopentane	0.00	0.00	5	1
Cyclopentene	0.00	0.00	5	0
Ethanol	4.48	2.29	5	5
Ethylbenzene	0.02	0.01	5	5
Formaldehyde	0.00	0.00	5	0
Isobutane	0.39	0.30	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.42	0.18	5	5
Isoprene	0.34	0.13	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.06	0.01	5	5
Methanol	12.20	3.03	5	5
Methylcyclohexane	0.07	0.13	5	5
Methylcyclopentane	0.04	0.02	5	5
Methylethylketone	0.30	0.28	5	3
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.34	0.27	5	4
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.13	0.19	5	5
n-Hexane	0.17	0.22	5	5
n-Nonane	0.01	0.02	5	1
n-Octane	0.03	0.05	5	2
n-Pentane	0.18	0.15	5	4
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	0.02	0.01	5	5
Styrene	0.00	0.00	5	0
Toluene	0.11	0.06	5	5
trans-2-Butene	0.01	0.02	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
Volatile Organic Compounds (VOCs) - Summary

2017
Indicated Sites and Dates

Station Name Station # Sample Date	Anzac AMS 14 Jun 06 - Jun 30 Average	Anzac AMS 14 Jun 06 - Jun 30 Std Dev	Anzac AMS 14 Jun 06 - Jun 30 Total Samples (#)	Anzac AMS 14 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.03	0.01	5	5
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.01	0.01	5	2
2,2-Dimethylbutane	0.00	0.00	5	1
2,3,4-Trimethylpentane	0.00	0.00	5	1
2,3-Dimethylbutane	0.01	0.01	5	2
2,3-Dimethylpentane	0.02	0.02	5	3
2,4-Dimethylpentane	0.01	0.01	5	2
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.01	0.02	5	3
2-Methylhexane	0.08	0.07	5	5
2-Methylpentane	0.07	0.05	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.00	0.01	5	1
3-Methylhexane	0.05	0.07	5	4
3-Methylpentane	0.05	0.04	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	6.60	3.51	5	5
Acetone	4.50	1.44	5	5
alpha-Pinene	0.08	0.18	5	1
Benzene	0.05	0.03	5	5
beta-Pinene	0.00	0.00	5	0
cis-2-Butene	0.01	0.01	5	1
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.00	0.00	5	0
Cyclopentane	0.00	0.00	5	0
Cyclopentene	0.00	0.00	5	0
Ethanol	2.78	1.67	5	5
Ethylbenzene	0.00	0.01	5	1
Formaldehyde	0.00	0.00	5	0
Isobutane	0.42	0.24	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.36	0.12	5	5
Isoprene	0.34	0.19	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.01	0.02	5	1
Methanol	9.00	3.08	5	5
Methylcyclohexane	0.05	0.09	5	4
Methylcyclopentane	0.03	0.03	5	3
Methylethylketone	0.24	0.23	5	3
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.35	0.16	5	5
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.08	0.11	5	5
n-Hexane	0.13	0.16	5	5
n-Nonane	0.00	0.00	5	1
n-Octane	0.01	0.01	5	2
n-Pentane	0.16	0.05	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	0.01	0.01	5	2
Styrene	0.00	0.00	5	0
Toluene	0.13	0.06	5	5
trans-2-Butene	0.01	0.01	5	2
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.01	5	1



Station Name Station # Sample Date	Barge Landing AMS 9 Jun 06 - Jun 30 Average	Barge Landing AMS 9 Jun 06 - Jun 30 Std Dev	Barge Landing AMS 9 Jun 06 - Jun 30 Total Samples (#)	Barge Landing AMS 9 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.02	0.03	5	2
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.01	0.03	5	1
2,2-Dimethylbutane	0.10	0.10	5	5
2,3,4-Trimethylpentane	0.00	0.01	5	2
2,3-Dimethylbutane	0.15	0.12	5	5
2,3-Dimethylpentane	0.02	0.03	5	2
2,4-Dimethylpentane	0.00	0.01	5	1
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.05	0.06	5	4
2-Methylhexane	0.08	0.05	5	5
2-Methylpentane	0.57	0.65	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.02	0.02	5	2
3-Methylhexane	0.07	0.05	5	5
3-Methylpentane	0.30	0.33	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	5.80	5.59	5	4
Acetone	4.48	1.32	5	5
alpha-Pinene	0.08	0.18	5	1
Benzene	0.10	0.07	5	5
beta-Pinene	0.06	0.13	5	1
cis-2-Butene	0.00	0.00	5	0
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.04	0.04	5	3
Cyclopentane	0.09	0.13	5	2
Cyclopentene	0.00	0.00	5	0
Ethanol	2.30	2.01	5	5
Ethylbenzene	0.01	0.02	5	2
Formaldehyde	0.00	0.00	5	0
Isobutane	0.29	0.18	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.85	0.73	5	5
Isoprene	0.95	0.67	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.03	0.04	5	2
Methanol	9.20	4.97	5	5
Methylcyclohexane	0.08	0.07	5	5
Methylcyclopentane	0.10	0.08	5	5
Methylethylketone	0.20	0.28	5	2
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.17	0.02	5	5
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.14	0.11	5	5
n-Hexane	0.26	0.23	5	5
n-Nonane	0.02	0.02	5	2
n-Octane	0.06	0.07	5	3
n-Pentane	0.88	1.07	5	4
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	0.01	0.02	5	3
Styrene	0.00	0.00	5	0
Toluene	0.13	0.13	5	5
trans-2-Butene	0.00	0.01	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Compound Name	Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.00	5	0
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.04	0.03	5	4
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.00	0.00	5	0
2,2-Dimethylbutane	0.04	0.05	5	3
2,3,4-Trimethylpentane	0.00	0.00	5	1
2,3-Dimethylbutane	0.06	0.06	5	4
2,3-Dimethylpentane	0.02	0.03	5	3
2,4-Dimethylpentane	0.00	0.01	5	1
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.04	0.04	5	4
2-Methylhexane	0.07	0.08	5	3
2-Methylpentane	0.29	0.31	5	5
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.01	0.02	5	2
3-Methylhexane	0.07	0.08	5	4
3-Methylpentane	0.17	0.18	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	4.60	4.51	5	4
Acetone	5.30	4.49	5	5
alpha-Pinene	0.28	0.44	5	2
Benzene	0.08	0.07	5	4
beta-Pinene	0.12	0.27	5	1
cis-2-Butene	0.00	0.00	5	0
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.04	0.05	5	3
Cyclopentane	0.05	0.06	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	1.46	0.56	5	5
Ethylbenzene	0.01	0.01	5	3
Formaldehyde	0.00	0.00	5	0
Isobutane	0.25	0.13	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	0.56	0.44	5	5
Isoprene	1.08	0.84	5	5
Isopropylalcohol	0.00	0.00	5	0
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.03	0.03	5	3
Methanol	9.20	1.10	5	5
Methylcyclohexane	0.10	0.12	5	5
Methylcyclopentane	0.10	0.10	5	4
Methylethylketone	0.10	0.22	5	1
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.11	0.09	5	4
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.15	0.20	5	5
n-Hexane	0.33	0.45	5	5
n-Nonane	0.02	0.02	5	4
n-Octane	0.06	0.07	5	4
n-Pentane	0.64	0.75	5	4
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	0.02	0.01	5	4
Styrene	0.00	0.00	5	0
Toluene	0.10	0.09	5	5
trans-2-Butene	0.01	0.01	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Station Name Station # Sample Date	Horizon AMS 15 Jun 06 - Jun 30 Average	Horizon AMS 15 Jun 06 - Jun 30 Std Dev	Horizon AMS 15 Jun 06 - Jun 30 Total Samples (#)	Horizon AMS 15 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name	ppbv	ppbv		
1,2,4-Trimethylbenzene	0.00	0.00	5	0
1,3,5-Trimethylbenzene	0.00	0.01	5	1
1,3-Butadiene	0.00	0.00	5	0
1-Butene	0.03	0.04	5	3
1-Pentene	0.00	0.00	5	0
2,2,4-Trimethylpentane	0.00	0.01	5	1
2,2-Dimethylbutane	0.06	0.06	5	4
2,3,4-Trimethylpentane	0.01	0.02	5	3
2,3-Dimethylbutane	0.12	0.11	5	5
2,3-Dimethylpentane	0.05	0.05	5	4
2,4-Dimethylpentane	0.00	0.01	5	1
2-Methyl-1-pentene	0.00	0.00	5	0
2-Methyl-2-butene	0.00	0.00	5	0
2-Methylheptane	0.03	0.03	5	3
2-Methylhexane	0.07	0.06	5	4
2-Methylpentane	0.15	0.18	5	3
3-Methyl-1-butene	0.00	0.00	5	0
3-Methylheptane	0.02	0.02	5	3
3-Methylhexane	0.06	0.06	5	3
3-Methylpentane	0.22	0.20	5	5
4-Methyl-1-pentene	0.00	0.00	5	0
Acetaldehyde	5.20	3.35	5	5
Acetone	4.36	1.26	5	5
alpha-Pinene	0.14	0.31	5	1
Benzene	0.05	0.05	5	4
beta-Pinene	0.06	0.13	5	1
cis-2-Butene	0.00	0.00	5	0
cis-2-Hexene	0.00	0.00	5	0
cis-2-Pentene	0.00	0.00	5	0
Cyclohexane	0.18	0.24	5	5
Cyclopentane	0.05	0.06	5	3
Cyclopentene	0.00	0.00	5	0
Ethanol	2.36	1.24	5	5
Ethylbenzene	0.02	0.02	5	3
Formaldehyde	0.00	0.00	5	0
Isobutane	0.62	0.85	5	5
Isobutylene	0.00	0.00	5	0
Isopentane	1.08	1.04	5	5
Isoprene	0.67	0.43	5	5
Isopropylalcohol	0.10	0.22	5	1
Isopropylbenzene	0.00	0.00	5	0
m,p-Xylene	0.03	0.03	5	3
Methanol	9.80	5.12	5	5
Methylcyclohexane	0.12	0.12	5	5
Methylcyclopentane	0.14	0.13	5	5
Methylethylketone	0.36	0.42	5	3
Methylisobutylketone	0.00	0.00	5	0
Methylvinylketone	0.00	0.00	5	0
n-Butane	0.15	0.14	5	4
n-Decane	0.00	0.00	5	0
n-Dodecane	0.00	0.00	5	0
n-Heptane	0.11	0.11	5	4
n-Hexane	0.19	0.26	5	5
n-Nonane	0.02	0.03	5	3
n-Octane	0.05	0.05	5	3
n-Pentane	0.30	0.35	5	3
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	0.01	0.02	5	3
Styrene	0.00	0.00	5	0
Toluene	0.09	0.08	5	5
trans-2-Butene	0.02	0.04	5	1
trans-2-Hexene	0.00	0.00	5	0
trans-2-Pentene	0.00	0.00	5	0



Wood Buffalo Environmental Association

VOC (ppb) summary

2017 June

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	0.0%	35	35	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	
1,3,5-Trimethylbenzene	2.9%	35	34	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
1,3-Butadiene	0.0%	35	35	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	
1-Butene	65.7%	35	12	0.00	0.00	0.02	0.04	0.05	0.05	0.07	0.08	0.09	0.09	0.09	0.03	0.03	0.02	0.16
1-Pentene	0.0%	35	35	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	
2,2,4-Trimethylpentane	42.9%	35	20	0.00	0.00	0.00	0.01	0.03	0.03	0.03	0.07	0.07	0.23	0.25	0.03	0.13	0.00	0.66
2,2-Dimethylbutane	51.4%	35	17	0.00	0.00	0.01	0.02	0.04	0.06	0.11	0.17	0.23	0.23	0.23	0.03	0.06	0.01	0.31
2,3,4-Trimethylpentane	34.3%	35	23	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.00	0.01	0.00	0.04
2,3-Dimethylbutane	82.9%	35	6	0.00	0.03	0.04	0.06	0.08	0.10	0.16	0.31	0.31	0.31	0.31	0.07	0.08	0.04	0.47
2,3-Dimethylpentane	68.6%	35	11	0.00	0.00	0.03	0.03	0.04	0.05	0.06	0.08	0.13	0.13	0.13	0.03	0.03	0.03	0.17
2,4-Dimethylpentane	34.3%	35	23	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.01	0.01	0.00	0.05
2-Methyl-1-pentene	0.0%	35	35	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	
2-Methyl-2-butene	0.0%	35	35	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	
2-Methylheptane	65.7%	35	12	0.00	0.00	0.02	0.03	0.05	0.06	0.08	0.11	0.15	0.15	0.15	0.03	0.04	0.02	0.21
2-Methylhexane	82.9%	35	6	0.00	0.03	0.06	0.07	0.12	0.13	0.19	0.20	0.25	0.25	0.25	0.07	0.07	0.06	0.40
2-Methylpentane	94.3%	35	2	0.00	0.03	0.04	0.09	0.15	0.27	0.36	0.61	1.25	1.32	1.32	0.22	0.31	0.09	1.78
3-Methyl-1-butene	0.0%	35	35	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	
3-Methylheptane	37.1%	35	22	0.00	0.00	0.00	0.00	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.01	0.02	0.00	0.10
3-Methylhexane	88.6%	35	4	0.00	0.03	0.04	0.05	0.09	0.12	0.18	0.20	0.23	0.23	0.23	0.06	0.06	0.04	0.36
3-Methylpentane	100.0%	35	0	0.01	0.02	0.03	0.07	0.11	0.20	0.25	0.38	0.63	0.69	0.69	0.15	0.17	0.07	1.02
4-Methyl-1-pentene	0.0%	35	35	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	
Acetaldehyde	88.6%	35	4	0.00	3.00	5.00	6.00	8.00	8.00	12.00	15.00	16.00	16.00	16.00	5.74	3.97	5.00	25.57
Acetone	100.0%	35	0	2.70	2.90	3.50	4.50	4.80	5.20	6.10	6.60	12.60	13.30	13.30	4.90	2.32	4.50	16.48
alpha-Pinene	17.1%	35	29	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.70	1.00	1.00	1.00	0.10	0.24	0.00	1.28
Benzene	94.3%	35	2	0.00	0.02	0.03	0.05	0.07	0.10	0.11	0.13	0.18	0.19	0.19	0.07	0.05	0.05	0.31
beta-Pinene	11.4%	35	31	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.40	0.60	0.60	0.60	0.05	0.14	0.00	0.72
cis-2-Butene	8.6%	35	32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.00	0.01	0.00	0.04
cis-2-Hexene	0.0%	35	35	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	
cis-2-Pentene	0.0%	35	35	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	
Cyclohexane	48.6%	35	18	0.00	0.00	0.00	0.04	0.05	0.06	0.09	0.12	0.60	0.60	0.60	0.04	0.10	0.00	0.56
Cyclopentane	34.3%	35	23	0.00	0.00	0.00	0.00	0.04	0.08	0.13	0.19	0.27	0.27	0.27	0.03	0.06	0.00	0.36
Cyclopentene	0.0%	35	35	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	
Ethanol	100.0%	35	0	0.60	1.10	1.70	2.40	2.80	3.90	4.50	5.70	5.80	8.00	8.00	2.88	1.72	2.40	11.49
Ethylbenzene	62.9%	35	13	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.04	0.08	0.08	0.08	0.01	0.02	0.01	0.10
Formaldehyde	0.0%	35	35	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	
Isobutane	100.0%	35	0	0.03	0.11	0.15	0.33	0.37	0.43	0.52	0.59	0.82	2.10	2.10	0.37	0.36	0.33	2.16
Isobutylene	0.0%	35	35	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	
Isopentane	100.0%	35	0	0.11	0.21	0.31	0.42	0.55	0.72	0.91	1.13	1.74	2.86	2.86	0.62	0.54	0.42	3.29
Isoprene	100.0%	35	0	0.12	0.21	0.32	0.46	0.59	0.69	0.99	1.43	2.10	2.53	2.53	0.65	0.56	0.46	3.48
Isopropylalcohol	5.7%	35	33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50	0.03	0.12	0.00	0.62
Isopropylbenzene	0.0%	35	35	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	
m,p-Xylene	60.0%	35	14	0.00	0.00	0.04	0.05	0.05	0.06	0.07	0.08	0.11	0.11	0.11	0.03	0.03	0.04	0.19
Methanol	100.0%	35	0	4.00	7.00	7.00	9.00	10.00	12.00	13.00	17.00	18.00	20.00	20.00	10.17	3.86	9.00	29.48
Methylcyclohexane	97.1%	35	1	0.00	0.01	0.02	0.03	0.05	0.10	0.19	0.26	0.31	0.32	0.32	0.08	0.10	0.03	0.56
Methylcyclopentane	88.6%	35	4	0.00	0.03	0.05	0.07	0.10	0.12	0.17	0.26	0.36	0.36	0.36	0.08	0.08	0.05	0.46
Methylethylketone	51.4%	35	17	0.00	0.00	0.30	0.40	0.50	0.50	0.60	0.70	1.00	1.00	1.00	0.26	0.29	0.30	1.69
Methylisobutylketone	0.0%	35	35	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	
Methylvinylketone	0.0%	35	35	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	
n-Butane	91.4%	35	3	0.00	0.06	0.14	0.21	0.26	0.34	0.36	0.57	0.69	0.77	0.77	0.26	0.19	0.21	1.18
n-Decane	0.0%	35	35	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	
n-Dodecane	0.0%	35	35	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	
n-Heptane	97.1%	35	1	0.00	0.02	0.03	0.07	0.09	0.16	0.19	0.30	0.46	0.50	0.50	0.11	0.12	0.07	0.73
n-Hexane	100.0%	35	0	0.01	0.04	0.06	0.11	0.17	0.25	0.42	0.57	0.72	1.12	1.12	0.21	0.25	0.11	1.45
n-Nonane	48.6%	35	18	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.07	0.07	0.01	0.02	0.00	0.10
n-Octane	60.0%	35	14	0.00	0.00	0.02	0.03	0.06	0.08	0.11	0.17	0.17	0.17	0.17	0.04	0.05	0.02	0.29
n-Pentane	80.0%	35	7	0.00	0.10	0.20	0.20	0.40	0.60	1.30	1.60	2.40	2.40	2.40	0.40	0.55	0.20	3.13
n-Propylbenzene	0.0%	35	35	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	
n-Undecane	0.0%	35	35	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	
Naphthalene	0.0%	35	35	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	
o-Xylene	71.4%	35	10	0.00	0.00	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.02	0.01	0.02	0.08
Styrene	0.0%	35	35	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	
Toluene	100.0%	35	0	0.02	0.03	0.07	0.10	0.11	0.16	0.21	0.25	0.34	0.89	0.89	0.14	0.15	0.10	0.89
trans-2-Butene	22.9%	35	27	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.06	0.08	0.08	0.08	0.01	0.02	0.00	0.10
trans-2-Hexene	0.0%	35	35	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	
trans-2-Pentene	5.7%	35	33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.03	0.00	0.01	0.00	0.03



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - IONS DATA SUMMARY JUNE 2017

Prepared
August 30, 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 JUNE 2017

Prepared
August 30, 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		06-Jun	
Sample Date	06-Jun			06-Jun		06-Jun	
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	7.25	V0	4.54	V0	0.05	V0
Calcium	0.16	0.10	V0	0.18	V0	0.01	V0
Magnesium	0.03	0.02	V0	0.01	V0	0.00	V0
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.01	V0	0.02	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	0.03	V0	0.02	V0	0.01	V0
Sulphate	0.25	1.18	V0	0.27	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.33	V0	0.08	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		06-Jun	
Sample Date	06-Jun			06-Jun		06-Jun	
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	5.31	V0	3.60	V0	0.05	V0
Calcium	0.16	0.18	V0	0.19	V0	0.01	V0
Magnesium	0.03	0.02	V0	0.01	V0	0.00	V0
Potassium	0.09	0.02	V0	0.00	V0	0.00	V1
Sodium	0.05	0.02	V0	0.01	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	0.02	V0	0.01	V0
Sulphate	0.25	0.25	V0	0.23	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.07	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		12-Jun	
Sample Date	12-Jun			12-Jun		12-Jun	
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	6.33	V0	6.41	V0	0.11	V0
Calcium	0.16	0.10	V0	0.20	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.02	V0	0.00	V0
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	0.01	V0	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	0.01	V0
Sulphate	0.25	0.78	V0	0.69	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.20	V0	0.17	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		12-Jun	
Sample Date	12-Jun			12-Jun		12-Jun	
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	5.85	V0	3.75	V4	0.11	V0
Calcium	0.16	0.12	V0	0.06	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.01	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	0.00	V1	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.01	V0	0.01	V0
Sulphate	0.25	0.68	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	0.16	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	18-Jun			18-Jun		18-Jun	
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	3.25	V0	5.23	V0	0.09	V0
Calcium	0.16	0.09	V0	0.17	V0	0.00	V1
Magnesium	0.03	0.00	V0	0.02	V0	0.00	V1
Potassium	0.09	0.00	V1	0.01	V0	0.00	V1
Sodium	0.05	0.01	V0	0.03	V0	0.00	V0
Chloride	0.12	0.00	V1	0.02	V0	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.01	V0	0.03	V0	0.01	V0
Sulphate	0.25	0.26	V0	0.34	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.06	V0	0.07	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		18-Jun	
Sample Date	18-Jun			18-Jun		18-Jun	
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	3.87	V0	2.46	V0	0.09	V0
Calcium	0.16	0.06	V0	0.04	V0	0.00	V1
Magnesium	0.03	0.01	V0	0.00	V0	0.00	V1
Potassium	0.09	0.00	V1	0.00	V1	0.00	V1
Sodium	0.05	0.02	V0	0.01	V0	0.00	V0
Chloride	0.12	0.01	V0	0.00	V1	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.02	V0	0.02	V0	0.01	V0
Sulphate	0.25	0.33	V0	0.27	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.08	V0	0.07	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6		24-Jun	
Sample Date	24-Jun			24-Jun		24-Jun	
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	5.34	V0	7.12	V0	0.07	V0
Calcium	0.16	0.29	V0	0.33	V0	0.00	V1
Magnesium	0.03	0.02	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	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	0.04	V0	0.00	V1
Sulphate	0.25	0.21	V0	0.44	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.04	V0	0.13	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		24-Jun	
Sample Date	24-Jun			24-Jun		24-Jun	
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	5.73	V0	4.05	V0	0.07	V0
Calcium	0.16	0.23	V0	0.13	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.01	V0	0.00	V1
Potassium	0.09	0.00	V1	0.00	V1	0.00	V1
Sodium	0.05	0.01	V0	0.01	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	0.02	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.38	V0	0.35	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.10	V0	0.11	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	30-Jun			30-Jun		30-Jun	
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	9.09	V0	5.65	V0	0.21	V0
Calcium	0.16	0.03	V0	0.04	V0	0.01	V0
Magnesium	0.03	0.01	V0	0.01	V0	0.00	V0
Potassium	0.09	0.00	V1	0.00	V1	0.00	V1
Sodium	0.05	0.01	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	0.02	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.65	V0	0.27	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.19	V0	0.09	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		30-Jun	
Sample Date	30-Jun			30-Jun		30-Jun	
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	8.68	V0	7.08	V0	0.21	V0
Calcium	0.16	0.14	V0	0.13	V0	0.01	V0
Magnesium	0.03	0.02	V0	0.01	V0	0.00	V0
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.01	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	0.04	V0	0.01	V0	0.00	V1
Sulphate	0.25	0.38	V0	0.55	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.11	V0	0.17	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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	2.17	5	5
Calcium	0.12	0.10	5	5
Magnesium	0.01	0.01	5	5
Potassium	0.01	0.01	5	3
Sodium	0.01	0.00	5	5
Chloride	0.00	0.00	5	1
Fluoride	0.00	0.00	5	0
Nitrate	0.02	0.01	5	5
Sulphate	0.61	0.40	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.17	0.12	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	1.01	5	5
Calcium	0.18	0.10	5	5
Magnesium	0.01	0.01	5	5
Potassium	0.01	0.01	5	4
Sodium	0.02	0.01	5	5
Chloride	0.00	0.01	5	2
Fluoride	0.00	0.00	5	0
Nitrate	0.02	0.01	5	5
Sulphate	0.40	0.18	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.11	0.04	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	5.89	1.75	5	5
Calcium	0.15	0.07	5	5
Magnesium	0.02	0.00	5	5
Potassium	0.01	0.01	5	3
Sodium	0.01	0.00	5	5
Chloride	0.00	0.00	5	2
Fluoride	0.00	0.00	5	0
Nitrate	0.02	0.01	5	5
Sulphate	0.41	0.16	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.10	0.04	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	4.19	1.73	5	5
Calcium	0.11	0.06	5	5
Magnesium	0.01	0.00	5	5
Potassium	0.00	0.00	5	3
Sodium	0.01	0.00	5	5
Chloride	0.00	0.00	5	0
Fluoride	0.00	0.00	5	0
Nitrate	0.01	0.00	5	5
Sulphate	0.40	0.16	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.12	0.05	5	5



Wood Buffalo Environmental Association

PM2.5 Ion (µg/sample) Summary

2017 June

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%	20	0	59	87	97	136	140	170	171	208	218	218	218	133	43	136	345
Calcium	100.0%	20	0	0.72	0.96	2.22	3.15	3.96	4.56	4.86	6.96	7.92	7.92	7.92	3.35	1.99	3.15	13.29
Magnesium	100.0%	20	0	0.06	0.12	0.18	0.33	0.39	0.51	0.51	0.57	0.57	0.57	0.57	0.32	0.17	0.33	1.16
Potassium	65.0%	20	7	0.00	0.03	0.06	0.15	0.15	0.33	0.33	0.39	0.42	0.42	0.42	0.17	0.14	0.15	0.85
Sodium	100.0%	20	0	0.06	0.12	0.18	0.27	0.30	0.36	0.39	0.45	0.60	0.60	0.60	0.27	0.13	0.27	0.93
Chloride	25.0%	20	15	0.03	0.06	0.06	0.06	0.09	0.12	0.12	0.15	0.42	0.42	0.42	0.09	0.08	0.06	0.51
Fluoride	0.0%	20	20	0.00	0.03	0.03	0.03	0.03	0.06	0.06	0.06	0.09	0.09	0.09	0.04	0.02	0.03	
Nitrate	100.0%	20	0	0.21	0.27	0.33	0.45	0.51	0.60	0.63	0.93	0.99	0.99	0.99	0.49	0.22	0.45	1.58
Sulphate	100.0%	20	0	4.92	6.03	6.51	9.18	10.65	15.60	16.41	18.69	28.29	28.29	28.29	10.90	5.89	9.18	40.34
Phosphate	0.0%	20	20	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%	20	0	1.07	1.61	1.77	2.54	3.12	4.12	4.19	4.82	7.94	7.94	7.94	2.98	1.64	2.54	11.20



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - IONS DATA SUMMARY JUNE 2017

Prepared
August 30, 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 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



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	06-Jun			06-Jun		06-Jun	
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	26.10	V0	17.35	V0	0.10	V0
Calcium	0.16	1.43	V0	0.78	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.07	V0	0.00	V0
Potassium	0.09	0.03	V0	0.03	V0	0.00	V1
Sodium	0.05	0.06	V0	0.07	V0	0.00	V0
Chloride	0.12	0.02	V0	0.07	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.12	V0	0.08	V0	0.00	V1
Sulphate	0.25	1.36	V0	0.34	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.37	V0	0.08	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		06-Jun	
Sample Date	06-Jun			06-Jun		06-Jun	
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	19.28	V0	9.90	V0	0.10	V0
Calcium	0.16	0.63	V0	0.19	V0	0.00	V1
Magnesium	0.03	0.09	V0	0.01	V0	0.00	V0
Potassium	0.09	0.03	V0	0.02	V0	0.00	V1
Sodium	0.05	0.06	V0	0.02	V0	0.00	V0
Chloride	0.12	0.06	V0	0.01	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.05	V0	0.00	V1
Sulphate	0.25	0.33	V0	0.26	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.07	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		06-Jun	
Sample Date	06-Jun			06-Jun		06-Jun	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m ³)	24			-9999		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	18.39	V0	-9999	M1	0.10	V0
Calcium	0.16	0.50	V0	-9999	M1	0.00	V1
Magnesium	0.03	0.05	V0	-9999	M1	0.00	V0
Potassium	0.09	0.02	V0	-9999	M1	0.00	V1
Sodium	0.05	0.04	V0	-9999	M1	0.00	V0
Chloride	0.12	0.01	V0	-9999	M1	0.00	V1
Fluoride	0.15	0.00	V1	-9999	M1	0.00	V1
Nitrate	0.20	0.10	V0	-9999	M1	0.00	V1
Sulphate	0.25	1.23	V0	-9999	M1	0.00	V1
Phosphate	0.26	0.00	V1	-9999	M1	0.00	V1
Ammonium (as N)	0.02	0.32	V0	-9999	M1	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			06-Jun	
Sample Date	06-Jun			06-Jun	
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	20.84	V0	0.10	V0
Calcium	0.16	0.57	V0	0.00	V1
Magnesium	0.03	0.06	V0	0.00	V0
Potassium	0.09	0.02	V0	0.00	V1
Sodium	0.05	0.04	V0	0.00	V0
Chloride	0.12	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.00	V1
Sulphate	0.25	1.57	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.41	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	12-Jun			12-Jun		12-Jun	
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	27.87	V0	32.46	V0	0.10	V0
Calcium	0.16	1.47	V0	1.42	V0	0.00	V1
Magnesium	0.03	0.06	V0	0.13	V0	0.00	V1
Potassium	0.09	0.02	V0	0.03	V0	0.00	V1
Sodium	0.05	0.07	V0	0.15	V0	0.00	V0
Chloride	0.12	0.05	V0	0.22	V0	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.14	V0	0.11	V0	0.00	V1
Sulphate	0.25	1.00	V0	0.79	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.21	V0	0.17	V0	0.01	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		12-Jun	
Sample Date	12-Jun			12-Jun		12-Jun	
Particulate Size	PM10			PM10		PM10	
Total Air Volume (m ³)	24			24.3		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	16.15	V0	8.82	V0	0.10	V0
Calcium	0.16	0.47	V0	0.16	V0	0.00	V1
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	0.05	V0	0.01	V0	0.00	V0
Chloride	0.12	0.05	V0	0.01	V0	0.01	V0
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	0.71	V0	0.63	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.16	V0	0.16	V0	0.01	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		12-Jun	
Sample Date	12-Jun			12-Jun		12-Jun	
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	18.29	V0	35.75	V0	0.10	V0
Calcium	0.16	0.48	V0	0.69	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.10	V0	0.00	V1
Potassium	0.09	0.02	V0	0.02	V0	0.00	V1
Sodium	0.05	0.06	V0	0.13	V0	0.00	V0
Chloride	0.12	0.03	V0	0.02	V0	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.15	V0	0.00	V1
Sulphate	0.25	1.04	V0	1.75	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.23	V0	0.40	V0	0.01	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			12-Jun	
Sample Date	12-Jun			12-Jun	
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	17.75	V0	0.10	V0
Calcium	0.16	0.36	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.00	V1
Potassium	0.09	0.02	V0	0.00	V1
Sodium	0.05	0.05	V0	0.00	V0
Chloride	0.12	0.01	V0	0.01	V0
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.06	V0	0.00	V1
Sulphate	0.25	0.65	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.14	V0	0.01	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	18-Jun			18-Jun		18-Jun	
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	11.16	V0	14.21	V0	0.06	V0
Calcium	0.16	0.27	V0	0.50	V0	0.00	V1
Magnesium	0.03	0.02	V0	0.08	V0	0.00	V1
Potassium	0.09	0.00	V1	0.01	V0	0.00	V1
Sodium	0.05	0.04	V0	0.06	V0	0.00	V1
Chloride	0.12	0.02	V0	0.08	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.04	V0	0.00	V1
Sulphate	0.25	0.34	V0	0.36	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.07	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		18-Jun	
Sample Date	18-Jun			18-Jun		18-Jun	
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	12.04	V0	7.32	V0	0.06	V0
Calcium	0.16	0.29	V0	0.12	V0	0.00	V1
Magnesium	0.03	0.05	V0	0.03	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.04	V0	0.03	V0	0.00	V1
Chloride	0.12	0.04	V0	0.02	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.04	V0	0.03	V0	0.00	V1
Sulphate	0.25	0.36	V0	0.32	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.08	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		18-Jun	
Sample Date	18-Jun			18-Jun		18-Jun	
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	10.39	V0	13.69	V0	0.06	V0
Calcium	0.16	0.12	V0	0.09	V0	0.00	V1
Magnesium	0.03	0.03	V0	0.03	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.04	V0	0.05	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	0.04	V0	0.02	V0	0.00	V1
Sulphate	0.25	0.32	V0	0.33	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.07	V0	0.07	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			18-Jun	
Sample Date	18-Jun			18-Jun	
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	55.59	V0	0.06	V0
Calcium	0.16	1.70	V0	0.00	V1
Magnesium	0.03	0.15	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.26	V0	0.00	V1
Chloride	0.12	0.09	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.09	V0	0.00	V1
Sulphate	0.25	1.92	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.16	V0	0.00	V0



Bertha Ganter - Fort							
Station Name	McKay			Patricia McInnes		Travel Blank	
Station #	AMS 1			AMS 6			
Sample Date	24-Jun			24-Jun		24-Jun	
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	41.80	V0	26.15	V0	0.23	V0
Calcium	0.16	2.13	V0	1.11	V0	0.01	V0
Magnesium	0.03	0.08	V0	0.08	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.06	V0	0.10	V0	0.00	V1
Chloride	0.12	0.04	V0	0.09	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.10	V0	0.12	V0	0.03	V0
Sulphate	0.25	0.40	V0	0.57	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.05	V0	0.12	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		24-Jun	
Sample Date	24-Jun			24-Jun		24-Jun	
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	23.87	V0	8.21	V0	0.23	V0
Calcium	0.16	1.07	V0	0.12	V0	0.01	V0
Magnesium	0.03	0.08	V0	0.02	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1	0.00	V1
Sodium	0.05	0.08	V0	0.02	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	0.12	V0	0.03	V0	0.03	V0
Sulphate	0.25	0.51	V0	0.40	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	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15			
Sample Date	24-Jun			24-Jun		24-Jun	
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	15.26	V0	10.04	V0	0.23	V0
Calcium	0.16	0.59	V0	0.16	V0	0.01	V0
Magnesium	0.03	0.05	V0	0.05	V0	0.00	V1
Potassium	0.09	0.00	V0	0.01	V0	0.00	V1
Sodium	0.05	0.04	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	0.06	V0	0.02	V0	0.03	V0
Sulphate	0.25	0.30	V0	0.24	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.05	V0	0.05	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			24-Jun	
Sample Date	24-Jun			24-Jun	
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	33.35	V0	0.23	V0
Calcium	0.16	1.41	V0	0.01	V0
Magnesium	0.03	0.12	V0	0.00	V1
Potassium	0.09	0.00	V1	0.00	V1
Sodium	0.05	0.08	V0	0.00	V1
Chloride	0.12	0.09	V0	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1
Nitrate	0.20	0.11	V0	0.03	V0
Sulphate	0.25	0.43	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		30-Jun	
Sample Date	30-Jun			30-Jun		30-Jun	
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	18.62	V0	11.54	V0	0.18	V0
Calcium	0.16	0.50	V0	0.20	V0	0.01	V0
Magnesium	0.03	0.04	V0	0.04	V0	0.00	V1
Potassium	0.09	0.01	V0	0.01	V0	0.00	V1
Sodium	0.05	0.02	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	0.10	V0	0.05	V0	0.00	V1
Sulphate	0.25	0.84	V0	0.32	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.19	V0	0.09	V0	0.00	V0



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		30-Jun	
Sample Date	30-Jun			30-Jun		30-Jun	
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	24.23	V0	10.79	V0	0.18	V0
Calcium	0.16	0.71	V0	0.09	V0	0.01	V0
Magnesium	0.03	0.11	V0	0.01	V0	0.00	V1
Potassium	0.09	0.04	V0	0.02	V0	0.00	V1
Sodium	0.05	0.06	V0	0.01	V0	0.00	V1
Chloride	0.12	0.05	V0	0.00	V1	0.00	V1
Fluoride	0.15	0.00	V1	0.00	V1	0.00	V1
Nitrate	0.20	0.13	V0	0.04	V0	0.00	V1
Sulphate	0.25	0.50	V0	0.59	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.10	V0	0.18	V0	0.00	V0



Station Name	Fort McKay South			Horizon		Travel Blank	
Station #	AMS 13			AMS 15		30-Jun	
Sample Date	30-Jun			30-Jun		30-Jun	
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	13.53	V0	20.48	V0	0.18	V0
Calcium	0.16	0.14	V0	0.16	V0	0.01	V0
Magnesium	0.03	0.04	V0	0.04	V0	0.00	V1
Potassium	0.09	0.03	V0	0.02	V0	0.00	V1
Sodium	0.05	0.02	V0	0.06	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	0.05	V0	0.09	V0	0.00	V1
Sulphate	0.25	0.52	V0	0.52	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.14	V0	0.12	V0	0.00	V0



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			30-Jun	
Sample Date	30-Jun			30-Jun	
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	31.01	V0	0.18	V0
Calcium	0.16	1.10	V0	0.01	V0
Magnesium	0.03	0.09	V0	0.00	V1
Potassium	0.09	0.01	V0	0.00	V1
Sodium	0.05	0.04	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	0.14	V0	0.00	V1
Sulphate	0.25	1.62	V0	0.00	V1
Phosphate	0.26	0.00	V1	0.00	V1
Ammonium (as N)	0.02	0.31	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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	25.11	11.44	5	5
Calcium	1.16	0.77	5	5
Magnesium	0.05	0.02	5	5
Potassium	0.01	0.01	5	4
Sodium	0.05	0.02	5	5
Chloride	0.03	0.02	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.10	0.04	5	5
Sulphate	0.79	0.43	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.18	0.13	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	20.34	8.73	5	5
Calcium	0.80	0.48	5	5
Magnesium	0.08	0.03	5	5
Potassium	0.02	0.01	5	5
Sodium	0.08	0.05	5	5
Chloride	0.09	0.07	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.08	0.03	5	5
Sulphate	0.48	0.20	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.11	0.04	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	19.11	5.19	5	5
Calcium	0.63	0.29	5	5
Magnesium	0.08	0.02	5	5
Potassium	0.02	0.01	5	5
Sodium	0.06	0.01	5	5
Chloride	0.05	0.01	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.09	0.04	5	5
Sulphate	0.48	0.15	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.10	0.04	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	9.01	1.37	5	5
Calcium	0.13	0.04	5	5
Magnesium	0.02	0.01	5	5
Potassium	0.01	0.01	5	4
Sodium	0.02	0.01	5	5
Chloride	0.01	0.01	5	4
Fluoride	0.00	0.00	5	0
Nitrate	0.04	0.01	5	5
Sulphate	0.44	0.16	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.12	0.05	5	5



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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
	µg/m³	µg/m³		
Particulate Matter	15.17	3.38	5	5
Calcium	0.37	0.22	5	5
Magnesium	0.04	0.01	5	5
Potassium	0.02	0.01	5	5
Sodium	0.04	0.01	5	5
Chloride	0.01	0.01	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.07	0.03	5	5
Sulphate	0.68	0.43	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.16	0.11	5	5



Station Name	Horizon	Horizon	Horizon	Horizon
Station #	AMS 15	AMS 15	AMS 15	AMS 15
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	19.99	11.36	4	4
Calcium	0.27	0.28	4	4
Magnesium	0.05	0.03	4	4
Potassium	0.01	0.01	4	4
Sodium	0.06	0.04	4	4
Chloride	0.01	0.00	4	4
Fluoride	0.00	0.00	4	0
Nitrate	0.07	0.06	4	4
Sulphate	0.71	0.70	4	4
Phosphate	0.00	0.00	4	0
Ammonium (as N)	0.16	0.16	4	4



Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average	Std Dev	Total Samples (#)	Total ≥ MDL (#)
	µg/m³	µg/m³		
Particulate Matter	31.71	14.89	5	5
Calcium	1.03	0.56	5	5
Magnesium	0.09	0.04	5	5
Potassium	0.01	0.01	5	4
Sodium	0.10	0.09	5	5
Chloride	0.05	0.04	5	5
Fluoride	0.00	0.00	5	0
Nitrate	0.10	0.03	5	5
Sulphate	1.24	0.66	5	5
Phosphate	0.00	0.00	5	0
Ammonium (as N)	0.21	0.15	5	5



Wood Buffalo Environmental Association

PM10 Ion (µg/sample) Summary

2017 June

Compound	% Det	N	N < Det.	Min.	10%	25%	50%	60%	75%	80%	90%	95%	99%	Max.	Mean	Std. Dev.	Median	Outlier Test
Particulate Matter	97.1%	35	1	1	214	268	426	463	626	669	800	1003	1334	1334	468	266	426	1800
Calcium	100.0%	35	0	1.14	2.76	3.78	11.88	14.16	25.56	26.70	34.20	40.80	51.06	51.06	14.90	13.05	11.88	80.15
Magnesium	100.0%	35	0	0.03	0.42	0.66	1.26	1.44	1.92	2.07	2.55	3.15	3.60	3.60	1.39	0.83	1.26	5.57
Potassium	88.6%	35	4	0.00	0.06	0.15	0.33	0.45	0.51	0.57	0.66	0.78	0.87	0.87	0.34	0.23	0.33	1.50
Sodium	97.1%	35	1	0.03	0.36	0.51	1.11	1.32	1.50	1.71	2.34	3.60	6.24	6.24	1.32	1.14	1.11	7.03
Chloride	94.3%	35	2	0.06	0.15	0.27	0.48	0.60	1.14	1.35	2.07	2.22	5.19	5.19	0.86	0.98	0.48	5.78
Fluoride	0.0%	35	35	0.00	0.03	0.06	0.06	0.06	0.09	0.09	0.09	0.09	0.12	0.12	0.06	0.02	0.06	
Nitrate	97.1%	35	1	0.09	0.66	0.96	1.83	2.19	2.61	2.79	3.06	3.33	3.54	3.54	1.80	0.94	1.83	6.49
Sulphate	97.1%	35	1	0.00	7.17	7.95	12.33	14.22	20.07	25.05	37.74	41.97	46.02	46.02	16.02	11.49	12.33	73.46
Phosphate	0.0%	35	35	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%	35	0	0.07	1.16	1.70	2.49	3.38	4.33	5.01	7.59	9.48	9.95	9.95	3.43	2.52	2.49	16.05



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - METALS DATA SUMMARY JUNE 2017

Prepared
August 30, 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 JUNE 2017

Prepared
August 30, 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	$< 2.5 \mu\text{m}$ 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



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	06-Jun		06-Jun		06-Jun	
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	7.47	V0	3.98	V0	0.02	V1
Aluminum	0.1380326	0.0624464	V0	0.0434879	V0	0.0000000	V1
Antimony	0.0001784	0.0000170	V0	0.0000463	V0	0.0000000	V1
Arsenic	0.0001060	0.0000470	V0	0.0001027	V0	0.0000000	V1
Barium	0.0092847	0.0005978	V0	0.0007693	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000041	V0	0.0000047	V0	0.0000024	V0
Cadmium	0.0000174	0.0000045	V0	0.0000102	V0	0.0000000	V1
Calcium	0.4112124	0.1011601	V0	0.0450894	V0	0.0000000	V1
Cerium	0.0000174	0.0000579	V0	0.0000489	V0	0.0000000	V1
Cesium	0.0000100	0.0000048	V0	0.0000033	V0	0.0000000	V1
Chromium	0.0022262	0.0001706	V0	0.0002810	V0	0.0001070	V0
Cobalt	0.0000273	0.0000186	V0	0.0000138	V0	0.0000046	V0
Copper	0.0017171	0.0005556	V0	0.0009187	V0	0.0000901	V0
Iron	0.0393063	0.0562902	V0	0.0455582	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000272	V0	0.0000235	V0	0.0000000	V1
Lead	0.0008577	0.0000851	V0	0.0001576	V0	0.0000000	V1
Lithium	0.0000374	0.0000660	V0	0.0000362	V0	0.0000027	V0
Magnesium	0.0091409	0.0129906	V0	0.0121110	V0	0.0007135	V0
Manganese	0.0006949	0.0009735	V0	0.0007859	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000664	V0	0.0000353	V0	0.0000000	V1
Neodymium	0.0000140	0.0000237	V0	0.0000180	V0	0.0000000	V1
Nickel	0.0005429	0.0003227	V0	0.0001387	V0	0.0000768	V0
Niobium	0.0000202	0.0000063	V0	0.0000049	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0117396	V0	0.0115835	V0	0.0082387	V0
Platinum	0.0000088	0.0000024	V0	0.0000029	V0	0.0000016	V0
Potassium	0.0061261	0.0251238	V0	0.0250294	V0	0.0008328	V0
Praseodymium	0.0000070	0.0000067	V0	0.0000049	V0	0.0000000	V1
Rubidium	0.0000184	0.0000847	V0	0.0000710	V0	0.0000000	V1
Samarium	0.0000133	0.0000047	V0	0.0000030	V0	0.0000000	V1
Selenium	0.0003366	0.0000598	V0	0.0000497	V0	0.0000000	V1
Silicon	0.7676322	0.1572156	V0	0.1253535	V0	0.0449413	V0
Silver	0.0000100	0.0000013	V0	0.0000013	V0	0.0000008	V0
Sodium	0.0169447	0.0152238	V0	0.0178711	V0	0.0012119	V0
Strontium	0.0003375	0.0002631	V0	0.0001824	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000013	V0	0.0000011	V0	0.0000000	V1
Thorium	0.0000059	0.0000077	V0	0.0000061	V0	0.0000000	V1
Tin	0.0004414	0.0000643	V0	0.0001070	V0	0.0000242	V0
Titanium	0.0015201	0.0023183	V0	0.0017264	V0	0.0006932	V0
Tungsten	0.0000938	0.0000069	V0	0.0000127	V0	0.0000000	V1
Uranium	0.0000048	0.0000020	V0	0.0000018	V0	0.0000000	V1
Vanadium	0.0007697	0.0002396	V0	0.0001185	V0	0.0000000	V1
Zinc	0.0055897	0.0013527	V0	0.0019363	V0	0.0000000	V1



Compound Name	Station Name	Athabasca Valley			Anzac		Travel Blank	
	Station #	AMS 7			AMS 14			
	Sample Date	06-Jun			06-Jun			
	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	6.09	V4	3.64	V0	0.02	V1	
Aluminum	0.1380326	0.0974219	V0	0.0298761	V0	0.0000000	V1	
Antimony	0.0001784	0.0002075	V0	0.0000328	V0	0.0000000	V1	
Arsenic	0.0001060	0.0000813	V0	0.0000500	V0	0.0000000	V1	
Barium	0.0092847	0.0031348	V0	0.0005856	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000044	V0	0.0000000	V1	0.0000000	V1	
Bismuth	0.0000093	0.0000092	V0	0.0000019	V0	0.0000024	V0	
Cadmium	0.0000174	0.0000049	V0	0.0000043	V0	0.0000000	V1	
Calcium	0.4112124	0.1093404	V0	0.0208507	V0	0.0000000	V1	
Cerium	0.0000174	0.0001112	V0	0.0000287	V0	0.0000000	V1	
Cesium	0.0000100	0.0000071	V0	0.0000022	V0	0.0000000	V1	
Chromium	0.0022262	0.0003300	V0	0.0003081	V0	0.0001070	V0	
Cobalt	0.0000273	0.0000334	V0	0.0000129	V0	0.0000046	V0	
Copper	0.0017171	0.0014625	V0	0.0002541	V0	0.0000901	V0	
Iron	0.0393063	0.1228521	V0	0.0611397	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0000562	V0	0.0000142	V0	0.0000000	V1	
Lead	0.0008577	0.0001361	V0	0.0000806	V0	0.0000000	V1	
Lithium	0.0000374	0.0000807	V0	0.0000225	V0	0.0000027	V0	
Magnesium	0.0091409	0.0278652	V0	0.0071516	V0	0.0007135	V0	
Manganese	0.0006949	0.0023713	V0	0.0007105	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000839	V0	0.0000925	V0	0.0000000	V1	
Neodymium	0.0000140	0.0000450	V0	0.0000118	V0	0.0000000	V1	
Nickel	0.0005429	0.0001911	V0	0.0001828	V0	0.0000768	V0	
Niobium	0.0000202	0.0000117	V0	0.0000037	V0	0.0000000	V1	
Palladium	0.0000632	0.0000062	V0	0.0000000	V1	0.0000000	V1	
Phosphorus	0.0459574	0.0142049	V0	0.0145822	V0	0.0082387	V0	
Platinum	0.0000088	0.0000021	V0	0.0000031	V0	0.0000016	V0	
Potassium	0.0061261	0.0427134	V0	0.0192713	V0	0.0008328	V0	
Praseodymium	0.0000070	0.0000115	V0	0.0000032	V0	0.0000000	V1	
Rubidium	0.0000184	0.0001357	V0	0.0000465	V0	0.0000000	V1	
Samarium	0.0000133	0.0000083	V0	0.0000024	V0	0.0000000	V1	
Selenium	0.0003366	0.0000986	V0	0.0000387	V0	0.0000000	V1	
Silicon	0.7676322	0.2516762	V0	0.1304153	V0	0.0449413	V0	
Silver	0.0000100	0.0000015	V0	0.0000018	V0	0.0000008	V0	
Sodium	0.0169447	0.0252336	V0	0.0134784	V0	0.0012119	V0	
Strontium	0.0003375	0.0004445	V0	0.0001044	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000016	V0	0.0000010	V0	0.0000000	V1	
Thorium	0.0000059	0.0000147	V0	0.0000046	V0	0.0000000	V1	
Tin	0.0004414	0.0002187	V0	0.0000708	V0	0.0000242	V0	
Titanium	0.0015201	0.0073881	V0	0.0021056	V0	0.0006932	V0	
Tungsten	0.0000938	0.0000375	V0	0.0000079	V0	0.0000000	V1	
Uranium	0.0000048	0.0000040	V0	0.0000013	V0	0.0000000	V1	
Vanadium	0.0007697	0.0002397	V0	0.0001901	V0	0.0000000	V1	
Zinc	0.0055897	0.0022730	V0	0.0006669	V0	0.0000000	V1	



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1		AMS 6			
	Sample Date	12-Jun		12-Jun		12-Jun	
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	6.29	V0	5.12	V0	0.02	V1
Aluminum	0.1380326	0.0791708	V0	0.0396930	V0	0.0000000	V1
Antimony	0.0001784	0.0000267	V0	0.0000666	V0	0.0000000	V1
Arsenic	0.0001060	0.0000479	V0	0.0000563	V0	0.0000000	V1
Barium	0.0092847	0.0006428	V0	0.0008380	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000026	V0	0.0000034	V0	0.0000000	V1
Cadmium	0.0000174	0.0000036	V0	0.0000055	V0	0.0000000	V1
Calcium	0.4112124	0.1137507	V0	0.0495716	V0	0.0000000	V1
Cerium	0.0000174	0.0000701	V0	0.0000464	V0	0.0000000	V1
Cesium	0.0000100	0.0000054	V0	0.0000027	V0	0.0000000	V1
Chromium	0.0022262	0.0002866	V0	0.0002453	V0	0.0000000	V1
Cobalt	0.0000273	0.0000261	V0	0.0000160	V0	0.0000000	V1
Copper	0.0017171	0.0006407	V0	0.0005017	V0	0.0000000	V1
Iron	0.0393063	0.0664187	V0	0.0454440	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000448	V0	0.0000330	V0	0.0000000	V1
Lead	0.0008577	0.0000843	V0	0.0000838	V0	0.0000000	V1
Lithium	0.0000374	0.0000796	V0	0.0000339	V0	0.0000000	V1
Magnesium	0.0091409	0.0144322	V0	0.0125841	V0	0.0000000	V1
Manganese	0.0006949	0.0013747	V0	0.0008373	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000948	V0	0.0000427	V0	0.0000000	V1
Neodymium	0.0000140	0.0000302	V0	0.0000170	V0	0.0000000	V1
Nickel	0.0005429	0.0003240	V0	0.0001185	V0	0.0000502	V0
Niobium	0.0000202	0.0000076	V0	0.0000038	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000053	V0
Phosphorus	0.0459574	0.0117938	V0	0.0106189	V0	0.0085010	V0
Platinum	0.0000088	0.0000034	V0	0.0000018	V0	0.0000019	V0
Potassium	0.0061261	0.0281421	V0	0.0212277	V0	0.0006546	V0
Praseodymium	0.0000070	0.0000077	V0	0.0000045	V0	0.0000000	V1
Rubidium	0.0000184	0.0001011	V0	0.0000573	V0	0.0000000	V1
Samarium	0.0000133	0.0000051	V0	0.0000031	V0	0.0000000	V1
Selenium	0.0003366	0.0000816	V0	0.0000668	V0	0.0000000	V1
Silicon	0.7676322	0.2933325	V0	0.2005691	V0	0.0000000	V1
Silver	0.0000100	0.0000011	V0	0.0000011	V0	0.0000000	V1
Sodium	0.0169447	0.0145743	V0	0.0142616	V0	0.0008928	V0
Strontium	0.0003375	0.0002870	V0	0.0001982	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	0.0000094	V0	0.0000054	V0	0.0000000	V1
Tin	0.0004414	0.0000716	V0	0.0001046	V0	0.0000219	V0
Titanium	0.0015201	0.0031913	V0	0.0015073	V0	0.0003458	V0
Tungsten	0.0000938	0.0000079	V0	0.0000139	V0	0.0000000	V1
Uranium	0.0000048	0.0000028	V0	0.0000018	V0	0.0000000	V1
Vanadium	0.0007697	0.0002856	V0	0.0001726	V0	0.0000000	V1
Zinc	0.0055897	0.0013729	V0	0.0012852	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank		
	AMS 7	AMS 14	AMS 7	AMS 14	AMS 7	AMS 14	AMS 7	
MDL (µg/sample)	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	
PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	
24	24.3	24	24.3	24	24.3	24	24.3	
Compound Name	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	5.18	V0	3.72	V4	0.02	V1	
Aluminum	0.1380326	0.0658865	V0	0.0273402	V0	0.0000000	V1	
Antimony	0.0001784	0.0001301	V0	0.0000193	V0	0.0000000	V1	
Arsenic	0.0001060	0.0000767	V0	0.0000357	V0	0.0000000	V1	
Barium	0.0092847	0.0020477	V0	0.0000000	V1	0.0000000	V1	
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1	
Bismuth	0.0000093	0.0000065	V0	0.0000014	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000044	V0	0.0000027	V0	0.0000000	V1	
Calcium	0.4112124	0.0851498	V0	0.0316715	V0	0.0000000	V1	
Cerium	0.0000174	0.0000863	V0	0.0000244	V0	0.0000000	V1	
Cesium	0.0000100	0.0000049	V0	0.0000021	V0	0.0000000	V1	
Chromium	0.0022262	0.0003110	V0	0.0001283	V0	0.0000000	V1	
Cobalt	0.0000273	0.0000257	V0	0.0000090	V0	0.0000000	V1	
Copper	0.0017171	0.0009598	V0	0.0001920	V0	0.0000000	V1	
Iron	0.0393063	0.0936024	V0	0.0290570	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0000545	V0	0.0000250	V0	0.0000000	V1	
Lead	0.0008577	0.0001207	V0	0.0000700	V0	0.0000000	V1	
Lithium	0.0000374	0.0000526	V0	0.0000198	V0	0.0000000	V1	
Magnesium	0.0091409	0.0187857	V0	0.0062082	V0	0.0000000	V1	
Manganese	0.0006949	0.0027882	V0	0.0004576	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000760	V0	0.0000607	V0	0.0000000	V1	
Neodymium	0.0000140	0.0000326	V0	0.0000105	V0	0.0000000	V1	
Nickel	0.0005429	0.0002052	V0	0.0000985	V0	0.0000502	V0	
Niobium	0.0000202	0.0000097	V0	0.0000027	V0	0.0000000	V1	
Palladium	0.0000632	0.0000065	V0	0.0000000	V1	0.0000053	V0	
Phosphorus	0.0459574	0.0114505	V0	0.0089069	V0	0.0085010	V0	
Platinum	0.0000088	0.0000026	V0	0.0000017	V0	0.0000019	V0	
Potassium	0.0061261	0.0308963	V0	0.0119580	V0	0.0006546	V0	
Praseodymium	0.0000070	0.0000085	V0	0.0000027	V0	0.0000000	V1	
Rubidium	0.0000184	0.0000919	V0	0.0000332	V0	0.0000000	V1	
Samarium	0.0000133	0.0000060	V0	0.0000017	V0	0.0000000	V1	
Selenium	0.0003366	0.0000804	V0	0.0000507	V0	0.0000000	V1	
Silicon	0.7676322	0.1861712	V0	0.4489863	V0	0.0000000	V1	
Silver	0.0000100	0.0000016	V0	0.0000006	V0	0.0000000	V1	
Sodium	0.0169447	0.0182320	V0	0.0069455	V0	0.0008928	V0	
Strontium	0.0003375	0.0003711	V0	0.0001162	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000013	V0	0.0000009	V0	0.0000000	V1	
Thorium	0.0000059	0.0000088	V0	0.0000032	V0	0.0000000	V1	
Tin	0.0004414	0.0001707	V0	0.0000765	V0	0.0000219	V0	
Titanium	0.0015201	0.0034724	V0	0.0015488	V0	0.0003458	V0	
Tungsten	0.0000938	0.0000262	V0	0.0000049	V0	0.0000000	V1	
Uranium	0.0000048	0.0000028	V0	0.0000010	V0	0.0000000	V1	
Vanadium	0.0007697	0.0002096	V0	0.0001365	V0	0.0000000	V1	
Zinc	0.0055897	0.0056152	V0	0.0011452	V0	0.0000000	V1	



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		18-Jun	
	Sample Date	18-Jun		18-Jun		18-Jun	
Particulate Size	PM2.5		PM2.5		24		
Total Air Volume (m ³)	24		-9999		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	3.01	V0	-9999	M1	0.04	V1
Aluminum	0.1380326	0.0269991	V0	-9999	M1	0.0000000	V1
Antimony	0.0001784	0.0000083	V0	-9999	M1	0.0000000	V1
Arsenic	0.0001060	0.0000215	V0	-9999	M1	0.0000000	V1
Barium	0.0092847	0.0014026	V0	-9999	M1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	-9999	M1	0.0000000	V1
Bismuth	0.0000093	0.0000218	V0	-9999	M1	0.0000000	V1
Cadmium	0.0000174	0.0000035	V0	-9999	M1	0.0000000	V1
Calcium	0.4112124	0.0307597	V0	-9999	M1	0.0000000	V1
Cerium	0.0000174	0.0000266	V0	-9999	M1	0.0000000	V1
Cesium	0.0000100	0.0000021	V0	-9999	M1	0.0000000	V1
Chromium	0.0022262	0.0001743	V0	-9999	M1	0.0000000	V1
Cobalt	0.0000273	0.0000093	V0	-9999	M1	0.0000000	V1
Copper	0.0017171	0.0005263	V0	-9999	M1	0.0000000	V1
Iron	0.0393063	0.0249214	V0	-9999	M1	0.0000000	V1
Lanthanum	0.0000130	0.0000125	V0	-9999	M1	0.0000000	V1
Lead	0.0008577	0.0000000	V1	-9999	M1	0.0000000	V1
Lithium	0.0000374	0.0000226	V0	-9999	M1	0.0000016	V0
Magnesium	0.0091409	0.0074152	V0	-9999	M1	0.0004838	V0
Manganese	0.0006949	0.0003738	V0	-9999	M1	0.0000000	V1
Molybdenum	0.0007116	0.0000481	V0	-9999	M1	0.0000000	V1
Neodymium	0.0000140	0.0000113	V0	-9999	M1	0.0000000	V1
Nickel	0.0005429	0.0001035	V0	-9999	M1	0.0000453	V0
Niobium	0.0000202	0.0000028	V0	-9999	M1	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	-9999	M1	0.0000000	V1
Phosphorus	0.0459574	0.0104015	V0	-9999	M1	0.0082367	V0
Platinum	0.0000088	0.0000034	V0	-9999	M1	0.0000016	V0
Potassium	0.0061261	0.0199723	V0	-9999	M1	0.0011697	V0
Praseodymium	0.0000070	0.0000028	V0	-9999	M1	0.0000000	V1
Rubidium	0.0000184	0.0000456	V0	-9999	M1	0.0000000	V1
Samarium	0.0000133	0.0000019	V0	-9999	M1	0.0000000	V1
Selenium	0.0003366	0.0000199	V0	-9999	M1	0.0000000	V1
Silicon	0.7676322	0.1114345	V0	-9999	M1	0.0769945	V0
Silver	0.0000100	0.0000000	V1	-9999	M1	0.0000000	V1
Sodium	0.0169447	0.0119635	V0	-9999	M1	0.0009849	V0
Strontium	0.0003375	0.0003264	V0	-9999	M1	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	-9999	M1	0.0000000	V1
Thallium	0.0000090	0.0000005	V0	-9999	M1	0.0000000	V1
Thorium	0.0000059	0.0000020	V0	-9999	M1	0.0000000	V1
Tin	0.0004414	0.0000717	V0	-9999	M1	0.0000224	V0
Titanium	0.0015201	0.0012498	V0	-9999	M1	0.0004908	V0
Tungsten	0.0000938	0.0000000	V1	-9999	M1	0.0000000	V1
Uranium	0.0000048	0.0000009	V0	-9999	M1	0.0000000	V1
Vanadium	0.0007697	0.0001026	V0	-9999	M1	0.0000000	V1
Zinc	0.0055897	0.0012210	V0	-9999	M1	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 18-Jun PM2.5 24	Results (µg/m ³)	QC Flag	AMS 14 18-Jun PM2.5 24	Results (µg/m ³)	QC Flag	18-Jun 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	3.32	V0	2.50	V0	0.04	V1
Aluminum	0.1380326	0.0428576	V0	0.0184159	V0	0.0000000	V1
Antimony	0.0001784	0.0001113	V0	0.0000082	V0	0.0000000	V1
Arsenic	0.0001060	0.0000892	V0	0.0000302	V0	0.0000000	V1
Barium	0.0092847	0.0016854	V0	0.0000000	V1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000039	V0	0.0000205	V0	0.0000000	V1
Cadmium	0.0000174	0.0000036	V0	0.0000058	V0	0.0000000	V1
Calcium	0.4112124	0.0506256	V0	0.0204946	V0	0.0000000	V1
Cerium	0.0000174	0.0000500	V0	0.0000291	V0	0.0000000	V1
Cesium	0.0000100	0.0000029	V0	0.0000012	V0	0.0000000	V1
Chromium	0.0022262	0.0001854	V0	0.0001199	V0	0.0000000	V1
Cobalt	0.0000273	0.0000152	V0	0.0000089	V0	0.0000000	V1
Copper	0.0017171	0.0007711	V0	0.0001806	V0	0.0000000	V1
Iron	0.0393063	0.0518059	V0	0.0232264	V0	0.0000000	V1
Lanthanum	0.0000130	0.0000240	V0	0.0000126	V0	0.0000000	V1
Lead	0.0008577	0.0000510	V0	0.0000433	V0	0.0000000	V1
Lithium	0.0000374	0.0000349	V0	0.0000130	V0	0.0000016	V0
Magnesium	0.0091409	0.0120747	V0	0.0064896	V0	0.0004838	V0
Manganese	0.0006949	0.0007792	V0	0.0003922	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000532	V0	0.0000508	V0	0.0000000	V1
Neodymium	0.0000140	0.0000194	V0	0.0000084	V0	0.0000000	V1
Nickel	0.0005429	0.0001187	V0	0.0000880	V0	0.0000453	V0
Niobium	0.0000202	0.0000051	V0	0.0000018	V0	0.0000000	V1
Palladium	0.0000632	0.0000040	V0	0.0000000	V1	0.0000000	V1
Phosphorus	0.0459574	0.0111225	V0	0.0106974	V0	0.0082367	V0
Platinum	0.0000088	0.0000022	V0	0.0000022	V0	0.0000016	V0
Potassium	0.0061261	0.0226249	V0	0.0170258	V0	0.0011697	V0
Praseodymium	0.0000070	0.0000055	V0	0.0000022	V0	0.0000000	V1
Rubidium	0.0000184	0.0000613	V0	0.0000331	V0	0.0000000	V1
Samarium	0.0000133	0.0000036	V0	0.0000014	V0	0.0000000	V1
Selenium	0.0003366	0.0000282	V0	0.0000000	V1	0.0000000	V1
Silicon	0.7676322	0.1904895	V0	0.0769139	V0	0.0769945	V0
Silver	0.0000100	0.0000006	V0	0.0000000	V1	0.0000000	V1
Sodium	0.0169447	0.0166766	V0	0.0174788	V0	0.0009849	V0
Strontium	0.0003375	0.0002258	V0	0.0001089	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000008	V0	0.0000005	V0	0.0000000	V1
Thorium	0.0000059	0.0000048	V0	0.0000015	V0	0.0000000	V1
Tin	0.0004414	0.0001319	V0	0.0000673	V0	0.0000224	V0
Titanium	0.0015201	0.0020294	V0	0.0014811	V0	0.0004908	V0
Tungsten	0.0000938	0.0000152	V0	0.0000169	V0	0.0000000	V1
Uranium	0.0000048	0.0000017	V0	0.0000007	V0	0.0000000	V1
Vanadium	0.0007697	0.0001244	V0	0.0000632	V0	0.0000000	V1
Zinc	0.0055897	0.0011565	V0	0.0006223	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		24-Jun	
	Sample Date	24-Jun		24-Jun		24-Jun	
Particulate Size	PM2.5		PM2.5		24		
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	5.11	V0	6.23	V0	0.11	V0
Aluminum	0.1380326	0.0833834	V0	0.0494565	V0	0.0000000	V1
Antimony	0.0001784	0.0000106	V0	0.0001110	V0	0.0000000	V1
Arsenic	0.0001060	0.0000474	V0	0.0006281	V0	0.0000000	V1
Barium	0.0092847	0.0007176	V0	0.0009151	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000020	V0	0.0000041	V0	0.0000011	V0
Cadmium	0.0000174	0.0000056	V0	0.0000166	V0	0.0000000	V1
Calcium	0.4112124	0.1239720	V0	0.0714091	V0	0.0000000	V1
Cerium	0.0000174	0.0000937	V0	0.0000670	V0	0.0000017	V0
Cesium	0.0000100	0.0000062	V0	0.0000042	V0	0.0000000	V1
Chromium	0.0022262	0.0002146	V0	0.0001890	V0	0.0001874	V0
Cobalt	0.0000273	0.0000263	V0	0.0000159	V0	0.0000036	V0
Copper	0.0017171	0.0004686	V0	0.0005294	V0	0.0000000	V1
Iron	0.0393063	0.1029947	V0	0.0520427	V0	0.0017891	V0
Lanthanum	0.0000130	0.0000416	V0	0.0000309	V0	0.0000000	V1
Lead	0.0008577	0.0000713	V0	0.0001144	V0	0.0000000	V1
Lithium	0.0000374	0.0001219	V0	0.0000468	V0	0.0000018	V0
Magnesium	0.0091409	0.0148188	V0	0.0130614	V0	0.0000000	V1
Manganese	0.0006949	0.0016344	V0	0.0008906	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000628	V0	0.0000969	V0	0.0000652	V0
Neodymium	0.0000140	0.0000370	V0	0.0000238	V0	0.0000006	V0
Nickel	0.0005429	0.0001307	V0	0.0001497	V0	0.0000827	V0
Niobium	0.0000202	0.0000089	V0	0.0000059	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000028	V0	0.0000053	V0
Phosphorus	0.0459574	0.0096506	V0	0.0193384	V0	0.0060255	V0
Platinum	0.0000088	0.0000018	V0	0.0000022	V0	0.0000019	V0
Potassium	0.0061261	0.0324419	V0	0.0421458	V0	0.0004712	V0
Praseodymium	0.0000070	0.0000101	V0	0.0000065	V0	0.0000000	V1
Rubidium	0.0000184	0.0001214	V0	0.0001057	V0	0.0000019	V0
Samarium	0.0000133	0.0000075	V0	0.0000044	V0	0.0000000	V1
Selenium	0.0003366	0.0000585	V0	0.0000629	V0	0.0000000	V1
Silicon	0.7676322	0.2711478	V0	0.1893091	V0	0.0000000	V1
Silver	0.0000100	0.0000014	V0	0.0000056	V0	0.0000009	V0
Sodium	0.0169447	0.0097773	V0	0.0105064	V0	0.0011921	V0
Strontium	0.0003375	0.0003128	V0	0.0002375	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000013	V0	0.0000015	V0	0.0000000	V1
Thorium	0.0000059	0.0000105	V0	0.0000063	V0	0.0000003	V0
Tin	0.0004414	0.0000867	V0	0.0001579	V0	0.0000256	V0
Titanium	0.0015201	0.0034214	V0	0.0020761	V0	0.0013868	V0
Tungsten	0.0000938	0.0000087	V0	0.0000129	V0	0.0000000	V1
Uranium	0.0000048	0.0000032	V0	0.0000022	V0	0.0000000	V1
Vanadium	0.0007697	0.0001651	V0	0.0003961	V0	0.0000000	V1
Zinc	0.0055897	0.0020356	V0	0.0040728	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7	AMS 14	AMS 14	AMS 14	AMS 14	AMS 14	AMS 14
	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun
	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5
	24	0	0	0	0	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	5.65	V0	-9999	M1	0.11	V0
Aluminum	0.1380326	0.0795342	V0	-9999	M1	0.0000000	V1
Antimony	0.0001784	0.0001187	V0	-9999	M1	0.0000000	V1
Arsenic	0.0001060	0.0009153	V0	-9999	M1	0.0000000	V1
Barium	0.0092847	0.0018006	V0	-9999	M1	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	-9999	M1	0.0000000	V1
Bismuth	0.0000093	0.0000076	V0	-9999	M1	0.0000011	V0
Cadmium	0.0000174	0.0000004	V0	-9999	M1	0.0000000	V1
Calcium	0.4112124	0.1180109	V0	-9999	M1	0.0000000	V1
Cerium	0.0000174	0.0000911	V0	-9999	M1	0.0000017	V0
Cesium	0.0000100	0.0000061	V0	-9999	M1	0.0000000	V1
Chromium	0.0022262	0.0002536	V0	-9999	M1	0.0001874	V0
Cobalt	0.0000273	0.0000275	V0	-9999	M1	0.0000036	V0
Copper	0.0017171	0.0008646	V0	-9999	M1	0.0000000	V1
Iron	0.0393063	0.0876762	V0	-9999	M1	0.0017891	V0
Lanthanum	0.0000130	0.0000441	V0	-9999	M1	0.0000000	V1
Lead	0.0008577	0.0001112	V0	-9999	M1	0.0000000	V1
Lithium	0.0000374	0.0000681	V0	-9999	M1	0.0000018	V0
Magnesium	0.0091409	0.0208137	V0	-9999	M1	0.0000000	V1
Manganese	0.0006949	0.0015459	V0	-9999	M1	0.0000000	V1
Molybdenum	0.0007116	0.0002397	V0	-9999	M1	0.0000652	V0
Neodymium	0.0000140	0.0000375	V0	-9999	M1	0.0000006	V0
Nickel	0.0005429	0.0001971	V0	-9999	M1	0.0000827	V0
Niobium	0.0000202	0.0000088	V0	-9999	M1	0.0000000	V1
Palladium	0.0000632	0.0000034	V0	-9999	M1	0.0000053	V0
Phosphorus	0.0459574	0.0111756	V0	-9999	M1	0.0060255	V0
Platinum	0.0000088	0.0000026	V0	-9999	M1	0.0000019	V0
Potassium	0.0061261	0.0469438	V0	-9999	M1	0.0004712	V0
Praseodymium	0.0000070	0.0000105	V0	-9999	M1	0.0000000	V1
Rubidium	0.0000184	0.0001262	V0	-9999	M1	0.0000019	V0
Samarium	0.0000133	0.0000069	V0	-9999	M1	0.0000000	V1
Selenium	0.0003366	0.0000978	V0	-9999	M1	0.0000000	V1
Silicon	0.7676322	0.3282190	V0	-9999	M1	0.0000000	V1
Silver	0.0000100	0.0000014	V0	-9999	M1	0.0000009	V0
Sodium	0.0169447	0.0304136	V0	-9999	M1	0.0011921	V0
Strontium	0.0003375	0.0003962	V0	-9999	M1	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	-9999	M1	0.0000000	V1
Thallium	0.0000090	0.0000013	V0	-9999	M1	0.0000000	V1
Thorium	0.0000059	0.0000098	V0	-9999	M1	0.0000003	V0
Tin	0.0004414	0.0002421	V0	-9999	M1	0.0000256	V0
Titanium	0.0015201	0.0057687	V0	-9999	M1	0.0013868	V0
Tungsten	0.0000938	0.0000354	V0	-9999	M1	0.0000000	V1
Uranium	0.0000048	0.0000033	V0	-9999	M1	0.0000000	V1
Vanadium	0.0007697	0.0003807	V0	-9999	M1	0.0000000	V1
Zinc	0.0055897	0.0034156	V0	-9999	M1	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	30-Jun		30-Jun			
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	8.45	V0	5.76	V0	0.22	V0
Aluminum	0.1380326	0.0245892	V0	0.0174861	V0	0.0000000	V1
Antimony	0.0001784	0.0000191	V0	0.0000927	V0	0.0000000	V1
Arsenic	0.0001060	0.0000681	V0	0.0000642	V0	0.0000000	V1
Barium	0.0092847	0.0000000	V1	0.0005751	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000040	V0	0.0000026	V0	0.0000008	V0
Cadmium	0.0000174	0.0000051	V0	0.0000048	V0	0.0000044	V0
Calcium	0.4112124	0.0358815	V0	0.0191346	V0	0.0000000	V1
Cerium	0.0000174	0.0000271	V0	0.0000215	V0	0.0000013	V0
Cesium	0.0000100	0.0000025	V0	0.0000015	V0	0.0000000	V1
Chromium	0.0022262	0.0001543	V0	0.0001537	V0	0.0001469	V0
Cobalt	0.0000273	0.0000099	V0	0.0000084	V0	0.0000075	V0
Copper	0.0017171	0.0007261	V0	0.0004580	V0	0.0000761	V0
Iron	0.0393063	0.0302998	V0	0.0208726	V0	0.0028337	V0
Lanthanum	0.0000130	0.0000067	V0	0.0000041	V0	0.0000000	V1
Lead	0.0008577	0.0000560	V0	0.0000654	V0	0.0000000	V1
Lithium	0.0000374	0.0000257	V0	0.0000153	V0	0.0000026	V0
Magnesium	0.0091409	0.0074438	V0	0.0058990	V0	0.0008431	V0
Manganese	0.0006949	0.0007501	V0	0.0003956	V0	0.0000455	V0
Molybdenum	0.0007116	0.0001096	V0	0.0000322	V0	0.0000313	V0
Neodymium	0.0000140	0.0000101	V0	0.0000080	V0	0.0000000	V1
Nickel	0.0005429	0.0001784	V0	0.0000955	V0	0.0000678	V0
Niobium	0.0000202	0.0000028	V0	0.0000032	V0	0.0000000	V1
Palladium	0.0000632	0.0000000	V1	0.0000000	V1	0.0000029	V0
Phosphorus	0.0459574	0.0076283	V0	0.0084947	V0	0.0054241	V0
Platinum	0.0000088	0.0000019	V0	0.0000018	V0	0.0000020	V0
Potassium	0.0061261	0.0238599	V0	0.0213497	V0	0.0006536	V0
Praseodymium	0.0000070	0.0000026	V0	0.0000020	V0	0.0000000	V1
Rubidium	0.0000184	0.0000532	V0	0.0000412	V0	0.0000021	V0
Samarium	0.0000133	0.0000018	V0	0.0000011	V0	0.0000000	V1
Selenium	0.0003366	0.0000600	V0	0.0000349	V0	0.0000000	V1
Silicon	0.7676322	0.0825099	V0	0.1125861	V0	0.0000000	V1
Silver	0.0000100	0.0000010	V0	0.0000010	V0	0.0000000	V1
Sodium	0.0169447	0.0065140	V0	0.0076348	V0	0.0012300	V0
Strontium	0.0003375	0.0001114	V0	0.0000949	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000011	V0	0.0000010	V0	0.0000000	V1
Thorium	0.0000059	0.0000032	V0	0.0000023	V0	0.0000000	V1
Tin	0.0004414	0.0000573	V0	0.0000852	V0	0.0000297	V0
Titanium	0.0015201	0.0020613	V0	0.0011767	V0	0.0006717	V0
Tungsten	0.0000938	0.0000042	V0	0.0000104	V0	0.0000000	V1
Uranium	0.0000048	0.0000014	V0	0.0000011	V0	0.0000000	V1
Vanadium	0.0007697	0.0000979	V0	0.0000440	V0	0.0000000	V1
Zinc	0.0055897	0.0010854	V0	0.0006067	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 30-Jun PM2.5 24	AMS 14 30-Jun PM2.5 23.7	AMS 14 30-Jun PM2.5 24	AMS 14 30-Jun PM2.5 23.7	AMS 14 30-Jun PM2.5 24	AMS 14 30-Jun PM2.5 24	AMS 14 30-Jun 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	8.61	V0	6.61	V0	0.22	V0
Aluminum	0.1380326	0.0593579	V0	0.0115645	V0	0.0000000	V1
Antimony	0.0001784	0.0001782	V0	0.0000164	V0	0.0000000	V1
Arsenic	0.0001060	0.0001690	V0	0.0001543	V0	0.0000000	V1
Barium	0.0092847	0.0027494	V0	0.0004937	V0	0.0000000	V1
Beryllium	0.0000946	0.0000000	V1	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000098	V0	0.0000366	V0	0.0000008	V0
Cadmium	0.0000174	0.0000109	V0	0.0000123	V0	0.0000044	V0
Calcium	0.4112124	0.0828646	V0	0.0000000	V1	0.0000000	V1
Cerium	0.0000174	0.0000846	V0	0.0000126	V0	0.0000013	V0
Cesium	0.0000100	0.0000045	V0	0.0000012	V0	0.0000000	V1
Chromium	0.0022262	0.0004408	V0	0.0001199	V0	0.0001469	V0
Cobalt	0.0000273	0.0000243	V0	0.0000059	V0	0.0000075	V0
Copper	0.0017171	0.0012959	V0	0.0005649	V0	0.0000761	V0
Iron	0.0393063	0.0847847	V0	0.0200967	V0	0.0028337	V0
Lanthanum	0.0000130	0.0000339	V0	0.0000007	V0	0.0000000	V1
Lead	0.0008577	0.0002041	V0	0.0000622	V0	0.0000000	V1
Lithium	0.0000374	0.0000541	V0	0.0000108	V0	0.0000026	V0
Magnesium	0.0091409	0.0189045	V0	0.0036300	V0	0.0008431	V0
Manganese	0.0006949	0.0012801	V0	0.0003295	V0	0.0000455	V0
Molybdenum	0.0007116	0.0000878	V0	0.0000470	V0	0.0000313	V0
Neodymium	0.0000140	0.0000286	V0	0.0000043	V0	0.0000000	V1
Nickel	0.0005429	0.0001993	V0	0.0000710	V0	0.0000678	V0
Niobium	0.0000202	0.0000095	V0	0.0000014	V0	0.0000000	V1
Palladium	0.0000632	0.0000048	V0	0.0000000	V1	0.0000029	V0
Phosphorus	0.0459574	0.0135751	V0	0.0090851	V0	0.0054241	V0
Platinum	0.0000088	0.0000022	V0	0.0000013	V0	0.0000020	V0
Potassium	0.0061261	0.0379746	V0	0.0249916	V0	0.0006536	V0
Praseodymium	0.0000070	0.0000079	V0	0.0000013	V0	0.0000000	V1
Rubidium	0.0000184	0.0000957	V0	0.0000427	V0	0.0000021	V0
Samarium	0.0000133	0.0000047	V0	0.0000008	V0	0.0000000	V1
Selenium	0.0003366	0.0000822	V0	0.0000446	V0	0.0000000	V1
Silicon	0.7676322	0.2600528	V0	0.0852070	V0	0.0000000	V1
Silver	0.0000100	0.0000027	V0	0.0000020	V0	0.0000000	V1
Sodium	0.0169447	0.0170324	V0	0.0043565	V0	0.0012300	V0
Strontium	0.0003375	0.0003472	V0	0.0001433	V0	0.0000000	V1
Tantalum	0.0000394	0.0000000	V1	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000018	V0	0.0000010	V0	0.0000000	V1
Thorium	0.0000059	0.0000089	V0	0.0000017	V0	0.0000000	V1
Tin	0.0004414	0.0002456	V0	0.0000750	V0	0.0000297	V0
Titanium	0.0015201	0.0034571	V0	0.0007389	V0	0.0006717	V0
Tungsten	0.0000938	0.0000230	V0	0.0000000	V1	0.0000000	V1
Uranium	0.0000048	0.0000030	V0	0.0000010	V0	0.0000000	V1
Vanadium	0.0007697	0.0002149	V0	0.0001509	V0	0.0000000	V1
Zinc	0.0055897	0.0022844	V0	0.0006626	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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	6.07	2.12	5	5
Aluminum	0.0553178	0.0280787	5	5
Antimony	0.0000163	0.0000073	5	5
Arsenic	0.0000464	0.0000165	5	5
Barium	0.0006722	0.0004984	5	4
Beryllium	0.0000000	0.0000000	5	0
Bismuth	0.0000069	0.0000084	5	5
Cadmium	0.0000045	0.0000009	5	5
Calcium	0.0811048	0.0443997	5	5
Cerium	0.0000551	0.0000288	5	5
Cesium	0.0000042	0.0000018	5	5
Chromium	0.0002001	0.0000532	5	5
Cobalt	0.0000180	0.0000083	5	5
Copper	0.0005834	0.0001011	5	5
Iron	0.0561850	0.0313980	5	5
Lanthanum	0.0000266	0.0000170	5	5
Lead	0.0000593	0.0000352	5	4
Lithium	0.0000631	0.0000412	5	5
Magnesium	0.0114201	0.0037061	5	5
Manganese	0.0010213	0.0004990	5	5
Molybdenum	0.0000763	0.0000251	5	5
Neodymium	0.0000224	0.0000117	5	5
Nickel	0.0002119	0.0001052	5	5
Niobium	0.0000057	0.0000028	5	5
Palladium	0.0000000	0.0000000	5	0
Phosphorus	0.0102428	0.0017217	5	5
Platinum	0.0000026	0.0000008	5	5
Potassium	0.0259080	0.0046831	5	5
Praseodymium	0.0000059	0.0000032	5	5
Rubidium	0.0000812	0.0000319	5	5
Samarium	0.0000042	0.0000024	5	5
Selenium	0.0000560	0.0000223	5	5
Silicon	0.1831280	0.0946414	5	5
Silver	0.0000010	0.0000006	5	4
Sodium	0.0116106	0.0035812	5	5
Strontium	0.0002601	0.0000866	5	5
Tantalum	0.0000000	0.0000000	5	0
Thallium	0.0000011	0.0000004	5	5
Thorium	0.0000066	0.0000038	5	5
Tin	0.0000703	0.0000109	5	5
Titanium	0.0024484	0.0008806	5	5
Tungsten	0.0000055	0.0000035	5	4
Uranium	0.0000020	0.0000009	5	5
Vanadium	0.0001782	0.0000831	5	5
Zinc	0.0014135	0.0003664	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	5.27	0.97	4	4
Aluminum	0.0375309	0.0139544	4	4
Antimony	0.0000791	0.0000285	4	4
Arsenic	0.0002128	0.0002776	4	4
Barium	0.0007744	0.0001456	4	4
Beryllium	0.0000000	0.0000000	4	0
Bismuth	0.0000037	0.0000009	4	4
Cadmium	0.0000093	0.0000054	4	4
Calcium	0.0463012	0.0214522	4	4
Cerium	0.0000459	0.0000187	4	4
Cesium	0.0000029	0.0000011	4	4
Chromium	0.0002173	0.0000568	4	4
Cobalt	0.0000135	0.0000036	4	4
Copper	0.0006020	0.0002132	4	4
Iron	0.0409794	0.0137548	4	4
Lanthanum	0.0000229	0.0000132	4	4
Lead	0.0001053	0.0000403	4	4
Lithium	0.0000331	0.0000131	4	4
Magnesium	0.0109139	0.0033657	4	4
Manganese	0.0007274	0.0002253	4	4
Molybdenum	0.0000518	0.0000304	4	4
Neodymium	0.0000167	0.0000065	4	4
Nickel	0.0001256	0.0000239	4	4
Niobium	0.0000045	0.0000012	4	4
Palladium	0.0000007	0.0000014	4	1
Phosphorus	0.0125088	0.0047323	4	4
Platinum	0.0000022	0.0000005	4	4
Potassium	0.0274382	0.0099626	4	4
Praseodymium	0.0000045	0.0000018	4	4
Rubidium	0.0000688	0.0000275	4	4
Samarium	0.0000029	0.0000014	4	4
Selenium	0.0000536	0.0000144	4	4
Silicon	0.1569544	0.0444081	4	4
Silver	0.0000022	0.0000022	4	4
Sodium	0.0125685	0.0044564	4	4
Strontium	0.0001782	0.0000602	4	4
Tantalum	0.0000000	0.0000000	4	0
Thallium	0.0000012	0.0000002	4	4
Thorium	0.0000051	0.0000018	4	4
Tin	0.0001137	0.0000311	4	4
Titanium	0.0016216	0.0003779	4	4
Tungsten	0.0000125	0.0000015	4	4
Uranium	0.0000017	0.0000005	4	4
Vanadium	0.0001828	0.0001517	4	4
Zinc	0.0019752	0.0015001	4	4



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	5.77	1.90	5	5
Aluminum	0.0690116	0.0206450	5	5
Antimony	0.0001492	0.0000417	5	5
Arsenic	0.0002663	0.0003648	5	5
Barium	0.0022836	0.0006301	5	5
Beryllium	0.0000009	0.0000020	5	1
Bismuth	0.0000074	0.0000024	5	5
Cadmium	0.0000062	0.0000030	5	5
Calcium	0.0891982	0.0263639	5	5
Cerium	0.0000846	0.0000221	5	5
Cesium	0.0000051	0.0000016	5	5
Chromium	0.0003042	0.0000949	5	5
Cobalt	0.0000252	0.0000066	5	5
Copper	0.0010708	0.0002953	5	5
Iron	0.0881443	0.0253298	5	5
Lanthanum	0.0000426	0.0000137	5	5
Lead	0.0001246	0.0000549	5	5
Lithium	0.0000581	0.0000173	5	5
Magnesium	0.0196888	0.0056463	5	5
Manganese	0.0017529	0.0008168	5	5
Molybdenum	0.0001081	0.0000747	5	5
Neodymium	0.0000326	0.0000096	5	5
Nickel	0.0001823	0.0000359	5	5
Niobium	0.0000089	0.0000024	5	5
Palladium	0.0000050	0.0000013	5	5
Phosphorus	0.0123057	0.0014686	5	5
Platinum	0.0000023	0.0000002	5	5
Potassium	0.0362306	0.0096619	5	5
Praseodymium	0.0000088	0.0000024	5	5
Rubidium	0.0001022	0.0000297	5	5
Samarium	0.0000059	0.0000018	5	5
Selenium	0.0000774	0.0000288	5	5
Silicon	0.2433218	0.0583410	5	5
Silver	0.0000016	0.0000007	5	5
Sodium	0.0215176	0.0060682	5	5
Strontium	0.0003569	0.0000817	5	5
Tantalum	0.0000000	0.0000000	5	0
Thallium	0.0000013	0.0000004	5	5
Thorium	0.0000094	0.0000035	5	5
Tin	0.0002018	0.0000492	5	5
Titanium	0.0044231	0.0021312	5	5
Tungsten	0.0000275	0.0000091	5	5
Uranium	0.0000029	0.0000008	5	5
Vanadium	0.0002339	0.0000929	5	5
Zinc	0.0029489	0.0016910	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
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	4.12	1.75	4	4
Aluminum	0.0217991	0.0084090	4	4
Antimony	0.0000192	0.0000102	4	4
Arsenic	0.0000676	0.0000584	4	4
Barium	0.0002698	0.0003138	4	2
Beryllium	0.0000000	0.0000000	4	0
Bismuth	0.0000151	0.0000168	4	4
Cadmium	0.0000063	0.0000042	4	4
Calcium	0.0182542	0.0132288	4	3
Cerium	0.0000237	0.0000077	4	4
Cesium	0.0000017	0.0000005	4	4
Chromium	0.0001690	0.0000928	4	4
Cobalt	0.0000092	0.0000029	4	4
Copper	0.0002979	0.0001809	4	4
Iron	0.0333800	0.0188753	4	4
Lanthanum	0.0000131	0.0000100	4	4
Lead	0.0000640	0.0000157	4	4
Lithium	0.0000165	0.0000055	4	4
Magnesium	0.0058699	0.0015447	4	4
Manganese	0.0004724	0.0001671	4	4
Molybdenum	0.0000627	0.0000206	4	4
Neodymium	0.0000087	0.0000033	4	4
Nickel	0.0001101	0.0000498	4	4
Niobium	0.0000024	0.0000010	4	4
Palladium	0.0000000	0.0000000	4	0
Phosphorus	0.0108179	0.0026356	4	4
Platinum	0.0000021	0.0000008	4	4
Potassium	0.0183117	0.0054026	4	4
Praseodymium	0.0000024	0.0000008	4	4
Rubidium	0.0000389	0.0000068	4	4
Samarium	0.0000016	0.0000006	4	4
Selenium	0.0000335	0.0000229	4	3
Silicon	0.1853806	0.1773029	4	4
Silver	0.0000011	0.0000010	4	3
Sodium	0.0105648	0.0059982	4	4
Strontium	0.0001182	0.0000174	4	4
Tantalum	0.0000000	0.0000000	4	0
Thallium	0.0000008	0.0000002	4	4
Thorium	0.0000028	0.0000015	4	4
Tin	0.0000724	0.0000042	4	4
Titanium	0.0014686	0.0005612	4	4
Tungsten	0.0000074	0.0000071	4	3
Uranium	0.0000010	0.0000003	4	4
Vanadium	0.0001352	0.0000531	4	4
Zinc	0.0007743	0.0002481	4	4



Wood Buffalo Environmental Association

PM2.5 Metal (µg/sample) Summary

2017 June

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%	18	0	60	72	90	136	138	151	157	203	207	207	129	43	136	342	
Aluminium	100.0%	18	0	0.2741	0.4197	0.6480	1.0437	1.1870	1.5813	1.9001	2.0012	2.3381	2.3381	1.1456	0.6190	1.0437	4.2407	
Antimony	100.0%	18	0	0.0002	0.0002	0.0004	0.0011	0.0016	0.0027	0.0028	0.0043	0.0050	0.0050	0.0016	0.0015	0.0011	0.0091	
Arsenic	100.0%	18	0	0.0005	0.0007	0.0011	0.0016	0.0018	0.0025	0.0037	0.0151	0.0220	0.0220	0.0036	0.0056	0.0016	0.0318	
Barium	83.3%	18	3	0.0073	0.0077	0.0138	0.0185	0.0201	0.0405	0.0432	0.0660	0.0752	0.0752	0.0266	0.0204	0.0185	0.1284	
Beryllium	5.6%	18	17	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0002	
Bismuth	100.0%	18	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0005	0.0009	0.0009	0.0002	0.0002	0.0001	0.0013	
Cadmium	100.0%	18	0	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0002	0.0001	0.0006	
Calcium	94.4%	18	1	0.1812	0.4592	0.7382	1.2150	1.7138	2.4278	2.6242	2.8323	2.9753	2.9753	1.4902	0.9356	1.2150	6.1680	
Cerium	100.0%	18	0	0.0003	0.0005	0.0007	0.0012	0.0014	0.0020	0.0021	0.0022	0.0027	0.0027	0.0027	0.0013	0.0007	0.0049	
Cesium	100.0%	18	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0000	0.0003	
Chromium	100.0%	18	0	0.0028	0.0029	0.0037	0.0051	0.0059	0.0069	0.0074	0.0079	0.0106	0.0106	0.0106	0.0054	0.0021	0.0159	
Cobalt	100.0%	18	0	0.0001	0.0002	0.0002	0.0004	0.0004	0.0006	0.0006	0.0007	0.0008	0.0008	0.0008	0.0004	0.0002	0.0014	
Copper	100.0%	18	0	0.0043	0.0047	0.0112	0.0134	0.0154	0.0208	0.0220	0.0311	0.0351	0.0351	0.0158	0.0083	0.0134	0.0573	
Iron	100.0%	18	0	0.4763	0.5009	0.7061	1.2490	1.3510	2.0348	2.1042	2.4719	2.9484	2.9484	1.3589	0.7421	1.2490	5.0694	
Lanthanum	100.0%	18	0	0.0000	0.0001	0.0003	0.0007	0.0007	0.0010	0.0011	0.0013	0.0013	0.0013	0.0007	0.0004	0.0007	0.0027	
Lead	94.4%	18	1	0.0008	0.0010	0.0015	0.0020	0.0020	0.0027	0.0029	0.0038	0.0049	0.0049	0.0049	0.0022	0.0010	0.0074	
Lithium	100.0%	18	0	0.0003	0.0003	0.0005	0.0009	0.0011	0.0016	0.0016	0.0019	0.0029	0.0029	0.0029	0.0011	0.0007	0.0046	
Magnesium	100.0%	18	0	0.0860	0.1416	0.1716	0.3020	0.3118	0.3557	0.4509	0.4995	0.6688	0.6688	0.2969	0.1510	0.3020	1.0521	
Manganese	100.0%	18	0	0.0078	0.0090	0.0111	0.0201	0.0214	0.0330	0.0371	0.0569	0.0669	0.0669	0.0249	0.0166	0.0201	0.1078	
Molybdenum	100.0%	18	0	0.0008	0.0008	0.0012	0.0016	0.0018	0.0022	0.0023	0.0026	0.0058	0.0058	0.0018	0.0011	0.0016	0.0074	
Neodymium	100.0%	18	0	0.0001	0.0002	0.0003	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011	0.0011	0.0005	0.0003	0.0005	0.0019	
Nickel	100.0%	18	0	0.0017	0.0021	0.0025	0.0036	0.0043	0.0047	0.0048	0.0077	0.0078	0.0078	0.0039	0.0017	0.0036	0.0126	
Niobium	100.0%	18	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0001	0.0001	0.0005	
Palladium	33.3%	18	12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0001	0.0000	0.0003	
Phosphorus	100.0%	18	0	0.1831	0.2039	0.2316	0.2682	0.2748	0.2831	0.3258	0.3500	0.4641	0.4641	0.2747	0.0652	0.2682	0.6008	
Platinum	100.0%	18	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	
Potassium	100.0%	18	0	0.2906	0.4086	0.5095	0.6007	0.6030	0.7786	0.9114	1.0251	1.1267	1.1267	0.6580	0.2310	0.6007	1.8130	
Praseodymium	100.0%	18	0	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0001	0.0001	0.0005	
Rubidium	100.0%	18	0	0.0008	0.0008	0.0011	0.0017	0.0020	0.0024	0.0025	0.0030	0.0033	0.0033	0.0018	0.0008	0.0017	0.0058	
Samarium	100.0%	18	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0004	
Selenium	94.4%	18	1	0.0003	0.0005	0.0009	0.0014	0.0014	0.0019	0.0020	0.0023	0.0024	0.0024	0.0014	0.0006	0.0014	0.0044	
Silicon	100.0%	18	0	1.8459	1.9802	2.7021	4.5434	4.5717	6.2413	6.5075	7.8773	10.9104	10.9104	4.6748	2.4093	4.5434	16.7215	
Silver	88.9%	18	2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0002	
Sodium	100.0%	18	0	0.1032	0.1563	0.2347	0.3498	0.3654	0.4195	0.4289	0.6056	0.7299	0.7299	0.3443	0.1573	0.3498	1.1308	
Strontium	100.0%	18	0	0.0023	0.0025	0.0028	0.0057	0.0063	0.0078	0.0083	0.0095	0.0107	0.0107	0.0057	0.0027	0.0057	0.0191	
Tantalum	0.0%	18	18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Thallium	100.0%	18	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	
Thorium	100.0%	18	0	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0004	0.0004	0.0004	0.0001	0.0001	0.0006	
Tin	100.0%	18	0	0.0014	0.0015	0.0017	0.0021	0.0025	0.0038	0.0041	0.0058	0.0059	0.0059	0.0028	0.0015	0.0021	0.0104	
Titanium	100.0%	18	0	0.0175	0.0282	0.0362	0.0498	0.0505	0.0821	0.0830	0.1384	0.1773	0.1773	0.0623	0.0405	0.0498	0.2646	
Tungsten	88.9%	18	2	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0006	0.0008	0.0009	0.0009	0.0003	0.0002	0.0003	0.0016	
Uranium	100.0%	18	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0002	
Vanadium	100.0%	18	0	0.0011	0.0015	0.0028	0.0041	0.0046	0.0058	0.0058	0.0091	0.0095	0.0095	0.0044	0.0023	0.0041	0.0161	
Zinc	100.0%	18	0	0.0146	0.0149	0.0260	0.0325	0.0329	0.0546	0.0548	0.0977	0.1348	0.1348	0.0438	0.0322	0.0325	0.2047	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - METALS DATA SUMMARY JUNE 2017

Prepared
August 30, 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	$< 2.5 \mu\text{m}$ 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



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay			Patricia McInnes		Travel Blank
	Station #	AMS 1	AMS 6	AMS 6	AMS 6	AMS 6	AMS 6
	Sample Date	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun
Particulate Size	PM10	PM10	PM10	PM10	PM10	PM10	PM10
Total Air Volume (m ³)	24	24	24	24	24	24	24
MDL (µg/sample)	1.00	24.98	16.26	0.04			
Results (µg/m ³)	0.1380326	0.5762066	0.3728731	0.0000000			
QC Flag	V0	V0	V0	V0	V0	V0	V0
Aluminum	0.1380326	0.5762066	0.3728731	0.0000000	V0	V0	V1
Antimony	0.0001784	0.0000304	0.0001538	0.0000000	V0	V0	V1
Arsenic	0.0001060	0.0001043	0.0001386	0.0000000	V0	V0	V1
Barium	0.0092847	0.0043035	0.0047261	0.0000000	V0	V0	V1
Beryllium	0.0000946	0.0000181	0.0000129	0.0000000	V0	V0	V1
Bismuth	0.0000093	0.0000049	0.0000067	0.0000000	V0	V0	V1
Cadmium	0.0000174	0.0000075	0.0000112	0.0000000	V0	V0	V1
Calcium	0.4112124	1.1236287	0.5330992	0.0000000	V0	V0	V1
Cerium	0.0000174	0.0005424	0.0003715	0.0000000	V0	V0	V1
Cesium	0.0000100	0.0000382	0.0000246	0.0000000	V0	V0	V1
Chromium	0.0022262	0.0007382	0.0006051	0.0001378	V0	V0	V0
Cobalt	0.0000273	0.0001390	0.0001084	0.0000014	V0	V0	V0
Copper	0.0017171	0.0011338	0.0011709	0.0000000	V0	V0	V1
Iron	0.0393063	0.4402105	0.4106916	0.0000000	V0	V0	V1
Lanthanum	0.0000130	0.0002540	0.0001734	0.0000000	V0	V0	V1
Lead	0.0008577	0.0002241	0.0002319	0.0000000	V0	V0	V1
Lithium	0.0000374	0.0006975	0.0002956	0.0000027	V0	V0	V0
Magnesium	0.0091409	0.1199934	0.1328020	0.0004436	V0	V0	V0
Manganese	0.0006949	0.0074836	0.0067410	0.0000000	V0	V0	V1
Molybdenum	0.0007116	0.0000885	0.0000694	0.0000426	V0	V0	V0
Neodymium	0.0000140	0.0002295	0.0001619	0.0000000	V0	V0	V1
Nickel	0.0005429	0.0005337	0.0004242	0.0000419	V0	V0	V0
Niobium	0.0000202	0.0000590	0.0000420	0.0000000	V0	V0	V1
Palladium	0.0000632	0.0000075	0.0000068	0.0000000	V0	V0	V1
Phosphorus	0.0459574	0.0347391	0.0292037	0.0082614	V0	V0	V0
Platinum	0.0000088	0.0000032	0.0000057	0.0000016	V0	V0	V0
Potassium	0.0061261	0.1673124	0.1318120	0.0003603	V0	V0	V0
Praseodymium	0.0000070	0.0000613	0.0000413	0.0000000	V0	V0	V1
Rubidium	0.0000184	0.0006994	0.0004998	0.0000000	V0	V0	V1
Samarium	0.0000133	0.0000424	0.0000293	0.0000000	V0	V0	V1
Selenium	0.0003366	0.0003083	0.0002131	0.0000000	V0	V0	V1
Silicon	0.7676322	1.7944087	1.3525257	0.0000000	V0	V0	V1
Silver	0.0000100	0.0000029	0.0000027	0.0000000	V0	V0	V1
Sodium	0.0169447	0.0674550	0.0817801	0.0000000	V0	V0	V1
Strontium	0.0003375	0.0023083	0.0015209	0.0000000	V0	V0	V1
Tantalum	0.0000394	0.0000038	0.0000030	0.0000000	V0	V0	V1
Thallium	0.0000090	0.0000056	0.0000047	0.0000000	V0	V0	V1
Thorium	0.0000059	0.0000740	0.0000495	0.0000000	V0	V0	V1
Tin	0.0004414	0.0000857	0.0001762	0.0000000	V0	V0	V1
Titanium	0.0015201	0.0216683	0.0159539	0.0009116	V0	V0	V0
Tungsten	0.0000938	0.0000426	0.0001189	0.0000000	V0	V0	V1
Uranium	0.0000048	0.0000205	0.0000154	0.0000000	V0	V0	V1
Vanadium	0.0007697	0.0011692	0.0008922	0.0000444	V0	V0	V0
Zinc	0.0055897	0.0023133	0.0046951	0.0000000	V0	V0	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 06-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 14 06-Jun PM10 24	Results (µg/m ³)	QC Flag	06-Jun 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	18.92	V0	10.21	V0	0.04	V1
Aluminum	0.1380326	0.4841472	V0	0.1533832	V0	0.0000000	V1
Antimony	0.0001784	0.0004320	V0	0.0000702	V0	0.0000000	V1
Arsenic	0.0001060	0.0001469	V0	0.0000923	V0	0.0000000	V1
Barium	0.0092847	0.0094828	V0	0.0024401	V0	0.0000000	V1
Beryllium	0.0000946	0.0000149	V0	0.0000077	V0	0.0000000	V1
Bismuth	0.0000093	0.0000157	V0	0.0000033	V0	0.0000000	V1
Cadmium	0.0000174	0.0000090	V0	0.0000077	V0	0.0000000	V1
Calcium	0.4112124	0.6949878	V0	0.0966739	V0	0.0000000	V1
Cerium	0.0000174	0.0005108	V0	0.0001611	V0	0.0000000	V1
Cesium	0.0000100	0.0000318	V0	0.0000104	V0	0.0000000	V1
Chromium	0.0022262	0.0008690	V0	0.0006412	V0	0.0001378	V0
Cobalt	0.0000273	0.0001563	V0	0.0000622	V0	0.0000014	V0
Copper	0.0017171	0.0031620	V0	0.0007189	V0	0.0000000	V1
Iron	0.0393063	0.5943785	V0	0.2608571	V0	0.0000000	V1
Lanthanum	0.0000130	0.0002437	V0	0.0000796	V0	0.0000000	V1
Lead	0.0008577	0.0003238	V0	0.0001260	V0	0.0000000	V1
Lithium	0.0000374	0.0003639	V0	0.0001125	V0	0.0000027	V0
Magnesium	0.0091409	0.1793174	V0	0.0355016	V0	0.0004436	V0
Manganese	0.0006949	0.0097226	V0	0.0034958	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001489	V0	0.0002249	V0	0.0000426	V0
Neodymium	0.0000140	0.0002187	V0	0.0000726	V0	0.0000000	V1
Nickel	0.0005429	0.0005644	V0	0.0008349	V0	0.0000419	V0
Niobium	0.0000202	0.0000550	V0	0.0000199	V0	0.0000000	V1
Palladium	0.0000632	0.0000145	V0	0.0000043	V0	0.0000000	V1
Phosphorus	0.0459574	0.0352867	V0	0.0326025	V0	0.0082614	V0
Platinum	0.0000088	0.0000026	V0	0.0000020	V0	0.0000016	V0
Potassium	0.0061261	0.1677811	V0	0.0814049	V0	0.0003603	V0
Praseodymium	0.0000070	0.0000572	V0	0.0000183	V0	0.0000000	V1
Rubidium	0.0000184	0.0006374	V0	0.0002329	V0	0.0000000	V1
Samarium	0.0000133	0.0000398	V0	0.0000137	V0	0.0000000	V1
Selenium	0.0003366	0.0003172	V0	0.0001012	V0	0.0000000	V1
Silicon	0.7676322	1.5119525	V0	0.6279509	V0	0.0000000	V1
Silver	0.0000100	0.0000040	V0	0.0000021	V0	0.0000000	V1
Sodium	0.0169447	0.0925300	V0	0.0310876	V0	0.0000000	V1
Strontium	0.0003375	0.0021837	V0	0.0004726	V0	0.0000000	V1
Tantalum	0.0000394	0.0000047	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000059	V0	0.0000020	V0	0.0000000	V1
Thorium	0.0000059	0.0000670	V0	0.0000226	V0	0.0000000	V1
Tin	0.0004414	0.0003873	V0	0.0001076	V0	0.0000000	V1
Titanium	0.0015201	0.0207666	V0	0.0062155	V0	0.0009116	V0
Tungsten	0.0000938	0.0002391	V0	0.0000502	V0	0.0000000	V1
Uranium	0.0000048	0.0000217	V0	0.0000069	V0	0.0000000	V1
Vanadium	0.0007697	0.0010962	V0	0.0016617	V0	0.0000444	V0
Zinc	0.0055897	0.0113783	V0	0.0016067	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 06-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 15 06-Jun PM10 24	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	20.09	V0	20.46	V0	0.04	V1	
Aluminum	0.1380326	0.5355028	V0	0.5867683	V0	0.0000000	V1	
Antimony	0.0001784	0.0000357	V0	0.0000219	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001188	V0	0.0001312	V0	0.0000000	V1	
Barium	0.0092847	0.0042229	V0	0.0047492	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000181	V0	0.0000207	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000089	V0	0.0000045	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000084	V0	0.0000067	V0	0.0000000	V1	
Calcium	0.4112124	0.4996548	V0	0.2096042	V0	0.0000000	V1	
Cerium	0.0000174	0.0005129	V0	0.0005626	V0	0.0000000	V1	
Cesium	0.0000100	0.0000367	V0	0.0000421	V0	0.0000000	V1	
Chromium	0.0022262	0.0007017	V0	0.0007864	V0	0.0001378	V0	
Cobalt	0.0000273	0.0001280	V0	0.0001514	V0	0.0000014	V0	
Copper	0.0017171	0.0006130	V0	0.0006687	V0	0.0000000	V1	
Iron	0.0393063	0.4282845	V0	0.4118397	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0002393	V0	0.0002689	V0	0.0000000	V1	
Lead	0.0008577	0.0002132	V0	0.0002351	V0	0.0000000	V1	
Lithium	0.0000374	0.0006725	V0	0.0005691	V0	0.0000027	V0	
Magnesium	0.0091409	0.1008422	V0	0.1036007	V0	0.0004436	V0	
Manganese	0.0006949	0.0068749	V0	0.0068648	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000942	V0	0.0001475	V0	0.0000426	V0	
Neodymium	0.0000140	0.0002170	V0	0.0002494	V0	0.0000000	V1	
Nickel	0.0005429	0.0005097	V0	0.0010204	V0	0.0000419	V0	
Niobium	0.0000202	0.0000546	V0	0.0000634	V0	0.0000000	V1	
Palladium	0.0000632	0.0000060	V0	0.0000058	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0401439	V0	0.0325654	V0	0.0082614	V0	
Platinum	0.0000088	0.0000015	V0	0.0000024	V0	0.0000016	V0	
Potassium	0.0061261	0.1661436	V0	0.1612250	V0	0.0003603	V0	
Praseodymium	0.0000070	0.0000583	V0	0.0000646	V0	0.0000000	V1	
Rubidium	0.0000184	0.0006678	V0	0.0007020	V0	0.0000000	V1	
Samarium	0.0000133	0.0000404	V0	0.0000462	V0	0.0000000	V1	
Selenium	0.0003366	0.0002715	V0	0.0003199	V0	0.0000000	V1	
Silicon	0.7676322	1.4770488	V0	1.7609549	V0	0.0000000	V1	
Silver	0.0000100	0.0000027	V0	0.0000040	V0	0.0000000	V1	
Sodium	0.0169447	0.0641602	V0	0.0786573	V0	0.0000000	V1	
Strontium	0.0003375	0.0017136	V0	0.0015937	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000035	V0	0.0000043	V0	0.0000000	V1	
Thallium	0.0000090	0.0000053	V0	0.0000058	V0	0.0000000	V1	
Thorium	0.0000059	0.0000685	V0	0.0000764	V0	0.0000000	V1	
Tin	0.0004414	0.0000858	V0	0.0001150	V0	0.0000000	V1	
Titanium	0.0015201	0.0174465	V0	0.0195747	V0	0.0009116	V0	
Tungsten	0.0000938	0.0000401	V0	0.0000187	V0	0.0000000	V1	
Uranium	0.0000048	0.0000200	V0	0.0000218	V0	0.0000000	V1	
Vanadium	0.0007697	0.0011063	V0	0.0027175	V0	0.0000444	V0	
Zinc	0.0055897	0.0024457	V0	0.0017708	V0	0.0000000	V1	



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			06-Jun	
Sample Date	06-Jun			06-Jun	
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	25.19	V0	0.04	V1
Aluminum	0.1380326	0.6254170	V0	0.0000000	V1
Antimony	0.0001784	0.0000359	V0	0.0000000	V1
Arsenic	0.0001060	0.0001349	V0	0.0000000	V1
Barium	0.0092847	0.0053231	V0	0.0000000	V1
Beryllium	0.0000946	0.0000236	V0	0.0000000	V1
Bismuth	0.0000093	0.0000076	V0	0.0000000	V1
Cadmium	0.0000174	0.0000075	V0	0.0000000	V1
Calcium	0.4112124	0.9104284	V0	0.0000000	V1
Cerium	0.0000174	0.0006476	V0	0.0000000	V1
Cesium	0.0000100	0.0000402	V0	0.0000000	V1
Chromium	0.0022262	0.0008929	V0	0.0001378	V0
Cobalt	0.0000273	0.0001794	V0	0.0000014	V0
Copper	0.0017171	0.0006269	V0	0.0000000	V1
Iron	0.0393063	0.7889816	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003042	V0	0.0000000	V1
Lead	0.0008577	0.0002745	V0	0.0000000	V1
Lithium	0.0000374	0.0008379	V0	0.0000027	V0
Magnesium	0.0091409	0.1569075	V0	0.0004436	V0
Manganese	0.0006949	0.0131843	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001448	V0	0.0000426	V0
Neodymium	0.0000140	0.0002778	V0	0.0000000	V1
Nickel	0.0005429	0.0006844	V0	0.0000419	V0
Niobium	0.0000202	0.0000705	V0	0.0000000	V1
Palladium	0.0000632	0.0000076	V0	0.0000000	V1
Phosphorus	0.0459574	0.0344873	V0	0.0082614	V0
Platinum	0.0000088	0.0000023	V0	0.0000016	V0
Potassium	0.0061261	0.1879902	V0	0.0003603	V0
Praseodymium	0.0000070	0.0000731	V0	0.0000000	V1
Rubidium	0.0000184	0.0007749	V0	0.0000000	V1
Samarium	0.0000133	0.0000516	V0	0.0000000	V1
Selenium	0.0003366	0.0003394	V0	0.0000000	V1
Silicon	0.7676322	1.9607035	V0	0.0000000	V1
Silver	0.0000100	0.0000033	V0	0.0000000	V1
Sodium	0.0169447	0.0804957	V0	0.0000000	V1
Strontium	0.0003375	0.0023916	V0	0.0000000	V1
Tantalum	0.0000394	0.0000046	V0	0.0000000	V1
Thallium	0.0000090	0.0000077	V0	0.0000000	V1
Thorium	0.0000059	0.0000892	V0	0.0000000	V1
Tin	0.0004414	0.0001314	V0	0.0000000	V1
Titanium	0.0015201	0.0219026	V0	0.0009116	V0
Tungsten	0.0000938	0.0000565	V0	0.0000000	V1
Uranium	0.0000048	0.0000254	V0	0.0000000	V1
Vanadium	0.0007697	0.0015744	V0	0.0000444	V0
Zinc	0.0055897	0.0032390	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		12-Jun	
	Sample Date	12-Jun		12-Jun		12-Jun	
Particulate Size	PM10		PM10		24		
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	26.98	V0	25.34	V0	0.06	V0
Aluminum	0.1380326	0.8405345	V0	0.7826412	V0	0.0000000	V1
Antimony	0.0001784	0.0000633	V0	0.0003210	V0	0.0000000	V1
Arsenic	0.0001060	0.0001862	V0	0.0002440	V0	0.0000000	V1
Barium	0.0092847	0.0062958	V0	0.0103808	V0	0.0000000	V1
Beryllium	0.0000946	0.0000282	V0	0.0000250	V0	0.0000000	V1
Bismuth	0.0000093	0.0000061	V0	0.0000166	V0	0.0000000	V1
Cadmium	0.0000174	0.0000075	V0	0.0000108	V0	0.0000000	V1
Calcium	0.4112124	1.7935416	V0	1.5659702	V0	0.0000000	V1
Cerium	0.0000174	0.0007999	V0	0.0009960	V0	0.0000000	V1
Cesium	0.0000100	0.0000562	V0	0.0000481	V0	0.0000000	V1
Chromium	0.0022262	0.0011101	V0	0.0011887	V0	0.0000000	V1
Cobalt	0.0000273	0.0002345	V0	0.0002311	V0	0.0000018	V0
Copper	0.0017171	0.0018998	V0	0.0023424	V0	0.0000824	V0
Iron	0.0393063	0.6889449	V0	1.1611528	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003910	V0	0.0005041	V0	0.0000000	V1
Lead	0.0008577	0.0003376	V0	0.0004305	V0	0.0000000	V1
Lithium	0.0000374	0.0008915	V0	0.0006674	V0	0.0000000	V1
Magnesium	0.0091409	0.1808835	V0	0.3953778	V0	0.0006287	V0
Manganese	0.0006949	0.0117472	V0	0.0182209	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002357	V0	0.0001536	V0	0.0000674	V0
Neodymium	0.0000140	0.0003484	V0	0.0004170	V0	0.0000000	V1
Nickel	0.0005429	0.0011549	V0	0.0009413	V0	0.0000576	V0
Niobium	0.0000202	0.0000811	V0	0.0000841	V0	0.0000000	V1
Palladium	0.0000632	0.0000103	V0	0.0000159	V0	0.0000027	V0
Phosphorus	0.0459574	0.0318217	V0	0.0333206	V0	0.0095302	V0
Platinum	0.0000088	0.0000043	V0	0.0000036	V0	0.0000014	V0
Potassium	0.0061261	0.2408515	V0	0.2590490	V0	0.0012019	V0
Praseodymium	0.0000070	0.0000907	V0	0.0001101	V0	0.0000000	V1
Rubidium	0.0000184	0.0010687	V0	0.0010338	V0	0.0000010	V0
Samarium	0.0000133	0.0000660	V0	0.0000736	V0	0.0000000	V1
Selenium	0.0003366	0.0004399	V0	0.0004966	V0	0.0000000	V1
Silicon	0.7676322	2.2674907	V0	2.1995703	V0	0.0000000	V1
Silver	0.0000100	0.0000041	V0	0.0000079	V0	0.0000008	V0
Sodium	0.0169447	0.1062828	V0	0.1971441	V0	0.0014235	V0
Strontium	0.0003375	0.0034531	V0	0.0040013	V0	0.0000000	V1
Tantalum	0.0000394	0.0000053	V0	0.0000061	V0	0.0000000	V1
Thallium	0.0000090	0.0000087	V0	0.0000095	V0	0.0000000	V1
Thorium	0.0000059	0.0001014	V0	0.0001254	V0	0.0000000	V1
Tin	0.0004414	0.0001191	V0	0.0003718	V0	0.0000000	V1
Titanium	0.0015201	0.0268453	V0	0.0269490	V0	0.0015491	V0
Tungsten	0.0000938	0.0000628	V0	0.0003044	V0	0.0000000	V1
Uranium	0.0000048	0.0000311	V0	0.0000333	V0	0.0000000	V1
Vanadium	0.0007697	0.0027315	V0	0.0020169	V0	0.0000000	V1
Zinc	0.0055897	0.0036462	V0	0.0088888	V0	0.0003368	V0



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7	AMS 14	AMS 7	AMS 14	AMS 7	AMS 14	AMS 7
	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun	12-Jun
	PM10	PM10	PM10	PM10	PM10	PM10	PM10
	24	24.4	24	24.4	24	24.4	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	14.71	V0	8.50	V0	0.06	V0
Aluminum	0.1380326	0.3397615	V0	0.1679329	V0	0.0000000	V1
Antimony	0.0001784	0.0002561	V0	0.0000480	V0	0.0000000	V1
Arsenic	0.0001060	0.0001326	V0	0.0000975	V0	0.0000000	V1
Barium	0.0092847	0.0062547	V0	0.0020085	V0	0.0000000	V1
Beryllium	0.0000946	0.0000092	V0	0.0000051	V0	0.0000000	V1
Bismuth	0.0000093	0.0000137	V0	0.0000024	V0	0.0000000	V1
Cadmium	0.0000174	0.0000060	V0	0.0000053	V0	0.0000000	V1
Calcium	0.4112124	0.5611092	V0	0.1818108	V0	0.0000000	V1
Cerium	0.0000174	0.0004172	V0	0.0001966	V0	0.0000000	V1
Cesium	0.0000100	0.0000232	V0	0.0000127	V0	0.0000000	V1
Chromium	0.0022262	0.0006971	V0	0.0005864	V0	0.0000000	V1
Cobalt	0.0000273	0.0001233	V0	0.0000569	V0	0.0000018	V0
Copper	0.0017171	0.0020553	V0	0.0005585	V0	0.0000824	V0
Iron	0.0393063	0.4263463	V0	0.1931524	V0	0.0000000	V1
Lanthanum	0.0000130	0.0002129	V0	0.0001146	V0	0.0000000	V1
Lead	0.0008577	0.0002619	V0	0.0001287	V0	0.0000000	V1
Lithium	0.0000374	0.0002642	V0	0.0001379	V0	0.0000000	V1
Magnesium	0.0091409	0.1354725	V0	0.0468966	V0	0.0006287	V0
Manganese	0.0006949	0.0081100	V0	0.0033555	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001302	V0	0.0000647	V0	0.0000674	V0
Neodymium	0.0000140	0.0001684	V0	0.0000865	V0	0.0000000	V1
Nickel	0.0005429	0.0004840	V0	0.0002956	V0	0.0000576	V0
Niobium	0.0000202	0.0000459	V0	0.0000198	V0	0.0000000	V1
Palladium	0.0000632	0.0000146	V0	0.0000038	V0	0.0000027	V0
Phosphorus	0.0459574	0.0226374	V0	0.0246657	V0	0.0095302	V0
Platinum	0.0000088	0.0000029	V0	0.0000019	V0	0.0000014	V0
Potassium	0.0061261	0.1249107	V0	0.0774205	V0	0.0012019	V0
Praseodymium	0.0000070	0.0000439	V0	0.0000226	V0	0.0000000	V1
Rubidium	0.0000184	0.0004565	V0	0.0002453	V0	0.0000010	V0
Samarium	0.0000133	0.0000303	V0	0.0000150	V0	0.0000000	V1
Selenium	0.0003366	0.0002383	V0	0.0001167	V0	0.0000000	V1
Silicon	0.7676322	1.0040612	V0	0.5262082	V0	0.0000000	V1
Silver	0.0000100	0.0000040	V0	0.0000013	V0	0.0000008	V0
Sodium	0.0169447	0.0743530	V0	0.0284925	V0	0.0014235	V0
Strontium	0.0003375	0.0016637	V0	0.0006312	V0	0.0000000	V1
Tantalum	0.0000394	0.0000033	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000043	V0	0.0000024	V0	0.0000000	V1
Thorium	0.0000059	0.0000486	V0	0.0000250	V0	0.0000000	V1
Tin	0.0004414	0.0003025	V0	0.0000896	V0	0.0000000	V1
Titanium	0.0015201	0.0140108	V0	0.0060983	V0	0.0015491	V0
Tungsten	0.0000938	0.0001548	V0	0.0000302	V0	0.0000000	V1
Uranium	0.0000048	0.0000146	V0	0.0000075	V0	0.0000000	V1
Vanadium	0.0007697	0.0008270	V0	0.0004230	V0	0.0000000	V1
Zinc	0.0055897	0.0124078	V0	0.0012608	V0	0.0003368	V0



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Fort McKay South			Horizon		Travel Blank	
		AMS 13 12-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 15 12-Jun PM10 24	Results (µg/m ³)	QC Flag	24 Results (µg/m ³) QC Flag
Particulate Matter	1.00	18.08	V0	32.44	V0	0.06	V0	
Aluminum	0.1380326	0.6871211	V0	1.0815141	V0	0.0000000	V1	
Antimony	0.0001784	0.0000848	V0	0.0000474	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001632	V0	0.0001883	V0	0.0000000	V1	
Barium	0.0092847	0.0053157	V0	0.0079572	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000189	V0	0.0000316	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000053	V0	0.0000060	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000067	V0	0.0000055	V0	0.0000000	V1	
Calcium	0.4112124	0.6709528	V0	0.5606863	V0	0.0000000	V1	
Cerium	0.0000174	0.0007105	V0	0.0009805	V0	0.0000000	V1	
Cesium	0.0000100	0.0000472	V0	0.0000795	V0	0.0000000	V1	
Chromium	0.0022262	0.0007912	V0	0.0013010	V0	0.0000000	V1	
Cobalt	0.0000273	0.0001779	V0	0.0002887	V0	0.0000018	V0	
Copper	0.0017171	0.0007833	V0	0.0016033	V0	0.0000824	V0	
Iron	0.0393063	0.4461162	V0	0.7736003	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0003567	V0	0.0004715	V0	0.0000000	V1	
Lead	0.0008577	0.0002779	V0	0.0003404	V0	0.0000000	V1	
Lithium	0.0000374	0.0006596	V0	0.0010366	V0	0.0000000	V1	
Magnesium	0.0091409	0.1120526	V0	0.1723994	V0	0.0006287	V0	
Manganese	0.0006949	0.0077277	V0	0.0117237	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001719	V0	0.0001701	V0	0.0000674	V0	
Neodymium	0.0000140	0.0003071	V0	0.0004516	V0	0.0000000	V1	
Nickel	0.0005429	0.0012934	V0	0.0011890	V0	0.0000576	V0	
Niobium	0.0000202	0.0000741	V0	0.0001314	V0	0.0000000	V1	
Palladium	0.0000632	0.0000115	V0	0.0000152	V0	0.0000027	V0	
Phosphorus	0.0459574	0.0318217	V0	0.0257492	V0	0.0095302	V0	
Platinum	0.0000088	0.0000023	V0	0.0000021	V0	0.0000014	V0	
Potassium	0.0061261	0.2010756	V0	0.2850520	V0	0.0012019	V0	
Praseodymium	0.0000070	0.0000800	V0	0.0001143	V0	0.0000000	V1	
Rubidium	0.0000184	0.0008661	V0	0.0012622	V0	0.0000010	V0	
Samarium	0.0000133	0.0000548	V0	0.0000853	V0	0.0000000	V1	
Selenium	0.0003366	0.0003471	V0	0.0005451	V0	0.0000000	V1	
Silicon	0.7676322	1.4133353	V0	4.0032515	V0	0.0000000	V1	
Silver	0.0000100	0.0000033	V0	0.0000049	V0	0.0000008	V0	
Sodium	0.0169447	0.0849569	V0	0.1222332	V0	0.0014235	V0	
Strontium	0.0003375	0.0020998	V0	0.0031943	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000045	V0	0.0000079	V0	0.0000000	V1	
Thallium	0.0000090	0.0000066	V0	0.0000102	V0	0.0000000	V1	
Thorium	0.0000059	0.0000882	V0	0.0001276	V0	0.0000000	V1	
Tin	0.0004414	0.0001554	V0	0.0001538	V0	0.0000000	V1	
Titanium	0.0015201	0.0250727	V0	0.0415092	V0	0.0015491	V0	
Tungsten	0.0000938	0.0000448	V0	0.0000384	V0	0.0000000	V1	
Uranium	0.0000048	0.0000232	V0	0.0000410	V0	0.0000000	V1	
Vanadium	0.0007697	0.0022597	V0	0.0028862	V0	0.0000000	V1	
Zinc	0.0055897	0.0036440	V0	0.0032035	V0	0.0003368	V0	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank	
		Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag
Particulate Matter	1.00	15.32	V0	0.06	V0
Aluminum	0.1380326	0.5095740	V0	0.0000000	V1
Antimony	0.0001784	0.0000283	V0	0.0000000	V1
Arsenic	0.0001060	0.0001575	V0	0.0000000	V1
Barium	0.0092847	0.0034603	V0	0.0000000	V1
Beryllium	0.0000946	0.0000138	V0	0.0000000	V1
Bismuth	0.0000093	0.0000045	V0	0.0000000	V1
Cadmium	0.0000174	0.0000042	V0	0.0000000	V1
Calcium	0.4112124	0.3235737	V0	0.0000000	V1
Cerium	0.0000174	0.0004581	V0	0.0000000	V1
Cesium	0.0000100	0.0000363	V0	0.0000000	V1
Chromium	0.0022262	0.0027972	V0	0.0000000	V1
Cobalt	0.0000273	0.0001681	V0	0.0000018	V0
Copper	0.0017171	0.0165731	V4	0.0000824	V0
Iron	0.0393063	0.4295809	V0	0.0000000	V1
Lanthanum	0.0000130	0.0002294	V0	0.0000000	V1
Lead	0.0008577	0.0002116	V0	0.0000000	V1
Lithium	0.0000374	0.0005072	V0	0.0000000	V1
Magnesium	0.0091409	0.0768562	V0	0.0006287	V0
Manganese	0.0006949	0.0058442	V0	0.0000000	V1
Molybdenum	0.0007116	0.0007294	V0	0.0000674	V0
Neodymium	0.0000140	0.0002011	V0	0.0000000	V1
Nickel	0.0005429	0.0029013	V0	0.0000576	V0
Niobium	0.0000202	0.0000578	V0	0.0000000	V1
Palladium	0.0000632	0.0000082	V0	0.0000027	V0
Phosphorus	0.0459574	0.0212787	V0	0.0095302	V0
Platinum	0.0000088	0.0000021	V0	0.0000014	V0
Potassium	0.0061261	0.1448158	V0	0.0012019	V0
Praseodymium	0.0000070	0.0000528	V0	0.0000000	V1
Rubidium	0.0000184	0.0006356	V0	0.0000010	V0
Samarium	0.0000133	0.0000380	V0	0.0000000	V1
Selenium	0.0003366	0.0002631	V0	0.0000000	V1
Silicon	0.7676322	1.6663811	V0	0.0000000	V1
Silver	0.0000100	0.0000043	V0	0.0000008	V0
Sodium	0.0169447	0.0598506	V0	0.0014235	V0
Strontium	0.0003375	0.0013635	V0	0.0000000	V1
Tantalum	0.0000394	0.0000038	V0	0.0000000	V1
Thallium	0.0000090	0.0000053	V0	0.0000000	V1
Thorium	0.0000059	0.0000564	V0	0.0000000	V1
Tin	0.0004414	0.0022011	V4	0.0000000	V1
Titanium	0.0015201	0.0203972	V0	0.0015491	V0
Tungsten	0.0000938	0.0000287	V0	0.0000000	V1
Uranium	0.0000048	0.0000182	V0	0.0000000	V1
Vanadium	0.0007697	0.0010416	V0	0.0000000	V1
Zinc	0.0055897	0.0020555	V0	0.0003368	V0



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		18-Jun	
	Sample Date	18-Jun		18-Jun		18-Jun	
Particulate Size	PM10		PM10		24		
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	10.81	V0	13.29	V0	0.04	V0
Aluminum	0.1380326	0.3610445	V0	0.4336331	V0	0.0000000	V1
Antimony	0.0001784	0.0000137	V0	0.0001228	V0	0.0000000	V1
Arsenic	0.0001060	0.0000763	V0	0.0001127	V0	0.0000000	V1
Barium	0.0092847	0.0044201	V0	0.0061217	V0	0.0000000	V1
Beryllium	0.0000946	0.0000130	V0	0.0000118	V0	0.0000000	V1
Bismuth	0.0000093	0.0000200	V0	0.0000051	V0	0.0000000	V1
Cadmium	0.0000174	0.0000061	V0	0.0000058	V0	0.0000000	V1
Calcium	0.4112124	0.2751896	V0	0.5753918	V0	0.0000000	V1
Cerium	0.0000174	0.0003527	V0	0.0004282	V0	0.0000000	V1
Cesium	0.0000100	0.0000289	V0	0.0000295	V0	0.0000000	V1
Chromium	0.0022262	0.0005848	V0	0.0006365	V0	0.0000000	V1
Cobalt	0.0000273	0.0000925	V0	0.0001200	V0	0.0000000	V1
Copper	0.0017171	0.0011180	V0	0.0008653	V0	0.0000000	V1
Iron	0.0393063	0.2593570	V0	0.3521825	V0	0.0000000	V1
Lanthanum	0.0000130	0.0001657	V0	0.0002108	V0	0.0000000	V1
Lead	0.0008577	0.0001291	V0	0.0001921	V0	0.0000000	V1
Lithium	0.0000374	0.0003061	V0	0.0002467	V0	0.0000000	V1
Magnesium	0.0091409	0.0729196	V0	0.1504404	V0	0.0000000	V1
Manganese	0.0006949	0.0038046	V0	0.0059379	V0	0.0000000	V1
Molybdenum	0.0007116	0.0000841	V0	0.0000589	V0	0.0000461	V0
Neodymium	0.0000140	0.0001543	V0	0.0001798	V0	0.0000000	V1
Nickel	0.0005429	0.0004118	V0	0.0004512	V0	0.0000411	V0
Niobium	0.0000202	0.0000376	V0	0.0000480	V0	0.0000000	V1
Palladium	0.0000632	0.0000037	V0	0.0000082	V0	0.0000000	V1
Phosphorus	0.0459574	0.0269731	V0	0.0261155	V0	0.0067148	V0
Platinum	0.0000088	0.0000033	V0	0.0000030	V0	0.0000019	V0
Potassium	0.0061261	0.1222859	V0	0.1334257	V0	0.0009217	V0
Praseodymium	0.0000070	0.0000400	V0	0.0000487	V0	0.0000000	V1
Rubidium	0.0000184	0.0004733	V0	0.0005211	V0	0.0000000	V1
Samarium	0.0000133	0.0000307	V0	0.0000340	V0	0.0000000	V1
Selenium	0.0003366	0.0001703	V0	0.0002353	V0	0.0000000	V1
Silicon	0.7676322	1.5200824	V0	1.4070770	V0	0.0347981	V0
Silver	0.0000100	0.0000019	V0	0.0000024	V0	0.0000004	V0
Sodium	0.0169447	0.0591325	V0	0.0944918	V0	0.0013671	V0
Strontium	0.0003375	0.0014186	V0	0.0026237	V0	0.0000000	V1
Tantalum	0.0000394	0.0000023	V0	0.0000033	V0	0.0000000	V1
Thallium	0.0000090	0.0000038	V0	0.0000052	V0	0.0000000	V1
Thorium	0.0000059	0.0000435	V0	0.0000637	V0	0.0000000	V1
Tin	0.0004414	0.0000689	V0	0.0001178	V0	0.0000000	V1
Titanium	0.0015201	0.0124100	V0	0.0155713	V0	0.0008051	V0
Tungsten	0.0000938	0.0000200	V0	0.0000814	V0	0.0000000	V1
Uranium	0.0000048	0.0000183	V0	0.0000203	V0	0.0000000	V1
Vanadium	0.0007697	0.0009261	V0	0.0008773	V0	0.0000000	V1
Zinc	0.0055897	0.0017603	V0	0.0037449	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7 18-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 14 18-Jun PM10 24	Results (µg/m ³)	QC Flag	18-Jun 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	10.71	V0	7.18	V0	0.04	V0
Aluminum	0.1380326	0.2795956	V0	0.1321927	V0	0.0000000	V1
Antimony	0.0001784	0.0002891	V0	0.0000175	V0	0.0000000	V1
Arsenic	0.0001060	0.0001605	V0	0.0000669	V0	0.0000000	V1
Barium	0.0092847	0.0057781	V0	0.0019845	V0	0.0000000	V1
Beryllium	0.0000946	0.0000083	V0	0.0000040	V0	0.0000000	V1
Bismuth	0.0000093	0.0000090	V0	0.0000231	V0	0.0000000	V1
Cadmium	0.0000174	0.0000062	V0	0.0000094	V0	0.0000000	V1
Calcium	0.4112124	0.3619399	V0	0.1611967	V0	0.0000000	V1
Cerium	0.0000174	0.0003100	V0	0.0001734	V0	0.0000000	V1
Cesium	0.0000100	0.0000191	V0	0.0000084	V0	0.0000000	V1
Chromium	0.0022262	0.0005354	V0	0.0002818	V0	0.0000000	V1
Cobalt	0.0000273	0.0000935	V0	0.0000557	V0	0.0000000	V1
Copper	0.0017171	0.0019327	V0	0.0003757	V0	0.0000000	V1
Iron	0.0393063	0.3083015	V0	0.1662221	V0	0.0000000	V1
Lanthanum	0.0000130	0.0001402	V0	0.0000848	V0	0.0000000	V1
Lead	0.0008577	0.0001718	V0	0.0001120	V0	0.0000000	V1
Lithium	0.0000374	0.0002330	V0	0.0000935	V0	0.0000000	V1
Magnesium	0.0091409	0.0920605	V0	0.0474997	V0	0.0000000	V1
Manganese	0.0006949	0.0049191	V0	0.0031460	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001065	V0	0.0000551	V0	0.0000461	V0
Neodymium	0.0000140	0.0001268	V0	0.0000674	V0	0.0000000	V1
Nickel	0.0005429	0.0004057	V0	0.0002081	V0	0.0000411	V0
Niobium	0.0000202	0.0000324	V0	0.0000140	V0	0.0000000	V1
Palladium	0.0000632	0.0000100	V0	0.0000034	V0	0.0000000	V1
Phosphorus	0.0459574	0.0239987	V0	0.0277664	V0	0.0067148	V0
Platinum	0.0000088	0.0000030	V0	0.0000024	V0	0.0000019	V0
Potassium	0.0061261	0.1078174	V0	0.0773920	V0	0.0009217	V0
Praseodymium	0.0000070	0.0000328	V0	0.0000178	V0	0.0000000	V1
Rubidium	0.0000184	0.0003761	V0	0.0002100	V0	0.0000000	V1
Samarium	0.0000133	0.0000239	V0	0.0000122	V0	0.0000000	V1
Selenium	0.0003366	0.0001690	V0	0.0000835	V0	0.0000000	V1
Silicon	0.7676322	0.8755752	V0	0.4567910	V0	0.0347981	V0
Silver	0.0000100	0.0000024	V0	0.0000014	V0	0.0000004	V0
Sodium	0.0169447	0.0618198	V0	0.0394171	V0	0.0013671	V0
Strontium	0.0003375	0.0012189	V0	0.0005665	V0	0.0000000	V1
Tantalum	0.0000394	0.0000025	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000035	V0	0.0000022	V0	0.0000000	V1
Thorium	0.0000059	0.0000368	V0	0.0000181	V0	0.0000000	V1
Tin	0.0004414	0.0002538	V0	0.0000620	V0	0.0000000	V1
Titanium	0.0015201	0.0106434	V0	0.0049145	V0	0.0008051	V0
Tungsten	0.0000938	0.0001087	V0	0.0001413	V0	0.0000000	V1
Uranium	0.0000048	0.0000111	V0	0.0000052	V0	0.0000000	V1
Vanadium	0.0007697	0.0006312	V0	0.0003187	V0	0.0000000	V1
Zinc	0.0055897	0.0064695	V0	0.0015296	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 18-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 15 18-Jun PM10 24	Results (µg/m ³)	QC Flag	24 Results (µg/m ³)
Particulate Matter	1.00	10.64	V0	14.44	V0	0.04	V0	
Aluminum	0.1380326	0.3447279	V0	0.5528434	V0	0.0000000	V1	
Antimony	0.0001784	0.0000098	V0	0.0000178	V0	0.0000000	V1	
Arsenic	0.0001060	0.0000874	V0	0.0000922	V0	0.0000000	V1	
Barium	0.0092847	0.0030753	V0	0.0041880	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000096	V0	0.0000154	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000024	V0	0.0000034	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000027	V0	0.0000033	V0	0.0000000	V1	
Calcium	0.4112124	0.1053485	V0	0.1204288	V0	0.0000000	V1	
Cerium	0.0000174	0.0002898	V0	0.0004675	V0	0.0000000	V1	
Cesium	0.0000100	0.0000288	V0	0.0000434	V0	0.0000000	V1	
Chromium	0.0022262	0.0004645	V0	0.0006873	V0	0.0000000	V1	
Cobalt	0.0000273	0.0000868	V0	0.0001278	V0	0.0000000	V1	
Copper	0.0017171	0.0004415	V0	0.0004041	V0	0.0000000	V1	
Iron	0.0393063	0.2007980	V0	0.2800419	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0001371	V0	0.0002222	V0	0.0000000	V1	
Lead	0.0008577	0.0001078	V0	0.0001503	V0	0.0000000	V1	
Lithium	0.0000374	0.0002900	V0	0.0005192	V0	0.0000000	V1	
Magnesium	0.0091409	0.0630332	V0	0.0780907	V0	0.0000000	V1	
Manganese	0.0006949	0.0026617	V0	0.0045106	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0000841	V0	0.0000663	V0	0.0000461	V0	
Neodymium	0.0000140	0.0001322	V0	0.0002116	V0	0.0000000	V1	
Nickel	0.0005429	0.0003893	V0	0.0005345	V0	0.0000411	V0	
Niobium	0.0000202	0.0000360	V0	0.0000530	V0	0.0000000	V1	
Palladium	0.0000632	0.0000039	V0	0.0000062	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0238416	V0	0.0242028	V0	0.0067148	V0	
Platinum	0.0000088	0.0000019	V0	0.0000023	V0	0.0000019	V0	
Potassium	0.0061261	0.1177493	V0	0.1549559	V0	0.0009217	V0	
Praseodymium	0.0000070	0.0000332	V0	0.0000542	V0	0.0000000	V1	
Rubidium	0.0000184	0.0004601	V0	0.0006879	V0	0.0000000	V1	
Samarium	0.0000133	0.0000253	V0	0.0000435	V0	0.0000000	V1	
Selenium	0.0003366	0.0001649	V0	0.0002579	V0	0.0000000	V1	
Silicon	0.7676322	1.1172703	V0	1.6771506	V0	0.0347981	V0	
Silver	0.0000100	0.0000020	V0	0.0000025	V0	0.0000004	V0	
Sodium	0.0169447	0.0558768	V0	0.0688056	V0	0.0013671	V0	
Strontium	0.0003375	0.0010075	V0	0.0013361	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000021	V0	0.0000032	V0	0.0000000	V1	
Thallium	0.0000090	0.0000032	V0	0.0000052	V0	0.0000000	V1	
Thorium	0.0000059	0.0000391	V0	0.0000637	V0	0.0000000	V1	
Tin	0.0004414	0.0000767	V0	0.0001866	V0	0.0000000	V1	
Titanium	0.0015201	0.0142825	V0	0.0169487	V0	0.0008051	V0	
Tungsten	0.0000938	0.0000355	V0	0.0000124	V0	0.0000000	V1	
Uranium	0.0000048	0.0000114	V0	0.0000202	V0	0.0000000	V1	
Vanadium	0.0007697	0.0007643	V0	0.0012685	V0	0.0000000	V1	
Zinc	0.0055897	0.0014570	V0	0.0023589	V0	0.0000000	V1	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank	
		Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag
Particulate Matter	1.00	57.97	V0	0.04	V0
Aluminum	0.1380326	3.1568530	V0	0.0000000	V1
Antimony	0.0001784	0.0000395	V0	0.0000000	V1
Arsenic	0.0001060	0.0005703	V0	0.0000000	V1
Barium	0.0092847	0.0223989	V0	0.0000000	V1
Beryllium	0.0000946	0.0000888	V0	0.0000000	V1
Bismuth	0.0000093	0.0000225	V0	0.0000000	V1
Cadmium	0.0000174	0.0000104	V0	0.0000000	V1
Calcium	0.4112124	2.4027056	V0	0.0000000	V1
Cerium	0.0000174	0.0039495	V0	0.0000000	V1
Cesium	0.0000100	0.0002069	V0	0.0000000	V1
Chromium	0.0022262	0.0030241	V0	0.0000000	V1
Cobalt	0.0000273	0.0007981	V0	0.0000000	V1
Copper	0.0017171	0.0013292	V0	0.0000000	V1
Iron	0.0393063	2.4276350	V0	0.0000000	V1
Lanthanum	0.0000130	0.0018228	V0	0.0000000	V1
Lead	0.0008577	0.0010246	V0	0.0000000	V1
Lithium	0.0000374	0.0039513	V0	0.0000000	V1
Magnesium	0.0091409	0.4161056	V0	0.0000000	V1
Manganese	0.0006949	0.0414392	V0	0.0000000	V1
Molybdenum	0.0007116	0.0003601	V0	0.0000461	V0
Neodymium	0.0000140	0.0017119	V0	0.0000000	V1
Nickel	0.0005429	0.0027103	V0	0.0000411	V0
Niobium	0.0000202	0.0003812	V0	0.0000000	V1
Palladium	0.0000632	0.0000465	V0	0.0000000	V1
Phosphorus	0.0459574	0.0459831	V0	0.0067148	V0
Platinum	0.0000088	0.0000038	V0	0.0000019	V0
Potassium	0.0061261	0.7084643	V0	0.0009217	V0
Praseodymium	0.0000070	0.0004518	V0	0.0000000	V1
Rubidium	0.0000184	0.0034872	V0	0.0000000	V1
Samarium	0.0000133	0.0003149	V0	0.0000000	V1
Selenium	0.0003366	0.0016994	V0	0.0000000	V1
Silicon	0.7676322	6.0230072	V0	0.0347981	V0
Silver	0.0000100	0.0000231	V0	0.0000004	V0
Sodium	0.0169447	0.3126123	V0	0.0013671	V0
Strontium	0.0003375	0.0092671	V0	0.0000000	V1
Tantalum	0.0000394	0.0000253	V0	0.0000000	V1
Thallium	0.0000090	0.0000266	V0	0.0000000	V1
Thorium	0.0000059	0.0004690	V0	0.0000000	V1
Tin	0.0004414	0.0001625	V0	0.0000000	V1
Titanium	0.0015201	0.1134754	V0	0.0008051	V0
Tungsten	0.0000938	0.0001309	V0	0.0000000	V1
Uranium	0.0000048	0.0001197	V0	0.0000000	V1
Vanadium	0.0007697	0.0059824	V0	0.0000000	V1
Zinc	0.0055897	0.0064898	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		24-Jun	
	Sample Date	24-Jun		24-Jun		24	
Particulate Size	PM10		PM10		24		
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	31.26	V0	25.33	V0	0.12	V0
Aluminum	0.1380326	1.4153631	V0	0.7085162	V0	0.0000000	V1
Antimony	0.0001784	0.0000355	V0	0.0002784	V0	0.0000000	V1
Arsenic	0.0001060	0.0003192	V0	0.0007499	V0	0.0000000	V1
Barium	0.0092847	0.0117640	V0	0.0078322	V0	0.0000000	V1
Beryllium	0.0000946	0.0000407	V0	0.0000186	V0	0.0000000	V1
Bismuth	0.0000093	0.0000074	V0	0.0000143	V0	0.0000017	V0
Cadmium	0.0000174	0.0000127	V0	0.0000195	V0	0.0000000	V1
Calcium	0.4112124	2.1186918	V0	1.2875079	V0	0.0000000	V1
Cerium	0.0000174	0.0015748	V0	0.0008279	V0	0.0000000	V1
Cesium	0.0000100	0.0000987	V0	0.0000518	V0	0.0000000	V1
Chromium	0.0022262	0.0016275	V0	0.0010223	V0	0.0000000	V1
Cobalt	0.0000273	0.0003840	V0	0.0002020	V0	0.0000020	V0
Copper	0.0017171	0.0014631	V0	0.0017785	V0	0.0000000	V1
Iron	0.0393063	1.3289513	V0	0.7440506	V0	0.0000000	V1
Lanthanum	0.0000130	0.0007437	V0	0.0004036	V0	0.0000000	V1
Lead	0.0008577	0.0005822	V0	0.0003537	V0	0.0000000	V1
Lithium	0.0000374	0.0014974	V0	0.0006267	V0	0.0000000	V1
Magnesium	0.0091409	0.2360788	V0	0.2414577	V0	0.0004926	V0
Manganese	0.0006949	0.0204820	V0	0.0119163	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002295	V0	0.0002425	V0	0.0000000	V1
Neodymium	0.0000140	0.0006751	V0	0.0003526	V0	0.0000000	V1
Nickel	0.0005429	0.0012426	V0	0.0008834	V0	0.0000394	V0
Niobium	0.0000202	0.0001550	V0	0.0000838	V0	0.0000000	V1
Palladium	0.0000632	0.0000194	V0	0.0000136	V0	0.0000038	V0
Phosphorus	0.0459574	0.0330345	V0	0.0318262	V0	0.0057532	V0
Platinum	0.0000088	0.0000051	V0	0.0000036	V0	0.0000013	V0
Potassium	0.0061261	0.3875369	V0	0.2461102	V0	0.0003527	V0
Praseodymium	0.0000070	0.0001793	V0	0.0000935	V0	0.0000000	V1
Rubidium	0.0000184	0.0018226	V0	0.0009848	V0	0.0000018	V0
Samarium	0.0000133	0.0001268	V0	0.0000614	V0	0.0000000	V1
Selenium	0.0003366	0.0008526	V0	0.0004707	V0	0.0000000	V1
Silicon	0.7676322	3.5916181	V0	2.1652047	V0	0.0000000	V1
Silver	0.0000100	0.0000068	V0	0.0000072	V0	0.0000000	V1
Sodium	0.0169447	0.1198946	V0	0.1290488	V0	0.0007932	V0
Strontium	0.0003375	0.0048267	V0	0.0033417	V0	0.0000000	V1
Tantalum	0.0000394	0.0000098	V0	0.0000059	V0	0.0000000	V1
Thallium	0.0000090	0.0000149	V0	0.0000083	V0	0.0000000	V1
Thorium	0.0000059	0.0002078	V0	0.0001022	V0	0.0000000	V1
Tin	0.0004414	0.0001238	V0	0.0002316	V0	0.0000482	V0
Titanium	0.0015201	0.0536766	V0	0.0282379	V0	0.0003943	V0
Tungsten	0.0000938	0.0000692	V0	0.0001424	V0	0.0000048	V0
Uranium	0.0000048	0.0000513	V0	0.0000301	V0	0.0000000	V1
Vanadium	0.0007697	0.0027055	V0	0.0020011	V0	0.0000000	V1
Zinc	0.0055897	0.0045598	V0	0.0096779	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
	AMS 7	AMS 14	AMS 14	AMS 14	AMS 14	AMS 14	AMS 14
	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun	24-Jun
	PM10	PM10	PM10	PM10	PM10	PM10	PM10
	24	24	24	24	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	23.48	V0	7.46	V0	0.12	V0
Aluminum	0.1380326	0.5897078	V0	0.1639462	V0	0.0000000	V1
Antimony	0.0001784	0.0002497	V0	0.0000179	V0	0.0000000	V1
Arsenic	0.0001060	0.0008194	V0	0.0000663	V0	0.0000000	V1
Barium	0.0092847	0.0073636	V0	0.0014410	V0	0.0000000	V1
Beryllium	0.0000946	0.0000181	V0	0.0000052	V0	0.0000000	V1
Bismuth	0.0000093	0.0000118	V0	0.0000047	V0	0.0000017	V0
Cadmium	0.0000174	0.0000088	V0	0.0000082	V0	0.0000000	V1
Calcium	0.4112124	1.0159090	V0	0.2021103	V0	0.0000000	V1
Cerium	0.0000174	0.0006501	V0	0.0001647	V0	0.0000000	V1
Cesium	0.0000100	0.0000426	V0	0.0000130	V0	0.0000000	V1
Chromium	0.0022262	0.0008931	V0	0.0004815	V0	0.0000000	V1
Cobalt	0.0000273	0.0001861	V0	0.0000470	V0	0.0000020	V0
Copper	0.0017171	0.0017319	V0	0.0003108	V0	0.0000000	V1
Iron	0.0393063	0.6237049	V0	0.1329833	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003045	V0	0.0000767	V0	0.0000000	V1
Lead	0.0008577	0.0003385	V0	0.0001014	V0	0.0000000	V1
Lithium	0.0000374	0.0005206	V0	0.0001456	V0	0.0000000	V1
Magnesium	0.0091409	0.1807187	V0	0.0389086	V0	0.0004926	V0
Manganese	0.0006949	0.0101617	V0	0.0021305	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001953	V0	0.0000807	V0	0.0000000	V1
Neodymium	0.0000140	0.0002747	V0	0.0000709	V0	0.0000000	V1
Nickel	0.0005429	0.0007197	V0	0.0003180	V0	0.0000394	V0
Niobium	0.0000202	0.0000629	V0	0.0000179	V0	0.0000000	V1
Palladium	0.0000632	0.0000126	V0	0.0000042	V0	0.0000038	V0
Phosphorus	0.0459574	0.0229057	V0	0.0188516	V0	0.0057532	V0
Platinum	0.0000088	0.0000052	V0	0.0000025	V0	0.0000013	V0
Potassium	0.0061261	0.1944717	V0	0.0714171	V0	0.0003527	V0
Praseodymium	0.0000070	0.0000724	V0	0.0000183	V0	0.0000000	V1
Rubidium	0.0000184	0.0008021	V0	0.0002415	V0	0.0000018	V0
Samarium	0.0000133	0.0000511	V0	0.0000129	V0	0.0000000	V1
Selenium	0.0003366	0.0003689	V0	0.0000976	V0	0.0000000	V1
Silicon	0.7676322	2.1638236	V0	0.5302237	V0	0.0000000	V1
Silver	0.0000100	0.0000036	V0	0.0000011	V0	0.0000000	V1
Sodium	0.0169447	0.0905075	V0	0.0242831	V0	0.0007932	V0
Strontium	0.0003375	0.0026945	V0	0.0006249	V0	0.0000000	V1
Tantalum	0.0000394	0.0000049	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000068	V0	0.0000019	V0	0.0000000	V1
Thorium	0.0000059	0.0000813	V0	0.0000209	V0	0.0000000	V1
Tin	0.0004414	0.0002718	V0	0.0001439	V0	0.0000482	V0
Titanium	0.0015201	0.0198706	V0	0.0060125	V0	0.0003943	V0
Tungsten	0.0000938	0.0001748	V0	0.0000207	V0	0.0000048	V0
Uranium	0.0000048	0.0000242	V0	0.0000062	V0	0.0000000	V1
Vanadium	0.0007697	0.0015208	V0	0.0004560	V0	0.0000000	V1
Zinc	0.0055897	0.0078575	V0	0.0016724	V0	0.0000000	V1



Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Fort McKay South			Horizon		Travel Blank	
	AMS 13	AMS 15		AMS 15		24-Jun	
	PM10	PM10		PM10		24	
	24	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	17.45	V0	10.17	V0	0.12	V0
Aluminum	0.1380326	0.6549562	V0	0.2976282	V0	0.0000000	V1
Antimony	0.0001784	0.0000254	V0	0.0000245	V0	0.0000000	V1
Arsenic	0.0001060	0.0001363	V0	0.0000865	V0	0.0000000	V1
Barium	0.0092847	0.0048848	V0	0.0030047	V0	0.0000000	V1
Beryllium	0.0000946	0.0000182	V0	0.0000100	V0	0.0000000	V1
Bismuth	0.0000093	0.0000040	V0	0.0000020	V0	0.0000017	V0
Cadmium	0.0000174	0.0000036	V0	0.0000032	V0	0.0000000	V1
Calcium	0.4112124	0.6869201	V0	0.3158644	V0	0.0000000	V1
Cerium	0.0000174	0.0007211	V0	0.0003689	V0	0.0000000	V1
Cesium	0.0000100	0.0000455	V0	0.0000219	V0	0.0000000	V1
Chromium	0.0022262	0.0009180	V0	0.0004130	V0	0.0000000	V1
Cobalt	0.0000273	0.0001606	V0	0.0000885	V0	0.0000020	V0
Copper	0.0017171	0.0005317	V0	0.0002679	V0	0.0000000	V1
Iron	0.0393063	0.5517532	V0	0.4009979	V0	0.0000000	V1
Lanthanum	0.0000130	0.0003372	V0	0.0001725	V0	0.0000000	V1
Lead	0.0008577	0.0002197	V0	0.0001255	V0	0.0000000	V1
Lithium	0.0000374	0.0008210	V0	0.0002937	V0	0.0000000	V1
Magnesium	0.0091409	0.1122567	V0	0.0735972	V0	0.0004926	V0
Manganese	0.0006949	0.0090634	V0	0.0059277	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001120	V0	0.0000775	V0	0.0000000	V1
Neodymium	0.0000140	0.0003003	V0	0.0001638	V0	0.0000000	V1
Nickel	0.0005429	0.0007097	V0	0.0003915	V0	0.0000394	V0
Niobium	0.0000202	0.0002479	V0	0.0000435	V0	0.0000000	V1
Palladium	0.0000632	0.0000088	V0	0.0000063	V0	0.0000038	V0
Phosphorus	0.0459574	0.0245273	V0	0.0142478	V0	0.0057532	V0
Platinum	0.0000088	0.0000015	V0	0.0000011	V0	0.0000013	V0
Potassium	0.0061261	0.1794130	V0	0.0951176	V0	0.0003527	V0
Praseodymium	0.0000070	0.0000807	V0	0.0000426	V0	0.0000000	V1
Rubidium	0.0000184	0.0008035	V0	0.0003973	V0	0.0000018	V0
Samarium	0.0000133	0.0000532	V0	0.0000296	V0	0.0000000	V1
Selenium	0.0003366	0.0003487	V0	0.0001441	V0	0.0000000	V1
Silicon	0.7676322	1.7326251	V0	0.8311635	V0	0.0000000	V1
Silver	0.0000100	0.0000029	V0	0.0000015	V0	0.0000000	V1
Sodium	0.0169447	0.0599438	V0	0.0333897	V0	0.0007932	V0
Strontium	0.0003375	0.0021905	V0	0.0011859	V0	0.0000000	V1
Tantalum	0.0000394	0.0000044	V0	0.0000030	V0	0.0000000	V1
Thallium	0.0000090	0.0000060	V0	0.0000039	V0	0.0000000	V1
Thorium	0.0000059	0.0000920	V0	0.0000482	V0	0.0000000	V1
Tin	0.0004414	0.0001175	V0	0.0001195	V0	0.0000482	V0
Titanium	0.0015201	0.0207878	V0	0.0133610	V0	0.0003943	V0
Tungsten	0.0000938	0.0000286	V0	0.0000160	V0	0.0000048	V0
Uranium	0.0000048	0.0000234	V0	0.0000135	V0	0.0000000	V1
Vanadium	0.0007697	0.0011650	V0	0.0008409	V0	0.0000000	V1
Zinc	0.0055897	0.0022597	V0	0.0004650	V0	0.0000000	V1



Station Name	Muskeg River			Travel Blank	
Station #	AMS 16			24-Jun	
Sample Date	24-Jun			24-Jun	
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	35.05	V0	0.12	V0
Aluminum	0.1380326	1.0936934	V0	0.0000000	V1
Antimony	0.0001784	0.0000283	V0	0.0000000	V1
Arsenic	0.0001060	0.0002299	V0	0.0000000	V1
Barium	0.0092847	0.0106236	V0	0.0000000	V1
Beryllium	0.0000946	0.0000388	V0	0.0000000	V1
Bismuth	0.0000093	0.0000063	V0	0.0000017	V0
Cadmium	0.0000174	0.0000045	V0	0.0000000	V1
Calcium	0.4112124	1.9133385	V0	0.0000000	V1
Cerium	0.0000174	0.0013573	V0	0.0000000	V1
Cesium	0.0000100	0.0000744	V0	0.0000000	V1
Chromium	0.0022262	0.0021448	V0	0.0000000	V1
Cobalt	0.0000273	0.0003458	V0	0.0000020	V0
Copper	0.0017171	0.0009421	V0	0.0000000	V1
Iron	0.0393063	1.7490471	V0	0.0000000	V1
Lanthanum	0.0000130	0.0006320	V0	0.0000000	V1
Lead	0.0008577	0.0004109	V0	0.0000000	V1
Lithium	0.0000374	0.0012692	V0	0.0000000	V1
Magnesium	0.0091409	0.2772331	V0	0.0004926	V0
Manganese	0.0006949	0.0291712	V0	0.0000000	V1
Molybdenum	0.0007116	0.0001957	V0	0.0000000	V1
Neodymium	0.0000140	0.0005700	V0	0.0000000	V1
Nickel	0.0005429	0.0011410	V0	0.0000394	V0
Niobium	0.0000202	0.0001591	V0	0.0000000	V1
Palladium	0.0000632	0.0000175	V0	0.0000038	V0
Phosphorus	0.0459574	0.0241023	V0	0.0057532	V0
Platinum	0.0000088	0.0000020	V0	0.0000013	V0
Potassium	0.0061261	0.3020798	V0	0.0003527	V0
Praseodymium	0.0000070	0.0001527	V0	0.0000000	V1
Rubidium	0.0000184	0.0013957	V0	0.0000018	V0
Samarium	0.0000133	0.0001080	V0	0.0000000	V1
Selenium	0.0003366	0.0005811	V0	0.0000000	V1
Silicon	0.7676322	3.4214819	V0	0.0000000	V1
Silver	0.0000100	0.0000062	V0	0.0000000	V1
Sodium	0.0169447	0.1268139	V0	0.0007932	V0
Strontium	0.0003375	0.0048360	V0	0.0000000	V1
Tantalum	0.0000394	0.0000103	V0	0.0000000	V1
Thallium	0.0000090	0.0000138	V0	0.0000000	V1
Thorium	0.0000059	0.0001772	V0	0.0000000	V1
Tin	0.0004414	0.0001177	V0	0.0000482	V0
Titanium	0.0015201	0.0511965	V0	0.0003943	V0
Tungsten	0.0000938	0.0000899	V0	0.0000048	V0
Uranium	0.0000048	0.0000498	V0	0.0000000	V1
Vanadium	0.0007697	0.0022468	V0	0.0000000	V1
Zinc	0.0055897	0.0038186	V0	0.0000000	V1



Compound Name	Bertha Ganter - Fort						
	Station Name	McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6		30-Jun	
	Sample Date	30-Jun		30-Jun		30-Jun	
Particulate Size	PM10		PM10		24		
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	18.21	V0	10.80	V0	0.09	V0
Aluminum	0.1380326	0.3148910	V0	0.0844779	V0	0.0000000	V1
Antimony	0.0001784	0.0000495	V0	0.0001520	V0	0.0000000	V1
Arsenic	0.0001060	0.0001636	V0	0.0000687	V0	0.0000000	V1
Barium	0.0092847	0.0032534	V0	0.0018949	V0	0.0000000	V1
Beryllium	0.0000946	0.0000099	V0	0.0000000	V1	0.0000000	V1
Bismuth	0.0000093	0.0000070	V0	0.0000038	V0	0.0000000	V1
Cadmium	0.0000174	0.0000110	V0	0.0000047	V0	0.0000000	V1
Calcium	0.4112124	0.7145447	V0	0.1635046	V0	0.0000000	V1
Cerium	0.0000174	0.0003497	V0	0.0001109	V0	0.0000000	V1
Cesium	0.0000100	0.0000252	V0	0.0000057	V0	0.0000000	V1
Chromium	0.0022262	0.0006491	V0	0.0003049	V0	0.0000000	V1
Cobalt	0.0000273	0.0001016	V0	0.0000286	V0	0.0000024	V0
Copper	0.0017171	0.0018829	V0	0.0008537	V0	0.0000000	V1
Iron	0.0393063	0.3372132	V0	0.1171137	V0	0.0000000	V1
Lanthanum	0.0000130	0.0001575	V0	0.0000470	V0	0.0000000	V1
Lead	0.0008577	0.0002229	V0	0.0000878	V0	0.0000000	V1
Lithium	0.0000374	0.0003043	V0	0.0000694	V0	0.0000017	V0
Magnesium	0.0091409	0.0881952	V0	0.0409878	V0	0.0000000	V1
Manganese	0.0006949	0.0061183	V0	0.0021039	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002162	V0	0.0000763	V0	0.0000000	V1
Neodymium	0.0000140	0.0001445	V0	0.0000447	V0	0.0000000	V1
Nickel	0.0005429	0.0005109	V0	0.0001568	V0	0.0000339	V0
Niobium	0.0000202	0.0000417	V0	0.0000099	V0	0.0000000	V1
Palladium	0.0000632	0.0000064	V0	0.0000044	V0	0.0000000	V1
Phosphorus	0.0459574	0.0379178	V0	0.0214505	V0	0.0059488	V0
Platinum	0.0000088	0.0000021	V0	0.0000038	V0	0.0000013	V0
Potassium	0.0061261	0.1602084	V0	0.0670680	V0	0.0000000	V1
Praseodymium	0.0000070	0.0000384	V0	0.0000117	V0	0.0000000	V1
Rubidium	0.0000184	0.0004943	V0	0.0001441	V0	0.0000000	V1
Samarium	0.0000133	0.0000258	V0	0.0000071	V0	0.0000000	V1
Selenium	0.0003366	0.0002148	V0	0.0000786	V0	0.0000000	V1
Silicon	0.7676322	0.9984957	V0	0.3939368	V0	0.0435962	V0
Silver	0.0000100	0.0000036	V0	0.0000052	V0	0.0000004	V0
Sodium	0.0169447	0.0539767	V0	0.0201679	V0	0.0007349	V0
Strontium	0.0003375	0.0015584	V0	0.0004569	V0	0.0000000	V1
Tantalum	0.0000394	0.0000026	V0	0.0000000	V1	0.0000000	V1
Thallium	0.0000090	0.0000046	V0	0.0000015	V0	0.0000000	V1
Thorium	0.0000059	0.0000422	V0	0.0000138	V0	0.0000000	V1
Tin	0.0004414	0.0001159	V0	0.0001180	V0	0.0000411	V0
Titanium	0.0015201	0.0128288	V0	0.0043963	V0	0.0004468	V0
Tungsten	0.0000938	0.0000299	V0	0.0000357	V0	0.0000000	V1
Uranium	0.0000048	0.0000139	V0	0.0000038	V0	0.0000000	V1
Vanadium	0.0007697	0.0008244	V0	0.0001944	V0	0.0000000	V1
Zinc	0.0055897	0.0026192	V0	0.0026807	V0	0.0000000	V1



Compound Name	Station Name Station # Sample Date Particulate Size Total Air Volume (m ³)	Athabasca Valley			Anzac		Travel Blank	
		MDL (µg/sample)	AMS 7 30-Jun PM10 24 Results (µg/m ³)	QC Flag	AMS 14 30-Jun PM10 24 Results (µg/m ³)	QC Flag	30-Jun 24 Results (µg/m ³)	QC Flag
Particulate Matter	1.00	24.46	V0	10.40	V0	0.09	V0	
Aluminum	0.1380326	0.4659707	V0	0.0625830	V0	0.0000000	V1	
Antimony	0.0001784	0.0004713	V0	0.0000405	V0	0.0000000	V1	
Arsenic	0.0001060	0.0002619	V0	0.0001811	V0	0.0000000	V1	
Barium	0.0092847	0.0104466	V0	0.0012953	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000146	V0	0.0000000	V1	0.0000000	V1	
Bismuth	0.0000093	0.0000196	V0	0.0000386	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000132	V0	0.0000163	V0	0.0000000	V1	
Calcium	0.4112124	0.8765163	V0	0.0702341	V0	0.0000000	V1	
Cerium	0.0000174	0.0006331	V0	0.0000635	V0	0.0000000	V1	
Cesium	0.0000100	0.0000323	V0	0.0000048	V0	0.0000000	V1	
Chromium	0.0022262	0.0008801	V0	0.0002614	V0	0.0000000	V1	
Cobalt	0.0000273	0.0001690	V0	0.0000225	V0	0.0000024	V0	
Copper	0.0017171	0.0033426	V0	0.0006210	V0	0.0000000	V1	
Iron	0.0393063	0.6565095	V0	0.0848884	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0002882	V0	0.0000282	V0	0.0000000	V1	
Lead	0.0008577	0.0004557	V0	0.0000878	V0	0.0000000	V1	
Lithium	0.0000374	0.0004039	V0	0.0000473	V0	0.0000017	V0	
Magnesium	0.0091409	0.1914507	V0	0.0200984	V0	0.0000000	V1	
Manganese	0.0006949	0.0100332	V0	0.0016324	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001959	V0	0.0001051	V0	0.0000000	V1	
Neodymium	0.0000140	0.0002539	V0	0.0000258	V0	0.0000000	V1	
Nickel	0.0005429	0.0006057	V0	0.0001934	V0	0.0000339	V0	
Niobium	0.0000202	0.0000664	V0	0.0000073	V0	0.0000000	V1	
Palladium	0.0000632	0.0000181	V0	0.0000000	V1	0.0000000	V1	
Phosphorus	0.0459574	0.0344519	V0	0.0317036	V0	0.0059488	V0	
Platinum	0.0000088	0.0000042	V0	0.0000026	V0	0.0000013	V0	
Potassium	0.0061261	0.2054742	V0	0.0791220	V0	0.0000000	V1	
Praseodymium	0.0000070	0.0000681	V0	0.0000071	V0	0.0000000	V1	
Rubidium	0.0000184	0.0006678	V0	0.0001460	V0	0.0000000	V1	
Samarium	0.0000133	0.0000452	V0	0.0000050	V0	0.0000000	V1	
Selenium	0.0003366	0.0003199	V0	0.0000875	V0	0.0000000	V1	
Silicon	0.7676322	1.6256349	V0	0.1900529	V0	0.0435962	V0	
Silver	0.0000100	0.0000393	V0	0.0000021	V0	0.0000004	V0	
Sodium	0.0169447	0.0897456	V0	0.0146152	V0	0.0007349	V0	
Strontium	0.0003375	0.0024555	V0	0.0003553	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000049	V0	0.0000000	V1	0.0000000	V1	
Thallium	0.0000090	0.0000063	V0	0.0000018	V0	0.0000000	V1	
Thorium	0.0000059	0.0000761	V0	0.0000081	V0	0.0000000	V1	
Tin	0.0004414	0.0005143	V0	0.0001267	V0	0.0000411	V0	
Titanium	0.0015201	0.0227616	V0	0.0036858	V0	0.0004468	V0	
Tungsten	0.0000938	0.0002550	V0	0.0000200	V0	0.0000000	V1	
Uranium	0.0000048	0.0000226	V0	0.0000029	V0	0.0000000	V1	
Vanadium	0.0007697	0.0011606	V0	0.0002814	V0	0.0000000	V1	
Zinc	0.0055897	0.0099068	V0	0.0014392	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 30-Jun PM10 24	Results (µg/m ³)	QC Flag	AMS 15 30-Jun PM10 24	QC Flag	Results (µg/m ³)	QC Flag
Particulate Matter	1.00	14.78	V0	20.04	V0	0.09	V0	
Aluminum	0.1380326	0.2065762	V0	0.6151394	V0	0.0000000	V1	
Antimony	0.0001784	0.0000247	V0	0.0000400	V0	0.0000000	V1	
Arsenic	0.0001060	0.0001254	V0	0.0001620	V0	0.0000000	V1	
Barium	0.0092847	0.0021173	V0	0.0052817	V0	0.0000000	V1	
Beryllium	0.0000946	0.0000075	V0	0.0000178	V0	0.0000000	V1	
Bismuth	0.0000093	0.0000041	V0	0.0000049	V0	0.0000000	V1	
Cadmium	0.0000174	0.0000074	V0	0.0000080	V0	0.0000000	V1	
Calcium	0.4112124	0.1523443	V0	0.2380581	V0	0.0000000	V1	
Cerium	0.0000174	0.0001960	V0	0.0005955	V0	0.0000000	V1	
Cesium	0.0000100	0.0000165	V0	0.0000484	V0	0.0000000	V1	
Chromium	0.0022262	0.0005134	V0	0.0009139	V0	0.0000000	V1	
Cobalt	0.0000273	0.0000592	V0	0.0001568	V0	0.0000024	V0	
Copper	0.0017171	0.0007958	V0	0.0006049	V0	0.0000000	V1	
Iron	0.0393063	0.1771577	V0	0.4654358	V0	0.0000000	V1	
Lanthanum	0.0000130	0.0000893	V0	0.0002757	V0	0.0000000	V1	
Lead	0.0008577	0.0001245	V0	0.0002041	V0	0.0000000	V1	
Lithium	0.0000374	0.0001848	V0	0.0006278	V0	0.0000017	V0	
Magnesium	0.0091409	0.0490550	V0	0.1069260	V0	0.0000000	V1	
Manganese	0.0006949	0.0032070	V0	0.0076802	V0	0.0000000	V1	
Molybdenum	0.0007116	0.0001023	V0	0.0001525	V0	0.0000000	V1	
Neodymium	0.0000140	0.0000863	V0	0.0002648	V0	0.0000000	V1	
Nickel	0.0005429	0.0004500	V0	0.0007143	V0	0.0000339	V0	
Niobium	0.0000202	0.0000240	V0	0.0000758	V0	0.0000000	V1	
Palladium	0.0000632	0.0000035	V0	0.0000082	V0	0.0000000	V1	
Phosphorus	0.0459574	0.0311906	V0	0.0355447	V0	0.0059488	V0	
Platinum	0.0000088	0.0000016	V0	0.0000011	V0	0.0000013	V0	
Potassium	0.0061261	0.1118220	V0	0.2021508	V0	0.0000000	V1	
Praseodymium	0.0000070	0.0000230	V0	0.0000686	V0	0.0000000	V1	
Rubidium	0.0000184	0.0003291	V0	0.0008363	V0	0.0000000	V1	
Samarium	0.0000133	0.0000164	V0	0.0000494	V0	0.0000000	V1	
Selenium	0.0003366	0.0001386	V0	0.0003796	V0	0.0000000	V1	
Silicon	0.7676322	0.6252646	V0	1.6082160	V0	0.0435962	V0	
Silver	0.0000100	0.0000025	V0	0.0000030	V0	0.0000004	V0	
Sodium	0.0169447	0.0365071	V0	0.0820330	V0	0.0007349	V0	
Strontium	0.0003375	0.0007672	V0	0.0019167	V0	0.0000000	V1	
Tantalum	0.0000394	0.0000000	V1	0.0000049	V0	0.0000000	V1	
Thallium	0.0000090	0.0000030	V0	0.0000066	V0	0.0000000	V1	
Thorium	0.0000059	0.0000277	V0	0.0000812	V0	0.0000000	V1	
Tin	0.0004414	0.0000886	V0	0.0001762	V0	0.0000411	V0	
Titanium	0.0015201	0.0077058	V0	0.0286569	V0	0.0004468	V0	
Tungsten	0.0000938	0.0000206	V0	0.0000191	V0	0.0000000	V1	
Uranium	0.0000048	0.0000084	V0	0.0000243	V0	0.0000000	V1	
Vanadium	0.0007697	0.0005173	V0	0.0015854	V0	0.0000000	V1	
Zinc	0.0055897	0.0018395	V0	0.0020449	V0	0.0000000	V1	



Compound Name	MDL (µg/sample)	Muskeg River		Travel Blank	
		Results (µg/m³)	QC Flag	Results (µg/m³)	QC Flag
Particulate Matter	1.00	30.82	V0	0.09	V0
Aluminum	0.1380326	0.9581728	V0	0.0000000	V1
Antimony	0.0001784	0.0000346	V0	0.0000000	V1
Arsenic	0.0001060	0.0002300	V0	0.0000000	V1
Barium	0.0092847	0.0078218	V0	0.0000000	V1
Beryllium	0.0000946	0.0000293	V0	0.0000000	V1
Bismuth	0.0000093	0.0000057	V0	0.0000000	V1
Cadmium	0.0000174	0.0000087	V0	0.0000000	V1
Calcium	0.4112124	1.4655642	V0	0.0000000	V1
Cerium	0.0000174	0.0011308	V0	0.0000000	V1
Cesium	0.0000100	0.0000661	V0	0.0000000	V1
Chromium	0.0022262	0.0011413	V0	0.0000000	V1
Cobalt	0.0000273	0.0002744	V0	0.0000024	V0
Copper	0.0017171	0.0008961	V0	0.0000000	V1
Iron	0.0393063	1.1804619	V0	0.0000000	V1
Lanthanum	0.0000130	0.0005255	V0	0.0000000	V1
Lead	0.0008577	0.0003445	V0	0.0000000	V1
Lithium	0.0000374	0.0010513	V0	0.0000017	V0
Magnesium	0.0091409	0.2107279	V0	0.0000000	V1
Manganese	0.0006949	0.0198145	V0	0.0000000	V1
Molybdenum	0.0007116	0.0002143	V0	0.0000000	V1
Neodymium	0.0000140	0.0004708	V0	0.0000000	V1
Nickel	0.0005429	0.0009753	V0	0.0000339	V0
Niobium	0.0000202	0.0001268	V0	0.0000000	V1
Palladium	0.0000632	0.0000128	V0	0.0000000	V1
Phosphorus	0.0459574	0.0358150	V0	0.0059488	V0
Platinum	0.0000088	0.0000021	V0	0.0000013	V0
Potassium	0.0061261	0.2820123	V0	0.0000000	V1
Praseodymium	0.0000070	0.0001262	V0	0.0000000	V1
Rubidium	0.0000184	0.0012357	V0	0.0000000	V1
Samarium	0.0000133	0.0000858	V0	0.0000000	V1
Selenium	0.0003366	0.0006164	V0	0.0000000	V1
Silicon	0.7676322	2.1701426	V0	0.0435962	V0
Silver	0.0000100	0.0000047	V0	0.0000004	V0
Sodium	0.0169447	0.0850147	V0	0.0007349	V0
Strontium	0.0003375	0.0035360	V0	0.0000000	V1
Tantalum	0.0000394	0.0000086	V0	0.0000000	V1
Thallium	0.0000090	0.0000116	V0	0.0000000	V1
Thorium	0.0000059	0.0001430	V0	0.0000000	V1
Tin	0.0004414	0.0001509	V0	0.0000411	V0
Titanium	0.0015201	0.0381032	V0	0.0004468	V0
Tungsten	0.0000938	0.0000711	V0	0.0000000	V1
Uranium	0.0000048	0.0000393	V0	0.0000000	V1
Vanadium	0.0007697	0.0020367	V0	0.0000000	V1
Zinc	0.0055897	0.0031209	V0	0.0000000	V1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

Particulate Matter (PM10) - 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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	22.45	8.03	5	5
Aluminum	0.7016080	0.4500016	5	5
Antimony	0.0000385	0.0000189	5	5
Arsenic	0.0001699	0.0000944	5	5
Barium	0.0060074	0.0033996	5	5
Beryllium	0.0000220	0.0000126	5	5
Bismuth	0.0000091	0.0000062	5	5
Cadmium	0.0000090	0.0000028	5	5
Calcium	1.2051193	0.7571210	5	5
Cerium	0.0007239	0.0005100	5	5
Cesium	0.0000494	0.0000300	5	5
Chromium	0.0009419	0.0004339	5	5
Cobalt	0.0001903	0.0001220	5	5
Copper	0.0014995	0.0003833	5	5
Iron	0.6109354	0.4328136	5	5
Lanthanum	0.0003424	0.0002432	5	5
Lead	0.0002992	0.0001746	5	5
Lithium	0.0007393	0.0004941	5	5
Magnesium	0.1396141	0.0679809	5	5
Manganese	0.0099271	0.0065704	5	5
Molybdenum	0.0001708	0.0000775	5	5
Neodymium	0.0003104	0.0002196	5	5
Nickel	0.0007708	0.0003946	5	5
Niobium	0.0000749	0.0000480	5	5
Palladium	0.0000095	0.0000060	5	5
Phosphorus	0.0328972	0.0040271	5	5
Platinum	0.0000036	0.0000011	5	5
Potassium	0.2156390	0.1052466	5	5
Praseodymium	0.0000819	0.0000584	5	5
Rubidium	0.0009117	0.0005625	5	5
Samarium	0.0000583	0.0000413	5	5
Selenium	0.0003972	0.0002747	5	5
Silicon	2.0344191	0.9841844	5	5
Silver	0.0000039	0.0000018	5	5
Sodium	0.0813483	0.0297629	5	5
Strontium	0.0027130	0.0014307	5	5
Tantalum	0.0000047	0.0000030	5	5
Thallium	0.0000075	0.0000045	5	5
Thorium	0.0000938	0.0000682	5	5
Tin	0.0001027	0.0000241	5	5
Titanium	0.0254858	0.0168991	5	5
Tungsten	0.0000449	0.0000210	5	5
Uranium	0.0000270	0.0000150	5	5
Vanadium	0.0016713	0.0009641	5	5
Zinc	0.0029798	0.0011182	5	5



Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
Station #	AMS 6	AMS 6	AMS 6	AMS 6
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	18.20	6.79	5	5
Aluminum	0.4764283	0.2800943	5	5
Antimony	0.0002056	0.0000881	5	5
Arsenic	0.0002628	0.0002798	5	5
Barium	0.0061911	0.0031959	5	5
Beryllium	0.0000137	0.0000093	5	4
Bismuth	0.0000093	0.0000057	5	5
Cadmium	0.0000104	0.0000059	5	5
Calcium	0.8250947	0.5805250	5	5
Cerium	0.0005469	0.0003590	5	5
Cesium	0.0000320	0.0000188	5	5
Chromium	0.0007515	0.0003531	5	5
Cobalt	0.0001380	0.0000805	5	5
Copper	0.0014022	0.0006458	5	5
Iron	0.5570383	0.4052298	5	5
Lanthanum	0.0002678	0.0001838	5	5
Lead	0.0002592	0.0001350	5	5
Lithium	0.0003812	0.0002573	5	5
Magnesium	0.1922131	0.1340193	5	5
Manganese	0.0089840	0.0062363	5	5
Molybdenum	0.0001201	0.0000780	5	5
Neodymium	0.0002312	0.0001512	5	5
Nickel	0.0005714	0.0003325	5	5
Niobium	0.0000536	0.0000313	5	5
Palladium	0.0000098	0.0000048	5	5
Phosphorus	0.0283833	0.0047463	5	5
Platinum	0.0000039	0.0000010	5	5
Potassium	0.1674930	0.0822832	5	5
Praseodymium	0.0000611	0.0000401	5	5
Rubidium	0.0006367	0.0003720	5	5
Samarium	0.0000411	0.0000265	5	5
Selenium	0.0002989	0.0001793	5	5
Silicon	1.5036629	0.7391867	5	5
Silver	0.0000051	0.0000025	5	5
Sodium	0.1045265	0.0650266	5	5
Strontium	0.0023889	0.0014185	5	5
Tantalum	0.0000037	0.0000025	5	4
Thallium	0.0000058	0.0000032	5	5
Thorium	0.0000709	0.0000439	5	5
Tin	0.0002031	0.0001055	5	5
Titanium	0.0182217	0.0097442	5	5
Tungsten	0.0001366	0.0001021	5	5
Uranium	0.0000206	0.0000118	5	5
Vanadium	0.0011964	0.0007936	5	5
Zinc	0.0059375	0.0031488	5	5



Station Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
Station #	AMS 7	AMS 7	AMS 7	AMS 7
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	18.46	5.82	5	5
Aluminum	0.4318366	0.1229634	5	5
Antimony	0.0003396	0.0001043	5	5
Arsenic	0.0003043	0.0002924	5	5
Barium	0.0078651	0.0020299	5	5
Beryllium	0.0000130	0.0000042	5	5
Bismuth	0.0000140	0.0000040	5	5
Cadmium	0.0000086	0.0000029	5	5
Calcium	0.7020924	0.2571648	5	5
Cerium	0.0005042	0.0001442	5	5
Cesium	0.0000298	0.0000091	5	5
Chromium	0.0007749	0.0001560	5	5
Cobalt	0.0001456	0.0000371	5	5
Copper	0.0024449	0.0007487	5	5
Iron	0.5218481	0.1487379	5	5
Lanthanum	0.0002379	0.0000655	5	5
Lead	0.0003103	0.0001044	5	5
Lithium	0.0003571	0.0001151	5	5
Magnesium	0.1558040	0.0415960	5	5
Manganese	0.0085893	0.0022103	5	5
Molybdenum	0.0001554	0.0000397	5	5
Neodymium	0.0002085	0.0000609	5	5
Nickel	0.0005559	0.0001195	5	5
Niobium	0.0000525	0.0000137	5	5
Palladium	0.0000140	0.0000030	5	5
Phosphorus	0.0278561	0.0064292	5	5
Platinum	0.0000036	0.0000011	5	5
Potassium	0.1600910	0.0426350	5	5
Praseodymium	0.0000549	0.0000165	5	5
Rubidium	0.0005880	0.0001709	5	5
Samarium	0.0000381	0.0000110	5	5
Selenium	0.0002827	0.0000789	5	5
Silicon	1.4362095	0.5177123	5	5
Silver	0.0000107	0.0000160	5	5
Sodium	0.0817911	0.0133112	5	5
Strontium	0.0020433	0.0005995	5	5
Tantalum	0.0000040	0.0000011	5	5
Thallium	0.0000053	0.0000014	5	5
Thorium	0.0000620	0.0000188	5	5
Tin	0.0003460	0.0001072	5	5
Titanium	0.0176106	0.0050769	5	5
Tungsten	0.0001865	0.0000605	5	5
Uranium	0.0000188	0.0000057	5	5
Vanadium	0.0010472	0.0003395	5	5
Zinc	0.0096040	0.0024483	5	5



Station Name	Anzac	Anzac	Anzac	Anzac
Station #	AMS 14	AMS 14	AMS 14	AMS 14
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	8.75	1.50	5	5
Aluminum	0.1360076	0.0433227	5	5
Antimony	0.0000388	0.0000222	5	5
Arsenic	0.0001008	0.0000471	5	5
Barium	0.0018339	0.0004651	5	5
Beryllium	0.0000044	0.0000028	5	4
Bismuth	0.0000144	0.0000160	5	5
Cadmium	0.0000094	0.0000041	5	5
Calcium	0.1424051	0.0565036	5	5
Cerium	0.0001518	0.0000513	5	5
Cesium	0.0000099	0.0000034	5	5
Chromium	0.0004505	0.0001732	5	5
Cobalt	0.0000489	0.0000157	5	5
Copper	0.0005170	0.0001701	5	5
Iron	0.1676207	0.0659379	5	5
Lanthanum	0.0000768	0.0000311	5	5
Lead	0.0001112	0.0000171	5	5
Lithium	0.0001073	0.0000394	5	5
Magnesium	0.0377810	0.0111433	5	5
Manganese	0.0027520	0.0008234	5	5
Molybdenum	0.0001061	0.0000690	5	5
Neodymium	0.0000646	0.0000229	5	5
Nickel	0.0003700	0.0002654	5	5
Niobium	0.0000158	0.0000053	5	5
Palladium	0.0000031	0.0000018	5	4
Phosphorus	0.0271180	0.0056097	5	5
Platinum	0.0000023	0.0000003	5	5
Potassium	0.0773513	0.0037009	5	5
Praseodymium	0.0000168	0.0000058	5	5
Rubidium	0.0002151	0.0000410	5	5
Samarium	0.0000118	0.0000039	5	5
Selenium	0.0000973	0.0000130	5	5
Silicon	0.4662453	0.1659888	5	5
Silver	0.0000016	0.0000005	5	5
Sodium	0.0275791	0.0091133	5	5
Strontium	0.0005301	0.0001166	5	5
Tantalum	0.0000000	0.0000000	5	0
Thallium	0.0000020	0.0000003	5	5
Thorium	0.0000190	0.0000066	5	5
Tin	0.0001060	0.0000319	5	5
Titanium	0.0053853	0.0010841	5	5
Tungsten	0.0000525	0.0000511	5	5
Uranium	0.0000057	0.0000018	5	5
Vanadium	0.0006282	0.0005822	5	5
Zinc	0.0015017	0.0001604	5	5



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	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	16.21	3.65	5	5
Aluminum	0.4857768	0.2058407	5	5
Antimony	0.0000361	0.0000287	5	5
Arsenic	0.0001262	0.0000275	5	5
Barium	0.0039232	0.0013166	5	5
Beryllium	0.0000144	0.0000054	5	5
Bismuth	0.0000049	0.0000024	5	5
Cadmium	0.0000058	0.0000025	5	5
Calcium	0.4230441	0.2789119	5	5
Cerium	0.0004861	0.0002392	5	5
Cesium	0.0000349	0.0000127	5	5
Chromium	0.0006778	0.0001895	5	5
Cobalt	0.0001225	0.0000496	5	5
Copper	0.0006331	0.0001553	5	5
Iron	0.3608219	0.1640284	5	5
Lanthanum	0.0002319	0.0001184	5	5
Lead	0.0001886	0.0000710	5	5
Lithium	0.0005256	0.0002731	5	5
Magnesium	0.0874479	0.0294549	5	5
Manganese	0.0059070	0.0028301	5	5
Molybdenum	0.0001129	0.0000345	5	5
Neodymium	0.0002086	0.0000987	5	5
Nickel	0.0006704	0.0003685	5	5
Niobium	0.0000873	0.0000917	5	5
Palladium	0.0000067	0.0000034	5	5
Phosphorus	0.0303050	0.0066152	5	5
Platinum	0.0000018	0.0000004	5	5
Potassium	0.1552407	0.0390346	5	5
Praseodymium	0.0000550	0.0000264	5	5
Rubidium	0.0006253	0.0002273	5	5
Samarium	0.0000380	0.0000169	5	5
Selenium	0.0002542	0.0000990	5	5
Silicon	1.2731088	0.4232015	5	5
Silver	0.0000027	0.0000005	5	5
Sodium	0.0602890	0.0173829	5	5
Strontium	0.0015557	0.0006415	5	5
Tantalum	0.0000029	0.0000019	5	4
Thallium	0.0000048	0.0000016	5	5
Thorium	0.0000631	0.0000288	5	5
Tin	0.0001048	0.0000321	5	5
Titanium	0.0170590	0.0065853	5	5
Tungsten	0.0000339	0.0000096	5	5
Uranium	0.0000173	0.0000070	5	5
Vanadium	0.0011625	0.0006674	5	5
Zinc	0.0023292	0.0008288	5	5



Station Name Station # Sample Date Particulate Size Compound Name	Horizon AMS 15 Jun 06 - Jun 30 PM10 Average µg/m ³	Horizon AMS 15 Jun 06 - Jun 30 PM10 Std Dev µg/m ³	Horizon AMS 15 Jun 06 - Jun 30 PM10 Total Samples (#)	Horizon AMS 15 Jun 06 - Jun 30 PM10 Total ≥ MDL (#)
Particulate Matter	19.51	8.39	5	5
Aluminum	0.6267787	0.2838693	5	5
Antimony	0.0000303	0.0000127	5	5
Arsenic	0.0001320	0.0000439	5	5
Barium	0.0050362	0.0018386	5	5
Beryllium	0.0000191	0.0000080	5	5
Bismuth	0.0000041	0.0000015	5	5
Cadmium	0.0000053	0.0000021	5	5
Calcium	0.2889284	0.1672200	5	5
Cerium	0.0005950	0.0002330	5	5
Cesium	0.0000471	0.0000207	5	5
Chromium	0.0008203	0.0003258	5	5
Cobalt	0.0001626	0.0000754	5	5
Copper	0.0007098	0.0005243	5	5
Iron	0.4663831	0.1846324	5	5
Lanthanum	0.0002822	0.0001137	5	5
Lead	0.0002111	0.0000842	5	5
Lithium	0.0006093	0.0002703	5	5
Magnesium	0.1069228	0.0394972	5	5
Manganese	0.0073414	0.0027184	5	5
Molybdenum	0.0001228	0.0000474	5	5
Neodymium	0.0002682	0.0001097	5	5
Nickel	0.0007699	0.0003317	5	5
Niobium	0.0000734	0.0000346	5	5
Palladium	0.0000083	0.0000039	5	5
Phosphorus	0.0264620	0.0082847	5	5
Platinum	0.0000018	0.0000006	5	5
Potassium	0.1797002	0.0701977	5	5
Praseodymium	0.0000689	0.0000273	5	5
Rubidium	0.0007771	0.0003149	5	5
Samarium	0.0000508	0.0000207	5	5
Selenium	0.0003293	0.0001488	5	5
Silicon	1.9761473	1.1928138	5	5
Silver	0.0000032	0.0000013	5	5
Sodium	0.0770238	0.0317928	5	5
Strontium	0.0018453	0.0008035	5	5
Tantalum	0.0000046	0.0000020	5	5
Thallium	0.0000063	0.0000024	5	5
Thorium	0.0000794	0.0000298	5	5
Tin	0.0001502	0.0000324	5	5
Titanium	0.0240101	0.0112999	5	5
Tungsten	0.0000209	0.0000101	5	5
Uranium	0.0000242	0.0000103	5	5
Vanadium	0.0018597	0.0009017	5	5
Zinc	0.0019686	0.0009979	5	5



Station Name	Muskeg River	Muskeg River	Muskeg River	Muskeg River
Station #	AMS 16	AMS 16	AMS 16	AMS 16
Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
Particulate Size	PM10	PM10	PM10	PM10
Compound Name	Average µg/m ³	Std Dev µg/m ³	Total Samples (#)	Total ≥ MDL (#)
Particulate Matter	32.87	15.86	5	5
Aluminum	1.2687421	1.0819267	5	5
Antimony	0.0000333	0.0000049	5	5
Arsenic	0.0002645	0.0001761	5	5
Barium	0.0099255	0.0074746	5	5
Beryllium	0.0000389	0.0000294	5	5
Bismuth	0.0000093	0.0000075	5	5
Cadmium	0.0000071	0.0000027	5	5
Calcium	1.4031221	0.8172452	5	5
Cerium	0.0015086	0.0014114	5	5
Cesium	0.0000848	0.0000702	5	5
Chromium	0.0020001	0.0009576	5	5
Cobalt	0.0003532	0.0002592	5	5
Copper	0.0040735	0.0069920	5	5
Iron	1.3151413	0.7913780	5	5
Lanthanum	0.0007028	0.0006469	5	5
Lead	0.0004532	0.0003280	5	5
Lithium	0.0015234	0.0013861	5	5
Magnesium	0.2275660	0.1284558	5	5
Manganese	0.0218907	0.0138992	5	5
Molybdenum	0.0003289	0.0002378	5	5
Neodymium	0.0006463	0.0006136	5	5
Nickel	0.0016825	0.0010406	5	5
Niobium	0.0001591	0.0001308	5	5
Palladium	0.0000185	0.0000161	5	5
Phosphorus	0.0323333	0.0099125	5	5
Platinum	0.0000024	0.0000008	5	5
Potassium	0.3250725	0.2239733	5	5
Praseodymium	0.0001713	0.0001618	5	5
Rubidium	0.0015058	0.0011513	5	5
Samarium	0.0001197	0.0001126	5	5
Selenium	0.0006999	0.0005790	5	5
Silicon	3.0483432	1.7924755	5	5
Silver	0.0000083	0.0000083	5	5
Sodium	0.1329574	0.1033307	5	5
Strontium	0.0042788	0.0030743	5	5
Tantalum	0.0000105	0.0000087	5	5
Thallium	0.0000130	0.0000083	5	5
Thorium	0.0001869	0.0001644	5	5
Tin	0.0005527	0.0009217	5	5
Titanium	0.0490150	0.0381871	5	5
Tungsten	0.0000754	0.0000382	5	5
Uranium	0.0000505	0.0000406	5	5
Vanadium	0.0025763	0.0019596	5	5
Zinc	0.0037448	0.0016613	5	5



Wood Buffalo Environmental Association

PM10 Metal (µg/sample) Summary

Compound	% Det	N	N < Det.	Min.	2017 June													Mean	Std. Dev.	Median	Outlier Test
					10%	25%	50%	60%	75%	80%	90%	95%	99% Max.								
Particulate Matter	100.0%	35	0	172	244	259	434	482	605	608	750	841	1391	1391	468	244	434	1687			
Aluminum	100.0%	35	0	1.5020	3.6812	7.1431	12.2298	14.0824	16.4909	18.7834	25.9563	33.9687	75.7645	75.7645	14.1522	13.0226	12.2298	79.2654			
Antimony	100.0%	35	0	0.0002	0.0004	0.0006	0.0010	0.0012	0.0036	0.0060	0.0069	0.0104	0.0113	0.0113	0.0025	0.0030	0.0010	0.0174			
Arsenic	100.0%	35	0	0.0016	0.0018	0.0024	0.0033	0.0039	0.0045	0.0055	0.0077	0.0180	0.0197	0.0197	0.0047	0.0042	0.0033	0.0256			
Barium	100.0%	35	0	0.0311	0.0476	0.0738	0.1172	0.1387	0.1877	0.1910	0.2507	0.2823	0.5376	0.5376	0.1398	0.0969	0.1172	0.6245			
Beryllium	94.3%	35	2	0.0001	0.0001	0.0002	0.0004	0.0004	0.0005	0.0006	0.0008	0.0010	0.0021	0.0021	0.0004	0.0004	0.0004	0.0023			
Bismuth	100.0%	35	0	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0009	0.0009	0.0002	0.0002	0.0001	0.0012			
Cadmium	100.0%	35	0	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0005	0.0002	0.0001	0.0002	0.0006			
Calcium	100.0%	35	0	1.6856	2.8903	4.8506	13.4565	16.4861	24.3818	30.9002	43.0450	50.8486	57.6649	57.6649	17.1100	15.1860	13.4565	93.0402			
Cerium	100.0%	35	0	0.0015	0.0040	0.0074	0.0123	0.0143	0.0173	0.0199	0.0271	0.0378	0.0948	0.0948	0.0155	0.0161	0.0123	0.0960			
Cesium	100.0%	35	0	0.0001	0.0003	0.0005	0.0009	0.0010	0.0012	0.0012	0.0018	0.0024	0.0050	0.0050	0.0010	0.0009	0.0009	0.0053			
Chromium	100.0%	35	0	0.0063	0.0099	0.0140	0.0177	0.0211	0.0245	0.0274	0.0391	0.0671	0.0726	0.0726	0.0220	0.0150	0.0177	0.0969			
Cobalt	100.0%	35	0	0.0005	0.0013	0.0021	0.0033	0.0039	0.0045	0.0055	0.0069	0.0092	0.0192	0.0192	0.0040	0.0033	0.0033	0.0206			
Copper	100.0%	35	0	0.0064	0.0097	0.0147	0.0215	0.0281	0.0427	0.0456	0.0562	0.0802	0.3978	0.3978	0.0387	0.0651	0.0215	0.3642			
Iron	100.0%	35	0	2.0373	3.9893	6.2606	10.2788	11.1705	16.5347	18.5664	28.3311	41.9771	58.2632	58.2632	13.7158	11.7414	10.2788	72.4229			
Lanthanum	100.0%	35	0	0.0007	0.0019	0.0034	0.0057	0.0066	0.0086	0.0097	0.0126	0.0178	0.0437	0.0437	0.0073	0.0075	0.0057	0.0447			
Lead	100.0%	35	0	0.0021	0.0026	0.0031	0.0053	0.0063	0.0081	0.0083	0.0103	0.0140	0.0246	0.0246	0.0063	0.0043	0.0053	0.0276			
Lithium	100.0%	35	0	0.0011	0.0027	0.0059	0.0122	0.0150	0.0167	0.0201	0.0252	0.0359	0.0948	0.0948	0.0145	0.0163	0.0122	0.0961			
Magnesium	100.0%	35	0	0.4824	0.9837	1.7501	2.6893	3.2513	4.3372	4.5948	5.7950	9.4891	9.9865	9.9865	3.2486	2.2443	2.6893	14.6699			
Manganese	100.0%	35	0	0.0392	0.0639	0.0913	0.1650	0.1946	0.2814	0.2860	0.4755	0.7001	0.9945	0.9945	0.2242	0.1962	0.1650	1.2054			
Molybdenum	100.0%	35	0	0.0013	0.0016	0.0020	0.0035	0.0037	0.0047	0.0052	0.0057	0.0086	0.0175	0.0175	0.0038	0.0029	0.0035	0.0183			
Neodymium	100.0%	35	0	0.0006	0.0017	0.0032	0.0052	0.0061	0.0074	0.0085	0.0113	0.0162	0.0411	0.0411	0.0066	0.0070	0.0052	0.0415			
Nickel	100.0%	35	0	0.0038	0.0072	0.0099	0.0135	0.0171	0.0234	0.0274	0.0298	0.0650	0.0696	0.0696	0.0185	0.0143	0.0135	0.0902			
Niobium	100.0%	35	0	0.0002	0.0004	0.0009	0.0013	0.0015	0.0019	0.0020	0.0037	0.0059	0.0091	0.0091	0.0018	0.0017	0.0013	0.0105			
Palladium	97.1%	35	1	0.0000	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0004	0.0005	0.0011	0.0011	0.0002	0.0002	0.0002	0.0012			
Phosphorus	100.0%	35	0	0.3419	0.5148	0.5785	0.7486	0.7638	0.8268	0.8337	0.8596	0.9635	1.1036	1.1036	0.7044	0.1583	0.7486	1.4960			
Platinum	100.0%	35	0	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0002			
Potassium	100.0%	35	0	1.6096	1.8891	2.6837	3.8694	4.3059	4.9314	5.9066	6.8412	9.3009	17.0031	17.0031	4.3915	2.8358	3.8694	18.5706			
Praseodymium	100.0%	35	0	0.0002	0.0004	0.0008	0.0014	0.0016	0.0019	0.0022	0.0030	0.0043	0.0108	0.0108	0.0017	0.0018	0.0014	0.0110			
Rubidium	100.0%	35	0	0.0035	0.0056	0.0095	0.0160	0.0168	0.0208	0.0248	0.0303	0.0437	0.0837	0.0837	0.0180	0.0146	0.0160	0.0909			
Samarium	100.0%	35	0	0.0001	0.0003	0.0006	0.0010	0.0011	0.0013	0.0016	0.0021	0.0030	0.0076	0.0076	0.0012	0.0013	0.0010	0.0077			
Selenium	100.0%	35	0	0.0019	0.0023	0.0040	0.0065	0.0077	0.0091	0.0113	0.0139	0.0205	0.0408	0.0408	0.0081	0.0071	0.0065	0.0434			
Silicon	100.0%	35	0	4.5613	12.7254	21.0138	36.4820	40.2516	51.9318	52.0834	82.1156	96.0780	144.5522	144.5522	40.2511	27.7809	36.4820	179.1554			
Silver	100.0%	35	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0006	0.0009	0.0009	0.0001	0.0002	0.0001	0.0010			
Sodium	100.0%	35	0	0.3508	0.6952	1.2954	1.7845	1.9688	2.2207	2.5508	3.0435	4.7315	7.5027	7.5027	1.9392	1.3156	1.7845	8.5174			
Strontium	100.0%	35	0	0.0085	0.0136	0.0285	0.0411	0.0526	0.0647	0.0802	0.0960	0.1161	0.2224	0.2224	0.0527	0.0411	0.0411	0.2580			
Tantalum	80.0%	35	7	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0006	0.0006	0.0001	0.0001	0.0001	0.0006			
Thallium	100.0%	35	0	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0006	0.0006	0.0002	0.0001	0.0001	0.0007			
Thorium	100.0%	35	0	0.0002	0.0005	0.0009	0.0016	0.0018	0.0022	0.0025	0.0034	0.0050	0.0113	0.0113	0.0020	0.0019	0.0016	0.0117			
Tin	100.0%	35	0	0.0015	0.0021	0.0028	0.0030	0.0037	0.0045	0.0061	0.0089	0.0123	0.0528	0.0528	0.0054	0.0086	0.0030	0.0483			
Titanium	100.0%	35	0	0.0885	0.1443	0.2978	0.4698	0.4989	0.6443	0.6777	0.9962	1.2882	2.7234	2.7234	0.5376	0.4789	0.4698	2.9322			
Tungsten	100.0%	35	0	0.0003	0.0005	0.0007	0.0011	0.0017	0.0029	0.0034	0.0042	0.0061	0.0073	0.0073	0.0019	0.0018	0.0011	0.0108			
Uranium	100.0%	35	0	0.0001	0.0001	0.0003	0.0005	0.0005	0.0006	0.0007	0.0010	0.0012	0.0029	0.0029	0.0006	0.0005	0.0005	0.0030			
Vanadium	100.0%	35	0	0.0047	0.0103	0.0198	0.0279	0.0365	0.0484	0.0539	0.0652	0.0693	0.1436	0.1436	0.0348	0.0263	0.0279	0.1662			
Zinc	100.0%	35	0	0.0112	0.0350	0.0425	0.0643	0.0875	0.1127	0.1558	0.2323	0.2731	0.2978	0.2978	0.0962	0.0752	0.0643	0.4721			



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

POLYCYCLIC AROMATIC HYDROCARBONS DATA SUMMARY JUNE 2017

Prepared
August 30, 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 -						
	Station #	Fort McKay			Patricia McInnes		Travel Blank
Sample Date	AMS 1	AMS 6			AMS 6		06-Jun
Total Air Volume (m ³)	06-Jun	07-Jun			07-Jun		06-Jun
	315.97	315.98			315.98		315.98
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	8.373	V0	3.898	V6	0.094	V0
Acenaphthylene	0.011	3.442	V0	1.604	V6	0.071	V0
Acenaphthene	0.006	2.364	V0	0.651	V6	0.075	V0
Fluorene	0.007	3.036	V0	0.502	V6	0.026	V0
Phenanthrene	0.007	3.104	V0	1.096	V6	0.045	V0
Anthracene	0.017	0.645	V0	0.173	V6	0.008	V1
Acridine	0.019	0.041	V0	0.023	V6	0.007	V1
Fluoranthene	0.007	0.244	V0	0.353	V6	0.007	V0
Pyrene	0.008	0.199	V0	0.362	V6	0.009	V0
Benzo(c)phenanthrene	0.015	0.033	V0	0.020	V6	0.007	V1
Benz(a)anthracene	0.014	0.047	V0	0.087	V6	0.005	V1
Chrysene	0.013	0.079	V0	0.089	V6	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.058	V0	0.023	V6	0.010	V1
Benzo(b)fluoranthene	0.020	0.042	V0	0.026	V6	0.003	V1
Benzo(k)fluoranthene	0.013	0.042	V0	0.026	V6	0.005	V1
Benzo(a)pyrene	0.016	0.013	V1	0.027	V6	0.005	V1
3-Methylcholanthrene	0.022	0.013	V1	0.014	V6	0.002	V1
Indeno(123-cd)pyrene	0.017	0.019	V0	0.015	V6	0.001	V1
Dibenz(a,h)anthracene	0.020	0.020	V0	0.019	V6	0.002	V1
Benzo(ghi)perylene	0.020	0.012	V1	0.020	V6	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.012	V1	0.011	V6	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.009	V1	0.011	V6	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.009	V1	0.008	V6	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		06-Jun	
Sample Date	06-Jun			06-Jun		06-Jun	
Total Air Volume (m ³)	316			315.85		315.98	
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	1.025	V0	10.547	V0	0.094	V0
Acenaphthylene	0.011	1.029	V0	2.607	V0	0.071	V0
Acenaphthene	0.006	0.747	V0	4.715	V0	0.075	V0
Fluorene	0.007	0.536	V0	3.656	V0	0.026	V0
Phenanthrene	0.007	0.684	V0	4.115	V0	0.045	V0
Anthracene	0.017	0.076	V0	1.000	V0	0.008	V1
Acridine	0.019	0.013	V1	0.016	V1	0.007	V1
Fluoranthene	0.007	0.208	V0	1.454	V0	0.007	V0
Pyrene	0.008	0.138	V0	0.694	V0	0.009	V0
Benzo(c)phenanthrene	0.015	0.014	V1	0.024	V0	0.007	V1
Benz(a)anthracene	0.014	0.021	V0	0.115	V0	0.005	V1
Chrysene	0.013	0.013	V1	0.140	V0	0.005	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.023	V0	0.026	V0	0.010	V1
Benzo(b)fluoranthene	0.020	0.046	V0	0.050	V0	0.003	V1
Benzo(k)fluoranthene	0.013	0.046	V0	0.050	V0	0.005	V1
Benzo(a)pyrene	0.016	0.013	V1	0.022	V0	0.005	V1
3-Methylcholanthrene	0.022	0.014	V1	0.007	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.014	V1	0.015	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	0.018	V1	0.018	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.013	V1	0.025	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.010	V1	0.011	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.010	V1	0.010	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.009	V1	0.007	V1	0.001	V1



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

Polycyclic Aromatic Hydrocarbons (PAHs)

2017

Indicated Sites and Dates

Compound Name	Bertha Ganter -						
	Station Name	Fort McKay		Patricia McInnes		Travel Blank	
	Station #	AMS 1		AMS 6			
	Sample Date	12-Jun		12-Jun		12-Jun	
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	7.989	V0	11.603	V0	0.167	V0
Acenaphthylene	0.011	1.232	V0	3.244	V0	0.039	V0
Acenaphthene	0.006	1.709	V0	3.148	V0	0.093	V0
Fluorene	0.007	0.922	V0	1.763	V0	0.055	V0
Phenanthrene	0.007	3.080	V0	3.901	V0	0.076	V0
Anthracene	0.017	0.283	V0	0.495	V0	0.013	V1
Acridine	0.019	0.098	V0	0.096	V0	0.008	V1
Fluoranthene	0.007	0.349	V0	0.592	V0	0.012	V0
Pyrene	0.008	0.358	V0	0.523	V0	0.012	V0
Benzo(c)phenanthrene	0.015	0.025	V0	0.027	V0	0.003	V1
Benz(a)anthracene	0.014	0.110	V0	0.039	V0	0.009	V1
Chrysene	0.013	0.135	V0	0.116	V0	0.004	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.064	V0	0.060	V0	0.005	V1
Benzo(b)fluoranthene	0.020	0.049	V0	0.049	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.049	V0	0.049	V0	0.006	V1
Benzo(a)pyrene	0.016	0.022	V0	0.011	V1	0.002	V1
3-Methylcholanthrene	0.022	0.010	V1	0.013	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.027	V0	0.017	V0	0.001	V1
Dibenz(a,h)anthracene	0.020	0.058	V0	0.003	V1	0.003	V1
Benzo(ghi)perylene	0.020	0.012	V1	0.023	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.004	V1	0.005	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.004	V1	0.006	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.006	V1	0.007	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		12-Jun	
Sample Date	12-Jun			12-Jun		12-Jun	
Total Air Volume (m ³)	0			315.77		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	-9999	M1	9.361	V0	0.167	V0
Acenaphthylene	0.011	-9999	M1	1.715	V0	0.039	V0
Acenaphthene	0.006	-9999	M1	7.386	V0	0.093	V0
Fluorene	0.007	-9999	M1	5.081	V0	0.055	V0
Phenanthrene	0.007	-9999	M1	9.544	V0	0.076	V0
Anthracene	0.017	-9999	M1	1.026	V0	0.013	V1
Acridine	0.019	-9999	M1	0.024	V0	0.008	V1
Fluoranthene	0.007	-9999	M1	0.978	V0	0.012	V0
Pyrene	0.008	-9999	M1	0.340	V0	0.012	V0
Benzo(c)phenanthrene	0.015	-9999	M1	0.005	V1	0.003	V1
Benz(a)anthracene	0.014	-9999	M1	0.067	V0	0.009	V1
Chrysene	0.013	-9999	M1	0.049	V0	0.004	V1
7,12-Dimethylbenz(a)anthracene	0.013	-9999	M1	0.012	V1	0.005	V1
Benzo(b)fluoranthene	0.020	-9999	M1	0.009	V1	0.006	V1
Benzo(k)fluoranthene	0.013	-9999	M1	0.009	V1	0.006	V1
Benzo(a)pyrene	0.016	-9999	M1	0.019	V0	0.002	V1
3-Methylcholanthrene	0.022	-9999	M1	0.008	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	-9999	M1	0.009	V1	0.001	V1
Dibenz(a,h)anthracene	0.020	-9999	M1	0.004	V1	0.003	V1
Benzo(ghi)perylene	0.020	-9999	M1	0.016	V1	0.002	V1
Dibenzo(a,l)pyrene	0.024	-9999	M1	0.006	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	-9999	M1	0.009	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	-9999	M1	0.011	V1	0.001	V1



Station Name	Bertha Ganter -						
	Station #	Fort McKay			Patricia McInnes		Travel Blank
Sample Date	AMS 1	AMS 6			AMS 6		18-Jun
Total Air Volume (m ³)	18-Jun	18-Jun			18-Jun		18-Jun
	315.98	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	4.891	V0	6.256	V0	0.193	V0
Acenaphthylene	0.011	2.152	V0	1.753	V0	0.067	V0
Acenaphthene	0.006	2.608	V0	1.114	V0	0.088	V0
Fluorene	0.007	0.794	V0	0.787	V0	0.045	V0
Phenanthrene	0.007	1.653	V0	1.451	V0	0.087	V0
Anthracene	0.017	0.149	V0	0.126	V0	0.011	V1
Acridine	0.019	0.066	V0	0.037	V0	0.005	V1
Fluoranthene	0.007	0.213	V0	0.286	V0	0.011	V0
Pyrene	0.008	0.196	V0	0.282	V0	0.010	V0
Benzo(c)phenanthrene	0.015	0.005	V1	0.015	V0	0.004	V1
Benz(a)anthracene	0.014	0.034	V0	0.029	V0	0.008	V1
Chrysene	0.013	0.063	V0	0.065	V0	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.080	V0	0.041	V0	0.006	V1
Benzo(b)fluoranthene	0.020	0.036	V0	0.041	V0	0.005	V1
Benzo(k)fluoranthene	0.013	0.036	V0	0.041	V0	0.005	V1
Benzo(a)pyrene	0.016	0.026	V0	0.031	V0	0.002	V1
3-Methylcholanthrene	0.022	0.015	V1	0.007	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.016	V1	0.019	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	0.005	V1	0.004	V1	0.001	V1
Benzo(ghi)perylene	0.020	0.025	V0	0.028	V0	0.001	V1
Dibenzo(a,l)pyrene	0.024	0.004	V1	0.004	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	0.004	V1	0.004	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.005	V1	0.005	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		18-Jun	
Sample Date	18-Jun			18-Jun		18-Jun	
Total Air Volume (m ³)	0			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	-9999	M1	9.845	V0	0.193	V0
Acenaphthylene	0.011	-9999	M1	1.857	V0	0.067	V0
Acenaphthene	0.006	-9999	M1	4.672	V0	0.088	V0
Fluorene	0.007	-9999	M1	2.982	V0	0.045	V0
Phenanthrene	0.007	-9999	M1	5.277	V0	0.087	V0
Anthracene	0.017	-9999	M1	0.490	V0	0.011	V1
Acridine	0.019	-9999	M1	0.031	V0	0.005	V1
Fluoranthene	0.007	-9999	M1	0.543	V0	0.011	V0
Pyrene	0.008	-9999	M1	0.330	V0	0.010	V0
Benzo(c)phenanthrene	0.015	-9999	M1	0.011	V1	0.004	V1
Benz(a)anthracene	0.014	-9999	M1	0.023	V0	0.008	V1
Chrysene	0.013	-9999	M1	0.061	V0	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	-9999	M1	0.028	V0	0.006	V1
Benzo(b)fluoranthene	0.020	-9999	M1	0.029	V0	0.005	V1
Benzo(k)fluoranthene	0.013	-9999	M1	0.029	V0	0.005	V1
Benzo(a)pyrene	0.016	-9999	M1	0.027	V0	0.002	V1
3-Methylcholanthrene	0.022	-9999	M1	0.016	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	-9999	M1	0.017	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	-9999	M1	0.005	V1	0.001	V1
Benzo(ghi)perylene	0.020	-9999	M1	0.014	V1	0.001	V1
Dibenzo(a,l)pyrene	0.024	-9999	M1	0.004	V1	0.002	V1
Dibenzo(a,i)pyrene	0.025	-9999	M1	0.006	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	-9999	M1	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		24-Jun
Total Air Volume (m ³)	24-Jun	24-Jun			24-Jun		24-Jun
	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	16.716	V0	17.032	V0	0.137	V0
Acenaphthylene	0.011	2.045	V0	3.465	V0	0.071	V0
Acenaphthene	0.006	5.700	V0	2.820	V0	0.091	V0
Fluorene	0.007	2.707	V0	2.107	V0	0.050	V0
Phenanthrene	0.007	4.498	V0	6.419	V0	0.060	V0
Anthracene	0.017	0.622	V0	0.813	V0	0.010	V1
Acridine	0.019	0.079	V0	0.081	V0	0.005	V1
Fluoranthene	0.007	0.669	V0	1.325	V0	0.014	V0
Pyrene	0.008	0.733	V0	1.311	V0	0.016	V0
Benzo(c)phenanthrene	0.015	0.029	V0	0.050	V0	0.004	V1
Benz(a)anthracene	0.014	0.148	V0	0.195	V0	0.009	V1
Chrysene	0.013	0.206	V0	0.219	V0	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.070	V0	0.062	V0	0.005	V1
Benzo(b)fluoranthene	0.020	0.083	V0	0.077	V0	0.004	V1
Benzo(k)fluoranthene	0.013	0.082	V0	0.077	V0	0.004	V1
Benzo(a)pyrene	0.016	0.042	V0	0.034	V0	0.002	V1
3-Methylcholanthrene	0.022	0.006	V1	0.006	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.035	V0	0.016	V1	0.002	V1
Dibenz(a,h)anthracene	0.020	0.028	V0	0.005	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.038	V0	0.038	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.005	V1	0.006	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.007	V1	0.006	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.006	V1	0.005	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		24-Jun	
Sample Date	24-Jun			24-Jun		24-Jun	
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	10.408	V0	22.897	V0	0.137	V0
Acenaphthylene	0.011	6.375	V0	2.671	V0	0.071	V0
Acenaphthene	0.006	3.772	V0	7.014	V0	0.091	V0
Fluorene	0.007	1.443	V0	4.997	V0	0.050	V0
Phenanthrene	0.007	2.314	V0	7.685	V0	0.060	V0
Anthracene	0.017	0.705	V0	0.702	V0	0.010	V1
Acridine	0.019	0.088	V0	0.017	V1	0.005	V1
Fluoranthene	0.007	0.283	V0	1.634	V0	0.014	V0
Pyrene	0.008	0.365	V0	0.608	V0	0.016	V0
Benzo(c)phenanthrene	0.015	0.010	V1	0.014	V1	0.004	V1
Benz(a)anthracene	0.014	0.047	V0	0.039	V0	0.009	V1
Chrysene	0.013	0.104	V0	0.086	V0	0.006	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.092	V0	0.041	V0	0.005	V1
Benzo(b)fluoranthene	0.020	0.067	V0	0.030	V0	0.004	V1
Benzo(k)fluoranthene	0.013	0.067	V0	0.030	V0	0.004	V1
Benzo(a)pyrene	0.016	0.018	V0	0.020	V0	0.002	V1
3-Methylcholanthrene	0.022	0.005	V1	0.004	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.024	V0	0.019	V0	0.002	V1
Dibenz(a,h)anthracene	0.020	0.023	V0	0.007	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.029	V0	0.034	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.004	V1	0.005	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.007	V1	0.005	V1	0.001	V1
Dibenzo(a,h)pyrene	0.020	0.007	V1	0.005	V1	0.001	V1



Station Name	Bertha Ganter -						
	Station #	Fort McKay			Patricia McInnes		Travel Blank
Sample Date	AMS 1	AMS 6			AMS 6		30-Jun
Total Air Volume (m ³)	30-Jun	30-Jun			30-Jun		30-Jun
	315.97	315.98			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	6.644	V0	9.213	V0	0.172	V0
Acenaphthylene	0.011	4.554	V0	5.030	V0	0.086	V0
Acenaphthene	0.006	3.138	V0	1.212	V0	0.074	V0
Fluorene	0.007	1.963	V0	1.057	V0	0.059	V0
Phenanthrene	0.007	2.730	V0	2.778	V0	0.061	V0
Anthracene	0.017	0.406	V0	0.274	V0	0.009	V1
Acridine	0.019	0.071	V0	0.058	V0	0.009	V1
Fluoranthene	0.007	0.280	V0	0.500	V0	0.013	V0
Pyrene	0.008	0.306	V0	0.509	V0	0.013	V0
Benzo(c)phenanthrene	0.015	0.010	V1	0.013	V1	0.007	V1
Benz(a)anthracene	0.014	0.043	V0	0.050	V0	0.010	V1
Chrysene	0.013	0.061	V0	0.108	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.063	V0	0.053	V0	0.008	V1
Benzo(b)fluoranthene	0.020	0.029	V0	0.065	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.029	V0	0.065	V0	0.005	V1
Benzo(a)pyrene	0.016	0.021	V0	0.019	V0	0.002	V1
3-Methylcholanthrene	0.022	0.005	V1	0.006	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.010	V1	0.021	V0	0.003	V1
Dibenz(a,h)anthracene	0.020	0.006	V1	0.008	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.023	V0	0.026	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.005	V1	0.006	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.006	V1	0.006	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.006	V1	0.005	V1	0.001	V1



Station Name	Athabasca Valley			Anzac		Travel Blank	
Station #	AMS 7			AMS 14		30-Jun	
Sample Date	30-Jun			30-Jun		30-Jun	
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	15.236	V0	22.999	V0	0.172	V0
Acenaphthylene	0.011	5.405	V0	4.111	V0	0.086	V0
Acenaphthene	0.006	1.748	V0	5.557	V0	0.074	V0
Fluorene	0.007	1.522	V0	4.230	V0	0.059	V0
Phenanthrene	0.007	3.402	V0	12.822	V0	0.061	V0
Anthracene	0.017	0.334	V0	2.048	V0	0.009	V1
Acridine	0.019	0.090	V0	0.076	V0	0.009	V1
Fluoranthene	0.007	0.572	V0	1.754	V0	0.013	V0
Pyrene	0.008	0.637	V0	0.610	V0	0.013	V0
Benzo(c)phenanthrene	0.015	0.017	V0	0.010	V1	0.007	V1
Benz(a)anthracene	0.014	0.058	V0	0.073	V0	0.010	V1
Chrysene	0.013	0.115	V0	0.073	V0	0.007	V1
7,12-Dimethylbenz(a)anthracene	0.013	0.062	V0	0.022	V0	0.008	V1
Benzo(b)fluoranthene	0.020	0.064	V0	0.025	V0	0.006	V1
Benzo(k)fluoranthene	0.013	0.064	V0	0.025	V0	0.005	V1
Benzo(a)pyrene	0.016	0.021	V0	0.020	V0	0.002	V1
3-Methylcholanthrene	0.022	0.008	V1	0.007	V1	0.002	V1
Indeno(123-cd)pyrene	0.017	0.022	V0	0.012	V1	0.003	V1
Dibenz(a,h)anthracene	0.020	0.006	V1	0.006	V1	0.002	V1
Benzo(ghi)perylene	0.020	0.043	V0	0.036	V0	0.002	V1
Dibenzo(a,l)pyrene	0.024	0.006	V1	0.005	V1	0.001	V1
Dibenzo(a,i)pyrene	0.025	0.005	V1	0.007	V1	0.002	V1
Dibenzo(a,h)pyrene	0.020	0.006	V1	0.004	V1	0.001	V1



Station Name Station # Sample Date	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30	Bertha Ganter - Fort McKay AMS 1 Jun 06 - Jun 30
	Average ng/m ³	Std Dev ng/m ³	Total Samples (#)	Total ≥ MDL (#)
Compound Name				
Naphthalene	8.923	4.565	5	5
Acenaphthylene	2.685	1.311	5	5
Acenaphthene	3.104	1.539	5	5
Fluorene	1.885	1.016	5	5
Phenanthrene	3.013	1.018	5	5
Anthracene	0.421	0.214	5	5
Acridine	0.071	0.021	5	5
Fluoranthene	0.351	0.185	5	5
Pyrene	0.358	0.221	5	5
Benzo(c)phenanthrene	0.020	0.012	5	3
Benz(a)anthracene	0.076	0.050	5	5
Chrysene	0.109	0.062	5	5
7,12-Dimethylbenz(a)anthracene	0.067	0.009	5	5
Benzo(b)fluoranthene	0.048	0.021	5	5
Benzo(k)fluoranthene	0.048	0.021	5	5
Benzo(a)pyrene	0.025	0.011	5	4
3-Methylcholanthrene	0.010	0.004	5	0
Indeno(123-cd)pyrene	0.022	0.010	5	3
Dibenz(a,h)anthracene	0.024	0.022	5	3
Benzo(ghi)perylene	0.022	0.011	5	3
Dibenzo(a,l)pyrene	0.006	0.004	5	0
Dibenzo(a,i)pyrene	0.006	0.002	5	0
Dibenzo(a,h)pyrene	0.006	0.001	5	0



Compound Name	Station Name	Patricia McInnes	Patricia McInnes	Patricia McInnes	Patricia McInnes
	Station #	AMS 6	AMS 6	AMS 6	AMS 6
	Sample Date	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30	Jun 06 - Jun 30
		Average ng/m ³	Std Dev ng/m ³	Total Samples (#)	Total ≥ MDL (#)
Naphthalene		9.600	5.077	5	5
Acenaphthylene		3.019	1.406	5	5
Acenaphthene		1.789	1.117	5	5
Fluorene		1.243	0.672	5	5
Phenanthrene		3.129	2.150	5	5
Anthracene		0.376	0.283	5	5
Acridine		0.059	0.030	5	5
Fluoranthene		0.611	0.417	5	5
Pyrene		0.597	0.411	5	5
Benzo(c)phenanthrene		0.025	0.015	5	4
Benz(a)anthracene		0.080	0.068	5	5
Chrysene		0.120	0.059	5	5
7,12-Dimethylbenz(a)anthracene		0.048	0.016	5	5
Benzo(b)fluoranthene		0.052	0.020	5	5
Benzo(k)fluoranthene		0.052	0.020	5	5
Benzo(a)pyrene		0.024	0.009	5	4
3-Methylcholanthrene		0.009	0.004	5	0
Indeno(123-cd)pyrene		0.018	0.002	5	3
Dibenz(a,h)anthracene		0.008	0.006	5	0
Benzo(ghi)perylene		0.027	0.007	5	5
Dibenzo(a,l)pyrene		0.006	0.003	5	0
Dibenzo(a,i)pyrene		0.006	0.003	5	0
Dibenzo(a,h)pyrene		0.006	0.002	5	0



Station Name Station # Sample Date Compound Name	Athabasca Valley	Athabasca Valley	Athabasca Valley	Athabasca Valley
	AMS 7 Jun 06 - Jun 30 Average ng/m ³	AMS 7 Jun 06 - Jun 30 Std Dev ng/m ³	AMS 7 Jun 06 - Jun 30 Total Samples (#)	AMS 7 Jun 06 - Jun 30 Total ≥ MDL (#)
Naphthalene	8.890	7.226	3	3
Acenaphthylene	4.270	2.848	3	3
Acenaphthene	2.089	1.541	3	3
Fluorene	1.167	0.548	3	3
Phenanthrene	2.133	1.368	3	3
Anthracene	0.372	0.316	3	3
Acridine	0.064	0.044	3	2
Fluoranthene	0.355	0.192	3	3
Pyrene	0.380	0.250	3	3
Benzo(c)phenanthrene	0.013	0.004	3	1
Benz(a)anthracene	0.042	0.019	3	3
Chrysene	0.077	0.056	3	2
7,12-Dimethylbenz(a)anthracene	0.059	0.034	3	3
Benzo(b)fluoranthene	0.059	0.011	3	3
Benzo(k)fluoranthene	0.059	0.011	3	3
Benzo(a)pyrene	0.018	0.004	3	2
3-Methylcholanthrene	0.009	0.004	3	0
Indeno(123-cd)pyrene	0.020	0.005	3	2
Dibenz(a,h)anthracene	0.015	0.009	3	1
Benzo(ghi)perylene	0.028	0.015	3	2
Dibenzo(a,l)pyrene	0.007	0.003	3	0
Dibenzo(a,i)pyrene	0.007	0.002	3	0
Dibenzo(a,h)pyrene	0.007	0.001	3	0



Station Name Station # Sample Date	Anzac AMS 14 Jun 06 - Jun 30 Average ng/m ³	Anzac AMS 14 Jun 06 - Jun 30 Std Dev ng/m ³	Anzac AMS 14 Jun 06 - Jun 30 Total Samples (#)	Anzac AMS 14 Jun 06 - Jun 30 Total ≥ MDL (#)
Compound Name				
Naphthalene	15.130	7.149	5	5
Acenaphthylene	2.592	0.952	5	5
Acenaphthene	5.869	1.272	5	5
Fluorene	4.189	0.893	5	5
Phenanthrene	7.889	3.471	5	5
Anthracene	1.053	0.599	5	5
Acridine	0.033	0.025	5	3
Fluoranthene	1.273	0.504	5	5
Pyrene	0.516	0.169	5	5
Benzo(c)phenanthrene	0.013	0.007	5	1
Benz(a)anthracene	0.063	0.035	5	5
Chrysene	0.082	0.035	5	5
7,12-Dimethylbenz(a)anthracene	0.026	0.011	5	4
Benzo(b)fluoranthene	0.029	0.015	5	4
Benzo(k)fluoranthene	0.029	0.015	5	4
Benzo(a)pyrene	0.022	0.003	5	5
3-Methylcholanthrene	0.008	0.004	5	0
Indeno(123-cd)pyrene	0.014	0.004	5	2
Dibenz(a,h)anthracene	0.008	0.006	5	0
Benzo(ghi)perylene	0.025	0.010	5	3
Dibenzo(a,l)pyrene	0.006	0.003	5	0
Dibenzo(a,i)pyrene	0.007	0.002	5	0
Dibenzo(a,h)pyrene	0.007	0.003	5	0



Wood Buffalo Environmental Association

PAH (ng/m³) Summary

2017 June

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%	18	0	1.0247	3.8976	6.6442	9.8455	10.4080	15.2362	16.7163	22.8968	22.9992	22.9992	22.9992	10.8296	6.0627	9.8455	41.1429
Acenaphthylene	100.0%	18	0	1.0290	1.2316	1.7527	2.6706	3.2438	4.1108	4.5544	5.4050	6.3746	6.3746	6.3746	3.0161	1.5488	2.6706	10.7602
Acenaphthene	100.0%	18	0	0.6510	0.7465	1.7093	3.1379	3.1482	4.7147	5.5571	7.0144	7.3857	7.3857	7.3857	3.3375	2.0959	3.1379	13.8168
Fluorene	100.0%	18	0	0.5018	0.5355	0.9218	1.9630	2.1071	3.0364	3.6560	4.9974	5.0806	5.0806	5.0806	2.2269	1.4907	1.9630	9.6802
Phenanthrene	100.0%	18	0	0.6839	1.0958	2.3138	3.4020	3.9007	5.2768	6.4187	9.5441	12.8225	12.8225	12.8225	4.2530	3.1449	3.4020	19.9777
Anthracene	100.0%	18	0	0.0759	0.1263	0.2744	0.4953	0.6217	0.7048	0.8133	1.0261	2.0480	2.0480	2.0480	0.5760	0.4678	0.4953	2.9148
Acridine	83.3%	18	3	0.0130	0.0165	0.0244	0.0657	0.0712	0.0810	0.0880	0.0961	0.0982	0.0982	0.0982	0.0559	0.0304	0.0657	0.2080
Fluoranthene	100.0%	18	0	0.2085	0.2132	0.2831	0.5431	0.5723	0.9784	1.3250	1.6345	1.7541	1.7541	1.7541	0.6799	0.5179	0.5431	3.2693
Pyrene	100.0%	18	0	0.1383	0.1961	0.3058	0.3646	0.5086	0.6102	0.6367	0.7328	1.3107	1.3107	1.3107	0.4723	0.2754	0.3646	1.8492
Benzo(c)phenanthrene	50.0%	18	9	0.0046	0.0051	0.0099	0.0150	0.0170	0.0246	0.0272	0.0335	0.0501	0.0501	0.0501	0.0184	0.0114	0.0150	0.0756
Benzo(a)anthracene	100.0%	18	0	0.0209	0.0226	0.0386	0.0496	0.0584	0.0873	0.1097	0.1480	0.1949	0.1949	0.1949	0.0680	0.0469	0.0496	0.3027
Chrysene	94.4%	18	1	0.0130	0.0488	0.0631	0.0893	0.1039	0.1158	0.1353	0.2063	0.2194	0.2194	0.2194	0.0990	0.0522	0.0893	0.3598
7,12-Dimethylbenz(a)anthracene	94.4%	18	1	0.0116	0.0216	0.0261	0.0579	0.0598	0.0634	0.0642	0.0803	0.0917	0.0917	0.0917	0.0489	0.0227	0.0579	0.1625
Benzo(b)fluoranthene	94.4%	18	1	0.0095	0.0250	0.0294	0.0459	0.0488	0.0644	0.0648	0.0769	0.0825	0.0825	0.0825	0.0455	0.0196	0.0459	0.1435
Benzo(k)fluoranthene	94.4%	18	1	0.0095	0.0250	0.0294	0.0461	0.0488	0.0644	0.0648	0.0769	0.0825	0.0825	0.0825	0.0455	0.0196	0.0461	0.1435
Benzo(a)pyrene	83.3%	18	3	0.0114	0.0129	0.0187	0.0215	0.0223	0.0271	0.0273	0.0342	0.0422	0.0422	0.0422	0.0227	0.0077	0.0215	0.0612
3-Methylcholanthrene	0.0%	18	18	0.0037	0.0048	0.0060	0.0075	0.0078	0.0131	0.0137	0.0151	0.0157	0.0157	0.0157	0.0090	0.0040	0.0075	
Indeno(123-cd)pyrene	55.6%	18	8	0.0091	0.0103	0.0147	0.0174	0.0187	0.0206	0.0223	0.0271	0.0353	0.0353	0.0353	0.0182	0.0062	0.0174	0.0492
Dibenz(a,h)anthracene	22.2%	18	14	0.0033	0.0036	0.0051	0.0073	0.0077	0.0189	0.0202	0.0285	0.0585	0.0585	0.0585	0.0136	0.0137	0.0073	0.0819
Benzo(ghi)perylene	72.2%	18	5	0.0116	0.0123	0.0156	0.0253	0.0261	0.0341	0.0365	0.0377	0.0428	0.0428	0.0428	0.0253	0.0097	0.0253	0.0739
Dibenzo(a,l)pyrene	0.0%	18	18	0.0035	0.0036	0.0042	0.0053	0.0058	0.0062	0.0104	0.0111	0.0123	0.0123	0.0123	0.0063	0.0028	0.0053	
Dibenzo(a,i)pyrene	0.0%	18	18	0.0038	0.0044	0.0052	0.0062	0.0068	0.0092	0.0094	0.0098	0.0108	0.0108	0.0108	0.0068	0.0021	0.0062	
Dibenzo(a,h)pyrene	0.0%	18	18	0.0043	0.0046	0.0052	0.0065	0.0068	0.0083	0.0085	0.0086	0.0111	0.0111	0.0111	0.0066	0.0018	0.0065	



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PRECIPITATION DATA SUMMARY JUNE 2017

Prepared
August 30, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

Precipitation: InnoTech Alberta, Inc.
Vegreville, Alberta



FILE CONTENTS DESCRIPTION	Precipitation Measurement of ions, pH and conductivity
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)
ANALYTICAL LABORATORY	InnoTech Alberta Inc
USER NOTE 1	Data are not blank corrected
SAMPLING INSTRUMENT TYPE	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 June

Fort McKay-Bertha Ganter AMS 1	Start Date End Date Dry Week Precip	05-Jun-17 13-Jun-17			13-Jun-17 20-Jun-17			20-Jun-17 28-Jun-17			28-Jun-17 05-Jul-17		
		X			X			X			X		
		Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag	Results	MDL	Flag
Acidity	µeq/L	21	2	V0	22	2	V0	15	2	V0	23	2	V0
Ammonium	mg/L	< 0.009	0.009	V1	0.152	0.009	V0	0.136	0.009	V0	< 0.009	0.009	V1
Bicarbonate (calc)	µeq/L	15			1.14			8.27			1.54		
Calcium	mg/L	0.846	0.005	V0	0.648	0.005	V0	0.466	0.005	V0	0.48	0.005	V0
Chloride	mg/L	0.144	0.004	V0	0.163	0.004	V0	0.085	0.004	V0	0.226	0.004	V0
Conductivity (25°C)	µS/cm	9	1	V0	11	1	V0	6	1	V0	8	1	V0
Conductivity (calc)	µS/cm	6.99			9.47			5.79			6.5		
Conductivity Difference %		-19.7		V0	-11.5		V0	-6.61		V0	-16.9		V0
Magnesium	mg/L	0.144	0.009	V0	0.116	0.009	V0	0.085	0.009	V0	0.112	0.069	V0
Nitrate	mg/L	0.487	0.004	V0	0.84	0.004	V0	0.558	0.004	V0	0.601	0.004	V0
pH		6.47			5.35			6.21			5.48		
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	0.091	0.006	V0	0.102	0.006	V0	0.056	0.006	V0	0.089	0.006	V0
Sodium	mg/L	0.114	0.006	V0	0.09	0.006	V0	0.049	0.006	V0	0.137	0.006	V0
Sulfate	mg/L	1.11	0.004	V0	1.96	0.004	V0	1.04	0.004	V0	1.1	0.004	V0
Sum Anions	µeq/L	50.2			60.1			41.2			40.4		
Sum Cations	µeq/L	62.1			61.4			42			44.7		
Total Ions	µeq/L	112.3			121.5			83.2			85.1		
Ion Difference	%	10.6		V0	1.06		V0	0.878			5.06		
Ion Difference	µeq/L	11.9			1.3			0.8		V0	4.3		V0



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